Description

i   Diese Beschreibung kann Kapitel enthalten, die nicht dem Lieferumfang der Systembaugruppe entsprechen und somit nicht zutreffen.

Server Board Features

Table 1 Server Board Features

Feature	Description
Processor	Installed: One Pentium® II processor, packaged in a single edge contact (S.E.C.) cartridge and installed in the 242 pin Slot 1 processor connector, operating at 1.8 V to 3.5 V. The server board's voltage regulator is automatically programmed by the processor's VID pins to provide the required voltage.
Memory, dynamic random access (DRAM)	Three 72 bit sockets for 100 MHz, 3.3 V, PC/100 compliant or 66 MHz, 3.3 V PC/66 compliant SDRAM on 168 pin gold DIMMs. Either 72 bit (ECC) or 64 bit (non ECC). Use 100MHz memory with a 100MHz FSB processor; use 66MHz memory with a 66MHz FSB processor.
Video memory	Installed: 2 MB of video memory.
PCI bus	Four PCI expansion slots for add in boards (one slot shared with an ISA slot). 1x32 bit PCI bus. Embedded devices: video controller, Network Interface Controller (NIC), and SCSI controller.
ISA bus	Two ISA expansion slots for add in boards (one slot shared with a PCI slot). Embedded PC compatible support (parallel, two serial, mouse, keyboard, diskette, two IDE channels, and Plug and Play features).
Server Management	Thermal/voltage monitoring and error handling. Front panel controls and indicators (LEDs). System Setup Utility (SSU). Basic Input/Output System (BIOS), Power On Self Test (POST), and Setup stored in flash memory.
Graphics	Integrated onboard Cirrus Logic CL-GD5480 super video graphics array (SVGA) controller.
SCSI	Symbios SYM53C875 single channel controller providing an ultra wide SCSI interface.
Network	Integrated onboard NIC, an Intel® 82558 Fast Ethernet PCI Bus Controller for 10 or 100 Mbps TX Fast Ethernet networks. RJ-45 Ethernet connector and indicator LEDs at I/O back panel.
System I/O	PS/2 compatible keyboard and mouse ports, 6 pin DIN. Advanced parallel port, supporting Enhanced Parallel Port (EPP) level 1.7 and 1.9, ECP, compatible 25 pin. VGA video port,15 pin.

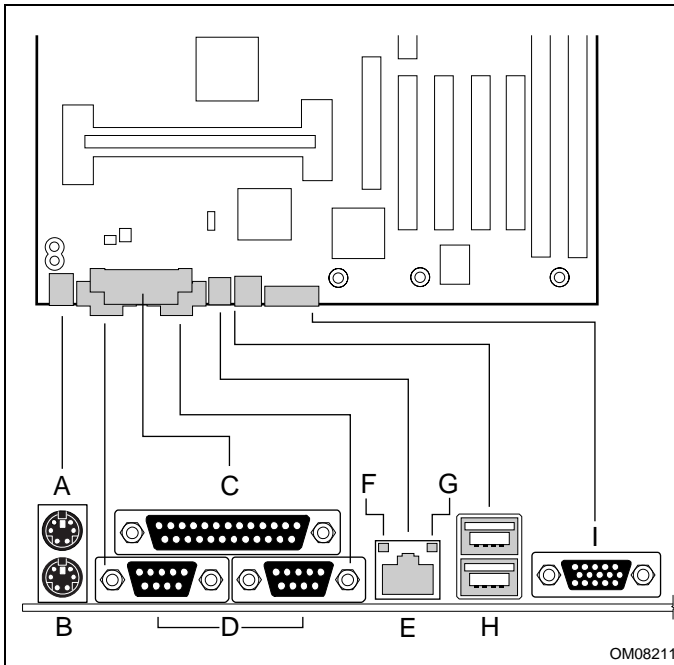| Feature	Description
	Two serial ports, 9 pin (serial port B is connected from the 10 pin header on the server board to the back panel via a provided ribbon cable). Network: RJ-45 Ethernet port. Two USB ports.
Form Factor	Extended ATX form factor, ATX 2.01 compliant I/O.

Back Panel Connectors

Figure 1. Back Panel Connectors

i	Connecting cable for peripherals must be adequately insulated to avoid interference.

A   = Mouse Connector   F   = Green NIC LED

B   = Keyboard Connector   G   = Orange NIC LED

C   = Parallel Port Connector   H   = USB Connectors

D   = Serial Port Connectors   I   = VGA Connector

E   = Network Connector

Table 2.NIC LEDs

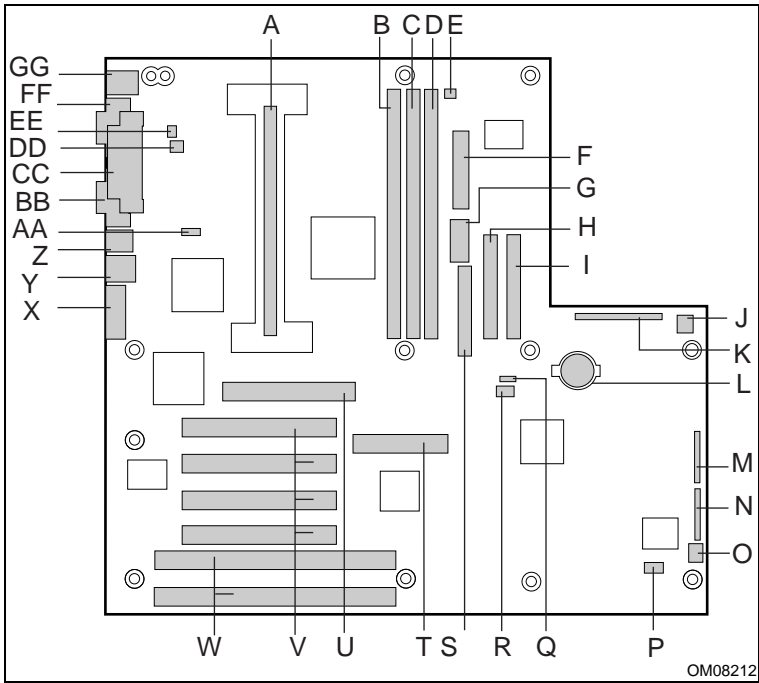| NIC LED Color	If it's on	If it's blinking	If it's off
Orange	100 Mbps network connection.	NA	10 Mbps network connection.
Green	Linked to network, no network traffic.	Linked to network, sending or receiving data.	Not linked to network.

Server Board Connector and Component Locations

Figure 2. Server Board Connector and Component Locations

A. Processor connector
B. DIMM slot 3
C. DIMM slot 2
D. DIMM slot 1
E. Processor heatsink fan connector
    (fan 3)
F. ATX power connector
G. ATX Auxiliary power
H. Secondary IDE connector
I. Primary IDE connector
J. System fan connector (fan 1)
K. AT front panel connector
L. Lithium backup battery
M. Configuration jumper block
N. Configuration jumper block
O. System fan connector (fan 2)
P. External IMB connector

Q. External Wake on LAN (WOL) header

R. Hard drive LED header
S. Diskette drive connector
T. Wide SCSI connector
U. AGP Connector
V. PCI slots for add in boards

W. ISA slots for add in boards
X. VGA monitor port
Y. USB connectors
Z. RJ-45 network connector
AA. WOL enable jumper
BB. Serial port 2 connector
CC. Parallel port connector
DD. System fan connector (fan 4)
EE. Chassis intrusion connector
FF. Serial port 1 connector
GG. Keyboard and Mouse PS/2 compatible
    connectors

Processor

The Pentium II processor is packaged in a Single Edge Contact (S.E.C.) cartridge. The cartridge includes the processor core with an integrated 32 KB primary (L1) cache; the secondary (L2) cache; a thermal plate; and a back cover.

The processor implements the MMX^{TM} technology and maintains full backward compatibility with the 8086, 80286, Intel386^{TM}, Intel486^{TM}, Pentium, Pentium Pro and Pentium II processors. The processor's numeric coprocessor significantly increases the speed of floating point operations and complies with ANSI/IEEE standard 754-1985.

The processor cartridge connects to the server board through a 242 pin edge connector. The cartridge is secured by a retention module attached to the server board.

The processor external interface operates at either 100 MHz or 66MHz.

The second level cache is located on the substrate of the S.E.C. cartridge. The cache includes burst pipelined synchronous static RAM (BSRAM). The L2 cache is offered in 512 KB configurations that operate at half the core clock rate, with ECC or without.

Memory

Either 72 bit (ECC) or 64 bit (non ECC) 100 MHz, 3.3 V, PC/100 compliant or 66 MHz, 3.3 V PC/66 compliant SDRAM on 168 pin gold DIMMs are supported by the server board. Memory is partitioned as three banks of SDRAM DIMMs, each providing 72 bits of noninterleaved memory (64 bit main memory plus ECC):

- Install from 64 MB to 768 MB of memory, using registered DIMMs.
- Install from 32 MB to 384 MB of memory, using unbuffered DIMMs.

Memory should be added in order from slot 1 to slot 3.

> **i** Do not mix registered and unbuffered memory. Mixing Non ECC memory and ECC memory causes all ECC features to be disabled.

System memory begins at address 0 and is continuous (flat addressing) up to the maximum amount of DRAM installed (exception: system memory is noncontiguous in the ranges defined as memory holes using configuration registers). The system supports both base (conventional) and extended memory.

- Base memory is located at addresses 00000h to 9FFFFh (the first 640 KB).
- Extended memory begins at address 0100000h (1 MB) and extends to FFFFFFFFh (4 GB), the limit of addressable memory. The top of physical memory is a maximum of 768 MB (to 3FFFFFFFh).

Some operating systems and application programs use base memory—for example, MS-DOS, OS/2, and UNIX. Other operating systems use both conventional and extended memory—for example, OS/2 and UNIX. MS-DOS does not use extended memory; however, some MS-DOS utility programs such as RAM disks, disk caches, print spoolers, and windowing environments use extended memory for better performance.

The controller automatically detects, sizes, and initializes the memory array, depending on the type, size, and speed of the installed DIMMs, and reports memory size and allocation to the system via configuration registers.

> **i**
>
> **DIMM sizes and compatibility:** use DIMMs that have been tested for compatibility with the server board. Contact your sales representative or dealer for a current list of approved memory modules. The table below lists some sample size combinations, however, any combination of sizes is supported

Table 3. Sample DIMM Component Combinations

Bank 1	Bank 2	Bank 3	Total memory
32			32 MB
32	32		64 MB
32	32	128	192 MB
32	128	128	288MB
128	128	128	384MB

Peripherals

Super I/O Chip

The National 87309 device supports two serial ports, one parallel port, diskette drive, PS/2 compatible keyboard and mouse. The server board provides a connector interface for each port.

Serial Ports

Each serial port can be set to one of four different COMx ports and can be enabled separately. When enabled, each port can be programmed to generate edge sensitive interrupts. When disabled, serial port interrupts are available to add in boards.

Parallel Port

The 87309 provides one IEEE 1284 compatible 25 pin bidirectional parallel port. BIOS programming of the 87309 registers enable the parallel port and determine the port address and interrupt. ECP mode is supported with 2 possible DMA channels. When disabled, the interrupt and DMA are available to add in boards.

Add in Board Slots

The server board has two full length ISA bus connectors. One of the connectors shares a chassis expansion slot with a PCI connector. ISA features:

- Bus speed up to 8.33 MHz
- 16 bit memory addressing
- Type A transfers at 5.33 Mbps
- Type B transfers at 8 Mbps
- 8 or 16 bit data transfers
- Plug and Play ready

The server board has four full length PCI connectors. One of the connectors shares a chassis expansion slot with an ISA connector. PCI features:

- 33 MHz Bus speed
- 32 bit memory addressing
- 5 V and 3.3 V signaling environments
- Burst transfers of up to 133 Mbps
- 8, 16, or 32 bit data transfers
- Plug and Play ready
- Parity enabled

The server board has on A.G.P connector. A.G.P. is a high-performance bus for graphics-intensive applications, such as 3D applications. A.G.P., while based on teh PCI Local Bus Specification, Rev. 2.1, is independent of the PCI bus and is intended for exclusive use with graphical display devices. A.G.P. overcomes certain limitations of the PCI bus related to handling a large amount of graphics data with the following features:

- Pipeline memory read and write operations that hide memory access latency
- Demultiplexing of address and data on the bus for near 100 percent bus efficiency
- AC timing for 133 MHz data transfer rates allowing real data throughput in excess of 500 MB/sec
- Support for +3.3V A.G.P. 66/133 Mhz devices
- Synchronous coupling to the host-bus frequency

Video

The onboard, integrated Cirrus Logic CL-GD5480 64 bit VGA chip contains an SVGA controller that is fully compatible with these video standards: CGA, EGA, Hercules Graphics, MDA, and VGA. The server board has 2 MB of 10 ns onboard video memory. The video controller supports pixel resolutions of up to 1600 x 1200 or up to 16.7 M colors.

The SVGA controller supports analog VGA monitors (single and multiple frequency, interlaced and noninterlaced) with a maximum vertical retrace noninterlaced frequency of 100 Hz.

You cannot increase the memory available to the onboard controller. Depending on the environment, the controller displays up to 16.7 M colors in some video resolutions. It also provides hardware accelerated bit block transfers (BITBLT) of data.

SCSI Controller

The server board includes a Symbios Logic SYM53C875 embedded single channel, PCI SCSI host adapter. The SYM53C875 contains a SCSI controller that uses a PCI bus master interface. The controller is capable of operations using either 8 or 16 bit SCSI providing 10 MB/s (Fast-10) or 20 MB/s (Fast-20) throughput, or 20 MB/s (Ultra) or 40 MB/s (Ultra-wide). As implemented on the server board, the controller attaches to a 68 pin 16 bit (wide) SCSI connector interface. As a PCI 2.1 bus master the SYM53C875 supports burst data transfers on PCI up to the maximum rate of 132 MB/sec using onchip buffers.

No logic, termination, or resistor loads are required to connect devices to the SCSI controller other than termination in the device at the end of the cable. The SCSI bus is terminated on the server board with active terminators that cannot be disabled. The onboard device must always be at one end of the bus.

IDE Controller

IDE is a 16 bit interface for intelligent disk drives with AT disk controller electronics onboard. The PCI/ISA/IDE Accelerator, also known as PIIX4, is a multifunction device on the server board that acts as a PCI based Fast IDE controller. The device controls:

- PIO and IDE DMA/bus master operations
- Mode 4 timings
- Transfer rates up to 22 MB/sec
- Buffering for PCI/IDE burst transfers
- Master/slave IDE mode
- Up to two devices per channel; two channels, IDE0 and IDE1

> **i** **18 inch maximum length of IDE cable on each channel:** you can connect an IDE signal cable, up to a maximum of 18 inches each, to each IDE connector on the server board. Each cable can support two devices, one at the end of the cable and one 6 inches from the end of the cable.

Network Controller

The server board includes a 10BASE-T/100BASE-TX network solution based on the Intel 82558 Fast Ethernet PCI Bus Controller. As a PCI bus master, the controller can burst data at up to 132 MB/sec. The controller contains two receive and transmit FIFO buffers that prevent data overruns or underruns while waiting for access to the PCI bus. The controller has the following:

- 32 bit PCI bus master interface (direct drive of bus), compatible with *PCI Bus Specification, Revision 2.1*
- Chained memory structure with improved dynamic transmit chaining for enhanced performance
- Programmable transmit threshold for improved bus utilization
- Early receive interrupt for concurrent processing of receive data
- Onchip counters for network management
- Autodetect and autoswitching for 10 or 100 Mbps network speeds

- Support for both 10 Mbps and 100 Mbps networks, capable of full or half duplex, with back to back transmit at 100 Mbps

The network status LEDs on the server board indicate:

- Transmit/receive activity on the LAN
- Valid link to the LAN
- 10/100 Mbps transfer mode

Keyboard and Mouse

The keyboard/mouse controller is PS/2 compatible. The system may be locked automatically if there is no keyboard or mouse activity for a predefined length of time, if specified through the System Setup Utility (SSU) or BIOS Setup. Once the inactivity (lockout) timer has expired, the keyboard and mouse do not respond until the previously stored password is entered. This feature is automatically enable when the User password is set.

Server Management

Server Management features are implemented using one microcontroller called the Baseboard Management Controller.

Server Board Management Controller (BMC)

All server management functionality is concentrated in the BMC. The BMC and associated circuitry are powered from + 5V_Standby, which remains active when system power is switched off and the system is still plugged into AC power.

One major function of the BMC is to autonomously monitor system management events, and log their occurrence in the nonvolatile System Event Log (SEL). These include events such as overtemperature and overvoltage conditions, fan failure, or chassis intrusion. To enable accurate monitoring, the BMC maintains the nonvolatile Sensor Data Record (SDR), from which sensor information can be retrieved. The BMC provides an ISA host interface to SDR sensor information, so software running on the server can poll and retrieve the server's current status.

SEL contents can be retrieved after system failure, for analysis by field service personnel using system management tools, such as EMP software or Intel® LANDesk® Server Manager. Since the BMC is powered by 5V_Standby, SEL (and SDR) information is also available via the IMB. The BMC performs the following functions:

- Baseboard temperature and voltage monitoring
- Processor presence monitoring and FRB control
- Baseboard fan failure detection and indicator control
- SEL interface management
- SDR Repository interface management
- SDR/SEL timestamp clock
- Baseboard Field Replaceable Unit (FRU) information interface
- System management watchdog timer
- Front panel NMI handling

- Event receiver
- ISA host and IMB interface management
- Secure mode control, video blank and floppy write protect monitoring and control, front panel lock/unlock initiation
- Sensor event initialization agent

Security

To help prevent unauthorized entry or use of the system, the system includes server management software that monitors the system intrusion switch.

Security with Mechanical Locks and Monitoring

If available on your chassis, you can activate the chassis intrusion alarm switch. When the chassis cover is removed, the switch transmits an alarm signal to the server board, where server management software processes the signal. The system can be programmed to respond to an intrusion by powering down or by locking the keyboard, for example.

Software Locks

The BIOS Setup and the System Setup Utility (SSU) provide a number of security features to prevent unauthorized or accidental access to the system. Once the security measures are enabled, you can access the system only after you enter the correct password(s). For example:

- Enable the keyboard lockout timer so that the server requires a password to reactivate the keyboard and mouse after a specified time out period - 1 to 120 minutes.
- Set and enable an administrator password.
- Set and enable a user password.
- Set secure mode to prevent keyboard or mouse input and to prevent use of the front panel reset and power switches.
- Activate a hotkey combination to enter secure mode quickly.
- Disable writing to the diskette drive when secure mode is set.

Using Passwords

You can set either the user password, the administrator password, or both passwords. If only the user password is set, you:

- must enter the user password to enter BIOS Setup or the SSU.
- must enter the user password to boot the server if Password on Boot is enabled in either the BIOS Setup or SSU.
- must enter the user password to exit secure mode.

If only the administrator password is set, you:

- must enter the administrator password to enter BIOS Setup or the SSU.
- must enter the administrator password to boot the server if Password on Boot is enabled in either the BIOS Setup or SSU.
- must enter the administrator password to exit secure mode.

If both passwords are set, you:

- may enter either password to enter BIOS Setup or the SSU. However, if you enter the user password, you will not be able to change many of the options.
- may enter either password to boot the server if Password on Boot is enabled in either the BIOS Setup or SSU.
- may enter either password to exit secure mode.

Secure Mode

Configure and enable the secure boot mode by using the SSU or BIOS Setup. When secure mode is in effect:

- You can boot the system and the operating system will run, but you must enter the user password to use the keyboard or mouse.
- You cannot turn off system power or reset the system from the front panel switches.

Secure mode has no effect on functions enabled via the Server Manager Module or power control via the real time clock.

Taking the system out of secure mode does not change the state of system power. That is, if you press and release the power switch while secure mode is in effect, the system will not be powered off when secure mode is later removed. However, if the front panel power switch remains depressed when secure mode is removed, the system will be powered off.

Summary of Software Security Features

The table below lists the software security features and describes what protection each offers. In general, to enable or set the features listed here, you must run the SSU or BIOS Setup and go to the Security Subsystem Group, menu. The table also refers to other SSU menus and to the Setup utility.

Table 4. Software Security Features

Feature	Description
Secure mode	The system can boot and run the operating system, but mouse and keyboard input is not accepted until the user password is entered.
	At boot time, if a CD is detected in the CD-ROM drive or a diskette in drive A, the system prompts for a password. When the password is entered, the system boots from CD or diskette and disables the secure mode.
	If there is no CD in the CD-ROM drive or diskette in drive A, the system boots from a hard drive and automatically goes into secure mode. All enabled secure mode features go into effect at boot time.
	To leave secure mode: Enter either password.
Disable writing to diskette	In secure mode, the system will not boot from or write to a diskette unless a password is entered. To set this feature, use the SSU Security Subsystem Group.
	To write protect access to diskette whether the system is in secure mode or not, use the Setup main menu, Floppy Options, and specify Floppy Access as read only.

Feature	Description
Disable the power and reset buttons	Enable the feature through the SSU. Then the power and reset buttons are disabled when the system is in secure mode.
Set a time out period so that keyboard and mouse input are not accepted Also, screen can be blanked, and writes to diskette can be inhibited	Specify and enable an inactivity time out period of from 1 to 120 minutes. If no keyboard or mouse action occurs for the specified period, attempted keyboard and mouse input will not be accepted. The monitor display will go blank, and the diskette drive will be write protected (if these security features are enabled through Setup or the SSU). To resume activity: Enter the correct password(s).
Control access to using the SSU: set administrator password	To control access to setting or changing the system configuration, set an administrator password and enable it through Setup or the SSU. If both the administrator and user passwords are enabled, either can be used to boot the system or enable the keyboard and/or mouse, but only the administrator password will allow Setup and the SSU to be changed. To disable a password, change it to a blank entry or press CTRL-D in the Change Password menu of the Administrator Password Option menu found in the Security Subsystem Group. To clear the password if you cannot access Setup or the SSU, change the Clear Password jumper (see Chapter "Technical Reference").
Control access to the system other than SSU: set user password	To control access to using the system, set a user password and enable it through Setup or the SSU. To disable a password, change it to a blank entry or press CTRL-D in the Change Password menu of the User Password Option menu found in the Security Subsystem Group. To clear the password if you cannot access Setup or the SSU, change the Clear Password jumper (see Chapter "Technical Reference").
Boot without keyboard	The system can boot with or without a keyboard. During POST, before the system boots, the BIOS automatically detects and tests the keyboard if it is present and displays a message. There is no entry in the SSU to enable or disable a keyboard.
Specify the boot sequence	The sequence that you specify on the menu in the SSU Multi-Boot Group will determine the boot order. If secure mode is enabled (a user password is set), then you will be prompted for a password before the system fully boots. If secure mode is enabled and the "Secure Boot Mode" option is also enabled, the system will fully boot but will require a password before accepting any keyboard or mouse input.

Upgrading

Tools and Supplies Needed

- Phillips (cross head) screwdriver (#1 bit and #2 bit)
- Jumper removal tool or needle nosed pliers
- Pen or pencil
- Antistatic wrist strap and conductive foam pad (recommended)

Warnings and Cautions

These warnings and cautions apply throughout this chapter. Only a technically qualified person should configure the server board.

System power on/off: The power button DOES NOT turn off the system AC power. To remove power from system, you must unplug the AC power cord from the wall outlet.

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

Electrostatic discharge (ESD) & ESD protection: ESD can damage disk drives, boards, and other parts. We recommend that you perform all procedures in this chapter only at an ESD workstation. If one is not available, provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground—any unpainted metal surface—on your system when handling parts.

ESD and handling boards: always handle boards carefully. They can be extremely sensitive to ESD. Hold boards only by their edges. After removing a board from its protective wrapper or from the system, place it component side up on a grounded, static free surface. Use a conductive foam pad if available but not the board wrapper. Do not slide board over any surface.

Installing or removing jumpers: a jumper is a small plastic encased conductor that slips over two jumper pins. Some jumpers have a small tab on top that you can grip with your fingertips or with a pair of fine needle nosed pliers. If your jumpers do not have such a tab, take care when using needle nosed pliers to remove or install a jumper; grip the narrow sides of the jumper with the pliers, never the wide sides. Gripping the wide sides can damage the contacts inside the jumper, causing intermittent problems with the function controlled by that jumper. Take care to grip with, but not squeeze, the pliers or other tool you use to remove a jumper, or you may bend or break the stake pins on the board.

Server Board

Removing the Server Board

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

If you place the server board on a conductive surface, the battery leads may short out. If they do, this will result in a loss of CMOS data and will drain the battery.

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Open the system and remove peripherals and components blocking access to the server board. See your chassis manual for more information.
3. Label and disconnect all internal cables connected to add in boards.
4. Remove all add in boards.
5. Label and disconnect all internal cables connected to the server board.
6. Remove the server board retaining screws and set them aside.
7. Remove the server board, and place it component side up on a nonconductive, static free surface or in an antistatic bag.
8. If present, remove and save the EMI gasket that covers the I/O connectors on the board.
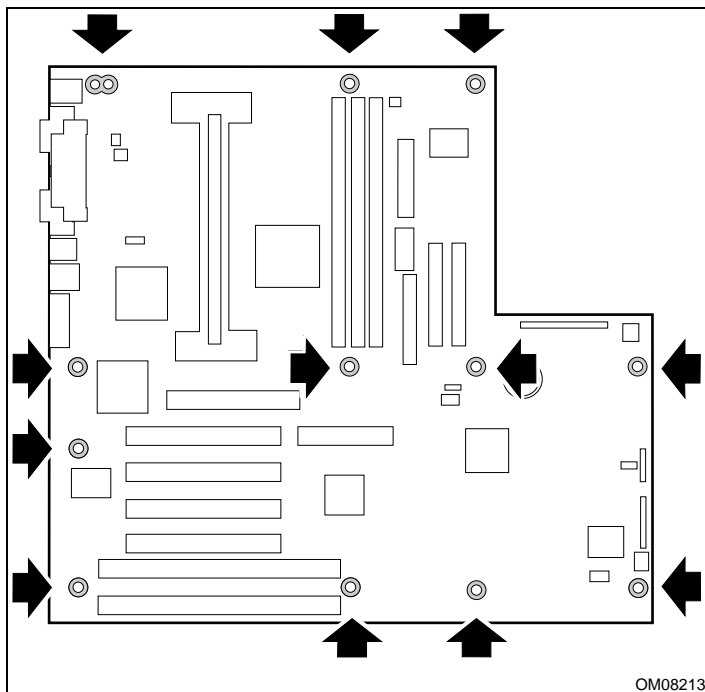
Figure 3. Server Board Screw Hole Locations

Installing the Server Board

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. If available, place the EMI gasket over the I/O connectors on the server board.
3. Insert screws through the mounting holes and into the threaded standoffs. Make sure the board is properly seated, and then tighten all the screws firmly.
4. Connect all internal cables to the server board.
5. Reinstall add in boards.
6. Connect all internal cables to add in boards. Make sure you connect the power cables to the correct power connectors.
7. Connect all peripheral device cables to the I/O panel on the rear of the system.
8. Run the SSU to configure the system.

Memory

Installing DIMMs

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

Mixing dissimilar metals may cause later memory failures resulting in data corruption. Install DIMMs with gold plated edge connectors only in gold plated sockets.

See Chapter "Description" for memory size and requirements:

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Open your system.
3. Holding the DIMM only by its edges, remove it from its antistatic package.
4. Orient the DIMM so that the two notches in the bottom edge of the DIMM align with the keyed socket. Install in slot 1 first.
5. Insert the bottom edge of the DIMM into the socket, and press down firmly on the DIMM until it seats correctly.
6. Gently push the plastic ejector levers on the socket ends to the upright position.
7. Repeat the steps to install each DIMM.
8. Close the system.
9. Connect all external cables and the power cord to the system.
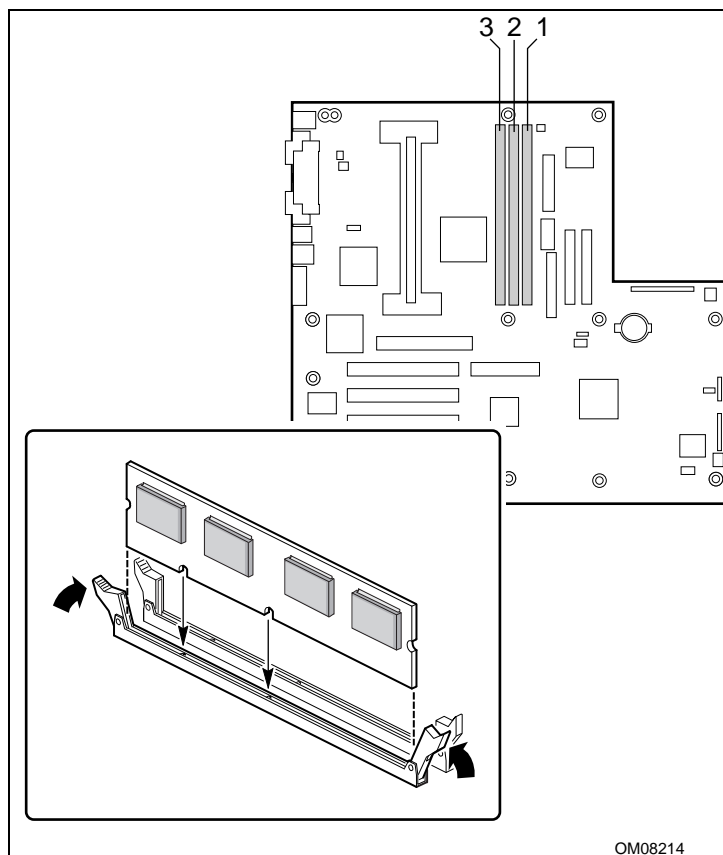10. Turn on the monitor and then the system.

Figure 4. Installing DIMMs

Removing DIMMs

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

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Open the system.
3. Gently push the plastic ejector levers out and down to eject a DIMM from its socket.
4. Hold the DIMM only by its edges, being careful not to touch its components or gold edge connectors. Carefully lift it away from the socket, and store it in an antistatic package.
5. Repeat to remove other DIMMs as necessary.
6. Close the system.
7. Connect all external cables and the power cord to the system.
8. Turn on the monitor and then the system.

Processor

⚠ **If the system has been running, any installed processor and heat sink will be hot. To avoid the possibility of a burn, be careful when removing or installing server board components that are located near the processor.**

⚠ **Processor must be appropriate:** You may damage the system if you install a processor that is inappropriate for your system. Make sure your system can handle a newer, faster processor (thermal and power considerations). For exact information about processor interchangeability, contact your customer service representative.

Heat sink must be appropriate: Depending on your configuration, the existing processor may have a passive heat sink. If you REPLACE the processor with a faster one, it may need a fan heat sink (powered fan instead of a passive heat sink).

ESD and handling processors: Reduce the risk of electrostatic discharge (ESD) damage to the processor by doing the following: (1) Touch the metal chassis before touching the processor or server board. Keep part of your body in contact with the metal chassis to dissipate the static charge while handling the processor. (2) Avoid moving around unnecessarily.

Removing the Processor

1. Observe the safety and ESD precautions at the beginning of this chapter and the additional cautions given here. If the processor has a fan heat sink, disconnect the power wire from the connector on the server board.
2. As you work, place boards and processors on a grounded, static free surface or conductive foam pad.
3. Press the processor latches toward the center of the S.E.C. cartridge to free them from the retention module (A).
4. Lift the S.E.C. cartridge upward, out of the retention module.
5. Put the processor in a piece of conductive foam and store in an antistatic package.
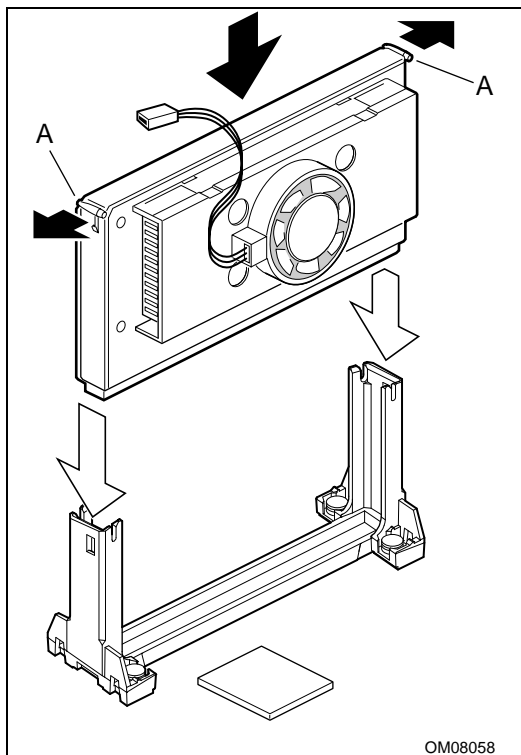
Figure 5. Installing the Processor

A.   = Processor latches

Installing a Processor

1. Observe the safety and ESD precautions at the beginning of this chapter and the additional cautions given here.

2. Remove the new processor from its antistatic package and place it on a grounded, static free surface or conductive foam pad.

3. Orient the processor so that the heat sink faces the center of the server board. Slide the processor into the retention module. Ensure that the alignment notch in the S.E.C. cartridge fits over the plug in Slot 1. Push down firmly, with even pressure on both sides of the top, until the S.E.C. cartridge is seated.

4. To lock in the processor, push the latches outward until they click into place in the retention module (A in figure, below). The latches must be secured for proper electrical connection of the processor.

5. Attach the small end of the power cable to the fan connector on the S.E.C. cartridge, then attach the large end (B) to the three pin connector on the server board (C).

6. After you have installed the processor, you must configure its speed.

Replacing the Backup Battery

The lithium battery on the server board powers the real time clock (RTC) for up to 10 years in the absence of power. When the battery starts to weaken, it loses voltage, and the system settings stored in CMOS RAM in the RTC (for example, the date and time) may be wrong. Contact your customer service representative or dealer for a list of approved devices.

The following warning and translations are required by specific certifying agencies to be printed immediately adjacent to the procedure for removing the real time clock.

WARNING!

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

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.
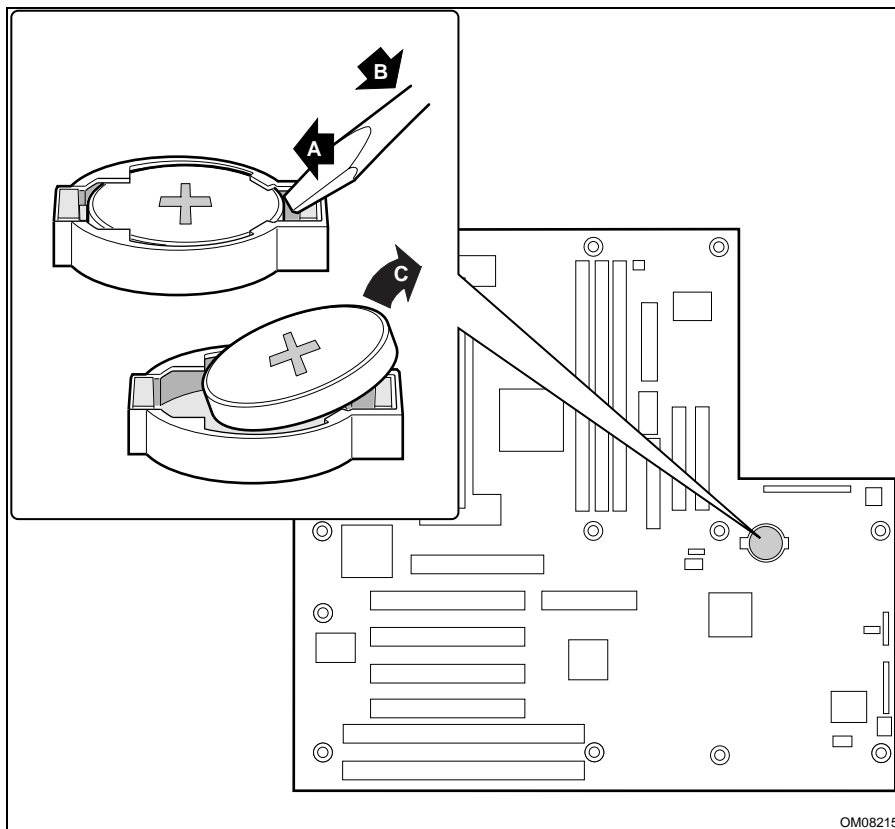
Figure 6. Replacing the Lithium Battery

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Open the chassis.
3. Insert the tip of a small flat bladed screw driver, or equivalent, under the plastic tab on the plastic retainer (A in figure).
4. Gently push down on the screwdriver to lift the battery (B).
5. Remove the battery from its socket (C).
6. Dispose of the battery according to local ordinance.
7. Remove the new lithium battery from its package, and, being careful to observe the correct polarity, insert it in the battery socket.
8. Reinstall the plastic retainer on the lithium battery socket.
9. close the chassis.
10. Run the SSU or BIOS Setup to restore the configuration settings to the RTC.

Configuration Software and Utilities

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

Table 5. Configuration Utilities

Utility	Description and brief procedure	Page
BIOS Setup	If the system does not have a diskette drive, or the drive is disabled or misconfigured, use Setup to enable it. Or, you can move the CMOS jumper on the server board from the default setting (Protect CMOS memory) to the Clear setting; this will allow most system configurations to boot.	27
Server Setup Utility (SSU)	Use for extended system configuration of onboard resources and add in boards, and for viewing the system event log, setting boot device priority, or setting system security options. The SSU may be run from the ServerStart CD , from a DOS-bootable diskette, or from a DOS hard drive.	42
EMP Console	Use to access and monitor the server remotely	51
FRUSDR Load Utility	Use to update the Field Replacement Unit (FRU), Sensor Data Record (SDR), and Desktop Management Interface (DMI) flash components.	65
BIOS Update Utility	Use to update the BIOS or recover from a corrupted BIOS update.	72
Firmware Update Utility	Use to update BMC flash ROM	75
Using the Symbios SCSI Utility	Use to configure or view the settings of the SCSI host adapters and onboard SCSI devices in the system.	76

Hot Keys

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

Table 6. Hot Keys

To do this:	Press these keys
Clear memory and reload the operating system—this is a system reset.	<Ctrl+Alt+Del>
Secure your system immediately.	<Ctrl+Alt>+hotkey (Set your hot key combination with the SSU or Setup.)

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 system. After a few seconds POST begins to run.
2. After the memory test, these screen prompts and messages appear:

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

Keyboard.....Detected

Mouse........Detected
```
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:

```
Insert bootable media in the appropriate drive
```
    If you do not press <F2> and DO have an operating system loaded, the boot process continues, and this message appears:

```
Press <Ctrl><C> to enter SCSI Utility
```
4. Press <Ctrl+C> if there are SCSI devices installed. When the utility opens, follow the displayed instructions to configure the onboard SCSI host adapter settings and to run the SCSI utilities. Also see "Using the Symbios SCSI Utility" on page 76. If you do not enter the SCSI utility, the boot process continues.
5. Press <Esc> during POST to open a boot menu when POST finishes. From this menu you can choose the boot device or enter BIOS Setup.

After POST completes, the system beeps once.

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

This section describes the BIOS Setup options. Use Setup to change the system configuration defaults. You can run Setup with or without an operating system being present. Setup stores most of the configuration values in battery backed CMOS; the rest of the values are stored in flash memory. The values take effect when you boot the system. POST uses these values to configure the hardware; if the values and the actual hardware do not agree, POST generates an error message. You must then run Setup to specify the correct configuration.

Run Setup: you may run Setup to modify any standard PC AT server board feature such as:

- Select diskette drive
- Select parallel port
- Select serial port
- Set time/date (to be stored in RTC)
- Configure IDE hard drive
- Specify boot device sequence
- Enable SCSI BIOS
- Specify processor speed
- Security options
- View firmware revision information and DMI information

Run SSU, not Setup: you must run the SSU instead of Setup to do the following:

- Add or remove any ISA board that is not Plug and Play compatible
- Enter or change information about a board
- Alter system resources (such as interrupts, memory addresses, I/O assignments) to user selected choices instead of choices selected by the BIOS resource manager

Record Your Setup Settings

If the default values ever need to be restored (after a CMOS clear, for example), you must run Setup again. Referring to the worksheets could make your task easier.

Clearing CMOS Memory

If the diskette drive is misconfigured so that you cannot access it to run a utility from a diskette, you may need to clear CMOS memory. This can be done in two ways:

- Open the system, change a jumper setting, power the system, let it run through the POST, power the system off, and change the jumper back. For a step by step procedure, see Chapter "Technical Reference", under the heading, "CMOS Jumper."
- CMOS configuration RAM may also be reset to defaults using the front panel buttons:
    1. Turn the system off, but leave the AC power connected.
    2. Press and hold the reset button for four seconds.
    3. While still holding the reset button, press the power button.
    4. Release both the power button and the reset button simultaneously.

Starting Setup

You can enter and start Setup under two conditions:

● When you turn on the system, after POST completes the memory test

● When you reboot the system by pressing <Ctrl+Alt+Del> while at the DOS operating system prompt

In the conditions listed above, after rebooting, you will see this prompt:

```
Press <F2> to enter SETUP
```
In a third condition, when CMOS/NVRAM has been corrupted, you will see other prompts but not the <F2> prompt:

```
Warning:  cmos checksum invalid
```

```
Warning:  cmos time and date not set
```
In this condition, the BIOS will load default values for CMOS and attempt to boot.

Setup Menus

Setup has six major menus and several submenus:

1. Main Menu
   − Primary IDE Master and Slave
   − Secondary Master and Slave
   − Keyboard Features
2. Advanced Menu
   − PCI Configuration
     - PCI Device, Embedded SCSI
     - PCI Device, Slot 1 - Slot 4
   − Integrated Peripheral Configuration
   − Advanced Chipset Control
3. Security Menu
4. Server Menu
   − System Management
     - Server Management Information
   − Console Redirection
5. Boot Menu
   − Boot Device Priority
   − Hard Drive
   − Removable Devices
6. Exit Menu

To:	Press
Get general help	<F1> or <Atl+H>
Move between menus˘	← →
Go to the previous item	↑
Go to the next Item	↓
Change the value of an item	+ or -
Select an item or display a submenu	<Enter>
Leave a submenu or exit Setup	<Esc>
Reset to Setup defaults	<F9>
Save and exit Setup	<F10>

When you see this:	What it means
On screen, an option is shown but you cannot select it or mo˘ve to that field.	You cannot change or configure the option in that menu screen. Either the option is autoconfigured or autodetected, or you must use a different Setup screen, or you must use the SSU.
On screen, the phrase Press Enter appears next to the option.	Press <Enter> to display a submenu that is either a separate full screen menu or a pop up menu with one or more choices.

The rest of this section lists the features that display onscreen after you press <F2> to enter Setup. Not all of the option choices are described, because (1) a few are not user selectable but are displayed for your information, and (2) many of the choices are relatively self explanatory.

Main Menu

You can make the following selections on the Main Menu itself.

Feature	Choices	Description
System Time	HH:MM:SS	Sets the system time.
System Date	MM/DD/YYYY	Sets the system date.
Legacy Diskette A:	Disabled 360KB 1.2 MB 720KB **1.44/1.25 MB** 2.88 MB	Selects the diskette type.
Legacy Diskette B:	**Disabled** 360KB 1.2 MB 720KB 1.44/1.25 MB 2.88 MB	
Primary IDE Master		Enters submenu.
Primary IDE Slave		Enters submenu.
Secondary IDE Master		Enters submenu.
Secondary IDE Slave		Enters submenu.
Keyboard Features		Enters submenu.
Memory Cache	**Enabled** Disabled	Enables processor cache.
CPU Speed Setting (for 100 MHz FSB processors. The BIOS will detect the FSB speed and display the appropriate values.)	300 MHz 350 MHz 400 MHz 450 MHz 500 MHz	Sets the speed for the installed processor. **CAUTION** Setting this higher than the proper speed for the installed processor may cause damage to the processor
CPU Speed Setting (for 66 MHz FSB processors. The BIOS will detect the FSB speed and display the appropriate values.) **NOTE** All speeds may not be available for your processor	200 MHz 233 MHz 266 MHz 300 MHz 333 MHz 366 MHz 400 MHz 433 MHz 466 MHz 500 MHz 533 MHz	Sets the speed for the installed processor. **CAUTION** Setting this higher than the proper speed for the installed processor may cause damage to the processor.
Language	**English (US)** Français Español Deutsch Italiano	Selects which language BIOS displays.

Primary/Secondary IDE Master and Slave Submenu

Feature	Choices	Description
Type	**Auto** None CD-ROM IDE Removable ATAPI Removable User	Auto forces the system to attempt autodetection of the drive type. None informs the system to ignore this drive. CD ROM allows the manual entry of some fields described below. IDE Removable allows the manual entry of some fields described below. ATAPI Removable allows the manual entry of some fields described below. User allows the manual entry of all fields described below.
Cylinders	0 to 65535	Number of Cylinders on Drive. This field is changeable only for Type User.
Heads	1 to 16	Number of read/write heads on drive. This field is available only for Type User.
Sectors	0 to 63	Number of sectors per track. This field is available only for Type User.
Maximum Capacity	N/A	Computed size of drive from cylinders, heads, and sectors entered. This field is informational only for Type User.
Multi-Sector Transfer	**Disabled** 2, 4, 8, or 16 sectors	Determines the number of sectors per block for multisector transfers. This field is informational only for Type Auto.
LBA Mode Control	**Disabled** Enabled	Enabling LBA causes logical block addressing to be used in place of cylinders, heads, and sectors. This field is informational only for Type Auto.
32 Bit I/O	**Disabled** Enabled	Enabling allows 32 bit IDE data transfers.
Transfer Mode	Standard Fast PIO 1 Fast PIO 2 Fast PIO 3 **Fast PIO 4** FPIO 3 / DMA 1 FPIO 4 / DMA 2	Selects the method for moving data to and from the drive. This field is informational only for Type Auto.
Ultra DMA Mode	**Disabled** Mode 0 Mode 1 Mode 2	Selects the Ultra DMA mode used for moving data to/from the drive.

Keyboard Submenu

Feature	Choices	Description
Num Lock	On **Off**	Selects the power on state for Num Lock.
Key Click	**Disabled** Enabled	Enables or disables the audible key click.
Keyboard auto-repeat rate	**30/sec** 26.7/sec 21.8/sec 18.5/sec 13.3/sec 10/sec 6/sec 2/sec	Sets the numbers of time per second a key will repeat while it is held down.
Keyboard auto-repeat delay	1/4 sec **1/2 sec** 3/4 sec 1 sec	Sets the delay before a key starts to repeat when it is held down.

Advanced Menu

You can make the following selections on the Advanced Menu itself. Use the submenus for the three other selections that appear on the Advanced Menu.

Feature	Choices	Description
Plug and Play OS	**No** Yes	Select Yes if you are booting a Plug and Play capable operating system.
Reset Configuration Data	**No** Yes	Select Yes if you want to clear the system configuration data during next boot. System automatically resets to No in next boot.
PCI Configuration		Enters submenu.
Integrated Peripherals Configuration		Enters submenu.
Advanced Chipset Control		Enters submenu.
Large Disk Access Mode	**LBA** CHS	
Delay on Option ROMs	**Disabled** Enabled	Forces a short delay at the end of each Option ROM scan.

PCI Configuration Submenu

The PCI Configuration Menu only contains selections that access other submenus.

PCI Device, Embedded SCSI Submenu

Feature	Choices	Description
Option ROM Scan	**Enabled** Disabled	Enables option ROM scan of the onboard Symbios SCSI chip.
Enable Master	**Enabled** Disabled	Enabled selects the device as a PCI bus master.
Latency Timer	Default 0020h **0040h** 0060h 0080h 00A0h 00C0h 00E0h	Minimum guaranteed time, in units of PCI bus clocks, that a device may be master on a PCI bus. **CAUTION** Do not change this setting unless you fully understand the priority of this device on the PCI bus.

PCI Device, Slot 1 - Slot 4 Submenus

Feature	Choices	Description
Enable Master	**Enabled** Disabled	Enables selected device as a PCI bus master.
Latency Timer	Default 020h **040h** 060h 080h 0A0h 0C0h 0E0h	Minimum guaranteed time, in units of PCI bus clocks, that a device may be master on a PCI bus. **CAUTION** Do not change this setting unless you fully understand the priority of this device on the PCI bus.

Integrated Peripheral Configuration Submenu

Feature	Choices	Description
COM 1	Disabled **Enabled** Auto OS Controlled	Auto forces BIOS to configure the port. Allows the OS to configure the port.
Base I/O Address	**3F8** 2F8 3E8 2E8	Selects the base I/O address for COM 1.
Interrupt	IRQ 3 **IRQ 4**	Selects the IRQ for COM 1.
COM 2	Disabled **Enabled** Auto OS Controlled	Auto forces BIOS to configure the port. Allows the OS to configure the port.
Base I/O Address	3F8 **2F8** 3E8 2E8	Selects the base I/O address for COM 2.
Interrupt	IRQ 3 **IRQ 4**	Selects the IRQ for COM 2.
Parallel Port	Disabled **Enabled** Auto OS Controlled	Auto forces BIOS to configure the port. Allows the OS to configure the port.
Mode	Output only Bi-directional EPP **ECP**	Selects parallel port mode.
Base I/O Address	**378** 278 3BC	Selects the base I/O address for LPT port. Not available in ECP or EPP modes
Interrupt	IRQ 5 **IRQ 7**	Selects the IRQ for LPT port.
DMA channel	**DMA 1** DMA 3	Selects the DMA for LPT port (only used for ECP mode).
Floppy disk controller	Disabled **Enabled**	Enables onboard diskette controller.

Advanced Chipset Control

Feature	Choices	Description
Graphics Aperture	4Mb 8Mb 16Mb 32Mb **64Mb** 128Mb 256Mb	Select the size of the Graphics Aperture for the AGP video device. Some operating systems require this value to be less than 256MB.
640-768K Memory Region	**Enabled** Disabled	Enabled forwards ISA Master and DMA cycles to the PCI bus. Disabled forwards these cycles to memory.
Delayed Transaction	**Enabled** Disabled	Enables the delayed transaction mechanism when the PIIX4 is the target of a PCI transaction.
Passive Release	**Enabled** Disabled	Enables the passive release mechanism on the PHOLD# signal when the PIIX4 is a PCI Master.

Security Menu

You can make the following selections on the Security Menu itself. Enabling the Supervisor Password field requires a password for entering Setup. The passwords are not case sensitive.

Feature	Choices	Description
User Password is	**Clear** Set	Status only; user cannot modify. Once set, this can be disabled by setting it to a null string, or by clearing password jumper on server board.
Administrator Password is	**Clear** Set	Status only; user cannot modify.
Set User Password	Press Enter	When the <Enter> key is pressed, you are prompted for a password; press ESC key to abort. Once set, this can be cleared by setting it to a null string, or by clearing password jumper on server board (see Server Board Jumpers in Chapter "Technical Reference").
Set Administrator Password	Press Enter	When the <Enter> key is pressed, you are prompted for a password; press ESC key to abort. Once set, this can be cleared by setting it to a null string, or by clearing password jumper on server board (see Server Board Jumpers in Chapter "Technical Reference").
Password on Boot	**Disabled** Enabled	Requires password entry before boot. System will remain in secure mode until password is entered. Password on Boot takes precedence over Secure Mode Boot.
Diskette Access	**Administrator** User	Controls access to diskette drives.

Feature	Choices	Description
Fixed Disk Boot Sector	**Normal** Write Protect	Write protects boot sector on hard disk to protect against viruses.
Secure Mode Timer	**Disabled** 1 min 2 min 5 min 10 min 20 min 1 hr 2 hr	Period of key/PS/2 mouse inactivity specified for secure mode to activate. A password is required for secure mode to function. Cannot be enabled unless at least one password is enabled.
Secure Mode Hot Key (Ctrl-Alt-)	[ ] [A, B, ..., Z]	Key assigned to start the Quicklock feature. Cannot be enabled unless at least one password is enabled.
Secure Mode Boot	**Disabled** Enabled	System will boot in secure mode. You must enter a password to unlock the system. Cannot be enabled unless at least one password is enabled.
Video Blanking	Disabled Enabled	Blank video when secure mode is activated. You must enter a password to unlock the system. Cannot be enabled unless at least one password is enabled.
Floppy Write Protect	**Disabled** Enabled	When secure mode is activated, the diskette drive is write protected. You must enter a password to disable. Cannot be enabled unless at least one password is enabled.

Server Menu

You can make the following selections on the Server Menu itself.

Feature	Choices	Description
System Management		Enters submenu.
Console Redirection		Enters submenu.
Processor Retest	Yes **No**	Yes tells BIOS to clear the historical processor status and retest the processor on the next boot. BIOS automatically resets to No in next boot.

System Management Submenu

Feature	Choices	Description
Server Management Info		Enters submenu.
System Event Logging	Disabled **Enabled**	When enabled, system events will be logged by BIOS and BMC in system event log.
Clear Event Log	**No** Yes	Yes clears the system event log.(SEL) in BMC.
EMP Password switch	**Disabled** Enabled	Enables the EMP password.
EMP Password	**[A..Z, 0..9]**	This field only shows up when the EMP password switch is enabled. Entering a password and pressing return will send the password immediately to the BMC. If a beep is heard the password was not accepted. If no password is entered, anyone has access to the server through the EMP Console.
EMP Escape sequence	**+++**	Sets the escape sequence for the modem being used for EMP. This will force the modem to command mode. This is only used if the EMP direct connect mode is set to modem.
EMP Hang-up Line String	**ATH**	Sets the Hang-up Line Sequence for the modem being used for EMP. Only used in EMP modem mode.
Modem Init String	**AT&F0S0=1S14=0&D**	Sets the initialization string for the modem being used for EMP. Only used in EMP modem mode. This field is only 16 characters long. High modem Init string field is a continuation of the Modem Init string to be able to enter in another 4 characters.
High Modem Init String	**0**	This is a continuation of the Modem Init string. When 16 characters are typed into the Modem Init string are entered this field will pop up to allow another 4 characters to be typed in.
EMP Access Mode	Pre-boot Only	Pre-boot Only - EMP is only enabled during power down through power up to the end of POST. Com 2 is returned to system use at the end of Post when operating system boots.
	Always Active	Always Active - EMP is always enabled. Com 2 cannot be used by operating system. It is now dedicated for EMP use.
	Disabled	Disabled - EMP is disabled. Com 2 is always available for system use by console redirection or operating system
EMP Restricted Mode Access	**Disabled** Enabled	If set to Enabled, Power on/off and Reset server controls via EMP are no longer available.

Feature	Choices	Description
EMP Direct Connect/Modem Mode	**Direct Connect** Modem Mode	Sets how EMP connects to the server. Direct Connect means a null modem serial cable directly connects COM 2 connector port to the EMP console machine. Modem mode indicates that a modem is connected on COM 2 for EMP use.

Server Management Information Submenu

Items on this menu can not be modified. If items require changes, consult your system administrator.

Feature	Choices	Description
Board Part Number	N/A	Information field only
Board Serial Number	N/A	Information field only
System Part Number	N/A	Information field only
System Serial Number	N/A	Information field only
Chassis Part Number	N/A	Information field only
Chassis Serial Number	N/A	Information field only
BMC Revision	N/A	Information field only

Console Redirection Submenu

Feature	Choices	Description
COM Port Address	**Disabled** 3F8 2F8 3E8	When enabled, console redirection uses the I/O port specified. 3F8 - typically is COM 1 2F8 - typically is COM 2 All keyboard/mouse and video will be directed to this port. This is designed to be used only under DOS in text mode.
IRQ #	3 or 4 **None**	When console redirection is enabled, this displays the IRQ assigned per the address chosen in the COM Port Address field. COM port address is disabled None is automatically selected
Baud Rate	9600 **19.2k** 38.4k 115.2k	When console redirection is enabled, use the baud rate specified.

Feature	Choices	Description
Flow Control	No Flow Control CTS/RTS XON/XOFF **CTS/RTS + CD**	Disables flow control. CTS/RTS is hardware flow control. XON/XOFF is software flow control. CTS/RTS +CD is hardware plus carrier detect for modem use. When carrier detect is lost modem will drop phone connection.

Boot Menu

You can make the following selections on the Boot Menu itself.

Feature	Choices	Description
Floppy Check	**Disabled** Enabled	If Enabled, system verifies diskette type on boot. Disabled results in a faster boot.
Boot Device Priority		Enters submenu.
Hard Drive		Enters submenu.
Removable Devices		Enters submenu.

Boot Device Priority

Use the up or down arrow keys to select a device, then press the <+> or <-> keys to move the device higher or lower in the boot priority list.

Boot Priority	Device	Description
1.	Removable Devices	Attempts to boot from a removable media device.
2.	Hard Drive	Attempts to boot from a hard drive device.
3.	ATAPI CD-ROM Drive	Attempts to boot from an ATAPI CD-ROM drive.
4.	LANDesk Service Agent II	Loads LANDesk service Agent and attempts to boot off of a remote agent on the embedded network interface card (Intel 82558 Fast Ethernet PCI Bus Controller).

Hard Drive

For options on this menu, use the up or down arrow keys to select a device, then press the <+> or <-> keys to move the device higher or lower in the boot priority list.

Option	Description
1. Hard Drive #1 (or actual drive string)	IDE drives will have a suffix attached to the drive ID string
	PM - hard drive on Primary Master Channel PS - hard drive on Primary Slave Channel SM - hard drive on Secondary Master Channel SS - hard drive on Secondary Slave Channel
	SCSI CD-ROMs will be displayed here because the onboard Symbios SCSI bios treats CD-ROMs as hard drives.
	SCSI zip or removable drives will also appear here.
	Removable IDE zip drives will only show up if the removable media is formatted as a hard drive.
2. Other Bootable Device	Covers all the boot devices that are not reported to the system BIOS through the BIOS boot specification mechanism. This includes all PCI cards that are not bios boot compliant (legacy) as well as ISA cards that are not PnP compliant. ISA legacy cards will boot first before non bios boot compliant PCI cards (in scan order from lowest slot to highest).

Removable Devices

For options on this menu, use the up or down arrow keys to select a device, then press the <+> or <-> keys to move the device higher or lower in the boot priority list.

Option	Description
1. Legacy Floppy Drive	Refers to the onboard 3.5" floppy drive.
	Removable IDE media may also show up here if the removable media was formatted in floppy emulation.

Exit Menu

You can make the following selections on the Exit Menu. Select an option using the up or down arrow keys, then press <Enter> to execute the option. Pressing <Esc> does not exit this menu. You must select one of the items from the menu or menu bar to exit.

Choices	Description
Exit Saving Changes	Exits after writing all modified Setup item values to NVRAM.
Exit Discarding Changes	Exits leaving NVRAM unmodified.
Load Custom Defaults	Loads default values for all Setup items.
Save Custom Defaults	Saves present Setup values to custom defaults.
Load Default Values	Loads values of all Setup items from previously saved custom defaults.
Discard Changes	Reads previous values of all Setup items from NVRAM.
Save Changes	Writes all Setup item values to NVRAM.

Using the System Setup Utility

The System Setup Utility (SSU) is on the ServerStart CD or diskette shipped with the server. The SSU provides a graphical user interface (GUI) over an extensible framework for server configuration. For the NL440BX systems, the SSU framework supports the following functions and capabilities:

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

When to Run the System Setup Utility

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

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

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

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

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

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

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

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

What You Need to Do

The SSU may be run directly from the ServerStart CD or from a set of DOS diskettes.

If you choose to run the SSU from a set of DOS diskettes, you must copy the SSU from the ServerStart CD to a set of DOS diskettes and follow the instructions in the included README.TXT file to prepare the diskettes.

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

Running the SSU

- **Running the SSU Locally**

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

  The SSU runs from writable, nonwritable, removable, and nonremovable media. If the SSU is run from nonwritable media, user preference settings (such as screen colors) can not be saved.

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

- **Running the SSU Remotely**

  Running the SSU remotely requires a remote server with a Server Monitor Module 2 (SMM2) card and a local system with Remote Control software available.

  The SMM2 card provides video memory, keyboard, and mouse redirection support for the remote server. The Remote Control console of the local system displays and sends video memory and user input to the remote server through either a modem or an Ethernet link. Because the SSU runs exclusively on the remote server, any files required for the SSU to run must be available on the remote server (on removable or nonremovable media).

  If you connect the local system to the remote server through a network or modem you can see the console, control the mouse, and control the keyboard of the remote server.

Starting the SSU

SSU consists of a collection of task oriented modules plugged into a common framework called the Application Framework (AF). The Application Framework provides a launching point for individual tasks and a location for setting customization information. For full functionality the SSU requires the availability of the AF.INI, AF.HLP, plus any .ADN files and their associated .HLP and .INI files.

1. Turn on your video monitor and your system.

2. There are two ways to start the SSU.

    a) **After creating set of SSU diskettes from the CD:** Insert the first SSU diskette in drive A, and press the reset button or <Ctrl+Alt+Del> to reboot your server from the diskette.

    b) **Directly from the ServerStart CD :** Insert the ServerStart CD into your CD-ROM drive and press the reset button or <Ctrl-Alt-Del> to reboot. When prompted to do so, press <F2> to enter BIOS Setup. From the Boot Menu, select the Boot Device Priority option and then select CD-ROM as your primary boot device. Save those settings and exit BIOS Setup. The server will boot from the CD-ROM and display a menu of options. Follow the instructions in the menu to start the SSU.

3. When the SSU title appears on the screen, press <Enter> to continue.

4. The mouse driver loads if it is available; press <Enter> to continue.

5. This message appears:

    ```
    Please wait while the Application Framework loads....
    ```

6. When the main window of the SSU appears, you can customize the user interface before continuing.
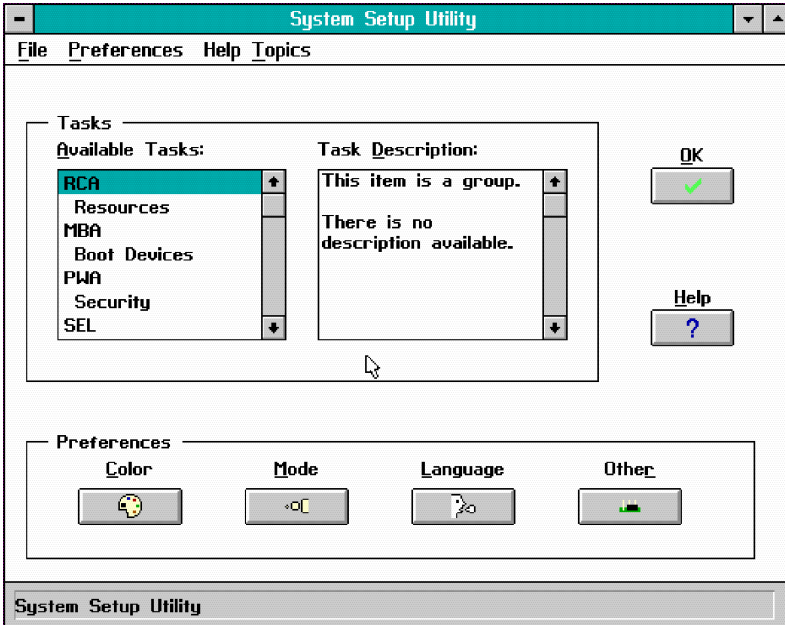
Figure 7. System Setup Utility Main Window

Customizing the SSU

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

- **Color—**this button lets you change the default colors associated with different items on the screen with predefined color combinations. The color changes are instantaneous.

- **Mode—**this button lets you set the desired expertise level.

    - novice

    - intermediate

    - expert

    The expertise level determines which tasks are visible in the Available Tasks section and what actions each task performs. For a new mode setting to take effect, you must exit the SSU and restart it.

- **Language—**this button lets you change the strings in the SSU to strings of the appropriate language. For a new language setting to take effect, you must exit the SSU and restart it.

- **Other—**this button lets you change other miscellaneous options in the SSU. The changes are instantaneous.

To change the interface default values:

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

or

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

or

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

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

Launching a Task

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

To launch a task:

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

    or

    Highlight the task name, and click on OK.

    or

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

Resource Configuration Add in (RCA) Window

The RCA provides three major functions:

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

You can use the RCA window to define an ISA card or add an ISA card by clicking on the appropriate button. Removing an ISA card requires that the card be highlighted in the Devices section of the screen before clicking on the button. You can only add as many ISA cards as you have ISA slots available.

1. From the SSU main window, launch the RCA by selecting the "Resources" task under the RCA heading in the task box.

2. When the RCA window appears, it displays messages similar to the following:

```
Baseboard:  Server board

PCI Card: Bus 00 dev 00 -- Host Processor Bridge

PCI Card: Bus 00 dev 0D -- Multifunction Controller

PCI Card: Bus 00 dev 0F -- Ethernet Controller

PCI Card: Bus 00 dev 12 -- SCSI Controller

PCI Card: Bus 00 dev 14 -- VGA Controller
```

3. To configure a device, select its name in the Devices section of the RCA window, and press the spacebar or <Enter>, or click on it.

4. It is possible to close the RCA window and return to the AF by clicking on the Close button. Any changes made will be kept in memory for use by the RCA when it is rerun.

5. Save all the changes made by clicking on the Save button. Saving writes your current configuration to nonvolatile storage where it will be available to the system after every reboot.

6. Closing the window by clicking on the system menu, the dash in the upper left corner, discards all changes.

Defining an ISA Card

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

1. To add or remove ISA card resources, click on the appropriate resource buttons, select the desired value, and click on Add or Remove.

2. After you complete the necessary information, click on Save.

3. To edit a card, click on Load to retrieve the card information. After making changes, click on Save.

4. To create a card, click on New.

5. To remove a current definition of a card, click on Delete.

Adding and Removing ISA Cards

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

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

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

Modifying Resources

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

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

    This displays the functions of the selected device along with possible choices and the resources associated with those choices.

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

System Resource Usage

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

Multiboot Options Add in

Under this window you can change the boot priority of a device.

1.   Select a device
2.   Press the + button to move it up in the list. Press the - button to move it down.

Security Add in

Under this window, you can set the User and Administrator passwords, and security options.

To Set the User Password

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

To Change or Clear the User Password

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

To Set the Administrator Password

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

To Change or Clear the Administrator Password

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

Security Options

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

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

SEL Viewer Add in

Clicking on the SELU Add in task brings up the Server Event Log (SEL) viewer. You can load and view the current SEL data stored in the BMC, save the currently loaded SEL data to a file, view previously saved SEL data, or clear the SEL. The SEL Viewer has the following menus:

File

The File menu has the following options:

- **Load SEL…** View data from a previously saved SEL file.
- **Save SEL…** Save the currently loaded SEL data to a file.
- **Clear SEL** Clears the SEL data from the BMC.
- **Exit** Quits the SEL Viewer.

View

The View menu has the following options:

- **SEL Info** Displays information about the SEL. These fields are display only.
- **All Events** Displays the current SEL data from the BMC.
- **By Sensor** Brings up a pop up menu that allows you to view only the data from a certain sensor type.
- **By Event** Brings up a pop up menu that allows you to view only the data from a certain event type.

Settings

The Settings menu has the following options:

- **Display HEX/Verbose** toggles between the Hex/interpreted mode of displaying the SEL records.
- **Output Text/Binary** determines whether SEL data will be saved to the file (as under File - Save) in binary format or verbose format.

Help

The Help menu has the following option:

- **About** Displays the SEL Viewer version information.

Exiting the SSU

Exiting the SSU causes all windows to close.

1.   Exit the SSU by opening the menu bar item Eile in the SSU Main window.
2.   Click on Exit.

     or

     Highlight Exit, and press <Enter>.

Emergency Management Port Console

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

The following server control operations available with the Console Manager are:

●   connecting to remote servers

●   powering the server on or off

●   resetting the server

●   switching the server console between EMP active and BIOS redirect modes

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

●   SEL viewer

●   SDR viewer

●   FRU viewer

The Console Manager also has a support plug in Phonebook, which you can use to create and maintain a list of servers and their phone numbers. You can launch the Connect dialog directly from the Phonebook dialog to connect to a selected server.

How the EMP Console Works

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

- *Command state* is the default COM 2 state. In this state, the EMP Console communicates with the server's firmware, allowing the client to remotely reset or power the server up or down. The client can also view the server's System Event Log (SEL), Field Replaceable Unit (FRU) information, or Sensor Data Record (SDR) table.

- In *redirect state*, the EMP Console serves as a PC ANSI terminal window for BIOS console redirection. Commands typed in this terminal window are transmitted through BIOS to the server's console, and text displayed on the server console are displayed on the EMP Console's terminal window. With the EMP in this state, you can remotely view boot messages, access BIOS setup, and run DOS text mode applications through the EMP Console's terminal window.
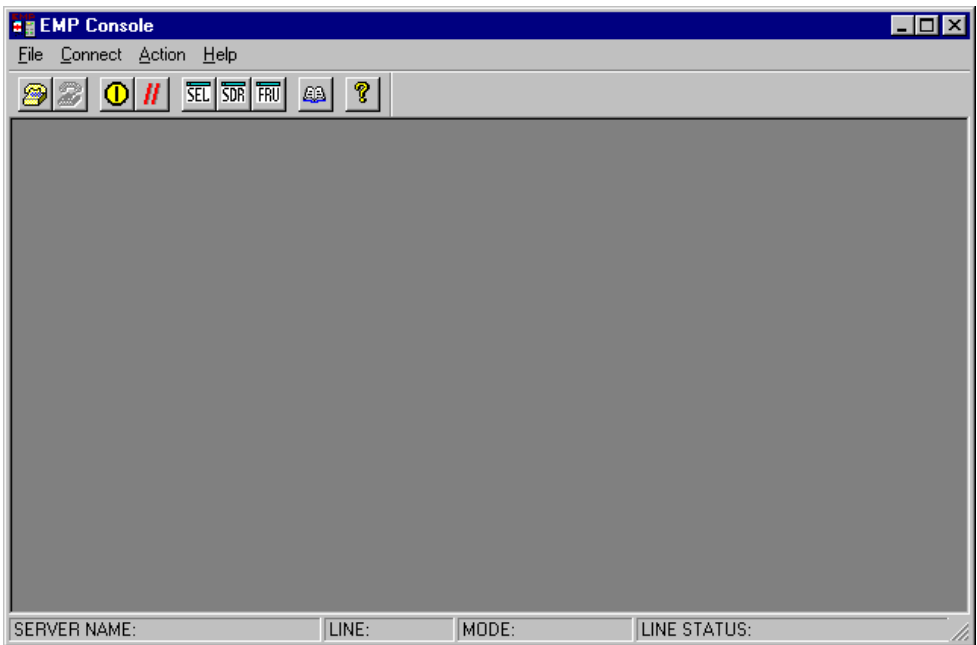
Figure 8. EMP Console in Command State
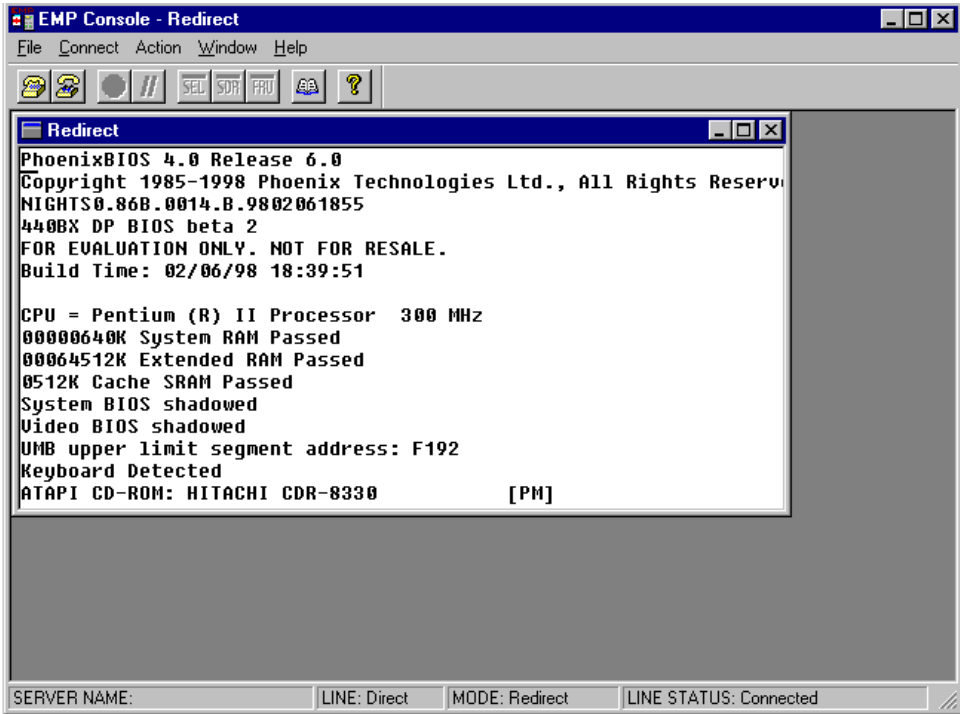
Figure 9. EMP Console in Redirect State

Figure 9 shows the EMP Console window in redirect state with the terminal window . The text that appears on the server monitor displays in the redirect window.

Availability of the various EMP Console features is determined by two things: the EMP access mode selected during configuration in the System Management Submenu of the BIOS Server Menu, and if the server's COM 2 port is configured for console redirect in BIOS. The three EMP access modes are disabled, preboot, and always active.

Table 7. EMP Console Access Modes (Server configured for console redirect)

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

* The operation mode can be modified by selections in the post reset and post power up dialogs. These are server control dialogs available with the EMP Console.

Table 8. EMP Console Access Modes (Server not configured for console redirect)

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

Requirements

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

Operating Systems:

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

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

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

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

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

For modem support, the server must use a Hayes compatible 14400 bps modem. The modem must be on the NT Hardware Compatibility List provided by Microsoft. The server modem must be set in autoanswer mode for the EMP Console to be able to connect to it.

Setting Up the Server for the EMP

To use the EMP, you must configure the server's BIOS with specific settings. These settings take place in two submenus of the BIOS Server menu, the System Management Submenu and the Console Redirect Submenu. The earlier BIOS settings section shows all available options. This section focuses on those settings that must be configured to use the EMP.

System Management Submenu

All EMP related settings occur from the System Management Submenu of the Server main menu. Change Only the items below; all other default settings should remain the same.

EMP Password: Anytime you attempt to initiate a connection, a prompt for the user password appears. If you never set up the EMP password, anyone can access the EMP by clicking OK through the password prompt.

In the EMP Password area of the System Management Submenu, type in a password of up to 8 alphanumeric characters. If a beep is heard, the password was not accepted and a different password must be entered.

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

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

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

Console Redirection Submenu

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

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

Baud Rate: Select 19.2k.

Flow Control: Choose CTS/RTS + CD.

Main EMP Console Window

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

Toolbar

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

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

Disconnects from the server currently connected to.

Generates the Power On/Off dialog.

Generates the Reset dialog.

Launches the SEL viewer.

Launches the SDR viewer.

Launches the FRU viewer.

Opens the phonebook.

Opens the online help.

Status Bar

The status bar displays at the bottom of the current window. If contains the following status information:

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

EMP Console Main Menu

- **File**
    - **Exit** - Exits the EMP Console.
- **Connect**
    - **Disconnect** - disconnects the server connection.
    - [Re]Connect - raises the connect dialog.
    - A list of the five most recent connections - can click on one of the five servers most recently connected to. A connection to the selected server is initiated.
- **Action**
    - **Power On/Off** - powers the server on or off with post-power up options.
    - **Reset** - resets the server with post-reset options.
    - **SEL Viewer** - opens the SEL viewer.
    - **SDR Viewer** - opens the SDR viewer.
    - **FRU Viewer** - opens the FRU viewer.
    - **Phonebook** - opens the phonebook dialog.
- **Help -** provides version information and help topics for the EMP Console.

Server Control Operations

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

Connect

When you select [Re]Connect from the Connect menu, the Connect dialog in Figure 10 allows you to connect to a selected server. If the client machine is already connected to a server, initiating connection generates a warning message. It lets you know that the existing connection will be terminated if you continue trying to initiate the new connection. You are prompted to enter the EMP password whenever a connection is attempted.
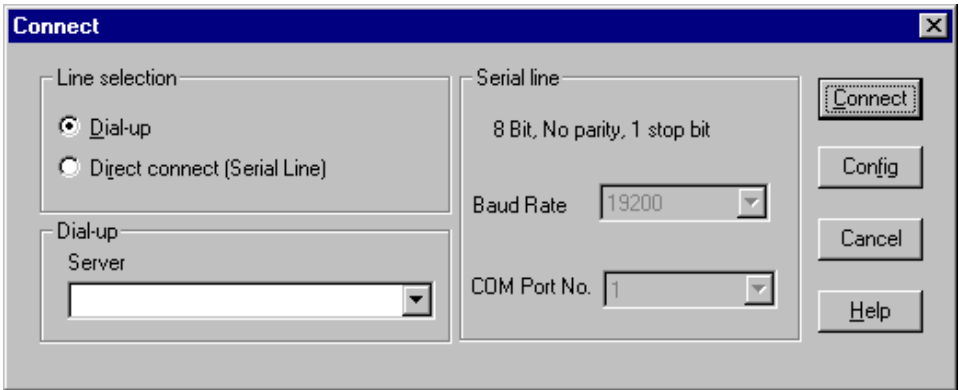
Figure 10. Connect Dialog

Options available in the dialog are:

- **Line Selection** - you can specify whether to use a direct connection or dial up modem connection to the server.

    - **Dial-up** - connects to a selected server with a modem.

    - **Direct connect (Serial Line)** - connects to the selected server directly using a null modem serial cable.

- **Server** - you can select or enter a server name from a dropdown edit list box of available servers. A server must be selected when the line selection is Dial up.

- **Serial Line** - must be filled out when the line selection is set to Direct connect (Serial Line).

    - **Baud Rate** - must be 19200 for EMP to connect properly.

    - **COM Port No.** - set the COM Port number to which the null modem serial cable is connected.

- **Connect** - initiates connection to the connected server. When this button is clicked, you are prompted for the EMP password.

- **Config** - displays the Phonebook dialog.

- **Cancel** - exits the Connect dialog without any action taken.

- **Help** - displays dialog level help information.

Power On/Off

Selecting Power On/Off from the Action menu allows you to power the server on or off, with post power-up options. It generates the Power on/off dialog.
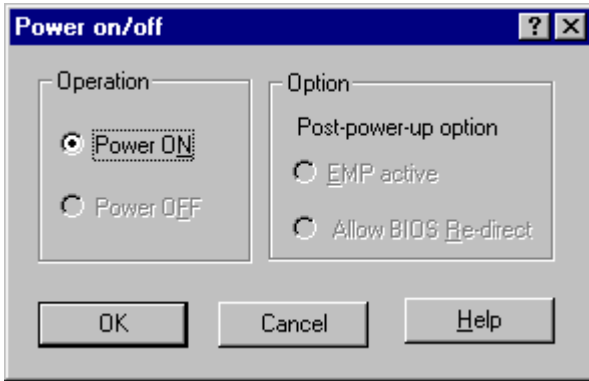

Figure 11. Power On/Off Dialog

Options available in the dialog are:

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

Reset

Selecting Reset from the Action menu generates the Reset dialog so that you can remotely reset the server with post-reset options.
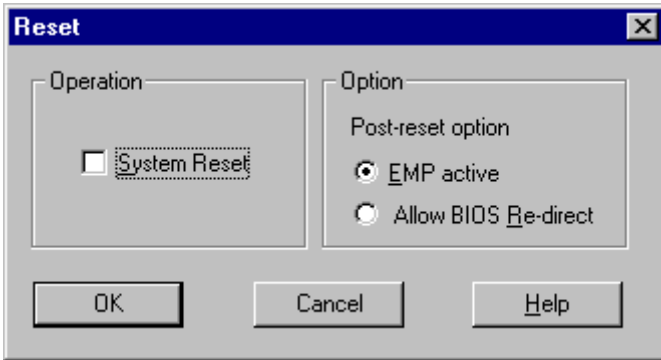
Figure 12. Reset Dialog

Options available in the dialog are:

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

Phonebook

The EMP Console provides a support plug in known as the Phonebook. The Phonebook stores names and numbers of servers in a list that can be updated by adding, modifying or deleting entries. The Phonebook can be opened from the main menu and tool bars, or launched from the Connect dialog by clicking the Config button.
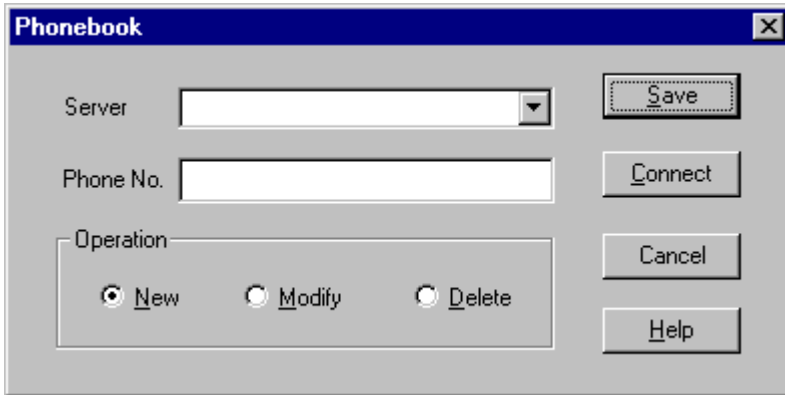
Figure 13. Phonebook Dialog

Options available in the dialog are:

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

Management Plug ins

SEL Viewer

The SEL viewer provides access to the System Event Log on the server and can display records in either hexadecimal or text (verbose) form. Options available through the SEL viewer are:

- View the SEL from a file
- Save the SEL to a file
- View SEL summary info
- View all SEL entries
- View SEL info by event type
- View SEL info by sensor type
- Set SEL display mode to either Hex or verbose mode
- Set the SEL output file format to either text or binary format
- Close the SEL viewer
- Exit the EMP Console

SEL Viewer Menu Options

The following menu options are found on the SEL viewer menu bar:

- **File**
    - **Open** - you can view SEL data from a previously saved file if it was stored in binary format. Selecting the Open menu item allows you to specify a filename under which the data is found. The default filename is "SELLOG.DAT." If the file cannot be opened, the program displays an error message.
    - **Close** - you can close the SEL viewer.
    - **Save As** - dumps the SEL data to a file in either binary raw or verbose text format. The binary file may be retrieved later. Selecting this option lets you specify a filename to which the data would be saved. The default filename is "SELLOG.DAT." If there is no data, an error message will be displayed.
    - **Exit** - exits the EMP Console.
- **Connect**
- **View**
    - **SEL Information** - displays SEL summary information as returned by the server.
    - **All Events** - displays all events in the SEL.
    - **By Sensor Type** - shows all events in the SEL generated by a specific sensor type such as voltage, temperature, etc.
    - **By Event** - displays all the events in the SEL of a particular type; for example, by memory or threshold. A pop up menu lets you select the event type to display. This pop up menu displays all the event types that may be generated by the particular hardware.

- **Settings** - you can change several operating parameters for the SEL viewer. This menu displays the following suboptions:
    - **Display HEX/Verbose** - toggles between HEX mode and interpreted mode of displaying SEL records.
    - **Output Text/Binary** - determines whether SEL data will be saved to the file in binary format or verbose format.
- **Window** - gives options for displaying currently open windows.
- **Help** - provides version information for the SEL viewer and provides help topics on the EMP Console.

SDR Viewer

The SDR viewer lets you view the Sensor Data Records retrieved from the SDR repository. Options available through the SDR viewer are:

- View all SDR records
- View SDR entries by SDR type
- View SDR summary info
- Set SDR display mode to either Hex or verbose mode
- Close the SDR viewer
- Exit the EMP Console

SDR Viewer Menu Options

The following menu options are found on the SDR viewer menu bar:

- **File**
    - **Close** - closes the SDR viewer.
    - **Exit** - exits the EMP Console.
- **View**
    - **Display all Records** - displays all records from the SDR repository.
    - **SDR Type** - displays the records of a particular SDR type. You select an SDR type from a pop up menu that displays all the SDR types available for the given hardware.
    - **SDR Info** - displays the SDR summary information as returned by the server.
- **Settings** - lets you change operating parameters for the SDR viewer. This menu displays the following suboption:
    - **Display HEX/Verbose** - toggles between HEX mode and interpreted mode of displaying SDR records.
- **Window** - gives options for displaying currently open windows.
- **Help** - provides version information for the SDR viewer and provides help topics on the EMP Console.

FRU Viewer

The FRU viewer allows you to view the server's FRU (Field Replaceable Units) data from the server's baseboard FRU information area. Options available with the SDR viewer are:

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

FRU Viewer Menu Options

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

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

FRUSDR Load Utility

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

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

When to Run the FRUSDR Load Utility

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

Because the utility must be reloaded to properly initialize the sensors after programming, turn the server off and remove the AC power cords from the server. Wait approximately 30 seconds, and reconnect the power cords.

What You Need to Do

The FRUSDR Load Utility may be run directly from the ServerStart CD or from diskettes you create from the CD. Before you can run the FRUSDR Load Utility from a diskette, you must copy the utility from the Server ServerStart CD to a DOS-bootable diskette.

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

How You Use the FRUSDR Load Utility

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

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

Command Line Format

The basic command line format is

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

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

Parsing the Command Line

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

Displaying Usage Information

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

```
   FRU & SDR Load Utility Version 2.0 Revision R.2.1

 Usage:    frusdr                Is the name of the utility.

           -? Or -h              Displays usage information

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

           -cfg filename.cfg     Uses custom CFG file.

           -p                    Pause between blocks of data.

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

```
Copyright (c) 1998, Intel Corporation, All Rights Reserved


This utility must be run from a system executing DOS. Running in a
Window's DOS box is insufficient and will provide incorrect results.
Programming the BMC FRU area clears the SDR table, therefore the SDR
table must be reprogrammed. Upon completing the programming of the FRU
and SDR areas, the  server should be rebooted.


Note:  DOS users may alternatively use a '/' instead of the '-'.
```

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

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


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


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

Displaying a Given Area

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

Displaying DMI Area

The DMI area is displayed in ASCII format when the field is ASCII or as a number when the field is a number. Each DMI area displayed is headed with the DMI area designated name. Each field has a field name header followed by the field in ASCII or as a number.

Example:

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

```
Displaying DMI Area...

System Information (Type 1, 8 bytes)
    Manufacturer          = Intel
    Product               = NA440BX BP
    Version               = 000000000000
    Serial Number         = 0123456789


Board Information (Type 2, 8 bytes)
    Manufacturer          = Intel
    Product               = NL440BX Ultra SCSI Backplane
    Version               = 681234-501
    Serial Number         = N03121530


Chassis Information (Type 3, 9 bytes)
    Manufacturer          = Intel
    Type                  = Main Server Chassis
    Version               = 000000-000
    Serial Number         = 9912345678
    Asset Tag#            =
```

Displaying FRU Area

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

Example:

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

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

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

Chassis Information Area (Version 1, Length 32)
    Chassis Type           = 11h
    Part Number (ASCII)    = 000000-000
    Serial Number (ASCII)  = 9912345678
END OF FIELDS CODE

Board Information Area (Version 1, Length 64)
    Unicode Country Base       = 00h
    Manufacturing Time (mins)  = 733803
    Manufacturer Name (ASCII)  = Intel
    Product Name (ASCII)       = N440BX
    Serial Number (ASCII)      = 0123456789
    Part Number (ASCII)        = 000000-000
END OF FIELDS CODE

Product Information Area (Version 1, Length 80)
    Unicode Country Base       = 00h
    Manufacturer Name (ASCII)  = Intel
    Product Name (ASCII)       = N440BX DP
    Part Number (ASCII)        = 000000000000
    Version (ASCII)            =
    Serial Number (ASCII)      = 0123456789
    Asset Tag (ASCII)          =
END OF FIELDS CODE
```

Displaying SDR Area

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

Example:

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

```
Reading SDR Record #1
    0E 00 10 01 37 20 00 0F 05 00 10 F1 F8 02 01 85  ....7..........
    02 00 00 00 04 00 00 C4 02 00 08 30 C2 07 91 95  ...........0....
    8E FF 00 1B 1B 00 99 95 00 8A 8E 02 02 00 01 CC  ................
    53 43 53 49 2D 42 2D 54 65 72 6D 33              SCSI-B-Term3

Reading SDR Record #2
    0E 40 10 01 30 20 00 13 05 00 10 F1 F8 04 01 05  .@..0 ..........
    00 00 00 20 29 00 00 1E 02 00 00 00 00 00 00 00  ... )...........
    00 FF 00 03 03 00 00 00 00 42 49 02 02 00 01 C5  .........BI.....
    46 41 4E 2D 32                                   FAN-2
```

Using Specified CFG File

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

Displaying Utility Title and Version

The utility displays its title**:**

```
FRU & SDR Load Utility, Version 2.0, Revision X.XX
```

Where X.XX is the revision number for the utility.

Configuration File

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

Prompting for Product Level FRU Information

Through the use of a Configuration File, the utility may prompt you for FRU information.

Filtering Sensor Data Record From the SDR File

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

Updating the SDR Nonvolatile Storage Area

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

Updating FRU Nonvolatile Storage Area

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

Updating DMI FRU Nonvolatile Storage Area

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

Example:

```
Loading DMI System Area

   Manufacturer Name : Intel

   Name : NA440BX Server System

   Version Number : SMADN000BN00

   Serial Number : 0123456789

Loading DMI Board Area

   Manufacturing Name : Intel

   Name : BMAD440LX

   Serial Number : 0123456789

   Version Number : 681234-501

Loading DMI Chassis Area

   Chassis Part Number : 000000-000

   Chassis Serial Number :

   Asset Tag :
```

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

Cleaning Up and Exiting

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

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

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.

> **i** 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 World Wide Web site:

http://www.intel.com

> **i** 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:

        10006BI1.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.

Upgrading the BIOS

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.

i	Because of the small amount of code available in the nonerasable 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 J2J1.
4. Move the Recovery Boot jumper from pins 9-10 to pins 10-11 (see Figure 15 on page 98).
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.
   – Two beeps and the end of activity in drive A indicate successful BIOS recovery.
   – A series of continuous beeps indicates failed BIOS recovery.
8. If recovery fails, return to step 1 and repeat the recovery process.
9. If recovery is successful, turn off the computer. Remove the computer cover and continue with the following steps.
10. Move the Recovery Boot jumper back to pins 9-10.
11. Replace the computer cover. Leave the upgrade disk in drive A and turn on the computer.
12. Continue with the BIOS upgrade (see page 73).

Changing the BIOS Language

You can use the BIOS upgrade utility to change the language the BIOS uses for messages and the Setup program. Use a bootable floppy disk containing the Intel® flash utility and language files (see page 73).

1. Boot the computer with the bootable floppy disk in drive A. The BIOS upgrade utility screen appears.
2. Select `Update Flash Memory From a File`.
3. Select `Update Language Set`. Press `<Enter>`.
4. Select drive A and use the arrow keys to select the correct `.lng` file. Press `<Enter>`.
5. When the utility asks for confirmation that you want to flash the new language 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. The computer will reboot and the changes will take effect.

Using the Firmware Update Utility

The Firmware Update Utility is a DOS based program used to update the Baseboard Management Controller's firmware code. You only need to run the Firmware Update Utility if new firmware code becomes necessary.

Running the Firmware Update Utility

1. Create a DOS bootable diskette. The version of DOS must be 6.0 or higher.
2. Place the firmware update utility (FWUPDATE.EXE) and the *.hex file on the diskette. Make a note of the *.hex file name, you will need it later.
3. Insert the diskette into the drive and boot to it.
4. At the DOS prompt, run the executable file (FWUPDATE.EXE).
5. The utility will display a menu screen. Select "Upload Flash."
6. The utility will ask for a file name. Enter the name of the *.hex file.
7. The program will load the file and then ask if it should "Upload Boot Block." Press "N" to continue.
8. The program will next ask if it should "Upload Operational Code." Press "Y" to continue.
9. Once the operational code has been updated and verified, press any key to continue. Then press the "ESC" key to exit the program.
10. Shut the system down and remove any floppy disks that may be in the system.
11. Disconnect the AC power cord from the system and wait 60 seconds.
12. Connect the AC power cord and power up the system.

Installing Video Drivers

After configuring the system, you need to install video drivers to take full advantage of the features of the onboard Cirrus Logic CL-GD5480 super VGA video controller.

*   The ServerStart CD includes video drivers for use with DOS and Windows NT. Check the README.TXT file on the CD for information on installing these drivers.
*   For other operating systems, see your OS instructions for installing device drivers.

Using the Symbios SCSI Utility

The Symbios SCSI utility detects the SCSI host adapters on the server board. Use the utility to

- change default values
- check and/or change SCSI device settings that may conflict with those of other devices in the server

Running the SCSI Utility

1.   When this message appears on the video monitor:

         Press Ctrl-C to run SCSI Utility...

2.   Press <Ctrl+C> to run this utility. When it appears, choose the host adapter that you want to configure.

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
Complete system power down. This stops all server management logging and other functions.	Pull the AC plug from the wall or the system.

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?

❑ Is the processor fully seated in its slot on the server board?

❑ Are all add in ISA and 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?

If these items are correct but the problem recurs, see "More Problem Solving Procedures" on page 80.

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 discs.

❑   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.)

i	**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

⚠ **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 82.

Using PCDiagnostics

A diagnostics package for the system is contained on the ServerStart CD that comes with the system. For documentation about the test modules, see the Diagnostic help disks that end with the extension .HLP. They are ASCII files that you can print to form a manual of all tests in this product.

*   The program called Testview uses a simple DOS-based menu system.
*   The program called T.EXE is not for Windows or DOS; you can access it at the command line prompt without having a hard drive installed.

The README.TXT file for diagnostics tells how to install the program.

⚠ **Read help information for a test before running it:** the diagnostic package contains many optional tests that should only be used by a user with advanced technical knowledge. Inadvertent actions could be damaging, such as running a hard drive write test on a hard disk. All tests that require external hardware, user interaction, or are destructive are disabled in the default configurations. Before using such a test, make sure you read and understand the help information for that test.

Monitoring POST

See Chapter "Configuration Software and Utilities".

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 83.

❑   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 83.

❑   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 84.

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 "Initial System Startup" on page 77.

Specific Problems and Corrective Actions

This section provides possible solutions for these specific problems:

● Power light does not light.

● No beep or 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.

● 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 assistance.

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 assistance.

No Characters Appear on Screen

Check the following:

❑ Is the keyboard working? 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 "POST Codes and Countdown Codes".
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 assistance.

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 assistance.

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 assistance.

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 you are using the onboard diskette controller, use the SSU to make sure that "Onboard Floppy" is set to "Enabled." If you are using an add in diskette controller, make sure that "Onboard Floppy" is set to "Disabled." To run the SSU, see Chapter "Configuration Software and Utilities".

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 assistance.

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?

i	**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 controlled by the onboard SCSI host controller, 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?

i	**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 controlled by the onboard SCSI host controller, 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 ServerStart 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), some hubs may also require 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 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.

PCI Installation Tips

Some common PCI tips are listed here.

❑   Reserve interrupts (IRQs) and/or memory addresses specifically for ISA adapters. This prevents PCI cards from trying to use the same settings ISA cards are using. Use the SSU to keep track of ISA adapter resources.

❑   Certain drivers may require interrupts that are not shared with other PCI drivers. The SSU can be used to adjust the interrupt numbers for PCI devices. For certain drivers, it may be necessary to alter settings so that interrupts are not shared.

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 "Technical Reference".

❑   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 assistance.

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.

POST Codes and Countdown Codes

The BIOS indicates the current testing phase during POST after the video adapter has been successfully initialized by outputting a 2 digit hex code to I/O location 80h. If a port-80h ISA POST card is installed, it displays the 2 digit code on a pair of hex display LEDs.

Table 9. Port-80 Codes

Normal Port 80 Codes	Beeps	Error
02		Verify Real Mode
12		Restore processor control word during warm boot (only occurs on warm reboot)
24		Set ES segment register to 4GB
04		Get processor type
06		Initialize system hardware
18		8254 timer initialization
08		Initialize PCIset registers with initial POST values
C4		Initialize system flags in CMOS
11		Load alternate registers with initial POST values
0E		Initialize I/O
0C		Initialize caches to initial POST values
16	1-2-2-3	BIOS ROM checksum
17		Turn cache off
28		Autosize DRAM
2A		Clear 512K base RAM
2C	1-3-4-1	RAM failure on address line xxxx
2E	1-3-4-3	RAM failure on data bits xxxx of low byte of memory bus (1st 4 meg)
2F		Initialize L2 cache if enabled in CMOS
38		Shadow system BIOS ROM
20	1-3-1-1	Test DRAM refresh
29		Post Memory Manager Initialization (PMM)
33		Post Dispatch manager Initialization
34		Test CMOS
C1		Post error manager Initialization
09		Set in POST flag
0A		Initialize processor registers and CPU microcode
3A		Autosize cache
0B		Enable processor cache

Normal Port 80 Codes	Beeps	Error
0F		Initialize the local bus IDE (not used anymore but here for phx std)
10		Initialize Power Management (APM not used in Nightshade)
14		Initialize keyboard controller
1A		8237 DMA controller initialization
1C		Reset Programmable Interrupt Controller
22	1-3-1-3	Test 8742 Keyboard Controller
32		Read processor bus-clock frequency and compute boot processor speed
67		Initialize and register other CPU via SMM through APIC bus
69		Initialize SMI handler for the processor
F4		Exit SMI handler
3C		Configure advanced PCIset registers and reset coprocessor
3D		Load alternate registers with CMOS values
42		Initialize interrupt vectors
46	2-1-2-3	Check ROM copyright notice
45		Initialize all pre-PnP devices
49		Initialize PCI bus and devices (also read ESCD and allocate resources)
48		Check video configuration against CMOS (VGA or MDA)
4A		Initialize all video adapters in system
4C		Shadow video BIOS ROM
24		Put CPU in big real mode (flat mode memory addressing - up to 4 GB)
59		Post display manager initialization (video screen error codes now visible)
22		Reset and test keyboard first try (only warm reset)
52		Reset and test keyboard controller (both warm and cold reset)
54		Set key click if enabled
76		Enable keyboard
58	2-2-3-1	Test for unexpected interrupts
4E		Display copyright notice
50		Display processor type and speed
5A		Display prompt "Press F2 to enter SETUP"
5B		Disable CPU L1 cache for memory test
5C		Test RAM between 512 and 640k
60		Test extended memory (4Mb to top of memory)

Normal Port 80 Codes	Beeps	Error
62		Test extended memory address lines
64		Jump to UserPatch1
66		Configure advanced cache registers
68		Enable external and processor caches
6A		Display external cache size
6C		Display shadow message
6E		Display nondisposable segments
70		Display error messages to video
72		Check for configuration errors
74		Test Real Time Clock
7C		Set up hardware interrupt vectors
7E		Test coprocessor if present
88		Initialize BIOS Data Area, timeouts for detecting parallel, serial and hdd controller; Clear CMOS shutdown flag
8A		Initialize Extended BIOS Data Area
81		late post core initialization of devices
87		Configure MCD devices
85		Initialize and detect PC compatible PnP ISA devices (serial, parallel etc)
84		Clear interrupts from com port detection
86		Console redirection initialized
83		Configure onboard hard disk controller
89		Enable NMI
8C		Initialize floppy controller
90		Initialize and detect hard disks
8B		Detect and test for Mouse or Auxiliary device on keyboard controller
95		Install CD-ROM for boot
92		Jump to UserPatch2
C5		Initialize GPNV areas of DMI
98	1-2	Search for option ROMs. One long, two short beeps on checksum failure of an option ROM
93		Scan for User flash ROMs
9C		Set up Power Management (not used)
9D		Enable security
9E		Enable hardware interrupts

Normal Port 80 Codes	Beeps	Error
A0		Set time of day
A2		Check key lock
A4		Initialize typematic rate
C2		Initialize DMI tables
C3		Log post errors with Post error manager and to SEL in BMC; update VID bits and memory presence to BMC display and FRB errors (watchdog timeouts, BIST or CPU failures)
A8		Erase F2 prompt
AA		Scan for F2 key stroke
AC		Initialize EMP port if selected. Remove com2 from BDA if EMP is enabled Enter SETUP
AE		Clear in-POST flag
B0		Turn on secure boot if enabled(secure front panel, blank video, floppy write protect); Check for errors
B2		POST done – prepare to boot Operating System
B4	1	One short beep before boot
B5		Display Quietboot (not used)
BE		Clear screen
B6		Check password (optional)
BC		Clear parity checkers
BD		Display multiboot menu if esc is hit
BF		Display system config summary(if enabled in CMOS)
8F		Get total # of hard drives and put in BDA
91		Program IDE hard drives (timing, PIO modes etc)
9F		Save Total # of hard drives (SCSI and ATA) in BDA
99		Check smart hard drive
C7		Prepare to boot to OS, clean up graphics and PMM areas

C0		Try to boot with INT 19
		  return to video mode 3
		  disable PMM
		  return to real mode
		  disable gate A20
		  clears system memory
		  reset stack
		  Invokes Int19
		
		Error handling Post codes (may occur at anytime during post)

Normal Port 80 Codes	Beeps	Error
DO		Interrupt handler error
D2		Unknown interrupt error
D4		Pending interrupt error
D6		Initialize option ROM error
D8		Shutdown error
DA		Extended Block Move
DC		Shutdown 10 error

POST Error Codes and Messages

The following error codes and messages are representative of various conditions BIOS identifies. The exact strings and error numbers may be different from those listed here.

Table 10. POST Error Codes and Messages

Code	Error message
0162	BIOS unable to apply BIOS update to processor
0164	BIOS does not support current stepping for processor
0200	Failure Fixed Disk
0210	Stuck Key
0211	Keyboard error
0212	Keyboard Controller Failed
0213	Keyboard locked - Unlock key switch
0220	Monitor type does not match CMOS - Run SETUP
0230	System RAM Failed at offset
0231	Shadow RAM Failed at offset
0232	Extended RAM Failed at offset
0250	System battery is dead - Replace and run SETUP
0251	System CMOS checksum bad - Default configuration used
0260	System timer error
0270	Real time clock error
0297	ECC Memory error in base (extended) memory test in Bank xx
02B2	Incorrect Drive A type - run SETUP
02B3	Incorrect Drive B type - run SETUP
02D0	System cache error - Cache disabled

Code	Error message
02F5	DMA Test Failed
02F6	Software NMI Failed
0401	Invalid System Configuration Data - run configuration utility
None	System Configuration Data Read Error
0403	Resource Conflict
0404	Resource Conflict
0405	Expansion ROM not initialized
0406	Warning: IRQ not configured
0504	Resource Conflict
0505	Expansion ROM not initialized
0506	Warning: IRQ not configured
0601	Device configuration changed
0602	Configuration error - device disabled
8100	Processor failed BIST
8104	Processor Internal Error (IERR) failure
8106	Processor Thermal Trip failure
8108	Watchdog Timer failed on last boot
810B	Processor failed initialization on last boot
8110	Server Management Interface failed to function
8120	IOP subsystem is not functional
8150	NVRAM Cleared by Jumper
8151	NVRAM Checksum Error, NVRAM cleared
8152	NVRAM Data Invalid, NVRAM cleared

Technical Reference

This chapter includes the following:

- Environmental specifications
- System memory map addresses
- Board interrupts
- Standard video modes
- Electromagnetic Compatibility (EMC) notices

Connectors
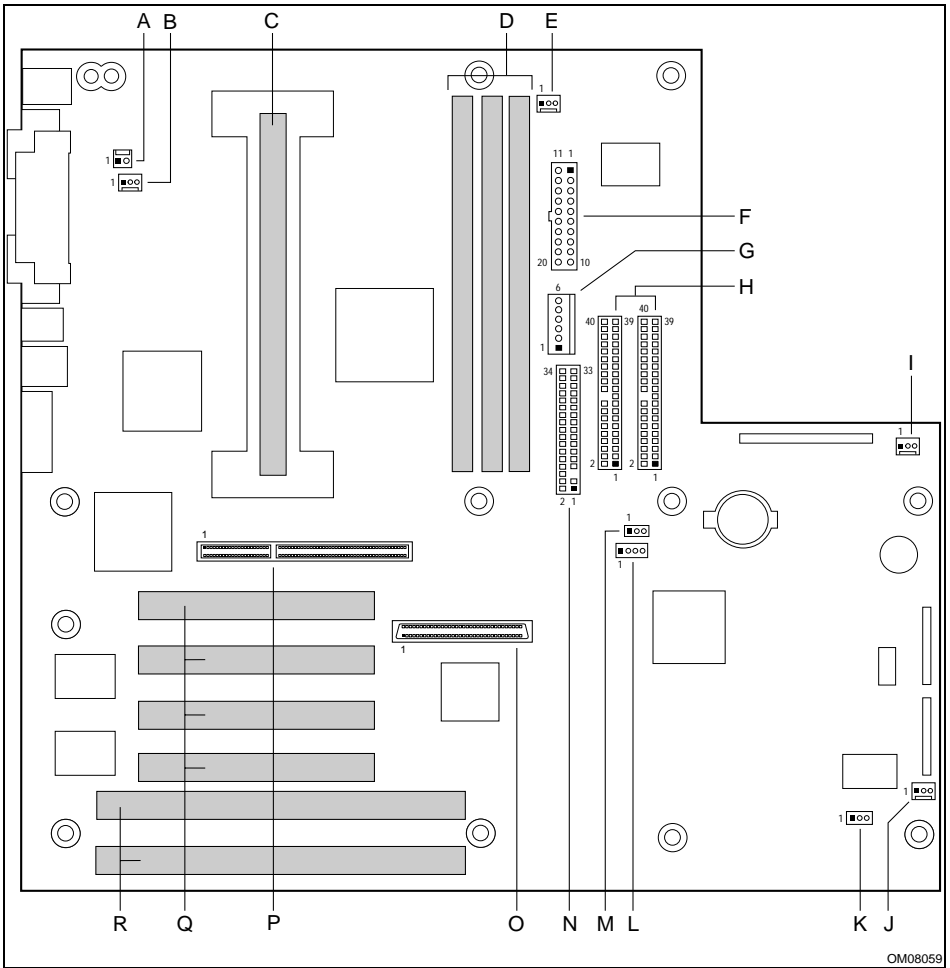
Figure 14. Connector Locations

A. Chassis intrusion switch connector
B. CPU fan connector (fan4)
C. Processor slot
D. DIMM slots
E. System fan connector (fan3)
F. ATX power connector
G. Auxiliary power connector
H. IDE connectors
I. System fan connector (fan1)

J. System fan connector (fan2)
K. External IMB connector
L. Hard drive LED connector
M. External WOL connector
N. Diskette drive connector
O. Wide SCSI connector
P. AGP Connector
Q. PCI slots
R. ISA slots

Table 11. Fan Connector pinout

Pin	Signal
1	GND
2	+12V
3	Fan Sensor

Table 12. WOL Connector pinout

Pin	Signal
1	+5 VSB
2	GND
3	MP_WAKEUP

Table 13. Hard Drive LED Connector pinout

Pin	Signal
1	GND
2	DRV_ACT_L
3	DRV_ACT_L
4	GND

Table 14. IMB Connector pinout

Pin	Signal
1	LOCAL_I2C_SCL
2	GND
3	LOCAL_I2C_SDA

Table 15. Chassis Intrusion Connector pinout

Pin	Signal
1	GND
3	DETECT_L

AT Style Front Panel Connector

OM08060
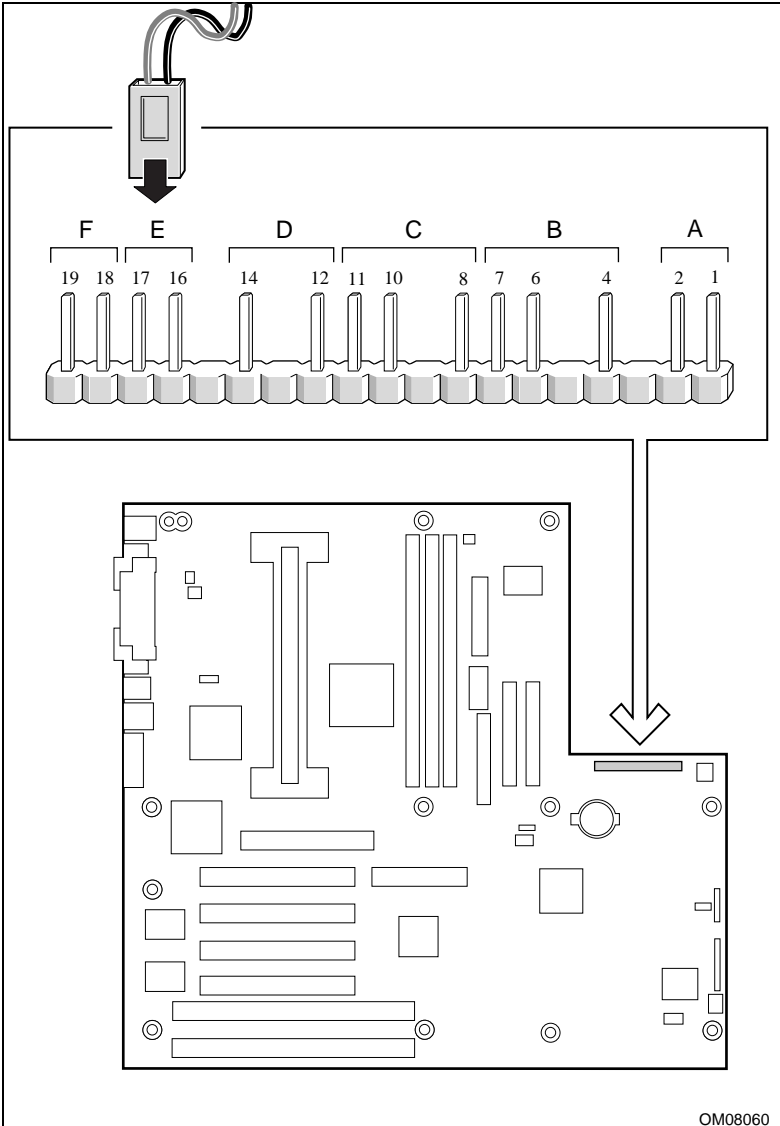
Table 16. AT Style Front Panel Connector pinout

Pin	Signal
1	Power button
2	GND
3	NC
4	+5V
5	NC
6	HD LED
7	+5V
8	GND
9	NC
10	Internal Speaker Enable
11	Speaker Out
12	GND
13	NC
14	Power LED
15	NC
16	GND
17	Reset Switch
18	GND
19	NMI switch

Server Board Jumpers
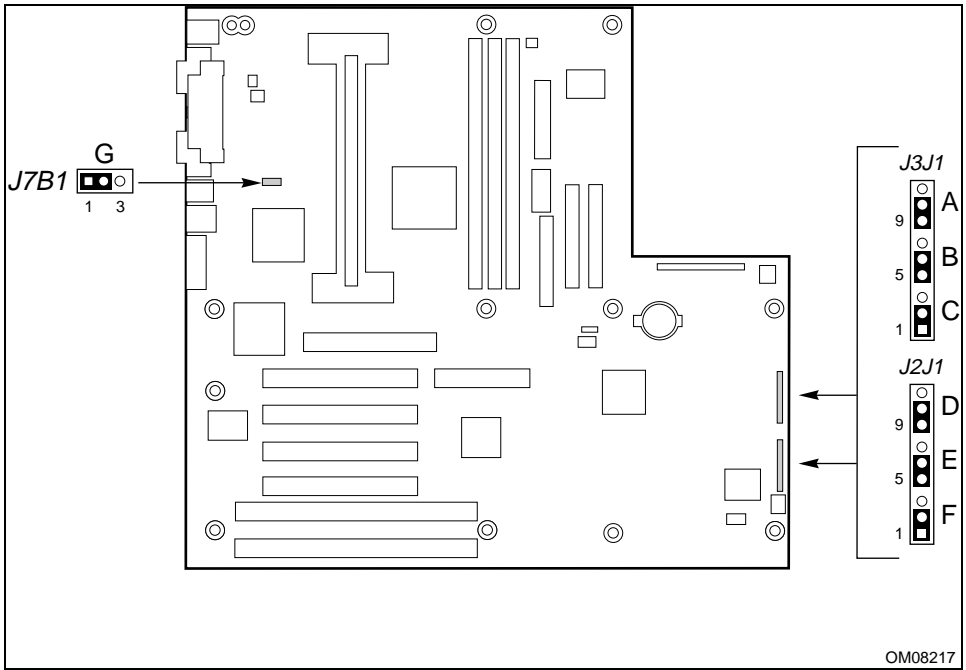
Figure 15. Jumper Locations

Table 17.   Server Board Jumper Summary

Jumper Block	Pins (default in bold)	What it does at system reset
A. BMC Boot Block Write Enable	**21-22, Protect**	BMC boot block is write protected.
	22-23, Erase/ Program	BMC boot block is erasable and programmable.
B. BMC Forced Update Mode	**5-6, Normal**	System boots normally.
	6-7, Program	System tries to update BMC firmware.
C. BIOS Boot Block Write Enable	**1-2, Protect**	BIOS boot block is write-protected.
	2-3 Erase/ Program	BIOS boot block is erasable and programmable.

Jumper Block	Pins (default in bold)	What it does at system reset
D. Recovery Boot	**9-10, Normal**	System attempts to boot using the BIOS stored in flash memory.
	10-11, Recovery	BIOS attempts a recovery boot, loading BIOS code from a floppy diskette into the flash device. This is typically used when the BIOS code has been corrupted.
E. Password clear	**5-6, Protect**	Maintains the current system password.
	6-7, Erase	Clears the password.
F. CMOS clear	**1-2, Protect**	Preserves the contents of NVRAM.
	2-3, Erase	Replaces the contents of NVRAM with the manufacturing default settings.
G. WOL Enable	**1-2, Disabled**	Disables Wake On LAN. If your power supply does not provide 0.8 A of +5 V Standby current, you must move the WOL Enable jumper to this position.
	2-3, Enabled	Enables Wake On LAN.

> ⚠ Moving either of the boot block write protect jumpers (J3J1-A, C) may cause significant damage to the server board. Only move these jumpers when directed to by your customer service representative.

> **i** **+5 V Standby required for WOL:** If you wish to use the WOL feature, your power supply must provide 0.8 A of +5 V Standby current. If it does not, your server board may not boot. Move the WOL Enable jumper to the Disabled position if your power supply does not provide the required current.

General Procedure to Change Jumper Setting

The short general procedure for changing a configuration setting is the same for most of the jumper functions, so we will describe it here.

1.   Observe the safety and ESD precautions at the beginning of this chapter.
2.   Turn off all connected peripherals, turn off system power, and disconnect the AC power cord.
3.   Remove the side cover. You do not need to remove the server board from the chassis, and you probably do not need to remove any add in boards.
4.   Locate the configuration jumpers at the edge of the server board toward the front of the system.
5.   Move jumper to pins specified for the desired setting.
6.   Reinstall the side cover, connect the power cord, and turn on the system for the change to take effect.
7.   You may need to repeat these steps to move the jumper back to its original setting, depending on the jumper function.

CMOS Jumper

The jumper at pins 1, 2, and 3 controls whether settings stored in CMOS nonvolatile memory (NVRAM) are retained during a system reset.

Procedure to restore the system's CMOS and RTC to default values:

1. See "General Procedure to Change Jumper Setting".
2. Move the CMOS jumper from pins 1 and 2 to pins 2 and 3 (the Clear CMOS memory position).
3. Reinstall the side cover for your safety, and connect the power cord to the system.
4. Turn the system on. Wait for POST to complete and for the messages "NVRAM cleared by jumper" and "Press F2 to enter Setup" to appear. This automatically reprograms CMOS and RTC to their default settings.
5. Enter Setup and make any changes necessary (for example, changing the boot device). Press F10 to save the new Setup configuration and exit Setup.
6. Turn off the system, and disconnect the power cord from the system.
7. Again remove the side cover.
8. Move the jumper from pins 2 and 3 back to pins 1 and 2 (the Protect CMOS memory position).
9. Reinstall the side cover, and connect the power cord to the system.
10. Run BIOS Setup or the SSU to verify the correct settings. See Chapter "Configuration Software and Utilities".

Password Jumper

The jumper at pins 5, 6, and 7 controls whether the user and administrator passwords are retained or cleared during a system reset.

Procedure to clear the current password and then enter a new one:

1. See "General Procedure to Change Jumper Setting".
2. Move the Password jumper from pins 5 and 6 to pins 6 and 7.
3. Reinstall the side cover for your safety, and connect the power cord to the system.
4. Turn the system on, and wait for POST to complete. This automatically clears the password.
5. Turn off the system, and disconnect the power cord.
6. Again remove the side cover.
7. Move the jumper from pins 6 and 7 back to pins 5 and 6.
8. Reinstall the side cover, and connect the power cord to the system.
9. Run the SSU to specify a new password. See Chapter "Configuration Software and Utilities".

Recovery Boot Jumper

The jumper at pins 9, 10, and 11 controls whether the system attempts to boot using the BIOS programmed in the boot block area of the FLASH memory. This should only be used if the operational area of the BIOS is corrupted or needs to be upgraded. Contact your local service representative before doing this.

Procedure to disable recovery booting:

1. See "General Procedure to Change Jumper Setting".
2. Move the recovery boot jumper from pins 9 and 10 to pins 10 and 11.
3. Reinstall the side cover for your safety, connect the power cord to the system.
4. Turn the system on, and insert the Flash Memory Update Utility diskette in drive A. After the system boots, the speaker emits a single beep and the recovery process starts. This takes about three minutes. When the recovery process completes, the speaker emits two beeps.

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

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

5. Turn the system off, disconnect the power cord(s) from the system, and remove the left side cover.
6. Move the jumper from pins 10 and 11 to pins 9 and 10 to enable the normal boot mode.
7. Replace the left side cover, remove the diskette from drive A, and connect the power cord(s) to the system.
8. After running the special recovery mode, run the SSU to specify a new password. See Chapter "Configuration Software and Utilities".

WOL Enable Jumper

The jumper at J7B1 controls the WOL functionality. If you power supply doesn't supply 0.8A of +5 V Standby current, this jumper should be in the disabled position.

Boot Block Jumpers

⚠ **Leave boot block jumpers at factory default setting:** Programming the boot block incorrectly will prevent the system from booting. Programming *should only be done* by a technically qualified person. The procedure requires a special "Boot Block Update Utility." Contact your dealer or sales representative for more information.

Interrupts

The table below recommends the logical interrupt mapping of interrupt sources; it reflects a typical configuration. Use the information to determine how to program each interrupt. The actual interrupt map is defined using configuration registers in the PIIX4 and the I/O controller.

> **i** **To disable either IDE controller and reuse the interrupt:** if you plan to disable either IDE controller to reuse the interrupt for that controller, you must physically unplug the IDE cable from the board connector (IDE0 or IDE1) if a cable is present. Simply disabling the drive by configuring the SSU option does not free up the interrupt.

Table 18. Interrupts

Interrupt	Description
INTR	Processor interrupt
NMI	NMI from BUD to processor
IRQ0	Timer interrupt from PIIX4
IRQ1	Keyboard interrupt
IRQ2	Interrupt signal from second 8259 in PIIX4
IRQ3	Serial port A or B interrupt from 87309VLJ device (user can configure)
IRQ4	Serial port A or B interrupt from 87309VLJ device (user can configure)
IRQ5	Open for use
IRQ6	Diskette
IRQ7	Parallel port
IRQ8_L	RTC interrupt
IRQ9	Reserved for SCI (ACPI)
IRQ10	Open for use
IRQ11	Open for use
IRQ12	Mouse interrupt
IRQ14	Compatibility IDE interrupt from primary channel IDE devices 0 and 1
IRQ15	Secondary IDE interrupt
PCI_INTA_L	PCI Interrupt signal A
PCI_INTB_L	PCI Interrupt signal B
PCI_INTC_L	PCI Interrupt signal C
PCI_INTD_L	PCI Interrupt signal D

Video Modes

The 5480 integrated video controller provides all standard IBM VGA modes. With 2 MB of video memory, the system goes beyond standard VGA support. The tables below show all supported video modes using 2 MB of video memory. The following tables show the standard modes that the chip supports, including the number of colors and palette size, resolution, pixel frequency, and scan frequencies.

Table 19. Standard VGA Modes

Mode(s) in Hex	Bits per pixel	Colors (no per palette size)	Resolution	Pixel Freq. (MHz)	Horizontal Freq. (kHz)	Vertical Freq. (Hz)
0, 1	4	16/256K	360 X 400	14	31.5	70
2, 3	4	16/256K	720 X 400	28	31.5	70
4, 5	4	4/256K	320 X 200	12.5	31.5	70
6	4	2/256K	640 X 200	25	31.5	70
7	4	Mono	720 X 400	28	31.5	70
D	4	16/256K	320 X 200	12.5	31.5	70
E	4	16/256K	640 X 200	25	31.5	70
F	4	Mono	640 X 350	25	31.5	70
10	4	16/256K	640 X 350	25	31.5	70
11	4	2/256K	640 X 480	25	31.5	60
12	4	16/256K	640 X 480	25	31.5	60
12+	4	16/256K	640 X 480	31.5	37.5	75
13	8	256/256K	320 X 200	12.5	31.5	70

Table 20. Extended VGA Modes

Mode(s) in Hex	Bits per pixel	Colors	Resolution	Pixel Freq. (MHz)	Horizontal Freq. (kHz)	Vert. Freq. (Hz)
58, 6A	8	16/256K	800 X 600	36	35.2	56
58, 6A	8	16/256K	800 X 600	40	37.8	60
58, 6A	8	16/256K	800 X 600	50	48.1	72
58, 6A	8	16/256K	800 X 600	49.5	46.9	75
5C	8	256/256K	800 X 600	36	35.2	56
5C	8	256/256K	800 X 600	40	37.9	60
5C	8	256/256K	800 X 600	50	48.1	72
5C	8	256/256K	800 X 600	49.5	46.9	75
5C	8	256/256K	800 X 600	56.25	53.7	85
5C	8	256/256K	800 X 600	68.2	63.6	100
5D	8	16/256K (interlaced)	1024 X 768	44.9	35.5	43
5D	8	16/256K	1024 X 768	65	48.3	60
5D	8	16/256K	1024 X 768	75	56	70
5D	8	16/256K	1024 X 768	78.7	60	75
5E	8	256/256K	640 X 400	25	31.5	70
5F	8	256/256K	640 X 480	25	31.5	60
5F	8	256/256K	640 X 480	31.5	37.9	72
5F	8	256/256K	640 X 480	31.5	37.5	75
5F	8	256/256K	640 X 480	36	43.3	85
5F	8	256/256K	640 X 480	43.2	50.9	100
60	8	256/256K (interlaced)	1024 X 768	44.9	35.5	43
60	8	256/256K	1024 X 768	65	48.3	60
60	8	256/256K	1024 X 768	75	56	70
60	8	256/256K	1024 X 768	78.7	60	75
60	8	256/256K	1024 X 768	94.5	68.3	85
60	8	256/256K	1024 X 768	113.3	81.4	100
64	16	64K	640 X 480	25	31.5	60
64	16	64K	640 X 480	31.5	37.9	72
64	16	64K	640 X 480	31.5	37.5	75
64	16	64K	640 X 480	36	43.3	85
64	16	64K	640 X 480	43.2	50.9	100

Mode(s) in Hex	Bits per pixel	Colors	Resolution	Pixel Freq. (MHz)	Horizontal Freq. (kHz)	Vert. Freq. (Hz)
65	16	64K	800 X 600	36	35.2	56
65	16	64K	800 X 600	40	37.8	60
65	16	64K	800 X 600	50	48.1	72
65	16	64K	800 X 600	49.5	46.9	75
65	16	64K	800 X 600	56.25	53.7	85
65	16	64K	800 X 600	68.2	63.6	100
66	16	32K	640 X 480	25	31.5	60
66	16	32K	640 X 480	31.5	37.9	72
66	16	32K	640 X 480	31.5	37.5	75
66	16	32K	640 X 480	36	43.3	85
66	16	32K	640 X 480	43.2	50.9	100
67	16	32K	800 X 600	36	35.2	56
67	16	32K	800 X 600	40	37.8	60
67	16	32K	800 X 600	50	48.1	72
67	16	32K	800 X 600	49.5	46.9	75
67	16	32K	800 X 600	56.25	53.7	85
67	16	32K	800 X 600	68.2	63.6	100
68	16	32K (interlaced)	1024 X 768	44.9	35.5	43
68	16	32K	1024 X 768	65	48.3	60
68	16	32K	1024 X 768	75	56	70
68	16	32K	1024 X 768	78.7	60	75
68	16	32K	1024 X 768	94.5	68.3	85
68	16	32K	1024 X 768	113.3	81.4	100
6C	8	16/256K (interlaced)	1280 X 1024	75	48	43
6D	8	256/256K (interlaced)	1280 X 1024	75	48	43
6D	8	256/256K	1280 X 1024	108	65	60
6D	8	256/256K	1280 X 1024	135	80	75
6D	8	256/256K	1280 X 1024	157.5	91	85
6E	16	32K	1152 X 864	94.5	63.9	70
6E	16	32K	1152 X 864	108	67.5	75
6E	16	32K	1152 X 864	121.5	76.7	85

Mode(s) in Hex	Bits per pixel	Colors	Resolution	Pixel Freq. (MHz)	Horizontal Freq. (kHz)	Vert. Freq. (Hz)
6E	16	32K	1152 X 864	143.5	91.5	100
71	24	16M	640 X 480	25	31.5	60
71	24	16M	640 X 480	31.5	37.9	72
71	24	16M	640 X 480	31.5	37.5	75
71	24	16M	640 X 480	36	43.3	85
71	24	16M	640 X 480	43.2	50.9	100
74	16	64K (interlaced)	1024 X 768	44.9	35.5	43
74	16	64K	1024 X 768	65	48.3	60
74	16	64K	1024 X 768	75	56	70
74	16	64K	1024 X 768	78.7	60	75
74	16	64K	1024 X 768	94.5	68.3	85
74	16	64K	1024 X 768	113.3	81.4	100
78	16	32K	800 X 600	36	35.2	56
78	24	16M	800 X 600	40	37.8	60
78	24	16M	800 X 600	50	48.1	72
78	24	16M	800 X 600	49.5	46.9	75
78	24	16M	800 X 600	56.25	53.7	85
78	24	16M	800 X 600	68.2	63.6	100
7B	8	256/256K (interlaced)	1600 X 1200	135	62.5	48
7B	8	256/256K	1600 X 1200	162	75	60
7C	8	256/256K	1152 X 864	94.5	63.9	70
7C	8	256/256K	1152 X 864	108	67.5	75
7C	8	256/256K	1152 X 864	121.5	76.7	85
7C	8	256/256K	1152 X 864	143.5	91.5	100
7D	16	64K	1152 X 864	94.5	63.9	70
7D	16	64K	1152 X 864	108	67.5	75
7D	16	64K	1152 X 864	121.5	76.7	85
7D	16	64K	1152 X 864	143.5	91.5	100

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