

# SKA4 Baseboard Product Guide

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Order Number: A09429-003

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

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# Part I: User's Guide

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- 1 Baseboard Description
- 2 Configuration Software and Utilities



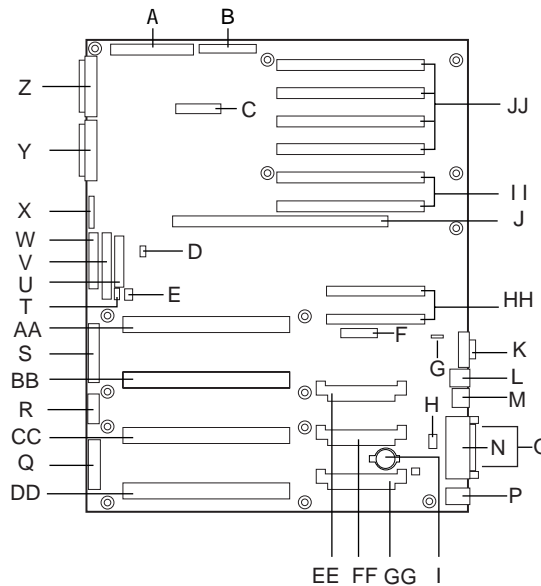
# 1 Baseboard Description

## Baseboard Features

**Table 1. Baseboard Features**

Feature	Description
Processor	Installed: Up to four Intel® Pentium® III Xeon™ processors, packaged in single edge contact (S.E.C.) cartridges and installed in 330-pin SC330.1 compliant edge connectors, operating at 1.8 V to 3.5 V. The baseboard's voltage regulator is automatically programmed by the processor's VID pins to provide the required voltage. The baseboard includes connectors for three 8.3-compliant plug-in voltage-regulator modules (VRM).
Memory, dynamic random access (DRAM)	Single plug-in module containing 64/72-bit four-way-interleaved pathway to main memory supporting SDRAM. Installed: 256 MB to 16 GB of error correcting code (ECC) memory. A minimum of four DIMMs must be installed.
Video memory (DRAM)	Installed: 2 MB of video memory.
PCI Segment A bus PCI Segment B bus PCI Segment C bus	<p><b>PCI-A</b>—Two full length connectors and one embedded device:</p> <ul style="list-style-type: none"> <li>• Two 184-pin, 3.3 V keyed, 64-bit PCI expansion connectors (66/33 MHz).</li> <li>• One DesotoE2 Hot-Plug PCI controller.</li> </ul> <p><b>PCI-B</b>—Four full length connectors and two embedded devices:</p> <ul style="list-style-type: none"> <li>• One Adaptec† AIC-7899 dual channel SCSI-3 Ultra 160/m SCSI controller.</li> <li>• Four 184-pin, 5 V keyed, 64-bit PCI expansion connectors (33 MHz).</li> <li>• One DesotoE2 Hot-Plug PCI controller.</li> </ul> <p><b>PCI-C</b>—Two half length connectors and several embedded devices:</p> <ul style="list-style-type: none"> <li>• Two 120-pin, 32-bit PCI expansion connectors (33 MHz).</li> <li>• OSB4 I/O APIC.</li> <li>• PCI network interface controller.</li> <li>• ATI Rage† IIc video controller.</li> <li>• PCI narrow/wide Adaptec AIC-7880 Ultra SCSI controller.</li> </ul>
PCI Bus Master IDE Interface	The baseboard supports Ultra DMA33 Synchronous Direct Memory Access (DMA) mode transfers.
USB Interface	The baseboard provides a dual external USB connector and one internally accessible header.
Server Management	Thermal/voltage monitoring and error handling. Front panel controls and indicators (LEDs).
Graphics	ATI Rage IIc VGA Graphics Accelerator, along with video SGRAM and support circuitry for an embedded SVGA video subsystem.
SCSI	Two embedded SCSI controllers: <b>Adaptec AIC-7899 SCSI Controller</b> —Dual Channel Wide Ultra/Ultra II/Ultra 160/M SCSI controller. <b>Adaptec AIC-7880 SCSI Controller</b> —PCI narrow/wide Ultra SCSI controller.
System I/O	PS/2†-compatible keyboard and mouse ports, 6-pin DIN. Advanced parallel port, supporting Enhanced Parallel Port (EPP) levels 1.7 and 1.9, ECP, compatible 25-pin. VGA video port, 15-pin. Two serial ports, 9-pin (serial port A is the top connector).
Form Factor	Form-factor, 16 × 13 inches, ATX-style backpanel I/O.

# Baseboard Connector and Component Locations



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**Figure 1. Baseboard Connector and Component Locations**

- |  |  |
|--|--|
| A. Legacy Narrow SCSI                              | B. Legacy Wide SCSI                                |
| C. SMM Connector                                   | D. IMB Connector                                   |
| E. HDD Activity                                    | F. HPIB Connector                                  |
| G. ICMB Connector                                  | H. Internal USB Connector                          |
| I. Lithium Battery                                 | J. Memory Module Connector                         |
| K. Video Connector                                 | L. USB, External Connector                         |
| M. Network Connector                               | N. Parallel Connector                              |
| O. COM1, COM2 Connector                            | P. Keyboard/Mouse                                  |
| Q. Main Power 1                                    | R. Auxiliary Power                                 |
| S. Main Power 2                                    | T. SMBus   |
| U. Front Panel                                     | V. IDE Connector                                   |
| W. Floppy Connector                                | X. Configuration Jumpers                           |
| Y. Ultra 160 SCSI A                                | Z. Ultra 160 SCSI BA. Legacy<br>Narrow SCSI        |
| AA. Processor #1                                   | BB. Processor #2                                   |
| CC. Processor #3                                   | DD. Processor #4                                   |
| EE. Voltage Regulator Module (VRM)<br>Connector #2 | FF. Voltage Regulator Module (VRM)<br>Connector #3 |
| GG. Voltage Regulator Module (VRM)<br>Connector #4 | HH. 32-bit, 33 MHz Half-length PCI<br>Slots        |
| II. 64-bit, 66/33 MHz Hot-Plug PCI                 | JJ. 64-bit, 33 MHz Hot-Plug PCI Slots              |



## CAUTION

**Lithium Battery:** See "Replacing the Backup Battery" on page 68 of this product guide for instructions on replacing and disposing of the Lithium Battery.

# Processor

Each Intel Pentium III Xeon 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 plastic cover.

The processor core and L2 cache components are on a pre-assembled printed circuit board, approximately 5 inches by 6 inches. The L2 cache and processor core L1 cache interface use a private bus isolated from the processor host bus. The L2 cache bus operates at the processor core frequency.

Each S.E.C. cartridge connects to the baseboard through a 330-pin SC330.1 compliant edge connector. A retention module attached to the baseboard secures the cartridge. Depending on configuration, the system supports one to four processors.

The processor external interface is MP-ready and operates at 100 MHz. The processor contains a local Advanced Configuration and Power Interface (APIC) unit for interrupt handling in multiprocessor (MP) and uniprocessor (UP) environments.

**Table 2. SKA4 Pentium Xeon Processor Family Support Matrix**

Name	Frequency	Cache Size	Support (Y/N)
Pentium II Xeon processor	400 MHz, 450 MHz	512k, 1M, 2M	No
Pentium III Xeon processor	500 MHz 550 MHz	512k, 1M, 2M	Yes
Pentium III Xeon processor	600 MHz +	256k	No
2.8 V Pentium III Xeon processor	600 MHz +	1M, 2M	Yes
5/12 V Pentium III Xeon processor	600 MHz +	1M, 2M	No

The L2 cache is located on the substrate of the S.E.C. cartridge. The cache:

- Is offered in 512 KB, 1 MB, and 2 MB configurations
- Has ECC
- Operates at the full core clock rate

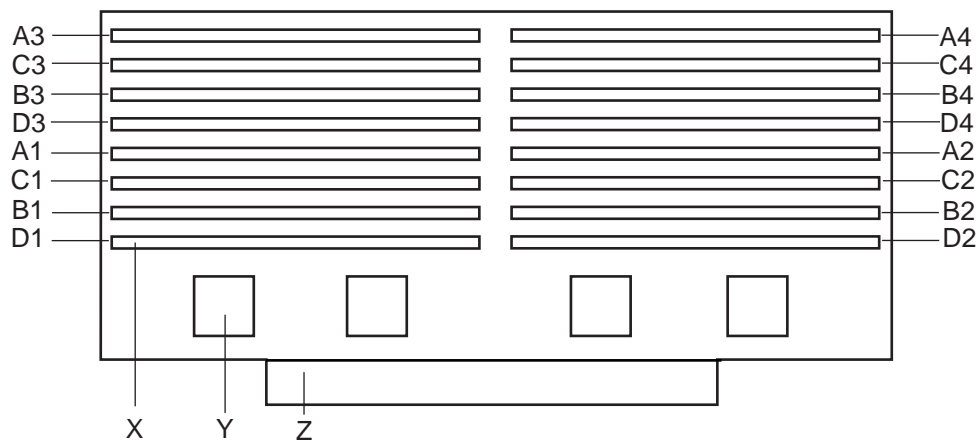
# Memory

Main memory resides on an add-in board, called a memory module, designed for the SKA4 baseboard. The memory module contains slots for 16 DIMMs, each of which must be at least 64 MB, and is attached to the baseboard through a 330-pin connector, called the Memory Expansion Card Connector (MECC). The memory module supports PC-100 compliant registered ECC SDRAM memory modules. The ECC used for the memory module is capable of correcting single-bit errors (SBEs) and detecting 100 percent of double-bit errors over one code word. Nibble error detection is also provided.

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 1 MB).
- Extended memory begins at address 0100000h (1 MB) and extends to 3FFFFFFFh (16 GB), which is the limit of supported addressable memory. The top of physical memory is a maximum of 16 GB (to 3FFFFFFFh).

Memory amounts from 256 MB to 16 GB of DIMM are supported, with a 64/72-bit four-way-interleaved pathway to main memory, which is also located on the module. Therefore, data transfers between MADPs and DIMMs is in four-way interleave fashion. Each of the four DIMMs must be populated in a bank. The 16 slots are divided into four banks of four slots each. They are labeled A through D. Bank A contains DIMM sockets A1, A2, A3, and A4. Banks B, C, and D each contain 4 DIMM sockets and are named in the same fashion. There are silk screens on the module next to each DIMM socket to label its bank number. For the best thermal results, populate the banks from A to D. For example, populate bank A and then bank B. For best performance results, populate adjacent banks. For example, populate bank A and then bank C.



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**Figure 2. Memory Module DIMM Installation Sequence**

- X. One of sixteen DIMM sockets
- Y. One of four Memory Address Data Paths (MADP)
- Z. Memory Expansion Card Connector (MECC)



Each slot is identified by another notation. Sockets A1 through A4 are identified as J1 through J4 respectively. Sockets B1 through B4 are identified as J5 through J8. Sockets C1 through C4 are identified as J9 through J12. Sockets D1 through D4 are identified as J13 through J16.

⇒ **NOTE**

Based on the chipset, addressable memory can be extended to 16 GB. However, some server systems are not thermally configured to support all 16 GB. Consult the documentation accompanying your server system to determine the maximum memory configuration of your server system.

Some operating systems and application programs use base memory while others use both conventional and extended memory. Examples are

- Base memory: Microsoft MS-DOS<sup>†</sup>, IBM OS/2<sup>†</sup>, Microsoft Windows NT<sup>†</sup>, and various UNIX<sup>†</sup>
- Conventional and extended memory: IBM OS/2, Microsoft Windows NT, and various UNIX

MS-DOS does not use extended memory; however, some MS-DOS utility programs like RAM disks, disk caches, print spoolers, and windowing environments use extended memory for better performance.

The BIOS 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.

⇒ **NOTE**

**DIMM sizes and compatibility:** Use DIMMs that have been tested for compatibility with the baseboard. For a list of approved DIMMs, see the *SKA4 Memory Qualification List*. The document can be found on

<http://support.intel.com/support/motherboards/server/SKA4/compat.htm>.

# Peripherals

## Super I/O Chip (SIO)

The National<sup>†</sup> PC97317VUL Super I/O Plug and Play Compatible with ACPI Compliant Controller/Extender device supports two serial ports, one parallel port, diskette drive, and PS/2-compatible keyboard and mouse. The system provides the connector interface for each port.

### Serial Ports

Both serial ports can be relocated. Each serial port can be set to one of four different COMx ports, and each can be enabled separately. When disabled, serial port interrupts are available to add-in boards.

### Parallel Port

The SKA4 baseboard provides a 25-pin Parallel Port connector. The SIO provides an IEEE 1284-compliant 25-pin bi-directional parallel port. BIOS programming of the SIO registers enable the parallel port, and determine the port address and interrupt. When disabled, the interrupt is available to add-in cards.

## Add-in Board Slots

The baseboard has eight slots for PCI add-in boards supported by three PCI bus segments called PCI-A, PCI-B, and PCI-C. There are two on PCI-A, four on PCI-B, and two on PCI-C. PCI-C supports half-length boards (5.6" to 6.3") only; the other slots support full-length boards.

The two slots for the PCI bus segment PCI-C consume a maximum of 375 mA of standby current on a 3.3V AUX power line. The remaining six slots do not have any 3.3V Aux capabilities.

Both PCI segments A and B allow you to add, remove, or replace PCI add-in boards installed in their slots without interrupting normal operation or powering down the system. To use this PCI Hot-Plug (PHP) feature, a server system requires PCI Hot-Plug software and PCI Hot-Plug capable add-in boards. PCI Hot-Plug software usually is a driver loaded for a specific operating system.

Each Hot-Plug PCI slot has two LEDs. The green LED indicates the state of power on each slot. The amber LED indicates an error condition with that slot.

The table below summarizes typical LED states that you may encounter during a system's operation.

**Table 3. Slot State Indicators**

LED State	Status
Green On Amber Off	The slot is on and functioning normally.
Green On Amber On	The slot is on and the card requires attention.
Green Off Amber On	The slot is off and the card in the slot requires attention.
Green blinking Amber Off	Slot power is transition from either ON to OFF or OFF to ON.
Off	The slot is powered off.

PCI features include:

- 33 or 66 MHz bus speed
- 32-bit or 64-bit memory addressing
- 3.3V or 5V signaling environment
- Independent bus structure supports transfers up to 1.2 GB/sec
- 8-, 16-, 32-, or 64-bit data transfers
- Plug and Play ready
- Parity enabled

## DesotoE2 Hot-Plug PCI Controller

The DesotoE2 Hot-Plug PCI controller is a 32-bit PCI bus agent that operates at either 33 or 66 MHz. The PCI controller manages PHP functionality for the PCI segment it resides on. There is a DesotoE2 controller on PCI segments A and B. The DesotoE2 PHP controller is:

- ACPI compliant
- Compatible with Compaq's<sup>†</sup> PHP controller design
- Supports either a 3.3 V or 5 V PCI bus

The DesotoE2 is responsible for:

- Managing power application and removal to individual slots
- Properly resetting newly-added PCI boards prior to bringing the board online
- Managing connection and disconnection of the PCI signals between the PCI bus and the add-in board
- Managing seamless addition and removal of individual PCI add-in boards without impacting bus functionality

## IDE Interface

The Open South Bridge (OSB4) acts as a PCI-based fast IDE controller. The controller supports programmed I/O and bus master transfers. While the OSB4 supports two IDE channels, the SKA4 baseboard uses only the primary IDE channel and provides a single 40 pin IDE connector.

## USB Interface

The SKA4 baseboard provides a dual external USB connector for the back panel of a server system. The connector is defined by the *USB Specification, Revision 1.0*. Both ports function identically with the same bandwidth. The SKA4 baseboard also provides a proprietary internal USB header.

## Network Interface Controller (NIC)

The SKA4 baseboard supports a 10BASE-T/100BASE-TX network subsystem based on the Intel® 82559 Fast Ethernet Multifunction PCI/CARDBus controller. The Intel 82559 controller is a highly integrated PCI LAN controller in a 196-pin Ball Grid Array (BGA) supporting 10 or 100 Mbps fast Ethernet networks.

Supported network features include:

- Glueless 32-bit PCI Bus Master Interface compatible with the *PCI Local bus Specification*
- 82596-like 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
- On-chip counters for network management
- Auto-detect and auto-switching for 10 or 100 Mbps network speeds
- Support for both 10 and 100 Mbps networks
- Integrated physical interface to TX magnetics
- The magnetics component terminates the 100BASE-TX connector interface and a flash device stores the network ID

## Video

The SKA4 baseboard provides an ATI Rage IIC VGA Graphics Accelerator, along with video Synchronous Graphics RAM (SGRAM) and support circuitry for an embedded Super VGA (SVGA) video subsystem. The ATI Rage IIC chip contains an SVGA video controller, clock generator, BitBLT engine, and a RAM digital-to-analog Converter (RAMDAC) in a 208-pin PQFP. One 256K x 32 SGRAM chip provides 2 MB of 10-ns video memory. The baseboard does not support adding video memory to the system. The SVGA subsystem supports a variety of modes, up to 1600 x 1200 resolution, or up to 16.7 M colors.

The SVGA subsystem also supports analog VGA monitors, single- and multi-frequency, interlaced and non-interlaced, up to 100 Hz vertical retrace frequency. The SKA4 baseboard provides a standard 15-pin VGA connector and video blanking logic for server management console redirection support.

Depending on the environment, the controller displays up to 16.7 M colors in some video resolutions.

## SCSI Controller

The baseboard includes two SCSI controllers. A dual function SCSI controller (Adaptec AIC-7899) is on the PCI-B bus, and a PCI wide SCSI controller (Adaptec AIC-7880) is on the PCI-C bus.

The Adaptec AIC-7899 SCSI controller contains two independent SCSI controllers that share a single PCI bus master interface as a multifunction device, packaged in a 352-pin ball grid array (BGA). Internally, each controller is identical, capable of operations using either 16-bit SE or Low Voltage Differential (LVD) SCSI providing 40 MBps (Ultra-wide SE), 80 MBps (Ultra 2), or 160 MBps (Ultra 160/m).

In the SKA4 implementation, both controller A and controller B attach to a 68-pin 16-bit differential SCSI connector LVD interface. Each controller has its own set of PCI configuration registers and SCSI I/O registers. As a PCI bus master, the AIC-7899 controller supports burst data transfers on PCI up to the maximum rate of 266 MBps using on-chip buffers.

The AIC-7880 controller contains a single SCSI controller with full-featured PCI bus master interface in a 160-pin Plastic Quad Flat Pack (PQFP). The controller supports either 8- or 16-bit Fast SCSI providing 10 MBps or 20 MBps (Fast-10) throughput, or Fast-20 SCSI that can burst data at 20 MBps or 40 MBps. As a PCI 2.1 bus master, the AIC-7880 controller supports burst data transfers on PCI up to the maximum rate of 133 MBps using the on-chip 256-byte FIFO.

The SKA4 AIC-7880 implementation offers 8-bit or 16-bit SCSI connectors and operation at data transfer rates of 10, 20, or 40 MBps. The AIC-7880 controller also offers active negation outputs, controls for external differential transceivers, a disk activity output, and a SCSI terminator power-down control. Active negation outputs reduce the chance of data errors by actively driving both polarities of the SCSI bus, avoiding indeterminate voltage levels and common-mode noise on long cable runs. The SCSI output drivers can directly drive a 48-mA single-ended SCSI bus with no additional drivers. The SCSI segment can support up to 15 devices.

The AIC-7880 controller can be used as an 8-bit controller via the narrow, 50-pin connector and as a 16-bit controller via the wide, 68-pin connector. As a result, the AIC-7880 controller is not always at one end of the SCSI bus, and termination is controlled through some simple circuitry. The circuitry senses whether there is a device attached through the narrow 50-pin connector or the wide 68-pin connector. When there are devices off both connectors, the termination is on for the upper 8 bits of data and the parity bit associated with these data lines. All other signals are not terminated on board and are terminated by the devices attached through the connector. When there is a device on only one connector (either wide or narrow), all on-board termination is on.

## IDE Controller

IDE is a 16-bit interface for intelligent disk drives with AT† disk controller electronics onboard. The Open South Bridge (OSB4) 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 33 MB/sec
- Ultra DMA 33 capacity
- Buffering for PCI/IDE burst transfers
- Master/slave IDE mode
- Up to two drives for one IDE channel

### ⇒ NOTE

**18-inch maximum length of IDE cable:** An IDE signal cable can be connected up to the IDE connector on the baseboard. However, the maximum length of the cable is 18 inches. The cable supports up to two devices, one at the end of the cable and the other six inches from the end.

## Keyboard and Mouse

The PS/2-compatible keyboard and mouse connectors are mounted in a single-stacked housing with the mouse connector over the keyboard. External to the system, they appear as two connectors.

The user can plug in the keyboard and mouse to either connector before powering up the system. BIOS detects these and configures the keyboard controller accordingly.

The keyboard controller is functionally compatible with the Intel® 8042A microcontroller. The system can be locked automatically if no keyboard or mouse activity occurs for a predefined length of time, if specified through the SSU. Once the inactivity (lockout) timer has expired, the keyboard and mouse do not respond until the previously stored password is entered.

# Server Management

Server management features are implemented using one microcontroller called the Baseboard Management Controller (BMC).

## Baseboard Management Controller (BMC)

The BMC and associated circuitry are powered from 5V\_Standby, which remains active when system power is switched off. The BMC is IPMI 1.0 compliant.

The primary function of the BMC is to autonomously monitor system platform management events and log their occurrence in the nonvolatile System Event Log (SEL). The BMC is compliant to the *Intelligent Platform Management Interface Specification, Version 1.0*. These events include overtemperature and overvoltage conditions, fan failure, or chassis intrusion. While monitoring, the BMC maintains the nonvolatile Sensor Data Record Repository (SDRR), from which run-time information can be retrieved. The BMC provides an interface to SDRR information, so software running on the server can poll and retrieve the current status of the platform. A shared register interface is defined for this purpose.

Field service personnel can retrieve SEL contents after system failure for analysis by using system management tools like Intel® LANDesk® Server Manager, Intel Server Control (ISC), or Direct Platform control (DPC). Because 5V\_Standby provides power the BMC, SEL (and SDRR) information is also available via the interperipheral management bus (IPMB). During monitoring, 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
- Sensor Data Record Repository (SDRR) interface management
- SDR/SEL timestamp clock
- Baseboard Field Replaceable Unit (FRU) information interface
- System management watchdog timer
- SMI/NMI Status Monitor
- Front panel NMI handling
- Event receiver
- IPMB Management Controller Initialization Agent
- Secure mode control, front panel lock/unlock initiation, and video blank and diskette write protect monitoring and control
- ACPI Support
- Direct Platform Control (DPC) support
- Platform Event Paging (PEP) / Platform Event Filtering (PEF)
- Power distribution board monitoring
- Speaker beep capability. When the system is powered up, this capability is used to indicate conditions such as "empty processor slot"
- Pentium III Xeon processor SEEPROM interface for Processor Information ROM (PIROM) and Scratch EEPROM access

- Processor temperature monitoring
- Hot-Plug PCI slot status reporting
- Processor bus speed setting
- Chassis fan failure light control
- Chassis power fault light control
- Chassis power light control

## System Security

To help prevent unauthorized entry or use of the system, the system includes a three-position key lock/switch to permit selected access to drive bays (position is communicated to BMC). The system also includes server management software that monitors the chassis intrusion switch.

### Software Locks via the SSU or BIOS Setup

The SSU provides a number of security features to prevent unauthorized or accidental access to the system. Once the security measures are enabled, access to the system is allowed only after the user enters the correct password(s). For example, the SSU allows:

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

### Using Passwords

If a user password is set and enabled, but an administrator password is not set, a user password must be entered to boot the system and run the SSU.

If both a user and administrator password is set:

- Enter either one to boot the server and enable the keyboard and mouse
- Enter the administrator password to access the SSU or BIOS Setup to change the system configuration

### Secure Mode

Configure and enable the secure boot mode by using the SSU. When secure mode is in effect,

- The system can boot and the operating system runs, but the user password must be entered for a user to use the keyboard or mouse
- The system cannot be turned off or reset 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 (RTC).



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 power off when secure mode is later removed. However, if the front panel power switch remains depressed when secure mode is removed, the system will power off.

## Summary of Software Security Features

Table 4 lists the software security features and describes what protection each offers. In general, to enable or set the features listed here, the SSU must be run and configured with the Security Menu (described in this manual on page 39.) The table also refers to other SSU menus and to the Setup utility. For greater detail, see Chapter 2, beginning on page 27.

**Table 4. Software Security Features**

Feature	Description
Secure mode	<p><b>How to enter secure mode:</b></p> <ul style="list-style-type: none"> <li>Setting and enabling passwords automatically places the system in secure mode.</li> <li>If a hot key combination is set (through the SSU or Setup), the system can be secured simply by pressing the key combination. This means that the user does not have to wait for the inactivity time-out period.</li> </ul> <p><b>When the system is in secure mode:</b></p> <ul style="list-style-type: none"> <li>The server can boot and run the operating system, but mouse and keyboard input is not accepted until the user password is entered.</li> <li>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 server boots from CD or diskette and disables the secure mode.</li> <li>If there is no CD in the CD-ROM drive or diskette in drive A, the server boots from drive C and automatically goes into secure mode. All enabled secure mode features go into effect at boot time.</li> </ul> <p>To leave secure mode, enter the correct password(s).</p>
Disable writing to diskette	<p>In secure mode, the server will not boot from or write to a diskette unless a password is entered. To set this feature, use the SSU Security Subsystem Group.</p> <p>To write protect access to diskette whether the server is in secure mode or not, use the Setup main menu, Floppy Options, and specify Floppy Access as read only.</p>
Disable the power and reset buttons	<p>Power and reset buttons are always disabled when the server is in secure mode.</p>
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	<p>Specify and enable an inactivity time out period of from 1 to 120 minutes.</p> <p>If no keyboard or mouse action occurs for the specified period, attempted keyboard and mouse input will not be accepted.</p> <p>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 and using onboard video).</p> <p>To resume activity, enter the user password.</p>

continued

**Table 4. Software Security Features** (continued)

<b>Feature</b>	<b>Description</b>
Control access to using the SSU: set administrative password	<p>To control access to setting or changing the system configuration, set an administrative password and enable it through Setup or the SSU.</p> <p>If both the administrative and user passwords are enabled, either can be used to boot the server or enable the keyboard and/or mouse, but only the administrative password will allow Setup and the SSU to be changed.</p> <p>To disable a password, change it to a blank entry or press CTRL-D in the Change Password menu of the Administrative Password Option menu found in the Security Subsystem Group.</p> <p>If you cannot access Setup or the SSU to clear the password, change the Clear Password jumper. See "CMOS Clear Jumper" on page 109.</p>
Control access to the system other than SSU: set user password	<p>To control access to using the system, set a user password and enable it through Setup or the SSU.</p> <p>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.</p> <p>If you cannot access Setup or the SSU to clear the password, change the Clear Password jumper. See "CMOS Clear Jumper" on page 109.</p>
Boot without keyboard	<p>The system can boot with or without a keyboard. During POST, before the system completes the boot sequence, 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.</p>
Specify the boot sequence	<p>The sequence specified on the menu in the SSU MultiBoot Group will determine the boot order. If secure mode is enabled (a user password is set), then the user is prompted for a password before the server fully boots. If secure mode is enabled and the "Secure Boot Mode" option is also enabled, the server fully boots but requires a password before accepting any keyboard or mouse input.</p>

## 2 Configuration Software and Utilities

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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 system board from the default setting (Protect CMOS memory) to the Clear setting; this will allow most system configurations to boot. For the procedure to do this, see "CMOS Clear Jumper" on page 109.	29
Changing Boot Device Priority	Use this option to change the boot device priority temporarily or permanently.	44
SCSI <i>Select</i> Utility	Use to configure the SCSI controllers in the system.	45
Adaptec SCSI Utility	Use to configure or view the settings of the SCSI host adapters and onboard SCSI devices in the system.	46
Server Setup Utility (SSU)	Use for extended system configuration of onboard resources and add-in boards, viewing the system event log (SEL), setting boot device priority, or setting system security options.  The SSU can be run from either the configuration software CD or from a set of bootable diskettes. You can create the diskettes from the CD.  Information entered via the SSU overrides information entered via Setup.	47
Direct Platform Control (DPC) Console	Use to access and monitor the server remotely.	49
FRUSDR Load Utility	Use to update the Field Replacement Unit (FRU), Sensor Data Record (SDR), and Desktop Management Interface (DMI) flash components.	51
BIOS Update Utility	Use to update the BIOS or recover from a corrupted BIOS update.	53
Firmware Update Utility	Use to update BMC flash ROM.	56

# 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>+hot key (Set your hot key combination with the SSU or Setup.)
Enter the Adaptec SCSI Utility during BIOS POST.	<Ctrl+A>
Enter BIOS Setup during BIOS POST.	F2
Abort memory test during BIOS POST.	ESC (Press while BIOS is updating memory size on screen.)

## Power-On Self Test (POST)

Each time you turn on the system, the BIOS begins execution of the Power-On Self Test (POST). POST discovers, configures, and tests the processors, memory, keyboard, and most installed peripheral devices. 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 and a splash screen is displayed.
2. While the splash screen is displayed, you can either
  - press <F2> to enter the BIOS Setup (see "Using BIOS Setup" on page 29)OR
  - press <Esc> to change the boot device priority for this boot only (see "Changing the Boot Device Priority Temporarily" on page 44).
3. After pressing <F2> or <Esc> during POST, you can press <Ctrl+A> to run the *SCSISelect* Utility. For more information, see "Running the *SCSISelect* Utility" on page 45.
4. If you do not press <F2> or <Esc> and do NOT have a device with an operating system loaded, the boot process continues and the system beeps once. The following message is displayed:  

```
Operating System not found
```
5. At this time, pressing any key causes the system to attempt a reboot. The system searches all removable devices in the order defined by the boot priority.
6. If you want to boot from a hard drive loaded with an operating system, make sure that the hard drive is installed and push the Reset button on the front panel.

# 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 the system is booted. 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 run Setup to specify the correct configuration.

**Run Setup:** Run Setup to modify any standard PC-AT<sup>†</sup> baseboard feature such as:

- Select diskette drive
- Select parallel port
- Select serial port
- Set time/date (to be stored in RTC)
- Configure hard drive(s)
- Specify boot device sequence
- Enable SCSI BIOS

**Run SSU, not Setup:** Run the SSU instead of Setup to do the following:

- Enter or change information about a board
- Alter system resources (e.g., interrupts, memory addresses, I/O assignments) to user-selected choices instead of choices selected by the BIOS resource manager

## Record Setup Settings

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

## If Setup is Not Accessible

If the diskette drive is misconfigured and you cannot use Setup to correct the problem, you might need to clear CMOS memory. You must open the system, change a jumper setting, use Setup to check and set diskette drive options, and change the jumper back. For a step-by-step procedure, see “CMOS Clear Jumper” on page 109.

## Starting Setup

Setup can be entered under several 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.
- When you have moved the CMOS jumper on the baseboard to the “Clear CMOS” position (enabled); for a step-by-step procedure, see “CMOS Clear Jumper” on page 109.

In the three conditions listed above, the following prompt is displayed:

Press <F2> to enter SETUP

In a fourth condition, when CMOS/NVRAM has been corrupted, these other prompts are displayed, but not the <F2> prompt:

```
Warning:  cmos checksum invalid
```

```
Warning:  cmos time and date not set
```

In this condition, the BIOS loads default values for CMOS and attempts to boot.

## Setup Menus

Setup has six major menus and several submenus:

1. Main Menu
  - Primary IDE Master and Slave Adapters
  - Processor Settings Information
2. Advanced Menu
  - PCI Configuration
    - Embedded Video Controller
    - Embedded Legacy SCSI
    - Embedded Dual Ultra 160 SCSI
    - Embedded NIC
    - PCI Devices, Slots 1 - 8
    - Hot-Plug PCI Control
  - Integrated Peripheral Configuration
  - Advanced Chipset Control
3. Security Menu
  - Passwords
  - Lockout features
4. Server Menu
  - System Management
  - Console Redirection
  - EMP Configuration
  - PEP Management
5. Boot Menu
  - Boot Device Priority
  - Hard Drive
  - Removable Devices Selections
6. Exit Menu

## Navigation

To:	Press:
Get general help	<F1> or <Alt+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>

## Display

When you see this:	What it means:
On screen, an option is shown but you cannot select it or move to that field.	You cannot change or configure the option in that menu screen for one of the following reasons: <ul style="list-style-type: none"> <li>• The option is auto-configured or auto-detected.</li> <li>• You must use a different Setup screen to change it.</li> <li>• You must use the SSU.</li> </ul>
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

Table 7 lists the selections you can make on the Main Menu itself. Use the submenus for other selections. Default values are in **bold**.

**Table 7. Main Menu**

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 <b>1.44/1.25 MB 3½"</b> 2.88 MB 3½"	Selects the diskette type.
Legacy Diskette B:	<b>Disabled</b> 1.44/1.25 MB 3½" 2.88 MB 3½"	Selects the diskette type.
Primary IDE Master	N/A	Enters submenu.
Primary IDE Slave	N/A	Enters submenu.
Processor Settings	N/A	Enters submenu.
Language	<b>English (US)</b> French Spanish German Italian Japanese (Kanji)	Selects which language BIOS displays.  ⇒ <b>NOTE</b> Serial redirection does not work with Kanji.

## Primary IDE Master and Slave Submenu

In the following table, the features other than “Type” appear only for Type Auto if a drive is detected.

**Table 8. Primary IDE Master and Slave Submenu**

Feature	Choices	Description
Type	User <b>Auto</b> CD-ROM ATAPI Removable	User allows the manual entry of all fields described below. Auto allows the system to attempt auto-detection of the drive type. CD-ROM allows the manual entry of fields described below.
Multi-Sector Transfers	<b>Disabled</b> 2, 4, 8, or 16 sectors	Determines the number of sectors per block for multisector transfers. For Type Auto, this field is informational only.
LBA Mode Control	<b>Disabled</b> Enabled	For Type Auto, this field is informational only.
32 Bit I/O	<b>Disabled</b> Enabled	Enabling allows 32-bit IDE data transfers. For Type Auto, this field is informational only.
Transfer Mode	<b>Standard</b> Fast PIO 1 Fast PIO 2 Fast PIO 3/DMA 1 Fast PIO 4/DMA 2	Selects the method for moving data to and from the drive. For Type Auto, this field is informational only.
Ultra DMA Mode	<b>Disabled</b> Enabled	For use with Ultra DMA drives. Ultra DMA is disabled by default to work around a chipset erratum. For Type Auto, this field is informational only.

## Processor Settings Submenu

**Table 9. Processor Settings Submenu**

Feature	Choices	Description
Processor Retest	<b>No</b> Yes	Select yes for the BIOS to clear historical processor status and retest all processors on the next boot.
Processor Serial Number	<b>Enabled</b> Disabled	If enabled, the system records the serial number of each processor.
Memory Cache	<b>Enabled</b> Disabled	Controls cacheability. For debug purposes only.
Measured Processor Speed	N/A	Reports the speed of Processor 1.
Processor 1 CPU ID	N/A	Reports Stepping for Processor 1.
Processor 1 L2 Cache Size	N/A	Reports L2 Cache Size for Processor 1. This feature is hidden if processor 1 is absent or disabled.
Processor 2 CPU ID	N/A	Reports Stepping for Processor 2.
Processor 2 L2 Cache Size	N/A	Reports L2 Cache Size for Processor 2. This feature is hidden if processor 2 is absent or disabled.
Processor 3 CPU ID	N/A	Reports Stepping for Processor 3.
Processor 3 L2 Cache Size	N/A	Reports L2 Cache Size for Processor 3. This feature is hidden if processor 3 is absent or disabled.
Processor 4 CPU ID	N/A	Reports Stepping for Processor 4.
Processor 4 L2 Cache Size	N/A	Reports L2 Cache Size for Processor 4. This feature is hidden if processor 4 is absent or disabled.



## 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.

**Table 10. Advanced Menu**

Feature	Choices	Description
PCI Configuration	N/A	Enters submenu.
Integrated Peripheral Configuration	N/A	Enters submenu.
Advanced Chipset Control	N/A	Enters submenu.
Reset Configuration Data	<b>No</b> Yes	Select Yes to clear the system configuration data during next boot. System automatically resets to No in next boot.
Enable Sleep Button	<b>Yes</b> No	If Yes, the ACPI sleep button is activated.
System Wakeup Feature	Enabled <b>Disabled</b>	If enabled, the system will be powered up upon receiving a LAN wakeup event, ring on COM1/COM2, or PME interrupt from a PCI board.
Delay on Option ROMs	Enabled <b>Disabled</b>	Enables a short delay after an Option ROM scan.

## PCI Configuration Submenu

The PCI Configuration submenu contains selections that access other submenus.

## Embedded Video Controller Submenu

**Table 11. Embedded Video Controller Submenu**

Feature	Choices	Description
Embedded Video Controller	<b>Enabled</b> Disabled	Enables the embedded video controller.

## Embedded Legacy SCSI Submenu

**Table 12. Embedded Legacy SCSI Submenu**

Feature	Choices	Description
Embedded Legacy SCSI	<b>Enabled</b> Disabled	Enables or disables embedded legacy SCSI controller hardware.
Option ROM Scan	<b>Enabled</b> Disabled	Initializes the device expansion ROM on the device.
Latency Timer	Default 020h <b>040h</b> 060h 080h 0A0h 0C0h 0E0h	Minimum guaranteed time, in units of PCI bus clocks, that a device can be master on a PCI bus. Typically, option ROM code overwrites the value set by the BIOS.

## Embedded Dual Ultra 160 SCSI Submenu

**Table 13. Embedded Dual Ultra 160 SCSI Submenu**

Feature	Choices	Description
Embedded Legacy SCSI	<b>Enabled</b> Disabled	Enables or disables embedded legacy SCSI controller hardware.
Option ROM Scan	<b>Enabled</b> Disabled	Initializes the device expansion ROM on the device.
Latency Timer	Default 020h <b>040h</b> 060h 080h 0A0h 0C0h 0E0h	Minimum guaranteed time, in units of PCI bus clocks, that a device can be master on a PCI bus. Typically, option ROM code overwrites the value set by the BIOS.

## Embedded NIC Submenu

**Table 14. Embedded NIC Submenu**

Feature	Choices	Description
Embedded NIC	<b>Enabled</b> Disabled	If enabled, the system uses the embedded NIC.

## PCI Device, Slot 1

**Table 15. PCI Device, Slot 1 Submenu**

Feature	Choices	Description
Option ROM Scan	<b>Enabled</b> Disabled	Initializes device expansion ROM.
Enable Master	<b>Enabled</b> Disabled	Enables the selected device as a PCI bus master.
Latency Timer	Default 020h <b>040h</b> 060h 080h 0A0h 0C0h 0E0h	Minimum guaranteed time, in units of PCI bus clocks, that a device can be master on a PCI bus. Typically, option ROM code overwrites the value set by the BIOS.

## PCI Device, Slot 2

**Table 16. PCI Device, Slot 2 Submenu**

Feature	Choices	Description
Option ROM Scan	<b>Enabled</b> Disabled	Initializes device expansion ROM.
Enable Master	<b>Enabled</b> Disabled	Enables the selected device as a PCI bus master.
Latency Timer	Default 020h <b>040h</b> 060h 080h 0A0h 0C0h 0E0h	Minimum guaranteed time, in units of PCI bus clocks, that a device can be master on a PCI bus. Typically, option ROM code overwrites the value set by the BIOS.

## PCI Device, Slot 3

**Table 17. PCI Device, Slot 3 Submenu**

Feature	Choices	Description
Option ROM Scan	<b>Enabled</b> Disabled	Initializes device expansion ROM.
Enable Master	<b>Enabled</b> Disabled	Enables the selected device as a PCI bus master.
Latency Timer	Default 020h <b>040h</b> 060h 080h 0A0h 0C0h 0E0h	Minimum guaranteed time, in units of PCI bus clocks, that a device can be master on a PCI bus. Typically, option ROM code overwrites the value set by the BIOS.

## PCI Device, Slot 4

**Table 18. PCI Device, Slot 4 Submenu**

Feature	Choices	Description
Option ROM Scan	<b>Enabled</b> Disabled	Initializes device expansion ROM.
Enable Master	<b>Enabled</b> Disabled	Enables the selected device as a PCI bus master.
Latency Timer	Default 020h <b>040h</b> 060h 080h 0A0h 0C0h 0E0h	Minimum guaranteed time, in units of PCI bus clocks, that a device can be master on a PCI bus. Typically, option ROM code overwrites the value set by the BIOS.

## PCI Device, Slot 5

**Table 19. PCI Device, Slot 5 Submenu**

Feature	Choices	Description
Option ROM Scan	<b>Enabled</b> Disabled	Initializes device expansion ROM.
Enable Master	<b>Enabled</b> Disabled	Enables the selected device as a PCI bus master.
Latency Timer	Default 020h <b>040h</b> 060h 080h 0A0h 0C0h 0E0h	Minimum guaranteed time, in units of PCI bus clocks, that a device can be master on a PCI bus. Typically, option ROM code overwrites the value set by the BIOS.

## PCI Device, Slot 6

**Table 20. PCI Device, Slot 6 Submenu**

Feature	Choices	Description
Option ROM Scan	<b>Enabled</b> Disabled	Initializes device expansion ROM.
Enable Master	<b>Enabled</b> Disabled	Enables the selected device as a PCI bus master.
Latency Timer	Default 020h <b>040h</b> 060h 080h 0A0h 0C0h 0E0h	Minimum guaranteed time, in units of PCI bus clocks, that a device can be master on a PCI bus. Typically, option ROM code overwrites the value set by the BIOS.

## PCI Device, Slot 7

**Table 21. PCI Device, Slot 7 Submenu**

Feature	Choices	Description
Option ROM Scan	<b>Enabled</b> Disabled	Initializes device expansion ROM.
Enable Master	<b>Enabled</b> Disabled	Enables the selected device as a PCI bus master.
Latency Timer	Default 020h <b>040h</b> 060h 080h 0A0h 0C0h 0E0h	Minimum guaranteed time, in units of PCI bus clocks, that a device can be master on a PCI bus. Typically, option ROM code overwrites the value set by the BIOS.

## PCI Device, Slot 8

**Table 22. PCI Device, Slot 8 Submenu**

Feature	Choices	Description
Option ROM Scan	<b>Enabled</b> Disabled	Initializes device expansion ROM.
Enable Master	<b>Enabled</b> Disabled	Enables the selected device as a PCI bus master.
Latency Timer	Default 020h <b>040h</b> 060h 080h 0A0h 0C0h 0E0h	Minimum guaranteed time, in units of PCI bus clocks, that a device can be master on a PCI bus. Typically, option ROM code overwrites the value set by the BIOS.

## Hot-Plug PCI Control Submenu

**Table 23. Hot-Plug PCI Control Submenu**

Feature	Choices	Description
Hot-Plug PCI BIOS Support	<b>Enabled</b> Disabled	If enabled, the system uses resource padding and the Hot-Plug resource table.
Resource Padding Level	Disabled <b>Minimum</b> Maximum	Determines amount of resources used by each Hot-Plug PCI slot.
Empty Bus Default Speed	<b>33 MHz</b> 66 MHz	Unoccupied bus default speed.

## Integrated Peripheral Configuration Submenu

**Table 24. Integrated Peripheral Configuration Submenu**

Feature	Choices	Description
COM1:	Disabled <b>Enabled</b> Auto OS Controlled	If set to "Auto", BIOS configures the port. If set to "OS Controlled", the OS configures the port.
Base I/O Address	<b>3F8h</b> 2F8h 3E8h 2E8h	Selects the base I/O address for COM port A.
Interrupt	<b>IRQ 4</b> IRQ 3	Selects the IRQ for COM port A.
COM2:	Disabled <b>Enabled</b> Auto OS Controlled	If set to "Auto", BIOS configures the port. If set to "OS Controlled", the OS configures the port.

continued

**Table 24. Integrated Peripheral Configuration Submenu (continued)**

Feature	Choices	Description
Base I/O Address	3F8h <b>2F8h</b> 3E8h 2E8h	Selects the base I/O address for COM port B.
Interrupt	IRQ 4 <b>IRQ 3</b>	Selects the interrupt for COM port B.
Parallel Port	Disabled <b>Enabled</b> Auto OS Controlled	If set to "Auto", BIOS configures the port. If set to "OS Controlled", the OS configures the port.
Mode	Output only Bi-Directional EPP <b>ECP</b>	Selects mode for parallel port.
Base I/O Address	<b>378</b> 278	Selects the base I/O address for parallel port.
Interrupt	IRQ 5 <b>IRQ 7</b>	Selects the interrupt for parallel port.
DMA Channel	DMA 1 <b>DMA 3</b>	Selects the DMA channel for parallel port.
Floppy Disk Controller	<b>Enabled</b> Disabled	If enabled, the system enables the floppy disk controller.

## Advanced Chipset Control Submenu

**Table 25. Advanced Chipset Control Submenu**

Feature	Option	Description
Base RAM Step	<b>1 MB</b> 1 KB Every location	Selects the size of step to use during Base RAM tests.
Extended RAM Step	<b>1 MB</b> 1 KB Every location No Memory Test	Selects the size of the step to use during Extended RAM tests.
Remap Memory	Enable <b>Disable</b>	Enables or disables remapping some amount of memory lost to PCI devices. This is an advanced feature. Consult the technical product specification before changing this option.

## Security Menu

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

**Table 26. Security Menu**

Feature	Choices	Description
User Password is	<b>Clear</b> 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 baseboard (see "Password Clear Jumper," page 110).
Administrator Password is	<b>Clear</b> 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 baseboard (see "Password Clear Jumper" page 110).
Set User Password	Press Enter	When the <Enter> key is pressed, the user is prompted for a password; press ESC key to abort. Once set, this can be disabled by setting it to a null string or by clearing password jumper on baseboard (see "Password Clear Jumper" page 110).
Set Administrative Password	Press Enter	When the <Enter> key is pressed, the user is prompted for a password; press ESC key to abort. Once set, this can be disabled by setting it to a null string or by clearing password jumper on baseboard (see "Password Clear Jumper" page 110).
Password on Boot	<b>Disabled</b> Enabled	If enabled and the user password is set, the system prompts the user for a password before the system boots.
Fixed Disk Boot Sector	<b>Normal</b> Write Protect	Write-protects boot sector on hard disk to protect against viruses.
Secure Mode Timer	Disabled 1, 2, 5, 10, or 20 min 1 or 2 hr	Period of keyboard or 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] [0-9]	Key assigned to invoke the secure mode feature. Cannot be enabled unless at least one password is enabled. Can be disabled by entering a new key followed by a backspace or by entering <Delete>.
Secure Mode Boot	<b>Disabled</b> Enabled	System boots in secure mode. The user must enter a password to unlock the system. Cannot be enabled unless at least one password is enabled.
Video Blanking	<b>Disabled</b> Enabled	Blank video when secure mode is activated. The user must enter a password to unlock the system. Cannot be enabled unless at least one password is enabled.
Floppy Write Protect	<b>Disabled</b> Enabled	When secure mode is activated, the diskette drive is write protected. The user must enter a password to re-enable diskette writes. Cannot be enabled unless at least one password is enabled.

## Server Menu

**Table 27. Server Menu**

Feature	Choices	Description
System Management	N/A	Enters submenu.
Console Redirection	N/A	Enters submenu.
EMP Configuration	N/A	Enters submenu.
PEP Management	N/A	Enters submenu.
Service Boot	Enable <b>Disable</b>	
Service Partition Type	[0-999]	
System Event Logging	Disabled <b>Enabled</b>	Enabled forces BIOS and BMC to log system events.
Clear Event Log	<b>No</b> Yes	If Yes, the System Event log is cleared.
Assert NMI on PERR	<b>Disabled</b> Enabled	If enabled, PCI bus parity error (PERR) is enabled and is routed to NMI.
Assert NMI on SERR	Disabled <b>Enabled</b>	If enabled, PCI bus system error (SERR) is enabled and is routed to NMI.
FRB-2 CPU Policy	<b>Disable BSP</b> Do not disable BSP	What action to take when FRB-2 occurs.

## System Management Submenu

**Table 28. System Management Submenu**

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
Primary HSBP Revision	N/A	Information field only



## Console Redirection Submenu

**Table 29. Console Redirection Submenu**

Feature	Choices	Description
COM Port Address: Redirection disabled	<b>Disabled</b> 3F8 2F8 3E8	When enabled, Console Redirection uses the I/O port specified. When disabled, Console Redirection is completely disabled.
IRQ #	3 or 4	When Console Redirection is enabled, this displays the IRQ assigned per the address chosen in the COM Port Address field.
Baud Rate	9600 <b>19.2k</b> 38.4k 115.2k	When Console Redirection is enabled, use the baud rate specified. When the Direct Platform Control (DPC) shares the COM port as console redirection, the baud rate must be set to 19.2k to match DPC baud rate, unless the autobaud feature is used.
Flow Control	No flow control CTS/RTS XON/XOFF <b>CTS/RTS + CD</b>	None disallows flow control. CTS/RTS is hardware based flow control. XON/XOFF is software flow control. CTS/RTS +CD is hardware based plus carrier-detect flow control. When DPC is sharing the Comm port as Console Redirection, the flow control must be set to XON/XOFF or XON/XOFF+CD depending on whether a modem is used.

## EMP Configuration Submenu

**Table 30. EMP Configuration Submenu**

Feature	Choices	Description
EMP Password Switch	<b>Disabled</b> Enabled	Enabled/Disables EMP password.
EMP ESC Sequence	<b>+++ or other text</b>	Escape string for the modem EMP port.
EMP Hang-up Line String	<b>ATH or other text</b>	Hang-up string for the modem EMP port.
Modem Init String	<b>ATE1Q0V1X4&amp; D0S0=0 or other text</b>	20 characters to set up the modem.
EMP Access Mode	<b>Pre-Boot Only</b> Always Active Disabled	Establishes EMP access mode.
EMP Restricted Mode Access	Disabled <b>Enabled</b>	Enables/Disables EMP Restricted Mode Access.
EMP Direct Connect/Modem Mode	Direct Connect <b>Modem Mode</b>	Establishes connection for EMP port.
System Phone Number	[Phone number]	Phone number of system you are dialing into.

## PEP Management Submenu

**Table 31. PEP Management Submenu**

Feature	Choices	Description
PEP Filter Events	N/A	Enters Submenu with a single feature listed. If the feature is enabled, all triggers for PEP are enabled.
PEP Enable	Enable <b>Disable</b>	Enables PEP.
PEP Blackout Period	<b>[0 – 255]</b>	Time in minutes between consecutive pages. Entering 0 disables paging.
PEP Page String	[Phone number]	
Send Test Page	<b>&lt;Enter&gt;</b>	Press <Enter> to send a test page.

## Boot Menu

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

**Table 32. Boot Menu**

Feature	Choices	Description
Boot-Time Diagnostic Screen	<b>Disabled</b> Enabled	If Enabled, system displays the diagnostic screen during the boot process.
Boot Device Priority	N/A	Enters submenu.
Hard Drive	N/A	Enters submenu.
Removable Devices	N/A	Enters submenu.
Maximum number of I2O Drives	<b>1</b> 4	Selects the maximum number of I2O drives assigned a DOS drive letter.

## Boot Device Priority Submenu

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

**Table 33. Boot Device Priority Submenu**

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.	Intel UND1, PXE-2.0	Wired for Management WFM 2.0 Specification.

## Hard Drive Submenu

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

**Table 34. Hard Drive Submenu**

Option	Description
1. Drive #1 (or actual drive string)	Other bootable cards cover all the boot devices that are not reported to the system BIOS through BIOS Boot Specification mechanisms. It may or may not be bootable, and may not correspond to any device.
2. Other bootable cards (additional entries for each drive that has a PnP header)	

## Removable Devices Selection Submenu

For options on this menu, use the up or down arrow keys to select a device.

**Table 35. Removable Devices Selection Submenu**

Feature	Option	Description
Lists Bootable Removable devices in the system.	+/-	This list includes legacy 1.44 MB floppy drives and 120 MB floppy drives.

## Exit Menu

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

**Table 36. Exit Menu**

Choices	Description
Exit Saving Changes	Exits and saves changes to CMOS.
Exit Discarding Changes	Exits without saving changes to CMOS. User is prompted if any of the Setup fields were modified.
Load Setup Defaults	Loads default values for all Setup data.
Save Custom Defaults	Loads settings from custom defaults.
Discard Changes	Reads previous values of all Setup data from CMOS.
Save Changes	Saves Setup data to CMOS.

## Changing the Boot Device Priority Temporarily

During POST, you can change the boot device priority for the current boot process. The changes made during this instruction set are not retained for the next boot process.

1. Boot the server.
2. At any time during POST, press <Esc>. When POST completes, a pop-up Boot menu is displayed.
3. Use the arrow keys to highlight the device you want the server system to boot from first. For example, if you want the server system to boot from the CD-ROM first, you select "CD-ROM Drive."

### ⇒ NOTE

One of the selections on the pop-up Boot menu is "Enter Setup". Selecting this option brings you into the BIOS setup. For more information about the BIOS setup, see "Using BIOS Setup" on page 29.

4. Press <Enter>.
5. The bootup process continues. When finished, a system prompt is displayed.

## Changing the Boot Device Priority Permanently

You can change the boot device permanently. Until you change the boot device priority again via this instruction set, the boot device priority does not change.

1. Quickly press the <F2> key. A prompt may or may not appear. After a few bootup tests complete, the main BIOS Setup screen appears.
2. From the Setup screen, select Boot Menu. Press <Enter>.
3. Select Boot Device Priority, and press <Enter>.
4. In the Boot Device Priority screen, use the up- or down-arrow keys to select "ATAPI CD-ROM Drive", or the appropriate SCSI CD-ROM drive, then press the <+> key to move it to the top of the list.
5. Now set the second boot device to Diskette Drive and the third boot device to Hard Drive.
6. Press the <F10> key to save your changes and exit Setup.
7. When the Exit prompt appears, press <Enter> again.
8. The bootup process continues. When finished, an operating system prompt is displayed.
9. Make sure the CD is in the drive, and boot the server.

## Running the *SCSISelect* Utility

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

After pressing <F2> or <Esc> during POST, the splash screen is replaced by text.

The system first finds the Adaptec AIC-7880 SCSI host adapter and displays the message `Adaptec AIC-7880 SCSI BIOS V x.xxx` where `x.xxx` is the version number of the *SCSISelect* utility. Pressing <Ctrl+A> at this time allows you to configure the Adaptec AIC-7880 SCSI host adapter.

If you do not press <Ctrl+A>, the system finds the Adaptec AIC-7899 SCSI host adapter and displays the message `Adaptec AIC-7899 SCSI BIOS V x.xxx` where `x.xxx` is the version number of the *SCSISelect* utility. Pressing <Ctrl+A> at this time allows you to configure the Adaptec AIC-7899 SCSI host adapter.

Once you enter the configuration menus for one of the host adapters, you cannot switch to the other adapter. For example, once you press <Ctrl+A> to configure the Adaptec AIC-7899 SCSI host adapter, you have to reboot the system to configure the Adaptec AIC-7880 SCSI host adapter.

## When to Run the *SCSISelect* Utility

Use the *SCSISelect* utility to

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

## Running the *SCSISelect* Utility

1. When this message appears on the video monitor:  
`<<<Press <Ctrl><A> for SCSISelect(TM) Utility!>>>`
2. Press <Ctrl+A> to run the utility. When the main menu for the host adapter appears, choose the adapter that you want to configure—each SCSI bus accepts up to 15 devices.

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

**Table 37. Navigation Keys**

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

## Configuring the Adaptec AIC-7880 SCSI Adapter

The following menu is displayed when you configure the Adaptec AIC-7880 SCSI adapter.

**Table 38. Main Menu**

Host Adapter	Option	Comment
AIC-7880 Ultra/Ultra W at Bus:Device 00:01h	Configure/View Host Adapter Settings	Press <Enter> to view the Configuration Menu.
	SCSI Disk Utilities	Press <Enter> to view the SCSI Disk Utilities Menu.

Make a selection and press <Enter>.

When you are finished, press <Esc> and make your selection from the following menu.

**Table 39. Exit Menu**

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

## Configuring the Adaptec AIC-7899 SCSI Adapter

The Adaptec AIC-7880 SCSI adapter has two busses. Select the bus from the following menu.

**Table 40. Main Menu**

Menu Item	Options
You have an AIC-7899 adapter in your system. Move the cursor to the bus:device:channel of the one to be configured and press <Enter>.	Bus:Device:Channel 01:06:A 01:06:B
<F5> - Toggle color/monochrome	

After selecting the bus, the following menu is displayed.

**Table 41. Menu for each SCSI Channel**

Host Adapter	Option	Comment
AIC-7899 at Bus:Device:Channel 01:06:A (or 01:06:B)	Configure/View Host Adapter Settings	Press <Enter> to view the Configuration Menu.
	SCSI Disk Utilities	Press <Enter> to view the SCSI Disk Utilities Menu. This menu allows you to format hard disks and/or verify disk media.

When you are finished, press <Esc> and make your selection from the following menu.

**Table 42. Exit Menu**

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

## Using the System Setup Utility (SSU)

The SSU is on the configuration software CD shipped with the server. The SSU provides a graphical user interface (GUI) over an extensible framework for server configuration. The SSU framework supports the following functions and capabilities:

- Assigns resources to baseboard devices and add-in boards before loading the operating system
- Specifies the boot device order and system security options
- Permits viewing and clearing of the system event log (SEL)
- Permits viewing of the system FRU and SDRs
- Allows troubleshooting of the server when the operating system is not operational
- Provides a system-level view of the server's I/O devices

## When to Run the SSU

The SSU is a DOS-based utility that supports extended system configuration operations for onboard resources and add-in boards. Use the SSU 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 SEL
- View FRU information
- View the SDR table

The SSU is PCI 2.1 compliant and uses the information entered and provided by configuration registers, flash memory to specify a system configuration. The SSU then writes the configuration information to flash memory.

The SSU stores configuration values in flash memory. These values take effect when the server is booted. POST checks the values against the actual hardware configuration; if the values 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

Run the SSU directly from the configuration software CD after you have installed a CD-ROM drive, or from a set of diskettes.

If you choose to run the SSU from diskettes, create the SSU diskettes from the CD by following the instructions in "Creating SSU Diskettes" on page 48.

If the diskette drive is disabled or improperly configured, use the flash-resident Setup utility to enable it to use the SSU. If necessary, disable the drive after exiting the SSU. Information entered using the SSU overrides any entered using Setup.

## Running the SSU Remotely

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

When running the SSU remotely, the client SSU (CSSU) runs on the remote server. The CSSU controls the local server and uses the local server's SSU software.

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 CSSU runs exclusively on the remote server, any files required for the CSSU to run must be available on the remote server (on removable or non-removable media).

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

For more information, see the documentation accompanying your SMM2 card.

## Creating SSU Diskettes

When creating SSU diskettes, the system copies the SSU from the CD to the diskettes.

1. Make sure that the CD-ROM is the first bootable device for the system.
2. Place the CD in the CD-ROM drive and boot the system.
3. Use the arrow keys to highlight "Create Diskettes" and press <Enter>.
4. Make sure "Create Disk Sets by Device/Function" is highlighted and press <Enter>.
5. Make sure "System Setup Utility" is highlighted and press <Enter>.
6. The software prompts you to insert a blank diskette. Insert the diskette in the floppy drive.
7. After the system formats the diskette, remove it from the drive and label it "SSU Disk 1".
8. The software prompts you to insert another blank diskette. Insert the diskette in the floppy drive.
9. After the system creates the diskette, remove it from the drive and label it "SSU Disk 2".



## Running the SSU

You can run the SSU from diskettes, a hard drive, or a CD-ROM drive.

### Running the SSU from Diskettes

For best results, Intel recommends that you execute the SSU from diskettes. Place the bootable diskette in the floppy drive. Typically, the floppy drive is recognized by the system as drive A. If the system is not set to boot from the floppy drive, change the boot priority. For more information, see "Changing the Boot Device Priority Permanently" on page 44. After making sure that the system boots from the floppy drive, restart the system.

Once the system boots, a virtual drive is created. The System Setup Utility files are copied to the virtual drive and invoked.

### Running the SSU from a CD

You can also run the SSU from a CD. Place the CD in the CD-ROM drive. If the system is not set to boot from the CD-ROM drive, change the boot priority. For more information, see "Changing the Boot Device Priority Permanently" on page 44. After making sure that the system boots from the CD-ROM drive, restart the system. Run the file SSU.BAT.

### Running the SSU from a Hard Drive

First, install the SSU software to the hard drive. To install the SSU software on the hard drive, insert either the diskette or CD into the floppy drive or CD-ROM drive respectively. Run the executable file called SSIOMAGE.EXE. If you are using diskettes, the executable file is on disk 1. When prompted, insert disk 2.

Lastly, run the file SSU.BAT on the hard disk. Note that the SSU does not function properly in a DOS window under another operating system.

## Direct Platform Control (DPC) Console

Direct Platform Control (DPC) Console is an application that provides a user interface to the emergency management port (EMP). The EMP allows remote system management.

DPC console runs on a client workstation. It communicates with a server by

- A Windows<sup>†</sup> 98/NT compatible modem.
- An RS-232 connection to the server COM2 port.

DPC Console is independent of the server operating system.

Even when the server is powered off, you can use DPC Console to verify the state of a server or diagnose a problem with the server hardware. DPC console features allows you to:

- Establish or end a connection to a remote server.
- Apply power to a remote server.
- Remove power from a remote server.
- Reset a remote server to either EMP mode or Re-direct Mode.

- Retrieve and display:
  - System Event Log (SEL) entries for information about recent server activities, such as from processors or fans.
  - Sensor Data Records (SDR) entries for information about sensor characteristics.
  - Field Replaceable Unit (FRU) inventories of the hardware components on the server.
  - Current Remote Sensor Access (RSA) information.
- Maintain a Phonebook for remote connection management.
- Run Remote Diagnostics.
- Transfer file to and from a server.
- Reboot to the service partition to get access to run DOS-based utilities on the server.

## DPC Console Modes of Operation

There are three modes DPC console modes of operation:

- **EMP mode.** The default mode. DPC console features are accessed using the DPC console window menus and/or toolbar.
- **Re-direct mode.** Active when the server is running BIOS console redirection. In this mode, the DPC console launches a separate window. The window operates as an ANSI terminal and communicates with the server through the port. Character-based commands you type in the DPC Console are sent directly to the server, and the DPC Console displays the text that would normally be displayed on the server console.

To use this mode, you must configure the Console Redirection option of BIOS setup for Re-direct mode. If the redirection window does not display information, the Console Redirection is not correctly configured or enabled, the EMP is disabled in BIOS setup, or the server is in protected mode. For DPC to function, the server must NOT be in graphics mode.

If the DPC console fails to connect in EMP within 10 seconds and the server can operate in Re-direct mode, a prompt is displayed with the option to switch to Re-direct mode.

- **Service Partition mode.** Entered when the server reboots from the service partition and the DPC Console has successfully connected to the server through a modem. This mode allows running of DOS-based programs that are stored on the service partition and transferring of files.

## Running the DPC Console

For more information about setting up and running the DPC Console, see the document named "ENUDPCUG.pdf". This document is in the Manuals\SrvMgmt directory on the server software kit accompanying the SKA4 baseboard.

# FRU and SDR 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 utility:

- Discovers the product configuration based on instructions in a master configuration file
- Displays the FRU information
- Updates the 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 might not be associated with the BMC

## What You Need to Do

Run the utility either directly from the configuration software CD or from diskettes created from the CD.

If you run the FRUSDR Load Utility from a diskette, copy the utility from the CD. Follow the instructions in the included README.TXT file.

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

## How You Use the FRUSDR Load Utility

The utility:

- Is compatible with ROM-DOS Ver. 6.22, MS-DOS Ver. 6.22, and later versions
- Accepts CFG, SDR, and FRU load files (the executable file for the utility is frusdr.exe)
- Requires the following supporting files
  - one or more .fru files describing the system's field replaceable units
  - a .cfg file describing the system configuration
  - an .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] [-fru filename.fru]
```

**Table 43. Command Line Format**

Command	Description
-? or -h	Displays usage information
-d {dmi, fru, sdr}	Displays requested area only
-cfg filename.cfg	Uses custom CFG file
-p	Pause between blocks of data

## Parsing the Command Line

The FRUSDR load utility allows only one command line function at a time. A command line function can consist of two parameters. Example: `-cfg filename.cfg`. Invalid parameters cause an error message and exit the program. You can use either a slash (/) or a minus sign (-) to specify command line options. The `-p` and flags can be used in conjunction with any of the other options.

## Displaying a Given Area

When the utility is run with the `-d DMI`, `-d FRU`, or `-d SDR` command line flag, information about each area is read from memory and printed on the screen. Each area represents 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.

## Using Specified CFG File

The utility can be run with the command line parameter of `-cfg filename.cfg`. The filename can be any DOS-accepted, eight-character filename string. The utility loads the specified CFG file and uses the entries in that 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 Y.Y, Revision X.XX where Y.Y is the version number and 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 run tasks needed to 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 might prompt you for FRU information.

## Filtering Records From the SDR File

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

## Updating the SDR Nonvolatile Storage Area

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

## Updating FRU Nonvolatile Storage Area

After the configuration is determined, the utility updates the FRU nonvolatile storage area. First it verifies the common header area and checksum from the specified FRU file. The internal use area is read out of the specified .FRU file and is programmed into the nonvolatile storage. The chassis area is read out of the specified .FRU file. Finally, it reads the product area out of the specified FRU file, then the area is programmed into the FRU nonvolatile storage. All areas are also written to the FRU.TMP file.

## Updating DMI FRU Nonvolatile Storage Area

After programming the BMC FRU area, the utility programs chassis, board, and product FRU information to the DMI fields, if the DMI flag follows each FRUAREA command in the configuration file.

## 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 upgrading 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 splash screen.
2. Write down the current settings in the BIOS Setup program.

### ⇒ NOTE

If you are not familiar with BIOS settings for the system, make sure you complete step two. You need these settings to configure your computer at the end of the procedure.

## Obtaining the Upgrade Utility

Upgrade to a new version of the BIOS using the new BIOS files and the BIOS upgrade utility, iFLASH.EXE. Obtain the BIOS upgrade file and the iFLASH.EXE utility from the Intel World Wide Web site:

<http://www.intel.com>

## ⇒ NOTE

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

This upgrade utility allows you to upgrade the BIOS in flash memory. The following steps explain how to upgrade the BIOS.

### Creating a Bootable Diskette

1. Use a Microsoft DOS system to create the diskette.
2. Insert a diskette in drive A.
3. At the C:\ prompt, for an unformatted diskette, type:  
format a:/s  
  
or, for a formatted diskette, type:  
sys a:
4. Press <Enter>

### Creating the BIOS Upgrade 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 the 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 diskette into drive A.
7. To extract the BIOS.EXE file to the diskette, change to the temporary directory that holds the BIOS.EXE file and type:  
BIOS A:
8. Press <Enter>.
9. The diskette now holds the BIOS upgrade and recovery files.

### Upgrading the BIOS

1. Boot the computer with the floppy disk in drive A.
2. Press <1> and <Enter>.
3. When the utility is done updating the BIOS, the system reboots automatically. Remove the floppy from the floppy drive.

4. Press <F2> while the splash screen is displayed to enter the BIOS Setup program.
5. Load the Setup program defaults. To load the defaults, press <F9>. To accept the defaults, press <Enter>.
6. Clear the CMOS. See "CMOS Clear Jumper" on page 109.
7. Turn off the computer and reboot.
8. If you need to change the BIOS settings, press <F2> while the splash screen is displayed to enter the Setup program.

## Recovering the BIOS

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

### ⇒ NOTE

Because of the small amount of code available in the 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 J9F2.
4. Move the Recovery Boot jumper from pins 9-10 to pins 10-11. See "Recovery Boot Jumper" on page 110.
5. Insert the bootable BIOS upgrade floppy disk into floppy drive A.
6. Replace the cover, turn on the computer, and allow it to boot. The recovery process will take a few minutes.
7. Listen to the speaker.
8. Two beeps indicate successful BIOS recovery.
9. A series of continuous beeps indicates failed BIOS recovery.
10. If recovery fails, return to step 1 and repeat the recovery process.
11. If recovery is successful, turn off the computer. Remove the computer cover and continue with the following steps.
12. Move the Recovery Boot jumper back to pins 9-10.
13. Replace the computer cover.
14. Follow the instructions for "Upgrading the BIOS" on page 53.

## Changing the BIOS Language

You can use the BIOS upgrade utility to change the language BIOS displays. Use a bootable diskette containing the Intel flash utility and language files (see page 54). See "Using BIOS Setup" on page 29.

## Using the Firmware Update Utility

The Firmware Update Utility is a DOS-based program used to update the BMC's firmware code. You need to run the utility only if new firmware code is 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, because 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 displays a menu screen. Select "Upload Flash."
6. The utility asks 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 code. Press "N" to continue.
8. The program next asks if it should upload operational code. Press "Y" to continue. The process of uploading operational code takes a few minutes.
9. Once the operational code has been updated and verified, press any key to continue. Then press <ESC> to exit the program.
10. Shut the system down and remove any diskettes in the system.
11. Disconnect the AC power cord from the system and wait 60 seconds.
12. Reconnect the AC power cord and power up the system.



## **Part II: Service Technician's Guide**

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**3 Removing and Installing Baseboard Components**

**4 Solving Problems**

**5 Technical Reference**

**A Equipment Log and Configuration Worksheets**

**B Regulatory Specifications**

**C Warnings**



## 3 Removing and Installing Baseboard Components

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### Tools and Supplies Needed

- Phillips (cross-head) screwdriver (#1 and #2 bit).
- Phillips (cross-head) screwdriver with a long blade (#1 and #2 bit).
- Jumper removal tool or needle-nosed pliers.
- Antistatic wrist strap and conductive foam pad (recommended).
- Pen or pencil.
- Equipment log: as you integrate new parts into the system, add information about them to your equipment log (page 113.) Record the model and serial number of the system, all installed options, and any other pertinent information specific to the system. You will need this information when running the SSU.

### Safety: Before You Work with the Baseboard

Before working with the baseboard, provide some electrostatic discharge (ESD) protection by wearing an antistatic wrist strap attached to chassis ground of the system—any unpainted metal surface. Turn off the system by using the power on/off switch on the front panel AND unplug all AC power cords.

#### ⇒ NOTE

**Hot-Plug PCI add-in boards:** If you are only removing and/or installing Hot-Plug PCI add-in board, you do not need to turn off the system.

### Warnings and Cautions

These warnings and cautions apply whenever you work with the SKA4 baseboard. Only a technically qualified person should integrate and configure the system.

#### ⇒ NOTE

**Hot-Plug PCI add-in boards:** If you are only removing and/or installing Hot-Plug PCI add-in boards, you do not need to turn off the system and the warnings pertaining to turning off the system do not apply.

## WARNINGS

**System power on/off:** The on/off button (a convex button) on the front panel DOES NOT turn off the system AC power. To remove power from system, you must unplug the AC power cords from the wall outlet or the system.

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

## CAUTIONS

**Electrostatic discharge (ESD) and ESD protection:** ESD can damage disk drives, boards, and other parts. We recommend that you do all procedures in this chapter only at an ESD-protected 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.

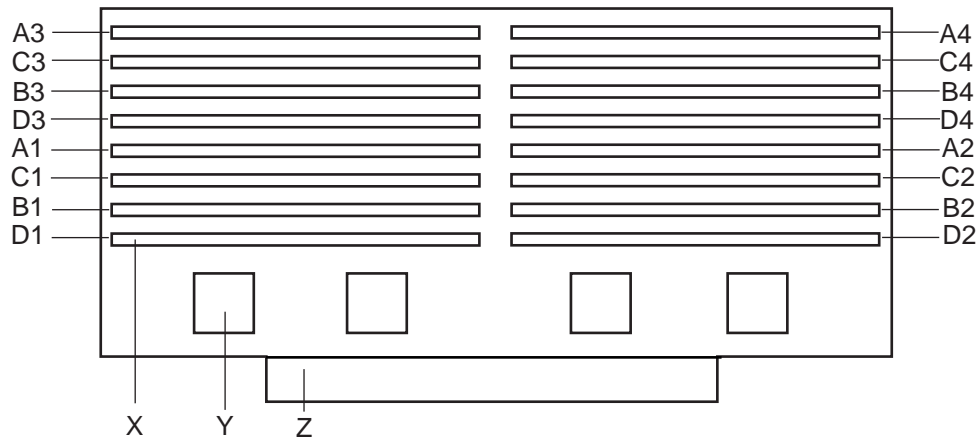
**ESD and handling boards:** Always handle boards carefully. They can be extremely sensitive to ESD. Hold boards only by their edges. After removing a board from its protective wrapper or from the system, place it component-side UP on a grounded, static-free surface. If you place the baseboard on a conductive surface, the battery leads may short out. If they do, this will result in a loss of CMOS data and will drain the battery. Use a conductive foam pad if available but NOT the board wrapper. Do not slide board over any surface.

**Chassis covers, proper cooling, and airflow:** For proper cooling and airflow, always install the chassis access covers before turning on the system. Operating the system without this cover in place can damage system parts.

**Installing or removing jumpers:** A jumper is a small, plastic-encased conductor that slips over two jumper pins. Newer 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 gently grip, but not squeeze, with the pliers or other tool you use to remove a jumper; you might bend or break the stake pins on the board.

# Memory

Memory amounts from 256 MB to 16 GB of DIMM are supported, with a 64/72-bit four-way-interleaved pathway to main memory, which is also located on the module. Therefore, data transfers between MADPs and DIMMs is in four-way interleave fashion. Each of the four DIMMs must be populated in a bank. The 16 slots are divided into four banks of four slots each. They are labeled A through D. Bank A contains DIMM sockets A1, A2, A3, and A4. Banks B, C, and D each contain 4 DIMM sockets and are named in the same fashion. There are silk screens on the module next to each DIMM socket to label its bank number. DIMM banks do not have to be filled in any order, but for best thermal results, you should populate them from A to D. If only one DIMM bank is used, use bank A first, and then B, C, and D.



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**Figure 3. Memory Module DIMM Installation Sequence**

- X. One of sixteen DIMM sockets
- Y. One of four Memory Address Data Paths (MADP)
- Z. Memory Expansion Card Connector (MECC)

## Removing the Memory Module

See “Memory” on page 16 for memory size and requirements. The memory module is located on the baseboard as shown in Figure 1 on page 14. The DIMM locations are shown in Figure 3.

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Remove the memory module from the baseboard:
  - Pull the module upward slightly to disengage it from the baseboard connector.
  - Slide the module straight up and away from the baseboard until it clears the guide rails.
  - Place the module component-side up on a nonconductive, static-free surface.

## Installing the Memory Module

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Holding the memory module by its edges, align the module so its edge engages the guide rails at the back and front of the electronics bay.



### CAUTION

The memory module is held in place by the 330-pin connector on the baseboard, the guide rails in the center of the electronics bay. You must support the module until it is fully seated in the connector.

3. Push the memory module toward the baseboard until it fully engages the connector on the baseboard.

## Removing DIMMs



### CAUTION

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

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Remove the memory module and place it component-side up on a nonconductive, static-free surface. See “Removing the Memory Module” on page 61.
3. Gently push the plastic ejector levers down. The DIMM is ejected 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.

## Installing DIMMs



### CAUTIONS

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.

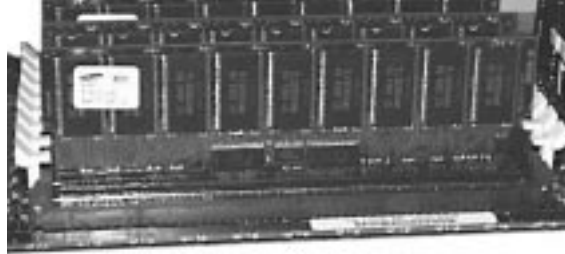
Mixing dissimilar metals might cause memory failures later, resulting in data corruption. Install DIMMs with gold-plated edge connectors only in gold-plated sockets.



### NOTE

DIMM slots on the memory module must be installed only in certain configurations. See “Memory” on page 16 for requirements.

1. Holding the DIMM only by its edges, remove it from its antistatic package.
2. Orient the DIMM so that the two notches in the bottom edge of the DIMM align with the keyed socket on the memory module. See Figure 4.



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**Figure 4. Installing DIMMs: Orientation of DIMM in a Memory Module**

3. Insert the bottom edge of the DIMM into the socket, then press down firmly on the DIMM until it seats correctly.
4. Gently push the plastic ejector levers on the socket ends to the upright position.
5. Repeat the steps to install each DIMM.

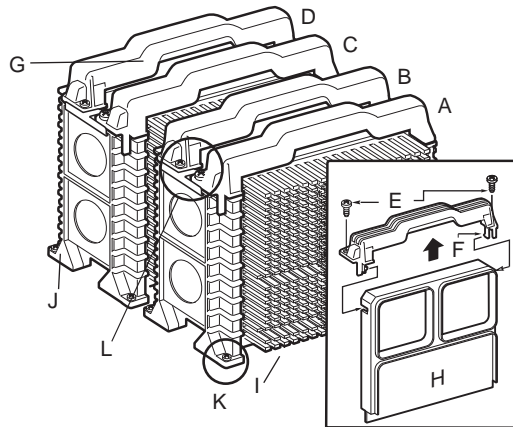
## Processors

### CAUTIONS

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

**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 baseboard. 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.

A processor has the following components.



OM09921

**Figure 5. Processor Orientation and Components**

- A. Processor 1
- B. Processor 2
- C. Processor 3
- D. Processor 4
- E. Screws (2) at the top of the processor
- F. Clip on processor handle
- G. Processor handle
- H. Termination Module
- I. Processor Heat Sink
- J. Processor retention mechanism
- K. Screws (2) for retention module guide rails
- L. Note the handle/screw orientation for each processor pair

## Removing a Processor

See Figure 5.

1. Observe the safety and ESD precautions at the beginning of this chapter and the additional cautions given here.
2. Remove the two screws that secure the handle to the processor.
3. Pull firmly and straight up on either side of the processor handle.
4. Put the processor on a piece of conductive foam and store it in an antistatic package.



## Installing a Processor

See Figure 5.

1. Observe the safety and ESD precautions at the beginning of this chapter and the additional cautions on page 63.
2. Remove the new processor from its antistatic package and place it on a grounded, static-free surface or conductive foam pad.
3. Attach the processor handle to the processor. For more information, see "Installing Processor Handles" on page 65.
4. If necessary, attach the heatsink to the processor. For more information, see "Installing Processor Heatsinks" on page 66.
5. Orient the processor correctly in the chassis. See Figure 5 and Figure 1.
6. Slide the processor into the guides on each side of the processor slot and press the processor downward firmly into the baseboard connector.
7. Insert and tighten two screws at the top of the processor handle.

## Removing Processor Retention Mechanisms

See Figure 5.

1. Observe the safety and ESD precautions at the beginning of this chapter and the additional cautions on page 63.
2. Make sure that the processor has been removed from the baseboard. To remove the processor, see "Removing a Processor" on page 64.
3. With a long bladed screwdriver, remove the two screws at the base of the processor retention mechanism.
4. Remove the retention mechanism from the baseboard.

## Installing Processor Retention Mechanisms

See Figure 5.

1. Observe the safety and ESD precautions at the beginning of this chapter and the additional cautions on page 63.
2. With a long bladed screwdriver, tighten the two screws at the base of the processor retention mechanism.

## Installing Processor Handles

Depending on your configuration, the handles for the processor might not be attached to the processor. In this case, you must attach a handle to each processor.

See Figure 5.

1. Orient the handle as shown in the Figure 5.
2. Press the handle into the processor until the handle snaps into place.

## Installing Processor Heatsinks

See Figure 5.

Depending on your configuration, the heatsink for each processor might not be attached. In this case, you must attach one heatsink to each processor. If you are working with a processor terminator module, you do not install a heatsink.

1. Remove the heatsink from its protective cover.
2. Pull the tab on the bottom of the heatsink to remove the blue plastic film and expose the square of adhesive thermal grease that will help attach the heatsink to the processor.
3. Orient the heatsink on the correct side of the processor. For correct orientation, see Figure 5.
4. Because of the adhesive grease on the heatsink, be careful to orient the heatsink properly before placing it against the processor.
5. Attach the heatsink to the processor with five 6-32 X 3/8 screws, and tighten to 8-10 inch-pounds.

## Voltage Regulator Modules (VRMs)

Up to seven voltage regulator modules provide power for processors. Table 44 shows this relationship.

**Table 44. VRM/Processor Power Sequence**

VRM #	VRM provides power for	Description
1 (Embedded)	Processor #1	Processor core power only
2 (Embedded)	Processor #1	GLT (FSB reference)
3 (Embedded)	Processor #1 and #2	L2 cache power only
4 (Embedded)	Processor #3 and #4	L2 cache power only
#2 Connector	Processor #2	Processor core power only
#3 Connector	Processor #3	Processor core power only
#4 Connector	Processor #4	Processor core power only

VRMs 1 through 4 are embedded in the SKA4 baseboard. Additional VRMs plug into connectors 2 through 4 on the baseboard. You must use a specific number and connector population sequence of VRMs for each combination of processors and termination boards. Table 45 lists the required number and location of VRMs for each potential processor. Figure 1 on page 14 shows this information graphically.

**Table 45. Processor/VRM Population Sequencing**

If you have a processor in connector #	VRM in connector #
1	None. All required VRMs are embedded in the SKA4 baseboard.
1 and 2	2
1, 2, and 3	3
1, 2, 3, and 4	4

## Removing a VRM

### CAUTIONS

**VRM must be appropriate:** You might damage the system if you install a VRM that is inappropriate for your system. For exact information about VRM and processor interchangeability, contact your customer service representative.

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

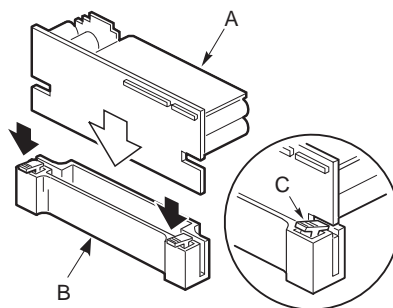
To decide what VRM you need to remove, see Figure 1 on page 14.

1. Using a small flat-bladed screwdriver, push the plastic ejector levers on each end of the connector away from the VRM to eject it out of the connector.
2. Pull VRM straight up and out of the baseboard.
3. Place the VRM on a nonconductive, static-free surface, or store it in an antistatic protective wrapper.

## Installing a VRM

To decide what VRM you need to install, see Figure 1 on page 14.

1. Remove the VRM from its protective package.
2. Orient the VRM within the VRM connector correctly. See Figure 6 on page 67.
3. Carefully insert the VRM in the connector on the baseboard. Make sure you do not bend the connector pins.
4. Push down firmly on both ends of the VRM until the ejector levers of the connector snap into place, locking the VRM in the connector.
5. Make sure that the ejector levers are firmly in place. If not, use a screwdriver to push them into place.



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**Figure 6. Installing a VRM**

- A. VRM
- B. VRM connector on baseboard
- C. Ejector lever

# Replacing the Backup Battery

The lithium battery on the baseboard powers the real-time clock (RTC) for three to four years in the absence of power. When the battery weakens, it loses voltage and the system settings stored in CMOS RAM in the RTC (e.g., the date and time) may be wrong. Contact your customer service representative or dealer for a list of approved devices.

## WARNING

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

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

## 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 - Eksplosjonsfare ved fejløgt 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.**

## WARNING

**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.**

Note the location of the lithium battery in Figure 1 on page 14.

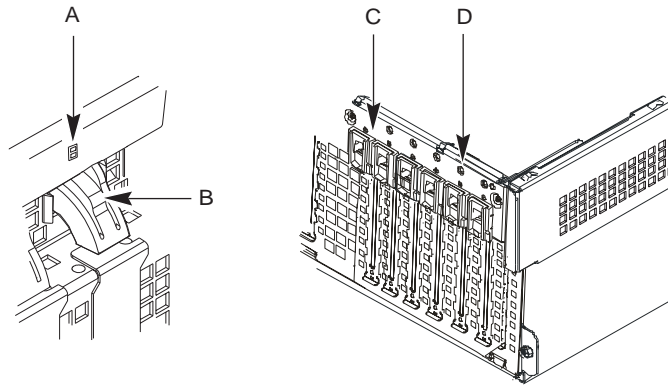
1. Observe the safety and ESD precautions at the beginning of this chapter and the additional warning given on page 68.
2. Remove the VRMs in VRM connectors 3 and 4. For more information, see "Removing a VRM" on page 67.
3. Insert the tip of a small flat-bladed screwdriver or equivalent under the plastic tab on the snap-on plastic retainer.
4. Gently push down on the screwdriver to lift the battery.
5. Remove the battery from its socket.
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.

## Add-in Boards

Figure 1 on page 14 identifies the add-in board locations. The SKA4 baseboard contains eight PCI slots. There are

- Two 32-bit, 33 MHz half-length PCI slots
- Two 64-bit, 66/33 MHz Hot-Plug PCI slots
- Four 64-bit, 33 MHz Hot-Plug PCI slots

Typically, the Hot-Plug PCI add-in boards are held in the Hot-Plug slots by a front and rear Hot-Plug retention mechanism.



OM09943

**Figure 7. Example of a Front Hot-Plug Retention Mechanism**

- A. Green and Amber LEDs
- B. Press here on the inside of the chassis and then rotate to release the PCI board
- C. PHP Retention Mechanism from the outside of the chassis
- D. HW push-button

## Removing a 32-bit, 33 MHz Half-Length PCI Add-in Board

### WARNING

If the system has been running, any installed PCI add-in board on the processor board(s) will be hot. To avoid the possibility of a burn, be careful when removing or installing baseboard components that are located near processors.

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

### CAUTION

Slot covers must be installed on all vacant expansion slots. This maintains the electromagnetic emissions characteristics of the system and ensures proper cooling of system components.

The add-in boards for the half-length 33 MHz PCI slots are NOT Hot-Pluggable. In other words, you must turn off the AC power to the system first before installing boards at these locations.

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Disconnect any cables attached to the PCI board you are removing.
3. Remove and save the screw that attaches the existing board retaining bracket to the chassis.
4. Holding the board by its top edge or upper corners, carefully pull it out. Do not scrape the board against other components.
5. Store board in an antistatic protective wrapper.
6. If you are not reinstalling a board in the same slot, install a slot cover over the vacant slot. The tapered foot of the cover must fit into the mating slot in the expansion slot frame.
7. Use the screw removed earlier to fasten the new board to the chassis. Tighten the screw firmly (6.0 inch-pounds).

## Installing a 32-bit, 33 MHz Half-Length PCI Add-in Board

### WARNING

If the system has been running, any installed PCI add-in board(s) will be hot. To avoid the possibility of a burn, be careful when removing or installing baseboard components that are located near processors.

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



## CAUTIONS

**Do not overload baseboard:** Do not overload the baseboard by installing add-in boards that draw excessive current.

**ESD and handling boards:** Add-in boards can be extremely sensitive to ESD and always require careful handling. After removing the board from its protective wrapper or from the baseboard, place it component-side up on a grounded, static-free surface or conductive foam pad—if available. Do not slide the board over any surface.

1. Remove add-in board from its protective wrapper. Be careful not to touch the components or gold edge connectors. Place board component-side up on an antistatic surface.
2. Record the serial number of the add-in board in your equipment log.
3. Set jumpers or switches on the PCI board according to the manufacturer's instructions.
4. Remove and save the screw that attaches the existing board or expansion slot cover to the chassis.
5. Remove and save the expansion slot cover.
6. Hold the add-in board by its top edge or upper corners. Firmly press it into an expansion slot on the baseboard. The tapered foot of the board-retaining bracket must fit into the mating slot in the expansion slot frame. Install a PCI board component-side DOWN.
7. Use the screw removed earlier to fasten the new board-retaining bracket to the chassis. Tighten the screw firmly (6.0 inch-pounds). Attach cables if necessary.

## Removing a 64-bit, 66/33 MHz Hot-Plug PCI Add-in Board



### WARNING

**If the system has been running, any installed PCI board on the processor board(s) will be hot. To avoid the possibility of a burn, be careful when removing or installing baseboard components that are located near processors.**



### CAUTION

**Slot covers must be installed on all vacant expansion slots.** This maintains the electromagnetic emissions characteristics of the system and ensures proper cooling of system components.

See Figure 7 on page 69.

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Make sure that the slot is powered off. If the slot is powered on, turn the power to the slot off through the PCI Hot-Plug application on your system. If the system has a HW push-button, press it to turn the power to the slot off.
3. Disconnect any cables attached to the board you are removing.
4. If there is a front and rear Hot-Plug retention mechanism, release it.

5. Remove the PCI board by pulling straight up.
6. Store board in an antistatic protective wrapper.
7. If you are not reinstalling a board in the same slot, install a slot cover over the vacant slot. The tapered foot of the cover must fit into the mating slot in the expansion slot frame.

## Installing a 64-bit, 66/33 MHz Hot-Plug PCI Add-in Board



### WARNING

**If the system has been running, any installed PCI add-in board on the processor board(s) will be hot. To avoid the possibility of a burn, be careful when removing or installing baseboard components that are located near processors.**



### CAUTIONS

**Do not overload baseboard:** Do not overload the baseboard by installing add-in boards that draw excessive current.

**ESD and handling boards:** Add-in boards can be extremely sensitive to ESD and always require careful handling. After removing the board from its protective wrapper or from the baseboard, place it component-side up on a grounded, static-free surface or conductive foam pad—if available. Do not slide the board over any surface.

1. If necessary, expose the SKA4 baseboard by removing the access covers and foam cover. For instructions on how to remove access covers for your system, see the product guide accompanying your system.
2. Remove add-in board from its protective wrapper. Be careful not to touch the components or gold edge connectors. Place board component-side up on an antistatic surface.
3. Record the serial number of the add-in board in your equipment log.
4. Make sure that the slot is powered off. Power off the add-in board through the PCI Hot-Plug application on your system, or through a HW push-button (if available).
5. Set jumpers or switches on the board according to the manufacturer's instructions.
6. If necessary, remove and save the expansion slot cover.
7. Hold the add-in board by its top edge or upper corners. Firmly press it into an expansion slot on the baseboard. The tapered foot of the board-retaining bracket must fit into the mating slot in the expansion slot frame. Install a PCI board component-side DOWN.
8. If there is a front and rear Hot-Plug retention mechanism, engage it.
9. Use the screw removed earlier to fasten the new board to the chassis. Tighten the screw firmly (6.0 inch-pounds).
10. Attach cables if necessary.
11. Power on the add-in board through the PCI Hot-Plug application on your system, or through a HW push-button (if available).



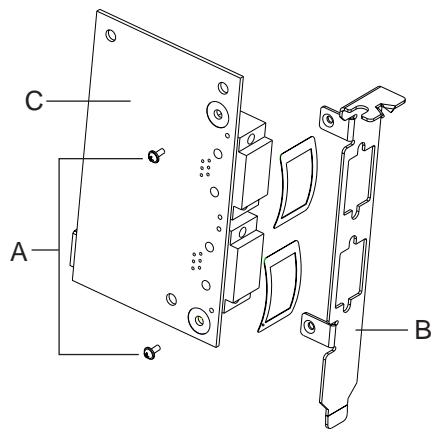
## ICMB Card

The ICMB card allows two servers to communicate through a serial connection. An ICMB card is installed in each server; the cards are connected through a serial cable.

Establishing communication between servers using the ICMB card is a two-step process. First, install the ICMB card in each server. Lastly, make sure that the software required for the card is in place. Software for the ICMB card includes firmware on the card and software already included in the ISC software. ISC software is included in the server software kit accompanying the SKA4 baseboard.

This product guide does not discuss the software for the ICMB card. However, this product guide does provide instructions for removing and installing ICMB hardware.

Figure 8 is a drawing of the ICMB card.



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**Figure 8. ICMB Card**

A filler panel is attached to the ICMB card with two screws. The screws are noted by "A" and the card is noted by "C" in Figure 8. The panel, noted by "B", is identical to any filler panel for a PCI add-in board. You attach the filler panel to the rear of a chassis in the same way as you would attach a PCI add-in board.

## Installing an ICMB Card

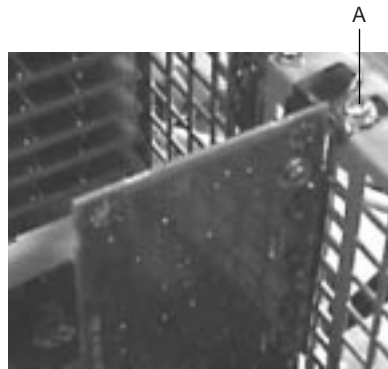
1. Remove the ICMB card and internal cable. The cable is noted by "A" in Figure 9.



OM09926

**Figure 9. Section of ICMB Internal Cable**

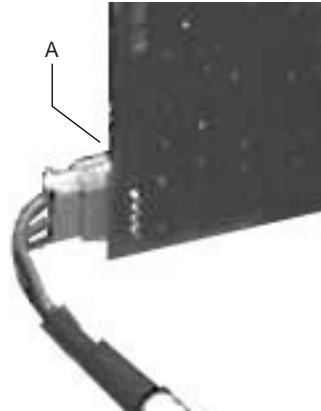
2. Designate a PCI slot for the ICMB card. The card does not plug into the connector on the baseboard, but does use the opening at the rear of the chassis.
3. Secure the filler panel to the chassis. On most systems, you use one screw. The screw is noted by "A" in Figure 10.



OM09927

**Figure 10. Example of an ICMB Card Attached to a Chassis**

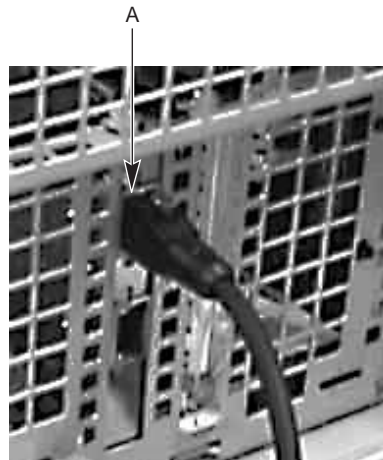
4. Attach the internal cable to the internal connector on the ICMB card. The internal cable connection to the card is noted by "A" in Figure 11.



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**Figure 11. Internal Cable Attached to the ICMB Card**

5. Connect the other end of the cable to the ICMB connector on the baseboard. The location of the connector is shown in Figure 1 on page 14.
6. The ICMB kit contains an external cable. The cable attaches to the card's external connector. The external cable connection to the card is noted by "A" in Figure 12.



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**Figure 12. External Cable Attached to the Card**

## Removing an ICMB Card

1. Disconnect the internal and external cables from the card and the baseboard.
2. Remove the screw securing the card to the chassis. The screw is noted by "A" in Figure 10 on page 74.
3. Remove the ICMB card from the server.



## 4 Solving Problems

---

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

In the event you encounter an issue with your SKA4 baseboard, this chapter helps you trouble shoot and identify possible problem areas. In some cases, you are directed to contact your customer service representative.

### Boot Issues

#### Issue 1: My server will not power on

Check for the following possibilities:

- Is the server AC power cord securely plugged into the power supply?
- Is the server plugged into a “powered on” power strip?
- Some ATX power supplies have a power switch on the back of the power supply next to the fan, is it switched on?
- Is the front panel power switch cable properly connected to the front panel header pins on the baseboard located at J9E3, pins 2 and 16?
- If you are using a SSI compliant power supply, make sure the proper power supply connector is attached to the auxiliary signal connector. SSI power supplies require a 3-volt sense signal to properly power on and have a special 5 pin by 2 row connector for that purpose. If that connector is available with your power supply, make sure it is firmly seated in the Auxiliary Signal connector located at J9B2 on the baseboard.
- Remove all add-in cards and see if the server boots using just the on-board components. If successful, add the cards back in one at a time with a reboot in between to see if you can pinpoint a suspect card.
- Remove the processor and terminator card and reseal them.
- Remove and reseal the memory modules. Try using memory modules from a known working server system. **Memory must be used in fours.**

Though it is unlikely that a server will not boot, there are many reasons why it may not boot. If you are unable to resolve this issue, please fill out the included customer support form and call your customer support representative. Please note the answers to the following questions below.

- What memory is being used? Is it on the tested memory list? Contact your customer service representative for the latest tested memory list.
- What chassis and power supply is being used?
- If you are using a chassis with front panel lights, are there any front panel lights on?
- Is the power supply fan spinning?
- Does the system beep? See issue 2.
- Please note what is displayed on the monitor or any sounds emanating from the server system.

## Issue 2: Upon boot, my server starts beeping

Most likely, these beeps are what are known as “beep codes.” They identify system events in case video fails to display. The following list is an excerpt of available beep codes. Contact your customer service representative for a complete list of beep codes.

**Table 46. Standard BIOS Port-80 Codes**

CP	Beeps	Reason
xx	1-1-1-1	There are no processors present in the system, or the processors are so incompatible that the system BIOS cannot be run (like mismatched cache voltages).
16	1-2-2-3	BIOS ROM checksum.
20	1-3-1-1	Test DRAM refresh.
22	1-3-1-3	Test 8742 Keyboard Controller.
28	1-3-3-1	Autosize DRAM, system BIOS stops execution here if the BIOS does not detect any usable memory DIMMs.
2C	1-3-4-1	Base RAM failure, BIOS stops execution here if entire memory is bad.
46	2-1-2-3	Check ROM copyright notice.
58	2-2-3-1	Test for unexpected interrupts.
98	1-2	Search for option ROMs. One long, two short beeps on checksum failure.
B4	1	One short beep before boot.

**Table 47. Recovery BIOS Port-80 Codes**

CP	Beeps	Reason
xx	1-1-1-1	There are no processors present in the system, or the processors are so incompatible that the system BIOS cannot be run (like mismatched cache voltages).

## Issue 3: My HDD lights went on, I heard the drives spin up, and my floppy drive light turned on – but I’m not seeing video

Check the following:

- Remove all add-in cards and retry booting with just the on-board components. If successful, try adding the add-in boards one at a time with a reboot in between to try and pinpoint a suspect card.
- Remove and reseal memory modules. Try using memory from a known working system.
- Remove and reseal processor and terminator card.
- If you are using a switch box to share a monitor between multiple servers, ensure you are switched to the proper server.

If you are still unable to get a video image, please fill out the included customer support form and call your customer support representative. Please note the answers to the following questions below.

- What memory is being used? Is it on the tested memory list? Contact your customer service representative for the latest tested memory list.
- What chassis and power supply is being used?
- If the chassis has front panel lights, are there any front panel lights on?
- Is the power supply fan spinning?
- Does the system beep? See issue 2.
- Please note any sounds emanating from the server system.
- If you are using a third party video adapter, please have manufacturer and model number ready.

## **Issue 4: I'm installing adapters in my powered-down system, and my system boots up when I install a PCI adapter!**

Server management features require full time “standby” power. This means that power is still provided to parts of the system even if the user has turned the system “off” via the front panel power switch.

Additionally, there are signals in the PCI connectors that tell the system to boot (normally used by server management adapters/NICs). Plugging in the adapter with AC power still applied can cause false signals to be transmitted commanding the system to boot. Before removing the cover to your chassis, you should always

- Turn off the server via the front panel power switch.
- Unplug the AC cord from the back.

Also, see issue 5. If your server is booting automatically, but the conditions specified here or in issue 5 do not match, please fill out the included customer support form and call your customer service representative. Please pay special attention to the following information:

- What BIOS do you have loaded on the system? (The latest tested BIOS is posted to the Intel Customer Support Website)
- What is the PBA number of the baseboard? (The PBA number is located on a white label near the edge of the board and is printed in the following format: PBA xxxxxx-xxx)
- What memory is being used? Is it on the tested memory list? Contact your customer service representative for the latest tested memory list.
- What chassis and power supply is being used?

## Issue 5: My system boots up automatically when I power on my power-strip

Some server systems save the “last known power state” since the last AC power connection. If you remove AC power before powering down the system via the front panel power switch, your system will automatically attempt to come back to the “on” state it was in once you restore AC power.

- Please keep in mind that unplugging the system or flipping a switch on the power strip both remove AC power.
- Follow the correct A/C removal sequence: Press the front panel button, then remove the A/C power cord.

Allowing your system to fully power up and then power down the system using the front panel power switch should correct this problem. If it does not, refer to issue 3. If neither of these options fix your problem, fill out the attached customer support form and call your customer support representative. Please have the following information available:

- What BIOS do you have loaded on the system? (the latest tested BIOS is posted to the Intel Customer Support Website)
- What is the PBA number of the baseboard? (The PBA number is located on a white label near the edge of the board and is printed in the following format: PBA xxxxxx-xxx)
- What memory is being used? Is it on the tested memory list? Contact your customer service representative for the latest tested memory list.
- What chassis and power supply is being used?

## Issue 6: The boot up process takes too long

What most people typically consider “booting” actually involves multiple phases:

- BIOS Power-On Self Test (POST): This includes the memory count and the keyboard/mouse and IDE drive check.
- Option-ROM loading: Each device may load a portion of its operating code or “option ROM” into memory. This is what the user may see as the messages that come up identifying the add-in device such as a SCSI card ROM.
- Operating system boot: During this time, the operating system takes control of the server and performs whatever checks & setups are necessary for operation. An example of this is the Windows NT “blue boot screen.”

A slow-down at any of these three points can produce what users perceive as a “slow boot.” The following is a list of items that can produce a slower boot:

- Large memory configurations. Large memory installations can take 1-2 minutes to check. Extended memory test can be disabled in BIOS setup to speed up the boot process when performing service which requires multiple reboots, however this memory test should be enabled for normal system operation.
- Multiple SCSI adapters. SCSI adapters take time to load their option ROMs and execute their code that scans for drives.



- Numerous SCSI devices. SCSI device adapters, like many other adapters, have option ROMs that must be loaded into memory. Detection & option ROM loading takes additional time.
- Numerous other adapters. Many adapters have a option ROM which takes time to load into memory.

If your system does not have any of these items and you still experience an extended boot time, please fill out the included customer support form and call your customer support representative. Please pay special attention to the following information:

- Amount of memory in the system.
- What memory is being used? Is it on the tested memory list? Contact your customer service representative for the latest tested memory list.
- Number and type of adapters in the system (manufacturer and model number).
- The number and type of hard drives in the system (manufacturer and model number).

## **Issue 7: I put one processor in my system but it doesn't boot**

Check the following:

- Is the processor a 100 MHz system bus or 133 MHz system bus processor? The SKA4 server board only supports Intel Pentium III processors designed for the 100 MHz system bus.
- Is the processor in the primary processor slot? Refer to the configuration label or the Technical Product Specification for details on which slot is the primary.
- Does the secondary processor slot contain a terminator card? The Pentium III processor architecture requires non-populated processor slots to be terminated. Without proper termination, the signals do not maintain their electrical integrity & may cause errors. Some server products prevent boot up if they do not detect a terminator card.
- Are the processor and terminator card firmly seated? The retention mechanisms designed to hold the processor and term card firmly in place. Ensure the processor and termination card have "snapped" into the retention mechanism.
- Does the system beep? Refer to issue 2.

If you are still having no-boot issues, please fill out the included customer support form and call your customer support representative. Have the following information ready:

- Does the system beep? What beep code is it giving?
- Does the system show video?
- What memory is being used? Is it on the tested memory list? Contact your customer service representative for the latest tested memory list.
- What error does the system give if any?
- What add-in adapters are installed in your system? (manufacturer and model number)
- Chassis and power supply manufacturer and model number.

## Other Issues

### Issue 8: Some of my hard drives show up during POST and some don't

Check on the following:

- Are you using third party SCSI adapters? System memory limitations limit the number & size of option ROMs in the system. If you place too many adapters or adapters that take up too much space in memory, they may not install and show the hard drives connected to them.
- If you disconnect your hard drives from the third party adapter and connect them to the on-board adapter, do they show up?
- Verify that pin 1 on the data cable is connected to pin 1 on the device. In most cases, if you orient the data cable so that the colored stripe on the cable is pointing towards the power connector on the device, you will have proper orientation.
- Verify that the device power cable is firmly connected.
- Are your hard drives properly terminated? If you are using Ultra 2 or Ultra 160 drives without a hot-swap backplane, a terminator needs to be placed in the last connector on the SCSI cable. Ultra 2/Ultra 160 devices do not provide their own termination logic like Ultra Wide devices did.
- Check your SCSI ID numbers. SCSI devices must have their own unique ID on the SCSI bus. This number is set automatically when using an Intel SCSI hot-swap backplane, but must be set with jumpers on the device when using a SCSI cable. ID number should be set starting at 0 and must be set lower than 8 if the drive is to be booted from.

If your hard drives still do not show, please fill out the included customer support form and call your customer support representative. Please pay special attention to the following information:

- What add-in adapters do you have in your system (manufacturer and model number)?
- What types of hard drives are in the system (manufacturer and model number)?
- If you are using a SCSI cable to attach your drives, what kind of terminator do you have at the end of the cable? (manufacturer and type e.g. ultra 160)
- What are the SCSI IDs of the devices on your SCSI bus?
- How many SCSI channels are you using?
- Are you using a hot-swap backplane with your third party adapter?
- What memory is being used? Is it on the tested memory list? Contact your customer service representative for the latest tested memory list.

## Issue 9: My hard drives don't show up under Windows NT

Verify that all your drives are detected during POST (see issue 8). IDE devices will be identified and listed on the screen by the server board BIOS and SCSI drives will be identified and listed on the screen by the SCSI BIOS.

Windows NT 4.0 does not ship with the latest drivers for some SCSI controllers. Because of this, Windows NT installation must be directed to the proper drivers during installation. To do this, you must press the F6 key during installation start up at the sight of the first "installation blue screen." This will allow you to skip auto-detection and manually install a driver. The other way to perform a manual install is to use the three boot floppies. When asked to perform an auto detection of mass storage devices or do it manually, choose to do it manually and you will be asked to choose from a list or provide the driver from a floppy. If you are unsure about what you should choose from the list, contact your customer service representative.

If your system can still not see the onboard adapter or your hard drives, please fill out the included customer support form and call your customer support representative. Please pay special attention to the following information:

- Does the SCSI controller identify itself during POST?
- Can you see the drives being identified at POST either by the system BIOS or the SCSI BIOS? (You should see the manufacturer's name and drive type during the Adaptec SCSI scan).
- If you are using a SCSI cable to attach your drives, what kind of terminator do you have at the end of the cable? (manufacturer and type e.g. ultra 160)
- What memory is being used? Is it on the tested memory list? Contact your customer service representative for the latest tested memory list.

# Checking Field Replaceable Units (FRU) with the Diagnostic Wizard

The Diagnostic Wizard is a suite of test utilities that check the functionality of Field Replaceable Units (FRU). First, the wizard displays a list of test modules to choose from. After completing the tests, the selected test modules return either a PASS or FAIL status on tested components. To run the Diagnostic Wizard, run it from the Service Partition installed on the system. For instructions on setting up the service partition, see the *Installation Guide for the Intel Server Control*.

## Starting the Service Partition & Test Menu

The Diagnostic Wizard may be started remotely, or you can do the following to work locally:

1. Power on your system. If it is currently running, restart using the method recommended by your operating system vendor. For example, in MS-DOS you press <Ctrl+Alt+Del>.
2. When your screen displays the message  
F2 to enter setup
3. Press <F2>.
4. Once System Setup is started, use the arrow keys to highlight the **Advanced** menu.
5. Highlight **Server Management** and press <Enter>.
6. Highlight **Service Boot** and press <Enter>.
7. A menu is displayed. Highlight **Enable** and press <Enter>.
8. Press <F10> to save and exit setup.
9. Press Y to confirm saving current settings.
10. The system restarts to a ROM-DOS prompt. At this point, you can execute any software installed on your Service Partition from the command line, or you can run the Diagnostic Wizard as instructed below.

### ⇒ NOTE

The option in System Setup to perform a Service Boot is a flag only. As soon as you save and exit setup, it is reset to **disable**. The next reboot returns you to the operating system or boot manager. Therefore, to reboot to the service partition, you must follow the steps above every time.

11. To open the Diagnostic Wizard test selection menu, type `testmenu` and press <Enter>.

## Running Tests

### ⇒ NOTE

The test modules included with your Server Software Kit CD are specifically designed to run on the server system you purchased from Intel. Running the tests on any other platform results in the following error message.

```
This Motherboard is not supported by this test.
```

```
Press any key to exit.
```

After displaying this message, the program terminates.

### Test Menu

The Test Menu displays a list of tests that you can run. Use your keyboard cursor (arrow) keys to highlight the desired test and press <Enter> to execute it.

### SAMPLE SCREEN DISPLAY

```
H820diag Version 1.0 ©Copyright 1999 Intel Corp. All Rights Reserved.
```

```
Server Diagnostic Options
```

```
Quick Test
```

```
Comprehensive Test
```

```
Comprehensive Test with continuous looping
```

```
Highlight selection using Cursor UP/DOWN and press ENTER
```

## System Configuration Check

Before executing the tests, the system hardware is scanned and a message is displayed for confirmation. Before continuing with the tests, check the accuracy of the scan. Once you are sure that the system has successfully scanned the system hardware, press <Enter>.

To cancel press <Ctrl + Break>. A message is displayed and instructs you to check all hardware and cable connections before returning to the test menu.

### SAMPLE SCREEN DISPLAY

```

                                DiagWiz Test Configuration
Base Memory Size:                640KB
CPU Type:                        Pentium® III Processor
CPU Speed:                       550MHz
CPU SMP #0:                       Present
CPU SMP #1:                       Present
Keyboard Type:                   101-Key
Mouse:                            Enabled
RTC RAM Size:                    128
Number of SCSI Channels:         2
COM2 at Port Address:           2F8 is enabled
LPT1:                            0x378
Floppy Cfg. Drive A:            1.44MB (3.5 inch)
Hard Drive 0:                   Cylinders: 531 Heads: 255 Sectors:65 Total Size:
                                4157MB
Video Subsystem:                Rage IIC, 1024K video RAM
External Cache Size:            512KB
Memory Size:                    128MB
```

If the above configuration is correct, press <Enter> to continue or press <Ctrl + Break> to quit.

## Test Results

Once the tests have ran, a summary is displayed showing the status of each test. If an FRU passed the test, the text PASSED in green letters is displayed. If an FRU failed the test, the text FAILED in red letters is displayed.

The report is broken down by FRU. Each section contains the status of every test run for one FRU. The text for an FRU is red even if just one test fails. The specific tests that failed are indicated below it in the report. Also be aware that the failure of some tests may effect the passing or failing of subsequent tests. If all the tests for an individual FRU pass, the FRU is displayed in Green.

### SAMPLE SCREEN DISPLAY

CPU FRU	PASSED
MATH_COPROCESSOR	PASSED
CPU	PASSED
SMP_PROCESSOR_0	PASSED
MEMORY FRU	PASSED
MEMORY	PASSED
STRESS	PASSED
HARD DISK FRU	PASSED
HARD DISK 0	PASSED
HARD DISK 1	PASSED





# 5 Technical Reference

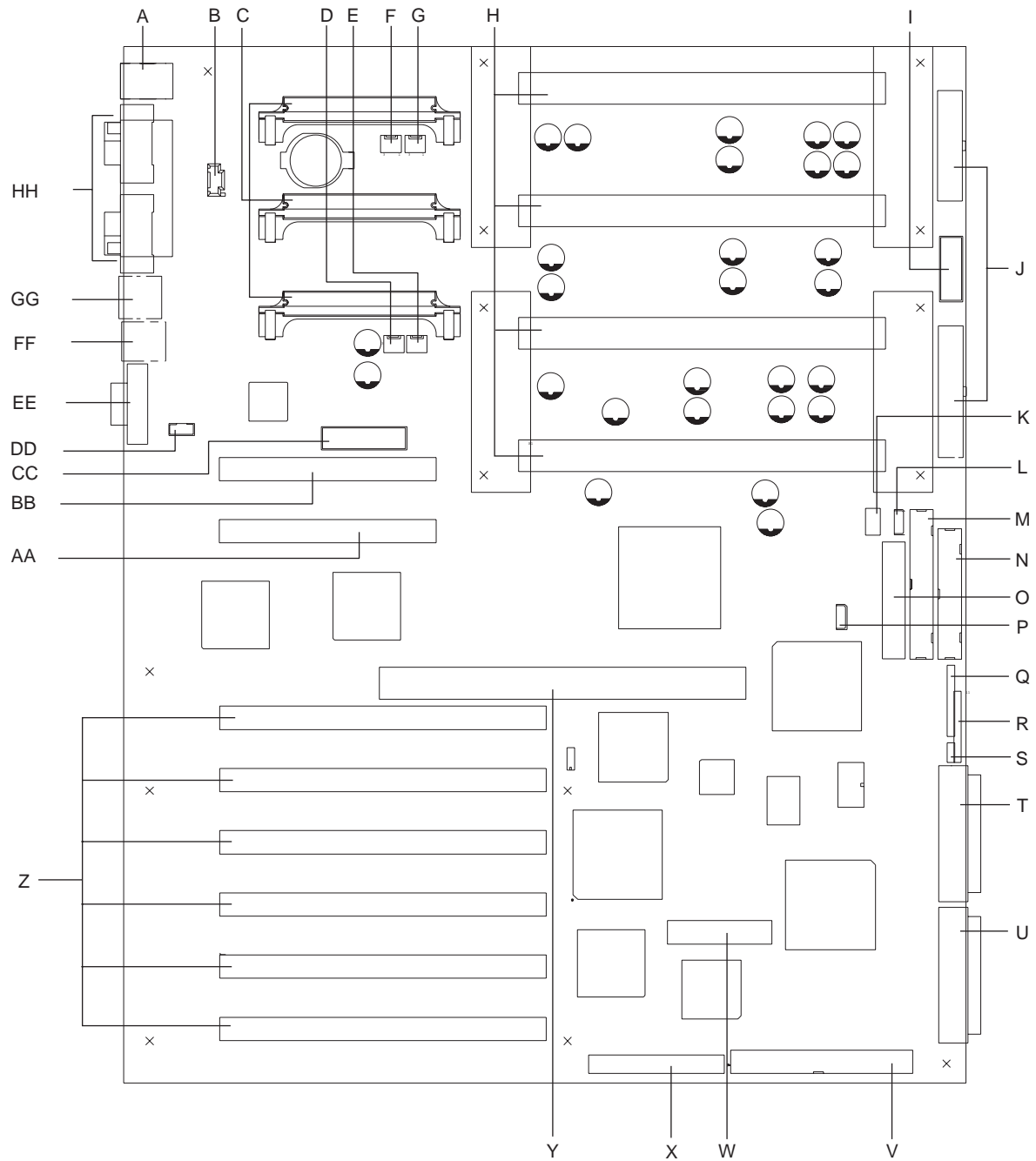
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This section includes:

- Connectors' pinouts and baseboard locations
- Information on baseboard jumpers
- Baseboard interrupts
- Video modes

# Connectors

The following figure shows connector locations on the baseboard. This section provides pin information about the connectors.



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**Figure 13. Detailed Diagram of Connector Locations**

Item	Connector	Description	Item	Connector	Description
A.	J1A1	Keyboard and Mouse Connector	R.	J9F2	Jumper Block
B.	J1B3	Internal USB	S.	J9G1	Jumper Block
C.	J2B1	VRM Connector #3	T.	J9G2	Ultra 160 Wide SCSI Channel B
	J2A2	VRM Connector #4 (VRM above)	U.	J9H1	Ultra 160 Wide SCSI Channel A
	J2C1	VRM Connector #2 (VRM below)	V.	J7J1	Legacy Narrow SCSI Connector
D.	J3C1	Fan Connector #1	W.	J7H1	SMM Feature Connector
E.	J4C1	Fan Connector #4	X.	J6J1	Legacy Wide SCSI
F.	J3A1	Fan Connector #2	Y.	J6F1	Memory Expansion Card Connector
G.	J4A1	Fan Connector #3	Z.	(Top to bottom)	PCI Slot #3 P64-A1  PCI Slot #4 P64-A2 PCI Slot #5 P64-B1 PCI Slot #6 P64-B2 PCI Slot #7 P64-B3 PCI Slot #8 P64-B4
H.	(Top to bottom)	Processor Connector #4 Processor Connector #3 Processor Connector #2 Processor Connector #1		J4F1	
	J7A1			J4G1	
	J7B1			J4G2	
	J7C1			J4H1	
I.	J9B2	Auxiliary Power Connector	J4H2		
			J4J1		
J.	(Top to bottom)	Main Power Connector A Main Power Connector B	AA.	J2E1	PCI Slot #2 P32-C1
	J9B1		BB.	J2D1	PCI Slot #1 P32-C2
	J9D1		CC.	J3D1	Hot Plug Indicator Board Connector (HPIB)
K.	J9E1	IDE Activity Input Connector	DD.	J1D2	ICMB Connector
L.	J9E4	SMBus Connector	EE.	J1D1	Video
M.	J9E5	IDE Connector	FF.	J1C2	USB
N.	J9E6	Floppy Connector	GG.	J1C1	NIC
O.	J9E3	Front Panel Connector	HH.	(Top to bottom)	Serial Port A Parallel Port Serial Port B
P.	J8F1	IMB Connector		J1A2	
Q.	J9F1	Jumper Block		J1B2 J1B1	

## Power Distribution Board Interface Connectors (J9B1, J9D1, J9B2)

The SKA4 Baseboard receives its main power through two primary and one auxiliary power connectors. The two main power connectors are identified as J9B1 and J9D1. The auxiliary power connector, identified as J9B2, provides a power subsystem communication path, control signals, power supply sense connections and other miscellaneous signals defined in the table below.

**Table 48. Main Power Connector A (J9B1)**

Pin	Signal	Type*	Current Carrying Capability	Description
1	12V	power	6 Amps	Power supply 12V
2	Ground	ground	6 Amps	Ground return connection
3	Ground	ground	6 Amps	Ground return connection
4	Ground	ground	6 Amps	Ground return connection
5	Ground	ground	6 Amps	Ground return connection
6	VCC	power	6 Amps	Power Supply 5V
7	VCC	power	6 Amps	Power Supply 5V
8	VCC	power	6 Amps	Power Supply 5V
9	VCC	power	6 Amps	Power Supply 5V
10	VCC	power	6 Amps	Power Supply 5V
11	SB5V	power	6 Amps	Power Supply 5V standby
12	Ground	ground	6 Amps	Ground return connection
13	Ground	ground	6 Amps	Ground return connection
14	Ground	ground	6 Amps	Ground return connection
15	Ground	ground	6 Amps	Ground return connection
16	VCC	power	6 Amps	Power Supply 5V
17	VCC	power	6 Amps	Power Supply 5V
18	VCC	power	6 Amps	Power Supply 5V
19	VCC	power	6 Amps	Power Supply 5V
20	VCC	power	6 Amps	Power Supply 5V

\* Type (in, out, in/out, power, ground) is from the perspective of the baseboard.

**Table 49. Main Power Connector B (J9D1)**

Pin	Signal	Type*	Current Carrying Capability	Description
1	VCC3	power	6 Amps	Power supply 3.3V
2	VCC3	power	6 Amps	Power supply 3.3V
3	VCC3	power	6 Amps	Power supply 3.3V
4	VCC3	power	6 Amps	Power supply 3.3V
5	VCC3	power	6 Amps	Power supply 3.3V
6	VCC3	power	6 Amps	Power supply 3.3V
7	Ground	ground	6 Amps	Ground return connection
8	Ground	ground	6 Amps	Ground return connection
9	Ground	ground	6 Amps	Ground return connection
10	Ground	ground	6 Amps	Ground return connection
11	Ground	ground	6 Amps	Ground return connection
12	12V	power	6 Amps	Power Supply 12V
13	VCC3	power	6 Amps	Power supply 3.3V
14	VCC3	power	6 Amps	Power supply 3.3V
15	VCC3	power	6 Amps	Power supply 3.3V
16	VCC3	power	6 Amps	Power supply 3.3V
17	VCC3	power	6 Amps	Power supply 3.3V
18	VCC3	power	6 Amps	Power supply 3.3V
19	Ground	ground	6 Amps	Ground return connection
20	Ground	ground	6 Amps	Ground return connection
21	Ground	ground	6 Amps	Ground return connection
22	Ground	ground	6 Amps	Ground return connection
23	Ground	ground	6 Amps	Ground return connection
24	12V	power	6 Amps	Power Supply 12V

\* Type (in, out, in/out, power, ground) is from the perspective of the baseboard.

**Table 50. Auxiliary Power Connector (J9B2)**

Pin	Signal	Type*	Current Carrying Capability	Description
1	Ground	ground		Ground return connection
2	5V Sense	out	N/A	Sense line feedback to power supply
3	3.3V Sense	out	N/A	Sense line feedback to power supply
4	BMC FAN SPD CTL	out	N/A	
5	SM PRI 5VSB SCL	in/out	N/A	Server Management I2C bus - clock
6	SM PRI 5VSB SDA	in/out	N/A	Server Management I2C bus - data
7	Ground	ground		Ground return connection
8	PWRGD PS	in	N/A	Signal from power subsystem indicating power is stable

continued

**Table 50. Auxiliary Power Connector (J9B2) (continued)**

Pin	Signal	Type*	Current Carrying Capability	Description
9	PS PWR ON_L	out	N/A	Control signal from baseboard to power supply
10	Ground	ground		Ground return connection
11	-12V	power		Power Supply negative 12V
12	Key		N/A	
13	12V	power		Power Supply 12V
14	Ground	ground		Ground return connection

\* Type (in, out, in/out, power, ground) is from the perspective of the baseboard.

## Front Panel Interface (J9E3)

The front panel attaches to a 30-pin header on the baseboard. The header contains reset, NMI, sleep, and power control buttons, LED indicators, and an IPMB connection. The table below summarizes the front panel signal pins, including the signal mnemonic, name, and brief description.

**Table 51. Front Panel Connector (J9E3)**

Pin	Signal	Type*	Description
1	SPKR_FP	out	SPEAKER DATA for the front panel/chassis mounted speaker.
2	GROUND	ground	GROUND is the power supply ground.
3	CHASSIS_INTRUSION	in	CHASSIS INTRUSION is connected to the BMC and indicates that the chassis has been opened. CHASSIS_INTRUSION is pulled high to +5 V standby on the baseboard.
4	FP_HD_ACT*	out	HARD DRIVE ACTIVITY indicates there is activity on one of the hard disk controllers in the system.
5	+5V	power	+5 V is the 5 volt power supply.
6	FP_SLP_BTN*	in	FRONT PANEL SLEEP is connected to the BMC and causes the system to be put to sleep if supported by the operating system. FP_SLP_BTN* is pulled high to +5 V on the baseboard and is intended to be connected to a momentary-contact push button (connected to GROUND when pushed) on the system front.
7	COOL_FLT_LED*	out	COOLING FAULT LED indicates that either a fan failure has occurred or the system is approaching an over-temperature situation. COOL_FLT_LED* is an output of the BMC.
8	PWR_LED*	out	POWER PRESENT LED.
9	PWR_FLT_LED*	out	SYSTEM FAULT indicates that either a power fault or SCSI drive failure has occurred in the system.
10	GROUND	ground	GROUND is the power supply ground.
11	SM_IMB_SDA	in/out	I <sup>2</sup> C DATA is the data signal for the Intelligent Platform Management Bus.

continued

**Table 51. Front Panel Connector (J9E3) (continued)**

Pin	Signal	Type*	Description
12	FP_NMI_BTN*	in	FRONT PANEL NMI is connected to a BMC input port, allowing the front panel to generate an NMI. FP_NMI_BTN* is pulled high to +5 V on the baseboard and is intended to be connected to a momentary-contact push button (connected to GROUND when pushed) on the system front panel.
13	SM_IMB_SCL	in/out	I <sup>2</sup> C CLOCK is the clock signal for the Intelligent Platform Management Bus.
14	FP_RST_BTN*	in	FRONT PANEL RESET is connected to the BMC. A hard reset occurs and all baseboard devices, except for the BMC are reset. FP_RST_BTN* is pulled high to +5V on the baseboard, and is intended to be connected to a momentary-contact push button (connected to GROUND when pushed) on the system front panel.
15	+5V standby	power	+5 V STANDBY is the standby 5 volt power supply.
16	FP_PWR_BTN*	in	FRONT PANEL POWER CONTROL is connected to the BMC and causes the power to toggle (on → off, or off → on). FP_PWR_BTN* is pulled high to +5 V standby on the baseboard and is intended to be connected to a momentary-contact push button (connected to GROUND when pushed) on the system front panel.
17	SM_FP_ISOL	in	SM_FP_ISOL, when asserted, isolates the front panel SM bus.
18	GROUND	ground	GROUND is the power supply ground.
19	FAN_TACH(0)	in	FAN_TACH signal is connected to the BMC to monitor the FAN speed.
20	FAN_TACH(1)	in	FAN_TACH signal is connected to the BMC to monitor the FAN speed.
21	FAN_TACH(2)	in	FAN_TACH signal is connected to the BMC to monitor the FAN speed.
22	FAN_TACH(3)	in	FAN_TACH signal is connected to the BMC to monitor the FAN speed.
23	FAN_TACH(4)	in	FAN_TACH signal is connected to the BMC to monitor the FAN speed.
24	FAN_TACH(5)	in	FAN_TACH signal is connected to the BMC to monitor the FAN speed.
25	FAN_TACH(6)	in	FAN_TACH signal is connected to the BMC to monitor the FAN speed.
26	FAN_TACH(7)	in	FAN_TACH signal is connected to the BMC to monitor the FAN speed.
27	RJ45_ACTLED_R	in	NIC activity LED.
28	reserved	-	Reserved.
29	SM_PRI_SCL	in/out	I <sup>2</sup> C CLOCK is the clock signal for the Primary Private Bus.
30	SM_PRI_SDA	in/out	I <sup>2</sup> C DATA is the data signal for the Primary Private Bus.

\* Type (in, out, in/out, power, ground) is from the perspective of the baseboard.

## Hot-Plug PCI Indicator Board Interface (J3D1)

The Hot-Plug PCI Indicator Board (HPIB) contains the necessary LEDs and pushbutton switches to help the user run PCI Hot-Plug (PHP) operations.

To indicate slot status, each PHP slot contains a green LED and amber LED. The actual interpretation of the LEDs depends on the operating system running on the system.

Each PHP slot also has a momentary pushbutton switch. When you push this button, the SKA4 baseboard notifies the operating system that a PHP operation on the respective slot is requested. If PHP operation is supported by the operating system, the user momentarily presses the switch and then waits for the operating system to signal via the LEDs that the PHP slot has been disabled. The user can then perform the desired PHP operation on the slot, such as replacing, removing, or adding a PCI adapter. When the user wants the operating system to enable and initialize the PHP slot, the user momentarily presses the switch again.

This (Active Low) pushbutton switch for the respective slot is routed to the PRSNT1# input to the PCI Hot-Plug Controller (PHPC). This switch should not be confused with slot-interlock switches, which are used in conjunction with mechanical lever designs to prevent access to an energized PHP slot. The slot interlock inputs into the PHPC are permanently pulled down to ground and are not accessible through the Hot-Plug PCI Indicator Board interface.

### ⇒ NOTE

The HW push button is located on the Hot-Plug Indicator board. Do not use this button to turn power on and off to the PCI slot. In some instances, pushing this button interrupts normal operation of the operating system. Instead, turn power off using a Hot-Plug PCI application.

The Hot-Plug PCI Indicator Board interface contains the necessary signals to drive the LEDs and receive the pushbutton signals.

A 20-pin connector is provided on the baseboard for connection to the external HPIB. The pin out for this connector is given in the table below.

**Table 52. Hot-Plug Indicator Board Connector Pin Out (J3D1)**

Connector contact	Signal Name	Connector contact	Signal Name
1	Vcc	2	GROUND
3	P64_A_SWITCH<0>	4	P64_A_GRN_LED<1>
5	P64_A_AMB_LED<0>	6	P64_A_SWITCH<1>
7	P64_A_GRN_LED<1>	8	P64_A_AMB_LED<1>
9	P64_B_SWITCH<0>	10	P64_A_GRN_LED<0>
11	P64_B_AMB_LED<0>	12	P64_B_SWITCH<1>
13	P64_B_GRN_LED<1>	14	P64_A_AMB_LED<1>
15	P64_B_SWITCH<2>	16	P64_A_GRN_LED<2>
17	P64_A_AMB_LED<2>	18	P64_B_SWITCH<3>
19	P64_A_GRN_LED<3>	20	P64_A_AMB_LED<3>



## Memory Module Interface (J6F1)

**Table 53. Memory Module Interface**

Pin**	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A001	GND	B001	PIN_B1	A084	GND	B084	MAA9
A002	GND	B002	VCC3	A085	MAA10	B085	VCC3
A003	GND	B003	SYNTH_OUT_MADPCLK	A086	MAA11	B086	MAA12
A004	GND	B004	VCC3	A087	GND	B087	MAA13
A005	ASCLK	B005	VCC3	A088	MAA14	B088	VCC3
A006	CMD0	B006	ASDATA	A089	MCD_MUXSEL	B089	VCC3
A007	GND	B007	CMD16	A090	GND	B090	VCC3
A008	CMD1	B008	VCC3	A091	BSCLK	B091	VCC3
A009	CMD2	B009	CMD3	A092	MECC12	B092	BSDATA
A010	GND	B010	CMD19	A093	GND	B093	MECC14
A011	CMD17	B011	VCC3	A094	MECC13	B094	VCC3
A012	CMD4	B012	CMD20	A095	MECC15	B095	CMD97
A013	GND	B013	CMD6	A096	GND	B096	CMD96
A014	CMD18	B014	VCC3	A097	CMD112	B097	VCC3
A015	CMD5	B015	CMD21	A098	CMD113	B098	CMD98
A016	GND	B016	CMD23	A099	GND	B099	CMD99
A017	CMD8	B017	VCC3	A100	CMD114	B100	VCC3
A018	CMD7	B018	CMD22	A101	CMD100	B101	CMD116
A019	GND	B019	CMD9	A102	GND	B102	CMD115
A020	CMD25	B020	VCC3	A103	CMD101	B103	VCC3
A021	CMD26	B021	CMD24	A104	CMD117	B104	CMD102
A022	GND	B022	CMD10	A105	GND	B105	CMD103
A023	CMD12	B023	VCC3	A106	CMD118	B106	VCC3
A024	CMD28	B024	CMD11	A107	CMD119	B107	CMD104
A025	GND	B025	CMD27	A108	GND	B108	CMD120
A026	CMD29	B026	VCC3	A109	CMD105	B109	VCC3
A027	CMD14	B027	CMD30	A110	CMD121	B110	CMD106
A028	GND	B028	CMD13	A111	GND	B111	CMD107
A029	CMD15	B029	VCC3	A112	CMD122	B112	VCC3
A030	CMD31	B030	MECC0	A113	CMD123	B113	CMD108
A031	GND	B031	MECC1	A114	GND	B114	CMD124
A032	MECC2	B032	VCC3	A115	CMD109	B115	VCC3
A033	MECC3	B033	CKE_0	A116	CMD125	B116	CMD110
A034	GND	B034	0_RAS	A117	GND	B117	CMD126
A035	0_WE*	B035	VCC3	A118	GND	B118	VCC3
A036	0_CAS	B036	0_CS0	A119	GND	B119	VCC3
A037	GND	B037	0_CS1	A120	CMD111	B120	VCC3

continued

**Table 53. Memory Module Interface (continued)**

Pin**	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A038	0_CS2	B038	VCC3	A121	CMD127	B121	CKE_1
A039	0_CS3	B039	0_MCDOE*	A122	GND	B122	1_RAS
A040	GND	B040	MEMPRSNT	A123	1_WE*	B123	VCC3
A041	0_MCDSEL*	B041	VCC3	A124	1_CAS	B124	1_CS0
A042	GND	B042	TMD0	A125	GND	B125	1_CS1
A043	GND	B043	VCC3	A126	1_CS2	B126	VCC3
A044	CMD34	B044	VCC3	A127	1_CS3	B127	1_MCDOE*
A045	CMD50	B045	CMD49	A128	GND	B128	1_MCDSEL*
A046	GND	B046	CMD54	A129	CMD80	B129	VCC3
A047	CMD52	B047	VCC3	A130	MECC8	B130	MECC10
A048	CMD51	B048	CMD33	A131	GND	B131	CMD64
A049	GND	B049	CMD32	A132	CMD81	B132	VCC3
A050	CMD40	B050	VCC3	A133	MECC9	B133	MECC11
A051	CMD38	B051	CMD53	A134	GND	B134	CMD65
A052	GND	B052	CMD36	A135	CMD66	B135	VCC3
A053	CMD35	B053	VCC3	A136	CMD82	B136	CMD85
A054	CMD42	B054	CMD58	A137	GND	B137	CMD67
A055	GND	B055	CMD39	A138	CMD83	B138	VCC3
A056	GND	B056	VCC3	A139	CMD84	B139	CMD68
A057	GND	B057	VCC3	A140	GND	B140	CMD71
A058	CMD55	B058	VCC3	A141	CMD87	B141	VCC3
A059	CMD37	B059	CMD43	A142	CMD70	B142	CMD86
A060	GND	B060	CMD57	A143	GND	B143	CMD69
A061	CMD56	B061	VCC3	A144	CMD73	B144	VCC3
A062	CMD62	B062	CMD63	A145	CMD89	B145	CMD72
A063	GND	B063	CMD61	A146	GND	B146	CMD88
A064	CMD44	B064	VCC3	A147	CMD76	B147	VCC3
A065	CMD60	B065	CMD41	A148	CMD92	B148	CMD75
A066	GND	B066	MECC6	A149	GND	B149	CMD91
A067	CMD47	B067	VCC3	A150	CMD74	B150	VCC3
A068	CMD48	B068	CMD59	A151	CMD90	B151	CMD78
A069	GND	B069	CMD45	A152	GND	B152	CMD77
A070	CMD46	B070	VCC3	A153	CMD94	B153	VCC3
A071	MECC7	B071	MECC4	A154	CMD93	B154	CMD79
A072	GND	B072	MECC5	A155	GND	B155	CMD95
A073	GND	B073	VCC3	A156	GND	B156	VCC3
A074	MADPCLK_FB_DLY	B074	VCC3	A157	GND	B157	VCC3

continued

**Table 53. Memory Module Interface (continued)**

Pin**	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A075	GND	B075	BCLK_MADP_OUT	A158	GND	B158	VCC3
A076	MAA0	B076	VCC3	A159	GND	B159	VCC3
A077	MAA1	B077	VCC3	A160	GND	B160	VCC3
A078	GND	B078	SDRDCLK_HE_DLY	A161	GND	B161	VCC3
A079	MAA2	B079	VCC3	A162	GND	B162	RESERVED162
A080	MAA3	B080	MAA4	A163	GND	B163	VCC
A081	GND	B081	MAA5	A164	GND	B164	VCC
A082	MAA6	B082	VCC3	A165	PIN_A165	B165	VCC
A083	MAA7	B083	MAA8	A166	NC	B166	NC

\* Signal active low.

\*\* Pins are numbered with respect to the module edge connector. Axx signals appear on the front (processor side) of the processor card.

## Processor Module Connector (J7A1, J7B1, J7C1, J7D1)

**Table 54. Processor Card Connector Pin Out (J7A1, J7B1, J7C1, J7D1)**

Pin**	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A001	RESERVED (nc)	B001	PWR_EN1	A084	GND	B084	RESERVED (nc)
A002	VCC_TAP	B002	VCCP	A085	D11*	B085	VCCP
A003	RESERVED (nc)	B003	OCVR_OK*	A086	D10*	B086	D17*
A004	GND	B004	TEST_VSS_B4	A087	GND	B087	D15*
A005	VTT	B005	VCCP	A088	D14*	B088	VCCP
A006	VTT	B006	VTT	A089	D9*	B089	D12*
A007	SELFSB1	B007	VTT	A090	GND	B090	D7*
A008	RESERVED_A8	B008	VCCP	A091	D8*	B091	VCCP
A009	RESERVED_A9	B009	RESERVED (nc)	A092	D5*	B092	D6*
A010	GND	B010	FLUSH*	A093	GND	B093	D4*
A011	TEST_GND (pd)	B011	VCCP	A094	D3*	B094	VCCP
A012	IERR*	B012	SMI*	A095	D1*	B095	D2*
A013	GND	B013	INIT*	A096	GND	B096	D0*
A014	A20M*	B014	VCCP	A097	BCLK	B097	VCCP
A015	FERR*	B015	STPCLK*	A098	TEST_VSS (pd)	B098	RESET*
A016	GND	B016	TCK	A099	GND	B099	FRCERR
A017	IGNNE*	B017	VCCP	A100	BERR*	B100	VCCP
A018	TDI	B018	SLP*	A101	A33*	B101	A35*
A019	GND	B019	TMS	A102	GND	B102	A32*
A020	TDO	B020	VCCP	A103	A34*	B103	VCCP
A021	PWRGOOD	B021	TRST*	A104	A30*	B104	A29*
A022	GND	B022	RESERVED (nc)	A105	GND	B105	A26*

continued

**Table 54. Processor Card Connector Pin Out (J7A1, J7B1, J7C1, J7D1) (continued)**

Pin**	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A023	TEST_25 (pu)***	B023	VCCP	A106	A31*	B106	VCCL2
A024	THERMTRIP*	B024	RESERVED (nc)	A107	A27*	B107	A24*
A025	GND	B025	RESERVED (nc)	A108	GND	B108	A28*
A026	OCRV_EN	B026	VCCP	A109	A22*	B109	VCCL2
A027	INTR	B027	TEST_VCCP (pu)	A110	A23*	B110	A20*
A028	GND	B028	NMI	A111	GND	B111	A21*
A029	PICD0	B029	VCCP	A112	A19*	B112	VCCL2
A030	PREQ*	B030	PICCLK	A113	A18*	B113	A25*
A031	GND	B031	PICD1	A114	GND	B114	A15*
A032	BP3*	B032	VCCP	A115	A16*	B115	VCC_L2
A033	BMP0*	B033	BP2*	A116	A13*	B116	A17*
A034	GND	B034	RESERVED (nc)	A117	GND	B117	A11*
A035	BINIT*	B035	VCCP	A118	A14*	B118	VCC_L2
A036	DEP0*	B036	PRDY*	A119	GND	B119	A12*
A037	VSS	B037	BPM1*	A120	A10*	B120	VCCL2
A038	DEP1*	B038	VCCP	A121	A5*	B121	A8*
A039	DEP3*	B039	DEP2*	A122	GND	B122	A7*
A040	GND	B040	DEP4*	A123	A9*	B123	VCCL2
A041	DEP5*	B041	VCCP	A124	A4*	B124	A3*
A042	DEP6*	B042	DEP7*	A125	GND	B125	A6*
A043	GND	B043	D62*	A126	RESERVED (nc)	B126	VCCL2
A044	D61*	B044	VCCP	A127	BNR*	B127	AERR*
A045	D55*	B045	D58*	A128	GND	B128	REQ0*
A046	GND	B046	D63*	A129	BPRI*	B129	VCCL2
A047	D60*	B047	VCCP	A130	TRDY*	B130	REQ1*
A048	D53*	B048	D56*	A131	GND	B131	REQ4*
A049	GND	B049	D50*	A132	DEFER*	B132	VCCL2
A050	D57*	B050	VCCP	A133	REQ2*	B133	LOCK*
A051	D46*	B051	D54*	A134	GND	B134	DRDY*
A052	GND	B052	D59*	A135	REQ3*	B135	VCCL2
A053	D49*	B053	VCCP	A136	HITM*	B136	RS0*
A054	D51*	B054	D48*	A137	GND	B137	HIT*
A055	GND	B055	D52*	A138	DBSY*	B138	VCCL2
A056	CPU_SENSE	B056	VCCP	A139	RS1*	B139	RS2*
A057	GND	B057	L2_SENSE	A140	GND	B140	RP*
A058	D42*	B058	VCCP	A141	BR2*	B141	VCCL2
A059	D45*	B059	D41*	A142	BR0*	B142	BR3*
A060	GND	B060	D47*	A143	GND	B143	BR1*

continued

**Table 54. Processor Card Connector Pin Out (J7A1, J7B1, J7C1, J7D1) (continued)**

Pin**	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A061	D39*	B061	VCCP	A144	ADS*	B144	VCCL2
A062	TEST_25 (pu)***	B062	D44*	A145	AP0*	B145	RSP*
A063	GND	B063	D36*	A146	GND	B146	AP1*
A064	D43*	B064	VCCP	A147	VID2_CORE	B147	VCCL2
A065	D37*	B065	D40*	A148	VID1_CORE	B148	RESERVED (nc)
A066	GND	B066	D34*	A149	GND	B149	VID3_CORE
A067	D33*	B067	VCCP	A150	VID4_CORE	B150	VCCL2
A068	D35*	B068	D38*	A151	RESERVED (nc)	B151	VID0_CORE
A069	GND	B069	D32*	A152	GND	B152	VID0_L2
A070	D31*	B070	VCCP	A153	VID2_L2	B153	VCCL2
A071	D30*	B071	D28*	A154	VID1_L2	B154	VID4_L2
A072	GND	B072	D29*	A155	GND	B155	VID3_L2
A073	D27*	B073	VCCP	A156	VTT	B156	VCCL2
A074	D24*	B074	D26*	A157	VTT	B157	VTT
A075	GND	B075	D25*	A158	GND	B158	VTT
A076	D23*	B076	VCCP	A159	SA2	B159	VCCL2
A077	D21*	B077	D22*	A160	VCC3.3	B160	SCLK
A078	GND	B078	D19*	A161	GND	B161	SDAT
A079	D16*	B079	VCCP	A162	SA1	B162	VCCL2
A080	D13*	B080	D18*	A163	SA0	B163	RESERVED (nc)
A081	GND	B081	D20*	A164	GND	B164	RESERVED (nc)
A082	TEST_VTT (pu)	B082	VCCP	A165	PWR_EN0	B165	RESERVED (nc)
A083	RESERVED (nc)	B083	RESERVED (nc)				

\* Signal is active low.

\*\* Pins are numbered with respect to the module edge connector. Axx signals appear on the front (processor side) of the processor card.

\*\*\* Signals that have no connection except for a pullup resistor to 2.5 volts are labeled with the signal mnemonic followed by "(pu)."

## Processor Termination, Regulation, and Power

The termination circuitry required by the Intel Pentium III Xeon processor bus (AGTL+) signaling environment and the circuitry to set the AGTL+ reference voltage, are implemented directly on the processor cards. The baseboard provides 1.5 V AGTL+ termination power (VTT), and VRM 8.3-compliant DC-to-DC converters to provide processor power (VCCP) at each connector. The baseboard provides three embedded and three VRM sockets to power the processors, which derive power from the +5 V and 12 V supplies. Each processor has a separate VRM to power its core; however, two processors share a VRM to power their cache.

**Table 55. Processor VRM Connectors (J2A2, J2B1, J2C1): Add-in VRM Connector Pin Listing**

Pin	Signal	Type*
A1	P5VIN1	POWER
A2	P5VIN2	POWER
A3	P5VIN3	POWER
A4	P12VIN1	POWER
A5	P12VIN3	POWER
A6	P1SHARE	
A7	VID0	OUT
A8	VID2	OUT
A9	VID4	OUT
A10	VCCP1	POWER
A11	VSS1	POWER
A12	VCCP2	POWER
A13	VSS2	POWER
A14	VCCP3	POWER
A15	VSS3	POWER
A16	VCCP4	POWER
A17	VSS4	POWER
A18	VCCP5	POWER
A19	VSS5	POWER
A20	VCCP6	POWER
B1	P5VIN4	POWER
B2	P5VIN5	POWER
B3	P5VIN6	POWER
B4	P12VIN2	POWER
B5	RES	
B6	OUTEN	OUT
B7	VID1	OUT
B8	VID3	OUT
B9	PWRGOOD	

continued

**Table 55. Processor VRM Connectors (J2A2, J2B1, J2C1): Add-in VRM Connector Pin Listing (continued)**

Pin	Signal	Type*
B10	VSS6	POWER
B11	VCCP7	POWER
B12	VSS7	POWER
B13	VCCP8	POWER
B14	VSS8	POWER
B15	VCCP9	POWER
B16	VSS9	POWER
B17	VCCP10	POWER
B18	VSS10	POWER
B19	VCCP11	POWER
B20	VSS11	POWER

\* Type (in/out) is from the perspective of the baseboard.

## Termination Card

You must install a termination card in any vacant processor card slot to ensure reliable system operation.

The termination card contains AGTL+ termination circuitry, clock signal termination, and Test Access Port (TAP) bypassing for the vacant connector. The system does not boot unless all slots are occupied with a processor or termination card.

## Server Monitor Module Connector (J7H1)

The baseboard supports the Server Monitor Module feature connector. The table below shows the pinout of the 26-pin baseboard connector.

On the SKA4 baseboard, pins 1, 9, 15, and 17 are connected to **SMI\_L**, **NMI**, **SECURE\_MODE**, and **CHASSIS\_INTRUSION**. Some server systems do not monitor these signals.

**Table 56. Server Monitor Module Connector Pin Out**

Pin	Signal	Type*	Description—SKA4 Implementation
1	SMI_L	out	System Management Interrupt: not supported on SMM
2	I2C_SCL	in	I <sup>2</sup> C clock line
3	CONP_L	out	Connector Present: tied to ground on the baseboard
4	Reserved		Reserved pin: NC on baseboard
5	PWR_CNTL_L	in	Power supply on/off control: allows SMM to control system power
6	I2C_SDA	in/out	I <sup>2</sup> C serial data line
7	5VSTNDBY	out	+5 V standby: monitored by SMM to determine if AC power is applied
8	Reserved		Pulled up to 5 V through 10k on baseboard

continued

**Table 56. Server Monitor Module Connector Pin Out (continued)**

Pin	Signal	Type*	Description—SKA4 Implementation
9	NMI	out	Non-maskable interrupt: not supported on SMM
10	HOST_AUX	out	Baseboard voltage monitored by SMM card: connected to 3.3 V
11	RESET_L	in	Baseboard reset signal from Server Monitor Module
12	GROUND	ground	Ground
13	GROUND	ground	Ground
14	Key		No connect on baseboard
15	SECURE_MODE	out	Secure mode indication: not supported on SMM
16	GROUND	ground	Ground
17	CHASSIS_INTRUSION	out	Chassis intrusion indication: not supported on SMM
18	Reserved		Reserved pin: NC on baseboard
19	Reserved		Reserved pin: NC on baseboard
20	GROUND	ground	Ground
21	Reserved		Reserved pin: NC on baseboard
22	Reserved		Reserved pin: NC on baseboard
23	Reserved		Reserved pin: NC on baseboard
24	Reserved		Reserved pin: NC on baseboard
25	key		No connect on baseboard
26	Reserved		Reserved pin: NC on baseboard

\* Type (in/out) is from the perspective of the baseboard.

## SM Bus Connector (J9E4)

This connector allows connection to the Memory Module I<sup>2</sup>C bus that the DIMMs EEPROMs reside on. A shorted I<sup>2</sup>C connection at the SM Bus I<sup>2</sup>C connector will prevent the system BIOS from sizing and configuring main memory.

**Table 57. SM Bus Connector (J9E4)**

Pin	Signal	Description
1	Local I2C SDA	OSB4 SM Bus Data Line
2	GROUND	
3	Local I2C SCL	OSB4 SM Bus Clock Line



## ICMB Connector (J1D2)

The external Intelligent Management Bus (ICMB) provides external access to IMB devices that are within the chassis. For example, you can externally access chassis management functions, alert logs, and post-mortem data. The ICMB connector also provides a mechanism for chassis power control. As an option, you can configure a server with an ICMB adapter board to provide two SEMCONN 6-pin connectors for daisy chained cabling.

**Table 58. ICMB Connector (J1D2)**

Pin	Signal	Type	Description
1	SDA	signal	IPMB I <sup>2</sup> C Data
2	Ground	power	
3	SCL	signal	IPMB I <sup>2</sup> C Clock
4	5 V standby	power	

## Auxiliary I<sup>2</sup>C Connector (J9E4)

The SKA4 baseboard provides a 3-pin auxiliary I<sup>2</sup>C connector for OEM access to the IPMB. This connector is not isolated when power is off. Any devices connected must remain powered in this state or the BMC will not work properly.

A shorted I<sup>2</sup>C connection at the auxiliary I<sup>2</sup>C connector will prevent restoration of main power because the BMC needs the bus to boot the server from standby power.

**Table 59. IMB Connector Pin out (J8F1)**

Pin	Signal	Description
1	Local I2C SDA	BMC IMB 5VSTNDBY Clock Line
2	GROUND	
3	Local I2C SCL	BMC IMB 5VSTNDBY Data Line

## Baseboard Fan Connectors (J3C1, J3A1, J4A1, J4C1)

There are four fan connectors located on the baseboard. These connectors are to be used for additional processor cooling.

The SKA4 baseboard only supports monitoring a total of 8 tachometer fan inputs. The front panel connector provides connections to all 8 tachometer fan inputs. The tachometer signals from these four processor fan connectors are connected to the same tachometer fan signals FAN\_TACH(4), FAN\_TACH(5), FAN\_TACH(6), FAN\_TACH(7) provided on the front panel connector J9E3. Therefore take care to ensure only one connection is utilized at any given time.

**Table 60. Processor Fan Connector #1 (J3C1)**

Pin	Signal	Type*	Description
1	Ground	power	GROUND is the power supply ground
2	12V	power	Power Supply 12V
3	Fan Tach	out	FAN_TACH signal is connected to the BMC to monitor the FAN speed

\* Type (in/out) is from the perspective of the baseboard.

**Table 61. Processor Fan Connector #2 (J3A1)**

Pin	Signal	Type*	Description
1	Ground	power	GROUND is the power supply ground
2	12V	power	Power Supply 12V
3	Fan Tach	out	FAN_TACH signal is connected to the BMC to monitor the FAN speed

\* Type (in/out) is from the perspective of the baseboard.

**Table 62. Processor Fan Connector #3 (J4A1)**

Pin	Signal	Type*	Description
1	Ground	power	GROUND is the power supply ground
2	12V	power	Power Supply 12V
3	Fan Tach	out	FAN_TACH signal is connected to the BMC to monitor the FAN speed

\* Type (in/out) is from the perspective of the baseboard.

**Table 63. Processor Fan Connector #4 (J4C1)**

Pin	Signal	Type*	Description
1	Ground	power	GROUND is the power supply ground
2	12V	power	Power Supply 12V
3	Fan Tach	out	FAN_TACH signal is connected to the BMC to monitor the FAN speed

\* Type (in/out) is from the perspective of the baseboard.

## Internal USB Header (J1B3)

**Table 64. Internal USB Connector (J1B3)**

Pin	Signal	Description
1	NC	No Connect
2	U_P2_L	USB Port 2 – signal
3	U_P2	USB Port 2 + signal
4	GROUND	Ground

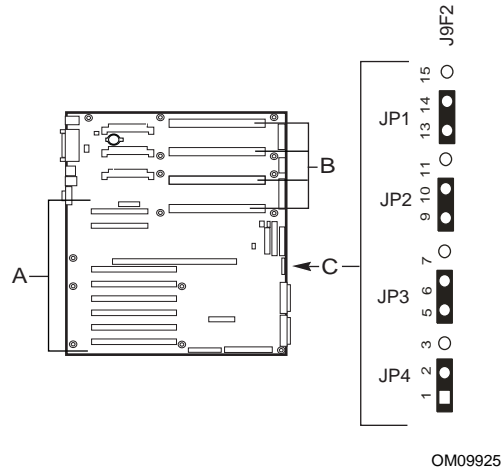
## Internal Disk Drive LED Connection

**Table 65. Internal USB Connector (J1B3)**

Pin	Signal	Description
1	NC	No Connect
2	Activity Signal	5V, High True Activity Signal
3	Activity Signal	Same as Pin 2 (Shorted to pin 2)
4	NC	No Connect

# Baseboard Jumpers

One 15-pin, one 11-pin, and one 3-pin single inline headers provide a total of eight 3-pin jumper blocks that control various configuration options. The jumper locations are shown in the figure below. The shaded areas show default jumper placement for each configurable option.



**Figure 14. SKA4 Configuration Jumpers**

- A. PCI Add-in Slots
- B. Processors
- C. Configuration Jumpers

**Table 66. Configuration Jumper Settings**

Callout	Name	State	Location
JP1	BMC Boot Block Write Enable	Disable Enable	13 – 14 14 – 15
JP2	BIOS Recovery Boot	Disable Enable	9 – 10 10 – 11
JP3	Password Clear	Protect Erase	5 – 6 6 – 7
JP4	CMOS Clear	BMC Control Force Erase	1 – 2 2 – 3

**Table 67. Configuration of Jumpers**

Option	Description
CMOS	If pins 1 and 2 of J9F2 are jumpered (default), NVRAM contents are preserved through system reset unless the user clears them through the front panel (by pressing the Power and Reset buttons together for four seconds). If pins 2 and 3 of J9F2 are jumpered, NVRAM contents are set to manufacturing default during system reset. If the jumper is removed, NVRAM contents are preserved through system reset.
Password	If pins 5 and 6 of J9F2 are jumpered (default), the current system password is maintained during system reset. If pins 6 and 7 are jumpered, the password is cleared on reset.
BIOS Recovery	If pins 9 and 10 of J9F2 are jumpered (default), BIOS jumps to a protected area of the flash part containing the "Recovery BIOS." If the normal BIOS gets corrupted, and you are unable to reload a fresh copy from the floppy disk, install the jumper between pins 10 and 11 of J9F2, which enables the system to boot from the Recovery BIOS. This code expects a fresh copy of the normal BIOS to be located on a floppy disk present in the floppy drive.

## Changing Jumper Settings



### CAUTIONS

**Electrostatic discharge (ESD) and ESD protection:** ESD can damage disk drives, boards, and other parts. We recommend that you do all procedures in this chapter only at an ESD-protected 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. If you place the baseboard 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. 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. Newer 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 gently grip, but not squeeze, with the pliers or other tool you use to remove a jumper; you might bend or break the stake pins on the board.

## CMOS Clear Jumper

The jumper at pins 1, 2, and 3 controls whether settings stored in CMOS nonvolatile memory (NVRAM) are retained during a system reset. The jumper is used to restore the system's CMOS and RTC to default values.

There are two methods to restore the default values.

### Method 1

1. Hold the system's reset button down for five seconds.
2. While continuing to hold down the system's reset button, press the power button.
3. Release both the reset and power buttons at the same time.

### Method 2

1. Observe the safety and ESD precautions at the beginning of this procedure.
2. Turn off all connected peripherals, turn off system power, and disconnect all AC power cords.
3. If the baseboard is installed in a system, remove access covers so that you have access to the baseboard.
4. Remove the memory module. See "Removing the Memory Module" on page 61.
5. Locate the configuration jumpers at the edge of the baseboard next to the memory expansion card connector (MECC).
6. Move the CMOS jumper from pins 1 and 2 to pins 2 and 3 (the Clear CMOS memory position).
7. If the baseboard is installed in a system, reinstall the access covers, connect the power cords, and turn on the system for the change to take effect.
8. You may need to repeat these steps to move the jumper back to its original setting, depending on the jumper function.
9. Wait for POST to complete and for the messages "NVRAM cleared by jumper" and "Press F1 to resume, Press F2 to Setup" to be displayed. This automatically reprograms CMOS and RTC to their default settings, except for the password.
10. Enter Setup and make any changes necessary (for example, changing the boot device). Press F10 to save the new Setup configuration and exit Setup.
11. Turn off the system, and disconnect all AC power cords from the system.
12. Move the jumper from pins 2 and 3 back to pins 1 and 2 (the Protect CMOS memory position).
13. If the baseboard is installed in a system, reinstall the access covers, connect the power cords, and turn on the system for the change to take effect.
14. Run BIOS Setup or the SSU to verify the correct settings. See Chapter 3.

## Password Clear Jumper

The jumper at pins 5, 6, and 7 controls whether a stored password is retained or cleared during a system reset.

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

1. Observe the safety and ESD precautions at the beginning of this procedure.
2. Turn off all connected peripherals, turn off system power, and disconnect all AC power cords.
3. If the baseboard is installed in a system, remove access covers so that you have access to the baseboard.
4. Remove the memory module. See "Removing the Memory Module" on page 61.
5. Locate the configuration jumpers at the edge of the baseboard next to the memory expansion card connector (MECC).
6. Move the Password jumper from pins 5 and 6 to pins 6 and 7.
7. If the baseboard is installed in a system, reinstall the access covers, connect the power cords, and turn on the system for the change to take effect.
8. Wait for POST to complete and for the message `Press F1 to resume, Press F2 to Setup` to be displayed.
9. Turn off the system, and disconnect all AC power cords from the system.
10. Move the jumper from pins 6 and 7 back to pins 5 and 6.
11. If the baseboard is installed in a system, reinstall the access covers, connect the power cords, and turn on the system for the change to take effect.
12. Run BIOS Setup or the SSU to specify a new password. See Chapter 3.

## Recovery Boot Jumper

The jumper at pins 9, 10, and 11 controls whether the system attempts to boot using the BIOS programmed in flash memory.

Procedure to disable recovery booting:

1. Observe the safety and ESD precautions at the beginning of this procedure.
2. Turn off all connected peripherals, turn off system power, and disconnect all AC power cords.
3. If the baseboard is installed in a system, remove access covers so that you have access to the baseboard.
4. Remove the memory module. See "Removing the Memory Module" on page 61.
5. Locate the configuration jumpers at the edge of the baseboard next to the memory expansion card connector (MECC).
6. Move the recovery boot jumper from pins 9 and 10 to pins 10 and 11.
7. If the baseboard is installed in a system, reinstall the access covers, connect the power cords, and turn on the system for the change to take effect.
8. Turn the system on, and insert the Flash Memory Update Utility diskette in drive A. After the system boots, 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.

**Table 68. Beep Codes**

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.

9. Wait for POST to complete and for the message “Press F1 to resume, Press F2 to Setup” to be displayed.
10. Turn off the system, and disconnect all AC power cords from the system.
11. Move the jumper from pins 6 and 7 back to pins 5 and 6.
12. If the baseboard is installed in a system, reinstall the access covers, connect the power cords, and turn on the system for the change to take effect.
13. After running the special recovery mode, run the SSU to specify a new password. See Chapter 3.

## Interrupts

The table below recommends the logical interrupt mapping of interrupt sources; it reflects a typical configuration, but a user can change these interrupts. Use the information to determine how to program each interrupt. The actual interrupt map is defined using configuration registers in the OSB4 I/O controller. I/O Redirection Registers in the I/O APIC are provided for each interrupt signal; the signals define hardware interrupt signal characteristics for APIC messages sent to local APIC(s).

### ⇒ NOTE

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

**Table 69. Interrupt Definitions**

ISA Interrupt	Description
INTR	Processor interrupt
NMI	NMI to processor
IRQ1	Keyboard interrupt
IRQ3	Serial port A or B interrupt from SIO device, user-configurable
IRQ4	Serial port A or B interrupt from SIO device, user-configurable

continued

**Table 69. Interrupt Definitions (continued)**

ISA Interrupt	Description
IRQ5	Parallel port
IRQ6	Floppy disk
IRQ7	Parallel port
IRQ8_L	Active low RTC interrupt
IRQ9	
IRQ10	
IRQ11	
IRQ12	Mouse interrupt
IRQ14	Compatibility IDE interrupt from primary channel IDE devices 0 and 1
IRQ15	Reserved
SMI	System Management Interrupt. General purpose indicator is sourced by the OSB4 and BMC to the processors
SCI	

## Video Modes

The RAGE IIC chip supports all standard IBM VGA modes. The following tables show all the modes that this implementation supports, including the number of colors, resolution, and refresh rates.

**Table 70. Standard VGA Modes**

Resolution	Refresh Rate (Hz)	Colors
640x480	200	256
800x600	200	256
1024x768	150	256
1152x864	120	256
1280x1024	100	256
1600x1200	76	256
640x480	200	65K
800x600	200	65K
1024x768	150	65K
1152x864	120	65K
1280x1024	100	65k
1600x1200	76	65k
640x480	200	16.7M
800x600	160	16.7M



# A Equipment Log and Configuration Worksheets

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## Equipment Log

Use the blank equipment log provided here to record information about your system. You will need some of this information when you run the SSU.

**Table 71. Equipment Log**

Item	Manufacturer Name and Model Number	Serial Number	Date Installed
System			
SKA4 Baseboard			
Processors (also note speed and cache)			
Memory Module			
DIMMs			
Hot-Plug PCI add-in boards			
PCI add-in boards			
Voltage Regulator Modules (VRMs)			

continued



## Configuration Worksheets

The rest of this chapter consists of worksheets to record the settings you make when configuring the system using the SSU, BIOS Setup, and the Adaptec SCSI Utility. If default values ever need to be restored to CMOS (e.g., after a CMOS-clear), you must reconfigure the system. Referring to the filled-in worksheets could make your task easier.

Circle or write in your selections or the values that are displayed onscreen.

## Power Configuration Worksheet

For power requirements, consult the documentation accompanying the server system you are using in conjunction with the SKA4 baseboard.

## SSU Worksheets

### Resource Configuration

**Table 72. Devices Worksheet 1**

Device/Feature	Value
PCI Multifunction Controller	Bus 00 Dev 00
PCI SCSI Controller	Bus 00 Dev 01
PCI Ethernet Controller	Bus 00 Dev 04
PCI VGA Controller	Bus 00 Dev 0C
PCI Multifunction Controller	Bus 00 Dev 0F
PCI Hot Plug Controller	Bus 01 Dev 05
PCI Hot Plug Controller	Bus 05 Dev 07

### Baseboard (SSU, Change Configuration Settings)

**Table 73. Systems Group Worksheet 2**

Device/Feature	Value
System Identification and Version Information	
SSU Configuration File Version	

**Table 74. On-board Disk Controllers Worksheet 3**

Device/Feature	Value
On-board Floppy Controller	Enable / Disable
On-board IDE Controller	Enable / Disable

**Table 75. Onboard Communications Devices Worksheet 4**

Device/Feature	Value
Serial Port 1 Configuration	
Serial Port 2 Configuration	
Parallel Port Configuration	

**Table 76. Diskette Drive Subsystems Group Worksheet 5**

Device/Feature	Value
Diskette drive A Options	
Diskette drive B Options	

**Table 77. IDE Subsystem Group Worksheet 6**

Device/Feature	Value
IDE Configuration <b>Master 32-bit I/O</b>	Enable/Disable
IDE Configuration <b>Slave 32-bit I/O</b>	Enable/Disable

**Table 78. On-Board PCI Devices Group Worksheet 7**

Device/Feature	Value
Embedded SCSI Options	Embedded SCSI - Enable / Disable Latency Timer Option ROM Scan - Enable / Disable
Embedded Dual SCSI Options	Embedded SCSI - Enable / Disable Latency Timer Option ROM Scan - Enable / Disable
Embedded NIC	Enable / Disable
PCI Slot 1	Option ROM Scan - Enable / Disable Enable Master - Enable / Disable Latency Timer
PCI Slot 2	Option ROM Scan - Enable / Disable Enable Master - Enable / Disable Latency Timer
PCI Slot 3	Option ROM Scan - Enable / Disable Enable Master - Enable / Disable Latency Timer
PCI Slot 4	Option ROM Scan - Enable / Disable Enable Master - Enable / Disable Latency Timer
PCI Slot 5	Option ROM Scan - Enable / Disable Enable Master - Enable / Disable Latency Timer
PCI Slot 6	Option ROM Scan - Enable / Disable Enable Master - Enable / Disable Latency Timer

continued

**Table 78. On-Board PCI Devices Group Worksheet 7 (continued)**

Device/Feature	Value
PCI Slot 7	Option ROM Scan - Enable / Disable Enable Master - Enable / Disable Latency Timer
PCI Slot 8	Option ROM Scan - Enable / Disable Enable Master - Enable / Disable Latency Timer
Hot Plug PCI Control	Hot Plug PCI BIOS - Enable / Disable Reource Padding Level - Disable / Minimum / Maximum Bus Default Speed 33 MHz / 66 MHz

**Table 79. Multiboot Group Worksheet 8**

Device/Feature	Value
Boot Device Priority	Removable Devices Hard Drive ATAPI CD-ROM Drive Intel UNDI, PXE-2.0

**Table 80. Security Subsystems Worksheet 9**

Device/Feature	Value
Password	Disable / Enable
User Password	Disable / Enable
Secure Mode Hot Key	Disable / Ctrl-Alt-{ }
Secure Mode Timer	Disable / { } minutes
Secure Boot Mode	Disable / Enable
Video Blanking	Disable / Enable
Floppy Write Protect	Disable / Enable
Reset/Power Switch Locking	Disable / Enable

## Management Subsystem, System Sensor Control Worksheet

For each sensor control, the display includes the choices shown below, with blanks for entering values. Write in both the sensor control and the values you select. This worksheet (two pages) provides space for a number of sensor controls; if you need more space, copy these pages to extend your worksheet.

<b>Item:</b>
Disable / Enable
Upper Fatal: _____
Upper Warning: _____
Lower Warning: _____
Lower Fatal: _____

<b>Item:</b>
Disable / Enable
Upper Fatal: _____
Upper Warning: _____
Lower Warning: _____
Lower Fatal: _____

<b>Item:</b>
Disable / Enable
Upper Fatal: _____
Upper Warning: _____
Lower Warning: _____
Lower Fatal: _____

<b>Item:</b>
Disable / Enable
Upper Fatal: _____
Upper Warning: _____
Lower Warning: _____
Lower Fatal: _____

<b>Item:</b>
Disable / Enable
Upper Fatal: _____
Upper Warning: _____
Lower Warning: _____
Lower Fatal: _____

<b>Item:</b>
Disable / Enable
Upper Fatal: _____
Upper Warning: _____
Lower Warning: _____
Lower Fatal: _____

<b>Item:</b>
Disable / Enable
Upper Fatal: _____
Upper Warning: _____
Lower Warning: _____
Lower Fatal: _____

<b>Item:</b>
Disable / Enable
Upper Fatal: _____
Upper Warning: _____
Lower Warning: _____
Lower Fatal: _____

<b>Item:</b>
Disable / Enable
Upper Fatal: _____
Upper Warning: _____
Lower Warning: _____
Lower Fatal: _____

<b>Item:</b>
Disable / Enable
Upper Fatal: _____
Upper Warning: _____
Lower Warning: _____
Lower Fatal: _____

<b>Item:</b>
Disable / Enable
Upper Fatal: _____
Upper Warning: _____
Lower Warning: _____
Lower Fatal: _____

<b>Item:</b>
Disable / Enable
Upper Fatal: _____
Upper Warning: _____
Lower Warning: _____
Lower Fatal: _____

## BIOS Setup Worksheets

**Table 81. Main Menu Worksheet 10**

Device/Feature	Value
System Time	
System Date	
Legacy Diskette A:	Disabled / <b>1.44 or 1.25 MB 3½"</b> / 2.88 MB 3½"
Legacy Diskette B:	<b>Disabled</b> / 1.44 or 1.25 MB 3½" / 2.88 MB 3½"
Language	<b>English (US)</b> / French / Spanish / German / Italian / Japanese (Kanji)

**Table 82. Primary Master and Slave Submenu Worksheet 11**

Device/Feature	Value
Type	User / <b>Auto</b> / CD-ROM / ATAPI Removable
Multi-Sector Transfers	<b>Disabled</b> / 2 / 4 / 8 / 16
LBA Mode Control	<b>Disabled</b> / Enabled
32 Bit I/O	<b>Disabled</b> / Enabled
Transfer Mode	<b>Standard</b> / Fast PIO 1 / Fast PIO 2 / Fast PIO 3/DMA 1 / Fast PIO 4/DMA 2
Ultra DMA Mode	<b>Disabled</b> / Enabled

**Table 83. Processor Settings Submenu Worksheet 12**

Device/Feature	Value
Processor Retest	<b>No</b> / Yes
Processor Serial Number	<b>Enabled</b> / Disabled
Memory Cache	<b>Enabled</b> / Disabled
Measured Processor Speed	
Processor 1 CPU ID	
Processor 1 L2 Cache Size	
Processor 2 CPU ID	
Processor 2 L2 Cache Size	
Processor 3 CPU ID	
Processor 3 L2 Cache Size	
Processor 4 CPU ID	
Processor 4 L2 Cache Size	

**Table 84. Advanced Menu Worksheet 13**

Device/Feature	Value
Reset Configuration Data	<b>No</b> / Yes
Enable Sleep Button	<b>No / Yes</b>
System Wakeup Feature	Enabled / <b>Disabled</b>
Delay on Option ROMs	Enabled / <b>Disabled</b>

**Table 85. Embedded Video Controller Submenu Worksheet 14**

Device/Feature	Value
Embedded Video Controller	<b>Enabled</b> / Disabled

**Table 86. Embedded Legacy SCSI Submenu Worksheet 15**

Device/Feature	Value
Embedded Legacy SCSI	<b>Enabled</b> / Disabled
Option ROM Scan	<b>Enabled</b> / Disabled
Latency Timer	Default / 020h / <b>040h</b> / 060h / 080h / 0A0h / 0C0h / 0E0h

**Table 87. Embedded Dual Ultra 160 SCSI Submenu Worksheet 16**

Device/Feature	Value
Embedded Legacy SCSI	<b>Enabled</b> / Disabled
Option ROM Scan	<b>Enabled</b> / Disabled
Latency Timer	Default / 020h / <b>040h</b> / 060h / 080h / 0A0h / 0C0h / 0E0h

**Table 88. Embedded NIC Submenu Worksheet 17**

Device/Feature	Value
Embedded NIC	<b>Enabled</b> / Disabled

**Table 89. PCI Device, Slot 1 Submenu Worksheet 18**

Device/Feature	Value
Option ROM Scan	<b>Enabled</b> / Disabled
Enable Master	<b>Enabled</b> / Disabled
Latency Timer	Default / 020h / <b>040h</b> / 060h / 080h / 0A0h / 0C0h / 0E0h

**Table 90. PCI Device, Slot 2 Submenu Worksheet 19**

Device/Feature	Value
Option ROM Scan	<b>Enabled</b> / Disabled
Enable Master	<b>Enabled</b> / Disabled
Latency Timer	Default / 020h / <b>040h</b> / 060h / 080h / 0A0h / 0C0h / 0E0h

**Table 91. PCI Device, Slot 3 Submenu Worksheet 20**

Device/Feature	Value
Option ROM Scan	<b>Enabled</b> / Disabled
Enable Master	<b>Enabled</b> / Disabled
Latency Timer	Default / 020h / <b>040h</b> / 060h / 080h / 0A0h / 0C0h / 0E0h

**Table 92. PCI Device, Slot 4 Submenu Worksheet 21**

Device/Feature	Value
Option ROM Scan	<b>Enabled</b> / Disabled
Enable Master	<b>Enabled</b> / Disabled
Latency Timer	Default / 020h / <b>040h</b> / 060h / 080h / 0A0h / 0C0h / 0E0h



**Table 93. PCI Device, Slot 5 Submenu Worksheet 22**

Device/Feature	Value
Option ROM Scan	<b>Enabled</b> / Disabled
Enable Master	<b>Enabled</b> / Disabled
Latency Timer	Default / 020h / <b>040h</b> / 060h / 080h / 0A0h / 0C0h / 0E0h

**Table 94. PCI Device, Slot 6 Submenu Worksheet 23**

Device/Feature	Value
Option ROM Scan	<b>Enabled</b> / Disabled
Enable Master	<b>Enabled</b> / Disabled
Latency Timer	Default / 020h / <b>040h</b> / 060h / 080h / 0A0h / 0C0h / 0E0h

**Table 95. PCI Device, Slot 7 Submenu Worksheet 24**

Device/Feature	Value
Option ROM Scan	<b>Enabled</b> / Disabled
Enable Master	<b>Enabled</b> / Disabled
Latency Timer	Default / 020h / <b>040h</b> / 060h / 080h / 0A0h / 0C0h / 0E0h

**Table 96. PCI Device, Slot 8 Submenu Worksheet 25**

Device/Feature	Value
Option ROM Scan	<b>Enabled</b> / Disabled
Enable Master	<b>Enabled</b> / Disabled
Latency Timer	Default / 020h / <b>040h</b> / 060h / 080h / 0A0h / 0C0h / 0E0h

**Table 97. Hot-Plug PCI Control Submenu Worksheet 26**

Device/Feature	Value
Hot-Plug PCI BIOS Support	<b>Enabled</b> / Disabled
Resource Padding Level	Disabled / <b>Minimum</b> / Maximum
Empty Bus Default Speed	<b>33 MHz</b> / 66 MHz

**Table 98. Integrated Peripheral Configuration Submenu Worksheet 27**

Device/Feature	Value
COM1:	Disabled / <b>Enabled</b> / Auto / OS Controlled
Base I/O Address	<b>3F8h</b> / 2F8h / 3E8h / 2E8h
Interrupt	<b>IRQ 4</b> / IRQ 3
COM2:	Disabled / <b>Enabled</b> / Auto / OS Controlled
Base I/O Address	3F8h / <b>2F8h</b> / 3E8h / 2E8h
Interrupt	IRQ 4 / <b>IRQ 3</b>
Parallel Port	Disabled / <b>Enabled</b> / Auto / OS Controlled
Mode	Output only / Bi-Directional / EPP / <b>ECP</b>
Base I/O Address	<b>378</b> / 278
Interrupt	IRQ 5 / <b>IRQ 7</b>
DMA channel	DMA 1 / <b>DMA 3</b>
Floppy Disk Controller	<b>Enabled</b> / Disabled

**Table 99. Advanced Chipset Control Submenu Worksheet 28**

Device/Feature	Value
Base RAM Step	1 MB / 1 KB / Every location
Extended RAM Step	1 MB / 1 KB / Every location / No Memory Test
Remap Memory	Enable / <b>Disable</b>

**Table 100. Security Menu Worksheet 29**

Device/Feature	Value
User Password is	<b>Clear</b> / Set
Administrator Password is	<b>Clear</b> / Set
Password on Boot	<b>Disabled</b> / Enabled
Fixed Disk Boot Sector	<b>Normal</b> / Write Protect
Secure Mode Timer	Disabled / <b>1 min</b> / 2 min / 5 min / 10 min / 20 min / 1 hr / 2 hr
Secure Mode Hot Key (Ctrl-Alt- )	
Secure Mode Boot	<b>Disabled</b> / Enabled
Video Blanking	<b>Disabled</b> / Enabled
Floppy Write Protect	<b>Disabled</b> / Enabled

**Table 101. Server Menu Worksheet 30**

Device/Feature	Value
Service Boot	Enable / <b>Disable</b>
Service Partition Type	
System Event Logging	Disabled / <b>Enabled</b>
Clear Event Log	<b>No</b> / Yes
Assert NMI on PERR	<b>Disabled</b> / Enabled
Assert NMI on SERR	Disabled / <b>Enabled</b>
FRB-2 CPU Policy	<b>Disable BSP</b> / Do not disable BSP

**Table 102. System Management Submenu Worksheet 31**

Device/Feature	Value
Board Part Number	
Board Serial Number	
System Part Number	
System Serial Number	
Chassis Part Number	
Chassis Serial Number	
BMC Revision	
Primary HSBP Revision	

**Table 103. Console Redirection Submenu Worksheet 32**

Device/Feature	Value
COM Port Address: Redirection disabled	<b>Disabled</b> / 3F8 / 2F8 / 3E8 /
IRQ #	3 / 4
Baud Rate	9600 / <b>19.2k</b> / 38.4k / 115.2k
Flow Control	No flow control / CTS/RTS / XON/XOFF / <b>CTS/RTS + CD</b>

**Table 104. EMP Configuration Submenu Worksheet 33**

Device/Feature	Value
EMP Password Switch	<b>Disabled</b> / Enabled
EMP ESC Sequence	
EMP Hang-up Line String	
Modem Init String	
EMP Access Mode	<b>Pre-Boot Only</b> / Always / Active / Disabled
EMP Restricted Mode Access	Disabled / <b>Enabled</b>
EMP Direct Connect/Modem Mode	Direct Connect / <b>Modem Mode</b>
System Phone Number	

**Table 105. PEP Management Submenu Worksheet 34**

Device/Feature	Value
PEP Enable	Enable / <b>Disable</b>
PEP Blackout Period	
PEP Page String	

**Table 106. Boot Menu Worksheet 35**

Device/Feature	Value
Boot-time Diagnostic Screen	<b>Disabled</b> / Enabled
Maximum umber of I2O Drives	<b>1</b> / 4

**Table 107. Boot Priority Submenu Worksheet 36**

Boot Priority	Device
1.	
2.	
3.	
4.	

**Table 108. Hard Drive Submenu Worksheet 37**

Selection	Value
1. Drive #1 (or actual drive string)	

**Table 109. Removable Devices Selection Submenu Worksheet 38**

Device	Value
1.	
2.	
3.	
4.	

## B Regulatory Specifications

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### Environmental Specifications and Regulatory Compliance

#### Environmental Specifications

When you install the SKA4 baseboard in a server system, follow the system's environmental specifications.

#### Regulatory Compliance

When correctly installed in the SPKA4 or SRKA4 server system, the SKA4 baseboard has been verified to comply with the following safety and EMC regulations. If installed in a server system other than an SPKA4 or SRKA4 server system, the combination of the baseboard and system may not comply in full with the following safety and EMC regulations.

In this section, the term "host computer" is defined as a compatible system that complies with the following safety and EMC regulations.

**Table 110. Safety Regulations**

Regulation	Title
UL 1950/CSA950	Bi-National Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (USA and Canada)
EN 60950	The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (European Community)
IEC60 950	The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (International)

**Table 111. Verification to EMC Regulations**

Regulation	Title
FCC (Verification to Class A Limits)	Title 47 of the Code of Federal Regulations, Parts 2 and 15, Subpart B, pertaining to unintentional radiators. (USA) This server board has been configured into a compatible Intel host system where it has been tested and verified to comply with FCC Class A limits. This is not a certification.
ICES-003 (Verification to Class A Limits)	Interference-Causing Equipment Standard, Digital Apparatus, Class B (Including CRC c.1374). (Canada)
CISPR 22 (Verification to Class A Limits)	Limits and methods of measurement of Radio Interference Characteristics of Information Technology Equipment. (International)
VCCI Class A (ITE) (Verification to Class A Limits)	Implementation Regulations for Voluntary Control of Radio Interference by Data Processing Equipment and Electronic Office Machines. (Japan)
EN55022 (Verification to Class A Limits)	Limits and methods of measurement of Radio Interference Characteristics of Information Technology Equipment. (Europe)
EN55024	ITE Product Family Immunity. (Europe)

This printed circuit assembly has the following product certification markings

- UL Joint Recognition Mark: Consists of small c followed by a stylized backward UR and followed by a small US ( typically located on component side)
- Manufacturer's recognition mark: Consists of a unique UL recognized manufacturer's logo, along with a flammability rating (94V-0) (typically located on solder side)
- UL File Number for motherboards: E139761 (typically located on component side)
- PB Part Number: Intel bare circuit board part number PBXXXXXX-ZZZ (solder side)
- Battery "+" marking: Located on the component side of the board in close proximity to the battery holder
- CE Mark: (component side) The CE mark should also be on the shipping container
- Australian C-Tick Mark: Consists of solid circle with white check mark and supplier code N232 (solder side)

## Installation Instructions



### CAUTION

Follow these guidelines to meet safety and regulatory requirements when installing this board assembly.

Read and adhere to all of these instructions and the instructions supplied with the host computer and associated modules. If the instructions for the host computer are inconsistent with these instructions or the instructions for associated modules, contact the supplier's technical support to find out how you can ensure that your computer meets safety and regulatory requirements. If you do not follow these instructions and the instructions provided by host computer and module suppliers, you increase safety risk and the possibility of noncompliance with regional laws and regulations.

## Ensure EMC Compliance

Before computer integration, make sure that the host chassis, power supply, and other modules have passed EMC certification testing. This will assist in your end EMC testing and verification for compliance.

In the installation instructions for the host chassis, power supply, and other modules pay close attention to the following:

- Certifications (see "Ensure Host Computer and Accessory Module Certifications")
- External I/O cable shielding and filtering
- Mounting, grounding, and bonding requirements
- Keying connectors when mismatching of connectors could be hazardous

## Ensure Host Computer and Accessory Module Certifications

Make sure that the host computer, any added subassembly (such as a board or drive assembly, including internal or external wiring), are certified for the region(s) where the end product will be used. Marks on the product are proof of certification. Certification marks are as follows:

### In Europe

The CE marking signifies compliance with all relevant European requirements. If the host computer does not bear the CE marking, obtain a supplier's Declaration of Conformity to the appropriate standards required by the European EMC Directive and Low Voltage Directive. Other directives, such as the Machinery and Telecommunications Directives, may also apply depending on the type of product. No regulatory assessment is necessary for low voltage DC wiring used internally or wiring used externally when provided with appropriate overcurrent protection. Appropriate protection is provided by a maximum 8 Amp current limiting circuit or a maximum 5 Amp fuse or positive temperature coefficient (PTC) resistor. This Intel server board has PTCs on all external ports that provide DC power externally.

### In the United States

A certification mark by a Nationally Recognized Testing Laboratory (NRTL) such as UL, CSA, or ETL signifies compliance with safety requirements. External wiring must be UL Listed and suitable for the intended use. Internal wiring must be UL Listed or Recognized and rated for applicable voltages and temperatures. The FCC mark (Class A for commercial or industrial only or Class B for residential) signifies compliance with electromagnetic interference requirements.

### In Canada

A nationally recognized certification mark such as CSA or cUL signifies compliance with safety requirements. No regulatory assessment is necessary for low voltage DC wiring used internally or wiring used externally when provided with appropriate overcurrent protection. Appropriate protection is provided by a maximum 8 Amp current limiting circuit or a maximum approved 5 Amp fuse or positive temperature coefficient (PTC) resistor. This server board has PTCs on all external ports that provide DC power externally.

## Prevent Power Supply Overload

Do not overload the power supply output. To avoid overloading the power supply, make sure that the calculated and measured total current load of all the modules within the computer is less than the maximum output current rating of the power supply. If you do not do this, the power supply may overheat, catch fire, or damage the insulation that separates hazardous AC line circuitry from low voltage user accessible circuitry and result in a shock hazard. If the load drawn by a module cannot be determined by the markings and instructions supplied with the module, contact the module supplier's technical support.

## Place Battery Marking on Computer

There is insufficient space on this server board to provide instructions for replacing and disposing of the battery. The following warning must be placed permanently and legibly on the host computer as near as possible to the battery.

### WARNINGS

**Danger of explosion if battery is incorrectly replaced.**

**Replace with only the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.**

## Use Only for Intended Applications

This product was evaluated for use in ITE computers that will be installed in offices, schools, computer rooms and similar locations. The suitability of this product for other product categories other than ITE applications, (such as medical, industrial, alarm systems, and test equipment) may require further evaluation.

## Installation Precautions

When you install and test the server board, observe all warnings and cautions in the installation instructions.

To avoid injury, be careful of:

- Sharp pins on connectors
- Sharp pins on printed circuit assemblies
- Rough edges and sharp corners on the chassis
- Hot components (like processors, voltage regulators, and heat sinks)
- Damage to wires that could cause a short circuit

Observe all warnings and cautions that instruct you to refer computer servicing to qualified technical personnel.

### WARNING

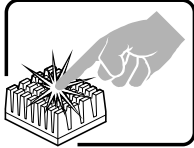
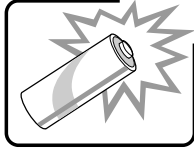
**Do not open the system power supply. Risk of electric shock and burns from high voltage and rapid overheating. Refer servicing of the power supply to qualified technical personnel.**



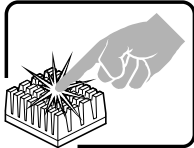
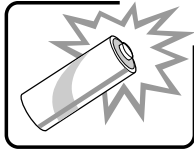
## C Warnings

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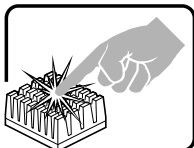
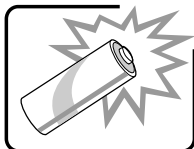
### WARNING: English (US)

	A microprocessor and heat sink may be hot if the system has been running. Also, there may be sharp pins and edges on some board and chassis parts. Contact should be made with care. Consider wearing protective gloves.
	Danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer. Discard used batteries according to manufacturer's instructions.

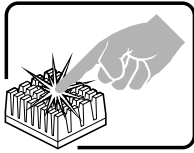
### AVERTISSEMENT: Français

	Le microprocesseur et le dissipateur de chaleur peuvent être chauds si le système a été sous tension. Faites également attention aux broches aiguës des cartes et aux bords tranchants du capot. L'usage de gants de protection est conseillé.
	Danger d'explosion si la batterie n'est pas remontée correctement. Remplacer uniquement par une batterie du même type ou de type équivalent recommandé par le fabricant. Débarrassez-vous des piles usagées selon les instructions du fabricant.

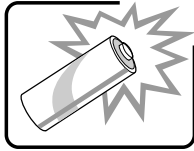
### WARNUNG: Deutsch

	Mikroprozessor und Kühlkörper können heiß sein, wenn das System längere Zeit eingeschaltet war. Außerdem können einige Platinen und Gehäuseteile scharfe Spitzen und Kanten aufweisen. Arbeiten an Platinen und Gehäuse sollten vorsichtig ausgeführt werden. Sie sollten Schutzhandschuhe tragen.
	Bei falschem Einsetzen einer neuen Batterie besteht Explosionsgefahr. Die Batterie darf nur durch denselben oder einen entsprechenden, vom Hersteller empfohlenen Batterietyp ersetzt werden. Entsorgen Sie verbrauchte Batterien den Anweisungen des Herstellers entsprechend.

## AVVERTENZE: Italiano

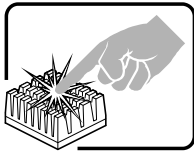


Se il sistema è stato a lungo in funzione, il microprocessore e il dissipatore di calore potrebbero essere surriscaldati. Fare attenzione alla presenza di piedini appuntiti e parti taglienti sulle schede e sul telaio. Prestare attenzione durante l'esecuzione dei contatti. È consigliabile utilizzare guanti di protezione.

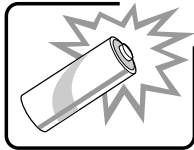


Se sostituita in modo errato, la batteria potrebbe esplodere. Sostituire le batterie scariche solo con batterie originali o del tipo consigliato dal produttore dell'apparecchiatura. Per lo smaltimento delle batterie usate, attenersi alle istruzioni del produttore.

## ADVERTENCIAS: Español



Si el sistema ha estado en funcionamiento, el microprocesador y el disipador de calor pueden estar aún calientes. También conviene tener en cuenta que en el chasis o en el tablero puede haber piezas cortantes o punzantes. Por ello, se recomienda precaución y el uso de guantes protectores.



Existe peligro de explosión si la pila no se cambia de forma adecuada. Utilice solamente pilas iguales o del mismo tipo que las recomendadas por el fabricante del equipo. Para deshacerse de las pilas usadas, siga igualmente las instrucciones del fabricante.

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