Intel® Server Board S845WD1-E (S845WD1H) Product Guide

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

Order Number: C22229-001

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Server Board Features

Table 1.   Server Board Features

Feature	Description
Processors	Support for an Intel® Pentium® 4 processor in a µPGA478 socket
	Support for an Intel® Celeron® processor in a µPGA478 socket
	400/533 MHz Supported
Memory	• Two 184-pin DDR SDRAM Dual Inline Memory Module (DIMM) sockets
	• Support for up to 2 GB ECC system memory
	• Support for single-sided or double-sided DIMMs (DDR 200/266)
Chipset	Intel® 845E Chipset, consisting of:
	• Intel® 82845E Memory Controller Hub (MCH)
	• Intel® 82801BA I/O Controller Hub (ICH2)
	• Intel® 82802AB 4 Mbit Firmware Hub (FWH)
I/O Control	SMSC LPC47M102 LPC bus I/O controller
Peripheral Interfaces	• Two external USB ports with an additional internal header providing two optional USB ports for front panel support
	• One serial port and one serial port header
	• One parallel port
	• Two IDE interfaces with UDMA 33, ATA-66/100 support
	• One floppy drive interface with support for two drives (Diskette A and Diskette B)
	• PS/2† keyboard and mouse ports
Expansion Capabilities	One independent PCI bus (32-bit/33 MHz, 5 V) with three PCI connectors and four embedded devices:
	• 2D/3D graphics controller – ATI Rage† XL Video Controller with 8 MB of SDRAM
	• Two Intel® 10/100 82550PM Fast Ethernet Controllers
	• ATA-100 controller, Promise Technology† PDC20267
BIOS	Intel/AMI BIOS with support for:
	• Advanced Configuration and Power Interface (ACPI)
	• Plug and Play
	• SMBIOS
Power Management	Support for ACPI
	• Wake on PME
	• Wake on Ring (WOR)
	• Wake on LAN† (WOL)
Form Factor	SSI-compliant

Back Panel Connectors

The back panel connectors are color-coded in compliance with PC 99 recommendations.
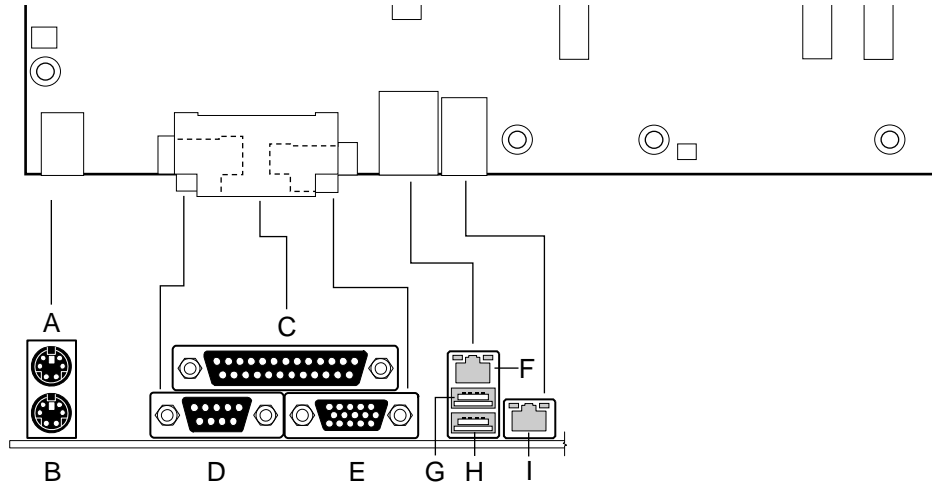
OM14342

A. PS/2 mouse
B. PS/2 keyboard
C. Parallel port
D. Serial port A
E. Video port
F. NIC 1
G. USB port 1
H. USB port 2
I. NIC 2

Figure 1. Back Panel Connectors

Front Panel Connectors

Figure 2 shows the location of the front panel connectors.
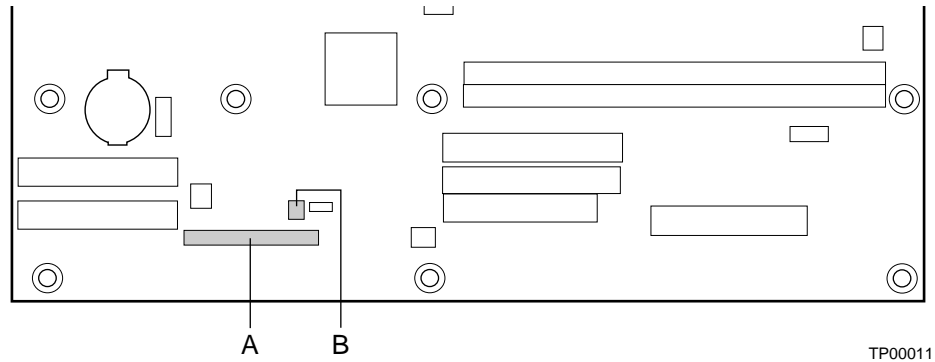
TP00011

A. Front panel header
B. HDD LED

Figure 2. Front Panel Connectors

Server Board Connector and Component Locations
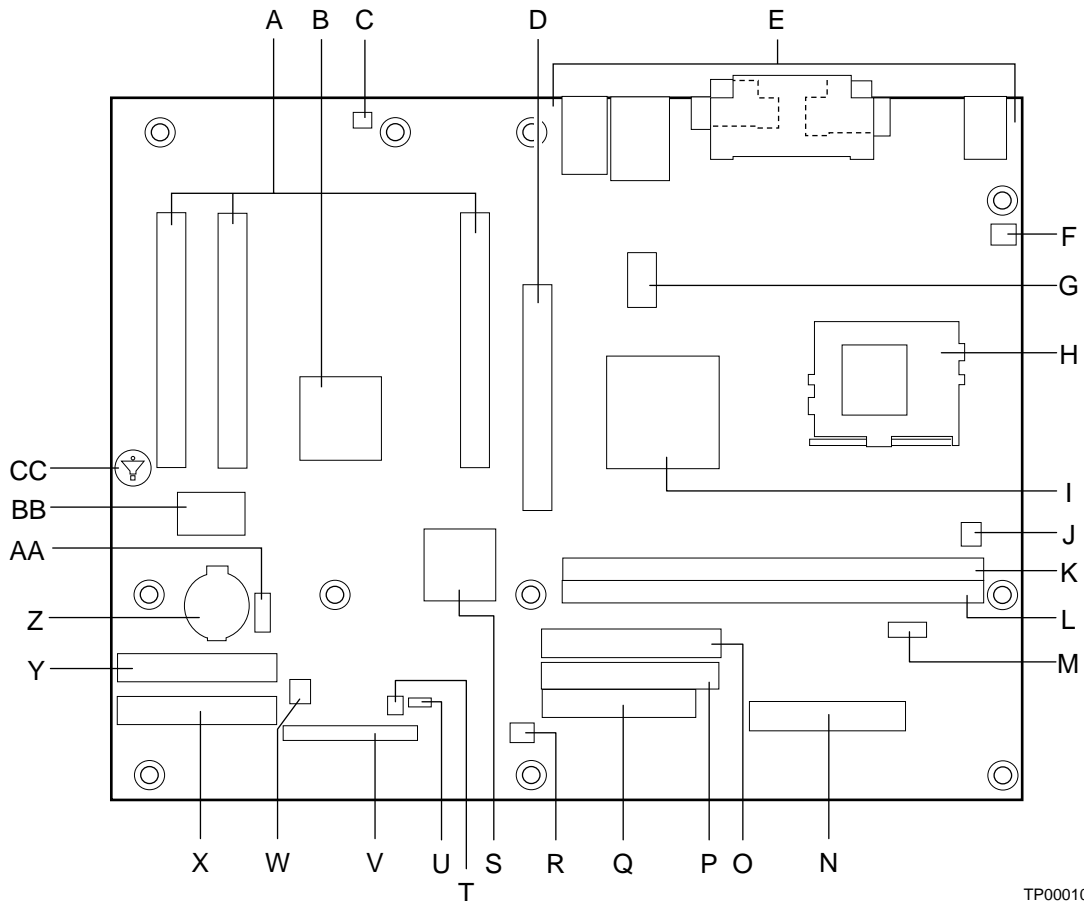
TP00010

A. PCI expansion slots
B. ATI Rage XL Video Controller
C. Chassis intrusion connector
D. AGP connector
E. Back panel connectors
F. System fan (fan 2)
G. 12 V auxiliary power connector
H. µPGA478 processor socket
I. Intel 82845E memory controller hub (MCH)
J. Chassis fan
K. DIMM1 socket
L. DIMM0 socket
M. Serial port B connector
N. Main power connector
O. Secondary IDE connector

P. Primary IDE connector
Q. Floppy drive connector
R. System fan (fan 3)
S. Intel 82801BA I/O controller hub (ICH2)
T. HDD LED connector
U. Configuration jumper block
V. Front panel header
W. System fan (fan 1)
X. Secondary RAID IDE connector
Y. Primary RAID IDE connector
Z. Battery
AA. Front panel USB connector
BB. Promise ATA RAID controller connector
CC. Speaker

Figure 3. Server Board Components

Processors

The S845WD1H board supports a single Intel Pentium 4 processor with a μPGA478 socket. Processors are not included with the server board and must be purchased separately.

Table 2.   Supported Processors

Type	Designation	System Bus	L2 Cache Size
Pentium 4 processor with Hyperthreading (HT) Technology	3.06 GHz	533 MHz	512 KB
Pentium 4 processor	2.26, 2.53, 2.66, and 2.8 GHz	533 MHz	512 KB
Pentium 4 processor	2.0A, 2.40B, and 2.6 GHz	400 MHz	512 KB
Intel Celeron processor	1.7, 1.8, and 1.9 GHz	400 MHz	128 KB

Memory

The S845WD1H server board contains two 184-pin DIMM sockets and supports up to two DDR SDRAM DIMMs. The minimum supported memory configuration is 64 MB and the maximum configurable memory size is a 2 GB stacked un-buffered DDR200/266 ECC DIMM. See the table below for supported memory configurations.

⟹ **NOTE**

> Only low profile DIMMs can be supported in a 1U server chassis.

Check the Intel Customer Support website for the latest tested memory list:

http://support.intel.com/support/motherboards/server/S845WD1-E

Table 3.   Supported Memory Configurations

DIMM Capacity	Number of Sides	DDR SDRAM Density	DDR SDRAM Organization Front-side/Back-side	Number of DDR SDRAM Devices
64 MB	SS	64 Mbit	8 M x 8/empty	8
64 MB	SS	128 Mbit	8 M x 16/empty	4
128 MB	DS	64 Mbit	8 M x 8/8 M x 8	16 (Note 1)
128 MB	SS	128 Mbit	16 M x 8/empty	8
128 MB	SS	256 Mbit	16 M x 16/empty	4
256 MB	DS	128 Mbit	16 M x 8/16 M x 8	16 (Notes 1 and 2)
256 MB	SS	256 Mbit	32 M x 8/empty	8
256 MB	SS	512 Mbit	32 M x 16/empty	4
512 MB	DS	256 Mbit	32 M x 8/32 M x 8	16 (Notes 1 and 2)
512 MB	SS	512 Mbit	64 M x 8/empty	8
1024 MB	DS	512 Mbit	64 M x 8/64 M X8	16

Notes:

1.   If the number of DDR SDRAM devices is greater than nine, the DIMM will be double sided.

2.   Front side population/back side population indicated for DDR SDRAM density and DDR SDRAM organization.

DIMM and memory configurations must adhere to the following:

- 2.5 V (only) 184-pin DDR SDRAM DIMMs with gold-plated contacts
- Unbuffered single-sided or double-sided DIMMs.
- Maximum total system memory: 2 GB; Minimum total system memory: 64 MB
- 200/266 MHz DDR SDRAM DIMMs only
- Serial Presence Detect (SPD)
- Suspend to RAM
- Non-ECC and ECC DIMMs
- Only DIMMs tested and qualified by Intel or a designated memory test vendor will be supported on the S845WD1H server board. A list of qualified DIMMs will be made available. Note that all DIMMs are supported by design, but only fully qualified DIMMs will be supported.

Intel 845E Chipset

The Intel 845E chipset consists of the following devices:

- Intel 82845E Memory Controller Hub (MCH) with Accelerated Hub Architecture (AHA) bus
- Intel 82801BA I/O Controller Hub (ICH2) with AHA bus
- Intel 82802AB Firmware Hub (FWH)

The MCH is a centralized controller for the system bus, the memory bus, the AGP bus, and the Accelerated Hub Architecture interface. The ICH2 is a centralized controller for the board's I/O paths. The FWH provides the nonvolatile storage of the BIOS.

Intel 82845E Memory Controller Hub (MCH)

The MCH supports the data integrity features supported by the Pentium Pro bus, including address, request, and response parity. The 845E chipset always generates ECC data while it is driving the processor data bus, although the data bus ECC can be disabled or enabled by BIOS. It is enabled by default.

The MCH provides the following:

- An integrated Synchronous DRAM memory controller with auto detection of SDRAM.
- Support for ACPI Rev 1.0b compliant power management.

Intel 82801BA I/O Controller Hub (ICH2)

The Intel 82801BA ICH2 has these features:

- 33 MHz Peripheral Component Interface (PCI) Local Bus slots supporting PCI specification, Rev 2.2.
- Support for the Low Pin Count (LPC) interface.
- Integrated IDE controller (supports Ultra ATA-66/100 mode and Ultra DMA 33 mode).
- Integrated LAN media access controller.
- Universal Serial Bus Interface with two USB controllers providing two back panel ports, and the option for two front panel ports, in a Universal Host Controller Interface (UHCI) implementation.
- Power management logic (ACPI Rev 1.0b compliant).
- Support for the System Management Bus routed to:
  — All PCI Slots
  — S5 wake from all PCI slots
- Real-Time Clock (with 256-byte battery backed CMOS RAM).
- Supports two Master/DMA devices.

Intel 82802AB Firmware Hub (FWH)

The Intel 82802AB Firmware Hub (FWH) includes a 4 megabit symmetrical flash memory device. Internally, the device is grouped into eight 64 KB blocks that are individually erasable, lockable, and unlockable.

The FWH provides the following:

- System BIOS program
- Logic that enables protection for storing and updating of platform information

I/O Controller

The SMSC LPC47M102 I/O Controller provides the following features:

- Low pin count (LPC) interface
- 3.3 V operation
- One serial port and one serial port header
- One parallel port with Extended Capabilities Port (ECP) and Enhanced Parallel Port (EPP) support
- Serial IRQ interface compatible with serialized IRQ support for PCI systems
- PS/2-style mouse and keyboard interfaces
- Interface for two 1.2 MB, 1.44 MB, or 2.88 MB diskette drives
- Intelligent power management, including a programmable wake up event interface
- PCI power management support
- Fan control:
  — Four fan control outputs
  — Four fan tachometer inputs

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

Serial Ports

The S845WD1H server board has one serial port connector and one serial port header. The serial port A connector is located on the back panel. The serial port B header is located near the main power connector. The serial ports' NS16C550-compatible UART supports data transfers at speeds up to 115.2 kb/s with BIOS support.

Parallel Port

The 25-pin D-Sub parallel port connector is located on the back panel. In the BIOS Setup program, the parallel port can be set to the following modes:

- Output only (PC AT†-compatible mode)
- Bi-directional (PS/2 compatible)
- EPP
- ECP

Diskette Drive Controller

The I/O controller supports two diskette drives that are compatible with the 82077 diskette drive controller and supports both PC-AT and PS/2 modes.

Keyboard and Mouse Interface

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

⟹ **NOTE**

> The keyboard is supported in the bottom PS/2 connector and the mouse is supported in the top PS/2 connector. Power to the computer should be turned off before a keyboard or mouse is connected or disconnected.

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

Hardware Management Subsystem

The Hardware Management features enable the board to be compatible with the Wired for Management (WfM) specification. The board has several hardware management features, including the following:

- Fan monitoring
- Thermal and voltage monitoring
- Chassis intrusion detection

Hardware Management ASIC

The Hardware Management ASIC provides low-cost instrumentation capabilities. The features of the component include:

- Internal ambient temperature sensing
- Remote thermal diode sensing for direct monitoring of processor temperature
- Power supply monitoring (+5 V, +3.3 V, +1.5 V, 3.3 VSB, and Vccp) to detect levels above or below acceptable values
- SMBus interface

Fan Monitoring

The Hardware Management ASIC provides four fan tachometer inputs. Monitoring can be implemented using Intel® LANDesk® Client Manager or third-party software.

Chassis Intrusion and Detection

The S845WD1H server board supports a chassis security feature that detects if the chassis cover is removed. For the chassis intrusion circuit to function, the chassis' power supply must be connected to AC power. The security feature uses a mechanical switch on the chassis that attaches to the chassis intrusion connector. When the chassis cover is removed the mechanical switch is in the closed position.

⇒ **NOTE**

> Chassis intrusion detection may be implemented using Intel LANDesk Client Manager or third-party software.

Real-Time Clock, CMOS SRAM, and Battery

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

A coin-cell battery (CR2032) powers the real-time clock and CMOS memory. When the computer is not plugged into a wall socket, the battery has an estimated life of three years. When the computer is plugged in, the standby current from the power supply extends the life of the battery. The clock is accurate to ± 13 minutes/year at 25 ℃ with 3.3 VSB applied.

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

⇒ **NOTE**

> If the battery and AC power fail, custom defaults, if previously saved, will be loaded into CMOS RAM at power-on.

Legacy USB Support

Legacy USB support enables USB devices such as keyboard, mice, and hubs to be used even when the operating system's USB drivers are not yet available. Legacy USB support is used to access the BIOS Setup program, and to install an operating system that supports USB. By default, Legacy USB support is set to Enabled.

The S845WD1H server board has four USB 1.1 ports; one USB peripheral can be connected to each port. For more than four USB devices, an external hub can be connected to any of the ports. Two of the USB ports are implemented with stacked back panel connectors; the other two are accessible via the front panel USB header. The S845WD1H server board fully supports UHCI and uses UHCI-compatible software drivers.

⟹ **NOTE**

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

Legacy USB support operates as follows:

1. When the user applies power to the computer, legacy support is disabled.
2. POST begins.
3. Legacy USB support is enabled by the BIOS allowing the user to use a USB keyboard to enter and configure the BIOS Setup program and the maintenance menu.
4. POST completes.
5. The operating system loads. While the operating system is loading, USB keyboard and mice are recognized and may be used to configure the operating system. (Keyboard and mice are not recognized during this period if Legacy USB support was set to Disabled in the BIOS Setup program.)
6. After the operating system loads the USB drivers, all legacy and non-legacy USB devices are recognized by the operating system, and Legacy USB support from the BIOS is no longer used.

To install an operating system that supports USB, verify that Legacy USB support in the BIOS Setup program is set to Enabled and follow the operating system's installation instructions.

⟹ **NOTE**

> Legacy USB support is for keyboard, mice, and hubs only. Other USB
> devices are not supported in legacy mode.

IDE Support

IDE Interfaces

The ICH2's IDE controller has two independent bus-mastering IDE interfaces that can be independently enabled. The IDE interfaces support the following modes:

- Programmed I/O (PIO): processor controls data transfer.
- 8237-style DMA: DMA offloads the processor, supporting transfer rates of up to 16 MB/sec.
- Ultra DMA: DMA protocol on IDE bus supporting host and target throttling and transfer rates of up to 33 MB/sec.
- ATA-66: DMA protocol on IDE bus supporting host and target throttling and transfer rates of up to 66 MB/sec. ATA-66 protocol is similar to Ultra DMA and is device driver compatible.
- ATA-100: DMA protocol on IDE bus allows host and target throttling. The ICH2's ATA-100 logic can achieve transfer rates up to 100 MB/sec.

⟹ **NOTE**

ATA-66 and ATA-100 are faster timings and require a specialized cable to reduce reflections, noise, and inductive coupling.

The IDE interfaces also support ATAPI devices (such as CD-ROM drives) and ATA devices using the transfer modes.

The BIOS supports Logical Block Addressing (LBA) and Extended Cylinder Head Sector (ECHS) translation modes. The drive reports the transfer rate and translation mode to the BIOS.

The S845WD1H server board supports Laser Servo (LS-120) diskette technology through the IDE interfaces. An LS-120 drive can be configured as a boot device by setting the BIOS Setup program's Boot menu to one of the following:

- ARMD-FDD (ATAPI removable media device – floppy disk drive)
- ARMD-HDD (ATAPI removable media device – hard disk drive)

SCSI Hard Drive Activity LED Connector

The SCSI hard drive activity LED connector is a 1 x 2-pin connector that allows an add-in SCSI controller to use the same LED as the onboard IDE controller. For proper operation, this connector should be wired to the LED output of the add-in SCSI controller. The LED indicates when data is being read from, or written to, both the add-in SCSI controller and the IDE controller.

BIOS

The S845WD1H server board uses an Intel/AMI BIOS that is stored in the Firmware Hub (FWH) and can be updated using a disk-based program. The FWH contains the BIOS Setup program, POST, the PCI auto-configuration utility, and Plug and Play support.

The S845WD1H server board supports system BIOS shadowing, allowing the BIOS to execute from 64-bit onboard write-protected system memory.

The BIOS displays a message during POST identifying the type of BIOS and a revision code. The initial production BIOS is identified as PT84510A.86B.

When the S845WD1H server board's jumper is set to configuration mode and the server is powered-up, the BIOS compares the processor version and the microcode version in the BIOS and reports if the two match.

PCI Auto Configuration

The BIOS can automatically configure PCI devices. PCI devices may be onboard or add-in cards. Auto configuration lets a user insert or remove PCI cards without having to configure the system. When a user turns on the system after adding a PCI card, the BIOS automatically configures interrupts, the I/O space, and other system resources. Any interrupts set to Available in Setup are considered to be available for use by the add-in card. Auto configuration information is stored in ESCD format.

PCI IDE Support

If you select Auto in the BIOS Setup program, the BIOS automatically sets up the two PCI IDE connectors with independent I/O channel support. The IDE interface supports hard drives up to ATA-66/100 and recognizes any ATAPI compliant devices, including CD-ROM drives, tape drives, and Ultra DMA drives.

The BIOS determines the capabilities of each drive and configures them to optimize capacity and performance. To take advantage of the high capacities typically available today, hard drives are automatically configured for Logical Block Addressing (LBA) and to PIO Mode 3 or 4, depending on the capability of the drive. You can override the auto-configuration options by specifying manual configuration in the BIOS Setup program.

To use ATA-66/100 features the following items are required:

- An ATA-66/100 peripheral device
- An ATA-66/100 compatible cable
- ATA-66/100 operating system device drivers

⇒ **NOTE**

> ATA-66/100 compatible cables are backward compatible with drives using slower IDE transfer protocols. If an ATA-66/100 disk drive and a disk drive using any other IDE transfer protocol are attached to the same cable, the maximum transfer rate between the drives is reduced to that of the slowest device.

BIOS Updates

The BIOS can be updated using either of the following utilities, which are available on the Intel World Wide Web site:

- Intel® Express BIOS update utility, which enables automated updating while in the Windows environment. Using this utility, the BIOS can be updated from a file on a hard disk, a 1.44 MB diskette, or a CD-ROM, or from the file location on the Web.
- Intel® Flash Memory Update Utility, which requires creation of a boot diskette and manual rebooting of the system. Using this utility, the BIOS can be updated from a file on a 1.44 MB diskette (from a legacy diskette drive or an LS-120 diskette drive) or a CD-ROM.

Both utilities support the following BIOS maintenance functions:

- Verifying that the updated BIOS matches the target system to prevent accidentally installing an incompatible BIOS.
- Updating both the BIOS boot block and the main BIOS. This process is fault tolerant to prevent boot block corruption.
- Updating the BIOS boot block separately.
- Changing the language section of the BIOS.
- Updating replaceable BIOS modules, such as the video BIOS module.
- Inserting a custom splash screen.

⇒ **NOTE**

> Review the instructions distributed with the upgrade utility before attempting a BIOS update.

Language Support

The BIOS Setup program and help messages are supported in two languages: US English and Spanish. Additional languages may be flashed in if desired (German, Italian, and French available). The default language is US English, which is present unless another language is selected in the BIOS Setup program.

Custom Splash Screen

During POST, an Intel splash screen is displayed by default. This splash screen can be replaced with a custom splash screen. A utility is available from Intel to assist with creating a custom splash screen. The custom splash screen can be programmed into the flash memory using the BIOS upgrade utility. Information about this capability is available on the Intel Support World Wide Web site.

Recovering BIOS Data

Some types of failure can destroy the BIOS. For example, the data can be lost if a power outage occurs while the BIOS is being updated in flash memory. The BIOS can be recovered from a diskette using the BIOS recovery mode. When recovering the BIOS, be aware of the following:

- Because of the small amount of code available in the non-erasable boot block area, there is no video support. The user can only monitor this procedure by listening to the speaker or looking at the diskette drive LED.
- The recovery process may take several minutes; larger BIOS flash memory devices require more time.
- Two beeps and the end of activity in the diskette drive indicate successful BIOS recovery.
- A series of continuous beeps indicates a failed BIOS recovery.

To create a BIOS recovery diskette, a bootable diskette must be created and the BIOS update files copied to it. BIOS upgrades and the Intel Flash Memory Update Utility are available from Intel Customer Support through the Intel World Wide Web site.

⟹ **NOTE**

> Even if the computer is configured to boot from an LS-120 diskette (in the Setup program's Removable Devices submenu), the BIOS recovery diskette must be a standard 1.44 MB diskette not a 120 MB diskette.

Boot Options

In the BIOS Setup program, the user can choose to boot from a diskette drive, hard drives, CD-ROM, or the network. The default setting is for the diskette drive to be the first boot device, the hard drive second, and the ATAPI CD-ROM third. The fourth device is disabled.

CD-ROM and Network Boot

Booting from CD-ROM is supported in compliance to the El Torito bootable CD-ROM format specification. Under the Boot menu in the BIOS Setup program, ATAPI CD-ROM is listed as a boot device. Boot devices are defined in priority order. Accordingly, if there is not a bootable CD in the CD-ROM drive, the system will attempt to boot from the next defined drive.

The network can be selected as a boot device. This selection allows booting from the on-board NIC or a network add-in card with a remote boot ROM installed.

Booting Without Attached Devices

For use in embedded applications, the BIOS has been designed so that after passing the POST, the operating system loader is invoked even if the following devices are not present:

- Video adapter
- Keyboard
- Mouse

Fast Booting Systems with Intel® Rapid BIOS Boot

These factors affect system boot speed:

- Selecting and configuring peripherals properly
- Using an optimized BIOS, such as the Intel Rapid BIOS

Intel Rapid BIOS Boot

Using the following BIOS Setup program settings reduces the POST execution time. In the Boot Menu:

- Set the hard disk drive as the first boot device. As a result, the POST does not first seek a diskette drive, which saves about one second from the POST execution time.
- Disable Quiet Boot, which eliminates display of the logo splash screen. This could save several seconds of painting complex graphic images and changing video modes.
- Enabled Intel® Rapid BIOS Boot. This feature bypasses memory count and the search for a diskette drive.

⟹ **NOTE**

It is possible to optimize the boot process to the point where the system boots so quickly that the Intel logo screen (or a custom logo splash screen) will not be seen. Monitors and hard disk drives with minimum initialization times can also contribute to a boot time that might be so fast that necessary logo screens and POST messages cannot be seen.

This boot time may be so fast that some drives might be not be initialized at all. If this condition should occur, it is possible to introduce a programmable delay ranging from three to 30 seconds (using the Hard Disk Pre-Delay feature of the Advanced Menu in the IDE Configuration Submenu of the BIOS Setup program).

BIOS Security Passwords

The BIOS includes security features that restrict whether the BIOS Setup program can be accessed and who can boot the server. A supervisor password and a user password can be set for the Setup menu and for booting the server, with the following restrictions:

- The supervisor password gives unrestricted access to view and change all Setup options. If only the supervisor password is set, pressing <Enter> at the password prompt of Setup gives the user restricted access to Setup.
- If both the supervisor and user passwords are set, you must enter either the supervisor password or the user password to access Setup. Setup options are then available for viewing and changing depending on whether the supervisor or user password was entered.
- Setting a user password restricts who can boot the server. The password prompt is displayed before the server is booted. If only the supervisor password is set, the server boots without asking for a password. If both passwords are set, you can enter either password to boot the server.

Table 4.   Supervisor and User Password Functions

Password Set	Supervisor Mode	User Mode	Setup Options	Password to Enter Setup	Password During Boot
Neither	Can change all options (Note)	Can change all options (Note)	None	None	None
Supervisor only	Can change all options	Can change a limited number of options	Supervisor Password	Supervisor	None
User only	N/A	Can change all options	Enter Password Clear User Password	User	User
Supervisor and user set	Can change all options	Can change a limited number of options	Supervisor Password Enter Password	Supervisor or user	Supervisor or user

Note: If no password is set, any user can change all Setup options.

System Management BIOS (SMBIOS)

SMBIOS is a Server Management Interface (DMI) compliant method for managing computers in a managed network.

The main component of SMBIOS is the Management Information Format (MIF) database, which contains information about the computing system and its components. Using SMBIOS, a system administrator can obtain the system types, capabilities, operational status, and installation dates for system components. The MIF database defines the data and provides the method for accessing this information. The BIOS enables applications such as third-party management software to use SMBIOS.

The BIOS stores and reports the following SMBIOS information:

- BIOS data, such as the BIOS revision level
- Fixed-system data, such as peripherals, serial numbers, and asset tags
- Resource data, such as memory size, cache size, and processor speed
- Dynamic data, such as event detection and error logging

Non-Plug and Play operating systems, such as Windows NT[†], require an additional interface for obtaining the SMBIOS information. The BIOS supports an SMBIOS table interface for such operating systems. Using this support, an SMBIOS service-level application running on a non-Plug and Play operating system can obtain the SMBIOS information.

Power Management Features

Power management is implemented at several levels, including:

- Software support through Advanced Configuration and Power Interface (ACPI)
- Hardware support:
  — Power connector
  — Fan connectors
  — LAN wake capabilities
  — Instantly Available PC technology
  — Resume on Ring
  — Wake from USB
  — Wake from PS/2 devices
  — Power Management Event (PME#) wake-up support

Wake on LAN Technology

Network adapters that are PCI 2.2 compliant assert the wake-up signal using the PCI bus signal PME# (pin A19 on the PCI bus connectors).

⚠ **CAUTION**

> For Wake on LAN technology, the 5 V standby line for the power supply must be capable of providing adequate +5 V standby current. Failure to provide adequate standby current when implementing Wake on LAN technology can damage the power supply.

⚠ **CAUTION**

> If the standby current necessary to support multiple wake events from the PCI and/or USB buses exceeds power supply capacity, the server board may lose register settings stored in memory, etc.

Wake on Ring

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

- Powers up the server from the ACPI S5 state.
- Modem must support PME.
- Requires two calls to access the server:
  — The first call powers up the server
  — The second call enables access (when the appropriate software is loaded)
- For external modems, hardware on the server board monitors the ring indicate (RI) input of the serial port.

Resume on Ring

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

- Resumes operation from the ACPI S1.
- Requires only one call to access the server.
- Detects incoming call similarly for external and internal modems; does not use the Wake on Ring connector.
- Requires modem interrupt be unmasked for correct operation.

ACPI

ACPI gives the operating system direct control over the power management and Plug and Play functions of a computer. The use of ACPI with the S845WD1H server board requires an operating system that provides full ACPI support.

ACPI features include:

- Plug and Play (including bus and device enumeration)
- Power management control of individual devices, add-in boards (some add-in boards may require an ACPI-aware driver), video displays, and hard disk drives
- Methods for achieving less than 15-watt system operation in the power-on/standby sleeping state
- A Soft-off feature that enables the operating system to power-off the computer
- Support for multiple wake-up events (see Table 7, page29)
- Support for a front panel power and sleep mode switch

Table 5 lists the system states based on how long the power switch is pressed, depending on how ACPI is configured with an ACPI-aware operating system.

Table 5.   Effects of Pressing the Power Switch

If the system is in this state…	…and the power switch is pressed for	…the system enters this state
Off (ACPI G2/G5 – Soft off)	Less than four seconds	Power-on (ACPI G0 – working state)
On (ACPI G0 – working state)	Less than four seconds	Soft-off/Standby (ACPI G1 – sleeping state)
On (ACPI G0 – working state)	More than four seconds	Fail safe power-off (ACPI G2/G5 – Soft off)
Sleep (ACPI G1 – sleeping state)	Less than four seconds	Wake-up (ACPI G0 – working state)
Sleep (ACPI G1 – sleeping state)	More than four seconds	Power-off (ACPI G2/G5 – Soft off)

System States and Power States

Under ACPI, the operating system directs all system and device power state transitions. The operating system puts devices in and out of low-power states based on user preferences and knowledge of how devices are being used by applications. Devices that are not being used can be turned off. The operating system uses information from applications and user settings to put the system as a whole into a low-power state.

Table 6 lists the power states supported by the S845WD1H board along with the associated system power targets. See the ACPI specification for a complete description of the various system and power states.

Table 6.   Power States and Targeted System Power

Global States	Sleeping States	Processor States	Device States	Targeted System Power [Note 1]
G0 – working state	S0 – working	C0 – working	D0 – working state.	Full power > 30 W
G1 – sleeping state	S1 – Processor stopped	C1 – stop grant	D1, D2, D3 – device specification specific.	5 W < power < 52.5 W
G1 – sleeping state	S3 – Suspend to RAM. Context saved to RAM.	No power	D3 – no power except for wake-up logic.	Power < 5 W [Note 2]
G1 – sleeping state	S4 – Suspend to disk. Context saved to disk.	No power	D3 – no power except for wake-up logic.	Power < 5 W [Note 2]
G2/S5	S5 – Soft off. Context not saved. Cold boot is required.	No power	D3 – no power except for wake-up logic.	Power < 5 W [Note 2]
G3 – mechanical off AC power is disconnected from the computer.	No power to the system.	No power	D3 – no power for wake-up logic, except when provided by battery or external source.	No power to the system. Service can be performed safely.

Notes:

1. Total system power is dependent on the system configuration, including add-in boards and peripherals powered by the system chassis' power supply.

2. Dependent on the standby power consumption of wake-up devices used in the system.

Wake-up Devices and Events

Table 7 lists the devices or specific events that can wake the computer from specific states.

Table 7.   Wake-up Devices and Events

These devices/events can wake up the computer…	…from this state
These devices/events can wake up the computer…	…from this state
Power switch	S1, S3, S4, S5
RTC alarm	S1, S3, S4, S5
LAN	S1, S3, S4, S5 [Note 1]
CNR	S1, S3, S4 [Note 2], S5 [Note 2]
PME#	S1, S3, S4, S5
Modem (back panel Serial Port A)	S1, S3
USB	S1, S3

Notes:

1. S4 state is dependent on an OS that supports this wake event.

2. For LAN and PME#, S5 is disabled by default in the BIOS Setup program. Setting this option to Power On will enable a wake-up event from LAN in the S5 state.

⟹ **NOTE**

> The use of these wake-up events from an ACPI state requires an operating system that provides full ACPI support. In addition, software, drivers, and peripherals must fully support ACPI wake events.

Hardware Support

The S845WD1H server board provides several power management hardware features, including:

- Power connector
- Fan connectors
- LAN wake capabilities
- Instantly Available PC technology
- Resume on Ring
- Wake from USB
- Wake from PS/2 keyboard
- PME# wake-up support

LAN wake capabilities and Instantly Available PC technology require power from the +5 V standby line. The sections discussing these features describe the incremental standby power requirements for each.

Resume on Ring enables telephony devices to access the computer when it is in a power-managed state. The method used depends on the type of telephony device (external or internal).

⚠ **CAUTION**

> Ensure that the power supply provides adequate +5 V standby current if LAN wake capabilities and Instantly Available PC technology features are used. Failure to do so can damage the power supply. The total amount of standby current required depends on the wake devices supported and manufacturing options.

⇒ **NOTE**

> The use of Resume on Ring and Wake from USB technologies from an ACPI state requires an operating system that provides full ACPI support.

Power Connector

When used with an ATX12V or EPS-12 V compliant power supply that supports remote power on/off, the S845WD1H server board can turn off the system power through software control. When the system BIOS receives the correct command from the operating system, the BIOS turns off power to the computer.

With soft-off enabled, if power to the computer is interrupted by a power outage or a disconnected power cord, when power resumes, the computer returns to the power state it was in before power was interrupted (on or off). The computer's response can be set using the After Power Failure feature in the BIOS Setup program's Boot menu.

⇒ **NOTE**

> A standard ATX 20 pin power connector and standard ATX 12V 4 pin 2x2 connector can be used to power the S845WD1H board. Plug the power cables into the pin 1 end of their respective motherboard connectors, leaving pins 21-24 unused on the main power connector and 5-8 unused on the 12V connector.

Fan Connectors

Table 8 summarizes the function/operation of the fan connectors.

Table 8.   Fan Connector Function/Operation

Connector	Description
Processor fan (CPU FAN)	• +12 V DC connection for a processor fan or active fan heat sink. • Fan is on in the S0 or S1 state. Fan is off when the system is off or in the S3, S4, or S5 state. • Wired to a fan tachometer input of the Hardware Management ASIC.
Front and rear chassis fans (FAN1, FAN2, and FAN3)	• +12 V DC connection for a system or chassis fan. • Fan is on in the S0 or S1 state. Fan is off when the system is off or in the S3, S4, or S5 state. • Wired to a fan tachometer input of the Hardware Management ASIC.

LAN Wake Capabilities

⚠ CAUTION

> For LAN wake capabilities, the 5 V standby line for the power supply must be capable of providing adequate +5 V standby current. Failure to provide adequate standby current when implementing LAN wake capabilities can damage the power supply.

LAN wake capabilities enable remote wake-up of the computer through a network. The LAN subsystem PCI bus network adapter monitors network traffic at the Media Independent Interface. Upon detecting a Magic Packet[†] frame, the LAN subsystem asserts a wake-up signal that powers up the computer.

Depending on the LAN implementation, the S845WD1H server board supports LAN wake capabilities with ACPI in the following ways:

- The PCI bus PME# signal for PCI 2.2 compliant LAN designs
- The onboard LAN subsystem

Instantly Available PC Technology

⚠ CAUTION

> For Instantly Available PC technology, the +5 V standby line for the power supply must be capable of providing adequate +5 V standby current. Failure to provide adequate standby current when implementing Instantly Available PC technology can damage the power supply.

The S845WD1H server board supports the *PCI Bus Power Management Interface Specification*. Add-in Board that also support this specification can participate in power management and can be used to wake the computer.

The use of Instantly Available PC technology requires operating system support and PCI 2.2 compliant add-in cards and drivers.

The standby power indicator LED shows that power is still present even when the computer appears to be off. Figure 4 shows the location of the standby power indicator LED.

⚠ CAUTION

> If AC power has been switched off and the standby power indicator is still lit, disconnect the power cord before installing or removing any devices connected to the board. Failure to do so could damage the board and any attached devices.
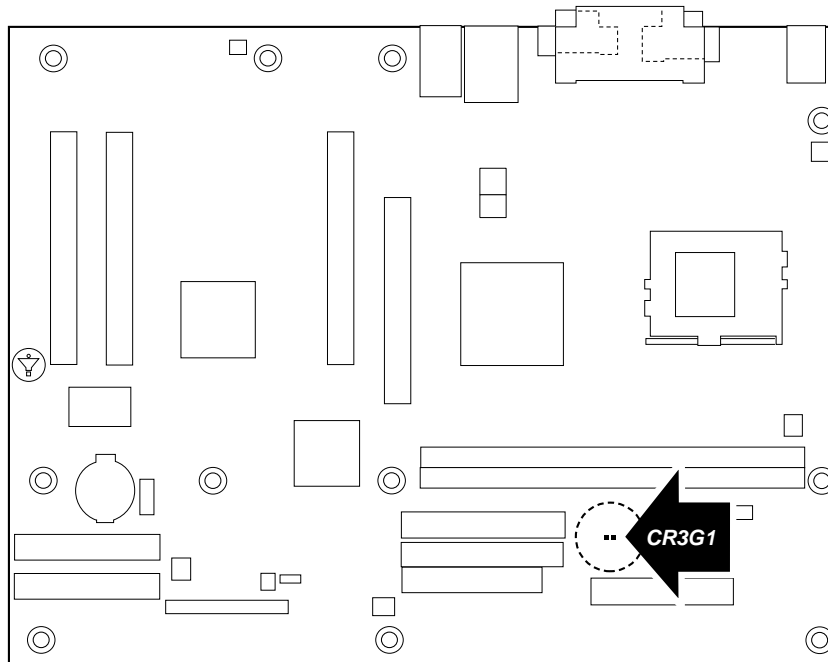
TP00002

Figure 4. Location of the Standby Power Indicator LED

Resume on Ring

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

- Resumes operation from ACPI S1 state
- Requires only one call to access the computer
- Detects incoming call similarly for external and internal modems
- Requires modem interrupt be unmasked for correct operation

Wake from USB

USB bus activity wakes the computer from an ACPI S1 state.

⇒ **NOTE**

> Wake from USB requires the use of a USB peripheral that supports Wake from USB.

Wake from PS/2 Devices

PS/2 device activity wakes the computer from an ACPI S1 state.

PME# Wake-up Support

When the PME# signal on the PCI bus is asserted, the computer wakes from an ACPI S1, S4, or S5 state (with Wake on PME enabled in BIOS).

PCI I/O Subsystem

The primary I/O bus for the S845WD1H server board is PCI, with one independent PCI bus. The PCI bus complies with the *PCI Local Bus Specification, Rev 2.2*. The PCI bus is directed through the Intel 82801BA I/O Controller Hub (ICH2). The table below lists the characteristics of the PCI bus.

Table 9.   PCI Bus Characteristics

Voltage	Width	Speed	Type	Comments
5 V	32-bits	33 MHz	Independent Bus	Supports full-length cards

32-bit, 33-MHz PCI Subsystem

All 32-bit, 33-MHz PCI I/O for the S845WD1H server board is directed through the Intel 82801BA I/O Controller Hub (ICH2). The PCI bus supports the following embedded devices and connectors:

- 2D/3D Graphics Accelerator: ATI Rage XL Video Controller.
- Two 10/100 Network Interface Controllers: Intel® 82550PM Fast Ethernet Controller.
- ATA-100 controller: Promise Technology PDC20267.
- Two Ultra DMA 33 / ATA 66/100 connectors.

Each of the embedded devices listed above, with exception to the Ultra DMA 33 / ATA 66/100 connectors, will be allocated a GPIO to disable the device.

Device IDs (IDSEL)

Each device under the PCI hub bridge has its IDSEL signal connected to one bit of AD[31:16], which acts as a chip select on the PCI bus segment in configuration cycles. This determines a unique PCI device ID value for use in configuration cycles. The following table shows each IDSEL value for the PCI bus devices and the corresponding device description.

Table 10.   PCI Bus Configuration IDs

IDSEL Value	Device
25	PCI slot 1 (closest to AGP connector)
26	PCI slot 2 (middle slot)
27	PCI slot 3 (closest to left edge of board)
28	Intel 82550PM Fast Ethernet Controller
29	Intel 82550PM Fast Ethernet Controller
30	ATA-100 controller Promise Technology PDC20267
31	ATI Rage XL Video Controller

PCI Arbitration

The PCI bus supports six PCI masters (ATI Rage XL, two Intel 82550s, Promise ATA-100 Controller, PCI connector 1 and an arbiter (PCI connector 2 and PCI connector 3). All PCI masters must arbitrate for PCI access, using resources supplied by the ICH2. The host bridge PCI interface (ICH2) arbitration lines REQx and GNTx are a special case in that they are internal to the host bridge.

ATA-100

The S845WD1H server board provides an embedded dual channel ATA-100 bus through the use of the Promise Technology PDC20267 ASIC. The PDC20267 ATA-100 controller contains two independent ATA-100 channels that share a single 32-bit, 33-MHz PCI bus master interface as a multifunction device, packaged in a 128-pin PQFP.

The ATA-100 controller supports the following features:
- The scatter / gather mechanism supports both Direct Memory Access (DMA) and Programmable I/O (PIO) IDE drives and ATAPI devices.
- Support for ATA and ATAPI proposal PIO Mode 0, 1, 2, 3, 4, DMA Mode 0, 1, 2, and Ultra DMA Mode 0, 1, 2, 3, 4, 5.
- The IDE drive transfer rate is capable of up to 100 MB/sec per channel.
- The host interface complies with PCI Local Bus Specification Revision 2.2.
- 32-bit, 33-MHz bus speed and 132 MB/sec sustained transfer rate.

The Promise PDC20267 supports IDE RAID through dual ATA-100 Channels. In a RAID configuration, multiple IDE hard drives are placed into one or more arrays of disks. Each array is seen as an independent disk, though the array may include upwards of two, three, or four drives. The IDE RAID can be configured as follows:
- RAID 0: Striping one to four drives.
- RAID 1: Mirroring two drives.
- RAID 1 +: Spare drive (three drives).
- RAID 0 +: One to four drives are required.

RAID 0 configurations are used for high-performance applications, as it doubles the sustained transfer rate of its drives. RAID 1 configurations primarily used for data protection. It creates an identical drive backup to a secondary drive. Whenever a disk write is performed, the controller sends data simultaneously to a second drive located on a different data channel. With four drives attached to dual ATA-100 channels, two striped drive pairs can mirror each other (RAID 0+1) for storage capacity and data redundancy.

Video Controller

The S845WD1H server board provides an ATI Rage XL PCI graphics accelerator, along with 8 MB of video SDRAM and support circuitry for an embedded SVGA video subsystem. The ATI Rage XL chip contains a SVGA video controller, clock generator, 2D and 3D engine, and RAMDAC in a 272-pin PBGA. One 2Mx32 SDRAM chip provides 8 MB of video memory.

The SVGA subsystem supports a variety of modes, up to 1600 x 1200 resolution in 8/16/24/32 bpp modes under 2D, and up to 1024 x 768 resolution in 8/16/24/32 bpp modes under 3D. It also supports both CRT and LCD monitors up to 100 Hz vertical refresh rate.

The S845WD1H server board provides a standard 15-pin VGA connector and supports disabling of the on-board video through the BIOS Setup menu or when a plug-in video card is installed in the AGP slot or any of the PCI slots.

Video Modes

The Rage XL chip supports all standard IBM VGA modes. The following table shows the 2D/3D modes supported for both CRT and LCD. The table specifies the minimum memory requirement for various display resolution, refresh rates, and color depths.

Table 11.   Video Modes

2D Mode	Refresh Rate (Hz)	S845WD1H 2D Video Mode Support			
		8 bpp	16 bpp	24 bpp	32 bpp
640x480	60, 72, 75, 90, 100	Supported	Supported	Supported	Supported
800x600	60, 70, 75, 90, 100	Supported	Supported	Supported	Supported
1024x768	60, 72, 75, 90, 100	Supported	Supported	Supported	Supported
1280x1024	43, 60	Supported	Supported	Supported	Supported
1280x1024	70, 72	Supported	–	Supported	Supported
1600x1200	60, 66	Supported	Supported	Supported	Supported
1600x1200	76, 85	Supported	Supported	Supported	–
3D Mode	**Refresh Rate (Hz)**	**S845WD1H 3D Video Mode Support with Z Buffer Enabled**			
640x480	60,72,75,90,100	Supported	Supported	Supported	Supported
800x600	60,70,75,90,100	Supported	Supported	Supported	Supported
1024x768	60,72,75,90,100	Supported	Supported	Supported	Supported
1280x1024	43,60,70,72	Supported	Supported	–	–
1600x1200	60,66,76,85	Supported	–	–	–

Video Memory Interface

The memory controller subsystem of the Rage XL arbitrates requests from direct memory interface, the VGA graphics controller, the drawing coprocessor, the display controller, the video scalar, and hardware cursor. Requests are serviced in a manner that ensures display integrity and maximum CPU/coprocessor drawing performance.

The S845WD1H supports an 8 MB (512Kx32bitx4 Banks) SDRAM device for video memory.

Network Interface Controller (NIC)

The S845WD1H server board supports two 10Base-T/100Base-TX Network Interface Controllers (NICs) based on the Intel 82550PM NIC. The 82550PM is a highly integrated PCI LAN controller in a thin BGA 15mm package. The controller's baseline functionality is equivalent to that of the Intel® 82559, with the addition of Alert-on-LAN functionality. The S845WD1H server board supports independent disabling of the two NIC controllers using the BIOS Setup menu.

The 82550PM supports the following features:

- Glueless 32-bit PCI, CardBus master interface (Direct Drive of Bus), compatible with PCI local Bus Specification, Revision 2.2.
- Integrated IEEE 802.3 10Base-T and 100Base-TX compatible PHY.
- IEEE 820.3u auto-negotiation support.
- Full duplex support at both 10 Mbps and 100 Mbps operation.
- Integrated UNDI ROM support.
- MDI/MDI-X and HWI support.
- Low power +3.3 V device.

NIC Connector and Status LEDs

The 82550 drives two LEDs located on each network interface connector. The amber LED indicates network connection when on, and transmit/receive activity when blinking. The yellow LED indicates 100-Mbps operation when lit, and 10-Mbps when off.

Hardware Monitoring

The S845WD1H server board has an integrated Hardware Management ASIC that is responsible for hardware monitoring. Together, the Hardware Management ASIC and the Intel LANDesk Client Manager (LDCM) 6.3 software provide basic server hardware monitoring which alerts a system administrator if a hardware problem occurs on an Intel Server Board S845WD1H based system. The Intel LDCM software is for use with Windows 2000 Server and Windows 2000 Advanced Server operating systems. Other S845WD1H operating systems like Red Hat† Linux† won't be monitored with LDCM.

Intel LANDesk Client Manager software and user guides that provide more information on using Intel LDCM software are available on the *Intel Server Board S845WD1H Resource CD* and are also available for download at:

*http://www.support.intel.com/support/motherboards/server/*S845WD1-E

2 Server Board Installation and Upgrading

Tools and Supplies Needed

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

Before You Begin

Emissions Disclaimer

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

See "Regulatory and Integration Information" on page 91 for product Safety and EMC regulatory compliance information. This is an FCC Class A device. Integration of it into a Class B chassis does not result in a Class B device.

Warnings and Cautions

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

⚠ WARNING

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

⚠ CAUTIONS

System power on/off: The power button DOES NOT turn off the system AC power. To remove power from system, you must unplug the AC power cord from the wall outlet. Make sure the AC power cord is unplugged before you open the chassis, add, or remove any components.

Electrostatic discharge (ESD) & ESD protection: ESD can damage disk drives, boards, and other parts. We recommend that you perform all procedures in this chapter only at an ESD workstation. If one is not available, provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground—any unpainted metal surface—on your server 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 server, place the board component side up on a grounded, static free surface. Use a conductive foam pad if available but not the board wrapper. Do not slide board over any surface.

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

Memory

The S845WD1H server board contains two 184-pin DIMM sockets and supports up to two DDR SDRAM DIMMs. The minimum supported memory configuration is 64 MB and the maximum configurable memory size is a 2 GB stacked un-buffered DDR200/266 ECC DIMM.

⟹ **NOTE**

Only low profile DIMMs can be supported in a 1U server chassis.

Check the Intel Customer Support website for the latest tested memory list:

http://support.intel.com/support/motherboards/server/S845WD1-E

DIMM Installation Guidelines

All memory components and DIMMs used with the S845WD1-# server board must comply with the DDR specifications. These include the following:

- Intel® Spec Addendum Rev 0.9 for the JEDEC DDR200/266 Unbuffered DIMM Specification
- DDR200/266 Unbuffered DIMM System-level Validation Results

You can access these documents through the Internet at:

http://www.intel.com/technology/memory/

Installing DIMMs

To install DIMMs, follow these steps:

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Turn off all peripheral devices connected to the server. Turn off the server and disconnect the AC power cord.
3. Remove the server's cover and locate the DIMM sockets (see Figure 5).
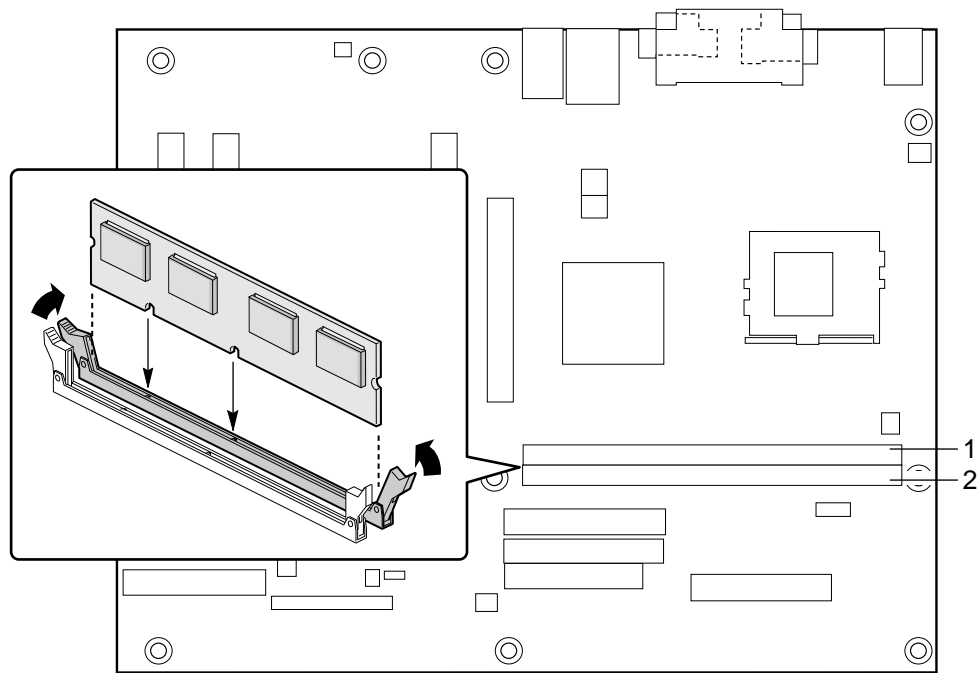
TP00003

Figure 5. DIMM Socket Locations

4. Make sure the clips at either end of the DIMM socket(s) are pushed outward to the open position.
5. Holding the DIMM by the edges, remove it from its anti-static package.
6. Position the DIMM above the socket. Align the two small notches in the bottom edge of the DIMM with the keys in the socket (see inset in Figure 5).
7. Insert the bottom edge of the DIMM into the socket.
8. When the DIMM is inserted, push down on the top edge of the DIMM until the retaining clips snap into place. Make sure the clips are firmly in place.
9. Replace the server's cover and reconnect the AC power cord.

Removing DIMMs

To remove a DIMM, follow these steps:

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Turn off all peripheral devices connected to the server. Turn off the server.
3. Remove the AC power cord from the server.
4. Remove the server's cover.
5. Gently spread the retaining clips at each end of the socket. The DIMM pops out of the socket.
6. Hold the DIMM by the edges, lift it away from the socket, and store it in an anti-static package.
7. Reinstall and reconnect any parts you removed or disconnected to reach the DIMM sockets.
8. Replace the server's cover and reconnect the AC power cord.

Installing the I/O Shield

⚠ **CAUTION**

> Systems based on the S845WD1H server board need the I/O shield properly installed to pass emissions (EMI) certification testing and to meet Class B emissions compliance levels. Without the I/O shield, or with an improperly installed I/O shield, the server system will not meet Class B regulatory compliance requirements.

The boxed server board comes with an I/O shield for a general purpose chassis. If installing this board in an 1U chassis, obtain an I/O shield from the chassis vendor. When installed in the chassis, the shield blocks radio frequency transmissions, protects internal components from dust and foreign objects, and promotes correct airflow within the chassis.

Install the I/O shield before installing the server board in the chassis. Place the shield inside the chassis and press the shield into place so that it fits tightly and securely. If the shield doesn't fit, obtain a proper-sized shield from the chassis supplier.
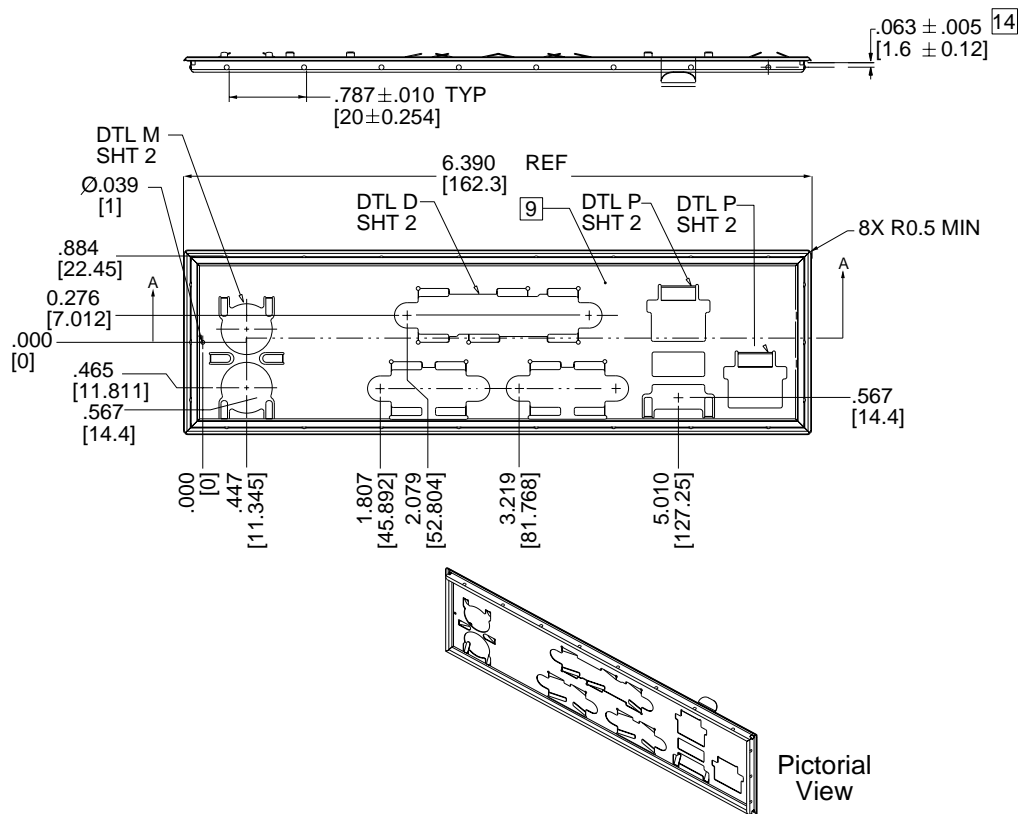
OM14350

Figure 6. I/O Shield Dimensions

Installing the Server Board

Refer to your chassis manual for instructions on installing the server board. Eight screws secure the server board to the chassis. Figure 7 shows the locations of the mounting screw holes.

⇒ **NOTES**

> You will need a Phillips (#2 bit) screwdriver.
>
> Refer to Page 91 for regulatory requirements and installation instructions and precautions.

⚠ **WARNING**

> Only qualified technical personnel should attempt this procedure. Disconnect the server from its power source before performing the procedures described here. Failure to disconnect the power before you open the server can result in personal injury or equipment damage.
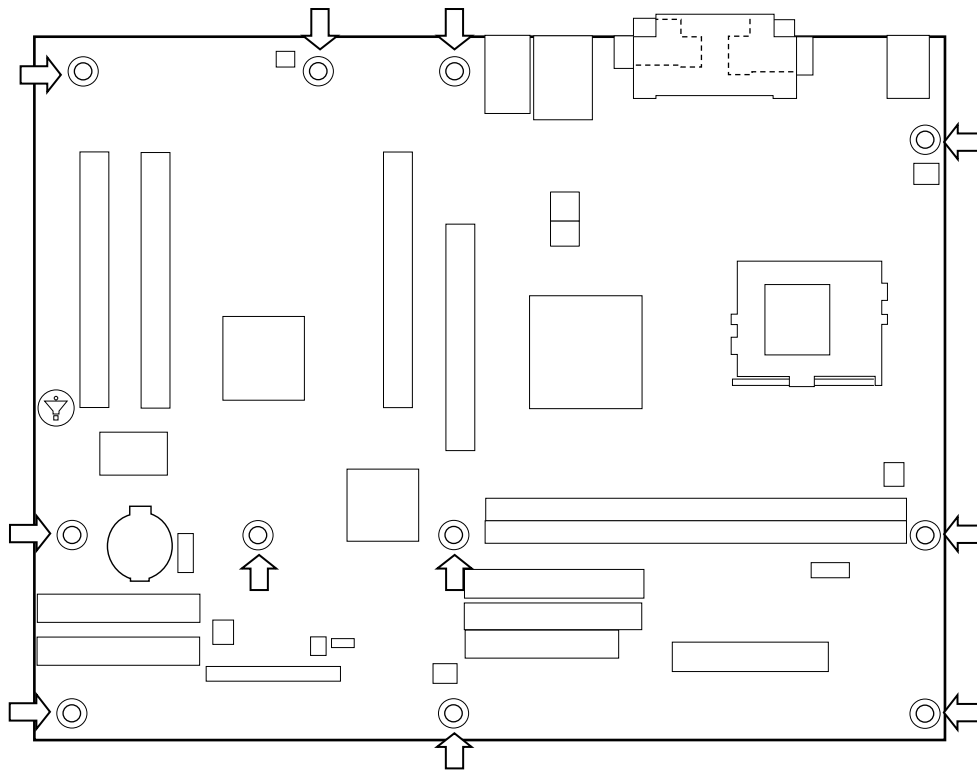
TP00004

Figure 7. Location of the Mounting Screw Holes

Installing a Processor

To install a processor, follow these instructions:

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Locate the processor socket and raise the socket handle completely (see Figure 8, B).
3. Aligning the pins of the processor with the socket, insert the processor into the socket (see Figure 8, A and C).
4. Close the handle completely (see Figure 8, D).

OM14263
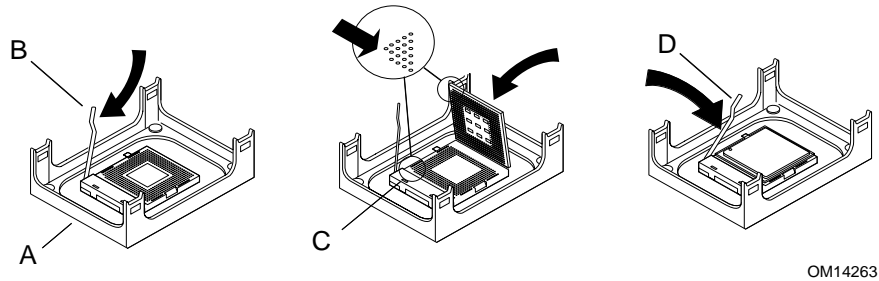
Figure 8. Installing the Processor in the Processor Socket

5. Place the fan heat sink on top of the processor.

⇒ **NOTE**

The bottom of the heat sink may have thermal interface material (TIM) already applied. Be careful not to damage the thermal interface material.

6. If there is no thermal interface material, use the enclosed syringe and apply the thermal interface material to the top of the processor as shown in Figure 9.

OM14482
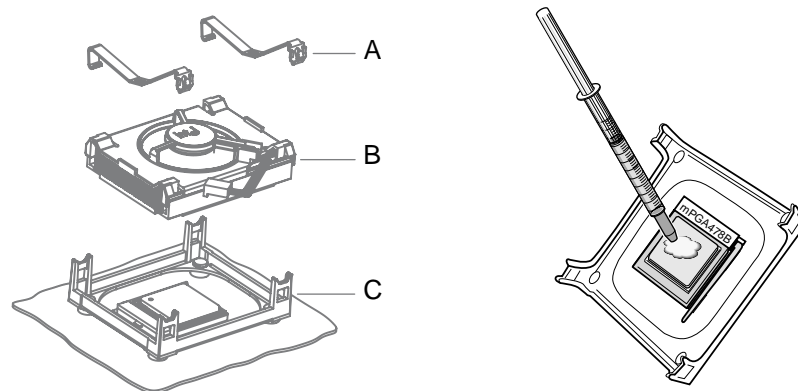
A.   Retention Mechanism
B.   Heat Sink
C.   Processor in Processor Socket

Figure 9. Attaching the Heat Sink to the Processor

7. Attach the fan heat sink clips to the processor socket.
    a. Align the heat sink and clip assembly with the retention mechanism and place it on the processor. The heat sink is symmetrical.
    b. With the clip levers in the up position, use a flat head screw drive to push down on all four clip frame corners to secure to the retention mechanism hooks (see Figure 10).
    c. Close the clip levers completely.
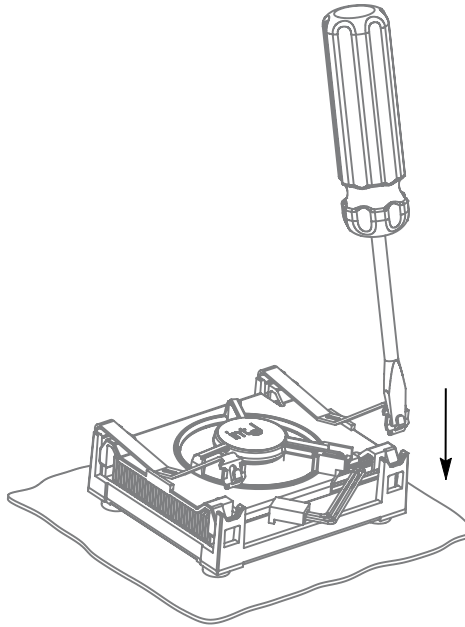
OM14470

Figure 10. Attaching the Fan Heat Sink Clips to the Processor Socket

8. Connect the processor fan cable to the processor fan connector (see Figure 11, A).
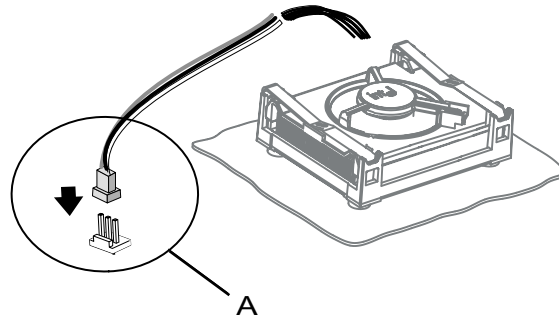
OM14483

Figure 11. Connecting the Processor Fan Cable to the Processor Fan Connector

Removing the Processor

To remove the processor, follow these instructions:
1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Disconnect the processor fan cable.
3. Detach the fan heat sink clips.
4. Remove the heat sink.
5. Raise the socket handle completely.
6. Remove the processor.

Replacing the Battery

When your server is turned off, a lithium battery maintains the time-of-day clock and the keeps the values in CMOS RAM. The location of the server board battery is shown in Figure 12 on page 48.

The battery should last about seven years whereupon it begins to lose voltage. When the voltage drops below a certain level, the BIOS Setup program settings stored in CMOS RAM (for example, the date and time) might not be accurate. Replace the battery with an equivalent one.

⚠ **CAUTION**

Refer to technically qualified persons only for replacement of battery.

⚠ **CAUTION**

Risk of explosion if the battery is replaced with an incorrect type. Batteries should be recycled where possible. Disposal of used batteries must be in accordance with local environmental regulations.

⚠ **PRÉCAUTION**

Risque d'explosion si la pile usagée est remplacée par une pile de type incorrect. Les piles usagées doivent être recyclées dans la mesure du possible. La mise au rebut des piles usagées doit respecter les réglementations locales en vigueur en matière de protection de l'environnement.
(French)

⚠ **FORHOLDSREGEL**

Eksplosionsfare, hvis batteriet erstattes med et batteri af en forkert type. Batterier bør om muligt genbruges. Bortskaffelse af brugte batterier bør foregå i overensstemmelse med gældende miljølovgivning.
(Danish)

⚠ **OBS!**

Det kan oppstå eksplosjonsfare hvis batteriet skiftes ut med feil type. Batterier bør sendes til gjenvinning hvis det er mulig. Brukte batterier bør kastes i henhold til gjeldende miljølovgivning.
(Norwegian)

⚠ **VIKTIGT!**

Risk för explosion om batteriet ersätts med felaktig batterityp. Batterier bör om möjligt återvinnas. Batterier ska kasseras enligt de lokala miljövårdsbestämmelserna.
(Swedish)

⚠ VARO

Räjähdysvaara, jos pariston tyyppi on väärä. Paristot on kierrätettävä, jos se on mahdollista. Käytetyt paristot on hävitettävä paikallisten ympäristömääräysten mukaisesti.
(Finnish)

⚠ VORSICHT

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.
(German)

⚠ AVVERTIMENTO

Esiste il pericolo di un esplosione se la pila non viene sostituita in modo corretto. Utilizzare solo pile uguali o di tipo equivalente a quelle consigliate dal produttore. Per disfarsi delle pile usate, seguire le istruzioni del produttore.
(Italian)

⚠ PRECAUCIÓN

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.
(Spanish)

⚠ WAARSCHUWING

Er bestaat ontploffingsgevaar als de batterij wordt vervangen door een onjuist type batterij. Batterijen moeten zoveel mogelijk worden gerecycled. Houd u bij het weggooien van gebruikte batterijen aan de plaatselijke milieuwetgeving.
(Dutch)

⚠ ATENÇÃO

Haverá risco de explosão se a bateria for substituída por um tipo de bateria incorreto. As baterias devem ser recicladas nos locais apropriados. A eliminação de baterias usadas deve ser feita de acordo com as regulamentações ambientais da região.
(Brazilian Portuguese)

To replace the battery, follow these steps:

1. Observe the safety and ESD precautions at the beginning of this chapter.
2. Turn off all peripheral devices connected to the server. Disconnect the server's power cord from the AC power source (wall outlet or power adapter).
3. Remove the server cover.
4. Locate the battery on the board (see Figure 12).
5. With your fingertip, gently pull back the tab away from the battery.
   Pull out the battery. Note the orientation of the "+" and "-" on the battery.
6. Install the new battery in the connector, orienting the "-" as shown in Figure 12.
7. Replace the server cover.

TP00005
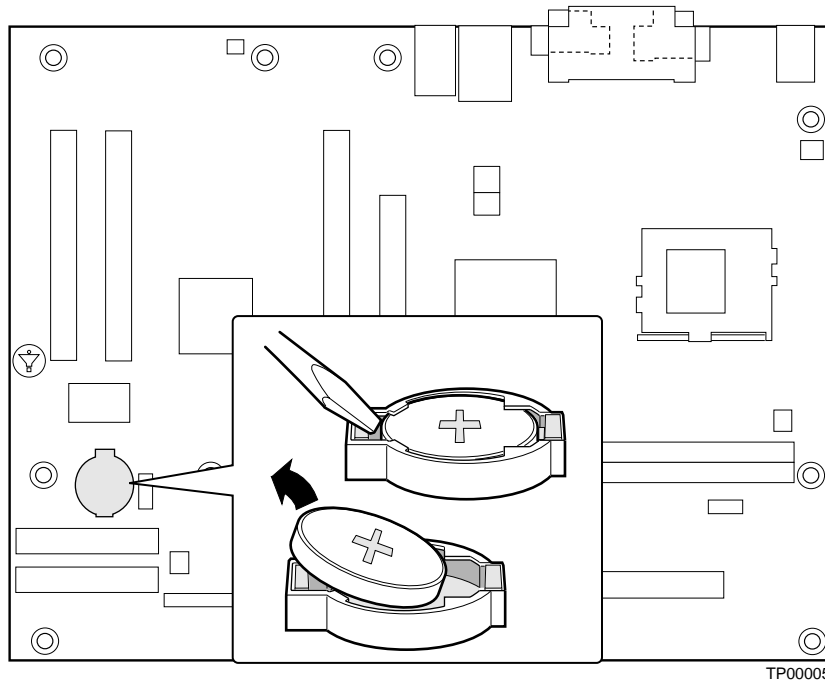
Figure 12. Removing the Battery

Connecting the IDE Cable

The Intel® boxed server board package includes a 40-contact, 80-conductor IDE cable. It is capable of connecting two drives to the server board. The cable supports Ultra ATA/66 and Ultra ATA/100 transfer protocols and is backward compatible with drives using slower IDE transfer protocols.

For the cable to function correctly:

- Attach the cable end with the single connector (A), which is black and labeled PRI IDE, to the server board as shown in Figure 13.
- Attach the cable end with the two closely spaced connectors (B), which are gray and black and are labeled P2 and P3, to the drives.
- If connecting only one IDE drive, be sure to connect the drive to the gray connector (P3).
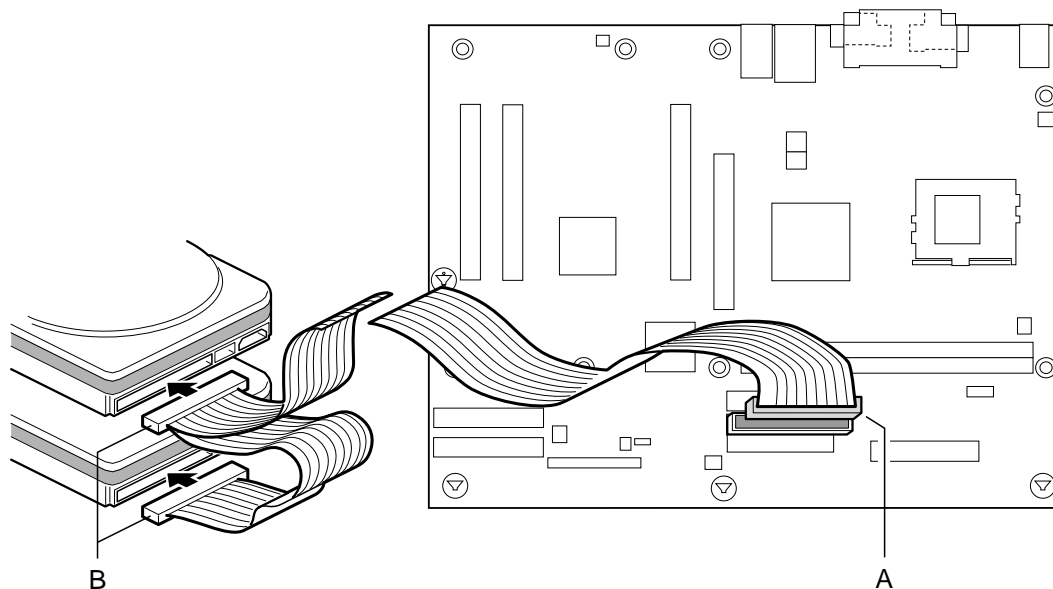
TP00006

Figure 13. Connecting the IDE Cable

Setting the BIOS Configuration Jumper

⚠ **CAUTION**

Always turn off the power and unplug the power cord from the server before changing the jumper. Moving the jumper with the power on may result in unreliable server operation.
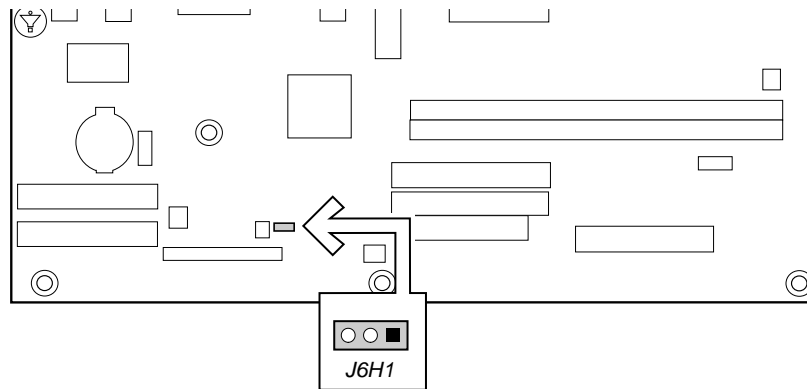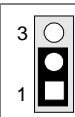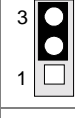
TP00007

Figure 14. BIOS Configuration Jumper Block Location

This three-pin jumper block, shown in Figure 14, enables all server board configurations to be done in BIOS Setup. Table 12 shows the jumper settings for the Setup program modes.

Table 12.   Jumper Settings for the BIOS Setup Program Modes

Function/Mode	Jumper Setting		Configuration
Normal	1-2	3 ○ ● □ 1	The BIOS uses current configuration information and passwords for booting.
Configure	2-3	3 ● ● □ 1	After the POST runs, Setup runs automatically. The maintenance menu is displayed.
Recovery	None	3 ○ ○ □ 1	The BIOS attempts to recover the BIOS configuration. A recovery diskette is required.

Intel Server Board S845WD1-E (S845WD1H) Product Guide

3 Configuration Software and Utilities

This chapter tells you how to update the BIOS by either using the Intel Express BIOS Update utility or the Intel Flash Memory Update Utility, and recovering the BIOS if an update fails.

Updating the BIOS with the Intel® Express BIOS Update Utility

With the Intel Express BIOS Update utility you can update the system BIOS while in the Windows environment. The BIOS file is included in an automated update utility that combines the functionality of the Intel Flash Memory Update Utility and the ease-of use of Windows-based installation wizards.

To update the BIOS with the Intel Express BIOS Update utility:

1. Go to the Intel support web site:
   http://support.intel.com/support/motherboards/server
2. Navigate to the S845WD1H page and click the Express BIOS Update utility file for the board's BIOS.
3. Download the file to your hard drive. (You can also save this file to a diskette. This is useful if you are updating the BIOS for multiple systems.)
4. Close all other applications. This step is required. Your system will be rebooted at the last Express BIOS Update window.
5. Double-click the executable file from the location on your hard drive where it was saved. This runs the update program.
6. Follow the instructions provided in the dialog boxes to complete the BIOS update.

Updating the BIOS with the Intel® Flash Memory Update Utility

Follow the steps described below to update the BIOS using the Intel Flash Memory Update Utility:

- Prepare for the update
- Update the BIOS
- Recover the BIOS if an update fails

Preparing for the Update

Before you update the BIOS, prepare by:

- Obtaining the BIOS update file
- Recording the current BIOS settings
- Creating the BIOS upgrade diskette

Obtaining the BIOS Update File

You can update to a new version of the BIOS by using the BIOS update file. The BIOS update file is a compressed self-extracting archive that contains all the files you need to update the BIOS. The BIOS update file contains:

- New BIOS files
- BIOS recovery files
- Intel Flash Memory Update Utility

You can obtain the BIOS update file through your server supplier or from the Intel World Wide Web site:

http://support.intel.com/support/motherboards/server/

⟹ **NOTE**

> Review the instructions distributed with the update utility before attempting a BIOS update.

The Intel Flash Memory Update Utility allows you to:

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

Recording the Current BIOS Settings

1. Boot the server and press <F2> when you see the message:

        Press <F2> Key if you want to run SETUP

⟹ **NOTE**

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

2. Write down the current settings in the BIOS Setup program.

Creating Bootable Media

You can create bootable media with a:

- CD writer
- Normal diskette drive or an LS-120 diskette drive

Creating a Bootable CD

Follow the instructions provided with your CD writer to make a bootable CD using floppy emulation and bootable files.

Creating a Bootable Diskette

⟹ **NOTE**

> If your drive A is an LS-120 diskette drive, you must use a 1.44 MB diskette
> as the bootable BIOS update diskette. The server is unable to recover a
> BIOS from an LS-120 diskette.

To create a bootable diskette using a DOS system:

- Place an unformatted diskette in the diskette drive and format the diskette using the /s option.
  Example: `format a: /s`
- Alternatively, place a formatted diskette in the diskette drive and use the sys command.
  Example: `sys a:`

To create a bootable diskette using a non-DOS system:

1. Obtain the BIOS update file through your server supplier or from the Intel World Wide Web site:

   http://support.intel.com/support/motherboards/server/
2. Copy the BIOS update file to a temporary directory on your hard disk.
3. Change to the temporary directory.
4. To extract the files, double click on the BIOS update file, for example, EABIOSxx.EXE.
5. One of the extracted files is MK_BOOTZ.EXE. Double click on this file to extract the README.TXT file.
6. Follow the directions in the README.TXT file.

Creating a BIOS Update Media

1. Obtain the BIOS update file through your server supplier or from the Intel World Wide Web site:

   http://support.intel.com/support/motherboards/server/
2. Copy the BIOS update file to a temporary directory on your hard disk.
3. From the C:\ prompt, change to the temporary directory.
4. To extract the file, type the name of the BIOS upgrade file, for example, EABIOSxx.
5. Press <Enter>. The extracted file contains the following files:
   >   LICENSE.TXT
   >   BIOINSTR.TXT
   >   BIOS.EXE
   >   MK_BOOTZ.EXE
6. Read the LICENSE.TXT file, which contains the software license agreement, and the BIOINSTR.TXT file, which contains the instructions for the BIOS update.
7. Insert the bootable diskette into drive A.
8. To extract the BIOS.EXE file to the diskette, change to the temporary directory that holds the BIOS.EXE file and type:
   >   BIOS A:
9. Press <Enter>.
10. The diskette now holds the new BIOS files, the Intel Flash Update Utility, and the recovery files.

Updating the BIOS

⚠ CAUTION

The AUTOEXEC.BAT file provided with the update files updates the BIOS
in two parts: first updating the boot block and displaying the `Operation`
`completed successfully` message and second, updating the BIOS core.
You will be asked to reboot the system when the update process is complete.
Do not interrupt the process or the system may not be capable of rebooting.

1. Boot the server with the BIOS upgrade diskette in drive A. During system boot, the
   AUTOEXEC.BAT file provided with the update files will automatically run the BIOS update
   process.
2. The AUTOEXEC.BAT file updates the BIOS in two parts: first updating the boot block and
   displaying the `Operation completed successfully` message and then updating the
   BIOS core.
3. When the update process is complete, the monitor will display a message telling you to remove
   the diskette and to reboot the system.
4. As the server boots, check the BIOS identifier (version number) to make sure the upgrade was
   successful. If a logo appears, press <Esc> to view the POST messages.
5. To enter the BIOS Setup program, press <F2> when you see the message:

   `Press <F2> to Run SETUP`

6. For proper operation, load the BIOS Setup program defaults. To load the defaults, press <F9>.
7. To accept the defaults, press <Enter>.
8. In Setup, enter the settings you wrote down before beginning the BIOS upgrade.
9. To save the settings, press <F10>.
10. To accept the settings, press <Enter>.
11. Turn off the server and reboot.

Recovering the BIOS

It is unlikely that anything will interrupt the BIOS update, however, if an interruption occurs, the BIOS could be damaged. The following steps explain how to recover the BIOS if an update fails. The following procedure uses recovery mode for the Setup program. See page 50 for more information on Setup modes.

⟹ **NOTE**

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

1. Turn off the server, disconnect the server's power cord, and disconnect all external peripherals.
2. Remove the server cover and locate the configuration jumper block (J6H1) (see Figure 14).
3. Remove the jumper from all pins as shown below to set recovery mode for Setup.

   3 ⬜ ○ ○ ⬜ 1

4. Insert the bootable BIOS update diskette into diskette drive A.
5. Replace the server cover, connect the power cord, turn on the server, and allow it to boot. (The recovery process will take a few minutes. Listen to the speaker and watch for drive A activity.)
   - Upon applying power, drive A will begin to show activity. In about a minute, two beeps are heard and drive A activity ceases (temporarily) indicating the successful recovery of the BIOS core. Drive A activity will begin again followed by two more beeps indicating the successful recovery of the boot block. This sequence of events indicates that successful BIOS recovery has taken place.
   - A series of continuous beeps indicates that BIOS recovery has failed.
6. If recovery fails, return to step 1 and repeat the recovery process.
7. If recovery is successful, turn off the server, and disconnect its power cord.
8. Remove the server cover and continue with the following steps.
9. On the jumper block (J6H1), reinstall the jumper back on pins 1-2 as shown below to set normal mode for Setup.

   3 ⬜ ○ ▣ 1

10. Leave the update diskette in drive A, replace the server cover, and connect the server's power cord.
11. Turn on the server and continue with the BIOS update (see page 54).

Using the Setup Program

You can use the BIOS Setup program to change the configuration information and boot sequence for the server. This chapter tells you how to access the BIOS Setup program and lists Setup features, options, and default settings.

⟹ **NOTE**

> For reference purposes, you should write down the current Setup settings.
> When you make changes to the settings, update this record.

BIOS Setup Program Modes

The BIOS Setup program has three modes of operation:

- Normal mode for normal operations
- Configure mode for clearing passwords (see Chapter 2 for instructions)
- Recovery mode for BIOS recovery

The BIOS Setup Program Operating mode is controlled by the setting of the configuration jumper block. The jumper is set to normal mode at the factory.

⟹ **NOTE**

> The Setup menus described in this section apply to the server boards with
> BIOS identifier WD845.10A.86B. Server boards with other BIOS
> identifiers might have differences in some of the Setup menu screens.

The BIOS Setup program can be used to view and change the BIOS settings for the server. The BIOS Setup program is accessed by pressing the <F2> key after the Power-On Self-Test (POST) memory test begins and before the operating system boot begins. The menu bar is shown below.

```
Maintenance    Main    Advanced    Security    Power    Boot    Exit
```

Table 13.   BIOS Setup Program Menu Bar

Maintenance	Main	Advanced	Security	Power	Boot	Exit
Clears passwords and Boot Integrity Service (BIS)* credentials, and configures extended configuration memory settings	Allocates resources for hardware components	Configures advanced features available through the chipset	Sets passwords and security features	Configures power management features	Selects boot options and power supply controls	Saves or discards changes to Setup program options

* For information about the BIS, refer to the Intel Web site at: *http://developer.intel.com/design/security/index1.htm*

Table 14 shows the function keys available for menu screens.

Table 14. BIOS Setup Program Function Keys

BIOS Setup Program Function Key	Description
<←> or <→>	Selects a different menu screen.
<↑> or <↓>	Moves cursor up or down.
<Tab>	Moves cursor to the next field.
<Enter>	Executes command or selects the submenu.
<F9>	Load the default configuration values for the current menu.
<F10>	Save the current values and exits the BIOS Setup program.
<Esc>	Exits the menu.

Maintenance Menu

This menu is used to clear passwords, to access the extended configuration submenu, and to access processor information. Setup only displays this menu in the configure mode. See page 50 for information about setting the configure mode. To access this menu, select Maintenance on the menu bar at the top of the screen.

Maintenance	Main	Advanced	Security	Power	Boot	Exit
Extended Configuration						

Table 15. Maintenance Menu

Feature	Options	Description
Clear All Passwords	• Yes (default) • No	Clears the user and administrative passwords.
Clear BIS Credentials	• Yes (default) • No	Clears the Wired for Management Boot Integrity Service (BIS) credentials.
Extended Configuration	• Default • User-Defined	Invokes the Extended Configuration submenu.
CPU Information	No options	Displays CPU Information.
CPU Microcode Update Revision	No options	Displays CPU's Microcode Update Revision.
CPU Stepping Signature	No options	Displays CPU's Stepping Signature.

Extended Configuration Submenu

To access this submenu, select Maintenance on the menu bar, then Extended Configuration.

Maintenance	Main	Advanced	Security	Power	Boot	Exit
Extended Configuration						

The submenu represented by Table 16 is for setting video memory cache mode. This submenu becomes available when User Defined is selected under Extended Configuration.

Table 16.   Extended Configuration Submenu

Feature	Options	Description
Extended Configuration	• Default • User-Defined	User Defined allows setting memory control and video memory cache mode. If selected here, will also display in the Advanced Menu as: "Extended Menu: *Used*."
Video Memory Cache Mode	• USWC	Selects Uncacheable Speculative Write-Combining (USWC) video memory cache mode. Full 32 byte contents of the Write-Combining buffer are written to memory as required. Cache lookups are not performed. Both the video driver and the application must support Write-Combining.
	• UC (default)	Selects UnCacheable (UC) video memory cache mode. This setting identifies the video memory range as uncacheable by the processor. Memory writes are performed in program order. Cache lookups are not performed. Well suited for applications not supporting Write-Combining.
ISA Enable Bit	• Disabled (default) • Enabled	
System Control	No options	
SDRAM Auto-Configuration	• Auto (default) • User Defined	Allows configuration of memory.
CAS# Latency	• SDR 2.0/DDR 1.5 • SDR 3.0/DDR 2.0 • DDR 2.5 • Auto (default)	Corresponds to CL.
SDRAM RAS# to CAS# delay	• 3 • 2 • Auto (default)	Corresponds to tRCD.
SDRAM RAS# Precharge	• 3 • 2 • Auto (default)	Corresponds to tRP.
SDRAM RAS Act. To Pre.	• 7 • 6 • 5 • Auto (default)	Corresponds to tRAS.

Main Menu

To access this menu, select Main on the menu bar at the top of the screen.

Maintenance	**Main**	Advanced	Security	Power	Boot	Exit

Table 17 describes the Main Menu. This menu reports processor and memory information and is for configuring the system date and system time.

Table 17.   Main Menu

Feature	Options	Description
BIOS Version	No options	Displays the version of the BIOS.
Processor Type	No options	Displays processor type.
Processor Speed	No options	Displays processor speed.
System Bus Speed	No options	Displays the system bus speed.
Processor L2 Cache	No options	Displays the size of second-level cache.
Internal Cache	• Disabled • Write Thru • Write Back • Reserved	Displays CPU internal cache and, if enabled, select Write Thru or Write Back mechanism.
External Cache	• Disabled • Write Thru • Write Back • Reserved	Displays CPU external cache and, if enabled, select Write Thru or Write Back mechanism.
Cache RAM	No options	Displays the size of second-level cache and whether it is ECC-capable.
Total Memory	No options	Displays the total amount of RAM.
Memory Bank 1 Memory Bank 2	No options	Displays the amount and type of RAM in the memory banks.
Language	• English (default) • Español	Selects the current default language used by the BIOS (Deutsch, Italiano, and Français available via .lng files).
Memory Configuration	• Non-ECC • ECC (default)	Allows the user to enable error reporting in the system and all installed memory supported ECC. If non-ECC memory is installed, BIOS will detect and change the setting to non-ECC.
IOAPIC	• Disabled • Enabled (default)	
System Time	• Hour, minute, and second	Specifies the current time.
System Date	• Day of week Month/day/year	Specifies the current date.

⟹ **NOTE**

Additional language support available. For more information visit Intel's support web site at:
www.support.intel.com/support/motherboards/server/S845WD1-E

Advanced Menu

To access this menu, select Advanced on the menu bar at the top of the screen.

Maintenance	Main	**Advanced**	Security	Power	Boot	Exit

PCI Configuration
Boot Configuration
Peripheral Configuration
IDE Configuration
Diskette Configuration
Event Log Configuration

Table 18 describes the Advanced Menu. This menu is used for setting advanced features that are available through the chipset.

Table 18.   Advanced Menu

Feature	Options	Description
Extended Configuration	No options	If *Used* is displayed, *User-Defined* has been selected in Extended Configuration under the Maintenance Menu.
PCI Configuration	Select to display submenu	Configures individual PCI slot's IRQ priority. When selected, displays the PCI Configuration submenu.
Boot Configuration	Select to display submenu	Configures Plug and Play and the Numlock key, and resets configuration data. When selected, displays the Boot Configuration submenu.
Peripheral Configuration	Select to display submenu	Configures peripheral ports and devices. When selected, displays the Peripheral Configuration submenu.
IDE Configuration	Select to display submenu	Specifies type of connected IDE device.
Diskette Configuration	Select to display submenu	When selected, displays the Diskette Configuration submenu.
Event Log Configuration	Select to display submenu	Configures Event Logging. When selected, displays the Event Log Configuration submenu.

PCI Configuration Submenu

To access this submenu, select Advanced on the menu bar, then PCI Configuration.

Maintenance	Main	**Advanced**	Security	Power	Boot	Exit

PCI Configuration
Boot Configuration
Peripheral Configuration
IDE Configuration
Diskette Configuration
Event Log Configuration

The submenu represented by Table 19 is for configuring the IRQ priority of PCI slots individually.

Table 19.   PCI Configuration Submenu

Feature	Options	Description
PCI Slot 1 IRQ Priority	• Auto (default) • 9 • 10 • 11	Allows selection of IRQ priority and S5 wake.
PCI Slot 2 IRQ Priority (Note 1)	• Auto (default) • 9 • 10 • 11	Allows selection of IRQ priority and S5 wake.
PCI Slot 3 IRQ Priority (Note 1)	• Auto (default) • 9 • 10 • 11	Allows selection of IRQ priority and S5 wake.

Notes:

1. Additional interrupts may be available if certain on-board devices (such as the serial and parallel ports) are disabled.

Boot Configuration Submenu

To access this submenu, select Advanced on the menu bar, then Boot Configuration.

Maintenance	Main	**Advanced**	Security	Power	Boot	Exit

PCI Configuration
Boot Configuration
Peripheral Configuration
IDE Configuration
Diskette Configuration
Event Log Configuration

The submenu represented by Table 20 is for setting Plug and Play (PnP) options, resetting configuration data, and the power-on state of the Numlock key.

Table 20. Boot Configuration Submenu

Feature	Options	Description
Plug and Play O/S	• No (default) • Yes	Specifies if manual configuration is desired. *No* lets the BIOS configure all devices. This setting is appropriate when using a Plug and Play operating system. *Yes* lets the operating system configure Plug and Play devices not required to boot the system. This option is available for use during lab testing.
Reset Config Data	• No (default) • Yes	*No* does not clear the PCI/PnP configuration data stored in flash memory on the next boot. *Yes* clears the PCI/PnP configuration data stored in flash memory on the next boot.
Numlock	• Off • On (default)	Specifies the power-on state of the Numlock feature on the numeric keypad of the keyboard.

Peripheral Configuration Submenu

To access this submenu, select Advanced on the menu bar, then Peripheral Configuration.

Maintenance	Main	**Advanced**	Security	Power	Boot	Exit

PCI Configuration
Boot Configuration
Peripheral Configuration
IDE Configuration
Diskette Configuration
Event Log Configuration

The submenu represented in Table 21 is used for configuring server peripherals.

Table 21.   Peripheral Configuration Submenu

Feature	Options	Description
Serial Port A	• Disabled • Enabled • Auto (default)	Configures serial port A. *Auto* assigns the first free COM port, normally COM1, the address 3F8h, and the interrupt IRQ4. An * (asterisk) displayed next to an address indicates a conflict with another device.
Base I/O Address (This feature is present only when Serial Port A is set to *Enabled*)	• 3F8 (default) • 2F8 • 3E8 • 2E8	Specifies the base I/O address for serial port A, if serial port A is Enabled.
Interrupt (This feature is present only when Serial Port A is set to *Enabled*)	• IRQ 3 • IRQ 4 (default)	Specifies the interrupt for serial port A, if serial port A is Enabled.
Serial Port B	• Disabled • Enabled • Auto (default)	Configures serial port B. Auto assigns the first free COM port, normally COM 2, the address 3F8h, and the interrupt IRQ4. An * (asterisk) displayed next to an address indicates a conflict with another device.
Base I/O address (This feature is displayed only if Serial Port B is set to Enabled)	• 2F8 (default) • 3E8 • 2E8	Specifies the base I/O address for serial port B.
Interrupt (This feature is displayed only if Serial Port B is set to Enabled)	• IRQ 3 (default) • IRQ 4	Specifies the interrupt for serial port B.

continued

Table 21. Peripheral Configuration Submenu (continued)

Feature	Options	Description
Mode	• Normal (default) • IrDA SIR-A • ASK-IR	Specifies the mode for serial port B.
Parallel Port	• Disabled • Enabled • **Auto (default)**	Configures the parallel port. *Auto* assigns LPT1 the address 378h and the interrupt IRQ7. An * (asterisk) displayed next to an address indicates a conflict with another device.
Mode	• Output Only • **Bi-directional (default)** • EPP • ECP	Selects the mode for the parallel port. Not available if the parallel port is disabled. *Output Only* operates in AT-compatible mode. *Bi-directional* operates in PS/2-compatible mode. *EPP* is Extended Parallel Port mode, a high-speed bi-directional mode. *ECP* is Enhanced Capabilities Port mode, a high-speed bi-directional mode.
Base I/O Address (This feature is present only when Parallel Port is set to *Enabled*)	• **378 (default)** • 278	Specifies the base I/O address for the parallel port.
Interrupt (This feature is present only when Parallel Port is set to *Enabled*)	• IRQ 5 • **IRQ 7 (default)**	Specifies the interrupt for the parallel port.
DMA (This feature is present only when Parallel Port Mode is set to ECP)	• 1 • **3 (default)**	Specifies the DMA channel.
Keyboard Error Message	• Disabled • **Enabled (default)**	Enables or disables keyboard error reporting.
LAN#1 Controller	• Disabled • **Enabled (default)**	Enables or disables the on-board LAN#1 device.
LAN#2 Controller	• Disabled • **Enabled (default)**	Enables or disables the on-board LAN#2 device.
ATA RAID Controller	• Disabled • **Enabled (default)**	Enables or disables the on-board ATA RAID controller.
ATI Rage Video	• Disabled • **Enabled (default)**	Enables or disables the on-board ATI* Rage video controller.
Legacy USB Support	• Disabled • **Enabled (default)**	Enables or disables Legacy USB support.

IDE Configuration Submenu

To access this submenu, select Advanced on the menu bar, then IDE Configuration.

Maintenance	Main	**Advanced**	Security	Power	Boot	Exit

PCI Configuration
Boot Configuration
Peripheral Configuration
IDE Configuration
Diskette Configuration
Event Log Configuration

The menu represented in Table 22 is used to configure IDE device options.

Table 22.   IDE Configuration Submenu

Feature	Options	Description
IDE Controller	• Disabled • Primary • Secondary • Both (default)	Specifies the integrated IDE controller. Primary enables only the primary IDE controller. Secondary enables only the secondary IDE controller. Both enables both IDE controllers.
Hard Disk Pre-Delay	• Disabled (default) • 3 Seconds • 6 Seconds • 9 Seconds • 12 Seconds • 15 Seconds • 21 Seconds • 30 Seconds	Specifies the hard disk drive pre-delay.
Primary IDE Master	Select to display sub-menu	Reports type of connected IDE device. When selected, displays the Primary IDE Master submenu.
Primary IDE Slave	Select to display sub-menu	Reports type of connected IDE device. When selected, displays the Primary IDE Slave submenu.
Secondary IDE Master	Select to display sub-menu	Reports type of connected IDE device. When selected, displays the Secondary IDE Master submenu.
Secondary IDE Slave	Select to display sub-menu	Reports type of connected IDE device. When selected, displays the Secondary IDE Slave submenu.

Primary/Secondary IDE Master/Slave Submenus

To access these submenus, select Advanced on the menu bar, then IDE Configuration, and then the master or slave to be configured.

Maintenance	Main	**Advanced**	Security	Power	Boot	Exit

PCI Configuration
Boot Configuration
Peripheral Configuration

IDE Configuration
  Primary IDE Master
  Primary IDE Slave
  Secondary IDE Master
  Secondary IDE Slave

Diskette Configuration
Event Log Configuration

There are four IDE submenus: primary master, primary slave, secondary master, and secondary slave. Table 23 shows the format of the IDE submenus. For brevity, only one example is shown.

Table 23.   Primary/Secondary IDE Master/Slave Submenus

Feature	Options	Description
Drive Installed	No options	Displays the type of drive installed.
Type	- None - User - Auto (default) - CD-ROM - ATAPI Removable - Other ATAPI - IDE Removable	Specifies the IDE configuration mode for IDE devices. *User* allows capabilities to be changed. *Auto* fills-in capabilities from ATA/ATAPI device.
Maximum Capacity	No options	Displays the capacity of the drive.
Multi-Sector Transfers (This feature is present only when Type is not set to *Auto*.)	- Disabled 2 Sectors 4 Sectors 8 Sectors 16 Sectors (default)	Specifies number of sectors per block for transfers from the hard disk drive to memory. Check the hard disk drive's specifications for optimum setting.

continued

Table 23.   Primary/Secondary IDE Master/Slave Submenus (continued)

Feature	Options	Description
PIO Mode (Note) (This feature is present only when Type is not set to *Auto.*)	• Auto (default) • Mode 0 • Mode 1 • Mode 2 • Mode 3 • Mode 4	Specifies the PIO mode.
Ultra DMA (This feature is present only when Type is not set to *Auto.*)	• Disabled (default) • Mode 0 • Mode 1 • Mode 2 • Mode 3 • Mode 4 • Mode 5	Specifies the Ultra DMA mode for the drive.
Cable Detected (Note)	No options	Displays the type of cable connected to the IDE interface: 40-conductor or 80-conductor (for ATA-66/100 devices).

Note: These configuration options appear only if an IDE device is installed.

Diskette Configuration Submenu

To access this menu, select Advanced on the menu bar, then Diskette Configuration.

Maintenance	Main	**Advanced**	Security	Power	Boot	Exit
		PCI Configuration				
		Boot Configuration				
		Peripheral Configuration				
		IDE Configuration				
		Diskette Configuration				
		Event Log Configuration				

The submenu represented by Table 24 is used for configuring the diskette drive.

Table 24.   Diskette Configuration Submenu

Feature	Options	Description
Diskette Controller	• Disabled • Enabled (default)	Disables or enables the integrated diskette controller.
Floppy A	• Not Installed • 360 KB 5¼ inch • 1.2 MB 5¼ inch • 720 KB 3½ inch • 1.44/1.25 MB 3½ inch (default) • 2.88 MB 3½ inch	Specifies the capacity and physical size of diskette drive A.

Table 24. Diskette Configuration Submenu (continued)

Feature	Options	Description
Floppy B	• Not Installed (default) • 360 KB 5¼ inch • 1.2 MB 5¼ inch • 720 KB 3½ inch • 1.44/1.25 MB 3½ inch • 2.88 MB 3½ inch	Specifies the capacity and physical size of diskette drive B.
Diskette Write-Protect	• Disabled (default) • Enabled	Disables or enables write-protect for the diskette drive.

Event Log Configuration Submenu

To access this menu, select Advanced on the menu bar, then Event Log Configuration.

Maintenance	Main	**Advanced**	Security	Power	Boot	Exit

PCI Configuration
Boot Configuration
Peripheral Configuration
IDE Configuration
Diskette Configuration
Event Log Configuration

The submenu represented by Table 25 is used to configure the event logging features.

Table 25. Event Log Configuration Submenu

Feature	Options	Description
Event Log	No options	Indicates if there is space available in the event log.
Event Log Validity	No options	Indicates if the contents of the event log are valid.
View Event Log	[Enter]	Displays the event log.
Clear All Event Logs	• No (default) • Yes	Clears the event log after rebooting.
Event Logging	• Disabled • Enabled (default)	Enables logging of events.
ECC Event Logging	• Disabled • Enabled (default)	Enables logging of ECC events.
Mark Events As Read	• Yes (default) • No	Marks all events as read.

Video Configuration Submenu

To access this menu, select Advanced on the menu bar, then Event Log Configuration.

Maintenance	Main	**Advanced**	Security	Power	Boot	Exit
		PCI Configuration				
		Boot Configuration				
		Peripheral Configuration				
		IDE Configuration				
		Diskette Configuration				
		Event Log Configuration				
		Video Configuration				

The submenu represented by Table 26 is used to configure the video features.

Table 26.   Video Configuration Submenu

Feature	Options	Description
AGP Aperture Size	• 64MB (default) • 256MB	Sets the aperture size for the AGP video controller.
Primary Video Adapter	• AGP (default) • PCI	Allows selecting an AGP or PCI video controller as the display device that will be active when the system boots.

Security Menu

To access this menu, select Security from the menu bar at the top of the screen.

Maintenance	Main	Advanced	**Security**	Power	Boot	Exit

The menu represented by Table 27 is for setting passwords and security features.

Table 27.   Security Menu

If no password entered previously:		
Feature	**Options**	**Description**
Supervisor Password Is	No options	Reports if there is a supervisor password set.
User Password Is	No options	Reports if there is a user password set.
Set Supervisor Password	Password can be up to seven alphanumeric characters.	Specifies the supervisor password.
Set User Password	Password can be up to seven alphanumeric characters.	Specifies the user password.
Clear User Password (Note 1)	• Yes (default) • No	Clears the user password.
User Access Level (Note 2)	• Limited • No Access • View Only • Full (default)	Sets BIOS Setup Utility access rights for user level.
Unattended Start (Note 1, Note 3, and Note 4)	• Enabled • Disabled (default)	Enabled allows system to complete the boot process without a password. The keyboard remains locked until a password is entered. A password is required to boot from a diskette.

Notes:

1.   This feature appears only if a user password has been set.
2.   This feature appears only if both a user password and a supervisor password have been set.
3.   If both Legacy USB Support (in the Peripheral Configuration submenu) and Unattended Start (in the Security menu) are enabled, USB aware operating systems can unlock a PS/2 style keyboard and mouse without requiring the user to enter a password.
4.   When Unattended Start is enabled, a USB aware operating system may override user password protection if used in conjunction with a USB keyboard and mouse without requiring the user to enter a password.

Power Menu

To access this menu, select Power from the menu bar at the top of the screen.

Maintenance	Main	Advanced	Security	**Power**	Boot	Exit
				ACPI		

The menu represented in Table 28 is for setting the power management features.

Table 28.   Power Menu

Feature	Options	Description
ACPI	No Options	When selected, displays the ACPI submenu.
After Power Failure	• Stays Off • Last State (default) • Power On	Specifies the mode of operation if an AC power loss occurs. *Power On* restores power to the server. *Stay Off* keeps the power off until the power button is pressed. *Last State* restores the previous power state before power loss occurred.
Wake on LAN	• Stay Off (default) • Power On	Specifies how the computer responds to a LAN wake up event.
Wake on PME	• Stay Off (default) • Power On	Specifies how the computer responds to a PCI power management event.
Wake on Modem Ring	• Stay Off (default) • Power On	Specifies how the computer responds to an incoming call on an installed modem when the power is off.

ACPI Submenu

To access this menu, select Power on the menu bar, then ACPI.

Maintenance	Main	Advanced	Security	**Power**	Boot	Exit
				ACPI		

The submenu represented in Table 29 is for setting the ACPI features.

Table 29.   ACPI Submenu

Feature	Options	Description
ACPI Suspend State	• S1 State • S3 State (default)	Specifies the ACPI sleep state.
Wake on LAN from S5	• Stay Off (default) • Power On	In ACPI soft-off mode only, determines how the system responds to a LAN wake-up event.

Boot Menu

To access this menu, select Boot from the menu bar at the top of the screen.

Maintenance	Main	Advanced	Security	Power	**Boot**	Exit
					Boot Device Priority	
					Hard Disk Drives	
					Removable Devices	
					ATAPI CD-ROM Drives	

The menu represented in Table 30 is used to set the boot features and the boot sequence.

Table 30.   Boot Menu

Feature	Options	Description
Quiet Boot	• Disabled • Enabled (default)	*Disabled* displays normal POST messages. *Enabled* displays OEM graphic instead of POST messages.
Intel® Rapid BIOS Boot	• Disabled • Enabled (default)	Enables the computer to boot without running certain POST tests.
Scan User Flash Area	• Disabled (default) • Enabled	Enables the BIOS to scan the flash memory for user binary files that are executed at boot time.
USB Boot	• Disabled • Enabled (default)	Enables the computer to boot from USB boot devices.
PXE Remote Boot	• Disabled • Enabled (default)	Enables PXE remote boot.
Boot Device Priority	Select to display submenu	Specifies the boot sequence from the available types of boot devices.
Hard Disk Drives	Select to display submenu	Specifies the boot sequence from the available hard disk drives.
Removable Devices	Select to display submenu	Specifies the boot sequence from the available removable devices.
ATAPI CD-ROM Drives	Select to display submenu	Specifies the boot sequence from the available ATAPI CD-ROM drives.

Boot Device Priority Submenu

To access this menu, select Boot on the menu bar, then Boot Devices Priority.

Maintenance	Main	Advanced	Security	Power	**Boot**	Exit
					Boot Device Priority	
					Hard Disk Drives	
					Removable Devices	
					ATAPI CDROM Drives	

The submenu represented in Table 31 is for setting boot devices priority.

Table 31.   Boot Device Priority Submenu

Feature	Options	Description
1st Boot Device 2nd Boot Device 3rd Boot Device 4th Boot Device (Note 1)	• Removable Dev. • Hard Drive • ATAPI CD-ROM • Intel® UNDI, PXE • Disabled	Specifies the boot sequence from the available types of boot devices. To specify boot sequence: 1. Select the boot device with <↑> or <↓>. 2. Press <Enter> to set the selection as the intended boot device. The default settings for the first through fourth boot devices are, respectively: • Removable Dev. • Hard Drive • ATAPI CD-ROM • Intel UNDI, PXE-2.0

Hard Disk Drives Submenu

To access this menu, select Boot on the menu bar, then Hard Disk Drives.

Maintenance	Main	Advanced	Security	Power	**Boot**	Exit
					Boot Device Priority	
					Hard Disk Drives	
					Removable Devices	
					ATAPI CDROM Drives	

The submenu represented in Table 32 is for setting hard disk drive priority.

Table 32.   Hard Disk Drives Submenu

Feature	Options	Description
1st Hard Disk Drive (Note)	Dependent on installed hard drives	Specifies the boot sequence from the available hard disk drives. To specify boot sequence: 1. Select the boot device with <↑> or <↓>. 2. Press <Enter> to set the selection as the intended boot device.

Note: This boot device submenu appears only if at least one boot device of this type is installed. This list will display up to twelve hard disk drives, the maximum number of hard disk drives supported by the BIOS.

Removable Devices Submenu

To access this menu, select Boot on the menu bar, then Removable Devices.

Maintenance	Main	Advanced	Security	Power	**Boot**	Exit
					Boot Device Priority	
					Hard Disk Drives	
					Removable Devices	
					ATAPI CDROM Drives	

The submenu represented in Table 33 is for setting removable device priority.

Table 33.   Removable Devices Submenu

Feature	Options	Description
1st Removable Device (Note)	Dependent on installed removable devices	Specifies the boot sequence from the available removable devices. To specify boot sequence: 1. Select the boot device with <↑> or <↓>. 2. Press <Enter> to set the selection as the intended boot device.

Note: This boot device submenu appears only if at least one boot device of this type is installed. This list will display up to four removable devices, the maximum number of removable devices supported by the BIOS.

ATAPI CDROM Drives Submenu

To access this menu, select Boot on the menu bar, then ATAPI CDROM Drives.

Maintenance	Main	Advanced	Security	Power	**Boot**	Exit
					Boot Device Priority	
					Hard Disk Drives	
					Removable Devices	
					ATAPI CDROM Drives	

The submenu represented in Table 34 is for setting ATAPI CDROM drive priority.

Table 34. ATAPI CDROM Drives Submenu

Feature	Options	Description
1st ATAPI CDROM Drive (Note)	Dependent on installed ATAPI CDROM drives	Specifies the boot sequence from the available ATAPI CDROM drives. To specify boot sequence: 1. Select the boot device with <↑> or <↓>. 2. Press <Enter> to set the selection as the intended boot device.

Note: This boot device submenu appears only if at least one boot device of this type is installed. This list will display up to four ATAPI CDROM drives, the maximum number of ATAPI CDROM drives supported by the BIOS.

Exit Menu

To access this menu, select Exit from the menu bar at the top of the screen.

Maintenance	Main	Advanced	Security	Power	Boot	**Exit**

The menu represented in Table 35 is for exiting the BIOS Setup program, saving changes, and loading and saving defaults.

Table 35. Exit Menu

Feature	Description
Exit Saving Changes	Exits and saves the changes in CMOS SRAM.
Exit Discarding Changes	Exits without saving any changes made in the BIOS Setup program.
Load Setup Defaults	Loads the factory default values for all the Setup options.
Load Custom Defaults	Loads the custom defaults for Setup options.
Save Custom Defaults	Saves the current values as custom defaults. Normally, the BIOS reads the Setup values from flash memory. If this memory is corrupted, the BIOS reads the custom defaults. If no custom defaults are set, the BIOS reads the factory defaults.
Discard Changes	Discards changes without exiting Setup. The option values present when the server was turned on are used.

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4 Solving BIOS Problems

The board reports POST errors in two ways:

- By sounding a beep code
- By displaying an error message on the monitor

BIOS Beep Codes

The BIOS beep codes are listed in Table 36. The BIOS also issues a beep code (one long tone followed by two short tones) during POST if the video configuration fails, or if an external ROM module does not properly checksum to zero.

Table 36.   Beep Codes

Number of Beeps	Description
1	Refresh failure
2	Parity cannot be reset
3	First 64 Kb memory failure
4	Timer not operational
5	Processor failure (Reserved; not used)
6	8042 GateA20 cannot be toggled (memory failure or not present)
7	Exception interrupt error
8	Display memory R/W error
9	(Reserved; not used)
10	CMOS Shutdown register test error
11	Invalid BIOS (such as, POST module not found)

BIOS Error Messages

When a recoverable error occurs during the POST, the BIOS displays an error message describing the problem (see Table 37).

Table 37.   BIOS Error Messages

Error Message	Explanation
GA20 Error	An error occurred with Gate A20 when switching to protected mode during the memory test.
Pri Master HDD Error Pri Slave HDD Error Sec Master HDD Error Sec Slave HDD Error	Could not read sector from corresponding drive.
Pri Master Drive - ATAPI Incompatible Pri Slave Drive - ATAPI Incompatible Sec Master Drive - ATAPI Incompatible Sec Slave Drive - ATAPI Incompatible	Corresponding drive is not an ATAPI device. Run Setup to make sure device is selected correctly.
A: Drive Error B: Drive Error	No response from diskette drive.
CMOS Battery Low	The battery may be losing power. Replace the battery soon.
CMOS Display Type Wrong	The display type is different than what has been stored in CMOS. Check Setup to make sure type is correct.
CMOS Checksum Bad	The CMOS checksum is incorrect. CMOS memory may have been corrupted. Run Setup to reset values.
CMOS Settings Wrong	CMOS values are not the same as the last boot. These values have either been corrupted or the battery has failed.
CMOS Date/Time Not Set	The time and/or date values stored in CMOS are invalid. Run Setup to set correct values.
DMA Error	Error during read/write test of DMA controller.
FDC Failure	Error occurred trying to access diskette drive controller.
HDC Failure	Error occurred trying to access hard disk controller.
Checking NVRAM.....	NVRAM is being checked to see if it is valid.
Update OK!	NVRAM was invalid and has been updated.
Updated Failed	NVRAM was invalid but was unable to be updated.
Keyboard Error	Error in the keyboard connection. Make sure keyboard is connected properly.
KB/Interface Error	Keyboard interface test failed.

Table 37.   BIOS Error Messages (continued)

Error Message	Explanation
Memory Size Decreased	Memory size has decreased since the last boot. If no memory was removed, then memory may be bad.
Memory Size Increased	Memory size has increased since the last boot. If no memory was added, there may be a problem with the system.
Memory Size Changed	Memory size has changed since the last boot. If no memory was added or removed, then memory may be bad.
No Boot Device Available	System did not find a device to boot.
Off Board Parity Error	A parity error occurred on an off-board card. This error is followed by an address.
On Board Parity Error	A parity error occurred in onboard memory. This error is followed by an address.
Parity Error	A parity error occurred in onboard memory at an unknown address.
NVRAM / CMOS / PASSWORD cleared by Jumper	NVRAM, CMOS, and passwords have been cleared. The system should be powered down and the jumper removed.
<CTRL_N> Pressed	CMOS is ignored and NVRAM is cleared. User must enter Setup.

5 Getting Help

World Wide Web

http://support.intel.com/support/motherboards/server/S845WD1-E

Telephone

Talk to a Customer Support Technician.* All calls are billed US $25.00 per incident, levied in local currency at the applicable credit card exchange rate plus applicable taxes. (Intel reserves the right to change the pricing for telephone support at any time without notice).

In U.S. and Canada		1-800-404-2284	
In Europe			
UK	0870 6072439	Finland	9 693 79297
France	01 41 918529	Denmark	38 487077
Germany	069 9509 6099	Norway	23 1620 50
Italy	02 696 33276	Sweden	08 445 1251
Spain	91 377 8166	Holland	020 487 4562
In Asia-Pacific region			
Australia	1800 649931	Indonesian	001-803 65 7249
Hong Kong	852 2 844 4456	Malaysia	1-800 80 1390
Korea	822 767 2595	New Zealand	0800 444 365
PRC	800 820 1100	Pakistan	632 6368415 (IDD via Philippines)
Singapore	65 213-1311	Philippines	1-800 1 651 0117
Taiwan	2 2545-1640	Thailand	1-800 6310003
India	0006517-830 3634	Vietnam	632 6368416 (IDD via Philippines)
In Japan			
0120-868686 (Domestic)		81-298-47-0800 (outside country)	
In Latin America			
Brazil	0021-0811-408-5540	Ecuador	999-119, 800-628-8686 (via AT&T)
Mexico	001-800-628-8686	Guatemala	99-99-190, 800-628-8686 (via AT&T)
Colombia	980-9-122-118	Venezuela	800-11-120, 800-628-8686 (via AT&T)
Costa Rica	0-800-011-0395	Argentina	001-800-222-1001, 800-628-8686 (via AT&T)
Panama	001-800-628-8686	Paraguay	008-11, 800-628-8686 (via AT&T)
Chile	800-532-992	Peru	0-800-50000, 800-628-8686 (via AT&T)
Miami	1-800-621-8423	Uruguay	000-410, 800-628-8686 (via AT&T)

* Or contact your local dealer or distributor.

 For an updated support contact list, please see *http://www.intel.com/support/9089.htm*.

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6 Technical Reference

Server Board Connectors

⚠ **CAUTION**

Many of the baseboard and front panel connectors provide operating voltage (+5 V DC and +12 V DC, for example) to devices inside the server chassis, such as fans and internal peripherals. These connectors are not overcurrent protected. Do not use these connectors for powering devices external to the server chassis. A fault in the load presented by the external devices could cause damage to the server, the interconnecting cable, and the external devices themselves.

⇒ **NOTE**

A standard ATX 20 pin power connector and standard ATX 12V 4 pin 2x2 connector can be used to power the S845WD1H board. Plug the power cables into the pin 1 end of their respective motherboard connectors, leaving pins 21-24 unused on the main power connector and 5-8 unused on the 12V connector.

Baseboard Connectors

Power and Hardware Control Connectors

Figure 15 shows the power and hardware connectors.

TP00008
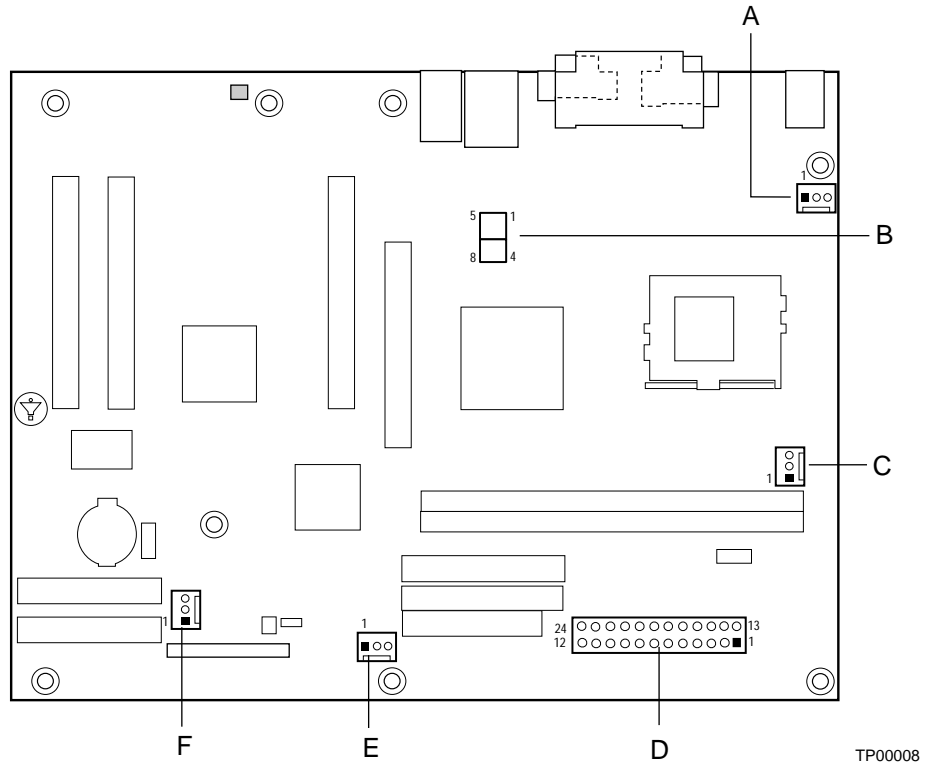
A. Chassis fan
B. Aux power
C. Processor fan
D. Power
E. Chassis fan
F. Chassis fan

Figure 15. Power and Hardware Control Connectors

Add-In Board and Peripheral Interface Connectors

Figure 16 shows the add-in board and peripheral interface connectors.
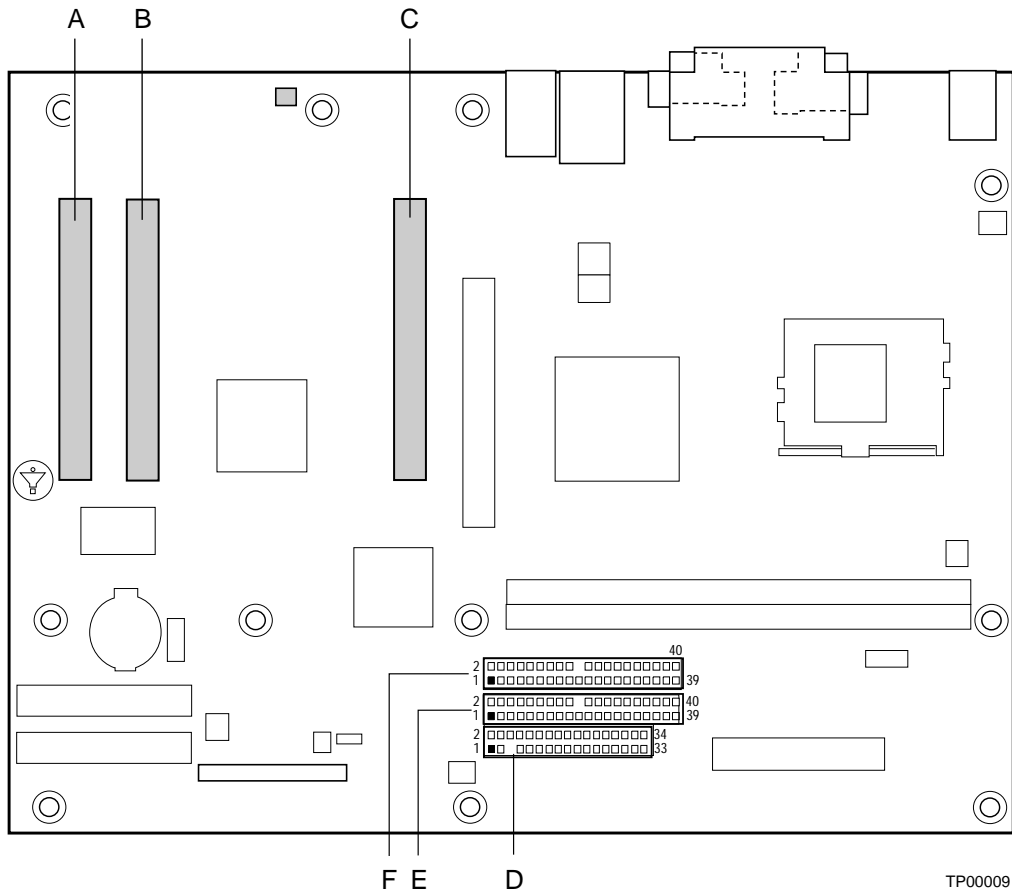
A. PCI slot 3
B. PCI slot 2
C. PCI slot 1
D. Diskette drive
E. Primary IDE
F. Secondary IDE

Figure 16. Add-in Board and Peripheral Interface Connectors

Server Board Resources

Memory Map

Table 38.   System Memory Map

| Address Range (decimal)	Address Range (hex)	Size	Description
1024 K - 2097152 K	100000 - 7FFFFFFF	2047 MB	Extended memory
960 K - 1024 K	F0000 - FFFFF	64 KB	Runtime BIOS
896 K - 960 K	E0000 - EFFFF	64 KB	Reserved
800 K - 896 K	C8000 - DFFFF	96 KB	Available high DOS memory (open to the PCI bus)
640 K - 800 K	A0000 - C7FFF	160 KB	Video memory and BIOS
639 K - 640 K	9FC00 - 9FFFF	1 KB	Extended BIOS data (movable by memory manager software)
512 K - 639 K	80000 - 9FBFF	127 KB	Extended conventional memory
0 K - 512 K	00000 - 7FFFF	512 KB	Conventional memory

DMA Channels

Table 39.   DMA Channels

DMA Channel Number	Data Width	System Resource
0	8 or 16 bits	Open
1	8 or 16 bits	Parallel port
2	8 or 16 bits	FDD0 and 1
3	8 or 16 bits	Open
4	8 or 16 bits	Parallel port (for ECP or EPP) & COM2
5	16 bits	Open
6	16 bits	Open
7	16 bits	Open

I/O Map

Table 40.   I/O Map

Address (hex)	Size	Description
0000 - 000F	16 bytes	DMA controller
0020 - 0021	2 bytes	Programmable Interrupt Control (PIC)
0040 - 0043	4 bytes	System timer
0060	1 byte	Keyboard controller byte—reset IRQ
0061	1 byte	System speaker
0064	1 byte	Keyboard controller, CMD/STAT byte
0070 - 0071	2 bytes	System CMOS/Real Time Clock
0072 - 0073	2 bytes	System CMOS
0080 - 008F	16 bytes	DMA controller
0092	1 byte	Fast A20 and PIC
00A0 - 00A1	2 bytes	PIC
00B2 - 00B3	2 bytes	APM control
00C0 - 00DF	32 bytes	DMA
00F0	1 byte	Numeric data processor
0170 - 0177	8 bytes	Secondary IDE channel
01F0 - 01F7	8 bytes	Primary IDE channel
0228 - 022F (Note 1)	8 bytes	LPT3
0278 - 027F (Note 1)	8 bytes	LPT2
02E8 - 02EF (Note 1)	8 bytes	COM4/video (8514A)
02F8 - 02FF (Note 1)	8 bytes	COM2
0376	1 byte	Secondary IDE channel command port
0377, bits 6:0	7 bits	Secondary IDE channel status port
0378 - 037F	8 bytes	LPT1
03B0 - 03BB	12 bytes	Intel 82845 MCH
03C0 - 03DF	32 bytes	Intel 82845 MCH
03E8 - 03EF	8 bytes	COM3
03F0 - 03F5	6 bytes	Diskette channel 1
0370 - 0375	6 bytes	Diskette channel 2
03F6	1 byte	Primary IDE channel command port
03F8 - 03FF	8 bytes	COM1
04D0 - 04D1	2 bytes	Edge/level triggered PIC
LPTn + 400	8 bytes	ECP port, LPTn base address + 400h
0CF8 - 0CFB (Note 2)	4 bytes	PCI configuration address register
0CF9 (Note 3)	1 byte	Turbo and reset control register
0CFC - 0CFF	4 bytes	PCI configuration data register
FFA0 - FFA7	8 bytes	Primary bus master IDE registers

Table 40.   I/O Map (continued)

Address (hex)	Description
8 bytes on an 8-byte boundary	Unknown
96 contiguous bytes starting on a 128-byte divisible boundary	ICH2 (ACPI + TCO)
64 contiguous bytes starting on a 64-byte divisible boundary	*S845WD1H* server board resource
32 contiguous bytes starting on a 32-byte divisible boundary (Note 3)	ICH2 (USB controller 1)
16 contiguous bytes starting on a 16-byte divisible boundary	ICH2 (SMBus)
4096 contiguous bytes starting on a 4096-byte divisible boundary	Intel 82801BA PCI bridge
96 contiguous bytes starting on a 128-byte divisible boundary	LPC47M102

Notes:

1.   Default, but can be changed to another address range

2.   Dword access only

3.   Byte access only

Interrupts

The interrupts can be routed through the Advanced Programmable Interrupt Controller (APIC) portion of the ICH2 component. The APIC is supported in Windows[†] 2000 Server and Windows XP and supports a total of twenty-four interrupts.

Table 41.   Interrupts

IRQ	System Resource
NMI	I/O channel check
0	Reserved, interval timer
1	Reserved, keyboard buffer full
2	Reserved, cascade interrupt from slave PIC
3	COM2 (Note 1)
4	COM1 (Note 1)
5	MPU-401
6	FDD0
7	LPT1 (Note 1)
	FDD1
8	Real-time clock
9	Reserved for ICH2 system management bus
10	User available
11	User available

Table 41.   Interrupts (continued)

IRQ	System Resource
12	Onboard mouse port (if present, else user available)
13	Reserved, math coprocessor
14	Primary IDE (if present, else user available)
15	Secondary IDE (if present, else user available)
16 (Note 2)	AGP video (through PIRQA)
17 (Note 2)	AC '97 audio/User available (through PIRQB)
18 (Note 2)	(optional) (through PIRQC)
19 (Note 2)	ICH2 USB controller 1 (through PIRQD)
20 (Note 2)	On-board ATI Rage XL PCI
21 (Note 2)	(optional)/User available (through PIRQF)
22 (Note 2)	(optional)/User available (through PIRQG)
23 (Note 2)	ICH2 USB controller 2/User available (through PIRQH)

Notes:

1.   Default, but can be changed to another IRQ.

2.   Available in APIC mode only.

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7 Regulatory and Integration Information

Product Regulatory Compliance

Product Safety Compliance

The S845WD1H complies with the following safety requirements:

- UL 1950 - CSA 950 (US/Canada)
- EN 60 950 (European Union)
- IEC60 950 (International)
- CE – Low Voltage Directive (73/23/EEC) (European Union)
- EMKO-TSE (74-SEC) 207/94 (Nordics)
- GOST R 50377-92 (Russia)

Product EMC Compliance

The S845WD1H has been has been tested and verified to comply with the following electromagnetic compatibility (EMC) regulations when installed a compatible Intel® host system. For information on compatible host system(s) refer to Intel's Server Builder website or contact your local Intel representative.

- FCC (Class A Verification) – Radiated & Conducted Emissions (USA)
- ICES-003 (Class A) – Radiated & Conducted Emissions (Canada)
- CISPR 22, 3rd Edition (Class A) – Radiated & Conducted Emissions (International)
- EN55022 (Class A) – Radiated & Conducted Emissions (European Union)
- EN55024 (Immunity) (European Union)
- CE – EMC Directive (89/336/EEC) (European Union)
- VCCI (Class A) – Radiated & Conducted Emissions (Japan)
- AS/NZS 3548 (Class A) – Radiated & Conducted Emissions (Australia / New Zealand)
- RRL (Class A) Radiated & Conducted Emissions (Korea)
- BSMI CNS13438 (Class A) Radiated & Conducted Emissions (Taiwan)
- GOST R 29216-91 (Class A) Radiated & Conducted Emissions (Russia)
- GOST R 50628-95 (Immunity) (Russia)

Product Regulatory Compliance Markings

This product is marked with the following Product Certification Markings:

Table 42.   Product Certification Markings

UL Recognition Mark	
CE Mark	
Russian GOST Mark	**ME06**
Australian C-Tick Mark	**N232**
BSMI DOC Marking	D33025
BSMI EMC Warning	警告使用者： 這是甲類的資訊產品，在居住的環境中使用時， 可能會造成射頻干擾，在這種情況下，使用者會 被要求採取某些適當的對策
RRL MIC Mark	

Electromagnetic Compatibility Notices

FCC (USA)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For questions related to the EMC performance of this product, contact:

Intel Corporation
5200 N.E. Elam Young Parkway
Hillsboro, OR 97124
1-800-628-8686

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

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

Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.   The customer is responsible for ensuring compliance of the modified product.

Only peripherals (computer input/output devices, terminals, printers, etc.) that comply with FCC Class A or B limits may be attached to this computer product. Operation with noncompliant peripherals is likely to result in interference to radio and TV reception.

All cables used to connect to peripherals must be shielded and grounded. Operation with cables, connected to peripherals, that are not shielded and grounded may result in interference to radio and TV reception.

INDUSTRY CANADA (ICES-003)

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the interference-causing equipment standard entitled: "Digital Apparatus," ICES-003 of the Canadian Department of Communications.

Cet appareil numérique respecte les limites bruits radioélectriques applicables aux appareils numériques de Classe A prescrites dans la norme sur le matériel brouilleur: "Apparelis Numériques", NMB-003 édictee par le Ministre Canadian des Communications.

Europe (CE Declaration of Conformity)

This product has been tested in accordance to, and complies with the Low Voltage Directive (73/23/EEC) and EMC Directive (89/336/EEC). The product has been marked with the CE Mark to illustrate its compliance.

Taiwan Declaration of Conformity

This product has been tested and complies with CNS13438. The product has been marked with the BSMI DOC mark to illustrate compliance.

Korean RRL Compliance

This product has been tested and complies with MIC Notices No. 1997-41 and 1997-42. The product has been marked with the MIC logo to illustrate compliance.

1. 기기의 명칭(모델명) :
2. 인증번호 :
3. 인증받은 자의 상호 :
4. 제조년월일:
5. 제조자/제조국가 :

The English translation for the above is as follows:
1. Type of Equipment (Model Name): S845WD1-E
2. Certification No.: Contact Intel Representative
3. Name of Certification Recipient: Intel
4. Date of Manufacturer: Marked on Product
5. Manufacturer / Nation : Intel

Australia / New Zealand

This product has been tested and complies with AS/NZS 3548. The product has been marked with the C-Tick mark to illustrate compliance.

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.

Installation Requirements

⚠ **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 chassis and associated modules. If the instructions for the chassis 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 chassis and module suppliers, you increase safety risk and the possibility of noncompliance with regional laws and regulations.

Prevent Power Supply Overload

Do not overload the power supply output. To avoid overloading the power supply, make sure that the calculated total current loads of all the modules within the computer is less than the output current rating of each of the power supplies output circuits.

Place Battery Marking

There is insufficient space on this server board to provide instructions for replacing and disposing of the battery. For system safety certification, the following statement or equivalent statement may be required to be placed permanently and legibly on the chassis near the battery.

⚠ **CAUTIONS**

> Risk 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 server board was evaluated as Information Technology Equipment (I.T.E.) for use in computers that will be installed in offices, homes, schools, computer rooms, and similar locations. The suitability of this product for other applications or environments, (such as medical, industrial, alarm systems, test equipment, etc.) may require further evaluation.