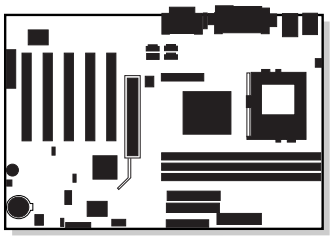
Intel® Desktop Board D815EEA Product Guide



Order Number: A16049-002

Revision History

Revision	Revision History	Date
-001	First Release	May 2000
-002	Second Release	June 2000

If an FCC declaration of conformity marking is present on the board, the following statement applies:

FCC Declaration of Conformity

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 B 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.

Canadian Department of Communications Compliance Statement:

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numerique német pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe B prescrites dans le Réglement sur le broullage radioélectrique édicté par le ministére des Communications du Canada.

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1 Desktop Board Features

Table 1 describes the board's major features.

Table 1. Feature Summary

Characteristic	Specification
Form Factor	ATX (12.0 inches by 8.2 inches)
Processors	• Intel® Pentium® III processor family with FC-PGA (Flip Chip Pin Grid Array) package supporting 100 MHz and 133 MHz system bus frequency • Intel® Celeron™ processor family with PPGA (Plastic Pin Grid Array) and FC-PGA package supporting 66 MHz system bus frequency
Memory	Three 168-pin Dual Inline Memory Module (DIMM) sockets supporting: • 100 MHz PC100 SDRAM (all system bus frequencies) • 133 MHz PC133 SDRAM (only with 133 MHz system bus frequency processors)
Chipset	Intel® 815E Chipset, consisting of: • Intel® FW82815E Graphics Memory Controller Hub (GMCH) • Intel® FW82801BA I/O Controller Hub (ICH2) • Intel® FW82802AB 4 Mbit Firmware Hub (FWH)
I/O Control	SMSC LPC47M102 LPC bus I/O controller
Video	AGP universal connector supporting: • 1x, 2x, or 4x AGP (AGP 2.0 Compliant) or, • GPA (Graphics Performance Accelerator) cards for integrated graphics local memory • Digital Video Output (DVO) connector (optional) • Rear panel VGA connector
Power Management	Support for both ACPI 1.0 and APM 1.2
PC Design Compliance	PC 99 and PC 99A
Peripheral Interfaces	• Two serial ports: one back panel, and one internal connector • Four USB ports: two back panel, and optionally, two front panel • One parallel port • Two IDE interfaces with Ultra ATA/66, and ATA/100 support • One diskette drive interface
Expansion Capabilities	Six add-in card expansion slots: • Five PCI bus add-in card slots (SMBus routed to PCI slot 2) • One AGP universal slot supporting 1x, 2x, and 4x AGP cards
BIOS	• Intel/AMI BIOS • Intel® 82802AB 4 Mbit Firmware Hub (FWH) • Support for Advanced Power Management (APM), Advanced Configuration and Power Interface (ACPI), Plug and Play, and SMBIOS
Wake on LAN† Technology	Support for system wake up using an add-in network interface card with remote wake up capability

Manufacturing Options

Table 2 describes the board's manufacturing options.

Table 2. Manufacturing Options

Characteristic	Specification
Audio	Two separate Audio Codec '97 (AC '97) compatible audio subsystem options are available: • A basic audio subsystem that includes the ICH2 component and an Analog Devices AD1885 analog codec, or • An enhanced audio subsystem that includes a Creative Labs ES1373 AC '97 digital controller and a Crystal Semiconductor CS4297 stereo audio codec.
Instantly Available Technology	• ACPI S3 Suspend to RAM (STR) sleep state • Support for *PCI Local Bus Specification* Revision 2.2 • Wake on PS/2† keyboard and USB ports
Diagnostic LEDs	Consists of four back-panel mounted LEDs
SCSI LED Connector	Allows add-in SCSI controllers to use the same LED as the onboard I/O controller
Digital Visual Interface (DVI)	Interface for optional card to support Flat Panel, Digital CRT, or TV out
Integrated LAN	Intel® 82562ET supports one rear panel LAN connector with LEDs
Hardware Monitor	Heceta 4 which supports the following: • Remote diode temperature sense • Voltage sense to detect out of range values
CNR	Communication and Networking Riser (CNR) slot. If used, mechanically precludes the use of PCI slot 5.

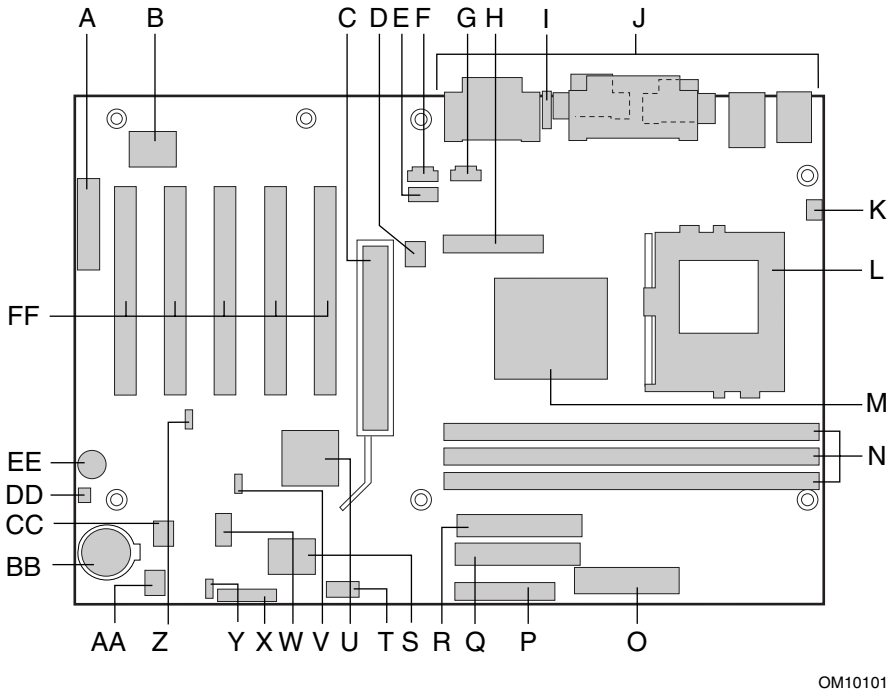
NOTE

For information about Intel® desktop boards, including technical product specifications, BIOS upgrades, and device drivers, go to the Intel World Wide Web site at:

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

Components

Figure 1 shows the major components on the desktop board.



A	CNR connector (optional)	P	Diskette drive connector
B	Creative Labs ES1373 digital controller (optional)	Q	Primary IDE connector
		R	Secondary IDE connector
C	AGP Universal connector	S	SMSC LPC47M102 I/O controller
D	Chassis fan connector (Fan 2)	T	Serial port B connector (COM 2)
E	Legacy CD-ROM connector	U	Intel® 82801BA I/O Controller Hub (ICH2)
F	ATAPI-style CD-ROM connector	V	BIOS configuration jumper block
G	Auxiliary line in connector	W	Front panel USB connector
H	Digital Video Output (DVO) connector	X	Front panel switch/LED connector
I	Diagnostic LEDs	Y	Alternate front panel power LED connector
J	Back panel connectors	Z	Wake on LAN technology connector
K	Processor fan connector (Fan 3)	AA	Chassis fan connector (Fan 1)
L	370-pin processor socket	BB	Battery
M	Intel® 82815E Graphics Memory Controller Hub (GMCH)	CC	Intel 82802AB Firmware Hub (FWH)
		DD	SCSI hard drive activity LED connector
N	DIMM sockets (3)	EE	Speaker
O	Main power connector	FF	PCI slots

Figure 1. Desktop Board Components

NOTE

Components labeled optional do not come on all D815EEA boards.

Processors

The board supports a single Intel Pentium III processor, or Intel Celeron processor above 500 MHz. Processors are not included with the desktop board and must be purchased separately.

The processor connects to the desktop board through a PGA370 socket. The desktop board supports the processors listed in Table 3.

Table 3. Supported Processors

Processor Type	Socket Type	Processor Designation (MHz)	System Bus Frequency (MHz)	L2 Cache Size (KB)
Pentium III processor	FC-PGA	866, 800EB, 733, 667, 600EB, and 533EB	133	256
		850, 800, 750, 700, 650, 600E, 550E, and 500E	100	256
Celeron processor	FC-PGA	700, 667, 633, 600, 566, 533A, and 500A	66	128
Celeron processor	PPGA	533 and 500	66	128

For the latest information on processor support for the board, refer to the Intel desktop board web site at:

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

For instructions on installing or upgrading the processor, see Chapter 2.

Main Memory

The board supports 168-pin SDRAM DIMMs as defined below:

- 168-pin SDRAM Dual Inline Memory Modules (DIMMs) with gold-plated contacts
- Three DIMM slots are provided for flexible memory configurations
- 133 MHz SDRAM up to two double-sided DIMMs, or one double-sided DIMM and two single-sided DIMMs
- 100 MHz SDRAM up to three double-sided DIMMs
- Minimum system memory: 32 MB
- Maximum system memory: 512 MB

NOTE

The BIOS cannot determine DIMM size or type when not initialized. If more than 512 MB system memory is installed, the BIOS displays a message at boot indicating some memory above 512 MB has not been initialized. The message indicates additional information is available in Setup. The first time BIOS detects this condition, a pause follows the message with the option to enter Setup or to <ESC> and continue to boot. The message continues to be displayed at boot time as long as the condition exists, however, the BIOS will not pause on subsequent detection. Setup displays the installed memory configuration and shows memory above 512 MB as "not initialized."

- Unbuffered single or double-sided DIMMs
- Serial Presence Detect (SPD) memory
- Non-ECC and ECC DIMMs (ECC DIMMs will operate in non-ECC mode only)
- 3.3 V memory (only)
- Suspend to RAM support
- Basic Non-SPD support
- Mixed speed DIMM configuration will default to the slowest speed DIMM installed.

The board supports the processor and memory module combinations shown in Table 4.

Table 4. Processor and Memory Module Combinations

Processor Type (System Bus Frequency)	PC100 Memory Modules…	PC133 Memory Modules…
Intel Celeron processor (66 MHz)	…will operate at 100 MHz	…will operate at 100 MHz
Intel Pentium III processor (100 MHz)	…will operate at 100 MHz	…will operate at 100 MHz
Intel Pentium III processor (133 MHz)	…will operate at 100 MHz	…will operate at 133 MHz

ECC Memory

The board supports both ECC and non-ECC DIMMs (ECC DIMMs will operate in non-ECC mode only).

NOTE

100 MHz system bus frequency processors will support 133 MHz memory, however, the memory will operate at 100 MHz.

Intel® 815E Chipset

The Intel 815E chipset consists of the following devices:

- Intel 82815E Graphics Memory Controller Hub (GMCH)
- Intel 82801BA I/O Controller Hub (ICH2)
- Intel 82802AB Firmware Hub (FWH)

Intel® 82815E Graphics Memory Controller Hub (GMCH)

The Intel 82815E GMCH has these features:

- Support for processors above 500 MHz including: Intel Pentium III processor (FC-PGA, 100 MHz and 133 MHz system bus frequency) and Intel Celeron processor (PPGA and FC-PGA, 66 MHz system bus frequency)
- Integrated synchronous DRAM memory controller
  - Supports 100 MHz/133 MHz unbuffered SDRAM DIMMs
  - 512 MB maximum system memory
- Supports a single AGP device or GPA card
  - 4 MB of 133 MHz SDRAM display Cache on GPA card
  - Accelerated Graphics Port (AGP) 2.0 compliant interface
  - Support for 1x/2x/4x data transfers
- Digital Video Output (DVO) connector supports optional card for flat panel, digital CRT, or TV out
- ACPI Rev 1.0 and APM Rev 1.2 compliant power management
- Auto-detection of SDRAM memory

Intel® 82801BA I/O Controller Hub (ICH2)

The Intel 82801BA ICH2 has these features:

- Five 33 MHz Peripheral Component Interface (PCI) Local Bus slots supporting:
  - Four PCI plus one PCI/CNR shared slot
  - Supports 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
- Support for CNR
- Support for USB
- Power management logic (ACPI rev 1.0b compliant)
- Support for the System Management Bus (routed to PCI slot 2 only)
- Real-Time Clock (with 256-byte battery backed CMOS RAM)
- AC ’97 digital link for audio and telephony CODECs:
  - AC’97 2.1 compliant
  - Logic for Audio In, Audio Out, Mic Input, Modem In, and Modem Out
  - Separate PCI functions for audio and modem
- Supports two Master/DMA devices

Intel® 82802AB 4 Mbit Firmware Hub (FWH)

The Intel 82802AB FWH has these features:

- System BIOS
- System security and management logic
- Random Number Generator (RNG) for use in security applications

Input/Output (I/O) Controller

The SMSC LPC47M102 I/O controller features the following:

- Two serial ports
- One parallel port with Extended Capabilities Port (ECP) and Enhanced Parallel Port (EPP) support
- Mouse and keyboard controller
- Diskette drive controller
- MIDI/Game port
- Fan control

Real-Time Clock

The desktop board has a time-of-day clock and 100-year calendar. A battery on the desktop board keeps the clock current when the computer is turned off.

NOTE

The recommended method of accessing the date in systems with Intel desktop boards is indirectly from the Real-Time Clock (RTC) via the BIOS. The BIOS on Intel desktop boards contains a century checking and maintenance feature that checks the least two significant digits of the year stored in the RTC during each BIOS request (INT 1Ah). This reads the date and, if less than 80 (i.e., 1980 is the first year supported by the PC), updates the century byte to 20. This feature enables operating systems and applications using the BIOS date/time services to reliably manipulate the year as a four-digit value.

USB Support

The desktop board has two rear panel USB ports. Front panel USB support is available as an option to provide an additional two USB ports. You can connect two USB peripheral devices directly to the computer without an external hub. To attach more than two devices, connect an external hub to either of the built-in ports. The desktop board supports the universal host controller interface (UHCI) and takes advantage of standard software drivers written to be compatible with UHCI.

NOTE

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

PCI Enhanced IDE Interface

The PCI enhanced IDE interface handles the exchange of information between the processor and peripheral devices like hard disks, CD-ROM drives, and Iomega ZIP† drives inside the computer. The interface supports:

- Up to four IDE devices (such as hard drives)
- ATAPI devices (such as CD-ROM drives)
- PIO Mode 3 and PIO Mode 4 devices
- Ultra ATA/33, Ultra ATA/66, and Ultra ATA/100 protocols
- Support for laser servo (LS-120) drives

Expansion Slots

The desktop board has seven add-in board connectors: five PCI expansion slots, one AGP universal connector, and one CNR connector. The seven connectors support only six expansion cards because the CNR slot and PCI slot 5 are shared and cannot be used simultaneously.

Accelerated Graphics Port (AGP)

The AGP is a high-performance interface for graphics-intensive applications such as 3D graphics. AGP is independent of the PCI bus and is intended for use with graphical display devices. The AGP universal connector supports AGP 1X, 2X, and 4X. The AGP universal connector also supports GPA and DVI add-in cards.

An AGP card retention mechanism (RM) is included with the boxed desktop board. Installation instructions are presented in Chapter 2.

Audio Subsystem (Optional)

The board offers two AC ’97 V 1.03 compliant audio subsystems. Both audio subsystems include these features:

- Split digital/analog architecture for improved S/N (signal-to-noise) ratio: ≥ 85dB
- Power management support for APM 1.2 and ACPI 1.0 (driver dependent)
- 3-D stereo enhancement

Basic Audio Subsystem (Optional)

The basic audio subsystem consists of the following:

- Intel 82801BA I/O Controller Hub (ICH2)
- Analog Devices AD1885 analog codec

Enhanced PCI Audio Subsystem (Optional)

The board offers an optional subsystem of audio features supported by the following:

- Creative Labs ES1373 digital controller
- Crystal Semiconductor CS4297 (A) codec

✏ NOTE

The line out connector is designed to power headphones or amplified speakers only. Poor audio quality may occur if passive (non-amplified) speakers are connected to this output.

Audio drivers and utilities are available from Intel's World Wide Web site:

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

BIOS

The BIOS provides the Power-On Self-Test (POST), the BIOS Setup program, the PCI and IDE auto-configuration utilities, and the video BIOS. The BIOS is stored in the Intel 82802AB Firmware Hub.

The BIOS can be upgraded by following the instructions in Chapter 3.

PCI Auto Configuration

If you install a PCI add-in board in your computer, the PCI auto-configuration utility in the BIOS automatically detects and configures the resources (IRQs, DMA channels, and I/O space) for that add-in board. You do not need to run the BIOS Setup program after you install a PCI add-in board.

IDE Auto Configuration

If you install an IDE device (such as, a hard drive) in your computer, the IDE auto-configuration utility in the BIOS automatically detects and configures the device for your computer. You do not need to run the BIOS Setup program after installing an IDE device.

Security Passwords

The BIOS includes security features that restrict whether the BIOS Setup program can be accessed and who can boot the computer. A supervisor password and a user password can be set for the Setup and for booting the computer, 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 computer. The password prompt is displayed before the computer is booted. If only the supervisor password is set, the computer boots without asking for a password. If both passwords are set, you can enter either password to boot the computer.

Diagnostic LEDs

Four dual-colored diagnostic LEDs are located on the back panel. The LEDs report POST failures. See page 74 for information about the LEDs.

Speaker

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

LAN Subsystem

The Intel 82562ET (in conjunction with the Intel 82801BA ICH2) provides a Fast Ethernet Wired for Management (WfM) PCI LAN subsystem providing both 10Base-T and 100Base-TX connectivity. Features include:

- 32-bit, 33-MHz direct bus mastering on the PCI bus
- Shared memory structure in the host memory that copies data directly to/from host memory
- 10Base-T and 100Base-TX capability using a single RJ-45 connector with connection and activity status LEDs
- IEEE 802.3u Auto-Negotiation for the fastest available connection
- Jumperless configuration; the LAN subsystem is completely software configurable

Intel® 82562ET Platform LAN Connect Device (Optional)

The Intel 82562ET LAN component provides an interface to the back panel RJ-45 connector with integrated LEDs. The physical interface may alternatively be provided through the CNR connector.

The Intel 82562ET provides the following functions:

- Basic 10/100 Ethernet LAN connectivity
- Supports RJ-45 connector with status indicator LEDs
- Full driver compatibility
- Advanced Power Management (APM) support
- Programmable transit threshold
- Configurable EEPROM that contains the MAC address

LAN Subsystem Software

For Intel 82562ET Fast Ethernet WfM PCI LAN software and drivers, refer to the D815EEA link on Intel's World Wide Web site at:

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

RJ-45 LAN Connector LEDs

Two LEDs are built into the RJ-45 LAN connector. Table 5 describes the LED states when the board is powered up and the LAN subsystem is operating.

Table 5. RJ-45 LAN Connector LEDs

LED Color	LED State	Indicates
Green	Off	10 Mbit/sec speed is selected.
	On	100 Mbit/sec speed is selected.
Yellow	Off	LAN link is not established.
	On (steady state)	LAN link is established.
	On (brighter and pulsing)	The computer is communicating with another computer on the LAN.

Battery

A battery on the desktop board keeps the values in CMOS RAM and the clock current when the computer is turned off. See Chapter 2 for instructions on how to replace the battery.

Power Management Features

Power management is implemented at several levels, including:

- Software support:
  - Advanced Power Management (APM)
  - Advanced Configuration and Power Interface (ACPI)
- Hardware support:
  - Wake on LAN technology
  - Instantly Available technology
  - Wake on Ring
  - Resume on Ring

If the board is used with an ACPI-aware operating system, the BIOS can provide ACPI support. Otherwise, it defaults to APM support.

The BIOS supports ACPI provided the operating system is ACPI-aware. Otherwise, the BIOS defaults to APM.

Wake on LAN Technology

The Wake on LAN technology connector can be used with PCI bus network adapters that have a remote wake-up connector. 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). See Figure 22 on page 67 for the location of the Wake on LAN technology connector on the desktop board.

⚠ 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.

Instantly Available Technology

Instantly Available technology enables the board to enter the ACPI S3 (Suspend-to-RAM) sleep state. While in the S3 sleep state, the computer will appear to be off. When signaled by a wake-up device or event, the system quickly returns to its last known awake state.

The desktop board standby power indicator, shown in Figure 2 on page 18, is lit when the memory modules and PCI bus connectors have power, even when the computer appears to be off.

If the system has a dual-colored power LED on the front panel, the sleep state is indicated by the LED turning amber. For more information about front panel LED states, see the *Intel® Desktop Board D815EEA Technical Product Specification.*

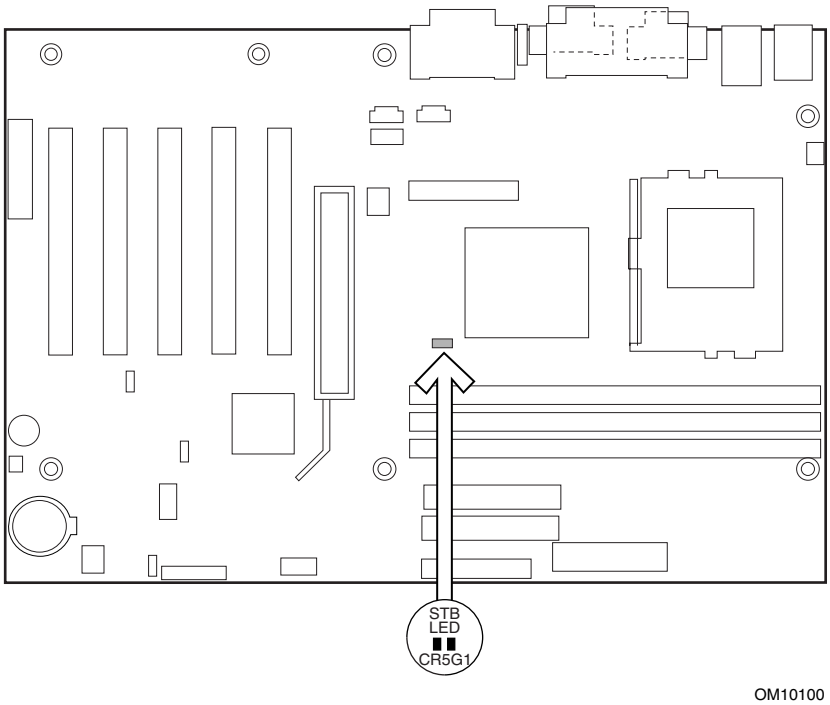


Figure 2. Location of Standby Power Indicator

⚠ CAUTION

If the standby current necessary to support multiple wake events from the PCI and/or USB buses exceeds power supply capacity, the desktop board may lose register settings stored in memory, etc. Calculate the standby current requirements using the steps described below.

Power supplies used with this desktop board must be able to provide enough standby current to support the standard Instantly Available (ACPI S3 sleep state) configuration as outlined in Table 6. Some values are set per specifications such as PCI 2.2. The values given in the table for Instantly Available are for a system containing a single wake-enabled PCI (or AGP) device and five non-wake devices. Actual measurements may vary.

Estimating Standby Current

⚠ CAUTION

Power supplies used with the board must provide enough standby current to support the Instantly Available (ACPI S3 sleep state) configuration. If the standby current necessary to support multiple wake events from the PCI and/or USB buses exceeds power supply capacity, the board may lose register settings stored in memory and may not awaken properly.

To estimate the standby current required for a specific system configuration, the standby current requirements of all installed components must be combined. Refer to Table 6 and follow these steps:

1. List the board's standby current requirement (767 mA).
2. List the PS/2 ports' standby current requirement (see note).
3. List, from the AGP and PCI 2.2 slots (wake enabled devices) row, the total number of wake-enabled devices installed and multiply by the standby current requirement.
4. List, from the AGP and PCI 2.2 slots (non-wake enabled devices) row, the total number of wake-enabled devices installed and multiply by the standby current requirement.
5. List all additional wake enabled devices' and non-wake enabled devices' standby current requirements as applicable.
6. Add all the listed standby current totals from steps 1 through 5 to determine the total estimated standby current power supply requirement.

Table 6. Standby Current Requirements

Instantly Available Current Support Requirements	Description	Standby Current Requirements (mA)
Minimum	Total for the board	767
Optional	Onboard LAN (optional)	95
	WOL header connected to wake enabled PCI LAN card	525
	PS/2 ports*	345
	AGP and PCI 2.2 slots (wake enabled devices)*	375
	AGP and PCI 2.2 slots (non-wake enabled devices)*	20
	USB Ports*	507.5 (max)
	CNR*	375

***** Dependent upon system configuration. See the note below.

NOTE

AGP and PCI requirements are calculated by totaling the following:

- *One wake-enabled device @ 375 mA*
- *Five non wake-enabled devices @ 20 mA each*

PS/2 Ports requirements per the IBM PS/2 Port Specification (Sept 1991):

- *Keyboard @ 275 mA (Actual measurements are 220 mA-300 mA, depending on the type of keyboard and the operational state of the keyboard's LEDs.)*
- *Mouse @ 70 mA*

USB requirements are calculated by totaling the following:

- *One wake-enabled device @ 500 mA*
- *Three USB non-wake-enabled devices @ 2.5 mA each*

The USB ports are limited to a combined total of 700 mA.

CNR requirements are calculated as follows:

- *One wake-enabled device @ 375 mA*
- *Non wake-enabled devices @ 20 mA*

Wake on Ring

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

- Powers up the computer from the APM soft-off mode.
- Requires two calls to access the computer:
  - The first call powers up the computer.
  - The second call enables access (when the appropriate software is loaded).
- Detects incoming call differently for external as opposed to internal modems:
  - For external modems, hardware on the desktop board monitors the ring indicate (RI) input of serial port A (serial port B does not support this feature).
  - For internal modems, a cable must be routed from the modem to the Wake on Ring connector.

See Figure 22 on page 67 for the location of the Wake on Ring connector on the desktop board.

Resume on Ring

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

- Resumes operation from either the APM sleep mode or the ACPI S1 state
- Requires only one call to access the computer
- 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

2 Installing and Replacing Desktop Board Components

This chapter tells you how to:

- Install and remove the retention mechanism (included), and optional AGP, GPA, and DVI cards
- Install and remove memory
- Install and remove the desktop board
- Install and remove the processor
- Replace the battery
- Connect the IDE cable
- Clear passwords
- Set the BIOS configuration jumper

Before You Begin

⚠ CAUTION

Before you install this desktop board in a chassis, see Appendix B for regulatory requirements and precautions.

- Always follow the steps in each procedure in the correct order.
- Set up a log to record information about your computer, such as model, serial number, installed options, and configuration information.
- Electrostatic discharge (ESD) can damage components. Perform the procedures described in this chapter only at an ESD workstation using an anti-static wrist strap and a conductive foam pad. If such a station is not available, you can provide some ESD protection by wearing an anti-static wrist strap and attaching it to a metal part of the computer chassis.

⚠ WARNINGS

The procedures in this chapter assume familiarity with the general terminology associated with personal computers and with the safety practices and regulatory compliance required for using and modifying electronic equipment.

Disconnect the computer from its power source and from any telecommunications links, networks, or modems before performing any of the procedures described in this chapter. Failure to disconnect power, telecommunications links, networks, or modems before you open the computer or perform any procedures can result in personal injury or equipment damage. Some circuitry on the desktop board can continue to operate even though the front panel power button is off.

Installing and Removing the Retention Mechanism and AGP and GPA Cards

The AGP universal connector supports AGP 1x, 2x, and 4x, and GPA cards. Newer cards have a retention notch as shown in Figure 3. When using notched cards, install the AGP card retention mechanism before installing the card. The AGP card retention mechanism is not used with unnotched cards. Pages 24-28 describe:

- Installing the AGP card retention mechanism
- Installing a GPA card
- Removing a GPA card from the retention mechanism
- Removing the AGP card retention mechanism

Installing the Retention Mechanism

⚠ CAUTION

Install the retention mechanism (RM) only when using a card with a retention notch as shown in the figure below. Use of the RM with an unnotched card may impair operation. If you need to remove the RM, follow the instructions on page 28.

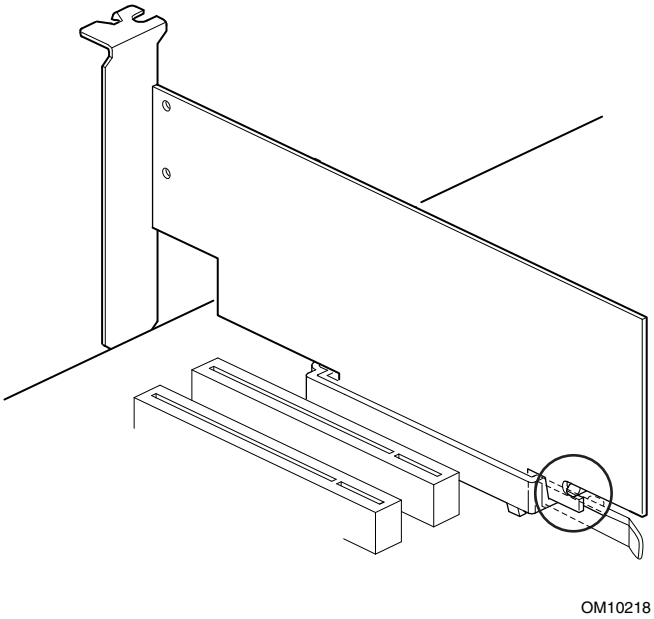


Figure 3. Retention Notch shown on AGP Card

The RM encloses the desktop board's AGP connector and provides additional mechanical stability to installed cards.

Place the anti-static bag in which the desktop board was shipped on a flat, supportive surface. Place the desktop board on top of the bag component-side up. Follow the steps outlined below to attach the RM (A) to the AGP connector (B):

1. Locate the AGP connector (J5E1) on the desktop board as shown below. Note that the desktop board's silkscreen (C) indicates the correct final position of the lever (D) on the RM.

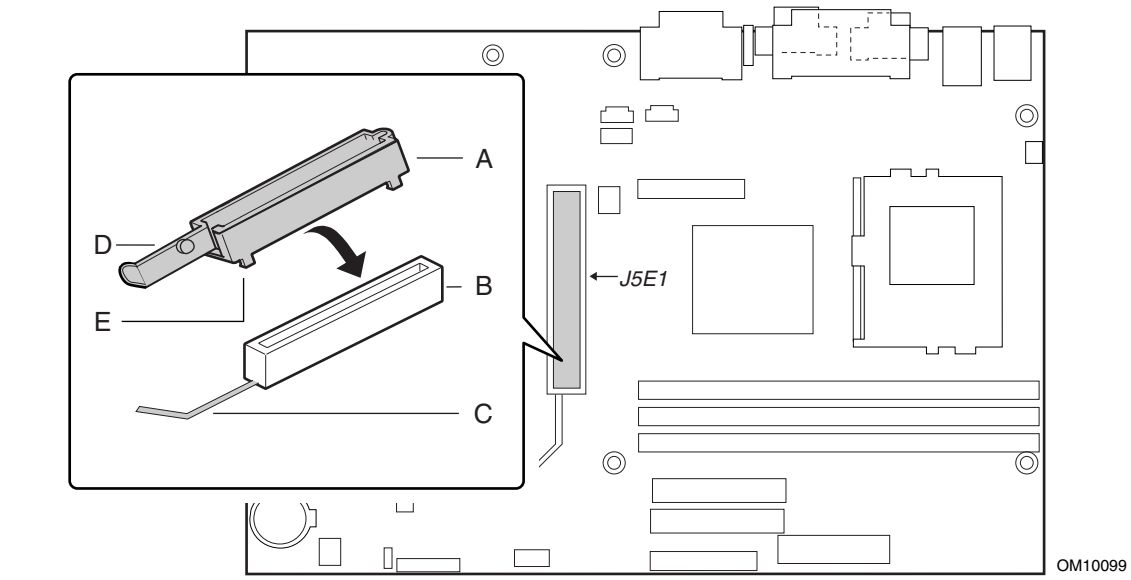
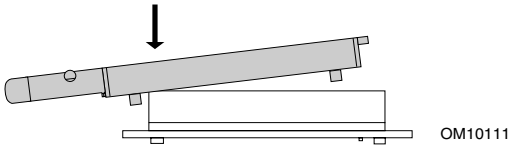
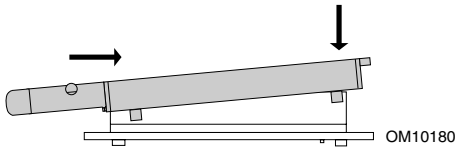


Figure 4. AGP Connector Location and Retention Mechanism (RM) Placement (Inset)

2. Position the RM over the AGP connector as shown below.



3. Push the lever end of the RM in the direction of the arrow until the two rearmost tabs (E) spread over the end of the AGP connector.



4. Push the free end of the RM over the other end of the AGP connector and press down evenly on both ends of the RM until all four tabs click underneath the AGP connector. Do not apply unnecessary pressure to avoid damaging the board.

Installing an AGP Card

CAUTION

When installing an AGP card, press the card straight down into the AGP connector. Allowing the card to slide forward or backward even a little during installation can damage the pins of the AGP socket.

Follow these instructions to install an AGP card if it has a retention notch.

1. Carefully position the card squarely over AGP connector. Press down on the card until it is completely seated in the AGP connector and the card retention notch snaps into place around the retention mechanism's pin (D).
2. If the card has a metal bracket (B) as shown Figure 5, secure the card's metal bracket to the chassis back panel with a screw (A).

Removing the AGP Card from the Retention Mechanism

Follow these instructions to remove the AGP card from the retention mechanism:

1. Remove the screw (A) that secures the card's metal bracket (B) to the chassis back panel.
2. Push back on the retention mechanism lever (C) until the retention pin (D) completely clears the notch in the card.
3. Pull the card straight up (E).

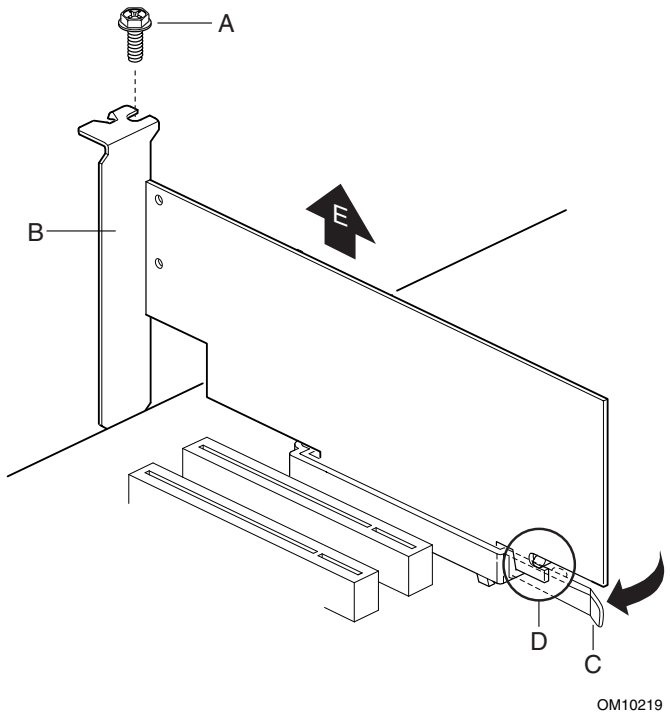


Figure 5. Removing the AGP Card

Installing and Removing GPA Cards

⚠ CAUTION

Damage can occur to the pins of the AGP connector if the GPA card's edge plug is not positioned squarely over the AGP connector before inserting.

Using Figure 6 as a reference, follow these steps to install a GPA card:

1. Position the GPA card over the AGP socket so that the arrow (A) on the GPA card points toward the back of the computer. Hook the notch (B) on the back of the GPA card over the back of the AGP connector's retention mechanism (RM).
2. Push the card in direction (C) while lowering (but not inserting) the card in direction (D). **Note**: The GPA card will tend to slip forward out of position unless pressure is maintained in direction (C) as the card is lowered.
3. Before inserting the GPA card, verify that both ends of the card's edge plug align squarely over the AGP connector (E).
4. Press down on both ends of the card in direction (F) until it seats completely in the AGP connector and the RM's retention notch snaps into place.

To remove the GPA card, push the RM's release lever in direction (G) to release the card. Lift the card out of the AGP connector and unhook it from the back of the RM.

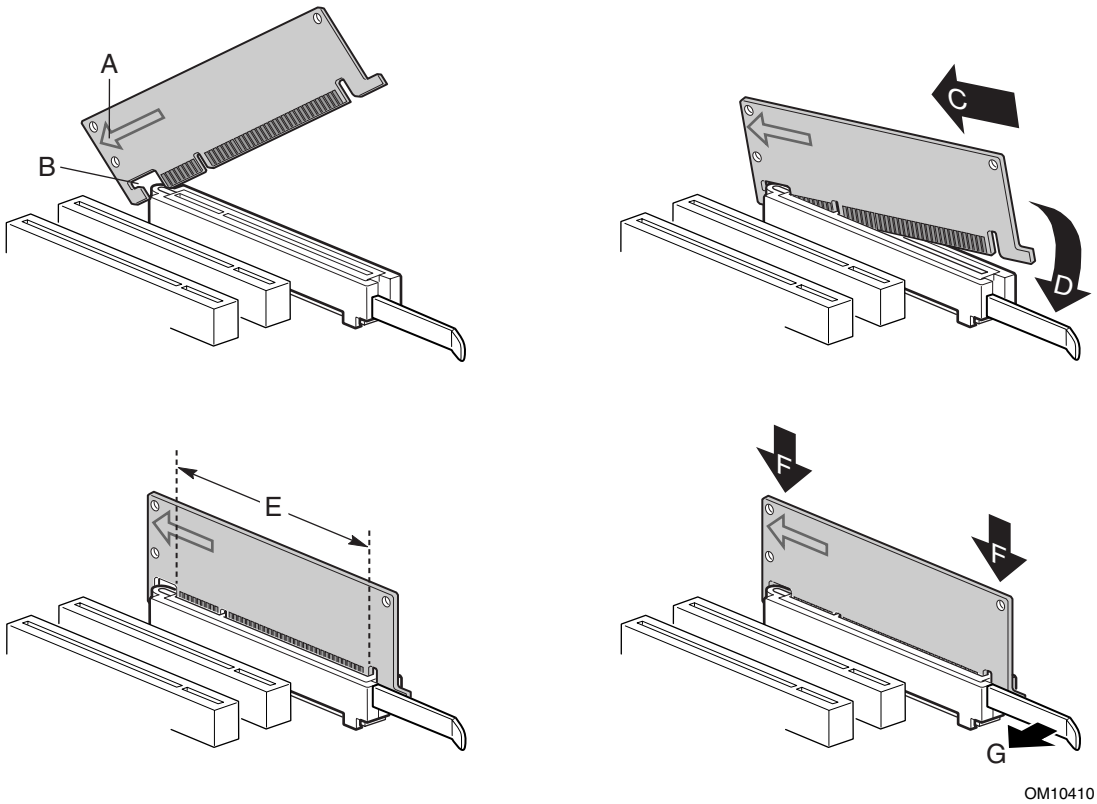


Figure 6. Installing a GPA Card

Removing the AGP Card Retention Mechanism

⚠ CAUTION

Once removed using this method, the AGP RM cannot be reused.

Follow these instructions to remove the AGP card retention mechanism:

1. Using side-cutters (A), cut the loop (B) joining the two sides of the retention mechanism.
2. Spread the sides of the retention mechanism (C) and lift the retention mechanism off of the AGP connector.

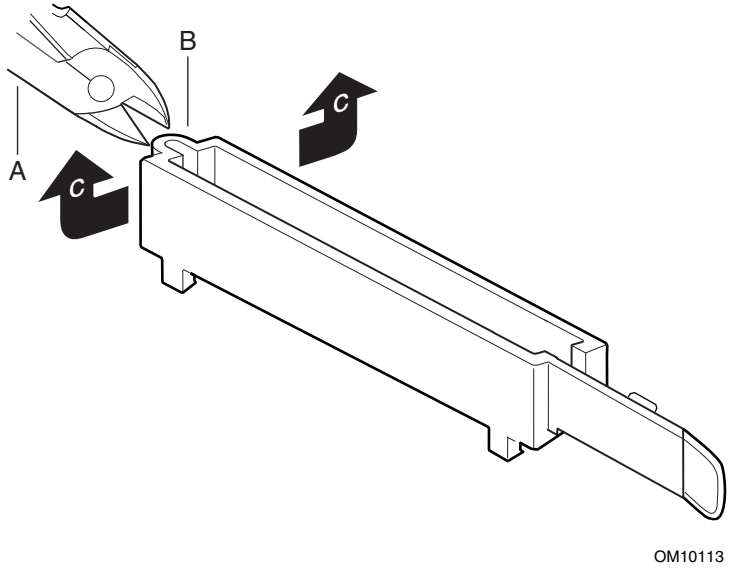


Figure 7. Removing the AGP Card Retention Mechanism

Installing and Removing Memory

⚠ CAUTION

To be fully compliant with all applicable Intel® SDRAM memory specifications, the board requires DIMMs that support the Serial Presence Detect (SPD) data structure.

You can access the PC Serial Presence Detect Specification at:

http://www.intel.com/design/chipsets/memory/

The board has three 168-pin DIMM sockets arranged as banks 0, 1, and 2 as shown in Figure 8. The memory module requirements are listed in the Main Memory section on page 10.

DIMM Installation Guidelines

All memory components and DIMMs used with the board must comply with the PC SDRAM specifications. These include the following:

- PC SDRAM Specification (memory component specific)
- PC100 and PC133 SDRAM Component Testing Summary
- PC Unbuffered DIMM Specification
- PC Registered DIMM Specification

You can access these documents through the Internet at:

http://www.intel.com/design/chipsets/memory/

Installing DIMMs

To install DIMMs, follow these steps:

1. Observe the precautions in "Before You Begin" (see page 23).
2. Turn off all peripheral devices connected to the computer. Turn off the computer and disconnect the AC power cord.
3. Remove the computer's cover and locate the DIMM sockets (see Figure 8).

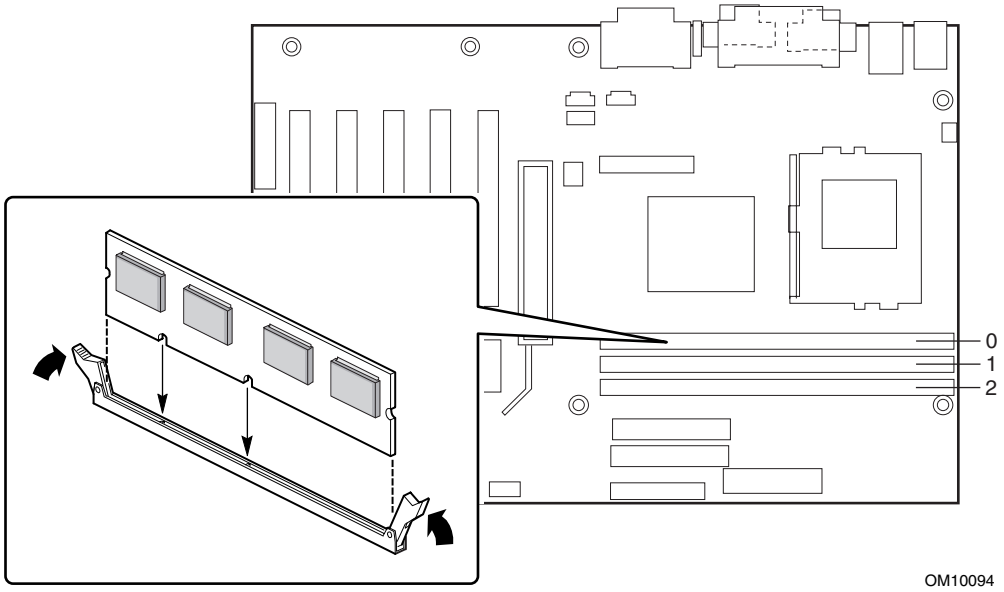


Figure 8. DIMM Socket Locations

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 8).
7. Insert the bottom edge of the DIMM into the socket.

8. When the DIMM is seated, 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 computer's cover and reconnect the AC power cord.

Removing DIMMs

To remove a DIMM, follow these steps:

1. Observe the precautions in "Before You Begin" (see page 23).
2. Turn off all peripheral devices connected to the computer. Turn off the computer.
3. Remove the AC power cord from the computer.
4. Remove the computer'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 computer's cover and reconnect the AC power cord.

Installing the I/O Shield

The boxed desktop board comes with an I/O shield. 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 desktop board in the chassis. Place the shield inside the chassis as shown in the following figure. 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.

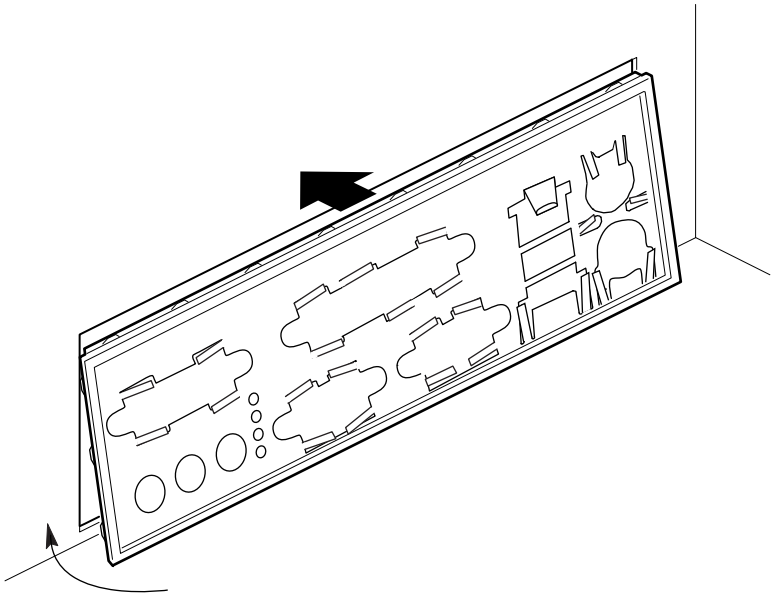


Figure 9. Installing the I/O Shield

Installing the Desktop Board

Refer to your chassis manual for instructions on installing the desktop board. The desktop board is secured to the chassis by seven screws. Figure 10 shows the locations of the mounting screw holes.

NOTES

You will need a Phillips (#2 bit) screwdriver.

Refer to Appendix B for regulatory requirements and installation instructions and precautions.

WARNING

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

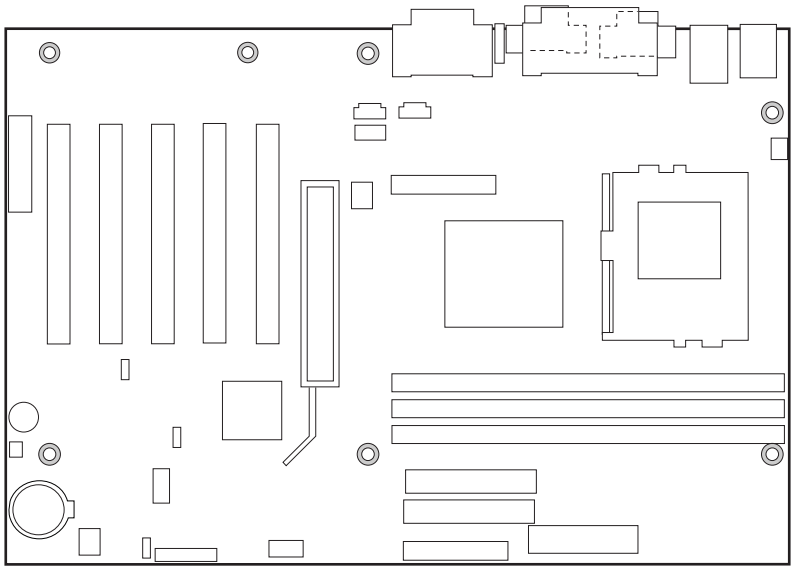


Figure 10. Location of the Mounting Screw Holes

Installing the Processor

To install a processor, follow these instructions:

1. Observe the precautions in "Before You Begin" (see page 23).
2. Locate the processor socket and raise the socket handle completely (see Figure 11).

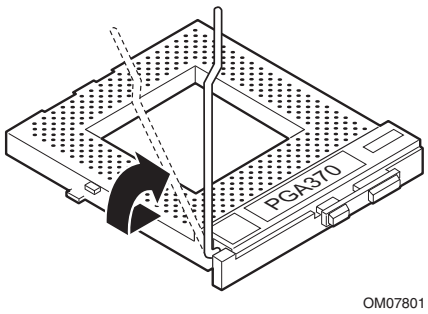


Figure 11. Raising the Socket Handle

3. Aligning the pins of the processor with the socket, insert the processor into the socket (see Figure 12).

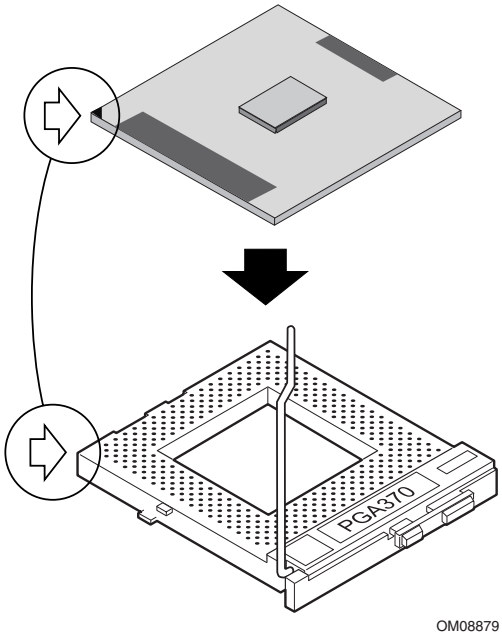


Figure 12. Inserting the Processor into the Socket

4. Close the handle completely (see Figure 13).

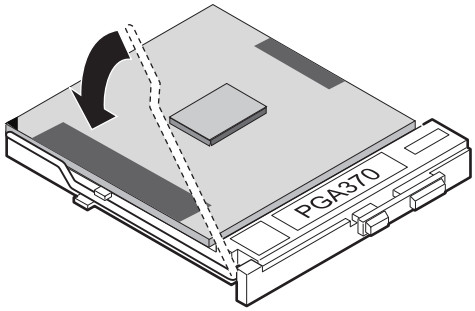


Figure 13. Closing the Handle

5. Place the fan heatsink on top of the processor (see Figure 14).

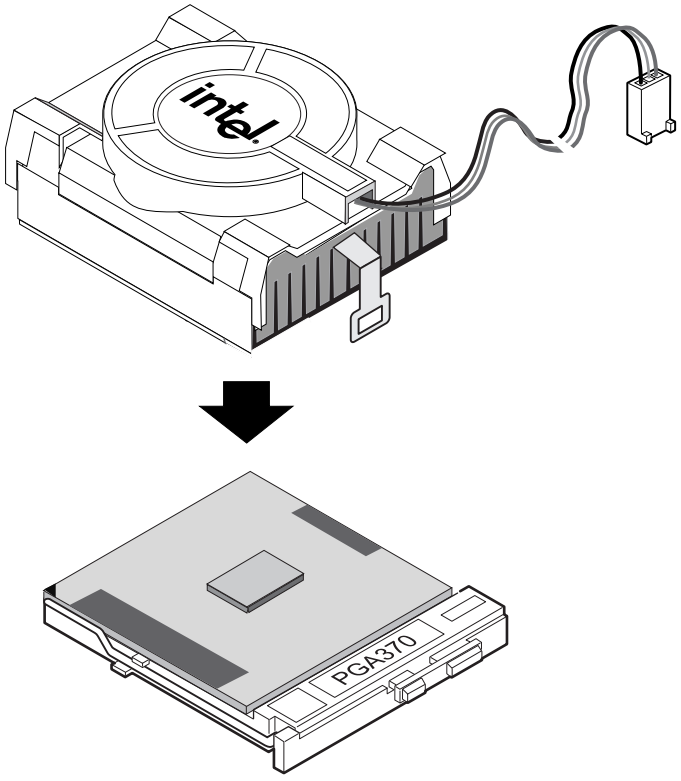
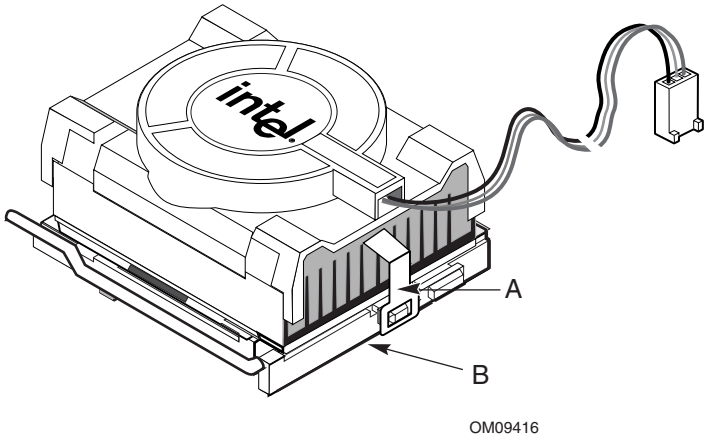


Figure 14. Attaching the Heatsink to the Processor

6. Attach the fan heatsink clips to the processor socket (see Figure 15).



A	Fan Heatsink Clip
B	Processor Socket

Figure 15. Attaching the Fan Heatsink Clip

7. Connect the processor fan cable to the processor fan connector (see Figure 16).

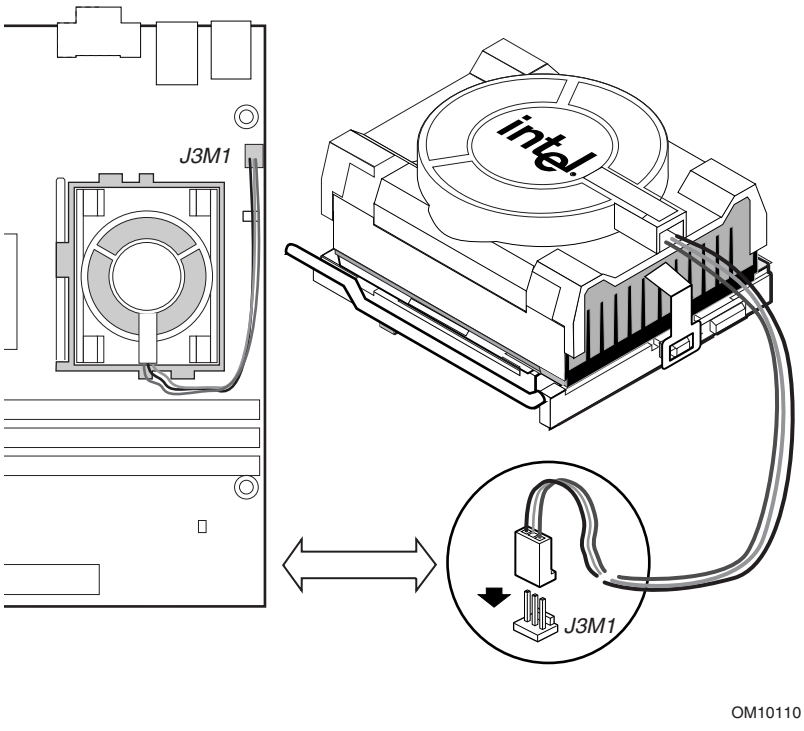


Figure 16. Connecting the Processor Fan Cable to the Processor Fan Connector

Removing the Processor

To remove the processor, follow these instructions:

1. Observe the precautions in "Before You Begin" (see page 23).
2. Disconnect the processor fan cable.
3. Detach the fan heatsink clips.
4. Remove the heatsink.
5. Raise the socket handle completely.
6. Remove the processor.

Replacing the Battery

When your computer is turned off, a lithium battery maintains the time-of-day clock and the keeps the values in CMOS RAM. Figure 17 on page 36 shows the location of the battery.

The battery should last about seven years whereupon it begins to loose 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.

WARNING

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

ATTENTION

Il y a danger d'explosion s'il y a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du méme type ou d'un type recommandé par le constructeur. Mettre au rébut les batteries usagées conformément aux instructions du fabricant.

ADVARSEL!

Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.

ADVARSEL

Lithiumbatteri - Eksplosjonsfare. Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten. Brukt batteri returneres apparatleverandøren.

VARNING

Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.

VAROITUS

Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Hävitä käjtetty paristo valmistajan ohjeiden mukaisesti.

To replace the battery, follow these steps:

1. Observe the precautions in "Before You Begin" (see page 23).
2. Turn off all peripheral devices connected to the computer. Disconnect the desktop board's power cord from the AC power source (wall outlet or power adapter).
3. Remove the computer cover.
4. Locate the battery on the desktop board (see Figure 17).
5. With your fingernail or a medium flat-bladed screwdriver, gently pry the battery hold-down latch back enough to free the battery from its socket.
6. Install the new battery in the socket, orienting the "+" according to Figure 17.
7. Replace the computer cover before reconnecting the computer.

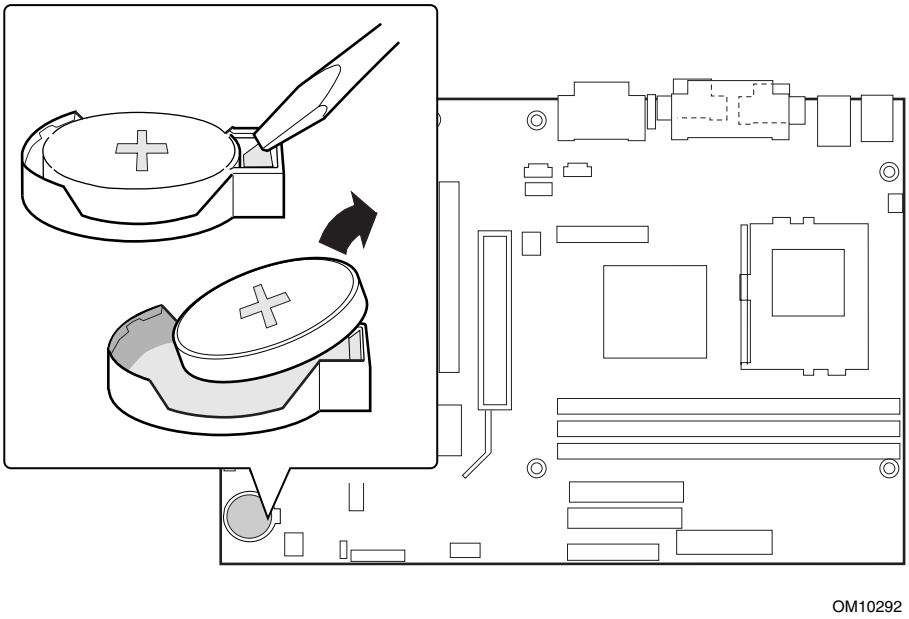


Figure 17. Removing the Battery

NOTE

If your local ordinances permit, you may dispose of individual batteries as normal trash. Do not expose batteries to excessive heat or fire. Keep all batteries away from children.

Connecting the IDE Cable

The Intel® boxed desktop board package includes a 40-contact, 80-conductor IDE cable. It is capable of connecting two drives to the desktop 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 blue in color and labeled P1, to the desktop board as shown in Figure 18.
- 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).

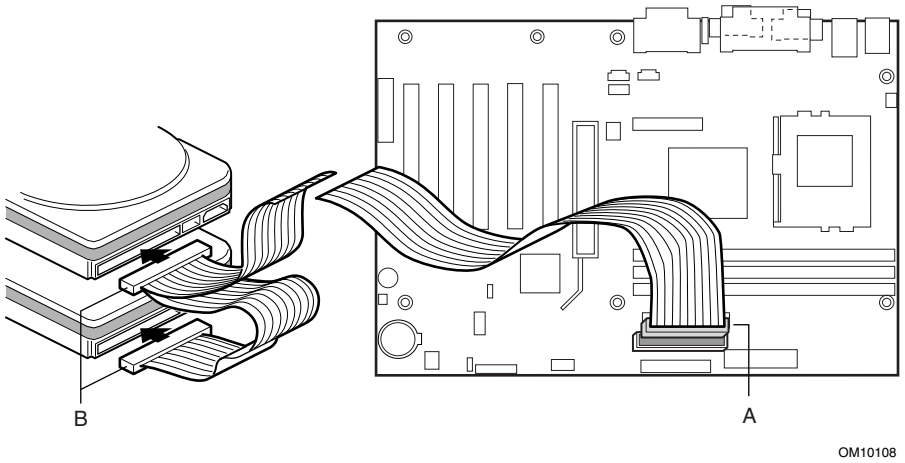


Figure 18. Connecting the IDE Cable

Setting the BIOS Configuration Jumper

CAUTION

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

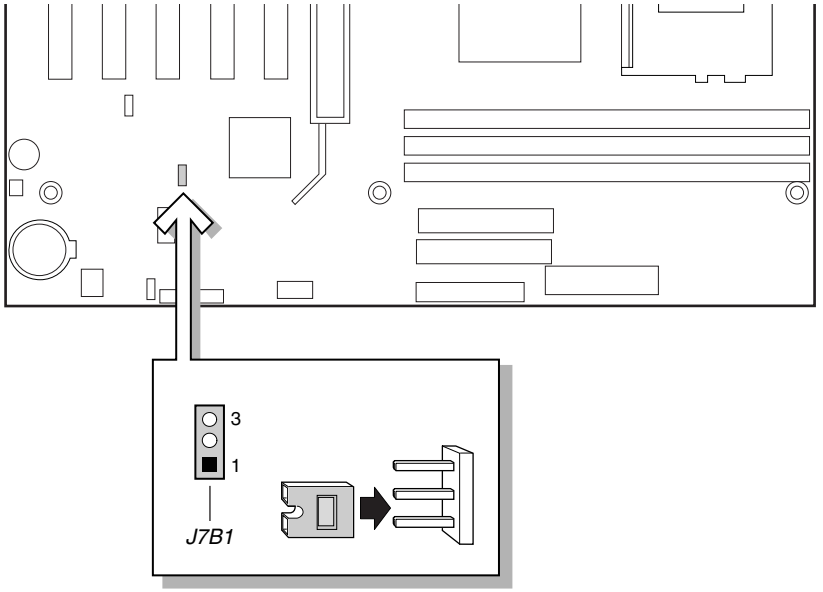
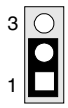
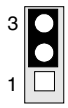
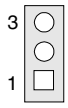


Figure 19. BIOS Configuration Jumper Block Location

This three-pin jumper block, shown in Figure 19, enables all desktop board configurations to be done in BIOS Setup. Table 7 shows the jumper settings for the Setup program modes.

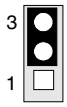
Table 7. Jumper Settings for the BIOS Setup Program Modes

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

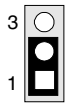
Clearing the Passwords

This procedure assumes that the desktop board is installed in the computer and the configuration jumper block is set to normal mode.

1. Observe the precautions in "Before You Begin" (see page 23).
2. Turn off all peripheral devices connected to the computer. Turn off the computer. Disconnect the computer's power cord from the AC power source (wall outlet or power adapter).
3. Remove the computer cover.
4. Find the configuration jumper block (see Figure 19).
5. Place the jumper on pins 2-3 as shown below.



6. Replace the cover, plug in the computer, turn on the computer, and allow it to boot.
7. The computer starts the Setup program. Setup displays the maintenance menu.
8. Press <Enter> and Setup displays a pop-up screen requesting that you confirm clearing the password. Select Yes and press <Enter>. Setup displays the maintenance menu again.
9. Press <F10> to save the current values and exit Setup.
10. Turn off the computer. Disconnect the computer's power cord from the AC power source.
11. Remove the computer cover.
12. To restore normal operation, place the jumper on pins 1-2 as shown below.



13. Replace the cover, plug in the computer, and turn on the computer.

3 Upgrading the BIOS

This chapter tells you how to:

- Upgrade the BIOS using the Intel® Flash Memory Update Utility
- Recover the BIOS if an upgrade fails
- Change the BIOS language

Preparing for the Upgrade

Before you upgrade the BIOS, prepare by:

- Obtaining the BIOS upgrade file
- Recording the current BIOS settings
- Creating a bootable diskette
- Creating the BIOS upgrade diskette

Obtaining the BIOS Upgrade File

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

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

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

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

NOTE

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

The Intel Flash Memory Update Utility allows you to:

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

Recording the Current BIOS Settings

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

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

NOTE

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

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

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 upgrade diskette. The computer 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 upgrade file through your computer supplier or from the Intel World Wide Web site:

   http://support.intel.com/support/motherboards/desktop/
2. Copy the BIOS upgrade 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 upgrade file, for example, CCBIOSxx.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 Upgrade Diskette

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

   http://support.intel.com/support/motherboards/desktop/
2. Copy the BIOS upgrade 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, CCBIOSxx.EXE.
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 upgrade.
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.

Upgrading 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 computer 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 computer 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 computer and reboot.

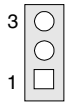
Recovering the BIOS

It is unlikely that anything will interrupt the BIOS upgrade, however, if an interruption occurs, the BIOS could be damaged. The following steps explain how to recover the BIOS if an upgrade fails. The following procedure uses recovery mode for the Setup program. See page 38 for more information on Setup modes.

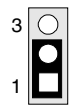
NOTE

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 computer, disconnect the computer's power cord, and disconnect all external peripherals.
2. Remove the computer cover and locate the configuration jumper block (J7B1) (see Figure 19).
3. Remove the jumper from all pins as shown below to set recovery mode for Setup.



4. Insert the bootable BIOS upgrade diskette into diskette drive A.
5. Replace the computer cover, connect the power cord, turn on the computer, 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 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 computer, and disconnect its power cord.
8. Remove the computer cover and continue with the following steps.
9. On the jumper block (J7B1), reinstall the jumper back on pins 1-2 as shown below to set normal mode for Setup.



10. Leave the upgrade diskette in drive A, replace the computer cover, and connect the computer's power cord.
11. Turn on the computer and continue with the BIOS upgrade (see page 43).

4 Using the Setup Program

You can use the BIOS Setup program to change the configuration information and boot sequence for the computer. 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 D815EEA desktop board with BIOS identifier EA81510A.86A. Desktop 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 computer. 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 8. BIOS Setup Program Menu Bar

Maintenance	Main	Advanced	Security	Power	Boot	Exit
Clears passwords and BIS credentials and enables extended configuration mode	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

Table 9 shows the function keys available for menu screens.

Table 9. 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 CPU information. Setup only displays this menu in the configure mode. See page 38 for information about setting the configure mode. To access this menu, select Maintenance on the menu bar at the top of the screen.

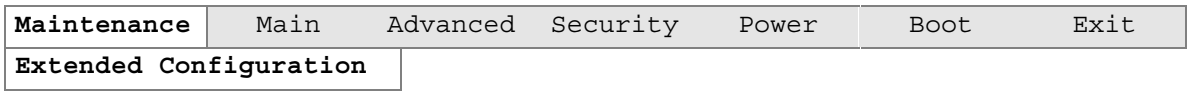


Table 10. Maintenance Menu

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

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 11 is for setting video memory cache mode. This submenu becomes available when User Defined is selected under Extended Configuration.

Table 11. Extended Configuration Submenu

Feature	Options	Description
Extended Configuration	• **Default (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 • **UC (default)**	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. 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.
SDRAM Auto-Configuration	• **Auto (default)** • User Defined	Sets extended memory configuration options to auto or user defined.
CAS# Latency	• 3 • 2 • **Auto (default)**	Selects the number of clock cycles required to address a column in memory.
SDRAM RAS# to CAS# Delay	• 3 • 2 • **Auto (default)**	Selects the number of clock cycles between addressing a row and addressing a column.
SDRAM RAS# Precharge	• 3 • 2 • **Auto (default)**	Selects the length of time required before accessing a new row.

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

Table 12. Main Menu

Feature	Options	Description
BIOS Version	No options	Displays the version of the BIOS.
Processor Type	No options	Displays processor type.
Processor Speed	No options	Displays processor speed.
System Bus Frequency	No options	Displays the system bus frequency.
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 0 Memory Bank 1 Memory Bank 2	No options	Displays the amount and type of RAM in the memory banks.
Language	• **English (default)** • Espanol • Deutsche • Italiano • Francais	Selects the current default language used by the BIOS.
Processor Serial Number	• **Disabled (default)** • Enabled	Enables and disables the processor serial number. (Present only when a Pentium III processor is installed.)
System Time	Hour, minute, and second	Specifies the current time.
System Date	Day of week Month/day/year	Specifies the current date.

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
Video Configuration

Table 13 describes the Advanced Menu. This menu is used for setting advanced features that are available through the chipset.

Table 13. 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	No options	Configures individual PCI slot's IRQ priority. When selected, displays the PCI Configuration submenu.
Boot Settings Configuration	No options	Configures Plug and Play and the Numlock key, and resets configuration data. When selected, displays the Boot Configuration submenu.
Peripheral Configuration	No options	Configures peripheral ports and devices. When selected, displays the Peripheral Configuration submenu.
IDE Configuration	No options	Specifies type of connected IDE device.
Diskette Configuration	No options	When selected, displays the Floppy Options submenu.
Event Log Configuration	No options	Configures Event Logging. When selected, displays the Event Log Configuration submenu.
Video Configuration	No options	Configures video features. When selected, displays the Video 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
Video Configuration

The submenu represented by Table 14 is for configuring the IRQ priority of PCI slots individually.

Table 14. PCI Configuration Submenu

Feature	Options	Description
PCI Slot 1 IRQ Priority	• **Auto (default)** • 9 • 10 • 11	Allows selection of IRQ priority. IRQ Priority selections for PCI slots 1 and 5 are linked. Selections made to PCI Slot 1 IRQ Priority are repeated in PCI Slot 5 IRQ Priority.
PCI Slot 2 IRQ Priority	• **Auto (default)** • 9 • 10 • 11	Allows selection of IRQ priority.
PCI Slot 3 IRQ Priority	• **Auto (default)** • 9 • 10 • 11	Allows selection of IRQ priority.
PCI Slot 4 IRQ Priority	• **Auto (default)** • 9 • 10 • 11	Allows selection of IRQ priority.
PCI Slot 5 IRQ Priority	• Whatever is selected in slot 1	No selections can be made to PCI Slot 5 IRQ Priority. Selections made to PCI Slot 1 repeat in PCI Slot 5.

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
Video Configuration

The submenu represented by Table 15 is for setting Plug and Play (PnP) options, resetting configuration data, and the power-on state of the Numlock key.

Table 15. Boot Configuration Submenu

Feature	Options	Description
Plug & 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
Video Configuration

The submenu represented in Table 16 is used for configuring computer peripherals.

Table 16. 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 COM2, the address 2F8h, and the interrupt IRQ3. An * (asterisk) displayed next to an address indicates a conflict with another device.
Mode	• **Normal (default)** • IrDA† SIR-A • ASK_IR	Specifies the mode for serial port B for normal (COM 2) or infrared applications. This option is not available if serial port B has been disabled.
Base I/O address (This feature is present only when Serial Port B is set to *Enabled*)	• **2F8 (default)** • 3E8 • 2E8	Specifies the base I/O address for serial port B.

continued

Table 16. Peripheral Configuration Submenu (continued)

Feature	Options	Description
Interrupt (This feature is present only when Serial Port B is set to *Enabled*)	• **IRQ 3 (default)** • IRQ 4	Specifies the interrupt 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 • 228	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 Channel (This feature is present only when Parallel Port Mode is set to *ECP*)	• 1 • **3 (default)**	Specifies the DMA channel.
Audio Device	• Disabled • **Enabled (default)**	Enables or disables the onboard audio subsystem.
LAN Device	• Disabled • **Enabled (default)**	Enables or disables the LAN device.
Legacy USB Support	• Disabled • Enabled • **Auto (default)**	Enables or disables USB legacy support. (See USB Support on page 13 for more information.)
USB Controller 2	• Disabled • **Enabled (default)**	Enables or disables USB controller 2.

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
Video Configuration

The menu represented in Table 17 is used to configure IDE device options.

Table 17. 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	No options	Reports type of connected IDE device. When selected, displays the Primary IDE Master submenu.
Primary IDE Slave	No options	Reports type of connected IDE device. When selected, displays the Primary IDE Slave submenu.
Secondary IDE Master	No options	Reports type of connected IDE device. When selected, displays the Secondary IDE Master submenu.
Secondary IDE Slave	No options	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				
		Video Configuration				

There are four IDE submenus: primary master, primary slave, secondary master, and secondary slave. Table 18 shows the format of the IDE submenus. For brevity, only one example is shown.

Table 18. Primary/Secondary IDE Master/Slave Submenus

Feature	Options	Description
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.
LBA Mode Control (This feature is present only when Type is not set to *Auto*.)	• Disabled • **Enabled (default)**	Enables or disables LBA mode control.
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.
PIO Mode (This feature is present only when Type is not set to *Auto*.)	• **Auto (default)** • 0 • 1 • 2 • 3 • 4	Specifies the PIO mode.

continued

Table 18. Primary/Secondary IDE Master/Slave Submenus (continued)

Feature	Options	Description
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	Specifies the Ultra DMA mode for the drive.

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
Video Configuration

The submenu represented by Table 19 is used for configuring the diskette drive.

Table 19. 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" • 1.2 MB 5¼" • 720 KB 3½" • **1.44/1.25 MB 3½" (default)** • 2.88 MB 3½"	Specifies the capacity and physical size of diskette drive A.
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
Video Configuration

The submenu represented by Table 20 is used to configure the event logging features.

Table 20. 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.
Mark events as read	[Enter]	Marks all events as read.

Video Configuration Submenu

To access this menu, select Advanced on the menu bar, then Video 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 in Table 21 is for configuring the video features.

Table 21. Video Configuration Submenu

Feature	Options	Description
Primary Video Adapter	• **AGP (default)** • PCI	Selects primary video adapter to be used during boot.

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 22 is for setting passwords and security features.

Table 22. 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)	• 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.

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

The menu represented in Table 23 is for setting the power management features.

Table 23. Power Menu

Feature	Options	Description
Power Management	• Disabled • **Enabled (default)**	Enables or disables the BIOS power management feature.
Inactivity Timer	• Off • 1 Minute • 5 Minutes • 10 Minutes • **20 Minutes (default)** • 30 Minutes • 60 Minutes • 120 Minutes	Specifies the amount of time before the computer enters standby mode.
Hard Drive	• Disabled • **Enabled (default)**	Enables power management for hard disks during standby modes.
Video Power-Down	• Disabled • Standby • **Suspend (default)** • Sleep	Specifies power management for video during standby modes.
ACPI Suspend State	• **S1 State (default)** • S3 State	Specifies the ACPI suspend state.

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
					IDE Drive Configuration	

The menu represented in Table 24 is used to set the boot features and the boot sequence.

Table 24. Boot Menu

Feature	Options	Description
Quiet Boot	• Disabled • **Enabled (default)**	*Disabled* displays normal POST messages. *Enabled* displays OEM graphic instead of POST messages.
Quick 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.
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 computer. *Stay Off* keeps the power off until the power button is pressed. *Last State* restores the previous power state before power loss occurred.
On Modem Ring	• **Stay Off (default)** • Power-On	In APM mode only, specifies how the computer responds to an incoming call on an installed modem when the power is off.
On LAN	• Stay Off • **Power-On (default)**	In APM mode only, determines how the system responds to a LAN wake up event.
On PME	• **Stay Off (default)** • Power-On	In APM mode only, determines how the system responds to a PCI power management event.
1st Boot Device 2nd Boot Device 3rd Boot Device 4th Boot Device 5th Boot Device	• Floppy • ARMD-FDD(Note 1) • ARMD-HDD(Note 2) • IDE-HDD(Note 3) • ATAPI CDROM • Intel UNDI, PXE 2.0 • Disabled	Specifies the boot sequence from the available 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 operating system assigns a drive letter to each boot device in the order listed. Changing the order of the devices changes the drive lettering. The default settings for the first through fifth boot devices are, respectively: • Floppy • IDE-HDD • ATAPI CDROM • Intel UNDI, PXE 2.0 • Disabled

continued

Table 24. Boot Menu (continued)

Feature	Options	Description
IDE Drive Configuration	No Options	Configures IDE drives. When selected, displays the IDE Drive Configuration submenu.

Notes:

1. ARMD-FDD = ATAPI removable device - floppy disk drive
2. ARMD-HDD = ATAPI removable device - hard disk drive
3. HDD = Hard Disk Drive

IDE Drive Configuration Submenu

To access this menu, select Boot on the menu bar, then IDE Drive Configuration.

Maintenance	Main	Advanced	Security	Power	**Boot**	Exit
					IDE Drive Configuration	

The submenu represented in Table 25 is used to set the order in which the IDE drives boot. Changing the boot-order of a given drive causes the boot-order for the other drives to change automatically to accommodate your selection.

Table 25. IDE Drive Configuration Submenu

Feature	Options	Description
Primary Master IDE	**1st IDE (default)** 1 through 4	Allows you to select the order in which the Primary Master IDE drive boots.
Primary Slave IDE	**2nd IDE (default)** 1 through 4	Allows you to select the order in which the Primary Slave IDE drive boots.
Secondary Master IDE	**3rd IDE (default)** 1 through 4	Allows you to select the order in which the Secondary Master IDE drive boots.
Secondary Slave IDE	**4th IDE (default)** 1 through 4	Allows you to select the order in which the Secondary Slave IDE drive boots.

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 26 is for exiting the BIOS Setup program, saving changes, and loading and saving defaults.

Table 26. 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 computer was turned on are used.

5 Technical Reference

Desktop Board Connectors

The desktop board's connectors can be divided into three groups, as shown in Figure 20.

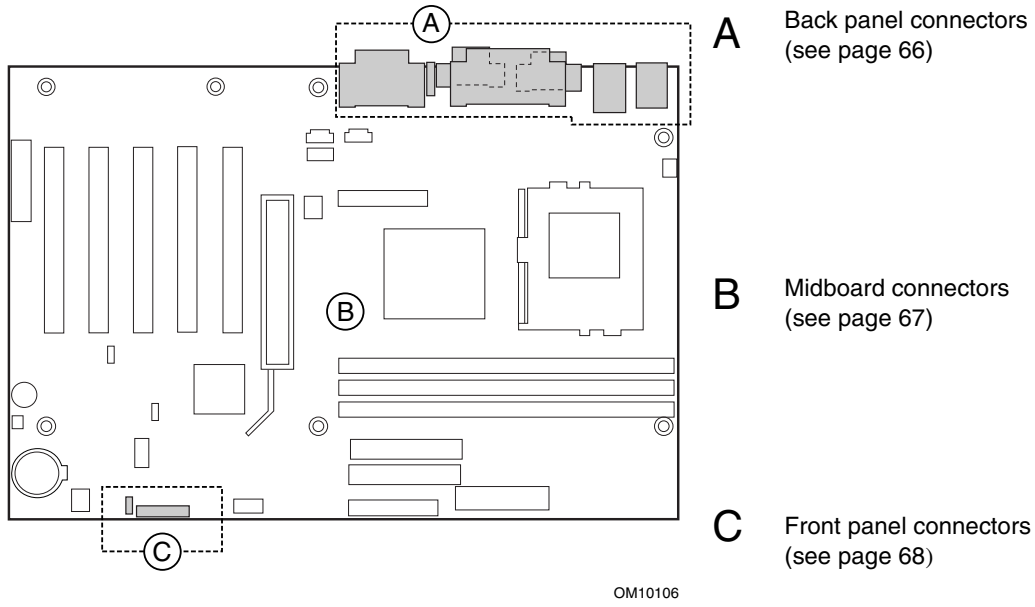


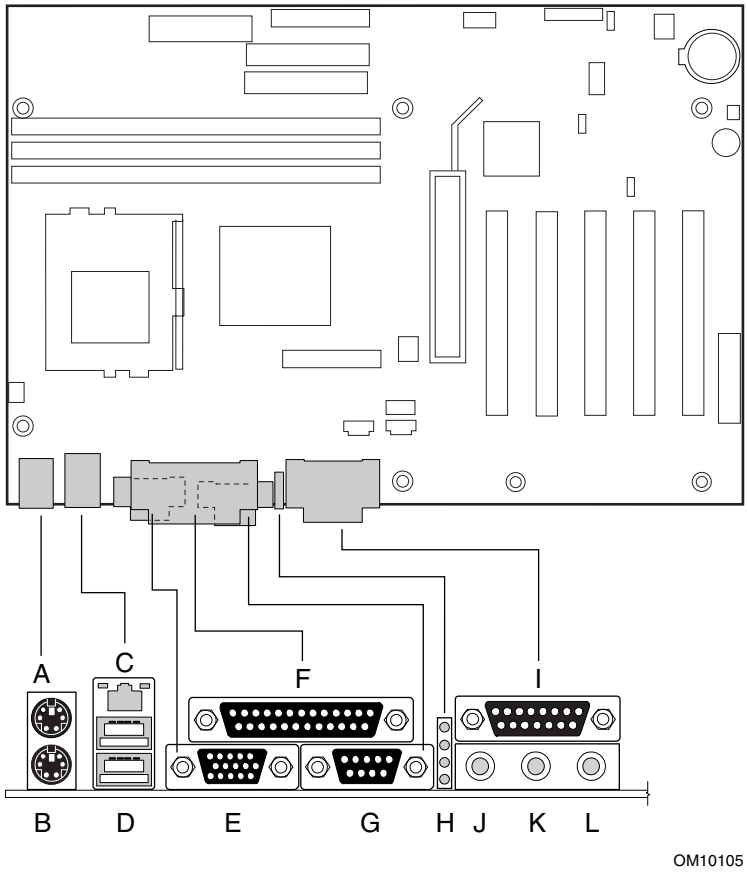
Figure 20. Connector Groups

⚠ CAUTION

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

Back Panel Connectors

Figure 21 shows the back panel connectors on the desktop board. The back panel connectors are color-coded in compliance with PC 99 recommendations. The figure legend below lists the colors used.



A	PS/2 mouse, green	G	Serial port A, teal
B	PS/2 keyboard, purple	H	Diagnostic LEDs
C	LAN connector with LED display (optional)	I	MIDI/Game port, gold
D	USB port 0, upper; USB port 1, lower	J	Audio line out, green
E	VGA port	K	Audio line in, blue
F	Parallel port, burgundy	L	Mic in, red

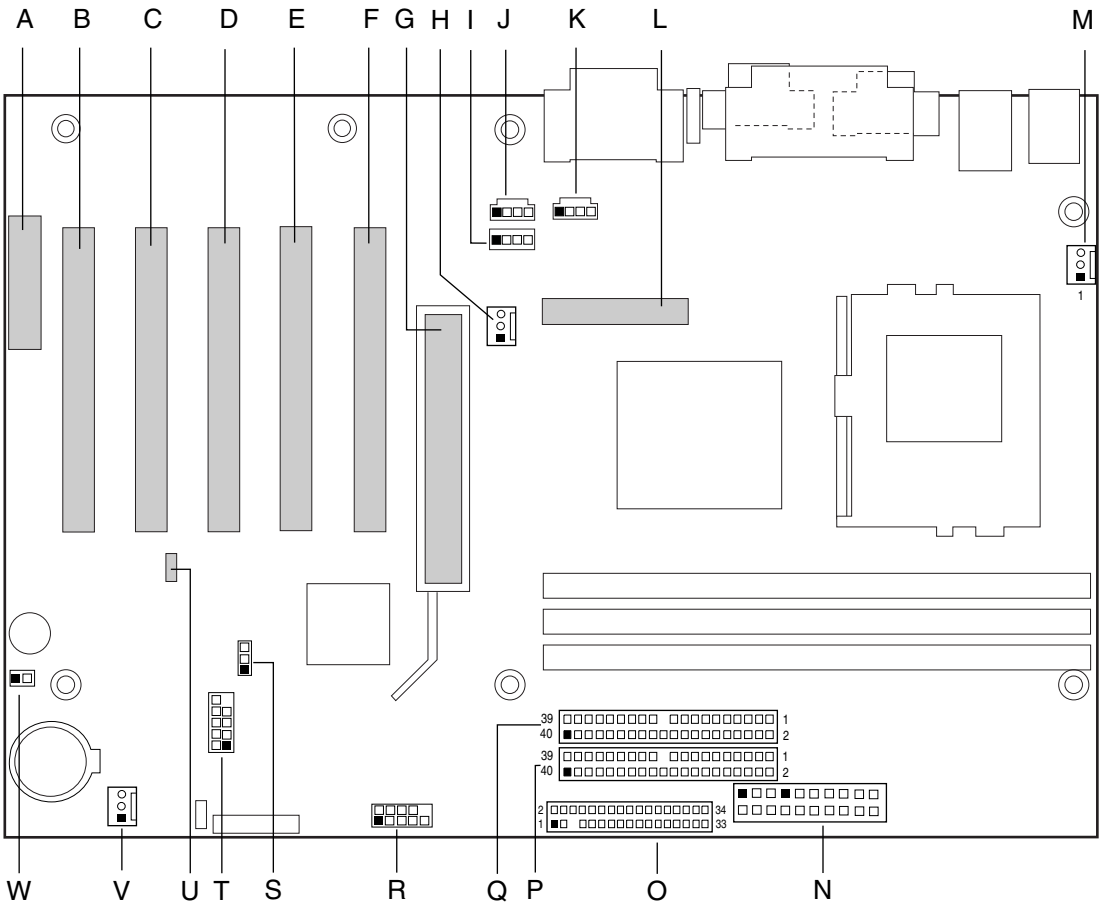
Figure 21. Back Panel Connectors

NOTE

The line out connector, located on the back panel, is designed to power either headphones or amplified speakers only. Poor audio quality may occur if passive (non-amplified) speakers are connected to this output.

Midboard Connectors

Figure 22 shows the location of the midboard connectors.

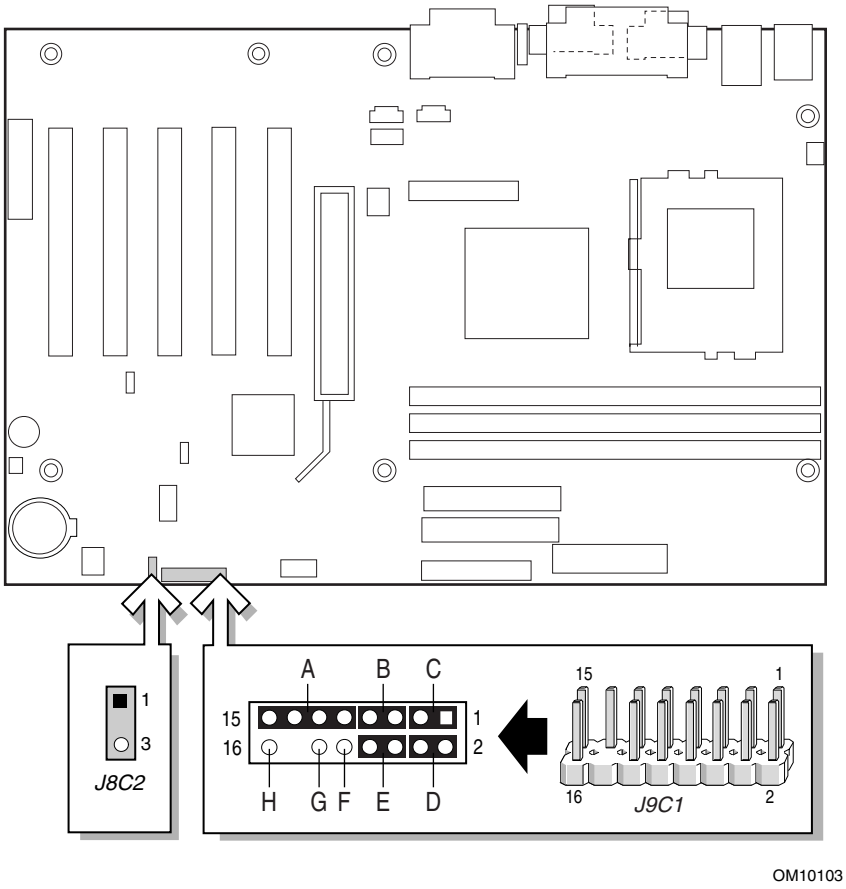


A	CNR (optional)	M	Processor fan (Fan 3)
B	PCI slot 5	N	Power
C	PCI slot 4	O	Diskette drive (Floppy)
D	PCI slot 3	P	Primary IDE
E	PCI slot 2	Q	Secondary IDE
F	PCI slot 1	R	Serial port (COM 2)
G	AGP universal	S	BIOS configuration jumper (see page 38)
H	Chassis fan (Fan 2)	T	USB front panel
I	Legacy CD-ROM, white	U	Wake on LAN technology
J	ATAPI-style CD-ROM, black	V	Chassis fan (Fan 1)
K	ATAPI-style auxiliary in, tan	W	SCSI hard drive activity LED
L	Digital Video Output (DVO)		

Figure 22. Midboard Connectors

Front Panel Connectors

Figure 23 shows the location of the front panel connectors.



J8C2: Alternate front panel power LED connector

J9C1: Front panel connector

A Infrared port
B Reset switch
C Hard drive activity LED
D Power LED
E On/Off switch
F No connect
G Ground
H +5 V

Figure 23. Front Panel Connectors

Desktop Board Resources

Memory Map

Table 27. System Memory Map

Address Range (decimal)	Address Range (hex)	Size	Description
1024 K - 524288 K	100000 - 1FFFFFFF	511 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 28. DMA Channels

DMA Channel Number	Data Width	System Resource
0	8 or 16 bits	Audio
1	8 or 16 bits	Audio / parallel port
2	8 or 16 bits	Diskette drive
3	8 or 16 bits	Parallel port (for ECP or EPP) / audio
4	8 or 16 bits	DMA controller
5	16 bits	Open
6	16 bits	Open
7	16 bits	Open

I/O Map

Table 29. 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
One of these ranges: 0200 - 0207 0208 - 020F 0210 - 0217 0218 - 021F	Can vary from 1 byte to 8 bytes	Audio / game port
One of these ranges:		Audio (Sound Blaster Pro† -compatible)
0220 - 022F	16 bytes	
0240 - 024F	16 bytes	
0228 - 022F*	8 bytes	LPT3
0278 - 027F*	8 bytes	LPT2
02E8 - 02EF*	8 bytes	COM4 / video (8514A)
02F8 - 02FF*	8 bytes	COM2
One of these ranges: 0320 - 0327 0330 - 0337 0340 - 0347 0350 - 0357	8 bytes	MPU-401 (MIDI)
0376	1 byte	Secondary IDE channel command port
0377, bits 6:0	7 bits	Secondary IDE channel status port
0378 - 037F	8 bytes	LPT1
0388- 038B	6 bytes	AdLib† (FM synthesizer)
03B0 - 03BB	12 bytes	Intel® 82815 - Memory Controller Hub (MCH)
03C0 - 03DF	32 bytes	Intel 82815 - Memory Controller Hub (MCH)
03E8 - 03EF	8 bytes	COM3

continued

Table 29. I/O Map (continued)

Address (hex)	Size	Description
03F0 - 03F5	6 bytes	Diskette channel 1
03F6	1 byte	Primary IDE channel command port
03F8 - 03FF	8 bytes	COM1
04D0 - 04D1	2 bytes	Edge / level triggered PIC
One of these ranges: 0530 - 0537 0E80 - 0E87 0F40 - 0F47	8 bytes	Windows Sound System
LPTn + 400h	8 bytes	ECP port, LPTn base address + 400h
0CF8 - 0CFB**	4 bytes	PCI configuration address register
0CF9***	1 byte	Turbo and reset control register
0CFC - 0CFF	4 bytes	PCI configuration data register
FFA0 - FFA7	8 bytes	Primary bus master IDE registers
FFA8 - FFAF	8 bytes	Secondary bus master IDE registers
96 contiguous bytes starting on a 128-byte divisible boundary	ICH (ACPI + TCO)	
64 contiguous bytes starting on a 64-byte divisible boundary	D815EEA desktop board resource	
64 contiguous bytes starting on a 64-byte divisible boundary	Onboard audio controller	
32 contiguous bytes starting on a 32-byte divisible boundary	ICH2 (USB#1)	
32 contiguous bytes starting on a 32-byte divisible boundary	ICH2 (USB#2)	
16 contiguous bytes starting on a 16-byte divisible boundary	ICH2 (SMBus)	
64 contiguous bytes starting on a 64-byte divisible boundary	ICH2 modem controller	
32 contiguous bytes starting on a 32-byte divisible boundary	ICH2 audio mixer	
64 contiguous bytes starting on a 64-byte divisible boundary	ICH2 LAN controller	
4096 contiguous bytes starting on a 4096-byte divisible boundary	Intel 82801BA PCI bridge	

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

** Dword access only.

*** Byte access only.

Interrupts

Table 30. 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* (user available if COM2 is not present)
4	COM1*
5	LPT2 (Plug and Play option) / audio / user available
6	Diskette drive controller
7	LPT1*
8	Real time clock
9	User available
10	User available
11	User available
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)

* Default, but can be changed to another IRQ.

A Error Messages and Indicators

The board reports POST errors in three ways:

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

BIOS Beep Codes

The BIOS beep codes are listed in Table 31. The BIOS also issues a beep code (one long tone followed by two short tones) during POST if the video configuration fails (a faulty video card or no card installed) or if an external ROM module does not properly checksum to zero.

Table 31. Beep Codes

Number of Beeps	Description
1	Refresh failure
2	Parity cannot be reset
3	First 64 K 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)

Diagnostic LEDs

Four dual-colored diagnostic LEDs are located on the back-panel next to the serial port (see Figure 24). If the BIOS stops (hangs) during the POST, the state of the LEDs indicates which BIOS operation was in progress when the BIOS hung. Table 32 lists the valid states of the LEDs.

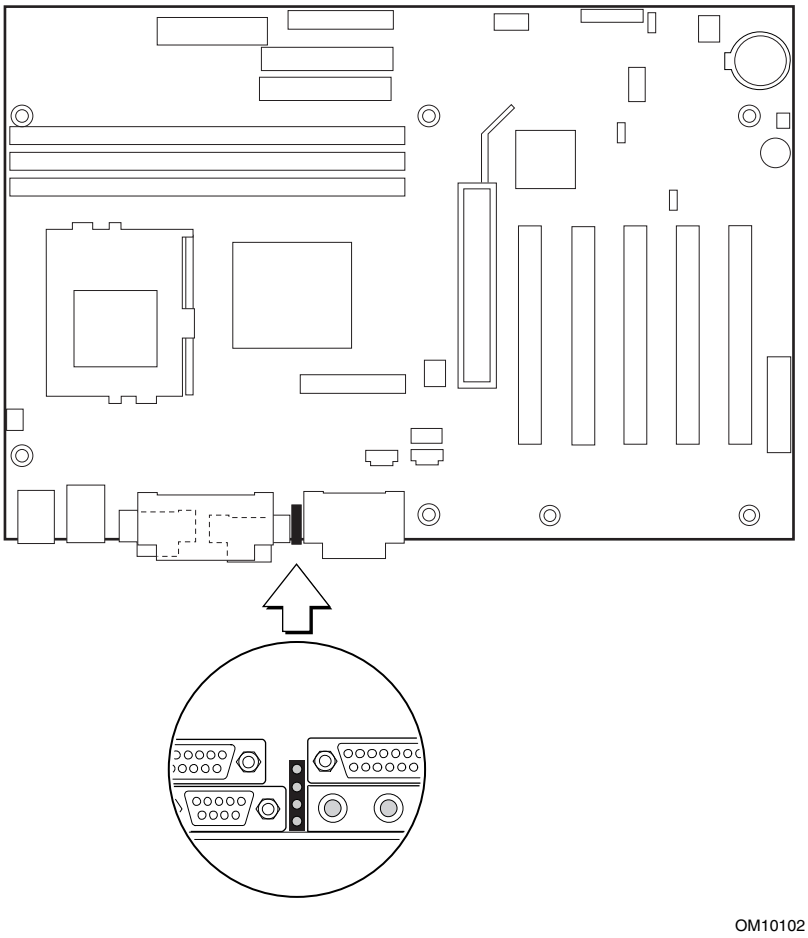
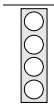
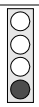
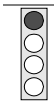
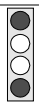
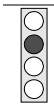
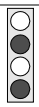
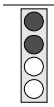
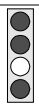
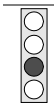
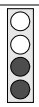
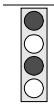
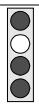
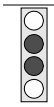
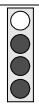
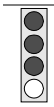
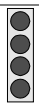


Figure 24. Location of the Diagnostic LEDs

Table 32. Diagnostic LED States

Display	BIOS Operation	Display	BIOS Operation
 Amber Amber Amber Amber	Power on, starting BIOS	 Amber Amber Amber Green	Undefined
 Green Amber Amber Amber	Recovery mode	 Green Amber Amber Green	Undefined
 Amber Green Amber Amber	Processor, cache, etc.	 Amber Green Amber Green	Undefined
 Green Green Amber Amber	Memory, auto-size, shadow, etc.	 Green Green Amber Green	Undefined
 Amber Amber Green Amber	PCI bus initialization	 Amber Amber Green Green	Undefined
 Green Amber Green Amber	Video	 Green Amber Green Green	Undefined
 Amber Green Green Amber	IDE bus initialization	 Amber Green Green Green	Undefined
 Green Green Green Amber	USB initialization	 Green Green Green Green	Booting operating system

Note: Undefined states are reserved for future use.

NOTE

After the system has booted, the diagnostic LEDs remain off during normal operation.

BIOS Error Messages

When a recoverable error occurs during the POST, the BIOS displays an error message describing the problem.

Table 33. 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.

continued

Table 33. 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.

B Regulatory and Integration Information

This appendix contains:

- Safety standards, electromagnetic compatibility regulations, and product certification markings for this desktop board
- Instructions and precautions for integrators who are installing this desktop board in a chassis

Regulatory Compliance

This desktop board complies with the following safety and EMC regulations when correctly installed in a compatible chassis.

Table 34. Safety Regulations

Regulation	Title
UL 1950/CSA950, 3rd edition, Dated 07-28-95	Bi-National Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (USA and Canada)
EN 60950, 2nd Edition, 1992 (with Amendments 1, 2, 3, and 4)	The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (European Community)
IEC 950, 2nd edition, 1991 (with Amendments 1, 2, 3, and 4)	The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (International)
EMKO-TSE (74-SEC) 207/94	Summary of Nordic deviations to EN 60950. (Norway, Sweden, Denmark, and Finland)

Table 35. EMC Regulations

Regulation	Title
FCC Class B	Title 47 of the Code of Federal Regulations, Parts 2 and 15, Subpart B, pertaining to unintentional radiators. (USA)
CISPR 22, 2nd Edition, 1993 (Class B)	Limits and methods of measurement of Radio Interference Characteristics of Information Technology Equipment. (International)
VCCI Class B (ITE)	Implementation Regulations for Voluntary Control of Radio Interference by Data Processing Equipment and Electronic Office Machines. (Japan)
EN55022 (1994) (Class B)	Limits and methods of measurement of Radio Interference Characteristics of Information Technology Equipment. (Europe)
EN50082-1 (1992)	Generic Immunity Standard; Currently compliance is determined via testing to IEC 801-2, -3, and -4. (Europe)
ICES-003 (1997)	Interference-Causing Equipment Standard, Digital Apparatus, Class B (Including CRC c.1374). (Canada)
AS/NZ 3548	Australian Communications Authority (ACA), Standard for Electromagnetic Compatibility.

Product Certification Markings

This printed circuit assembly has the following product certification markings:

- UL Joint Recognition mark: Consists of small c followed by a stylized backward UR and followed by a small US (Component side)
- Manufacturer's recognition mark: Consists of a unique UL recognized manufacturer's logo, along with a flammability rating (94V-0) (Solder side)
- UL file number for desktop boards: E139761 (Component side)
- PB part number: Intel bare circuit board part number (Solder side) 726794-003
- Battery "+ Side Up" marking: Located on the component side of the board in close proximity to the battery holder
- FCC logo/declaration: Located on the solder side
- ACA (C-Tick) mark: Consists of a unique letter C, with a tick mark; followed by N-232. Located on the component side of the desktop board and on the shipping container
- CE mark: Located on the component side and on the shipping container

Installation Precautions

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

To avoid injury, be careful of:

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

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

WARNING

Do not open the power supply. Risk of electric shock and burns from high voltage and rapid overheating. Refer servicing of the power supply 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.

Ensure Electromagnetic Compatibility (EMC)

Before computer integration, make sure that the power supply and other modules have passed EMC testing using a desktop board with a processor from the same family and operating at the same (or higher) speed as the processor on this desktop board.

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

- Certifications
- External I/O cable shielding and filtering
- Mounting, grounding, and bonding requirements
- Keying connectors when mating the wrong connectors could be hazardous

If the power supply and other modules have not passed applicable EMC testing before integration, EMC testing must be conducted on a representative sample of the newly completed computer.

Ensure Chassis and Accessory Module Certifications

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

In Europe

The CE marking signifies compliance with all relevant European requirements. If the chassis does not bear the CE marking, obtain a supplier's Declaration of Conformity to the appropriate standards required by the European EMC Directive and Low Voltage Directive. Other directives, such as the Machinery and Telecommunications Directives, might also apply depending on the type of product. No regulatory assessment is necessary for low voltage DC wiring used internally or wiring used externally when provided with appropriate overcurrent protection. Appropriate protection is provided by a maximum 8 A current limiting circuit, or a maximum 5 A fuse, or Positive Temperature Coefficient (PTC) resistor. All Intel desktop boards now have PTCs on all external ports that provide DC power externally.

In the United States

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

In Canada

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

Prevent Power Supply Overload

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

Place Battery Marking on the Computer

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

⚠ WARNINGS

Danger of explosion if battery is incorrectly replaced.

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

Use Only for Intended Applications

This desktop board was evaluated 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, (such as medical, industrial, alarm systems, and test equipment) might require further evaluation.