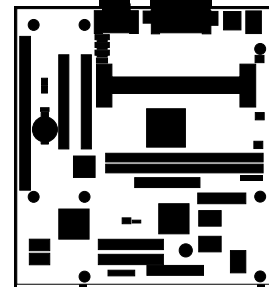


MU440EX Motherboard Product Guide



Order Number: 710026-001

Revision History

Revision	Revision History	Date
-001	Initial release of the MU440EX Motherboard Product Guide.	March 1998

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 numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe B prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

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An Intel product, when used in accordance with its associated documentation, is "Year 2000 Capable" when, upon installation, it accurately stores, displays, processes, provides, and/or receives date data from, into, and between the twentieth and twenty-first centuries, including leap year calculations, provided that all other technology used in combination with said product properly exchanges date data with it.

Copies of documents which have an ordering number and are referenced in this document, or other Intel literature, may be obtained from:

Intel Corporation
P.O. Box 5937
Denver, CO 80217-9808

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1 Motherboard Features

This chapter gives an overview of the MU440EX motherboard, including:

- Features
- Components
- Back panel I/O connectors

The remaining chapters explain how to:

- Add or upgrade components, such as processors or memory
- Use the BIOS Setup program to modify the motherboard's configuration
- Upgrade the BIOS

Features Summary

- microATX form factor, 8.8 x 9.6 inches with eight mounting screw holes
- Support for a single Pentium® II processor or an Intel® Celeron™ processor with a 66 MHz host bus speed and Slot 1 connector
- Two PCI and one ISA expansion slots
- Two dual inline memory module (DIMM) sockets for up to 256 MB of synchronous DRAM (SDRAM) memory
- Integrated ATI Rage Pro Turbo 1X† Accelerated Graphics Port (A.G.P.) controller
- Sound Blaster†-compatible, 16-bit stereo, full-duplex audio with MIDI/game port, audio line in and line out connectors, and microphone connector
- Support for a single diskette drive and up to four PCI/IDE drives
- One parallel, one serial (COM1), and two Universal Serial Bus (USB) ports
- PS/2†-compatible mouse and keyboard connectors
- Intel/Phoenix Basic Input/Output System (BIOS)
- Power management with optional Wake on Ring and optional Wake on LAN† technology
- Battery-backed real-time clock
- Single-jumper configuration

Software drivers and utilities are available from Intel.

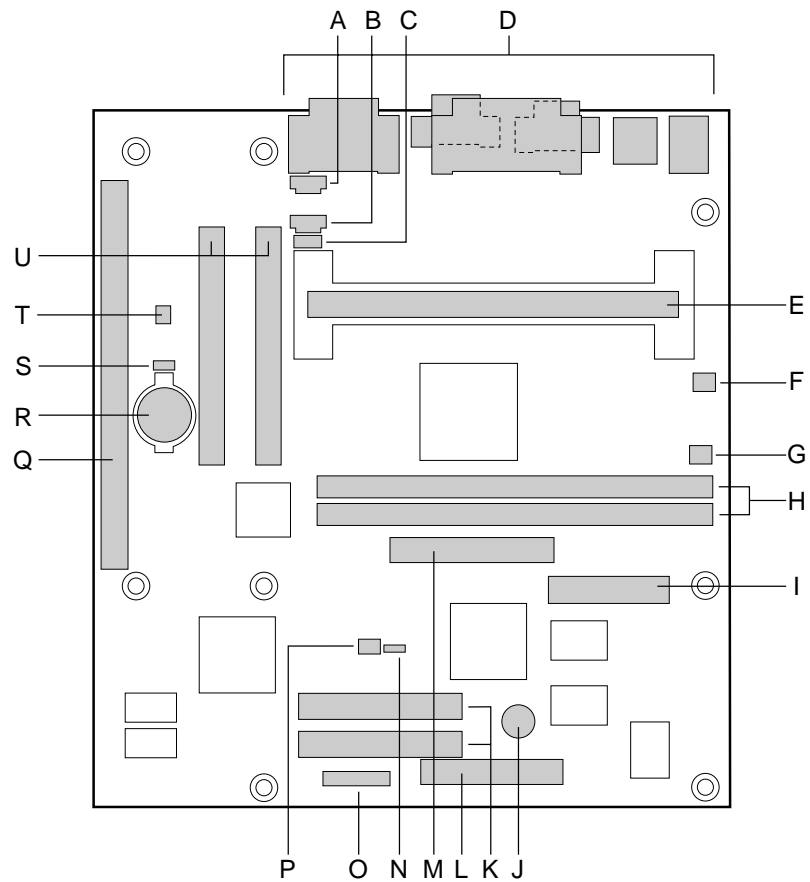
⇒ NOTE

For information about Intel® motherboards, including technical product specifications, BIOS upgrades, and device drivers, see “Products” at the Intel World Wide Web site:

<http://developer.intel.com/>

Components

Figure 1 shows the major components on the motherboard.



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- | | | | |
|---|---------------------------------|---|---|
| A | Telephony connector | L | Diskette drive connector |
| B | CD-ROM ATAPI audio in connector | M | ATI Media Channel connector (optional) |
| C | CD-ROM 2 mm audio in connector | N | Configuration jumper block |
| D | Back panel connectors | O | Front panel connectors |
| E | Slot 1 connector | P | PC/PCI connector (optional) |
| F | Fan 2 connector | Q | ISA slot |
| G | Fan 3 connector | R | Battery |
| H | DIMM sockets | S | Wake on LAN technology connector (optional) |
| I | Power supply connector | T | Wake on Ring connector (optional) |
| J | Speaker (optional) | U | PCI slots |
| K | IDE connectors | | |

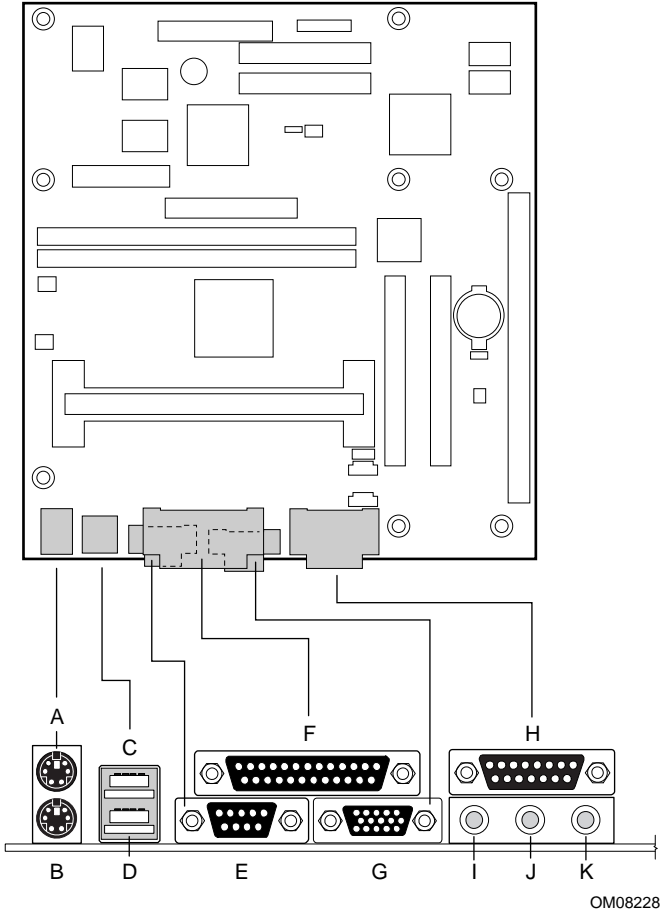
Figure 1. Motherboard Components

⇒ **NOTE**

Components labeled optional are not included on some MU440EX motherboards.

Back Panel I/O Connectors

Figure 2 shows the back panel I/O connectors on the motherboard.



- | | | | |
|---|------------------------|---|----------------|
| A | PS/2 keyboard or mouse | G | Video |
| B | PS/2 keyboard or mouse | H | MIDI/game Port |
| C | USB Port 1 | I | Audio Line Out |
| D | USB Port 0 | J | Audio Line In |
| E | Serial Port A | K | Audio Mic In |
| F | Parallel Port | | |

Figure 2. Back Panel I/O Connectors

Microprocessor

The motherboard supports a single processor. Processors are not included with the MU440EX motherboard and must be purchased separately. You can use any of these processors with the MU440EX:

- Pentium II processor operating at 233 MHz, 266 MHz, 300 MHz, or 333 MHz with a 66 MHz host bus frequency.
- Celeron processor operating at 266 MHz with a 66 MHz host bus frequency.

The Pentium II processor is packaged in a Single Edge Contact (S.E.C.) cartridge. The Celeron processor is packaged in a Single Edge Processor (S.E.P.) package. Some packages include an integrated fan for cooling.

The processor connects to the motherboard through the Slot 1 connector, a 242-pin edge connector. When mounted in Slot 1, the processor is secured by a retention mechanism attached to the motherboard.

Microprocessor Upgrades

The motherboard can be upgraded with compatible processors that run at higher speeds. To upgrade the processor, use the BIOS Configure mode to change the processor speed. See “How to Set the Processor Speed and Clear Passwords” on page 40.

Expansion Slots

The motherboard has three expansion slots for installing add-in boards, such as network cards, that expand the capabilities of your computer:

- One ISA slot
- Two PCI slots

Main Memory

The motherboard has two sockets for installing DIMMs, which support a total memory configuration of 8 MB to 256 MB. DIMMs must meet the following requirements:

- 168-pin DIMMs with gold-plated contacts
- 3.3 V, 4-clock, 64-bit, 66 MHz SDRAM
- Non-Error Checking and Correcting (non-ECC) memory
- Serial presence detect (SPD) EEPROM or non-SPD memory
- Unbuffered, single- or double-sided, DIMMs in the following sizes:

DIMM Size	Configuration
8 MB	1 Mbit x 64
16 MB	2 Mbit x 64
32 MB	4 Mbit x 64
64 MB	8 Mbit x 64
128 MB	16 Mbit x 64

⇒ NOTE

All memory components and DIMMs used with the MU440EX motherboard must comply with the PC SDRAM specifications. These include the PC SDRAM Specification (memory component specific) and the PC Unbuffered DIMM Specification. When using a DIMM with SPD, the DIMM must also comply with the PC Serial Presence Detect Specification. You can access these documents through the Internet at: <http://www.intel.com/design/pcisets/memory/>

The system automatically detects and configures the memory. To install memory, see “How to Install Memory” on page 32.

A.G.P. Display Controller

The motherboard includes an integrated ATI Rage Pro Turbo 1X A.G.P. display controller. The controller includes 2 MB of SGRAM video memory standard (4 MB is optional). The controller supports resolutions up to 1600 x 1200 pixels and up to 16.7 million colors (24-bit).

An optional ATI Multimedia Channel connector provides a 16-bit, bi-directional video interface.

Audio Subsystem

The Audio Codec '97-compatible audio subsystem consists of the following:

- Yamaha YMF 740-V digital controller
- Analog Devices AD1819A analog codec
- Back panel and onboard audio connectors
- Onboard speaker (optional)

The audio subsystem is compatible with Sound Blaster and features 16-bit stereo, full-duplex digital sound with a sampling rate up to 48 kHz. The system supports 32-voice software wavetable synthesis.

Audio Connectors

The audio connectors on the back panel include:

- Stereo line-level output (Line Out)
- Stereo line-level input (Line In)
- Mic In

Connectors on the motherboard include:

- CD-ROM for connecting an internal CD-ROM to the input of the audio system
- Telephony for connecting internal monophonic telephony devices to the input and output of the audio system

See “Motherboard Connectors” on page 57 for the location and pinouts of the connectors on the motherboard.

Speaker (Optional)

An optional 47 Ω inductive speaker is mounted on the motherboard. The speaker provides audible error code (beep code) information during the power-on self test (POST).

IDE Drive Support

The motherboard supports up to four IDE devices, such as hard disk drives, CD-ROM drives, Iomega ZIP[†] drives, and laser servo (LS-120) removable-media drives. When you install a new IDE device, the BIOS automatically detects and configures the device. There is no need to run the BIOS Setup program after installing an IDE device.

A PCI enhanced IDE interface handles the exchange of information between the processor the IDE devices. The interface supports:

- PIO mode 3, PIO mode 4, ATAPI, Ultra DMA, and DMA bus mastering devices
- Logical block addressing (LBA) of hard drives larger than 528 MB and extended cylinder head sector (ECHS) translation modes

Diskette Drive Support

The motherboard also supports a single diskette drive with the following capacities:

- 360 KB, 5¼"
- 1.2 MB, 5¼"
- 720 KB, 3½"
- 1.44/1.25 MB, 3½"
- 2.88 MB, 3½"

Input/Output (I/O) Ports

The motherboard includes these I/O ports:

- Two PS/2 ports for keyboard and mouse

⇒ NOTE

The mouse and keyboard can be plugged into either PS/2 connector. Power to the computer should be turned off before a keyboard or mouse is connected or disconnected.

- One multimode bi-directional parallel port
 - Standard mode: Centronics-compatible operation
 - High speed mode: support for Extended Capabilities Port (ECP) and Enhanced Parallel Port (EPP); EPP requires a driver from the peripheral manufacturer
- One serial port (COM1)
 - 9-pin D-Sub connector on the back panel
 - Up to 115.2 Kbits/sec transfer rate
- Flexible IRQ and DMA mapping for Windows[†] 95
- Two Universal Serial Bus (USB) Ports:
 - Self-identifying peripherals can be plugged in while the computer is running
 - Support for up to 127 physical devices (to attach more than two devices, connect an external hub to either of the built-in ports)
 - Guaranteed bandwidth and low latencies appropriate for applications such as telephony and audio
- Additional ports, for the audio subsystem, are listed in the “Audio Connectors” section on page 12.

⇒ NOTE

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

BIOS

The motherboard's system BIOS is contained in a flash memory device. The BIOS provides the power-on self test (POST), the BIOS Setup program, and the PCI and IDE auto-configuration utilities.

BIOS Upgrades

Because the BIOS is stored in a flash memory device, you can upgrade the BIOS by using a software utility from a diskette, hard disk, or over a network. For information on upgrading the BIOS, see "Upgrading the BIOS" on page 53.

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.

However, PCI add-in boards use the same IRQ resources as ISA add-in boards. If you install both a PCI and an ISA add-in board, you must specify the IRQ used by the ISA card.

The PCI auto-configuration utility complies with version 2.1 of the PCI BIOS specification.

IDE Auto Configuration

If you install an IDE device (such as a hard disk 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.

ISA Plug and Play Capability

The motherboard automatically configures Plug and Play ISA cards and lets you manage resources for legacy (non-Plug and Play) ISA cards when used with the ISA Configuration Utility (ICU) or a Plug and Play compatible operating system like Windows 95. To obtain the ICU, contact your computer supplier.

Security Passwords

The BIOS includes security features that restrict whether the BIOS Setup program can be accessed and who can boot the computer. An Administrative password and a User password can be set for the Setup program and for booting the computer, with the following restrictions:

- The Administrative password gives unrestricted access to view and change all the Setup options in the Setup program. This is Administrative mode.
- The User password gives restricted access to view and change Setup options in the Setup program. This is User mode.
- If only the Administrative password is set, pressing the <Enter> key at the password prompt of the Setup program gives the user restricted access to Setup.

- If both the Administrative and User passwords are set, you must enter either the Administrative password or the User password to access Setup.
- Setting a User password restricts who can boot the computer. The password prompt is displayed before the computer is booted. If only the Administrative 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.

Power Management

The motherboard supports two types of power management: Advanced Power Management (APM) and Advanced Configuration and Power Interface (ACPI).

Advanced Power Management (APM)

APM's energy-saving standby mode can be initiated in the following ways:

- Specify a time-out period in Setup
- Press the suspend/resume switch connected to the front panel sleep connector
- Use an operating system option, such as the Suspend menu item in Windows 95

In standby mode, the motherboard can reduce power consumption by spinning down hard drives, and reducing power to or turning off VESA[†] DPMS-compliant monitors. Power-management mode can be enabled or disabled in Setup (see "Setup Menus" on page 41 and "Power Menu" on page 50).

While in standby mode, the system retains the ability to respond to external interrupts and service requests, such as incoming faxes or network messages. Any keyboard or mouse activity brings the system out of standby mode and immediately restores power to the monitor.

The BIOS enables APM by default, but the operating system must support an APM driver for the power-management features to work. For example, Windows 95 supports the power-management features upon detecting that APM is enabled in the BIOS.

Advanced Configuration and Power Interface (ACPI)

ACPI gives the operating system direct control over the power management and Plug and Play functions of a computer. ACPI requires an ACPI-aware operating system. ACPI features include:

- Plug and Play (including bus and device enumeration) and APM functionality normally contained in the BIOS
- Power management control of individual devices, add-in boards (some add-in boards may require an ACPI-aware driver), video monitor, and hard disk drives
- Methods for achieving less than 30 W system operation in the Power On Suspend sleeping state, and less than 5 W system operation in the Soft Off sleeping state
- A Soft Off feature that enables the operating system to power off the computer
- Support for multiple wake up events, including Wake on Ring and Wake on LAN technology
- Support for power-button override: normal depress puts system in sleep mode; four-second or greater depress turns off system

Wake on Ring (Optional)

Wake on Ring powers up the computer from sleep or soft-off mode when a call is received on a telephony device, such as a modem, configured for operation on COM1. The first incoming call powers up the computer. A second call must be made to access the computer. To access this feature, use the Wake on Ring connector. See “Motherboard Connectors” on page 57 for the location and pinouts of the Wake on Ring connector.

Wake on LAN Technology (Optional)

Wake on LAN technology powers up the computer from sleep or soft-off mode when a wakeup signal is received from the network. Wake on LAN technology requires a PCI add-in network interface card (NIC) with remote wakeup capabilities. The remote wakeup connector on the NIC must be connected to the onboard Wake on LAN technology connector. The NIC monitors network traffic at the MII interface; upon detecting a Magic Packet[†], the NIC asserts a wakeup signal that powers up the computer. To access this feature use the Wake on LAN technology connector. See “Motherboard Connectors” on page 57 for the location and pinouts of the Wake on LAN technology connector.



CAUTION

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

Real-Time Clock

The motherboard has a time-of-day clock and 100-year calendar that rolls over to 2000 at the turn of the century. A battery on the motherboard keeps the clock current when the computer is turned off.

⇒ NOTE

On systems with Intel motherboards you should access the date indirectly from the Real-Time Clock (RTC) via the BIOS. The BIOS on Intel motherboards 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) to read the date and, if less than 80 (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.

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

Battery

A battery on the motherboard keeps the clock and the values in CMOS RAM current when your computer is turned off. To replace the battery, see “How to Replace the Battery” on page 35.

Single-Jumper Configuration

The motherboard contains a single jumper for setting the boot mode (see “Setup Program Modes” on page 39). Other configuration settings, such as memory configuration, are controlled by the Setup program or are handled automatically by the BIOS.

Motherboard Features

2 Installing and Replacing Motherboard Components

This chapter describes:

- How to install and remove the motherboard
- How to install a motherboard support standoff
- How to install a Pentium II processor
- How to install a Celeron processor
- How to prepare the motherboard for a processor upgrade
- How to install and remove memory
- How to replace the battery
- How to install the I/O shield

Before You Begin



CAUTION

Before you install this motherboard in a chassis, see Appendix B on page 69 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 numbers, installed options, and configuration information.
- Use an antistatic wrist strap and a conductive foam pad when working on the motherboard.



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 motherboard can continue to operate even though the front panel power button is off.



CAUTION

Electrostatic discharge (ESD) can damage components. Perform the procedures described in this chapter only at an ESD workstation. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the computer chassis.

How to Install and Remove the Motherboard

Refer to your chassis manual for instructions on installing and removing the motherboard. The motherboard is secured to the chassis by eight screws. Figure 3 shows the locations of the mounting screw holes.

⇒ NOTES

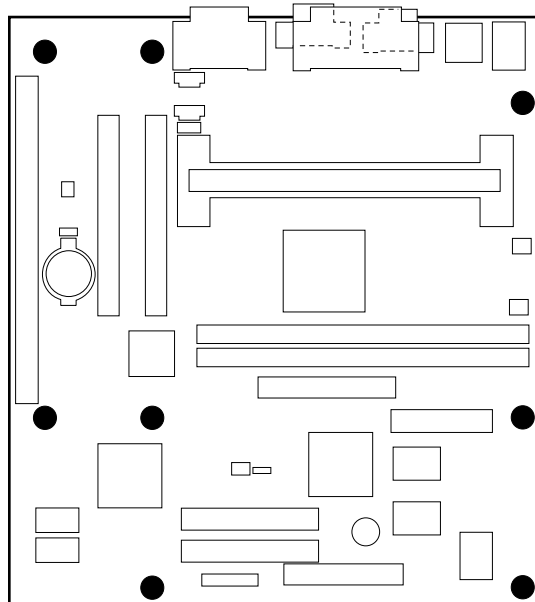
You will need a Phillips (#2 bit) screwdriver.

Refer to Appendix B on page 69 for regulatory requirements and installation instructions and precautions.



WARNING

This procedure should be done only by qualified technical personnel. Disconnect the computer from its power source before doing the procedures described here. Failure to disconnect the power before you open the computer can result in personal injury or equipment damage.



OM08229

Figure 3. Mounting Screw Holes

How to Install a Motherboard Support Standoff

The motherboard is designed for a microATX chassis, but you can also install it in a standard ATX chassis. The ATX chassis lacks one of the eight motherboard support positions. The following steps describe how to install an additional motherboard support standoff in a standard ATX chassis, and then secure the motherboard to this added standoff. Figure 4 shows the standoff (B), its associated adhesive pad (C), and a standoff retention pin (A).

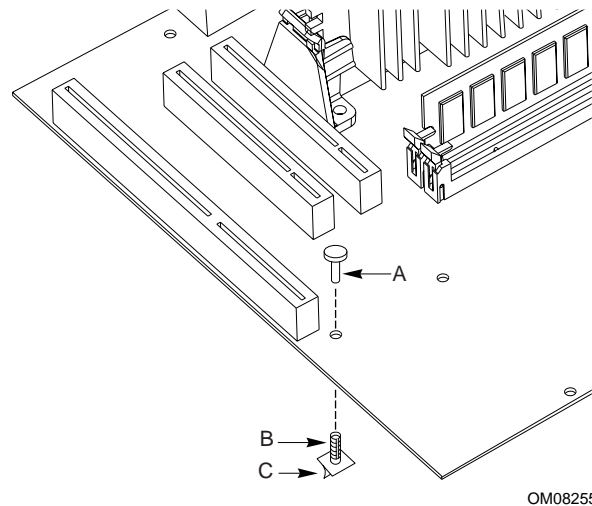


Figure 4. Installing a Motherboard Support Standoff

Perform the following steps to install the added standoff for the motherboard:

1. Trial fit the standoff (B) in the motherboard (in the position indicated in the figure), then position the motherboard in the ATX chassis on the existing standoffs, noting the required mounting location for the new standoff in the chassis.
2. Remove the motherboard, clean the mounting location, then remove the protective paper (C) covering the adhesive at the base of the new standoff (B).
3. Remount the motherboard in the chassis, and press down on the new standoff (B) until the adhesive secures it to the chassis.
4. Position the motherboard over the new standoff (B) so that the board is level with the other standoffs, then insert the standoff retention pin (A) to lock the motherboard at that height.

How to Install a Pentium® II Processor

To install a processor, you must:

1. Install the retention mechanism.
2. Install the processor.
3. Set the processor speed.

Detailed instructions follow for installing the retention mechanism and processor. To set the processor speed, see “How to Set the Processor Speed and Clear Passwords” on page 40.

⇒ **NOTE**

Celeron processors use a different retention mechanism. If you have a Celeron processor, see “How to Install a Celeron Processor” on page 25.

⇒ **NOTE**

If you are installing a processor upgrade, see “How to Upgrade the Processor” on page 27.

Installing the Retention Mechanism for the Pentium II Processor

The processor retention mechanism is shipped with the fasteners and retainer pins pre-assembled. Figure 5 shows the mechanism ready for installation on the motherboard, with an exploded view of a fastener and retainer pin. Detailed installation instructions follow the figure.

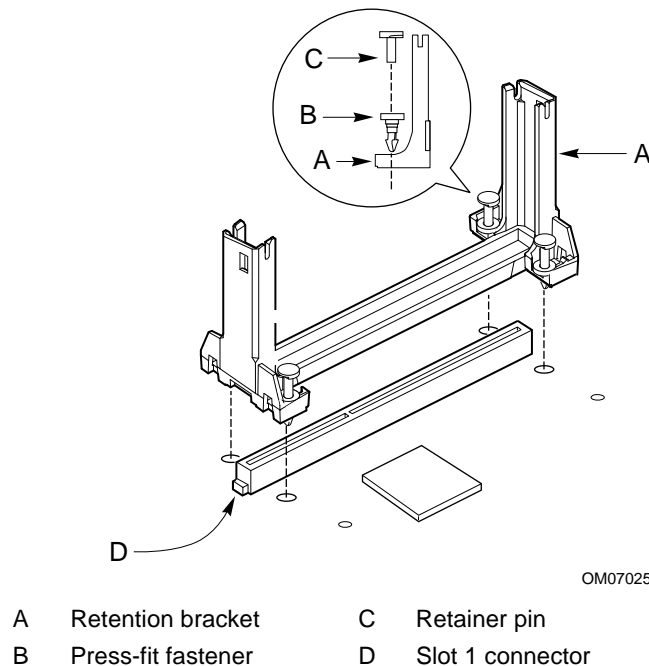


Figure 5. Installing the Pentium II Processor Retention Mechanism

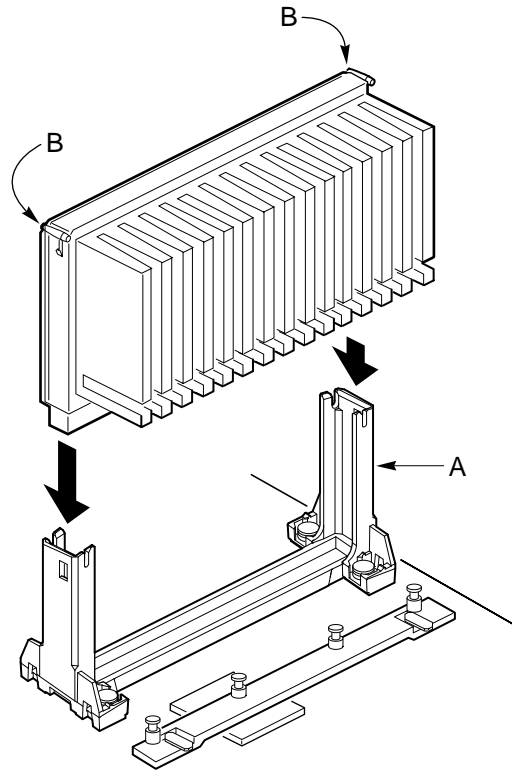
To install the retention mechanism, follow these steps:

1. Observe the precautions in “Before You Begin” (see page 19).
2. Support the motherboard so that it will not bend while the retention mechanism is being pressed into the mounting holes; leave space below each mounting hole for the fastener to protrude through the hole.
3. Find the Slot 1 connector on the motherboard. For the location of the connector, see Figure 1 on page 8.
4. Orient the retention bracket (A) so the tab of the Slot 1 connector (D) matches the corresponding cutout in the retention bracket, then position the retention bracket on the motherboard (see Figure 5 on page 22).
5. Push down on the retention bracket (A) until the fasteners (B) snap through the holes in the motherboard. Before proceeding, make sure all four fasteners are correctly seated and the retention mechanism fits snugly against the board.
6. Push each retainer pin (C) into the fastener (B) until the head of the pin is seated against the head of the fastener.

Installing the Pentium II Processor

To install the processor, follow these steps:

1. Insert the processor in the retention mechanism as shown in Figure 6 on page 24.
2. Press down on the processor until it is firmly seated in the Slot 1 connector and the latches on the processor lock into place.

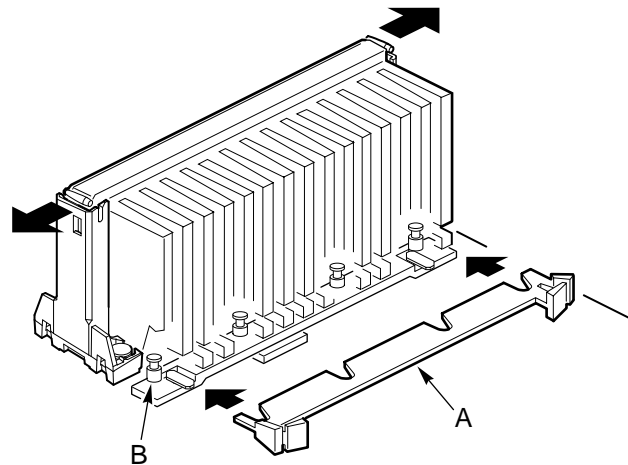


OM08232

A Retention mechanism B Latches

Figure 6. Installing the Pentium II Processor

3. Slide the top heatsink support bar onto the retaining pins of the support's base as shown in Figure 7.



OM08234

A Heatsink support bar B Retaining pins

Figure 7. Installing the Heatsink Support Top Bar

How to Install an Intel® Celeron™ Processor

To install a processor, you must:

1. Install the retention mechanism.
2. Install the processor.
3. Set the processor speed.

Detailed instructions follow for installing the retention mechanism and processor. For instructions on setting the processor speed, see “How to Set the Processor Speed and Clear Passwords” on page 40.

⇒ NOTE

Pentium II processors use a different retention mechanism. If you have a Pentium II processor, see “How to Install a Pentium II Processor” on page 22.

⇒ NOTE

If you are installing a processor upgrade, see “How to Upgrade the Processor” on page 27.

Installing the Retention Mechanism for the Celeron Processor

The processor retention brackets are shipped with the fasteners and retainer pins pre-assembled. Figure 8 on page 26 shows the two ends of the brackets ready for installation on the motherboard, with an exploded view of a fastener and retainer pin.

To install the retention mechanism, follow these steps:

1. Observe the precautions in “Before You Begin” (see page 19).
2. Support the motherboard so that it will not bend while the retention mechanism is being pressed into the mounting holes; leave space below each mounting hole for the fastener to protrude through the hole.
3. Find the Slot 1 connector on the motherboard. For the location of the connector, see Figure 1 on page 8.
4. Orient one of the retention brackets (A) so the tab of the Slot 1 connector (D) matches the corresponding cutout in the retention bracket, then position the retention bracket on the motherboard (see Figure 8 on page 26).
5. Push down on the retention bracket (A) until the fasteners (B) snap through the holes in the motherboard. Before proceeding, make sure both fasteners are correctly seated and the retention mechanism fits snugly against the board.
6. Push each retainer pin (C) into the fastener (B) until the head of the pin is seated against the head of the fastener.
7. Repeat steps 4 through 6 for the other retention bracket.

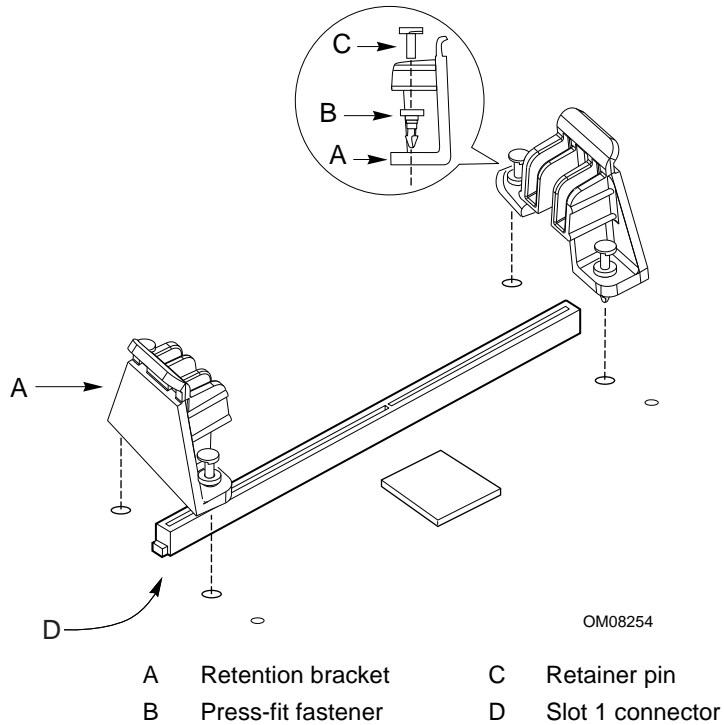


Figure 8. Installing the Celeron Processor Retention Mechanism

Installing the Celeron Processor

To install the processor, follow these steps:

1. Orient the processor so that the notch in the edge connector of the processor lines up with the key (C) in the Slot 1 connector (see Figure 9 on page 27).
2. Insert the processor in the center slots of the retention mechanism, as shown in Figure 9, with the ends of the heatsink in the adjacent slots.
3. Press down on the processor until it is firmly seated in the Slot 1 connector and the latches on the retention mechanism lock into place on the ends of the heatsink.

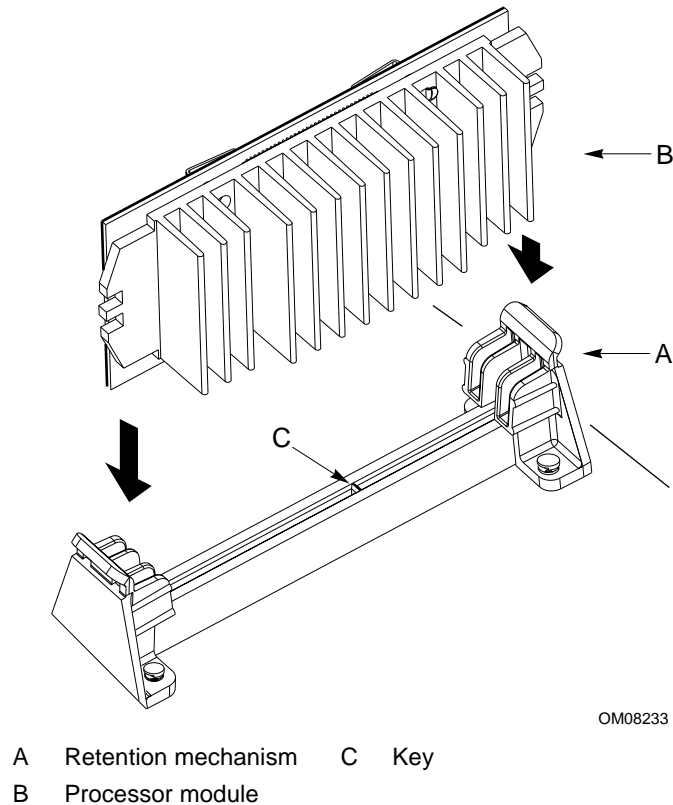


Figure 9. Installing the Celeron Processor

How to Upgrade the Processor

Use the instructions in this section to prepare the motherboard for a processor upgrade by removing the existing processor:

- If you are upgrading from a Pentium II processor, see “Removing a Pentium II Processor” below
- If you are upgrading from a Celeron processor, see “Removing a Celeron Processor” on page 31

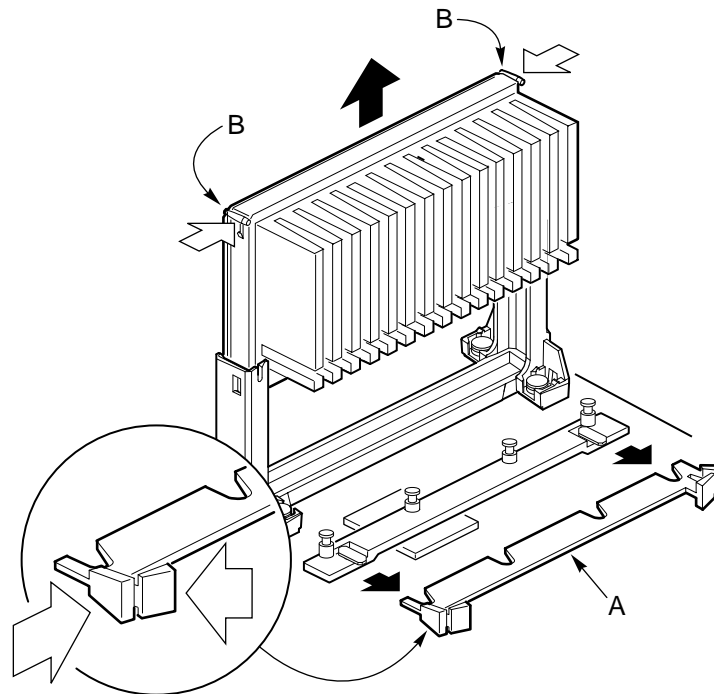
After you have removed the existing processor, see the documentation that came with the new processor for instructions on installing that processor. If you need instructions for installing the retention mechanism for the new processor, see “Installing the Retention Mechanism for the Pentium II Processor” on page 22 or “Installing the Retention Mechanism for the Celeron Processor” on page 25.

Removing a Pentium II Processor

To remove the installed processor, follow these steps:

1. Observe the precautions in “Before You Begin” (see page 19).
2. Turn off all peripheral devices connected to the computer. Turn off the computer.

3. Remove the computer cover.
4. Remove the motherboard from the computer chassis. (See “How to Install and Remove the Motherboard” on page 20.)
5. Place the motherboard on a flat work surface and remove any components that block access to the installed processor.
6. Remove the top bar of the heatsink support from the base as shown in Figure 10. Press in on the latches to release the top bar.



OM08238

- A Heatsink support top bar
- B Latches

Figure 10. Removing the Heatsink Support Top Bar and the Processor



CAUTION

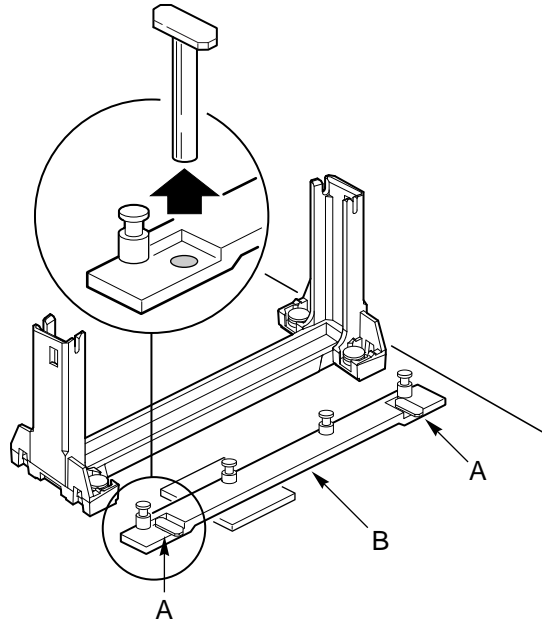
Pressing on the motherboard or components while removing the processor can cause damage. If necessary, you can safely press on the motherboard's plastic connectors to gain leverage while removing the processor.

7. Remove the processor by pressing in on the latches and pulling the processor straight up as shown in Figure 10. Place the processor aside.

⇒ **NOTE**

To remove the heatsink support base from the motherboard, you need a special removal tool (MID #58982) that is available from Dexter Design (call 503-648-7000 for ordering information).

8. With your fingers, remove the two retention pins from the heatsink support base as shown in Figure 11.

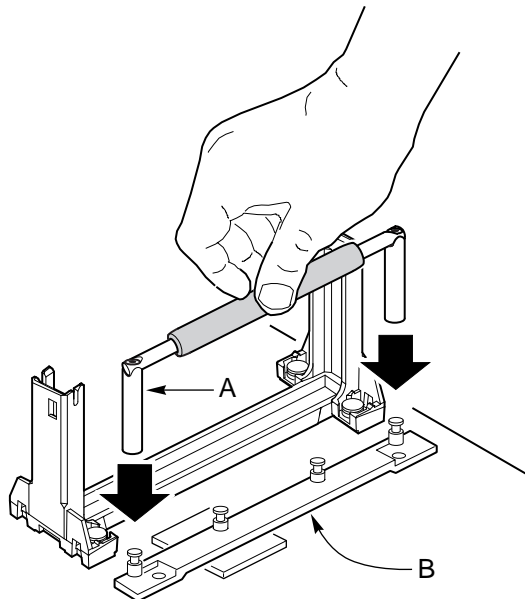


OM08240

- A Retention pins
- B Heatsink support base

Figure 11. Removing the Heatsink Support Retention Pins

- Place the heatsink support removal tool over the two outside posts of the heatsink support base as shown in Figure 12. Make sure the tool completely engages the posts.

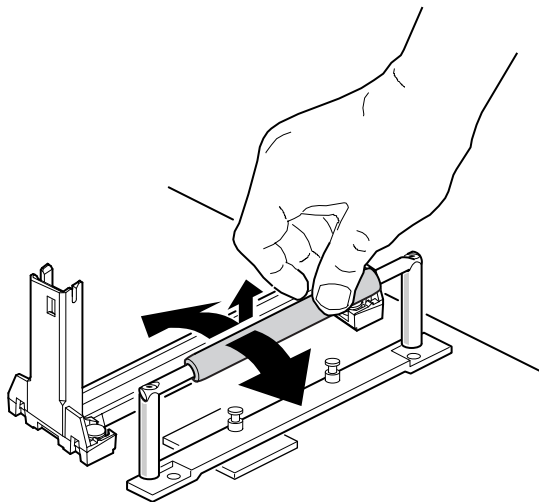


OM08241

A Heatsink support removal tool B Heatsink support base

Figure 12. Placing the Heatsink Support Base Removal Tool on the Retention Pins

- Carefully rock the tool back and forth until the heatsink support base disengages from the holes in the motherboard (as shown in Figure 13). There is an audible click when the base disengages from the motherboard.



OM08242

Figure 13. Using the Heatsink Support Base Removal Tool

- Remove the tool and the heatsink support base from the motherboard.

That completes the removal of the Pentium II processor and heatsink support base. For instructions on installing the new processor, see the documentation that came with the new processor. If you need instructions for installing the retention mechanism for the new processor, see “Installing the Retention Mechanism for the Pentium II Processor” on page 22 or “Installing the Retention Mechanism for the Celeron Processor” on page 25.

Removing a Celeron Processor

To remove the installed processor, follow these steps:

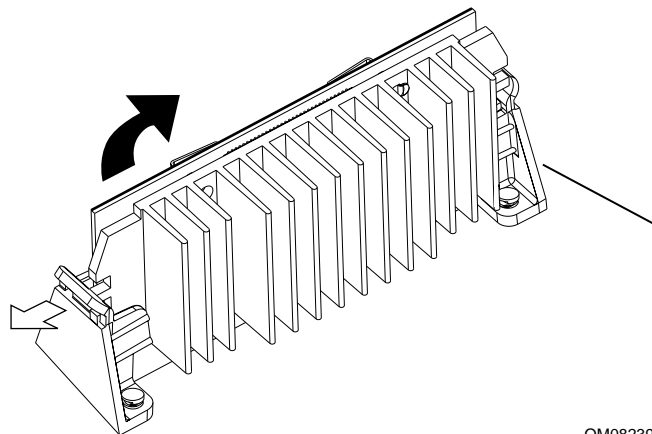
1. Observe the precautions in “Before You Begin” (see page 19).
2. Turn off all peripheral devices connected to the computer. Turn off the computer.
3. Remove the computer cover.
4. Remove the motherboard from the computer chassis. (See “How to Install and Remove the Motherboard” on page 20.)
5. Place the motherboard on a flat work surface and remove any components that block access to the installed processor.



CAUTION

Pressing on the motherboard or components while removing the processor can cause damage. If necessary, you can safely press on the motherboard’s plastic connectors to gain leverage while removing the processor.

6. Release the processor by pulling out on the latch at the top of one retention mechanism and rotating the processor until it clears the latch as shown in Figure 14.



OM08239

Figure 14. Removing the Celeron Processor

7. Lift the processor straight up to remove it.

⇒ NOTE

If you are replacing the processor with another Celeron processor, you don't need to remove the retention mechanism, and you should skip the remaining steps. The existing retention mechanism will work with the new Celeron processor.

⇒ NOTE

To remove the processor retention mechanism from the motherboard, you need a special removal tool (P/N 000020) that is available from Napco (call 602-968-5586 for ordering information).

8. Remove the four retainer pins from the fasteners in the retention mechanism: insert the prongs of the removal tool under the head of each retainer pin and pull back on the handle of the tool to extract the pin.
9. Remove the two ends of the retention mechanism from the board. You might need to squeeze the tips of the fasteners on the underside of the motherboard so the fasteners will pass through the holes.

That completes the removal of the Celeron processor and retention mechanism. For instructions on installing the new processor, see the documentation that came with the new processor. If you need instructions for installing the retention mechanism for the new processor, see “Installing the Retention Mechanism for the Pentium II Processor” on page 22.

How to Install Memory

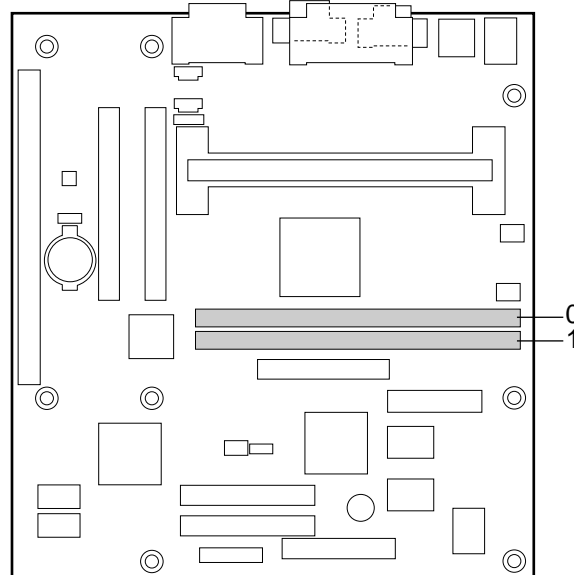
You can install from 8 MB to 256 MB of memory in the motherboard DIMM sockets. The board has DIMM sockets arranged as banks 0 and 1. For specifications on the type of memory, see “Main Memory” on page 11.

When adding memory, follow these guidelines:

- You can install DIMMs in either of the two banks.
- You can use different sizes of DIMMs in different banks.

The BIOS automatically detects the size and type of installed memory; there is no need to run the BIOS Setup program after installing memory.

Figure 15 shows the location of the DIMM sockets.

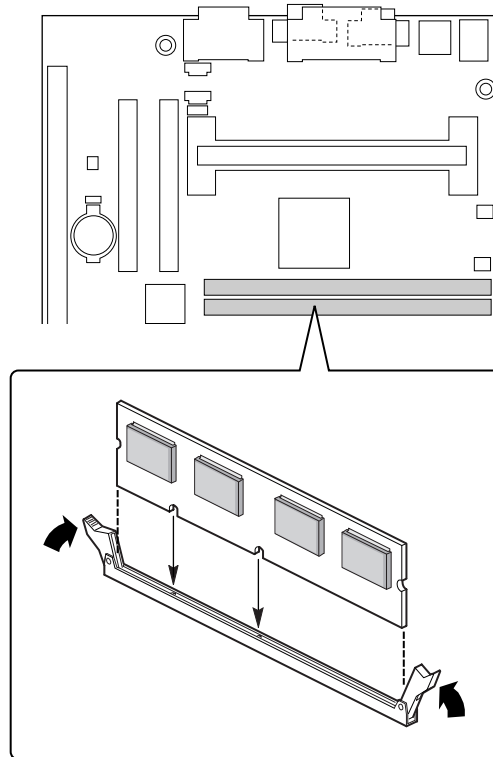


OM08244

Figure 15. Location of DIMM Sockets

To install DIMMs, follow these steps:

1. Observe the precautions in “Before You Begin” (see page 19).
2. Turn off all peripheral devices connected to the computer. Turn off the computer.
3. Remove the computer cover and locate the DIMM sockets.
4. Holding the DIMM by the edges, remove it from its antistatic package.
5. Make sure the clips at either end of the socket are pushed away from the socket.
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 Figure 16 on page 34).
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 cover.



OM08245

Figure 16. Installing a DIMM

How to Remove Memory

To remove a DIMM, follow these steps:

1. Observe the precautions in "Before You Begin" (see page 19).
2. Turn off all peripheral devices connected to the computer. Turn off the computer.
3. Remove the computer cover.
4. Gently spread the retaining clips at each end of the socket. The DIMM pops out of the socket.
5. Hold the DIMM by the edges, lift it away from the socket, and store it in an antistatic package.
6. Reinstall and reconnect any parts you removed or disconnected to reach the DIMM sockets.

How to Replace the Battery

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

The battery should last about seven years. When the battery begins to fail, it loses voltage; when the voltage drops below a certain level, the 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 même type ou d'un type recommandé par le constructeur. Mettre au rebut 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

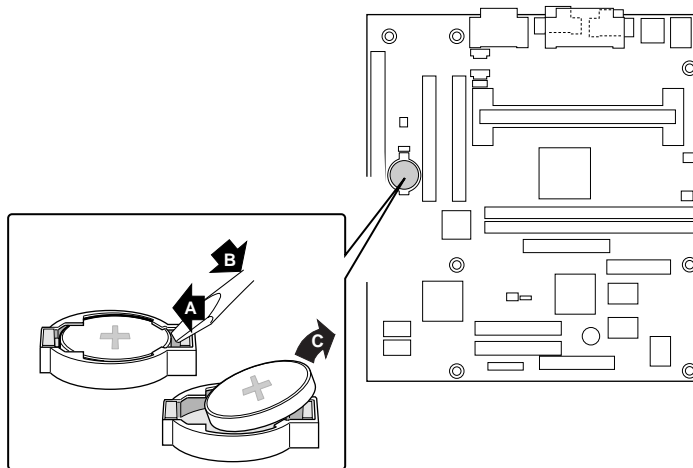
Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.

VAROITUS

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

To replace the battery, follow these steps:

1. Observe the precautions in “Before You Begin” (see page 19).
2. Turn off all peripheral devices connected to the computer. Turn off the computer.
3. Remove the computer cover.
4. Locate the battery on the motherboard (see Figure 17).
5. With a medium flat-bladed screwdriver, gently pry the battery free from its socket. Note the orientation of the “+” and “-” on the battery.
6. Install the new battery in the socket, orienting the “+” and “-” correctly.
7. Replace the computer cover.



OM08246

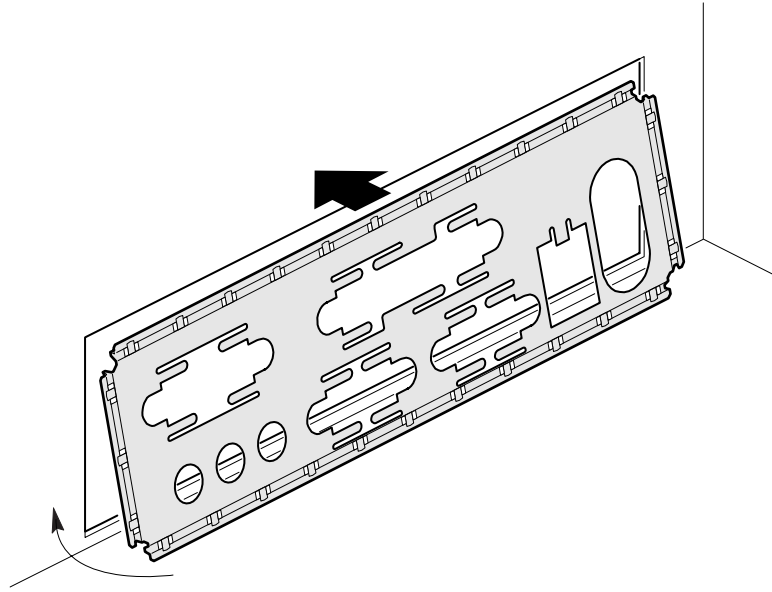
Figure 17. Replacing the Battery

⇒ **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.

How to Install the I/O Shield

Some motherboards come with a small I/O shield to limit electromagnetic radiation that might interfere with other electronic devices. To install the shield, from inside the chassis, press the shield into place so that it fits tightly and securely (see Figure 18). If the shield doesn't fit, obtain a properly sized shield from the chassis supplier.



OM07030

Figure 18. Installing the I/O Shield

3 Using the Setup Program

This chapter provides an overview of the BIOS Setup program. You can use the Setup program to change the configuration information and boot sequence for the computer.

⇒ **NOTE**

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

Setup Program Modes

The Setup program has three modes of operation:

- Normal mode for all setup operations except setting the processor speed and clearing passwords
- Configure mode for configuring the processor speed and clearing passwords (see “How to Set the Processor Speed and Clear Passwords” on page 40)
- Recovery mode for recovering the BIOS data

The Setup program operating mode is controlled by the setting of the configuration jumper block J8E1 (see Figure 19). The jumper is set to normal mode at the factory.

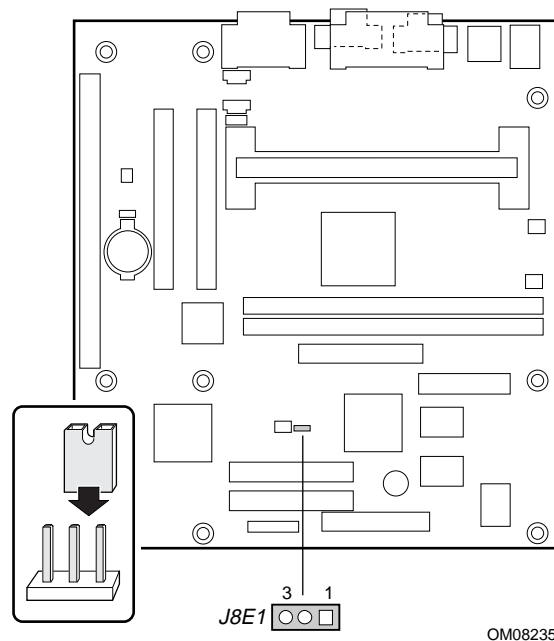


Figure 19. Location of the Configuration Jumper Block

Table 1 shows jumper settings for the different Setup modes.

Table 1. Jumper Settings for Setup Program Modes

Mode	Jumper	Description
Normal	1-2	BIOS uses current configuration and passwords for booting.
Configure	2-3	After the POST runs, Setup starts and displays the Maintenance menu. This menu displays options for setting the processor speed and clearing passwords.
Recovery	None	BIOS recovers data from a recovery diskette. Refer to Chapter 4 for information on recovering the BIOS data during an upgrade.

How to Set the Processor Speed and Clear Passwords

This procedure assumes that the motherboard is installed in the computer and the configuration jumper block is set to normal mode. Figure 19 on page 39 shows the location of the configuration jumper block on the motherboard. The jumper is set to normal mode at the factory.



CAUTION

To avoid bending or breaking pins, use caution when removing or installing a jumper.

To set the processor speed, follow these steps:

1. Observe the precautions in “Before You Begin” (see page 19).
2. Turn off all peripheral devices connected to the computer. Turn off the computer.
3. Remove the computer cover.
4. Find the configuration jumper block (see Figure 19 on page 39).
5. Place the jumper on pins 2-3 as shown below.



6. Replace the cover, turn on the computer, and allow it to boot.
7. The computer starts the Setup program. Setup displays the Maintenance menu.
8. To set processor speed:
 - a. Use the arrow keys to select the Processor Speed feature and press <Enter>. Setup displays a popup screen with the available processor speeds.
 - b. Use the arrow keys to select the processor speed. For example, select 266 for a 266 MHz Celeron processor. Press <Enter> to confirm the speed. Setup displays the Maintenance menu again.
9. To clear the passwords:
 - a. Use the arrow keys to select Clear Passwords and press <Enter>. Setup displays a pop-up screen requesting that you confirm clearing the password.
 - b. Select Yes and press <Enter>. Setup displays the Maintenance menu again.

10. Press <F10> to save the current values and exit Setup.
11. Turn off the computer.
12. Remove the computer cover.
13. To restore normal operation, place the configuration jumper on pins 1-2 as shown below.



14. Replace the cover and turn on the computer.
15. Verify the processor speed during POST.

Setup Menus

To enter the Setup program, turn on the computer and press <F2> when you see the message:

Press <F2> Key if you want to run SETUP

Table 2 is an overview of the menu screens in the Setup program.

Table 2. Setup Menu Bar

Setup Menu Screen	Description
Maintenance	Specifies the processor speed and clears the Setup passwords. This menu is only available in Configure mode. For information about Configure mode, see "Setup Program Modes" on page 39.
Main	Allocates resources for hardware components.
Advanced	Specifies advanced features available through the chipset.
Security	Specifies passwords and security features.
Power	Specifies power management features.
Boot	Specifies boot options and power supply controls.
Exit	Saves or discards changes to the Setup program options.

Function Keys

Table 3 shows the function keys available for menu screens.

Table 3. Setup Function Keys

Function Key	Description
<F1> or <Alt-H>	Brings up a help screen for the current item.
<Esc>	Exits the menu.
<←> or <→>	Selects a different menu screen.
<↑> or <↓>	Moves the cursor up or down.
<Home> or <End>	Moves the cursor to the top or bottom of the window.
<PgUp> or <PgDn>	Moves the cursor to the top or bottom of the window.
<F5> or <->	Selects the previous value for a field.
<F6> or <+> or <Space>	Selects the next value for a field.
<F9>	Loads the default configuration values for the current menu.
<F10>	Saves the current values and exit Setup.
<Enter>	Executes the command or selects the submenu.

Maintenance Menu

This menu is for setting the processor speed and clearing the Setup passwords. Setup only displays this menu in Configure mode. For information about setting Configure mode, see “Setup Program Modes” on page 39.

Table 4. Maintenance Menu

Feature	Options	Description
Processor Speed	<ul style="list-style-type: none"> • 233 • 266 • 300 • 333 	Specifies the processor speed in megahertz. This setup screen will only show speeds up to and including the maximum speed of the processor installed on the motherboard.
Clear All Passwords	No options	Clears the User and Administrative passwords.

Main Menu

This menu reports processor and memory information and lets you set the system date and system time.

Table 5. Main Menu

Feature	Options	Description
BIOS Version	No options	Displays the version of the BIOS.
Processor Type	No options	Displays the processor type.
Processor Speed	No options	Displays the processor speed.
Cache RAM	No options	Displays the size of the second-level cache.
System Memory	No options	Displays the total amount of RAM on the motherboard.
Memory Bank 0 Memory Bank 1	No options	Displays the size and type of DIMM installed in each memory bank.
Language	<ul style="list-style-type: none"> • English (US) (default) • Italian • Francais • Deutsch • Espanol 	Displays the language used by the BIOS.
L2 Cache ECC Support	<ul style="list-style-type: none"> • Disabled (default) • Enabled 	<i>Enabled</i> allows error checking to occur on data accessed from the L2 cache. This menu appears only for processors that support an L2 cache.
System Time	Hour, minute, and second	Specifies the current time.
System Date	Month, day, and year	Specifies the current date.

Advanced Menu

This menu is for setting advanced features that are available through the chipset.

Table 6. Advanced Menu

Feature	Options	Description
Plug & Play O/S	<ul style="list-style-type: none"> • No (default) • Yes 	<p>Specifies whether a Plug and Play operating system is being used.</p> <p><i>No</i> lets the BIOS configure all devices.</p> <p><i>Yes</i> lets the operating system configure Plug and Play devices. Not required with a Plug and Play operating system.</p>
Reset Configuration Data	<ul style="list-style-type: none"> • No (default) • Yes 	Clears the BIOS configuration data on the next boot.
Numlock	<ul style="list-style-type: none"> • Auto (default) • On • Off 	Specifies the power on state of the Num Lock feature on the numeric keypad of the keyboard.
Peripheral Configuration	No options	When selected, displays the Peripheral Configuration submenu for configuring peripheral ports and devices.
IDE Configuration	No options	When selected, displays the IDE Configuration submenu.
Floppy Options	No options	When selected, displays the Floppy Options submenu.
DMI Event Logging	No options	When selected, displays the DMI Events Logging submenu.
Video Configuration	No options	When selected, displays the Video Configuration submenu.
Resource Configuration	No options	When selected, displays the Resource Configuration submenu for configuring memory blocks and IRQs for legacy ISA devices.

Peripheral Configuration Submenu

This submenu is for configuring the computer peripherals.

Table 7. Peripheral Configuration Submenu

Feature	Options	Description
Serial port	<ul style="list-style-type: none"> • Disabled • Enabled • Auto (default) 	<p>Configures the serial port.</p> <p><i>Auto</i> assigns the first free COM port, normally COM1, the address 3F8h and the interrupt IRQ4.</p> <p>An * (asterisk) displayed next to an address indicates a conflict with another device.</p>
Base I/O address	<ul style="list-style-type: none"> • 3F8 (default) • 2F8 • 3E8 • 2E8 	<p>Specifies the base I/O address** for the serial port.</p>
Interrupt	<ul style="list-style-type: none"> • IRQ 3 • IRQ 4 (default) 	<p>Specifies the interrupt for the serial port.</p>
IR port	<ul style="list-style-type: none"> • Disabled • Enabled • Auto (default) 	<p>Configures IR port.</p> <p><i>Auto</i> assigns the first free COM port, normally COM1, the address 3F8h and the interrupt IRQ4.</p> <p>An * (asterisk) displayed next to an address indicates a conflict with another device.</p>
Mode	<ul style="list-style-type: none"> • IrDA[†] (default) • ASK-IR 	<p>Specifies the IR mode.</p>
Base I/O address	<ul style="list-style-type: none"> • 3F8 • 2F8 (default) • 3E8 • 2E8 	<p>Specifies the base I/O address** for the IR port.</p>
Interrupt	<ul style="list-style-type: none"> • IRQ 3 (default) • IRQ 4 	<p>Specifies the interrupt for the IR port.</p>

** If either the serial port or the IR port address is set, that address will not appear in the list of options for the other port. If an ATI mach32[†] or an ATI mach64[†] video controller is active as an add-in card, the COM4, 2E8h address will not appear in the list of options for either the serial port or the IR port.

continued

Table 7. Peripheral Configuration Submenu (continued)

Parallel port	<ul style="list-style-type: none"> • Disabled • Enabled • Auto (default) 	Configures the parallel port. <i>Auto</i> assigns LPT1 the address 378h and the interrupt IRQ7. An * (asterisk) displayed next to an address indicates a conflict with another device.
Mode	<ul style="list-style-type: none"> • Output Only • Bi-directional (default) • EPP • ECP 	Selects the mode for the parallel port. <i>Output Only</i> operates in AT†-compatible mode. <i>Bi-directional</i> operates in bi-directional PS/2-compatible mode. <i>EPP</i> is Extended Parallel Port mode, a high-speed bi-directional mode. <i>ECP</i> is Enhanced Capabilities Port mode, a high-speed bi-directional mode.
Base I/O address	<ul style="list-style-type: none"> • 378 (default) • 278 • 228 	Specifies the base I/O address for the parallel port.
Interrupt	<ul style="list-style-type: none"> • IRQ 5 • IRQ 7 (default) 	Specifies the interrupt for the parallel port.
Audio	<ul style="list-style-type: none"> • Disabled • Enabled (default) 	Enables or disables the onboard audio subsystem.
Legacy USB Support	<ul style="list-style-type: none"> • Disabled (default) • Enabled 	Enables or disables legacy USB support.

IDE Configuration

Table 8. IDE Configuration

Feature	Options	Description
IDE Controller	<ul style="list-style-type: none"> • Disabled • Primary • Secondary • Both (default) 	Specifies the integrated IDE controller. <i>Primary</i> enables only the Primary IDE Controller. <i>Secondary</i> enables only the Secondary IDE Controller. <i>Both</i> enables both IDE controllers.
Hard Disk Pre-Delay	<ul style="list-style-type: none"> • 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 the type of connected IDE device. When selected, displays the Primary IDE Master submenu.
Primary IDE Slave	No options	Reports the type of connected IDE device. When selected, displays the Primary IDE Slave submenu.
Secondary IDE Master	No options	Reports the type of connected IDE device. When selected, displays the Secondary IDE Master submenu.
Secondary IDE Slave	No options	Reports the type of connected IDE device. When selected, displays the Secondary IDE Slave submenu.

IDE Configuration Submenus

This submenu is for configuring IDE devices, including:

- Primary IDE master
- Primary IDE slave
- Secondary IDE master
- Secondary IDE slave

Table 9. IDE Configuration Submenus

Feature	Options	Description
Type	<ul style="list-style-type: none"> • None • ATAPI Removable • Other ATAPI • CD-ROM • User • IDE Removable • Auto (default) 	<p>Specifies the IDE configuration mode for IDE devices.</p> <p><i>User</i> allows the cylinders, heads, and sectors fields to be changed.</p> <p><i>Auto</i> automatically fills in the values for the cylinders, heads, and sectors fields.</p>
Maximum Capacity	No options	Reports the maximum capacity for the hard disk.
Multi-Sector Transfers	<ul style="list-style-type: none"> • Disabled (default) • 2 Sectors • 4 Sectors • 8 Sectors • 16 Sectors 	<p>Specifies number of sectors per block for transfers from the hard drive to memory.</p> <p>Check the hard drive's specifications for optimum setting.</p>
LBA Mode Control	<ul style="list-style-type: none"> • Disabled • Enabled (default) 	Enables or disables the LBA mode control.
Transfer Mode	<ul style="list-style-type: none"> • Standard (default) • Fast PIO 1 • Fast PIO 2 • Fast PIO 3 • Fast PIO 4 • FPIO 3 / DMA 1 • FPIO 4 / DMA 2 	Specifies the method for moving data to/from the drive.
Ultra DMA	<ul style="list-style-type: none"> • Disabled (default) • Mode 0 • Mode 1 • Mode 2 	Specifies the Ultra DMA mode for the drive.

Floppy Options

This submenu is for configuring diskette drive.

Table 10. Floppy Options

Feature	Options	Description
Floppy Disk Controller	<ul style="list-style-type: none"> Disabled Enabled (default) Auto 	Disables or enables the integrated floppy disk controller.
Diskette A:	<ul style="list-style-type: none"> Disabled 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.
Floppy Write Protect	<ul style="list-style-type: none"> Disabled (default) Enabled 	Disables or enables write protect for the diskette drive.

DMI Event Logging

This submenu is for configuring the DMI event logging features.

Table 11. DMI Event Logging Submenu

Feature	Options	Description
Event log capacity	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 DMI event log	No options	Displays the DMI event log.
Clear all DMI event logs	<ul style="list-style-type: none"> No (default) Yes 	Clears the DMI event log after rebooting.
Event Logging	<ul style="list-style-type: none"> Disabled Enabled (default) 	Enables logging of DMI events.
Mark DMI events as read	No options	Marks all DMI events as read.

Video Configuration Submenu

This submenu is for configuring video features.

Table 12. Video Configuration Submenu

Feature	Options	Description
Palette Snooping	<ul style="list-style-type: none"> Disabled (default) Enabled 	Controls the ability of a primary PCI graphics controller to share a common palette with an ISA add-in video card.
AGP Aperture Size	<ul style="list-style-type: none"> 64 MB (default) 256 MB 	Specifies the aperture size for the A.G.P. video controller.

Resource Configuration Submenu

This submenu is for configuring the memory and interrupts used by ISA cards.

Table 13. Resource Configuration Submenu

Feature	Options	Description
Memory Reservation	<ul style="list-style-type: none"> • C800 - CBFF Available (default) Reserved • CC00- CFFF Available (default) Reserved • D000 - D3FF Available (default) Reserved • D400 - D7FF Available (default) Reserved • D800 - DBFF Available (default) Reserved • DC00 - DFFF Available (default) Reserved • Memory hole Disabled (default) Conventional Extended 	Reserves specific upper memory blocks for use by legacy ISA devices. Memory hole frees address space in RAM for a legacy ISA board.
IRQ Reservation	<ul style="list-style-type: none"> • IRQ3 Available (default) Reserved • IRQ4 Available (default) Reserved • IRQ5 Available (default) Reserved • IRQ7 Available (default) Reserved • IRQ10 Available (default) Reserved • IRQ11 Available (default) Reserved 	Reserves specific IRQs for use by legacy ISA devices. An * (asterisk) displayed next to an IRQ indicates an IRQ conflict.

Security Menu

This menu is for setting passwords and security features.

Table 14. Security Menu

Feature	Options	Description
User Password Is	No options	Reports if there is a User password set.
Administrator Password Is	No options	Reports if there is a Administrative password set.
Set User Password	Password can be up to seven alphanumeric characters.	Specifies the User password.
Set Administrative Password	Password can be up to seven alphanumeric characters.	Specifies the Administrative password.
Clear User	No Options	Clears the User password.
User Setup Access	<ul style="list-style-type: none"> • Name • View Only (default) • Limited Access • Full 	Enables or disables User Setup Access. <i>Disabled</i> prevents the user from accessing Setup.
Unattended Start	<ul style="list-style-type: none"> • Disabled (default) • Enabled 	Enables the unattended start feature. When enabled, the computer boots, but the keyboard is locked. The user must enter a password to unlock the computer or boot from a floppy diskette.

Power Menu

This menu is for setting power management features.

Table 15. Power Menu

Feature	Options	Description
Power Management	<ul style="list-style-type: none"> • Disabled • Enabled (default) 	Enables or disables the BIOS power management feature.
Inactivity Timer	<ul style="list-style-type: none"> • Off (default) • 1 Minute • 5 Minutes • 10 Minutes • 20 Minutes • 30 Minutes • 60 Minutes • 120 Minutes 	Specifies the amount of time before the computer enters standby mode.
Hard Drive	<ul style="list-style-type: none"> • Disabled • Enabled (default) 	Enables power management for hard disks during standby and suspend modes.
VESA Video Power Down	<ul style="list-style-type: none"> • Disabled • Standby (default) • Suspend • Sleep 	Specifies power management for video during standby and suspend modes.

Boot Menu

This menu is for setting the boot features and the boot sequence.

Table 16. Boot Menu

Feature	Options	Description
Quick Boot Mode	<ul style="list-style-type: none"> Disabled Enabled (default) 	Enables the computer to boot without running certain POST tests.
Scan User Flash Area	<ul style="list-style-type: none"> Disabled (default) Enabled 	Enables the BIOS to scan the flash memory for user binary files that are executed at boot time.
After Power Failure	<ul style="list-style-type: none"> Power On Stay Off Last State (default) 	<p>Specifies the mode of operation if an AC Power loss occurs.</p> <p><i>Power On</i> restores power to the computer.</p> <p><i>Stay Off</i> keeps the power off until the power button is pressed.</p> <p><i>Last State</i> restores the previous power state before power loss occurred.</p>
On Modem Ring	<ul style="list-style-type: none"> Stay Off Power On (default) 	Specifies how the computer responds to an incoming call on an installed modem when the power is off.
On LAN	<ul style="list-style-type: none"> Stay Off Power On (default) 	Specifies how the computer responds to a LAN wakeup event when the power is off.
On PME	<ul style="list-style-type: none"> Stay Off (default) Power On 	Specifies how the computer responds to a PME wakeup event when the power is off.
First Boot Device Second Boot Device Third Boot Device Fourth Boot Device	<ul style="list-style-type: none"> Removable devices Hard Drive ATAPI CD-ROM Drive Network Boot 	<p>Specifies the boot sequence from the available devices. To specify boot sequence:</p> <ol style="list-style-type: none"> Select the boot device with <↑> or <↓>. Press <+> to move the device up the list or <-> to move the device down the list. <p>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.</p>
Hard Drive	No options	Lists available hard drives. When selected, displays the Hard Drive submenu.
Removable Devices	No options	Lists available removable devices. When selected, displays the Removable Devices submenu.

Hard Drive Submenu

This submenu is for configuring the boot sequence for hard drives.

Table 17. Hard Drive Submenu

Options	Description
<ul style="list-style-type: none"> • Bootable Add in Card 	<p>Specifies the boot sequence for the hard drives attached to the computer. To specify boot sequence:</p> <ol style="list-style-type: none"> 1. Select the boot device with <↑> or <↓>. 2. Press <+> to move the device up the list or <-> to move the device down the list. <p>The operating system assigns a drive letter to each device in the order listed. Changing the order of the devices changes the drive lettering.</p>

Removable Devices Submenu

This submenu is for configuring the boot sequence for removable devices.

Table 18. Removable Devices Submenu

Options	Description
<ul style="list-style-type: none"> • Legacy Floppy Drives 	<p>Specifies the boot sequence for the removable devices attached to the computer. To specify boot sequence:</p> <ol style="list-style-type: none"> 1. Select the boot device with <↑> or <↓>. 2. Press <+> to move the device up the list or <-> to move the device down the list. <p>The operating system assigns a drive letter to each device in the order listed. Changing the order of the devices changes the drive lettering.</p>

Exit Menu

This menu is for exiting the Setup program, saving changes, and loading and saving defaults.

Table 19. Exit Menu

Feature	Description
Exit Saving Changes	Exits and saves the changes in CMOS RAM.
Exit Discarding Changes	Exits without saving any changes made in Setup.
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.

4 Upgrading the BIOS

This chapter describes how to upgrade the BIOS and how to recover the BIOS if an upgrade fails.

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://developer.intel.com/>

⇒ 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.

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

```
format a:/s
```

or, for a formatted diskette, type:

```
sys a:
```

4. Press <Enter>.

Creating the BIOS Upgrade Diskette

Obtain the BIOS upgrade file as described in “Obtaining the BIOS Upgrade File” on page 53 and then:

1. Copy the BIOS upgrade file to a temporary directory on your hard disk.
2. From the C:\ prompt, change to the temporary directory.
3. To extract the file, type the name of the BIOS upgrade file, for example:

```
10006BI1.EXE
```

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

```
LICENSE.TXT
```

```
BIOINSTR.TXT
```

```
BIOS.EXE
```

5. Read the LICENSE.TXT file, which contains the software license agreement, and the BIOINSTR.TXT file, which contains the instructions for the BIOS upgrade.
6. Insert the bootable diskette into drive A.
7. To extract the BIOS.EXE file to the diskette, change to the temporary directory that holds the BIOS.EXE file and type:

```
BIOS A:
```

8. Press <Enter>.
9. The diskette now holds the new BIOS files, the Intel Flash Update Utility, and the recovery files.

Upgrading the BIOS

1. Boot the computer with the BIOS upgrade diskette in drive A. The flash memory update utility screen appears.
2. Select Update Flash Memory From a File.
3. Select Update System BIOS. Press <Enter>.
4. Use the arrow keys to select the correct .bio file. Press <Enter>.

5. When the utility asks for confirmation that you want to flash the new BIOS into memory, select `Continue with Programming`. Press `<Enter>`.
6. When the utility displays the message `upgrade is complete`, remove the diskette. Press `<Enter>`.
7. As the computer boots, check the BIOS identifier (version number) to make sure the upgrade was successful.
8. To enter the BIOS Setup program, press `<F2>` when you see the message:

`Press <F2> Key if you want to run SETUP`
9. For proper operation, load the BIOS Setup program defaults. To load the defaults, press `<F9>`.
10. To accept the defaults, press `<Enter>`.
11. In Setup, set the options to the settings you wrote down before beginning the BIOS upgrade.
12. To save the settings, press `<F10>`.
13. To accept the settings, press `<Enter>`.
14. Turn off the computer and reboot.

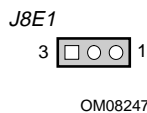
Recovering the BIOS

It is unlikely that anything will interrupt the BIOS upgrade; however, if an interruption occurs, the BIOS could be damaged. The following steps explain how to recover the BIOS if an upgrade fails. The following procedure uses Recovery mode for the Setup program. For more information on Setup modes, see “Setup Program Modes” on page 39.

NOTE

Because of the small amount of code available in the non-erasable boot block area, there is no video support. You will not see anything on the screen during 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 (see Figure 19 on page 39).
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.
6. Listen to the speaker.
 - Two beeps and the end of activity in drive A indicate successful BIOS recovery.
 - A series of continuous beeps indicates failed BIOS recovery.
7. If recovery fails, return to step 1 and repeat the recovery process.
8. If recovery is successful, turn off the computer and disconnect its power cord.

Upgrading the BIOS

9. Remove the computer cover and continue with the following steps.
10. On the jumper block (J8E1), move the jumper back to pins 1-2 as shown below to set normal mode for Setup.



11. Leave the upgrade diskette in drive A, replace the computer cover, and connect the computer's power cord.
12. Turn on the computer and continue with the BIOS upgrade (see "Upgrading the BIOS" on page 54).

Changing the BIOS Language

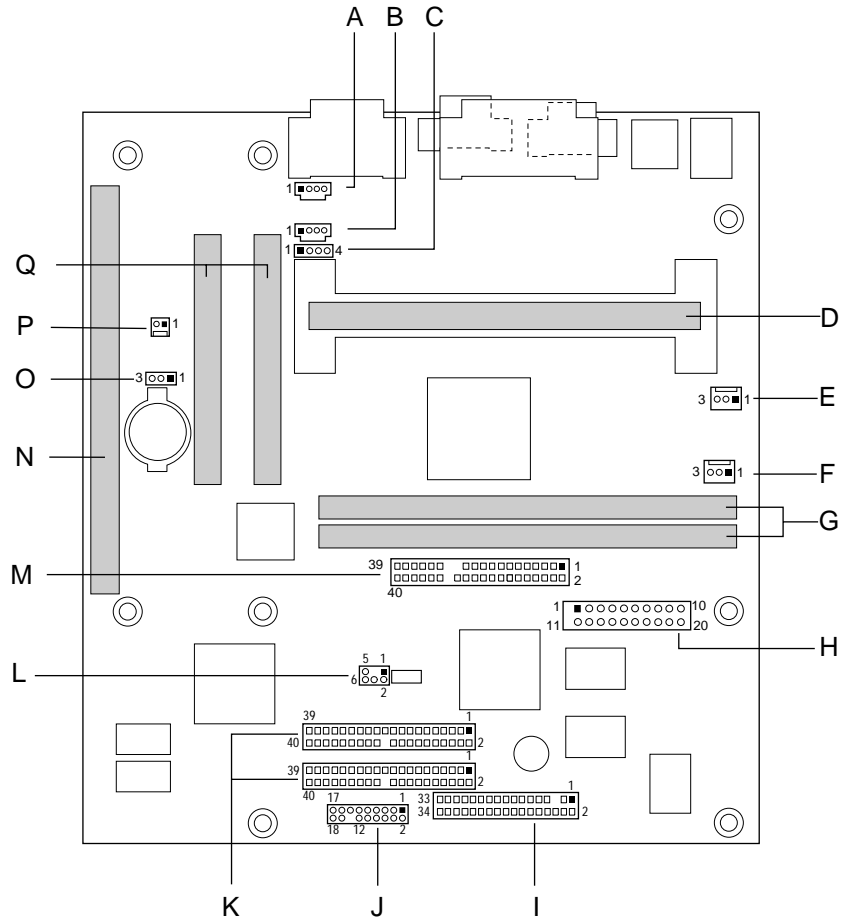
You can use the BIOS upgrade utility to change the language the BIOS uses for messages and the Setup program. Use a bootable diskette containing the Intel Flash Memory Update Utility and language files (see "Upgrading the BIOS" on page 54).

1. Boot the computer with the bootable diskette in drive A. The BIOS upgrade utility screen appears.
2. Select `Update Flash Memory From a File`.
3. Select `Update Language Set`. Press `<Enter>`.
4. Select drive A and use the arrow keys to select the correct `.lng` file. Press `<Enter>`.
5. When the utility asks for confirmation that you want to flash the new language into memory, select `Continue with Programming`. Press `<Enter>`.
6. When the utility displays the message `upgrade is complete`, remove the diskette. Press `<Enter>`.
7. The computer will reboot and the changes will take effect.

5 Technical Reference

Motherboard Connectors

Figure 20 shows the location of some of the motherboard connectors.



OM08248

- | | | | |
|---|---------------------------------|---|---|
| A | Telephony connector | J | Front panel connectors |
| B | CD-ROM ATAPI audio in connector | K | IDE connectors |
| C | CD-ROM 2 mm audio in connector | L | PC/PCI connector (optional) |
| D | Slot 1 connector | M | ATI Media Channel connector (optional) |
| E | Fan 2 connector | N | ISA slot |
| F | Fan 3 connector | O | Wake on LAN technology connector (optional) |
| G | DIMM sockets | P | Wake on Ring connector (optional) |
| H | Power supply connector | Q | PCI slots |
| I | Diskette drive connector | | |

Figure 20. Motherboard Connectors

Table 20. Wake on Ring Connector J3A2 (optional)

Pin	Signal Name
1	Ground
2	RINGA#

Table 21. Wake on LAN Technology Connector J4A1 (optional)

Pin	Signal Name
1	+5 VSB
2	Ground
3	WOL

Table 22. Telephony Connector J1C1

Pin	Signal Name
1	Audio In (monaural)
2	Ground
3	Ground
4	Mic pre-amp out (to modem)

Table 23. CD-ROM ATAPI Audio In Connector J2C2

Pin	Signal Name
1	CD Left In
2	CD Common
3	CD Common
4	CD Right In

Table 24. CD-ROM 2 MM Audio In Connector J2C3

Pin	Signal Name
1	CD Common
2	CD Left In
3	CD Common
4	CD Right In

Table 25. Fan 2 Connector J4J1

Pin	Signal Name
1	Ground
2	+12 V
3	Ground

Table 26. Fan 3 Connector J5J1

Pin	Signal Name
1	Ground
2	+12 V
3	Ground

Table 27. Power Supply Connector J7H1

Pin	Signal Name	Pin	Signal Name
1	+3.3 V	11	+3.3 V
2	+3.3 V	12	-12 V
3	Ground	13	Ground
4	+5 V	14	PS-ON# (power supply remote on/off control)
5	Ground	15	Ground
6	+5 V	16	Ground
7	Ground	17	Ground
8	PWRGD (Power Good)	18	-5 V
9	+5 VSB	19	+5 V
10	+12 V	20	+5 V

Table 28. PC/PCI Connector J8D2 (optional)

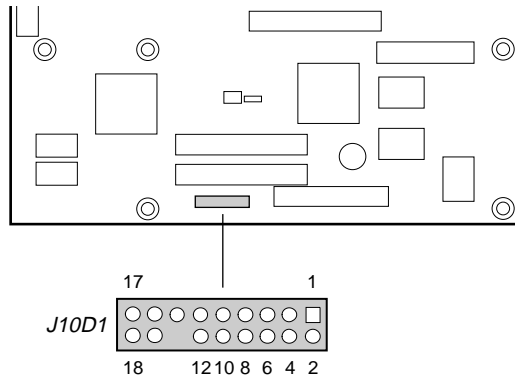
Pin	Signal Name	Pin	Signal Name
1	P_PCIGNTA	2	Ground
3	Key	4	P_PCIREQA
5	Ground	6	SER_IRQ

Table 29. ATI Media Channel Connector J7F1 (optional)

Pin	Signal Name	Pin	Signal Name
1	Ground	2	VFC_D0
3	Ground	4	VFC_D1
5	Ground	6	VFC_D2
7	EVIDEO	8	VFC_D3
9	ESYNC	10	VFC_D4
11	EDCLK	12	VFC_D5
13	SDA	14	VFC_D6
15	Ground	16	VFC_D7
17	Ground	18	DCLK
19	Ground	20	BLANK#
21	VFCSNS#	22	HSYNC
23	SCL	24	VSYNC
25	Key	26	Ground
27	Key	28	Key
29	+5 V	30	SAD3
31	RST#	32	SAD7
33	SAD6	34	SAD5
35	SAD4	36	AMCREV
37	Ground	38	+12 V
39	N/C	40	N/C

Front Panel Connectors

The motherboard has connectors for controls and indicators typically located on the front panel of the computer.



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Figure 21. Front Panel Connectors

Table 30. Front Panel Connectors J10D1

Pin	Signal Name	In/Out	Description
1	HD_PWR	Out	Hard disk LED pullup (330 Ω) to +5 V
2	HDR_BLNK_GRN	Out	Front panel green LED
3	HDA	Out	Hard disk active LED
4	HDR_BLNK_YEL	Out	Front panel yellow LED
5	GND		Ground
6	SW_ON	In	Front panel On/Off button
7	FP_RESET	In	Front panel Reset button
8	GND		Ground
9	+5 V	Out	
10	FPSLP	In	Front panel Sleep button
11	IRRX	In	IrDA serial input
12	GND		Ground
13	GND		Ground
14	(pin removed)		Not connected
15	IRTX	Out	IrDA serial output
16	+5 V	Out	
17	N/C		Not connected
18	N/C		Not connected

Motherboard Resources

Memory Map

Table 31. Memory Map

Address Range (decimal)	Address Range (hex)	Size	Description
1024 K - 262144 K	100000 - 10000000	255 MB	Extended memory
928 K - 1024 K	E8000 - FFFFF	96 KB	System BIOS
896 K - 928 K	E0000 - E7FFF	32 KB	System BIOS (available as UMB)
800 K - 896 K	C8000 - DFFFF	96 KB	Available high DOS memory (open to ISA and PCI buses)
640 K - 800 K	A0000 - C7FFF	160 KB	Video memory and BIOS
0 K - 640 K	00000 - 9FFFF	640 KB	Conventional memory

DMA Channels

Table 32. 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)/audio
4		Reserved - cascade channel
5	16-bits	Open
6	16-bits	Open
7	16-bits	Open

I/O Map

Table 33. I/O Map

Address (hex)	Size	Description
0000 - 000F	16 bytes	DMA controller 1
0020 - 0021	2 bytes	Interrupt controller 1
002E - 002F	2 bytes	Super I/O controller configuration registers
0040 - 0043	4 bytes	Counter/Timer 1
0048 - 004B	4 bytes	Counter/Timer 2
0060	1 byte	Keyboard controller
0061	1 byte	NMI, speaker control
0064	1 byte	Keyboard controller
0070 - 0071	2 bytes	Real time clock controller
0080 - 008F	16 bytes	DMA page registers
00A0 - 00A1	2 bytes	Interrupt controller 2
00B2 - 00B3	2 bytes	APM control
00C0 - 00DE	31 bytes	DMA controller 2
00F0 - 00FF	16 bytes	Numeric processor
0170 - 0177	8 bytes	Secondary IDE controller
01F0 - 01F7	8 bytes	Primary IDE controller
0200 - 0207	8 bytes	Audio / game port / joy stick
0220 - 022F	16 bytes	Audio (Sound Blaster compatible)
0228 - 022F	8 bytes	LPT3
0278 - 027F	8 bytes	LPT2
02EB - 02EF	8 bytes	COM4/Video (8514)
02F8 - 02FF	8 bytes	COM2
0330 - 0331	2 bytes	MPU-401 (MIDI)
0376 - 0377	2 bytes	Secondary IDE controller
0120 - 0127	8 bytes	Audio controller
0274 - 0277	4 bytes	I/O read data port for ISA Plug and Play enumerator
0378 - 037F	8 bytes	LPT1
0388 - 038D	6 bytes	AdLib [†] (FM synthesizer)
03B0 - 03BB	12 bytes	Video (monochrome)
03C0 - 03DF	32 bytes	Video (VGA [†])
03E8 - 03EF	8 bytes	COM3
03F0 - 03F5, 03F7	7 bytes	Diskette controller
03F6	1 byte	Primary IDE controller
03F8 - 03FF	8 bytes	COM1
04D0 - 04D1	2 bytes	Edge/level triggered PIC
0530 - 0537	8 bytes	Windows Sound System
LPT _n + 400h	8 bytes	ECP port, LPT _n base address + 400h
0CF8 - 0CFF*	8 bytes	PCI configuration registers
0CF9**	1 byte	Turbo and reset control register

* DWORD access only

** Byte access only

PCI Configuration Space Map

Table 34. PCI Configuration Space Map

Bus Number (hex)	Device Number (hex)	Function Number (hex)	Description
00	00	00	Intel® 82443EX (PAC)
00	01	00	Intel 82443EX (PAC) A.G.P. bus
00	07	00	Intel® 82371EB (PIIX4E) PCI/ISA bridge
00	07	01	Intel 82371EB (PIIX4E) IDE bus master
00	07	02	Intel 82371EB (PIIX4E) USB
00	07	03	Intel 82371EB (PIIX4E) power management
00	0B	00	Audio/multimedia controller
00	0D	00	PCI expansion slot 1 (J4C1)
00	0E	00	PCI expansion slot 2 (J4B1)

Interrupts

Table 35. Interrupts

IRQ	System Resource
NMI	I/O channel check
0	Reserved, interval timer
1	Reserved, keyboard controller
2	Reserved, cascade interrupt from slave PIC
3	COM2*
4	COM1*
5	LPT2 (Plug and Play option) / audio / user available
6	Diskette drive controller
7	LPT1*
8	Real time clock
9	Reserved
10	USB/User available
11	Windows Sound System*/user available
12	PS/2 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

When a recoverable error occurs during Power-On Self Test (POST), the BIOS displays an error message describing the problem and issues a beep code. The following sections list the possible beep codes and error messages.

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

An external ROM module (e.g., video BIOS) can also issue audible errors, usually consisting of one long tone followed by a series of short tones. For more information on the beep codes issued, check the documentation for that external device.

BIOS Beep Codes

Table 36. Beep Codes

Beeps	Port 80h Code	Explanation
1-2-2-3	16h	BIOS ROM checksum
1-3-1-1	20h	Test DRAM refresh
1-3-1-3	22h	Test Keyboard Controller
1-3-3-1	28h	Autosize DRAM
1-3-3-2	29h	Initialize POST Memory Manager
1-3-3-3	2Ah	Clear 512 KB base RAM
1-3-4-1	2Ch	RAM failure on address line xxxx
1-3-4-3	2Eh	RAM failure on data bits xxxx of low byte of memory bus
1-4-1-1	30h	RAM failure on data bits xxxx of high byte of memory bus
2-1-2-2	45h	POST device initialization
2-1-2-3	46h	Check ROM copyright notice
2-2-3-1	58h	Test for unexpected interrupts
2-2-4-1	5Ch	Test RAM between 512 and 640 KB
1-2	98h	Search for option ROMs. One long, two short beeps on checksum failure

BIOS Error Messages

Table 37. BIOS Error Messages

Error Message	Explanation
Diskette drive A error	Drive A is present but fails the POST diskette tests. Check that the drive is defined with the proper diskette type in Setup and that the diskette drive is installed correctly.
Extended RAM Failed at offset: <i>nnnn</i>	Extended memory not working or not configured properly at offset <i>nnnn</i> .
Failing Bits: <i>nnnn</i>	The hexadecimal number <i>nnnn</i> is a map of the bits at the RAM address (System, Extended, or Shadow memory) that failed the memory test. Each 1 in the map indicates a failed bit.
Fixed Disk 0 Failure or Fixed Disk 1 Failure or Fixed Disk Controller Failure	Fixed disk is not working or not configured properly. Check to see if fixed disk is installed properly. Run Setup to be sure the fixed-disk type is correctly identified.
Incorrect Drive A type - run SETUP	Type of diskette drive for drive A not correctly identified in Setup.
Invalid NVRAM media type	Problem with NVRAM (CMOS) access.
Keyboard controller error	The keyboard controller failed test. Try replacing the keyboard.
Keyboard error	Keyboard not working.
Keyboard error nn	BIOS discovered a stuck key and displayed the scan code nn for the stuck key.
Keyboard locked - Unlock key switch	Unlock the system to proceed.
Monitor type does not match CMOS - Run SETUP	Monitor type not correctly identified in Setup.
Operating system not found	Operating system cannot be located on either drive A or drive C. Enter Setup and see if fixed disk and drive A are properly identified.
Parity Check 1	Parity error found in the system bus. BIOS attempts to locate the address and display it on the screen. If it cannot locate the address, it displays ????.
Parity Check 2	Parity error found in the I/O bus. BIOS attempts to locate the address and display it on the screen. If it cannot locate the address, it displays ????.
Press <F1> to resume, <F2> to Setup	Displayed after any recoverable error message. Press <F1> to start the boot process or <F2> to enter Setup and change any settings.
Real time clock error	Real-time clock fails BIOS test. May require motherboard repair.
Shadow RAM Failed at offset: <i>nnnn</i>	Shadow RAM failed at offset <i>nnnn</i> of the 64 KB block at which the error was detected.
System battery is dead - Replace and run SETUP	The CMOS clock battery indicator shows the battery is dead. Replace the battery and run Setup to reconfigure the system.
System cache error - Cache disabled	RAM cache failed the BIOS test. BIOS disabled the cache.

continued

Table 37. BIOS Error Messages (continued)

Error Message	Explanation
System CMOS checksum bad - run SETUP	System CMOS RAM has been corrupted or modified incorrectly, perhaps by an application program that changes data stored in CMOS. Run Setup and reconfigure the system either by getting the default values and/or making your own selections.
System RAM Failed at offset: <i>nnnn</i>	System RAM failed at offset <i>nnnn</i> of the 64 KB block at which the error was detected.
System timer error	The timer test failed. Requires repair of system motherboard.

nnnn = hexadecimal number

Error Messages

B Regulatory and Integration Information

This appendix contains:

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

Regulatory Compliance

This motherboard complies with the following safety and EMC regulations when correctly installed in a compatible host system.

Table 38. Safety Regulations

Regulation	Title
UL 1950 - CSA 950-95, 3rd edition, Dated 07-28-95	The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (USA and Canada)
EN 60 950, 2nd Edition, 1992 (with Amendments 1, 2, and 3)	The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (European Union)
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 60 950. (Norway, Sweden, Denmark, and Finland)

Table 39. 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	Limits and methods of measurement of Radio Interference Characteristics of Information Technology Equipment. (International)
EN 55 022, 1995	Limits and methods of measurement of Radio Interference Characteristics of Information Technology Equipment. (Europe)
EN 50 082-1 (1992)	Generic Immunity Standard; Currently compliance is determined via testing to IEC 801-2, -3, and -4. (Europe)
VCCI Class B (ITE)	Implementation Regulations for Voluntary Control of Radio Interference by Data Processing Equipment and Electronic Office Machines. (Japan)
ICES-003, Issue 2	Interference-Causing Equipment Standard, Digital Apparatus. (Canada)

Product Certification Markings

This printed circuit board assembly has the following product certification markings:

- European CE Marking: Consists of a marking on the board and shipping container.
- UL Recognition Mark: Consists of the UL File No. E139761 on the component side of the board and the PB No. on the solder side of the board. Board material flammability is 94V-1 or -0.
- Each board will be marked with an FCC Declaration of Conformity.
- Canadian Compliance: Consists of small “c” followed by a stylized backward UR on component side of the board.

Installation Precautions

When you install and test the motherboard, 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 Instructions



CAUTION

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

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

Ensure Electromagnetic Compatibility (EMC)

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

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 mismatching of 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 Host Computer and Accessory Module Certifications

Make sure that the host computer, 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 host computer does not bear the CE marking, obtain a supplier's Declaration of Conformity to the appropriate standards required by the European EMC Directive and Low Voltage Directive. Other directives, such as the Machinery and Telecommunications Directives, may also apply depending on the type of product. No regulatory assessment is necessary for low voltage DC wiring used internally or wiring used externally when provided with appropriate overcurrent protection. Appropriate protection is provided by a maximum 8-Amp current limiting circuit or a maximum 5-Amp fuse or positive temperature coefficient (PTC) resistor. All Intel motherboards 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-Amp current limiting circuit or a maximum 5-Amp fuse or positive temperature coefficient (PTC) resistor. All Intel motherboards 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 motherboard to provide instructions for replacing and disposing of the battery. The following warning must be placed permanently and legibly on the host computer as near as possible to the battery.



WARNING

Danger of explosion if battery is incorrectly replaced.

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

Use Only for Intended Applications

This product was evaluated for use in 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) may require further evaluation.