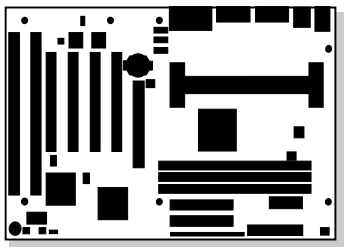
AL440LX Motherboard Product Guide



Order Number: 680701-001

Revision History

Revision	Revision History	Date
-001	First release of the AL440LX Motherboard Product Guide.	July 1997

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1 Product Description

This chapter gives an overview of the AL440LX motherboard, including:

- Features
- Components
- Back panel I/O connectors

Features

The motherboard has these features:

- Support for one 233, 266, or 300 MHz Intel Pentium® II processor with a 512 KB second-level cache integrated in the Single Edge Contact (S.E.C.) cartridge
- Support for up to 384 MB of 66 MHz synchronous DRAM (SDRAM) using three DIMM sockets with 168-pin DIMM modules and 3.3 V memory
- Intel 440LX AGPset that includes a high-speed processor interface controller, a DRAM controller, the Accelerated Graphics Port (A.G.P.) interface, a Universal Serial Bus (USB) controller, a fully synchronous PCI bus interface, the real-time clock, and support for power management and system management mode
- National Semiconductor PC97307 I/O component that includes the floppy-drive interface, one multimode parallel port, two FIFO serial ports, keyboard and mouse controller, and an IrDA†-compatible interface
- Intel/Phoenix BIOS that supports power management, Plug and Play, advanced IDE features, and password security
- Five expansion slots: one 16-bit ISA/AT†-compatible slot, three PCI-compatible expansion slots, and one combination slot for either a PCI or an ISA card
- Two USB connectors
- Onboard connector that supports add-in A.G.P. boards
- Optional onboard audio subsystem based on the Yamaha OPL† family of single-chip audio controllers (YM 715)
- Optional onboard Yamaha YM 704 wavetable synthesizer
- Optional hardware monitor that integrates a temperature sensor, fan speed sensors, power supply voltage monitor, support for Intel LANDesk® Client Manager, and support for chassis security

NOTE

Information about Intel motherboards including technical product specifications, BIOS upgrades, and device drivers is available under "Product Info" at the Intel World Wide Web site:

http://www.intel.com/

Components

Figure 1 shows the components on the motherboard.

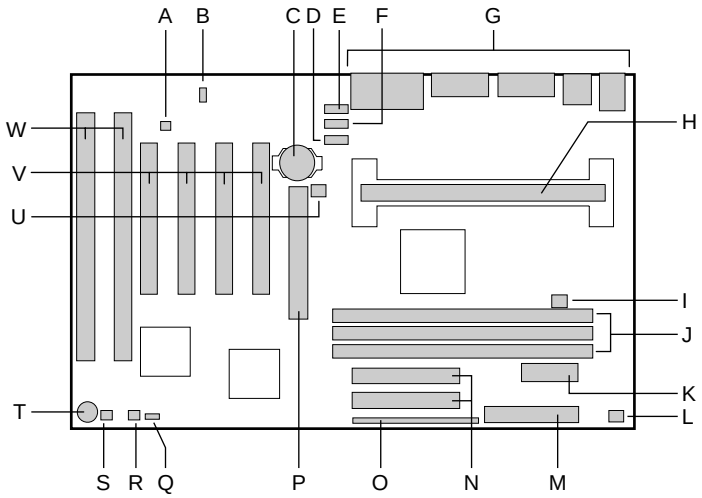

Figure 1. Motherboard Components

A	Optional chassis security header	M	Floppy drive connector
B	Optional Wake on LAN† header	N	IDE connectors
C	Battery	O	Front panel header
D	Optional Line In connector	P	Accelerated Graphics Port (A.G.P.) connector
E	Optional CD-ROM audio connector	Q	Configuration header
F	Optional telephony connector	R	Optional SCSI hard disk LED header
G	Back-panel I/O connectors	S	Wake on Ring header
H	Slot 1 connector	T	Speaker
I	Fan 3 header (for the active heatsink fan)	U	Fan 2 header
J	DIMM sockets	V	PCI connectors
K	Primary power connector	W	ISA connectors
L	Fan 1 header		

NOTE

Components labeled optional do not come on all AL440LX motherboards.

Back Panel I/O Connectors

Figure 2 shows the back panel connectors on the motherboard.

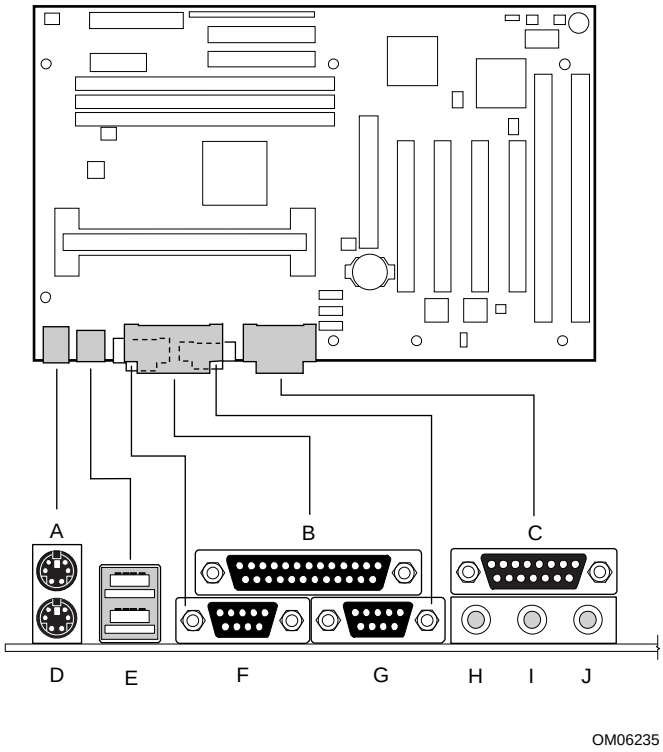

Figure 2. Back Panel I/O Connectors

A	PS/2† connector (mouse or keyboard)	F	Serial port 1 connector
B	Parallel port connector	G	Serial port 2 connector
C	MIDI/game port connector (optional)	H	Audio Line Out jack (optional)
D	PS/2 connector (mouse or keyboard)	I	Audio Line In jack (optional)
E	USB connectors	J	Audio Mic In jack (optional)

2 Installing the Motherboard

This chapter describes the following:

- Installing a processor
- Preparing the motherboard for installing a boxed Pentium II processor
- Installing and removing memory
- Replacing the battery
- Installing and removing the motherboard

Before You Begin

⚠ CAUTION

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

- Always follow the steps in each procedure in the correct order.
- Set up a log to record information about your computer, such as model, serial 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.

Installing a Processor

To install a processor, you must:

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

Detailed instructions for each of these procedures follow.

NOTE

If you are installing a boxed Intel Pentium II processor, see the instructions on page 14.

Installing the Retention Mechanism

NOTE

To install the retention mechanism, you need a Phillips (#2 bit) manual torque screwdriver capable of a 6.0 in.-lb. ± 1.0 in.-lb. (0.678 N-m ± 0.113 N-m) setting. The screwdriver also must have a shaft longer than 2 inches.

To install the retention mechanism, follow these steps:

1. Observe the precautions in "Before You Begin" (see page 11).
2. Locate Slot 1 (A in Figure 3) and the four attachment studs (B) on the motherboard.

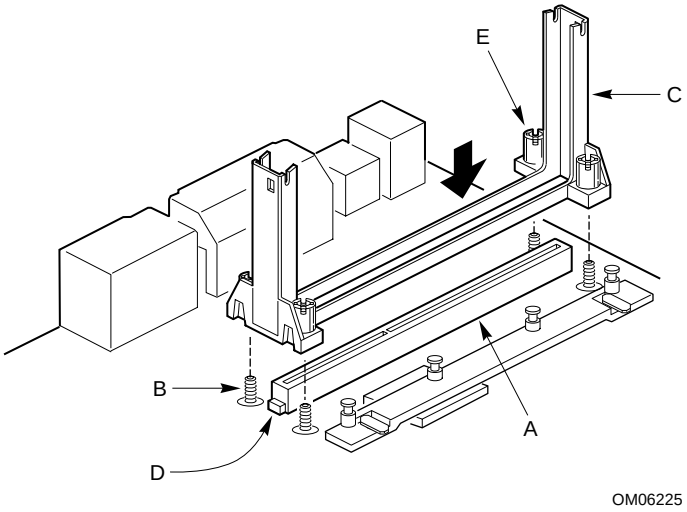

Figure 3. Installing the Processor Retention Mechanism

3. To position the mechanism (C), orient it as shown in Figure 3. The tab (D) on the connector fits into a notch in the base of the mechanism. When properly seated, the base of the mechanism is flush with the motherboard.

CAUTION

Overtightening the captive nuts on the retention mechanism can damage the motherboard. Tighten the captive nuts (E in Figure 3) to no more than 6.0 in.-lb. ± 1.0 in.-lb. (0.678 N-m ± 0.113 N-m).

4. Finger tighten all four captive nuts to make sure they start correctly on the threads of the attachment studs.
5. To secure the mechanism, tighten the captive nuts with the torque screwdriver to no more than 6.0 in.-lb. ± 1.0 in.-lb. (0.678 N-m ± 0.113 N-m).

Installing the Processor

To install the processor, follow these steps:

1. Insert the processor in the retention mechanism (A in Figure 4).
2. Press down on the processor until it is firmly seated in the Slot 1 connector and the latches (B) on the processor lock into place.

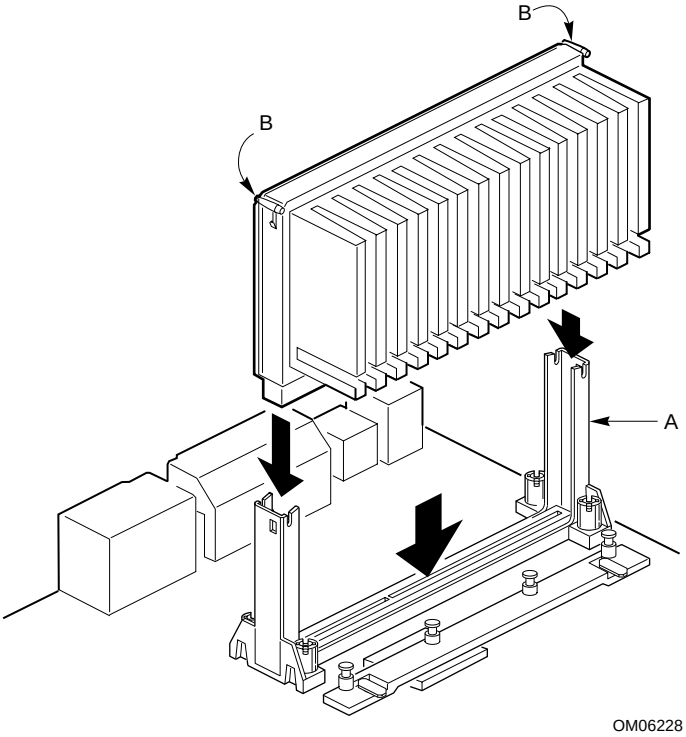

Figure 4. Installing the Processor

3. Slide the top heatsink support bar (A) onto the retaining pins (B) of the support's base as shown in Figure 5.

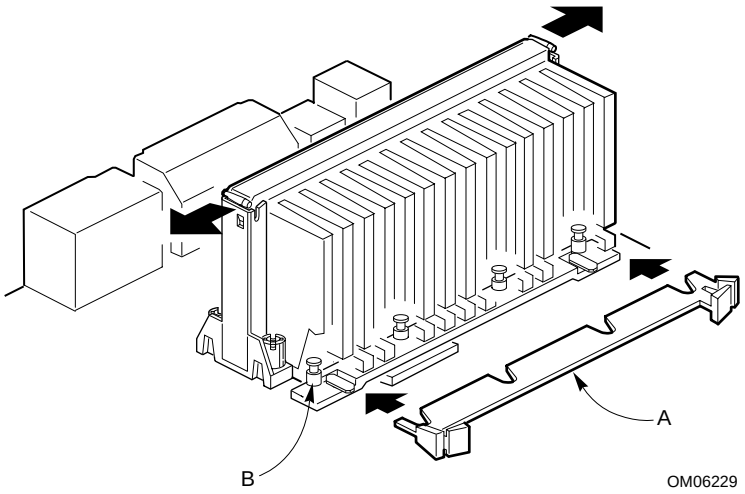

Figure 5. Installing the Heatsink Support Top Bar

Setting the Processor Speed

After you install the processor and install the motherboard, set the processor speed by using the Setup program. See Chapter 3 to set processor speed.

Upgrading to a Boxed Pentium® II Processor

Use the instructions in this section to prepare the motherboard for a boxed Pentium II processor upgrade.

To prepare for a boxed Pentium II processor upgrade, you must:

1. Remove the heatsink support top bar and the installed processor.
2. Remove the heatsink support base.
3. Upgrade the processor.

Detailed instructions for each of these procedures follow.

Removing the Installed Processor

To remove the installed processor, follow these steps:

1. Observe the precautions in "Before You Begin" (see page 11).
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. Refer to " Installing and Removing the Motherboard" on page 23.
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 6. Press in on the latches (A) to release the top bar.

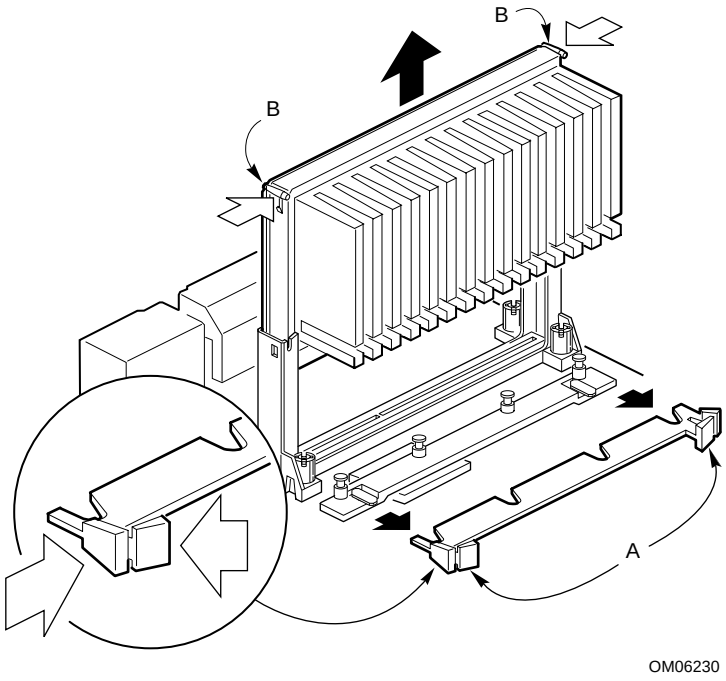

Figure 6. Removing the Heatsink Support Top Bar and the Processor

⚠ 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 (B) and pulling the processor straight up as shown in Figure 6. Place the processor aside.

Removing the Heatsink Support Base

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).

To remove the heatsink support base follow these steps:

1. With your fingers, remove the two retention pins (A) from the heatsink support base (B) as shown in Figure 7.

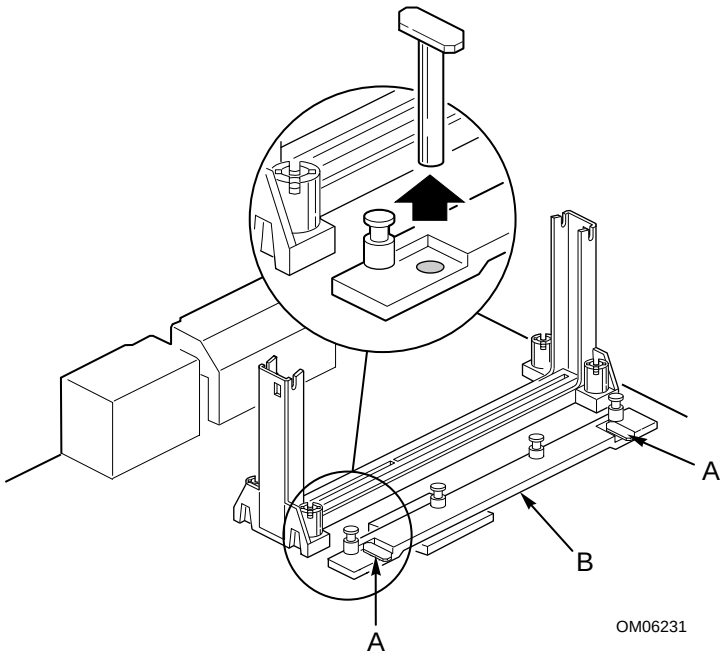

Figure 7. Removing the Heatsink Support Retention Pins

2. Place the heatsink support removal tool (A) over the two outside posts of the heatsink support base (B) as shown in Figure 8. Make sure the tool completely engages the posts.

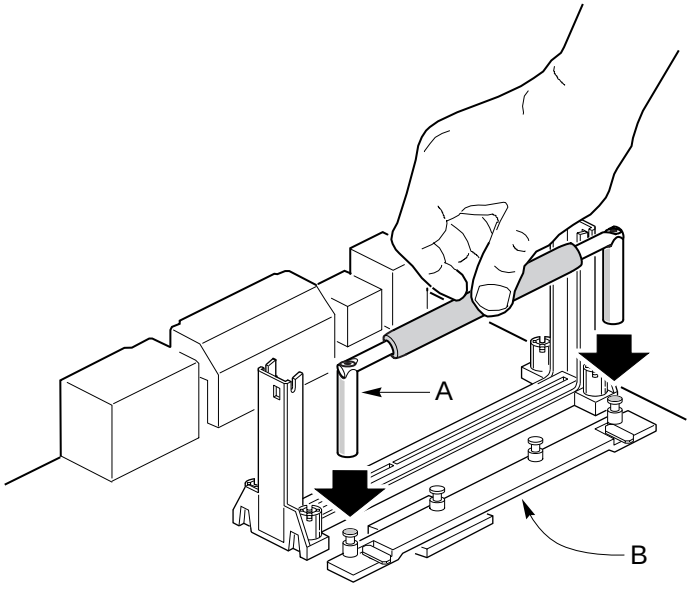

Figure 8. Placing the Heatsink Support Base Removal Tool on the Retention Pins

3. Carefully rock the tool back and forth until the heatsink support base disengages from the holes in the motherboard (Figure 9). There is an audible click when the base disengages from the motherboard.

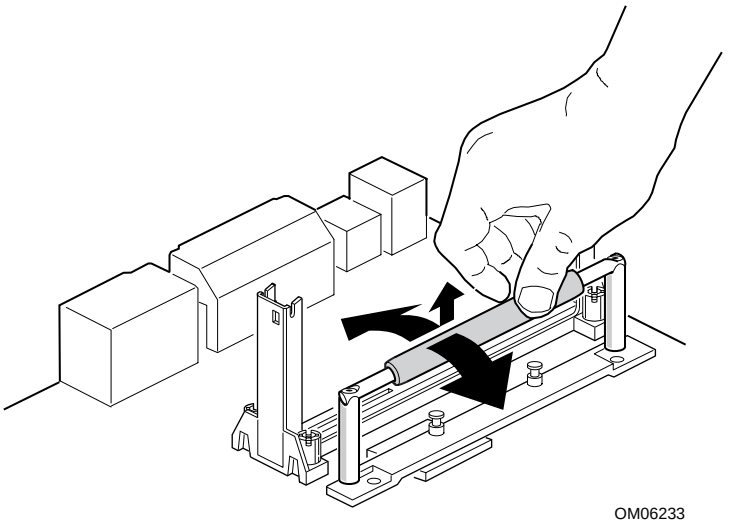

Figure 9. Using the Heatsink Support Base Removal Tool

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

Upgrading the Processor

Refer to the boxed Intel Pentium II processor documentation for installation instructions.

Installing Memory

You can install from 8 MB to 384 MB of memory in the motherboard DIMM sockets. The board has DIMM sockets arranged as banks 0, 1, and 2. The motherboard supports the following memory features:

- 168-pin 3.3 V DIMMs with gold-plated contacts
- 66 MHz unbuffered SDRAM
- Non-ECC (64-bit) or ECC (72-bit) memory
- 8 MB, 16 MB, 32 MB, 64 MB, and 128 MB modules

When adding memory, follow these guidelines:

- You can install DIMMs in any of the three banks.
- You can use different size DIMMs in different banks.
- The BIOS detects the size and type of installed memory.
- For ECC operation to be available, all installed memory must be ECC and you must enable the ECC Configuration feature in the Setup program (see page 34).

NOTE

DIMMs must meet the Intel specifications for either 64-bit or 72-bit SDRAM. For information about vendors that support these specifications refer to the Intel World Wide Web site:

http://www.intel.com/

Figure 10 shows the location of the DIMM sockets.

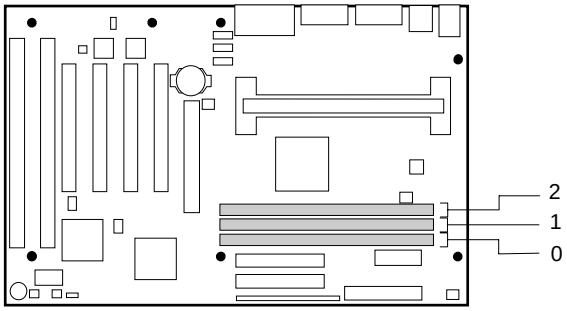

Figure 10. Location of DIMM Sockets

To install DIMMs, follow these steps:

1. Observe the precautions in "Before You Begin" (see page 11).
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.
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 at the ends of the socket snap into place. Make sure the clips are firmly in place.
9. Replace the computer cover.
10. If you installed a DIMM with ECC memory, start the computer and use the ECC Configuration feature in Setup to enable the use of ECC.

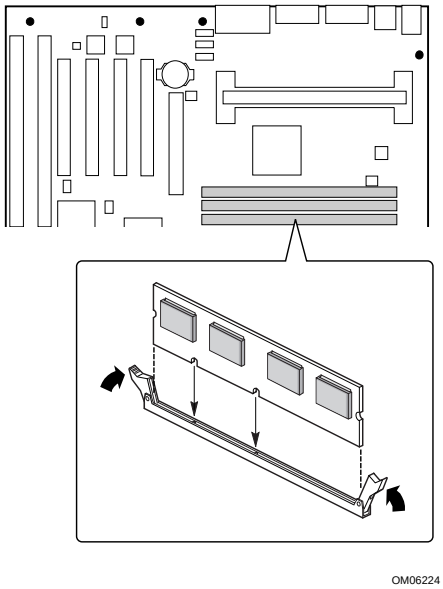

Figure 11. Installing a DIMM

Removing Memory

To remove a DIMM, follow these steps:

1. Observe the precautions in "Before You Begin" (see page 11).
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.

Replacing the Battery

When your computer is turned off, a lithium battery keeps the time-of-day clock and the values in CMOS RAM current. Figure 12 shows the location of the battery.

The battery should last about seven years. When the battery begins to die, 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.

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.

⚠ CAUTION

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

⚠ ATTENTION

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

⚠ ADVARSEL!

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

⚠ ADVARSEL

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

⚠ VARNING

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

⚠ VAROITUS

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

To replace the battery, follow these steps:

1. Observe the precautions in “Before You Begin” (see page 11).
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 12).
5. With your fingers, 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.

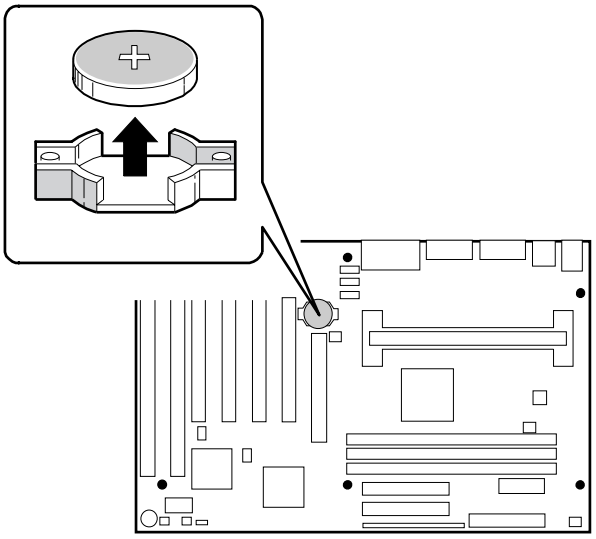

Figure 12. Replacing the Battery

Installing and Removing the Motherboard

Refer to your chassis manual for instructions on installing and removing the motherboard.

NOTES

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

Refer to Appendix B 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.

The motherboard is secured to the chassis by seven screws. Figure 13 shows the locations of the mounting screw holes.

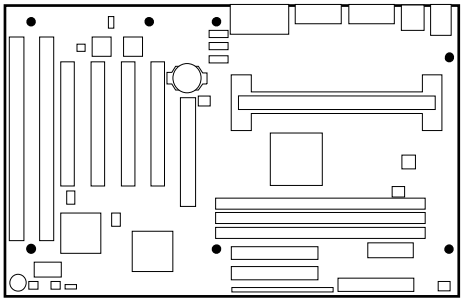

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Figure 13. Mounting Screw Holes

3 Configuring the Motherboard

This chapter describes how to configure the motherboard using the Setup program. Refer to Chapter 4 for more information about Setup.

Before You Begin

⚠ CAUTION

If you are installing this motherboard in a chassis, see Appendix B for regulatory requirements and precautions.

- Always follow the steps in each procedure in the correct order.
- Set up a log to record information about your computer, such as model, serial 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 may 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.

Configuration Modes

The Setup program has three configuration modes:

- Normal mode for normal operations
- Configure mode for configuring the processor speed and clearing passwords
- Recovery mode for recovering the BIOS data

Figure 14 shows the location of the configuration header on the motherboard. The jumper is usually set to normal mode at the factory.

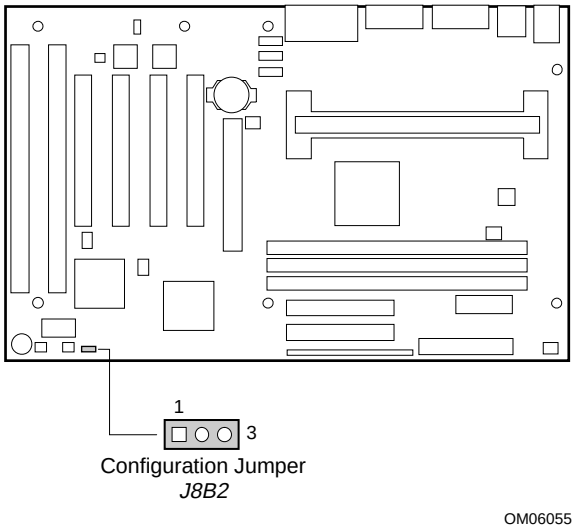

Figure 14. Configuration Header

NOTE

A jumper is a small plastic conductor that slips over two header pins. To change a setting, remove the jumper from the pins and slide it onto the new pins for the desired setting.

CAUTION

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

Table 1 shows jumper settings for the different Setup modes. These modes configure Setup for normal operations, maintenance options, or recovering the BIOS.

Table 1. Jumper Settings for the Setup Program

Function	Jumper (J8B2)	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. Refer to Chapter 4 for information on the Maintenance menu.
Recovery	None	BIOS recovers data from a recovery diskette. Refer to Chapter 5 for information on recovering the BIOS data during an upgrade.

Setting the Processor Speed

Set the processor speed after you have installed or upgraded the processor. This procedure assumes that the motherboard is installed in the computer and the configuration header (J8B2) has the jumper set on pins 1-2 for normal mode.

1. Observe the precautions in "Before You Begin" (see page 11).
2. Turn off all peripheral devices connected to the computer. Turn off the computer.
3. Remove the computer cover.
4. Locate the configuration header (Figure 14; J8B2 on the motherboard).
5. On the header, move the jumper to pins 2-3 as shown below to set configure mode.

J8B2

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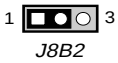
6. Replace the cover, turn on the computer, and allow it to boot.
7. The computer starts the Setup program. Setup displays the Maintenance menu.
8. Use the arrow keys to select the Processor Speed feature and press <Enter>. Setup displays a popup screen with the available processor speeds.
9. Use the arrow keys to select the processor speed. For example, select 266 for a 266 MHz Pentium II processor. Press <Enter> to confirm the speed. This Maintenance menu reappears again.
10. Press <F10> to save the current values and exit Setup.
11. Turn off the computer.
12. Remove the computer cover.

13. On the header (J8B2), move the jumper back to pins 1-2 to restore normal operation as shown below.



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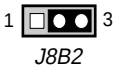
14. Replace the cover and turn on the computer.
15. Verify the processor speed in the startup information the BIOS displays.

Clearing the Passwords

This procedure assumes that the motherboard is installed in the computer and the configuration header (J8B2) has the jumper set on pins 1-2 for normal mode.

1. Observe the precautions in "Before You Begin" (see page 11).
2. Turn off all peripheral devices connected to the computer. Turn off the computer.
3. Remove the computer cover.
4. Locate the configuration header (Figure 14; J8B2 on the motherboard).
5. On the header (J8B2), move the jumper to pins 2-3 as shown below to set configure mode.



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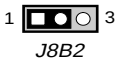
6. Replace the cover, turn on the computer, and allow it to boot.
7. The computer starts the Setup program. Setup displays the Maintenance menu.
8. Use the arrow keys to select Clear Passwords. Press <Enter> and Setup displays a pop-up screen requesting that you confirm clearing the password. Select Yes and press <Enter>. Setup displays the Maintenance menu again.
9. Press <F10> to save the current values and exit Setup.
10. Turn off the computer.
11. Remove the computer cover.
12. On the header (J8B2), move the jumper back to pins 1-2 to restore normal operation as shown below.



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13. Replace the cover and turn on the computer.

4 Using the Setup Program

This chapter provides an overview of the 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 Menus

To enter the Setup program, turn the computer on 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 is only available in configure mode. Refer to Chapter 3 for information about configure mode.
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

Setup 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 cursor up or down.
<Home> or <End>	Moves cursor to top or bottom of the window.
<PgUp> or <PgDn>	Moves cursor to 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>	Load the default configuration values for the current menu.
<F10>	Save the current values and exit Setup.
<Enter>	Executes command or selects the submenu.

Maintenance Menu

Use this menu to specify the processor speed and clear the Setup passwords. Setup only displays this menu in configure mode (see page 26).

Table 4. Maintenance Menu

Feature	Options	Description
Processor Speed	• 200 • 233 • 266 • 300	Specifies the processor speed in megahertz.
Clear All Passwords	No options	Clears the user and supervisor passwords.

Main Menu

This menu reports processor and memory information. Use it to configure the system date, system time, floppy options, and IDE devices.

Table 5. Main Menu

Feature	Options	Description
Processor Type	No options	Displays processor type.
Processor Speed	No options	Displays processor speed.
Cache RAM	No options	Displays size of second-level cache.
Total Memory	No options	Displays the total amount of RAM on the motherboard.
BIOS Version	No options	Displays the version of the BIOS.
Language	English (US)	Selects the default language used by the BIOS.
System Time	Hour, minute, and second	Specifies the current time.
System Date	Month, day, and year	Specifies the current date.
Floppy Options, submenu	No options	When selected, displays the Floppy Options submenu.
Primary IDE Master, submenu	No options	Reports type of connected IDE device. When selected, displays the Primary IDE Master submenu.
Primary IDE Slave, submenu	No options	Reports type of connected IDE device. When selected, displays the Primary IDE Slave submenu.
Secondary IDE Master, submenu	No options	Reports type of connected IDE device. When selected, displays the Secondary IDE Master submenu.
Secondary IDE Slave, submenu	No options	Reports type of connected IDE device. When selected, displays the Secondary IDE Slave submenu.

Floppy Options Submenu

Use this submenu to configure floppy drives.

Table 6. Floppy Options Submenu

Feature	Options	Description
Diskette A:	• 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.
Diskette B:	• **Disabled (default)** • 360 KB, 5¼″ • 1.2 MB, 5¼″ • 720 KB, 3½″ • 1.44/1.25 MB, 3½″ • 2.88 MB, 3½″	Specifies the capacity and physical size of diskette drive B.
Floppy Write Protect	• **Disabled (default)** • Enabled	Disables or enables write protect for the diskette drive(s).

IDE Device Configuration Submenus

Use this submenu to configure IDE devices, including:

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

Table 7. IDE Device Configuration Submenus

Feature	Options	Description
Type	• None • ATAPI Removable • CD-ROM • User • **Auto (default)**	Specifies the IDE configuration mode for IDE devices. User allows the cylinders, heads, and sectors fields to be changed. Auto automatically fills in the values for the cylinders, heads, and sectors fields.
Cylinders	1 to *XXXX*	Specifies number of disk cylinders.
Heads	1 to 16	Specifies number of disk heads.
Sectors	1 to 64	Specifies number of disk sectors.
Maximum Capacity	No options	Reports the maximum capacity for the hard disk. Value calculated from number of cylinders, heads, and sectors.
Multi-Sector Transfers	• Disabled • 2 Sectors • 4 Sectors • 8 Sectors • **16 Sectors (default)**	Specifies number of sectors per block for transfers from the hard drive to memory. Check the hard drive's specifications for optimum setting.
LBA Mode Control	• Disabled • **Enabled (default)**	Enables or disables logical block addressing (LBA) in place of the Cylinders, Heads, and Sectors fields. ⚠ **CAUTION** *Changing the LBA Mode Control after a hard drive has been formatted can corrupt data on the drive.*
Transfer Mode	• Standard • Fast PIO 1 • Fast PIO 2 • Fast PIO 3 • **Fast PIO 4 (default)**	Specifies method for transferring data between the hard drive and system memory.
Ultra DMA	• **Disabled (default)** • Mode 0 • Mode 1 • Mode 2	Specifies the ultra DMA mode for the hard drive.

Advanced Menu

Use this menu to set advanced features that are available through the chipset.

Table 8. Advanced Menu

Feature	Options	Description
Plug & Play O/S	• No • **Yes (default)**	Specifies if a Plug and Play operating system is being used. No lets the BIOS configure all devices. Yes lets the operating system configure Plug and Play devices. Not required with a Plug and Play operating system.
Reset Configuration Data	• **No (default)** • Yes	Clears the BIOS configuration data on the next boot.
Memory Cache	• Disabled • **Enabled (default)**	Enables or disables the memory cache.
ECC Configuration	• **Non-ECC (default)** • ECC	Specifies ECC memory operation.
Resource Configuration, submenu	No options	Configures memory blocks and IRQs for legacy ISA devices. When selected, displays the Resource Configuration submenu.
Peripheral Configuration, submenu	No options	Configures peripheral ports and devices. When selected, displays the Peripheral Configuration submenu.
Keyboard Features, submenu	No options	Configures keyboard features. When selected, displays the Keyboard Features submenu.
Video Configuration, submenu	No options	Configures video features. When selected, displays the Video Configuration submenu.
DMI Events Logging, submenu	No options	Configures DMI Events Logging. When selected, displays the DMI Events Logging submenu.

Resource Configuration Submenu

Use this submenu to configure the memory and interrupts.

Table 9. Resource Configuration Submenu

Feature	Options		Description
Memory Reservation	• C800 - CBFF • CC00- CFFF • D000 - D3FF • D400 - D7FF • D800 - DBFF • DC00 - DFFF • Memory hole	**Available (default)** | Reserved **Available (default)** | Reserved **Available (default)** | Reserved **Available (default)** | Reserved **Available (default)** | Reserved **Available (default)** | Reserved **Disabled (default)** | Conventional | Extended	Reserves specific upper memory blocks for use by legacy ISA devices. Memory hole frees address space in RAM for an legacy ISA boards.
IRQ Reservation	• IRQ3 • IRQ4 • IRQ5 • IRQ7 • IRQ10 • IRQ11	**Available (default)** | Reserved **Available (default)** | Reserved **Available (default)** | Reserved **Available (default)** | Reserved **Available (default)** | Reserved **Available (default)** | Reserved	Reserves specific IRQs for use by legacy ISA devices. An * (asterisk) displayed next to an IRQ indicates an IRQ conflict.

Peripheral Configuration Submenu

Use this submenu to configure the computer peripherals.

Table 10. Peripheral Configuration Submenu

Feature	Options	Description
Serial port A	• Disabled • Enabled • **Auto (default)**	Configures serial port A. Auto assigns the first free COM port, normally COM1, the address 3F8h and the interrupt IRQ4. An * (asterisk) displayed next to an address indicates a conflict with another device.
Serial port B	• Disabled • Enabled • **Auto (default)**	Configures serial port B. Auto assigns the first free COM port, normally COM2, the address 2F8h and the interrupt IRQ3. An * (asterisk) displayed next to an address indicates a conflict with another device. If either serial port address is set, that address will not appear in the list of options for the other serial 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 serial port.
Mode	• **Normal (default)** • IrDA • ASK-IR	Specifies the mode for Serial Port B for normal (COM 2) or infrared applications.
Parallel port	• Disabled • Enabled • **Auto (default)**	Configures the parallel port. Auto assigns LPT1 the address 378h and the interrupt IRQ7. An * (asterisk) displayed next to an address indicates a conflict with another device.
Mode	• Output Only • **Bi-directional (default)** • EPP • ECP	Selects the mode for the parallel port. Output Only operates in AT-compatible mode. Bi-directional operates in bidirectional PS/2-compatible mode. EPP is Extended Parallel Port mode, a high-speed bidirectional mode. ECP is Enhanced Capabilities Port mode, a high-speed bidirectional mode.
Floppy disk controller	• Disabled • **Enabled (default)**	Configures the floppy disk controller.
IDE controller	• Disabled • Primary • Secondary • **Both (default)**	Configures the IDE controller. Both specifies both the primary and secondary the primary and secondary channel are used.
Audio	• Disabled • **Enabled (default)**	Enables or disables the onboard audio subsystem.

Keyboard Features Submenu

Use this submenu to set keyboard features.

Table 11. Keyboard Features Submenu

Feature	Options	Description
Numlock	• **Auto (default)** • On • Off	Specifies the power on state of the Numlock feature on the numeric keypad of the keyboard.
Key Click	• **Disabled (default)** • Enabled	Enables the key click option.
Keyboard auto-repeat rate	• **30/sec (default)** • 26.7/sec • 21.8/sec • 18.5/sec • 13.3/sec • 10/sec • 6/sec • 2/sec	Selects the key repeat rate.
Keyboard auto-repeat delay	• ¼ sec • **½ sec (default)** • ¾ sec • 1 sec	Selects the delay before key repeat.

Video Configuration Submenu

Use this submenu to configure video features.

Table 12. Video Configuration Submenu

Feature	Options	Description
Palette Snooping	• **Disabled (default)** • Enabled	Controls the ability of a primary PCI graphics controller to share a common palette with an ISA add-in video card.

DMI Event Logging Submenu

Use this submenu to set keyboard features.

Table 13. 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	Enables viewing of DMI event log.
Clear all DMI event logs	• **No (default)** • Yes	Clears the DMI Event Log after rebooting.
Event Logging	• Disabled • **Enabled (default)**	Enables logging of DMI events.
ECC Event Logging	• **Disabled (default)** • Enabled	Enables logging of ECC events.
Mark DMI events as read	No options	Marks all DMI events as read.

Security Menu

Use this menu to set passwords and security features.

Table 14. Security Menu

Feature	Options	Description
User Password Is	No options	Reports if there is a user password set.
Supervisor Password Is	No options	Reports if there is a supervisor password set.
Set User Password	Password can be up to seven alphanumeric characters.	Specifies the user password.
Set Supervisor Password	Password can be up to seven alphanumeric characters.	Specifies the supervisor password.
Unattended Start	• **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

Use this menu to set power management features.

Table 15. Power Menu

Feature	Options	Description
Power Management	• Disabled • **Enabled (default)**	Enables or disables the BIOS power management feature.
Inactivity Timer	• **Off (default)** • 1 Minute • 2 Minutes • 4 Minutes • 6 Minutes • 8 Minutes • 12 Minutes • 16 Minutes	Specifies the amount of time before the computer enters standby mode.
Hard Drive	• Disabled • **Enabled (default)**	Enables power management for hard disks during standby and suspend modes.
VESA† Video Power Down	• Disabled • **Enabled (default)**	Enables power management for video during standby and suspend modes.

Boot Menu

Use this menu to specify the boot features and the boot sequence.

Table 16. Boot Menu

Feature	Options	Description
Restore on AC/Power Loss	• Stay Off • **Last State (default)** • Power On	Specifies how the computer responds following a power failure. Stay Off keeps power off until power button pressed. Last State restores previous power state before a power failure. Power On restores power without restoring previous power state.
On Modem Ring	• 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	• Stay Off • **Power On (default)**	Specifies how the computer responds to a LAN wakeup event when the power is off.
On PME	• Stay Off • **Power On (default)**	Specifies how the computer responds to a PCI power management enable event when the power is off.
QuickBoot Mode	• Enabled • **Disabled (default)**	Enables the computer to boot without running certain POST tests.
Scan User Flash Area	• **Enabled (default)** • Disabled	Enables the BIOS to scan the flash memory for user binary files that are executed at boot time.
First Boot Device Second Boot Device Third Boot Device Fourth Boot Device	• Removable devices • Hard Drive • ATAPI CD-ROM Drive • Network boot	Specifies the boot sequence from the available devices. To specify boot sequence: 1. Select the boot device with <↑> or <↓>. 2. Press <+> to move the device up the list or <-> to move the device down the list. 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.
Hard Drive, submenu	No options	Lists available hard drives. When selected, displays the Hard Drive submenu.
Removable Devices, submenu	No options	Lists available removable devices. When selected, displays the Removable Devices submenu.

Hard Drive Submenu

Use this submenu to configure the boot sequence for hard drives.

Table 17. Hard Drive Submenu

Options	Description
• Installed hard drive • Bootable ISA Cards	Specifies the boot sequence for the hard drives attached to the computer. To specify boot sequence: 1. Select the boot device with <↑> or <↓>. 2. Press <+> to move the device up the list or <-> to move the device down the list. The operating system assigns a drive letter to each device in the order listed. Changing the order of the devices changes the drive lettering.

Removable Devices Submenu

Use this submenu to configure the boot sequence for removable devices.

Table 18. Removable Devices Submenu

Options	Description
• Legacy Floppy Drives	Specifies the boot sequence for the removable hard drives attached to the computer. To specify boot sequence: 1. Select the boot device with <↑> or <↓>. 2. Press <+> to move the device up the list or <-> to move the device down the list. The operating system assigns a drive letter to each device in the order listed. Changing the order of the devices changes the drive lettering.

Exit Menu

Use this menu to exit the Setup program, save changes, load defaults, and save 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 default values for all the Setup options.
Load Custom Defaults	Loads the custom defaults for Setup options.
Save Custom Defaults	Saves the current values as custom defaults. Normally, the BIOS reads the Setup values from flash memory. If this memory is corrupted, the BIOS reads the custom defaults. If no custom defaults are set, the BIOS reads the factory defaults.
Discard Changes	Discards changes without exiting Setup. The option values present when the computer was turned on are used.

5 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 for the upgrade by recording the current BIOS settings, obtaining the upgrade utility, and making a copy of the current BIOS.

Obtaining the Upgrade Utility

You can upgrade to a new version of the BIOS using the new BIOS files and the BIOS upgrade utility, iFLASH.EXE. You can obtain the BIOS upgrade file and the iFLASH.EXE utility through your computer supplier or from the Intel World Wide Web site:

http://www.intel.com.

NOTE

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

This upgrade utility allows you to:

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

The following steps explain how to upgrade 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 procedure.

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

Creating a Bootable Floppy Diskette

1. Use a DOS or Windows† 95 system to create the floppy disk.
2. Insert a floppy disk in floppy drive A.
3. At the C:\ prompt, for an unformatted floppy disk, type:
   ```
   format a:/s
   ```
   or, for a formatted floppy disk, type:
   ```
   sys a:
   ```
4. Press <Enter>

Creating the BIOS Upgrade Floppy Diskette

The BIOS upgrade file is a compressed self-extracting archive that contains the files you need to upgrade the BIOS.

1. Copy the BIOS upgrade file to a temporary directory on your hard disk.
2. From the C:\ prompt, change to the temporary directory.
3. To extract the file, type the name of the BIOS upgrade file, for example:
   ```
   10006BI1.EXE
   ```
4. Press <Enter>. The extracted file contains the following files:
   ```
   LICENSE.TXT
   README.TXT
   BIOS.EXE
   ```
5. Read the `LICENSE.TXT` file, which contains the software license agreement and the `README.TXT` file, which contains the instructions for the BIOS upgrade.
6. Insert the bootable floppy disk into drive A.
7. To extract the `BIOS.EXE` file to the floppy disk, change to the temporary directory that holds the `BIOS.EXE` file and type:
   ```
   BIOS A:
   ```
8. Press <Enter>.
9. The floppy disk now holds the BIOS upgrade and recovery files.

Upgrading the BIOS

1. Boot the computer with the floppy disk in drive A. The BIOS upgrade utility screen appears.
2. Select `Update Flash Memory From a File`.
3. Select `Update System BIOS`. Press <Enter>.
4. Use the arrow keys to select the correct `.bio` file. Press <Enter>.
5. When the utility asks for confirmation that you want to flash the new BIOS into memory, select `Continue with Programming`. Press <Enter>.
6. When the utility displays the message `upgrade is complete`, remove the floppy disk. Press <Enter>.
7. As the computer boots, check the BIOS identifier (version number) to make sure the upgrade was successful.

8. To enter the Setup program, press <F2> when you see the message:

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

9. For proper operation, load the Setup program defaults. To load the defaults, press <F9>.
10. To accept the defaults, press <Enter>.
11. Set the options in the Setup program to the settings you wrote down before the BIOS upgrade.
12. To save the settings, press <F10>.
13. To accept the settings, press <Enter>.
14. Turn off the computer and reboot.

Recovering the BIOS

It is unlikely that anything will interrupt the BIOS upgrade; however, if an interruption occurs, the BIOS could be damaged. The following steps explain how to recover the BIOS if an upgrade fails. The following procedure use recovery mode for the Setup program. See Chapter 3 for more information about Setup modes.

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 the procedure. Monitor the procedure by listening to the speaker and looking at the floppy drive LED.

1. Turn off all peripheral devices connected to the computer. Turn off the computer.
2. Remove the computer cover.
3. Locate the configuration header (see Figure 14 on page 26; J8B2 on the motherboard).
4. On the header (J8B2), remove the jumper from all pins as shown below to set recovery mode for Setup.

J8B2

OM06240

5. Insert the bootable BIOS upgrade floppy disk into floppy drive A.
6. Replace the cover, turn on the computer, and allow it to boot.
7. Reconnect the AC power cord and turn on the computer. The recovery process will take a few minutes.
8. 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.
9. If recovery fails, return to step 1 and repeat the recovery process.
10. If recovery is successful, turn off the computer and disconnect the AC power cord from the computer. Remove the computer cover and continue with the following steps.

11. On the header (J8B2), move the jumper back to pins 1-2 as shown below to set normal mode for Setup.

J8B2

OM06240A

12. Replace the computer cover and reconnect the AC power cable; leave the upgrade disk in drive A and turn on the computer.
13. Continue with the BIOS upgrade (see page 42).

Changing the BIOS Language

You can use the BIOS upgrade utility to change the language the BIOS uses for messages and the Setup program. Use a bootable floppy disk containing the Intel flash utility and language files (see page 42).

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

6 Technical Reference

Motherboard Connectors

The following figure shows the location of the motherboard connectors.

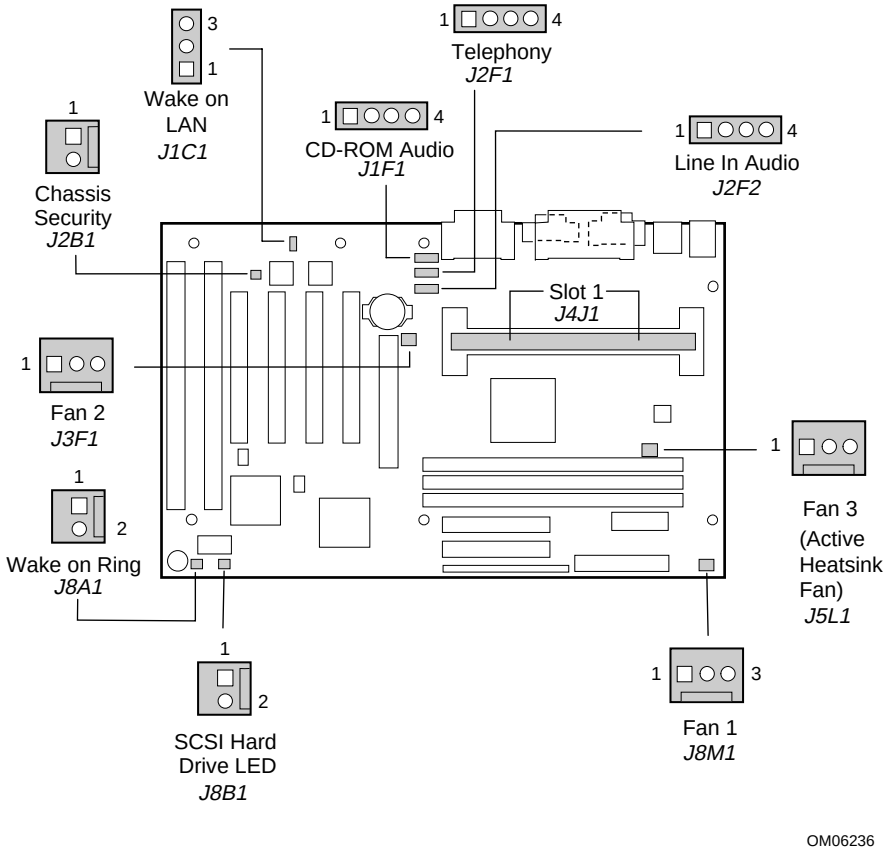

Figure 15. Motherboard Connectors

Table 20. Chassis Security Header (J2B1)

Pin	Signal Name
1	Ground
2	CHS_SEC

Table 21. Wake on LAN Header (J1C1)

Pin	Signal Name
1	+5 VSB
2	Ground
3	WOL

Table 22. ATAPI CD Audio Connector (J1F1)

Pin	Signal Name
1	CD_IN-Left
2	Ground
3	Ground
4	CD_IN-Right

Table 23. ATAPI Telephony Connector (J2F1)

Pin	Signal Name
1	Audio Out (monaural)
2	Ground
3	Ground
4	Audio In (monaural)

Table 24. ATAPI Line In Connector (J2F2)

Pin	Signal Name
1	Left Line In
2	Ground
3	Ground
4	Right Line In (monaural)

Table 25. Fan 1 Header (J8M1)

Pin	Signal Name
1	Ground
2	FAN_CTRL (+12 V)
3	FAN_SEN*

* If the optional management extension hardware is not available, pin 3 is ground.

Table 26. Fan 2 Header (J3F1)

Pin	Signal Name
1	Ground
2	FAN_CTRL (+12 V)
3	FAN_SEN*

* If the optional management extension hardware is not available, pin 3 is ground.

Table 27. Fan 3 Header (J5L1) (Active Heatsink Fan)

Pin	Signal Name
1	Ground
2	+12 V
3	Ground

Table 28. SCSI Hard Drive LED Input Header (J8B1)

Pin	Signal Name
1	DRV_ACT#
2	No connect

Table 29. Wake on Ring Header (J8A1)

Pin	Signal Name
1	Ground
2	RINGA

Front Panel Connectors

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

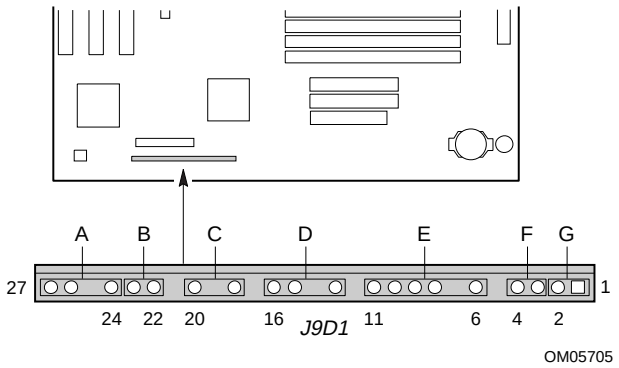

Table 30. Front Panel Connectors

Connector	Pin	Signal Name
A. Speaker*	27	SPKR_HDR
	26	PIEZO_IN
	25	Key
	24	Ground
B. Reset switch	23	SW_RST
	22	Ground
		Key
C. Power LED	20	+5 V
	19	Key
	18	Ground
		Key
D. Hard drive LED	16	+5 V
	15	HD Active#
	14	Key
	13	+5 V
		Key
E. Infrared	11	CONIR (consumer IR)
	10	IrTX (transmit)
	9	Ground
	8	IrRX (receive)
	7	Key
	6	+5 V
		Key
F. Sleep switch	4	+5 V
	3	SLEEP
G. Power switch	2	Ground
	1	SW_ON#

* A jumper on pins 26-27 enables the onboard speaker.

Motherboard Resources

Memory Map

Table 31. Memory Map

Address Range (decimal)	Address Range (hex)	Size	Description
1024 K - 393216 K	100000 - 18000000	383 MB	Extended memory
1008 K - 1024 K	FC000 - FFFFF	16 KB	Boot block
1000 K - 1008 K	FA000 - FBFFF	8 KB	ESCD (Plug and Play configuration and DMI)
996 K - 1000 K	F9000 - F9FFF	4 KB	Reserved for BIOS
992 K - 996 K	F8000 - F8FFF	4 KB	OEM Logo or Scan User Flash
928 K - 992 K	E8000 - F7FFF	64 KB	POST BIOS
896 K - 928 K	E0000 - E7FFF	32 KB	POST BIOS (Available as UMB)
800 K - 896 K	C8000 - DFFFF	96 KB	Available high DOS memory (open to ISA and PCI bus)
640 K - 800 K	A0000 - C7FFF	160 KB	Video memory and BIOS
639 K - 640 K	9FC00 - 9FFFF	1 KB	Extended BIOS data (movable by memory manager software)
512 K - 639 K	80000 - 9FBFF	127 KB	Extended conventional memory
0 K - 512 K	00000 - 7FFFF	512 KB	Conventional memory

DMA Channels

Table 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	Floppy 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	PIIX4- DMA 1
0020 - 0021	2 bytes	PIIX4 - interrupt controller 1
002E - 002F	2 bytes	Super I/O controller configuration registers
0040 - 0043	4 bytes	PIIX4 - Counter/Timer 1
0048 - 004B	4 bytes	PIIX4- Counter/Timer 2
0060	1 byte	Keyboard Controller Byte - Reset IRQ
0061	1 byte	PIIX4 - NMI, Speaker Control
0064	1 byte	Keyboard controller, CMD/STAT Byte
0070, bit 7	1 bit	PIIX4 - enable NMI
0070, bits 6:0	7 bits	PIIX4 - real time clock, address
0071	1 byte	PIIX4 - real time clock, data
0078	1 byte	Reserved - motherboard configuration
0079	1 byte	Reserved - motherboard configuration
0080 - 008F	16 bytes	PIIX4 - DMA page registers
00A0 - 00A1	2 bytes	PIIX4 - interrupt controller 2
00B2 - 00B3	2 bytes	APM control
00C0 - 00DE	31 bytes	PIIX4 - DMA 2
00F0	1 byte	Reset numeric error
0170 - 0177	8 bytes	Secondary IDE channel
01F0 - 01F7	8 bytes	Primary IDE channel
0201	1 byte	Audio / game port
0220 - 022F	16 bytes	Audio (Sound Blaster† compatible)
0228 - 022F	8 bytes	LPT3
0240 - 024F	16 bytes	Audio (Sound Blaster compatible)
0278 - 027F	8 bytes	LPT2
0290 - 0297	8 bytes	Management extension hardware
02E8 - 02EF	8 bytes	COM4/Video (8514A)
02F8 - 02FF	8 bytes	COM2
0300 - 0301	2 bytes	MPU-401 (MIDI)
0330 - 0331	2 bytes	MPU-401 (MIDI)
0332 - 0333	2 bytes	MPU-401 (MIDI)
0334 - 0335	2 bytes	MPU-401 (MIDI)
0376	1 byte	Secondary IDE channel command port
0377	1 byte	Floppy channel 2 command
0377, bit 7	1 bit	Floppy disk change, channel 2
0377, bits 6:0	7 bits	Secondary IDE channel status port

continued ☛

Table 33. I/O Map (continued)

Address (hex)	Size	Description
0378 - 037F	8 bytes	LPT1
0388- 038D	6 bytes	AdLib (FM synthesizer)
03B4 - 03B5	2 bytes	Video (VGA†)
03BA	1 byte	Video (VGA)
03C0 - 03CA	11 bytes	Video (VGA)
03CC	1 byte	Video (VGA)
03CE - 03CF	2 bytes	Video (VGA)
03D4 - 03D5	2 bytes	Video (VGA)
03DA	1 byte	Video (VGA)
03E8 - 03EF	8 bytes	COM3
03F0 - 03F5	6 bytes	Floppy Channel 1
03F6	1 byte	Primary IDE channel command port
03F7 (Write)	1 byte	Floppy channel 1 command
03F7, bit 7	1 bit	Floppy disk change channel 1
03F7, bits 6:0	7 bits	Primary IDE channel status port
03F8 - 03FF	8 bytes	COM1
04D0 - 04D1	2 bytes	Edge/level triggered PIC
0530 - 0537	8 bytes	Windows Sound System
0604 - 060B	8 bytes	Windows Sound System
LPT*n* + 400h	8 bytes	ECP port, LPT*n* base address + 400h
0CF8 - 0CFB*	4 bytes	PCI configuration address register
0CF9**	1 byte	Turbo and reset control register
0CFC - 0CFF	4 bytes	PCI configuration data register
0E80 - 0E87	8 bytes	Windows Sound System
0F40- 0F47	8 bytes	Windows Sound System
0F86 - 0F87	2 bytes	Yamaha OPL3-SA configuration
FF00 - FF07	8 bytes	IDE bus master register
FFA0 - FFA7	8 bytes	Primary bus master IDE registers
FFA8 - FFAF	8 bytes	Secondary bus master IDE registers

* DWORD access only

** Byte access only

NOTE

This table does not list I/O addresses that may be used by add-in cards in the system.

PCI Configuration Space Map

Table 34. PCI Configuration Space Map

Bus Number (hex)	Device Number (hex)	Function Number (hex)	Description
00	00	00	Intel 82440LX (PAC)
00	01	00	Intel 82371AB (PIIX4) A.G.P. bus
00	07	00	Intel 82371AB (PIIX4) PCI/ISA bridge
00	07	01	Intel 82371AB (PIIX4) IDE bus master
00	07	02	Intel 82371AB (PIIX4) USB
00	07	03	Intel 82371AB (PIIX4) power management
00	0D	00	PCI expansion slot 1 (J4D2)
00	0E	00	PCI expansion slot 2 (J4D1)
00	0F	00	PCI expansion slot 3 (J4C1)
00	10	00	PCI expansion slot 4 (J4B1)

Interrupts

Table 35. Interrupts

IRQ	System Resource
NMI	I/O channel check
0	Reserved, interval timer
1	Reserved, keyboard buffer full
2	Reserved, cascade interrupt from slave PIC
3	COM2*
4	COM1*
5	LPT2 (Plug and Play option) / audio / user available
6	Floppy drive
7	LPT1*
8	Real time clock
9	Reserved
10	User available
11	Windows Sound System* / user available
12	Onboard mouse port (if present, else user available)
13	Reserved, math coprocessor
14	Primary IDE (if present, else user available)
15	Secondary IDE (if present, else user available)

* Default, but can be changed to another IRQ

A Error Messages

BIOS Beep Codes

One long beep followed by several short beeps indicates a video problem.

Table 36. Beep Codes

Beeps	80h Code	Description
1	B4h	One short beep before boot
1-2	98h	Search for option ROMs
1-2-2-3	16h	BIOS ROM checksum
1-3-1-1	20h	Test DRAM refresh
1-3-1-3	22h	Test keyboard controller
1-3-4-1	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
2-1-2-3	46h	Check ROM copyright notice
2-2-3-1	58h	Test for unexpected interrupts

BIOS Error Messages

Table 37. BIOS Error Messages

Error Message	Explanation
Diskette drive A error or Diskette drive B error	Drive A: or B: 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: *nnnn*	Extended memory not working or not configured properly at offset *nnnn*.
Failing Bits: *nnnn*	The hex number nnnn 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 be sure the fixed-disk type is correctly identified.
Incorrect Drive A type - run SETUP	Type of floppy drive for drive A: not correctly identified in Setup.

continued ☛

Table 37. BIOS Error Messages (continued)

Error Message	Explanation
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 displays 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: *nnnn*	Shadow RAM failed at offset *nnnn* 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.
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: *nnnn*	System RAM failed at offset *nnnn* of the 64 KB block at which the error was detected.
System timer error	The timer test failed. Requires repair of system motherboard.

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 Requirements

This printed circuit assembly meets the following safety and electromagnetic compatibility (EMC) regulations when correctly installed in a compatible host computer.

Safety Standards

UL 1950 - CSA 950-95, 3rd edition, 28 July 1995

The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (USA and Canada)

CSA C22.2 No. 950-95, 3rd Edition

The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (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, and 3)

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)

Electromagnetic Compatibility (EMC) Regulations

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 2 (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 assembly has the following product certification markings:

- European CE Mark
  - — Marking on the board or shipping container.
- UL Recognition Mark
  - — Marking is 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.
- Canadian Compliance Mark
  - — Marking is a small c followed by a stylized backward UR on the 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 host chassis, power supply, and other modules have passed EMC testing using a motherboard with a microprocessor from the same family (or higher) 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 (see page 75)
- External I/O cable shielding and filtering
- Mounting, grounding, and bonding requirements
- Keying connectors when mismating of connectors could be hazardous

If the host chassis, 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.