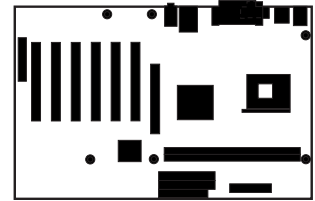


Intel® Desktop Boards D845PT and D845BG Product Guide



Order Number: A72165-001

Revision History

Revision	Revision History	Date
-001	First release of the Intel® Desktop Boards D845PT and D845BG Product Guide.	October 2001

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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The D845PT and D845BG desktop boards may contain design defects or errors known as errata, which may cause the product to deviate from published specifications. Current characterized errata are available on request.

Contact your local Intel sales office or your distributor to obtain the latest specifications and before placing your product order.

Copies of documents which have an ordering number and are referenced in this document, or other Intel literature, may be obtained from Intel Corporation by going to the World Wide Web site at: <http://www.intel.com/> or by calling 1-800-548-4725.

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1 Desktop Board Features

 **NOTE**

The D845PT board layout was used for illustrations unless otherwise noted.

Table 1 describes the major features of the boards.

Table 1. Feature Summary

Form Factors	<ul style="list-style-type: none">• microATX at 8.2 inches by 9.6 inches (D845PT board)• ATX at 8.2 inches by 12.0 inches (D845BG board)
Processor	Support for a single Intel® Pentium® 4 processor in an mPGA-478 socket
Memory	Two 184-pin double data rate (DDR) SDRAM DIMM sockets
Chipset	<ul style="list-style-type: none">• Intel® 845 chipset, consisting of:• Intel® 82845 Memory Controller Hub (MCH) with Accelerated Hub Architecture (AHA) bus• Intel® 82801BA I/O Controller Hub (ICH2) with AHA bus• 4 Mbit Firmware Hub (FWH)
I/O Control	SMSC LPC47M142 (with USB 1.1 hub) low pin count (LPC) interface I/O controller
LAN (optional)	Intel® 82562ET 10/100 Mbit/sec Platform LAN Connect (PLC) device and RJ-45 connector
Graphics	AGP connector supporting 1.5 V 4X and 2X AGP cards
Audio	Analog Devices Inc. AD1885 analog codec (AC '97) featuring SoundMAX [†] with SPX [†] software support
Peripheral Interfaces	<ul style="list-style-type: none">• Up to seven Universal Serial Bus (USB) ports<ul style="list-style-type: none">— Four ports routed to the back panel— Two ports routed to the front panel USB connector— One port routed to the optional CNR• Two IDE interfaces with Ultra DMA-33 and ATA-66/100 support• One diskette drive interface• One parallel port• Two serial ports (one via a board connector)• PS/2[†] keyboard and mouse ports
Expansion Capabilities	<ul style="list-style-type: none">• D845PT board:<ul style="list-style-type: none">— Three PCI bus add-in card connectors— One AGP connector— One optional CNR connector (slot shared with PCI bus connector 3)• D845BG board:<ul style="list-style-type: none">— Six PCI bus add-in card connectors— One AGP connector— One optional CNR connector (slot shared with PCI bus connector 6)

continued

Table 1. Feature Summary (continued)

BIOS	<ul style="list-style-type: none"> • Intel/AMI BIOS • 4 Mbit symmetrical flash memory • Support for SMBIOS
Power Management	<ul style="list-style-type: none"> • Support for Advanced Configuration and Power Interface (ACPI) • Support for Instantly Available PC • Support for Plug & Play
Management Features	<p>Hardware monitor with:</p> <ul style="list-style-type: none"> • Two fan sensing inputs used to monitor fan activity • Remote diode temperature sensing • Voltage sensing to detect out of range values
Instantly Available PC	<ul style="list-style-type: none"> • Support for PCI Local Bus Specification Revision 2.2 • Support for Suspend to RAM (STR) • Wake on USB, PCI, CNR, RS-232, PS/2, LAN, and front panel
Other Features	<ul style="list-style-type: none"> • SCSI hard drive activity LED connector for the front panel • Chassis intrusion connector • Speaker

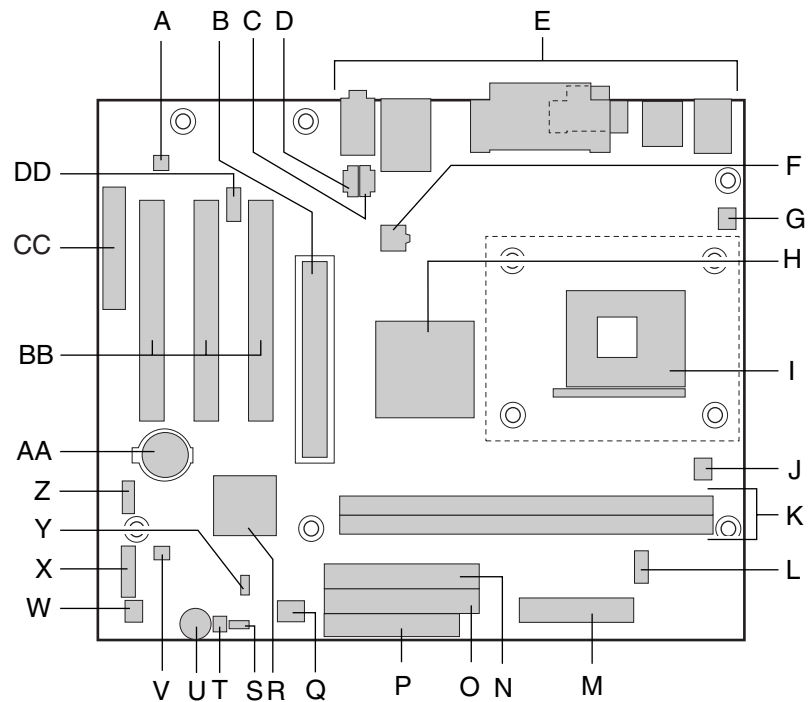
 **NOTE**

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

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

Board Components

Figure 1 shows the location of the major components on the D845PT board.

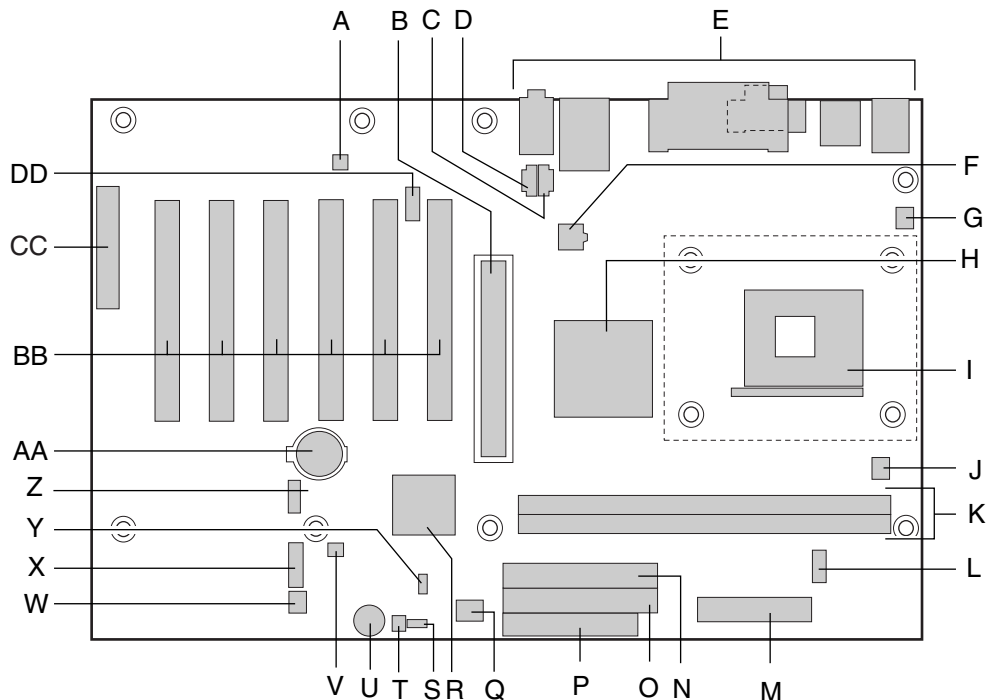


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A	Analog Devices Inc. AD1885 audio codec	P	Diskette drive connector
B	AGP connector	Q	Firmware Hub (FWH)
C	CD-ROM connector (ATAPI)	R	Intel 82801BA I/O Controller Hub (ICH2)
D	Auxiliary line-in connector (ATAPI)	S	BIOS configuration jumper block
E	Back panel connectors	T	SCSI hard drive activity LED connector
F	12 V processor core voltage connector	U	Speaker
G	Rear chassis fan connector (tachometer input)	V	Chassis intrusion connector
H	Intel 82845 Memory Controller Hub (MCH)	W	Front chassis fan connector
I	Processor socket	X	Front panel connector
J	Processor fan connector (tachometer input)	Y	Alternate power/sleep LED connector
K	DIMM sockets	Z	Front panel USB connector
L	Serial port B connector	AA	Battery
M	Power connector	BB	PCI bus add-in card connectors
N	Secondary IDE connector	CC	Communication and Networking Riser (CNR) (optional)
O	Primary IDE connector	DD	Front panel audio connector

Figure 1. D845PT Board Components

Figure 2 shows the location of the major components on the D845BG board.



OM12624

- | | | | |
|---|---|----|--|
| A | Analog Devices Inc. AD1885 audio codec | P | Diskette drive connector |
| B | AGP connector | Q | Firmware Hub (FWH) |
| C | CD-ROM connector (ATAPI) | R | Intel 82801BA I/O Controller Hub (ICH2) |
| D | Auxiliary line-in connector (ATAPI) | S | BIOS configuration jumper block |
| E | Back panel connectors | T | SCSI hard drive activity LED connector |
| F | 12 V processor core voltage connector | U | Speaker |
| G | Rear chassis fan connector (tachometer input) | V | Chassis intrusion connector |
| H | Intel 82845 Memory Controller Hub (MCH) | W | Front chassis fan connector |
| I | Processor socket | X | Front panel connector |
| J | Processor fan connector (tachometer input) | Y | Alternate power/sleep LED connector |
| K | DIMM sockets | Z | Front panel USB connector |
| L | Serial port B connector | AA | Battery |
| M | Power connector | BB | PCI bus add-in card connectors |
| N | Secondary IDE connector | CC | Communication and Networking Riser (CNR)
(optional) |
| O | Primary IDE connector | DD | Front panel audio connector |

Figure 2. D845BG Board Components

Processor



CAUTION

Failure to use an ATX12V power supply, or not connecting the additional power supply lead to the D845PT or D845BG boards may result in damage to the desktop board and/or power supply.

The boards support a single Intel Pentium 4 processor. Processors are not included with the board and must be purchased separately.

The processor connects to the board through the mPGA 478-pin socket. The Intel Pentium 4 processor may be removed and replaced to accommodate supported higher speed processors.

The board supports the processors listed in Table 2.

Table 2. Processors Supported by the Desktop Board

Type	Designation (GHz)	System Bus Frequency (MHz)	L2 Cache Size (KB)
Intel Pentium 4 processor in an mPGA-478 package	1.4, 1.5, 1.6, 1.7, 1.8, 1.9, and 2.0	400	256

For the latest information on supported Intel® processors for the boards, refer to the Intel customer support World Wide Web site:

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

For instructions on installing or upgrading the processor, see Chapter 2 on page 22.

The D845PT and D845BG boards require an ATX12V compliant power supply to function according to desktop board specifications. Both boards have two ATX12V compliant power supply connectors that are needed to provide extra power to the Intel 845 chipset and Intel Pentium 4 processor.

Items A and E in Figure 22 on page 70 show the two power connector locations.

Main Memory



NOTE

To be fully compliant with all applicable Intel® SDRAM memory specifications, the board should be populated with DIMMs that support the Serial Presence Detect (SPD) data structure. If your memory modules do not support SPD, you will see a notification to this effect on the screen at power up. The BIOS will attempt to configure the memory controller for normal operation.

The boards supports system memory as defined below:

- Up to two 184-pin DDR SDRAM Dual Inline Memory Modules (DIMMs) with gold-plated contacts
- DDR200 and DDR266 SDRAM

- 64 Mbit, 128 Mbit, 256 Mbit, and 512 Mbit technologies for the following memory configurations:
 - 64 MB (minimum)
 - 256 MB (64 Mbit technology)
 - 512 MB (128 Mbit technology)
 - 1024 MB (256 Mbit technology)
 - 2048 MB (512 Mbit technology)

 **NOTE**

The D845PT and D845BG desktop boards have been designed to support DIMMs based on 512 Mbit technology up to 2 GB, but this technology has not been validated on these boards. For more information about the latest list of tested memory, refer to the Intel World Wide Web site at:

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

- Unbuffered and non-registered single or double-sided DIMMs
- Serial Presence Detect (SPD) memory
- Non-ECC and ECC DIMMs
- 2.5 V memory only

 **NOTE**

For information about vendors that support these memory requirements, refer to the D845PT or D845BG link on this Intel World Wide Web site:

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

For information about installing memory, see Chapter 2 starting on page 23.

Intel® 845 Chipset

The Intel 845 chipset consists of the following devices:

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

Intel® 82845 Memory Controller Hub (MCH)

The MCH provides the processor, system memory, AGP, and hub interfaces in the Intel 845 chipset platform. Features on D845PT and D845BG boards includes:

- Single processor support with 400 MHz data transfer rate
- Designed to support up to 2.0 GB (with 512 Mbit technology) DDR SDRAM at 266 MHz operation

 **NOTE**

512 Mbit technology has not been validated on these boards.

- 1.5 V AGP interface with 4X Side Band Addressing (SBA)/data transfer and 2X and 4X fast write

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

The Intel 82801BA I/O Controller Hub integrates many I/O functions and provides the I/O subsystem with access to the rest of the platform. ICH2 features on D845PT and D845BG boards includes:

- Integrated IDE controller supports two Ultra DMA-33 and ATA-66/100 channels, BMIDE and PIO modes
- SMBus interface
- FWH interface
- Low Pin Count (LPC) interface
- AC'97 2.1 compliant link for audio and telephony codecs
- Integrated Intel 82562ET 10/100 Mbit/sec Platform LAN Connect (PLC) device for interfacing the ICH2 LAN connect interface to LAN connect component
- Two UHCI USB 1.1 compliant host controllers with four ports (additional ports are provided by the I/O controller)

Firmware Hub (FWH)

The 4 Mbit Firmware Hub has these features:

- System BIOS
- System security and management logic

Input/Output (I/O) Controller

The SMSC LPC47M142 ultra I/O controller features the following:

- Low pin count (LPC) interface
- Two serial ports (one via a board connector)
- One parallel port with Extended Capabilities Port (ECP) and Enhanced Parallel Port (EPP) support
- Serial IRQ interface compatible with serialized IRQ support for PCI systems
- PS/2-style mouse and keyboard interfaces
- Interface for one 1.2 MB, 1.44 MB, or 2.88 MB diskette drive
- Intelligent power management, including a programmable wake up event interface
- PCI power management support
- Two fan tachometer inputs

Real-Time Clock

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

USB Support

NOTE

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

The boards support up to seven USB 1.1 ports via the ICH2 and I/O controller; four ports routed to the back panel, two to the front panel connector, and one to the optional CNR. To attach additional devices, connect an external hub to either of the built-in ports. The board supports the standard universal host controller interface (UHCI) and takes advantage of standard software drivers written to be compatible with UHCI.

PCI Enhanced IDE Interface

The ICH2's IDE interface handles the exchange of information between the processor and peripheral devices like hard disks, CD-ROM drives, and Iomega Zip[†] drives inside the computer. The interface supports:

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

Expansion Slots

The D845PT and D845BG boards have the following add-in card connectors:

The D845PT board has:

- Three PCI bus add-in card connectors (PCI bus connector 3 slot shared with CNR)
- One AGP connector
- One optional CNR connector (slot shared with PCI bus connector 3)

The D845BG board has:

- Six PCI bus add-in card connectors (PCI bus connector 6 slot shared with CNR)
- One AGP connector
- One optional CNR connector (slot shared with PCI bus connector 6)

Accelerated Graphics Port (AGP)

NOTE

The D845PT and D845BG boards are only compatible with 1.5 V AGP cards.

AGP is a high-performance interface for graphics-intensive applications, such as 3D graphics. AGP is independent of the PCI bus and is intended for exclusive use with graphical display devices.

The AGP connector supports 1.5 V AGP 4X and 2X add-in cards. The boxed desktop board comes with either an integrated AGP card retention mechanism (RM) or an AGP RM that you will need to install on the board. The AGP card retention mechanism is used only with cards with retention notches (see Figure 13 on page 33). For information about installing the AGP card retention mechanism and an AGP card, see Chapter 2 on page 22.

Communication and Networking Riser (CNR) (Optional)

The optional CNR provides an interface that supports various features such as audio, modem, USB, and LAN.

Audio Subsystem

The audio subsystem features the following:

- Intel 82801BA ICH2
- Analog Devices AD1885 analog codec (AC '97)

NOTE

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

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

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

BIOS

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

The BIOS can be updated by following the instructions in Chapter 3 on page 43.

PCI Auto Configuration

If you install a PCI add-in card 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 card. You do not need to run the BIOS Setup program after you install a PCI add-in card.

IDE Auto Configuration

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

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

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

Security Passwords

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

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

LAN Subsystem (Optional)

The optional Intel 82562ET (with the Intel 82801BA ICH2) provides a Fast PCI LAN subsystem providing both 10Base-T and 100Base-TX connectivity. The Intel 82562ET provides the following functions:

- Basic 10/100 Ethernet LAN connectivity
- Supports RJ-45 connector with status indicator LEDs
- Programmable transit threshold
- Configurable EEPROM that contains the MAC address

LAN Subsystem Software

For LAN software and drivers, refer to the D845PT or D845BG link on Intel's World Wide Web site at:

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

RJ-45 LAN Connector LEDs

Two LEDs are built into the RJ-45 LAN connector. Table 3 describes the LED states when the board is powered up and the LAN subsystem is operating.

Table 3. RJ-45 LAN Connector LEDs

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

Speaker

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

Battery

A battery on the board keeps the values in CMOS RAM and the clock current when the computer is turned off. See Chapter 2 starting on page 23 for instructions on how to replace the battery.

Power Management Features

- Advanced Configuration and Power Interface (ACPI)
- Hardware:
 - Power connectors
 - Fan connectors
 - Resume on Ring
 - Instantly Available PC technology
 - Wake from USB
 - Wake from PS/2 keyboard/mouse
 - PME# wakeup support

ACPI

ACPI gives the operating system direct control over the power management and Plug & Play functions of a computer. The use of ACPI with the D845PT or D845BG board requires an operating system that provides full ACPI support.

Hardware

Power Connectors

The D845PT and D845BG boards have two power connectors. See Figure 22 on page 70 for the location of the power connectors.

Fan Connectors

The D845PT and D845BG boards have one processor fan connector and two standard fan connectors. See Figure 22 on page 70 for the location of the fan connectors.

Resume on Ring

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

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

Instantly Available PC Technology



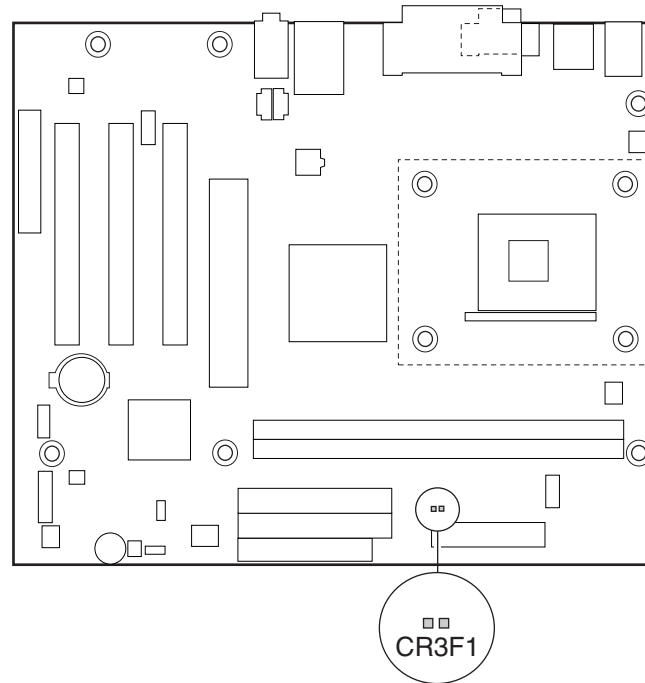
CAUTION

For Instantly Available PC technology, the 5 V standby line for the power supply must be capable of delivering adequate +5 V standby current. Failure to provide adequate standby current when using this feature can damage the power supply and/or effect ACPI S3 sleep state functionality.

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

The board's standby power indicator, shown in Figure 3, is lit when there is standby power to the system. This includes the memory modules and PCI bus connectors, even when the computer appears to be off.

If the system has a dual-colored power LED on the front panel, the sleep state is indicated by the LED turning amber.



OM12625

Figure 3. Location of Standby Power Indicator



CAUTION

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

Power supplies used with this board must be able to provide enough standby current to support the standard Instantly Available (ACPI S3 sleep state) configuration as outlined in Table 4. Values are determined by specifications such as PCI 2.2. Actual measurements may vary.

To estimate the total amount of standby current required for a particular system configuration, standby current requirements of all installed components must be added. Refer to the descriptions in and follow the steps outlined below:

1. Note the total D845PT or D845BG board standby current requirement.
2. Add to that the total PS/2 port standby current requirement if a wake-enabled device is connected.
3. Add, from the PCI 2.2 slots (wake-enabled) row, the total of the number of wake-enabled devices installed (PCI and AGP) multiplied by the standby current requirement.
4. Add, from the PCI 2.2 slots (non-wake-enabled) row, the total of the number of non-wake-enabled devices installed (PCI and AGP) multiplied by the standby current requirement.
5. Add all additional wake-enabled devices' and non-wake-enabled devices' standby current requirements as applicable.
6. Add all the required current totals from steps 1 through 5 to determine the total estimated standby current power supply requirement.

Table 4. Standby Current Requirements

Instantly Available Current Support	Description	Standby Current Requirements (mA)
Estimate for integrated board components	Total for the D845PT or D845BG board	770*
Estimate for add-on components (Add to integrated board components shown above)	PS/2 ports**	345
	PCI 2.2 slots (wake-enabled)	375
	PCI 2.2 slots (non-wake-enabled)	100
	CNR** (wake enabled)	875
	CNR** (non-wake-enabled)	40
	USB ports**	700

* Refer to the Intel Desktop Board D845PT/D845BG Technical Product Specification for the exact standby current requirements

** Dependent upon system configuration

NOTE

PCI requirements are calculated by totaling the following:

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

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

- Keyboard @ 275 mA.
- Mouse @ 70 mA.

USB requirements are calculated by totaling the following:

- One wake-enabled device @ 500 mA.
- USB hub @ 100 mA.
- Three USB non-wake-enabled devices @ 2.5 mA each.
- The USB ports are limited to a combined total of 700 mA.

Wake from USB

USB bus activity wakes the computer from an ACPI S1 or S3 state.

NOTE

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

Wake from PS/2 Keyboard/Mouse

PS/2 keyboard/mouse activity wakes the computer from an ACPI S1 or S3 state.

PME# Wakeup Support

When the PME# signal on the PCI bus is asserted, the computer wakes from an ACPI S1, S3, or S5 state.

2 Installing and Replacing Desktop Board Components

This chapter tells you how to:

- Install the I/O shield
- Install and remove the desktop board
- Install and remove a processor
- Install and remove memory
- Install and remove an AGP retention mechanism and card
- Connect the IDE cable
- Set the BIOS jumper
- Clear passwords
- Replace the battery

Before You Begin



CAUTION

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

- *Always follow the steps in each procedure in the correct order.*
- *Set up a log to record information about your computer, such as model, serial numbers, installed options, and configuration information.*
- *Electrostatic discharge (ESD) can damage components. Perform the procedures described in this chapter only at an ESD workstation using an antistatic wrist strap and a conductive foam pad. 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.*



WARNINGS

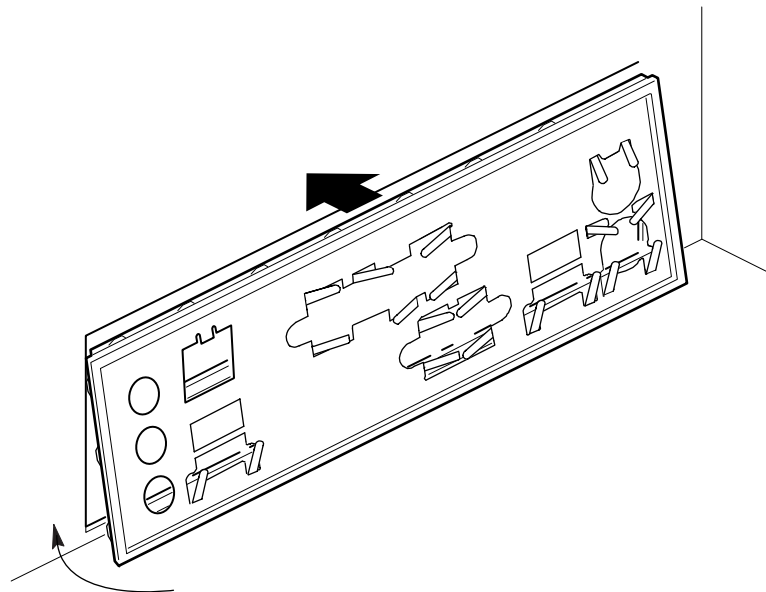
The procedures in this chapter assume familiarity with the general terminology associated with personal computers and with the safety practices and regulatory compliance required for using and modifying electronic equipment.

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

Installing the I/O Shield

The board comes with an I/O shield. When installed in the chassis, the shield blocks radio frequency transmissions, protects internal components from dust and foreign objects, and promotes correct airflow within the chassis.

Install the I/O shield before installing the board in the chassis. Place the shield inside the chassis as shown in Figure 4. Press the shield into place so that it fits tightly and securely. If the shield doesn't fit, obtain a properly-sized shield from the chassis supplier.



OM11543

Figure 4. Installing the I/O Shield

Installing and Removing the Desktop Board

Refer to your chassis manual for instructions on installing and removing the board. The D845PT board is secured to the chassis by six screws and the D845BG board by eight screws. See Figure 5 and Figure 6 for the locations of the mounting holes of each board.

WARNING

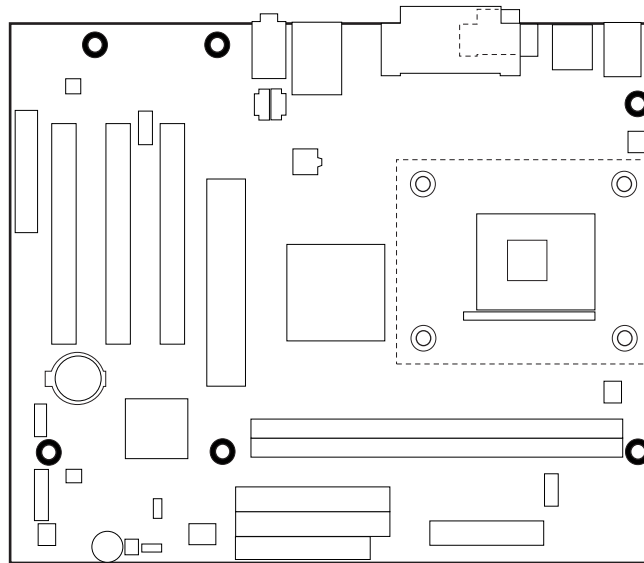
Only qualified technical personnel should do this procedure. Disconnect the computer from its power source before performing the procedures described here. Failure to disconnect the power before you open the computer can result in personal injury or equipment damage.

NOTES

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

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

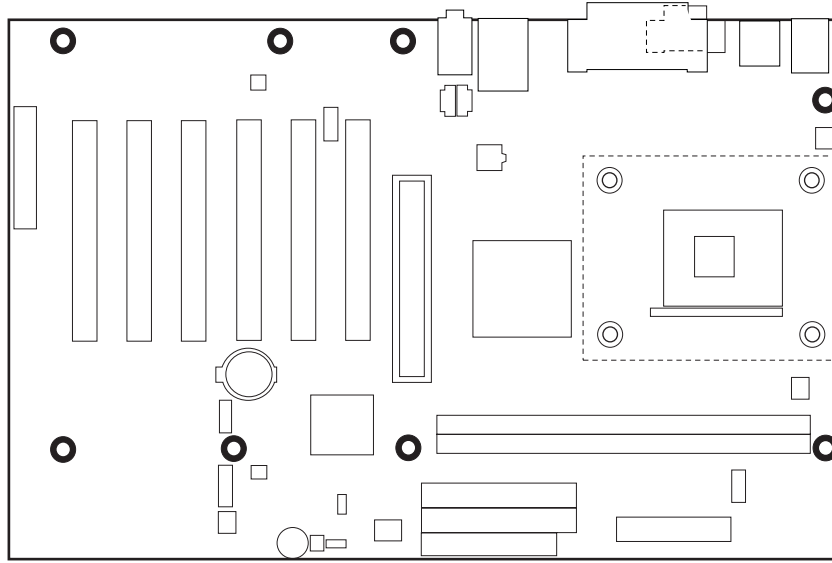
Figure 5 shows the location of the mounting holes for the D845PT board.



OM12627

Figure 5. D845PT Board Mounting Holes

Figure 6 shows the location of the mounting holes for the D845BG board.



OM12626

Figure 6. D845BG Board Mounting Holes

Installing and Removing a Processor

Instructions on how to install the processor fan heatsink retention mechanism (RM) base and processor to the desktop board are given below. For instruction on how to install the processor fan heatsink, refer to the processor installation manual or the Intel customer support World Wide Web site:

<http://support.intel.com/support/processors/pentium4/intnotes478.htm>

Installing the Processor Fan Heatsink Retention Mechanism Base

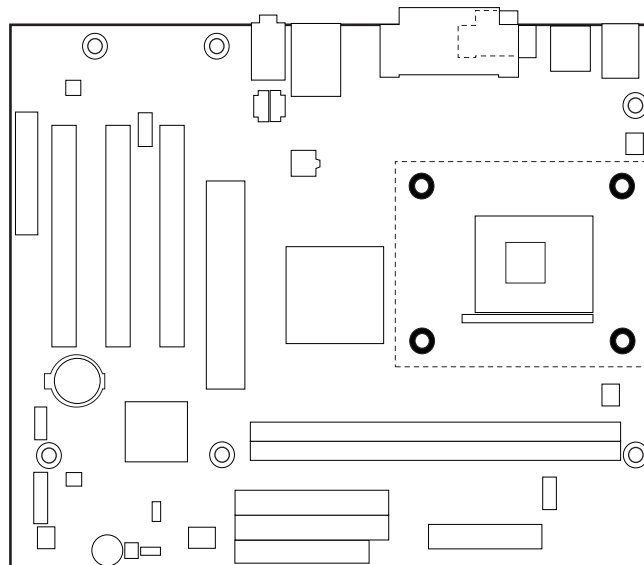
NOTE

The following assembly operation should be performed after the desktop board is secured in the chassis.

The processor fan heatsink RM package includes the RM base, four black fasteners, and four white pushpins.

To install the processor fan heatsink RM base, follow these instructions:

1. Observe the precautions in “Before You Begin” on page 23.
2. Locate the processor fan heatsink RM holes on the desktop board (see Figure 7).



OM12628

Figure 7. Processor Fan Heatsink RM Mounting Holes

3. Remove the four white pushpins from the RM base, if installed.
4. Align the four fasteners of the processor fan heatsink RM base (A) with the corresponding holes in the desktop board (B). Gently press down the four corners of the base until it snaps into place (see Figure 8). Verify that all four fasteners are fully engaged.

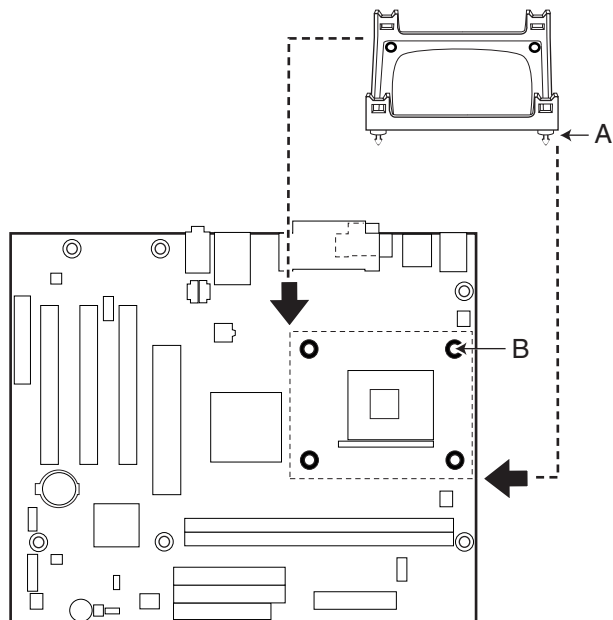


Figure 8. Installing the Processor Fan Heatsink RM Base to the Board

5. Insert the four white locking pushpins into the fasteners and press down to fully secure the RM base to the desktop board (see Figure 9).

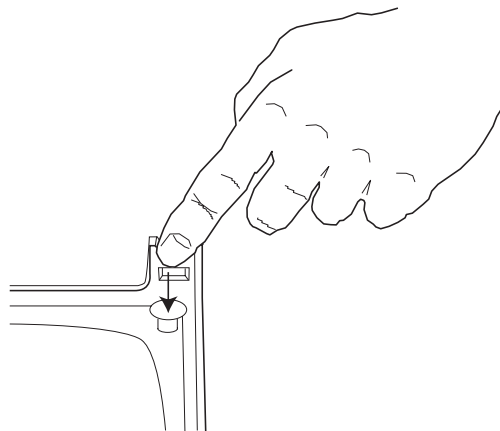


Figure 9. Pressing Down the Pushpin

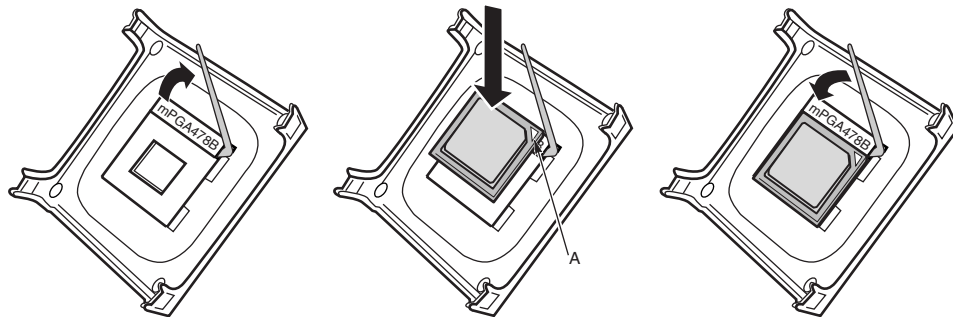
Installing a Processor

CAUTION

Before installing or removing the processor, make sure that ac power has been removed by unplugging the power cord from the computer; the standby power LED should not be lit (see Figure 3 on page 21). Failure to do so could damage the processor and the board.

To install a processor, follow these instructions:

1. Observe the precautions in “Before You Begin” on page 23.
2. Locate the processor socket and raise the socket lever completely.
3. Install the processor so that the corner with the triangle marking (A) is aligned with the corner where the lever is attached to the socket (see Figure 10).
4. Lower the lever to its original position.



OM12078

Figure 10. Installing a Processor

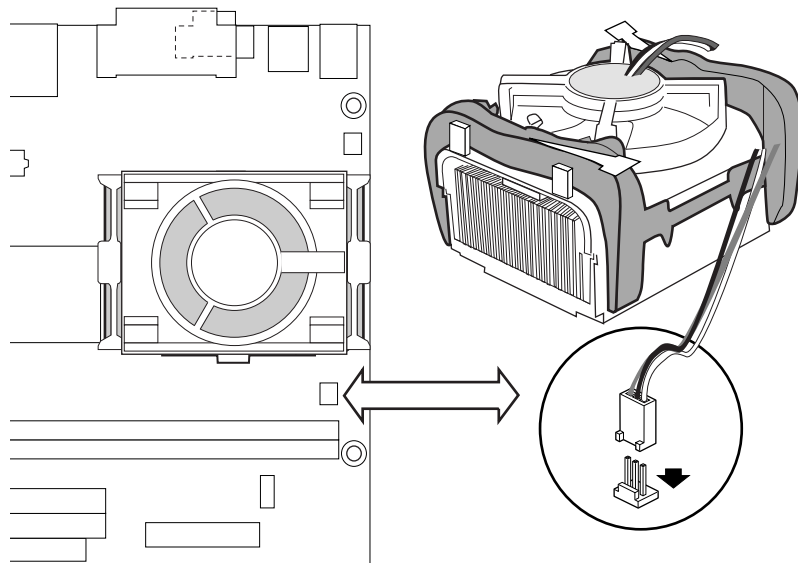
Installing the Processor Fan Heatsink

For instructions on how to install the processor fan heatsink, refer to the boxed processor manual or the Intel World Wide Web site at:

<http://support.intel.com/support/processors/pentium4/intnotes478.htm>

Connecting the Processor Fan Heatsink Cable

Connect the processor fan heatsink cable to the processor fan connector (see Figure 11).



OM12630

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

Removing a Processor

For instruction on how to remove the processor fan heatsink, refer to the processor installation manual or the Intel World Wide Web site at:

<http://support.intel.com/support/processors/pentium4/intnotes478.htm>

Installing and Removing Memory

CAUTION

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

You can access the PC Serial Presence Detect Specification at:

<http://www.intel.com/technology/memory/pcsdram/spec/>

The boards have two 184-pin DIMM sockets arranged as banks 1 and 0, as shown in Figure 12. If installing a single DIMM, install it in bank 0. If installing two DIMMs, install them in banks 0 and 1.

DIMM Installation Guidelines

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

- PC SDRAM Specification (memory component specific)
- PC SDRAM DIMM SPD Specification
- PC SDRAM Unbuffered DIMM Specification
- Intel® DDR JEDEC Specification Addendums

You can access these documents through the Internet at:

<http://www.intel.com/technology/memory/pcsdram/spec/>

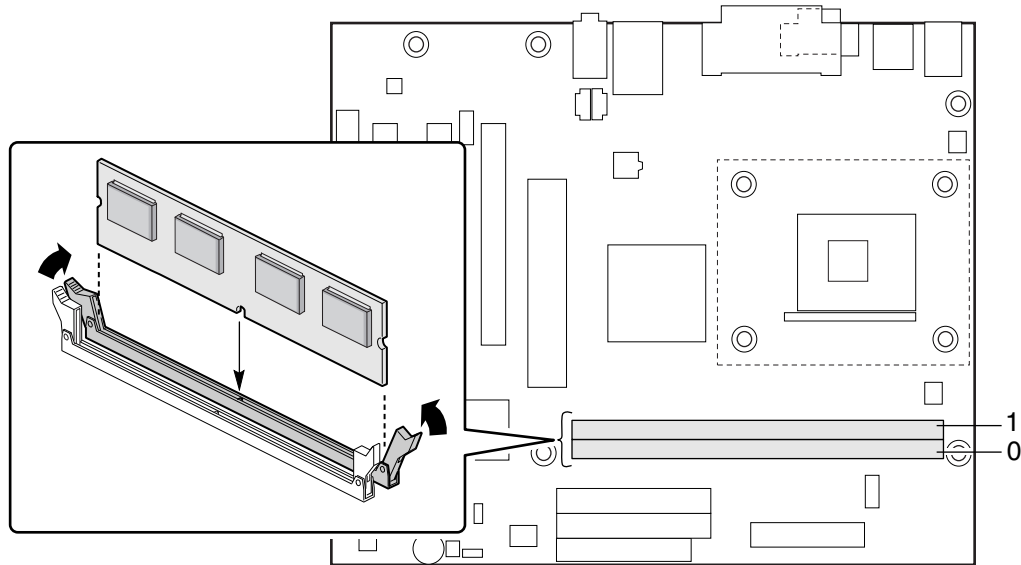
Installing DIMMs

CAUTION

Install memory in the DIMM sockets prior to installing the AGP video card to avoid interference with the memory retention mechanism.

To install DIMMs, follow these steps:

1. Observe the precautions in “Before You Begin” on page 23.
2. Turn off all peripheral devices connected to the computer. Turn off the computer and disconnect the ac power cord.
3. Remove the computer’s cover and locate the DIMM sockets (see Figure 12).
4. Remove the AGP video card (if it interferes with the DIMM clips being easily opened and closed).



OM12631

Figure 12. Installing a Memory Module

5. Make sure the clips at either end of the DIMM socket(s) are pushed outward to the open position.
6. Holding the DIMM by the edges, remove it from its anti-static package.
7. Position the DIMM above the socket. Align the small notch in the bottom edge of the DIMM with the key in the socket (see inset in Figure 12).
8. Insert the bottom edge of the DIMM into the socket.
9. When the DIMM is inserted, push down on the top edge of the DIMM until the retaining clips snap into place. Make sure the clips are firmly in place.
10. Reinstall the AGP card if it was removed prior to installing the DIMMs.
11. Replace the computer's cover and reconnect the ac power cord.

Removing DIMMs

To remove a memory module, follow these steps:

1. Observe the precautions in "Before You Begin" on page 23.
2. Turn off all peripheral devices connected to the computer. Turn off the computer.
3. Remove the ac power cord from the computer.
4. Remove the computer's cover.
5. Remove the AGP card (if it interferes with the DIMM clips being easily opened and closed).
6. Gently spread the retaining clips at each end of the DIMM socket. The DIMM pops out of the socket.
7. Hold the DIMM by the edges, lift it away from the socket, and store it in an anti-static package.
8. Reinstall the AGP card (if you removed it before installing the DIMMs).
9. Reinstall and reconnect any parts you removed or disconnected to reach the DIMM sockets.
10. Replace the computer's cover and reconnect the ac power cord.

Installing and Removing the AGP Retention Mechanism and Card

The AGP connector supports 1.5 V 4X and 2X AGP cards. Newer cards have a retention notch as shown in Figure 13. When using notched cards, install the AGP card retention mechanism (RM) before installing a card. The AGP card RM is not used with unnotched cards.

Pages 33–36 describe:

- Installing the AGP card RM
- Installing an AGP card
- Removing an AGP card from the AGP card RM
- Removing the AGP card RM

Installing the AGP Card Retention Mechanism



CAUTION

Install the AGP card RM only when using an AGP card with a retention notch (A) as shown in Figure 13. Use of the AGP card RM with an unnotched card may impair video operation. If you need to remove the AGP card RM, follow the instructions on page 36.



NOTE

All D845PT and D845BG boxed desktop boards may not include an AGP RM. See “Installing an AGP Card” on page 35 if your boxed desktop board does not include an AGP RM.

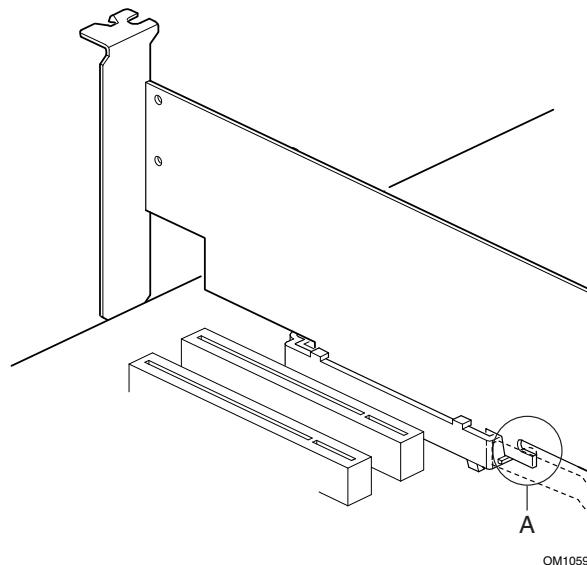
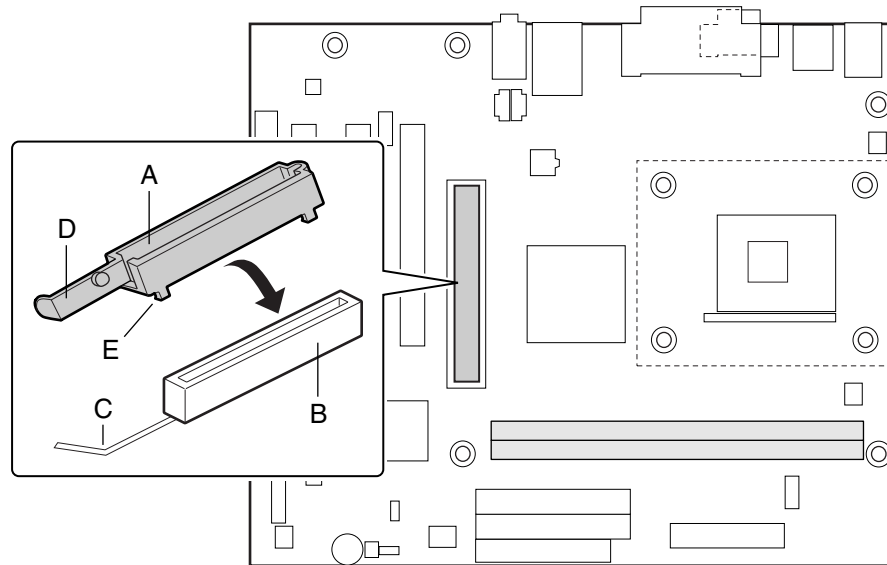


Figure 13. AGP Card with Retention Notch

The AGP card RM (see Figure 14) encloses the board's AGP connector and stabilizes the AGP card. Place the board (component side up) on a flat, supportive surface, preferably on the anti-static bag in which the board was shipped. Follow the steps outlined below to attach the RM (A) to the AGP connector (B):

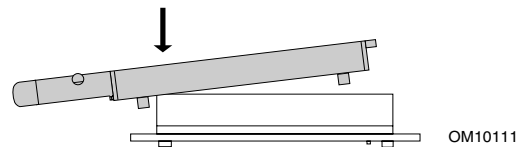
1. Locate the AGP connector (J5E1) on the board as shown below. Note that the board's silkscreen (C) indicates the correct final position of the lever (D) on the RM.



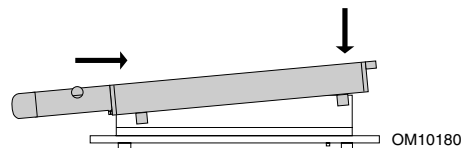
OM12632

Figure 14. Installing the AGP Card Retention Mechanism

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



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



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



Installing an AGP Card

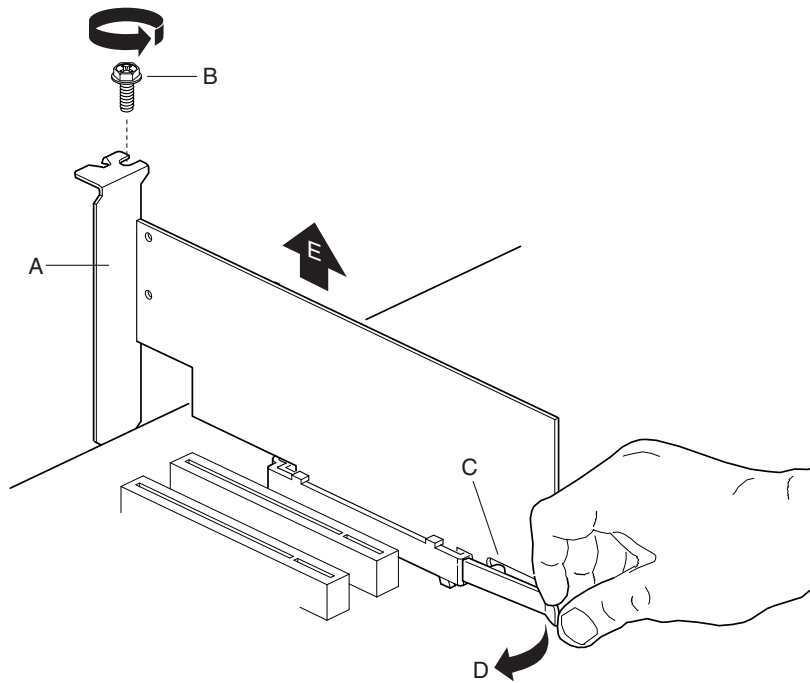
Follow these instructions to install an AGP card:

1. Place the AGP card in the AGP connector.
2. Press down on the card until it is completely seated in the AGP connector and the card retention notch snaps into place around the RM pin.
3. Secure the card's metal bracket to the chassis back panel with a screw.

Removing the AGP Card from the Retention Mechanism

Follow these instructions to remove the AGP card from the RM:

1. Remove the screw (B) that secures the card's metal bracket (A) to the chassis back panel.
2. Push back on the RM lever (D), as shown in Figure 15, until the retention pin (C) completely clears the notch in the card.
3. Pull the card straight up (E).



OM10595

Figure 15. Removing the AGP Card

Removing the AGP Card Retention Mechanism

Follow these instructions to remove the AGP card retention mechanism:

1. Using diagonal cutters (A), cut the loop (B) joining the two sides of the retention mechanism (see Figure 16).
2. Spread the sides of the retention mechanism (C) and lift the retention mechanism off of the AGP connector.

 **NOTE**

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

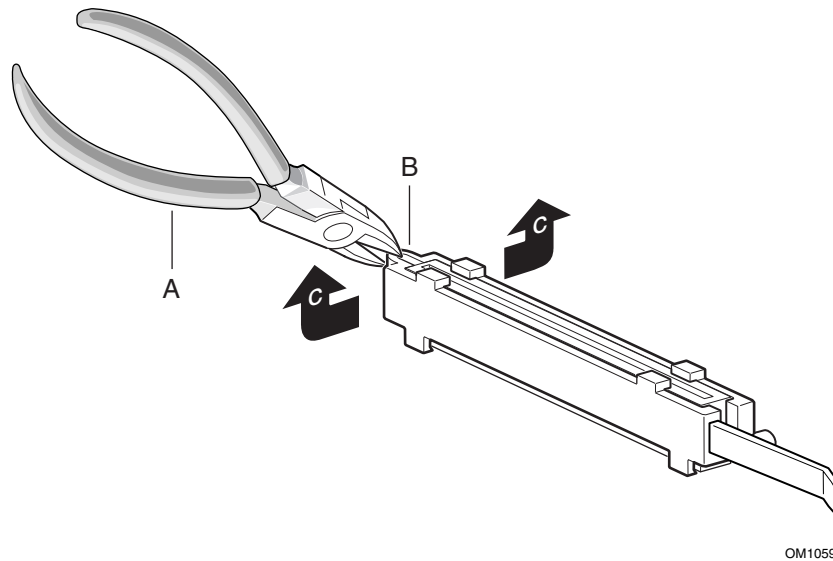


Figure 16. Removing the AGP Card Retention Mechanism

Connecting the IDE Cable

The Intel® boxed desktop board package include an IDE cable. The cable connects two drives to the desktop board. The cable supports the Ultra DMA-33 and ATA-66/100 transfer protocols. Figure 17 shows the correct installation of the cable.

 **NOTE**

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

 **NOTE**

Do not connect an ATA device as a slave on the same IDE cable as an ATAPI master device. For example, do not connect an ATA hard drive as a slave to an ATAPI CD-ROM drive.

For correct function of the cable:

- Attach the cable end with the single connector to the board.
- Attach the cable end with the two closely spaced connectors to the drives.

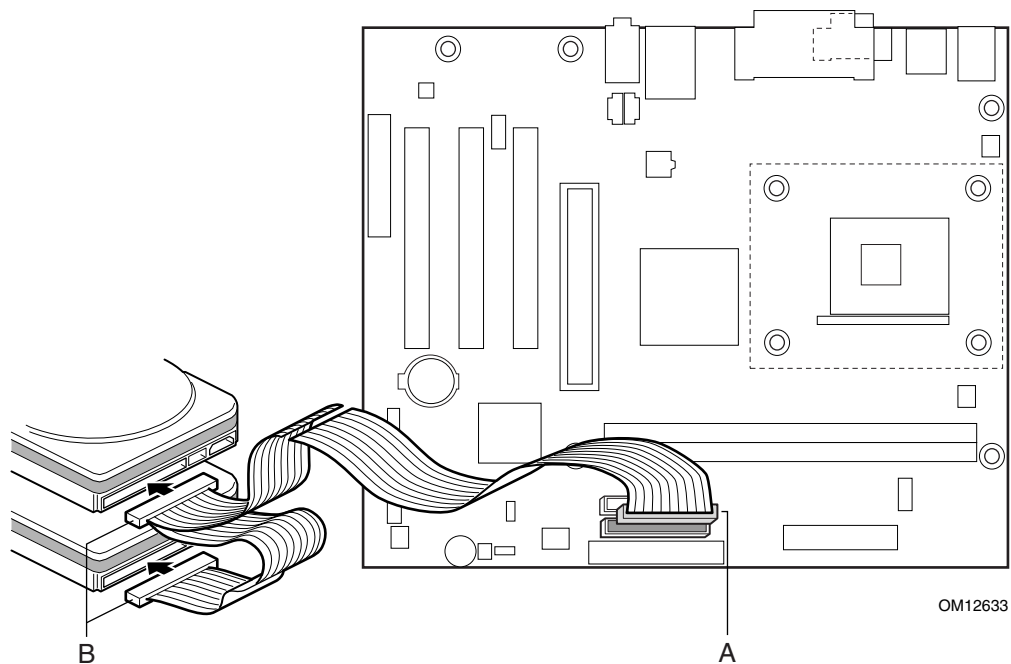


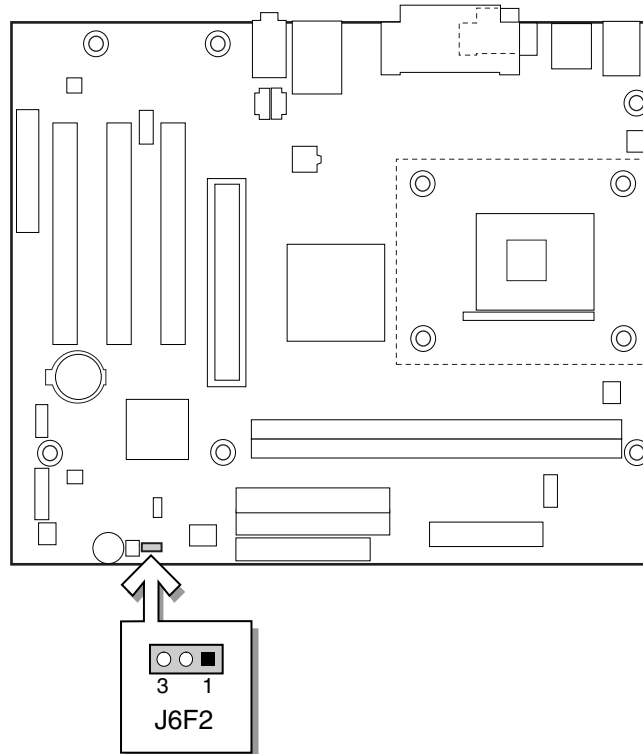
Figure 17. Connecting the IDE Cable

Setting the BIOS Configuration Jumper Block

CAUTION

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

The location of the board's BIOS configuration jumper is shown in Figure 18.






OM12634

Figure 18. Location of the BIOS Configuration Jumper Block

The three-pin BIOS jumper block enables all board configurations to be done in BIOS Setup. Table 5 shows the jumper settings for the Setup program modes.

Table 5. Jumper Settings for the BIOS Setup Program Modes (J6F2)

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

Clearing Passwords

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

1. Observe the precautions in “Before You Begin” on page 23.
2. Turn off all peripheral devices connected to the computer. Turn off the computer. Disconnect the computer’s power cord from the ac power source (wall outlet or power adapter).
3. Remove the computer cover.
4. Find the configuration jumper block (see Figure 18).
5. Place the jumper on pins 2-3 as shown below.



6. Replace the cover, plug in the computer, turn on the computer, and allow it to boot.
7. The computer starts the Setup program. Setup displays the maintenance menu.
8. 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. Disconnect the computer’s power cord from the ac power source.
11. Remove the computer cover.
12. To restore normal operation, place the jumper on pins 1-2 as shown below.



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

Replacing the Battery

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

When the voltage drops below a certain level, the BIOS Setup program settings stored in CMOS RAM (for example, the date and time) might not be accurate. Replace the battery with an equivalent one. Figure 19 on page 42 shows the location of the battery.



CAUTION

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



PRECAUTION

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



FORHOLDSREGEL

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



OBS!

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



VIKTIGT!

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



VARO

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



VORSICHT

Bei falschem Einsetzen einer neuen Batterie besteht Explosionsgefahr. Die Batterie darf nur durch denselben oder einen entsprechenden, vom Hersteller empfohlenen Batterietyp ersetzt werden.

Entsorgen Sie verbrauchte Batterien den Anweisungen des Herstellers entsprechend.

(German)



AVVERTIMENTO

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

(Italian)



PRECAUCIÓN

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

(Spanish)



WAARSCHUWING

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

(Dutch)



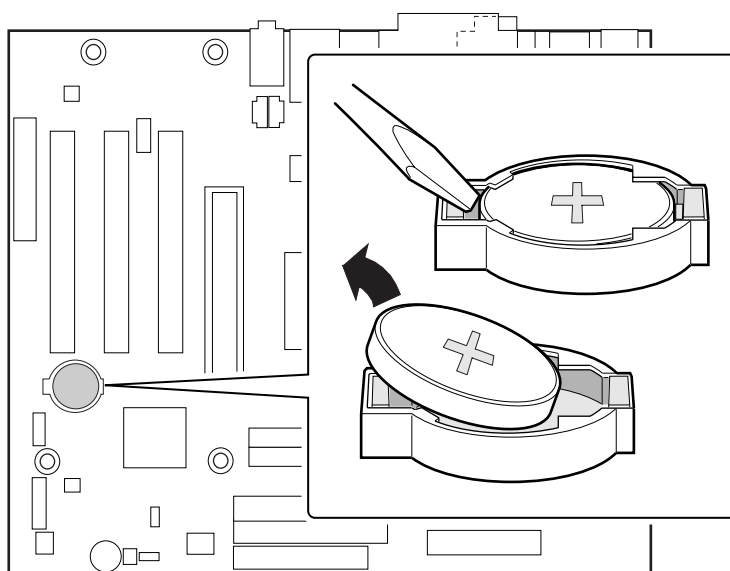
ATENÇÃO

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

(Brazilian Portuguese)

To replace the battery, follow these steps:

1. Observe the precautions in “Before You Begin” (see page 23).
2. Turn off all peripheral devices connected to the computer. Disconnect the computer’s power cord from the ac power source (wall outlet or power adapter).
3. Remove the computer cover.
4. Locate the battery on the board (see Figure 19).
5. With a medium flat-bladed screwdriver, gently pry the battery free from its connector. Note the orientation of the “+” and “-” on the battery.
6. Install the new battery in the connector, orienting the “+” and “-” correctly.
7. Replace the computer cover.



OM12635

Figure 19. Removing the Battery

3 Updating the BIOS

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

Updating the BIOS with the Intel® Express BIOS Update Utility

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

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

1. Go to the Intel customer support World Wide Web site:
<http://support.intel.com/support/motherboards/desktop/>
2. Navigate to the D845PT or D845BG page and click the Express BIOS Update utility file for the D845PT or D845BG board's BIOS.
3. Download the file to your hard drive. (You can also save this file to a diskette. This is useful if you are updating the BIOS for multiple identical systems.)
4. Close all other applications. This step is required. Your system will be rebooted at the last Express BIOS Update window.
5. Double-click the executable file from the location on your hard drive where it was saved. This runs the update program.
6. Follow the instructions provided in the dialog boxes to complete the BIOS update.

Updating the BIOS with the Intel® Flash Memory Update Utility

With the Intel Flash Memory Update Utility you can update the system BIOS from a floppy disk or other bootable media. The utility available from the Web provides a simple method for creating a bootable flash memory update floppy that will automatically update your BIOS.

Obtaining the BIOS Update File

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

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

You can obtain the BIOS update file through your computer supplier or by navigating to the D845PT or D845BG page on the Intel customer support World Wide Web site:

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

NOTE

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

The Intel Flash Memory Update Utility allows you to:

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

Updating the BIOS

CAUTION

The AUTOEXEC.BAT file provided with the update files updates the BIOS. Do not interrupt the process or the system may not function.

1. Boot the computer with the BIOS update diskette in drive A. During system boot, the AUTOEXEC.BAT file provided with the update files will automatically run the BIOS update process.
2. When the update process is complete, the monitor will display a message telling you to remove the diskette and to reboot the system.
3. As the computer boots, check the BIOS identifier (version number) to make sure the update was successful. If a logo appears, press <Esc> to view the POST messages.

Recovering the BIOS

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

NOTE

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

1. Turn off the computer, disconnect the computer's power cord, and disconnect all external peripherals.
2. Remove the computer cover and locate the configuration jumper block (J6F2) (see Figure 18).
3. Remove the jumper from all pins as shown below to set recovery mode for Setup.



4. Insert the bootable BIOS update 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:
 - Upon applying power, drive A will begin to show activity. In about a minute, two beeps will be heard and drive A activity will cease (temporarily) indicating the successful recovery of the BIOS core. Drive A activity will begin again followed by two more beeps indicating the successful recovery of the boot block. This sequence of events indicates a successful BIOS recovery.
 - A series of continuous beeps indicates a 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.
9. Remove the computer cover and continue with the following steps.
10. On the jumper block (J6F2), reinstall the jumper back on pins 1-2 as shown below to set normal mode for Setup.



11. Leave the update 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 update (see page 44).

4 Using the Setup Program

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

 **NOTE**

The BIOS Setup menus described in this section may not show the latest settings. For the latest BIOS settings, refer to the Intel® Desktop Board D845PT/D845BG Technical Product Specification or the Intel customer support World Wide Web site:

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

 **NOTE**

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

 **NOTE**

The Setup menus described in this section apply to the desktop boards with BIOS identifier PT84510A.86A. Boards with other BIOS identifiers might have differences in some of the Setup menu screens.

The Setup screen menu bar is shown below.

Maintenance	Main	Advanced	Security	Power	Boot	Exit
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Table 6 shows the BIOS Setup program menu bar.

Table 6. BIOS Setup Program Menu Bar

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

* For information about the BIS, refer to the Intel World Wide Web site:

<http://developer.intel.com/design/security/index1.htm>

Table 7 shows the function keys available for menu screens.

Table 7. BIOS Setup Program Function Keys

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

Maintenance Menu

Maintenance	Main	Advanced	Security	Power	Boot	Exit
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The menu shown in Table 8 is used to clear the Setup passwords and enable extended configuration mode. Setup only displays this menu in configure mode. See page 38 for information about setting configure mode.

Table 8. Maintenance Menu

Feature	Options	Description
Clear All Passwords	<ul style="list-style-type: none"> • Yes (default) • No 	Clears the user and administrative passwords.
Clear BIS Credentials	<ul style="list-style-type: none"> • Yes (default) • No 	Clears the Wired for Management Boot Integrity Service (BIS) credentials.
Extended Configuration	No options	Invokes the Extended Configuration submenu.
CPU Stepping Signature	No options	Displays CPU's Stepping Signature.
CPU Microcode Update Revision	No options	Displays CPU's Microcode Update Revision.

* For information about the BIS, refer to the Intel Web site at:

<http://developer.intel.com/design/security/index1.htm>

Extended Configuration Submenu

Maintenance	Main	Advanced	Security	Power	Boot	Exit
Extended Configuration						

This submenu shown in Table 9 is used to set system control and video memory cache mode. This submenu becomes available when User Defined is selected under Extended Configuration.

Table 9. Extended Configuration Submenu

Feature	Options	Description
Extended Configuration	<ul style="list-style-type: none"> • Default (default) • User-Defined 	<i>User Defined</i> allows setting memory control and video memory cache mode. If selected here, will also display in the Advanced Menu as: "Extended Menu: <i>Used.</i> "
Video Memory Cache Mode	<ul style="list-style-type: none"> • USWC • UC (default) 	<p>Selects Uncacheable Speculative Write-Combining (USWC) video memory cache mode. Full 32 byte contents of the Write Combining buffer are written to memory as required. Cache lookups are not performed. Both the video driver and the application must support Write Combining.</p> <p>Selects UnCacheable (UC) video memory cache mode. This setting identifies the video memory range as uncacheable by the processor. Memory writes are performed in program order. Cache lookups are not performed. Well suited for applications not supporting Write Combining.</p>
SDRAM Auto-Configuration	<ul style="list-style-type: none"> • Auto (default) • User Defined 	Sets extended memory configuration options to <i>Auto</i> or <i>User Defined</i> .
CAS# Latency	<ul style="list-style-type: none"> • 3 • 2 • Auto (default) 	Selects the number of clock cycles required to address a column in memory.
SDRAM RAS# to CAS# Delay	<ul style="list-style-type: none"> • 3 • 2 • Auto (default) 	Selects the number of clock cycles between addressing a row and addressing a column.
SDRAM RAS# Precharge	<ul style="list-style-type: none"> • 3 • 2 • Auto (default) 	Selects the length of time required before accessing a new row.
SDRAM RAS Act. To Pre.	<ul style="list-style-type: none"> • 7 • 6 • 5 • Auto (default) 	Selects length of time from read to pre-change.

Main Menu

Maintenance	Main	Advanced	Security	Power	Boot	Exit
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Table 10 describes the Main Menu. This menu reports processor and memory information and is used to configure the system date and system time.

Table 10. Main Menu

Feature	Options	Description
BIOS Version	No options	Displays the version of the BIOS.
Processor Type	No options	Displays processor type.
Processor Speed	No options	Displays processor speed.
System Bus Speed	No options	Displays the system bus speed.
Cache RAM	No options	Displays the size of second-level cache and whether it is ECC-capable.
Total Memory	No options	Displays the total amount of RAM.
Memory Bank 0 Memory Bank 1	No options	Displays the amount and type of RAM in the memory banks.
Language	<ul style="list-style-type: none"> • English (default) • Espanol • Deutsch • Italiano • Francais 	Selects the current default language used by the BIOS.
System Time	Hour, minute, and second	Specifies the current time.
System Date	Day of week Month/day/year	Specifies the current date.

Advanced Menu

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

Table 11 describes the Advanced Menu. This menu is used to set advanced features that are available through the chipset.

Table 11. Advanced Menu

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

PCI Configuration Submenu

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

The submenu shown in Table 12 is used to configure the IRQ priority of PCI slots individually.

Table 12. PCI Configuration Submenu

Feature	Options	Description
PCI Slot 1 IRQ Priority	<ul style="list-style-type: none"> • Auto (default) • 9 • 10 • 11 	Allows selection of IRQ priority. IRQ Priority selections for PCI slots 1 and 5 are linked. Selections made to PCI Slot 1 IRQ Priority are repeated in PCI Slot 5 IRQ Priority.
PCI Slot 2 IRQ Priority	<ul style="list-style-type: none"> • Auto (default) • 9 • 10 • 11 	Allows selection of IRQ priority and S5 wake.
PCI Slot 3 IRQ Priority	<ul style="list-style-type: none"> • Auto (default) • 9 • 10 • 11 	Allows selection of IRQ priority.
PCI Slot 4 IRQ Priority (Note)	<ul style="list-style-type: none"> • Auto (default) • 9 • 10 • 11 	Allows selection of IRQ priority.
PCI Slot 5 IRQ Priority (Note)	No options	Always set to Auto.
PCI Slot 6 IRQ Priority (Note)	No options	Always set to Auto.

Note: PCI slots 4, 5, and 6 are available only on the D845BG board.

Boot Configuration Submenu

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

The submenu shown in Table 13 is used to set the Plug & Play options, reset configuration data, and the power-on state of the Numlock key.

Table 13. Boot Configuration Submenu

Feature	Options	Description
Plug & Play O/S	<ul style="list-style-type: none"> • No (default) • Yes 	<p>Specifies if manual configuration is desired.</p> <p><i>No</i> lets the BIOS configure all devices. This setting is appropriate when using a Plug and Play operating system.</p> <p><i>Yes</i> lets the operating system configure Plug and Play devices not required to boot the system. This option is available for use during lab testing.</p>
Reset Config Data	<ul style="list-style-type: none"> • No (default) • Yes 	<p><i>No</i> does not clear the PCI/PnP configuration data stored in flash memory on the next boot.</p> <p><i>Yes</i> clears the PCI/PnP configuration data stored in flash memory on the next boot.</p>
Numlock	<ul style="list-style-type: none"> • Off • On (default) 	<p>Specifies the power-on state of the Numlock feature on the numeric keypad of the keyboard.</p>

Peripheral Configuration Submenu

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

This submenu shown in Table 14 is used for configuring computer peripherals.

Table 14. Peripheral Configuration Submenu

Feature	Options	Description
Serial Port A	<ul style="list-style-type: none"> Disabled Enabled Auto (default) 	Configures serial port A. <i>Auto</i> assigns the first free COM port, normally COM1, the address 3F8h, and the interrupt IRQ4. An * (asterisk) displayed next to an address indicates a conflict with another device.
Base I/O Address (This feature is present only when Serial Port A is set to <i>Enabled</i>)	<ul style="list-style-type: none"> 3F8 (default) 2F8 3E8 2E8 	Specifies the base I/O address for serial port A, if serial port A is Enabled.
Interrupt (This feature is present only when Serial Port A is set to <i>Enabled</i>)	<ul style="list-style-type: none"> IRQ 3 IRQ 4 (default) 	Specifies the interrupt for serial port A, if serial port A is Enabled.
Serial Port B	<ul style="list-style-type: none"> Disabled Enabled Auto (default) 	Configures serial port B. <i>Auto</i> 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.
Base I/O Address (This feature is present only when Serial Port B is set to <i>Enabled</i>)	<ul style="list-style-type: none"> 2F8 (default) 3E8 2E8 	Specifies the base I/O address for serial port B.
Interrupt (This feature is present only when Serial Port B is set to <i>Enabled</i>)	<ul style="list-style-type: none"> IRQ 3 (default) IRQ 4 	Specifies the interrupt for serial port B.

continued

Table 14. Peripheral Configuration Submenu (continued)

Feature	Options	Description
Parallel Port	<ul style="list-style-type: none"> • Disabled • Enabled • Auto (default) 	<p>Configures the parallel port.</p> <p><i>Auto</i> assigns LPT1 the address 378h and the interrupt IRQ7.</p> <p>An * (asterisk) displayed next to an address indicates a conflict with another device.</p>
Mode	<ul style="list-style-type: none"> • Output Only • Bi-directional (default) • EPP • ECP 	<p>Selects the mode for the parallel port. Not available if the parallel port is disabled.</p> <p><i>Output Only</i> operates in AT⁺-compatible mode.</p> <p><i>Bi-directional</i> operates in PS/2-compatible mode.</p> <p><i>EPP</i> is Extended Parallel Port mode, a high-speed bi-directional mode.</p> <p><i>ECP</i> is Enhanced Capabilities Port mode, a high-speed bi-directional mode.</p>
Base I/O Address (This feature is present only when Parallel Port is set to <i>Enabled</i>)	<ul style="list-style-type: none"> • 378 (default) • 278 	Specifies the base I/O address for the parallel port.
Interrupt (This feature is present only when Parallel Port is set to <i>Enabled</i>)	<ul style="list-style-type: none"> • IRQ 5 • IRQ 7 (default) 	Specifies the interrupt for the parallel port.
DMA Channel (This feature is present only when Parallel Port Mode is set to <i>ECP</i>)	<ul style="list-style-type: none"> • 1 • 3 (default) 	Specifies the DMA channel.
Audio Device	<ul style="list-style-type: none"> • Disabled • Enabled (default) 	Enables or disables the onboard audio subsystem.
LAN Device (This feature is present only when there is onboard LAN)	<ul style="list-style-type: none"> • Disabled • Enabled (default) 	Enables or disables the LAN device.
Legacy USB Support	<ul style="list-style-type: none"> • Disabled • Enabled (default) 	Enables or disables USB legacy support.

IDE Configuration Submenu

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

This submenu shown in Table 15 is used to configure IDE device options.

Table 15. IDE Configuration Submenu

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.
PCI IDE Bus Master	<ul style="list-style-type: none"> • Disabled • Enabled (default) 	Allows for a PCI device to initiate a transaction as a master.
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 type of connected IDE device. When selected, displays the Primary IDE Master submenu.
Primary IDE Slave	No options	Reports type of connected IDE device. When selected, displays the Primary IDE Slave submenu.
Secondary IDE Master	No options	Reports type of connected IDE device. When selected, displays the Secondary IDE Master submenu.
Secondary IDE Slave	No options	Reports type of connected IDE device. When selected, displays the Secondary IDE Slave submenu.

Primary/Secondary IDE Master/Slave Submenus

Maintenance	Main	Advanced	Security	Power	Boot	Exit				
		Boot Configuration								
		Peripheral Configuration								
		IDE Configuration	→	<table border="1"> <tr> <td>Primary IDE Master</td> </tr> <tr> <td>Primary IDE Slave</td> </tr> <tr> <td>Secondary IDE Master</td> </tr> <tr> <td>Secondary IDE Slave</td> </tr> </table>			Primary IDE Master	Primary IDE Slave	Secondary IDE Master	Secondary IDE Slave
Primary IDE Master										
Primary IDE Slave										
Secondary IDE Master										
Secondary IDE Slave										
		Diskette Configuration								
		Event Log Configuration								
		Video Configuration								

There are four IDE submenus: Primary master, primary slave, secondary master, and secondary slave. Table 16 shows the format of these IDE submenus. For brevity, only one example is shown.

Table 16. Primary/Secondary IDE Master/Slave Submenus

Feature	Options	Description
Drive Installed	None	Displays the type of drive installed.
Type	<ul style="list-style-type: none"> • None • User • Auto (default) • CD-ROM • ATAPI Removable • Other ATAPI • IDE Removable 	<p>Specifies the IDE configuration mode for IDE devices.</p> <p><i>User</i> allows capabilities to be changed.</p> <p><i>Auto</i> fills-in capabilities from ATA/ATAPI device.</p>
Maximum Capacity	None	Displays the capacity of the drive.
Multi-Sector Transfers	<ul style="list-style-type: none"> • Disabled • 2 Sectors • 4 Sectors • 8 Sectors • 16 Sectors (default) 	<p>Specifies number of sectors per block for transfers from the hard disk drive to memory.</p> <p>Check the hard disk drive's specifications for optimum setting.</p>
PIO Mode (Note)	<ul style="list-style-type: none"> • Auto (default) • 0 • 1 • 2 • 3 • 4 	Specifies the PIO mode.

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

continued

Table 16. Primary/Secondary IDE Master/Slave Submenus (continued)

Feature	Options	Description
Ultra DMA	<ul style="list-style-type: none"> • Disabled (default) • Mode 0 • Mode 1 • Mode 2 • Mode 3 • Mode 4 • Mode 5 	Specifies the Ultra DMA mode for the drive.
Cable Detected (Note)	None	Displays the type of cable connected to the IDE interface: 40-conductor or 80-conductor (for ATA-66/100 devices).

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

Diskette Configuration Submenu

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

This submenu shown in Table 17 is used to configure the diskette drive.

Table 17. Diskette Configuration Submenu

Feature	Options	Description
Diskette Controller	<ul style="list-style-type: none"> • Disabled • Enabled (default) 	Disables or enables the integrated diskette controller.
Floppy A	<ul style="list-style-type: none"> • Not Installed • 360 KB 5¼" • 1.2 MB 5¼" • 720 KB 3½" • 1.44/1.25 MB 3½" (default) • 2.88 MB 3½" 	Specifies the capacity and physical size of diskette drive A.
Diskette Write-Protect	<ul style="list-style-type: none"> • Disabled (default) • Enabled 	Disables or enables write-protect for the diskette drive.

Event Log Configuration Submenu

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

The submenu shown in Table 18 is used to configure the event logging features.

Table 18. Event Log Configuration Submenu

Feature	Options	Description
Event Log	No options	Indicates if there is space available in the event log.
Event Log Validity	No options	Indicates if the contents of the event log are valid.
View Event Log	[Enter]	Displays the event log.
Clear All Event Logs	<ul style="list-style-type: none"> • No (default) • Yes 	Clears the event log after rebooting.
Event Logging	<ul style="list-style-type: none"> • Disabled • Enabled (default) 	Enables logging of events.
ECC Event Logging	<ul style="list-style-type: none"> • Disabled • Enabled (default) 	Allows logging of ECC events.
Mark Events As Read	<ul style="list-style-type: none"> • Yes (default) • No 	Marks all events as read.

Video Configuration Submenu

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

The submenu shown in Table 19 is used to configure video features.

Table 19. Video Configuration Submenu

Feature	Options	Description
AGP Apperture Size	<ul style="list-style-type: none"> • 64MB (default) • 256MB 	Amount of system memory available for direct access by the AGP device.
Primary Video Adapter	<ul style="list-style-type: none"> • AGP (default) • PCI 	Selects primary video adapter to be used during boot.

Security Menu

Maintenance	Main	Advanced	Security	Power	Boot	Exit
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The menu shown in Table 20 is used to set passwords and security features.

Table 20. Security Menu

If no password entered previously:		
Feature	Options	Description
Supervisor Password Is	No options	Reports if there is a supervisor password set.
User Password Is	No options	Reports if there is a user password set.
Set Supervisor Password	Password can be up to seven alphanumeric characters.	Specifies the supervisor password.
Set User Password	Password can be up to seven alphanumeric characters.	Specifies the user password.
Clear User Password (Note 1)	<ul style="list-style-type: none"> • Yes (default) • No 	Clears the user password.
User Access Level (Note 2)	<ul style="list-style-type: none"> • Limited • No Access • View Only • Full (default) 	Sets BIOS Setup Utility access rights for user level.
Unattended Start (Notes 1, 3, and 4)	<ul style="list-style-type: none"> • Enabled • Disabled (default) 	<i>Enabled</i> allows system to complete the boot process without a password. The keyboard remains locked until a password is entered. A password is required to boot from a diskette.

Notes:

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

Power Menu

Maintenance	Main	Advanced	Security	Power	Boot	Exit
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The menu shown in Table 21 is used to set power management features.

Table 21. Power Menu

Feature	Options	Description
ACPI	No Options	When selected, displays the ACPI submenu.
After Power Failure	<ul style="list-style-type: none"> Stays Off Last State (default) Power On 	<p>Specifies the mode of operation if an ac power loss occurs.</p> <p><i>Stays 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> <p><i>Power On</i> restores power to the computer.</p>
Wake on LAN	<ul style="list-style-type: none"> Stay Off (default) Power On 	Determines the action taken when the system power is off and a LAN wake up event occurs.
Wake on PME	<ul style="list-style-type: none"> Stay Off (default) Power On 	Determines how the system responds to a PCI-PME wake up event.
Wake on Modem Ring	<ul style="list-style-type: none"> Stay Off (default) Power On 	Specifies how the computer responds to a Modem Ring wake up event on an installed modem.

ACPI Submenu

Maintenance	Main	Advanced	Security	Power	Boot	Exit
				ACPI		

The submenu represented in Table 22 is for setting the ACPI features.

Table 22. ACPI Submenu

Feature	Options	Description
ACPI Suspend State	<ul style="list-style-type: none"> S1 State S3 State 	Specifies the ACPI sleep state.
Wake on LAN from S5	<ul style="list-style-type: none"> Stay Off (default) Power On 	In ACPI soft-off mode only, determines how the system responds to a LAN wake up event when the system is in the ACPI soft-off mode.

Boot Menu

Maintenance	Main	Advanced	Security	Power	Boot	Exit
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The menu shown in Table 23 is used to set the boot features and the boot sequence.

Table 23. Boot Menu

Feature	Options	Description
Quiet Boot	<ul style="list-style-type: none"> • Disabled • Enabled (default) 	<p><i>Disabled</i> displays normal POST messages.</p> <p><i>Enabled</i> displays OEM graphic instead of POST messages.</p>
Intel® Rapid BIOS Boot	<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.
USB Boot	<ul style="list-style-type: none"> • Disabled • Enabled (default) 	Disables or enables booting to USB boot devices.
Boot Device Priority	No options	Specifies the boot sequence from the available types of boot devices.
Hard Disk Drives	No options	Specifies the boot sequence from the available hard disk drives.
Removable Devices	No options	Specifies the boot sequence from the available removable devices.
ATAPI CD-ROM Drives	No options	Specifies the boot sequence from the available ATAPI CD-ROM drives.

Boot Device Priority Submenu

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

The submenu represented in Table 24 is for setting boot devices priority.

Table 24. Boot Device Priority Submenu

Feature	Options	Description
1 st Boot Device 2 nd Boot Device 3 rd Boot Device 4 th Boot Device (Note 1)	<ul style="list-style-type: none"> Removable Device Hard Drive ATAPI CD-ROM Intel® UNDI, PXE Disabled 	<p>Specifies the boot sequence from the available types of boot devices. To specify boot sequence:</p> <ol style="list-style-type: none"> Select the boot device with <↑> or <↓>. Press <Enter> to set the selection as the intended boot device. <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. The default settings for the first through final boot devices are, respectively listed below. The BIOS supports up to sixteen total boot devices in any combination of the boot device types below, with respect to these maximums per type.</p> <ul style="list-style-type: none"> Removable Device (maximum of four) Hard Drive (maximum of 12) ATAPI CD-ROM (maximum of four) Intel UNDI, PXE (maximum of five) (Note 2) <p>The boot devices appear in order by type. For example, assume that the default boot order is preserved and that seven boot devices of the following types are installed on the system: two removable devices, two hard drives, two ATAPI CD-ROMs, and an Intel UNDI (Universal Network Device Interface), PXE device. Both removable devices would appear as the first and second boot devices, the two hard drives would appear as the third and fourth, the two ATAPI CD-ROM drives would appear as the fifth and sixth, and the Intel UNDI, PXE device would appear as the seventh boot device.</p>

Notes:

- After the predefined boot device types (removable devices, hard drives, and ATAPI CD-ROM drives), the entries in this list will reflect as many boot entry vector (BEV) boot devices (for example, Intel UNDI, PXE devices) and SCSI CD-ROM drives as are installed, up to the five BEV boot devices supported by the BIOS.
- While the predefined boot device types are individually listed in submenus by type, the BEV devices and SCSI CD-ROM drives are all listed at this level.

Hard Disk Drives Submenu

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

The submenu shown in Table 25 is for setting hard disk drives.

Table 25. Hard Disk Drives Submenu

Feature	Options	Description
1 st Hard Disk Drive (Note)	Dependent on installed hard drives	Specifies the boot sequence from the available hard disk drives. To specify boot sequence: <ol style="list-style-type: none"> 1. Select the boot device with <↑> or <↓>. 2. Press <Enter> to set the selection as the intended boot device.

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

Removable Devices Submenu

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

The submenu in shown Table 26 is for setting removable devices.

Table 26. Removable Devices Submenu

Feature	Options	Description
1 st Removable Device (Note)	Dependent on installed removable devices	Specifies the boot sequence from the available removable devices. To specify boot sequence: <ol style="list-style-type: none"> 1. Select the boot device with <↑> or <↓>. 2. Press <Enter> to set the selection as the intended boot device.

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

ATAPI CD-ROM Drives

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

The submenu shown in Table 27 is for setting ATAPI CD-ROM drives.

Table 27. ATAPI CD-ROM Drives Submenu

Feature	Options	Description
1 st ATAPI CD-ROM Drive (Note)	Dependent on installed ATAPI CD-ROM drives	Specifies the boot sequence from the available ATAPI CD-ROM drives. To specify boot sequence: <ol style="list-style-type: none"> 1. Select the boot device with <↑> or <↓>. 2. Press <Enter> to set the selection as the intended boot device.

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

Exit Menu

Maintenance	Main	Advanced	Security	Power	Boot	Exit
-------------	------	----------	----------	-------	------	-------------

The menu shown in Table 28 is used to exit the BIOS Setup program, saving changes, and loading and saving defaults.

Table 28. Exit Menu

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

5 Technical Reference

Board Connectors

The board connectors can be divided into three groups:

- Back panel connectors
- Midboard connectors
 - Audio connectors
 - Power and hardware connectors
 - Add-in board and peripheral interface connectors
- Front panel connectors

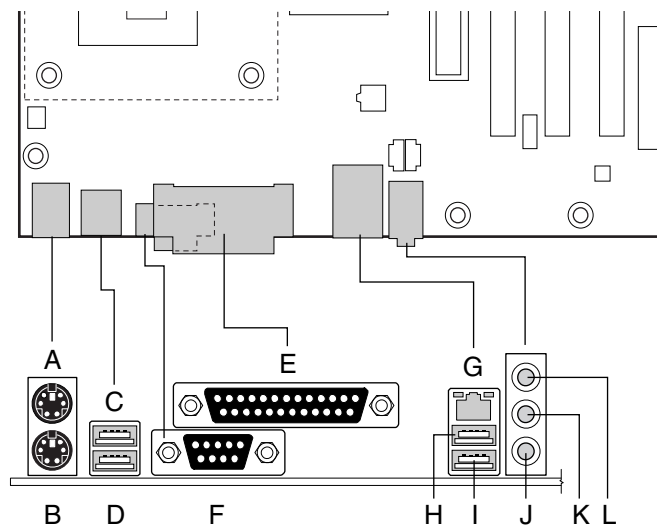


CAUTION

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

Back Panel Connectors

Figure 20 shows the back panel connectors on the board.



OM12636

Item	Description	Color
A	PS/2 mouse port	Green
B	PS/2 keyboard port	Purple
C	USB port 0	Black
D	USB port 1	Black
E	Parallel port	Burgundy
F	Serial port A	Teal
G	RJ-45 (optional)	Black
H	USB port 2	Black
I	USB port 3	Black
J	Mic in	Pink
K	Audio line out	Lime green
L	Audio line in	Light blue

Figure 20. Back Panel Connectors

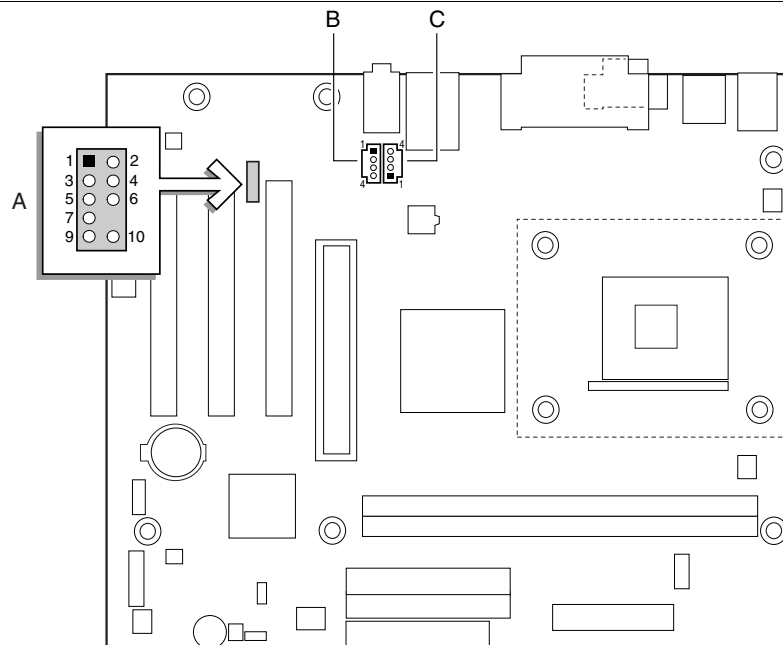
 **NOTE**

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

Midboard Connectors

Audio Connectors

Figure 21 shows the location of the audio connectors.



OM12637

Item	Description	Color
A	Front panel audio (see Table 29 for pin assignments)	Black
B	Auxiliary line in	White
C	CD-ROM	Black

Figure 21. Audio Connectors

Table 29 shows the pin assignments for the front panel audio connector.

Table 29. Front Panel Audio Connector Signal Names

Pin	Signal Name	Pin	Signal Name
1	AUD-MIC	2	AUD-GND
3	AUD-MIC-BIAS	4	AUD-VCC
5	AUD-FPOUT-R	6	AUD-RET-R
7	HP-ON	8	KEY
9	AUD-FPOUT-L	10	AUD-RET-L

Power and Hardware Connectors

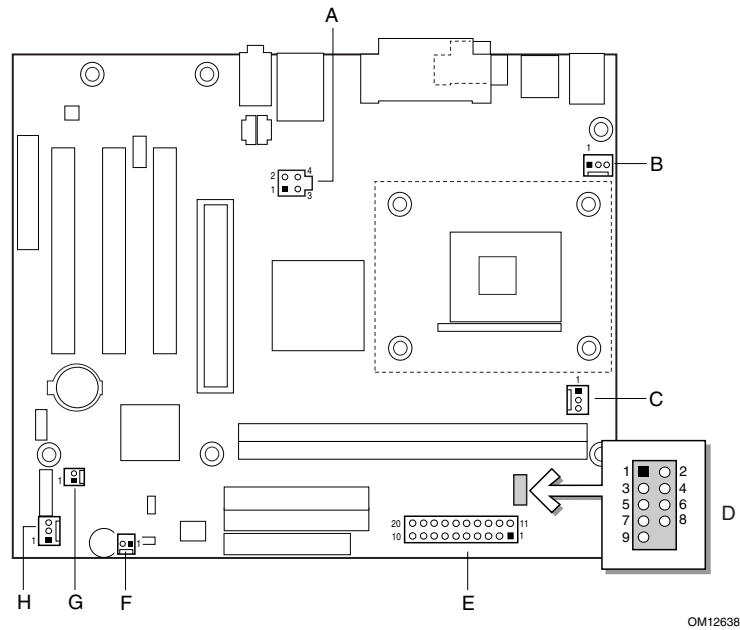


CAUTION

Failure to use an ATX12V power supply, or not connecting the additional power supply lead to the D845PT or D845BG board may result in damage to the desktop board.

The D845PT and D845BG boards require an ATX12V compliant power supply to function according to desktop board specifications. Both boards have two ATX12V compliant power supply connectors that are needed to provide extra power to the Intel 845 chipset and Pentium 4 processor.

Figure 22 shows the power and hardware connectors.



OM12638

Item	Description	Item	Description
A	ATX12V power	E	Main power
B	Rear chassis fan (tachometer input)	F	Chassis intrusion
C	Processor fan (tachometer input)	G	SCSI hard drive activity LED
D	Serial port B (see Table 30 for pin assignments)	H	Front chassis fan

Figure 22. Power and Hardware Control Connectors

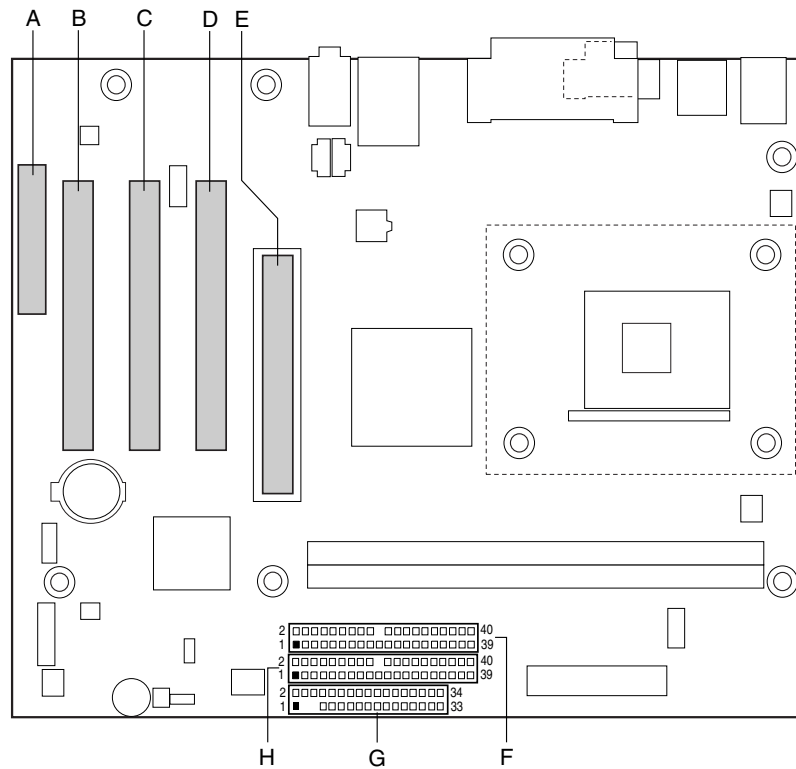
Table 30 shows the pin assignments for the serial port B connector.

Table 30. Serial Port B Connector

Pin	Signal Name	Pin	Signal Name
1	DCD (Data Carrier Detect)	2	RXD# (Receive Data)
3	TXD# (Transmit Data)	4	DTR (Data Terminal Ready)
5	Ground	6	DSR (Data Set Ready)
7	RTS (Request to Send)	8	CTS (Clear to Send)
9	RI (Ring Indicator)	10	Not connected

Add-In Card and Peripheral Interface Connectors

Figure 23 shows the add-in card and peripheral interface connectors for the D845PT board.

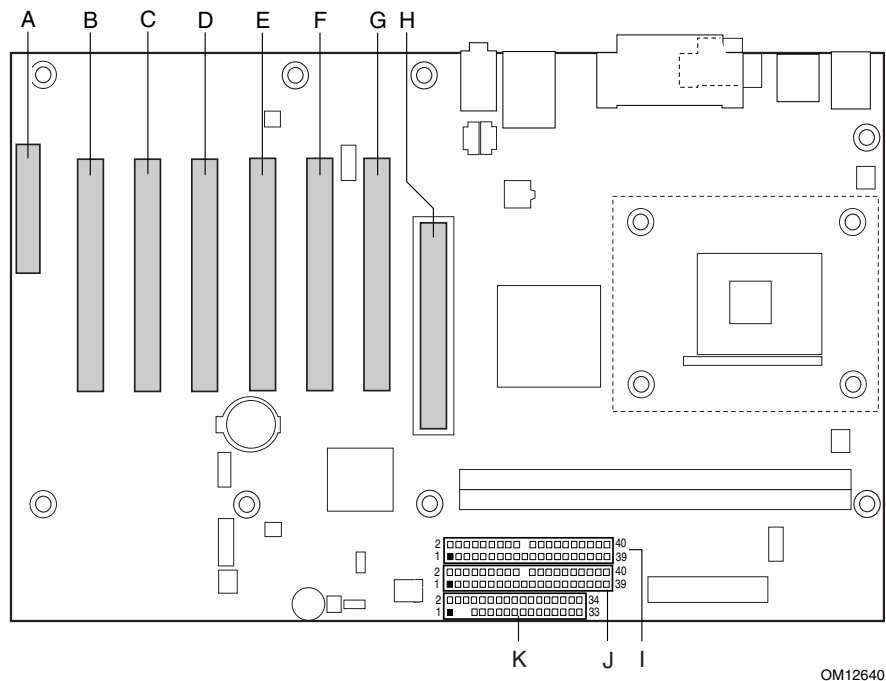


OM12639

Item	Description	Item	Description
A	CNR (optional)	E	AGP
B	PCI bus connector 3	F	Secondary IDE
C	PCI bus connector 2	G	Primary IDE
D	PCI bus connector 1	H	Diskette drive

Figure 23. D845PT Board Add-in Card and Peripheral Interface Connectors

Figure 24 shows the add-in card and peripheral interface connectors for the D845BG board.

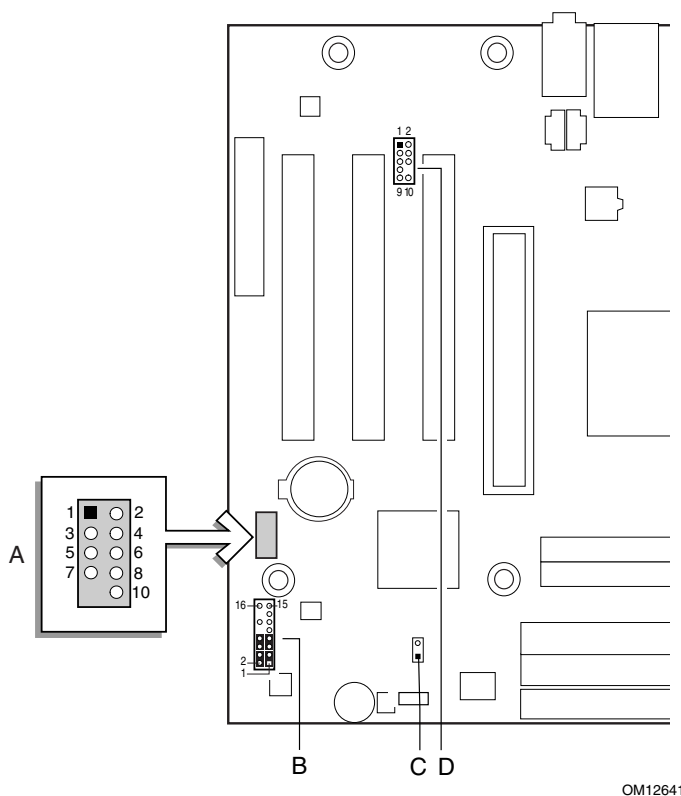


Item	Description	Item	Description
A	CNR (optional)	G	PCI bus connector 1
B	PCI bus connector 6	H	AGP
C	PCI bus connector 5	I	Secondary IDE
D	PCI bus connector 4	J	Primary IDE
E	PCI bus connector 3	K	Diskette drive
F	PCI bus connector 2		

Figure 24. D845BG Board Add-in Card and Peripheral Interface Connectors

Front Panel Connectors

Figure 25 shows the location of the front panel connectors.



OM12641

Item	Description
A	Front panel USB (see Table 31 for pin assignments)
B	Front panel
C	Alternate power/sleep LED
D	Front panel audio

Figure 25. Front Panel Connectors

Table 31 shows the pin assignments for the front panel USB connectors.

Table 31. Front Panel USB Connectors

Pin	Signal name	Pin	Signal name
1	VREG_FP_WSBPWR0	2	VREG_FP_USBPWR0
3	USB_FPP0-	4	USB_FPP1-
5	USB_FPP0+	6	USB_FPP1+
7	Ground	8	Ground
9	Key	10	USB_FP_OC0

Note: USB ports may be assigned as needed.

Desktop Board Resources

Memory Map

Table 32. System Memory Map

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

DMA Channels

Table 33. DMA Channels

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

I/O Map

Table 34. I/O Map

Address (hex)	Size	Description
0000 - 000F	16 bytes	DMA controller
0020 - 0021	2 bytes	Programmable Interrupt Control (PIC)
0040 - 0043	4 bytes	System timer
0060	1 byte	Keyboard controller byte—reset IRQ
0061	1 byte	System speaker
0064	1 byte	Keyboard controller, CMD / STAT byte
0070 - 0071	2 bytes	System CMOS / Real Time Clock
0072 - 0073	2 bytes	System CMOS
0080 - 008F	16 bytes	DMA controller
0092	1 byte	Fast A20 and PIC
00A0 - 00A1	2 bytes	PIC
00B2 - 00B3	2 bytes	APM control
00C0 - 00DF	32 bytes	DMA
00F0	1 byte	Numeric data processor
0170 - 0177	8 bytes	Secondary IDE channel
01F0 - 01F7	8 bytes	Primary IDE channel
0228 - 022F*	8 bytes	LPT3
0278 - 027F*	8 bytes	LPT2
02E8 - 02EF*	8 bytes	COM4 / video (8514A)
02F8 - 02FF*	8 bytes	COM2
0376	1 byte	Secondary IDE channel command port
0377, bits 6:0	7 bits	Secondary IDE channel status port
0378 - 037F	8 bytes	LPT1
03B0 - 03BB	12 bytes	Video (VGA)
03C0 - 03DF	32 bytes	Video (VGA)
03E8 - 03EF	8 bytes	COM3
03F0 - 03F5	6 bytes	Diskette channel 1
03F6	1 byte	Primary IDE channel command port
03F8 - 03FF	8 bytes	COM1
04D0 - 04D1	2 bytes	Edge / level triggered PIC
LPTn + 400	8 bytes	ECP port, LPTn base address + 400h
0CF8 - 0CFB**	4 bytes	PCI configuration address register
0CF9***	1 byte	Turbo and reset control register
0CFC - 0CFF	4 bytes	PCI configuration data register
FFA0 - FFA7	8 bytes	Primary bus master IDE registers
FFA8 - FFAF	8 bytes	Secondary bus master IDE registers

continued

Table 34. I/O Map (continued)

Address (hex)	Description
96 contiguous bytes starting on a 128-byte divisible boundary	ICH2 (ACPI + TCO)
64 contiguous bytes starting on a 64-byte divisible boundary	D845PT and D845BG board resources
32 contiguous bytes starting on a 32-byte divisible boundary	ICH2 (USB controller #1)
16 contiguous bytes starting on a 16-byte divisible boundary	ICH2 (SMBus)
4096 contiguous bytes starting on a 4096-byte divisible boundary	Intel 82801BA PCI bridge
256 contiguous bytes starting on a 256-byte divisible boundary	ICH2 audio mixer
64 contiguous bytes starting on a 64-byte divisible boundary	ICH2 audio bus mixer
32 contiguous bytes starting on a 32-byte divisible boundary	ICH2 (USB controller #2)
64 contiguous bytes starting on a 64-byte divisible boundary	ICH2/Intel 82562ET (optional)
96 contiguous bytes starting on a 128-byte divisible boundary	LPC47M142

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

** Dword access only.

*** Byte access only.

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) / **
6	Diskette drive controller
7	LPT1*
8	Real time clock
9	**
10	**
11	**
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.

** Dynamically allocated for all PCI/AGP devices and slots.

A Error Messages and Indicators

The D845PT and D845BG boards report POST errors in two ways:

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

BIOS Beep Codes

The BIOS beep codes are listed in Table 36. The BIOS also issues a beep code (one long tone followed by two short tones) during POST if the video configuration fails (a faulty video card or no card installed) or if an external ROM module does not properly checksum to zero.

Table 36. Beep Codes

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

BIOS Error Messages

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

Table 37. BIOS Error Messages

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

continued

Table 37. BIOS Error Messages (continued)

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

B Regulatory Compliance

This appendix contains:

- Safety standards, electromagnetic compatibility (EMC) regulations, and product certification markings for the D845PT and D845BG desktop boards.
- Instructions and precautions for integrators who are installing this desktop board in a chassis.

Safety Regulations

This desktop board complies with the safety regulations stated in Table 38 when correctly installed in a compatible host system.

Table 38. Safety Regulations

Regulation	Title
UL 1950/CSA C22.2 No. 950, 3 rd edition	Bi-National Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (USA and Canada)
EN 60950, 2 nd Edition, 1992 (with Amendments 1, 2, 3, and 4)	The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (European Union)
IEC 60950, 2 nd edition, 1991 (with Amendments 1, 2, 3, and 4)	The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (International)
EMKO-TSE (74-SEC) 207/94	Summary of Nordic deviations to EN 60950. (Norway, Sweden, Denmark, and Finland)

EMC Regulations

The desktop board complies with the EMC regulations stated in Table 39 when correctly installed in a compatible host system.

Table 39. EMC Regulations

Regulation	Title
FCC Class B	Title 47 of the Code of Federal Regulations, Parts 2 and 15, Subpart B, Radiofrequency Devices. (USA)
ICES-003 (Class B)	Interference-Causing Equipment Standard, Digital Apparatus. (Canada)
EN55022: 1998 (Class B)	Limits and methods of measurement of Radio Interference Characteristics of Information Technology Equipment. (European Union)
EN55024: 1998	Information Technology Equipment – Immunity Characteristics Limits and methods of measurement. (European Union)
AS/NZS 3548 (Class B)	Australian Communications Authority, Standard for Electromagnetic Compatibility. (Australia and New Zealand)
CISPR 22, 3 rd Edition, (Class B)	Limits and methods of measurement of Radio Disturbance Characteristics of Information Technology Equipment. (International)
CISPR 24: 1997	Information Technology Equipment – Immunity Characteristics – Limits and Methods of Measurement. (International)

Product Certification Markings

The desktop boards have the following product certification markings:

- UL joint US/Canada Recognized Component mark: consists of small c followed by a stylized backward UR and followed by a small US. Includes adjacent UL file number for Intel desktop boards: E210882 (component side).
- FCC Declaration of Conformity logo mark for Class B equipment; includes Intel name and model designation (solder side).
- CE mark: declaring compliance to European Union (EU) EMC directive (89/336/EEC) and Low Voltage directive (73/23/EEC) (component side).
- Australian Communications Authority (ACA) C-Tick mark: consists of a stylized C overlaid with a check (tick) mark (component side), followed by Intel supplier code number, N-232.
- Printed wiring board manufacturer's recognition mark: consists of a unique UL recognized manufacturer's logo, along with a flammability rating (94V-0) (solder side).
- PB part number: Intel bare circuit board part number (solder side):
 - A67355-001 (for D845PT board)
 - A65250-001 (for D845BG board)
 - Also includes SKU number starting with AA followed by additional alphanumeric characters.
- Battery "+ Side Up" marking: located on the component side of the board in close proximity to the battery holder.
- Korean MIC logo mark: denotes Korean EMC certification (component side). Additional certification information is provided below:
 1. Product Name (model)
 2. Certificate ID
 3. Applicant: Intel Korea Ltd.
 4. Date of manufacture as separate marking on product
 5. Manufacturer (country of origin)

Korean MIC logo mark for the D845PT board

Korean MIC logo mark for the D845BG board

Installation Precautions

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

To avoid injury, be careful of:

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

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

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

Ensure Electromagnetic Compatibility (EMC) Compliance

Before computer integration, make sure that the power supply and other modules or peripherals, as applicable, have passed Class B EMC testing and are marked accordingly.

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

- Product certifications or lack of certifications
- External I/O cable shielding and filtering
- Mounting, grounding, and bonding requirements
- Keying connectors when mating the wrong connectors could be hazardous

If the power supply and other modules or peripherals, as applicable, are not Class B EMC compliant before integration, then EMC testing is required on a representative sample of the newly completed computer.

Chassis and Component Certifications

Ensure that the chassis and certain components; such as the power supply, peripheral drives, wiring, and cables; are components certified for the country or market where used. Agency certification marks on the product are proof of certification. Typical product certifications include:

In Europe

The CE marking signifies compliance with all applicable European requirements. If the chassis and other components are not properly CE marked, a supplier's Declaration of Conformity statement to the European EMC directive and Low Voltage directive (as applicable), should be obtained. Additionally, other directives, such as the Radio and Telecommunications Terminal Equipment (R&TTE) directive may also apply depending on product features.

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. Wiring and cables must also be UL listed or recognized and suitable for the intended use. The FCC Class B logo for home or office use signifies compliance with electromagnetic interference (EMI) requirements.

In Canada

A nationally recognized certification mark such as CSA or cUL signifies compliance with safety requirements. The Industry Canada statement at the front of this product guide demonstrates compliance with Canadian EMC regulations. Industry Canada recognizes and accepts FCC certification as denoting compliance with national electromagnetic interference (emissions) requirements.

Prevent Power Supply Overload

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

Place Battery Marking

There is insufficient space on this desktop board to provide instructions for replacing and disposing of the Lithium ion coin cell battery. For system safety certification, the following statement or equivalent statement is required to be permanently and legibly marked on the chassis near the battery.



CAUTION

Risk of explosion if battery is incorrectly replaced.

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

Use Only for Intended Applications

All Intel desktop processor boards are evaluated as Information Technology Equipment (I.T.E.) for use in personal computers for installation in homes, offices, schools, computer rooms, and similar locations. The suitability of this product for other applications or environments, such as medical, industrial, alarm systems, test equipment, etc. may require further evaluation.

