PCI

486 System Board

Installation Guide

PCI400C-C

Problem Report Form

From: Date:
Tel: Fax:

Hardware Configuration	
Mainboard: Cache: BIOS ver.: Bar Code:	CPU clk: DRAM: BIOS date: CPU model name:
VGA card: BIOS ver.: Maker:	RAM size: Bus:
HDC: Maker:	Bus:
HDD: Maker:	
Others:	
Software Configuration	
O.S.	ver:
CONFIG.SYS	
AUTOEXEC.BAT	
BIOS setup:	
Problem List:	
Confirmed by (Name) _____ on date _____	

Contents

PCI400C-C Quick Reference

CPU Selection Jumper Switch Settings

CPU TYPE		JC1	JC2	JC3	JC4	JC6	JC8	JC9	JC10	JC11	JC12	JC13	JC14	JC15	Q5
INTEL	486DX/DX2-5V (SL-Enhanced)	2-3	NC	3-4	NC	NC	NC	2-3	3-4	4-5	1-2	1-2 3-4	NC	NC	2-3 2-3
	486DX4-3V (SL-Enhanced)	2-3	NC	3-4	NC	NC	NC	2-3	3-4	4-5	1-2	1-2 3-4	NC	NC	NC
	486DX4-3V OverDrive (SL-Enhanced)	2-3	NC	3-4	NC	NC	NC	2-3	2-3	1-2	1-2	1-2 3-4	NC	NC	NC
	Pentium-5V OverDrive (SL-Enhanced)	2-3	NC	3-4	1-2	NC	NC	2-3	2-3	1-2	1-2	1-2 3-4	NC	NC	2-3 2-3
	DX2 OverDrive 168PGA ODPR (SL-Enhanced)	2-3	NC	3-4	NC	NC	NC	2-3	3-4	4-5	1-2	1-2 3-4	NC	NC	2-3 2-3
	487SX OverDrive 169PGA ODP (SL-Enhanced)	2-3	NC	3-4	NC	NC	NC	2-3	2-3	4-5	1-2	1-2 3-4	NC	NC	2-3 2-3
	486DX/DX2-STD	2-3	NC	NC	NC	NC	NC	NC	3-4	NC	NC	1-2 3-4	NC	NC	2-3 2-3
	486SX/SX2-5V (SL-Enhanced)	2-3	NC	3-4	NC	NC	NC	2-3	3-4	4-5	1-2	2-3	NC	NC	2-3 2-3
AMD	AM486DX2-STD	2-3	NC	NC	NC	NC	NC	NC	3-4	NC	NC	1-2 3-4	NC	NC	2-3 2-3
	AM486DX4-3V	2-3	NC	NC	NC	NC	NC	NC	3-4	NC	NC	1-2 3-4	NC	NC	NC
	AM486DXL2 (SL-Enhanced)	2-3	NC	NC	NC	NC	3-4	4-5	1-2 3-4	NC	1-2	1-2 3-4	NC	2-3	2-3 2-3
	FUTURE 3V CPU AM486DX4 W/B (SL-Enhanced)	2-3	NC	1-2 3-4	NC	4-5	NC	2-3	3-4	4-5	1-2	1-2 3-4	1-2	NC	NC
UMC	U5S (5V)	2-3	NC	NC	NC	NC	3-4	NC	1-2	NC	1-2	2-3	NC	NC	2-3 2-3
	U5SD (5V)	2-3	NC	NC	NC	NC	3-4	NC	1-2	NC	1-2	3-4	NC	NC	2-3 2-3
Cyrix	CX486DX2 (M7) 5V	2-3	NC	2-3	NC	NC	2-3	1-2	3-4	2-3	1-2	1-2 3-4	2-3	NC	2-3 2-3
	CX486DX4 (M9) 3V	1-2	1-2	1-2 3-4	NC	2-3	NC	2-3	3-4	2-3	1-2	1-2 3-4	1-2	NC	NC

WARNING

Note that there are two jumpers labeled Q5. If the CPU used on your system board is a 3.3V CPU, leave these two Q5 jumpers OPEN. If your CPU operates at 5V, both of the Q5 jumpers must be shorted on pins 2 and 3. Incorrect jumper settings may result in damage to the CPU. In addition , JP5 and JP7 should be left open in this version of the system board.

Cache Size Selection Jumpers

Cache Size	Data SRAM	TAG	JP9	JP10	JP11	JP12	JP13
128K	32K*8X4	8K*8	1-2	1-2	1-2	1-2	1-2, 3-4
256K	32K*8X8	16K*8	1-2	2-3	2-3	1-2	2-3, 4-5
256K	64K*8X4	16K*8	1-2	2-3	1-2	2-3	1-2, 3-4
512K	128K*8X4	32K*8	2-3	2-3	1-2	1-2	1-2, 3-4
512K	64K*8X8	32K*8	2-3	2-3	2-3	1-2	2-3, 4-5
1M	128K*8X8	64K*8	2-3	2-3	2-3	1-2	2-3, 4-5

System Clock Frequcncy Selection Jumpers

Normal High-Speed	Low-Speed	JP5	JP4	JP3
40MHz	8MHz	Open	Short	Open
33MHz	8MHz	Open	Short	Short
25MHz	8MHz	Open	Open	Open

Serial Port Enable Jumpers

COM1	JP20	COM2	JP22
Disable	2-3	Disable	2-3
COM1 = 3F8H	1-2 (default)	COM2 = 2F8H	1-2 (default)

Parallel Port Setting Jumpers

Mode	JP24	JP25	JP29	JP31
Printer, LPT1	2-3	2-3	1-2/Open	Don't care
EPP Mode (default)	2-3	1-2	1-2/Open	Open
ECP/EPP	1-2	2-3	1-2/Open	Open
EXT, Two FDD	1-2	1-2	1-2/Open	Open

Printer Port DMA REQ/ACK	JP26	JP27
DMA Channel 3 (default)	2-3	2-3
DMA Channel 1	1-2	1-2

LPT1 IRQ Selection Jumper

IRQ of LPT1	JP30
IRQ7	1-2 (default)
IRQ5	2-3

FDC Enable Jumper

FDC	JP32
Disable	2-3
Enable	1-2

Clear CMOS Data Jumper

Function	JP17
Normal Operation	Open (default)
Clear CMOS Data	Short

On-board Battery Enable Jumper

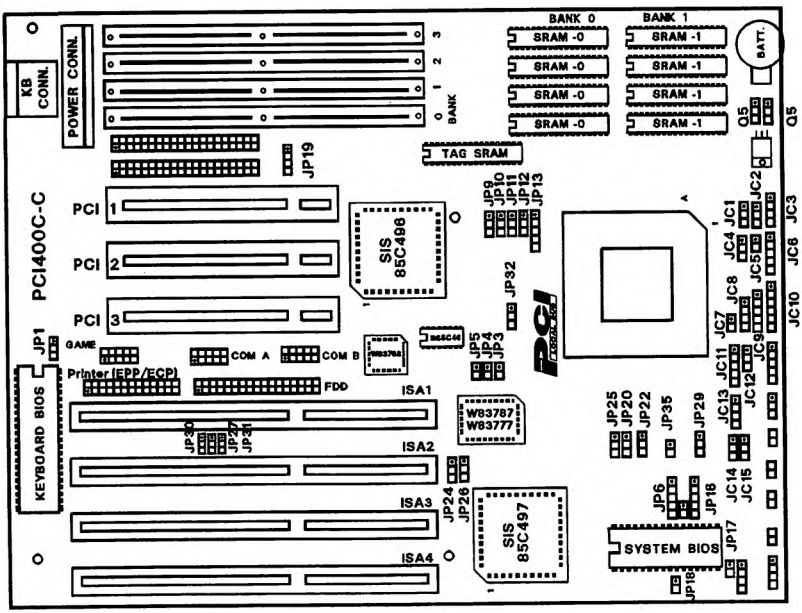
On-board Battery	JP18
Enable	Short (default)
Disable	Open

Power-Saving Mode Control Jumpers

Power Saving Control	JP6
by STP.CLK	1-2 (default)
by SMI OUT	2-3

Flash BIOS Upgrage Jumper

Operating Mode	JP16
Update BIOS	1-2, 5-6
Normal Mode	2-3, 4-5 (default)



Chapter 1
Introduction

Incorporating advanced design techniques and the most recent technology, this PCI 486 system board provides you with the means to build a high-performance 486 personal computer system. The board features a PCI standard local bus design to enable your system to exploit the enhanced I/O performance available from a CPU local bus. This board also provides "green PC" power-saving functions that reduce the amount of power consumed by your computer when you are not actually working. In addition, the board integrates a built-in PCI-based IDE and a multi-I/O interface that supports four IDE devices, two serial ports, one parallel port, one game port, and two 3.5 or 5.25-inch floppy disk drive.

1.1 System Specifications

The following is a brief summary of this PCI system board's features:

- Supports full range of Intel, AMD, UMC, and Cyrix 486 CPUs, including SX/DX/DX2/DX4/OverDrive.
- System speed: 25 to 40 MHz
  CPU speed: 25 to 100 MHz
- Chip Set: SiS 85C496/497 deep green chip set
- Dimensions: 8.65 × 11 inches
- Local bus interface: PCI local bus specification 2.0
- Expansion Slots: Four 16-bit AT slots and three 32-bit PCI slots

- Main Memory: 1 to 128 MB on-board system memory using 256K, 512K, 1M, 2M, 4M, 8M, or 16M × 36-bit 70ns DRAMs with automatic DRAM configuration.
- System BIOS: Supports full green functions as well as plug-and-play function
- Cache RAM: 128KB, 256KB, 512KB, or 1MB write-back or write-through cache
- Supports deep green features
- Integrated multi-I/O
  - Supports two serial (fast UART 16550 compliance), one parallel (supports EPP/ECP function), and one game port
  - Supports two 3.5 or 5.25-inch FDDs
- Integrated PCI IDE
  - Complies with 32-bit PCI local bus specification 2.0
  - Supports four IDE devices with enhanced IDE mode 3, 4 and above

1.2 System Board Layout

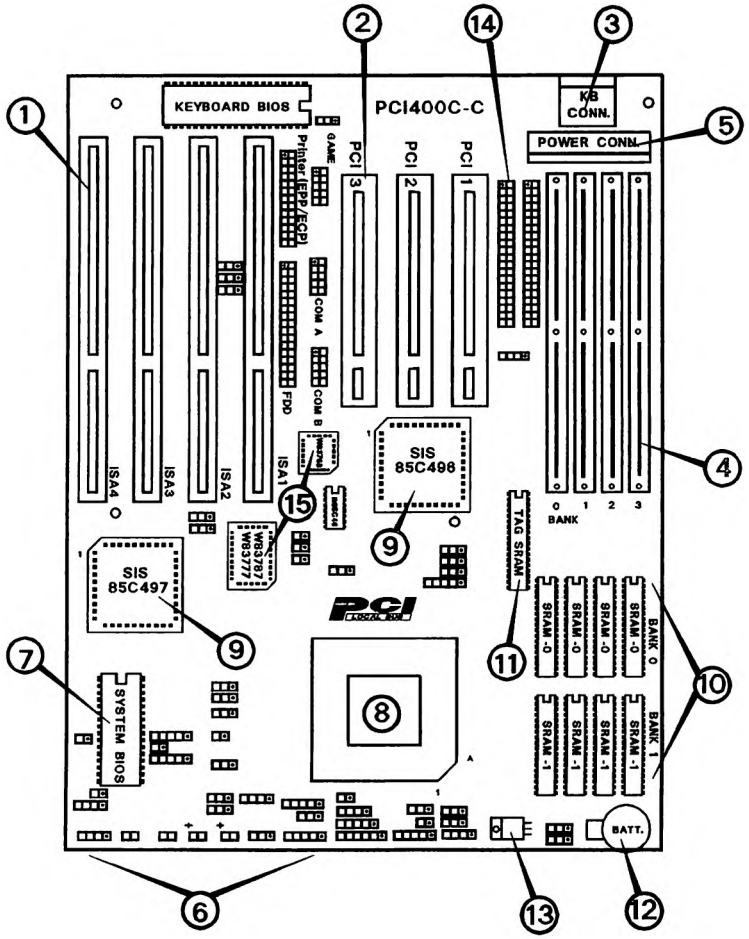
The major components on your system board and their locations are depicted in the diagram on the next page.

Expansion Slots

This 486 system board has four 16-bit AT expansion slots and three 32-bit PCI local bus expansion slots. The 16-bit slots have two sections, one long and one short. The long sections may be used to install 8-bit add-on cards, if necessary. The 32-bit slots are used to install PCI local bus specification add-on cards

BIOS

A standard design feature of PC/AT-compatible system boards is a basic software program permanently stored in a memory chip on the board. This software is referred to as the BIOS, or Basic Input/Output System. The major functions of the BIOS are to check the hardware in your system each time it is powered on and to act as an interface be-



1. AT expansion slots
2. PCI expansion slots
3. Keyboard connector
4. Main memory banks
5. Power supply connector
6. Case feature connectors
7. BIOS
8. CPU socket
9. SiS 85C496/497 chip set
10. Data SRAMs
11. Tag SRAM
12. Lithium battery
13. Voltage regulator
14. IDE connectors
15. Multi-I/O chip set

tween the CPU and the other components and peripherals in the system.

CPU Socket

The CPU socket on this system board is an OverDrive Socket 3, which is designed to support full range of 486 CPUs.

On-board Battery

An long-life lithium battery is installed on this system board. The battery is used to power the CMOS RAM in which information about the system configuration is stored while the system power is off. If the on-board battery fails, you may replace it with a lithium battery with the same module (CR2032). To attach the battery, be sure that the "+" terminal of the battery must face up.

In addition, you can replace the on-board battery with a 4.5V to 6V battery via an external battery connector. To use an external battery, make sure that the on-board battery is disabled. (refer to section 2.1 and 2.2 for more information)

1.3 Static Electricity Precautions

Static electricity can build up in your body due to the type of clothing you are wearing, the carpet in the room in which you are working, or various items that you may touch. When working with delicate electronic components such as those found on your system board, you need to take precautions to prevent them from being damaged by electrostatic discharge.

Whenever installing or upgrading various parts of a computer system, you should take care to prevent a discharge of static electricity from your body or clothes to the components in the system. Fortunately, it is easy to prevent such discharges while you are working: each time you are going to pick up or begin installing a component, first touch a grounded object, such as the unpainted rear panel of your system unit or a water faucet or other grounded fixture in your work area. Any static electricity in your body will then be discharged through that object.

Chapter 2
System Board Setup

Before you begin installing your system board in the system unit case and connecting peripheral devices to the board, you must first prepare the board by setting the jumper switches, attaching the connectors, and installing the memory devices. This chapter will tell you how to perform these steps.

If your system board has already been installed by the dealer, you will still want to refer to this chapter in case you make any changes or upgrades to your system.

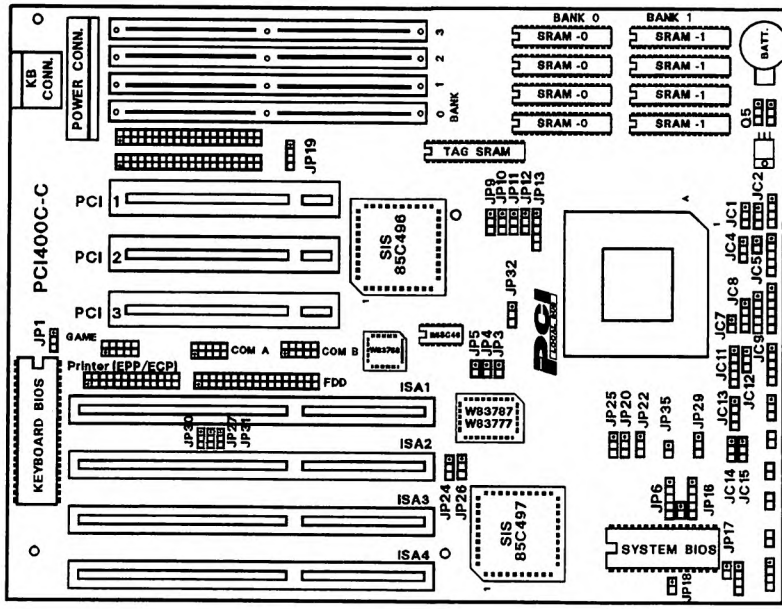
2.1 Jumper Switches

Jumper switches are used to select various operating modes. Placing the plastic *jumper cap* over two pins connects those pins and makes a particular selection. Using the cap to cover two pins in this way is commonly referred to as *shorting* those pins. If the cap is not placed on any pins at all, this is referred to as leaving the pins *open*.

This section will explain the functions and settings of all of the user-configurable jumper switches on this PCI system board. To determine the locations of the jumpers, consult the diagram on page 2-2.

2-pin Jumper

3-pin Jumper



Jumper Switches

Cache Size Selection Jumpers

Adjust the cache size selection jumpers to correspond to the size of the cache memory and the type of data SRAM installed according to the settings shown in Table 2.1:

Cache Size	Data SRAM	TAG SRAM	JP9	JP10	JP11	JP12	JP13
128KB	Four 32K*8	8K*8	1-2	1-2	1-2	1-2	1-2, 3-4
256KB	Eight 32K*8	16K*8	1-2	2-3	2-3	1-2	2-3, 4-5
	Four 64K*8		1-2	2-3	1-2	2-3	1-2, 3-4
512KB	Four 128K*8	32K*8	2-3	2-3	1-2	1-2	1-2, 3-4
	Eight 64K*8		2-3	2-3	2-3	1-2	2-3, 4-5
1MB	Eight 128K*8	64K*8	2-3	2-3	2-3	1-2	2-3, 4-5

Table 2.1: Cache Memory Size Jumper Switch Settings

CPU Selection Jumpers

The CPU selection jumpers are used to configure the system board for the type of CPU installed in the CPU socket. Adjust these jumpers according to the settings shown in Table 2.2. (Note: In Table 2.2 "NC" indicates "not connected", or open.)

IMPORTANT NOTE: There are two jumpers labeled Q5 located to the left of the on-board battery. If the CPU used on your system board is a 3.3V CPU, leave these two Q5 jumpers open. If your CPU operates at 5V, pins 2 and 3 of both of the Q5 jumpers must be shorted. In addition, jumpers JP5 and JP7 must be left open in this version of the system board. Incorrect jumper settings may result in damage to the CPU.

CPU TYPE		JC1	JC2	JC3	JC4	JC6	JC8	JC9	JC10	JC11	JC12	JC13	JC14	JC15	Q5
INTEL	486DX/DX2 5V (SL-Enhanced)	2-3	NC	3-4	NC	NC	NC	2-3	3-4	4-5	1-2	1-2 3-4	NC	NC	2-3 2-3
	486DX4-3V (SL-Enhanced)	2-3	NC	3-4	NC	NC	NC	2-3	3-4	4-5	1-2	1-2 3-4	NC	NC	NC
	486DX4-3V OverDrive (SL-Enhanced)	2-3	NC	3-4	NC	NC	NC	2-3	2-3	1-2	1-2	1-2 3-4	NC	NC	NC
	Pentium-5V OverDrive (SL-Enhanced)	2-3	NC	3-4	1-2	NC	NC	2-3	2-3	1-2	1-2	1-2 3-4	NC	NC	2-3 2-3
	DX2 OverDrive 168PGA ODPR (SL-Enhanced)	2-3	NC	3-4	NC	NC	NC	2-3	3-4	4-5	1-2	1-2 3-4	NC	NC	2-3 2-3
	487SX OverDrive 169PGA ODP (SL-Enhanced)	2-3	NC	3-4	NC	NC	NC	2-3	2-3	4-5	1-2	1-2 3-4	NC	NC	2-3 2-3
	486DX/DX2-STD	2-3	NC	NC	NC	NC	NC	NC	3-4	NC	NC	1-2 3-4	NC	NC	2-3 2-3
	486SX/SX2-5V (SL-Enhanced)	2-3	NC	3-4	NC	NC	NC	2-3	3-4	4-5	1-2	2-3	NC	NC	2-3 2-3
AMD	AM486DX2-STD	2-3	NC	NC	NC	NC	NC	NC	3-4	NC	NC	1-2 3-4	NC	NC	2-3 2-3
	AM486DX4-3V STD	2-3	NC	NC	NC	NC	NC	NC	3-4	NC	NC	1-2 3-4	NC	NC	NC
	AM486DXL2 (SL-Enhanced)	2-3	NC	NC	NC	NC	3-4	4-5	1-2 3-4	NC	1-2	1-2 3-4	NC	2-3	2-3 2-3
	Future 3V CPU AM486DX4 W/B (SL-Enhanced)	2-3	NC	1-2 3-4	NC	4-5	NC	2-3	3-4	4-5	1-2	1-2 3-4	1-2	NC	NC
UMC	U5S (5V)	2-3	NC	NC	NC	NC	3-4	NC	1-2	NC	1-2	2-3	NC	NC	2-3 2-3
	U5SD (5V)	2-3	NC	NC	NC	NC	3-4	NC	1-2	NC	1-2	3-4	NC	NC	2-3 2-3
Cyrix	CX486DX2 (M7) 5V	2-3	NC	2-3	NC	NC	2-3	1-2	3-4	2-3	1-2	1-2 3-4	2-3	NC	2-3 2-3
	CX486DX4 (M9) 3V	1-2	1-2	1-2 3-4	NC	2-3	NC	2-3	3-4	2-3	1-2	1-2 3-4	1-2	NC	NC

Table 2.2: CPU Selection Jumper Switch Settings

System Speed Selection Jumpers

Jumpers JP3, JP4, and JP5 are used to configure the input clock to the CPU and PCI bus. Which of these speeds should be selected depends on the CPU and PCI cards installed in the system. Note that very few PCI add-on card can run at 40 MHz continuously and properly. Make sure that your PCI add-on card can operate at 40 MHz before you select 40 MHz for your system speed.

Normal Speed	Low Speed	JP5	JP4	JP3
40 MHz	8 MHz	Open	Short	Open
33 MHz	8 MHz	Open	Short	Short
25 MHz	8 MHz	Open	Open	Open

Table 2.3: System Speed Jumper Settings

Serial Port Enable Jumpers

Jumper JP20 is used to enable COM1, and JP22 is used to enable COM2. (COM1 occupies IRQ4, and COM2 occupies IRQ3.)

COM1	JP20	COM2	JP22
Disable	2-3	Disable	2-3
Enable COM1 = 3F8H	1-2	Enable COM2 = 2F8H	1-2

Table 2.4: Serial Port Jumper Settings

Parallel Port Setting Jumpers

Jumpers JP24 and JP25 are used to select the operating mode of the parallel port. This board supports an IBM XT/AT compatible parallel port, Enhanced Parallel Port, Extended Capabilities Parallel Port, Extension floppy disk drive mode, and Extension two floppy disk drive mode on the parallel port. Jumper JP31 is used to enable EPP mode, and jumper JP29 is used to enable the printer port.

Mode	JP24	JP25	JP29	JP31
Printer, LPT1	2-3	2-3	1-2/Open	Don't care
EPP Mode (default)	2-3	1-2	1-2/Open	Open
ECP/EPP	1-2	2-3	1-2/Open	Open
EXT, Two FDD	1-2	1-2	1-2/Open	Open

Parallel Port DMA REQ/ACK	JP26	JP27
DMA Channel 3 (default)	2-3	2-3
DMA Channel 1	1-2	1-2

Table 2.5: Parallel Port Jumper Settings

Parallel Port IRQ Selection Jumper

Jumper JP30 is used to select either IRQ7 or IRQ5 for the parallel port.

Parallel Port IRQ	JP30
IRQ7 (default)	1-2
IRQ5	2-3

Table 2.6: Parallel Port IRQ Jumper Setting

Clear CMOS Data Jumper

Jumper JP17 is used to clear the system configuration data currently stored in the CMOS RAM and reload the default system configuration settings.

Function	JP17
Normal Operation (default)	Open
Clear CMOS Data	Short

Table 2.7: Clear CMOS Data Jumper Setting

On-board Battery Enable Jumper

To activate the on-board battery, short JP18. To deactivate the on-board battery and enable the external battery, leave JP18 open.

On-board Battery	JP18
Enable (default)	Short
Disable	Open

Table 2.8: On-board Battery Enable Jumper Setting

On-board FDC Enable Jumper

Jumper JP32 is used to enable/disable the on-board floppy disk controller.

On-board FDC	JP32
Disable	2-3
Enable (default)	1-2

Table 2.9: On-board FDC Enable Jumper Setting

Power-Saving Mode Control Jumpers

Jumper JP6 determines how the power-saving mode is controlled. If the CPU installed on the system board provides a stop clock function (all Intel SL-enhanced CPUs support this function), then select STP.CLK. If the CPU installed does not support a stop clock function, then select SMI OUT so that the power-saving mode will be controlled by the SMI (System Management Interrupt) function. Incor-

rect configuration may cause the power saving mode operate abnormally.

Power Saving Control	JP6
STP.CLK (default)	1-2
SMI OUT	2-3

Table 2.10: Power-Saving Mode Control Jumper Setting

Flash BIOS Upgrade Jumper

The BIOS on this system board is stored in either an EPROM or a flash memory. If the BIOS on your board is stored in a flash memory, you may wish to use an update utility to update the BIOS in the future. To update the BIOS, short pins 1-2 and 5-6 of jumper JP16 and then run the update utility. For normal operation, pins 2-3 and 4-5 of jumper JP16 must be shorted.

Operating Mode	JP16
Update BIOS	1-2, 5-6
Normal Mode (default)	2-3, 4-5

Table 2.11: Flash BIOS Upgrade Jumper Setting

On-board Game Port Enable Jumper

Jumper JP35 is used to enable/disable the on-board game port. Note that if a Sound blast card that includes a game port is installed in the system, the on-board game port must be disabled to prevent conflicts between the two ports.

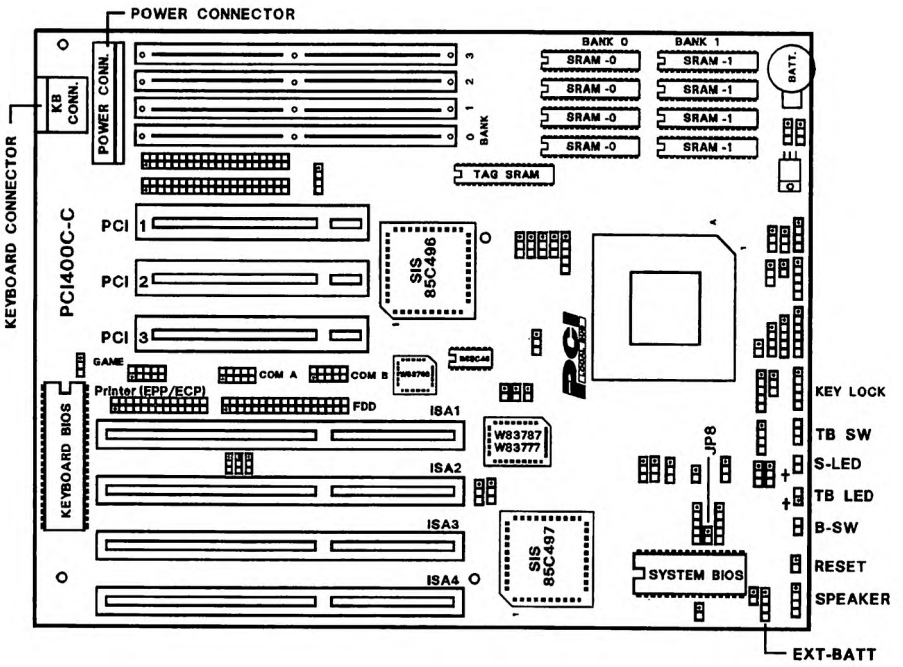
On-board Game Port	JP35
Disable	Open
Enable (default)	Short

Table 2.12: On-board Game Port Jumper Setting

2.2 Connectors

Connectors are used to connect the system board to other parts of the system, including the power supply, the keyboard, and the various controls on the front panel of the system case. When attaching connecting wires to the con-

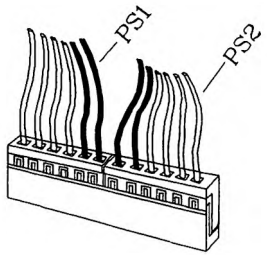
nectors you should remember that some of them must be aligned in a specific way in order to function properly.



Connectors

Power Supply

Most power supplies have two six-wire connectors that must be attached to the system board. Two of the wires on each connector are black. When attaching these two connectors to the power supply connector, align them so that the two black wires on each connector are in the *middle*, as shown below.



Reset The reset switch may be used to reset the computer.

Speaker An external speaker mounted inside the case may be attached to the system board via this connector.

Key Lock The keyboard lock can be used to disable the keyboard.

Turbo Switch The hardware turbo switch can be used to toggle the turbo mode on and off. **Note** that do not try to power on your computer under the de-turbo mode.

Turbo LED If connected, the turbo LED will light whenever the system is running in turbo mode.

B-SW The B-SW (break switch) can be used to force the system to enter the power-saving mode.

S-LED If connected, this connector will cause the LED to light whenever the system is in power-saving mode.

External Battery The external battery connector may be used to attach an external 4.5 V to 6 V battery to replace the on-board battery. When using an external battery, make sure that jumper JP18 is left open (refer to section 2.1).

External Device Power Saving JP8 is a connector used to send a signal that temporarily cuts off the power to the I/O peripheral devices when they are not in use.

Keyboard The keyboard is usually the last part of the system attached to the board, after the board has been installed in its case.

2.3 Main Memory

The on-board memory includes four slots labeled Banks 0 through 3. Each slot will hold one SIMM. The minimum amount of memory that may be installed on the board is 1 MB, and the maximum amount of main memory is 128 MB.

In addition to the minimum and maximum memory size of 1 MB and 128 MB, a variety of other configurations can be used. You can insert 256K, 512K, 1M, 2M, 4M, 8M, or 16M × 36 bit 70ns DRAM modules in any slot to configure the main memory as you wish. The system will automatically adjust itself to run with the memory configuration you install.

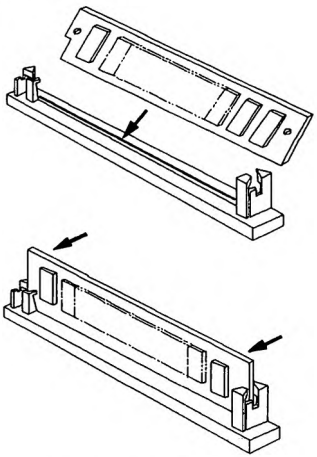
Installing SIMMs

To install SIMM modules, follow these instructions:

1. Turn off the computer and all peripheral devices.

2. Orient a SIMM with the first slot of the memory bank and insert the module into the slot at a 75-degree angle to the system board.

3. After the edge connector on the module is inserted completely into the socket, gently push the module forward against the retaining clips on each end of the socket until it snaps into place.



Installing SIMMs

2.4 External Cache Memory

The cache memory on the system board may be 128KB, 256KB, 512KB, or 1MB in size. In order for the cache

memory to operate properly, you must have the correct memory devices installed and the correct jumper settings selected. Details concerning the configuration of the cache size jumper settings are given in section 2.1. Table 2.13 displays all possible cache memory sizes and recommended memory devices.

Cache Size	Data SRAM	Tag SRAM
128K	Four 32Kx8 in Bank 0	8Kx8
256K	Four 64Kx8 in Bank 0	16Kx8
256K	Eight 32Kx8 in Banks 0 & 1	16Kx8
512K	Four 128Kx8 in Bank 0	32Kx8
512K	Eight 64Kx8 in Banks 0 & 1	32Kx8
1MB	Eight 128Kx8 in Bank 0 & 1	64Kx8

Table 2.13: Recommended Cache Memory Devices

Installing the Cache Memory Devices

The procedure for installing individual SRAM chips in the cache memory banks is as follows:

1. First, orient the chip correctly with the socket into which it will be inserted. There is a U-shaped notch at one end of each SRAM chip. This notch should be aligned with the corresponding notch on the chip socket.

2. Carefully align the pins of the chip with the holes of the socket and gently seat the chip part of the way into the socket. Check to see that the chip is level, that all of the pins are seated properly, and that there are no bent or misaligned pins.

3. Once all of the pins are properly aligned, gently push the chip the rest of the way into the socket.

4. Repeat this procedure until all of the SRAMs are installed.

IMPORTANT NOTE: When handling and installing memory devices, you should take care to follow standard precautions against static electricity (see section 1.3). To install or upgrade memory for your computer system, you are advised to consult an authorized dealer. Note that in some cases, altering the system board yourself may void the product warranty.

Chapter 3
System Installation

Once you have set up the system board and installed the main memory, you will be ready to install the board in a system unit case. This chapter provides general instructions on how to install the system board in a standard case along with the peripherals needed to complete a typical personal computer system.

3.1 Components

In addition to setting up the system board and installing the memory, you will need to install a number of peripheral components and connect the board to various devices on the system case in order to complete a computer system based on the system board. Some of these devices were referred to in chapter 2 above, where the system board connectors were described. A list of devices commonly used to build a computer system based upon this type of system board appears below. Aside from the last two items – the monitor and keyboard – all of these components are usually installed inside the system case.

- A system case similar to the Baby AT in size or one with compatible mounting holes.
- A standard 200W power supply (usually provided with the system case).
- A speaker (usually provided with the system case).
- A hard disk/floppy disk drive controller card.
- A monochrome, EGA, or VGA video card.
- One or two 5.25-inch and/or 3.5-inch floppy disk drives.

- A hard disk drive.
- Flat ribbon cables to connect the hard/floppy disk drive controller and the drives.
- A serial/parallel interface card to allow peripheral devices such as a printer to communicate with the system.
- A color or monochrome monitor.
- A keyboard.

3.2 Installing the Board in a Case

There are eight mounting holes on this system board, at least some of which should line up with the mounting holes on the case you have selected. The case should include screws or other mounting hardware for fastening the system board to the case. With some cases, the system board will need to be fastened down to the chassis inside the case with screws. Other cases may have a metal or plastic drawer-type holder into which the system board is to be slid. In general, the manufacturer recommends using a case in which the system board is fastened down with a number of screws, as this design helps to ground the board thoroughly and divides the weight of the cards installed in the expansion slots more evenly across the board.

3.3 Controls and Connectors

Once the system board is secured to the case, you will need to attach various connectors on the board to the controls on the front panel of the system case. Most system cases will have several controls and indicators built onto the front panel of the case, as well as a speaker mounted inside the front panel. The various connectors provided on this system board for controls of this type are described in chapter 2 above. Follow the descriptions given there to connect the controls.

Once you have finished connecting these controls and indicators to the case, you may wish to tie the connecting wires together to make access to this area of the system board more convenient.

After you have completed attaching the controls and indicators to the system board, you will need to connect the board to the power supply via the power connector.

3.4 Case-Mounted Peripherals

The next step in installing your computer system will be to install the various peripheral devices that go inside the system unit case, such as floppy and hard disk drives, the disk drive controller card, serial/parallel interface cards, and other adapter cards. Consult the literature provided with those products or with your system case for further instructions on installing these devices.

Adapter Card Installation

You may wish to install additional add-on or adapter cards. The procedure for installing add-on or adapter cards is essentially the same for all types of cards. Note, however, that on this system board either the rightmost AT expansion slot or the first PCI slot must be left empty. Only one of these slots may be used at a time.

1. First check that the power for the system and all peripheral devices is turned off. Unplug all power cords from the back of the system unit.

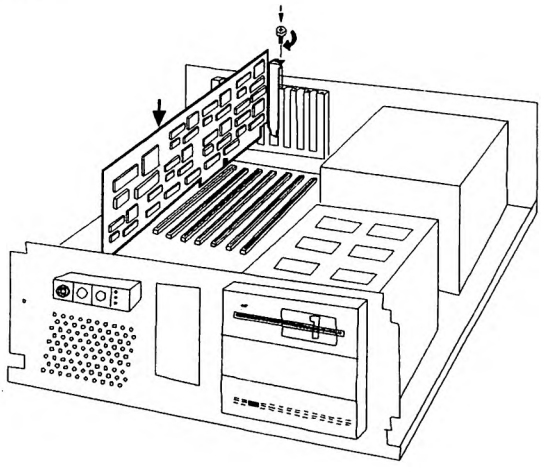
2. If you have already installed the system board in its case, loosen the screws on the rear panel of the system unit case that hold the cover in place and slide the cover forward so that you have access to the system board.

3. Select an unused expansion slot and remove the slot cover corresponding to that slot from the rear panel of the system case. Save the screw holding the slot cover in place.

4. Insert the adapter card firmly into the expansion slot and use the screw removed in step 3 to fasten it to the rear panel of the case.

5. Replace the cover of the system unit case and fasten it in place with the screws removed in step 1.

For further instructions on installing adapter cards and other devices, consult the manuals provided with those products.



Installing an Adapter Card

3.5 Starting Up the System

Once the system board is mounted in its case and you have completed installation of the peripheral devices inside the case, slide the cover of the case into place and secure it to the rear panel of the case using the screws provided. Next, connect your keyboard to the keyboard connector on the rear panel and your monitor to the output from the video card, also on the rear panel.

Your computer is now ready to be powered on. Once the computer is powered on, you will need to adjust the settings in the BIOS setup utility to match the set-up of your system. Finally, you will need to install and boot an operating system, such as DOS, before your computer can be used. For further instructions, consult your operating system manual.

Chapter 4
BIOS Setup Program

The major functions of the BIOS are to check the hardware in your system each time it is powered on and to act as an interface between the CPU and the other components and peripherals in the system. If you received your mainboard installed in a system, the BIOS setup has probably already been adjusted properly.

If you are installing the system board yourself or modifing the system hardware configuration, you will need to enter the setup information. To enter the AWARD BIOS setup program, power on the computer and press <Del> key immediately or simultaneously press <Ctrl>, <Alt>, and <Esc> keys. This Chapter explains how to use the Setup program and make the appropriate entries.

4.1 BIOS Features Setup

ROM PCI/ISA BIOS (2A4IBJ31)
BIOS FEATURES SETUP
AWARD SOFTWARE, INC.

Virus Warning	: Disabled	Video BIOS Shadow	: Enabled
CPU Internal Cache	: Enabled	C8000-CFFFF Shadow	: Disabled
External Cache	: Enabled	D0000-D7FFF Shadow	: Disabled
Quick Power On Self Test	: Disabled	D8000-DFFFF Shadow	: Disabled
Boot Sequence	: A, C		
Swap Floppy Drive	: Disabled		
Boot Up Floppy Seek	: Enabled		
Boot Up NumLock Status	: On		
Gate A20 Option	: Fast		
Memory Parity Check	: Disabled		
Typematic Rate Setting	: Disabled	ESC : Quit	: Select Item
Typematic Rate (Chars/Sec)	: 6	F1 : Help	PU/PD/+/- : Modify
Typematic Delay (Msec)	: 250	F5 : Old Values	(Shift) F2 : color
Security Option	: Setup	F6 : Load BIOS Defaults	
		F7 : Load Setup Defaults	

Figure 4.1: BIOS Features Setup Menu

Virus Warning

If this function is enabled, when the system boots up, any attempt to write to the boot sector or partition table of the hard disk drive will halt the system and a warning message will appear. In the mean time, you can run anti-virus program to located the problem.

Quick Power On Self Test

If it is set to Enabled, BIOS will shorten or skip some check items during POST.

Memory Parity Check

If 36-bit SIMMs are used (32 data bits plus 4 parity bits), then select "Enabled". In this case, if an error occurs, the system will display a warning message before it crashes.

If 32-bit SIMMs (without parity bits) are used, then "Disabled" must be selected or the system can't boot up. In this case, if an error occurs, the system will crash without giving advance warning.

Security Option

If "System" is selected, the system will not boot and access to Setup will be denied if the correct password is not entered at the prompt. If "Setup" is selected, the system will boot, but access to Setup will be denied if the correct password is not entered at the prompt.

Video BIOS Shadow

Determines whether video BIOS will be copied to RAM. However, it is optional from chip set design.

C8000-CBFFF to D8000-DFFFF Shadow

These settings are for shadowing other adaptor ROMs. If you have other expansion cards with ROMs on them, you will need to know which addresses the ROMs use.

4.2 Chipset Features Setup

This portion of the BIOS Setup is entirely chip-set specific and requires knowledge about the chip set in use. These registers control most of the system options in the computer.

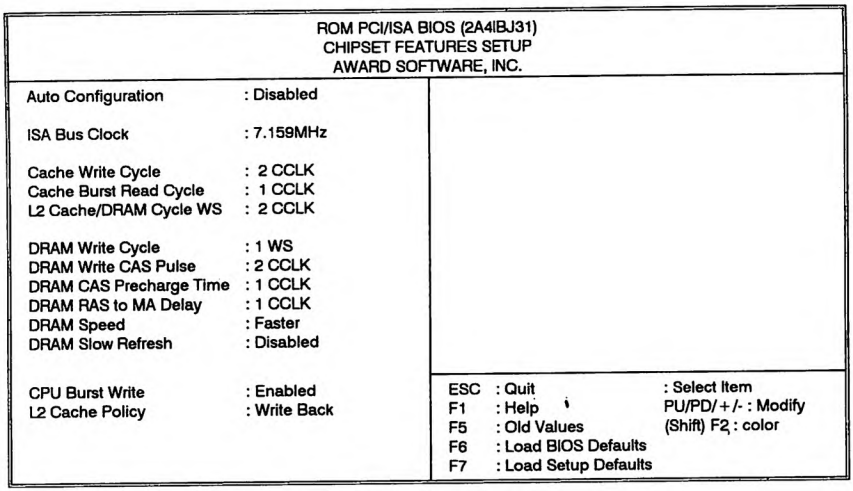


Figure 4.2: Chipset Features Setup Menu

Item	Option	Description
Cache Write Cycle	2 CCLK 3 CCLK	Select 2 CCLK for a 25 or 33 MHz CPU. Select 3 CCLK for a 40 MHz CPU.
Cache Burst Read Cycle	1 CCLK 2 CCLK	Select 1 CCLK for a 25 or 33 MHz CPU. Select 2 CCLK for a 40 MHz CPU.
L2 Cache/DRAM Cycle WS	2 CCLK 3 CCLK	Select 2 CCLK for a 25 or 33 MHz CPU. Select 3 CCLK for a 40 MHz CPU.
DRAM Write Cycle	0 WS (wait status) 1 WS	Select 0 WS for a 25 MHz CPU. Select 1 WS for a 33 or 40 MHz CPU.
DRAM Write CAS Pulse	1 CCLK 2 CCLK	Select 2 CCLK for a 25, 33, or 40 MHz CPU. (Do not select 1 CCLK, or the system may not boot up)
DRAM CAS Precharge	1 CCLK 2 CCLK	Select 1 CCLK for a 25 or 33 MHz CPU. Select 2 CCLK for a 40 MHz CPU.
DRAM RAS to MA Delay	1 CCLK 2 CCLK	Select 2 CCLK for a 25, 33, or 40 MHz CPU.
DRAM Speed	Slower Faster Fastest	Select Slower for a 40 MHz CPU. Select Faster for a 33 MHz CPU. Select Fastest for a 25 MHz CPU.
DRAM Slow Refresh	Enabled Disabled	Enable this item cause the refresh function occurred at one quarter of normal frequency. Disable this item cause the refresh function occurred at normal frequency.
CPU Burst Write	Enabled Disabled	Enable this item to improve the CPU performance. It is recommended to disable this funciton for a 40 MHz CPU.
L2 Cache Policy	Write Back Write Through	Write-back mode provides better performance than write-through mode.

4.3 Power Management Setup

ROM PCI/ISA BIOS (2A4IBJ31)
POWER MANAGEMENT SETUP
AWARD SOFTWARE, INC.

Power Management	: Disabled	IRQ3 (COM 2)	: Enabled
PM Control by APM	: Yes	IRQ4 (COM 1)	: Enabled
Video Off Option	: Susp, Stby -> Off	IRQ5 (LPT 2)	: Disabled
Video Off Method	: V/H SYNC+Blank	IRQ6 (Floppy Disk)	: Disabled
Suspend Switch	: Enabled	IRQ7 (LPT 1)	: Disabled
		IRQ9 (IRQ2 Redir)	: Disabled
** PM Timers **		IRQ10 (Reserved)	: Disabled
HDD Off After	: Disabled	IRQ11 (Reserved)	: Disabled
Doze Mode	: Disabled	IRQ12 (Reserved)	: Disabled
Standby Mode	: Disabled	IRQ14 (Hard Disk)	: Disabled
Suspend Mode	: Disabled	IRQ15 (Reserved)	: Disabled
** PM Events **			
PCI Master Activity	: Disabled		
COM Ports Activity	: Disabled		
LPT Ports Activity	: Disabled	ESC : Quit	: Select Item
HDD Ports Activity	: Disabled	F1 : Help	PU/PD/+/- : Modify
DMA Ports Activity	: Disabled	F5 : Old Values	(Shift) F2 : color
VGA Activity	: Disabled	F6 : Load BIOS Defaults	
		F7 : Load Setup Defaults	

Figure 4.3: Power Management Menu

Item	Option	Description
Power Management	Disabled	Power Management will be disabled.
	User Defined	User can define the length of time the system waits when no activity is detected before it invokes the power saving mode and reduces the clock speed
	Min Saving	System enters power-saving mode after 40 minutes w/ no activity
	Max Saving	System enters power-saving mode after 20 seconds w/ no activity
PM control by APM	No	System BIOS will ignore APM. Note: If APM function is disabled, the SMI (system management interrupt) mode supported by chipset will be activated.
	Yes	System BIOS will wait for APM's prompt before it enters any PM mode. Note: If APM is installed, and if there is a task running, then even if the timer times out, the APM will not prompt the BIOS to put the system into power saving mode. If APM is not installed, this option has no effect.
Video Off Option	Always On	System BIOS will never turn off the screen.
	Suspend -> Off	Screen off when system is in Suspend mode.
	Susp, Stby -> Off	Screen off when system is in Standby or Suspend mode.
	All Modes -> Off	Screen off when system is in Doze, Standby, or Suspend mode.

Item	Option	Description
Video Off Method	Blank Screen	The system BIOS will only blank off the screen when video is disabled.
	V/H SYNC + Blank	In addition to blank screen, BIOS will also turn off the V-SYNC & H-SYNC signals from VGA cards to monitor. Green monitors detect the V/H sync signals to turn off its electron gun.
	DPMS	This function allows the video subsystem to put a DPMS-compliant monitor into power savings modes in order to meet the EPA's "Energy Star" requirements.
HDD Off After	Disabled	HDD's motor will not be turned off.
	When Suspend	HDD's motor will be turned off when system is in suspend mode
	1 Min - 15 Min	Defines the continuous HDD idle time before the HDD enters power saving mode (motor off).
PM Events	Disabled	The specified event or activity will not affect the PM timer.
	Enabled	The specified event or activity causes the PM timer to be reloaded, i.e., the Power Management Unit (PMU) monitors the specified activities as PM events.

4.4 PCI Configuration Setup

Since PCI is intended to be a plug & play technology, **ideally no setup should be needed**. However, there are many "dirty" PCI devices (PCI devices which do not follow the PCI 2.0 specification exactly) on the market. The Award setup utility is mainly for manual override of the IRQs of such dirty devices.

The most common "dirty" device is an IDE device. According to the PCI 2.0 specification, a single device can request only one IRQ. If a PCI IDE card is intended to support two IDE channels, two IRQs should be assigned to the card. Unless the card supports multi-function operation, i.e., more than one and up to seven devices can be found on one card, the IDE card is "dirty".

As another example, according to the PCI 2.0 specification, PCI devices should inform the system BIOS which INT line they are using. This is implemented by hardwiring the address 0Dh of the configuration space registers to a predefined value:

00 - N/A
01 - INT A
02 - INT B
03 - INT C
04 - INT D

If a PCI device does not implement the above technique, it will confuse a pure plug & play BIOS and therefore it is a "dirty" device.

In addition, according to the PCI 2.0 specification, PCI devices should provide accurate configuration space registers so that the PCI BIOS can identify them. If a PCI device does not provide such a group of registers, it is a "dirty" device.

ROM PCI/ISA BIOS (2A4IBJ31)
PCI/IDE CONFIGURATION SETUP
AWARD SOFTWARE, INC.

Slot 1 Using INT#	: AUTO	Onboard 486B IDE Port	: Enabled
Slot 2 Using INT#	: AUTO	IDE 0 Master Mode	: Auto
Slot 3 Using INT#	: AUTO	IDE 0 Slave Mode	: Auto
		IDE 1 Master Mode	: Auto
1st Available IRQ	: 11	IDE 1 Slave Mode	: Auto
2nd Available IRQ	: 10	IDE Prefetch Read Buffer	: Enabled
3rd Available IRQ	: 9	IDE HDD Block Mode	: Enabled
4th Available IRQ	: NA	IDE 32-bit Transfer Mode	: Enabled
PCI IRQ Activated By	: Edge		
EXT. PCI IDE IRQ To	: PCI-AUTO	EXC : Quit	: Select Item
Primary IDE INT#	: A	F1 : Help	PU/PD/+/- : Modify
Secondary IDE INT#	: B	F5 : Old Values	(Shift) F2 : color
PCI IDE 2nd Channel	: Enabled	F6 : Load BIOS Defaults	
		F7 : Load Setup Defaults	
Master Arbitration Protocol	: Strong		
CPU->PCI Mem Post Write Buf	: Enabled		
PCI Master Burst Read/Write	: Enabled		

Figure 4.4: PCI Configuration Setup Menu

Item	Options	Descriptions
Slot 1 Using INT# Slot 2 Using INT# Slot 3 Using INT#	AUTO A B C D	AUTO: BIOS will - ask the PCI device which INT (A to D) it wants to use for interrupt - check out which IRQ is available from the above - inform the device which IRQ has been assigned to it A, B, C, D: These options are reserved for "dirty" cards that do not allow the system BIOS to tell which INT they are using. Note: - Choose "AUTO" for all devices unless you know exactly which card is a dirty device and which INTs that card uses. - Choose "AUTO" for multi-function PCI devices because options A, B, C, and D will force the BIOS to assign IRQs for function 0 only.

Item	Options	Descriptions
1st Available IRQ through 4th Available IRQ	3, 4, 5, 7, 9, 10, 11, 12, 14, 15	The system BIOS will assign these 4 available IRQs to the PCI devices found
PCI IRQ Activated By	Edge Level	Informs chip set whether the IRQ signal input is level or edge trigger
EXT. PCI IDE IRQ To	PCI-AUTO PCI-SLOT1 PCI-SLOT2 PCI-SLOT3 ISA	PCI-AUTO: The BIOS will - scan for PCI IDE devices and determine the location of the PCI IDE device - assign IRQ 14 for primary IDE INT# and IRQ15 for secondary IDE INT# PCI-SLOT1 through PCI-SLOT3: - assign IRQ 14 for primary IDE INT# and IRQ 15 for secondary IDE INT# for the specified slot ISA: - The BIOS will not assign any IRQs even if PCI IDE card is found, because some IDE cards connect IRQ14 and 15 directly from ISA slot through a cord. (This cord is called the Legacy Header.)
Primary IDE INT# Secondary IDE INT#	A B	Determines which INT# the PCI IDE card is using for its interrupts.
Master Arbitration Protocol	Strong Weak	Arbiter always grants a CPU request after a PCI or ISA Master cycle. Arbiter only grants a CPU request after a PCI or ISA Master cycle if no other pending request exists.
CPU->PCI Mem Post-Write Buf	Enabled Disabled	Enabled: CPU access cache or on-board memory cycle can be executed concurrently with PCI memory write cycle.
PCI Master Burst Read/Write	Enabled Disabled	Enabled: Burst read/write transfer Disabled: Single read/write transfer
IDE Prefetch Read Buffer	Enabled Disabled	Enable this item may improve the performance of the on-board IDE disk. However, if a 40 MHz CPU is used, this function must be disabled.
IDE HDD Block Mode	Enabled Disabled	Enable this feature to improve the hard disk performance if your IDE hard disk supports this function.
IDE 32-bit Transfer Mode	Enabled Disabled	Enable this feature to improve the hard disk performance if your IDE hard disk supports this function.

External PCI IDE Add-on CardSetup

Identifiable PCI IDE:

- Choose "PCI-Auto" for these cards and determine the INTs for primary as well as secondary channels by checking the IDE card manual.

PCI IDE with "Legacy Header" or no PCI IDE device:

- Choose option "ISA" in item PCI IDE IRQ Map To.

Dirty PCI IDE without "Legacy Header" and without an accurate Cfg Space:

- First, check which slot this card is plugged into and choose a PCI slot accordingly. Next, determine the INTs for the primary and secondary channels by checking the IDE card manual.

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