

82440FX PCIset

PP6-NB

ISA PCI MotherBoard

with Onboard PCI IDE and Super Multi-I/O.

TRADEMARK

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The specification is subject to change without notice.

Package Checklist

Please check your package to contains all the items listed below. If you find any item damaged or missed items, please contact your retailer.

- One motherboard
- One manual
- One parallel port ribbon cable
- Two serial port ribbon cable
- One IDE ribbon cable
- One floppy ribbon cable
- Two brackets for parallel and serial
- One PS/2 mouse cable with bracket
- One 1.44MB diskette containing support software as follows
 - Bus Master Derice Driver's to supports
 - 1) DOS WIN
 - 2) NOVELL.312
 - 3) NOVELL.4X
 - 5) OS2 Warp
 - 6) WIN 95
 - 7) WINNT 35
 - UTILITY
 - 1) Flash Memory Utility
 - 2) Flash Update Readme
 - 3) Binary File Containing BIOS Information

Contents

| | page |
|---|------------|
| Chapter 1 - Introduction | 1-1 |
| 1-1 Pentium®Pro Processor Overview | 1-1 |
| 1-2 Specification | 1-2 |
| Chapter 2 - Hardware Design | 2-1 |
| 2-1 Motherboard Layout | 2-1 |
| PP6-NB Board Layout | 2-2 |
| System Block Diagram | 2-3 |
| 2-2 Connectors and Jumpers | 2-4 |
| 2-3 System Memory Configuration | 2-7 |
| 2-4 Integrated PCI Bridge | 2-9 |
| 2-5 I/O Connector Cables | 2-10 |
| Chapter 3 - Award BIOS SETUP | 3-1 |
| 3-1 Standard CMOS Setup | 3-2 |
| 3-3 BIOS Features Setup | 3-2 |
| 3-3 Chipset Features Setup | 3-6 |
| 3-4 Power Management Setup | 3-8 |
| 3-5 PNP/PCI Configuration | 3-10 |
| 3-6 Integrated Peripherals | 3-12 |
| 3-7 Load Setup Defaults | 3-14 |
| 3-8 Change Supervisor or User password | 3-15 |
| 3-9 IDE HDD Auto Detection | 3-16 |
| 3-10 HDD Low Level Format | 3-18 |
| 3-11 Save & Exit Setup | 3-18 |
| 3-11 Exit Without Saving | 3-18 |
| Chapter 4 - Onboard Technical Information..... | 4-1 |
| 4-1 I/O & Memory Map | 4-1 |
| 4-2 Time & DMA Channels Map | 4-2 |
| 4-3 Interrupt Map | 4-2 |
| 4-4 RTC & CMOS RAM Map | 4-3 |
| Appendix A: Post Codes | 4-4 |
| Appendix B: I/O Connector | 4-8 |

NOTE :

The "**LOAD SETUP DEFAULTS**" function loads the system default data directly from ROM and initializes associated hardware properly. This function will be necessary when you accept this motherboard, or the system CMOS data is corrupted.

| ROM PCI/ISA BIOS CMOS SETUP UTILITY AWARD SOFTWARE, INC. | |
|---|------------------------------------|
| STANDARD CMOS SETUP | SUPERVISOR PASSWORD |
| BIOS FEATURES SETUP | USER PASSWORD |
| CHIPSET FEATURES SETUP | IDE HDD AUTO DETECTION |
| POWER MANAGEMENT SETUP | HDD LOW LEVEL FORMAT |
| PNP/PCI CONFIGURATION | LOAD SETUP Default (Y/N)? Y |
| INTEGRATED PERIPHERALS | LOAD SETUP SAVING |
| LOAD SETUP DEFAULTS | |
| ESC: QUIT | ↑↓←→ :SELECT ITEM |
| F10:Save & Exit Setup | (Shift)F2 :Change Color |
| Load Setup Defaults Except Standard COMS SETUP | |

LOAD SETUP DEFAULT

Chapter 1

Introduction

The **PP6-NB** motherboard is a high performance system hardware based on Intel Pentium®Pro processor and is equipped with four PCI slots, three standard ISA slots, Super Multi-I/O controller and dual ports PCI-IDE connectors for the future expansion. The hardware dimension is Half **AT** form factor with four layer design technology.

1-1 Pentium® Pro Processor Overview

The Intel® Pentium® Pro Processor is the 6th generation in the Intel 386™, Intel 486™, and Pentium family of processors. The Pentium®Pro Processor has several key features such as 12-stage superpipeline architecture, Built-in 256KB/512KB cache, Out of order execution, dynamic branch prediction & speculative execution and a pipestage time 33 percent less than the Pentium® Processor, which helps achieve a higher clock rate on any given Process. It will be superpipelined for high clock speed from 150MHz up to 233MHz. The Pentium®Pro Processor was used to the Dynamic Execution that is the combination of improved branch prediction, speculative execution and data flow analysis that enables the Pentium®Pro processor to deliver its superior performance from CPU architecture.

The Pentium® Pro Processor is a 64 bit processor with RISC technology. It requires 32-bit applications (like Microsoft Windows NT and OS/2) to optimize its capabilities and performances. The Pentium®Pro processor delivers best value for businesses moving to 32-bit computing when using the 32-bit Operating System and Applications.

The motherboard provides a 387-PIN ZIF Socket 8. When install a Pentium® Pro Processor that should have a fan attached to it to prevent overheating. Without a fan, the CPU can overheat and cause damage to both the motherboard's circuit and Pentium®Pro Processor.

Note: To install a Pentium® Pro Processor, you must set the "Clock Frequency selection and CPU Internal Frequency Ration" depending on the Pentium®Pro Processor that you install. (See Page 2-2 and 2-6 Jumper Setting for CPU Installation)

1-2 Specification

- Intel 82440FX PCIset chipset.
- Intel **Pentium**[®]Pro Processor operating at **150 ~ 233 MHz** with **387 ZIF socket 8** is scalable to accept faster Processors in the future. The Pentium[®]Pro Processor is the next in the Intel386[™], Intel486[™], and Pentium[®] family of processor. The second Level Cache (L2), controller are some of the components that existed in the Pentium[®]Pro Processor.
- Onboard VRM supports full line Pentium[®]Pro CPU.(need No VRM in Header 8)
- Supports up to 768 MegaBytes DRAM(minimum of 8 MB) on board(72 Pin SIMM x 6, and BIOS auto FP DRAM, EDO and Burst EDO DRAM detection and configuration.(Refer to Chapter 2-3 System Memory Configuration)
- Supports three 16 bits ISA slots, four 32 bits PCI slots, and provides two independent high performance PCI IDE interfaces capable of supporting **PIO Mode 3 and Mode 4** devices. The **PP6-NB** supports four PCI Bus Masters and a jumperless PCI INT# control scheme which reduces configuration confusion when plugging in PCI I/O controller card(s).
- Supports **ATAPI** (e.g. **CD-ROM**) devices on both IDE interfaces.
- Supports 1 floppy port, 1 parallel port (EPP,ECP port), and 2 serial ports (16550 Fast UART compatible).
- Supports a **PS/2** style mouse and a **Standard** AT keyboard connectors.
- Supports Award Plug & Play BIOS . The BIOS is stored in Flash EPROM form. It provides better upgradeability for the system.
- Supports CPU Hardware sleep and SMM (System Management Mode).
- Supports the USB connector for the future.
- Four Layer design technology and 220mm x 280mm 2/3 AT form factor.

Chapter 2

Hardware design

2-1 Motherboard Layout

The PP6-NB is designed with Intel 82440FX PCIset chipset which is developed by INTEL Corporation to fully support Pentium®Pro Processor PCI/ISA system. The Intel 82440FX PCIset chipset provides increased integration and improved performance designs. The chipset provides an integrated IDE controller with two high performance IDE interfaces for up to four IDE devices (hard devices, CD-ROM device, etc). The SMC 37C669 Super I/O controller provides the standard PC I/O function: floppy interface, two 16 Byte FIFO serial ports and EPP/ECP capable parallel port. The **PP6-NB** layout is shown in nexts page (Figure 1-1) for user's reference. **Care must be taken** when inserting memory modules, inserting Pentium®Pro processor CPU or even plugging PCI card into associated slots to avoid damaging any circuits or sockets on board. A right fan and heatsink fan is strongly recommended when installing Pentium®Pro processor due to possible overheat.

The PP6-NB supports minimum of 8MB of System Memory and maximum of 768MB while L2 Cache and cache controller included in Pentium®Pro Processor CPU.

The PP6-NB supports standard Fast Page, EDO (Extended Data Out or Hyper Page Mode) or Burst EDO DRAM. **The PP6-NB** provides six 72-pins SIMM sites for memory expansion. The socket support 1M x 32(4MB), 2M x 32(8MB), 4M x 32(16MB), 8M x 32(32MB) 16MB x 32(64MB), and 32MB x 32(128MB) single-sided or double-sided memory modules. The memory timing requires 70 nS Fast page devices or 60 nS EDO DRAM. Memory parity generation and checking or ECC(Error Checking and Correction) are supported(DRAM Modules may be parity (x 72)or non-parity(x 64)or ECC(x 72). The BIOS will automatically detect which DRAM has installed in SIMM sites.

The PP6-NB supports **Onboard two PCI IDE** connectors, and detects IDE harddisk type by BIOS utility automatically.

The PP6-NB supports Award Plug & Play BIOS for the ISA and PCI cards. The BIOS can be located in Flash EPROM. The advantage of having Flash EPROM is much easier to replace BIOS code if necessary.

The PP6-NB's motherboard layout and system block diagram are shown in Figure 1-1, 1-2.

PP6-NB Layout

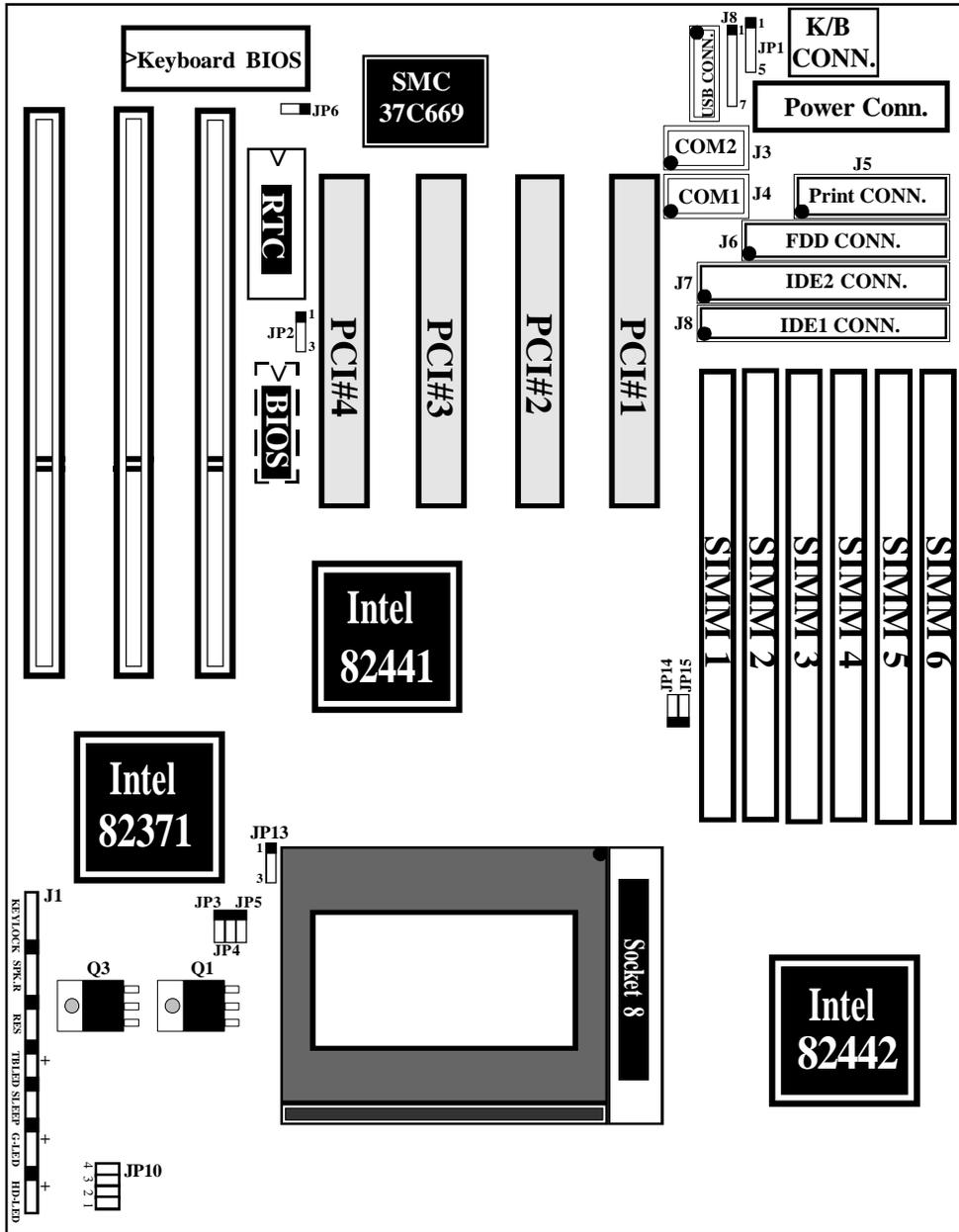


Figure 1-1

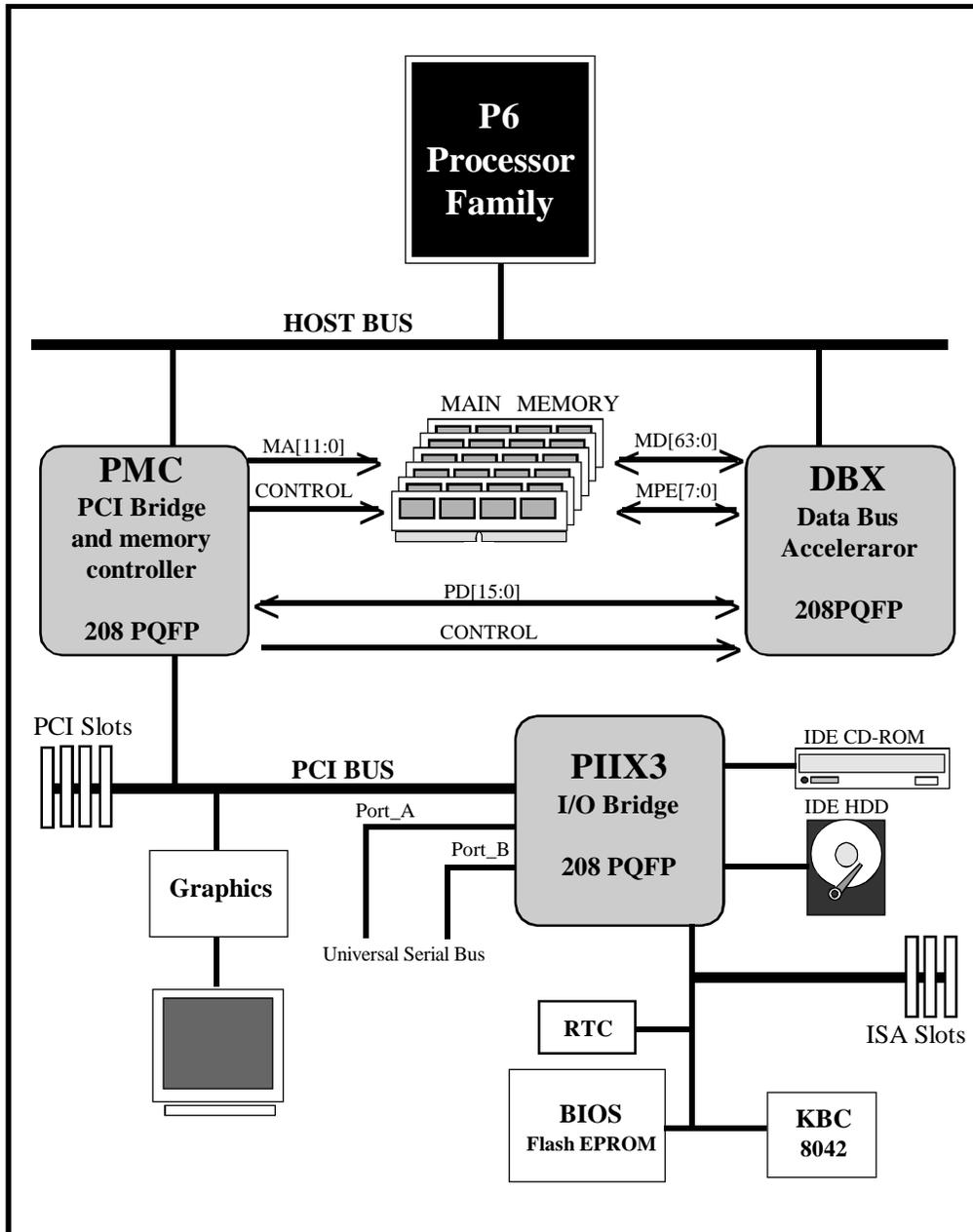


Figure 1-2 System Block Diagram

2-2 Connectors and Jumpers

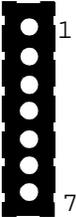
This section describes all of the connectors and jumpers equipped in the motherboard. Please refer to **Figure 1-1** for actual location of each connector and jumper. The following jumpers will be show graphically such as  to connect pin 1&2 and  to connect pins 2&3. Jumpers with two pins will be shown as  for open and  for close.

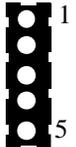
| | |
|--|--|
|  | <p>J1 KeyLock - Keyboard lock switch & Power LED connector</p> <ul style="list-style-type: none"> 1.Power LED(+) 2.N/C 3.GND 4.Keylock 5.GND <p>Speaker - connect to the system's speaker for beeping</p> <ul style="list-style-type: none"> 1.Speaker 2.N/C 3.GND 4.GND <p>Reset - Closed to restart system.</p> <p>Turbo LED indicator - LED ON when higher speed is selected</p> <p>Sleep/Resume switch : Closed to enter sleep mode A keystroke or mouse movement (mouse driver exists). The system will instantly "wake up".</p> <p>Power Saving LED indicator - LED ON when system is in any saving mode</p> <p>IDE LED indicator - LED ON when Onboard PCI IDE Harddisks activate</p> |
|--|--|

JP13  **The Power Supply (+12V) of the Pentium® Pro CPU colling fan**

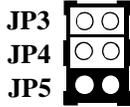
JP6  **Onboard SMC's chip select :**
Open: Normal operation.(Default)
Close: Disable the Onboard SMC chip.

JP2  **EPROM BIOS Select :**
1-2 for 12V Flash EPROM.
2-3 for 5V Flash EPROM.(Default)
Note: The JP2 setting is dependent on which EPROM type is attached.

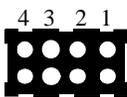
J8  **IrDA/ASK IR CONNECTOR:**
1.IRRX
2.GND
3.IRTX
4.VCC
5.Reserve
6.VCC
7.GND

JP1  **PS/2 MOUSE CONNECTOR:**
1. RED wire
2. BLUE wire
3. GREEN wire
4. NC
5. YELLOW wire

| Intel Pentium® Pro Processor Installation | | | | | | |
|---|-------|-------|-------|-------|-------|--------------------|
| CPU/Rate | JP3 | JP4 | JP5 | JP14 | JP15 | |
| 133 MHz | CLOSE | CLOSE | CLOSE | OPEN | CLOSE | 66MHz 2X |
| 150 MHz | CLOSE | CLOSE | OPEN | CLOSE | CLOSE | 50MHz 3X |
| 166 MHz | OPEN | CLOSE | CLOSE | OPEN | CLOSE | 66MHz 2.5X |
| 180 MHz | CLOSE | CLOSE | OPEN | CLOSE | OPEN | 60MHz 3X (Default) |
| 200 MHz | CLOSE | CLOSE | OPEN | OPEN | CLOSE | 66MHz 3X |
| 233 MHz | OPEN | CLOSE | OPEN | OPEN | CLOSE | 66MHz 3.5X |



JP10



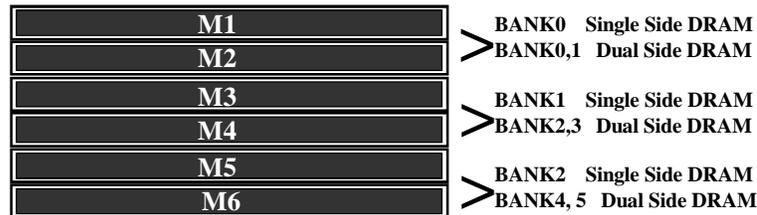
| JP10 Setting The Various Output Voltage for Pentium® processor | | | | |
|--|----------|----------|----------|----------------|
| Vout | JP10 (4) | JP10 (3) | JP10 (2) | JP10 (1) |
| Auto | OPEN | OPEN | OPEN | OPEN (Default) |
| 2.1V | OPEN | OPEN | OPEN | CLOSE |
| 2.2V | OPEN | OPEN | CLOSE | OPEN |
| 2.3V | OPEN | OPEN | CLOSE | CLOSE |
| 2.4V | OPEN | CLOSE | OPEN | OPEN |
| 2.5V | OPEN | CLOSE | OPEN | CLOSE |
| 2.6V | OPEN | CLOSE | CLOSE | OPEN |
| 2.7V | OPEN | CLOSE | CLOSE | CLOSE |
| 2.8V | CLOSE | OPEN | OPEN | OPEN |
| 2.9V | CLOSE | OPEN | OPEN | CLOSE |
| 3.0V | CLOSE | OPEN | CLOSE | OPEN |
| 3.1V | CLOSE | OPEN | CLOSE | CLOSE |
| 3.2V | CLOSE | CLOSE | OPEN | OPEN |
| 3.3V | CLOSE | CLOSE | OPEN | CLOSE |
| 3.4V | CLOSE | CLOSE | CLOSE | OPEN |
| 3.5V | CLOSE | CLOSE | CLOSE | CLOSE |

Note:

The above table indicates The Various Voltages for Pentium®Pro Processor on **PP6-NB** board. Older Pentium®Pro Processors without VID Supports so that require manual Voltage ID setting from JP10. But current Pentium®Pro Processors support VID and will automatically setting the voltage regulator so that no jumper settings are needed(JP10 is setting all open at Auto).

2-3 System Memory Configuration

The PP6-NB supports different type of settings for the system memory. There is no jumper nor connector needed for memory configuration. Following figures provides all possible memory combinations.



| M1, M2(BANK 0) | M3, M4(BANK 1) | M5, M6(BANK 2) | Total Size |
|----------------|----------------|----------------|------------|
| 4MB, 4MB | Empty | Empty | 8MB |
| 4MB, 4MB | 4MB, 4MB | Empty | 16MB |
| 4MB, 4MB | 4MB, 4MB | 4MB, 4MB | 24MB |
| 4MB, 4MB | 8MB, 8MB | Empty | 24MB |
| 4MB, 4MB | 4MB, 4MB | 8MB, 8MB | 32MB |
| 4MB, 4MB | 8MB, 8MB | 8MB, 8MB | 40MB |
| 4MB, 4MB | 16MB, 16MB | Empty | 40MB |
| 4MB, 4MB | 8MB, 8MB | 16MB, 16MB | 56MB |
| 4MB, 4MB | 16MB, 16MB | 16MB, 16MB | 72MB |
| 4MB, 4MB | 32MB, 32MB | Empty | 72MB |
| 4MB, 4MB | 16MB, 16MB | 32MB, 32MB | 104MB |
| 4MB, 4MB | 32MB, 32MB | 32MB, 32MB | 136MB |
| 4MB, 4MB | 64MB, 64MB | Empty | 136MB |
| 8MB, 8MB | Empty | Empty | 16MB |
| 8MB, 8MB | 8MB, 8MB | Empty | 32MB |
| 8MB, 8MB | 8MB, 8MB | 8MB, 8MB | 48MB |
| 8MB, 8MB | 16MB, 16MB | Empty | 48MB |
| 8MB, 8MB | 16MB, 16MB | 16MB, 16MB | 80MB |
| 8MB, 8MB | 16MB, 16MB | 32MB, 32MB | 112MB |
| 8MB, 8MB | 32MB, 32MB | Empty | 80MB |
| 8MB, 8MB | 32MB, 32MB | 32MB, 32MB | 144MB |
| 16MB, 16MB | Empty | Empty | 32MB |

| M1, M2(BANK 0) | M3, M4(BANK 1) | M5, M6(BANK 2) | Total Size |
|-----------------------|-----------------------|-----------------------|-------------------|
| 16MB, 16MB | 16MB, 16MB | Empty | 64MB |
| 16MB, 16MB | 16MB, 16MB | 16MB, 16MB | 96MB |
| 16MB, 16MB | 32MB, 32MB | Empty | 96MB |
| 16MB, 16MB | 32MB, 32MB | 32MB, 32MB | 160MB |
| 32MB, 32MB | Empty | Empty | 64MB |
| 32MB, 32MB | 32MB, 32MB | Empty | 128MB |
| 32MB, 32MB | 32MB, 32MB | 32MB, 32MB | 192MB |
| 32MB, 32MB | 64MB, 64MB | Empty | 192MB |
| 32MB, 32MB | 64MB, 64MB | 64MB, 64MB | 320MB |
| 64MB, 64MB | 64MB, 64MB | Empty | 256MB |
| 64MB, 64MB | 64MB, 64MB | 64MB, 64MB | 384MB |
| 128MB, 128MB | 128MB, 128MB | 128MB, 128MB | 768MB |

NOTE :

1. PP6-NB supports and extends many memory configurations on its 6 SIMM sites. The memory size of any configuration can be combined flexibly. The above table only lists the basic memory configurations for reference. There are still many configurations not yet listed on the above three banks. You can combine any configuration as you like. BIOS will detect your memory configurations and sizes automatically.
2. PP6-NB support Fast Page DRAM, EDO or BEDO (Burst EDD) DRAM SIMMs, but they cannot be mixed within the same memory bank.
3. SIMMs may be parity (x 72) or non parity (x 64) or ECC(x 72).
4. The 70nS Fast Page Mode or 60nS EDO/BEDO DRAM is necessary.
5. "BANK" = 64 Bit = M1, M2 = M3, M4 = M5, M6
6. To install the SIMM memory modules, press the memory module firmly into place starting from a 45 degree angle making sure that all the Contacts are aligned with the SIMM slot,.

2-4 Integrated PCI Bridge

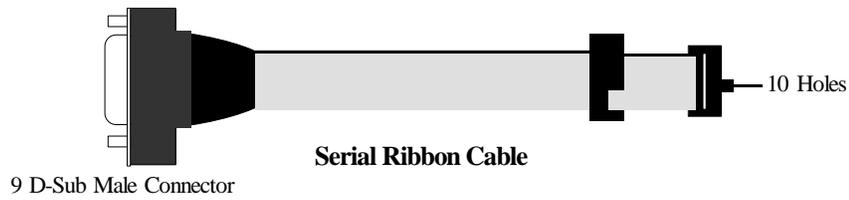
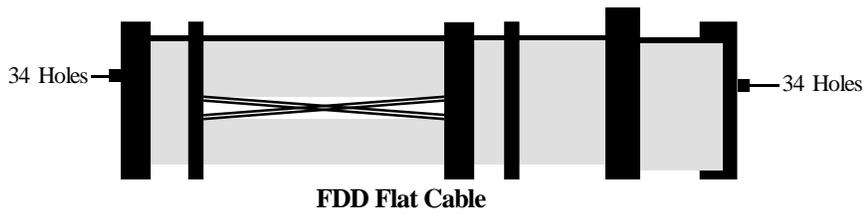
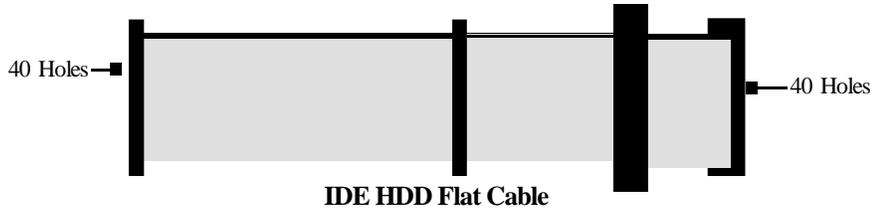
The **PP6-NB** utilizes **Intel's 440FX PCIset** chipset to support Pentium® Pro Processor PCI/ISA system. The Intel 82440FX PCIset chipset consists of the 82441FX PCI and Memory Controller (PMC), 82442FX Data Bus Accelerator (DBX) devices, and one 82371SB PCI ISA/IDE Accelerator (PIIX3) bridge chip. It provides an interface which translates CPU cycle into PCI bus cycle, and PCI burst read/write capability. In addition, it provides high performance PCI arbitor to support four PCI Masters, Rotating Priority Mechanism, Hidden Arbitration Scheme Minimizes Arbitration Overhead, and PCI Rev.2.1 compliant. The PMC provides bus control signals and address paths for transfers between the host bus, PCI bus, and main memory. The DBX is used to create the 64-bit CPU to main memory data path and DBX also interfaces to the 16-bit Private data bus for PCI transactions and providing optimal CPU-to-DRAM performance.(reference Figure 1-2 simple architecture)

There are four interrupts in each PCI slot : INTA#, INTB#, INTC#, and INTD#. Since the **PP6-NB** adapts the PCI auto-configuration with the system BIOS Setup utility. When the system is turned on after adding a PCI add-in card, the BIOS automatically configure interrupts, DMA channels, I/O space, and other paramaters. You do not have to configure jumpers or worry potential resource conflicts. Because PCI cards use the same interrupt resource as ISA cards, you must specify the interrupt used by ISA add-in cards in the BIOS Setup utility.

If however, a "Legacy card" (such as plug paddle card and cable into the ISA slot.) is plugged in the system, modification in the **ROM SETUP UTILITY** becomes necessary. First, enter **PCI CONFIGURATION SETUP** utility from **ROM SETUP UTILITY** main menu to set the "**PCI IDE IRQ MAP TO : ISA**". Secondly, you must enter **CHIPSET FEATURES SETUP UTILITY** from **ROM SETUP UTILITY** main menu and set the "**Onboard Primary PCI IDE: Disabled** and **Onboard Secondary PCI IDE: Disabled.**" When you plugg the PCI/ISA IDE card into the system, You should **Disabled Onboard Primary and Secondary PCI IDE** from **CHIPSET FEATURES SETUP UTILITY** too.

Some "Legacy card" (no paddle card and cable.) you can set the system interrupt request (IRQ) on the "Legacy card" (refer to user's manual of the card) to a proper system IRQ level (in general, card's Primary assigned to INTA and Secondary assigned to INTB). If the card is plugged into slot 1(marked PCI#1), you can not use second slot (marked PCI#2) because the Secondary INT signal takes INTB from the slot (refer to Page 3-12 for circuit diagram). The user then enter **PCI CONFIGURATION SETUP** utility from **ROM SETUP UTILITY** main menu and set the "**PCI IDE IRQ MAP TO : PCI-Slot 1**" (depend on the slot # where the Legacy card is plugged).

2-5 I/O Connector Cables



CHAPTER 3

AWARD BIOS SETUP

Award's ROM BIOS provides a built-in Setup program which allows user to modify the basic system configuration and hardware parameters. The modified data will be stored in a battery-backed CMOS RAM so data will be retained even when the power is turned off. In general, the information saved in the CMOS RAM stay unchanged unless there is configuration change in the system, such as hard drive replacement or new equipment change.

It is possible that CMOS had a battery failure which cause data lose in CMOS_RAM. If so, re_enter system configuration parameters become necessary.

To enter Setup Program

Power on the computer and press key immediately will bring you into BIOS CMOS SETUP UTILITY.

| ROM PCI/ISA BIOS CMOS SETUP UTILITY AWARD SOFTWARE, INC. | |
|--|--------------------------|
| STANDARD CMOS SETUP | SUPERVISOR PASSWORD |
| BIOS FEATURES SETUP | USER PASSWORD |
| CHIPSET FEATURES SETUP | IDE HDD AUTO DETECTION |
| POWER MANAGEMENT SETUP | HDD LOW LEVEL FORMAT |
| PNP/PCI CONFIGURATION | SAVE & EXIT SETUP |
| INTEGRATED PERIPHERALS | EXIT WITHOUT SAVING |
| LOAD SETUP DEFAULTS | |
| ESC : QUIT | ↑ ↓ → ← : SELECT ITEM |
| F10 : Save & Exit Setup | (Shift)F2 : Change Color |
| Time, Date, Hard Disk Type... | |

Figure 3-1 CMOS SETUP UTILITY

The menu displays all the major selection items and allow user to select any one of shown item. The selection is made by moving cursor (press any direction key) to the item and press 'Enter' key. An on_line help message is displayed at the bottom of the screen as cursor is moving to various items which provides user better understanding of each function. When a selection is made, the menu of selected item will appear so the user can modify associated configuration parameters.

3 - 2 CHAPTER 3

3-1 STANDARD CMOS SETUP

Choose "STANDARD CMOS SETUP" in the **CMOS SETUP UTILITY** Menu (Fig.3-1). The **STANDARD CMOS SETUP** allows user to configure system setting such as current date and time, type of hard disk drive installed in the system, floppy drive type, and the type of display monitor. Memory size is auto_detected by the BIOS and displayed for your reference. When a field is highlighted (direction keys to move cursor and <Enter> key to select), the entries in the field will be changed by pressing <PgDn> or <PgUp> keys or user can enter new data directly from the keyboard.

| ROM PCI/ISA BIOS STANDARD CMOS SETUP AWARD SOFTWARE, INC. | | | | | | | | | |
|---|--------|---------------------------|------|-------------------------|---------|----------|---------|------|------|
| Date (mm:dd:yy) : Wed, Apr 17 1996 | | | | | | | | | |
| Time (hh:mm:ss) : 14 : 30 : 50 | | | | | | | | | |
| HARD DISKS | TYPE | SIZE | CYLS | HEAD | PRECOMP | LANDZONE | SECTORS | MODE | |
| Primary Master | : Auto | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Auto |
| Primary Slave | : Auto | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Auto |
| Secondary Master | : Auto | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Auto |
| Secondary Slave | : Auto | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Auto |
| Drive A : 1.44M,3.5 in. | | | | | | | | | |
| Drive B : None | | | | | | | | | |
| Video : EGA/VGA | | | | | | | | | |
| Halt On : All Errors | | | | | | | | | |
| | | | | Base Memory : 640K | | | | | |
| | | | | Extended Memory : 5360K | | | | | |
| | | | | Other Memory : 384K | | | | | |
| | | | | Total Memory : 16384K | | | | | |
| ESC : Quit | | ↑ ↓ → ← : Select Item | | PU/PD/+/- : Modify | | | | | |
| F1 : Help | | (Shift) F2 : Change Color | | | | | | | |

Figure 3-2 STANDARD CMOS SETUP

NOTE: If hard disk Primary Master/Slave and Secondary Master/Slave were used Auto, then the hard disk size and model will be auto-detected on display during POST.

NOTE: The "Halt On :" field is to determine when to halt the system by the BIOS if error occurs during POST.

3-2 BIOS FEATURES SETUP

Selecting the "**BIOS FEATURES SETUP**" option in the **CMOS SETUP UTILITY** menu allows user to change system related parameters in the displayed menu. This menu shows all of the manufacturer's default values of PP6-NB. Again, user can move the cursor by pressing direction keys and <PgDn> or <PgUp> keys to modify the parameters. Pressing [F1] key to display help message of the selected item.

This setup program also provides 2 convenient ways to load the default parameter data from BIOS[F6] or CMOS[F7] area if shown data is corrupted. This provides the system a capability to recover from any possible error.

| ROM PCI/ISA BIOS BIOS FEATURES SETUP AWARD SOFTWARE, INC. | | | |
|---|------------|--------------------------|-----------------------|
| Virus Warning | : Disabled | Video BIOS | Shadow : Enabled |
| CPU Internal Cache | : Enabled | C8000-CBFFF | Shadow : Disabled |
| External Cache | : Enabled | CC000-CFFFF | Shadow : Disabled |
| Quick Power On Self Test | : Enabled | D0000-D3FFF | Shadow : Disabled |
| Boot Sequence | : A,C | D4000-D7FFF | Shadow : Disabled |
| Swap Floppy Drive | : Disabled | D8000-DBFFF | Shadow : Disabled |
| Boot Up Floppy Seek | : Enabled | DC000-DFFFF | Shadow : Disabled |
| Boot Up NumLock Status | : On | | |
| Boot UP System Speed | : High | | |
| Gate A20 option | : Fast | | |
| Typematic Rate Setting | : Disabled | | |
| Typematic Rate (Chars/Sec) | : 6 | | |
| Typematic Delay (Msec) | : 250 | | |
| Security Option | : Setup | Esc : Quit | ↑ ↓ → ← : Select Item |
| PCI/VGA Palette Snoop | : Enabled | F1 : Help | PU/PD/+/- : Modify |
| OS Select For DRAM > 64MB | : Non-OS2 | F5 : Old Values | (Shift)F2 : Color |
| | | F6 : Load Bios Defaults | |
| | | F7 : Load Setup Defaults | |

Figure 3-3 BIOS FEATURES SETUP

Note: The **Security Option** contains "setup" and "system". The "setup" indicates that the password setting is for CMOS only while the "system" indicates the password setting is for both CMOS and system boot up procedure.

- Virus Warning:** This category flashes on the screen. During and after 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 the following error message will appear, in the mean time, you can run an anti-virus program to locate the problem. Default value is Disabled

Enabled : Activates automatically when the system boots up causing a warning message to appear when anything attempts to access the boot sector or hard disk partition table.

Disabled: No warning message to appear when anything attempts to access the boot sector or hard disk partition table.
- CPU Internal Cache / External Cache:** These two categories speed up memory access. However, it depends on CPU/chipset design. The Pentium Pro Processor has including Internal/External cache. The default value is Enable. If your Pentium Pro Processor CPU is without External Cache then this item " External Cache" will not be shown.

Enabled: Enable cache.

Disable : Disable cache.

3 - 4 CHAPTER 3

- **Quick Power On Self Test:** This category speeds up Power On Self Test (POST) after you power on the computer. If it is set to Enable, BIOS will shorten or skip some check items during POST.
Enabled : Enable quick POST.
Disabled: Normal POST.
- **Boot Sequence:** This category determines which drive computer searches first for the DOS(Disk Operating System). Default value is A,C.
A,C :System will first search for floppy disk drive then hard disk drive.
C,A :System will first search for hard disk drive then floppy disk drive.
CDROM,C,A:System will first search for the CDROM driver (If the CDROM has a bootable CD title.) and second search hard disk driver then floppy disk driver.
C,CDROM,A:System will first search for the hard disk driver and second search the CDROM driver (If the CDROM has a bootable CD title.) then floppy disk driver.
- **Swap Floppy Drive:** The swap floppy drive. Default value is Disabled.
Enabled : Floppy A & B will be swapped under the DOS.
Disabled: Floppy A & B will be not swap.
- **Boot Up Floppy Seek:** During POST,BIOS will determine if the floppy disk drive installed is 40 or 80 tracks. 360K type is 40 tracks while 760K, 1.2M and 1.44M are all 80 tracks. The default value is Enabled.
Enabled : BIOS searches for floppy disk drive to determine if it is 40 or 80 tracks, Note that BIOS can not tell from 720K, 1.2M or 1.44M drive type as they are all 80 tracks.
Disabled: BIOS will not search for the type of floppy disk drive by track number. Note that there will not be any warning message if the drive installed is 360K.
- **Boot Up NumLock Status:** The default value is On.
On : Keypad is number keys.
Off : Keypad is arrow keys.
- **Boot UP System Speed:** It selects the default system speed, that the system will run at immediately after system boot.
High: Set the speed to high.
Low : Set the speed to low.
- **Gate A20 Option:** The default value is Fast.
Normal: The A20 signal is controlled by keyboard controller or chipset hardware.
Fast : Default : Fast.The A20 signal is controlled by Port 92 or chipset specific method.

- **Typematic Rate Setting:** This determines the typematic rate.
Enabled : Enable typematic rate and typematic delay programming.
Disabled: Disable typematic rate and typematic delay programming. The system BIOS will use default value of this 2 items and the default is controlled by keyboard.

- **Typematic Rate(Chars/Sec):**

| | |
|-------------------------------|-------------------------------|
| 6 : 6 characters per second. | 8 : 8 characters per second. |
| 10: 10 characters per second. | 12: 12 characters per second. |
| 15: 15 characters per second. | 20: 20 characters per second. |
| 24: 24 characters per second. | 30: 30 characters per second. |

- **Typematic Delay(Msec):** When holding a key, the time between the first and second character displayed.
 250 : 250msec.
 500 : 500 msec.
 750 : 750 msec.
 1000: 1000 msec.

- **Security Option:** This category allows you to limit access to the system and Setup, or just to Setup. The default value is Setup.
System: The system will not boot and access to Setup will be denied if the correct password is not entered at the prompt.
Setup : The system will boot; but access to Setup will be denied if the incorrect password is not entered at the prompt.

- **PCI/VGA Palette Snoop:** This filed controls the ability of a primary PCI VGA controller to share a common palette(When a snoop write cycles) with an ISA video card. The default value is Disabled.
Enabled: If an ISA card connects to a PCI VGA card via the VESA connector and that ISA card connects to VGA monitor and that ISA card uses the RAMDAC of PCI card.
Disabled: Disable the VGA card Palette snoop function.

- **Video BIOS Shadow:** It determines whether video BIOS will be copied to RAM, however; it is optional from chipset design. Video Shadow will increase the video speed.
Enabled : Video shadow is enabled.
Disabled: Video shadow is disabled.

3 - 6 CHAPTER 3

- **C8000 - CBFFF Shadow :**
- **CC000 - CFFFF Shadow:**
- **D0000 - D3FFF Shadow:**
- **D4000 - D7FFF Shadow:**
- **D8000 - DBFFF Shadow:**
- **DC000 - DFFFF Shadow:**

These categories determine whether optional ROM will be copied to RAM by 16K byte or 32K byte per/unit and the size depends on chipset.

Enabled : Optional shadow is enabled.

Disabled: Optional shadow is disabled.

3-3 CHIPSET FEATURES SETUP

Choose the "CHIPSET FEATURES SETUP" in the CMOS SETUP UTILITY menu to display following menu.

| ROM PCI/ISA BIOS CHIPSET FEATURES SETUP AWARD SOFTWARE, INC. | | | |
|--|------------|--------------------------|-----------------------|
| Auto Configuration | : Enabled | 8 Bit I/O Recovery Time | : 1 |
| DRAM Speed Selection | : 60ns | 16 Bit I/O Recovery Time | : 1 |
| DRAM RAS# Precharge Time | : 4 | Memory Hole AT 15M-16M | : Disabled |
| MA Additional Wait state | : Disabled | DRAM Fast Leadoff | : Disabled |
| RAS# To Cas# Delay | : Enabled | | |
| DAM Read Burst (B/E/F) | : 2/2/3 | | |
| DRAM Write Burst (B/E/F) | : 2/2/3 | | |
| ISA Bus Clock | : PCICLK/4 | | |
| DRAM Refresh Queue | : Enabled | | |
| DRAM RAS Only Refresh | : Disabled | | |
| ECC Checking / Generation | : Disabled | | |
| Fast Dram Refresh | : Disabled | | |
| Read-Around-Write | : Enabled | | |
| PCI Burst Write Combine | : Disabled | | |
| PCI-To-DRAM Pipeline | : Enabled | Esc : Quit | ↑ ↓ → ← : Select Item |
| CPU-To-PCI Write Post | : Enabled | F1 : Help | PU/PD/+/- : Modify |
| CPU-To-PCI IDE Posting | : Enabled | F5 : Old Values | (Shift)F2 : Color |
| System BIOS Cacheable | : Disabled | F6 : Load Bios Defaults | |
| Video RAM Cacheable | : Disabled | F7 : Load Setup Defaults | |

Figure 3-4 CHIPSET FEATURES SETUP

- **Auto Configuration:** This Category allows you to set the DRAM timing. The default value is Enabled. When disabled this field. You can select the different DRAM's timing that supports by chipset below item.

Note:When you insert slower memory modules in the system and set a faster timing. Maybe the system will hang up.

- **DRAM Speed Selection:** The default value is 60ns.
60ns : 2 (faster) Burst Wait State, for 60~70ns FPM/EDO/BEDO DRAM.
70ns : 3 (slower) Burst Wait State, for 70ns Fast Page Mode/EDO/BEDO DRAM.
- **DRAM RAS# Precharge Time:** The default value is 4.
3 : This field define the DRAM RAS Precharge Time that are 3 host clocks.
4 : This field define the DRAM RAS Precharge Time that are 4 host clocks.
- **MA Additional Wait State:** The default value is Disabled.
Enabled : Add one additional wait state is inserted before the assertion of the first MAxx and CASx#/RASx# assertion during DRAM read or write leadoff cycles.
Disabled : Doesn't add one extra wait state for MAxx and CASx#/RASx#.
- **RAS# to CAS# Delay:** The default value is Enabled.
Enabled : Add one clock between the assertion of RAS# and CAS#.
Disabled : Doesn't delay one clock between the assertion of RAS# and CAS#.
- **DRAM Read/Write Burst (B/E/F):** The default value is x 2/2/3.
This field indicats the BEDO/EDO/FPM(B/E/F) DRAM they are meet the system at Read/Write burst mode. The value x 2/2/3 is stand for BEDO(x222), EDO(x222)or FPM(x333) respectively DRAM timing.
- **ISA Bus Clock:** The default value is PCICLK/4.
PCICLK/4 : The system is operating at 60/66MHz, than PCICLK is 30/33MHz.
PCICLK/3 : The system is operating at 50MHz, than PCICLK is 25MHz.
- **DRAM RAS Only Refresh:** The default value is Disabled.
Enabled : The DRAM Refresh type is RAS only.
Disabled : The DRAM Refresh type is CAS-before-RAS.
- **ECC Checking/Generation:** The default value is Disabled.
Enabled : This field is enabled the optional DRAM Error Checking and Crrection(ECC) with 72-bit Wide memory.
Disabled : Disabled the ECC function.
- **Video BIOS Cacheable:** The default value is Disabled.
Enabled : This field Enabled the Video BIOS Cacheable to speed up the VGA Performance.
Disabled: Disabled the Video BIOS Cacheable function.
- **8/16 Bit I/O Recovery Time:** The default value is 1.
8 Bit I/O Recovery Time: This field defines the recovery time from 1 to 8 for 8-bit I/O.
16 Bit I/O Recovery Time: To define the recovery time from 1 to 4 for 16-bit I/O.
- **Memory Hole at 15M-16M:** The default value is Disabled.
Disabled: Normal Setting.
Enabled : This field enables the main memory (15~16MB) remap to ISA BUS.

3-4 POWER MANAGEMENT SETUP

Choose the "POWER MANAGEMENT SETUP" in the CMOS SETUP UTILITY to display the following screen. This menu allows user to modify the power management parameters and IRQ signals. In general, these parameters should not be changed unless it's absolutely necessary.

| ROM PCI/ISA BIOS POWER MANAGEMENT SETUP AWARD SOFTWARE, INC. | | |
|--|------------------|--|
| Power Management | : User Define | ** Power Down & Resume Events ** |
| PM Control by APM | : Yes | IRQ3 (COM 2) : ON |
| Video off Method | : V/H SYNC+Blank | IRQ4 (COM 1) : ON |
| Doze Mode | : Disable | IRQ5 (LPT 2) : ON |
| Standby Mode | : Disabled | IRQ6 (Floppy Disk) : ON |
| Suspend Mode | : Disabled | IRQ7 (LPT 1) : OFF |
| HDD Power Down | : 15min | IRQ8 (RTC Alarm) : OFF |
| ** Wake Up Events In Doze & Standby ** | | IRQ9 (IRQ2 Redir) : ON |
| IRQ3 (Wake-Up Event) | : ON | IRQ10 (Reserved) : ON |
| IRQ4 (Wake-Up Event) | : ON | IRQ11 (Reserved) : ON |
| IRQ8 (Wake-Up Event) | : ON | IRQ12 (PS/2 Mouse) : ON |
| IRQ12 (Wake-Up Event) | : ON | IRQ13 (Coprocesor) : ON |
| | | IRQ14 (Hard Disk) : ON |
| | | IRQ15 (Reserved0) : ON |
| | | Esc : Quit ↑ ↓ ← → : Select Item |
| | | F1 : Help PU/PD/+/- : Modify |
| | | F5 : Old Values (Shift)F2 : Color |
| | | F6 : Load Bios Defaults |
| | | F7 : Load Setup Defaults |

Figure 3-5 POWER MANAGEMENT SETUP

Again, user can move the cursor by pressing direction keys to the field needed to be modified and press <PgDn> or <PgUp> to alter item selection. You can only change the content of **Doze Mode**, **Standby Mode**, and **Suspend Mode** when the **Power Management** is set to 'User Define'.

3-4-1 The Description of the Power Management

A. Power Management mode selection :

Disabled : The system operates in NORMAL conditions (Non-GREEN), and and the Power Management function is disabled.

Max.saving: This mode will maximize the power saving capability.

Min.saving: This mode will minimize the power saving capability.

User define: Allow user to define timeout parameters to control power saving timing. Refer to item B shown below.

B. Timeout parameters :**HDD Standby**

HDD Standby timer can be set from 1 to 15 minute(s).

System Doze

The "System Doze" mode timer starts to count when there is no "PM events" occurred. The valid timeout setting is from 1 minute up to 1 hour.

System Standby

The "Standby" mode timer starts to count when "System Doze" mode timer timed out and no "PM events" occurred. Valid range is from 1 minute up to 1 hour.

System Suspend

This function works only when the Pentium®Pro Processor is installed. The timer starts to count when "System Standby" mode timer is timed out and no "PM Events" occurred. Valid range is from 1 minute up to 1 hour.

3-4-2 Description of the Green Functions

The PP6-NB supports HDD Power Down, Doze and standby power saving functions when Intel Pentium®Processor is installed. In addition, the suspend function is supported when the **J5** (sleep ref. Figure1-1) be close to enter the green function. The detail description of these functions are provided in next page.

HDD Standby Mode

When system stop reading or writing HDD, the timer starts to count. The system will cut off the HDD power when timer runs out of time. The system will not resume operation until either a read from or a write to HDD command is executed again.

Doze Mode

The system hardware will drop down CPU clock from normal working speed when Doze mode timeout occurs.

Standby Mode

When the system standby mode timer runs out, it will enter the standby mode and retain CPU at slow working speed. The screen will be blanked out.

Suspend Mode

When the system suspend timer times out, the system will enter the suspend mode and the chipset will stop CPU clock immediately. The power consumption in Suspend Mode is lower than in standby mode. The screen is also blanked out.

3 - 10 CHAPTER 3

PM Events:

AWARD BIOS defines 15 PM Events in the power management mode (Doze, standby & suspend). The user can initialize any PM Events to be "Enable" or "Disable". When the system detects all of the enabled events do not have any activity, it will start the system Doze timer first if the "Power Management" isn't "Disabled". Once the system Doze timer is timed out, it will process doze power saving procedure by starting the system standby timer. When the standby timer ran out and all of the "Enabled" events remains silent, the system will enter the standby mode. By now, the system will not only process the standby power saving procedures but also start the system suspend timer. When the suspend timer times out, all of the CPU clock will be stopped by dropping system clock down to zero and remains this way until any one of the "Enabled" event occurs.

3-5 PNP/PCI CONFIGURATION

The PNP/PCI configuration program is for the user to modify the PCI/ISA IRQ signals when various PCI/ISA cards are inserted in the PCI or ISA slots.

WARNING : Any misplacing IRQ could cause system can't pick out the rescouces.

| ROM PCI/ISA BIOS PNP/PCI CONFIGURATION AWARD SOFTWARE, INC. | | | |
|---|---------------|--------------------------|-----------------------|
| Resources Controlled By | : Manual | PCI IRQ Activated By | : Level |
| Reset Configuration Data | : Disabled | PCI IDE IRQ Map To | : PCI-AUTO |
| | | Primary IDE INT# | : A |
| | | Secondary IDE INT# | : B |
| IRQ-3 assigned to | : Legacy ISA | | |
| IRQ-4 assigned to | : Legacy ISA | | |
| IRQ-5 assigned to | : PCI/ISA PnP | | |
| IRQ-7 assigned to | : PCI/ISA PnP | | |
| IRQ-9 assigned to | : PCI/ISA PnP | | |
| IRQ-10 assigned to | : PCI/ISA PnP | | |
| IRQ-11 assigned to | : PCI/ISA PnP | | |
| IRQ-12 assigned to | : PCI/ISA PnP | | |
| IRQ-14 assigned to | : PCI/ISA PnP | | |
| IRQ-15 assigned to | : PCI/ISA PnP | | |
| DMA-0 assigned to | : PCI/ISA PnP | | |
| DMA-1 assigned to | : PCI/ISA PnP | | |
| DMA-3 assigned to | : PCI/ISA PnP | | |
| DMA-5 assigned to | : PCI/ISA PnP | | |
| DMA-6 assigned to | : PCI/ISA PnP | | |
| DMA-7 assigned to | : PCI/ISA PnP | | |
| | | Esc : Quit | ↑ ↓ → ← : Select Item |
| | | F1 : Help | PU/PD/+/- : Modify |
| | | F5 : Old Values | (Shift)F2 : Color |
| | | F6 : Load Bios Defaults | |
| | | F7 : Load Setup Defaults | |

Figure 3-6 PCI CONFIGURATION SETUP

- Resource Controlled By:** The default value is Manual.
Manual: The field defines that the PNP Card's resource is controlled by manual. You can set which IRQ-X and DMA-X assigned to PCI/ISA PNP or Legacy ISA Cards.
Auto: If your ISA card and PCI card are all PNP cards. To set this field Auto. The BIOS will be assigned the interrupt resource automatically.
- Reset Configuration Data:** The default value is Disabled
Disabled: Normal Setting
Enabled: If you had plugged some Legacy cards in the system and there were record into ESCD(Extended System Configuration Data). You can set this field to Enabled and to clear ESCD one time. When some Legacy cards were removed.
- PCI IDE IRQ Map To:** The default value is PCI-AUTO
 When you have true PCI card(s) plugged into the system, you will not need to change any thing here in the **SETUP** program. However, if you do not know whether you have true PCI card or not, please refer to your PCI card user's manual for the details.

When you have a Legacy card (described in section 2-4) to be plugged into the system, a proper setting is extremely important or it may cause the system hang up. The diagram shown below tells you how the Rotating Priority Mechanism is designed.

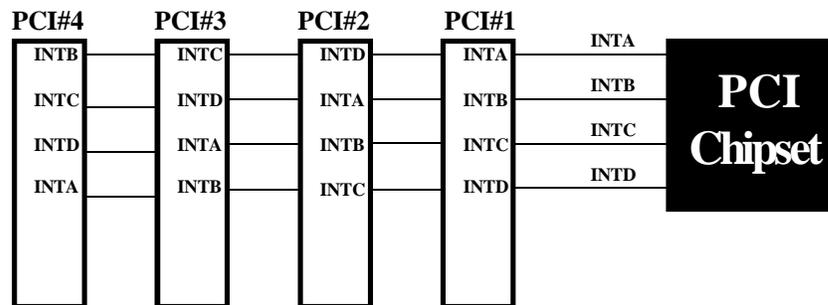


Figure 3-7 The Combination of PCI INT# lines

3-6 INTEGRATED PERIPHERALS

| ROM PCI/ISA BIOS INTEGRATED PERIPHERALS WARD SOFTWARE, INC. | | |
|---|------------|---------------------------|
| IDE HDD Block Mode | : Enabled | USB Controller : Disabled |
| IDE Primary Master PIO | : Auto | |
| IDE Primary Slave PIO | : Auto | |
| IDE Secondary Master PIO | : Auto | |
| IDE Secondary Slave PIO | : Auto | |
| On-Chip Primary PCI IDE | : Enabled | |
| On-Chip Secondary PCI IDE | : Enabled | |
| PCI Slot IDE 2nd Channel | : Enabled | |
| Onboard FDC Controller | : Enabled | |
| Onboard UART 1 | : 3F8/IRQ4 | |
| Onboard UART 2 | : 2F8/IRQ3 | |
| Onboard UART 2 Mode | : Standard | |
| Onboard Parallel Port | : 378/IRQ7 | Esc : Quit |
| Parallel Port Mode | : ECP+EPP | F1 : Help |
| ECP Mode Use DMA | : 3 | F5 : Old Values |
| Parallel Port EPP Type | : EPP1.9 | F6 : Load Bios Defaults |
| | | F7 : Load Setup Defaults |

↑ ↓ ← → : Select Item
 PU/PD/+/- : Modify
 (Shift)F2 : Color

Note: If you don't use the Onboard IDE connector, than use On-card (PCI or ISA card) IDE connector. You will set Onboard Primary PCI IDE: Disabled and Onboard Secondary PCI IDE: Disabled from CHIPSET FEATURES SETUP UTILITY. The Onboard PCI IDE cable should be equal to or less than 18 inches (45 cm.).

- **IDE HDD Block Mode:** The default value is Enabled.
Enabled : Enabled IDE HDD Block Mode. The HDD transfer rate is better than Disable.
Disabled: Disable IDE HDD Block Mode.
- **PCI Slot IDE 2nd Channel:** The default value is Enabled.
Enabled : Enable secondary IDE port and BIOS will assign IRQ15 for this port.
Disabled : Disable secondary IDE port and IRQ15 is available for other device.
- **Onboard Primary PCI IDE:** The default value is Enabled.
Enabled : Enable Onboard 1st channel IDE port.
Disabled : Disable Onboard 1st channel IDE port. When use On-card (PCI or ISA card) IDE connector.
- **Onboard Secondary PCI IDE:** The default value is Enabled.
Enabled : Enable Onboard 2nd channel IDE port.
Disabled : Disable Onboard 2nd channel IDE port When use On-card (PCI or ISA card) IDE connector.

- **IDE Primary Master PIO:** The default value is Auto.
 - Auto* : BIOS will automatically detect the Onboard Primary Master PCI IDE HDD Accessing mode.
 - Mode0~4* : Manually set the IDE Accessing mode.

- **IDE Primary Slave PIO:** The default value is Auto.
 - Auto* : BIOS will automatically detect the Onboard Primary Slave PCI IDE HDD Accessing mode.
 - Mode0~4* : Manually set the IDE Accessing mode.

- **IDE Secondary Master PIO:** The default value is Auto.
 - Auto* : BIOS will automatically detect the Onboard Secondary Master PCI IDE HDD Accessing mode.
 - Mode0~4* : Manually set the IDE Accessing mode.

- **IDE Secondary Slave PIO:** The default value is Auto.
 - Auto* : BIOS will automatically detect the Onboard Secondary Slave PCI IDE HDD Accessing mode.
 - Mode0~4* : Manually set the IDE Accessing mode.

- **Onboard FDC Controller:** The default value is Enabled.
 - Enabled* : Enable the Onboard SMC CHIP's floppy drive interface controller.
 - Disabled* : Disable the Onboard SMC CHIP's floppy drive interface controller. When use On-card ISA FDC's controller.

- **Onboard UART 1:** This field allows the user to select the serial port. The default value is 3F8H/IRQ4.
 - COM1:* Enable Onboard Serial port 1 and address is 3F8H/IRQ4.
 - COM2:* Enable Onboard Serial port 1 and address is 2F8H/IRQ3.
 - COM3:* Enable Onboard Serial port 1 and address is 3E8H/IRQ4.
 - COM4:* Enable Onboard Serial port 1 and address is 2E8H/IRQ3.
 - Disabled:* Disable Onboard SMC CHIP's Serial port 1.

- **Onboard UART 2:** This field allows the user to select the serial port. The default value is 2F8H/IRQ3.
 - COM1:* Enable Onboard Serial port 2 and address is 3F8H/IRQ4.
 - COM2:* Enable Onboard Serial port 2 and address is 2F8H/IRQ3.
 - COM3:* Enable Onboard Serial port 2 and address is 3E8H/IRQ4.
 - COM4:* Enable Onboard Serial port 2 and address is 2E8H/IRQ3.
 - Disabled:* Disable Onboard SMC CHIP's Serial port 2.

3 - 14 CHAPTER 3

- **Onboard UART 2 Mode:**The default value is standard. This field allows the User to select the COM2 port that can support a serial Infrared Interface.
standard:Support a Serial Infrared Interface IrDA.
HPSIR:Support a HP Serial Infrared Interface formats.
ASKIR:Support a Sharp Serial Infrared Interface formats.
- **Onboard Parallel port:** This field allows the user to select the LPT port. The default value is 378H/IRQ7.
378H : Enable Onboard LPT port and address is 378H and IRQ7
278H : Enable Onboard LPT port and address is 278H and IRQ5.
3BCH : Enable Onboard LPT port and address is 3BCH and IRQ7.
Disabled : Disable Onboard SMC CHIP's LPT port.

NOTE: Parallel Port address is 378H/3BCH that selects the routing of IRQ7 for LPT1.
Parallel Port address is 278H that selects the routing of IRQ5 for LPT1.

- **Parallel port Mode:** This field allows the user to select the parallel port mode. The default value is ECP+EPP.
Normal : Standard mode. IBM PC/AT Compatible bidirectional parallel port.
EPP : Enhanced Parallel Port mode.
ECP : Extended Capabilities Port mode.
EPP+ECP : ECP Mode & EPP Mode.
- ECP Mode USE DMA:** This field allows the user to select DMA1 or DMA3 for the ECP mode. The default value is DMA3.
DMA1 : The filed selects the routing of DMA1 for the ECP mode.
DMA3 : The filed selects the routing of DMA3 for the ECP mode.

3-7 LOAD SETUP DEFAULTS

The "LOAD SETUP DEFAULTS" function loads the system default data directly from ROM and initialize associated hardware properly. This function will be necessary only when the system CMOS data is corrupted.

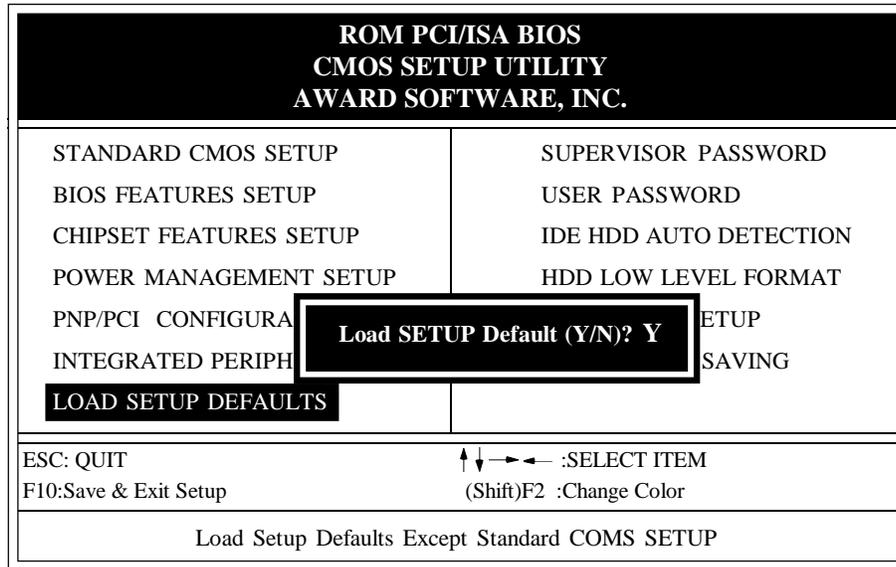


Figure 3-8 LOAD SETUP DEFAULT

3-8 CHANGE SUPERVISOR or USER PASSWORD

To change the password, choose the "SUPERVISOR PASSWORD or USER PASSWORD" option from the CMOS SETUP UTILITY menu and press [Enter].

NOTE : Either "Setup" or "System" must be selected in the "Security Option" of the BIOS FEATURES SETUP menu (Refer to Figure 3-3 for the details).

1. If CMOS is corrupted or the option was not used, a default password stored in the ROM will be used. The screen will display the following message:

Enter Password:

Press the [Enter] key to continue after proper password is given.

2. If CMOS is corrupted or the option was used earlier and the user wish to change default password, the SETUP UTILITY will display a message and ask for a confirmation.

Confirm Password:

3. After pressing the [Enter] key (ROM password if the option was not used) or current password (user-defined password), the user can change the password and store new one in CMOS RAM. A maximum of 8 characters can be entered.

3-9 IDE HDD AUTO DETECTION

The "IDE HDD AUTO DETECTION" utility is a very useful tool especially when you do not know which kind of hard disk type you are using. You can use this utility to detect the correct disk type installed in the system automatically. **But now** you can set **HARD DISK TYPE** to **Auto** in the **STANDARD CMOS SETUP**. You don't need the "IDE HDD AUTO DETECTION" utility. The BIOS will Auto-detect the hard disk size and model on display during POST.

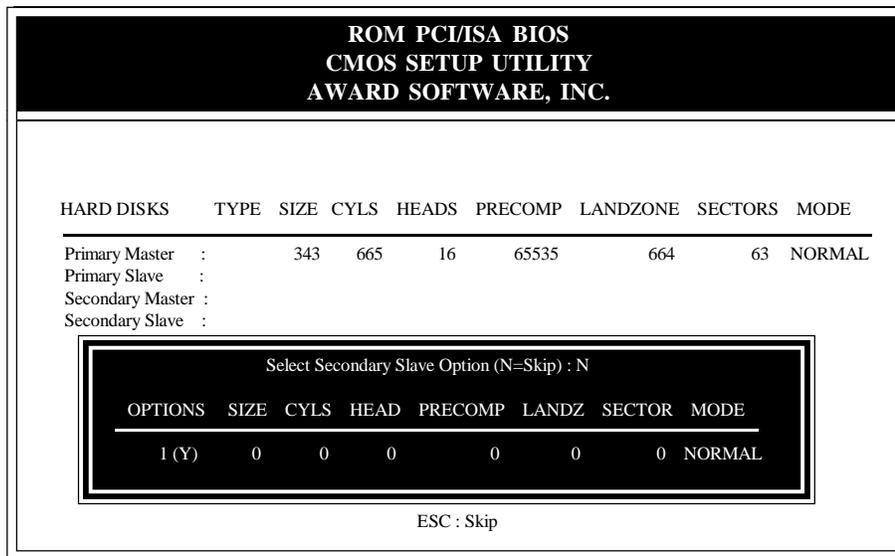


Figure 3-9 IDE HDD AUTO DETECTION

NOTE: HDD Modes

The Award BIOS supports 3 HDD modes : NORMAL, LBA & LARGE

NORMAL mode

Generic access mode in which neither the BIOS nor the IDE controller will make any transformations during accessing.

The maximum number of cylinders, head & sectors for NORMAL mode are. 1024, 16 & 63.

| | |
|-------------------------|---------------|
| no. Cylinder | (1024) |
| x no. Head | (16) |
| x no. Sector | (63) |
| <u>x no. per sector</u> | <u>(512)</u> |
| 528 Megabytes | |

If user set his HDD to NORMAL mode, the maximum accessible HDD size will be 528 Megabytes even though its physical size may be greater than that!

LBA (Logical Block Addressing) mode

A new HDD accessing method to overcome the 528 Megabyte bottleneck. The number of cylinders, heads & sectors shown in setup may not be the number physically contained in the HDD.

During HDD accessing, the IDE controller will transform the logical address described by sector, head & cylinder into its own physical address inside the HDD.

The maximum HDD size supported by LBA mode is 8.4 Gigabytes which is obtained by the following formula:

$$\begin{array}{r}
 \text{no. Cylinder} \quad (1024) \\
 \times \text{ no. Head} \quad (255) \\
 \times \text{ no. Sector} \quad (63) \\
 \hline
 \times \text{ bytes per sector} \quad (512) \\
 \hline
 8.4 \text{ Gigabytes}
 \end{array}$$

LARGE mode

Extended HDD access mode supported by Award Software.

Some IDE HDDs contain more than 1024 cylinder without LBA support (in some cases, user do not want LBA). The Award BIOS provides another alternative to support these kinds of LARGE mode:

| <u>CYLS.</u> | <u>HEADS</u> | <u>SECTOR</u> | <u>MODE</u> |
|--------------|--------------|---------------|-------------|
| 1120 | 16 | 59 | NORMAL |
| 560 | 32 | 59 | LARGE |

BIOS tricks DOS (or other OS) that the number of cylinders is less than 1024 by dividing it by 2. At the same time, the number of heads is multiplied by 2. Areverse transformation process will be made inside INT 12h in order to access the right HDD address the right HDD address!

Maximum HDD size:

$$\begin{array}{r}
 \text{no. Cylinder} \quad (1024) \\
 \times \text{ no. Head} \quad (32) \\
 \times \text{ no. Sector} \quad (63) \\
 \hline
 \times \text{ bytes per sector} \quad (512) \\
 \hline
 1 \text{ Gigabytes}
 \end{array}$$

3 - 18 CHAPTER 3

Note:

To support LBA or LARGE mode of HDDs, there must be some softwares involved. All these softwares are located in the Award HDD Service Routine (1NT 13h). It may be failed to access a HDD with LBA (LARGE) mode selected if you are running under a Operating System which replaces the whole 1NT 13h. UNIX operating systems do not support either LBA or LARGE and must utilize the Standard mode. UNIX can support drives larger than 528MB.

3-10 HDD LOW LEVEL FORMAT

Interleave

Select the interleave number of the hard disk drive you wish to perform low level format. You may select from 1 to 8. Check the documentation that came with the drive for the correct interleave number, or select 0 for utility automatic detection.

Auto scan bad track

This allows the utility to scan first then format by each track.

Start

Press <Y> to start low level format.

3-11 SAVE & EXIT SETUP

The "SAVE & EXIT SETUP" option will bring you back to boot up procedure with all the changes you just made which are recorded in the CMOS RAM.

3-12 EXIT WITHOUT SAVING

The "EXIT WITHOUT SAVING" option will bring you back to normal boot up procedure without saving any data into CMOS RAM. All of the old data in the CMOS will not be destroyed.

Chapter 4

Technical Information

4-1 I/O & MEMORY MAP

MEMORY MAP

| Address Range | Size | Description |
|---------------|------|--|
| [00000-7FFFF] | 512K | Conventional memory |
| [80000-9FBFF] | 127K | Extended Conventional memory |
| [9FC00-9FFFF] | 1K | Extended BIOS data area if PS/2 mouse is installed |
| [A0000-C7FFF] | 160K | Available for Hi DOS memory |
| [C8000-DFFFF] | 96K | Available for Hi DOS memory and adapter ROMs |
| [E0000-EEFFF] | 60K | Available for UMB |
| [EF000-EFFFF] | 4K | Video service routine for Monochrome & CGA adaptor |
| [F0000-F7FFF] | 32K | BIOS CMOS setup utility |
| [F8000-FCFFF] | 20K | BIOS runtime service routine (2) |
| [FD000-FDFFF] | 4K | Plug and Play ESCD data area |
| [FE000-FFFFF] | 8K | BIOS runtime service routine (1) |

I/O MAP

| | |
|------------|---------------------------------------|
| [000-01F] | DMA controller.(Master) |
| [020-021] | INTERRUPT CONTROLLER.(Master) |
| [022-023] | CHIPSET control registers. I/O ports. |
| [040-05F] | TIMER control registers. |
| [060-06F] | KEYBOARD interface controller.(8042) |
| [070-07F] | RTC ports & CMOS I/O ports. |
| [080-09F] | DMA register. |
| [0A0-0BF] | INTERRUPT controller.(Slave) |
| [0C0-0DF] | DMA controller.(Slave) |
| [0F0-0FF] | MATH COPROCESSOR. |
| [1F0-1F8] | HARD DISK controller. |
| [278-27F] | PARALLEL port 2. |
| [2B0-2DF] | GRAPHICS adapter controller. |
| [2F8-2FF] | SERIAL port 2. |
| [360-36F] | NETWORK ports. |
| [378-37F] | PARALLEL port 1. |
| [3B0-3BF] | MONOCHROME & PARALLEL port adapter. |
| [3C0-3CF] | EGA adapter. |
| [3D0-3DF] | CGA adapter. |
| [3F0-3F7] | FLOPPY DISK controller. |
| [3F8-3FF] | SERIAL port 1. |

4 - 2 CHAPTER 4

4-2 TIME & DMA CHANNELS MAP

| | | |
|-----------------------|-----------------|-------------------------------|
| TIME MAP: | TIMER Channel 0 | System timer interrupt. |
| | TIMER Channel 1 | DRAM REFRESH request. |
| | TIMER Channel 2 | SPEAKER tone generator. |
| DMA CHANNELS : | DMA Channel 0 | Available. |
| | DMA Channel 1 | Onboard ECP (Option). |
| | DMA Channel 2 | FLOPPY DISK (SMC CHIP). |
| | DMA Channel 3 | Onboard ECP (default). |
| | DMA Channel 4 | Cascade for DMA controller 1. |
| | DMA Channel 5 | Available. |
| | DMA Channel 6 | Available. |
| | DMA Channel 7 | Available. |

4-3 INTERRUPT MAP

| | |
|--------------------|--|
| NMI : | Parity check error. |
| IRQ (H/W) : | 0 System TIMER interrupt from TIMER 0. |
| | 1 KEYBOARD output buffer full. |
| | 2 Cascade for IRQ 8-15. |
| | 3 SERIAL port 2. |
| | 4 SERIAL port 1. |
| | 5 PARALLEL port 2. |
| | 6 FLOPPY DISK (SMC CHIP). |
| | 7 PARALLEL port 1. |
| | 8 RTC clock. |
| | 9 Available. |
| | 10 Available. |
| | 11 Available. |
| | 12 PS/2 Mouse. |
| | 13 MATH coprocessor. |
| | 14 Onboard HARD DISK(IDE1) channel. |
| | 15 Onboard HARD DISK(IDE2) channel. |

4-4 RTC & CMOS RAM MAP

| | | |
|-------------------------|-------|--|
| RTC & CMOS : | 00 | Seconds. |
| | 01 | Second alarm. |
| | 02 | Minutes. |
| | 03 | Minutes alarm. |
| | 04 | Hours. |
| | 05 | Hours alarm. |
| | 06 | Day of week. |
| | 07 | Day of month. |
| | 08 | Month. |
| | 09 | Year. |
| | 0A | Status register A. |
| | 0B | Status register B. |
| | 0C | Status register C. |
| | 0D | Status register D. |
| | 0E | Diagnostic status byte. |
| | 0F | Shutdown byte. |
| | 10 | FLOPPY DISK drive type byte. |
| | 11 | Reserve. |
| | 12 | HARD DISK type byte. |
| | 13 | Reserve. |
| | 14 | Equipment type. |
| | 15 | Base memory low byte. |
| | 16 | Base memory high byte. |
| | 17 | Extension memory low byte. |
| | 18 | Extension memory high byte. |
| | 19-2d | |
| | 2E-2F | |
| | 30 | Reserved for extension memory low bytw. |
| | 31 | Reserved for extension memory high byte. |
| | 32 | DATE CENTURY byte. |
| | 33 | INFORMATION FLAG. |
| | 33-3F | Reserve. |
| | 40-7F | Reserved for CHIPSET SETTING DATA. |

APPENDIX A: POST CODES

ISA POST codes are typically output to port address 80h.

POST(hex) DESCRIPTION

| | |
|--------------|---|
| 01-02 | Reserved. |
| C0 | Turn off OEM specific cache, shadow. |
| 03 | 1.Initialize EISA registers (EISA BIOS only). 2.Initialize all the standard devices with default values Standard devices includes. -DMA controller (8237). -Programmable Interrupt Controller (8259). -Programmable Interval Timer (8254). -RTC chip. |
| 04 | Reserved |
| 05 | 1.Keyboard Controller Self-Test. 2.Enable Keyboard Interface. |
| 06 | Reserved. |
| 07 | Verifies CMOS's basic R/W functionality. |
| C1 | Auto-detection of onboard DRAM & Cache. |
| C5 | Copy the BIOS from ROM into E0000-FFFFFF shadow RAM so that POST will go faster. |
| 08 | Test the first 256K DRAM. |
| 09 | OEM specific cache initialization. (if needed) |
| 0A | 1.Initialize the first 32 interrupt vectors with corresponding Interrupt handlers Initialize INT no from 33-120 with Dummy (Suprious) Interrupt Handler. 2.Issue CPUID instruction to identify CPU type. 3.Early Power Management initialization. (OEM specific) |
| 0B | 1.Verify the RTC time is valid or not. 2.Detect bad battery. 3.Read CMOS data into BIOS stack area. 4.PnP initializations including. (PnP BIOS only) -Assign CSN to PnP ISA card. -Create resource map from ESCD. 5.Assign IO & Memory for PCI devices. (PCI BIOS only) |

POST(hex) DESCRIPTION

| | |
|--------------|---|
| 0C | Initialization of the BIOS Data Area. (40:0N - 40:FF) |
| 0D | 1.Program some of the Chipset's value according to Setup. (Early Setup Value Program) 2.Measure CPU speed for display & decide the system clock speed. 3.Video initialization including Monochromc, CGA, EGA/VGA. If no display device found, the speaker will beep. |
| 0E | 1.Test video RAM. (If Monochromc display device found) 2.Show messages including. -Award Logo, Copyright string, BIOS Data code & Part No. -OEM specific sign on messages. -Energy Star Logo. (Green BIOS ONLY) -CPU brand, type & speed. -Test system BIOS checksum. (Non-Compress Version only) |
| 0F | DMA channel 0 test. |
| 10 | DMA channel 1 test. |
| 11 | DMA page registers test. |
| 12-13 | Reserved. |
| 14 | Test 8254 Timer 0 Counter 2. |
| 15 | Test 8259 interrupt mask bits for channel 1. |
| 16 | Test 8259 interrupt mask bits for channel 2. |
| 17 | Reserved. |
| 19 | Test 8259 functionality. |
| 1A-1D | Reserved. |
| 1E | If EISA NVM checksum is good, exccute EISA initialization. (EISA BIOS only) |
| 1F-29 | Reserved. |
| 30 | Detect Base Memory & Extended Memory Size. |
| 31 | 1.Test Base Memory from 256K to 640K. 2.Test Extended Memory from 1M to the top of memory. |

4 - 6 CHAPTER 4

| POST(hex) | DESCRIPTION |
|------------------|--|
| 32 | 1.Display the Award Plug & Play BIOS Extension message. (PnP BIOS only) 2.Program all onboard super I/O chips (if any) including COM ports, LPT ports, FDD port ... according to setup value. |
| 33-3B | Reserved. |
| 3C | Set flag to allow users to enter CMOS Setup Utility. |
| 3D | 1.Initialize Keyboard. 2.Install PS2 mouse. |
| 3E | Try to turn on Level 2 cache. Note : Some chipset may need to turn on the L2 cache in this stage. But usually, the cache is turn on later in POST 61h. |
| 3F-40 | Reserved. |
| BF | 1.Program the rest of the Chipset's value according to Setup. (Later Setup Value Program) 2.If auto-configuration is enabled, programmed the chipset with pre-defined Values. |
| 41 | Initialize floppy disk drive controller. |
| 42 | Initialize Hard drive controller. |
| 43 | If it is a PnP BIOS, initialize serial & parallel ports. |
| 44 | Reserved. |
| 45 | Initialize math coprocessor. |
| 46-4D | Reserved. |
| 4E | If there is any error detected (such as video, kb...), show all the error messages on the screen & wait for user to press <F1> key. |
| 4F | 1.If password is needed, ask for password. 2.Clear the Energy Star Logo. (Green BIOS only) |
| 50 | Write all CMOS values currently in the BIOS stack area back into the CMOS. |
| 51 | Reserved. |

POST(hex) DESCRIPTION

- 52** 1.Initialize all ISA ROMs.
2.Later PCI initializations. (PCI BIOS only)
-assign IRQ to PCI devices.
-initialize all PCI ROMs.
3.PnP Initializations. (PnP BIOS only)
-assign IO, Memory, IRQ & DMA to PnP ISA devices.
-initialize all PnP ISA ROMs.
4.Program shadows RAM according to Setup settings.
5.Program parity according to Setup setting.
6.Power Management Initialization.
-Enable/Disable global PM.
-APM interface initialization.
- 53** 1.If it is NOT a PnP BIOS, initialize serial & paralalled ports.
2.Initialize time value in BIOS data area by translate the RTC time value into a timer tick value.
- 60** Setup Virus Protection. (Boot Sector Protection) functionality according to Setup setting.
- 61** 1.Try to turn on Level 2 cache.
Note : if L2 cache is already turned on in POST 3D, this part will be skipped.
2.Set the boot up speed according to Setup setting.
3.Last chance for Chipset initialization.
4.Last chance for Power Management initialization. (Green BIOS only)
5.Show the system configuration table.
- 62** 1.Setup daylight saving according to Setup value.
2.Program the NUM Lock, typematic rate & typematic speed according to Setup setting.
- 63** 1.If there is any changes in the hardware configuration, update the ESCD information. (PnP BIOS only)
2.Clear memory that have been used.
3.Boot system via INT 19H.
- FF** System Booting. This means that the BIOS already pass the control right to the operating system.

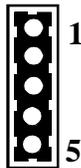
Unexpected Errors:

POST(hex) DESCRIPTION

- B0** If interrupt occurs in protected mode.
- B1** Unclaimed NMI occurs.

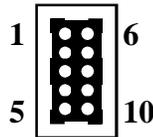
APPENDIX B: I/O CONNECTORS

JP1 : PS/2 MOUSE CONNECTOR:



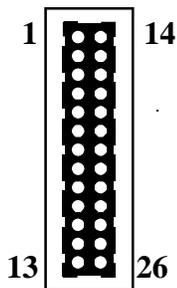
| Pin | Signal Name |
|-----|-------------------|
| 1 | Data (Red Wire) |
| 2 | Clock (Blue Wire) |
| 3 | GND (Green Wire) |
| 4 | NC |
| 5 | VCC (Yellow Wire) |

J4/COM1,J3/COM2 : Serial Ports Connector



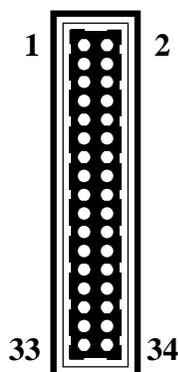
| Signal Name | Pin | Pin | Signal Name |
|-------------|-----|-----|-------------|
| DCD | 1 | 6 | DSR |
| SIN | 2 | 7 | RTS |
| SOUT | 3 | 8 | CTS |
| DTR | 4 | 9 | RI |
| GND | 5 | 10 | N.C. |

J5 : Parallel Port Connector



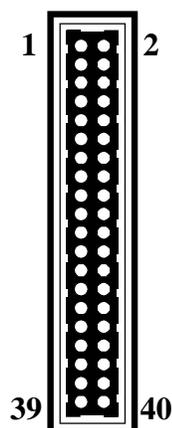
| Signal Name | Pin | Pin | Signal Name |
|-------------|-----|-----|-------------|
| STROBE- | 1 | 14 | AUTO FEED- |
| Data Bit 0 | 2 | 15 | ERROR- |
| Data Bit 1 | 3 | 16 | INIT- |
| Data Bit 2 | 4 | 17 | SLCT IN- |
| Data Bit 3 | 5 | 18 | Ground |
| Data Bit 4 | 6 | 19 | Ground |
| Data Bit 5 | 7 | 20 | Ground |
| Data Bit 6 | 8 | 21 | Ground |
| Data Bit 7 | 9 | 22 | Ground |
| ACJ- | 10 | 23 | Ground |
| BUSY | 11 | 24 | Ground |
| PE | 12 | 25 | Ground |
| SLCT | 13 | 26 | N.C. |

J6 : Floppy Disk Connector

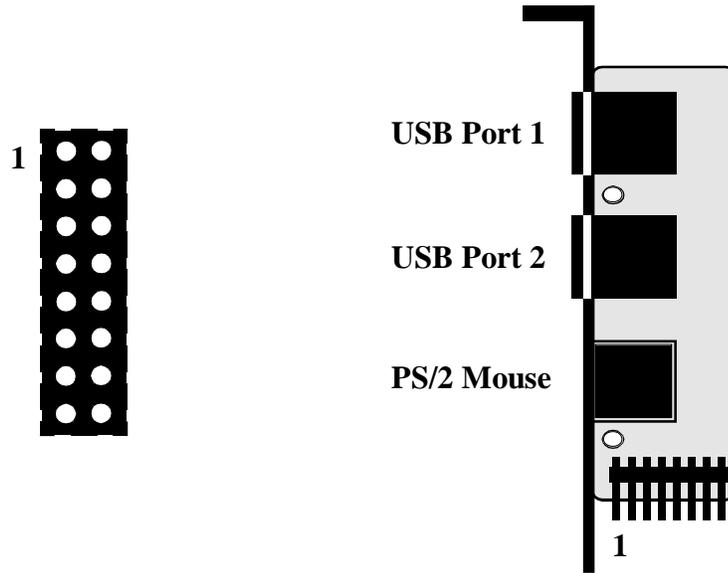


| Signal Name | Pin | Pin | Signal Name |
|-------------|-----|-----|-----------------|
| Ground | 1 | 2 | FDHDIN |
| Ground | 3 | 4 | Reserved |
| Ground | 5 | 6 | FDEDIN |
| Ground | 7 | 8 | Index- |
| Ground | 9 | 10 | Motor Enable |
| Ground | 11 | 12 | Drive Select B- |
| Ground | 13 | 14 | Drive Select A- |
| Ground | 15 | 16 | Motor Enable |
| Ground | 17 | 18 | DIR- |
| Ground | 19 | 20 | STEP- |
| Ground | 21 | 22 | Write Data |
| Ground | 23 | 24 | Write Gate |
| Ground | 25 | 26 | Track 00- |
| Ground | 27 | 28 | Write Protect- |
| Ground | 29 | 30 | Read Data- |
| Ground | 31 | 32 | SIDE 1 SELECT- |
| Ground | 33 | 34 | Diskette |

J8,J7 : Primary, Secondary IDE Connector



| Signal Name | Pin | Pin | Signal Name |
|----------------|-----|-----|----------------|
| Reset IDE | 1 | 2 | Ground |
| Host Data 7 | 3 | 4 | Host Data 8 |
| Host Data 6 | 5 | 6 | Host Data 9 |
| Host Data 5 | 7 | 8 | Host Data 10 |
| Host Data 4 | 9 | 10 | Host Data 11 |
| Host Data 3 | 11 | 12 | Host Data 12 |
| Host Data 2 | 13 | 14 | Host Data 13 |
| Host Data 1 | 15 | 16 | Host Data 14 |
| Host Data 0 | 17 | 18 | Host Data 15 |
| Ground | 19 | 20 | Key |
| DRQ3 | 21 | 22 | Ground |
| I/O Write- | 23 | 24 | Ground |
| I/O Read- | 25 | 26 | Ground |
| IOCHRDY | 27 | 28 | BALE |
| DACK3- | 29 | 30 | Ground |
| IRQ14 | 31 | 32 | IOCS16- |
| Addr 1 | 33 | 34 | N.C |
| Addr 0 | 35 | 36 | Addr 2 |
| Chip Select 0- | 37 | 38 | Chip Select 1- |
| Activity | 39 | 40 | Ground |



USB Port & PS/2 Mouse Adapter(Reserve for Future Use)