

**Peak 550/PISA 550**  
**Single Board Computer**

**User's Guide**

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# How to use this guide

This manual is written to help you use Peak 550/PISA 550. The manual describes how to arrange various settings on the Pentium CPU board to meet your requirements. It's briefed as follows:

**Chapter 1**, "Introduction" gives an overview of the product's specifications. It also tells you what are included in the product package.

**Chapter 2**, "Jumpers and Connectors" describes the definitions and positions of Jumpers and Connectors that you may easily configure and set up per your requirement.

**Chapter 3**, "Capability Expanding" describes how to change or expand the CPU Board by changing the system memory, cache memory, and CPU to get more power out from the CPU board.

**Chapter 4**, "Award BIOS Setup" describes how to use the advanced PCI/Green BIOS to control almost every feature of the Peak 550/PISA 550, including the watchdog timer.

**The Appendix** describes how to set up the Watch Dog Timer (WDT) and gives an example to program the WDT.

## Chapter 1

### Introduction

Welcome to the PEAK-550/PISA 550 Pentium single board computer.

The PEAK 550/PISA 550 is a brand new generation of advanced technologies. They are built with high performance Pentium CPU and compatible, high performance PCI Bus and I/O's, and the brand new technologies: the pipeline burst cache and the 3<sup>rd</sup> generation VGA with Unified Memory Architecture (UMA) are also included. It's excellent to the system integrators, VARs, or turnkey vendor demanding high performance computing, high performance I/O and the best solution as the Industrial workstation, and the controller in the computer telephony application. The difference between Peak 550 and PISA 550 is the gold finger: the Peak 550 has the ISA gold fingers whereas the PISA 550 has the "PISA" (*PCI+ISA*) gold fingers.

The PEAK-550/PISA 550 can run with Intel Pentium processor up to 233 MHz, the brand new compatible CPU like AMD K6, Cyrix M2 are also supported. Memory support up to 512KB pipeline burst cache and 128MB DRAM. This generates great computing power. The SMC 37C669 integrates the floppy controller, two serial ports and one parallel ports. The two on-chip UARTs are compatible with NS 16C550, and the parallel port support EPP/ECP. The on board VGA is a high performance graphic and video accelerator, with the unified memory architecture it can fully utilize the system memory up to 1024x768, true color, and 1280x1024, high color . The shared memory could be 4MB for display purposes. The IDE now supports the Ultra DMA/33, and the USB ports are also reserved, the socket for Disk on Chip of the M-systems is on board, supporting up to 24MB.

The additional keyboard connector is reserved for connecting to the keyboard connector on the back plane. The high precision real time clock/calendar is built in for accurate scheduling and the watchdog timer is also the standard feature.

A special circuit is reserved to monitor the CPU cooling fan. If the cooling fan stops or abnormally slow, the buzzer will beep as alarm. The Peak's unique offering, the ISAMAX is the standard feature of the Peak 550/PISA 550, and supporting up to 20 PCs of ISA add-on cards without any problems

The Peak 550 is designed for the current ISA environments to directly upgrade the vast installation base and provide a ready-to-go solution to the popular industrial applications. The PISA 550 is designed with future built in. A new standard- "the PISA architecture" (PCI+ISA) is implemented to equip the half size SBC with the high performance PCI bus. Since the gold finger is a brand new one, we have to use the different back plane to unleash the power of the PISA 550.

## 1-1 Specifications

- **Main processor**
  - Intel Pentium P54C/P55C up to 233MHz
  - AMD K5/K6 up to 233MHz
  - Cyrix M1/M2 up to 233MHz
  
- **Main Memory**
  - Two 72 pin SIMM sockets, DRAM size up to 128MB
  - Extended-Data-Output (EDO) DRAM supported
  
- **Cache Memory**
  - 256KB(standard)/512KB (factory option)
  - Pipe line burst cache only
  
- **BIOS**
  - Award system BIOS, and SIS VGA BIOS stored in the EPROM or flash ROM
  
- **Chipset**
  - SIS 5598 all-in-one system logic graphic/video controller
  
- **Clock/Calendar**
  - Real time clock/calendar with battery backup
  - High precision
  
- **Bus Interface**
  - PCI (32bit) and ISA (16 bit)
  
- **On Board VGA**
  - Unified memory architecture (UMA)
  - Video play back built-in
  - Maximum resolution/color/refresh rate
  - 1024x768 high color/75Hz
  - 1280x1024, 256 color/75Hz
  - 1024x768, true color, interlaced
  - 1280x1024, high color, interlaced

VGA drivers supported

DOS, Windows 3.1, Windows NT 4.0, OS/2 Warp 3.0, Windows 95
  
- **Serial Ports**
  - Support 2 high speed serial port, Data transfer rate are programmable up to 50K baud independently

- **Parallel Ports**  
Support one ECP/EPP bi-directional parallel port
- **PCI IDE Hard Disk Interface**  
Support two enhanced IDE hard disk or CD-ROM drive up to mode 4 PIO and mode 2 DMA master, also support ultra DMA/33
- **Floppy Drive Controller**  
Up to 2 floppy drives supported  
5 1/4", 360K, 1.2MB, 3 1/2" 720K, 1.2MB, 1.44MB, 2.88MB support
- **Timers**  
Programmable timers
- **Watchdog Timer**  
1,2,4,8,16,32, 64 sec time-out interval  
BIOS Supported
- **On Board Solid State Disk**  
Socket reserved for Disk on Chip of M-system, up to 24MB capacity
- **ISA MAX**  
ISA signals amplified to support 20 ISA cards
- **Keyboard Connectors**  
Both 5-pin header and 6-pin mini-din connector supported on back panel
- **PS/2 mouse port connector**  
By 6-pin mini-din connector
- **Gold Fingers**  
Peak 550 with standard ISA gold fingers  
PISA 550 with EISA like gold fingers but PISA signals
- **Power Good**  
Power good generation with reset time, 300~500ms
- **Power Requirement**  
+5V @6.0A (Max.), +/- 12V @40mA

- **Physical Information**

Dimension: 185mmx122mm

Weight: 400g

- **Environmental Information**

Operating Temperature: 10°C~60°C

Storage Temperature: -20°C ~80°C

Relative Humidity:10 ~90%, non condensing

## **1-2 What you'll have from the package**

In addition to this manual, the PEAK-550/PISA 550 package includes the following items

- PEAK 550 or PISA 550 single board computer x 1
- Printer and SIO cable x 1
- FDC cable x 1
- IDE cable x 1
- 5 pin to 5 pin keyboard cable x 1 (for DIN keyboard connector)
- SiS VGA driver diskette x 1 (Win95, Win NT 3.5, Win NT 4.0)

If any of these items is missed or damaged, please contact your vendor for what you want.

## Chapter 2

# Jumpers and Connectors

This chapter gives the definitions and shows where to locate the positions of jumpers and connectors.

### 2-1 Jumpers

Jumpers on the CPU board are used to select options for certain features. To select any option, cover the jumper cap over (short) or remove it from (open) the jumper pins according to the follows instructions. (see figure 2-1 for jumper positions)

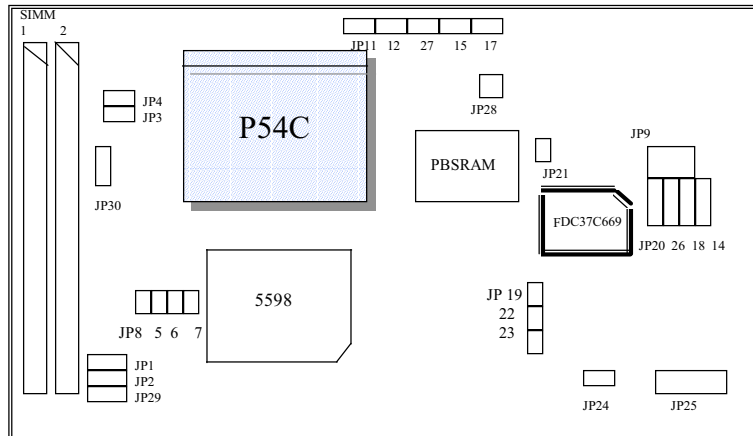


Figure 2-1 Jumper Positions

**Jumper Setting Table (\*: default setup)**

<u>Item</u>	<u>Function</u>			<u>Remark</u>
<b>VGA Control</b>	Disable	*Enable		
<b>JP1</b>	2-3	1-2		
<b>JP2</b>	1-2	2-3		
<b>JP29</b>	2-3	1-2		
<b>CPU Type</b>	P54C(3.3V)	*P55C(2.8V)	K6-200(2.9V)	K6-233(3.2V)
<b>JP3</b>	NC	1-2	1-2	1-2
<b>JP4</b>	NC	1-2	1-2	1-2
<b>JP30</b>	NC	NC	1-2	3-4
<b>Core/Bus Ratio</b>	1	1.5	2	
<b>JP5</b>	X	1-2	2-3	
<b>JP6</b>	X	1-2	1-2	
<b>JP8</b>	1-2	2-3	2-3	
	*2.5	3	3.5(for 233MHz)	
<b>JP5</b>	2-3	1-2	1-2	
<b>JP6</b>	2-3	2-3	1-2	
<b>JP8</b>	2-3	2-3	2-3	
<b>PS/2 Mouse</b>	Disable	*Enable		
<b>JP7</b>	2-3	1-2		
<b>JP24</b>	1-2	NC		
<b>L1 Cache</b>	WT	*WB		
<b>JP11</b>	1-2	NC		
<b>Pipeline</b>	*Enable	Disable		
<b>JP12</b>	1-2	NC		
<b>CPU Type for Cache</b>	Cyrix CPU	* Intel /AMD CPU		
<b>JP15</b>	1-2	NC		
<b>Cache RAM</b>	*256K	512K		
<b>JP17</b>	NC	1-2		

<b>RS232/422/485</b>	*RS232	RS422	RS485	
<b>JP9</b>	1-2	3-4	5-6	
<b>JP14</b>	1-2	2-3	2-3	
<b>JP18</b>	1-2	2-3	2-3	
<b>JP20</b>	1-2	2-3	2-3	
<b>JP26</b>	1-2	2-3	2-3	
<b>Multi I/O</b>	Disable	*Enable		
<b>JP21</b>	1-2	NC		
<b>CPU Freq.</b>	50MHz	60MHz	*66MHz	
<b>JP19</b>	1-2	NC	1-2	
<b>JP22</b>	1-2	1-2	NC	
<b>CMOS RAM</b>	*Normal	Clear		
<b>JP23</b>	NC	1-2		
<b>M-System Addr.</b>	C0000	C8000	D0000	*D8000
<b>JP25</b>	1-2	3-4	5-6	7-8
<b>BIOS Program</b>	*Not Programmable	Programable		
<b>JP27</b>	NC	1-2		
<b>FAN Control</b>	*Disable	Enable		
<b>JP28</b>	NC	1-2		

Enabled to alarm for the abnormal cooling fan.

## 2-2 Connectors

Connectors on the CPU Board provide interfaces to other devices.

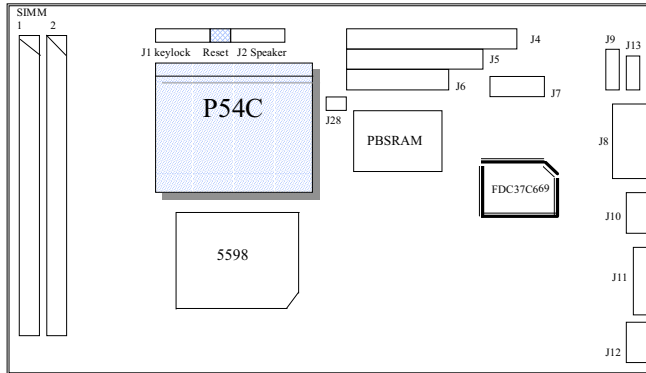


Figure 2-2 Connector Locations

Connector	Function	Remark
J1	Key Lock Connector	
J2	Speaker Connector	
J4	Primary IDE Connector	
J5	FDD Connector	
J6	Printer Connector	
J7	Serial Connector 2	
J8	VGA Connector	
J9	USB Connector	
J10	PS/2 Mini DIN Mouse	
J11	Serial Connector 1	
J12	PS/2 Mini DIN KBD Connector	
J13	5 Pins KBD Connector	
J28	3 pins Connector	
LED 1	2 Pins HDD LED	
Reset	2 Pins Reset Connector	

## Pin definitions of connectors

- J1: Key lock

<b>PIN No.</b>	<b>Description</b>
1	+5V
2	N/C
3	Ground
4	Key lock
5	Ground

- J2: Speaker

<b>PIN No.</b>	<b>Description</b>
1	Speaker signal
2	Ground
3	Ground
4	+5V

- Reset: Reset Switch

<b>PIN No.</b>	<b>Description</b>
1	External Reset
2	Ground

J4: IDE Interface Connector

<b>PIN No.</b>	<b>Description</b>	<b>PIN No.</b>	<b>Description</b>
1	Reset#	2	Ground
3	Data 7	4	Data 8
5	Data 6	6	Data 9
7	Data 5	8	Data 10
9	Data 4	10	Data 11
11	Data 3	12	Data 12
13	Data 2	14	Data 13
15	Data 1	16	Data 14
17	Data 0	18	Data 15
19	Ground	20	N/C
21	DMA REQ	22	Ground
23	IOW#	24	Ground
25	IOR#	26	Ground
27	IOCHRDY	28	N/C
29	DMA ACK	30	Ground
31	Interrupt	32	N/C
33	SA1	34	N/C
35	SA0	36	SA2
37	HDC CS0#	38	HDC CS1#
39	HDD Active#	40	Ground

- J5: FDC Connector

PIN No.	Description	PIN No.	Description
1	Ground	2	Density Select
3	Ground	4	N/C
5	Ground	6	N/C
7	Ground	8	Index#
9	Ground	10	Motor Enable A#
11	Ground	12	Drive Select B#
13	Ground	14	Drive Select A#
15	Ground	16	Motor Enable B#
17	Ground	18	Direction#
19	Ground	20	Step#
21	Ground	22	Write Data#
23	Ground	24	Write Gate#
25	Ground	26	Track 0#
27	Ground	28	Write Protect#
29	N/C	30	Read Data#
31	Ground	32	Head Side Select#
33	N/C	34	Disk Change#

- J6: Parallel Port Connector

PIN No.	Description	PIN No.	Description
1	Strobe#	2	Data 0
3	Data 1	4	Data 2
5	Data 3	6	Data 4
7	Data 5	8	Data 6
9	Data 7	10	Acknowledge
11	Busy	12	Paper Empty
13	Printer Select	14	Auto Form Feed#
15	Error#	16	Initialize
17	Printer Select IN#	18	Ground
19	Ground	20	Ground
21	Ground	22	Ground
23	Ground	24	Ground
25	Ground		

- J7, J11: Serial Port Connector -D-Sub 9-Pin

PIN No.	Description
1	Data Carrier Detect (DCD)
2	Receive Data (RXD)
3	Transmit Data (TXD)
4	Data Terminal Ready (DTR)
5	Ground (GND)
6	Data Set Ready (DSR)
7	Request to Send (RTS)
8	Clear to Send (CTS)
9	Ring Indicator (RI)

- J8: VGA Connector

PIN No.	Description
1	RED
2	Green
3	Blue
4	NC
5	GND
6	GND
7	GND
8	GND
9	+5V
10	GND
11	NC
12	Display data channel data
13	Horizontal Sync
14	Vertical Sync
15	Display Data Channel Clock

- J9: USB Connector

PIN No.	Description
1	VCC
2	SBD1-
3	SBD1+
4	SBD0-
5	SBD0+
6	Ground

- J10,J12: 6-Pin Mini-DIN Keyboard Connector (PS/2 Type)

PIN No.	Description
1	Keyboard Data
2	N/C
3	Ground
4	+5V
5	Keyboard Clock
6	N/C

- J13: Keyboard Connector

PIN No.	Description
1	Keyboard Clock
2	Keyboard Data
3	N/C
4	Ground
5	+5V

- LED1: IDE LED Connector

PIN No.	Description
1	HDD Active #
2	+5V

- J28: 3 pins Fan Connector

PIN No.	Description
1	Ground
2	+12V
3	+5V

- J7: Serial Port Connector II for RS422/485

PIN No.	RS422	RS485
1	TXD-	Data -
2	TXD+	Data +
3	RXD+	-
4	RXD-	-
5	GND	GND
6	-	-
7	-	-
8	-	-
9	-	-

## Chapter 3

# Capability Expanding

This chapter explain how you can expand capability of your CPU board in such aspects as system memory, cache memory, and CPU.

### 3-1 System Memory

Your system DRAM is provided by SIMM's (Single In-line Memory Modules) on the CPU board. The CPU board contains only one memory bank corresponding to connector SIMM1 and SIMM2.

The table below shows possible SIMM configurations for the memory banks and the figure helps you correctly install the SIMM modules. See Figure 3-2 for memory bank's location.

<b>SIMM 1</b>	<b>SIMM 2</b>	<b>Total Memory</b>
1MBit x 32	1MBit x 32	8MB
2MBit x 32	2MBit x 32	16MB
4MBit x 32	4MBit x 32	32MB
8MBit x 32	8MBit x 32	64MB
16MBit x 32	16MBit x 32	128MB

The SIMM used could be either FP memory (Fast Page Mode) or EDO memory (Extended Data Out). For the FP memory, the speed should be no slower than 70 ns.

*Figure 3-1 Installing SIMM*

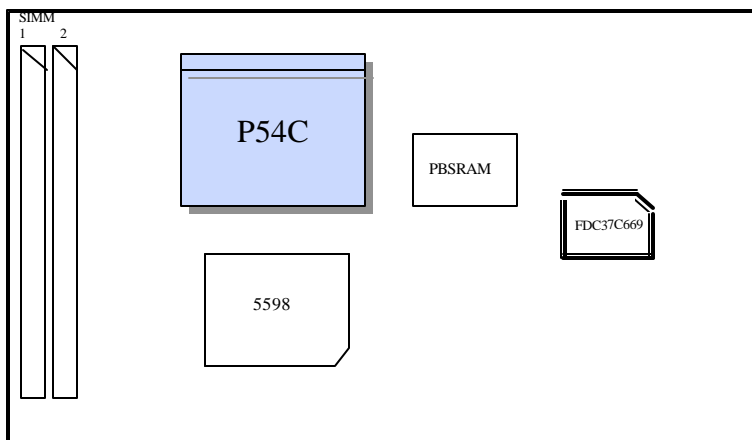


Figure 3-2 Memory Banks

### **3.2 The Cache Memory**

The Peak 550 series only support the high speed pipeline burst SRAM. The advanced single Chip SRAM is 32Kx64 for 256KB, or 64Kx64 for 512KB. Since it is mounted on board, the field upgrade is not allowed.

### **3.3 Change CPU**

The Peak 550 uses the 321 pin PGA socket rather than the ZIF socket, so it needs force to push or pull the CPU into or out from the socket. Normally, you have to use some tool to pull the CPU out from the socket. To put on a new CPU, please place the new CPU on the middle of the socket, orienting its beveled corner to line up with the socket's beveled corner. Make sure the pins of the CPU fit evenly to the socket openings, then press the CPU until all the pins fit into the socket. Be sure to re-arrange the jumper setting for the correct clock (JP19, JP22) and Core/Bus ratio (JP5,6,8). The Peak 550 support many kinds of CPU's, please refer to the jumper setting table for the right arrangement.

## Chapter 4

# AWARD BIOS Setup

Award's BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This type of information is stored in battery-backed RAM (CMOS RAM) so that it retains the Setup information when the power is turned off.

### *Entering Setup*

Power on the computer and press <Del> immediately will allow you to enter Setup. The other way to enter Setup is to power on the computer, when the below message appears briefly at the bottom of the screen during the POST (Power On Self Test), press <Del> key or simultaneously press <Ctrl>, <Alt>, and <Esc> keys.

TO ENTER SETUP BEFORE BOOT PRESS <CTRL-ALT-ESC> OR <DEL> KEY

If the message disappears before you respond and you still wish to enter Setup, restart the system to try again by turning it OFF then ON or pressing the "RESET" button on the system case. You may also restart by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys. If you do not press the keys at the correct time and the system does not boot, an error message will be displayed and you will again be asked to,

PRESS <F1> TO CONTINUE, <CTRL-ALT-ESC> OR <DEL> TO ENTER SETUP

## Control Keys

Up arrow	Move to previous item
Down arrow	Move to next item
Left arrow	Move to the item in the left hand
Right arrow	Move to the item in the right hand
Esc key	Main Menu -- Quit and not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu
PgUp/“+” key	Increase the numeric value or make changes
PgDn/“-” key	Decrease the numeric value or make changes
F1 key	General help, only for Status Page Setup Menu and Option Page Setup Menu
(Shift)F2 key	Change color from total 16 colors. F2 to select color forward, (Shift) F2 to select color backward
F3 key	Reserved
F4 key	Reserved
F5 key	Restore the previous CMOS value from CMOS, only for Option Page Setup Menu
F6 key	Load the default CMOS value from BIOS default table, only for Option Page Setup Menu
F7 key	Load the Setup default , only for Option Page Setup Menu
F8 key	Reserved
F9 key	Reserved
F10 key	Save all the CMOS changes, only for Main Menu

## *Getting Help*

### Main Menu

The on-line description of the highlighted setup function is displayed at the bottom of the screen.

### Status Page Setup Menu/Option Page Setup Menu

Press F1 to pop up a small help window that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the Help Window press <F1> or <Esc>.

## The Main Menu

Once you enter Award BIOS CMOS Setup Utility, the Main Menu (Figure 1) will appear on the screen. The Main Menu allows you to select from ten setup functions and two exit choices. Use arrow keys to select among the items and press <Enter> to accept or enter the sub-menu.

Figure 1 Main Menu

ROM PCI/ISA BIOS (2A5IIN09)	
CMOS SETUP UTILITY	
AWARD SOFTWARE, INC.	
STANDARD CMOS SETUP  BIOS FEATURES SETUP  CHIPSET FEATURES SETUP  POWER      MANAGEMENT  PNP/PCI CONFIGURATION  LOAD BIOS DEFAULTS  LOAD SETUP DEFAULTS	INTEGRATED PERIPHERALS  SUPERVISOR PASSWORD  USER    PASSWORD  IDE HDD AUTO DETECTION  HDD LOW LEVEL FORMAT  SAVE & EXIT SETUP  EXIT WITHOUT SAVING
Esc : Quit	↑ ↓ → ← : Select Item
F10 : Save & Exit Setup	(Shift) F2 : Change Color
Time, Date, Hard Disk Type...	

### Standard CMOS setup

This setup page includes all the items in a standard compatible BIOS. See Page 4-7 to Page 4-10 for details.

### BIOS features setup

This setup page includes all the items of Award special enhanced features. See Page 4-11 to Page 4-15 for details.

## Chipset features setup

This setup page includes all the items of chipset special features. See Page 4-16 for details.

## Power Management setup

This category determines how much power consumption for system after selecting below items. Default value is Disable. See Page 4-17 to Page 4-20 for details.

## PNP/PCI CONFIGURATION

This category specifies the assignment of all the IRQ's and DMA's  
See Page 4-21 to Page 4-22 for details.

## Load BIOS defaults

BIOS defaults indicates the most appropriate value of the system parameter which the system would be in minimum performance. The OEM manufacturer may change the defaults through MODBIN before the binary image burn into the ROM.

## Load setup defaults

Chipset defaults indicates the values required by the system for the maximum performance. The OEM manufacturer may change to defaults through MODBIN before the binary image burn into the ROM.

## Integrated Peripherals

This category allows you to set up all the on board I/O controllers like IDE, SCSI, FDC, etc., See Page 4-23 to Page 4-25

## Supervisor/User Password

Change, set, or disable password of supervisor or user. It allows you to limit access to the system and Setup, or just to Setup. See Page 4-26 for details.

### IDE HDD auto detection

Automatically configure hard disk parameters. See Page 4-27 to Page 4-30 for details.

### HDD low level format

Hard disk low level format utility. See Page 4-31 to Page 4-32 for details.

### Save & exit setup

Save CMOS value changes to CMOS and exit setup.

### Exit without save

Abandon all CMOS value changes and exit setup.

## Standard CMOS Setup Menu

The items in Standard CMOS Setup Menu are divided into 10 categories. Each category includes no, one or more than one setup items. Use the arrow keys to highlight the item and then use the <PgUp> or <PgDn> keys to select the value you want in each item.

Figure 2 Standard CMOS Setup Menu (Support Enhanced IDE)

ROM PCI/ISA BIOS (2A5IIN09)																																				
STANDARD CMOS SETUP																																				
AWARD SOFTWARE, INC.																																				
Date (mm:dd:yy) : Fri, Apr 7 1997																																				
Time (hh:mm:ss) : 00:00:00																																				
<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">HARD DISKS</th> <th style="text-align: left;">TYPE</th> <th style="text-align: left;">SIZE</th> <th style="text-align: left;">CYLS</th> <th style="text-align: left;">HEAD</th> <th style="text-align: left;">PRECOMP</th> <th style="text-align: left;">LANDE</th> <th style="text-align: left;">SECTOR</th> <th style="text-align: left;">MODE</th> </tr> </thead> <tbody> <tr> <td>Primary Master</td> <td>: Auto</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>AUTO</td> </tr> <tr> <td>Primary Slave</td> <td>: Auto</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>AUTO</td> </tr> </tbody> </table>										HARD DISKS	TYPE	SIZE	CYLS	HEAD	PRECOMP	LANDE	SECTOR	MODE	Primary Master	: Auto	0	0	0	0	0	0	AUTO	Primary Slave	: Auto	0	0	0	0	0	0	AUTO
HARD DISKS	TYPE	SIZE	CYLS	HEAD	PRECOMP	LANDE	SECTOR	MODE																												
Primary Master	: Auto	0	0	0	0	0	0	AUTO																												
Primary Slave	: Auto	0	0	0	0	0	0	AUTO																												
Drive A : 1.44M , 3.5 in.						Base Memory : 640K																														
Drive B : None						Extended Memory : 15360K																														
Video : EGA / VGA						Other Memory : 384K																														
Halt On : All Errors						Total Memory : 16384K																														
ESC : Quit			↑ ↓ → ← : Select Item				PU / PD / + / - : Modify																													
F1 : Help			(Shift) F2 : Change Color																																	

### Date

The date format is <day>, <date> <month> <year>. Press <F3> to show the calendar.

Day	The day of week, from Sun to Sat, determined by the BIOS, is read only
date	The date, from 1 to 31 (or the maximum allowed in the month), can key in the numerical / function key
month	The month, Jan through Dec
year	The year, depend on the year of BIOS

## Time

The time format is <hour> <minute> <second>, which accepts both function key or numerical key. The time is calculated based on the 24-hour military-time clock. For example, 1 p.m. is 13:00:00.

## Primary Master/Primary Slave

The categories identify the types of drives that have been installed in the computer. There are 45 predefined types and 2 user definable types are for Enhanced IDE BIOS. Type 1 to Type 45 are predefined. Type User is user-definable.

Press PgUp/<+> or PgDn/<-> to select a numbered hard disk type or type the number and press <Enter>. Note that the specifications of your drive must match with the drive table. The hard disk will not work properly if you enter improper information for this category. If your hard disk drive type is not matched or listed, you can use Type User to define your own drive type manually.

If you select Type User, related information is asked to be entered to the following items. Enter the information directly from the keyboard and press <Enter>. This information should be provided in the documentation from your hard disk vendor or the system manufacturer.

If the controller of HDD interface is ESDI, the selection shall be "Type 1".

If the controller of HDD interface is SCSI, the selection shall be "None".

If the controller of HDD interface is CD-ROM, the selection shall be "None".

CYLS.	number of cylinders
HEADS	number of heads
PRECOMP	write precom
LANDZON E	landing zone
SECTORS	number of sectors
MODE	HDD access mode

If a hard disk has not been installed select NONE and press <Enter>.

## Drive A type/Drive B type

The category identifies the types of floppy disk drive A or drive B that have been installed in the computer.

None	No floppy drive installed
360K, 5.25 in	5-1/4 inch PC-type standard drive; 360 kilobyte capacity
1.2M, 5.25 in	5-1/4 inch AT-type high-density drive; 1.2 megabyte capacity
720K, 3.5 in	3-1/2 inch double-sided drive; 720 kilobyte capacity
1.44M, 3.5 in	3-1/2 inch double-sided drive; 1.44 megabyte capacity
2.88M, 3.5 in	3-1/2 inch double-sided drive; 2.88 megabyte capacity

## Video

The category selects the type of adapter used for the primary system monitor that must match your video display card and monitor. Although secondary monitors are supported, you do not have to select the type in Setup.

You have two ways to boot up the system:

1. When VGA as primary and monochrome as secondary, the selection of the video type is "VGA Mode".
2. When monochrome as primary and VGA as secondary, the selection of the video type is "Monochrome Mode".

EGA/VGA	Enhanced Graphics Adapter/Video Graphics Array. For EGA, VGA, SEGA, or PGA monitor adapters.
CGA 40	Color Graphics Adapter, power up in 40 column mode
CGA 80	Color Graphics Adapter, power up in 80 column mode
MONO	Monochrome adapter, includes high resolution monochrome adapters

## Error halt

The category determines whether the computer will stop if an error is detected during power up.

No errors	Whenever the BIOS detects a non-fatal error the system will be stopped and you will be prompted.
All errors	The system boot will not be stopped for any error that may be detected.
All, But Keyboard	The system boot will not stop for a keyboard error; it will stop for all other errors.
All, But Diskette	The system boot will not stop for a disk error; it will stop for all other errors.
All, But Disk/Key	The system boot will not stop for a keyboard or disk error; it will stop for all other errors.

## Memory

The category is display-only which is determined by POST (Power On Self Test) of the BIOS.

### Base Memory

The POST of the BIOS will determine the amount of base (or conventional) memory installed in the system. The value of the base memory is typically 512K for systems with 512K memory installed on the motherboard, or 640K for systems with 640K or more memory installed on the motherboard.

### Extended Memory

The BIOS determines how much extended memory is present during the POST. This is the amount of memory located above 1MB in the CPU's memory address map.

### Other Memory

This refers to the memory located in the 640K to 1024K address space. This is memory that can be used for different applications. DOS uses this area to load device drivers to keep as much base memory free for application programs. Most use for this area is Shadow RAM.

### Total Memory

System total memory is the sum of basic memory, extended memory, and other memory.



Note: This function is available only for DOS and other OSes that do not trap INT13.

### CPU Internal Cache/External Cache

These two categories speed up memory access. However, it depends on CPU/chipset design. The default value is Enable. If your CPU without Internal Cache then this item "CPU Internal Cache" will not be show.

Enabled	Enable cache
Disabled	Disable cache

### 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 disk operating system (i.e., DOS). Default value is A,C.

C,A	System will first search for hard disk drive then floppy disk drive.
A,C	System will first search for floppy disk drive then hard disk drive.

Note: This function is only available for IDE type  
For SCSI type is always boot from A.

### 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.

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 - the speed that the system will run at immediately after power up.

High	Set the speed to high
Low	Set the speed to low

### Gate A20 Option

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	250 msec
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.

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 correct password is not entered at the prompt.

Note: To disable security, select PASSWORD SETTING at Main Menu and then you will be asked to enter password. Do not type anything and just press <Enter>, it will disable security. Once the security is disabled, the system will boot and you can enter Setup freely.

### OS Select for DRAM > 64MB

This segment is specifically created for OS/2 when DRAM is larger than 64MB. If your operating system is OS/2 and DRAM used is larger the 64MB, you have to select "OS 2", otherwise, non-OS2, default is NON-OS2.

## 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

## C8000 - CFFFF Shadow/E8000 - EFFFF 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

Note: 1. for C8000-DFFFF option-ROM on PCI BIOS , BIOS will automatically enable the shadow RAM. User does not have to select the item.

2. IDE second channel control:

Enable : enable secondary IDE port and BIOS will assign IRQ15 for this port.

Disable: disable secondary IDE port and IRQ15 is available for other device.

The item is optional only for PCI BIOS.

3. Some of the sound cards have an onboard CD-ROM controller which uses IDE Secondary Port. In order to avoid PCI IDE conflict, the IDE secondary channel control has to select “disable” then CD-ROM can work.

## Chipset Features Setup Menu

Since the features in this section are related to the chipset in the CPU board and all are optimized, you are not recommended to change the default settings in the setup table, unless you know very detailed of the chipset features.

ROM PCI/ISA BIOS (2A5IHN09)  
 CHIPSET FEATURES SETUP  
 AWARD SOFTWARE, INC.

Auto Configuration	: Enable	CPU to PCI Burst Mem. WR	: Disabled
L2 (WB) Tag Bit Length	: 8 bits	ISA Bus Clock Frequency	: PCICLK/4
SRAM Back-to-Back	: Enable	System BIOS Cacheable	: Enabled
NA # Enable	: Enabled	Video BIOS Cacheable	: Enabled
Starting Point of Paging	: 1T	Memory Hole at 15M-16M	: Disabled
Refresh Cycle Time(us)	: 187.2	VGA Shared Memory Size	: 1MB
RAS Pulse Width Refresh	: 6T	VGA Memory Clock (MHz)	: 55
RAS Precharge Time	: 4T		
RAS to CAS Delay	: 4T		
CAS# Pulse Width (FP)	: 2T		
CAS# Pulse Width (EDO)	: 1T		
RAMW# Assertion Timing	: 3T		
CAS Precharge Time(FP)	: 1T/2T		
CAS Precharge Time (EDO)	: 1T/2T		
Enhanced Memory Write	: Disabled	ESC: Quit	↑↓→←: Select item
Read Prefetch Memory RD	: Enabled	F1 : Help	PU/PD/+/-: Modify
CPU to PCI Post Write	: 3T	F5 : Old Values	(Shift) F2: Color
		F6 : Load BIOS Defaults	
		F7 : Load Setup Defaults	

## Power Management Setup

The Power management setup will appear on your screen like this:

ROM PCI/ISA BIOS (2A5IIN09)  
POWER MANAGEMENT SETUP  
AWARD SOFTWARE, INC.

Power Management	: Disable	VGA Activity	: Disabled
PM Control by APM	: Yes	IRQ 3 (COM2)	: Enabled
Video Off Option	: Susp, Stby →Off	IRQ 4 (COM1)	: Enabled
Video Off Method	: V/H SYNC+Blank	IRQ 5 (LPT 2)	: Enabled
Switch Function	: Break/Wake	IRQ 6 (Floppy Disk)	: Enabled
Doze Speed (div by)	: 2	IRQ 7 (LPT 1)	: Enabled
Stdby Speed (div by)	: 3	IRQ 8 (RTC Alarm)	: Disabled
Modem Use IRQ	: 3	IRQ 9 (IRQ 2 Redir)	: Enabled
Hot Key Power Off	: Disabled		
**PM Timers**		IRQ 10 (Reserved)	: Enabled
HDD Off After	: Disable	IRQ 11 (Reserved)	: Enabled
Doze Mode	: Disable	IRQ 12 (PS/2 Mouse)	: Enabled
Standby Mode	: Disable	IRQ 13 (Coprocessor)	: Enabled
Suspend Mode	: Disable	IRQ 14 (Hard Disk)	: Enabled
		IRQ 15 (Reserved)	: Enabled
** PM Events**		ESC: Quit	↑↓→←: Select item
COM Ports Activity	: Enabled	F1 : Help	PU/PD/+/-: Modify
LPT Ports Activity	: Enabled	F5 : Old Values	(Shift) F2: Color
HDD Ports Activity	: Enabled	F6 : Load BIOS Default	
		F7 : Load Setup Default	

### Power Management

This category determines how much power consumption for system after selecting below items. Default value is Disable. The following pages tell you the options of each item & describe the meanings of each options.

Item	Options	Descriptions
A. Power Management	1. Disable	Global Power Management will be disabled
	2. User Define	Users can configure their own power management
	3. Min Saving	Pre-defined timer values are used such that all timers are in their MAX value
	4. Max Saving	Pre-defined timer values are used such that all timers MIN value
B. PM Control by APM	1. No	System BIOS will ignore APM when power managing the system
	2. Yes	System BIOS will wait for APM' s prompt before it enter any PM mode e.g. DOZE, STANDBY or SUSPEND Note: If APM is installed, & if there is a task running, even the timer is time out, the APM will not prompt the BIOS to put the system into any power saving mode!
		Note: if APM is not installed, this option has no effect
C. Video Off Method	1. Blank Screen	The system BIOS will only blanks off the screen when disabling video
	2. V/H SYN C+Blank	In addition to (1), BIOS will also turn off the V-SYNC & H-SYNC signals from VGA cards to monitor
	3. DPMS Supported	This function is enabled for only the VGA card supporting DPMS
		Note: Green monitors detect the V/H SYNC signals to turn off its electron gun
D. Modem Use IRQ	3,4,5,7,9 4,10,11,NA	For external modem, 3 or 4 will be used for card type modem. It is up to card definition. Default is 3.

E. Switch Function	1. Break	The External Suspend Switch is "Break"
	2. Wake	The External Suspend Switch is "Wake"
	2. 1 Min 2 Min 4 Min 6 Min 8 Min 10 Min 20 Min 30 Min 40 Min 1 Hr	Defines the continuous idle time before the system entering DOZE mode.  if any item defined in (J) is enabled & active, DOZE timer will be reloaded
		Note: Normally,STANDBY mode puts the system into low speed or 8 MHz, screen may be off depend on (E)
F. Standby Mode (*) Remark 1	1. Disable	System will never enter STANDBY mode
	2. 1 Min 2 Min 4 Min 6 Min 8 Min 10 Min 20 Min 30 Min 40 Min 1 Hr	Defines the continuous idle time before the system entering STANDBY mode.  if any item defined in (J) is enabled & active, STANDBY timer will be reloaded
		Note: Normally,STANDBY mode puts the system into low speed or 8 MHz, screen may be off depend on (E)
G. Suspend Mode (*) Remark 1	1. Disable	System will never enter SUSPEND mode
	2. 1 Min 2 Min 4 Min 6 Min 8 Min 10 Min 20 Min 30 Min 40 Min 1 Hr	Defines the continuous idle time before the system entering SUSPEND mode.  if any item defined in (J) is enabled & active, SUSPEND timer will be reloaded
		Note: Normally,SUSPEND

		mode puts the system into low speed or 8 MHz, clock is stopped, screen may be off depend on (E)
--	--	---

H. HDD Power down (#) Remark 2	1. Disable	HDD' s motor will not off
	2. 1 Min 2 Min 3 Min 4 Min 5 Min 6 Min 7 Min 8 Min 9 Min 10 Min 11 Min 12 Min 13 Min 14 Min 15 Min	Defines the continuous HDD idle time before the HDD entering power saving mode (motor off)
I. Wake Up Events In Doze & Standby	OFF	Input signals will not wake up the system
	ON	Input signals will wake up the system. Default is ON
J. Power Down & Resume Events  IRQ3 (COM 2) IRQ4 (COM 1) IRQ5 (LPT 2) IRQ6 (Floppy Disk) IRQ7 (LPT 1) IRQ8 (RTC Alarm) IRQ9 (IRQ2 Redir) IRQ10 (Reserved) IRQ11 (Reserved) IRQ12 (PS/2 Mouse) IRQ13 (Coprocessor) IRQ14 (Hard Disk) IRQ15 (Reserved)	1. OFF	The specified event' s activity will not affect the PM timers. Any input signals will not wake up the system from suspend. Default is off.
	2. ON	The specified event' s activity causes the PM Timers to be reloaded. i.e. the Power Management Unit(PMU) monitors the specified activities as PM events. Any input signals will wake the system up from suspend.

\* Remark 1: All items mark with (\*) in this menu, will be loaded with predefined values as long as the item 'Power Management' is not configured to 'User Defined'

These items are:

Item 'System Doze' , 'System Standby' & 'System Suspend'

# Remark 2: Although the item 'HDD Power Down' is not controlled by item 'Power Management' in terms of timer value, the HDD (s) will not power down if

the global power management is disabled!

***PnP/PCI Configuration***

This section describes configuring the PCI bus system. PCI, or **P**eripheral **C**omponent **I**nterconnect, is a system which allows I/O devices to operate at speeds nearing the speed the CPU itself uses when communicating with its own special components. This section covers some very technical items and it is strongly recommended that only experienced users should make any changes to the default settings.

ROM PCI / ISA BIOS (2A5IIN09)  
 POWER MANAGEMENT SETUP  
 AWARD SOFTWARE, INC.

Resources Controlled by	: Manual	PCI IRQ Activated By	: Level
Reset Configuration Date	: Disabled		
IRQ-3 assigned to	: Legacy ISA	PCI IDE IRQ Map To Primary IDE INT#	: PCI-AUTO : A
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	: Legacy ISA		
IRQ-15 assigned to	: Legacy ISA		

DMA-0 to DMA-1 to DMA-3 to DMA-5 to DMA-6 to DMA-7 to	assigned assigned assigned assigned assigned assigned assigned	: PCI/ISA PnP : PCI/ISA PnP : PCI/ISA PnP : PCI/ISA PnP : PCI/ISA PnP	ESC : Quit F1 : Help F5 : Old Values F6 : Load BIOS Defaults F7 : Load Setup Defaults	↑ ↓ → ← : Select Item PU/PD/+/- : Modify (Shift) F2 : Color
--	--	--	---	---

### Resource Controlled by

The Award Plug and Play BIOS has the capacity to automatically configure all of the boot and Plug and Play compatible devices. However, this capability means absolutely nothing unless you are using a Plug and Play operating system such as Windows® 95.

Choices are *Auto* and *Manual* (default).

### Reset Configuration Data

This item allows you to determine reset the configuration data or not.

Choices are *Enabled* and *Disabled* (default).

### IRQ/DMA Assigned To

This item allows you to determine the IRQ / DMA assigned to the ISA bus and is not available to any PCI slot. (Legacy ISA) or PnP for both ISA and PCI.

Choices are *Legacy ISA* and *PCI/ISA PnP*.

### PCI IRQ Activated by

This sets the method by which the PCI bus recognizes that an IRQ service is being requested by a device. Under all circumstances, you should retain the default configuration unless advised otherwise by your system's manufacturer.

Choices are *Level* (default) and *Edge*.

## PCI IDE IRQ Map to

This allows you to configure your system to the type of IDE disk controller in use. By default, Setup assumes that your controller is an ISA (Industry Standard Architecture) device rather than a PCI controller. The more apparent difference is the type of slot being used.

If you have equipped your system with a PCI controller, changing this allows you to specify which slot has the controller and which PCI interrupt (A, B,C or D) is associated with the connected hard drives.

Remember that this setting refers to the hard disk drive itself, rather than individual partitions. Since each IDE controller supports two separate hard drives, you can select the INT# for each. Again, you will note that the primary has a lower interrupt than the secondary as described in “*Slot x Using INT#*” above.

Selecting “*PCIAuto*” allows the system to automatically determine how your IDE disk system is configured.

## Integrated Peripherals

ROM PCI / ISA BIOS (2A5IIN09)  
 INTEGRATED PERIPHERALS  
 AWARD SOFTWARE, INC.

Internal PCI/IDE : Primary IDE Primary Master PIO : Auto IDE Primary Slave PIO : Auto IDE Burst Mode : Disabled IDE Data Port Post Write : Enabled IDE HDD Block Mode : Enabled Onboard FDC Controller : Enabled Onboard UART 1 : Auto Onboard UART 2 : Auto Onboard Parallel Port : 278/IRQ5 Parallel Port Mode : Normal  PS/2 Mouse Function : Enabled  WDT Configuration Port : F2h	Watch Dog Timer : Disabled WDT Time Out Active For : Reset WDT Active Time : 64 sec. USB Controller : Disabled USB Keyboard Support : Disabled  <hr/> ESC : Quit                    ↑ ↓ → ← : Select Item F1 : Help                    PU/PD/+/- : Modify  F5 : Old Values            (Shift) F2 : Color F6 : Load BIOS Defaults F7 : Load Setup Defaults
--	--

### IDE HDD Block Mode

This allows your hard disk controller to use the fast block mode to transfer data to and from your hard disk drive (HDD).

Enabled	IDE controller uses block mode.
Disabled	IDE controller uses standard mode.

*Enabled* is the default.

### IDE PIO

IDE hard drive controllers can support up to two separate hard drives. These drives have a master/slave relationship which are determined by the cabling configuration used to attach them to the controller. Your system supports one IDE

controllers--a primary and a secondary--so you have to ability to install up to four separate hard disks.

PIO means Programmed Input/Output. Rather than have the BIOS issue a series of commands to effect a transfer to or from the disk drive, PIO allows the BIOS to tell the controller what it wants and then let the controller and the CPU perform the complete task by themselves. This simpler and more efficient (and faster).

Your system supports five modes, numbered from 0 (default) to 4, which primarily differ in timing. When *Auto* is selected, the BIOS will select the best available mode. This is true for the next two setup items:

1. IDE Primary Master PIO
2. IDE Primary Slave PIO

**On board FDC Controller:** Enabled, no jumper setting is required

**On board UART 1**

**On board UART 2**

**The on board SIO 1 and SIO 2 could be set as below:**

COM 1	3F8H
COM 2	2F8H
COM 3	3E8H
COM 4	2E8H
Disabled	

Different port requires different address to avoid conflicts.

**On board Parallel Port**

The on board PIO could be set as below:

278H/IRQ5	Default
378H/IRQ5	
378H/IRQ7	
3BCH/IRQ7	
Disabled	

If you have additional PIO on the add-on card, make sure to assign different address. In the IBM PC compatible system, 3 PIO in total are allowed to install.

**On board Printer Mode**

The on board printer mode could be set as below:

Normal	Default
Extended	
EPP mode	
ECP mode	
ECP+EPP	

## *Supervisor/User Password Setting*

You can set either supervisor or user password, or both of them. The differences between are:

supervisor password : can enter and change the options of the setup menus.  
user password : just can enter but do not have the right to change the options of the setup menus.

When you select this function, the following message will appear at the center of the screen to assist you in creating a password.

ENTER PASSWORD:

Type the password, up to eight characters in length, and press <Enter>. The password typed now will clear any previously entered password from CMOS memory. You will be asked to confirm the password. Type the password again and press <Enter>. You may also press <Esc> to abort the selection and not enter a password.

To disable a password, just press <Enter> when you are prompted to enter the password. A message will confirm the password will be disabled. Once the password is disabled, the system will boot and you can enter Setup freely.

PASSWORD DISABLED.

When a password has been enabled, you will be prompted to enter it every time you try to enter Setup. This prevents an unauthorized person from changing any part of your system configuration.

Additionally, when a password is enabled, you can also require the BIOS to request a password every time your system is rebooted. This would prevent unauthorized use of your computer.

You determine when the password is required within the BIOS Features Setup Menu and its Security option (see Section 4). If the Security option is set to "System", the password will be required both at boot and at entry to Setup. If set to "Setup", prompting only occurs when trying to enter Setup.

## IDE HDD Auto Detection

The Enhance IDE features was included in all Award BIOS. Below is a brief description of this feature.

1. Setup Changes

<I> Auto-detection

BIOS setup will display all possible modes that supported by the HDD including NORMAL, LBA & LARGE.

if HDD does not support LBA modes, no 'LBA' option will be shown.

Users can select a mode which is appropriate for them.

ROM/PCI/ISA BOPS (2XXXXXXX)  
CMOS SETUP UTILITY  
AWARD SOFTWARE, INC.

<u>HARD DISKS</u>	<u>TYPE</u>	<u>SIZE</u>	<u>CYLS</u>	<u>HEAD</u>	<u>PRECOMP</u>	<u>LANDZ</u>	<u>SECTOR</u>
<u>MODE</u>							
Select Primary Master Option (N = Skip) : N							
OPTION	SIZE	CYLS	HEADS	PRECOMP	LANDZONE	SECTORS	
MODE							
1(Y)	516	1120	16	65535	1119	59	
NORMAL							
2	516	524	32	0	1119	63	LBA

<II> Standard CMOS Setup

	<u>CYLS</u>	<u>Heads</u>	<u>Precom</u>	<u>Landzone</u>	<u>Sector</u>	<u>Mode</u>
Primary Master:	User (516MB)	1120	16	65535	1119	59 Norma
Primary Slave:	None (203MB)	684	16	65535	685	38 -----

Secondary Master:	None	0	0	0	0	0	0
Secondary Slave	None	0	0	0	0	0	0

When HDD type is in 'user' type, the "MODE" option will be opened for user to select their own HDD mode.

## (2) 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)
x no. per sector	( 512)
<hr/>	
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 number 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:

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

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 HDD!

Example 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. A reverse transformation process will be made inside INT13h in order to access the right HDD address the right HDD address!

Maximum HDD size:

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

(3) Remarks

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(INT 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 INT 13h.

## *Hard Disk Low Level Format Utility*

This Award Low-Level-Format Utility is designed as a tool to save your time formatting your hard disk. The Utility automatically looks for the necessary information of the drive you selected. The Utility also searches for bad tracks and lists them for your reference.

Shown below is the Main Menu after you enter into the Award Low-Level-Format Utility.

<p style="text-align: center;">Hard Disk Low Level Format Utility</p> <hr/> <p style="text-align: center;">SELECT DRIVE BAD TRACK LIST PREFORMAT</p> <hr/> <p style="text-align: center;">Current select drive is: C</p> <p style="text-align: center;">DRIVE: C CYLINDER: 0 HEAD: 0</p>	<p style="text-align: center;">NO. CYLS HEAD</p> <hr/>
--	--

	Size	CYLS	Head	Precom	Landz	Sector	Mode
Primary Master	:	0	0	0	0	0	AUTO
Primary Slave	:	0	0	0	0	0	AUTO

Up/Down- Select item    ENTER-Accept    ESC-Exit/Abort Copyright (C) Award Software, Inc. 1992-94 All Rights Reserved
--

### Control Keys

Use the Up and Down arrow keys to move around the selections displayed on the upper screen. Press [Enter] to accept the selection. Press Esc to abort the selection or exit the Utility.

### SELECT DRIVE

Select from installed hard disk drive C or D. List at the bottom of the screen is the drive automatically detected by the utility.



## BAD TRACK LIST

### Auto scan bad track

The utility will automatically scan bad tracks and list the bad tracks in the window at the right side of the screen.

### Add bad track

Directly type in the information of the known bad tracks in the window at the right side of the screen.

### Modify bad track

Modify the information of the added bad tracks in the window at the right side of the screen.

### Delete bad track

Delete the added bad tracks in the window at the right side of the screen.

### Clear bad track table

Clear the whole bad track list in the window at the right side of the screen.

## PREFORMAT

### 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.

## *Power-On Boot*

After you have made all the changes to CMOS values and the system cannot boot with the CMOS values selected in Setup, restart the system by turning it OFF then ON or Pressing the "RESET" button on the system case. You may also restart by simultaneously press <Ctrl>, <Alt>, and <Delete> keys. Upon restart the system, immediately press <Insert> to load BIOS default CMOS value for boot up.

## *BIOS Reference - POST Message*

During the Power On Self Test (POST), if the BIOS detects an error requiring you to do something to fix, it will either sound a beep code or display a message.

If a message is displayed, it will be accompanied by:

PRESS F1 TO CONTINUE, CTRL-ALT-ESC OR DEL TO ENTER SETUP

### **POST Beep**

Currently there is only one beep code in BIOS. This code indicates that a video error has occurred and the BIOS cannot initialize the video screen to display any additional information. This beep code consists of a single long beep followed by two short beeps.

### **Error Messages**

One or more of the following messages may be displayed if the BIOS detects an error during the POST. This list includes messages for both the ISA and the EISA BIOS.

#### **CMOS BATTERY HAS FAILED**

CMOS battery is no longer functional. It should be replaced.

#### **CMOS CHECKSUM ERROR**

Checksum of CMOS is incorrect. This can indicate that CMOS has become corrupt. This error may have been caused by a weak battery. Check the battery and replace if necessary.

### **DISK BOOT FAILURE, INSERT SYSTEM DISK AND PRESS ENTER**

No boot device was found. This could mean that either a boot drive was not detected or the drive does not contain proper system boot files. Insert a system disk into Drive A: and press <Enter>. If you assumed the system would boot from the hard drive, make sure the controller is inserted correctly and all cables are properly attached. Also be sure the disk is formatted as a boot device. Then reboot the system.

### **DISKETTE DRIVES OR TYPES MISMATCH ERROR - RUN SETUP**

Type of diskette drive installed in the system is different from the CMOS definition. Run Setup to reconfigure the drive type correctly.

### **DISPLAY SWITCH IS SET INCORRECTLY**

Display switch on the motherboard can be set to either monochrome or color. This indicates the switch is set to a different setting than indicated in Setup. Determine which setting is correct, and then either turn off the system and change the jumper, or enter Setup and change the VIDEO selection.

### **DISPLAY TYPE HAS CHANGED SINCE LAST BOOT**

Since last powering off the system, the display adapter has been changed. You must configure the system for the new display type.

### **EISA Configuration Checksum Error PLEASE RUN EISA CONFIGURATION UTILITY**

The EISA non-volatile RAM checksum is incorrect or cannot correctly read the EISA slot. This can indicate either the EISA non-volatile memory has become corrupt or the slot has been configured incorrectly. Also be sure the card is installed firmly in the slot.

### **EISA Configuration Is Not Complete PLEASE RUN EISA CONFIGURATION UTILITY**

The slot configuration information stored in the EISA non-volatile memory is incomplete.

Note: When either of these errors appear, the system will boot in ISA mode, which allows you to run the EISA Configuration Utility.
---

### **ERROR ENCOUNTERED INITIALIZING HARD DRIVE**

Hard drive cannot be initialized. Be sure the adapter is installed correctly and all cables are correctly and firmly attached. Also be sure the correct hard drive type is selected in Setup.

### **ERROR INITIALIZING HARD DISK CONTROLLER**

Cannot initialize controller. Make sure the cord is correctly and firmly installed in the bus. Be sure the correct hard drive type is selected in Setup. Also check to see if any jumper needs to be set correctly on the hard drive.

### **FLOPPY DISK CNTRLR ERROR OR NO CNTRLR PRESENT**

Cannot find or initialize the floppy drive controller. make sure the controller is installed correctly and firmly. If there are no floppy drives installed, be sure the Diskette Drive selection in Setup is set to NONE.

### **Invalid EISA Configuration**

#### **PLEASE RUN EISA CONFIGURATION UTILITY**

The non-volatile memory containing EISA configuration information was programmed incorrectly or has become corrupt. Re-run EISA configuration utility to correctly program the memory.

NOTE: When this error appears, the system will boot in ISA mode, which allows you to run the EISA Configuration Utility.
--

### **KEYBOARD ERROR OR NO KEYBOARD PRESENT**

Cannot initialize the keyboard. Make sure the keyboard is attached correctly and no keys are being pressed during the boot.

If you are purposely configuring the system without a keyboard, set the error halt condition in Setup to HALT ON ALL, BUT KEYBOARD. This will cause the BIOS to ignore the missing keyboard and continue the boot.

### **Memory Address Error at ...**

Indicates a memory address error at a specific location. You can use this location along with the memory map for your system to find and replace the bad memory chips.

### **Memory parity Error at ...**

Indicates a memory parity error at a specific location. You can use this location along with the memory map for your system to find and replace the bad memory chips.

### **MEMORY SIZE HAS CHANGED SINCE LAST BOOT**

Memory has been added or removed since the last boot. In EISA mode use Configuration Utility to reconfigure the memory configuration. In ISA mode enter Setup and enter the new memory size in the memory fields.

### **Memory Verify Error at ...**

Indicates an error verifying a value already written to memory. Use the location along with your system's memory map to locate the bad chip.

### **OFFENDING ADDRESS NOT FOUND**

This message is used in conjunction with the I/O CHANNEL CHECK and RAM PARITY ERROR messages when the segment that has caused the problem cannot be isolated.

### **OFFENDING SEGMENT:**

This message is used in conjunction with the I/O CHANNEL CHECK and RAM PARITY ERROR messages when the segment that has caused the problem has been isolated.

### **PRESS A KEY TO REBOOT**

This will be displayed at the bottom screen when an error occurs that requires you to reboot. Press any key and the system will reboot.

### **PRESS F1 TO DISABLE NMI, F2 TO REBOOT**

When BIOS detects a Non-maskable Interrupt condition during boot, this will allow you to disable the NMI and continue to boot, or you can reboot the system with the NMI enabled.

**RAM PARITY ERROR - CHECKING FOR SEGMENT ...**

Indicates a parity error in Random Access Memory.

**Should Be Empty But EISA Board Found  
PLEASE RUN EISA CONFIGURATION UTILITY**

A valid board ID was found in a slot that was configured as having no board ID.

NOTE: When this error appears, the system will boot in ISA mode, which allows you to run the EISA Configuration Utility.
--

**Should Have EISA Board But Not Found  
PLEASE RUN EISA CONFIGURATION UTILITY**

The board installed is not responding to the ID request, or no board ID has been found in the indicated slot.

NOTE: When this error appears, the system will boot in ISA mode, which allows you to run the EISA Configuration Utility.
--

**Slot Not Empty**

Indicates that a slot designated as empty by the EISA Configuration Utility actually contains a board.

NOTE: When this error appears, the system will boot in ISA mode, which allows you to run the EISA Configuration Utility.
--

**SYSTEM HALTED, (CTRL-ALT-DEL) TO REBOOT ...**

Indicates the present boot attempt has been aborted and the system must be rebooted. Press and hold down the CTRL and ALT keys and press DEL.

**Wrong Board In Slot  
PLEASE RUN EISA CONFIGURATION UTILITY**

The board ID does not match the ID stored in the EISA non-volatile memory.

NOTE: When this error appears, the system will boot in ISA mode, which allows

you to run the EISA Configuration Utility.

## BIOS Reference - POST Codes

**Note:** EISA POST codes are typically output to port address 300h.  
ISA POST codes are output to port address 80h.

POST (hex)	Description
C0	<ol style="list-style-type: none"> <li>1. Turn off OEM specific cache, shadow...</li> <li>2. Initialize all the standard devices with default values standard devices includes:                             <ul style="list-style-type: none"> <li>-DMA controller (8237)</li> <li>-Programmable Interrupt Controller (8259)</li> <li>-Programmable Interval Timer (8254)</li> <li>-RTC chip</li> </ul> </li> </ol>
C1	Auto-detection of onboard DRAM & Cache
C3	<ol style="list-style-type: none"> <li>1. Test system BIOS checksum</li> <li>2. Test the first 256K DRAM</li> <li>3. Expand the compressed codes into temporary DRAM area including the compressed System BIOS &amp; Option ROMs</li> </ol>
C5	Copy the BIOS from ROM into E0000-FFFFF shadow RAM so that POST will go faster
01-02	Reserved
03	Initialize EISA registers (EISA BIOS only)
04	Reserved
05	<ol style="list-style-type: none"> <li>1. Keyboard Controller Self-Test</li> <li>2. Enable Keyboard Interface</li> </ol>
06	Reserved
07	Verifies CMOS's basic R/W functionality
BE	Program defaults values into chipset according to the MODBINable Chipset Default Table
09	<ol style="list-style-type: none"> <li>1. Program the configuration register of Cyrix CPU according to the MODBINable Cyrix Register Table</li> <li>2. OEM specific cache initialization (if needed)</li> </ol>
0A	<ol style="list-style-type: none"> <li>1. Initialize the first 32 interrupt vectors with corresponding Interrupt handlers Initialize INT no from 33-120 with Dummy(Suprious) Interrupt Handler</li> <li>2. Issue CPUID instruction to identify CPU type</li> <li>3. Early Power Management initialization (OEM specific)</li> </ol>

**This POST code is for boot block**

<b>POST (hex)</b>	<b>Description</b>
C0	1. Turn off OEM specific cache, shadow... 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
C1	Auto-detection of onboard DRAM & Cache
C3	Checking checksum of compressed code
C5	Copy the BIOS from ROM into E0000-FFFFFF shadow RAM so that POST will go faster
01	Clear base memory 0-640K
0C	Initial interrupt vector 00-1FH
0D	Initial ISA VGA
41H	Enable FDD and detect media type
FFH	Boot from FDD

**This page is for Non-Compressed Version only**

01-02	Reserved
C0	Turn off OEM specific cache, shadow...
03	<ol style="list-style-type: none"> <li>1. Initialize EISA registers (EISA BIOS only)</li> <li>2. Initialize all the standard devices with default values Standard devices includes: <ul style="list-style-type: none"> <li>-DMA controller (8237)</li> <li>-Programmable Interrupt Controller (8259)</li> <li>-Programmable Interval Timer (8254)</li> <li>-RTC chip</li> </ul> </li> </ol>
04	Reserved
05	<ol style="list-style-type: none"> <li>1. Keyboard Controller Self-Test</li> <li>2. Enable Keyboard Interface</li> </ol>
06	Reserved
07	Verifies CMOS's basic R/W functionality
BE	Program defaults values into chipset according to the MODBINable Chipset Default Table
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	<ol style="list-style-type: none"> <li>1. Program the configuration register of Cyrix CPU according to the MODBINable Cyrix Register Table</li> <li>2. OEM specific cache initialization (if needed)</li> </ol>
0A	<ol style="list-style-type: none"> <li>1. Initialize the first 32 interrupt vectors with corresponding Interrupt handlers Initialize INT no from 33-120 with Dummy(Suprious) Interrupt Handler</li> <li>2. Issue CPUID instruction to identify CPU type</li> <li>3. Early Power Management initialization (OEM specific)</li> </ol>

The following POST Codes are for all of Compress Version & Non-Compress Version

POST (hex)	Description
0B	<ol style="list-style-type: none"> <li>1. Verify the RTC time is valid or not</li> <li>2. Detect bad battery</li> <li>3. Read CMOS data into BIOS stack area</li> <li>4. PnP initializations including (PnP BIOS only) <ul style="list-style-type: none"> <li>-Assign CSN to PnP ISA card</li> <li>-Create resource map from ESCD</li> </ul> </li> <li>5. Assign IO &amp; Memory for PCI devices (PCI BIOS only)</li> </ol>
0C	Initialization of the BIOS Data Area (40 : 00 – 40:FF)
0D	<ol style="list-style-type: none"> <li>1. Program some of the Chipset's value according to Setup. (Early Setup Value Program)</li> <li>2. Measure CPU speed for display &amp; decide the system clock speed</li> <li>3. Video initialization including Monochrome, CGA, EGA/VGA. If no display device found, the speaker will beep which consists of one single long beep followed by two short beeps.</li> </ol>
0E	<ol style="list-style-type: none"> <li>1. Initialize the APIC (Multi-Processor BIOS only)</li> <li>2. Test video RAM (If Monochrome display device found)</li> <li>3. Show messages including: <ul style="list-style-type: none"> <li>-Award Logo, Copyright string, BIOS Date code &amp; Part No.</li> <li>-OEM specific sign on messages</li> <li>-Energy Star Logo (Green BIOS ONLY)</li> <li>-CPU brand, type &amp; speed</li> <li>-Test system BIOS checksum(Non-Compress Version only)</li> </ul> </li> </ol>
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, execute EISA initialization (EISA BIOS only)
1F-29	Reserved
30	Detect Base Memory & Extended Memory Size

31	<ol style="list-style-type: none"><li>1. Test Base Memory from 256K to 640K</li><li>2. Test Extended Memory from 1M to the top of memory</li></ol>
----	--

32	<ol style="list-style-type: none"><li>1. Display the Award Plug &amp; Play BIOS Extension message (PnP BIOS only)</li><li>2. Program all onboard super I/O chips (if any) including COM ports, LPT ports, FDD port... according to setup value</li></ol>
33-3B	Reserved
3C	Set flag to allow users to enter CMOS Setup Utility
3D	<ol style="list-style-type: none"><li>1. Initialize Keyboard</li><li>2. Install PS2 mouse</li></ol>

POST(hex)	Description
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
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
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 in the MODBINable Auto-Table
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
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 & parallel 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 settin

## *BIOS Default Drive Table*

This is a current list of the drive type table contained in Setup.

Type	Size (MB)	Cylinders	Heads	Sectors	Write Precomp	Land Zone	Example Model
1	10	306	4	17	128	305	TEAC SD510, MMI 112, 5412
2	20	615	4	17	300	615	Seagate ST225, ST4026
3	30	615	6	17	300	615	
4	62	940	8	17	512	940	
5	46	940	6	17	512	940	
6	20	615	4	17	None	615	Seagate ST125, Tandon TM262
7	30	462	8	17	256	511	
8	30	733	5	17	None	733	Tandon TM 703
9	112	900	15	17	None	901	
10	20	820	3	17	None	820	
11	35	855	5	17	None	855	
12	49	855	7	17	None	855	
13	20	306	8	17	128	319	Disctron 526, MMI M125
14	42	733	7	17	None	733	
15		Reserved					
16	20	612	4	17	0	663	Microscience HH725, Syquest 3250, 3425
17	40	977	5	17	300	977	
18	56	977	7	17	None	977	
19	59	1024	7	17	512	1023	
20	30	733	5	17	300	732	

21	42	733	7	17	300	732	
22	30	306	5	17	300	733	Seagate ST4038
23	10	977	4	17	0	336	

24	40	1024	5	17	None	976	Seagate ST4051
25	76	1224	9	17	None	1023	Seagate ST4096
26	71	1224	7	17	None	1223	Maxtor 2085
27	111	1224	11	17	None	1223	Maxtor 2140, Priam S14
28	152	1024	15	17	None	1223	Maxtor 2190, Priam S19
29	68	1024	8	17	None	1023	Maxtor 1085, Micropolis 1325
30	93	918	11	17	None	1023	Maxtor 1105 1120, 4780
31	83	925	11	17	None	1023	Maxtor 1170
32	69	1024	9	17	None	926	CDC 9415
33	85	1024	10	17	None	1023	
34	102	1024	12	17	None	1023	
35	110	1024	13	17	None	1023	
36	119	1024	14	17	None	1023	
37	17	1024	2	17	None	1023	
38	136	1024	16	17	None	1023	
39	114	918	15	17	None	1023	Maxtor 1140, 4380
40	40	820	6	17	None	820	Seagate ST251
41	42	1024	5	17	None	1023	Seagate 4053 Miniscribe 3053/6053
42	65	1024	5	26	None	1023	Miniscribe 3053/6053 RLL
43	40	809	6	17	None	852	Miniscribe 3650
44	61	809	6	26	None	852	Miniscribe 3675 RLL
45	100	776	8	33	None	775	Conner CP3104
46	203	684	16	38	None	685	Conner CP3204
User							

## Appendix Watch Dog Timer

**Set up menu: refer to Page 4-24, "Integrated Peripherals"**

WDT Configuration port	F2	Default at F2
Watch Dog Timer	Disabled	1. Default at disabled
	Enabled	2. Enabled for user's programming
WDT Time out active for	Reset NMI	Default at Reset
WDT Active Time	1 sec	Default at 64sec
	2 sec	
	4 sec	
	8 sec	
	16 sec	
	32 sec	
	64 sec	

You can program "INDEX 7D" in the CMOS RAM to read or change the set up information.

**Example**

- Read index 7D in the CMOS RAM
 

```
MOV    DX, 70
MOV    AL, 7D
OUT    DX, AL
MOV    DX, 71
IN     AL, DX
```
- Write to index 7D in the CMOS RAM
 

```
MOV    DX, 70
MOV    AL, 7D
OUT    DX, AL
MOV    DX, 71
MOV    AL, Data
OUT    DX, AL
```

## Port Used

Default at F2

## Bit definitions of F2

- D4: 1 select NMI  
0 select Reset
- D3: 1 Enable watch dog timer  
0 Disable watch dog timer

< D2, D1, D0>:	111	:	N/A
	110	:	Select 1 second
	101	:	Select 2 second
	100	:	Select 4 second
	011	:	Select 8 second
	010	:	Select 16 second
	001	:	Select 32 second
	000	:	Select 64 second

## Watch dog Timer Programming Procedure

- Power on or reset the system  
The values of D4~D0 in port F2 are zero, i.e. the watch dog timer is disabled
- Clear the WDT, repeatedly read port F2 with the duration no longer than the preset time out interval, otherwise, the WDT will generate NMI or reset the system.

- Initialize the SQW of RTC, set SQW output period=0.5 second
  - Out port 70 = 0A
  - Out port 71 = 2F ( generate SQW = 0.5 Sec.)
  - Out port 70 = 0B
  - Out port 71 = 0A ( enable the SQW output)
  
- Select the time out intervals of WDT (decide the values of D2, D1, D0 in F2 , if you reset the system, i.e. D2~D0 = 0, the time out interval will be 64 sec.)
  
- Select NMI or CPU reset (decide D4 value in F2 or F6, if you just reset the system, i.e. D4 = 0, then it's CPU reset)
  
- Enable or disable WDT ( decide D3 value in F2, if you reset the system, i.e. D3=0, it's "disable")
  
- You should build in a mechanism in the program to always read F2 to clear WDT before the time out of WDT.

An Example

- a. Enable watchdog timer
- b. Select I/O port F2 & set WDT timer at 1 sec interval
- c. Select NMI
- d. Enable WDT
- e. Clear WDT
- f. Disable WDT

**a. Set RTC to generate WDT timer source "SQW" to generate 0.5 sec. duty cycle timer source**

```
MOV    AL, 0A    ; Set RTC output signal "SQW" to generate 0.5 sec.
                    cycling timer
MOV    DX, 070
OUT    DX, AL
MOV    AL, 2F
MOV    DX, 071
OUT    DX, AL

MOV    AL, 0B    ; Enable "SQW" signal pin active
MOV    DX, 070
OUT    DX, AL
MOV    AL, 0A
MOV    DX, 071
OUT    DX, AL
```

**b. Select WDT timer setting (use port F2)**

```
MOV    AL, 06    ; Setting WDT=1 sec.
MOV    DX, 0F2
OUT    DX, AL
```

**c. Select WDT for NMI or reset (select NMI)**

```
MOV    DX, 70
MOV    AL, 7D
OUT    DX, AL
MOV    DX, 71
IN     AL, DX
OR     AL, 10
MOV    DX, 0F2
OUT    DX, AL
MOV    BL, AL
MOV    DX, 70
MOV    AL, 7D
OUT    DX, AL
MOV    DX, 71
MOV    AL, BL
OUT    DX, AL
```

**d. Enable WDT**

```
MOV    DX, 70
MOV    AL, 7D
OUT    DX, AL
MOV    DX, 71
IN     AL, DX
OR     AL, 08
MOV    DX, 0F2
OUT    DX, AL
MOV    BL, AL
MOV    DX, 70
MOV    AL, 7D
OUT    DX, AL
MOV    DX, 71
MOV    AL, BL
OUT    DX, AL
```

e. **Clear WDT (this operation should be repeatedly executed before WDT time out, e.g. if WDT time out set at 16 sec., then to clear WDT, the instruction should be executed within 16 sec. repeatedly)**

```
MOV    DX, 0F2
IN     AL, DX
```

f. **Disable WDT**

```
MOV    DX, 70
MOV    AL, 7D
OUT    DX, AL
MOV    DX, 71
IN     AL, DX
AND    AL, 0F7
OUT    DX, AL
MOV    BL, AL
MOV    DX, 70
MOV    AL, 7D
OUT    DX, AL
MOV    DX, 71
MOV    AL, BL
OUT    DX, AL
```

You can also combine programming procedure b+c+d with same subroutine, for example, set WDT=1 sec, select NMI and go to enable WDT. The instruction as followings.

```
MOV    AL, 01E    ; Directly write to port F2 to set WDT=1 sec, select NMI
                    and Enable WDT
MOV    DX, 0F2
OUT    DX, AL
MOV    DX, 70    ; Save to CMOS index 7D
MOV    AL, 7D
OUT    DX, AL
MOV    AL, 01E
MOV    DX, 71
OUT    DX, AL
```