AR-B8020

**R8610 Processor with LAN, PCI/104, COMs,USB 2.0
Onboard SSD.**

**Edition: 1.1
Book Number: AR-B8020-08.07.22**

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Contents

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Introduction

1.1 Specifications:

CPU : RDC R8610 133 MHz, L1 Cache 16KB, 216pin LQFP

RAM memory : Onboard 64MB default, Min 32MB optional

IDE Interface : 1 x 44-P 2x22x2.0mm support ATA-33 (ITE8211F)

Series ports : Three high-speed 16C550 compatible UARTs ports.COM2/3 can also support RS-485.

USB port : Support Two USB 2.0 compatible ports.

Digital IO : Supports eight digital-in, and eight digital-out TTL-level I/O ports.

PS/2 Mouse/Keyboard : Keyboard Mouse pin header

Extention Bus: PC/104 *Plus* Connector

SSD : Onboard Solid-State Drive(SSD) 128MB default, Max 256MB optional

Watchdog timer : Time setting form 1 to 255 second / minute System Reset generate when CPU did not periodically trigger the timer.

Intel LAN Controller: Single ports IEEE 802.3u Auto-Negotiation support for IC+ IP101A 10/100BASE-TX Connected to your LAN through pin header.

Power Consumption : 12V / 5V

Operating Temperature : -10∘ ~ 60∘ C (CPU needs Cooler)

Dimension: 90.17mm(W) X m95.88m(L)

1.2 What You Have

In addition to this *User's Manual*, the AR-B8020 package includes the following items:

AR-B8020 board

User Manual

Drive CD

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Installation

This chapter describes how to install the AR-B8020. At first, the layout of AR-B8020 is shown, and the unpacking information that you should be careful is described. The jumpers and switches setting for the AR-B8020's configuration

2.1 AR-B8020's Layout
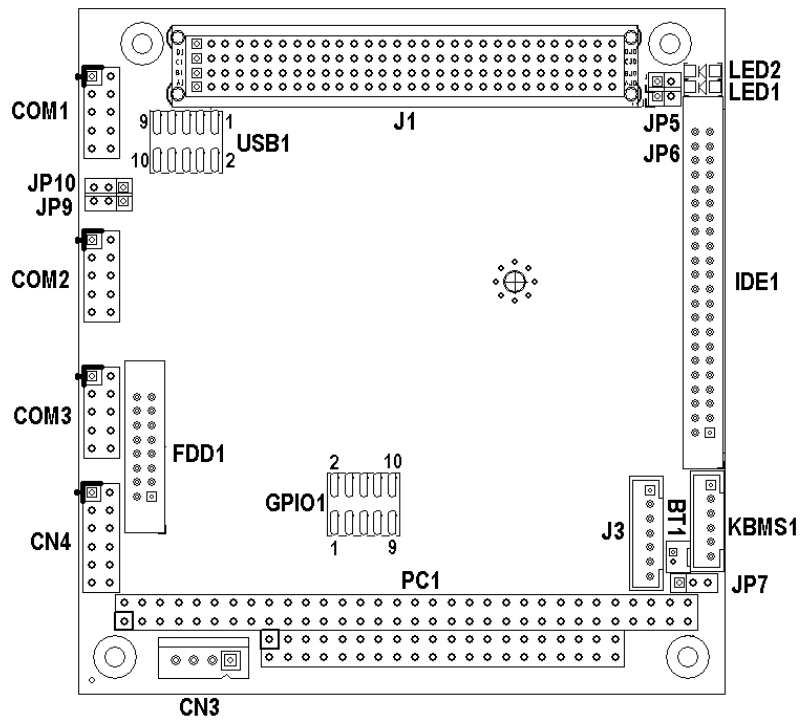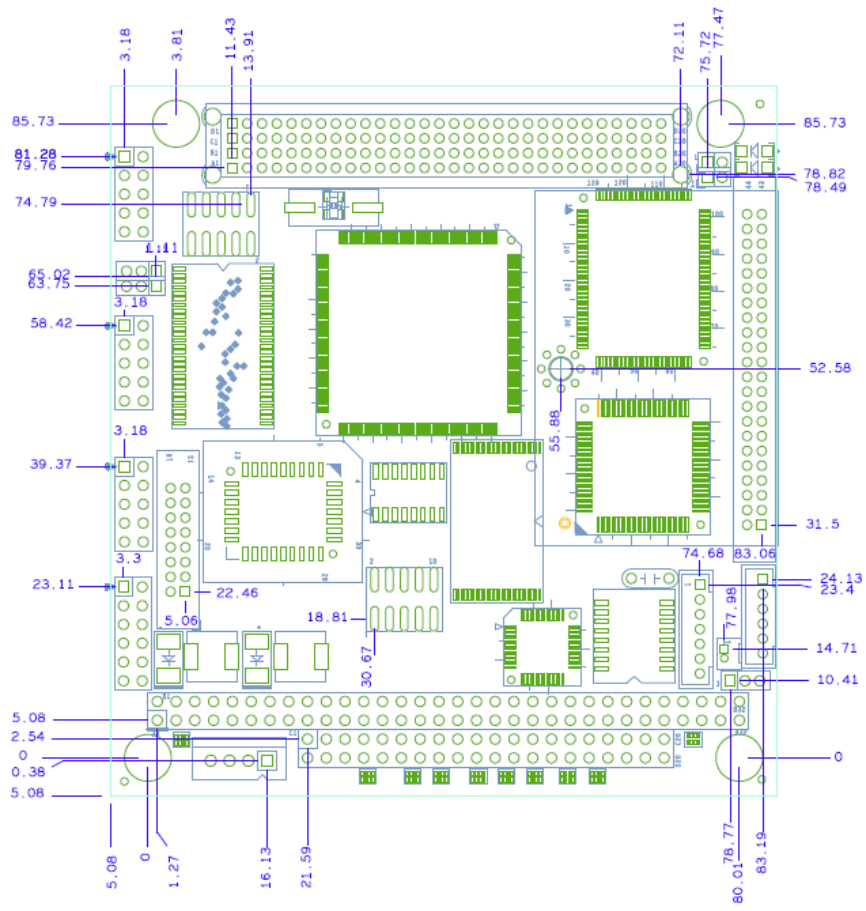
2.2 Power description

- **CN3 : power connecter**

PIN NO.	DESCRIPTION
1	+12V
2	GND
3	GND
4	+5V
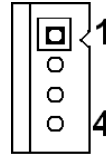
- **JP6: PCI-104 +3.3V source from on board or other**

JP6	Description
Short	+3.3V on board
Open	other
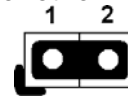
2.3 CMOS Reset

- **JP7: CMOS Reset**

JP7	DESCRIPTION
1-2	Normal Operation
2-3	Clear CMOS
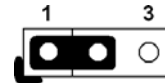
2.4 Jumper description

- **JP5 : Short SERIRQ Connect to PCI104 Pin B1**

JP5	Description
Short	Connect
Open	Unconnect
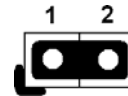
- **JP9/JP10 : Select COM2/3 is RS232 or RS485**

JP9/JP10	DESCRIPTION
1-2	RS232
2-3	RS485
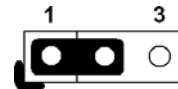
3

Connection

This chapter describes how to connect peripherals, switches and indicators to the AR-B8020 board.

3.1 Ultra ATA33/66 IDE Disk Drive Connector(IDE1)

You can attach one IDE(Integrated Device Electronics) hard disk drives to the AR-B8020 IDE controller.

● **IDE1 : IDE Connector (44 Pins)**

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
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	N/C	22	GROUND
23	IOW#	24	GROUND
25	IOR#	26	GROUND
27	N/C	28	BALE - DEFAULT
29	N/C	30	GROUND - DEFAULT
31	INTERRUPT	32	IOCS16#-DEFAULT
33	SA1	34	N/C
35	SA0	36	SA2
37	HDC CS0#	38	HDC CS1#
39	HDD ACTIVE#	40	GROUND
41	+5V LOGIC	42	+5V MOTOR
43	GROUND	44	TYPE
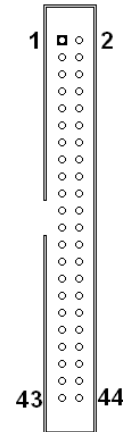
AR-B8020

3.2 Serial Ports(COM1~3)

The AR-B8020 offers two high speeds NS16C550 compatible UARTs with Read/Receive 16 byte FIFO serial ports.

- **COM1/2/3 : RS-232 Serial port (Pin Header)**

PIN	DESCRIPTION	PIN	DESCRIPTION
1	-DCD	2	-DSR
3	RXD	4	-RTS
5	TXD	6	-CTS
7	-DTR	8	-RI
9	GND	10	GND
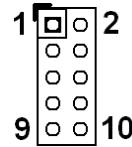
NOTE : COM1(I/O BASE:3F8), COM2(I/O BASE:2F8) , COM3(I/O BASE:3E8)

3.3 Keyboard / Mouse Connector(KBMS1)

A PS/2 type connector(MSKB1)is for easy connection to a keyboard and PS/2 mouse. The board comes with a Y split PS/2 cable for keyboard and mouse pin header.

- **KBMS1: Keyboard and Mouse port(Pin Header)**

PIN NO.	DESCRIPTION
1	M_DATA
2	K_DATA
3	GND
4	+5V
5	M_CLK
6	K_CLK

3.4 USB Port Connector(USB1~2)

The AR-B8020 provides two USB pin header.

- **USB1 : USB Pin header**

PIN	DESCRIPTION	PIN	DESCRIPTION
1	VCC	2	VCC
3	USB1-	4	USB2-
5	USB1+	6	USB2+
7	GND	8	GND
9	USB_GND	10	USB_GND
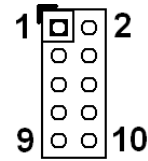
3.5 Front Connector (CN4)

The AR-B8020 provides one connectors for two RS485 and HDD
LED ,RESET ,SPEAKER ,POWER LED(Pin Header).

- **CN4 : Two RS485 with HDD LED and RESET ,SPEAKER ,POWER LED(Pin Header)**

PIN	DESCRIPTION	PIN	DESCRIPTION
1	TX0+	2	TX1+
3	TX0-	4	TX1-
5	+5V	6	+5V
7	GND	8	IDE_LED
9	+5V	10	SPEAKER
11	RESET	12	GND
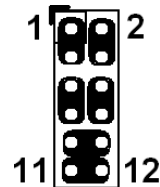
PIN NO.	DESCRIPTION
1-3	RS485(COM2)
2-4	RS485(COM3)
5-7	POWER LED
6-8	HDD LED
9-10	SPEAKER
11-12	RESET

3.6 LAN pin header(J3)

AR-B8020 is equipped with built-in 10/100Mbps Ethernet Controller. You can connect it to your LAN through LAN pin header. The pin assignments are as following:

- **J3 : LAN port(Pin Header)**

PIN NO.	DESCRIPTION
1	TX+
2	TX-
3	RX+
4	RX-
5	GND
6	Connect RC Circuit to Ground
7	Connect RC Circuit to Ground

3.7 FDD(FDD1)

AR-B8020 board is equipped with a 16-pin daisy-chain driver connecting cable.

- **FDD1 : Floppy port (Pin Header)**

PIN	DESCRIPTION	PIN	DESCRIPTION
1	DENSEL	2	INDEX#
3	DR#	4	MTR#
5	GND	6	DIR#
7	STEP#	8	WDATA#
9	WGATB#	10	TRK#
11	GND	12	WRTPRP#
13	RDATA#	14	HSIDE#
15	DSKCHG#	16	GND
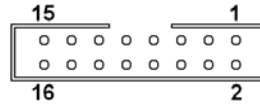
3.8 8-BIT GPIO Connector(GPIO1)

- **GPIO1 : Connector(Pin header)**

PIN	DESCRIPTION	PIN	DESCRIPTION
1	GPIO0	2	GPIO1
3	GPIO2	4	GPIO3
5	GPIO4	6	GPIO5
7	GPIO6	8	GPIO7
9	GND	10	+5V

4
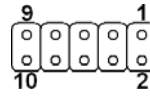
AMI BIOS Setup

4.1 Introduction

This chapter provides information on the BIOS Setup program
and allows you to configure the system for optimum use.
You may need to run the Setup program when:

◇ An error message appears on the screen during the system booting
    up, and requests you to run SETUP.
◇ You want to change the default settings for customized features.

4.2 Starting Setup

Power on the computer and the system will start POST (Power On Self
Test) process. When the message below appears on the screen, press
<DEL> key to enter Setup.

Press DEL to enter SETUP

If the message disappears before you respond and you still wish to enter
Setup, restart the system by turning it OFF and On or pressing the
RESET button. You may also restart the system by simultaneously
pressing <Ctrl>, <Alt>, and <Delete> keys.

Getting Help
After entering the Setup menu, the first menu you will see is the Main
Menu.

Main Menu

The main menu lists the setup functions you can make changes to. You can use the control keys (Up/Down Arrow) to select the item. The on-line description of the highlighted setup function is displayed at the bottom of the screen.

Sub-Menu
If you find a right pointer symbol appears to the left of certain fields that means a sub-menu containing additional options can be launched from this field. You can use control keys (Up Arrow ,Down Arrow) to highlight the field and press <Enter> to call up the sub-menu. Then you can use the control keys to enter values and move from field to field within a sub-menu. If you want to return to the main menu, just press <Esc >.

General Help <F1>
The BIOS setup program provides a General Help screen. You can call up this screen from any menu by simply pressing <F1>. The Help screen lists the appropriate keys to use and the possible selections for the highlighted item. Press <Esc> to exit the Help screen.

Control Keys

Key	Function
Up/Down Arrow	Select Screen
Right/Left Arrow	Select Item
+/- Key	Change Option/Field
Enter key	Go to Sub Screen
PGDN key	Next Page
PGUP key	Previous Page
HOME key	Go to Top of Screen
END key	Go to Bottom of Screen
F2/F3 key	Change Colors
F7 key	Discard Changes
F8 key	Load Failsage Defaults
F9 key	Load Optimal Defaults
F10 key	Save and Exit
ESC key	Exit

4.3 Standard CMOS Features

The items in Standard CMOS Features Menu are divided into several categories. Each category includes no, one or more than one setup items. Use the arrow keys to highlight the item and then ue the <PgUp> or <PgDn> keys to select the value you want in each item.
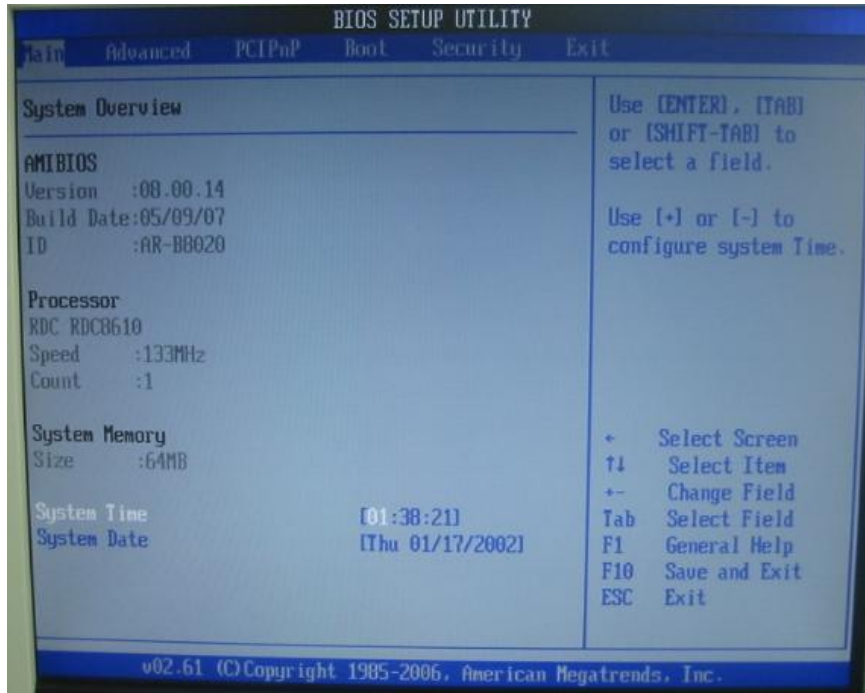
Figure 1 Standard CMOS Features

System Time

This allows you to set the system time that you time format is <hour> <minute> <second>.

System Date

This allows you to set the system to the date that The format is <day><mnth> <date> <year>.

day Day of the week, from Sun to Sat, determined by BIOS. Read-only.

month The month from Jan. through Dec.

date The date from 1 to 31 can be keyed by numeric function keys.

year The year can be adjusted by users.

4.4 Advanced BIOS Features
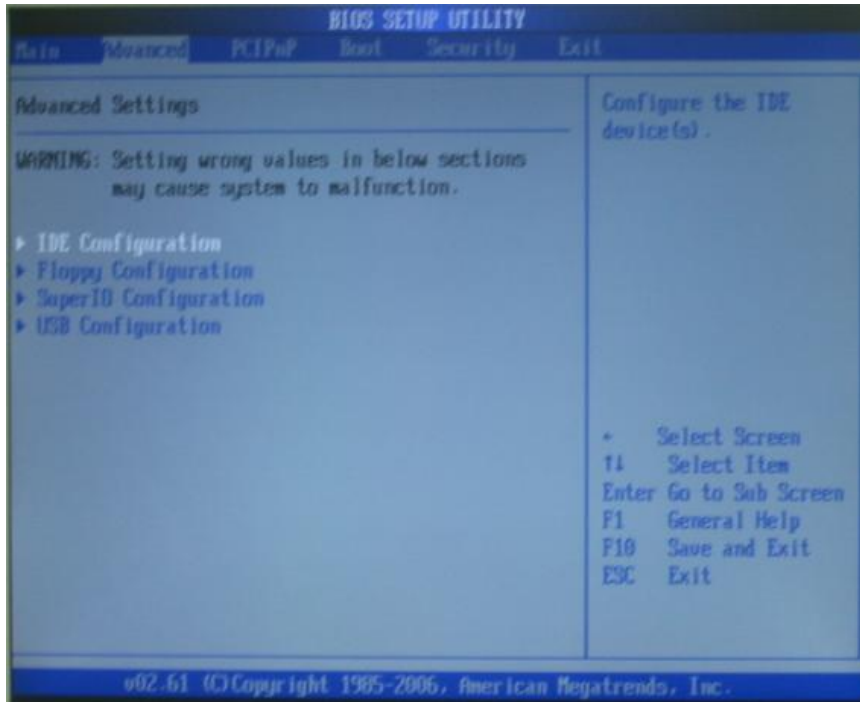
Figure 2 IDE Configuration

IDE Configuration
The IDE adapters control the hard disk drive. Use a separate sub menu to configure each hard disk drive.
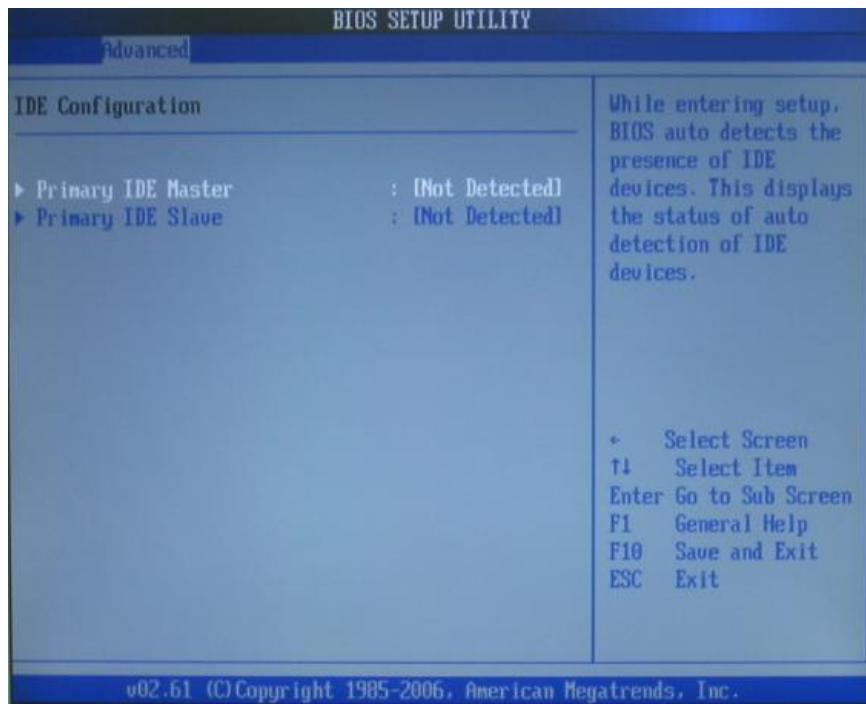
Figure 3 Primary IDE Master/Slave

Primary IDE Master/ Slave
Press <+> or <-> to select the hard disk drive type. The specification of hard disk drive will show up on the right hand according to your selection. Press <Enter> for the sub-menu of each item:
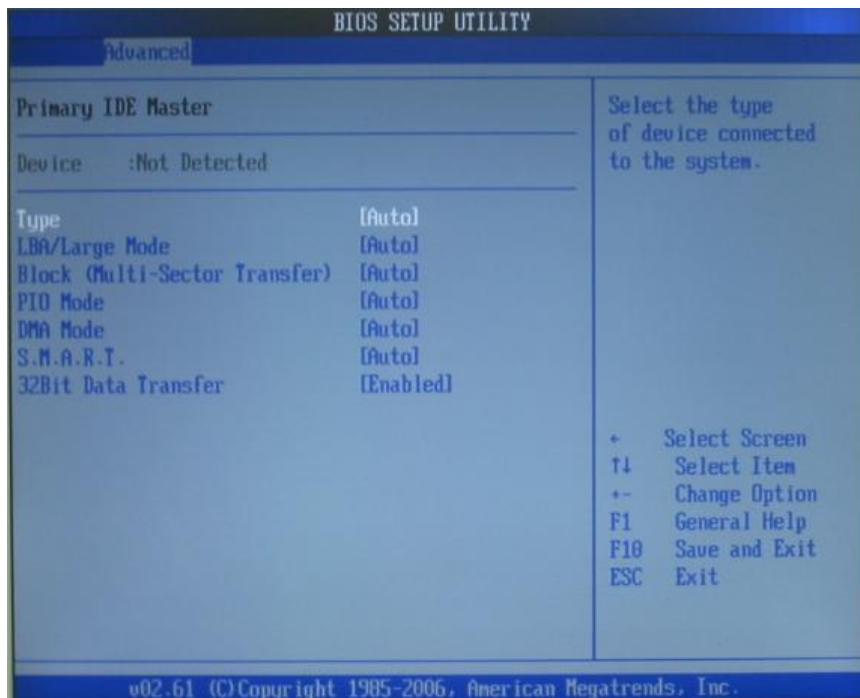
Figure 4 Primary IDE Master

Device
This item shows the information about the specified item (Read-only).
Type
This item defines the HDD parameters.
LBA/Large Mode
This item allows you to enable or disable the LBA (Logical Block Address, the logical block size in hard disk) mode.
Setting options: [Auto], [Disabled].
Block Mode
When the setting is Auto, it will read or write more sector at every circle to enhance the hard disk performance.
Setting options: [Auto], [Disabled].
PIO Mode
The PIO (Programmed Input/Output) Mode let you set a PIO mode (0-4) for the IDE devices that the onboard IDE interface supports. Modes 0

through 4 provide successively increased performance. In Auto mode, the system automatically determines the best mode for each device. The settings are: [Auto], [Mode 0], [Mode 1], [Mode 2], [Mode 3], [Mode 4].

DMA Mode

This item allows you to enable or disable the DMA (Direct Memory Access) mode.
Setting options: [Auto].

Hard Disk S.M.A.R.T.

This allows you to activate the S.M.A.R.T. (Self-Monitoring Analysis & Reporting Technology) capability for the hard disks. S.M.A.R.T is a utility that monitors your disk status to predict hard disk failure. This gives you an opportunity to move data from a hard disk that is going to fail to a safe place before the hard disk becomes offline.
Settings: [Auto], [Enabled], [Disabled].

32Bit Data Transfer

This allows you to activate the 32bit data transfer to enhance the IDE hard disk performance.
Settings options: [Enabled], [Disabled].
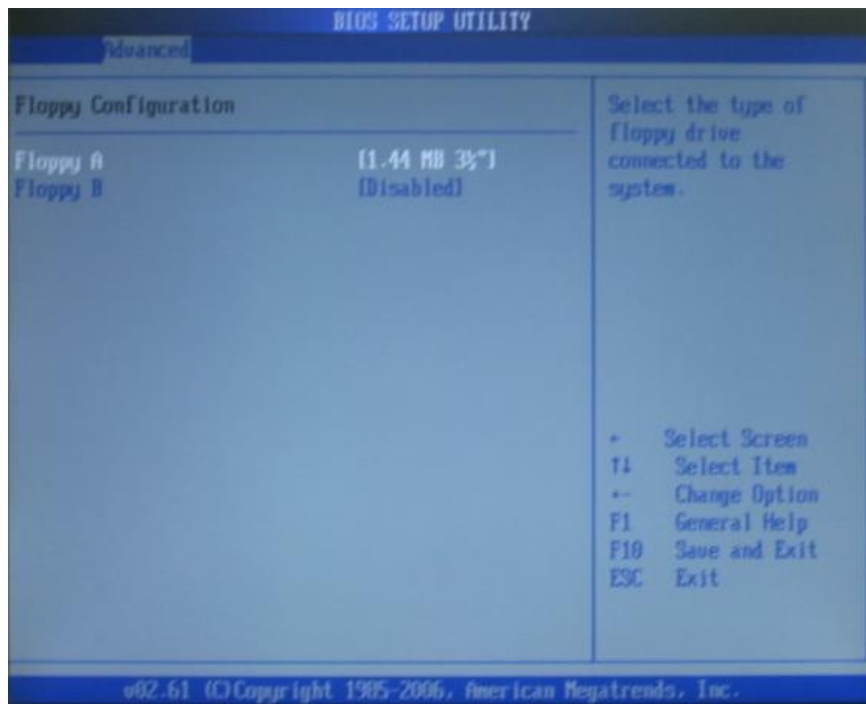
Figure 5 Floppy Configuration

Floppy A

This item allows you to set the type of floppy drives installed.

Available options:

[Disabled], [360K, 5.25 in.], [1.2M, 5.25 in.], [720K, 3.5 in.], [1.44M, 3.5 in.], [2.88M, 3.5 in.].
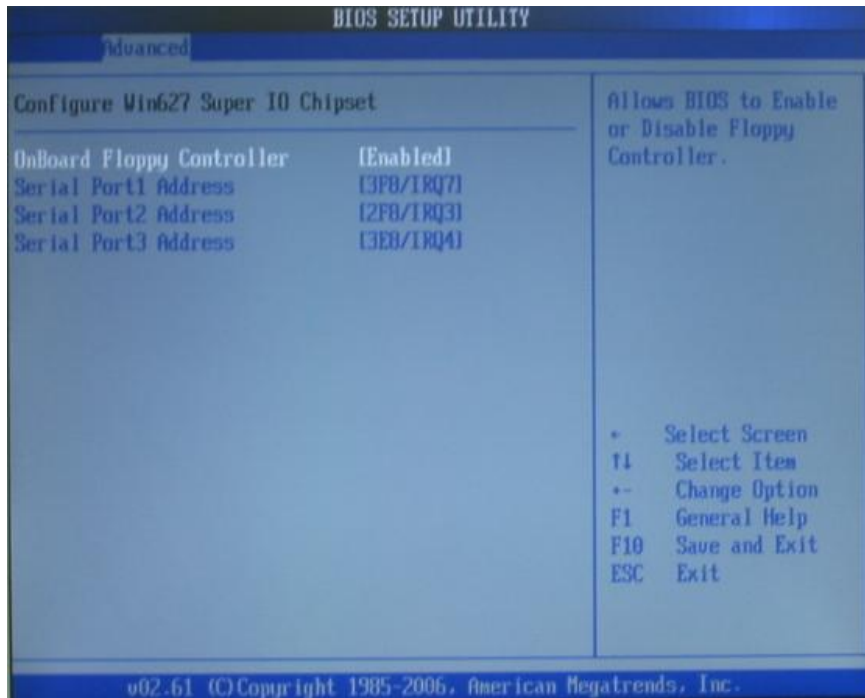
Figure 6 Super IO Configuration

Onboard Floppy Controller

Select [Enabled] if your system has a floppy disk controller (FDD) installed on the system board and you wish to use it. If you install add-on FDC or the system has no floppy drive, select [Disabled] in this field.

The settings are: [Enabled], [Disabled].

Serial Port 1 Address

Select an address and corresponding interrupt for Serial Port 1.

Setting options:

[Disabled], [3F8/IRQ7] , [2F8/IRQ7], [3E8/IRQ7], [2E8/IRQ7].

Serial Port 2 Address

Select an address and corresponding interrupt for Serial Port 2.

Setting options:

[Disabled], [3F8/IRQ4], [2F8/IRQ3], [2E8/IRQ3].

Serial Port 1 Address

Select an address and corresponding interrupt for Serial Port 3.

Setting options:

[Disabled], [3F8/IRQ4], [3E8/IRQ4], [2E8/IRQ3].
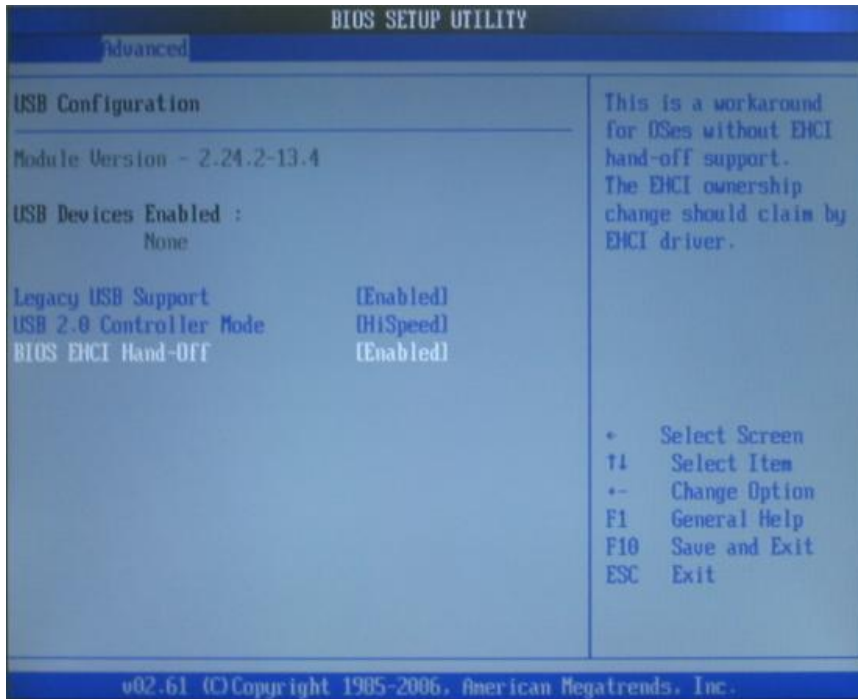
Figure 7 USB Configuration

USB Device Legacy Support

Set to Enabled if your need to use any USB 1.1/2.0 device in the operating system that does not support or have any USB 1.1/2.0 driver installed, such as DOS and SCO Unix. Set to Disabled only if you want to use any USB device other than the USB mouse.

Setting options: [Disabled], [Enabled], [Auto].

USB 2.0 Controller

Set to [Enabled] if you need to use any USB 2.0 device in the operating system that does not support or have any USB 2.0 driver installed, such as DOS and SCO Unix.

Setting options: [Fullspeed], [Hispeed].

BIOS EHCI Hand-Off

This is a workaround for Oses without EHCI hand-off support.

The EHCI ownership change should claim by EHCI driver.

Setting options: [Enabled], [Disabled].

4.5 PCI PnP

This section describes configuring the PCI bus system and PnP (Plug & Play) feature. PCI, or Peripheral Component Interconnect, is a system which allows I/O devices to operate at speeds nearing the speed the CPU itself uses when communicating with its 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.

```
                        BIOS SETUP UTILITY
   Main    Advanced    PCIPnP    Boot    Security    Exit

  Advanced PCI/PnP Settings                        Clear NVRAM during
                                                   System Boot.
  WARNING: Setting wrong values in below sections
           may cause system to malfunction.

  Clear NVRAM                   [No]
  PCI Latency Timer             [64]

  IRQ3                          [Available]
  IRQ4                          [Available]
  IRQ5                          [Available]
  IRQ9                          [Available]
  IRQ10                         [Available]      +     Select Screen
  IRQ11                         [Available]      ↑↓    Select Item
  IRQ14                         [Available]      +-    Change Option
  IRQ15                         [Available]      F1    General Help
                                                 F10   Save and Exit
  Reserved Memory Size          [Disabled]       ESC   Exit


         v02.61 (C)Copyright 1985-2006, American Megatrends, Inc.
```
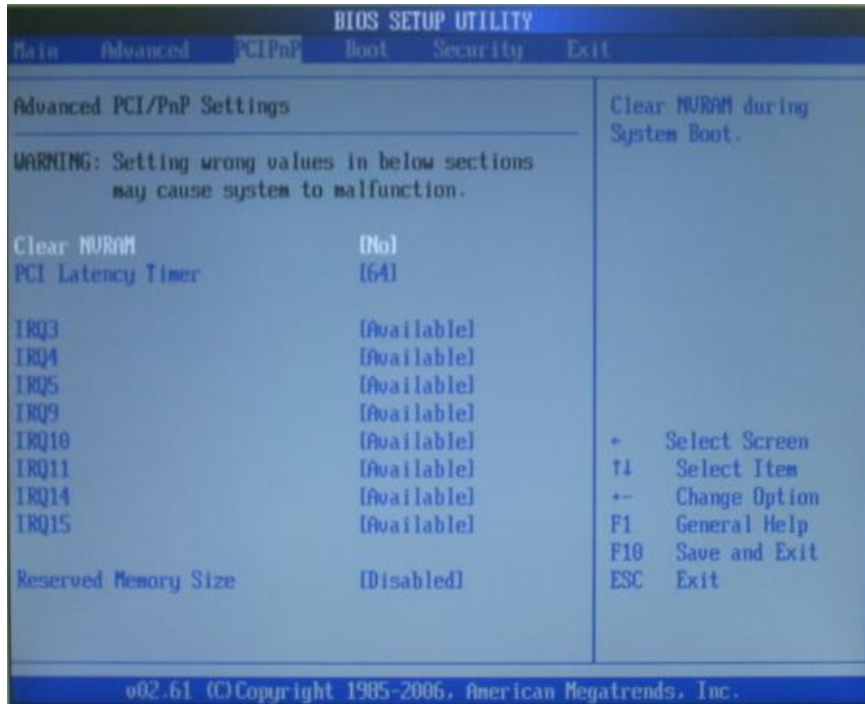
Figure 8 PCI PnP Configuration

Clear NVRAM
The ESCD (Extended System Configuration Data) NVRAM (Non-volatile Random Access Memory) is where the BIOS stores resource information for both PNP and non- PNP devices in a bit string format. When the item

---

is set to [Yes], the system will reset ESCD NVRAM right after the system is booted up and then set the setting of the item back to [No] automatically.

PCI Latency Timer

This item controls how long each PCI device can hold the bus before another takes over. When set to higher values, every PCI device can conduct transactions for a longer time and thus improve the effective PCI bandwidth. For better PCI performance, you should set the item to higher values. Setting options: [32], [64], [96], [128], [160], [192], [224], [248].

IRQ 3/4/5/9/10/11/14/15

These items specify the bus where the specified IRQ line is used.The settings determine if BIOS should remove an IRQ from the pool of available IRQs passed to devices that are configurable by the system BIOS. The available IRQ pool is determined by reading the ESCD NVRAM. If more IRQs must be removed from the IRQ pool, the end user can use these settings to reserve the IRQ by assigning an [Reserved] setting to it. Onboard I/O is configured by AMIBIOS. All IRQs used by onboard I/O are configured as [Available]. If all IRQs are set to [Reserved], and IRQ 14/15 are allocated to the onboard PCI IDE, IRQ 9 will still be available for PCI and PnP devices. Available settings: [Reserved] and [Available].

Reserved Memory Size

Size of memory block to reserve for legacy ISA devices.
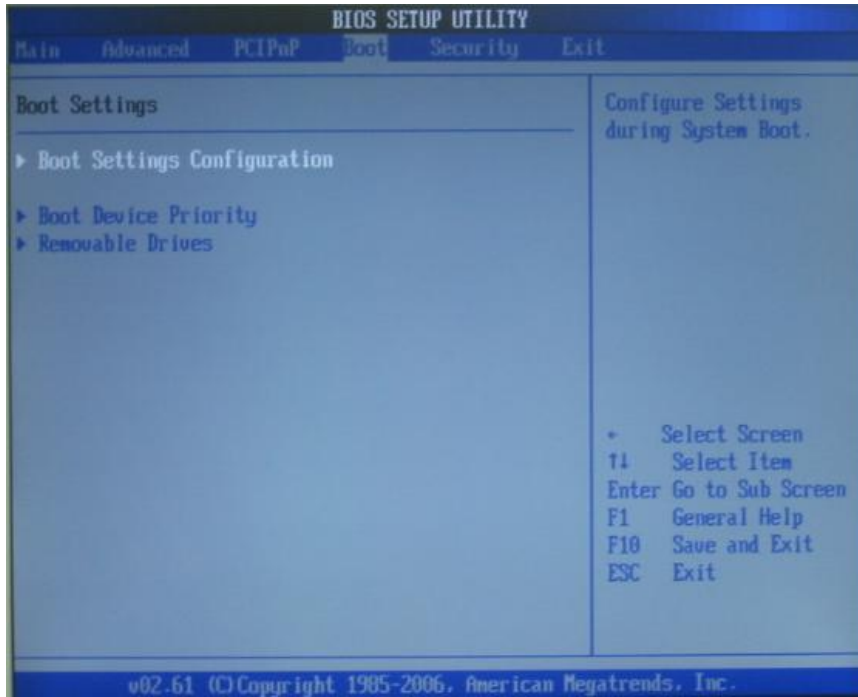Setting options: [Disabled], [16K], [32K], [64K].
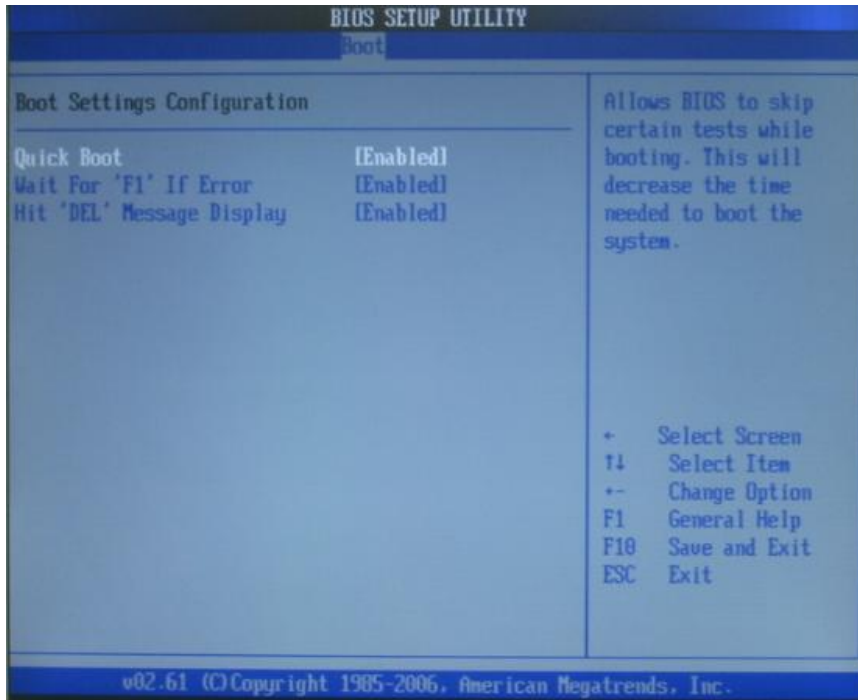
4.6 Boot

Figure 9 Boot Setting

Figure 10 Boot Setting configuration

Boot settings Configuration
Press <Enter> to enter the sub-menu, and the following screen appears.
Quick Boot
Select Enabled to reduce the amount of time required to run the power-on self-test (POST). A quick POST skips certain steps. We recommend that you normally disable quick POST. It is better to find a problem during POST than lose data during your work.
Setting options: [Enabled], [Disabled].
Wait For 'F1' If Error
Wait for F1 key to be pressed if error occurs.
Setting options: [Enabled], [Disabled].
Hit 'DEL' Message Display
Displays 'Press DEL to run Setup' in POST.

Setting options: [Enabled], [Disabled].
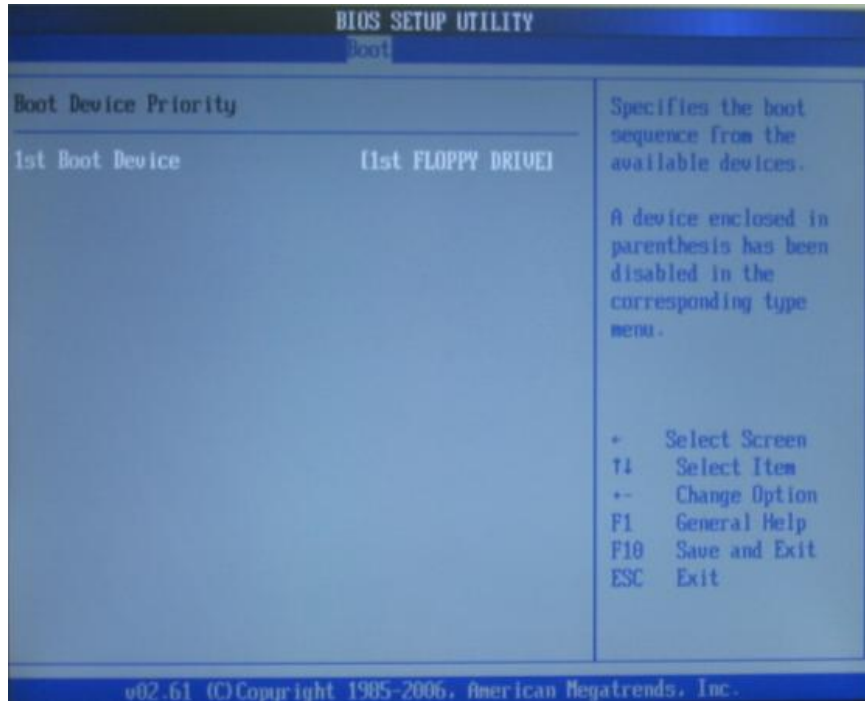
Figure 11 Boot Device Priority

Boot Device Priority
Press <Enter> to enter the sub-menu, and the following screen appears.
1st/2nd/3rd Boot Device
The items allow you to set the sequence of boot devices where BIOS attempts to load the disk operating system.

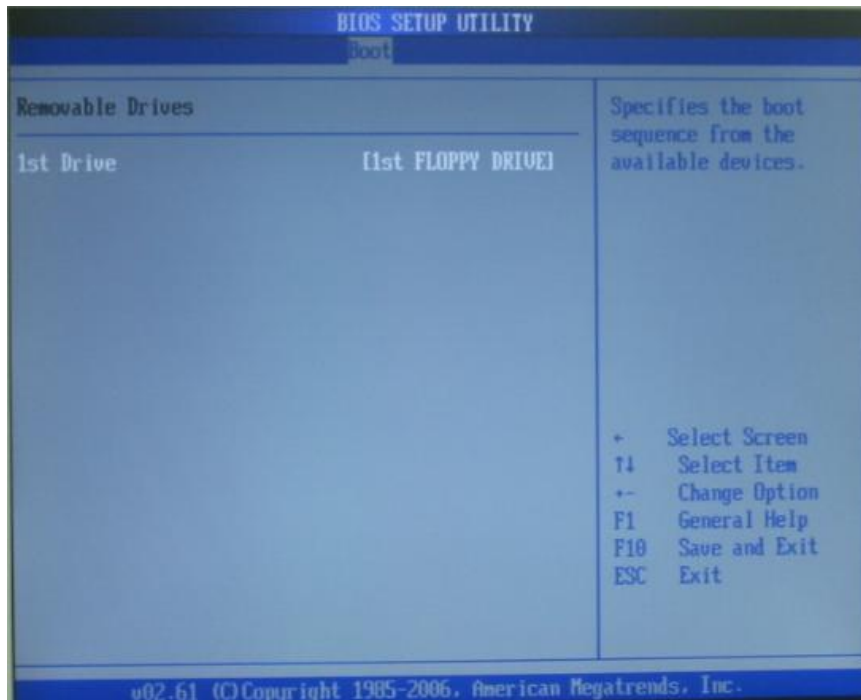Figure 12 Removable Drives

Removable Device
Press <Enter> to enter the sub-menu, and the following screen appears.
1st/2nd/3rd Boot Device
The items allow you to specifies the Boot Device Priority sequence from available Removable Drives.

4.7 Security
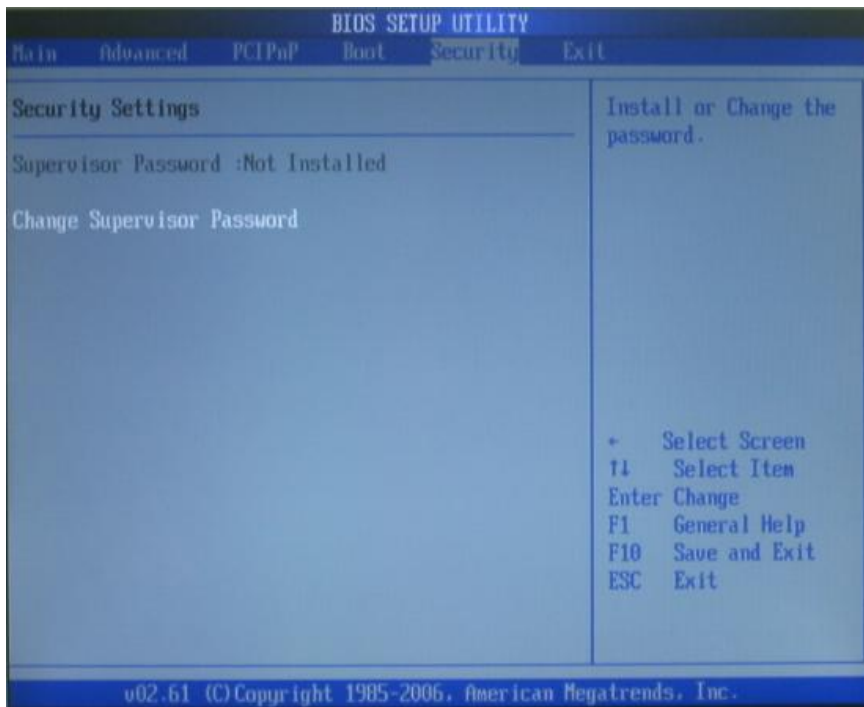
Figure 13 Change Supervisor Password

Type the password, up to six characters in length, and press <Enter>. The password typed now will replace any previously set password from CMOS memory. You will be prompted to confirm the password. Retype the password and press <Enter>. You may also press <Esc> to abort the selection and not enter a password. To clear a set password, just press <Enter> when you are prompted to enter the password. A message will show up confirming the password will be disabled. Once the password is disabled, the system will boot and you can enter Setup without entering any password. When a password has been set, 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.

4.8 Exit
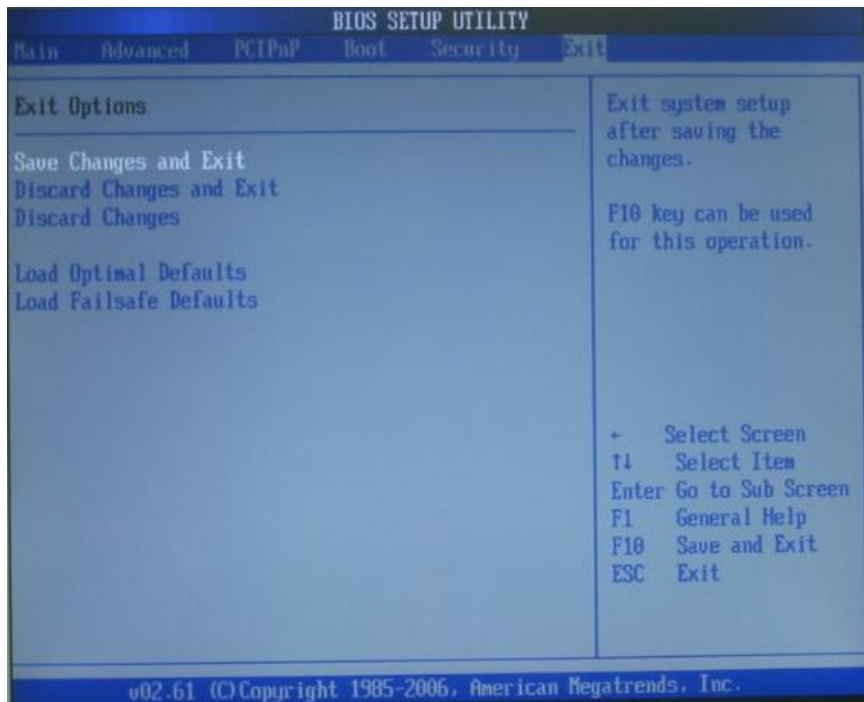
Save Changes & Exit Setup
Save changes to CMOS and exit setup.
Discard Changes and Exit
Abandon all changes and exit setup.
Discard Changes
Abandon all changes without exit setup.
Load Optimized Defaults
Use this menu to load the default values set by the main board manufacturer specifically for optimal performance of the main board.
Load Fail-Safe Defaults

Use this menu to load the default values set by the BIOS vendor for stable system performance.

Appendix A. Watchdog Timer

The WDT(Watch Dog Timer)is used to generate a variety of output signals after a user programmable cont. The WDT is suitable for use in the prevention of system lock-up, such as when software becomes trapped in a deadlock. Under these sort of circumstances, the timer will count to zero and the selected outputs will be driven. Under normal circumstance, the user will restart the WDT at regular intervals before the timer counts to zero.

WATCHDOG TIMER SETTING
The watchdog timer is a circuit that maybe be used from your program software to detect crash or hang up. The watchdog timer is automatically disabled after reset. Once you enabled the watchdog timer, your program should trigger the watchdog timer every time before it times out. After you trigger the watchdogtimer, the timer will be set to zero and start to count again. If your program fails to trigger the watchdog timer before times out, it will generate a reset pulse to reset the system or trigger the IRQ9 signal in order to tell your system that the watchdog time is out.

User could test watch dog function under 'Debug.exe' program as follows:

WDT Example	Description
o 2e 87	;Extended Functions Enable Register
o 2e 87	;Extended Functions Enable Register
o 2e 07	;EFIR=EFER(Extended Function Index Register)point to Logical Device Number Reg.
o 2f 08	;EFDR=EFIR+1, select logical device 8
o 2e 30	;select CR30

o 2f 01	;update CR30 with value 01H
o 2e f6	;select CRF6
o 2f 08	;update CRF6 with value 08H,(8sec reset)
g	;go

Appendix B: Digital I/O

One characteristic of digital circuit is its fast response to high or low signal. This kind of response is highly needed for harsh and critical industrial operating environment. Digital Input and Output, generally, are control signals. You can use these signals to control external devices that needs On/Off circuit or TTL devices. You can read or write data to the selected address to enable the function of digital IO.

Users could test GPIO function under 'Debug.exe' program as follow:

GPO Example	Description
O 2E 87	;Eetended Functions Enable Register
O 2E 87	;Eetended Functions Enable Register
O 2E 2A	;Select CR2A
O 2F FC	;(Define the PINs as GPIO or Game Port 1) "FC" Pin 121~128 set as GPIO
O 2E 07	;EFIR=EFER(Extended Functions Index Register)point to Logical Device Number Reg.
O 2F 07	;EFDR=EFIR+1(select logical device 7,GPIO in logical device 7)
O 2E 30	;select CR30(Active or inactive)
O 2F 01	;set 01(Active), 00(inactive)
O 2E F0	;select CRF0(Set the PINs be GPO or GPI Function)
O 2F 00	;set the PINs be GPO
O 2E F2	;select CRF2(Output High/Low)
O 2F 00	;set the PINs be all Low Level(FF=all High Level)
O 2E F1	;select CRF1
O 2F FF	;set the Output to be FF(all High)
O 2E AA	;exit EFER
Q	;quit debug

GPI Example	Description
O 2E 87	;Extended Functions Enable Register
O 2E 87	;Extended Functions Enable Register
O 2E 2A	;select CR2A
O 2F FC	;(Define the PINs as GPIO or Game Port1)"FC"Pin121~128 set as GPIO
O 2E 07	;EFIR=EFER(Extended Functions Index Register)point to Logical Device Number Reg.
O 2F 07	;EFDR=EFIR+1(select logical device 7,GPIO in logical device7)
O 2E 30	;select CR30(Active or inactive)
O 2F 01	;set 01(Active) , 00(Inactive)
O 2E F0	;select CRF0(Set the PINs be GPO or GPI Funciton)
O 2F FF	;set the PINs be GPI
O 2E F1	;select CRF1(Set the PINs be Read only)
I 2F	;Show the PINs Value
Q	;Quit debug

Appendix C: Memory Address Map

1ST MB MEMORY ADDRESS MAP

MEMORY ADDRESS	DESCRIPTION
0000 003F	Interrupt vector table
0040 004F	BIOS data area
0050 006F	DOS data area
0070 00C8	IBMBIO
00C9 4E26	IBMDOS
4E27 9FFF	Available
A000 AFFF	VGA Graphics
B000 B7FF	Unused
B800 BFFF	VGA Text
C000 C7FF	Video ROM
C800 EFFF	Unused
F000 FFFF	System ROM

IRQ Mapping Chart

IRQ	FUNCTION
0	Timer Ouput 0
1	Keyboard
2	Cascade
3	COM2
4	COM1
5	LPT2
6	Diskette Controller
7	LPT1
8	Real Time Clock
9	Reserved
10	Reserved
11	Reserved
12	Reserved
13	Co-Processor
14	Fixed Disk
15	Reseved