

**SAGP-648E**  
**SOCKET 478 PENTIUM 4 with**  
**Ethernet & USB 2.0 & IEEE 1394**  
**PCB Revision 1.1**

**User Manual Version 1.0**

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Any questions regarding the content of this manual or related issues can be e-mailed to us directly at: [support@iei.com.tw](mailto:support@iei.com.tw).

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## 1. Introduction

Thank you for choosing SAGP-648E SOCKET 478 Pentium 4 Single Board Computer. SAGP-648E board is an AGP/PCI form factor board equipped with high performance processor and multi-mode I/O, designed for system manufacturers, integrators, or VARs that want to provide quality and reliable performance at a reasonable price.

The AGP interface can support external AGP slot with AGP4X/8X capability and Fast Write Transactions. A high bandwidth and mature SiS MuTIOL 1G technology is incorporated to connect SiS648 and SiS963 MuTIOL 1G media I/O together.

For the application that needs a high-speed serial transmission, SAGP-648E provides both 1394 and USB 2.0 for your choice. The high speed USB 2.0 host controller implements an ECHI interface that provides 480Mb/s bandwidth. The integrated 1394a controller supports bus transfer rate of 400Mbits/s.

An advanced high performance super LPC I/O chip–W83627HF is used in SAGP-648E board. Both on-chip UARTs are compatible with the NS16C550. The parallel port and IDE interface are compatible with IBM PC/AT architecture.

SAGP-648E built-in 10/100 Fast Ethernet LAN. It is a fully integrated 10BASE-T/100BASE-TX LAN solution with high performance and low power features.

SAGP-648E uses the advanced SiS 648/963 Chipsets which are 100% software compatible with PCI 2.2 standard.

## 1.1 Specifications

CPU (PGA 478)	Intel Pentium 4 Processor, supports 400/533 MHz FSB (SET BY BIOS)
Bus interface	AGP/PCI bus, PICMG compliant
Bus speed	PCI: 33MHz
DMA channels	7
Interrupt levels	15
Chipset	SIS 648/SIS 963
RAM memory	Two 184-pin DIMM sockets support DDR266/333 SDRAM. The maximum memory is up to 2 GB.
Ultra DMA 133 IDE interface	Up to four PCI Enhanced IDE hard drives. Ultra DMA 133 IDE can handle data transfer up to 133 MB/s. Compatible with existing ATA IDE specifications, so there is no need to do any changes for users' current accessories.
Floppy disk drive interface	Supports up to two floppy disk drives, 5.25" (360 KB and 1.2 MB) and/or 3.5" (720 KB, 1.44 MB, and 2.88 MB)
Serial ports	Two RS-232 ports with 16C550 UART (or compatible) with 16-byte FIFO buffer. Support up to 115.2 Kbps. The ports can be individually configured to COM1, COM2, or disabled.
Bi-directional parallel port	Configurable to LPT1, LPT2, LPT3 or disabled. Supports EPP/ECP/SPP.
Hardware monitor	Built-in to monitor power supply voltage and fan speed status
IrDA port	Supports Serial Infrared (SIR) and Amplitude Shift Keyed IR (ASKIR) interface
USB 2.0/1.1 port	Supports 4 USB 2.0/1.1 ports for future expansion
1394 port	Supports 2 1394 ports compliant with 1394 OHCI specification 1.1, IEEE 1394-1395 and 1394a-2000.
Watchdog timer	Software Programmable Reset generated when CPU does not periodically trigger the timer.
Serial ATA	Supports two independent serial ATA channels. Serial ATA generation 1 transfer rate of 150MB/s*.
Ethernet	SIS963 integrated fast Ethernet MAC features an IEEE802.3 and 802.3x compliant MAC supporting full duplex 10-base-T, 100-base-T Ethernet.
Keyboard and PS/2 mouse connector	A 6-pin mini DIN connector is located on the mounting bracket for easy connection to a keyboard or PS/2 mouse. For alternative application, a keyboard and a PS/2 mouse pin header connector are also available.

Audio	AC'97 Audio CODEC
Compact flash	It can be used with a passive adapter (True IDE Mode) in a Type I/II Socket.
Power consumption	PENTIUM 4: 2.4 GHz, 1 GB DDR333 DDR-SDRAM +5V @ 7.3A, +12V @ 4.8A Recommended: 350-watt power supply or higher
Operating temperature	0 ~ 55 (*CPU needs cooler & silicone heatsink paste*)

**Warning:**

1. Never run the processor without the heatsink (Cooler).
2. Always use ATX-12V Power Connector (PWR1) to provide power to the CPU.

**\*Note:** SATA is incompatible with backplane with RAID controller.

## 1.2 Package Contents

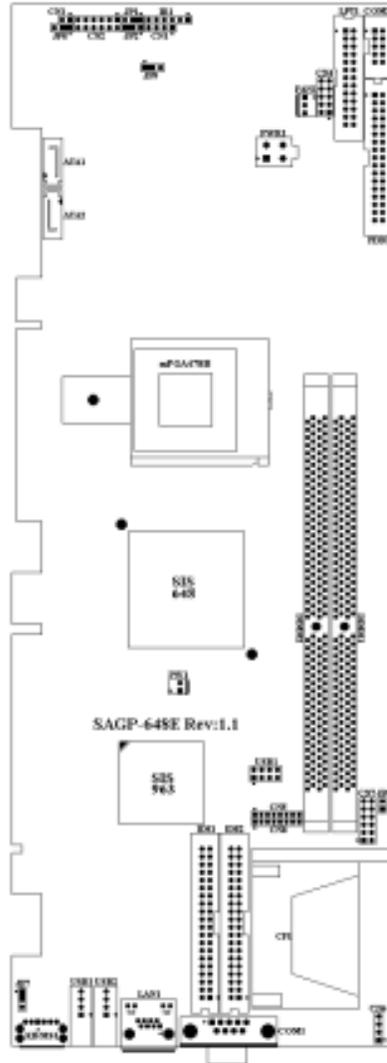
SAGP-648E package includes the following items:

- SAGP-648E Single Board Computer x 1
- RS-232 and printer cable with bracket x 1
- FDD cable x 1
- ATA IDE cable x 2
- SATA IDE cable x 2
- SATA Power cable x 2
- IEEE1394 cable x 1
- AUDIO cable x 1
- ATX-12V cable x 1
- Keyboard and mouse Y-Adapter cable x 1
- Driver CD x 1
- User Manual x 1

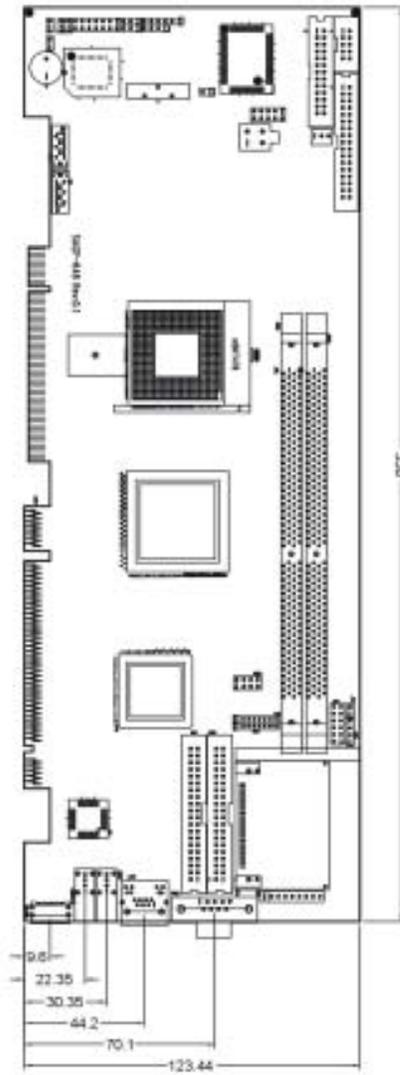
If any of these items are missing or damaged, contact the dealer from whom you purchased this product. Save the shipping materials and carton in case you want to ship or store the product in the future.

## 2. Installation

### 2.1 SAGP-648E Layout



## 2.2 SAGP-648E Dimensions (Unit: mm)



## 2.3 Unpacking Precautions

Some components on SAGP-648E are very sensitive to static electric charges and can be damaged by a sudden rush of power. To protect it from unintended damage, be sure to follow these precautions:

- Ground yourself to remove any static charge before touching SAGP-648E. You can do it by using a grounded wrist strap at all times or by frequently touching any conducting materials that is connected to the ground.
- Handle SAGP-648E by its edges. Don't touch IC chips, leads or circuitry if not necessary.
- Do not plug any connector or jumper while the power is on.

**Note:** All shaded rows in tables of this manual are the default settings for SAGP-648E.

## 2.4 Clear CMOS Setup

To clear CMOS Setup (for example if you have forgotten the password, you should clear the CMOS and then re-set the password), you should close the JP2 (1-2) for about 3 seconds, and open it once more. This will set back to normal operation mode.

- **JP2: Clear CMOS Setup**

JP2	Description
2-3 (Default)*	Keep CMOS Setup (Normal Operation)
Short 1-2	Clear CMOS Setup

## 2.5 Compact Flash Master/Slave Function Setting

- **JP6: Compact Flash Master/Slave Function Setting**  
Short 1 - 2 pin, Compact Flash is Master

JP6	Description
Close	Master
Open	Slave

## 2.6 COM2 RS232 or RS422/485 Selection

- **JP1: COM2-RS232 or RS422/485 Selection**

JP1	Description
1-2 Short	RS232
2-3 Short	RS422/485

- **JP9: COM2-RS422 or RS/485 Selection**

JP9	Description
1-2 Short	RS422
2-3 Short	RS485

**Note:** When RS422/485 is in use, the COM port on the main board will be disabled.

## 2.7 Select KB/MS Power Setting

- **JP7: Select KB/MS Power Setting**

JP7	Description
1-2 Short	+5V_DUAL
2-3 Short	+5V

## 2.8 Enable/Disable Serial ATA Function Setting

- **JP8: Enabled/Disabled Onboard SATA Function**

JP8	Description
1-2 Short	Enabled
2-3 Short	Disabled

### 3. Connection

This chapter describes how to connect peripherals, switches and indicators to the SAGP-648E board.

<b>Label</b>	<b>Function</b>
IDE1 & IDE2	Ultra ATA133 Primary & Secondary IDE connectors
FDD1	Floppy connector
LPT1	Parallel port connector
COM1 & COM2	Serial port connectors
CF1	Compact Flash Storage Card Type II connector
IR1	IRDA infrared interface port
USB1	USB dual port connector
USB2 & USB3	USB port connectors
LAN1	LAN RJ45 connector
KB/MS1	6-pin Mini-Din Keyboard & Mouse connector
FAN1	FAN connector
ATA1 & ATA2	Serial ATA connectors
CN1	COM2 RS-422/485 connector
CN2	External switches and indicators
CN3	Serial ATA LED connector
CN4	Digital I/O connector
CN5 & CN8	IEEE1394 connectors
CN6	Audio CD in connector
CN7	Audio connector
PW1	ATX Power Button connector
PWR1	ATX +12V Power connector

### 3.1 Audio Connector

The onboard AC'97 CODEC supports several audio functions. The audio connectors are described below.

- **CN7: Audio Connector**  
(Speaker out, Line out, Line in, and MIC in)

PIN	Description	PIN	Description
1	Speaker out (Left)	2	Speaker Out (Right)
3	GROUND	4	GROUND
5	Line Out (Left)	6	Line Out (Right)
7	Line In (Left)	8	Line In (Right)
9	GROUND	10	GROUND
11	MIC In	12	GROUND

- **CN6: Audio CD in Connector**

PIN	Description
1	CD SIGNAL (LEFT)
2	GROUND
3	GROUND
4	CD SIGNAL (RIGHT)

### 3.2 PCI E-IDE Disk Drive Connector

You can attach up to four IDE (Integrated Device Electronics) devices.

- **IDE1: Primary IDE Connector**
- **IDE2: Secondary IDE Connector**
- **IDE1 & IDE2: IDE Interface Connector**

<b>PIN</b>	<b>Description</b>	<b>PIN</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	DRQ	22	GROUND
23	IOW#	24	GROUND
25	IOR#	26	GROUND
27	CHRDY	28	REV. PULL LOW
29	DACK	30	GROUND-DEFAULT
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

### 3.3 Parallel Port Connector

Usually a printer is connected to the parallel port. SAGP-648E includes an on-board parallel port, accessed via a 26-pin flat-cable connector PRN1.

- **LPT1: Parallel Port Connector**

PIN	Description	PIN	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 LN#	18	GROUND
19	GROUND	20	GROUND
21	GROUND	22	GROUND
23	GROUND	24	GROUND
25	GROUND	26	NC

### 3.4 ATX Power Button Connector

- **PW1: ATX Power Button Connector**

PIN	Description
1	PWRBTN
2	GROUND

### 3.5 USB Port Connector

SAGP-648E is equipped with four USB (Version. 2.0) ports for the future new I/O bus expansion.

- **USB1: 2-port USB Connector**

PIN	Description	PIN	Description
1	VCC	5	VCC
2	DATA0-	6	DATA1-
3	DATA0+	7	DATA1+
4	GROUND	8	GROUND

- **USB2, USB3: 1-port USB Connector**

PIN	Description
1	VCC
2	DATA0-
3	DATA0+
4	GROUND

### 3.6 Serial ATA LED Connector

SAGP-648E is equipped one LED connector to display Serial ATA active.

- **CN3: Serial ATA LED Connector**

PIN	Description
1	GROUND
2	SERIAL ATA ACTIVE

### 3.7 Serial Port

SAGP-648E offers two high speed NS16C550 compatible UARTs with 16-byte Read/Receive FIFO serial ports.

- **COM1: D-SUB-9 Serial Port Connector**

PIN	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)

- **COM2: 10Pin Serial Port Connector**

PIN	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)
10	GROUND (GND)

### 3.8 Keyboard/Mouse Connector

SAGP-648E has a 6-pin DIN keyboard/mouse connector and a 5-pin keyboard connector.

- **KB/MS1: Mini DIN Keyboard/Mouse Connector**

PIN	Description
1	KEYBOARD DATA
2	MOUSE DATA
3	GROUND
4	+5V
5	KEYBOARD CLOCK
6	MOUSE CLOCK

### 3.9 IrDA Infrared Interface Port

The SAGP-648E comes with an integrated IrDA port which supports either a Serial Infrared (SIR) or an Amplitude Shift Keyed IR (ASKIR) interface.

- **IR1: IrDA Connector**

PIN	Description
1	VCC
2	NC
3	IR-RX
4	Ground
5	IR-TX
6	CIR-RX

### 3.10 Fan Connector

SAGP-648E also has a CPU with cooling fan connector and chassis fan connector, which can supply 12V/500mA to the cooling fan. There is a "rotation" pin in the fan connector, which transfers the fan's rotation signal to the system BIOS in order to recognize the fan speed. Note that only specific fans offer a rotation signal.

- **FAN 1: CPU Fan Connector**

PIN	Description
1	Rotation Signal
2	+12V
3	Ground

### 3.11 Digital I/O Connector

SAGP-648E has a 4-bit IN and 4-bit OUT built-in digital I/O connector. The DIO is 5V CMOS signal. Internal pull-up is existed on the output.

- **CN4: 10-pin Digital I/O Connector**

PIN	Description	PIN	Description
1	GROUND	2	+5V
3	Digital Output_3	4	Digital Output_2
5	Digital Output_1	6	Digital Output_0
7	Digital Input_3	8	Digital Input_2
9	Digital Input_1	10	Digital Input_0

### 3.12 External Switches and Indicators

There are several external switches and indicators for monitoring and controlling your CPU board. All functions are in the CN2 connector.

- **CN2: Pin Assignment and Functions**

Function	PIN	Description
BUZZER	2	BUZZER-
	4	NC
	6	NC
	8	VCC
RESET	10	RESET
	12	GROUND
HDD LED	9	IDE_LED+
	11	IDE_LED-
POWER LED	1	LED+
	3	LED- (GROUND)
RESERVED	5	GROUND
	7	NC

### 3.13 LAN Connector

SAGP-648E is equipped with Ethernet Controllers 10/100Mbps, which are connected to the LAN via an RJ45 LAN connector. The pin assignments are as follows:

- **LAN1: RJ45 Connector (10/100)**

PIN	Description	PIN	Description
1	TX+	7	N/C
2	TX-	8	N/C
3	RX+	9	Speed +
4	N/C	10	Speed -
5	N/C	11	Active/LINK +
6	RX-	12	Active/LINK -

### 3.14 RS422/485 Connector

This connector is RS422/485 port of COM2. The RS485 port of SAGP-648E is half-duplex with auto direction. So you do not have to switch transfer mode while sending or receiving data

- **CN1: RS 422/485 Connector**

PIN	Description
1	TX+
2	TX-
3	RX+
4	RX-

### 3.15 Serial ATA Connector

SAGP-648E provides two serial ATA ports to connect with serial ATA devices.

- **ATA1, ATA2: Serial ATA Connector**

PIN	Description	PIN	Description
1	S_TXP	3	S_RXN
2	S_TXN	4	S_RXP

### 3.16 Floppy Connector

The SAGP-648E board is equipped with a 34-pin daisy-chain drive connector cable.

- **FDD1: Floppy Connector**

PIN	Description	PIN	Description
1	GROUND	2	RWC0-
3	GROUND	4	NC
5	GROUND	6	RWC1-
7	GROUND	8	INDEX-
9	GROUND	10	MO-A
11	GROUND	12	DS-B
13	GROUND	14	DS-A
15	GROUND	16	MO-B
17	GROUND	18	DIR-
19	GROUND	20	STEP-
21	GROUND	22	WD-
23	GROUND	24	WGATE-
25	GROUND	26	TRK0-
27	GROUND	28	WP-
29	GROUND	30	RDATA-
31	GROUND	32	HEAD-

33	GROUND	34	DSKCHG-
----	--------	----	---------

### 3.17 IEEE 1394 Port Connector

SAGP-648E provides two built-in IEEE 1394 ports to connect with IEEE1394 devices.

- **CN5, CN6: IEEE1394 Connector**

PIN	Description	PIN	Description
1	+12V	5	TPA-
2	GND	6	TPA+
3	TPB-	7	SHIELD
4	TPB+	8	SHIELD

### 3.18 Compact Flash Storage Card Socket

SAGP-648E configures Compact Flash Storage Card in IDE Mode. This type II Socket is compatible with IBM Micro Drive.

- **CF1: Compact Flash Storage Card Socket pin assignment**

PIN	Description	PIN	Description
1	GROUND	26	PULL DOWN
2	D3	27	D11
3	D4	28	D12
4	D5	29	D13
5	D6	30	D14
6	D7	31	D15
7	CS1#	32	CS3#
8	N/C	33	N/C
9	GROUND	34	IOR#
10	N/C	35	IOW#
11	N/C	36	VCC
12	N/C	37	IRQ15
13	VCC	38	VCC
14	N/C	39	MASTER/SLAVE
15	N/C	40	N/C
16	N/C	41	RESET#
17	N/C	42	IORDY
18	A2	43	N/C
19	A1	44	VCC
20	A0	45	ACTIVE#
21	D0	46	PDIAG#
22	D1	47	D8
23	D2	48	D9
24	N/C	49	D10
25	PULL DOWN	50	GROUND

## 4. AMI BIOS SETUP

### 4.1 Introduction

AMI Setup program is built into the ROM BIOS. The program enables users to modify basic system configuration. The information is then stored in battery-backed RAM so that it retains the Setup information when the power is turned off.

### 4.2 Starting Setup

AMI BIOS is immediately activated when you first boot up the computer. BIOS reads the system information contained in the CMOS and begins the process of checking out the system and configures it. When the process is completed, BIOS will seek an operating system on one of the disks and launch and pass the control over to the operating system.

While BIOS is in charge, the Setup program can be activated in one of the following ways:

1. By pressing <Del> immediately after switching the system on, or
2. By pressing <Del> when the following message appears briefly at the bottom of the screen during the POST.

#### **Press DEL to enter SETUP**

If the message disappears before you respond and you still want to enter Setup, press the "RESET" button on the chassis or turn off the power and restart the system, then you can try again. You may also restart the system by pressing <Ctrl>, <Alt>, and <Delete> keys simultaneously. If you do not press the keys at the correct moment and the system does not boot, an error message will be displayed and you will again be asked to:

#### **Press F2 to continue, DEL to enter SETUP**

### 4.3 Using Setup

Use arrow keys to highlight the options and press <Enter> to select. To change the entries, use the PageUp and PageDown. Press <F1> for help or <Esc> to quit. The following table provides more details on how to navigate the Setup program using the keyboard.

Up arrow	Move to previous option
Down arrow	Move to next option
Left arrow	Move to the option on the left column
Right arrow	Move to the option on the right column
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
+ key	Increase the numeric value or make changes
- key	Decrease the numeric value or make changes
F1 key	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2 /F3 key	Change color from total 16 colors. F2 to select color forward, F3 to select color backward.
F4 key	Reserved
F5 key	Reserved
F6 key	Reserved
F7 key	Reserved
F8 key	Reserved
F9 key	Reserved
F10 key	Save all CMOS changes, only for Main Menu.

## 4.4 Getting Help

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

If, after making and saving system changes with Setup, you discover that your computer is no longer able to boot, the AMI BIOS supports an override to the CMOS settings which can reset your system to its defaults.

The best advice is to alter only the settings which you thoroughly understand. To this end, we strongly recommend not to make any changes to the chipset defaults. These defaults have been carefully chosen by both AMI and the system manufacturer to provide the optimum performance and reliability. Even a seemingly little change to the chipset setup may shut the system down and need the override program to reset it.

## 4.5 Main Menu

Once you enter the AMIBIOS™ CMOS Setup Utility, the Main Menu will appear on the screen. The Main Menu allows you to select from several setup functions and two exit choices. Use the arrow keys to select among the option and press <Enter> to accept and enter the sub-menu.

Note that a brief description of each highlighted selection appears at the bottom of the screen. The main menu includes the following main setup categories. Recall that some systems may not include all entries.

```
AMIBIOS HIFLEX SETUP UTILITY - VERSION 1.54SIS
(C)2001 American Megatrends, Inc. All Rights Reserved

SAGP-648 v1.0 (01/22/2003)

Standard CMOS Setup
Advanced CMOS Setup
Advanced Chipset Setup
Power Management Setup
PCI / Plug and Play Setup
Peripheral Setup
Hardware Monitor Setup
Auto-detect Hard Disks
Change User Password
Change Supervisor Password
Auto Configuration with optimal Settings
Auto Configuration with Fail Safe Settings
Save Settings and Exit
Exit without Saving

Standard CMOS setup for changing time, date, hard disk type, etc.
ESC:Exit  F1:Sel  F2/F3:Color  F10:Save & Exit
```

### Standard CMOS Setup

Use this menu for basic system configuration.

### Advanced CMOS Setup

Use this menu to set the Advanced Features available on your system.

### Advanced Chipset Setup

Use this menu to change the values in the chipset registers and optimize the system's performance.

### Power Management Setup

When Disabled, SMI will not be initialized, and complete power management functionality is removed unless this option is set to Enabled.

### PCI / Plug and Play Setup

This entry appears if your system supports PnP/PCI.

**Peripheral Setup**

Use this menu to specify your settings for integrated peripherals.

**Hardware Monitor Setup**

Use this menu to monitor your hardware.

**Auto-detect Hard Disks**

Use this menu to specify your settings for hard disks control.

**Change User Password**

Use this menu to set User Passwords.

**Change Supervisor Password**

Use this menu to set Supervisor Passwords.

**Auto Configuration with Optimal Settings**

Use this menu to load the BIOS factory settings for optimal system performance. While AMI has been designed the custom BIOS to optimize performance, the factory has the right to change these defaults to meet its needs.

**Auto Configuration with Fail-Safe Settings**

Use this menu to load the BIOS default values for the safe and stable system performance.

**Save Settings and Exit**

Save CMOS value changes to CMOS and exit setup.

**Exit Without Saving**

Abandon all CMOS value changes and exit setup.

## 4.6 Standard CMOS Setup

The options in Standard CMOS Setup Menu are divided into 10 categories. Each category includes none, one or more than one setup options. Use the arrow keys to highlight the option and then use the <PgUp> or <PgDn> keys to select the value you want for each option.

AMIBIOS SETUP - STANDARD CMOS SETUP										
(C)2001 American Megatrends, Inc. All Rights Reserved										
Date (mm/dd/yyyy):	wed Jan 22, 2003	Base Memory:	0 KB							
Time (hh/mm/ss):	14:38:49	Extd Memory:	0 MB							
Floppy Drive A:	1.44 MB 3%									
Floppy Drive B:	Not Installed									
	Type	Size	Cyln	Head	WPcon	Sec	LBA Mode	81k Mode	PIO 32bit Mode	
Prf Master:	Auto								off	
Prf Slave:	Auto								off	
Sec Master:	Auto								off	
Sec Slave:	Auto								off	
Boot Sector Virus Protection	Disabled									
Month:	Jan - Dec						ESC:Exit	F1:Set		
Day:	01 - 31						PgUp/PgDn:Modify			
Year:	1980 - 2099						F1:Help	F2/F3:Color		

## Main Menu Selections

Item	Options	Description
Date	MM : DD : YYYY	Set the system date
Time	HH : MM : SS	Set the system time
IDE Primary Master	Options are in its sub menu (described in Table 3)	Press <Enter> to enter the sub menu for more options
IDE Primary Slave	Options are in its sub menu (described in Table 3)	Press <Enter> to enter the sub menu for more options
IDE Secondary Master	Options are in its sub menu (described in Table 3)	Press <Enter> to enter the sub menu for more options
IDE Secondary Master	Options are in its sub menu (described in Table 3)	Press <Enter> to enter the sub menu for more options
Drive A Drive B	None 360K, 5.25 in 1.2M, 5.25 in 720K, 3.5 in 1.44M, 3.5 in 2.88M, 3.5 in	Select the type of floppy disk drive installed in the system
Halt On	All Errors No Errors All, but Keyboard All, but Diskette All, but Disk/Key	Select the status in which you want the BIOS to stop the POST processes and notify you
Base Memory	N/A	Displays the amount of conventional memory detected during boot up
Extended Memory	N/A	Displays the amount of extended memory detected during boot up

## 4.7 Advanced CMOS Setup

This section enables you to configure your system for basic operation. You have the opportunity to select the system default speed, boot-up sequence, keyboard operation, shadowing and security.



### Quick Boot

When this option is set to Enabled, DRAM testing function will be disabled.

### 1st /2nd /3rd Boot Device

This option sets the type of device for the first boot drives that the AMIBIOS attempts to boot from after AMIBIOS POST completes. The settings are Disabled, IDE-0, IDE-1, IDE-2, IDE-3, Floppy, ARMD-FDD, ARMD-HDD, CDROM, and SCSI.

### **Try Other Boot Devices**

The options are Yes or No. Set this setting to Yes to instruct AMIBIOS to attempt to boot from any other drives in the system if it cannot find a boot drive among the drives specified in the 1st Boot Device, 2nd Boot Device, 3rd Boot Device, 4th Boot Device options.

### **Floppy Access Control**

This setting specifies the assigned read/write access that when booting from a floppy drive. The options are Read/Write or Read-Only.

### **Hard Disk Access Control**

This setting specifies the assigned read/write access that when booting from a hard disk drive. The options are Read/Write or Read-Only.

### **S.M.A.R.T. for Hard Disks**

S.M.A.R.T. stands for Self-Monitoring, Analysis and Reporting Technology. This setting can help BIOS to warn the user of the possible device failure and let the user back up the device before actual failure happens. The options are Disabled, Enabled.

### **Boot Up Num-Lock**

If the user wants the Num-Lock function to be turned on during the boot-up period so that the user can use the key pad on the keyboard right after the system starts, please select ON to do so. Otherwise, select OFF.

### **PS/2 Mouse Support**

When this setting is enabled, BIOS support a PS/2- type mouse.

### **System Keyboard**

This won't be specified if a keyboard is attached to the computer. Otherwise, when there's no keyboard detected and an error message is displayed, this setting can be marked as needed. This setting permits you to configure workstation with no keyboard. The options are Absent, Present.

### **Primary Display**

This setting is to configure the type of monitor attached to the computer. The settings are Monochrome, Color 40x25, Color 80x25, VGA/PGA/EGA, or Not Install.

### **Password Check**

This option enables the password check option every time the system boots or the end user runs Setup. If always is chosen a user password prompt appears every time the computer is tuned on. If setup is chosen, the password prompt appears if BIOS is executed.

### **Boot To OS/2**

Set this option to YES if running OS/2 operating system and using more than 64MB of system memory on the motherboard. The options are YES or NO.

### **Internal Cache**

The setting enabled or disabled the internal cache memory in the processor.

### **External Cache**

The setting enables secondary cache memory. If Enabled is selected, external cache memory is enabled. If disabled is select, external cache memory is disabled.

### **System BIOS Cacheable**

When this setting is set to Enabled, the System ROM area from F0000-FFFFF is copied (shadowed) to RAM for faster execution.

### **C000, 32k Shadow**

This setting is about the contents inside the Video ROM area form C000-C7FFF, which influences the speed of execution.

Disabled: The contents of the video ROM are not copied to RAM.

Cached: The contents of the video ROM area from C0000h - C7FFFh are copied from ROM to RAM and can be written to or read from cache memory.

Enabled: The contents of the video ROM area from C0000h - C7FFFh are copied (shadowed) from ROM to RAM for faster execution.

### **C800, 16k Shadow**

These settings enable shadowing of the contents of the ROM area named in the option title. The options are Enable Disable, Cached.

The ROM area that is not used by ISA adapter cards will be allocated to PCI adapter cards. 000, 32k Shadow.

### **CC00, 16k Shadow**

These settings enable shadowing of the contents of the ROM area named in the setting title. The settings are Enable Disable, Cached.

The ROM area that is not used by ISA adapter cards will be allocated to PCI adapter cards. 800, 16k Shadow

### **D000, 16k Shadow**

These settings enable shadowing of the contents of the ROM area named in the setting title. The options are Enable, Disable, and

Cached. The ROM area that is not used by ISA adapter cards will be allocated to PCI adapter cards. C00, 16k Shadow.

### D400, 16k Shadow

These settings enable shadowing of the contents of the ROM area named in the setting title. The options are Enable, Disable, and Cached. The ROM area that is not used by ISA adapter cards will be allocated to PCI adapter cards.000, 16k Shadow.

### D800, 16k Shadow

These settings enable shadowing of the contents of the ROM area named in the setting title. The options are Enable, Disable, and Cached. The ROM area that is not used by ISA adapter cards will be allocated to PCI adapter cards.400, 16k Shadow.

### DC00, 16k Shadow

These settings enable shadowing of the contents of the ROM area named in the setting title. The options are Enable, Disable, and Cached. ISA adapter cards will be allocated to PCI adapter cards.800, 16k Shadow.

## 4.8 Advanced Chipset Setup



This section allows you to configure the system based on the specific features of the installed chipset. This chipset manages bus speeds and access to system memory resources, such as DRAM and the external cache. It also coordinates communications between the conventional ISA bus and the PCI bus. It must be stated that these items should never need to be altered. The default settings have been chosen because they provide the best operating conditions for your system.

### CPU Frequency

This field displays the capability of the CPU modules that you are using either H/W TRAP, 100MHz, 133MHz(MAX.), The CPU Frequency of 100/133Mhz = (FSB Frequency of 400/533Mhz respectively).

### **CPU / DRAM Frequency Ratio**

This setting is decided by CPU and DRAM frequency ratio, e.g.

Having CPU's frequency=133Mhz(FSB=533Mhz) and DDR333 SDRAM.  
When you should set the" CPU/DRAM Frequency Ratio" to [4:5]

If CPU Frequency = 133Mhz(FSB=533Mhz).

CPU / DRAM Frequency Ratio = [4:5]

When DRAM Frequency =  $133 * 5 / 4 = 166$ Mhz, that is DDR333 (166X2)

### **DRAM Frequency**

This field displays the capability of the memory modules that you are using either H/W TRAP, 100MHz, 133MHz, 166MHz (MAX).

The DRAM Frequency of 100/133/166Mhz = (DDR Frequency of 200/266/333Mhz respectively)

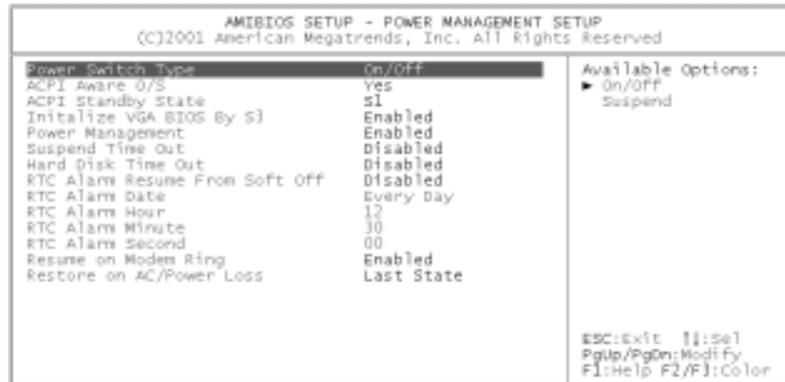
### **DRAM CAS# Latency**

This controls the latency between the SDRAM read command and the time that the data actually becomes available.

### **HYPER THREADING CPU SUPPORT**

This setting is to enable or disable hyper threading CPU support.

## 4.9 Power Management Setup



### ACPI Aware O/S

This feature is switch of ACPI function. Configuration options: [No] [Yes].

### ACPI Standby State

This feature is switch of STR (S3) or POS (S1) function. Configuration options: [S3/STR] [S1/POS].

### Power Management

When Disabled, SMI will not be initialized, and complete power management functionality is removed until this option is set to Enabled.

### Suspend Time Out

If no activity occurs during this time period, the BIOS will configure the system to low power state. The "Standby Time Out" period must expire first (if enabled) before this time out period begins.

### Hard Disk Time Out

If no disk activity occurs for, this time period, the BIOS will put the hard disk, device(s) into low power mode.

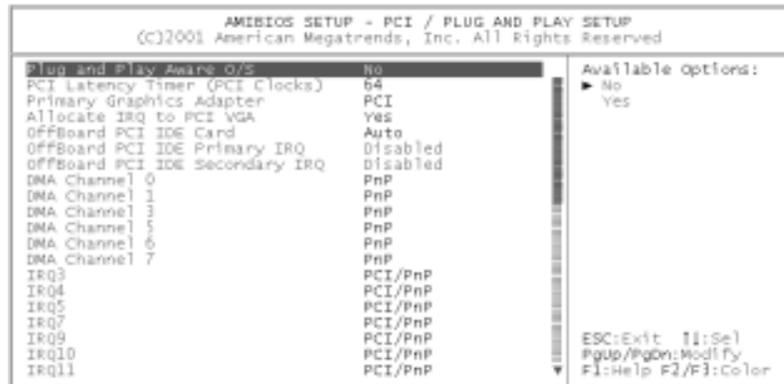
### RTC Alarm Resume From Soft Off

When this option is set enabled, system will according to you set time then wakeup from soft off mode.

### Resume on Modem Ring

Modem Ring resumes from Soft Off.

## 4.10 PCI / Plug and Play Setup



### Plug and Play Aware O/S

When being enabled, BIOS will configure only PnP ISA boot devices (i.e. all PnP ISA cards which has boot flag set). And PnP aware OS will configure all other devices. When being disabled, BIOS will configure all devices.

### PCI Latency Timer (PCI Clocks)

This option specifies the latency timings (in PCI clocks) for PCI devices installed in the PCI expansion slots. The settings are 32, 64, 96, 128, 160, 192, 224, or 248.

### Primary Graphics Adapter

This setting is to select primary graphic by PCI or AGP Adapter.

### Allocate IRQ to PCI VGA

Set this option to Yes to allocate an IRQ to the VGA device on the PCI bus. The settings are Yes or No.

### OffBoard PCI IDE Card

This question is needed for off-board non-compliant PCI IDE card. If present, BIOS needs to know which slot it is in and how the IRQ is used by the card.

### OffBoard PCI IDE Primary IRQ

This option specifies the PCI interrupt used by the primary IDE channel on the offboard PCI IDE controller. The settings are Disabled, Hardwired, INTA, INTB, INTC, or INTD.

### **OffBoard PCI IDE Secondary IRQ**

This option specifies the PCI interrupt used by the secondary IDE channel on the offboard PCI IDE controller. The settings are Disabled, Hardwired, INTA, INTB, INTC, or INTD.

### **DMA Channel 0, 1, 3, 5, 6, 7**

The option allows you to specify the bus type used by each DMA channel. The settings are PnP or ISA/EISA.

### **IRQ 3, 4, 5, 7, 9, 10, 11**

The option specifies the bus that the specified IRQ line is used on. The option allows you to reserve IRQs for legacy ISA adapter cards. The option determine if AMIBIOS 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 pool, the end user can use the option to reserve the IRQ by assigning an ISA/EISA setting to it. Onboard I/O is configured by AMIBIOS. All IRQs used by onboard I/O are configured as PCI/PnP.

## 4.11 Peripheral Setup

Peripheral Setup enables users to configure the system to the most effectively power saving mode while operating in a consistent manner with your own style of computer use.

AMIBIOS SETUP - PERIPHERAL SETUP (C)2001 American Megatrends, Inc. All Rights Reserved		
Audio Device	Enabled	Available Options: Disabled ► Enabled
On Board MAC Device	Enabled	
USB 2.0 Supports	Enabled	
USB Ports Supports	Enable	
USB Function	Enabled	
USB KB/Mouse/FDD Legacy Support	Disabled	
Onboard 1394 Device	Enable	
Onboard FDC	Enabled	
Onboard Serial Port A	3F8/COM1	
Onboard Serial Port B	2F8/COM2	
Serial Port B Mode	Normal	
IR Duplex Mode	Half Duplex	
IR Pin Select	IRRX/IRTX	
Onboard Parallel Port	378	
Parallel Port Mode	Normal	
EPP Version	N/A	
Parallel Port IRQ	7	
Parallel Port DMA Channel	N/A	
Onboard PCI IDE	Both	

### Audio Device

This setting is to Enable or Disable Audio Function.

### Onboard MAC Device

This setting is to Enable or Disable Onboard Ethernet Function.

### USB 2.0 Supports

This setting is to Enable or Disable Onboard USB 2.0 Function.

### Onboard 1394 Device

This setting is to Enable or Disable Onboard 1394 Function.

### Onboard FDC Device

This setting is to Enable or Disable On board FDC Function.

### Onboard Serial Port A /Port B

This option specifies the base I/O port address of serial port 1. The settings are Auto (AMIBIOS automatically determines the correct base I/O port address).

### Serial Port B Mode

This option specifies the IR active pulse or inverting clock of serial port B.

### **IR Pin Select**

The SINB/SOUTB pin of Serial Port B function or IRRX/IRTX pin if IR function in normal condition.

### **Onboard Parallel Port**

This option specifies the base I/O port address of parallel port on the motherboard. The settings are Disabled, 378h, 278h, or 3BCh.

### **Parallel Port Mode**

This option specifies the parallel port mode. The settings are Normal, Bi-Dir, EPP, and ECP. Normal: The normal parallel port mode is used. Bi-Dir: Use this setting to support bi-directional transfers on the parallel port.

EPP: The parallel port can be used with devices that adhere to the Enhanced Parallel Port (EPP) specification. EPP uses the existing parallel port signals to provide asymmetric bi-directional data transfer driven by the host device.

ECP: The parallel port can be used with devices that adhere to the Extended Capabilities Port (ECP) specification. ECP uses the DMA protocol to achieve data transfer rates up to 2.5 Megabits per second. ECP provides symmetric bi-directional communication.

### **EPP Version**

EPP data or address read cycle 1.9 or 1.7

### **Parallel Port IRQ**

This option specifies the IRQ used by the parallel port. The settings are Auto, (IRQ) 5, or (IRQ) 7.

### **Parallel Port DMA Channel**

This option is only available if the setting for the Parallel Port Mode option is ECP. This option sets the DMA channel used by the parallel port. The settings are DMA Channel 0, 1, or 3.

## 4.12 Hardware Monitor Setup



## 4.13 Change Supervisor Password

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



### Supervisor password:

To enter and change the settings of the setup menus.

### User password:

To only access the setup menus, but can't change anything of it. When you select this option, 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>. Previous password will then be cleared from CMOS memory. You will be prompted to confirm the password. Type the password again and press <Enter>. To abort the selection, press <Esc>.

To disable a password, press <Enter> when you are prompted to enter the password. Confirm to disable the password. 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 user from changing any bit of your system configuration. Additionally, when a password is enabled, you can also require the BIOS to request a password every time the system is booting. This would prevent unauthorized uses of your computer. The user can determine whether the password is needed for entering BIOS Setup Program or other Security options (see Section 4.5). Once the Password has been set, users will be prompted to enter the password when entering the Setup Menu.

This chapter discusses the Setup program built into the BIOS; it allows users to configure the system. This configuration is then stored in battery-backed CMOS RAM so that Setup information is retained whilst the power is off.

## Appendix A: Watchdog Timer

The Watchdog Timer is provided to ensure that standalone systems can always recover from catastrophic conditions that cause CPU crash, e.g. external EMI or a software bug. When the CPU stops working properly, hardware on the board will either perform a hardware reset (cold boot) or a Non-Maskable Interrupt (NMI) to resume the system to a known state.

A BIOS function call (INT 15H) is used to control the Watchdog Timer:

### INT 15H:

<b>AH – 6FH</b>
<u>Sub-function:</u>
<b>AL – 2:</b> Set the Watchdog Timer period
<b>BL:</b> Time-out value (the time unit—second or minute, is dependent on the Watchdog Timer unit selected in BIOS setup).

You have to call sub-function 2 to set the time-out period of Watchdog Timer first. If the time-out value is not zero, Watchdog Timer will start counting down. When the timer value reaches zero, the system will reset. To ensure that this reset condition does not occur, Watchdog Timer must be periodically refreshed by calling sub-function 2. However, Watchdog timer will be disabled if you set the time-out value to be zero.

A tolerance of at least 10 % must be maintained to avoid unknown routines within the operating system (DOS), such as disk I/O that can be very time-consuming.

**Note:** When exiting a program, it is necessary to disable the Watchdog Timer. Otherwise the system will reset.

### Example program:

```
; INITIAL TIMER PERIOD COUNTER
;
W_LOOP:
    MOV    AX, 6F02H        ;setting the time-out value
    MOV    BL, 30          ;time-out value is 48 seconds
    INT    15H
;
; ADD YOUR APPLICATION PROGRAM HERE
;
    CMP    EXIT_AP, 1      ;is your application over?
    JNE    W_LOOP         ;No, restart your application

    MOV    AX, 6F02H      ;disable Watchdog Timer
    MOV    BL, 0          ;
    INT    15H
;
; EXIT
;
```

## Appendix B: Address Mapping

### IO Address Map

I/O address Range	Description
000-01F	DMA Controller #1
020-021	Interrupt Controller #1, Master
040-05F	8254 timer
060-06F	8042 (Keyboard Controller)
070-07F	Real time Clock, NMI Mask
080-09F	DMA Page Register
0A0-0BF	Interrupt Controller #2
0C0-0DF	DMA Controller #2
0F0	Clear Math Coprocessor Busy
0F1	Reset Math Coprocessor
0F2	Core Logic Programming Configuration
0F8-0FF	Math Coprocessor
1F0-1F8	Fixed Disk
200-207	Game I/O
278-27F	Reserved
290-297	Hardware Monitor
2F8-2FF	Serial Port 2
300-31F	Prototype Card
360-36F	Reserved
378-37F	Parallel Printer Port 1
3B0-3BF	Reserved
3C0-3CF	Reserved
3D0-3DF	Color/Graphics Monitor Adapter
3E8-3EF	Reserved
3F0-3F7	Diskette Controller
3F8-3FF	Serial Port 1

### 1st MB Memory Address Map

Memory address	Description
00000-9FFFF	System memory
A0000-BFFFF	VGA buffer
C0000-C7FFF	VGA BIOS
F0000-FFFFF	System BIOS
1000000-	Extend BIOS

\*Default setting

### IRQ Mapping Table

IRQ0	System Timer	IRQ8	RTC clock
IRQ1	Keyboard	IRQ9	Available
IRQ2	Cascade to IRQ Controller	IRQ10	AC'97 CODEC
IRQ3	COM2	IRQ11	Reserved
IRQ4	COM1	IRQ12	PS/2 mouse
IRQ5	USB	IRQ13	FPU
IRQ6	FDC	IRQ14	Primary IDE
IRQ7	Printer	IRQ15	Secondary IDE

### DMA Channel Assignments

Channel	Function
0	Available
1	Available
2	Floppy disk (8-bit transfer)
3	Available
4	Cascade for DMA controller 1
5	Available
6	Available
7	Available

## **Appendix C: Wake-up Function**

### **How to Use Wake-up Function**

SAGP-648E provides two kinds of Wake-Up Function. This page describes how to use the Modem Wake-Up and LAN Wake-Up functions. Wake-Up function works when ATX power supply is in use.

#### **Wake-Up By Modem Ring On:**

In CMOS SETUP, the user must set Resume On Modem Ring status to Enabled. The ATX power supply will be switched on when there is a ring signal detected on the pin "RI" of the serial port.

#### **Wake-Up On LAN:**

When the computer is in power-down status, a LAN Link/Active LED is flashing. This status indicates that the LAN chip has entered standby mode and is waiting for a Wake-Up signal. You can use other computers to wake up your computer by sending ID to it.

ID: ID is the address of your system LAN. Every LAN chip has a factory default ID, which can be found from network information in WINDOWS.

ID's format is xx-xx-xx-xx-xx-xx  
Example ID: 00905C21D4

## Appendix D: Digital I/O

One of the characteristics 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. SAGP-648E is designed with 4-bit digital inputs and 4-bit digital outputs.

There are two kinds of signals (Input and Output) used by the Digital I/O function. These signals are used to control external devices that need On/Off circuit or TTL devices. When one of the signals has been selected, the user can read or write data to the system through the Digital I/O function.

A BIOS function call (INT 15H) is used to control the Digital I/O Function:

### INT 15H:

<b>AH – 6FH</b>
<u>Sub-function:</u>
<b>AL – 8:</b> Set the Digital port as INPUT
<b>AL:</b> Digital I/O input value

#### Example program:

```
MOV  AX, 6F08H      ;setting the Digital port is input
INT  15H           ;
```

**AL low byte = value**

<b>AH – 6FH</b>
<u>Sub-function:</u>
<b>AL – 9:</b> Set the Digital port as OUTPUT
<b>BL:</b> Digital I/O output value

#### Example program:

```
MOV  AX, 6F09H      ;setting the Digital port is output
MOV  BL, 09H        ;Digital value is 09H
INT  15H           ;
```

**Digital Output is 1001b**

## Appendix E: Creating/Deleting SATA Raid Sets

Creating and deleting RAID sets is a function found in the BIOS. During boot-up, the following message will appear, pausing for a few moments to allow the user to choose what to do:

Press <CTRL-S> or F4 to enter RAID utility.

An easy-to-use screen will appear with the following choices in the top left:

**Create RAID Set**  
**Delete RAID Set**  
**Rebuild RAID Set**  
**Resolve Conflicts**

Below this will be listed the drives currently installed on the system.

The top right half of the screen displays directions and comments for the user. The bottom right half lists the command keys:

Arrows up and down are Select Keys  
**ESC** takes the user to the previous menu  
**Enter** selects the user's choice  
**Ctrl-E** exits the utility

### Creating RAID Sets

SATA Raid supports two drives, which makes it simple to create RAID Sets.

1. Select "Create RAID Set."
2. Choose either a "Striped" or "Mirrored" RAID Set.
3. Select if you want the utility to Auto Configure the RAID Set or if you want to manually configure the RAID Set. For Striped Sets, you can change the chunk size. For Mirrored Sets, you assign which is the Source and Target drives, as well as if you want Disk Copy.

### What is Disk Copy?

If the disk assigned as the source disk already has been partitioned with data stored on it, and a second disk is added for redundancy, the data on the source drive can be copied to the destination drive. The disks are identical, and all subsequent data will be written to both drives as a Mirrored set. However, if the source disk does not have data stored on it, there is no need to perform Disk Copy. The utility will ask "Are You Sure?" before completing the configuration.

### Deleting RAID Sets

1. To remove one or more RAID sets, select "Delete RAID Set".
2. Select the desired RAID set and press Y when your are asked "Are You Sure?"

## **Resolving Conflict**

When a RAID set is created, the metadata written to the disk will include drive connection information (Primary Channel, Secondary Channel). In case of a disk failure, the replacement disk, which was previously part of a RAID set (or used in another system), may have conflicting metadata, specifically in reference to the drive connection information. This will prohibit the RAID set from being created or rebuilt. For the RAID set to function properly, old metadata must be first overwritten with new metadata. To resolve this, select "Resolve Conflict" and choose the correct metadata, including the correct drive connection information that will be written to the replacement disk.