USER'S MANUAL

EBC-I845C

Pentium® 4/P4-M
5.25" Embedded CPU Card
With VGA/Sound/2LAN

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OPERATION MANUAL

CE NOTICE

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

FCC NOTICE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

You are cautioned that any change or modifications to the equipment not expressly approve by the party responsible for compliance could void your authority to operate such equipment.

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APPENDIX A EXPANSION BUS

APPENDIX B TECHNICAL SUMMARY

CHAPTER

1

INTRODUCTION

This chapter gives you the information for EBC-I845C. It also outlines the System specification.

Section includes:

- About This Manual
- System Specifications
- Safety precautions

Experienced users can skip to chapter 2 on page 2-1 for Quick Start.

1-1. ABOUT THIS MANUAL

Thank you for purchasing our EBC-I845C Socket 478 5.25" Embedded Card enhanced with VGA / Sound / 2LAN (or option single LAN), which is fully PC / AT compatible. EBC-I845C provides faster processing speed, greater expandability and can handle more task than before. This manual is designed to assist you how to install and set up the system. It contains four chapters. The user can apply this manual for configuration according to the following chapters :

Chapter 1 Introduction

This chapter introduces you to the background of this manual, and the specification for this system. Final part of this chapter will indicate you how to avoid damaging this Embedded Card.

Chapter 2 Hardware Configuration

This chapter outlines the component location and their functions. In the end of this chapter, you will learn how to set jumper and how to configure this card to meet your own needs.

Chapter 3 Software Utilities

This chapter contains helpful information for proper installations of the VGA utility, LAN utility, sound utility, and BIOS update. It also describes the Watchdog timer configuration.

Chapter 4 Award BIOS Setup

This chapter indicates you how to set up the BIOS configurations.

Appendix A Expansion Bus

This Appendix introduces you the expansion bus for PCI Bus and PPCI Bus.

Appendix B Technical Summary

This section gives you the information about the Technical maps.

1-2. SYSTEM SPECIFICATION

- **CPU (mPGA 478) :**
  Intel® Pentium® 4 processor or Pentium® 4-M processor in socket 478.
  Available at 1.8~ 3.06GHz
  System bus frequency at 400MHz/533MHz
  Auto detect voltage regulator

- **SYSTEM CHIPSET :**
  Intel® 845GV chipset

- **MEMORY :**
  Supports up to 2GB DDR SDRAM.
  Two 184-pin DDR DIMM sockets on board

- **CACHE :**
  Built-in CPU

- **REAL-TIME CLOCK / CALENDAR :**
  256-byte battery backed CMOS RAM.
  Hardware implementation to indicate century rollover

- **BIOS :**
  Phoenix-AwardBIOS™ for plug & play function
  Memory size with 4 MB, with VGA BIOS

- **KEYBOARD/MOUSE CONNECTOR :**
  PS/2 keyboard with 1 x 4 pin wafer connector.
  PS/2 mouse connector with 1 x 4 pin wafer connector.

- **UNIVERSAL SERIAL BUS :**
  Universal Serial Bus Connector on board
  Supports up to four USB 2.0 ports.

- **BUS SUPPORT :**
  PCI Bus
  External EPCI Bus
  Compact Flash Bus (IDE Secondary)

- **DISPLAY :**
  Built in Intel 845GV, support CRT, DVO.

- **WATCHDOG :**
  Time-out timing select from 1~255 sec.

- **IDE INTERFACE :**
  Two IDE ports support up to four IDE devices.
  Supports UDMA 100.

- **FLOPPY DISK DRIVER INTERFACE :**
  Supports up to two Floppy Disk Drives, 3.5" and 5.25".

- **LAN INTERFACE :**
  Dual ports.
  LAN 1: Intel® 82562ET 10/100 Base-TX Ethernet.
  LAN 2: Intel® 82551QM or Intel® 82541GI.
  Supports Wake-on-LAN.

- **SERIAL PORT :**
  Four high speed 16550 Compatible UARTs with Send / Receive 16 Byte FIFOs. COM1, COM3, COM4 for RS232; COM2 for RS232/422/485. COM3, COM4 support +5V/+12V output. (Max. 1A)
  Programmable Baud Rate Generator

- **SOUND INTERFACE :**
  AC '97 Codec. Reatel ALC202A.
  Fully Compliant AC '97 Analog I/O Component

- **PARALLEL PORT :**
  One port supports SPP / ECP / EPP Function.

- **HARDWARE MONITORING FUNCTION :**
  Monitor Voltage, CPU Temperature and Cooling Fan.

- **IRDA PORT :**
  One 5-pin Infrared connector
  Supports IrDA v1.0 SIR protocol.

- **LED INDICATOR :**
  HDD LED, Power LED.

- **DMA CONTROLLER :**
  82C37 x 2

- **DMA CHANNELS :**
  7

- **INTERRUPT CONTROLLERS :**
  82C59 x 2

- **INTERRUPT LEVELS :**
  15

- **OPERATING TEMPERATURE :**
  0 to 60°C (32°F to 140°F)

- **INPUT POWER REQUIREMENT :**
  ATX power: +5V, +12V, -12V.
  AT power:

- **BOARD DIMENSION :**
  203mm x 146mm (7.99” x 5.75”)

- **BOARD NET WEIGHT :**
  350 grams (0.77 lb)

1-3. SAFETY PRECAUTIONS

Follow the messages below to avoid your systems from damage:

1. Avoid your system from static electricity on all occasions.

2. Prevent electric shock. Don‘t touch any components of this card when the card is power-on. Always disconnect power when the system is not in use.

3. Disconnect power when you change any hardware devices. For instance, when you connect a jumper or install any cards, a surge of power may damage the electronic components or the whole system.

HARDWARE CONFIGURATION

CHAPTER

2

*** QUICK START ***

Helpful information describes the jumper & connector settings, and component locations.

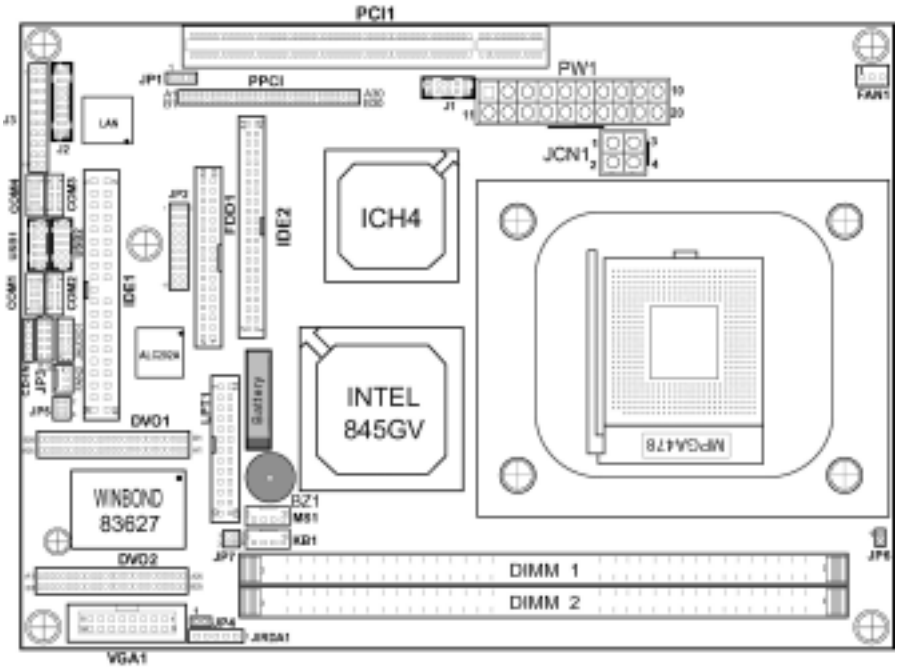
Section includes:

- Jumper & Connector Quick Reference Table
- Component Locations
- Configuration and Jumper settings
- Connector's Pin Assignments

2-1. JUMPER & CONNECTOR QUICK REFERENCE TABLE

COM Port Connector	COM1, COM2
	COM3, COM4
COM Port RI/Voltage Selection	JP3
RS232/422/485 (COM2) Selection	JP2
Keyboard Connector	KB1
Mouse Connector	MS1
Reset Connector	J3 (18,20)
Hard Disk Drive LED Connector	J3 (12,14)
ATX Power Button	J3 (13,15)
External Speaker Connector	J3 (2,4,6,8)
Power LED Connector	J3 (1,3,5)
KeyLock Connector	J3 (7,9)
Clear CMOS Data Selection	JP1
CPU Fan Connector	FAN1
System Fan Connector	FAN2
VGA Connector	VGA
DVO Connector	DVO1, DVO2
Hard Disk Drive Connector	IDE1, IDE2
Floppy Disk Drive Connector	FDD1
Printer Connector	LPT1
Universal Serial Bus Connector	USB1, USB2
IrDA Connector	JIRDA1
LAN Connector	J1, J2
ATX Power Connector	PW1
ATX +12V Power Connector	JCN1
Memory Installation	DIMM1, DIMM2
Reset/NMI/Clear Watchdog Selection	JP5
Sound Connector	JAUDIO1
CD Audio-In Connector	CD-IN1
Compact Flash Card Master/Slave Selection	JP4
AT/ATX Power Selection	JP7
P4/P4-M CPU Selection	JP6

2-2. COMPONENT LOCATIONS



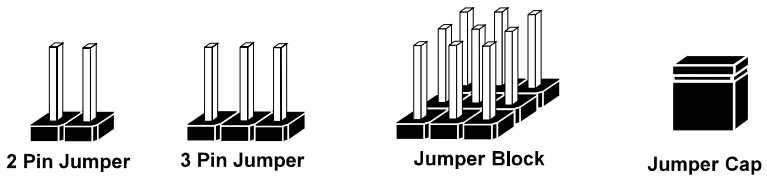
EBC-I845C Connector, Jumper and Component locations

2-3. HOW TO SET THE JUMPERS

You can configure your board by setting jumpers. Jumper is consists of two or three metal pins with a plastic base mounted on the card, and by using a small plastic "cap", Also known as the jumper cap (with a metal contact inside), you are able to connect the pins. So you can set-up your hardware configuration by "open" or "close" pins.

The jumper can be combined into sets that called jumper blocks. When the jumpers are all in the block, you have to put them together to set up the hardware configuration. The figure below shows how this looks like.

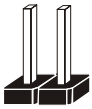
JUMPERS AND CAPS



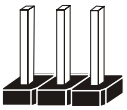
If a jumper has three pins (for examples, labelled PIN1, PIN2, and PIN3), You can connect PIN1 & PIN2 to create one setting and shorting. You can either connect PIN2 & PIN3 to create another setting. The same jumper diagrams are applied all through this manual. The figure below shows what the manual diagrams look and what they represent.

JUMPER DIAGRAMS

Jumper Cap looks like this

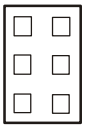


2 pin Jumper looks like this



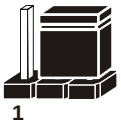
3 pin Jumper looks like this

Jumper Block looks like this



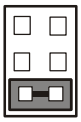
JUMPER SETTINGS

2 pin Jumper close(enabled) Looks like this



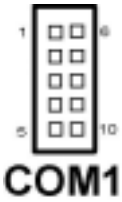
3 pin Jumper 2-3 pin close(enabled) Looks like this

Jumper Block 1-2 pin close(enabled) Looks like this



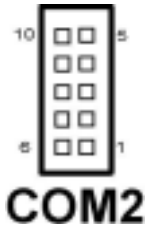
2-4. COM PORT CONNECTOR

COM1 : COM1 Connector
COM1 is fixed as RS-232.
The pin assignment is as follows :



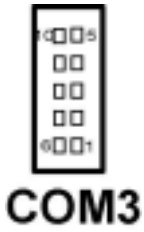
PIN	ASSIGNMENT
1	DCD1
2	RX1
3	TX1
4	DTR1
5	GND
6	DSR1
7	RTS1
8	CTS1
9	RI1
10	NC

COM2 : COM2 Connector
The COM2 is selectable as RS-232/422/485.
The pin assignment is as follows :



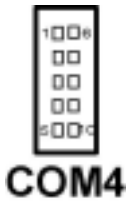
PIN	ASSIGNMENT		
	RS-232	RS-422	RS-485
1	DCD2	TX-	TX-
2	RX2	TX+	TX+
3	TX2	RX+	RX+
4	DTR2	RX-	RX-
5	GND	GND	GND
6	DSR2	RTS-	NC
7	RTS2	RTS+	NC
8	CTS2	CTS+	NC
9	RI2	CTS-	NC
10	NC	NC	NC

COM3 : COM3 Connector
COM3 is fixed as RS-232.
The pin assignment is as follows :



PIN	ASSIGNMENT
1	DCD3
2	RX3
3	TX3
4	DTR3
5	GND
6	DSR3
7	RTS3
8	CTS3
9	RI3
10	NC

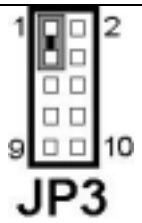
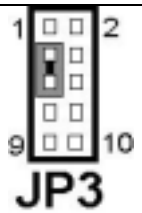
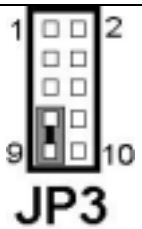
COM4 : COM4 Connector
COM4 is fixed as RS-232.
The pin assignment is as follows :

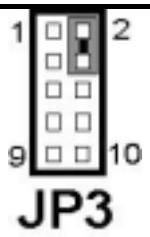
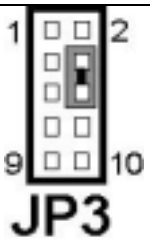
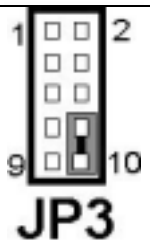


PIN	ASSIGNMENT
1	DCD4
2	RX4
3	TX4
4	DTR4
5	GND
6	DSR4
7	RTS4
8	CTS4
9	RI4
10	NC

2-5. COM3/4 RI & VOLTAGE SELECTION

JP3 : COM3/4 RI & Voltage Selection
The jumper settings are as follows :

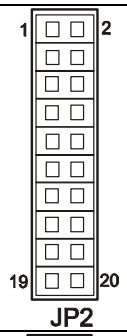
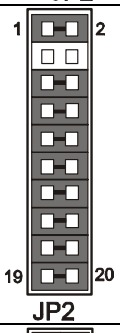
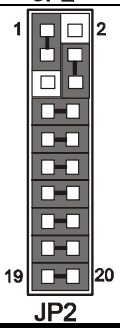
Function		Jumper Settings (pin closed)	Jumper Illustrations
COM3 (Max. 1A)	12V	1-3	
	5V	3-5	
	RI	7-9	

COM4 (Max. 1A)	12V	2-4	
	5V	4-6	
	RI	8-10	

*** Manufactory default --- RI.

2-6. RS232/422/485 (COM2) SELECTION

JP2 : RS-232/422/485 (COM2) Selection
This connector is used to set the COM2 function.
The jumper settings are as follows :

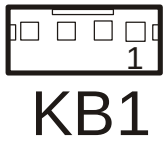
COM 2 Function	Jumper Settings (pin closed)	Jumper Illustrations
RS-232	Open	
RS-422	1-2, 5-6, 7-8 9-10, 11-12, 13-14 15-16, 17-18, 19-20	
RS-485	1-3, 4-6, 7-8, 9-10 11-12, 13-14, 15-16 17-18, 19-20	

*** Manufactory default --- RS-232.

2-7. KEYBOARD CONNECTOR

KB1 : Keyboard Connector
The pin assignments are as follows :

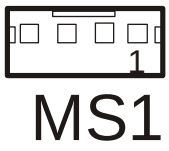
PIN	ASSIGNMENT
1	KBCLK
2	KBDAT
3	GND
4	KBVCC



2-8. MOUSE CONNECTOR

MS1 : Mouse Connector
The pin assignments are as follows :

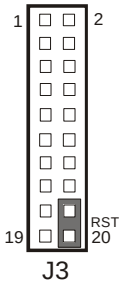
PIN	ASSIGNMENT
1	MSCLK
2	MSDAT
3	GND
4	MSVCC



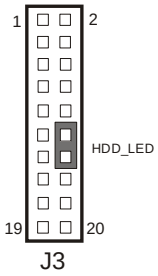
2-9. RESET CONNECTOR

J3 (18,20) : Reset Connector.
The pin assignment is as follows :

PIN	ASSIGNMENT
18	HW RESET
20	GND



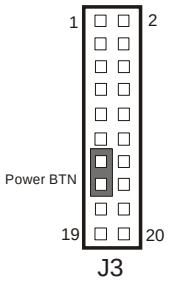
2-10. HARD DISK DRIVE LED CONNECTOR



J3 (12,14) : Hard Disk Drive LED Connector
The pin assignment is as follows :

PIN	ASSIGNMENT
12	HDD_LED
14	PULL HI (VCC)

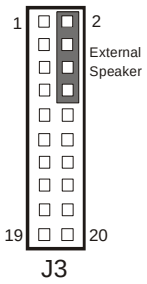
2-11. ATX POWER BUTTON



J3 (13,15) : ATX Power Button
The pin assignment is as follows :

PIN	ASSIGNMENT
13	PWR_BN1
15	PWR_BN2

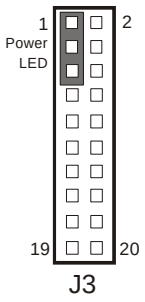
2-12. EXTERNAL SPEAKER CONNECTOR



J3 (2,4,6,8) : External Speaker Connector
The pin assignment is as follows :

PIN	ASSIGNMENT
2	VCC
4	GND
6	NC
8	SPEAKER SIGNAL

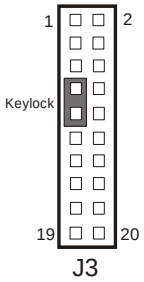
2-13. POWER LED CONNECTOR



J3 (1,3,5) : Power LED Connector
The pin assignment is as follows:

PIN	ASSIGNMENT
1	PW_LED
3	PW_LED
5	GND

2-14. KEYLOCK CONNECTOR

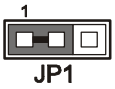
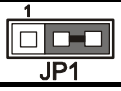


J3 (7,9) : Keylock Connector
The pin assignment is as follows:

PIN	ASSIGNMENT
7	KEYLOCK
9	GND

2-15. CLEAR CMOS DATA SELECTION

JP1 : Clear CMOS Data Selection
The selections are as follows :

FUNCTION	JUMPER SETTING (pin closed)	JUMPER ILLUSTRATION
Clear CMOS	1-2	
Normal	2-3	

*** Manufacturing Default is set as Normal.

Note: To clear CMOS data, user must power-off the computer and set the jumper to "Clear CMOS" as illustrated above. After five to six seconds, set the jumper back to "Normal" and power-on the computer.

2-16. CPU FAN CONNECTOR

FAN1 : CPU Fan connector
The pin assignment is as follows:

PIN	ASSIGNMENT
1	GND
2	+12V
3	FANIO1

2-17. SYSTEM FAN CONNECTOR

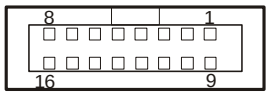
FAN2 : System Fan connector
The pin assignment is as follows:

PIN	ASSIGNMENT
1	GND
2	+12V
3	FANIO2

2-18. VGA CONNECTOR

VGA1 : VGA Connector
The pin assignments are as follows:

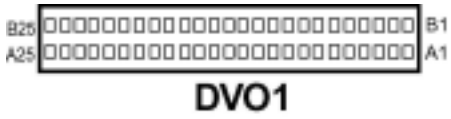
PIN	ASSIGNMENT
1	RED
2	GREEN
3	BLUE
4	NC
5	GND
6	GND
7	GND
8	GND
9	VCC
10	GND
11	NC
12	VGA DDA
13	HSYNC
14	VSYNC
15	VGA DDC CLK
16	NC



VGA1

2-19. DVO CONNECTOR

DVO1 : DVO Connector
The pin assignments are as follows :



PIN	ASSIGNMENT	PIN	ASSIGNMENT
A1	VCC	B1	VCC12
A2	VCC	B2	VCC12
A3	VCC	B3	GND
A4	VCC3_3	B4	GND
A5	VCC3_3	B5	DVOC_D0
A6	VDDQ	B6	DVOC_D1
A7	MI2C_DATA	B7	DVOC_D2
A8	MI2C_CLK	B8	DVOC_D3
A9	DVOC_BLANKJ	B9	DVOC_D4
A10	DVOC_FLDSTL	B10	DVOC_D5
A11	GND	B11	DVOC_D6
A12	DVOC_CLK	B12	DVOC_D7
A13	DVOC_CLKJ	B13	DVOC_D8
A14	GND	B14	DVOC_D9
A15	DVOC_VSYNC	B15	DVOC_D10
A16	DVOC_HSYNC	B16	DVOC_D11
A17	MDVI_CLK	B17	DVOBC_INTRJ
A18	MDVI_DATA	B18	G_PAR-
A19	PCIRSTJ	B19	ADDID4
A20	DVOB_CCLKINTJ	B20	ADDID5
A21	ADDID0	B21	ADDID6
A22	ADDID1	B22	ADDID7
A23	ADDID2	B23	REF14.318M
A24	ADDID3	B24	VCC25
A25	GAGPREF	B25	VCC25

DVO2 : DVO Connector
The pin assignments are as follows :

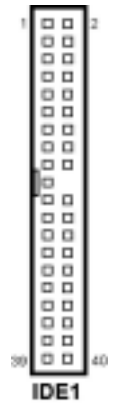
DVO2

PIN	ASSIGNMENT	PIN	ASSIGNMENT
A1	VCC	B1	GND
A2	VCC	B2	GND
A3	NC	B3	GND
A4	NC	B4	NC
A5	NC	B5	NC
A6	NC	B6	NC
A7	NC	B7	NC
A8	NC	B8	NC
A9	NC	B9	NC
A10	NC	B10	NC
A11	NC	B11	NC
A12	NC	B12	NC
A13	NC	B13	NC
A14	NC	B14	NC
A15	NC	B15	NC
A16	NC	B16	NC
A17	NC	B17	NC
A18	NC	B18	NC
A19	NC	B19	NC
A20	NC	B20	NC
A21	NC	B21	NC
A22	NC	B22	NC
A23	NC	B23	NC
A24	NC	B24	NC
A25	NC	B25	NC

2-20. HARD DISK DRIVE CONNECTOR

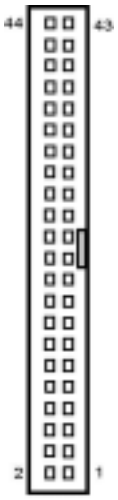
IDE1: Hard Disk Drive Connector
The EBC-I845C possesses two HDD connectors, IDE1 and IDE2. The pin assignments are as follows:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	IDERST	2	GND
3	PDD7	4	PDD8
5	PDD6	6	PDD9
7	PDD5	8	PDD10
9	PDD4	10	PDD11
11	PDD3	12	PDD12
13	PDD2	14	PDD13
15	PDD1	16	PDD14
17	PDD0	18	PDD15
19	GND	20	NC
21	PDREQ	22	GND
23	PDIOW#	24	GND
25	PDIOR#	26	GND
27	PIORDY	28	PULL LOW
29	PDDACK#	30	GND
31	IRQ14	32	NC
33	PDA1	34	P66 DETECT
35	PDA0	36	PDA2
37	PDCS#1	38	PDCS#3
39	IDEACTP#	40	GND



IDE2: Hard Disk Drive Connector
The pin assignments are as follows:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	IDERST	2	GND
3	SDD7	4	SDD8
5	SDD6	6	SDD9
7	SDD5	8	SDD10
9	SDD4	10	SDD11
11	SDD3	12	SDD12
13	SDD2	14	SDD13
15	SDD1	16	SDD14
17	SDD0	18	SDD15
19	GND	20	NC
21	SDREQ	22	GND
23	SDIOW#	24	GND
25	SDIOR#	26	GND
27	SIORDY	28	PULL LOW
29	SDDACK#	30	GND
31	IRQ15	32	NC
33	SDA1	34	S66 DETECT
35	SDA0	36	SDA2
37	SDCS#1	38	SDCS#3
39	IDEACTS#	40	GND
41	VCC	42	VCC
43	GND	44	GND

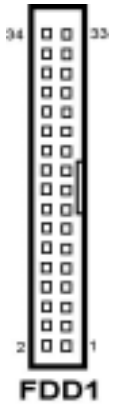


IDE2

2-21. FLOPPY DISK DRIVE CONNECTOR

FDD1 : Floppy Disk Drive Connector
You can use a 34-pin daisy-chain cable to connect two-FDDs. On one end of this cable is a 34-pin flat cable to attach the FDD on the board, and the other side is attaches two FDDs.
The pin assignments are as follows :

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	GND	2	RWC#
3	GND	4	NC
5	NC	6	DS1#
7	GND	8	INDEX
9	GND	10	MOA#
11	GND	12	DSB#
13	GND	14	DSA#
15	GND	16	MOB#
17	GND	18	DIR#
19	GND	20	STEP#
21	GND	22	WD#
23	GND	24	WE#
25	GND	26	TRK0#
27	GND	28	WP#
29	NC	30	RDATA#
31	GND	32	HEAD#
33	NC	34	DSKCHG

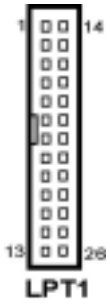


FDD1

2-22. PRINTER CONNECTOR

LPT1 : Printer Connector
As to link the Printer to the card, you need a cable to connect both DB25 connector and parallel port.
The pin assignments are as follows :

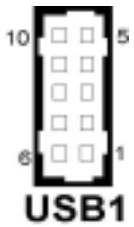
PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	STB	14	AFD#
2	PDR0	15	ERROR#
3	PDR1	16	PAR_INIT#
4	PDR2	17	SLIN#
5	PDR3	18	GND
6	PDR4	19	GND
7	PDR5	20	GND
8	PDR6	21	GND
9	PDR7	22	GND
10	ACK#	23	GND
11	BUSY	24	GND
12	PE	25	GND
13	SLCT	26	NC



2-23. UNIVERSAL SERIAL BUS CONNECTOR

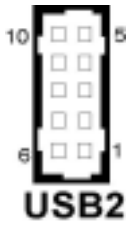
USB1: Universal Serial Bus Connector
The EBC-I845C possesses two USB connectors, USB1 and USB2. The pin assignments are as follows:

PIN	ASSIGNMENT
1	USBVCC
2	DATA0N
3	DATA0P
4	GND
5	GND
6	USBVCC
7	DATA1N
8	DATA1P
9	GND
10	GND



USB2: Universal Serial Bus Connector
The pin assignments are as follows:

PIN	ASSIGNMENT
1	USBVCC
2	DATA2N
3	DATA2P
4	GND
5	GND
6	USBVCC
7	DATA3N
8	DATA3P
9	GND
10	GND



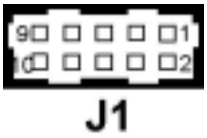
2-24. IRDA CONNECTOR

JIRDA1: IrDA (Infrared) Connector
The pin assignments are as follows:

PIN	ASSIGNMENT
1	VCC
2	NC
3	IRRX
4	GND
5	IRTX

2-25. LAN CONNECTOR

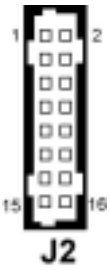
J1: LAN Connector (10/100 Mbps)
The pin assignments are as follows:



PIN	ASSIGNMENT
1	TDP
2	VCC3.3R
3	TDN
4	LILEDJ
5	GND
6	SPLEDJ
7	RDP
8	ACTLEDJ
9	RDN
10	NC

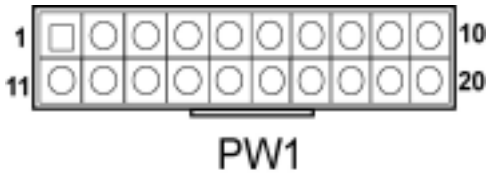
J2: LAN Connector (10/100/1000 Mbps)
The pin assignments are as follows:

PIN	ASSIGNMENT
1	1MDI_3P
2	1MDI_3M
3	1MDI_2P
4	1MDI_2M
5	1MDI_1P
6	1MDI_1M
7	1MDI_0P
8	1MDI_0M
9	VCC25-CG
10	GND
11	1VCC3.3R
12	GND
13	1LINK-R
14	1ACT
15	1SPEED100
16	1SPEED1000-R



2-26. ATX POWER CONNECTOR

PW1 : ATX Power Connector
The pin assignments are as follows:

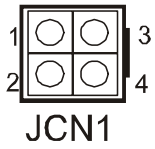


PW1

PIN	ASSIGNMENT
1	3.3V
2	3.3V
3	GND
4	5V
5	GND
6	5V
7	GND
8	NC
9	5VSB
10	12V
11	3.3V
12	-12V
13	GND
14	PSON
15	GND
16	GND
17	GND
18	-5V
19	5V
20	5V

2-27. ATX +12V POWER CONNECTOR

JCN1 : ATX +12V Power Connector
The pin assignments are as follows:



PIN	ASSIGNMENT
1	GND
2	GND
3	+12V
4	+12V

2-28. MEMORY INSTALLATION

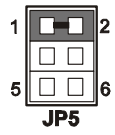
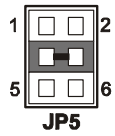
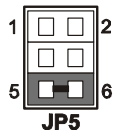
EBC-I845C CPU Card can support up to 2GB in two DIMM sockets.
DRAM BANK CONFIGURATION

DIMM 1	DIMM 2	TOTAL MEMORY
128MB	128MB	256MB
256MB	256MB	512GB
512MB	512MB	1GB
1GB	1GB	2GB

🔔 If want to install two DIMMs, please make sure both of memories are exactly the same brand and same model.

2-29. RESET/NMI/CLEAR WATCHDOG SELECTION

JP5 : Reset/NMI/Clear Watchdog Selection
The selections are as follows:

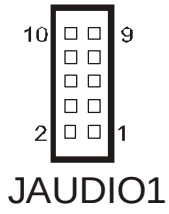
FUNCTION	JUMPER SETTING (pin closed)	JUMPER ILLUSTRATION
RESET	1-2	
NMI	3-4	
CLEAR WATCHDOG	5-6	

***Manufacturing Default is without jumper.

🔔 User may select to use the Reset or NMI watchdog. NMI, also known as Non-Maskable Interrupt, is used for serious conditions that demand the processor's immediate attention, it cannot be ignored by the system unless it is shut off specifically. To clear NMI command, user should short the "Clear Watchdog" pin via push button.

2-30. SOUND CONNECTOR

JAUDIO1 : Sound Connector
The pin assignments are as follows:



JAUDIO1

PIN	ASSIGNMENT
1	MIC-IN
2	NC
3	GND
4	GND
5	LINE-L
6	LINE-R
7	GND
8	GND
9	SPK-L
10	SPK-R

2-31. CD Audio-IN CONNECTOR

CD-IN1 : CD Audio-In Connector
The pin assignments are as follows:

CD-IN1

PIN	ASSIGNMENT
1	AUX L
2	CD_REF
3	CD_REF
4	AUX R

2-32. CF CARD MASTER/SLAVE SELECTION

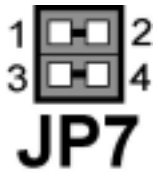
JP4 : Compact Flash Card Master/Slave Selection.
The selections are as follows:

FUNCTION	JUMPER SETTING (pin closed)	JUMPER ILLUSTRATION
Master	1-2	
Slave	Open	

***Manufacturing Default is Master.

2-33. AT/ATX POWER SELECTION

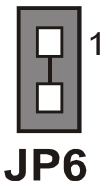
JP7 : AT/ATX Power Selection.
The selections are as follows:

FUNCTION	JUMPER SETTING (pin closed)	JUMPER ILLUSTRATION
AT	1-2,3-4	 JP7
ATX	open	 JP7

***Manufacturing Default is ATX.

2-34. P4/P4-M CPU SELECTION

JP6 : P4/P4-M CPU Selection.
The selections are as follows:

FUNCTION	JUMPER SETTING (pin closed)	JUMPER ILLUSTRATION
P4-M	1-2	 JP6
P4	Open	 JP6

***Manufacturing Default is P4.

Please be aware that when using Pentium® 4-M CPU, JP6 jumper must set as closed, otherwise the Pentium® 4-M CPU will be damaged, vice versa.

SOFTWARE UTILITIES

CHAPTER

3

This chapter comprises the detailed information of VGA driver, LAN driver, and Flash BIOS update. It also describes how to install the watchdog timer configuration.

Section includes:

- VGA Driver Utility
- Flash BIOS Update
- LAN Driver Utility
- Sound Driver Utility
- Intel® Chipset Software Installation Utility
- USB2.0 Chipset Software Installation Utility
- Watchdog Timer Configuration

3-1. INTRODUCTION

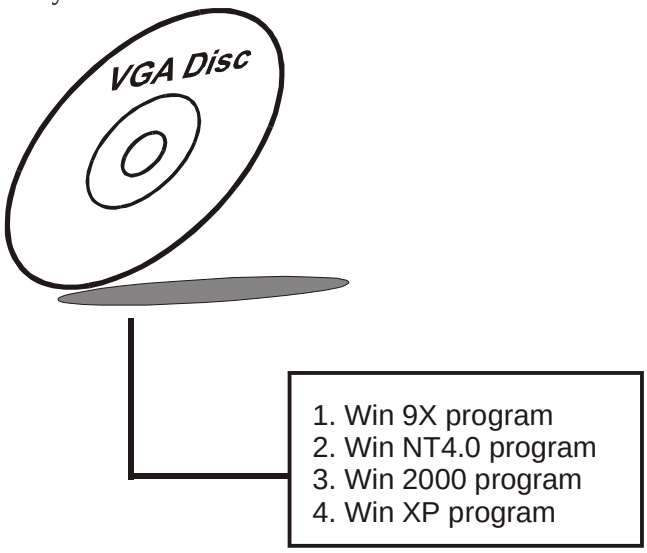
Enclosed with our EBC-I845C package is our driver utility, which may comes in a form of a CD ROM disc or floppy diskettes. For CD ROM disc user, you will only need some of the files contained in the CD ROM disc, please kindly refer to the following chart:

Filename (Assume that CD ROM drive is D:)	**Purpose**
D:\VGA	Intel 845GV For VGA driver installation
D:\AWDFLASH	For BIOS update utility
D:\LAN	Intel 82562EM&82541GI For LAN Driver installation
D:\SOUND	Realtel ALC202A AC97 For Sound driver installation
D:\UTILITY	Intel® Chipset Software Installation Utility For Win 98SE,ME, 2000, XP
D:\USB 20	USB 2.0 Software Installation Utility For Win 98SE, 2000, ME, XP

🔔 User should remember to install the Utility right after the OS fully installed.

3-2. VGA DRIVER UTILITY

The VGA interface embedded with our EBC-I845C can support a wide range of display. You can display CRT, LVDS and PanelLink™ simultaneously with the same mode.



3-2-1. Installation of VGA Driver:

To install the VGA Driver, simply follow the following steps:

1. Place insert the Utility Disk into CD ROM drive.
2. Under Windows 9X/NT4.0/2000/XP system, go to the directory where VGA driver is located.
3. Click Setup file for VGA driver installation.
4. Follow the instructions on the screen to complete the installation.
5. Once installation is completed, shut down the system and restart in order for the changes to take effect.

3-3. FLASH BIOS UPDATE

3-3-1. System BIOS Update:

Users of EBC-I845C can use the program “Awdflash.exe” contained in the Utility Disk for system BIOS and VGA BIOS update.

3-3-2. To update VGA BIOS for LCD Flat Panel Display:

As EBC-I845C user, you have to update the VGA BIOS for your specific LCD flat panel you are going to use. For doing this, you need two files. One is the “Awdflash.exe” file and the other is the VGA BIOS for ATI Rage Mobility M6 file for LCD panel display. Both file must be provided by the vendor or manufacturer. When you get these two files ready, follow the following steps for updating your VGA BIOS:

1. Install “Awdflash.exe” from Utility Disk to Drive C.
2. Insert the VGA BIOS file you have obtained from the vendor. Type the path to Awdflash.exe and execute the VGA BIOS update with file H15bxxxx.bin
3. C:\UTIL\AWDFLASH>AWDFLASH H15bxxxx.bin
4. The screen will display as the table fount on the next page:

FLASH MEMORY WRITER v8.XX (C) Award Software 2001 All Rights Reserved
Flash Type – SST 49LF004A /3.3V File Name to Program: H20bxxxx.bin Checksum: XXXXX
Error Message: Do You Want To Save BIOS (Y/N)

If you want to save up the original BIOS, enter "Y" and press < Enter >. If you choose "N", the following table will appear on screen.

FLASH MEMORY WRITER v8.XX (C) Award Software 2001 All Rights Reserved
Flash Type – SST 49LF004A /3.3V File Name to Program: H20bxxxx.bin Checksum: XXXXX
Error Message : Are You Sure To Program (Y/N)

Select "Y", and the BIOS will be renewed. When you are refreshing the BIOS, do not turn off or reset the system, or you will damage the BIOS. After you have completed all the programming, the screen displays the table below:

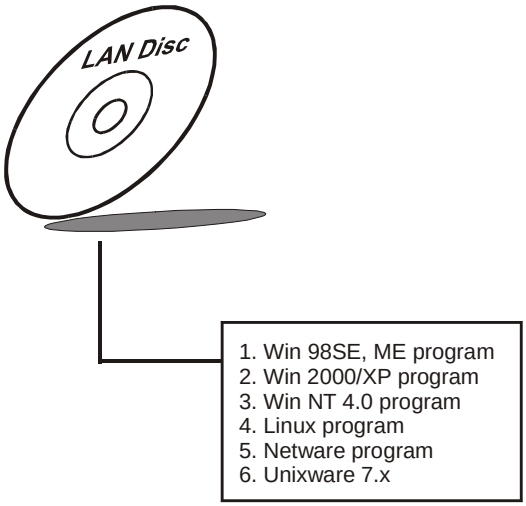
FLASH MEMORY WRITER v8.XX (C) Award Software 2001 All Rights Reserved
Flash Type – SST 49LF004A /3.3V File Name to Program: H20bxxxx.bin Checksum: XXXXX Reset System or Power off to accomplish update process!
F1: Reset F10: Exit

Please reset or power off the system, and then the Flash BIOS is fully implemented.

3-4. LAN DRIVER UTILITY

3-4-1. Introduction

EBC-I845C is enhanced with LAN function that can support various network adapters. Installation programs for LAN drivers are listed as follows:

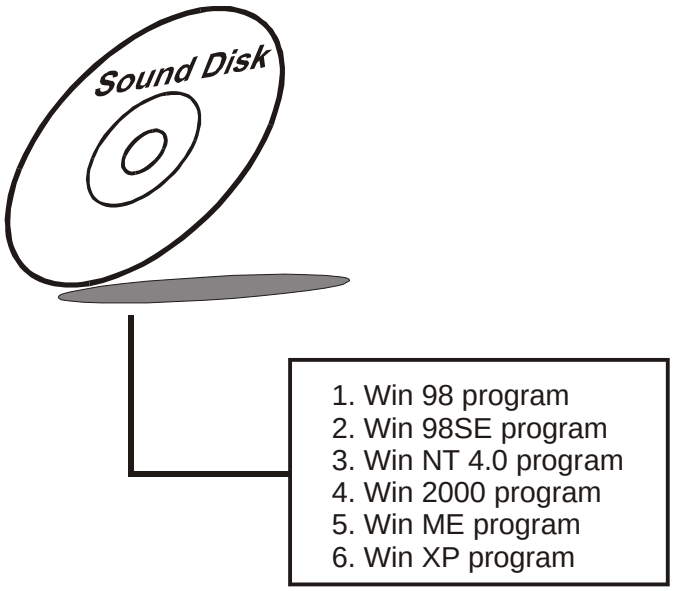


For more details on Installation procedure, please refer to Readme.txt file found on LAN DRIVER UTILITY.

3-5. SOUND DRIVER UTILITY

3-5-1. Introduction

The Realtek ALC202A sound function enhanced in this system is fully compatible with Windows 98, Windows 98SE, Windows NT 4.0, Windows 2000, Windows ME and Windows XP. Below, you will find the content of the Sound driver :



3-5-2. Installation Procedure for Windows 9x/NT/2000/XP

1. From the task bar, click on Start, and then Run.
2. In the Run dialog box, type D:\Sound\setup, where "D:\Sound\pathname" refers to the full path to the source files.
3. Click on the OK button or press the ENTER key.
4. Click on the "Next" and OK prompts as they appear.
5. Reboot the system to complete the driver installation.

3-6. INTEL® CHIPSET SOFTWARE INSTALLATION UTILITY

3-6-1. Introduction

The Intel® Chipset Software Installation Utility installs to the target system the Windows* INF files that outline to the operating system how the chipset components will be configured. This is needed for the proper functioning of the following features:

- Core PCI and ISAPNP Services
- AGP Support
- IDE/ATA33/ATA66/ATA100 Storage Support
- USB Support
- Identification of Intel® Chipset Components in Device Manager

3-6-2. Installation of Utility for Windows 98SE/ME/2000/XP

The Utility Pack is to be installed only for Windows 98SE, Windows ME, Windows 2000 and XP program.
It should be installed right after the OS installation, kindly follow the following steps:

1. Place insert the Utility Disk into Floppy Disk Drive A/B or CD ROM drive.
2. Under Windows 98SE/ME/2000/XP system, go to the directory where Utility Disc is located.
3. Click Setup file for utility installation.
4. Follow the instructions on the screen to complete the installation.
5. Once installation is completed, shut down the system and restart in order for the changes to take effect.

3-7. USB2.0 SOFTWARE INSTALLATION UTILITY

3-7-1. Installation of Utility for Windows 98SE/ 2000/XP

Intel USB 2.0 Enhanced Host Controller driver can only be used on Windows 98SE, Windows 2000 and Windows XP on Intel Desktop boards. It should be installed right after the OS installation, kindly follow the following steps:

1. Place insert the Utility Disk into Floppy Disk Drive A/B or CD ROM drive.
2. Under Windows 98SE, 2000, and XP system, go to the directory where Utility Disc is located.
3. Start the "System" wizard in control panel. (Click Start/Settings/Control Panel).
4. Select "Hardware" and click "Device Manager " button.
5. Double Click "USB Root Hub".
6. Select "Driver".
7. Click "Install" to install the driver.
8. Follow the instructions on the screen to complete the installation.
9. Click "Finish" after the driver installation is complete.

3-8. WATCHDOG TIMER CONFIGURATION

This board has watchdog timer function for monitoring whether the system is still work or not after a period of time. The user can select watchdog timer to system reset or NMI (Non Maskable interrupt) depending on the jumper set in chapter 2. This is defined at I/O port **443H**. When you want to enable the watchdog timer, please write I/O port **443H**, and then the system will either reset itself or perform the NMI function. Likewise, when you want to disable the function, write I/O port **441H**, the system will run the command to stop the Watchdog function.

In EBC-I845C watchdog function, you must write your program so when it writes I/O port address 443 for enable watchdog and write I/O port address 441 for disable watchdog. The timer's intervals have a tolerance of 25% (but for level 1 and 2, the tolerance is 4%), so you should program an instruction that will refresh the timer about every second.

The following program shows you how to program the watch timer in your program.

Watchdog enable program:

```
MOVAX, 000FH(choose the values you need; start from 0)
MOVDX, 443H
OUTDX, AX
```

Watchdog disable program:

```
MOVAX, 000FH(this value can be ignored)
MOVDX, 441H
OUTDX, AX
```

The Watchdog Timer control table is as follows:

Level	Value	Time/sec	Level	Value	Time/sec
1	F	0	9	7	64
2	E	8	10	6	72
3	D	16	11	5	80
4	C	24	12	4	88
5	B	32	13	3	96
6	A	40	14	2	104
7	9	48	15	1	112
8	8	56	16	0	120

AWARD BIOS SETUP

CHAPTER 4

This chapter shows how to set up the Award BIOS.

Section includes:

- Introduction
- Entering Setup
- The Standard CMOS Features
- The Advanced BIOS Features
- The Advanced Chipset Features
- Integrated Peripherals
- Power Management Setup
- PNP/PCI Configuration
- PC Health Status
- Frequency Control
- Load Fail-Safe Defaults
- Load Optimized Defaults
- Password Setting
- Save and Exit Setup
- Exit Without Saving

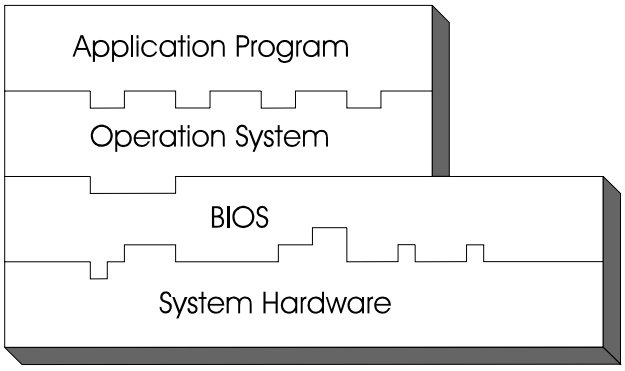
4-1. INTRODUCTION

This chapter will show you the function of the BIOS in managing the features of your system. The EBC-I845C Pentium® 4 5.25" Embedded CPU Card is equipped with the BIOS for system chipset from Award Software Inc. This page briefly explains the function of the BIOS in managing the special features of your system. The following pages describe how to use the BIOS for system chipset Setup menu.

Your application programs (such as word processing, spreadsheets, and games) rely on an operating system such as DOS or OS/2 to manage such things as keyboard, monitor, disk drives, and memory.

The operating system relies on the BIOS (Basic Input and Output system), a program stored on a ROM (Read-only Memory) chip, to initialize and configure your computer's hardware. As the interface between the hardware and the operating system, the BIOS enables you to make basic changes to your system's hardware without having to write a new operating system.

The following diagram illustrates the interlocking relationships between the system hardware, BIOS, operating system, and application program:



4-2. ENTERING SETUP

When the system is powered on, the BIOS will enter the Power-On Self Test (POST) routines and the following message will appear on the lower screen:

PRESS <DEL> TO ENTER SETUP, ESC TO SKIP MEMORY TEST

As long as this message is present on the screen you may press the <Del> key (the one that shares the decimal point at the bottom of the number keypad) to access the Setup program. In a moment, the main menu of the Award SETUP program will appear on the screen:

Phoenix - AwardBIOS CMOS Setup Utility

►Standard CMOS Features	►Frequency Control
►Advanced BIOS Features	Load Fail-Safe Defaults
►Advanced Chipset Features	Load Optimized Defaults
►Integrated Peripherals	Set Supervisor Password
►Power Management Setup	Set User Password
►PnP/PCI Configurations	Save & Exit Setup
►PC Health Status	Exit Without Saving
Esc : Quit F10 : Save & Exit Setup	↑↓→← : Select Item
Time, Date, Hard Disk Type ….	

Setup program initial screen

You may use the cursor the up/down keys to highlight the individual menu items. As you highlight each item, a brief description of the highlighted selection will appear at the bottom of the screen.

4-3. THE STANDARD CMOS FEATURES

Highlight the "STANDARD CMOS FEATURES" and press the <ENTER> key and the screen will display the following table:

Phoenix - AwardBIOS CMOS Setup Utility
Standard CMOS Features

Date (mm:dd:yy)	Tue, Jun 29 2004	Item Help
Time (hh:mm:ss)	11 : 5 : 34	Menu Level ►
► IDE Primary Master	[ST380011A]	
► IDE Primary Slave	[None]	Change the internal clock.
► IDE Secondary Master	[None]	
► IDE Secondary Slave	[None]	
Drive A	[1.44M, 3.5 in.]	
Drive B	[None]	
Video	[EGA/VGA]	
Halt On	[All, But Keyboard]	
Base Memory	640K	
Extended Memory	252928K	
Total Memory	253952K	

↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7:Optimized Defaults

CMOS Setup screen

In the above Setup Menu, 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.

Date:

< Month >, < Date > and <Year >. Ranges for each value are in the CMOS Setup Screen, and the week-day will skip automatically.

Time:

< Hour >, < Minute >, and < Second >. Use 24 hour clock format, i.e., for PM numbers, add 12 to the hour. For example: 4: 30 P.M. You should enter the time as 16:30:00.

IDE Primary Master / Slave:
IDE Secondary Master / Slave:

The BIOS can automatically detect the specifications and optimal operating mode of almost all IDE hard drives. When you select type AUTO for a hard drive, the BIOS detect its specifications during POST, every time system boots.

If you do not want to select drive type AUTO, other methods of selecting drive type are available:

1. Match the specifications of your installed IDE hard drive(s) with the preprogrammed values for hard drive types 1 through 45.
2. Select USER and enter values into each drive parameter field.
3. Use the IDE HDD AUTO DETECTION function in Setup.

Here is a brief explanation of drive specifications:

Type: The BIOS contains a table of pre-defined drive types. Each defined drive type has a specified number of cylinders, number of heads, write precompensation factor, landing zone, and number of sectors. Drives whose specifications do not accommodate any predefine type are classified as type USER.

- Size: Disk drive capacity (approximate). Note that this size is usually greater than the size of a formatted disk given by a disk-checking program.
- Cyls: number of cylinders.
- Head: number of heads.
- Precomp: write precompensation cylinders.
- Landz: landing zone.
- Sector: number of sectors.
- Mode: Auto, Normal, Large or LBA.

  Auto: The BIOS automatically determines the optimal mode.

  - Normal: Maximum number of cylinders, heads, sectors supported are 1024, 16 and 63.
  - Large: For drives that do not support LBA and have more than 1024 cylinders.

- LBA (Logical Block Addressing): During drive accesses, the IDE controller transforms the data address described by sector, head and cylinder number into a physical block address, significantly improving data transfer rates. For drives greater than 1024 cylinders.

DRIVE A AND DRIVE B:

Select the type of floppy disk drive installed in your system. The available options are 360KB 5.25in, 1.2KB 5.25in, 720KB 3.5in, 1.44MB 3.5in, 2.88MB 3.5in and None.

VIDEO:

This category selects the type of video adapter used for the primary system monitor. Although secondary monitors are supported, you do not have to select the type in Setup. Available Options are as follows:

EGA/VGA	Enhanced Graphics Adapter/Video Graphics Array. For EGA, VGA, SEGA, SVGA 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.

HALT ON:

This category allows user to choose whether the computer will stop if an error is detected during power up. Available options are “All errors”, “No errors”, “All, But keyboard”, “All, But Diskette”, and “All But Disk/Key”.

BASE MEMORY:

Displays the amount of conventional memory detected during boot up.

EXTENDED MEMORY:

Displays the amount of extended memory detected during boot up.

TOTAL MEMORY:

Displays the total memory available in the system.

HARD DISK ATTRIBUTES:

Type	Cylinders	Heads	V-P comp	LZone	Sect	Capacity
1	306	4	128	305	17	10
2	615	4	300	615	17	20
3	615	6	300	615	17	30
4	940	8	512	940	17	62
5	940	6	512	940	17	46
6	615	4	65535	615	17	20
7	642	8	256	511	17	30
8	733	5	65535	733	17	30
9	900	15	65535	901	17	112
10	820	3	65535	820	17	20
11	855	5	65535	855	17	35
12	855	7	65535	855	17	49
13	306	8	128	319	17	20
14	733	7	65535	733	17	42
15	000	0	0000	000	00	00
16	612	4	0000	663	17	20
17	977	5	300	977	17	40
18	977	7	65535	977	17	56
19	1024	7	512	1023	17	59
20	733	5	300	732	17	30
21	733	7	300	732	17	42
22	733	5	300	733	17	30
23	306	4	0000	336	17	10
24	977	5	65535	976	17	40
25	1024	9	65535	1023	17	76
26	1224	7	65535	1223	17	71
27	1224	11	65535	1223	17	111
28	1224	15	65535	1223	17	152
29	1024	8	65535	1023	17	68
30	1024	11	65535	1023	17	93
31	918	11	65535	1023	17	83
32	925	9	65535	926	17	69
33	1024	10	65535	1023	17	85
34	1024	12	65535	1023	17	102
35	1024	13	65535	1023	17	110
36	1024	14	65535	1023	17	119
37	1024	2	65535	1023	17	17
38	1024	16	65535	1023	17	136
39	918	15	65535	1023	17	114
40	820	6	65535	820	17	40
41	1024	5	65535	1023	17	42
42	1024	5	65535	1023	26	65
43	809	6	65535	852	17	40
44	809	6	65535	852	26	61
45	776	8	65335	775	33	100
47			AUTO			

Award Hard Disk Type Table

4-4. THE ADVANCED BIOS FEATURES

Choose the "ADVANCED BIOS FEATURES" in the main menu, the screen shown as below.

Phoenix - AwardBIOS CMOS Setup Utility
Advanced BIOS Features

Virus Warning	[Disabled]	Item Help
CPU L1 & L2 Cache	[Enabled]	
Quick Power On Self Test	[Enabled]	Menu Level ►
First Boot Device	[Floppy]	
Second Boot Device	[HDD-0]	
Third Boot Device	[LS120]	
Boot Other Device	[Enabled]	
Swap Floppy Drive	[Disabled]	
Boot Up Floppy Seek	[Disabled]	
Boot Up NumLock Status	[On]	
Gate A20 Option	[Fast]	
Typematic Rate Setting	[Disabled]	
x Typematic Rate (Chars/Sec)	6	
x Typematic Delay (Msec)	250	
Security Option	[Setup]	
APIC Mode	[Enabled]	
MPS Version Control For OS	[1.4]	
OS Select For DRAM > 64MB	[Non-OS2]	
HDD S.M.A.R.T Capability	[Disabled]	
Small Logo (EPA) Show	[Disabled]	

↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7:Optimized Defaults

BIOS Features Setup Screen

The "BIOS FEATURES SETUP" allow you to configure your system for basic operation. The user can select the system's default speed, boot-up sequence, keyboard operation, shadowing and security.

A brief introduction of each setting is given below.

VIRUS WARNING :

This item allows you to choose the Virus Warning feature for IDE Hard Disk boot sector protection. If this function is enabled and someone attempt to write data into this area, BIOS will show a warning message on screen and alarm beep.

CPU L1 & L2 CACHE :

This item allows you to enable L1 & L2 cache.

QUICK POWER ON SELF-TEST:

This item allows you to speed up Power On Self Test (POST) after power-up the computer. When enabled, the BIOS will shorten or skip some check items during POST.

FIRST/SECOND/THIRD/OTHER BOOT DEVICE:

The BIOS attempt to load the operating system from the devices in the sequence selected in these items.

SWAP FLOOPY DRIVE:

This field is effective only in systems with two floppy drives. Selecting Enabled assigns physical drive B to logical drive A, and physical drive A to logical drive B.

BOOT UP FLOPPY SEEK:

You may enable / disable this item to define whether the system will look for a floppy disk drive to boot at power-on, or proceed directly to the hard disk drive.

BOOT UP NUMLOCK STATUS:

Select power on state for NumLock.

GATE A20 OPTION:

This entry allows you to select how the gate A20 is handled. When Normal was set, a pin in the keyboard controller controls Gate A20. And when Fast was set, the chipset controls Gate A20.

TYPEMATIC RATE SETTING:

Enable this item if you wish to be able to configure the characteristics of your keyboard. Typematic refers to the way in which characters are entered repeatedly if a key is held down. For example, if you press and hold down the "A" key, the letter "a" will repeatedly appear on your screen on your screen until you release the key. When enabled, the typematic rate and typematic delay can be selected.

TYPEMATIC RATE (CHARS/SEC):

This item sets the number of times a second to repeat a key stroke when you hold the key down.

TYPEMATIC DELAY (MSEC):

The item sets the delay time after the key is held down before it begins to repeat the keystroke.

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.

- 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 :

Select the operating system that is running with greater than 64MB or RAM on the system. You may choose OS2 or Non-OS2.

4-5. ADVANCED CHIPSET FEATURES

Choose the "ADVANCED CHIPSET FEATURES" from the main menu, the screen shown as below.

Phoenix - AwardBIOS CMOS Setup Utility
Advanced Chipset Features

DRAM Timing Selectable	[By SPD]	Item Help
x CAS Latency Time	2.5	
x Active to Precharge Delay	6	
x DRAM RAS# to CAS# Delay	3	Menu Level ►
x DRAM RAS# Precharge	3	
Memory Frequency For	[Auto]	
System BIOS Cacheable	[Enabled]	
Video BIOS Cacheable	[Disabled]	
Memory Hole At 15M-16M	[Disabled]	
Delayed Transaction	[Enabled]	
AGP Aperture Size (MB)	[64]	
	[Disabled]	
** On-Chip VGA Setting **		
On-Chip VGA	[Enabled]	
On-Chip Frame Buffer Size	[8MB]	
Boot Display	[Auto]	
Panel Type	[1024x768 LVDS]	
PCI SERR# NMI	[Disabled]	

↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7:Optimized Defaults

Chipset Features Setup Screen

This parameter allows you to configure the system based on the specific features of the installed chipset. The chipset manages bus speed and access to system memory resources, such as DRAM and the external cache.

It also coordinates communications between 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 the system. The only time you might consider making any changes would be if you discovered that data was being lost while using your system.

DRAM TIMING BY SELECTABLE:

This allows you to select the DRAM timing.

CAS LATENCY TIME:

When synchronous DRAM is installed, the number of clock cycles of CAS latency depends on the DRAM timing.

ACTIVE TO PRECHARGE DELAY:

This item controls the number of DRAM clocks for TRAS.

DRAM RAS# TO CAS# DELAY:

This field let's you insert a timing delay between the CAS and RAS strobe signals, used when DRAM is written to, read from, or refreshed. Fast gives faster performance; and Slow gives more stable performance. This field applies only when synchronous DRAM is installed in the system.

DRAM RAS# PRECHARGE:

If an insufficient number of cycles is allowed for the RAS to accumulate its charge before DRAM refresh, the refresh may be incomplete and the DRAM may fail to retain data. Fast gives faster performance; and Slow gives more stable performance. This field applies only when synchronous DRAM is installed in the system.

SYSTEM BIOS CACHEABLE:

Selecting Enabled allows caching of the system BIOS ROM at F0000h-FFFFFh, resulting in better system performance. However, if any program writes to this memory area, a system error may result.

VIDEO BIOS CACHEABLE:

Select Enabled allows caching of the video BIOS, resulting in better system performance. However, if any program writes to this memory area, a system error may result.

MEMORY HOLE AT 15M-16M:

You can reserve this area of system memory for ISA adapter ROM. When this area is reserved, it cannot be cached. The user information of peripherals that need to use this area of system memory usually discusses their memory requirements.

DELAYED TRANSACTION:

The chipset has an embedded 32-bit posted write buffer to support delay transactions cycles. Select Enabled to support compliance with PCI specification version 2.1.

AGP APERTURE SIZE:

This field determines the effective size of the Graphic Aperture used for a particular GMCH configuration. It can be updated by the GMCH-specific BIOS configuration sequence before the PCI standard bus enumeration sequence takes place. If it is not updated then a default value will select an aperture of maximum size.

4-6. INTEGRATED PERIPHERALS

Choose "INTEGRATED PERIPHERALS" from the main setup menu, a display will be shown on screen as below:

Phoenix - AwardBIOS CMOS Setup Utility
Integrated Peripherals

	On-Chip Primary PCI IDE	[Enabled]	Item Help
	IDE Primary Master PIO	[Auto]	
	IDE Primary Slave PIO	[Auto]	Menu Level ►
	IDE Primary Master UDMA	[Auto]	
	IDE Primary Slave UDMA	[Auto]	
	On-Chip Secondary PCI IDE	[Enabled]	
	IDE Secondary Master PIO	[Auto]	
	IDE Secondary Slave PIO	[Auto]	
	IDE Secondary Master UDMA	[Auto]	
	IDE Secondary Slave UDMA	[Auto]	
	USB Controller	[Enabled]	
	USB 2.0 Controller	[Enabled]	
	USB Keyboard Support	[Disabled]	
	USB Mouse Support	[Disabled]	
	AC97 Audio	[Auto]	
	Onboard LAN	[Enabled]	
	Init Display First	[Onboard]	
	BIOS Flash Function	[Enabled]	
	IDE HDD Block Mode	[Enabled]	
	POWER ON Function	[BUTTON ONLY]	
x	KB Power ON Password	Enter	
x	Hot Key Power ON	Ctrl-F1	
	Onboard FDC Controller	[Enabled]	
	Onboard Serial Port 1	[3F8/IRQ4]	
	Onboard Serial Port 2	[2F8/IRQ3]	
	UART Mode Select	[Normal]	
x	RxD, TxD Active	Hi, Lo	
x	IR Transmission Delay	Enabled	
x	UR2 Duplex Mode	Half	
x	Use IR Pins	IR-Rx2Tx2	
	Onboard Parallel Port	[378/IRQ7]	
	Parallel Port Mode	[SPP]	
x	EPP Mode Select	EPP1.7	
x	ECP Mode Use DMA	3	
	PWRON After PWR-Fail	[Off]	
	Onboard Serial Port 3	[3E8/ IRQ10]	
	Onboard Serial Port 4	[2E8/ IRQ11]	

↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7:Optimized Defaults

Integrated Peripherals Setup Screen

By moving the cursor to the desired selection and by pressing the <F1> key, the all options for the desired selection will be displayed for choice.

ON-CHIP PRIMARY PCI IDE:
ON-CHIP SECONDARY PCI IDE:

The chipset contains a PCI IDE interface with support for two IDE channels. Select Enabled to activate the primary or secondary IDE interface. Select Disabled to deactivate this interface.

IDE PRIMARY MASTER/SLAVE PIO:
IDE SECONDARY MASTER/SLAVE PIO:

The four IDE PIO fields allow you to set a PIO mode (0-4) for each of the four 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.

IDE PRIMARY MASTER/SLAVE UDMA:
IDE SECONDARY MASTER/SLAVE UDMA:

Ultra DMA/33 implementation is possible only if your IDE hard drive supports it and the operating environment includes a DMA driver (Windows 95 OSR2 or a third-party IDE bus master driver). If you hard drive and your system software both support Ultra DMA/33, select Auto to enable BIOS support.

USB CONTROLLER:

Select enabled if the system contains a Universal Serial Bus (USB) controller and you have a USB peripherals.

USB KEYBOARD SUPPORT:

Select Enabled if you have a USB Keyboard.

USB MOUSE SUPPORT:

Select enabled if the system contains a Universal Serial Bus (USB) controller and you have a USB Mouse.

AC97 Audio:

This item allows you to enable/disable to support AC97 Audio.

INIT DISPLAY FIRST:

This item allows you to decide to active whether PCI Slot or on-chip VGA first.

BIOS FLASH FUNCTION:

This item allows you to enable the BIOS Flash function.

IDE HDD BLOCK MODE:

Block mode is also called block transfer, multiple commands, or multiple sector read/write. If your IDE hard drive supports block mode (most new drives do), select Enabled for automatic detection of the optimal number of block read/writes per sector the drive can support.

POWER ON FUNCTION:

This item allows you the select power on event.

KB POWER ON PASSWORD:

This item allows you to set the keyboard power on password.

HOT KEY POWER ON:

This item allows you to select the hot key of the keyboard power on.
The choice: Ctrl-F1~F12.

ONBOARD FDC CONTROLLER:

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

ONBOARD SERIAL PORT 1:
ONBOARD SERIAL PORT 2:

Select an address and corresponding interrupt for the first and second serial ports.

UART MODE SELECT:

This item allows you to select UART mode.

RxD, TxD ACTIVE:

This item allows you to determine the active of RxD, TxD.

IR TRANSMISSION DELAY:

This item allows you to enable/disable IR transmission delay.

UR2 DUPLEX MODE:

This item allows you to select the IR half/full duplex function.

USE IR PINS:

This item allows you to select IR transmission routes, one is RxD2m, TxD2 (COM Port) and the other is IR-Rx2Tx2.

ONBOARD PARALLEL PORT:

This item allows you to determine access onboard parallel port controller with which I/O address.

PARALLEL PORT MODE:

Select an operating mode for the onboard parallel (printer) port. Select *Normal, Compatible,* or *SPP* unless you are certain your hardware and software both support one of the other available modes.

EPP MODE SELECT:

Select EPP port type 1.7 or 1.9.

ECP MODE USE DMA:

Select a DMA channel for the parallel port for use during ECP mode.

PWRON AFTER PWR-FAIL:

This item allows you to select if you want to power on the system after power failure. The choice: Off, On, Former-Sts.

ONBOARD SERIAL PORT 3/4:

Select a logical COM port name and matching address for the first and second serial ports. Select an address and corresponding interrupt for the first and second serial ports.

4-7. POWER MANAGEMENT SETUP

Choose "POWER MANAGEMENT SETUP" option on the main menu, a display will be shown on screen as below :

Phoenix - AwardBIOS CMOS Setup Utility
Power Management Setup

ACPI Function	[Enabled]	Item Help
Power Management	[User Define]	
Video Off In Suspend	[Yes]	
MODEM Use IRQ	[3]	
Suspend Mode	[Disabled]	Menu Level ►
Power-Supply Type	[ATX]	
Soft-Off by PWR-BTTN	[Instant-Off]	
Wake-Up by PCI card	[Enabled]	
Resume by Alarm	[Disabled]	
x Date (of Month) Alarm	0	
x Time (hh:mm:ss) Alarm	0 : 0 : 0	
** Reload Global Timer Events **		
Primary IDE 0	[Disabled]	
Primary IDE 1	[Disabled]	
Secondary IDE 0	[Disabled]	
Secondary IDE 1	[Disabled]	
FDD, COM, LPT Port	[Disabled]	

↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7:Optimized Defaults

Power Management Setup Screen

The "Power Management Setup" allows the user to configure the system to the most effectively save energy while operating in a manner consistent with your own style of computer use.

ACPI SUSPEND TYPE:

This item allows the user to set the ACPI suspend type to be used.

POWER MANAGEMENT:

This item allows you to select the Power Management mode.

MODEM USE IRQ:

This item enable you to name the interrupt request (IRQ) line assigned to the modem (if any) on your system. Activity of the selected IRQ always awakens the system.

SUSPEND MODE:

When enabled and after the set time of system inactivity, all devices except the CPU will be shut off.

SOFT-OFF BY PWR-BTTN:

Pressing the power button for more than 4 seconds forces the system to enter the Soft-Off state when the system has "hung". The choices are Delay 4 Sec and Instant-Off.

WAKE-UP BY PCI CARD:

An input signal from PME on the PCI card awakens the system from a soft off state.

RESUME BY ALARM:

When *Enabled,* your can set the date and time at which the RTC (real-time clock) alarm awakens the system from Suspend mode.

PM EVENTS:

PM events are I/O events whose occurrence can prevent the system from entering a power saving mode or can awaken the system from such a mode. In effect, the system remains alert for anything, which occurs to a device which is configured as *Enabled*, even when the system is in a power down mode. (1) **Primary IDE 0** (2) **Primary IDE 1** (3) **Secondary IDE 0** (4) **Secondary IDE 1** (5) **FDD, COM, LPT Port**

4-8. PNP/PCI CONFIGURATION

Choose "PNP/PCI CONFIGURATION" from the main menu, a display will be shown on screen as below:

Phoenix - AwardBIOS CMOS Setup Utility
PnP/PCI Configurations

PNP OS Installed	[No]	Item Help
Reset Configuration Data	[Disabled]	
Resources Controlled By	[Auto (ESCD)]	Menu Level ►
x IRQ Resources	Press Enter	
x DMA Resources	Press Enter	Select Yes if you are using a Plug and Play capable operating system Select No if you need the BIOS to configure non-boot devices
PCI/VGA Palette Snoop	[Disabled]	

↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7:Optimized Defaults

PNP/PCI Configuration Setup Screen

The PNP/PCI Configuration Setup describes how to configure PCI bus system. PCI, also known as Personal Computer Interconnect, is a system, which allows I/O devices to operate at speeds nearing the speed of the CPU itself uses when communicating with its own special components.

This section covers technical items, which is strongly recommended for experienced users only.

PNP OS INSTALLED:

This item allows you to determine install PnP OS or not.

RESET CONFIGURATION DATA:

Normally, you leave this field Disabled. Select Enabled to reset Extended System Configuration Data (ESCD) when you exit Setup if you have installed a new add-on and the system configuration has caused such a serious conflict that the operating system cannot boot.

RESOURCE CONTROLLED BY:

The Award Plug and Play Bios can automatically configure all of the booth 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. By choosing "manual", you are allowed to configure the *IRQ Resources and DMA Resources*.

IRQ RESOURCES:

You may assign each system interrupt a type, depending on the type of device using the interrupt.

DMA RESOURCES:

When resources are controlled manually, assign each system DMA channel a type, depending on the type of device using the DM channel.

PCI/VGA PALETTE SNOOP:

Leave this field at disabled.

4-9. PC HEALTH STATUS

Choose "PC HEALTH STATUS" from the main menu, a display will be shown on screen as below:

Phoenix - AwardBIOS CMOS Setup Utility
PC Health Status

Current Warning Temperature	[Disabled]	Item Help
Current System Temp.	36°C/96°F	
Current CPU Temperature	36°C/96°F	Menu Level ►
Current CPU Fan Speed	4821 RPM	
Current System Fan Speed	0 RPM	
Vcore	1.47V	
3.3 V	3.24V	
+ 5 V	4.99V	
+12 V	11.91V	
-12 V	-12.44V	
VBAT (V)	3.42V	
5VSB (V)	4.94V	
Shutdown Temperature	[Disabled]	

↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7:Optimized Defaults

PC Health Status Setup Screen

The PC Health Status Setup allows you to select whether to choose between monitoring or to ignore the hardware monitoring function of your system.

CURRENT WARNING TEMPERATURE:

Select the combination of lower and upper limits for the CPU temperature. If the CPU temperature extends beyond either limit, any warning mechanism programmed into your system will be activated.

CURRENT CPU/SYSTEM TEMPERATURE:

This item shows you the current CPU/System temperature.

CURRENT CPU/SYSTEM FAN SPEED:

This item shows you the current CPU/ System FAN speed.

VCORE:

This item shows you the current system voltage.

3.3V / +5V / +12V / -12V:

Show you the voltage of 3.3V/+5V/+12V/-12V.

SHUTDOWN TEMPERATURE:

This item allows you to set up the CPU shutdown Temperature. This function is only effective under Windows 98 ACPI mode.

4-10. FREQUENCY CONTROL

Choose "FREQUENCY CONTROL" from the main menu, a display will be shown on screen as below:

Phoenix - AwardBIOS CMOS Setup Utility
Frequency Control

Auto Detect PCI Clk	[Enabled]	Item Help
Spread Spectrum	[Disabled]	Menu Level ►

↑↓→←: Move Enter: Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7:Optimized Defaults

Frequency Control Setup Screen

This setup menu allows you to specify your settings for frequency control.

AUTO DETECT PCI CLK:

This item allows you to enable or disable auto detect PCI Clock.

SPREAD SPECTRUM:

When the system clock generator pulses, the extreme values of the pulse generate excess EMI. Enabling pulse spectrum spread modulation changes the extreme values from spikes to flat curves, thus reducing EMI. This benefit may in some cases be outweighed by problems with timing-critical devices such as a clock-sensitive SCSI device.

4-11. LOAD FAIL-SAFE DEFAULTS

By pressing the <ENTER> key on this item, you get a confirmation dialog box with a message similar to the following:

Load Fail-Safe Defaults (Y/N) ? N

To use the BIOS default values, change the prompt to "Y" and press the <Enter > key. CMOS is loaded automatically when you power up the system.

4-12. LOAD OPTIMIZED DEFAULTS

When you press <Enter> on this category, you get a confirmation dialog box with a message similar to the following:

Load Optimized Defaults (Y/N) ? N

Pressing "Y" loads the default values that are factory setting for optimal performance system operations.

4-13. PASSWORD SETTING

User is allowed to set either supervisor or user password, or both of them. The difference is that the supervisor password can enter and change the options of the setup menus while the user password can enter only but do not have the authority to change the options of the setup menus.

TO SET A PASSWORD

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 the < Enter > key. You may also press < Esc > to abort the selection and not enter a password.

🔔 User should bear in mind that when a password is set, you will be asked to enter the password everything you enter CMOS setup Menu.

TO DISABLE THE PASSWORD

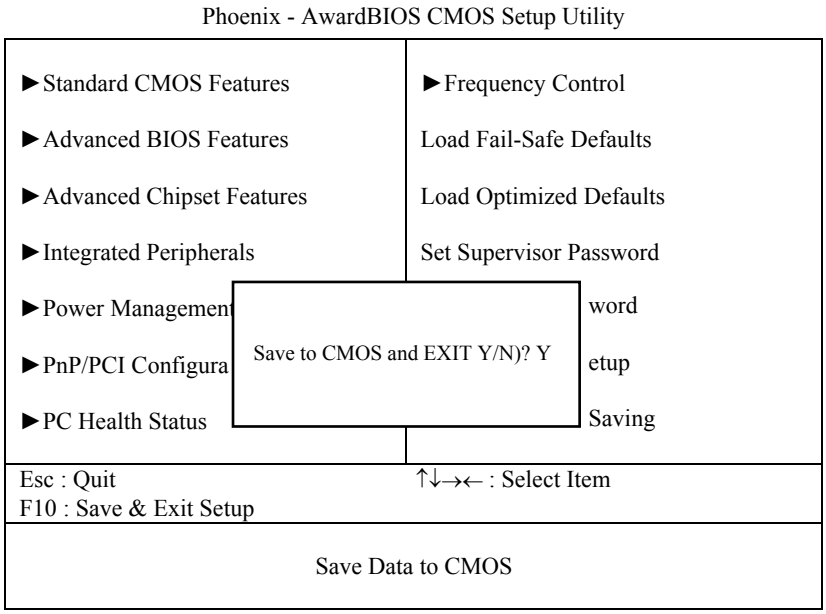
To disable the password, select this function (do not enter any key when you are prompt to enter a password), and press the <Enter> key and a message will appear at the center of the screen:

PASSWORD DISABLED!!! Press any key to continue...

Press the < Enter > key again and the password will be disabled. Once the password is disabled, you can enter Setup freely.

4-14. SAVE & EXIT SETUP

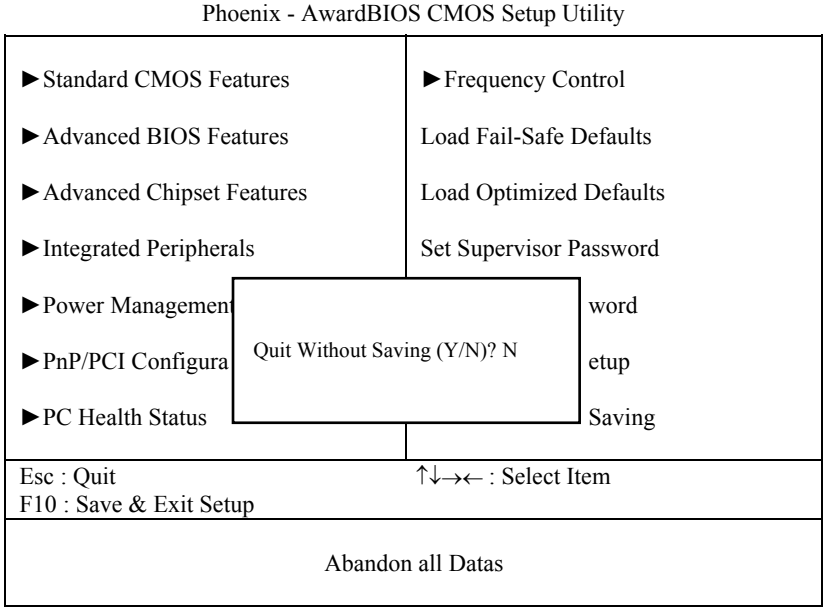
After you have completed adjusting all the settings as required, you must remember to save these setting into the CMOS RAM. To save the settings, select "SAVE & EXIT SETUP" and press <Enter>, a display will be shown as follows:



When you confirm that you wish to save the settings, your system will be automatically restarted and the changes you have made will be implemented. You may always call up the setup program at any time to adjust any of the individual items by pressing the <Del> key during boot up.

4-15. EXIT WITHOUT SAVING

If you wish to cancel any changes you have made, you may select the "EXIT WITHOUT SAVING" and the original setting stored in the CMOS will be retained. The screen will be shown as below:



EXPANSION BUS

APPENDIX

A

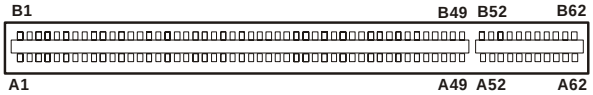
This appendix indicates the pin assignments.

Section includes:

- PCI BUS Pin Assignment
- EPCI BUS Pin Assignment
- Compact Flash Card Connector Pin Assignment

PCI BUS PIN ASSIGNMENT

Like ISA-BUS connector, the PCI-BUS edge connector is also divided into two sets: one consists of 98-pin; the other consists of 22-pin.
The pin assignments are as follows :



B		A		B		A	
PIN	ASSIGNMENT	PIN	ASSIGNMENT	PIN	ASSIGNMENT	PIN	ASSIGNMENT
B1	-12V	A1	TRST#	B31	+3.3V	A31	AD18
B2	TCK	A2	+12V	B32	AD17	A32	AD16
B3	GND	A3	TMS	B33	C/BE2#	A33	+3.3V
B4	TDO	A4	TDI	B34	GND	A34	FRAME#
B5	+5V	A5	+5V	B35	IRDY#	A35	GND
B6	+5V	A6	INTA#	B36	+3.3V	A36	TRDY#
B7	INTB#	A7	INTC#	B37	DEVSEL#	A37	GND
B8	INTD#	A8	+5V	B38	GND	A38	STOP#
B9	REQ3#	A9	CLKC	B39	LOCK#	A39	+3.3V
B10	REQ1#	A10	+5V(I/O)	B40	PERR#	A40	SDONE
B11	GNT3#	A11	CLKD	B41	+3.3V	A41	SB0#
B12	GND	A12	GND	B42	SERR#	A42	GND
B13	GND	A13	GND	B43	+3.3V	A43	PAR
B14	CLKA	A14	GNT1#	B44	C/BE1#	A44	AD15
B15	GND	A15	RST#	B45	AD14	A45	+3.3V
B16	CLKB	A16	+5V(I/O)	B46	GND	A46	AD13
B17	GND	A17	GNT0#	B47	AD12	A47	AD11
B18	REQ0#	A18	GND	B48	AD10	A48	GND
B19	+5V(I/O)	A19	REQ2#	B49	GND	A49	AD09
B20	AD31	A20	AD30	B52	AD08	A52	C/BE0#
B21	AD29	A21	+3.3V	B53	AD07	A53	+3.3V
B22	GND	A22	AD28	B54	+3.3V	A54	AD06
B23	AD27	A23	AD26	B55	AD05	A55	AD04
B24	AD25	A24	GND	B56	AD03	A56	GND
B25	+3.3V	A25	AD24	B57	GND	A57	AD02
B26	C/BE3#	A26	GNT2#	B58	AD01	A58	AD00
B27	AD23	A27	+3.3V	B59	+5V(I/O)	A59	+5V(I/O)
B28	GND	A28	AD22	B60	ACK64#	A60	REQ64#
B29	AD21	A29	AD20	B61	+5V	A61	+5V
B30	AD19	A30	GND	B62	+5V	A62	+5V

EPCI CONNECTOR

You will find a PPCI connector in our EBC-I845C.
The pin assignments are as follows:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
A1	GND	B1	GND
A2	AD0	B2	AD1
A3	AD2	B3	AD3
A4	AD4	B4	AD5
A5	AD6	B5	AD7
A6	AD8	B6	AD9
A7	AD10	B7	AD11
A8	VCC	B8	VCC
A9	AD12	B9	AD13
A10	AD14	B10	AD15
A11	AD16	B11	AD17
A12	AD18	B12	AD19
A13	AD20	B13	AD21
A14	AD22	B14	AD23
A15	VCC	B15	VCC
A16	AD24	B16	AD25
A17	AD26	B17	AD27
A18	AD28	B18	AD29
A19	AD30	B19	AD31
A20	PIRQ#B	B20	PAR
A21	PP CLK	B21	IRDY#
A22	ID SEL	B22	TRDY#
A23	CBE#0	B23	CBE#1
A24	CBE#2	B24	CBE#3
A25	PGNT#4	B25	PREQ#4
A26	SERR#	B26	PERR#
A27	PIRQ#A	B27	PCI_RST#
A28	STOP#	B28	PLOCK#
A29	DEVSEL#	B29	FRAME#
A30	GND	B30	GND

☞ The PPCI expansion connector of this Card is designed based on PCI Bus Master.

COMPACT FLASH CARD CONNECTOR PIN ASSIGNMENT

The pin assignments of Compact Flash Card connector are stated below.

PIN	ASSIGNMENT	PIN	Assignment
1	GND	26	-CD1
2	D03	27	D111
3	D04	28	D121
4	D05	29	D131
5	D06	30	D141
6	D07	31	D151
7	-CS0	32	-CS11
8	A102	33	-VS1
9	-ATASEL	34	-IORD
10	A092	35	-IOWR
11	A082	36	-WE3
12	+3.3V	37	INTRQ
13	VCC	38	VCC
14	A062	39	-CSEL
15	A052	40	-VS2
16	A042	41	-RESET
17	A032	42	IORDY
18	A02	43	-INPACK
19	A01	44	-REG3
20	A00	45	-DASP
21	D00	46	-PDIAG
22	D01	47	D081
23	D02	48	D091
24	-IOCS16	49	D101
25	-CD2	50	GND

TECHNICAL SUMMARY

APPENDIX

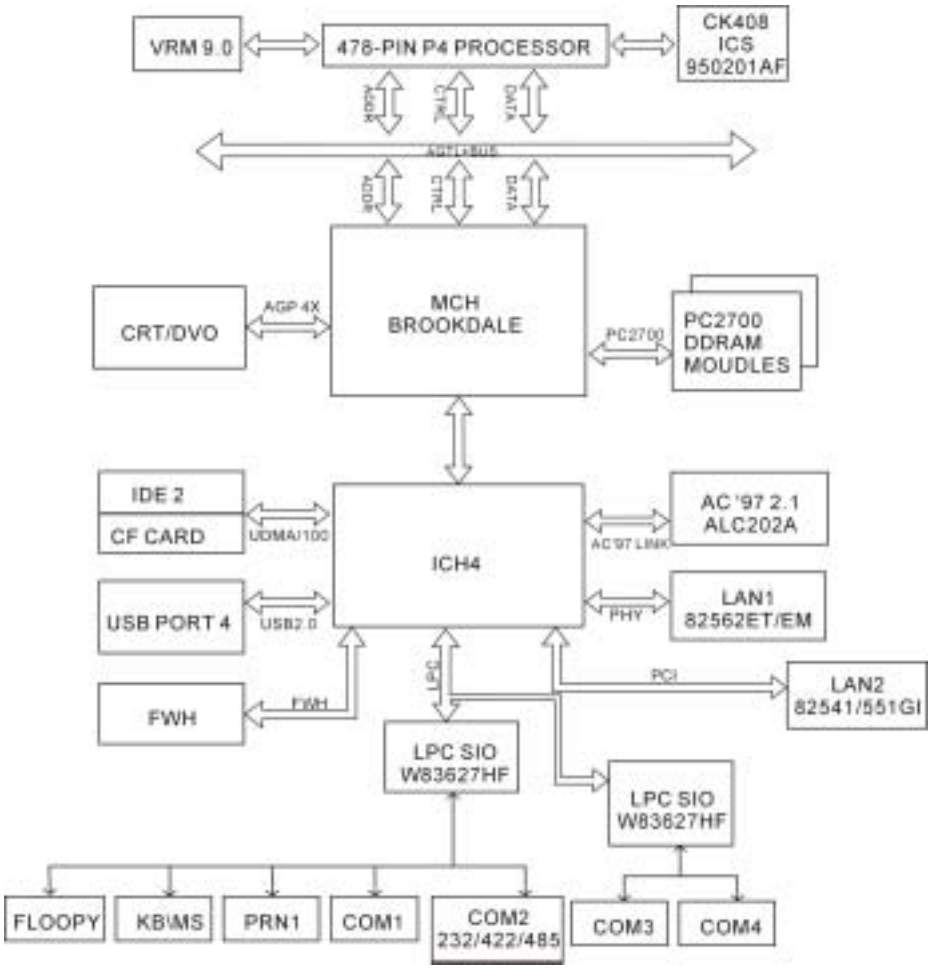
B

This section introduce you the maps concisely.

Section includes:

- Block Diagram
- Interrupt Map
- RTC & CMOS RAM Map
- Timer & DMA Channels Map
- I / O & Memory Map

BLOCK DIAGRAM



INTERRUPT MAP

IRQ	ASSIGNMENT
0	System TIMER
1	Keyboard
2	Cascade
3	Serial port 2
4	Serial port 1
5	Available
6	Floppy
7	Parallel port 1
8	RTC clock
9	Available
10	Available
11	Available
12	PS/2 Mouse
13	Math coprocessor
14	IDE1
15	IDE2

RTC & CMOS RAM MAP

CODE	ASSIGNMENT
00	Seconds
01	Second alarm
02	Minutes
03	Minutes alarm
04	Hours
05	Hours alarm
06	Day of week
07	Day of month
08	Month
09	Year
0A	Status register A
0B	Status register B
0C	Status register C
0D	Status register D
0E	Diagnostic status byte
0F	Shutdown byte
10	Floppy Disk drive type byte
11	Reserve
12	Hard Disk type byte
13	Reserve
14	Equipment byte
15	Base memory low byte
16	Base memory high byte
17	Extension memory low byte
18	Extension memory high byte
30	Reserved for extension memory low byte
31	Reserved for extension memory high byte
32	Date Century byte
33	Information Flag
34-3F	Reserve
40-7f	Reserved for Chipset Setting Data

TIMER & DMA CHANNELS MAP

Timer Channel Map :

Timer Channel	Assignment
0	System timer interrupt
1	DRAM Refresh request
2	Speaker tone generator

DMA Channel Map :

DMA Channel	Assignment
0	Available
1	Available
2	Floppy
3	Available
4	Cascade
5	Available
6	Available
7	Available

I/O & MEMORY MAP

Memory Map :

MEMORY MAP	ASSIGNMENT
0000000-009FFFF	System memory used by DOS and application
00A0000-00BFFFF	Display buffer memory for VGA/ EGA / CGA / MONOCHROME adapter
00C0000-00DFFFF	Reserved for I/O device BIOS ROM or RAM buffer.
00E0000-00EFFFF	Reserved for PCI device ROM
00F0000-00FFFFF	System BIOS ROM
0100000-FFFFFFF	System extension memory

I/O Map :

I/O MAP	ASSIGNMENT
000-01F	DMA controller (Master)
020-021	Interrupt controller (Master)
022-023	Chipset controller registers I/O ports.
040-05F	Timer control regsiters.
060-06F	Keyboard interface controller (8042)
070-07F	RTC ports & CMOS I/O ports
080-09F	DMA register
0A0-0BF	Interrupt controller (Slave)
0C0-0DF	DMA controller (Slave)
0F0-0FF	Math coprocessor
1F0-1F8	Hard Disk controller
278-27F	Parallel port-2
2B0-2DF	Graphics adapter controller
2F8-2FF	Serial port-2
360-36F	Net work ports
378-37F	Parallel port-1
3B0-3BF	Monochrome & Printer adapter
3C0-3CF	EGA adapter
3D0-3DF	CGA adapter
3F0-3F7	Floppy disk controller
3F8-3FF	Serial port-1