

MB877

Socket LGA775 Pentium® 4
ATI RS400 Mini ITX
Industrial Motherboard

USER'S MANUAL

Version 1.0A

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Table of Contents

Introduction	1
Checklist.....	1
Product Description.....	2
Specifications	3
Board Dimensions	4
Installations	5
Installing the CPU	6
ATX Power Installation	7
Installing the Memory	7
Setting the Jumpers	8
Connectors on MB877	11
Watchdog Timer Configuration	21
BIOS Setup.....	25
Drivers Installation	45
Appendix	51
A. I/O Port address Map.....	51
B. Interrupt Request Lines (IRQ).....	52
C. Digital I/O Sample Code	53

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Introduction

Checklist

Your MB877 Pentium® 4 motherboard package should include the items listed below:

Your MB877 package should include the items listed below.

- The MB877 P4 Mini ITX Board
- This User's Manual
- 1 CD Containing Chipset Drivers And Flash Memory Utility
- ULI SATA/RAID Controller Driver
- Optional cables such as:
 - 1 Slim FDD Ribbon Cable
 - 1 IDE Ribbon Cable (40-Pin)
 - 1 COM Port Cable (For COM2/3/4)
 - Serial ATA Cable

Product Description

The MB877 LGA 775 Pentium® 4 motherboard incorporates the ATI RS400 chipset that can utilize a single LGA775 processor of up to 3.8+GHz or higher and supports FSB frequency of 400MHz/533MHz/800MHz (133MHz, and 200MHz HCLK respectively).

The ATI RS400 chipset is designed for use with the Pentium® 4 processor with 1M Level 2 (CPU integrated) cache. The integrated MCH component provides the CPU interface, DDR2 interface, Hub Interface and PCI Express interface.

Two dual channel DDR2 memory sockets supports DDR2 400/533/667 SDRAM DIMM modules with up to 2GB in capacity.

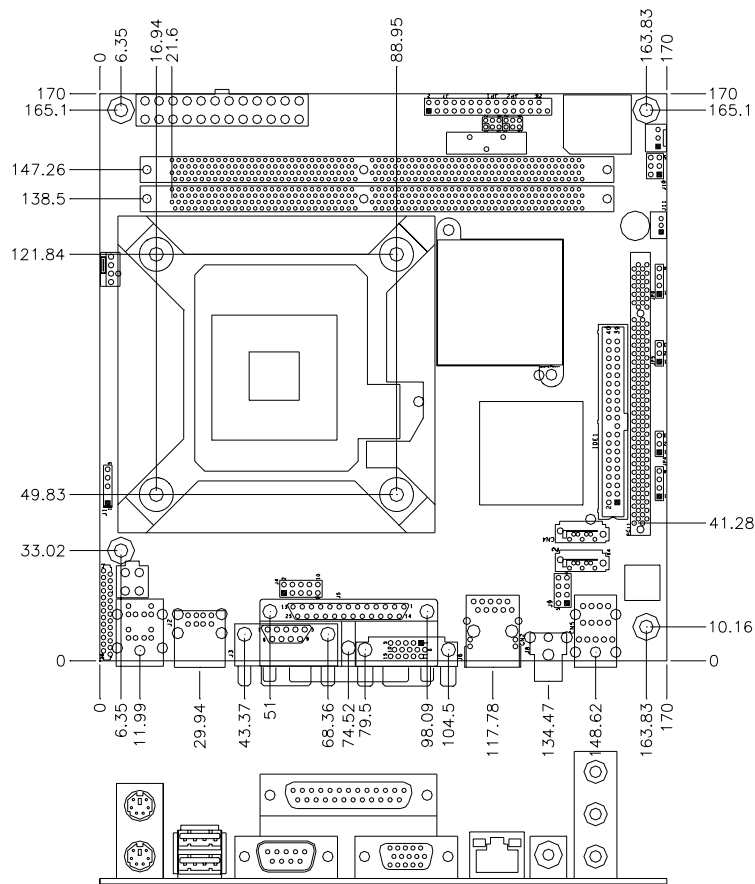
The MB877 Mini ITX motherboard supports CRT VGA interface as well as TV out. The board is designed with one Marvell 88E8052 PCI Express Gigabit LAN single controllers. The board also has AC97 6CH audio, 4 COM ports, UDMA 100, 4 USB ports, two serial ATA ports, watchdog timer, 4 In/4 Out Digital I/O and a PCI slot for expandability. Dimensions of the board are 170mm x 170mm.

This board represents the perfect choice for those who want superior performance for POS, kiosk, ATM, Web payphone, medical and other embedded applications.

Specifications

Product Name	MB877
CPU Support	Intel® Pentium® 4
CPU Voltage	0.8375V~1.6V (VRD 10.1)
System Speed	Up to 3.8GHz+
CPU Operating Frequency	400MHz/533MHz/800MHz
Green /APM	APM1.2
CPU Socket	LGA 775
Chipset	Chipset NB: ATI RS400 SB: ULi M1573
BIOS	Award BIOS; Supports ACPI
Cache	1M Level 2 (CPU integrated)
VGA	ATI RS400 built-in Mobility Radeon 9600(M10) Graphic core. Supports AGP 8X,CRT.TV-out
PCI Express Gigabit LAN	Marvell 88E8052 PCI Express Gigabit LAN single controller
Audio	ULi M1573 Built-in Sound controller + AC97 Codec ALC655 6 Channel (Line-in, Line-out, Mic.), On board D-SUB connector
Memory type	2x DDR2 400/533/667 SDRAM DIMM module (without ECC function), Max. 2GB (Dual Channel)
LPC I/O	1. First I/O: Winbond 83627EHF: IrDax1 Parallel x1, COM1 (RS-232), COM2(RS-232), FDC 1.44MB (Slim type), Hardware monitor (3 thermal inputs, 8 voltage monitor inputs, VID0-5, 1 chassis open detection, 3 fan headers) 2. Secondary I/O: Fintek F81216 support COM3, 4 (RS-232)
RTC/CMOS	Built in ULi M1573
Battery	Lithium battery
Keyboard Controller	Built-in Winbond 83627EHF
IDE	M1573 built in, IDE1 (40-pin/2.5mm pitch); supports Ultra DMA 33/66/100
Serial ATA connector	ULi M1573 built-in two SATA ports
On board D-type connector	PS/2 Keyboard/Mouse, VGA (CRT), COM1, Printer, USBx2, RJ-45, Line-out, Line-in, Mic, TV-out
Power Connector	ATX 24-pin
Expansion Slots	1 slot (supports 2 bus master)
USB 2.0	Supports 4 ports (D-type CN. x2 & pin header x2)
Digital I/O	4 In, 4 Out
Watchdog Timer	Supports 256 segments (0,1,2...255. sec/min)
System Voltages	+5V, +12V, -12V, 5VSB, -5V, 3.3V
Board Size	170 x170mm

Board Dimensions



Installations

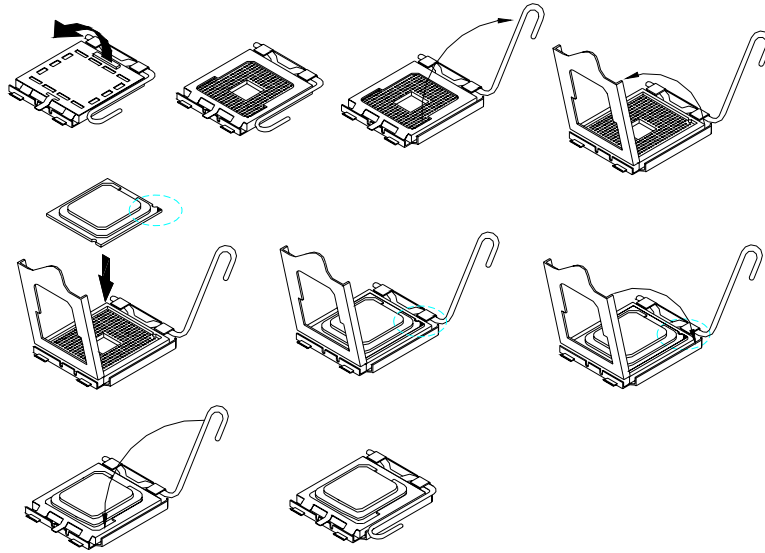
This section provides information on how to use the jumpers and connectors on the MB877 in order to set up a workable system. The topics covered are:

Installing the CPU	6
ATX Power Installation	7
Installing the Memory	7
Setting the Jumpers	8
Connectors on MB877	11
Watchdog Timer Configuration	21

Installing the CPU

The MB877 motherboard supports an LGA 775 processor socket for Intel® Pentium® 4 processors.

The LGA 775 processor socket comes with a lever to secure the processor. Refer to the pictures below, from left to right, on how to place the processor into the CPU socket. **Please note that the cover of the LGA775 socket must always be installed during transport to avoid damage to the socket.**



ATX Power Installation

The system power is provided to the motherboard with the ATX1 and ATX_12V1 power connectors. ATX1 is a 24-pin power connector and ATX_12V1 is a 4-pin 12V power connector.

The 24-pin power connector can to be connected to a standard 20-pin ATX power connector in a standard ATX power supply (Min. 400watt).

Note: The power supply 5VSB voltage must be at least 2A.

Installing the Memory

The MB877 motherboard supports two DDR2 memory sockets for a maximum total memory of 2GB in DDR2 memory type. It supports DDR2 400/533/667 when installed with CPUs that have clock speeds of 533MHz. The board provides dual channel functionality for its DIMM slots. DIMM1 is for one channel and DIMM2 is for another channel.

Basically, the system memory interface has the following features:

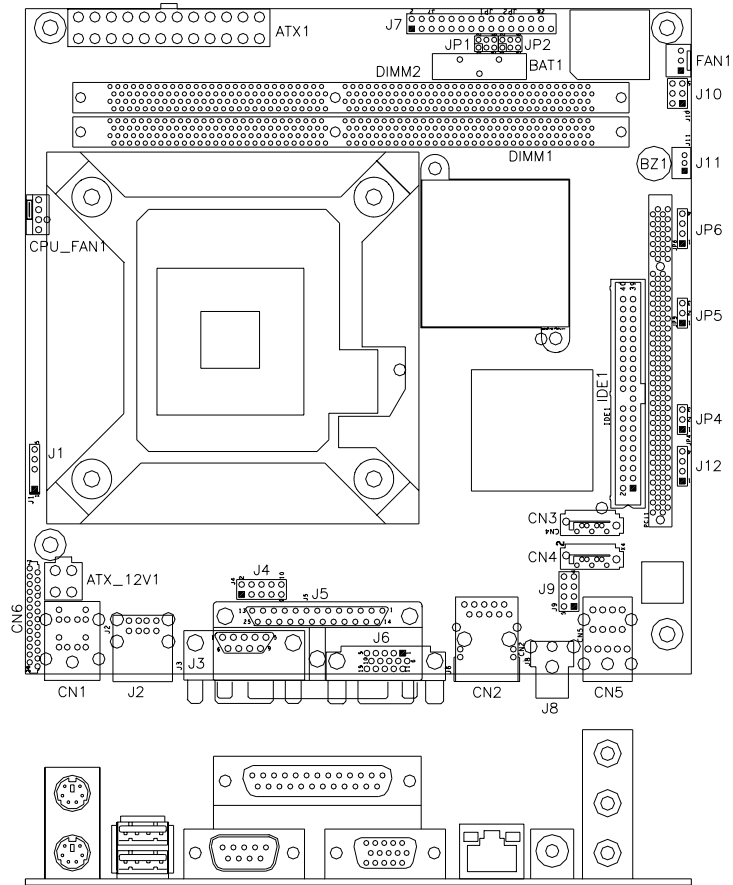
- Supports two 64-bit wide DDR2 data channels
- Available bandwidth up to 3.2GB/s (DDR2 400) for single-channel mode and 6.4GB/s (DDR2 400) in dual-channel mode.
- Supports 128Mb, 256Mb, 512Mb, 1Gb DDR2 technologies.
- Supports only x8, x16, DDR2 devices with four banks
- Registered DIMMs not supported
- Supports opportunistic refresh
- Up to 16 simultaneously open pages (four per row, four rows maximum)

Setting the Jumpers

Jumpers are used on MB877 to select various settings and features according to your needs and applications. Contact your supplier if you have doubts about the best configuration for your needs. The following lists the connectors on MB877 and their respective functions.

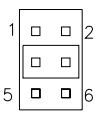
Jumper Locations on MB877.....	9
JP1: COM3 RS232 +5V/+12V Power Setting.....	10
JP2: COM4 RS232 +5V/+12V Power Setting.....	10
JP4: Clear CMOS Contents	10

Jumper Locations on MB877

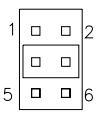


Jumper Locations on MB877	Page
JP1: COM3 RS232 +5V/+12V Power Setting	10
JP2: COM4 RS232 +5V/+12V Power Setting	10
JP4: Clear CMOS Contents	10

JP1: COM3 RS232 +5V/+12V Power Setting



JP1	Setting	Function
	Pin 1-2 Short/Closed	+12V
	Pin 3-4 Short/Closed	Normal
	Pin 5-6 Short/Closed	+5V

JP2: COM4 RS232 +5V/+12V Power Setting

JP2	Setting	Function
	Pin 1-2 Short/Closed	+12V
	Pin 3-4 Short/Closed	Normal
	Pin 5-6 Short/Closed	+5V

JP4: Clear CMOS Contents

Note: the ATX-power connector should be disconnected from the motherboard before clearing CMOS.

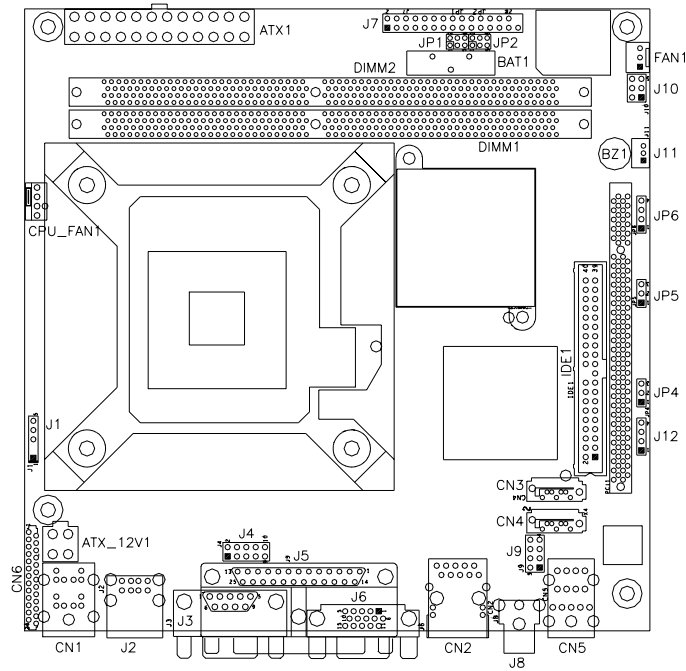
JP4	Setting	Function
	Pin 1-2 Short/Closed	Normal
	Pin 2-3 Short/Closed	Clear CMOS

Connectors on MB877

The connectors on MB877 allows you to connect external devices such as keyboard, floppy disk drives, hard disk drives, printers, etc. The following table lists the connectors on MB877 and their respective functions.

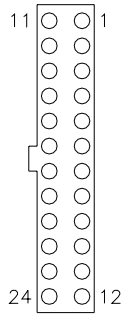
Connector Locations on MB877	12
ATX1: ATX Power Supply Connector	13
ATX_12V1: ATX 12V Power Connector	13
DIMM1: Channel A DDR2 Socket	13
DIMM2: Channel B DDR2 Socket	13
PCI1: PCI Slots	13
CN1: PS/2 Keyboard and PS/2 Mouse Connectors.....	14
CN2: RJ45 Connector	14
CN3, CN4: Serial ATA (SATA) Connectors	14
CN5: Line In, Line Out, Mic Connector	14
CN6: Floppy Drive Connector	15
J1: IrDA Connector	15
J2: USB Connector (USB1/USB2).....	15
J3: Serial Ports (COM1, RS232)	16
J4: Digital I/O Connector (4 in, 4 out)	16
J5: Parallel Port Connector.....	16
J6: VGA CRT Connector	17
J7: Serial Ports (COM2,3,4).....	17
J8:TV-Out connector (RCA Jack).....	18
J9: USB Connector (USB3/USB4).....	18
J10: System Function Connector.....	18
J11: Wake On LAN Connector	18
J12: CD-In Audio Connector	18
JP5: Power LED Connector	19
JP6: Speaker Connector.....	19
CPU_FAN1: CPU Fan Power Connector.....	19
FAN1: System & Chassis Fan Power Connectors.....	19
IDE1: Primary IDE Connectors.....	20

Connector Locations on MB877



Connectors on MB877.....	Page
ATX1: ATX Power Supply Connector.....	13
ATX_12V1: ATX 12V Power Connector.....	13
DIMM1: Channel A DDR2 Socket.....	13
DIMM2: Channel B DDR2 Socket.....	13
PCI1: PCI Slots.....	13
CN1: PS/2 Keyboard and PS/2 Mouse Connectors.....	14
CN2: RJ45 Connector.....	14
CN3, CN4: Serial ATA (SATA) Connectors.....	14
CN5: Line In, Line Out, Mic Connector.....	14
CN6: Floppy Drive Connector.....	15
J1: IrDA Connector.....	15
J2: USB Connector (USB1/USB2).....	15
J3: Serial Ports (COM1, RS232).....	16
J4: Digital I/O Connector (4 in, 4 out).....	16
J5: Parallel Port Connector.....	16
J6: VGA CRT Connector.....	17
J7: Serial Ports (COM2,3,4).....	17
J8: TV-Out Connector (RCA Jack).....	18
J9: USB Connector (USB3/USB4).....	18
J10: System Function Connector.....	18
J11: Wake On LAN Connector.....	18
J12: CD-In Audio Connector.....	18
JP5: Power LED Connector.....	19
JP6: Speaker Connector.....	19
CPU_FAN1: CPU Fan Power Connector.....	19
FAN1: System & Chassis Fan Power Connectors.....	19
IDE1: Primary IDE Connectors.....	20

ATX1: ATX Power Supply Connector

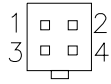


Signal Name	Pin #	Pin #	Signal Name
3.3V	13	1	3.3V
-12V	14	2	3.3V
Ground	15	3	Ground
PS-ON	16	4	+5V
Ground	17	5	Ground
Ground	18	6	+5V
Ground	19	7	Ground
-5V	20	8	Power good
+5V	21	9	5VSB
+5V	22	10	+12V
+5V	23	11	+12V
Ground	24	12	+3.3V

ATX1 is a 24-pin ATX power supply connector.

ATX_12V1: ATX 12V Power Connector

This connector supplies the CPU operation voltage



Pin #	Signal Name
1	Ground
2	Ground
3	+12V
4	+12V

DIMM1: Channel A DDR2 Socket

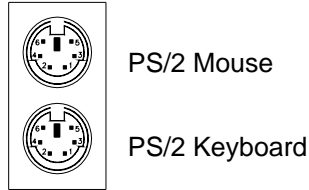
DIMM1 is the first-channel DDR2 socket.

DIMM2: Channel B DDR2 Socket

DIMM2 is the second-channel DDR2 socket.

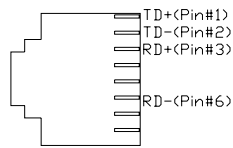
PCI1: PCI Slots

CN1: PS/2 Keyboard and PS/2 Mouse Connectors



Signal Name	Keyboard	Mouse	Signal Name
Keyboard data	1	1	Mouse data
N.C.	2	2	N.C.
GND	3	3	GND
5V	4	4	5V
Keyboard clock	5	5	Mouse clock
N.C.	6	6	N.C.

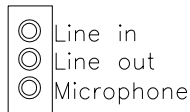
CN2: RJ45 Connector



CN3, CN4: Serial ATA (SATA) Connectors

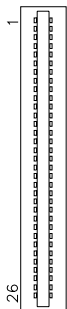
The SATA connectors support serial ATA 150. Each connector can only use one serial ATA hard disk. CN4 is port 1 and CN3 is port 2.

CN5: Line In, Line Out, Mic Connector



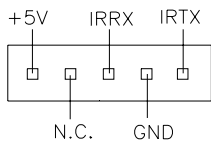
CN6: Floppy Drive Connector

CN6 is a slim 26-pin connector and will support up to 2.88MB FDD.



Signal Name	Pin #	Pin #	Signal Name
VCC	1	2	INDEX
VCC	3	4	DRV_SEL
VCC	5	6	DSK_CH
NC	7	8	NC
NC	9	10	MOTOR
DINST	11	12	DIR
NC	13	14	STEP
GND	15	16	WDATA
GND	17	18	WGATE
GND	19	20	TRACK
NC	21	22	WPROT
GND	23	24	RDATA
GND	25	26	SIDE

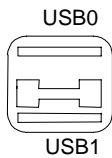
J1: IrDA Connector



Pin #	Signal Name
1	+5V
2	No connect
3	Ir RX
4	Ground
5	Ir TX

J2: USB Connector (USB1/USB2)

J2 is a stacked USB port.



Pin #	Signal Name
1	Vcc
2	USB-
3	USB+
4	Ground

J3: Serial Ports (COM1, RS232)

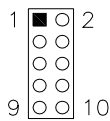


Signal Name	Pin #	Pin #	Signal Name
DCD, Data carrier detect	1	6	DSR, Data set ready
RXD, Receive data	2	7	RTS, Request to send
TXD, Transmit data	3	8	CTS, Clear to send
DTR, Data terminal ready	4	9	RI, Ring indicator
GND, ground	5	10	Not Used

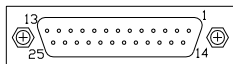
J4: Digital I/O Connector (4 in, 4 out)

This 10-pin Digital I/O connector supports TTL levels and is used to control external devices requiring ON/OFF circuitry.

Signal Name	Pin #	Pin #	Signal Name
Ground	1	2	+5V
Out3	3	4	Out1
Out2	5	6	Out0
IN3	7	8	IN1
IN2	9	10	IN0



J5: Parallel Port Connector

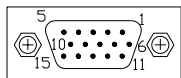


J5 Parallel Port

Signal Name	Pin #	Pin #	Signal Name
Line printer strobe	1	14	AutoFeed
PD0, parallel data 0	2	15	Error
PD1, parallel data 1	3	16	Initialize
PD2, parallel data 2	4	17	Select
PD3, parallel data 3	5	18	Ground
PD4, parallel data 4	6	19	Ground
PD5, parallel data 5	7	20	Ground
PD6, parallel data 6	8	21	Ground
PD7, parallel data 7	9	22	Ground
ACK, acknowledge	10	23	Ground
Busy	11	24	Ground
Paper empty	12	25	Ground
Select	13	N/A	N/A

J6: VGA CRT Connector

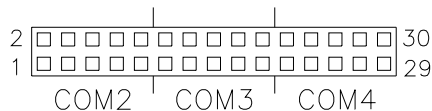
J6 is a DB-15 VGA connector located beside the COM1 port. The following table shows the pin-out assignments of this connector.



Signal Name	Pin #	Pin #	Signal Name
Red	1	2	Green
Blue	3	4	N.C.
GND	5	6	GND
GND	7	8	GND
N.C.	9	10	GND
N.C.	11	12	N.C.
HSYNC	13	14	VSYNC
NC	15		

J7: Serial Ports (COM2,3,4)

J7 is a 30-pin header for the board's serial ports (RS232).

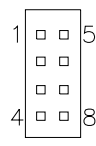


Signal Name	Pin #	Pin #	Signal Name
DCD2	1	2	DSR2
SIN2	3	4	RTS2
SO2	5	6	CTS2
DTR2-	7	8	RI2
GND	9	10	N/A
DCD3	11	12	DSR3
SIN3	13	14	RTS3
SOUT3	15	16	CTS3
DTR3	17	18	RI3-
GND	19	20	N/A
DCD4	21	22	DSR4
SIN4	23	24	RTS4
SOUT4	25	26	CTS4
DTR4	27	28	RI4
GND	29	30	N/A

J8: TV-Out connector (RCA Jack)

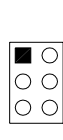
J9: USB Connector (USB3/USB4)

The following table shows the pin outs of the USB pin headers connectors (USB 2.0 compliant).



Signal Name	Pin	Pin	Signal Name
Vcc	1	5	Ground
USB0-	2	6	USB1+
USB0+	3	7	USB1-
Ground	4	8	Vcc

J10: System Function Connector



Signal Name	Pin	Pin	Signal Name
Gnd	1	2	PS_ON
5V	3	4	HDD Active
Ground	5	7	Reset

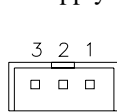
ATX power on switch: Pins 1-2

HDD LED: Pins 3-4

Reset switch: Pins 5-6


J11: Wake On LAN Connector

J11 is a 3-pin header for the Wake On LAN function on the motherboard. The following table shows the pin out assignments of this connector. Wake On LAN will function properly only with an ATX power supply with 5VSB that has 1A.



Pin #	Signal Name
1	+5VSB
2	Ground
3	LAN Wakeup

J12: CD-In Audio Connector



Pin #	Signal Name
1	CD Audio R
2	Ground
3	Ground
4	CD Audio L

JP5: Power LED Connector



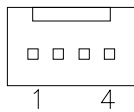
Pin #	Signal Name
1	Vcc
2	NC
3	Power LED

JP6: Speaker Connector



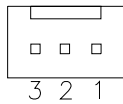
Pin #	Signal Name
1	Speaker
2	NC
3	NC
4	VCC

CPU_FAN1: CPU Fan Power Connector



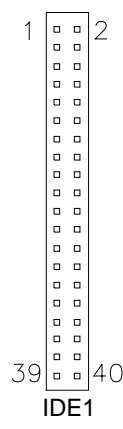
Pin #	Signal Name
1	Ground
2	+12V
3	Rotation detection
4	Control

FAN1: System & Chassis Fan Power Connectors



Pin #	Signal Name
1	Ground
2	+12V
3	Rotation detection

IDE1: Primary IDE Connectors



Signal Name	Pin #	Pin #	Signal Name
Reset IDE	1	2	Ground
Host data 7	3	4	Host data 8
Host data 6	5	6	Host data 9
Host data 5	7	8	Host data 10
Host data 4	9	10	Host data 11
Host data 3	11	12	Host data 12
Host data 2	13	14	Host data 13
Host data 1	15	16	Host data 14
Host data 0	17	18	Host data 15
Ground	19	20	Protect pin
DRQ0	21	22	Ground
Host IOW	23	24	Ground
Host IOR	25	26	Ground
IOCHRDY	27	28	Host ALE
DACK0	29	30	Ground
IRQ14	31	32	No connect
ADDR2ess 1	33	34	No connect
ADDR2ess 0	35	36	ADDR2ess 2
Chip select 0	37	38	Chip select 1
Activity	39	40	Ground

Watchdog Timer Configuration

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

SAMPLE CODE:

This code and information is provided "as is" without warranty of any kind, either expressed or implied, including but not limited to the implied warranties of merchantability and/or fitness for a particular purpose.

```

;[]=====
; Name   : Enable_And_Set_Watchdog
; IN    : AL - 1sec ~ 255sec
; OUT   : None
;[]=====
Enable_And_Set_Watchdog Proc Near
    push ax                ;save time interval
    call Unlock_Chip

    mov cl, 2Bh
    call Read_Reg
    and al, NOT 10h
    call Write_Reg        ;set GP24 as WDTO

    mov cl, 07h
    mov al, 08h
    call Write_Reg        ;switch to LD8
    mov cl, 0F5h
    call Read_Reg
    and al, NOT 08h
    call Write_Reg        ;set count mode as second

    pop ax
    mov cl, 0F6h
    call Write_Reg        ;set watchdog timer

    mov al, 01h
    mov cl, 30h
    call Write_Reg        ;watchdog enabled

```

```

        call Lock_Chip
        ret
Enable_And_Set_Watchdog   Endp

;[]=====
;Name   : Disable_Watchdog
;IN    : None
;OUT   : None
;[]=====
Disable_Watchdog   Proc Near
        call Unlock_Chip

        mov cl, 07h
        mov al, 08h
        call Write_Reg      ;switch to LD8

        xor al, al
        mov cl, 0F6h
        call Write_Reg      ;clear watchdog timer

        xor al, al
        mov cl, 30h
        call Write_Reg      ;watchdog disabled

        call Lock_Chip
        ret
Disable_Watchdog   Endp

;[]=====
;Name   : Unlock_Chip
;IN    : None
;OUT   : None
;[]=====
Unlock_Chip   Proc Near
        mov dx, 4EH
        mov al, 87h
        out dx, al
        out dx, al
        ret
Unlock_Chip   Endp

;[]=====
;Name   : Lock_Chip
;IN    : None
;OUT   : None

```

```
=====  
:[]=====  
Unlock_Chip Proc Near  
    mov dx, 4EH  
    mov al, 0Aah  
  
    out dx, al  
    ret  
Unlock_Chip Endp  
:[]=====  
; Name      : Write_Reg  
; IN       : CL - register index  
; AL       : Value to write  
; OUT      : None  
:[]=====  
Write_Reg Proc Near  
    push ax  
    mov dx, 4EH  
    mov al, cl  
    out dx, al  
    pop ax  
    inc dx  
    out dx, al  
    ret  
Write_Reg Endp  
:[]=====  
; Name      : Read_Reg  
; IN       : CL - register index  
; OUT      : AL - Value to read  
:[]=====  
Read_Reg Proc Near  
    mov al, cl  
    mov dx, 4EH  
    out dx, al  
    inc dx  
    in  al, dx  
    ret  
Read_Reg Endp  
:[]=====
```

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BIOS Setup

This chapter describes the different settings available in the Award BIOS that comes with the motherboard. The topics covered in this chapter are as follows:

BIOS Introduction	26
BIOS Setup.....	26
Standard CMOS Setup	28
Advanced BIOS Features	30
Advanced Chipset Features	34
Integrated Peripherals	36
Power Management Setup	38
PNP/PCI Configurations	41
PC Health Status.....	42
Frequency/Voltage Control	43
Load Fail-Safe Defaults.....	44
Load Setup Defaults	44
Set Password	44
Save & Exit Setup	44
Exit Without Saving	44

BIOS Introduction

The Award BIOS (Basic Input/Output System) installed in your computer system's ROM supports Intel® Pentium® 4 processors. The BIOS provides critical low-level support for a standard device such as disk drives, serial ports and parallel ports. It also adds virus and password protection as well as special support for detailed fine-tuning of the chipset controlling the entire system.

BIOS Setup

The Award BIOS provides a Setup utility program for specifying the system configurations and settings. The BIOS ROM of the system stores the Setup utility. When you turn on the computer, the Award BIOS is immediately activated. Pressing the key immediately allows you to enter the Setup utility. If you are a little bit late pressing the key, POST (Power On Self Test) will continue with its test routines, thus preventing you from invoking the Setup. If you still wish to enter Setup, restart the system by pressing the "Reset" button or simultaneously pressing the <Ctrl>, <Alt> and <Delete> keys. You can also restart by turning the system Off and back On again. The following message will appear on the screen:

Press to Enter Setup

In general, you press the arrow keys to highlight items, <Enter> to select, the <PgUp> and <PgDn> keys to change entries, <F1> for help and <Esc> to quit.

When you enter the Setup utility, the Main Menu screen will appear on the screen. The Main Menu allows you to select from various setup functions and exit choices.

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

The section below the setup items of the Main Menu displays the control keys for this menu. At the bottom of the Main Menu just below the control keys section, there is another section, which displays information on the currently highlighted item in the list.

Note: *If the system cannot boot after making and saving system changes with Setup, the Award BIOS supports an override to the CMOS settings that resets your system to its default.*

Warning: *It is strongly recommended that you avoid making any changes to the chipset defaults. These defaults have been carefully chosen by both Award and your system manufacturer to provide the absolute maximum performance and reliability. Changing the defaults could cause the system to become unstable and crash in some cases.*

Standard CMOS Setup

“Standard CMOS Setup” choice allows you to record some basic hardware configurations in your computer system and set the system clock and error handling. If the board is already installed in a working system, you will not need to select this option. You will need to run the Standard CMOS option, however, if you change your system hardware configurations, the onboard battery fails, or the configuration stored in the CMOS memory was lost or damaged.

Phoenix - AwardBIOS CMOS Setup Utility
Standard CMOS Features

Date (mm:dd:yy)	Thu, Jan 4 2006	Item Help
Time (hh:mm:ss)	00 : 00 : 00	Menu Level
IDE Channel 0 Master	None	Change the day, month, Year and century
IDE Channel 0 Slave	None	
IDE Channel 1 Master	None	
IDE Channel 1 Slave	None	
Drive A	1.44	
Halt On	All, But Keyboard	
Base Memory	640K	
Extended Memory	1013760K	
Total Memory	1014784K	

At the bottom of the menu are the control keys for use on this menu. If you need any help in each item field, you can press the <F1> key. It will display the relevant information to help you. The memory display at the lower right-hand side of the menu is read-only. It will adjust automatically according to the memory changed. The following describes each item of this menu.

Date

The date format is:

Day : Sun to Sat
Month : 1 to 12
Date : 1 to 31
Year : 1999 to 2099

To set the date, highlight the “Date” field and use the PageUp/PageDown or +/- keys to set the current time.

Time

The time format is: **Hour : 00 to 23**
Minute : 00 to 59
Second : 00 to 59

To set the time, highlight the "Time" field and use the <PgUp>/<PgDn> or +/- keys to set the current time.

IDE Primary HDDs / IDE Secondary HDDs

The onboard PCI IDE connectors provide Primary and Secondary channels for connecting up to four IDE hard disks or other IDE devices. Each channel can support up to two hard disks; the first is the "Master" and the second is the "Slave".

Press <Enter> to configure the hard disk. The selections include Auto, Manual, and None. Select 'Manual' to define the drive information manually. You will be asked to enter the following items.

Capacity : Capacity/size of the hard disk drive
Cylinder : Number of cylinders
Head : Number of read/write heads
Precomp : Write precompensation
Landing Zone : Landing zone
Sector : Number of sectors

Drive A

This field identify the type of floppy disk drive A or drive B that has been installed in the computer.

Halt On

This field determines whether or not the system will halt if an error is detected during power up.

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

Advanced BIOS Features

This section allows you to configure and improve your system and allows you to set up some system features according to your preference.

Phoenix - AwardBIOS CMOS Setup Utility
Advanced BIOS Features

CPU Feature	Press Enter	ITEM HELP
Hard Disk Boot Priority	Press Enter	
Virus Warning	Disabled	Menu Level
CPU L1 and L2 Cache	Enabled	Allows you 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
Hyper-Threading Technology	Enabled	
Quick Power On Self Test	Enabled	
First Boot Device	Floppy	
Second Boot Device	Hard Disk	
Third Boot Device	CDROM	
Boot Other Device	Enabled	
Boot Up Floppy Seek	Enabled	
Boot Up Numlock Status	On	
Gate A20 Option	Fast	
Typematic Rate Setting	Disabled	
Typematic Rate (chars/Sec)	6	
Typematic Delay (Msec)	250	
Security Option	Setup	
APIC Mode	Enabled	
MPS Version Control for OS	1.4	
OS Select For DRAM>64MB	Non-OS2	
Report No FDD For WIN 95	Yes	
Small Logo (EPA) Show	Enabled	

Phoenix - AwardBIOS CMOS Setup Utility
CPU Features

Delay Prior Thermal	16 Min	ITEM HELP
Thermal Management	Thermal Monitor 1	
Limit CPUID MaxVal	Disabled	Menu Level

Delay Prior to Thermal

This field activates the CPU thermal function after the systems boots for the set number of minutes. The options are *16Min* and *64Min*.

Limit CPUID MaxVal

The choices are:

Enabled: Limits CPUID maximum value to 3 when used with older OS like Windows NT4.

Disabled: Disables CPUID limit for Windows XP.

Hard Disk Boot Priority

This item allows you to set the priority for hard disk boot. When you press enter, the selections shows the current hard disks used in your system as well as the "Bootable Add-in Card" that is relevant to other boot sources media such as SCSI cards and LAN cards.

Virus Warning

This item protects the boot sector and partition table of your hard disk against accidental modifications. If an attempt is made, the BIOS will halt the system and display a warning message. If this occurs, you can either allow the operation to continue or run an anti-virus program to locate and remove the problem.

CPU L1 and L2 Cache

Cache memory is additional memory that is much faster than conventional DRAM (system memory). CPUs from 486-type on up contain internal cache memory, and most, but not all, modern PCs have additional (external) cache memory. When the CPU requests data, the system transfers the requested data from the main DRAM into cache memory, for even faster access by the CPU. These items allow you to enable (speed up memory access) or disable the cache function.

Hyper-Threading Technology

Hyper-Threading Technology enables two logical processors on a single physical processor by replicating, partitioning, and sharing the resources within the Intel NetBurst microarchitecture pipeline.

Quick Power On Self Test

When enabled, this field speeds up the Power On Self Test (POST) after the system is turned on. If it is set to *Enabled*, BIOS will skip some items.

First/Second/Third Boot Device

These fields determine the drive that the system searches first for an operating system. The options available include *Floppy*, *LS/ZIP*, *HDD-0*, *SCSI*, *CDROM*, *HDD-1*, *HDD-2*, *HDD-3*, *USB-FDD*, *USB-ZIP*, *USB-CDROM* and *Disable*.

Boot Other Device

These fields allow the system to search for an operating system from other devices other than the ones selected in the First/Second/Third Boot Device.

Boot Up Floppy Seek

This feature controls whether the BIOS checks for a floppy drive while booting up. If it cannot detect one (either due to improper configuration or its absence), it will flash an error message.

Boot Up NumLock Status

This allows you to activate the NumLock function after you power up the system.

Gate A20 Option

This field allows you to select how Gate A20 is worked. Gate A20 is a device used to aDDR2ess memory above 1 MB.

Typematic Rate Setting

When disabled, continually holding down a key on your keyboard will generate only one instance. When enabled, you can set the two typematic controls listed next. By default, this field is set to *Disabled*.

Typematic Rate (Chars/Sec)

When the typematic rate is enabled, the system registers repeated keystrokes speeds. Settings are from 6 to 30 characters per second.

Typematic Delay (Msec)

When the typematic rate is enabled, this item allows you to set the time interval for displaying the first and second characters. By default, this item is set to *250msec*.

Security Option

This field allows you to limit access to the System and Setup. The default value is *Setup*. When you select *System*, the system prompts for the User Password every time you boot up. When you select *Setup*, the system always boots up and prompts for the Supervisor Password only when the Setup utility is called up.

APIC Mode

APIC stands for Advanced Programmable Interrupt Controller. The default setting is *Enabled*.

MPS Version Control for OS

This option specifies the MPS (Multiprocessor Specification) version for your operating system. MPS version 1.4 added extended configuration tables to improve support for multiple PCI bus configurations and improve future expandability. The default setting is **1.4**.

OS Select for DRAM > 64MB

This option allows the system to access greater than 64MB of DRAM memory when used with OS/2 that depends on certain BIOS calls to access memory. The default setting is **Non-OS/2**.

Report No FDD For WIN 95

If you are using Windows 95/98 without a floppy disk drive, select Enabled to release IRQ6. This is required to pass Windows 95/98's SCT test. You should also disable the Onboard FDC Controller in the Integrated Peripherals screen when there's no floppy drive in the system. If you set this feature to Disabled, the BIOS will not report the missing floppy drive to Win95/98.

Small Logo (EPA) Show

The EPA logo appears at the right side of the monitor screen when the system is boot up. The default setting is **Enabled**.

Advanced Chipset Features

This Setup menu controls the configuration of the chipset.

Phoenix - AwardBIOS CMOS Setup Utility
Advanced Chipset Features

South Configuration	Press Enter	ITEM HELP
Current MRC Version	6.4	Menu Level
Current FSB Frequency	200 MHz	
Current DRAM Frequency	266MHz	
Memory Frequency For	AUTO	
UMA Frame Buffer Size	32MB	
Video Display Devices	Auto	
TV Standard	NTSC	
Memory Hole	Enabled	
System BIOS Cacheable	Disabled	
Onboard PCI-I LAN	Enabled	
Memory Timing Parameter	Auto	
AUTO CAS Latency	3 Clocks	
AUTO TRCD	4 Clocks	
AUTO TRP	1 Clock	
AUTO TRAS	4 Clocks	
MANUAL CAS Latency	1 Clock	
MANUAL TRCD	1 Clock	
MANUAL TRP	1 Clock	
Multi-Function	Disabled	

South Configuration

This section refers to the options related to the following:

- South Bridge Feature (Press Enter)
- AC97 Audio (AC97 Audio)
- Serial ATA Controller (Enabled)
- RAID Function (Disabled)

Phoenix - AwardBIOS CMOS Setup Utility
South Bridge Feature

P3P Pre-fetch Queue Depth	Depth = 4	ITEM HELP
P2P Maximum Pre-fetch DW	Pre-fetch 4x16DW	Menu Level
PCI/14M/USB CLK PowerDown	Disabled	
S.B. PCI-E Performance	Enabled	
ULI HPET	Disabled	
Midi Port From	Super IO	
Game Port From	Super IO	

Current MRC Version

The default setting is 6.4.

Current FSB Frequency

The default setting is 200 MHz

Current DRAM Frequency

The default setting is 266 MHz.

Memory Frequency For

The default setting is AUTO.

UMA Frame Buffer Size

The default setting is 32MB.

Video Display Devices

The default setting is Auto.

Memory Hole At 15-16M

In order to improve performance, certain space in memory can be reserved for ISA cards. This memory must be mapped into the memory space below 16 MB. The choices are *Enabled* and *Disabled*.

Onboard PCI-E LAN

The default setting is Enabled.

Memory Timing Parameter

The default setting is Auto.

Integrated Peripherals

Phoenix - AwardBIOS CMOS Setup Utility
Integrated Peripherals

OnChip IDE Setting	Press Enter	ITEM HELP
I/O Setting	Press Enter	
On-Chip USB1.1 Controller	Enabled	
USB Keyboard Support	Disabled	
USB Mouse Support	Disabled	
On-Chip USB2.0 Controller	Enabled	
Init Display First	OnChip	
Surroundview	Disabled	
PWON After PWR-Fail	Off	
2nd SuperIO Device	Press Enter	

Phoenix - AwardBIOS CMOS Setup Utility
OnChip IDE Setting

On-Chip Primary IDE	Enabled	ITEM HELP
Master PIO	Auto	Menu Level
Slave PIO	Auto	
Master UDMA	Auto	
Slave UDMA	Auto	
On-Chip Secondary IDE	Enabled	
Master PIO	Auto	
Slave PIO	Auto	
Master UDMA	Auto	
Slave UDMA	Auto	
IDE HDD Block Mode	Enabled	

Phoenix - AwardBIOS CMOS Setup Utility
I/O Setting

FIR MODE FUNCTION	Disabled	ITEM HELP
Fast IR Mode Use IO	3E8	Menu Level >
Fast IR Mode Use IRQ	5	
Fast IR Mode Use DMA	1	
Onboard FDC Controller	Enabled	
Onboard Serial Port 1	3F8/IRQ4	
Onboard Serial Port 2	2F8/IRQ3	
UART Mode Select	Normal	
RxD TxD Active	Hi, Lo	
IR Transmission Delay	Enabled	
UR2 Duplex Mode	Half	
Use IR Pins	IR-Rx2Tx2	
Parallel Port Mode	SPP	
EPP Mode Select	EPP1.7	
ECP Mode Use DMA	3	

Phoenix - AwardBIOS CMOS Setup Utility
2nd SuperIO Device

Onboard Serial Port 3	3E8h	ITEM HELP
Serial Port 3 Use IRQ	IRQ11	Menu Level
Onboard Serial Port 4	Disabled	
Serial Port 4 Use IRQ	IRQ10	

IDE HDD Block Mode

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

OnChip Primary/Secondary IDE

The integrated peripheral controller contains an IDE interface with support for two IDE channels. Select *Enabled* to activate each channel.

IDE Primary/Secondary Master/Slave PIO

These fields allow your system hard disk controller to work faster. Rather than have the BIOS issue a series of commands that transfer to or from the disk drive, PIO (Programmed Input/Output) allows the BIOS to communicate with the controller and CPU directly.

IDE Primary/Secondary Master/Slave Ultra UDMA

These fields allow your system to improve disk I/O throughput to 33Mb/sec with the Ultra DMA/33 feature

Onboard FDC Controller

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

Onboard Serial/Parallel Port

These fields allow you to select the onboard serial and parallel ports and their address. The default values for these ports are:

Serial Port 1	3F8/IRQ4
Serial Port 2	2F8/IRQ3
Parallel Port	378H/IRQ7

Parallel Port Mode

This field allows you to determine parallel port mode function.

SPP	Standard Printer Port
EPP	Enhanced Parallel Port
ECP	Extended Capabilities Port
ECP+EPP	Combination of ECP and EPP capabilities
Normal	Normal function

PWRON After PWR-Fail

This field sets the system power status whether *on* or *off* when power returns to the system from a power failure situation.

Power Management Setup

The Power Management Setup allows you to save energy of your system effectively.

Phoenix - AwardBIOS CMOS Setup Utility
Power Management Setup

		ITEM HELP
ACPI Function	Enabled	
ACPI Suspend Type	S1 (POS)	
ACPI C2 Function	Disabled	
ACPI C3 Function	Disabled	
CPU FERR#	Disabled	
VGA ROM Call by S3-Resume	Disabled	
Power Management	User Define	
Modem Use IRQ	3	
Video Off in Suspend	Yes	
Video Off Method	DPMS	
PM Timers		
HDD Power Down	Disabled	
Suspend Mode	Disabled	
PowerOn/WakeUp Function		
Suspend Break Events	Press Enter	

Phoenix - AwardBIOS CMOS Setup Utility
PowerOn/WakeUp Function

		ITEM HELP
Soft-Off by PWR-BTTN	Instant Off	
WakeUp/PowerOn by PCI Card	Disabled	
WakeUp/PowerOn by Ring	Disabled	
USB Dev WakeUp	Disabled	
Resume by Alarm	Disabled	
Date (of Month) Alarm	0	
Time (hh:mm:ss) Alarm	0 : 0 : 0	

Phoenix - AwardBIOS CMOS Setup Utility
Suspend Break Events

		ITEM HELP
IRQ[1] (Keyboard)	Enabled	
IRQ[3]	Disabled	
IRQ[4]	Disabled	
IRQ[5]	Disabled	
IRQ[6] (Floppy Disk)	Disabled	
IRQ[7]	Disabled	
IRQ[8] (RTC)	Disabled	
IRQ[9]	Disabled	
IRQ[10]	Disabled	
IRQ[11]	Disabled	
IRQ[12] (PS2 Mouse)	Enabled	
IRQ[14] (Primary IDE)	Enabled	
IRQ[15] (Secondary IDE)	Disabled	

ACPI Function

Enable this function to support ACPI (Advance Configuration and Power Interface).

PWRON After PWR-Fail

This field sets the system power status whether on or off when power returns from a power failure situation.

Power Management

This field allows you to select the type of power saving management modes. There are four selections for Power Management.

Min. Power Saving	Minimum power management
Max. Power Saving	Maximum power management.
User Define	Each of the ranges is from 1 min. to 1hr. Except for HDD Power Down which ranges from 1 min. to 15 min.

Modem Use IRQ

This field sets the IRQ used by the Modem. By default, the setting is 3.

Video Off In Suspend

When enabled, the video is off in suspend mode.

Video Off Method

This field defines the Video Off features. There are three options.

V/H SYNC + Blank	Default setting, blank the screen and turn off vertical and horizontal scanning.
DPMS	Allows BIOS to control the video display.
Blank Screen	Writes blanks to the video buffer.

HDD Power Down

When enabled, and after the set time of system inactivity, the hard disk drive will be powered down while all other devices remain active.

Suspend Mode

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

Soft-Off by PWRBTN

This field defines the power-off mode when using an ATX power supply. The *Instant Off* mode allows powering off immediately upon pressing the power button. In the *Delay 4 Sec* mode, the system powers off when the power button is pressed for more than four seconds.

Wake-Up by PCI Card

Enable this field to allow wake up function through a PCI Ethernet card.

Power On by Ring

This function is used with modem connected to the serial port or LAN.

Resume by Alarm

This field enables or disables the resumption of the system operation. When enabled, the user is allowed to set the *Date* and *Time*.

Suspend Break Events

The HDD, FDD, COM, LPT Ports, and PCI PIRQ are I/O events which can prevent the system from entering a power saving mode or can awaken the system from such a mode. When an I/O device wants to gain the attention of the operating system, it signals this by causing an IRQ to occur. When the operating system is ready to respond to the request, it interrupts itself and performs the service.

PNP/PCI Configurations

This option configures the PCI bus system. All PCI bus systems on the system use INT#, thus all installed PCI cards must be set to this value.

Phoenix - AwardBIOS CMOS Setup Utility
PnP/PCI Configurations

		ITEM HELP
Reset Configuration Data	Disabled	Menu Level
Resources Controlled By	Auto (ESCD)	Default is 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 reconfiguration has caused such a serious conflict that the OS cannot boot
PCI/VGA Palette Snoop	Disabled	
PCI IRQ Activated By	Level	
** PCI Express Relative items **		
Maximum Payload Size	4096	

Reset Configuration Data

This field allows you to determine whether to reset the configuration data or not. The default value is *Disabled*.

Resources Controlled by

This PnP BIOS can configure all of the boot and compatible devices automatically with the use of a use a PnP OS such as Windows 95.

PCI/VGA Palette Snoop

Some non-standard VGA display cards may not show colors properly. This field allows you to set whether or not MPEG ISA/VESA VGA cards can work with PCI/VGA. When this field is enabled, a PCI/VGA can work with an MPEG ISA/VESA VGA card. When this field is disabled, a PCI/VGA cannot work with an MPEG ISA/VESA card.

PCI IRQ Activated By

The options are: Level (Default), Edge.

Maximum Payload Size

PCI/VGA cannot work with an MPEG ISA/VESA card.

PC Health Status

This section shows the parameters in determining the PC Health Status. These parameters include temperatures, fan speeds and voltages.

Phoenix - AwardBIOS CMOS Setup Utility
PC Health Status

		ITEM HELP
Shutdown Temperature	Disabled	
CPU Warning Temperature	Disabled	
Current System Temp	40°C/104°F	
Current CPU Temp	42°C/107°F	
Fan1 Speed	5400 RPM	
CPU Fan1 Speed	5463 RPM	
Vcore(V)	1.32 V	
+12V	12.13V	
VTT	1.81V	
-5V	-5.44V	
+5V	5.30V	
-12V	-12.59V	
3.3V	3.34V	
VBAT (V)	3.21V	
5VSB (V)	5.64V	

Shutdown Temperature

This field allows the user to set the temperature by which the system automatically shuts down once the threshold temperature is reached. This function can help prevent damage to the system that is caused by overheating.

CPU Warning Temperature

This field allows the user to set the temperature so that when the temperature is reached, the system sounds a warning. This function can help prevent damage to the system that is caused by overheating.

Temperatures/Fan Speeds/Voltages

These fields are the parameters of the hardware monitoring function feature of the board. The values are read-only values as monitored by the system and show the PC health status.

CPU/Chassis Fan Failure Warning

When enabled, this field lets the system sounds a 'siren' audible warning to the user that the CPU fan or chassis fan has malfunctioned.

Frequency/Voltage Control

This section shows the user how to configure the processor frequency.

Phoenix - AwardBIOS CMOS Setup Utility
Frequency/Voltage Control

Spread Spectrum	Disabled	ITEM HELP
		Menu Level

Spread Spectrum

This field sets the value of the spread spectrum. The default setting is *Disabled*. This field is for CE testing use only.

Load Fail-Safe Defaults

This option allows you to load the troubleshooting default values permanently stored in the BIOS ROM. These default settings are non-optimal and disable all high-performance features.

Load Setup Defaults

This option allows you to load the default values to your system configuration. These default settings are optimal and enable all high performance features.

Set Password

This option set the system password. Supervisor Password sets a password that will be used to protect the system and Setup utility. User Password sets a password that will be used exclusively on the system. To specify a password, highlight the type you want and press <Enter>. The Enter Password: message prompts on the screen. Type the password, up to eight characters in length, and press <Enter>. The system confirms your password by asking you to type it again. After setting a password, the screen automatically returns to the main screen.

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

Save & Exit Setup

This option allows you to determine whether or not to accept the modifications. If you type “Y”, you will quit the setup utility and save all changes into the CMOS memory. If you type “N”, you will return to Setup utility.

Exit Without Saving

Select this option to exit the Setup utility without saving the changes you have made in this session. Typing “Y” will quit the Setup utility without saving the modifications. Typing “N” will return you to Setup utility.

Drivers Installation

This section describes the installation procedures for software and drivers under the Windows 2000 and Windows XP. The software and drivers are included with the board. If you find the items missing, please contact the vendor where you made the purchase. The contents of this section include the following:

ATI RS400 Chipset Graphics Driver	46
ULI M1573 Integrated Driver	47
ULi M5287 SATA/RAID Disk Installation	48
Realtek AC97 Codec Audio Driver Installation	49
Marvell 88E8052 LAN Drivers Installation	50

IMPORTANT NOTE:

After installing your Windows operating system (Windows 2000/XP), you must install first the Intel Chipset Software Installation Utility before proceeding with the drivers installation.

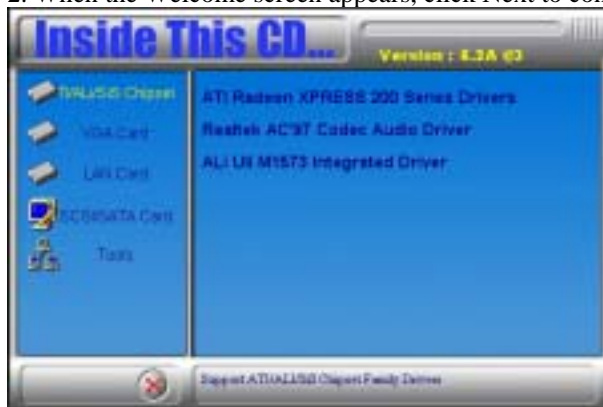
ATI RS400 Chipset Graphics Driver

The ATI RS400 Chipset Family Graphics Drivers come in the CD with the motherboard. Follow the instructions below to complete the installation under Windows 2000/XP.

1. Insert the CD that comes with the board and the screen below would appear. Click ATI RS400 Chipset Family Graphics Driver.



2. When the Welcome screen appears, click Next to continue.



3. Click Yes to accept the software license agreement and proceed with the installation process. After the installation, Setup will be complete. Start the system when prompted and for changes to take effect.

ULI M1573 Integrated Driver

The ULI M1573 Integrated Drivers come in the CD with the motherboard. Follow the instructions below to complete the installation under Windows 2000/XP.

1. Insert the CD that comes with the board and the screen below would appear. Click ULI M1573 Integrated Driver.



2. Click Finish to restart the computer and for changes to take effect.



ULi M5287 SATA/RAID Disk Installation

The ULI M5287 SATA/RAID installation can be done using the accompanying driver diskettes. Please follow the procedures below.

1. During the installation of the operating system, there will be a screen that prompts the user to press <F6> in order to install the SCSI or RAID controller drivers.
2. Press <F6> to start RAID drivers installation. Follow the installation instructions as indicated to finish the installation process.

REMARKS: The ULI M5287 SATA/RAID drivers are located in the driver CD that comes with the board. The path location is: CD-ROM Device:\ATI\RS400\ULI_M5287_SATA_V1010_floppy

Realtek AC97 Codec Audio Driver Installation

Follow the steps below to install the Realtek AC97 Codec Audio Drivers.

1. Insert the CD that comes with the board and the screen below would appear. Click Realtek AC97 Codec Audio Drivers to start the drivers installation.



2. Click Finish to restart the computer and for changes to take effect.



Marvell LAN Drivers Installation

1. Insert the CD that comes with the board to install the PCI Express Gigabit LAN drivers. In the initial screen, click on LAN Card on the left side, then Marvell LAN Controller Driver. Follow the instructions accordingly to finish the installation process.



2. To use the wake up function by PCIe LAN, go to the Device Manager under Windows and select LAN controller. The following window will appear (Generic Marvell Yukon Chipset based Ethernet Controller Properties). Click Advanced and select Wake From Shutdown. In the Value field on the right, select On.



3. Then, also in the Advanced section, click on Wake Up Capabilities. In the Value field on the right, select Magic Packet, then click OK.

Appendix

A. I/O Port address Map

Each peripheral device in the system is assigned a set of I/O port address that also becomes the identity of the device. The following table lists the I/O port address used.

address	Device Description
000h - 01Fh	DMA Controller #1
020h - 03Fh	Interrupt Controller #1
040h - 05Fh	Timer
060h - 06Fh	Keyboard Controller
070h - 07Fh	Real Time Clock, NMI
080h - 09Fh	DMA Page Register
0A0h - 0BFh	Interrupt Controller #2
0C0h - 0DFh	DMA Controller #2
0F0h	Clear Math Coprocessor Busy Signal
0F1h	Reset Math Coprocessor
1F0h - 1F7h	IDE Interface
278h - 27Fh	Parallel Port #2(LPT2)
2F8h - 2FFh	Serial Port #2(COM2)
2B0h - 2DFh	Graphics adapter Controller
378h - 3FFh	Parallel Port #1(LPT1)
360h - 36Fh	Network Ports
3B0h - 3BFh	Monochrome & Printer adapter
3C0h - 3CFh	EGA adapter
3D0h - 3DFh	CGA adapter
3F0h - 3F7h	Floppy Disk Controller
3F8h - 3FFh	Serial Port #1(COM1)

B. Interrupt Request Lines (IRQ)

Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on board.

Level	Function
IRQ0	System Timer Output
IRQ1	Keyboard
IRQ2	Interrupt Cascade
IRQ3	Serial Port #2
IRQ4	Serial Port #1
IRQ5	Reserved
IRQ6	Floppy Disk Controller
IRQ7	Parallel Port #1
IRQ8	Real Time Clock
IRQ9	Reserved
IRQ10	Reserved
IRQ11	Reserved
IRQ12	PS/2 Mouse
IRQ13	80287
IRQ14	Primary IDE
IRQ15	Secondary IDE

C. Digital I/O Sample Code

```

Filename: W627hf.h
//=====
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY
// OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO
// THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A
// PARTICULAR
// PURPOSE.
//
//=====
#ifndef __W627HF_H
#define __W627HF_H                1
//=====
#define W627_IOBASE                0x4E
//=====
#define W627HF_INDEX_PORT (W627_IOBASE+0)
#define W627HF_DATA_PORT  (W627_IOBASE+1)
//=====
#define W627HF_REG_LD      0x07
//=====
#define W627HF_UNLOCK     0x87
#define W627HF_LOCK       0xAA
//=====
void Set_W627HF_LD(unsigned char);
void Set_W627HF_Reg(unsigned char, unsigned char);
unsigned char Get_W627HF_Reg(unsigned char);
//=====
#endif  // __W627HF_H

```

```
Filename: W627hf.cpp
//=====
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//=====
#include "W627HF.H"
#include <dos.h>
//=====
void Unlock_W627HF (void);
void Lock_W627HF (void);
//=====
void Unlock_W627HF (void)
{
    outportb(W627HF_INDEX_PORT, W627HF_UNLOCK);
    outportb(W627HF_INDEX_PORT, W627HF_UNLOCK);
}
//=====
void Lock_W627HF (void)
{
    outportb(W627HF_INDEX_PORT, W627HF_LOCK);
}
//=====
void Set_W627HF_LD(unsigned char LD)
{
    Unlock_W627HF();
    outportb(W627HF_INDEX_PORT, W627HF_REG_LD);
    outportb(W627HF_DATA_PORT, LD);
    Lock_W627HF();
}
//=====
void Set_W627HF_Reg(unsigned char REG, unsigned char DATA)
{
    Unlock_W627HF();
    outportb(W627HF_INDEX_PORT, REG);
    outportb(W627HF_DATA_PORT, DATA);
    Lock_W627HF();
}
//=====
unsigned char Get_W627HF_Reg(unsigned char REG)
{
    unsigned char Result;
    Unlock_W627HF();
    outportb(W627HF_INDEX_PORT, REG);
    Result = inportb(W627HF_DATA_PORT);
    Lock_W627HF();
    return Result;
}
//=====
```

```

File of the Main.cpp
//=====
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//=====
#include <dos.h>
#include <conio.h>
#include <stdio.h>
#include <stdlib.h>
#include "W627HF.H"
//=====
void ClrKbBuf(void);
int main (int argc, char *argv[]);
//=====
int main (int argc, char *argv[])
{
    unsigned char ucDO = 0;                //data for digital output
    unsigned char ucDI;                    //data for digital input
    unsigned char ucBuf;

    Set_W627HF_LD(0x07);                  //switch to logic device 7

    Set_W627HF_Reg(0xF1, 0x00);           //clear
    ucDI = Get_W627HF_Reg(0xF1) & 0x0F;

    ClrKbBuf();
    while(1)
    {
        ucDO++;
        Set_W627HF_Reg(0xF1, ((ucDO & 0x0F) << 4));
        ucBuf = Get_W627HF_Reg(0xF1) & 0x0F;
        if (ucBuf != ucDI)
        {
            ucDI = ucBuf;
            printf("Digital I/O Input Changed. Current Data is 0x%X\n",ucDI);
        }

        if (kbhit())
        {
            getch();
            break;
        }
        delay(500);
    }
    return 0;
}
//=====
void ClrKbBuf(void)
{
    while(kbhit())
    {   getch();   }
}
//-----

```

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