MI945P

Intel ® Core™ 2 Duo/GM45

Mini-ITX Motherboard

USER'S MANUAL

Version 1.0

Acknowledgments

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Remarks: *The IDE connector on board does not support OS installation in hard drive. A system hard drive connected to this IDE cannot be booted up to OS.*

Introduction

Product Description

The MI945P Mini ITX board incorporates the Mobile Intel® GM45 Express Chipset for Embedded Computing, consisting of the Intel® GM45 Graphic Memory Controller Hub (GMCH) and Intel® I/O Controller Hub (ICH9-M), an optimized integrated graphics solution with a 1066MHz and 800MHz front-side bus. Dimensions of the board are 170mm x 170mm.

The integrated powerful 3D graphics engine, based on Intel® Graphics Media Accelerator X3500 (Intel® GMA X3500) architecture, operates at core speeds of up to 533 MHz. It features a low-power design, is validated with the Intel® Core 2 Duo processors on 45nm process. With dual channel DDR2 800MHz two SoDIMM sockets on board, the board supports up to 4GB of DDR2 system memory.

Intel® Graphics supports a unique intelligent memory management scheme called Dynamic Video Memory Technology (DVMT). DVMT handles diverse applications by providing the maximum (384MB) availability of system memory for general computer usage, while supplying additional graphics memory when a 3D-intensive application requests it. The Intel GMA X3500 graphics architecture also takes advantage of the high-performance Intel processor. Intel GMA X3500 graphics supports Dual Independent Display technology.

The main features of the board are:
- Supports Intel® Core^{TM} 2 Duo (Penryn 1066MHz)
- Supports up to 2.53GHz, 1066MHz/800MHz FSB
- Two DDR2 SoDIMM, Max. 4GB memory
- Onboard Gigabit PHY and Intel PCI-Express Gigabit LAN
- Intel® GM45 Express VGA for CRT / LVDS
- 4x SATA, 8x USB 2.0, 4x COM, Watchdog timer
- 1x PCI-E(x16) slot, 1x PCI slot
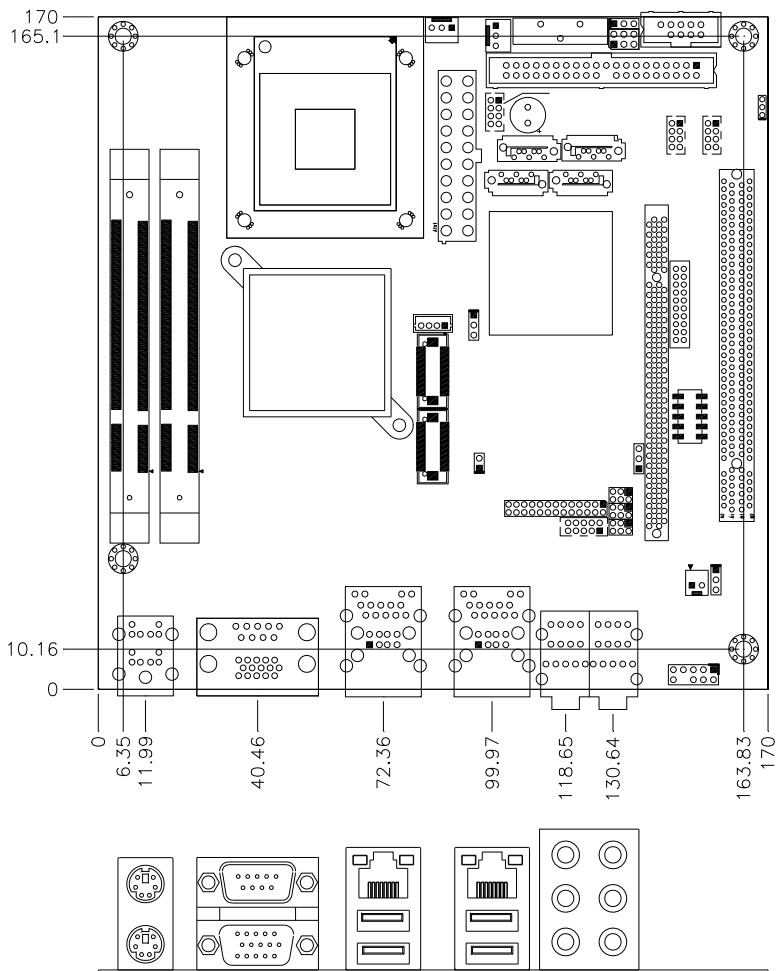
Checklist

Your MI945P package should include the items listed below.

- The MI945P Mini-ITX motherboard
- This User's Manual
- 1 CD containing chipset drivers and flash memory utility
- Cable kit (IDE, Serial port, Serial ATA)

MI945P Specifications

Form Factor	Mini ITX
CPU Type	Intel® Mobile Core™2 Duo/Core™2 Quad Processor (Penryn) Intel® Celeron 5x5 Series
CPU Speed	Up to 2.93GHz
CPU FSB	667/800/1066MHz FSB
L2 Cache	*3MB or 6MB (P8000-series or P9000-series, T9000-series)*
Green /APM	APM1.2
CPU Socket	Socket 478 "Type P" (Socket P) or micro-FCBGA on board
Chipset	Intel® GM45 (Cantiga) chipset - GMCH: AC82GM45 1329-pin FCBGA - ICH9M: AF82801IM 676-pin mBGA
BIOS	Award BIOS, support ACPI Function
Memory	DDRII 667/800 - SoDIMM x2 *Dual-Channel* (w/o ECC), Max. 4GB
VGA & LVDS	Intel® GM45 built-in Intel gen.5.0 Graphics Media Accelerator (533MHz 1.05V), supports DirectX10 for CRT & LVDS (single/dual channel 18-bit/ 24-bit)
SDVO (DUAL CH)	None
Backlight control (LVDS)	- GMCH built-in control by PWM
LAN	1. Intel® ICH9M 10/100/gigabit MAC + PHY: • Intel 82567LM 10/100/1000 2. Intel 82574L PCI-e Gigabit LAN controller x1
USB	ICH9M built-in USB 2.0 host controller, supports 8 ports
Serial ATA	ICH9M built-in SATA controller, supports 4 ports
Parallel IDE	JMicron JM368 (PCI-e to PATA) x1 for 1 PATA channel for IDE
Audio	Intel® ICH9M built-in High Definition Audio controller ALC888 with 7.1 channels
LPC I/O	Winbond® W83627DHG-P: COM1 (RS232), COM2 (RS232/422/485), LPT, Hardware monitor (3 thermal inputs, 4 voltage monitor inputs, VID0-4 & 2 fan headers) - Fintek 81216AD for COM3/COM4 (RS232),
Digital IO	4 in & 4 out
KB/Mouse Connector	Supports PS/2 Keyboard/Mouse
Expansion Slots	PCIe(x16) x1 (Inner) and PCI x 1
Edge Connector	- PS/2 KB/Mouse connector - Gigabit LAN RJ45 + dual USB stack connector - Gigabit LAN RJ45 + dual USB stack connector - DB9 + DB15 stack connector x1 for COM 1 & VGA - HD Audio (Phone jack 3 x 2)
Onboard Header/Connector	- 40-pin box-header x1 for IDE1 - DF13 connector x2 for LVDS - 10-pin headerx1 for Digital I/O - 10-pin header x1 for COM2 - 20-pin header x1 for COM3/COM4 - 8-pin header x 2 for USB 5/6/7/8 - SATA connector x4 for 4 SATA ports - 26-pin header x1 for LPT
Watchdog Timer	Yes (256 segments, 0, 1, 2…255 sec/min)
System Voltage	+5V, +3.3V, +12V, -12V, 5VSB (2A)
Other	LAN Wakeup
Board Size	170mm x 170mm

# Board Dimensions

Installations

This section provides information on how to use the jumpers and connectors on the MI945P in order to set up a workable system. The topics covered are:

Installing the CPU

The MI945P board supports a Socket P processor socket for Intel®
Core™ 2 Duo, Intel® Celeron mobile processors.

The processor socket comes with a screw to secure the processor. As
shown in the left picture below, loosen the screw first before inserting
the processor. Place the processor into the socket by making sure the
notch on the corner of the CPU corresponds with the notch on the inside
of the socket. Once the processor has slide into the socket, fasten the
screw. Refer to the figures below.
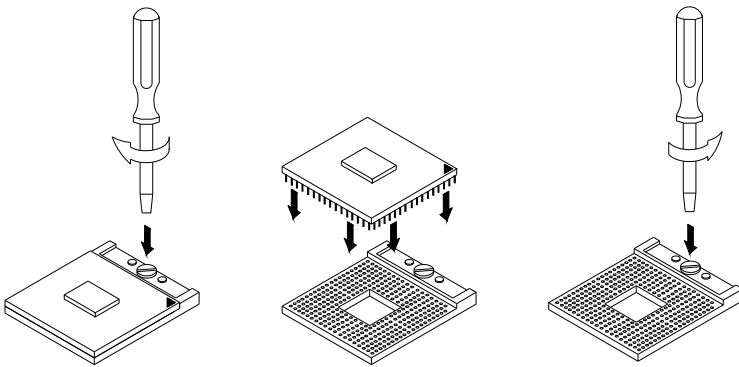
NOTE: *Ensure that the CPU heat sink and the CPU top surface are in
total contact to avoid CPU overheating problem that would
cause your system to hang or be unstable.*

Installing the Memory

The MI945P board supports two DDR2 memory socket for a maximum total memory of 4GB in DDR2 memory type.

Installing and Removing Memory Modules

To install the DDR2 modules, locate the memory slot on the board and perform the following steps:

1. Hold the DDR2 module so that the key of the DDR2 module aligned with that on the memory slot.

2. Gently push the DDR2 module in an upright position until the clips of the slot close to hold the DDR2 module in place when the DDR2 module touches the bottom of the slot.

3. To remove the DDR2 module, press the clips with both hands.

Lock → **DDR2 Module** ← **Lock**

Lock → ← **Lock**
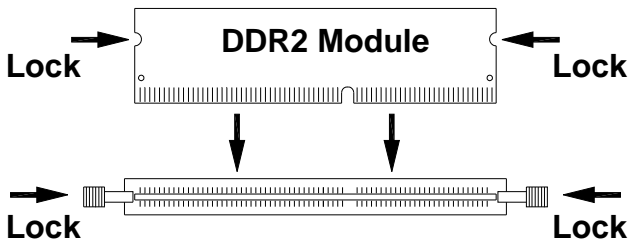
Setting the Jumpers
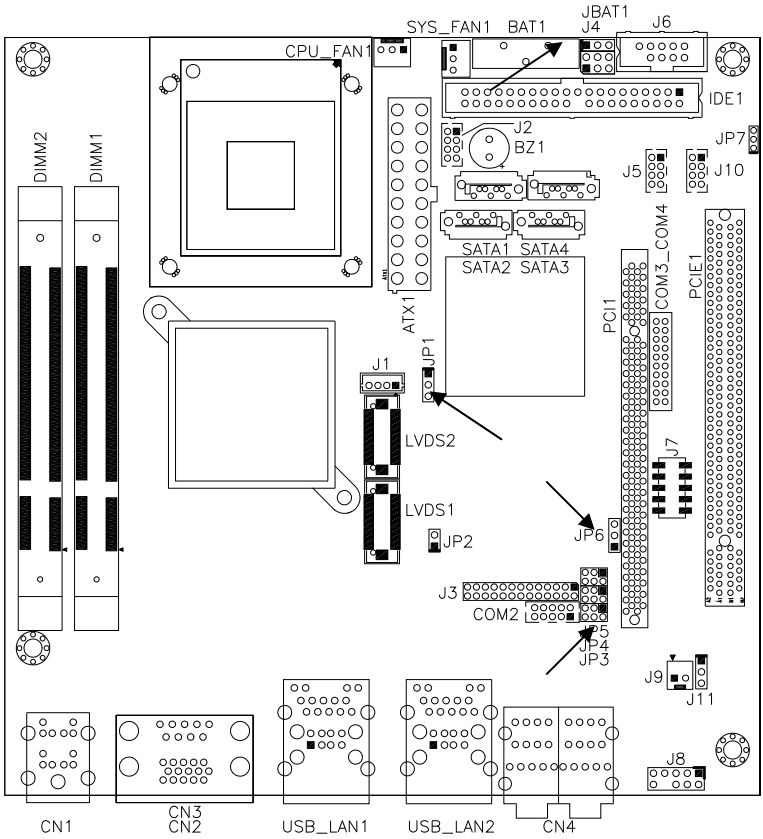
Jumpers are used on MI945P to select various settings and features according to your needs and applications. Contact your supplier if you have doubts about the best configuration for your needs. The following lists the connectors on MI945P and their respective functions.

Jumper Locations on MI945P

JBAT1: Clear CMOS Setting

JBAT1	Setting
□ □ □ 1 2 3	Normal
□ □ □ 1 2 3	Clear CMOS

JP1: LCD Panel Power Selection

JP1	LCD Panel Power
□ □ □ 1 2 3	3.3V
□ □ □ 1 2 3	5V

JP3, JP4, JP5: RS232/422/485 (COM2) Selection

COM1/COM3/COM4 are fixed for RS-232 use only.

COM2 is selectable for RS232, RS-422 and RS-485.

The following table describes the jumper settings for COM2 selection.
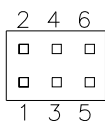
COM2 Function	RS-232	RS-422	RS-485
Jumper Setting (Pin closed)	JP5: 1-2 JP3: 3-5 & 4-6 JP4: 3-5 & 4-6	JP5: 3-4 JP3: 1-3 & 2-4 JP4: 1-3 & 2-4	JP5: 5-6 JP3: 1-3 & 2-4 JP4: 1-3 & 2-4

COM2 is jumper selectable for RS-232, RS-422 and RS-485.

Pin #	Signal Name		
	RS-232	**R2-422**	**RS-485**
1	DCD	TX-	DATA-
2	RX	TX+	DATA+
3	TX	RX+	NC
4	DTR	RX-	NC
5	Ground	Ground	Ground
6	DSR	RTS-	NC
7	RTS	RTS+	NC
8	CTS	CTS+	NC
9	RI	CTS-	NC
10	NC	NC	NC

JP6: PCI Riser Card Selection

JP6	Riser Card
□ □ □ 1 2 3	IP390 Riser Card Install
□ □ □ 1 2 3	IP151, IP240 Riser Card Install

Connectors on MI945P

Connector Locations on MI945P

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

 PS/2 Mouse
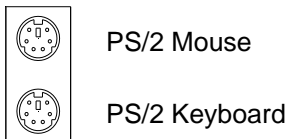
PS/2 Keyboard

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, CN3: COM1 and VGA Connector
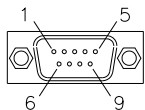
Signal Name	Pin #	Pin #	Signal Name
DCD	1	6	DSR
RXD	2	7	RTS
TXD	3	8	CTS
DTR	4	9	RI
GND	5	10	Not Used
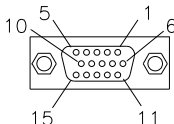
Signal Name	Pin #	Pin #	Signal Name
Red	1	2	Green
Blue	3	4	N.C.
GND	5	6	GND
GND	7	8	GND
N.C.	9	10	GND
N.C.	11	12	N.C.
HSYNC	13	14	VSYNC
NC	15		
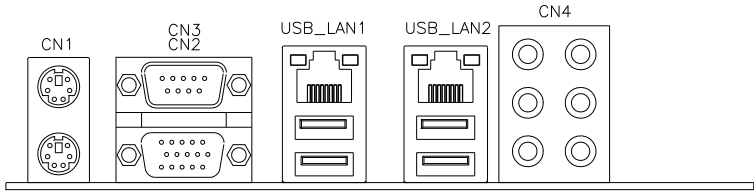
USB_LAN1: Gigabit LAN RJ-45 and USB6/7 Ports

USB_LAN2: Gigabit LAN RJ-45 and USB0/1 Ports

CN4: Audio Connector

Orange/Side Surround	Blue/Line In
Black/Rear Surround	Green/Line out
Gray/Center/LFE	Pink/Microphone
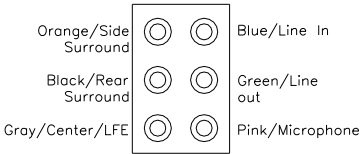
SYS_FAN1: System Fan Power Connector
This is a 3-pin header for system fans. The fan must be a 12V fan.

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

CPU_FAN1: CPU Fan Power Connector
This is a 3-pin header for the CPU fan. The fan must be a 12V fan.

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

IDE1: IDE Connector
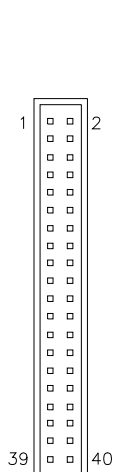
Signal Name	Pin #	Pin #	Signal Name
Reset IDE	1	2	Ground
Host data 7	3	4	Host data 8
Host data 6	5	6	Host data 9
Host data 5	7	8	Host data 10
Host data 4	9	10	Host data 11
Host data 3	11	12	Host data 12
Host data 2	13	14	Host data 13
Host data 1	15	16	Host data 14
Host data 0	17	18	Host data 15
Ground	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
Address 1	33	34	No connect
Address 0	35	36	Address 2
Chip select 0	37	38	Chip select 1
Activity	39	40	Ground

COM3_COM4: COM3, COM4 Serial Port
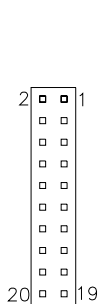
Signal Name	Pin #	Pin #	Signal Name
DSR3	2	1	DCD3
RTS3	4	3	RXD3
CTS3	6	5	TXD3
RI3	8	7	DTR3
NA	10	9	Ground
DSR4	12	11	DCD4
RTS4	14	13	RXD4
CTS4	16	15	TXD4
RI4	18	17	DTR4
NA	20	19	Ground

ATX1: ATX Power Supply Connector
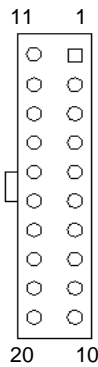
Signal Name	Pin #	Pin #	Signal Name
3.3V	11	1	3.3V
-12V	12	2	3.3V
Ground	13	3	Ground
PS-ON	14	4	+5V
Ground	15	5	Ground
Ground	16	6	+5V
Ground	17	7	Ground
-5V	18	8	Power good
+5V	19	9	5VSB
+5V	20	10	+12V

COM2: COM2 Serial Port
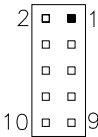
Signal Name	Pin	Pin	Signal Name
DCD2	1	2	RXD2
TXD2	3	4	DTR2
GND	5	6	DSR2
RTS2	7	8	CTS2
RI2	9	10	Not Used

COM2 is jumper selectable for RS-232, RS-422 and RS-485.

Pin #	Signal Name		
	RS-232	**R2-422**	**RS-485**
1	DCD	TX-	DATA-
2	RX	TX+	DATA+
3	TX	RX+	NC
4	DTR	RX-	NC
5	Ground	Ground	Ground
6	DSR	RTS-	NC
7	RTS	RTS+	NC
8	CTS	CTS+	NC
9	RI	CTS-	NC
10	NC	NC	NC

LVDS1, LVDS2: LVDS Connectors (1st channel, 2nd channel)

The LVDS connectors on board consist of the first channel (LVDS1) and second channel (LVDS2).
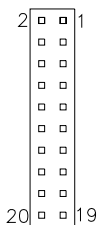
Signal Name	Pin #	Pin #	Signal Name
TX0-	2	1	TX0+
Ground	4	3	Ground
TX1-	6	5	TX1+
5V/3.3V	8	7	Ground
TX3-	10	9	TX3+
TX2-	12	11	TX2+
Ground	14	13	Ground
TXC-	16	15	TXC+
5V/3.3V	18	17	ENABKL
+12V	20	19	+12V

J1: LCD Backlight Connector

Pin #	Signal Name
1	+12V
2	Backlight Enable
3	Brightness Control
4	Ground

J2: TV-out Connector
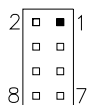
Signal Name	Pin #	Pin #	Signal Name
NC	2	1	NC
GND	4	3	TV_Y
GND	6	5	TV_C/Pr
GND	8	7	TV_CVBS/Pb

J3: Parallel Port Connector
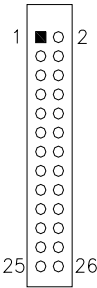
Signal Name	Pin #	Pin #	Signal Name
Line printer strobe	1	2	AutoFeed
PD0, parallel data 0	3	4	Error
PD1, parallel data 1	5	6	Initialize
PD2, parallel data 2	7	8	Select
PD3, parallel data 3	9	10	Ground
PD4, parallel data 4	11	12	Ground
PD5, parallel data 5	13	14	Ground
PD6, parallel data 6	15	16	Ground
PD7, parallel data 7	17	18	Ground
ACK, acknowledge	19	20	Ground
Busy	21	22	Ground
Paper empty	23	24	Ground
Select	25	26	N/A

J4: System Function Connector

Signal Name	Pin	Pin	Signal Name
3VDUAL	1	2	PS_ON
+3.3V	3	4	HDD Active
Ground	5	6	Reset

ATX power on switch: Pins 1-2
HDD LED: Pins 3-4
Reset switch: Pins 5-6

J5: USB2/USB3 Connector
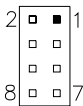
Signal Name	Pin	Pin	Signal Name
Ground	2	1	Vcc
D3+	4	3	D2-
D3-	6	5	D2+
Vcc	8	7	Ground

J6: SPI Flash Connector (factory use only)

J7: Digital I/O
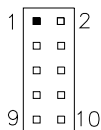
Signal Name	Pin	Pin	Signal Name
GND	1	2	VCC
OUT3	3	4	OUT1
OUT2	5	6	OUT0
IN3	7	8	IN1
IN2	9	10	IN0

J8: Front Audio Connector
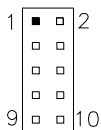
Signal Name	Pin #	Pin #	Signal Name
MIC2_L	1	2	Ground
MIC2_R	3	4	Presence#
Line2_R	5	6	MIC2_ID
Sense	7	8	NC
Line2_L	9	10	Line2_ID

J9: SPDIF Out Connector

Pin #	Signal Name
1	SPDIF out
2	Ground

J10: USB4/USB5 Connector
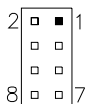
Signal Name	Pin	Pin	Signal Name
Ground	2	1	Vcc
D5+	4	3	D4-
D5-	6	5	D4+
Vcc	8	7	Ground

J11: Power LED Connector

Pin #	Signal Name
1	Vcc
2	NC
3	PLED

SATA1, SATA2, SATA3, SATA4: SATA Connectors

PCI1: PCI Slot (supports 2 Master)

PCIE1: PCI-E(x16) Slot

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BIOS Setup

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

BIOS Introduction

The Award BIOS (Basic Input/Output System) installed in your computer system's ROM supports Intel 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 <Del> key immediately allows you to enter the Setup utility. If you are a little bit late pressing the <Del> 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  <DEL>  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 Supervisor Password
Power Management Setup	Set User Password
PnP/PCI Configurations	Save & Exit Setup
PC Health Status	Exit Without Saving
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 motherboard 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)	Wed, Apr 28, 2007	Item Help
Time (hh:mm:ss)	00 : 00 : 00	Menu Level >
IDE Channel 0 Master	None	Change the day, month,
IDE Channel 1 Slave	None	Year and century
IDE Channel 2 Master	None	
IDE Channel 2 Slave	None	
IDE Channel 3 Master	None	
IDE Channel 3 Slave	None	
IDE Channel 4 Master	None	
IDE Channel 4 Slave	None	
Video	EGA/VGA	
Halt On	All, But Keyboard	
Base Memory	640K	
Extended Memory	129024K	
Total Memory	130048K	

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 Channel Master/Slave
The onboard PCI IDE connector provides Primary and Secondary channels for connecting up to two IDE hard disks or other IDE devices.

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.

  CYLS :   Number of cylinders
  HEAD :   Number of read/write heads
  PRECOMP :   Write precompensation
  LANDING ZONE :   Landing zone
  SECTOR :   Number of sectors

  The Access Mode selections are as follows:
                                        CHS   (HD < 528MB)
                                        LBA   (HD > 528MB and supports
                                                    Logical Block Addressing)
                                        Large (for MS-DOS only)
                                        Auto
Remarks: The main board supports two serial ATA ports and are represented in this setting as IDE Channel 0.

Video

This field selects the type of video display card installed in your system. You can choose the following video display cards:

EGA/VGA	For EGA, VGA, SEGA, SVGA or PGA monitor adapters. (default)
CGA 40	Power up in 40 column mode.
CGA 80	Power up in 80 column mode.
MONO	For Hercules or MDA adapters.

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 L3 Cache	Enabled	
Quick Power On Self Test	Enabled	
First Boot Device	Hard Disk	
Second Boot Device	CDROM	
Third Boot Device	USB-CDROM	
Boot Other Device	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	
Small Logo (EPA) Show	Disabled	
Summary Screen Show	Disabled	

CPU Feature

Press Enter to configure the settings relevant to CPU Feature.

Hard Disk Boot Priority

With the field, there is the option to choose, aside from the hard disks connected, "Bootable add-in Cards" which refers to other external devices.

Virus Warning

If this option is enabled, an alarm message will be displayed when trying to write on the boot sector or on the partition table on the disk, which is typical of the virus.

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*, *LS120*, *Hard Disk*, *CDROM, ZIP100*, *USB-Floppy, USB-ZIP*, *USB-CDROM, LAN* and *Disable*.

Boot Other Device

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

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 address 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 is 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*.

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 *Disabled*.

Advanced Chipset Features

This Setup menu controls the configuration of the chipset.

```
                        Phoenix - AwardBIOS CMOS Setup Utility
                             Advanced Chipset Features
```

System BIOS Cacheable	Enabled	ITEM HELP
Memory Hole at 15M-16M	Disabled	
PCI Express Root Port Func	Press Enter	
VT-d	Disabled	
** VGA Setting **		
PEG/On Chip VGA Control	Auto	
PEG Force X1	Disabled	
On-Chip Frame Buffer Size	64MB	
DVMT Mode	Enabled	
Total GFX Memory	128MB	
PAVP Mode	PAVP-Lite	
Boot Display	CRT	
SDVO Device Setting	None	
SDVO LVDS Protocol	1CH SPWG, 18bit	
SDVO Panel Number	1024x768	
Active LVDS Device	No LVDS	
Integrated LVDS Protocol	18 bit	
Panel Scaling	Auto	
Panel Number	1024x768 SC/DC	
TV1 Standard Type	VBIOS Default	
TV2 Standard Type	VBIOS Default	
BIA Control	Auto	

System BIOS Cacheable

The setting of *Enabled* allows caching of the system BIOS ROM at F000h-FFFFFh, resulting in better system performance. However, if any program writes to this memory area, a system error may result.

Memory Hole At 15M-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*.

VT-d

Virtualization solutions allow multiple operating systems and applications to run in independent partitions all on a single computer. Using virtualization capabilities, one physical computer system can function as multiple "virtual" systems.

Intel Dynamic Video

Memory Technology 3.0 (DVMT 3.0) allows additional memory to be allocated for graphics usage based on application need. Once the application is closed, the memory that was allocated for graphics usage is then released and made available for system use. Dynamically allocating memory for graphics use ensures a sold balance between system and graphics performance.

On-Chip VGA Setting

The fields under the On-Chip VGA Setting and their default settings are:

    PEG/On Chip VGA Control: Auto
    PEG Force X1: Disabled
    On-Chip Frame Buffer Size: 64MB
    DVMT Mode: Enabled
    Total GFX Memory: 128MB
    PAVP Mode: PAVP-Lite
    Boot Display: CRT
    SDVO Device Setting: None
    SDVO LVDS Protocol: 1CH SPWG, 18bit
    SDVO Panel Number: 1024x768
    Active LVDS Device: No LVDS
    Integrated LVDS Protocol: 18 bit
    Panel Scaling: Auto
    Panel Number: 1024x768 SC/DC
    TV1 Standard Type: VBIOS Default
    TV2 Standard Type: VBIOS Default
    BIA Control: Auto

PAVP Mode.

This setting enables/disables the Protected Audio/Video Path (PAVP) mode.

Panel Number

These fields allow you to select the LCD Panel type. The values for these ports are:

640x480	SC/DC	1400x1050	SC/DC
800x600	SC/DC	1600x1050	SC/DC
1024x768	SC/DC	1600x1200	SC/DC
1280x600	SC/DC	1920x1200	SC/DC
1280x768	SC/DC	2048x1536	SC/DC
1280x800	SC/DC		
1280x1024	SC/DC		

Integrated Peripherals

This section sets configurations for your hard disk and other integrated peripherals.

Phoenix - AwardBIOS CMOS Setup Utility
Integrated Peripherals

OnChip IDE Device	Press Enter	ITEM HELP
Super IO Device	Press Enter	Menu Level >
2nd Super Device	Press Enter	
USB Device Setting	Press Enter	

Phoenix - AwardBIOS CMOS Setup Utility
OnChip IDE Device

IDE HDD Block Mode	Enabled	ITEM HELP
IDE DMA transfer access	Enabled	
IDE Primary Master PIO	Auto	Menu Level >
IDE Primary Slave PIO	Auto	
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	
SATA Mode	IDE	
LEGACY Mode Support	Disabled	

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.

IDE DMA transfer access
By default, this field is enabled.

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.

The system supports five modes, numbered from 0 (default) to 4, which primarily differ in timing. When Auto is selected, the BIOS will select the best available mode.

IDE Primary/Secondary Master/Slave UDMA

These fields allow your system to improve disk I/O throughput to 33Mb/sec with the Ultra DMA/33 feature. The options are *Auto* and *Disabled*.

SATA Mode

The setting choices for the SATA Mode are IDE and AHCI
Mode. Select [IDE] if you want to have SATA function as IDE.
Select [AHCI] for Advanced Host Controller Interface (AHCI) feature, with improved SATA performance with native command queuing & native hot plug.

LEGACY Mode Support

When the Serial ATA (SATA) is set with the legacy mode enabled, then the SATA is set to the conventional IDE mode. Legacy mode is otherwise known as compatible mode.

Phoenix - AwardBIOS CMOS Setup Utility
SuperIO Device

		ITEM HELP
POWER ON Function	BUTTON ONLY	
KB Power ON Password	Enter	
Hot Key power ON	Ctrl-F1	
Onboard Serial Port 1	3F8/IRQ4	Menu Level >
Onboard Serial Port 2	2F8/IRQ3	
UART Mode Select	Normal	
Parallel Port	378/IRQ7	
Parallel Port Mode	SPP	
ECP Mode Select	EPP 1.7	
ECP Mode Use Mode	3	
PWRON After PWR-Fail	Off	

2nd Super IO Device

		ITEM HELP
Onboard Serial Port 3	230	Menu Level >
Serial Port 3 Use IRQ	IRQ5	
Onboard Serial Port 4	238	
Serial Port 4 Use IRQ	IRQ11	

Power ON Function

This field is related to how the system is powered on – such as with the use of conventional power button, keyboard or hot keys. The default is *BUTTON ONLY*.

KB Power ON Password

This field allows users to set the password when keyboard power on is the mode of the Power ON function.

Hot Key Power ON
This field sets certain keys, also known as hot keys, on the keyboard that can be used as a 'switch' to power on the system.

Onboard Serial Port/Parallel Port
These fields allow you to select the onboard serial ports and their addresses. The default values for these ports are:

Serial Port 1	3F8/IRQ4
Serial Port 2	2F8/IRQ3
Serial Port 3	230/IRQ5
Serial Port 4	238/IRQ11
Parallel Port	378/IRQ7

UART Mode Select
This field determines the UART 2 mode in your computer. The default value is ***Normal***.

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.

Phoenix - AwardBIOS CMOS Setup Utility
USB Device Setting

		ITEM HELP
USB 1.0 Controller	Enabled	
USB 2.0 Controller	Enabled	
USB Keyboard Function	Enable	
USB Mouse Function	Disable	Menu Level >
USB Storage Function	Enabled	
*** USB Mass Storage Device Boot Setting ***		

USB 1.0 Controller

The options for this field are *Enabled* and *Disabled*. By default, this field is set to **Enabled**.

USB 2.0 Controller

The options for this field are *Enabled* and *Disabled*. By default, this field is set to **Enabled**. In order to use USB 2.0, necessary OS drivers must be installed first. ***Please update your system to Windows XP SP2.***

USB Keyboard/Mouse/Storage Function

The options for this field are *Enabled* and *Disabled*. By default, this field is set to **Disabled**.

Power Management Setup

		ITEM HELP
PCI Express PM Function	Press Enter	
ACPI Function	Enabled	
ACPI Suspend	S3(STR)	Menu Level >
Power Management	User Define	
Video Off Method	V/H SYNC+ Blank	
Video Off In Suspend	Yes	
Suspend Type	Stop Grant	
Modem Use IRQ	3	
Suspend Mode	Disabled	
HDD Power Down	Disabled	
Soft-Off by PWR-BTTN	Instant-Off	
CPU THRM-Throttling	50.0%	
Wake-Up by PCI Card	Disabled	
Power On by Ring	Disabled	
Resume by Alarm	Disabled	
Date (of Month) Alarm	0	
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	
PCI PIRQ[A-D] #	Disabled	
HPET Support	Disabled	
HPET Mode	32-bit mode	

ACPI Function

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

ACPI Suspend

The default setting of the ACPI Suspend mode is *S3(STR)*.

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.

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.

Video Off In Suspend

When enabled, the video is off in suspend mode. The default setting is *Yes*.

Suspend Type

The default setting for the Suspend Type field is ***Stop Grant***.

Modem Use IRQ

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

Suspend Mode

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

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.

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 or enters the suspend mode when pressed for less than 4 seconds.

Wake up by PCI Card

By default, this field is disabled.

Power On by Ring

This field enables or disables the power on of the system through the 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*.

Reload Global Timer Events

The HDD, FDD, COM, LPT Ports, and PCI PIRQ are I/O events that 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

Init Display First	PCI Slot	ITEM HELP
Reset Configuration Data	Disabled	
		Menu Level
Resources Controlled By	Auto (ESCD)	
IRQ 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	
PCI Express relative items		
Maximum Payload Size	4096	

Init Display First
The default setting is *PCI Card*.

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 with the use of a PnP operating system 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.

Maximum Payload Size
The default setting of the PCI Express Maximum Payload Size is 4096.

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	Menu Level >
Current System Temp	45°C/113°F	
Current CPU Temp	45°C/113°F	
Current Chassis Temp	45°C/113°F	
System FAN Speed	5400 RPM	
CPU FAN Speed	5400 RPM	
Vcore(V)	1.02 V	
12 V	1.32 V	
1.8V	1.8V	
+5V	5.25 V	
3.3V	3.37V	
VBAT (V)	3.21 V	
3VSB(V)	3.01V	
CPU Smart Fan Temp	Disabled	
System Smart Fan Temp	Disabled	

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/Voltages

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

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.

Smart Fan Temperature

This field enables or disables the smart fan feature. At a certain temperature, the fan starts turning. Once the temperature drops to a certain level, it stops turning again.

Frequency/Voltage Control

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

Phoenix - AwardBIOS CMOS Setup Utility
Frequency/Voltage Control

Auto Detect PCI Clk	Disabled	ITEM HELP
Spread Spectrum Modulated	Disabled	Menu Level >
CPU Host/SRC/PCI Clock	Default	

Auto Detect PCI Clk

This field enables or disables the auto detection of the PCI clock.

Spread Spectrum Modulated

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

CPU Host/SRC/PCI Clock

By default this field is set to *Default*.

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 Optimized 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 Supervisor Password

These two options 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.

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Drivers Installation

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

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

Intel Chipset Software Installation Utility

The Intel Chipset Drivers should be installed first before the software drivers to enable Plug & Play INF support for Intel chipset components. Follow the instructions below to complete the installation.
1. Insert the CD that comes with the board. Click **Intel** and then **Intel(R) GM45 Chipset Drivers**.

2. Click **Intel(R) Chipset Software Installation Utility.**

3. When the Welcome screen to the Intel® Chipset Device Software appears, click **Next** to continue.

4. Click *Yes* to accept the software license agreement and proceed with the installation process.

5. On the Readme File Information screen, click *Next* to continue the installation.

6. The Setup process is now complete. Click *Finish* to restart the computer and for changes to take effect.

VGA Drivers Installation

To install the VGA drivers, follow the steps below to proceed with the installation.

1. Insert the CD that comes with the board. Click *Intel* and then *Intel(R) GM45 Chipset Drivers*.

2. Click *Intel(R) GM45 Chipset Family Graphics Driver.*

3. When the Welcome screen to the Setup Program appears, click *Next* to continue.

4. Click **Yes** to to agree with the license agreement and continue the installation.

5. On the Readme File Information screen, click **Next** to continue the installation of the Intel® Graphics Media Accelerator Driver.

6. On Setup Progress screen, click **Next** to continue.

7. Setup complete. Click **Finish** to restart the computer and for changes to take effect.

Realtek Audio Driver Installation

1. Insert the CD that comes with the board. Click *Intel* and then *Intel(R) GM45 Chipset Drivers*.

2. Click *Realtek High Definition Audio Driver.*

3. On the Welcome to the InstallShield Wizard screen, click *Next*.
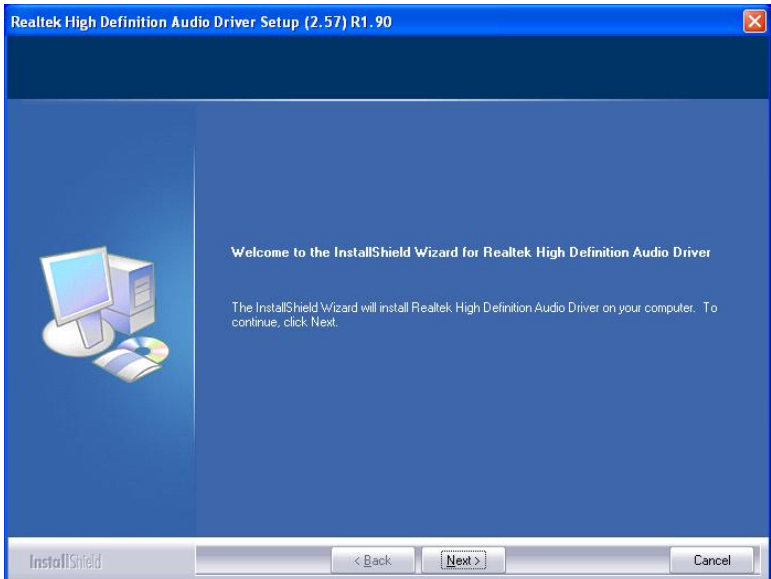
3. InstallShield Wizard is complete. Click *Finish* to restart the computer.

LAN Drivers Installation

Follow the steps below to install the Intel LAN drivers. *This one installation will cover both 82574L and 82567LM LAN controllers.*

1. Insert the CD that comes with the motherboard. Click **LAN Card** and then **Intel(R) PRO 82574L LAN Drivers**.

2. When the Welcome screen to the InstallShield Wizard for Intel® Network Connections appears, click **Next**. On the next screen, click **Yes** to to agree with the license agreement.

3. Click the checkbox for **Drivers** in the Setup Options screen to select it and click **Next** to continue.
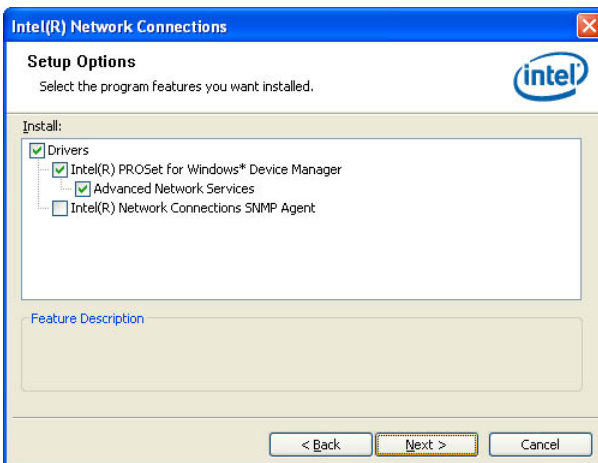
4. The wizard is ready to begin installation. Click *Install* to begin the installation.
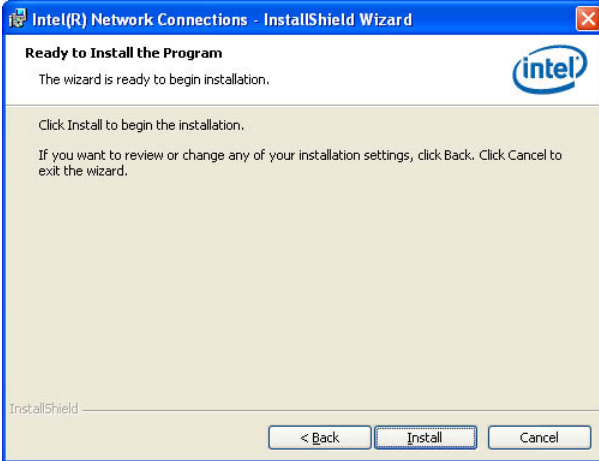
5. When InstallShield Wizard is complete, click *Finish*.
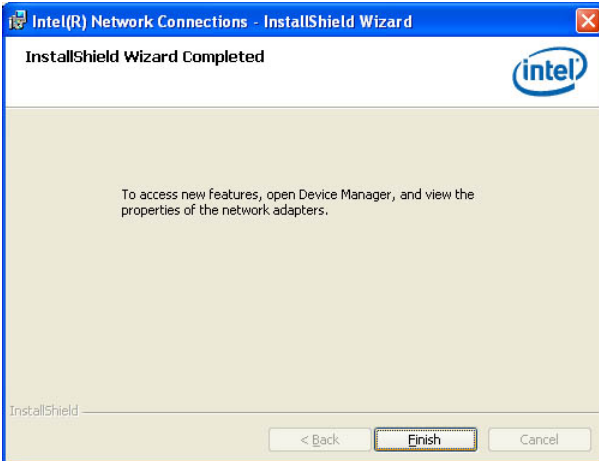
Remarks: This Intel® PRO 82574L LAN drivers support both Intel 82574L and 82567LM LAN controllers.

Appendix

A. I/O Port Address Map

Each peripheral device in the system is assigned a set of I/O port addresses which also becomes the identity of the device. The following table lists the I/O port addresses 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
2F8h - 2FFh	Serial Port #2(COM2)
2B0 - 2DF	Graphics adapter Controller
378h - 3FFh	Parallel Port #1(LPT1)
360 - 36F	Network Ports
3B0 - 3BF	Monochrome & Printer adapter
3C0 - 3CF	EGA adapter
3D0 - 3DF	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. 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 sorts 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.
//
//==========================================================================
#include <stdio.h>
#include <stdlib.h>
#include "W627DHG.H"
//==========================================================================
int main (int argc, char *argv[]);
void copyright(void);
void EnableWDT(int);
void DisableWDT(void);
//==========================================================================
int main (int argc, char *argv[])
{
        unsigned char bBuf;
        unsigned char bTime;
        char **endptr;

        copyright();

        if (argc != 2)
        {
                printf(" Parameter incorrect!!\n");
                return 1;
        }

        if (Init_W627DHG() == 0)
        {
                printf(" Winbond 83627HF is not detected, program abort.\n");
                return 1;
        }
        bTime = strtol (argv[1], endptr, 10);
        printf("System will reset after %d seconds\n", bTime);

        EnableWDT(bTime);

        return 0;
}
//==========================================================================
```

```
void copyright(void)
{
        printf("\n======= Winbond 83627DHG Watch Timer Tester (AUTO DETECT) =======\n"\
                "       Usage : W627E_WD reset_time\n"\
                "       Ex : W627E_WD 3  => reset system after 3 second\n"\
                "           W627E_WD 0  => disable watch dog timer\n");
}
//============================================================================
void EnableWDT(int interval)
{
        unsigned char bBuf;

        bBuf = Get_W627DHG_Reg( 0x2D);
        bBuf &= (!0x01);
        Set_W627DHG_Reg( 0x2D, bBuf);                   //Enable WDTO

        Set_W627DHG_LD( 0x08);                          //switch to logic device 8
        Set_W627DHG_Reg( 0x30, 0x01);                   //enable timer

        bBuf = Get_W627DHG_Reg( 0xF5);
        bBuf &= (!0x08);
        Set_W627DHG_Reg( 0xF5, bBuf);                   //count mode is second

        Set_W627DHG_Reg( 0xF6, interval);               //set timer
}
//============================================================================
void DisableWDT(void)
{
        Set_W627DHG_LD(0x08);                           //switch to logic device 8
        Set_W627DHG_Reg(0xF6, 0x00);                    //clear watchdog timer
        Set_W627DHG_Reg(0x30, 0x00);                    //watchdog disabled
}
//============================================================================
```

```
//=========================================================================
//
// 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 "W627DHG.H"
#include <dos.h>
//=========================================================================
unsigned int W627DHG_BASE;
void Unlock_W627DHG (void);
void Lock_W627DHG (void);
//=========================================================================
unsigned int Init_W627DHG(void)
{
        unsigned int result;
        unsigned char ucDid;

        W627DHG_BASE = 0x2E;
        result = W627DHG_BASE;

        ucDid = Get_W627DHG_Reg(0x20);
        if (ucDid == 0x88)
        {       goto Init_Finish;       }

        W627DHG_BASE = 0x4E;
        result = W627DHG_BASE;
        ucDid = Get_W627DHG_Reg(0x20);
        if (ucDid == 0x88)
        {       goto Init_Finish;       }

        W627DHG_BASE = 0x00;
        result = W627DHG_BASE;

Init_Finish:
        return (result);
}
//=========================================================================
void Unlock_W627DHG (void)
{
        outportb(W627DHG_INDEX_PORT, W627DHG_UNLOCK);
        outportb(W627DHG_INDEX_PORT, W627DHG_UNLOCK);
}
//=========================================================================
void Lock_W627DHG (void)
{
        outportb(W627DHG_INDEX_PORT, W627DHG_LOCK);
}
//=========================================================================
void Set_W627DHG_LD( unsigned char LD)
{
        Unlock_W627DHG();
        outportb(W627DHG_INDEX_PORT, W627DHG_REG_LD);
        outportb(W627DHG_DATA_PORT, LD);
        Lock_W627DHG();
}
```

```
//=============================================================================
void Set_W627DHG_Reg( unsigned char REG, unsigned char DATA)
{
        Unlock_W627DHG();
        outportb(W627DHG_INDEX_PORT, REG);
        outportb(W627DHG_DATA_PORT, DATA);
        Lock_W627DHG();
}
//=============================================================================
unsigned char Get_W627DHG_Reg(unsigned char REG)
{
        unsigned char Result;
        Unlock_W627DHG();
        outportb(W627DHG_INDEX_PORT, REG);
        Result = inportb(W627DHG_DATA_PORT);
        Lock_W627DHG();
        return Result;
}
//=============================================================================




//=============================================================================
//
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// PURPOSE.
//
//=============================================================================
#ifndef __W627DHG_H
#define __W627DHG_H                        1
//=============================================================================
#define      W627DHG_INDEX_PORT         (W627DHG_BASE)
#define      W627DHG_DATA_PORT          (W627DHG_BASE+1)
//=============================================================================
#define      W627DHG_REG_LD             0x07
//=============================================================================
#define W627DHG_UNLOCK                  0x87
#define      W627DHG_LOCK               0xAA
//=============================================================================
unsigned int Init_W627DHG(void);
void Set_W627DHG_LD( unsigned char);
void Set_W627DHG_Reg( unsigned char, unsigned char);
unsigned char Get_W627DHG_Reg( unsigned char);
//=============================================================================
#endif //__W627DHG_H
```

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