AEC-6860

Fanless Embedded Controller
Intel® Core™ 2 Duo Processor
with Gigabit Ethernet,
4 COMs, Audio, VGA,
DVI, LVDS, TV-out

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Acknowledgments

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Packing List

Before you begin operating your PC, please make sure that the following materials have been shipped:

- 1   AEC-6860 Embedded Controller
- 1   Keyboard & mouse cable
- 1   Phoenix Power Connector
- 2   Wallmount Brackets
- 1   Audio Cable
- 1   Screw Package
- 1   CD-ROM for manual (in PDF format) and drivers

If any of these items should be missing or damaged, please contact your distributor or sales representative immediately.

Safety & Warranty

1. Read these safety instructions carefully.

2. Keep this user's manual for later reference.

3. Disconnect this equipment from any AC outlet before cleaning. Do not use liquid or spray detergents for cleaning. Use a damp cloth.

4. For pluggable equipment, the power outlet must be installed near the equipment and must be easily accessible.

5. Keep this equipment away from humidity.

6. Put this equipment on a firm surface during installation. Dropping it or letting it fall could cause damage.

7. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.

8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.

9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.

10. All cautions and warnings on the equipment should be noted.

11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient over-voltage.

12. Never pour any liquid into an opening. This could cause fire or electrical shock.

13. Never open the equipment. For safety reasons, only qualified service personnel should open the equipment.

14. If any of the following situations arises, get the equipment checked by service personnel:

    a. The power cord or plug is damaged.

    b. Liquid has penetrated into the equipment.

    c. The equipment has been exposed to moisture.

　　d.　The equipment does not work well, or you cannot get it to work according to the user's manual.

　　e.　The equipment has been dropped and damaged.

　　f.　The equipment has obvious signs of breakage.

15. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE IS BELOW -20°C (-4°F) OR ABOVE 60°C (140°F). IT MAY DAMAGE THE EQUIPMENT.

FCC

Warning!

This device complies with Part 15 FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received including interference that may cause undesired operation.

Caution:
There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions and your local government's recycling or disposal directives.

Below Table for China RoHS Requirements
产品中有毒有害物质或元素名称及含量
AAEON Boxer/ Industrial System

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯 醚(PBDE)
印刷电路板 及其电子组件	×	○	○	○	○	○
外部信号 连接器及线材	×	○	○	○	○	○
外壳	×	○	○	○	○	○
中央处理器 与内存	×	○	○	○	○	○
硬盘	×	○	○	○	○	○
电源	×	○	○	○	○	○

O：表示该有毒有害物质在该部件所有均质材料中的含量均在
　　SJ/T 11363-2006 标准规定的限量要求以下。

X：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出
　　SJ/T 11363-2006 标准规定的限量要求。

备注：
一、此产品所标示之环保使用期限，系指在一般正常使用状况下。
二、上述部件物质中央处理器、内存、硬盘、电源为选购品。

Contents

Chapter

1

General Information

1.1 Introduction

Due to the growing popularity from the IPC market, the newest Boxer series AEC-6860 has been introduced by AAEON. Compared with the AEC-6850, it is an advanced version because it utilizes an Intel® Core 2 Duo processor without a fan.

New Innovation for Entertainment Multimedia Domain

In this era of information explosion, the advertising of consumer products will not be confined to the family television, but will also spread to high-traffic public areas, like department stores, the bus, transportation station, the supermarket etc. The advertising marketing industry will resort to every conceivable means to transmit product information to consumers. System integrators will need a multifunction device to satisfy commercial needs for such public advertising.

Being a control center, the AEC-6860 is suitable for public multimedia entertainment services. Equipped with a high efficiency heat conduction mechanism.

The AEC-6860 is compact in size but has attractive and flexible extension capabilities such as 4 USB2.0 ports, VGA, TV-out, DVI, Audio, 4 COM ports.

Stable Design for Rugged Environment

The AEC-6860 is designed for rugged environments due to the following reasons; first, it can withstand tough vibration testing up to 5G rms. With the anti-vibration hard drive device option, the AEC-6860 can be used in high vibration environments. In addition, the AEC-6860 offers low power consumption system that while operating in ambient temperatures ranging from -15° to 60°C.

The AEC-6860 is a standalone high performance controller designed for long-life operation and with high reliability. It can replace traditional methods and become the mainstream controller for the multimedia entertainment market.

1.2 Features

- Fanless Design with Intel® Core 2 Duo Processor

- VGA, DVI, LVDS, S-Video Output.

- 4 COMs, 4 USB 2.0, Single GbE (RJ-45)

- Supports SATA Hard Disk Drive

1.3 Specifications

System

- CPU: Intel® Core 2 Duo Processor up to 1.6GHz (Optional Celeron® M 400 1.86GHz)
- Construction: Rugged Aluminum Alloy chassis
- System Memory: DDRII 533/667 RAM SODIMM x 1, Max. 2GB
- VGA: DB-15 VGA connector
- Keyboard/Mouse: PS/2 Keyboard & Mouse by extension cable
- Ethernet: Single Gigabit Ethernet RJ-45 connector x 1
- SSD: Internal Type II CompactFlash™ slot x 1
- Display Interface: DVI, LVDS, S-Video
- Device Bay (Optional):   CD-ROM & 2.5"HDD (SATA/IDE) Kit, 2 x 2.5" HDD(SATA/IDE) Kit, 3.5" HDD(SATA/IDE) Kit
- Serial Port: 3 x RS-232 (COM1,3,4), 1 x RS-232/422/485

(COM2)

- Audio: MIC / Line In / Line Out (by extension cable)
- USB: 4 USB 2.0 ports
- Watchdog Timer: Generate a time-out System reset, setting via software
- Power Supply: 1. DC input: Internal DC to DC converter (Default); Input range: DC 9V/12A~30V/3.6A 2. AC input: External power adapter (Optional); Input range: AC 100~240V @ 50~60Hz
- System Control: Power on / off switch x 1 Reset button x 1
- Indicator: Power LED x 1 HDD active LED x 1
- OS Support: Windows® XP, Windows® 2000

Mechanical and Environmental

- Construction: Rugged Aluminum Alloy chassis
- Color: Dark Blue
- Mounting: Wallmount, Desktop

- Dimension: 13.22" (W) x 11.57" (H) x 10.24" (D) (336mm x 294mm x 260mm)
- Net Weight: 5.57lb (2.53kg)
- Gross Weight: 10.34lb (4.7kg)
- Operation Temperature: 5°F ~ 140°F (-15°C ~ 55°C) – Core 2 Duo 1.67GHz/CFD; 32°F ~ 122°F (0°C ~ 50°C) –Core 2 Duo 1.6GHz/Automotive HDD
- Storage Humidity: 5~95% @ 40°C, non-condensing
- Vibration: 5 g rms / 5~500Hz / random operation (CFD) 1 g / 5~500Hz / random operation (HDD)
- Shock: 100g peak acceleration (11 msec. duration) 20g peak acceleration (11 msec. duration) (HDD)
- EMC: CE/FCC class A

Front Side
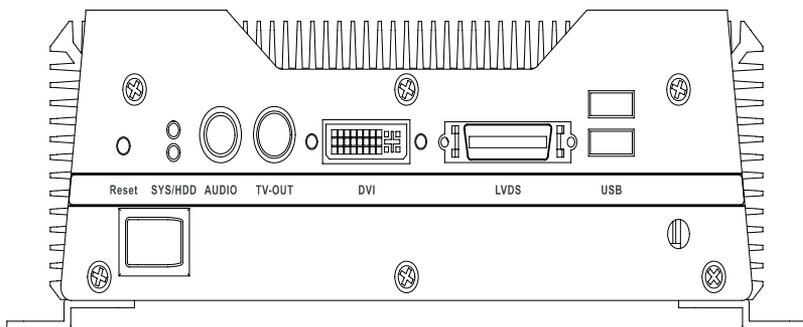
Rear Side
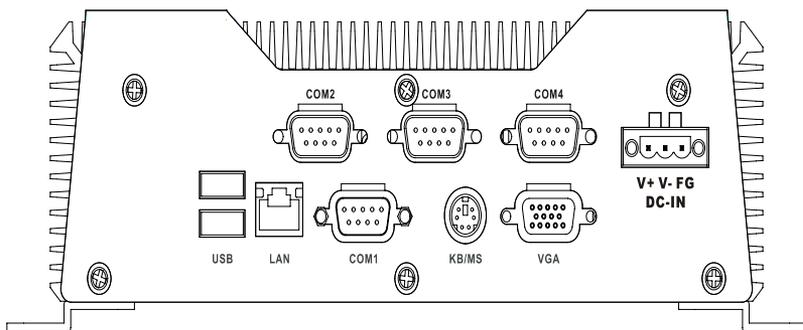
Chapter

2

Hardware Installation

2.1 Dimension
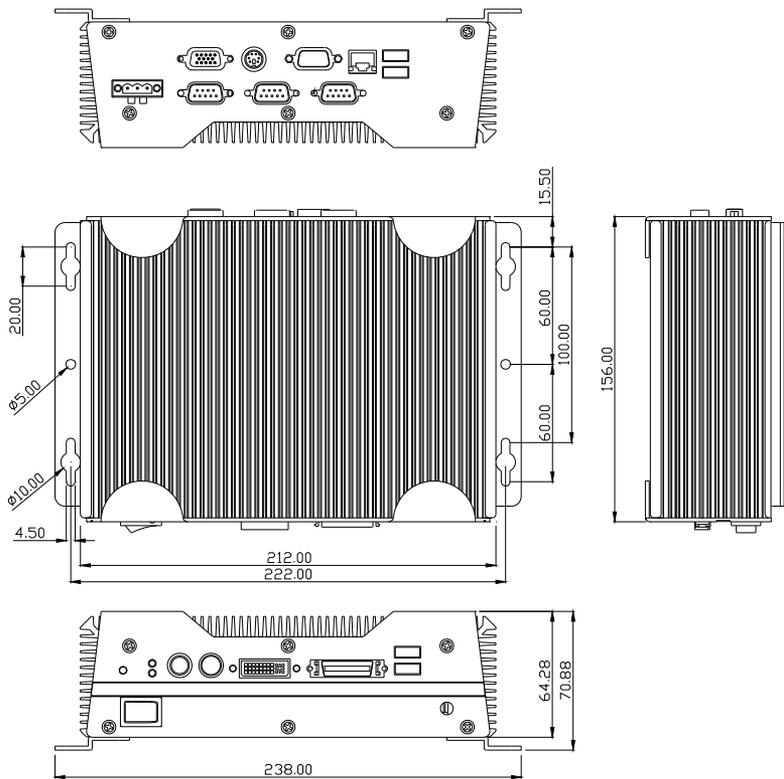
2.2 COM2 RI/+5V/+12V Selection (JP3)

JP3	Function
1-2	+12V
3-4	+5V
5-6	RI
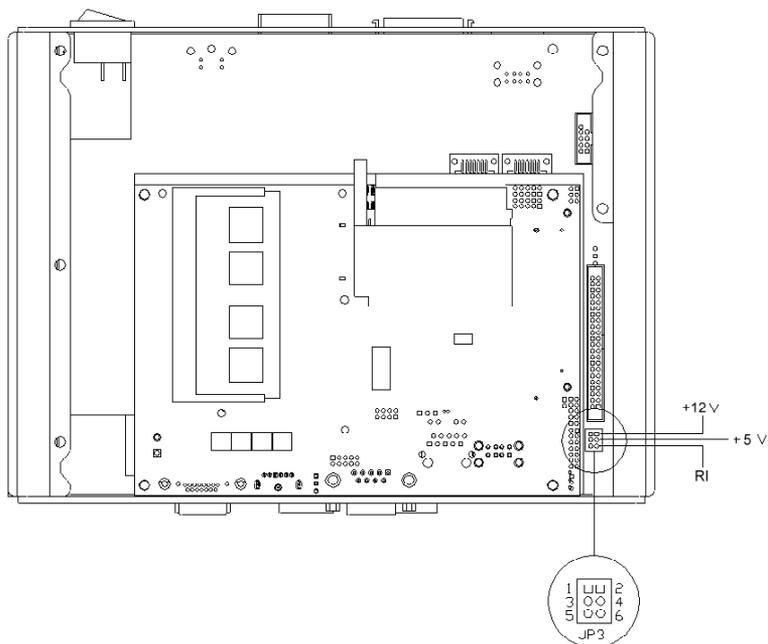
2.3 COM2 RS-232/422/485 Serial Port Connector

Different devices implement the RS-232/422/485 standard in
different ways. If you are having problems with a serial device, be
sure to check the pin assignments below for the connector.
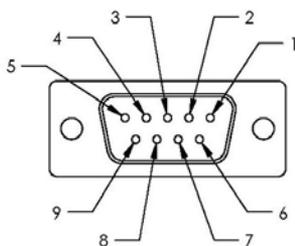
Pin	Signal	Pin	Signal
1	DCD (422TXD-/485DATA-)	2	RXD (422RXD+)
3	TXD (422TXD+/485DATA+)	4	DTR (422RXD-)
5	GND	6	DSR
7	RTS	8	CTS
9	RI	10	N.C.

2.4 COM1 RS-232 Serial Port Connector

Pin	Signal	Pin	Signal
1	DCD	2	RXD
3	TXD	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	RI	10	N.C.

2.5 LVDS Pin Definition
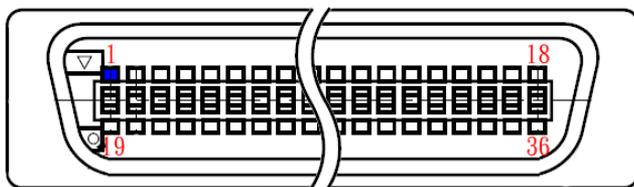
Pin	Signal	Pin	Signal
1	BKLEN	16	TXUCLK
2	BKLCTL	17	SDATA
3	VCC	18	SCLK
4	GND	19	TXLCLK#
5	TXL1#	20	TXLCLK
6	TXL1	21	TXL0#
7	VCC	22	TXL0
8	GND	23	TXL2#
9	TXU0#	24	TXL2
10	TXU0	25	NC
11	TXU1#	26	NC
12	TXU1	27	VCC
13	TXU2#	28	GND
14	TXU2	29	NC
15	TXUCLK#	30	NC

2.6 RAM Module Installation

Step 1: Take off the lid from the bottom of the chassis by loosening the

screws.
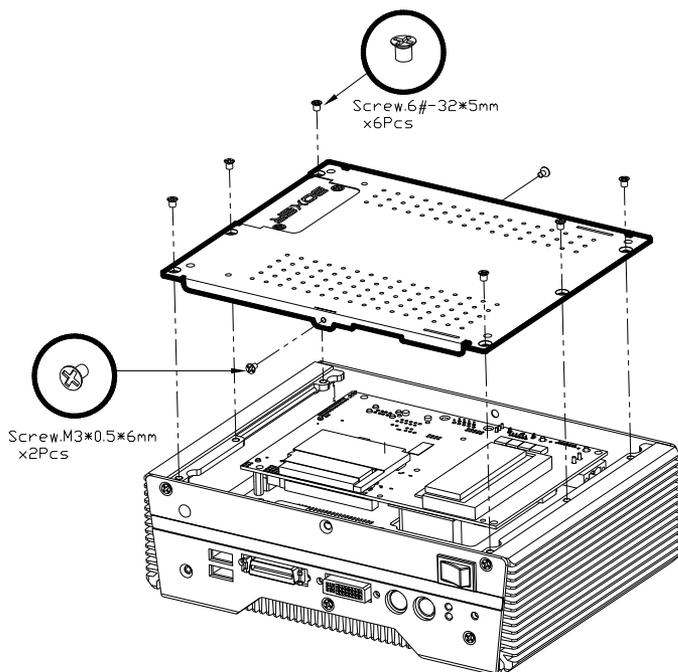
Step 2: Cover the chips with a thermal pad
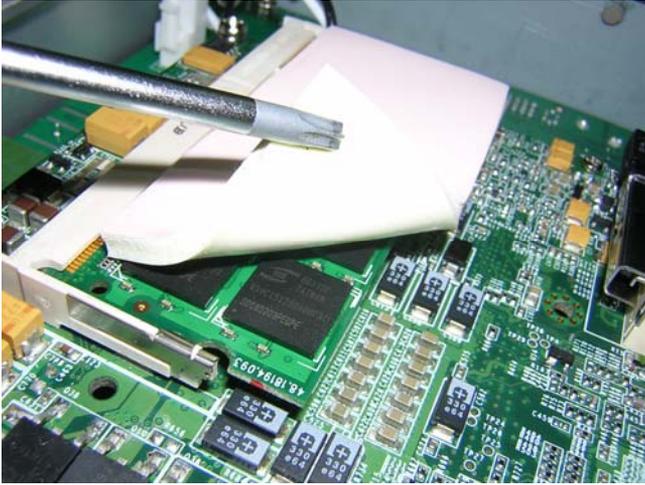
Step 3: Place the lid back on and lock with screws.
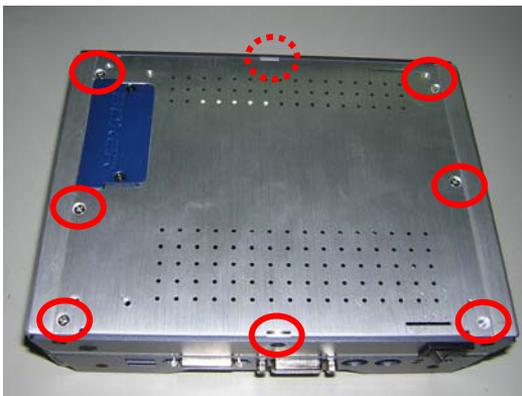
2.7 CD-ROM and 2.5" HDD Kit Installation

CD-ROM and 2.5" HDD Kit Combination

Step 1: Get the disk bracket ready.

Step 2: Fasten the CD-ROM to the disk bracket with screws.

Step 3: Fasten the Riser Card and the CD-ROM with screws.

Riser Card

Step 4: Fasten the 2.5" HDD module to the disk bracket with screws.

Step 5: Insert the SATA cable and IDE cable into the slots on the Riser

Card and the 2.5" HDD module.

IDE Cable

Step 6: Place the CD-ROM and HDD kit into the suitable plate and then reverse it. Screw the CD-ROM and HDD kit to the plate.

Cable Insertion

Step 1: Open the HDD cover by loosening the screws on the bottom of the chassis.

Step 2: Insert the other side of IDE cable into the slot on the bottom of
the chassis.

IDE Cable
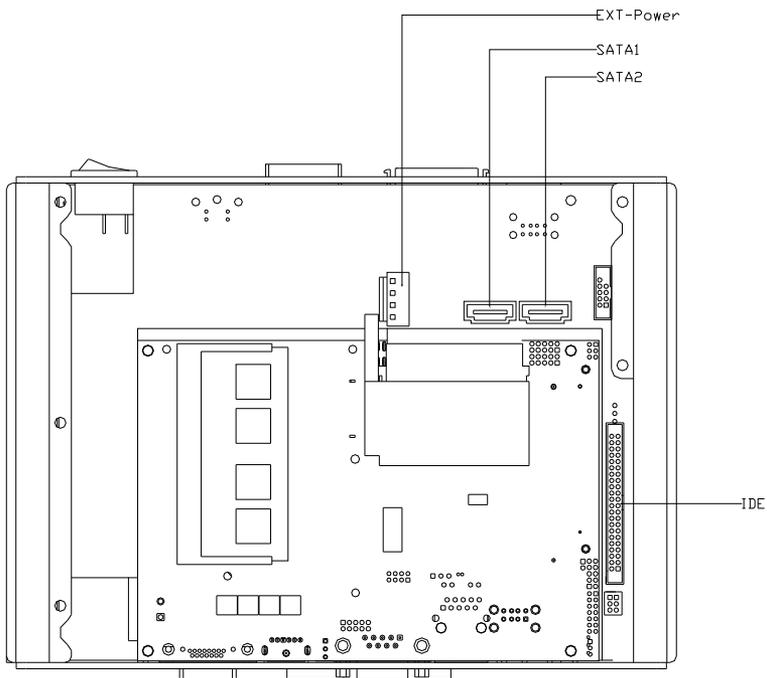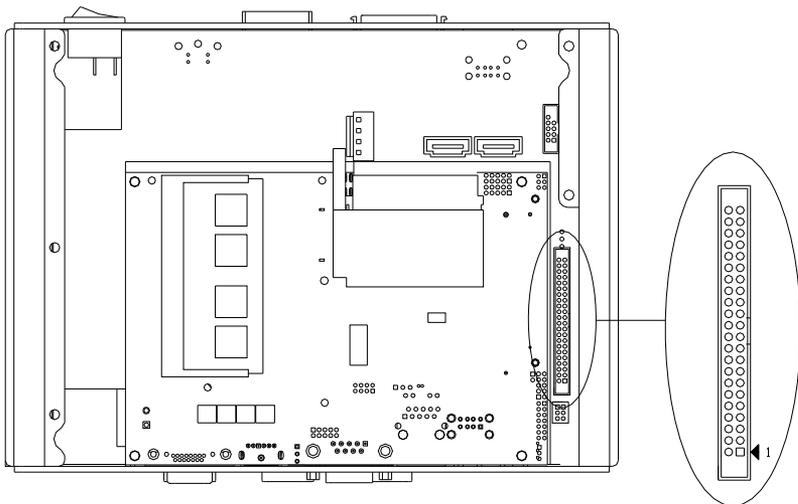
Step 3: Combine the chassis with the CD-ROM and 2.5" HDD kit plate.

Then lock with screws.
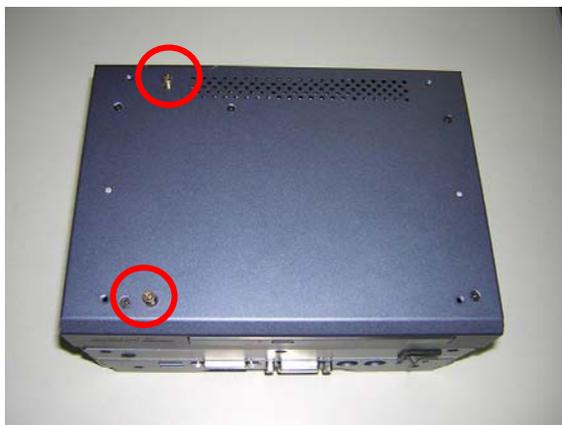
2.8 Dual 2.5" HDD Kit Installation

HDD Kit Combination

Step 1: Get the bracket ready. Attach the rubber shock absorbers with the bracket as illustration shown below.
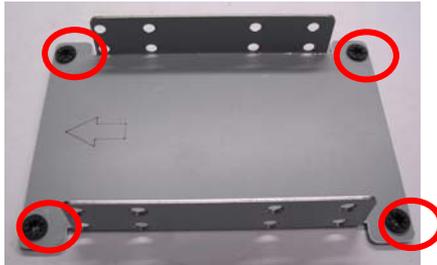
Step 2: Fasten the first HDD module to the bracket with screws.

Step 3: Fasten the second HDD module to the bracket with screws.

Step 4: Insert the HDD cable into the slot on the HDD module.

SATA HDD Cable

Power Cable
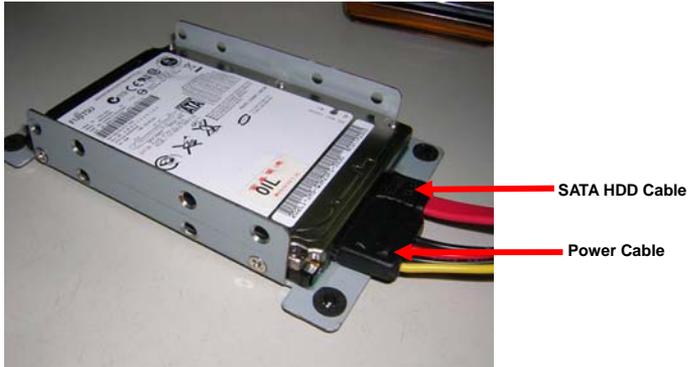
Step 5: Place the HDD kit into the HDD kit housing and then screw the

HDD kit onto the HDD kit housing.

Cable Insertion

Step 1: Open the HDD cover by loosening the screws on the bottom of the chassis.

Step 2: Insert the other side of HDD cable into the slot on the bottom of the chassis.

IDE Cable

SATA HDD Cable/ EXT Power Cable
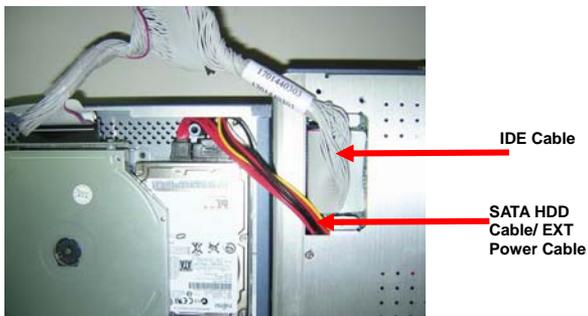
Step 3: Combine the chassis with the HDD kit housing and then lock with

screws.

2.9 3.5" HDD Kit Installation

HDD Kit Combination

Step 1: Get the HDD module ready. Insert power cable and HDD cable into the slots on the HDD module.

SATA HDD Cable

EXT Power Cable

Step 2: Get the bracket ready.

Step 3: Attach the rubber shock absorbers to the bracket as illustration shown below.

Step 4: Fasten the HDD module to the bracket with screws.

Step 5: Get the screws ready, by matching them up with a washer. Meanwhile, place the HDD kit into the HDD kit housing and then screw the HDD kit to the HDD kit housing.

Magnificent

### Cable Insertion

Step 1: Open the HDD cover by loosening the screws on the bottom of the chassis.

Step 2: Insert the other side of HDD cable and power cable into the slots on the bottom of the chassis.

SATA HDD Cable/ EXT Power Cable

Step 3: Combine the chassis with the HDD kit housing and then lock with

screws.

2.10 Wallmount Bracket Installation

Fasten the brackets with the appropriate screws.
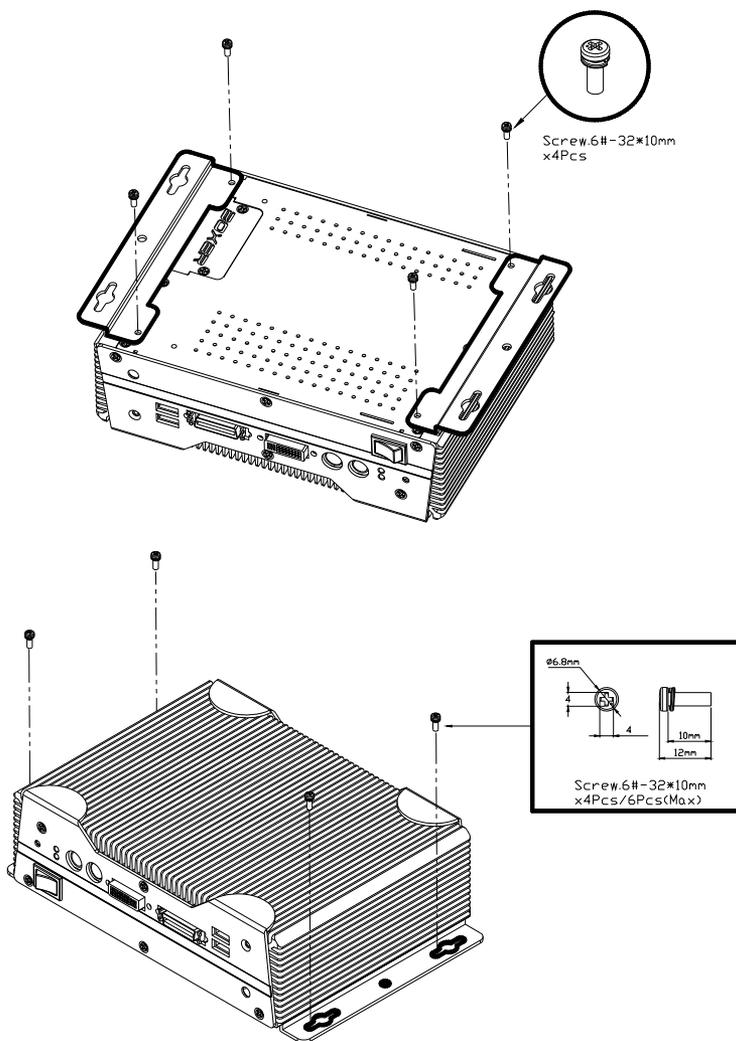
Chapter

3

Award BIOS Setup

3.1 System Test and Initialization

These routines test and initialize board hardware. If the routines encounter an error during the tests, you will either hear a few short beeps or see an error message on the screen. There are two kinds of errors: fatal and non-fatal. The system can usually continue the boot up sequence with non-fatal errors. Non-fatal error messages usually appear on the screen along with the following instructions:

Press <F1> to RESUME

Write down the message and press the F1 key to continue the boot up sequence.

System configuration verification

These routines check the current system configuration against the values stored in the CMOS memory. If they do not match, the program outputs an error message. You will then need to run the BIOS setup program to set the configuration information in memory.

There are three situations in which you will need to change the CMOS settings:

1.   You are starting your system for the first time

2.   You have changed the hardware attached to your system

3.   The CMOS memory has lost power and the configuration information has been erased.

The AEC-6860 CMOS memory has an integral lithium battery backup for data retention. However, you will need to replace the complete unit when it finally runs down.

3.2 Award BIOS Setup

Awards BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This type of information is stored in battery-backed CMOS RAM so that it retains the Setup information when the power is turned off.

Entering Setup

Power on the computer and press <Del> immediately. This will allow you to enter Setup.

Standard CMOS Features

Use this menu for basic system configuration. (Date, time, IDE, etc.)

Advanced BIOS Features

Use this menu to set the advanced features available on your system.

Advanced Chipset Features

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

Integrated Peripherals

Use this menu to specify your settings for integrated peripherals. (Primary slave, secondary slave, keyboard, mouse etc.)

Power Management Setup

Use this menu to specify your settings for power management. (HDD power down, power on by ring, KB wake up, etc.)

PnP/PCI Configurations

This entry appears if your system supports PnP/PCI.

PC Health Status

This menu allows you to set the shutdown temperature for your system.

Frequency/Voltage Control

Use this menu to specify your settings for auto detect DIMM/PCI clock and spread spectrum.

Load Fail-Safe Defaults

Use this menu to load the BIOS default values for the minimal/stable performance for your system to operate.

Load Optimized Defaults

Use this menu to load the BIOS default values that are factory settings for optimal performance system operations. While AWARD has designated the custom BIOS to maximize performance, the factory has the right to change these defaults to meet their needs.

Set Supervisor/User Password

Use this menu to set Supervisor/User Passwords.

Save and Exit Setup

Save CMOS value changes to CMOS and exit setup.

Exit Without Saving

Abandon all CMOS value changes and exit setup.

You can refer to the "AAEON BIOS Item Description.pdf" file in the CD for the meaning of each setting in this chapter.

Chapter

4

Driver
Installation

The AEC-6860 comes with a CD-ROM that contains all drivers and utilities that meet your needs.

Follow the sequence below to install the drivers:

Step 1 – Install Intel INF Driver

Step 2 – Install Intel VGA Driver

Step 3 – Install Intel LAN Driver

Step 4 – Install Realtek Audio Driver

Step 5 – Install Sil3132 SATA Driver

USB 2.0 Drivers are available for download using Windows Update for both Windows XP and Windows 2000. For additional information regarding USB 2.0 support in Windows XP and Windows 2000, please visit www.microsoft.com/hwdev/usb/.

Please read instructions below for further detailed installations.

4.1 Installation

Insert the AEC-6860 CD-ROM into the CD-ROM Drive. And install the drivers from Step 1 to Step 5 in order.

Step 1 – Install Intel INF Driver

1. Click on the *Step 1-Intel inf Driver* folder and then double click on the *infinst_autol.exe*

2. Follow the instructions that the window shows you

3. The system will help you install the driver automatically

Step 2 – Install Intel VGA Driver

1. Click on the *Step 2- Intel VGA Driver* folder and select the OS folder your system is

2. Double click on the *.exe* located in each OS folder

3. Follow the instructions that the window shows you

4. The system will help you install the driver automatically

Note: For preventing from display resolution issues occurred on different VGA displays, AAEON recommends you to install the driver (Version 6.14.10.4436) in the CD-ROM.

Step 3 – Install Intel LAN Driver

1. Click on the *Step 3-Intel LAN Driver* folder and select the OS folder your system is

2. Double click on the *.exe* file located in each OS folder

3. Follow the instructions that the window shows you

4. The system will help you install the driver automatically

Step 4 – Install Realtek Audio Driver

1. Click on the ***Step 4-Realtek Audio Driver*** folder and select the OS folder your system is

2. Double click on the ***.exe*** file located in each OS folder

3. Follow the instructions that the window shows you

4. The system will help you install the driver automatically

Step 5 – Install Sil3132 SATA Driver

Please follow the application note to install the **Step 5 - Sil3132 SATA Driver**

Application Note:

Windows Operating System cannot recognize the driver of chip Sil3132 and treat it as a third-part driver.   Please follow the steps below to install the driver with the Operating System.

1. Creating a Drive Disk: copy the SATA driver from AAEON CD to floppy disk before install the OS

   A. Click on ***Step 5 - Sil3132 SATA Driver***

   B. Click on ***Sil 3132 BASE Driver (For_BIOS_7.3.13)***

   C. Click on ***Sil 3132 32-bit Windows BASE Driver v1.0.19.0(For_BIOS_7.3.13)***

   D. Copy all the files to the USB Floppy Disk

   E. Driver disk done

2. Insert your Windows CD, and then restart the computer

3. Follow the on-screen instructions to begin the Windows installation.

4. When prompted to install a third-party driver, press **F6**.
   Note: When F6 is actived, a prompt appears at the bottom of the

screen for only 5 seconds.
> If you did not press **F6** in time, please restart your computer.
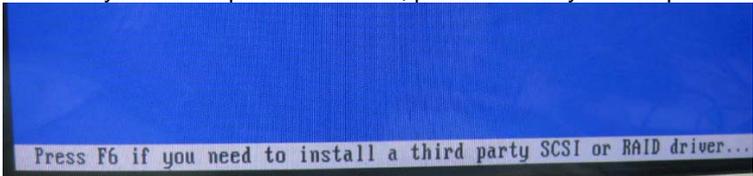
5. Insert the driver disk, and then wait until you are prompted to install a driver.

6. Press "**S"** to specify the driver is on a floppy disk, and then press "**Enter**."

7. The computer reads the disk

8. When the SATA driver has been found, press "**Enter**."
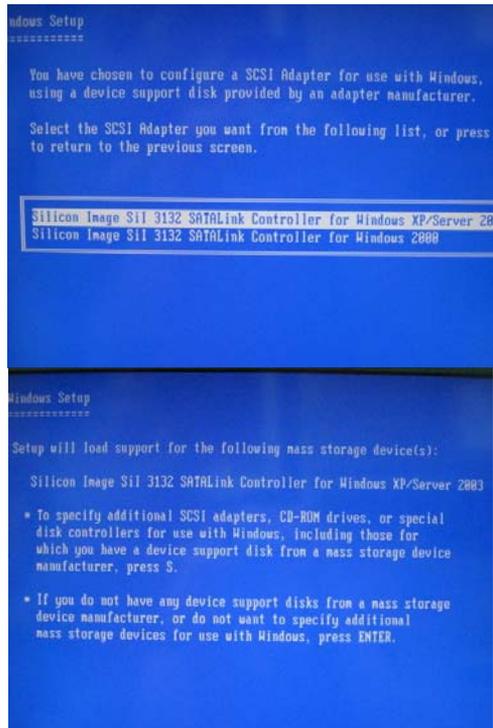
9. Follow the on-screen instructions to complete the installation.

After finish installing OS, you have to install Silicon Raid

Management Utility.

Setup RAID Management

    A. Click on *Step 5 - Sil3132 SATA Driver* and select the folder

       of *Sil 3132 32 & 64-bit Windows SATARAID5*

       Management Utility(For_BIOS_7.3.13)

    B. Double click on *3132-W-I32-R_1552.exe*

    C. Follow the instructions that the window shows

    D. The system will help you install the driver automatically

Appendix

A

Programming the Watchdog Timer

A.1 Programming

AEC-6860 utilizes ITE 8712 chipset as its watchdog timer controller.

Below are the procedures to complete its configuration and the AAEON intial watchdog timer program is also attached based on which you can develop customized program to fit your application.

Configuring Sequence Description

After the hardware reset or power-on reset, the ITE 8712 enters the normal mode with all logical devices disabled except KBC. The initial state (enable bit) of this logical device (KBC) is determined by the state of pin 121 (DTR1#) at the falling edge of the system reset during power-on reset.
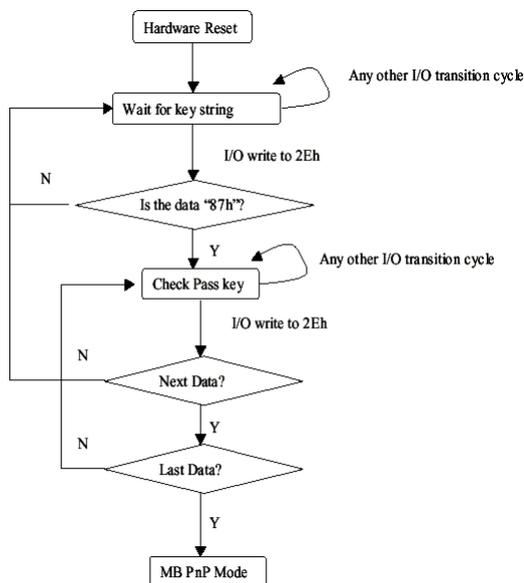
There are three steps to complete the configuration setup: (1) Enter the MB PnP Mode; (2) Modify the data of configuration

registers; (3) Exit the MB PnP Mode. Undesired result may occur if the MB PnP Mode is not exited normally.

(1) Enter the MB PnP Mode

To enter the MB PnP Mode, four special I/O write operations are to be performed during Wait for Key state. To ensure the initial state of the key-check logic, it is necessary to perform four write operations to the Special Address port (2EH). Two different enter keys are provided to select configuration ports (2Eh/2Fh) of the next step.

	Address Port	Data Port
87h, 01h, 55h, 55h:	2Eh	2Fh

(2) Modify the Data of the Registers

All configuration registers can be accessed after entering the MB PnP Mode. Before accessing a selected register, the content of Index 07h must be changed to the LDN to which the register belongs, except some Global registers.

(3) Exit the MB PnP Mode

Set bit 1 of the configure control register (Index=02h) to 1 to exit the MB PnP Mode.

WatchDog Timer Configuration Registers

LDN	Index	R/W	Reset	Configuration Register or Action
All	02H	W	N/A	Configure Control
07H	71H	R/W	00H	WatchDog Timer Control Register
07H	72H	R/W	00H	WatchDog Timer Configuration Register
07H	73H	R/W	00H	WatchDog Timer Time-out Value Register

Configure Control (Index=02h)

This register is write only. Its values are not sticky; that is to say, a hardware reset will automatically clear the bits, and does not require the software to clear them.

Bit	Description
7-2	Reserved
1	Returns to the Wait for Key state. This bit is used when the configuration sequence is completed
0	Resets all logical devices and restores configuration registers to their power-on states.

WatchDog Timer Control Register (Index=71h, Default=00h)

Bit	Description
7	WDT is reset upon a CIR interrupt
6	WDT is reset upon a KBC (mouse) interrupt
5	WDT is reset upon a KBC (keyboard) interrupt
4	WDT is reset upon a read or a write to the Game Port base address
3-2	Reserved
1	Force Time-out. This bit is self-clearing
0	WDT Status
	1: WDT value reaches 0.
	0: WDT value is not 0

WatchDog Timer Configuration Register (Index=72h, Default=00h)

Bit	Description
7	WDT Time-out value select
	1: Second
	0: Minute
6	WDT output through KRST (pulse) enable
5-4	Reserved
3-0	Select the interrupt level[Note] for WDT

WatchDog Timer Time-out Value Register (Index=73h, Default=00h)

Bit	Description
7-0	WDT Time-out value 7-0

A.2 IT8712 Watchdog Timer Initial Program

```
        .MODEL SMALL
        .CODE
Main:
        CALL Enter_Configuration_mode
        CALL Check_Chip
        mov cl, 7
        call Set_Logic_Device
        ;time setting
        mov cl, 10 ; 10 Sec
        dec al
Watch_Dog_Setting:
        ;Timer setting
        mov al, cl
        mov cl, 73h
        call Superio_Set_Reg
        ;Clear by keyboard or mouse interrupt
        mov al, 0f0h
        mov cl, 71h
        call Superio_Set_Reg
        ;unit is second.
        mov al, 0C0H
        mov cl, 72h
        call Superio_Set_Reg
```

```
; game port enable
mov cl, 9
call Set_Logic_Device


Initial_OK:
CALL Exit_Configuration_mode
MOV AH,4Ch
INT 21h


Enter_Configuration_Mode PROC NEAR
MOV SI,WORD PTR CS:[Offset Cfg_Port]


MOV DX,02Eh
MOV CX,04h
Init_1:
MOV AL,BYTE PTR CS:[SI]
OUT DX,AL
INC SI
LOOP Init_1
RET
Enter_Configuration_Mode ENDP


Exit_Configuration_Mode PROC NEAR
MOV AX,0202h
CALL Write_Configuration_Data
```

```
        RET
        Exit_Configuration_Mode ENDP


        Check_Chip PROC NEAR


        MOV AL,20h
        CALL Read_Configuration_Data
        CMP AL,87h
        JNE Not_Initial


        MOV AL,21h
        CALL Read_Configuration_Data
        CMP AL,12h
        JNE Not_Initial


Need_Initial:
        STC
        RET
Not_Initial:
        CLC
        RET
        Check_Chip ENDP
        Read_Configuration_Data PROC NEAR
        MOV DX,WORD PTR CS:[Cfg_Port+04h]
        OUT DX,AL
```

```
MOV DX,WORD PTR CS:[Cfg_Port+06h]
IN AL,DX
RET
Read_Configuration_Data ENDP


Write_Configuration_Data PROC NEAR
MOV DX,WORD PTR CS:[Cfg_Port+04h]
OUT DX,AL
XCHG AL,AH
MOV DX,WORD PTR CS:[Cfg_Port+06h]
OUT DX,AL
RET
Write_Configuration_Data ENDP


Superio_Set_Reg proc near
push ax
MOV DX,WORD PTR CS:[Cfg_Port+04h]
mov al,cl
out dx,al
pop ax
inc dx
out dx,al
ret
Superio_Set_Reg endp.Set_Logic_Device proc near
Set_Logic_Device   proc   near
```

```
        push ax

        push cx

        xchg al,cl

        mov cl,07h

        call Superio_Set_Reg

        pop cx

        pop ax

        ret

        Set_Logic_Device endp


        ;Select 02Eh->Index Port, 02Fh->Data Port

        Cfg_Port DB 087h,001h,055h,055h


        DW 02Eh,02Fh
```

END Main

Note: Interrupt level mapping

0Fh-Dh: not valid

0Ch: IRQ12

.

.

03h: IRQ3

02h: not valid

01h: IRQ1

00h: no interrupt selected

Appendix

B

I/O Information

B.1 I/O Address Map

```
Input/output (IO)
  [00000000 - 0000000F] Direct memory access controller
  [00000000 - 00000CF7] PCI bus
  [00000010 - 0000001F] Motherboard resources
  [00000020 - 00000021] Programmable interrupt controller
  [00000022 - 0000003F] Motherboard resources
  [00000040 - 00000043] System timer
  [00000044 - 0000005F] Motherboard resources
  [00000060 - 00000060] Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
  [00000061 - 00000061] System speaker
  [00000062 - 00000063] Motherboard resources
  [00000064 - 00000064] Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
  [00000065 - 0000006F] Motherboard resources
  [00000070 - 00000073] System CMOS/real time clock
  [00000074 - 0000007F] Motherboard resources
  [00000080 - 00000090] Direct memory access controller
  [00000091 - 00000093] Motherboard resources
  [00000094 - 0000009F] Direct memory access controller
  [000000A0 - 000000A1] Programmable interrupt controller
  [000000A2 - 000000BF] Motherboard resources
  [000000C0 - 000000DF] Direct memory access controller
  [000000E0 - 000000EF] Motherboard resources
  [000000F0 - 000000FF] Numeric data processor
  [00000170 - 00000177] Secondary IDE Channel
  [000001F0 - 000001F7] Primary IDE Channel
  [00002274 - 00000277] ISAPNP Read Data Port
  [00000279 - 00000279] ISAPNP Read Data Port
  [00000290 - 0000029F] Motherboard resources
  [000002E0 - 000002E7] Communications Port (COM5)
  [000002E8 - 000002EF] Communications Port (COM4)
  [000002F0 - 000002F7] Communications Port (COM6)
  [000002F8 - 000002FF] Communications Port (COM2)
  [00000376 - 00000376] Secondary IDE Channel
  [000003B0 - 000003BB] Mobile Intel(R) 945GM Express Chipset Family
  [000003C0 - 000003DF] Mobile Intel(R) 945GM Express Chipset Family
  [000003E8 - 000003EF] Communications Port (COM3)
  [000003F0 - 000003F5] Standard floppy disk controller
  [000003F6 - 000003F6] Primary IDE Channel
  [000003F7 - 000003F7] Standard floppy disk controller
  [000003F8 - 000003FF] Communications Port (COM1)
  [00000400 - 000004BF] Motherboard resources
  [000004D0 - 000004D1] Motherboard resources
  [00000500 - 0000051F] Intel(R) 82801G (ICH7 Family) SMBus Controller - 27DA
  [00000800 - 0000087F] Motherboard resources
  [00000880 - 0000088F] Motherboard resources
  [00000A79 - 00000A79] ISAPNP Read Data Port
  [00000D00 - 0000FFFF] PCI bus
  [00009000 - 00009FFF] Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D0
  [00009F00 - 00009F1F] Intel(R) PRO/1000 PL Network Connection
  [0000B000 - 0000BFFF] Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D6
  [0000C000 - 0000CFFF] Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D4
  [0000D000 - 0000DFFF] Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D2
  [0000DF00 - 0000DF7F] Silicon Image SiI 3132 SATALink Controller
  [0000F000 - 0000F0FF] Realtek AC'97 Audio
  [0000F800 - 0000F80F] Intel(R) 82801G (ICH7 Family) Ultra ATA Storage Controllers - 27DF
  [0000FA00 - 0000FA3F] Realtek AC'97 Audio
  [0000FB00 - 0000FB1F] Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CB
  [0000FC00 - 0000FC1F] Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CA
  [0000FD00 - 0000FD1F] Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27C9
  [0000FE00 - 0000FE1F] Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27C8
  [0000FF00 - 0000FF07] Mobile Intel(R) 945GM Express Chipset Family
```

B.2 1st MB Memory Address Map

```
Memory
   [00000000 - 0009FFFF]  System board
   [000A0000 - 000BFFFF]  Mobile Intel(R) 945GM Express Chipset Family
   [000A0000 - 000BFFFF]  PCI bus
   [000C0000 - 000DFFFF]  PCI bus
   [000E0000 - 000EFFFF]  System board
   [000F0000 - 000FFFFF]  System board
   [00100000 - 1F6DFFFF]  System board
   [1F6E0000 - 1F6FFFFF]  System board
   [1F700000 - FEBFFFFF]  PCI bus
   [D0000000 - DFFFFFFF]  Mobile Intel(R) 945GM Express Chipset Family
   [E0000000 - EFFFFFFF]  Motherboard resources
   [FD400000 - FD4FFFFF]  Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D2
   [FD500000 - FD5FFFFF]  Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D2
   [FD5F8000 - FD5FBFFF]  Silicon Image SiI 3132 SATALink Controller
   [FD5FF000 - FD5FF07F]  Silicon Image SiI 3132 SATALink Controller
   [FD600000 - FD6FFFFF]  Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D0
   [FD900000 - FD9FFFFF]  Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D0
   [FD9E0000 - FD9FFFFF]  Intel(R) PRO/1000 PL Network Connection
   [FDA00000 - FDAFFFFF]  Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D6
   [FDB00000 - FDBFFFFF]  Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D6
   [FDC00000 - FDCFFFFF]  Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D4
   [FDD00000 - FDDFFFFF]  Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D4
   [FDE80000 - FDEFFFFF]  Mobile Intel(R) 945GM Express Chipset Family
   [FDF00000 - FDF7FFFF]  Mobile Intel(R) 945GM Express Chipset Family
   [FDF80000 - FDFBFFFF]  Mobile Intel(R) 945GM Express Chipset Family
   [FDFFD000 - FDFFD0FF]  Realtek AC'97 Audio
   [FDFFE000 - FDFFE1FF]  Realtek AC'97 Audio
   [FEBFFC00 - FEBFFFFF]  Intel(R) 82801G (ICH7 Family) USB2 Enhanced Host Controller - 27CC
   [FEC00000 - FEC00FFF]  System board
   [FED13000 - FED1DFFF]  System board
   [FED20000 - FED8FFFF]  System board
   [FEE00000 - FEE00FFF]  System board
   [FFB00000 - FFB7FFFF]  System board
   [FFB80000 - FFBFFFFF]  Intel(r) 82802 Firmware Hub Device
   [FFF00000 - FFFFFFFF]  System board
```

B.3 IRQ Mapping Chart


```
Interrupt request (IRQ)
    (ISA) 0    System timer
    (ISA) 1    Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
    (ISA) 3    Communications Port (COM2)
    (ISA) 4    Communications Port (COM1)
    (ISA) 6    Standard floppy disk controller
    (ISA) 8    System CMOS/real time clock
    (ISA) 9    Microsoft ACPI-Compliant System
    (ISA) 10   Communications Port (COM3)
    (ISA) 10   Communications Port (COM5)
    (ISA) 11   Communications Port (COM4)
    (ISA) 11   Communications Port (COM6)
    (ISA) 12   PS/2 Compatible Mouse
    (ISA) 13   Numeric data processor
    (ISA) 14   Primary IDE Channel
    (ISA) 15   Secondary IDE Channel
    (PCI) 5    Intel(R) 82801G (ICH7 Family) SMBus Controller - 27DA
    (PCI) 16   Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D0
    (PCI) 16   Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CB
    (PCI) 16   Intel(R) PRO/1000 PL Network Connection
    (PCI) 16   Mobile Intel(R) 945GM Express Chipset Family
    (PCI) 17   Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D2
    (PCI) 17   Realtek AC'97 Audio
    (PCI) 17   Silicon Image SiI 3132 SATALink Controller
    (PCI) 18   Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D4
    (PCI) 18   Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CA
    (PCI) 19   Intel(R) 82801G (ICH7 Family) PCI Express Root Port - 27D6
    (PCI) 19   Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27C9
    (PCI) 23   Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27C8
    (PCI) 23   Intel(R) 82801G (ICH7 Family) USB2 Enhanced Host Controller - 27CC
```

B.4 DMA Channel Assignments


```
Direct memory access (DMA)
    2   Standard floppy disk controller
    4   Direct memory access controller
```