FusionStor

Innovation Infinite
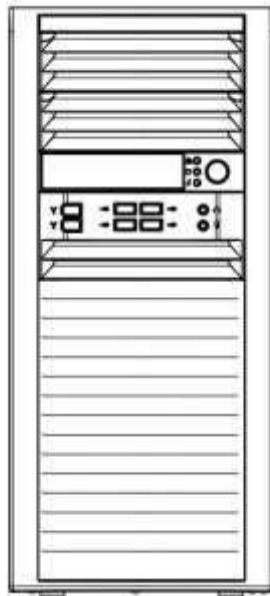
FUSIONSTOR INVENTO SERIES

INVENTO i737e SERIES-MANUAL

Fusionstor Workstation

Invento i737e Series

USER'S MANUAL
1.0a

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Manual Revision 1.0a

Preface

About This Manual

This manual is written for professional system integrators and PC technicians. It provides information for the installation and use of the Fusionstor Invento i737e. Installation and maintenance should be performed by experienced technicians only.

The Fusionstor Invento i737e is a high-end system based on the Mid-Tower chassis and the Fusionstor server board.

The Fusionstor Invento i737e features a unique and highly optimized design, allowing the user to install components with minimal or no use of screws or tools. The chassis is equipped with a either a 500, 865, 900 or redundant 500 Watt whisper quiet, high-efficiency power supply for superb power savings.

Manual Organization

Chapter 1: Introduction

The first chapter provides a description of the main components included with this chassis and describes the main features of the Fusionstor Invento i737e chassis

Chapter 2: Standardized Warning Statements for AC Systems

You should thoroughly familiarize yourself with this chapter for a general overview of safety precautions that should be followed when installing and servicing the Fusionstor Invento i737e.

Chapter 3: System Interface

Refer here for details on the system interface, which includes the functions and information provided by the control panel on the chassis as well as other LEDs located throughout the system.

Chapter 4: Standardized Warning Statements for AC Systems

Chapter 4 provides detailed information to follow the procedures of installing, removing, or reconfiguring components in your chassis.

Chapter 6: Advanced Serverboard Setup

Chapter 5 provides detailed information on the Fusionstor serverboard, including the locations and functions of connections, headers and jumpers. Refer to this chapter when adding or removing processors or main memory and when reconfiguring the serverboard.

Chapter 7: Chassis Setup and Maintenance

Chapter 8: BIOS

The BIOS chapter includes an introduction to BIOS and provides detailed information on running the CMOS Setup Utility.

Appendix A: BIOS Error Beep Codes

Chapter 1

Introduction

1-1   Overview

The Invento i737e is a high-end workstation comprised of two main subsystems: the Mid-Tower chassis and the Fusionstor dual Intel® Xeon® processor serverboard.

In addition to the serverboard and chassis, various hardware components have been included with the Fusionstor Invento i737e, as listed below:

•   One 12cm rear exhaust fan(s) with Optional 1 x 12cm (front) cooling fan

•   Two active CPU heatsinks

•   High-efficiency power supply

•   SATA Accessories

         One SATA backplane

         Four 3.5" HDD drive bays and four optional 2.5" HDD drive bays offer maximum storage capacity

1-2   Serverboard Features

At the heart of the Fusionstor Invento i737e lies the motherboard a dual processor serverboard based on the Intel® C612 chipset. Below are the main features of the motherboard.

Processors

The Fusionstor motherboard supports single or dual Intel E5-2600 v3/v4 processors in LGA 2011 sockets (Socket R3).

Memory

The motherboard has 16 DIMM slots that can support up to 2 TB of LRDIMM (Load-Reduced DIMMs) or 512GB of RDIMM (Registered DIMMs) ECC DDR4 2400/2133/1866/1600 memory.

SATA

A SATA controller is integrated into the chipset, which provides support for ten SATA 3.0 ports on the serverboard. RAID 0, 1, 5 and 10 are supported. The motherboard also provides two power connectors for SATA DOMs (Device-On-Module).

PCI Expansion Slots

The motherboard has three PCI-E 3.0 x16, two PCI-E 3.0 x8 and one PCI-E 2.0 x4 (in a x8 slot) slots.

Onboard Controllers/Ports

The rear I/O ports include one 6x USB 3.0 ports (4 rear + 2 via header), 5x USB 2.0 ports (2 rear + 2 via header + 1 Type A), two Gb Ethernet ports and HDA (High Definition Audio) ports.

1-3   Chassis Features

The i737e is an ATX form factor chassis that can be used as a Mid- tower. The following is a general outline of the main features of the chassis.

System Power

The Fusionstor Invento i737e features a single 900W power supply. This power supply unit has been designed to operate at a low noise level to make it ideal for use in a workstation environment.

SATA Subsystem

The i737e chassis was designed to support four SATA hard drives.

Front Control Panel

The control panel on the Fusionstor Invento i737e provides you with system monitoring and control. LEDs indicate system power, HDD activity, network activity, overheat conditions and power supply failure. A main power button and a system reset button are also included.

Note: the power supply fail LED indicates the power supply fan has failed.

Cooling System

The i737e chassis has high-performance fans provide ample optimized cooling. The chassis includes one 12cm rear exhaust fan(s) and optional one 12cm (front) cooling fan system cooling fan.

Figure 1-1. Intel C612 Chipset:

System Block Diagram

Note: This is a general block diagram. Please see Chapter 5 for details.

Chapter 2

Installation

2-1 Overview

This chapter provides a quick setup checklist to get your Fusionstor Invento i737e up and running. Following these steps in the order given should enable you to have the system operational within a minimum amount of time. This quick setup assumes that your system has come to you with the processor and memory preinstalled. If your system is not already fully integrated with a serverboard, processor, system memory etc., please turn to the chapter or section noted in each step for details on installing specific components.

2-2 Unpacking the System

You should inspect the box the system was shipped in and note if it was damaged in any way. If the system itself shows damage you should file a damage claim with the carrier who delivered it.

Decide on a suitable location for the workstation. It should be situated in a clean, dust-free area that is well ventilated. Avoid areas where heat, electrical noise and electromagnetic fields are generated. You will also need it placed near a grounded power outlet. Be sure to read the Rack and Server Precautions in the next section.

Warnings and Precautions!

• Ensure that the caster wheels on the workstation are locked.

• Review the electrical and general safety precautions.

• Use a regulating uninterruptible power supply (UPS) to protect the workstation from power surges, voltage spikes and to keep your system operating in case of a power failure.

• Allow the power supply units and hot-swap SATA drives to cool before touching them.

• To maintain proper cooling, always keep all chassis panels closed and all SATA carriers installed when not being serviced

2-3   Accessing the Inside of the System

You may need to access the system periodically to perform maintenance or install components such as hard drives. The Workstation features two removable side covers, allowing easy access to the chassis interior.

Removing the Side Covers
1. Disconnect the chassis from any power source.
2. Remove the two screws securing the left side cover to the chassis.
3. Slide the left cover toward the rear of the chassis.
4. Lift the left cover from the chassis.
5. Remove the three screws securing the right side cover to the chassis.
6. Slide the right cover toward the rear of the chassis
7. Lift the right cover from the chassis

Figure. Removing the Chassis Side Covers
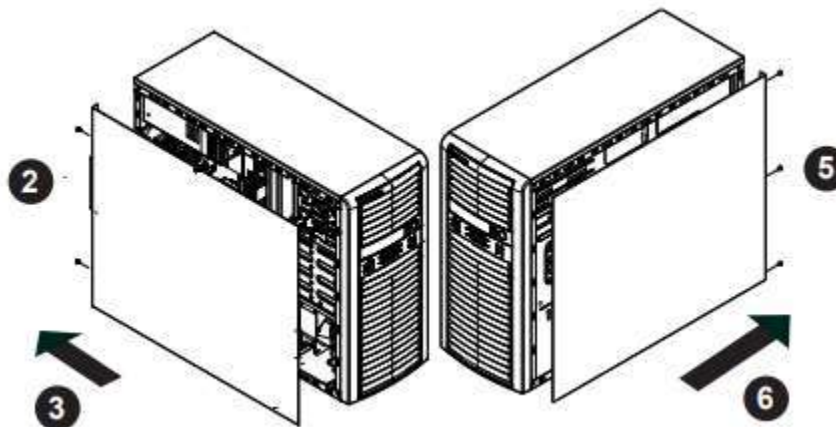
Chapter 3

System Interface

3-1   Overview

The control panel on the Fusionstor i737e has several LEDs and two buttons. There are also two LEDs on each hard drive carrier. These LEDs keep you constantly informed of the overall status of the system and the activity and health of specific components.

3-2   Control Panel Buttons

There are two push-buttons located on the front of the chassis: a power on/off button and a reset button.

Power

This is the main power button, which is used to apply or turn off the main system power. Turning off system power with this button removes the main power but keeps standby power supplied to the system.

3-3   Communications Panel Components

The Fusionstor Invento i737e Workstation features a front communication panel allowing easy access to the chassis communication ports. The chassis models are equipped as follows:

• Two IEEE 1394a ports

• Two USB 2.0 ports

• Two USB 3.0 ports

• One audio port

• One microphone port

See diagram on the following page.
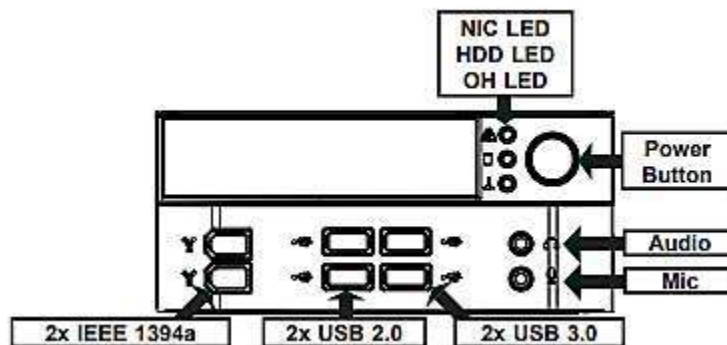
3-4 Control Panel LEDs

The control panel located on the front of the Fusionstor chassis has six LEDs that provide you with critical information related to different parts of the system. This section explains what each LED indicates when illuminated and any corrective action you may need to take.

NIC: Indicates network activity when flashing.

HDD

Indicates activity in the SAS/SATA drive, and/or DVD-ROM drive activity when flashing

3-5 Information LED: The information LED is a multi-functional LED that can provide you with important information about the system. See the table below for a description of each state of this LED and appropriate actions you may need to take

Informational LED	
Status	**Description**
Solid red	An overheat condition has occured. (This may be caused by cable congestion).
Blinking red (1Hz)	Fan failure, check for an inoperative fan.
Blinking red (0.25Hz)	Power failure, check for a non-operational power supply.
Solid blue	Local UID has been activated. Use this function to locate the server in a rack mount environment.
Blinking blue (300 msec)	Remote UID is on. Use this function to identify the server from a remote location.

3-6 Overheat/Fan Fail

When this LED flashes, it indicates a chassis fan failure. When on continuously it indicates an overheat condition, which may be caused by cables obstructing the airflow in the system or the ambient room temperature being too warm. Check the routing of the cables and make sure all fans are present and operating normally. You should also check to make sure that the chassis covers are installed. Finally, verify that the heatsinks are installed properly (see Chapter 5). This LED will remain flashing or on as long as the indicated condition exists.

3-7   Drive Carrier LEDs

Note: the LEDs of some drive carriers may not function depending on the number of drives that are supported by the serverboard and/or backplane.

•   **Green:** When illuminated, the green LED on the front of the hard drive carrier indicates drive activity. A connection to the drive backplane enables this LED to blink on and off when that particular drive is being accessed.

•   **Red:** The backplane activates the red LED to indicate a drive failure. If one of the hard drives fail, you should be notified by your system management software. Please refer to Chapter 6 for instructions on replacing failed hard drives.

Chapter 4

Standardized Warning Statements for AC Systems

4-1   About Standardized Warning Statements

The following statements are industry standard warnings, provided to warn the user of situations which have the potential for bodily injury. Should you have questions or experience difficulty, contact Fusionstor's Technical Support department for assistance. Only certified technicians should attempt to install or configure components.

Read this appendix in its entirety before installing or configuring components in the Fusionstor chassis.

Warning Definition

 Warning!

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents.

Installation Instructions

 Warning!

Read the installation instructions before connecting the system to the power source.

Circuit Breaker

 Warning!

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 250 V, 20 A.

Power Disconnection Warning

Warning!

The system must be disconnected from all sources of power and the power cord removed from the power supply module(s) before accessing the chassis interior to install or remove system components.

Equipment Installation

 Warning!

Only trained and qualified personnel should be allowed to install, replace, or service this equipment.

Restricted Area

 Warning!

This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security. (This warning does not apply to workstations).

Battery Handling

Warning!

There is the danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Redundant Power Supplies

Warning!

This unit might have more than one power supply connection. All connections must be removed to de-energize the unit.

Backplane Voltage

Warning!

Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing.

Comply with Local and National Electrical Codes

Warning!

Installation of the equipment must comply with local and national electrical codes.

Product Disposal

Warning!

Ultimate disposal of this product should be handled according to all national laws and regulations.

Hot Swap Fan Warning

Warning!

The fans might still be turning when you remove the fan assembly from the chassis. Keep fingers, screwdrivers, and other objects away from the openings in the fan assembly's housing.

Power Cable and AC Adapter

Warning!

When installing the product, use the provided or designated connection cables, power cables and AC adaptors. Using any other cables and adaptors could cause a malfunction or a fire.

Chapter 5
Advanced Serverboard Setup

This chapter covers the steps required to install the serverboard into the chassis, connect the data and power cables and install add-on cards. All serverboard jumpers and connections are also described. A layout and quick reference chart are included in this chapter for your reference. Remember to completely close the chassis when you have finished working with the serverboard to better cool and protect the system.

5-1   Handling the Serverboard

Electrostatic discharge (ESD) can damage electronic comp onents. To prevent damage to any printed circuit boards (PCBs), it is important to handle them very carefully (see previous chapter). To prevent the serverboard from bending, keep one hand under the center of the board to support it when handling. The following measures are generally sufficient to protect your equipment from electric static discharge. Precautions

- Use a grounded wrist strap designed to prevent Electrostatic Discharge.
- Touch a grounded metal object before removing any board from its antistatic bag.
- Handle a board by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.
- When handling chips or modules, avoid touching their pins.
- Put the serverboard, add-on cards and peripherals back into their antistatic bags when not in use.
- For grounding purposes, make sure your computer chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the serverboard.

Unpacking

The serverboard is shipped in antistatic packaging to avoid electrical static discharge. When unpacking the board, make sure the person handling it is static protected.

5-3   Connecting Cables

Now that the serverboard is installed, the next step is to connect the cables to the board. These include the data (ribbon) cables for the peripherals and control panel and the power cables.

Connecting Data Cables

The cables used to transfer data from the peripheral devices have been carefully routed to prevent them from blocking the flow of cooling air that moves through the system from front to back. If you need to disconnect any of these cables, you should take care to keep them routed as they were originally after reconnecting them (make sure the red wires connect to the pin 1 locations). See the layout in Section 5-8 for connector locations.
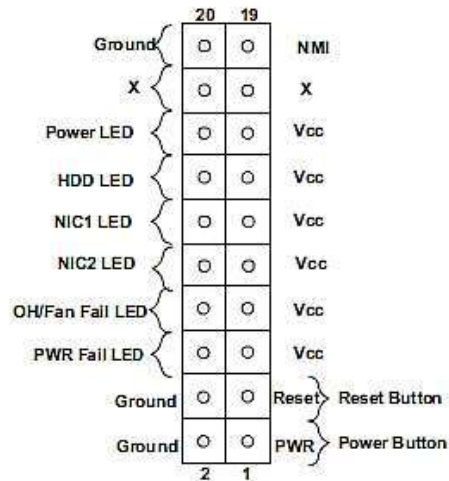
Connecting Power Cables

The motherboard has a 24-pin primary power supply connector (J24) for connection to the ATX power supply. In addition, two 8-pin secondary power connectors (JPWR1 and JPWR2) must also be connected to your power supply. See Section 5-9 for power connector pin definitions.

Connecting the Control Panel

JF1 contains header pins for various front control panel connectors. See Figure 5-1 for the pin locations of the various front control panel buttons and LED indicators.

All JF1 wires have been bundled into a single ribbon cable to simplify this connection. Make sure the red wire plugs into pin 1 as marked on the board. The other end connects to the Control Panel PCB board, located just behind the system status LEDs on the chassis. See Section 5-9 for details and pin descriptions.
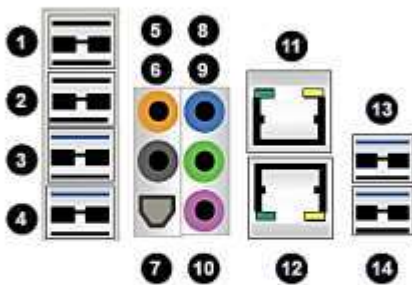
Figure 5-1. Control Panel Header Pins

	20	19	
Ground	O	O	NMI
X	O	O	X
Power LED	O	O	Vcc
HDD LED	O	O	Vcc
NIC1 LED	O	O	Vcc
NIC2 LED	O	O	Vcc
OH/Fan Fail LED	O	O	Vcc
PWR Fail LED	O	O	Vcc
Ground	O	O	Reset — Reset Button
Ground	O	O	PWR — Power Button
	2	1	

5-4 I/O Ports

See Figure 5-2 below for the locations of the rear I/O ports.

Figure 5-2. I/O Ports

I/O Ports	
1. USB1 Port (USB 2.0)	8. Line In
2. USB0 Port (USB 2.0)	9. Line Out
3. USB6 Port (USB 3.0)	10. Mic In
4. USB5 Port (USB 3.0)	11. LAN1 Port
5. CEN/LFE Out	12. LAN2 Port
6. Surround Out	13. USB8 Port (USB 3.0)
7. SPDIF Out	14. USB7 Port (USB 3.0)

5-5 Processor and Heatsink Installation

Warning: When handling the processor package, avoid placing direct pressure on the label area of the fan.

Notes:

• Always connect the power cord last and always remove it before adding, removing or changing any hardware components. Make sure that you install the processor into the CPU socket before you install the CPU heatsink.

• If you buy a CPU separately, make sure that you use an Intel-certified multidirectional heatsink only.

• Make sure to install the serverboard into the chassis before you install the CPU heatsinks.

• When receiving a serverboard without a processor pre-installed, make sure that the plastic CPU socket cap is in place and none of the socket pins are bent; otherwise, contact your retailer immediately.

Installing an LGA 2011 Processor

1. There are two levers on the LGA2011 socket. First press and release the load lever labeled 'Open 1st'.

2. Press the second load lever labeled 'Close 1st' to release the load plate from its locked position.

Press down on the lever labeled 'Close 1st'

Pull lever away from the socket
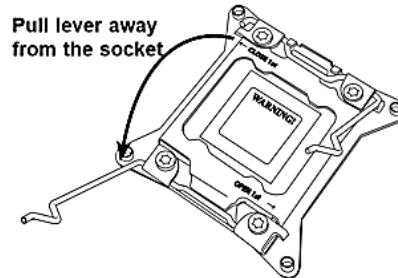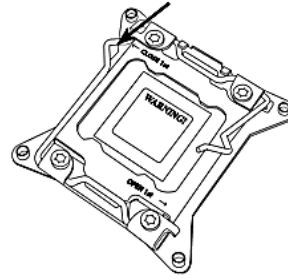
3. With the lever labeled 'Close 1st' fully retracted, gently push down on the 'Open 1st' lever to open the load plate. Lift the load plate to open it completely.

4. Using your thumb and the index finger, remove the 'WARNING' plastic cap from the socket.
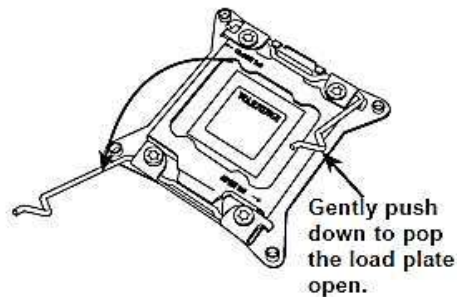
5. Use your thumb and index finger to hold the CPU by its edges. Align the CPU keys, which are semi-circle cutouts, against the socket keys.

6. Once they are aligned, carefully lower the CPU straight down into the socket. (Do not drop the CPU on the socket. Do not move the CPU horizontally or vertically and do not rub the CPU against any pins of the socket, which may damage the CPU or the socket.)
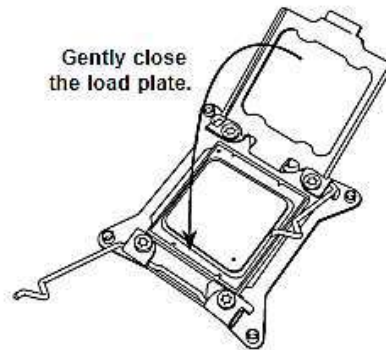
Gently push down to pop the load plate open.

Socket Keys

CPU Keys
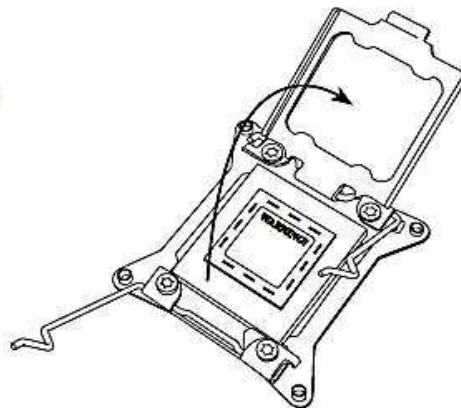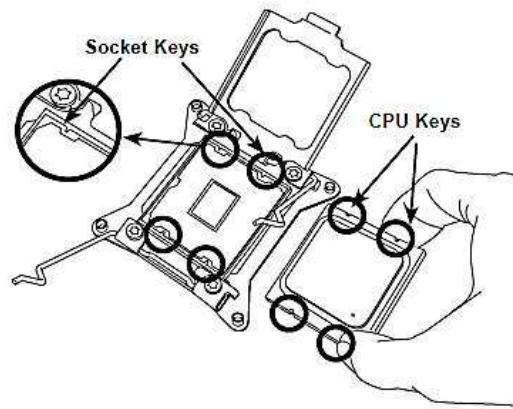
Warning: You can only install the CPU to the socket in one direction. Make sure that the CPU is properly inserted into the socket before closing the load plate. If it doesn't close properly, do not force it as it may damage your CPU. Instead, open the load plate again and double-check that the CPU is aligned properly.

7. With the CPU in the socket, inspect the four corners of the CPU to make sure that they are flush with the socket.

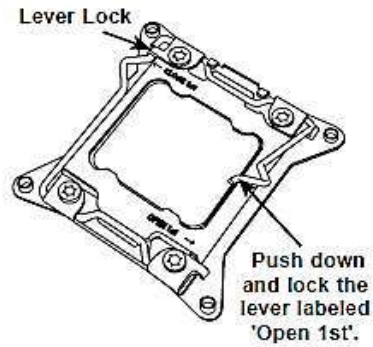8. Close the load plate. Lock the lever labeled 'Close 1st', then lock the lever labeled 'Open 1st'. Use your thumb to gently push the load levers down until the lever locks.

Gently close the load plate.

Push down and lock the level labeled 'Close 1st'.

Lever Lock

Push down and lock the lever labeled 'Open 1st'.
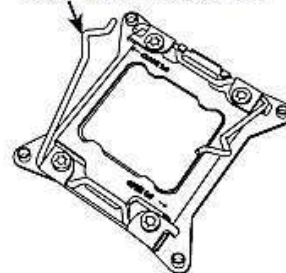
Installing a CPU Heatsink

1. Do not apply any thermal grease to the heatsink or the CPU die; the required amount has already been applied.

2. Place the heatsink on top of the CPU so that the four mounting holes are aligned with those on the serverboard and the heatsink bracket underneath.

3. Screw in two diagonal screws (i.e., the #1 and the #2 screws) until just snug. (To avoid possible damage to the CPU do not over-tighten the screws.)

4. Finish the installation by fully tightening all four screws.

Figure 5-3. Installing a Heatsink

Top View

Screw#1   Screw#4

Screw#3   Screw#2

Side View   Screw#1   Screw#2   Side View

Screw#3

Bottom View
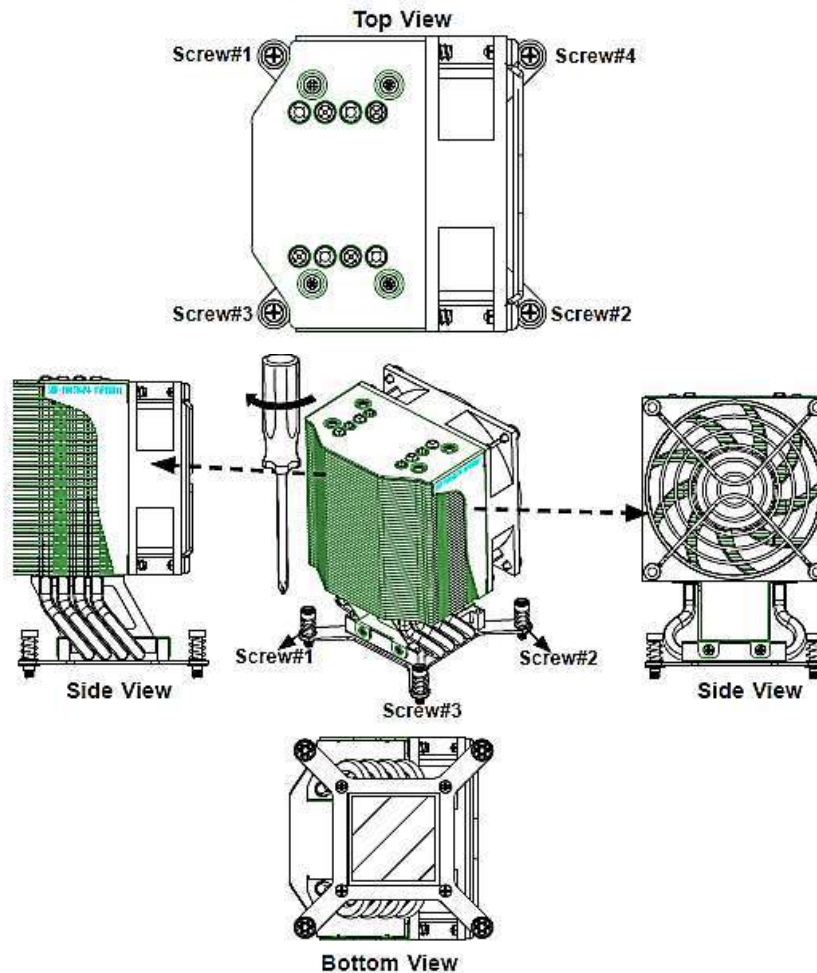
Removing the Heatsink

**Warning:** We do not recommend that the CPU or the heatsink be removed. However, if you do need to uninstall the heatsink, please follow the instructions below to uninstall the heatsink to prevent damage done to the CPU or the CPU socket.

1. Unscrew the heatsink screws from the serverboard in the sequence as shown in the illustration below.

2. Gently wriggle the heatsink to loosen it from the CPU. (Do not use excessive force when wriggling the heatsink!)

3. Once the heatsink is loosened, remove it from the CPU socket.

4. Remove the used thermal grease and clean the surface of the CPU and the heatsink, Reapply the proper amount of thermal grease on the surface before reinstalling the heatsink.

Figure 5-4. Removing a Heatsink

Loosen screws
in sequence as
shown.

Screw#1

Screw#2

Screw#3
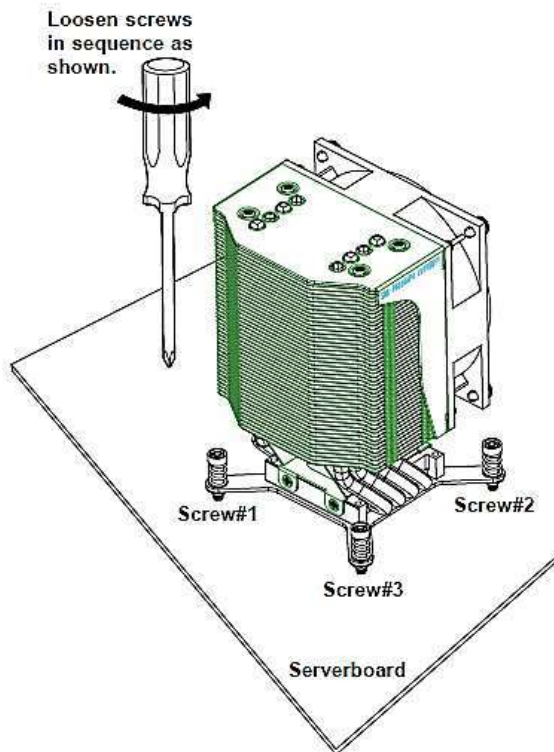
Serverboard

5-6 Installing Memory Modules

Caution: To prevent any possible damage, exercise extreme care when installing or removing DIMMs. Be sure to use memory modules of the same type, same speed, same frequency on the same serverboard. Mixing of memory modules of different types and speeds is not allowed.

Installing & Removing DIMMs

1. Insert the desired number of DIMMs into the memory slots, starting with P1 DIMMA1. For best performance, please use the memory modules of the same type and speed in the same bank. See the DIMM Installation Charts on the following page.

2. Press down the release tabs on the ends of a memory slot. Insert each DIMM vertically into its slot. Pay attention to the notch along the bottom of the module to prevent inserting the DIMM incorrectly.

3. Using both thumbs, gently press down on the DIMM until it snaps into place in the slot. Repeat for all DIMMs.

4. Reverse the steps above to remove a DIMM from its slot.

Memory Support

The motherboard supports up to 2 TB of LRDIMM (Load-Reduced DIMMs) or 1 TB of RDIMM (Registered DIMMs) ECC DDR4-2400/2133/1866/1600 memory.

Figure 5-5. DIMM Installation

Release Tab

Socket Key

Release Tab
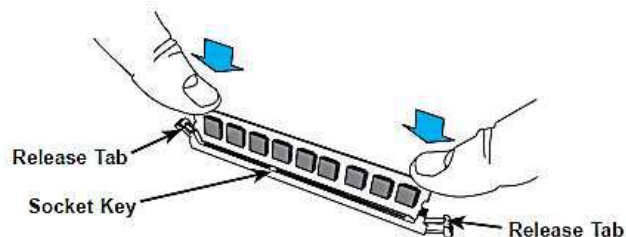
Processors and their Corresponding Memory Modules							
CPU#	**Corresponding DIMM Modules**						
CPU 1	P1-DIMMA1	P1-DIMMB1	P1-DIMMC1	P1-DIMMD1	P1-DIMMA2	P1-DIMMB2	P1-DIMMC2	P1-DIMMD2
CPU2	P2-DIMME1	P2-DIMMF1	P2-DIMMG1	P2-DIMMH1	P2-DIMME2	P2-DIMM F2	P2-DIMMG2	P2-DIMMH2

Populating RDIMM/LRDIMM DDR4 Memory Modules for the E5-2600v3-based Motherboard

| Type	Ranks Per DIMM and Data Width	DIMM Capacity (GB)		Speed (MT/s); Voltage (V); Slot Per Channel (SPC) and DIMM Per Channel (DPC)		
				1 Slot Per Channel	2 Slots Per Channel	
				1DPC	1DPC	2DPC
		4Gb	8Gb	1.2V	1.2V	1.2V
RDIMM	SRx4	8GB	16GB	2133	2133	1866
RDIMM	SRx8	4GB	8GB	2133	2133	1866
RDIMM	DRx8	8GB	16GB	2133	2133	1866
RDIMM	DRx4	16GB	32GB	2133	2133	1866
LRDIMM	QRx4	32GB	64GB	2133	2133	2133
LRDIMM 3DS†	8Rx4	64GB	128GB	2133	2133	2133

Populating RDIMM/LRDIMM DDR4 Memory Modules for the E5-2600v4-based Motherboard

Type	Ranks Per DIMM and Data Width	DIMM Capacity (GB)		Speed (MT/s); Voltage (V); Slot Per Channel (SPC) and DIMM Per Channel (DPC)		
				1 Slot Per Channel	2 Slots Per Channel	
				1DPC	1DPC	2DPC
		4Gb	8Gb	1.2V	1.2V	1.2V
RDIMM	SRx4	8GB	16GB	2400	2400	2133
RDIMM	SRx8	4GB	8GB	2400	2400	2133
RDIMM	DRx8	8GB	16GB	2400	2400	2133
RDIMM	DRx4	16GB	32GB	2400	2400	2133
LRDIMM	QRx4	32GB	64GB	2400	2400	2400
LRDIMM 3DS	8Rx4	64GB	128GB	2400	2400	2400

5-7 Control Panel Connectors and I/O Ports

The I/O ports are color coded in conformance with the industry standards. See the picture below for the colors and locations of the various I/O ports.

Back Panel Connectors and I/O Ports
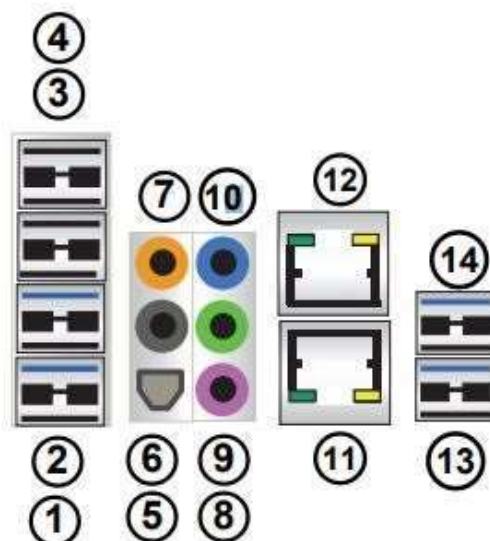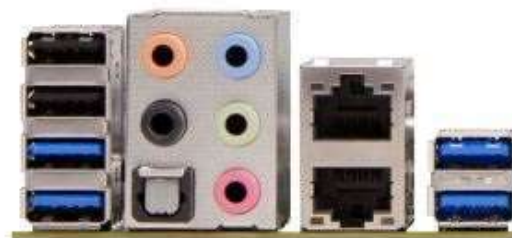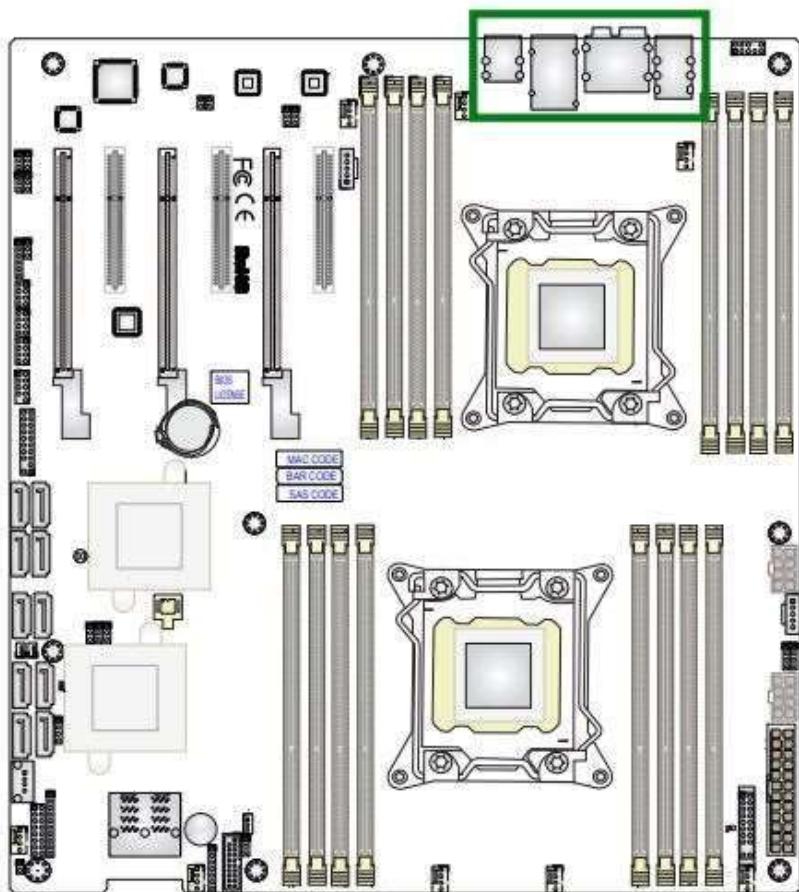
Back Panel I/O Port Locations and Definitions

1. Rear USB 3.0 Port 5
2. Rear USB 3.0 Port 6
3. Rear USB 2.0 Port 0
4. Rear USB 2.0 Port 1
5. SPDIF_Out
6. Surround_Out
7. CEN/LFE_Out
8. Mic_In
9. Line-Out
10. Line_In
11. Gigabit LAN 1
12. Gigabit LAN 2
13. Rear USB 3.0 Port 7
14. Rear USB 3.0 Port 8

5-8 Serverboard Details

Figure.- Motherboard Layout
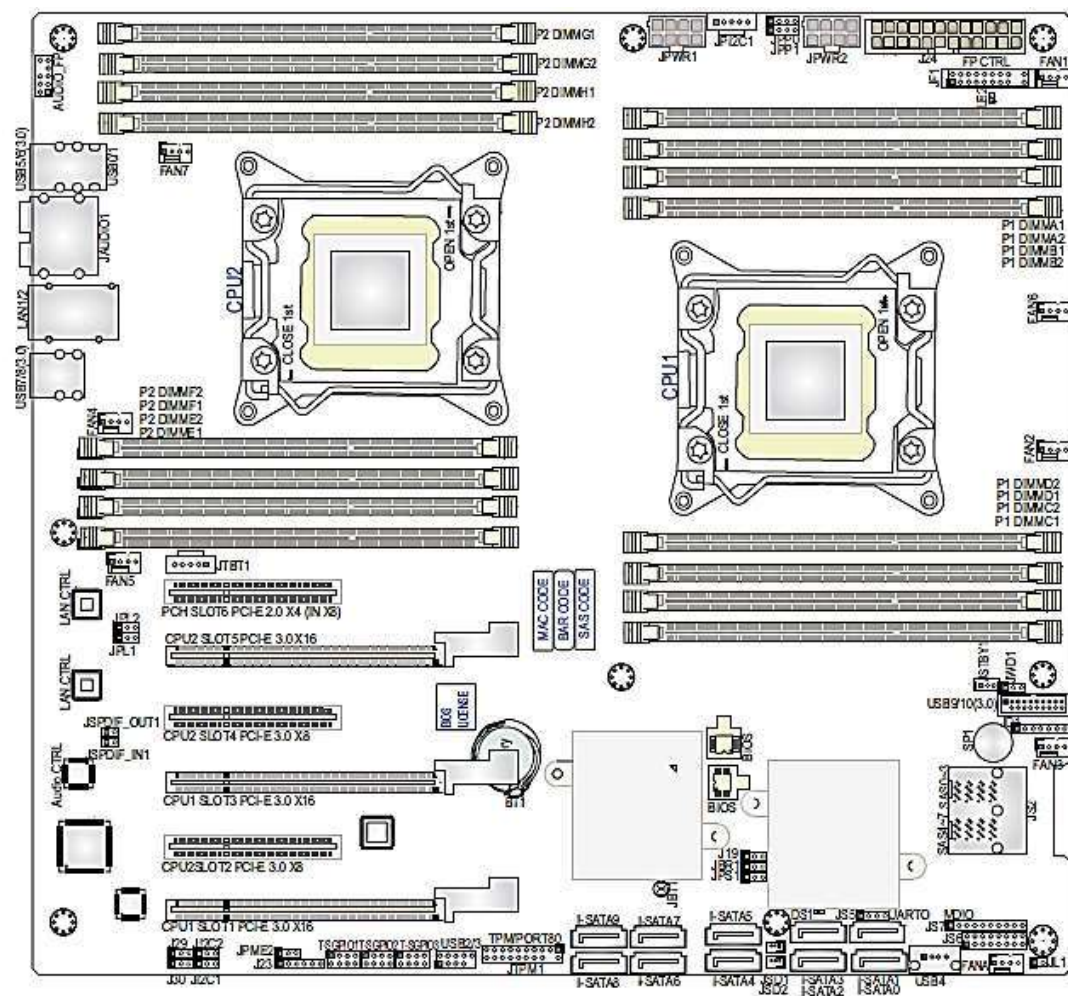
Notes:

- "■" indicates the location of "Pin 1".

- Jumpers not indicated are for test purposes only.

- **SAS components are not included on the motherboard**

Quick Reference

LED	Description	State	Status
LE2	Standby PWR LED	Green: On	SB Power On

Jumper	Description	Default Setting
JBT1	Clear CMOS	See Section 5-10
JI²C1/JI²C2	SMBus to PCI-E Slots	Pins 2-3 (Normal)
JPL1	GLAN1 & GLAN2 Enable/Disable	Pins 1-2 (Enabled)
JPL2	GLAN2 Enable/Disable	Pins 1-2 (Enabled)
JPME2	Manufacturer Model Select	Pins 1-2 (ME Mode)
JWD1	Watch Dog	Pins 1-2 (Reset)

Connector	Description
Audio_FP (JA1)	Audio Connector for Front Access
JAudio1	7.1 HD (8-channel High-Definition) Audio Connector
CPU1 Slot1/Slot3	PCI-E 3.0 x16 Slots (available when CPU1 is installed)
CPU2 Slot5	PCI-E 3.0 x16 Slot (available when CPU2 is installed)
CPU2 Slot2	PCI-E 3.0 x8 Slot (available when CPU2 is installed)
CPU2 Slot4	PCI-E 3.0 x8 Slot (available when CPU2 is installed)
PCH Slot6	PCI-E 2.0 x4 in x8 Slot
FAN1-7, FANA	CPU/System Fan Headers
J24	ATX 24-Pin Power Connector
JD1	Speaker/Power LED Indicator
JF1	Front Panel Control Header
JL1	Chassis Intrusion Header
JPI²C1	Power Supply SMBbus I²C Header
JPWR1/JPWR2	12V 8-Pin Power Connectors
JSD1/JSD2	Powered SATA DOM Connectors 1/2
JSPDIF_In	SPDIF (Sony/Philips Digital Interface) In Header
JSPDIF_Out	SPDIF (Sony/Philips Digital Interface) Out Header
JTBT1	GPIO (General-Purpose I/O) Header for Thunderbolt Add-on Card
JTPM1	TPM (Trusted Platform Module)/Port 80 Header
LAN1/LAN2	Gb Ethernet Ports 1/2
I-SATA0-9	SATA Ports (supported by Intel PCH)
STBY1	Standby Power Header
T-SGPIO 1/2/3	Serial-Link General_Purpose IO Headers 1/2/3
USB 0/1 (2.0)	Rear USB 2.0 Ports
USB2/3, USB9/10	Front-accessible USB 2.0 (USB2/3) and 3.0 (USB9/10) Headers
USB 4 (2.0)	Type A USB 2.0 Connector USB 4
USB5/6/7/8	Rear USB 3.0 Ports

5-9   Connector Definitions

Main ATX Power Supply Connector

The main power supply connector (J24) meets the SSI EPS 12V specification. Refer to the table on the right for the pin definitions of the ATX 24-pin power connector. You must also connect the 8-pin power connectors to your power supply (see below).

Main ATX Power Connector Pin Definitions			
Pin#	Definition	Pin #	Definition
13	+3.3V	1	+3.3V
14	-12V	2	+3.3V
15	COM	3	COM
16	PS_ON	4	+5V
17	COM	5	COM
18	COM	6	+5V
19	COM	7	COM
20	Res (NC)	8	PWR_OK
21	+5V	9	5VSB
22	+5V	10	+12V
23	+5V	11	+12V
24	COM	12	+3.3V

Caution: To prevent damage to the power supply or serverboard, please be sure to connect the 24-pin and the two 8-pin power connectors on your serverboard to the power supply. Failure to do so will void the manufacturer warranty on the power supply and serverboard.

Processor Power Connectors

JPWR1 and JPWR2 must also be connected to the power supply to provide power for the processors. See the table on the right for pin definitions.

Processor Power Connectors Pin Definitions	
Pins	Definition
1 - 4	Ground
5 - 8	+12V

Required Connection

Power Button

The connection for the power button is on pins 1 and 2 of JF1. See the table on the right for pin definitions.

Power Button Pin Definitions (JF1)	
Pin#	Definition
1	Signal
2	Ground

Reset Connector

The reset header is located on pins 3 and 4 of JF1. Attach the reset switch on the computer chassis to these pins. See the table on the right for pin definitions.

Reset Button Pin Definitions (JF1)	
Pin#	Definition
3	Reset
4	Ground

Power Fail LED

The Power Fail LED connection is located on pins 5 and 6 of JF1. Refer to the table on the right for pin definitions.

PWR Fail LED Pin Definitions (JF1)	
Pin#	Definition
5	3.3V
6	PWR Supply Fail

Overheat/Fan Fail LED (OH)

Connect an LED to pins 7 and 8 of JF1 to provide advanced warning of chassis overheating or fan failure. Refer to the table on the right for pin definitions.

OH/Fan Fail LED Pin Definitions (JF1)	
Pin#	Definition
7	Vcc
8	OH/Fan Fail LED)

OH/Fan Fail Indicator Status	
State	Definition
Off	Normal
On	Overheat
Flash-ing	Fan Fail

NIC1/NIC2 LEDs

The LED connections for the LAN1 and LAN2 ports are on pins 11-12 and 9-10 of JF1, repectively. Attach an LED cable to display network activity. See the table for pin definitions.

NIC1 LED Pin Definitions (JF1)	
Pin#	Definition
11	Vcc
12	Ground

HDD LED

The HDD LED connection is located on pins 13 and 14 of JF1. This LED is used to display SATA drive activity. See the table on the right for pin definitions.

HDD LED Pin Definitions (JF1)	
Pin#	Definition
13	Vcc
14	HD Active

Power On LED

The Power On LED connector is located on pins 15 and 16 of JF1 (use JLED for a 3-pin connector). This connection is used to provide LED indication of power being supplied to the system. See the table on the right for pin definitions.

Power LED Pin Definitions (JF1)	
Pin#	Definition
15	3.3V
16	PWR LED

NMI Button

The non-maskable interrupt button header is located on pins 19 and 20 of JF1. Refer to the table on the right for pin definitions.

NMI Button Pin Definitions (JF1)	
Pin#	Definition
19	Control
20	Ground

Fan Headers

The has eight fan headers, all of which are 4-pin fans. However, pins 1-3 of the fan headers are backward compatible with the traditional 3-pin fans. The onboard fan speeds are controlled by IPMI. See the table on the right for pin definitions.

Fan Header Pin Definitions (FAN1-8)	
Pin#	Definition
1	Ground (Black)
2	+12V (Red)
3	Tachometer
4	PWM Control

Internal Speaker

The Internal Speaker, located at SP1, can be used to provide audible indications for various beep codes. See the table on the right for pin definitions.

Internal Buzzer Pin Definition		
Pin#		Definitions
Pin 1	Pos. (+)	Beep In
Pin 2	Neg. (-)	Alarm Speaker

Internal Speaker

The Internal Speaker, located at SP1, can be used to provide audible indications for various beep codes. See the table on the right for pin definitions.

Internal Buzzer Pin Definition		
Pin#		Definitions
Pin 1	Pos. (+)	Beep In
Pin 2	Neg. (-)	Alarm Speaker

Power LED/Speaker

On JD1 header, pins 1-3 are used for power LED indication, and pins 4-7 are for the speaker. See the tables on the right for pin definitions. Please note that the speaker connector pins (4-7) are used with an external speaker. If you wish to use the on-board speaker, you should close pins 6-7 with a jumper.

PWR LED Connector Pin Definitions	
Pin Setting	Definition
Pin 1	Anode (+)
Pin2	Cathode (-)
Pin3	NA

Speaker Connector Pin Settings	
Pin Setting	Definition
Pins 4-7	External Speaker
Pins 6-7	Internal Speaker

Chassis Intrusion

The Chassis Intrusion header is designated JL1. Attach an appropriate cable from the chassis to inform you of a chassis intrusion when the chassis is opened

Chassis Intrusion Pin Definitions	
Pin#	Definition
1	Intrusion Input
2	Ground

TPM Header/Port 80

A Trusted Platform Module/Port 80 header is located at JTPM1 to provide TPM support and Port 80 connection. Use this header to enhance system performance and data security. See the table on the right for pin definitions.

	TPM/Port 80 Header Pin Definitions		
Pin #	Definition	Pin #	Definition
1	LCLK	2	GND
3	LFRAME#	4	<(KEY)>
5	LRESET#	6	+5V (X)
7	LAD 3	8	LAD 2
9	+3.3V	10	LAD1
11	LAD0	12	GND
13	SMB_CLK4	14	SMB_DAT4
15	+3V_DUAL	16	SERIRQ
17	GND	18	CLKRUN# (X)
19	LPCPD#	20	LDRQ# (X)

Standby Power Header

The Standby Power header is located at STBY1 on the serverboard. See the table on the right for pin definitions.

	Standby Power Pin Definitions
Pin#	Definition
1	+5V Standby
2	Ground
3	Wake-up

Power SMB (I²C) Connector

Power System Management Bus (I²C) Connector (JPI²C1) monitors power supply, fan and system temperatures. See the table on the right for pin definitions.

	PWR SMB Pin Definitions
Pin#	Definition
1	Clock
2	Data
3	PWR Fail
4	Ground
5	+3.3V

Ethernet Ports

Two Gigabit Ethernet ports (LAN1/2) are located on the I/O back panel on the serverboard All these ports accept RJ45 type cables. Please refer to the LED Indicator Section for LAN LED information.

SGPIO Header

Three SGPIO (Serial General Purpose Input/Output) headers are designated T-SGPIO1, T-SGPIO2 and T-SGPIO3. These headers are used to communicate with the system's enclosure management chip. See the table on the right for pin definitions.

	SGPIO Header Pin Definitions		
Pin#	Definition	Pin	Definition
1	NC	2	NC
3	Ground	4	Data
5	Load	6	Ground
7	Clock	8	NC

NC = No Connection

DOM Power Connector

Two power connectors for SATA DOM (Disk On Module) devices are located at JSD1 and JSD2. Connect an appropriate cable here to provide power support for your DOM devices.

	DOM PWR Pin Definitions
Pin#	Definition
1	+5V
2	Ground
3	Ground

7.1 HD (High-Definition) Audio

This serverboard features a 7.1 Channel High-Definition Audio (HDA) codec that provides 8 DAC channels. The HD audio supports multiple-streaming 7.1 sound playback through the frontpanel stereo output via subwoofer speakers.

7.1 HD Audio	
Conn#	Signal
1	SPDIF_Out
2	Surround_Out
3	CEN/LFE_Out
4	Mic_In
5	Line_Out
6	Line_In

HD Audio
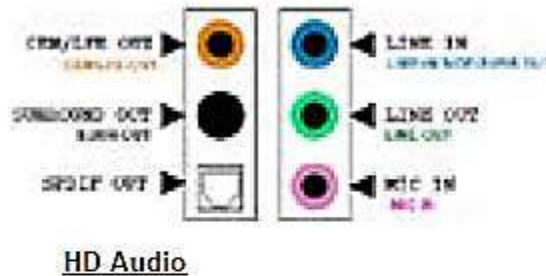
10-Pin Audio Pin Definitions	
Pin#	Signal
1	Microphone_Left
2	Audio_Ground
3	Microphone_Right
4	Audio_Detect
5	Line_2_Right
6	Ground
7	Jack_Detect
8	Key
9	Line_2_Left
10	Ground

Front Accessible Audio Header

A 10-pin audio header (AUDIO_FP), located next to USB ports 0-4, allows you to use the onboard sound for audio playback. Connect an audio cable to the audio header to use this feature. See the tables above for the pin definitions of the onboard audio headers.

Universal Serial Bus (USB)

Six Universal Serial Bus (USB) ports are located on the rear I/O panel. The USB5/6 and USB7/8 ports support 3.0 connections, while USB0/1 support 2.0 connections. Two USB headers on the board provide four USB connections (USB2/3, 9/10) for front access. USB2/3 support USB 2.0, and USB9/10 support USB 3.0 connections. In addition, a Type A USB header (USB4) also provides a USB 2.0 connection. USB cables are not included for front access. See the tables on the right for pin definitions.

Rear USB0/1 (2.0) Pin Definitions			
Pin#	Definition	Pin#	Definition
1	+5V	5	+5V
2	USB_PN1	6	USB_PN0
3	USB_PP1	7	USB_PP0
4	Ground	8	Ground

Rear USB5/6, 7/8, Front Panel USB9/10 (3.0) Pin Definitions			
Pin#	Pin#	Signal Name	Description
1	10	VBUS	Power
2	11	D-	USB 2.0 Differential Pair
3	12	D+	
4	13	Ground	Ground of PWR Return
5	14	StdA_SSRX-	SuperSpeed Receiver
6	15	StdA_SSRX+	Differential Pair
7	16	GND_DRAIN	Ground for Signal Return
8	17	StdA_SSTX-	SuperSpeed Transmitter
9	18	StdA_SSTX+	Differential Pair

Front Panel USB (2.0) 2/3, 4, Pin Definitions			
USB 2/4		USB 3	
Pin #	Definition	Pin #	Definition
1	+5V	2	+5V
3	USB_PN2	4	USB_PN3
5	USB_PP2	6	USB_PP3
7	Ground	8	Ground
9	Key	10	Ground

SPDIF_In/SPDIF_Out Headers

The SPDIF In (JSPDIF_In) and SPDIF Out (JSPDIF_Out) headers are located next to the LAN controller on the serverboard. Place a cap on each header for audio support. You will also need to have a cable to use each connection.

SPDIF_In Pin Definitions	
Pin#	Definition
1	S/PDIF_In
2	Ground

SPDIF_Out Pin Definitions	
Pin#	Definition
1	S/PDIF_Out
2	Ground

5-10 Jumper Settings

Explanation of Jumpers

To modify the operation of the serverboard, jumpers can be used to choose between optional settings. Jumpers create shorts between two pins to change the function of the connector. Pin 1 is identified with a square solder pad on the printed circuit board. See the serverboard layout pages for jumper locations.

Note: On a two-pin jumper, "Closed" means the jumper is on both pins and "Open" means the jumper is either on only one pin or completely removed.
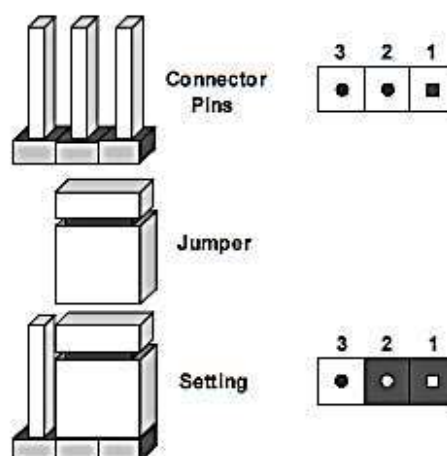
CMOS Clear

JBT1 is used to clear CMOS (which will also clear any passwords). Instead of pins, this jumper consists of contact pads to prevent accidentally clearing the contents of CMOS.

To clear CMOS,

1. First power down the system and unplug the power cord(s).

2. With the power disconnected, short the CMOS pads with a metal object such as a small screwdriver.

3. Remove the screwdriver (or shorting device).

4. Reconnect the power cord(s) and power on the system.

Note: *Do not use the PW_ON connector to clear CMOS.*

GLAN Enable/Disable

JPL1 enables/disables both LAN ports 1 and 2, while JPL2 enables/disables LAN2 only. See the table on the right for jumper settings. The default setting is enabled.

LAN Jumper Settings	
Jumper Setting	Definition
Pins 1-2	Enabled
Pins 2-3	Disabled

LAN Enable/Disable Jumpers	
Jumpers	LAN Ports Supported
JPL1	Enable/Disable LAN1 & LAN2
JPL2	Enable/Disable LAN2

Watch Dog Enable/Disable

JWD controls the Watch Dog function. Watch Dog is a system monitor that can reboot the system when a software application hangs. Jumping pins 1-2 will cause WD to reset the system if an application hangs. Jumping pins 2-3 will generate a non-maskable interrupt signal for the application that hangs. See the table on the right for jumper settings. Watch Dog must also be enabled in BIOS.

Watch Dog Jumper Settings	
Jumper Setting	Definition
Pins 1-2	Reset (default)
Pins 2-3	NMI
Open	Disabled

Management Engine

Jumper JPME2 allows the user to flash the system firmware from a host server to modify system settings. Close this jumper to bypass SPI flash security, and force ME into recovery mode in order to use recovery jumpers. See the table on the right for jumper settings.

ME Mode Select Jumper Settings	
Jumper Setting	Definition
Pins 1-2	Manufacture Mode
Pins 2-3	Normal

5-11 Onboard Indicators

LAN1/2 LEDs

The Ethernet ports (located beside the VGA port) have two LEDs. On each port, one LED indicates activity while the other LED may be green, amber or off to indicate the speed of the connection. See the table on the right for the functions associated with the connection speed LED.

LAN1/2 LED (Connection Speed Indicator)	
LED Color	Definition
Off	No Connection or 10 Mb/s
Green	100 Mb/s
Amber	1 Gb/s

Onboard Power LED

An Onboard Power LED is designated LE2 on the serverboard. When this LED is on, the system is on. Be sure to turn off the system and unplug the power cord before removing or installing components. See the table at right for more information.

Onboard PWR LED Indicator LED Definitions	
LED Color	Status
Off	System Off (PWR cable not connected)
Green	System On
Green: Flashing Quickly	ACPI S1 State

5-12 SATA Ports

SATA Ports

Two SATA3 Ports (I-SATA0/1), colored in white, and four SATA2 Ports (I-SATA2~5) are located on the serverboard. These ports provide serial-link signal connections, which are faster than the connections of Parallel ATA. See the table on the right for pin definitions.

SATA Port Pin Definitions			
Pin#	Definition	Pin #	Definition
1	Ground	2	TXP
3	TXN	4	Ground
5	RXN	6	RXP
7	Ground		

5-13 Onboard Battery

Please handle used batteries carefully. Do not damage the battery in any way; a damaged battery may release hazardous materials into the environment. Do not discard a used battery in the garbage or a public landfill. Please comply with the regulations set up by your local hazardous waste management agency to dispose of your used battery properly.

Installing the Onboard Battery

LITHIUM BATTERY

BATTERY HOLDER
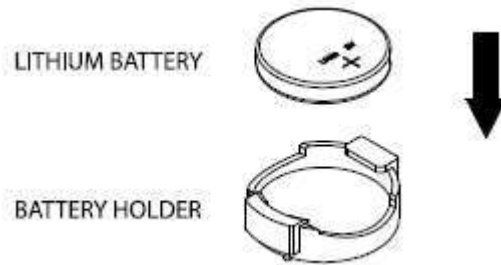
Chapter 6
Chassis Setup and Maintenance

Overview:

This chapter covers the steps required to install components and perform maintenance on the chassis. Most components of the Fusionstor i737e do not require tools or screws to set them up. Those components which must be secured with screws require only a Phillips screwdriver. Print this chapter to use as a reference while setting-up your chassis.

Note that due to the variety of features which are available on the front communication panels of the Fusionstor i737e chassis models, the images shown of the front of the chassis may differ from the actual chassis purchased.

Removing the Chassis Side Covers
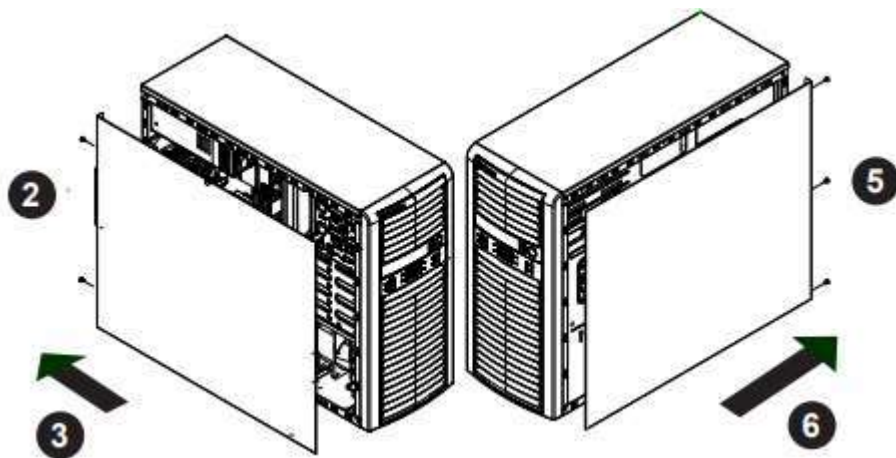
Figure. Removing the Chassis Side Covers

The Fusionstor i737e features two removable side covers, allowing easy access to the chassis interior.

Removing the Side Covers

1. Power down the system and remove the power cord from the rear of the power supply.
2. Remove the two screws securing the left side cover to the chassis.
3. Slide the left cover toward the rear of the chassis.
4. Lift the left cover from the chassis.
5. Remove the three screws securing the right side cover to the chassis.
6. Slide the right cover toward the rear of the chassis
7. Lift the right cover from the chassis.
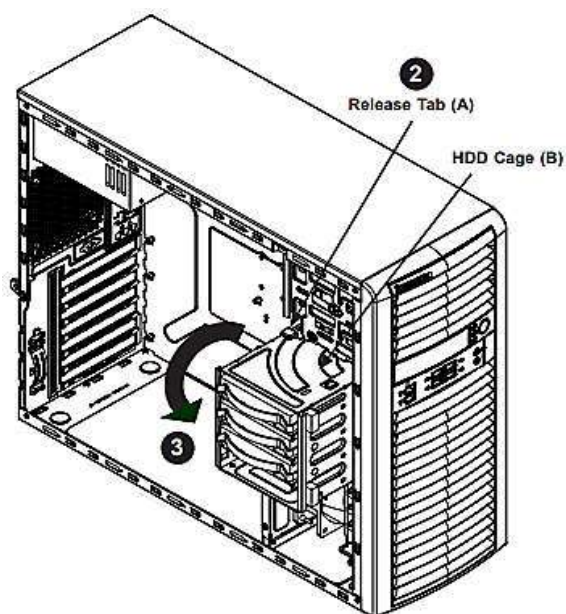
Rotating the Hard Drive Cage

Figure. Rotating the Hard Drive Cage

In order to access and install components in the chassis interior, it is necessary to rotate the hard drive cage (B). This will provide sufficient room to install and configure the chassis components.

Rotating the Hard Drive Cage

1. Power down the system and remove the power cord from the rear of the power supply. Remove the chassis side cover as described in previous Section.

2. Lift the release tab (A).

3. Rotate the hard disk drive cage (B) outward.

Removing and Installing 3.5" Hard Drives
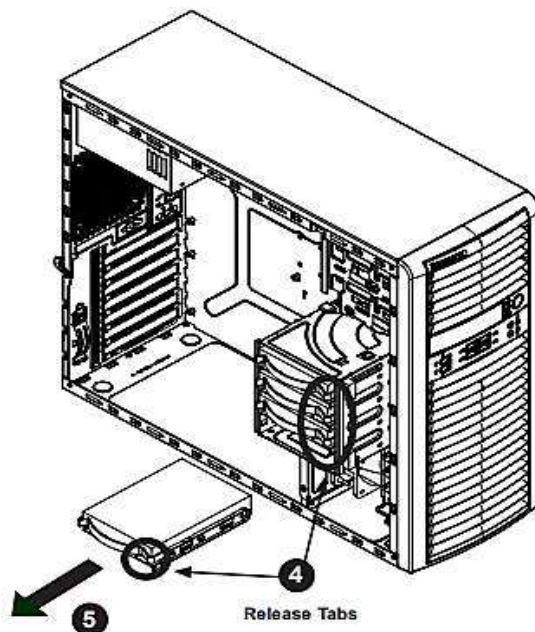
Figure. Removing the Hard Drive Carrier from the Hard Drive Cage

The Fusionstor i737e chassis must be powered-down before hard drives can be removed from the hard drive carriers.

Removing and Installing 3.5" Hard Drives

1. Power down the system and remove the power cord from the rear of the power supply. Remove the chassis side cover as described in Previous Section.

2. Rotate the hard drive cage outward 90 degrees as described in previous section Rotating the Hard Drive Cage.

3. Disconnect all of the cables from the hard drive.

4. Press the release tab on the side of the hard drive carrier that is to be removed from the hard drive cage.
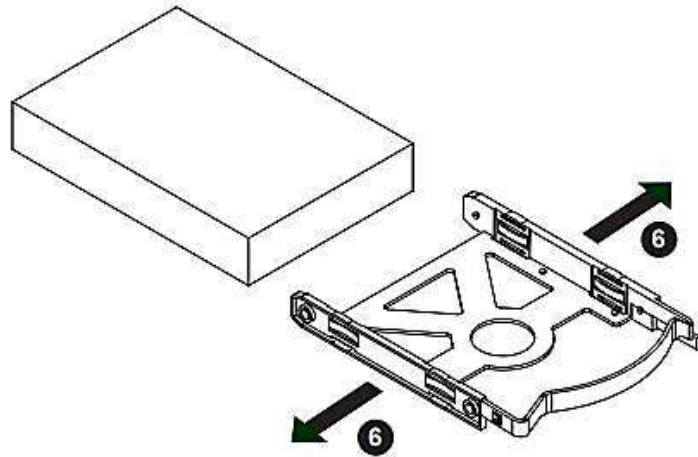
Figure. Removing the 3.5" Hard Drive from the Hard Drive Carrier

5. Gently slide the hard drive carrier out of the hard drive cage.

6. If a hard drive is already present, remove it by carefully pulling the sides of the hard drive carrier outward

Warning: Only enterprise level HDDs are recommended for use in this chassis.
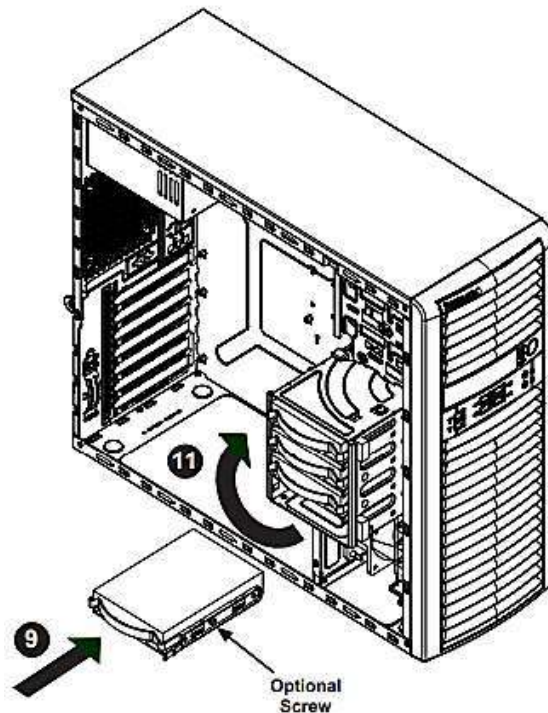

Figure. Installing the Hard Drive Carrier into the Hard Drive Cage

7. Remove the hard drive from the hard drive carrier.

8. Insert the new hard drive into the hard drive carrier.

9. Insert the hard drive carrier into the hard drive cage, sliding it towards the back of the hard drive cage until it clicks into a locked position.

10. If desired, each hard drive carrier may be secured to the exterior of the hard drive cage using one optional screw.

11. Rotate the hard drive cage 90 degrees inward, returning it to the closed, operational position in the chassis.

12. Connect the related cables to the hard drives.

13. Plug the power cord back into the power module, replace the chassis cover and power-up the system.

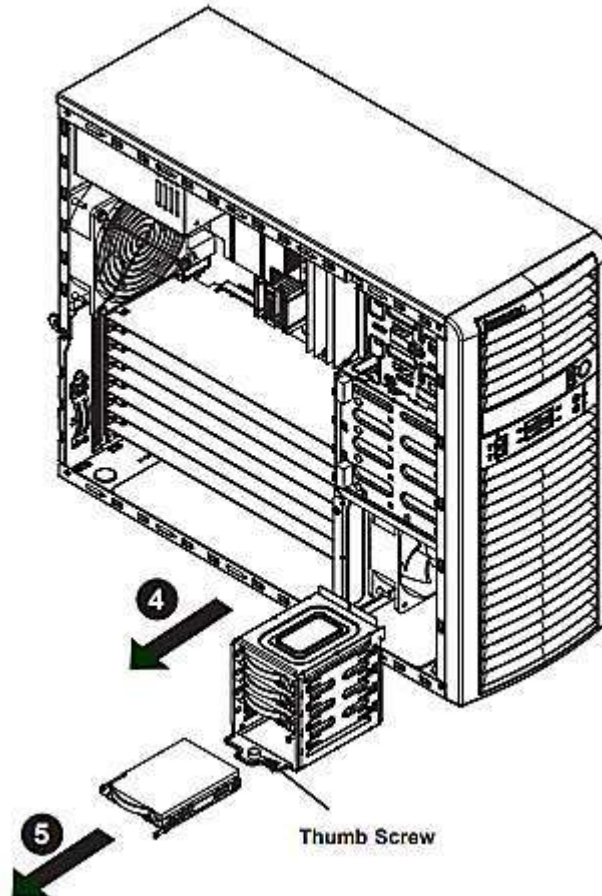## Removing and Installing 2.5" Hard Drives (Optional)

Figure. Removing the 2.5" Hard Drives

The Fusionstor i737e chassis must be powered-down before hard drives can be removed from the hard drive carriers.

Removing and Installing 2.5" Hard Drives

1. Power down the system and remove the power cord from the rear of the power supply. Remove the chassis side cover as described in Previous Section.

2. Loosen the thumb screw securing the 2.5" hard drive cage to the chassis.

3. Disconnect all cables from the hard drive.
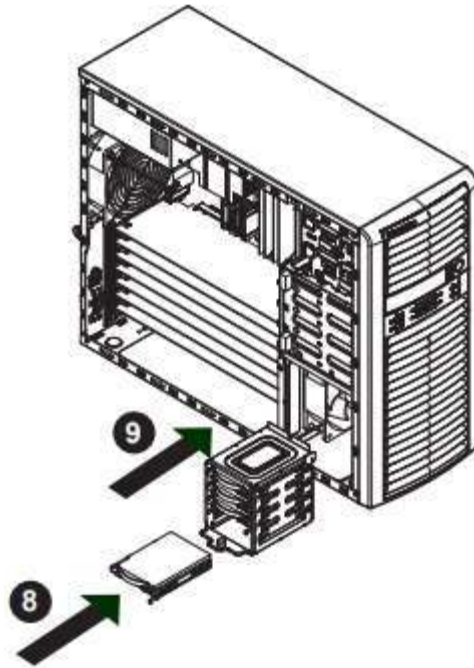
4. Slide the 2.5" hard drive cage out of the chassis.

Figure. Installing 2.5" Hard Drives

5. If a hard drive is already present, remove it by carefully pulling the sides of the hard drive carrier outward.

6. Remove the hard drive from the hard drive carrier.

7. Insert the new hard drive into the hard drive carrier.

8. Insert the hard drive carrier into the hard drive cage, sliding it towards the back of the the hard drive cage until it clicks into a locked position.

9. Slide the 2.5" hard drive cage back into the chassis and tighten the thumb screw to secure the cage.

10. Connect the related cables to the hard drive.

11. Plug the power cord back into the power module, replace the chassis cover and power-up the system

Installing a 3.5" Device (Optional)

The Fusionstor i737e chassis has one 3.5" device slot, which supports an optional device, such as an all-in-one card reader.

Installing a 3.5" Device

1. Power down the system and remove the power cord from the rear of the power supply. Remove the chassis side cover as described in Previous Section.

2. Remove the front bezel from the chassis by lifting it upwards from the bottom, and pulling off the front of the chassis.

3. Remove the cover plate from the 3.5" device slot on the front of the chassis.

4. Install the bracket rail (A) which is included in the accessory box, onto one side of the 3.5" device, by inserting the pins of the bracket into the mounting holes on the sides of the optical device.

5. Slide the 3.5" device into the chassis.

6. Plug the power cord back into the power module, replace the chassis cover and power-up the system.
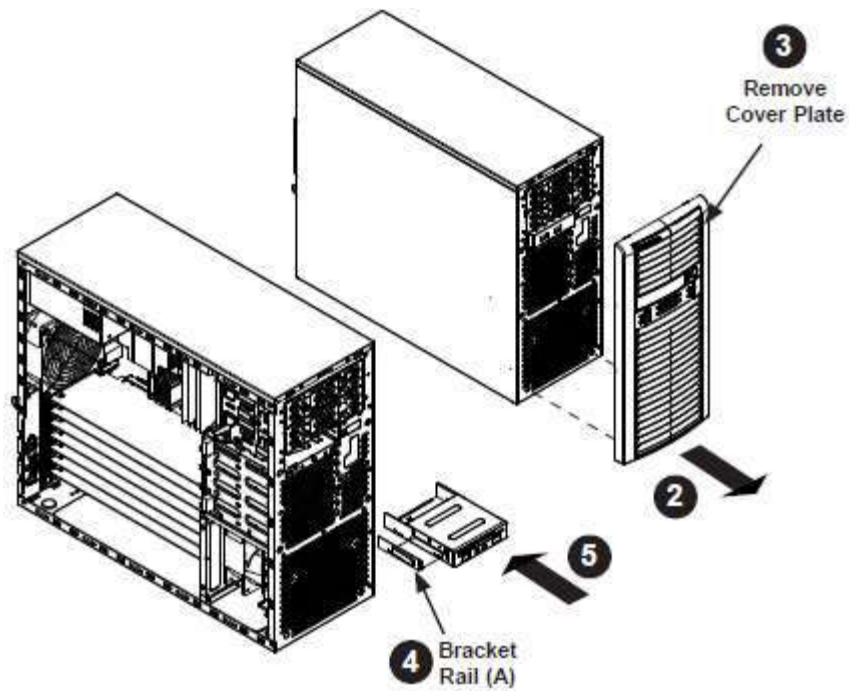
Figure. Installing the 3.5" Device

Installing the Front Bezel

Front Bezel Installation

1. Insert the tabs on the front bezel into the mounting holes on the front of the chassis.

2. Ensure that the cover fits snugly.

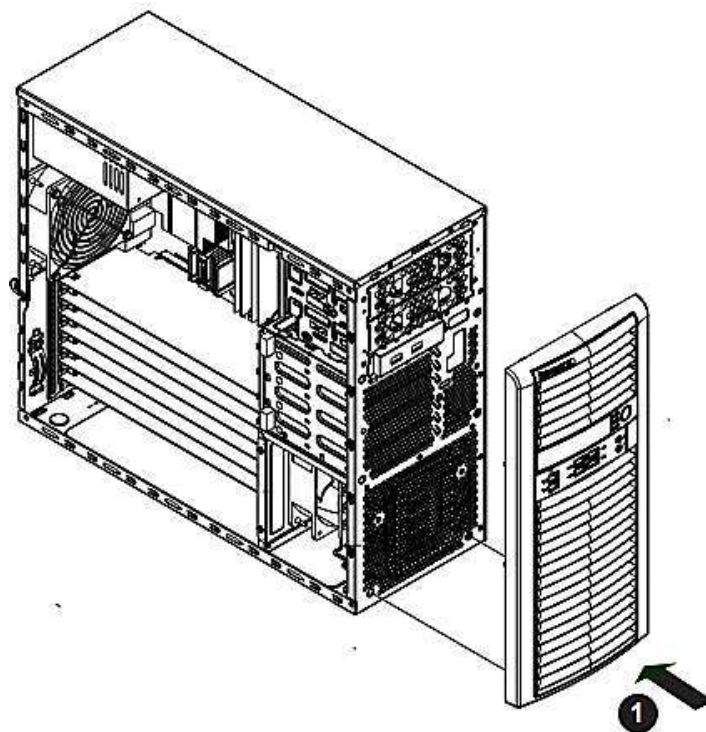This completes the installation of basic components in the Fusionstor i737e chassis

Figure. Installing the Front Bezel

Power Supply

The Fusionstor i737e chassis includes either a 500W, redundant 500W, 865W or 900W power supply. In the unlikely event that it becomes necessary to replace the power supply, follow the instructions below
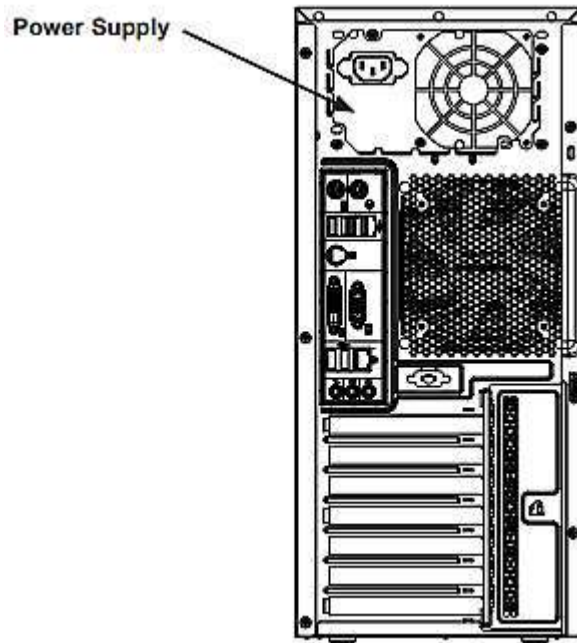

Figure. Removing the Power Supply

Changing the Power Supply

1. Power down the system and remove the power cord from the rear of the power supply. Remove the chassis side cover as described in Previous Section.

2. Disconnect the motherboard cables.

3. Remove the screws securing the power supply to the chassis. Set these screws aside for later use.

4. Gently lift the power supply out of the chassis.

5. Replace the failed power supply with an identical power supply model.

6. Secure the new power supply using the screws previously set aside.

7. Plug the power cord back into the power module and power-up the system.

Chapter 8

BIOS

Introduction

This chapter describes the AMI BIOS setup utility for the Motherboard. The ROM BIOS is stored in a Flash EEPROM and can be easily updated. This chapter describes the basic navigation of the AMI BIOS setup utility screens.

Starting BIOS Setup Utility

To enter the AMI BIOS setup utility screens, press the <Delete> key while the system is booting up.

Note: In most cases, the <Delete> key is used to invoke the AMI BIOS setup screen.

Each main BIOS menu option is described in this manual. The AMI BIOS setup menu screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured. Options in blue can be configured by the user. The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

Note: the AMI BIOS has default text messages built in. Fusionstor retains the option to include, omit, or change any of these text messages.

The AMI BIOS setup utility uses a key-based navigation system called "hot keys." Most of the AMI BIOS setup utility "hot keys" can be used at any time during the setup navigation process. These keys include <F1>, <F4>, <Enter>, <Esc>, arrow keys, etc.

Note: Options printed in Bold are default settings.

How To Change the Configuration Data

The configuration data that determines the system parameters may be changed by entering the AMI BIOS setup utility. This setup utility can be accessed by pressing <Del> at the appropriate time during system boot.

How to Start the Setup Utility

Normally, the only visible Power-On Self-Test (POST) routine is the memory test. As the memory is being tested, press the <Delete> key to enter the main menu of the AMI BIOS setup utility. From the main menu, you can access the other setup screens. An AMI BIOS identification string is displayed at the left bottom corner of the screen, below the copyright message.

Warning: Do not upgrade the BIOS unless your system has a BIOS-related issue. Flashing the wrong BIOS can cause irreparable damage to the system. In no event shall Fusionstor be liable for direct, indirect, special, incidental, or consequential damages arising from a BIOS update. If you have to update the BIOS, do not shut down or reset the system while the BIOS is updating to avoid possible boot failure.

Main Setup

When you first enter the AMI BIOS setup utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab on the top of the screen.

The following Main menu items will be displayed:

System Date/System Time

Use this option to change the system date and time. Highlight System Date or System Time using the arrow keys. Enter new values using the keyboard. Press the <Tab> key or the arrow keys to move between fields. The date must be entered in Day MM/DD/YYYY format. The time is entered in HH:MM:SS format.

Note: The time is in the 24-hour format. For example, 5:30 P.M. appears as 17:30:00.

Version: This item displays the version of the BIOS ROM used in the system.

Build Date: This item displays the date when the version of the BIOS ROM used in the system was built.
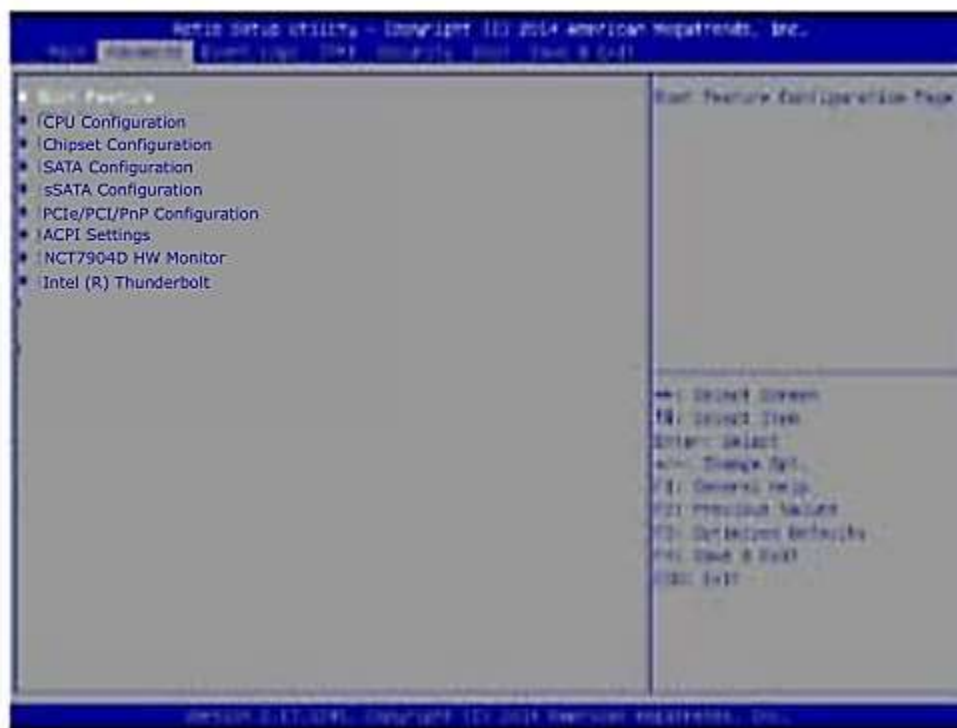
Memory Information

Total Memory: This item displays the total size of memory available in the system.

Memory Speed: This item displays the default speed of the memory modules installed in the system.

Advanced Setup Configurations

Use the arrow keys to select Advanced setup and press <Enter> to access the submenu items:

Warning: Take Caution when changing the Advanced settings. An incorrect value, a very high DRAM frequency or an incorrect BIOS timing setting may cause the system to malfunction. When this occurs, restore the setting to the manufacture default setting.

▶Boot Feature

Quiet Boot

Use this feature to select the screen display between POST messages or the OEM logo at bootup. Select Disabled to display the POST messages. Select Enabled to display the OEM logo instead of the normal POST messages. The options are **Enabled** and Disabled.

AddOn ROM Display Mode

Use this item to set the display mode for the Option ROM. Select Keep Current to use the current AddOn ROM display setting. Select Force BIOS to use the Option ROM display mode set by the system BIOS. The options are **Force BIOS** and Keep Current.

Bootup Num-Lock State

Use this feature to set the Power-on state for the Numlock key. The options are Off and **On**.

Wait For 'F1' If Error

Select Enabled to force the system to wait until the 'F1' key is pressed if an error occurs. The options are Disabled and **Enabled**.

INT19 (Interrupt 19) Trap Response

Interrupt 19 is the software interrupt that handles the boot disk function. When this item is set to Immediate, the ROM BIOS of the host adaptors will "capture" Interrupt 19 at bootup immediately and allow the drives that are attached to these host adaptors to function as bootable disks. If this item is set to Postponed, the ROM BIOS of the host adaptors will not capture Interrupt 19 immediately and allow the drives attached to these adaptors to function as bootable devices at bootup. The options are **Immediate** and Postponed.

Re-try Boot

When EFI Boot is selected, the system BIOS will automatically reboot the system from an EFI boot device after its initial boot failure. Select Legacy Boot to allow the BIOS to automatically reboot the system from a Legacy boot device after its initial boot failure. The options are **Disabled**, Legacy Boot, and EFI Boot.

Power Configuration

EuP

Select Enabled for EuP (Energy using Product) support to conserve energy use and enhance power performance. The options are Enabled and **Disabled.**

Power Button Function

This feature controls how the system shuts down when the power button is pressed. Select 4 Seconds Override for the user to power off the system after pressing and holding the power button for 4 seconds or longer. Select Instant Off to instantly power off the system as soon as the user presses the power button. The options are 4 Seconds Override and **Instant Off.**

Restore on AC Power Loss

Use this feature to set the power state after a power outage. Select Power-Off for the system power to remain off after a power loss. Select Power-On for the system power to be turned on after a power loss. Select Last State to allow the system to resume its last power state before a power loss. The options are Power-On, Stay-Off and **Last State.**

►CPU Configuration

This submenu displays the following CPU information as detected by the BIOS. It also allows the user to configure CPU settings.

- Processor Socket

- Processor ID

- Processor Frequency

- Processor Max Ratio

- Processor Min Ratio

- Microcode Revision

- L1 Cache RAM

- L2 Cache RAM

- L3 Cache RAM

- Processor 0 Version

- Processor 1 Version

Clock Spread Spectrum

Select Enabled to allow the BIOS to monitor and attempt to reduce the level of Electromagnetic Interference caused by the components whenever needed. The options are **Disabled** and Enabled.

Hyper-Threading (All)

Select Enable to support Intel's Hyper-threading Technology to enhance CPU performance. The options are **Enable** and Disable.

Cores Enabled

This feature allows the user to set the number of CPU cores to enable. Enter "0" to enable all cores. There are 10 cores available in the system. The default setting is **0**.

Execute-Disable Bit (Available if supported by the OS & the CPU)

Select Enable for Execute Disable Bit Technology support, which will allow the processor to designate areas in the system memory where an application code can execute and where it cannot, thus preventing a worm or a virus from flooding illegal

codes to overwhelm the processor to damage the system during an attack. This feature is used in conjunction with the items: "Clear MCA," "VMX," "Enable SMX," and "Lock Chipset" for Virtualization media support. The options are **Enable** and Disable. (Refer to Intel and Microsoft websites for more information.)

PPIN Control

Select Unlock/Enable to use the Protected-Processor Inventory Number (PPIN) in the system. The options are **Unlock/Enable** and Unlock/Disable.

Hardware Prefetcher (Available when supported by the CPU)

If set to Enable, the hardware prefetcher will prefetch streams of data and instructions from the main memory to the L2 cache to improve CPU performance. The options are Disable and **Enable**.

Adjacent Cache Prefetch (Available when supported by the CPU)

Select Enable for the CPU to prefetch both cache lines for 128 bytes as comprised. Select Disable for the CPU to prefetch both cache lines for 64 bytes. The options are Disable and **Enable**.

> **Note**: Please reboot the system for changes on this setting to take effect. Please refer to Intel's website for detailed information.

DCU (Data Cache Unit) Streamer Prefetcher (Available when supported by the CPU)

If set to Enable, the DCU Streamer Prefetcher will prefetch data streams from the cache memory to the DCU (Data Cache Unit) to speed up data accessing and processing to enhance CPU performance. The options are Disable and **Enable**.

DCU IP Prefetcher

If set to Enable, the IP prefetcher in the DCU (Data Cache Unit) will prefetch IP addresses to improve network connectivity and system performance. The options are **Enable** and Disable.

Direct Cache Access (DCA)

Select Enable to use Intel DCA (Direct Cache Access) Technology to improve the efficiency of data transferring and accessing. The options are **Auto**, Enable, and Disable.

X2APIC (Advanced Programmable Interrupt Controller)

Based on Intel's Hyper-Threading architecture, each logical processor (thread) is assigned 256 APIC IDs (APIDs) in 8-bit bandwidth. When this feature is set to Enable, the APIC ID will be expanded from 8 bits (X2) to 16 bits to provide 512 APIDs to each thread to enhance CPU performance. The options are **Disable** and Enable.

AES-NI

Select Enable to use the Intel Advanced Encryption Standard (AES) New Instructions (NI) to ensure data security. The options are Enable and **Disable**.

Intel Virtualization Technology

Select Enable to use Intel Virtualization Technology support for Direct I/O VT-d support by reporting the I/O device assignments to the VMM (Virtual Machine Monitor) through the DMAR ACPI tables. This feature offers fully-protected I/O resource sharing across Intel platforms, providing greater reliability, security and availability in networking and data-sharing. The options are **Enable** and Disable.

▶ Advanced Power Management Configuration

Advanced Power Management Configuration

Power Technology

Select Energy Efficient to support power-saving mode. Select Custom to customize system power settings. Select Max Performance to optimize system performance. Select Disabled to disable power-saving settings. The options are Disable, **Energy Efficient**, and Custom.

If the option is set to Custom, the following items will display:

▶ CPU P State Control (Available when Power Technology is set to Custom)

EIST (P-states)

EIST (Enhanced Intel SpeedStep Technology) allows the system to automatically adjust processor voltage and core frequency to reduce power consumption and heat dissipation. The options are Disable and **Enable**.

Turbo Mode

Select Enabled to use the Turbo Mode to boost system performance. The options are **Enable** and Disable.

P-state Coordination

This feature is used to change the P-state (Power-Performance State) coordination type. P-state is also known as "SpeedStep" for Intel processors. Select HW_ALL to change the P-state coordination type for hardware components only. Select SW_ALL to change the P-state coordination type for all software installed in the system. Select SW_ANY to change the P-state coordination type for a software program in the system. The options are **HW_All,** SW_ALL, and SW_ANY.

► CPU C State Control (Available when Power Technology is set to Custom)

Package C State limit

Use this item to set the limit on the C-State package register. The options are C0/1 state, C2 state, C6 (non-Retention) state, **C6 (Retention) state**, and No Limit.

CPU C3 Report

Select Enable to allow the BIOS to report the CPU C3 State (ACPI C2) to the operating system. During the CPU C3 State, the CPU clock generator is turned off. The options are Enable and **Disable.**

CPU C6 Report (Available when Power Technology is set to Custom)

Select Enable to allow the BIOS to report the CPU C6 state (ACPI C3) to the operating system. During the CPU C6 state, power to all cache is turned off. The options are **Enable** and Disable.

Enhanced Halt State (C1E)

Select Enabled to use Enhanced Halt-State technology, which will significantly reduce the CPU's power consumption by reducing the CPU's clock cycle and voltage during a Halt-state. You will need to reboot the system for the change of this setting to take effect. The options are Disable and **Enable**.

► CPU T State Control (Available when Power Technology is set to Custom)

ACPI (Advanced Configuration Power Interface) T-States

Select Enable to support CPU throttling by the operating system to reduce power consumption. The options are **Enable** and Disable.

▶Chipset Configuration

Warning! Please set the correct settings for the items below. A wrong configuration setting may cause the system to malfunction.

▶North Bridge

This feature allows the user to configure the settings for the Intel North Bridge.

▶IIO Configuration

EV DFX (Device Function On-Hide) Feature

When this feature is set to Enable, the EV_DFX Lock Bits that are located on a processor will always remain clear during electric tuning. The options are **Disable** and Enable.

▶IIO0 Configuration

IIO1 Port 1A Link Speed

Use this item to configure the link speed of a PCI-E device installed on the PCI-E slot specified by the user. The options are Gen1 (2.5 GT/s), Gen2 (5 GT/s), Gen3 (8 GT/s), and **Auto.**

IIO1 Port 2A Link Speed

Use this item to configure the link speed of a PCI-E device installed on the PCI-E slot specified by the user. The options are Gen1 (2.5 GT/s), Gen2 (5 GT/s), Gen3 (8 GT/s), and **Auto.**

IIO1 Port 3A Link Speed

Use this item to configure the link speed of a PCI-E device installed on the PCI-E slot specified by the user. The options are Gen1 (2.5 GT/s), Gen2 (5 GT/s), Gen3 (8 GT/s), and **Auto.**

▶IIO1 Configuration

IIO2 Port 1A Link Speed

Use this item to configure the link speed of a PCI-E device installed on the PCI-E slot specified by the user. The options are Gen1 (2.5 GT/s), Gen2 (5 GT/s), Gen3 (8 GT/s), and **Auto.**.

IIO2 Port 2A Link Speed

Use this item to configure the link speed of a PCI-E device installed on the PCI-E slot specified by the user. The options are Gen1 (2.5 GT/s), Gen2 (5 GT/s), Gen3 (8 GT/s), and **Auto**.

IIO2 Port 3C Link Speed

Use this item to configure the link speed of a PCI-E device installed on the PCI-E slot specified by the user. The options are Gen1 (2.5 GT/s), Gen2 (5 GT/s), Gen3 (8 GT/s), and **Auto**.

▶IOAT (Intel® IO Acceleration) Configuration

Enable IOAT

Select Enable to enable Intel I/OAT (I/O Acceleration Technology) support, which will significantly reduce CPU overhead by leveraging CPU architectural improvements and freeing the system resource for other tasks. The options are **Enable** and Disable.

No Snoop

Select Enable to support no-snoop mode for each CB device. The options are **Disable** and Enable.

Relaxed Ordering

Select Enable to enable Relaxed Ordering support which will allow certain transactions to violate the strict-ordering rules of PCI bus for a transaction to be completed prior to other transactions that have already been enqueued earlier. The options are **Disable** and Enable.

· Intel VT for Directed I/O (VT-d)

Intel VT for Direct I/O (VT-d)

Intel® VT for Directed I/O (VT-d)

Select Enable to use Intel Virtualization Technology support for Direct I/O VT-d support by reporting the I/O device assignments to the VMM (Virtual Machine Monitor) through the DMAR ACPI Tables. This feature offers fully-protected I/O resource sharing across Intel platforms, providing greater reliability, security and availability in networking and data-sharing. The options are **Enable** and Disable.

Interrupt Remapping

Select Enable for Interrupt Remapping support to enhance system performance. The options are **Enable** and Disable.

Coherency Support (Non-Isoch)

Select Enable for the Non-Iscoh VT-d engine to pass through DMA (Direct Memory Access) to enhance system performance. The options are **Enable** and Disable.

Coherency Support (Isoch)

Select Enable for the Iscoh VT-d engine to pass through ATS to enhance system performance. The options are Enable and **Disable**.

▶QPI (Quick Path Interconnect) Configuration

▶QPI General Configuration

QPI Status

The following information will display:

- Number of CPU

- Number of IIO

- Current QPI Link Speed

- Current QPI Link Frequency

- QPI Global MMIO Low Base/Limit

- QPI Global MMIO High Base/Limit

- QPI PCIe Configuration Base/Size

Link Frequency Select

Use this item to select the desired frequency for QPI Link connections. The options are 6.4GB/s, 8.0GB/s, 9.6GB/s, **Auto,** and Auto Limited.

Link L0p Enable

Select Enable for Link L0p support. The options are **Enable** and Disable.

Link L1 Enable

Select Enable for Link L1 support. The options are **Enable** and Disable.

Early Snoop (Available when the OS and the CPU support this feature)

Select Enable for Early Snoop support to enhance system performance. The options are Enable, Disable, and **Auto**.

Isoc Mode

Select Enable for Isochronous support to meet QoS (Quality of Service) requirements. This feature is especially important for Virtualization Technology. The options are Enable and **Disable**.

▶Memory Configuration

Enforce POR

Select Enabled to enforce POR restrictions on memory frequency and voltage programming. The options are **Enabled** and Disabled.

Memory Frequency

Use this feature to set the maximum memory frequency for onboard memory modules. The options are **Auto**,1333, 1400, 1600, 1800, 1867, 2000, 2133, 2200, 2400, 2600, 2667, 2800, 2993, 3000, 3200 and Reserved (Do not select Reserved).

Data Scrambling

Select Enabled to enable data scrambling to enhance system performance and data integrity. The options are **Auto**, Disabled and Enabled.

DRAM RAPL (Running Average Power Limit) Baseline

Use this feature to set the run-time power-limit baseline for the DRAM modules. The options are Disable, DRAM RAPL Mode 0, and **DRAM RAPL Mode 1**.

Set Throttling Mode

Throttling improves reliability and reduces power consumption in processors via automatic voltage control during processor idle states. The options are Disabled and **CLTT** (Closed Loop Thermal Throttling).

Socket Interleave Below 4GB

Select Enabled for the memory above the 4G Address space to be split between two sockets. The options are Enable and **Disable**.

A7 Mode

Select Enabled to support the A7 (Addressing) mode to improve memory performance. The options are **Enable** and Disable.

►DIMM Information

This item displays the status of a DIMM module as detected by the BIOS.

P1-DIMMA1/A2, P1-DIMMB1/B2, P1-DIMMC1/C2, P1-DIMMD1/D2, P2-DIMME1/E2, P2-DIMMF1/F2, P2-DIMMG1/G2, and P2-DIMMH1/H2

►Memory RAS (Reliability_Availability_Serviceability) Configuration

Use this submenu to configure the following Memory RAS settings.

RAS Mode

When Disable is selected, RAS is not supported. When Mirror is selected, the motherboard maintains two identical copies of all data in memory for data backup. When Lockstep is selected, the motherboard uses two areas of memory to run the same set of operations in parallel to boost performance. The options are **Disable**, Mirror, and Lockstep Mode.

Memory Rank Sparing

Select Enable to enable memory-sparing support for memory ranks to improve memory performance. The options are **Disabled** and Enabled.

Patrol Scrub

Patrol Scrubbing is a process that allows the CPU to correct correctable memory errors detected on a memory module and send the correction to the requestor (the original source). When this item is set to Enable, the PCH (Platform Control Hub) will read and write-back one cache line every 16K cycles if there is no delay caused by internal processing. By using this method, roughly 64 GB of memory behind the PCH will be scrubbed every day. The options are **Enable** and Disable.

Patrol Scrub Interval

This feature allows you to decide how many hours the system should wait before the next complete patrol scrub is performed. Use the keyboard to enter a value from 0-24. The Default setting is **24**.

Demand Scrub

Demand Scrubbing is a process that allows the CPU to correct correctable memory errors found on a memory module. When the CPU or I/O issues a demand-read command, and the read data from memory turns out to be a correctable error, the error is corrected and sent to the requestor (the original source). Memory is updated as well. Select Enable to use Demand Scrubbing for ECC memory correction. The options are **Enable** and Disable.

Device Tagging

Select Enable to support device tagging. The options are **Disable** and Enable.

▶South Bridge Configuration

The following South Bridge information will display:

▶USB Configuration

- USB Module Version

- USB Devices

Legacy USB Support

Select Enabled to support onboard legacy USB devices. Select Auto to disable legacy support if there are no legacy USB devices present. Select Disable to have all USB devices available for EFI applications only. The options are **Enabled,** Disabled and Auto.

XHCI (Extensible Host Controller Interface) Hand-Off

This is a work-around solution for operating systems that do not support XHCI (Extensible Host Controller Interface) hand-off. The XHCI ownership change should be claimed by the XHCI driver. The settings are **Enabled** and Disabled.

EHCI (Enhanced Host Controller Interface) Hand-Off

This item is for operating systems that do not support Enhanced Host Controller Interface (EHCI) hand-off. When this item is enabled, EHCI ownership change will be claimed by the EHCI driver. The settings are Enabled and **Disabled**.

Port 60/64 Emulation

Select Enabled for I/O port 60h/64h emulation support, which in turn, will provide complete legacy USB keyboard support for the operating systems that do not support legacy USB devices. The options are Disabled and **Enabled**.

USB 3.0 Support

Select Enabled for USB 3.0 support. The options are Smart Auto, Auto, **Enabled**, Disabled and Manual.

EHCI1

Select Enabled to enable EHCI (Enhanced Host Controller Interface) support on USB 2.0 connector #1 (-at least one USB 2.0 connector should be enabled for EHCI support.) The options are Disabled and **Enabled**.

EHCI2

Select Enabled to enable EHCI (Enhanced Host Controller Interface) support on USB 2.0 connector #2 (-at least one USB 2.0 connector should be enabled for EHCI support.) The options are Disabled and **Enabled**.

▶SATA Configuration

When this submenu is selected, AMI BIOS automatically detects the presence of the SATA devices that are supported by the Intel PCH chip and displays the following items:

SATA Controller

This item enables or disables the onboard SATA controller supported by the Intel PCH chip. The options are **Enabled** and Disabled.

Configure SATA as

Select IDE to configure a SATA drive specified by the user as an IDE drive. Select AHCI to configure a SATA drive specified by the user as an AHCI drive. Select RAID to configure a SATA drive specified by the user as a RAID drive. The options are IDE, **AHCI**, and RAID.

If the item above "Configure SATA as" is set to AHCI, the following items will display:

Support Aggressive Link Power Management

When this item is set to Enabled, the SATA AHCI controller manages the power usage of the SATA link. The controller will put the link to a low power state when the I/O is inactive for an extended period of time, and the power state will return to normal when the I/O becomes active. The options are **Enabled** and Disabled.

SATA Port 0~ Port 5

This item displays the information detected on the installed SATA drive on the particular SATA port.

- Model number of drive and capacity

- Software Preserve Support

SATA Port 0~ Port 5

Select Enabled to enable a SATA port specified by the user. The options are Disabled and Enabled.

Port 0 ~ Port 5 Spin Up Device

On an edge detect from 0 to 1, set this item to allow the PCH to initialize the device. The options are Enabled and **Disabled**.

Port 0 ~ Port 5 SATA Device Type

Use this item to specify if the SATA port specified by the user should be connected to a Solid State drive or a Hard Disk Drive. The options are **Hard Disk Drive** and Solid State Drive.

If the item above "Configure SATA as" is set to IDE, the following items will display:

Serial ATA Port 0~ Port 5

This item indicates that a SATA port specified by the user is installed (present) or not.

SATA Port 0 ~ Port 5 SATA Device Type (Available when a SATA port is detected)

Use this item to specify if the SATA port specified by the user should be connected to a Solid State drive or a Hard Disk Drive. The options are **Hard Disk Drive** and Solid State Drive.

If the item above "Configure SATA as" is set to RAID, the following items will display:

Support Aggressive Link Power Management

When this item is set to Enabled, the SATA AHCI controller manages the power usage of the SATA link. The controller will put the link to a low power state when the I/O is inactive for an extended period of time, and the power state will return to normal when the I/O becomes active. The options are **Enabled** and Disabled.

SATA RAID Option ROM/UEFI Driver

Select EFI to load the EFI driver for system boot. Select Legacy to load a legacy driver for system boot. The options are Disabled, EFI, and **Legacy**.

SATA/sSATA RAID Boot Select

Select SATA Controller to boot the system from a SATA RAID device. Select sSATA Controller to boot the system from a S-SATA RAID device. Select Both to boot the system either from a SATA RAID device or from an sSATA RAID device. Please note that the option-Both is not supported by the Windows Server 2012/R2 OS. The options are None, Both, SATA Controller, and **sSATA Controller**.

Serial ATA Port 0~ Port 5

This item displays the information detected on the installed SATA drives on the particular SATA port.

- Model number of drive and capacity

- Software Preserve Support

Port 0~ Port 5

Select Enabled to enable a SATA port specified by the user. The options are Disabled and **Enabled**.

Port 0 ~ Port 5 Spin Up Device

On an edge detect from 0 to 1, set this item to allow the PCH to start a COMRE-SET initialization to the device. The options are Enabled and **Disabled**.

Port 0 ~ Port 5 SATA Device Type

Use this item to specify if the SATA port specified by the user should be connected to a Solid State drive or a Hard Disk Drive. The options are **Hard Disk Drive** and Solid State Drive.

▶sSATA Configuration

When this submenu is selected, AMI BIOS automatically detects the presence of the SATA devices that are supported by the PCH-sSATA controller and displays the following items:

sSATA Controller

This item enables or disables the onboard SATA controller supported by the Intel PCH-sSATA controller. The options are **Enabled** and Disabled.

Configure sSATA as

Select IDE to configure an sSATA drive specified by the user as an IDE drive. Select AHCI to configure an sSATA drive specified by the user as an AHCI drive. Select RAID to configure an sSATA drive specified by the user as a RAID drive. The options are IDE, **AHCI**, and RAID.

If the item above "Configure sSATA as" is set to AHCI, the following items will display:

Support Aggressive Link Power Management

When this item is set to Enabled, the SATA AHCI controller manages the power usage of the SATA link. The controller will put the link to a low power state when the I/O is inactive for an extended period of time, and the power state will return to normal when the I/O becomes active. The options are **Enabled** and Disabled.

sSATA Port 0~ Port 3

This item displays the information detected on the installed on the sSATA port. specified by the user.

- Model number of drive and capacity

- Software Preserve Support

sSATA Port 0 ~ Port 3 Spin Up Device

On an edge detect from 0 to 1, set this item to allow the PCH to start a COMRE-SET initialization to the device. The options are Enabled and **Disabled**.

Port 0 ~ Port 3 sSATA Device Type

Use this item to specify if the sSATA port specified by the user should be connected to a Solid State drive or a Hard Disk Drive. The options are **Hard Disk Drive** and Solid State Drive.

If the item above "Configure sSATA as" is set to IDE, the following items will display:

sSATA Port 0~ Port 3

This item indicates that an sSATA port specified by the user is installed (present) or not.

Port 0 ~ Port 3 sSATA Device Type (Available when a SATA port is detected)

Use this item to specify if the sSATA port specified by the user should be connected to a Solid State drive or a Hard Disk Drive. The options are **Hard Disk Drive** and Solid State Drive.

If the item above "Configure sSATA as" is set to RAID, the following items will display:

Support Aggressive Link Power Management

When this item is set to Enabled, the SATA AHCI controller manages the power usage of the SATA link. The controller will put the link to a low power state when the I/O is inactive for an extended period of time, and the power state will return to normal when the I/O becomes active. The options are **Enabled** and Disabled.

sSATA RAID Option ROM/UEFI Driver

Select EFI to load the EFI driver for system boot. Select Legacy to load a legacy driver for system boot. The options are Disabled, EFI, and **Legacy**.

SATA/sSATA RAID Boot Select

Select SATA Controller to use a device supported by the SATA connector for system boot. Select sSATA Controller to use a device supported by the sSATA connector for system boot. The options are None, SATA Controller, **sSATA Controller**, and Both.

sSATA Port 0~ Port 3

This item displays the information detected on the installed sSATA drives on the particular sSATA port.

- Model number of drive and capacity

- Software Preserve Support

sSATA Port 0~ Port 3

Select Enabled to enable an sSATA port specified by the user. The options are Disabled and Enabled.

sSATA Port 0 ~ Port 3 Spin Up Device

On an edge detect from 0 to 1, set this item to allow the PCH to start a COMRE-SET initialization to the device. The options are Enabled and **Disabled**.

Port 0 ~ Port 3 sSATA Device Type

Use this item to specify if the sSATA port specified by the user should be connected to a Solid State drive or a Hard Disk Drive. The options are **Hard Disk Drive** and Solid State Drive.

▶PCIe/PCI/PnP Configuration

PCI Devices Common Settings

PCI Latency Timer

Use this item to configure the PCI latency timer for a device installed on a PCI bus. Select 32 to set the PCI latency timer to 32 PCI clock cycles. The options are **32**, 64, 96, 128, 160, 192, 224 and 248 (PCI Bus Clocks).

VGA Palette Snoop

Select Enabled to support VGA palette register snooping which will allow the PCI cards that do not contain their own VGA color palette to examine the video cards palette and mimic it for proper color display. The options are **Disabled** and Enabled.

PCI PERR# Generation

Select Enabled for the BIOS to generate a PERR number when a runtime PERR (PCI/PCI-E Parity Error) event occurs on a PCI/PCI-E slot for PERR reporting. The options are Enabled and **Disabled**.

PCI SERR# Support

Select Enabled for the BIOS to generate a SERR number when a runtime SERR (System Error) event occurs on a PCI/PCI-E slot for SERR reporting. The options are Enabled and **Disabled**.

PCI PERR/SERR Support

Select Enabled to support PERR (PCI/PCI-E Parity Error)/SERR (System Error) runtime error reporting for a PCI/PCI-E slot. The options are Enabled and **Disabled**.

Above 4G Decoding (Available if the system supports 64-bit PCI decoding)

Select Enabled to decode a PCI device that supports 64-bit in the space above 4G Address. The options are Enabled and **Disabled**.

SR-IOV (Available if the system supports Single-Root Virtualization)

Select Enabled for Single-Root IO Virtualization support. The options are Enabled and **Disabled.**

Maximum Payload

Select Auto for the system BIOS to automatically set the maximum payload value for a PCI-E device to enhance system performance. The options are **Auto**, 128 Bytes, 256 Bytes, 512 Bytes, 1024 Bytes, 2048 Bytes, and 4096 Bytes.

Maximum Read Request

Select Auto for the system BIOS to automatically set the maximum size for a read request for a PCI-E device to enhance system performance. The options are **Auto**, 128 Bytes, 256 Bytes, 512 Bytes, 1024 Bytes, 2048 Bytes, and 4096 Bytes.

ASPM Support

Use this item to set the Active State Power Management (ASPM) level for a PCI-E device. Select Auto for the system BIOS to automatically set the ASPM level based on the system configuration. Select Disabled to disable ASPM support. The options are **Disabled** and Auto.

Warning: Enabling ASPM support may cause some PCI-E devices to fail!

MMIOHBase

Use this item to select the base memory size according to memory-address mapping for the PCH. The base memory size must be between 4032G to 4078G. The options are **56T**, 48T, 24T, 2T, 512G, and 256G.

MMIO High Size

Use this item to select the high memory size according to memory-address mapping for the PCH. The options are **256G**, 128G, 512G, and 1024G.

PCI Devices Option ROM Setting

CPU1 Slot 1 PCI-E x16 OPROM (Option ROM)/CPU2 Slot 2 PCI-E x8 OPROM (Option ROM)/CPU1 Slot 3 PCI-E x16 OPROM (Option ROM)/CPU2 Slot 4 PCI-E x8 OPROM (Option ROM)/CPU1 Slot 5 PCI-E x16 OPROM (Option ROM)/PCH Slot 6 PCI-E x4 OPROM (Option ROM)/Onboard LSI 3008 OPROM (Option ROM)

Select Enabled to enable Option ROM support to boot the computer using a device installed on the slot specified by the user. The options are Disabled, **Legacy** and EFI.

Onboard LAN Option ROM Type

Select Legacy to boot the computer using a Legacy device installed on the motherboard. The options are **Legacy** and EFI.

Onboard LAN1 Option ROM/Onboard LAN2 Option ROM

Use this option to select the type of device installed in LAN Port1, LAN Port2 or the onboard video device used for system boot. The default setting for LAN1 Option ROM is **PXE**, for LAN2 Option ROM is **Disabled**.

Network Stack

Select Enabled to enable PXE (Preboot Execution Environment) or UEFI (Unified Extensible Firmware Interface) for network stack support. The options are Enabled and **Disabled**.

▶Trusted Computing (Available when a TPM device is installed and detected by the BIOS)

Configuration

Security Device Support

If this feature and the TPM jumper on the motherboard are both set to Enabled, onboard security devices will be enabled for TPM (Trusted Platform Module) support to enhance data integrity and network security. Please reboot the system for a change on this setting to take effect. The options are Enabled and **Disabled**.

TPM State

Select Enabled to use TPM (Trusted Platform Module) settings to enhance system data security. Please reboot your system for any change on the TPM state to take effect. The options are Disabled and **Enabled**.

Pending Operation

Use this item to schedule a TPM-related operation to be performed by a security device for system data integrity. Your system will reboot to carry out a pending TPM operation. The options are **0**, Enable Take Ownership, Disable Take Ownership, and TPM Clear.

> **Note**: Your system will reboot to carry out a pending TPM operation.

Current Status Information

This item displays the status of the TPM support on this motherboard.

▶ACPI Settings

WHEA Support

Select Enabled to support the Windows Hardware Error Architecture (WHEA) platform and provide a common infrastructure for the system to handle hardware errors within the Windows OS environment to reduce system crashes and to enhance system recovery and health monitoring. The options are **Enabled** and Disabled.

High Precision Timer

Select Enabled to activate the High Precision Event Timer (HPET) that produces periodic interrupts at a much higher frequency than a Real-time Clock (RTC) does in

synchronizing multimedia streams, providing smooth playback and reducing the dependency on other timestamp calculation devices, such as an x86 RDTSC Instruction embedded in the CPU. The High Performance Event Timer is used to replace the 8254 Programmable Interval Timer. The options are **Enabled** and Disabled.

NUMA (Available when the OS supports this feature)

Select Enabled to enable Non-Uniform Memory Access support to enhance system performance. The options are **Enabled** and Disabled.

ACPI Sleep State

This feature selects the ACPI Sleep State that the system will enter into when the suspend button is activated. The options are Suspend Disabled, and **S3 only (Suspend to RAM)**.

PCI AER (Advanced Error-RepoArting) Support

Select Enabled to support Advanced Error-Reporting for onboard PCI devices. The options are **Disabled** and Enabled.
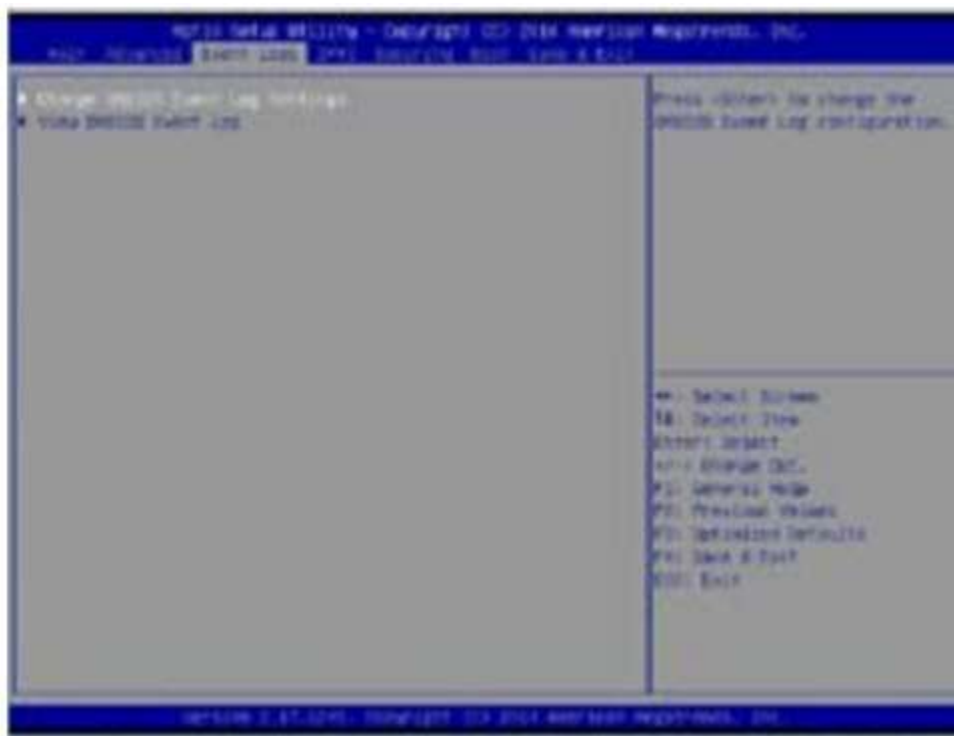
▶NCT7904D HW Monitor

This submenu displays system health monitoring information on the following items as detected by the BIOS:

- CPU1 Temperature

- CPU2 Temperature

- PCH Temperature

- System Temperature

- Fan1 Speed - Fan7 Speed & FanA Speed

- 1.05V

- 1.5V

- 5VSB

- 5V

- 12V

Event Logs

Use this feature to configure Event Log settings

▶Change SMBIOS Event Log Settings

This feature allows the user to configure SMBIOS Event settings.

Enabling/Disabling Options

SMBIOS Event Log

Select Enabled to enable SMBIOS (System Management BIOS) Event Logging during system boot. The options are **Enabled** and Disabled.

Runtime Error Logging Support

Select Enabled to support Runtime Error Logging. The options are **Enabled** and Disabled. If this item is set to Enabled, the following item will be available for configuration:

Memory Corrected Error Enabling (Available when the item above-Runtime Error Logging Support is set to Enable)

Select Enabled for the BIOS to correct a memory error if it is correctable. The options are **Enabled** and Disabled.

PCI-Ex (PCI-Express) Error Enable

Select Yes for the BIOS to correct errors occurred in the PCI-E slots. The options are Enabled and **Disabled**.

Memory Correctable Error Threshold

Use this item to enter the threshold value for correctable memory errors. The default setting is **10**.

Erasing Settings

Erase Event Log

Select Enabled to erase all error events in the SMBIOS (System Management BIOS) log before an event logging is initialized at bootup. The options are **No**, Yes, Next reset, and Yes, Every reset.

When Log is Full

Select Erase Immediately to immediately erase all errors in the SMBIOS event log when the event log is full. Select Do Nothing for the system to do nothing when the SMBIOS event log is full. The options are **Do Nothing** and Erase Immediately.

SMBIOS Event Log Standard Settings

Log System Boot Event

Select Enabled to log system boot events. The options are **Disabled** and Enabled.

MECI (Multiple Event Count Increment)

Enter the increment value for the multiple event counter. Enter a number between 1 to 255. The default setting is **1**.

METW (Multiple Event Count Time Window)

This item is used to determine how long (in minutes) should the multiple event counter wait before generating a new event log. Enter a number between 0 to 99. The default setting is **60**.

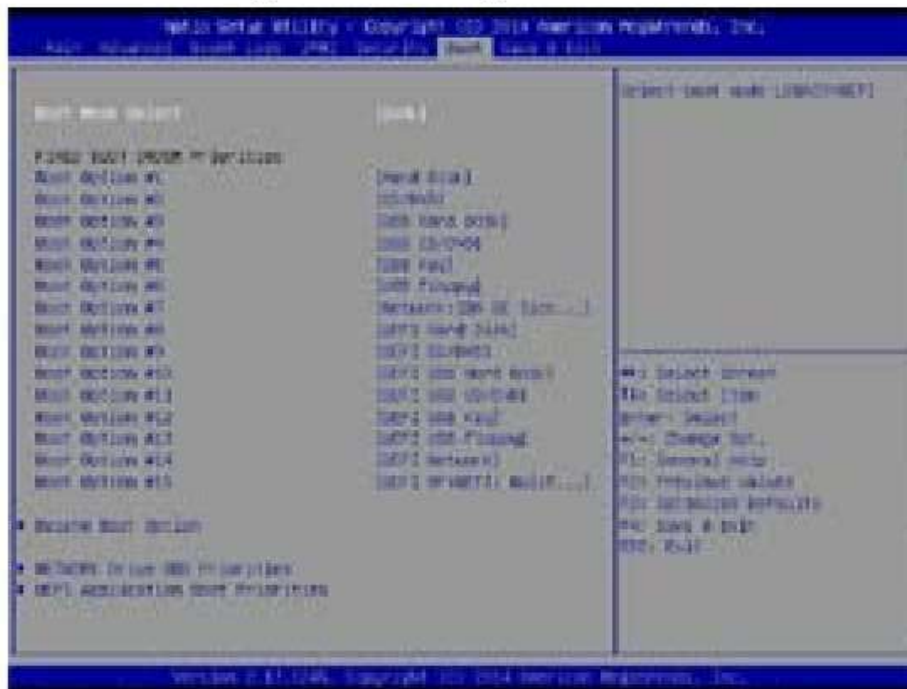> **Note**: Please reboot the system for the changes to take effect.

▶View SMBIOS Event Log

This item allows the user to view the event in the SMBIOS event log. Select this item and press <Enter> to view the status of an event in the log. The following categories are displayed:

Date/Time/Error Code/Severity

Boot Settings

Use this feature to configure Boot Settings:

Boot Configuration

Boot Mode Select

Use this item to select the type of device to be used for system boot. The options are Legacy, UEFI, and **Dual.**

Fixed Boot Order Priorities

This option prioritizes the order of bootable devices from which the system will boot. Press <Enter> on each entry from top to bottom to select devices.

- Dual Boot Order #1

- Dual Boot Order #2

- Dual Boot Order #3

- Dual Boot Order #4

- Dual Boot Order #5

- Dual Boot Order #6

- Dual Boot Order #7

- Dual Boot Order #8

- Dual Boot Order #9

- Dual Boot Order #10

- Dual Boot Order #11

- Dual Boot Order #12

- Dual Boot Order #13

- Dual Boot Order #14

- Dual Boot Order #15

▶**Add New Boot Option**

Use this item to select a new boot device to add to the boot priority list.

Add Boot Option

Select the target boot device to add to the boot priority list.

Path for Boot Option

Select the device path (-the file system) for the new boot device to use.

Create

After selecting a boot device to add and the path for this new device, choose this feature and click OK to add the new device to the boot priority list.

▶**Delete Boot Option**

Use this item to select a boot device to delete from the boot priority list.

Delete Boot Option

Select the target boot device to delete.

▶**Hard Disk Drive BBS Priorities**

- Boot Order #1

- Boot Order #2

▶**Network Drive BBS Priorities**

- Boot Order #1

▶**UEFI Application Boot Priorities**

- UEFI Boot Order #1

Save & Exit

Select the Save & Exit tab from the BIOS setup screen to configure the settings below.

Discard Changes and Exit

Select this option to quit the BIOS setup without making any permanent changes to the system configuration, and reboot the computer. Select Discard Changes and Exit from the Exit menu and press <Enter>.

Save Changes and Reset

When you have completed the system configuration changes, select this option to leave the BIOS setup utility and reboot the computer for the new system configuration parameters to take effect. Select Save Changes and Exit from the Exit menu and press <Enter>.

Save Options

Save Changes

When you have completed the system configuration changes, select this option to save all changes made. This will not reset (reboot) the system.

Discard Changes

Select this option and press <Enter> to discard all the changes and return to the AMI BIOS setup utility.

Restore Optimized Defaults

To set this feature, select Restore Optimized Defaults from the Exit menu and press <Enter>. These are manufacture default settings designed for maximum system performance but not for maximum stability.

Save as User Defaults

To set this feature, select Save as User Defaults from the Exit menu and press <Enter>. This enables the user to save any changes to the BIOS setup for future use.

Restore User Defaults

To set this feature, select Restore User Defaults from the Exit menu and press <Enter>. Use this feature to retrieve user-defined settings that were previously saved.

Boot Override

This feature allows the user to override the Boot priorities sequence in the Boot menu, and immediately boot the system with another device specified by the user. This is a one-time override.

BIOS Error Beep Codes

During the POST (Power-On Self-Test) routines, which are performed at each system boot, errors may occur.

Non-fatal errors are those which, in most cases, allow the system to continue to boot. The error messages normally appear on the screen.

Fatal errors will not allow the system to continue with bootup procedure. If a fatal error occurs, you should consult with your system manufacturer for possible repairs.

These fatal errors are usually communicated through a series of audible beeps. The numbers on the fatal error list correspond to the number of beeps for the corresponding error.

BIOS Error Beep Codes		
Beep Code/LED	**Error Message**	**Description**
1 beep	Refresh	Circuits have been reset. (Ready to power up)
5 short beeps + 1 long beep	Memory error	No memory detected in the system
5 beeps	No Con-In or Con-Out devices	Con-In includes USB or PS/2 keyboard, PCI or Serial Console Redirection. Con-Out includes Video Controller, PCI or Serial Console Redirection.

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