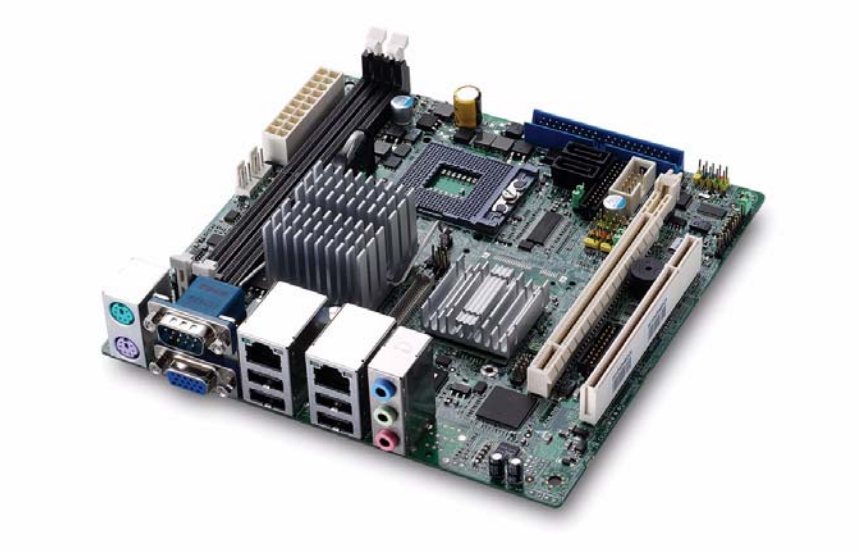
MI-965

Mini-ITX Industrial Motherboard with
Intel® GME965 Chipset

User's Manual



Manual Rev.: 2.01

Revision Date: December 12, 2008

Part No: 50-1X002-1000

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Revision History

Revision	Release Date	Description of Change(s)
2.00	2008/10/02	Initial Release
2.01	2008/12/12	Correct IO Shield Drawing

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Preface

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Using this Manual

Audience and Scope

The MI-965 User's Manual is intended for hardware technicians and systems operators with knowledge of installing, configuring and operating industrial grade single board computers.

Manual Organization

This manual is organized as follows:

Preface: Presents important copyright notifications, disclaimers, trademarks, and associated information on the proper understanding and usage of this document and its associated product(s).

Chapter 1, Introduction: Introduces the MI-965, its features, applications, and specifications, including functional descriptions and board layout.

Chapter 2, Connectors & Jumpers: Provides technical information on connectors and jumpers as well as pin assignments for configuring the MI-965 and any attached external devices.

Chapter 3, Getting Started: Illustrates how to install components on the MI-965, specifically, CPU, memory modules, operating systems and drivers.

Chapter 4, BIOS Setup: Presents information and illustrations to help understand and configure the system BIOS.

Chapter 5, POST Codes: Presents POST information and detailed descriptions for users.

Appendix A, Watchdog Timer: Presents information on understanding and configuring the embedded Watchdog timer.

Appendix B, System Resources: Presents information on I/O mapping, IRQ routing, and resource allocation.

Important Safety Instructions: Presents safety instructions all users must follow for the proper setup, installation and usage of equipment and/or software.

Getting Service: Contact information for ADLINK's worldwide offices.

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Conventions

Take note of the following conventions used throughout this manual to make sure that users perform certain tasks and instructions properly.



Additional information, aids, and tips that help users perform tasks.



Information to prevent ***minor*** physical injury, component damage, data loss, and/or program corruption when trying to complete a task.



Information to prevent ***serious*** physical injury, component damage, data loss, and/or program corruption when trying to complete a specific task.

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1 Introduction

This chapter will introduce the MI-965, its features, specifications and applications. This chapter also provides detailed information about the mechanics of the product and technical information to assist users.

1.1 Package Contents

Please check that your package contains the items below. If you discover damaged or missing items, please contact your vendor.

- MI-965 Industrial Mini-ITX Motherboard
- I/O shield x1
- SATA cable x2
- SATA power cable x2
- IDE cable x1
- COM + Printer cable with bracket x1
- Driver CD
- User's Manual



DO NOT install or apply power to equipment that is damaged or if there is missing/incomplete equipment. Retain the shipping carton and packing materials for inspection. Please contact your ADLINK dealer/vendor immediately for assistance. Obtain authorization from your dealer before returning any product to ADLINK.

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1.2 Overview

The ADLINK MI-965 is a Mini-ITX industrial motherboard supporting the next-generation Intel® Core 2 Duo/Intel® Celeron® processors in the Micro-FCPGA package to deliver a high performance and space-saving platform for a wide array of embedded computing applications. With a compact footprint, the MI-965 supports processing speeds up to 2.2 GHz and high-bandwidth network connectivity with PCI Express®-based gigabit LAN.

These advanced features, coupled with a dual-channel DDR2 system memory architecture, diverse I/O, storage, and audio interfaces make the MI-965 suitable for multimedia, automation control, and gaming applications requiring a compact, easy-to-deploy, and cost-effective mainboard.

1.3 Features

- Mini-ITX form factor
- Support Intel® mobile Core™ 2 Duo, Celeron® M processors in 478-pin micro-FCPGA package
- Integrated graphics controller, supports dual independent display
- Supports PCIe® x16, PCI™
- Onboard CompactFlash® socket
- RoHS compliant

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1.4 Specifications

System	
CPU/Cache	• Intel® Core™2 Duo Mobile Processor T7500, 2.2GHz, 4MB L2 cache, 800MHz FSB • Mobile Intel® Celeron® Processor 550, 2.0GHz, 1MB L2 cache, 533MHz FSB • Socket P 478-pin micro-FCPGA package
FSB	• 533/800MHz
Chipset	• North Bridge: Intel® GME965 chipset • South Bridge: Intel® ICH8M chipset
Memory	• DDR2 533/667 SDRAM (4GB Max) • 2 DDR2 DIMM slots (240pin / 1.8V)
BIOS	• AMI BIOS with 8 Mb Flash ROM
Audio	• HDA Codec by Realtek ALC888 • supports line-in, line-out and mic-in
Watch Dog Timer	• 1-255 second or 1-255 minute programmable and can generate system reset.
Hardware Monitor	• CPU/System temperature, fan speed and onboard DC voltage
Trusted Platform	• Supports TPM 1.2 via Infineon SLB 9635
I/O Interfaces	
IDE	• 1 IDE port by ICH8M • Supports Ultra DMA 66/100 mode • Supports PIO, Bus Master operation mode
CompactFlash	• One CompactFlash type II socket
Serial ATA	• Two serial ATA ports with 300 MB/s data transfer
Onboard I/O	• 2 USB 2.0 pin headers (4 ports) • 1 parallel port connector • 1 SPDIF connector • 1 LVDS connector • 1 TV-out connector • 1 digital I/O connector (16GPIO) • 1 serial port connector • 1 front panel connector

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I/O Interfaces (cont'd)	
Rear I/O	• 2 RJ-45 LAN • 4 USB 2.0 ports • 1 D-Sub VGA connector • 1 serial port • 2 PS2 keyboard/mouse ports • 3 audio jacks
Expansion Slots	• 1 PCI Express x16 slot • 1 32-bit/33MHz PCI slot • 1 CF socket
Display	
VGA	• GMA X3100 integrated in GME965 GMCH
VRAM	• Shared system memory up to 384 MB
CRT	• External Dsub-15 connector, resolution up to 2048 x 1536 @ 60 Hz
LVDS	• Internal 24-bit header, supports dual independent display
TV-Out	• Supported by optional TV-Out cable
Ethernet	
Controller	• Intel® 82573L & 82566DC
Ports	• Two RJ-45 Ethernet ports
Mechanical and Environment	
Form Factor	• Mini-ITX Industrial Motherboard
Dimensions	• 170 mm x 170 mm (L x W)
Operating Temp.	• 0°C to 55°C
Storage Temp.	• -20ºC to 80ºC
Safety	• CE, FCC Class A

Table 1-1: MI-965 General Specifications

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Power Consumption

Component	Description
CPU	Intel Core 2 Duo T7100 processor
Memory	Kingston 2G DDR2-667 x2
Add-On VGA	Nvidia FX1400 PCI-Express VGA Card x1
Hard Disk	Seagate 500G SATA2 7200rpm HDD x1
Operating system	Microsoft® Windows XP® Professional SP2

MI-965	3.3V	5V	12V	12V Main Connector	5V Standby	(-)12V
	Current(A)					
Enter DOS(Stable)	2.45	2.75	2.97	0	0.05	0.02
Enter BIOS(Stable)	2.42	2.74	2.97	0	0.05	0.02
Idle	1.64	2.37	1.92	0	0.05	0.01
CPU Stress 100%	1.66	2.7	3.5	0	0.05	0.02
Windows stress (3dMARK2006)	1.66	3.22	4.5	0	0.05	0.02
Windows Desktop Standby S1 w/wo two LANs connected (stable)	1.08/ 1.07	1.78/ 1.76	1.58/ 1.56	0	0.08/ 0.08	0.02
Windows Desktop Standby S3 w/wo two LANs connected (stable)	0	0	0	0	0.45/ 0.44	0
Windows Desktop Hibernate S4 w/wo two LANs connected (stable)	0	0	0	0	0.25/ 0.24	0
Windows Desktop Soft Off S5 w/wo two LANs connected (stable)	0	0	0	0	0.25/ 0.24	0

Table 1-2: MI-965 Power Consumption

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1.5 Block Diagram

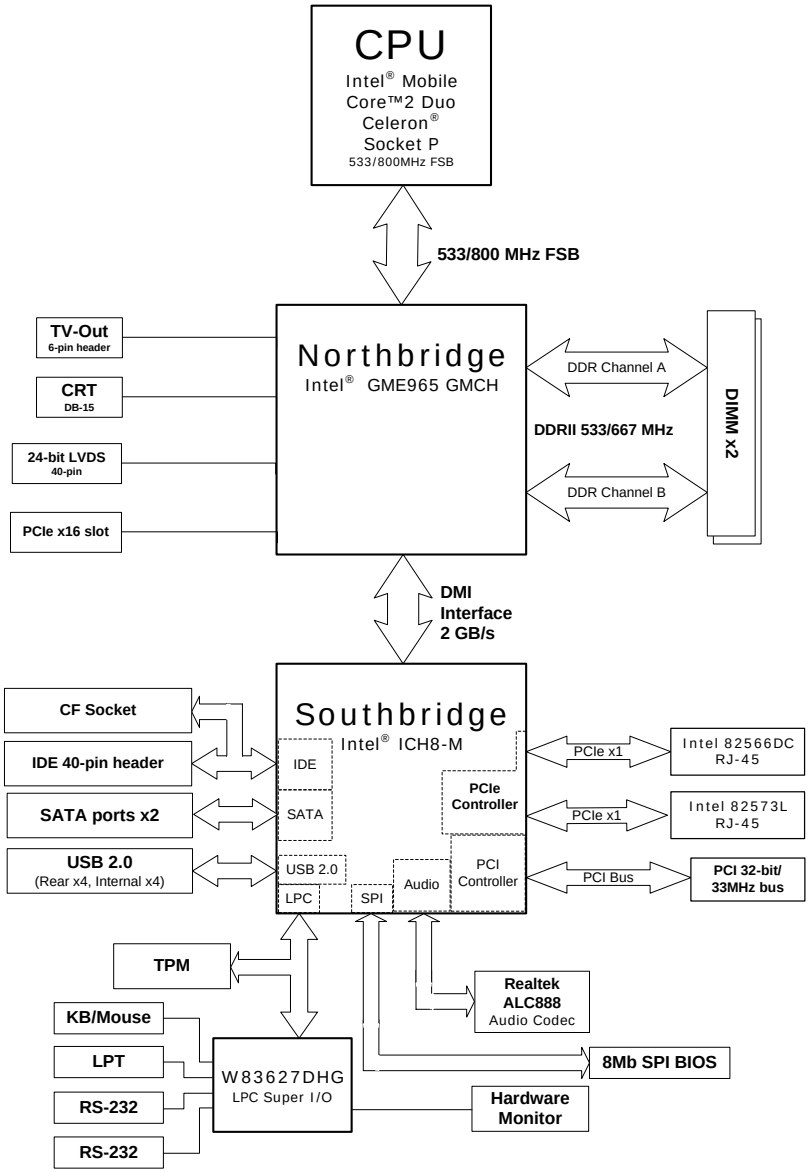


Figure 1-1: MI-965 Block Diagram

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1.6 Functional Description

Processor Support

The MI-965 motherboard features the Socket P interface designed for Intel processors in the Micro-FCPGA package. The motherboard features a powerful 533/800 MHz Front Side Bus (FSB).

Providing high-performance computing and energy-efficiency, the MI-965 is designed for the next-generation Intel® Core 2 Duo and Celeron® processors based on 65nm process technology. The MI-965 supports dual-core processing when deployed with a CPU containing two physical cores and dedicated L2 caches to meet the ever-increasing demands of industrial computing.

Intel® GME965 Express chipset

The Intel® GME965 Express chipset, featuring the Intel® GME965 graphics memory controller hub (GMCH) and the Intel® ICH8M I/O controller hub, provides the vital interfaces for the motherboard. The Intel® GME965 comes with the Intel® Graphics Media Accelerator X3100, an integrated graphics engine with enhanced 3D/2D graphics rendering and video capabilities. The GMCH also provides the interface for the processor and system memory.

The Intel® ICH8-M Southbridge is the eighth generation of Intel I/O controller hub that provides key interfaces such as PCI Express®, USB 2.0, and SATA II.

Dual-channel DDR2 memory

To meet the requirements of memory-intensive applications, the MI-965 has a dual-channel memory architecture supporting DDR2 533/667 MHz DIMMs. The high-bandwidth memory specification, meets the requirements of the latest 3D graphics, multimedia, and network application, and boosts system performance by eliminating bottlenecks.

Intel® Graphics Media Accelerator X3100

The Intel® Graphics Media Accelerator (GMA) X3100 revolutionizes integrated graphics with new capabilities that provide significant increase in graphics performance. With support for DirectX 9

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hardware acceleration, 333 MHz display clock, and up to 384 MB of video memory, the Intel GMA X3100 provides a cost-effective and high-performance graphics solution. The MI-965 comes with the dual-independent display technology, enabling different contents to be displayed on two separate display terminals or a single content stretched across two display devices for expanded workspace.

Gigabit Ethernet

The motherboard is equipped with the Intel® 82573L and 82566DC. 82566DC is a single port Gigabit Ethernet Physical Layer Transceiver (PHY) that connects to its MAC through a dedicated interconnects. Both 82573L and 82566DC are based on Intel's Gigabit PHY technology, and supports operation at data rates of 10/100/1000 Mbps. Utilizing its wide bandwidth, the gigabit LAN controller allows up to 1 Gbps of data transfer rate for superior network communications.

PCI Express®

The MI-965 fully supports the PCI Express® technology with one PCI Express® x16 slot. The PCI Express x16 graphics interface offers increased bandwidth and scalability over AGP 8X. PCI Express x16 allows up to 4 GB/s of peak bandwidth per direction, and up to 8 GB/s concurrent bandwidth.

Serial ATA II technology

Storage is efficient and secure with the Serial ATA II interface. Utilizing the Intel® ICH8M, the MI-965 supports up to two Serial ATA II devices capable of reading/writing data at up to 3 Gbps. The SATA specification improves chassis airflow via thinner and more flexible cables with lower pin count.

Universal Serial Bus (USB) 2.0

The MI-965 incorporates the Universal Serial Bus (USB) 2.0 specification that increases peripheral connection speed from 12 Mbps (USB 1.1) to 480 Mbps. USB 2.0 is backward compatible with USB 1.1.

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Hardware monitoring

A built-in, proactive hardware monitoring system in the ASIC monitors the CPU temperature, system fan rotations, and voltage levels to prevent overheating and/or component damage, effect timely failure detection, and ensure stable supply of current for critical motherboard components.

Watchdog Timer

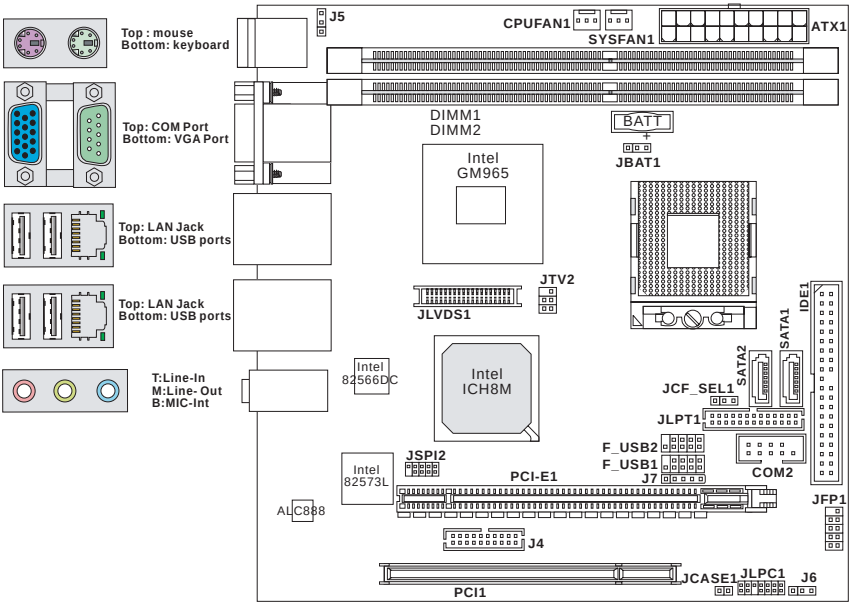
The watchdog timer (WDT) monitors system operations based on user-defined configurations. The WDT can be programmed for different time-out periods, such as from 1 to 255 seconds or from 1 to 255 minutes. The WDT generates a reset signal, then a reset request, after failure to strobe it within the programmed time period. A register bit may be enabled to indicate if the watchdog timer caused the reset event. The WDT register is cleared during the power-on sequence to enable the operating system to take appropriate action when the watchdog generates a reboot.

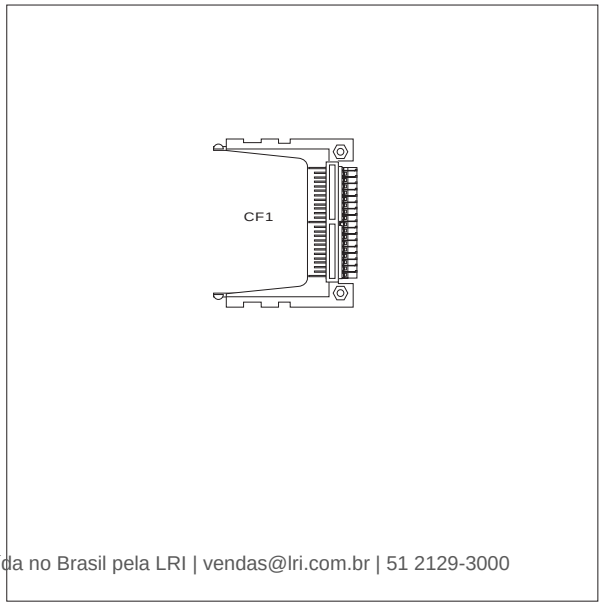
Software

The MI-965 is compatible with all major operating systems. ADLINK provides additional drivers for ADLINK peripherals. Hardware and software drivers may be found on the Driver CD.

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1.7 Board Layout

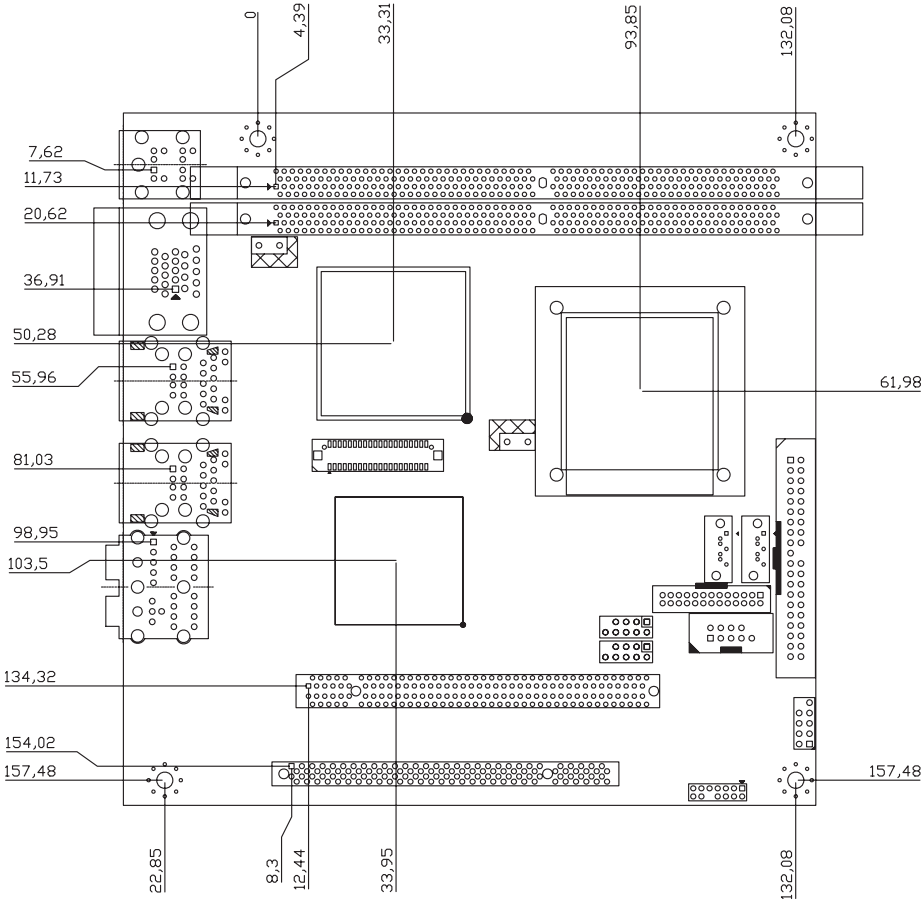




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Figure 1-2: MI-965 Board Layout

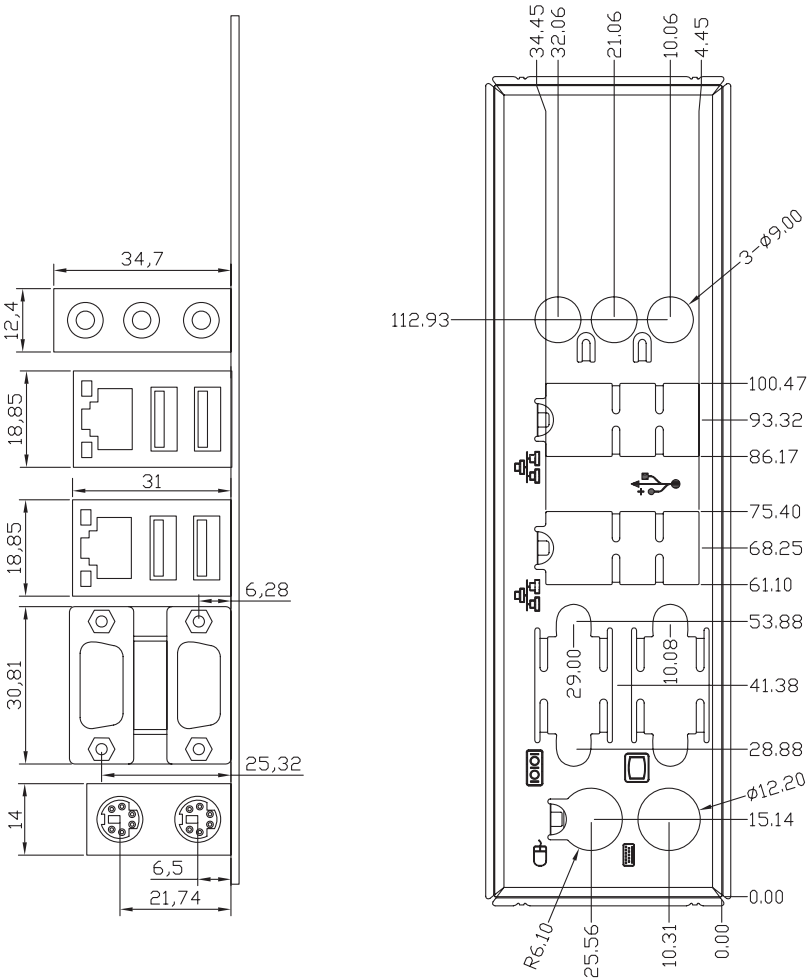
1.8 Mechanical Drawings



Dimensions in mm

Figure 1-3: MI-965 Board Dimensions (top view)

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Dimensions in mm

Figure 1-4: MI-965 Rear I/O Dimensions

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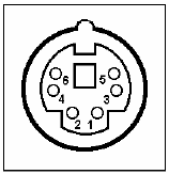
2 Connectors & Jumpers

The connectors and jumpers on the MI-965 allow you to connect and configure external devices such as keyboard, floppy disk drives, hard disk drives, printers, etc. The following subsections specify the pin assignments for connectors and jumper blocks on the MI-965. Refer to **Figure 1-2: MI-965 Board Layout** for connector and jumper locations.

2.1 Rear I/O Connectors

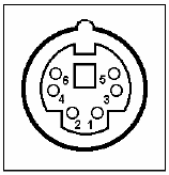
PS/2 Mouse Port (green)

Pin #	Signal	Function
1	MSDATA	Mouse Data
2	NC	not connected
3	GND	Ground
4	+5V	Power
5	CLK	Clock
6	NC	not connected



PS/2 Keyboard Port (purple)

Pin #	Signal	Function
1	KBDATA	Keyboard Data
2	NC	not connected
3	GND	Ground
4	+5V	Power
5	CLK	Clock
6	NC	not connected



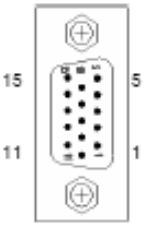
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Serial Port Connector (COM1)

Pin #	RS-232
1	DCD, Data carrier detect
2	RXD, Receive data
3	TXD, Transmit data
4	DTR, Data terminal ready
5	IsoGND, Isolated ground
6	DSR, Data set ready
7	RTS, Request to send
8	CTS, Clear to send
9	RI, Ring indicator

VGA Connector.

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

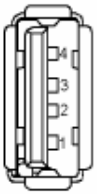


Audio I/O port

The three-jack audio I/O supports Line-In, Line-Out, and Mic-In functions. The Line-In jack (blue) connects to an audio source such as tape recorders, etc. The green Line-Out port connects a speaker or headphone, while the pink Mic-In jack connects a microphone.

USB Connectors

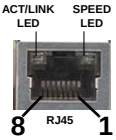
Pin #	Signal Name
1	Vcc
2	USB2/3-
3	USB2/3+
4	GND



LAN Port (RJ-45)

This port allows gigabit connection to a Local Area Network (LAN) using a network hub. The LAN port comes with an activity/link and speed LED. Refer to the tables below for the LAN port pin definitions and LED indications.

Pin #	Signal Name
1	GBE0_MDI0+
2	GBE0_MDI0-
3	GBE0_MDI1+
4	GBE0_MDI2+
5	GBE0_MDI2-
6	GBE0_MDI1-
7	GBE0_MDI3+
8	GBE0_MDI3-

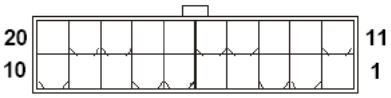


Status		LED1	LED2
Network link is not established or system powered off		OFF	OFF
10 Mbps	Link	OFF	ON
	Active	OFF	Blinking
100 Mbps	Link	ON	OFF
	Active	Blinking	OFF
1000 Mbps	Link	Blinking	ON
	Active	Blinking	Blinking

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2.2 Onboard Connectors

ATX Power Connector (ATX1)



Pin #	Signal	Pin #	Signal
1	3.3V	13	3.3V
2	3.3V	14	- 12V
3	GND	15	GND
4	5V	16	PS On
5	GND	17	GND
6	5V	18	GND
7	GND	19	GND
8	Power Good	20	- 5V
9	5VSB	21	5V
10	12V	22	5V

Chassis Intrusion Connector (JCASE1)

This connector connects to the chassis intrusion switch cable. If the chassis is opened, the chassis intrusion mechanism will be activated. The system will record this status and show a warning message on the screen. To clear the warning, you must enter the BIOS utility and clear the record.

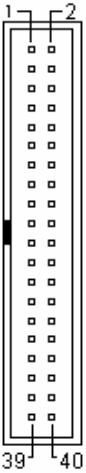
Pin #	Signal Name
1	CINTRU
2	GND



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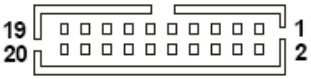
IDE Connector (IDE1)

Pin #	Signal	Pin #	Signal
1	Reset IDE	2	Ground
3	Host data 7	4	Host data 8
5	Host data 6	6	Host data 9
7	Host data 5	8	Host data 10
9	Host data 4	10	Host data 11
11	Host data 3	12	Host data 12
13	Host data 2	14	Host data 13
15	Host data 1	16	Host data 14
17	Host data 0	18	Host data 15
19	Ground	20	NC
21	DRQ0 / DRQ1	22	Ground
23	Host IOW	24	Ground
25	Host IOR	26	Ground
27	IOCHRDY	28	Host ALE
29	DACK0 / DACK1	30	Ground
31	IRQ14 / IRQ 15	32	No connect
33	Address 1	34	No connect
35	Address 0	36	Address 2
37	Chip select 0	38	Chip select 1
39	Activity	40	Ground



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Digital IO Connector (J4)



Pin #	Signal	Pin #	Signal
1	VCC3	13	VCC5
2	N_GPIO10	14	N_GPIO20
3	N_GPIO11	15	N_GPIO21
4	N_GPIO12	16	N_GPIO22
5	N_GPIO13	17	N_GPIO23
6	N_GPIO14	18	N_GPIO24
7	N_GPIO15	19	N_GPIO25
8	N_GPIO16	20	N_GPIO26
9	N_GPIO17	21	N_GPIO27
10	GND	22	NC

Serial ATA Connectors (SATA1-2))

Pin #	Signal
1	GND
2	TXP (A +)
3	TXN (A -)
4	GND
5	RXN (B -)
6	RXP (B +)
7	GND



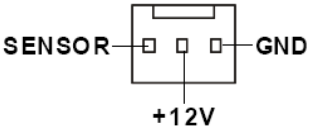
SPI Flash ROM Connector (JSPI2)

Pin #	Signal	Pin #	Signal
1	VCC3_SB	2	VCC3_SB
3	SPI_MISO_F	4	SPI_MOSI_F
5	SPI_CS0_F#	6	SPI_CLK_F
7	GND	8	GND
9	SPI_HOLD#	10	NC

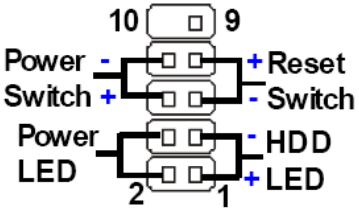


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Fan Power Connectors (CPUFAN1, SYSFAN1)



Front Panel Connector (JFP1)

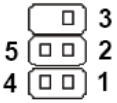


Pin #	Signal	Description
1	HD_LED +	Hard disk LED pull-up
2	FP PWR/SLP	MSG LED pull-up
3	HD_LED -	Hard disk active LED
4	FP PWR/SLP	MSG LED pull-up
5	RST_SW -	Reset Switch low reference pull-down to GND
6	PWR_SW +	Power Switch high reference pull-up
7	RST_SW +	Reset Switch high reference pull-up
8	PWR_SW -	Power Switch low reference pull-down to GND
9	RSVD_DNU	Reserved. Do not use.
10	NC	NC

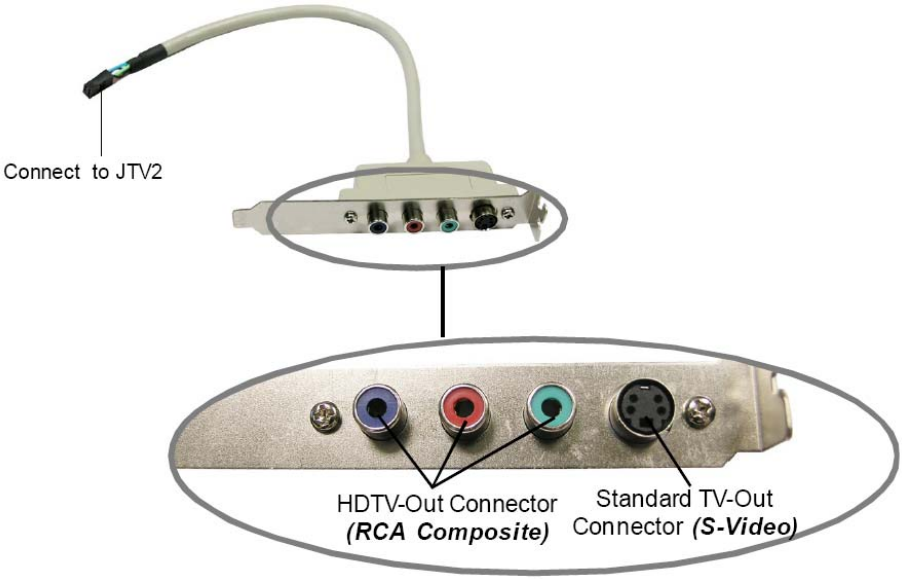
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TV-Out Connector (JTV2)

Pin #	Signal	Pin #	Signal
1	GND	4	GND
2	LCVBS	5	LC
3	LY	6	NC

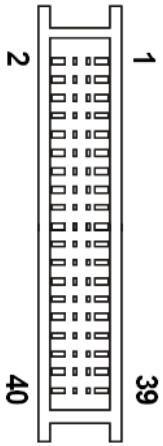


TV-Out Bracket (optional)



LVDS Flat Panel Connector (JLVDS1)

Pin #	Signal	Pin #	Signal
1	+12V	2	+12V
3	+12V	4	+12V
5	+12V	6	GND
7	VCC3/VCC5	8	GND
9	LCD_VDD	10	LCD_VDD
11	LDDC_CLK	12	LDDC_DATA
13	L_BKLTCTL	14	LVDS_VDDEN
15	L_BKLTEN	16	GND
17	LA_DATA0#	18	LA_DATA0
19	LA_DATA1#	20	LA_DATA1
21	LA_DATA2#	22	LA_DATA2
23	LA_CLK#	24	LA_CLK
25	LA_DATA3#	26	LA_DATA3
27	GND	28	GND
29	LB_DATA0#	30	LB_DATA0
31	LB_DATA1#	32	LB_DATA1
33	LB_DATA2#	34	LB_DATA2
35	LB_CLK#	36	LB_CLK
37	LB_DATA3#	38	LB_DATA3
39	GND	40	GND



Note: Refer to LVDS Power Selection Jumper (J7).

USB Connector (F_USB1, F_USB2)

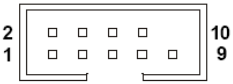
Pin #	Signal	Pin #	Signal
1	VCC	2	VCC
3	USB0-	4	USB1-
5	USB0+	6	USB1+
7	GND	8	GND
9	Key	10	NC



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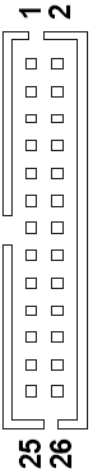
Serial Port Connector (COM2))

Pin #	Signal	Functions
1	DCD	Data Carry Detect
2	SIN	Serial In or Receive Data
3	SOUT	Serial Out or Transmit Data
4	DTR	Data Terminal Ready
5	GND	Ground
6	DSR	Data Set Ready
7	RTS	Request To Send
8	CTS	Clear To Send
9	VCC_COM3	Power Source
10	NC	NC



Parallel Port Connector (JLPT1)

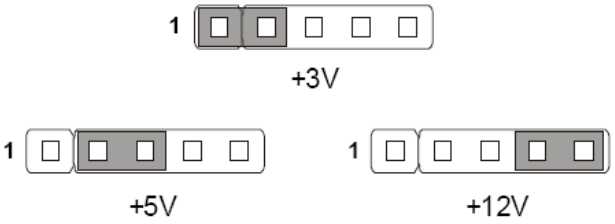
Pin #	Signal	Pin #	Signal
1	RSTB#	2	AFD#
3	PRND0	4	ERR#
5	PRND1	6	PINIT#
7	PRND2	8	LPT_SLIN#
9	PRND3	10	GND
11	PRND4	12	GND
13	PRND5	14	GND
15	PRND6	16	GND
17	PRND7	18	GND
19	ACK#	20	GND
21	BUSY	22	GND
23	PE	24	GND
25	SLCT	26	GND



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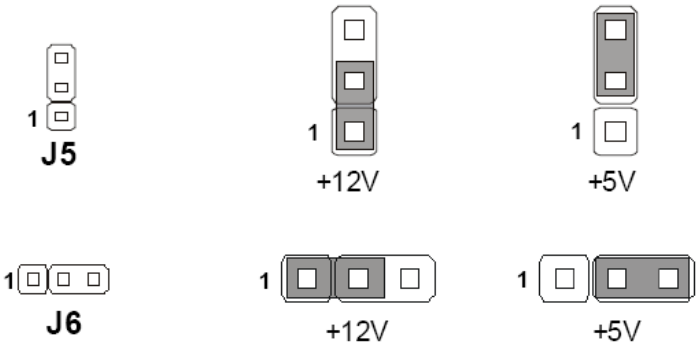
2.3 Jumpers

LVDS Power Selection Jumper (J7)

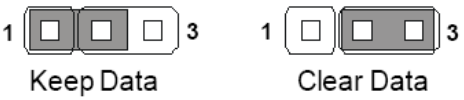


COM Port Power Jumpers (J5, J6)

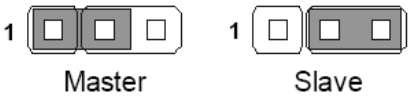
J5 corresponds to COM1, J6 corresponds to COM2.



Clear CMOS Jumper (JBAT1)



CF Mode Selecting Jumper (JCF_SEL1)



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3 Getting Started

This chapter provides information on how to install components to the MI-965 SBC. Specifically, the installation of CPU, memory modules, and operating system are explained.

3.1 Installing the CPU

The MI-965 Supports the Intel® Core™ 2 Duo, Celeron® M processors in the Micro-FCPGA package using the Socket P interface. To install the CPU on the main board, follow the instructions below.

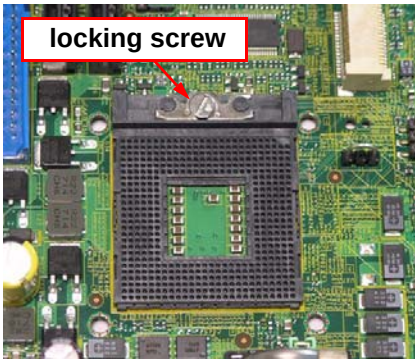
CAUTION:

Overheating will seriously damage the CPU and system. Always make sure the cooling fan is functioning properly to protect the CPU from overheating.

Make sure that you apply an even layer of thermal paste (or thermal tape) between the CPU and the heatsink to allow heat dissipation.

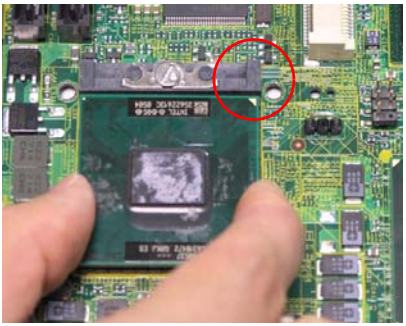
Before replacing the CPU, always turn off the power supply or unplug the power supply's power cord from the grounded outlet to ensure the safety of CPU.

1. Locate the CPU socket on the MI-965. Fully turn the CPU locking screw counter-clockwise as far as it will go.

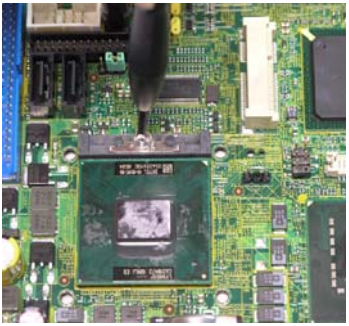


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2. Carefully place the CPU into the CPU socket. Be sure to align the gold triangle on the corner of the chip with the triangular marking in the corner of the socket.



3. Press down gently on the chip to ensure that it is securely in place, and then fully turn the CPU locking screw clockwise as far as it will go to lock the CPU into position.



.

CAUTION:

A CPU heatsink and fan are **not** included with the MI-965. Obtain a suitable CPU cooler and follow the installation instructions provided with your unit. Connect the fan power cable to the CPUFAN1 socket.

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3.2 Memory Module Installation

The MI-965 supports up to 4 GB of DDR2 533/667 SDRAM in two 240-pin DIMM sockets. The DDR2 memory modules are notched to facilitate correct installation in the DIMM sockets.

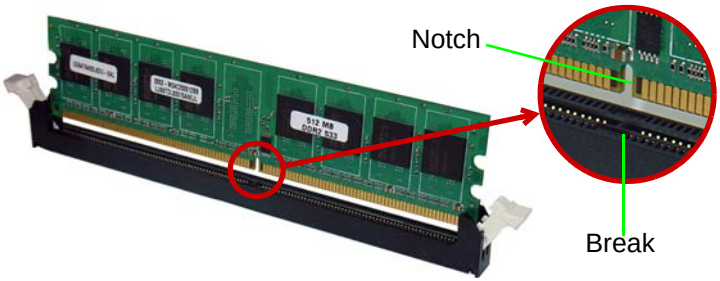
- ▶ It is recommended that you install DIMMs with the same CAS latency. For maximum compatibility, install memory modules with the same brand, model, and/or rating.

To install a memory module:

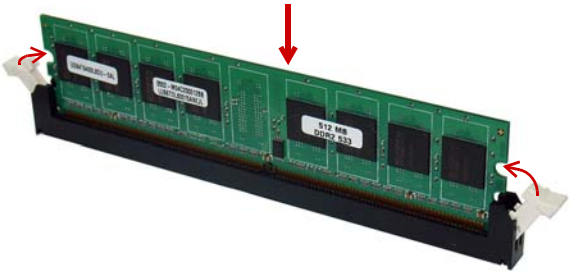
1. Locate the DIMM slots on the motherboard.
2. Press the socket's retaining clips outward to unlock.



3. Align the memory module on the socket making sure that the notch matches the break on the socket.



4. Insert the module firmly into the slot until the retaining clips snap back inwards and the module is securely seated.



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3.3 Driver Installation

The MI-965 drivers are located in the following directories on the Driver CD, or can be downloaded from the ADLINK website (**http://www.adlinktech.com**):

Chipset driver	\CHIPSET\Intel\INF8.3.0.1013\
Display driver	\SVGA\Intel\GM965\Winxp32\
LAN driver	\NETWORK\Intel\
TPM driver	\TPM\Win32\
Audio driver	\SOUND\REALTEK\ALC888\windows\R187\

Follow the instructions below to install the required MI-965 drivers:

1. Install the Windows operating system before installing any driver. Most standard I/O device drivers are installed during Windows installation.
2. Install the chipset driver by running the program **X:\CHIPSET\Intel\INF8.3.0.1013\infinst_autol.exe**. Follow the instructions given and reboot when instructed.
3. Install the VGA driver and utilities by running the program **X:\SVGA\Intel\GM965\Winxp32\setup.exe**. Follow the instructions given and reboot when instructed.
4. Install the LAN driver by running the program **X:\NETWORK\Intel\autorun.exe**. Follow the instructions given and reboot if required.
5. Install the Audio driver by running the program **X:\SOUND\REALTEK\ALC888\windows\R187\setup.exe**. Follow the instructions given and reboot if required.
6. Install the TPM driver by running the program **X:\TPM\Win32\setup.exe**. Follow the instructions given and reboot if required.

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4 BIOS Setup

The following chapter describes basic navigation for the AMIBIOS®8 BIOS setup utility.

4.1 Starting the BIOS

To enter the setup screen, follow these steps:

1. Power on the motherboard
2. Press the < Delete > key on your keyboard when you see the following text prompt:
   < Press DEL to run Setup >
3. After you press the < Delete > key, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as Chipset and Power menus.



Note: In most cases, the < Delete > key is used to invoke the setup screen. There are several cases that use other keys, such as < F1 >, < F2 >, and so on.

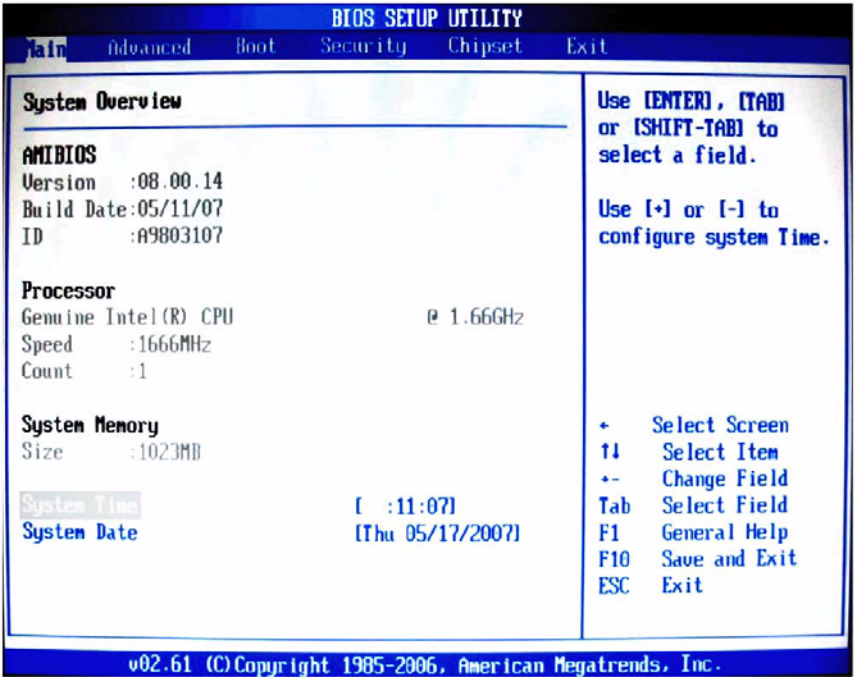
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Setup Menu

The main BIOS setup menu is the first screen that you can navigate. Each main BIOS setup menu option is described in this user's guide.

The Main BIOS setup menu screen has two main frames. The left frame displays all the options that can be configured. "Grayed" options cannot be configured, "Blue" options can be.

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.

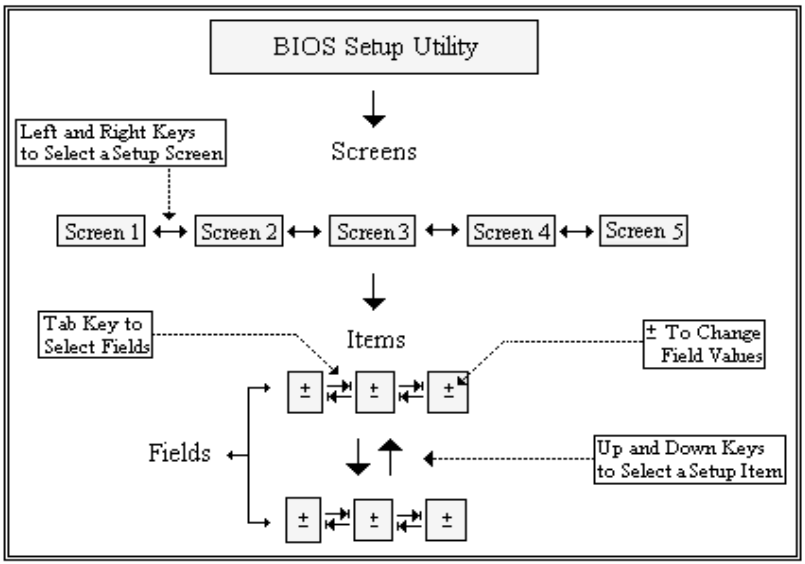


Navigation

The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process.

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These keys include < F1 >, < F10 >, < Enter >, < ESC >, < Arrow > keys, and so on. .



Note: There is a hot key legend located in the right frame on most setup screens.

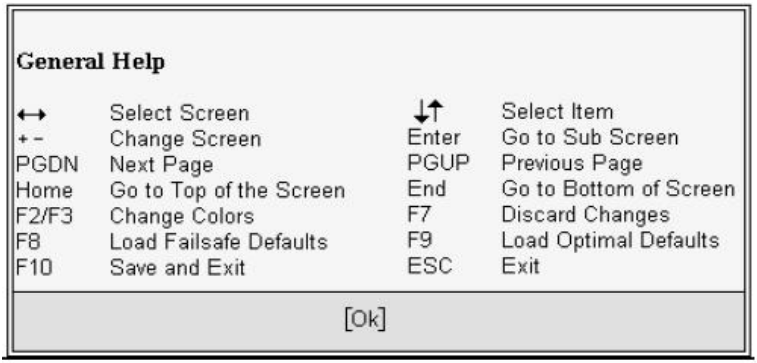
The < F8 > key on your keyboard is the Fail-Safe key. It is not displayed on the key legend by default. To set the Fail-Safe settings of the BIOS, press the < F8 > key on your keyboard. It is located on the upper row of a standard 101 keyboard. The Fail-Safe settings allow the motherboard to boot up with the least amount of options set. This can lessen the probability of conflicting settings.

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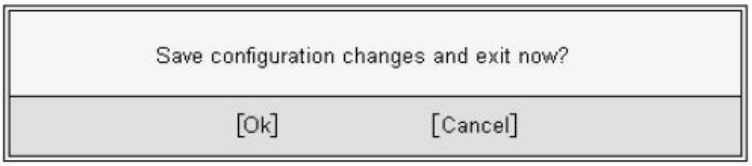
Hotkey Descriptions

F1 The < F1 > key allows you to display the General Help screen.

Press the < F1 > key to open the General Help screen.

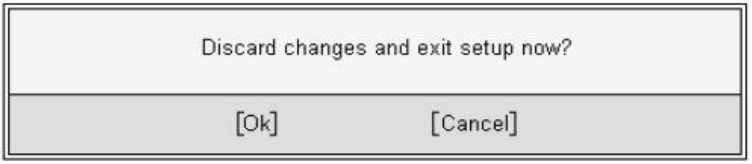


F10 The < F10 > key allows you to save any changes you have made and exit Setup. Press the < F10 > key to save your changes. The following screen will appear:



Press the < Enter > key to save the configuration and exit. You can also use the < Arrow > key to select Cancel and then press the < Enter > key to abort this function and return to the previous screen.

ESC The < Esc > key allows you to discard any changes you have made and exit the Setup. Press the < Esc > key to exit the setup without saving your changes. The following screen will appear:



Press the < Enter > key to discard changes and exit. You can also use the < Arrow > key to select Cancel and then press

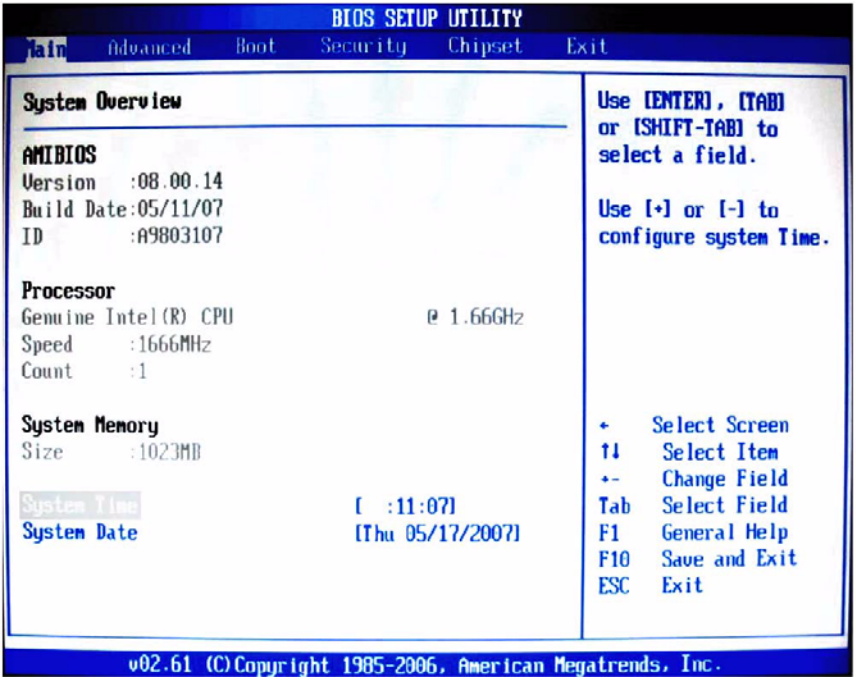
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the < Enter > key to abort this function and return to the previous screen.

Enter The < Enter > key allows you to display or change the setup option listed for a particular setup item. The < Enter > key can also allow you to display the setup sub-screens.

4.2 Main Setup

When you first enter the Setup Utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. There are two Main Setup options. They are described in this section. The Main BIOS Setup screen is shown below.



System Time/System Date

Use this option to change the system time and date. Highlight System Time or System Date using the < Arrow > keys. Enter new values using the keyboard. Press the < Tab > key or the < Arrow >

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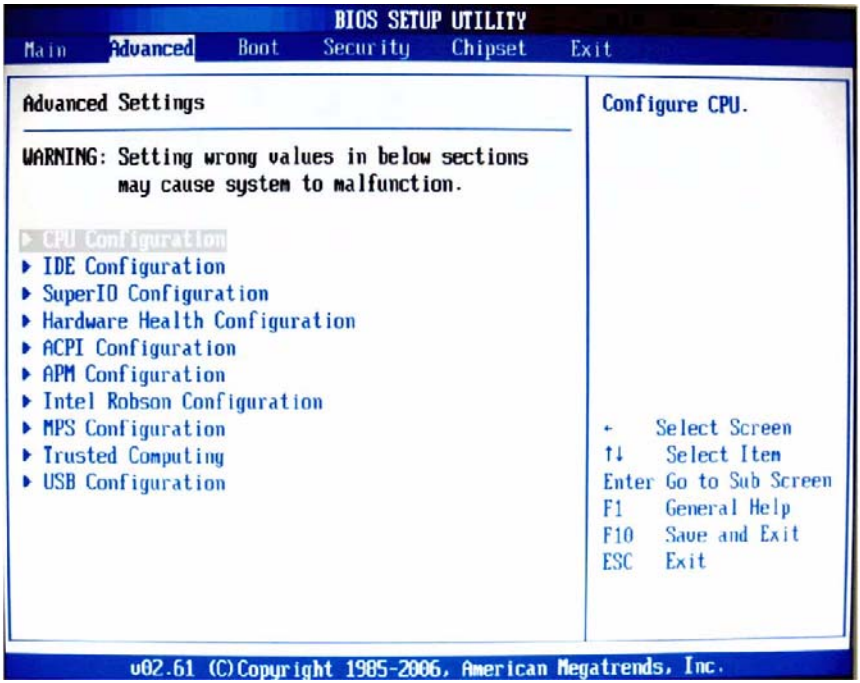
keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

Note: The time is in 24-hour format. For example, 5:30 A.M. appears as 05:30:00, and 5:30 P.M. as 17:30:00.

4.3 Advanced BIOS Setup

Select the Advanced tab from the setup screen to enter the Advanced BIOS Setup screen. You can select any of the items in the left frame of the screen, such as SuperIO Configuration, to go to the sub menu for that item. You can display an Advanced BIOS Setup option by highlighting it using the < Arrow > keys. The Advanced BIOS Setup screen is shown below.

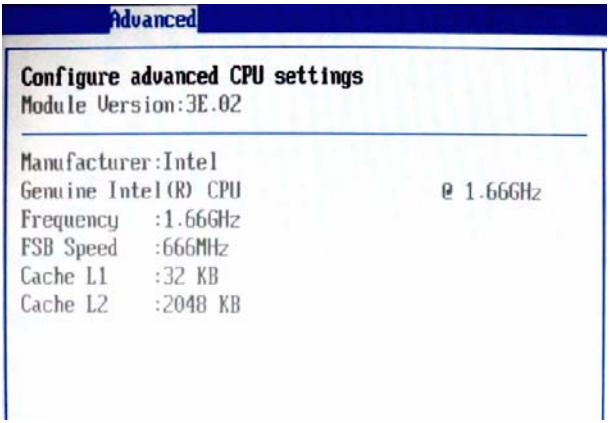
The sub menus are described on the following pages.



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CPU Configuration

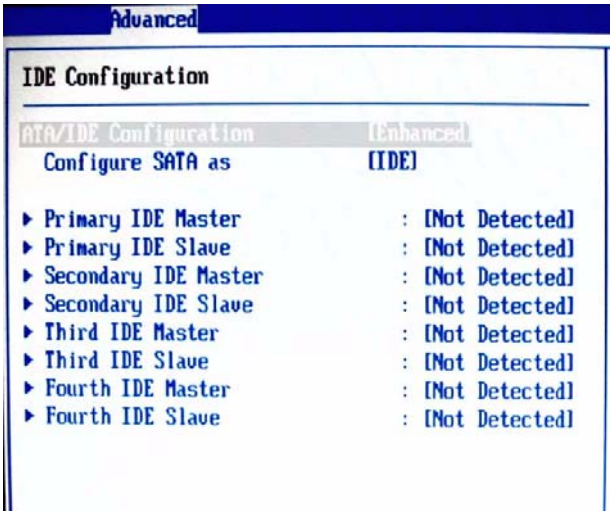
This screen displays the advanced configurations of your CPU (non-configurable).



IDE Configuration

You can use this screen to select options for the IDE Configuration Settings. Use the up and down < Arrow > keys to select an item. Use the < + > and < - > keys to change the value of the selected option. A description of the selected item appears on the right side of the screen. The settings are described on the following pages. An example of the IDE Configuration screen is shown below.

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ATA/IDE Configuration

This item specifies whether the IDE channels should be initialized in Compatible or Enhanced mode of operation. The settings are **Disabled**, **Compatible** and **Enhanced**.

Configure SATA as

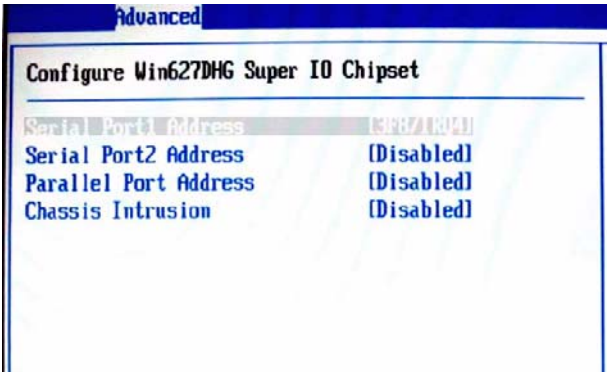
This item specifies function of the SATA channels. The settings are **IDE mode** and **AHCI mode**.

Primary IDE Master/Slave, Secondary IDE Master/Slave, Third IDE Master/Slave, Fourth IDE Master/Slave

Select one of the hard disk drives to configure it. Press < Enter > to access its sub menu.

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Super IO Configuration



Serial Port 1 / 2 Address

Select an address and a corresponding interrupt for Serial Port 1/2.

Parallel Port Address

This setting specifies the I/O port address and IRQ of the onboard parallel port.

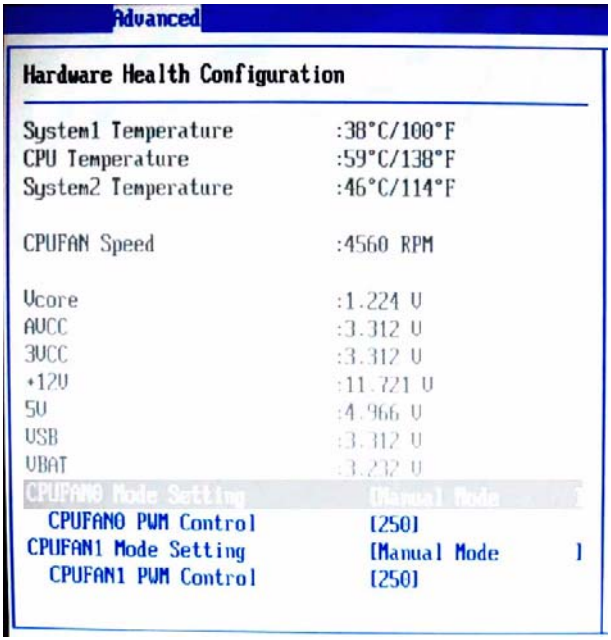
Chassis Intrusion

The field enables or disables recording the chassis intrusion status and issuing a warning message if the chassis is opened. To clear the warning message, set the field to [Reset]. The setting of the field will automatically be returned to [Enabled].

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Hardware Health Configuration

This option displays the current status of all of the monitored hardware devices / components such as voltages and temperatures.



CPUFAN0 / CPUFAN1 Mode Setting

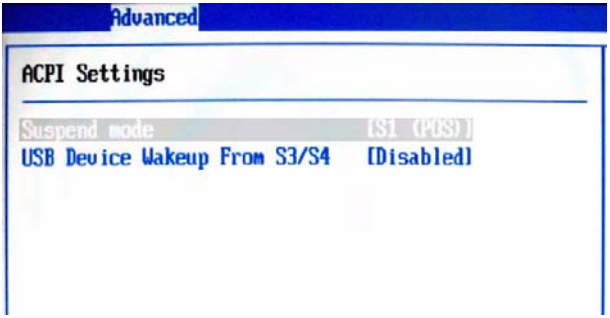
These settings specify the operation mode of the CPU fans.

CPUFAN0 / CPUFAN1 PWM Control

These settings control the PWM duty cycle of the CPU fans.

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ACPI Settings



Suspend Mode

This item specifies the power saving modes for ACPI function. If your operating system supports ACPI, you can choose to enter the Standby mode in S1 (POS) or S3 (STR) fashion through the setting of this field. Options are:

[S1 (POS)]: The S1 sleep mode is a low power state. In this state, no system context is lost (CPU or chipset) and hardware maintains all system context.

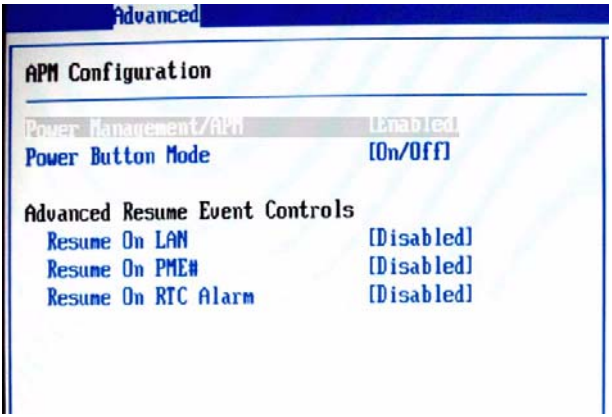
[S3 (STR)]: The S3 sleep mode is a lower power state where the information of system configuration and open applications/ files is saved to main memory that remains powered while most other hardware components turn off to save energy. The information stored in memory will be used to restore the system when a “wake up” event occurs.

USB Device Wakeup from S3/S4

This setting allows the activity of the USB device to wake up the system from S3/S4 sleep state.

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APM Configuration



Power Management/APM

Setting to [Enabled] will activate an Advanced Power Management (APM) device to enhance Max Saving mode and stop CPU internal clock.

Power Button Mode

This setting controls the operation of the power button.

Resume On LAN

This field specifies whether the system will be awakened from power saving modes when activity or input signal of onboard LAN is detected.

Resume On PME#

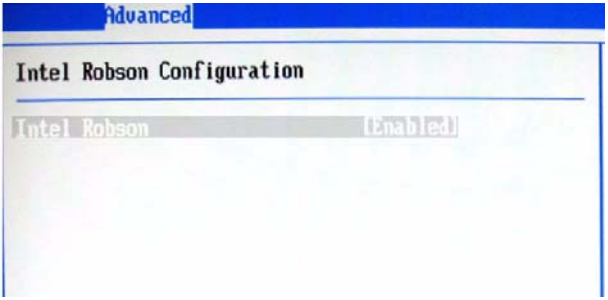
When setting to [Enabled], this setting allows your system to be awakened from the power saving modes through any event on PME (Power Management Event).

Resume On RTC Alarm

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

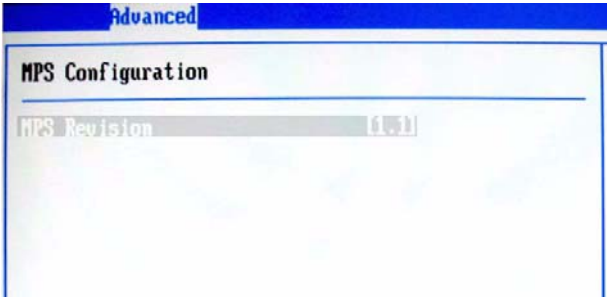
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Intel Robson Configuration



Robson is the code name for a new Intel platform technology that uses non-volatile memory (Flash memory) to increase system responsiveness, make multi-tasking faster, and extend battery life. Intel Robson technology is poised to eliminate many of the bottlenecks associated with HDD latency. By enabling the majority of application workload to be written and read from a system cache instead of the HDD, Robson will offer users of mobile computers built on the Santa Rosa platform significantly increased performance -- particularly in application load and run time, the speed in which systems resume operation after hibernation or boot, and in system-level power usage.

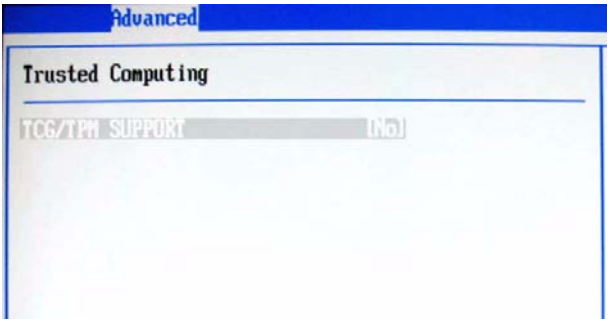
MPS Configuration



This field allows you to select which MPS (Multi-Processor Specification) version to be used for the operating system. You need to select the MPS version supported by your operating system. To find out which version to use, consult the vendor of your operating system.

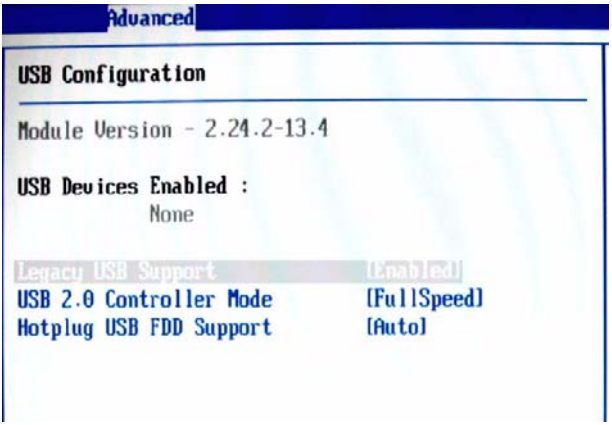
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Trusted Computing



This setting controls the Trusted Platform Module (TPM) designed by the Trusted Computing Group (TCG). TPMs are special-purpose integrated circuits (ICs) built into a variety of platforms to enable strong user authentication and machine attestation—essential to prevent inappropriate access to confidential and sensitive information and to protect against compromised networks.

USB Configuration



Legacy USB Support

Set to [Enabled] if you need to use any USB 1.1/2.0 device in the operating system that does not support or have any USB 1.1/2.0 driver installed, such as DOS and SCO Unix.

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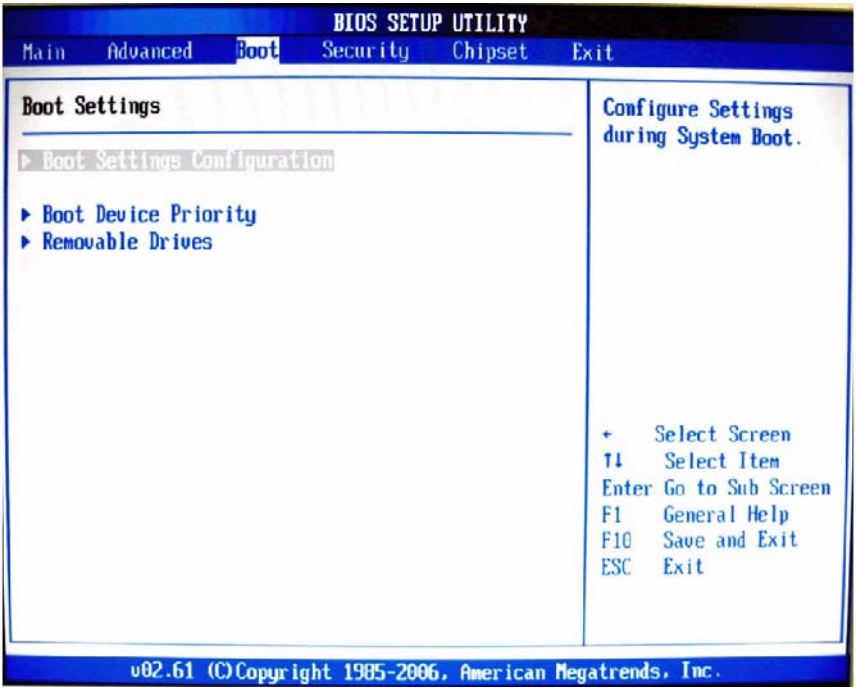
USB 2.0 Controller Mode

This setting specifies the operation mode of the onboard USB 2.0 controller.

Hotplug USB FDD Support

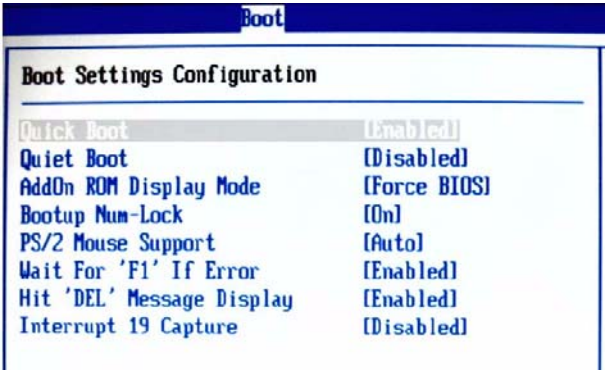
Set to [Enabled] if your need to use a hotplug USB-interfaced FDD in the operating system that does not support or have any USB driver installed, such as DOS and SCO Unix.

4.4 Boot Setup



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Boot Setting Configuration



Quick Boot

Enabling this setting will cause the BIOS power-on self test routine to skip some of its tests during bootup for faster system boot.

Quiet Boot

This BIOS feature determines if the BIOS should hide the normal POST messages with the motherboard or system manufacturer's fullscreen logo.

When it is enabled, the BIOS will display the full-screen logo during the boot-up sequence, hiding normal POST messages.

When it is disabled, the BIOS will display the normal POST messages, instead of the full-screen logo.

Please note that enabling this BIOS feature often adds 2-3 seconds of delay to the booting sequence. This delay ensures that the logo is displayed for a sufficient amount of time. Therefore, it is recommended that you disable this BIOS feature for a faster boot-up time.

AddOn ROM Display Mode

This item is used to determine the display mode when an optional ROM is initialized during POST. When set to [Force BIOS], the display mode used by AMI BIOS is used. Select [Keep Current] if you want to use the display mode of optional ROM.

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Bootup Num-Lock

This setting is to set the Num Lock status when the system is powered on. Setting to [On] will turn on the Num Lock key when the system is powered on. Setting to [Off] will allow users to use the arrow keys on the numeric keypad.

PS/2 Mouse Support

Select [Enabled] if you need to use a PS/2-interfaced mouse in the operating system.

Wait For 'F1' If Error

When this setting is set to [Enabled] and the boot sequence encounters an error, it asks you to press F1. If disabled, the system continues to boot without waiting for you to press any keys.

Hit 'DEL' Message Display

Set this option to [Disabled] to prevent the message as follows:

Hit Del if you want to run setup

It will prevent the message from appearing on the first BIOS screen when the computer boots. Set it to [Enabled] when you want to run the BIOS Setup Utility.

Interrupt 19 Capture

Interrupt 19 is the software interrupt that handles the boot disk function. When enabled, this BIOS feature allows the ROM BIOS of these host adaptors to "capture" Interrupt 19 during the boot process so that drives attached to these adaptors can function as bootable disks. In addition, it allows you to gain access to the host adaptor's ROM setup utility, if one is available.

When disabled, the ROM BIOS of these host adaptors will not be able to "capture" Interrupt 19. Therefore, you will not be able to boot operating systems from any bootable disks attached to these host adaptors. Nor will you be able to gain access to their ROM setup utilities.

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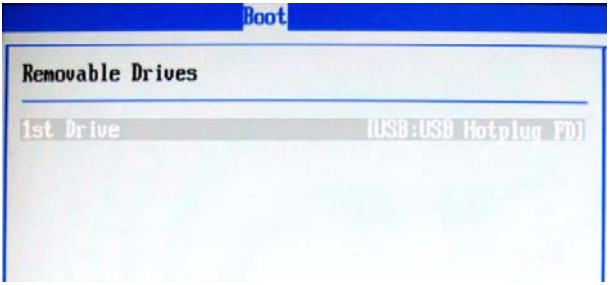
Boot Device Priority



1st Boot Device

The items allow you to set the sequence of boot devices where BIOS attempts to load the disk operating system. First press <Enter> to enter the sub-menu. Then you may use the arrow keys to select the desired device, then press <+>, <-> or <PageUp>, <PageDown> key to move it up/down in the priority list.

Removable Drives

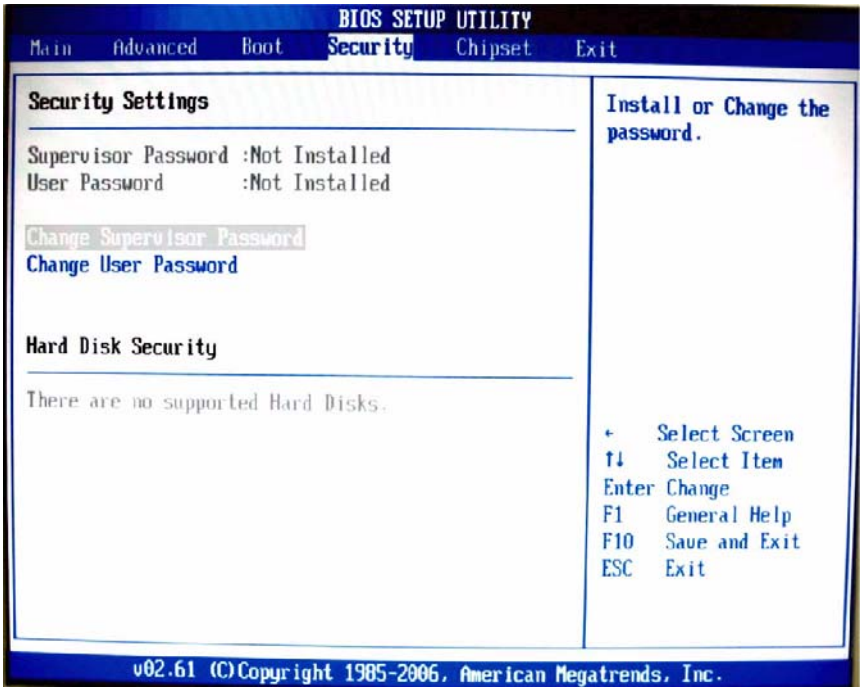


1st Drive

This setting allows users to set the priority of the removable devices. First press <Enter> to enter the sub-menu. Then you may use the arrow keys (-¯) to select the desired device, then press <+>, <-> or <PageUp>, <PageDown> key to move it up/down in the priority list.

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4.5 Security Setup



Password Support

Two Levels of Password Protection

Provides both a Supervisor and a User password. If you use both passwords, the Supervisor password must be set first.

The system can be configured so that all users must enter a password every time the system boots or when Setup is executed, using either or either the Supervisor password or User password.

The Supervisor and User passwords activate two different levels of password security. If you select password support, you are prompted for a one to six character password. Type the password on the keyboard. The password does not appear on the screen when typed. Make sure you write it down. If you forget it, you must drain NVRAM and re-configure.

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Remember the Password

Keep a record of the new password when the password is changed. If you forget the password, you must erase the system configuration information in NVRAM.

To access the sub menu for the following items, select the item and press < Enter >:

- Change Supervisor Password
- Change User Password
- Clear User Password

Supervisor Password

Indicates whether a supervisor password has been set.

User Password

Indicates whether a user password has been set.

Change Supervisor Password

Select this option and press < Enter > to access the sub menu. You can use the sub menu to change the supervisor password.

Change User Password

Select this option and press < Enter > to access the sub menu. You can use the sub menu to change the user password.

Clear User Password

Select this option and press < Enter > to access the sub menu. You can use the sub menu to clear the user password.

Change Supervisor Password

Select Change Supervisor Password from the Security Setup menu and press < Enter >.

Enter New Password:

Type the password and press < Enter >. The screen does not display the characters entered. Retype the password as prompted

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and press < Enter >. If the password confirmation is incorrect, an error message appears. The password is stored in NVRAM after completes.

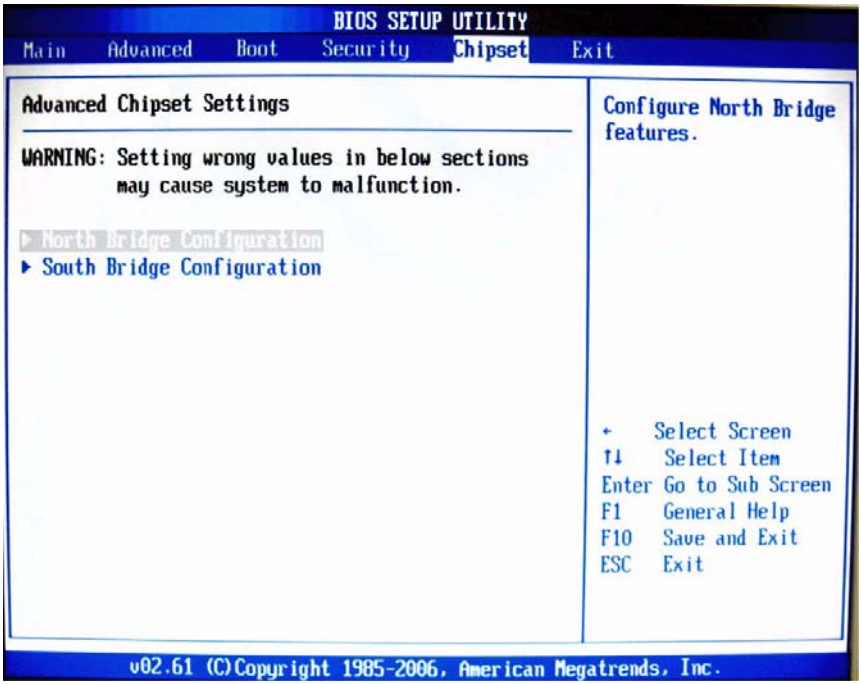
Change User Password

Select Change User Password from the Security Setup menu and press < Enter >.

Enter New Password:

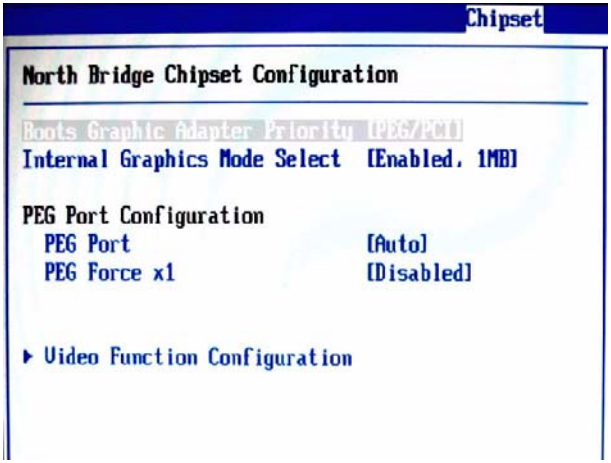
Type the password and press < Enter >. The screen does not display the characters entered. Retype the password as prompted and press < Enter >. If the password confirmation is incorrect, an error message appears. The password is stored in NVRAM after completes.

4.6 Chipset Setup



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North Bridge Configuration



Boot Graphics Adapter Priority

This item specifies which VGA card is your primary graphics adapter.

Internal Graphics Mode Select

The field specifies the size of system memory allocated for video memory.

PEG Port

This setting allows you to select whether to use the onchip graphics processor or the PCI Express card. When set to [Auto], the BIOS checks to see if a PCI Express graphics card is installed. If it detects that a PCI Express graphics card is present, the motherboard boots up using that card. Otherwise, it defaults to the onboard graphics processor.

PEG Force X1

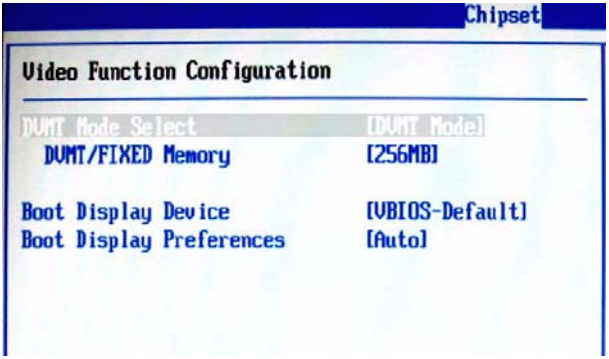
This BIOS feature allows you to convert a PCI Express X16 slot into a PCI Express X1 slot. When [Enabled], the PCI Express X16 slot will be forced to run in the PCI Express X1 mode. When [Disabled], the PCI Express X16 slot will be allowed to run in its normal PCI Express X16 mode.

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If you have a PCI Express X16 graphics card installed in your system, you should disable this BIOS feature. This allows for optimal performance of the card by ensuring maximum transfer rates between the graphics card and the motherboard.

But if you need to install a PCI Express X1 card into the PCI Express X16 slot, you should enable this BIOS feature to ensure maximum compatibility.

Video Function Configuration



DVMT Mode Select

Intel's Dynamic Video Memory Technology (DVMT) allows the system to dynamically allocate memory resources according to the demands of the system at any point in time. The key idea in DVMT is to improve the efficiency of the memory allocated to either system or graphics processor.

It is recommended that you set this BIOS feature to DVMT Mode for maximum performance. Setting it to DVMT Mode ensures that system memory is dynamically allocated for optimal balance between graphics and system performance.

DVMT/FIXED Memory

When set to DVMT/FIXED Mode, the graphics driver will allocate a fixed amount of memory as dedicated graphics memory, as well as allow more system memory to be dynamically allocated between the graphics processor and the operating system.

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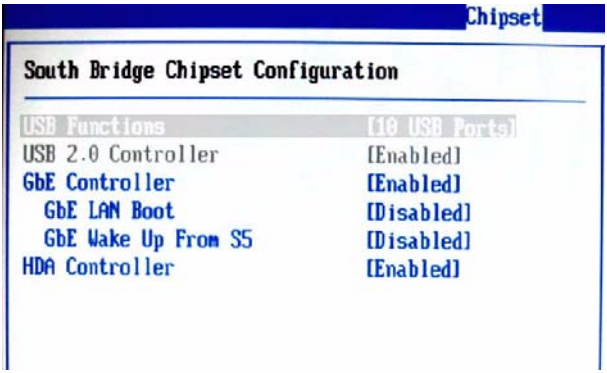
Boot Display Device

Use the field to select the type of device you want to use as the display(s) of the system.

Boot Display Preferences

This setting allows you to set your preferences for the boot display device.

South Bridge Configuration



USB Functions

This setting specifies the function of the onboard USB controller.

USB 2.0 Controller

Set to [Enabled] if you need to use any USB 2.0 device in the operating system that does not support or have any USB 2.0 driver installed, such as DOS and SCO Unix.

GbE Controller

This setting disables/enables the onboard Gigabit Ethernet controller.

GbE LAN Boot

When [Enabled], the BIOS attempts to boot from a LAN boot image before it attempts to boot from a local storage device.

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GbE Wake Up From S5

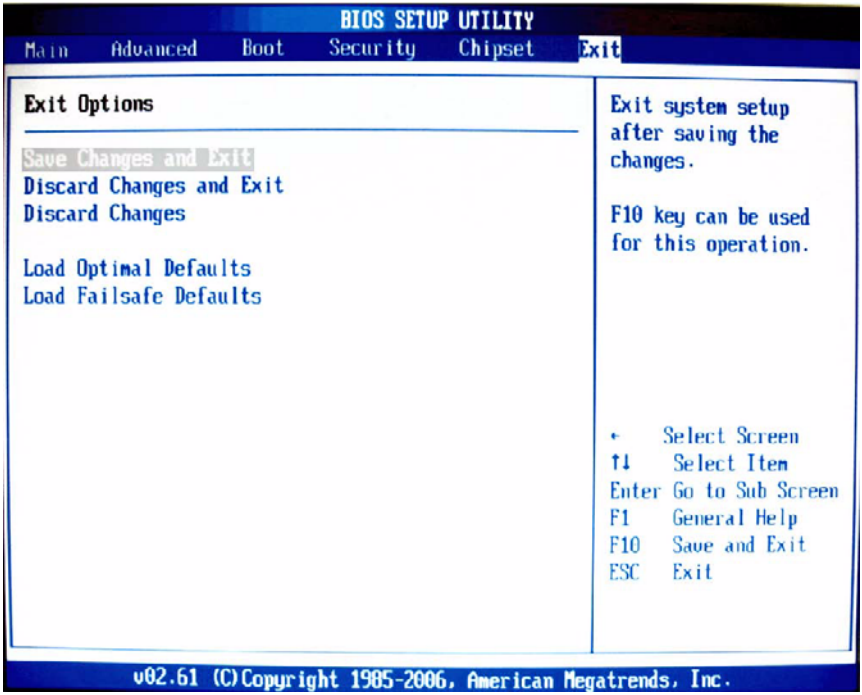
This field specifies whether the system will be awakened from the S5 power saving mode when activity or input signal of onboard LAN is detected.

HDA Controller

This setting controls the High Definition Audio interface integrated in the Southbridge.

4.7 Exit Menu

Select the Exit tab from the setup screen to enter the Exit BIOS Setup screen. You can display an Exit BIOS Setup option by highlighting it using the < Arrow > keys. The Exit BIOS Setup screen is shown below.



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Save Changes and Exit

When you have completed the system configuration changes, select this option to leave Setup and reboot the computer so the new system configuration parameters can take effect.

Save Configuration Changes and Exit Now?

[Ok] [Cancel]

appears in the window. Select Ok to save changes and exit.

Discard Changes and Exit

Select this option to quit Setup without making any permanent changes to the system configuration.

Discard Changes and Exit Setup Now?

[Ok] [Cancel]

appears in the window. Select Ok to discard changes and exit.

Discard Changes

Select Discard Changes from the Exit menu and press < Enter >.

Select Ok to discard changes.

Load Optimal Defaults

Automatically sets all Setup options to a complete set of default settings when you select this option. The Optimal settings are designed for maximum system performance, but may not work best for all computer applications. In particular, do not use the Optimal Setup options if your computer is experiencing system configuration problems.

Select Load Optimal Defaults from the Exit menu and press < Enter >.

Select Ok to load optimal defaults.

Load Failsafe Defaults

Automatically sets all Setup options to a complete set of default settings when you select this option. The Failsafe settings are

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designed for maximum system stability, but not maximum performance. Select the FailSafe Setup options if your computer is experiencing system configuration problems.

Select Load Fail-Safe Defaults from the Exit menu and press < Enter >.

Load FailSafe Defaults?

[Ok] [Cancel]

appears in the window. Select Ok to load FailSafe defaults.

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5 POST Codes

The POST code checkpoints are the largest set of checkpoints during the BIOS pre-boot process. The following table describes the type of checkpoints that may occur during the POST portion of the BIOS.

Note that checkpoints may differ between different platforms based on system configuration. Checkpoints may change due to vendor requirements, system chipset or option ROMs from add-in PCI devices.

5.1 Post Code Checkpoints

Checkpoint	Description
03	Disable NMI, Parity, video for EGA, and DMA controllers. Initialize BIOS, POST, Runtime data area. Also initialize BIOS modules on POST entry and GPNV area. Initialized CMOS as mentioned in the Kernel Variable "wCMOSFlags."
04	Check CMOS diagnostic byte to determine if battery power is OK and CMOS checksum is OK. Verify CMOS checksum manually by reading storage area. If the CMOS checksum is bad, update CMOS with power-on default values and clear passwords. Initialize status register A. Initializes data variables that are based on CMOS setup questions. Initializes both the 8259 compatible PICs in the system
05	Initializes the interrupt controlling hardware (generally PIC) and interrupt vector table.
06	Do R/W test to CH-2 count reg. Initialize CH-0 as system timer.Install the POSTINT1Ch handler. Enable IRQ-0 in PIC for system timer interrupt. Traps INT1Ch vector to "POSTINT1ChHandlerBlock."
07	Fixes CPU POST interface calling pointer.
08	Initializes the CPU. The BAT test is being done on KBC.Program the keyboard controller command byte is being done after Auto detection of KB/MS using AMI KB-5.
C0	Early CPU Init Start -- Disable Cache – Init Local APIC
C1	Set up boot strap processor Information
C2	Set up boot strap processor for POST
C5	Enumerate and set up application processors

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Checkpoint	Description
C6	Re-enable cache for boot strap processor
C7	Early CPU Init Exit
0A	Initializes the 8042 compatible Key Board Controller.
0B	Detects the presence of PS/2 mouse.
0C	Detects the presence of Keyboard in KBC port.
0E	Testing and initialization of different Input Devices. Also, update the Kernel Variables. Traps the INT09h vector, so that the POST INT09h handler gets control for IRQ1. Uncompress all available language, BIOS logo, and Silent logo modules.
13	Early POST initialization of chipset registers.
20	Relocate System Management Interrupt vector for all CPU in the system.
24	Uncompress and initialize any platform specific BIOS modules. GPNV is initialized at this checkpoint.
2A	Initializes different devices through DIM. See *DIM Code Checkpoints* section of document for more information.
2C	Initializes different devices. Detects and initializes the video adapter installed in the system that have optional ROMs.
2E	Initializes all the output devices.
31	Allocate memory for ADM module and uncompress it. Give control to ADM module for initialization. Initialize language and font modules for ADM. Activate ADM module.
33	Initializes the silent boot module. Set the window for displaying text information.
37	Displaying sign-on message, CPU information, setup key message, and any OEM specific information.
38	Initializes different devices through DIM. See *DIM Code Checkpoints* section of document for more information. USB controllers are initialized at this point.
39	Initializes DMAC-1 & DMAC-2.
3A	Initialize RTC date/time.
3B	Test for total memory installed in the system. Also, Check for DEL or ESC keys to limit memory test. Display total memory in the system.
3C	Mid POST initialization of chipset registers.

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Checkpoint	Description
40	Detect different devices (Parallel ports, serial ports, and coprocessor in CPU, … etc.) successfully installed in the system and update the BDA, EBDA…etc.
52	Updates CMOS memory size from memory found in memory test. Allocates memory for Extended BIOS Data Area from base memory. Programming the memory hole or any kind of implementation that needs an adjustment in system RAM size if needed.
60	Initializes NUM-LOCK status and programs the KBD typematic rate.
75	Initialize Int-13 and prepare for IPL detection.
78	Initializes IPL devices controlled by BIOS and option ROMs.
7C	Generate and write contents of ESCD in NVRam.
84	Log errors encountered during POST.
85	Display errors to the user and gets the user response for error.
87	Execute BIOS setup if needed / requested. Check boot password if installed.
8C	Late POST initialization of chipset registers.
8D	Build ACPI tables (if ACPI is supported)
8E	Program the peripheral parameters. Enable/Disable NMI as selected
90	Initialization of system management interrupt by invoking all handlers. Please note this checkpoint comes right after checkpoint 20h
A1	Clean-up work needed before booting to OS.
A2	Takes care of runtime image preparation for different BIOS modules. Fill the free area in F000h segment with 0FFh. Initializes the Microsoft IRQ Routing Table. Prepares the runtime language module. Disables the system configuration display if needed.
A4	Initialize runtime language module. Display boot option popup menu.
A7	Displays the system configuration screen if enabled. Initialize the CPU's before boot, which includes the programming of the MTRR's.
A9	Wait for user input at config display if needed.
AA	Uninstall POST INT1Ch vector and INT09h vector.

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Checkpoint	Description
AB	Prepare BBS for Int 19 boot. Init MP tables.
AC	End of POST initialization of chipset registers. De-initializes the ADM module.
B1	Save system context for ACPI. Prepare CPU for OS boot including final MTRR values.
00	Passes control to OS Loader (typically INT19h).

Table 5-1: POST Code Checkpoints

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Appendix A - Watchdog Timer

The following is a sample program for configuring the MI-965's watchdog timer.

A.1 Sample Code

```
SIO_IDX equ 2EH
SIO_DTA equ 2FH
Timer equ 10; reset after 10 seconds

; Enter configuration mode
     mov dx,SIO_IDX
     mov al,87h
     out dx,al
     out dx,al

; Set to LDN 08
     mov dx,SIO_IDX
     mov al,07h
     out dx,al
     mov dx,SIO_DTA
     mov al,08h
     out dx,al

; Set WatchDog Timer
     mov dx,SIO_IDX
     mov al,0f6h
     out dx,al
     mov dx,SIO_DTA
     mov al,Timer
     out dx,al

; Exit configuration mode
     mov dx,SIO_IDX
     mov al,0AAh
     out dx,al
```

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Appendix B - System Resources

B.1 Generic I/O Ports

ICH8M GPIO

Pin	GPIO	Typ	Multi	Power	Connection.
AG12	0	I/O	BMBUSY#	3.3v	PM_BMBUSY#
AG22	11	I/O	SMBALERT#	3.3v	SMB_ALERT#
AE20	15	I/OD	STP_PCI#	3.3v	PM_STP_PCI#
AG18	3	I/OD	STP_CPU#	5v	PM_STP_CPU#
AH11	32	I/OD	CLKRUN#	3.3v	P_CLKRUN#
AJ8	1	I/OD	TACH1	3.3v	NC
AJ9	6	I/O	TACH2	3.3v	NC
AH9	7	I/O	TACH3	3.3v	NC
AE16	8	I/O	GPIO8	3.3v	SIO_PME#
AC19	12	I/O	GPIO12	3.3v	SPI_HOLD_GPO#
AG8	17	I/O	TACH0	3.3v	SPI_WP#
AH12	18	I/O	GPIO18	3.3v	SLPBTIN#
AE11	20	I/O	GPIO20	3.3v	ATADET0
AG10	22	I/O	SCLOCK	3.3v	NC
AH25	27	I/O	QRT_STATE0	3.3v	EL_STATE0
AD16	28	I/O	QRT_STATE1	3.3v	EL_STATE1
AG13	35	I/O	SATACLKREQ#	3.3v	CLK_SATA_OE#
AF9	38	I/O	SLOAD	3.3v	NC
AJ11	39	I/O	SDATAOUT0	3.3v	NC
AD10	48	I/O	SDATAOUT1	3.3v	NC
AJ12	21	I/O	SATA0GP	3.3v	RESISTOR
AJ10	19	I/O	SATA1GP	3.3v	RESISTOR
AF11	36	I/O	SATA2GP	3.3v	RESISTOR
AG11	37	I/O	SATA3GP	3.3v	RESISTOR
AH27	26	I/O	S4_STATE#	3.3v	NC
AJ27	24	I/O	NCMEM_LED	3.3v	LAN_EN
AJ24	10	I/O	ME_EC_ALERT	3.3v	PHY_DIS#

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Pin	GPIO	Typ	Multi	Power	Connection.
AF22	14	I/O	EC_ME_ALERT	3.3v	NC
AG19	9	I/O	WOL_EN	3.3v	NC
AG16	40	I/O	OC1#	3.3v	OC0#
AG15	41	I/O	OC2#	3.3v	OC0#
AE15	42	I/O	OC3#	3.3v	OC0#
AF15	43	I/O	OC4#	3.3v	OC1#
AG17	29	I/O	OC5#	3.3v	OC1#
AD12	30	I/O	OC6#	3.3v	OC1#
AJ18	31	I/O	OC7#	3.3v	OC1#

Table B-1: ICH8M GPIO Resources

SIO GPIO

Pin	GPIO	Typ	Multi	Power	Connection.
121	17	I/O	VID7	VCC5	NC
122	16	I/O	VID6	VCC5	NC
123	15	I/O	VID5	VCC5	NC
124	14	I/O	VID4	VCC5	NC
125	13	I/O	VID3	VCC5	NC
126	12	I/O	VID2	VCC5	NC
127	11	I/O	VID1	VCC5	NC
128	10	I/O	VID0	VCC5	NC
120	20	O	CPUFANOUT1/GP20	VCC	CFAN_PWM
119	21	I/O	CPUFANN1/GP21	VCC	CPU_FAN
89	33	I/O	RSTOUT3#/GP33/SDA	VSB	NC
90	32	I/O	RSTOUT2#/GP32/SCL	VSB	NC
91	31	I/O	GP31	VSB	NC
92	30	I/O	GP30	VSB	NC
67	57	O	GP57/PSOUT#	VSB	PWRBTN#
68	56	I	GP56/PSIN#	VSB	IO_PWRBTN#
64	37	I/O	GP37	VSB	NC
72	53	I/O	GP53/PSON#	VSB	PS_ON#
73	52	I	GP52/SUSB#	VSB	SLP_S3#

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Pin	GPIO	Typ	Multi	Power	Connection.
77	50	I/O	WDTO#GP50	VSB	GP50
2	23	I/O	SCK/GP23	VCC	NC
88	34	O	RSTOUT4#GP34	VSB	NC
69	36	I/O	GP36	VSB	NC
87	35	I/O	GP35	VSB	NC
75	51	O	RSMRST#	VSB	VCC3
56	61	I	DCDA#	VCC	DCDA#
50	66	I	DDSRA#	VCC	DDSRA#
53	63	I	SINA	VCC	SINA
51	65	I/O	RTSA#	VCC	RTSA#
54	62	O	SOUTA	VCC	SOUTA
49	67	I	CTSA#	VCC	CTSA#
52	64	O	DTRA#	VCC	DTRA#
57	60	I	RIA#	VSB	RIA#
84	41	I	DCDB#	VSB	DCDB#
79	46	I	DSRB#	VSB	DSRB#
82	43	I	SINB	VSB	SINB
80	45	O	RTSB#	VSB	RTSB#
83	42	O	SOUTB	VSB	SOUTB
78	47	I	CTSB#	VSB	CTSB#
81	44	O	DTRB#	VSB	DTRB#
85	40	I	RIB#	VSB	RIB#
63	26	I/O	KBDAT#	VSB	KBDAT#
62	27	I/O	KBCLK#	VSB	KBCLK#
66	24	I/O	MSDAT#	VSB	MSDAT#
65	25	I/O	MSCLK#	VSB	MSCLK#
70	55	I/O	SUSLED	VSB	GND
71	54	I/O	PWROK	VSB	NC

Table B-2: SIO GPIO Resources

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B.2 IO Map

I/O Port	Description
0000-000F	DMA Controller 1
0020-0021	Interrupt Controller 1
002E-002F	SIO Port
0040-0043	System Timer
004E-004F	TPM Port
0060, 0064	Keyboard Controller
0070-0073	RTC and CMOS
0080-0090	DMA Controller Page Registers
0092	Port 92h
00A0-00A1	Interrupt Controller 2
00B2-00B3	APM Register
00C0-00DF	DMA Controller 2
00F0-00FF	Numeric Data Processor
01F0-01F7	Primary IDE Controller
02F8-02FF	COM2
0376	Secondary IDE Controller
0378-037F	LPT1
03F6	Primary IDE Controller
03F8-03FF	COM1
0400-045F	ACPI I/O Space
0500-050F	SMBus I/O Space
0CF8-0CFF	PCI Configuration Port

Table B-3: IO Map

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B.3 PCI Devices

PCI Device	Ven. ID	Dev. ID	Bus#	Dev#	Func#
Host Bridge	8086	2A00	00	00	00
VGA-compatible Controller	8086	2A02	00	02	00
Other Display Controller	8086	2A03	00	02	01
Ethernet Controller	8086	104B	00	19	00
UHCI USB Controller	8086	2834	00	1A	00
UHCI USB Controller	8086	2835	00	1A	01
Unknown Device	8086	283A	00	1A	07
Unknown Device	8086	284B	00	1B	00
PCI-to-PCI Bridge	8086	283F	00	1C	00
UHCI USB Controller	8086	2830	00	1D	00
UHCI USB Controller	8086	2831	00	1D	01
UHCI USB Controller	8086	2832	00	1D	02
Unknown Device	8086	2836	00	1D	07
Subtractive Decode P2P Bridge	8086	2448	00	1E	00
ISA Bridge	8086	2815	00	1F	00
IDE Controller	8086	2850	00	1F	01
IDE Controller	8086	2828	00	1F	02
Smbus	8086	283E	00	1F	03

Table B-4: PCI Device Resources

PCI Interrupt Request Routing

Device	INT Pin	IDSEL	Clock	REQ# / GNT#
32-bit PCI Slot	PIRQA	AD17	PCICLK 0	REQ#0 / GNT#0
32-bit PCI Riser	PIRQC	AD18	PCICLK 1	REQ#1 / GNT#1
32-bit PCI Riser	PIRQD	AD19	PCICLK 2	REQ#2 / GNT#2

Table B-5: PCI Interrupt Request Routing

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SMBus Resource Allocation

Device	Address	Description
MS-7	0101 111X	MSI ACPI Controller
DIMM Slot	1010 0000	SPD

Table B-6: SMBus Resource Allocation

ISA Interrupt Allocation

IRQ	Description
IRQ0	System Timer
IRQ1	Keyboard Controller
IRQ2	Cascade Interrupt
IRQ3	COM2
IRQ4	COM1
IRQ5	PCI Device
IRQ6	PCI Device
IRQ7	LPT1
IRQ8	RTC
IRQ9	ACPI Controller Interrupt
IRQ10	PCI Device
IRQ11	PCI Device
IRQ12	PS/2 Mouse
IRQ13	Numeric Data Processor
IRQ14	Primary IDE Controller
IRQ15	Secondary IDE Controller

Table B-7: ISA Interrupt Allocation

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ISA DMA Channel Allocation

IRQ	Description
CHANNEL0	Unassigned 8-bit channel
CHANNEL1	Unassigned 8-bit channel
CHANNEL2	Unassigned 8-bit channel
CHANNEL3	Unassigned 8-bit channel
CHANNEL4	Cascade channel
CHANNEL5	Unassigned 16-bit channel
CHANNEL6	Unassigned 16-bit channel
CHANNEL7	Unassigned 16-bit channel

Table B-8: ISA DMA Channel Allocation

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Important Safety Instructions

For user safety, please read and follow all **instructions**, **WARNINGS**, **CAUTIONS,** and **NOTES** marked in this manual and on the associated equipment before handling/operating the equipment.

- Read these safety instructions carefully.
- Keep this user's manual for future reference.
- Read the specifications section of this manual for detailed information on the operating environment of this equipment.
- When installing/mounting or uninstalling/removing equipment:
  - Turn off power and unplug any power cords/cables.
- To avoid electrical shock and/or damage to equipment:
  - Keep equipment away from water or liquid sources;
  - Keep equipment away from high heat or high humidity;
  - Keep equipment properly ventilated (do not block or cover ventilation openings);
  - Make sure to use recommended voltage and power source settings;
  - Always install and operate equipment near an easily accessible electrical socket-outlet;
  - Secure the power cord (do not place any object on/over the power cord);
  - Only install/attach and operate equipment on stable surfaces and/or recommended mountings; and,
  - If the equipment will not be used for long periods of time, turn off and unplug the equipment from its power source.

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- Never attempt to fix the equipment. Equipment should only be serviced by qualified personnel.

A Lithium-type battery may be provided for uninterrupted, backup or emergency power.



Risk of explosion if battery is replaced with one of an incorrect type. Dispose of used batteries appropriately.

- Equipment must be serviced by authorized technicians when:
  - The power cord or plug is damaged;
  - Liquid has penetrated the equipment;
  - It has been exposed to high humidity/moisture;
  - It is not functioning or does not function according to the user's manual;
  - It has been dropped and/or damaged; and/or,
  - It has an obvious sign of breakage.

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Getting Service

Contact us should you require any service or assistance.

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