

***ATXP-965Q***  
***Long Life Industrial Motherboard***

**Revision A**

**Technical Reference**

**Intel® Core 2 Duo E6400**

**Intel® Core 2 Duo E4300**

**Intel® Pentium 4**

**or**

**Intel® Celeron D 440**

**Embedded Processors**

**Intel 965Q Express Chipset**



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- Serial number from the label on the back of the board
- Description of the failure

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- San Diego, CA 92123
- Attn: Repair Department

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# Revision History

Revision	Revision History	Date
01	First Release	10/12/07
02	Updated lay-out and technical information	01/07/08

## Notice

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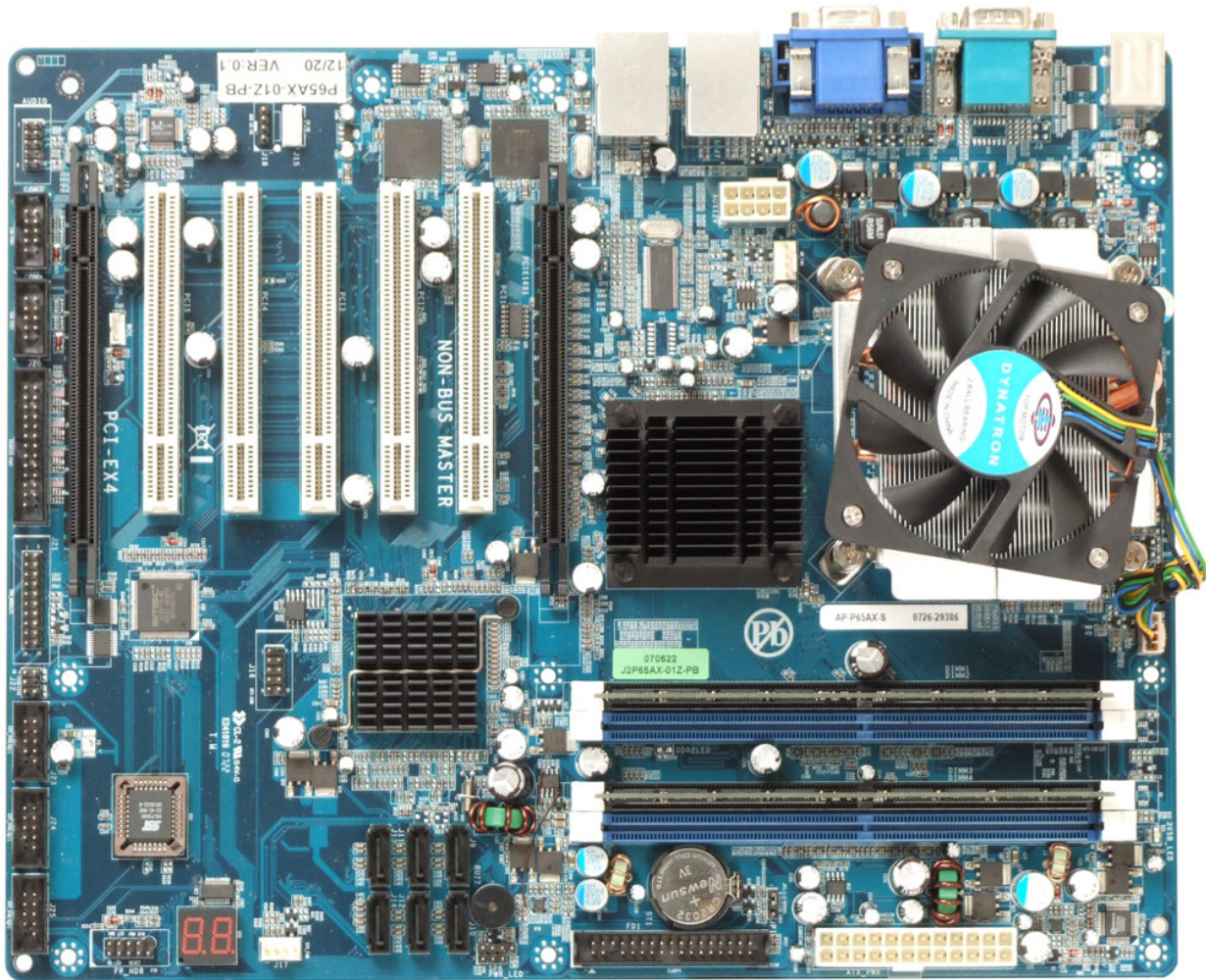
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## Preface

Thank you for your purchase of the ATXP-965Q industrial embedded motherboard. The ATXP-965Q design is based on the Intel® Q965 Express chipset providing the ideal platform for industrial applications. The ATXP-965Q will accommodate an Intel Pentium 4, Celeron D 440, or Core 2 Duo E6400 and E4300 processors in a LGA775 socket (FC-LGA4). With proper installation and maintenance, your ATXP-965Q will provide years of high performance and trouble free operation.

This manual provides a detailed explanation into the installation and use of the ATXP-965Q industrial embedded motherboard. This manual is written for the novice PC user/installer. However, as with any major computer component installation, previous experience is helpful and should you not have prior experience, it would be prudent to have someone assist you in the installation.



ATXP-965Q Top View

# Safety Precautions Warning!

## Static Electricity Warning!

The ATXP-965Q has been designed as rugged as possible but can still be damaged if jarred sharply or struck. Handle the motherboard with care.

The ATXP-965Q also contains delicate electronic circuits that can be damaged or weakened by static electricity. Before removing the ATXP-965Q from its protective packaging, it is strongly recommended that you use a grounding wrist strap. The grounding strap will safely discharge any static electricity build up in your body and will avoid damaging the motherboard. Do not walk across a carpet or linoleum floor with the bare board in hand.

## FCC Notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference.

You are cautioned that any change or modifications to the equipment not expressly approve by the party responsible for compliance could void your authority to operate such equipment.

## CE Notice

This is a CE approved product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

## Conventions Used in this Manual



*Notes - Such as a brief discussion of memory types.*



*Important Information - such as static warnings, or very important instructions.*



*When instructed to enter keyboard keystrokes, the text will be noted by this graphic.*

# Chapter 1 Technical Specifications

The ATXP-965Q is a long-life industrial motherboard with multi-core processor technology and PCI Express support. Powered by the Intel® Q965 Express chipset, the ATXP-965Q motherboard was designed specifically for performance intensive embedded applications such as Medical, Security, Imaging, Industrial Automation, and Manufacturing.

## Embedded Processor (775 LGA package)

Intel® Pentium® 4 651	2 MB L2 cache, 800 MHz FSB, 65nm
Intel® Celeron® D 352	512K L2 cache, 533 MHz FSB, 65nm
Intel® Core™ 2 Duo E6400	2M unified cache, 800/ 1066 MHz FSB, 65nm
Intel® Core™ 2 Duo E4300	2M unified cache, 800 MHz FSB, 65nm
Intel® Core™ 2 Duo E2160	2M unified cache, 800 MHz FSB, 65nm
Intel® Celeron 440	512K unified, 800 MHz FSB, 65nm

## Non-Embedded Processors

Additional supported processors, please contact your Sales Representative.

## Chipset

<b>Q965 GMCH</b>	Intel® Pentium 4 , Celeron D (Cedar Mill), Core 2 Duo and Conroe L support
	Supports FSB of 533/800/1066 MHz
	Intel® Integrated Graphics Accelerator 3000 (GMA3000) with CRT and 2 Ch. SDVO(signals mixed with PCI-E x16)
	Analog video maximum resolution 2048x1536@75 Hz refresh
	Single dedicated graphics 1 x 16 PCI –E Slot
	Two independent channels of DDR2 memory @ 533/667/800MHz (4 Slots, 8GB max memory size)
	ACPI 1.0 Power Management
	1226 BGA package

<b>ICH8DO</b>	10Gb/s each direction, full duplex DMI (Direct Media Interface – between ICH8 and GMCH)
	PCI –E V 1.1 root ports
	PCI Rev 2.3 @ 33MHz
	6 SATA @ 300Gb/s (300MB/s) with integrated AHCI (Advanced Host Controller Interface) controller
	Intel® RAID Storage Technology supports RAID 0/1/5/10
	Audio CODEC support for HD Audio (Std Audio on I/O Connector; HD Audio on header)
	5 UHCI USB 2.0 Host Controllers – 10 external ports
	ACPI 3.0 Support
	652 mBGA package

## Peripheral Chips

<b>SMSC SCH3114 SIO chip</b>	Four full handshake COM ports
	IRDA on 6 pin header
	Floppy / parallel/ keyboard-mouse
	Hardware voltage monitor /CPU temp. monitor
	Watchdog timer
	PWM fan control outputs / tachometer inputs
	Monitors thermal diode of CPU
	128-pin VTQFP package
<b>2x PCI-E Gigabit Ethernet controller</b>	Intel ® 82573L
	10/100/1000 Mbps full and half duplex operation
	PCI-E x 1 interface
	Full gigabit support at wire speed
	Watchdog timer
	PWM fan control outputs / tachometer inputs
	Monitors thermal diode of CPU
	128-pin VTQFP package
Intel ® 82573L	
<b>POST Code (On-board POST code display for self-diagnostics)</b>	2 seven segment, alphanumeric displays

## System Memory

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Four 240-pin DDR2 DIMM sockets

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Support for DDR2 800/667/533 MHz DIMMs

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Support for up to 8GB of system memory using DDR2 667 or DDR2 533 DIMMs

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Support for up to 4GB of system memory using DDR2 800 DIMMs

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## BIOS

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AMI BIOS Firmware Hub (FWH or SPI)

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## Embedded I/O

<b>Floppy</b>	Up to two floppy disk drives
	Sizes supported are: 5.25" 360K and 1.2MB; 3.5" 720K, 1.44MB and 2.88MB
<b>Serial Ports (4)</b>	4 full function RS232 serial ports
	Shared infrared support (IRDA 1.0 Compliant) on COM2
	Two (2) additional serial ports on 2 10 pin shrouded headers
<b>USB Interfaces (10)</b>	6-pin IRDA header
	4 USB ports on 2 shared RJ45 / Doubled stacked connectors
<b>Parallel Port (1)</b>	6 USB ports on 3x 10-pin headers
	One bidirectional and ECP/EPP compatible parallel port header
<b>Keyboard/Mouse Port</b>	Dual stacked PS/2 compatible 6 pin mini-DIN connector on I/O back-panel
<b>PCI Interfaces / PCI-E Interfaces</b>	1 PCI Express 1x16 dedicated graphics slot
	5 PCI Rev.2.3 (5V) bus interface slots (One slot is non-Bus master)
	1 PCI Express 1x4 interface in x16 connector
<b>Video Support</b>	DB-15 VGA connector on I/O back-panel (Maximum resolution 2048x1536 @75Hz)

<b>Audio</b>	Realtek ALC883 HD Audio CODEC
	Microphone IN, Stereo LINE OUT, Stereo LINE IN jacks on I/O back-panel
	10-pin HD Audio header for extra surround sound outputs.
	AUX CD-IN (ATAPI), CD-IN (ATAPI) headers
	4-pin SPDIF OUT header

## Miscellaneous

CMOS/Battery	RTC integrated in ICH8 with lithium battery socket
	CR2032 coin battery or equivalent
Front Panel Header	Reset, Soft Power, LEDs for power and HDD
CPU Socket	775 – pin LGA

## Power connectors

ATX2.2 – 24 pin power connector, backwards compatible with 20 pin

8 pin ATX12V power connector backward compatible with 4 pin.

## Fan Headers

CPU – 4 pin header

System fan, NB fan– 4 pin headers supports tachometer monitoring / PWM control

## TPM header

Pin out matches available TPM modules (optional)

## SPDIF OUT header

4-pin header connected to ALC883 HD audio codec

Pin out compatible with 3rd party SPDIF motherboard cables

## Legacy PWR LED Header

3-pin header connected directly to +5V with current limiting resistor.

## Form Factor and Dimensions

ATX– 12.0”X 9.6”

## Reliability

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MTBF: At 35°C = 206,853

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MTBF: At 55°C = 90,296

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## Agency Approvals

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FCC/CE Certification (Please contact your local Regional Sales Manager for the certificate)

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## Environmental Requirements

RoHS compliant assembly.

CATEGORY	OPERATING	NON-OPERATING
TEMPERATURE	0°C to 55°C	-40°C to 70°C
HUMIDITY	5 to 95% @ 40°C non-condensing	5 to 95% @ 40°C non-condensing
SHOCK	2.5G @ 10ms	10G @ 10ms
VIBRATION	0.25 @ 5-100Hz	5 @ 5-100Hz

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## Chapter 2 Hardware Configuration

This chapter provides all the necessary information for installing the ATXP-965Q into a standard PC chassis. Topics discussed include: installing the processor, DRAM and jumper settings.

### Handling Precautions

The ATXP-965Q has been designed to be as rugged as possible but it can be damaged if dropped, jarred sharply or struck. Damage may also occur by using excessive force in performing certain installation procedures such as forcing the system board into the chassis or placing too much torque on a mounting screw.

Take special care when installing or removing the system memory DIMMs. Never force a DIMM into a socket. Screwdrivers slipping off a screw and scraping the board can break a trace or component leads, rendering the board unusable. Always handle the ATXP-965Q with care.



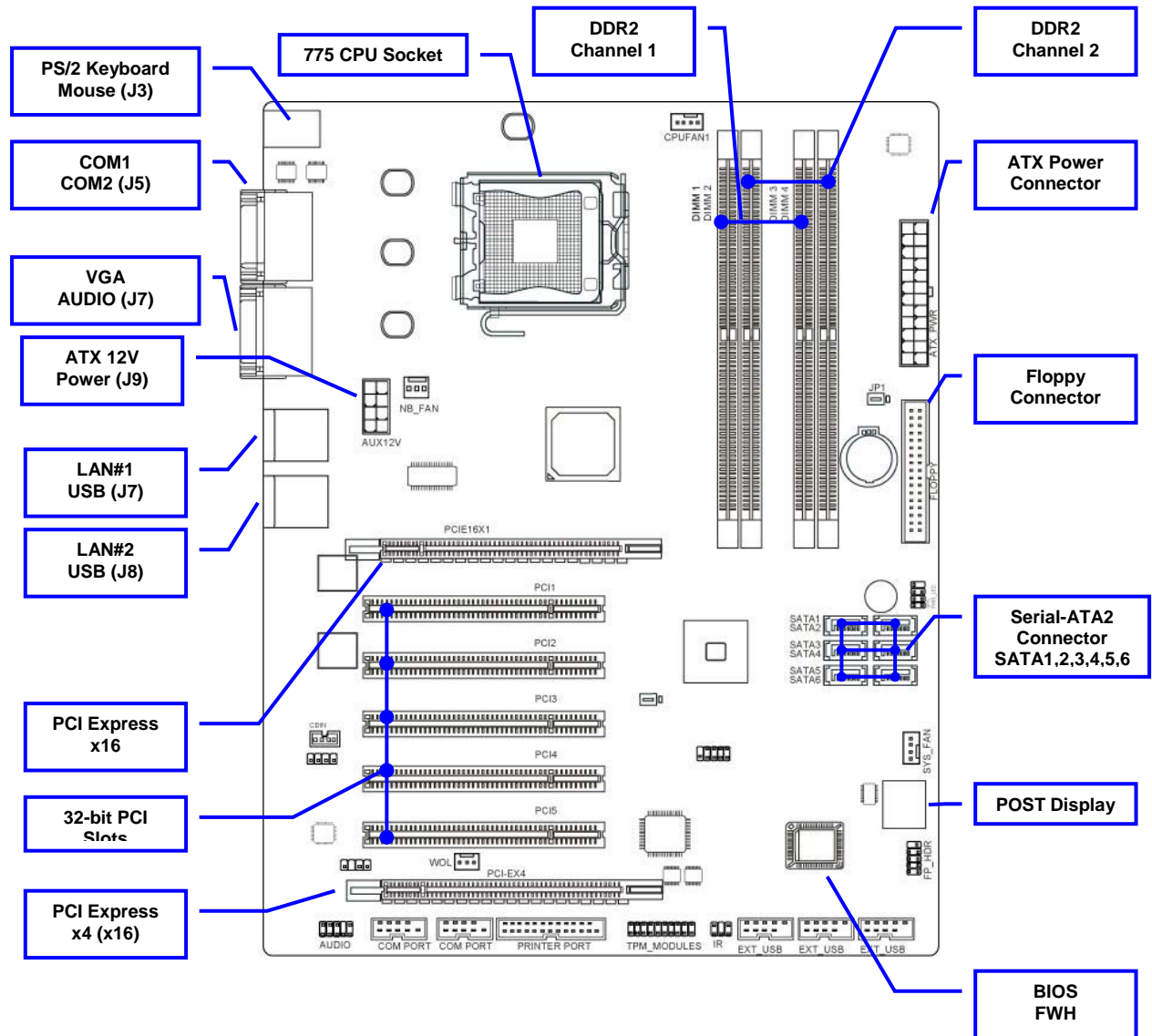
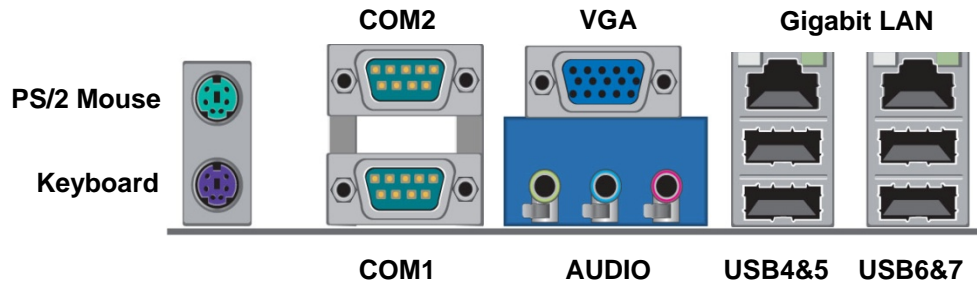
#### **Special Warranty Note:**

*Products returned for warranty repair will be inspected for damage caused by improper installation and misuse as described in the previous section and the static warning below. Should the board show signs of abuse, the warranty will become void and the customer will be billed for all repairs and shipping and handling costs.*

### Static Warning

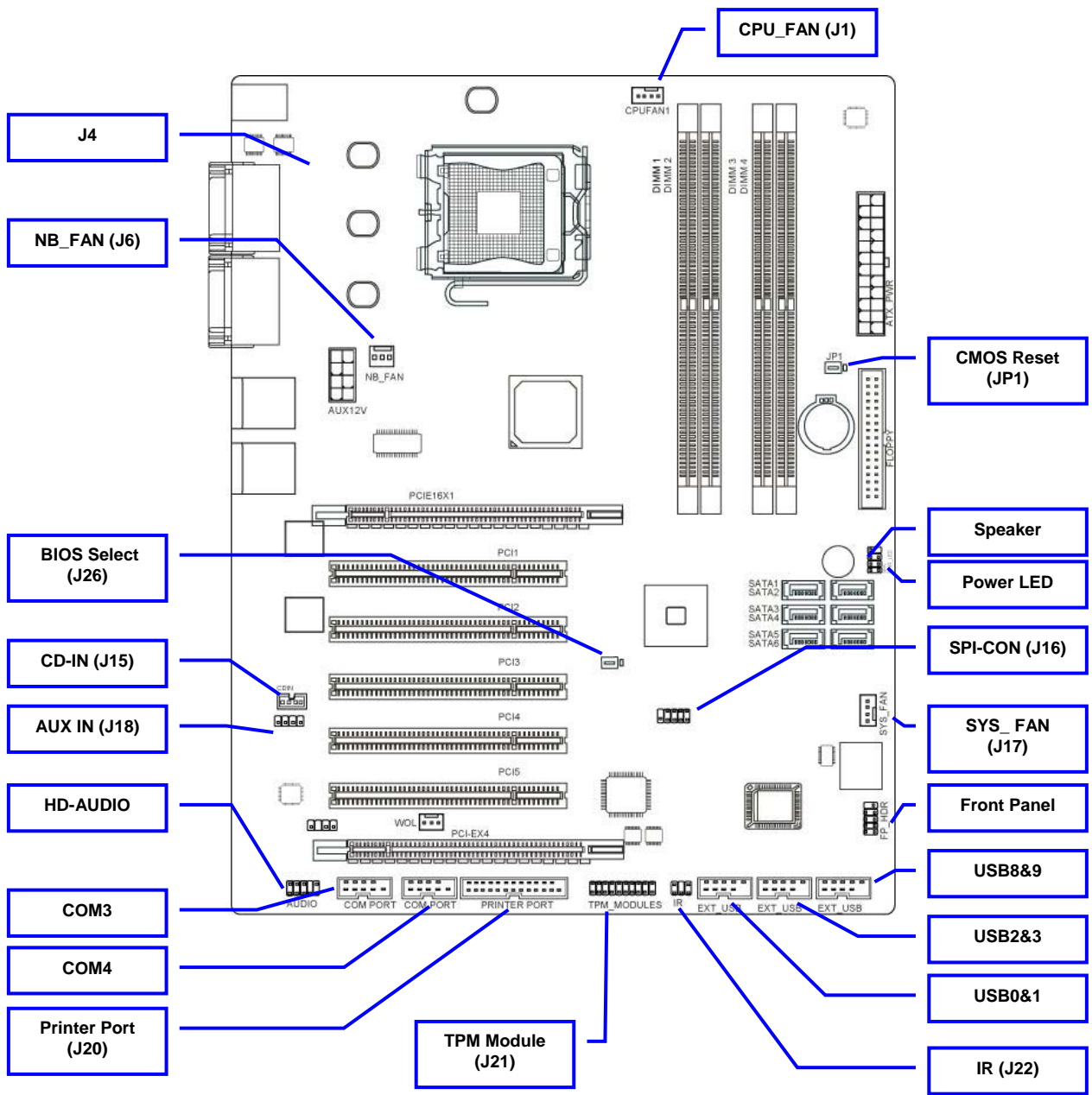
The ATXP-965Q contains delicate electronic semiconductors that are highly sensitive to static electricity. These components, if subjected to a static electricity discharge, can be weakened thereby reducing the serviceable life of the system board. **BEFORE THE BOARD IS REMOVED FROM ITS PROTECTIVE ANTISTATIC PACKAGING, TAKE PROPER PRECAUTIONS!** Work on a conductive surface that is connected to the ground. Before touching any electronic device, ground yourself by touching an unpainted metal object or, and highly recommended, use a grounding strap.

### Connector Location



J10	Primary IDE Master	SATA # 1
J9	Secondary IDE Master	SATA # 1
J12	Primary IDE Slave	SATA # 1
J11	Secondary IDE Slave	SATA # 1
J14	Third IDE Master	SATA # 2
J13	Fourth IDE Master	SATA # 2

### Header and Jumper Location



**Connectors, Headers and Slots Quick Reference Table**

<b>Connector</b>	<b>Name</b>	<b>Description</b>
ATX_PWR	ATX Power Connector	24-pin connector
AUX12V	ATX 12V Power Connector	8-pin connector
J7 / J8	RJ45 LAN Port + USB Conn.	RJ-45 Connector and USB Conn.
PS/2 KB/MOUSE(J2)	PS/2 Mouse & PS/2 Keyboard Connector	6-pin mini-DIN Female
AUDIO/VGA(J5)	Audio Line In/Out MIC Connector	3 phone jack connector
	VGA Display Connector	15-pin Female connector
COM1/COM2(J4)	Serial Port COM1 Connector	9-pin DB-9
	Serial Port COM2 Connector	9-pin DB-9
FDD	Floppy Driver Connector	34-pin shrouded header
SATA1~6(J9,J10,J11,J12, J13,J14)	Serial-ATA2 Port Connector	7-pin shrouded connector
<b>Header</b>	<b>Name</b>	<b>Description</b>
AUDIO	Line-Out, MIC Headers	10-pin keyed header
EXT_USB(0&1)(J23)/ EXT_USB(2&3)(J24)/ EXT_USB(8&9)(J25)	USB Port Headers	10-pin shrouded header
SPK	Legacy Speaker connector	4-pin header
FP_HDR	Front Panel Header (including Power LED/ IDE activity LED/ Reset switch / Power On Button lead)	10-pin keyed header
CPU_FAN (J1)	CPU FAN Power Header	4-pin connector
SYSFAN(J17), NB_FAN(J6)	FAN Power Headers	4-pin connector
IR(J22)	IR connector	6-Pin keyed header
PRINTER PORT(J20)	Parallel Port header	26-Pin header
COM3/COM4	COM Port Header	10-Pin shrouded header
AUX-CD(J15)	AUX CD Audio –In Headers	4-Pin header
CDIN(J18)	CD Audio-In Headers	4-pin header
PWR_LED	Legacy Power On LED	3-pin header

Slots/Sockets	Name	Description
LGA 775 Socket	CPU Socket	LGA 775 CPU Socket
DIMM1, DIMM2 DIMM3, DIMM4	DDR2 Module Socket	240-pin DDR2 RAM Module Expansion Socket
PCI1	PCI Slot non Bus Master	32-bit PCI Local Bus Expansion slots
PCI2-PCI5	PCI Slots Bus Master	32-bit PCI Local Bus Expansion slots
PCIEX16X1	x16 PCI Express Slot	x16 PCI Express Slot
PCI-EX4	x16PCI Express Slot	x4 –lane Express Slot

## Setting the Jumpers

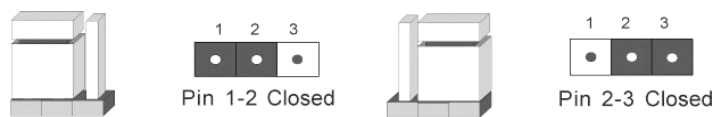
### Jumper Types

Jumpers or headers are small pins attached to the system board. Covering two pins with a shunt closes the connection between them. The ATXP-965Q examines these jumpers to determine specific configuration information. There are two different categories of jumpers on the ATXP-965Q.

- A. Two pin jumpers are used for binary selections such as enable, disable. Instructions for this type of jumper are open, for no shunt over the pins or closed, when the shunt covers the pins.
- B. Three or four pin jumpers are used for multiple selections. Instructions for these jumpers will indicate which two pins to cover. For example: for JPx 2-3 the shunt will be covering pins 2 and 3 leaving pins 1 and 4 exposed.

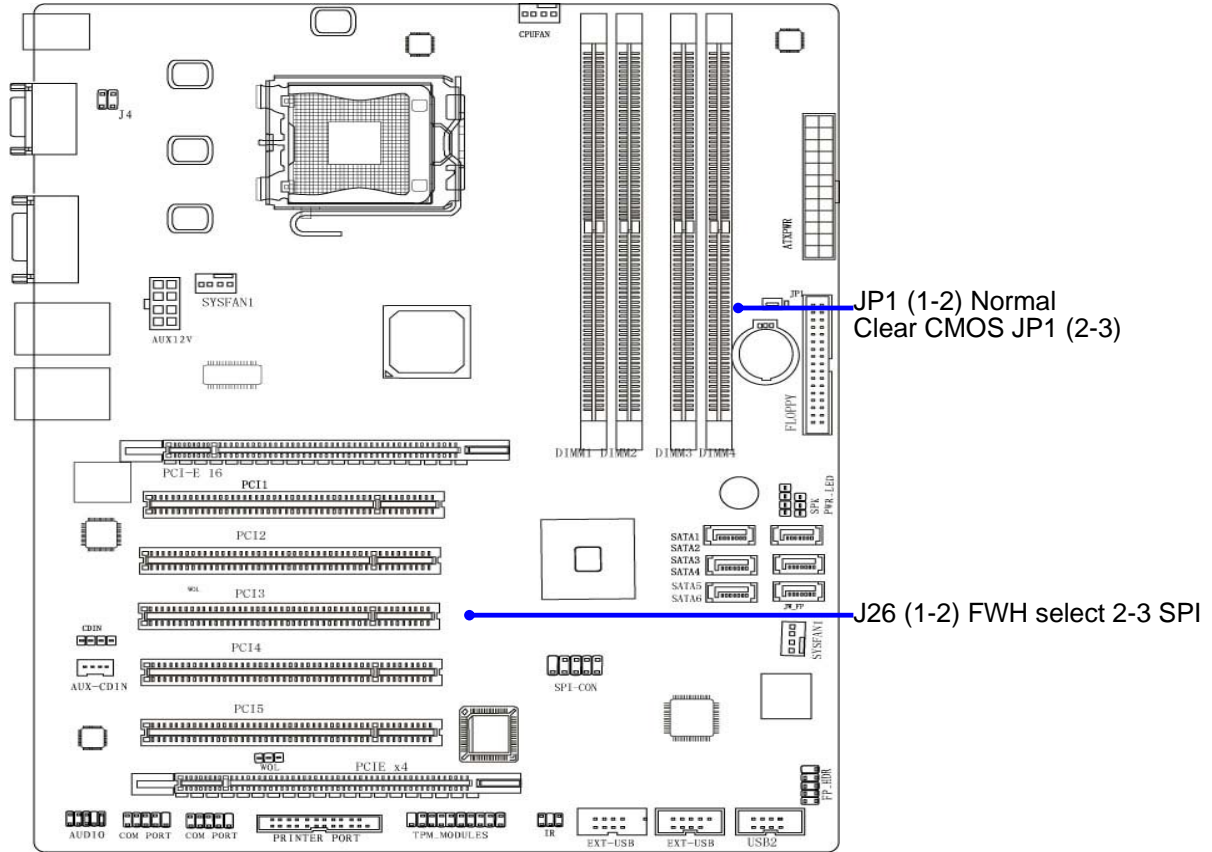
Pin 1 can be identified by looking to the solder side (The board side with fewer components) of the PCB (Printed Circuit Board). Pin 1 will have a squared pad. Other pins will have a circular pad. They are numbered sequentially.

Double row jumpers are numbered alternately, i.e. pin number 2 is in the other row, but in the same column of pin number 1. Pin number 3 is in the same row of pin 1, but in the next column and so forth.



## Jumper Location

Use the diagram below and the tables on the following pages to locate and set the on-board configuration jumpers.



### CMOS Reset

This option is provided as a convenience for those who need to reset the CMOS registers. It should always be set to “Normal” for standard operation. If the CMOS needs to be reset, turn off the system; move JP1 to 2-3, and back to 1-2, and power the system on.

**Table 1-1 CMOS Reset**

Reset CMOS	Normal	Clear CMOS
JP1	1-2*	2-3

\* Manufacturer's Settings

**Table 1-2 BIOS Boot Setting**

BIOS Boot	FWH	SPI
J26	1-2	2-3

## Installing Memory

This motherboard provides four 240-pin MEMORY MODULES (DIMM) sockets for DDR2 memory. Sockets can be populated with a minimum of 128MB up to a maximum memory of 8GB.

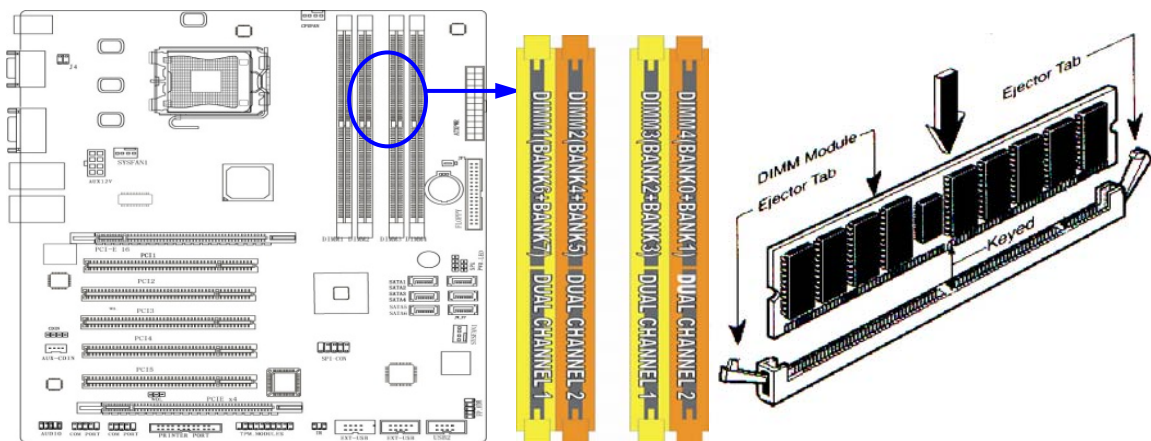
### Valid Memory Configurations

Bank	240-Pin DIMM	PCS	Total Memory
Bank 0, 1 (DIMM1)	DDR2 533/DDR2 667/DDR2 800	X1	128MB~2.0GB
Bank 2, 3 (DIMM2)	DDR2 533/DDR2 667/DDR2 800	X1	128MB~2.0GB
Bank 4, 5 (DIMM3)	DDR2 533/DDR2 667/DDR2 800	X1	128MB~2.0GB
Bank 6,7 (DIMM4)	DDR2 533/DDR2 667/DDR2 800	X1	128MB~2.0GB
Total	System Memory (Max. 8.0GB)	4	128MB~8.0GB

#### Recommend DIMM Module Combination

1. **One DIMM Module** ---Plug in DIMM1
2. **Two DIMM Modules**---Plug in DIMM1 and DIMM3 for Dual channel function
3. **Four DIMM Modules**---Plug in DIMM1/DIMM2/DIMM3/DIMM4.

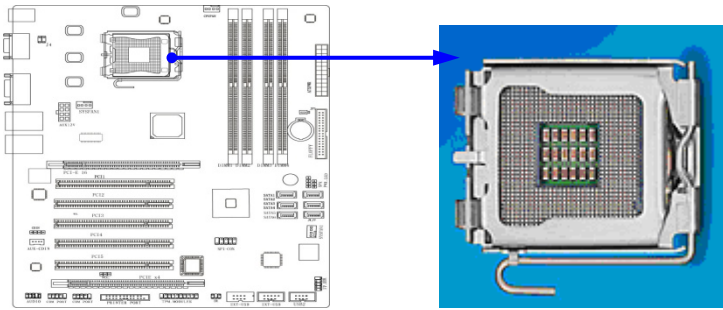
To install DDR SDRAM modules on your motherboard, please refer to figure below:



## Installing CPU

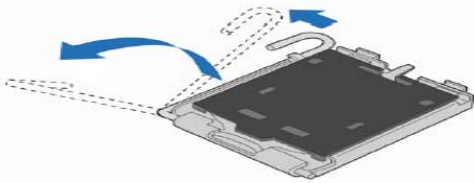


1. *Improper installation of the CPU may cause permanent damage to both the system board and the CPU. -- Void of warranty*
2. *Always handle the CPU by the edges, never touch the pins or pads.*
3. *Always use a heat-sink and a CPU fan.*



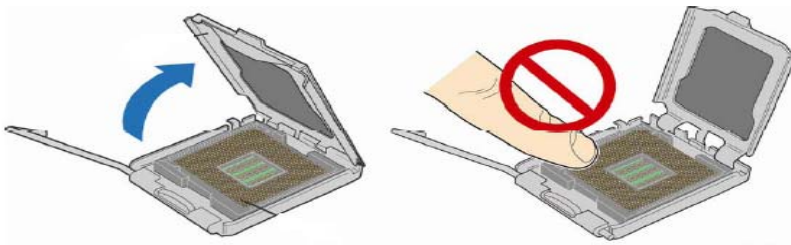
**To properly install the processor, make sure to carefully follow these instructions:**

1. Open the socket lever by pushing the lever down and away from the socket.



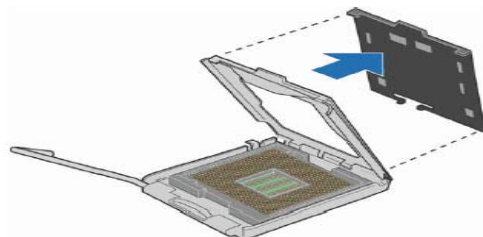
**Lift Socket Lever**

2. Lift the metal plate and make sure not to touch the socket pins



**Lift the Load Plate**

3. Remove the plastic protective cover



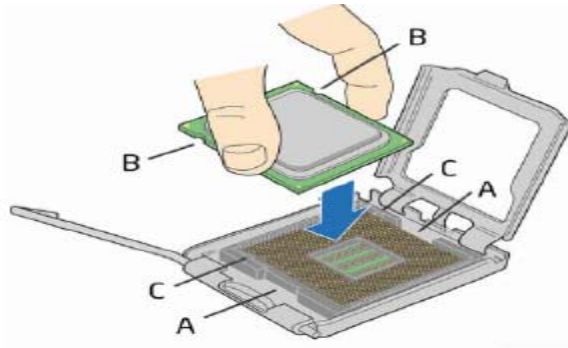
**Remove the Protective Socket Cover**



- Remove the protective processor cover. Be careful not to touch the bottom contacts of the processor.

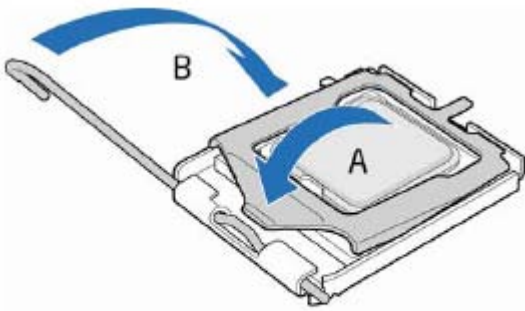


- Hold the processor as shown in the picture. Align the processor with the socket (A). Align the processor notches (B) with the socket (C). Insert the processor into the socket without tilting.



**Figure 1 . Install the Processor**

- Press down on the load plate (A) close and return the socket lever (B) to its original position

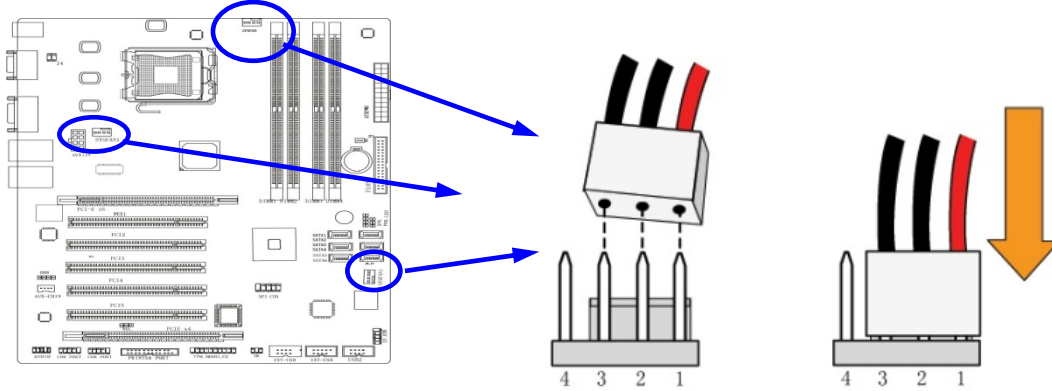


**Close the Load Plate**

## Installing FAN(s)

### FAN Power Headers: SYS\_FAN, NB\_FAN (4-pin), CPU\_FAN (4-pin) (J17, J6, J1)

These connectors support cooling fans of up to 350mA (4.2 Watts). 3 pin FANs will not be controllable and will be on full time. Connect the fan’s plug to the board taking into consideration the polarity of connector.



#### CPU\_FAN: CPU Fan connector

The pin assignment is as follows:

PIN	ASSIGNMENT
1	GND
2	12V
3	Tachometer
4	PWM

**CPU\_FAN**

SYS\_FAN and NB\_FAN have identical pin assignments.



*Be sure that there is sufficient air circulation across the processor’s heat sink and the CPU cooling FAN is working correctly, otherwise it may cause the processor and motherboard to overheat and be damaged. You may install an auxiliary cooling FAN, if necessary.*

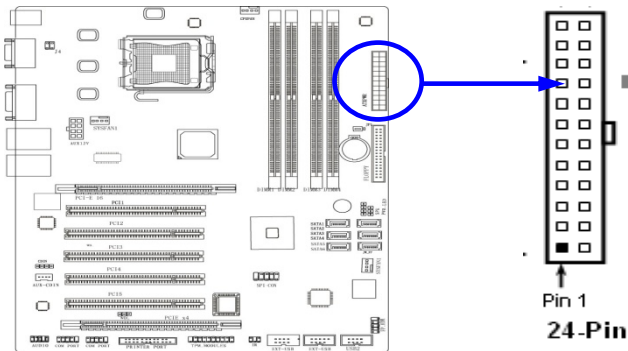
## Installing Power Cables

### Power Connector (24-pin block): (ATXPWR)

The ATX Power Supply allows using a soft power-on momentary switch to power up the motherboard.

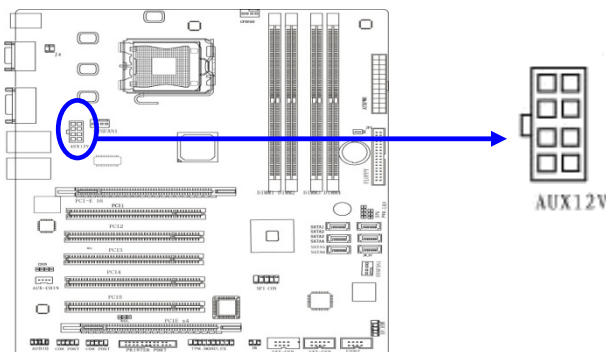
This allows for a low voltage control of the power supply by the user, through the front panel power button, or the Operating System. The 24 pin connector has some additional power rails but is still backwards compatible with the original 20 pin specification.

- \*\* An ATX 12V Specification 2.0 or better compliant power supply unit (PSU) with a minimum of 350W power rating is recommended. This type has 24-pin and 4-pin power plugs.
- \*\* If you intend to use a PSU with 20-pin and 4-pin power plugs, make sure that the 20-pin power plug can provide at least 15A on +12V and the power supply unit has a minimum power rating of 350W. The system may become unstable or may not boot up if the power is inadequate.



### ATX 12V Power Connector (8-pin block): (AUX12V)

This 8-pin connector supports the newer high power processors from Intel. It is fully backwards compatible with the original 4 pin connector. **PLEASE MAKE SURE NOT TO USE THE 2x3 plugs.** They are designed for PCI-e cards only.



## Back Panel Connections

### PS/2 Mouse & PS/2 Keyboard Connector: (PS2 KB/MOUSE) (J2)

The stacked color-coded mini-DIN connectors are for the keyboard and Mouse.

### Dual Serial COM Port: COM1 / COM2 (J4)

The stacked 9 pin male D-Subminiature connectors are COM1 and COM2. They can be disabled and configured through BIOS SETUP. Please refer to Chapter 3 “INTEGRATED PERIPHERALS SETUP” section for more information.

### VGA Connector (15-pin D-Sub) Connector: VGA (J5A)

The 15-pin D-Subminiature female connector supports analog displays.

### Audio Line-In, Lin-Out, MIC Connector: AUDIO (J5B)

The 3 color-coded phone jacks are LINE-IN, LINE-OUT, and MIC

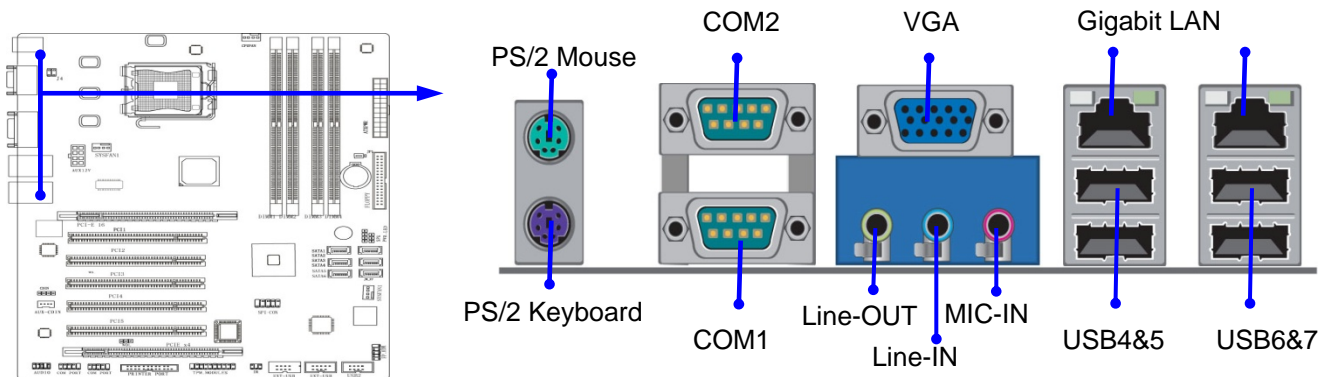
Line-out: (GREEN)	Audio output to speaker
Line-in: (BLUE)	Audio input to sound chip
MIC: (PINK)	Microphone Connector

### Dual LAN Port connector: (J7/J8)

These connectors are standard GbE RJ45 Ethernet ports stacked over an USB2.0 port.

### USB Port connectors: (USB 4&5 & USB 6&7)

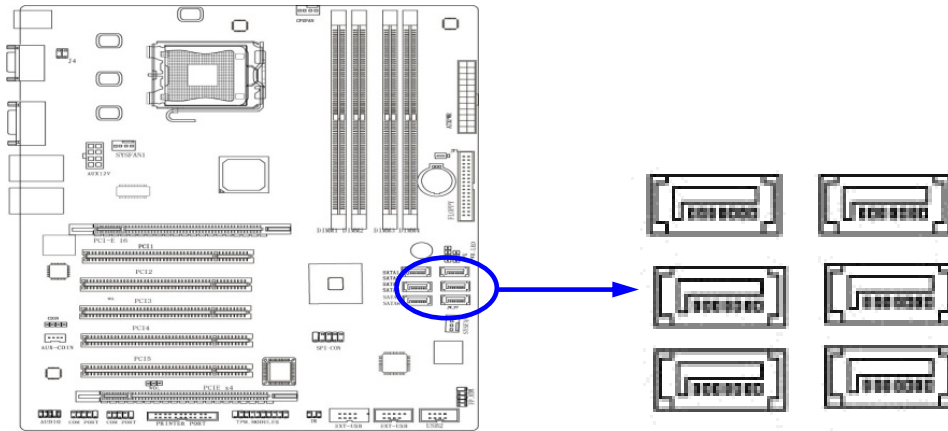
These connectors are standard USB2.0 connectors.



## Header Connections

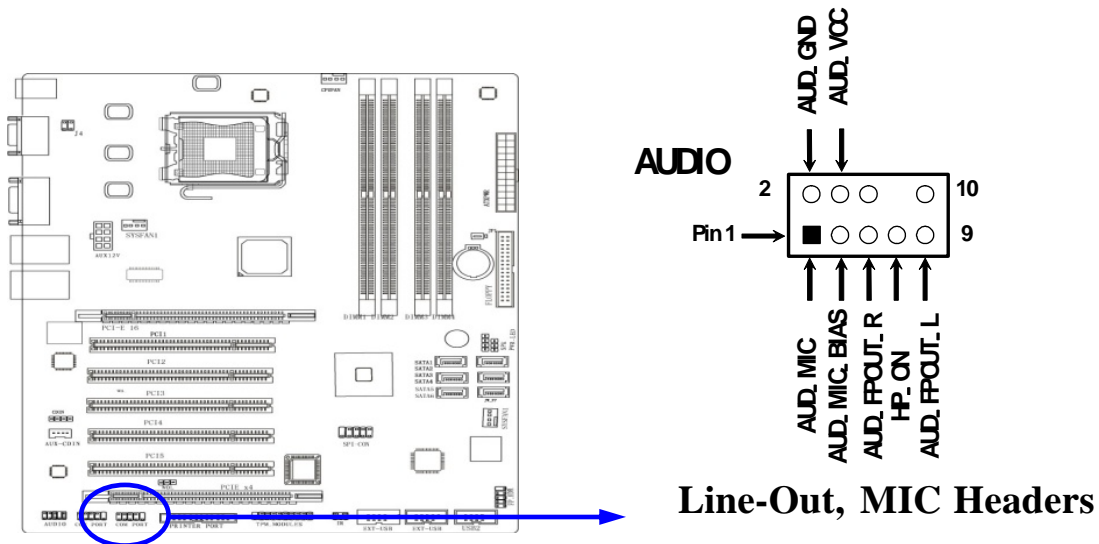
### Serial-ATA2 Port: SATA1-SATA6 (J9, J10, J11, J12, J13, J14)

These connectors allow for the support of up to 6 SATA devices. It is preferable to use SATA-II certified cables. These cables easily connect to the motherboard and the SATA peripheral.



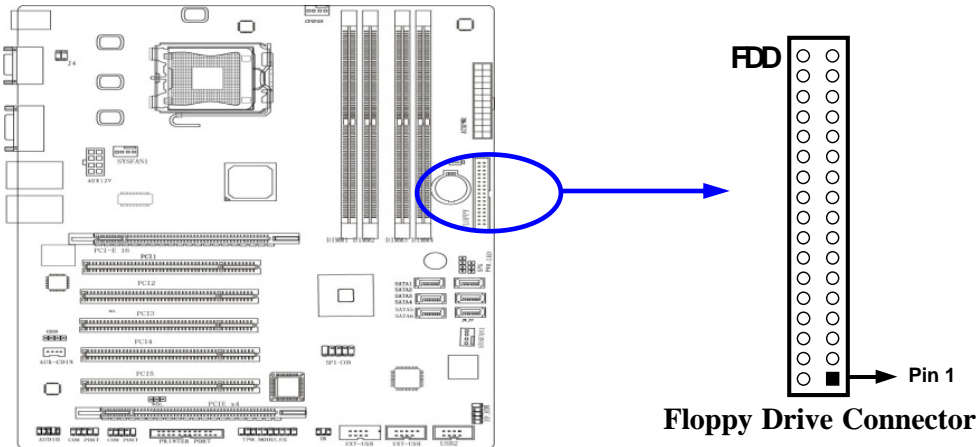
### Line-Out, MIC Header (9-pin): AUDIO

These headers connect to Front Panel Line-out, MIC connector through a cable.



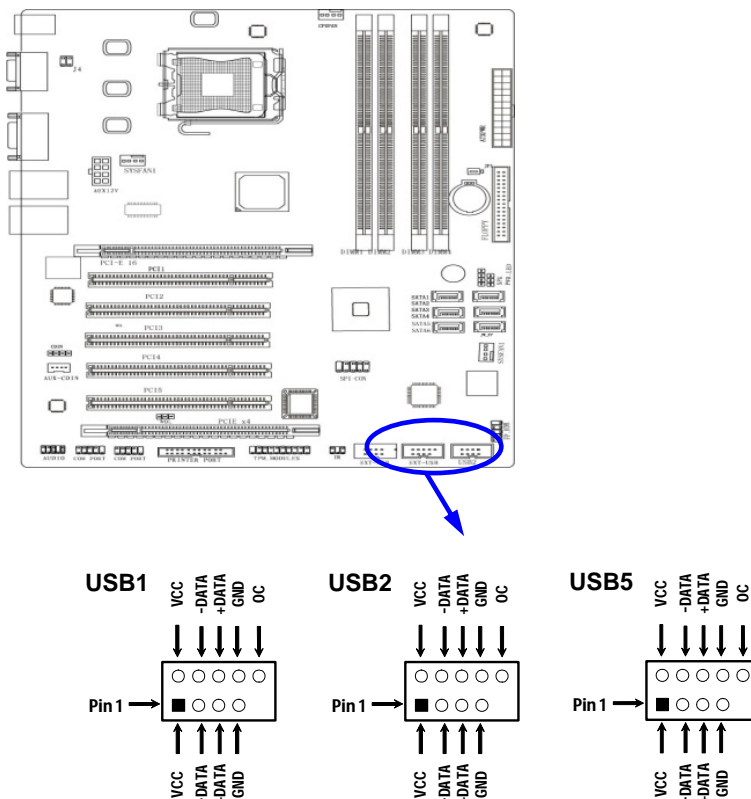
### Floppy drive Connector (34-pin block): FDD

Use this connector with a standard floppy drive ribbon cable. The motherboard supports up to 2 floppy-drives. After connecting the single plug end to motherboard, connect the two plugs at other end of the cable. If using a single drive, make sure to connect it to the connector at the end of the cable.



### USB Port Headers (9-pin): USB0&1, USB2&3, USB8&9 (J23, J24, J25)

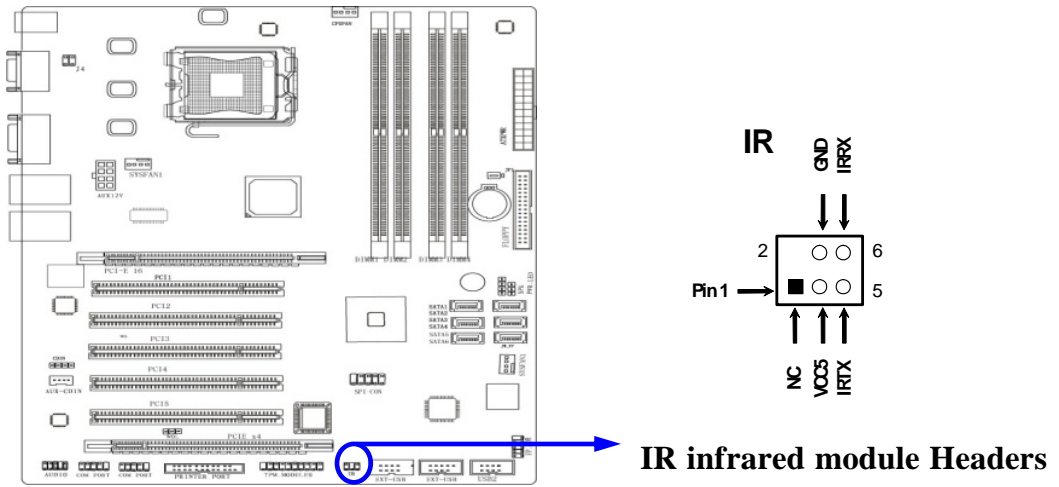
The headers are used for additional USB connectivity. By attaching optional USB cables, your will have 6 additional USB ports.



USB Port Headers

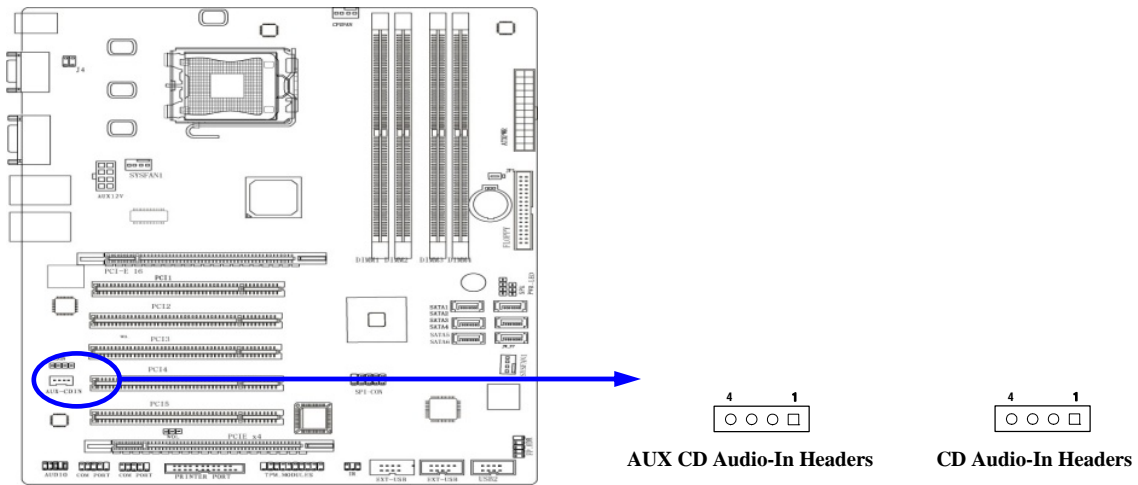
**IR infrared module Headers (5-pin): IR (J22)**

This connector supports the optional wireless transmitting and receiving infrared module. You must configure the setting through the BIOS setup to use the IR function.



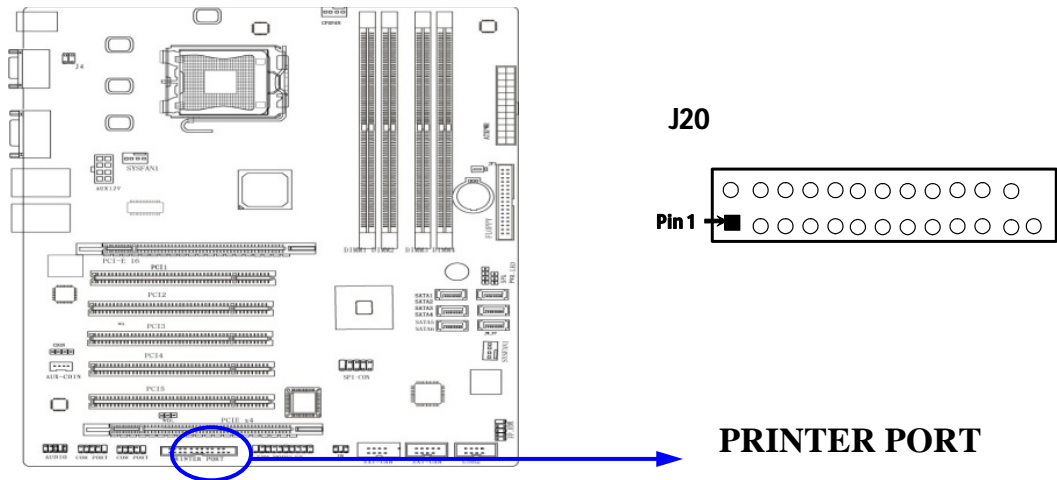
**AUX CD Audio-In and CD Audio-In Headers (4-pin): J18:AUX\_CDIN / J15: CD-IN**

AUX\_CDIN and CD-IN are the connectors for auxiliary CD signals.



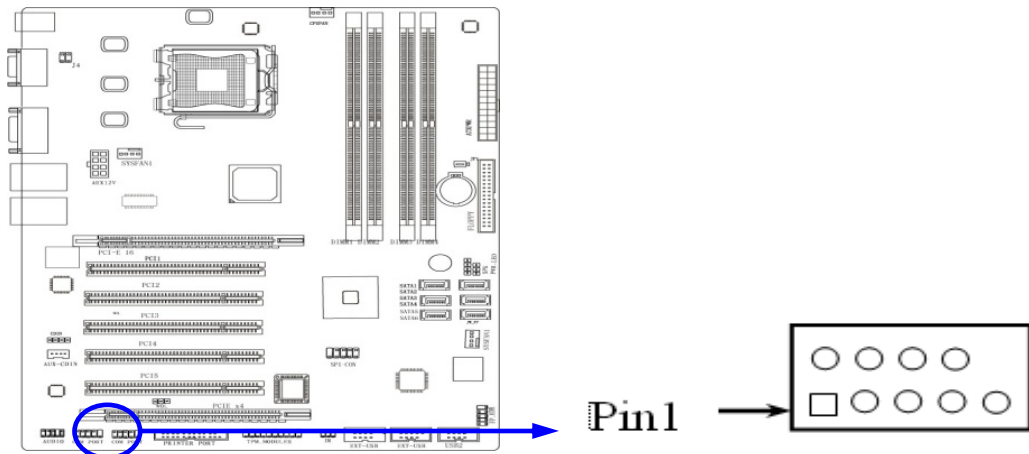
**Parallel Port Header (25-pin): PRINTER PORT (J20)**

The parallel port connector is a 25-pin male header. The onboard Parallel Port can be disabled or configured through the BIOS SETUP. Please refer to Chapter 3 “INTEGRATED PERIPHERALS SETUP” section for more detail information.



**Serial COM Port: COM3/ COM4**

COM3 / COM4 are available through 9-pin shrouded headers. These ports can be disabled or configured through BIOS SETUP. Please refer to Chapter 3 “INTEGRATED PERIPHERALS SETUP” section for more detail information





## Front Panel Header Connections

### SATA LED

This connector connects to the hard disk activity indicator light on the case.

PIN	ASSIGNMENT
1	HD_LED+
3	HD_LED-

### Reset switch

This 2-pin connector connects to the case-mounted reset switch for rebooting your computer.

PIN	ASSIGNMENT
5	GND
7	RST_BTN

### Power LED: PWR-LED

Connect your system Power LED to these pins. Connect a bi-color LED for additional functionality (signaling not supported).

PIN	ASSIGNMENT
2	PW_LED+
4	PW_LED-

### Power Button: PWR BTN

This 2-pin connector connects to the case-mounted power switch to power ON/OFF the system.

PIN	ASSIGNMENT
6	PWRBTNSW
8	GND

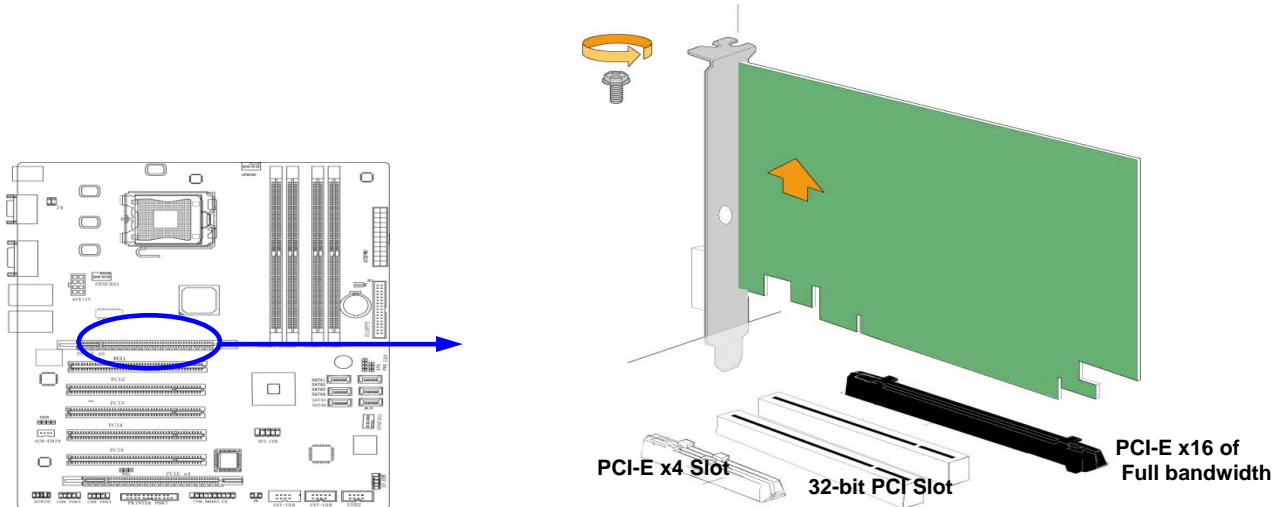
### Speaker connector: SPEAK

This 4-pin connector connects to the case-mounted speaker. See the figure below. The ATXP-965Q already has an onboard buzzer. This header is for legacy applications.

PIN	ASSIGNMENT
1	SPEAKER SIGNAL
2	NC
3	GND
5	SPK_VCC

## PCI Express and PCI Slot

The ATXP-965Q motherboard offers one PCI-Express x16 graphics slot providing 4Gbyte/sec data transfer rate at each relative direction. This allows for 3.5 times the bandwidth of the AGP8X, and it supports a peak concurrent bandwidth of 8Gbyte/sec at full speed. Five 32-bit PCI slots guarantee the rich connectivity for peripheral I/O. Four of the five PCI slots are fully bus-master. One PCI Express x4 in a PCI-e x16 slot provides 2Gbyte/sec concurrently bandwidth; while allowing for the use of higher performance boards.



## Chapter 3

## AMIBIOS Setup

The ATXP-965Q motherboard features the American Megatrends AMIBIOS8. The system configuration parameters are set via the BIOS setup. Since the BIOS Setup resides in the ROM BIOS, it is available each time the computer is turned on.

American Megatrends' AMIBIOS8 brand BIOS (Basic Input Output System) pre-boot firmware is the industry's standard product used by most designers of X86 computer equipment in the world today. Its superior combination of configurability and functionality enables it to satisfy the most demanding ROM BIOS needs for x86 designers. Its modular architecture and high degree of configurability make it the most flexible BIOS in the world.

When your platform is powered on, AMIBIOS8 tests and initializes the hardware and programs the chipset and other peripheral components. During this time, Power On Self Test (POST) progress codes are written by the system BIOS to I/O port 80h, allowing the user to monitor the progress with a special monitor. Appendix B lists the POST codes and their meanings.

During early POST, no video is available to display error messages should a critical error be encountered; therefore, POST uses beeps on the speaker to indicate the failure of a critical system component during this time. Consult Appendix B for a list of Beep codes used by the BIOS.

### Starting BIOS Setup

AMIBIOS has been integrated into many motherboards for over a decade. In the past, people often referred to the AMIBIOS setup menu as BIOS, BIOS setup, or CMOS setup.

To enter the CMOS setup screens, follow the steps below:

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

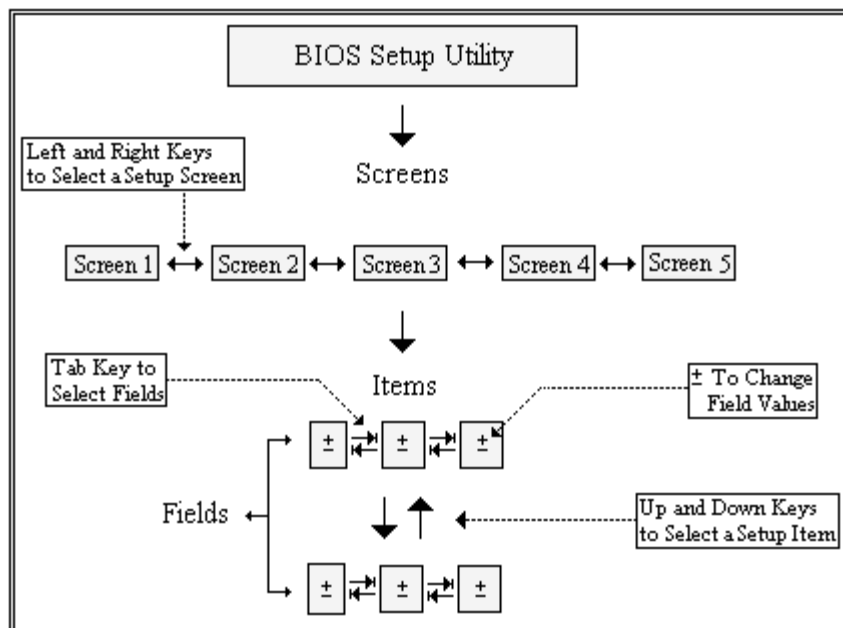
### BIOS Setup Main Menu

The CMOS main BIOS setup menu is the first screen that you can navigate. Each main BIOS setup menu option is described in the Chapter 2.

The Main 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.

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.

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

HOT KEY	DESCRIPTION
←→ <b>Left/Right</b>	The <i>Left and Right</i> <Arrow> keys allow you to select an setup screen.  For example: Main screen, Advanced screen, Chipset screen, and so on.
↑↓ <b>Up/Down</b>	The <i>Up and Down</i> <Arrow> keys allow you to select an setup item or sub-screen.
+− <b>Plus/Minus</b>	The <i>Plus and Minus</i> <Arrow> keys allow you to change the field value of a particular setup item.  For example: Date and Time.
<b>Tab</b>	The <Tab> key allows you to select setup fields.

**Note:** 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

HOT KEY	DESCRIPTION		
<p><b>F1</b></p>	<p>The &lt;F1&gt; key allows you to display the <i>General Help</i> screen.</p> <p>Press the &lt;F1&gt; key to open the <i>General Help</i> screen.</p> <div data-bbox="444 411 1308 842" style="border: 1px solid black; padding: 10px;"> <p><b>General Help</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>↔ Select Screen</p> <p>+ - Change Screen</p> <p>PGDN Next Page</p> <p>Home Go to Top of the Screen</p> <p>F2/F3 Change Colors</p> <p>F8 Load Failsafe Defaults</p> <p>F10 Save and Exit</p> </td> <td style="width: 50%; vertical-align: top;"> <p>↓↑ Select Item</p> <p>Enter Go to Sub Screen</p> <p>PGUP Previous Page</p> <p>End Go to Bottom of Screen</p> <p>F7 Discard Changes</p> <p>F9 Load Optimal Defaults</p> <p>ESC Exit</p> </td> </tr> </table> <p style="text-align: center; margin-top: 10px;">[Ok]</p> </div>	<p>↔ Select Screen</p> <p>+ - Change Screen</p> <p>PGDN Next Page</p> <p>Home Go to Top of the Screen</p> <p>F2/F3 Change Colors</p> <p>F8 Load Failsafe Defaults</p> <p>F10 Save and Exit</p>	<p>↓↑ Select Item</p> <p>Enter Go to Sub Screen</p> <p>PGUP Previous Page</p> <p>End Go to Bottom of Screen</p> <p>F7 Discard Changes</p> <p>F9 Load Optimal Defaults</p> <p>ESC Exit</p>
<p>↔ Select Screen</p> <p>+ - Change Screen</p> <p>PGDN Next Page</p> <p>Home Go to Top of the Screen</p> <p>F2/F3 Change Colors</p> <p>F8 Load Failsafe Defaults</p> <p>F10 Save and Exit</p>	<p>↓↑ Select Item</p> <p>Enter Go to Sub Screen</p> <p>PGUP Previous Page</p> <p>End Go to Bottom of Screen</p> <p>F7 Discard Changes</p> <p>F9 Load Optimal Defaults</p> <p>ESC Exit</p>		
<p><b>F10</b></p>	<p>The &lt;F10&gt; key allows you to save any changes you have made and exit Setup. Press the &lt;F10&gt; key to save your changes. The following screen will appear:</p> <div data-bbox="444 1010 1308 1199" style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Save configuration changes and exit now?</p> <p style="margin-top: 10px;">[Ok]                      [Cancel]</p> </div> <p>Press the &lt;Enter&gt; key to save the configuration and exit. You can also use the &lt;Arrow&gt; key to select <i>Cancel</i> and then press the &lt;Enter&gt; key to abort this function and return to the previous screen.</p>		
<p><b>ESC</b></p>	<p>The &lt;Esc&gt; key allows you to discard any changes you have made and exit the Setup. Press the &lt;Esc&gt; key to exit the setup without saving your changes. The following screen will appear:</p> <div data-bbox="444 1514 1308 1703" style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Discard changes and exit setup now?</p> <p style="margin-top: 10px;">[Ok]                      [Cancel]</p> </div> <p>Press the &lt;Enter&gt; key to discard changes and exit. You can also use the &lt;Arrow&gt; key to select <i>Cancel</i> and then press the &lt;Enter&gt; key to abort this function and return to the previous screen.</p>		
<p><b>Enter</b></p>	<p>The &lt;Enter&gt; key allows you to display or change the setup option listed for a</p>		

particular setup item. The <Enter> key can also allow you to display the setup sub- screens.

## Main Setup

When you first enter the CMOS Setup Utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the *Main* tab. This screen shows some basic system information, like the BIOS Version and Identification, the processor parameters and also the date and time settings.

### 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 through the keyboard. Press the <Tab> key or the <Arrow> 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.

## BIOS SETUP UTILITY

Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
<div style="display: flex; justify-content: space-between;"> <div style="width: 60%;"> <p><b>System Overview</b></p> <p>AMIBIOS</p> <p>Version : 08.00.14</p> <p>Build Date: 07/16/07</p> <p>IDE : 0ABMK008</p> <p>Processor</p> <p>Type : Intel ® Pentium ® D CPU 3.40GHz</p> <p>Speed : 3400 MHz</p> <p>Count : 1</p> <p>System Memory</p> <p>Size : 4088MB</p> <p>System Time [22:57:10]</p> <p>System Date [Thu 07/31/2007]</p> </div> <div style="width: 35%; padding-left: 10px;"> <p>Use [Enter], [TAB] or [Shift-TAB] to select a field.</p> <p>Use [+] or [-] to configure system Time.</p> <p>← Select Screen</p> <p>↑↓ Select Item</p> <p>+ - Change Field</p> <p>Tab Select Field</p> <p>F1 General Help</p> <p>F10 Save and Exit</p> <p>ESC Exit</p> </div> </div>						
<p>V02.61 © Copyright 1985-2006, American Mega trends, Inc.</p>						

## Advanced BIOS Setup

Select the *Advanced* tab from the CMOS setup screen to enter the Advanced BIOS Setup screen.

BIOS SETUP UTILITY						
Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
<b>Advanced Settings</b>		Configure CPU.				
WARNING: Setting wrong values in below Sections may cause system to malfunction.						
▶ CPU Configuration						
▶ IDE Configuration						
▶ Floppy Configuration						
▶ Super IO Configuration						
▶ Hardware Health Configuration						
▶ ACPI Configuration						
▶ AHCI Configuration						
▶ Event Log Configuration		← Select Screen				
▶ MPS Configuration		↑↓ Select Item				
▶ PCI Express Configuration		Enter Go to Sub Screen				
▶ Smbios Configuration		F1 General Help				
▶ Remote Access Configuration		F10 Save and Exit				
▶ USB Configuration		ESC Exit				
V02.61 © Copyright 1985-2006, American Mega trends, Inc.						

### ► CPU Configuration Settings

This screen allows the user to change Processor related parameters

Hardware Prefetcher	<b>Enable</b> or Disable
Adjacent Cache Line Prefetch	<b>Enable</b> or Disable
Intel® Virtualization Tech.	<b>Enable</b> or Disable
Execute-Disable Bit Capability	<b>Enable</b> or Disable
Single Logical Processor Mode	Enable or <b>Disable</b>
Intel® Speedstep™ Tech.	<b>Auto</b> , Maximum speed, Minimum speed or Disabled
Intel® C-State Tech.	
C1 Configuration	<b>Standard</b> or Enhanced

### ► IDE Configuration Settings

This screen allows the user to configure the IDE devices. The CMOS screen is showing you the two SATA Host Controllers #1 & # 2, where SATA controller #1 controls the first 4 SATA ports, and SATA #2 control the last 2 SATA ports.

Below are the options:

SATA#1 Configuration	<b>Enhanced</b> , Compatible or disabled
Configure SATA#1	<b>IDE</b> , AHCI or RAID
SATA#2 Configuration	<b>Enhanced</b> or Disabled

SATA#2 does not support the same options as SATA #1, like IDE, RAID and AHCI. According to Intel's ICH8 Specification. the first Host controller supports Ports 0 -3 and the second controller support ports 4 and 5. In AHCI or RAID mode, only SATA #1 controller is utilized enabling all six ports.

### ► Floppy Configuration Settings

This screen allows the user to select the Floppy drive configuration.

<b>Floppy Drive A: and B:</b>	Disabled, 360KB, 1.2MB, 1.44MB and 2.88MB are the
-------------------------------	---



► **Super I/O Configuration Screen**

<b>Onboard Floppy Controller</b>	Set this option to enable to enable the floppy drive controller on the motherboard. The settings are Enabled and Disabled. The default setting is <i>enabled</i> .
<b>Serial Port Address</b>	This option selects the base I/O port address of the serial port. Available addresses are 3F8, 2F8, 3E8 and 2E8
<b>Serial Port IRQ</b>	This option selects the IRQ of the serial port.
<b>Serial Port Mode</b>	This option is only available for COM2 and allows the user to configure the IR options
<b>Parallel Port Address</b>	This option selects the I/O address used by the parallel port. Available options are Disabled, <b>378</b> , 278 and 3BC
<b>Parallel Port Mode</b>	This option selects the parallel port mode. Available options are <b>Normal</b> , SPP Bi-Dir, EPP+SPP, ECP and ECP+EPP
<b>Parallel Port IRQ</b>	This option selects the IRQ used by the parallel port. Available options are <b>7</b> and 5

► **Hardware Health Configuration Screen**

Shows information about temperatures and voltages and allows setting FAN parameter

<b>H/W Health Function</b>	Enable or Disable
<b>PWM1 Mode Setting</b>	Auto Fan Mode, Fan Always on Full, Fan Disable mode and

Manual mode

PWM1 Ramp Rate

The P64AX has 3 different Fans. The settings on this screen will control the functionality of all three if the fans used 4 pin connectors

► **ACPI Configuration Screen**

<b>General ACPI Configuration</b>	Suspend mode, Repose Video on S3 Resume
-----------------------------------	--

**Advanced ACPI Configuration**

<b>ACPI Version Feature</b>	1.0, 2.0 or 3.0
<b>ACPI APIC support</b>	Include ACPI APIC pointer to RSDT pointer list
<b>AMI OEM Table</b>	<p>Enable or Disable</p> <p>Set this value to allow the ACPI BIOS to add a pointer to an OEMB table in the Root System Description Table (RSDT) table.</p> <p>Note: OEMB table is used to pass POST data to the AML code during ACPI O/S operations.</p>
<b>Headless Mode</b>	<p>Enable or <b>Disable</b></p> <p>This option is used to update the ACPI FACP table to indicate headless operations.</p>

**Chipset ACPI Configuration**

<b>Energy Lake Feature</b>	Enable or <b>Disable</b>
<b>APIC ACPI SCI IRQ</b>	Enable or <b>Disable</b>
<b>USB Device Wakeup from S3/S4</b>	
<b>High Performance Event timer</b>	

**► AHCI Configuration**

AHCI Ports 0 through 5

**► Event Log Configuration**

View Events Log

Mark all Events as read

Clear events log

**► MPS Configuration:**

Select 1.4 or 1.1

**► PCI Express Configuration**

<b>Active State Power Management</b>	<b>Disable</b> or Enable
--------------------------------------	--------------------------

## ► SMBIOS Configuration

## ► Remote Access Configuration

Set the value for this option to serial to allow the system to use the remote access feature. The remote access feature requires a dedicated serial port connection.

<b>Serial Port Number</b>	Select the serial port you want to use for console redirection. You can set the value for this option to either COM1 or COM2
<b>Serial Port Mode</b>	Select the baud rate you want the serial port to use for console redirection.
<b>Flow Control</b>	Select Flow Control for console redirection Available options are None, Hardware and Software.
<b>Redirection after BIOS POST</b>	
<b>[Disable]</b>	Turn off the redirection after POST
<b>[Boot Loader]</b>	Redirection is active during Boot loader
<b>[Always]</b>	Redirection is always active (some OS's may not work if set to always)
<b>Terminal Type</b>	ANSI, VT100 or VT-UTF8
<b>UT-UTF8 Combo Key Support</b>	
<b>Sredir Memory Display Delay</b>	

## ► USB Configuration

**Legacy USB Support:** Available options are **Auto**, Enable and Disable

<b>Option</b>	<b>Description</b>
Disabled	Set this value to prevent the use of any USB device in DOS or during system boot.
Enabled	Set this value to allow the use of USB devices during boot and while using DOS
Auto	This option auto detects USB Keyboards or Mice and USB devices to allow them to be utilized during boot and while using DOS.
Port 64/60 Emulation	<b>Disable</b> or Enable
USB2.0 Controller mode	<b>Hi-speed</b> or Full-speed
BIOS EHCI Hand-off	<b>Enable</b> or Disable

**USB Mass Storage Device Configuration**

Emulation Type – Auto	Floppy
	Forced FDD
	HDD
	CDROM

If Auto, USB devices less than 530 MB will be emulated as Floppy and remaining as HDD. Forced FDD option can be used to force a HDD formatted drive to boot as FDD.



**Plug and Play O/S**

<b>No</b>	The No setting is for operating systems that do not meet the Plug and Play specifications. It allows the BIOS to configure all the devices in the system.
<b>Yes</b>	The Yes setting allows the operating system to change the interrupt, I/O, and DMA settings. Set this option if the system is running Plug and Play aware operating systems.
<b>PCI Latency Timer</b>	Set this value to allow the PCI Latency Timer to be adjusted from 32 to 248. This option sets the latency of all PCI devices on the PCI bus.
<b>Allocate IRQ to VGA</b>	
<b>Yes</b>	Set this value to allow the allocation of an IRQ to a VGA adapter card that uses the PCI local bus.
<b>No</b>	Set this value to prevent the allocation of an IRQ to a VGA adapter card that uses the PCI local bus.

**Palette Snooping**

<b>Disabled</b>	This is the default setting and should not be changed unless the VGA card manufacturer requires Palette Snooping to be enabled
<b>Enabled</b>	This setting informs the PCI devices that an ISA based Graphics device is installed in the system. It does this so the ISA based Graphics card will function correctly. This does not necessarily indicate a physical ISA adapter card. The graphics chipset can be mounted on a PCI card. Always check with your adapter card's manuals first, before modifying the default settings in the BIOS

**PCI IDE Bus Master**

<b>Disabled</b>	Set this value to prevent PCI bus mastering.
<b>Enabled</b>	This option specifies that the IDE controller on the PCI local bus has mastering capabilities.

**Off Board PCI/ISA IDE Card**

Set this value to allow the Off Board PCI/ISA IDE Card to be selected.

<b>Auto</b>	This setting will auto select the location of an Off Board PCI IDE adapter card.
<b>PCI Slot1</b>	This setting will select PCI Slot 1 as the location of the Off Board PCI IDE adapter card. Use this setting only if there is an IDE adapter card installed in PCI Slot 1.
<b>PCI Slot2</b>	This setting will select PCI Slot 2 as the location of the Off Board PCI IDE adapter card. Use this setting only if there is an IDE adapter card installed in PCI Slot 2.
<b>IRQ</b>	Set this value to allow the IRQ settings to be modified. Changing an IRQ from Available to Reserved will remove it from the PCI PnP pool.
<b>DMA</b>	Set this value to allow the DMA channels to be modified from Available to Reserved.

### Reserved Memory Size

Set this value to allow the system to reserve memory that is used by ISA or legacy devices.

<b>Disabled</b>	Set this value to prevent BIOS from reserving memory to ISA devices.
<b>16K</b>	Set this value to allow the system to reserve 16K of the system memory to the ISA devices.
<b>32K</b>	Set this value to allow the system to reserve 32K of the system memory to the ISA devices.
<b>64K</b>	Set this value to allow the system to reserve 64K of the system memory to the ISA devices.

### Reserved Memory Address

Note: Reserved Memory Address can be displayed and set manually only if the Reserved Memory Size is set to 16K, 32K, or 64K.

## Boot Setup

### Boot Settings Configuration Screen

**BIOS SETUP UTILITY**

Main
Advanced
PCIPnP
Boot
Security
Chipset
Exit

<p><b>Boot Settings</b></p> <ul style="list-style-type: none"> <li>▶ Boot Settings Configuration</li> <li>▶ Boot Device Priority</li> <li>▶ Hard Disk Drives</li> <li>▶ Removable Drives</li> <li>▶ CD/DVD Drives</li> <li>▶ BIOS Boot Configuration Options</li> </ul>	<p><b>Configure Settings During System Boot.</b></p> <p>← Select Screen                  ↑↓ Select Item                  Enter Go to Sub Screen                  F1 General Help                  F10 Save and Exit                  ESC Exit</p>
---	---

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## ► Boot Settings Configuration

### Quick Boot

<b>Disabled</b>	Set this value to allow the BIOS to perform all POST tests.
<b>Enabled</b>	Set this value to allow the BIOS to skip certain POST tests to boot faster.

### Quiet Boot

<b>Disabled</b>	Set this value to allow the computer system to display the POST messages
<b>Enabled</b>	Set this value to allow the computer system to display the OEM logo

### Add-On ROM Display Mode

<b>Force BIOS</b>	Set this value to allow the computer system to force a third party BIOS to display during system boot
<b>Keep Current</b>	Set this value to allow the computer system to display the configuration information during system boot

### Boot up Num-Lock

<b>Off</b>	This option disables the keyboard Number Lock automatically
<b>On</b>	Set this value to allow the Number Lock on the keyboard to be enabled automatically when the computer system is boot up

### PS/2 Mouse Support

<b>Disabled</b>	This option will prevent the PS/2 mouse port from using system resources and will prevent the port from being active. Use this setting if installing a serial mouse
<b>Enabled</b>	Set this value to allow the system to use a PS/2 mouse. This is the default setting

### Wait for 'F1' If Error

<b>Disabled</b>	This prevents the board from waiting on an error for user intervention. This setting should be used if there is a known reason for a BIOS error to appear. An example would be a system administrator must remote boot the system. The computer system does not have a keyboard currently attached. If this setting is set the system will continue to boot up in to the operating system. If 'F1' is enabled
<b>Enabled</b>	Set this value to allow the system BIOS to wait for any error. If an error is detected pressing <F1> will enter Setup and the BIOS setting can be adjusted to fix the problem. This normally happens when upgrading the hardware and not setting the BIOS to recognize it. This is the default setting.



### Hit 'DEL' Message Display

<b>Disabled</b>	This prevents the CMOS set-up to display Hit Del to enter Setup during memory initialization. If Quiet Boot is enabled, the Hit 'DEL' message will not display.
<b>Enabled</b>	This allows the CMOS set-up to display Hit Del to enter Setup during memory initialization

### ► Boot Device Priority

Set the boot device options to determine the sequence in which the computer checks which device to boot from. The settings are *Removable Dev.*, *Hard Drive*, or *ATAPI CDRROM*. The Optimal and Fail-Safe settings are:

1st boot device	Removable Device
2nd boot device	CD/DVD
3rd boot device	HDD

To change the boot order, select a boot category type such as Hard disk drives, Removable media, or ATAPI CD ROM devices from the boot menu. For example, if the 1st boot device is set to Hard disk drives, then BIOS will try to boot to hard disk drives first.

**Note:** When you select a boot category from the boot menu, a list of devices in that category appears. For example, if the system has three hard disk drives connected, then the list will show all three hard disk drives attached.

### ► Hard Disk Drives

Use this screen to select the primary hard drive in the system.

### ► Removable Drives

Use this screen to select the primary removable drives attached to the system.

### ► CD/DVD Drives

Use this screen to select the primary ATAPI CD-ROM drives in the system.

### ► BIOS Boot Configuration Options

Select BIOS Boot Look & Feel

<b>BBS</b>	AMI Enhanced BBS
<b>AUTOFLEX</b>	BBS without the redundant extra menu when only one drive of a type is present
<b>FLEXBOOT</b>	AMI Enhanced single-menu Look & Feel

## Security Setup

### CMOS Password Support

#### Two Levels of Password Protection

CMOS set-up 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 CMOS Setup is executed. 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 reconfigure.

### BIOS SETUP UTILITY

Main      Advanced      PCIPnP      Boot      **Security**      Chipset      Exit

<p><b>Security Settings</b></p> <p>Supervisor Password    :Not Installed  User Password            :Not Installed</p> <p>Change Supervisor Password  Change User Password</p> <p>Boot Sector Virus Protection    [Disabled]</p>	<p><b>Configure Settings</b>  During System Boot.</p> <p>← Select Screen  ↑↓ Select Item  Enter Change  F1 General Help  F10 Save and Exit  ESC Exit</p>
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<b>Remember the Password</b>	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. See (Deleting a Password) for information about erasing system configuration information.
<b>Deleting a Password</b>	If you forget the passwords you set up through CMOS Setup, the only way you can reset the password is to erase the system configuration information where the passwords are stored. System configuration data is stored in CMOS RAM, a type of memory that consumes very little power. You can drain CMOS RAM power by removing the battery or resetting CMOS information using the CMOS erase jumper.
<b>Supervisor Password</b>	Indicates whether a supervisor password has been set, if the password has been installed, Installed displays. If not, Not Installed displays.
<b>User Password</b>	Indicates whether a user password has been set. If the password has been installed, Installed displays. If not, Not Installed displays.
<b>Change Supervisor Password</b>	Select this option and press <Enter> to access the sub menu. You can use the sub menu to change the supervisor password.
<b>Change User Password</b>	Select this option and press <Enter> to access the sub menu. You can use the sub menu to change the user password.
<b>Boot Sector Virus Protection</b>	Disabled Set this value to prevent the Boot Sector Virus Protection. This is the default setting.
<b>Enabled</b>	Select Enabled to enable boot sector protection. CMOS displays a warning when any program (or virus) issues a Disk Format command or attempts to write to the boot sector of the hard drive. If enabled, a warning message will appear when a write is attempted to the boot sector. You may have to type N several times to prevent the boot sector write.

## Chipset Setup

<b>BIOS SETUP UTILITY</b>						
Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
<b>Advanced Chipset Settings</b> <b>WARNING: Setting wrong values in below Sections may cause system to malfunction.</b>  ▶ North Bridge Configuration ▶ South Bridge Configuration			<b>Configure North Bridge features.</b>          ← Select Screen ↑↓ Select Item Enter Go to Sub Screen F1 General Help F10 Save and Exit ESC Exit			
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### ▶ Northbridge Configuration

#### Memory Remap Feature

<b>Enabled</b>	Allows remapping of overlapped PCI memory above the total physical memory
<b>Disabled</b>	Does not allow remapping. PCI devices will use memory below 4GB.
<b>DRAM Frequency</b>	Configures the memory speed automatically or manually.
<b>Configure DRAM Timing by SPD</b>	Configures the memory timing automatically (SPD) or manually.
<b>Memory Hole</b>	Configures the 15MB-16MB memory hole.
<b>Initiate Graphic Adapter</b>	Select the VGA boot order.
<b>Internal Graphics Mode Select</b>	Selects the amount of system memory to be allocated to the Internal Graphics device. This memory size can be changed by the OS driver.

► **South Bridge Configuration**

<b>USB Functions</b>	Configures the amount of available USB ports.
<b>USB 2.0 controller</b>	Enables and disables USB2.0 controller.
<b>HDA Controller</b>	Configures the onboard AUDIO Controller.
<b>Intel 82573L LAN1</b>	Enables and disables onboard NIC.
<b>Intel 82573L LAN2</b>	Enables and disables onboard NIC.
<b>SMBUS Controller</b>	Enables or Disabled SMBUS Controller
<b>SLP_S4# Min. Assertion Width</b>	Select 1-2, 2-3, 3-4 and 4-5
<b>Restore on AC Power Loss</b>	Selects how the ATXP-965Q behaves after power loss, Options are : Power Off, Power On and Last State

**Exit Menu**

**BIOS SETUP UTILITY**

Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
------	----------	--------	------	----------	---------	------

<p><b>Exit Options</b></p> <p>Save Changes and Exit</p> <p>Discard Changes and Exit</p> <p>Discard Changes</p> <p>Load Optimal Defaults</p> <p>Load Failsafe Defaults</p>	<p><b>Configure North Bridge features.</b></p> <p>← Select Screen</p> <p>↑↓ Select Item</p> <p>Enter Go to Sub Screen</p> <p>F1 General Help</p> <p>F10 Save and Exit</p> <p>ESC Exit</p>
---	---

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**Exit Saving Changes**

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

**Exit Discarding Changes**

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

**Load Optimal Defaults**

This option automatically sets all CMOS Setup options to a complete set of default settings. The Optimal settings are designed for maximum and stable system performance.

**Load FailSafe Defaults**

This option automatically sets all CMOS Setup options to a set of default settings designed for maximum system stability, but not maximum performance. Select the Fail-Safe option if your computer is experiencing system configuration problems.

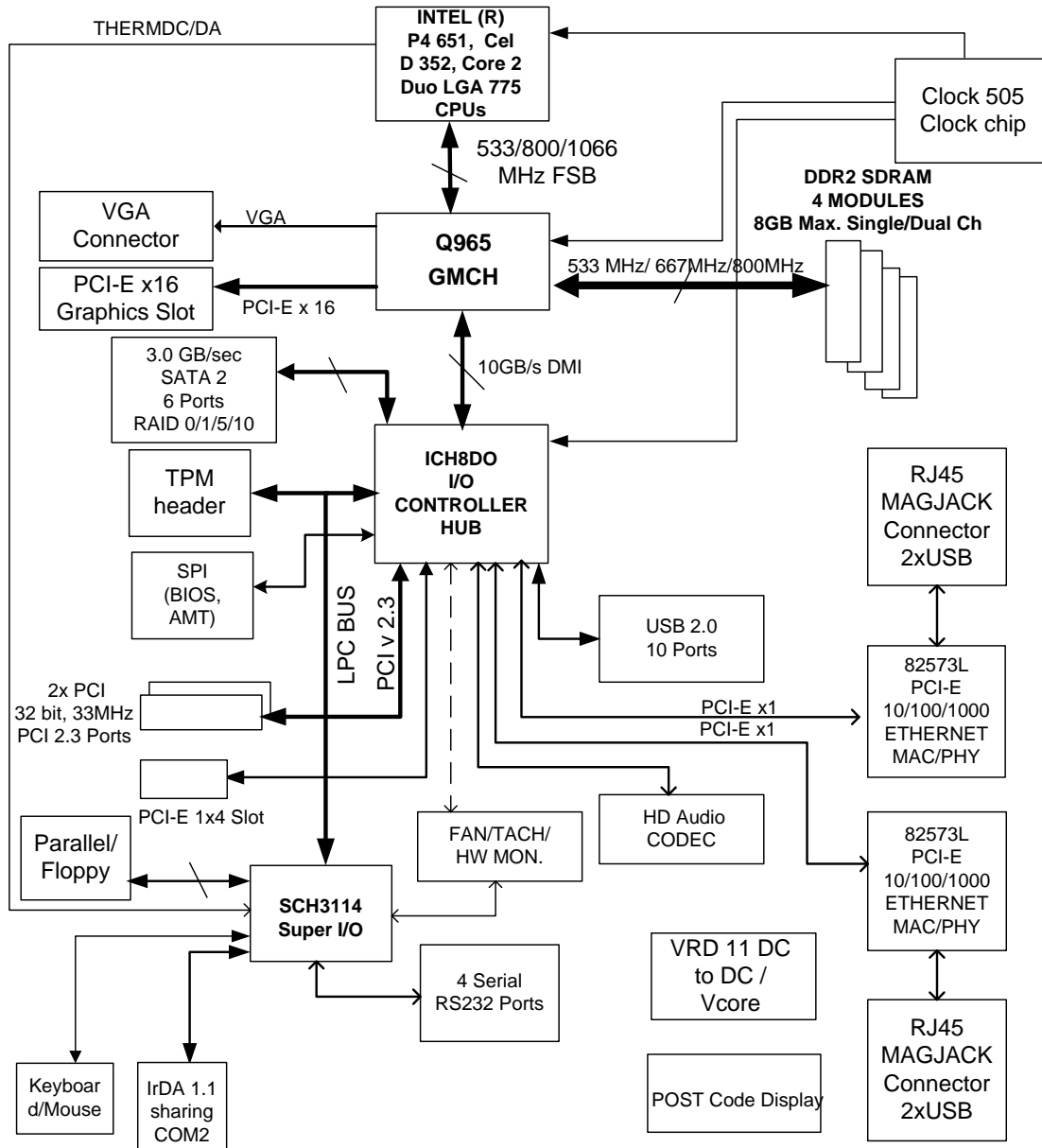
**Discard Changes**

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

# Appendix A

# Technical Summary

## Block Diagram



## System Memory Map

ADRESS RANGE (DECIMAL)	ADDRESS RANGE (HEX)	SIZE	DESCRIPTION
1024K – 8388608K	100000-1FFFFFFFFF	8191MB	EXTENDED MEMORY
960K – 1024K	F0000-FFFFFFF	64K	RUNTIME BIOS
896K – 960K	E0000-EFFFF	64K	RESERVED
800K – 896K	C8000-DFFFF	96K	AVAILABLE TO ADAPTER ROMS
640K – 800K	A0000-C7FFF	160K	VIDEO MEMORY AND BIOS
639K – 640K	9FC00-9FFFF	1K	EXTENDED BIOS DATA
512K – 639K	80000-9FBFF	127K	EXTENDED CONVENTIONAL MEMORY
0K – 512K	00000-7FFFF	512K	CONVENTIONAL MEMORY

## DMA Channels

DMA NUMBER	DATA WIDTH	RESOURCE
0	8/16	
1	8/16	PARALLELPOR
2	8/16	FLOPPY DRIVE
3	8/16	PARALLEL PORT
4	8/16	DMA
5	16	
6	16	
7	16	



## I/O Map

ADDRESS MAP	SIZE	
0000 - 00FF	256	RESERVED
01F0 – 01F7	8	PRIMARY PATA CHANNEL
0228 – 022F	8	LPT3
0278 – 027F	8	LPT2
02E8 – 02EF	8	COM4
02F8 – 02FF	8	COM2
0378 – 037F	8	LPT1
03B0 – 03BB	12	Q965 MCH
03C0 – 03DF	32	Q965 MCH
03E8 – 03EF	8	COM3
03F0 – 03F5	6	FLOPPY
03F4 – 03F7	4	PRIMARY PATA CHANNEL
03F8 – 03FF	8	COM1
04D0 – 04D1	2	PIC CONTROL
0CF8 - 0CFB	4	PCI CONF. REGISTER
0CF9	1	RESET CONTROL REGISTER
0CFC – 0CFF	4	PCI CONF. DATA REGISTER
FFA0 – FFA7	8	PRIMARY PATA BUS MASTER

## PCI Routing Table

ATXP-965Q	ISEL	IRQx	REQ/GNT
PCI Slot 1	AD16	F,G,H,E	0
PCI Slot 2	AD17	G,F,E,H	1

## PCI Configuration Map

BUS NUMBER	DEVICE	FUNCTION	
00	00	00	GMCH
00	02	00	INTEGRATED GRAPHICS
00	1B	00	HD AUDIO
00	1D	00	UHCI
00	1D	01	UHCI
00	1D	02	UHCI
00	1D	03	UHCI
00	1A	07	UHCI
00	1A	07	EHCI
00	1D	07	EHCI
00	1E	00	PCI BRIDGE
00	1F	00	LPC
00	1F	02	SATA #1
00	1F	05	SATA #2
00	1F	03	SMBUS
03 *	00	00	GBE #1
02 *	00	00	GBE #1
04 *	00	00	PCI #1
04 *	00	01	PCI #2
01 *	00	00	PCI-E

\* Bus number may vary depending on configuration

## Interrupt Map

<b>IRQ</b>	<b>PRIORITY</b>	<b>STANDARD FUNCTION</b>
0	N/A	System Timer
1	N/A	Keyboard Controller
2	N/A	Programmable Interrupt
3	8	Communications Port (COM2)
4	9	Communications Port (COM1)
5	6	Optional LPT2
6	11	Floppy Disk Controller
7	7	Printer Port (LPT1)
8	N/A	System CMOS/Real Time Clock
9	10	ACPI Mode when enabled
10	3	Available
11	2	Available
12	4	PS/2 Compatible Mouse Port
13	N/A	Numeric Data Processor
14	5	Prim. SATA Channel
15	1	Sec. SATA Channel
16-23		APIC only

## On-Board Industrial Devices

The ATXP-965Q offers one or two Gigabit Ethernet controller and up to four serial ports (one optional RS422/485). The ATXP-965Q also offers three other On-Board Industrial devices: Watchdog timer, Hardware health monitor and a Post Code display that will help you on troubleshooting.

<b>Post Code Display</b>	The POST code display is a device implemented on the ATXP-965Q to help on failure diagnostics. A POST code is transmitted by the BIOS during the POST (Power On Self Test). It is a number that refers to the state or test condition of a circuit or group of circuits. Knowing the results of these tests (hence the POST code) can be very important in debugging a system.
<b>POST Checkpoint Codes</b>	When AMIBIOS8 performs the Power On Self Test, it writes diagnostic codes checkpoint codes to I/O port 0080h where the POST code display is connected. Please, refer to Appendix B for POST codes description.
<b>On-board Ethernet</b>	The ATXP-965Q features two Intel 82573L Ethernet Controllers.
<b>PCIe</b>	x1 PCIe interface
	Peak bandwidth: 2Gb/s per direction
	Power management
	High bandwidth density per pin
<b>MAC</b>	Optimized transmit and receive queues
	IEEE 802.3x compliant flow control with software controlled pause times and threshold values
	Caches up to 64 packet descriptors per queue
	Programmable host memory receives buffers (256 bytes to 16 KB) and cache line size (16 bytes to 256 bytes)
	32 KB configurable transmit and receive FIFO buffer
	Mechanism available for reducing interrupts generated by transmits and receives operation
	Descriptor ring management hardware for transmit and receive
	Optimized descriptor fetching and write-back mechanisms
	Wide, pipelined internal data path architecture
<b>PHY</b>	Integrated PHY for 10/100/1000 Mb/s full and half duplex operation
	IEEE 802.3ab auto negotiation support
	IEEE 802.3ab PHY compliance and compatibility
	DSP architecture implements digital adaptive equalization, echo cancellation, and cross-talk cancellation

<b>Host Offloading</b>	Transmit and receive IP, TCP and UDP checksum off-loading capabilities
	Transmit TCP segmentation, IPv6 offloading, and advanced packet filtering
	IEEE 802.1q VLAN support with VLAN tag insertion, stripping and packet filtering for up to 4096 VLAN tags
	Descriptor ring management hardware for transmits and receives

## Graphics Features

### Intel 965 Graphics Subsystem

The Intel 965 chipset GMCH provides an integrated graphics device (IGD) delivering cost competitive 3D, 2D and video capabilities. The GMCH contains an extensive set of instructions for 3D operations, 2D operations, motion compensation, overlay, and display control. The GMCH's video engines support video conferencing and other video applications. The GMCH uses a UMA configuration with up to 256 MB of DVMT for graphic memory. The GMCH also has the capability to support external graphics accelerators via the PCI Express Graphics (PEG) port but cannot work concurrently with the integrated graphic device.

### SDVO and Analog Display Features

The GMCH provides interfaces to a progressive scan analog monitor and two SDVO ports (multiplexed with PCI Express x16 graphics port signals on the 82965 and 82G965 GMCH) capable of driving an Advanced Digital Display (ADD2) card or media Expansion card. The GMCH provides two multiplexed SDVO ports that are capable of driving up to a 270 MHz pixel clock each.

<b>SDVO Support</b>	SDVO ports in either single/single-combined or dual operation modes supported
	3x3 Built In full panel scalar
	180 degree Hardware screen rotation
	Multiplexed Digital Display Channel (supported with ADD2 card)Two channels multiplexed with PCI Express Graphic port
	270 MHz dot clock on each 12-bit interface
	Supports flat panels up to 2048x1536 @ 60 Hz or digital CRT/HDTV at 1920x1080 @ 85 Hz
	Support TMDS transmitters or TV-out encoders
	ADD2/Media Expansion card use PCI Express Graphic x16 connector
<b>Analog Display Support</b>	400MHz Integrated 24-bit RAMDAC
	Up to 2048x1536 @ 75Hz refresh
	Hardware Color Cursor Support
	DDC2B Compliant Interface

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**Dual Independent Display options with digital display**


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**Dynamic Video Memory Technology (DVMT)**

DVMT enables enhanced graphics and memory performance through Direct AGP, and highly efficient memory utilization. DVMT ensures the most efficient use of available system memory for maximum 2-D/3-D graphics performance. Up to 224 MB of system memory can be allocated to DVMT on systems that have 512 MB or more of total system memory installed. Up to 128 MB can be allocated to DVMT on systems that have 256 MB but less than 512 MB of total installed system memory. Up to 64 MB can be allocated to DVMT when less than 256 MB of system memory is installed. DVMT returns system memory back to the operating system when the additional system memory is no longer required by the graphics subsystem.

DVMT will always use a minimal fixed portion of system physical memory (as set in the BIOS Setup program) for compatibility with legacy applications. An example of this would be when using VGA graphics under DOS. Once loaded, the operating system and graphics drivers allocate additional system memory to the graphics buffer as needed for performing graphics functions.

**Advanced Digital Display (ADD2/ADD2+) Card Support**

The GMCH routes two multiplexed DVO ports that are each capable of driving up to a 200 MHz pixel clock to the PCI Express x16 connector. The DVO ports can be paired for a dual channel configuration to support up to a 400 MHz pixel clock. When an ADD2/ADD2+ card is detected, the Intel GMA950 graphics controller is enabled and the PCI Express x16 connector is configured for DVO mode. DVO mode enables the DVO ports to be accessed by the ADD2/ADD2+ card. An ADD2/ADD2+ card can either be configured to support simultaneous display with the primary VGA display or can be configured to support dual independent display as an extended desktop configuration with different color depths and resolutions. ADD2/ADD2+ cards can be designed to support the following configurations:

---

 TV-Out (composite video)
 

---



---

 Transition Minimized Differential Signaling (TMDS) for DVI 1.0
 

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 Low Voltage Differential Signaling (LVDS)
 

---



---

 Single device operating in dual channel mode
 

---



---

 VGA output
 

---



---

 HDTV output
 

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**On-Board Audio**

The embedded Azalia 6-channel Audio CODEC is fully compatible with Sound Blaster Pro standards that offer you home cinema quality and satisfying software compatibility.

**On-Board Supper I/O**

The multiple I/O function designed with SMSC SCH3114-NU I/O controller of Intel Q965 chipset based motherboard series that offers you various choices for non-stop business. The optional expandable serial COM ports can provide up to 4 COM ports as you need for your various solutions.

## Appendix B

## RAID Configuration

### Configuring for RAID (Intel Matrix Storage Technology)

#### Configuring the BIOS for Intel Matrix Storage Technology

1. Assemble your system and attach two or more SATA drives to the SATA connectors.
2. Enter the system BIOS Setup by pressing the <DEL> key after the Power-On-Self-Test (POST) memory test begins.
3. Go to Advanced -> Drive Configuration -> Configure SATA as; ensure that RAID is selected.
4. Save your settings by pressing <F10>.

#### Creating your RAID Set

1. Upon re-boot, you will see the following Intel Matrix storage Manager Option ROM status message on the screen: Press <Ctrl-I> to enter the RAID Configuration Utility. Press <Ctrl-I> and enter the RAID Configuration Utility.
2. In the Intel Matrix Storage Manager option ROM Main Menu, select option #1: Create RAID Volume. Enter a volume name and press <Enter>. NOTE: The RAID Volume name must be in English alphanumeric ASCII characters.
3. Use the arrow keys to select RAID 0 or RAID 1 (if only two SATA drives are available), RAID 5 and RAID 10 (these options will only appear if three or four SATA drives are installed respectively). Press <Enter> once you have selected the RAID LEVEL.
4. Select the drives to be used in the RAID array (only if there are more than two drives available) and press <Enter>.
5. Select the strip size, if necessary, and press <Enter>
6. Enter the size of the volume (if you enter less than the maximum volume size, you can then create a second RAID array on the remaining portion of your volume) and press <Enter>
7. Finally, press <Enter> to Create Volume.
8. Exit the Option ROM user interface by pressing <ESC> or going to the EXIT option in the MAIN MENU.

#### Loading the Intel Matrix Storage Technology RAID Driver

1. Begin Windows Setup by booting from the Windows Installation CD.
2. At the beginning of windows Setup, press <F6> to install third-party SCSI or RAID driver. When prompted, insert the diskette with the Intel Matrix Storage Technology RAID Driver. This drivers are available on you Driver CD and need to be copied to a floppy disk. (Note: a USB floppy drive may be used if the system does not have a floppy drive).
3. Install the "Intel ICH8R/DO/DH SATA RAID Controller (Desktop ICH8R)" driver.
4. Finish the windows Installation and install all necessary drivers.

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# Appendix C

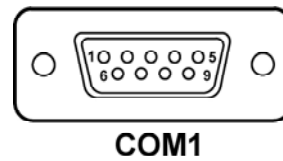
# Pin-Outs

How to identify pin number 1: Looking to the solder side (The board side with fewer components) of the PCB (Printed Circuit Board), pin number 1 will have a square pad ■. All the other pins will have a circular pad ●.

## COM1

The pin assignment is as follows:

PIN	ASSIGNMENT		
	RS-232	RS-485	RS-422
1	COM1_DCD#	TX-	TX-
2	COM1_RX	TX+	TX+
3	COM1_TX	RX+	RX+
4	COM1_DTR#	RX-	RX-
5	GND	GND	GND
6	COM1_DSR#	GND	RTS-
7	COM1_RTS#	GND	RTS+
8	COM1_CTS#	GND	CTS+

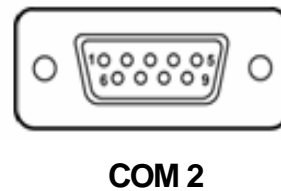


## COM2

The COM2 is fixed as RS-232. When selecting IR, the pins from this connector will be routed to J22.

The pin assignment is as follows:

PIN	ASSIGNMENT
1	COM2_DCD#
2	COM2_RX
3	COM2_TX
4	COM2_DTR#
5	GND
6	COM2_DSR#
7	COM2_RTS#
8	COM2_CTS#
9	COM2_RI#

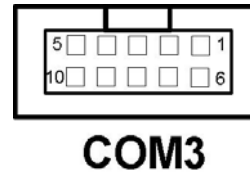


## COM3

COM3 is fixed as RS-232.

The pin assignment is as follows:

PIN	ASSIGNMENT
1	COM3_DCD#
2	COM3_RX
3	COM3_TX
4	COM3_DTR#
5	GND
6	COM3_DSR#
7	COM3_RTS#
8	COM3_CTS#
9	COM3_RI#

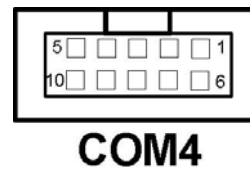


## COM4

COM4 is fixed as RS-232.

The pin assignment is as follows:

PIN	ASSIGNMENT
1	COM4_DCD#
2	COM4_RX
3	COM4_TX
4	COM4_DTR#
5	GND
6	COM4_DSR#
7	COM4_RTS#
8	COM4_CTS#
9	COM4_RI#

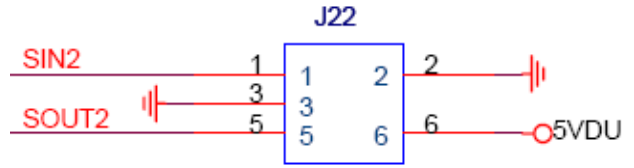


### IrDA Header

**J22:** IR Connector

The pin assignments are as follows:

PIN	ASSIGNMENT
1	SIN2
2	GND
3	GND
4	NC
5	SOUT2
6	5VDU

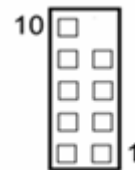


### Universal Serial Bus Header

**J23, J24 and J25:** Universal Serial Bus Connectors

The pin assignments are as follows:

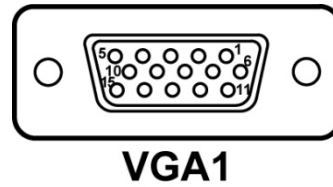
PIN	ASSIGNMENT
1	SBV0_VCC
2	SBV0_VCC
3	USBP0-
4	USBP1-
5	USBP0+
6	USBP1+
7	GND
8	GND
9	KEY
10	NC



## VGA Connector

**J5A:** Analog VGA Connector

PIN	ASSIGNMENT
1	RED
2	GREEN
3	BLUE
4	VCC
5	GND
6	GND
7	GND
8	GND
9	VCC
10	GND
11	VCC
12	5VCCA
13	HSYNC
14	VSYNC
15	CLK

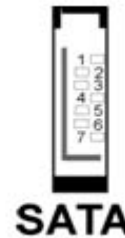


## Serial ATA Connector

**J9, J10, J11, J12:** SATA #1 Port Connectors / **J13, J14:** SATA #2 Port Connectors

The pin assignments are as follows:

PIN	ASSIGNMENT
1	GND
2	SATA_TXPC
3	SATA_TXNC
4	GND
5	SATA_RXNC
6	SATA_RXPC
7	GND

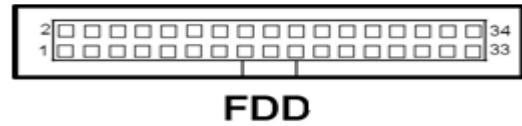


## Floppy Disk Drive Header

### FD1: FLOPPY

You can use an optional standard 34-pin daisy-chain floppy-drive cable to connect up to two-FDDs to the ATXP-965Q. The pin-out is as follows:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	GND	2	F_DENSEL#
3	GND	4	NC
5	GND	6	Key
7	GND	8	F_INDEX#
9	GND	10	F_MTRA#
11	GND	12	F_DRVB#
13	GND	14	F_DRVA#
15	GND	16	F_MTRB#
17	GND	18	F_DIR#
19	GND	20	F_STEP#
21	GND	22	F_WDATA#
23	GND	24	F_WGATE#
25	GND	26	F_TRK0#
27	GND	28	F_WPT#
29	GND	30	F_RDATA#
31	GND	32	F_HDSEL#
33	GND	34	F_DSKCHG#



## Printer Port Header

### J19: Printer Port (Parallel Port)

Use an optional parallel port cable if the printer port function is required.

The pin assignments are as follows:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	-STROBE	14	GND
2	AUTOFEED	15	+DATA BIT 6
3	+DATA BIT 0	16	GND
4	ERROR	17	+DATA BIT 7
5	+DATA BIT 1	18	GND
6	INIT	19	ACK1
7	+DATA BIT 2	20	GND
8	SLCT IN	21	BUSY
9	+DATA BIT 3	22	GND
10	GND	23	PAPER EMPTY
11	+DATA BIT 4	24	GND
12	GND	25	SLCT
13	+DATA BIT 5	26	NC

## ATX Power Connector

### AUX\_12V: ATX 12V Connector

The pin assignment is as follows:

PIN	ASSIGNMENT
1	GND
2	+12V
3	GND
4	+12V
5	GND
6	+12V
7	GND
8	+12V

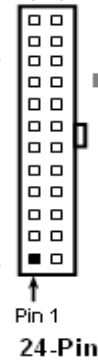


AUX 12V

**ATX\_PWR:** ATX Power Connector

The pin assignment is as follows:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	+3.3V	13	+3.3V
2	+3.3V	14	-12V
3	GND	15	GND
4	+5V	16	PSON
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	POK	20	-5V
9	5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	GND



**CD-IN AUX CD-IN Connectors**

**CD-IN, AUX CD-IN:** J15, J18 Audio-In Connectors

The pin assignments are as follows:

PIN	ASSIGNMENT
1	CD-L
2	CD-COM
3	CD-COM
4	CD-R



## FP\_HDR (Front Panel Header)

Pin#	Front Panel Header
1	HDD LED Anode
2	Power LED Green
3	HDD LED Cathode
4	Power LED Yellow
5	Reset - GND
6	Power Switch
7	Reset
8	Power Switch - GND
9	+5V
10	NC

## SPI CON (J16)

Pin#	SPI -CON (J16)
1	SPI_DIS
2	KEY
3	SPI_CS
4	VCC
5	SPI_SDO
6	SPI_HOLD
7	SPI_WP1
8	SPI_CLK
9	GND
10	SPI_SI



## Appendix D Flash BIOS Programming and Codes

The ATXP-965Q offers the standard FLASH BIOS. When installed, you will be able to update your BIOS without having to replace the EEPROM. The AMIBIOS8 will read the new BIOS file from a floppy disk during boot and replace the old BIOS. When updating your BIOS, make sure you have a disk with the correct BIOS file (its size should be 8Mb (512kB)) named AMIBOOT.ROM.

### How to Reflash the BIOS

Insert a floppy containing AMIBOOT.ROM into floppy A: Please never turn the power off while reprogramming a FLASH BIOS. While powering on, press CTRL-Home simultaneously. The board will reboot after completion. You can also follow the process through the POST codes on Table B-2.

Alternatively the software AFUDOS can be used to reflash the BIOS.

### Troubleshooting POST

AMIBIOS8 writes progress codes, also known as POST codes, to I/O port 80h during POST, in order to provide information to OEM developers about system faults. These POST codes may be monitored by the On-board POST Display.

#### Table B-1 Boot block Initialization Code Checkpoints

The Boot block initialization code sets up the chipset, memory and other components before system memory is available. The following table describes the type of checkpoints that may occur during the boot block initialization portion of the BIOS:

Checkpoint	Description
Before D0	If boot block debugger is enabled, CPU cache-as-RAM functionality is enabled at this point. Stack will be enabled from this point.
D0	Early Boot Strap Processor (BSP) initialization like microcode update, frequency and other CPU critical initialization. Early chipset initialization is done.
D1	Early super I/O initialization is done including RTC and keyboard controller. Serial port is enabled at this point if needed for debugging. NMI is disabled. Perform keyboard controller BAT test. Save power-on CPUID value in scratch CMOS. Go to flat mode with 4GB limit and GA20 enabled.
D2	Verify the boot block checksum. System will hang here if checksum is bad.
D3	Disable CACHE before memory detection. Execute full memory sizing module. If memory sizing module not executed, start memory refresh and do memory sizing in Boot block code. Do additional chipset initialization. Re-enable CACHE. Verify that flat mode is enabled.
D4	Test base 512KB memory. Adjust policies and cache first 8MB. Set stack.
D5	Boot block code is copied from ROM to lower system memory and control is given to it. BIOS now executes out of RAM. Copies compressed boot block code to memory in right segments. Copies BIOS from ROM to RAM for faster access. Performs main BIOS checksum and updates recovery status accordingly.
D6	Both key sequence and OEM specific method is checked to determine if BIOS recovery is forced. If BIOS recovery is necessary, control flows to checkpoint E0. See <i>Boot block Recovery Code Checkpoints</i> section of document for more information.

D7	Restore CPUID value back into register. The Boot block-Runtime interface module is moved to system memory and control is given to it. Determine whether to execute serial flash.
D8	The Runtime module is uncompressed into memory. CPUID information is stored in memory.
D9	Store the Uncompressed pointer for future use in PMM. Copying Main BIOS into memory. Leaves all RAM below 1MB Read-Write including E000 and F000 shadow areas but closing SMRAM.
DA	Restore CPUID value back into register. Give control to BIOS POST (ExecutePOSTKernel). See <i>POST Code Checkpoints</i> section of document for more information.
DC	System is waking from ACPI S3 state
E1-E8 EC-EE	OEM memory detection/configuration error. This range is reserved for chipset vendors & system manufacturers. The error associated with this value may be different from one platform to the next.

### Table B-2 Boot block Recovery Code Checkpoints

The Boot block recovery code gets control when the BIOS determines that a BIOS recovery needs to occur because the user has forced the update or the BIOS checksum is corrupt. The following table describes the type of checkpoints that may occur during the Boot block recovery portion of the BIOS:

Checkpoint	Description
E0	Initialize the floppy controller in the super I/O. Some interrupt vectors are initialized. DMA controller is initialized. 8259 interrupt controller is initialized. L1 cache is enabled.
E9	Set up floppy controller and data. Attempt to read from floppy.
EA	Enable ATAPI hardware. Attempt to read from ARMD and ATAPI CDROM.
EB	Disable ATAPI hardware. Jump back to checkpoint E9.
EF	Read error occurred on media. Jump back to checkpoint EB.
F0	Search for pre-defined recovery file name in root directory.
F1	Recovery file not found.
F2	Start reading FAT table and analyze FAT to find the clusters occupied by the recovery file.
F3	Start reading the recovery file cluster by cluster.
F5	Disable L1 cache.
FA	Check the validity of the recovery file configuration to the current configuration of the flash part.
FB	Make flash write enabled through chipset and OEM specific method. Detect proper flash part. Verify that the found flash part size equals the recovery file size.
F4	The recovery file size does not equal the found flash part size.
FC	Erase the flash part.

FD	Program the flash part.
FF	The flash has been updated successfully. Make flash write disabled. Disable ATAPI hardware. Restore CPUID value back into register. Give control to F000 ROM at F000:FFF0h.

### Table B-3 POST Code Checkpoints

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:

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. Initialize 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
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 <i>DIM Code Checkpoints</i> 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 <i>DIM Code Checkpoints</i> 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.
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 type matic 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 interrupts by invoking all handlers. <i>Please note this checkpoint comes right after checkpoint 20h</i>

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.
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 B-4 DIM Code Checkpoints

The Device Initialization Manager (DIM) gets control at various times during BIOS POST to initialize different system busses. The following table describes the main checkpoints where the DIM module is accessed:

Checkpoint Code	Description
2A	Initialize different buses and perform the following functions: Reset, Detect, and Disable (function 0); Static Device Initialization (function 1); Boot Output Device Initialization (function 2). Function 0 disables all device nodes, PCI devices, and PnP ISA cards. It also assigns PCI bus numbers. Function 1 initializes all static devices that include manual configured onboard peripherals; memory and I/O decode windows in PCI-PCI bridges, and noncompliant PCI devices. Static resources are also reserved. Function 2 searches for and initializes any PnP, PCI, or AGP video devices.
38	Initialize different buses and perform the following functions: Boot Input Device Initialization (function 3); IPL Device Initialization (function 4); General Device Initialization (function 5). Function 3 searches for and configures PCI input devices and detects if system has standard keyboard controller. Function 4 searches for and configures all PnP and PCI boot devices. Function 5 configures all onboard peripherals that are set to an automatic configuration and configures all remaining PnP and PCI devices.

While control is in the different functions, additional checkpoints are output to port 80h as a word value to identify the routines under execution. The low byte value indicates the main POST Code Checkpoint. The high byte is divided into two nibbles and contains two fields. The details of the high byte of these checkpoints are as follows:

**HIGH BYTE XY**

The upper nibble 'X' indicates the function number that is being executed. 'X' can be from 0 to 7.

0 =	func#0 disable all devices on the BUS concerned
1 =	func#1 static devices initialization on the BUS concerned
2 =	func#2 output device initialization on the BUS concerned
3 =	func#3 input device initialization on the BUS concerned.
4 =	func#4 IPL device initialization on the BUS concerned
5 =	func#5 general device initialization on the BUS concerned
6 =	func#6 error reporting for the BUS concerned
7 =	func#7 add-on ROM initialization for all BUSes
8 =	func#8 BBS ROM initialization for all BUSes

The lower nibble 'Y' indicates the BUS on which the different routines are being executed. 'Y' can be from 0 to 5.

0 =	Generic DIM (Device Initialization Manager)
1 =	On-board System devices
2 =	ISA devices
3 =	EISA devices
4 =	ISA PnP devices
5 =	PCI devices

### Table B-5 ACPI Runtime Checkpoints

ACPI checkpoints are displayed when an ACPI capable operating system either enters or leaves a sleep state. The following table describes the type of checkpoints that may occur during ACPI sleep or wake events:

Checkpoint Code	Description
AC	First ASL checks point. Indicates the system is running in ACPI mode.
AA	System is running in APIC mode.
01, 02, 03, 04, 05	Entering sleep state S1, S2, S3, S4, or S5.
10, 20, 30, 40, 50	Waking from sleep state S1, S2, S3, S4, or S5.

### Critical Error BEEP Codes

The following table describes the beep codes used by AMIBIOS:

#### Table B-6 AMIBIOS Beep Codes

##### Boot Block Beep Codes

Number of Beeps	Description
1	No media present. (Insert diskette in floppy drive A:)
2	'AMIBOOT.ROM' file not found in root directory of diskette in A:
3	Insert next diskette if multiple diskettes are used for recovery
4	Flash Programming successful
5	File read error
6	Keyboard controller BAT command failed
7	No Flash EPROM detected
10	Flash Erase error
11	Flash Program error
12	'AMIBOOT.ROM' file size error
13	BIOS ROM image mismatch (file layout does not match image present in flash device)

##### POST BIOS Beep Codes

Number of Beeps	Description
1	Memory refreshes timer error.
3	Base memory read/write test error
6	8042 Gate A20 test error (cannot switch to protected mode)
7	General exception error (processor exception interrupt error)
8	Display memory error (system video adapter)

**Troubleshooting POST BIOS Beep Codes**

<b>Number of Beeps</b>	<b>Troubleshooting Action</b>
1, 3	Reseat the memory, or replace with known good modules.
6, 7	<p>Fatal error indicating a serious problem with the system. Consult your system manufacturer. Before declaring the motherboard beyond all hope, eliminate the possibility of interference by a malfunctioning add-in card. Remove all expansion cards except the video adapter.</p> <p>If beep codes are generated when all other expansion cards are absent, consult your system manufacturer's technical support.</p> <p>If beep codes are not generated when all other expansion cards are absent, one of the add-in cards is causing the malfunction. Insert the cards back into the system one at a time until the problem happens again. This will reveal the malfunctioning card.</p>
8	If the system video adapter is an add-in card, replace or reseat the video adapter. If the video adapter is an integrated part of the system board, the board may be faulty.