D865GLC Motherboard Manual

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Viglen, EMC and the ‘CE’ mark

CE Marking
European standards are being harmonised across borders. If products comply to the same standards in all European countries, product exporting and importing is made simple - paving our way to a common market. If you buy a product with a 'CE' mark on it (shown below), on the box, in the manual, or on the guarantee - it complies with the currently enforced directive(s).

Introduction to EMC
EMC (Electromagnetic Compatibility) is the term used to describe certain issues with RF (Radio Frequency) energy. Electrical items should be designed so they do not interfere with each other through RF emissions. E.g. If you turn on your microwave, your television shouldn't display interference if both items are CE marked to the EMC directive.

If emitted RF energy is not kept low, it can interfere with other electrical circuitry - E.g. Cars Automatic Braking Systems have been known to activate by themselves while in a strong RF field. As this has obvious repercussions ALL electrical products likely to cause RF related problems have to be 'CE' marked from 1st January 1996 onwards.

If a product conforms to the EMC directive, not only should its RF emissions be very low, but its immunity to RF energy (and other types) should be high. The apparatus has to resist many 'real world' phenomena such as static shocks and mains voltage transients.

Viglen’s Environment laboratory
To gain a 'CE' mark, the Viglen computer range has had to undergo many difficult tests to ensure it is Electromagnetically Compatible. These are carried out in the in-house 'Environment lab' at Viglen Headquarters. We have made every effort to guarantee that each computer leaving our factory complies fully to the correct standards. To ensure the computer system maintains compliance throughout its functional life, it is essential you follow these guidelines.

>Install the system according to Viglen’s instructions
>If you open up your Viglen:
> Keep internal cabling in place as supplied.
> Ensure the lid is tightly secured afterwards
> Do not remove drive bay shields unless installing a 'CE' marked peripheral in its place
> The clips or ‘bumps' around the lips of the case increase conductivity - do not remove or damage.
> Do not remove the ferrite ring from the L.E.D cables.
> Only use your Viglen computer with 'CE' marked peripherals

This system has been tested in accordance with European standards for use in residential and light industrial areas-this specifies a 10 meter testing radius for emissions and immunity. If you do experience any adverse affects which you think might be related to your computer, try moving it at least 10 meters away from the affected item. If you still experience problems, contact Viglen’s Technical Support department who will put you straight through to an EMC engineer - s/he will do everything possible to help. If modifications are made to your Viglen computer system, it might breach EMC regulations. Viglen take no responsibility (with regards to EMC characteristics) of equipment which has been tampered with or modified.

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Contents

Chapter 1: Overview

Introduction

This manual describes the Viglen D865GLC motherboard inside your computer. The motherboard is the most important part of your computer. It contains all of the CPU, memory and graphics circuitry that make the computer work.

The motherboard contains the very latest CPU design, the Intel Pentium 4 processor, which includes Intel's **MMX Technology**. MMX technology adds a total of 57 new instructions to the CPU, all of which are designed to vastly improve both multimedia and communications on your PC. The combination of the Intel processor, MMX technology and Viglen expertise make this a formidable computer.

This manual contains technical information about the Viglen D865GLC motherboard and other hardware components inside your computer. If you are new to computers we recommend that you read the user guide first. If you are an experienced computer user this manual should provide all the information you will need to perform simple upgrades and maintenance.

We hope that this manual is both readable and informative. If you have any comments for suggestions about how we could improve the format then please fill out the form at the back of the manual and send it to us.

Above all we hope that you enjoy using your Viglen computer.

System Board Components

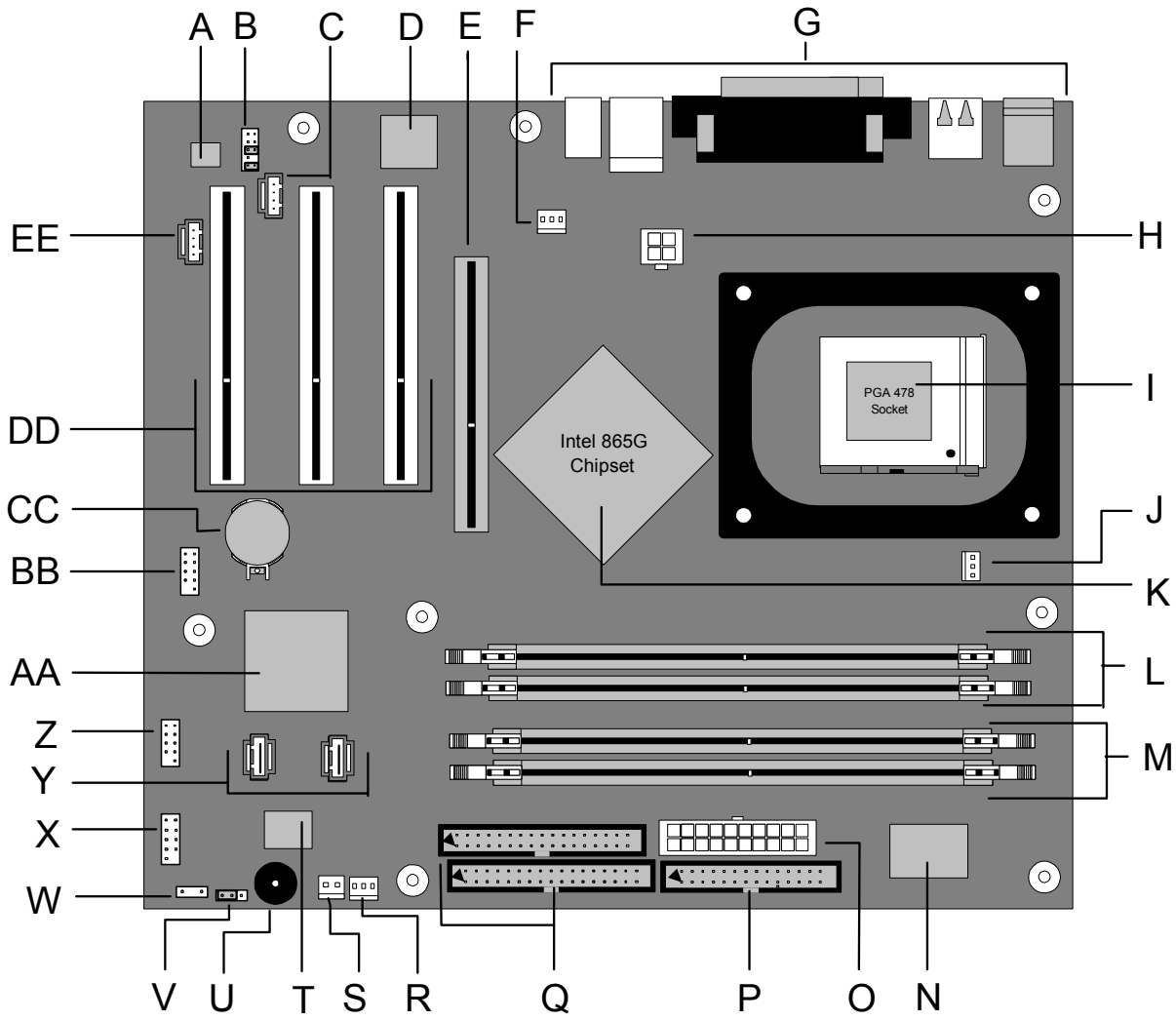


Figure 1: Motherboard Layout & Components

A	Audio codec
B	Front panel audio connector
C	ATAPI CD-ROM connector
D	Ethernet PLC device (optional)
E	AGP connector
F	Rear chassis fan connector
G	Back panel connectors
H	+12V power connector (ATX12V)
I	mPGA478 processor socket
J	Processor fan connector
K	Intel 82865G GMCH
L	DIMM Channel A socket
M	DIMM Channel B socket
N	I/O controller
O	Power connector
P	Diskette drive connector
Q	Parallel ATA IDE connectors
R	Front chassis fan connector
S	Chassis intrusion connector
T	4 Mbit Firmware Hub (FWH)
U	Speaker
V	BIOS Setup configuration jumper block
W	Aux front panel power LED connector
X	Front panel connector
Y	Serial ATA connectors
Z	Front panel USB connectors
AA	Intel 82801EB I/O Controller Hub (ICH5)
BB	Front Panel USB connector
CC	Battery
DD	PCI bus add-in card connectors
EE	Aux line-in connector

Back Panel Connectors

The motherboard external IO connectors are attached to a metallic I/O shield. This shield serves several purposes:

- It protects the sensitive motherboard from any external EMC interference.
- It stops the computer from interfering with other electrical devices.
- It allows the motherboard to be easily upgraded in the future without having to resort to buying a whole new case. Simply change the I/O shield to match the motherboard.

The I/O shield provides external access to PS/2 keyboard and mouse connectors as well as one serial port, one parallel port, two USB ports, one LAN Port and the audio connectors.

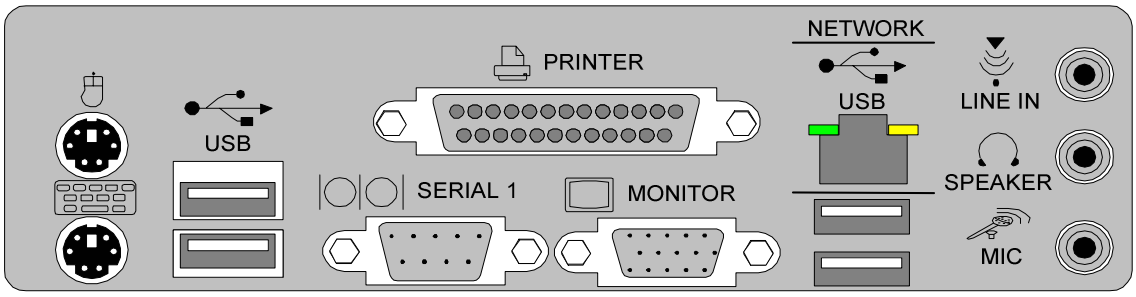


Figure 2: Rear I/O Shield

Note: *Power to the computer should be turned off before a keyboard or mouse is connected or disconnected.*

Feature Summary

The D865GLC motherboard supports Intel Pentium 4 processors 478 pin with 512KB of second-level cache integrated in a micro PGA 478 Socket package operating at speeds up to 3.06GHz. The Celeron processor 478 pin with 128K second-cache with 400MHz system bus is also supported up to 2.4GHz.

Table 1: Feature Summary

Form Factor	Micro ATX Form Factor: 11.6 inches (L) x 9.6 inches (W) x 6 layers PCB
Processor	- Single Pentium 4/Celeron CPU - 400/533/800MHz Quad-pumped bus - Integrated 128/256/512KB second-level cache - Socket micro PGA 478 connector
Memory	- Four 184-pin DDR SDRAM Dual Inline DIMM sockets. - Support for up to 4GB of DDR266, DDR333 or DDR400 SRAM DIMMs using 2.5V memory
Chipset	Intel 865G Chipset - Intel® 82865G Graphics and Memory Controller Hub (GMCH) - Intel® 82801EB I/O Controller Hub (ICH5) - 4 Mbit Firmware Hub (FWH)
Video	Intel Extreme Graphics 2 controller - Universal 0.8V / 1.5V AGP 3.0 connector supporting 1x ,4x and 8x AGP cards or an AGP Digital Display (ADD card) - Integrated retention mechanism
Audio	Flex 6 audio subsystem using the Analog Devices AD1985 codec
I/O Controller	SMSC LPC47M172LPC Bus I/O controller
USB	Support for USB 2.0 devices
Peripheral Interfaces	- Eight USB Ports - One Serial Port - One Parallel Port - Two Serial ATA IDE interfaces - Two Parallel ATA IDE interfaces with UDMA 33, ATA-66/100 support - One diskette drive interface - PS/2 keyboard and mouse ports
LAN Support	10/100 Mbit/sec LAN subsystem using the Intel 82562EZ Platform LAN Connect (PLC) device
BIOS	- Intel/AMI BIOS (resident in the 4 Mbit FWH) - Support for Advanced Configuration and Power Interface (ACPI), Plug and Play SMBIOS
Instantly Available PC Technology	- Support for PCI Local Bus Specification Revision 2.2 - Suspended to RAM support - Wake on PCI, RS-232, front panel, PS/2 devices and USB ports
Expansion Capabilities	Three PCI bus add-in card connectors
Hardware Monitor Subsystem	- Hardware monitoring and fan control ASIC - Voltage sense to detect out of range power supply voltages - Thermal sense to detect out of range thermal values - Three fan connectors - Three fan sense inputs used to monitor fan activity - Fan speed control

System Processor

The D865GLC motherboard supports a single Pentium 4 processor. The processor's VID pins automatically program the voltage regulator on the motherboard to the required processor voltage. In addition, the front side bus speed is automatically selected. The motherboard currently supports processors that run internally up to 3.06GHz and have a 512 KB second-level cache running at full CPU Speed.

The processor implements MMX ™ technology and maintains full backward compatibility with the 8086, 80286, Intel386 ™, Intel486 ™, Pentium, Pentium Pro, Pentium II & Pentium III processors. The processor's numeric coprocessor significantly increases the speed of floating-point operations and complies with ANSI/IEEE standard 754-1985.

Microprocessor Packaging

The Pentium 4 processor comes in a micro PGA 478 package that connects to the motherboard through a socket 478 connector. The package consists of:

- Processor card including the processor core and the second-level cache, burst pipelined synchronous static RAM (BSRAM) and tag RAM.
- Thermal plate.
- Back cover.

Second Level Cache

The second-level cache is located on the die of the CPU itself. The cache includes burst pipelined synchronous static RAM (BSRAM) and tag RAM. All supported onboard memory can be cached.

Processor Upgrades

The motherboard can be upgraded with a Pentium 4 processor that runs at higher speeds.

System Memory

Main Memory

The motherboard has four DDR SDRAM Dual Inline Memory Module (DIMM) sockets. Support for up to a maximum memory size of 4GB. The BIOS automatically detects memory type, size, and speed.

The motherboard supports the following memory features:

- 2.5 V (only) 184-pin DDR SDRAM DIMMs with gold-plated contacts
- Unbuffered, single-sided or double-sided DIMMs with the following restriction:

- Double-sided DIMMS with x16 organisation are not supported.

- 4 GB maximum total system memory.
- Minimum total system memory: 64 MB
- Non-ECC DIMMs
- Serial Presence Detect
- DDR400, DDR333, and DDR266 SDRAM DIMMs

Table 2: Supported System Bus Frequency and Memory Speed Combinations

To use this type of DIMM…	The processor's system bus frequency must be…
DDR400	800MHz
DDR333 (Note)	800 or 533MHz
DDR266	800, 533 or 400MHz

Note: *When using an 800MHz system bus frequency processor, DDR333 memory is clocked at 320MHz. This minimises system latencies to optimise system throughput.*

Notes:

- *Remove the AGP video card before installing or upgrading memory to avoid interference with the memory retention mechanism.*
- *To be fully compliant with all applicable DDR SDRAM memory specifications, the board should be populated with DIMMs that support the Serial Presence Detect (SPD) data structure. This allows the BIOS to read the SPD data and program the chipset to accurately configure memory settings for optimum performance. If non-SPD memory is installed, the BIOS will attempt to correctly configure the memory settings, but performance and reliability may be impacted or the DIMMs may not function under the determined frequency.*

Below table lists the supported DIMM configuration

Table 3: Support Memory Configurations

DIMM Capacity	Configurations	DDR SDRAM Density	DDR SDRAM Configurations Front-side/Back-side	Number of DDR SDRAM Devices
64MB	SS	64 Mbit	8 M x 8/empty	8
64MB	SS	128 Mbit	8 M x 16/empty	4
128MB	DS	64 Mbit	8 M x 8/8 M x 8	16
128MB	SS	128 Mbit	16 M x 8/empty	8
128MB	SS	256 Mbit	16 M x 16/empty	4
256MB	DS	128 Mbit	16 M x 8/16 M x 8	16
256MB	SS	256 Mbit	32 M x 8/empty	8
256MB	SS	512 Mbit	32 M x 16/empty	4
512MB	DS	256 Mbit	32 M x 8/32 M x 8	16
512MB	SS	512 Mbit	64 M x 8/empty	8
1024MB	DS	512Mbit	64 M x 8/64 M x 8	16

Note: *In the second column, "DS" refers to double-sided memory modules (containing two rows of DDR SDRAM) and "SS" refers to single-sided memory modules (containing one row of DDR SDRAM).*

Memory Configurations

The Intel 82865PE MCH component provides two features for enhancing memory throughput:

- Dual Channel memory interface. The board has two memory channels, each with two DIMM sockets, as shown in Figure 3
- Dynamic Addressing Mode. Dynamic mode minimises overhead by reducing memory accesses

Table 4 summarises the characteristics of Dual and Single Channel configurations with and without the use of Dynamic Mode.

Table 4: Characteristics of Dual/Single Channel Configurations with/without Dynamic Mode

Throughput Levels	Configurations	Characteristics
Highest ↑	Dual Channel with Dynamic mode	All DIMMs matched (Example Configurations are shown in Figure 4)
	Dual Channel without Dynamic mode	- DIMMs matched from Channel A to Channel B - DIMMs not matched within channels (Example configurations are shown in Figure 5)
	Single Channel with Dynamic Mode	Single DIMM or DIMMs matched with a channel (Example configurations are shown in Figure 6)
Lowest	Single Channel without Dynamic Mode	DIMMs not matched (Example configurations are shown in Figure 7)

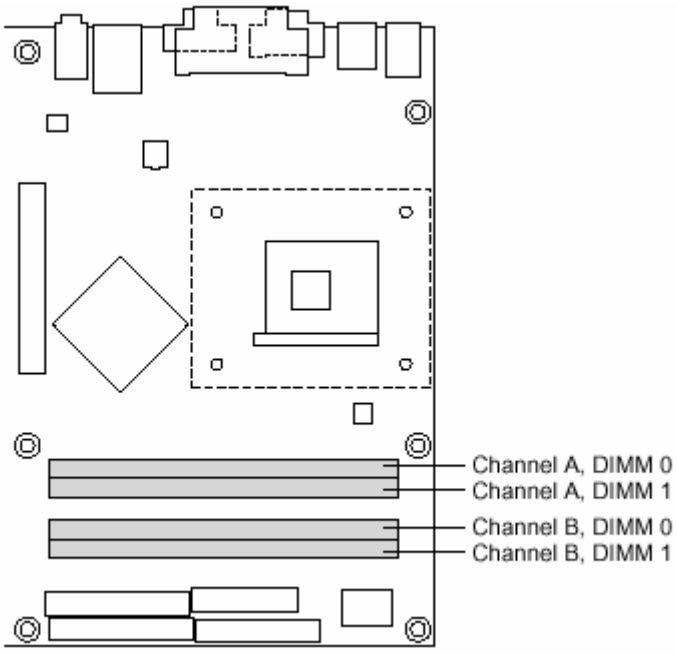


Figure 3: Memory Channel Configurations

Dual Channel Configurations with Dynamic Mode (All DIMMs matched)

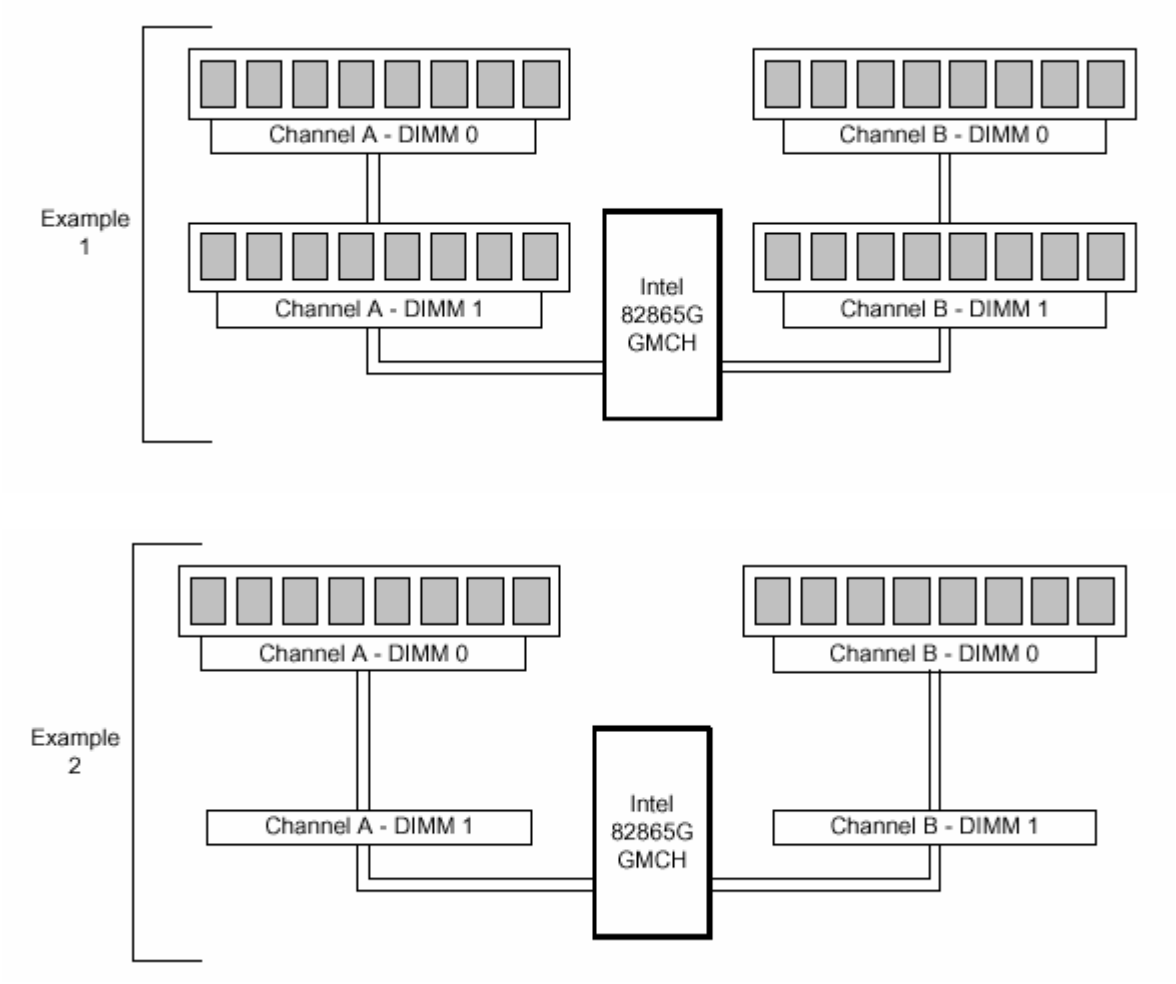


Figure 4: Examples of Dual Channel configurations with Dynamic Mode

Dual Channel Configuration without Dynamic Mode

- DIMMs not matched within channel
- DIMMs match Channel A to Channel B

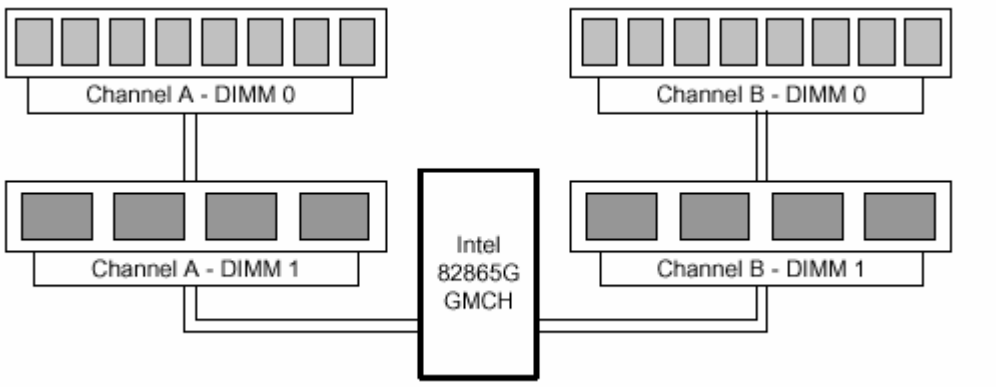


Figure 5: Examples of Dual Channel Configurations without Dynamic mode

Single Channel Configurations with Dynamic Mode (Single DIMM or DIMMs matched within channel)

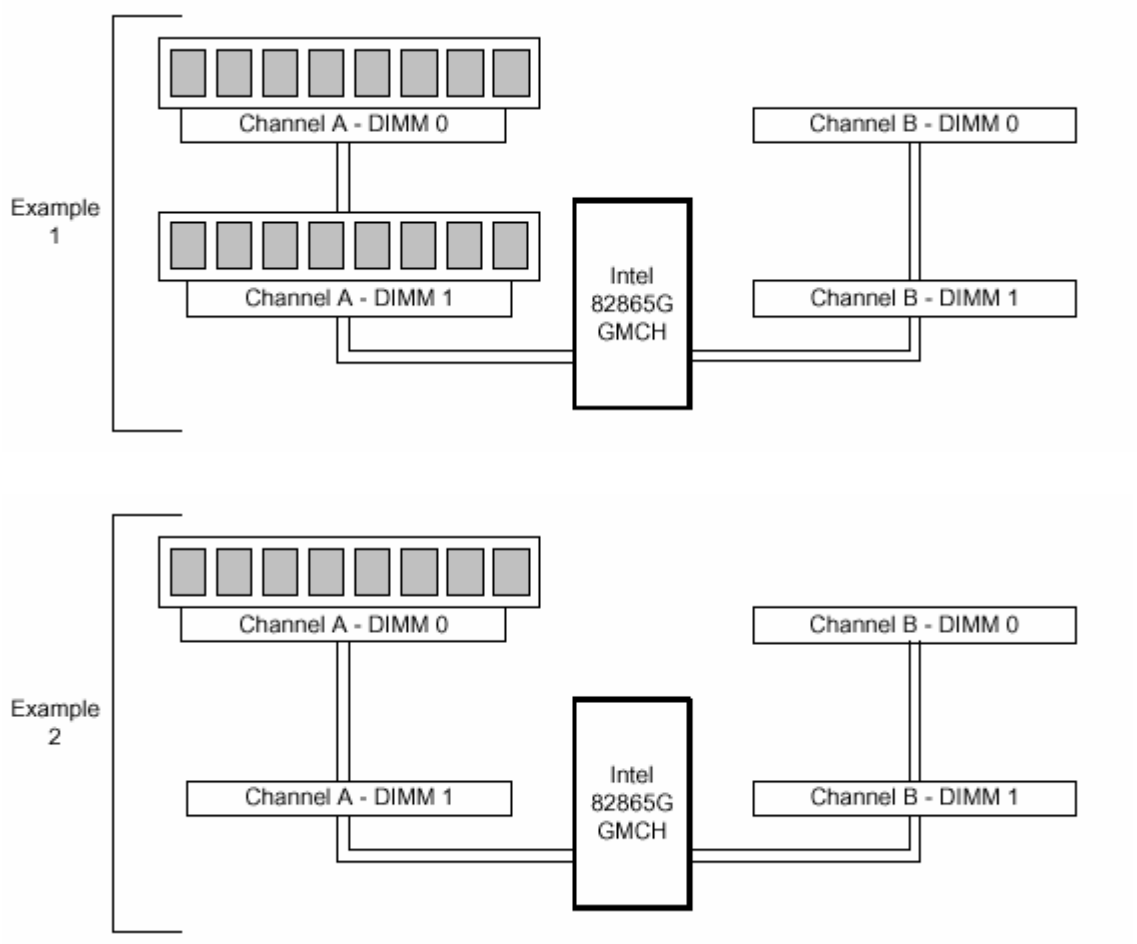
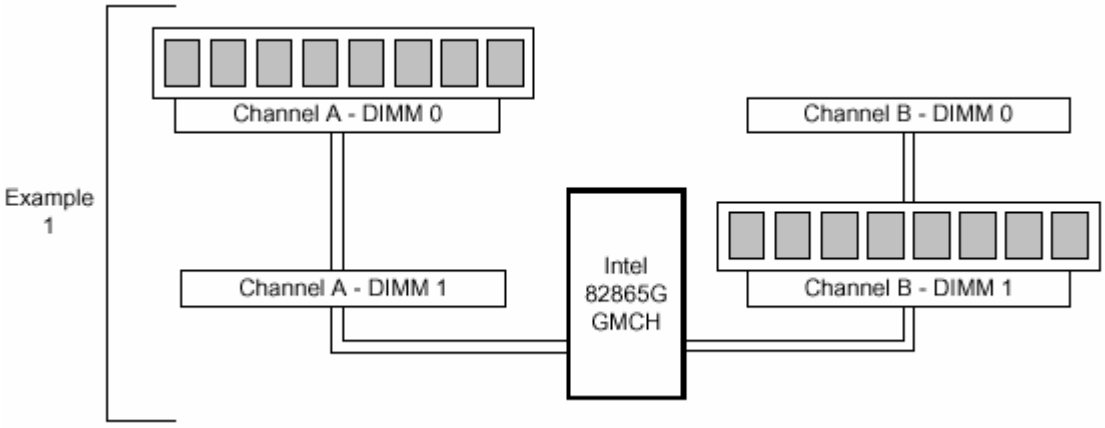


Figure 6: Examples of Single Channel Configurations with Dynamic mode

Single Channel Configurations without Dynamic Mode (DIMMs not matched)



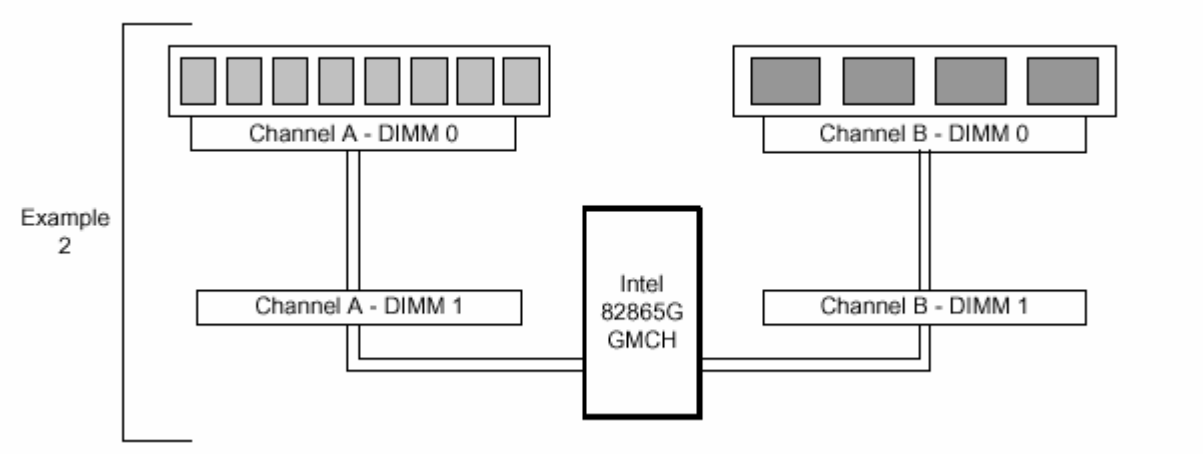


Figure 7: Examples of Single Channel Configurations without Dynamic mode

SDRAM

DDR (Double Data Rate) Synchronous DRAM (SDRAM) improves memory performance through memory access that is synchronous with the memory clock. This simplifies the timing design and increases memory speed because all timing is dependent on the number of memory clock cycles.

Note: *All memory components and DIMMs used with the D865GLC motherboard must comply with the PC SDRAM specifications. These include the PC SDRAM Specification (memory component specific) and the PC Serial Presence Detect Specification.*

ECC Memory

Error checking and correcting (ECC) memory detects multiple-bit errors and corrects single-bit errors. When ECC memory is installed the BIOS supports both ECC and non-ECC mode. ECC mode is enabled in the Setup program. The BIOS automatically detects if ECC memory is installed and provides the Setup option for selecting ECC mode. If any non-ECC memory is installed, the Setup option for ECC configuration does not appear and ECC operation is not available.

The following table describes the effect of using Setup to put each memory type in each supported mode. Whenever ECC mode is selected in Setup, some performance loss occurs.

Table 5: Memory Type

	Memory Error Detection Mode Established in Setup Program	
	ECC Disabled	**ECC Enabled**
Non-ECC DIMM	No error detection	N/A
ECC DIMM	No error detection	Single-bit error correction, multiple-bit error detection

Intel 865G Chipset

The Intel 865G chipset consists of the following devices:

- Intel 82865G Graphics and Memory Controller Hub (GMCH) with Accelerated Hub Architecture (AHA) bus
- Intel 82801EB I/O Controller Hub (ICH5) with AHA bus
- Firmware Hub (FWH)

The GMCH is a centralised controller for the system bus, the memory bus, the AGP bus, and the Accelerated Hub Architecture interface. The ICH5 is a centralised controller for the board's I/O paths. The FWH provides the nonvolatile storage of the BIOS. The component combination provides the chipset interfaces as shown in Figure 8.

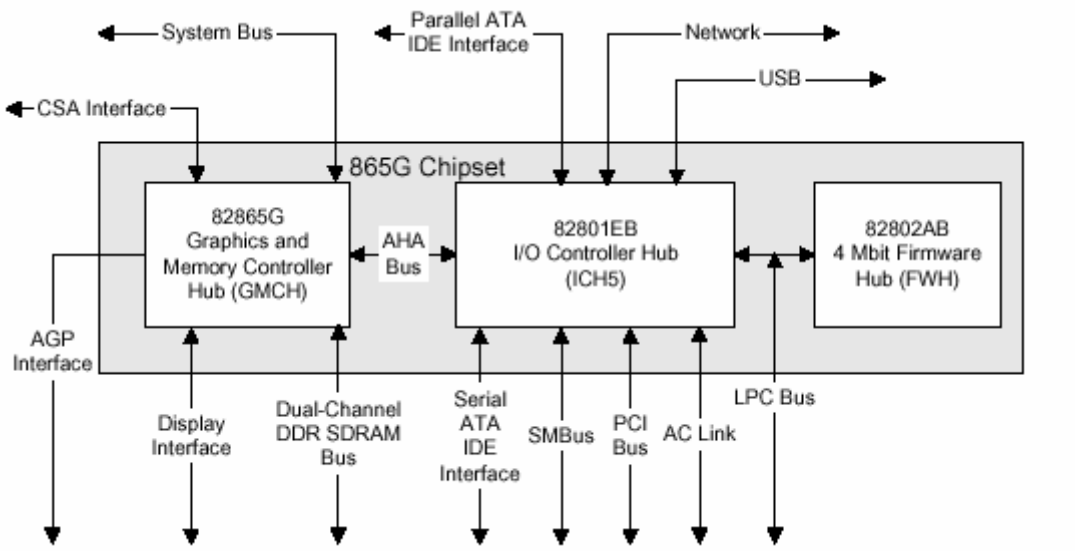


Figure 8: Intel 865G Chipset Block Diagram

Intel 865G Graphics Subsystem

The Intel 865G chipset contains two separate, mutually exclusive graphics options. Either the Intel Extreme Graphics controller (contained within the 82865G GMCH) is used, or an AGP add-in card can be used. When an AGP add-in card is installed, the Intel Extreme Graphics controller is disabled.

Intel ® Extreme Graphics 2 Controller

The Intel Extreme Graphics controller features the following:

- Integrated graphics controller
    - 32 bpp (Bits Per Pixel) graphics engine
    - 266 MHz core frequency
    - 256-bit internal data path for 2-D
    - 32-bit internal data path for 3-D
    - Motion video acceleration
- 3-D graphics visual and texturing enhancement
- Display
    - Integrated 24-bit 350 MHz RAMDAC
    - DDC2B compliant interface
- Video
    - Hardware motion compensation for software MPEG2 decode
    - Two multiplexed DVO port interfaces with 165 MHz pixel clocks using an AGP Digital Display (ADD) card
- Dynamic Video Memory Technology (DVMT) support up to 64 MB (driver dependent)
- Intel 865G Chipset
    - 400/533/800 MHz Front Side Bus (FSB)
    - AGP 8x 1.5volt

Table 6: Supported Graphics Modes using an Analog CRT

Resolution	Max Colour palette	Max Refresh rate
640x480	16M	85Hz
800x600	16M	85Hz
1024x768	16M	85Hz
1280x1024	16M	85Hz
1600 x 1200	16M	85Hz
1920x1440	64K	75Hz

Dynamic Video Memory Technology (DVMT)

DVMT enables enhanced graphics and memory performance through Direct AGP, and highly efficient memory utilisation. DVMT ensures the most efficient use of available system memory for maximum 2-D/3-D graphics performance. Up to 64 MB of system memory can be allocated to DVMT on systems that have 256 MB or more of total system memory installed. Up to 32 MB can be allocated to DVMT on systems that have 128 MB but less than 256 MB of total installed system memory. Up to 8 MB can be allocated to DVMT when less than 128 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.

Note: *The use of DVMT requires operating system driver support*

Zone Rendering Technology (ZRT)

The Intel Extreme Graphics 2 Controller supports Zone Rendering Technology (ZRT). ZRT is a process by which the screen is divided into several zones. Each zone is completely cached and rendered on chip before being written to the frame buffer. The benefits of ZRT include the following:

- Increased memory efficiency via better localisation of data
- Increased on-chip processing speed due to decreased wait time for data
- Increased effective pixel fill rates
- Increased headroom for larger resolution and color depth
- Reduced power as a result of decreased memory bandwidth
- Reduction in depth and color bandwidth associated with conventional rendering

Rapid Pixel and Text Rendering (RPTR)

The Rapid Pixel and Text Rendering Engine (RPTR) architecture utilises special pipelines that allow 2D and 3D operations to overlap. By providing 8X compression, the RPTR engine reduces the memory bandwidth required to read texture memory, and reduces the amount of memory required for texture storage.

A dedicated, non-blocking, multi-tier cache is provided for textures, colors, Z and vertex rendering. With single-pass, quad texture support, the drivers can submit up to four textures that pass to the graphics engine concurrently. The graphics core can switch between 2D and 3D operations without having to complete all operations of the same mode, which minimises the overhead time required in switching between modes.

2D Block Level Transfer (BLT) in the RPTR engine is extended to 256-bit, which supports fast blitter fill rate. This enables the blitter sequence of the same addresses to access the cache and offloads the memory bandwidth required to support blitter fill rate. Then the cache is emptied automatically when the sequence of operations are complete.

Intelligent Memory Management (IMM)

Intelligent Memory Management (IMM) technology is Intel's unique UMA memory manager architecture, consisting of these key elements:

- Tiled memory addressing capability
- Deep display buffer implementation
- Dynamic data management scheme

The memory addressing allows address remapping in the hardware for all graphics surfaces including textures, frame buffer, Z buffer, and video surfaces. Deep display buffers and dedicated screen refreshes improve visual performance, while the dynamic data management scheme manages burst size and page closing policies for memory accesses.

IMM reduces the aggregate processor latency and allows longer in-page bursts for higher system performance. IMM also increases page coherency and improves memory efficiency in texture loads, 2D blitters, color/Z, MPEG2 motion compression, and other operations.

Video Mixing Renderer (VMR)

PC/VCR requires a TV-tuner add-in card and a third party application. PC/VCR time shifted viewing allows the user to view and digitally record video pictures on their PC. Users can view stored images while recording and by using time-shifted viewing they can pause, resume, replay, and catch up to real time. The Intel Pentium 4 processor in combination with the Intel 82865G GMCH optimises performance so that the video output is smooth without leaving any visual artifacts. Video tearing and corruption is prevented by the use of multiple buffers within the Intel Extreme Graphics 2 controller.

Bi-Cubic Filtering

Bi-cubic filtering is a new 4X4 filter that allows images to be generated more smoothly in the 3D pipeline. The bi-cubic filter can be used to improve image quality for all 3D texture engine components.

AGP Digital Display (ADD) Card Support

The GMCH routes two 12-bit multiplexed DVO ports that are each capable of driving a 165 MHz pixel clock to the AGP connector. The DVO ports can be paired for dual channel mode. In dual channel mode, the GMCH is capable of driving a 24-bit 330 MHz pixel clock. When an AGP add-in card is used, the Intel Extreme Graphics 2

controller is disabled and the AGP connector operates in AGP mode. When an ADD card is detected, the Intel Extreme Graphics 2 controller is enabled and the AGP connector is configured for DVO mode. DVO mode enables the DVO ports to be accessed by an ADD card. ADD cards can support up to two display devices with the following configurations:

- TV-Out and Transition Minimised Differential Signaling (TMDS)
- Low Voltage Differential Signaling (LVDS)
- Single device operating in dual channel mode

Universal 0.8V / 1.5V AGP 3.0 Connector

The AGP connector supports the following:

- 4x, 8x AGP 3.0 add-in cards with 0.8 V I/O
- 1x, 4x AGP 2.0 add-in cards with 1.5 V I/O
- AGP Digital Display (ADD) cards

AGP is a high-performance interface for graphics-intensive applications, such as 3D applications. While based on the *PCI Local Bus Specificatio*n, Rev. 2.2, AGP is independent of the PCI bus and is intended for exclusive use with graphical display devices. AGP overcomes certain limitations of the PCI bus related to handling large amounts of graphics data with the following features:

- Pipelined memory read and write operations that hide memory access latency
- Demultiplexing of address and data on the bus for nearly 100 percent efficiency

Notes:

- *AGP 2x operation is not supported.*
- *Install memory in the DIMM sockets prior to installing the AGP video card to avoid interference with the memory retention mechanism.*
- *The AGP connector is keyed for Universal 0.8 V AGP 3.0 cards or 1.5 V AGP 2.0 cards only. Do not attempt to install a legacy 3.3 V AGP card. The AGP connector is not mechanically compatible with legacy 3.3 V AGP cards.*

USB Support

The motherboard has four USB 2.0 ports; note an optional front panel USB connector is required to use the internal USB header to provide 2 more additional ports. One USB peripheral can be connected to each port. For more than four USB devices, an external hub can be connected to either port. The motherboard fully supports the universal host controller interface (UHCI) and (EHCI) and uses UHCI- and EHCI- compatible drivers. The ICH5 provides the USB controller for all ports.
The port arrangement is as follows:

- Two ports are implemented with stacked back panel connectors, adjacent to the PS/2 connectors
- Two ports are implemented with stacked back panel connectors, adjacent to the audio connectors
- Four ports are routed to two separate front panel USB connectors

Note: *USB 2.0 drivers are available for Windows 2000 Pro and Windows XP, and currently not supported by any other operating system.*

USB features include:

- Self-identifying peripherals that can be plugged in while the computer is running.
- Automatic mapping of function to driver and configuration.
- Supports isochronous and asynchronous transfer types over the same set of wires.
- Supports up to **127** physical devices.
- Guaranteed bandwidth and low latencies appropriate for telephony, audio, and other applications.
- Error-handling and fault-recovery mechanisms built into the protocol.

Note: *Computer systems that have an unshielded cable attached to a USB port may not meet FCC Class B requirements, even if no device or a low-speed (sub-channel) USB device is attached to the cable. Use shielded cable that meets the requirements for high-speed (fully rated) devices.*

IDE Support

The D865GLC motherboard provides four IDE interface connectors:

- Two Parallel ATA IDE connectors, which support a total of four devices (two per connector)
- Two Serial ATA IDE connectors, which support one device per connector

Parallel ATA IDE Interfaces

The ICH5's Parallel ATA IDE controller has two independent bus-mastering Parallel ATA IDE interfaces that can be independently enabled. The Parallel ATA IDE interfaces support the following modes:

- Programmed I/O (PIO): processor controls data transfer.
- 8237-style DMA: DMA offloads the processor, supporting transfer rates of up to 16 MB/sec.
- Ultra DMA: DMA protocol on IDE bus supporting host and target throttling and transfer rates of up to 33 MB/sec.
- ATA-66: DMA protocol on IDE bus supporting host and target throttling and transfer rates of up to 66 MB/sec. ATA-66 protocol is similar to Ultra DMA and is device driver compatible.
- ATA-100: DMA protocol on IDE bus allows host and target throttling. The ICH5's ATA-100 logic can achieve read transfer rates up to 100 MB/sec and write transfer rates up to 88 MB/sec.

Serial ATA Support

The ICH5's Serial ATA controller offers two independent Serial ATA ports with a theoretical maximum transfer rate of 150 MB/s per port. One device can be installed on each port for a maximum of two Serial ATA devices. A point-to-point interface is used for host to device connections, unlike Parallel ATA IDE which supports a master/slave configuration and two devices per channel.

For compatibility, the underlying Serial ATA functionality is transparent to the operating system. The Serial ATA controller can operate in both legacy and native modes. In legacy mode, standard IDE I/O and IRQ resources are assigned (IRQ 14 and 15). In Native mode, standard PCI resource steering is used. Native mode is the preferred mode for configurations using the Windows XP and Windows 2000 operating systems.

LS-120 Support

LS-120 MB Diskette technology enables you to store 120MB of data on a single, 3.5" removable diskette. LS-120 technology is backward (both read and write) compatible with 1.44MB and 720KB DOS-formatted diskette and is supported by Windows 95 and Windows NT operating system.

The D865GLC board allows connection of an LS-120 compatible drive and a standard 3½" floppy drive. The LS-120 drive can be configured as a boot device before a floppy drive, if selected in the BIOS setup utility.

***Note**: If you connect an LS-120 drive to an IDE connector and configure it as the "A" drive and configure a standard 3.5" floppy as "B" drive, the standard floppy must be connected to the floppy drive cable's "A" connector (the connector at the end of the cable).*

The BIOS setup utility can be configured to boot firstly from either the LS120 or standard 3½ “ floppy drive.

Real-Time Clock, CMOS SRAM and Battery

A coin-cell battery (CR2032) powers the real-time clock and CMOS memory. When the computer is not plugged into a wall socket, the battery has an estimated life of three years. When the computer is plugged in, the standby current from the power supply extends the life of the battery. The clock is accurate to ± 13 minutes/year at 25 ºC with 3.3 VSB applied.

Note: If the battery and AC power fail, custom defaults, if previously saved, will be loaded into CMOS RAM at power-on.

I/O Controller

The I/O controller (SMSC LPC47M172 or National Semiconductor PC87372) provides the following features:

- One serial port.
- One parallel port with Extended Capabilities Port (ECP) and Enhanced Parallel Port (EPP) support
- Serial IRQ interface compatible with serialised IRQ support for PCI systems PS/2-style mouse and keyboard interfaces
- Interface for one 1.2 MB or 1.44 MB diskette drive
- Intelligent power management, including a programmable wake-up event interface
- PCI power management support
- Two fan tachometer inputs
- Integrated USB hub

By default, the I/O controller interfaces are automatically configured during boot up. The I/O controller can also be manually configured in the Setup program.

Serial Ports

One 9-pin D-Sub serial port connector is located on the back panel and is compatible with NS16C550 UARTs.

Parallel Port

The connector for the multimode bi-directional parallel port is a 25-pin D-Sub connector located on the back panel. In the Setup program, the parallel port can be configured for the following:

- Compatible (standard mode).
- Bi-directional (PS/2 compatible).
- Extended Parallel Port (EPP).

- Enhanced Capabilities Port (ECP).

Floppy Controller

The I/O controller is software compatible with the N82077 floppy drive controllers and supports both PC-AT and PS/2 modes. In the Setup program, the floppy interface can be configured for the following floppy drive capacities and sizes:

- 360 KB, 5.25-inch
- 1.2 MB, 5.25-inch
- 720 KB, 3.5-inch
- 1.2 MB, 3.5-inch (driver required)
- 1.25/1.44 MB, 3.5-inch
- 2.88 MB, 3.5-inch

PS/2 Keyboard and Mouse Interface

PS/2 keyboard and mouse connectors are located on the back panel. The +5 V lines to these connectors are protected with a PolySwitch circuit that, like a self-healing fuse, re-establishes the connection after an over-current condition is removed.

The keyboard controller contains the AMI Megakey keyboard and mouse controller code, provides the keyboard and mouse control functions, and supports password protection for power on/reset. A power on/reset password can be specified in Setup. The keyboard controller also supports the hot-key sequence <Ctrl><Alt><Del> for a software reset. This key sequence resets the computer's software by jumping to the beginning of the BIOS code and running the Power-On Self Test (POST).

Audio Subsystem

The D865GLC motherboard provides a Flex 6 audio subsystem based on the Analog Devices AD1985 codec. The audio subsystem supports the following features:

- Advanced jack sense with Auto Topology Switching that enables the audio codec to recognise what device is connected to an audio port and alerts the user if the wrong type of device has been connected.
- Split digital/analog architecture for improved S/N (signal-to-noise) ratio: > 94 dB

The Flex 6 audio subsystem includes the following features:

- Intel 82801EB I/O Controller Hub (ICH5)
- Analog Devices AD1985 audio codec
- Microphone input that supports a single dynamic, condenser, or electrets microphone

The subsystem has the following connectors:

- ATAPI-style CDROM connector
- Front panel audio connector, including pins for:
    - Line In
    - Mic in
- Back panel audio connectors that are configurable through the audio devices derivers. The available configurations are shown below:

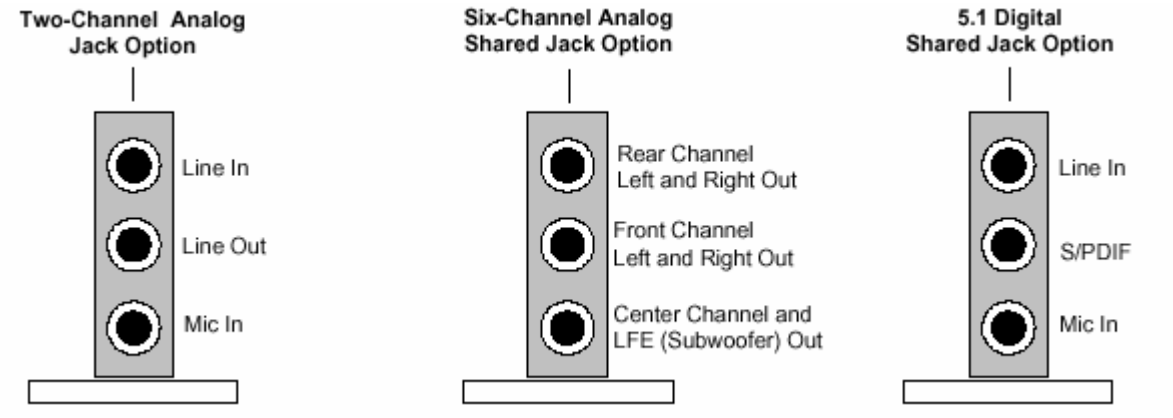


Figure 9: Back Panel Audio Connector Options

Note: *To access the S/PDIF signal with the 5.1 Digital Shared Jack option, connect a 1/8-inch stereo phone plug to RCA jack adapter/splitter as shown in Figure 10.*

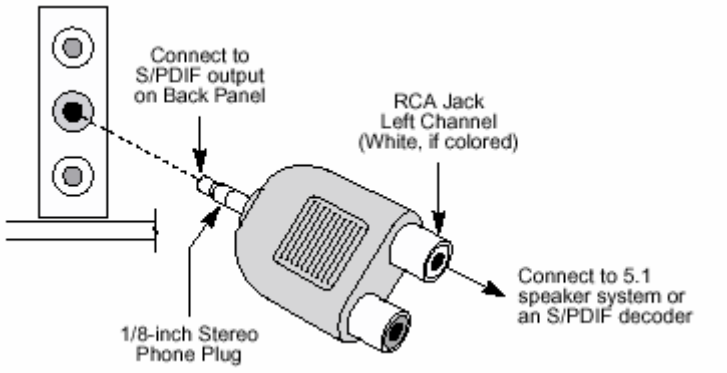


Figure 10: Adapter for S/PDIF Back Panel Connector

Audio Connectors

Front Panel Audio connector

A 2 x 5-pin connector provides mic in and line out signals for front panel audio connectors.

Auxiliary Line In Connector

A 1 x 4-pin ATAPI-style connector connects the left and right channel signals of an internal audio device to the audio subsystem.

ATAPI CDROM Audio Connector

A 1 x 4-pin ATAPI-style connector connects an internal ATAPI CD-ROM drive to the audio mixer.

LAN Subsystem

The Network Interface Controller subsystem consists of the ICH5 (with integrated LAN Media Access Controller) and a physical layer interface device. Feature of the LAN subsystem include:

- PCI Bus Master Interface
- CSMA/CD Protocol Engine
- Serial CSMA/CD unit interface that supports the following physical layer interface devices:
    - Intel® 82562EZ 10/100 Mbit/sec Platform LAN Connect (PLC) device
- PCI Power Management
    - Supports APM
    - Supports ACPI technology
    - Supports Wake up from suspend state (Wake-On-LAN † technology)

Intel ® 82562EZ Platform LAN Connect Device

The Intel 82562EZ component provides an interface to the back panel RJ-45 connector with integrated LEDs. This physical interface may alternately be provided via the CNR connector. The Intel 82562EZ provides the following functions:

- Basic 10/100 Ethernet LAN Connectivity
- Supports RJ-45 connector with status indicator LEDs
- Full driver compatibility
- Advanced Power Management support
- Programmable transit threshold
- Configuration EEPROM that contains the MAC address

RJ-45 LAN Connector LEDs

Two LEDs are built into the RJ-45 LAN connector. The following table describes the LED states when the board is powered up and the LAN subsystem is operating.

Table 7: LAN Connector LEDs

LED Colour	LED State	Condition
Green	Off	10 Mbit/sec data rate is selected.
Green	On	100 Mbit/sec date rate is selected.
Yellow	Off	LAN link is not established.
Yellow	On (steady state)	LAN link is established.
Yellow	On (brighter and pulsing)	The computer is communicating with another computer on the LAN.

Hardware Management Subsystem

The hardware management features enable the Desktop Boards to be compatible with the Wired for Management (WfM) specification. The Desktop Board has several hardware management features, including the following:

- Fan monitoring and control (through the hardware monitoring and fan control ASIC)
- Thermal and voltage monitoring
- Chassis intrusion detection

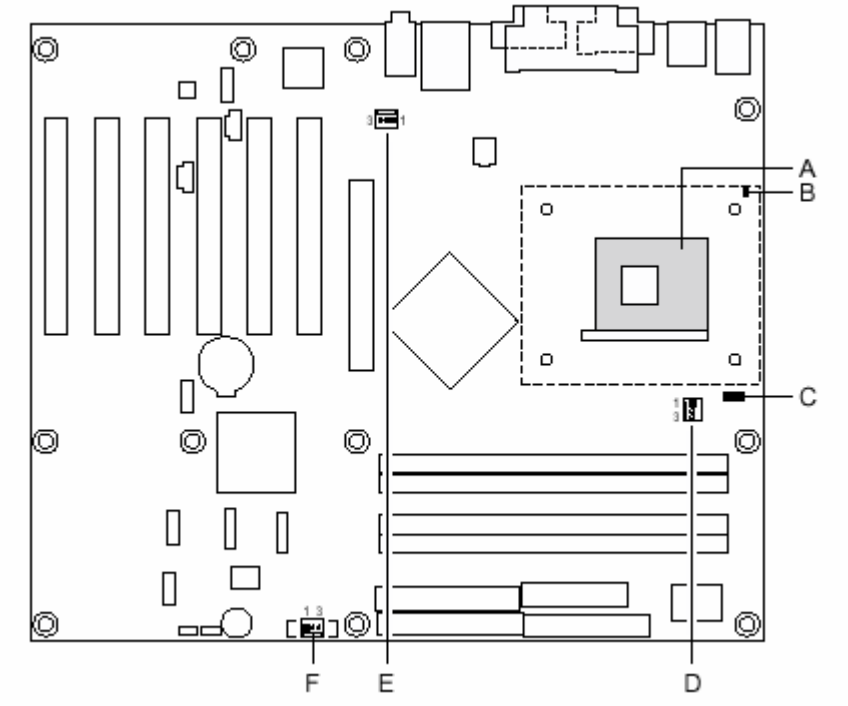
Hardware Monitoring and Fan Control ASIC

The features of the hardware monitoring and fan control ASIC include:

- Internal ambient temperature sensor
- Two remote thermal diode sensors for direct monitoring of processor temperature and ambient temperature sensing
- Power supply monitoring of five voltages (+5 V, +12 V, +3.3 VSB, +1.5 V, and +VCCP) to detect levels above or below acceptable values
- Thermally monitored closed-loop fan control, for all three fans, that can adjust the fan speed or switch the fans on or off as needed
- SMBus interface

Thermal Monitoring

Figure 11 shows the location of the sensors and fan connectors.



Item	Description
A	Thermal diode, located on processor die
B	Remote ambient temperature sensor
C	Ambient temperature sensor
D	Processor fan
E	Rear chassis fan
F	Front chassis fan

Figure 11: Thermal Sensors

Fan Monitoring

Fan monitoring can be implemented using Intel ® Active Monitor, LANDesk* software, or third-party software. The level of monitoring and control is dependent on the hardware monitoring ASIC used with the Desktop Board.

Chassis Intrusion and Detection

The D865GLC motherboard supports a chassis security feature that detects if the chassis cover is removed. The security feature uses a mechanical switch on the chassis that attaches to the chassis intrusion connector. When the chassis cover is removed, the mechanical switch is in the closed position.

Power Management

Power management is implemented at several levels, including:

- Software support through Advanced Configuration and Power Interface (ACPI)
- Hardware support:
    - Power connector
    - Fan connectors
    - LAN wake capabilities
    - Instantly Available PC technology
    - Resume on Ring
    - Wake from USB
    - Wake from PS/2 devices
    - Power Management Event signal (PME#) wake-up support

ACPI

ACPI gives the operating system direct control over the power management and Plug and Play functions of a computer. The use of ACPI with the D865GLC motherboard requires an operating system that provides full ACPI support. ACPI features include:

- Plug and Play (including bus and device enumeration)

- Power management control of individual devices, add-in boards (some add-in boards may require an ACPI-aware driver), video displays, and hard disk drives
- Methods for achieving less than 15-watt system operation in the power-on/standby sleeping state
- A Soft-off feature that enables the operating system to power-off the computer
- Support for multiple wake-up events
- Support for a front panel power and sleep mode switch

Table 8 lists the system states based on how long the power switch is pressed, depending on how ACPI is configured with an ACPI-aware operating system.

Table 8: Effects of Pressing the Power Switch

If the system is in this state…	**…and the power switch is pressed for**	**…the system enters this state**
Off (ACPI G2/G5 – soft off)	Less that four seconds	Power-on (ACPI G0 – working)
On (ACPI G0 – working state)	Less than four seconds	Soft off/Standby (ACPI G1 – sleeping state)
On (ACPI G0 – working state)	More than four seconds	Fail safe power-off (ACPI G2/G5 – soft-off)
Sleep (ACPI G1 – sleeping state)	Less that four seconds	Wake-up (ACPI G0 – working state)
Sleep (ACPI G1 – sleeping state)	More than fore seconds	Power-off (ACPI G2/G5 – Soft off)

System States and Power States

Under ACPI, the operating system directs all system and device power state transitions. The operating system puts devices in and out of low-power states based on user preferences and knowledge of how devices are being used by applications. Devices that are not being used can be turned off. The operating system uses information from applications and user settings to put the system as a whole into a low-power state.

Table 9 lists the power states supported by the D865GLC motherboard along with the associated system power targets. See the ACPI specification for a complete description of the various system and power states.

Table 9: Power States and Targeted System Power

Global States	**Sleeping States**	**Processor States**	**Device States**	**Targeted System Power**
G0 – working state	S0 – working	C0 – working	D0 – working state	Full Power > 30W
G1 – sleeping state	S1 – Processor stopped	C1 – stop grant	D1, D2, D3 – device specification specific	5W < power < 52.5W
G1 – sleeping state	S3 – Suspend to RAM.	No power	D3 – no power except for wake-up logic	Power < 5W
G1 – Sleeping state	S4 – Suspended to disk.	No power	D3 – no power except for wake-up logic	Power < 5W
G2/S5	S5 – Soft off. saved	No power	D3 – no power except for wake-up logic	Power < 5W

G3 – Mechanical off AC power is disconnected for the computer	No power to the system	No power	D3 – no power for wake-up logic, except when provided by battery or external source	No power to the system. Service can be performed safely.

Wake-up Devices and Events

Table 10 lists the devices or specific events that can wake the computer from specific states.

Table 10: Wake-up Devices and Events

These devices/events can wake up the computer…	**…from this state**
LAN	S1, S3, S4, S5
Modem (Back panel Serial Port A)	S1, S3
PME# signal	S1, S3, S4, S5
Power switch	S1, S3, S4, S5
PS/2 devices	S1, S3
RTC alarm	S1, S3, S4, S5
USB	S1, S3

Note: *The use of these wake-up events from an ACPI state requires an operating system that provides full ACPI support. In addition, software, drivers, and peripherals must fully support ACPI wake events.*

Hardware Support

CAUTION!

Ensure that the power supply provides adequate +5 V standby current if LAN wake capabilities and Instantly Available PC technology features are used. Failure to do so can damage the power supply. The total amount of standby current required depends on the wake devices supported and manufacturing options.

The D865GLC motherboard provides several power management hardware features, including:

- Power connector
- Fan connectors
- LAN wake capabilities
- Instantly Available PC technology
- Resume on Ring
- Wake from USB
- Wake from PS/2 keyboard
- PME# signal wake-up support

LAN wake capabilities and Instantly Available PC technology require power from the +5 V standby line. The sections discussing these features describe the incremental standby power requirements for each.

Resume on Ring enables telephony devices to access the computer when it is in a power-managed state. The method used depends on the type of telephony device (external or internal).

Note: *The use of Resume on Ring and Wake from USB technologies from an ACPI state requires an operating system that provides full ACPI support.*

Power Connector

ATX12V-, SFX12V-, and TFX12V-compliant power supplies can turn off the system power through system control. When an ACPI-enabled system receives the correct command, the power supply removes all non-standby voltages.

When resuming from an AC power failure, the computer returns to the power state it was in before power was interrupted (on or off). The computer's response can be set using the Last Power State feature in the BIOS Setup program's Boot menu.

LAN wake Capabilities

CAUTION!

For LAN wake capabilities, the +5 V standby line for the power supply must be capable of providing adequate +5 V standby current. Failure to provide adequate standby current when implementing LAN wake capabilities can damage the power supply.

LAN wake capabilities enable remote wake-up of the computer through a network. The LAN subsystem PCI bus network adapter monitors network traffic at the Media Independent Interface. Upon detecting a Magic Packet* frame, the LAN subsystem asserts a wake-up signal that powers up the computer. Depending on the LAN implementation, the D865GLC motherboard supports LAN wake capabilities with ACPI in the following ways:

- The PCI bus PME# signal for PCI 2.2 compliant LAN designs
- The onboard LAN subsystem

Instantly Available PC Technology

CAUTION!

For Instantly Available PC technology, the +5 V standby line for the power supply must be capable of providing adequate +5 V standby current. Failure to provide adequate standby current when implementing Instantly Available PC technology can damage the power supply.

Instantly Available PC technology enables the D865GLC motherboard to enter the ACPI S3 (Suspend-to-RAM) sleep-state. While in the S3 sleep-state, the computer

will appear to be off (the power supply is off, and the front panel LED is amber if dual colored, or off if single colored.) When signaled by a wake-up device or event, the system quickly returns to its last known wake state.

The use of Instantly Available PC technology requires operating system support and PCI 2.2 compliant add-in cards and drivers.

Resume on Ring

The operation of Resume on Ring can be summarised as follows:

- Resumes operation from ACPI S1 or S3 states
- Detects incoming call similarly for external and internal modems
- Requires modem interrupt be unmasked for correct operation

Wake from USB

USB bus activity wakes the computer from ACPI S1 or S3 states.

Note: *Wake from USB requires the use of a USB peripheral that supports Wake from USB.*

Wake from PS/2 Devices

PS/2 device activity wakes the computer from an ACPI S1 or S3 state.

PME# Signal Wake-up Support

When the PME# signal on the PCI bus is asserted, the computer wakes from an ACPI S1, S3, S4, or S5 state (with Wake on PME enabled in BIOS).

Chapter 2: System Board Options

The D865GLC motherboard is capable of accepting Pentium 4 CPU's. RAM can be upgraded to a maximum of 4GB using DDR266, DDR333 or DDR400 SDRAM DIMMs ECC and Non ECC 2.5volt Unbuffered memory.

WARNING!

Unplug the system before carrying out the procedures described in this chapter. Failure to disconnect power before you open the system can result in personal injury or equipment damage. Hazardous voltage, current, and energy levels are present in this product. Power switch terminals can have hazardous Voltages present even when the power switch is off.

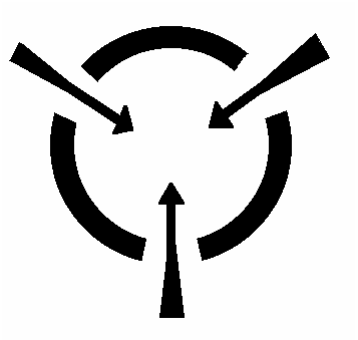
The procedures assume familiarity with the general terminology associated with personal computers and with the safety practices and regulatory compliance required for using and modifying electronic equipment.
Do not operate the system with the cover removed. Always replace the cover before turning on the system.

As the colours of the wires in the mains lead of this computer may not correspond with the coloured markings identifying the terminals in your plug precede as follows:

The wire which is coloured green-and-yellow must be connected to the terminal in the plug which is marked by the letter **E** or by the safety Earth symbol Q or coloured green or green-and-yellow.

The wire which is coloured blue must be connected to the terminal which is marked with the letter **N** or coloured black.

The wire which is coloured brown must be connected to the terminal which is marked with the letter **L** or coloured red.



CAUTION!

The Viglen D865GLC motherboard and associated components are sensitive electronic devices. A small static shock from your body can cause expensive damage to your equipment.

Make sure you are earthed and free of static charge before you open the computer case. If you are unsure about upgrading your computer, return it to Viglen so a qualified engineer can perform the upgrade.

STEPS TO TAKE TO PREVENT STATIC DISCHARGE:

1. The best way to prevent static discharge is to buy an anti-static strap from your local electrical shop. While you are wearing the strap and it is earthed, static charge will be harmlessly bled to ground.

2. Do not remove the component from its anti-static protective packaging until you are about to install it.

3. Hold boards by the edges - try not to touch components / interface strips etc.

Note: *We recommend that you return your computer to the service department for upgrading. Any work carried out is fully guaranteed. Upgrades should only be carried out by persons who are familiar with handling IC's, as incorrect installation will invalidate the guarantee.*

Overview of Jumper Settings

The D865GLC motherboard contains the latest technology to offer an almost jumperless configuration. All Pentium 4 CPUs are automatically detected and the Speed is automatically set from the information provided by the CPU.

The only jumper present on the motherboard is for clearing all the CMOS settings. In the unlikely event of the CMOS becoming corrupted then jumper J9J4 can be set to clear the contents of the CMOS.

CAUTION!

Never remove jumpers using large pliers as this can damage the pins. The best way to remove a jumper is to use a small pair of tweezers or fine needle-nosed pliers.

Never remove a jumper when the computer is switch on. Always switch the computer off first.

System Board Jumper Settings

The Configuration Jumper (J9J4) allows the user to enter the configuration mode, and to recover from a corrupted BIOS update. The following figure shows the location of the header on the motherboard. The audio jumper block (J9A2) allows the implementation of front panel audio.

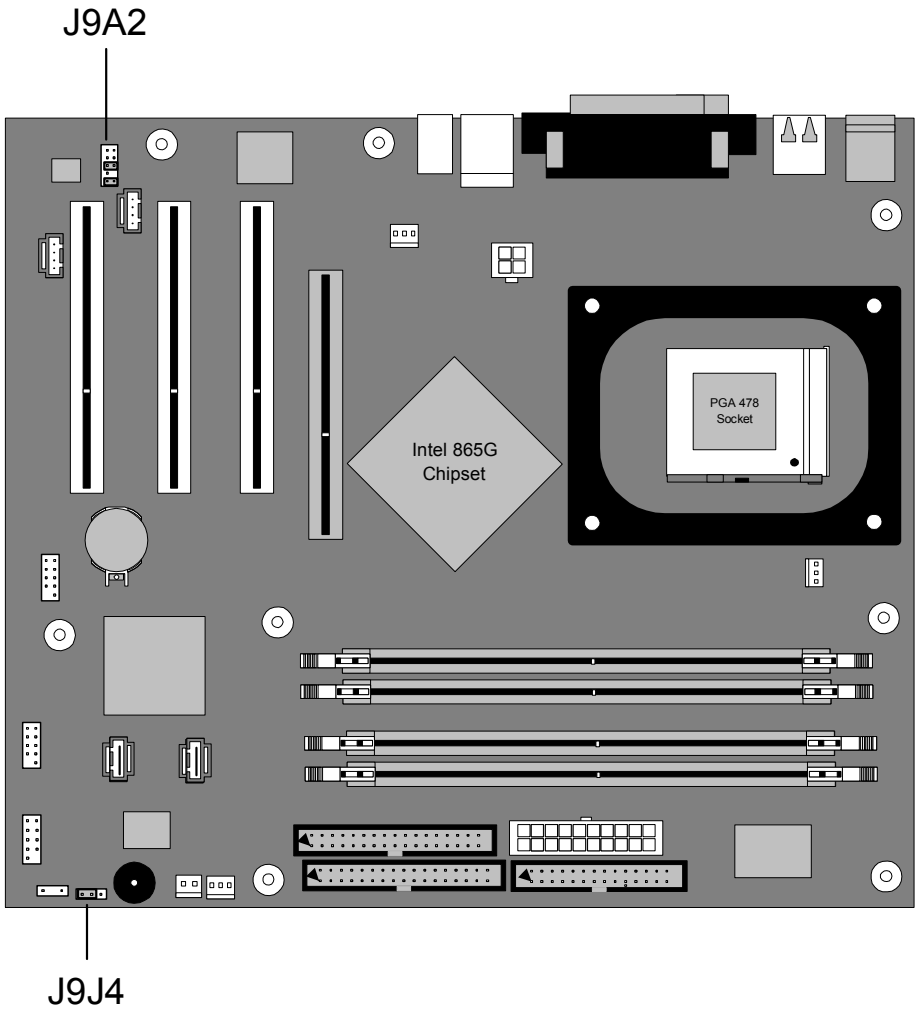


Figure 12: Single-Jumper Configurations

Table 11: Configuration Jumper Settings

Function	Jumper J9J4	Configuration
Normal	1-2	The BIOS uses current configuration information and passwords for booting.
Configure	2-3	After the POST runs, Setup runs automatically. The maintenance menu is displayed.
Recovery	None	The BIOS attempts to recover the BIOS configuration. A recovery diskette is required.

Table 12: Front Panel Audio Jumper Settings

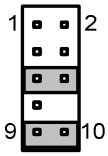
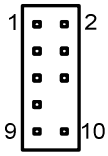
Function	Jumper J9A2	Configuration
Normal 	5 – 6 and 9- 10	The audio line signals are routed back to the line connector.
Front audio cable 	none	Audio line out and mic in signals are available for front panel audio connectors on this connector when no jumpers are installed.

Table 12a: Front panel Audio Connector

Pin	Signal name	Pin	Signal name
1	MIC_IN	2	Ground
3	MIC_BIAS	4	+5V
5	RIGHT_OUT	6	RIGHT_IN
7	Ground	8	Key
9	LEFT_OUT	10	LEFT_IN

CAUTION!

Do not move the jumper with the power on. Always turn off the power and unplug the power cord from the computer before changing the jumper.

Note: *There is no jumper setting for configuring the processor speed or bus frequency. The feature for configuring the processor speed is in the Setup program using configure mode. See BIOS Section for information about configure mode.*

Motherboard Connectors

There are connectors on the motherboard for FAN, IDE, Power supply, CD audio, Floppy, IDE, & Front Panel Connectors. The location and/or details of these connections are shown below.

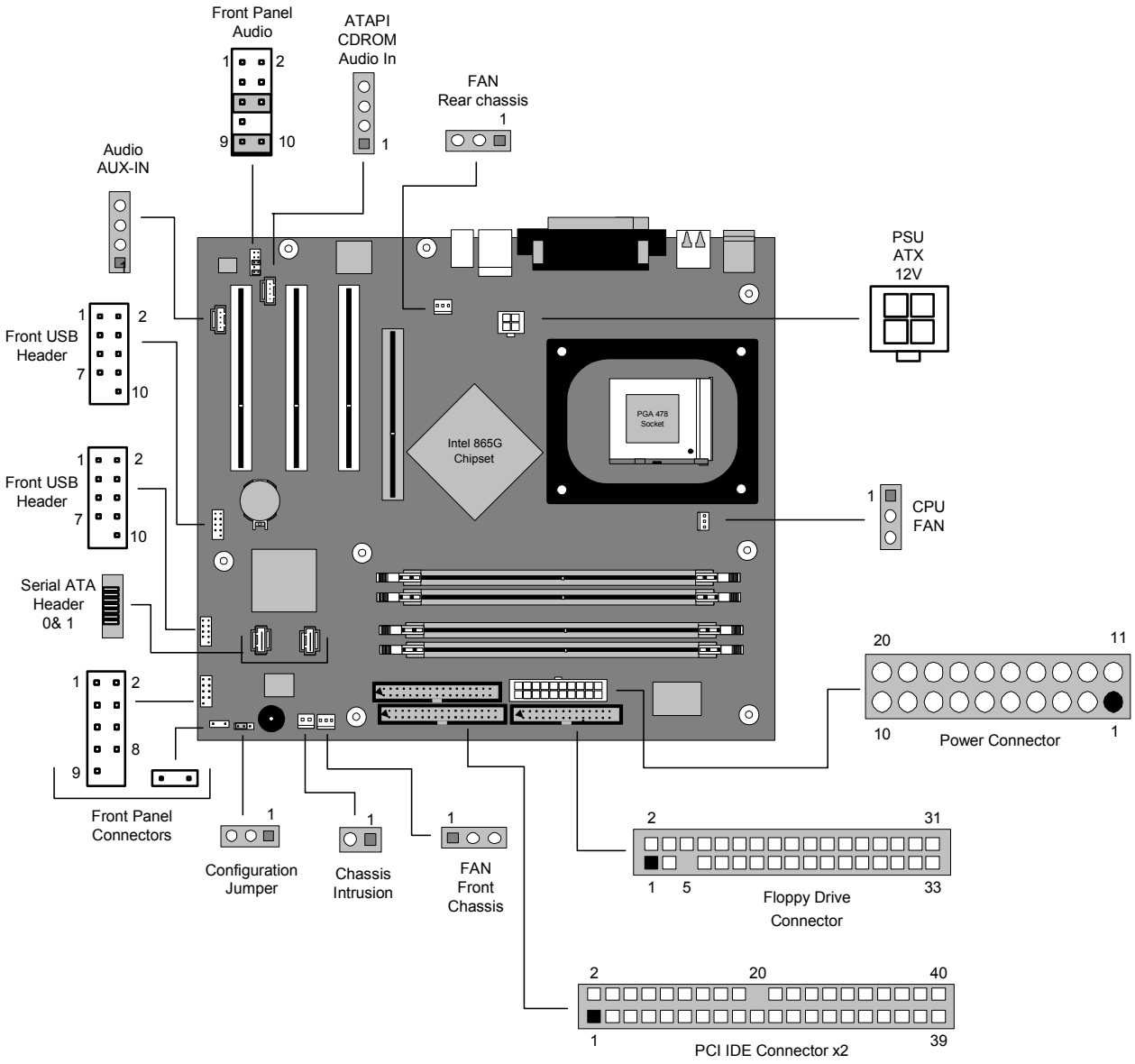


Figure 13: Motherboard Connectors

Front Panel Connectors

The following are all connectors situated along the front edge of the motherboard. They are often connected to buttons and LED's situated on the front panel.

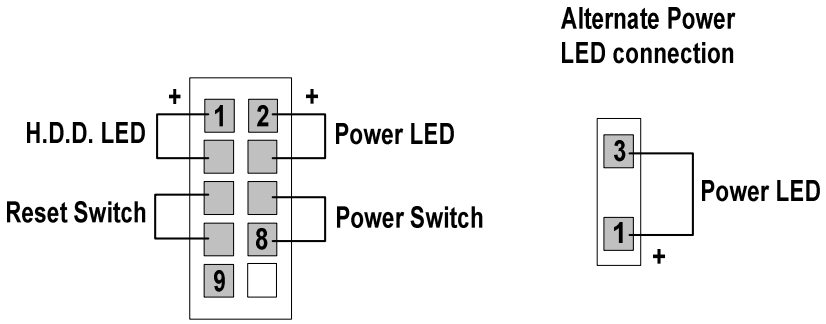


Figure 14: Front panel connectors

A- Hard Disk L.E.D. Connector

This goes to the Hard Disk L.E.D. on the front panel, which lights up when the IDE Hard Disk is in use.

B - Reset switch connector

When these pins are shorted, it will cause the computer to perform a cold reboot.

C - Power L.E.D.

This attaches to the power L.E.D on the front panel, to display if the computer is active or not.

D- Power On/Off

When these pins are shorted it turns the computer on and off.

Upgrading the CPU

CAUTION!

Allow time for the processor and heatsink to cool before touching either of them.

The Pentium 4 processor together with Level 2 cache chips are housed in a protective package.

The design of the D865GLC computer makes it a simple job to replace or upgrade the processor. To do so please refer to figure 15 and follow the instructions below:

1. Read the warnings at the start of this chapter and ensure a static free environment
2. Remove the lid from the computer by removing the four screws at the rear of the case
3. Locate the CPU module by referring to figure 1 if necessary
4. Locate the heat sink clips, and remove heat sink (and unplug FAN cable)
5. Lift arm on Socket to release the CPU
6. Lift the CPU Vertically upwards until it is clear of the socket

You can now fit the replacement CPU and heat sink into the socket.

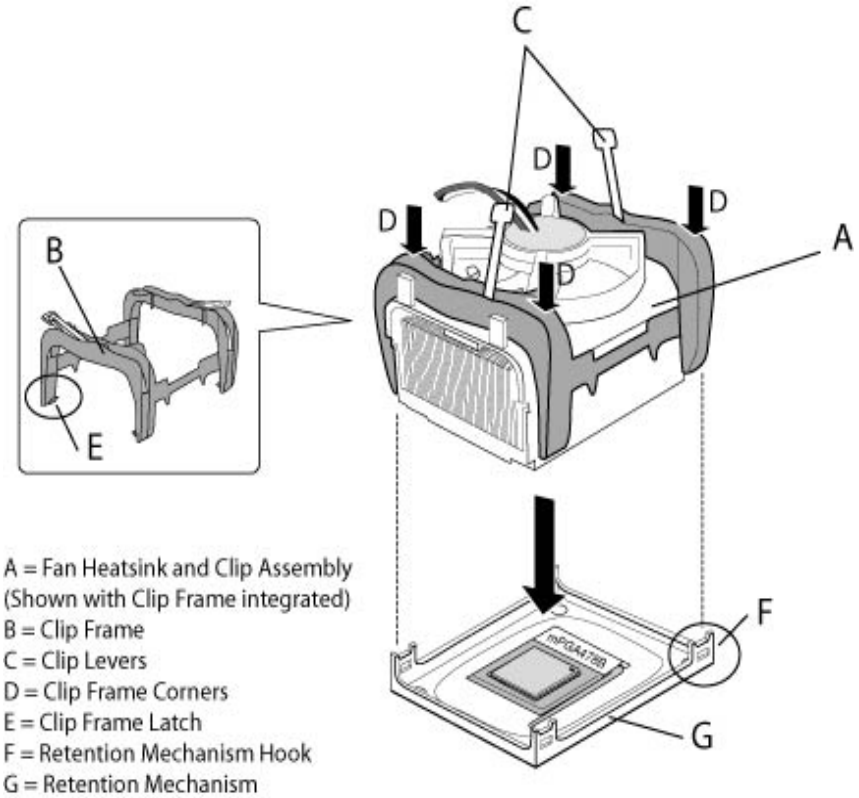


Figure 15: Installing the CPU heatsink (note heatsink type may vary from one shown above)

Installing & Removing Dual In-line Memory Modules

Installing Memory

You can install from 128MB to 4GB of memory in the motherboard DIMM sockets. The motherboard has four DIMM sockets. The motherboard supports the following memory features:

- 184-pin 2.5 V DIMMs with gold-plated contacts.
- Non-ECC (64-bit) or ECC (72-bit) memory.
- 64MB, 128MB, 256MB, 512MB and 1GB modules.

When adding memory, follow these guidelines:

- The BIOS detects the size and type of installed memory.
- For ECC operation to become available all installed memory must be ECC and you must enable the ECC Configuration feature in the BIOS Setup program.

Note: *DDR SDRAM must meet the Version 1.0 June 2000 JEDEC Solid State Technology Association specifications for DDR266 SDRAM.*

To install DIMMs, follow these steps:

1. Observe the precautions in “Before You Begin”. Turn off the computer and all Peripheral devices.
2. Remove the computer cover and locate the DIMM sockets.
3. Holding the DIMM by the edges, remove it from its antistatic package.
4. Make sure the clips at either end of the socket are pushed away from the socket.
5. Position the DIMM above the socket. Align the two small notches in the bottom edge of the DIMM with the keys in the socket. Insert the bottom edge of the DIMM into the socket.
6. When the DIMM is seated, push down on the top edge of the DIMM until the retaining clips at the ends of the socket snap into place. Make sure the clips are firmly in place.
7. Replace the computer cover.
8. If you installed a DIMM with ECC memory, start the computer and use the ECC Configuration feature in Setup to enable the use of ECC.

Removing Memory

To remove a DIMM, follow these steps:

1. Observe the precautions in "Before You Begin”.
2. Turn off all peripheral devices connected to the computer. Turn off the computer.
3. Remove the computer cover.

4. Gently spread the retaining clips at each end of the socket. The DIMM pops out of the socket. Hold the DIMM by the edges, lift it away from the socket, and store it in an antistatic package.
5. Reinstall and reconnect any parts you removed or disconnected to reach the DIMM sockets.

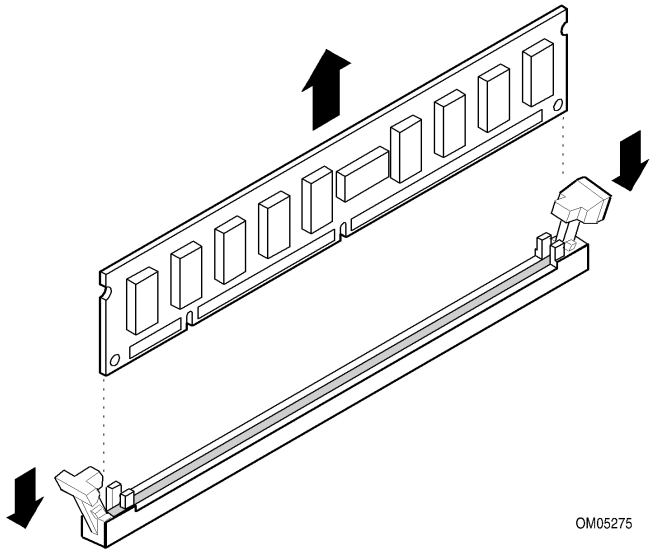


Figure 16: Removing Memory Modules

Replacing the Clock/CMOS RAM Battery

A lithium battery is installed in a socket on the system board.

The battery has an estimated life expectancy of seven years. When the battery starts to weaken, it loses voltage; when the voltage drops below a certain level, the system settings stored in CMOS RAM (for example, the date and time) may be wrong.

If the battery fails, you will need to replace it with a **CR2032** battery or an equivalent. As long as local ordinance permits, you may dispose of individual batteries as normal rubbish. Do not expose batteries to excessive heat or any naked flame. Keep all batteries away from children.

CAUTION!

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

The battery is listed as board component 'CC' on the diagram on Figure 1.

To replace the battery, carry out the following:

1. Observe the precautions in "Before You Begin."
2. Turn off all peripheral devices connected to the system.
3. Turn off the system.
4. Remove any components that are blocking access to the battery.
5. Figure 1 shows the battery location. Gently pry the battery free from its socket, taking care to note the "+" and "-" orientation of the battery (Figure 17).
6. Install the new battery in the socket.

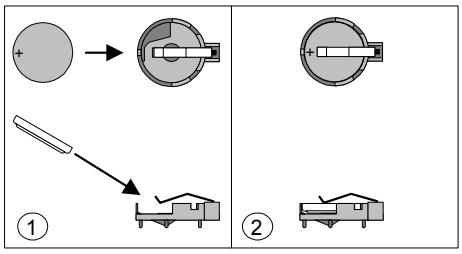


Figure 17: Removing the Battery

Chapter 3: Solving Problems

The first part of this chapter helps you identify and solve problems that might occur when the system is in use. The second part lists error code messages that might be displayed.

Please remember that if you cannot solve the problem by yourself then you should contact your suppliers Technical Support for further assistance.

Viglen Technical Support can be reached in the following ways:

Telephone: 020 8758 7000
Fax: 020 8758 7080
Email: techsupport@viglen.co.uk

You can also look for support information on our web site:

http://www.viglen.co.uk

Device drivers and various useful utilities can be downloaded from our ftp site:

ftp://ftp.viglen.co.uk

Resetting the System

Before checking your system for hardware problems, it is always a good idea to try resetting your computer and see if a re-boot can solve the problem. Most software related problems can be solved simply by re-booting your PC.

Table 13: Resetting the System

To do the following	Press
Soft boot: Clear the system memory and reload the operating system (also called warm reset).	<Ctrl + Alt + Del>
Cold boot: Clear the system memory, halt power to all peripherals, restart POST, and reload the operating system.	Power off/on or reset button (at front of the system)

Troubleshooting Procedure

This section provides a step-by-step troubleshooting procedure to identify a problem and locate its source.

CAUTION!

1. *Turn off the system and any peripheral devices before you disconnect any peripheral cables from the system. Otherwise, you can permanently damage the system or the peripheral devices.*

2. *Make sure the system is plugged into a properly grounded power outlet.*

3. *Make sure your keyboard and video display are correctly connected to the system. Turn on the video display, and turn up its brightness and contrast controls to at least two-thirds of the maximum (refer to the documentation supplied with the video display).*

4. *If the operating system normally loads from the hard disk drive, make sure there is no diskette in the diskette drive. If the operating system normally loads from a diskette, insert the operating system diskette into the drive.*

5. *Turn on the system. If the power indicator does not light, but the system seems to be operating normally, the indicator is probably defective. Monitor the power-on self test (POST) execution. Each time you turn on the system, the POST checks the system board, memory, keyboard, and certain peripheral devices.*

Note: *If the POST does not detect any errors, the system beeps once and boots up.*

Errors that do not prevent the boot process (non-fatal errors) display a message that looks similar to the following:

> *Error Message Line 1*
> *Error Message Line 2*
> *Press <F2> for Set-up, <F1> to Boot*
> *You can note the error and press <F1> to resume the boot- up process, or <F2> to enter Set-up.*

Errors that prevent the boot process from continuing (fatal errors), are communicated by a series of audible beeps. If this type of error occurs, refer to the error codes and messages listed at the end of this chapter.

6. *Confirm that the operating system has loaded.*

Problems Operating Add-in Boards

Problems related to add-in boards are usually related to improper board installation or interrupt and address conflicts. Go through the checklist below to see if you can correct the problem. If the problem persists after you have checked and corrected all of these items, contact the board vendor's customer service representative.

Did you install the add-in board according to the manufacturer's instructions?
Check the documentation that came with the board. Are all cables installed properly?

The following items are suggestions for troubleshooting problems related to PCI/ISA legacy (non-Plug and Play) add-in boards.

- If the PCI/ISA board uses an interrupt, run Set-up and set the interrupt that is being used by the PCI/ISA board to Used by PCI/ISA Card. Please refer to the BIOS manual for details of how to do this.

- If the PCI/ISA legacy board uses memory space between 80000H - 9FFFFH, run Set-up and set conventional memory to 256 K.

- If the PCI/ISA legacy board uses shared memory between C8000H - DFFFH, run Set-up and enable shared memory for the appropriate memory space.

Problems and Suggestions

Table 14: Problems and Suggestions

What happens	What to do
Application software problems	Try resetting the system. Make sure all cables are installed correctly. Verify that the system board jumpers are set properly. Verify that your system hardware configuration is set correctly. In Setup, check the values against the system settings you recorded previously. If an error is evident (wrong type of drive specified, for example), make the change in Setup and reboot the system. Record your change. Make sure the software is properly configured for the system. Refer to the software documentation for information. Try a different copy of the software to see if the problem is with the copy you are using. If other software runs correctly on the system, contact the vendor of the software that fails. If you check all of the above with no success, try clearing CMOS RAM and reconfiguring the system. Make sure you have your list of system settings available to re-enter, because clearing CMOS RAM sets the options to their default values.
Characters on-screen are distorted or incorrect	Make sure the brightness and contrast controls are properly adjusted on the monitor. Make sure the video signal cable and power cables are properly installed. Make sure your monitor is compatible with the video mode you have selected.
Characters do not appear on screen	Make sure the video display is plugged in and turned on. Check that the brightness and contrast controls are properly adjusted. Check that the video signal cable is properly installed. Make sure a video board is installed, enabled, and the jumpers are positioned correctly. Reboot the system.
CMOS RAM settings are wrong	If system settings stored in CMOS RAM change for no apparent reason (for example, the time of day develops an error), the backup battery may no longer have enough power to maintain the settings. Replace the battery (Chapter 2).
Diskette drive light does not go on when drive is in use or is tested by POST	Make sure the power and signal cables for the drive are properly installed. Check that the drive is properly configured and enabled in Setup.

Table 14: Problems and Suggestions **(Continued)**

What happens	What to do
Hard drive light does not go on when drive is in use or is tested by POST	Make sure the power and signal cables for the drive are properly installed. Make sure the front panel connector is securely attached to the system board headers. Check that the drive is properly configured and enabled in Setup. Check the drive manufacturer's manual for proper configuration for remote hard disk drive activity.
Power-on light does not go on	If the system is operating normally, check the connector between the system board and the front panel. If OK, the light may be defective.
Prompt doesn't appear after system boots	It's probably switched off. A serious fault may have occurred consult your dealer service department / Technical Support.
Setup, can't enter	If you can't enter Setup to make changes, check the switch that disables entry into Setup (Chapter 2). If the switch is set to allow entry into Setup, you might need to clear CMOS RAM to the default values and reconfigure the system in Setup.
System halts before completing POST	This indicates a fatal system error that requires immediate service attention. Note the screen display and write down any beep code emitted. Provide this information to your dealer service department / Technical Support.

Error and Information Messages

The rest of this chapter describes beep codes, and error messages that you might see or hear when you start up the system:

BIOS Error Messages

Table 15: BIOS Error Messages

Error Message	Explanation
GA20 Error	An error occurred with Gate A20 when switching to protected mode during the memory test.
Pri Master HDD Error Pri Slave HDD Error Sec Master HDD Error Sec Slave HDD Error	Could not read sector from corresponding drive.
Pri Master Drive - ATAPI Incompatible Pri Slave Drive - ATAPI Incompatible Sec Master Drive - ATAPI Incompatible Sec Slave Drive - ATAPI Incompatible	Corresponding drive in not an ATAPI device. Run Setup to make sure device is selected correctly.
A: Drive Error	No response from diskette drive.
Cache Memory Bad	An error occurred when testing L2 cache. Cache memory may be bad.
CMOS Battery Low	The battery may be losing power. Replace the battery soon.
CMOS Display Type Wrong	The display type is different than what has been stored in CMOS. Check Setup to make sure type is correct.
CMOS Checksum Bad	The CMOS checksum is incorrect. CMOS memory may have been corrupted. Run Setup to reset values.
CMOS Settings Wrong	CMOS values are not the same as the last boot. These values have either been corrupted or the battery has failed.
CMOS Date/Time Not Set	The time and/or date values stored in CMOS are invalid. Run Setup to set correct values.
DMA Error	Error during read/write test of DMA controller.
FDC Failure	Error occurred trying to access diskette drive controller.
HDC Failure	Error occurred trying to access hard disk controller.
Checking NVRAM.....	NVRAM is being checked to see if it is valid.
Update OK!	NVRAM was invalid and has been updated.
Updated Failed	NVRAM was invalid but was unable to be updated.
Keyboard Error	Error in the keyboard connection. Make sure keyboard is connected properly.
KB/Interface Error	Keyboard interface test failed.
Memory Size Decreased	Memory size has decreased since the last boot. If no memory was removed then memory may be bad.
Memory Size Increased	Memory size has increased since the last boot. If no memory was added there may be a problem with the system.

Table 15: BIOS Error Messages **(Continued)**

Error Message	Explanation
Memory Size Changed	Memory size has changed since the last boot. If no memory was added or removed then memory may be bad.
No Boot Device Available	System did not find a device to boot.
Off Board Parity Error	A parity error occurred on an off-board card. This error is followed by an address.
On Board Parity Error	A parity error occurred in onboard memory. This error is followed by an address.
Parity Error	A parity error occurred in onboard memory at an unknown address.
NVRAM/CMOS/PASSWORD cleared by Jumper	NVRAM, CMOS, and passwords have been cleared. The system should be powered down and the jumper removed.
<CTRL_N> Pressed	CMOS is ignored and NVRAM is cleared. User must enter Setup.

BIOS Beep Codes

If an unrecoverable hardware problem occurs the computer may emit a number of beeps from the speaker. These are known as beep codes. The pitch and duration of the beep codes may vary but there will always be a set number of beeps. These beeps stem from the BIOS's initial check on the system and will normally occur in the first few seconds of power on.

Beeps codes represent a terminal error. If the BIOS detects a terminal error condition, it outputs an error beep code, halts the POST, and attempts to display a port 80h code on a POST card's LED display.

Table 16: Beep Codes

Beeps	Description
1	Refresh failure
2	Parity cannot be reset
3	First 64 KB memory failure
4	Timer not operational
5	Not used
6	8042 GateA20 cannot be toggled
7	Exception interrupt error
8	Display memory R/W error
9	Note used
10	CMOS Shutdown registry test error
11	Invalid BIOS (e.g. POST module not found, etc.)

Chapter 4: System BIOS

What is the BIOS?

The BIOS (Basic Input Output System) is an important piece of software which is stored in a ROM (Read Only Memory) chip inside the computer. It consists of the basic instructions for controlling the disk drives, hard disk, keyboard and serial/parallel ports. The BIOS also keeps a list of the specifications of the computer in battery-backed RAM (also known as the CMOS RAM) and provides a special Setup program to change this information.

The BIOS in your Viglen computer is guaranteed to be fully compatible with the IBM BIOS. It has been written by American MegaTrends Inc. (AMI), an industrial leader in the field of BIOS software.

The Power-on sequence

When the computer is first switched on, certain instructions in the BIOS are executed to test various parts of the machine. This is known as the POST (Power-On Self Test) routine. When you switch the computer on (or when you press the Reset button or press <Ctrl> + <Alt>+ <Delete> keys, which has the same effect), you can see on the monitor that it counts through the memory, testing it. The floppy disk drives are then accessed and tested, and the various interfaces are checked. If there are any errors, a message is displayed on the screen.

Having passed all the tests, and if you have activated the password facility, the BIOS then asks you to enter the boot password to continue. The following section describes how to do this. The BIOS then loads the operating system, either - MS DOS, Windows 98SE, OS/2 or NetWare, etc. - from the hard disk (or floppy disk if one is inserted in Drive A:). The computer is then ready for use.

INTEL/AMI BIOS

Introduction

The motherboard uses an Intel/AMI BIOS, which is stored in flash memory and can be upgraded using a disk-based program. In addition to the BIOS, the flash memory contains the Setup program, Power-On Self Test (POST), Advanced Power Management (APM), the PCI auto-configuration utility, and is Windows 95-ready Plug and Play. This motherboard supports system BIOS shadowing, allowing the BIOS to execute from 64-bit onboard write-protected DRAM.

The BIOS displays a message during POST identifying the type of BIOS and the revision code.

BIOS Upgrades

A new version of the BIOS can be upgraded from a diskette using the iFLASH.EXE utility that is available from Intel. This utility does BIOS upgrades as follows:

- Updates the flash BIOS from a file on a disk.
- Updates the language section of the BIOS.
- Makes sure that the upgrade BIOS matches the target system to prevent accidentally installing a BIOS for a different type of system.

BIOS upgrades and the iFLASH.EXE utility may be available online at www.viglen.co.uk or by request.

Note: *Please review the instructions distributed with the upgrade utility before attempting a BIOS upgrade.*

BIOS Flash Memory Organisation

The Intel Firmware Hub (FWH) includes a 4 Mbit (512 KB) symmetrical flash memory device. Internally, the device is grouped into eight 64-KB blocks that are individually erasable, lockable, and unlockable.

The Intel 28F002 2-Mbit flash component is organised as 256 KB x 8 bits and is divided into areas as described in Table 17. The table shows the addresses in the ROM image in normal mode (the addresses change in BIOS Recovery Mode).

Table 17: Typical Flash Memory Organisation

Address (Hex)	Size	Description
FFFFC000 – FFFFFFFF	16 KB	Boot Block
FFFFA000 – FFFFBFFF	8 KB	Vital Product Data (VPD) Extended System Configuration Data (ESCD) (DMI configuration data / Plug and Play data)
FFFF9000 - FFFF9FFF	4 KB	Used by BIOS (e.g., for Event Logging)
FFFF8000 - FFFF8FFF	4 KB	OEM logo or Scan Flash Area
FFFC0000 - FFFF7FFF	228 KB	Main BIOS Block

Plug and Play: PCI Auto-configuration

The BIOS automatically configures PCI devices and Plug and Play devices. PCI devices may be onboard or add-in cards. Plug and Play devices are ISA add-in cards built to meet the Plug and Play specification. Auto-configuration lets a user insert or remove PCI or Plug and Play cards without having to configure the system. When a user turns on the system after adding a PCI or Plug and Play card, the BIOS automatically configures interrupts, the I/O space, and other system resources. Any interrupts set to Available in Setup are considered to be available for use by the add-in card.

PCI interrupts are distributed to available ISA interrupts that have not been assigned to an ISA card or to system resources. The assignment of PCI interrupts to ISA IRQs is non-deterministic. PCI devices can share an interrupt, but an ISA device cannot share an interrupt allocated to PCI or to another ISA device. Auto-configuration information is stored in the extended system configuration data (ESCD) format.

PCI IDE Support

If Auto is selected as a primary or secondary IDE in Setup, the BIOS automatically sets up the two local-bus IDE connectors with independent I/O channel support. The IDE interface supports hard drives up to PIO Mode 4 and recognises any ATAPI devices, including CD-ROM drives, tape drives and Ultra DMA drives. Add-in ISA IDE controllers are not supported. The BIOS determines the capabilities of each drive and configures them so as to optimise capacity and performance. To take advantage of the high-capacity storage devices, hard drives are automatically configured for logical block addressing (LBA) and to PIO Mode 3 or 4, depending on the capability of the drive. To override the auto-configuration options, use the

specific IDE device options in Setup. The ATAPI specification recommends that ATAPI devices be configured as shown in Table 18.

Table 18: Recommendations for Configuring an ATAPI Device

	Primary Cable		**Secondary Cable**	
Configuration	Drive 0	Drive 1	Drive 0	Drive 1
Normal, no ATAPI	ATA			
Disk and CD-ROM for enhanced IDE systems	ATA		ATAPI	
Legacy IDE system with only one cable	ATA	ATAPI		
Enhanced IDE with CD-ROM and a tape or two CD-ROMs	ATA		ATAPI	ATAPI

Plug and Play

If Plug and Play operating system is selected in Setup, the BIOS auto-configures only ISA Plug and Play cards that are required for booting (IPL devices). If Plug and Play operating system is not selected in Setup, the BIOS auto-configures all Plug and Play ISA cards.

Desktop Management Interface (DMI)

Desktop Management Interface (DMI) is an interface for managing computers in an enterprise environment. The main component of DMI is the management information format (MIF) database, which contains information about the computing system and its components. Using DMI, a system administrator can obtain the system types, capabilities, operational status, and installation dates for system components. The MIF database defines the data and provides the method for accessing this information. The BIOS enables applications such as Intel LANDesk® Client Manager to use DMI. The BIOS stores and reports the following DMI information:

- BIOS data, such as the BIOS revision level.
- Fixed-system data, such as peripherals, serial numbers, and asset tags.
- Resource data, such as memory size, cache size, and processor speed.
- Dynamic data, such as event detection and error logging.

DMI does not work directly under non-Plug and Play operating systems (e.g., Windows NT). However, the BIOS supports a DMI table interface for such operating systems. Using this support, a DMI service-level application running on a non-Plug and Play OS can access the DMI BIOS information.

Advanced Power Management (APM)

The BIOS supports APM and standby mode. The energy saving standby mode can be initiated in the following ways:

- Time-out period specified in Setup.

- Suspend/resume switch connected to the front panel sleep connector.
- From the operating system, such as the Suspend menu item in Windows 95.

In standby mode, the motherboard reduces power consumption by using SMM capabilities, spinning down hard drives, and reducing power to or turning off VESA DPMS-compliant monitors. Power-management mode can be enabled or disabled in Setup.

While in standby mode, the system retains the ability to respond to external interrupts and service requests, such as incoming faxes or network messages. Any keyboard or mouse activity brings the system out of standby mode and immediately restores power to the monitor.

The BIOS enables APM by default, but the operating system must support an APM driver for the power-management features to work. For example, Windows 95 supports the power-management features upon detecting that APM is enabled in the BIOS.

Advanced Configuration and Power Interface (ACPI)

ACPI gives the operating system direct control over the power management and Plug and Play functions of a computer. ACPI requires an ACPI-aware operating system. ACPI features include:

- Plug and Play (including bus and device enumeration) and APM functionality normally contained in the BIOS.
- Power management control of individual devices, add-in boards, video displays, and hard disk drives.
- Methods for achieving less than 30-watt system operation in the Power On Suspended sleeping state, and less than 5-watt system operation in the Suspended to Disk sleeping state.
- A soft-off feature that enables the operating system to power off the computer.
- Support for multiple wake up events.
- Support for a front panel power and sleep mode switch. Table 19 describes the system states based on how long the power switch is pressed, depending on how ACPI is configured with an ACPI-aware operating system.

Table 19: Effects of Pressing the Power Switch

If the system is in this state…	… and the power switch is pressed for	…the system enters this state
Off	Less than 4 seconds	Power On
On	Less than 4 seconds	Soft Off/ Suspended
On	More than 4 seconds	Fail safe power off
Sleep	Less than 4 seconds	Wake up

Under ACPI, the operating system directs all system and device power state transitions. The operating system puts devices in and out of low-power state based on user preferences and knowledge of how devices are being used by applications. Devices that are not being used can be turned off. See Power Management section in Chapter 1, Page 28 for more information on ACPI.

Language Support

The Setup program and help messages can be supported in 32 languages. The default language is American English, which is present unless another language is programmed into the BIOS using the flash memory update utility.

Boot Options

In the Setup program, the user can choose to boot from a floppy drive, hard drive, CD-ROM, or the network. The default setting is for the floppy drive to be the primary boot device and the hard drive to be the secondary boot device. By default the third and fourth devices are disabled.

Booting from CD-ROM is supported in compliance to the El Torito bootable CD-ROM format specification. Under the Boot menu in the Setup program, CD-ROM is listed

as a boot device. Boot devices are defined in priority order. If the CD-ROM is selected as the boot device, it must be the first device.

The network can be selected as a boot device. This selection allows booting from a network add-in card with a remote boot ROM installed.

OEM Logo or Scan Area

A 4 KB flash-memory user area at memory location FFFF8000h-FFFF8FFFh is for displaying a custom OEM logo during POST.

USB Support

The USB connectors allow any of several USB devices to be attached to the computer. Typically, the device driver for USB devices is managed by the operating system. However, because keyboard and mouse support may be needed in the Setup program before the operating system boots, the BIOS supports USB keyboards and mice.

BIOS Setup Access

Access to the Setup program can be restricted using passwords. User and supervisor passwords can be set using the Security menu in Setup. The default is no passwords enabled.

Recovering BIOS Data

Some types of failure can destroy the BIOS. For example, the data can be lost if a power outage occurs while the BIOS is being updated in flash memory. The BIOS can be recovered from a diskette with recovery files using the BIOS recovery mode.

Configuring the Motherboard using BIOS Setup

Before You Begin

CAUTION!

- *Always follow the steps in each procedure in the correct order.*
- *Set up a log to record information about your computer, such as model, serial numbers, installed options, and configuration information.*
- *Use an anti-static wrist strap and a conductive foam pad when working on the motherboard.*

WARNINGS

The procedures in this chapter assume familiarity with the general terminology associated with personal computers and with the safety practices and regulatory compliance required for using and modifying electronic equipment.

Disconnect the computer from its power source and from any telecommunications links, networks, or modems before performing any of the procedures described in this chapter. Failure to disconnect power, telecommunications links, networks, or modems before you open the computer or perform any procedures can result in personal injury or equipment damage. Some circuitry on the motherboard may continue to operate even though the front panel power button is off.

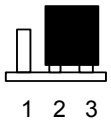
CAUTION!

Electrostatic discharge (ESD) can damage components. Perform the procedures described in this chapter only at an ESD workstation. If such a station is not available, you can provide some ESD protection by wearing an anti-static wrist strap and attaching it to a metal part of the computer chassis.

Setting the Processor Speed

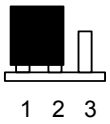
Set the processor speed after you have installed or upgraded the processor. This procedure assumes that the motherboard is installed in the computer and the configuration header (J9J4) has the jumper set on pins 1-2 for normal mode.

1. Observe the precautions in “Before You Begin”.
2. Turn off all peripheral devices connected to the computer. Turn off the computer.
3. Remove the computer cover.
4. Locate the configuration header (Figure 12, J9J4 on the motherboard).
5. On the header, move the jumper to pins 2-3 as shown below to set configure mode.



Configuration Jumper
J9J4

6. Replace the cover, turn on the computer, and allow it to boot.
7. The computer starts the Setup program. Setup displays the Maintenance menu.
8. Use the arrow keys to select the Processor Speed feature and press <Enter>. Setup displays a popup screen with the available processor speeds.
9. Use the arrow keys to select the processor speed. Press <Enter> to confirm the speed. This Maintenance menu reappears again.
10. Press <F10> to save the current values and exit Setup.
11. Turn off the computer.
12. Remove the computer cover.
13. On the header (J9J4), move the jumper back to pins 1-2 to restore normal operation as shown below.



Configuration Jumper

J9J4

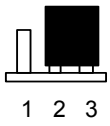
14. Replace the cover and turn on the computer.
15. Verify the processor speed in the start-up information the BIOS displays.

Clearing the Passwords

Note: *Passwords can be cleared individually from the normal setup mode if the password to be changed is known, if no passwords have been set they can be set as described later in this section.*

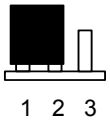
This procedure assumes that the motherboard is installed in the computer and the configuration header (J9J4) has the jumper set on pins 1-2 for normal mode.

1. Observe the precautions in "Before You Begin".
2. Turn off all peripheral devices connected to the computer. Turn off the computer.
3. Remove the computer cover.
4. Locate the configuration header J9J4 on the motherboard).
5. On the header (J9J4), move the jumper to pins 2-3 as shown below to set configure mode.



Configuration Jumper
J9J4

6. Replace the cover, turn on the computer, and allow it to boot.
7. The computer starts the Setup program. Setup displays the Maintenance menu.
8. Use the arrow keys to select Clear Passwords. Press <Enter> and Setup displays a pop-up screen requesting that you confirm clearing the password. Select Yes and press <Enter>. Setup displays the Maintenance menu again.
9. Press <F10> to save the current values and exit Setup.
10. Turn off the computer.
11. Remove the computer cover.
12. On the header (J9J4), move the jumper back to pins 1-2 to restore normal operation as shown below.



Configuration Jumper
J9J4

13. Replace the cover and turn on the computer.

The Setup program is for viewing and changing the BIOS settings for a computer. Setup is accessed by pressing the <DEL> key after the Power-On Self Test (POST) memory test begins and before the operating system boot begins.

BIOS Setup Program

The Setup program is for viewing and changing the BIOS settings for a computer. Setup is accessed by pressing the <F2> key after the Power-On Self Test (POST) memory test begins and before the operating system boot begins.

Table 20 shows the menus available from the menu bar at the top of the Setup screen.

Table 20: Setup Menu Bar

Setup Menu Screen	Description
Maintenance	Specifies the processor speed and clears the Setup passwords. This is only available in configure mode.
Main	Allocates resources for hardware components.
Advanced	Specifies advanced features available through the chipset.
Security	Specifies passwords and security features.
Power	Specifies power management features.
Boot	Specifies boot options and power supply controls.
Exit	Saves or discards changes to the Setup program options.

Table 21 shows the function keys available for menu screens.

Table 21: Setup Function Keys

Setup Key	Description
<←> or <→>	Selects a different menu screen (Moves the cursor left or right)
<↑> or <↓>	Selects an item (Moves the cursor up or down)
<Tab>	Selects a field (Not implemented)
<Enter>	Executes command or selects the submenu
<F9>	Load the default configuration values for the current menu
<F10>	Save the current values and exits the BIOS Setup program
<Esc>	Exits the menu

Maintenance Menu

The menu below is for setting the processor frequency and clearing the Setup passwords. Setup only displays this menu in **configuration mode**. When <Enter> has been pressed for the processor frequency the menu will appear as below.

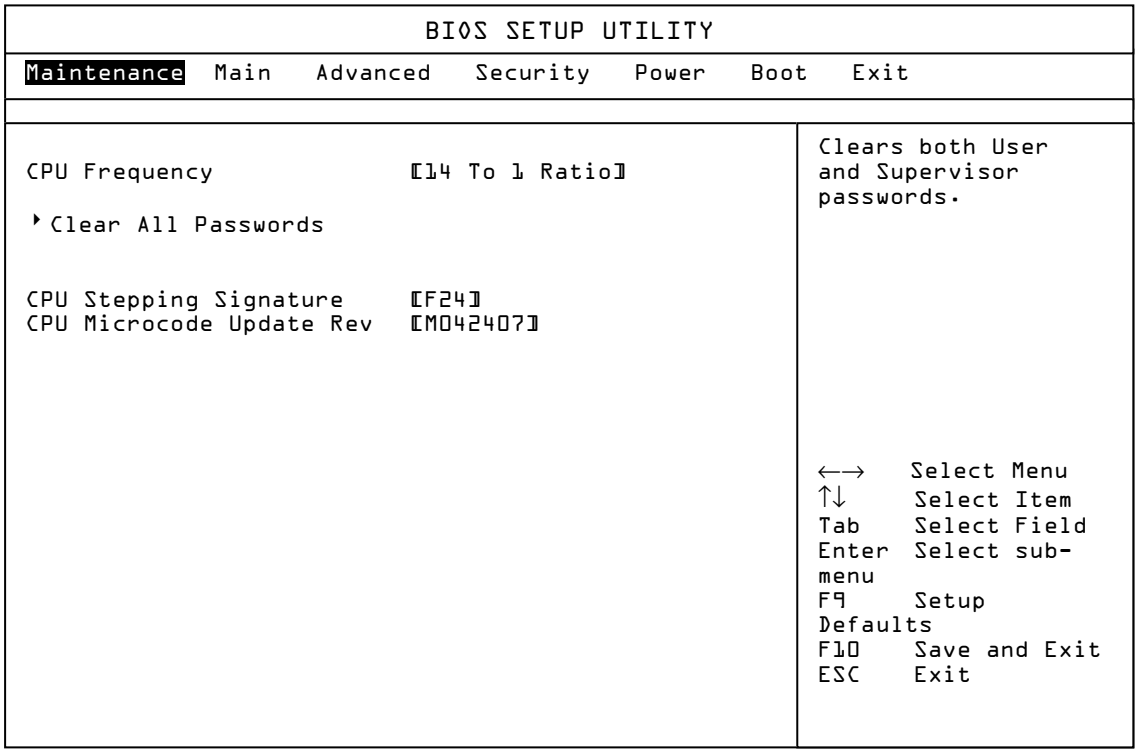


Figure 18: Maintenance Menu

Table 22: Maintenance Menu

Feature	Options	Description
Clear All Passwords	• **Ok (default)** • Cancel	Clears the user and supervisor passwords.
CPU Stepping Signature	No options	Displays CPU's Stepping Signature
CPU Microcode Update	No options	Displays CPU's Microcode Update Revision

Main Menu

When in normal mode "Jumper (J9J4) set across pins 1 and 2" the main menu will appear as below after selecting <F2> during power on boot up when the text press <F2> is displayed.

This menu reports processor and memory information and is for configuring the system date, system time.

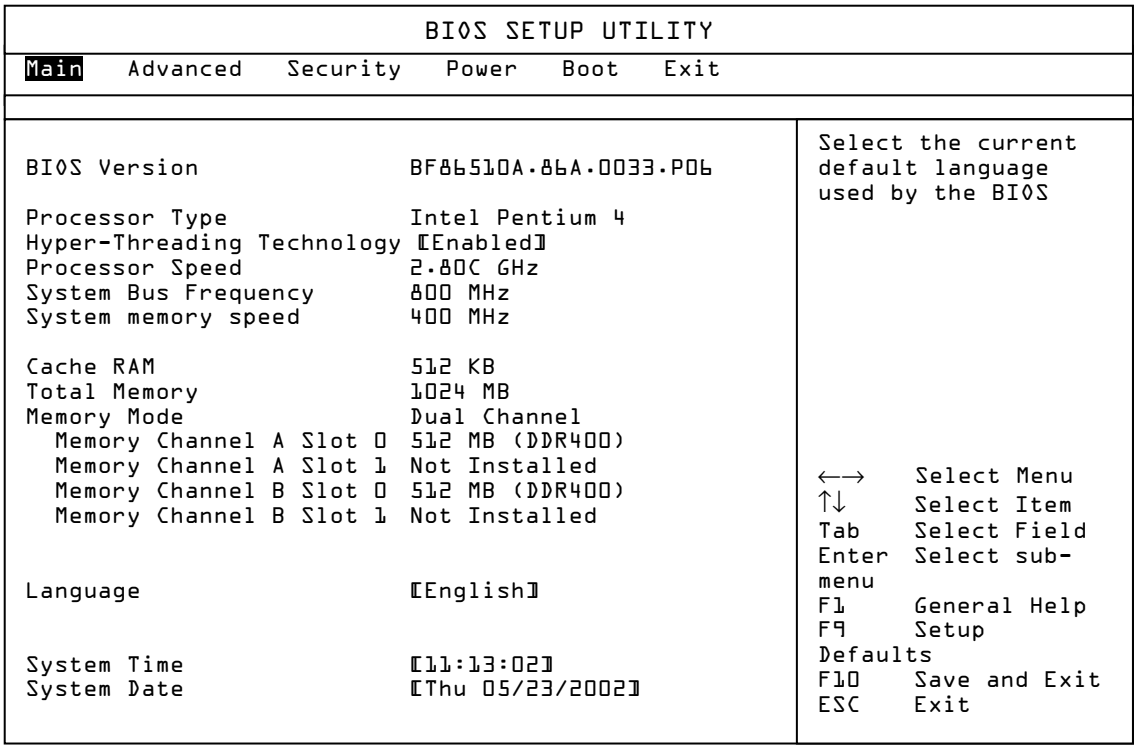


Figure 19: Main Menu

A detailed description of each of the features is given in the following table.

Table 23: Main Menu

Feature	Options	Description
BIOS Version	No options	Displays the version of the BIOS
Processor Type	No options	Displays processor type
Hyper-Threading Technology	• Disabled • **Enabled (default)**	Disables/enables Hyper-Threading Technology. This option is present only when a processor that supports Hyper-Threading Technology is installed
Processor Speed	No options	Displays processor speed
System bus speed	No options	Displays the CPU Front Side Bus speed
System memory speed	No options	Displays the system memory speed
Cache RAM	No options	Displays size of second-level cache.
Total memory	No options	Displays the total amount of RAM on the motherboard.
Memory mode	No options	Displays the memory mode (Dual Channel or Single Channel)
System Time	Hour, minute, and second	Specifies the current time.
System Date	Month, day, and year	Specifies the current date.

Advanced Menu

This menu is for setting advanced features that are available through the chipset.

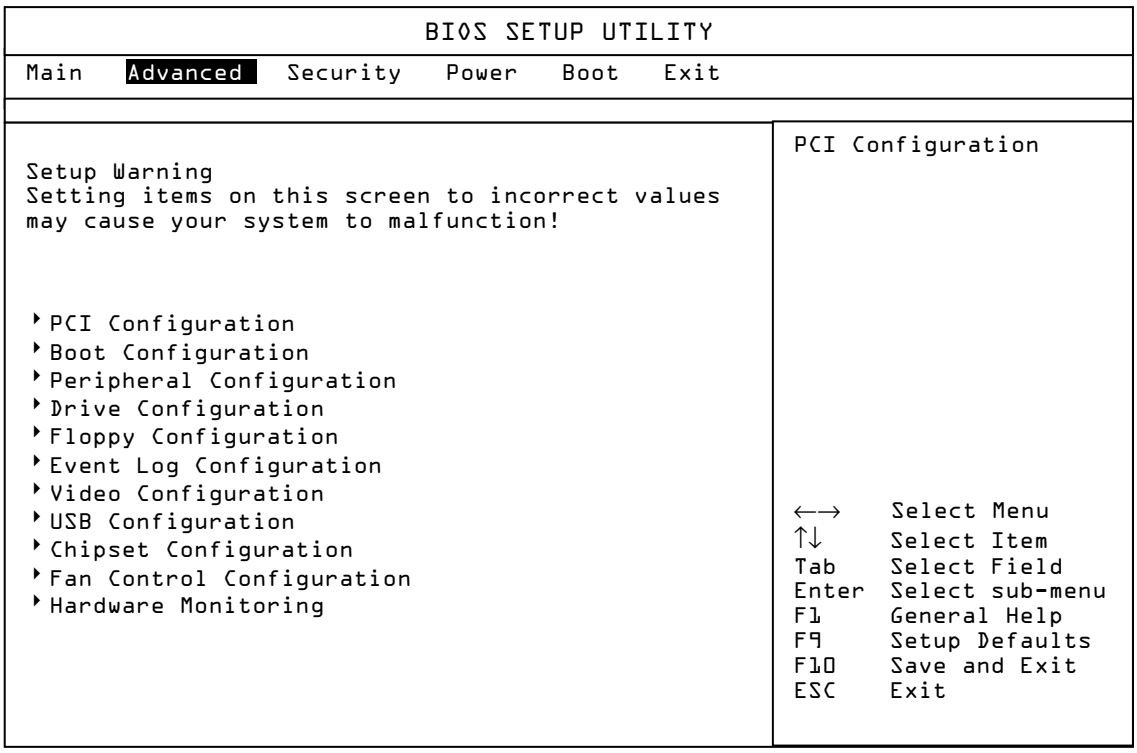


Figure 20: Advanced Menu

A detailed description of each of the features of the advanced menu is given in the following table.

Table 24: Advanced Menu

Feature	Options	Description
PCI Configuration	Select to Submenu	Configures individual PCI slot's IRQ priority
Boot Configuration	Select to Submenu	Configures Plug and Play and the Numlock key, and resets configuration data
Peripheral Configuration	Select to Submenu	Configures peripheral ports and devices
Drive Configuration	Select to Submenu	Specifies type on connected IDE devices
Floppy Configuration	Select to Submenu	Configures the diskette drive
Event Log Configuration	Select to Submenu	Configures Event Logging
Video Configuration	Select to Submenu	Configures video features
USB Configuration	Select to Submenu	Configure USB support
Chipset Configuration	Select to Submenu	Configures advanced chipset features
Fan Control Configuration	Select to Submenu	Configures fan operation
Hardware Monitoring	Select to Submenu	Monitors system temperatures, voltages and fan speeds

PCI Configuration Submenu

This submenu is for configuring the PCI peripherals.

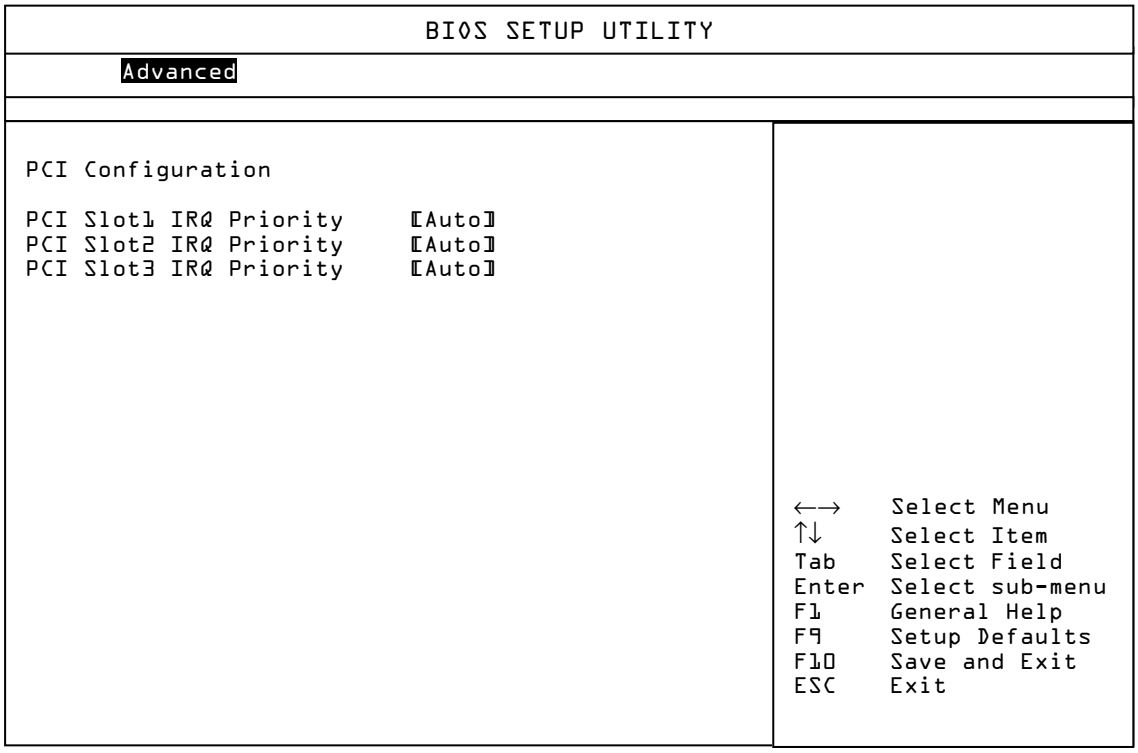


Figure 21: PCI Configuration Submenu

Table 25: PCI Configuration Submenu

Feature	Options	Description
PCI Slot1 IRQ Priority	• **Auto (default)** • 3 • 5 • 9 • 10 • 11	Allows selection of IRQ priority for PCI bus connector 1
PCI Slot2 IRQ Priority	• **Auto (default)** • 3 • 5 • 9 • 10 • 11	Allows selection of IRQ priority for PCI bus connector 2
PCI Slot3 IRQ Priority	• **Auto (default)** • 3 • 5 • 9 • 10 • 11	Allows selection of IRQ priority for PCI bus connector 3

Boot Configuration Submenu

This submenu is for configuring the computer boot options.

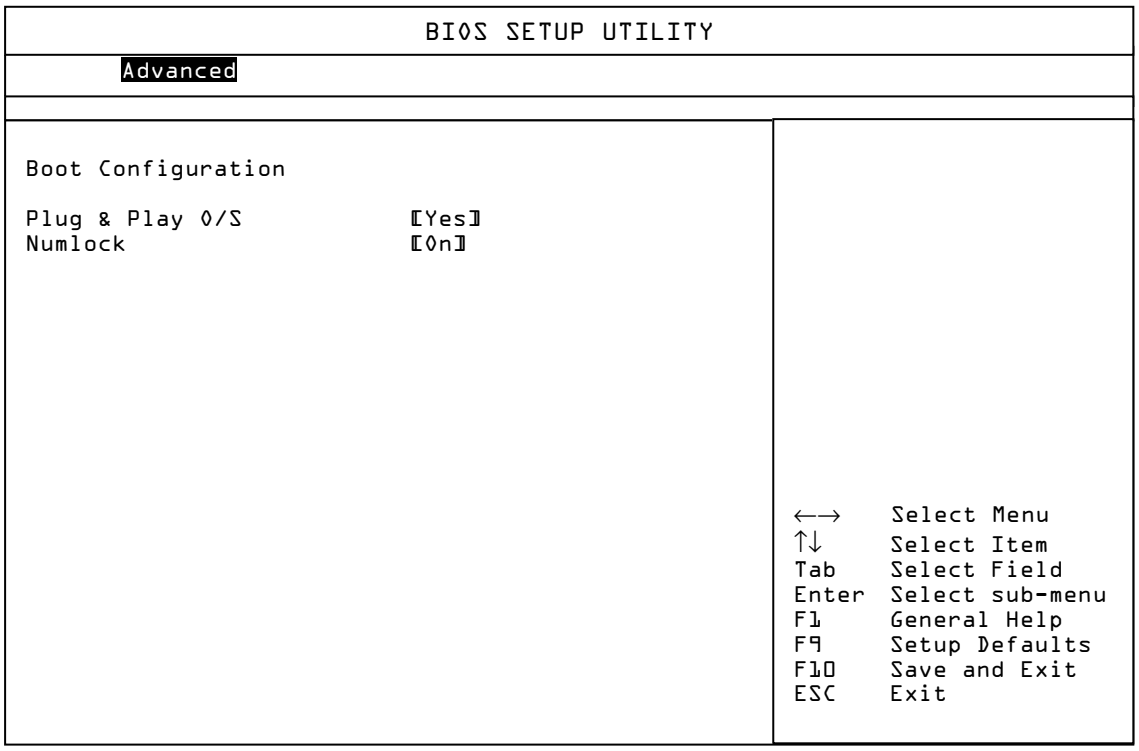


Figure 22: Boot configuration Submenu

Table 26: Boot Configuration Submenu

Feature	Options	Description
Plug & Play O/S	• **No (default)** • Yes	Specifies if manual configuration is desired. *No* lets the BIOS configure all devices. This setting is appropriate when using a Plug and Play operating system. *Yes* lets the operating system configure Plug and Play devices not required to boot the system. This option is available for use during lab testing.
Numlock	• Off • **On (default)**	Specifies the power-on state of the numlock feature on the numeric keypad of the keyboard.

Peripheral Configuration Submenu

This submenu is for configuring the computer peripherals.

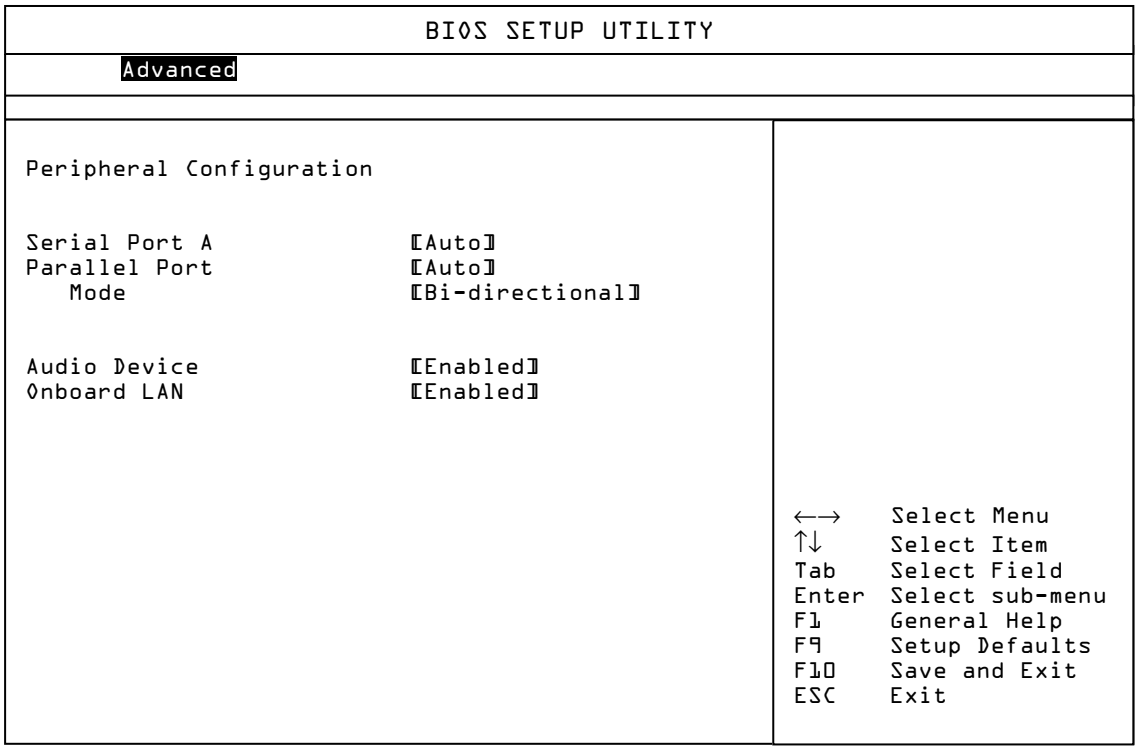


Figure 23: Peripheral Configuration Submenu

Table 27: Peripheral Configuration Submenu

Feature	Options	Description
Serial port A	• Disabled • Enabled • **Auto (default)**	Configures serial port A. Auto Assigns the first free COM port, normally COM1, the address 3F8h, and the interrupt IRQ4 An * (asterisk) displayed next to an address indicates a conflict with another device.
Base I/O address (This feature is present only when Serial Port A is set to *Enabled*)	• **3F8 (default)** • 2F8 • 3E8 • 2E8	Specifies the base I/O address for serial port A, if serial port A is set to *Enabled*
Interrupt (This feature is present only when Serial Port A is set to *Enabled*)	• IRQ3 • **IRQ4 (default)**	Specifies the interrupt for serial port A, if serial port A is set to *Enabled.*

Parallel port	• Disabled • Enabled • **Auto (default)**	Configures the parallel port. *Auto* assigns LPT1 the address 378h and the interrupt IRQ7. An * (asterisk) displayed next to an address indicates a conflict with another device.
Mode	• Output Only • Bi-directional (default) • EPP • ECP	Selects the mode for the parallel port. Not available if the parallel port is disabled. Output Only operates in AT*-compatible mode Bi-directional operates in PS/2 compatible mode EPP is extended Parallel Port mode, a high speed bi-directional mode ECP is Enhanced Capabilities Port mode, a high-speed bi-directional mode
Base I/O address (This feature is present only when Parallel Port is set to *Enabled*)	• **378 (default)** • 278	Specifies the base I/O address for the parallel port
Interrupt (This feature is present only when Parallel Port is set to *Enabled*)	• IRQ5 • **IRQ7 (default)**	Specifies the interrupt for the parallel port
DMA (This feature is present only when Parallel Port Mode is set to ECP)	• 1 • **3 (default)**	Specifies the DMA channel
Audio	• **Enabled (default)** • Disabled	Enables or disables the onboard audio subsystem
Onboard LAN	• **Enabled (default)** • Disabled	Enables or disables the onboard LAN device

Drive Configuration Submenu

This submenu is for configuring the IDE and Serial-ATA devices.

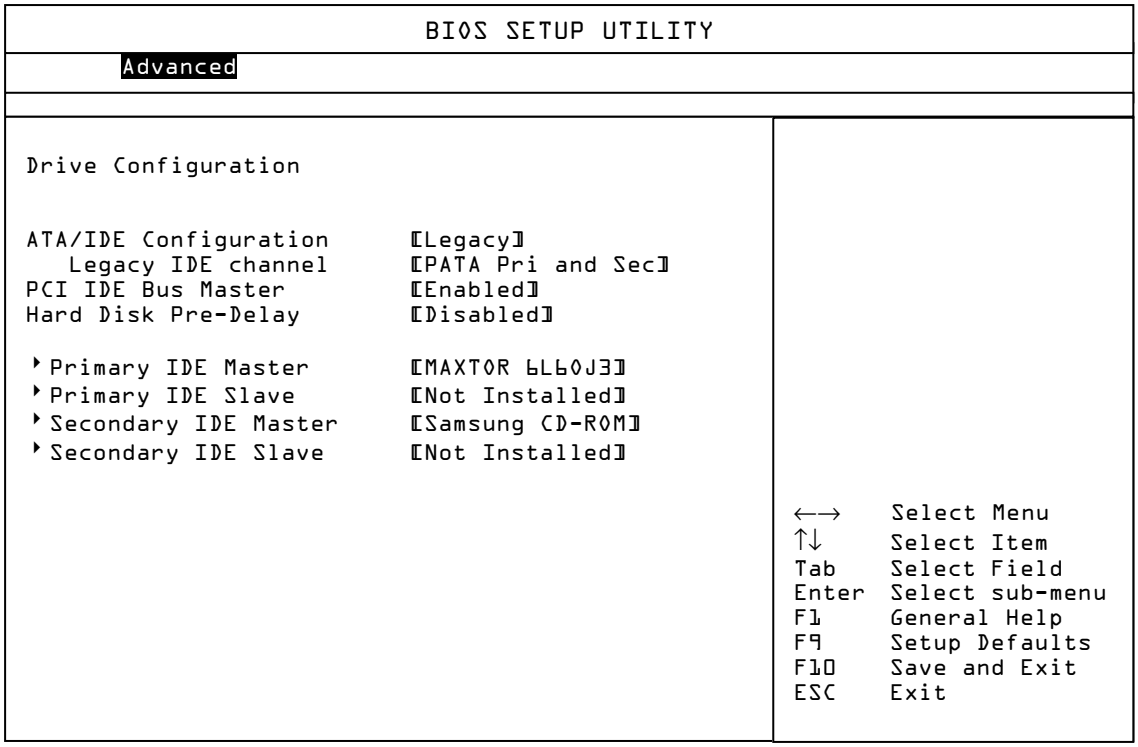


Figure 24: Drive Configuration Submenu

Table 28: Drive Configuration Submenu

ATA/IDE Configuration	• Disabled • Legacy • **Enhanced (default)**	Disabled = All IDE resources disabled Legacy = Up to two IDE channels enabled for operating systems that require legacy IDE operation Enhanced = All Serial ATA (SATA) and Parallel ATA (PATA) resources enabled
Legacy IDE channels	• PATA Pri Only • PATA Sec Only • PATA Pri and Sec • SATA P0/P1 Only • SATA P0/P1, PATA Sec • SATA P0/P1, PATA Pri	Configures PATA and SATA resources for operating systems that require legacy IDE operation. PATA = Parallel ATA SATA = Serial ATA Pri = Primary Sec = Secondary P0 = Serial ATA Connector 0 P1 = Serial ATA connector 1 This feature is present only when the ATA/IDE configuration option is set to legacy
PCI IDE Bus Master	• Disabled • **Enabled (default)**	Enables/disables the use of DMA for hard drive BIOS INT13 reads and writes

Hard Disk Pre-Delay	• Disabled (default) • 1 Second • 2 Second • 3 Second • 4 Second • 5 Second • 6 Second • 9 Second • 12 Second • 15 Second • 21 Second • 30 Second	Specifies the hard disk drive pre-delay
SATA Port-0	Select to display sub menu	Reports type of device attached to Serial ATA connector 0
SATA Port-1	Select to display sub menu	Reports type of device attached to Serial ATA connector 1
PATA Primary Master	Select to display sub menu	Reports type of connected device on Parallel ATA (PATA) IDE primary mater interface
PATA Primary Slave	Select to display sub menu	Reports type of connected device on Parallel ATA (PATA) IDE primary slave interface
PATA Secondary Master	Select to display sub menu	Reports type of connected device on Parallel ATA (PATA) IDE secondary mater interface
PATA Secondary Slave	Select to display sub menu	Reports type of connected device on Parallel ATA (PATA) IDE secondary slave interface

SATA/PATA Submenu

There are six SATA/PATA submenus: SATA Port-0, SATA Port-1, PATA primary master, PATA primary slave, PATA secondary master, and PATA secondary slave. Table 29 below shows the format of the SATA/PATA IDE submenus. For brevity, only one example is shown.

Table 29: SATA/PATA Submenu

Feature	Options	Description
Drive Installed	No option	Displays the type of drive installed
Type	• **Auto (default)** • User	Specifies the IDE configuration mode for IDE devices *User* allows capabilities to be changed *Auto* fills-in capabilities from ATA/ATAPI devices
Max. Capacity	No Option	Displays the drive capacity
LBA/Large mode	• Disabled • **Auto (default)**	Displays whether automatic translation mode is enabled from the hard disk (This item is read only unless Type is set to *User*)
Block Mode	• Disabled • **Auto (default)**	Displays whether automatic multiple sector data transfers are enabled (This item is read-only unless Type is set to *User*)

PIO Mode	• **Auto (default)** • 0 • 1 • 2 • 3 • 4	Sets the PIO mode (This item is read-only unless Type is set to *User*)
DMA Mode	• **Auto (default)** • SWDMA0 • SWDMA1 • SWDMA2 • MWDMA0 • MWDMA1 • MWDMA2 • UDMA0 • UDMA1 • UDMA2	Specifies the DMA mode for the drive *Auto* = Auto-detected *SWDMAn* = Single Word DMA*n* *SWDMAn* = Multi Word DMA*n* *UDMAn* = Ultra DMA*n* (This item is read-only unless Type is set to *User*)
S.M.A.R.T.	• **Auto (default)** • Disabled • Enabled	Enables/disables S.M.A.R.T. (Self Monitoring Analysis and Reporting Technologies) (This Item is read-only unless Type is set to *User*)
Cable Detected	No Option	Displays the type of cable connected to the Parallel ARA IDE interface: 40-conductor or 80-conductor (for ATA-100 peripherals)

Note: *If an LS-120 drive is attached to the system, a row entitled ARMD Emulation Type will be displayed in the above table. The BIOS will always recognise the drive as an ATAPI floppy drive. The ARMD Emulation Type should always be set to Floppy.*

Diskette Configuration Submenu

This submenu is for configuring the diskette drives.

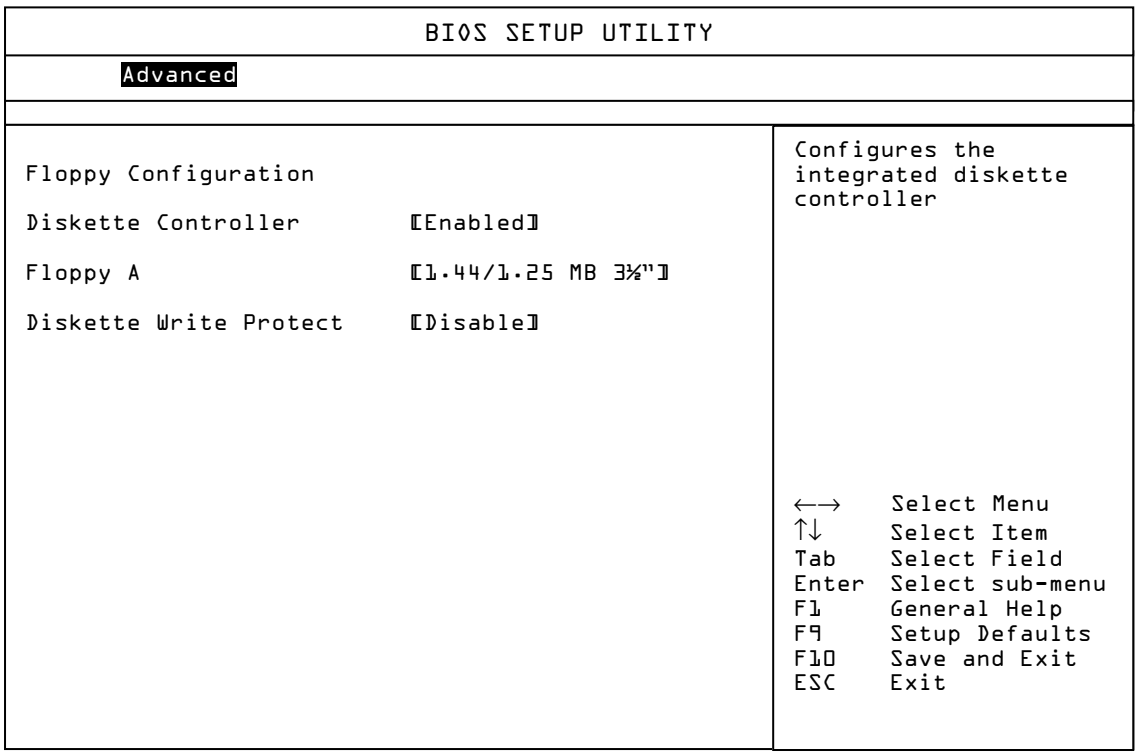


Figure 25: Diskette Configuration Submenu

Table 30: Diskette Configuration Submenu

Feature	Options	Description
Diskette Configuration	• Disabled • **Enabled (default)**	Disables or enables the integrated diskette controller
Floppy A:	• Disabled • 360 KB, 5¼″ • 1.2 MB, 5¼″ • 720 KB, 3½″ • **1.44/1.25 MB, 3½″ (default)** • 2.88 MB, 3½″	Specifies the capacity and physical size of diskette drive A.
Floppy Write Protect	• **Disabled (default)** • Enabled	Disables or enables write protect for the diskette drive(s).

Event Log Configuration Submenu

This submenu is for setting DMI event logging features.

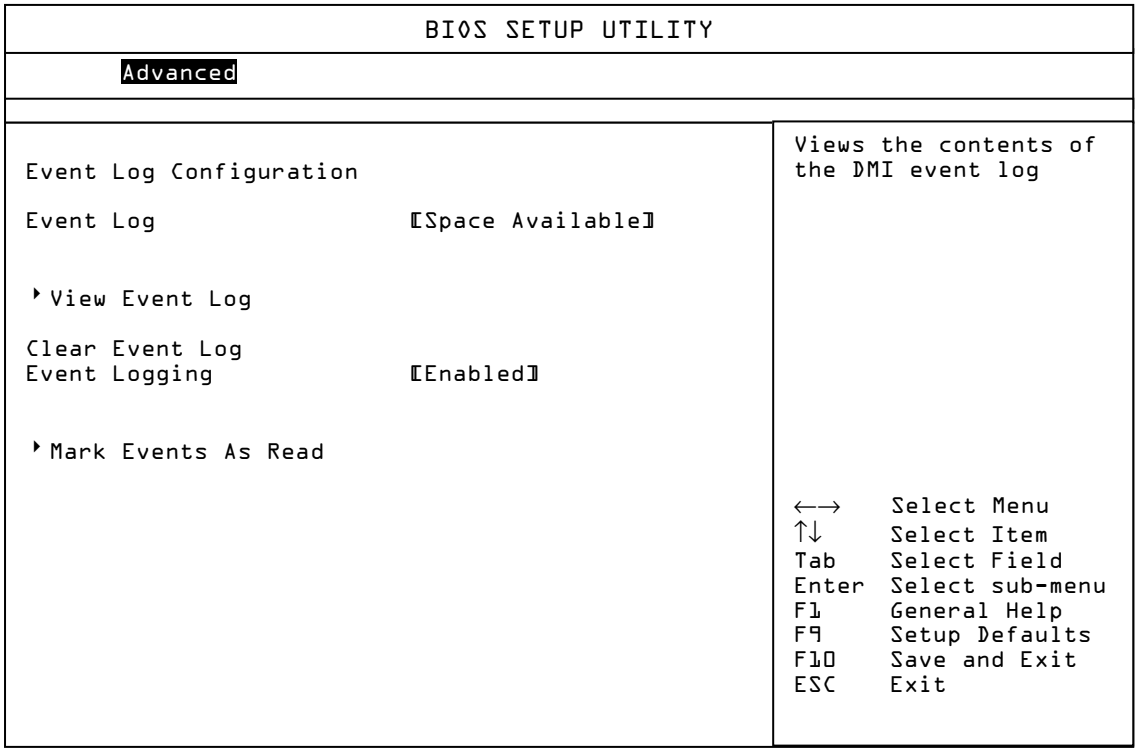


Figure 26: Event Log Configuration Submenu

Table 31: Event Log Configuration Submenu

Feature	Options	Description
Event log	No options	Indicates if there is space available in the event log.
View event log	[Enter]	Displays the event log
Clear event log	• **Ok (default)** • Cancel	Clears the DMI Event Log after rebooting.
Event Logging	• Disabled • **Enabled (default)**	Enables logging of DMI events.

Mark DMI events as read	• **Ok (default)** • Cancel	Marks all DMI events as read.

Video Configuration Submenu

This submenu is for configuring the video features.

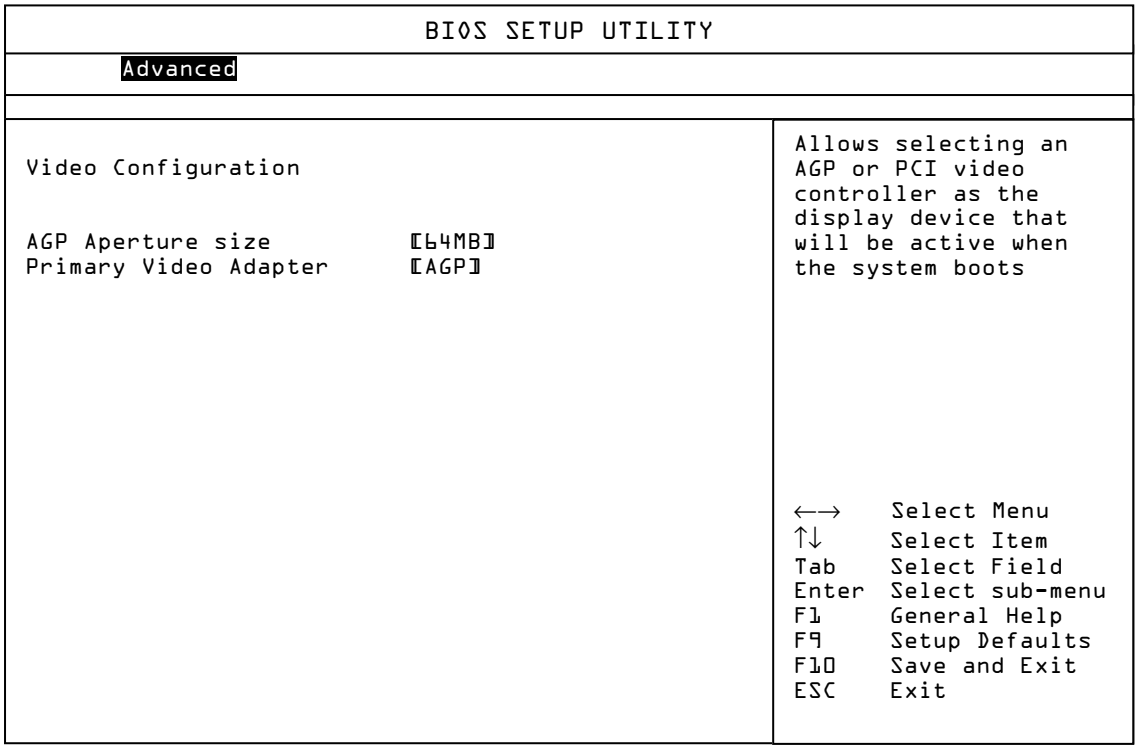


Figure 27: Video Configuration Submenu

A detailed description of each of the features of the menu is given in the following table.

Table 32: Video Configuration Submenu

Feature	Options	Description
AGP Aperture size	• 4 MB • 8 MB • 16 MB • 32 MB • **64 MB (default)** • 128 MB • 256 MB	Sets the aperture size for the video controller
Primary Video Adaptor	• **AGP (default)** • PCI	Selects primary video adapter to be used during boot
Frame Buffer size	• 1 MB • 8 MB • **16 MB (default)**	Controls how much system RAM is reserved for use by the internal graphics device. A larger frame buffer should provide higher performance.

USB Configuration Submenu

This submenu is for configuring the USB features.

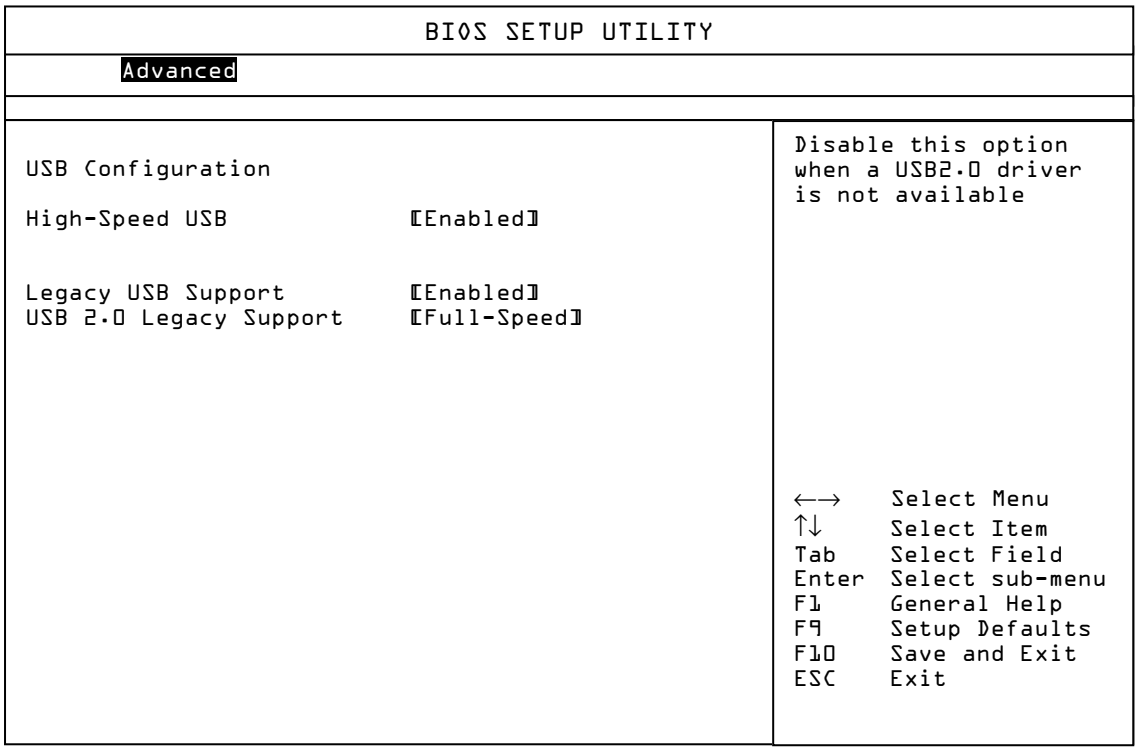


Figure 28: USB Configuration Submenu

A detailed description of each of the features of the menu is given in the following table.

Table 33: USB Configuration Submenu

Feature	Options	Description
High-Speed USB	• **Enabled (default)** • Disabled	Set to *Disabled* when a USB 2.0 driver is not available
Legacy USB Support	• **Enabled (default)** • Disabled	Enables/disables legacy USB support.
USB 2.0 Legacy Support	• **FullSpeed (default)** • Hi Speed	Configures the USB 2.0 Legacy support to Hi Speed (480 Mbps) or Full Speed (12 Mbps)

Chipset Configuration Submenu

This submenu is for configuring the chipset features.

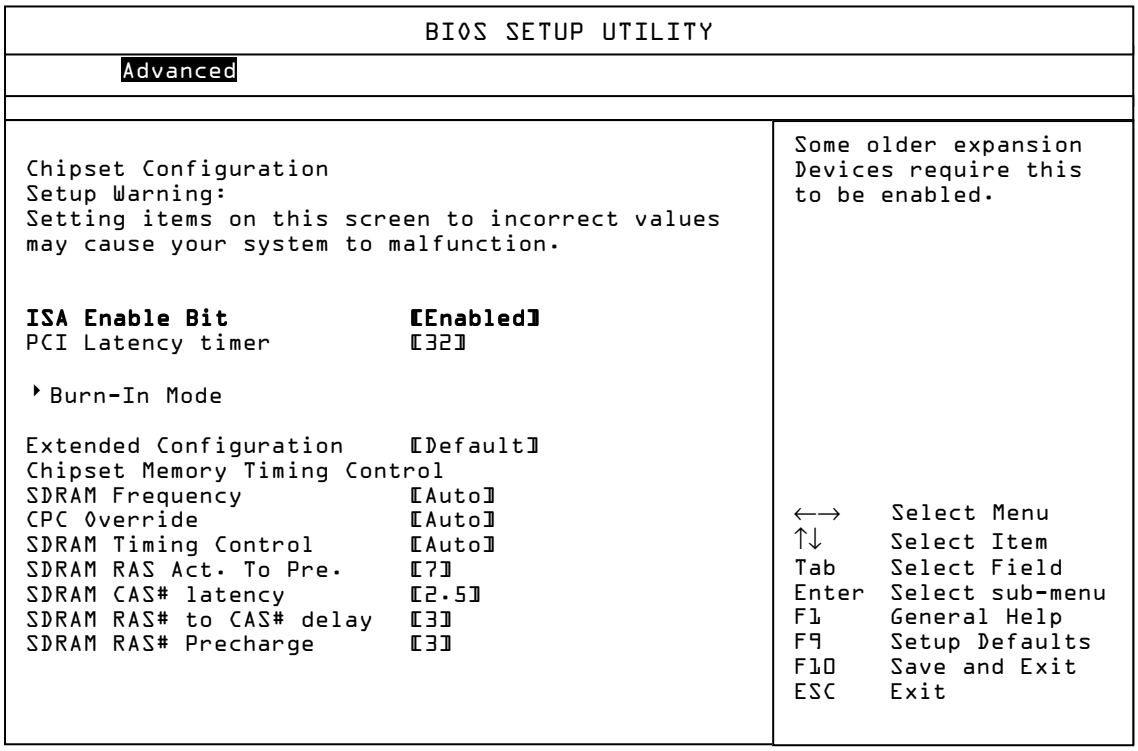


Figure 29: Chipset Configuration Submenu

A detailed description of each of the features of the menu is given in the following table.

Table 34: Video Configuration Submenu

Feature	Options	Description
ISA Enable Bit	• Disabled • **Enabled (default)**	When set to *Enable*, a PCI-to-PCI bridge will only recognise I/O addresses that do not alias to an ISA range (within the bridge's assigned I/O range).
PCI Latency timer	• **32 (default)** • 64, 96,128 • 160, 192, 224 • 248	Allows you to control the time (in PCI bus clock cycles) that an agent on the PC bus can hold the bus when another agent has requested the bus.
Extended Configuration	• **Default (default)** • User defined	Allows the setting of extended configuration options
SDRAM Frequency	• **Auto (default)** • 266 MHz • 333 MHz (Note 2) • 400 MHz (Note 3)	Allows override of the detected memory frequency. ***NOTE:*** *If SDRAM Frequency is changed, you must reboot for the change to take effect. After changing this setting and rebooting, the System Memory Speed parameter in the Main menu will reflect the new value.*

CPC Override	• **Auto (default)** • Enabled • Disabled	Controls the CPC/1n rule mode *Enabled* allows the DRAM controller to attempt chip select assertions in two consecutive common clocks
SDRAM Timing Control (Note 1)	• **Auto (default)** • Manual - Aggressive • Manual - User Defined	*Auto* = Timings will be programmed according to the memory detected. *Manual – Aggressive* = Selects most aggressive user-defined timings. *Manual – User Defined* = Allows manual override of detected SDRAM settings.
SDRAM RAS Active to Precharge (Note 4)	• 8 • 7 • **6 (default)** • 5	Corresponds to tRAS
SDRAM CAS# Latency (Note 4)	• 2.0 • **2.5 (default)** • 3.0	Selects the number of clock cycles required to address a column in memory.
SDRAM RAS# to CAS# Delay (Note 4)	• 4 • **3 (default)** • 2	Selects the number of clock cycles between addressing a row and addressing a column.
SDRAM RAS# Precharge (Note 4)	• 4 • **3 (default)** • 2	Selects the length of time required before accessing a new row.

Note:

1. *This feature is displayed only if Extended Configuration is set to User Defined.*
2. *This option is displayed only if the installed processor has a 533 MHz system bus.*
3. *This option is displayed only if the installed processor has an 800 MHz system bus.*
4. *This feature is displayed only if SDRAM Timing Control is set to Manual – User Defined.*

Fan Control Submenu

This submenu is for configuring the fan control options

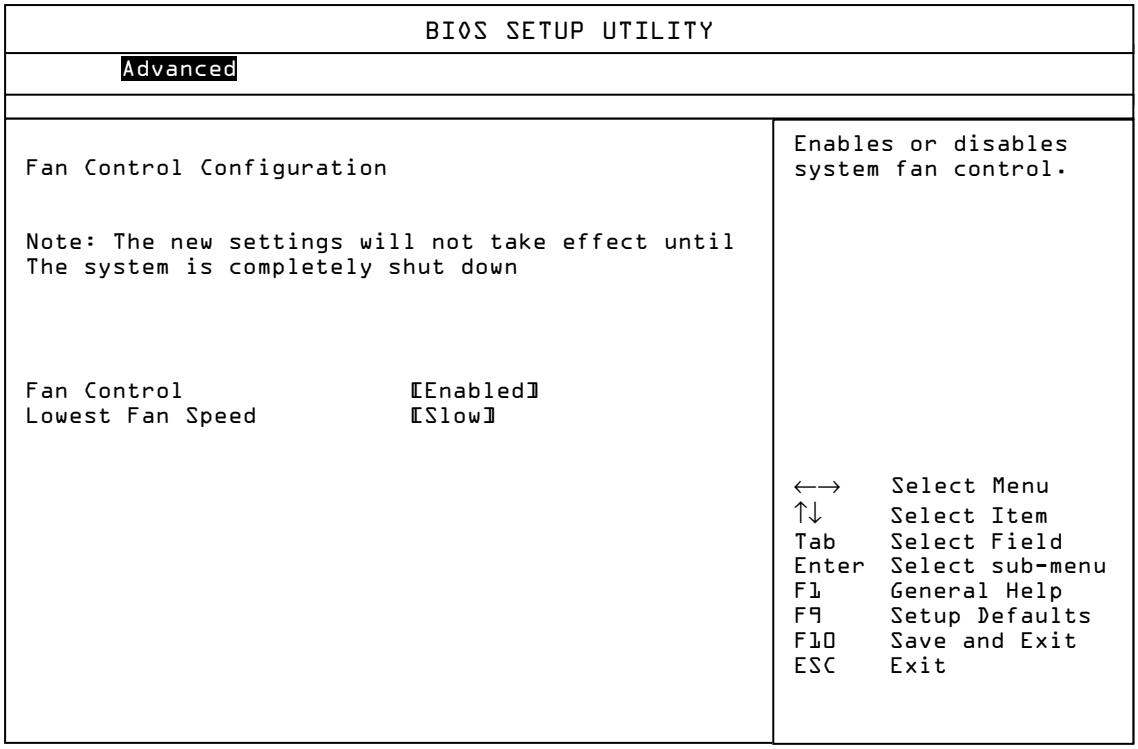


Figure 30: Fan Control Submenu

Table 35: Fan Control Submenu

Feature	Options	Description
Fan Control	• Disabled • **Enabled (default)**	Enables or disables fan control
Lowest Fan Speed	• **Slow (default)** • Off	Defines the lower limit of chassis fan speed operation. When set to *Slow*, at low system temperatures the fans will continue to run at slow speed. When set to *Off*, at low system temperatures the fans will turn off.

Note: *These options will not take effect until power has been completely removed from the system. After saving the BIOS settings and turning off the system, unplug the power cord from the system and wait at least 30 seconds before reapplying power and turning the system back on.*

Hardware Monitoring

This menu displays system monitoring information

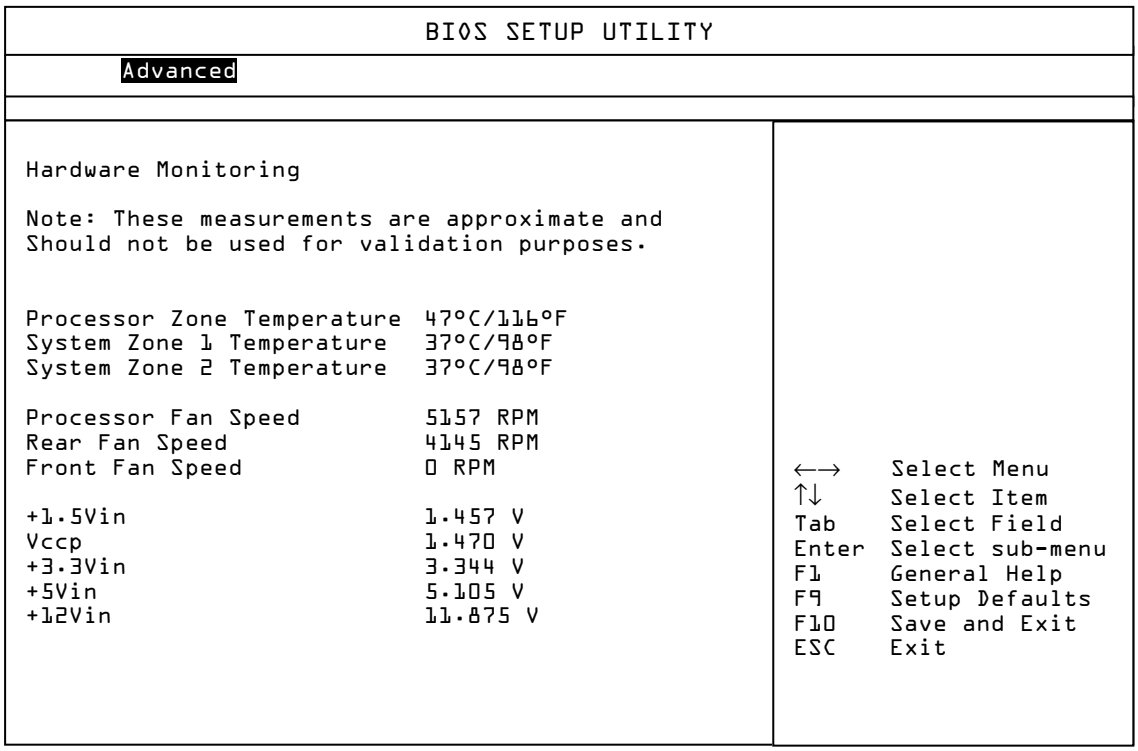


Figure 31: Hardware Monitoring

Security Menu

This menu is for setting passwords and security features.

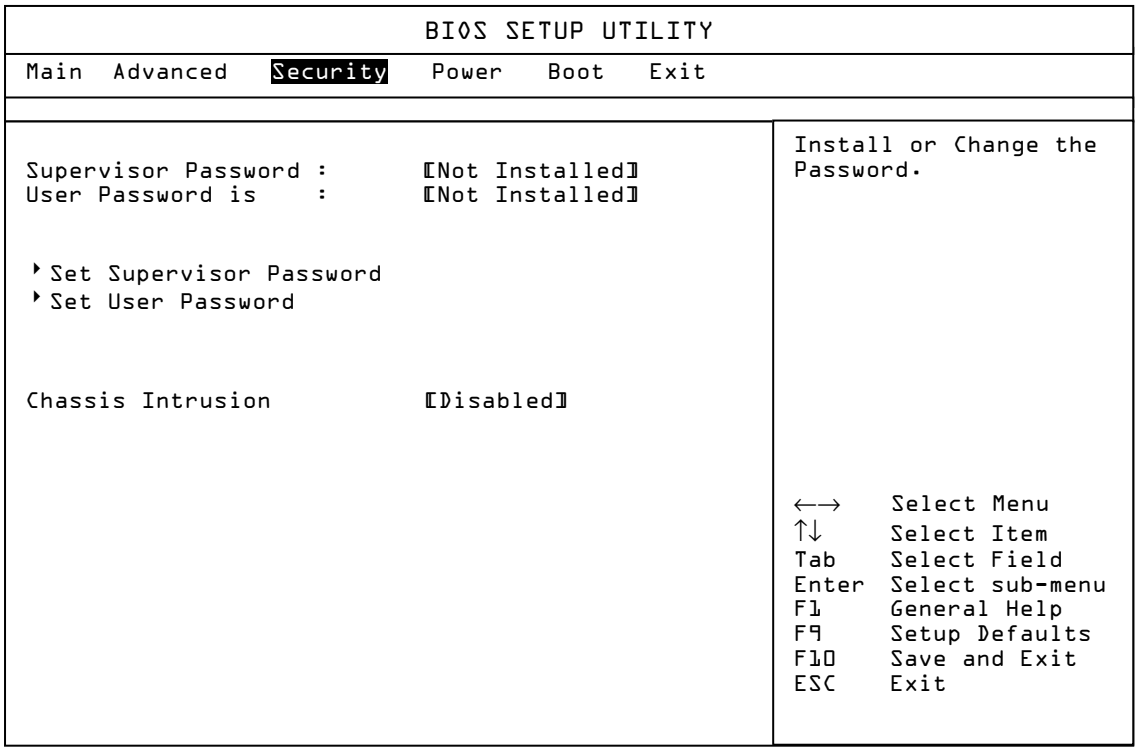


Figure 32: Security Menu

A detailed description is given for each item in the following table.

Table 36: Security Menu

Feature	Options	Description
Supervisor Password	No Option	Reports if there is a supervisor password set.
User Password	No Option	Reports if there is a user password set.
Set Supervisory Password	Password can be up to seven alphanumeric characters (Note 1)	Specifies the supervisor password.
User Access Level (Note2)	• No Access • View Only • Limited • **Full (default)**	Sets the user access rights to the BIOS Setup Utility. *No Access* prevents user access to the BIOS Setup Utility. *View Only* allows the user to view but not change the BIOS Setup Utility fields. *Limited* allows the user to changes some fields. *Full* allows the user to changes all fields except the supervisor password.

Set User Password	Password can be up to seven alphanumeric characters (Note 1)	Specifies the user password.
Clear User Password (Note 3)	• **Ok (default)** • Cancel	Clears the user password.
Chassis Intrusion	• **Disabled (default)** • Log • Log, notify once • Log, notify until cleared	*Disabled* = Disables Chassis Intrusion *Log* = Logs the intrusion in the event log *Log, notify once* = Halts system during POST. User must press <F4> to continue. Intrusion flag is cleared and the event log is updated. *Log, notify till cleared* = Halts system during POST. User must enter BIOS setup Security Menu and select "Clear Chassis Intrusion Status" to clear the Chassis intrusion flag.

Note:

1. *Valid password characters are A-Z, a-z, and 0-9.*
2. *This feature is displayed only if a supervisor password has been set.*
3. *This feature is displayed only if a user password has been set.*

Power Menu

This menu is for setting power management features.

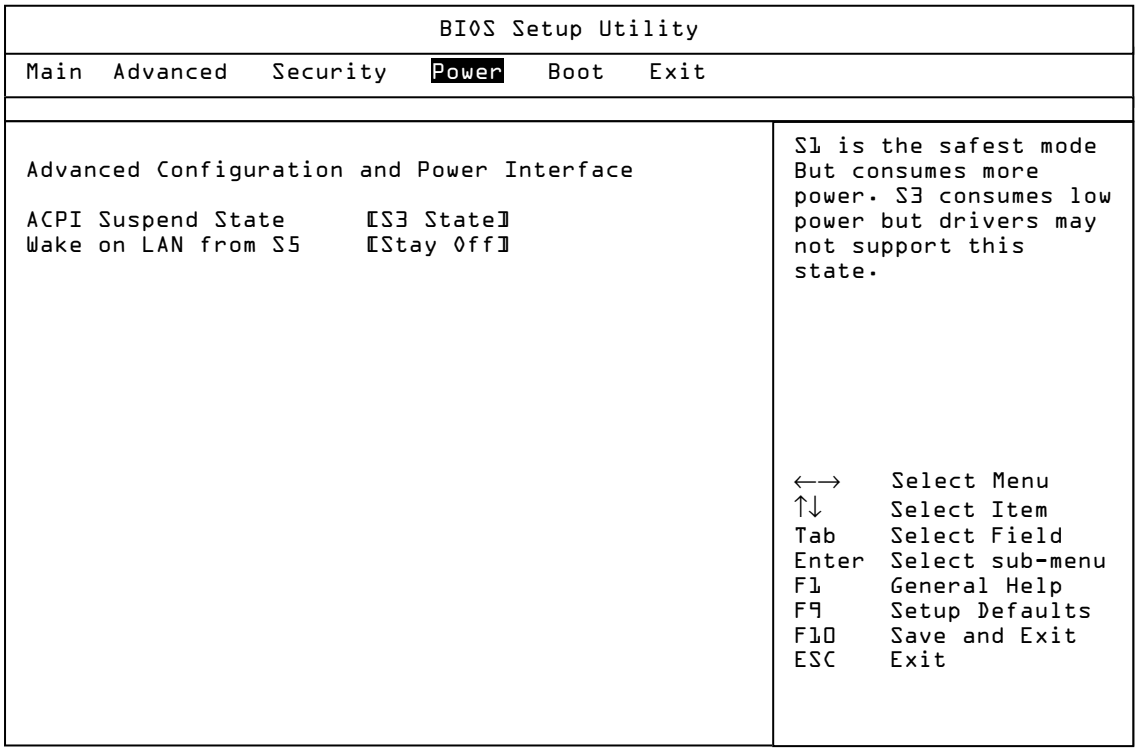


Figure 33: Power Menu

A detailed description is given for each item in the following table.

Table 37: Power Menu

Feature	Options	Description
ACPI	Select to display submenu	Sets the ACPI power management options
Wake on PCI PME	• Stay Off • **Last State (default)** • Power On	Specifies the mode of operation if an AC power loss occurs. *Stay Off* keeps the power off until the power button is pressed. *Last State* restores the previous power state before power loss occurred. *Power On* restores power to the computer.
Wake on Modem Ring	• **Stay Off (default)** • Power on	Specifies how the computer responds to a PCI power management event.

Advanced Configuration and Power Interface (ACPI) submenu

This submenu is for setting ACPI features.

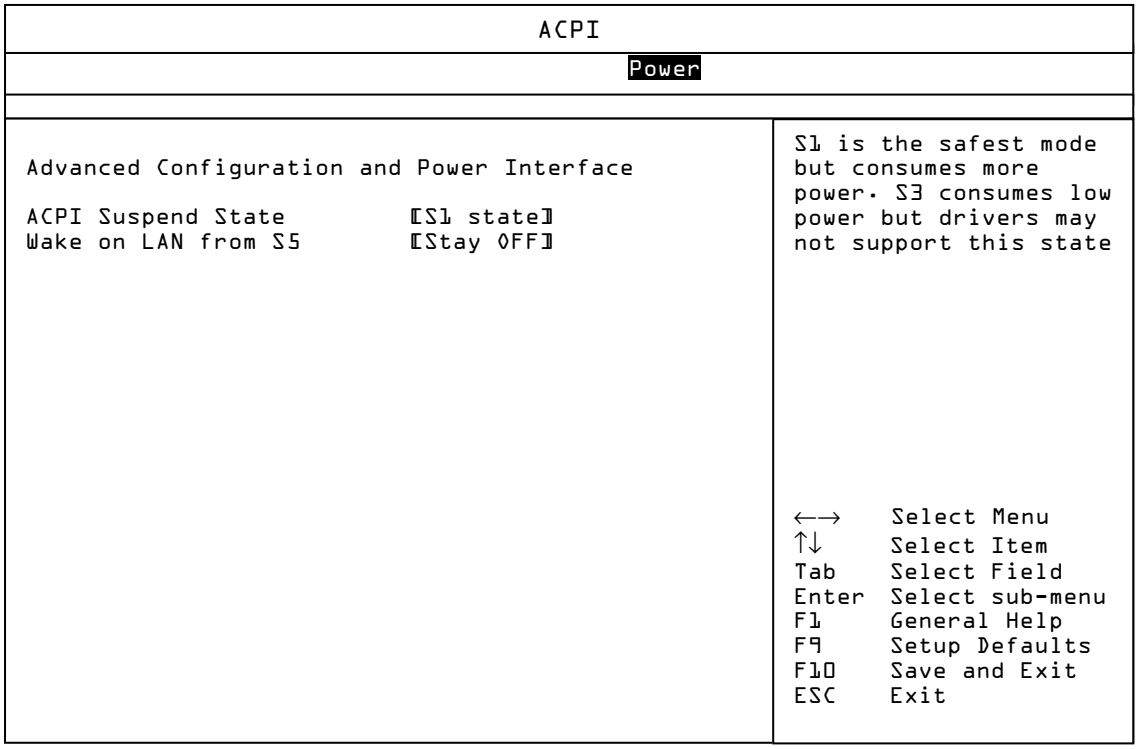


Figure 34: ACPI Submenu

A detailed description is given for each item in the following table.

Table 38: ACPI submenu

Feature	Options	Description
ACPI Suspend State	• S1 state • S3 state	S1 is the safest mode but consumes more power. S3 consumes less power, but some drivers may not support this state.
Wake on LAN from S5	• **Stay off (default)** • Power on	In ACPI soft-off mode only, determines how the system responds to a LAN wake-up event.

Boot Menu

This menu is for configuring Boot procedures and depends solely on the configuration of your system; it may also include one or all of the following submenus:

- Boot Device Priority
- Hard Disk Drives
- Removable Devices
- ATAPI CD-ROM Devices

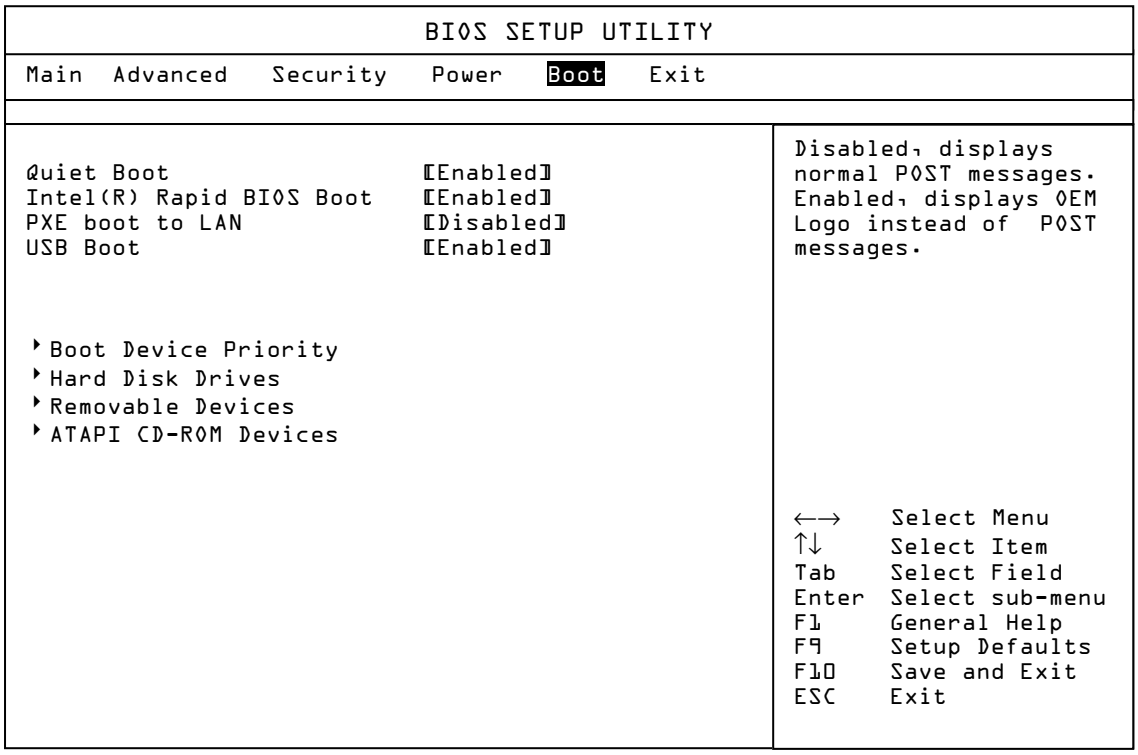


Figure 35: Boot Menu

A detailed description is given for each item in the following table.

Table 39: Boot Menu

Feature	Options	Description
Silent Boot	• Disabled • **Enabled (default)**	*Disabled* displays normal POST messages. *Enabled* displays OEM graphic instead of POST messages.
Intel® Rapid BIOS Boot	• Disabled • **Enabled (default)**	Enables the computer to boot without running certain POST tests.
PXE Boot to LAN	• **Disabled (default)** • Enabled	Disables/enables PXE boot to LAN. ***Note:*** *When set to Enabled, you must reboot for the Intel Boot Agent device to be available in the Boot Device menu.*

USB Boot	• Disabled • **Enabled (default)**	Disables/enables booting to USB boot devices.
Boot Device Priority	Select to display submenu	Specifies the boot sequence from the available types of boot devices.
Hard Disk Drives	Select to display submenu	Specifies the boot sequence from the available hard disk drives.
Removable Devices	Select to display submenu	Specifies the boot sequence from the available removable devices.
ATAI CD-ROM Drives	Select to display submenu	Specifies the boot sequence from the available ATAPI CD-ROM drives.

Boot Device Priority Submenu

This submenu is for configuring the boot sequence for hard drives.

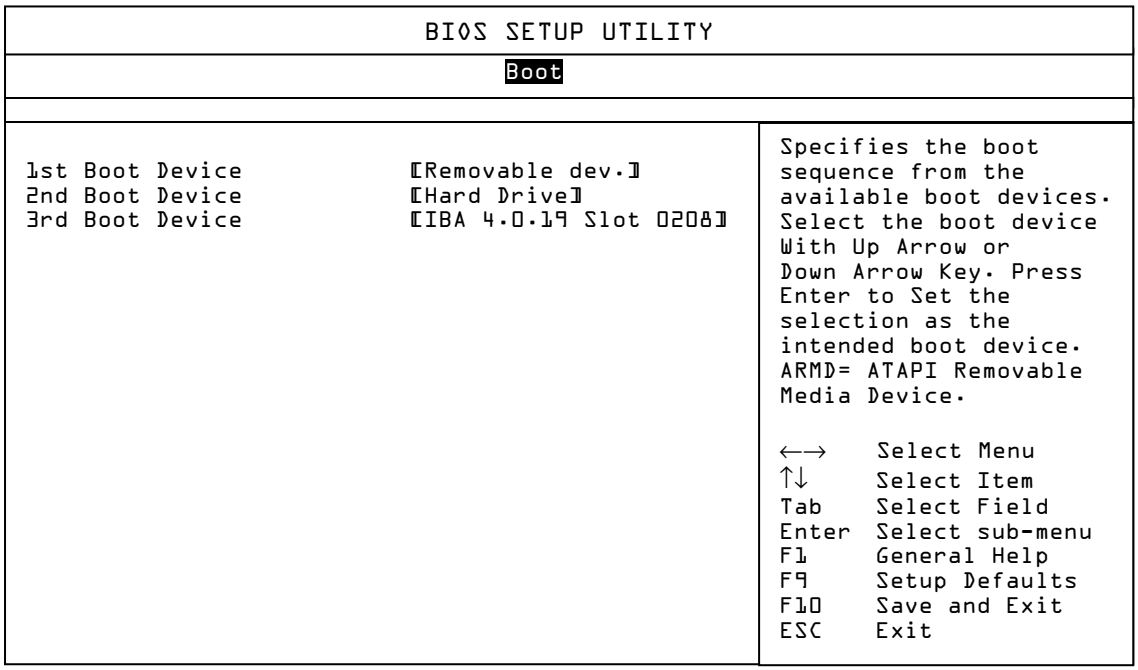


Figure 36: Boot Device Priority Submenu

A detailed description is given for each item in the following table.

Table 40: Boot Device Priority Submenu

Feature	Options	Description
1st Boot Device 2nd Boot Device 3rd Boot Device 4th Boot Device	• Removable Device • Hard Drive • ATAPI CD-ROM • Intel® Boot Agent • Disabled	Specifies the boot sequence according to the device type. The computer will attempt to boot from up to five devices as specified here. Only one of the devices can be an IDE hard disk drive. To specify boot sequence: 1. Select the boot device 2. Press <Enter> to set the selection as the intended boot device. The default settings for the first through fourth boot devices are, respectively:

		• Removable Dev. • Hard Drive • ATAPI CD-ROM • Intel Boot Agent

Hard Disk Drives submenu

This submenu is for configuring the boot sequence for hard drives.

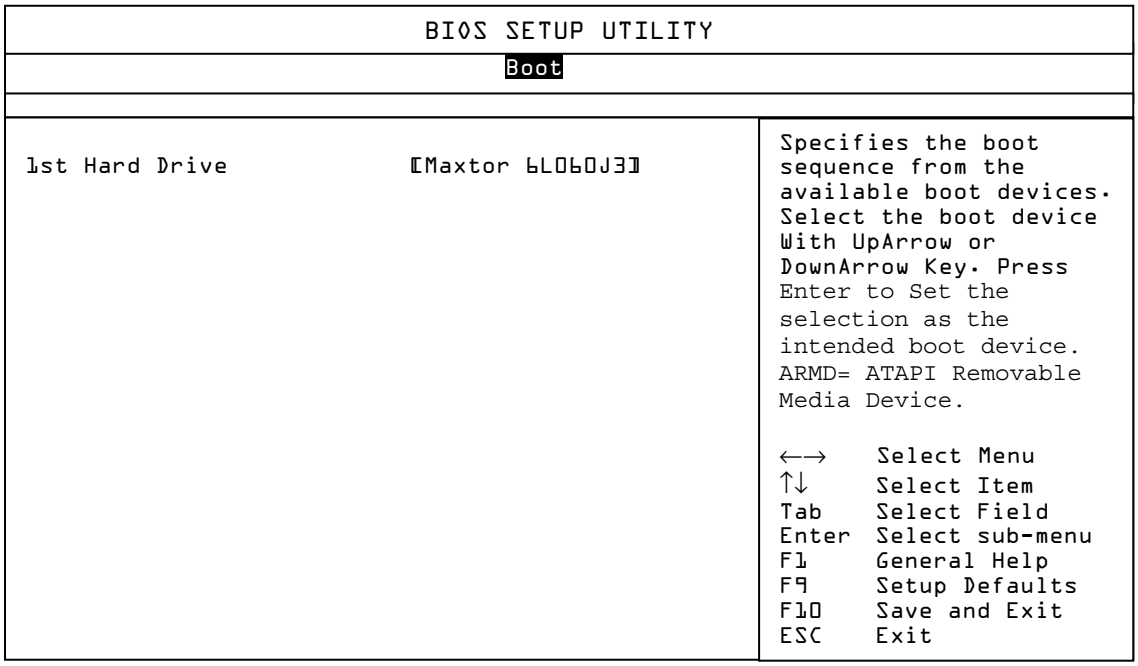


Figure 37: Boot Device Priority Submenu

A detailed description is given for each item in the following table.

Table 41: Boot Device Priority Submenu

Feature	Options	Description
1st Hard Drive (Note)	Dependent on installed hard drives	Specifies the boot sequence from the available hard disk drives. To specify boot sequence: 1. Select the boot device 2. Press <Enter> to set the selection as the intended boot device.

Note: *This boot device submenu appears only if at least one boot device of this type is installed. This list will display up to twelve hard disk drives, the maximum number of hard disk drives supported by the BIOS.*

Removable Devices Submenu

This submenu is for configuring the boot sequence of Removable devices.

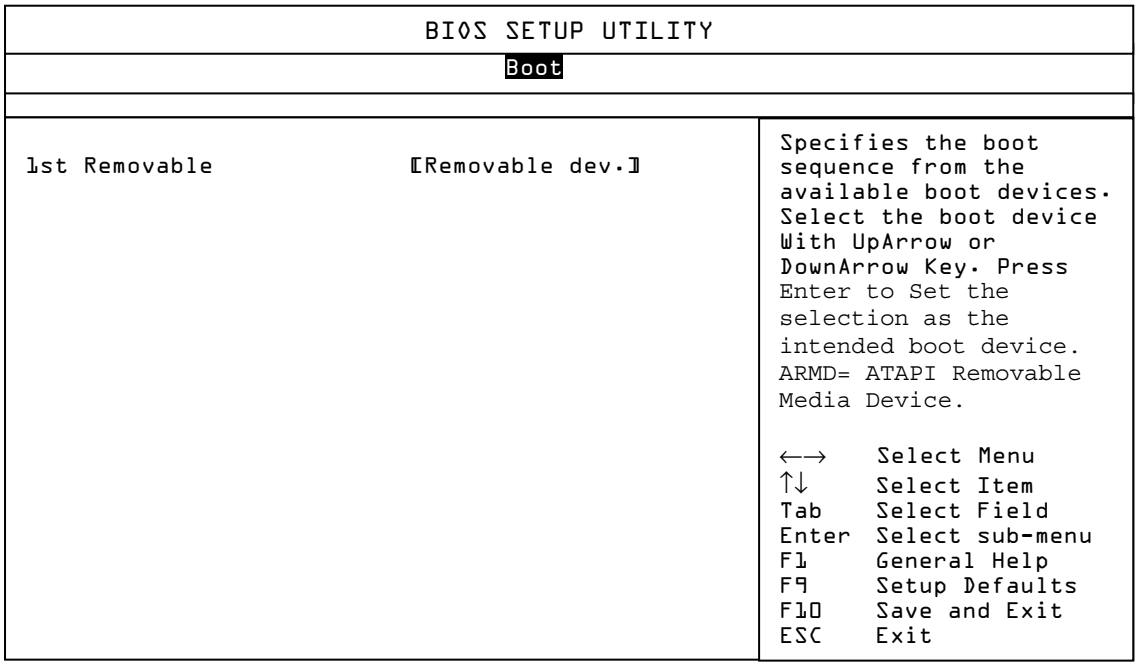


Figure 38: Removable Devices Submenu

A detailed description is given for each item in the following table.

Table 42: Removable Devices Submenu

Feature	Options	Description
1st Removable Device (Note)	Dependent on installed removable devices	Specifies the boot sequence from the available removable devices. To specify boot sequence: 1. Select the boot device 2. Press <Enter> to set the selection as the intended boot device.

Note: *This boot device submenu appears only if at least one boot device of this type is installed. This list will display up to four removable devices, the maximum number of removable devices supported by the BIOS.*

ATAPI CD-ROM Drives Submenu

This submenu is for configuring the boot sequence for ATAPI CD-ROM drives.

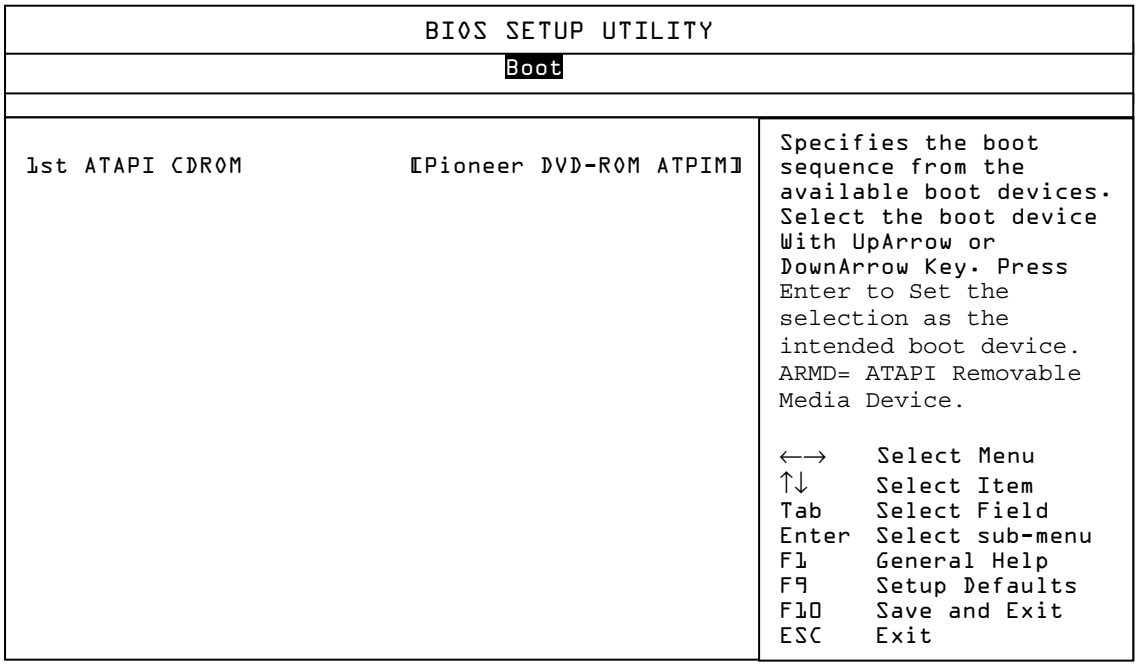


Figure 39: ATAPI CD-ROM Drive Submenu

A detailed description is given for each item in the following table.

Table 43: ATAPI CD-ROM Drive Submenu

Feature	Options	Description
1st ATAPI CDROM (Note)	Dependent on installed ATAPI CD-ROM drives	Specifies the boot sequence from the available ATAPI CD-ROM drives. To specify boot sequence: 1. Select the boot device 2. Press <Enter> to set the selection as the intended boot device.

Note: *This boot device submenu appears only if at least one boot device of this type is installed. This list will display up to four ATAPI CD-ROM drives, the maximum number of ATAPI CD-ROM drives supported by the BIOS.*

Exit Menu

This menu is for exiting the Setup program, saving changes, and loading and saving defaults.

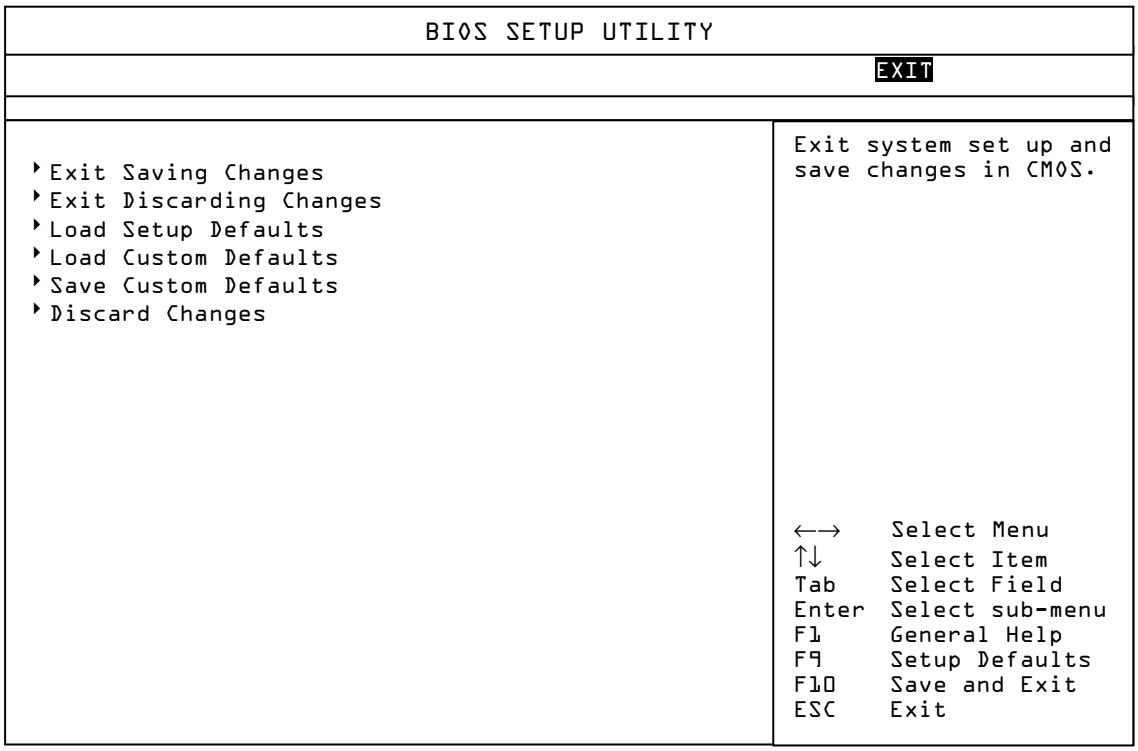


Figure 40: Exit Menu

A detailed description is given for each item in the following table.

Table 44: Exit Menu

Feature	Description
Exit Saving Changes	Exits and saves the changes in CMOS RAM.
Exit Discarding Changes	Exits without saving any changes made in Setup.
Load Setup Defaults	Loads the default values for all the Setup options.
Load Custom Defaults	Loads the custom defaults for Setup options.
Save Custom Defaults	Saves the current values as custom defaults. Normally, the BIOS reads the Setup values from flash memory. If this memory is corrupted, the BIOS reads the custom defaults. If no custom defaults are set, the BIOS reads the factory defaults.
Discard Changes	Discards changes without exiting Setup. The option values present when the computer was turned on are used.

Upgrading the BIOS

This chapter describes how to upgrade the BIOS and how to recover the BIOS if an upgrade fails.

Preparing for the Upgrade

Before you upgrade the BIOS, prepare for the upgrade by recording the current BIOS settings, obtaining the upgrade utility, and making a copy of the current BIOS.

Obtaining the Upgrade Utility

You can upgrade to a new version of the BIOS using the new BIOS files and the BIOS upgrade utility, iFLASH.EXE. You can obtain the BIOS upgrade file and the iFLASH.EXE utility through your computer supplier or from the Intel World Wide Web site:

http://www.viglen.co.uk

Note: *Please review the instructions distributed with the upgrade utility before attempting a BIOS upgrade.*

This upgrade utility allows you to:

- Upgrade the BIOS in flash memory.
- Update the language section of the BIOS.

The following steps explain how to upgrade the BIOS.

STEP ONE: Recording the Current BIOS Settings

1. Boot the computer and press <F2> when you see the message:

   Press <F2> Key if you want to run SETUP

Note: *Do not skip step 2. You will need these settings to configure your computer at the end of the procedure.*

2. Write down the current settings in the BIOS Setup program.

STEP TWO: Creating a Bootable Floppy Diskette

1. Use a DOS or Windows 95/98 system to create the floppy disk.
2. Insert a floppy disk in floppy drive A.
3. At the C:\ prompt, for an unformatted floppy disk, type:

   format a:/s

   Or, for a formatted floppy disk, type:

   sys a:

4. Press <Enter>

STEP THREE: Creating the BIOS Upgrade Floppy Diskette

The BIOS upgrade file is a compressed self-extracting archive that contains the files you need to upgrade the BIOS.

1. Copy the BIOS upgrade file to a temporary directory on your hard disk.
2. From the C:\ prompt, change to the temporary directory.
3. To extract the file, type the name of the BIOS upgrade file, for example:

   10006BI1.EXE

4. Press <Enter>. The extracted file contains the following files:

   LICENSE.TXT
   README.TXT
   BIOS.EXE

5. Read the LICENSE.TXT file, which contains the software license agreement and the README.TXT file, which contains the instructions for the BIOS upgrade.
6. Insert the bootable floppy disk into drive A.
7. To extract the BIOS.EXE file to the floppy disk, change to the temporary directory that holds the BIOS.EXE file and type:

   BIOS A:

8. Press <Enter>.
9. The floppy disk now holds the BIOS upgrade and recovery files.

Upgrading the BIOS

1. Boot the computer with the floppy disk in drive A. The BIOS upgrade utility screen appears.
2. Select Update Flash Memory From a File.
3. Select Update System BIOS. Press <Enter>.
4. Use the arrow keys to select the correct .bio file. Press <Enter>.

5. When the utility asks for confirmation that you want to flash the new BIOS into memory, select continue with Programming. Press <Enter>.
6. When the utility displays the message upgrade is complete, remove the floppy disk. Press <Enter>.
7. As the computer boots, check the BIOS identifier (version number) to make sure the upgrade was successful.
8. To enter the Setup program, press <F2> when you see the message:

   Press <F2> Key if you want to run SETUP

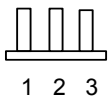
9. For proper operation, load the Setup program defaults. To load the defaults, press <F9>.
10. To accept the defaults, press <Enter>.
11. Set the options in the Setup program to the settings you wrote down before the BIOS upgrade.
12. To save the settings, press <F10>.
13. To accept the settings, press <Enter>.
14. Turn off the computer and reboot.

Recovering the BIOS

It is unlikely that anything will interrupt the BIOS upgrade, however, if an interruption occurs, the BIOS could be damaged. The following steps explain how to recover the BIOS if an upgrade fails. The following procedure uses the recovery mode for the Setup program. See Chapter 3 for more information about Setup modes.

Note: *Because of the small amount of code available in the non-erasable boot block area, there is no video support. You will not see anything on the screen during the procedure. Monitor the procedure by listening to the speaker and looking at the floppy drive LED.*

1. Turn off all peripheral devices connected to the computer. Turn off the computer.
2. Remove the computer cover.
3. Locate the configuration header (Jumper J9J4 on the motherboard).
4. On the header (J9J4), remove the jumper from all pins as shown below to set recovery mode for Setup.

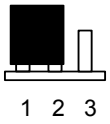


Configuration Jumper
J9J4

5. Insert the bootable BIOS upgrade floppy disk into floppy drive A.
6. Replace the cover, turn on the computer, and allow it to boot.
7. Reconnect the AC power cord and turn on the computer. The recovery process will take a few minutes.
8. Listen to the speaker.

    - Two beeps and the end of activity in drive A indicate successful BIOS recovery.
    - A series of continuous beeps indicates failed BIOS recovery.

9. If recovery fails, return to step 1 and repeat the recovery process.
10. If recovery is successful, turn off the computer and disconnect the AC power cord from the computer. Remove the computer cover and continue with the following steps.
11. On the header (J9J9), move the jumper back to pins 1-2 as shown below to set normal mode for Setup.



Configuration Jumper
J9J4

12. Replace the computer cover and reconnect the AC power cable; leave the upgrade disk in drive A and turn on the computer.
13. Continue with the BIOS upgrade.

Chapter 5: Technical Information

Note: *This chapter is indented for experienced users only, and only to be used as a reference. Changes to or modify any of the components/ connectors listed herein can and will seriously damage your system, including the motherboard, CPU and/or any other hardware.*

You do not need to read this chapter to configure your motherboard. If you are not sure about the details listed herein, please skip and disregard them.

Enhanced IDE

IDE has been used in computer systems for some time, and has been a cheap solution to data storage. It has now been realised that traditional IDE has its limitations and thus needed to be improved. This was where Enhanced IDE came from. The main developments to the IDE interface are:

- Support hard drives of capacity greater than 528MB. This is achieved through BIOS changes.

- Improved data transfer rates. Transfer rates of 1-3MB/sec were the best to be expected from older IDE drives. With local bus technology this increased to about 6MB/sec. Now with multimedia applications, requiring vast amounts of information, even faster transfers rates were needed. Now drives with Enhanced IDE controllers can deliver up to 13MB/sec which is in the region of SCSI-2 performance.

- Dual-IDE channels have now been added which allows up to four IDE drives to be supported by the system. Each channel supporting two IDE devices.

- Non disk IDE peripherals have been developed (IDE CD-ROMs, IDE tape streamers) which can be simply attached to the one channel requiring no special hardware (requiring the use of an ISA slot) or complicated drivers. This is a standard interface meaning that any IDE CD-ROM or tape streamer can be attached.

Operating Systems and Hard Drives

Standard CHS is the translation that has been used for years. Its use limits IDE capacity to maximum of 528MB regardless of the size of the drive used.

Logical Block mode overcomes the 528MB maximum size limitation imposed by the Standard CHS mode. It should be used only when the drive supports LBA (Logical Block Addressing), and the OS supports LBA, or uses the BIOS to access the disk.

Extended CHS mode also overcomes the 528MB maximum size limitation imposed by Standard CHS mode. It can be used with drives which are larger than 528MB that do not support LBA.

Auto Detected allows the BIOS to examine the drive and determine the optimal mode. The first choice is to utilise Logical Block mode if it is supported by the drive. The second choice is to utilise Extended CHS mode if the drive topology allows. If neither of the above methods is possible, the Standard CHS mode is used.

Different operating systems have different abilities regarding IDE translation mode.

UNIX operating systems (as currently implemented) do not support either LBA or ECHS and must utilise the standard CHS method. UNIX can support drives larger than 528MB, but does so in its own way.

OS/2 2.1 and OS/2 Warp can support LBA, ECHS or standard CHS methods. Note that LBA support may require a switch setting on an OS/2 driver in order to operate in that mode.

OS/2 2.0 & Novel NetWare can support either ECHS or standard CHS methods. In order to use LBA with NetWare a driver that supports current parameters must be used.OS/2 2.0 does not support LBA.

DOS & Windows can use LBA, ECHS or standard CHS methods. The '32-bit Disk Access' driver built into Windows WDCTRL.386 can only be used with the standard CHS method, To use either LBA or ECHS method and '32-bit Disk Access' an alternative .386 driver must be installed, this combination will also provide the best performance. If this driver is not installed and the drive fitted to the system supports Type F DMA on the ISA interface or Mode 3 on the PCI interface then higher performance will be achieved by NOT using '32-bit Disk Access'.

Connector Signal Details

Table 45: Wake on Ring Connector

Pin	Signal Name
1	Ground
2	RINGA#

Table 46: Wake on LAN Connector

Pin	Signal Name
1	+5 VSB
2	Ground
3	WOL

Table 47: Fan 3 Connector

Pin	Signal Name
1	Ground
2	FAN_CTRL (+12 V)
3	FAN_SEN*

Table 48: Auxiliary Line In Connector

Pin	Signal Name
1	Left Line In
2	Ground
3	Ground
4	Right Line In (monaural)

Table 49: Telephony Connector

Pin	Signal Name
1	Audio in (monaural)
2	Ground
3	Ground
4	Mic pre-amp out (to modem)

Table 50: CD Audio Connector

Pin	Signal Name
1	CD_IN-Left
2	Ground
3	Ground
4	CD_IN-Right

Table 51: Chassis Intrusion Connector

Pin	Signal Name
1	Ground
2	CHS_SEC

Table 52: Fan 2 Connector

Pin	Signal Name
1	Ground
2	FAN_CTRL (+12 V)
3	FAN_SEN*

* If the optional management extension hardware is not available, pin 3 is ground.

Table 53: Fan 1 Connector

Pin	Signal Name
1	Ground
2	FAN_CTRL (+12 V)
3	FAN_SEN*

* If the optional management extension hardware is not available, pin 3 is ground.

Table 54: SCSI LED Header

Pin	Signal Name
1	DRV_ACT#
2	No connect

Table 55: Serial ATA Connector

Pin	Signal Name
1	Ground
2	TXP
3	TXN
4	Ground
5	RXN
6	RXP
7	Ground

Table 56: Floppy Drive Connector

Pin	Signal Name	Pin	Signal Name
1	Ground	2	DENSEL
3	Ground	4	Reserved
5	Key	6	FDEDIN
7	Ground	8	FDINDX# (Index)
9	Ground	10	FDM00# (Motor Enable A)
11	Ground	12	No connect
13	Ground	14	FDDS0# (Drive Select A)
15	Ground	16	No connect
17	No Connect	18	FDDIR# (Stepper Motor Direction)
19	Ground	20	FDSTEP# (Step Pulse)
21	Ground	22	FDWD# (Write Data)
23	Ground	24	FDWE# (Write Enable)
25	Ground	26	FDTRK0# (Track 0)
27	Connect	28	FDWPD# (Write Protect)
29	Ground	30	FDRDATA# (Read Data)
31	Ground	32	FDHEAD# (Side 1 Select)
33	Ground	34	DSKCHG# (Diskette Change)

Table 57: PCI IDE Connectors

Pin	Signal Name	Pin	Signal Name
1	Reset IDE	2	Ground
3	Data 7	4	Data 8
5	Data 6	6	Data 9
7	Data 5	8	Data 10
9	Data 4	10	Data 11
11	Data 3	12	Data 12
13	Data 2	14	Data 13
15	Data 1	16	Data 14
17	Data 0	18	Data 15
19	Ground	20	Key
21	DDRQ0 [DDRQ1]	22	Ground

23	I/O Write#	24	Ground
25	I/O Read#	26	Ground
27	IOCHRDY	28	P_ALE (Cable Select pullup)
29	DDACK0# [DDACK1#]	30	Ground
31	IRQ 14 [IRQ 15]	32	Reserved
33	Address 1	34	Reserved
35	Address 0	36	Address 2
37	Chip Select 1P# [Chip Select 1S#]	38	Chip Select 3P# [Chip Select 3S#]
39	Activity#	40	Ground

NOTE: *Signal names in brackets ([ ]) are for the secondary IDE connector.*

Table 58: Accelerated Graphics Port

Pin	Signal Name	Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
A1	+12V	B1	No Connect	A34	Vcc3.3	B34	Vcc3.3
A2	No Connect	B2	Vcc	A35	AD22	B35	AD21
A3	Reserved	B3	Vcc	A36	AD20	B36	AD19
A4	No Connect	B4	No Connect	A37	Ground	B37	Ground
A5	Ground	B5	Ground	A38	AD18	B38	AD17
A6	INTA#	B6	INTB#	A39	AD16	B39	C/BE2#
A7	RST#	B7	CLK	A40	Vcc3.3	B40	Vcc3.3
A8	GNT1#	B8	REQ#	A41	FRAME#	B41	IRDY#
A9	Vcc3.3	B9	Vcc3.3	A42	Reserved	B42	+3.3 V aux
A10	ST1	B10	ST0	A43	Ground	B43	Ground
A11	Reserved	B11	ST2	A44	Reserved	B44	Reserved
A12	PIPE#	B12	RBF#	A45	Vcc3.3	B45	Vcc3.3
A13	Ground	B13	Ground	A46	TRDY#	B46	DEVSEL#
A14	No Connect	B14	No Connect	A47	STOP#	B47	Vcc3.3
A15	SBA1	B15	SBA0	A48	PME#	B48	PERR#
A16	Vcc3.3	B16	Vcc3.3	A49	Ground	B49	Ground
A17	SBA3	B17	SBA2	A50	PAR	B50	SERR#
A18	Reserved	B18	SB_STB	A51	AD15	B51	C/BE1#
A19	Ground	B19	Ground	A52	Vcc3.3	B52	Vcc3.3
A20	SBA5	B20	SBA4	A53	AD13	B53	AD14
A21	SBA7	B21	SBA6	A54	AD11	B54	AD12
A22	Key	B22	Key	A55	Ground	B55	Ground
A23	Key	B23	Key	A56	AD9	B56	AD10
A24	Key	B24	Key	A57	C/BE0#	B57	AD8
A25	Key	B25	Key	A58	Vcc3.3	B58	Vcc3.3
A26	AD30	B26	AD31	A59	Reserved	B59	AD_STB0
A27	AD28	B27	AD29	A60	AD6	B60	AD7
A28	Vcc3.3	B28	Vcc3.3	A61	Ground	B61	Ground
A29	AD26	B29	AD27	A62	AD4	B62	AD5
A30	AD24	B30	AD25	A63	AD2	B63	AD3
A31	Ground	B31	Ground	A64	Vcc3.3	B64	Vcc3.3
A32	Reserved	B32	AD_STB1	A65	AD0	B65	AD1
A33	C/BE3#	B33	AD23	A66	SMB0	B66	SMB1

Power Supply Connector

When used with an ATX-compliant power supply that supports remote power on/off, the motherboard can turn off the system power through software control.

To enable soft-off control in software, advanced power management must be enabled in the Setup program and in the operating system. When the system BIOS receives the correct APM command from the operating system, the BIOS turns off power to the computer.

With soft-off enabled, if power to the computer is interrupted by a power outage or a disconnected power cord, when power resumes, the computer returns to the power state it was in before power was interrupted (on or off).

Table 59: Power Supply Connector

Pin	Signal Name
1	+3.3 V
2	+3.3 V
3	Ground
4	+5 V
5	Ground
6	+5 V
7	Ground
8	PWRGD (Power Good)
9	+5 VSB (Standby)
10	+12 V
11	+3.3 V
12	-12 V
13	Ground
14	PS-ON# (power supply remote on/off control)
15	Ground
16	Ground
17	Ground
18	-5 V
19	+5 V
20	+5 V

Table 60: Front Panel I/O Connectors

Connector	Pin	Signal Name	Connector	Pin	Signal Name
Sleep/Power LED Green	2	+5 V	HDD LED	1	+5V HDD
Sleep/Power LED Yellow	4	0 v	HDD LED	3	OV HDD
Power Switch	6	SWITCH ON	RESET	5	RESET
Power Switch	8	Ground	RESET	7	Ground
No connection	10	None	No connection	9	+5V

Table 61: PS/2 Keyboard/Mouse Connectors

Pin	Signal Name
1	Data
2	No connect
3	Ground
4	+5 V (fused)
5	Clock
6	No connect

Table 62: Stacked USB Connectors

Pin	Signal Name
1	+5 V (fused)
2	USBP0# [USBP1#]
3	USBP0 [USBP1]
4	Ground

Table 63: Serial Port Connectors

Pin	Signal Name
1	DCD
2	Serial In #
3	Serial Out #
4	DTR#
5	Ground
6	DSR
7	RTS
8	CTS
9	RI

Table 64: Audio Line Out Connector

Pin	Signal Name
Sleeve	Ground
Tip	Audio Left Out
Ring	Audio Right Out

Table 65: Audio Line In Connector

Pin	Signal Name
Sleeve	Ground
Tip	Audio Left In
Ring	Audio Right In

Table 66: Audio Mic In Connector

Pin	Signal Name
Sleeve	Ground
Tip	Mono In
Ring	Electret Bias Voltage

Table 67: Parallel Port Connector

Pin	Signal Name	Pin	Signal Name
1	Strobe#	14	Auto Feed#
2	Data bit 0	15	Fault#
3	Data bit 1	16	INIT#
4	Data bit 2	17	SLCT IN#
5	Data bit 3	18	Ground
6	Data bit 4	19	Ground
7	Data bit 5	20	Ground
8	Data bit 6	21	Ground
9	Data bit 7	22	Ground
10	ACK#	23	Ground
11	Busy	24	Ground
12	Error	25	Ground
13	Select		

Table 68: MIDI / Game Port Connector (not applicable for this motherboard)

Pin	Signal Name	Pin	Signal Name
1	+5 V (fused)	9	+5 V (fused)
2	GP4 (JSBUTO)	10	GP6 (JSBUT2)
3	GP0 (JSX1)	11	GP2 (JSX2)
4	Ground	12	MIDI-OUTR
5	Ground	13	GP3 (JSY2)
6	GP1 (JSY1)	14	GP7 (JSBUT3)
7	GP5 (JSBUT1)	15	MIDI-IN
8	+5 V (fused)		

Table 69: PCI Bus Connectors

Pin	Signal Name	Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
A1	Ground (TRST#)*	B1	-12 V	A32	AD16	B32	AD17
A2	+12 V	B2	Ground (TCK)*	A33	+3.3 V	B33	C/BE2#
A3	+5 V (TMS)*	B3	Ground	A34	FRAME#	B34	Ground
A4	+5 V (TDI)*	B4	no connect (TDO)*	A35	Ground	B35	IRDY#
A5	+5 V	B5	+5 V	A36	TRDY#	B36	+3.3 V
A6	INTA#	B6	+5 V	A37	Ground	B37	DEVSEL#
A7	INTC#	B7	INTB#	A38	STOP#	B38	Ground
A8	+5 V	B8	INTD#	A39	+3.3 V	B39	LOCK#
A9	Reserved	B9	no connect (PRSNT1#)*	A40	+5 V (SDONE)*	B40	PERR#
A10	+5 V (I/O)	B10	Reserved	A41	+5 V (SBO#)*	B41	+3.3 V
A11	Reserved	B11	no connect (PRSNT2#)*	A42	Ground	B42	SERR#
A12	Ground	B12	Ground	A43	PAR	B43	+3.3 V
A13	Ground	B13	Ground	A44	AD15	B44	C/BE1#
A14	+3.3 V aux	B14	Reserved	A45	+3.3 V	B45	AD14
A15	RST#	B15	Ground	A46	AD13	B46	Ground
A16	+5 V (I/O)	B16	CLK	A47	AD11	B47	AD12
A17	GNT#	B17	Ground	A48	Ground	B48	AD10
A18	Ground	B18	REQ#	A49	AD09	B49	Ground
A19	PME#	B19	+5 V (I/O)	A50	Key	B50	Key
A20	AD30	B20	AD31	A51	Key	B51	Key
A21	+3.3 V	B21	AD29	A52	C/BE0#	B52	AD08

A22	AD28	B22	Ground	A53	+3.3 V	B53	AD07
A23	AD26	B23	AD27	A54	AD06	B54	+3.3 V
A24	Ground	B24	AD25	A55	AD04	B55	AD05
A25	AD24	B25	+3.3 V	A56	Ground	B56	AD03
A26	IDSEL	B26	C/BE3#	A57	AD02	B57	Ground
A27	+3.3 V	B27	AD23	A58	AD00	B58	AD01
A28	AD22	B28	Ground	A59	+5 V (I/O)	B59	+5 V (I/O)
A29	AD20	B29	AD21	A60	REQ64C#	B60	ACK64C#
A30	Ground	B30	AD19	A61	+5 V	B61	+5 V
A31	AD18	B31	+3.3 V	A62	+5 V	B62	+5 V

* These signals (in parentheses) are optional in the PCI specification and are not currently implemented.

Motherboard Resources

Table 70: Typical Memory Map

Address Range (decimal)	Address Range (hex)	Size	Description
1024 K - 393216 K	100000 - 18000000	383 MB	Extended memory
928 K - 1024 K	E8000 - FFFFF	96 KB	System BIOS
896 K - 928 K	E0000 - E7FFF	32 KB	System BIOS (Available as UMB)
800 - 896 K	C8000 - DFFFF	96 KB	Available high DOS memory (open to ISA and PCI bus)
640 K - 800 K	A0000 - C7FFF	160 KB	Video memory and BIOS
0 K - 512 K	00000 - 7FFFF	512 KB	Conventional memory

Table 71: DMA Channels

DMA Channel Number	Data Width	System Resource
0	8- or 16-bits	Open
1	8- or 16-bits	Parallel port
2	8- or 16-bits	Floppy drive
3	8- or 16-bits	Parallel port (for ECP)/audio
4	8- or 16-bits	Reserved - cascade channel
5	16-bits	Open
6	16-bits	Open
7	16-bits	Open

Table 72: I/O Map

Address (hex)	Size	Description
0000 - 000F	16 bytes	DMA 1 controller 1
0020 - 0021	2 bytes	Interrupt controller 1
002E - 002F	2 bytes	Super I/O controller configuration registers
0040 - 0043	4 bytes	Counter/Timer 1
0048 - 004B	4 bytes	Counter/Timer 2
0060	1 byte	Keyboard Controller Byte
0061	1 byte	NMI, Speaker Control
0064	1 byte	Keyboard controller
0070 - 0071	2 bit	Real time clock controller
0080 - 008F	16 bytes	DMA page registers
00A0 - 00A1	2 bytes	Interrupt controller 2
00B2 - 00B3	2 bytes	APM control
00C0 - 00DE	31 bytes	DMA 2
00F0 - 00FF	16 byte	Numeric processor
0170 - 0177	8 bytes	Secondary IDE controller
01F0 - 01F7	8 bytes	Primary IDE controller

0200 - 0207	8 bytes	Audio/ game port/ joystick
0220 - 022F	16 bytes	Audio (Sound Blaster compatible)
o228 - 022F	8 bytes	LPT3
0278 - 027F	8 bytes	LPT2
02E8 - 02EF	8 bytes	COM4/Video (8514A)
02F8 - 02FF	8 bytes	COM2
0330 - 0331	2 bytes	MPU-401 (MIDI)
0376 - 0377	2 byte	Secondary IDE channel command port
0120 - 0127	8 byte	Audio controller
0274 - 0277	4 bit	I/O read data port for ISA Plug and Play enumerator
0378 - 037F	8 bytes	LPT1
0388 - 038D	6 bytes	AdLib (FM synthesizer)
03B0 - 03BB	12 bytes	Video (monochrome)
03C0 - 03DF	32 bytes	Video (VGA)
03E8 - 03EF	8 bytes	COM3
03F0 - 03F5, 03F7	7 bytes	Floppy Controller
03F6	1 byte	Primary IDE controller
03F8 - 03FF	8 bytes	COM1
04D0 - 04D1	2 bytes	Edge/level triggered PIC
0530 - 0537	8 bytes	Windows Sound System
LPT*n* + 400h	8 bytes	ECP port, LPT*n* base address + 400h
0CF8 - 0CFF*	8 bytes	PCI configuration registers
0CF9**	1 byte	Turbo and reset control register

* DWORD access only

** Byte access only

Table 73: Typical PCI Configuration Space Map

Bus Number (hex)	**Device Number (hex)**	**Function Number (hex)**	**Description**
00	00	00	Intel 82440BX (PAC)
00	01	00	Intel 82440BX (PAC) AGP bus
00	07	00	Intel 82371AB (PIIX4E) PCI/ISA bridge
00	07	01	Intel 82371AB (PIIX4E) IDE bus master
00	07	02	Intel 82371AB (PIIX4E) USB
00	07	03	Intel 82371AB (PIIX4E) power management
00	0D	00	PCI expansion slot 1 (J4D2)
00	0E	00	PCI expansion slot 2 (J4D1)
00	0F	00	PCI expansion slot 3 (J4C1)
00	10	00	PCI expansion slot 4 (J4B1)

Table 74: Typical Interrupts

IRQ	**System Resource**
NMI	I/O channel check
0	Reserved, interval timer
1	Reserved, keyboard buffer full
2	Reserved, cascade interrupt from slave PIC
3	COM2*
4	COM1*
5	LPT2 (Plug and Play option) / audio / user available
6	Floppy drive
7	LPT1*
8	Real time clock

9	Reserved
10	User available
11	Windows Sound System* / user available
12	Onboard mouse port (if present, else user available)
13	Reserved, math coprocessor
14	Primary IDE (if present, else user available)
15	Secondary IDE (if present, else user available)

* Default, but can be changed to another IRQ

Other Information

Reliability

The mean time between failures (MTBF) prediction is calculated using component and subassembly random failure rates. The calculation is based on the Bellcore Reliability Prediction Procedure, TR-NWT-000332, Issue 4, September 1991.
The MTBF prediction is for:

- Redesigning the motherboard for alternate components if failure rates exceed reliability expectations.
- Estimating repair rates and spare parts requirements.

MTBF data is calculated from predicted data @ 55 °C.

The MTBF prediction for the motherboard is 112,977. 7547 hours.

Temperature

Table 75: Temperature

Temperature	Specification
Non-operating	-40°C to +70°C
Operating	0°C to +55°C

Chapter 6: Glossary

BIOS
(Basic Input Output System) This is software stored on a chip and consists of the instructions necessary for the computer to function. The System BIOS contains the instructions for the keyboard, disk drives etc., and the VGA BIOS controls the VGA graphics card.

CPU
Central Processing Unit. This is the main piece of equipment on the motherboard. The CPU processes data, tells memory what to store and the video card what to display.

Default
The configuration of the system when it is switched on or the standard settings before any changes are made.

DIMM
Dual In-Line Memory Module, a type of memory module used for the systems main memory.

Driver
A piece of software which is used by application software to control some special features. Each graphics board and printer requires its own driver.

D-Type
A common type of connector used for connecting printers, serial ports, game port, and many other types of interface.

DRAM
Dynamic Ram used for main system memory, providing a moderately fast but cheap storage solution.

FDC
Floppy Disk Controller - the interface for connecting floppy disk drives to the computer.

Hercules
A monochrome graphics video mode which first appeared in the Hercules graphics card. Provides a resolution of 720 by 348 pixels.

IDE
Integrated Drive Electronics - currently the most popular type of interface for hard disk drives. Much of the circuitry previously required on hard disk controller cards is now integrated on the hard disk itself.

Interface
The electronics providing a connection between two pieces of equipment. For example, a printer interface connects a computer to a printer.

Interlace
The mode the graphics card uses to refresh a monitor screen. When the graphics is in interlace mode, the frequency of the display update is lower than in non-interlace mode. This causes a slight flicker, so generally non-interlaced mode is better if the monitor supports it.

L.E.D.
Light Emitting Diode - a light which indicates activity - for example hard disk access.

PCI
Peripheral Component Interface. It became apparent to manufacturers that the 8MHz AT ISA BUS on the standard PC was just not fast enough for today's applications, and so PCI was invented. It is a high speed data bus that carries information to and from components - known as 'Local Bus'.

RAM
Random Access Memory - the memory used by the computer for running programs and storing data.

ROM
Read Only Memory - a memory chip which doesn't lose its data when the system is switched off. It is used to store the System BIOS and VGA BIOS instructions. It is slower than RAM.

RAMBUS
RAMBUS In-line Memory Module- a type of memory module used for the systems main memory. Faster than conventional DIMMs.

Shadow Memory
The BIOS is normally stored in ROM. On certain systems it can be copied to RAM on power up to make it go faster. This RAM is known as shadow memory. The System BIOS is responsible for this copying.

Super VGA
Additional screen modes and capabilities provided over and above the standard VGA defined by IBM.

VGA
Video Graphics Array - the graphics standard defined by IBM and provided on IBM's PS/2 machines.

Notes

Chapter 7: Suggestions

Viglen is interested in continuing to improve the quality and information provided in their manuals. Viglen has listed some questions that you may like to answer and return to Viglen. This will help Viglen help to keep and improve the standard of their manuals.

1. Is the information provided in this and other manuals clear enough?

2. What could be added to the manual to improve it?

3. Does the manual go into enough detail?

4. Would you like an on-line version of this manual?

5. How do you rate the Viglen Technical support and Service Departments?

6. Are there any technological improvements that could be made to the system?

7. Other points you would like to mention?

Please return this slip to:

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