Advanced Pentium II
Motherboard

# IN440EX-D

## USER'S MANUAL

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# EASY INSTALLATION

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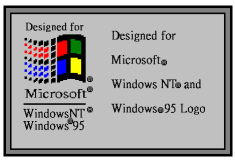


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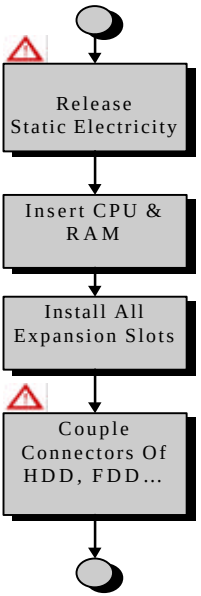
# EASY INSTALLATION

The following “Easy Installation” steps are for users accustomed to the assembly of a computer system. For those individuals requiring more specific information please refer to the more detailed descriptions located within the latter chapters of this manual. Note: You must keep your power cable unplugged until the following installation steps are completed.

Getting Start:

Touch a grounded metal surface to release static electricity stored in your body before unpacking your motherboard. For details please refer to Precaution section in Chapter 3.




Install the CPU by correctly aligning the CPU with the Slot 1 as noted in the motherboard diagram. Once aligned, press down on the CPU gently but firmly. Next, install either the 3.3 volt unbuffered EDO or SDRAM into the 168 pin DIMMs. See Sec. 3.2 & Sec. 3.3.

After completing the above steps, install any expansion cards into the appropriate PCI, ISA or AGP slots and screw them tight to the chassis. See Sec. 3.4.

Plug in all cables included in the package except for the power cord. Please see Sec. 3.5.

Please recheck all steps to ensure no mistakes have been made and then plug in the power cord and turn on the power to enter the BIOS setup, Chapter 4.

# EASY INSTALLATION

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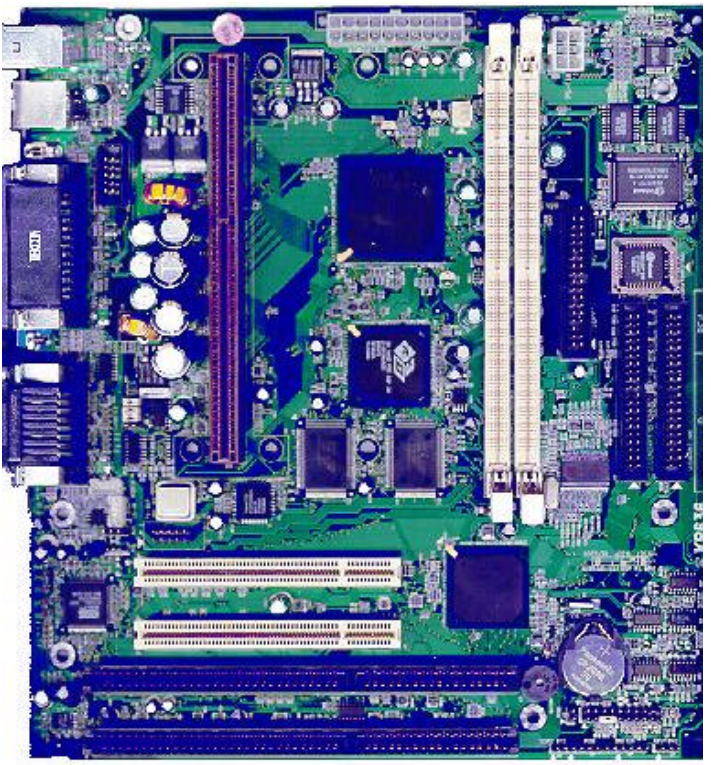

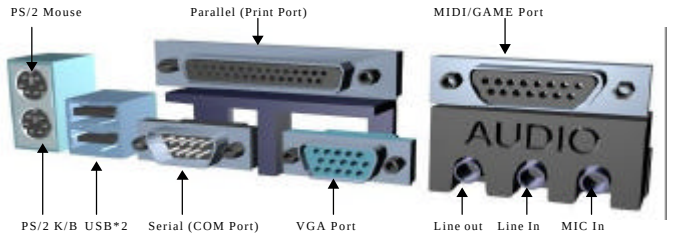

## FEATURES

### Processor/Cache:

| | |
|---|---|
| Processor | Intel "Deschutes", "Klamath", Celeron", "Mendocino" Pentium II 233 ~ 433 MHz Operation with FSB (Front Side Bus) 66 MHz |
| Upgrades | Slot 1 |
| Cache | CPU Cartridge Integrated; Write Back and Write Through, direct mapped organization "BSB" Cache |
| Size | 0KB or 512KB |

### System Memory

| | |
|---|---|
| Memory Size | 8MB Min up to 256MB with Un-buffered SDRAM |
| Memory Sites | 2 DIMM Sockets. SDRAM. Auto-detect w/Table Free Configuration Double Density DIMMs. |
| ECC/EC | Non-ECC support. |
| DIMM Type | 8, 16, 32, 64 and 128MB. 64-bit non-ECC |
| Memory Speed | SDRAM 66Mhz parameter for synchronous memory. |

### Chipset

| | |
|---|---|
| Chipset type | 82440EX AGP/PCI/ISA Chipset |
| ISA/PCI Bus | |
| ISA/PCI SPEC | PCI Level 2.1. 33 MHz Zero Wait State |

### Graphics Support

| | |
|---|---|
| "AGP" | ATI 3D Rage Pro Turbo 2X AGP with sidebands and pipelining 64-bit PCI Graphics Accelerator. |
| Video Memory | SGRAM @ 100MHz (1M*16) |
| Memory Capacity | 8MB on the motherboard, |

### Integrated I/O

| | |
|---|---|
| I/O Controller | Winbond W83977TF (Plug & Play Compliant) Serial Ports One 9 pin connectors for dual asynchronous serial ports. High speed 16C550 compatible serial ports. |
| Infrared Interface | Infrared port with FIR, IrDA and ASKIR |
| Parallel Port | One 25 pin supporting EPP, ECP and Centronics Interface |
| Hard Disk Controller | PCI Bus Mastering IDE. Native and Compatible Mode Support. IDE Transfer with Scatter Gather. "Ultra 33" Synchronous DMA. Enhanced IDE |

| | |
|---|---|
| | PIO mode 4 (16MB/s) Independent IDE timing. FIFOs for PCI Burst Transfers. Swap-Bay Support. Integrated 8x32-bit buffer for IDE PCI Burst Transfers |
| Hard Disk Connector | 2 PCI IDE Connectors for 4 Drives Support |
| Floppy Controller | 720 KB, 1.2, 1.44 and 2.88 |
| Keyboard Port | PS/2 (Integrated in the W83977TF) |
| Mouse Port | PS/2 (Integrated in the W83977TF) |
| Real Time Clock | Integrated in the PIIX4 (DS1287 Compatible) |
| System Monitor | Winbond W83781D; Voltage/Temperature/Fan Speed |

**External Communication Ports**

| | |
|---|---|
| Serial Bus | Universal Serial Bus (USB), integrated with Core Logic |

**Integrated Sound**

| | |
|---|---|
| Sound Chip | ESS Solo –1 Business Audio |
| CODEC | 16-bit Stereo |
| FM Synthesis | ESFM™ Music Synthesiser |
| Sound Effects | 3D stereo effects |
| Wave Table | Software Wavetable |

**System BIOS**

| | |
|---|---|
| BIOS Type | Winbond based 2Mbit Flash |
| Hard Disk Driver | IDE, Auto-configuring |
| Plug&Play Support | Steerable DMA Channels and Interrupts. ISA Plug&Play |
| Special Features | PC-98 ready. Multi-Boot. PCI Add-In cardauto-config. |

**Green Features**

| | |
|---|---|
| Power Management | APM 1.2, |
| Advanced Features | ACPI (Advanced Configuration and Power Interface) compliant hardware for use with APM & PNP-BIOS APIs |

**Jumpers and Front Panel Connectors**

| | |
|---|---|
| Connectors | Reset switch. Suspend/Resume Button. Speaker. HD & PWR LED. Power Button. IR. (Jumpers CPU Speed Multiplier. Password/CMOS Clear. |

**Headers and Rear Panel Connectors**

# FEATURES

| | |
|---|---|
| Connectors | Video. Parallel and Serial 1 Ports. Keyboard. Mouse. Line-Out. Mic., Line-In, game/midi USB 1&2 |
| Headers | Serial 2. CPU Fan. |

**Headers and Connectors**

| | |
|---|---|
| Connectors | None |
| Headers | Floppy. IDE 1&2. CD-Audio In. Modem Audio. Aux-In. Reset switch. Speaker. Suspend/Resume Button. HDD & Power LED. Chassis Fan. |

**Mechanical**

| | |
|---|---|
| Board Style | MicroATX Form Factor |
| Board Size/Type | 9.6” x 9.0”, Four Layer Board |

**Expansion Slots**

| | |
|---|---|
| Description | Two PCI Expansion connectors and two ISA Expansion connectors(One Shared). |

# 1. INTRODUCTION

This section provides an overview for the MicroATX Pentium® II based PCI/ISA Printed Wiring Assembly (PWA) code-named "IN440EX-D-D". It describes functional blocks and their relationship. The following diagram shows the functional blocks

## 1.1. Overview

The IN440EX-D-D is an implementation of BCM Advanced Research for a High-Volume MicroATX motherboard featuring these subsystems:

- Intel Pentium™ II MMX Processor cartridge support through the SLOT 1 connector
- Intel 82440EX PCIset: 82443EX (“PAC” PCI A.G.P. Controller) and 82371SB (“PIIX4” PCI-ISA-IDE Xcelerator)
- Accelerated Graphics Port “AGP” connector
- PCI IDE Bus Master interface
- Embedded advanced I/O support
- System Management Logic
- Advanced multiple Audio interface
- USB (Universal Serial Bus)
- System Monitoring Hardware
- MicroATX form-factor motherboard

The targeted Operating Systems for the IN440EX-D-D are: Windows 95, Windows 98 and Windows NT.

### 1.1.1. Processor Subsystem

The IN440EX-D has provisions to support the following processors: Intel Pentium™ II Processor with MMX™ technology (Deschutes) operating at 333/66, 300/66, 266/66 and 233/66, Celeron at 366/66, 400/66 and 433/66 MHz. The Processor speeds are selectable with a four, (4) jumper block combination for the bus-to-core frequency ratio and CPU bus speed. The bus-to-core ratio is either 2/7, 1/4, 2/9 or 1/5 yielding the bus/core frequency; 66/233, 66/266, 66/300, 66/333, 66/366, 66/400 or 66/433 MHz respectively.

High-performance features, including pipelined 32-bit addressing, 64-bit data, 16KB/16KB Instruction/Data Write-back or Write-through 2-way set

associative primary cache. 0KB/512KB Write-back direct mapped secondary cache on the CPU Cartridge using a Back-Side-Bus (BSB). Two (2) Memory DIMM for support of SDRAM.

Two onboard DC/DC converters supply the +2.5 Volts for the CPU I/O voltage and the +1.5 Volts GTL+ bus voltage (VTT). An on-board switching power converter supplies the CPU core voltage (VCORE), the switcher supports the Pentium® II Voltage-ID pins for auto-voltage programming of the switcher supply.

### 1.1.2. Cache Subsystem

The cache and control functions are part of the Pentium® II Processor. The cache SRAM interface is through the processor's Back-Side-Bus (BSB) and is included within the CPU cartridge.

The IN440EX-D can accept either the Pentium® II cartridge with 512KB of second level (L2) Pipelined Burst SRAM cache. The Pentium® II second level cache supports a direct mapped organization with a write-back policy, providing all necessary snoop functions and inquire cycles. Cacheability of the entire memory space in the first level cache is supported. For the second level cache only the first 512MB of main memory is cacheable, and only main memory controlled by the PAC DRAM interface will be cached, PCI and ISA memory is not cached.

### 1.1.3. Memory Subsystem

The IN440EX-D DRAM controller supports a 64-bit memory data interface, optionally supporting 64-bit wide DIMM modules, without ECC/EC. The DRAM types supported are Synchronous DRAM (SDRAM). SDRAM is supported at 66 MHz using symmetrical addressing.

The IN440EX-D Main Memory interface provides two (2) 168-pin DIMM socket (DIMM0 and DIMM1) sites, allowing system memory from 8MB to 256MB of SDRAM.

The DIMM sockets support either single or double-sided 'Unbuffered DIMM' modules. The installed DRAM type can be 8MB, 16MB, 32MB, 64MB or 128MB DIMMs. The DRAM Controller uses the JEDEC standard Serial Presence Detect (SPD) Mechanism to detect memory and array configurations, there is no jumper settings required for the memory size. Memory is automatically detected by the system BIOS.

Rules for Populating the DIMM memory array

- DIMM sockets can be populated in any order.
- The DRAM Timing register, which provides the DRAM speed grade control for the entire memory array, will be programmed to use the timings of the slowest DRAMs installed.

### 1.1.4. Data Integrity Subsystem

Several data integrity features are included in the system. These are 64-bit DRAM interface for EX chipset, parity generation and checking on the PCI Bus and A.G.P. (for PCI transactions).

**PCI Bus.**

The system implements parity generation/checking as defined by the PCI specification.

**A.G.P. Bus.**

For the operations on the A.G.P. interface using PCI protocol, the system supports Parity generation/checking as defined by the PCI specification.

**Main Memory DRAM Protection Modes.**

The system supports three modes of data protection of the DRAM array:
Non-ECC with Byte-Wise Write Support (Default mode, in this mode there is no provision for protecting the integrity of data in the DRAM array.)

### 1.1.5. A.G.P. Interface

The A.G.P. is a high performance, component level interconnect targeted at 3D graphics applications and is based on a set of performance enhancements to PCI. The IN440EX-D is designed to support the A.G.P. Interface.

The A.G.P. implementation is compatible with the Accelerated Graphics Port Specification. The system supports only a synchronous A.G.P. interface coupling to the host bus frequency. The actual bandwidth will be limited by the capability of the system's memory, reaching the highest performance with fast SDRAM. The A.G.P. Interface supports PCI operations as defined by the PCI specification. Electrically, only 66MHz PCI operations are supported.

For the definition of A.G.P. Interface functionality (protocols, rules and signalling mechanisms, as well as the platform aspect of A.G.P. functionality), refer to the latest A.G.P. Interface Specification. This

document focuses only on the Controller specifics of the A.G.P. interface functionality.

### 1.1.6. Embedded PCI Devices

The PCI bus contains 1 embedded PCI device: PCI bus mastering IDE interface. The arbiter within the PAC performs arbitration for PCI bus masters.

### 1.1.7. PCI Bus Master IDE

PIIX-4 provides an integrated Bus Mastering IDE controller with two high performance IDE interfaces for up to four devices, such as Hard Drives and CD-ROM.

### 1.1.8. PCI Add-in Cards

High Performance PCI I/O cards can be used in the IN440EX-D through the PCI connector slots. The PCI bus is specified to support 10 loads. Each embedded controller or bridge (Video, PCI to ISA Bridge) count as 1 load, each PCI expansion slot used counts as 2 loads. To support multiple PCI devices in a single slot, add an expansion board containing PCI to PCI Bridge to a secondary PCI segment.

### 1.1.9. Embedded A.G.P. Devices

The AGP bus contains 1 embedded device: The ATI 3D Rage Pro Turbo 2X Graphics Accelerator. The 3D Rage Pro is a highly integrated graphics controller, integrating the 2D, 3D and video accelerators, palette DAC and quadruple clock synthesiser.

### 1.1.10. Embedded I/O Subsystem

The Winbond Plug and Play Ultra I/O controller “W83977TF” represents the newest technology in functionality and integration. While providing the standard PC I/O requirements the Ultra I/O complies with the ISA Plug-and-Play standard version 1.0a, and provides for the recommended functionality to support Windows 95. The Ultra I/O qualifies 16-bit address to allow relocation of 480 different addresses, with 13 IRQ options and 3 DMA channels available for each logical device.

Other features of the Ultra I/O are: 8042 keyboard controller. An Infrared interface for Fast IR (FIR), IrDA and ASKIR. Floppy interface. Two serial ports with 16-byte FIFOs. One EPP/ECP supported bi-directional parallel port.

### 1.1.11. System Management Subsystem

The IN440EX-D support the System Monitor services using Winbond's W83781D System Management chip. The W83781D is used to monitor Voltage, Temperature and Fan Speed. The combination of the System Monitor and the Wake On LAN (WOL) functionality achieves the Management Level 3.

### 1.1.12. Advanced Configuration and Power Interface "ACPI"

The IN440EX-D supports the ACPI specification and its key elements; The Operating System Directed Power Management (OSPM). ACPI evolves the existing collection of power management BIOS code, APM APIs, PNP BIOS APIs, and so on into a well-specified power management and configuration mechanism. It provides support for an orderly transition from existing (legacy) hardware to ACPI hardware, and it allows for both mechanisms to exist in a single machine and be used as needed. ACPI evolves the existing motherboard configuration interfaces to support these advanced architectures in a more robust, and potentially more efficient manner.

OSPM provides a new appliance interface to customers. In particular, it provides for a sleep button. This sleep button is a "soft" button, which does not turn the machine physically off but signals the OS to go into a 'soft off' or sleeping state. ACPI defines two types of these "soft" buttons: one for putting the machine into sleep mode and one for putting the machine into 'soft off' mode.

This gives the OEM two different ways to implement machines: A one or a two-button model. The button on the one-button model can be used as a power button or a sleep button as determined by user settings. The two-button model has an easily accessible sleep button and a separate power button. In either model, an override feature that forces the machine to turn off or to reset without OS consent is also needed to deal with various rare, but problematic, situations.

# INTRODUCTION

ACPI is neither a software nor a hardware specification, although it addresses both software and hardware and how they must behave. ACPI is actually an interface specification.

# 2. Functional Architecture

## 2.1. Processor Subsystem

The Pentium® II processor connects with the system through a 242-pin connector type socket on the circuit board labelled SLOT-1. The 242-pin configuration corresponds to a standard pinout that can accommodate the following processors:

Intel Pentium™ II Processor with MMX (Celeron)
Intel Pentium™ II Processor with MMX (Klamath)
Intel Pentium™ II Processor with MMX (Deschutes)

### 2.1.1. SLOT-1 Processor Socket Pinout

The 242-pin connector is provided to allow for easy configuration at the time of manufacture or as a field upgrade of the microprocessor.

| | |
|---|---|
| Reference: | SLOT-1 |
| Connector Type: | Female, 242 pin Dimm |
| Connector Part Number: | Molex 71796-0001 (Or equivalent) |

### 2.1.2. Processor Upgrade

The Pentium™ II processor maybe removed and replaced to accommodate Kamath or “Deschutes”. Changes to the VCORE (Core Voltage Selection) are automatically adjusted.

### 2.1.3. Processor Heat Sink

The IN440EX-D M/B provides 12V power for the cooling fan through a 3-pin header with Fan-On control and Fan Speed detection.

## 2.2. Memory Subsystem

### 2.2.1. DRAM Subsystem

The IN440EX-D has two 64-bit (168-pin) DIMM sockets (DIMM0 and DIMM1) allowing system memory from 8 MB to 256MB of main DRAM. There are no

jumpers settings required for the memory size, which is automatically detected by the system BIOS.

The DIMMs are rated 66 MHz (Klamath) or 100 MHz (Deschutes) SDRAM (Synchronous DRAM). DIMM modules must be 'Unbuffered' and operate at 3.3V. All the allowable memory size configurations are described on table 2.1 (Refer to Table 3.6 in the "Configuration" section for the different combinations and sizes of DIMMs).

**Table 2.1. DRAM memory configurations in Megabytes.**

| | | | | | |
|---|---|---|---|---|---|
| 8 | 16 | 24 | 32 | 40 | 48 |
| 64 | 72 | 80 | 96 | 128 | 136 |
| 144 | 176 | 192 | 256 | | |

### 2.2.2. DRAM (DIMM) Sockets

Connection to the main system DRAM can be done via two (2) DIMM connectors on the system PWA.

Reference: DIMM0, DIMM1
Connector Type: female, 168 pin DIMM, in-line connector
Connector Part Number: Berg. 91145-60024 (Or equivalent)

### 2.2.3. System BIOS

The system and video BIOS are stored in a 2M-bit (256Kx8) Flash Memory device. The system BIOS is always shadowed and cached.

## 2.3. L2 Cache Subsystem

The Pentium® II processor cartridge provides an unified 0KB or 512KB second level (L2) cache to complement the level one data and instruction (L1) internal caches. The L2 cache is Direct-Mapped non-sectored, supporting the Write Back policy architecture.

**Table 2.2. L2 Cache latency with Burst SRAM**

| Cycle Type | Clock Count |
|---|---|
| Burst Read | X-1-1-1 |
| Burst Write (Write-back) | X-1-1-1 |
| Single Read | X |
| Single Write | X |
| Pipelined Back-to-Back Burst | X-1-1-1,1-1-1-1[1] |

| | |
|---|---|
| Reads | |

[1]: The back-to-back cycles do not account for CPU idle clocks between cycles

### 2.3.1. Cacheable and Non-Cacheable Regions

The system caches the following regions:

All system memory, including 0 to 640 KB and all memory present above 1 MB up to 1GB.
System and integrated video controller BIOS.

The system does not cache the following regions:

The video memory block from A0000 to BFFFF.
PCI memory space on top of main memory.
Any access to the PCI or AT bus.

## 2.4. Address Maps

### 2.4.1. Memory Map

The following table describes the breakdown of the IN440EX-D memory areas and how they are assigned.

**Table 2.3. Memory Map**

| LOCATION | SIZE | TO | DESCRIPTION |
|---|---|---|---|
| 0FFFFFFF-FFFFFFFF | 256MB | 4GB | BIOS ROM |
| 000E0000-000FFFFF | 128KB | 1MB | System BIOS (Shadowed in DRAM) |
| 000C8000-000DFFFF | 96KB | 896KB | Expansion region (Shadowed in DRAM) |
| 000C0000-000C7FFF | 32KB | 800KB | Video BIOS (Shadowed in DRAM) |
| 000A0000-000BFFFF | 128KB | 768KB | Video Buffer (SMM space Non-Cacheable) |
| 00080000-0009FFFF | 128KB | 640KB | Optional memory space gap (DOS Apps) |
| 00000000-0007FFFF | 512KB | 512KB | DOS applications (No read/write protect) (Always cacheable) |

## 2.5. Video Subsystem

3D RAGE PRO Graphics Controller is a highly integrated graphics controller. Incorporated within this single chip are the 2D, 3D and video accelerators, palette DAC, and quadruple clock synthesiser. This multi-function integrated controller delivers superior 3D performance, TV-quality scaled video optimized for MPEG playback, industry-leading Mach64 2D performance, and video expansion capability suited for video conferencing, cable TV viewing, and hardware MPEG decoding.

The availability of ATI BIOS, drivers, utilities, and application software developed for the entire chip family is a major strength for the 3D RAGE PRO. Being register-compatible with all other controllers in the Mach64 accelerator series means immediate compatibility with a wide range of application drivers. Since this controller is also pin-compatible with ATI's family of other mach64 integrated controllers, it provides to the OEM a low-cost upgrade path to additional features and performance.

This controller uses active power management techniques to monitor activity levels within its' self and to perform real-time power reductions such as dynamic clock control and graphics engine shutdown. Because full-speed operation can be restored without delay, these techniques do not impact performance. Major advances have been included in this chip to boost performance in the area of a new bus interface, Accelerated Graphics Port (AGP). With AGP data the throughput between host and 3D RAGE PRO has greatly increased. The result is even faster 2D and 3D performance and enhancements to motion video support (e.g. MPEG-2 motion compensation).

### 2.5.1. FEATURES

3D Accelerator

Complete 3D primitive support: points, lines, triangles, lists, strips and Quadrilaterals
Triangle Setup Engine with floating point to integer parameter conversion
4K on-chip Texture Cache
Destination Alpha
Gouraud shading
Alpha blending and alpha interpolation
16-bit Z buffer
Fogging and fog interpolation
Dithering support in 16 bpp for near 24 bpp quality
Perspectively correct mip-mapped texture mapping hardware, supporting:

Palletized CI4 and CI8 texture expansion
Texture filtering models including tri-linear mip mapping
Texture lighting modes
Ability to use YUV format textures
Alpha in texture map
Texture maps up to 1024 x 1024
Non square texture maps

Software driver support for Direct 3D, QuickDraw 3D RAVE and OpenGL interfaces, as well as others.

Video Accelerator/Video Capture

Back end scaling
Color interpolation during scaling for improved high resolution video quality
Integrated 768 pixel wide dual video line buffers support filtered video scaling
4 tap horizontal and 2 tap vertical scalers for high-quality, full-screen video playback with MPEG-2 (720x480) sources
YUV to ROB color space conversion with support for both packed and planar YUV formats as follows:
YUV422, YUV410 (YUV9), YUV420 (YUV12)
RGB32, RGB16/15
Built-in continuous brightness and gamma correction to correct 'dark' images
Chroma keying for effective overlay of video on graphics
Overlay true color video regardless of the current graphics mode
New buffer and frame synchronization modes to reduce display tearing
Ability to turn off graphics data access behind video, hence reducing bandwidth
Support for CCIR 656 video standard
Ability to capture VBI and Intercast data
Mirror video capture to support video conference

2D Accelerator

Hardware acceleration - Rectangle Fill, Line Draw, BitBlt, Polygon Fill,Panning/Scrolling, Bit Masking, Monochrome Expansion, Scissoring, and full ROP support
PCI bus master support for GUI programming
8x8x8 SRC Brush support
Quick engine setup with alias registers
Improved FIFO management to memory controller
Increased command FIFO to 128 DWORDs
Hardware cursor up to 64x64x2
Acceleration provided in 8/l6/24/32bpp modes. Packed pixel support (24bpp) enables true color in 1MB configurations

Game acceleration for Microsoft's DirectDraw—Double Buffering, Virtual Sprites, Transparent Blit and Masked Blit
Increased display FIFO to 32 DWORDs. Additional 64 entry FIFO for Bus mastering
True 24-bit, true-color palette DAC:
Pixel clock rates up to 200MHz, with 230MHz option, for up to 1600x1200 screen resolution at 85Hz vertical
Pixel depth of 32 bit at 1600x1200 screen resolution with WRAM and external RAMDAC at 240 MHz
Gamma correction for true WYSIWYG
Full 24-bit palette

### 2.5.2. General Features

Integrated 3D, 2D, and Video accelerators with palette DAC and quad-clock synthesiser in a single chip
Comprehensive AGP support, including 66 MHz and 133 MHz pipeline operation with sideband addressing
PCI revision 2.1 bus for Plug-and-Play ease of use
Bi-endian support for compliance on a variety of processor platforms
128-level command FIFO assures fast response to host command transfers for maximum CPU/host bus/controller efficiency and concurrent operation
Additional 64 entry FIFO dedicated to Bus mastering
Programmable flat or paged memory model with enhanced host access to a linear frame buffer
32-bit wide read/writeable memory mapped registers with optimized organization, reduces instruction overhead and raises performance
DDC1 and DDC2B+ Plug-and-Play monitor support
Power management for full VESA Display Power Management Signalling(DPMS) and EPA Energy Star compliance. Also, register support for controller power reduction and DAC power down
Built-in CRC, chip diagnostics and manufacturing SCAN to ensure quality components

### 2.5.3. Video Modes

The following video modes are supported on the system board by the ATI-3D Rage Pro Graphics and Video Controller

**Table 2.4. Video Modes**

| Display Screen Resolution | Re-fresh Rate | Hor. Scan (kHz) | Pixel Clock (MHz) | Colors (Bits per Pixel) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 8 MB DRAM | | | | |
| | | | | 4 | 8 | 16 | 24 | 32 |
| 640x480 | 60 | 31.4 | 25.2 | √ | √ | √ | √ | √ |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 640x480 | 72 | 37.7 | 31.2 | √ | √ | √ | √ | √ |
| 640x480 | 75 | 37.5 | 31.5 | √ | √ | √ | √ | √ |
| 640x480 | 90 | 47.9 | 39.9 | √ | √ | √ | √ | √ |
| 640x480 | 100 | 52.9 | 44.9 | √ | √ | √ | √ | √ |
| 640x480 | 120 | 63.7 | 55.0 | √ | √ | √ | √ | √ |
| 800x600 | 48 | 33.8 | 36.0 | √ | √ | √ | √ | √ |
| 800x600 | 56 | 35.1 | 36.0 | √ | √ | √ | √ | √ |
| 800x600 | 60 | 37.8 | 40.0 | √ | √ | √ | √ | √ |
| 800x600 | 70 | 44.5 | 44.9 | √ | √ | √ | √ | √ |
| 800x600 | 72 | 48.0 | 50.0 | √ | √ | √ | √ | √ |
| 800x600 | 75 | 46.8 | 49.5 | √ | √ | √ | √ | √ |
| 800x600 | 90 | 57.0 | 56.6 | √ | √ | √ | √ | √ |
| 800x600 | 100 | 62.5 | 67.5 | √ | √ | √ | √ | √ |
| 800x600 | 120 | 76.0 | 81.0 | √ | √ | √ | √ | √ |
| 1024x768 | 43 | 35.5 | 44.9 | √ | √ | √ | √ | √ |
| 1024x768 | 60 | 48.3 | 65.0 | √ | √ | √ | √ | √ |
| 1024x768 | 70 | 56.4 | 75.0 | √ | √ | √ | √ | √ |
| 1024x768 | 72 | 58.2 | 75.0 | √ | √ | √ | √ | √ |
| 1024x768 | 75 | 60.0 | 78.8 | √ | √ | √ | √ | √ |
| 1024x768 | 90 | 76.2 | 100 | √ | √ | √ | √ | √ |
| 1024x768 | 100 | 79.0 | 110 | √ | √ | √ | √ | - |
| 1024x768 | 120 | 96.7 | 130 | √ | √ | √ | √ | - |
| 1152x864 | 43 | 45.9 | 65.0 | √ | √ | √ | √ | √ |
| 1152x864 | 47 | 44.8 | 65.0 | √ | √ | √ | √ | √ |
| 1152x864 | 60 | 54.9 | 80.0 | √ | √ | √ | √ | - |
| 1152x864 | 70 | 66.1 | 100 | √ | √ | √ | √ | - |
| 1152x864 | 75 | 75.1 | 110 | √ | √ | √ | √ | - |
| 1152x864 | 80 | 75.1 | 110 | √ | √ | √ | √ | - |
| 1152x864 | 85 | 77.1 | 121.5 | √ | √ | √ | √ | - |
| 1280x1024 | 43 | 50.0 | 80.0 | √ | √ | √ | √ | - |
| 1280x1024 | 47 | 50.0 | 80.0 | √ | √ | √ | √ | - |
| 1280x1024 | 60 | 69.3 | 110 | √ | √ | √ | √ | - |
| 1280x1024 | 70 | 74.6 | 126 | √ | √ | √ | √ | - |
| 1280x1024 | 74 | 78.8 | 135 | √ | √ | √ | - | - |
| 1280x1024 | 75 | 79.9 | 135 | √ | √ | √ | - | - |

### 2.5.4. Video Memory

The system's video memory consists of SGRAM only. In it's standard configuration, the system will have 1M*16 SGRAM chips soldered on the board to give a total of 2MB/4MB.

### 2.5.5. Video (Monitor) Connector

Connection to VGA monitor is via a connector on the rear panel on the system PWA.

Reference: J1 (Video)
Connector Type: female, high density DB15S, 15-pin AT-compatible
Connector Part Number: Foxconn Dz11AA1B8 or equivalent

**Table 2.5. Video Monitor Connector Pinout**

| PIN | Description |
|---|---|
| 1 | RED |
| 2 | GREEN |
| 3 | BLUE |
| 4 | N/C |
| 5 | LOGIC-GROUND |
| 6 | RED GROUND RETURN |
| 7 | GREEN GROUND RETURN |
| 8 | BLUE GROUND RETURN |
| 9 | +5V PULL-UP |
| 10 | LOGIC GROUND |
| 11 | N/C |
| 12 | DDC DAT |
| 13 | HORIZONTAL-SYNC |
| 14 | VERTICAL-SYNC |
| 15 | DDC CLK |
| 16 | LOGIC-GROUND[1] |
| 17 | LOGIC-GROUND[1] |

1: Pins 16 and 17 are connector mounting holes connected to logic ground.

## 2.6. Sound Subsystem

The IN440EX-D uses the ESS Solo-1 (ES1938), which is a single chip multimedia audio system controller. It includes an integrated FM synthesiser and a Plug and Play PSI interface. The ES1938 is compatible with the Microsoft Windows Sound System standard and will run software written to the Sound Blaster and Sound Blaster Pro interfaces.

### 2.6.1. Sound Features

Compatible with Sound Blaster™, Sound Blaster Pro™, and Windows Sound System™, PC97/PC98 and WHQL specifications.
High-Quality ESFM™ Music Synthesiser.
Fully Plug-and-Play PCI Compatible
Integrated Spatializer® 3D Audio Effects Processor.
16-Bit Address Decode Support
4248 Register Compatible
Dynamic Range (SNR) Over 80dB

ACP1 Compliant

### 2.6.2. Line Out Connector

The audio subsystem provides external sound through a user accessible stereo jack connector (J5-1) soldered to the PWA. This jack will allow the connection of self-amplified speakers.

| | |
|---|---|
| Reference: | J5-1 (LINE OUT) |
| Connector Type: | 1/8 in. Audio Jack Connector |
| Connector Part Number: | Singatron, SJ-500C-0 (or equivalent) |

### 2.6.3. Microphone In Connector

An external accessible jack connector (J5-3) is soldered to the PWA to allow the connection of a microphone for voice input.

| | |
|---|---|
| Reference: | J5-3 (MIC IN) |
| Connector Type: | 1/8 in. Microphone Jack Connector |
| Connector Part Number: | Singatron, SJ-500C-0 (or equivalent) |

### 2.6.4. Line In Connector

An external accessible jack connector (J5-2) is soldered to the PWA to allow the connection of a Line-In for line input.

| | |
|---|---|
| Reference: | J5-2 (Line-In) |
| Connector Type: | 1/8 in. Line-In Jack Connector |
| Connector Part Number: | Singatron, SJ-500C-0 (or equivalent) |

### 2.6.5. 3D Sound

The ESS Solo-1 has integrated the 3D Audio Effects processor which uses technology from Spatializer® Audio Laboratories, Inc., and expands the sound field emitted by two speakers to create a resonant 3D sound environment.

### 2.6.6. CD-IN Connector (Audio)(J11)

Access to the CD-IN connector for audio input from CD-ROM drives.

### 2.6.7. Modem-In Connector(J9)

Access to the MODEM-IN connector for audio input and output from the phone connection.

## 2.7. PCI/ISA Expansion Slots

### 2.7.1. ISA Interface

The IN440EX-D incorporates a fully ISA (AT) bus compatible master and slave interface that is compatible with the IEEE 996 specification. The ISA interface also provides byte swap logic and I/O recovery support.

The ISA interface supports the following types of cycles:

PCI master-initiated I/O and memory cycles to the ISA bus
DMA compatible cycles between main memory and ISA I/O and between ISA I/O and ISA memory
Enhanced DMA cycles between PCI memory and ISA I/O
ISA refresh cycles initiated by either the controller or an external master
ISA master-initiated memory cycles to PCI and ISA master-initiated I/O cycles to the controller registers

### 2.7.2. ISA/PCI Expansion Slots

The IN440EX-D motherboard support ISA and PCI expansion buses to implement up to two (2) ISA and two (2) PCI slots. The IN440EX-D will support one (1) ISA, one (1) PCI and one (1) shared ISA/PCI slot.

### 2.7.3. ISA Bus Speed

Dividing the PCI clock by 4 generates the ISA system clock. The divide by 4 setting is used for 30MHz and 33MHz PCI bus speed. The frequencies supported are 7.5MHz and 8.33MHz.

### 2.7.4. AT Bus Refresh

The IN440EX-D system board supports *hidden* refresh cycles which allows the CPU to continue to execute unless an AT bus cycle is attempted coincident with the AT bus refresh cycle (ISA Bus refresh cycles are completely decoupled from DRAM Refresh). Transactions driven by PCI masters that target ISA or IDE resources while refresh is active are held off with wait states until the refresh is complete.

## 2.8. Storage Subsystem

### 2.8.1. IDE Hard Disk Drive Interface

The IN440EX-D provides two (2) independent high performance bus-mastering PCI IDE interfaces capable of supporting PIO Mode 3, Mode 4 and 'Ultra33' Synchronous DMA mode devices. The integrated IDE interface can control up to four IDE devices allowing for both CD-ROM and Hard Disk drives. IDE PRI & IDE SEC are the primary and secondary IDE connectors respectively. Both IDE controllers can be disabled through BIOS to allow for external disk drive controllers.

### 2.8.2. Floppy Disk Drive Interface

The IN440EX-D has an integrated 765B compatible floppy disk controller using the Winbond's W83977TF component. The FDC sub-section can control one (720KB, 1.2, 1.44 or 2.88MB) floppy disks or compatible tape drives. The floppy I/O address can be relocated to 480 different locations. 13 IRQ and 3 DMA channel options are available as well. Includes multiple power down modes for reduced power use.

The floppy disk interface contains 48mA drivers and Schmitt trigger inputs on the drive interface.

## 2.9. I/O Subsystem

The I/O Subsystem consists of a single component from Winbond. The IN440EX-D uses the Plug and Play Compatible Ultra I/O Controller "W83977TF", this device provides support for the ISA Plug-and-Play version 1.0a and includes the recommended functionality to support Windows 95. Through internal configuration registers, each of the W83977TF's logical device's I/O address, DMA channel and IRQ channel may be programmed. There are 480 I/O address location options, 13 IRQ options and 3 DMA channel options for each logical device.

The Ultra I/O device provides two (2) high speed UARTs compatible serial ports with send/receive 16 Byte FIFOs or one IR port, one Multi-Mode Parallel Port with ECP/EPP modes, and a Floppy/Tape Controller supporting up to 2.88MB transfer rates.

### 2.9.1. Serial Ports

The IN440EX-D has two (2) UARTs compatible serial ports configured as Data Terminal Equipment (DTE). The electrical characteristics are compliant with the *EIA-232-D Serial Communications Specifications*. The serial ports may be remapped above other installable serial ports or disabled through BIOS. As a minimum the first serial port (COM1) must be capable of re-mapping to COM3. The second serial port (COM2) must be able to be remapped to COM4. The serial ports I/O address can be relocated within 480 different locations. The default address for COM1, COM2, COM3 and COM4 are 3F8H, 338H, 2F8H and 238H respectively. 13 different IRQ options are available to the serial ports.

One port (COM1) is available through a connector (J4) is located on the rear panel of the system PWA. The second Serial Port (COM2) is available through a header on the PWA.

Reference: J4 (COM1)
Connector Type: male, 9 pin metal shell D-SUB
Connector Part Number: Amp 1-103322-5 or equivalent

Reference: J13 (COM2)
Connector Type: male, 2x5, 0.100” centerline, straight
Connector Part Number: Amp 1-103322-5 or equivalent

**Table 2.6. Serial Port Connector Pinout.**

| PIN | DESCRIPTION |
|---|---|
| 1 | DATA-CARRIER-DETECT (DCD) |
| 2 | RECEIVE-DATA (RXD) |
| 3 | TRANSMIT-DATA (TXD) |
| 4 | DATA-TERMINAL-READY (DTR) |
| 5 | LOGIC-GROUND |
| 6 | DATA-SET-READY (DSR) |
| 7 | REQUEST-TO-SEND (RTS) |
| 8 | CLEAR-TO-SEND (CTS) |
| 9 | RING-INDICATOR (RI) |
| 10 | SHELL-GROUND[1] |
| 11 | SHELL-GROUND[1] |

[1]: Pins 10 and 11 (Shell Ground) are mounting holes connected to the metal connector housing on serial port 1.

### 2.9.2. Parallel Port

The system PWA has a single, bi-directional parallel port (EPP/ECP compatible). The parallel port is capable of being disabled or remapped to

either the secondary LPT address or the tertiary LPT address through BIOS if other parallel ports are installed in the system. The parallel port I/O address can be relocated within 480 different locations. Three (3) DMA channels options and 13 different IRQ options are available to the parallel port.

A connector is located on the rear panel of the system PWA for the external connection to the port. The parallel port interface contains 12mA source output drivers on the drive interface, and incorporates ChipProtect circuitry for protection against damage due to printer Power-On.

Reference: J7 (PARALLEL)
Connector Type: female, 25 pin metal shell D-SUB
Connector Part Number: AMP 750096-3 or equivalent

**Table 2.7. Printer Port Connector Pinout**

| PIN | DESCRIPTION |
|---|---|
| 1 | STROBE* |
| 2 | PD0 |
| 3 | PD1 |
| 4 | PD2 |
| 5 | PD3 |
| 6 | PD4 |
| 7 | PD5 |
| 8 | PD6 |
| 9 | PD7 |
| 10 | ACKNOWLEDGE* |
| 11 | BUSY |
| 12 | PAPER-END (PE) |
| 13 | SELECT |
| 14 | AUTO-FEED* |
| 15 | ERROR* |
| 16 | INIT* |
| 17 | SELECT -IN* |
| 18 | LOGIC-GROUND |
| 19 | LOGIC-GROUND |
| 20 | LOGIC-GROUND |
| 21 | LOGIC-GROUND |
| 22 | LOGIC-GROUND |
| 23 | LOGIC-GROUND |
| 24 | LOGIC-GROUND |
| 25 | LOGIC-GROUND |
| 26 | SHELL-GROUND[1] |
| 27 | SHELL-GROUND[1] |

[1]: Pins 26 and 27 are connector-mounting holes connected to the metal connector housing.

### 2.9.3. Keyboard Interface

The system PWA has a PS/2-compatible keyboard interface. The shielded keyboard interface connector has a PS/2-compatible pinout and is located on the rear panel on the system PWA, this connector is a dual package with the Mouse connector residing on top. To meet the requirements for UL compliance, the Vcc pin (pin 4) is connected through a fuse prior to connection to the external connector.

Reference: J2 (KEYBOARD) bottom
Connector Type: female, 6-pin metal shield mini-DIN
Connector Part Number: AMP 749231-1 or equivalent

**Table 2.8. Keyboard Connector Pinout**

| PIN | DESCRIPTION |
|---|---|
| 1 | KEYBOARD-DATA |
| 2 | N/C |
| 3 | LOGIC-GROUND |
| 4 | KEYBOARD-Vcc |
| 5 | KEYBOARD-CLOCK |
| 6 | N/C |
| 7 | SHELL-GROUND[1] |
| 8 | SHELL-GROUND[1] |
| 9 | SHELL-GROUND[1] |

[1]: Pins 7-9 are, connector-mounting hole pins connected to the metal connector housing

### 2.9.4. Mouse Interface

The system PWA has a PS/2-compatible mouse interface. The shielded mouse port can be disabled through SETUP. A connector, utilizing PS/2 pinouts, is located on the rear panel on the system PWA. To meet the requirements for UL compliance the Vcc pin (pin 4) was connected through a fuse prior to connection to the external connector.

Reference: J2 (MOUSE) Top
Connector Type: female, 6-pin metal shield mini-DN
Connector Part Number: AMP 749231-1 or equivalent

**Table 2.9. Mouse Connector Pinout**

| PIN | DESCRIPTION |
|---|---|
| 1 | MOUSE-DATA |
| 2 | N/C |
| 3 | LOGIC-GROUND |
| 4 | MOUSE-Vcc |
| 5 | MOUSE-CLOCK |
| 6 | N/C |
| 7 | SHELL-GROUND[1] |
| 8 | SHELL-GROUND[1] |
| 9 | SHELL-GROUND[1] |

[1]: Pins 7-9 are connector-mounting hole pins connected to the metal connector housing.

### 2.9.5. Universal Serial Bus Connectors

The Universal Serial Bus (USB) is a communications architecture that gives a PC the ability to interconnect a variety of devices via a simple four-wire cable. The USB is actually a two-wire serial communication link that runs at 12 megabits (Mbs) per second. USB protocols can configure devices at startup or when they are plugged in at run time. These devices have been broken into five major classes:

- Monitors
- Communication devices
- Audio
- Human input
- Mass storage

More classes will be identified as the USB Standard matures.

The IN440EX-D is equipped with two USB Serial Ports. This permits connection of two USB peripheral devices directly to the system without an external hub. If more devices are needed, an external hub can be connected to either of the built-in ports.

Reference: J3, (USB-1) + USB2
Connector Type: USB CONN, DUAL
Connector Part Number: Molex, 87525-001 or equivalent

**Table 2.10. USB-1 & 2 Connector Pinout**

| PIN | DESCRIPTION | COMMENT |
|---|---|---|
| 1 | VCC | Cable power |

| | | |
|---|---|---|
| 2 | - Data | |
| 3 | + Data | |
| 4 | Ground | Cable ground |

### 2.9.6. Real-Time Clock

The integrated Real Time Clock (RTC) is DS12887/MC146818 compatible and provides the time of day clock, 100-year calendar with alarm features and is accurate to within 1 minute per month, it consumes less than 1 µA of standby current (Typ.). The (RTC) supports 256 bytes of battery backed Non-volatile CMOS memory in two banks of 128 bytes each, both banks being reserved for BIOS use. One bank of CMOS memory is used to maintain the clock and user-system-setting configuration parameters when the main system power is removed. The other bank (128 bytes) is lockable in 4x32 byte blocks and can be used to store and lock miscellaneous information.

The CMOS RAM can be set to specific values or cleared to the system default values using the BIOS SETUP program. Also to prevent a lock-up situation the CMOS RAM values can be cleared to the system defaults by using the CLR CMOS jumper on the PWA.

### 2.9.7. Non-volatile CMOS Memory Battery

An external coin-cell style battery provides power to the RTC and CMOS memory when system power is removed. The battery has an estimated lifetime of five to seven years and is socketed for easy replacement.

Reference: BT1
Socket Type: COIN TYPE

### 2.9.8. IR (Infra-Red) Support

The IN440EX-D I/O subsystem incorporates an IR interface supporting the following industry standards; Fast IR, IRDA (HP-SIR), ASK-IR. The IR header provides the necessary signal interface allowing a two-way wireless communication port using infrared as the transmission medium. The user can transfer files to/from portable devices such as laptops, PDA's and printers using application software such as LapLink. The Fast IR

specification provides for data transfers at 4 Mbps from a distance of 1 meter. This implementation also provides an infrared interface supporting a standard or custom remote control device to perform wireless keyboard or mouse functions.

### 2.9.9. IRDA Header (J19)

A header is available on the IRDA header for a cable connection to the IR module.

## 2.10. Miscellaneous Connectors

### 2.10.1. PC Speaker Connector

A header is available on the Speaker header (J22), pin 1 and pin 4 to drive a chassis-mounted speaker if desired.

### 2.10.2. CPU Fan Connector

A 1 x 3 straight header is available on the PWA to drive the CPU mounted cooling fan and provide the system with the Fan's tachometer input.

| | |
|---|---|
| Reference: | J18 (FAN) |
| Connector Type: | 1 x 3 male straight 0.100 |
| Connector Part Number: | AMCO 463-2-03 or equivalent |

**Table 2.11. CPU Fan Conn. Pinout**

| PIN | SIGNAL |
|---|---|
| 1 | LOGIC-GROUND |
| 2 | FAN-PWR-ON |
| 3 | FANTACH3 |

### 2.10.3. Hard Drive LED Connector

A header is available on the primary IDZ connector (J32) and secondary IDZ connector (J28) to power an LED on the front panel to indicate hard drive activity.

### 2.10.4. Suspend (Sleep) Connector (J27)

A header is available on the Sleep Header (J27) for connecting a momentary contact switch on the front panel, which can be used to turn the system into Sleep Mode.

### 2.10.5. Power Button Switch (J29)

A header is available on the power button header (J29) for connecting a momentary contact switch on the front panel, which can be used to turn the system power off or on.

### 2.10.6. Green/Power-on LED Connector

A header is available on the Green LED (J23, pin 1 and pin 3) for connecting to a Green LED or Power-on indicator (J23).

### 2.10.7. Reset Button Connector (J30)

A header is available on the Reset header (J30) for connecting a momentary contact switch on the front panel, which can be used to reset the system.

# 3. Configuration

## 3.1. Product Configuration

The PWA component will be produced by BCM without the microprocessor installed, it is assumed that the microprocessor will be installed during the customer's integration process. The same applies to the system memory DRAM DIMMs.

Processor Speed Select Jumper

To select the processor speed there is a jumper block of user-accessible jumpers labeled "JP1".

To select the processor speed install the jumper as follows:

**Table 3.1. CPU Speed Selection**

| Klamath CPU Speed (MHz) | 1-2 | 3-4 | 5-6 | 7-8 |
|---|---|---|---|---|
| 233 | ON | OFF | ON | OFF |
| 266 | OFF | ON | ON | ON |
| 300 | OFF | ON | ON | OFF |
| 333 | OFF | OFF | ON | ON |
| 366 | OFF | OFF | ON | OFF |
| 400 | ON | ON | OFF | ON |
| 433 | ON | ON | OFF | OFF |

## 3.2. DRAM Subsystem Configurations

The IN440EX-D supports 8 MB to 256MB of system RAM. The allowable memory configurations are shown below:

**Table 3.2. DIMMs Configurations**

| DIMM0 | DIMM1 | Total Memory |
|---|---|---|
| 8MB | EMPTY | 8MB |
| 8MB | 8MB | 16MB |
| 16MB | EMPTY | 16MB |
| 16MB | 8MB | 24MB |

| | | |
|---|---|---|
| 16MB | 16MB | 32MB |
| 32MB | EMPTY | 32MB |
| 32MB | 8MB | 40MB |
| 32MB | 16MB | 48MB |
| 32MB | 32MB | 64MB |
| 64MB | EMPTY | 64MB |
| 64MB | 8MB | 72MB |
| 64MB | 16MB | 80MB |
| 64MB | 32MB | 96MB |
| 64MB | 64MB | 128MB |
| 128MB | EMPTY | 128MB |
| 128MB | 8MB | 136MB |
| 128MB | 16MB | 144MB |
| 128MB | 32MB | 176MB |
| 128MB | 64MB | 192MB |
| 128MB | 128MB | 256MB |

For simplicity other memory configurations were not included on this table.

# 4. Electrical and Mechanical Specifications

This section specifies Electrical parameters for the IN440EX-D motherboard and describes its Mechanical characteristics.

## 4.1. Absolute Maximum Ratings

Stresses beyond those shown in the following table may cause permanent damage to the system (provided for stress testing only).

**Table 4.1. Absolute Maximum Ratings**

| | |
|---|---|
| Operating Temperature | 0°C to + 55°C |
| Storage Temperature | -55°C to + 150°C |
| Voltage on any Signal with Respect to VSS | -0.3 to Vcc +0.3 V |
| Supply Voltage with Respect to VSS (5v) | -0.3 to +5.5 V |
| Supply Voltage with Respect to VSS (3.3V) | -0.3 to +4.0 V |

The topics in this section specify the normal operating conditions for the IN440EX-D motherboard. Exposure to absolute maximum rating conditions for extended periods may affect the system reliability.

## 4.2. Electrical

IN440EX-D DC specifications are summarized here, for motherboard signaling environment, power connectors and 5V power budget. Refer to PCI Local Bus Specification Rev. 2.1, and ISA Bus Specification for PCI and ISA DC and AC electrical specifications. Refer also to the documentation for ASIC devices used on the IN440EX-D motherboard.

### 4.2.1. DC Specifications for 5V and 3.3V Signals

The following tables, show the required DC specifications for 5V and 3.3V CPU bus signalling environment.

**Table 4.2. 5 Volt DC Specifications**

| Symbol | Parameter | Condition | Min | Max | Units |
|---|---|---|---|---|---|
| Vcc | Supply Voltage | | 4.75 | 5.25 | V |
| Vih | Input High Voltage | | 2.2 | 5.25 | V |
| Vil | Input Low Voltage | | 0.3 | 0.8 | V |
| Voh | Output High Voltage | Ioh, max | 2.4 | | V |

| | | | | | |
|---|---|---|---|---|---|
| | | Vcc, min | | | |
| Vol | Ouput Low Voltage | Iol, max<br>Vcc, min | | 0.4 | V |
| | | | | | |
| | | | | | |

**Table 4.3. 3.3 Volt DC Specifications**

| Symbol | Parameter | Condition | Min | Max | Units |
|---|---|---|---|---|---|
| Vcc3 | Supply Voltage | | 3.168 | 3.432 | V |
| Vih | Input High Voltage | | 2.2 | 3.432 | V |
| Vil | Input Low Voltage | | -0.3 | 0.8 | V |
| Voh | Output High Voltage | | 2.4 | | V |
| Vol | Ouput Low Voltage | | | 0.4 | V |

## 4.3. Power Supply

### 4.3.1. Power Supply Connectors

The input power is supplied via the ATX power supply. The ATX power supply incorporates the power supply connector (J17) on the system PWA.

### 4.3.2. Input Power Budget

The +5V current available reflects the rating of the power connector. The Power itself may deliver more so the system integrator must be sure that the total load does not exceed the system power supply or board power connector rating, whichever is less. The rating of the ISA slots is 4.5A per slot. The ISA specification recommends supporting an average of 3.0A per slot. The average current consumption may not exceed 3A per slot. The system integrator must also guarantee that worst-case power consumption does not exceed the maximum allowed by the motherboard power connector.

**Table 4.4. IN440EX-D Motherboard Power Budget**

| Voltage | | Current Load(A) | |
|---|---|---|---|
| Input | Tolerance | Minimum | Maximum |
| -12V | +/-5% | 0 | 0.1 amp |
| -5V | +/-5% | 0 | 0.1 amp |
| +5V | +/-5% | 1 | 9 amp |
| +12V | +/-5% | 0.2 | 0.8 amp |
| 3.3 | +/-4% | 1.5 | 5 amp |

## 4.4. Mechanical

### 4.4.1. System Interfaces

### 4.4.2. User-Accessible Sockets

The following user accessible sockets are located on the top of the system PWA:

**Table 4.5. Accessible Sockets**

| | |
|---|---|
| U22 (BIOS) | System and Video BIOS PROM (During development only) |
| MICROPROCESSOR UPGRADE | SLOT 1 processor socket |
| DIMM0, DIMM1 | DIMM sockets |

### 4.4.3. Back-Panel Interfaces

The following interface connections are located on the rear panel of the system PWA:

**Table 4.6. Back-Panel Interfaces**

| | |
|---|---|
| J2 (bottom) | Keyboard connector |
| J2 (top) | PS/2 Mouse connector |
| J3 | Universal Serial Bus connector 1 |
| J1 | SVGA Connector |
| J4 | COM 1 port connector |
| J5-3 | Mic-In |
| J5-1 | Line-Out |
| J5-2 | Line-In |
| J6 | Game/MIDI port |
| J7 | Parallel port connector |

## 4.5. Manufacturability/Serviceability

IN440EX-D is designed to be both easy to manufacture and service. The items specifically related to the system PWA are:

Connector location & labeling
Jumper location & labeling
PWA bar code label (part number and revision)
Flash BIOS
DIMM sockets labeling & location
Video memory upgrade DRAM sockets & labeling location

Regulatory

BCM will supply information and resource to assist in the IN440EX-D product qualification testing for compliance with the regulatory agency approvals.

# ELECTRICAL AND MECHANICAL SPEC.

# 5. BIOS SETUP

The IN440EX-D motherboard uses AWARD BIOS, which is stored in a Flash EEPROM and can be upgraded by a floppy disk-based program. The BIIOS has a built-in Setup Program that allows users to modify the basic system configuration settings. The settings are then stored in a dedicated battery-backed memory, called CMMOS RAM that retains the information when the power is turned off. The BIOS provides critical low-level support for the system's central processing, memory and I/O subsystems. The AWARD BIOS has been customized by adding important, nonstandard, features such as virus and password protection, power management, and detailed fine-tuning of the chipset which controls the system. The remainder of this manual is intended to guide you through the process of configuring your system using the BIOS Setup.

## 5.1. How To Enter BIOS Setup

The AWARD BIOS is immediately activated when you first turn on the computer. The BIOS reads system configuration information in CMOS RAM and begins the process of checking the system and configuring it through the power-on self test (POST). When these preliminaries are finished, the BIOS seek an operation system on the data storage devices (hard drive, floppy drive, etc.). The BIOS launches the operating system and hands over control of system operation to it.

To start Setup, press the <Del> key during boot-up before or while a message similar to this appears briefly at the bottom of the screen during POST (Power On Self Test):

Press DEL if you want to enter SETUP

If the above message disappears before you have responded and you still wish to enter Setup, reboot the system to try again by pressing the "RESET" button on the system case. You may also restart by simultaneously pressing the <Ctrl>, <Alt> and <Delete> keys.

Press F1 to continue, DEL to enter SETUP

### 5.1.1. Setup Keys

These keys help you navigate in Setup:

| | |
|---|---|
| <↑> , <↓> | Move to previous or next item |

| | |
|---|---|
| <←> , <→> | Move to the item in the left or right hand |
| <Esc> | Main Menu – Quit and not save changes into CMOS<br>Other Pages -- Exit current page and return to Main Menu |
| <PgUp> / <+> | Increase the numeric value or make changes |
| <PgDn> / <–> | Decrease the numeric value or make changes |
| <F1> | General help, only for Status Page Setup Menu and Option Page Setup Menu |
| <F2> | Change color from total 16 colors. F2 to select Shift-F2 color forward, Shift-F2 to select color backward |
| <F3> | Calendar, only for Status Page Setup Menu |
| <F5> | Restore the previous CMOS value from CMOS, only for Option Page Setup Menu |
| <F7> | Load the Setup default |
| <F10> | Save all the CMOS changes, only for Main Menu |

### 5.1.2. Getting Help

Press F1 to pop up a small help window that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the Help Window press Esc or the F1 key again.

### 5.1.3. In Case of Problems

If after making and saving system changes with Setup, you discover that your computer no longer is able to boot, the Award BIOS supports an override to the CMOS settings that resets your system to its default configuration.

The best advice is to alter only settings that you thoroughly understand. In particular, do
not change settings in the Chipset screen without a good reason. BCM Advanced Research Inc. or your system manufacturer for the best performance and reliability has carefully chosen the Chipset defaults. Even a seemingly small change to the Chipset setup may cause the system to become unstable.

## 5.2. Main Setup Menu

When you enter the Award BIOS CMOS Setup Utility, a Main Menu (Figure 1) appears on the screen. The Main Menu allows you to select from several Setup functions and two exit choices. Use the arrow keys to select among the items and press Enter to accept and enter the sub-menu.

A brief description of each highlighted selection appears at the bottom of the screen.

# BIOS SETUP

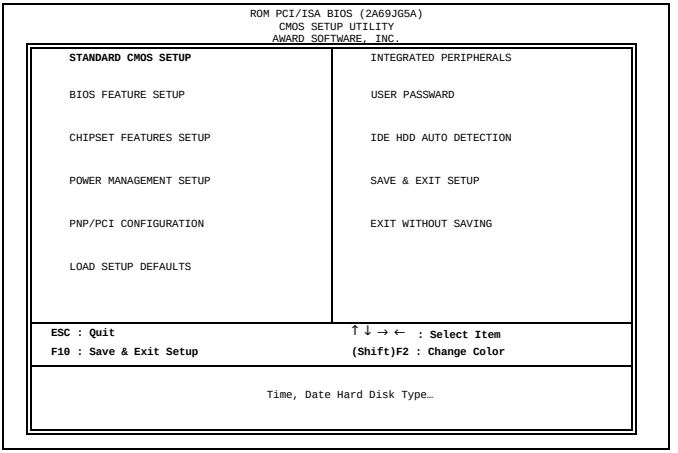


Figure 1

Following is a brief summary of each Setup category.

| | |
|---|---|
| Standard CMOS | Options in the original PC AT-compatible BIOS. |
| BIOS Features | Award enhanced BIOS options. |
| Chipset Features | Options specific to your system chipset. |
| Power Management | Advanced Power Management (APM) options. |
| PnP/PCI Configuration | Plug and Play standard and PCI Local Bus configuration options. |
| Integrated Peripherals | I/O subsystems that depend on the integrated peripherals controller in your system. |
| Supervisor/User Password Setting | Change, set, or disable a password. In BIOS versions that allow separate user and supervisor passwords, only the supervisor password permits access to Setup. The user password generally allows only power-on access. |
| IDE HDD Auto Detection | Automatically detect and configure IDE hard disk parameters. |
| Load Setup Defaults | Setup defaults are factory settings for optimal-performance system operations. |
| Save & Exit Setup | Save settings in nonvolatile CMOS RAM and exit Setup. |
| Exit Without Save | Abandon all changes and exit Setup. |

## 5.3. Standard CMOS Setup Menu

In the Standard CMOS Menu (Figure 2) you can set the system clock and calendar, record disk drive parameters and the video subsystem type, and select the type of errors that stop the BIOS POST.

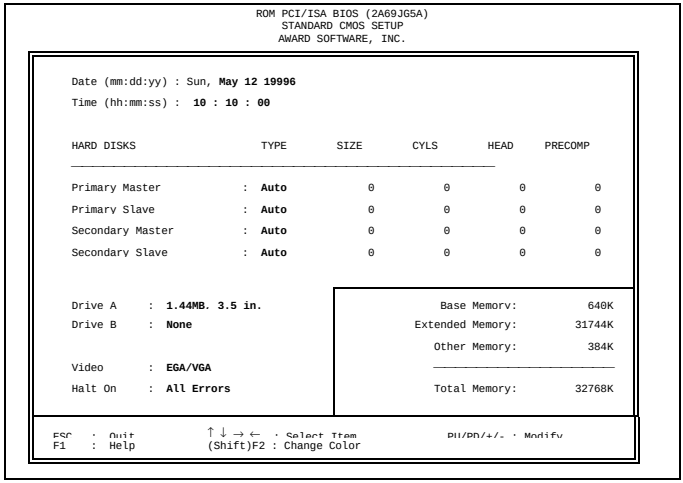


Figure 2

### 5.3.1. Date

The BIOS determines the day of the week from the other date information. This field is for information only. Press the left or right arrow key to move to the desired field (date, month, year). Press the PgUp or PgDn key to increment the setting, or type the desired value into the field.

### 5.3.2. Time

The time format is based on the 24-hour military-time clock. For example, 1 p.m. is 13:00:00. Press the left or right arrow key to move to the desired field. Press the PgUp or PgDn key to increment the setting, or type the desired value into the field.

### 5.3.3. Hard Disks

# BIOS SETUP

The BIOS supports up to four IDE drives. This section does not show information about other IDE devices, such as a CD-ROM drive, or about other hard drive types, such as SCSI drives.

NOTE: We recommend that you select type AUTO for all drives.

The BIOS can automatically detect the specifications and optimal operating mode of almost all IDE hard drives. When you select type AUTO for a hard drive, the BIOS detects its specifications during POST, every time the system boots.

If you do not want to select drive type AUTO, other methods of selecting the drive type are available:
Match the specifications of your installed IDE hard drive(s) with the preprogrammed values for drive types 1 through 45.

Select USER and enter values into each drive parameter field.

Use the IDE HDD AUTO DECTECTION function in Setup.

Here is a brief explanation of drive specifications:
Type: The BIOS contains a table of pre-defined drive types. Each defined drive type has a specified number of cylinders, number of heads, write precompensation factor, landing zone, and number of sectors, Drives whose specifications do not accommodate any pre-defined type are classified as type USER.

Size: Disk drive capacity (approximate). Note that this size is usually slightly greater than the size of a formatted disk given by a disk-checking program.

Cyls: Number of cylinders

Head: Number of herds

Precomp: Write precompensation cylinder

Landz: Landing zone

Sector: Number of sectors

Mode: Auto, Normal, large, or LBA

Auto: The BIOS automatically determines the optimal mode.

Normal: Maximum number of cylinders, heads, and sectors supported are 1024, 16 and 63.

Large: For drives that do not support LBA and have more than 1024 cylinders.

LBA (Logical Block Addressing): During drive accesses, the IDE controller
Transforms the data address described by sector, head, and cylinder number

into a physical block address, significantly improving data transfer rates. For drives with greater than 1024 cylinders.

### 5.3.4. Drive A/B type

Select the correct specifications for the diskette drive(s) installed in the computer.

| | |
|---|---|
| None | No diskette drive installed |
| 360K, 5.25 in | 5-1/4 inch PC-type standard drive; 360 kilobyte capacity |
| 1.2M, 5.25 in | 5-1/4 inch AT-type high-density drive; 1.2 megabyte capacity |
| 720K, 3.5 in | 3-1/2 inch double-sided drive; 720 kilobyte capacity |
| 1.44M, 3.5 in | 3-1/2 inch double-sided drive; 1.44 megabyte capacity |
| 2.88M, 3.5 in | 3-1/2 inch double-sided drive; 2.88 megabyte capacity |

### 5.3.5. Video

Select the type of primary video subsystem in your computer. The BIOS usually detects the correct video type automatically. The BIOS supports a secondary video subsystem, but you do not select it in Setup.

| | |
|---|---|
| EGA/VGA | Enhanced Graphics Adapter/Video Graphics Array. For EGA, VGA, SEGA, SVGA or PGA monitor adapters. |
| CGA 40 | Color Graphics Adapter, power up in 40 column mode. |
| CGA 80 | Color Graphics Adapter, power up in 80 column mode. |
| MONO | Monochrome adapter includes high-resolution monochrome adapters. |

### 5.3.6. Halt on

During the power-on self-test (POST), the computer stops if the BIOS detect a hardware error. You can tell the BIOS to ignore certain errors during POST and continue the boot-up process. These are the selections:

| | |
|---|---|
| No errors | POST does not stop for any errors. |
| All errors | If the BIOS detect any non-fatal error, POST stops and prompts you to take corrective action. |
| All, But | POST does not stop for a keyboard error, but stops for all |

| | |
|---|---|
| Keyboard | other errors. |
| All, But Diskette | POST does not stop for diskette drive errors, but stops for all other errors. |
| All, But Disk/Key | POST does not stop for a keyboard or disk error, but stops for all other errors. |

### 5.3.7. Memory

You cannot change any values in the Memory fields; they are only for your information. The fields show the total installed random access memory (RAM) and amounts allocated to base memory, extended memory, and other (high) memory, RAM is counted in kilobytes (KB: approximately one thousand bytes) and megabytes (MB: approximately one million bytes).

RAM is the computer's working memory, where the computer stores programs and data currently being used, so they are accessible to the CPU. Modern personal computers may contain up to 64MB, 128MB, or more.

**Base Memory**

Typically 640 KB. Also called conventional memory. The DOS operating system and
conventional applications use this area.

**Extended Memory**

Above the 1-MB boundary. Early IBM personal computers could not use memory above 1 MB, but current PCs and their software can use extended memory.

**Other Memory**

Between 640 KB and 1 MB; often called High memory. DOS may load terminate-and-

stay-resident (TSR) programs, such as device drivers, in this area, to free as much conventional memory as possible for applications. Lines in your CONFIG.SYS file that start with LOADHIGH load programs into high memory

**Total memory**

System total memory is the sum of base memory, extended memory, and other memory.

## 5.4. BIOS Features Setup Menu

This screen (Figure 3) contains industry-standard options additional to the core PC AT BIOS. This section describes all fields offered by Award Software in this screen. Some fields may vary from those in your Setup program. Your system board designer may omit or modify some fields.

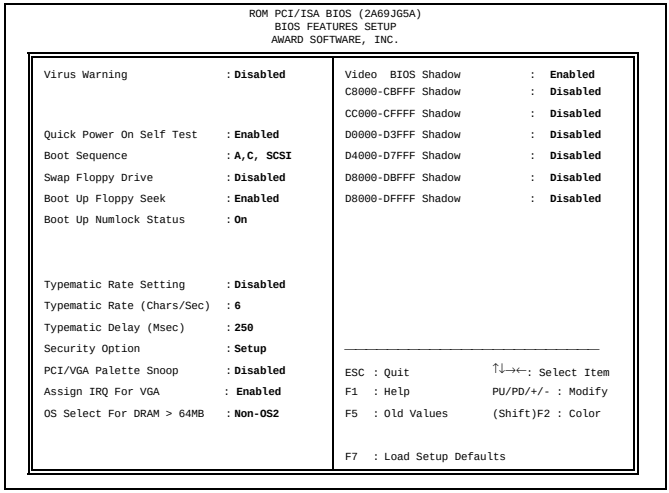


Figure 3

### 5.4.1. Virus Warning

When enabled, you receive a warning message if a program (specifically, a virus) attempts to write to the boot sector or the partition table of the hard disk drive. You should then run an anti-virus program. Keep in mind that this feature protects only the boot sector, not the entire hard drive.

NOTE: Many disk diagnostic programs that access the boot sector table can trigger the virus-warning message. If you plan to run such a program, we recommend that you first disable the virus warning.

### 5.4.2. Quick Power On Self Test

Select Enabled allows system to shorten or skip certain checks during the Power On Self Test(POST). The system will boot more quickly.

### 5.4.3. Boot Sequence

The original IBM PCs loaded the DOS operating system from drive A (floppy disk), so IBM PC-compatible systems are designed to search for an operating system first on drive A, and then on drive C (hard disk). However,

the BIOS now offers 10 different boot sequences options of three drive each. In addition to the traditional drives A and C, options include IDE hard drives D, E, and F; plus a SCSI hard drive and a CD-ROM drive.

### 5.4.4. Swap Floppy Drive

This field is effective only in systems with two floppy drives. Selecting Enabled assigns physical drive B to logical drive A, and physical drive A to logical drive B.
or 80 tracks. Only 360-KB floppy drives have 40 tracks; drives with 720 KN< 1.2MB, and 1.44MB capacity all have 80 tracks. Because very few modern PCs have 40-track

### 5.4.5. Boot Up Floppy Seek

When *Enabled*, the BIOS tests (seeks) floppy drives to determine whether they have 40 floppy drives, we recommend that you set this field to *Disabled* to save time.

### 5.4.6. Boot Up NumLock Status

Toggle between *On* or *off* to control the state of the NumLock key when the system boots. When toggled *on*, the numeric keypad generates numbers instead of controlling cursor operations.

### 5.4.7. Typematic Rate Setting

When *Disabled*, the following two items (Typematic Rate and Typematic Delay) are
irrelevant. Keystrokes repeat at a rate determined by the keyboard controller in your system. When *Enabled*, you can select a typematic a\rate and typematic delay.

### 5.4.8. Typematic Rate (Chars/Sec)

When the typematic rate setting is enabled, you can select a typematic rate (the rate at which character repeats when you hold down a key) of 6,8,10,12,15,20,24, or 30 characters per second.

### 5.4.9. Typematic Delay (Msec)

When the typematic rate setting is enabled, you can select a typematic delay (the delay before keystrokes begin to repeat) of 250, 500, 750 or 1000 milliseconds.

### 5.4.10. Security Option

If you have set a password, select whether the password is required every time the System boots, or only when you enter Setup.

### 5.4.11. PCI/VGA Palette Snoop

Some display cards that are not standard VGA such as graphics accelerators or MPEG cards may not show the correct colors, the setting can correct this problem once you set it to Enable, To default setting leave at Disabled.

### 5.4.12. Assign IRQ For VGA

Set this option to Yes to allocate an IRQ to VGA device on the PCI Bus. The setting are Enabled or Disabled.

### 5.4.13. OS select for DRAM>64MB

Select OS2 only if you are running OS/2 operating system with greater than 64MB of RAM on your system.

### 5.4.14. Shadow

Software that resides in a read-only memory (ROM) chip on a device is called *firmware*. The Award BIOS permits *shadowing* of firmware such as the system BIOS, video BIOS, and similar operating instructions that come with some expansion peripherals, such as, for example, a SCSI adapter.

Shadowing copy firmware from ROM into system RAM, where the CPU can read it through the 16-bit or 32-bit DRAM bus. Firmware not shadowed must be read by the system through the 8-bit x-bus. Shadowing improves the performance of the system BIOS and similar ROM firmware for expansion peripherals, but it also reduces the

amount of high memory (640KB to 1 MB) available for loading device drivers, etc.

Enable shadowing into each section of memory separately. Many system designers hardwire shadowing of the system BIOS and eliminate a System BIOS Shadow option.

Video BIOS shadows into memory area C0000-C7FFF> The remaining areas shown on the BIOS Features Setup screen may be occupied by other expansion card firmware. If an expansion peripheral in your system contains ROM-based firmware, you need to know the address range the ROM occupies to shadow it into the correct area of RAM.

## 5.5. Chipset Features Setup Menu

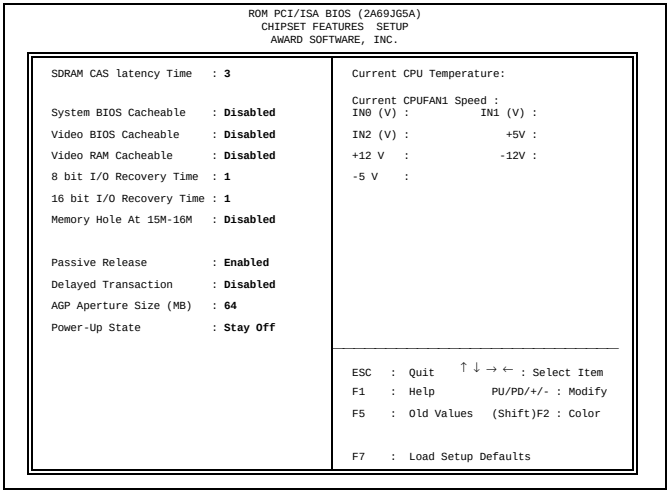


Figure 4

### 5.5.1. SDRAM CAS latency Time

You can select CAS latency time in HCLKs of 2/2 or 3/3. The system board designer should set the values in this field, depending on the DRAM installed. Do not change the values in this field unless you change specifications of the installed DRAM or the installed CPU.

### 5.5.2. System BIOS Cacheable

Select Enabled allows caching of the system BIOS ROM at F000h-FFFFFh, resulting in better system performance. However, if any program writes to this memory area, a system error may result.

### 5.5.3. Video BIOS Cacheable

Select Enabled allows caching of the video BIOS ROM at F0000h-FFFFFh, resulting in better system performance. However, if any program writes to this memory area, a system error may result.

### 5.5.4. Video RAM Cacheable

Select Enabled allows caching of the video RAM, resulting in better system performance. However, if any program writes to this memory area, a system error may result.

### 5.5.5. 8 Bit I/O Recovery Time

The recovery time is the length of time, measured in CPU clocks, which the system will delay after the completion of an input/output request. This delay takes place because the CPU is operating so much faster than the input/output bus that the CPU must be delayed to allow for the completion of the I/O.

This item allows you to determine the recovery time allowed for 8 bit I/O. Choices are from NA, 1 to 8 CPU clocks.

### 5.5.6. 16 Bit I/O Recovery Time

This item allows you to determine the recovery time allowed for 16 bit I/O. Choices are from NA, 1 to 4 CPU clocks.

### 5.5.7. Memory Hole At 15M-16M

In order to improve performance, certain space in memory can be reserved for ISA cards. This memory must be mapped into the memory space below 16 MB. You can reserve this area of system memory for ISA adapter ROM. When that area is reserved it cannot be cached. The user information of peripherals that need to use this area of system memory usually discusses their memory requirements.

### 5.5.8. Passive Release

When Enabled, CPU to PCI bus accesses are allowed during passive release. Otherwise, the arbiter only accepts another PCI master access to local DRAM.

### 5.5.9. Delayed Transaction

The chipset has an embedded 32-bit posted write buffer to support delay transactions cycles. Select Enabled to support compliance with PCI specification version 2.1.

### 5.5.10. AGP Aperture Size (MB)

Select the size of the Accelerated Graphics Port (AGP) aperture. The aperture is a portion of the PCI memory address range dedicated for graphics memory address space. Host cycles that hit the aperture range are forwarded to the AGP without any translation. See www.agpforum.org for AGP information.

### 5.5.11. Power-Up State

It specifies how the computer responds following a power failure. Stay Off keeps power off until power button pressed. Last State restores previous power state before a power failure. Power On restores power without restoring previous power state.

### 5.5.12. Current CPU1 Temperature

This item presents the current hardware situation for the hardware monitoring feature of this motherboard.

## 5.6. Power Management Setup Menu

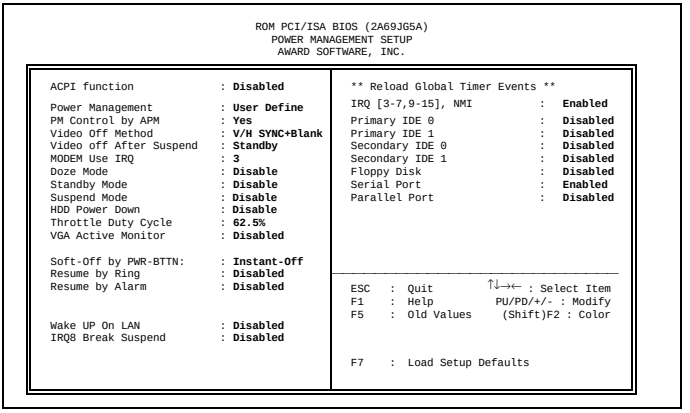


Figure 5

### 5.6.1. ACPI Function

ACPI(Advanced Configuration and Power Interface)Evolves the existing motherboard configuration interfaces to support these advanced architectures in a more robust, and potentially more efficient manner.

### 5.6.2. Power Management

This option allows you to select the type (or degree) of power saving for Doze, Standby, and Suspend modes. See the section *PM Timers* for a brief description of each mode. This table describes each power management mode:

| | |
|---|---|
| Disable | Global Power Management will be disabled |
| Max Saving | Maximum power savings. Only Available for SL CPUs. Inactivity period is 1 minute in each mode. |
| User Define | Set each mode individually. Select time-out periods in the *PM Timers* section, following. |
| Min Saving | Minimum power savings. Inactivity period is 1 hour in each mode (except the hard drive). |

### 5.6.3. PM Control by APM

If Advanced Power Management (APM) is installed on your system, selecting *Yes* gives better power savings.

### 5.6.4. Video Off Method

Determines the manner in which the monitor is blanked.

| | |
|---|---|
| V/H SYNC+Blank | System turns off vertical and horizontal synchronization ports and writes blanks to the video buffer. |
| DPMS Support | Select this option if your monitor supports the Display Power Management Signaling (DPMS) standard of the Video Electronics Standards Association (VESA). Use the software supplied for your video subsystem to select video power management values. |
| Blank Screen | System only writes blanks to the video buffer. |

### 5.6.5. Video Off After

As the system moves from lesser to greater power-saving modes, select the mode in which you want the monitor to blank.

### 5.6.6. MODEM Use IRQ

Name the interrupt request (IRQ) line assigned to the modem (if any) on your system. Activity of the selected IRQ always awakens the system.

### 5.6.7. Doze Mode

Defines the continuous idle time before the system entering DOZE mode. The range is from 1 min to 1 Hr. If any item defined is enabled & active, STANDBY timer will be reloaded

### 5.6.8. Standby Mode

After the selected period of system inactivity (1 minute to 1 hour), the fixed disk drive and the video shut off while all other devices still operate at full speed.

### 5.6.9. Suspend Mode

After the selected period of system inactivity (1 minute to 1 hour), all devices except the CPU shut off.

### 5.6.10. HDD Power Down

After the selected period of drive inactivity (1 to 15 minutes), the hard disk drive powers down while all other devices remain active.

### 5.6.11. Throttle Duty Cycle

When the system enters Doze mode, the CPU clock runs only part of the time. You may select the percent of time that the clock runs.

### 5.6.12. VGA Active Monitor

When *Enabled,* any video activity restarts the global timer for Standby mode.

### 5.6.13. Soft-Off by PWR-BTTN

When this feature set to “Delay 4 sec.” , the system will become suspend once the Power Switch be pressed within 4 second, and the system will Power Off once the Power Switch be pressed over 4 second. If it set to “Instant Off”, the system will unconditional Power Off once the Power Switch be pressed.

### 5.6.14. Resume by Ring

An input signal on the serial Ring Indicator (RI) line (in other words, an incoming call on the modem) awakens the system from a soft off state.

### 5.6.15. Resume By Alarm

This allows you to have an unattended or automatic power up of your system. You may configure your system to power up at a certain time on a certain date by selecting Enabled to configure it.

### 5.6.16. Wake Up On LAN

This option specifies whether the computer responds to an incoming call or not. Wake-On Lan requires a PCI add-in network interface card with remote wakeup capabilities.

Note: The above three items (Resume By Ring, Resume By Alarm & Wake Up On Lan) only work when Power On is selected in Power-Up State item(See Chipset Features Setup in main menu).

### 5.6.17. IRQ8 Break Suspend

You can turn *On* or *Off* monitoring of IRQ8 (the Real Time Clock) so it does not awaken the system from Suspend mode.

### 5.6.18. Reload global Timer Events

When *Enabled,* an event occurring on each device listed below restarts the global time for Standby mode.

- IRQ3 -7, 9-15, NMI
- Primary IDE 0
- Primary IDE 1
- Secondary IDE 0
- Secondary IDE 1
- Floppy Disk
- Serial Port
- Parallel Port

## 5.7. PCI Configuration Setup Menu

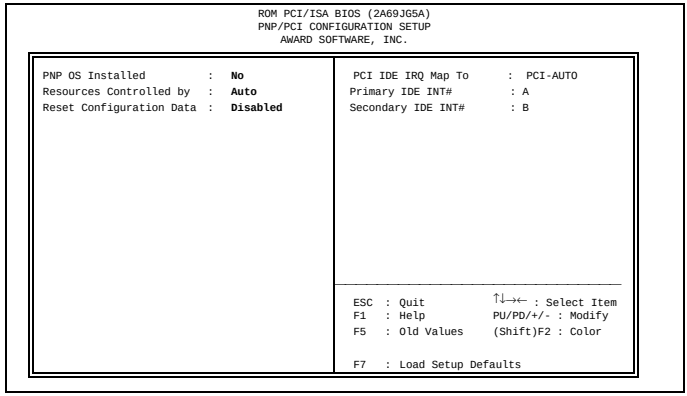


Figure 6

### 5.7.1. PNP OS Installed

The default setting is No when a non PNP OS installed or to prevent reassigning of interrupt setting for some of non PNP cards installed. Select Yes if the OS is PNP aware (e.g. Windows 95).

### 5.7.2. Resources Controlled by

The Award Plug and Play BIOS can automatically configure all the boot and Plug and Play-compatible devices. If you select Auto, all the interrupt request (IRQ) and DMA assignment fields disappear, as the BIOS automatically assign them.

### 5.7.3. Reset Configuration Data

Normally, you leave this field Disabled. Select Enabled to reset Extended System
Configuration Date (ESCD) when you exit Setup if you have installed a new add-on and the system reconfiguration has caused such a serious conflict that the operating system cannot boot.

### 5.7.4. IRQ # Assigned to

When resources are controlled manually, assign each system interrupt as one of the following types, depending on the type of device using the interrupt.

Legacy ISA Devices compliant with the original PC AT bus specification, requiring a specific interrupt (such as IRQ4 for serial port 1).

PCI/ISA PnP Devices compliant with the Plug and Play standard, whether designed for PCI or ISA bus architecture.

### 5.7.5. DMA # Assigned to

When resources are controlled manually, assign each system DMA channel as one of the following types, depending on the type of device using the interrupt:
Legacy ISA Devices compliant with the original PC AT bus specification, requiring a specific DMA channel.
PCI/ISA PnP Devices compliant with the Plug and Play standard, whether designed for PCI or ISA bus architecture.

### 5.7.6. PCI IDE IRQ Map To

When resources are controlled manually, assign each system interrupt as one of the following types, depending on the type of device using the interrupt.
ISA devices compliant with the original PC AT bus specification, requiring a specific DMA channel.

PCI-SLOT1, PCI-SLOT2, PCI-SLOT3 and PCI-AUTO, set the Primary/Secondary IDE INT# manualy.

## 5.8. Integrated peripherals Menu

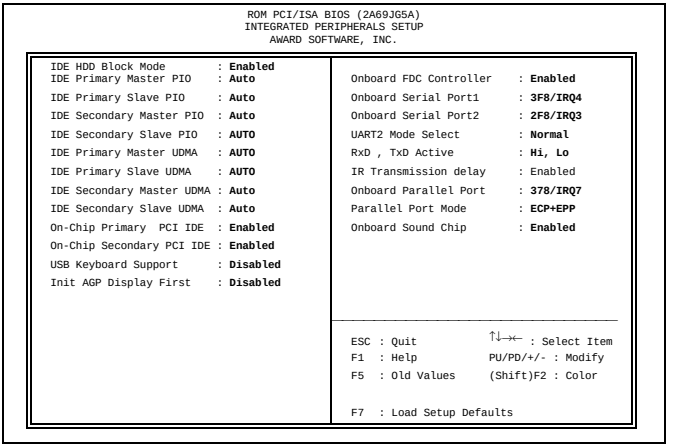


Figure 7

### 5.8.1. IDE HDD Block Mode

Block mode is also called block transfer, multiple commands, or multiple sector read/write. If your IDE hard drive supports block mode (most new drives do), select Enabled for automatic detection of the optimal number of block read/writes per sector the drive can support.

### 5.8.2. IDE Primary/Secondary Master/Slave PIO

The four IDE PIO (Programmed Input/Output) fields let you set a PIO mode (0-4) for each of the four IDE devices that the onboard IDE interface supports. Modes 0 through 4 provide successively increased performance. In Auto mode, the system automatically determines the best mode for each device.

### 5.8.3. IDE Primary/Secondary Master/Slave UDMA

Ultra DMA/33 implementation is possible only if your IDE hard drive supports it and the operating environment includes a DMA driver (Windows 95 OSR2 or a third-party IDE bus master driver). If your hard drive and you system software both support Ultra DMA/33, select Auto to enable BIOS support

### 5.8.4. On-Chip Primary/Secondary PCI IDE

The integrated peripheral controller contains an IDE interface with support for two IDE channels. Select Enabled to activate each channel separately.

### 5.8.5. USB Keyboard Support

Select Enabled if your system contains a Universal Serial Bus (USB) controller and you have a USB keyboard.

### 5.8.6. Init AGP Display First

### 5.8.7. Onboard FDC Controller

Select Enabled if your system has a floppy disk controller (FDC) installed on the system board and you wish to use it. If you install an add-in FDC or the system has no floppy drive, select disabled in this field.

### 5.8.8. Onboard Serial Port 1/2

Select an address and corresponding interrupt for the first and second serial ports.

### 5.8.9. UART2 Mode Select

This item allows you to determine which Infrared (IR) function of onboard I/O chip. The Choice are Standard, ASKIR and HPSIR.

### 5.8.10. RxD , TxD Active

### 5.8.11. IR Transmission delay

### 5.8.12. Onboard Parallel Port

Select a logical LPT port name and matching address for the physical parallel (printer) port.

### 5.8.13. Parallel Port Mode

Select an operating mode for the onboard parallel (printer) port. Select Normal unless your hardware and software require one of the other modes offered in this field.

| | |
|---|---|
| SPP | Standard parallel port mode (Default) |
| EPP | Bi-directional mode |
| ECP | Fast, buffered |
| ECP+EPP | Bi-directional and buffered |

### 5.8.14. Onboard Sound Chip

Select Enabled to use the onboard integrated sound system or Disabled to use other add-in sound card.

## 5.9. IDE HDD Auto Detection

BIOS setup will display all possible modes that supported by the HDD including NORMAL, LBA & LARGE.

If HDD does not support LBA modes, no 'LBA" option will be shown.

If no of cylinders is less than or equal to 1024, no "LARGE" option will be show

Users can select a mode, which is appropriate for them.

## 5.10. Password Setting

When you select this function, a message appears at the center of the screen:

ENTER PASSWORD:

Type the password, up to eight characters, and press Enter. Typing a password clears any previously entered password from CMOS memory. Now the message changes:

CONFIRM PASSWARD:

Again, type the password and press Enter.

To abort the process at any time, press Esc.

In the *Security Option* item in the BIOS Features Setup screen select *System or Setup*:

System : Enter a password each time the system boots and whenever you enter Setup.

Setup : Enter a password whenever you enter Setup.

NOTE: To clear the password, simply press Enter when asked to enter a password. Then the password function is disabled.