Advanced/AS

Motherboard
Technical Product Specification

Order Number 281836-001

May 1996

intel.

Revision History

Revision Date	Version	Description
May 1996	-001	First controlled release of the Advanced/AS Technical Product Specification.

This product specification applies only to standard Advanced/AS motherboards with BIOS identifier CL0.

Changes will be published in the Advanced/AS Motherboard Specification Update before being incorporated into a revision of this document.

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Introduction

The Advanced/AS integrates the latest advances in processor, memory, and I/O technologies into a Baby-AT form factor with maximum flexibility for a variety of price/performance levels. The motherboard provides the ideal platform for the increasing requirements of today's (and tomorrow's) desktop applications.

The flexible motherboard design will accept all speed variations of the Pentium® processors ranging from 75 MHz to 200 MHz. The processor is complemented by a Card Edge Low Profile (CELP) socket that accepts a 256 KB or 512 KB second level write-back cache module using standard asynchronous SRAM or the new high-performance Pipeline Burst SRAM designed to the *COAST 1.2* specification or later. The memory subsystem is designed to support up to 128 MB of EDO DRAM (for improved performance) or standard Fast Page DRAM in 72-pin SIMM sockets. A Type 7 Pentium OverDrive® socket provides access to future processor enhancements.

Advanced/AS provides a new level of I/O integration. Intel's 82430FX PCIset provides increased integration and improved performance over other chip set designs. The 82430FX PCIset provides an integrated Bus Mastering-capable IDE controller with two high performance IDE interfaces for up to four IDE devices (such as hard drives and CD-ROM drives). The National Semiconductor PC87306B Super I/O controller provides the standard PC I/O functions such as: one floppy interface, two FIFO serial ports, one EPP/ECP capable parallel port, a Real Time Clock, and keyboard controller. The PC87306 also provides support for an IrDA compatible infrared interface. Up to four PCI local bus slots provide a high bandwidth data path for data intensive transfers, required by devices such as graphics interfaces. Up to three ISA slots complete the I/O mix. A total of six expansion slots may be populated: one of the PCI/ISA slots shares the same chassis I/O panel, making it a combined slot location.

A Crystal CS4232 Codec is integrated onto the motherboard. This Codec provides 16-bit stereo audio with enhanced capabilities, such as full duplex operation, to provide support for the increasing number of demanding multimedia applications. An optional ATI-264*CT SVGA graphics solution with 1 MB of graphics DRAM (upgradeable to 2 MB) also can be integrated onto the motherboard. The *264*CT is a high performance GUI accelerator that combines a VGA controller, 64-bit graphics engine, dual-frequency clock synthesizer, and 135 MHz true-color DAC in a single package. The optional on board graphics controller provides a highly integrated multimedia system without the necessity of add-in cards.

In addition to superior hardware capabilities, a full set of software drivers and utilities are available to allow advanced operating systems such as Windows* 95 to take full advantage of the hardware capabilities. Features such Windows 95-ready Plug and Play, Advanced Power Management (APM) with application restart, software-controlled power supply shutdown, and bi-directional audio are all provided on the Advanced/AS platform.

The Advanced/AS provides the foundation for cost effective, high performance, highly expandable platforms which deliver the latest in CPU, I/O, and audio technology.

BABY-AT FORM FACTOR

The Advanced/AS motherboard is designed to fit into a standard Baby-AT form factor chassis. Figure 1 illustrates the actual dimensions, which do not strictly adhere to Baby-AT guidelines.
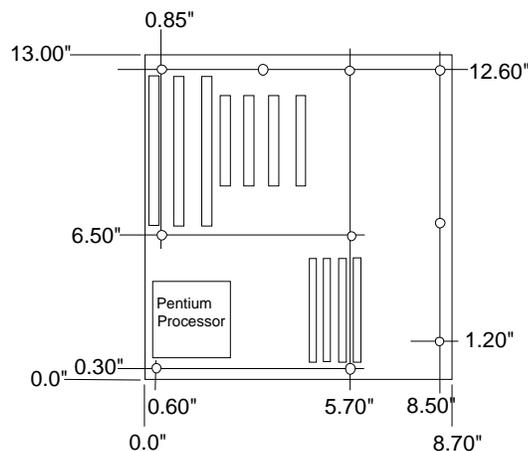
Figure 1. Advanced/AS Motherboard dimensions.

Board Level Features
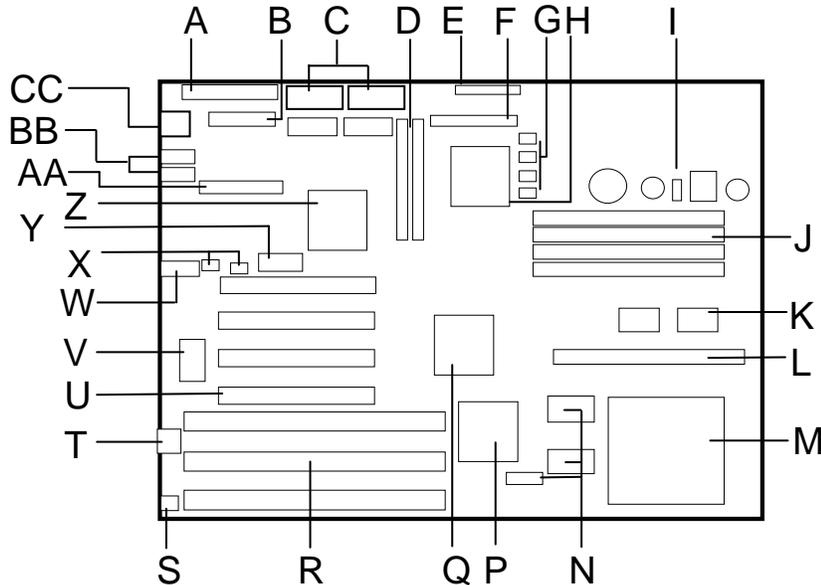
Figure 2. Advanced/AS motherboard features

A – Primary power connector
B – VESA feature connector **
C – Video memory and expansion sockets **
D – Two PCI IDE interfaces
E – Parallel port connector
F – Floppy drive connector
G – Configuration jumpers
H – National PC87306 I/O controller
I – Voltage regulation circuitry
J – Four SIMM sockets (two banks)
K– 82438FX data path device (TDP)
L – CELP socket for secondary cache
M – Pentium processor socket
N – Tag SRAM and Pipeline Burst SRAM cache **

P – 82437FX system controller (TSC)
Q – 82371FB PCI ISA/IDE Accelerator (PIIX)
R – Three ISA expansion connectors
S – Clock Multiplier Jumper
T – Flash EEPROM for system BIOS
U – Four PCI expansion connectors
V – Crystal CS4232 audio, OPL3 synthesizer
W – Custom video header for I/O panel **
X – Wavetable and CD-ROM connectors
Y – 3.3 volt PCI bus power connector
Z – ATI-264CT PCI graphics controller
AA – Audio connector for I/O panel
BB – Two serial ports
CC – AT Keyboard Connector

**factory option, may not be available in all configurations

CPU

The Advanced/AS motherboard is designed to operate with 3.3 volt Pentium™ Processors, reducing the system power requirements. A patented on-board voltage regulator circuit provides the required 3.3 volts from the 5 volts provided by a standard PC power supply. The motherboard supports Pentium™ Processors which run internally at 75, 90, 100, 120, 133, 150, and 166 MHz. The Pentium™ Processor maintains full backward compatibility with the 8086, 80286, i386™ and Intel486™ processors. It supports both read and write burst mode bus cycles, and includes separate 8 KB on-chip code and data caches which employ a write-back policy. Also integrated into the Pentium™ Processor is an advanced numeric coprocessor which significantly increases the speed of floating point operations, while maintaining backward compatibility with i486DX™ math coprocessor and complying to ANSI/IEEE standard 754-1985.

PERFORMANCE UPGRADE

A 321-pin Type 7 Zero Insertion Force socket provides users with an OverDrive processor performance upgrade path. OverDrive processors being developed for most processor speeds will provide performance beyond that delivered by the originally installed Pentium processor.

SECOND LEVEL CACHE

The processor's internal cache can be complimented by a second level cache using either new high-performance Pipeline Burst SRAM, or traditional asynchronous SRAM. Pipeline Burst (PB) SRAM provides performance similar to expensive Synchronous Burst SRAM for only a slight cost premium over slower performing Asynchronous SRAMs. PB SRAM have registered data outputs. This allows SRAM vendors to use CMOS instead of expensive BiCMOS technology to produce PB SRAM. With the 82430FX PCIset, the performance level of PB and Synchronous SRAM is identical.

A Card Edge Low Profile (CELP) socket provides flexibility for second level cache options. If the Advanced/AS is ordered with no cache installed, the cache can be added later in a field upgrade by installing an approved cache module into the socket. The CELP socket can accommodate both 256 KB and 512 KB cache modules and is designed to work with modules that adhere to the COAST (Cache On A Stick) specification, version 1.2 or later. For a list of approved cache module vendors or a copy of the COAST specification, contact your local Intel sales office or Intel Authorized Distributor.

CELP SOCKET

- Supports 3.3 volt mixed mode (5.0 volt power, 3.3 volt signal) or level-triggered modules that adhere to the COAST specification version 1.2
- Supports 256 KB or 512 KB asynchronous or Pipeline Burst cache in write-back mode
- Single sectored cache for 256 KB and 512 KB for optimal performance
- Data SRAM speed is 15ns which supports up to 66 MHz processor (external) bus speed.
- 3-1-1-1 reads and writes at all processor speeds when using Pipeline Burst cache
- 3-2-2-2 reads and 4-3-3-3 writes with Asynchronous cache
- Enables/Disables L2 cache without jumpers
- L2 size autosensed
- Burndy socket part number CELP2X80SC

SYSTEM MEMORY

The Advanced/AS motherboard provides four 72-pin SIMM sites for memory expansion. The sockets support 1M x 32 (4 MB), 2M x 32 (8 MB), 4M x 32 (16 MB), and 8M x 32 (32 MB) single-sided or double-sided SIMM modules. Minimum memory size is 8 MB and maximum memory size using four 8M x 32 SIMM modules is 128 MB. Memory timing requires 70 ns fast page devices or, for optimum performance, 60 ns EDO DRAM (if the external CPU clock speed is 60 MHz or slower, 70 ns EDO DRAM may be used). Although 36-bit SIMM modules may be used, parity generation and checking is not supported.

The four sockets are arranged as Bank 0 and Bank 1, with each bank consisting of two sockets and providing a 64-bit wide data path. Both SIMMs in a bank must be of the same memory size and type, although Banks 0 and 1 may have different sizes and types of memory installed. It is even possible to have 70 ns Fast Page DRAM in one bank and 60 ns EDO DRAM in the other, in which case each bank is independently optimized for increased performance. Bank 0 only, Bank 1 only, or both banks may be populated. There are no jumper settings required for the memory size or type, which is automatically detected by the system BIOS. Tin lead SIMMs are required when adding DRAM.

EDO DRAM

Extended Data Out (or Hyper Page Mode) DRAM is designed to improve the DRAM read performance. EDO DRAM holds the memory data valid until the next CAS# falling edge, unlike standard fast page mode DRAM which tri-states the memory data when CAS# negates to precharge for the next cycle. With EDO, the CAS# precharge overlaps the data valid time, allowing CAS# to negate earlier while still satisfying the memory data valid window time.

EXPANSION SLOTS

Up to six expansion slots may be populated on the Advanced/AS motherboard. There are three ISA bus expansion connectors and four PCI expansion connectors. One of the expansion slots is shared by connectors that will accommodate either an ISA or a PCI expansion card, but not both at the same time. This accounts for the disparity between the number of slots and the number of connectors. All four PCI expansion slots accept PCI bus master cards, and fully support the PCI 2.0 specification.

On motherboards shipped from Intel with a processor, and the special low-profile heatsink, all ISA slots will accept full length add-in cards. Interference from the CELP socket and DRAM limit two of the PCI slots to being able to support only half-length add-in cards.

PCI 3.3 VOLT CAPABILITIES

To maintain strict compliance with the PCI specification, the motherboard provides a connector which can be used to route 3.3 volt power to the PCI slots. The connector may be used with a separate 3.3 volt power supply or with a custom designed voltage converter. *Note: The on-board 3.3 volt regulator provides power for the CPU, PCIset and L2 cache only, not the PCI slots.*

PERIPHERAL COMPONENT INTERCONNECT (PCI) PCISET

The Intel 82430FX PCIset consists of the 82437FX system controller (TSC), two 82438FX data path devices (TDP) devices, and one 82371FB PCI ISA/IDE Accelerator (PIIX) bridge chips. The 82430FX PCIset provides these functions:

- CPU interface control
- Integrated L2 write-back cache controller
  – Pipelined Burst SRAM
  – 256 KB or 512 KB Direct Mapped
- Integrated DRAM controller
  – 64-bit path to Memory
  – Support for EDO and Fast Page DRAM
  – Up to 128 MB main memory
- Fully synchronous PCI bus interface
  – 25/30/33 MHz
  – PCI to DRAM > 100 Mbytes/sec
  – PCI to DRAM posting of 12 Dwords
  – 5 Dword buffers for CPU to PCI write posting
  – 4 Dword buffers for PCI to Memory bus master cycles

  – Support for up to 5 PCI masters
- Interface between the PCI bus and ISA bus
- Integrated fast IDE interface
  – Support for up to 4 devices
  – PIO Mode 4 transfers up to 16 MB/sec
  – Integrated 8x32-bit buffer for PCI IDE burst transfers
- Plug-n-Play port Audio I/O
  – 2 steerable fast DMA channels with 4-byte buffer
  – Up to 6 steerable interrupts
  – 1 programmable chip select
- Enhanced Fast DMA controller
- Interrupt controller and steering
- Counters/Timers
- SMI interrupt logic and timer with Fast On/Off mode

82437FX SYSTEM CONTROLLER (TSC)

The 82437FX provides all control signals necessary to drive a second level cache and the DRAM array, including multiplexed address signals. It also controls system access to memory and generates snoop controls to maintain cache coherency. The TSC comes in a 208-pin QFP package.

82438FX DATA PATH (TDP)

There are two 82438FX components which provide data bus buffering and dual port buffering to the memory array. Controlled by the 82437FX, the 82438FX devices add one load each to the PCI bus and perform all the necessary byte and word swapping required. Memory and I/O write buffers are included in these devices. The TDP devices are 100-pin QFP packages.

82371FB PCI ISA/IDE ACCELERATOR (PIIX)

The 82371FB provides the interface between the PCI and ISA buses and integrates a dual channel fast IDE interface capable of supporting up to 4 devices. The 82371FB integrates seven 32-bit DMA channels, five 16-bit timer/counters, two eight-channel interrupt controllers, PCI-to-AT interrupt mapping circuitry, NMI logic, ISA refresh address generation, and PCI/ISA bus arbitration circuitry together onto the same device. The PIIX comes in a 208-pin QFP package.

IDE SUPPORT

The Advanced/AS motherboard provides two independent high performance bus-mastering capable PCI IDE interfaces with support for PIO Mode 3 and Mode 4 devices. The system BIOS supports Logical Block Addressing (LBA) and Extended Cylinder Sector Head (ECHS) translation modes as well as ATAPI devices (e.g. CD-ROM) on both IDE interfaces. Detection of the IDE device transfer rate and translation mode is automatically determined by the system BIOS.

In the Windows 95 environment, special drivers may become available in the future that will allow the IDE interface to operate as a PCI bus master, capable of supporting PIO Mode 4 devices with transfer rates up to 16 MB per second while minimizing the system demands upon the processor. Normally, Programmed I/O operations require a substantial amount of CPU bandwidth. In true multi-tasking operating systems like Windows 95, the CPU bandwidth freed up by using a bus mastering IDE device can be used to complete other tasks while disk transfers are occurring.

NATIONAL SEMICONDUCTOR PC87306B SUPER I/O CONTROLLER

Control for the integrated serial ports, parallel port, floppy drive, RTC and keyboard controller is incorporated into a single component, the National Semiconductor PC87306. This component provides:

- Two NS16C550-compatible UARTs with send/receive 16 byte FIFO
  - Support for an IrDA compliant Infra Red interface
- Multi-mode bi-directional parallel port
  - Standard mode; IBM and Centronics compatible
  - Bidirrectional; IBM PS/2 compatible
  - Enhanced Parallel Port (EPP) with BIOS/Driver support
  - High Speed mode; Extended Capabilities Port (ECP) compatible
- Industry standard floppy controller with 16 byte data FIFO (2.88 MB floppy support)
- Integrated Real Time Clock accurate within ± 13 minutes per year
- Integrated 8042 compatible keyboard controller

The PC87306B is normally configured by the BIOS automatically, but configuration of these interfaces is possible via the CMOS Setup program that can be invoked during boot-up. The serial ports can be enabled as COM1, COM2, IrDA, or disabled. The parallel port can be configured as compatible, bi-directional, ECP, EPP, or disabled. The floppy interface can be configured for 360 KB or 1.2 MB 5¼" media or for 720 KB, 1.44 MB/1.25 MB, or 2.88 MB 3½" media. Header pins located near the back of the board allow cabling to use these interfaces.

KEYBOARD INTERFACE

An AT-style keyboard connector is located on the back panel side of the motherboard. The 5V lines to these connectors are protected with a PolySwitch* circuit which acts much like a self-healing fuse, re-establishing the connection after an over-current condition is removed. While this device eliminates the possibility of having to replace a fuse, care should be taken to turn off the system power before installing or removing a keyboard or mouse.

The integrated 8042 microcontroller contains the AMI Megakey keyboard/mouse controller code which, besides providing traditional keyboard and mouse control functions, supports Power-On/Reset (POR) password protection. The POR password can be defined by the user via the Setup program. The keyboard controller also provides for the following "hot key" sequences:

- <CTRL><ALT><DEL>: System software reset. This sequence performs a software reset of the system by jumping to the beginning of the BIOS code and running the POST operation.
- <CTRL><ALT><+> and <CTRL><ALT><->: Turbo mode selection. <CTRL><ALT><-> sets the system for de-turbo mode, emulating an 25 MHz AT, and <CTRL><ALT><+> sets the system for turbo mode. Changing the Turbo mode may be prohibited by an operating system, or when the CPU is in Protected mode or virtual x86 mode under DOS.
- <CTRL><ALT><defined in setup>: Power down and coffee-break key sequences take advantage of the SMM features of the Pentium Processor to greatly reduce the system's power consumption while maintaining the responsiveness necessary to service external interrupts.

REAL TIME CLOCK, CMOS RAM AND BATTERY

The integrated Real Time Clock, RTC, is accurate to within 13 minutes per year at 25°C and 5V. The RTC can be set via the BIOS Setup Program. CMOS memory supports the standard 128-byte battery-backed RAM, fourteen bytes for clock and control registers, and 114 bytes of general purpose non-volatile CMOS RAM. All CMOS RAM is reserved for BIOS use. The CMOS RAM can be set to specific values or cleared to the system default values using the BIOS SETUP program. Also, the CMOS RAM values can be cleared to the system defaults by using a configuration jumper

(J7F2) on the motherboard. An external coin-cell style battery provides power to the RTC and CMOS memory. The battery has an estimated lifetime of seven years and is socketed for easy replacement.

GRAPHICS SUBSYSTEM

The Advanced/AS motherboard is available with a factory option of a ATI-264CT SVGA graphics controller with 1 MB of graphics DRAM upgradeable to 2 MB. For optimal performance, the graphics DRAM should be upgraded to 2 MB by installing two 256kB x 16, 60nS Fast Page or *Extended Data Out (EDO) DRAM devices in the provided sockets. Please contact your sales representative for suggested vendors and part numbers. The ATI-264CT is a high performance GUI accelerator that combines a VGA controller, 64-bit graphics engine, dual-frequency clock synthesizer, and 135 MHz true-color DAC in a single package. The on-chip RAMDAC/clock synthesizer is capable of output pixel data rates of 135 MHz providing non-interlaced screen resolutions of up to 1280x1024x256 colors at 75 Hz with 2MB of DRAM. In addition, the ATI-264CT features 64x64x2 memory mapped hardware cursor support, and a fast linear addressing scheme, based upon DCI (ver 1.6), reduces software overhead by mapping the display memory into the CPU's upper memory address space and permitting direct CPU access to the display memory.

The Advanced/AS motherboard supports the 26-pin VESA feature connector for synchronizing graphics output with an external NTSC or PAL signal and a shared frame buffer interface to maximize multi-media performance. Advanced/AS also supports other VESA standards such as the VESA DPMS protocol to put a DPMS compliant monitor into power savings modes. For ease of use, the ATI ATI-264CT support the VESA Display Data Channel (DDC) specification that defines a mechanism which permits the display monitor to inform the host system about its identity and capabilities. The DDC protocol supported on the Advanced/AS by the ATI ATI-264CT graphics controllers, DDC1, is continuos uni-directional communication of EDID information from the monitor to the host.

*Using EDO DRAM in the video DRAM sockets will not enhance performance.

RESOLUTIONS SUPPORTED

Resolution	1 MB DRAM	2 MB DRAM	Max Vfreq
640x480x4bpp	X		100 Hz
640x480x8bpp	X	X	100 Hz
640x480x16bpp	X	X	100 Hz
640x480x24bpp	X	X	90 Hz
640x480x32bpp		X	60 Hz
800x600x4bpp	X		100 Hz
800x600x8bpp	X	X	100 Hz
800x600x16bpp	X	X	75 Hz
800x600x24bpp		X	60 Hz
1024x768x4bpp	X		100 Hz
1024x768x8bpp	X		75 Hz
1024x768x8bpp		X	100 Hz
1024x768x16bpp		X	60 Hz
1280x1024x4bpp	X		75 Hz
1280x1024x8bpp		X	75 Hz

Table 1. Advanced/AS graphics resolution supported

GRAPHICS DRIVERS AND UTILITIES

Common Graphics drivers and utilities for DOS, Windows* 3.1x s, Windows 95, and other operating systems, as well as a variety of applications (such as AutoCAD) are available for the Advanced/AS motherboard. Please contact your vendor for a list of available drivers. The Windows 3.1x drivers include the ATI WinSwitch utility that allows users to change screen resolution without rebooting Windows, and the ATI DeskTop that supports panning and scrolling across a virtual workspace of up to 2048 x 1536.

Drivers for some operating systems such as OS/2* are native to the operating systems. Drivers for SCO* and Interactive UNIX* should be obtained from the respective UNIX vendor. Although Windows 95 installs native drivers for the onboard video, these drivers are not optimized, so you should obtain and install the accelerated drivers available through your vendor.

CRYSTAL AUDIO SUBSYSTEM

Common Audio drivers and utilities for Windows 3.1x, Windows 95, and other operating systems are available for the Advanced/AS motherboard. Please contact your vendor for a list of available drivers. The audio subsystem is based upon the Crystal CS4232 multi-media Codec and Yamaha OPL3 FM synthesizer. The CS4232 provides all the digital audio and analog mixing functions required for recording and playing audio on personal computers. These functions include stereo analog-to-digital and digital-to-analog converters, analog mixing, anti-aliasing and reconstruction filters, line and microphone level inputs, digital audio compression via selectable A-law / μlaw, and full digital control of all mixer and volume control functions. Combined with the Yamaha OPL3 FM synthesizer, the CS4232 also provides support for four major sound standards including Adlib*, and Sound Blaster* Pro 2.0, Windows Sound System, and MPU-401 to meet all of the requirements of today's multi-media applications. The CS4232 also supports full-duplex operation which ensures support for future applications such as video conferencing.

The CS4232 includes a full Plug and Play ISA interface, and is comprised of seven logical devices including the Synthesizer, Game Port, Sound Blaster, Sound System, MPU-401, CD-ROM and the CS4232 device itself. Each logical device is configured into the host environment using the ISA Plug and Play configuration methodologies. (Note: The CD-ROM port is not utilized on the Advanced/AS design as CD-ROM devices are supported via the IDE interface). The audio sub-system requires up to two DMA channels and two interrupts. The system may be configured to use either DMA channels 0, 1, or 3 and the interrupts and can be mapped to interrupt 5, 7, 9, 11, 12, or 15. (Note: Not all interrupts may be available in a specific configuration.)

AUDIO DRIVERS

Audio software and utilities are provided via the foundation software CD for the Advanced/AS motherboard. A Windows setup program installs all of the software programs and utilities onto the system hard drive. Included in the audio software are DOS utilities that allow the user to play a CD-ROM, control sound volume and mixer settings, run diagnostics, and switch between Sound Blaster Pro and Windows Sound System modes. Windows drivers and utilities include the Windows sound driver, audio input control panel, audio mixer control panel, and a business audio transport utility.

AUDIO I/O ACCESS

An audio I/O module ships with the Advanced/AS, containing all of the necessary audio jacks (Speaker Out, Line In, Mic In, and game port). The audio module plugs into a 34-pin header connector on the motherboard and occupies an otherwise unused I/O slot on the back of the chassis. The audio connectors are 1/8" stereo jacks.

The audio output is connected to the standard PC speaker to provide an output path that does not require external speakers. If external speakers are plugged into the attached I/O module, then the audio output is redirected to the speakers. If headphones are plugged into the speaker jack, the audio is redirected to the headphones.

CD-ROM AUDIO INPUT

A four pin connector resides on the board (J6L2) for interfacing the audio stream from a CD-ROM reader into the audio subsystem mixer. This connector is compatible with the typical cable that is supplied with CD-ROM drives for interfacing to audio add-in cards.

WAVE TABLE UPGRADE

A Wave Table upgrade connector provides access to compatible Wave Table add-in cards − allowing the onboard audio solution to use a lookup table for wavetable synthesis. Wave table devices can significantly enhance synthesized sound effects and music.

Audio I/O

Wave Table
Upgrade

CD-ROM Input
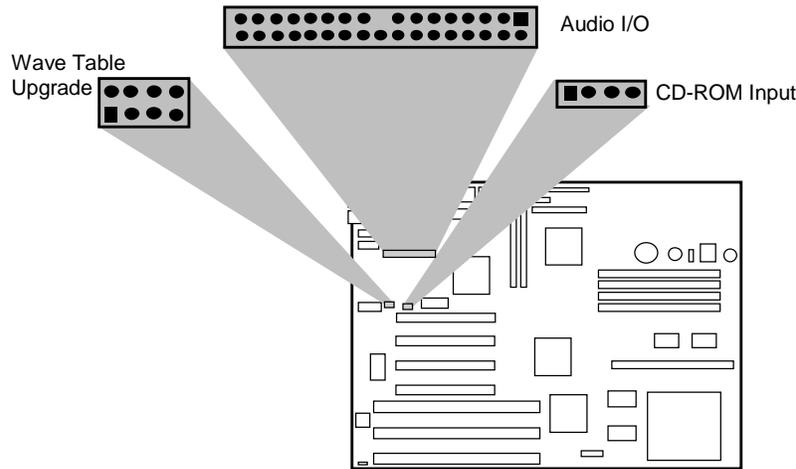
MOTHERBOARD BIOS

The Advanced/AS motherboard uses an American Megatrends Incorporated (AMI) Pentium ROM BIOS, which is stored in Flash EEPROM. The BIOS is easily upgraded using a floppy disk-based program. BIOS upgrades will be available from your vendor. In addition to the AMIBIOS, the Flash EEPROM also contains the Setup utility, Power-On Self Tests (POST), and the PCI auto-configuration utility. This motherboard supports system BIOS shadowing, allowing the BIOS to execute from 64-bit on-board write-protected DRAM.

The BIOS displays a sign-on message during POST identifying the type of BIOS and a five-digit revision code. The initial production BIOS in the Advanced/AS will be identified as 1.00.01.CL0. As BIOS updates occur the revision number will increase to 1.00.02.CL0, and so on.

Information on BIOS functions can be found in the *IBM PS/2 and Personal Computer BIOS Technical Reference* published by IBM, and the *AMI Programmers guide* published by AMI. Both manuals are available at most technical bookstores.

FLASH IMPLEMENTATION

The Intel 28F001BXT 1 Mb FLASH component is organized as 128K x 8 (128 KB). The Flash device is divided into five areas, as described in Table 1.

System Address		FLASH Memory Area
F0000H	FFFFFH	64 KB Main BIOS
EE000H	EFFFFH	8 KB Boot Block (Not FLASH erasable)
ED000H	EDFFFH	4 KB ECSD Area (Plug and Play data)
EC000H	ECFFFH	4 KB OEM Logo Area
E0000H	EBFFFH	48 KB Reserved for possible future use

Table 1. Flash memory organization

The FLASH device resides in system memory in two 64 KB segments starting at E0000H, and can be mapped two different ways, depending on the mode of operation. In *Normal Mode,* address line A16 is inverted, setting the E000H and F000H segments so that the BIOS is organized as shown in the system address column above.

BIOS UPGRADES

FLASH memory makes distributing BIOS upgrades easy. A new version of the BIOS can be installed from a diskette. BIOS upgrades can be made available as downloadable files in a secure section on a bulletin board system.

The disk-based Flash upgrade utility, FMUP.EXE, has three options for BIOS upgrades:

- The Flash BIOS can be updated from a file on a disk;
- The current BIOS code can be copied from the Flash EEPROM to a disk file as a backup in the event that an upgrade cannot be successfully completed; or
- The BIOS in the Flash device can be compared with a file to ensure the system has the correct version.

The upgrade utility ensures the upgrade BIOS extension matches the target system to prevent accidentally installing a BIOS for a different type of system.

SETUP UTILITY

The ROM-based Setup utility allows the configuration to be modified without opening the system for most basic changes. The Setup utility is accessible only during the Power-On Self Test (POST) by pressing the <DEL> or <F1> key after the POST memory test has begun and before boot begins. A prompt may be enabled that informs users to press the <F1> key to access Setup. A Jumper setting on the motherboard can be set to prevent user access to Setup for security purposes. For more details, refer to the appendix on BIOS.

PCI AUTO-CONFIGURATION CAPABILITY

The PCI auto-configuration utility operates in conjunction with the system Setup utility to allow the insertion and removal of PCI cards to the system without user intervention. When the system is turned on after adding a PCI add-in card, the BIOS automatically configures interrupts, I/O space, and other parameters. The user does not have to configure jumpers or worry about potential resource conflicts. Because PCI cards use the same interrupt resources as ISA cards, the user must specify the interrupts used by ISA add-in cards in the Setup utility. The PCI Auto-Configuration function complies with version 2.0 of the PCI BIOS specification.

ISA PLUG & PLAY CAPABILITY

The BIOS incorporates ISA Plug and Play capabilities as delivered by Intel Architectural Labs Plug and Play Release 1.0A (Plug and Play BIOS Ver. 1.0A, ESCD Ver. 1.02) This will allow auto-configuration of Plug and Play ISA cards, and resource management for legacy ISA cards, when used in conjunction with the ISA Configuration Utility (ICU). Copies of the IAL Plug and Play specification may be obtained via CompuServe* by typing Go PlugPlay.

SHADOW MEMORY

Memory from C8000-DFFFF is not shadowed. This is a change from previous products using AMI based BIOS. This may have an adverse affect on the performance of some ISA legacy (non Plug and Play) cards.

POWER MANAGEMENT CAPABILITY

The Advanced/AS BIOS supports power management via System Management Mode (SMM) interrupts to the CPU and Advanced Power Management (APM Ver. 1.1 and 1.0). In general, power management capabilities will allow the system to be put into a power-managed, standby state by either pressing a sleep/resume button on the front of the chassis, by entering a user configurable hot-key sequence on the keyboard, or by the expiration of a hardware timer which detects system inactivity for a user-configurable amount of time. When in the standby state, the Advanced/AS motherboard reduces power consumption by utilizing the power-saving capabilities of the Pentium processor and also spinning down hard drives and turning off DPMS compliant monitors. Add-in cards supplied with APM-aware drivers also can be put into a power managed state for further energy savings. The ability to respond to external interrupts is fully maintained while in standby mode, allowing the system to service requests such as an incoming fax or network messages while unattended.

FLASH LOGO AREA

Advanced/AS supports a 4 KB programmable FLASH user area located at EC000-ECFFF. An OEM may use this area to display a custom logo. The Advanced/AS BIOS accesses the user area just after completing POST.

SECURITY FEATURES

Administrative Password

If enabled, the administrative password protects all sensitive Setup options from being changed by a user unless the password is entered.

User Password

The User Password feature provides security during the boot process. The user password can be set using the Setup utility, and must be entered prior to peripheral boot or keyboard/mouse operation. For more details on how to enable, disable, or change the password, see the BIOS appendix.

If the password is forgotten, it can be cleared by turning off the system and setting the "password clear" jumper (J7F1) to the clear position.

Setup Enable Jumper

A motherboard configuration jumper (J7F2) controls access to the BIOS Setup utility. By setting the jumper to the disable position, the user is prevented from accessing the Setup utility during the Power-On Self Test or at any other time. The message prompting the user to press <F1> to enter setup is also disabled

CONNECTORS

FRONT PANEL CONNECTIONS

The Advanced/AS motherboard provides header connectors to support functions typically located on the chassis bezel:

- System Reset
- Power LED
- Keyboard Lock
- Hard Drive activity LED
- Turbo LED

- System Speaker
- Auxiliary System Fan
- Infra-Red (IrDA) port
- Sleep/Resume
- Power Supply On
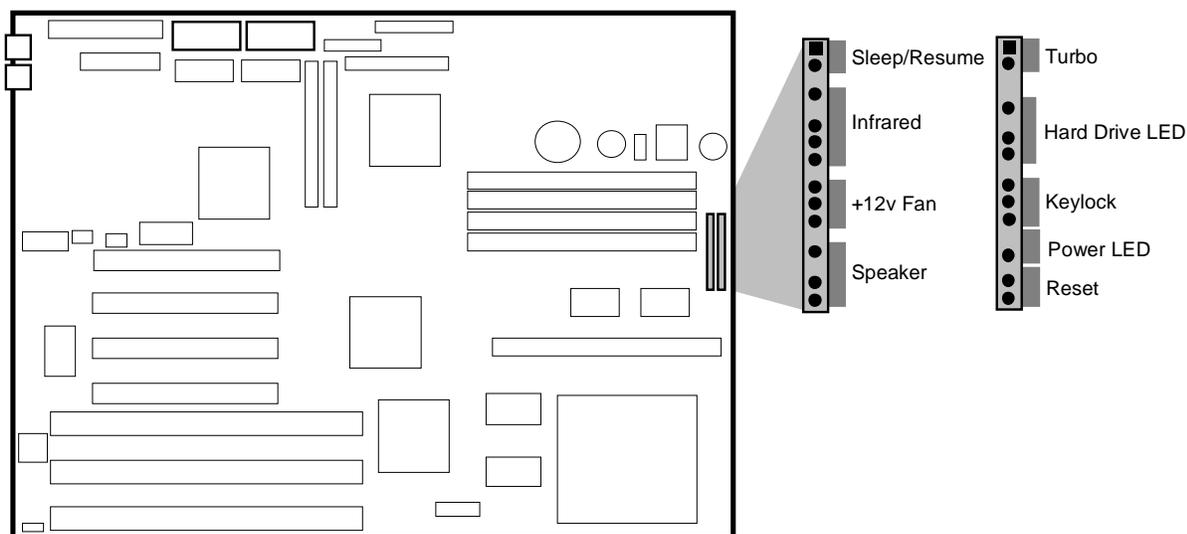
Figure 3. Front Panel Connectors

Sleep/Resume

This two pin header, when connected to a momentary switch, can be used to put the system into a power managed state (Stand By) that will reduce the system's power consumption. If the system is in Standby mode and the switch is closed, the system will instantly "wake up" or resume full system activity. (System activity will also resume when an external interrupt, such as a keystroke or mouse movement, occurs.) When used with a power supply with a high efficiency rating, the Advanced/AS is easily capable of reducing the system power to below EPA Energy Star requirements. The function of the Sleep/Resume button can also be achieved via the keyboard with a hot key sequence (programmable using CMOS setup). This connector can be found in two locations on the Advanced/AS motherboard to minimize system cable requirements.

Soft Power Down

If this option is stuffed on the board and when used with a power supply that supports remote power on/off, the Advanced/AS motherboard can turn off the system power via software control. An APM command issued to the system BIOS will cause the power supply to turn off via the three-pin PS ON header connector. For example, Windows 95 will issue this APM command when the user clicks on the Shutdown icon. The PS ON connector is a Molex 2695 3-pin connector which features a security latch. Power can be restored via a front panel power button when it is connected to the S_OFF two pin header.

By implementing a dual-pole momentary switch from the power button to the S_OFF/SLEEP four-pin header connector, both sleep/resume and power resume functions can be supported via a single button. In this configuration,

pressing the button (closing the switch) while the system is active will put the motherboard into Stand By mode, pressing the button while in Stand By will cause the system to Resume to full operation. When the system has been completely powered off via software control as mentioned above, pressing the button will turn the system ON invoking POST.

Infrared (IrDA) connector

Serial port 2 can be configured to support an IrDA module via a 5 pin header connector. Once configured for IrDA, the user can transfer files to/from portable devices such as laptops, PDAs and printers using application software such as LapLink*. The IrDA specification provides for data transfers at 115kbps from a distance of 1 meter.

Speaker

The external speaker provides error beep code information during the Power-On Self Test if the system cannot use the video interface.

BACK PANEL CONNECTIONS

A standard AT-style keyboard connector is available on standard configurations. Figure 4 shows this configuration.

Keyboard connector

Figure 4. Advanced/AS Back panel.

I/O CONNECTIONS

The motherboard contains shroudless stake pin header connections for cabling the serial, parallel, floppy, IDE and wave table interfaces. The CDROM header is shrouded, the audio interface is a female type connector. Figure 6 shows the locations of these connectors and the orientation of pin 1 on each.
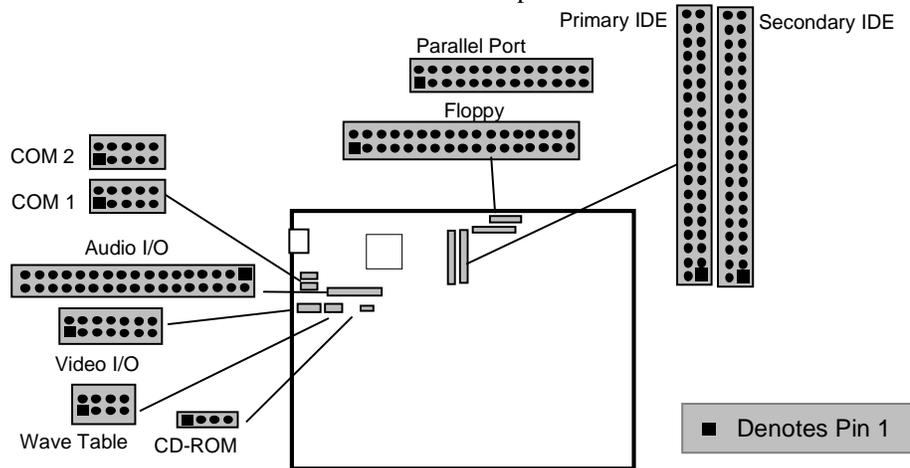
Figure 6. I/O Connections

POWER CONSUMPTION

Table 2 lists the current used by system resources in a configuration which includes 8 MB of DRAM. Table 3 lists the typical power consumed by the same configuration. Note that the 3.3 volts used to drive the CPU and core logic is derived from an on-board voltage regulator from the +5 volt source. This information is preliminary and is provided only as a guide for calculating approximate total system power usage with additional resources added.

CURRENT

DC Voltage	Typical Current*
+5V	2.7 amps
-5V	120 milliamps
+12V	780 milliamps
-12V	90 milliamps

Table 2. Advanced/AS Current Requirements (Preliminary)
*(measured with 8 MB DRAM, VGA controller and Floppy Drive while sitting at DOS prompt)

WATTS

System Configuration	Typical Power*	standby Power*
Advanced/AS motherboard, 8 MB, 256 KB cache, Floppy drive, 540 MB hard drive, DPMS graphics card	30 Watts	23.7 Watts

Table 3. Power use by System Resources (Preliminary)
*(True power measured from the wall with a 65% efficient power supply)

Appendix A – User Installable Upgrades

SYSTEM MEMORY

Table A-1 shows the possible memory combinations. The Advanced/AS will support both Fast Page DRAM or EDO DRAM SIMMs, but they cannot be mixed within the same memory bank. If Fast Page DRAM and EDO DRAM SIMMs are installed in separate banks, each bank will be optimized for maximum performance. Parity generation and detection is NOT supported, but parity SIMMs (x36) may be used. SIMM requirements are 70 ns Fast Page Mode or 60 ns EDO DRAM with tin-lead connectors.

J7C1 & J6C2 SIMM 1,2 (Bank 0) SIMM Type (Amount)	J6C1 & J5C1 SIMM 3,4 (Bank 1) SIMM Type (Amount)	Total System Memory
1M X 32 (4 MB)	Empty	8 MB
1M X 32 (4 MB)	1M X 32 (4 MB)	16 MB
1M X 32 (4 MB)	2M X 32 (8 MB)	24 MB
1M X 32 (4 MB)	4M X 32 (16 MB)	40 MB
1M X 32 (4 MB)	8M X 32 (32 MB)	72 MB
2M X 32 (8 MB)	Empty	16 MB
2M X 32 (8 MB)	1M X 32 (4 MB)	24 MB
2M X 32 (8 MB)	2M X 32 (8 MB)	32 MB
2M X 32 (8 MB)	4M X 32 (16 MB)	48 MB
2M X 32 (8 MB)	8M X 32 (32 MB)	80 MB
4M X 32 (16 MB)	Empty	32 MB
4M X 32 (16 MB)	1M X 32 (4 MB)	40 MB
4M X 32 (16 MB)	2M X 32 (8 MB)	48 MB
4M X 32 (16 MB)	4M X 32 (16 MB)	64 MB
4M X 32 (16 MB)	8M X 32 (32 MB)	96 MB
8M X 32 (32 MB)	Empty	64 MB
8M X 32 (32 MB)	1M X 32 (4 MB)	72 MB
8M X 32 (32 MB)	2M X 32 (8 MB)	80 MB
8M X 32 (32 MB)	4M X 32 (16 MB)	96 MB
8M X 32 (32 MB)	8M X 32 (32 MB)	128 MB

Table A-1. Possible SIMM memory combinations
Note: SIMMs may be parity (x 36) or non-parity (x 32)

REAL TIME CLOCK BATTERY REPLACEMENT

The battery can be replaced with a Sanyo CR2032, or equivalent, coin cell lithium battery. This battery has a 220 mAh rating.

Appendix B – Jumper Settings
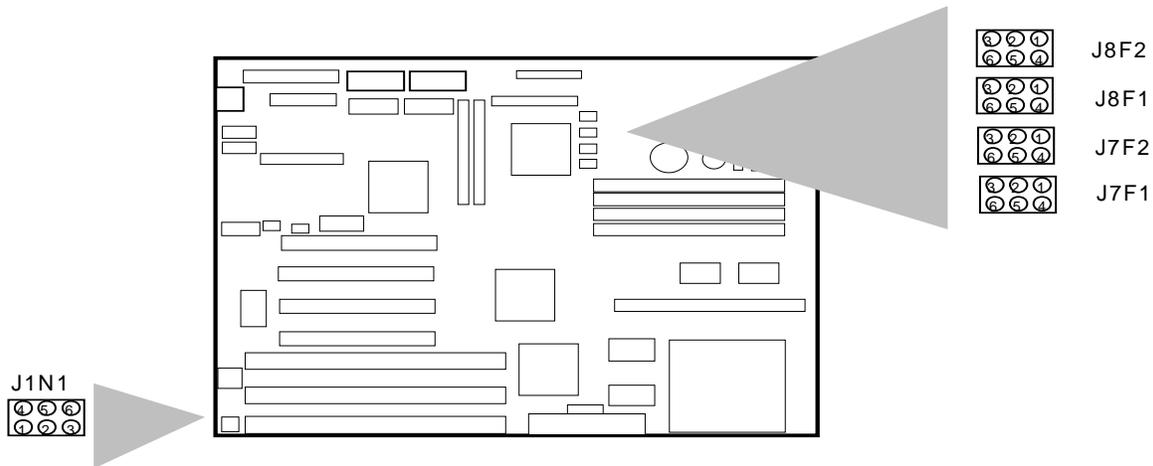
Figure B-1. Jumper locations and settings

INTERNAL CPU CLOCK SPEED - JUMPER J8F2 AND J1N1

This jumper sets the internal CPU clock speed to either 3/2 (OFF) or 2x (ON) the external CPU clock speed.

CPU Clock Multiplier	J8F2	J1N1
1.5x	1-2	4-5
2.0x	2-3	4-5
2.5x	2-3	5-6
3.0x	1-2	5-6

Note: The Advanced/AS does not support recovery, however J1N1 must be strapped from pins 1-2 to work properly. If the jumper is either moved from pins 1-2 or removed, the system will fail to boot properly.

EXTERNAL CPU CLOCK SPEED (50/60/66 MHZ) - JUMPER J8F1

This jumper block sets the CPU's external operating frequency to memory at 50, 60, or 66 MHz. Default setting depends on the specific product code, see table for specific Pentium processor configuration information.

External Bus Freq.	Jumpers
50 MHz	1-2, 5-6
60 MHz	1-2, 4-5
66 MHz	2-3, 5-6
Reserved	2-3, 4-5

JUMPER SETTINGS FOR CPU SPEED SUPPORT

This combination of the above two tables defines the speed of the processor. The following table simply combines these two settings into a processor support table for convenience.

External Bus Speed	Bus Clock Multiplier	Processor Speed	Jumper J8F1	Jumper J8F2	Jumper J1N1
50	1.5	75	1-2, 5-6	1-2	4-5
60	1.5	90	1-2, 4-5	1-2	4-5
66	1.5	100	2-3, 5-6	1-2	4-5
60	2	120	1-2, 4-5	2-3	4-5
66	2	133	2-3, 5-6	2-3	4-5
60	2.5	150	1-2, 4-5	2-3	5-6
66	2.5	166	2-3, 5-6	2-3	5-6
66	3.0	200	2-3, 5-6	1-2	5-6

VR/VRE - JUMPER J8F2

This jumper block changes the output of the on-board voltage regulator. Pins 4-5 in J8F2 should be jumpered for standard voltage regulation, pins 5-6 in J8F2 should be jumpered for the VRE specification. This jumper should not be changed by the user unless changing to a new processor type. Some upgrade processors may require a different setting, check the processor's documentation for the correct setting. (Standard = 3.135-3.465V, VRE = 3.465-3.63V)

SETUP DISABLE - JUMPER J7F2

Allows access to CMOS Setup Utility to be disabled by jumpering pins 2-3 in J7F2. Default is for access to setup to be enabled, jumpers on 1-2.

CLEAR CMOS - JUMPER J7F2

Allows CMOS settings to be reset to default values by jumpering pins 5-6in J7F2. The system should then be turned off and the jumper returned to pins 4-5 to restore normal operation. This procedure should be done whenever the system BIOS is updated.

ISA BUS CLOCK - JUMPER J7F1

This jumper changes the clock frequency of the ISA bus. The effect of this jumper on the ISA clock depends upon the setting of the CPU clock speed jumpers. The default setting for this jumper is 1-2. In general, this jumper should only be set to 2-3 if higher ISA performance is required, and the ISA expansion cards can handle the faster bus clock.

Bus Frequency	Jumper J7F1	ISA Bus Speed
50 MHz	1-2 or 2-3	8.33 MHz
60 MHz	1-2	7.5 MHz
	2-3	10 MHz
66 MHz	1-2	8.25 MHz
	2-3	11 MHz

PASSWORD CLEAR - JUMPER J7F1

Allows system password to be cleared by jumpering pins 5-6 in J7F1 and turning the system on. The system should then be turned off and the jumper should be returned to 4-5 in J7F1 to restore normal operation. This procedure should only be done if the user password has been forgotten.

RECOVERY - JUMPER J1N1

Due to BIOS space limitations in the Flash component on the Advanced/AS, the BIOS support for recovery has been removed. The silk screen for the jumper at J1N1 erroneously implies that there is recovery support. If you have a problem wherein you are unable to make your system operational due to severe BIOS corruption, and the only means of correction is a flash recovery, please contact your vendor for special recovery tools.

Appendix C – Connectors

POWER SUPPLY CONNECTORS

PRIMARY POWER (J9M1)

Pin	Name	Function
1	PWRGD	Power Good
2	+5 V	+ 5 volts Vcc
3	+12 V	+ 12 volts
4	-12 V	- 12 volts
5	GND	Ground
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	-5 V	-5 volts
10	+5 V	+ 5 volts Vcc
11	+5 V	+ 5 volts Vcc
12	+5 V	+ 5 volts Vcc

PCI (3.3V) POWER (J6L1)

Pin	Name	Function
1	GND	Ground
2	GND	Ground
3	GND	Ground
4	+3.3 V	+ 3.3 volts
5	+3.3V	+ 3.3 volts
6	+3.3 V	+ 3.3 volts

SOFT-OFF POWER (J8M2)

Pin	Name	Function
1	PS_ON	Remote ON/OFF
2	n/c	no connect
3	PS_COM	Supply presence

SOFT-OFF SLEEP (J7A1)

Pin	Name
1	SLEEPPU
2	SLEEP
3	PS_ON
4	PS_COMM

FRONT PANEL – (J5A1, J5A2)

SLEEP/RESUME(J5A2)

Pin	Signal Name
1	Sleep +5 (1K Pullup)
2	Sleep Driver
3	Key

INFRA-RED(J5A2)

Pin	Signal Name
4	+5V
5	Key
6	IR_RX
7	Ground
8	IR_TX

CPU FAN(J5A2)

Pin	Signal Name
10	Ground
11	+12V
12	Ground

SPEAKER CONNECTOR(J5A2)

Pin	Signal Name
14	SPKRHDR
15	Key
16	SPKROUT

17	Ground

TURBO LED(J5A1)

Pin	Signal Name
1	TURBOPU
2	TURBODRVR

HARD DRIVE LED (DISK)(J5A1)

Pin	Signal Name
5	+5V
6	Key
7	HD ACTIVE
8	+5V

POWER LED / KEYLOCK(J5A1)

	Signal Name
10	Ground
11	Key
12	Ground
13	Ground
14	LED Pwr

RESET CONNECTOR(J5A1)

Pin	Signal Name
16	Ground
17	RESET

I/O CONNECTORS

VESA FEATURE CONNECTOR (J8L1)

Signal Name	Pin	Pin	Signal Name
Ground	1	2	Data 0
Ground	3	4	Data 1
Ground	5	6	Data 2
Data Enable	7	8	Data 3
Sync Enable	9	10	Data 4
PClk Enable	11	12	Data 5
NC	13	14	Data 6
Ground	15	16	Data 7
Ground	17	18	PClk
Ground	19	20	Blank*
Ground	21	22	HSync
NC	23	24	VSync
NC	25	26	Ground

AT STYLE KEYBOARD PORT (J8N2)

Pin	Signal Name
1	Clock
2	Data
3	No Connect
4	Ground
5	Vcc (fused)

CD-ROM AUDIO INTERFACE (J6L2)

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

AUDIO I/O CONNECTOR (J7M1)

Signal Name	Pin	Pin	Signal Name
+5 V	1	2	+5 V
JoyStick But0	3	4	JoyStick But2
JoyStick X1	5	6	JoyStick X2
Ground	7	8	MIDI Out
Ground	9	10	JoyStick Y2
JoyStick Y1	11	12	JoyStick But3
JoyStick But1	13	14	MIDI In
+5 V	15	16	Mono_Out
Key	17	18	Mono_In
Line Out Right	19	20	Ground
Right Speaker	21	22	Ground
Left Speaker	23	24	Key
Line Out Left	25	26	Ground
Line In Right	27	28	-12 V
Line In Left	29	30	Ground
Mic In	31	32	+12 V
Ground	33	34	Ground

WAVE TABLE CONNECTOR (J6M1)

Pin	Signal Name
1	Wave Right
2	Ground
3	Wave Left
4	Ground
5	Key
6	Ground
7	NC
8	MIDI out

IDE CONNECTORS (J7H1 & J7H2)

Signal Name	Pin	Pin	Signal Name
Reset IDE	1	2	Ground
Host Data 7	3	4	Host Data 8
Host Data 6	5	6	Host Data 9
Host Data 5	7	8	Host Data 10
Host Data 4	9	10	Host Data 11
Host Data 3	11	12	Host Data 12
Host Data 2	13	14	Host Data 13
Host Data 1	15	16	Host Data 14
Host Data 0	17	18	Host Data 15
Ground	19	20	Key
DRQ3	21	22	Ground
I/O Write-	23	24	Ground
I/O Read-	25	26	Ground
IOCHRDY	27	28	BALE
DACK3-	29	30	Ground
IRQ14	31	32	IOCS16-
Addr 1	33	34	Not Connected
Addr 0	35	32	Addr 2
Chip Select 0-	37	38	Chip Select 1-
Activity	39	40	Ground

SERIAL PORTS (J7N1 & J7N2)

Pin	Signal Name
1	DCD
2	DSR
3	Serial In - (SIN)
4	RTS
5	Serial Out - (SOUT)
6	CTS
7	DTR
8	RI
9	GND
10	Not Connected

PARALLEL PORT CONNECTOR (J9F1)

Signal Name	Pin	Pin	Signal Name
STROBE-	1	2	AUTO FEED-
Data Bit 0	3	4	ERROR-
Data Bit 1	5	6	INIT-
Data Bit 2	7	8	SLCT IN-
Data Bit 3	9	10	Ground
Data Bit 4	11	12	Ground
Data Bit 5	13	14	Ground
Data Bit 6	15	16	Ground
Data Bit 7	17	18	Ground
ACJ-	19	20	Ground
BUSY	21	22	Ground
PE (Paper End)	23	24	Ground
SLCT	25	26	N.C.

FLOPPY CONNECTOR (J8G1)

Signal Name	Pin	Pin	Signal Name
Ground	1	2	FDHDIN
Ground	3	4	Reserved
Key	5	6	FDEDIN
Ground	7	8	Index-
Ground	9	10	Motor Enable A-
Ground	11	12	Drive Select B-
Ground	13	14	Drive Select A-
Ground	15	16	Motor Enable B-
EN1	17	18	DIR-
Ground	19	20	STEP-
Ground	21	22	Write Data-
Ground	23	24	Write Gate-
Ground	25	26	Track 00-
EN0	27	28	Write Protect-
Ground	29	30	Read Data-
Ground	31	32	Side 1 Select-
Ground	33	34	Diskette Change-

VIDEO CONNECTOR (J6N1)

Signal Name	Pin	Pin	Signal Name
Ground	1	2	Ground
Ground	3	4	VRED
Ground	5	6	VGREEN
Ground	7	8	VBLUE
Ground	9	10	HSYNC
Ground	11	12	VSYNC
Ground	13	14	MONID1
Ground	15	16	MONOID2

ISA CONNECTORS (J1K1, J2K1, J2K2)

Signal Name	Pin	Pin	Signal Name
GND	B1	A1	IOCHK-
RSTDRV	B2	A2	SD7
Vcc	B3	A3	SD6
IRQ9	B4	A4	SD5
-5V	B5	A5	SD4
DRQ2	B6	A6	SD3
-12V	B7	A7	SD2
0WS-	B8	A8	SD1
+12V	B9	A9	SD0
GND	B10	A10	IOCHRDY
SMEMW-	B11	A11	AEN
SMEMR-	B12	A12	SA19
IOW-	B13	A13	SA18
IOR-	B14	A14	SA17
DACK3-	B15	A15	SA16
DRQ3	B16	A16	SA15
DACK1-	B17	A17	SA14
DRQ1	B18	A18	SA13
REFRESH-	B19	A19	SA12
SYSCLK	B20	A20	SA11
IRQ7	B21	A21	SA10
IRQ6	B22	A22	SA9
IRQ5	B23	A23	SA8
IRQ4	B24	A24	SA7
IRQ3	B25	A25	SA6
DACK2-	B26	A26	SA5
TC	B27	A27	SA4
BALE	B28	A28	SA3
Vcc	B29	A29	SA2
OSC	B30	A30	SA1
GND	B31	A31	SA0
KEY	KEY	KEY	
MEMCS16-	D1	C1	SBHE-
IOCS16-	D2	C2	LA23
IRQ10	D3	C3	LA22
IRQ11	D4	C4	LA21
IRQ12	D5	C5	LA20
IRQ15	D6	C6	LA19
IRQ14	D7	C7	LA18
DACK0-	D8	C8	LA17
DRQ0	D9	C9	MEMR-
DACK5-	D10	C10	MEMW-
DRQ5	D11	C11	SD8
DACK6-	D12	C12	SD9
DRQ6	D13	C13	SD10
DACK7-	D14	C14	SD11
DRQ7	D15	C15	SD12
Vcc	D16	C16	SD13
Master-	D17	C17	SD14
GND	D18	C18	SD15

PCI CONNECTORS (J3K1, J4K1, J5K1, J5K2)

Signal Name	Pin	Pin	Signal Name		Signal Name	Pin	Pin	Signal Name
*TRST#(VCC)	A1	B1	-12V		AD16	A32	B32	AD17
+12V	A2	B2	*TCK(GND)		3.3V	A33	B33	CBE2-
*TMS(VCC)	A3	B3	GND		FRAME-	A34	B34	GND
*TDI(VCC)	A4	B4	*TDO(INC)		GND	A35	B35	IRDY-
Vcc	A5	B5	Vcc		TRDY-	A32	B32	3.3V
INTA	A6	B6	Vcc		GND	A37	B37	DEVSEL-
INTC	A7	B7	INTB		STOP-	A38	B38	GND
Vcc	A8	B8	INTD		3.3V	A39	B39	LOCK-
Reserved	A9	B9	Prsnt1#		SDONE	A40	B40	PERR-
Vcc	A10	B10	Reserved		SBO-	A41	B41	3.3V
Reserved	A11	B11	Prsnt2#		GND	A42	B42	SERR-
GND	A12	B12	GND		PAR	A43	B43	3.3V
GND	A13	B13	GND		AD15	A44	B44	CBE1-
Reserved	A14	B14	Reserved		3.3V	A45	B45	AD14
RST-	A15	B15	GND		AD13	A46	B46	GND
Vcc	A16	B16	CLK		AD11	A47	B47	AD12
AGNT-	A17	B17	GND		GND	A48	B48	AD10
GND	A18	B18	REQA-		AD9	A49	B49	GND
Reserved	A19	B19	Vcc		KEY	A50	B50	KEY
AD30	A20	B20	AD31		KEY	A51	B51	KEY
3.3V	A21	B21	AD29		CBEO-	A52	B52	AD8
AD28	A22	B22	GND		3.3V	A53	B53	AD7
AD26	A23	B23	AD27		AD6	A54	B54	3.3V
GND	A24	B24	AD25		AD4	A55	B55	AD5
AD24	A25	B25	3.3V		GND	A56	B56	AD3
IDSEL	A26	B26	CBE3-		AD2	A57	B57	GND
3.3V	A27	B27	AD23		AD0	A58	B58	AD1
AD22	A28	B28	GND		Vcc	A59	B59	Vcc
AD20	A29	B29	AD21		REQ64-	A60	B60	ACK64-
GND	A30	B30	AD19		Vcc	A61	B61	Vcc
AD18	A31	B31	3.3V		Vcc	A62	B62	Vcc

*These optional boundary scan signals are not implemented in this motherboard

.

CELP CONNECTOR (J4C1)

Signal Name	Pin	Pin	Signal Name		Signal Name	Pin	Pin	Signal Name
GND	1	41	D58		GND	81	121	D59
TIO0	2	42	D56		TIO1	82	122	D57
TIO2	3	43	GND		TIO7	83	123	GND
TIO6	4	44	D54		TIO5	84	124	D55
TIO4	5	45	D52		TIO3	85	125	D53
RSVD	6	46	D50		RSVD	86	126	D51
VCC3	7	47	D48		VCC5	87	127	D49
TWE*	8	48	GND		RSVD	88	128	GND
CADS*	9	49	D46		CADV*	89	129	D47
GND	10	50	D44		GND	90	130	D45
CWE4*	11	51	D42		COE*	91	131	D43
CWE6*	12	52	VCC3		CWE5*	92	132	VCC5
CWE0*	13	53	D40		CWE7*	93	133	D41
CWE2*	14	54	D38		CWE1*	94	134	D39
VCC3	15	55	D36		VCC5	95	135	D37
CCS*	16	56	GND		CWE3*	96	136	GND
GWE*	17	57	D34		CAB3	97	137	D35
BWE*	18	58	D32		CALE	98	138	D33
GND	19	59	D30		GND	99	139	D31
A3	20	60	VCC3		RSVD	100	140	VCC5
A7	21	61	D28		A4	101	141	D29
A5	22	62	D26		A6	102	142	D27
A11	23	63	D24		A8	103	143	D25
A16	24	64	GND		A10	104	144	GND
VCC3	25	65	D22		VCC5	105	145	D23
A18	26	66	D20		A17	106	146	D21
GND	27	67	D18		GND	107	147	D19
A12	28	68	VCC3		A9	108	148	VCC5
A13	29	69	D16		A14	109	149	D17
ADSP*	30	70	D14		A15	110	150	D15
ECS1*	31	71	D12		RSVD	111	151	D13
ECS2*	32	72	GND		PD0	112	152	GND
PD1	33	73	D10		PD2	113	153	D11
PD3	34	74	D8		PD4	114	154	D9
GND	35	75	D6		GND	115	155	D7
CLK1	36	76	VCC3		CLK0	116	156	VCC5
GND	37	77	D4		GND	117	157	D5
D62	38	78	D2		D63	118	158	D3
VCC3	39	79	D0		VCC5	119	159	D1
D60	40	80	GND		D61	120	160	GND

Appendix D – Memory Map

Address Range (Decimal)	Address Range (hex)	Size	Description
1024K-131072K	100000-8000000	127M	Extended Memory
960K-1023K	F0000-FFFFF	64K	AMI System BIOS
952K-959K	EE000-EFFFF	8K	FLASH Boot Block (Available as UMB)
948K-951K	ED000-EDFFF	4K	ESCD (Plug and Play configuration area)
944-947K	EC000-ECFFF	4K	OEM LOGO (available as UMB)
896K-943K	E0000-EBFFF	48K	BIOS RESERVED (Currently available as UMB)
800-895K	C8000-DFFFF	96K	Available HI DOS memory (open to ISA and PCI bus)
640K-799K	A0000-C7FFF	160K	Available HI DOS Memory (normally reserved for) video)
639K	9FC00-9FFFF	1K	Extended BIOS Data (moveable by QEMM, 386MAX)
512K-638K	80000-9FBFF	127K	Extended conventional
0K-511K	00000-7FFFF	512K	Conventional

Table D1. Advanced/AS Memory Map

The table above details the Advanced/AS memory map. The ECSD area from ED000-EDFFF is not available for use as an Upper Memory Block (UMB) by memory managers. The area from E0000-EBFFF is currently not used by the BIOS and is available for use as UMB by memory managers. Parts of this area may be used by future versions of the BIOS to add increased functionality.

Appendix E – I/O Map

The following table lists the I/O addresses used by motherboard devices. Some of these devices (audio and graphics) may not be present in all configurations. Some devices (serial ports, parallel ports etc.) may be configured for various addresses or disabled. These I/O locations are listed in the Variable Motherboard Resources column. Note: the Crystal audio controller is a plug and play device, only standard audio addresses are listed below.

Address (hex)	Size	Fixed Motherboard Resources	Variable Motherboard Resources
0000 - 000F	16 bytes	PIIX - DMA controller	
0020 - 0021	2 bytes	PIIX - Interrupt Controller 1	
0040 - 0043	4 bytes	PIIX - Timer 1	
0060	1 byte	Keyboard Controller Data Byte	
0061	1 byte	PIIX - NMI, speaker control	
0064	1 byte	Kbd Controller, CMD/STAT Byte	
0070, bit 7	1 bit	PIIX - Enable NMI	
0070, bits 6:0	7 bits	87C306 - Real Time Clock,	
0071	1 byte	87C306 - Real Time Clock, Data	
0078	1 byte	Reserved - Brd. Config.	
0079	1 byte	Reserved - Brd. Config.	
0080 - 008F	16 bytes	PIIX - DMA Page Register	
00A0 - 00A1	2 bytes	PIIX - Interrupt Controller 2	
00C0 - 00DE	31 bytes	PIIX - DMA controller	
00F0	1 byte	Reset Numeric Error	
0170 - 0177	8 bytes		Secondary IDE Channel
01F0 - 01F7	8 bytes		Primary IDE Channel
0200 - 0207	8 bytes		Gameport Joystick
0220 - 022F	16 bytes		Audio - WSS
0278 - 027B	4 bytes		Parallel Port 2

Table E-1. Advanced/AS I/O Address Map(* Only accessible by DWORD accesses.)

I/O MAP (CONTINUED)

Address (hex)	Size	Fixed Motherboard Resources	Variable Motherboard Resources
02F8 - 02FF	8 bytes		Serial Port 2
0330 - 0331	2 bytes		Audio - MUP-401
0376	1 byte		Sec IDE Chan Cmd Port
0377	1 byte		Sec IDE Chan Stat Port
0378 - 037F	8 bytes		Parallel Port 1
0388 - 038B	4 bytes		Audio - WSS
03BC - 03BF	4 bytes		Parallel Port 3 (add-in device)
03E8 - 03EF	8 bytes		Serial Port 3
03F0 - 03F5	6 bytes		Floppy Channel 1
03F6	1 bytes		Pri IDE Chan Cmnd Port
03F7 (Write)	1 byte		Floppy Chan 1 Cmd
03F7, bit 7	1 bit		Floppy Disk Chg Chan 1
03F7, bits 6:0	7 bits		Pri IDE Chan Status Port
03F8 - 03FF	8 bytes		Serial Port 1
LPT + 400h	3 bytes		ECP regs, LPT base + 400h
608 - 60B	4 bytes		Audio - WSS
0CF8 - 0CFB*	4 bytes	PCI Config Address Reg.	
0CFC - 0CFF	4 bytes	PCI Config Data Reg	
0FE0 - 0FE7	8 bytes		Audio - CS4232 Control
FF00-FF07	8 bytes		IDE Bus Master Reg.

Table E-1. Advanced/AS I/O Address Map (* Only accessible by DWORD accesses.)

I/O Port 78 is reserved for BIOS use. Port 79 is a read only port, the bit definitions are shown below.

Bit #	Description	Bit = 1	Bit = 0
0	Internal CPU Clock Freq.	3/2	2x
1	Soft Off capable power supply	No	Yes
2	On-bd Audio present	Yes	No
3	External CPU clock		
4	External CPU clock		
5	Setup Disable	Enable access	Disable access
6	Clear CMOS	Keep values	Clear values
7	Password Clear	Keep password	Clear password

Appendix F – PCI Configuration Space Map

The 82430FX PCIset uses Configuration Mechanism 1 to access PCI configuration space. The PCI Configuration Address register is a 32-bit register located at CF8h, the PCI Configuration Data register is a 32-bit register located at CFCh. These registers are only accessible by full DWORD accesses. The table below lists the PCI bus and device numbers used.

Bus Number (hex)	Dev Number (hex)	Func. Number (hex)	Description
00	00	00	Intel 82437FX (TSC)
00	07	00	Intel 82371FB (PIIX) PCI/ISA bridge
00	07	01	Intel 82371FB (PIIX) IDE Bus Master
00	08	00	ATI Mach64 CT Graphics Controller
00	0D		Expansion Slot 6 (PCI)
00	0E		Expansion Slot 5 (PCI)
00	0F		Expansion Slot 4 (PCI)
00	10		Expansion Slot 3 (PCI)

Table F-1. Advanced/AS PCI Config. Space Map

Appendix G – Interrupts & DMA Channels

The following tables list the Interrupt and DMA Channel configuration options for on-board devices. The serial ports, parallel ports, and IDE controller can be configured via SETUP, the ICU, or any other Plug and Play resource manager (such as the Windows 95 Device Manager). The Audio controller can only be configured via a Plug and Play resource manager.

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	Serial Port 2
4	Serial Port 1
5	On-bd Audio (default)
6	Floppy
7	Parallel Port 1
8	Real Time Clock
9	User available
10	User available
11	User available
*12	On-brd Mouse Port (Avail if no PS/2 mouse)
13	Reserved, Math coprocessor
14	Primary IDE
15	Secondary IDE if applicable, otherwise User available

Table G-1. Advanced/AS Interrupts

DMA	Data Width	System Resource
0	8- or 16-bits	On-bd Audio (default)
1	8- or 16-bits	On-bd Audio (default)
2	8- or 16-bits	Floppy
3	8- or 16-bits	Parallel Port (for ECP/EPP Config.)
4		Reserved - Cascade channel
5	16-bits	Open
6	16-bits	Open
7	16-bits	Open

Table G-2. Advanced/AS DMA Map

Appendix H – PCI Configuration Error Messages

The following PCI messages are displayed as a group with bus, device and function information.

```
<'NVRAM Checksum Error, NVRAM Cleared'>, \ ; String
<'System Board Device Resource Conflict'>, \ ; String
<'Primary Output Device Not Found'>, \ ; String
<'Primary Input Device Not Found'>, \ ; String
<'Primary Boot Device Not Found'>, \ ; String
<'NVRAM Cleared By Jumper'>, \ ; String
<'NVRAM Data Invalid, NVRAM Cleared'>, \ ; String
<'Static Device Resource Conflict'>, \ ; String
```

The following messages chain together to give a message such as:

```
 "PCI I/O Port Conflict: Bus: 00, Device 0D, Function: 01".
```

If and when more than 15 PCI conflict errors are detected the log full message is displayed.

```
<'PCI I/O Port Conflict:'>, \ ; String
<'PCI Memory Conflict: '>, \ ; String
<'PCI IRQ Conflict: '>, \ ; String
<' Bus '>, \ ; String
<', Device '>, \ ; String
<', Function '>, \ ; String
<',PCI Error Log is Full.'>, \ ; String
<'Floppy Disk Controller Resource Conflict '>, \ ; Text
<'Primary IDE Controller Resource Conflict '>, \ ; Text
<'Secondary IDE Controller Resource Conflict '>, \ ; Text
<'Parallel Port Resource Conflict '>, \ ; Text
<'Serial Port 1 Resource Conflict '>, \ ; Text
<'Serial Port 2 Resource Conflict '>, \ ; Text
```

Appendix I – AMIBIOS Error messages and Beep Codes

Errors can occur during POST (Power On Self Test) which is performed every time the system is powered on. Fatal errors, which prevent the system from continuing the boot process, are communicated through a series of audible beeps. Other errors are displayed in the following format:

ERROR *Message Line 1*

ERROR *Message Line 2*

For most displayed error messages, there is only one message. If a second message appears, it is "RUN SETUP". If this message occurs, press <F1> to run AMIBIOS Setup.

BEEP CODES

Beeps	Error Message	Description
1 long, 2 short	No video card found	Applies only to motherboards with no on-bd video.
1 long, 3 short	No Monitor connected	Applies only to motherboards with on-bd video present.
1 long, x short	Video related failure	Other video beep codes may exist and are tied to specific video BIOS implementations. Contact the vendor for details should the need arise.
1	Refresh Failure	The memory refresh circuitry on the motherboard is faulty.
2	Parity Error	Parity is not supported on this product, will not occur.
3	Base 64 KB Memory Failure	Memory failure in the first 64 KB.
4	Timer Not Operational	Memory failure in the first 64 KB of memory, or Timer 1 on the motherboard is not functioning.
5	Processor Error	The CPU on the motherboard generated an error.
6	8042 - Gate A20 Failure	The keyboard controller may be bad. The BIOS cannot switch to protected mode.
7	Processor Exception Interrupt Error	The CPU generated an exception interrupt.
8	Display Memory Read/Write Error	The system video adapter is either missing or its memory is faulty. This is not a fatal error.
9	ROM Checksum Error	ROM checksum value does not match the value encoded in BIOS.
10	CMOS Shutdown Register Rd/Wrt Error	The shutdown register for CMOS RAM failed.
11	Cache Error / External Cache Bad	The external cache is faulty.

ERROR MESSAGES

Error Message	Explanation
8042 Gate - A20 Error	Gate A20 on the keyboard controller is not working.
Address Line Short!	Error in the address decoding circuitry on the motherboard
Cache Memory Bad, Do Not Enable Cache!	Cache memory is defective. Replace it.
CH-2 Timer Error	Most AT systems include two timers. There is an error in timer 2.
CMOS Battery State Low	CMOS RAM is powered by a battery. The battery power is low. Replace the battery.
CMOS Checksum Failure	After CMOS RAM values are saved, a checksum value is generated for error checking. The previous value is different from the current value. Run AMIBIOS Setup.
CMOS System Options Not Set	The values stored in CMOS RAM are either corrupt or nonexistent. Run Setup.
CMOS Display Type Mismatch	The video type in CMOS RAM does not match the type detected by the BIOS. Run AMIBIOS Setup.
CMOS Memory Size Mismatch	The amount of memory on the motherboard is different than the amount in CMOS RAM. Run AMIBIOS Setup.
CMOS Time and Date Not Set	Run Standard CMOS Setup to set the date and time in CMOS RAM.
Diskette Boot Failure	The boot disk in floppy drive A: is corrupt. It cannot be used to boot the system. Use another boot disk and follow the screen instructions.
Display Switch Not Proper	The display jumper is not implemented on this product, this error will not occur.
DMA Error	Error in the DMA controller.
DMA #1 Error	Error in the first DMA channel.
DMA #2 Error	Error in the second DMA channel.
FDD Controller Failure	The BIOS cannot communicate with the floppy disk drive controller. Check all appropriate connections after the system is powered down.
HDD Controller Failure	The BIOS cannot communicate with the hard disk drive controller. Check all appropriate connections after the system is powered down.
INTR #1 Error	Interrupt channel 1 failed POST.
INTR #2 Error	Interrupt channel 2 failed POST.
Invalid Boot Diskette	The BIOS can read the disk in floppy drive A:, but cannot boot the system. Use another boot disk
Keyboard Is Locked...Unlock It	The keyboard lock on the system is engaged. The system must be unlocked to continue.
Keyboard Error	There is a timing problem with the keyboard. Set the Keyboard option in Standard CMOS Setup to Not Installed to skip the keyboard POST routines.
KB/Interface Error	There is an error in the keyboard connector.
Off Board Parity Error	Parity error in memory installed in an expansion slot. The format is: OFF BOARD PARITY ERROR ADDR (HEX) = (XXXX) XXXX is the hex address where the error occurred.
On Board Parity Error	Parity is not supported on this product, this error will not occur.
Parity Error ????	Parity error in system memory at an unknown address.

ISA NMI MESSAGES

ISA NMI Message	Explanation
Memory Parity Error at xxxxx	Memory failed. If the memory location can be determined, it is displayed as xxxxx. If not, the message is Memory Parity Error ????.
I/O Card Parity Error at xxxxx	An expansion card failed. If the address can be determined, it is displayed as xxxxx. If not, the message is I/O Card Parity Error ????.
DMA Bus Time-out	A device has driven the bus signal for more than 7.8 microseconds.

Appendix J – Soft-off Control

The Advanced/AS design supports Soft off control via the SMM code in the BIOS. The CS1 pin out of the National 306B Super I/O controller is connected to the Soft off control line in our power supply circuit. The registers in the Ultra I/O controller that sets the I/O address and control of the CS1 pin is NOT setup until the SMM code is activated. The code performs the following operations:

- OUT 0Ch to I/O port 2Eh
- OUT 75h to I/O port 2Fh
- OUT 11h to I/O port 2Eh
- OUT 00h to I/O port 2Fh
- OUT 0Dh to I/O port 2Eh
- OUT A0h to I/O port 2Fh

After setting the above registers, any read operation to I/O location 75H will trigger the Softoff circuit and turn the power supply off.

Appendix K – BIOS Setup

This section details the BIOS CMOS Setup Utility. The parameters described below are based on BIOS version 1.00.05.CL0; other BIOS versions may differ from the description below as new features are added.

OVERVIEW OF THE SETUP MENU SCREENS

The Setup program initially displays the Main menu screen. In each screen there are options for modifying the system configuration. Select a menu screen by pressing the left <←> or right <→> arrow keys. Use the up <↑> or down <↓> keys to select items in a screen. Use <Enter> to select an item for modification. For certain items, pressing <Enter> will bring up a subscreen. After you have selected an item, use the arrow keys to modify the setting.

Setup Menu Screen	Description
Main	For setting up and modifying basic options of a PC, such as time, date, diskette drives, hard drives.
Advanced	For modifying the more advanced features of a PC, such as peripheral configuration and advanced chipset configuration.
Security	For specifying passwords that can be used to limit access to the system.
Exit	For saving or discarding changes.

Setup Subscreen	Description
Floppy Options	For configuring floppy drives.
Primary IDE Master	For configuring your Primary IDE Master hard drive.
Primary IDE Slave	For configuring your Primary IDE Slave hard drive.
Secondary IDE Master	For configuring your Secondary IDE Master hard drive.
Secondary IDE Slave	For configuring your Secondary IDE Slave hard drive.
Boot Options	For modifying options that affect the system boot up, such as the boot sequence.
Peripheral Configuration	For modifying options that affect the serial ports, the parallel port, and the disk drive interfaces.
Advanced Chipset Configuration	For modifying options that affect memory and system busses.
Power Management Configuration	For accessing and modifying Advanced Power Management (APM) options.
Plug and Play Configuration	For modifying options that affect the system's plug and play capabilities.

OVERVIEW OF THE SETUP KEYS

Setup Key	Description
<F1>	Pressing <F1> key brings up help screen for currently selected item where available.
<Esc>	Pressing the <Esc> key takes you back to the previous screen. Pressing it in the Main, Advanced, Security, or Exit screen allows you to Exit Discarding Changes (see later in this chapter).
<Enter>	Pressing the <Enter> key selects the current item or option.
<↑>	Pressing the up <↑> key changes the selection to the previous item or option.
<↓>	Pressing the down <↓> key changes the selection the to the next item or option.
<←> <→>	Pressing the left <←> or right <→> keys in the Main, Advanced, Security, or Exit menu screens changes the menu screen. Pressing either key in a subscreen does nothing.
<F5>	Pressing the <F5> key allows you to Load Setup Defaults (see later in this chapter).
<F6>	Pressing the <F6> key allows you to Discard Changes (see later in this chapter).
<F10>	Pressing the <F10> key allows you to Exit Saving Changes (see later in this chapter).

MAIN SCREEN

This section describes the Setup options found on the main menu screen. If you select certain options from the main screen (e.g. Boot Options), the Setup program will switch to a subscreen for the selected option. Subscreens are described in the sections following the description of the main screen options.

System Date

When selected, this brings up dialog boxes that allow you to specify the current date. You must first select the month by using the arrow keys to highlight the month followed by enter. You then enter the date with the numeric keys.

System Time

When selected, this brings up a dialog box that allows you to specify the current time.

Floppy Options

When selected, this brings up the Floppy Options subscreen.

Primary IDE Master

Primary IDE Slave

Secondary IDE Master

Secondary IDE Slave

These fields reports if a hard disk is connected to the system. When selected, these bring up the Hard Disk Configuration subscreens.

Language

When selected, this brings up a dialog box that allows you to specify the language of the text strings used in the Setup program and the BIOS. The options are any installed languages. If no additional languages have been installed, this item will be grayed out and unselectable.

Boot Options

When selected, this brings up the Boot Options subscreen.

Video Mode

This reports the video mode. There are no options.

Mouse

This reports if a PS/2 mouse is installed. Since there is not a PS/2 mouse port on this board it will always report not installed. There are no options.

Base Memory

This reports the amount of base memory. This will reflect the option selected under the Advanced chip set configuration / base memory size, following saving the settings and exiting. There are no options.

Extended Memory

This reports the amount of extended memory. There are no options.

BIOS Version

This reports the current BIOS version loaded in your board. There are no options.

FLOPPY OPTIONS SUBSCREEN

Floppy A: Type

When selected, this brings up a dialog box that allows you to specify the physical size and capacity of the diskette drive. The options are Disabled, 360 KB, 5.25-inch; 1.2 MB, 5.25-inch; 720 KB, 3.5-inch; 1.44 MB/1.25 MB, 3.5-inch; 2.88 MB, 3.5-inch. The default is 1.44 MB/1.25 MB, 3.5-inch.

Floppy B: Type

When selected, this brings up a dialog box that allows you to specify the physical size and capacity of the diskette drive. The options are Disabled, 360 KB, 5.25-inch; 1.2 MB, 5.25-inch; 720 KB, 3.5-inch; 1.44 MB/1/25 MB, 3.5-inch; 2.88 MB, 3.5-inch. The default is Disabled.

PRIMARY/SECONDARY IDE MASTER SUBSCREEN

IDE Device Configuration

When selected, this brings up a dialog box that allows you to manually configure your hard drive, have the system auto configure it, or disable it. The options are Auto Configured, User Definable, and Disabled. The default is Auto Configured. If you select User Definable then the Number of Cylinders, Number of Heads, and Number of Sectors items should be modified.

Number of Cylinders

If Hard Disk Type is set to User Definable, you must type the correct number of cylinders for your hard disk. If Hard Disk Type is set to Auto Configured, this reports the number of cylinders for your hard disk and cannot be modified.

Number of Heads

If Hard Disk Type is set to User Definable, you must type the correct number of heads for your hard disk. If Hard Disk Type is set to Auto Configured, this reports the number of heads for your hard disk and cannot be modified.

Number of Sectors

If Hard Disk Type is set to User Definable, you must type the correct number of sectors for your hard disk. If Hard Disk Type is set to Auto Configured, this reports the number of sectors for your hard disk and cannot be modified.

Maximum Capacity

This reports the maximum capacity of your hard disk. It is calculated from the number of cylinders, heads, and sectors. There are no options here.

IDE Translation Mode

When selected, this brings up a dialog box that allows you to specify the IDE translation mode. The options are Standard CHS (standard cylinder head sector — less than 1024 cylinders), Logical Block Addressing, Extended CHS (extended cylinder head sector — greater than 1024 cylinders), and Auto Detected (BIOS detects IDE drive support). The default is Auto-detected.

Some operating systems do not support LBA and/or ECHS translation modes. In these cases, this parameter should be set to CHS. Check the documentation for your specific operating s system to see if it supports these extended modes. (DOS/Windows 3.x and Windows 95 both support LBA and ECHS modes).

Also, if an IDE drive has been FDISKed and formatted on another system, you must ensure both systems are set for the same translation mode. Data corruption or erratic operation may result if different translation modes are used.

Multiple Sector Setting

When selected, this brings up a dialog box that allows you to set the IDE programmed I/O cycles so that multiple sectors are transferred in a single block. The options are Disabled, 4 Sectors/Block, 8 Sectors/Block, or Auto Detected. The default is Auto Detected. Check the specifications for your hard disk drive to determine which setting will provide the optimum performance for your drive.

Fast Programmed I/O Modes

When selected, this brings up a dialog box that allows you to set how fast transfers on the PCI IDE interface occur. The options are Disabled or Auto Detected. The default is Auto Detected. If set to Disabled, transfers occur at an un-optimized speed. If set to Auto Detected, transfers occur at a speed that is optimized for the drive and system combination.

BOOT OPTIONS SUBSCREEN

Boot Sequence

First Boot Device
Second Boot Device
Third Boot Device
Fourth Boot Device

If any of these submenu options is selected it will bring up a dialog box that allows you to pick from the following list:
Disabled
Floppy
Hard Disk
CD-ROM
Network

The default is Floppy, Hard Disk, CD-ROM, and Disabled.

System Cache

When selected, this brings up a dialog box that allows you to enable or disable both the primary and secondary cache memory. The options are Enabled or Disabled. The default is Enabled.

Boot Speed

When selected, this brings up a dialog box that allows you to set the system's boot speed. The options are Deturbo and Turbo. The default is Turbo. If Turbo is selected, boot-up occurs at full speed. If Deturbo is selected, the board operates at a slower speed.

Num Lock

When selected, this brings up a dialog box that allows you to set the beginning state of the Num Lock feature on your keyboard. The options are On and Off. The default is Off.

Setup Prompt

When selected, this brings up a dialog box that allows you to turn on the "Press <F1> Key if you want to run Setup" prompt during the power-up sequence. The options are Enabled and Disabled. The default is Enabled.

Hard Disk Pre Delay

When selected, this brings up a dialog box that allows you to select a pre delay for your hard drive. The options are Disabled, 3s, 6s, 9s, 12s, 15s, 21s, and 30s. The default is Disabled.

Typematic Rate Programming

When selected, this brings up a dialog box that allows you to set the typematic rates. The options are Default and Override. The default is Default. Choosing Override enables a selectable Typematic Rate Delay and Typematic Rate.

Typematic Rate Delay

When selected, this brings up a dialog box that allows you to set how long it takes for the key-repeat function to start when you hold down a key on the keyboard. The options are 250, 500, 750, and 1000 millisecond delays. The default is 250. If Typematic Rate Programming is set to Default, this option will not be visible.

Typematic Rate

When selected, this brings up a dialog box that allows you to set the speed at which characters repeat when you hold down a key on the keyboard. The higher the number, the faster the characters repeat. The options are 6, 8, 10, 12, 15, 20, 24, and 30 characters per second. The default is 6. If Typematic Rate Programming is set to Default, this option will not be visible.

Scan User Flash Area

When enabled, this allows an OEM to use the 4KB programmable FLASH user area located at EC000-ECFFF to display a custom logo. The options are Enabled and Disabled. The default is Disabled.

ADVANCED SCREEN

This section describes the Setup options found on the Advanced menu screen. If you select certain options from the Advanced screen (e.g. Peripheral Configuration), the Setup program will switch to a subscreen for the selected option. Subscreens are described in the sections following the description of the Advanced screen options.

Processor Type

This reports the CPU type. There are no options.

Processor Speed

This reports the clock speed of the CPU. There are no options.

Cache Size

This reports the size of the secondary cache. There are no options. If no secondary cache is installed, this field will not be displayed.

Peripheral Configuration

When selected, this brings up the Peripheral Configuration subscreen.

Advanced Chipset Configuration

When selected, this brings up the Advanced Chipset Configuration subscreen.

Power Management Configuration

When selected and enabled, this brings up the Advanced Power Management (APM) subscreen.

Plug and Play Configuration

When selected, this brings up the Plug and Play Configuration subscreen.

PERIPHERAL CONFIGURATION SUBSCREEN

Configuration Mode

When selected, this brings up a dialog box that allows you to set the peripheral configuration yourself, or have the system do it. The options are Auto and Manual. The default is Auto.

When Auto is selected, the system peripherals are automatically configured during power up. The options below for the Primary IDE Interface, Secondary IDE Interface, Floppy Interface, Serial Port 1 / Serial Port 2 Addresses, and the Parallel Port Address can not be modified. The settings displayed for those options reflect the current state of the hardware.

If Manual is selected, the options for the Primary IDE Interface, Secondary IDE Interface, Floppy Interface, Serial Port 1 / Serial Port 2 Addresses, and Parallel Port Address can be explicitly configured.

Primary PCI IDE Interface

When selected, this brings up a dialog box that allows you to enable the Primary PCI IDE hard disk interfaces. The options are Enabled and Disabled. The default is Enabled. (If Configuration Mode is set to Auto, this option cannot be modified.)

Secondary PCI IDE Interface

When selected, this brings up a dialog box that allows you to enable the Secondary PCI IDE hard disk interfaces. The options are Enabled and Disabled. The default is Enabled. (If Configuration Mode is set to Auto, this option cannot be modified.)

Floppy Interface

When selected, this brings up a dialog box that allows you to enable the diskette drive interface. The options are Enabled and Disabled. The default is Enabled. (If Configuration Mode is set to Auto, this option cannot be modified.)

Serial Port 1 Address

When selected, this brings up a dialog box that allows you to select the address of the serial port. The options are Disabled; COM1, 3F8h, IRQ 4; and COM3, 3E8h, IRQ 4. Options selected for Serial Port 2 will not appear in the selection list. The default is COM1, 3F8h, IRQ 4. If the Configuration Mode is set to Auto, the Setup program assigns the first free COM port (normally COM1, 3F8h, IRQ 4) as the serial port 1 address, regardless of what is selected under the Serial Port 1 Address option. (If Configuration Mode is Auto, this option cannot be modified.)

Serial Port 2 Address

When selected, this brings up a dialog box that allows you to select the address of the serial port. The options are Disabled; COM2, 2F8h, IRQ 3 and; COM3, 3E8h, IRQ 4. Options selected for Serial Port 1 will not appear in the selection list. The default is COM1, 3F8h, IRQ 4. If the Configuration Mode is set to Auto, the Setup program assigns the first free COM port (normally COM2, 2F8h, IRQ 3) as the serial port 1 address, regardless of what is selected under the Serial Port 2 Address option. (If Configuration Mode is Auto, this option cannot be modified.)

Serial Port 2 IR Mode

When selected, this dedicates Serial Port 2 for infrared applications. Serial Port 2 also can be enabled with software from application programs. This option is only available when the Configuration Mode is set to Manual. The options are Enable and Disable. The default is Disable.

Parallel Port Address

When selected, this brings up a dialog box that allows you to select the address of the parallel port. The options are Disabled; LPT3, 3BCh, IRQ7; LPT1, 378h, IRQ7; LPT2, 278h, IRQ7; LPT3, 3BCh, IRQ5; LPT1, 378h, IRQ5; LPT2, 278h, IRQ5. The default is LPT1, 378h, IRQ7. If the Configuration Mode is set to Auto, the setup program assigns the first free parallel port, normally LPT1, 378h, IRQ7 as the parallel port address, regardless of what is selected under the Parallel Port Address option. (If Configuration Mode is set to Auto, this option cannot be modified.)

Parallel Port Mode

When selected, this brings up a dialog box that allows you to select the mode for the parallel port. The options are Compatible, Bi-directional, ECP and EPP. The default is Compatible. Compatible means the parallel port will operate in AT-compatible output mode. Bi-directional means the parallel port will operate in bi-directional PS/2-compatible mode. ECP sets the port up to be ECP ready. This option is not affected by what is selected on the Configuration Mode field above.

ADVANCED CHIPSET CONFIGURATION SUBSCREEN

Base Memory Size

When selected, this brings up a dialog box that allows you to set the size of the base memory. The options are 512 KB and 640 KB. The default is 640 KB.

ISA LFB Size

When selected, brings up a dialog box that allows you to set the size of the video linear frame buffer. The options are Disabled or 1 MB. The default is Disabled. If this is not set to Disabled, the ISA LFB Base Address field will appear.

ISA LFB Base Address

Reports the base address of the LFB. There are no options. This field will not appear if ISA LFB Size is set to Disabled.

Video Palette Snoop

When selected, this brings up a dialog box that allows you to control the ability of a PCI graphics card to "snoop" write cycles to an ISA graphics card's color pallet registers. The options are Enabled and Disabled. The default is Enabled. *Note: Some video capture or TV tuner add-in boards may require this feature to be disabled. Depending on hardware limitations, this item may not appear.*

Latency Timer (PCI Clocks)

This field allows you to control the time an agent on the PCI bus can hold the bus when another agent has requested the bus. The valid numbers are between 0 and 255. The numeric keys are used for data entry in this field. The default is 66.

PCI Burst

This enables or disables support for PCI-to-memory burst mode data transfers. The options are Enabled or Disabled. The default is Enabled.

Bank 0 SIMM Detected

Bank 1 SIMM Detected

This reports the size and type of DRAM installed in each of the two memory banks: The type can be Fast Page Mode, Extended Data Out Mode, or None. There are no options.

POWER MANAGEMENT CONFIGURATION

Advanced Power Management

The options here are Enabled and Disabled. Power Management Configuration enables or disables the Advanced Power Management (APM) support in your system's BIOS. Power Management will only work with APM-capable operating systems to manage power consumption in your system. If Advanced Power Management is set to Disabled, none of the fields in the Advanced Power Management subscreen will be visible. The default is Enabled.

IDE Drive Power Down

When selected, this brings up a dialog box that allows you to enable or disable IDE drives to spin down when the system goes into power managed mode. The options are Enabled and Disabled. The default is Enabled.

VESA Video Power Down

When selected, this brings up a dialog box that allows you to set the command issued to your graphics card when the system goes into power managed mode. The command options are Disabled, Standby, Suspend, and Sleep. The default is Sleep. Refer to your monitor documentation for support of power down mode support. Sleep mode offers maximum power savings.

Inactivity Timer

This allows you to set how many minutes the system must be inactive before it enters power managed mode. The range is 0 to 255 minutes. The default is 10 minutes.

Hot Key

This allows you to enter a hot key that, when pressed while holding down the <Ctrl> and <Alt> keys, will cause the system to enter power managed mode. All alphanumeric keys, punctuation keys, and spaces are valid keys.

PLUG AND PLAY CONFIGURATION SUBSCREEN

Configuration Mode

When selected, this brings up a dialog box that allows you to set how the BIOS gets information about ISA cards that do not have plug and play capabilities. The options are Use Setup Utility and Use ICU (ISA Configuration Utility). The default is Use Setup Utility.

If Use ICU is selected, the BIOS will depend on run-time software to ensure that there are no conflicts between ISA boards with plug and play capabilities and those without. Only the "Boot With PnP OS" field will be visible if Use ICU is selected. If Use Setup Utility is selected, the BIOS will depend on the following items to avoid conflicts.

ISA Shared Memory Size

When selected, this brings up a dialog box that allows you to select a block of the memory to access the ISA bus. The options are Disabled, 16 KB, 32 KB, 48 KB, 64 KB, 80 KB and 96 KB. The default is Disabled. If this is set to Disabled, ISA Shared Memory Base Address, below, will not be visible.

ISA Shared Memory Base Address

When selected, this brings up a dialog box that allows you to set the base address for the ISA Shared Memory. The options are C8000h, CC000h, D0000h, D4000h, D8000h, and DC000h. The default is C8000h. The options available depend on the size of the ISA shared memory selected above. The ISA Shared Memory area cannot extend into the E0000h address range. For example, if a size of 64K was selected, options D4000h, D8000h, and DC000h will not be available.

Boot With PnP OS

When Enabled is selected, the BIOS will activate only those Plug and Play add-in cards needed to boot the system, then pass control to the operating system to configure any remaining Plug and Play add-in cards. The default is Disabled but this feature should be set to Enabled for use with Windows 95.

IRQ 3, 4, 5, 7, 9, 10, 11, 12

When selected, this brings up a dialog box that allows you to set the status of the IRQ. The options are Available and Used By ISA Card. Default is Available. The auto-configuration code looks here to see if these interrupts are available. If an interrupt is available, auto-configuration can assign the interrupt to be used by Plug and Play or PCI devices. If your system contains an ISA agent that uses one of these interrupts, select Used By ISA Card for that interrupt.

Some of these interrupts may not be displayed if they already have been assigned to other peripherals, such as IRQ 3 and IRQ 4, which are normally used by the serial ports, and IRQ 7 for the parallel port.

SECURITY SCREEN

This section describes the two access modes that can be set using the options found on the Security screen, and then describes the Security screen options themselves.

ADMINISTRATIVE AND USER ACCESS MODES

The options on the Security screen menu make it possible to restrict access to the Setup program by allowing you to set passwords for two different access modes: Administrative mode and User mode.

In general, Administrative mode has full access to the Setup options, whereas User mode has restricted access to the options. Thus, by setting separate Administrative and User passwords, a system administrator can limit who can change critical Setup values. The actual limitations depend on whether either the Administrative or User passwords or both are set.

If you want to limit access to who can boot the system, you must set the User password. This is the password that the system will ask for before booting. If only the Administrative password is set, the system will boot up without asking for a password. If both passwords are set, you can enter either password to boot the system.

This table shows the effects of setting the Administrative and User passwords. (The table is for reference only, and is not shown on the Security screen.) In the table, the statement "Can change a limited number of options" means you can change the system date and time, the User password, and the security hot key.

Password Set	Administrative mode can:	User mode can:	Pswd Required at Boot
Neither	Change all options*	Change all options*	None
Administrative only	Change all options	Change a limited number of options	None
User only	N/A	Change all options	User
Both	Change all options	Change a limited number of options	Administrative or User

* If no password is set, any user can change all Setup options.

SECURITY SCREEN OPTIONS

User Password is

This reports if there is a User password enabled. There are no options.

Administrative Password is

This reports if there is an Administrative password set. There are no options.

Set User Password

When selected, this brings up a dialog box that allows you to set the User password.

Set Administrative Password

When selected, this brings up a dialog box that allows you to set the Administrative password.

Unattended Start

When selected, this brings up a dialog box that allows you to control when the security password is requested. The options are Enabled and Disabled. The default is Disabled. The User password must be enabled before you can enable this option. If Enabled is selected, the system will boot, but the keyboard will be locked until the User password is entered. This field is only visible if a user password is installed.

Security Hot Key (CTRL-ALT-)

This allows you to set a hot key that, when pressed, will lock the keyboard until the User password is entered. This field is only visible if a user password is installed.

EXIT SCREEN

EXIT SAVING CHANGES

When selected, this allows you to save the change to CMOS and exit the Setup program. You can also press the <F10> key anywhere in the Setup program to do this.

EXIT DISCARDING CHANGES

When selected, this allows you to exit the Setup program without saving any changes. This means that any changes made while in the Setup program will be discarded and **NOT SAVED**. Pressing the <Esc> key in any of the four main screens will do this.

LOAD SETUP DEFAULTS

When selected, this allows you to reset all of the setup options to their defaults. You can also press the <F5> key anywhere in the Setup program to do this.

This selection loads the default Setup values from the ROM table.

DISCARD CHANGES

When selected, this allows you to discard any changes you made during the current Setup session without exiting the program. You can also press the <F6> key anywhere in the Setup program to do this. This selection loads the CMOS values that were present when the system was turned on.

Appendix L – BIOS Update

The Advanced/AS incorporates the AMIBIOS in a Flash memory component. Flash BIOS allows easy upgrades without the need to replace an EPROM. The upgrade utility fits on a floppy diskette and provides the capability to save, verify, and update the system BIOS. The upgrade utility also provides the capability to install alternate languages for BIOS messages and the SETUP utility. The upgrade utility can be run from a hard drive or a network drive, but no memory managers can be installed during upgrades.

The latest upgrade utility and BIOS code are available from your service provider or from the Intel Applications Support bulletin board.

Using the upgrade utility

If the utility is obtained from the bulletin board, UNZIP the archive and copy the files to a bootable MS-DOS 3.3, 4.01, 5.0, or 6.x diskette. Reboot the system with the upgrade diskette in the bootable floppy drive and follow the directions in the easy to use menu-driven program.

Prior to starting the update, the user must make a note of the current SETUP parameters. After the update completes, CMOS memory should be reset to default values by entering SETUP and hitting the <F5> key. The user may then re-enter his original values. CMOS memory must be reset to default values because the mapping of the parameters to specific CMOS memory locations may change from one version of BIOS to the next. If CMOS memory is not reset, erratic operation can occur.

BIOS Recovery

In the unlikely event a problem occurs during the FLASH update process and the BIOS is not programmed correctly so that the system cannot boot, the board must be returned to a repair facility since there is no recovery code located in the FLASH device. A PCI card has been designed that allows a recovery process to take place and the BIOS to be programmed correctly.

NOTE: Flash Recovery Boot option is not supported on the Advanced/AS.

Appendix M – Environmental Standards

BOARDS

Parameter	Condition	Specification
Temperature	Non-Operating	-40°C to +70°C
	Operating	+0°C to +55°C
Humidity	Non-Operating	92% Relative Humidity max. @ 55°C
	Operating	85% Relative Humidity max. @ 55°C
Altitude	Non-Operating	50,000 feet (15,240 meters)
	Operating	10,000 feet (3048 meters)
Vibration	Non-Operating	0.01g2/Hz @ 5Hz, 0.02g2/Hz from 20Hz-500Hz
Shock	Non-Operating	30.0G, 11ms, 1/2 sine

Table M-1. Environmental standards

Appendix N – Reliability Data

The Mean-Time-Between-Failures (MTBF) data is calculated from predicted data @ 55C.

Advanced/AS motherboard   77,819 hours