Advanced/EV
Motherboard
Technical Product Specification

Order Number 281835-001

May 1996

intel

Revision History

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

This product specification applies only to standard Advanced/EV motherboards with BIOS identifier CB0.

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

Table of Contents

Introduction

The Advanced/EV 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 accepts Pentium® processors operating at 75 MHz, 90 MHz, 100 MHz, 120 MHz, and 133MHz. Some additional motherboards equipped with an additional Bus Frequency ratio jumper will also support 150MHz, 166MHZ, and 200MHz. The processor is optionally 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. The memory subsystem supports up to 128 MB of EDO DRAM (for improved performance) or standard Fast Page DRAM in standard 72-pin SIMM sockets. A Type 5 or 7 Pentium OverDrive® socket provides access to future processor enhancements.

Advanced/EV 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 IDE controller with two high performance IDE interfaces for up to four IDE devices (such as hard drives, CD-ROM readers, and so forth). A Creative Labs VIBRA 16S codec integrated onto the motherboard provides 16-bit stereo Sound Blaster* compatible audio with enhanced capabilities to provide support for the increasing number of demanding multimedia applications. The National PC87306 Super I/O controller provides the standard PC I/O functions: floppy interface, two FIFO serial ports, one EPP/ECP capable parallel port, a Real Time Clock, and keyboard controller as well as support for an IrDA compatible infrared interface. Up to four PCI local bus slots provide a high bandwidth data path for data-movement intensive functions such as graphics, and up to three ISA slots complete the I/O mix. A total of six expansion slots may be populated: one PCI and ISA slot share the same chassis I/O panel.

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 as bus mastering IDE drivers, Windows 95-ready Plug and Play, Advanced Power Management (APM) with application restart, software-controlled power supply shutdown, and glitchless bidirectional audio are all provided by software available for the Advanced/EV.

The Advanced/EV 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/EV 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.
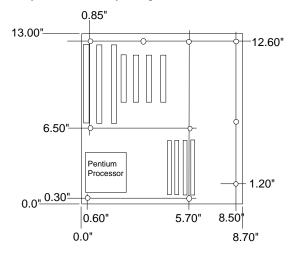

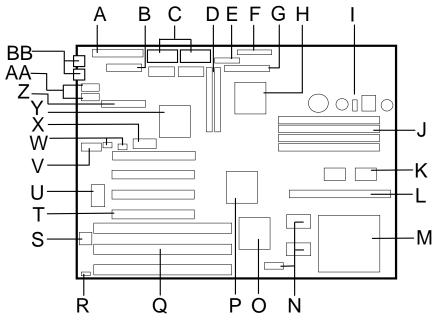Figure 1. Advanced/EV Motherboard dimensions.

Board Level Features

Figure 2. Advanced/EV motherboard features

A – Primary power connector
B – VESA feature connector
C – Video memory and expansion sockets
D – Two PCI IDE interfaces
E – Configuration switches (eliminates most jumpers)
F – Parallel port connector
G – Floppy drive connector
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 – Type 5 or 7 Pentium processor socket
N – Tag SRAM and Pipeline Burst SRAM cache**

O – 82437FX system controller (TSC)
P – 82371FB PCI ISA/IDE Accelerator (PIIX)
Q – Three ISA expansion connectors
R – Flash recovery jumper
S – Flash EEPROM for system BIOS
T – Four PCI expansion connectors
U – Vibra 16S audio controller
V – Custom video header for I/O panel**
W – Wavetable and CD-ROM connectors
X – 3.3 volt PCI bus power connector
Y – S3* Trio64* PCI video controller**
Z – Audio connector for I/O panel
AA – Two serial ports
BB – PS/2 Keyboard and mouse ports**

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

CPU

The Advanced/EV 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 166MHz. 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 320-pin Zero Insertion Force socket provides users with a Level 5 OverDrive processor performance upgrade path for boards shipped with Processor speeds less than 133MHz. A 321-pin Zero Insertion Force socket provides users with a Level 7 OverDrive processor performance upgrade path for boards and systems shipped with processors greater than 133MHz installed. An OverDrive processor being developed for use with this socket will provide performance beyond that delivered by the originally installed Pentium Processor.

SECOND LEVEL CACHE

The processor's internal cache can be complemented 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 these second level cache options. If the Advanced/EV is ordered with no cache installed, the cache can be added later in a field upgrade by installing a 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. For a list of cache module vendors or a copy of the COAST specification, contact your local Intel sales office or Intel Authorized Distributor.

A factory option on some Advanced/EV motherboards is an integrated 256 KB direct mapped write-back second level cache implemented with two 32k x 32 Pipeline Burst SRAM devices soldered to the motherboard. A 5v 32Kb x 8 external Tag SRAM provides caching support for up to 64 MB of system memory. Memory above 64 MB will not be cached. Advanced/EV motherboards with this 256 KB of soldered-down cache cannot be field upgraded by installing an additional 256 KB or 512KB of second-level cache on a module, for a total of 512 KB or 768 KB.

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 Pipelined 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 Pipelined 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/EV 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 A and Bank B, 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 A and B may have different 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 A only, Bank B 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 memory data valid window time.

EXPANSION SLOTS

Up to six expansion slots may be populated on the Advanced/EV 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 special low-profile heatsink, all ISA slots will accept full length add-in cards. Interference with the CELP socket limits two 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 (TDP) devices, and one 82371FB PCI ISA/IDE Accelerator (PIIX) bridge chip. The 82430FX PCIset provides the following 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
  – 4 MB 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 8 x 32-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 DEVICES (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/EV provides two independent high performance bus-mastering PCI IDE interfaces capable of supporting 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 (e.g.; CD-ROM) devices on both interfaces. Detection of the device transfer rate and translation mode capability is automatically determined.

In the Windows 95 environment, a driver provided by Intel allows 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 bus mastering IDE can be used to complete other tasks while disk transfers are occurring .

Detailed information on the PCIset is available in the Intel 82430 PCISet data sheet.

NATIONAL SEMICONDUCTOR PC87306 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
  - 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 PC87306 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 normal, extended, EPP/ECP, or disabled. The floppy interface can be configured for 360 KB or 1.2 MB 5¼" media or for 720 KB, 1.2 MB, 1.44 MB, or 2.88 MB 3½" media. Header pins located near the back of the board allow cabling to use these interfaces

KEYBOARD INTERFACE

PS/2 keyboard/mouse connectors are located on the back panel side of the motherboard. (Some product configurations replace the PS/2 style connectors with a single AT-style keyboard connector). 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 system BIOS can detect, and correct keyboards and mice plugged into the wrong PS/2 style connector.

The integrated 8042 compatible 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. 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, CMOS RAM values can be cleared to system defaults by using a motherboard configuration switch.

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/EV motherboard is available with the factory option of an S3 Trio64 SVGA graphics controller with 1 MB of graphics DRAM. The graphics DRAM can be upgraded to 2 MB by installing two 256kB x 16, 60 ns SOJ DRAM devices in the provided sockets. Refer to Appendix A for suggested vendors and part numbers.

The Trio64 incorporates a 64-bit graphics engine with a 24-bit RAMDAC, dual programmable clock generators, and a high performance accelerator core in a single device. The on-chip RAMDAC/clock synthesizer is capable of output pixel data rates of 135 MHz, providing non-interlaced screen resolutions of up to 1280 x 1024 x 256 colors at 75 Hz (with 2 MB of DRAM). Hardware acceleration for graphics functions such as BitBLTs with ROPs, 2-point line draws, trapezoidal and polygon fills, clipping and cursor support provide high performance operation under Windows and other GUI environments. In addition, a fast linear addressing scheme based upon DCI reduces software overhead by mapping the display memory into the CPU upper memory address space and permitting direct CPU access to the display memory.

The Advanced/EV supports the VESA feature connector for synchronizing graphics output with an external NTSC or PAL signal and a shared frame buffer interface to maximize multimedia performance. The Advanced/EV also supports other VESA standards such as the DPMS protocol to put a DPMS compliant monitor into power saving modes and the VESA Display Data Channel (DDC) Level 1 for the transfer of monitor identification and resolution support data for ease of use.

GRAPHICS DRIVERS AND UTILITIES

Graphics drivers and utilities for DOS, Windows 3.11, Windows for Workgroups 3.11, and Windows NT are shipped with Advanced/EV motherboards that are equipped with a video controller. These drivers come in a compressed form and are extracted by using an installation utility provided on the diskette.

Graphics drivers for common MS-DOS software applications such as AutoCAD are included on the drivers diskette or may be downloaded from the Intel Applications Support BBS. Drivers for SCO and Interactive UNIX should be obtained from the respective UNIX vendor.

RESOLUTIONS SUPPORTED *SEE DETAILS IN APPENDIX H*

Resolution (Horiz x Vert x Color bits	1 MB DRAM	2 MB DRAM
640x480x4	X	X
640x480x8	X	X
640x480x15	X	X
640x480x16	X	X
640x480x32		X
800x600x8	X	X
800x600x15	X	X
800x600x16	X	X
800x600x32		X
1024x768x8	X	X
1024x768x15		X
1024x768x16		X
1280x1024x4	X	X

1280x1024x8		X

Color bits: 4 = 16; 8 = 256; *15 = 32K; 16 = 64K; 32 = 16.7 Million

*Supported, but function not available in Windows 95

AUDIO SUBSYSTEM

The Advanced/EV motherboard features a 16-bit stereo audio subsystem. The audio subsystem is based upon the Creative Labs Vibra* 16S (CT2504) multimedia Codec and the Yamaha OPL3 FM synthesizer. The Vibra 16S provides all the digital audio and analog mixing functions required for recording and playing of audio on personal computers. The Creative Labs Vibra 16S is a single chip VLSI solution which is SoundBlaster* compatible and Roland MPU-401 UART mode compatible. Combined with the Yamaha OPL3 FM synthesizer, the Creative Labs Vibra 16S also provides MPCII, Adlib*, and Multimedia PC Level 2 compliance to meet all of the requirements of today's multi-media applications.

The Vibra 16S is plug and play and has been implemented as a motherboard device. This means that there is a device node defined for the Vibra 16S and the BIOS must configure it. Although it is not a plug and play device, the Vibra 16S is very flexible in that it accommodates a variety of I/O addresses, DMA channels and interrupts.

The audio subsystem requires up to two DMA channels (to support full duplex operation) and one interrupt. When the Vibra 16S is programmed for full duplex operation, two DMA channels are assigned: one of the channels will be a 16-bit channel and the other will be 8 bits. The system can be configured to use either DMA channels 1 or 3 (8 bit channels) and DMA channels 5 or 7 (16 bit channels). The interrupt can be mapped to IRQ 5, 7, 9, or 10. The base address register is also configurable for a variety of base addresses ranging from I/O address 220 through address 280 (see the resource map below for more details). The ICU (ISA Configuration Utility) must be installed and configured before installing the DOS and Windows audio drivers.

VIBRA 16S RESOURCE MAP

Base Address (software configured)
220H - 233H(Default) or
240H - 253H or
260H - 273H or
280H - 293H
FM Address (fixed)
388H - 38BH
Joystick Address/Game Port (fixed)
200H - 207H
MPU-401 Address (software configured)
300H - 301H or
330H - 331H (default)
MPU-401 Enable (software configured)
Default is disabled

Joystick Enable (software configured)
Default Enabled
Interrupt (Software configured)
IRQ2/9 or
IRQ5 (default) or
IRQ7 or
IRQ10
8-bit DMA Channel (software configured)
DMA Channel 1 (default) or
DMA Channel 3*
16-bit DMA Channel (software configured)
DMA channel 5 (default)*
DMA channel 7*

*Option

*Option depends on configuration of periperal devices

AUDIO I/O ACCESS

An audio I/O module ships with the Advanced/EV, 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.

An additional connector located on the audio I/O module allows routing of the audio jacks to the front of the chassis so it can be connected to a front panel audio module that would allows easier access to the audio jacks along with a mute button and infrared interface.
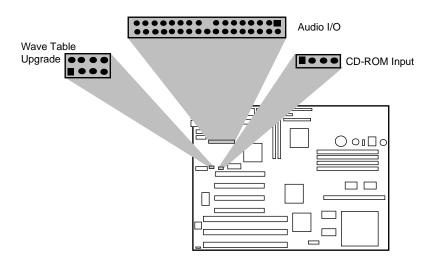
The audio output is connected to the standard PC speaker to provide an output path that does not require external speakers. If external speakers are plugged into the attached I/O module, then the audio output is redirected to the speakers. Furthermore, if headphones are plugged into a front panel speaker 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 readers for interfacing to audio add-in cards.

WAVE TABLE UPGRADE

A Wave Table upgrade connector provides access to Wave Table ISA compatible add-in cards − allowing the onboard audio solution to use a lookup table for wave table synthesis.

MOTHERBOARD BIOS

The Advanced/EV motherboard uses an American Megatrends Incorporated (AMI) Pentium ROM BIOS, which is stored in Flash EEPROM and easily upgraded using a floppy disk-based program. BIOS upgrades will be downloadable from the Intel Applications Support electronic bulletin board service. In addition to the AMIBIOS, the Flash EEPROM also contains the Setup utility, Power-On Self Tests (POST), update recovery code, 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/EV will be identified as 1.00.01.CB0. As BIOS updates occur the revision number will increase to 1.00.02.CB0, 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 *ISA and EISA Hi-Flex AMIBIOS Technical Reference* 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. *Recovery mode* removes the inversion on address line A16, swapping the E000H and F000H segments so that the 8 KB boot block resides at FE000H where the CPU expects the bootstrap loader to exist. This mode is only necessary in the unlikely event that a BIOS upgrade procedure is interrupted, causing the BIOS area to be left in an unusable state.

BIOS UPGRADES

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

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. Security to prevent unauthorized changes to the BIOS is provided via a write-protect switch setting on the motherboard. The default setting is to allow BIOS upgrades. A recovery jumper is provided to allow recovery in the unlikely event of an unsuccessful BIOS upgrade. The jumper forces the ROM decode to access a 8 KB block of write protected recovery code in the Flash device.

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 switch setting on the motherboard can be set to prevent user access to Setup for security purposes. For more details, refer to the Appendix L, BIOS Setup.

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, DMA channels, 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 2.10 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 the Intel BBS (916) 365-3600, or via CompuServe* by typing Go PlugPlay.

SHADOW MEMORY

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

POWER MANAGEMENT CAPABILITY

The Advanced/EV 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/EV 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/EV supports a 4 KB programmable FLASH user area located at EC000-ECFFF. An OEM may use this area to display a custom logo. When the option to scan the Flash user area is selected in the Setup Utility's Boot Options menu, the Advanced/EV 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 Appendix L.

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

Setup Enable Switch

A motherboard configuration switch controls access to the BIOS Setup utility. By setting the switch 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/EV 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
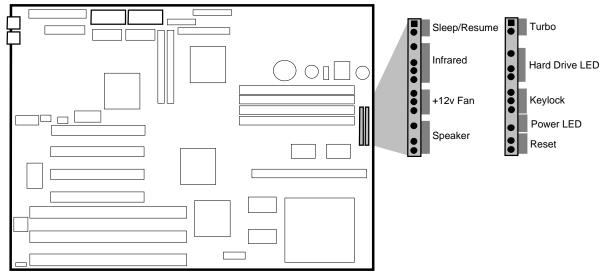- Infra-Red (IrDA) port
- Sleep/Resume
- Power Supply On

CONNECTORS

Figure 3. Front Panel Connectors

The connectors shown include:
- Sleep/Resume
- Infrared
- +12v Fan
- Speaker
- Turbo
- Hard Drive LED
- Keylock
- Power LED
- Reset

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 Stand By 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/EV 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/EV motherboard to minimize system cable requirements.

Soft Power Down

When used with a power supply that supports remote power on/off, the Advanced/EV 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

The back panel provides external access to PS/2 style keyboard and mouse connectors integrated on some Advanced/EV motherboards. Figure 4 shows the general location of the keyboard and mice connectors.
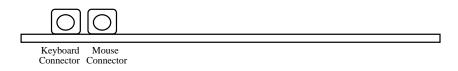

Keyboard   Mouse
Connector   Connector

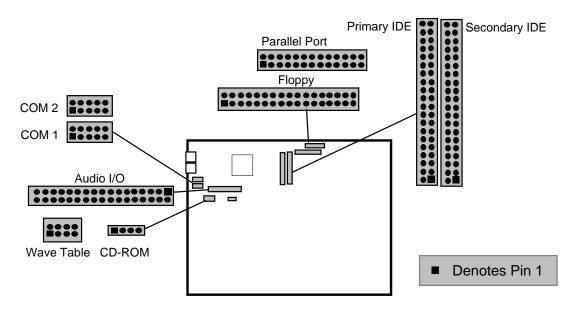Figure 4. Advanced/EV PS/2 Style Back panel

A standard AT-style keyboard connector (in place of the PS/2 style connectors) is available on some other configurations. Figure 5 shows this configuration.

Keyboard connector

Figure 5. Advanced/EV AT Style 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/EV 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/EV 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)

System Level Features

CHASSIS

EXPANDABLE DESKTOP

The Advanced/EV Expandable Desktop easily provides the expandability required for most traditional PC applications − seven peripheral bays, seven expansion slots, an ample 200 watt power supply and an additional fan located at the left front of the chassis to help keep the system cool. The Advanced/EV Expandable Desktop also meets stringent environmental requirements.

MINITOWER

The MiniTower chassis provides an ideal platform for multimedia applications that require integration of CD-ROM, sound cards, graphics and video solutions and high performance communications cards.

Expandability is provided for most traditional and emerging PC applications, including seven peripheral bays (four external and three internal). A 200 watt power supply and an additional fan located behind the front grill provide all of the power and cooling requirements needed to support future generations of Intel's Pentium and OverDrive processors.

The MiniTower chassis has been designed to offer the maximum in flexibility, ease of integration and maintenance. Two screws secure a sliding side panel that provides access to the inside of the chassis. The enclosure also meets stringent environmental requirements.

The chassis dimensions are: 16.0" (40.6 cm) high with feet, 8.3" (21 cm) wide, 18.1" (46 cm) deep with bezel. The weight without peripherals is 21.4 lbs (9.79 kgs).
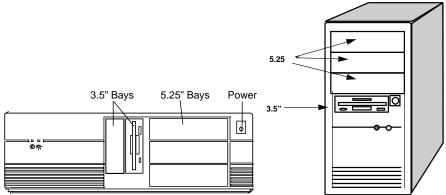
PERIPHERAL BAYS

Figure 7. Advanced/EV Expandable Desktop and MiniTower front panels

EXPANDABLE DESKTOP

Seven expansion bays are available for peripherals and other devices. These include three 5¼" half-height bays and two 3½" one-inch bays accessible from the front panel. Two internal 3½" bays are located above the power supply.

MINITOWER

Seven expansion bays are available for peripherals and other add-in devices. These include three 5¼" half-height bays and one 3½" one-inch bays that are accessible from the front panel. Three internal 3½" peripheral bays are located in front of the power supply and are accessed by sliding off the chassis side, undoing the three screws that secure the peripheral bay to the chassis and rotating the bay.

FAN

The Advanced/EV Expandable Desktop and MiniTower both have two fans to keep the system cool. One fan within the power supply provides 28 cfm of air movement. The second fan, located behind the card guide, provides 26 cfm across the add-in cards and the CPU. The second fan receives 12 Vdc directly from the motherboard at stake pin location J1A1.
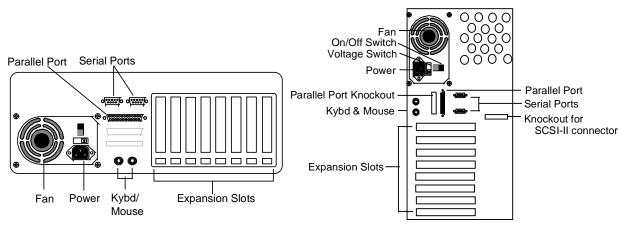
EXPANSION SLOTS

The Advanced/EV has seven expansion card slots. At the system level, the Baby-AT or the Mini-Tower chassis do not interfere with the length of add-in cards. Some board level limitations are noted in the Board Level Features section of this document.

FRONT PANEL

The Advanced/EV Expandable Desktop front panel consists of a power switch, a power-on LED and a hard disk access LED. Five peripheral bays can be accessed from the front panel of the Expandable Desktop, while four bays are externally accessible on the MiniTower.

BACK PANEL

The back panel on both chassis consists of access panels for the expansion slots (one location is unused), two DB9 RS-232 serial ports, a bi-directional parallel port, a 115/230 voltage switch, a power supply input, and the power supply fan. The chassis is designed to support PS/2 style keyboard and mouse connectors. Punch-out locations also are provided for adding a second parallel port and a SCSI-2 connector. An audio riser card will be shipped with Advanced/EV products that have audio integrated on board, and a video riser card will be shipped with products that have the S3 Trio64 video controller. The audio and video risers plug into the motherboard, and occupy otherwise unused slots in the back of the chassis. This does not affect the slot openings used for ISA and PCI add-in cards.

Figures 8 & 9. Advanced/EV Expandable Desktop and MiniTower Back Panels

POWER SUPPLY

The Advanced/EV integrates a 200 watt switchable power supply for all onboard resources, add-in cards, and peripherals. The Astec Corp. model SA201-3440 supports operating settings at 100-120 VAC (5 Amps AC) or 200-240 VAC (3 Amps AC). The input voltage is selected using a switch on the back of the system.

AC POWER INPUT SPECIFICATIONS

Input frequency 50/60 Hz	
AC Voltage	Current
90-135	5.0 A
180-265	3.0 A

Table 4. Power Supply Input Specifications.

DC OUTPUT SPECIFICATIONS

DC Voltage	Max. Continuous Current	Peak Current 15 Seconds	Minimum Current Load
+5V	22.0A	-	3.0A
-5V	0.5A	-	0A
+12V	8.0A	9.0 A	0A
-12V	0.5A	-	0A

Table 5. Power Supply DC Output Specifications.

FLOPPY DRIVE

A 3½" Teac Floppy drive Model FD-235HF is integrated into the right 3½" bay of the Expandable Desktop chassis and the external bay of the MiniTower chassis. This is the same proven floppy disk drive that has been used on many previous Intel systems.

SPEAKER

The standard systems ship with an external speaker installed. The user may enable/disable the speaker using the Setup utility or program the speaker via port 61H. The speaker provides error beep code information during POST if the system cannot use the video interface. Appendix Jcontains detailed beep and error code information.

CHASSIS COLOR

The Expandable Desktop chassis color is beige. The bottom and back of the chassis are not painted.

The MiniTower chassis color is Fuller O'Brien 271026C Dusty Beige. The bezel uses General Electric plastic chip H86204. The bottom and back of the chassis are not painted.

Appendix A – User-Installable Upgrades

SYSTEM MEMORY

Table A-1 shows the possible memory combinations. The Advanced/EV supports 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.

SIMM 1,2 (Bank 0) SIMM Type (Amount)	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 – Switch Settings and Jumpers

Figure B-1. Jumper/Switch locations and settings

EXTERNAL/INTERNAL CPU CLOCK SPEED - SWITCHES 6, 7 & 8

Switches 6, 7 & 8 are used to set the CPU's external operating frequency at 50, 60, or 66 Mhz. Default setting depends on the specific product code, see table for specific Pentium processor configuration information.

The following table gives the position of Switches 6, 7 and 8 and Jumper J1N1:

External Bus Speed	Bus Clock Multiplier	Processor Speed	Switch 6	Switch 7	Switch 8	J1N1
50	1.5	75	off	on	off	4/5
60	1.5	90	off	off	off	4/5
66	1.5	100	off	on	on	4/5
60	2	120	on	off	off	4/5
66	2	133	on	on	on	4/5
60	5/2	150	on	off	off	5/6
66	5/2	166	on	off	off	5/6
66	3	200	off	on	on	5/6

Table B-1 External CPU Clock Speed Switch Settings

SETUP DISABLE - SWITCH 5

Allows access to CMOS Setup Utility to be disabled by setting switch 5 to the ON position. Default is for access to setup to be enabled (switch 5 = OFF)

CLEAR CMOS - SWITCH 4

Allows CMOS settings to be reset to default values by moving switch 4 to the ON position and turning the system on. The system should then be turned off and switch 4 should be returned to the OFF position to restore normal operation. This procedure should be done whenever the system BIOS is updated.

PASSWORD CLEAR - SWITCH 3

Allows system password to be cleared by moving switch 3 to the ON position and turning the system on. The system should then be turned off and switch 3 should be returned to the OFF position to restore normal operation. This procedure should only be done if the user password has been forgotten.

VR/VRE - SWITCH 2

Changes the output of the on-board voltage regulator. OFF = standard VR, ON = VRE specification. This switch 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. (VR = 3.3-3.465V, VRE = 3.465-3.63V)

ISA BUS CLOCK - SWITCH 1

This switch changes the clock frequency of the ISA bus. The effect of this switch on the ISA clock depends upon the setting of the CPU clock speed switches. The default setting for this switch is OFF. In general, this switch should only be set to ON if higher ISA performance is required, and the ISA expansion cards can handle the faster bus clock.

Bus Frequency	Switch 1	ISA Bus Speed
50 MHz	ON/OFF	8.33 MHz
60 MHz	OFF	7.5 MHz
	ON	10 MHz
66 MHz	OFF	8.25 MHz
	ON	11 MHz

RECOVERY BOOT ENABLE/BUS FREQUENCY - J1N1

Jumper J1N1 performs dual function. Recovery Boot Enable allows the system to boot in the event the system BIOS has been corrupted by moving the jumper from the default position of 1-2 to the 2-3 position. The procedure for recovery boot is described in detail in Appendix M. Along with switches 6, 7, and 8, J1N1 is used to set the CPU's external operating frequency. See table B-1 for settings.

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

AUX. (3.3V) PCI 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/SLEEP

Pin	Signal Name
1	+5 V
2	Ext. SMI
3	PS_ON
4	Ground

SOFT POWER SUPPLY ON (J8M1)

Pin	Name	Function
1	PS_ON	Remote ON/OFF
2	N/C	Not connected
3	GND	Ground

FRONT PANEL CONNECTORS – (J2A1, J1B1)

SLEEP/RESUME

Pin	Signal Name
1	+5 V
2	Comatose

TURBO LED

Pin	Signal Name
1	PULL_UP_330
2	LED_TURBO-

INFRA-RED

Pin	Signal Name
1	+5 V
2	Key
3	IR_RX
4	Ground
5	IR_TX

HARD DRIVE LED (DISK)

Pin	Signal Name
1	PULL_UP_330
2	Key
3	HD ACTIVE
4	PULL_UP_330

AUXILIARY 12V FAN POWER

Pin	Signal Name
1	Ground
2	+12 V (fused)
3	Ground

KEYBOARD LOCK/POWER LED

Pin	Signal Name
1	Ground
2	KEY LOCK
3	Ground
4	Key
5	LED_PWR

SPEAKER CONNECTOR

Pin	Signal Name
1	SPKR_DAT
2	Key
3	SPKR_DAT Connect
4	Ground

RESET CONNECTOR

Pin	Signal Name
1	Ground
2	RESET

I/O CONNECTORS

PS/2 KEYBOARD & MOUSE PORTS

Pin	Signal Name
1	Data
2	No Connect
3	Ground
4	+5V (Fused)
5	Clock
6	Noc Connect

AT STYLE KEYBOARD PORT

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

CD-ROM AUDIO INTERFACE

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

AUDIO I/O CONNECTOR

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	Key
Key	17	18	Key
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 UPGRADE CONNECTOR

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

IDE CONNECTORS

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	Ground
Addr 0	35	32	Addr 2
Chip Select 0-	37	38	Chip Select 1-
Activity	39	40	Ground

SERIAL PORTS

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	N.C.

PARALLEL PORT CONNECTOR

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

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
Ground	11	12	Drive Select
Ground	13	14	Drive Select
Ground	15	16	Motor Enable
Ground	17	18	DIR-
Ground	19	20	STEP-
Ground	21	22	Write Data-
Ground	23	24	Write Gate-
Ground	25	26	Track 00-
Ground	27	28	Write Protect-
Ground	29	30	Read Data-
Ground	31	32	Side 1 Select-
Ground	33	34	Diskette

ISA CONNECTORS

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	
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

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	A3	B3	GND		FRAME-	A34	B34	GND
TDI	A4	B4	*TDO(INC)		GND	A35	B35	IRDY-
Vcc	A5	B5	Vcc		*TRDY-	A36	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

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	ECSD (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 D-1. Advanced/EV Memory Map

The table above details the Advanced/EV 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

Address (hex)	Size	Description
0000 - 000F	16 bytes	PIIX - DMA 1
0020 - 0021	2 bytes	PIIX - Interrupt Controller 1
0040 - 0043	4 bytes	PIIX - Timer 1
0048 - 004B	4 bytes	PIIX - Timer 2
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	I/O(87306) - RTC, Address
0071	1 byte	I/O(87306) - RTC, 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 2
00F0	1 byte	Reset Numeric Error
0170 - 0177	8 bytes	Secondary IDE Channel

Address (hex)	Size	Description
01F0 - 01F7	8 bytes	Primary IDE Channel
0278 - 027B	4 bytes	Parallel Port 2
02F8 - 02FF	8 bytes	On-Board Serial Port 2
0376	1 byte	Sec IDE Chan Cmd Port
0377	1 byte	Sec IDE Chan Stat Port
0378 - 037F	8 bytes	Parallel Port 1
03BC - 03BF	4 bytes	Parallel Port x
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	On-Board Serial Port 1
LPT + 400h	8 bytes	ECP port, LPT + 400h
0CF8-0CFB*	4 bytes	PCI Config Address Reg
0CFC-0CFF*	4 bytes	PCI Config Data Reg
FF00-FF07	8 bytes	IDE Bus Master Reg.

Table E-1. Advanced/EV 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. (Switch 6)	3/2	2x
1	Soft Off capable power supply	No	Yes
2	On-bd Audio present	Yes	No
3	External CPU clock (Switch x)		
4	External CPU clock (Switch x		
5	Setup Disable (Switch 5)	Enable access	Disable access
6	Clear CMOS (Switch 4)	Keep values	Clear values
7	Password Clear (Switch 3)	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 accessable by full DWORD accesses. The table below lists the PCI bus and device numbers used by the motherboard.

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	S3* Trio64
00	0D		PCI Expansion Slot4*
00	0E		PCI Expansion Slot3*
00	0F		PCI Expansion Slot2*
00	10		PCI Expansion Slot1*

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

* PCI Expansion Slot 1 is furthest PCI slot from Power Supply

Appendix G – Interrupts & DMA Channels

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 (default)
4	Serial Port 1 (default)
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 if present
15	Secondary IDE if present

Table G-1. Advanced/EV 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/EV DMA Map

Appendix H – Video Modes

Mode (HEX)	VBEDIT Mode	Screen Resolution	Bits/Pixel	Sweep (KHz)	Refresh Rate (Hz)	*Dot Clock (MHz)
10A	54	132x43 Chars	4	31.5	70	40.000
109	55	132x43 Chars	4	31.5	70	40.000
101	69	640x480	8	31.5	60	25.175
101	69	640x480	8	37.9	72	31.500
101	69	640x480	8	37.5	75	31.500
103	6B	800x600	8	35.1	56	36.000
103	6B	800x600	8	37.9	60	40.000
103	6B	800x600	8	48.1	72	50.000
103	6B	800x600	8	46.8	75	49.500
105	6D	1024x768	8	35.5	43 (i)	44.900
105	6D	1024x768	8	48.4	60	65.000
105	6D	1024x768	8	56.5	70	75.000
105	6D	1024x768	8	60.2	75	80.000
106	6E	1280x1024	4	47.7	45(i)	75.000
107	6F	1280x1024	8	47.7	45(i)	37.500 x 2
107	6F	1280x1024	8	63.7	60	55.000 x 2
107	6F	1280x1024	8	77.7	72	65.000 x 2
107	6F	1280x1024	8	79.5	75	67.500 x 2
110	70	640x480	15	31.5	60	25.175
110	70	640x480	15	37.5	72	31.500
110	70	640x480	15	37.5	75	31.500
111	71	640x480	16	31.5	60	25.175
111	71	640x480	16	37.5	72	31.500
111	71	640x480	16	37.5	75	31.500
112	72	640x480	32	31.5	60	25.175
112	72	640x480	32	37.9	72	31.500
112	72	640x480	32	37.5	75	31.500
113	73	800x600	15	37.9	60	40.000
113	73	800x600	15	48.1	72	50.000
113	73	800x600	15	46.8	75	49.500
114	74	800x600	16	37.9	60	40.000
114	74	800x600	16	48.1	72	50.000
114	74	800x600	16	46.8	75	49.500
115	75	800x600	32	37.9	60	40.000
115	75	800x600	32	48.1	72	50.000
115	75	800x600	32	46.8	75	49.500
116	76	1024x768	15	35.0	43(i)	44.900
116	76	1024x768	15	48.9	60	65.000
116	76	1024x768	15	56.5	70	75.000
116	76	1024x768	15	60.4	75	80.000
117	77	1024x768	16	35.0	43(i)	44.900
117	77	1024x768	16	48.9	60	65.000
117	77	1024x768	16	56.5	70	75.000
117	77	1024x768	16	60.4	75	80.000
118	78	1024x768	32	35.2	43(i)	44.900
201	49	640x480	8	31.5	60	25.175
201	49	640x480	8	37.9	72	31.500
201	49	640x480	8	37.5	75	31.500
203	4B	800x600	8	35.1	56	36.000
203	4B	800x600	8	37.9	60	40.000
203	4B	800x600	8	48.1	72	50.000
203	4B	800x600	8	46.8	75	49.500

Mode (HEX)	VBEDIT Mode	Screen Resolution	Bits/Pixel	Sweep (KHz)	Refresh Rate (Hz)	*Dot Clock (MHz)
205	4D	1024x768	8	35.5	43(i)	44.900
205	4D	1024x768	8	48.4	60	65.000
205	4D	1024x768	8	56.5	70	75.000
205	4D	1024x768	8	60.2	75	80.000
208	4F	1280x1024	4	47.7	43(i)	37.500 x 2
208	4F	1280x1024	4	63.7	60	55.000 x 2
208	4F	1280x1024	4	77.7	72	65.000 x 2
208	4F	1280x1024	4	79.8	75	67.500 x 2

(i) Interlaced
* Pixel Data Clock Rate x 1/2

Appendix I – 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 J – 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 (8042) 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 (8042) is not working. Replace the 8042.
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 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 Setup.
CMOS Memory Size Mismatch	The amount of memory on the motherboard is different than the amount in CMOS RAM. Run Setup.

ERROR MESSAGES (CONT.)

CMOS Time and Date Not Set	Run 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 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 K – Soft-off Control

The Advanced/EV 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 Super 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 L – BIOS Setup

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 selecting item, use the arrow keys to modify the setting.

Setup Menu Screen	Description
Main	For setting up and modifying some of the 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
Hard Disk Configuration	For configuring your hard drives.
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 the <F1> key brings up a help screen for the currently selected item.
<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, Hard Disk), 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 a dialog box that allows you to specify the current date.

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.

Hard Disk (Primary IDE Master/Slave, Secondary IDE Master/Slave)

Reports if a hard disk is connected to the system. When selected, this brings up the Hard Disk Configuration subscreen.

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 not appear.

Boot Options

When selected, this brings up the Boot Options screen.

Video Mode

This reports the video mode. There are no options.

Mouse

This reports if a mouse is installed or not. There are no options.

Base Memory

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

Extended Memory

This reports the amount of extended memory. 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, 3.5-inch; 2.88 MB, 3.5-inch. The default is 1.44 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, 3.5-inch; 2.88 MB, 3.5-inch. The default is Disabled.

HARD DISK CONFIGURATION SUBSCREEN

Hard Disk Type

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

CHS (extended cylinder head sector — greater than 1024 cylinders), and Auto Detected (BIOS detects IDE drive support for LBA). The default is Auto-detected.

Do not change this from the option selected when the hard drive was formatted. Changing the option may result in corrupted data.

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. This only affects drives connected to the ISA/IDE connector. 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 a non-optimized speed. If set to Auto Detected, transfers occur at the drive's maximum speed.

BOOT OPTIONS SUBSCREEN

Boot Sequence

When selected, this brings up a dialog box that allows you to set which drive the system checks first to find operating system to boot from. The following options are available:

First Boot Device	Floppy
	Hard Disk
	CD-ROM
	Network
	Disabled
Second Boot Device	
Third Boot Device	
Fourth Boot Device	

For example, if CD-ROM is selected as the first boot device, then the second boot device can be set as any one of the following - Floppy, Hard Disk, Network or Disabled. The third boot device can be set as any of the three remaining devices , and the fourth boot device as any of the remaining two.

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.

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 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 Flash User Area

When selected, this brings up a dialog box that allows you to enable the BIOS to scan the Flash user area. The Advanced/EV supports a 4 KB programmable FLASH user area located at EC000-ECFFF. An OEM may use this area to display a custom logo. When the option to scan the Flash user area is selected in the Setup Utility's Boot Options menu, the Advanced/EV BIOS accesses the user area just after completing POST.

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. For the 150/166 MHz Pentium processors this field will not be displayed because the BIOS cannot read the status of the Bus Frequency(BF1) pin. The board will run at 150/166 MHz, but the processor speed won't be displayed in the BIOS.

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 PCI/IDE Interfaces, Floppy Interface, Serial Port 1 and 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 PCI IDE Interfaces, Floppy Interface, Serial Port 1 and Serial Port 2 Addresses, and Parallel Port Address can be explicitly configured.

PCI IDE Interface

When selected, this brings up a dialog box that allows you to enable the PCI IDE hard disk interface. 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; COM2, 2F8h; COM3, 3E8h; and COM4, 2E8h. The default is COM1, 3F8h. If the Configuration Mode is set to Auto, the Setup program assigns the first free COM port (normally COM1, 3F8h) as the serial port 1 address, regardless of what is selected under the Serial Port 1 Address option. (If Configuration Mode is set to 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; COM1, 3F8h; COM2, 2F8h; COM3, 3E8h; and COM4, 2E8h. The default is COM2, 2F8h. If the Configuration Mode is set to Auto, the Setup program assigns the first free COM port (normally COM2, 2F8h) as the serial port 2 address, regardless of what is selected under the Serial Port 2 Address option. (If Configuration Mode is set to Auto, this option cannot be modified.)

If either serial port address is set, the address it is set to will not appear in the options of the other serial port.

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.

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; LPT1, 378h; and LPT2, 278h. The default is LPT1, 378h. If the Configuration Mode is set to Auto, the setup program assigns LPT1, 378h 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-directionalnded 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.

Serial Port 1 IRQ

This reports the IRQ number for serial port 1. There are no options. If the Serial Port 1 Address field is set to Disabled, this field will not be visible.

Serial Port 2 IRQ

This reports the IRQ number for serial port 2. There are no options. If the Serial Port 2 Address field is set to Disabled, this field will not be visible.

Parallel Port IRQ

This reports the IRQ number for the parallel port. There are no options. If the Parallel Port Address field is set to Disabled, this field will not be visible.

AUDIO CONFIGURATION

Configuration Mode

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

The Audio subsystem of the Advanced/EV should be configured by using the ICU (ISA Configuration Utility).

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, this 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, then the ISA LFB Base Address field will appear.

ISA LFB Base Address

This reports the base address of the LFB. There are no options. This field will not appear if the 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 Disabled. *Note: Some video capture or TV tuner add-in boards may require this feature to be enabled. Depending on hardware limitations, this item may not appear.*

Latency Timer (PCI Clocks)

When selected, this brings up a dialog box that allows you to control the time and agent on the PCI bus can hold the bus when another agent has requested the bus. The valid numbers are between 0 and 256. The default is 66.

SIMM Type Detection

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

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.

POWER MANAGEMENT CONFIGURATION

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.

IDE Drive Power Down

When selected, this brings up a dialog box that allows you to set any 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

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.

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.

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. None of the rest of the items in this subscreen will be visible.

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 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. This setting may affect the ISA Shared Memory Size item. The value entered in the ISA Shared Memory Size item cannot extend to the E0000h address. 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. The default is Available. The PCI auto-configuration code looks here to see if these interrupts are available. If an interrupt is available, the PCI auto-configuration code can assign the interrupt to be used by the system. 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 set. 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.

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.

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 M – BIOS Recovery

The Advanced/EV incorporates the AMIBIOS in a Flash memory component. Flash BIOS allows easy upgrades without the need to replace an EEPROM. 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.

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, 6.x, or Windows 95 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.

RECOVERY MODE

In the unlikely event that a Flash upgrade is interrupted catastrophically, it is possible the BIOS may be left in an unusable state. Recovering from this condition requires the following steps (be sure a power supply and speaker have been attached to the board, and a floppy drive is connected as drive A:):

1. Change Recovery Boot Enable jumper to the recovery mode position.

2. Install the bootable upgrade diskette into drive A:

3. Reboot the system.

4. Because of the small amount of code available in the non-erasable boot block area, no video is available to direct the procedure. The procedure can be monitored by listening to the speaker and looking at the floppy drive LED. When the system beeps and the floppy drive LED is lit, the system is copying the recovery code into the Flash device. As soon as the drive LED goes off, the recovery is complete.

5. Turn the system off.

6. Change the Recovery Boot Enable jumper back to the default position.

7. Leave the upgrade floppy in drive A: and turn the system on.

8. Continue with the original upgrade.

Appendix N – 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 N-1. Board Environmental standards

SYSTEMS

Parameter	Condition	Specification
Temperature		
	Non-Operating	-40°C to +70°C
	Operating	+10°C to +35°C
Humidity		
	Non-Operating	92% Relative Humidity max. @ 36°C
	Operating	80% Relative Humidity max. @ 36°C
AC Line		
Surge Test	Non-Operating	2.0kV/3KA Unidirectional
	Operating	1.5kV/3KA Unidirectional
Line Voltage Range		90-132V or 180-264V
Line Freq. Range		47-63Hz
Source Interrupt		17 msec nominal line
ESD		
	0-2.5KV	No errors
	2.5KV-15.0KV	limited errors, no physical damage
Acoustical Noise		40 dba (measured at bystander position)
Vibration		
	Non-operating	.001g2/Hz@5Hz, .01g2/hz from 20Hz-500Hz
Shock	Non-Operating	30.0G, trapezoidal wave form
	Operating	2G, 11 msec, 1/2 sine

Table N-2. System Environmental standards

Appendix O – Reliability Data

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

Advanced/EV motherboard	TBD
Advanced/EV Expandable Desktop	29,914 hrs
Advanced/EV MiniTower	29,914 hrs

Note: The power supply fan and auxiliary fan are considered wear-out items and are not included in calculation of the system MTBF numbers listed above.