

Advanced/MN Low Profile Desktop & Board

Technical Product Summary

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**Advanced/MN
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Introduction

The Intel Advanced/MN Low Profile baseboards and systems integrate the latest advances in processor, memory, and I/O technologies into a standard LPX form factor that provides the best combination of performance, price, and flexibility. It provides the ideal platform base for the increasing requirements of today's (and tomorrow's) desktop applications.

The flexible baseboard design will accept Pentium® processors operating at 75 MHz, 90 MHz, 100 MHz, and 120 MHz, and has the scalability to accept faster Pentium processors in the future. The processor is complemented by a second level write-back cache in either 0 KB, 256 KB or 512 KB configurations implemented using asynchronous SRAMs for cost effective performance. The memory subsystem is designed to support up to 128 MB of EDO DRAM (for improved performance) or Fast-Page DRAM in standard 72-pin SIMM sockets. A Level 5 Pentium OverDrive® socket provides access to future processor enhancements

Advanced/MN provides a new level of I/O integration. Intel's Triton 82430 PCIset chipset provides increased integration and improved performance over other chipset designs. An integrated Bus Mastering IDE controller provides two high performance IDE interfaces for up to four IDE devices (hard drives, CD ROM drive, etc.). A Crystal CS4232 Codec integrated onto the baseboard provides 16-bit stereo audio with enhanced capabilities such as full duplex operation 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 16550 compatible serial ports with FIFO, one EPP/ECP capable parallel port, a Real Time Clock, and keyboard controller as well as support for an IrDA compatible infra-red interface. PCI and ISA expansion slots are supported by a connector on the baseboard designed to accept a riser card.

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, soft-controlled power supply shutdown, and glitchless bi-directional audio are all provided by software available from Intel for the Advanced/MN platform.

The Advanced/MN Low Profile Desktop baseboard provides the foundation for cost effective, high performance, highly expandable platforms which deliver the latest in CPU and I/O technology.

MINI LPX FORM FACTOR

The Advanced/MN baseboard is designed to fit into a standard LPX form factor chassis. Figure 1 illustrates the mechanical form factor for the Advanced/MN. The Advanced/MN mini-LPX form factor does not strictly adhere to the standard LPX guidelines in that the outer dimensions are 10" x 8.8" rather than 13" x 9". Location of the I/O connectors, riser slot, and mounting holes are in strict compliance with the LPX specification.

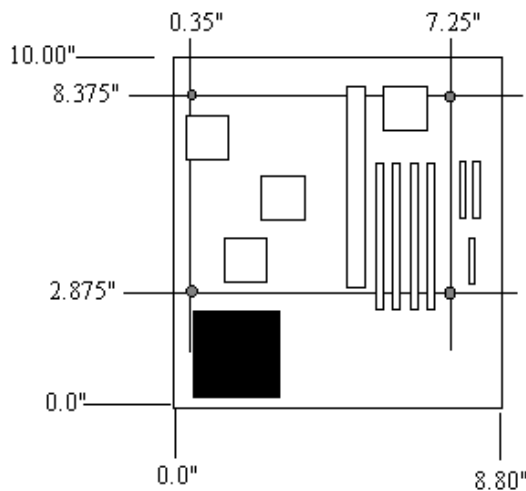


Figure 1. Advanced/MN Baseboard dimensions.

BASEBOARD DESIGN EXCEPTIONS

FRONT PANEL CONNECTORS

There is no front panel connector on the baseboard for a Turbo/Deturbo switch. The processor speed can be set either through a parameter in the CMOS Setup Utility, or from the keyboard (<CTL><ALT><+> = Turbo, <CTL><ALT><-> = Deturbo). Changing processor speed from the keyboard may be prohibited by the operating system, or when the processor is in protected mode.

Setting the processor to deturbo (or slow) only slows the processor to the approximate equivalent of a 25 MHz clock rate, not the standard 8 MHz clock rate.

JUMPERS/SWITCHES

There is no Color/Mono jumper/switch on the baseboard to specify Monochrome or Color video mode at boot, the BIOS will automatically detect the type of video card installed.

Also, there is no Flash write protect jumper/switch, the BIOS needs to be able to write to FLASH to support the Plug and Play features.

Board Level Features

- A – National PC87306 I/O controller
- B – Crystal CS4232 audio, OPL3 synthesizer
- C – Audio I/O connector
- D – Wave table upgrade connector
- E – Two PCI IDE interfaces
- F – CD-ROM audio connector
- G – Primary power connector
- H – Floppy connector
- I – Power Supply Remote On/Off connector
- J – Sleep/Resume connector
- K – Four SIMM sockets (two banks)
- L – 82438FX Triton Data Path (TDP)
- M – CPU 3.3v voltage regulator
- N – Battery for the Real-time clock
- O – Up to 512kB secondary cache
- P – Socket 5 Pentium™ Processor socket
- Q – Front Panel I/O connectors
- R – 82437FX Triton System Controller (TSC)
- S – Configuration switch block
- T – 82371FB PCI ISA/IDE Accelerator (PIIX)
- U – PCI/ISA expansion connector
- V – S3 Trio PCI graphics controller
- W – VESA feature connector
- X – Up to 2MB graphics memory
- Y – VGA connector
- Z – Parallel port connector
- AA – Serial port connectors
- BB – PS/2 Mouse port
- CC – PS/2 Keyboard port

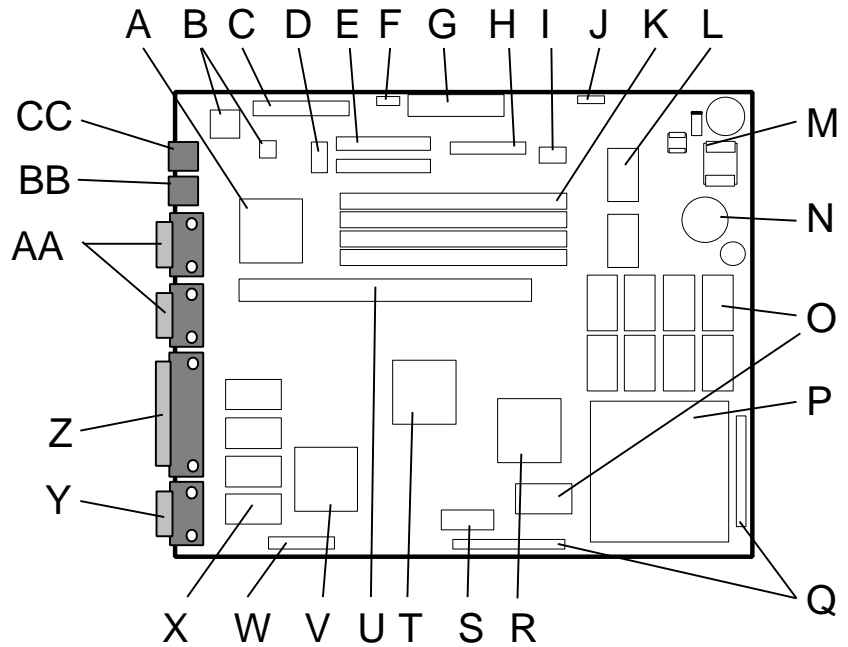


Figure 2. Advanced/MN Baseboard Features

CPU

The Advanced/MN baseboard 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 volt tap provided by a standard PC power supply. The baseboard supports the Pentium processors at iCOMP™ index 615 \ 75 MHz , 735 \ 90 MHz, 815 \ 100 MHz, and 1000 \ 120 MHz. The Pentium processor maintains full backward compatibility with the 8086, 80286, i386™ and i486™ processors. It supports both read and write burst mode bus cycles, and includes a 16 KB write-back cache configured as separate 8 KB code and data caches. 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. 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 Pentium processor's internal cache is complemented by a 256 KB direct mapped write-back second level cache implemented with eight 20 ns 32kx8, 3.3v asynchronous SRAM devices and a single 15 ns 32kx8, 5v external Tag SRAM which provides support for up to 64MB of system memory. The Advanced/MN can optionally be manufactured with SOJ sockets to support a "no cache" configuration upgradable to 256 KB or 512 KB. See User Installable Upgrades for more details.

Note: Baseboards supporting the Pentium processor at 100 MHz will require 15 ns data SRAM and a 15 ns Tag SRAM.

SYSTEM MEMORY

The Advanced/MN baseboard 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, 70 ns EDO DRAM (note: if the CPU clock speed is 100/66 MHz, EDO DRAM needs to be 60 ns, Fast Page can still be 70 ns). 36-bit SIMM modules may be used, but 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 Fast Page DRAM in one bank and EDO DRAM in the other, in which case each bank is independently optimized for maximum 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 to be used when adding DRAM.

EDO DRAM

Extended Data Out (or Hyper Page Mode) DRAM is designed to improve the DRAM read performance to approximately the level of an asynchronous second level (L2) cache (EDO write performance is the same as FPM DRAM). EDO DRAM holds the memory data valid until the next CAS# falling edge, unlike standard fast page mode DRAM which tri-states the memory data when CAS# negates to precharge for the next cycle. With EDO, the CAS# precharge overlaps the data valid time, allowing CAS# to negate earlier while still satisfying the memory data valid window time.

TRITON PCISSET

The Intel Triton 82430FX PCIset consists of the 82437FX Triton System Controller (TSC), two 82438FX Triton Data Path (TDP) devices, and one 82371FB PCI ISA/IDE Accelerator (PIIX) bridge chip. It provides the following functions:

- CPU interface control
- Integrated L2 write-back cache controller
 - Pipeline Burst or standard SRAM
 - 256kB or 512kB Direct Mapped
- Integrated DRAM controller
 - 64-bit path to Memory
 - Support for EDO and Fast Page DRAM
 - support for up to 128 MB main memory
- Fully synchronous PCI bus interface
 - 25/30/33 MHz
 - PCI to DRAM > 100 Mbytes/sec
 - PCI to DRAM posting of 12 Dwords
 - 5 Dword buffers for CPU to PCI write posting
 - 4 Dword buffers for PCI to Memory bus master cycles
 - Support for up to 5 PCI masters
- Interface between the PCI bus and ISA bus
- Integrated fast IDE interface
 - Support for up to 4 devices
 - PIO Mode 4 transfers up to 16MB/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 TRITON 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 TRITON DATA PATH (TDP)

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

82371FB PCI ISA/IDE ACCELERATOR (PIIX)

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

IDE SUPPORT

The Advanced/MN baseboard provides two independent high performance PCI IDE interfaces capable of supporting PIO Mode 3 and 4 devices for transfer rates of up to 16 MB/sec. 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 IDE interfaces. Detection of IDE device transfer rate and translation mode capability is automatically determined by the system BIOS.

In the Windows 95 environment, a driver provided by Intel allows the IDE interface to operate as a PCI bus master capable of supporting transfer rates of up to 16MB/sec while minimizing the system demands upon the processor. In true multi-tasking operating systems like Windows95, the CPU bandwidth freed up by using bus mastering IDE can be used to complete other tasks while disk transfers are occurring, significantly improving performance.

TRITON DESIGN CONSIDERATIONS

Triton Memory Hole Limitation

Due the design of the Triton chipset, only one memory hole can be active at a time. The user can not set the Base Memory size to 512 KB and enable the ISA LFB at the same time.

Triton PCI Hold Time Requirement

The chipset provides less hold time than the earlier Neptune and Mercury chipsets on the PCI address and data lines, but still is within the PCI specification. (The PCI specification calls out a 0 ns minimum hold time.) Some PCI expansion cards do not meet this requirement, and in fact require more hold time than the Triton chipset provides. Disabling PCI write bursting will sometimes enable these cards to function.

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 (N82077) with 16 byte data FIFO (2.88 MB floppy support)
- Integrated Real Time Clock accurate within +/- 13 minutes/yr.
- Integrated 8042 compatible keyboard controller

Configuration of these interfaces is possible via the CMOS Setup program that can be invoked during boot-up. The serial ports can be enabled as COM1, COM2, IrDA, or disabled. The parallel port can be configured as compatible, bi-directional, 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 (3-mode), 1.44 MB, or 2.88 MB 3½" media. Connectors for the serial ports, parallel port, PS/2 mouse and keyboard are located on the rear of the baseboard.

KEYBOARD INTERFACE

PS/2 keyboard/mouse connectors are located on the back panel side of the baseboard. 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. For ease of use, the system BIOS can detect and correct keyboards and mice plugged into the wrong PS/2 connector.

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

- <CTRL><ALT>: 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 a 23MHz 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 86 mode under DOS.
- <CTRL><ALT><defined in setup>: Power down (Stand By) key sequence takes 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.
- <CTRL><ALT><defined in setup>: Keyboard lock key sequence provides system security by blanking the screen and ignoring keyboard input until the BIOS User Password is typed. When invoked, the keyboard LEDs will flash to indicate that the User Password must be entered to unlock the system. This feature will not take effect unless the User Password has been set in the BIOS setup.

REAL TIME CLOCK, CMOS RAM AND BATTERY

The integrated Real Time Clock (RTC) is DS1287 and MC146818 compatible and provides a time of day clock, 100-year calendar with alarm features and is accurate to within 13 minutes/year. The RTC can be set via the BIOS SETUP program. The RTC also supports 242-byte battery-backed CMOS RAM in two banks which is reserved for BIOS use. The CMOS RAM can be set to specific values or cleared to the system default values using the BIOS SETUP program. Also, the CMOS RAM values can be cleared to the system defaults by using a configuration switch on the baseboard.

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.

IRDA (INFRARED) SUPPORT

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, PDA's and printers using application software such as LapLink. The IrDA specification provides for data transfers at 115kbps from a maximum distance of 1 meter.

A 5-pin header is provided to allow connection to a Hewlett Packard HSDSL-1000 compatible Infra-red transmitter/receiver.

S3 TRIO GRAPHICS SUBSYSTEM

The Advanced/MN baseboard comes standard with a S3 Trio32 SVGA graphics controller with 1MB of graphics DRAM upgradeable to 2MB. The graphics DRAM can be upgraded to 2MB by installing two 256kBx16, 70 ns SOJ DRAM devices in the provided sockets. Refer to Appendix A for suggested vendors and part numbers. The Trio32 incorporates a 32-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 1280x1024x256 colors at 75 Hz with 2MB 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 (Display Control Interface) reduces software overhead by mapping the display memory into the CPU's upper memory address space and permitting direct CPU access to the display memory. The Advanced/MN can optionally support the Trio64 controller which provides all of the same features as the Trio32 with additional performance supplied by taking advantage of its 64-bit graphics engine when 2MB of DRAM is installed.

The Advanced/MN 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. NOTE: the VESA feature connector is default disabled. To enable the feature connector, run the utility FCON.EXE that is included with the Windows video drivers. Also, if the VESA feature connector is enabled, only 1MB of video DRAM will be available for use.

The Advanced/MN also supports other VESA standards such as the VESA DPMS protocol to put a DPMS compliant monitor into power savings modes and the VESA Display Data Channel (DDC1) that permits transfer of monitor identification and resolution support data for ease of use.

GRAPHICS DRIVERS AND UTILITIES

Graphics drivers and utilities for Windows 3.11 are shipped with the Advanced/MN baseboard on the foundation software CD. These drivers come in a compressed form and are extracted by using an installation utility that runs under Windows. Also included is a control panel applet called Galileo which allows the user to change the screen resolution, number of colors, and large or small fonts while in Windows. Windows NT drivers are embedded in the OS

Graphics drivers for OS/2 2.11 and OS/2 WARP, MS-DOS AutoCAD and Microstation, as well as driver updates for Windows 3.11 and Windows NT may be downloaded from the Intel Applications Support BBS. Drivers for SCO UNIX are available from SCO.

Graphics Resolutions supported

<i>Resolution</i>	<i>1 MB DRAM</i>	<i>2 MB DRAM</i>	<i>Refresh Rate (Hz)</i>
640x480x4	X	X	60
640x480x8	X	X	60,72,75
640x480x16	X	X	60,72,75
640x480x24 (T32)	X	X	60,72,75
640x480x32		X	60,72,75
800x600x8	X	X	56(IL),60,72,75
800x600x16	X	X	60,72,75
800x600x32 (T64)		X	60,72,75
1024x768x8	X	X	43(IL),60,70,75
1024x768x16 (T32=IL)		X	43(IL),60,70,75
1280x1024x4	X	X	43(IL),45(IL),60,72,75
1280x1024x8		X	45(IL),60,72,75

Note: T32 = Trio32, T64 = Trio64, IL = Interlaced

AUDIO SUBSYSTEM (OPTIONAL)

The Advanced/MN baseboard features a 16-bit stereo audio subsystem as a factory installed option in some areas. The audio subsystem is based upon the Crystal CS4232 multimedia Codec and Yamaha OPL3 FM synthesizer. The CS4232 provides all the digital audio and analog mixing functions required for recording and playing of audio on personal computers. These functions include stereo analog-to-digital and digital-to-analog converters, analog mixing, anti-aliasing and reconstruction

filters, line and microphone level inputs, and digital audio compression via selectable A-law / μ law, and full digital control of all mixer and volume control functions. Combined with the Yamaha OPL3 FM synthesizer, the CS4232 also provides support for four major sound standards including Adlib*, Sound Blaster* Pro 2.0, Windows Sound System and MPU-401 to meet all of the requirements of today's multimedia applications. The CS4232 also supports full-duplex operation which ensures support for future applications such as video conferencing.

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

AUDIO I/O ACCESS

An audio I/O module available with the Advanced/MN containing all of the necessary audio jacks (Speaker Out, Line IN, Mic IN) and game port plugs into a 34-pin header connector on the baseboard. 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. 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 (J9F1) for interfacing the audio stream from a CD-ROM reader into the audio sub-system mixer. This is needed to record from audio CDs or play music CDs. This connector is compatible with the typical cable that is supplied with CD-ROM readers for interfacing to audio add-in cards.

AUDIO DRIVERS

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

WAVE TABLE UPGRADE

An eight pin header is provided to connect to a wave table upgrade card for richer sound quality in both DOS and Windows environments. The upgrade module is simply installed into a standard ISA slot with a small cable routed to the connector (J8H1).

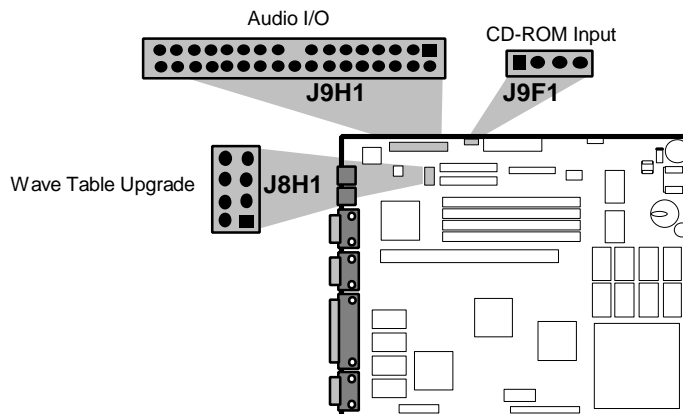


Figure 3 - Audio connector locations

EXPANSION SLOTS

A riser connector of EISA form factor provides the capability to support up to two Bus Master PCI and up to five ISA expansion slots on the Advanced/MN baseboard. The PCI bus is fully compliant with the PCI 2.0 specification. To ensure that the lowest positioned slot can support a full length add-in card, the minimum height requirement for the lowest positioned slot on the riser card must be a minimum of 1.2" above the baseboard on either side of the riser connector.

PCI 3.3 VOLT CAPABILITIES

To maintain strict compliance with the PCI specification, the baseboard 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.*

BASEBOARD BIOS

The Advanced/MN baseboard 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 baseboard supports system BIOS shadowing, allowing the BIOS to execute from 32-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/MN with the Trio32 graphics controller option will be identified as 1.00.03.BT0. Boards with the Trio64 graphics controller will have BIOS 1.00.02.CA0. As BIOS updates occur the revision number will increase to 1.00.04.BT0, 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 ESCD Area (Plug'n'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. 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 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 baseboard can be set to prevent user access to Setup for security purposes.

PCI AUTO-CONFIGURATION

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

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 FaxBack (800) 628-2283, or via CompuServe by typing Go PlugPlay.

SHADOW MEMORY

Shadowing memory is a technique that copies a block of memory from ROM to the same address in DRAM to improve performance. In the Advanced/MN, shadow memory is automatically enabled from C0000-C7FFF (video BIOS area), and from E0000-FFFFFF (system BIOS area). Memory from C8000-DFFFF is not shadowed unless used for PCI or Plug and Play expansion card ROM space. ISA legacy card ROM space will not be shadowed, this may have a slight adverse effect on performance of these cards.

POWER MANAGEMENT

The Advanced/MN BIOS supports power management via System Management Mode (SMM) interrupts to the CPU and Advanced Power Management (APM Ver. 1.1). The APM capabilities will allow the system to be put into a power managed Stand By state by:

1. Pressing a sleep/resume button on the front of the chassis
2. Entering an user configurable hot-key sequence on the keyboard
3. Expiration of the user configurable system inactivity timer

Stand By mode reduces power consumption to Energy Star levels by utilizing the power saving capabilities of the Pentium™ processor and turning off DPMS compliant monitors and hard drives. Stand By mode also allows the system to be responsive to external interrupts such as in-coming Fax's or network messages. Add-in cards supplied with APM-aware (v1.1) drivers can also be put into a power managed state for further energy savings.

The Advanced/MN also is supplied with a power management utility for Windows called Powerman. In addition to the features mentioned above, Powerman provides support for the system to wake up at scheduled times (such as

delayed faxes), support for a user prompted password upon wake up, and support for turning the system completely off via a mouse click for systems equipped with a soft-off power supply. Powerman is supplied on the foundation software CD that is available for the Advanced/MN.

OEM LOGO AREA

Advanced/MN supports a 4 KB programmable FLASH user area located at EC000-ECFFF. An OEM may use this area to display a custom logo. The Advanced/MN BIOS accesses the user area just after completing POST. Instructions and a utility for generating a logo file are available on the Intel BBS. Logo files can be flashed into the BIOS using the standard FMUP utility.

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.

BIOS User Password

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

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

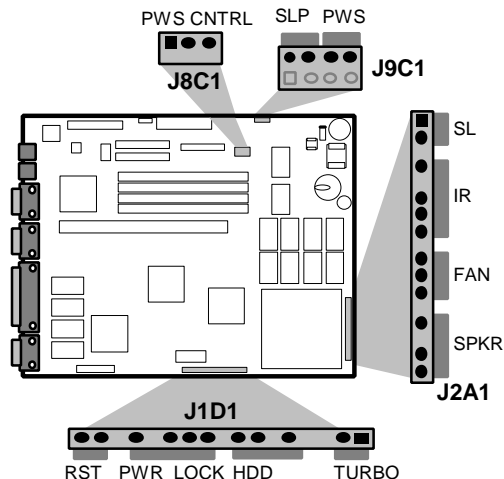
A baseboard configuration switch controls access to the BIOS Setup utility. By setting the switch to the disable position, the user is prevented from accessing the Setup utility during the Power-On Self Test or at any other time. The message prompting the user to press <F1> to enter setup is also disabled.

CONNECTORS

FRONT PANEL CONNECTIONS

The Advanced/MN baseboard 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 Fan
- Infra-Red (IrDA) port
- Sleep/Resume
- Power Supply On



Sleep/Resume (J2A1-SL, J9C1-SLP)

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/MN 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/MN baseboard to minimize system cable requirements.

Soft Power Down (J8C1-PWS CNTRL)

When used with a power supply that supports remote power on/off, the Advanced/MN baseboard can turn off the system power via software control (Powerman for Windows or shutdown in Windows95). An APM command issued to the system BIOS will cause the power supply to completely turn off the system via the three pin "PWS Control" header connector. For example, Windows™95 will issue this APM command when the user clicks on the Shutdown icon. The "PWS CNTRL" 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 "PWS" two pin header. To properly support this feature, the power supply is required to pull down pin 3 of the PWS Control connector. When this pin is pulled low, the system BIOS will recognize the presence of a supply that supports soft-off.

By implementing a dual-pole momentary switch from the power button to the "PWS/SLP" 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 baseboard 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 (J2A1-IR)

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, PDA's and printers using application software such as LapLink. The IrDA specification provides for data transfers at 115kbps from a maximum distance of 1 meter.

Speaker (J2A1-SPKR)

The external speaker provides error beep code information during the Power-On Self Test if the system cannot use the video interface. See the appendix for more information about error beep codes.

I/O CONNECTIONS

The baseboard contains shrouded stake pin header connections for cabling the audio, floppy, and IDE interfaces. Figure 5 shows the locations of these connectors and the orientation of pin 1 on each.

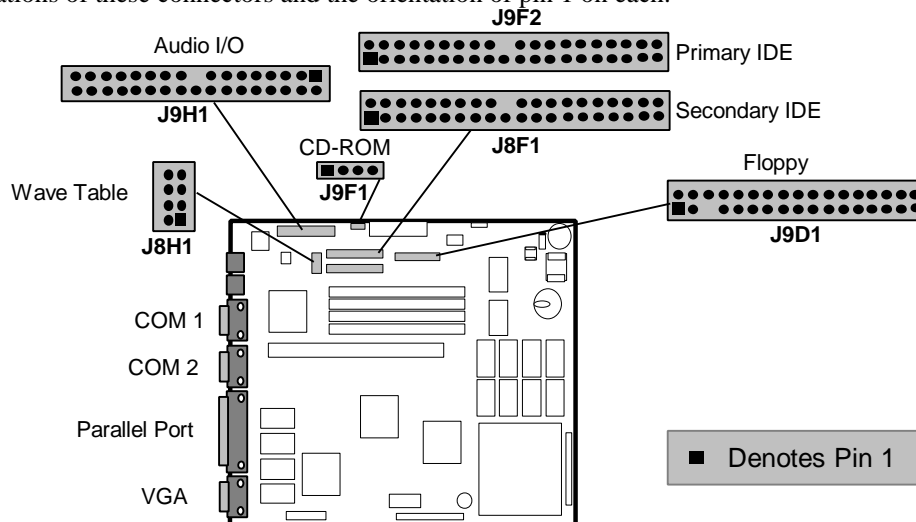


Figure 5. I/O Connections

BACK PANEL CONNECTIONS

The back panel provides external access to PS/2 style keyboard and mouse connectors integrated on the Advanced/MN baseboard. Figure 6 shows the general location of the keyboard and mice connectors.



Figure 6. Advanced/MN PS/2 Style Back panel

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	75 MHz Typical Current*	90 MHz Typical Current*	100 MHz Typical Current*
+5V	3.5 amps	3.88 amps	4.12 amps
-5V	20 milliamps	20 milliamps	20 milliamps
+12V	75 milliamps	75 milliamps	75 milliamps
-12V	10 milliamps	10 milliamps	10 milliamps

Table 2. Advanced/MN Current Requirements (Typical)

*(measured with 8 MB DRAM, 256kB L2, audio and Floppy Drive while sitting at DOS prompt)

WATTS

System Configuration	Typical Power*	StandBy Power*
Advanced/MN baseboard, 8 MB, 256 KB cache, Floppy drive, 540 MB hard drive	33 Watts	21.7 Watts

Table 3. Power use by System Resources (Typical)

*(true power measured from the wall with a 65% efficient power supply)

System Level Features

CHASSIS

A slimline case gives the Advanced/MN Low Profile Desktop a sleek look – while four peripheral bays, two PCI slots, and three ISA slots offer the expandability required for traditional PC applications. A 200 watt power supply ensures the system can support installation of the maximum number of peripherals and add-in cards. The Advanced/MN also has been tested to ensure it meets stringent environmental requirements.

PERIPHERAL BAYS

Four peripheral bays offer ample expandability for add-in devices. The system provides two 5¼" half-height bays, one 3½" one-inch bay, and one 3½" 1.6-inch bay. Both 5¼" bays and one of the 3½" bays are accessible from the front panel. The final 3½" bay can be used for an internally-mounted hard drive, as well as to provide external access for an optional infrared transceiver/audio connector panel.

The two 5¼" bays also can accommodate a single 5¼" full-height drive.

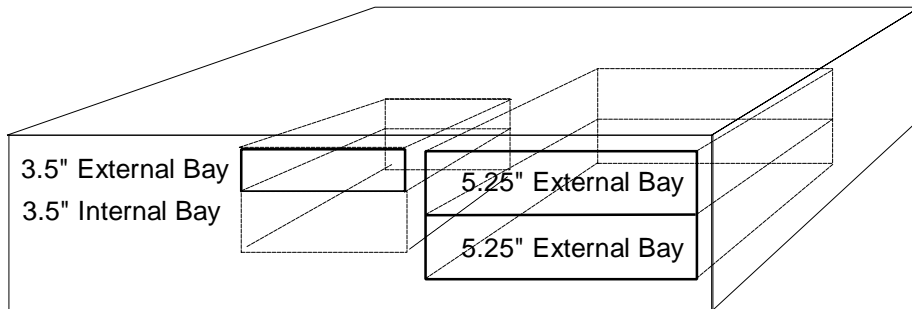


Figure 7. Advanced/MN Peripheral Bays

FAN

The Advanced/MN has two fans to keep the system cool. One fan is located within the power supply and exhausts warm air out of the system. The second fan, located behind the card guide, provides airflow across the add-in cards and the CPU. The second fan receives 12 Vdc directly from the power supply.

FRONT PANEL

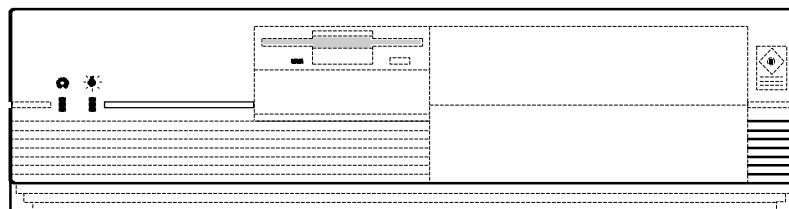


Figure 8. Advanced/MN Front Bezel

The front panel contains a power-on LED and a hard disk access LED to provide visual system information. Access is also provided to the peripheral bays, as described above. The power control button is also located on the front panel. For this switch to be enabled, the back panel power on/off switch must be set to "ON". Depending on the current state of the system, this switch has different functions. These functions are listed below.

<i>Systems Status</i>	<i>Power Control Switch function*</i>
System powered off (back panel power switch set to "ON")	Enables power to the system.
System in Active state, no power management driver installed/active.	Momentary depression: no affect Depressed > 3 sec: two descending tones generated, system will be powered off when switch is released.
System in Active state, power management driver installed/active.	Momentary depression: single tone generated, system will go into power managed state when switch is released. Depressed > 3 sec: two descending tones generated, system will be powered off when switch is released.
System in Power Managed state.	Momentary depression: system will go into active state when switch is released. Depressed > 3 sec: two descending tones generated, system will be powered off when switch is released.

Table 4. Front Panel Power Control Switch)

EXPANSION SLOTS

The Advanced/MN has five expansion card slots as shown in Figure 9. One slot is a full length 16-bit ISA card slot, two are half length 16-bit ISA card slots, one is a full length PCI slot, and one is a half length PCI slot. The Advanced/MN riser card uses a custom edge connector to route PCI signals from the baseboard. The sixth I/O panel (directly above the keyboard and mouse connectors) is reserved for a custom audio I/O module.

BACK PANEL

The back panel consists of the power supply fan, a 115/230 voltage switch, the system power-on/power-off switch, access covers for the expansion slots, PS/2-style keyboard and mouse connectors, two DB9 RS-232 serial ports, a bi-directional parallel port, and a video output connector.

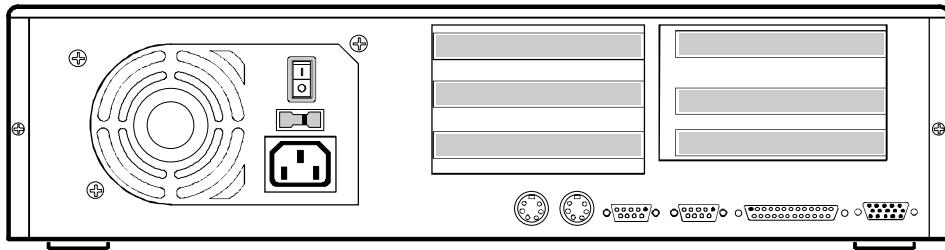


Figure 9. Advanced/MN Back Panel.

POWER SUPPLY

A 200 watt switchable power supply is integrated into the Advanced/MN Desktop to provide power for onboard resources, add-in cards, and peripherals. A switch on the back of the system sets the Astec SA201 power supply to operate at either 90-132VAC (3 Amps AC) or 180-264 VAC (2 Amps AC). Table 5 lists the current outputs.

Note: Maximum wattage consumption for the system is 120 watts.

AC POWER INPUT SPECIFICATIONS

<i>Input frequency 50/60 Hz</i>	
AC Voltage	Current
90-132	3.0 A
180-264	2.0 A

Table 4. Power Supply Input Specifications.

DC OUTPUT SPECIFICATIONS

DC Voltage	Max. Continuous Current	Minimum Current Load
+5V	18.6A	3.0A
-5V	0.5A	0A
+12V	8.0A	0.3A
-12V	0.5A	.2A

Table 5. Power Supply DC Output Specifications.

POWER CONSUMPTION

Table 6 lists the current used by system resources in a configuration which includes 8 MB of DRAM. Table 7 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 which derives the +3.3 volts from the +12 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 6. Advanced/MN current requirements (preliminary)

*Measured with 8 MB DRAM, VGA controller and Floppy Drive while sitting at DOS prompt

WATTS

Resource	Typical Power
Advanced/MN baseboard, 8 MB and 256 KB cache	xx Watts
Teac 3.5" Floppy drive	1.7 Watts

Table 7. Power Use by System Resources (Preliminary)

FLOPPY DRIVE

The Advanced/MN integrates a 3½" Teac Floppy drive Model FD-235HF into the externally-accessible 3.5" bay. This is the same proven floppy disk drive used on many other Intel systems.

SPEAKER

The standard system ships with an external speaker installed. The speaker provides error beep code information during POST if the system cannot use the video interface. See Appendix E or the Advanced/MN product guide (Order # 635904) for more detailed beep and error code information.

CHASSIS COLOR

The chassis paint color is Fuller O'Brien 271026C Dusty Beige. The color of the front bezel uses General Electric chip H86204. The bottom and back of the chassis are not painted, but a back panel label shows connector information.

Appendix A - User-Installable Upgrades

The most recent qualified vendor list for the following components is available from FaxBack.

SYSTEM MEMORY

Table A-1 shows the possible memory combinations. The Advanced/MN will support both Fast Page DRAM or EDO DRAM SIMMs, but they cannot be mixed within the same memory bank. If Fast Page DRAM and EDO DRAM SIMMs are installed in separate banks, each bank will be optimized for maximum performance. Parity generation and detection is NOT supported, but parity SIMMs (X 36) may be used. SIMM requirements are 70ns Fast Page Mode or 60nS EDO DRAM with tin-lead connectors.

<i>SIMM 1,2 (Bank 0)</i> <i>SIMM Type (Amount)</i>	<i>SIMM 3,4 (Bank 1)</i> <i>SIMM Type (Amount)</i>	<i>Total System Memory</i>
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

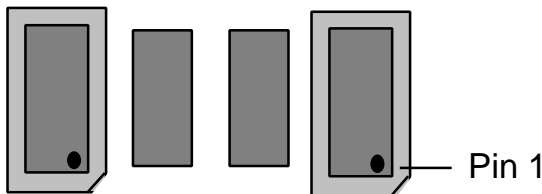
Table A-1. Possible SIMM memory combinations
Note: SIMMs may be parity (x 36) or non-parity (x 32)

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.

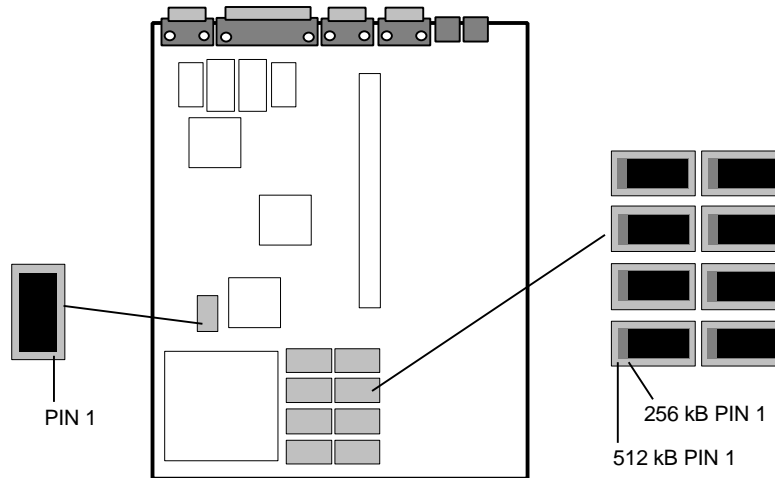
GRAPHICS DRAM

The Advanced/MN baseboard has 1 MB of Fast Page DRAM installed for graphics and two SOJ type sockets for upgrades up to 2 MB of graphics DRAM. The user can install two 256k x 16, 60 ns DRAM to provide a total of 2 MB of graphics DRAM.



CACHE SRAM

Baseboards configured for 0 kB of L2 cache can be upgraded to either 256 kB or 512 kB of L2 cache by installing 24-pin 32kx8 or 28-pin 64kx8 SOJ (20 nSec) devices into the provided sockets. The TAG socket accepts a 24-pin 32kx8 SOJ SRAM (15nSec). The figure below shows the Pin 1 location for the TAG and data SRAM. To properly support the 100/66 MHz Pentium™ Processor, the data and tag SRAM must be 15 nSec devices.



Appendix B - Switch Settings and Jumpers

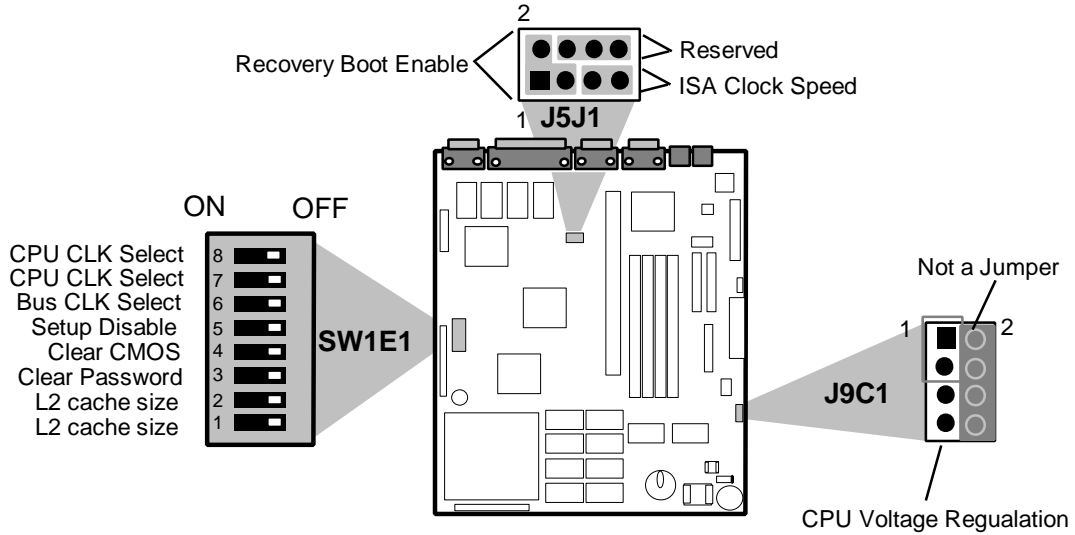


Figure B-1. Jumper/Switch locations and settings

EXTERNAL CPU CLOCK SPEED (50/60/66 MHZ) - SWITCHES 7 & 8

These switches set the CPU's external operating frequency at 50, 60, or 66 MHz. Default setting depends on the specific product code, see the table below for specific Pentium processor configuration information.

INTERNAL CPU CLOCK SPEED - SWITCH 6

This switch sets the internal CPU clock speed to either 3/2 (OFF) or twice (ON) the external CPU clock speed. Default setting is 3/2, (switch 6 = OFF).

Pentium Processor type	Switch 8	Switch 7	Switch 6	J9C1
50/75 MHz	OFF	OFF	OFF	The VR/VRE setting is dependent on the specific CPU type.
60/90 MHz	OFF	ON	OFF	
66/100 MHz	ON	OFF	OFF	
Reserved	ON	ON	NA	
Reserved	OFF	OFF	ON	
60/120 MHz	OFF	ON	ON	
66/133 MHz (not tested)	ON	OFF	ON	

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. When this jumper is in the ON position, the system BIOS will display the message "CMOS cleared by jumper". The default is OFF.

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 or administrative password has been forgotten. Default is for this switch to be OFF.

L2 CACHE SIZE - SWITCHES 1 & 2

These switch settings must match the amount of L2 cache installed on the baseboard for proper operation.

<i>L2 Cache Size</i>	<i>Switch 1</i>	<i>Switch 2</i>
0 kByte	ON	N/A
256 kBytes	OFF	OFF
512 kBytes	OFF	ON

J5J1 - 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 1-3 to the 1-2 position.

J5J1 - ISA BUS SPEED

Sets the ISA bus speed as either 1/6 or 1/8 of the External CPU Bus clock speed. The default depends on the specific board configuration. By installing the jumper between pins 5-7 the ISA clock speed will be equal to 1/8 the External CPU Bus clock speed. Some ISA cards may not function correctly if the ISA bus clock speed is set above 8.33MHz.

<i>CPU External CLK Speed</i>	<i>ISA CLK Speed</i>	
	<i>1/6 speed 5-7 Not Installed</i>	<i>1/8 speed 5-7 Installed</i>
50 MHz	8.33 MHz	6.25 MHz
60 MHz	10 MHz	7.5 MHz
66 MHz	11 MHz	8.25 MHz

J5J1 - RESERVED

The stake pins 4, 6, 8 are reserved and should not have a jumper installed between any of these pins.

J9C1 - CPU VOLTAGE REGULATION

This jumper changes the output of the on-board voltage regulator: 1-3 = VR voltage level, 5-7 = VRE voltage level. The VR voltage range is specified as 3.3-3.465V, the VRE range is 3.45-3.6V. Pentium processors that do not require the VRE voltage specification should use the VR setting. When upgrading your processor, be sure to consult the documentation for the voltage requirements, an incorrect setting may damage the processor.

Appendix C - Memory Map

Address Range (Decimal)	Address Range (hex)	Size	Description
1024K-131072K	100000-8000000	127M	Extended Memory
960K-1023K	F0000-FFFFF	64K	AMI System BIOS
952K-959K	EE000-EFFFF	8K	FLASH Boot Block (Available as UMB)
948K-951K	ED000-EDFFF	4K	ESCD (Plug and Play configuration area)
944-947K	EC000-ECFFF	4K	OEM LOGO (available as UMB)
896K-943K	E0000-EBFFF	48K	BIOS RESERVED (Currently available as UMB)
800-895K	C8000-DFFFF	96K	Available HI DOS memory (open to ISA and PCI bus)
640K-799K	A0000-C7FFF	160	On-board video memory and BIOS
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 C-1. Advanced/MN Memory Map

The ESCD 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. The user may need to force inclusion of the OEM logo and FLASH Boot Block areas in order for them to be used by a memory manager.

Appendix D - I/O Map

Address (hex)	Size	Description	Address (hex)	Size	Description
0000 - 000F	16 bytes	PIIX - DMA 1	01F0 - 01F7	8 bytes	Primary IDE Channel
0020 - 0021	2 bytes	PIIX - Interrupt Controller 1	0278 - 027B	4 bytes	Parallel Port 2
002E - 002F	2 bytes	87306 Base Configuration	02F8 - 02FF	8 bytes	On-Board Serial Port 2
0040 - 0043	4 bytes	PIIX - Timer 1	0376	1 byte	Sec IDE Chan Cmd Port
0048 - 004B	4 bytes	PIIX - Timer 2	0377	1 byte	Sec IDE Chan Stat Port
0060	1 byte	Keyboard Controller Data Byte	0378 - 037F	8 bytes	Parallel Port 1
0061	1 byte	PIIX - NMI, speaker control	03BC - 03BF	4 bytes	Parallel Port x
0064	1 byte	Kbd Controller, CMD/STAT Byte	03E8 - 03EF	8 bytes	Serial Port 3
0070, bit 7	1 bit	PIIX - Enable NMI	03F0 - 03F5	6 bytes	Floppy Channel 1
0070, bits 6:0	7 bits	PIIX - Real Time Clock, Address	03F6	1 bytes	Pri IDE Chan Cmd Port
0071	1 byte	PIIX - Real Time Clock, Data	03F7 (Write)	1 byte	Floppy Chan 1 Cmd
0078	1 byte	Reserved - Brd. Config.	03F7, bit 7	1 bit	Floppy Disk Chg Chan 1
0079	1 byte	Reserved - Brd. Config.	03F7, bits 6:0	7 bits	Pri IDE Chan Status Port
0080 - 008F	16 bytes	PIIX - DMA Page Register	03F8 - 03FF	8 bytes	On-Board Serial Port 1
00A0 - 00A1	2 bytes	PIIX - Interrupt Controller 2	LPT + 400h	8 bytes	ECP port, LPT + 400h
00C0 - 00DE	31 bytes	PIIX - DMA 2	0CF8-0CFB*	4 bytes	PCI Config Address Reg
00F0	1 byte	Reset Numeric Error	0CFC-0CFF*	4 bytes	PCI Config Data Reg
0170 - 0177	8 bytes	Secondary IDE Channel	FF00-FF07	8 bytes	IDE Bus Master Reg.

Table D-1. Advanced/MN 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)	3/2x	2x
1	Soft Off capable power supply	No	Yes
2	On-bd Audio present	Yes	No
3	External CPU clock (Switch 7)		
4	External CPU clock (Switch 8)		
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 E - PCI Configuration Space Map

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

<i>Bus Number (hex)</i>	<i>Dev Number (hex)</i>	<i>Func. Number (hex)</i>	<i>Description</i>
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 Trio32/64 graphics controller
00	11	00	PCI Expansion Slot
00	13	00	PCI Expansion Slot

Table E-1. Advanced/MN PCI Config. Space Map

Appendix F - Interrupts & DMA Channels

<i>IRQ</i>	<i>System Resource</i>
NMI	I/O Channel Check
0	Reserved, Interval Timer
1	Reserved, Keyboard buffer full
2	Reserved, Cascade interrupt from slave PIC
3	Serial Port 2
4	Serial Port 1
5	On-bd Audio (default)
6	Floppy
7	Parallel Port 1
8	Real Time Clock
9	User available
10	User available
11	User available
12	On-board Mouse Port (Avail if no PS/2 mouse)
13	Reserved, Math coprocessor
14	Primary on-bd IDE (Avail if IDE disabled)
15	Secondary on-bd IDE (Avail if IDE disabled)

Table F-1. Advanced/MN Interrupts

<i>DMA</i>	<i>Data Width</i>	<i>System Resource</i>
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 F-2. Advanced/MN DMA Map

Appendix G - Connectors

POWER SUPPLY CONNECTORS

PRIMARY POWER (J9E1)

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 (J7H1)

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 (J9C1)

Pin	Signal Name
2	+5 V
4	Sleep
6	PS_ON
8	Ground

SOFT POWER SUPPLY ON (J8C1)

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

FRONT PANEL CONNECTORS

J2A1

Pin	Signal Name	Function
1	+5 V	Sleep/Resume
2	Comatose	
3		
4	+5 V	Infra-Red
5	Key	
6	IR_RX	
7	Ground	
8	IR_TX	
9		
10	Ground	Aux. 12V Fan Power
11	+12 V (fused)	
12	Ground	
13		
14	Ground	Speaker
15	Key	
16	SPKR_DAT	
17	SPKR_DAT	

J1D1

Pin	Signal Name	Function
1	PULL_UP_330	Turbo LED
2	LED_TURBO-	
3		
4		
5	PULL_UP_330	Hard Drive LED
6	Key	
7	HD ACTIVE	
8	PULL_UP_330	
9		
10	Ground	Key Lock/ Power LED
11	KEY LOCK	
12	Ground	
13	Key	
14	LED_PWR	
15		
16	Ground	Reset
17	RESET	

BACK PANEL I/O CONNECTORS

PS/2 KEYBOARD & MOUSE PORTS (J8K1, J7K1)

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

VIDEO CONNECTOR (J1K1)

Pin	Signal Name
1	Analog Red
2	Analog Green
3	Analog Blue
4	NC
5	Ground
6	Ground
7	Ground
8	Ground
9	NC
10	Ground
11	NC
12	DCI Comm
13	HSYNC
14	VSYNC
15	NC

SERIAL PORTS (J6K1, J5K1)

Pin	Signal Name
1	DCD
2	Serial In - (SIN)
3	Serial Out - (SOUT)
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

PARALLEL PORT (J3K1)

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

INTERNAL I/O CONNECTORS

VESA FEATURE CONNECTOR

Signal Name	Pin	Pin	Signal Name
Ground	1	2	Data 0
Ground	3	4	Data 1
Ground	5	6	Data 2
Data enable	7	8	Data 3
Sync enable	9	10	Data 4
PCLK enable	11	12	Data 5
Vcc	13	14	Data 6
Ground	15	16	Data 7
Ground	17	18	PCLK
Ground	19	20	BLANK
Ground	21	22	HSYNC
Vcc	23	24	VSYNC
	25	26	Ground

AUDIO I/O CONNECTOR (J9H1)

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 (J8H1)

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

CD-ROM AUDIO INTERFACE (J9F1)

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

IDE CONNECTORS (J9F2, J8F1)

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

FLOPPY CONNECTOR (J9D1)

Signal Name	Pin	Pin	Signal Name
Ground	1	2	FDHDIN
Ground	3	4	Reserved
Key	5	6	FDEDIN
Ground	7	8	Index-
Ground	9	10	Motor Enable A-
Ground	11	12	Drive Select B-
Ground	13	14	Drive Select A-
Ground	15	16	Motor Enable B-
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 Change-

PCI RISER CONNECTOR (J6F1)

Signal Name	Pin	Pin	Signal Name
IOCHK-	A1	B1	GND
SD7	A2	B2	RSTDRV
SD6	A3	B3	Vcc
SD5	A4	B4	IRQ9
SD4	A5	B5	-5V
SD3	A6	B6	DRQ2
SD2	A7	B7	-12V
SD1	A8	B8	0WS-
SD0	A9	B9	+12V
IOCHRDY	A10	B10	GND
AEN	A11	B11	SMEMW-
SA19	A12	B12	SMEMR-
SA18	A13	B13	IOW-
SA17	A14	B14	IOR-
SA16	A15	B15	DACK3-
SA15	A16	B16	DRQ3
SA14	A17	B17	DACK1-
SA13	A18	B18	DRQ1
SA12	A19	B19	REFRESH-
SA11	A20	B20	SYSCLK
SA10	A21	B21	IRQ7
SA9	A22	B22	IRQ6
SA8	A23	B23	IRQ5
SA7	A24	B24	IRQ4
SA6	A25	B25	IRQ3
SA5	A26	B26	DACK2-
SA4	A27	B27	TC
SA3	A28	B28	BALE
SA2	A29	B29	Vcc
SA1	A30	B30	OSC
SA0	A31	B31	GND
SBHE-	C1	D1	MEMCS16-
LA23	C2	D2	IOCS16-
LA22	C3	D3	IRQ10
LA21	C4	D4	IRQ11
LA20	C5	D5	IRQ12
LA19	C6	D6	IRQ13
LA18	C7	D7	IRQ14
LA17	C8	D8	DACK0-
MEMR-	C9	D9	DRQ0
MEMW-	C10	D10	DACK5-
SD8	C11	D11	DRQ5
SD9	C12	D12	DACK6-
SD10	C13	D13	DRQ6
SD11	C14	D14	DACK7-
SD12	C15	D15	DRQ7
SD13	C16	D16	Vcc
SD14	C17	D17	MASTER-
SD15	C18	D18	GND

Signal Name	Pin	Pin	Signal Name
GND	E1	F1	GND
GND	E2	F2	GND
PCIINT1-	E3	F3	PCIINT3-
PCIINT2-	E4	F4	PCIINT4-
Vcc	E5	F5	Vcc
Key	E6	F6	Key
Vcc	E7	F7	Vcc
PCIRST-	E8	F8	PCLKF
GNT0-	E9	F9	GND
REQ0-	E10	F10	GNT1-
GND	E11	F11	GND
PCLKE	E12	F12	REQ1-
GND	E13	F13	AD31
AD30	E14	F14	AD29
3.3V	E15	F15	3.3V
Key	E16	F16	Key
3.3V	E17	F17	3.3V
AD28	E18	F18	AD27
AD26	E19	F19	AD25
AD24	E20	F20	CBE3-
AD22	E21	F21	AD23
AD20	E22	F22	AD21
AD18	E23	F23	AD19
3.3V	E24	F24	3.3V
Key	E25	F25	Key
3.3V	E26	F26	3.3V
AD16	E27	F27	AD17
FRAME-	E28	F28	IRDY-
CBE2-	E29	F29	DEVSEL-
TRDY-	E30	F30	PLOCK-
STOP-	E31	F31	PERR-
SDONE	G1	H1	SERR-
SBO-	G2	H2	AD15
CBE1-	G3	H3	AD14
PAR	G4	H4	AD12
GND	G5	H5	GND
Key	G6	H6	Key
GND	G7	H7	GND
AD13	G8	H8	AD10
AD11	G9	H9	AD8
AD9	G10	H10	AD7
CBE0-	G11	H11	AD5
AD6	G12	H12	AD3
AD4	G13	H13	AD1
AD2	G14	H14	AD0
Key	G15	H15	Key
Vcc	G16	H16	Vcc
Vcc	G17	H17	Vcc
GND	G18	H18	GND
GND	G19	H19	GND

Appendix H - BIOS Setup

This section details the BIOS CMOS Setup Utility. The parameters described below are based on BIOS Ver. 1.00.03.BT0, other BIOS versions may differ from the description below as new features are added.

OVERVIEW OF THE SETUP MENU SCREENS

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

<i>Setup Menu Screen</i>	<i>Description</i>
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.

<i>Setup Subscreen</i>	<i>Description</i>
Floppy Options	For configuring your floppy disk drives.
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

<i>Setup Key</i>	<i>Description</i>
<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 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 C:, D:, E:, F:

This reports if an IDE hard disk is connected to the system. When selected, this brings up the Hard Disk Configuration subscreen.

Language

This reports the current language of the text strings used in the Setup program and the BIOS. There are no options. The language of the text strings can be changed by using the FLASH Memory Update utility.

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 PS/2 style 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; 1.44/1.25 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; 1.44/1.25 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.

Initialization Time-out

When selected, this brings up a dialog box that allows you to specify the amount of time the system allows for auto-configuring an IDE drive before reporting that a drive is not present. The options are Disabled, 5, 10, or 31 seconds. The default setting for drive C: is 10 seconds, and the default for drives D:, E:, and F: is Disabled. To decrease boot-up time, you can set the time-out specification to Disabled for any drive not in the system. Furthermore, many hard drives do not require 10 seconds for auto-configuration. You may try setting the time-out to Disabled for a hard drive in your system. When set to Disabled, the system will try to auto-configure your drive once. If you set the time-out to Disabled and the drive is not detected, reset the time-out to a higher setting.

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. The options are Disabled, 4 Sectors/Block, 8 Sectors/Block, or Auto Detected. The default is Auto Detected. Check the specifications for your hard disk drive to determine which setting will provide the optimum performance for your drive.

Fast Programmed I/O Modes

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

- | | |
|-------------------|--|
| C: First, Then A: | The system checks drive C first. |
| A: First, Then C: | The system checks drive A before checking drive C.
This selection allows you to boot from a diskette, if necessary. |
| C: Only | The system checks drive C and no other drives. |
| A: Only | The system checks drive A and no other drives. |

The default is A: First, Then C:

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 (approximately equivalent to 25 MHz PC-AT).

Num Lock

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

Setup Prompt

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

Hard Disk Pre-Delay

When selected, this brings up a dialog box that allows you to set the hard disk drive pre-delay. The options are Disabled, 1, 2, 3, 4, 5, 6, or 7 seconds. The default is 3 seconds. When enabled, this option causes the BIOS to wait the specified time before it first accesses the hard drive. If your system contains a hard drive, and you don't see the drive type displayed during boot-up, the hard drive may need more time before it is able to communicate with the controller. Setting a pre-delay will provide additional time for the hard drive to initialize.

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.

ADVANCED SCREEN

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

Processor Type

This reports the CPU type. There are no options.

Processor Speed

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

Cache Size

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

Peripheral Configuration

When selected, this brings up the Peripheral Configuration subscreen.

Advanced Chipset Configuration

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

Power Management Configuration

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

Plug and Play Configuration

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

PERIPHERAL CONFIGURATION SUBSCREEN

Configuration Mode

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

When Auto is selected, the system peripherals are automatically configured during power up. The options below for the 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. If an ATI *mach32** or *mach64** add-in card is used, COM4 will be in use for video and will not appear.

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, IRQ 7; LPT1, 378h, IRQ 7; LPT1, 378h, IRQ 5; and LPT2, 278h, IRQ 7. The default is LPT1, 378h, IRQ 7. 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 or EPP. The default is Compatible, which means the parallel port will operate in AT-compatible output mode. Bi-directional means the parallel port will be set for 8-bit bi-directional. When set to ECP, the port will be configured to support the Enhanced Capabilities Port standard. When set to EPP, the parallel port will be configured for the Extended Parallel Port standard.

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.

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 access memory on the ISA bus instead of baseboard DRAM in the address range from 15-16 MB. 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. *Note: If Base Memory Size is set to 512 KB, ISA LFB cannot be enabled.*

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 an agent on the PCI bus can hold the bus after another agent has requested the bus. The valid numbers are between 0 and 256. The default is 66.

PCI Burst

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

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.

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

When selected, this brings up a dialog box that allows you to set the command issued to your graphics card when the system goes into power managed mode. The command options are Disabled, Standby, Suspend, and Sleep. The default is Sleep.

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, and spaces are valid.

The **Hot Key** field is used to define a key which when entered will cause the APM BIOS to ask an APM (Advanced Power Management) aware Operating Systems to go into immediate power managed mode. There will be some delay, but the speaker will issue a single tone.

If there is a User Password in effect, then upon going into power managed mode the Num Lock, Caps Lock, and Scroll Lock LEDs on the keyboard will flash on and off, indicating to the user that the system is in Secure Mode. In this case the correct password will have to be entered before the user regains control of the system. This password will not be echoed to the screen nor will a carriage return be required. This is true whether the screen is active or inactive at the time the password is entered. The following table describes how the Power Down hot key interacts with the Security Hot Key.

	Power-Down Hot Key Entered	Security Hot Key Entered
Power-Down Hot Key Only Enabled	System powers down (can include screen blanking if enabled) Powers up when any key/mouse activity is detected	N/A
Security Hot Key Only Enabled	N/A	System Secure Immediately LEDs flash Input accepted when password typed
Both Hot Keys Enabled	System Secure Immediately System powers down (can include screen blanking if enabled) LEDs flash Input accepted when password typed Powers up when any key/mouse activity is detected	System Secure Immediately System powers down (can include screen blanking if enabled) LEDs flash Input accepted when password typed Powers up when any key/mouse activity is detected

PLUG AND PLAY CONFIGURATION SUBSCREEN

Configuration Mode

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

If Use ICU is selected, the BIOS will depend on run-time software to ensure that there are no conflicts between ISA boards with plug and play capabilities and those without. Only "Boot With PnP OS" will be visible if this parameter is set to Use ICU, 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 parameters in this subscreen to avoid conflicts. "Boot With PnP OS" will not be visible if this parameter is set to Use Setup Utility.

Boot With PnP OS

When selected, this brings up a dialog box that allows you to specify how the Plug and Play devices are configured. The options are None, Other, and Windows 95. The default is None. If set to Other or Windows 95, the BIOS will activate only those Plug and Play devices required to boot the system. The other Plug and Play devices will be configured by the operating system. If set to None, the BIOS will use both the CMOS settings and the information stored in the ESCD area to configure all the Plug and Play and PCI devices in the system. (The ICU is used to store information into the ESCD area.)

ISA Shared Memory Size

When selected, this brings up a dialog box that allows you to specify a range of memory addresses that will be directed to the ISA bus rather than on-board memory. The options are Disabled, 16 KB, 32 KB, 48 KB, 64 KB, 80 KB and 96 KB. The default is Disabled. If this is set to Disabled, "ISA Shared Memory Base Address", below, will not be visible.

This field should be set to *Enabled* only when a non Plug and Play ISA card (legacy card) is used that requires non-ROM memory space. LAN cards that have on-board memory buffers are one example of this, video capture cards that have video buffer memory are another.

By default, allocation of upper memory is as follows. Memory from C0000-C7FFF is automatically shadowed. (This memory range is typically reserved for Video BIOS.) Memory from C8000-DFFFFh is initially unshadowed. The BIOS will scan this range for any ISA expansion card BIOSes that may be present and note the location and size. The BIOS will then autoconfigure the PCI and Plug and Play devices, shadowing the ROM requirements (other than video) into the area above E0000h until that area is full. It will then assign additional PCI and Plug and Play expansion cards to the area between C8000h and DFFFFh. If an ISA legacy card has non-ROM memory requirements, the autoconfigure routine may write into an area that is needed by the ISA expansion card. The *ISA Shared Memory Size* parameter is used to signify to the autoconfigure routine that this block of memory is reserved and should not be shadowed. (Shadowing is a technique which copies a block of memory from an add in card's ROM to the same address in system DRAM memory to allow faster access to the code and achieve higher performance.)

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 into the E0000h address. For example, if a size of 64K was selected, options D4000h, D8000h, and DC000h will not be available.

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 auto-configuration code looks here to see if these interrupts are available. If an interrupt is available, the 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 particular 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 12 for the mouse port.

Note: If PCI add-in cards are used, all but one IRQ can be set to Used By ISA Card; one must remain available in order for PCI cards which use interrupts to function correctly.

Note: IRQ 14 and IRQ 15 will not show up as user available. If the on-bd IDE controller is not used, these interrupts are available for use by ISA cards, even though they do not show up in the list above. These interrupts can not be used for PCI cards.

SECURITY SCREEN

The objectives of the BIOS security system are to:

1. Keep unwanted individuals from accessing the computer.
2. Limit the fields that can be accessed in the CMOS Setup Utility program.
3. Allow the computer to boot while unattended and still be secure.
4. Set up a hot key to invoke the security system immediately.

The security system is implemented using two passwords in tandem, a **User Password** and an **Administrative Password**. The level of security available is dependent on whether one or both passwords are set and which password is used to enter the system. It is assumed that if the **Administrative Password** is used, it is controlled by a central corporate information services or security organization and that the **Administrative Password** and **User Password** will have been set prior to the end user receiving the system.

To meet each of the objectives above, use the following procedures:

1. End user sets/resets **User Password** depending upon whether the **Administrative Password** is in effect.
2. **Administrative Password** and **User Password** were set prior to end user receiving system; no action required by end user.
3. End user sets **User Password** then *Enables Unattended Start*. If **User Password** had previously been set, user *Enables Unattended Start*.
4. End user sets **User Password** then *Enables Security Hot Key*. If **User Password** had previously been set, user *Enables Security Hot Key*.

Password in Effect	Password Needed at Boot?	Password Needed to Access Setup?	Able To Access All Setup Fields?	Able To Set Unattended Start?	Able To Set Security Hot Key?
User only	Yes	Yes	Yes	Yes	Yes
Administrative only	No	Yes	Yes	No	No
Both -- User password used	Yes	Yes	No	Yes	Yes
Both -- Admin password used	Yes	Yes	Yes	Yes	Yes
No password enabled	No	No	Yes	No	No

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 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 I - BIOS Recovery

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

USING THE UPGRADE UTILITY

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

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 Flash Recovery 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 Flash Recovery 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 J - BIOS 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 to continue 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

<i>Beeps</i>	<i>Error Message</i>	<i>Description</i>
1	Refresh Failure	The memory refresh circuitry on the baseboard 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 baseboard is not functioning.
5	Processor Error	The CPU on the baseboard 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

<i>Error Message</i>	<i>Explanation</i>
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 baseboard.
Cache Memory Bad, Do Not Enable Cache!	Cache memory is defective. Replace it.
CH-2 Timer Error	Most AT systems include two timers. There is an error in timer 2.
CMOS Battery State Low	CMOS RAM is powered by a battery. The battery power is low. Replace the battery.
CMOS Checksum Failure	After CMOS RAM values are saved, a checksum value is generated for error checking. The previous value is different from the current value. Run AMIBIOS Setup.
CMOS System Options Not Set	The values stored in CMOS RAM are either corrupt or nonexistent. Run Setup.
CMOS Display Type Mismatch	The video type in CMOS RAM does not match the type detected by the BIOS. Run AMIBIOS Setup.
CMOS Memory Size Mismatch	The amount of memory on the baseboard is different than the amount in CMOS RAM. Run AMIBIOS Setup.
CMOS Time and Date Not Set	Run Standard CMOS Setup to set the date and time in CMOS RAM.
Diskette Boot Failure	The boot disk in floppy drive A: is corrupt. It cannot be used to boot the system. Use another boot disk and follow the screen instructions.
Display Switch Not Proper	Some systems require a video switch on the baseboard be set to either color or monochrome. Turn the system off, set the switch, then power on.
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.

ERROR MESSAGES (CONT.)

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 <i>Keyboard</i> option in Standard CMOS Setup to <i>Not Installed</i> 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.

PLUG AND PLAY ERROR MESSAGES

Bad PNP Serial ID Checksum	The serial ID checksum of a Plug and Play card was invalid.
Floppy Disk Controller Resource Conflict	The floppy disk controller has requested a resource that is already in use.
NVRAM Checksum Error, NVRAM Cleared	The ESCD data was reinitialized because of an NVRAM checksum error. Try rerunning the ICU.
NVRAM Cleared by Jumper	The "Clear CMOS" switch has been moved to the ON position and CMOS RAM has been cleared.
NVRAM Data Invalid, NVRAM Cleared	Invalid entry in the ESCD area.
Parallel Port Resource Conflict	The parallel port has requested a resource that is already in use.
PCI Error Log is Full	This message is displayed when more than 15 PCI conflict errors are detected. No additional PCI errors can be logged.
PCI I/O Port Conflict	Two devices requested the same resource, resulting in a conflict.
PCI IRQ Conflict	Two devices requested the same resource, resulting in a conflict.
Primary Memory Conflict	Two devices requested the same resource, resulting in a conflict.
Primary Boot Device Not Found	The designated primary boot device (hard disk drive, diskette drive, or CD-ROM drive) could not be found.
Primary IDE Controller Resource Conflict	The primary IDE controller has requested a resource that is already in use.
Primary Input Device not Found	The designated primary input device (keyboard, mouse, or other, if input is redirected) could not be found.
Secondary IDE Controller Resource Conflict	The secondary IDE controller has requested a resource that is already in use.
Serial Port 1 Resource Conflict	Serial port 1 has requested a resource that is already in use.
Serial Port 2 Resource Conflict	Serial port 2 has requested a resource that is already in use.
Static Device Resource Conflict	A non-Plug and Play ISA card has requested a resource that is already in use.
System Board Device Resource Conflict	A non Plug and Play system resource has requested a resource that is already in use.

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 <i>Memory Parity Error ????</i> .
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>I/O Card Parity Error ????</i> .
DMA Bus Time-out	A device has driven the bus signal for more than 7.8 microseconds.

Appendix K - Environmental Standards

BOARDS

<i>Parameter</i>	<i>Condition</i>	<i>Specification</i>
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 J-1. Board Environmental standards

SYSTEMS

<i>Parameter</i>	<i>Condition</i>	<i>Specification</i>
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
	Operating	30.0G, trapezoidal wave form
Shock	Non-Operating	2G, 11 msec, 1/2 sine
	Operating	

Table J-2. System Environmental standards

Appendix L - Reliability Data

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

Advanced/MN baseboard (no audio, no cache, 8MB)	97,330 hrs.
Advanced/MN Low Profile Desktop (no audio, no cache, 8MB, 3.5" floppy)	32,470 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.