DB440FX Motherboard
Technical Product Specification

April, 1997

Order Number 282971-001

The DB440FX motherboard may contain design defects or errors known as errata which may cause the product to deviate from published specifications. Current characterized errata are documented in the DB440FX Motherboard Specification Update.

Revision History

Revision	Revision History	Date
-001	First release of the DB440FX Technical Product Specification.	4/97

This product specification applies only to standard DB440FX motherboards with BIOS identifier 1.00.0x.DU0.

Changes to this specification will be published in the DB440FX Motherboard Specification Update before being incorporated into a revision of this document.

Contents

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Tables

1 Motherboard Description

1.1 Overview

The DB440FX motherboard supports Pentium® II processors operating at 233 MHz and 266 MHz. The motherboard features:

- LPX form factor
- Slot 1 for installation of a Pentium II processor
- Main Memory
  - Three 168-pin DIMM sockets
  - Support for up to 384 MB of extended data out (EDO) memory
  - Support for unbuffered nonparity or ECC DRAM
- Chipset and PCI/IDE Interface
  - Intel 82440FX PCIset
  - Integrated PCI bus mastering controller
  - Two fast IDE interfaces
  - Support for up to four IDE drives or devices
- I/O Features
  - National PC87307VUL SuperI/O† controller
  - Integrates standard I/O functions: floppy drive interface, one multimode parallel port, one FIFO serial port, real-time clock, keyboard and mouse controller, and IrDA† compatible infrared interface
  - Two Universal Serial Bus (USB) interfaces
- LAN Subsystem
  - Integrates a complete LAN interface onboard using the Intel 82557 LAN controller
  - Includes a Wake on LAN† feature implemented via the Remote Wakeup ASIC
- Crystal CS4236B, a 100-pin TQFP audio codec with an integrated FM synthesizer
- Graphics Subsystem
  - S3† ViRGE/DX† graphics controller
  - 2 MB EDO memory
  - Local Peripheral Bus (LPB) VESA feature connector
- Other Features
  - Support for a riser card with three PCI expansion slots
  - Intel BIOS
  - Plug and Play compatible
  - Support for Advanced Power Management
  - Optional Management Extension Hardware
- Software drivers and utilities available from Intel

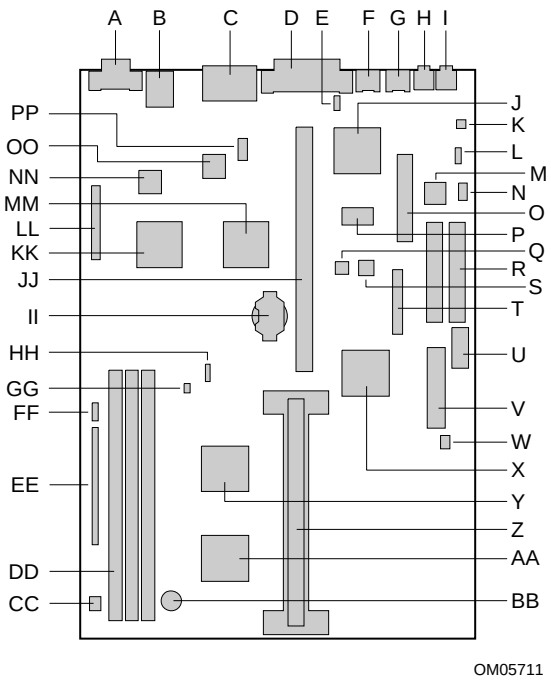

Figure 1. Motherboard Components

A	VGA† video connector	V	Primary power connector
B	Optional LAN connector	W	BIOS recovery jumper
C	USB connectors	X	Intel 82371SB (PIIX3)
D	Parallel port connector	Y	Intel 82442FX (DBX)
E	Soft off power connector	Z	Slot 1 processor connector
F	PS/2† mouse connector	AA	Intel 82441FX (PMC)
G	PS/2 keyboard connector	BB	Speaker
H	Optional Audio Line Out connector	CC	Chassis fan connector
I	Optional Audio MIC In connector	DD	DIMM sockets
J	National PC87307VUL SuperI/O Controller	EE	Front panel header
K	Optional telephony connector	FF	SCSI HD activity LED connector
L	Optional ATAPI CD-ROM audio connector	GG	Wake on LAN connector
M	Optional Crystal CS4236B audio codec	HH	Wake-on-Modem (WOM) connector
N	Optional wavetable connector	II	Battery
O	Floppy drive connector	JJ	PCI riser card slot
P	2 Mbit flash memory device	KK	S3 ViRGE/DX graphics controller
Q	Optional chassis security header	LL	VESA† Feature/S3 LPB connector
R	PCI IDE connectors	MM	Optional Intel 82557 LAN controller
S	Optional Management Extension component	NN	Optional ICS 18901 Physical Layer Interface device
T	Configuration jumper block	OO	Optional Remote Wakeup ASIC
U	3.3 V power connector	PP	Serial port header

1.2 Motherboard Manufacturing Options

- Audio subsystem
- 10/100 Mbit/sec LAN hardware
- Management Extension hardware

1.3 Form Factor

The motherboard is designed to fit into a standard LPX form factor chassis. Figure 2 illustrates the mechanical form factor for the motherboard.

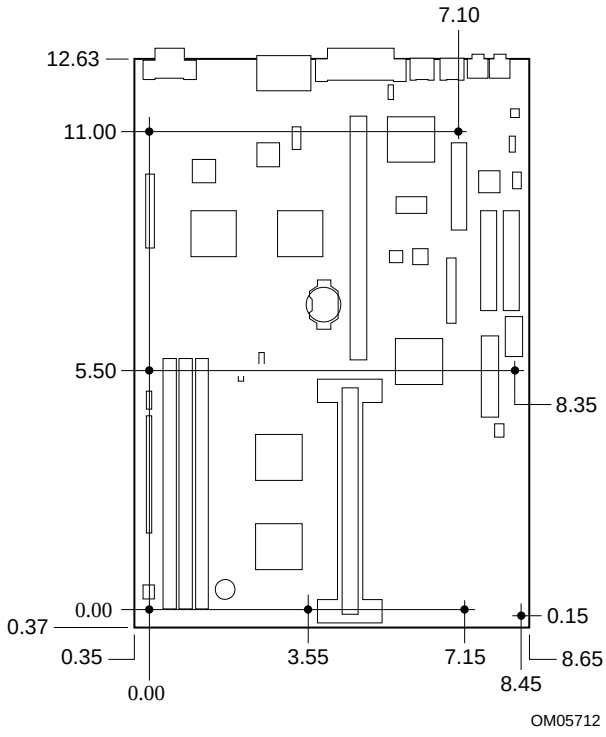

Figure 2. Motherboard Dimensions

1.4 I/O Shield

The back panel I/O shield for this motherboard must meet specific dimensional and material requirements. Systems based on this motherboard need the back panel I/O shield in order to pass environmental certification testing. Figure 3 shows the critical dimensions for the I/O shield and indicates the position of each cutout. The I/O shield in Figure 3 is an Intel-specific design shown as a reference. System integrators must design an I/O shield to meet their system requirements.

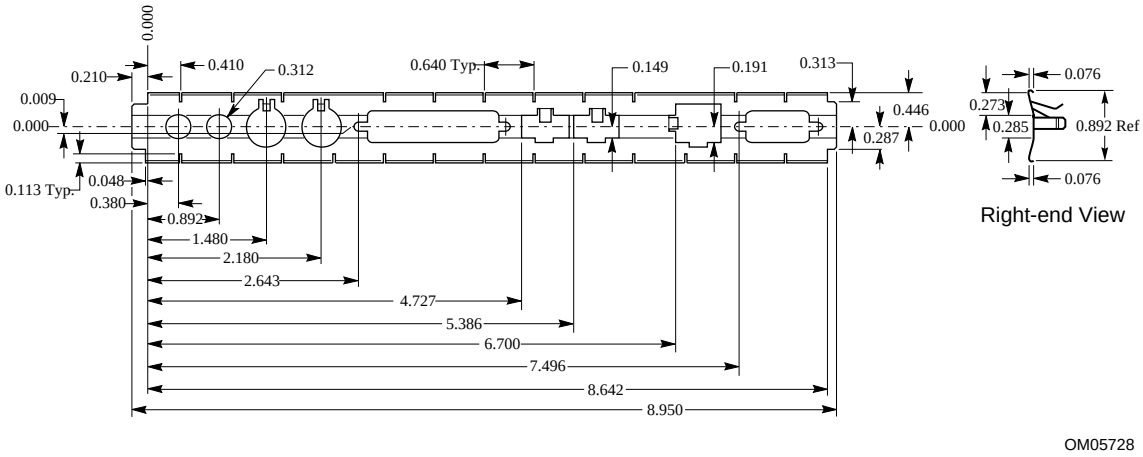

Figure 3. Back Panel I/O Shield Dimensions

1.5 Microprocessor

The motherboard supports a single Pentium II processor operating at 2.1 V to 3.5 V. The motherboard's voltage regulator is automatically programmed by the processor's VID pins to provide the required voltage. The motherboard operates with processors that run internally at 233 or 266 MHz and have either a 256 KB or 512 KB second-level cache.

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

1.5.1 Microprocessor Packaging

The processor is packaged in a Single Edge Contact (S.E.C.) cartridge. The S.E.C. cartridge includes the processor core, the second-level cache, a thermal plate, and a back cover.

The processor connects to the motherboard through the Slot 1 processor connector, a 242-pin edge connector. When the processor is mounted in Slot 1, it is secured by a retention mechanism attached to the motherboard. The processor's heatsink is stabilized by a heatsink support that is attached to the motherboard.

1.5.2 Second Level Cache

The second-level cache is located on the substrate of the S.E.C. cartridge. The cache includes burst pipelined synchronous static RAM (BSRAM) and tag RAM. There can be two or four BSRAM components totaling 256 KB or 512 KB in size. All supported onboard memory can be cached.

1.5.3 Processor Upgrade

Higher-performance Pentium II processors can be mounted in Slot 1 as an upgrade to the motherboard.

1.6 Main Memory

The motherboard has three Dual Inline Memory Module (DIMM) sockets. Memory can be installed in one, two, or three sockets. Minimum memory size is 16 MB. Maximum memory size is 384 MB for EDO DIMMs. The BIOS automatically detects memory type, size, and speed so no jumper settings are required.

The motherboard supports the following:

- 168-pin DIMMs with gold-plated contacts
- 60-ns, 3.3 V, unbuffered EDO memory
- Nonparity and ECC memory
- 64-bit data path
- Single- or double-sided EDO DIMMs in the following sizes:

DIMM Size	Nonparity Configuration	ECC Configuration
16 MB	2 Mbit x 64	2 Mbit x 72
32 MB	4 Mbit x 64	4 Mbit x 72
64 MB	8 Mbit x 64	8 Mbit x 72
128 MB	16 Mbit x 64	16 Mbit x 72

Error Checking and Correcting (ECC) memory detects multi-bit errors and corrects single-bit errors. The user must use the BIOS Setup program to enable ECC support. If nonparity memory is installed, Setup options for selecting ECC mode do not appear.

The following table describes the effect of using Setup to put each memory type in each supported mode.

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

NOTE

Do not use DIMM modules composed of 8 K refresh DRAMs, as they require 13 address lines rather than the 12 address lines supported by the motherboard.

1.7 Chipset

The Intel 82440FX PCIset consists of the 82441FX Xcelerated Bridge and Memory Controller (PMC), the 82442FX Data Bus Accelerator (DBX), and a 82371SB PCI/ISA IDE Xcelerator (PIIX3) bridge chip.

1.7.1 82441FX PCI Bridge and Memory Controller (PMC)

The PMC provides all control signals necessary to drive second level cache and main memory including multiplexed address signals. It also controls system access to memory and generates snoop controls to maintain cache coherency. The PMC comes in a 208-pin QFP package that features:

- Microprocessor interface control
- Integrated L2 write-back cache controller
  - Pipeline BSRAM
  - 256 or 512 KB direct-mapped
- Integrated DRAM controller
  - 64/72-bit noninterleaved path to memory
  - EDO DRAM support
  - Nonparity and ECC support
- Fully synchronous PCI bus interface
  - 33 MHz bus speeds
  - PCI to DRAM data throughput at greater than 100 MB/sec
  - Up to three PCI masters
- Data Buffering
  - Host-to-DRAM and PCI-to-DRAM write data buffering
  - Host-to-PCI burst writes

1.7.2 82442FX Data Bus Accelerator (DBX)

The DBX connects to the 64-bit Pentium II processor data bus, the 64/72-bit memory data bus and the 16 bit-PMC private data bus. The DBX works in parallel with the PMC to provide a high performance memory subsystem for Pentium II processor-based systems. The DBX comes in a 208-pin QFP package.

1.7.3 82371SB PCI/ISA IDE Xcelerator (PIIX3)

The PIIX3 is the interface between the PCI and ISA buses. It features an integrated dual-channel enhanced IDE interface that supports up to four IDE devices. The PIIX3 comes in a 208-pin QFP package that features:

- PCI and ISA bus interface
- USB host/hub controller
- Integrated dual-channel enhanced IDE interface
  - — Support for up to four IDE devices
  - — PIO Mode 4 transfers at up to 16 MB/sec
  - — Integrated 8 x 32-bit buffer for bus master PCI IDE burst transfers
  - — Bus master mode
- PCI compliance (see Section 6.2)
- Enhanced DMA controller supporting up to seven DMA channels
- Interrupt controller with PCI-to-ISA interrupt mapping circuitry
- 16-bit counters/timers
- SMI interrupt logic and timer with fast on/off mode
- NMI circuitry

1.7.4 USB Support

The motherboard features two USB ports. The ports permit the direct connection of two USB peripherals without an external hub. If more devices are required, an external hub can be connected to either of the built-in ports. The motherboard fully supports the standard universal host controller interface (UHCI) and uses standard software drivers that are UHCI-compatible. Features of the USB include:

- Self-identifying, hot pluggable peripherals
- Automatic mapping of function to driver and configuration
- Support for isochronous and asynchronous transfer types over the same set of wires
- Support for up to 127 physical devices
- Guaranteed bandwidth and low latencies appropriate for telephony, audio, and other applications
- Error handling and fault recovery mechanisms built into protocol

NOTE

Computers that have an unshielded cable attached to a USB port may not meet FCC Class B requirements, even if no device or a low-speed USB device is attached to the cable. Use shielded cable that meets the requirements for high-speed devices.

1.7.5 IDE Support

The motherboard has two independent bus mastering PCI IDE interfaces that support PIO Mode 3, PIO Mode 4, and ATAPI (e.g., CD-ROM) devices. The BIOS supports Logical Block Addressing (LBA) and Extended Cylinder Head Sector (ECHS) translation modes. IDE device transfer rate and translation mode are automatically detected by the BIOS.

Normally, programmed I/O operations require a substantial amount of processor bandwidth; however, in multitasking operating systems, the bandwidth freed by bus mastering IDE can be devoted to other tasks while disk transfers take place.

1.8 SuperI/O Controller

The PC87307VUL SuperI/O Controller from National Semiconductor is an ISA Plug and Play (version 1.0a) compatible, multifunction I/O device that provides the following features:

- Serial ports:
  - — Two 16450/16550A-software compatible UARTs (this motherboard only supports one serial port)
  - — Send/receive 16-byte FIFO
  - — Four 8-bit DMA options for the UART with Slow Infrared Support (USI)
- Multimode bidirectional parallel port
  - — Standard mode, IBM, and Centronics compatible
  - — Enhanced Parallel Port (EPP) mode with BIOS and driver support
  - — High-speed Extended Capabilities Port (ECP) mode
- Floppy disk controller
  - — DP8473 and N82077 compatible
  - — 16 byte FIFO
  - — PS/2 diagnostic register support
  - — High performance digital data separator (DDS)
  - — PC-AT† and PS/2 drive mode support
- Keyboard and mouse controller
  - — Industry standard 8042A compatible
  - — General purpose microcontroller
  - — 8 bit internal data bus
- Real-time clock
  - — DS1287 and MC146818 compatible
  - — Accurate within ±13 minutes/year at 25 ºC and 5 V
  - — Includes advanced power control (APC)
- Support for an IrDA-compliant infrared interface

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

1.8.1 Serial Port

The motherboard has one keyed 10-pin serial header located onboard for cabling to the back panel. The 16450- and 16550A-compatible UART supports data transfers at speeds up to 921.6 Kbits/sec, while the extended UART mode supports data rates up to 1.5 Mbits/sec.

1.8.2 Parallel Port

The connector for the multimode bidirectional parallel port is a 25-pin D-Sub connector located on the back panel of the motherboard. In the Setup program, there are four options for parallel port operation:

- Compatible (standard mode)
- Bidirectional (PS/2 compatible)
- Bidirectional Enhanced Parallel Port (EPP)
- Bidirectional Extended Capabilities Port (ECP)

1.8.3 Floppy Controller

The I/O controller is software compatible with the DP8473 and N82077 floppy drive controllers and supports both PC-AT and PS/2 modes. In the Setup program, the floppy interface can be configured for the following floppy drive capacities and sizes:

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

1.8.4 Keyboard and Mouse Interface

PS/2 keyboard and mouse connectors are located on the back panel of the motherboard.

The 5 V lines to these connectors are protected with a PolySwitch† circuit that, like a self-healing fuse, reestablishes the connection after an over-current condition is removed. While this device eliminates the possibility of having to replace a fuse, power to the computer should be turned off before connecting or disconnecting a keyboard or mouse.

NOTE

A mouse or keyboard can be plugged into either PS/2 connector.

The keyboard controller contains the AMI Megakey keyboard and mouse controller code, which provides the traditional keyboard and mouse control functions, and also supports Power On/Reset password protection.

The keyboard controller also supports the following hot-key sequences:

- <Ctrl><Alt><Del> Software reset. This key sequence resets the computer's software by jumping to the beginning of the BIOS code and running the Power On Self Test (POST).
- <Ctrl><Alt><defined in Setup> Power management. This key sequence invokes power managed mode, which reduces the computer's power consumption while maintaining its ability to service external interrupts.
- <Ctrl><Alt><defined in Setup> Keyboard lock. This key sequence is a security feature that locks the keyboard until the User password is entered. When keyboard lock is invoked, the keyboard LEDs flash. To enable the keyboard lock feature, a User password must be specified in the Setup program.

1.8.5 Real-time Clock, CMOS RAM, and Battery

The real-time clock is compatible with DS1287 and MC146818 components. It provides a time-of-day clock and a 100-year calendar with alarm features and century rollover. The real-time clock also supports 242 bytes of battery-backed CMOS RAM in two banks, which are reserved for BIOS use.

The time, date, and CMOS values can be specified in the Setup program. The CMOS values can be returned to their defaults by using the Setup program or by setting a configuration jumper on the motherboard.

An external coin-cell battery powers the real-time clock and CMOS memory. If the computer is not plugged into a wall socket, the battery has an estimated life of three years. When the computer is plugged in, the 5 V standby current from the motherboard's power supply extends the life of the battery. The real-time clock is accurate to ±13 minutes/year at 25 ºC and 5 V.

1.8.6 Infrared Support

The motherboard has a 6-pin header that supports Hewlett-Packard HSDL-1000 compatible infrared (IR) transceivers. The connection can be used to transfer files to or from portable devices such as laptop computers, PDAs, and printers. The Infrared Data Association (IrDA) specification supports data transfers of 115 Kbits/sec at a distance of 1 meter.

1.9 Graphics Subsystem

The onboard graphics subsystem uses the S3 ViRGE/DX graphics controller, with the following features:

- 64-bit graphics engine with accelerator core
- 24-bit RAMDAC/clock synthesizer
- Dual programmable clock generators
- DCI-based linear addressing scheme
- S3 Streams Processor, which enables the conversion of video data from YUV format to RGB format and accelerates display scaling while maintaining picture quality and frame rate
- 3-D graphics support including flat shading, Gouraud shading, and advanced texture mapping
- S3 Scenic Highway support for hardware MPEG

1.9.1 Memory Type and Size

The controller is supported by 2 MB of 40 ns EDO SOJ DRAM soldered to the motherboard.

1.9.2 Supported Video Resolutions

Table 1. S3 ViRGE/DX Resolutions and Refresh Rates

2 MB Memory	Refresh Rate (Hz) At:			
Resolution	**4-bit Color (16 Colors)**	**8-bit Color (256 Colors)**	**15/16-bit Color (32K/64K Colors)**	**24-bit Color (16M Colors)**
640 x 480	60	60, 70, 72, 75, 85	60, 72, 75, 85	60, 72, 75, 85
800 x 600	56, 60, 72, 75, 85	56, 60, 72, 75, 85	56, 60, 72, 75, 85	56, 60, 72, 75, 85
1024 x 768	43(IL), 60, 70, 75, 85	43(IL), 60 ,70, 75, 85	43(IL), 60, 70, 75, 85	not supported
1152 x 864	not supported	60	not supported	not supported
1280 x 1024	43(IL), 60, 75, 80	43(IL), 60, 75, 85	not supported	not supported
1600 x 1200	not supported	48.5(IL), 60	not supported	not supported

IL = Interlaced

1.9.3 VESA/S3 Local Peripheral Bus Connector

The motherboard has an optional 34-pin multimedia feature connector that uses 26 pins for the VESA standard bus and six pins for the S3 Local Peripheral Bus. The connector features a shared frame buffer interface and a local peripheral bus with a bidirectional interface that supports video companion devices such as MPEG/live video decoders.

1.9.4 Graphics Drivers and Utilities

Graphics drivers and common graphics utilities are available for Windows† 3.x, Windows 95, and Windows NT†. Drivers and utilities are available from Intel's World Wide Web site (see Section 6.1).

1.10 Audio Subsystem

The optional onboard audio subsystem features the Crystal CS4236B, a 100-pin TQFP audio codec with an integrated FM synthesizer. The audio subsystem provides all the digital audio and analog mixing functions needed for recording and playing sound on personal computers. Together, these components feature the following:

- Stereo analog-to-digital and digital-to-analog converters
- Analog mixing, anti-aliasing, and reconstruction filters
- Line out and microphone in connectors
- ADPCM, A-law, or µlaw digital audio compression/decompression
- Full digital control of all mixer and volume control functions
- Full duplex operation
- Sound Blaster† Game and Windows Sound System compatibility

The audio subsystem requires up to two DMA channels and one IRQ. The following table shows the IRQ, DMA channel, and base I/O address options. These options are automatically chosen by the Plug and Play interface, so there are no default settings.

Resource	IRQ (Options)	DMA Channel (Options)	I/O Address (Options)
Sound Blaster (DMA playback, DMA / IRQ shared with Windows Sound System capture)	5 (best choice) 7 9 11	0 (best choice) 3	210-21Fh 220-22Fh (best choice) 230-234h 240-24Fh 250-25Fh 260-26Fh
Windows Sound System (DMA playback)	5 7 9 (best choice) 11	0 1 (best choice) 3	534-537h (best choice) 608-60Bh
MPU-401 (IRQ shared with Sound Blaster)	5 (best choice) 7 9 11		300-301h 330-331h (best choice) 332-333h 334-335h
MIDI			200-207h
FM Synthesis			388-308Bh
CS4236B Control			FF0-FFFh

1.10.1 Audio Drivers and Utilities

Audio software and utilities are available from Intel's World Wide Web site (see Section 6.1). Audio driver support is provided for Microsoft Windows 3.1, Microsoft Windows 95, and Microsoft Windows NT operating systems.

1.11 Audio Connectors

Audio connectors include the following:

- Back panel audio jacks (Line Out and MIC In)
- ATAPI CD-ROM audio connector
- Telephony connector
- Wavetable connector

1.11.1 ATAPI CD-ROM Audio Connector

An ATAPI-compliant 1 x 4-pin connector is available for connecting an internal CD-ROM drive to the audio subsystem's mixer. The connector is an AMP† P/N 104450-3. Appropriate mating connectors are AMP P/N 103956-3. The connector is only compatible with cables supplied with the mating ATAPI CD-ROM connector.

1.11.2 Telephony Connector

A 2 x 2-pin connector is available for connecting the monaural audio signals of an internal telephony device such as a fax/modem to the motherboard's audio subsystem. The mono-in and mono-out signal interface is necessary for telephony applications such as speakerphones and answering machines.

1.11.3 Wavetable Connector

An 8-pin header supports wavetable add-in cards. Most wavetable add-in cards are installed in a standard ISA slot; a cable is then routed from the card to the connector.

Compatible wavetable cards are available from several vendors. The ICS WaveFront and the CrystaLake Series 2000 wavetable product families offer general MIDI-compatible audio operation.

1.12 Management Extension Hardware

The optional Management Extension hardware provides low-cost instrumentation capabilities designed to reduce the total cost of owning a PC when used with LANDesk® Client Manager. The hardware implementation is a single-chip ASIC (see Figure 4). Features include:

- An integrated ambient temperature sensor
- A fan speed sensor
- Power supply voltage monitoring to detect levels above or below acceptable values
- Registers for storing POST hardware test results and error codes
- Security switch header used with external circuitry to detect physical intrusion, such as when the chassis lid has been removed (even when power is off)
- Remote reset capabilities from a remote peer or server through LANDesk Client Manager, Version 3.0 and service layers (when available)

When suggested ratings for temperature, fan speed, or voltage are exceeded, an interrupt is activated.

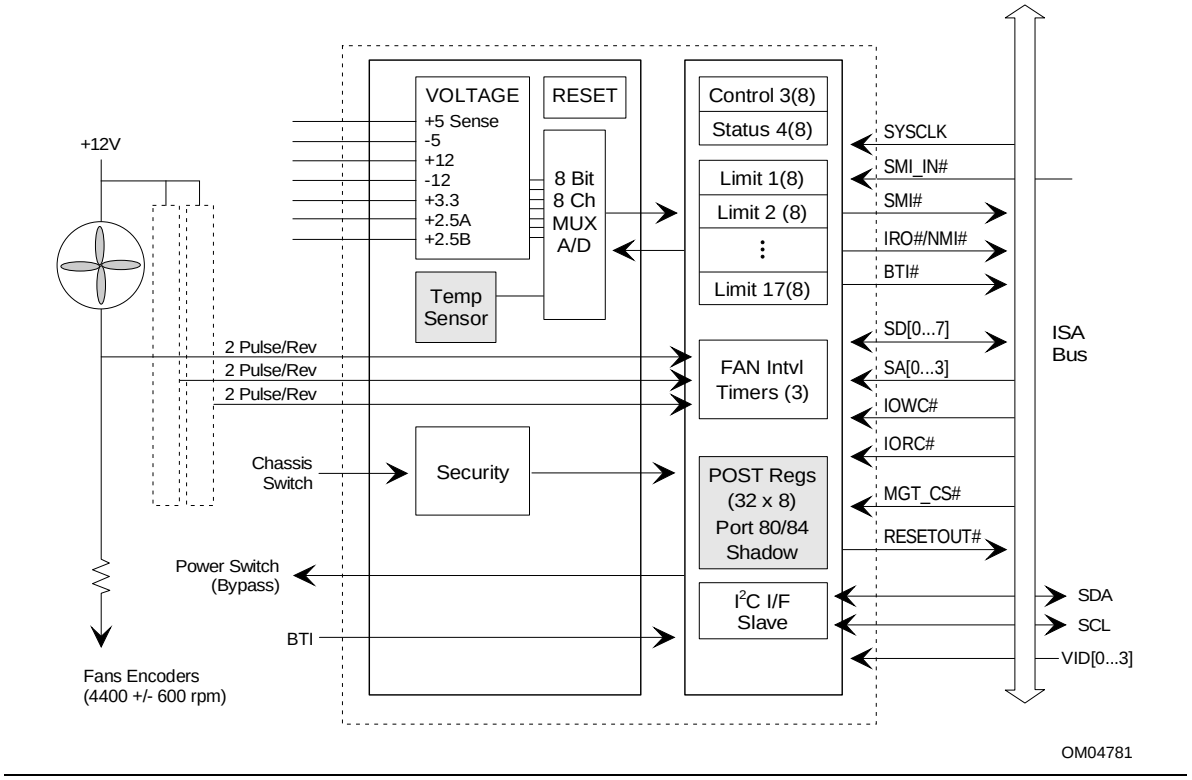

Figure 4. Block Diagram of Management Extension ASIC

1.13 Onboard Networking

1.13.1 EtherExpress™ PRO/100B PCI LAN Subsystem

The optional Intel EtherExpress™ PRO/100B PCI LAN subsystem (see Figure 5) is an Ethernet† LAN interface that provides both 10Base-T and 100Base-TX connectivity. Features include:

- 32-bit direct bus mastering on the PCI bus
- Shared memory structure in the host memory that copies data directly to/from host memory
- 10Base-T and 100Base-TX capability using a single RJ-45 connector
- IEEE 802.3 Auto-Negotiation for the fastest available connection
- Jumperless configuration; the LAN subsystem is completely software configurable

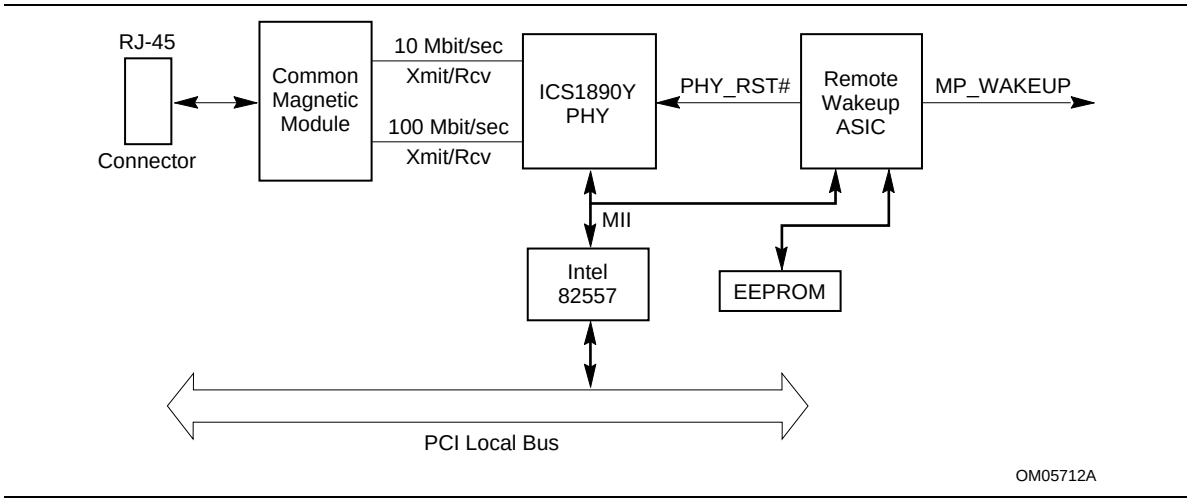

Figure 5. Block Diagram of the LAN Subsystem

1.13.1.1 Intel 82557 LAN Controller

This device is the heart of the LAN subsystem. It provides the following functions:

- CSMA/CD Protocol Engine
- PCI compatibility
- DMA engine for movement of commands, status, and network data across the PCI bus
- Access to EEPROM
- Standard MII interface for access to IEEE 802.3-compliant physical layer devices

1.13.1.2 10 / 100 Mbit/sec Physical Layer Interface

The physical layer interface is implemented in a device from Integrated Computer Solutions: the ICS1890Y. This device provides:

- Complete functionality necessary for the 10Base-T and 100Base-TX interfaces; when in 10 Mbit/sec mode, the interface drives the cable directly
- Complete set of MII management registers for control and status reporting
- 802.3 Auto-Negotiation for automatically establishing the best operating mode when connected to other 10Base-T or 100Base-TX devices

1.13.1.3 Remote Wakeup ASIC

The Remote Wakeup ASIC performs remote wakeup (Wake on LAN) of the motherboard via the onboard LAN interface. When the system is powered off, the Remote Wakeup ASIC and the ICS1890Y remain powered by a 5 V standby voltage. The ASIC monitors network traffic at the MII interface and when it detects a Magic Packet† it asserts a wakeup signal that powers up the system.

If an external network interface card (NIC) with remote wakeup capabilities is added to the system, the NIC's remote wakeup header must be connected to the onboard Wake on LAN header (J3F1).

1.13.2 LAN Software

The EtherExpress PRO/100B PCI LAN software includes setup/diagnostic software (SETUP.EXE) and a readme file viewer (README.EXE) that lists supported drivers. The LAN software can be obtained from the Intel World Wide Web site (see Section 6.1).

1.14 Wake on Modem

The Wake-on-Modem feature allows the computer to wake from Sleep mode when a call is received on a telephony device, such as a modem, configured for operation on COM1. The first incoming call will power up the motherboard, but a second call must be made to access the computer.

1.15 Motherboard Connectors

The following figure shows the connectors on the motherboard.

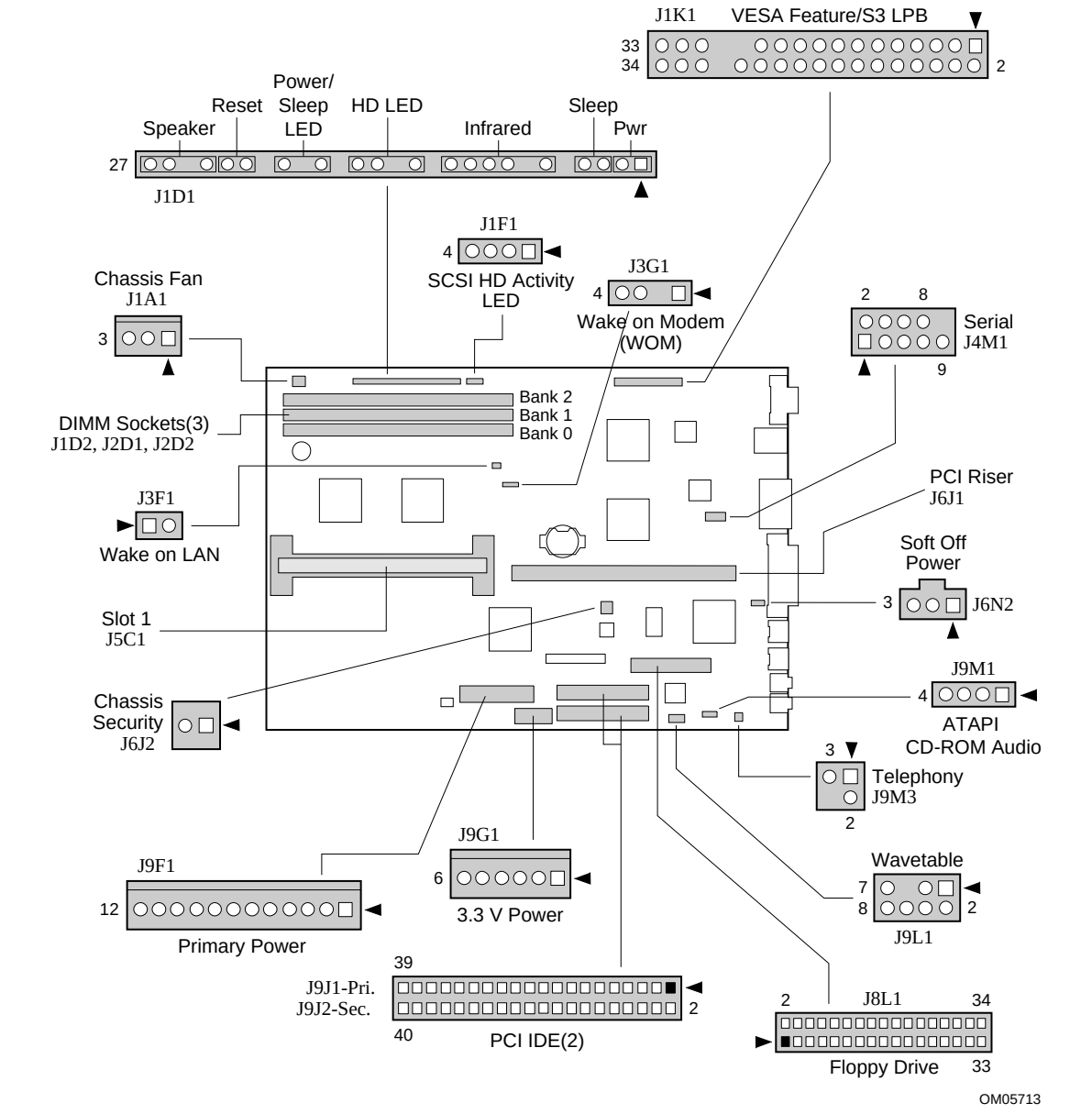

Figure 6. Motherboard Connectors

Table 2. ATAPI CD-ROM Audio Connector (J9M1)

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

Table 3. Wavetable Connector (J9L1)

Pin	Signal Name	Pin	Signal Name
1	Wave In right	2	Ground
3	Wave In left	4	Ground
5	Key	6	Ground
7	MIDI In (to Host)	8	MIDI Out (from Host)

Table 4. Telephony Connector (J9M3)

Pin	Signal Name
1	Ground
2	Audio Out (monaural)
3	Audio In (monaural)
4	Key

Table 5. Floppy Drive Connector (J8L1)

Pin	Signal Name	Pin	Signal Name
1	Ground	2	DENSEL
3	Ground	4	No connection
5	Key	6	FDEDIN#
7	Ground	8	FDINDX# (Index)
9	Ground	10	FDM00# (Motor Enable A)
11	Ground	12	FDDS1# (Drive Select B)
13	Ground	14	FDDS0# (Drive Select A)
15	Ground	16	FDM01# (Motor Enable B)
17	MSEN1	18	FDDIR# (Stepper Motor Direction)
19	Ground	20	FDSTEP# (Step Pulse)
21	Ground	22	FDWD# (Write Data)
23	Ground	24	FDWE# (Write Enable)
25	Ground	26	FDTRK0# (Track 0)
27	MSEN0	28	FDWPD# (Write Protect)
29	Ground	30	FDRDATA# (Read Data)
31	Ground	32	FDHEAD# (Side 1 Select)
33	Ground	34	DSKCHG# (Diskette Change)

Table 6. PCI IDE Connectors (J9J1, J9J2)

Pin	Signal Name	Pin	Signal Name
1	Reset IDE	2	Ground
3	Host Data 7	4	Host Data 8
5	Host Data 6	6	Host Data 9
7	Host Data 5	8	Host Data 10
9	Host Data 4	10	Host Data 11
11	Host Data 3	12	Host Data 12
13	Host Data 2	14	Host Data 13
15	Host Data 1	16	Host Data 14
17	Host Data 0	18	Host Data 15
19	Ground	20	Key
21	DDRQ0 [DDRQ1]	22	Ground
23	I/O Write#	24	Ground
25	I/O Read#	26	Ground
27	IOCHRDY	28	P_ALE (Cable Select pullup)
29	DDACK0# [DDACK1#]	30	Ground
31	IRQ 14 [IRQ 15]	32	Reserved
33	Address 1	34	Reserved
35	Address 0	36	Address 2
37	Chip Select 1P# [Chip Select 1S#]	38	Chip Select 3P# [Chip Select 3S#]
39	Activity#	40	Ground

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

Table 7. Primary Power Connector (J9F1)

Pin	Signal Name
1	PWRGD (Power Good)
2	Vcc
3	+12 V
4	-12 V (keyed)
5	Ground
6	Ground
7	Ground (keyed)
8	Ground
9	-5 V
10	Vcc
11	Vcc
12	Vcc

Table 8. 3.3 V Power Connector (J9G1)

Pin	Signal Name
1	Ground
2	Ground
3	Ground
4	Vcc3
5	Vcc3
6	Vcc3 (keyed)

Table 9. Serial Header (J4M1)

Pin	Signal Name
1	DCD#
2	DSR#
3	SIN
4	RTS#
5	SOUT
6	CTS#
7	DTR#
8	RI#
9	Ground
10	Key

Table 10. Chassis Security Header (J6J2)

Pin	Signal Name
1	Ground
2	CHS_SEC

Table 11. Soft Off Power Connector (J6N2)

Pin	Signal Name
1	5VSB
2	PW_ON#
3	Ground

Table 12. Wake on LAN Connector (J3F1)

Pin	Signal Name
1	MP_WAKEUP#
2	Ground

Table 13. WOM Connector (J3G1)

Pin	Signal Name
1	5VSB
2	Key
3	COM_WAKEUP#
4	Ground

Table 14. Chassis Fan Connector (J1A1)

Pin	Signal Name
1	Ground
2	+12 V
3	RPM_SENSE

Table 15. SCSI HD Activity LED Connector (J1F1)

Pin	Signal Name
1	No connection
2	Vcc
3	HDACT#
4	No connection

Note: This connector routes SCSI HD activity indication from a SCSI add-in card to the motherboard's front panel HD LED header.

1.16 Front Panel Connectors

The front panel connector includes headers for these I/O connections:

- Speaker
- Reset switch
- Power/Sleep LED
- Hard drive activity LED
- Infrared (IrDA) port
- Sleep switch
- Power switch

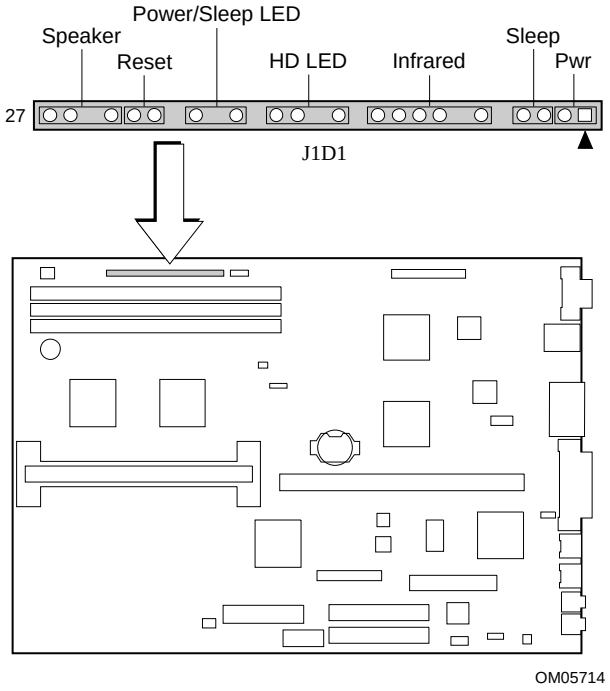

Figure 7. Front Panel I/O Connectors

Table 16. Front Panel I/O Connectors (J1D1)

Connector	Pin	Signal Name	Connector	Pin	Signal Name
Speaker	27	SPKR_HDR	none	12	No connect
	26	PIEZO_IN	Infrared	11	CONIR (Consumer IR)
	25	Key		10	IrTX
	24	Ground		9	Ground
Reset	23	SW_RST		8	IrRX
	22	Ground		7	Key
none	21	No connect/Key		6	+5 V
Power/Sleep LED	20	PWR_LED	none	5	No connect
	19	Key	Sleep	4	SLEEP_PU (pullup)
	18	Ground		3	SLEEP
none	17	No connect/Key	Power	2	Ground
Hard Drive LED	16	HD_PWR		1	SW_ON#
	15	HD Active#			
	14	Key			
	13	HD_PWR +5 V			

1.16.1 Speaker

The motherboard includes a piezoelectric speaker. The speaker can be disabled by removing the jumper on pins 26-27 of the front panel connector. After the jumper is removed, an offboard speaker can be connected to pins 26-27. The speaker (onboard or offboard) provides error beep code information during the POST in the event that the computer cannot use the video interface. The speaker is not connected to the audio subsystem, and does not receive output from the audio subsystem.

1.16.2 Reset

This header can be connected to a momentary SPST type switch that is normally open. When the switch is closed, the board resets and runs the POST.

1.16.3 Power/Sleep LED

This header can be connected to an LED that will light when the computer is powered on. This LED will also blink when the computer is in a power-managed state.

1.16.4 Hard Drive (HD) LED

This header can be connected to an LED to provide a visual indicator that data is being read from or written to an IDE hard drive. For the LED to function properly, the IDE drive must be connected to the onboard IDE controller on the motherboard.

1.16.5 Infrared Connector

The infrared port can be configured to support an IrDA module connected to this 6-pin header. This port can be used to transfer files to or from portable devices such as laptops, PDAs, and printers using application software.

1.16.6 Sleep Switch

When advanced power management (APM) is enabled in the system BIOS, and the operating system's APM driver is loaded, the computer can enter Sleep (Standby) mode in one of three ways:

- Optional front panel Sleep/Resume button
- Hot key defined in the BIOS Setup program
- Prolonged system inactivity; the default timeout is 10 minutes and can be changed in Setup

The 2-pin header located on the front panel I/O connector supports a front panel Sleep/Resume switch, which must be a momentary SPST type that is normally open.

Closing the Sleep/Resume switch generates a System Management Interrupt (SMI) to the processor, which immediately goes into System Management Mode (SMM). While the system is in Sleep mode it is fully capable of responding to and servicing external interrupts (such as an incoming fax) even though the monitor turns on only if a keyboard or mouse interrupt occurs. To reactivate the system, or Resume, the user must press the Sleep/Resume switch again, or use the keyboard or mouse.

1.16.7 Power Connector

This header can be connected to a front panel power switch. The switch must pull the SW_ON# pin to ground for at least 50 ms to signal the power supply to switch on or off. (The time requirement is due to the motherboard's internal debounce circuitry.) To prevent double-clicking, at least two seconds must pass before the motherboard will recognize another on/off signal.

1.17 Back Panel Connectors

Figure 8 shows the general location of the back panel I/O connectors, which include:

- Optional external audio jacks: MIC In and Line Out
- PS/2-style keyboard and mouse connectors
- One parallel port
- Two USB ports
- Optional LAN connector
- VGA Video

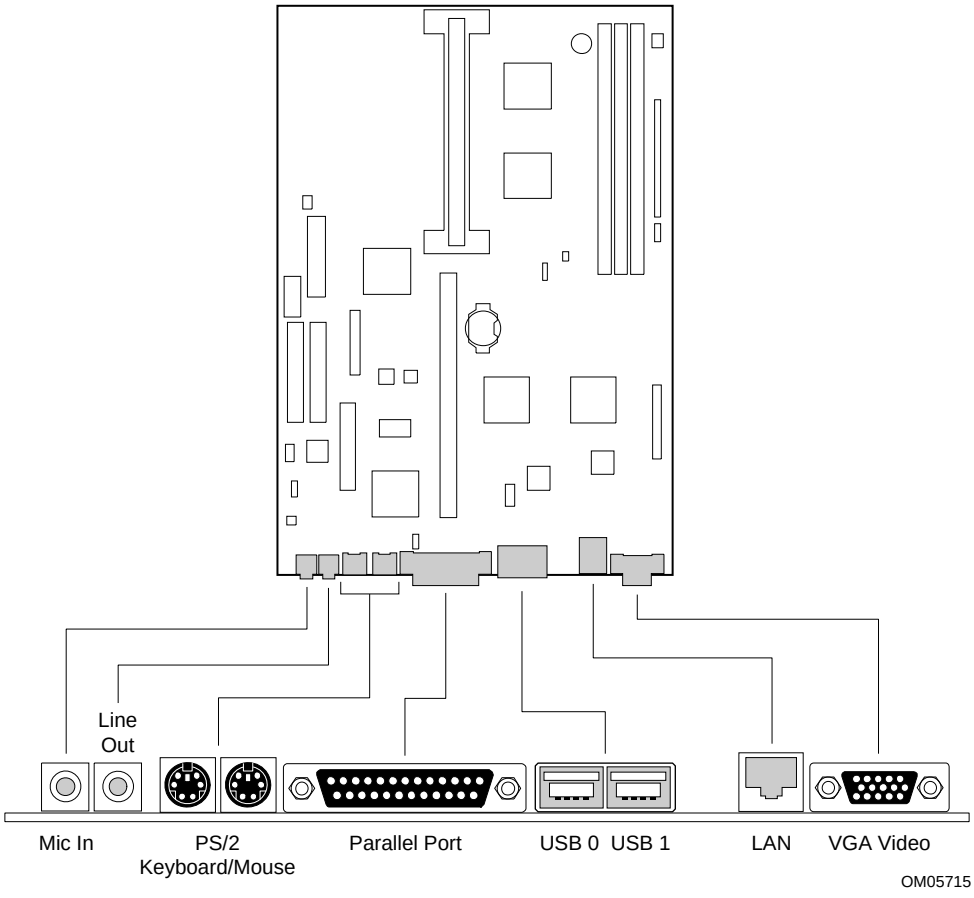

Figure 8. Back Panel I/O Connectors

Table 17. PS/2 Mouse and Keyboard Connectors (J7N1 and J8N1)

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

Table 18. Parallel Port Connector (J6N1)

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

Table 19. VGA Video Connector (J1N1)

Pin	Signal Name	Pin	Signal Name
1	Red	9	+5 V
2	Green	10	Ground
3	Blue	11	No connect
4	No connect	12	No connect
5	Ground	13	Horizontal Sync
6	Ground	14	Vertical Sync
7	Ground	15	No connect
8	Ground		

Table 20. USB Connectors (J4N1, J4N2)

Pin	Signal Name
1	Power
2	USBP0# [USBP1#]
3	USBP0 [USBP1]
4	Ground

Table 21. LAN Connector (J2N1)

Pin	Signal Name
1	TXP
2	TXM
3	RXP
4	FLT_PLANE
5	FLT_PLANE
6	RXM
7	FLT_PLANE
8	FLT_PLANE

Table 22. Audio MIC In Connector (J9N1)

Pin	Signal Name
Sleeve	Ground
Tip	Mono In

Table 23. Audio Line Out Connector (J8N2)

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

1.18 Memory/Expansion Connectors

The motherboard provides three DIMM sockets for main memory. These sockets accept 168-pin unbuffered DIMM modules.

1.18.1 Expansion Connectors

The motherboard uses a PCI/ISA riser connector (J6J1) to provide for expansion PCI or ISA boards. The associated riser board can support three PCI slots. Table 24 contains the pinout listing for the PCI/ISA riser connector.

Table 24. PCI/ISA Riser Connector (J6J1)

Pin	Signal Name	Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
A1	IOCHK#	B1	GND	E1	GND	F1	GND
A2	SD7	B2	RSTDRV	E2	GND	F2	GND
A3	SD6	B3	Vcc	E3	PCIINT1#	F3	PCIINT3#
A4	SD5	B4	IRQ9	E4	PCIINT2#	F4	PCIINT4#
A5	SD4	B5	-5 V	E5	Vcc	F5	Vcc
A6	SD3	B6	DRQ2	E6	Key	F6	Key
A7	SD2	B7	-12 V	E7	Vcc	F7	Vcc
A8	SD1	B8	0WS#	E8	PCIRST#	F8	PCKLF
A9	SD0	B9	+12 V	E9	GNT0#	F9	GND
A10	IOCHRDY	B10	GND	E10	REQ0#	F10	GNT1#
A11	AEN	B11	SMEMW#	E11	GND	F11	GND
A12	SA19	B12	SMEMR#	E12	PCKLE	F12	REQ1#
A13	SA18	B13	IOW#	E13	GND	F13	AD31
A14	SA17	B14	IOR#	E14	AD30	F14	AD29
A15	SA16	B15	DACK3#	E15	3.3 V	F15	3.3 V
A16	SA15	B16	DRQ3	E16	Key	F16	Key
A17	SA14	B17	DACK1#	E17	3.3 V	F17	3.3 V
A18	SA13	B18	DRQ1	E18	AD28	F18	AD27
A19	SA12	B19	REFRESH#	E19	AD26	F19	AD25
A20	SA11	B20	SYSCLK	E20	AD24	F20	CBE3#
A21	SA10	B21	IRQ7	E21	AD22	F21	AD23
A22	SA9	B22	IRQ6	E22	AD20	F22	AD21
A23	SA8	B23	IRQ5	E23	AD18	F23	AD19
A24	SA7	B24	IRQ4	E24	3.3 V	F24	3.3 V
A25	SA6	B25	IRQ3	E25	Key	F25	Key

continued ☛

Table 24. PCI/ISA Riser Connector (J6J1) (continued)

Pin	Signal Name	Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
A26	SA5	B26	DACK2#	E26	3.3 V	F26	3.3 V
A27	SA4	B27	TC	E27	AD16	F27	AD17
A28	SA3	B28	BALE	E28	FRAME#	F28	IRDY#
A29	SA2	B29	Vcc	E29	CBE2#	F29	DEVSEL#
A30	SA1	B30	OSC	E30	TRDY#	F30	PLOCK#
A31	SA0	B31	GND	E31	STOP#	F31	PERR#
C1	SBHE#	D1	MEMCS16#	G1	SDONE	H1	SERR#
C2	LA23	D2	IOCS16#	G2	SBO#	H2	AD15
C3	LA22	D3	IRQ10	G3	CBE1#	H3	AD14
C4	LA21	D4	IRQ11	G4	PAR	H4	AD12
C5	LA20	D5	IRQ12	G5	GND	H5	GND
C6	LA19	D6	IRQ15	G6	Key	H6	Key
C7	LA18	D7	IRQ14	G7	GND	H7	GND
C8	LA17	D8	DACK0#	G8	AD13	H8	AD10
C9	MEMR#	D9	DRQ0	G9	AD11	H9	AD8
C10	MEMW#	D10	DACK5#	G10	AD9	H10	AD7
C11	SD8	D11	DRQ5	G11	CBE0#	H11	AD5
C12	SD9	D12	DACK6#	G12	AD6	H12	AD3
C13	SD10	D13	DRQ6	G13	AD4	H13	AD1
C14	SD11	D14	DACK7#	G14	AD2	H14	AD0
C15	SD12	D15	DRQ7	G15	Key	H15	Key
C16	SD13	D16	Vcc	G16	Vcc	H16	Vcc
C17	SD14	D17	MASTER#	G17	GNT2	H17	Vcc
C18	SD15	D18	GND	G18	REQ2	H18	PCCLK2
				G19	GND	H19	GND

1.18.2 VESA Feature/S3 LPB Connector

The optional 34-pin multimedia feature connector uses 26 pins for the VESA standard bus and six pins for the S3 LPB. The connector features a shared frame buffer interface and a local peripheral bus with a bidirectional interface that supports video devices such as MPEG/live video decoders.

Table 25. VESA Feature/S3 LPB Connector (J1K1)

Pin	Signal Name (Function)	Pin	Signal Name (Function)
1	DGND (Digital Ground)	2	FC0 (Pixel Data 0)
3	DGND (Digital Ground)	4	FC1 (Pixel Data 1)
5	DGND (Digital Ground)	6	FC2 (Pixel Data 2)
7	EVIDEO (External Video)	8	FC3 (Pixel Data 3)
9	ESYNC (External Sync)	10	FC4 (Pixel Data 4)
11	EDCLK (External Clock)	12	FC5 (Pixel Data 5)
13	SDA (not used)	14	FC6 (Pixel Data 6)
15	DGND (Digital Ground)	16	FC7 (Pixel Data 7)
17	DGND (Digital Ground)	18	PCLK (Pixel Clock)
19	DGND (Digital Ground)	20	BLANK#
21	DGND (Digital Ground)	22	HSYNC (Horizontal Sync)
23	SCL (not used)	24	VSYNC (Vertical Sync)
25	Key (no pin)	26	DGND (Digital Ground)
27	Key (no pin)	28	Key (no pin)
29	Ground	30	IICCLK (I^2C bus clock)
31	not used	32	IICDAT (I^2C bus data)
33*	GOP1/EN2 (Enable signal)	34*	GOP0/ENFEAT# (Enable signal)

* The signal name that applies to these pins is dependent on the operating mode of the graphics controller.

1.19 Connector Part Numbers

This section lists the part numbers for the connectors and jumper blocks on the motherboard.

Table 26. Connector/Jumper Block Part Numbers

Connector	Description	Manufacturer *	Part Number
J1A1	Chassis fan	Foxconn/Hon Hai	HF06030-P1
J1D1	Front panel	Foxconn/Hon Hai	HB1127G-KU7
J1D2, J2D1, J2D2	DIMM sockets	Molex	71736-0008
J1F1	SCSI HD activity LED	AMP	146225-1
J1K1	VESA Feature S3/LPB	Foxconn/Hon Hai	HC1917G-E1
J1N1	VGA video	Foxconn/Hon Hai	DZ11A36-B8
J2N1	LAN	AMP	406071-1
J3F1	Wake on LAN	Foxconn/Hon Hai	HF58020-P1
J3G1	WOM	Foxconn/Hon Hai	HB1940G-P3
J4M1	Serial	Foxconn/Hon Hai	146220-2
J4N1	USB	AMP	787779-1
J5C1	Slot 1	AMP	145251-1
J6J1	PCI/ISA riser	Foxconn/Hon Hai	EL09401-PC
J6J2	Chassis security	Foxconn/Hon Hai	HF06021-P1
J6N1	Parallel port	Foxconn/Hon Hai	DT11326-R8
J6N2	Soft Off power	AMP	104450-2, mating connector: AMP 103959-2
J7N1, J8N1	PS/2 mouse and keyboard	AMP	749266-1
J8H1	Jumper block	Foxconn/Hon Hai	HC1915G-E3
J8L1	Floppy drive	Foxconn/Hon Hai	HL16176-P4
J8N2, J9N1	Audio MIC Out/Line In	Foxconn/Hon Hai	JA1333L-100
J9E1	BIOS recovery jumper	AMP	146224-1
J9F1	Primary power	Foxconn/Hon Hai	HZ50120-E1
J9G1	3.3 V power	Foxconn/Hon Hai	HZ50060-P4
J9J1, J9J2	PCI IDE	Foxconn/Hon Hai	HL16206-D2
J9L1	Wavetable	Foxconn/Hon Hai	HC1904G-P0, mating connector: Berg 71600-308
J9M1	ATAPI CD-ROM audio	AMP	104450-3, mating connector: AMP 103956-3
J9M3	Telephony	Foxconn/Hon Hai	HC1902G-P3

* Or equivalent

1.20 Jumper Settings

Figure 9 shows the location of jumper blocks on the motherboard.

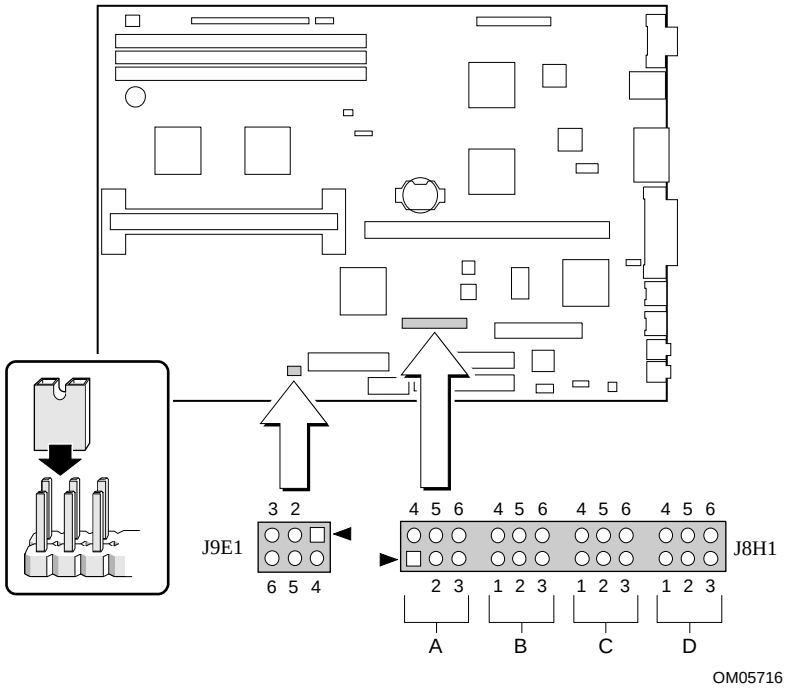

Figure 9. Jumper Locations

CAUTION

Always turn off the power and unplug the power cord from the computer before changing jumpers. Moving the jumpers with the power on could damage the motherboard.

Table 27. Jumper Settings

Function	Jumper	Configuration
Password Clear	J8H1-D	2-3 Password enabled (**Default**) 1-2 Password clear/disabled
CMOS (NVRAM and ESCD) Clear	J8H1-C	5-6 Keep (**Default**) 4-5 Clear
BIOS Setup Access	J8H1-D	5-6 Access enabled (**Default**) 4-5 Access denied
Floppy Write Enable	J8H1-A	5-6 Write enabled (**Default**) 4-5 Write disabled
Processor Frequency	J8H1-A, B, C	See Table 28
BIOS Recovery	J9E1	5-6 Normal operation (**Default**) 4-5 Recover BIOS

1.20.1 Processor Frequency (J8H1-A, B, C)

The motherboard must be configured for the frequency of the installed processor. Table 28 shows the jumper settings for each frequency and the corresponding host bus, PCI bus, and ISA bus frequencies.

Table 28. Jumper Settings for Processor Frequencies

Processor Freq.(MHz)	Jumpers J8H1-A	Jumpers J8H1-B	Jumpers J8H1-C	Host Bus Freq.(MHz)	PCI Bus Freq.(MHz)	ISA Bus Freq.(MHz)	Bus/Processor Freq. Ratio
233	2-3	2-3 and 5-6	2-3	66	33	8.33	3.5
266	1-2	1-2 and 4-5	2-3	66	33	8.33	4.0
Reserved	1-2	2-3 and 4-5	2-3				

1.20.2 Password Clear (J8H1-D)

Use this jumper to clear the password if the password is forgotten. The default setting is pins 2-3, (password enabled). To clear the password, turn off the computer, move the jumper to pins 1-2, and turn on the computer. Then turn off the computer, and return the jumper to pins 2-3 to restore normal operation. If the jumper is in the 1-2 position (password disabled), the user cannot set a password.

1.20.3 Clear CMOS (J8H1-C)

This jumper resets the CMOS settings to the default values. This procedure must be done each time the system BIOS is updated. The default setting for this jumper is pins 5-6 (keep CMOS settings). To reset the CMOS settings to the default values, turn off the computer, move the jumper to pins 4-5, then turn on the computer. When the computer displays the message "NVRAM cleared by jumper," turn off the computer and return the jumper to pins 5-6 to restore normal operation.

1.20.4 BIOS Setup Access (J8H1-D)

This jumper enables or disables access to the Setup program. The default setting is pins 5-6 (access enabled). To disable access to the Setup program, move the jumper to pins 4-5.

1.20.5 Floppy Write Enable (J8H1-A)

This jumper enables or disables the ability to write to all floppy drives attached to the system. The default setting is pins 5-6 (write access enabled). To disable write access to the floppy drives, move the jumper to pins 4-5.

1.20.6 BIOS Recovery (J9E1)

This jumper lets the user recover the BIOS data from a diskette in the event of a catastrophic failure. The default setting is pins 5-6 (normal operation). To recover the BIOS, turn off the computer, move the jumper to pins 4-5, then turn on the computer to perform BIOS recovery. After recovery, turn off the computer and return the jumper to pins 5-6 to restore normal operation. See Section 3.15 for more details.

1.21 Reliability

The Mean Time Between Failures (MTBF) data is calculated from predicted data at 55 ºC.

Motherboard MTBF: 62619 hours calculated

1.22 Environmental

Table 29 lists the environmental specifications for the motherboard.

Table 29. Motherboard Environmental Specifications

Parameter	Specification		
Temperature			
Non-Operating	-40 °C to +70 °C		
Operating	10 °C to +55 °C		
Shock			
Unpackaged	50 G 11 ms trapezoidal waveform		
	Velocity change of 170 inches/second		
Packaged	Half sine 2 millisecond		
	Product Weight	Free Fall (inches)	Velocity Change (inches/sec)
	<20 lbs	36	167
	21-40 lbs	30	152
	41-80 lbs	24	136
	81-100 lbs	18	118
Vibration			
Unpackaged	5 Hz to 20 Hz : 0.01 g² Hz sloping up to 0.02 g² Hz		
	20 Hz to 500 Hz : 0.02 g² Hz (flat)		
Packaged	10 Hz to 40 Hz : 0.015 g² Hz (flat)		
	40 Hz to 500 Hz : 0.015 g² Hz sloping down to 0.00015 g² Hz		

1.23 Power Consumption

Tables 30 and 31 list voltage and current specifications for a computer that contains the motherboard, a 233 MHz Pentium II processor, 32 MB RAM, keyboard, 3.5-inch floppy drive, Western Digital Caviar AC32500 hard drive, and Sony CDU311 CD-ROM. This information is provided only as a guide for calculating approximate power usage with additional resources added.

Values for the Windows 95 desktop mode are measured at 800 x 600 x256 colors and 72 Hz refresh rate. AC watts are measured with a 200 W Liteon PS-5201-6I power supply, nominal input voltage and frequency, with true RMS wattmeter at the line input.

Table 30. DC Voltage

DC Voltage	Acceptable Tolerance
+3.3 V	± 5%
+5 V	± 5%
+5 V SB (standby)	± 5%
-5 V	± 5%
+12 V	± 5%
-12 V	± 5%

Table 31. Power Usage

		DC (amps) At:				
Mode	**AC (watts)**	**+3.3 V**	**+5 V**	**-5 V**	**+12 V**	**-12 V**
Windows 95 desktop, APM disabled	36.5	0.71	2.67	*	0.39	*
Windows 95 desktop, APM enabled, in System Management Mode (SMM)	29.6	0.71	2.13	*	0.12	*

* Negligible current as measured by an inductive probe.

1.23.1 Power Supply Considerations

For typical configurations, the motherboard is designed to operate with at least a 200 W, 3.3 V LPX power supply. The power supply must meet the following requirements:

- Rise time for power supply: 2 ms to 20 ms
- Minimum delay for Reset to Power Good: 100 ms
- Minimum Powerdown warning: 1 ms
- 3.3 V must reach its minimum regulation level within ±20 ms of the 5 V output reaching its minimum regulation level
- A 720 mA, 5-V standby voltage is required to support the motherboard's Wake on LAN feature

1.24 Regulatory Compliance

This printed circuit assembly complies with the following safety and EMI regulations when correctly installed in a compatible host system.

1.24.1 Safety

1.24.1.1 UL 1950 - CSA 950-95, 3rd edition, Dated 07-28-95

The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (USA & Canada)

1.24.1.2 CSA C22.2 No. 950-93, 3rd Edition

The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (Canada)

1.24.1.3 EN 60 950, 2nd Edition, 1992 (with Amendments 1, 2 & 3)

The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (European Union)

1.24.1.4 IEC 950, 2nd edition, 1991 (with Amendments 1, 2 & 3)

The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (International)

1.24.1.5 EMKO-TSE (74-SEC) 207/94

Summary of Nordic deviations to EN 60 950. (Norway, Sweden, Denmark & Finland)

1.24.2 EMI

1.24.2.1 FCC Class B

Title 47 of the Code of Federal Regulations, Parts 2 & 15, Subpart B, pertaining to unintentional radiators. (USA)

1.24.2.2 CISPR 22, 2nd Edition, 1993

Limits and methods of measurement of Radio Interference Characteristics of Information Technology Equipment. (International)

1.24.2.3 EN 55 022, 1995

Limits and methods of measurement of Radio Interference Characteristics of Information Technology Equipment. (Europe)

1.24.2.4 EN 50 082-1 (1992)

Generic Immunity Standard; Currently compliance is determined via testing to IEC 801-2, -3, and -4. (Europe)

1.24.2.5 VCCI Class 2 (ITE)

Implementation Regulations for Voluntary Control of Radio Interference by Data Processing Equipment and Electronic Office Machines. (Japan)

1.24.2.6 ICES-003, Issue 2

Interference-Causing Equipment Standard, Digital Apparatus. (Canada)

1.24.3 Product Certification Markings

This printed circuit assembly has the following product certification markings:

- European CE Marking: Consists of a marking on the board and shipping container.
- UL Recognition Mark: Consists of the UL File No. E139761 on the component side of the board and the PB No. on the solder side of the board. Board material flammability is 94V-1 or -0.
- Canadian Compliance: Consists of small c followed by a stylized backward UR on component side of board.

2 Motherboard Resources

NOTE

For more detailed information about the resources used for onboard audio, see the Audio Subsystem section in Chapter 1.

2.1 Memory Map

Table 32. Memory Map

Address Range (decimal)	Address Range (hex)	Size	Description
1024 K - 393216 K	100000 - 18000000	383 MB	Extended Memory
960 K - 1024 K	F0000 - FFFFF	64 K	System BIOS
944 K - 960 K	EC000 - EFFFF	16 K	Boot Block (available as UMB)
936 K - 944 K	EA000 - EBFFF	8 K	ESCD (Plug and Play configuration DMI)
932 K - 936 K	E9000 - E9FFF	4 K	Reserved for BIOS
928 K - 932 K	E8000 - E8FFF	4 K	OEM Logo or Scan User Flash
896 K - 928 K	E0000 - E7FFF	32 K	POST BIOS (available as UMB)
800 - 896 K	C8000 - DFFFF	96 K	Available High DOS memory (open to ISA and PCI bus)
640 K - 800 K	A0000 - C7FFF	160 K	Video memory and BIOS
639 K - 640 K	9FC00 - 9FFFF	1 K	Extended BIOS data (movable by memory manager software)
512 K - 639 K	80000 - 9FBFF	127 K	Extended conventional memory
0 K - 512 K	00000 - 7FFFF	512 K	Conventional memory

2.2 DMA Channels

Table 33. DMA Channels

DMA Channel Number	Data Width	System Resource
0	8- or 16-bits	Audio
1	8- or 16-bits	Audio / Parallel Port
2	8- or 16-bits	Floppy Drive
3	8- or 16-bits	Parallel Port (for ECP or EPP) / Audio
4		Reserved - Cascade Channel
5	16-bits	Open
6	16-bits	Open
7	16-bits	Open

2.3 I/O Map

Table 34. I/O Map

Address (hex)	Size	Description
0000 - 000F	16 bytes	PIIX3 - DMA 1
0020 - 0021	2 bytes	PIIX3 - Interrupt Controller 1
002E - 002F	2 bytes	SuperI/O Controller Configuration Registers
0040 - 0043	4 bytes	PIIX3 - Counter/Timer 1
0048 - 004B	4 bytes	PIIX3 - Counter/Timer 2
0060	1 byte	Keyboard Controller Byte - Reset IRQ
0061	1 byte	PIIX3 - NMI, Speaker Control
0064	1 byte	Keyboard Controller, CMD/STAT Byte
0070, bit 7	1 bit	PIIX3 - Enable NMI
0070, bits 6:0	7 bits	PIIX3 - Real Time Clock, Address
0071	1 byte	PIIX3 - Real Time Clock, Data
0078	1 byte	Reserved - Board Configuration
0079	1 byte	Reserved - Board Configuration
0080 - 008F	16 bytes	PIIX3 - DMA Page Registers
00A0 - 00A1	2 bytes	PIIX3 - Interrupt Controller 2
00B2 - 00B3	2 bytes	APM Control
00C0 - 00DE	31 bytes	PIIX3 - DMA 2
00F0	1 byte	Reset Numeric Error
0170 - 0177	8 bytes	Secondary IDE Channel
01F0 - 01F7	8 bytes	Primary IDE Channel
0220 - 022F	16 bytes	CS4236B Audio
0278 - 027F	8 bytes	LPT2
0290 - 0297	8 bytes	Management extension hardware
02F8 - 02FF	8 bytes	COM2
0330 - 0331	2 bytes	MPU-401 (MIDI)
0376	1 byte	Secondary IDE Channel Command Port
0377	1 byte	Floppy Channel 2 Command
0377, bit 7	1 bit	Floppy Disk Change, Channel 2
0377, bits 6:0	7 bits	Secondary IDE Channel Status Port
0378 - 037F	8 bytes	Parallel Port 1
0388- 038B	4 bytes	FM Synthesis
03BC - 03BF	4 bytes	LPT3
03E8 - 03EF	8 bytes	COM3
03F0 - 03F5	6 bytes	Floppy Channel 1

continued ☛

Table 34. I/O Map (continued)

Address (hex)	Size	Description
03F6	1 byte	Primary IDE Channel Command Port
03F7 (Write)	1 byte	Floppy Channel 1 Command
03F7, bit 7	1 bit	Floppy Disk Change Channel 1
03F7, bits 6:0	7 bits	Primary IDE Channel Status Port
03F8 - 03FF	8 bytes	COM1
04D0 - 04D1	2 bytes	Edge/level triggered PIC
0534 - 0537	4 bytes	Windows Sound System
LPT*n* + 400h	8 bytes	ECP port, LPT*n* base address + 400h
0CF8 - 0CFB*	4 bytes	PCI Configuration Address Register
0CF9**	1 byte	Turbo and Reset Control Register
0CFC - 0CFF	4 bytes	PCI Configuration Data Register
0FF0 - 0FF7	8 bytes	CS4236B Audio Control
FF00 - FF07	8 bytes	IDE Bus Master Register
FFA0 - FFA7	8 bytes	Primary Bus Master IDE Registers
FFA8 - FFAF	8 bytes	Secondary Bus Master IDE Registers
Dynamically allocated	32 bytes	USB

* DWORD access only

** Byte access only

NOTE

See the Audio section(s) in Chapter 1 for specific I/O addresses that can be used by the audio components on the motherboard. This table does not list I/O addresses that may be used by add-in cards in the system.

2.4 PCI Configuration Space Map

Table 35. PCI Configuration Space Map

Bus Number (hex)	Device Number (hex)	Function Number (hex)	Description
00	00	00	Intel 82441FX (PMC) Host bridge
00	07	00	Intel 82371SB (PIIX3) PCI/ISA bridge
00	07	01	Intel 82371SB (PIIX3) IDE Bus Master
00	07	02	Intel 82371SB (PIIX3) USB
00	08	00	VGA Graphics
00	06	00	Intel 82557 Ethernet controller
00	11	00	PCI Expansion Slot: User Available
00	13	00	PCI Expansion Slot: User Available
00	0B	00	PCI Expansion Slot: User Available

2.5 Interrupts

Table 36. Interrupts

IRQ	System Resource
NMI	I/O Channel Check
0	Reserved, Interval Timer
1	Reserved, Keyboard Buffer Full
2	Reserved, Cascade Interrupt From Slave PIC
3	COM2*
4	COM1*
5	LPT2 (Plug and Play option) / Audio / User available
6	Floppy Drive
7	LPT1*
8	Real Time Clock
9	Audio/User available
10	USB (if present, else user available)
11	Video* / User available
12	Onboard Mouse Port (if present, else user available)
13	Reserved, Math Coprocessor
14	Primary IDE (if present, else user available)
15	Secondary IDE (if present, else user available)

* Default, but can be changed to another IRQ

2.6 PCI Interrupt Routing Map

The PCI specification allows for sharing of interrupts between devices attached to the PCI bus. In most cases, the small amount of latency added by interrupt sharing does not affect the normal operation or throughput of the devices. However, in some special cases where maximum performance is needed from a device, the system integrator may want to ensure that it does not share an interrupt with other PCI devices.

This section describes the interrupt sharing mechanism and how the interrupt signals are connected between the motherboard's PCI expansion slots and onboard PCI devices. Use this information to avoid sharing an interrupt for a PCI add-in card.

PCI devices are categorized as follows to specify their interrupt grouping:

- INTA: By default, all add-in cards that require only one interrupt are in this category. For almost all cards that require more than one interrupt, the first interrupt on the card is also classified as INTA.
- INTB: Generally, the second interrupt on add-in cards that require two or more interrupts is classified as INTB. (This is not an absolute requirement.)
- INTC and INTD: Generally, a third interrupt on add-in cards is classified as INTC and a fourth interrupt is classified as INTD.

The PIIX3 PCI-to-ISA bridge has four Programmable Interrupt Request (PIRQ) input signals. Any PCI interrupt source (either onboard or from a PCI add-in card) connects to one of these PIRQ signals. Because there are only four signals, some PCI interrupt sources are mechanically tied together on the motherboard and therefore share the same interrupt. Table 37 lists the PIRQ signals and shows how the signals are connected to onboard PCI interrupt sources and to the PCI expansion slots. The interrupt assignment for the expansion slots is specific to the Intel reference riser card and may be different with different riser cards.

Table 37. PCI Interrupt Routing Map

PIIX3 PIRQ Signal	First PCI Expansion Slot	Second PCI Expansion Slot	Third PCI Expansion Slot	USB	Onboard Video	Ethernet LAN Controller
PIRQA	INTC	INTA	INTB			
PIRQB	INTB	INTC	INTA			
PIRQC	INTA	INTB	INTC			X
PIRQD	INTD	INTD	INTD	X	X	

NOTE

The PIIX3 can connect each PIRQ line internally to one of the IRQ signals (3,4,5,7,9,11,14,15). Typically, a device that does not share a PIRQ line will have a unique interrupt. However, in certain interrupt-constrained situations, it is possible for two or more of the PIRQ lines to be connected to the same IRQ signal.

3 Overview of BIOS Features

3.1 Introduction

The motherboard uses an Intel BIOS, which is stored in flash memory and can be upgraded using a disk-based program. In addition to the BIOS, the flash memory contains the Setup program, the POST, advanced power management (APM), the PCI auto-configuration utility, and Windows 95-ready Plug and Play. See Section 6.2 for the supported versions of these specifications.

This motherboard supports system BIOS shadowing, allowing the BIOS to execute from 64-bit onboard 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 on the motherboard is identified as 1.00.00.DU0.

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.

3.2 BIOS Upgrades

Flash memory simplifies distributing BIOS upgrades. The user can install a new version of the BIOS from a disk. BIOS upgrades are available to be downloaded from the secure section on the Intel bulletin board or from Intel's FTP or World Wide Web sites (see Section 6.1).

The disk-based flash upgrade utility has three main options for BIOS upgrades:

- Update the flash BIOS from a file on a disk
- Copy the current BIOS code from the flash device to a disk file as a backup, in the event that an upgrade cannot be successfully completed
- Compare the BIOS in the flash device with a file to make sure the system has the correct version

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

NOTE

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

3.3 Auto-configuration of PCI Devices and Plug and Play Devices

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

PCI interrupts are distributed to available ISA interrupts that have not been assigned to an ISA card or to system resources. The assignment of PCI interrupts to ISA IRQs is nondeterministic. PCI devices can share an interrupt, but an ISA device cannot share an interrupt allocated to PCI or to another ISA device.

Auto-configuration information is stored in Extended System Configuration Data (ESCD) format. The user can clear the ESCD area by moving the Clear CMOS jumper (see Section 1.20.3).

For information about the versions of PCI and Plug and Play supported by this BIOS, see Section 6.2. Copies of the specifications can be obtained from the Intel World Wide Web site (see Section 6.1). Peer-to-peer and hierarchical PCI Bridges are supported, and by using an OEM-supplied option ROM or TSR, PCI-to-PCMCIA bridge capability is possible as well.

3.4 PCI IDE Support

If Auto Configured is selected in Setup, the BIOS automatically sets up the two local bus IDE connectors with independent I/O channel support. The IDE interface supports hard drives up to PIO Mode 4 and recognizes any ATAPI devices, including CD-ROM drives and tape drives (see Section 6.2 for the supported version of ATAPI). The BIOS determines the capabilities of each drive and configures them so as to optimize capacity and performance. To take advantage of the high capacities typically available today, hard drives are automatically configured for Logical Block Addressing (LBA) and to PIO Mode 3 or 4, depending on the capability of the drive. The user can override the auto-configuration options by specifying manual configuration in Setup. The ATAPI Specification recommends that ATAPI devices be configured as shown in Table 38.

Table 38. Recommendations for Configuring an ATAPI Device

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

3.5 ISA Plug and Play

If the user selects in Setup to boot with a Plug and Play OS (see Section 4.10.2), the BIOS auto-configures only ISA Plug and Play cards that are required for booting (IPL devices). If the user selects to not boot with a Plug and Play OS, the BIOS auto-configures all Plug and Play ISA cards.

3.6 ISA Legacy Devices

Since ISA legacy devices are not auto-configurable, the resources for them must be reserved. The user can reserve resources in the Setup program or with an ISA configuration utility (see Section 6.1 for a Web site address).

System configuration information is stored in ESCD format. The user can clear the ESCD area by moving the Clear CMOS jumper (see Section 1.20.3).

3.7 Desktop Management Interface

Desktop Management Interface (DMI) is a method of managing computers in an enterprise. The main component of DMI is the Management Information Format (MIF) database, which contains information about the computing system and its components. Using DMI, a system administrator can obtain the system types, capabilities, operational status, installation date, and other information about the system components. The DMI specification requires that certain information about the system's motherboard be made available to an applications program. This information is located in a series of data structures which are accessed in various ways by the DMI service layer. Component instrumentation allows the service layer to gain access to information stored in the general-purpose area of nonvolatile memory. The MIF database defines the data and provides the method for accessing the information.

The BIOS support for DMI enables the maximum benefit from applications such as LANDesk Client Manager from Intel. The BIOS stores and can report on the following types of DMI information:

- BIOS data, such as the BIOS revision level
- Fixed system information, such as data about the motherboard, peripherals, serial numbers and asset tags, etc.
- System information discovered during bootup, such as memory size, cache size, processor speed, etc.
- Dynamic information, such as event detection and error logging (see also Section 4.11)

An OEM can use a utility that makes DMI calls to program system and chassis-related information into the flash memory, so the BIOS can also report that information. Once this information is written, it is locked (read-only).

Intel can provide a utility for making DMI calls to the BIOS. The latest DMI specification (see Section 6.2 for the version supported) is available from Intel and other sites (see Section 6.1).

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

3.8 Advanced Power Management

The BIOS supports Advanced Power Management (APM); see Section 6.2 for the version supported. The user can initiate the energy saving Standby mode in these ways:

- Keyboard hot key sequence specified in Setup
- Time-out period specified in Setup
- Suspend/resume switch connected to the front panel sleep connector
- From the OS, as with the Suspend menu item in Windows 95

When in Standby mode, the motherboard reduces power consumption by using the processor's System Management Mode (SMM) capabilities and by spinning down hard drives and reducing power to or turning off VESA DPMS-compliant monitors. In Setup the user can select the DPMS mode to use for the monitor: Standby, Suspend, Sleep, or Disabled (see Section 4.9.3).

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

APM is enabled in the BIOS by default; however, the system must be configured with an OS-dependent APM driver for the power-saving features to take effect. For example, Windows 95 enables APM automatically upon detecting the presence of the APM BIOS.

3.9 Advanced Power Control

The BIOS supports Advanced Power Control (APC) if it is supported by the I/O controller. Two APC features include:

- Auto Start On AC Loss, which sets the control for returning to the last known state of the system or powering down the system if the motherboard detects that the power supply has lost AC power.
- Power-On COM1 Ring, which sets the control that allows the system to be powered on when an incoming call is received on a telephony device configured for operation on COM1.

3.10 Language Support

The BIOS Setup utility and help messages can be supported in 32 languages. Five languages are available at this time: American English, German, Italian, French, and Spanish. The BIOS includes extensions to support the Kanji character set and other non-ASCII character sets. Translations of other languages may become available at a later date.

The default language is American English, which is always present unless another language is programmed into the BIOS using the flash device upgrade utility. See Section 6.1 for information about downloading the flash device upgrade utility.

3.11 Boot Options

The user can choose in Setup to boot from a floppy drive, hard drive, CD-ROM, or a network.

Booting from CD-ROM is supported in adherence to the "El Torito" bootable CD-ROM format specification developed by Phoenix Technologies and IBM. Under the Boot Options field in Setup, CD-ROM is one of four possible boot devices, which are defined in priority order. The default setting is for the floppy drive to be the primary boot device and the hard drive to be the secondary boot device. (By default the third and fourth devices are disabled.) If the user selects CD-ROM as the boot device, it must be the first device.

NOTE

A copy of the "El Torito" specification is available on the Phoenix Web site http://www.ptltd.com/techs/specs.html.

The user can also select the network as a boot device, which allows booting from the onboard LAN subsystem.

3.12 OEM Logo or Scan Area

The motherboard supports a 4 KB programmable flash memory user area at memory location E8000-E8FFF. Users can use this area to display a custom OEM logo during POST, or insert an executable binary image that runs at certain times during the POST. A utility is available from Intel to assist with installing a logo into flash memory for display during POST. Contact Intel customer support for further information (see Section 6.1 for a Web site address).

3.13 USB Support

The USB connectors on the motherboard allow users to attach any of several USB devices as they become available. Typically, the device driver for USB devices will be managed by the OS. However, because keyboard and mouse support may be needed in the Setup program before the OS boots, the BIOS supports USB keyboards and mice. The user can disable this support in Setup if necessary.

3.14 BIOS Setup Access Jumper

The user can move the Setup Access jumper on the motherboard to enable or disable access to the Setup program. The default is for access to be enabled. See Section 1.20.4 for the specific pins on which to place the jumper.

3.15 Recovering BIOS Data

Some types of failure can destroy the BIOS data. For example, the data could be lost if a power outage occurs while the user is updating the BIOS in flash memory. The user can recover the BIOS data from a diskette by changing the setting of the BIOS Recovery jumper (see Section 1.20.6).

To create a BIOS recovery diskette, make a bootable DOS diskette and place the recovery files on it. The recovery files are available from Intel. Contact Intel customer support for further information (see Section 6.1 for a Web site address).

To recover the BIOS, turn off the computer and move the jumper to the BIOS recovery setting. Insert the bootable BIOS recovery diskette in drive A:. Boot the computer to recover the BIOS. Two beeps and the end of floppy access to drive A: indicate a successful BIOS recovery. A series of continuous beeps indicates that the recovery operation failed.

NOTE

No video is displayed during the recovery process.

After a successful recovery, turn off the computer and return the jumper to the original pins to restore normal operation.

3.16 Boot Virus Detection and Cleaning

The BIOS has an integrated boot sector virus detection and cleaning feature that detects and cleans the majority of boot sector viruses. It also stores the virus scan results in a DMI BIOS-log which can be accessed by the LANDesk Client Manager health monitor. The virus detection scheme uses a rule-based detection algorithm rather than the more vulnerable pattern-recognition algorithms, which can be defeated by mutating or polymorphic viruses. With a rule-based detection algorithm, new viruses with unknown characteristics may be detected as well. This is an improvement over pattern-recognition detection algorithms which must be updated with the characteristics of the new viruses before they can be detected and cleaned.

When the computer is booted from a hard drive or a floppy disk, the virus scanner performs the functions listed below:

- Checks the boot sequence to determine if there is boot virus behavior and prompts the user to clean the virus or to continue the boot process.
- Ensures that the hard disk master boot record is not modified while the operating system is booting.

The user can enable or disable this feature in the BIOS Setup program.

4 BIOS Setup Program

The Setup program lets users modify the configuration for most basic changes without opening the system. Setup is accessible only during POST. To enter Setup, press the <F1> key after the POST memory test has begun and before boot begins. By default, there is a prompt to press the <F1> key to access Setup, but this prompt may be disabled with an option in the Setup program.

4.1 Overview of the Setup Screens

The following table lists the screens displayed by the Setup program. Setup initially displays the Main screen. Select a screen from the menu at the top by pressing the left <←> or right <→> arrow key. Each screen has options for modifying the system configuration. Use the up <↑> or down <↓> arrow key to highlight an item in a screen. Use the <Enter> key to select an item for modification. After selecting an item, use the arrow keys to modify the setting.

For certain items, pressing <Enter> brings up a subscreen, with its own options. For example. pressing <Enter> on Floppy Options in the Main screen brings up the subordinate options listed in Table 39. The table also lists the section numbers in this document where each item is described. The final column of the table tells whether an option can be modified from within the Setup program. Unmodifiable items are report fields that may change depending on the system configuration.

Table 39. Overview of the Setup Screens

Screen	Subscreen Options	Described In	Modifiable
Main		(Sec. 4.2)	
	System Date	(Sec. 4.2.1)	Yes
	System Time	(Sec. 4.2.2)	Yes
	Floppy Options	(Sec. 4.2.3 and 4.3)	Yes
	Floppy A:	(Sec. 4.3.1)	No
	Floppy B:	(Sec. 4.3.2)	No
	Floppy A: Type	(Sec. 4.3.3)	Yes
	Floppy B: Type	(Sec. 4.3.4)	Yes
	Primary IDE Master	(Sec. 4.2.4 and 4.4)	Yes*
	Primary IDE Slave	(Sec. 4.2.5 and 4.4)	Yes*
	Secondary IDE Master	(Sec. 4.2.6 and 4.4)	Yes*
	Secondary IDE Slave	(Sec. 4.2.7 and 4.4)	Yes*
	IDE Device Configuration	(Sec. 4.4.1)	Yes
	Cylinders	(Sec. 4.4.2)	Yes*
	Heads	(Sec. 4.4.3)	Yes*
	Sectors	(Sec. 4.4.4)	Yes*

continued ☛

Table 39. Overview of the Setup Screens (continued)

Screen	Subscreen Options	Described In	Modifiable
Main Screen, IDE Subscreen Options (continued)			
	Maximum Capacity	(Sec. 4.4.5)	No**
	IDE Translation Mode	(Sec. 4.4.6)	Yes
	Multiple Sector Setting	(Sec. 4.4.7)	Yes
	Fast Programmed I/O Modes	(Sec. 4.4.8)	Yes
Language		(Sec. 4.2.8)	No
Boot Options		(Sec. 4.2.9 and 4.5)	Yes
	Boot Device Options	(Sec. 4.5.1)	Yes
	First Boot Device	(Sec. 4.5.1.1)	Yes
	Second Boot Device	(Sec. 4.5.1.2)	Yes
	Third Boot Device	(Sec. 4.5.1.3)	Yes
	Fourth Boot Device	(Sec. 4.5.1.4)	Yes
	LAN Power On Startup Sequence	(Sec. 4.5.1.5)	Yes
	First Alternate Boot Device	(Sec. 4.5.1.6)	Yes
	Second Alternate Boot Device	(Sec. 4.5.1.7)	Yes
	Third Alternate Boot Device	(Sec. 4.5.1.8)	Yes
	Fourth Alternate Boot Device	(Sec. 4.5.1.9)	Yes
	System Cache	(Sec. 4.5.2)	Yes
	Boot Speed	(Sec. 4.5.3)	Yes
	Num Lock	(Sec. 4.5.4)	Yes
	Setup Prompt	(Sec. 4.5.5)	Yes
	Hard Disk Pre-Delay	(Sec. 4.5.6)	Yes
	Typematic Rate Programming	(Sec. 4.5.7)	Yes*
	Typematic Rate Delay	(Sec. 4.5.8)	Yes*
	Typematic Rate	(Sec. 4.5.9)	Yes*
	Speaker	(Sec. 4.5.10)	Yes
	Scan User Flash Area	(Sec. 4.5.11)	Yes
	Boot Virus Detection	(Sec. 4.5.12)	Yes
Video Mode		(Sec. 4.2.10)	No
Mouse		(Sec. 4.2.11)	No
Base Memory		(Sec. 4.2.12)	No
Extended Memory		(Sec. 4.2.13)	No
BIOS Version		(Sec. 4.2.14)	No
Advanced		(Sec. 4.6)	
Processor Type		(Sec. 4.6.1)	No
Processor Speed		(Sec. 4.6.2)	No
Cache Size		(Sec. 4.6.3)	No
Peripheral Configuration		(Sec. 4.6.4 and 4.7)	Yes
	Primary PCI IDE Interface	(Sec. 4.7.1)	Yes
	Secondary PCI IDE Interface	(Sec. 4.7.2)	Yes
	Floppy Interface	(Sec. 4.7.3)	Yes
	Serial Port 1 Interface	(Sec. 4.7.4)	Yes
	Infrared Port Interface	(Sec. 4.7.5)	Yes
	Parallel Port Interface	(Sec. 4.7.6)	Yes

continued ☛

Table 39. Overview of the Setup Screens (continued)

Screen	Subscreen Options	Described In	Modifiable
Advanced Screen, Peripheral Configuration (continued)			
	Parallel Port Type	(Sec. 4.7.7)	Yes
	USB Interface	(Sec. 4.7.8)	Yes
	Audio Interface	(Sec. 4.7.9)	Yes
	Hardware Monitor Interface	(Sec. 4.7.10)	Yes
	PCI LAN Interface	(Sec. 4.7.11)	Yes
	Primary IDE Status	(Sec. 4.7.12)	No**
	Secondary IDE Status	(Sec. 4.7.13)	No**
	Floppy Status	(Sec. 4.7.14)	No
	Serial Port 1 Status	(Sec. 4.7.15)	No**
	Infrared Port Status	(Sec. 4.7.16)	No**
	Parallel Port Status	(Sec. 4.7.17)	No**
Advanced Chipset Configuration		(Sec. 4.6.5 and 4.8)	Yes
	Base Memory	(Sec. 4.8.1)	Yes
	ISA LFB Size	(Sec. 4.8.2)	Yes
	ISA LFB Base Address	(Sec. 4.8.3)	No
	Onboard Video IRQ	(Sec. 4.8.4)	Yes
	Video Palette Snoop	(Sec. 4.8.5)	Yes
	ISA VGA Write Combining	(Sec. 4.8.6)	Yes*
	Latency Timer (PCI Clocks)	(Sec. 4.8.7)	Yes
	Memory Error Detection	(Sec. 4.8.8)	Yes
	Bank 0	(Sec. 4.8.9)	No
	Bank 1	(Sec. 4.8.10)	No
	Bank 2	(Sec. 4.8.11)	No
Power Management Configuration		(Sec. 4.6.6 and 4.9)	Yes
	Advanced Power Management	(Sec. 4.9.1)	Yes
	IDE Drive Power Down	(Sec. 4.9.2)	Yes*
	VESA Video Power Down	(Sec. 4.9.3)	Yes*
	Inactivity Timer	(Sec. 4.9.4)	Yes*
	Hot Key	(Sec. 4.9.5)	Yes*
	Auto Start on AC Loss	(Sec. 4.9.6)	Yes*
	Power-On COM1 Ring	(Sec. 4.9.7)	Yes*
	Power On LAN	(Sec. 4.9.8)	Yes*
Plug and Play Configuration		(Sec. 4.6.7 and 4.10)	Yes
	Configuration Mode	(Sec. 4.10.1)	Yes
	PnP OS	(Sec. 4.10.2)	Yes
	ISA Shared Memory Size	(Sec. 4.10.3)	Yes
	ISA Shared Memory Base Address	(Sec. 4.10.4)	Yes*
	IRQ 5, 9, 10, 11	(Sec. 4.10.5)	Yes

continued ☛

Table 39. Overview of the Setup Screens (continued)

Screen	Described In	Modifiable
Advanced Screen (continued)		
Event Logging Configuration	(Sec. 4.6.8 and 4.11)	Yes
Event Log Capacity	(Sec. 4.11.1)	No
Event Log Count Granularity	(Sec. 4.11.2)	No
Event Time Granularity (Min.)	(Sec. 4.11.3)	No
Event Log Control	(Sec. 4.11.4)	Yes
Clear Event Log	(Sec. 4.11.5)	Yes
Mark Existing Events as Read	(Sec. 4.11.6)	Yes
Event Log Subscreens	(Sec. 4.11.7)	No
Security	(Sec. 4.12)	
User Password	(Sec. 4.12.3)	No**
Administrative Password	(Sec. 4.12.2)	No**
Enter Password	(Sec. 4.12.3)	Yes
Set Administrative Password	(Sec. 4.12.4)	Yes
User Privilege Level	(Sec. 4.12.5)	Yes
Clear User Password	(Sec. 4.12.6)	Yes
Unattended Start	(Sec. 4.12.7)	Yes*
Security Hot Key	(Sec. 4.12.8)	Yes*
Exit	(Sec. 4.13)	
Exit Saving Changes	(Sec. 4.13.1)	N/A
Exit Discarding Changes	(Sec. 4.13.2)	N/A
Load Setup Defaults	(Sec. 4.13.3)	N/A
Discard Changes	(Sec. 4.13.4)	N/A

* These items are modifiable but may not be displayed or available for modification if the support is disabled in Setup, or if the BIOS does not detect the related hardware.

** These items are not directly modifiable, but the reported value will change based on entries in other Setup options.

4.2 Main BIOS Setup Screen

This section describes the Setup options found on the Main screen. If the user selects certain options from the Main screen (e.g., Floppy Options), Setup switches to a subscreen for the selected option.

4.2.1 System Date

Specifies the current date. Select the month, day, and year from a pop-up menu.

4.2.2 System Time

Specifies the current time.

4.2.3 Floppy Options

When selected, this displays the Floppy Options menu.

4.2.4 Primary IDE Master

Reports if an IDE device is connected to the Primary IDE master interface. When selected, this displays the IDE Device Configuration subscreen.

4.2.5 Primary IDE Slave

Reports if an IDE device is connected to the Primary IDE slave interface. When selected, this displays the IDE Device Configuration subscreen.

4.2.6 Secondary IDE Master

Reports if an IDE device is connected to the Secondary IDE master interface. When selected, this displays the IDE Device Configuration subscreen.

4.2.7 Secondary IDE Slave

Reports if an IDE device is connected to the Secondary IDE slave interface. When selected, this displays the IDE Device Configuration subscreen.

4.2.8 Language

Specifies the language of the text strings used in the Setup utility and the BIOS. The options are any installed languages.

4.2.9 Boot Options

When selected, this displays the Boot Options subscreen.

4.2.10 Video Mode

Reports the video mode. There are no options.

4.2.11 Mouse

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

4.2.12 Base Memory

Reports the amount of base memory. There are no options.

4.2.13 Extended Memory

Reports the amount of extended memory. There are no options.

4.2.14 BIOS Version

Reports the BIOS identification string. There are no options.

4.3 Floppy Options Subscreen

4.3.1 Floppy A:

Reports if a diskette drive is connected to the system. There are no options.

4.3.2 Floppy B:

Reports if a second diskette drive is connected to the system. There are no options.

4.3.3 Floppy A: Type

Specifies 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 **(default)**
- 2.88 MB, 3.5-inch

4.3.4 Floppy B: Type

Specifies the physical size and capacity of the diskette drive. The options are:

- Disabled **(default)**
- 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

4.4 Primary/Secondary IDE Master/Slave Configuration Subscreens

There are four subscreens used to enable IDE devices:

- Primary IDE Master
- Primary IDE Slave
- Secondary IDE Master
- Secondary IDE Slave

All four subscreens contain the same eight fields described below.

4.4.1 IDE Device Configuration

Used to manually configure the hard drive or have the system auto-configure it. The options are:

- Auto Configured **(default)**
- User Definable
- Disabled

When User Definable is selected, the Cylinders, Heads, and Sectors items can be modified. If Disabled is selected, the BIOS will not scan for a device on that interface.

4.4.2 Cylinders

If IDE Device Configuration is set to Auto Configured, this field reports the number of cylinders for the hard disk and cannot be modified. If IDE Device Configuration is set to User Definable, type the correct number of cylinders for the hard disk.

4.4.3 Heads

If IDE Device Configuration is set to Auto Configured, this field reports the number of heads for the hard disk and cannot be modified. If IDE Device Configuration is set to User Definable, type the correct number of heads for the hard disk.

4.4.4 Sectors

If IDE Device Configuration is set to Auto Configured, this field reports the number of sectors for the hard disk and cannot be modified. If IDE Device Configuration is set to User Definable, type the correct number of sectors for the hard disk.

4.4.5 Maximum Capacity

Reports the maximum capacity of the hard disk, which is calculated from the number of cylinders, heads, and sectors. There are no options.

4.4.6 IDE Translation Mode

⚠ CAUTION

Do not change the IDE translation mode from the option selected when the hard drive was formatted. Changing the option after formatting can result in corrupted data.

Specifies the IDE translation mode. The options are:

- Standard CHS (standard cylinder head sector, for drives with fewer than 1024 cylinders)
- Logical Block Addressing (LBA)
- Extended CHS (extended cylinder head sector, for drives with more than 1024 cylinders)
- Auto Detected (BIOS detects IDE drive support for LBA) **(default)**

4.4.7 Multiple Sector Setting

Sets the number of sectors transferred by an IDE drive per interrupt generated. The options are:

- Disabled
- 4 Sectors/Block
- 8 Sectors/Block
- Auto Detected **(default)**

Check the specifications for the hard disk drive to determine which setting provides optimum performance for the drive.

4.4.8 Fast Programmed I/O Modes

Sets how fast the transfers occur on the IDE interface. The options are:

- Disabled (transfers occur at a less than optimized speed)
- Auto Detected (transfers occur at the drive's maximum speed) **(default)**

4.5 Boot Options Subscreen

This section describes the options available on the Boot Options subscreen.

4.5.1 Boot Device Options

When selected, displays the Boot Device Options subscreen.

4.5.1.1 First Boot Device

Sets which drive the system checks first to find an operating system to boot from. The options are:

- Disabled
- Floppy **(default)**
- Hard Disk
- CD-ROM
- Network

4.5.1.2 Second Boot Device

Sets which drive the system checks second to find an operating system to boot from. The options are:

- Disabled
- Floppy
- Hard Disk **(default)**
- Network

4.5.1.3 Third Boot Device

Sets which drive the system checks third to find an operating system to boot from. The options are:

- Disabled **(default)**
- Floppy
- Hard Disk
- Network

4.5.1.4 Fourth Boot Device

Sets which drive the system checks fourth to find an operating system to boot from. The options are:

- Disabled **(default)**
- Floppy
- Hard Disk
- Network

4.5.1.5 LAN Power On Startup Sequence

If this option is enabled, it sets the boot device order when the system is powered on by the onboard LAN subsystem. This option is displayed only if the optional LAN subsystem is installed on the motherboard. The options are:

- Disabled
- Enabled **(default)**

When set to Enabled, the alternate boot device options are displayed.

4.5.1.6 First Alternate Boot Device

Sets which drive the system checks first to find an operating system to boot from. The options are:

- Disabled
- Floppy
- Hard Disk
- CD-ROM
- Network **(default)**

4.5.1.7 Second Alternate Boot Device

Sets which drive the system checks second to find an operating system to boot from. The options are:

- Disabled
- Floppy
- Hard Disk **(default)**
- Network

4.5.1.8 Third Alternate Boot Device

Sets which drive the system checks third to find an operating system to boot from. The options are:

- Disabled **(default)**
- Floppy
- Hard Disk
- Network

4.5.1.9 Fourth Alternate Boot Device

Sets which drive the system checks fourth to find an operating system to boot from. The options are:

- Disabled **(default)**
- Floppy
- Hard Disk
- Network

4.5.2 System Cache

Enables or disables both primary and secondary cache memory. The options are:

- Enabled **(default)**
- Disabled

4.5.3 Boot Speed

Sets the system's boot speed. The options are:

- Deturbo (the motherboard operates at a slower speed to enable use of some legacy cards)
- Turbo (boot-up occurs at full speed) **(default)**

4.5.4 Num Lock

Sets the beginning state of the Num Lock feature on the numeric keypad of the keyboard. The options are:

- Off **(default)**
- On

4.5.5 Setup Prompt

NOTE

The Setup Prompt option does not affect the ability to access the Setup program. It only enables or disables the prompt.

Controls whether the "Press <F1> Key if you want to run Setup" prompt is displayed during the power-up sequence. The options are:

- Enabled **(default)**
- Disabled

4.5.6 Hard Disk Pre-Delay

Sets the hard disk drive pre-delay. When enabled, this option causes the BIOS to wait the specified time before it accesses the first hard drive. If the computer contains a hard drive and the drive type is not displayed during boot-up, but the drive type is displayed following a warm boot (<Ctrl><Alt><Del>), the hard drive may need more time before it is able to communicate with the controller. Setting a pre-delay provides additional time for the hard drive to initialize. The options are:

- Disabled **(default)**
- 3 Seconds
- 6 Seconds
- 9 Seconds
- 12 Seconds
- 15 Seconds
- 21 Seconds
- 30 Seconds

4.5.7 Typematic Rate Programming

Sets the typematic rates. The options are:

- Default **(default)**
- Override (displays Typematic Rate Delay and Typematic Rate options)

4.5.8 Typematic Rate Delay

Sets the delay (in milliseconds) before the key-repeat function starts when the user holds down a key on the keyboard. If Typematic Rate Programming is set to Default, this option will not be visible. The options are:

- 250 msec **(default)**
- 500 msec
- 750 msec
- 1000 msec

4.5.9 Typematic Rate

Sets the speed at which characters repeat when a key is held down on the keyboard. The higher the number, the faster the characters repeat. If Typematic Rate Programming is set to Default, this option will not be visible. The options are:

- 6 char/sec **(default)**
- 8 char/sec
- 10 char/sec
- 12 char/sec
- 15 char/sec
- 20 char/sec
- 24 char/sec
- 30 char/sec

4.5.10 Speaker

Turns the onboard speaker control on or off. The options are:

- Disabled
- Enabled **(default)**

4.5.11 Scan User Flash Area

NOTE

Regardless of the setting of this option, if an OEM logo is programmed into the user flash area it will be displayed at bootup.

Scans the user flash area for an executable binary to be executed during POST. The options are:

- Disabled (no scan) (**default**)
- Enabled (scan occurs during POST)

4.5.12 Boot Virus Detection

Assigns the BIOS to monitor the master boot sector of the boot device. The options are:

- Disabled
- Enabled **(default)**

4.6 Advanced Screen

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

4.6.1 Processor Type

Reports the processor type. There are no options.

4.6.2 Processor Speed

Reports the processor clock speed. There are no options.

4.6.3 Cache Size

Reports the size of the secondary (L2) cache. There are no options.

4.6.4 Peripheral Configuration

When selected, this displays the Peripheral Configuration subscreen.

4.6.5 Advanced Chipset Configuration

When selected, this displays the Advanced Chipset Configuration subscreen.

4.6.6 Power Management Configuration

When selected and enabled, this displays the Advanced Power Management subscreen.

4.6.7 Plug and Play Configuration

When selected, this displays the Plug and Play Configuration subscreen.

4.6.8 Event Logging Configuration

When selected, this displays the Event Logging Configuration subscreen.

4.7 Peripheral Configuration Subscreen

This section describes the Setup options for the Peripheral Configuration subscreen. For peripherals set to Auto, the BIOS automatically configures the peripheral during power up.

4.7.1 Primary PCI IDE Interface

Disables or automatically configures the primary PCI IDE hard disk interface. The options are:

- Disabled
- Auto Configured **(default)**

4.7.2 Secondary PCI IDE Interface

Disables or automatically configures the secondary PCI IDE hard disk interface. The options are:

- Disabled
- Auto Configured **(default)**

4.7.3 Floppy Interface

Disables or automatically configures the diskette drive interface. The options are:

- Disabled
- Enabled
- Auto Configured **(default)**

4.7.4 Serial Port 1 Interface

Selects the logical COM port, I/O address and interrupt for Serial Port 1. The options that are displayed can vary, depending on whether the user chooses Windows 95 in the PnP OS screen (see Section 4.10.2). The options appear in the following format:

- Disabled
- <COMx>, <I/O address>, <IRQx>
- Auto Configured (Setup assigns the first free COM port, normally COM1, 3F8h, IRQ4) **(default)**

4.7.5 Infrared Port Interface

Selects the logical COM port, I/O address and IRQ of the IR Port. The options that are displayed can vary, depending on whether the user chooses Windows 95 in the PnP OS screen (see Section 4.10.2). The options appear in the following format:

- Disabled
- <COMx>, <I/O address>, <IRQx>
- Auto Configured (Setup assigns the first free COM port, normally COM2, 2F8h, IRQ3) **(default)**

NOTE

If the user sets either the Serial Port 1 or the IR Port I/O address, that address will not appear in the list of options for the other port. If an ATI mach32† or an ATI mach64† video controller is active (as an add-in card), the COM4, 2E8h address will not appear in the list of options for either port.

4.7.6 Parallel Port Interface

Selects the logical printer port, I/O address, interrupt, and DMA channel (if applicable) of the parallel port. The options that are displayed can vary, depending on the Parallel Port Mode selected (see Section 4.7.7) and whether the user selects Windows 95 in the Boot with PnP OS screen (see Section 4.10.2). The options appear in the following format:

- Disabled
- <LPTx>, <I/O address>, <IRQx>, <DMA x>
- Auto Configured (Setup assigns LPT1, 378h, IRQ7) **(default)**

4.7.7 Parallel Port Type

Selects the mode for the parallel port. The options are:

- Compatible (operates in AT†-compatible mode) **(default)**
- Bidirectional (operates in bidirectional PS/2-compatible mode)
- EPP (Enhanced Parallel Port, a high-speed bidirectional mode)
- ECP (Extended Capabilities Port, a high-speed bidirectional mode)

4.7.8 USB Interface

Enables or disables the USB interface. USB support requires that the BIOS allocate a PCI interrupt, which could cause an interrupt to be shared with another device. If interrupt sharing is a problem, and support for USB is not required, an interrupt can be made available by disabling USB. The options are:

- Disabled (frees the PCI interrupt used to support USB)
- Enabled **(default)**

4.7.9 Audio Interface

This option enables or disables the onboard audio subsystem. This option is displayed only if the optional audio subsystem is installed on the motherboard. The options are:

- Disabled (frees the I/O resources and addresses used to support the audio interface)
- Enabled **(default)**

4.7.10 Hardware Monitor Interface

This option enables or disables the hardware monitor subsystem. This option is displayed only if the optional Hardware Management Extension component is installed on the motherboard. The options are:

- Disabled
- Enabled **(default)**

4.7.11 PCI LAN Interface

This option enables or disables the onboard LAN interface. This option is displayed only if the optional LAN subsystem is installed on the motherboard. The options are:

- Disabled
- Enabled **(default)**

4.7.12 Primary IDE Status

Reports if the primary IDE interface is enabled or disabled. There are no options.

4.7.13 Secondary IDE Status

Reports if the secondary IDE interface is enabled or disabled. There are no options.

4.7.14 Floppy Status

Reports if the diskette drive interface is enabled or disabled. There are no options.

4.7.15 Serial Port 1 Status

Reports the COM port, I/O address, and IRQ for Serial Port 1. There are no options.

4.7.16 Infrared Port Status

Reports the COM port, I/O address, and IRQ for the IR Port. There are no options.

4.7.17 Parallel Port Status

Reports the logical printer port, I/O address, and IRQ for the parallel port. There are no options.

4.8 Advanced Chipset Configuration Subscreen

This section describes the options available on the Advanced Chipset Configuration subscreen.

4.8.1 Base Memory

Sets the size of the base memory. The options are:

- 512 KB
- 640 KB **(default)**

4.8.2 ISA LFB Size

Sets the size of the linear frame buffer. The options are:

- Disabled **(default)**
- 1 MB (if selected, the ISA LFB Base Address field appears)

4.8.3 ISA LFB Base Address

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

4.8.4 Onboard Video IRQ

Determines whether the BIOS assigns an interrupt to PCI video. This option applies both to onboard video and/or a PCI video add-in card. The options are:

- Disabled (no IRQ is assigned) **(default)**
- Enabled (BIOS assigns an IRQ to PCI video)

4.8.5 Video Palette Snoop

Controls the ability of a primary PCI graphics controller to share a common palette with an ISA add-in video card. The options are:

- Disabled **(default)**
- Enabled

4.8.6 ISA VGA Write Combining

Determines whether VGA frame buffer addresses are set to the processor's Write Combined memory type. The options are:

- Disabled (not set to Write Combined type)
- Enabled (set to Write Combined type) **(default)**

4.8.7 Latency Timer (PCI Clocks)

Sets the length of time an agent on the PCI bus can hold the bus when another agent has requested the bus. The units are numbers of PCI clocks. The options are:

- 16
- 24
- 32
- 40
- 48
- 56
- 64
- 72
- 80
- 88
- 96
- 104
- 112
- 120
- 128
- Auto Configured **(default)**

4.8.8 Memory Error Detection

Sets the type of error detection or correction. This field appears if ECC system memory is detected. ECC memory may be configured to run either as parity or ECC. The options are:

- Disabled **(default)**
- ECC
- Parity

This item does not appear if the memory detected by the BIOS does not support ECC.

4.8.9 Bank 0

Reports the type of memory found in the first bank. There are no options.

4.8.10 Bank 1

Reports the type of memory found in the second bank. There are no options.

4.8.11 Bank 2

Reports the type of memory found in the third bank. There are no options.

4.9 Power Management Configuration Subscreen

This section describes the options available on the Power Management Configuration subscreen.

4.9.1 Advanced Power Management

Enables or disables the Advanced Power Management (APM) support in the BIOS. APM manages power consumption only when used with an APM-capable operating system. The options are:

- Disabled (none of the following fields in the Advanced Power Management subscreen appear)
- Enabled **(default)**

4.9.2 IDE Drive Power Down

Sets any IDE drives to spin down when the computer goes into power managed mode. The options are:

- Disabled
- Enabled **(default)**

4.9.3 VESA Video Power Down

Sets any VESA-compliant monitor to be power managed when the system goes into power managed mode. The options are:

- Disabled (the monitor is not under power management)
- Standby (minimal power reduction, HSYNC signal not active)
- Suspend (significant power reduction, VSYNC signal not active)
- Sleep (maximum power reduction, HSYNC and VSYNC not active) **(default)**

4.9.4 Inactivity Timer

Sets the number of minutes the computer must be inactive before it enters power-managed mode. The range is 0 - 255 minutes. The default is 10 minutes.

4.9.5 Hot Key

Sets the hot key for power-managed mode. When a user presses this key while holding down the <Ctrl> and <Alt> keys, the system enters power-managed mode. All alphabetic keys are valid entries for this field. The BIOS must be connected to an OS-dependent APM driver for this option to work.

NOTE

If the user sets the APM hot key and the Security hot key (see Section 4.12.8) to the same key, the APM function has priority.

4.9.6 Auto Start On AC Loss

Enables returning to the last known state of the system, or powering down the system if the motherboard detects that AC power to the power supply is lost. The options are:

- Disabled
- Enabled (**default**)

4.9.7 Power-On COM1 Ring

Power-On COM1 Ring sets the control that allows the system to be powered on when an incoming call is received on a telephony device configured for operation on COM1. The options are:

- Disabled (**default**)
- Enabled

4.9.8 Power On LAN

Power-On LAN sets the control that allows the system to be powered on when the LAN subsystem receives a Magic Packet addressed to it. The options are:

- Disabled
- Enabled (**default**)

This option is displayed only if the BIOS detects the presence of the onboard Remote Wakeup ASIC.

4.10 Plug and Play Configuration Subscreen

This section describes the options in the Plug and Play configuration subscreen.

4.10.1 Configuration Mode

Sets how the BIOS gets information about ISA cards that do not have Plug and Play capabilities. The options are:

- Use PnP OS (displays a choice of OSs as listed in the following section) **(default)**
- Use BIOS Setup (displays options for reserving resources for ISA legacy devices)

4.10.2 PnP OS

This option applies only to Plug and Play ISA cards; the BIOS always auto-configures PCI devices. The option lets the computer boot with an operating system capable of managing Plug and Play add-in cards. If the user chooses one of the Plug and Play OS options (Other or Windows 95), the BIOS assigns resources to ISA Plug and Play initial program load (IPL) devices. The OS is then responsible to enable devices and assign resources (I/O addresses, interrupts, etc.) for all remaining devices. The options are:

- Disabled (for DOS; BIOS configures and enables all devices at boot time, whether they are Plug and Play or not)
- Other PnP OS (BIOS auto-configures PCI devices before onboard motherboard devices)
- Windows 95 (BIOS auto-configures onboard motherboard devices before PCI devices) **(default)**

4.10.3 ISA Shared Memory Size

Lets the user specify a range of memory addresses that will be usable by ISA add-in cards for shared memory, and that will not be used for shadowing ROM memory from other devices. The options are:

- Disabled (the ISA Shared Memory Base Address field does not appear) **(default)**
- 16 KB
- 32 KB
- 48 KB
- 64 KB
- 80 KB
- 96 KB

Enable this field only if a legacy ISA add-in card without Plug and Play capabilities is being used, and the card requires non-ROM memory space. For example, this could include LAN cards that have onboard memory buffers or video capture cards that have video buffer memory.

By default, upper memory is allocated as follows: Memory from C0000-C7FFF is automatically shadowed (this memory range is typically reserved for video BIOS). Memory from C8000-DFFFF is initially unshadowed. The BIOS scans this range for any ISA add-in cards that may be present and notes their location and size. The BIOS then auto-configures the PCI devices and Plug and Play devices, shadowing their ROM requirements (other than video) into the area above E0000. If that area becomes full, it continues shadowing to the area between C8000 and DFFFF. If an ISA legacy card has non-ROM memory requirements, the auto-configure routine might write into an area that is needed by the ISA card. Use the ISA Shared Memory Size and ISA Shared Memory Base Address fields to reserve a block of memory that will not be used for shadowing.

4.10.4 ISA Shared Memory Base Address

Sets the base address for the ISA Shared Memory. The options are:

- C8000h **(default)**
- CC000h
- D0000h
- D4000h
- D8000h
- DC000h

The options that appear depend on the ISA Shared Memory Size field. The total amount of ISA Shared Memory cannot extend to the E0000h address. For example, if a size of 64 KB is selected, options D4000h, D8000h, and DC000h will not be available.

4.10.5 IRQ 5, 9, 10, 11

Sets the status of the IRQ. The options are:

- Available **(default)**
- Used By ISA Card

The PCI auto-configuration code uses these settings to determine whether these interrupts are available for use by PCI add-in cards. If an interrupt is marked available, the auto-configuration code can assign the interrupt to be used by the system. If the computer has an ISA add-in card that requires an interrupt, select Used By ISA Card for that interrupt.

NOTE

IRQs 5, 9, 10, and 11 are the default user-available IRQs. Depending on the configuration of the computer, other IRQs might be listed (for example, if a user disables the parallel port and/or serial port).

4.11 Event Logging Configuration

This section describes the options available in the Event Logging Configuration subscreen.

4.11.1 Event Log Capacity

This information field tells whether the log is full or not. There are no options.

4.11.2 Event Log Count Granularity

This information field tells the number of log events that will occur before the event log is updated. There are no options.

4.11.3 Event Time Granularity (Minutes)

This information field tells the number of minutes that will pass before the event log is updated. There are no options.

4.11.4 Event Log Control

Enables event logging. The options are:

- All Events Enabled **(default)**
- ECC Events Disabled
- All Events Disabled

4.11.5 Clear Event Log

Sets a flag that clears the event log the next time the POST runs. The options are:

- Keep (the event log will not be cleared) **(default)**
- On Next Boot (the event log will be cleared)

4.11.6 Mark Existing Events as Read

Sets a flag that marks all events in the log as having been read, the next time the POST runs. The options are:

- Do Not Mark (events will not be marked as read) **(default)**
- Mark (all events will be marked as read)

4.11.7 Event Log Subscreens

The bottom of the Event Log screen includes several information fields that display information about the date and time of the last event of a specific type, as well as a count of how many events of that type are logged. Selecting a field and pressing Enter displays a subscreen that shows information specific to that type of event. Table 40 lists the event types for which subscreens are available. The subscreens for all event types include the initial three lines of information (date, time, and total count) as shown for Single Bit ECC Events.

Table 40. Event Log Subscreens

Event Type	Subscreen Detail	
Single Bit ECC Events	Date of Last Occurrence Time of Last Occurrence Total Count of Events/Errors Memory Bank with Errors	None *(initial value)* None *(initial value)* None *(initial value)* None *(initial value)*
Multiple Bit ECC Events *	Memory Bank with Errors	None *(initial value)*
Pre-Boot Events *	POST ERRORS FOUND:	None *(initial value)*
Boot Virus Detection Events	Virus Scan Details	None *(initial value)*

* The first three lines of the subscreen detail are the same as shown for the Single Bit ECC Events type.

Note: These logs show the last recorded event, which may not be from this boot session unless the Clear Event Log option is set to On Next Boot.

4.12 Security Screen

This section describes the options that can be set to restrict access to the Setup program and to restrict who can boot the computer.

An administrative password and a user password can be set for the Setup program and for booting the computer, with the following restrictions:

- The administrative password gives unrestricted access to view and change all the Setup options in the Setup program. This is administrative mode.
- The user password gives restricted access to view and change Setup options in the Setup program. This is user mode. The level of user-mode access is set with the User Privilege Level option. See Section 4.12.5 for information about the User Privilege Level option.
- If only the administrative password is set, pressing the <Enter> key at the password prompt of the Setup program allows the user restricted access to Setup. The restricted access is the level set for the User Privilege Level option.
- If both the administrative and user passwords are set, users can enter either the administrative password or the user password to access Setup. Users have access to Setup respective to which password is entered.
- Setting the user password restricts who can boot the computer. The password prompt will be displayed before the computer is booted. If only the administrative password is set, the computer boots without asking for a password. If both passwords are set, the user can enter either password to boot the computer.

Table 41 shows the effects of setting the administrative password and user password. This table is for reference only and is not displayed on the screen.

Table 41. Administrative and User Password Functions

Password Set	Administrative Mode	User Mode	Setup Options	Password to Enter Setup	Password During Boot
Neither	Can change all options *	Can change all options *	None	None	None
Administrative only	Can change all options	Can change a limited number of options **	Administrative Password User Privilege Level	Administrative	None
User only	N/A	Can change all options	Enter Password Clear User Password	User	User
Administrative and user set	Can change all options	Can change a limited number of options **	Administrative Password User Privilege Level Enter Password	Administrative or user	Administrative or user

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

** The level of user access is set with the User Privilege Level option. See Section 4.12.5 for more information about the User Privilege Level option.

4.12.1 User Password

Reports if there is a user password set. There are no options.

4.12.2 Administrative Password

Reports if there is an administrative password set. There are no options.

4.12.3 Enter Password

Sets the user password. The password can be up to seven alphanumeric characters.

4.12.4 Set Administrative Password

Sets the administrative password. The password can be up to seven alphanumeric characters.

4.12.5 User Privilege Level

Sets the level of access users can have to the Setup program. This option can be set only by an administrative user with access to the administrative password. This option is displayed only when an administrative password is set. The options are:

- Limited Access **(default)**
- No access
- View Only
- Full Access

The following table specifies the permitted access to Setup for each option:

Table 42. Access for User Privilege Level Options

Option	Access
Limited Access	User can access the Setup program and can change the following options: System Date, System Time, User Password, Unattended Start, and Security Hot-Key. Other Setup options are not visible.
No access	User cannot access the Setup program.
View Only	User can access the Setup program and view options, but cannot change any options.
Full Access	User can access the Setup program and can change all options except User Privilege Level and Set Administrative Password.

4.12.6 Clear User Password

Clears the current user password. The user password must be set to enable this field.

4.12.7 Unattended Start

Controls when the security password is requested. The user password must be set to enable this field. The options are:

- Enabled (the system boots, but the keyboard is locked until the user password is entered)
- Disabled (the system does not boot until the user password is entered) **(default)**

4.12.8 Security Hot Key (CTRL-ALT-)

Sets a hot key that locks the keyboard until the user password is entered. All alphabetic keys are valid entries for this field. When a user presses this key while holding down the <Ctrl> and <Alt> keys, the keyboard locks and the keyboard LEDs flash to indicate that the keyboard is locked.

NOTE

If the user sets the Security hot key and the APM hot key (see Section 4.9.5) to the same key, the APM function has priority.

4.13 Exit Screen

This section describes how to exit Setup with or without saving the changes that have been made.

4.13.1 Exit Saving Changes

Exits Setup and saves the changes in CMOS RAM. The user can also press the <F10> key at any time in the Setup program to do this.

4.13.2 Exit Discarding Changes

Exits Setup program without saving any changes. This means that any changes made in Setup are discarded and not saved. Pressing the <Esc> key in any of the four main screens will also exit and discard changes.

4.13.3 Load Setup Defaults

Returns all of the Setup options to their defaults. The default Setup values are loaded from the ROM table. The user can also press the <F5> key anywhere in Setup to load the defaults.

4.13.4 Discard Changes

Discards any changes made up to this point in Setup without exiting Setup. This selection loads the CMOS RAM values that were present when the system was turned on. The user can also press the <F6> key anywhere in Setup to discard changes.

5 Error Messages and Beep Codes

5.1 BIOS Beep Codes

One long beep followed by short beeps indicates a video problem.

Table 43. Beep Codes

Beeps	Error Message	Description
1	Refresh Failure	The memory refresh circuitry on the motherboard is faulty.
2	Parity Error	A parity error occurred in system memory.
3	First Bank Memory Failure	Memory failure in the first bank of memory.
4	Timer Not Operational	Memory failure in the first bank of memory, or Timer 1 on the motherboard is not functioning.
5	Processor Error	The processor on the motherboard generated an error.
6	Keyboard Controller Failure	The keyboard controller may be bad. The BIOS cannot switch to protected mode.
7	Processor Exception Interrupt Error	The processor 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 Read/Write Error	The shutdown register for CMOS RAM failed.

5.2 PCI Configuration Error Messages

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

Table 44. PCI Error Messages

Message	Explanation
Bad PnP Serial ID Checksum	The Serial ID checksum of a Plug and Play card is 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 Extended System Configuration Data (ESCD) was reinitialized because of an NVRAM checksum error. Try rerunning the ISA Configuration Utility (ICU).
NVRAM Cleared By Jumper	The Clear CMOS jumper has been moved to the Clear position. CMOS RAM and ESCD have been cleared.
NVRAM Data Invalid, NVRAM Cleared	Invalid data found in the ESCD. When this message is displayed, the BIOS has already rewritten the ESCD with current configuration data.
Parallel Port Resource Conflict	The parallel port requested a resource that is already in use.
PCI Error Log is Full	More than 15 PCI conflict errors have been detected and no additional PCI errors can be logged.
PCI I/O Port Conflict	Two devices requested the same I/O address, resulting in a conflict.
PCI IRQ Conflict	Two devices requested the same IRQ, resulting in a conflict.
PCI Memory Conflict	Two devices requested the same memory resource, resulting in a conflict.
Primary Boot Device Not Found	The designated primary boot device (hard disk drive, floppy drive, CD-ROM drive, or network) could not be found.
Primary IDE Controller Resource Conflict	The primary IDE controller has requested a resource already in use.
Primary Input Device Not Found	The designated primary input device (keyboard, mouse, or other device if input is redirected) could not be found.
Secondary IDE Controller Resource Conflict	The secondary IDE controller has requested a resource 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 ISA card has requested a resource that is already in use.

5.3 BIOS Error Messages

Table 45 lists error messages that the BIOS can report.

Table 45. BIOS Error Messages

Error Message	Explanation
A20 Error	The keyboard controller is not working.
Address Line Short!	Error in the address decoding circuitry on the motherboard.
CH-2 Timer Error	There is an error in Counter/Timer 2.
CMOS Battery State Low	The battery power is low. Replace the battery.
CMOS Checksum Failure	After CMOS RAM values are saved, a checksum value is generated for error checking. The previous value is different from the current value. Run Setup.
CMOS System Options Not Set	The values stored in CMOS RAM are either corrupt or nonexistent. Run Setup.
CMOS Display Type Mismatch	The video type in CMOS RAM does not match the type detected by the BIOS. Run Setup.
CMOS Memory Size Mismatch	The amount of memory on the motherboard is different than the amount indicated in CMOS RAM. Run Setup.
CMOS Time and Date Not Set	Run Setup to set the date and time in CMOS RAM.
Diskette Boot Failure	The boot disk in floppy drive A: is corrupt. It cannot be used to boot the system. Use another boot disk and follow the screen instructions.
DMA Error	Error in the DMA controller.
DMA #1 Error	Error in the first DMA channel.
DMA #2 Error	Error in the second DMA channel.
FDD Controller Failure	The BIOS cannot communicate with the floppy disk drive controller. Check all appropriate connections after the system is powered down.
HDD Controller Failure	The BIOS cannot communicate with the hard disk drive controller. Check all appropriate connections after the system is powered down.
INTR #1 Error	Interrupt channel 1 failed POST.
INTR #2 Error	Interrupt channel 2 failed POST.
Invalid Boot Diskette	The BIOS can read the disk in floppy drive A:, but cannot boot the system from it. 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.
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) where XXXX is the hex address where the error occurred.
Parity Error	Parity error in system memory at an unknown address.

5.4 ISA NMI Messages

Table 46 lists error messages that can be caused by a nonmaskable interrupt (NMI).

Table 46. NMI Error Messages

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

5.5 Port 80h POST Codes

During POST, the BIOS generates diagnostic progress codes (POST codes) to I/O port 80h. If the POST fails, execution stops and the last POST code generated is left at port 80h. This code is useful for determining the point where an error occurred.

Displaying the POST codes requires the use of an add-in card (often called a POST card). The POST card can decode the port and display the contents on a medium such as a seven-segment display. These cards can be purchased from JDR Microdevices or other sources.

The following table provides the POST codes that can be generated by the motherboard's BIOS. Some codes are repeated in the table because that code applies to more than one operation.

Table 47. Port 80h Codes

Code	Description of POST Operation Currently In Progress
000h	Give control to ROM in flash - execute boot.
000h	Execute boot.
002h	Disable internal cache. Keyboard controller test.
008h	Disable DMA controller #1, #2. Disable interrupt controller #1, #2. Reset video display.
00Dh	Check for signature of the board manufacturing company.
00Dh	If default jumper is set, go to Load CMOS Default.
00Eh	Check the validity of CMOS - if there is anything wrong or invalid, force to default.
00Fh	Load default CMOS settings.
010h	Clear error register, clear CMOS pending interrupt, check and set clock rate, check and set base memory size 512 KB of 640 KB.
010h	If base memory size is 640 KB, allocate extended BIOS data area (EBDA) - otherwise, calculate the EBDA.
010h	Set up overlay environment. Update setupFlags with current operating environment. Initialize interrupt vector pointing to the error handlers, Update setupFlags in EBDA. Initialize CMOS pointers in EBDA.
013h	Program all chipset registers.

continued ☛

Table 47. Port 80h Codes (continued)

Code	Description of POST Operation Currently In Progress
015h	Initialize system timer.
01Bh	Go to real memory base 64 KB test.
020h	16 KB base RAM Test.
023h	Hook made available prior to initializing the interrupt vector table.
023h	Set up interrupt vectors.
024h	Initialize and load interrupt vectors.
025h	Video rows initialization.
028h	Set monochrome mode.
029h	Set color display - color mode set.
02Ah	Clear parity status if any.
02Bh	Initialization required internal to some chipset before video initialization. Custom video initialization.
02Ch	Test optional video ROM.
02Dh	Initialize registers internal to chipset after video initialization.
02Eh	Check for video ROM.
02Fh	Display memory read/write test.
030h	Test video horizontal and vertical tracing.
031h	Display video memory read/write test.
032h	Test video horizontal and vertical tracing - Beep if no video controller installed. Check for MDA.
034h	Set up video configuration (column x row). Display copyright message.
036h	Initialize messaging services. Clear the screen.
037h	Display the first screen signon.
039h	Update screen pointer. Display setup message. Display keyboard signon. Display mouse signon.
040h	Memory test starting segment at 00000h.
043h	Calculate the memory size left to be tested.
04Fh	Disable caching, etc. Check if the system memory size is larger than zero. Test and initialize to zero all DRAM. Remap memory partition if necessary. Test one MB of memory. Update counter on screen. Repeat memory test for each MB of memory until done.
052h	ChipsetAdjustMemorySize - Adjust any base of extended memory size because of chipset.
061h	Test DMA master page registers.
062h	Test DMA slave page registers.
065h	Program DMA controllers.
066h	Clear DMA write control registers.
067h	Unmask timer and NMI. Update master mask register.
080h	Run keyboard detection. Run mouse detection.
080h	Read interrupt mask - Setup diskette ISR, #2, keyboard, and timer.
081h	8042 interface test - Enable keyboard interrupt if keyboard is detected.
082h	Enable interrupt.

continued ☛

Table 47. Port 80h Codes (continued)

Code	Description of POST Operation Currently In Progress
083h	Check and set keyboard lock bit.
088h	Floppy unit initialization - Floppy controller and data setup.
08Ch	Set up interface between the BIOS POST and the device initialization management (DIM).
08Fh	Read interrupt mask. Unmask floppy interrupt. Setup floppy controller and data setup.
092h	Set up COM port and LPT port timeout values. Display wait message if setup key is pressed.
096h	Clear to bottom of the screen - Perform chipset initialization required before option ROM scans. Give control to ROM in flash.
097h	Verify and give control to optional ROM.
098h	Perform any chipset initialization required after option ROM scans - give control to ROM in flash.
09Ah	Adds MP entries for buses, I/O APIC, I/O INTRs, and LINTs.
09Dh	Timer data area initialization - set time and date.
0A0h	Set up printer base addresses.
0A0h	Enable internal cache.
0A1h	Set COM base addresses - keyboard stuck key check.
0A2h	Reset floating point unit.
0A3h	Log and display POST errors if any. Check if manufacturing mode - if there are POST errors, display setup key and boot key options.
0A6h	Call Setup program if setup was requested.
0A7h	Load and wait for the valid password - unmask INT-0A redirection.
0ABh	Custom floating point unit initialization.
0ACh	Initialize internal floating point unit.
0ADh	Update CMOS with floating point unit presence.
0ADh	A fatal error results in a continuous echo of ‘DEAD’ to port 80h - echo ‘DE’ (wait 1 sec.), echo ‘AD’ (wait 1 sec.).
0AEh	Set typematic rate.
0AFh	Read keyboard ID.
0B0h	Process POST errors.
0B1h	Test cache memory.
0B3h	Set up display mode (40x25, 80x25).
0B4h	Jump to PreOS (pre-operating system) module.
0BBh	Perform work before registers and circular keyboard buffer are cleared just prior to INT 19h. Reinitialize message services. Initialize APM. Perform post SMI initialization. Circumvents EMM386’s attempts to utilize the lower 32 KB area base.
0BBh	Fix CMOS Read and CMOS Write so that every call does not set NMI off. Shadow product information in the compatibility segment. Give a beep for boot. Handle chipset specific manipulation before boot. Check keyboard for data before MP manipulation.
0D0h	Initialize DS, ES, GS, and FS. Check if keyboard system bit is set. Check whether a hard or soft reset has occurred.
0D1h	Power on initialization. Initialize special chipsets in power on/hard reset. Check cache size and type, write reserved cache size information to CMOS, determine processor speed (optional).
0D2h	Disable NMI reporting.

continued ☛

Table 47. Port 80h Codes (continued)

Code	Description of POST Operation Currently In Progress
0D3h	Reset video adapter.
0D4h	If the microprocessor is in protected mode, load GDT 4 GB segment - ChipsetPreInit(), disable L1 and L2 cache, perform any initialization required before the main chipset configuration is done.
0D5h	System validity check. Calculate checksum.
0D6h	Provides ability to do any special chipset initialization required before keyboard controller testing can begin.
0D7h	Flush the keyboard input buffer.
0D8h	Issue keyboard BAT command.
0D9h	Retrieve 8042 KBC output buffer.
0DAh	If keyboard initialization failed, display error message and halt.
0DBh	Provide ability to do any special chipset initialization after KBC test.
0DDh	Initialize keyboard controller command byte.
0DEh	A fatal error results in a continuous echo of 'DEAD' to port 80h - echo 'DE' (wait 1 sec.), echo 'AD' (wait 1 sec).
0DFh	Disable master/slave DMA controllers.
0E0h	Initialize master/slave programmable interrupt controllers.
0E1h	ChipsetInit - Preset any defaults needed to chipset registers.
0E1h	Start the refresh timer(s) running.
0E1h	Size all L2 Cache (if present/required).
0E1h	Detect EDO memory module.
0E1h	Size memory partition boundaries.
0E1h	Disable all memory holes.
0E1h	The 512-640 KB must be DRAM mapped.
0E1h	Gate A20 must be set and left set for POST.
0E2h	Initialize timer channel 2 for speaker.
0E3h	Initialize timer channel 0 for system timer.
0E4h	Clear pending parity errors - disable and clear parity, reactivate parity.
0E5h	Enter flat mode.
0E6h	Test the first 2 MB of system memory.
0E7h	Get minimum memory partition size and test memory.
0E8h	Remap DIMMs if failure detected and remapping supported.
0E8h	Display error message and halt if remapping not supported.
0E9h	After memory test, clear pending parity errors. Disable and clear parity, set bits to reactivate parity.
0EAh	Set up stack for POST, enable enhanced POST, shadow FE00h block.
0EBh	Look for the location of dispatcher in the packing list.
0EBh	Call decompression dispatcher Init function.

continued ☛

Table 47. Port 80h Codes (continued)

Code	Description of POST Operation Currently In Progress
0ECh	Make F000h DRAM R/W enabled, force use of EDI.
0EDh	Actively dispatch BIOS.
0F0h	Initialize I/O cards in slots.
0F1h	Enable extended NMI sources.
0F2h	Test extended NMI sources.
0F3h	Display EISA error message if any. Get keyboard controller vendor, program the keyboard controller.
0F4h	Enable extended NMI sources.
0F5h	Initialize mouse.

Note: Some port 80 codes are listed more than once because they test multiple functions. For example code 0EBh tests both of the following:
Look for the location of dispatcher in the packing list
Call decompression dispatcher Init function.

6 Specifications and Customer Support

6.1 Online Support

Find information about Intel motherboards under “Product Info” or “Customer Support” at this World Wide Web site: `http://www.intel.com`

6.2 Specifications

The motherboard complies with the following specifications:

Table 48. Compliance with Specifications

Specification	Description	Revision Level
APM	Advanced Power Management BIOS interface specification	Revision 1.2, February, 1996 Intel Corporation, Microsoft Corporation
ATA-3	Information Technology - AT Attachment-3 Interface	X3T10/2008D Revision 6 ATA Anonymous FTP Site: fission.dt.wdc.com
ATAPI	ATA Packet Interface for CD-ROMs	SFF-8020i Revision 2.5 (SFF) Fax Access: (408) 741-1600
DMI	Desktop Management Interface BIOS specification	Version 2.0, October 16, 1995 American Megatrends Inc., Award Software International Inc., Dell Computer Corporation, Intel Corporation, Phoenix Technologies Ltd., SystemSoft Corporation
“El Torito”	Bootable CD-ROM format specification	Version 1.0, January 25, 1995 Phoenix Technologies Ltd., IBM Corporation. The El Torito specification is available on the Phoenix Web site http://www.ptltd.com/techs/specs.html.
EPP	Enhanced Parallel Port	IEEE 1284 standard, Mode [1 or 2], v1.7
IrDA	Serial Infrared Physical Layer Link specification	Version 1.1, October 17, 1995 Infrared Data Association.
Management extension hardware	LM78 Microprocessor System Hardware Monitor	Current Web site: http://www.national.com/pf/LM/LM78.html
PCI	PCI Local Bus specification	Revision 2.1, June 1, 1995 PCI Special Interest Group
Plug and Play	Plug and Play BIOS specification	Version 1.0a, May 5, 1994 Compaq Computer Corporation, Phoenix Technologies Ltd., Intel Corporation
USB	Universal Serial Bus specification	Revision 1.0, January 15, 1996 Compaq Computer Corporation, Digital Equipment Corporation, IBM PC Company, Intel Corporation, Microsoft Corporation, NEC, Northern Telecom

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Manual Order Number: 282971-001
Total Number of Pages: 104
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