AG430HX Motherboard Technical Product Specification

Order Number 281833-001

August 1996

intel. ®

Revision History

Revision	Revision History	Date
-001	First release of the AG430HX Motherboard Technical Product Specification.	8/96

This product specification applies only to standard AG430HX Motherboards with BIOS identifier 1.00.0x.DD0.

Changes to this specification will be published in the AG430HX Motherboard Specification Update (Order Number: 281834) before being incorporated into a revision of this document.

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1   Motherboard Description

1.1 Overview

The AG430HX motherboard integrates the Pentium® processor, memory, and I/O technologies into a standard ATX form factor. The design supports Pentium processors operating at 75 MHz, 90 MHz, 100 MHz, 120 MHz, 133 MHz, 150 MHz, 166 MHz, and 200 MHz. The other motherboard features include:

- Support for up to 128 MB of Extended Data Out (EDO) or Fast Page (FP) DRAM in 72-pin SIMM† sockets; support for either parity, non-parity, as well as support for ECC operation.
- Socket 7 Pentium OverDrive® socket
- L2 cache of 256 KB Pipeline Burst SRAM soldered onto the board
- Intel 82430HX PCIset
- 2 Universal Serial Bus (USB) interfaces
- National Semiconductor Corporation PC87306B Super I/O controller
- Yamaha OPL3-SA audio CODEC component
- Yamaha wavetable header connectors
- Circuitry for SRS† Passive 3D stereo enhancement
- Dual-channel PCI Bus Mastering IDE
- Support for Plug and Play and Advanced Power Management (APM)
- ATI† 264GT video
- 3 PCI and 2 ISA expansions slots, and 1 PCI/ISA shared expansion slot

Software drivers and utilities are available to allow operating systems such as Windows† 95 to take advantage of the hardware capabilities. Features such as Bus Mastering IDE, Windows 95-ready Plug and Play, Advanced Power Management (APM) with software-controlled power supply shutdown, and bidirectional audio are all provided by software available for the AG430HX.
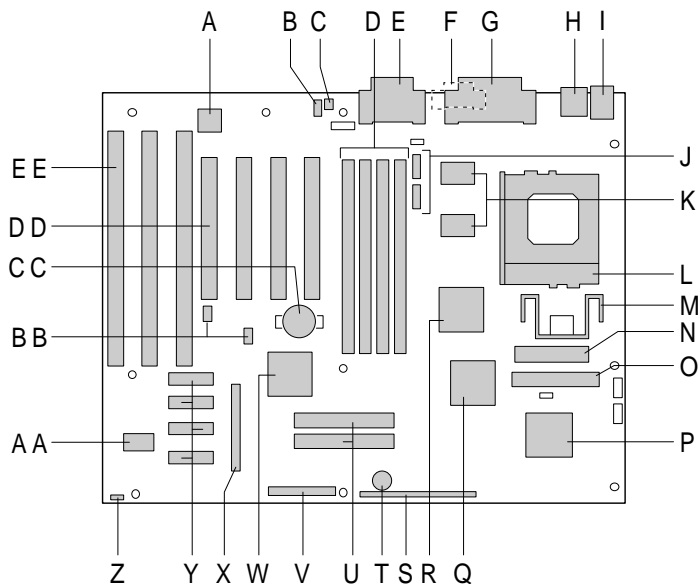
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Figure 1. Motherboard Features

A. Yamaha OPL3-SA audio component

B. CD-ROM audio connector

C. Telephony connector

D. SIMM sockets

E. MIDI/game port (top)
Line Out, Line In, Mic In ports (bottom)

F. VGA port

G. Parallel port

H. USB ports

I. PS/2† keyboard/mouse connectors

J. Serial port headers

K. Pipeline burst L2 cache

L. Socket 7 Pentium processor socket

M. Voltage regulator

N. Primary power connector

O. Floppy drive connector

P. PC87306B Super I/O controller

Q. 82371SB PCI/ISA IDE Xcelerator (PIIX3)

R. 82439HX (TXC) PCIset

S. Front panel I/O connectors

T. Piezo speaker (optional)

U. Primary and secondary IDE connectors

V. Configuration jumper block

W. ATI-264GT graphics controller

X. VESA/AMC header connector

Y. 2 MB video memory

Z. Fan connector (optional)

AA. 2 Mb flash component

BB. Yamaha wavetable header connectors

CC. Battery socket

DD. PCI expansion connectors

EE. ISA expansion connectors

1.2 Motherboard Manufacturing Options

- Yamaha daughter card wavetable upgrade
- SRS sound
- Piezo speaker
- Fan header connector

1.3 Form Factor

The motherboard is designed to fit into a standard ATX form factor chassis. Figure 2 illustrates the mechanical form factor for the motherboard. The motherboard does not adhere to the standard ATX v. 1.1 guidelines in that the outer dimensions are 12 inches x 9.6 inches (30.48 cm x 24.38 cm). Location of the I/O connectors, PCI and ISA slots, and mounting holes are in strict compliance with the ATX v. 1.1 specification.

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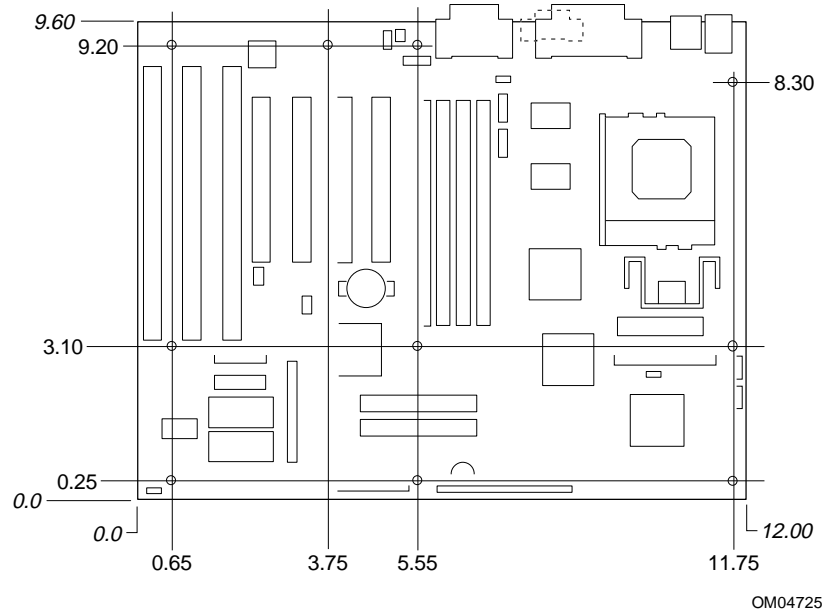
Figure 2. Motherboard Dimensions

1.4   Microprocessor

The motherboard is designed to operate with 3.3 volt Pentium processors. An onboard linear voltage regulator circuit provides the required 3.3 volts from the 5.0 volt tap of the power supply. Pentium processors that run internally at 75, 90, 100, 120, 133, 150, 166, and 200 MHz are supported.

The Pentium processor maintains full backward compatibility with the 8086, 80286, Intel386™ and Intel486™ processors. It supports both read and write burst mode bus cycles, and includes separate 8 KB on-chip code and data caches that employ a write-back policy. The Pentium processor has an advanced numeric coprocessor that significantly increases the speed of floating point operations, while maintaining backward compatibility with math coprocessors that comply with ANSI/IEEE standard 754-1985.

1.4.1   Microprocessor Upgrade

The motherboard provides a 321-pin Socket 7 ZIF processor socket that provides an upgrade path to future OverDrive processors.

1.5   Memory

1.5.1   System Memory

The motherboard provides four 72-pin SIMM sockets that make it possible to install up to 128 MB of RAM. The sockets support 1M x 32 (4 MB), 2M x 32 (8 MB), 4M x 32 (16 MB), and 8M x 32 (32 MB) single- or double-sided modules. Minimum memory size is 8 MB and maximum memory size is 128 MB. Memory timing requires 70 ns Fast Page devices or, for optimum performance, 60 ns EDO DRAM. If the maximum external processor clock speed is 60 MHz or slower, you can use 70 ns EDO DRAM. Both parity and non-parity devices are supported as well as ECC.

The four sockets are arranged in two banks of two sockets each. The sockets are designated Bank 0 and Bank 1. Each bank provides a 64/72-bit wide data path. Both SIMMs in a bank must be of the same memory size and type, although you can install different types of memory between banks. For instance, you can install 70 ns Fast Page DRAM in one bank and 60 ns EDO DRAM in the other. Each memory bank is independently optimized for maximum performance. You can install memory in only one bank or both banks may be populated at the same time. There are no jumper settings required for the memory size or type. Memory size and type are automatically detected by the system BIOS. Thus, no jumper settings need to be set for installing memory. Use only tin lead SIMMs when adding DRAM.

1.5.1.1   EDO DRAM

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

1.5.2   Parity/ECC Memory

Memory error checking and correction is supported with parity SIMMs. ECC is also supported. If parity SIMMs are installed, a BIOS Setup option provides choices for error detection only (parity) or error correction (ECC). Parity memory will detect single-bit errors. ECC memory will detect double-bit errors and correct single-bit errors. Errors may be generated by a defective memory module, different speeds of memory modules, or DMA or memory conflicts.

1.5.3   Second-level Cache

The Xcelerated Controller device supports a second-level cache that uses the synchronous pipeline burst static RAM (PBSRAM).

The motherboard supports 256KB of soldered down L2 cache. This configuration can provide cache for the first 64 MB of system memory. The BIOS automatically detects and configures the cache size.

1.6   Chipset

The Intel 82430HX PCIset consists of the 82439HX Xcelerated Controller (TXC) and one 82371SB PCI ISA/IDE Xcelerator (PIIX3) bridge chip.

1.6.1   82439HX Xcelerated Controller (TXC)

The 82439HX provides all control signals necessary to drive an L2 cache and the DRAM array, including multiplexed address signals. The TXC also controls system access to memory and generates snoop controls to maintain cache coherency. The TXC comes in a 324-pin Ball Grid Array (BGA) package and includes the following features:

- Processor interface control
- Integrated L2 write-back cache controller
  — Pipeline burst SRAM
- Integrated DRAM controller
  — 64 bit path to memory
  — Support for EDO and Fast Page DRAM
  — Parity and non-parity support
- Fully synchronous PCI 2.1 compliant bus interface
  — 25/30/33 MHz
  — PCI to DRAM > 100 MB/sec
  — Up to 4 PCI bus masters in addition to the PIIX3 and IDE.

1.6.2   82371SB PCI ISA/IDE Xcelerator (PIIX3)

The 82371SB provides the interface between the PCI and ISA buses and integrates a dual channel fast IDE interface capable of supporting up to four devices. The 82371SB integrates four 8-bit and three 16-bit DMA channels, one 16-bit timer/counter, two eight-channel interrupt controllers, PCI-to-AT interrupt mapping circuitry, NMI logic, ISA refresh address generation, and PCI/ISA bus arbitration circuitry together on the same device. The PIIX3 comes in a 208-pin QFP package and includes the following features:

- Interface between the PCI and ISA buses
- Universal Serial Bus controller
    — Host/hub controller
- Integrated fast IDE interface
    — Support for up to four devices
    — PIO Mode 4 transfers up to 16 MB/sec
    — Integrated 8 x 32-bit buffer for bus master PCI IDE burst transfers
    — Bus master mode
- PCI 2.1 compliance
- Enhanced fast DMA controller
- Interrupt controller and steering
- Counters/timers
- System Management Interrupt (SMI) logic and timer with fast on/off mode

1.6.3   IDE Support

The motherboard provides two independent high performance bus-mastering PCI IDE interfaces capable of supporting PIO Mode 3 and Mode 4 devices. The system BIOS supports Logical Block Addressing (LBA) and Extended Cylinder Sector Head (ECSH) translation modes as well as ATAPI (e.g. CD-ROM) devices on both IDE interfaces. Detection of IDE device transfer rate and translation mode capability is automatically determined by the system BIOS. Booting from CD-ROM is supported in compliance to the "El Torito" bootable CD-ROM format specification.

Normally, programmed I/O operations require a substantial amount of processor bandwidth. In true multi-tasking operating systems like Windows 95, the processor bandwidth freed up by using bus mastering IDE can be used to complete other tasks while disk transfers are occurring. When used in conjunction with the appropriate driver for the Windows 95 environment, the IDE interface can operate as a PCI bus master capable of supporting PIO Mode 4 devices with transfer rates of up to 16 MB/sec.

1.7 I/O Controller

The National Semiconductor PC87306B component combines control for the integrated serial ports, parallel port, floppy drive, RTC and keyboard controller. This component provides:

- Two NS16C550-compatible UARTs with send/receive 16 byte FIFO
- Two 9-pin serial port header connectors on the motherboard
- Support for an IrDA-compliant Infra Red interface
- Multi-mode bidirectional parallel port
    — Standard mode; IBM and Centronics compatible
    — Enhanced Parallel Port (EPP) with BIOS/Driver support
    — High Speed mode; Extended Capabilities Port (ECP) compatible
- Industry standard floppy controller with 16 byte data FIFO (2.88 MB floppy support)
- Integrated Real Time Clock (RTC) accurate within +/- 13 minutes/yr. at 25º C and 5 volts when the system is continuously powered on
- Integrated 8042-compatible keyboard controller

By default, the 306B interfaces are automatically configured by the BIOS during boot-up. You can also manually configure the interfaces with the BIOS Setup program. Chapter 3 describes and tells how to invoke the BIOS Setup program.

1.7.1 Floppy Controller

The I/O controller is software compatible with the DP8473 and 82077 floppy disk controllers. You can configure the floppy interface for 360 KB or 1.2 MB 5.25-inch media or for 720 KB, 1.2 MB, 1.44 MB, or 2.88 MB 3.5-inch media with the BIOS setup program. By default, the Floppy A interface is configured for 1.44 MB and Floppy B is disabled. A Setup option makes it possible to prevent a user from being able to write to a floppy drive. A driver is required for configuring the floppy interface for 1.2 MB 3.5-inch (3-mode floppy) operation.

1.7.2 Keyboard and Mouse Interface

PS/2 keyboard and mouse connectors are located on the back panel side of the motherboard. The 5 volt lines to these connectors are protected with a PolySwitch† circuit that acts much like a self-healing fuse, re-establishing the connection after an over-current condition is removed. While this device eliminates the possibility of having to replace a fuse, you should still be sure to turn off the system power before installing or removing a keyboard or mouse.

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

- <CTRL><ALT><DEL>: System software reset. This sequence performs a software reset of the system by jumping to the beginning of the BIOS code and running the POST operation.
- <CTRL><ALT><+> and <CTRL><ALT><->: Turbo mode selection. <CTRL><ALT><-> sets the system for deturbo mode (which operates the system at approximately 25 MHz) and <CTRL><ALT><+> sets the system for turbo mode. Changing the Turbo mode may be prohibited by an operating system, or when the processor is in Protected mode or virtual x86 mode under DOS.

- <CTRL><ALT><defined in Setup>: A power down hot-key sequence takes advantage of the SMM features of the Pentium processor to greatly reduce the computer's power consumption while maintaining the responsiveness necessary to service external interrupts. A security hot-key sequence provides password protection to the computer.
- The User Password must be entered to unlock the computer. This feature will not take effect unless the User Password has been set in the Setup program.

1.7.3   Real-Time Clock, CMOS RAM and Battery

The integrated real-time clock (RTC) is DS1287 and MC146818-compatible and provides a time of day clock and a 100-year calendar with alarm features. You can use the BIOS Setup program to set the RTC.

An external coin-cell style battery provides power to the RTC and CMOS memory. The battery has an estimated lifetime of three years, if the computer is not plugged into the wall socket. When the computer is plugged in, power is supplied from the power supply's 5 V standby current to extend the life of the battery.

The battery also supports the 242-byte battery-backed CMOS RAM, which is reserved for BIOS use. The BIOS Setup program makes it possible to set the CMOS RAM to specific values or to clear the settings to the default values. You can also clear the CMOS RAM values by changing a configuration jumper on the motherboard.

1.7.4   Infrared Support

The motherboard provides a 6-pin header connector to allow connection to a Hewlett Packard† HSDSL-1000 compatible Infrared Data Association (IrDA) transmitter/receiver. Consumer IR requires the use of a Sharp GP1U58X, Panasonic PNA4602M, ICX IRR538 and ICX model IRR638 or equivalent receiver module. While both modules can be connected and supported, only one module can be active at a time. Once the module is connected to the front panel I/O header, serial port 2 can be redirected to either the IrDA or the Consumer IR module. Once the serial port has been configured for IrDA, the user can transfer files to or from portable devices such as laptops, PDAs, and printers using application software such as LapLink†. The IrDA specification provides for data transfers at 115 Kbps from a distance of 1 meter. The Consumer IR operates in a system receive mode only and can be used to control telephony functions and multimedia operations such as volume control, CD track change, etc.

1.7.5   Serial Ports

The motherboard provides two standard 9-pin serial port header connectors.

1.7.6   Parallel Port

The back panel of the motherboard provides a multi-mode bidirectional parallel port. The BIOS Setup program provides options for configuring the parallel port in the following modes: output only compatible mode, bidirectional mode, ECP or EPP mode. You can also assign the parallel port to I/O addresses 278h, 378h, or 3BCh and IRQ's 5 or 7. Furthermore, a routable DMA scheme allows Plug and Play operating systems such as Windows 95 to route either DMA channels 1 or 3 to the parallel port for ECP mode. EPP BIOS support must be provided by a device driver or TSR.

1.8 Universal Serial Bus (USB) Ports

The motherboard provides two USB ports that make it possible to connect two USB peripheral devices directly to the motherboard without an external hub. You can connect additional devices by connecting an external hub to either of the built-in ports. The motherboard supports the standard universal host controller interface (UHCI) and takes advantage of the standard software drivers written to be compatible with UHCI. Features of the USB include:

- Self-identifying 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 the protocol

1.9 Graphics Subsystem

The motherboard comes with the ATI-264GT graphics controller.

1.9.1 Graphics Controller Features

The graphics controller includes the following features:

- Drawing coprocessor that operates concurrently with the host processor
- 3-D graphics capability
- Video scaler, color space converter, true color palette
- Triple-clock synthesizer

1.9.2 Memory Size and Type

The graphics controller comes with 2 MB EDO DRAM soldered on the motherboard.

1.9.3 Resolutions and Refresh Rates

Table 1 shows the video resolutions and maximum refresh rates that are supported by the controller.

⚠ CAUTION

Some monitors do not support all the refresh rates supported by the graphics controller. If you run the graphics subsystem at a refresh rate that is not supported by your monitor, you might damage the monitor. Check the manual that came with your monitor to determine the maximum and minimum refresh rates.

Table 1.   Supported Video Resolutions for ATI-264GT Controller

Resolution	Refresh rate (Hz) at:			
	4-bit Color	**8-bit Color**	**16-bit Color**	**24-bit Color**
640 x 480	100	100	100	100
800 x 600	100	100	100	100
1024 x 768	100	100	100	not supported
1152 x 864	80	80	80	not supported
1280 x 1024	75	75	not supported	not supported

1.9.4 VESA/AMC Feature Connector

The motherboard has an optional 40-pin ATI Multimedia Connector (AMC) that uses 34 pins for the VESA standard bus and 6 pins for the ATI Enhanced Visual Architecture bus. The connector makes it possible to support MPEG decoders or synchronize graphics output between an external NTSC/PAL signal and a shared frame buffer interface.

1.9.5 Graphics Drivers and Utilities

Intel makes available graphics drivers for OS/2[†] 2.11 and OS/2 WARP, MS-DOS[†] applications such as AutoCAD and Microstation, as well as driver updates for Windows 3.x, Windows 95 and Windows NT[†] 3.51. Drivers for SCO[†] UNIX[†] are available from SCO.

1.10 Audio Subsystem

The optional onboard audio subsystem features the Yamaha OPL YMF701, a 100-pin SQFP audio chip that integrates a 16-bit audio codec, OPL3 FM synthesis and its DAC, an MPU401 and joystick interface. It provides all the digital audio and analog mixing functions needed for recording and playing sound on personal computers. The Yamaha YMF701 features:

- Stereo analog-to-digital and digital-to-analog converters
- Analog mixing, anti-aliasing, and reconstruction filters
- Line and microphone level inputs
- ADPCM, A-law or µlaw digital audio compression/decompression

- Full digital control of all mixer and volume control functions
- Software switching between rear panel Mic In and Line In connectors
- Sound Blaster Game and Windows Sound System compatibility

The following table shows the IRQ, DMA channel, and base I/O address options for the audio subsystem.

Resource	IRQ (Options)	DMA channel (Options)	I/O Address (Options)
Sound Blaster (DMA playback, DMA shared with Windows Sound System capture)	5 (default) 7 9 10	0 (default) 1 3	220h (default) 240h
Windows Sound System (DMA playback)	7 9 10 11 (default)	0 1 (default) 3	530h (default) 604h E80h F40h
MPU-401 (IRQ shared with Sound Blaster)			300h (default) 330h 332h 334h
MIDI / Game Port			201h
FM Synthesis			388h

1.10.1 Audio Manufacturing Options

Audio manufacturing options include:

- Back panel audio jacks (line in, line out, mic in)
- CD-ROM audio connector
- Telephony connector
- Wavetable connector
- Sound Retrieval System (SRS) 3-D stereo circuitry

1.10.2 CD-ROM Audio Connector

A 1 x 4-pin connector is available for connecting an internal CD-ROM reader to the audio subsystem's mixer. The connector is compatible with most cables supplied with ATAPI CD-ROM readers designed to connect to audio add-in cards.

1.10.3 Telephony Connector

A 2x2-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 subsection. The mono-in and mono-out signal interface is necessary for telephony applications such as speakerphones and answering machines.

1.10.4   Wavetable Connector

A dual-header connector system supports a Yamaha OPL4-ML Wavetable Synthesizer daughter card. The daughter card has two keyed connectors that insure proper connection to the motherboard's 2x3-pin stake-pin headers.

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.

1.10.5   Sound Retrieval System

Sound Retrieval System (SRS)™ circuitry produces 3-D stereo enhancement from conventional stereo or monaural input. With a standard two-speaker system, SRS makes it possible to hear audio output as it would sound in the original 3-D sound field.

SRS uses corrective transfer functions to compensate for the difference in the spectral characteristics for both the sounds that originate in front of the listener and those that originate from the sides. SRS processes and equalizes the sum (L+R) and the difference (L-R and R-L) of the signals so that ambiance and spatial cues are restored. By controlling the frequency response of the different signals in this way, SRS provides a broader perceived stereo image.

The SRS feature can be enabled or disabled in the Setup program or in a Windows 95 utility that is available from Intel.

1.10.6   Audio Drivers

Audio software and utilities are available from Intel's World Wide Web site:

http://www.intel.com, or

http://www-cs.intel.com/oem_developer/motherbd/

1.11 Motherboard Connectors

The motherboard provides header connectors for CD-ROM audio, telephony audio, floppy drive, IDE, serial ports, main power, fan, wavetable audio daughter card, VESA/AMC, and front panel I/O connectors.
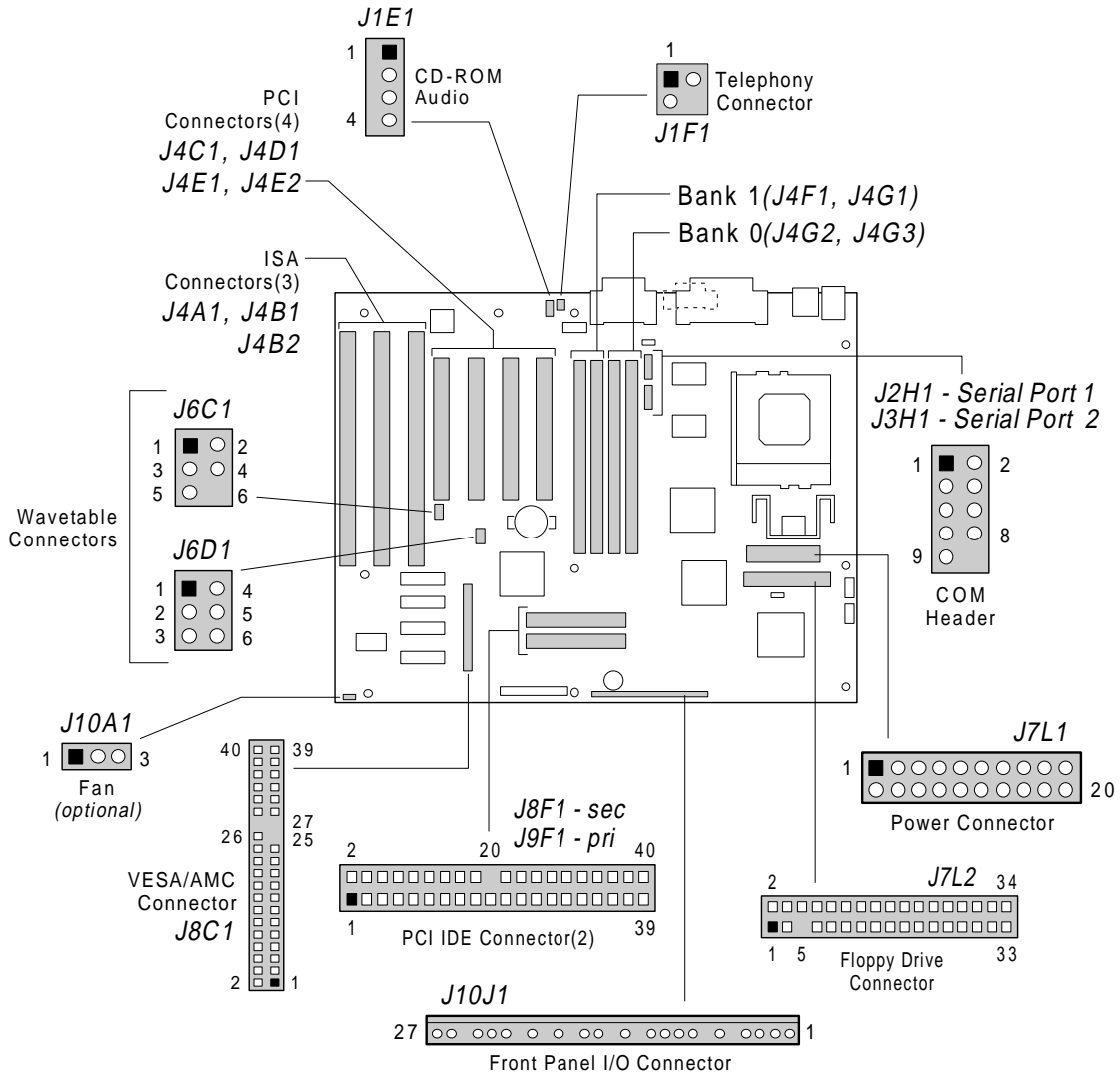
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Figure 3. Motherboard Connector Locations

1.11.1 VESA/AMC Feature Connector

VESA/AMC Connector Pinout (J8C1)

Pin	Signal Name	Pin	Signal Name
1	Ground	2	DATA0
3	Ground	4	DATA1
5	Ground	6	DATA2
7	EVIDEO#	8	DATA3
9	ESYNC#	10	DATA4
11	EDCLK#	12	DATA5
13	SDA	14	DATA6
15	Ground	16	DATA7
17	Ground	18	VDCLK
19	Ground	20	BLK#
21	VFSENSE#	22	HSYNCH
23	SCL	24	VSYNCH
25	Key	26	Ground
27	Key	28	Key
29	+5 V	30	SA#_SAD3
31	RESET#	32	SNRDYN_SAD7
33	SAD6	34	VMASK0_SAD5
35	SDA_SAD4	36	AMCREV
37	Ground	38	+12 V
39	AUDL	40	AUDR

1.11.2 CD-ROM Audio Connector

CD-ROM Audio Connector (J1E1)

Pin	Signal Name
1	Ground
2	CD-LEFT
3	Ground
4	CD-RIGHT

1.11.3 Telephony Connector

Telephony Connector Pinout (J1F1)

Pin	Signal Name
1	Ground
2	MONO_OUT
3	MIC IN
4	Key

1.11.4   Wavetable Connectors (Optional)

Wavetable Connector Pinout (J6C1)

Pin	Signal Name	Pin	Signal Name
1	Reset	2	+5 V
3	33 MHz	4	MIDI_OUT
5	Ground	6	Key

Wavetable Connector Pinout (J6D1)

Pin	Signal Name	Pin	Signal Name
1	EXTEN#	2	SIN
3	+5 V	4	Ground
5	BCK	6	LRCK

1.11.5   Serial Port Header Connectors

Serial Port Header Connector Pinouts: Serial Port1 (J2H1), Serial Port 2 (J3H1)

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

1.11.6 Floppy Drive Connector

Floppy Drive Connector Pinout (J7L2)

Pin	Signal Name	Pin	Signal Name
1	Ground	2	DENSEL
3	Ground	4	TP
5	Key	6	FDEDIN#
7	Ground	8	FDINDX#
9	Ground	10	FDM00#
11	Ground	12	FDDS1#
13	Ground	14	FDDS0#
15	Ground	16	FDM01#
17	MSEN1	18	FDDIR#
19	Ground	20	FDSTEP#
21	Ground	22	FDWD#
23	Ground	24	FDWE#
25	Ground	26	FDTRK0#
27	MSEN0	28	FDWPD#
29	Ground	30	FDRDATA#
31	Ground	32	FDHEAD#
33	Ground	34	DSKCHG#

1.11.7 Front Panel I/O Connector

Front Panel I/O Connector Pinout (J10J1)

Pin	Signal Name	Pin	Signal Name
1	Power On	15	HD ACTIVE
2	Ground	16	+5 V
3	Sleep Req	17	Key
4	Sleep Driver	18	Ground
5	Key	19	Key
6	+5 V	20	SLEEPLED
7	Key	21	Key
8	IrDA	22	Ground
9	Ground	23	Reset
10	IRTX	24	Ground
11	CONIR	25	Key
12	Key	26	PIEZO_IN
13	+5 V	27	SPKROUT
14	Key		

1.11.8 PCI IDE Header Connectors

PCI IDE Header Connector J8F1, J9F1

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	+5 V pull-up
29	DDACK0 (DDACK1) #	30	Ground
31	IRQ14 (IRQ15)	32	Reserved
33	Addr 1	34	Reserved
35	Addr 0	36	Addr 2
37	Chip Select 1P (1S) #	38	Chip Select 3P (3S) #
39	Activity #	40	Ground

1.11.9 Fan Connector (Optional)

Processor Fan Connector (J10A1)

Pin	Signal Name
1	Ground
2	+12 V
3	Ground

1.11.10   Power Supply Connectors

When used with a power supply that supports remote power on/off, the motherboard can turn off the computer's power via software control ("soft-off" is a manufacturing option). The Powerman program supplied for Windows 3.1x allows for soft-off as does the Shutdown icon in the Windows 95 Start menu. The BIOS turns the power off when it receives the proper APM command from the OS. For example, Windows 95 issues this APM command when the user selects "Shutdown the computer" option. APM must be enabled in the BIOS and operating system in order for the soft-off feature to work correctly. In order for the computer to recognize the presence of a "soft-off" power supply, the supply must tie pin 14 of the primary power connector to ground. If power is interrupted due to a power outage or the power cord being unplugged, when power is reapplied, the computer returns to the state it was in when the power was disconnected. If the computer was turned on when power was disconnected, it turns back on when power is reapplied.

Primary Power Connector Pinout (J7L1)

Pin	Name	Function
1	3.3 V	3.3 V
2	3.3 V	3.3 V
3	Ground	Ground
4	+5 V	+ 5 V
5	Ground	Ground
6	+5 V	+ 5 V
7	Ground	Ground
8	PWRGD	Power Good
9	5 VSB	standby 5 V
10	+12 V	+ 12 V
11	3.3 V	3.3 V
12	-12 V	- 12 V
13	Ground	Ground
14	PS_ON*	soft-off control
15	Ground	Ground
16	Ground	Ground
17	Ground	Ground
18	-5 V	- 5 V
19	+5 V	+5 V
20	+5 V	+5 V

1.11.11   Front Panel Connectors

The motherboard provides header connectors that support functions typically located on the chassis bezel. Front panel connectors include:

- Speaker
- System Reset
- Sleep LED
- Hard Drive Activity LED
- Infrared
- Sleep SW (switch)
- Power On
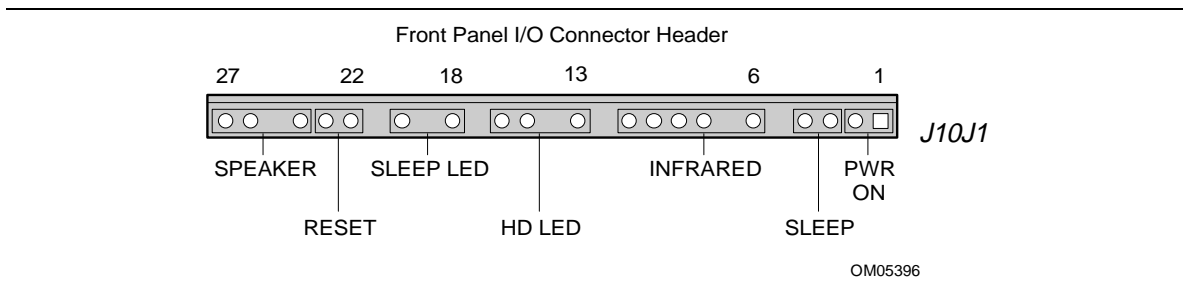
Figure 4. Front Panel I/O Connectors (J10J1)

1.11.11.1   Speaker (Optional)

A speaker may be installed on the motherboard as a manufacturing option. The speaker provides error beep code information during the Power-On Self Test (POST) in the event that a computer cannot use the video interface. The speaker option includes a jumper on pins 26-27 of the front panel connector. You can disable the speaker by removing the jumper. (Disabling the onboard speaker makes it possible to install an offboard speaker.) The optional onboard speaker is not connected to the Yamaha audio subsystem, so it does not receive output from the audio subsystem.

Speaker Connector Pinout (J10J1)

Pin	Signal Name
24	Ground
25	Key
26	PIEZO IN
27	SPKROUT

1.11.11.2   Reset

This header can be connected to a momentary SPST type switch that is normally open. When the switch is closed, the computer will do a hard reset and run the POST.

Reset Connector Pinout (J10J1)

Pin	Signal Name
22	Ground
23	RESET

1.11.11.3   Sleep LED

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

Sleep Connector Pinout (J10J1)

Pin	Signal Name
17	Key
18	Ground
19	Key
20	SLEEP LED

1.11.11.4   Hard Drive LED

You can connect this header to an LED to provide a visual indicator of data 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 connector on the motherboard.

HD LED Connector Pinout (J10J1)

Pin	Signal Name
13	+5 V
14	Key
15	HD ACTIVE
16	+5 V

1.11.11.5 Infrared Connector

Serial port 2 can be configured to support an IrDA module via a 6-pin header connector. With the serial port configured for IrDA, the user can transfer files to or from portable devices such as laptops, PDAs, and printers by using application software such as LapLink. The IrDA specification provides for data transfers at 115 Kbps from a distance of 1 meter.

Infrared Connector Pinout (J10J1)

Pin	Signal Name
6	+5 V
7	Key
8	IrRX
9	Ground
10	IrTX
11	CONIr

1.11.11.6 Sleep/Resume Front Panel Connector

Once you have activated Advanced Power Management (APM) in the BIOS and have loaded the operating system's APM driver, you can activate the sleep mode by using an optional sleep/resume button, by pressing a user-defined hot key sequence, or by prolonged inactivity. The following paragraphs explain each mode more fully.

The motherboard supports a sleep/resume button with a 2-pin header (pins 3 and 4) on the front panel I/O connector. The sleep/resume button makes it possible to put the computer in sleep mode and then to resume normal operation. When the computer is operating normally, pressing the sleep/resume button generates a System Management Interrupt (SMI) to the processor, which puts the processor in SMM (System Management Mode) or sleep mode. The sleep mode button must be a momentary two-pin SPST type switch that is normally open.

You can also activate the sleep mode by pressing a keyboard hot-key sequence. The hot-key sequence is set with the Setup program.

The Setup program contains a programmable inactivity timer that allows you to determine how long the computer must be inactive before it goes into sleep mode (the timer is set to 10 minutes by default).

To wake up the computer from sleep mode, press the sleep/resume button again, or use the keyboard or mouse. Mouse activity wakes up the computer only if a mouse driver has been loaded. While in sleep mode, the computer can respond to and service an external interrupt (such as an in-coming FAX), but the monitor turns on only when the sleep/resume button is pressed or the mouse or keyboard is used.

Sleep/Resume Pinout (J10J1)

Pin	Signal Name
3	SLEEP REQ
4	SLEEP DRIVER

1.11.11.7   Power On Connector

Power On Connector Pinout (J10J1)

Pin	Signal Name
1	SW_ON
2	Ground

1.11.12   Back Panel Connectors

The back panel provides external access to PS/2-style keyboard and mouse connectors, two USB connectors, one parallel port, a VGA connector, a MIDI/game port, and the external audio jacks that are integrated on the motherboard. Figure 5 shows the location of the I/O connectors.
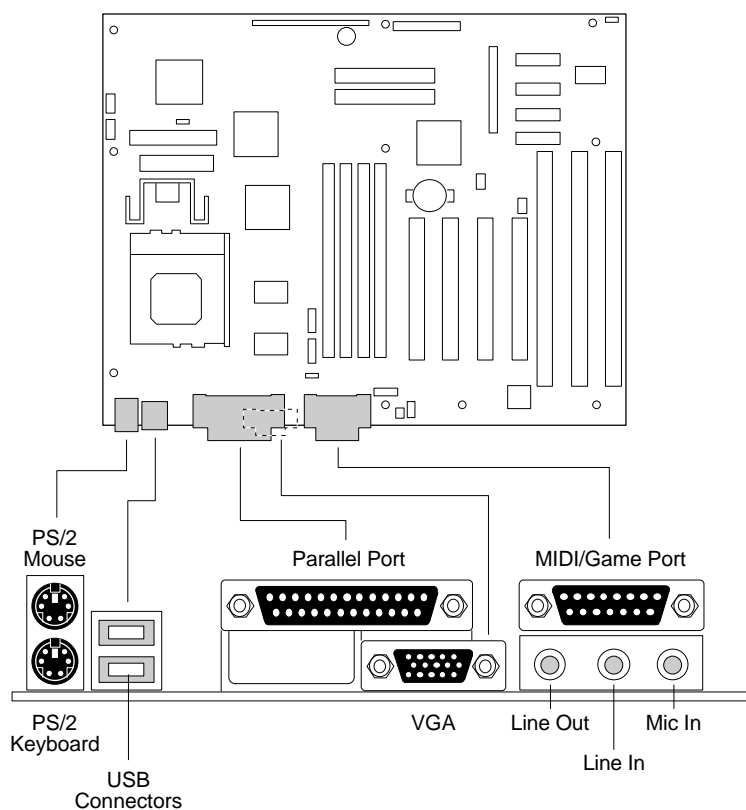
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Figure 5. I/O Connections

1.11.12.1   Keyboard and Mouse Ports

Keyboard and Mouse Connector Pinouts (J1M1)

Pin	Signal Name
1	DATA
2	NC
3	Ground
4	+5 V (FUSED)
5	CLOCK
6	NC

1.11.12.2   USB Connectors

USB Connector Pinout (J1L2)

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

1.11.12.3   Parallel Port

Parallel Port Connector Pinout (J1J2)

Pin	Signal Name	Pin	Signal Name
1	STROBE#	14	AUTOFD#
2	DATA BIT 0	15	FAULT#
3	DATA BIT 1	16	PINIT#
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	PEERROR	25	Ground
13	SLCT		

1.11.13   VGA Video Port

VGA Video Port Pinout (J1J1)

Pin	Signal Name
1	VRED
2	VGREEN
3	VBLUE
4	NC
5	Ground
6	Ground
7	Ground
8	Ground
9	NC
10	Ground
11	NC
12	MONID1
13	HSYNC
14	VSYNC
15	MONID2

1.11.14   MIDI/Game Port

MIDI/Game Port Pinout (J1G1)

Pin	Signal Name
1	+5 V
2	JSBUT0
3	JSX1
4	Ground
5	Ground
6	JSY1
7	JSBUT1
8	+5 V
9	+5 V
10	JSBUT2
11	JSX2
12	MIDI_OUT
13	JSY2
14	JSBUT3
15	MIDI_IN

1.11.15   Add-in Board Expansion Connectors

The motherboard supports three dedicated PCI slots, 2 dedicated ISA slots, and one PCI or ISA shared slot. The PCI bus is fully compliant with the PCI 2.1 specification and supports up to four bus master devices through the four PCI connectors.

PCI Add-in Board Expansion Connector Pinout (J4E1, J4E2, J4C1, J4D1)

Pin	Signal Name	Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
A1	+5 V	B1	-12 V	A32	AD16	B32	AD17
A2	+12 V	B2	Ground	A33	3.3 V	B33	CBE2#
A3	+5 V	B3	Ground	A34	FRAME#	B34	Ground
A4	+5 V	B4	No Connect	A35	Ground	B35	IRDY#
A5	+5 V	B5	+5 V	A32	TRDY#	B32	3.3 V
A6	IRQA#	B6	+5 V	A37	Ground	B37	DEVSEL#
A7	IRQC#	B7	IRQB#	A38	STOP#	B38	Ground
A8	+5 V	B8	IRQD#	A39	3.3 V	B39	LOCK#
A9	No Connect	B9	PRSNT1#	A40	SDONE	B40	PERR#
A10	+5 V	B10	No Connect	A41	SBO#	B41	3.3 V
A11	No Connect	B11	PRSNT2#	A42	Ground	B42	SERR#
A12	Ground	B12	Ground	A43	PAR	B43	3.3 V
A13	Ground	B13	Ground	A44	AD15	B44	CBE1#
A14	No Connect	B14	No Connect	A45	3.3 V	B45	AD14
A15	RST#	B15	Ground	A46	AD13	B46	Ground
A16	+5 V	B16	CLK	A47	AD11	B47	AD12
A17	GNT#	B17	Ground	A48	Ground	B48	AD10
A18	Ground	B18	REQ#	A49	AD9	B49	Ground
A19	Reserved	B19	+5 V	A50	Key	B50	Key
A20	AD30	B20	AD31	A51	Key	B51	Key
A21	3.3 V	B21	AD29	A52	CBEO#	B52	AD8
A22	AD28	B22	Ground	A53	3.3 V	B53	AD7
A23	AD26	B23	AD27	A54	AD6	B54	3.3 V
A24	Ground	B24	AD25	A55	AD4	B55	AD5
A25	AD24	B25	3.3 V	A56	Ground	B56	AD3
A26	IDSEL	B26	CBE3#	A57	AD2	B57	Ground
A27	3.3 V	B27	AD23	A58	AD0	B58	AD1
A28	AD22	B28	Ground	A59	+5 V	B59	+5 V
A29	AD20	B29	AD21	A60	REQ64#	B60	ACK64#
A30	Ground	B30	AD19	A61	+5 V	B61	+5 V
A31	AD18	B31	3.3 V	A62	+5 V	B62	+5 V

ISA Add-in Board Expansion Connector Pinout (J4A1, J4B1, J4B2)

Pin	Signal Name	Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
A1	IOCHK#	B1	Ground	A26	SA5	B26	DACK2#
A2	SD7	B2	RSTSLOT	A27	SA4	B27	TC
A3	SD6	B3	+5 V	A28	SA3	B28	BALE
A4	SD5	B4	IRQB9	A29	SA2	B29	+5 V
A5	SD4	B5	+5 V	A30	SA1	B30	OSC
A6	SD3	B6	DREQ2	A31	SA0	B31	Ground
A7	SD2	B7	+12 V	C1	SBHE#	D1	MEMCS16#
A8	SD1	B8	ZEROWS#	C2	LA23	D2	IOCS16#
A9	SD0	B9	+12 V	C3	LA22	D3	IRQB10
A10	IOCHRDY	B10	Ground	C4	LA21	D4	IRQB11
A11	AEN	B11	SMEMW#	C5	LA20	D5	IRQB12
A12	SA19	B12	SMEMR#	C6	LA19	D6	IRQ15
A13	SA18	B13	IOW#	C7	LA18	D7	IRQ14
A14	SA17	B14	IOR#	C8	LA17	D8	DACK0#
A15	SA16	B15	DACK3#	C9	MEMR#	D9	DREQ0
A16	SA15	B16	DREQ3	C10	MEMW#	D10	DACK5#
A17	SA14	B17	DACK1#	C11	SD8	D11	DREQ5
A18	SA13	B18	DREQ1	C12	SD9	D12	DACK6#
A19	SA12	B19	REFRESH#	C13	SD10	D13	DREQ6
A20	SA11	B20	SYSCLK	C14	SD11	D14	DACK7#
A21	SA10	B21	IRQA7	C15	SD12	D15	DREQ7
A22	SA9	B22	IRQA6	C16	SD13	D16	+5 V
A23	SA8	B23	IRQA5	C17	SD14	D17	MASTER#
A24	SA7	B24	IRQA4	C18	SD15	D18	Ground
A25	SA6	B25	IRQA3				

1.12 Jumper Settings
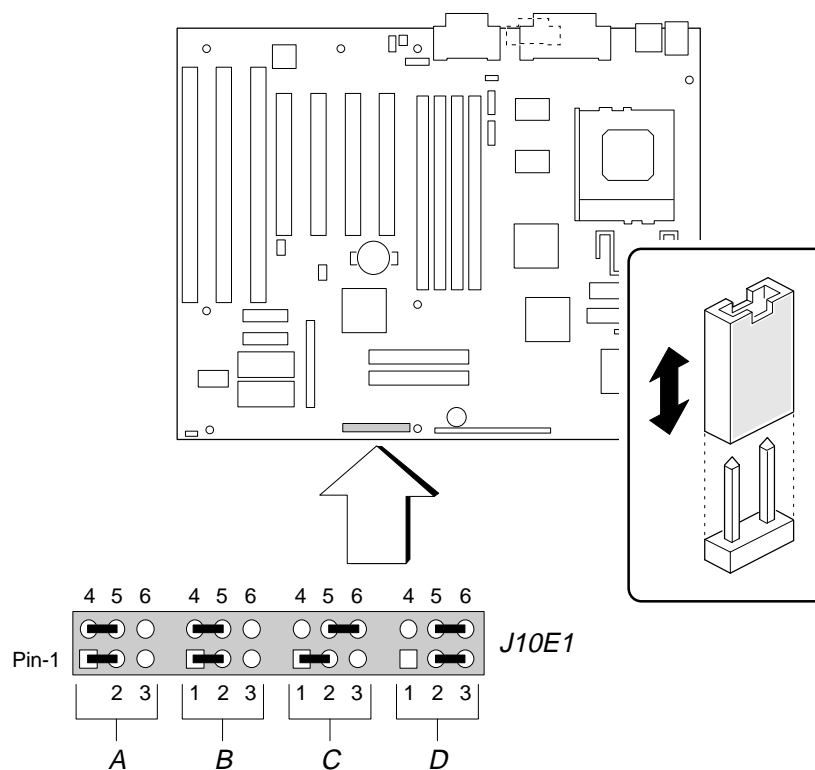
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Figure 6. Jumper Locations

Table 3.   Configuration Jumper Settings

Function	Jumper Block J10E1 Section	Configuration
Password clear	A	1-2 Password enabled (**Default**) 2-3 Password clear/disabled
CMOS clear	A	4-5 Keep (**Default**) 5-6 Clear
BIOS Setup Access	B	1-2 Access enable (**Default**) 2-3 Access disable
BIOS Recover	B	4-5 Normal (**Default**) 5-6 Recover enabled
Host bus speed **(Note: These jumpers also set the PCI and ISA clock speeds.)**	C	See Table 4
Processor speed ratio	D	See Table 4

Table 4. **Processor/System Speed Settings**

CPU Freq. (MHz)	Host Bus Freq. (MHz)	Bus Freq. Ratio	PCI Freq. (MHz)	ISA Freq. (MHz)	Jumper Settings for J10E1-C	Jumper Settings for J10E1-D
200	66	3x	33	8.33	1-2 and 5-6	1-2 and 5-6
166	66	2.5x	33	8.33	1-2 and 5-6	2-3 and 5-6
150	60	2.5x	30	7.5	2-3 and 4-5	2-3 and 5-6
133	66	2x	33	8.33	1-2 and 5-6	2-3 and 4-5
120	60	2x	30	7.5	2-3 and 4-5	2-3 and 4-5
100	66	1.5x	33	8.33	1-2 and 5-6	1-2 and 4-5
90	60	1.5x	30	7.5	2-3 and 4-5	1-2 and 4-5
75	50	1.5x	25	6.77	2-3 and 5-6	1-2 and 4-5

1.12.1   Clear CMOS (J10E1-A)

Allows CMOS settings to be reset to default values by moving the jumper from pins 4-5 to pins 5-6 and turning the computer on. When the computer displays "NVRAM cleared by jumper," you should turn off the computer and return the jumper to the 4-5 position to restore normal operation. This procedure should be done whenever the BIOS is updated. Default is for this jumper to be on pins 4-5.

1.12.2   Password Clear (J10E1-A)

Allows you to clear the password by moving the jumper from pins 1-2 to pins 2-3 and turning the computer on. You should then turn the computer off and return the jumper to the 1-2 position to restore normal operation. This procedure should only be done if the user password has been forgotten. Moving the password clear jumper to the 2-3 position effectively disables the password function. Default is for the password to be enabled (1-2 position).

1.12.3   BIOS Setup Access (J10E1-B)

Allows you to disable access to BIOS Setup program by moving this jumper from the 1-2 position to the 2-3 position. Default is for access to the Setup program to be enabled (1-2 position). When you set this jumper to the disable position, you cannot access Setup, and the computer does not display the message prompting you to press <F1> to enter Setup.

1.12.4   BIOS Recovery (J10E1-B)

This jumper makes it possible to recover a corrupted BIOS by moving the jumper from the 4-5 position to the 5-6 position and inserting a recovery diskette in drive A. Default setting is for normal operation (4-5 position).

1.13 Reliability

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

AG430HX Motherboard   82932 Hours

1.14 Environmental

Table 5.   Motherboard Environmental Specifications

Parameter	Specification
Temperature	
Non-operating	-40°C to +70°C
Operating	+0°C to +55°C
DC Voltage	
+3.3 V	+/- 5%
+5 V	+/- 5%
-5 V	+/- 5%
+12 V	+/- 5%
-12 V	+/- 5%
Vibration	
Unpackaged	5 Hz to 20 Hz : 0.01g² Hz sloping up to 0.02 g² Hz
	20 Hz to 500 Hz : 0.02g² Hz (flat)
Packaged	10 Hz to 40 Hz : 0.015g² Hz (flat)
	40 Hz to 500 Hz : 0.015g² Hz sloping down to 0.00015 g² Hz

1.15 Power Consumption

Table 6 lists the voltage and current specifications for a hypothetical computer configured with the motherboard and the following components: a 166 MHz Pentium processor, 16 MB EDO DRAM, 256 KB cache, 3.5-inch floppy drive, 1.6 GB hard drive, 8X IDE CD-ROM and running at the DOS prompt or in Windows 95. This information is preliminary and is provided only as a guide for calculating **approximate** total power usage with additional resources added.

Table 6.   Power Usage

		DC (Amps)				
	AC (watts)	+3.3 V	+5 V	-5 V	+12 V	-12 V
APM disabled						
DOS prompt	41.4	0.76	4.06	0.01	0.23	0.02
Windows 95	41.7	0.82	4.09	0.01	0.23	0.02
APM enabled (typical)						
DOS prompt	26.2	0.55	1.82	0.01	0.24	0.02
Windows 95	27.1	0.59	1.91	0.01	0.23	0.02
APM enabled (sleep mode)						
DOS prompt	22.1	0.55	1.51	0.01	0.08	0.02
Windows 95	22.9	0.59	1.58	0.01	0.07	0.02

1.16 Power Supply Considerations

For typical configurations, the AG430HX is designed to operate with a 200 W ATX power supply. For heavier power-load applications, a higher wattage supply may be needed.

In addition to supporting the required soft-OFF function, the power supply must meet the following specifications:

- Rise time for power supply - 2ms to 20ms
- Minimum delay from RESET to Powergood - 100ms
- Minimum Powerdown warning - 1ms
- The +3.3 V output must reach its minimum regulation level within +/- 20 ms of the time the +5 V output reaches its minimum regulation level.

1.17 Regulatory Compliance

This printed circuit assembly meets the following safety and EMI regulations when correctly installed in a compatible host computer.

1.17.1 Safety

1.17.1.1 UL 1950 - CSA 950-95, 3rd edition, 28 July 1995

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

1.17.1.2 CSA C22.2 No. 950-93, 2nd Edition

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

1.17.1.3 EN 60 950, 2nd Edition, 1992 (with Amendments 1, 2, and 3)

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

1.17.1.4 IEC 950, 2nd edition, 1991 (with Amendments 1, 2, and 3)

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

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

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

1.17.2   Electromagnetic Interference (EMI)

1.17.2.1   FCC Class B

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

1.17.2.2   CISPR 22, 2nd Edition, 1993

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

1.17.2.3   EN 55 022, 1995

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

1.17.2.4   EN 50 082-1, 1992

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

1.17.2.5   VCCI Class 2 (ITE)

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

1.17.2.6   ICES-003, Issue 2

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

1.17.3   Product Certification Markings

This printed circuit assembly has the following product certification markings:

- European CE Mark
  — Marking on the board or shipping container.
- UL Recognition Mark
  — Marking is 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 Mark
  — Marking is a small c followed by a stylized backward UR on the component side of the board.

2   Motherboard Resources

2.1 Memory Map

Memory Map

Address Range (Decimal)	Address Range (hex)	Size	Description
1024K	100000-10000000	127M	Extended Memory
960k-1023k	F0000-FFFFF	64k	System BIOS
944K-959K	EC000-EFFFF	16K	Boot Block
936K-943K	EA000-EBFFF	8K	ESCD (Plug-N-Play configuration area)
928K-935K	E8000-E9FFF	8K	OEM Logo Area
896K-927K	E0000-E7FFF	32K	BIOS Reserved
800-895K	C8000-DFFFF	96K	Available High DOS memory (open to ISA and PCI bus)
640K-799K	A0000-C7FFF	160K	Video memory and BIOS
639K	9FC00-9FFFF	1K	Extended BIOS Data (moveable by memory management applications)
512K-638K	80000-9FBFF	127K	Extended conventional
0K-511K	00000-7FFFF	512K	Conventional

2.2 I/O Map

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	Super I/O Configuration
0040 - 0043	4 bytes	PIIX3 - Timer 1
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

I/O Map (continued)

Address (hex)	Size	Description
0080 - 008F	16 bytes	PIIX3 - DMA Page Register
00A0 - 00A1	2 bytes	PIIX3 - Interrupt Controller 2
00B2	1 byte	APM control port
00B3	1 byte	APM status port
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
0201	1 byte	Gameport Joystick
0220 - 022F	16 bytes	Audio - Yamaha Sound System Base
0270 - 0273	4 bytes	I/O read port for Plug and Play
0278 - 027B	4 bytes	LPT2
02E8 - 02EF	8 bytes	COM4
02F8 - 02FF	8 bytes	Onboard COM2
0330 - 0331	2 bytes	Audio - MPU-401
0376	1 byte	Secondary IDE Chan Cmd Port
0377	1 byte	Secondary IDE Chan Stat Port
0378 - 037B	4 bytes	LPT1
0388 - 038B	4 bytes	Audio - FM Synthesis
03B0 - 03BB	12 bytes	ATI-264GT
03BC - 03BF	4 bytes	LPT3
03C0 - 03DF	16 bytes	ATI-264GT
03E8 - 03EF	8 bytes	COM3
03F0 - 03F5	6 bytes	Floppy Channel 1
03F6	1 byte	Pri IDE Chan Cmd Port
03F7 (Write)	1 byte	Floppy Chan 1 Cmd
03F7, bit 7	1 bit	Floppy Disk Chg Chan 1
03F7, bits 6:0	7 bits	Primary IDE Channel Status Port
03F8 - 03FF	8 bytes	Onboard COM1
04D0 - 04D1	2 bytes	Edge/level triggered
LPT + 400h	8 bytes	ECP port, LPT + 400h
0530 - 0537	8 bytes	Audio - Yamaha Sound System
0CF8 - 0CFB*	4 bytes	PCI Configuration Address Register
0CF9	1 byte	Turbo & Reset Control Register
0CFC-0CFF	4 bytes	PCI Configuration Data Register
FF00 - FF07	8 bytes	IDE Bus Master Register
FF40 - FF5F	32 bytes	USB
FFA0 - FFA7	8 bytes	Primary Bus Master IDE Registers
FFA8 - FFAF	8 bytes	Secondary Bus Master IDE Registers

*   Only by DWORD accesses.

2.3 PCI Configuration Space Map

PCI Configuration Space Map

Bus Number (hex)	Dev Number (hex)	Function Number (hex)	Description
00	00	00	Intel 82430HX (TXC)
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	Video controller (ATI-264GT)
00	0D	00	PCI Expansion Slot: J4E2
00	0E	00	PCI Expansion Slot: J4E1
00	0F	00	PCI Expansion Slot: J4D1
00	10	00	PCI Expansion Slot: J4C1

2.4 DMA Channels

DMA Channels

DMA	Data Width	System Resource
0	8- or 16-bits	Audio
1	8- or 16-bits	Audio or ECP
2	8- or 16-bits	Floppy
3	8- or 16-bits	Audio or ECP
4	N/A	Reserved - Cascade channel
5	16-bits	Open
6	16-bits	Open
7	16-bits	Open

2.5 Interrupts

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	Audio-Yamaha Sound System*
6	Floppy
7	Parallel Port 1*
8	Real Time Clock
9	User available*
10	USB*
11	Audio-Yamaha Sound System*
12	Onboard Mouse Port if present, else user available
13	Reserved, Math coprocessor
14	Primary IDE
15	Secondary IDE

*   Typical Configuration

3   Motherboard BIOS and Setup Program

3.1 Introduction

The motherboard uses an Intel BIOS, which is stored in Flash EEPROM and which can be upgraded using a floppy disk-based program. In addition to the BIOS, the Flash EEPROM also contains the Setup program, Power-On Self Test (POST), APM 1.2, the PCI auto-configuration program, and Windows 95-ready Plug and Play 1.0A. This motherboard also supports BIOS shadowing, allowing the BIOS to execute from 64-bit on-board write-protected DRAM.

Hardware has been added to the motherboard to insure that only Intel-compiled BIOS can be programmed into the Flash EEPROM. This secure flash memory device provides extended virus protection and security.

The BIOS displays a sign-on message during POST that identifies the type of BIOS and a five-digit BIOS revision code. The initial production BIOS in the motherboard is identified as 1.00.01.DD0.

3.2 BIOS Flash Memory Organization

The Intel PA28FB001BX 2 Mb Flash component is organized as 256K x 8 (256 KB). The Flash device is divided into four areas, as shown in Table 7.

Table 7.   **Flash Memory Organization**

System Address		FLASH Memory Area
FFFF0000h	FFFFFFFFh	64 KB Main BIOS (Reserved for BIOS)
FFFEC000h	FFFEFFFFh	16 KB Boot block (Not FLASH erasable) (Reserved for BIOS)
FFFEA000h	FFFEBFFFh	8 KB ESCD Area (Plug-N-Play data storage area)
FFFE8000h	FFFE9FFFh	8 KB OEM Logo Area
FFFE0000h	FFFE7FFFh	32 KB (Reserved for BIOS)
FFFD0000h	FFFDFFFFh	64 KB (Reserved for BIOS)
FFFC0000h	FFFCFFFFh	64 KB (Reserved for BIOS)

3.3 BIOS Upgrades

Flash memory makes distributing BIOS upgrades easy. A new version of the BIOS can be installed from a diskette. BIOS upgrades are available to be downloaded from the Intel FTP site (FTP.INTEL.COM\PUB\BIOS).

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

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

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

3.4 PCI IDE Support

If you select the auto configuration option in the Setup program, the BIOS automatically sets up the two local bus IDE connectors with independent I/O channel support. The IDE interface supports PIO Mode 3 and Mode 4 hard drives and it recognizes ATAPI CD-ROMs, tape drives, and any other ATAPI devices. The BIOS determines the capabilities of each drive and configures them to optimize capacity and performance. The BIOS automatically configures high-capacity hard drives for Logical Block Addressing (LBA). The drive is configured for maximum capacity and to PIO Mode 3 or 4, depending on the capability of the drive. You can override the auto-configuration options by using the manual mode setting. The ATAPI Specification Revision 2.5 recommends that an ATAPI device be configured as shown in Table 8.

Table 8.   Recommendations for Configuring an ATAPI Device

IDE Configuration	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
ATAPI CD-ROM as only IDE device in the system	ATAPI			

3.5 PCI Auto Configuration

The PCI auto configuration utility operates in conjunction with the Setup program to allow the insertion and removal of PCI cards without user intervention (Plug and Play). When the computer is turned on after adding a PCI add-in card, the BIOS automatically configures interrupts, I/O space, and other parameters. PCI interrupts are distributed to available ISA interrupts that have been not been assigned to an ISA card or to other resources. Interrupts that remain set to available in the Setup are considered free for PCI add-in cards. It is nondeterministic as to which PCI interrupt will be assigned to which ISA IRQ.

The PCI auto configuration function complies with version 2.10 of the PCI BIOS specification. Configuration information is stored in ESCD format. You can clear the ESCD data may by setting the CMOS clear jumper to the ON position.

PCI specification 2.1 for add-in card auto configuration is also a part of the Plug and Play BIOS. Peer-to-peer hierarchical PCI Bridge 1.0 is supported, and by using an OEM supplied option ROM or TSR, a PCI-to-PCMCIA bridge capability is possible as well.

3.6 ISA Plug and Play

The BIOS incorporates ISA Plug and Play capabilities as delivered by Plug and Play Release 1.0A (Plug and Play BIOS v. 1.0A, ESCD v. 1.03). When used in conjunction with the ISA Configuration Utility (ICU) for DOS or Windows 3.x, the BIOS automatically configures ISA Plug and Play cards and PCI cards. The BIOS also manages the resources for ISA legacy cards. Because the BIOS supports configuring devices across PCI bridges, release 1.41 or greater of the ICU must be used with the motherboard to properly view and change the settings. Computer configuration information is stored in ESCD format. You can clear the ESCD data by setting the CMOS clear jumper to the ON position.

The BIOS provides a Setup option to support the Windows 95 run time Plug and Play utilities. When you select this option, the BIOS only assigns resources to devices that are critical to booting. Device node information is available for all devices to ensure compatibility with Windows 95.

Copies of the Plug and Play specification may be obtained from the Intel BBS.

3.7 Advanced Power Management

The BIOS supports Advanced Power Management (APM) version 1.2. The energy saving mode (also called sleep or stand-by mode) can be activated by using an optional sleep/resume button, by pressing a user-defined hot key sequence, or by prolonged inactivity.

When in sleep mode, the motherboard reduces power consumption by utilizing the Pentium processor's System Management Mode (SMM), by spinning down hard drives, and turning off VESA DPMS-compliant monitors. You can use the BIOS Setup program to select which DPMS mode (stand by, suspend, or Off) to send to the monitor. While in sleep mode, the computer can respond to and service an external interrupt (such as an in-coming FAX). Any keyboard or mouse activity brings the computer out of the energy saving mode. When this occurs, the monitor and IDE drives are turned back on immediately.

The BIOS enables APM by default. However, the computer must be configured with an APM driver for the power saving features to take effect. Windows 95 enables APM automatically when it detects the presence of the APM BIOS.

3.8 Language Support

The Setup screen and help messages are supported in 32 languages. There are 5 languages translated at this time; American English, German, Italian, French, and Spanish. Translations of other languages will be available at a later date.

3.9 Boot Options

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 to be the primary boot device and the hard drive to be the secondary boot device. If you select CD-ROM, it must be the first device. The third and fourth devices are set to *disabled* in the default configuration. You can also select *network* as a boot device. The network option allows booting from a network add-in card with a remote boot ROM installed.

⟹ **NOTE**

A copy of "El Torito" is available on Phoenix Web page (http://www.ptltd.com/techs/specs.html).

3.10 Flash LOGO Area

The motherboard supports an 8 KB programmable Flash user area located at E8000-E8FFF. An OEM may use this area to display a custom logo. The BIOS accesses the user area just after completing POST. A utility is available from Intel to assist with installing a logo into Flash. Contact your local Intel Sales office or authorized distributor for further information.

3.11 BIOS Setup Program

The ROM-based Setup program allows the configuration to be modified without opening the computer for most basic changes. You can access the Setup program by pressing the <F1> key after the memory test has begun and before the boot begins. A prompt may be enabled that informs users to press the <F1> key to access Setup.

3.11.1 Overview of the Setup Menu Screens

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

Table 9.   Overview of the Setup Menu Screens

Setup Menu Screen	Description
Main	For setting up and modifying some of the basic options of a PC, such as time, date, floppy drives, hard drives.
Advanced	For modifying the more advanced features of a PC, such as peripheral configuration and advanced chipset configuration.
Security	For specifying passwords that can be used to limit access to the computer.
Exit	For saving or discarding changes.
Setup Subscreen	**Description**
Floppy Options	For configuring your floppy drives.
IDE Device Configuration	For configuring your IDE devices.
Boot Options	For modifying options that affect the computer boot up, such as the boot sequence.
Peripheral Configuration	For modifying options that affect the serial ports, the parallel port, and the disk drive interfaces.
Audio Configuration	For accessing and modifying audio configuration options.
Advanced Chipset Configuration	For modifying options that affect memory and busses.
Power Management Configuration	For accessing and modifying Advanced Power Management (APM) options.
Plug and Play Configuration	For modifying options that affect the computer's Plug and Play capabilities.

3.11.2 Main CMOS Setup Screen

This section describes the Setup options found on the main menu screen. If you select certain options from the main screen (e.g., Floppy Options), the Setup program switches to a subscreen for the selected option.

3.11.2.1 System Date

Specifies the current date. Select the month from a pop-up menu.

3.11.2.2 System Time

Specifies the current time.

3.11.2.3   Floppy Options

When selected, this displays the Floppy Options menu.

3.11.2.4   Primary IDE Master

Reports if an IDE device is connected to the system. When selected, this brings up the IDE Device Configuration subscreen.

3.11.2.5   Primary IDE Slave

Reports if an IDE device is connected to the system. When selected, this brings up the IDE Device Configuration subscreen.

3.11.2.6   Secondary IDE Master

Reports if an IDE device is connected to the system. When selected, this brings up the IDE Device Configuration subscreen.

3.11.2.7   Secondary IDE Slave

Reports if an IDE device is connected to the system. When selected, this brings up the IDE Device Configuration subscreen.

3.11.2.8   Language

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

3.11.2.9   Boot Options

When selected, this brings up the Boot Options subscreen.

3.11.2.10   Video Mode

Reports the video mode. There are no options.

3.11.2.11   Mouse

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

3.11.2.12   Base Memory

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

3.11.2.13   Extended Memory

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

3.11.3   Floppy Options Subscreen

3.11.3.1   Floppy A:

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

3.11.3.2   Floppy B:

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

3.11.3.3   Floppy A: Type

Specifies the physical size and capacity of the floppy drive. The options are Disabled, 360 KB, 5.25-inch; 1.2 MB, 5.25-inch; 720 KB, 3.5-inch; 1.44/1.25 MB, 3.5-inch; 2.88 MB, 3.5-inch. The default is 1.44/1.25 MB, 3.5-inch.

3.11.3.4   Floppy B: Type

Specifies the physical size and capacity of the floppy drive. The options are Disabled, 360 KB, 5.25-inch; 1.2 MB, 5.25-inch; 720 KB, 3.5-inch; 1.44/1.25 MB, 3.5-inch; 2.88 MB, 3.5-inch. The default is Disabled.

3.11.3.5   Floppy Access

Specifies read/write access for all attached floppy drives. The options are Read/Write and Read Only. The default is Read/Write.

3.11.4   IDE Device Configuration Subscreen

3.11.4.1   IDE Device Configuration

Used to manually configure the hard drive or have the system auto configure it. The options are Auto Configured, User Definable and Disabled. The default is Auto Configured. If you select User Definable then the Number of Cylinders, Number of Heads, and Number of Sectors items can be modified.

3.11.4.2   Number of Cylinders

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

3.11.4.3   Number of Heads

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

3.11.4.4 Number of Sectors

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

3.11.4.5 Maximum Capacity

Reports the maximum capacity of your IDE Device. It is calculated from the number of cylinders, heads, and sectors. There are no options.

3.11.4.6 IDE Translation Mode

Specifies the IDE translation mode. The options are Standard CHS (standard cylinder head sector −less than 1024 cylinders), Logical Block, Extended CHS (extended cylinder head sector−greater than 1024 cylinders), and Auto Detected (BIOS detects IDE drive support for LBA). The default is Auto Detected.

⚠ **CAUTION**

Do not change the IDE Translation Mode from the option selected when the hard drive was formatted. Changing the option can result in corrupted data.

3.11.4.7 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, or Auto Detected. The default is Auto Detected. Check the specifications for your hard disk drive to determine which setting provides optimum performance for your drive.

3.11.4.8 Fast Programmed I/O Modes

Sets how fast transfers on the IDE interface occur. The options are Disabled or Auto Detected. The default is Auto Detected. If set to Disabled, transfers occur at a less than optimized speed. If set to Auto Detected, transfers occur at the drive's maximum speed.

3.11.5 Boot Options Subscreen

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

3.11.5.1 First, Second, Third, Fourth Boot Device

Sets which drives the system checks to find an operating system to boot from. The following options are available:

First Boot Device: Select Disabled, Floppy, Hard Disk, CD-ROM, Network.

Second, Third, Fourth Device: Select Disabled, Floppy, Hard Disk, Network.

3.11.5.2 System Cache

Enables or disables both the primary and the secondary cache memory. The options are Enabled or Disabled. The default is Enabled.

3.11.5.3 Boot Speed

Sets the system's boot speed. The options are Deturbo and Turbo. The default is Turbo. If Turbo is selected, boot-up occurs at full speed. If Deturbo is selected, the board operates at approximately 25 MHz. (The slower speed may be required for compatibility with some older programs.)

3.11.5.4 Num Lock

Sets the beginning state of the Num Lock feature on your keyboard. The options are On and Off. By default the Num Lock feature is turned off.

3.11.5.5 Setup Prompt

Turns on (or off) the "Press <F1> Key if you want to run Setup" prompt during the power-up sequence. The options are Enabled and Disabled. The default is Enabled.

⟹ **NOTE**

The Setup Prompt option has no effect on your ability to access the Setup program. It only toggles the prompt.

3.11.5.6 Typematic Rate Programming

Sets the typematic rates. The options are Default and Override. The default is Default, which disables the Typematic Rate Delay and Typematic Rate options. Choosing Override enables the Typematic Rate Delay and Typematic Rate options.

3.11.5.7 Typematic Rate Delay

Sets how long it takes for the key-repeat function to start when you hold down a key on the keyboard. The options are 250, 500, 750, and 1000 millisecond delays. The default is 250. If Typematic Rate Programming is set to Default, this option is not visible.

3.11.5.8 Typematic Rate

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

3.11.6   Advanced Screen

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

3.11.6.1   Processor Type

Reports the processor type. There are no options.

3.11.6.2   Processor Speed

Reports the processor clock speed. There are no options.

3.11.6.3   Cache Size

Reports the size of the secondary cache. There are no options. If your system contains no L2 cache, this item will not appear.

3.11.6.4   Peripheral Configuration

When selected, this displays the Peripheral Configuration subscreen.

3.11.6.5   Audio Configuration

When selected, this brings up the Audio Configuration subscreen.

3.11.6.6   Advanced Chipset Configuration

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

3.11.6.7   Power Management Configuration

When selected and enabled, this brings up the Power Management Configuration subscreen.

3.11.6.8   Plug and Play Configuration

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

3.11.7 Peripheral Configuration Subscreen

This section describes the screens for the Peripheral Configuration subscreen.

3.11.7.1 Configuration Mode

Enables you to choose between setting the peripheral configuration yourself, or having the system do it. The options are Auto and Manual. The default is Auto.

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

3.11.7.2 PCI IDE Interface

Enables or disables the PCI IDE hard disk interface. The options are Enabled and Disabled. The default is Enabled. (If Configuration Mode is set to Auto, this option cannot be modified.)

3.11.7.3 Floppy Interface

Enables or disables the floppy drive interface. The options are Enabled and Disabled. The default is Enabled. (If Configuration Mode is set to Auto, this option cannot be modified.)

3.11.7.4 Serial Port 1 Address

Selects the address of serial port 1. The options are described and listed in Table 10. The default option is Auto Configured. If the Configuration Mode is set to Auto Configured, the Setup program assigns the first free COM port (normally COM1, 3F8h) as the serial port 1 address, regardless of what is selected under the Serial Port 1 Address option.

Table 10. Serial Port Configuration Options

Option	Description
Disabled	Port not enabled
COM1, 3F8, IRQ4	Enabled as COM1 at indicated I/O address and IRQ
COM2, 2F8, IRQ3	Enabled as COM2 at indicated I/O address and IRQ
COM3, 3E8, IRQ4	Enabled as COM3 at indicated I/O address and IRQ
COM1, 3F8, IRQ3	Enabled as COM1 at indicated I/O address and IRQ
COM2, 2F8, IRQ4	Enabled as COM2 at indicated I/O address and IRQ
COM3, 3E8, IRQ3	Enabled as COM3 at indicated I/O address and IRQ
Auto Configured	Port will be auto configured **(Default option)**

3.11.7.5   Serial Port 2 Address

Selects the address of serial port 2. The options are described and listed in Table 10. The default option is Auto Configured. If the Configuration Mode is set to Auto Configured, the Setup program assigns the first free COM port (normally COM2, 2F8h) as the serial port 2 address, regardless of what is selected under the Serial Port 2 Address option.

⟹ **NOTE**

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

3.11.7.6   Serial Port 2 IR Mode

Makes Serial Port 2 available to infrared applications. The options are Enabled and Disabled. The default is Disabled. (If Configuration Mode is set to Auto, this option cannot be modified.)

3.11.7.7   Parallel Port Address

Selects the address and IRQ of the parallel port. The options are described and listed in Table 11. If the Configuration Mode is set to Auto Configured, the Setup program assigns LPT1, 378h, IRQ7, DMA3 as the parallel port address, regardless of what is selected under the Parallel Port Address option.

Table 11. Parallel Port Configuration Options

Option	Description
Disabled	Port not enabled
LPT1, 378, IRQ7, DMA3	Enabled as LPT1 at indicated I/O address, IRQ and DMA **(Default option)**
LPT2, 278, IRQ7, DMA3	Enabled as LPT2 at indicated I/O address, IRQ and DMA
LPT1, 378, IRQ5, DMA3	Enabled as LPT1 at indicated I/O address, IRQ and DMA
LPT2, 278, IRQ5, DMA3	Enabled as LPT2 at indicated I/O address, IRQ and DMA
LPT1, 378, IRQ7, DMA1	Enabled as LPT1 at indicated I/O address, IRQ and DMA
LPT2, 278, IRQ7, DMA1	Enabled as LPT2 at indicated I/O address, IRQ and DMA
LPT1, 378, IRQ5, DMA1	Enabled as LPT1 at indicated I/O address, IRQ and DMA
LPT2, 278, IRQ5, DMA1	Enabled as LPT2 at indicated I/O address, IRQ and DMA
Auto Configured	Port will be auto configured

3.11.7.8   Parallel Port Mode

Selects the mode for the parallel port. The options are Compatible, Bi-directional, EPP, and ECP. The default is Compatible. Compatible means the parallel port operates in AT-compatible mode. Bidirectional means the parallel port operates in bidirectional PS/2-compatible mode. EPP and ECP mean the parallel port operates high-speed, bidirectionally. This option is not affected by the Configuration Mode field above.

3.11.7.9   USB Interface

Selects the mode for the USB ports. The options are Enable and Disabled. The default is Enabled.

3.11.7.10   Primary IDE Status

Displays the current status of the Primary IDE Interface from the selectable setting above. This is an informational field and cannot be changed.

3.11.7.11   Secondary IDE Status

Displays the current status of the Secondary IDE Interface from the selectable setting above. This is an informational field and cannot be changed.

3.11.7.12   Floppy Status

Reports the current status of the floppy drive from the selectable setting above. There are no options.

3.11.7.13   Serial Port 1 Status

Reports the current status of serial port 1 from the selectable setting above. There are no options.

3.11.7.14   Serial Port 2 Status

Reports the current status of serial port 2 from the selectable setting above. There are no options.

3.11.7.15   Parallel Port Status

Reports the current status of the parallel port from the selectable setting above. There are no options.

3.11.8   Audio Configuration Subscreen

This section describes the options available on the Audio Configuration Subscreen.

3.11.8.1   Audio Configuration Mode

Sets the configuration mode for the audio subsystem. The options are Disabled, Manual and Auto. When set to Auto, the only fields that are accessible are the Game Port configuration and the SRS enable/disable. All other fields may be viewed, but not changed. By setting the audio configuration mode to Manual, you can independently change the audio configurations.

3.11.8.2   SB Port Base

Sets the base I/O address for the Sound Blaster-compatible audio subsystem. The options are Disabled, 220h and 240h. The default is 220h. If you set the Auto Configuration Mode to Auto, you cannot modify this field.

3.11.8.3   WSS Port Base

Sets the base I/O address for the Windows Sound System Compatible audio subsystem. The options are Disabled, 530h, E80h, F40h and 604h. The default is 530h. If you set the Auto Configuration Mode to Auto, you cannot modify this field.

3.11.8.4   MPU Port Base

Sets the base I/O address for the MPU-401 Compatible audio subsystem. The options are Disabled, 330h, 332h, 334h and 300h. The default is 330h. If you set the Auto Configuration Mode to Auto, you cannot modify this field.

3.11.8.5   WSS Port Interrupt

Sets the IRQ for the Windows Sound System Compatible audio subsystem. The options are Disabled, IRQ7, IRQ8 and IRQ11. The default is IRQ11. If you set the Auto Configuration Mode to Auto, you cannot modify this field.

3.11.8.6   SB/MPU Interrupt

Sets the IRQ for the Sound Blaster and MPU-401 Compatible audio subsystems. The options are Disabled, IRQ5, IRQ7, IRQ9 and IRQ10. The default is IRQ5. If you set the Auto Configuration Mode to Auto, you cannot modify this field.

3.11.8.7   WSS Play DMA

Sets the DMA channel for the Windows Sound System Compatible audio subsystem. The options are Disabled, Channel 0 Channel 1 and Channel 3. The default is Channel 0. If you set the Auto Configuration Mode to Auto, you cannot modify this field.

3.11.8.8   SB Play / WSS Capture DMA

Sets the DMA channel for the Sound Blaster and MPU-401 Compatible audio subsystems. The options are Disabled, Channel 0 and Channel 1. The default is Channel 1. If you set the Auto Configuration Mode to Auto, you cannot modify this field.

3.11.8.9   Game Port

Sets the base I/O address for the Game Port audio subsystem. The options are Disabled, Enabled and Auto. The default is Auto.

3.11.8.10   Game Port Status

Displays the base I/O address for the Game Port audio subsystem. This field may be viewed but not altered.

3.11.8.11   FM Synthesizer Port Status

Displays the base I/O address for the FM Synthesizer Port audio subsystem. This field may be viewed but not altered.

3.11.8.12 SRS Mode

Sets the configuration mode for the SRS audio subsystem. The options are Enabled and Disabled. The default is Enabled. If the Audio Configuration Mode is set to Disabled, SRS is also Disabled.

3.11.9 Advanced Chipset Configuration Subscreen

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

3.11.9.1 Base Memory Size

Sets the size of the base memory. The options are 512 KB and 640 KB. The default is 640 KB.

3.11.9.2 ISA LFB Size

Sets the size of the linear frame buffer. The options are Disabled 1 MB, 2 MB and 4 MB. The default is Disabled. If this is set to 1 MB, 2 MB or 4MB, then the ISA LFB Base Address field is displayed.

3.11.9.3 ISA LFB Base Address

Reports the base address of the LFB. There are no options. This field will not appear if the ISA LFB Size is set to Disabled. If the ISA LFB size is set to 1 MB, 2 MB or 4 MB, the field displays the base address to be 15 MB, 14 MB, or 12 MB respectively.

3.11.9.4 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 Enabled and Disabled. The default is Enabled.

3.11.9.5 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. Valid numbers are between 0 and 256. The default is 66.

3.11.10 Power Management Configuration Subscreen

This section describes the options available on the Power Management Subscreen.

3.11.10.1 Advanced Power Management

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

3.11.10.2 IDE Drive Power Down

Sets any IDE drives to spin down when the system goes into power managed mode. The options are Enabled and Disabled. The default is Enabled.

3.11.10.3   Inactivity Timer

Sets how long the system must be inactive before it enters power managed mode. Enter the number of minutes. The range is 0 to 255 minutes. The default is 10 minutes.

3.11.10.4   VESA Video Power Down

Sets the command issued to the video system when the computer goes into power management mode. The options are Disabled, Standby, Suspend, and Sleep. The default is Sleep.

3.11.10.5   Hot Key

Sets the hot key that, when pressed while holding down the <Ctrl> and <Alt> keys, causes the system to enter power managed mode. All alphabetic keys are valid.

3.11.11   Plug and Play Configuration Subscreen

This section describes the options found on the Plug and Play configuration subscreen.

3.11.11.1   Configuration Mode

Sets how the BIOS gets information about ISA cards that do not have Plug and Play capabilities. The options are Use Setup Program and Use ICU (ISA Configuration Utility). The default is Use Setup Program.

If Use ICU is selected, the BIOS will depend on run-time software to ensure that there are no conflicts between ISA boards with Plug and Play capabilities and those without. Only Boot With PnP OS will be visible.

3.11.11.2   Use PnP OS

Enables a computer to boot with an operating system that is capable of managing Plug and Play add-in cards. The options are None, Other, and Windows 95. The default is Windows 95.

3.11.11.3   ISA Shared Memory Size

When enabled, allows the user to specify a range of memory addresses that will be directed to the ISA bus rather than on-board memory. The options are Disabled, 16 KB, 32 KB, 48 KB, 64 KB, 80 KB and 96 KB. The default is Disabled. If this is set to Disabled, the ISA Shared Memory Base Address (described below) will not be visible.

Generally, this field should only be enabled when a non Plug and Play ISA card (legacy card) is used that requires non-ROM memory space. LAN cards that have on-board memory buffers are one example of this, video capture cards that have video buffer memory are another. If an ISA legacy card has non-ROM memory requirements, the autoconfigure routine may write into an area that is needed by the ISA expansion card. The ISA Shared Memory Size parameter is used to signify to the autoconfigure routine that this block of memory is reserved for use by the legacy card and should not be made available for other uses such as PCI cards or Upper Memory Blocks.

3.11.11.4   ISA Shared Memory Base Address

Sets the base address for the ISA Shared Memory. The options are C8000h, CC000h, D0000h, D4000h, D8000h, and DC000h. The default is C8000h. This setting could affect the ISA Shared Memory Size item. The value entered in the ISA Shared Memory Size item cannot extend to the E0000h address. For example, if you select a size of 64K, options D4000h, D8000h, and DC000h are not available.

3.11.11.5   IRQ 3, 4, 5, 7, 9, 10, 11, 12, 14, 15

Sets the status of the IRQ. The options are Available and Used By ISA Card. The default is Available. The PCI auto configuration code looks here to see if these interrupts are available for use by a PCI or ISA Plug and Play add-in board. If an interrupt is available, the PCI auto configuration code can assign the interrupt to be used by the computer. If your computer contains a legacy ISA agent that uses one of these interrupts, select Used By ISA Card for that interrupt.

⟹ **NOTE**

IRQ 3, 4, 5, and 7 may not be available in the IRQ option, depending on the setting chosen for the serial and parallel ports in the Peripheral Configuration Subscreen.

IRQ 14 and 15 will not show up as user available. If the on-board IDE controller is not used, these interrupts will be available to ISA cards. These interrupts can not be used for PCI cards.

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

3.11.11.6   Administrative and User Access Modes

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

In general, Administrative mode has full access to the Setup options, whereas User mode has restricted access to the options. Thus, by setting separate Administrative and User passwords, a system administrator can limit who can change critical Setup values. The actual limitations depend on whether either the Administrative or User passwords or both are set. (See Table 12 for a description of how the passwords actually work together.)

To limit access to who can boot the computer, set the User password. This is the password that the computer asks for before booting. If only the Administrative password is set, the computer boots up without asking for a password. If both passwords are set, you can enter either password to boot the computer.

Table 10 shows the effects of setting the Administrative and User passwords. (The table is for reference only, and is not shown on the Security screen.) In the table, the statement "Can change a limited number of options" means you can change the system date and time, the power management hot key, the User password, the security hot key, and can enable or disable the unattended start.

Table 12.   Administrative and User Password Functions

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

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

3.11.12   Security Screen Options

3.11.12.1   User Password is

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

3.11.12.2   Administrative Password is

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

3.11.12.3   Set User Password

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

3.11.12.4   Set Administrative Password

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

3.11.12.5   Unattended Start

Controls when the security password is requested. The options are Enabled and Disabled. The default is Disabled. The User password must be enabled before you can enable this option. If Enabled is selected, the computer boots, but the keyboard will be locked until the User password is entered.

3.11.12.6   Security Hot Key (CTRL-ALT-)

Sets a hot key that, when pressed, locks the keyboard until the User password is entered. The Keyboard LEDs flash to indicate that the keyboard is locked. When you enter the User password, you do not have to press the <Enter> key.

3.11.12.7   Exit Screen

This section describes the different ways to exit and save or not save changes made in the Setup program.

3.11.12.8   Exit Saving Changes

Saves the changes to CMOS RAM and exits the Setup program. You can also press the <F10> key anywhere in the Setup program to do this.

3.11.12.9   Exit Discarding Changes

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

3.11.12.10   Load Setup Defaults

Resets all of the Setup options to their defaults. You can also press the <F5> key anywhere in the Setup program to do this.

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

3.11.12.11   Discard Changes

Discards any changes you made during the current Setup session without exiting the program. You can also press the <F6> key anywhere in the Setup program to do this.

This selection loads the CMOS RAM values that were present when the computer was turned on.

4   Error Messages and Beep Codes

4.1   BIOS Beep Codes

BIOS Beep Codes

Beeps	Error Message	Description
1	Refresh Failure	The memory refresh circuitry on the motherboard is faulty.
3	Base 64 KB Memory Failure	Memory failure in the first 64 KB.
4	Timer Not Operational	Memory failure in the first 64 KB of memory, or Timer 1 on the motherboard is not functioning.
6	8042 - Gate A20 Failure	The keyboard controller (8042) may be bad. The BIOS cannot switch to protected mode.
7	Processor Exception Interrupt Error	The 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.

4.2 PCI Configuration Error Messages

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

4.3 BIOS Error Messages

BIOS Error Messages

Error Message	Explanation
CH-2 Timer Error	Most AT systems include two timers. There is an error in timer 2.
CMOS Checksum Failure	After CMOS RAM values are saved, a checksum value is generated for error checking. The previous value is different from the current value. Run AMIBIOS Setup.
CMOS System Options Not Set	The values stored in CMOS RAM are either corrupt or nonexistent. Run Setup.
CMOS Time and Date Not Set	Run Standard CMOS Setup to set the date and time in CMOS RAM.
Diskette Boot Failure	The boot disk in floppy drive A: is corrupt. It cannot be used to boot the system. Use another boot disk and follow the screen instructions.
Display Switch Not Proper	The display jumper is not implemented on this product, this error will not occur.
DMA Error	Error in the DMA controller.
DMA #1 Error	Error in the first DMA channel.
DMA #2 Error	Error in the second DMA channel.
FDD Controller Failure	The BIOS cannot communicate with the floppy disk drive controller. Check all appropriate connections after the system is powered down.
HDD Controller Failure	The BIOS cannot communicate with the hard disk drive controller. Check all appropriate connections after the system is powered down.
INTR #1 Error	Interrupt channel 1 failed POST.
INTR #2 Error	Interrupt channel 2 failed POST.
Invalid Boot Diskette	The BIOS can read the disk in floppy drive A:, but cannot boot the system. Use another boot disk.
Keyboard Error	There is a timing problem with the keyboard. Set the Keyboard option in Standard CMOS Setup to Not Installed to skip the keyboard POST routines.
Parity Error -- System Halted	A parity error has been detected in the computer's memory or in an add-in card's memory.

4.4 ISA NMI Messages

ISA NMI Messages

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