# RU430HX

## Motherboard
## Technical Product Specification

Order Number 281810-002

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**intel.**

# Revision History

| Revision | Revision History | Date |
|---|---|---|
| -001 | Preliminary release of the RU430HX Technical Product Specification. | 05/96 |
| -002 | Second release of the RU430HX Technical Product Specification. | 05/96 |

This product specification applies only to standard RU430HX LPX motherboards with BIOS identifier 1.00.01.RU.

Changes to this specification will be published in the RU430HX Motherboard Specification Update before being incorporated into a revision of this document.

# Table of Contents

# 1  Board Description

## 1.1  Overview

The RU430HX motherboard will accept Pentium® processors operating at 75 MHz, 90 MHz, 100 MHz, 120 MHz, 133 MHz, 150 MHz, 166 MHz, and 200 MHz.  There is an option of having 256 KB or 512 KB of Pipeline Burst SRAM soldered onto the board.  The memory subsystem supports up to 128 MB of DRAM using either EDO or fast page SIMMs.  A type 7 Pentium OverDrive® socket provides an upgrade path to future OverDrive processors.

The Intel 82430HX PCIset contains an integrated PCI Bus Mastering IDE controller with two high performance IDE interfaces for up to four IDE devices (such as hard drives, CD-ROM readers, and so forth).  The National PC87306B Super I/O controller integrates the standard PC I/O functions: floppy interface, two FIFO serial ports, one EPP/ECP capable parallel port, a real-time clock, keyboard controller, and support for an IrDA compatible infrared interface.  To provide for the increasing number of multimedia applications, a Yamaha OPL3-SA audio CODEC is integrated onto the motherboard.  The OPL3-SA provides 16-bit stereo, Sound Blaster Pro† and Windows† Sound System compatibility and full-duplex capabilities to meet the demands of interactive multimedia applications.  An optional Yamaha OPL4-ML audio CODEC provides FM and Wave Table synthesis for  high quality audio applications.

PCI and ISA expansion slots are supported by a connector on the motherboard designed to accept a riser card.

A full set of software drivers and utilities are available to allow advanced operating systems such as Windows 95 to take full advantage of the hardware capabilities.  Features such as bus mastering IDE, Windows 95-ready Plug 'N' Play, Advanced Power Management (APM) with application restart, software-controlled power supply shutdown, and bi-directional audio are all provided by software available for the RU430HX.

## 1.2  Motherboard Manufacturing Options

- Yamaha OPL3-SA or OPL4-ML wave table audio
- 256 KB or 512 KB pipelined burst SRAM cache soldered to the board
- Support for universal serial bus (USB)
- S3 Trio 64 or S3 V+ or VirGE Graphics, including EDO video memory upgrade
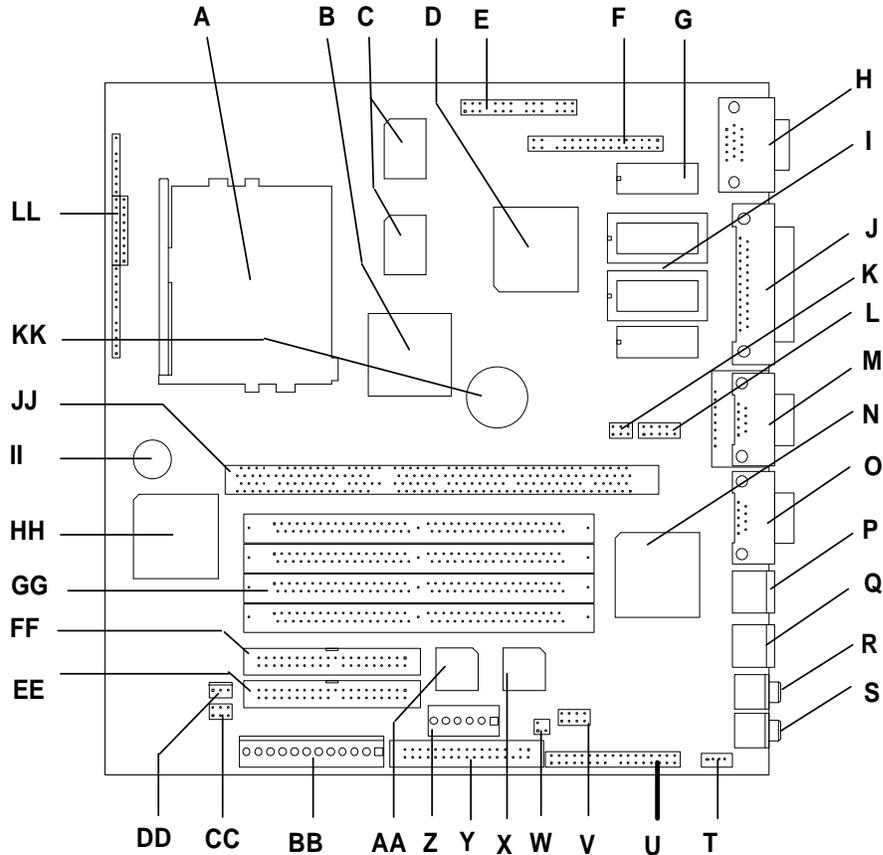
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**Figure 1.  Board Features**

A -  Socket 7 Pentium Processor socket

B - 82430HX (TXC)

C - Option of 256K or 512K PB SRAM

D - S3 V+ or ViRGE PCI graphics controller

E - Configuration jumper blocks

F - VESA† Feature connector

G - EDO graphics memory

H - VGA connector

I -  Graphics memory upgrade

J -  Parallel port connector

K - Riser card configuration header

L -  Serial port B header

M - Serial port B or USB connector

N - National PC87306B I/O controller

O - Serial port A connector

P -  PS/2 Mouse port

Q - PS/2 Keyboard port

R -  Mic In (3.5mm, stereo)

S - Line Out (3.5mm, stereo)

T -  CD ROM Audio connector

U - Audio I/O connector

V - Wave table upgrade connector

W - Telephony audio connector

X - Optional Yamaha OPL3 FM Synthesizer

Y - Floppy drive connector

Z -  3.3V Power connector

AA -  Optional Yamaha OPL4 Wave Table upgrade

BB -  Primary Power connector

CC -  Flash Recovery jumper

DD -  Soft-off power supply control

EE -  Primary IDE connector

FF -  Secondary IDE connector

GG -  SIMM sockets

HH -  82371SB PCI ISA/IDE Accelerator (PIIX3)

II -  Optional Piezo transducer

JJ -  PCI/ISA expansion connector

KK -  Battery for real-time clock

LL -  Front panel connector

## 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 RU430HX. The RU430HX LPX form factor adheres to the standard LPX guidelines in that the outer dimensions are 9 inches x 8.6 inches. Location of the I/O connectors, riser slot, and mounting holes are in strict compliance with the LPX specification.
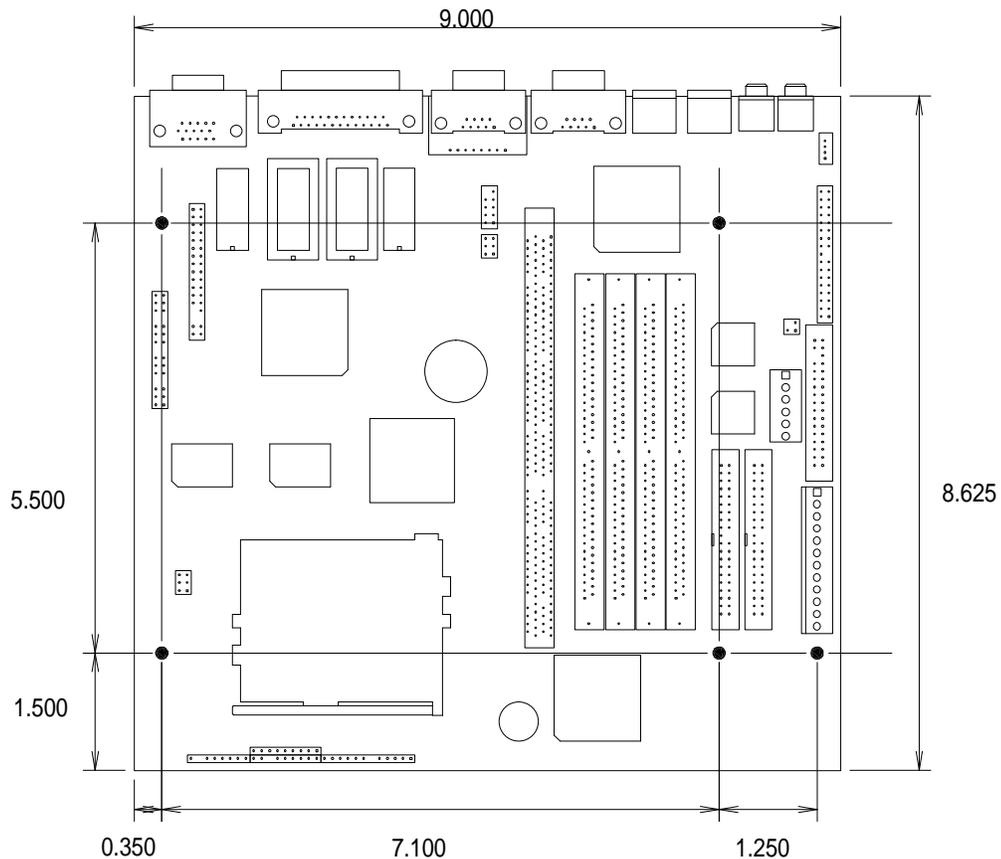


**Figure 2. Board Dimensions**

## 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. An on-board jumper enables use of VRE specified processors. 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, i386™ and Intel486™ processors. It supports both read and write burst mode bus cycles, and includes separate 8 KB on-chip code and data caches that employ a write-back policy. The Pentium processor

includes an advanced numeric coprocessor that increases the speed of floating point operations, while maintaining backward compatibility with Intel486 DX math coprocessor and complying to ANSI/IEEE standard 754-1985.

### 1.4.1   Microprocessor Upgrade

The board contains a 321-pin Socket 7 ZIF processor socket.  Socket 7 supports a processor upgrade path that includes higher performance Pentium OverDrive processors than can be supported with socket 5.

## 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, using four 8M x 32 SIMM modules, is 128 MB.   Memory timing requires 70 ns fast page devices or, for optimum performance, 60 ns EDO DRAM.  If the maximum external CPU clock speed is 60 MHz or slower, 70 ns EDO DRAM may be used.  Both parity and non-parity memory 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 the different types of memory may differ between banks. It is even possible to have 70 ns Fast Page DRAM in one bank and 60 ns EDO DRAM in the other, in which case each bank is independently optimized for maximum performance.  Bank 0 only, Bank 1 only, or both of the banks may be populated.  There are no jumper settings required for the memory size or type, that is automatically detected by the system BIOS.  Use only tin lead SIMMs when adding DRAM.

### 1.5.1.1   EDO DRAM

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

### 1.5.2   Second Level Cache

The Xcelerated Controller device supports a second level cache that uses the high performance synchronous pipeline burst static RAM (PBSRAM).  PBSRAM provides performance similar to expensive synchronous Burst SRAMs for only a slight cost premium over slower performing asynchronous SRAMs.

The RU430HX motherboard supports options for 256 or 512 KB cache soldered down.  Either configuration can provide cache for the first 64 MB of system memory.  For ease of use the cache size is automatically detected and configured by the system BIOS for optimal performance.

## 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 a second level 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 BGA package and includes the following features:

- CPU interface control
- Integrated L2 write-back cache controller
  - Pipeline burst SRAM
  - 256 or 512 KB direct-mapped
- Integrated DRAM controller
  - 64 bit path to memory
  - Support for EDO and fast page DRAM
  - 8 MB to 128 MB main memory
  - Parity and non-parity support
- Fully synchronous PCI bus interface
  - 25/30/33 MHz
  - PCI to DRAM > 100 Mbytes/sec
  - Up to 4 PCI masters in addition to the PIIX3 and IDE.

### 1.6.2  PCI ISA/IDE Xcelerator (PIIX3)

The PIIX3 provides the interface between the PCI and ISA buses and integrates a dual channel fast IDE interface capable of supporting up to 4 devices.  The PIIX3 integrates seven 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 onto 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 compliant
- Enhanced fast DMA controller
- Interrupt controller and steering
- Counters/timers
- SMI interrupt 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 (ECHS) translation modes as well as ATAPI (e.g. CD-ROM) devices on both IDE interfaces. Detection of IDE device transfer rate and translation mode capability is automatically determined by the system BIOS.

Normally, programmed I/O operations require a substantial amount of CPU bandwidth. In true multi-tasking operating systems like Windows 95, the CPU bandwidth freed up by using bus mastering IDE can be used to complete other tasks while disk transfers are occurring. 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

Control for the integrated serial ports, parallel port, floppy drive, RTC and keyboard controller is incorporated into a single component, the National Semiconductor PC87306B. This component provides:

- Two NS16C550-compatible UARTs with send/receive 16 byte FIFO
- Support for an IrDA compliant Infra Red interface
- Multi-mode bi-directional parallel port
    — Standard mode; IBM and Centronics compatible
    — Enhanced Parallel Port (EPP) with BIOS/Driver support
    — High Speed mode; Extended Capabilities Port (ECP) compatible
- Industry standard floppy controller with 16 byte data FIFO (2.88 MB floppy support)
- Integrated real-time clock accurate within +/- 13 minutes/year at 25° C and +5 V when the system is continuously powered on
- Integrated 8042 compatible keyboard controller

By default, the 87306B interfaces are automatically configured by the BIOS during boot-up. You can also manually configure the interfaces with the BIOS Setup utility. Chapter 3 describes the BIOS Setup utility.

### 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 5¼ inch media or for 720 KB, 1.2 MB, 1.44 MB, or 2.88 MB 3½ inch media with the BIOS setup utility. 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 baseboard.  The 5V 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 de-turbo mode, emulating an 25 MHz AT, and <CTRL><ALT><+> sets the system for turbo mode.  Changing the Turbo mode may be prohibited by an operating system, or when the CPU is in Protected mode or virtual x86 mode under DOS.
- <CTRL><ALT><defined in setup>:  A power down hot-key sequence takes advantage of the SMM features of the Pentium Processor to greatly reduce the system's power consumption while maintaining the responsiveness necessary to service external interrupts.  A security hot-key sequence provides password protection to the system.

## 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, 100-year calendar with alarm features.  The RTC can be set via the BIOS SETUP program.  The RTC also supports 242-byte battery-backed CMOS RAM in two banks which is reserved for BIOS use.  The CMOS RAM can be set to specific values or cleared to the system default values using the BIOS SETUP program.  Also, the CMOS RAM values can be cleared to the system defaults by using a configuration jumper on the board.

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 system is not plugged into the wall socket.  When the system is plugged in, power is supplied from the power supply's +5 V standby current to extend the life of the battery.

## 1.7.4    IrDA (infra-red) support

A 5-pin interface on the front panel I/O connector is provided to allow connection to a Hewlett Packard HSDSL-1000 compatible Infra-red (IrDA) transmitter/receiver.  For Consumer Ir, a Sharp GP1U58X (second sourced by Litton), Panasonic PNA4602M, ICX IRR538 and ICX model IRR638 or equivalent receiver module is required.  Both modules can be connected/supported, however only one can be active at a time.  Once the module is connected to the front panel I/O header, Serial port 2 can be re-directed to either the IrDA or Consumer Ir module.  Once configured for IrDA, the user can transfer files to or from portable devices such as laptops, PDA's 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 is (system) receive only and can be used to control telephony functions and multimedia operation such as volume control, CD track change etc.

## 1.7.5   Parallel port

A 25-pin D-Sub header is provided on the back panel for a multi-mode bi-directional parallel port. The Parallel port can be configured in the BIOS setup as output only compatible mode, bidirectional mode, ECP or EPP modes.  The highly flexible parallel port can also be assigned to I/O addresses 278H, 378H, or 3BCH and IRQ's 5 or 7.  Furthermore, a routable DMA scheme allows Plug 'N' 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  Graphics Subsystem

The RU430HX motherboard is available with a factory option of an S3 Trio 64, S3 V+, or S3 ViRGE SVGA graphics.  The RU430HX motherboard supports S3 media channel for HW MPEG.

## 1.8.1   S3 Trio 64 Graphics

The RU430HX motherboard is available with the factory option of an S3 Trio64 SVGA graphics controller with 1 MB of graphics DRAM.  The graphics DRAM can be upgraded to 2 MB by installing two 256 KB x 16, 60 ns SOJ DRAM devices in the provided sockets.

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

## 1.8.2   S3 V+ Graphics

The RU430HX motherboard is available with a factory option of an S3 Trio64 V+ SVGA graphics controller with 1 MB of graphics DRAM upgradeable to 2 MB.  The graphics DRAM can be upgraded to 2 MB by installing two 256 KB x 16, 60 ns SOJ DRAM devices in the provided sockets.  The Trio64 V+ has a 64-bit graphics engine and incorporates the S3[†] Streams Processor that enables the device to convert YUV formatted video data to RGB and provides acceleration for scaling the video display without compromising picture quality or frame rate.  The on-chip RAMDAC/clock synthesizer is capable of output pixel data rates of 135 MHz providing non-interlaced screen resolutions of up to 1280x1024x256 colors at 75 Hz with 2 MB of DRAM. Hardware acceleration for graphics functions such as BitBLTs with ROPs, 2-point line draws, trapezoidal and polygon fills, clipping and cursor support provide high performance operation

under Windows and other GUI environments.  In addition, a fast linear addressing scheme based upon DCI reduces software overhead by mapping the display memory into the CPU's upper memory address space and permitting direct CPU access to the display memory.

### 1.8.3   S3 ViRGE Graphics

The RU430HX motherboard is available with a factory option of an S3 VIRGE SVGA graphics controller with 2 MB of 50 ns EDO SOJ DRAM.  The S3 VIRGE has a high performance 64-bit 2D/3D graphics engine and incorporates the S3 Streams Processor that enables the device to convert YUV formatted video data to RGB and provides acceleration for scaling the video display without compromising picture quality or frame rate.  The on-chip RAMDAC/clock synthesizer is capable of output pixel data rates of 135 MHz providing non-interlaced screen resolutions of up to 1280x1024x256 colors at 75 Hz.  The 64-bit S3d Engine incorporates the key Windows and other GUI accelerator functions of BitBLT, line draw and polygon fill.  3D features include flat shading, Gouraud shading and texture mapping support.  Advanced texture mapping features include perspective correction, bi-linear and tri-linear filtering, MIP-mapping, and Z-buffering.  These features provide the most realistic user experience for interactive 3D applications.  In addition, a fast linear addressing scheme based upon DCI reduces software overhead by mapping the display memory into the CPU's upper memory address space and permitting direct CPU access to the display memory.

## 1.8.4   Supported Video Resolutions

**Table 1.    Supported Video Resolutions**

| Resolution | S3 Trio 64 1 MB DRAM | S3 Trio 64 2 MB DRAM | Refresh rate (Hz) | S3 V+ 1 MB DRAM | S3 V+ 2 MB DRAM | Refresh rate (Hz) | S3 ViRGE 2 MB DRAM | Refresh rate (Hz) |
|---|---|---|---|---|---|---|---|---|
| 640x480x4 | X | X | 60 | X | X | 60 | X | 60 |
| 640x480x8 | X | X | 60,72,75,85 | X | X | 60,72,75,85 | X | 60,72,75,85 |
| 640x480x15 | X | X | 60,72,75 | X | X | 60,72,75 | X | 60,72,75 |
| 640x480x16 | X | X | 60,72,75 | X | X | 60,72,75 | X | 60,72,75 |
| 640x480x24 | | | | X* | X* | 60, 72, 75 | X* | 60,72,75 |
| 640x480x32 | | X | 60,72,75 | | X | 60,72,75 | X | 60,72,75 |
| 800x600x8 | X | X | 56,60,72, 75,85 | X | X | 56,60,72, 75,85 | X | 56,60,72,75, 85 |
| 800x600x15 | X | X | 60,72,75 | X | X | 60,72,75 | X | 60,72,75 |
| 800x600x16 | X | X | 60,72,75 | X | X | 60,72,75 | X | 60,72,75 |
| 800x600x24 | | | | X* | X* | 60, 72,75 | X* | 60,72,75 |
| 800x600x32 | | X | 60,72,75 | | X | 60,72,75 | X | 60,72,75 |
| 1024x768x8 | X | X | 43(IL),60, 70,75,85 | X | X | 43(IL),60, 70,75,85 | X | 43(IL),60, 70,75,85 |
| 1024x768x15 | | X | 43(IL),60, 70,75 | | X | 43(IL),60, 70,75 | X | 43(IL),60, 70,75 |
| 1024x768x16 | | X | 43(IL),60, 70,75 | | X | 43(IL),60, 70,75 | X | 43(IL),60, 70,75 |
| 1024x768x24 | | | | | X* | 43(IL),60, 70,75 | X* | 43(IL),60, 70,75 |
| 1152x864x8 | X | X | 60 | X | X | 60 | X | 60 |
| 1280x1024x4 | X | X | 43(IL), 45(IL),60, 72,75 | X* | X* | 43(IL), 45(IL),60, 72,75 | X* | 45(IL),60, 72,75 |
| 1280x1024x8 | | X | 45(IL),60, 72,75 | | X | 45(IL),60, 72,75 | X | 45(IL),60, 72,75 |
| 1600x1200x8 | | X | 48.5(IL) | | X | 48.5(IL) | X | 48.5(IL) |

NOTES:   Color bits: 4=16 colors; 8=256 colors; 16=64K colors; 32=16.7 million colors.
IL = Interlaced
* Non-accelerated mode

### 1.8.5 VESA Feature Connector

The RU430HX motherboard supports a 34-pin or 26-pin VESA feature connector for synchronizing graphics output with an external NTSC or PAL signal and a shared frame buffer interface to maximize multimedia performance, as well as the LPB (Local Peripheral Bus) that provides a glueless bi-directional interface to a video companion device such as an MPEG/live video decoder. The RU430HX also supports other VESA standards such as the VESA DPMS protocol to put a DPMS compliant monitor into power saving modes and the VESA Display Data Channel (DDC2B) that permits transfer of monitor identification and resolution support data for ease of use.

### 1.8.6 Graphics Drivers and Utilities

Graphics drivers and utilities for Windows 3.11 and Windows 95 are provided on the foundation software CD. These drivers come in a compressed form and are extracted by an installation utility. Also included is a Windows 3.1x control panel applet called Galileo which allows the user to change the screen resolution, number of colors, and large or small fonts while in Windows. Windows NT[†] drivers are embedded in the O.S.

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 3.11 and Windows NT may be downloaded from the Intel Applications Support BBS. Drivers for SCO UNIX are available from SCO.

## 1.9 Audio Subsystem

The RU430HX motherboard features a 16-bit stereo audio subsystem as a factory installed option. The audio subsystem is based upon the Yamaha YMF701 OPL3-SA FM synthesizer. The YMF701 provides all the digital audio and analog mixing functions required for recording and playing of audio on personal computers. These functions include stereo analog-to-digital and digital-to-analog converters, analog mixing, anti-aliasing and reconstruction filters, line and microphone level inputs, and digital audio compression via selectable A-law / μlaw, and full digital control of all mixer and volume control functions. The rear panel Mic/Line In function is switchable between Mic In and Line In via software.

**Table 2.     RU430HX Audio Resource Mapping**

| Resource | Interrupts (Options) | | DMA (Options) | I/O (Options) | |
|---|---|---|---|---|---|
| Sound Blaster (DMA playback, DMA shared with Windows Sound System Capture) | 5* 7 | 9 10 | 1* 3 | 220h 240h | |
| Windows Sound System (DMA playback) | 7 9 10* | | 0* 1 3 | 530h* E80h | F40h 604h |
| MPU-401 (IRQ shared with Sound Blaster) | | | | 330h* 332h | 334h 300h |
| Game Port | | | | 220-22Fh | |

Note:  * indicates default setting

### 1.9.1    Audio Drivers

Audio software and utilities are provided via the foundation software CD for the RU430HX motherboard.  Drivers are supplied for MS-DOS, Windows 3.x, Windows 95, and Windows NT. A Windows setup program installs all of the software programs and utilities onto the system hard drive.  The software provides for recording from line and mic inputs, Wave, MIDI and CD playback and an audio mixer.  Utilities provide control of settings and modes.

## 1.10  Baseboard Connectors
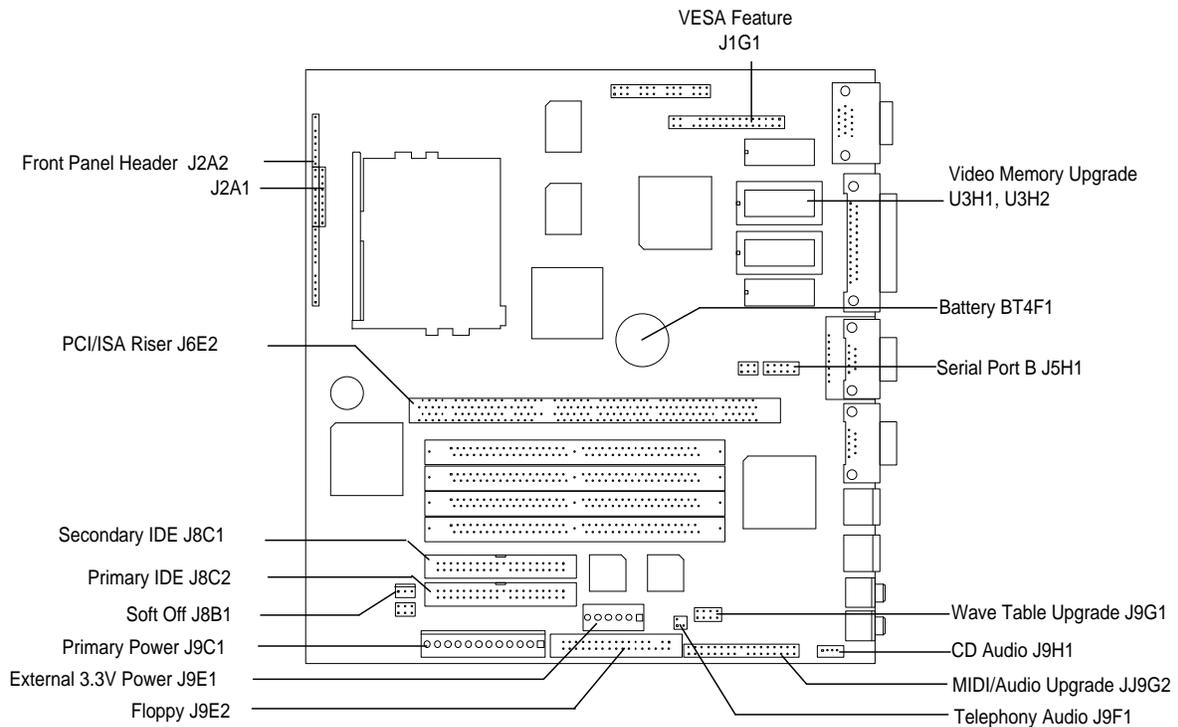


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**Figure 3.  Motherboard Connector Locations**

## 1.10.1   VESA Feature Connector - J1G1

| Pin | Signal Name | Pin | Signal Name |
|-----|-------------|-----|-------------|
| 1 | Ground | 2 | Data 0 |
| 3 | Ground | 4 | Data 1 |
| 5 | Ground | 6 | Data 2 |
| 7 | Data enable | 8 | Data 3 |
| 9 | Sync enable | 10 | Data 4 |
| 11 | PCLK enable | 12 | Data 5 |
| 13 | N/C | 14 | Data 6 |
| 15 | Ground | 16 | Data 7 |
| 17 | Ground | 18 | PCLK |
| 19 | Ground | 20 | BLANK |
| 21 | Ground | 22 | HSYNC |
| 23 | N/C | 24 | VSYNC |
| 25 | Ground | 26 | N/C |
| 27 | Key | 28 | Key |
| 29 | IICCLK | 30 | Ground |
| 31 | IICDAT | 32 | N/C |
| 33 | EN1 | 34 | EN2 |

## 1.10.2   Wave Table Upgrade Connector - J9G1

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

## 1.10.3   CD Audio - J9H1

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

## 1.10.4    MIDI/Audio Upgrade J9G2

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

## 1.10.5    Telephony Connector - J9F1

| Pin | Signal Name |
| --- | --- |
| 1 | Ground |
| 2 | Audio Out |
| 3 | Audio In |
| 4 | Key |

## 1.10.6    Floppy Drive Connector - J9E2

| Pin | Signal Name | Pin | Signal Name |
|-----|-------------|-----|-------------|
| 1 | Ground | 2 | DENSEL |
| 3 | Ground | 4 | Reserved |
| 5 | Key | 6 | FDEDIN |
| 7 | Ground | 8 | Index # |
| 9 | Ground | 10 | Motor Enable A # |
| 11 | Ground | 12 | Drive Select B # |
| 13 | Ground | 14 | Drive Select A # |
| 15 | Ground | 16 | Motor Enable B # |
| 17 | MSEN1 | 18 | DIR # |
| 19 | Ground | 20 | STEP # |
| 21 | Ground | 22 | Write Data # |
| 23 | Ground | 24 | Write Gate # |
| 25 | Ground | 26 | Track 00 # |
| 27 | MSEN0 | 28 | Write Protect # |
| 29 | Ground | 30 | Read Data # |
| 31 | Ground | 32 | Side 1 Select # |
| 33 | Ground | 34 | Diskette Change # |

## 1.10.7    External 3.3 V Power Connector - J9E1

| Pin | Name |
|-----|------|
| 1 | Ground |
| 2 | Ground |
| 3 | Ground |
| 4 | +3.3 V |
| 5 | +3.3 V |
| 6 | +3.3 V |

## 1.10.8    Primary Power Connector J9C1

| Pin | Name | Function |
|---|---|---|
| 1 | PWRGD | Power good |
| 2 | +5 V | +5 volts VCC |
| 3 | +12 V | +12 volts |
| 4 | -12 V | -12 volts |
| 5 | Ground | Ground |
| 6 | Ground | Ground |
| 7 | Ground | Ground |
| 8 | Ground | Ground |
| 9 | -5 V | -5 volts |
| 10 | +5 V | +5 volts VCC |
| 11 | +5 V | +5 volts VCC |
| 12 | +5 V | +5 volts VCC |

## 1.10.9    Soff-Off Power Supply Connector J8B1

| Pin | Name | Function |
|---|---|---|
| 1 | PS_ON | Remote On/Off |
| 2 | N/C | No connect |
| 3 | PS_COM | Supply presence |

## 1.10.10    IDE Connectors - J8C2, J8C1

| 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 |

**IDE Connectors - J8C2, J8C1 (continued)**

| Pin | Signal Name | Pin | Signal Name |
|-----|-------------|-----|-------------|
| 21 | DDRQ0 (DDRQ1) | 22 | Ground |
| 23 | I/O Write # | 24 | Ground |
| 25 | I/O Read # | 26 | Ground |
| 27 | IOCHRDY | 28 | Vcc 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 |

## 1.10.11   PCI/ISA Riser Connector - J6E2

| Pin | Signal Name | Pin | Signal Name | Pin | Signal | 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 | PCIIINT2# | 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 |

**PCI/ISA Riser Connector - J6E2 (continued)**

| Pin | Signal Name | Pin | Signal Name | Pin | Signal | Pin | Signal Name |
|-----|-------------|-----|-------------|-----|--------|-----|-------------|
| A24 | SA7 | B24 | IRQ4 | E24 | 3.3 V | F24 | 3.3 V |
| A25 | SA6 | B25 | IRQ3 | E25 | Key | F25 | Key |
| 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 | Vcc | H17 | Vcc |
| C18 | SD15 | D18 | GND | G18 | GND | H18 | GND |
|  |  |  |  | G19 | GND | H19 | GND |

## 1.10.12    Front Panel Connector - J2A1

| Pin | Signal Name |
|-----|-------------|
| 1 | Ground |
| 2 | +12 V |
| 3 | Ground |
| 4 | Ground |
| 5 | RESET |
| 6 | Key |
| 7 | PWR LED + |
| 8 | Key |
| 9 | PWR LED - |
| 10 | Key |
| 11 | HDD LED + |
| 12 | HDD LED - |
| 13 | Key |
| 14 | PWR LED + |
| 15 | Power Switch |
| 16 | Ground |
| 17 | Sleep Req |
| 18 | Sleep +5 (1K pullup) |
| 19 | Key |
| 20 | +5 V |
| 21 | Key |
| 22 | IR_RX |
| 23 | Ground |
| 24 | IR_TX |
| 25 | Consumer IR |
| 26 | SPKROUT |
| 27 | SPKRHDR |
| 28 | Key |
| 29 | Ground |

## 1.10.13 Front Panel Connector - J2A2

| Pin | Signal Name |
|-----|-------------|
| 1 | HDD LED + |
| 2 | Key |
| 3 | HDD LED - |
| 4 | Key |
| 5 | Ground |
| 6 | Key |
| 7 | Reset |
| 8 | Key |
| 9 | +5 V |
| 10 | Key |
| 11 | IR_RX |
| 12 | Key |
| 13 | Ground |
| 14 | Key |
| 15 | IR_TX |
| 16 | Key |
| 17 | Consumer IR |
| 18 | Key |

## 1.10.14 Power Supply Connectors

When used with a power supply that supports remote power on/off, the RU430HX baseboard can turn off the system power via software control (soft-off). The Powerman utility supplied for Windows 3.1x allows for soft-off as does the shutdown icon in Windows 95 Start menu. The system BIOS will turn the system power off when it receives the proper APM command from the OS. For example, Windows 95 will issue this APM command when the user selects "Shutdown the computer" option. Note that APM must be enabled in the system BIOS and OS in order for the soft-off feature to work correctly. Power supplies that support soft-off interface to the baseboard via the 3-pin "PWS CNTRL" connector (J8B1) which is a Molex 2695 connector featuring a security latch for reliability. In order for the system to recognize the presence of a soft-off power supply, the supply must tie pin 3 of the PWS Control connector to ground.

The system's front panel ON/OFF button is connected to the baseboard via the 1x4-pin "PS SLEEP" header (J2A1). Pins 15 and 16 of this connector should be tied to a SPST momentary button to support a power button and, likewise, pins 17 and 18 provide support for a energy saving sleep/resume button. These functions can be integrated into a system as two separate buttons or a single button. By implementing a DPST momentary button connected to all four pins of the PS SLEEP connector, both sleep/resume and power on/off functions can be supported via a single button. In this configuration, pressing the button momentarily (closing the switch) while the system is off will turn the system on as you would expect (POST is run). Pressing the button while the system is running (system will beep), causes the system to enter the energy saving Stand By (sleep) mode. Pressing the button (or keyboard/mouse) while the system is sleeping, causes the

system to resume to full power and return to whatever application was active before entering sleep mode. To turn the system off using the front panel button, the button must be pressed (system will beep) and held down (2 seconds) until the system produces a two-toned beep. At that time the system will power off. Remember, the system may also be powered off by utilizing the soft-off feature mentioned above. When the button is pressed again, the system will power on and run POST. Traditional power supplies with mechanical ON/OFF buttons (those that do not support soft-off) will bypass these connectors.

## 1.10.15   Front panel Connectors

The board provides header connectors to support functions typically located on the chassis bezel. Front panel features supported include:

- System reset
- Power LED
- Hard drive activity LED
- Power switch
- System speaker
- CPU fan
- Infra-red (IrDA) port
- Sleep/resume
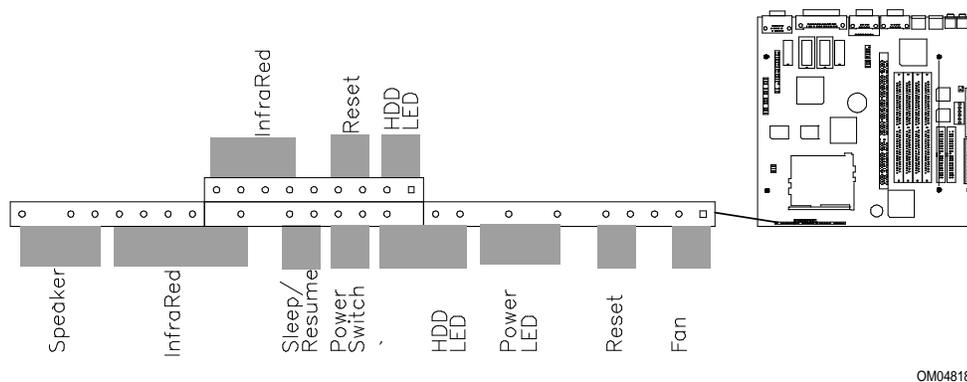


**Figure 4.  Front Panel I/O Connectors**

## 1.10.15.1   Speaker

The external speaker provides error beep code information during the Power-On Self Test, if the system cannot use the video interface. If there are no speakers plugged into the audio output jack, the audio output is redirected to the external speaker.

### 1.10.15.2    Infra-Red (IrDA) connector

Serial port 2 can be configured to support an IrDA or Consumer Ir module via a front panel header connector.  Once configured for IrDA, the user can transfer files to or from portable devices such as laptops, PDA's, and printers using application software such as LapLink.  The IrDA specification provides for data transfers at 115 Kbps from a distance of 1 meter.  Consumer Ir is typically used for remote control of telephony and multimedia functions.

### 1.10.15.3    Sleep / resume

When Advanced Power Management (APM) is activated in the system BIOS and the Operating System's APM driver is loaded, Sleep mode (Stand-By) can be entered in one of three ways: an optional front panel "Sleep/Resume" button, a user defined keyboard hot key, or prolonged system inactivity.  The Sleep/Resume button is supported by a 2-pin header located on the front panel I/O connector.  Closing the "Sleep" switch will generate an SMI (System Management Interrupt) to the processor which immediately goes into System Management Mode (SMM), the so called "Sleep" mode.

The front panel "Sleep mode" switch must be a momentary two pin SPST type that is normally open.  The function of the Sleep/Resume button can also be achieved via a keyboard hot-key sequence, or by a time-out of the system inactivity timer.  Both the keyboard hot-key and the inactivity timer are programmable in the BIOS setup (timer is set to 10 minutes by default).  To re-activate the system, or "Resume", the user must simply press the sleep/resume button again, or use the keyboard or mouse.  Mouse activity will only "wake up" the system if a mouse driver is loaded.  While the system is in Stand-By or "sleep" mode  it is fully capable of responding to and servicing external interrupts (such as incoming FAX) even though the monitor will only turn on if a user interrupt (keyboard/mouse) occurs as mentioned above.

### 1.10.15.4    HDD LED

This header can be connected to an LED to provide a visual indicator for when an IDE hard drive connected to the onboard IDE controller is being read or written.

### 1.10.15.5    Reset

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

## 1.10.16    Audio Connectors



OM04819
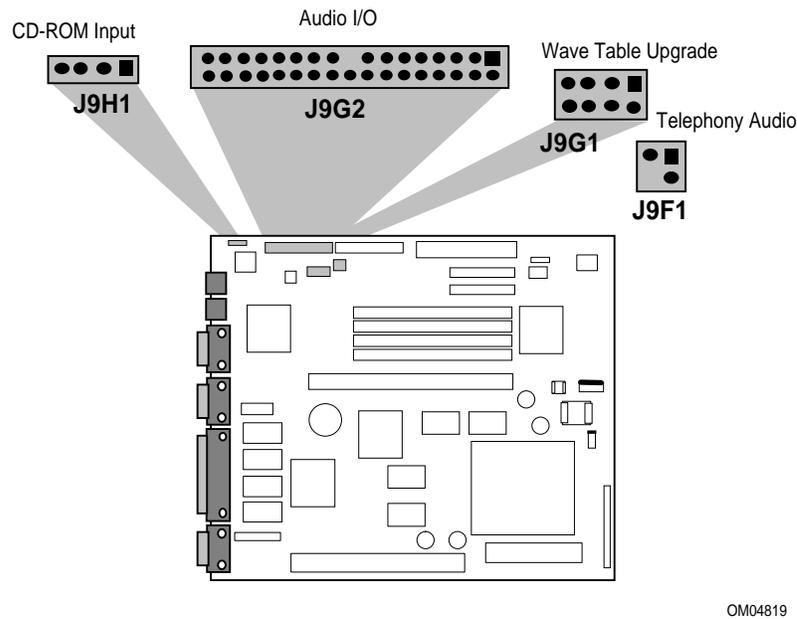
**Figure 5.  Audio I/O Connections**

## 1.10.16.1    Audio I/O Connector

An optional audio I/O module is available for the RU430HX motherboard.  The module contains all of the necessary audio jacks (Speaker Out, Line IN, Mic IN) and a game port.  The module plugs into a 34-pin header connector on the motherboard.  The audio connectors are 1/8-inch stereo jacks.  An additional connector located on the audio I/O module allows routing of the audio jacks to the front of the chassis.  The audio output is connected to the standard PC speaker to provide an output path that does not require external speakers.  If external speakers are plugged into the attached I/O module, the audio output is redirected to the external speakers.  If headphones are plugged into a front panel speaker jack, the audio is redirected to the headphones.



OM4820
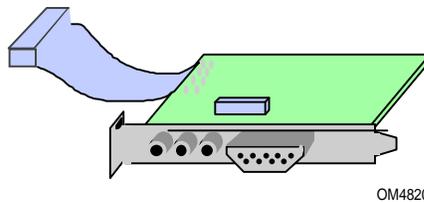
**Figure 6.  RU430HX Audio I/O Module**

### 1.10.16.2   CD-ROM Audio Input

A four pin connector is provided for interfacing the audio output stream from a CD-ROM reader into the audio sub-system mixer.  This connector is compatible with the typical cable that is supplied with CD-ROM readers for interfacing to audio add-in cards.

### 1.10.16.3   Wave Table Upgrade

With the standard audio feature (YMF701) installed, an eight pin header is provided to connect to a wave table upgrade card for richer sound quality in both DOS and Windows environments.  The wave table upgrade module typically is installed into a standard ISA slot with a cable routed to the connector.

Compatible wave table upgrade cards are available from several venders; the ICS WaveFront upgrade module and the CrystaLake Series 2000 wave table product family add a complete General MIDI compatible music solution to the RU430HX based system.

The advanced audio feature (YMF704) includes wave table sound and the upgrade connector is not installed.
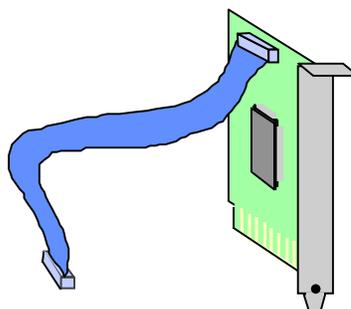


**Figure 7.  RU430HX Wave Table Upgrade Module**

### 1.10.17   Back Panel Connectors

The back panel provides external access to PS/2 style keyboard and mouse connectors, two serial port connectors, one parallel port connector, a VGA connector, and the external audio jacks. Figure 8 shows the general location of the I/O connectors.



Line Mic/  PS/2        PS/2       COM 1                COM 2                    Parallel Port                       VGA
Out  Line  Mouse    Keybrd
     In
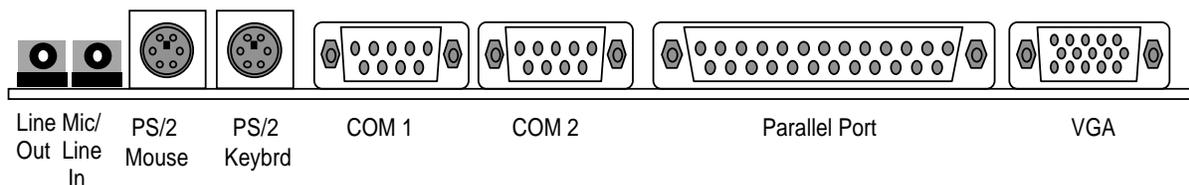
OM04822

**Figure 8.  I/O Connections**

### 1.10.17.1    PS/2 Keyboard and Mouse Connectors - J7J1 and J8J1

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

### 1.10.17.2    Serial Port Connectors - J5J2 and J6J1

| Pin | Signal Name |
|-----|-------------|
| 1 | DCD |
| 2 | Serial In # |
| 3 | Serial Out # |
| 4 | DTR# |
| 5 | GND |
| 6 | DSR# |
| 7 | RTS# |
| 8 | CTS# |
| 9 | GND |

### 1.10.17.3    Parallel Port Connector - J3J1

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

## 1.10.17.4   Video Monitor Connector - J1J1

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

## 1.11 Jumper Settings
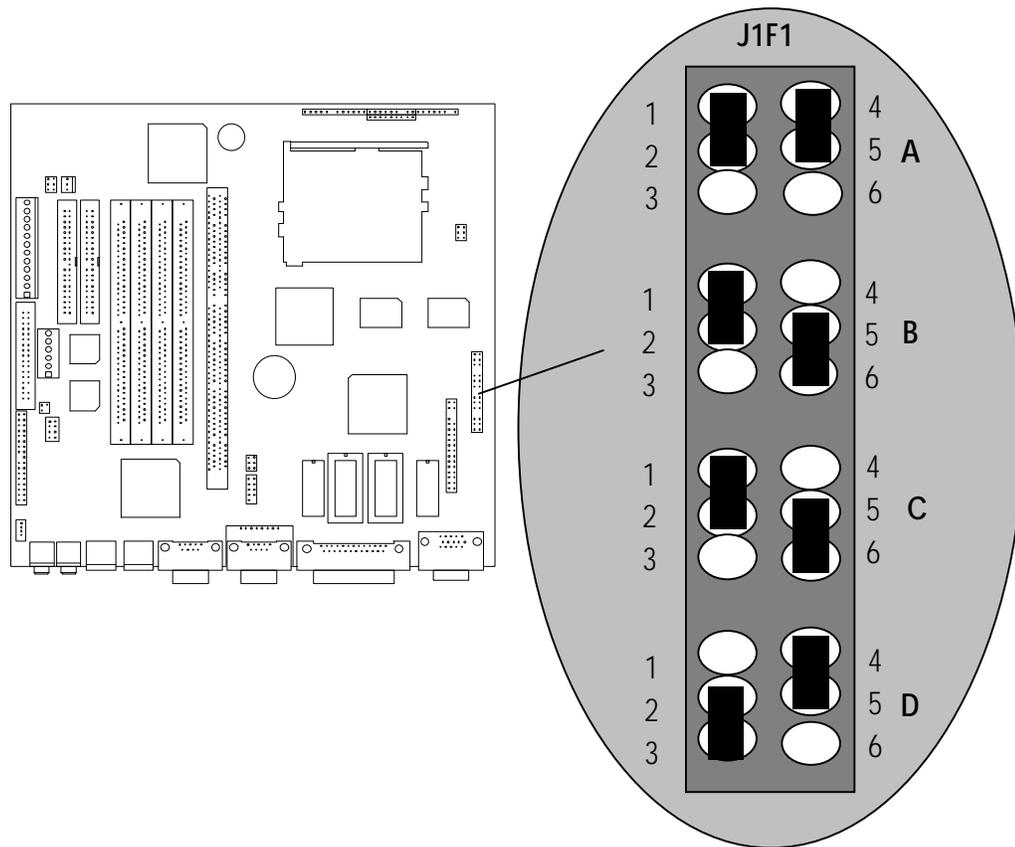


OM04823

**Figure 9.  Jumper Locations**

**Table 3.      Configuration Jumper Settings**

| Function | Jumper | Configuration |
|---|---|---|
| Password clear | J1F1-A | 1-2 Password enabled (**Default**)<br>2-3 Password clear/disabled |
| CMOS clear | J1F1-A | 4-5 Keep (**Default**)<br>5-6 Clear |
| CMOS Setup Access | J1F1-B | 1-2 Access allowed (**Default**)<br>2-3 Access denied |
| Processor voltage | J1F1-B | 4-5 Standard voltage (**Default**)<br>5-6 VRE enabled |
| CPU speed ratio | J1F1-C | See Table 4 |
| Host bus speed<br>**(Note:  These jumpers also set the PCI<br>and ISA clock speeds.)** | J1F1-D | See Table 4 |

### 1.11.1 CPU Configuration (J1F1-C, D)

These allow the board to be switched between different speeds of the Pentium processor. These jumpers also affect the PCI and ISA clock speeds according to the following table.

**Table 4.      CPU/SYSTEM Speed Settings**

| CPU Freq. (MHz) | Host Bus Freq. (MHz) | Jumper Settings for J9C1-C | Jumper Settings for J9C1-D | PCI Freq. (MHz) | Clock Ratio |
|---|---|---|---|---|---|
| 200 | 66 | 1-2 and 5-6 | 1-2 and 5-6 | 33 | 6/2 |
| 180 | 60 | 2-3 and 4-5 | 1-2 and 5-6 | 30 | 6/2 |
| 166 | 66 | 1-2 and 5-6 | 2-3 and 5-6 | 33 | 5/2 |
| 150 | 60 | 2-3 and 4-5 | 2-3 and 5-6 | 30 | 5/2 |
| 133 | 66 | 1-2 and 5-6 | 2-3 and 4-5 | 33 | 4/2 |
| 120 | 60 | 2-3 and 4-5 | 2-3 and 4-5 | 30 | 4/2 |
| 100 | 66 | 1-2 and 5-6 | 1-2 and 4-5 | 33 | 3/2 |
| 90 | 60 | 2-3 and 4-5 | 1-2 and 4-5 | 30 | 3/2 |
| 75 | 50 | 2-3 and 5-6 | 1-2 and 4-5 | 25 | 3/2 |
| Reserved | - | 1-2 and 4-5 | - | - | - |

### 1.11.2 Password clear (J1F1-A, Pins 1, 2, and 3)

Allows system password to be cleared by moving the jumper from pins 1-2 to pins 2-3 and turning the system on. The system should then be turned off and the jumper should be returned to the 1-2 position to restore normal operation. This procedure should only be done if the user password has been forgotten. The password function is effectively disabled if this jumper is in the 2-3 position. Default is for the password to be enabled (1-2 position).

### 1.11.3 Clear CMOS (J1F1-A, Pins 4, 5, and 6)

Allows CMOS settings to be reset to default values by moving the jumper from pins 4-5 to pins 5-6 and turning the system on. When the system reports that "NVRAM cleared by jumper", the system can be turned off, and the jumper should be returned to the 4-5 position to restore normal operation. This procedure should be done whenever the system BIOS is updated. Default is for this jumper to be on pins 4-5.

### 1.11.4 CMOS Setup Access (J1F1-B, Pins 1, 2, and 3)

Allows access to CMOS Setup utility to be disabled by moving this jumper from the 1-2 position to the 2-3 position. Default is for access to setup to be enabled (1-2 position).

### 1.11.5 CPU Voltage (J1F1-B, Pins 4, 5, and 6)

This jumper block changes the output of the on-board voltage regulator. Pins 4-5 should be jumpered for processors that require standard voltage regulation. Pins 5-6 should be jumpered for processors that require the VRE specification. This jumper should not be changed by the user

unless changing to a new processor type.  Some upgrade processors may require a different setting.  Check the processor's documentation for the correct setting.  (Standard = 3.135-3.63V, VR = 3.3-3.465V, VRE = 3.465-3.63V)

## 1.12  Reliability

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

RU430HX Motherboard          TBD

## 1.13  Environmental

**Table 5.      Board Environmental Specifications**

| Parameter | Specification | | |
|---|---|---|---|
| **Temperature** | | | |
| Non-Operating | -40°C to +70°C | | |
| Operating | +0°C to +55°C | | |
| **DC Voltage** | | | |
| +5 V | ±5 % | | |
| -5 V | ±5 % | | |
| +12 V | ±5 % | | |
| -12 V | ±5 % | | |
| +3.3 V | ±5 % | | |
| **Shock** | | | |
| Unpackaged | 50 G trapezoidal waveform | | |
| | Velocity change of 170 inches/second | | |
| Packaged | Half sine 2 millisecond | | |
| | **Product (Weight)** | **Free fall (height in inches)** | **Velocity (Change - inches/second)** |
| | <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 :  0.01g² 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 | | |

## 1.14 Power Consumption

Table 6 lists the wattage and current specifications for a hypothetical system configured with the motherboard and the following components: a 133 MHz Pentium Processor, 16 MB RAM, 256 KB cache, 3.5-inch floppy drive, 1 GB hard drive.  This information is preliminary and is provided only as a guide for calculating **approximate** total system power usage with additional resources added.

**Table 6.     Power Usage**

| | | DC (amps) | | | |
|---|---|---|---|---|---|
| | AC (watts) | +5 V | -5 V | +12 V | -12 V |
| No APM enabled | | | | | |
|     DOS prompt | TBD | TBD | TBD | TBD | TBD |
| APM enabled | | | | | |
|     DOS prompt | TBD | TBD | TBD | TBD | TBD |

## 1.15 Regulatory Compliance

TBD

# 2 Board Resources

## 2.1 Memory Map

**Table 7.    Memory Map**

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

## 2.2 I/O Map

**Table 8.    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 | Ultra 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 | Kbd 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 - Brd. Config. |
| 0079 | 1 byte | Reserved - Brd. Config. |

**Table 8.      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 |
| 0200 - 0207 | 8 bytes | Gameport Joystick |
| 0220 - 022F | 16 bytes | Sound Blaster / OPL3-SA base port |
| 0270 - 0273 | 4 bytes | I/O read port for Plug and Play |
| 0278 - 027B | 4 bytes | Parallel Port 2 |
| 02E8 - 02EF | 8 bytes | Serial Port 4 |
| 02F8 - 02FF | 8 bytes | On-Board Serial Port 2 |
| 0330 - 0331 | 2 bytes | Audio - MUP-401 |
| 0376 | 1 byte | Sec IDE Chan Cmd Port |
| 0377 | 1 byte | Sec IDE Chan Stat Port |
| 0378 - 037F | 8 bytes | Parallel Port 1 |
| 0388 - 038B | 4 bytes | Audio - FM Synth |
| 03B0 - 03BB | 4 bytes | S3 Trio64V+ |
| 03BC - 03BF | 4 bytes | Parallel Port 3 |
| 03C0 - 03DF | 16 bytes | S3 Trio64V+ |
| 03E8 - 03EF | 8 bytes | Serial Port 3 |
| 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 | Pri IDE Chan Status Port |
| 03F8 - 03FF | 8 bytes | On-Board Serial Port 1 |
| 04D0 - 04D1 | 2 bytes | Edge/level triggered |
| LPT + 400h | 8 bytes | ECP port, LPT + 400h |
| 530 | 8 bytes | Windows Sound System base port |
| 0608 - 060B | 4 bytes | Audio - WSS |
| 0CF8 - 0CFB | 4 bytes | PCI Config Address Reg. |
| 0CF9 | 1 byte | Turbo & Reset Control Reg. |
| 0CFC-0CFF* | 4 bytes | PCI Config Data Reg |
| FF00 - FF07 | 8 bytes | IDE Bus Master Reg. |
| FFA0 - FFA7 | 8 bytes | Primary Bus Master IDE Registers |
| FFA8 - FFAF | 8 bytes | Secondary Bus Master IDE Registers |

*  Only by DWORD accesses.

## 2.2.1   Port 79 Definition

| Bit | Description | Bit = 1 | Bit = 0 |
|-----|-------------|---------|---------|
| 0 | Reserved | N/A | N/A |
| 1 | Soft Off capable power supply present | No | Yes |
| 2 | Onboard Audio present | Yes | No |
| 3 | External CPU clock | See Table 4 | See Table 4 |
| 4 | External CPU clock | See Table 4 | See Table 4 |
| 5 | Setup Disable | Enable access | Disable access |
| 6 | Clear CMOS | Keep values | Clear values |
| 7 | Password Clear | Keep password | Clear password |

## 2.3   Soft-Off Control

The board design supports Soft-off control via the SMM code in the BIOS.  This feature is a manufacturing option.  The CS1 pinout of the I/O controller is connected to the Soft-off control line in the power supply circuit.  The registers in the I/O controller that set the I/O address and control of the CS1 pin are NOT setup until the SMM code is activated.  The code performs the following operations:

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

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

## 2.4   PCI Configuration Space Map

**Table 9.      PCI Configuration Space Map**

| Bus Number (hex) | Dev Number (hex) | Function Number (hex) | Description |
|------------------|------------------|-----------------------|-------------|
| 00 | 00 | 00 | Intel 82439HX (TXC) |
| 00 | 07 | 00 | Intel 82371FB (PIIX3 ) PCI/ISA bridge |
| 00 | 07 | 01 | Intel 82371FB (PIIX3 ) IDE Bus Master |
| 00 | 07 | 02 | Intel 82371FB (PIIX3 ) USB |
| 00 | 08 | 00 | |
| 00 | 11 | 00 | PCI Expansion Slot |
| 00 | 13 | 00 | PCI Expansion Slot |

## 2.5  DMA Channels

**Table 10.    DMA Channels**

| DMA | Data Width | System Resource |
|---|---|---|
| 0 | 8- or 16-bits | Audio |
| 1 | 8- or 16-bits | Audio |
| 2 | 8- or 16-bits | Floppy |
| 3 | 8- or 16-bits | Parallel Port |
| 4 | | Reserved - Cascade channel |
| 5 | 16-bits | Open |
| 6 | 16-bits | Open |
| 7 | 16-bits | Open |

## 2.6  Interrupts

**Table 11.    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 | Serial Port 2 |
| 4 | Serial Port 1 |
| 5 | Audio |
| 6 | Floppy |
| 7 | Parallel Port 1 |
| 8 | Real-time Clock |
| 9 | User available |
| 10 | WSS |
| 11 | 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 |

# 3   Motherboard BIOS and Setup Utility

## 3.1  Introduction

The board uses an Intel BIOS, which is stored in Flash EEPROM and upgraded using a floppy disk-based program.  In addition to the Intel BIOS, the Flash EEPROM also contains the Setup utility, Power-On Self Tests (POST), APM 1.1, the PCI auto-configuration utility, and Windows 95 ready Plug and Play.  This board also supports system BIOS shadowing, allowing the BIOS to execute from 64-bit on-board write-protected DRAM.

The BIOS displays a sign-on message during POST identifying the type of BIOS and a five-digit revision code.  The initial production BIOS in the board will be identified as 1.00.01.CY0.

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 Flash Memory Organization

The Intel PA28FB100BX 1 Mb Flash component is organized as 128K x 8 (128 KB).  Flash memory is visible at system addresses FFFE0000 - FFFFFFFFh.  The Flash device is divided into four areas, as described in Table 12.

**Table 12.    Flash Memory Organization**

| System Address | | FLASH Memory Area |
|---|---|---|
| FE000H | FFFFFH | 8 KB Boot Block (erasable only if jumpered) |
| FD000H | FDFFFH | 4 KB Plug and Play ESCD  Storage Area |
| FC000H | FCFFFH | 4 KB Custom LOGO and Vital Product Data |
| E0000H | FBFFFH | 112 KB System BIOS Reserved during boot |

## 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 down loaded from the secure section on the Intel bulletin board, or Intel's FTP site.

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

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

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

## 3.4 PCI IDE Support

The two local bus IDE connectors with independent I/O channel support are setup up automatically by the BIOS if the user selects "Autoconfiguration" in setup.  The IDE interface supports PIO Mode 3, and Mode 4 hard drives and recognition of ATAPI CD-ROMs, tape drives, and any other ATAPI devices.  The BIOS will determine the capabilities of each drive and configure them to optimize capacity and performance.  For the high capacity hard drives typically available today, the drive will be automatically be configured for Logical Block Addressing (LBA) for maximum capacity and to PIO Mode 3 or 4 depending on the capability of the drive.  Mixing IDE drives, on the same cable, that offer different transfer modes is supported.  Each drive's mode is supported independently.  The user is able to override the auto-configuration options by using the manual mode setting.

## 3.5 PCI Auto-configuration

The PCI auto-configuration utility operates in conjunction with the system Setup utility to allow the insertion and removal of PCI cards to the system without user intervention (Plug and Play). When the system 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 system resources.  Those interrupts left set to "available" in the CMOS setup  will be considered free for PCI add-in card use. 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. System configuration information is stored in ESCD format.  The ESCD data may be cleared 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 system allows auto-configuration of Plug and Play ISA cards, PCI cards, and resource management for legacy ISA cards.  Because the BIOS supports configuring devices across PCI bridges, release 1.41 or greater of the ICU must be used with the board to properly view and change system settings.  System configuration information is stored in ESCD format.  The ESCD data may be cleared by setting the CMOS clear jumper to the ON position.

The BIOS also has a setup option to support the Windows 95 run time plug and play utilities. When this option is selected, only devices critical to booting are assigned resources by the BIOS. Device Node information is available for all devices to ensure compatibility with Windows 95.

Copies of the IAL Plug and Play specification may be obtained via the Intel BBS, or via CompuServe by typing Go PlugPlay.

## 3.7 Advanced Power Management

The BIOS has support for Advanced Power Management (APM version 1.1). The energy saving Stand By mode can be initiated by a keyboard hot key sequence set by the user, a time-out period set by the user, or by a suspend/resume button tied to the front panel sleep connector.

When in Stand-by mode, the board reduces power consumption by utilizing the Pentium processor's System Management Mode (SMM) capabilities and also spinning down hard drives and turning off VESA DPMS compliant monitors. The user may select which DPMS mode (Stand By, Suspend, or Off) send to the monitor in setup. The ability to respond to external interrupts is fully maintained while in Stand-by mode allowing the system to service requests such as in-coming FAX's or network messages while unattended. Any keyboard or mouse activity brings the system out of the energy saving Stand By mode. When this occurs the monitor and IDE drives are turned back on immediately.

APM is enabled in BIOS by default, however, the system must be configured with an APM driver in order for the system power saving features to take effect. Windows 95 will enable APM automatically upon detecting the presence of the APM BIOS.

## 3.8 Language Support

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

With a 1 Mb Flash BIOS, only one language can be resident at a time. The default language is American English, and will always be present unless another language is programmed into the BIOS using the Flash Memory Update Program (FMUP) available on the Intel BBS.

## 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 floppy to be the primary boot device and hard drive to be the secondary boot device. If CD-ROM is selected, it must be the first device. The third and fourth devices are set to *disabled* in the default configuration.. The user can add 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 the Phoenix Web page (http://www.ptltd.com/techs/specs.html).*

## 3.10  Flash LOGO Area

The baseboard supports a 4 KB programmable FLASH user area located at EC000-ECFFF.  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 for display during POST.  Contact your local Intel Sales office or authorized distributor for further information.

## 3.11  Setup Enable Jumper

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

## 3.12  BIOS Setup Utility

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

### 3.12.1  Overview of the Setup Menu Screens

The Setup program initially displays the Main menu screen.  In each screen there are options for modifying the system 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 13.     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, diskette drives, hard drives. |
| Advanced | For modifying the more advanced features of a PC, such as peripheral configuration and advanced chipset configuration. |
| Security | For specifying passwords that can be used to limit access to the system. |
| Exit | For saving or discarding changes. |

| Setup Subscreen | Description |
|---|---|
| Floppy Options | For configuring your diskette drives. |
| IDE Device Configuration | For configuring your IDE devices. |
| Boot Options | For modifying options that affect the system boot up, such as the boot sequence. |
| Peripheral Configuration | For modifying options that affect the serial ports, the parallel port, and the disk drive interfaces. |
| Advanced Chipset Configuration | For modifying options that affect memory and system busses. |
| Power Management Configuration | For accessing and modifying Advanced Power Management (APM) options. |
| Plug and Play Configuration | For modifying options that affect the system's Plug and Play capabilities. |

## 3.12.2   Main BIOS 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., Hard Disk), the Setup program switches to a subscreen for the selected option.

### 3.12.2.1   System Date

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

### 3.12.2.2   System Time

Specifies the current time.

### 3.12.2.3   Floppy Options

When selected, this pops up the Floppy Options menu.

### 3.12.2.4   Primary Master

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

### 3.12.2.5   Primary Slave

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

### 3.12.2.6   Secondary Master

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

### 3.12.2.7   Secondary Slave

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

### 3.12.2.8   Language

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

### 3.12.2.9   Boot Options

When selected, this brings up the Boot Options subscreen.

### 3.12.2.10   Video Mode

Reports the video mode.  There are no options.

### 3.12.2.11   Mouse

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

### 3.12.2.12   Base Memory

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

### 3.12.2.13   Extended Memory

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

## 3.12.3   Floppy Options Subscreen

### 3.12.3.1   Floppy A:

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

### 3.12.3.2   Floppy B:

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

### 3.12.3.3 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; 2.88 MB, 3.5-inch. The default is 1.44/1.25 MB, 3.5-inch.

### 3.12.3.4 Floppy B: 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; 2.88 MB, 3.5-inch. The default is Disabled.

### 3.12.3.5 Floppy Access

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

## 3.12.4 IDE Device Configuration Subscreen

### 3.12.4.1 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.

### 3.12.4.2 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.

### 3.12.4.3 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.

### 3.12.4.4 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.

### 3.12.4.5 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 here.

### 3.12.4.6  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 this from the option selected when the hard drive was formatted.  Changing the option can result in corrupted data.*

### 3.12.4.7  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.

### 3.12.4.8  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

### 3.12.5  Boot Options Subscreen

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

### 3.12.5.1  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.

### 3.12.5.2  System Cache

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

### 3.12.5.3  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 a slower speed.

### 3.12.5.4  Num Lock

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

### 3.12.5.5   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**

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

### 3.12.5.6   Typematic Rate Programming

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

### 3.12.5.7   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 will not be visible.

### 3.12.5.8   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 will not be visible.

## 3.12.6   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.

### 3.12.6.1   Processor Type

Reports the CPU type.  There are no options.

### 3.12.6.2   Processor Speed

Reports the CPU clock speed.  There are no options.

### 3.12.6.3   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.

### 3.12.6.4   Peripheral Configuration

When selected, this brings up the Peripheral Configuration subscreen.

### 3.12.6.5    Advanced Chipset Configuration

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

### 3.12.6.6    Power Management Configuration

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

### 3.12.6.7    Plug and Play Configuration

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

### 3.12.7    Peripheral Configuration Subscreen

This section describes the screens for the peripheral configuration subscreen.

### 3.12.7.1    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.

### 3.12.7.2    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.)

### 3.12.7.3    Floppy Interface

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

### 3.12.7.4   Serial Port 1 Address

Selects the address of the serial port. The options are Disabled; COM1, 3F8h; COM2, 2F8h; COM3, 3E8h; and COM4, 2E8h. The default is COM1, 3F8h. If the Configuration Mode is set to Auto, the Setup program assigns the first free COM port (normally COM1, 3F8h) as the serial port 1 address, regardless of what is selected under the Serial Port 1 Address option. (If Configuration Mode is set to Auto, this option cannot be modified.)

### 3.12.7.5   Serial Port 2 Address

Selects the address of the serial port. The options are Disabled; COM1, 3F8h; COM2, 2F8h; COM3, 3E8h; and COM4, 2E8h. The default is COM2, 2F8h. If the Configuration Mode is set to Auto, the Setup program assigns the first free COM port (normally COM2, 2F8h) as the serial port 2 address, regardless of what is selected under the Serial Port 2 Address option. (If Configuration Mode is set to Auto, this option cannot be modified.)

⟹ **NOTE**

If either serial port address is set, the address it is set to will not appear in the options dialog box of the other serial port. If an ATI mach32* or an ATI mach64* video controller is active, the COM4, 2E8h address will not appear in the options dialog box of either serial port.

### 3.12.7.6   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.)

### 3.12.7.7   Parallel Port Address

Selects the address and IRQ of the parallel port. The options are Disabled; LPT3, 3BCh, IRQ7; LPT1, 378h, IRQ7; LPT1, 378h, IRQ5; and LPT2, 278h, IRQ5. The default is LPT1, 378h, IRQ7. If the Configuration Mode is set to Auto, the setup program assigns LPT1, 378h, IRQ7 as the parallel port address, regardless of what is selected under the Parallel Port Address option. (If Configuration Mode is set to Auto, this option cannot be modified.)

### 3.12.7.8   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. Bi-directional means the parallel port operates in bi-directional PS/2-compatible mode. EPP and ECP mean the parallel port operates high-speed, bi-directionally. This option is not affected by the Configuration Mode field above.

## 3.12.8   Advanced Chipset Configuration Subscreen

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

### 3.12.8.1   Base Memory Size

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

### 3.12.8.2   ISA LFB Size

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

### 3.12.8.3   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.

### 3.12.8.4   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 Disabled.

### 3.12.8.5   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.

### 3.12.8.6   PCI Burst

Controls the support for PCI to memory burst mode data transfers.  The options are Enabled and Disabled.  The default is Enabled.

### 3.12.9   Power Management Configuration Subscreen

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

### 3.12.9.1   Advanced Power Management

Enables or disables the Advanced Power Management (APM) support in your system's 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 will be visible.

### 3.12.9.2   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.

### 3.12.9.3   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.

### 3.12.9.4   VESA Video Power Down

Sets the command issued to your graphics card when the system goes into power managed mode.  The options are Disabled, Standby, Suspend, and Sleep.  The default is Sleep.

### 3.12.9.5   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.

## 3.12.10    Plug and Play Configuration Subscreen

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

### 3.12.10.1    Configuration Mode

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

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

### 3.12.10.2    Boot with PnP OS

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

### 3.12.10.3    ISA Shared Memory Size

Enables you to "unshadow" a block of the upper memory area.  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.

Shadowing is a technique that copies a block of memory from an add-in card's ROM to the same address in system memory.  This provides faster access and achieves higher performance.  By default, all upper memory is shadowed.

### 3.12.10.4    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 a size of 64K was selected, options D4000h, D8000h, and DC000h will not be available.

### 3.12.10.5    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 add-in board.  If an interrupt is available, the PCI auto-configuration code can assign the interrupt to be used by the system.  If your system contains an ISA agent that uses one of these interrupts, select Used By ISA Card for that interrupt.

⇒  **NOTE**

IRQ 3, 4, 5, and 7 may not be available in this option, depending on the setting chosen for the COM1, COM2 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

## 3.12.11    Security Screen

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

### 3.12.11.1    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 the table below for a description of how the passwords actually work together.)

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

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

**Table 14.    Administrative and User Password Functions**

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

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

### 3.12.12    Security Screen Options

### 3.12.12.1    User Password is

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

### 3.12.12.2    Administrative Password is

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

### 3.12.12.3    Set User Password

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

### 3.12.12.4    Set Administrative Password

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

### 3.12.12.5    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 system boots, but the keyboard will be locked until the User password is entered.

### 3.12.12.6    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.

### 3.12.13    Exit Screen

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

### 3.12.13.1    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.

### 3.12.13.2    Exit Discarding Changes

Exits the Setup program without saving any changes.  This means that any changes made while in the Setup program are discarded and NOT SAVED.  Pressing the <Esc> key in any of the four main screens will do this.

### 3.12.13.3    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.

### 3.12.13.4    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 system was turned on.

# 4 Error Messages and Beep Codes

## 4.1 BIOS Beep Codes

| Beeps | Error Message | Description |
|---|---|---|
| 1 | Refresh Failure | The memory refresh circuitry on the baseboard is faulty. |
| 2 | Parity Error | Parity is not supported on this product, will not occur. |
| 3 | Base 64 KB Memory Failure | Memory failure in the first 64 KB. |
| 4 | Timer Not Operational | Memory failure in the first 64 KB of memory, or Timer 1 on the baseboard is not functioning. |
| 5 | Processor Error | The CPU on the baseboard generated an error. |
| 6 | 8042 - Gate A20 Failure | The keyboard controller (8042) may be bad. The BIOS cannot switch to protected mode. |
| 7 | Processor Exception Interrupt Error | The CPU generated an exception interrupt. |
| 8 | Display Memory Read/Write Error | The system video adapter is either missing or its memory is faulty. This is not a fatal error. |
| 9 | ROM Checksum Error | ROM checksum value does not match the value encoded in BIOS. |
| 10 | CMOS Shutdown Register Rd/Wrt Error | The shutdown register for CMOS RAM failed. |

## 4.2 PCI Configuration Error Messages

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

| 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 Configuration Error Messages (continued)**

| Message | Explanation |
| --- | --- |
| 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

| Error Message | Explanation |
| --- | --- |
| 8042 Gate - A20 Error | Gate A20 on the keyboard controller (8042) is not working. |
| Address Line Short! | Error in the address decoding circuitry on the baseboard. |
| Cache Memory Bad, Do Not Enable Cache! | Cache memory is defective. Replace it. |
| CH-2 Timer Error | Most systems include two timers. There is an error in timer 2. |
| CMOS Battery State Low | CMOS RAM is powered by a battery. The battery power is low. Replace the battery. |
| CMOS Checksum Failure | After CMOS RAM values are saved, a checksum value is generated for error checking. The previous value is different from the current value. Run AMIBIOS Setup. |
| CMOS System Options Not Set | The values stored in CMOS RAM are either corrupt or nonexistent. Run Setup. |
| CMOS Display Type Mismatch | The video type in CMOS RAM does not match the type detected by the BIOS. Run AMIBIOS Setup. |
| CMOS Memory Size Mismatch | The amount of memory on the baseboard is different than the amount in CMOS RAM. Run AMIBIOS Setup. |
| CMOS Time and Date Not Set | Run Standard CMOS Setup to set the date and time in CMOS RAM. |
| Diskette Boot Failure | The boot disk in floppy drive A: is corrupt. It cannot be used to boot the system. Use another boot disk and follow the screen instructions. |
| Display Switch Not Proper | The display jumper is not implemented on this product, this error will not occur. |
| DMA Error | Error in the DMA controller. |

**BIOS Error Messages (continued)**

| Error Message | Explanation |
| --- | --- |
| DMA #1 Error | Error in the first DMA channel. |
| DMA #2 Error | Error in the second DMA channel. |
| FDD Controller Failure | The BIOS cannot communicate with the floppy disk drive controller. Check all appropriate connections after the system is powered down. |
| HDD Controller Failure | The BIOS cannot communicate with the hard disk drive controller. Check all appropriate connections after the system is powered down. |
| INTR #1 Error | Interrupt channel 1 failed POST. |
| INTR #2 Error | Interrupt channel 2 failed POST. |
| Invalid Boot Diskette | The BIOS can read the disk in floppy drive A:, but cannot boot the system. Use another boot disk. |
| Keyboard Is Locked...Unlock It | The keyboard lock on the system is engaged. The system must be unlocked to continue. |
| Keyboard Error | There is a timing problem with the keyboard. Set the Keyboard option in Standard CMOS Setup to Not Installed to skip the keyboard POST routines. |
| KB/Interface Error | There is an error in the keyboard connector. |
| Off Board Parity Error[DS1] | Parity error in memory installed in an expansion slot. The format is: <br> OFF BOARD PARITY ERROR ADDR (HEX) = (XXXX) <br> XXXX is the hex address where the error occurred. |
| On Board Parity Error | Parity is not supported on this product, this error will not occur. |
| Parity Error ????[DS2] | Parity error in system memory at an unknown address. |

## 4.4  ISA NMI Messages

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