

# **RadiSys Long-Life Baby-AT Baseboard Hardware Reference Manual**

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# Chapter 1 - Introduction

## Purpose

The purpose of this manual is to fully explain the standard software and hardware that ships with each RadiSys Long-life Baby-AT Baseboard. The reader should be able to install this product based on the instructions provided. Simple repairs and replacement of easily-accessed components should also be possible.

## About This Manual

This manual assumes that the reader possesses a good working knowledge of microcomputer system architectures and peripheral devices. While inexperienced users should be able to follow the instructions and perform the tasks explained here, a moderate degree of competency is assumed.

This manual consists of the following chapters and information:

- Chapter 1**     *Introduction.* This chapter provides an overview of the Baby-AT Baseboard and includes electrical and environmental specifications.
- Chapter 2**     *Getting Started.* Provides information about how to install the Baby-AT Baseboard, set jumpers on the board, set up the Phoenix BIOS, power up the board, and boot an operating system.
- Chapter 3**     *Theory of Operation.* Contains detailed information about the on-board processor, memory, chipset, and peripheral interfaces.
- Chapter 4**     *Connectors.* Provides pinout diagrams and other information about the connectors and headers on the board.
- Chapter 5**     *Troubleshooting and Error Messages.* Provides a list of error messages you may encounter and how to resolve error causes.
- Chapter 6**     *Support and Service.* Provides information about how to contact technical support engineers regarding this product.
- Appendix A**   *I/O and Memory Maps.* Provides table information about system I/O, the memory map, board interrupts and DMA.
- Appendix B**   *BIOS Update and Recovery.* Describes how to update the board's BIOS and recover from a corrupt BIOS.
- Appendix C**   *Suspend/Resume.* Provides in-depth information about advanced power management features.
- Appendix G**   *Glossary.* Defines terms used in this manual.

## Feature Summary

- Intel Pentium( microprocessor running at up to 200 MHz
- Support for up to 128 MB of DRAM installed in single in-line memory modules (SIMMs)
- Tritonsystem controller, data path, and ISA/IDE accelerator components
- Super I/O controller
- AMIBIOS in a flash memory device; supports system setup and PCI auto-configuration
- Windows95 compatible Plug and Play capability

- Two IDE peripheral connectors on the system board
- Three dedicated PCI slots
- Four dedicated ISA slots
- One combination slot for one PCI or ISA board
- Support for advanced power management (APM)
- Two 9-pin headers for 2 serial COM ports
- One 25-pin header for multimode Centronics-compatible parallel port
- One 33-pin header for floppy diskette drive (can be as large as 2.88 MB)
- Backup battery for the CMOS RAM and real-time clock
- PS/2-style keyboard and mouse connectors
- One 6-pin connector for 3.3V source for PCI slots

## Safety Compliance

This equipment was designed to meet or exceed requirements for safety in the US (UL 1950), Canada (CSA 950), Europe (EN60950) and international IEC 950). A 'Dear Customer Letter' ships with this product while certification is pending.

## System Environment

**MANY OF THE CONNECTORS ON THE BASEBOARD PROVIDE POWER FOR PERIPHERAL DEVICES THROUGH DIFFERENT PINS. MAKING INCORRECT CONNECTIONS CAN DAMAGE THE BASEBOARD AND MAY DAMAGE THE DEVICE BEING CONNECTED. USE EXTREME CAUTION WHEN PREPARING TO CONNECT CABLES TO THIS PRODUCT. REFER TO CHAPTER 4 FOR CONNECTOR LOCATIONS AND PINOUT INFORMATION.**

## Specifications

Tables 1-1 through 1-3 define environmental, electrical, and physical specifications of the baseboard.

Characteristic		Value
Environmental		
Temperature	operating	10°C to 35°C, derated 2°C per 1,000 feet (300 meters) over 10,000 feet (3,000 meters) 2°C per minute maximum excursion gradient
	storage	-40° to 70°C, 5°C per minute maximum excursion gradient
Humidity	operating	5% to 85% non-condensing @ 55( C
	storage	5% to 92% non-condensing @ 55( C
Altitude	operating	0 to 10,000 feet (3,048 meters)
	storage	0 to 50,000 feet (15,200 meters)
Vibration	operating	0.015 inch (0.38 mm) P-P displacement with 2.5 g peak (maximum) acceleration over 5 to 2000 Hz
	storage	0.030 inch (0.76 mm) P-P displacement with 5.0 g peak (maximum) acceleration over 5 to 2000 Hz.
Shock	operating	30 g, 11 ms duration, half-sine shock pulse
	storage	50 g, 11 ms duration, half-sine shock pulse

**Table 1-1. Environmental Specifications.**

Table 1-2 shows the voltage and current specifications for a system at the DOS prompt, configured with the motherboard and the following components: a 100 MHz Pentium Processor w/heat sink and fan, PCI video, 8 MB EDO 60ns DRAM, 256 KB L2 cache, 3.5-inch floppy drive, and 540 MB hard drive. Advanced Power Management is not enabled. This information is provided only as a guide for calculating **approximate** total system power usage with additional resources added.

**NOTE:** The 3.3V power from the Baby-AT power supply is used only to power PCI slots in the current configurations. Therefore, 3.3V does not show up in the following tables.

Characteristic		Value
Electrical		
Current	+5 VDC	3260 mA (typical)
	+12 VDC	89 mA (typical)
	-12 VDC	30 mA (typical)

**Table 1-2. Electrical Specifications.**

# Physical Measurements

Table 1-3 shows physical specifications of the baseboard.

Characteristic	Value
Physical	
Length	13 inches (330 mm)
Height	8 11/16 inches (220 mm)
Thickness	1 1/2 inches (40 mm), including SIMM and CPU fan

**Table 1-3. Physical Specifications.**

## Additional References

*Memory Products Data Manual*, Intel Corporation, 1995.

*Plug and Play BIOS Specification 1.0A*, Compaq Computer Corp., Phoenix Technologies Ltd., Intel Corp., May 5, 1994.

*PCI Local Bus Specification*, Revision 2.1, PCI Special Interest Group, June 1, 1995.

*Pentium( Processor User's Manual*, Intel Corporation, 1995.

*Technical Reference, Personal Computer AT*, International Business Machines Corporation, 1985.

# Chapter 2 - Getting Started

This chapter explains how to install and set up your System Board, including

- Removing an old board (optional) and installing the new system board and optional devices
- Turning on the system at first start-up
- Using the menu-driven software to set up the Baby-AT system
- Setting jumpers on the board

## Before You Begin

Before you begin an installation into a new system, have the following equipment ready to use:

- Video device (VGA or better monitor or flat panel display)
- Video graphics adapter card, PCI or ISA
- Power supply (PC or portable power supply)
- PC/AT PS/2 style keyboard to enter BIOS setup information
- Two SIMMs (4 MB or larger; 5 V; 70 ns or better recommended — see Chapter 3)
- PS/2 style mouse (a mouse is not optional for some operating systems)

And optionally, you'll need one of the following mass storage devices to boot from:

- IDE hard disk drive w/cable
- Floppy disk drive w/cable

## Supplied Equipment

Each Baby-AT baseboard evaluation kit includes the following:

- Small plastic bag of screws
- CPU heatsink already mounted
- This manual

## Optional Parts

The following parts are available as options from your dealer or RadiSys:

- 4 MB SIMM
- 8 MB SIMM
- 16 MB SIMM
- 32 MB SIMM

## WARNINGS

The procedures in this chapter assume familiarity with the general terminology associated with personal computers and with the safety practices and regulatory compliance required for using and modifying electronic equipment.

Disconnect the system from its power source and from any telecommunications links, networks or modems before doing any of the procedures described in this chapter. Failure to disconnect power, telecommunications links, networks or internal modems before you open the system or do any procedures can result in personal injury or equipment damage.

Do not operate the system with the cover removed. Always replace the cover before turning on the system.

## CAUTIONS

The total power draw on the system must not exceed the specifications for the power supply.

Electrostatic discharge (ESD) can damage disk drives, add-in boards, and other components. Do the procedures described in this chapter only at an ESD workstation. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis.

Add-in boards can be extremely sensitive to ESD and always require careful handling. After removing the board from its protective wrapper or from the system, place the board flat on a grounded, static-free surface, component-side up. Use a conductive foam pad if available, but not the board wrapper. Do not slide the board over any surface.

# Unpack and Inspect the Baby-AT baseboard

Unpack and visually inspect the board for damage which may have occurred in shipment. Retain all packing material and shipping documentation.

**DO NOT REMOVE ANY MODULES FROM THEIR ANTI-STATIC BAGS UNLESS YOU ARE IN A STATIC-FREE ENVIRONMENT. THE BABY-AT BASEBOARD, LIKE MOST OTHER ELECTRONIC DEVICES, IS SUSCEPTIBLE TO ESD DAMAGE. ESD DAMAGE IS NOT ALWAYS IMMEDIATELY OBVIOUS - IT CAN CAUSE A PARTIAL BREAKDOWN IN SEMICONDUCTOR DEVICES THAT MIGHT NOT IMMEDIATELY RESULT IN FAILURE.**

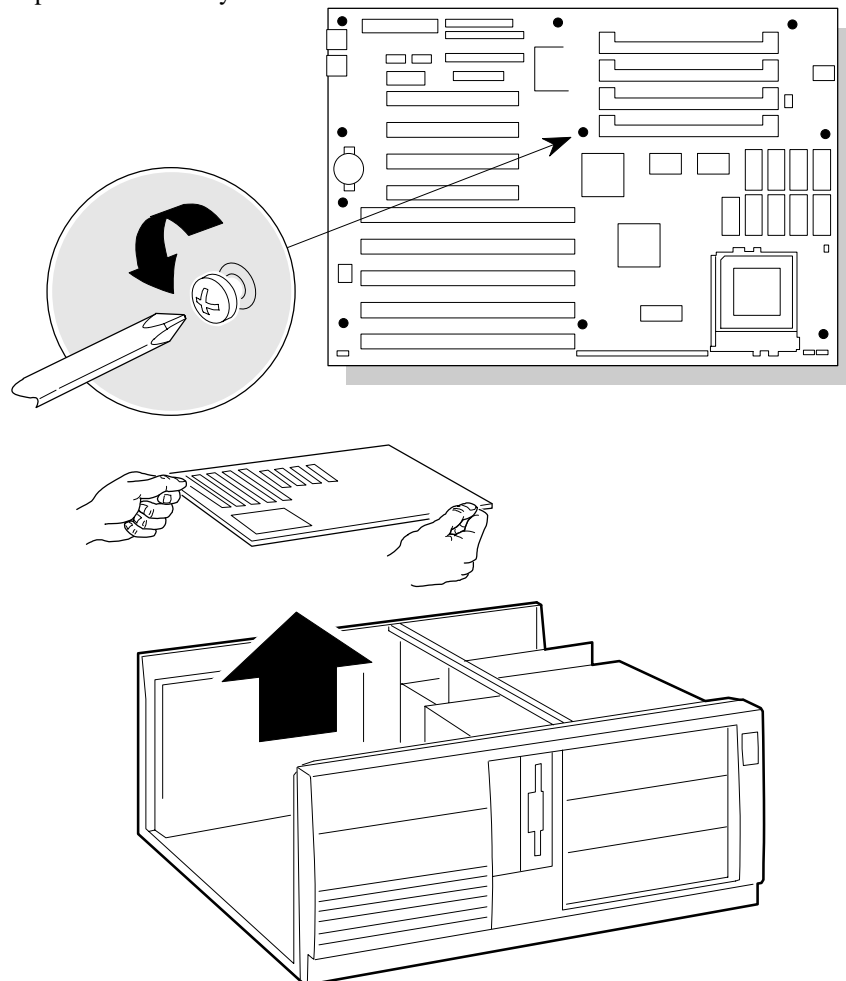
If damage has occurred in shipment, notify the carrier at once to initiate a damage claim. Contact your dealer or Radi-Sys customer service for replacement of damaged products.

Make sure you take great care in providing protection from Electro-Static Discharge (ESD). Do not flex or scrape a printed circuit board when handling.

If you are working with a new system, skip ahead to the appropriate section of this chapter.

# Removing the Old System Board

- 1 .Observe the precautions in “Before You Begin.”
- 2 .Disconnect cables, connectors, etc. from the back panel.
- 3 .Remove any add-in boards. (If necessary, refer to *Removing an Add-in Board*, later in this chapter, for more information.)
- 4 .Remove the front 3.5-inch drive carrier, if necessary.
- 5 .Label and disconnect the all cables connected to the system board.
- 6 .Remove any metal screws that secure the system board to the chassis (Figure 2-1). Carefully lift the board up and out of the system.



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**Figure 2-1. Removing the Old System Board.**

## Before Installing the New Board

**DO NOT INSTALL THE BABY-AT BASEBOARD UNTIL YOU COMPLETE THE FOLLOWING STEPS.**

Before you install the baseboard, complete the following steps. Required tools include a Phillips screwdriver (#2 bit) and a jumper removal tool. Use an antistatic wrist strap and a conductive foam pad when working on the system.

Complete these steps before you begin the installation.

- 1 .Set up an equipment log to record the system model and serial numbers, all installed options, and other information about the system. When you need this information, it is easier to consult the log than to open up and examine the system.
- 2 .Inspect the board, noting the location of the connectors and major components.
- 3 .Check and record the jumper settings to make sure they are correct. In most cases the jumper defaults should be adequate for your needs. For more information about the jumper settings, refer to the next section of this chapter.
- 4 .Insert plastic standoffs into motherboard (if required).

## Jumper and Switch Block Overview

The system board in your computer contains two sets of moveable jumpers and a switch block with eight slide switches. Refer to Figure 2.1 for a complete drawing of the motherboard jumpers.

The jumpers and switches make it possible to change certain aspects of the system configuration. (For instance, you can prevent access to the system Setup program by changing a switch.) The system has been properly configured at the factory.

Normally, the only time you change the jumper or a switch is if you want to do the following:

- Disable or enable access to the Setup program
- Reset the CMOS RAM settings to the default values
- Clear the system password
- Change the ISA bus clock speed
- Recover from a corrupted BIOS during a BIOS upgrade
- Upgrade the secondary cache
- Upgrade the CPU

Table 2-1 describes the function of the switches and jumper. Figure 2-2 shows the location of the switches and jumper on the system board. Descriptions of how to change the switches and jumper follow Figure 2-2.



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### CAUTIONS

To change a jumper or switch in an existing system, remove the system cover and, optionally, add-in boards or other system components.

To change a jumper or switch on a new motherboard before installation, be sure to follow the precautions and procedures provided earlier in this chapter when you remove the cover or other system parts.

Do not squeeze the pliers or other tool you use to remove a jumper, or you may bend or break the pins.



### Note

A jumper is a small plastic-encased conductor that slips over jumper pins. To change a jumper setting, use a pair of fine needle-nosed pliers to remove the jumper from its current location and slide it onto the new pins to obtain the desired setting.

•Figure 2-2. System Board Switch and Jumper Blocks (see Table 2-1).

Jumper or Switch in Figure 2-1	Function	Settings																
Jumper J1	CPU Bus Clock Speed	Refer to <i>CPU</i> , Chapter 3.																
Jumper J1N1	Recovery boot enable jumper: If the BIOS is corrupted during a BIOS upgrade, this jumper allows you to boot the system and recover the BIOS (see Appendix C).	Pins 1-2 = Normal (Default) Pins 2-3 = Recovery boot enable																
J1A1, J1A2, J3A1	Secondary cache: these jumpers must be set according to the amount of secondary cache installed.	<table border="1"> <thead> <tr> <th>Cache Size</th> <th>J1A1</th> <th>J1A2</th> <th>J3A1</th> </tr> </thead> <tbody> <tr> <td>0 KB (default)</td> <td>1-2</td> <td>1-2</td> <td>No jumper</td> </tr> <tr> <td>256 KB</td> <td>1-2</td> <td>2-3</td> <td>No jumper</td> </tr> <tr> <td>512 KB</td> <td>2-3</td> <td>1-2</td> <td>1-2</td> </tr> </tbody> </table>	Cache Size	J1A1	J1A2	J3A1	0 KB (default)	1-2	1-2	No jumper	256 KB	1-2	2-3	No jumper	512 KB	2-3	1-2	1-2
Cache Size	J1A1	J1A2	J3A1															
0 KB (default)	1-2	1-2	No jumper															
256 KB	1-2	2-3	No jumper															
512 KB	2-3	1-2	1-2															
Switches 8, 7, 6	Reserved	<b>CAUTION: These switches have been set by the factory for your system; do not change these switches from the factory setting unless you are installing a new CPU. Make sure Jumper J1 is set correctly when changing these settings. Refer to <i>CPU</i>, Chapter 3.</b>																
Switch 5	Enables/disables access to Setup Program	OFF = Setup program can be accessed (Default) ON = Setup program access disabled																
Switch 4	Reset CMOS settings to default CMOS RAM values	OFF = Normal mode (Default) ON = Reset CMOS settings																
Switch 3	Clear password	OFF = Normal mode (Default); ON = Clear password																

•Table 2-1. System Board Jumper and Switch Settings.

Jumper or Switch in Figure 2-1	Function	Settings
Switch 2	CPU Voltage Regulator	Refer to <i>CPU</i> , Chapter 3.
Switch 1	ISA bus clock speed	Refer to <i>CPU</i> , Chapter 3.

•Table 2-2. CPU Jumper and Switch Settings.

## How to Disable Access to the Setup Program

- 1 .Turn off power and remove the system cover.
- 2 .Move switch 5 to the ON position.
- 3 .Replace the system cover and turn power back on.
- 4 .To enable access to the setup program, move switch 5 back to the OFF position.

## How to Clear CMOS RAM

This procedure should be done after the system BIOS is updated.

- 1 .Turn off power and remove the system cover.
- 2 .Move switch 4 to the ON position.
- 3 .Turn on power and allow the system to boot.
- 4 .Turn off power.
- 5 .Move switch 4 back to the OFF position to restore normal operation.
- 6 .Replace the system cover and turn power back on.

## How to Clear the Password

This procedure should only be done if the user password has been forgotten.

- 1 .Turn off power and remove the system cover.
- 2 .Move switch 3 to the ON position.
- 3 .Turn on power and allow the system to boot.
- 4 .Turn off power.
- 5 .Move switch 3 back to the OFF position to restore normal operation.
- 6 .Replace the system cover and turn the power back on.

## How to Set the ISA Bus Clock Speed Switch (Switch #1)

Depending on the speed of the CPU in your system, the *default* setting for the ISA bus clock switch ranges from 7.5 MHz to 8.33 MHz. You may be able to improve the performance of some ISA add-in boards by speeding up the ISA bus clock speed. However, keep in mind that some ISA add-in boards may have problems operating above the ISA bus clock standard of 8 MHz. If you change switch #1 to ON and experience operating problems with ISA boards, you may want to move the switch back to the OFF position. Below shows how the two settings for switch #1 affect the ISA bus clock speed for different CPUs.

CPU Speed	PCI speed	ISA Bus Clock Speed	
		Switch #1 OFF (default setting)	Switch #1 ON
75 MHz	25 MHz	8.33 MHz	8.33 MHz
90 MHz	30 MHz	10.0 MHz	7.50 MHz
100 MHz	33 MHz	11.0 MHz	8.33 MHz
120 MHz	30 MHz	10.0 MHz	7.50 MHz
133 MHz	33 MHz	11.0 MHz	8.33 MHz
150 MHz	30 MHz	10.0 MHz	7.50 MHz
166 MHz	33 MHz	11.0 MHz	8.33 MHz
200 MHz	33 MHz	11.0 MHz	8.33 MHz

•Table 2-3. PCI/ISA Bus Clock Speeds for Different CPUs.

To change the ISA bus clock speed switch,

- 1 .Turn off power and remove the system cover.
- 2 .Move switch #1 to the desired position.
- 3 .Replace the system cover and turn power back on.

## Changing the BIOS Recovery Jumper

Appendix B tells how and when to use the BIOS recovery jumper.

## Changing the Secondary Cache Jumpers

You must change the secondary cache jumpers if you install cache memory. See "Installing Cache and Tag Memory" later in this chapter for instructions for adding cache memory, including changing the secondary cache jumpers.

## Power Supply Requirements

Power the Baby-AT baseboard using the P8/P9 connector found on any standard PC/AT compatible power supply.

## Installing the Motherboard

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### CAUTION

Do not flex any printed circuit board or scrape any board components.

## Upgrade

If you are swapping out motherboards in an existing system, identify and mark any cables or peripheral cards before removing them. Use your system log to record the system configuration so that you can complete a full recovery, if necessary. Note that you may be completely replacing a system I/O board that contains serial and parallel ports plus the hard disk drive and floppy disk drive controller. Consider backing up your hard disk drive as well.

## New System

If you are building a system for the first time, take note of whether the motherboard can be attached to the chassis with screws or with plastic standoffs.

Make sure you have sufficient add-in cards, such as PCI video (recommended over ISA video cards), and driver diskettes, plus any operating system diskettes or CD-ROMs.

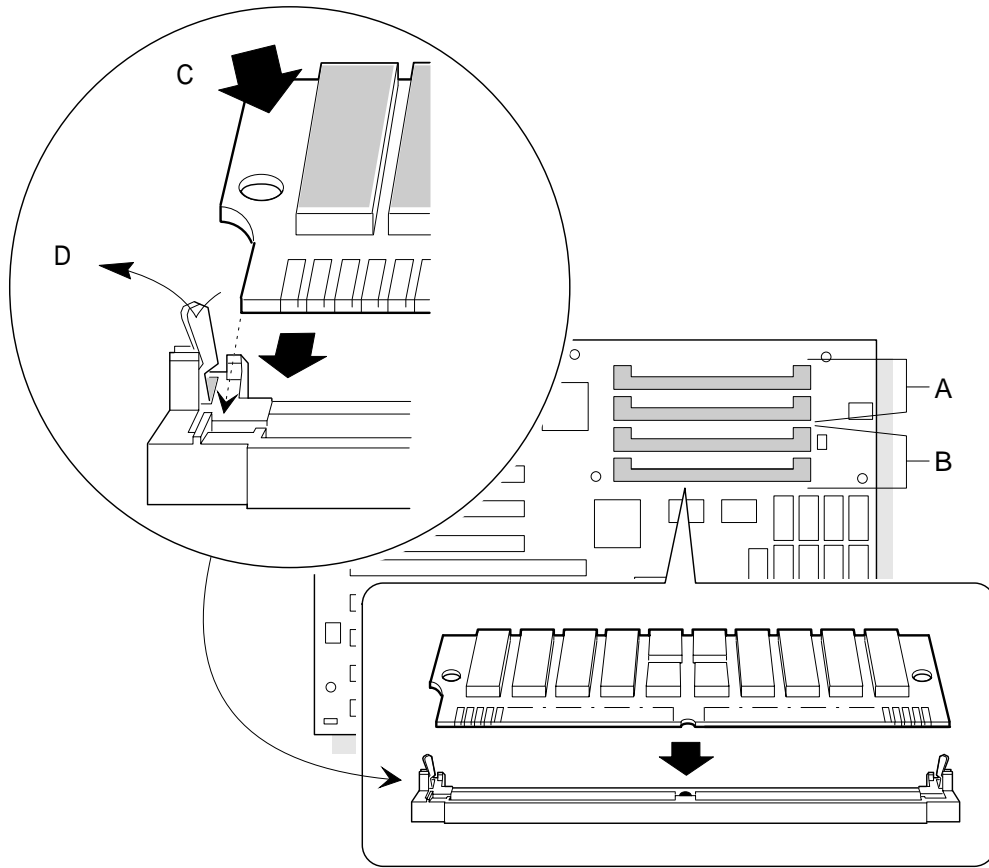
## Installation

- 1 .Align the board over the chassis with the expansion slot connectors toward the back of the system.
- 2 .
- 3 **.NOTE: Some system “cages” allow access by removing a side panel or even a bottom panel. The Baby-AT baseboard installs in any ‘Baby AT’ tower or flat cage.**
- 4 .
- 5 .Move the board into place over the mounting screw standoffs until the holes line up. If plastic standoffs are used, they should be lined up in their guides.
- 6 .Make sure the keyboard connector lines up with the insertion hole in the back.
- 7 .Secure the board to the chassis with the screws provided.
- 8 .If necessary, reinstall the front 3.5-inch front drive carrier and any other obstacles that were removed.

## Connecting the SIMMs

Select a pair of matching 72-pin SIMMs for use with the Baby-AT baseboard. You must fully occupy at least one bank at a time. Make sure that , if possible, you are using SIMMs with gold-plated connections to match the baseboard’s SIMM connectors. The SIMM connectors on the Baby-AT baseboard are made with gold plating and may not work reliably over the long-term with tin plated SIMM connectors. It may be necessary to rotate your SIMMs annually to avoid corrosion and pitting if you use tin-plated SIMMs.

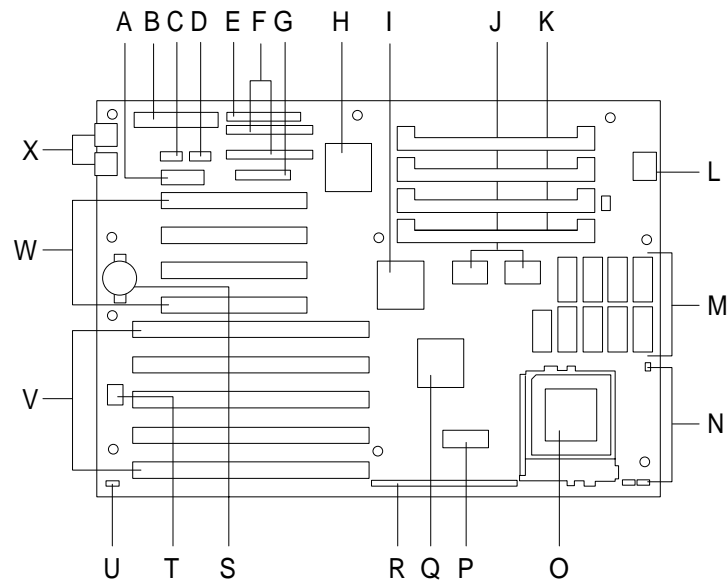
SIMMs are described in greater detail in Chapter 3.



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•Figure 2-3. SIMM Installation.

## System Board Components



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•Figure 2-4. System Board Components.

- |                                |  |
|--------------------------------|--|
| A. 3.3 V. power connector      | N. Secondary cache size jumpers        |
| B. Primary power connector     | O. Pentium microprocessor              |
| C. Serial port COM2            | P. Configuration switch block          |
| D. Serial port COM1            | Q. PCI ISA/IDE accelerator             |
| E. Floppy drive connector      | R. Front panel I/O connectors          |
| F. Two IDE connectors          | S. Battery                             |
| G. Parallel port connector     | T. Flash memory device for system BIOS |
| H. Super I/O controller        | U. BIOS recovery boot jumper           |
| I. Triton system controller    | V. ISA add-in board connectors         |
| J. Triton data path components | W. PCI add-in board connectors         |
| K. SIMM sockets                | X. PS/2 keyboard and mouse connectors  |
| L. CPU voltage regulator       |  |
| M. Secondary cache sockets     |  |

# Installing an Add-in Board

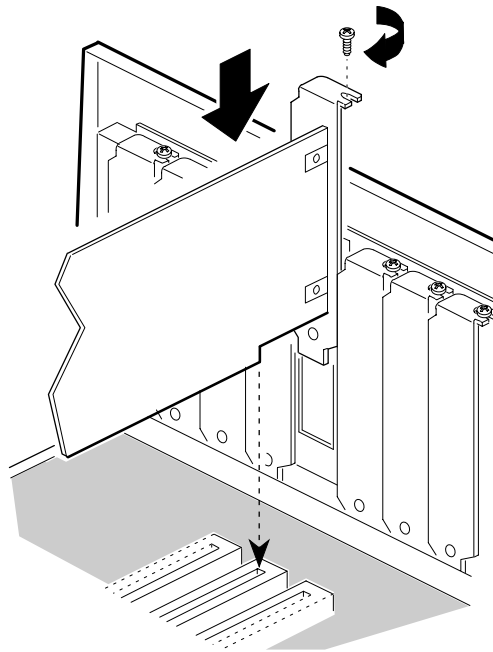
„!)-

## CAUTIONS

Do not overload the system board by installing add-in boards that draw excessive current. (See “Add-in Board Considerations” in this chapter for more information.)

Add-in boards can be extremely sensitive to ESD and always require careful handling. Hold the board by the edges only; do not touch the electronic components or gold connectors. After removing a board from its protective wrapper or from the system, place it flat on a grounded, static-free surface, component-side up. Do not slide the board over any surface.

- 1 .Observe the precautions in “Before You Begin.”
- 2 .Remove the expansion slot cover from the slot you plan to use. Save the cover and screw to reinstall if you decide not to install a board in that slot.
- 3 .Remove the board from its wrapper, and place it on a grounded, static-free surface, component-side up.
- 4 .Record the board’s serial number in your equipment log.
- 5 .Set board jumpers and switches according to the manufacturer’s instructions. Record the settings in your equipment log.
- 6 .Hold the board by the top edge or upper corners, and firmly press it into the connector on the system board (Refer to ).
- 7 .Align the rounded notch in the retaining bracket with the hole in the slot frame. The retaining bracket fits into the space that was occupied by the slot cover.
- 8 .Insert a screw, but push the notch against the screw before tightening. Otherwise, the bracket may interfere with the bracket of an adjacent slot cover or with another add-in board.
- 9 .Connect cables (if any are needed) to the installed board.



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•Figure 2-5. Installing an Add-in Board

## Removing an Add-in Board

- 1 .Observe the precautions in “Before You Begin.”
- 2 .Disconnect any cables from the board you are going to remove.
- 3 .Remove the screw that holds the board retaining bracket to the chassis.
- 4 .Holding the board at each end, pull firmly until the edge connectors pull free. Be careful not to scrape the add-in board against other components.
- 5 .Store the board in an antistatic protective wrapper.
- 6 .If you disconnected cables from the board and you are not reinstalling this board or one like it, remove the cables from the system.



### Note

There must be covers on the vacant expansion slots to maintain the electromagnetic emissions and cooling characteristics of the system.

## Connecting Devices When Configuring the System

To configure the system, you must add a monitor, graphics controller, and keyboard to the system. If the system nor-



mally operates without a monitor or keyboard (for example, as a network server), remove the appropriate devices *after* configuring the system.

## Before Installing Optional Items

Before installing other items, such as drives, add-in boards, software, and a mouse, connect a keyboard, graphics controller, and a monitor, and let the power-on self test (POST) run. Then, add your drives, boards, system board components, and software. Be sure to follow the warnings and cautions in this manual.

- To run the BIOS Setups, refer to the next section in this chapter.
- Chapter 5 contains Troubleshooting information.

If the POST is not successful, see "Turning on the System at First Startup" in this chapter and "Problems at Initial System Start-up" in Chapter 5.

## Turning on the System at First Start-up

To power up the system for the first time, do the following procedure:

- 1 .All system components such as a video monitor and keyboard should be connected before turning on the system. All connections should be done while the system is off. Make sure the power enable switch at the rear of the system is turned to "0."
- 2 .Connect the female end of the AC power cord into the AC power input socket at the rear of the system, and plug the male end of the power cord into a grounded electrical outlet.
- 3 .Turn on power to the monitor.
- 4 .Flip the power enable switch at the rear of the system to the "1" position.
- 5 .Press in and release the power control button at the front of the system (the green power LED on the front panel will go on). If the system is equipped with a keylock, ensure that it is in the "unlocked" position. The system will power up and immediately begin the power-on self test (POST).



### Note

If your system contains the suspend/resume power feature, the power control button on the front of the system gives you additional control features. See Appendix C for a description of the suspend/resume features.

When you boot the system, the POST checks the settings stored in CMOS RAM against the actual hardware configuration. During the memory test, the POST displays the amount of memory that it has tested. The POST can take up to 30 seconds to complete. If you do not want to wait for the memory test to complete, you can stop the test after it starts by pressing the <Esc> key. If you want to go into the Setup program, press the <F1> key after the POST starts the memory test, but before the system boots up.

Your next step after booting depends on what the POST finds. See the following possibilities.

## What happens

### What to do

Nothing.

Check power supply and connections to motherboard. Make sure P9/P8 connectors properly installed. Verify power supply by noting if drives spin up.  
No video.

Check monitor power. If okay, check power supply to see if motherboard powers up. If okay, replace video card.  
If the settings in CMOS RAM *match* the hardware configuration, and if the POST does not find any errors, the power-on testing continues.

No action needed.

If the POST finds a fatal error (an error that prevents the system from continuing the boot process), it generates a series of beeps. A specific number of beeps indicates a certain error message.

Record the number of beeps. See Chapter 5 for a description of the system beep codes and troubleshooting procedures.

If the POST finds a non-fatal error (an error that doesn't stop the boot process from continuing), the system displays a message in the following format:

Error Message Line 1

Error Message Line 2

Press <F1> for Setup,

<Esc> to Boot

Locate the error message in Chapter 5, and take action as indicated under the explanation for the error message. If needed, run the Setup program.

If you need to reconfigure the system setup, start the Setup program.

To enter Setup, press the <F1> key after the POST starts the memory test, but before the system boots up. You have about five seconds to press <F1> to enter Setup before the boot process continues.

If you need to begin again, reboot the system.

Press <Ctrl + Alt + Del>.

### • Table 2-4. Problems During First Power-Up.

## Using Keyboard Shortcuts

The keyboard controller supports using shortcuts to reset the system (soft boot) and toggle between fast (turbo) and slow CPU speed.

Normally, the CPU runs in fast (turbo) mode at its full rated speed. Some application software require that you run the system in slow mode. Using shortcuts to change to fast mode may not be supported by some systems or by some applications, in which case you can specify fast or slow mode by using the Setup program. For instance the set slow or fast mode keyboard shortcut will not work if the CPU is being operated in protected mode. (When you operate Windows in enhanced mode, the CPU is operating in protected mode.)

The numbers and symbols in the following tables refer to the keys on the numeric keypad.

## Setting Fast and Slow CPU Modes

### To do the following

#### Press at the same time

Set slow (deturbo) mode: (You'll hear a low-tone beep.)

<Ctrl + Alt + ->

Set fast (turbo) mode: System runs at the full rated speed of the CPU. (You'll hear a high-tone beep.)

<Ctrl + Alt + +>

### •Table 2-5. Keyboard Speed Controls.

## Setting Up Add-in Boards and Drives

Information earlier in this chapter described how to physically install add-in boards and drives. Note that this system board is fully Plug and Play compatible. With Plug and Play capability, the system automatically configures IDE hard disk drives, diskette drives, PCI add-in boards, and ISA add-in boards that are compatible with the Plug and Play standard.

The remainder of this chapter tells how to use the American Megatrends (AMI) BIOS Setup program that is built into the system BIOS. The Setup program makes it possible to change and store system configuration information such as the types of peripherals that are installed, the boot-up sequence for the system, and enabling or disabling the power management support. The Setup information is stored in CMOS random access memory (RAM) and is backed up by a battery when power to the system is off.

If the system does not operate as described here, see the section "Solving Problems" for problem descriptions and error messages.

If you want to go into the Setup program, press the <F1> key after the POST starts the memory test, but before the system boots up. You have about five seconds to press <F1> to enter Setup before the boot process continues.

## Make a Record of the Setup Configuration

To make sure you have a reference to the Setup values for your system, we recommend you write down the current settings and keep this record up-to-date. For example, there are blank NOTES pages at the end of several chapters in this book.

## 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.

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 advanced features of a PC, such as peripherals and advanced chipset configuration.
Security	For specifying passwords that limit access to the system.
Exit	For saving or discarding changes.

•Table 2-6. Setup Menu Screens.

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

•Table 2-7. Setup Subscreen Menus.

## Overview of the Setup Keys

The following keys have special functions in the Setup program.

Setup Key	Description
<F1>	Pressing the <F1> key brings up a help screen for the current item.
<Esc>	Pressing the <Esc> key takes you back to the previous screen. Pressing <Esc> in the Main, Advanced, Security, or Exit screen allows you to Exit Discarding Changes (see later in this chapter).
<Enter>	Pressing the <Enter> key selects the current item or option.
<↑>	Pressing the up arrow <↑> key changes the selection to the previous item or option.
<↓>	Pressing the down arrow <↓> key changes the selection to the next item or option.
<←> <→>	Pressing the left <←> or right arrow <→> keys in the Main, Advanced, Security, or Exit menu screens changes the menu screen. Pressing either key in a subscreen does nothing.
<F5>	Pressing the <F5> key allows you to Load Setup Defaults (see later in this chapter).
<F6>	Pressing the <F6> key allows you to Discard Changes (see later in this chapter).
<F10>	Pressing the <F10> key allows you to Exit Saving Changes (see later in this chapter).

•Table 2-8. Setup Function Keys.

# 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.

## System Date

Specifies the current date. Press Enter to select the month from a list of the 12 months. Type in the day and year as required. Press Enter for the changes to take effect.

## System Time

Specifies the current time. Press display the time in an editable window. Type in the hours, minutes and seconds as required. Press Enter for the changes to take effect.

## Floppy Options

When selected, this brings up the Floppy Options menu.

## Hard Disk C:, D:, E:, F:

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

## Language

Specifies the language of the text strings used in the Setup program and the BIOS. The default is English.

## Boot Options

Displays the Boot Options subscreen.

## Video Mode

Reports the video mode. There are no options.

## Mouse

Reports if a mouse is installed. There are no options.

## Base Memory

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

## Extended Memory

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

- **BIOS Version**

Reports the version number reported by the BIOS. There are no options.

## Floppy Options Subscreen

### Floppy A:

Reports if a diskette drive is installed in the system as Floppy A:. There are no options.

### Floppy B:

Reports if a diskette drive is installed in the system as Floppy B: There are no options.

### Floppy A: Type

Specifies the physical size and capacity of the Floppy A: 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.

### Floppy B: Type

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

## Hard Disk Configuration Subscreen

### Hard Disk Type

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

If you set up the system to Auto Configure when no C: drive is present, the system can spend up to 15 seconds searching for the nonexistent drive.

Note that when you select Auto Configure, the system configures automatically each time it boots up.

..!)- **CAUTION**

Do not change cylinders, heads and sectors information from the entries used when the hard drive was formatted. Changing the configuration can result in corrupted data or problems booting the system.

- **Number of Cylinders**

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

## Number of Heads

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

## Number of Sectors

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

## Maximum Capacity

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

## IDE Translation Mode

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.

Use the Auto Detect feature first to determine if your drive is recognized by the BIOS. This ensures that the drive is configured and formatted properly by any system that supports autotyping.

### ..!)- **CAUTION**

Do not change this from the option selected when the hard drive was formatted. Changing the option can result in corrupted data or problems booting the system.

## 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.

## Fast Programmed I/O Modes

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

# Boot Options Subscreen

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

## Boot Sequence

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

- |                   |  |
|-------------------|--|
| C: First, Then A: | The system checks drive C first. If no drive is present, or no system files are on the drive, the computer checks the floppy for system files. |
| A: First, Then C: | The computer checks drive A before checking drive C. This selection enables you to boot from a diskette, if necessary.                         |
| C: Only:          | The computer checks drive C and no other drives.   |
| A: Only:          | The computer checks drive A and no other drives.   |

The default is: A: First, Then C:

## System Cache

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

Disabling the system cache degrades performance significantly, but can occasionally be useful during debugging.

## Boot Speed

Sets the system's boot and operating speed. The options are Deturbo and Turbo. The default is Turbo. If Turbo is selected, boot-up and system operation occurs at full speed. If Deturbo is selected, the board operates at a slower speed equivalent to a 25 MHz AT, which may be necessary to run older software.

## Num Lock

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

## 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.

## Hard Disk Pre-Delay

Sets the hard disk drive pre-delay. The options are Disabled, 1, 2, 3, 4, 5, 6, or 7 seconds. The default is 3 seconds. When enabled, this option causes the BIOS to wait the specified time before it accesses the first hard drive. If your



system contains a hard drive, and you don't see the drive type displayed during boot-up, the hard drive may need more time before it is able to communicate with the controller. Setting a pre-delay provides additional time for the hard drive to initialize. If your hard drive type displays on time, you may be able to disable this option in order to boot faster.

## **Typematic Rate Programming**

Sets the typematic rates. The options are Default and Override. The default is 250 millisecond delay and 6 characters per second. Choosing Override displays prompts for Typematic Rate Delay and Typematic Rate.

### **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.

### **Typematic Rate**

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

## **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.

### **Processor Type**

Reports the CPU type. There are no options.

### **Processor Speed**

Reports the CPU clock speed. There are no options.

### **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.

### **Peripheral Configuration**

Brings up the Peripheral Configuration subscreen.

### **Advanced Chipset Configuration**

Brings up the Advanced Chipset Configuration subscreen.

## **Power Management Configuration**

Brings up the Advanced Power Management subscreen.

## **Plug and Play Configuration**

Brings up the Plug and Play Configuration subscreen.

# **Peripheral Configuration Subscreen**

This section describes the screens for the Peripheral Configuration subscreen.

## **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.

## **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.)

If you need to use a IDE PCI add-card with IDE enabled on the card, disable the motherboard's IDE interface using this option.

## **Floppy Interface**

Enables or disables the floppy 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.)

If using an IDE PCI add-in card with the floppy enabled on the card, disable the motherboard's floppy interface using this option.

## **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.)

## **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 does 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 does not appear in the options dialog box of either serial port.

## **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.)

## **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.)

## **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. ECP means Extended Capabilities Port (IEEE 1284) and EPP means Enhanced Parallel Port (Rev. 1.7). This option is not affected by the Configuration Mode field above.

## **Serial Port 1 IRQ**

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

## **Serial Port 2 IRQ**

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

# **Advanced Chipset Configuration Subscreen**

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

## **Base Memory Size**

Sets the size of the base memory. The options are 512 KB and 640 KB. The default is 640 KB. If you use an ISA expansion card that is not Plug and Play compatible, and the card uses memory space between 80000h - 9FFFFh, set this option to 512 KB.

## **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 displays. The base of this memory reported to the operating system will be 1 MB below the base address of the LFB. Use only for older ISA expansion cards that are not Plug and Play compatible.

## **ISA LFB Base Address**

Reports the base address of the LFB, which is set to 15 MB. There are no options. This field does not display if the ISA LFB Size is set to Disabled.

## **Video Palette Snoop**

Controls the ability of a primary PCI graphics controller to share a common palette with an ISA add-in video card by 'snooping' write cycles to an ISA graphics card's color pallet registers. Some video capture or TV tuner add-in boards may require this feature to be enabled. The options are Enabled and Disabled. The default is Disabled.

## **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. One PCI clock is 1/PCI Bus Speed, so if the PCI bus is operating at 33 MHz,  $1/33 \text{ MHz} = \sim 30$  nanoseconds. The larger the number entered, the longer the amount of time PCI bus agents can conflict with each other, and thus the slower the system.

## **PCI Burst**

Enables or disables bursting on the PCI bus. When disabled, forces normal PCI cycles. When enabled, allows PCI cycles to be bursted. Must be disabled with some graphics cards that don't support burst cycles. If the display appears to be corrupted, disable this field. The default is enabled.

## **Bank 0 SIMM Detected**

Reports the type of memory (fast page mode or EDO) found in the bank 0 SIMM slots. There are no options.

## **Bank 1 SIMM Detected**

Reports the type of memory (fast page mode or EDO) found in the bank 1 SIMM slots. There are no options.

# **Power Management Configuration Subscreen**

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

## **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.

## **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.

## **VESA Video Power Down**

Sets the command issued to your graphics controller when the system goes into power managed mode. The command options are Disabled, Standby, Suspend, and Sleep. The default is Sleep, which is the setting for the greatest power savings.

## **Inactivity Timer**

Sets how long the system must be inactive before it enters power managed mode. Enter the number of minutes. The range is 2 to 255 minutes. The default is 10 minutes.

## **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. The system takes one minute before entering power managed mode after invoking the hot key.

# **Plug and Play Configuration Subscreen**

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

## **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 depends 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 is visible.

## **Boot with PnP OS**

Enables the PC to fully utilize the features of an operating system capable of managing Plug and Play add-in cards. The options are None, Other, and Windows95. The default is Windows95.

## **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.

## 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 are not available.

## IRQ 3, 4, 5, 7, 9, 10, 11, 12

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 assigns 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.

## Security Screen

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

### Administrative and User Access Modes

The options on the Security screen menu make it possible to restrict access to the Setup program by 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.

#### •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.

# Security Screen Options

## User Password is

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

## Administrative Password is

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

## Set User Password

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

## Set Administrative Password

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

## 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.

## 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.

# Exit Screen

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

## 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.

## **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.

## **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.

## **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.



## NOTES

# Chapter 3 - Theory of Operation

This chapter contains information about the following components, functions, and aspects of the RadiSys Long-life Baby-AT baseboard:

- CPU
- System and cache memory
- Enhanced IDE Peripheral Interface
- System I/O
- System BIOS
- BIOS Upgrades
- Plug and Play Capability
- Expansion Slots
- Power Management
- System Security
- Keyboard/Mouse Controller
- Battery

## Central Processing Unit (CPU)

The system is designed to operate with the 75, 90, 100, 120, 133, 166, or 200 MHz Intel Pentium microprocessor. The Pentium processor, in addition to its expanded data and addressing capabilities, includes the following features:

- Ready for next generation OverDrive<sup>®</sup> processor
- Backward compatibility with Intel microprocessor architecture
- Onchip numeric coprocessor (compatible with the Intel486<sup>™</sup> DX processor and compliant with ANSI/IEEE standard 754-1985)
- Onchip 16 KB cache (8 KB for data, 8 KB for code)
- Burst-mode bus cycles

## Upgrading the Processor

This section tells how to install an OverDrive processor upgrade in your system. Be sure to read the “Clearance Requirements” section below before installing a processor upgrade in your system.

### ..!)- CAUTION

You do not need to change any jumpers to install an OverDrive processor upgrade.

## Clearance Requirements

The OverDrive processor comes with a heat sink mounted on top. To maintain proper airflow once the upgrade is installed in the system, the processor and heat sink require certain clearances. Table -1 shows the required clearances.

Location	Minimum Clearance
Clearance above the top of the OverDrive processor's heat sink	0.4 inches
Clearance on at least 3 of the 4 sides of the upgrade processor	0.2 inches

•Table 3-1. Clearances for OverDrive Processor Upgrades.

## Internal CPU Bus clock Speed - J1

The internal CPU speed is controlled by changing the jumpers on pins 1-6 as shown below. The jumper selection is used in conjunction with switch 7 and switch 8 for speed options.

CPU	J1	Switch 7	Switch 8
75 MHz	2-3, 4-5	on	off
90 MHz	2-3, 4-5	off	off
100 MHz	2-3, 4-5	on	on
120 MHz	1-2, 4-5	off	off
133 MHz	1-2, 4-5	on	on
150 MHz	1-2, 5-6	off	off
166 MHz	1-2, 5-6	on	on
200 MHz	2-3, 5-6	on	on

• Table 3-2. CPU Speed Settings.

1

Jumper or Switch	Function	Settings
Switch 2	CPU voltage regulator: some upgrade processors may require changing from the default VR setting to the VRE setting.	<p><b>OFF = Default VR mode (3.3 V - 3.465 V)</b></p> <p>ON = VRE mode (3.465 V - 3.63 V)</p> <p><b>CAUTION: This switch should only be changed to the VRE setting if documentation that came with your upgrade CPU indicates that the required voltage must be between 3.465 V and 3.63 V.</b></p>

Switch 1	<b>ISA bus clock speed:</b> sets the ISA bus to a slower or faster setting.	<b>OFF (default)</b> 8.33 MHz (75 MHz CPU) 10.0 MHz (90 MHz CPU) 11.0 MHz (100 MHz CPU) 10.0 MHz (120 MHz CPU) 11.0 MHz (133 MHz CPU) 10.0 MHz (150 MHz CPU) 11.0 MHz (166 MHz CPU) 11.0 MHz (200 MHz CPU)  ON = 8.33 MHz (75 MHz CPU) 7.50 MHz (90 MHz CPU) 8.33 MHz (100 MHz CPU) 7.50 MHz (120 MHz CPU) 8.33 MHz (133 MHz CPU) 7.50 MHz (150 MHz CPU) 8.33 MHz (166 MHz CPU) 8.33 MHz (200 MHz CPU)
----------	--	--

•Table 3-3. System Board CPU Jumper and Switch Settings.

## Installing the Upgrade

To install the upgrade, do the following:

- 1 .Observe the precautions in “Before You Begin.” We recommend you take the following steps to reduce the risk of electronic discharge damage to the processor and system board components:
  - Touch the metal chassis before touching the processor or system board. Keep part of your body in contact with the metal chassis to dissipate the static charge while handling the processor.
  - Avoid moving around needlessly.
- 2 .Turn off all peripheral devices to the system, and turn off the system.

### WARNING

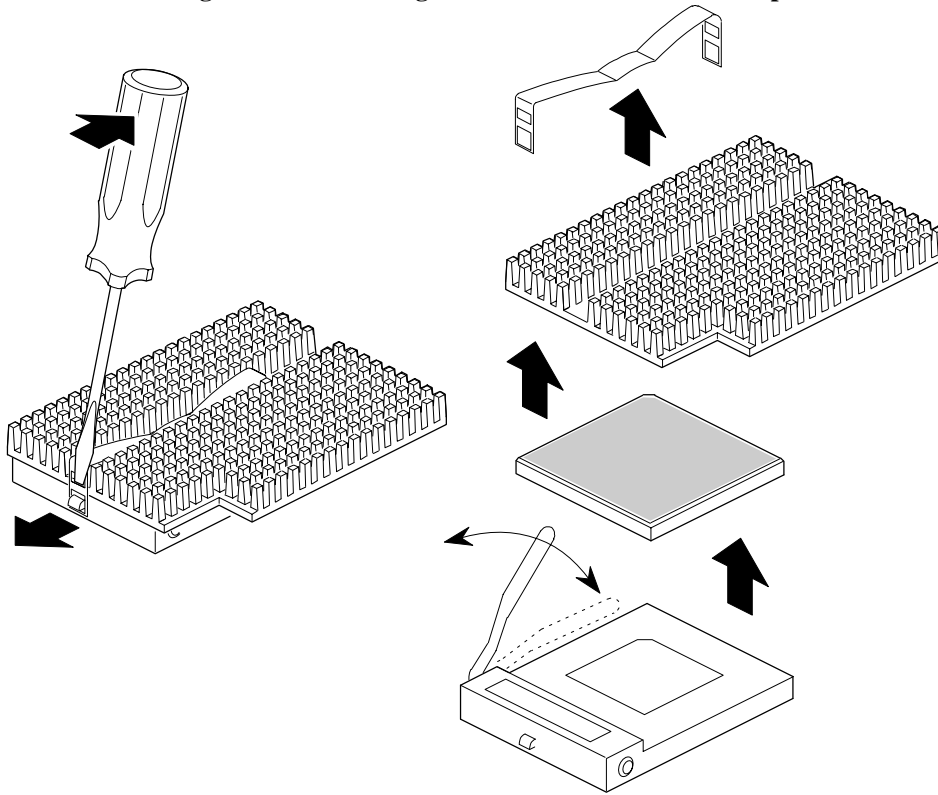
**The microprocessor and heat sink may be hot if the system has been running. To avoid the possibility of a burn, if the system has been running let the processor and heat sink cool for 10 minutes before going on with this procedure.**

- 3 .Remove any add-in boards that block access to the socket.
- 4 .Figure 3-1 shows the location of the processor socket. You must first remove the clamp over the heat sink and CPU. Insert a small flat-bladed screwdriver into the slot on the end of the clamp. Release the clamp by pushing outward on the blade of the screwdriver as shown in Figure 3-1. As you move the clamp away from the socket, ease the clamp up and away from the processor and heat sink. When you remove the clamp, the heat sink will slide off the CPU.

### „!)- CAUTION

When you remove the CPU clamp, avoid scraping the clamp against any system board components.

• **Figure 3-1. Removing the CPU Heat Sink and Clamp.**

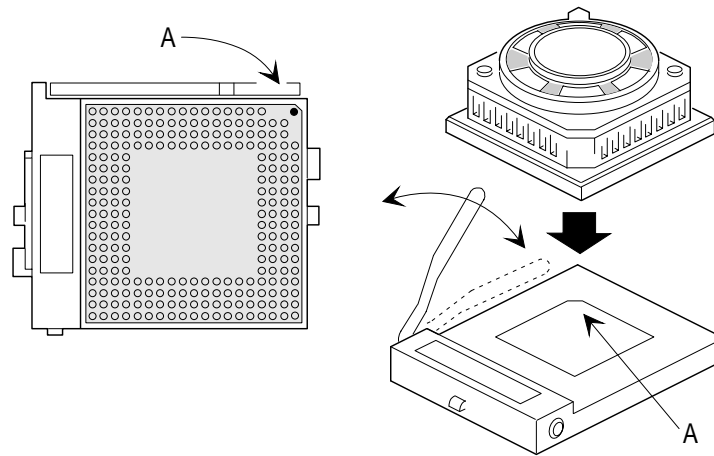


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NOTE: Your heat sink, clamp, and fan assembly may vary from the figure above. Use the figure and disussion for reference purposes if this is the case.

- 5 .Push the lever on the processor socket down and out until it pulls up freely. Lift the lever until it stands straight up (Figure 3-2). Remove the processor from the socket. Do not touch or bend the pins.
- 6 .Place the old processor in a piece of conductive foam and store it in an antistatic package. Save the processor clamp and heat sink.
- 7 .Remove the upgrade processor from its antistatic package; do not touch or bend the pins.
- 8 .Center the processor over the socket. Take care to align the beveled edge of the processor (Pin 1) as shown in Figure 3-2, A.
- 9 .With the processor in place, lower it gently, being careful not to bend the pins. Push the lever on the socket forward until it snaps into place (Figure 3-2).
- 10 .Replace any add-in boards that were removed.
- 11 .If for any reason you need to reinstall the original processor, do steps 1 through 10 above (remember to replace the clamp that came with the original processor).

**Follow the same procedures to upgrade a CPU chip that you follow to install the Overdrive upgrade.**



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•Figure 3-2. Installing an OverDrive Microprocessor Upgrade.

## System Memory

The system supports base (conventional) and extended memory. Operating systems such as MS-DOS, OS/2, UNIX, and all application programs use base memory. For better performance, Windows95, OS/2 and UNIX as well as many MS-DOS applications use extended memory. For the system memory map, See Appendix A.

The system supports up to 128 MB of DRAM. DRAM is implemented through four 72-pin single in-line memory modules (SIMMs).

### Installing Single In-line Memory Modules (SIMMs)

The system board contains four 72-pin, gold-contact SIMM sockets. The sockets are defined as Bank 0 and Bank 1. Two SIMM sockets make up one SIMM bank. Figure 3-3, A shows the sockets that make up Bank 0; Figure 3-3, B shows Bank 1. The types of SIMMs that can be installed in the system are as follows: 4 MB, 8 MB, 16 MB, and 32 MB.

When you install SIMMs, you must completely fill at least one bank. The computer automatically detects the installed memory, so it doesn't matter which bank is used, as long as both sockets in the bank are filled. You can mix SIMM sizes and types between banks, but not within a bank. For example, you should not install a 4 MB SIMM in one socket of Bank 0 and install an 8 MB SIMM in the second socket of the same bank. Likewise, you should not mix EDO and Fast Page Mode (FPM) SIMMs in the same bank. You can, however, install 4 MB SIMMs in Bank 0 and 8 MB SIMMs in Bank 1. You can also install EDO SIMMs in one bank and FPM SIMMs in the second bank. When adding SIMMs, use only tin lead, 72-pin, EDO or FPM DRAM. Table 3-4 shows which speed DRAMs should be used with which CPU. Faster devices can be used but will not improve system performance.

<b>CPU Speed</b>	<b>EDO DRAM Speed</b>	<b>Fast Page Mode DRAM Speed</b>
75 MHz	70 ns	70 ns
90 MHz	70 ns	70 ns
100 MHz	60 ns	70 ns
120 MHz	70 ns	70 ns
133 MHz	60 ns	70 ns
150 MHz	70 ns	70 ns
166 MHz	60 ns	70 ns
200 MHz	60 ns	70 ns

•Table 3-4. Required SIMM Speeds.

By using various combinations of SIMMs, you can configure the system memory from 8 MB to 128 MB. Table 3-5 shows the possible combinations of SIMM types and the resulting amount of system memory. Remember that each SIMM *bank* contains two SIMM *sockets*. Therefore, the amount of memory in one bank includes the memory installed in both sockets in that bank.

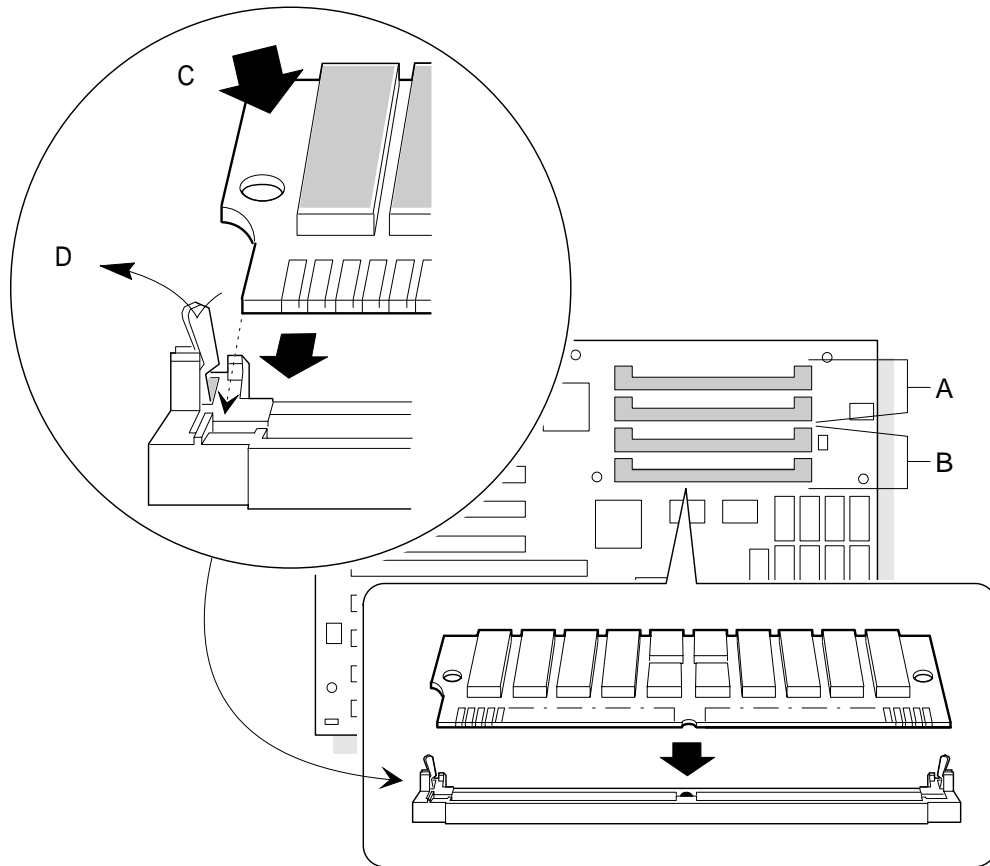
<b>For a Total System Memory Of...</b>	<b>Install a 72-pin SIMM of the following size in each socket in SIMM Bank 0</b>	<b>Install a 72-pin SIMM of the following size in each socket in SIMM Bank 1</b>
8 MB	4 MB (8 MB total in Bank 0)	Empty
16 MB	4 MB (8 MB total in Bank 0)	4 MB (8 MB total in Bank 1)
16 MB	8 MB (16 MB total in Bank 0)	Empty
24 MB	8 MB (16 MB total in Bank 0)	4 MB (8 MB total in Bank 1)
32 MB	8 MB (16 MB total in Bank 0)	8 MB (16 MB total in Bank 1)
32 MB	16 MB (32 MB total in Bank 0)	Empty
40 MB	16 MB (32 MB total in Bank 0)	4 MB (8 MB total in Bank 1)
48 MB	16 MB (32 MB total in Bank 0)	8 MB (16 MB total in Bank 1)
64 MB	16 MB (32 MB total in Bank 0)	16 MB (32 MB total in Bank 1)
64 MB	32 MB (64 MB total in Bank 0)	Empty
72 MB	32 MB (64 MB total in Bank 0)	4 MB (8 MB total in Bank 1)
80 MB	32 MB (64 MB total in Bank 0)	8 MB (16 MB total in Bank 1)
96 MB	32 MB (64 MB total in Bank 0)	16 MB (32 MB total in Bank 1)
128 MB	32 MB (64 MB total in Bank 0)	32 MB (64 MB total in Bank 1)

•Table 3-5. Memory Options.

To install SIMMs, do the following procedure:

- 1 .Observe the precautions in “Before You Begin.”
- 2 .Turn off all peripheral devices connected to the system.
- 3 .Turn off the system.
- 4 .Remove any full-length add-in boards or other components as needed to gain access to the sockets (see Chapter 2 for assembly procedures and precautions).
- 5 .Holding the SIMM only by the edges, remove it from its antistatic package. A SIMM has a small notch in the middle of the bottom edge that mates with a raised bump in the SIMM socket. There is also a notch at one side of the module.
- 6 .Hold the SIMM at approximately a 60° angle relative to the socket (Figure 3-3, C). Firmly insert the bottom edge of the SIMM into the socket.
- 7 .Press evenly against the SIMM’s upper corners and rotate the module to approximately a 30° - 40° angle relative to the socket. Secure the SIMM with the retaining clips of the connector (Figure 3-3 D). If the SIMM does not install correctly, gently spread the retaining clips just enough so that you can pull away the top edge of the SIMM and try again.
- 8 .Reinstall and reconnect any parts you removed or disconnected to gain access to the SIMM sockets.





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•Figure 3-3. SIMM Installion.

## Removing SIMMs

To remove a SIMM, do the following:

- 1 .Observe the precautions in “Before You Begin.”
- 2 .Turn off all peripheral devices connected to the system.
- 3 .Turn off the system.
- 4 .Remove any full-length add-in boards or other components as needed to gain access to the sockets.
- 5 .Gently spread the retaining clips just enough so you can rotate the top edge of the module upward until the module is loose in the socket (Figure 3-3 D).
- 6 .Holding the module only by the edges, lift it away from the socket, and store it in an antistatic package.

- 7 .Reinstall and reconnect any parts you removed or disconnected to gain access to the SIMM sockets.

## Cache Memory

The Pentium microprocessor includes 16 KB of cache on the chip. The core chip set includes a cache controller that supports secondary write-back cache memory. The system board provides eight secondary cache sockets that make it possible to install either 256 or 512 KB of secondary cache memory as an upgrade to the system.

## Installing Cache and Tag Memory

The system may not come with secondary cache memory installed on the system board. You can add secondary cache by following the guidelines in

Table 3-6. Whenever you upgrade from 0 cache, you must also install a memory device in the Tag socket. The cache will not function properly without the Tag device.

The cache memory plugs into the sockets shown in Figure 3-4(A). Each cache socket can hold either a 32 KB x 8 or 64 KB x 8, 3.3 V., 15 ns (or faster), SOJ SRAM component. The tag memory plugs into the socket shown in Figure 3-4(B). The tag socket can only hold a 32 KB x 8, 5 volt, 15 ns (or faster), SOJ SRAM component.



### Note

All eight of the cache sockets must either be empty or fully populated with the same type of device. Do not mix 32 KB x 8 devices with 64 KB x 8 devices.

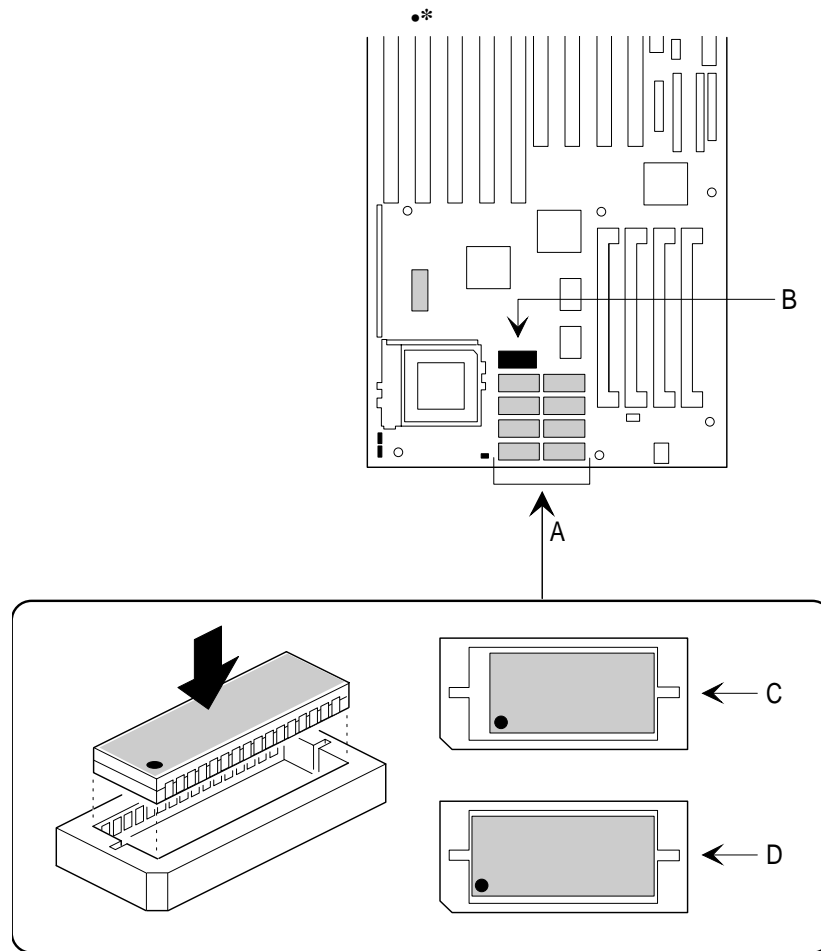
To upgrade from	Do This:
0 to 256 KB	1 .Install eight 32 KB x 8, 3.3 volt, 15 ns (or faster) SRAMs in the eight cache sockets.
	2 .Install one 32 KB x 8, 5 volt, 15 ns (or faster) SRAM in the Tag socket.
0 to 512 KB	1 .Install eight 64 KB x 8, 3.3 volt, 15 ns (or faster) SRAMs in the eight cache sockets.
	2 .Install one 32 KB x 8, 5 volt, 15 ns (or faster) SRAM in the Tag socket.
256 KB to 512 KB	1 .Remove the eight 32 KB x 8 SRAMs from the cache sockets.
	2 .Install eight 64 KB x 8, 3.3 volt, 15 ns (or faster) SRAMs in the cache sockets.
	3 .Leave the Tag SRAM in its socket.

•Table 3-6. Guidelines for Adding or Upgrading Cache and Tag Memory.

Contact your service representative for a recommendation on specific part numbers for installing cache/Tag memory.

Before you can install or remove cache/tag SRAM, you must remove the system cover and any add-in boards that are blocking access to the cache/Tag memory sockets. After you are finished, replace any system parts you removed. Refer to Chapter 2 for the procedures to remove and replace the system cover and add-in boards.

- 1 .Remove one of the SRAMs from its antistatic package, being careful not to touch the pins on the device.
- 2 .For 32 KB x 8 memory devices: Position the SRAM so that the top four pins of the socket are unconnected (Figure 3-4 C).
- 3 .For 64 KB x 8 memory devices: Position the SRAM so its orientation mark (either a notch or a small dot on the top of the short side) aligns with the end of socket that has a notch (Figure 3-4 D). Notice that with 64 KB x 8 memory devices all the pins in the socket are used.
- 4 .Press the SRAM into the socket. Be careful not to bend the pins.
- 5 .Repeat steps 1 through 3 to install the remaining SRAMs in the remaining empty SRAM sockets.
- 6 .Change the secondary cache jumper settings to match the amount of cache now present on the system board. (Refer to Table 2-1 and Figure 2-1 for the correct settings for the secondary cache jumpers.)
- 7 .Replace any add-in boards or other system components that were removed to gain access to the SRAM sockets.



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**Figure 3-4. Installing Cache and Tag Memory.**

## Enhanced IDE Peripheral Interface

The system provides two high speed, 32-bit IDE interfaces. Each IDE interface supports:

- Up to two IDE hard drives on the PCI bus
- PIO Mode 3 and 4 and AT API devices
- In conjunction with the system BIOS, the IDE interface provides an option that supports logical block addressing (LBA) of hard drives larger than 528 MB

If you are using third-party controllers or non-IDE hard disk drives, the system Setup program provides options that allow you to manually configure the controller functions.

# System I/O

A single onboard I/O controller integrates the functions for the serial ports, parallel port, and diskette drive. This component provides

- Multimode bi-directional parallel port.
  - Standard mode: Centronics-compatible operation
  - Support for Enhanced Parallel Port
  - High-speed mode: support for Enhanced Capabilities Port
- Two RS-232C-compatible 9-pin serial ports.
- Industry standard diskette drive controller
- Real-time clock for the system
- Keyboard and mouse controller

# System BIOS

The system BIOS, from American Megatrends Incorporated (AMI), provides ISA and PCI compatibility. The BIOS is contained in a flash memory device on the system board. The BIOS provides the power-on self test (POST), the system Setup program, a PCI and IDE auto-configuration utility, and BIOS recovery code.

## BIOS Upgrades

Because the BIOS is stored in a flash memory device, you can easily upgrade the BIOS without having to disassemble the system. The flash upgrade process can be done by running a utility from a diskette or hard disk, or over a network.

The DOS-based upgrade utility (Flash Memory Update Program, FMUP) has three main options:

- Update the flash BIOS from a file on disk.
- Copy the current BIOS code from the flash device to a disk file to provide a backup if the upgrade cannot be finished.
- Compare the flash BIOS to a disk file to verify that the versions are the same and make sure that the system has the correct BIOS version.

For information about the latest BIOS update, contact your service representative.

# Plug and Play

Your system is fully Plug and Play compatible. Plug and Play makes it easier to add components to your system. This feature provides these important benefits:

- PCI cards and Plug and Play ISA cards are configured automatically
- IDE hard disks and main memory are configured automatically
- Windows95 Plug and Play ready

# Expansion Slots

The system has four dedicated 16-bit ISA/AT-compatible, three dedicated PCI-compatible expansion slots, and one combination slot that can be used by **either** a PCI or an ISA board. See Chapter 2 for more information about expansion slots and installing add-in boards.

# Power Management

Your system supports the Intel Advanced Power management (APM) specification. Advanced Power Management consists of one or more layers of software that support power management in computer with power manageable hardware. Power Management works with APM-capable operating systems to reduce power consumption in your system. IDE hard drives and monitor/graphics card combinations that support the VESA DPMS standards can be put to sleep along with the processor after a user-defined period of inactivity. The system Setup program provides options for defining a time and a hotkey to enable the power saving mode.

# Turning the System Off

There are two ways to power off the system.

- Press and release the front panel power control button.
- Flip the rear power enable switch to the “0” position.

⇒ **Note**

**If your system contains the suspend/resume power feature, the power control button on the front of the system gives you additional control features. See Appendix C for a description of the suspend/resume features.**

# Resetting the System

To reset the system from the keyboard, press the key sequence:

<Ctrl + Alt + Del>

You can also reset the system by shutting system power off and then powering back up. To do this:

Press and release the front panel power control button. (Moving the rear panel power enable switch to the “0” position will also power down the system).

- 1 .Wait at least 20 seconds.
- 2 .Press and release the front panel power control button. (If you moved the power enable switch at the back of the system to "0," you must move it back to the “1” position before pressing the front power control switch).
- 3 .The system powered up and immediately begin the power-on self test (POST).

Resetting the system will:

- Clear the system memory
- Restart the power-on self test (POST)
- Reinitialize all peripherals

Load the operating system.

## System Security

System security is provided by password options enabled through the Setup program (see Chapter 2).

## Keyboard/Mouse Controller

The onboard I/O controller (mentioned earlier in this chapter) stores the keyboard and mouse controller code. PS/2-style connectors for keyboard and mouse are located at the back panel. The controller supports using keyboard shortcuts to reset the system and to toggle between fast and slow CPU speed. See Chapter 2 for specific keyboard shortcuts.

## Battery

A battery on the system board provides power backup for the real-time clock and CMOS RAM.

You can set the time for the clock and the CMOS values by using the system BIOS Setup program, described in Chapter 2.

### Replacing the Battery

A lithium battery, installed in a socket on the system board, provides backup for the real-time clock and CMOS RAM. The battery has an estimated life expectancy of seven years.

When the battery starts to weaken, it loses voltage; when the voltage drops below a certain level, the system settings

stored in CMOS RAM (for example, the date and time) may be wrong. If the battery fails, you will need to replace it with the same or equivalent type of battery installed in the system.

As long as local ordinance permits, you may dispose of individual batteries as normal trash. Do not expose batteries to excessive heat or fire. Keep all batteries away from children.

„!)- **CAUTION**

Danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer. Discard used batteries according to manufacturer's instructions.

„!)- **ATTENTION**

Il y a danger d'explosion s'il y a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du même type ou d'un type recommandé par le constructeur. Mettre au rebut les batteries usagées conformément aux instructions du fabricant.

„!)- **ADVARSEL!**

Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.

„!)- **ADVARSEL**

Lithiumbatteri - Eksplosjonsfare. Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten. Brukt batteri returneres apparatleverandøren.

„!)- **VARNING**

Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.

„!)- **VAROITUS**

Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

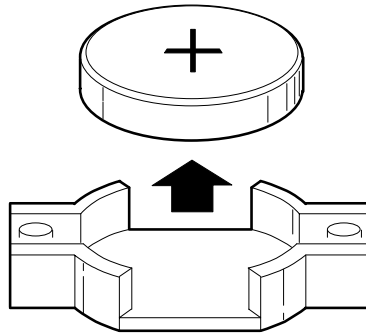
## Instructions

To replace the battery, do the following:

- 1 .Observe the precautions in “Before You Begin.”
- 2 .Turn off all peripheral devices connected to the system.
- 3 .Turn off the system.
- 4 .Remove any components that are blocking access to the battery.
- 5 .Figure 3-5 shows the battery location on the system board. Gently pry the battery free from its socket, taking care to note the "+" and "-" orientation of the battery (Figure 3-5).
- 6 .Install the new battery in the socket.



- 7 .Replace any system parts that were previously removed.
- 8 .Run Setup to reset the date and time.



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•Figure 3-5. Replacing the Battery.

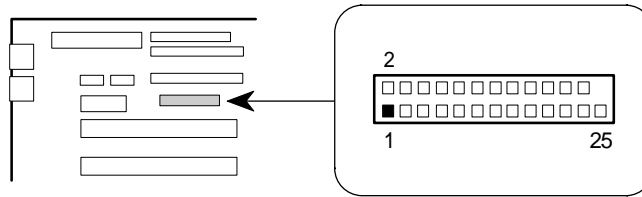
# Chapter 4 - Connectors

This chapter describes the connectors on the RadiSys Long-life Baby-AT baseboard. These connectors adhere to existing standards. This chapter shows illustrations of each connector with pins oriented as they appear when viewing the front of the connector.

•Figure 4-1. Main Connectors.

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# Parallel Connector



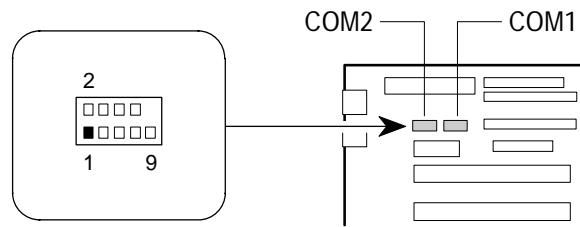
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Pin	Signal Name	Pin	Signal Name
1	Strobe-	14	Ground
2	Auto Feed-	15	Data Bit 6
3	Data Bit 0	16	Ground
4	ERROR-	17	Data Bit 7
5	Data Bit 1	18	Ground
6	INIT-	19	ACK-
7	Data Bit 2	20	Ground
8	SLCT IN-	21	BUSY
9	Data Bit 3	22	Ground
10	Ground	23	PE (Paper End)
11	Data Bit 4	24	Ground
12	Ground	25	SLCT
13	Data Bit 5	26	NC

•Table 4-1. Parallel Connector.

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# Serial Connectors



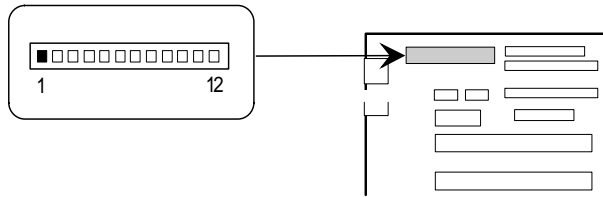
OM03931

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

•Table 4-2. Serial Connectors.

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# Primary Power Connector



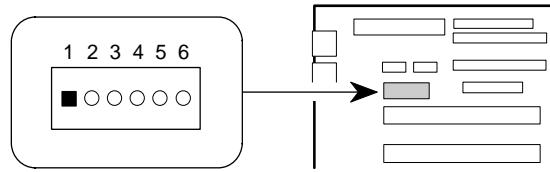
OM04114

Pin	Signal Name
1	PWRGD
2	+5 V
3	+12 V
4	-12 V
5	GND
6	GND
7	GND
8	GND
9	-5 V
10	+5 V
11	+5 V
12	+5 V

•Table 4-3. Primary Power Connector.

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## 3.3 V PCI Power Connector



OM03933



### Note

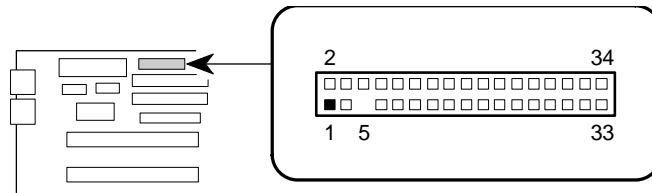
This connector provides 3.3 V. power only to the PCI bus connectors. The 3.3 V. power is not always required by PCI add-in boards.

Pin	Name
1	GND
2	GND
3	GND
4	+3.3 V
5	+3.3 V
6	+3.3 V

•Table 4-4. 3.3V PCI Power Connector.

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# Diskette Drive Connector



OM03930

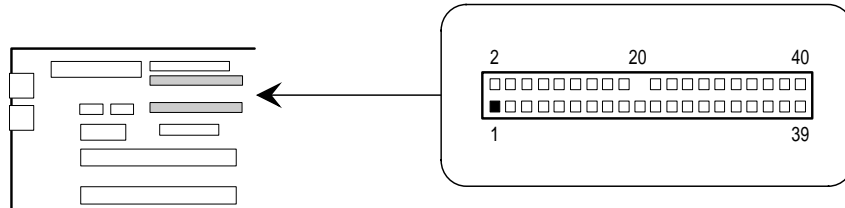
Pin	Signal Name	Pin	Signal Name
1	Ground	2	FDHDIN
3	Ground	4	Reserved
5	Key	6	FDEDIN
7	Ground	8	Index-
9	Ground	10	Motor Enable A-
11	Ground	12	Drive Select B-
13	Ground	14	Drive Select A-
15	Ground	16	Motor Enable B-
17	Ground	18	DIR-
19	Ground	20	STEP-
21	Ground	22	Write Data-
23	Ground	24	Write Gate-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

•Table 4-5. Diskette Drive Connector.

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# IDE Connectors

The system provides two IDE peripheral connectors.



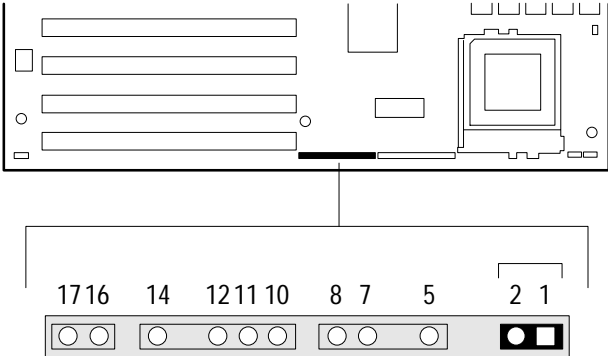
OM03817

Pin	Signal Name	Pin	Signal Name
1	Reset IDE	2	Ground
3	Host Data 7	4	Host Data 8
5	Host Data 6	6	Host Data 9
7	Host Data 5	8	Host Data 10
9	Host Data 4	10	Host Data 11
11	Host Data 3	12	Host Data 12
13	Host Data 2	14	Host Data 13
15	Host Data 1	16	Host Data 14
17	Host Data 0	18	Host Data 15
19	Ground	20	Key
21	DRQ3	22	Ground
23	I/O Write-	24	Ground
25	I/O Read-	26	Ground
27	IOCHRDY	28	BALE
29	DACK3-	30	Ground
31	IRQ14	32	IOCS16-
33	Addr 1	34	Ground
35	Addr 0	36	Addr 2
37	Chip Select 0-	38	Chip Select 1-
39	Activity	40	Ground

•Table 4-6. IDE Peripheral Connectors.



# Turbo Connector



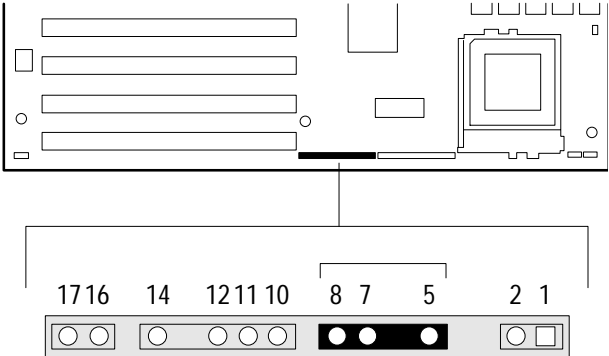
OM03945

Pin	Signal Name
1	PULL_UP_330
2	LED_TURBO-

•Table 4-7. Turbo Connector.

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# Hard Disk Drive LED Connector



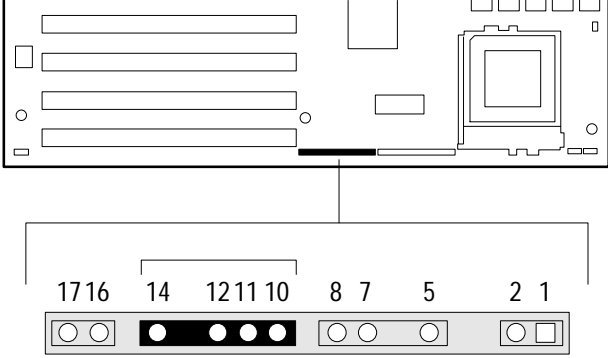
OM03946

Pin	Signal Name
5	PULL_UP_330
6	Key
7	HD ACTIVE
8	PULL_UP_330

•Table 4-8. Hard Disk Drive LED Connector.

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# Keylock/Power LED Connector



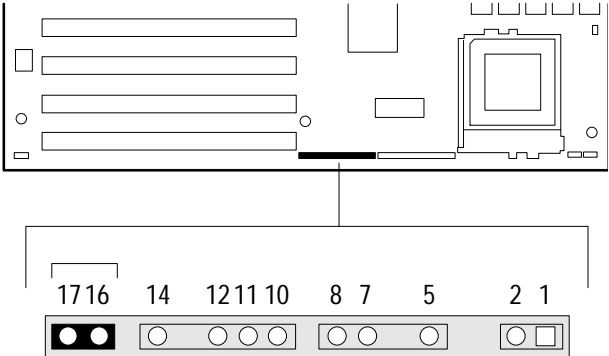
OM03947

Pin	Signal Name
10	Ground
11	KEY LOCK
12	Ground
13	Key
14	LED_PWR

•Table 4-9. Keylock/Power LED Connector.

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# Reset Connector



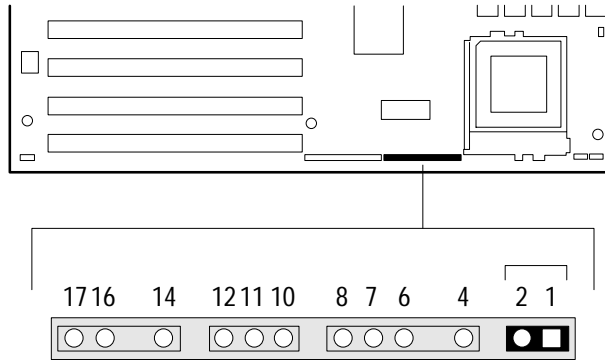
OM03948

Pin	Signal Name
16	Ground
17	RESET

•Table 4-10. Reset Connector.

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# Sleep/Resume Connector



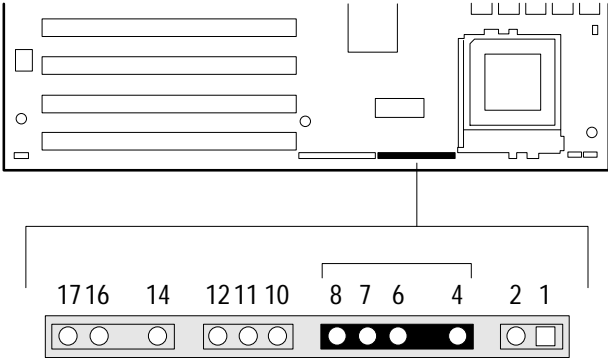
OM03941

Pin	Signal Name
1	+ 5 V
2	Comatose

•Table 4-11. Sleep/Resume Connector.

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# Infra-red Connector



OM03942

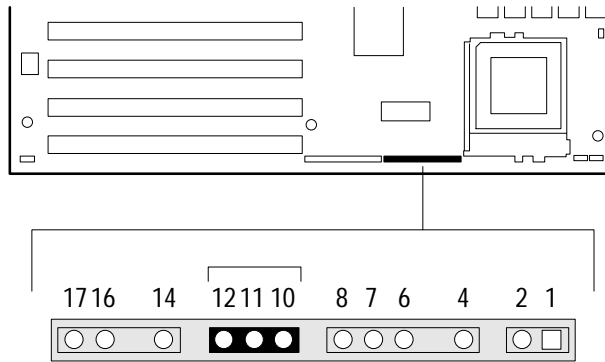
Pin	Signal Name
4	+5 V.
5	Key
6	IR_RX
7	Ground
8	IR_TX

•Table 4-12. Infra-red Connector.

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# 12 Volt Fan Power Connector

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OM03943

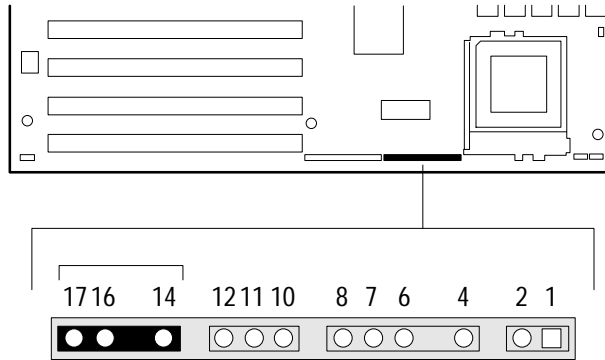
Pin	Signal Name
10	Ground
11	+12 V. (fused)
12	Ground

•Table 4-13. 12V Fan Connector.

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# Speaker Connector



OM03944

Pin	Signal Name
14	SPKR_DAT
15	Key
16	SPKR_DAT connect
17	Ground

•Table 4-14. Speaker Connector.

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# ISA Connector

Pin	Signal Name	Pin	Signal Name
B1	GND	A1	IOCHK-
B2	RSTDRV	A2	SD7
B3	Vcc	A3	SD6
B4	IRQ9	A4	SD5
B5	-5 V	A5	SD4
B6	DRQ2	A6	SD3
B7	-12 V	A7	SD2
B8	0WS-	A8	SD1
B9	+12 V	A9	SD0
B10	GND	A10	IOCHRDY
B11	SMEMW-	A11	AEN
B12	SMEMR-	A12	SA19
B13	IOW-	A13	SA18
B14	IOR-	A14	SA17
B15	DACK3-	A15	SA16
B16	DRQ3	A16	SA15
B17	DACK1-	A17	SA14
B18	DRQ1	A18	SA13
B19	REFRESH-	A19	SA12
B20	SYSCLK	A20	SA11
B21	IRQ7	A21	SA10
B22	IRQ6	A22	SA9
B23	IRQ5	A23	SA8
B24	IRQ4	A24	SA7
B25	IRQ3	A25	SA6
B26	DACK2-	A26	SA5
B27	TC	A27	SA4
B28	BALE	A28	SA3
B29	Vcc	A29	SA2
B30	OSC	A30	SA1
B31	GND	A31	SA0
KEY		KEY	
D1	MEMCS16-	C1	SBHE-
D2	IOCS16-	C2	LA23
D3	IRQ10	C3	LA22
D4	IRQ11	C4	LA21
D5	IRQ12	C5	LA20
D6	IRQ15	C6	LA19
D7	IRQ14	C7	LA18
D8	DACK0-	C8	LA17

Continued

- ISA Connector (continued)

Pin	Signal Name	Pin	Signal Name
D9	DRQ0	C9	MEMR-
D10	DACK5-	C10	MEMW-
D11	DRQ5	C11	SD8
D12	DACK6-	C12	SD9
D13	DRQ6	C13	SD10
D14	DACK7-	C14	SD11
D15	DRQ7	C15	SD12
D16	Vcc	C16	SD13
D17	Master-	C17	SD14
D18	GND	C18	SD15

•Table 4-15. ISA Connector.

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# PCI Connector

Pin	Signal Name	Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
A1	GND	B1	-12 V	A32	AD16	B32	AD17
A2	+12 V	B2	No Connect	A33	3.3 V	B33	CBE2-
A3	No Connect	B3	GND	A34	FRAME-	B34	GND
A4	No Connect	B4	No Connect	A35	GND	B35	IRDY-
A5	Vcc	B5	Vcc	A36	TRDY-	B36	3.3 V
A6	PCIINT3-	B6	Vcc	A37	GND	B37	DEVSEL-
A7	PCIINT1-	B7	PCIINT2-	A38	STOP-	B38	GND
A8	Vcc	B8	PCIINT4-	A39	3.3 V	B39	PLOCK-
A9	Reserved	B9	No Connect	A40	SDONE	B40	PERR-
A10	Vcc	B10	Reserved	A41	SBO-	B41	3.3 V
A11	Reserved	B11	No Connect	A42	GND	B42	SERR-
A12	GND	B12	GND	A43	PAR	B43	3.3 V
A13	GND	B13	GND	A44	AD15	B44	CBE1-
A14	Reserved	B14	Reserved	A45	3.3 V	B45	AD14
A15	SPCIRST-	B15	GND	A46	AD13	B46	GND
A16	Vcc	B16	PCLK	A47	AD11	B47	AD12
A17	AGNT-	B17	GND	A48	GND	B48	AD10
A18	GND	B18	REQA-	A49	AD9	B49	GND
A19	Reserved	B19	Vcc	A50	KEY	B50	KEY
A20	AD30	B20	AD31	A51	KEY	B51	KEY
A21	3.3 V	B21	AD29	A52	CBE0-	B52	AD8
A22	AD28	B22	GND	A53	3.3 V	B53	AD7
A23	AD26	B23	AD27	A54	AD6	B54	3.3 V
A24	GND	B24	AD25	A55	AD4	B55	AD5
A25	AD24	B25	3.3 V	A56	GND	B56	AD3
A26	AD22 (ID-SEL)	B26	CBE3-	A57	AD2	B57	GND
A27	3.3 V	B27	AD23	A58	AD0	B58	AD1
A28	AD22	B28	GND	A59	Vcc	B59	Vcc
A29	AD20	B29	AD21	A60	SREQ64-	B60	SACK64-
A30	GND	B30	AD19	A61	Vcc	B61	Vcc
A31	AD18	B31	3.3 V	A62	Vcc	B62	Vcc

•Table 4-16. PCI Connector.

NOTES

# Chapter 5 - Troubleshooting & Error Messages

## Troubleshooting

The first part of this chapter helps you identify and solve problems that might occur when the system is in use. The second part lists error code messages that might display.

Please note that you should run an anti-virus program whenever your system exhibits problems. The cause of the problem may not be a virus, but you could save considerable time and effort if your system turns out to be infected. Many virus programs display intermittent symptoms that seem to be restricted to the hardware, the software, or the operating system, only to change behavior.

## Troubleshooting Procedure

This section provides a step-by-step troubleshooting procedure to identify a problem and locate its source.

### ⚠ CAUTION

Turn off the system and any peripheral devices before you disconnect peripheral cables from the system. Otherwise, you can permanently damage the system or the peripheral devices.

- 1 .Turn off the system and any peripheral devices. Disconnect all external peripherals from the system, except for the keyboard and the video display.
- 2 .Make sure the system is plugged into a properly grounded power outlet.
- 3 .Make sure your keyboard and video display are correctly connected to the system. Turn on the video display, and turn up its brightness and contrast controls to at least two-thirds of the maximum (refer to the documentation supplied with the video display).
- 4 .If the operating system normally loads from the hard disk drive, make sure there is no diskette in the diskette drive. If the operating system normally loads from a diskette, insert the operating system diskette into the drive.
- 5 .Turn on the system. If the power indicator does not light, but the system seems to be operating normally, the indicator is probably defective.
- 6 .Monitor the power-on self test (POST) execution. Each time you turn on the system, the POST checks the system board, memory, keyboard, and certain peripheral devices.

### ⇒ Note

During the memory test, the POST displays the amount of memory it has tested. Depending on the amount of memory installed, the POST can take up to 60 seconds to complete. If you do not want to wait for the memory test to complete, you can terminate the test after it starts by pressing the <Esc>.

Check the following during the POST:

- a. If the POST does not detect any errors, the system beeps once and boots up.
- b. Errors that do not prevent the boot process (*non-fatal* errors) display a message that looks similar to the following:

```
Error Message Line 1  
  
Error Message Line 2  
  
Press <F1> for Setup,  
  
<Esc> to Boot
```

You can note the error and press <Esc> to resume the boot-up process, or <F1> to enter Setup.

- c. Errors that prevent the boot process from continuing (*fatal* errors), are communicated by a series of audible beeps. If this type of error occurs, refer to the error codes and messages listed at the end of this chapter.

- 7 .Confirm that the operating system has loaded.

## Problems at Initial System Start-up

Problems that occur at initial start-up are usually caused by incorrect installation or configuration. Hardware failure is a less frequent cause.

- \_\_\_ Are all cables correctly connected and secured?
- \_\_\_ Are the configuration settings correct in Setup?
- \_\_\_ Are all drivers properly installed?
- \_\_\_ Are switches and jumpers on the system board correct if changed from the default settings?
- \_\_\_ Are all jumper and switch settings on add-in boards and peripheral devices set correctly? For the valid settings, see the documentation shipped with these devices. Ensure that there are no conflicts, for example, two add-in boards sharing the same interrupt.
- \_\_\_ Is the power supply set to the proper input voltage? See Chapter 2.
- \_\_\_ Are add-in boards and disk drives installed correctly?
- \_\_\_ Is there a keyboard attached?
- \_\_\_ Is a bootable diskette installed in drive A?
- \_\_\_ If the system has a hard disk, is it properly formatted or defined?

- \_\_\_ Are all SIMMs installed correctly? Try reseating the SIMMs.
- \_\_\_ Is the operating system properly loaded? See the operating system documentation.

## **Problems After the System Has Been Running Correctly**

After the system hardware and software have been running correctly, problems often indicate equipment failure. Go through the checklist below to see if the situation is one that may be easily corrected.

If the problem recurs after you have checked and corrected all of these items, refer to the troubleshooting procedures (see "Troubleshooting Procedure" in this chapter).

- \_\_\_ If you are running the software from a diskette, try a new copy.
- \_\_\_ If you are running the software from a hard disk, try running it from a diskette. If the software runs correctly, there may be a problem with the copy on the hard disk. Reinstall the software on the hard disk and try again. Make sure all the necessary files are installed.
- \_\_\_ Try clearing CMOS RAM and running Setup.
- \_\_\_ If the problems are intermittent, there may be a loose cable, dirt in the keyboard (if keyboard input is incorrect), a marginal power supply, or other random component failures.
- \_\_\_ A transient voltage spike, power outage, or brownout may have occurred. Symptoms of voltage spikes include a flickering video display, unexpected system reboots, and the system not responding to user commands. Reload the software and try again.
- \_\_\_ Voltage spikes can occasionally cause the heads of the disk drive to contact the disk. This can corrupt or destroy data files. If you are experiencing voltage spikes on the power line, install a surge suppressor between the power outlet and the system power cord.
- \_\_\_ Try reseating the SIMMs.

## **Problems Running New Application Software**

Problems that occur when you run new application software are usually related to the software. Faulty equipment is much less likely, especially if other software runs correctly. Go through the checklist below to see if the situation is one that may be easily corrected. If the problem persists after you have checked and corrected all of these items, contact the software vendor's customer service representative.

- \_\_\_ Does the system meet the minimum hardware requirements for the software? Refer to the software documentation.
- \_\_\_ Is the software an authorized copy? Unauthorized copies often do not work. Obtain an authorized copy of the software.
- \_\_\_ If you are running the software from a diskette, is it a good copy?

- \_\_\_ If you are running the software from a hard disk, is the software correctly installed? Were all necessary procedures followed and files installed?
- \_\_\_ Are the correct device drivers installed?
- \_\_\_ Are the correct video drivers installed?
- \_\_\_ Is the software correctly configured for the system?
- \_\_\_ Are you using the software correctly?

## Problems Operating Add-in Boards

Problems related to add-in boards are usually related to improper board installation or interrupt and address conflicts. Go through the checklist below to see if you can correct the problem. If the problem persists after you have checked and corrected all of these items, contact the board vendor's customer service representative.

- \_\_\_ Did you install the add-in board according to the manufacturer's instructions? Check the documentation that came with the board.
- \_\_\_ Are all cables installed properly?

The following items are suggestions for troubleshooting problems related to ISA legacy (non-Plug and Play add-in boards).

- \_\_\_ If the ISA legacy board uses an interrupt, run Setup and set the interrupt that is being used by the ISA board to Used by ISA Card.
- \_\_\_ If the ISA legacy board uses memory space between 80000H - 9FFFFH, run Setup and set conventional memory to 512 K.
- \_\_\_ If the ISA legacy board uses shared memory between C8000H - DFFFFH, run Setup and enable shared memory for the appropriate memory space.

## Problems and Suggestions

Contact your service representative if the suggested actions don't solve the problem.

What happens	What to do
--------------	------------

Application software problems	<p>Make sure all cables are installed correctly.</p> <p>Verify that the system board jumpers are set properly.</p> <p>Verify that your system hardware configuration is set correctly. In Setup, check the values against the system settings you recorded previously. If an error is evident (wrong type of drive specified, for example), make the change in Setup and reboot the system. Record your change.</p> <p>Make sure the software is properly configured for the system. Refer to the software documentation for information.</p> <p>Try a different copy of the software to see if the problem is with the copy you are using.</p> <p>Try running the software in a different speed mode. See "Using Keyboard Shortcuts" in Chapter 2.</p> <p>If other software runs correctly on the system, contact the vendor of the software that fails.</p>
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<b>What happens</b>	<b>What to do</b>
Characters on-screen are distorted or incorrect	<p>Make sure the brightness and contrast controls are properly adjusted.</p> <p>Make sure the video signal cable and power cables are properly installed.</p> <p>Make sure your monitor is compatible with the video mode you have selected.</p>
Characters do not appear on screen	<p>Make sure the video display is plugged in and turned on.</p> <p>Check that the brightness and contrast controls are properly adjusted.</p> <p>Check that the video signal cable is properly installed.</p> <p>Make sure a video board is installed, enabled, and jumpered correctly.</p> <p>Reboot the system.</p>
CMOS RAM settings are wrong	<p>If system settings stored in CMOS RAM change for no apparent reason (for example, the time of day develops an error), the backup battery may no longer have enough power to maintain the settings. Replace the battery.</p>
Diskette drive light does not go on when drive is in use or is tested by POST	<p>Make sure the power and signal cables for the drive are properly installed.</p> <p>Check that the drive is properly configured and enabled in Setup.</p>
<b>What happens</b>	<b>What to do</b>



Hard drive light does not go on when drive is in use or is tested by POST	<p>Make sure the power and signal cables for the drive are properly installed.</p> <p>Make sure the front panel connector is securely attached to the system board headers.</p> <p>Check that the drive is properly configured and enabled in Setup.</p> <p>Check the drive manufacturer's manual for proper configuration for remote hard disk drive activity.</p>
Power-on light does not go on	<p>If the system is operating normally, check the connector between the system board and the front panel. If OK, the light may be defective.</p>
Prompt doesn't appear after system boots	<p>See "Problems at Initial System Start-up".</p>
Setup, can't enter	<p>If you can't enter Setup to make changes, check the switch that disables entry into Setup (Chapter 6). If the switch is set to allow entry into Setup, you might need to clear CMOS RAM to the default values and reconfigure the system in Setup.</p>
System halts before completing POST	<p>This indicates a fatal system error that requires immediate service attention. Note the screen display and write down any beep code emitted. Provide this information to your service representative.</p>

## Error and Information Messages

The rest of this chapter describes beep codes, and error messages that you might see or hear when you start up the system:



### Note

In all cases, if the problem persists, call your service representative.

## Beep Codes

Beeps	Error Message	Description
1	Refresh Failure	The memory refresh circuitry on the motherboard is faulty.
3	Base 64 KB Memory Failure	Memory failure in the first 64 KB.

4	Timer Not Operational	Memory failure in the first 64 KB of memory, or Timer 1 on the motherboard is not functioning.
5	Processor Error	The CPU on the motherboard generated an error.
6	8042 - Gate A20 Failure	The keyboard controller 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	The ROM checksum value does not match the value encoded in the BIOS.
10	CMOS Shutdown Register Read/Write Error	The shutdown register for CMOS RAM failed.
11	Cache Error / External Cache Bad	The external cache is faulty.

## Error and Information Messages

<b>Error Message</b>	<b>Explanation</b>
Address Line Short!	Error in the address decoding circuitry on the motherboard.
Cache Memory Failure, Do Not Enable Cache!	Cache memory is defective.
CMOS Battery Failed	CMOS RAM is powered by a battery. The battery power is low. Replace the battery.

CMOS Checksum Invalid	After CMOS RAM values are saved, a checksum value is generated for error checking. The previous value is different from the current value. Run Setup.
CMOS System Options Not Set	The values stored in CMOS RAM are either corrupt or nonexistent. Run Setup.
CMOS Time and Date Not Set	Run Setup to set the date and time in CMOS RAM.
Diskette Boot Failure	The boot disk in floppy drive A: is corrupt. It cannot be used to boot the system. Use another boot disk and follow the screen instructions.
DMA Controller Error	Error in the DMA Controller
Drive Not Ready Error	The BIOS cannot access the floppy drive. Check all the appropriate connections after the system is powered down.

<b>Error Message</b>	<b>Explanation</b>
Floppy Disk Controller Failure	The BIOS cannot communicate with the floppy disk drive controller. Check all appropriate connections after the system is powered down.
Floppy Drive A: Failure	The BIOS cannot access Drive A:. Check all the appropriate connections after the system is powered down.
Floppy Drive B: Failure	The BIOS cannot access Drive B:. Check all the appropriate connections after the system is powered down.
Gate - A20 Error	Gate A20 on the keyboard controller is not working. Call for service.
Invalid Boot Diskette	The BIOS can read the disk in floppy drive A:, but cannot boot the system. Use another boot disk.
Keyboard Controller Error	The keyboard controller has failed during POST.
Keyboard is Locked ... Please Unlock It	Some systems have an electronic key that enables the user to lock the keyboard.
Keyboard Stuck Key Detected	There is a key pressed down.
Master DMA Controller Error	Error in the master DMA channel.
Master Interrupt Controller Error	Master Interrupt Controller failed during POST.
Memory Size Decreased	The amount of memory on the system board is less than the amount in CMOS RAM. Run Setup.

<b>Error Message</b>	<b>Explanation</b>
----------------------	--------------------

Off Board Parity Error	Parity error in memory installed in an expansion slot. The format is:  OFF BOARD PARITY ERROR ADDR (HEX) = (XXXX)  XXXX is the hex address where the error occurred.
Slave DMA Controller Error	Error in the slave DMA channel.
Slave Interrupt Controller Error	Slave Interrupt Controller failed during POST.
System Memory Size Mismatch	The amount of memory on the system board is different than the amount in CMOS RAM. Run Setup.
Timer Channel 2 Error	Most systems include two timers. There is an error in timer 2.

## PCI Configuration Status and Error Messages

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

Message	Explanation
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" DIP switch has been moved to the ON position and CMOS RAM has been cleared.
NVRAM Data Invalid, NVRAM Cleared	Invalid entry in the ESCD.
Parallel Port Resource Conflict	The parallel port has requested a resource that is already in use.
PCI Error Log is Full	This message is displayed when more than 15 PCI conflict errors are detected. No additional PCI errors can be logged.
PCI I/O Port Conflict	Two devices requested the same resource, resulting in a conflict.
PCI IRQ Conflict	Two devices requested the same resource, resulting in a conflict.
PCI Memory Conflict	Two devices requested the same resource, resulting in a conflict.
Primary Boot Device Not Found	The designated primary boot device (hard disk drive, diskette drive, or CD-ROM drive) could not be found.

<b>Message</b>	<b>Explanation</b>
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 1 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.

## Resetting the System

To reset the system from the keyboard, press the key sequence:

<Ctrl + Alt + Del>

You can also reset the system by shutting system power off and then powering back up. To do this:

- 1 .Press and release the front panel power control button. (Moving the rear panel power enable switch to the "0" position will also power down the system).
- 2 .Wait at least 20 seconds.
- 3 .Press and release the front panel power control button. (If you moved the power enable switch at the back of the system to "0," you must move it back to the "1" position before pressing the front power control switch).
- 4 .The system powers up and immediately begins the power-on self test (POST).



### **Note**

If your system contains the suspend/resume power feature, the power control button on the front of the system gives you additional control features. See

# Chapter 6 - Support and Service

## In North America

### Technical Support

RadiSys maintains a technical support phone that is staffed weekdays (except holidays) between 8:00 AM and 5:00 PM Pacific time. If you require assistance outside these hours, you can leave a message on voice-mail using the same phone number. You can also request help via electronic mail or by FAX addressed to RadiSys Technical Support Department. See the cover of this manual for the RadiSys telephone and FAX numbers. The RadiSys e-mail address on the internet is [support@radisys.com](mailto:support@radisys.com). If you are sending e-mail or a FAX, please include information on both the hardware and software being used and a detailed description of the problem, specifically how the problem can be reproduced. We will respond by e-mail, phone or FAX by the next business day.

Technical support services are designed for customers who have purchased their products from RadiSys or an authorized sales representative. If your RadiSys product is part of a piece of OEM equipment, or was integrated by someone else as part of a system, support will be better provided by the OEM or system vendor that did the integration and understands the final product and environment.

### World Wide Web

RadiSys maintains an active site on the world wide web. The home-page URL is <http://www.radisys.com>. The site contains current information about the company and locations of sales offices, new and existing products, contacts for sales, service, and technical support information. You can also send e-mail to RadiSys using the web site. Requests for sales, service, and technical support information receive prompt response.

### Repair Services

RadiSys provides Factory Repair Service for the entire RadiSys product line. Standard service for all RadiSys products covers factory repair with customers paying shipping to the factory and RadiSys paying for return shipment. Overnight return shipment is available at customer expense. Normal turn-around time for repair and re-certification is five working days.

Quick Exchange services (immediate shipment of a loaner unit while the failed product is being repaired) are available. Negotiate these or other extra-cost services in advance to allow RadiSys to pool the correct product configurations. RadiSys does not maintain a general "loaner" pool: units are available only for customers who have negotiated this service in advance.

RadiSys does not provide a fixed-price "swap-out" repair service. Many customers indicate that issues of serial number tracking and version control make it more convenient to receive their original products back after repair.

### Warranty Repairs

RadiSys will repair at no charge products having manufacturing defects during the warranty period. See the warranty information at the front of this manual. Products without fault sent in for warranty repair will be subject to a recertification charge. Extended warranties are available at a standard price for any product still under original warranty. RadiSys will gladly quote prices for extended warranties on products with lapsed original warranties; contact the factory if this applies.

Customer induced damage (resulting from misuse, abuse, or exceeding the product specifications) is not covered by warranty.

## **Non-Warranty Services**

There are several classes of non-warranty service. These include repair of customer induced problems, repairs of failures for products outside the warranty period, recertification (functional testing) of a product either in or out of warranty, and procurement of spare parts.

All non-warranty repairs are subject to service charges. RadiSys has determined that pricing repairs based on time and materials is more cost-effective for the customer than a flat-rate repair charge. RadiSys analyzes the product after it is received. When instructed to do so, RadiSys informs the customer of repair costs for authorization. After the customer authorizes repairs and makes billing arrangements, RadiSys repairs the product and returns it to the customer.

RadiSys provides a recertification service for products either in or out of warranty. This service verifies correct operation of a product by inspecting and testing the product using standard manufacturing tests. There is a product-dependent charge for recertification.

Generally, very few components are field-repairable. However, since RadiSys understands that some customers want or need the option of repairing their own equipment, all components are available in a spares program. RadiSys charges a minimum billing for this program.

## **Arranging Service**

To schedule service for a product, please call the RadiSys Technical Support Department. The telephone number appears on the cover of this manual. Have the product model and serial numbers available, along with a description of the problem. A technical support representative will issue a Returned Materials Authorization (RMA) number, a code number by which RadiSys tracks the product while it is being processed. Once you receive the RMA number, follow the instructions of the technical support representative and return the product to RadiSys, freight prepaid. Mark the RMA number clearly on the exterior of the package. If possible, re-use original shipping containers and packaging. In any case, be sure you follow good ESD-control practices when handling the product. Use anti-static bags and packing materials with adequate padding and shock-absorbing properties.

Before you ship the product, include the following information: return address, contact names and phone numbers in purchasing and engineering, and a description of the problem. If available, include ancillary information related to the problem.

Ship the product, freight prepaid, to the RadiSys Product Service Center at the address shown on the front cover of this manual.

## **Other Countries**

Use the RadiSys world wide web site to contact us, or contact the sales organization from which you purchased your RadiSys product for service and support. The RadiSys world wide web URL is *<http://www.radisys.com>*

# Appendix A - I/O Memory Maps

This appendix defines the system I/O addresses, memory map, board interrupts, and DMA channels.

## System I/O Addresses

Address Range (Hexadecimal)	Size (Decimal)	Description
0000 - 000F	16 bytes	PIIX - DMA 1
0020 - 0021	2 bytes	PIIX - Interrupt Controller 1
0040 - 0043	4 bytes	PIIX - Timer 1
0048 - 004B	4 bytes	PIIX - Timer 2
0060	1 byte	Keyboard Controller Data Byte
0061	1 byte	PIIX - NMI, speaker control
0064	1 byte	Keyboard Controller. CMD/STAT Byte
0070, bit 7	1 bit	PIIX - Enable NMI
0070, bits 6:0	7 bits	PIIX - Real Time Clock, Address
0071	1 byte	PIIX - Real Time Clock, Data
0078	1 byte	Reserved - Brd. Config.
0079	1 byte	Reserved - Brd. Config. rd only
0080 - 008F	16 bytes	PIIX - DMA Page Register
00A0 - 00A1	2 bytes	PIIX - Interrupt Controller 2
00C0 - 00DE	31 bytes	PIIX - DMA 2
00F0	1 byte	Reset Numeric Error
0170 - 0177	8 bytes	Secondary IDE Channel
01F0 - 01F7	8 bytes	Primary IDE Channel
0278 - 027B	4 bytes	Parallel Port 2
02F8 - 02FF	8 bytes	On-Board Serial Port 2
0376	1 byte	Secondary IDE Chan

Continued



## System I/O Addresses (continued)

Address Range (Hexadecimal)	Size (Decimal)	Description
0377	1 byte	Secondary IDE Channel
0378 - 037F	8 bytes	Parallel port 1
03BC - 03BF	4 bytes	Parallel Port x
03E8 - 03EF	8 bytes	Serial Port 3
03F0 - 03F5	6 bytes	Floppy Channel 1
03F6	1 byte	Primary IDE Channel Command Port
03F7 (Write)	1 byte	Floppy Channel 1
03F7, bit 7	1 bit	Floppy Disk Change
03F7, bits 6:0	7 bits	Primary IDE Channel
03F8 - 03FF	8 bytes	On-Board Serial Port 1
LPT + 400h	8 bytes	ECP port, LPT + 400h
0CF8-0CFB*	4 bytes	PCI Configuration Address Reg
0CFC-0CFF*	4 bytes	PCI Configuration Data Reg
FF00-FF07	8 bytes	IDE Bus Master Reg

\* Only accessible after PCI configuration space is enabled.

**Table 1: Table A-1. System I/O Addresses.**

## Memory Map

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

**Table 2: Table A-2. Memory Map.**

# Board Interrupts

<b>Interrupt Request</b>	<b>System Resource</b>
NMI	Parity error
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	Parallel port 2
6	Floppy
7	Parallel Port 1
8	Real Time Clock
9	User available
10	User available
11	User available
12	On-board Mouse Port (Avail if no PS/2 mouse)
13	Reserved, Math coprocessor
14	Primary IDE if enabled, else user available
15	Secondary IDE if enabled, else user available

**Table 3: Table A-3. Board Interrupts.**

# DMA

<b>DMA Channel</b>	<b>Data Width</b>	<b>System Resource</b>
0	8- or 16-bits	Open
1	8- or 16-bits	Open(Normally used for LAN
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	ISA IDE

**Table 4: Table 4-4. DMA.**

## NOTES

# Appendix B: BIOS Update and Recovery

## BIOS Update

The system BIOS resides on a flash component. You can upgrade a flash BIOS through software, without taking the system apart or replacing the flash component. This appendix tells how to upgrade your system BIOS from a diskette. The appendix also tells how to recover from an interrupted upgrade. Your service representative can provide you with the latest BIOS upgrade for your system.

### Using the Upgrade Utility

- 1 .Write down the Setup selections currently set on your system (Chapter 2 tells about the Setup program).
- 2 .Insert the upgrade diskette in your system's diskette drive.
- 3 .Reboot the system.
- 4 .When the flash upgrade menu appears, choose "Update Flash Memory Area from a file."
- 5 .When the menu asks you to enter a path/filename, use the arrow keys to select the *.bio* file, and press <Enter>.
- 6 .The utility asks for a confirmation that you want to load the new flash into memory. Select "Continue with Programming."
- 7 .After the upgrade completes, remove the upgrade disk.
- 8 .Reboot the system and start the Setup program. Press <F5> to reset the BIOS defaults. Then, use the copy of the Setup selections you made at the beginning of this procedure to set the options.

## BIOS Recovery

It is unlikely that anything will interrupt the Flash upgrade process. However, if an interruption occurs that prevents continuing with the upgrade, it is possible the BIOS may be left in an unusable state. The steps below tell how to recover from this kind of problem.



### Note

Because of the small amount of code available in the non-erasable boot block area, no video is available to direct the procedure. You must monitor the flash recovery by listening to the speaker.

- 1 .Change the "Recovery Boot Enable" jumper to the Recovery mode position (see Chapter 6 for the location of the jumper).
- 2 .Install the bootable upgrade diskette into diskette drive A.
- 3 .Reboot the system.
- 4 .Listen to the speaker. You should hear beeps in the following sequence:
  - a)After you reboot the system, the speaker beeps once. This beep marks the beginning of the power on self test (POST).
  - b)After a short delay (less than 10 seconds), the speaker beeps again, but at a higher frequency. This marks the beginning of the recovery process. At this point, the system is copying the recovery code into the flash device.
  - c)After about 30 seconds, the speaker beeps twice (again at the higher frequency), marking the end of the recovery process.
- 5 .Turn the system off.
- 6 .Change the "Recovery Boot Enable" jumper back to the Normal position.
- 7 .Leave the upgrade floppy in drive A, and turn the system on.
- 8 .Continue with the original upgrade.

# Appendix C: Suspend/Resume

## The Suspend/Resume Option

The suspend/resume feature makes it possible to suspend and resume system operation and to shut down and restart system power, all by pressing and releasing the power control button on the front of the system. This appendix tells how to

- Suspend and resume system operation
- Shut down and restart system power
- Reset the system



### Note

Chapter 2 in this manual tells how to turn off system power and how to reset the system. If your system contains the suspend/resume option, use the information in this appendix for turning off, re-starting, and resetting the system.

## Suspending and Resuming Operation

When you use the suspend mode of operation, you reduce the computer's energy consumption in accordance with the EPA Energy Star specification. The resume feature returns the system to an active state.

To suspend system operation, do one of the following:

- Press and immediately release the front panel power control button. You will hear one beep.
- Press a user-defined keyboard hot-key sequence (the Hot Key option in the Power Management Configuration Subscreen, described in Chapter 2).
- Wait until the Inactivity Timer automatically switches the system into suspended mode (the Inactivity Timer option in the Power Management Configuration Subscreen, described in Chapter 2).

To resume system operation, do one of the following:

- Press and immediately release the front panel power control button. You will hear one beep.
- Press any key on the keyboard.
- Move or click the mouse (configurable via Power Management).

## Turning Off and Restarting the System

There are two methods for shutting down system power.



To shut down system power with the power control button:

- 1 .Press and hold the front panel power control button for several seconds. When you first press the button, you'll hear one beep. Continue holding in the button until you hear a two-tone descending beep. Release the button. The system will power down.
- 2 .When you want to turn the power on again, press and release the power control button.

You can also shut down system power by moving the power enable switch at the rear of the system to the "0" position. To turn on power after you have moved the rear power enable switch to "0," do the following:

- 1 .Flip the power enable switch to the "1" position.
- 2 .Press and release the power control button at the front of the system.

## Resetting the System

To reset the system from the keyboard, press the key sequence:

<Ctrl + Alt + Del>

You can also reset the system by shutting off system power and powering back up.

- 1 .Press and hold the front panel power control button for several seconds. When you first press the button, you'll hear one beep. Continue holding in the button until you hear a two-tone descending beep. Release the button. The system will power down.
- 2 .Wait at least 20 seconds.
- 3 .Press and release the front panel power control button. (If you moved the power enable switch at the back of the system to "0," you must move it back to the "1" position before pressing the front power control button).
- 4 .The system will power up and immediately begin the power-on self test (POST).

Resetting the system will:

- Clear the system memory
- Restart the power-on self test (POST)
- Reinitialize all peripherals
- Load the operating system

# Appendix G - GLOSSARY

## A

**Access Time:** A factor in measurement of a memory storage device's operating speed. It is the amount of time required to perform a read operation. More specifically, it is the period of time between which the memory receives a read command signal and the time when the requested data becomes available to the system data bus.

**Address:** A number that identifies the location of a word in memory. Each word in a memory storage device or system has a unique address. Addresses are always specified as a binary number, although octal, hexadecimal, and decimal numbers are often used for convenience.

**American National Standards Institute (ANSI):** An organization dedicated to advancement of national standards related to product manufacturing.

**Autotype:** A convenient method of IDE device detection whereby the system BIOS queries the IDE device to obtain operational parameters. If the device supports autotype, this information is passed to the BIOS where it is used to automatically configure the drive controller.

## B

**Basic Input/Output System (BIOS):** Firmware in a PC-compatible computer that runs when the computer is powered up. The BIOS initializes the computer hardware, allows the user to configure the hardware, boots the operating system, and provides standard mechanisms that the operating system can use to access the PC's peripheral devices.

**BIOS Data Area (BDA):** BIOS Data Area. A 256 byte block of DRAM starting at address 400H that contains data initialized and used by the System BIOS detailing the system configuration and errors encountered during POST.

**BIOS Extension:** An object code module that is typically integrated into the FBD or placed into a ROM that is accessible on the peripheral bus (PCI, ISA, etc.) in the address range 0C0000H through 0DFFFFH. BIOS extensions have a pre-defined header format and contain code that is used to extend the capabilities of the System BIOS.

**BIOS Image:** Information contained in the flash boot device in binary file format consisting of initialization data, setup configuration data, diagnostic sequences, and other instructions necessary to start up a computer and prepare it to load an operating system.

**BIOS Recovery:** A process whereby an existing, corrupt BIOS image in the flash boot device is overwritten with a new image. Also referred to as a *flash recovery*.

**BIOS Update:** A process whereby an existing, uncorrupted BIOS image in the flash boot device is overwritten with a new image. Also referred to as a *flash update*.

**Bit:** A binary digit.

**Boot:** The process of starting a computer and loading the operating system from a powered down state (cold boot) or after a computer reset (warm boot). Before the operating system loads, the computer performs a general hardware initialization and resets internal registers.

**Boot Block:** A write-protected 16KB section of the flash boot device located at physical address FFFFC000h to FFFFFFFFh which contains code to perform rudimentary hardware initialization at system power up. The boot block also contains code to establish an Xmodem serial communication link with a host PC when re-flashing the BIOS.

**Boot Device:** The storage device from which the computer boots the operating system.

**Boot Sequence:** The order in which a computer searches external storage devices for an operating system to boot. The boot device must be the first in the boot sequence.

**Byte:** A group of 8 bits.

## C

**Central Processing Unit (CPU):** A semiconductor device which performs the processing of data in a computer. The CPU, also referred to as the microprocessor, consists of an arithmetic/logic unit to perform the data processing, and a control unit which provides timing and control signals necessary to execute instructions in a program.

**Chipset:** One or more integrated circuits that, along with a CPU, memory, and other peripherals, implements an IBM PC-AT compatible computer. The chipset typically implements a DRAM controller, bus, interface logic, and PC peripheral devices.

**Complimentary Hi-performance Metal Oxide Semiconductor (CHMOS):** A proprietary CMOS technology used by Intel Corporation in the 386EX CPU and other Intel microprocessor ICs.

**Column Address Strobe (CAS):** An input signal from the DRAM controller to an internal DRAM latch register specifying the column at which to read or write data. The DRAM requires a column address and a row address to define a memory address. Since both parts of the address are applied at the same DRAM inputs, use of column addresses and row addresses in a multiplexed array allows use of half as many pins to define an address location in a DRAM device as would otherwise be required.

**COM Port:** A bi-directional serial communication port which implements the RS-232 specification.

**Complimentary Metal Oxide Semiconductor (CMOS):** A fast, low power semiconductor RAM used to store system configuration data.

**Configuration Byte:** A set up value in the Baby-AT baseboard's BIOS enabling it to establish a pointer to an ATA PC card configuration register. Once the pointer has been established, the BIOS requires a *register location* to successfully complete an AT PC card interface.

**Conventional Memory:** The first 640 KB of a computer's total memory capacity. If a computer has no extended memory, conventional memory equals the total memory capacity. In typical computer systems, conventional memory can contain BIOS data, the operating system, applications, application data, and terminate and stay resident (TSR) programs. Also called *system memory*.

**Cylinders/Heads/Sectors (CHS):** A specification of disk drive operating parameters consisting of the number of disk cylinders, disk drive read/write heads, and disk sectors. See also Logical Block Addressing.

## D

**Default:** The state of all user-changeable hardware and software settings as they are originally configured before any changes are made.

**Disk Operating System (DOS):** One or more programs which allow a computer to use a disk drive as an external storage device. These programs manage storage and retrieval of data to and from the disk and interpret commands from the computer operator.

**Driver:** A software component of the operating system which directs the computer interface with a hardware device. The software interface to the driver is standardized such that application software calling the driver requires no specific operational information about the hardware device.

**Dual In-Line Package (DIP):** A semiconductor package configuration consisting of a rectangular plastic case with two rows of pins, one row on each lengthwise side.

**Dynamic Bus Sizing:** The ability of the Intel386EX microprocessor, via a dedicated signal from the memory/bus controller, to engage 16-bit to 8-bit conversion cycles and adjust wait states when accessing an 8-bit device.

**Dynamic Random Access Memory (DRAM):** Semiconductor RAM memory devices in which the stored data will not remain permanently stored, even with the power applied, unless the data are periodically rewritten into memory during a *refresh* operation.

## E

**Electrically Erasable Programmable ROM (EEPROM):** Specifically, those EPROMs which may be erased electrically as compared to other erasing methods.

**Erasable Programmable ROM (EPROM):** A semiconductor ROM device capable of being erased and reprogrammed by the user as often as desired. Once programmed, the EPROM is a nonvolatile memory that will hold its stored data indefinitely.

**Extended Data Out (EDO):** A type of DRAM that allows higher memory system performance since the data pins are still driven when CAS# is de-asserted. This allows the next DRAM address to be presented to the device sooner than with Fast Page Mode DRAM.

**Extended Memory:** The RAM address space, in a computer so equipped, above the 1 MB level.

**External Device:** A peripheral or other device connected to the computer from an external location via an interface cable.

## F

**Fast Page Mode (FPM):** A “standard” type of DRAM that is lower performance than EDO but is less expensive.

**Fixed Disk:** A hard disk drive or other data storage device having no removable storage medium. Fixed disk storage devices use inflexible disk media and are sealed to prevent data loss due to media surface contamination. Fixed disks generally provide the most storage space for a given cost when compared to semiconductor, tape, and other popular mass storage technologies.

**Flash Boot Device (FBD):** A flash memory device containing the computer’s BIOS. In the Baby-AT baseboard, a 512 KB Intel 28F400BV-T semiconductor flash memory containing the system and video BIOS images, the BIOS initializing code and the recovery code which allows self hosted reflashing.

**Flash Card:** A removable read/write flash storage device closely resembling a credit card in size and able to hold several megabytes of data.

**Flash Memory:** A fast EEPROM semiconductor memory typically used to store firmware such as the computer BIOS. Flash memory also finds general application where a semiconductor non-volatile storage device is required.

**Flash Recovery:** See *BIOS Recovery*.

**Flash Update:** See *BIOS Update*.

**Force Update:** See *BIOS Recovery*.

## G

**Gigabyte (GB):** One billion bytes;  $2^{30} = 1,073,741,824$  to be exact.

## H

**Hang:** A condition where the system microprocessor suspends processing operations due to an anomaly in the data or an illegal command in the instruction set.

**Header:** A mechanical pin and sleeve style connector on a circuit board. The header may exist in either a male or female configuration. For example, a male header has a number and pattern of pins which corresponds to the number and pattern of sleeves on a female header plug.

**Hexadecimal (h):** A base 16 numbering system using numeric symbols 0 through 9 plus alpha characters A, B, C, D, E, and F as the 16 digit symbols. Digits A through F are equivalent to the decimal values 10 through 15.

## I

**Industry Standard Architecture (ISA):** A popular microcomputer expansion bus architecture standard. The ISA standard originated with the IBM PC when the system bus was expanded to accept peripheral cards.

**Input/Output (I/O):** The communication interface between system components and between the system and connected peripherals.

**Integrated Drive Electronics (IDE):** A hard disk drive/controller interface standard. IDE drives contain the controller circuitry at the drive itself, as compared to the location of this circuitry on the computer motherboard in non-IDE systems. IDE drives typically connect to the system bus with a simple adapter card containing a minimum of on-board logic.

**Interrupt Request (INT):** A software-generated interrupt request.

**Interrupt Request (IRQ):** In ISA bus systems, a microprocessor input from the control bus used by I/O devices to interrupt execution of the current program and cause the microprocessor to jump to a special program called the *interrupt service routine*. The microprocessor executes this special program, which normally involves servicing the interrupting device. When the interrupt service routine is completed, the microprocessor resumes execution of the program it was working on before the interruption occurred.

**Interrupt Service Routine (ISR):** A program executed by the microprocessor upon receipt of an *interrupt request* from an I/O device and containing instructions for servicing of the device.

## J

**Jumper:** A set of male connector pins on a circuit board over which can be placed coupling devices to electrically connect pairs of the pins. By electrically connecting different pins, a circuit board can be configured to function in predictable ways to suit different applications.

## K

**Kilobyte (KB):** One thousand bytes;  $2^{10} = 1024$  bytes, to be exact.

## L

**Liquid Crystal Display (LCD):** A device containing a series or matrix of liquid crystal diodes. Each diode consists of a sandwich of transparent electrodes, between which is a layer of liquid crystal. Behind the sandwich is a reflective layer. In an unpowered state, light is reflected through the electrodes and liquid crystal to the reflective layer and back. When current is applied to the liquid crystal, its molecular structure changes in such a way as to prevent light from passing back from the reflective layer.

**Logical Address:** The memory-mapped location of a segment after application of the address offset to the physical address.

**Logical Block Addressing (LBA):** A method the system BIOS uses to reference hard disk data as logical blocks, with each block having a specific location on the disk. LBA differs from the CHS reference method in that the BIOS requires no information relating to disk cylinders, heads, or sectors. LBA can be used only on hard disk

drives designed to support it.

## M-N

**Megabyte (MB):** One million bytes;  $2^{20} = 1,048,576$  bytes to be exact.

**Memory:** A designated system area to which data can be stored and from which data can be retrieved. A typical computer system has more than one memory area. See *Conventional Memory* and *Extended Memory*.

## O

**Offset:** The difference in location of memory-mapped data between the physical address and the logical address.

**Operating System:** See *Disk Operating System*.

## P-Q

**Peripheral Connect Interface (PCI):** A popular microcomputer bus architecture standard.

**Peripheral Device:** An external device connected to the system for the purpose of transferring data into or out of the system.

**Personal Computer/Advanced Technology (PC/AT):** A popular computer design first introduced by IBM in the early 1980s.

**Personal Computer Memory AT Attachment (PC/ATA):** A popular standard for interfacing flash memory cards in computer systems.

**Personal Computer Memory Card International Association (PCMCIA):** The group of computer hardware designers responsible for development of standards for use and application of flash memory cards in computer systems.

**Personal System 2 (PS/2):** Computers designed with IBM's proprietary bus architecture known as Micro Channel.

**Phase-Locked Loop (PLL):** A semiconductor device which functions as an electronic feedback control system to maintain a closely regulated output frequency from an unregulated input frequency. The typical PLL consists of an internal phase comparator or detector, a low pass filter, and a voltage controlled oscillator which function together to capture and lock onto an input frequency. When locked onto the input frequency, the PLL can maintain a stable, regulated output frequency (within bounds) despite frequency variance at the input.

**Physical Address:** The address or location in memory where data is stored before it is moved as memory remapping occurs. The physical address is that which appears on the computer's address bus when the CPU requests data from a memory address. When remapping occurs, the data can be moved to a different memory location or *logical address*.

**Pinout:** A diagram or table describing the location and function of pins on an electrical connector.

**Plastic Quad Flat Pack (PQFP):** A popular package design for integrated circuits of high complexity.

**Power On Self Test (POST):** A diagnostic routine which a computer runs at power up. Along with other testing functions, this comprehensive test initializes the system chipset and hardware, resets registers and flags, performs ROM checksums, and checks disk drive devices and the keyboard interface.

**Program:** A set of instructions a computer follows to perform specific functions relative to user need or system requirements. In a broad sense, a program is also referred to as a software application, which can actually contain many related, individual programs.

**Programmable Array Logic (PAL):** A semiconductor programmable ROM which accepts customized logic gate programming to produce a desired sum-of-products output function.

## R

**Random Access Memory (RAM):** Memory in which the actual physical location of a memory word has no effect on how long it takes to read from or write to that location. In other words, the access time is the same for any address in memory. Most semiconductor memories are RAM.

**Read Only Memory (ROM):** A broad class on semiconductor memories designed for applications where the ratio of read operations to write operations is very high. Technically, a ROM can be written to (programmed) only once, and this operation is normally performed at the factory. Thereafter, information can be read from the memory indefinitely.

**Real Mode:** The operational mode of Intelx86 CPUs that uses a segmented, offset memory addressing method. These CPUs can address 1 MB of memory using real mode.

**Real Mode Address:** A memory address composed of two 16-bit values: a segment address and an offset quantity. A real mode address is constructed by shifting a segment address 4 bits to the left and then adding the offset value. A real mode address is a *physical address*.

**Real Time Clock (RTC):** Peripheral circuitry on a computer motherboard which provides a nonvolatile time-of-day clock, an alarm, calendar, programmable interrupt, square wave generator, and a small amount of SRAM. In the Baby-AT baseboard, the RTC operates independently of the system PLL which generates the internal system clocks. The RTC is typically receives power from a small battery to retain the current time of day when the computer is powered down.

**Reflashing:** The process of replacing a BIOS image, in binary format, in the flash boot device.

**Register:** An area typically inside the microprocessor where data, addresses, instruction codes, and information on the status on various microprocessor operations are stored. Different types of registers store different types of information.

**Register Location:** A set up value in the Baby-AT baseboard's BIOS which defines the base location at which the configuration register block in an ATA PC card may be found.

**Reset:** A signal delivered to the microprocessor by the control bus, which causes a halt to internal processing and resets most CPU registers to 0. The CPU then jumps to a starting address vector to begin the boot process.

**Resident Flash Array (RFA):** The RFA represents flash memory that is resident on the hardware platform that is utilized for OS or application purposes.

**Romtable DOS:** A special DOS designed specifically to load into and operate from semiconductor ROM. Romtable DOS consumes much less memory space than DOS, and because it resides in ROM, boots much more quickly than DOS.

**ROM/RAM Disk:** A feature of the BIOS allowing the use of RAM, ROM, a PC card or other semiconductor memory storage devices to be accessed by the CPU like a fixed disk in the same manner as a fixed disk.

**RS-232:** A popular asynchronous bi-directional serial communication protocol. Among other things, the RS-232 standard defines the interface cabling and electrical characteristics, and the pin arrangement for cable connectors.

**Row Address Strobe (RAS):** An input signal to an internal DRAM latch register specifying the row at which to read or write data. The DRAM requires a row address and a column address to define a memory address. Since both parts of the address are applied at the same DRAM inputs, use of row addresses and column addresses in a multiplexed array allows use of half as many pins to define an address location in a DRAM device as would otherwise be required.

## S-T

**Segment:** A section or portion of addressable memory serving to hold code, data, stack, or other information allowing more efficient memory usage in a computer system. A segment is the portion of a real mode address which specifies the fixed base address to which the offset is applied.

**Serial Host:** A computer connected to another through a serial interface. Connected together this way, one computer can execute a program remotely on the other "host" computer.

**Serial Port:** A physical connection with a computer for the purpose of serial data exchange with a peripheral device. The port requires an I/O address, a dedicated IRQ line, and a name to identify the physical connection and establish serial communication between the computer and a connected hardware device. A serial port is often referred to as a *COM port*.

**Shadow Memory:** RAM in the address range 0xC000h through 0xFFFFh used for shadowing. Shadowing is the process of copying BIOS extensions from ROM into DRAM for the purpose of faster CPU access to the extensions when the system requires frequent BIOS calls. Typically, system and video BIOS extensions are shadowed in DRAM to increase system performance.

**Single In-Line Memory Module (SIMM):** A small, rectangular circuit board on which is mounted semiconductor memory ICs.

**Standoff:** A mechanical device, typically constructed of an electrically non-conductive material, used to fasten a circuit board to the bottom, top, or side of a protective enclosure.

**Static Random Access Memory (SRAM):** A semiconductor RAM device in which the data will remain permanently stored as long as power is applied, without the need for periodically rewriting the data into memory.

**Symmetrically Addressable SIMM:** A SIMM, the memory content of which is configured as two independent banks. Each 16-bit wide bank contains an equal number of rows and columns and is independently addressable by the CPU via twin row address strobe registers in the DRAM controller.

**Synchronous Expansion Bus (SEB):** An extension of the local bus on some systems that is provided for the purpose of convenient interface with a user-designed peripheral board. The SEB operates at the speed of the CPU and provides an ISA-like interface to the SVGA, PCM ATA, keyboard/mouse, and IDE controllers.

**System Memory:** See *Conventional Memory*.

## U

**User Editable Drive (UED):** A feature of the Baby-AT baseboard's BIOS. When a "User" type hard disk drive setting shows in the IDE Adapter Sub-Menu the BIOS queries the hard disk drive for the purpose of retrieving disk geometry. If the hard disk drive is capable of providing this information, the BIOS uses it to automatically set up the drive for use with the system.

## V

**Video Graphics Adapter (VGA):** A popular PC graphics controller and display adapter standard developed by IBM. The standard specifies, among other things, the resolution capabilities of the display device. Display devices meeting the VGA standard must be capable of displaying a resolution of 640 horizontal pixels by 480 vertical pixels with 16 screen colors.

## W

**Wait State:** A period of one or more microprocessor clock pulses during which the CPU suspends processing while waiting for data to be transferred to or from the system data or address buses.

## X - Y - Z

**Xmodem:** A popular serial communication protocol which specifies, among other things, the size of data packets to be transmitted or received, and error correction methodology.