American Megatrends

Apollo

Pentium PCI ISA Motherboard

User's Guide

Limited Warranty

Limitations of Liability

Trademarks

Revision History

7/31/95	Initial release.
11/3/95	Corrections to the manual.
2/21/96	Corrections to the manual.

Table of Contents

Preface

To the OEM Thank you for purchasing the high performance American Megatrends Apollo Pentium PCI ISA motherboard. This product is a state of the art motherboard that includes the famous AMIBIOS. It is assumed that you have also licensed the rights to use the American Megatrends documentation for the American Megatrends Apollo motherboard

This manual was written for the OEM to assist in the proper installation and operation of this motherboard. This manual describes the specifications and features of the Apollo motherboard. It explains how to assemble a system based on the Apollo motherboard and how to use the AMIBIOS that is specifically designed for this motherboard.

This manual is not meant to be read by the computer owner who purchases a computer with this motherboard. It is assumed that you, the computer manufacturer, will use this manual as a sourcebook of information, and that parts of this manual will be included in the computer owner's manual.

Technical Support If an American Megatrends motherboard fails to operate as described or you are in doubt about a configuration option, please call technical support at 770-246-8645.

Precautions Against Static Electricity

Static electricity can damage the motherboard and other computer components. Keep the motherboard in the anti-static bag until it is to be installed. Wear an anti-static wrist grounding strap before handling the motherboard. Make sure you stand on an anti-static mat when handling the motherboard.

Avoid contact with any component or connector on any adapter card, printed circuit board, or memory module. Handle these components by the mounting bracket.

Packing List

You should have received the following:

- an Apollo Pentium PCI ISA motherboard,
- several cables,
- a Warranty Card, and
- The *American Megatrends Apollo Pentium PCI ISA Motherboard User's Guide*.

Apollo Motherboard User's Guide

1   System Overview

The American Megatrends Apollo Pentium PCI ISA motherboard is a high performance motherboard with integrated PCI IDE and onboard I/O.

The Apollo Pentium PCI motherboard includes a low-voltage Intel Pentium® P54C CPU running at 100, 120, or 133 MHz. The Intel Triton chipset on the motherboard optimizes the PCI local bus interface, allowing the CPU to sustain the highest possible bandwidth at all times. This motherboard includes four PCI and four ISA expansion slots. Onboard I/O includes IDE on the PCI local bus, two serial ports, and a parallel port.

Apollo Dimensions

The Apollo Pentium PCI motherboard is approximately 8½ inches wide by 10.2 inches long (the standard mini Baby AT size with similar mounting holes).
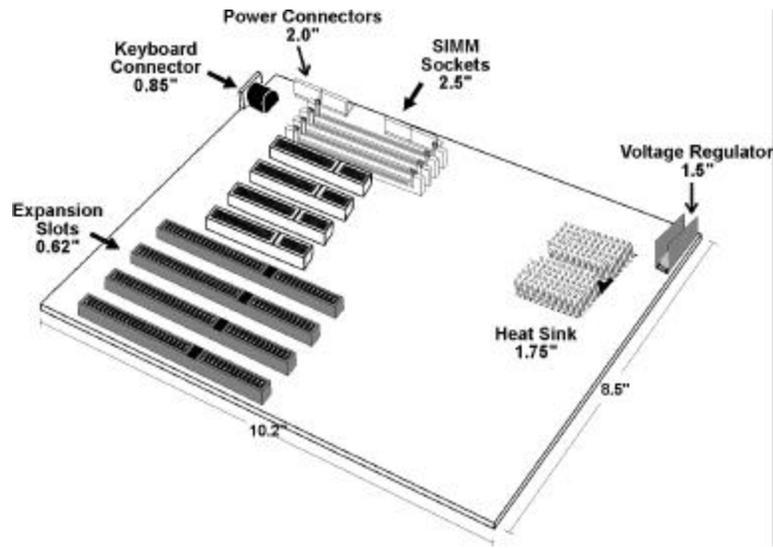
System Description

CPU Type   The Apollo Pentium PCI motherboard supports a 90, 100, 120, or 133 MHz Intel Pentium CPU in a single 320-pin ZIF socket.

CPU Type	CPU Speed	Host Clock Rate	PCI Clock Rate
P54C	100 MHz	50 MHz	25 MHz
P54C	100 MHz	66 MHz	33.33 MHz
P54C	90 MHz	60 MHz	30 MHz
P54CS	120 MHz	60 MHz	30 MHz
P54CS	133 MHz	66.66 MHz	33.33 MHz

The Apollo Pentium PCI motherboard includes Socket 5 support. The CPU speed is selected through jumper settings. CPU voltages are supported through a built-in voltage regulator.

Programmable Crystal Oscillator   The Apollo motherboard has a programmable crystal oscillator that supports all possible motherboard frequencies.

Supported CPU Voltages   This motherboard supports standard, VR, and VRE voltages. Voltages are selected through jumper settings.

CPU Cooling   A heat sink or a heat sink and fan are required for every Pentium CPU. If the motherboard is shipped with a 100 MHz, 120 MHz, or 133 MHz CPU, the heat sink and cooling fan are supplied with the motherboard.

> ### *Important*
>
> If you are installing the CPU, you must make sure that adequate cooling is provided. See the CPU manufacturer's instructions.

System Description, Continued

Cache Memory The Apollo Pentium PCI motherboard supports 256 KB or 512 KB of L2 secondary cache memory. External cache memory is Write-through/Write-back. Asynchronous cache memory is supported. 3-2-2-2 and 4-3-3-3 Burst Read/Write is supported with asynchronous secondary cache memory.

The Pentium CPU includes 16 KB of L1 internal cache memory. Internal cache memory is Write-back/Write-through.

Cache Memory Type	Cache Memory Size	Maximum System Memory Cached
L1 Internal	16 KB	128 MB
L2 Secondary	256 KB	64 MB
L2 Secondary	512 KB	128 MB

Cache Access Times The access times for L2 secondary cache memory are:

Host Clock Rate	Asynchronous SRAM Access Time
50 MHz	15 ns
60 MHz	15 ns
66.66 MHz	15 ns

CMOS RAM The Apollo Pentium PCI motherboard has 128 bytes of nonvolatile CMOS RAM (NVRAM) to store system configuration information.

Real Time Clock The Apollo motherboard has a real time clock and CMOS RAM powered by an onboard 3V Lithium battery.

Important

The battery on the motherboard can explode if improperly installed. Handle the battery according to the battery manufacturer's instructions. Use only the recommended type of battery. Discard used batteries according to the battery manufacturer's instructions.

Main System Memory The Apollo Pentium PCI motherboard supports up to 128 MB of DRAM system memory in two memory banks mounted directly on the motherboard. Memory parity generation and memory parity checking are not supported.

With EDO (Extended Data Out) memory, 7-2-2-2 Burst Read page hit is supported. With standard memory, 7-3-3-3 Burst Read page hit is supported.

The memory sockets use SIMM (Single Inline Memory Modules) or DIMM (Dual Inline Memory Modules). Standard fast page mode or EDO memory types are supported and can be used together in the same memory bank.

SIMM Types The Apollo Pentium PCI motherboard supports EDO or fast page mode SIMMs operating at 70 ns (RAS access time). Memory must be populated two SIMMs at a time. The SIMMs can be single-sided or double-sided. Both x 32 and x 36 SIMMs are supported. The following SIMM types can be used:

- 512 KB x 32 (or 36),
- 1 MB x 32 (or 36),
- 2 MB x 32 (or 36),
- 4 MB x 32 (or 36),
- 8 MB x 32 (or 36), and
- 16 MB x 32 (or 36) SIMMs

Memory Restrictions The following restrictions apply to motherboard memory:

- System memory slots must be populated one bank at a time. Each bank of memory consists of two SIMM modules.
- The same type of SIMMs must be used within a bank of memory.

Description, Continued

System BIOS   The Apollo Pentium PCI motherboard system BIOS is mounted on a 128 KB x 8 32-pin flash ROM DIP. Boot block BIOS code is installed on the flash ROM so the BIOS code can be upgraded easily. The AMIBIOS on the Apollo motherboard:

- supports the Plug and Play 1.0A specification,
- provides PCI-PCI bridge support,
- provides DMI (Desktop Management Interface) support,
- provides PnP Device Initialization Manager (DIM) support,
- includes ATAPI support for IDE CD-ROM drives,
- provides APM (Advanced Power Management) support,
- allows you to boot the computer from a CD-ROM drive,
- provides ATA IDE Mode programming support,
- provides an icon in WINBIOS Setup that displays system information, and
- supports the Extended Capabilities Port (ECP) and Enhanced Parallel Port (EPP) specifications.

The system BIOS is stored at E0000h - FFFFFh and has a built-in WINBIOS Setup for system configuration. WINBIOS Setup has a graphical user interface that is extremely easy to use.

Expansion Slots   The Apollo Pentium PCI motherboard has four PCI expansion slots and four ISA expansion slots. The PCI bus and ISA bus are synchronous with the CPU clock speeds, as shown below:

CPU Speed	PCI Bus Speed	ISA Bus Speed
66.66 MHz	33.33 MHz	8.33 MHz
60 MHz	30.0 MHz	7.50 MHz
50 MHz	25.0 MHz	8.33 MHz

Description, Continued

I/O Capability   The Apollo Pentium PCI ISA motherboard accesses 16- or 8-bit I/O devices on the ISA bus and 32-bit devices on the PCI local bus.

PCI Local Bus   The Apollo Pentium PCI motherboard has four PCI expansion slots..

Keyboard and Mouse   The Apollo Pentium PCI motherboard has a standard six-pin DIN keyboard connector. The mouse connector is a five-pin Single Inline connector. A four-pin berg connector is provided on the motherboard to attach a keyboard lock cable.

Speaker   The motherboard has a standard speaker attachment.

CMOS RAM Drain   The motherboard includes a two-pin berg (JCP Password Clear) that can be shorted to drain all power from CMOS RAM. This jumper can be used if the computer is password-protected and the user has forgotten the password.

Fuse   The motherboard includes a resettable UL-rated fuse in the keyboard circuit.

3.3V Power   The Apollo Pentium PCI motherboard includes a 3.3V power supply connector and a 3.3V voltage regulator and heat sink onboard. Either one can be used to provide 3.3V power.

Onboard I/O Support

Onboard I/O   The Apollo Pentium PCI motherboard provides the following onboard I/O:

- two bus mastering IDE channels on the PCI local bus,
- one bidirectional parallel port with EPP (Enhanced Parallel Port) and ECP (Extended Capabilities Port) mode support with a DB25 connector,
- two serial ports with two 16550 UARTs and two DB9 connectors, and
- a standard shrouded 34-pin floppy drive connector that supports 1.2 MB, 1.44 MB, and 2.88 MB floppies. Vertical recording is supported on 2.88 MB floppy drives.

Onboard IDE   The two onboard IDE controllers are on the PCI local bus. The IDE controllers support IDE Modes 0, 1, 2, 3, and 4 and up to four IDE drives. Two standard 40-pin IDE connectors are on the motherboard. IDE bus mastering, 32-bit transfer, LBA mode, and fast ATA are supported. The cycle times for the IDE modes are:

IDE Mode	Cycle Time (in nanoseconds)
0	600
1	383
2	240
3	180
4	120

Onboard NS16550s   The Apollo motherboard has two National Semiconductor NS16550 UARTs for serial port, which provide enhanced serial port features.

Floppy Drive Support   The motherboard supports up to two floppy drives (720 KB, 1.44 MB, and 2.88 MB 3½" drives and 1.2 MB 5¼" drives).

Cont'd

Memory Addresses The motherboard uses 32-bit memory addresses to access 4 gigabytes of memory address space on the PCI expansion slots. The ISA expansion slots use the 16-bit memory addresses to access up to 16 MB.

I/O Channel Check The motherboard supports the use of the I/O channel check to generate NMIs.

I/O Address Space The Apollo Pentium PCI motherboard uses I/O addresses 0100h through 03FFh for ISA-compatible I/O.

Seven DMA Channels The motherboard has seven DMA channels. Any DMA channel can be set for 8 or 16-bit DMA device sizes.

Fifteen Interrupt Levels The NMI takes precedence over all 15 hardware interrupts.

Priority	Label	Typical Interrupt Source
1	IRQ 0	Interval Timer 1, Counter 0 OUT
2	IRQ 1	Keyboard
3-10	IRQ 2	Used internally for IRQ 8 through IRQ 15
3	IRQ 8	Real-Time-Clock
4	IRQ 9	PCI/PnP or ISA
5	IRQ 10	PCI/PnP or ISA
6	IRQ 11	PCI/PnP or ISA
7	IRQ 12	Onboard PS/2 Mouse *or* PCI/PnP or ISA
8	IRQ 13	Coprocessor Error (internal)
9	IRQ 14	Hard disk drive, local bus IDE controller, or PCI/PnP. or ISA
10	IRQ 15	PCI/PnP or ISA
11	IRQ 3	Serial Port 2, PCI/PnP, or ISA
12	IRQ 4	Serial Port 1, PCI/PnP, or ISA
13	IRQ 5	Parallel Port 2, PCI/PnP or ISA
14	IRQ 6	Floppy disk controller
15	IRQ 7	Parallel Port 1, PCI/PnP or ISA

Green PC Features

The American Megatrends Apollo Pentium PCI motherboard has been designed with the EPA Green PC specifications in mind. The Green PC features include:

- flash BIOS write protection,
- flash BIOS programming,
- SMI support,
- APM support,
- stop clock support, and
- Sleep Mode, which allows the system to go to a low power consumption mode of operation when the PC is idle.

Compliance with EPA Green PC Specifications

To meet the Green PC specifications, a computer system must be able to enter an idle state (Sleep Mode) that reduces the total system power use to 30 watts or less on the input - AC side. The monitor and printer must also use no more than 30 watts.

Responsibility The system integrator is ultimately responsible for meeting all Green PC specifications and performing the tests necessary to obtain Energy Star approval.

The motherboard is only one component in the system. Other components have a major impact on system power use.

Green PC Implementation Disclaimers

Green PC Responsibility   The system integrator must be responsible for Green PC compliance.

American Megatrends has simply supplied the means to meet the Green PC requirements and cannot be held responsible for final system assembly.

Disabling Sleep Mode   If a computer will be running an application that requires long periods of CPU activity with no input from the keyboard, mouse, COM1, or COM2, Sleep Mode should be disabled in WINBIOS Setup.

If Sleep Mode is not disabled, the system will switch to Sleep Mode and the system performance will be greatly decreased. Some examples of such applications are: file servers, CAD systems, software compilers, screen savers, and many more.

No Need for Screen Savers

> ### *Important*
>
> *Screen saver software should not be used with Sleep Mode enabled.*

Sleep Mode serves the same purpose as a screen saver and obviates the need for a screen saver.

2   PCI Local Bus

The Apollo motherboard conforms to the PCI Version 2.0 specification. This motherboard has expansion slots for four PCI adapter cards. The PCI slots are automatically configured by the WINBIOS system BIOS.

PCI is a specification for a local bus standard. The PCI specification also provides the electrical specifications for peripheral chip makers and the logic requirements for a PCI Controller. While PCI defines a local bus standard, it also defines a standard component-level interface. PCI is a common I/O component interface.

The motherboard conforms to the Intel PCI specifications. The PCI Local Bus Specification is a standard set of interface, architecture, timings, electrical, and physical specifications that permit all PCI local bus products to be totally interchangeable. PCI is a multiplexed extension of the CPU bus. In PCI, the CPU bus control mechanisms have been extended to optimize I/O support. PCI establishes a local bus standard where a large variety of I/O components can be directly connected without using any glue logic.

What PCI Accomplishes   PCI is a way to physically interconnect highly integrated peripheral components and processor/memory systems.

PCI Features   Up to ten PCI loads can be used in the same system on the PCI bus, including the PCI Controller and an expansion bus controller for computers based on the EISA, ISA, or MCA® architectures. PCI decouples the CPU from the expansion bus, works at 30 or 33 MHz, and uses a 32-bit data connection path to the CPU.

Cont'd

PCI Features   PCI:

- is processor-independent,
- has a multiplexed address, command, and data bus and supports burst mode operation on reads and writes,
- runs synchronous with the CPU at speeds up to 33 MHz,
- has a maximum data transfer rate of 120 MBs (with a peak rate of 132 MBs on a 32-bit data path),
- has low latency for random accesses (about 60 ns write access latency) to slave registers from a PCI bus master on the PCI bus,
- is capable of full concurrency with the processor and PCI bus masters,
- has full multimaster capability, allowing any PCI Master peer-to-peer access to any PCI slave,
- has hidden and overlapped central arbitration,
- has a low pin count (master - 47; slave - 45),
- has address and data parity, and
- uses three physical address spaces: 32-bit memory, 32-bit I/O, and a 256 byte-per-agent configuration space.

Buffered Reads and Writes The PCI Controller buffers reads and writes between the memory/CPU and PCI peripheral devices.

PCI Component Classes PCI components must be one of three classes: bus master, slave, or master/slave combination.

Bus Mastering PCI devices can be bus masters, slaves, or a combination of bus master and slave.

Concurrent Operation The CPU in a PCI system runs concurrently with PCI bus mastering peripherals.

Although bus mastering peripheral devices are arbitrated, significant data transfer rate improvements can be achieved without splitting resource utilization between the CPU and a bus mastering device.

Peripheral devices can operate at speeds up to 33 MHz in a PCI environment.

Burst Mode The PCI specification also provides for burst mode of any length for both reads and writes.

Multiplexing PCI is a multiplexed bus. Multiplexing allows more than one signal to be sent on the same electrical path.

The control mechanisms have been modified and extended to optimize I/O support.

PCI Adapter Cards The Apollo Pentium PCI Pentium motherboard has four PCI expansion slots. The PCI expansion slots can accept any adapter card that complies with the PCI Revision 2.0 specification.

All PCI expansion slots are bus mastering slots.

3　Installation

Installation Steps

The steps for assembling a system that uses the Apollo Pentium PCI motherboard are shown in the following table. Each step is discussed in detail in the following pages.

Step	Action	Turn to
1	Unpack the motherboard	Page 17
2	Set jumpers.	Page 19
3	Install memory	Page 22
4	Install motherboard	Page 28
5	Connect the power supply	Page 30
6	Connect the keyboard	Page 32
7	Connect the mouse	Page 33
8	Connect cables	Page 34
9	Connect onboard I/O	Page 37
10	Install floppy disk drives	Page 39
11	Install IDE hard disk drives	Page 40
12	Install riser card and adapter cards	Page 43
13	Test and configure	Page 44

STOP

Warning

This motherboard contains sensitive electronic components which can be easily damaged by static electricity. Follow the instructions carefully to ensure correct installation and to avoid static damage.

Apollo Motherboard Layout
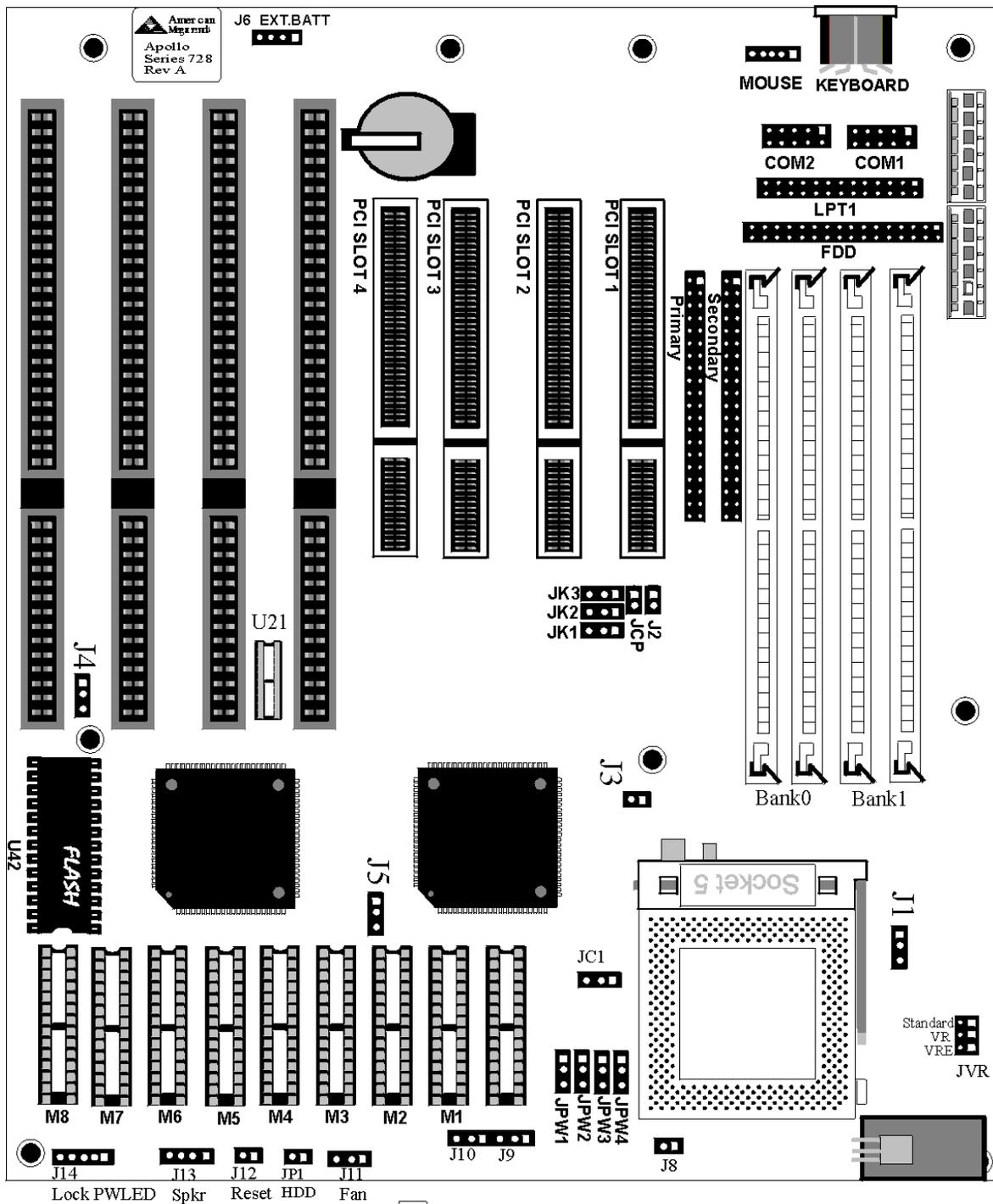
A Square Pad ☐ identifies Pin 1
in Jumpers and Connectors.

Step 1 Unpack the Motherboard

Step	Action
1	Inspect the cardboard carton for obvious damage. If damaged, call 770-246-8645. Leave the motherboard in its original packing.
2	Perform all unpacking and installation procedures on a ground-connected anti-static mat. Wear an anti-static wristband grounded at the same point as the anti-static mat. Or use a sheet of conductive aluminum foil grounded through a 1 megohm resistor instead of the anti-static mat. Similarly, a strip of conductive aluminum foil wrapped around the wrist and grounded through a 1 megohm resistor serves the same purpose as the wristband.
3	Inside the carton, the motherboard is packed in an anti-static bag, and sandwiched between sheets of sponge. Remove the sponge and the anti-static bag. Place the motherboard on a grounded anti-static surface component side up. Save the original packing material.
4	Inspect the motherboard for damage. Press down on all ICs mounted in sockets to verify proper seating. Do not apply power to the motherboard if it has been damaged.
5	If the motherboard is undamaged, it is ready to be installed.

Step 2 Set Jumpers

A jumper is a component on the motherboard with two to six pins rising from it. A shorting bridge is designed to fit on two of the jumper pins. You should have a supply of shorting bridges. Configure motherboard features by arranging the shorting bridges on the jumpers, or by removing the shorting bridge entirely.

When the jumper has no shorting bridges installed on it, it is said to be OPEN. The jumper descriptions instruct you to short Pins 1-2 or Pins 3-4, etc. Pin 1 is always identified by a "1" printed on the motherboard. Pins are numbered consecutively.

> ### *Important*
>
> Do not change any jumper settings that are not described in this manual. The Apollo motherboard has more jumpers than are described in this section. Changing undocumented jumpers may cause unpredictable results.

Set all user-configurable jumpers and switches and install the CPU before placing the motherboard in the chassis. The jumpers are:

Jumper	Description
J1	Internal Caching Method
J2	Display Type
J4	Flash ROM Power Supply
J12	Hardware Reset
JCP	Clear CMOS RAM
J3	Processor Pipeline Mode
J8	Bus to Processor Speed Ratio
JVR	Processor Voltage
JK3	Processor Clock Rate
JK2	Processor Clock Rate
JK1	Processor Clock Rate
J5	ISA Bus Clock Rate

J1 Caching Method J1 is a three-pin berg. Short pins 1-2 to select Write-Through caching, as shown below:
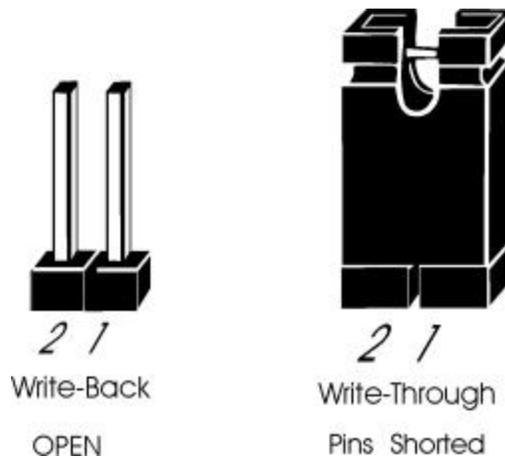
Leave J1 OPEN to select Write-Back caching (this is the factory setting). See the drawing on page 16 for the J1 location.

J2 Display Type   J2 is a two-pin single-inline berg.

Short pins 1-2 of J2 if using a CGA monitor.

Leave J2 OPEN (the factory setting) if using a monochrome, EGA, or VGA monitor. See the drawing on page 16 for the J2 location.

J4 Flash ROM Power J4 is a three-pin berg that selects the type of power provided to the Flash ROM.

Short pins 1-2 to select +12V.

Short Pins 2-3 to select +5V (the factory setting). See the drawing on page 16 for the J4 location.

J12 Hardware Reset J12 is a two-pin single-inline berg. Short J12 to reset the system.

J3 CPU Pipeline Mode J3 is a two-pin single-inline berg.

Short J3 to enable CPU pipeline mode (factory setting).

Leave J3 OPEN to disable CPU pipeline mode. See the drawing on page 16 for the J3 location.

JCP Memory Drain JCP is a two-pin single-inline berg. In normal operation, JCP is OPEN. Short pins 1-2 to drain all power CMOS RAM. Use this technique to remove a password that the user cannot remember. See the drawing on page 16 for the JCP location.

Step	Action
1	Turn power off.
2	Place a shorting bridge on JCP for several seconds to quickly drain CMOS RAM power.
3	Turn the power on for five seconds.
4	Turn power off again.
5	Remove the shorting bridge from JCP.
6	Turn power on again and boot the computer normally.
7	Press <Del> to run WINBIOS Setup. Load the Optimal default settings by clicking on the Optimal icon on the WINBIOS Setup screen (see page 47).
8	Modify the WINBIOS Setup Standard Setup, Advanced Setup, Chipset Setup, Power Management Setup, and Peripheral Setup options as appropriate.
9	Choose *Save and Exit* when leaving WINBIOS Setup.

J8 Bus/CPU Speed Ratio J8 is a two-pin berg that specifies the ratio between the PCI Local bus frequency and the CPU frequency.

Short Pins 1-2 to specify a 1:2 ratio.

Leave J8 OPEN to specify a 3:2 ratio. See the drawing on page 16 for the J8 location.

JVR CPU Voltage JVR is a six-pin berg that specifies the CPU voltage.

CPU Voltage	Voltage Standard	JVR Setting
3.3V	Standard	Short Pins 1-2.
3.45V	VR	Short Pins 3-4.
3.6V	VRE	Short Pins 5-6.

Cont'd

JK3, JK2, JK1 CPU Speed JK3, JK2, and JK1 are three-pin bergs that together select the CPU clock speed.

Jumper	50 MHz	60 MHz	66 MHz
JK3	Short Pins 2-3	Short Pins 1-2 (Factory setting)	Short Pins 1-2
JK2	Short Pins 1-2	Short Pins 1-2 (Factory setting)	Short Pins 2-3
JK1	Short Pins 2-3	Short Pins 1-2 (Factory setting)	Short Pins 2-3

J5 Bus Clock   J5 is a three-pin berg that sets the bus clock speed.

CPU Type	Clock	J5 Setting
Intel P54C A80502-75	PCLK/3	Short Pins 1-2
Intel P54C A80502-90 Intel P54C A80502-100	PCLK/4	Short Pins 2-3
Intel P54CQS A80502-120	PCLK/4	Short Pins 2-3

Step 3 Install Memory

The main memory subsystem on the Apollo Pentium PCI motherboard has four 32-bit SIMM (Single Inline Memory Module) memory sockets arranged in two memory banks. The motherboard supports 8 to 128 MB of onboard system memory. You can use:

- 1 MB x 32 or 36,
- 4 MB x 32 or 36,
- 8 MB x 32 or 36,
- 16 MB x 32 or 36, or
- 32 MB x 32 or 36 SIMMs.

The motherboard supports banks of fast page mode and EDO (Extended Data Out) memory together operating at 60 ns or 70 ns.

Memory Configuration The Apollo Pentium PCI motherboard supports the following onboard system memory configurations:

Bank0	Bank0	Bank1	Bank1	Total Memory
4 MB	4 MB	None	None	8 MB
4 MB	4 MB	1 MB	1 MB	10 MB
8 MB	8 MB	None	None	16 MB
8 MB	8 MB	1 MB	1 MB	18 MB
8 MB	8 MB	4 MB	4 MB	24 MB
8 MB	8 MB	8 MB	8 MB	32 MB
16 MB	16 MB	1 MB	1 MB	34 MB
16 MB	16 MB	4 MB	4 MB	40 MB
16 MB	16 MB	8 MB	8 MB	48 MB
16 MB	16 MB	8 MB	8 MB	64 MB
32 MB	32 MB	None	None	64 MB
32 MB	32 MB	1 MB	1 MB	66 MB
32 MB	32 MB	4 MB	4 MB	72 MB
32 MB	32 MB	8 MB	8 MB	80 MB
32 MB	32 MB	16 MB	16 MB	96 MB
32 MB	32 MB	32 MB	32 MB	128 MB

Memory System memory is reported by AMIBIOS as it boots and again when the AMIBIOS System Configuration Screen is displayed. Memory displayed on the System Configuration Screen is 384 KB less than the total memory installed.

Selecting SIMMs The SIMM specifications are:

Parameter	Specification
Page Mode	FAST
Refresh	CAS before RAS
t_{CAC}	≤ 20 ns
t_{RAC}	≤ 80 ns
t_{AA}	≤ 45 ns
t_{RP}	70 ns
t_{CPA}	≤ 45 ns

SIMM Part Numbers

Type	Manufacturer	Part Number
256 KB x 36	Micron®	MT9D25636M-7
	Mitsubishi®	MH26636BJ-7
	Motorola®	MCM36256S-70
	Oki®	MSC2320A-70YS9
	PNY®	P36256-70
	Samsung®	KMM536256B-7
1 MB x 36	Micron	MT12D136M-7
	Mitsubishi	MH1M36ADJ-7
	PNY	P361000-70
	Motorola	MCM36100AS-70
	Oki	MSC2355-70YS12
	Samsung	KMM5361000AV-7
4 MB x 36	Micron	MT12D436M-7
	Mitsubishi	MH4M36SAJ-7
	Motorola	MCM36400S-70
	PNY	P364000-70
	Samsung	KMM5364100-7
8 MB x 36	Motorola	MCM36800S-70
	PNY	P368000-707
	Samsung	KMM5368100-7

Cont'd

Installing SIMMs There are four x 36 SIMM sockets located on the Apollo motherboard. These sockets can be filled with either 256 KB x 32 or 36, 1 MB x 32 or 36, 4 MB x 32 or 36, 8 MB x 32 or 36, or 16 MB x 32 or 36 SIMMs.

Place the motherboard on an anti-static mat. With the component side of the SIMM facing you, firmly push the SIMM into the socket at an angle, then push it up. When properly inserted, the SIMM clicks into place as the latching pins engage. The SIMM installation process is shown below:
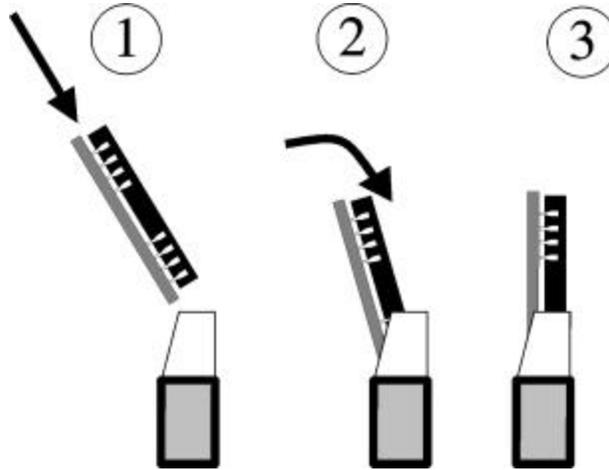

A SIMM looks like this:
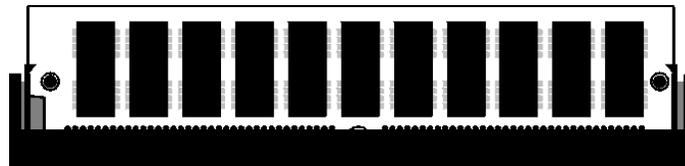
Step 4 Install the CPU

The CPU may already be installed in the motherboard. Follow the procedures in this step to install the CPU if it is not present or to replace a defective CPU. The ZIF (zero insertion force) CPU socket is near one edge of the motherboard, as shown on the drawing on page 16.

> **STOP**
>
> *Warning*
>
> *Improper CPU installation can damage the CPU and the motherboard. You must follow the procedures in this section exactly as documented. Make sure you wear an antistatic wristband while installing the CPU. Follow all antistatic procedures.*

Step	Action
1	Lift the lever on the ZIF socket. The empty CPU socket looks like this.

Step	Action
2	Pin 1 of the socket has a white diagonal line across one corner on the motherboard, which corresponds to pin 1 of the CPU. Check for bent pins on the CPU. Gently straighten any bent pins with pliers. Place the CPU in the middle of the socket, as shown below. Make sure that pin 1 of the CPU is aligned with pin 1 of the socket. *Make sure you are properly grounded while handling the CPU.*
3	Complete installation by lifting the ZIF lever to the other side of the socket, as shown below.
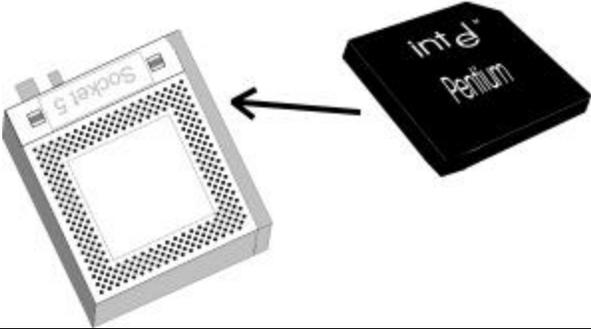
Step 5 Install the Motherboard

The motherboard mounting hole pattern is the same as the mounting hole pattern on the standard mini Baby AT motherboard. Standoffs and mounting screws are not supplied with the motherboard. The chassis manufacturer should supply these parts.

| Step	Action
1	Place the chassis on an anti-static mat. Connect the chassis to ground to avoid static damage during installation. Connect an alligator clip with a wire lead to any unpainted part of the chassis. Ground the other end of the lead at the same point as the mat and the wristband.
2	Rotate the chassis so that the front is to the right, and the rear is to the left. The side facing you is where the motherboard is mounted. The power supply is mounted at the far end of the chassis.
3	Hold the motherboard, component-side up, with the edge with the SIMM sockets toward you and the edge with the power supply connector away from you. The keyboard, mouse, and video connectors should be to the left.
4	Carefully slide the motherboard into the chassis. Make certain that the edge connectors fit the ports in the rear of the chassis. The motherboard should rest level with the chassis.
5	Place the mounting screws in the holes provided for them and tighten them. If necessary, shift the motherboard slightly to align the mounting holes on the motherboard with the holes on the chassis. See the drawing on the next page.

STOP

Warning

If using metallic screws, make sure that you use them only in the plated mounting holes.

If using metallic screws, make sure that the head of the screw fits completely inside the plated mounting holes. See the graphic on the following page.
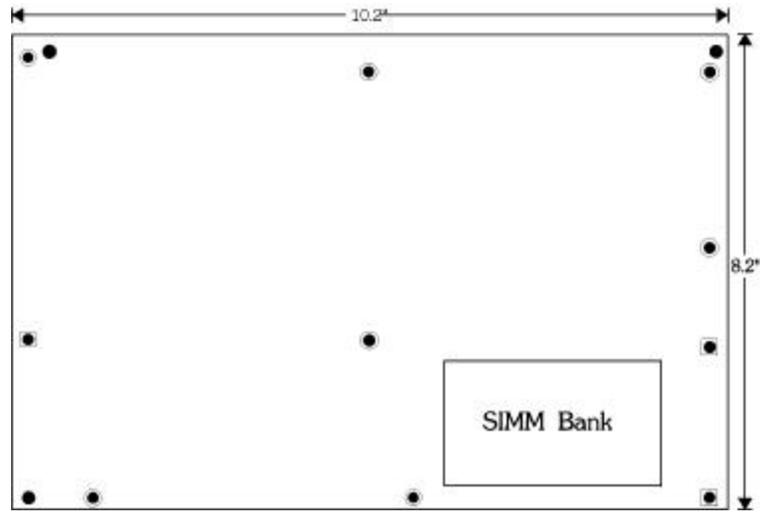
Step 6 Connect the Power Supply

The power supply should match the physical configuration of the chassis. Make sure that the power switch is Off before assembly.

Before attaching all components, make sure that the proper voltage has been selected. Power supplies often can run on a wide range of voltages and must be set (usually via a switch) to the proper range. Use at least a 200 watt power supply, which should have built-in filters to suppress radiated emissions.

**Connect Power Cables** Attach the power supply cables to the power connector (CN1) on the motherboard. AT-compatible power supplies have two six-pin connectors, attached as shown below. The six-pin connector on the power cable with three red wires and two black wires is attached to CN1 Pins 7-12. The other connector on the end of the power cable is attached to CN1 pins 1-6.
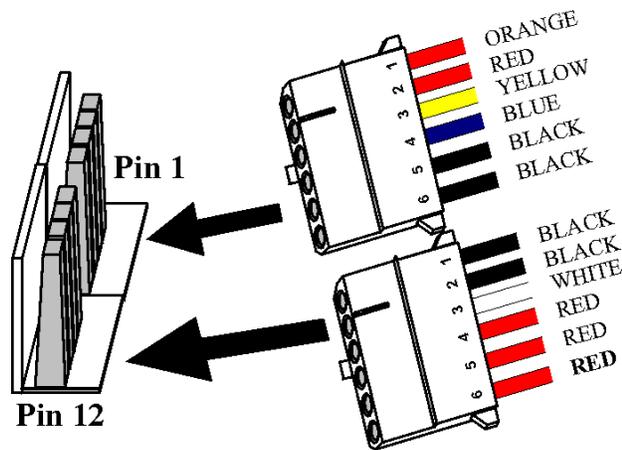
Power Supply Connector

Connector Keys   The keys on the connector must be cut to fit on some power supplies, as shown below.
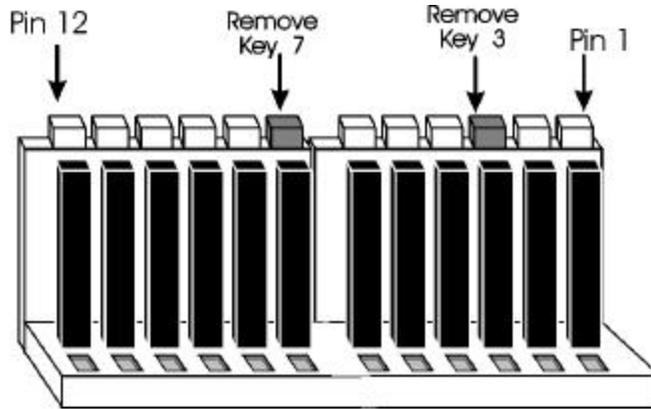
CN1 Pinout

Pin	Description
1	Power Good (Orange wire) (Not used)
2	VCC (Red wire)
3	+12 Volts (Yellow wire)
4	-12 Volts (Blue wire)
5	Ground (Black wire)
6	Ground (Black wire)
7	Ground (Black wire)
8	Ground (Black wire)
9	-5 Volts (White wire)
10	VCC (Red wire)
11	VCC (Red wire)
12	VCC (Red wire)

## Step 7 Connect the Keyboard Cable

The keyboard attaches via a standard six-pin DIN keyboard connector (CN2).

Pin	Assignments
1	Keyboard data
2	N/C
3	Ground
4	Vcc
5	Keyboard clock
6	N/C

Step 8 Connect the Mouse Cable

Attach the mouse connector cable supplied by American Megatrends to the five-pin mouse berg connector on the motherboard, as shown below. Attach the standard 9-pin mouse connector at the other end of the mouse cable to the mouse connector port on the computer case. Incorrect mouse installation can cause the system to hang.
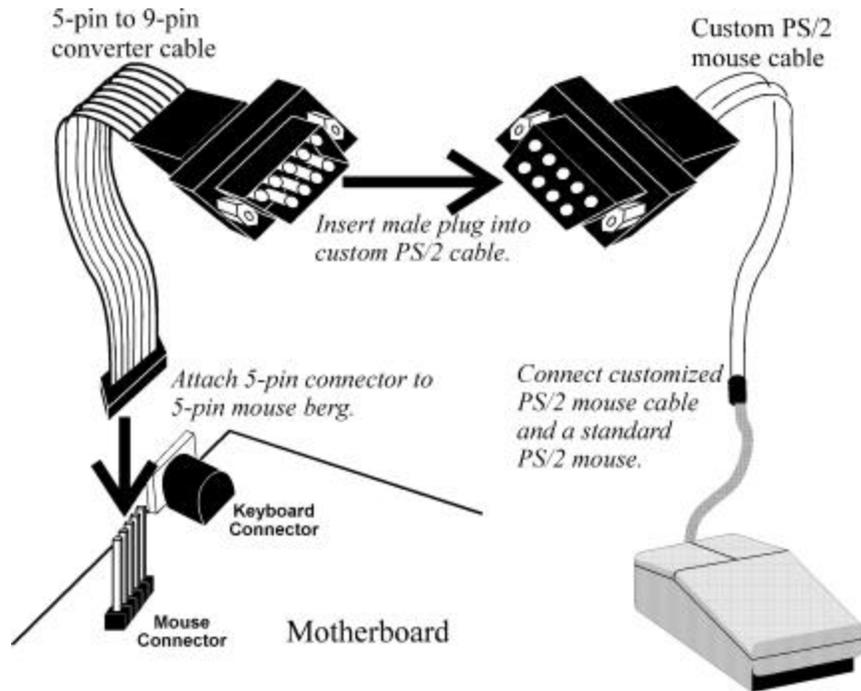
The motherboard mouse connector and cable connector pinouts are:

Motherboard Mouse Connector Pins	Pin Assignments	Corresponding Cable Connector Pins
1	Mouse data	9
2	N/C	6
3	Ground	5
4	Vcc (+5V)	8
5	Mouse clock	1

Step 9 Connect Cables

 When connecting chassis connectors to the motherboard, make sure to connect the correct connector end. Most connector wires are color-coded. Match the color of the wires leaving the switch or LED to the same pin on the connector end. There may be more than one connector with the same color-coded wires. If so, follow the wire to the switch or LED. Pin 1 is always indicated on the motherboard, as shown below:
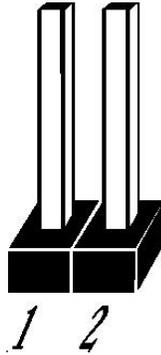
List of Connectors The following cables should be connected to the motherboard:

- CPU fan cable to J11,
- (optional) external battery to J6,
- Reset Switch cable to J12,
- Speaker cable to J13,
- Keyboard Lock Power LED cable to J14
- IDE LED Activity Indicator LED cable to JP1.

J11 CPU Fan   J11is a three-pin berg that attaches to the CPU fan.

Pin	Description
1	Ground
2	+12V
3	Ground

Cont'd

J6 External Battery You can optionally attach an external battery to J6 if you do not want to use the onboard battery.

The onboard battery is automatically disconnected if you attach an battery to J6. J6 is a four-pin berg.

J12 Reset   J12 is a two-pin single-inline berg that is attached via a cable to an externally-mounted reset switch.

When the reset switch is pressed, the system performs a hard reset. Pin 1 is ground and Pin 2 is Hard Reset.

Speaker Connector (J13) J13 is a four-pin single-inline berg that is optionally attached via a cable to a standard system speaker. AMIBIOS signals hardware problems through the speaker. Pin 1 on the motherboard is identified by the arrow on the white box around the berg. The Apollo Pentium PCI motherboard also has a built-in speaker mounted on the motherboard.

Pin	Description
1	Data Out
2	Ground
3	N/C
4	VCC

Cont'd

Keyboard Lock (J14) J14 is a five-pin single-inline berg that is attached via a cable to the keyboard lock connector. The computer chassis may not include the keyboard lock and Power LED on a single connector. The keyboard lock allows the user to lock the keyboard. Pin 1 on the motherboard is identified.

Pin	Description
1	LED power
2	LED power
3	Ground
4	Keyboard Lock
5	Ground

IDE Indicator LED (JP1) JP1 is a two-pin berg that is attached via a cable to the externally-mounted IDE Activity LED. This LED lights when the IDE drive is running.

STOP

Warning

In some IDE drives, you may have to disable the IDE LED mounted on the drive by changing a jumper or setting a switch on the IDE drive itself, before the IDE drive sends a signal to this berg.

Step 10 Connect Onboard I/O

Onboard Adapters The Apollo Pentium PCI motherboard has:

- two serial ports,
- a parallel port,
- an IDE controller on the PCI bus (Primary drive and Secondary drive, and
- a floppy connector.

The serial and parallel port connectors are described below. The IDE connector is described on page 41. The floppy connector is described on page 39.

Conflicts AMIBIOS minimize conflicts between onboard and offboard I/O devices.

AMIBIOS automatically checks the adapter cards installed in the expansion slots on the Apollo motherboard for a hard disk or floppy controller and serial or parallel ports.

COM1 and COM2 These are 10-pin bergs that provide an AT-compatible serial port interface. The serial port pinouts are:

Pin	Signal Description
1	Carrier Detect
2	Receive Data
3	Transmit Data
4	Data Terminal Ready
5	Ground
6	Data Set Ready
7	Request to Send
8	Clear to Send
9	Ring Indicator

Cont'd

LPT1   The parallel port connector is a 26-pin berg. The pinout is shown below.

Pin	Signal Description
1	STROBE#
2	PD0
3	PD1
4	PD2
5	PD3
6	PD4
7	PD5
8	PD6
9	PD7
10	ACK#
11	BUSY
12	PE
13	SLCT
14	AUTOFD#
15	ERROR#
16	INIT#
17	SLCTIN#
18	Ground
19	Ground
20	Ground
21	Ground
22	Ground
23	Ground
24	Ground
25	Ground

Cont'd

Step 11 Install Floppy Drive

Floppy Connector The floppy drive connector is labeled FDD on the motherboard. It is a 34-pin dual-inline berg. Connect the cable from the floppy drive as shown below. The onboard floppy controller cannot be used if a hard disk adapter card with floppy controller is installed.

The motherboard supports up to two 720 KB, 1.44 MB, or 2.88 MB 3½" drives and 360 KB and 1.2 MB 5¼" drives. The connecting cable is a 34-pin ribbon connector with two 34-pin edge connectors for attaching the floppy disk drives. There is a small twist in the cable between the floppy connectors. The last (end) connector should be connected to floppy drive A: as shown below.

Floppy Connector Pinout

Pin	Signal Description	Pin	Signal Description
1	GND	2	DENSE1
3	GND	4	N/C
5	GND	6	DRATE0
7	GND	8	-INDEX
9	GND	10	-MOTOR0
11	GND	12	-FDSEL1
13	GND	14	-FDSEL0
15	GND	16	-MOTOR1
17	GND	18	DIR
19	GND	20	-STEP
21	GND	22	-WDATA
23	GND	24	-WGATE
25	GND	26	-TRK0
27	GND	28	-WRPROT
29	GND	30	-RDATA
31	GND	32	HDSEL
33	GND	34	DSKCHNG

Twist in Floppy Cable

Floppy B to A	Floppy B to A	Floppy B to A	Floppy B to A
10 to 16	12 to 14	14 to 12	16 to 10
11 to 15	13 to 13	15 to 11	

Step 12 Install Hard Disk

Attach IDE Cable This motherboard has two IDE (Integrated Drive Electronics) connectors. The primary connector (CN11) is labeled PRIMARY. The secondary connector (CN9) is labeled SECONDARY. Both the primary master and the primary slave IDE drives must be connected by cable as shown below.
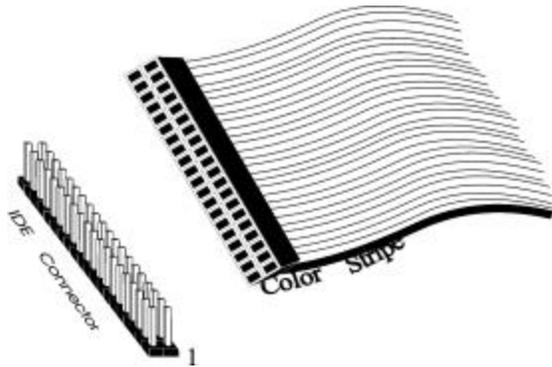
The IDE connectors are 40-pin dual-inline bergs. This motherboard supports IDE Modes 0, 1, 2, 3, and 4, IDE prefetch, LBA (Logical Block Address) mode, high capacity drives (over 528 MB), 32-bit data transfer, and fast IDE transfer. These IDE features are configured in Peripheral Setup in WINBIOS Setup.

Disable the onboard IDE interface in Peripheral Setup to use an ISA ESDI, RLL, MFM, or SCSI hard disk drive controller.

IDE Pinout   The IDE connector pinout is:

Pin	Signal Description	Pin	Signal Description
1	-RESET	2	GND
3	DATA7	4	DATA8
5	DATA6	6	DATA9
7	DATA5	8	DATA10
9	DATA4	10	DATA11
11	DATA3	12	DATA12
13	DATA2	14	DATA13
15	DATA1	16	DATA14
17	DATA0	18	DATA15
19	GND	20	KEY (N/C)
21	N/C	22	GND
23	-IOW	24	GND
25	-IOR	26	GND
27	IDERDY	28	ALE
29	N/C	30	GND
31	INT14	32	-IOCS16
33	HA1	34	N/C
35	HA0	36	HA2
37	-CS0	38	-CS1
39	-IDEACT	40	GND

Secondary IDE Controller The secondary IDE connector, is a 40-pin dual-inline berg that connects the secondary primary and slave IDE drives to the secondary onboard IDE controller.

Attach the secondary master and slave IDE drives via a standard 40-pin IDE cable as shown on page 41. The location of J10 is also shown on page 41.

Step 12 Install Hard Disk, Continued

IDE Pinout   The Secondary IDE connector pinout is:

Pin	Signal Description	Pin	Signal Description
1	-RESET	2	GND
3	DATA7	4	DATA8
5	DATA6	6	DATA9
7	DATA5	8	DATA10
9	DATA4	10	DATA11
11	DATA3	12	DATA12
13	DATA2	14	DATA13
15	DATA1	16	DATA14
17	DATA0	18	DATA15
19	GND	20	KEY (N/C)
21	N/C	22	GND
23	-IOW	24	GND
25	-IOR	26	GND
27	IDERDY	28	ALE
29	N/C	30	GND
31	INT15	32	-IOCS16
33	HA1	34	N/C
35	HA0	36	HA2
37	-CS2	38	-CS3
39	N/C	40	GND

Step 13 Install Adapter Cards

The Apollo Pentium PCI motherboard has four PCI expansion slots and four ISA expansion slots. PCI adapter cards are automatically configured by AMIBIOS.

The ISA expansion slots provide full compatibility with all IBM XT and AT-compatible adapter cards.

Step 14 Test and Configure

Review the following points before powering up:

- make sure that all adapter cards are seated properly,
- make sure all connectors are properly installed,
- if the upgrade processor is used, make sure it is seated properly,
- make sure there are no screws or other foreign material on the motherboard,
- plug the system into a surge-protected power strip, and
- make sure blank back panels are installed on the back of the chassis to minimize RF emissions.

Start the Test   Plug everything in and turn on the switch. If there are any signs of a problem, turn off the unit immediately. Reinstall the connectors. Call American Megatrends Technical Support at 770-246-8645 if there are problems.

BIOS Errors   If the system operates normally, a display should appear on the monitor. The BIOS Power On Self Test (POST) should execute.

If POST does not run successfully, it will beep or display error messages. Beeps indicate a serious problem with the system configuration or hardware. The Beep Code indicates the problem. AMIBIOS Beep Codes are defined in *the AMIBIOS Technical Reference.* Make sure the affected part is properly seated and connected. An error message is displayed if the error is less serious. Recheck the system configuration or the connections.

Configure the System Run WINBIOS Setup. You must enter the requested information and save the configuration data in CMOS RAM. The system will then reset, run POST, and boot the operating system. See page 48 for information on configuring the computer.

4   WINBIOS Setup

In ISA and EISA computers, the system parameters (such as amount of memory, type of disk drives and video displays, and many other elements) are stored in CMOS RAM. Unlike the DRAM (dynamic random access memory) that is used for standard system memory, CMOS RAM requires very little power. When the computer is turned off, a back-up battery provides power to CMOS RAM, which retains the system parameters. Every time the computer is powered-on, the computer is configured with the values stored in CMOS RAM by the system BIOS, which gains control when the computer is powered on.

The system parameters are configured by a system BIOS Setup utility. Historically, BIOS Setup utilities have been character-based, required keyboard input, and have had user interfaces that were not very intuitive.

New BIOS Setup Utility   American Megatrends has now made available a new type of system BIOS Setup utility. WINBIOS Setup has a graphical user interface that permits mouse access, and is so compact that it can reside on the same ROM as the system BIOS. The system configuration parameters are set via WINBIOS Setup.

Since WINBIOS Setup resides in the ROM BIOS, it is available each time the computer is turned on.

Starting WINBIOS Setup As POST executes, the following appears:

```
Hit <DEL> if you want to run SETUP
```

Press <Del> to run WINBIOS Setup.

Using a Mouse with WINBIOS Setup

WINBIOS Setup has a built-in mouse driver and can be accessed by either a serial mouse or PS/2-style mouse. WINBIOS Setup supports Microsoft-Compatible serial mice and all PS/2-type mice.

The mouse click functions are: single click to change or select both global and current fields and double-click to perform an operation in the selected field.

Using the Keyboard with WINBIOS Setup

WINBIOS Setup has a built-in keyboard driver that uses simple keystroke combinations:

Keystroke	Action
<Tab>	Change or select a global field.
<→, ←, ↑, ↓	Change or select the current field.
<Enter>	Perform an operation in the current field
+	Increment a value.
–	Decrement a value.
<Esc>	Abort any window function.
<PgUp>	Return to the previous page
<PgDn>	Advance to the next page.
<Home>	Returns to the beginning of the text.
<End>	Advance to the end of the text.
<Ctrl><Alt><+ >	Change to high speed
<Ctrl><Alt><->	Change to low speed.

WINBIOS Setup

The WINBIOS Setup main menu is organized into four sections. Each of these sections corresponds to a section in this chapter.

Each section contains several icons. Clicking on each icon activates a specific AMIBIOS function. The WINBIOS Setup main windows and related functions are described on the next page.

WINBIOS Setup Main Windows   The WINBIOS Setup main windows are:

- Setup, described in Section 1 on page 48, this section has up to six icons that permit you to set system configuration options such as date, time, hard disk type, floppy type, and many others parameters,
- Utilities, described in Section 2 beginning on page 64, has four icons that perform system functions,
- Security, described in Section 3 beginning on page 65, has two icons that control AMIBIOS security features, and
- Default, described in Section 4 beginning on page 68, this section has three icons that permit you to select a group of settings for all WINBIOS Setup options.

Section 1 Setup

Standard Setup

Standard Setup options are displayed by choosing the Standard icon from the WINBIOS Setup menu. All Standard Setup options are described below.

Date/Time   Select the Date/Time option to change the date or time. The current date and time are displayed. Enter new values through the displayed window.

Floppy Drive A, B   Choose the Floppy Drive A or B icon to specify the floppy drive type. The settings are *360 KB 5¼'*, *1.2 MB 5¼'*, *720 KB 3½*, *1.44 MB 3½*, or *2.88 MB 3½*.

Pri Master
Pri Slave
Sec Master
Sec Slave   Choose these icons to configure the hard disk drive named in the option. When you click on an icon, the following parameters are listed: Type, LBA/Large Mode, Block Mode, 32Bit Mode, and PIO Mode. All parameters relate to IDE drives except **Type.**

Configuring an MFM Drive   If configuring an old MFM hard disk drive, you must know the drive parameters (number of heads, number of cylinders, number of sectors, the starting write precompensation cylinder, and drive capacity). Choose **Type** and choose the appropriate hard disk drive type (1 - 46). The old MFM hard drive types are listed on page 51. If the drive parameters of your MFM drive do not match any drive type listed on page 51, select *User* in the **Type** field and enter the drive parameters on the screen that appears.

User-Defined Drive If you are configuring a SCSI drive or an MFM, RLL, ARLL, or ESDI drive with drive parameters that do not match drive types 1-46, you must select *User* in the **Type** field. You must then enter the drive parameters on the screen that appears. The drive parameters include:

- Cylinder (number of cylinders),
- Hd (number of heads),
- WP (starting write precompensation cylinder),
- Sec (number of sectors),
- Size (drive capacity).

Parameter	Description
Type	The number for a drive with certain identification parameters.
Cylinders	The number of cylinders in the disk drive.
Heads	The number of heads.
Write Precompensation	The size of a sector gets progressively smaller as the track diameter diminishes. Yet each sector must still hold 512 bytes. Write precompensation circuitry on the hard disk compensates for the physical difference in sector size by boosting the write current for sectors on inner tracks. This parameter is the track number where write precompensation begins.
Landing Zone	This number is the cylinder location where the heads will normally park when the system is shut down.
Sectors	The number of sectors per track. MFM drives have 17 sectors per track. RLL drives have 26 sectors per track. ESDI drives have 34 sectors per track. SCSI and IDE drives have more sectors per track.
Capacity	The formatted capacity of the drive is (Number of heads) x (Number of cylinders) x (Number of sectors per track) x (512 bytes per sector)

Standard Setup, Continued

Configuring IDE Drives   If the hard disk drive to be configured is an IDE drive, select the appropriate drive icon (Pri Master, Pri Slave, Sec Master, or Sec Slave). Choose the **Type** parameter and select Auto.

AMIBIOS automatically detects the IDE drive parameters and displays them. Click on the OK button to accept these parameters.

Click on **LBA/Large Mode** and choose *On* to enable support for IDE drives with capacities greater than 528 MB.

Click on **Block Mode** and choose *On* to support IDE drives that use Block Mode.

Click on **32Bit Mode** and click on *On* to support IDE drives that permit 32-bit accesses.

Click on **PIO Mode** to select the IDE Programmed I/O mode. The settings are *Auto, 0, 1, 2, 3, 4,* or *5.* Click on *Auto* to allow AMIBIOS to automatically choose the PIO mode that the IDE drive being configured uses. If you select *0-5* you must make absolutely certain that you are selecting the PIO mode supported by the IDE drive being configured.

Configuring a CD-ROM Drive Select the appropriate drive icon (Pri Master, Pri Slave, Sec Master, or Sec Slave). Choose the **Type** parameter and select CDROM.

Standard Setup, Continued

Hard Disk Drive Types

Type	Cylinders	Heads	Write Precompensation	Landing Zone	Sectors	Capacity
1	306	4	128	305	17	10 MB
2	615	4	300	615	17	20 MB
3	615	6	300	615	17	31 MB
4	940	8	512	940	17	62 MB
5	940	6	512	940	17	47 MB
6	615	4	65535	615	17	20 MB
7	462	8	256	511	17	31 MB
8	733	5	65535	733	17	30 MB
9	900	15	65535	901	17	112 MB
10	820	3	65535	820	17	20 MB
11	855	5	65535	855	17	35 MB
12	855	7	65535	855	17	50 MB
13	306	8	128	319	17	20 MB
14	733	7	65535	733	17	43 MB
16	612	4	0	663	17	20 MB
17	977	5	300	977	17	41 MB
18	977	7	65535	977	17	57 MB
19	1024	7	512	1023	17	60 MB
20	733	5	300	732	17	30 MB
21	733	7	300	732	17	43 MB
22	733	5	300	733	17	30 MB
23	306	4	0	336	17	10 MB
24	925	7	0	925	17	54 MB
25	925	9	65535	925	17	69 MB
26	754	7	754	754	17	44 MB
27	754	11	65535	754	17	69 MB
28	699	7	256	699	17	41 MB
29	823	10	65535	823	17	68 MB
30	918	7	918	918	17	53 MB
31	1024	11	65535	1024	17	94 MB
32	1024	15	65535	1024	17	128 MB
33	1024	5	1024	1024	17	43 MB
34	612	2	128	612	17	10 MB
35	1024	9	65535	1024	17	77 MB
36	1024	8	512	1024	17	68 MB
37	615	8	128	615	17	41 MB
38	987	3	987	987	17	25 MB
39	987	7	987	987	17	57 MB
40	820	6	820	820	17	41 MB
41	977	5	977	977	17	41 MB
42	981	5	981	981	17	41 MB
43	830	7	512	830	17	48 MB
44	830	10	65535	830	17	69 MB
45	917	15	65535	918	17	114 MB
46	1224	15	65535	1223	17	152 MB
	USER-DEFINED HARD DRIVE - Enter user-supplied parameters.					

Advanced Setup

Advanced Setup options are displayed by choosing the Advanced icon from the WINBIOS Setup main menu. All Advanced Setup options are described in this section.

Quick Boot Set this option to *Enabled* to instruct AMIBIOS to boot within five seconds after the computer is powered on. The settings are *Enabled* or *Disabled.* The default settings are *Enabled.*

BootUp Sequence This option sets the sequence of boot drives (floppy drive A:, hard disk drive C:, or a CD-ROM drive) that the AMIBIOS attempts to boot from after AMIBIOS POST completes. The settings are *C:,A:,CDROM, CDROM,C:,A:,* or *A:,C:, CDROM.*

The default settings are *C:,A:,CDROM.*

BootUp NumLock Set this option to *Off* to turn the Num Lock key off when the computer is powered on and booted so you can use the arrow keys on both the numeric keypad and the keyboard. The settings are *On* or *Off.* The default settings are *On.*

Floppy Drive Swapping Set this option to *Enabled* to permit drives A: and B: to be swapped. The settings are *Enabled* or *Disabled.* The default settings are *Disabled.*

Mouse Support When this option is set to *Enabled,* AMIBIOS supports a PS/2-type mouse. The settings are *Enabled* or *Disabled.* The default settings are *Disabled.*

Cont'd

Password Check This option enables password checking every time the computer is powered on or every time WINBIOS Setup is executed. If *Always* is chosen, a user password prompt appears every time the computer is turned on. If *Setup* is chosen, the password prompt appears if WINBIOS is executed. See page 65 for instructions on changing a password.

The Optimal and Power-On defaults are *Setup*.

OS/2 Compatible Mode Set this option to *Enabled* to permit AMIBIOS to run with IBM OS/2®. The settings are *Enabled* or *Disabled*. The default settings are *Disabled*.

Internal Cache This option specifies the caching algorithm used for L1 internal cache memory. The settings are:

Setting	Description
Disabled	Neither L1 internal cache memory on the CPU or L2 secondary cache memory is enabled.
WriteBack (default)	Use the write-back caching algorithm.
WriteThru	Use the write-through caching algorithm.

External Cache This option specifies the caching algorithm used for L2 secondary (external) cache memory. The settings are:

Setting	Description
Disabled	Neither L1 internal cache memory on the CPU or L2 secondary cache memory is enabled.
WriteBack (default)	Use the write-back caching algorithm.
WriteThru	Use the write-through caching algorithm.

System BIOS Shadow Cacheable   When this option is set to *Enabled,* the contents of the F0000h system memory segment can be read from or written to L2 secondary cache memory. The contents of the F0000h memory segment are always copied from the BIOS ROM to system RAM for faster execution.

The settings are *Enabled* or *Disabled.* The Optimal default setting is *Enabled.* The Fail-Safe default setting is *Disabled.*

C000,16K Shadow
C400,16K Shadow
C800,16K Shadow
CC00,16K Shadow
D000,16K Shadow
D400,16K Shadow
D800,16K Shadow
C000,16K Shadow These options control the location of the contents of the 16KB of ROM beginning at the specified memory location. The settings are:

Setting	Description
Shadow	The contents of C0000h - C3FFFh are written to the same address in system memory (RAM) for faster execution.
Cache	The contents of C0000h - C3FFFh are written to the same address in system memory (RAM) for faster execution. Also, the contents of the C0000h – C3FFFh RAM area can be read from and written to cache memory.
Disabled	The video ROM is not copied to RAM. The contents of the video ROM cannot be read from or written to cache memory.

The default setting is *Cache.*

Cont'd

Chipset Setup

Memory Hole   Use this option to specify an area in memory that cannot be addressed on the ISA bus. The settings are *Disabled, 512-640K,* or *15-16MB.* The default setting is *Disabled.*

DRAM Speed   Specify the RAS access speed of the SIMMs installed in the motherboard as system memory. The settings are *60ns* or *70 ns.* The default is *70ns.*

> ### *Caution*
>
> If you have installed SIMMs with different speeds in the motherboard, select the speed of the slowest SIMM.
>
> You must always use SIMMs that have the same speed within a memory bank.

Power Management Setup

Power Management Setup options are displayed by choosing the Power Mgmt icon from the WINBIOS Setup main menu. All Power Management Setup options are described in this section.

Power Management/APM Set this option to *Enabled* to enable the power management and APM (Advanced Power Management) features.

The settings are *Enabled* or *Disabled*. The default settings are *Disabled*.

Instant On Support Set this option to *Enabled* to allow the computer to go to full power on mode when leaving a low-power state. The settings are *Enabled* or *Disabled*. The default settings are *Disabled*.

Green PC Monitor Power State This option specifies the power management state that the Green PC-compliant video monitor enters after the specified period of display inactivity has expired. The settings are *Disabled, Off, Standby,* or *Suspend*. The default settings are *Disabled*.

Video Power Down Mode This option specifies the power management state that the video subsystem enters after the specified period of display inactivity has expired. The settings are *Disabled, Standby,* or *Suspend*. The default settings are *Disabled*.

Hard Disk Power Down Mode This option specifies the power management state that the hard disk drive enters after the specified period of display inactivity has expired. The settings are *Disabled, Standby,* or *Suspend*. The default settings are *Disabled*.

Power Management Setup, Continued

Hard Disk Timeout (Min) This option specifies the length of a period of hard disk inactivity. When this period expires, the hard disk drive enters the power-conserving mode specified in the **Hard Disk Power Down Mode** option described on the previous page. The settings are *Disabled, 1 Min (minutes),* and all one minute intervals up to and including 15 *Min.* The default settings are *Disabled.*

Standby to Suspend Timeout This option specifies the length of the period of system inactivity when the computer is already in Standby mode before the computer is placed in Suspend mode. In Suspend mode, nearly all power use is curtailed. The settings are *Disabled, 1 Min, 2 Min,* and all one minute intervals up to and including 15 *Min.* The default settings are *Disabled.*

Slow Clock Ratio This option specifies the speed at which the system clock runs in power saving modes. The settings are expressed as a ratio between the normal clock speed and the power down clock speed. The settings are *1:1, 1:2* (half as fast as normal), *1:4* (¼ the normal clock speed*), 1:8, 1:16, 1:32, 1:64,* or *1:128.* The default setting is *1:1.*

Display Activity This option specifies if AMIBIOS is to monitor activity on the display monitor for power conservation purposes. When this options set to *Monitor* and there is no display activity for the length of time specified in the value in **the Full-On to Standby Timeout (Min)** option, the computer enters a power saving state. The settings are *Monitor* or *Ignore.* The default settings are *Ignore.*

Cont'd

IRQ 3
IRQ 4
IRQ 5
IRQ 7
IRQ 9
IRQ 10
IRQ 11
IRQ 12
IRQ 13
IRQ 14
IRQ 15   These options enable event monitoring. When the computer is in a power saving mode, activity on the named interrupt request line is monitored by AMIBIOS. When any activity occurs, the computer enters Full On mode.

Each of these options can be set to *Monitor* or *Ignore.* The default setting for all options is *Ignore.*

PCI/PnP Setup

PCI/PnP Setup options are displayed by choosing the PCI/PnP Setup icon from the WINBIOS Setup main menu. All PCI/PnP Setup options are described in this section

Plug and Play Aware OS   Set this option to *Yes* if the operating system installed in the computer is Plug and Play-aware. Windows 95 is PnP-aware.

The settings are *No* or *Yes.* The default settings are *No.*

PCI Latency Timer (in PCI Clocks) This option sets latency on the PCI local bus. The settings are in units equal to PCI clocks. The settings are *32, 64, 96, 128, 160, 192, 224,* or *248.* The Optimal and Fail-Safe default setting is *64.*

PCI VGA Palette Snoop   This option must be set to *Enabled* if any ISA adapter card installed in the computer requires VGA palette snooping. The settings are *Disabled* or *Enabled.* The Optimal and Fail-Safe default settings are *Disabled.*

PCI IDE BusMaster Set this option to *Enabled* to specify that the IDE controller on the PCI local bus has bus mastering capability. The settings are *Disabled* or *Enabled.* The Optimal and Fail-Safe default settings are *Disabled.*

Offboard PCI IDE Card   This option specifies if an offboard PCI IDE controller adapter card is used in the computer. You must also specify the PCI expansion slot on the motherboard where the offboard PCI IDE controller card is installed. If an offboard PCI IDE controller is used, the onboard IDE controller on the motherboard is automatically disabled.

The settings are *Disabled, Auto, Slot1, Slot2, Slot3,* or *Slot4*. If Auto is selected, AMIBIOS automatically determines the correct setting for this option. The default settings are *Auto*.

Offboard PCI IDE Primary IRQ   This option specifies the PCI interrupt used by the primary IDE channel on the offboard PCI IDE controller. The settings are *Disabled, INTA, INTB, INTC,* or *INTD*. The default settings are *Disabled*.

Offboard PCI IDE Secondary IRQ This option specifies the PCI interrupt used by the secondary IDE channel on the offboard PCI IDE controller. The settings are *Disabled, INTA, INTB, INTC,* or *INTD*. The Optimal and Fail-Safe defaults are *Disabled*.

IRQ3
IRQ4
IRQ5
IRQ7
IRQ9
IRQ10
IRQ11
IRQ12
IRQ14
IRQ15   These options specify the bus that the named interrupt request lines (IRQs) are used on. The settings are *PCI/PnP* or I The optimal and Fail-Safe default settings are *PCI/PnP*.

Reserved Memory Size This option specifies the size of reserved memory area. The settings are *Disabled, 16K, 32K*, or *64K*. The Optimal and Fail-Safe default settings are *Disabled*.

Reserved Memory Address This option specifies the beginning address (in hex) of the reserved memory area. The settings are *C0000, C4000, C8000, CC000, D0000, D4000, D8000,* or *DC000*. The Optimal and Fail-Safe default settings are *C0000*.

Peripheral Setup

Peripheral Setup options are displayed by choosing the Peripheral Setup icon from the WINBIOS Setup main menu. All Peripheral Setup options are described in this section.

Onboard FDC   This option enables the floppy drive controller on the motherboard. The settings are *Enabled* or *Disabled*. The Optimal default setting is *Enabled*. The Fail-Safe default setting is *Disabled*.

Onboard Serial Port1 This option enables serial port 1 on the motherboard and specifies the base I/O port address for serial port 1.

The settings are *3F8h, 3E8h,* or *Disabled*. The Optimal default setting is *3F8h*. The Fail-Safe default setting is *Disabled*.

Onboard Serial Port2 This option enables serial port 2 on the motherboard and specifies the base I/O port address for serial port 2.

The settings are *2F8h, 2E8h,* or *Disabled*. The Optimal default setting is *3F8h*. The Fail-Safe default setting is *Disabled*.

Onboard Parallel Port This option enables the parallel port on the motherboard and specifies the parallel port base I/O port address. The settings are *378h, 278h,* or *Disabled*.

The Optimal default setting is *378h*. The Fail-Safe default setting is *Disabled*.

Parallel Port Mode This option specifies the parallel port mode. ECP and EPP are both bidirectional data transfer schemes that adhere to the IEEE P1284 specifications. The settings are:

Setting	Description
Normal	The normal parallel port mode is used. This is the default setting.
Bi-Dir	Use this setting to support bidirectional transfers on the parallel port.
EPP	The parallel port can be used with devices that adhere to the Enhanced Parallel Port (EPP) specification. EPP uses the existing parallel port signals to provide asymmetric bidirectional data transfer driven by the host device.
ECP	The parallel port can be used with devices that adhere to the Extended Capabilities Port (ECP) specification. ECP uses the DMA protocol to achieve transfer rates of approximately 2.5 Mbs. ECP provides symmetric bidirectional communications.

Parallel Port DMA This option is only available if the setting for the **Parallel Port Mode** option is *ECP*.

The settings are *Disabled, DMA CH (channel) 0, DMA CH 1,* or *DMA CH 3*. The default setting is *Disabled.*

Onboard Triton IDE This option specifies the onboard IDE controller channels that will be used. The settings are *Primary, Secondary, Both*, or *Disabled.* The Optimal and Fail-Safe default settings are *Primary.*

Section 2 Utility

The following icons appear in this section:

Color Set sets the WINBIOS Setup screen colors.

Language allows you to select English, German, or French language screen prompts and messages.

Section 3 Security

AMIBIOS Password Support

WINBIOS Setup has an optional password feature. The system can be configured so that all users must enter a password every time the system boots or when WINBIOS Setup is executed. You can set either a Supervisor password or a User password.

Setting a Password

The password check option is enabled in Advanced Setup (see page 53) by choosing either *Always* (the password prompt appears every time the system is powered on) or *Setup* (the password prompt appears only when WINBIOS is run). The password is stored in CMOS RAM.

When you select Supervisor or User, AMIBIOS prompts for a password. You must set the Supervisor password before you can set the User password. Enter a 1 – 6 character password. The password does not appear on the screen when typed. Make sure you write it down. If you forget it, you must drain CMOS RAM and reconfigure the system.

If You Do Not Want to Use a Password   Just press <Enter> when the password prompt appears.

Changing a Password

Select the appropriate password icon (Supervisor or User) from the Security section of the WINBIOS Setup main menu. Enter the password and press <Enter>. The screen does not display the characters entered. After the new password is entered, retype the new password as prompted and press <Enter>.

If the password confirmation is incorrect, an error message appears. If the new password is entered without error, press <Esc> to return to the WINBIOS Main Menu. The password is stored in CMOS RAM after WINBIOS completes. The next time the system boots, you are prompted for the password if the password function is present and is enabled.

Remember the Password   Keep a record of the new password when the password is changed. If you forget the password, remove the computer cover, set switch 1-2 (the DIAG switch) to ON, power on the computer. AMIBIOS will erase the password.

Anti-Virus

When this icon is selected from the Security section of the WINBIOS Setup main menu, AMIBIOS issues a warning when any program (or virus) issues a Disk Format command or attempts to write to the boot sector of the hard disk drive. The settings are *Enabled* or *Disabled*. If enabled, the following appears when a write is attempted to the boot sector. You may have to type *N* several times to prevent the boot sector write.

```
Boot Sector Write!!!
Possible VIRUS: Continue (Y/N)? _
```

The following appears after any attempt to format any cylinder, head, or sector of any hard disk drive via the BIOS INT 13 Hard Disk Drive Service:

```
Format!!!
Possible VIRUS: Continue (Y/N)? _
```

Section 4 Default

The icons in this section permit you to select a group of settings for all WINBIOS Setup options. Not only can you use these icons to quickly set system configuration parameters, you can choose a group of settings that have a better chance of working when the system is having configuration-related problems.

Original

Choose the Original icon to return to the system configuration values present in WINBIOS Setup when you first began this WINBIOS Setup session.

Optimal

You can load the optimal default settings for the WINBIOS by selecting the Optimal icon. The Optimal default settings are best-case values that should optimize system performance. If CMOS RAM is corrupted, the Optimal settings are loaded automatically.

Fail-Safe

You can load the Fail-Safe WINBIOS Setup option settings by selecting the Fail-Safe icon from the Default section of the WINBIOS Setup main menu.

The Fail-Safe settings provide far from optimal system performance, but are the most stable settings. Use this option as a diagnostic aid if the system is behaving erratically.

5   Jumper Settings for Commonly-Used CPUs

The Apollo motherboard supports several types of Intel Pentium CPUs. Jumpers JK1, JK2, JK3, JV, and J8 must be set for each CPU. The following drawings illustrate the jumper settings for some common CPUs.

100MHz Standard Voltage (3.3V)
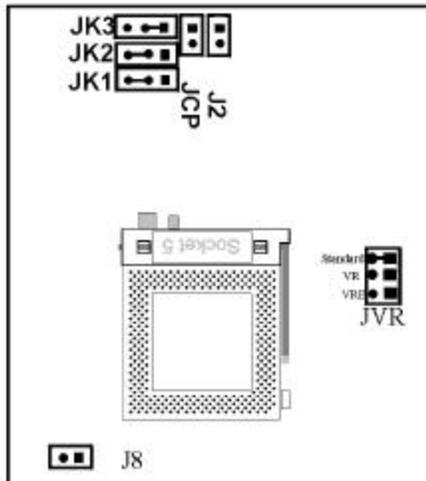
90MHz Standard Voltage (3.3V)
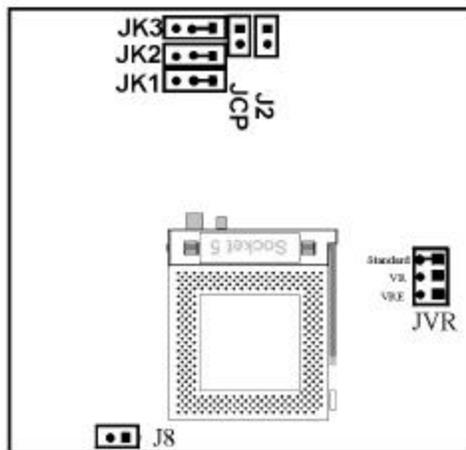
Cont'd

120 MHz VRE Voltage (3.6V)
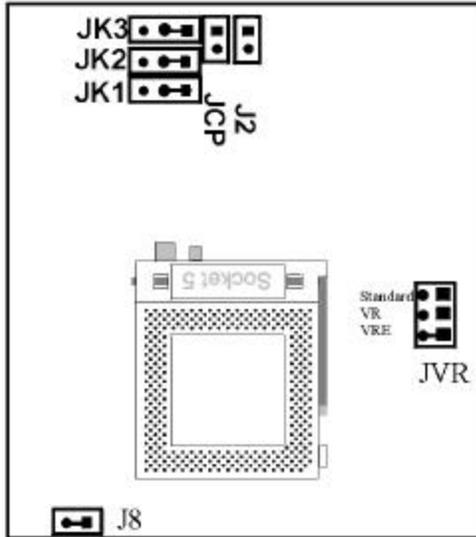
133MHz VRE Voltage (3.6V)
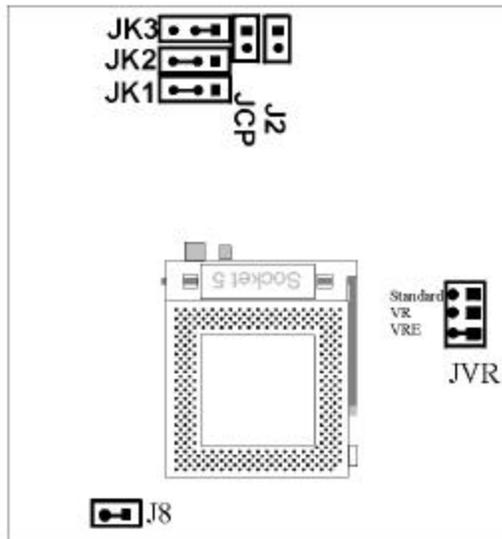
6 Upgrading Cache Memory

If your Apollo Pentium PCI ISA motherboard has 256 KB of secondary cache memory, you can upgrade to 512 KB of cache memory. See the following steps.

Cache Type   Use 3.3V SRAM in the cache memory sockets. The recommended 15 ns 3.3V 64 KB x 8 DIPs are:

Vendor	Type	Part Number	Package	Vcc	I/O	Mode
Micron	32 x 8	MT5LC2568	DIP	3.3V	3.3V	Pure
Samsung	32 x 8	KM68257CP	DIP	5V	3.3V 5V	Mix
Samsung	32 x 8	KM68257P	DIP	3.3V	3.3V	Pure
Alliance	32 x 8	AS7C3256PCM	DIP	3.3V	3.3V	Pure
Toshiba	32 x 8	TC55V328P	DIP	3.3V	3.3V	Pure
Winbond	32 x 8	W24M257AK	DIP	5V	3.3V 5V	Mix
UMC	32 x 8	61M256AH	DIP	5V	3.3V 5V	Mix
ISSI	32 x 8	61LV256	DIP	3.3V	3.3V	Pure

Upgrade Steps

Step	Action
1	Turn the system off. If the motherboard is already installed in a computer case, remove the cover and expose the motherboard.
2	*Make sure you are properly grounded to prevent electrostatic discharge.* Remove the DIPs in sockets M1 through M8. See the drawing on the previous page for the M1 through M8 locations.
3	Install the new 64 KB x 8 3.3V SRAM DIPs in sockets M1 through M8. Make sure that Pin 1 of the sockets matches Pin 1 of the SRAM DIPs. The end of the DIP that has a notch or a dot indicates Pin 1. Pin 1 of the socket is printed on the motherboard and is indicated on the motherboard drawing on the previous page. Press the DIPs firmly but slowly into each socket.
4	Install a *5V 32 KB x 8 SRAM DIP* in M9. M9 is the tag RAM socket.

Upgrading Cache Memory, Continued

Jumper Settings The jumpers that control secondary cache memory (JPW1, JPW2, JPW3, JPW4, J9, J10, and JC1 are shown below. These jumpers are near the CPU. The jumper settings for 256 KB mixed voltage, 256 KB 3.3V, and 512 KB 3.3V cache memory are shown below:
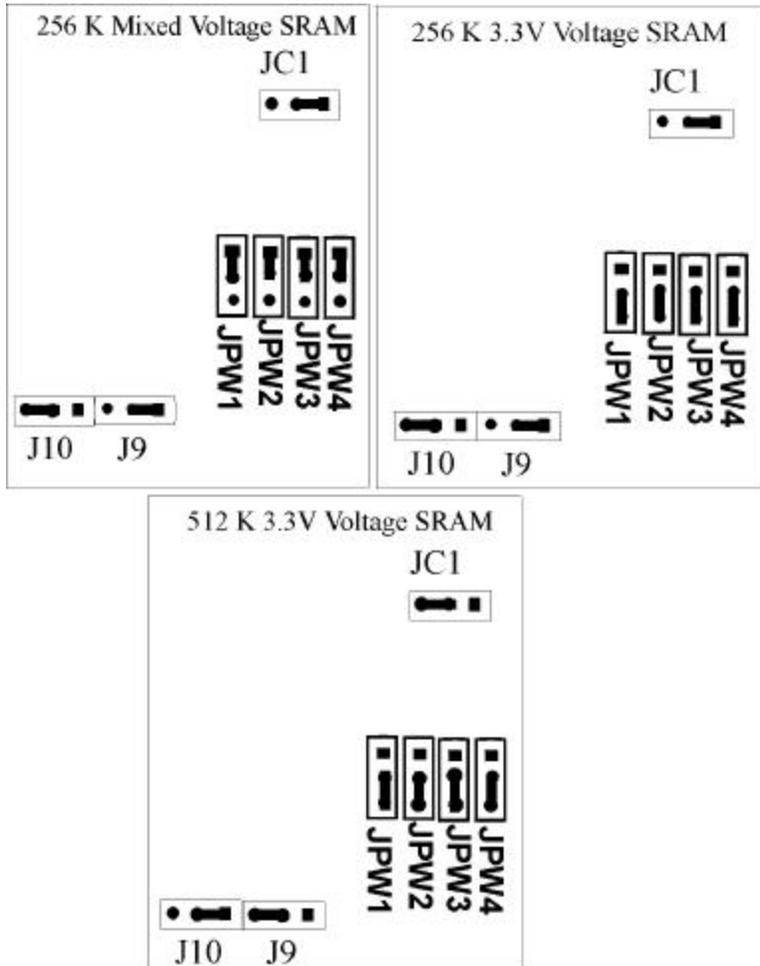
Upgrading Cache Memory, Continued

512 KB Jumper Settings Make sure that Pins 2-3 of JPW1, JPW2, JPW3, and JPW4 are shorted to select 3.3V SRAMs. Pins 2-3 of J9 should be shorted. Pins 1-2 of J10 should be shorted. Pins 2-3 of JC1 should be shorted.

Reinstall Cover Reinstall the computer cover and turn system power on.

The system BIOS should now report 512 KB of secondary cache memory now after the computer boots. If it does not, repeat the cache memory installation procedure above.

Using only 256 KB If using 256 KB of secondary cache memory, 32 KB x 8 SRAM DIPs should be installed in M1 through M8.

An 8 KB x 8 5V SRAM DIP should be installed in M9, Pins 1-2 of JC1 should be shorted, Pins 1-2 of J9 should be shorted, and Pins 2-3 of J10 should be shorted.

7 Programming the Flash ROM

All versions of the Apollo Pentium PCI motherboard use Flash EPROM to store the system BIOS. The advantage of Flash EPROM is that the EPROM chip does not have to be replaced to update the BIOS. The end user can actually reprogram the BIOS, using a ROM file supplied by American Megatrends..

Programming the Flash EPROM

Step	Action
1	Turn power off and wait at least 10 seconds. Make sure that the computer has a working speaker.
2	Insert the floppy disk with the S728P.ROM file in drive A:.
3	Before DOS boots, press and hold down the <Home> key to reprogram the Flash EPROM-based AMIBIOS. The bootblock code immediately reads the A: drive, looking for the new BIOS information.
4	When the flash ROM has successfully been programmed, the computer will reboot.

Boot Block BIOS Actions When you reprogram from system boot, the boot block BIOS code:

Reads S728P.ROM from the root directory of the floppy disk in drive A:.

Erases the Flash EPROM.

Programs the Flash EPROM with the data read from the floppy disk in drive A:.

Generates a CPU reset, rebooting the computer.

The bootblock part of the Flash EPROM is not programmed. Should you inadvertently open the disk drive door or turn power off to the computer while programming the Flash EPROM, the bootblock will be unaffected. Simply turn power back on and begin the Flash ROM programming process again.

Cont'd

S728P.ROM   S728P.ROM resides on a floppy disk and contains the updated main BIOS code. American Megatrends will provide this file when the AMIBIOS for the Apollo Pentium PCI ISA motherboard must be updated.

S728P.ROM must be present in the root directory of the floppy disk before the onboard Flash EPROM can be reprogrammed. The file that has the main BIOS code must be named S728P.ROM.

Sequence of Operation The sequence of operation and expected behavior of the boot block BIOS code is:

Step	Expected behavior
1 Look for floppy disk.	The system beeps one time before the BIOS attempts to read from floppy drive A:.
2 Look for S728P.ROM on the floppy disk.	S728P.ROM must be in the root directory of the floppy disk in drive A:. There is no beep if successful.
3 Read the floppy disk.	The floppy disk is read. There is no beep if this step is successful.
4 Check for BIOS file size.	The BIOS file size is checked. There is no beep if this step is successful.
5 Check for Flash EPROM.	The BIOS looks for an Intel i28F001BX-T Flash EPROM. It does not beep if this step is successful.
6 Erase the Flash EPROM.	Two beeps sound when the BIOS begins erasing the Flash EPROM.
7 Program the Flash EPROM.	Three beeps sound when the AMIFlash Code begins reprogramming the Flash EPROM.
8 Continue programming the Flash EPROM.	Four beeps sound when reprogramming has been successfully completed.
9 AMIFlash does a reset.	A CPU reset is generated to reboot the computer.

Cont'd

Programming the Flash ROM, Continued

Beep Codes The bootblock code produces a series of beeps during Flash ROM programming to:

- signify completion of a step (as shown on the previous page), or to
- signal an error.

Error beeps are arranged in a coded sequence and have different meanings depending on when they occur. The error beep codes and when they can occur are:

Number of Beeps	Description
1	Insert diskette in floppy drive A:.
2	The AMIBOOT.ROM file was not found in the root directory of the diskette in floppy drive A:.
3	Base memory error.
4	Flash program successful.
5	Floppy read error.
6	Keyboard controller BAT command failed.
7	No Flash EPROM detected.
8	Floppy controller failure.
9	Boot Block BIOS checksum error.
10	Flash erase error.
11	Flash Program error.
12	AMIBOOT.ROM file size error.
Continuous beep	Flash Programming successful. Turn power off. The turn power on again to restart.

Bootblock Code Checkpoint Codes

Code	Description
E0h	Verify the Boot Block BIOS checksum. Disable the internal cache, DMA, and interrupt controllers. Initialize the system timer. Start memory refresh.
E1h	Initialize the chipset registers. Set the BIOS size to 128K. Make the 512 KB base memory available.
E2h	Test the base 64 KB of system memory. Send the BAT command to the keyboard controller. Make sure that the <Home> key was pressed. Verify the main system BIOS checksum.
E3h	The main system BIOS is good. Transfer control to the main system BIOS.
E4h	Start the memory test.
E5h	The memory test is over. Initialize the interrupt vector table.
E6h	Initialize the DMA and interrupt controllers.
E7h	Determine the CPU internal clock frequency.
E8h	Initialize the I/O chipset, if any.
E9h	Program the CPU clock-dependent chip set parameters.
EAh	Enable the timer and the floppy diskette interrupt. Enable the internal cache. Copy the boot block BIOS and pass control to the boot block BIOS in the 0000h segment.
EDh	Initialize the floppy drive.
EEh	Look for a diskette in drive A:. Read the first sector of the diskette.
EFh	Floppy read error.
F0h	Search for AMIBOOT.ROM in the root directory of the floppy diskette in drive A:.
F1h	The AMIBOOT.ROM file is not in the root directory.
F2h	Read the FAT table. Analyze the FAT to find the clusters occupied by the AMIBOOT.ROM.
F3h	Start reading the AMIBOOT.ROM file, cluster by cluster.
F4h	The AMIBOOT.ROM file is not the correct size.
F5h	Disable the internal cache. Raise the Vpp. Enable Flash write and reset the Flash ROM.
FBh	Detect the flash type.
FCh	Start erasing flash blocks.
FDh	Program the Flash ROM in the E0000-EFFFFh region.
FEh	Start programming Flash at F0000-FFFFF region.
FFh	Flash programming is successful. The computer reboots.

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