UP1000
User Manual

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Revision History

Date	Rev	Description
12/10/99	**51-0036-0A**	**First product release. This manual describes the Alpha Processor, Inc. parts numbered 90-0001-2C (beta test boards) and 90-0001-3A (first product release boards).**
4/05/00	51-0036-1A	Modified for final etch of motherboard. This manual describes the Alpha Processor, Inc. part number 90-0001-3B. Revisions include the following: • Replaced Chapter 4—removed AlphaBios and included System Reference Manual (SRM) Console. • Removed fixed configuration jumpers. • Included minor component connector changes.

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Preface

Overview

This manual describes the Alpha Processor, Inc. UP1000 product, including the UP1000 Motherboard and the Alpha Slot B Module.

The document emphasizes the System Resource Manual (SRM) Console firmware user interface.

Task-oriented topics include a description of how to:

- Navigate menus
- Install an operating system
- Check or change system configurations
- Troubleshoot basic system problems

Hardware-oriented topics include how to:

- Install memory modules
- Cable the I/O connections
- Cable the diskette and IDE disk I/O ports

Audience

This manual is intended for technicians and engineers who support resellers, dealers, system integrators, and OEM vendors who supply UP1000-based systems.

Scope

This manual describes the features, configuration options, functional operation, troubleshooting analysis and user interface of the system and its SRM Console firmware. It is a companion piece to Alpha Processor, Inc.'s UP1000 document set that includes the *UP1000 Quick Start Installation Guide* (51-0035) and the *UP1000 Technical Reference Manual* (51-0034).

Manual Organization

The UP1000 User Manual is organized as follows:

- Chapter 1, “Introduction” presents the product features and includes a functional block diagram of the system.
- Chapter 2, “System Configuration” provides a pictorial layout of the UP1000 Motherboard with its key components. Configuration elements include main memory guidelines, I/O disk port cabling, and non-keyed I/O connections.
- Chapter 3, “Electrical and Environmental Data” furnishes the electrical and environmental requirements, and physical board dimensions.
- Chapter 4, “Software Support” describes the three major software components that form the UP1000 user interface. Topics include the Alpha System Resource Manual (SRM) Console, Alpha Diagnostics, and installing and upgrading a Linux operating system.
- Chapter 5, “Troubleshooting” discusses solutions for hardware and software problems encountered during system startup.
- Appendix A, “Support, Products and Documentation” provides directions for obtaining additional product information and technical support.

Conventions and Definitions

This section defines product-specific terminology, abbreviations, and other conventions used throughout this manual.

Acronyms

The following is a list of the acronyms used in this document and their definitions.

Abbreviation	Meaning
AGP	**Accelerated Graphics Port**
API	Application Program Interface
BIOS	**Basic Input/Output System**
CE	European Conforming
CPU	**Central Processing Unit**
cUL	Canadian Underwriters Laboratory

Abbreviation	Meaning
DDR	**Double Data Rate**
DIMM	Dual Inline Memory Module
DMA	**Direct Memory Access**
DRAM	Dynamic Random Access Memory
ECC	**Error Correcting Code**
EIDE	Enhanced Integrated Device Electronics
EMI	**Electromagnetic Interference**
FDD	Floppy Disk Drive
FIFO	**First In, First Out**
FPGA	Field Programmable Gate Array
HDD	**Hard Disk Drive**
IDE	Integrated Device Electronics
ISA	**Industry Standard Architecture**
LED	Light Emitting Diode
LVD	**Low Voltage Differential**
LW	Late Write
OEM	**Original Equipment Manufacturer**
PCI	Peripheral Component Interconnect
PIO	**Programmed Input/Output**
PLL	Phase Locked Loop
PCB	**Printed Circuit Board**
ROM	Read-only Memory
SCSI	**Small Computer System Interface**
SDRAM	Synchronous Dynamic Random Access Memory
SRM	**System Reference Manual**
SROM	Serial Read-only Memory
SRAM	**Static Random Access Memory**
SSRAM	Synchronous SRAM
UL	**Underwriters Laboratory**
UART	Universal Asynchronous Receiver Transmitter
USB	**Universal Serial Bus**

Chapter 1 Introduction

This chapter provides an overview of the UP1000 product consisting of a UP1000 Motherboard and one Alpha Slot B Module.

1.1 Features

Following is a summary of the UP1000 product features:

Table 1-1 UP1000 Product Features

Feature	Description	Manufacturer
Physical Form Factor:	**ATX (12" X 9.6")**	
Daughter Card Interface:	Supports one or two Alpha Slot B Modules using the Alpha 21264 microprocessor, at speeds of 600 or 700 MHz	Alpha Processor, Inc.
Cache:	**External L2 cache with 128-bit data path for an Alpha Slot B Module supports:**	
	• 2MB cache per 600 MHz processor	
	• 4MB cache per 700 MHz processor	
	• Late Write (LW) Synchronous SRAMS (SSRAMs)	
Chipsets:	**• AMD751 System Controller System Controller**	**AMD**
	• M1543C PCI-ISA Bridge	ALI
Main Memory:	**Three 168-pin, PC 100 Synchronous Direct Random Access Memory (SDRAM) unbuffered Serial Presence Detect (SPD) Dual Inline Memory Modules (DIMMs) of 64 MB, 128 MB, or 256 MB, providing 64 MB to 768 MB memory with Error-correcting Code (ECC)**	
Power:	• Requires 400W ATX power supply	
	• Uses ATX power connectors	
System Interface:	• 100 MHz clock with Double Data Rate (DDR) transfers	

Table 1-1 UP1000 Product Features (Continued)

Feature	Description	Manufacturer
	• **Two Ultra DMA33 Integrated Device Electronics (IDE) connectors, driven by the dual-channel IDE controllers in the M1543C PCI-ISA Bridge**	
	• Inter-integrated Circuit (I2C) System Management (SM) bus	
	• **Two external Universal Serial Bus (USB) ports, driven by the USB controller in the M1543C PCI-ISA Bridge**	
On-board Input/Output (I/O):	• Two serial Universal Asynchronous Receiver Transmitter (UART) ports, driven by the Super I/O controller in the M1543C PCI-ISA Bridge	
	• **One Enhanced Capabilities Port (ECP) / Enhanced Parallel Port (EPP) / SP parallel port, driven by the Super I/O controller in the M1543C PCI-ISA Bridge**	
	• One dual-drive capable Floppy Disk Drive (FDD) controller driven by the Super I/O controller in the M1543C PCI-ISA Bridge	
	• **PS/2 Keyboard and Mouse port**	
	• One 2x Accelerated Graphics Port (AGP) slot, driven by the AGP controller in the AMD751 System Controller	
I/O Slots:	• **Four 33 MHz PCI slots, driven by the 32-bit PCI bus controller in the AMD751 System Controller**	
	• Two Industry Standard Architecture (ISA) slots, driven by the M1543C PCI-ISA Bridge	
Firmware:	**Embedded Alpha System Reference Manual (SRM) Console**	

1.2 System Components

The functional components of the UP1000 are shown in Figure 1-1 in block diagram form.

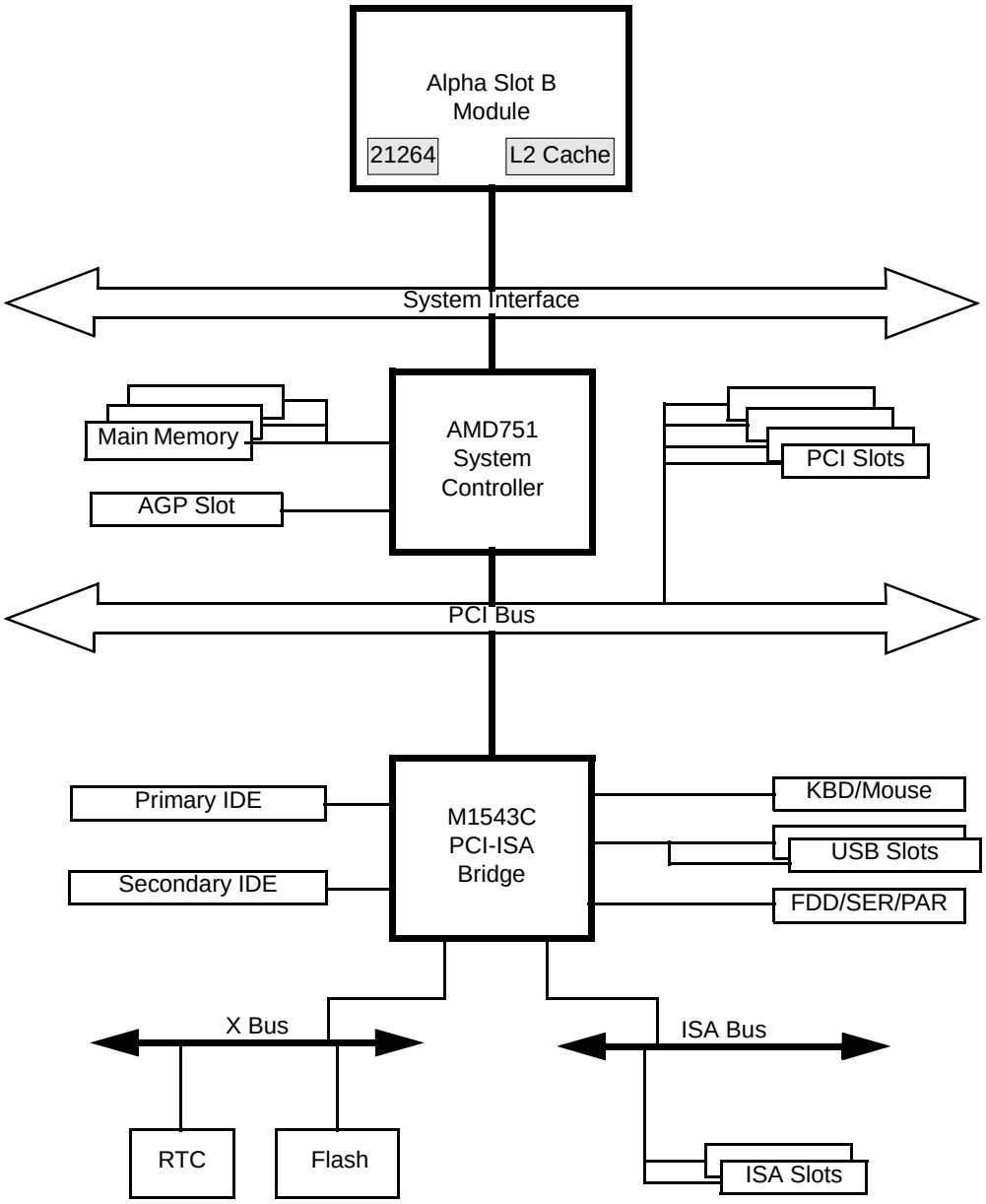

Figure 1-1 UP1000 Functional Block Diagram

Chapter 2 System Configuration

This chapter describes the layout and configuration of the UP1000 components.

2.1 Board Layout and Components

The UP1000 Motherboard uses onboard connectors for:

- Alpha Slot B Module
- Memory modules
- AGP, PCI, and ISA modules
- Rear Panel I/O peripherals (keyboard, mouse, serial, parallel, and USB)
- IDE and floppy disk devices
- System power
- Internal I/O connections (indicators and buttons)

These connectors are shown in Figure 2-1 and listed in Table 2-1.

Alpha Slot B Module Auto configuration

During start-up the UP1000 system detects these Alpha Slot B Module parameters:

- System speed
- Cache size

The Alpha Slot B Module is automatically configured for the proper values. You are not required to set switches or install pin jumpers.

Memory Configuration

Memory modules employed in the system must be selected and utilized under guidelines shown in Section 2.2.

Cabling Configuration

Disk ports (including sockets for diskette and IDE devices) are shown in Figure 2-3.

Internal I/O connections for internal system I/O functions are shown in Figure 2-4. These connectors are not keyed; however, their Pin 1 orientation is important and shown in Figure 2-4.

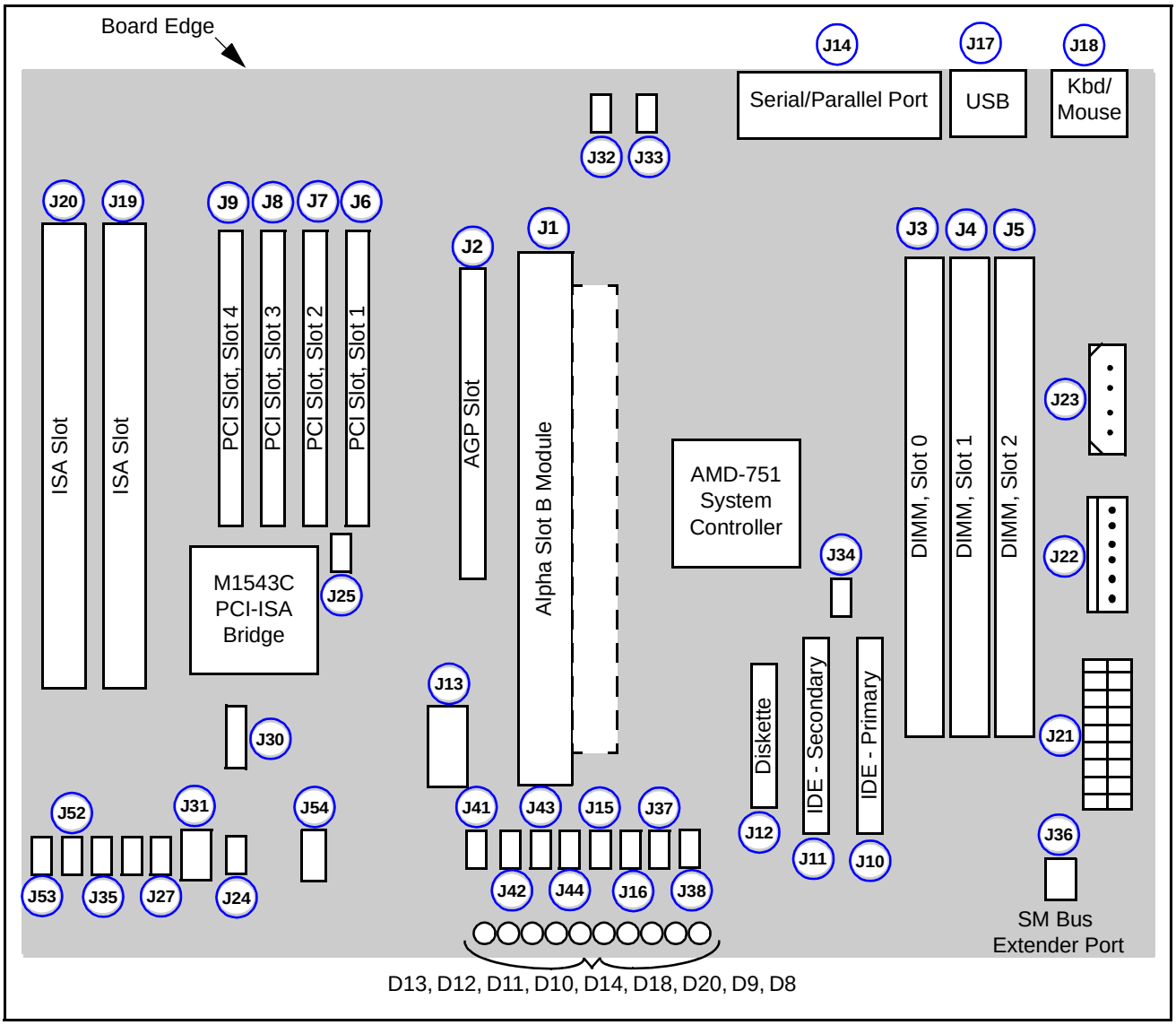

Figure 2-1 UP1000 Motherboard Component Layout

Table 2-1 UP1000 User Accessible Connections List

Comp. No.	Specification
J1	**Alpha Slot B Connector**
J2	AGP Connector
J3	**168-pin DIMM Socket, Slot 0**
J4	168-pin DIMM Socket, Slot 1
J5	**168-pin DIMM Socket, Slot 2**
J6	32-bit PCI Connector, Slot 1
J7	**32-bit PCI Connector, Slot 2**
J8	32-bit PCI Connector, Slot 3
J9	**32-bit PCI Connector, Slot 4**
J10	Primary IDE Connector
J11	**Secondary IDE Connector**
J12	Diskette Connector
J13	**Electrical Programmable Logic Device (EPLD) Program Port**
J14	Serial (2) / Parallel (1) I/O Ports
J15	**Option Switch 3**
J16	Option Switch 4
J17	**USB (2) Ports**
J18	Keyboard / Mouse Ports
J19	**ISA Connector**
J20	ISA Connector
J21	**ATX Power Connector**
J22	Auxiliary ATX Power Connector
J23	**System Power Connector**
J24	Reset Switch Cable Connector
J25	**Debug Port Connector**
J26	Not Used
J27	**Power Switch Cable Connector**
J29	Not Used
J30	**Speaker Cable Connector**
J31	Optional System Fan Power Connector

Notes: 1. J38 and J41 are used to establish default settings. Do not changes these jumpers.
2. J52 and J53 are reserved for Customer Service use.

Table 2-1 UP1000 User Accessible Connections List (Continued)

Comp. No.	Specification
J32	**Module Fan Cable Connector**
J33	Module Fan Cable Connector
J34	**Hard Disk Drive (HDD) Activity LED Connector**
J35	Keyboard Lock Cable Connector
J36	**SM Bus Extender Port**
J37	Option Switch 5
J38	**SROM Format Selection[1]**
J39	L2 Cache Disabled / Enable Jumper
J40	**Failsafe Block Select Jumper**
J41	Motherboard Bus Speed Selection[1]
J42	**Option Switch 0**
J43	Option Switch 1
J44	**Option Switch 2**
J52	Safety Block for Flash ROM U31[2]
J53	**Safety Block for Flash ROM U32[2]**
J54	LED Power Connector

Notes: 1. J38 and J41 are used to establish default settings. Do not changes these jumpers.
2. J52 and J53 are reserved for Customer Service use.

Note: *LED Status Indicators, D8-D14 and D18-D20, are described in Section 5.1.2.*

2.2 Memory Subsystem

Memory Configuration

The memory subsystem has one DIMM bank with three independent slots. (See Figure 2-2.) Each slot accepts 168-pin, PC 100 SDRAM Unbuffered SPD DIMM modules.

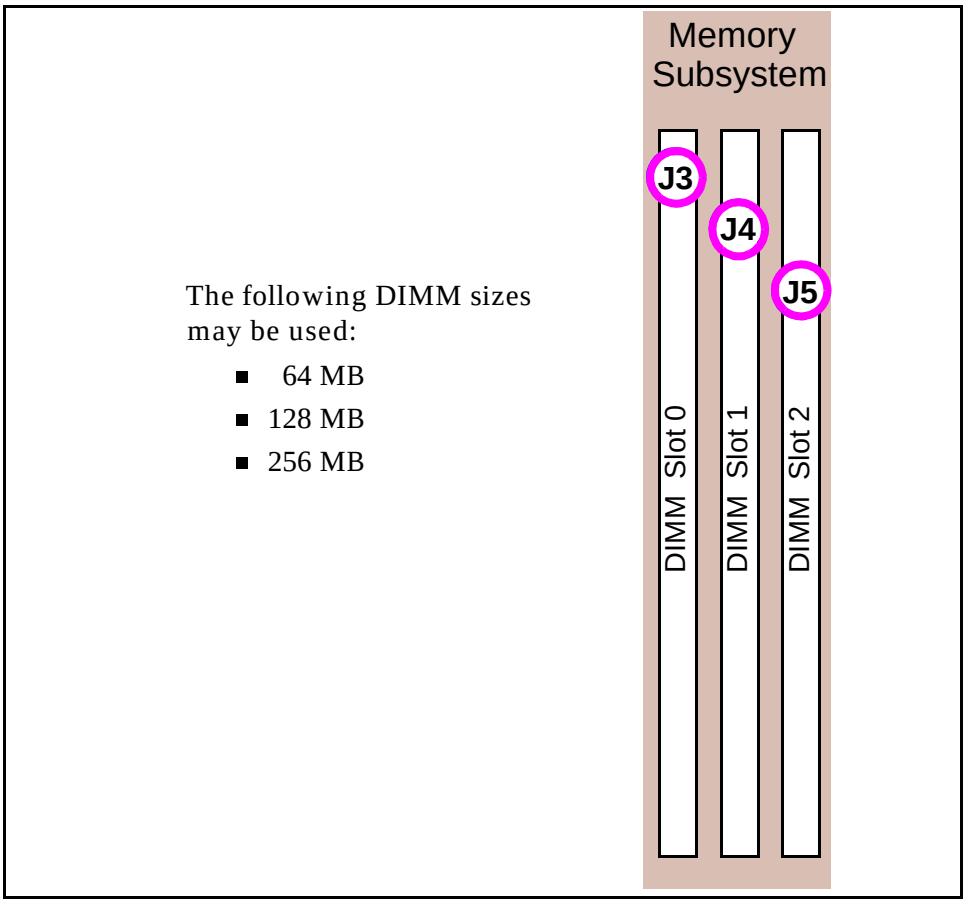

Figure 2-2 Memory Subsystem — DIMM Slot Orientation

Memory Guidelines

Use the following rules:

- Populate Slot 2 (J5) first.
- Each slot can have a PC100 DIMM from a different manufacturer, of a different size, and a different refresh rate.
- PC100 unbuffered DIMMs.
- Memory is supported in a size range between 64 MB (minimum) to 768 MB (maximum). See Table 2-2 for typical memory configurations.

Note: *See the Alpha Processor, Inc. web site*

http://www.alpha-processor.com

for the hardware compatibility list (HCL).

Table 2-2 Typical UP1000 Memory Configurations

Total Memory	No. of DIMMs	Slot 2 (J5)	Slot 1(J4)	Slot 0 (J3)
64 MB	**1**	**64 MB**		
128 MB	1	128 MB		
128 MB	**2**	**64 MB**	**64 MB**	
192 Mb	2	128 MB	64 MB	
256 Mb	**1**	**256 MB**		
256 MB	2	128 MB	128 MB	
256 Mb	**3**	**128 MB**	**64 MB**	**64 MB**
320 MB	2	256 MB	64 MB	
384 MB	**2**	**256 MB**	**128 MB**	
384 MB	3	256 MB	64 MB	64 MB
384 MB	**2**	**256 MB**	**128 MB**	
512 MB	2	256 MB	256 MB	
512 MB	**3**	**256 MB**	**128 MB**	**128 MB**
576 MB	3	256 MB	256 MB	64 MB
640 MB	**3**	**256 MB**	**256 MB**	**128 MB**
768 MB	3	256 MB	256 MB	256 MB

2.3 Disk Ports

A pictorial view of the UP1000 disk ports is shown in Figure 2-3. The IDE and diskette port sockets are keyed with one or more notches.

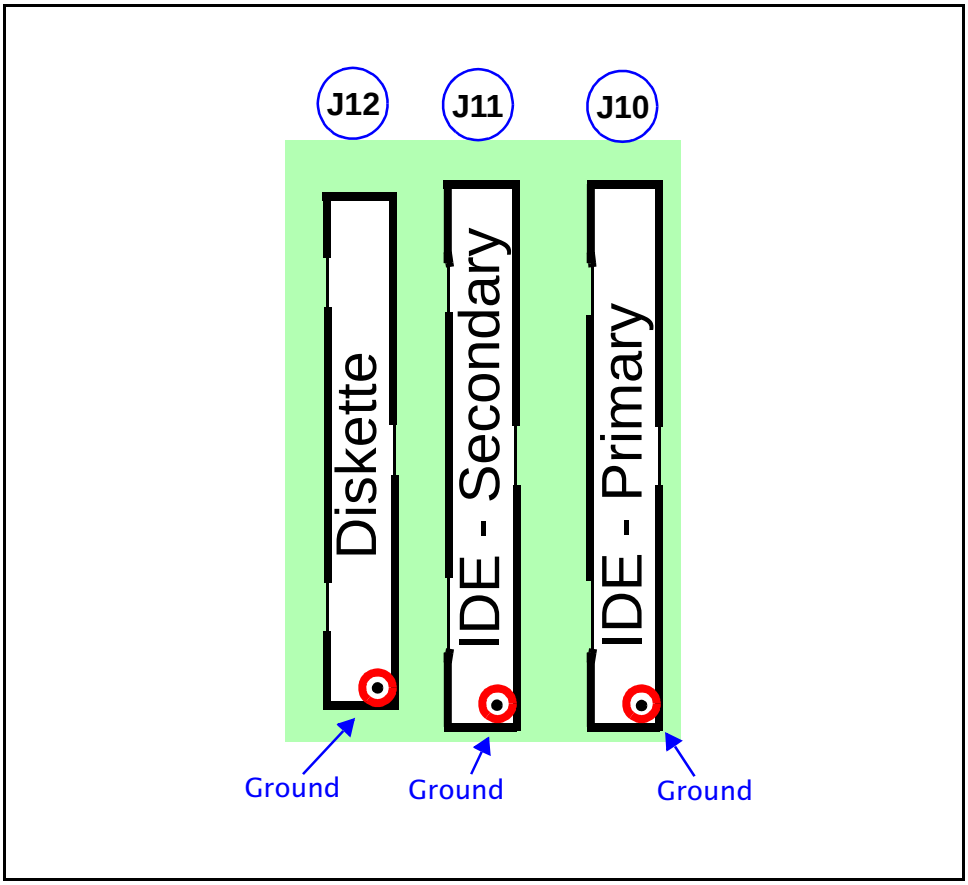

Figure 2-3 Disk Ports with Ground Orientation

2.4 Internal I/O Connections

2.4.1 Indicators and Buttons

These internal I/O connectors are not keyed. Figure 2-4 and Figure 2-5 show enlargements of the connectors and the Pin 1 position for each function. Pin 1 orientation is important during installation.

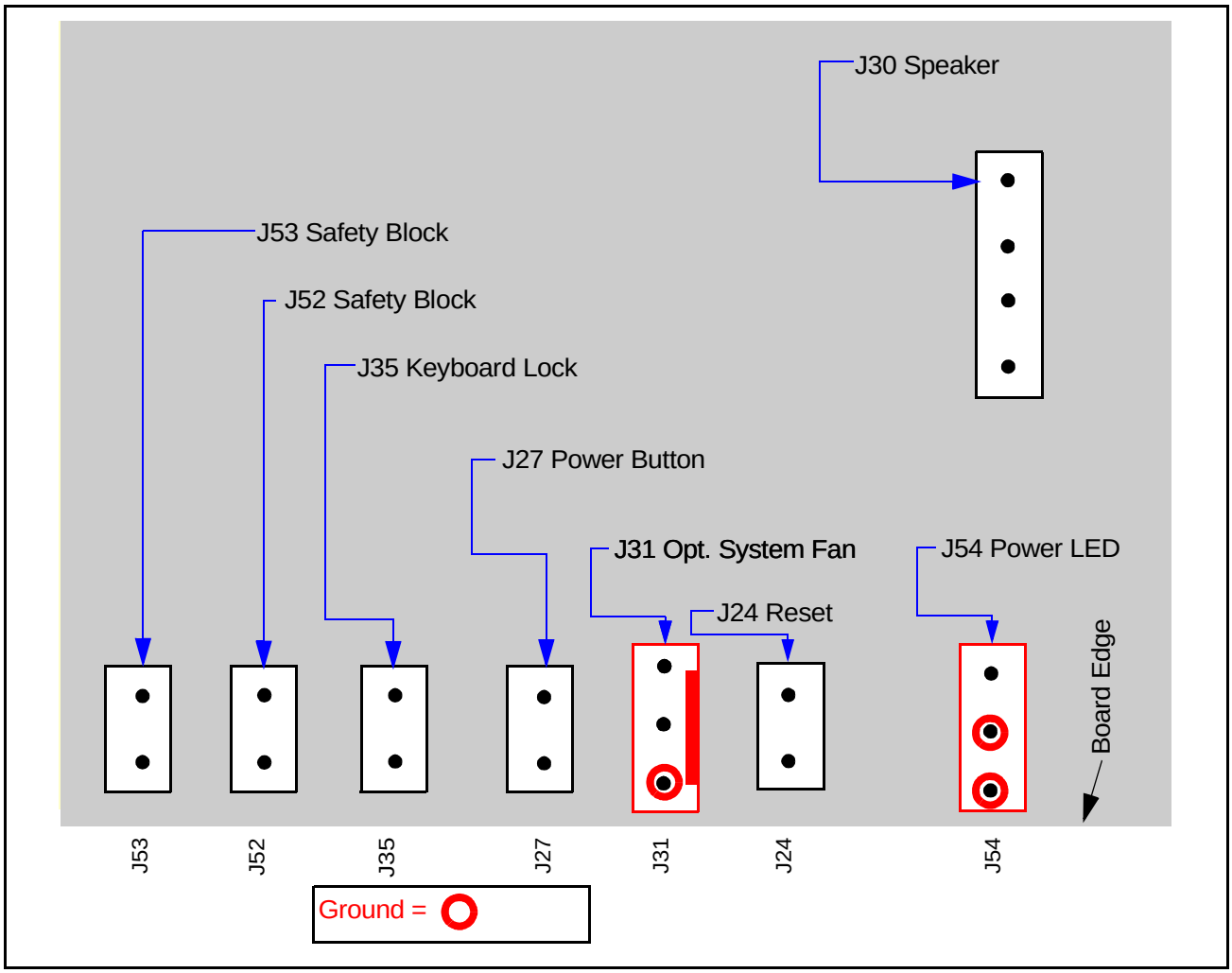

Figure 2-4 Internal I/O Connectors with Ground Orientation

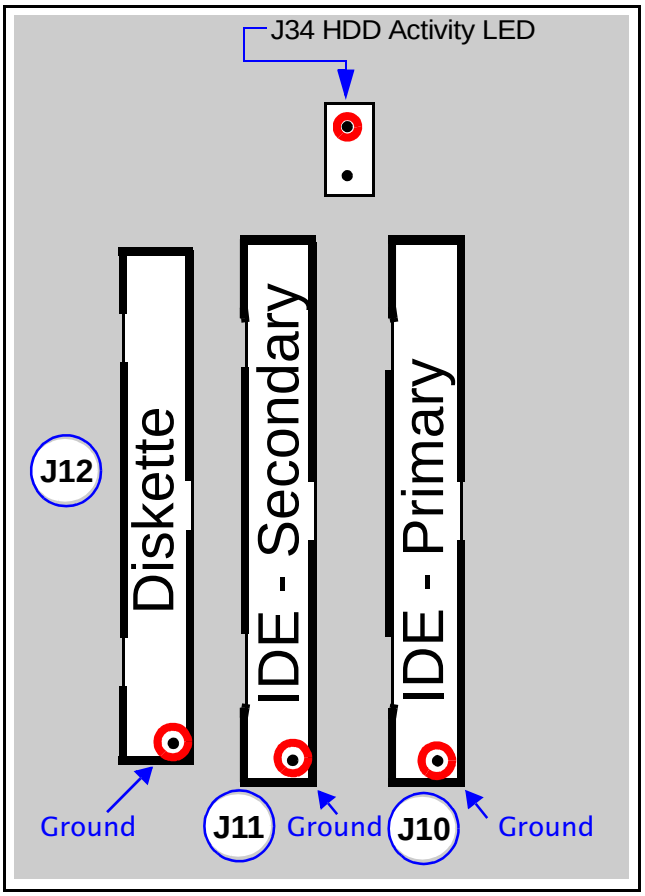

Figure 2-5 J34 HDD Activity LED Location

2.5 Variable Configuration Jumpers

The UP1000's firmware interfaces with a set of six configuration jumpers which are used to:

- Establish the factory default conditions for the system
- Enable a re-set to the default condition (after certain errors)
- Enable a re-flash of certain firmware

Note: *Each configuration jumper is composed of a 3-pin header with a 2-position jumper shunt.*

There are ten jumpers in the configuration section. A shaded box shown within Figure 2-4 identifies the six variable configuration jumpers as J42, J43, J44, J15, J16 and J37.

These are the only jumpers that you may be required to select.

See Chapter 5, "Troubleshooting," for details concerning:

- What error conditions require changing the Variable configuration jumpers
- What values to select when changing the shunts
- What system procedures to use to enable error recovery

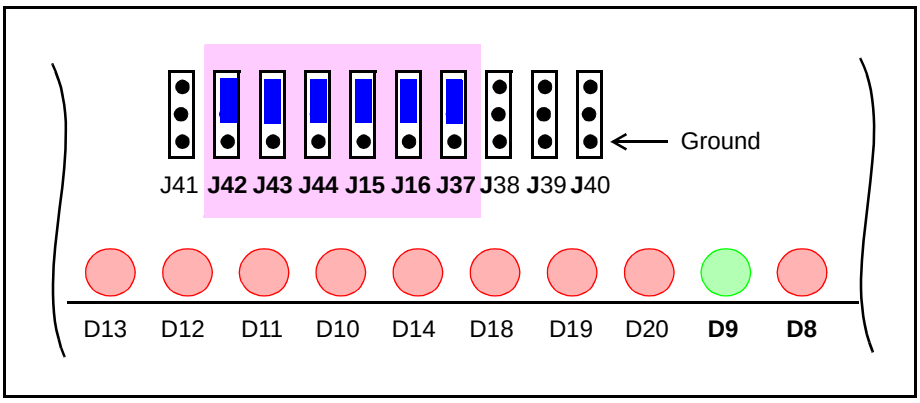

Figure 2-6 Variable Configuration Jumpers

2.6 Fixed Configuration Settings

The UP1000 Motherboard has two configuration jumpers, which must remain with their default settings unchanged. These components are identified as follows:

- J38—SROM format selection
- J41—MB bus speed selection (Note: The factory default setting for J41 is set to maximum speed)

Locations of these configuration components are highlighted in Figure 2-6.

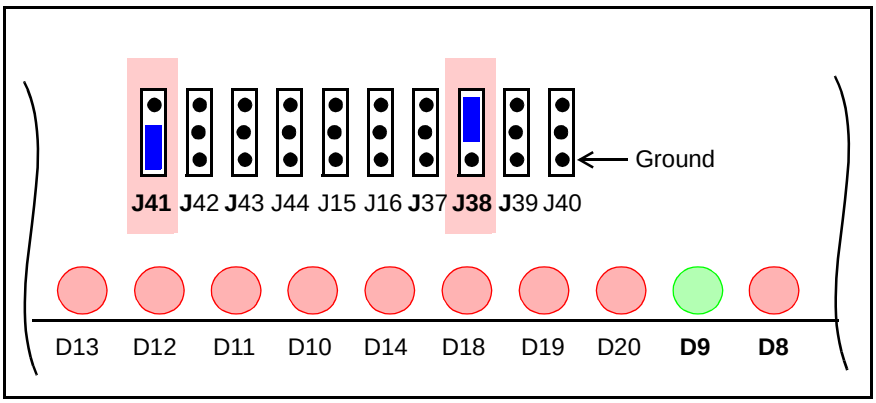

Figure 2-7 Fixed Configuration Switches

WARNING: ***To ensure proper operation of the UP1000, do not change the default settings of these fixed configuration components.***

Table 2-3 shows the configuration default settings for J38 and J41.

Table 2-3 Fixed Configuration Settings (J38, J41)

Jumper	Configuration
J41	**100 MHz—Shunt installed on pins 1 and 2**
J38	Option Block—Shunt installed on pins 2 and 3

Note: Pin 1 is closest to the board edge, pin 3 is closest to the Alpha Slot B Modules.

Chapter 3 Electrical and Environmental Data

In this chapter, a description is provided of the UP1000 power requirements, environmental and enclosure specifications, and physical parameters.

3.1 Power Specifications

3.1.1 Power Requirements

The power connectors utilized to support the UP1000 motherboard and one Alpha Slot B module are shown below. Connector J23 has the same form factor as power connectors used with standard disk peripherals.

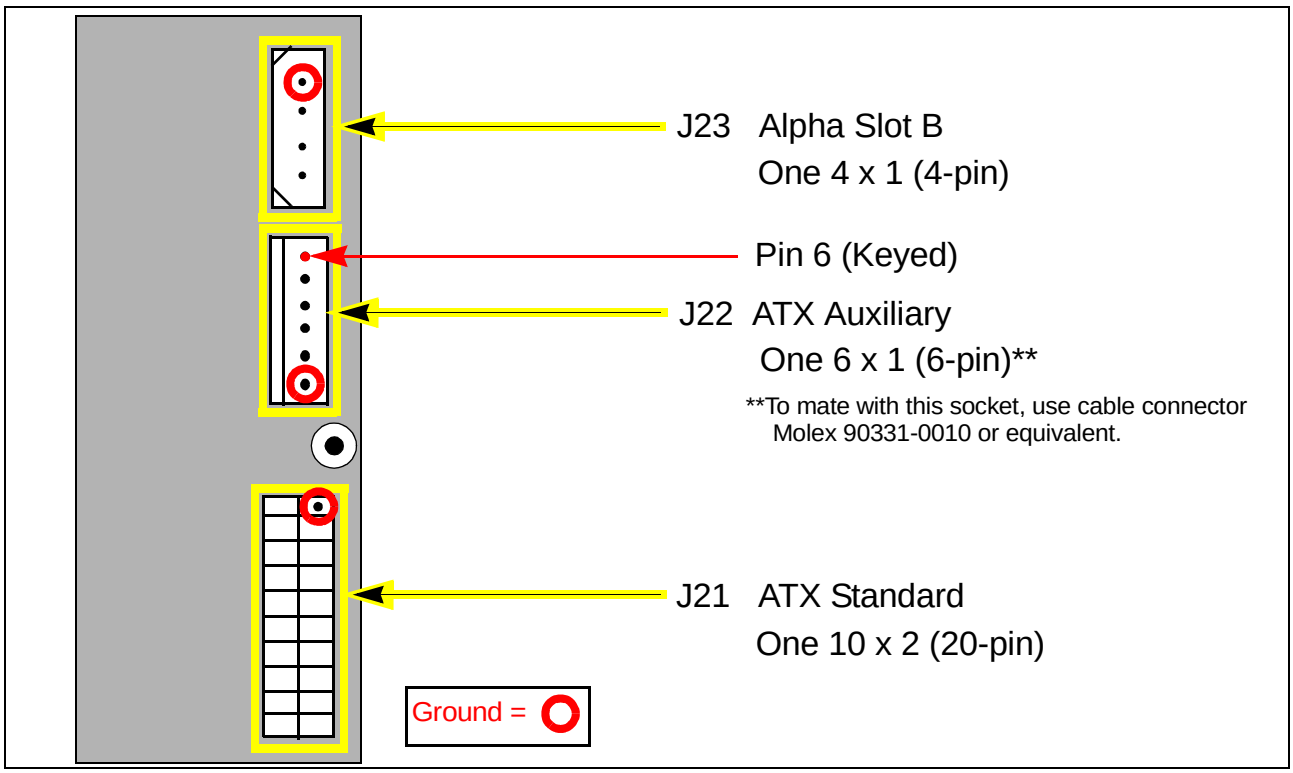

Figure 3-1 Power Connectors for UP1000

3.1.2 Power Consumption

A UP1000 system requires a 400 Watt ATX power supply which provides at least 14 Amps on the +12 Volt rail. Power is distributed as follows:

- Motherboard 37W
- Memory DIMMs Customer System Dependent
- Peripheral Cards Customer System Dependent
- Disk Drives Customer System Dependent
- Alpha Slot B Module 132W

The following individual power segments and specifications provide an example of an acceptable 400 Watt commercial ATX power supply.

+5V @ 24 to 30A	+12V @ 14A	+3.3V @ 20 to 28A
-5V @ 1A	-12V @ 1A	+5VSB @ 850mA
Note:Maximum Output for +5V and + 3.3V (combined) is 215W		

3.2 Environmental Specifications

An Alpha Slot B Module is cooled by two small fans. Depending upon cabinetry and plug-in card requirements, additional fans for cooling the entire UP1000 system may be necessary.

The UP1000 Motherboard and Alpha Slot B Module are specified to run within the environment listed in Table 3-1.

Table 3-1 Environmental Requirements for UP1000 System

Parameter	Specification
Operating temperature	**5°C to 35°C (41°F to 95°F)**
Storage temperature	-35°C to 85°C (-31°F to 185°F)
Relative humidity	**10% to 90% with maximum wet bulb temperature 35°C (95°F) and minimum dew point 2°C (36°F)**
Rate of (dry bulb) temperature change	11°C / hour ± 2°C / hour (20°F / hour ± 4°F / hour)

3.2.1 Safety

The UP1000 Motherboard meets registered product-safety certification for the U.S. and Canadian Underwriters Laboratories (UL and cUL). It also meets the European Conforming (CE) standard EN 60950:1992 "Safety of Information Technology Equipment Including Electrical Business Equipment Incorporating Amendment Nos 1, 2, 3, 4." European Norm (EN) standards which conform to the relevant directives are published in the Official Journal of the European Community.

3.2.2 EMI

The UP1000 Motherboard meets electro-magnetic interference (EMI) emission certification for the following:

- EN 55022:1994 / A1:1958 / A2:1997 Class A ITE emissions requirements
- Federal Communications Commission (FCC) 47 CFR Part 15 Class A

It also meets the EMI immunity certification EN 50082-1:1992 "EMC Residential, Commercial and Light Industrial Generic Immunity Standard."

Note: *Alpha Processor, Inc. recommends the use of high-quality, shielded cables for all I/O.*

3.3 Chassis Requirements

Chassis or enclosures must be capable of:

- Mounting the ATX form factor motherboard
- Accommodating four goalpost assembly mounting holes

The goalpost assembly is a mechanical fixture for aligning and supporting an Alpha Slot B module. This fixture must be installed prior to mounting the motherboard into the enclosure.

3.3.1 Mounting Procedures

Chassis Mounting Holes

Identify the nine standard ATX mounting holes. See Figure 3-2 in Section 3.4.1, "UP1000 Motherboard Mounting Hole Specifications" for additional information.

Check for the four Alpha Slot B goalpost mounting holes. For chassis or enclosures without this mounting hole pattern, obtain a drill template or chassis mounting tips from our website:

http://www.alpha-processor.com/products/downloads/customer_support/UP1000/UP1000_drill_template.pdf

You can also navigate to this information by pointing your browser to:

www.Alpha-Processor.com

Then:

1. Click on Support in the top right of your browser.
2. Click on FTP Downloads in the center left of your browser.
3. Click on customer_support in the center of your browser.
4. Click on UP1000 in the center of your browser.
5. Scroll down until you find UP1000_drill_template.pdf, then click on it. This downloads the template to your system.

WARNING: ***Alpha Slot B goalpost assembly must be securely fastened to chassis backplate. Refer to the*** UP1000 Quick Start Installation Guide ***for complete mechanical installation details.***

Motherboard & Goalposts to Chassis Assembly

Requirements for attaching motherboard and goalpost fixture to the chassis are:

- Fastening Hardware
  - Four Slot B captive nut shoulder screws and washers
  - Four M4X6 mm Phillips pan head screws
  - Assorted hardware supplied by the chassis vendor
- Tools
  - Phillips head screwdriver
  - Flat head screwdriver
  - Torque wrench
  - Nut driver (1/4 in.)
- Proper chassis mounting holes drilled for goalpost captive nuts

Use the following mounting technique:

1. Align the goalposts fixture holes with the corresponding motherboard clearance holes.
2. Affix goalposts to motherboard from the backside using captive nuts. Torque to 8 inch/lbs.
3. Affix goalpost brace to goalpost assembly. Torque to 4 inch/lbs.
4. Secure this assembly to the chassis with the standoffs and screws supplied by the chassis vendor.
5. Secure M4x6 mm screws through chassis to goalpost captive nuts.

3.4 Physical Parameters

UP1000 Motherboard Parameters

The UP1000 Motherboard is a printed wiring board (PWB) with the dimensions specified in Table 3-2.

Table 3-2 UP1000 Motherboard Physical Parameters

Dimension	Value
Length	**304.8 mm (12.0 in)**
Width	243.8 mm (9.6 in)
Height (board only)	**1.6 mm (0.063 in)**
Total Product Height (from underside of motherboard to top of goalpost assembly	127.0 mm (5.00 in)

Alpha Slot B Module Parameters

The Alpha Slot B Module is an assembly with the dimensions specified below.

Table 3-3 Alpha Slot B Module Physical Parameters

Dimension	Value
Length	**168.8 mm (6.65 in)**
Width	47.8 mm (1.9 in)
Height	**114.3 mm (4.5 in)**
Weight	1.2 kg (2.6 lbs)

3.4.1 UP1000 Motherboard Mounting Hole Specifications

The UP1000 Motherboard's overall dimensions and mounting hole specifications conform to standard ATX board specifications. They are depicted in Figure 3-2. Note the goalpost assembly mounting area and the additional mounting holes.

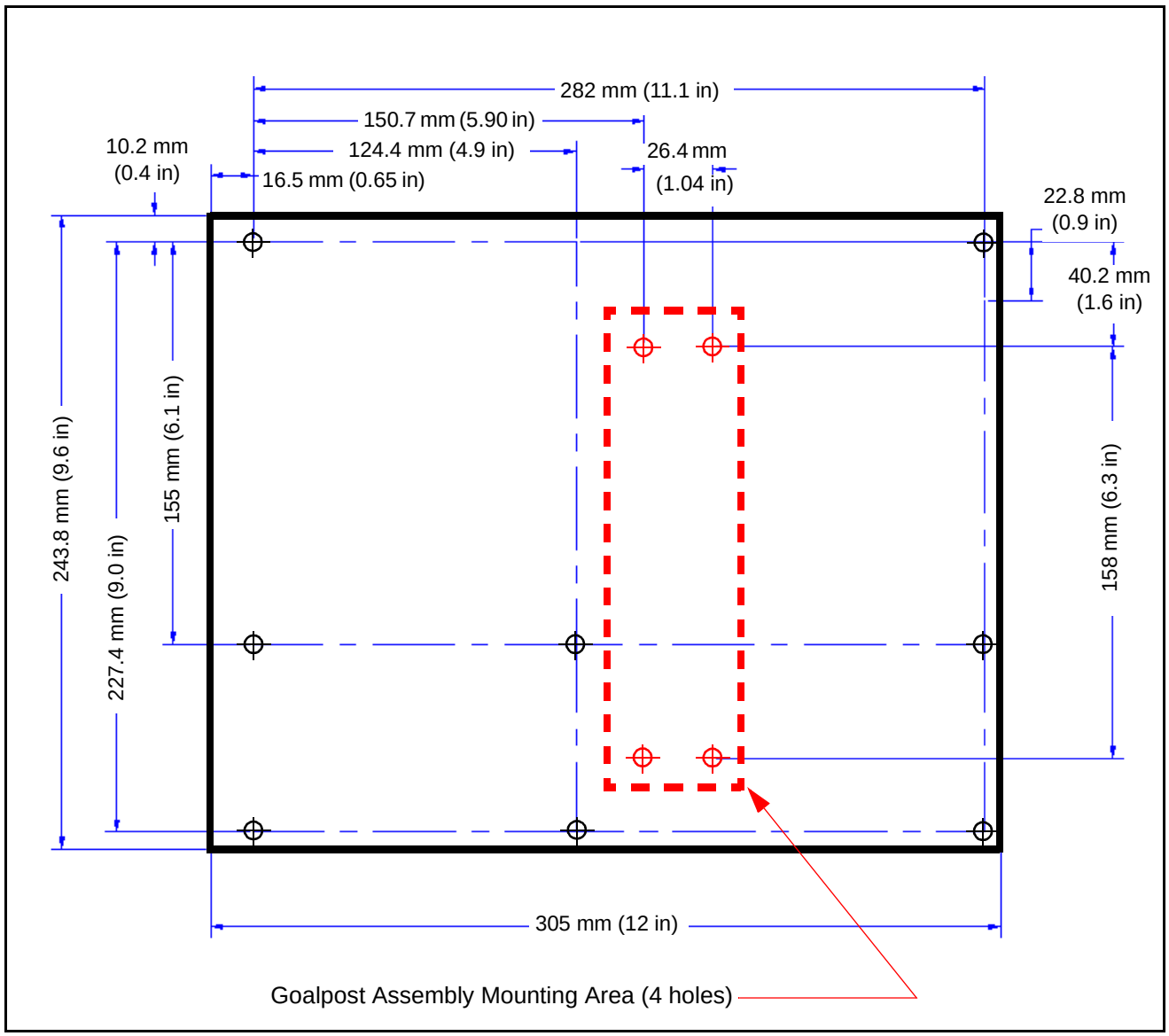

Figure 3-2 Mounting Hole Specifications Including Goalpost Assembly Mounting Area

3.5 I/O Shield Information

The rear panel connectors must be fitted with a suitable Core Design 1 I/O shield. ATX compatible motherboards have various core I/O shield designs. The UP1000 utilizes the design shown in the diagram below.

Individual connectors are designated with letters. Each connector type and its description are listed in Table 3-4.

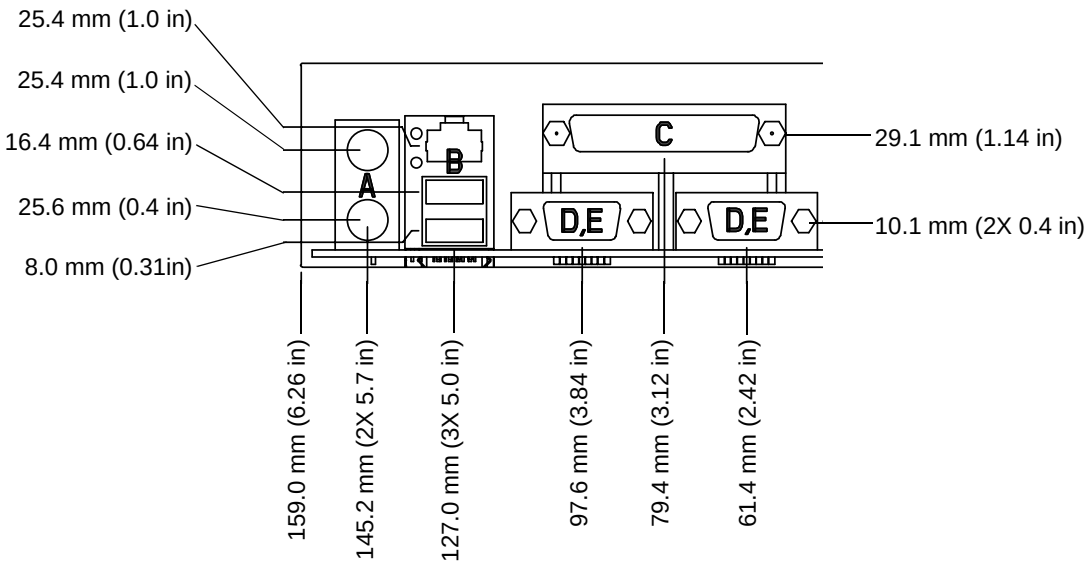

Figure 3-3 Rear Panel Connectors

Table 3-4 Rear Panel Connectors

Letter	Connector Description
A	**PS/2 Stacked Mouse/Keyboard (DIN)**
B	Dual Stack USB
C	**Stacked Parallel (25 Pin D-Sub)**
D	Serial (9 Pin D-Sub)

Chapter 4 Software Support

4.1 Software Overview

UP1000 systems support three major software components:

- Alpha SRM Console
- Alpha Diagnostics
- Operating System

4.1.1 Alpha SRM Console

The SRM Console is special firmware that initializes the UP1000 system and enables you to install and boot the operating systems. Alpha SRM Console firmware resides in the flash ROM on the UP1000 Motherboard.

For further information about the Alpha SRM Console, visit our web site at:

http://www.alpha-processor.com/support/srm.html

or

Navigate from the Alpha Processor, Inc. web site:

www.alpha-processor.com

through the following steps:

1. Click on Support in the upper right of your browser.
2. Click on FAQs in the center left of your browser.
3. Scroll through the FAQs until you reach the one on SRM.
4. Click on the word, "here." This takes you to the SRM web pages.

or go to the Alpha Linux home page:

http://www.alphalinux.org

4.1.2 Alpha Diagnostics

The Alpha Diagnostics firmware is used internally by Alpha Processor, Inc. for diagnostic purposes.

4.1.3 Operating System

The UP1000 works with the Linux kernel 2.2.14 or higher in order to boot from SRM 5.6-3 or higher.

Note: *Consult the Alpha Processor, Inc. web site for a list of OS vendors and versions currently supported.*

4.2 Alpha SRM Console

The Alpha SRM Console is the command line interface that supports the Linux operating systems. The SRM Console is used to bootstrap the operating system, configure and test the system hardware, examine system options for errors, and set or change environment variables.

This following sections describe the SRM Console commands and environment variables:

- Invoking the SRM Console
- Command Summary
- Displaying the System Configuration
- Booting the Operating System
- Updating Firmware
- Using Environment Variables
- Environment Variable Summary
- Finding Help

4.2.1 Invoking the SRM Console

When a system is powered up, the SRM Console runs and either remains running or passes control to an operating system. If the system is already running, you can invoke the SRM Console by:

1. Shutting down the operating system
2. Pressing the **Halt** button

Both of these actions return you to the SRM Console prompt, >>>.

For example, in a running system, in which control has been passed to the Linux operating system, do one of the following steps to invoke SRM Console mode:

1. Shut down the operating system according to the procedure described in your operating system documentation. The SRM Console prompt, >>>, displays.

2. Press the **Halt** button. The SRM Console prompt, >>>, displays. You may now perform tasks in SRM Console mode.
3. At the >>> prompt, type **boot** to return to the operating system.

Note: *See "Using Environment Variables," Section 4.2.6 on page 4-15 for more details.*

4.2.2 Command Summary

The SRM Console is a command line interface. SRM Console commands enable you to examine and modify the system state. Table 4-1 gives the most commonly used SRM Console commands. Table 4-2 gives the syntax for the SRM Console commands. Table 4-3 gives special characters you can use in SRM Console mode.

Table 4-1 Summary of SRM Console Commands

Command	Function
boot	**Loads and starts the operating system.**
clear envar	Resets an environment variable to its default value.
clear password	**Sets the password to zero.**
continue	Resumes program execution.
edit	**Invokes the SRM Console line editor on a RAM file or on the nvram file (power-up script).**
halt	Halts the processor. (Same as the **stop** command.)
help	**Displays information about the specified SRM Console command.**
initialize	Resets the system to a known state.
isacfg	**Displays or modifies parameters for ISA devices.**
lfu	Runs the Loadable Firmware Update Utility.
login	**Turns off secure mode, enabling access to all SRM Console commands during the current session.**
more	Displays a file one screen at a time.
set *envar*	**Sets or modifies the value of an environment variable.**
set password	Sets the SRM Console password for the first time or changes an existing password.

Table 4-1 Summary of SRM Console Commands (Continued)

Command	Function
set secure	**Enables secure mode without requiring a restart of the SRM Console.**
show *envar*	Displays the state of the specified environment variable.
show config	**Displays the configuration at the last system initialization.**
show cpu	Displays the state of the processor.
show device	**Displays a list of controllers and their devices in the system.**
show memory	Displays memory module information.
show pal	**Displays the version of the privileged architecture library code (PALcode).**
show power	Displays information about the power supplies, system fans, CPU fans, and temperature.
show version	**Displays the version of the SRM Console program.**
stop	Halts the processor. (Same as **halt**.)

Table 4-2 Syntax for SRM Console Commands

Option	Attribute or Action
Length	**Up to 255 characters, not including the terminating carriage return or any characters deleted as the command is entered. A command longer than 80 characters and without the backslash character (see Table 4-3) causes display of an error message.**
Case	Upper- or lowercase characters can be used for input. Characters are displayed in the case in which they are entered.
Abbreviation	**Only by dropping characters from the end of words. You must enter the minimum number of characters to identify the keyword unambiguously. Abbreviation of environment variables is allowed with the show command.**
Options	You can use command options, to modify the environment, after the command keyword or after any symbol or number in the command. See individual command descriptions for examples.

Table 4-2 Syntax for SRM Console Commands (Continued)

Option	Attribute or Action
Numbers	**Most numbers in SRM Console commands are in decimal notation. Two exceptions, both of which use hexadecimal notation, are addresses and numbers used in the deposit command. The default radic can be overridden by inserting %d before the numbers you want to express in decimal, %o before octal, or %x before hexadecimal. Register names (for example, R0) are not considered numbers and use decimal notation.**
No characters	A command line with no characters is a null command. The SRM Console program takes no action and does not issue an error message; it returns the SRM Console prompt. The SRM Console supports command line recall and editing.
Spaces or Tabs	**Multiple adjacent spaces and tabs are compressed and treated as a single space. The SRM Console program ignores leading and trailing spaces.**

Table 4-3 Special Characters for SRM Console

Character	Function
Return or Enter	**Terminates a command line. No action is taken on a command until it is terminated. If no characters are entered and this key is pressed, the SRM Console just redisplays the prompt.**
Backslash (\)	Continues a command on the next line. Must be the last character on the line to be continued.
Delete	**Deletes the previous character.**
Help	By itself, displays first-level help. When the **Help** key is pressed after part of a command, the system displays available options.
Ctrl/A or F14	**Toggles between insert and overstrike modes. The default is overstrike.**
Ctrl/B or up-arrow	Recalls previous command or commands. The last 16 commands are stored in the recall buffer.
Ctrl/C or Ctrl/P	**Terminates the process that is running. Clears Ctrl/S; resumes output suspended by Ctrl/O. When entered as part of a command line, deletes the current line. Ctrl/C has no effect as part of a binary data stream.**

Table 4-3 Special Characters for SRM Console (Continued)

Character	Function
Ctrl/D or left-arrow	Moves the cursor left one position.
Ctrl/E	**Moves the cursor to the end of the line.**
Ctrl/F or right-arrow	Moves the cursor right one position.
Ctrl/H or Backspace or F12	**Moves the cursor to the beginning of the line.**
Ctrl/J	Deletes the previous word.
Ctrl/O	**Stops output to the SRM Console terminal for the current command. Toggles between** enable **and** disable**. The output can be reenabled by other means as well: when the SRM Console prompts for a command, issues an error message, or enters program mode, or when Ctrl/P is entered.**
Ctrl/Q	Resumes output to the SRM Console terminal that was suspended by Ctrl/S.
Ctrl/R	**Redisplays the current line. Deleted characters are omitted. This command is useful for hardcopy terminals.**
Ctrl/S	Suspends output to the SRM Console terminal until Ctrl/Q is entered. Cleared by Ctrl/C.
Ctrl/U	**Deletes the current line.**
*	Wildcarding for commands such as **show**.
" "	**Double quotes enable you to denote a string for environment variable assignment.**
#	**Specifies that all text between it and the end of the line is a comment. Control characters are not considered part of a comment.**

4.2.3 Displaying the System Configurations

Several commands are used to display the system configuration:

- show config
- show cpu
- show device
- show memory
- show pal
- show power
- show version

show config

The **show config** command displays a list of devices found on the system interconnect and I/O buses. This is the configuration at the most recent initialization. The syntax is:

show config

Example 4-1 Show Config Command

```
>>>show config
                API UP1000 598 MHz

SRM Console:    A5.6-4
PALcode:        OpenVMS PALcode V1.69-54, Tru64 UNIX PALcode V1.62-1

Processors
CPU 0           Alpha 21264A 598 MHz   SROM Revision: V17.31
            Bcache size: 2 MB

Core Logic

MEMORY

Array #       Size     Base Addr
-------    ----------  ---------
  0        128 MB    000000000
  1        128 MB    008000000
  2        128 MB    010000000

Total Bad Pages = 0
Total Good Memory = 384 MBytes

PCI Hose 00
    Bus 00  Slot 00: 1022 7006 25 Host PCI Bridge (AMD-751)
    Bus 00  Slot 01: 1022 7007 25 Bridge to Bus 2, AGP (AMD-751)
    Bus 00  Slot 07: 10B9 1533 C3 Bridge to Bus 1, ISA (Acer Labs M1543C)
    Bus 00  Slot 08/0: 1000 000B 01 NCR 53C896
            pka0.7.0.8.0          SCSI Bus ID7
            dka600.6.0.8.0        QUANTUM ATLASIV 36
    Bus 00  Slot 08/1: 1000 000B 01 NCR 53C896
            pkb0.7.0.108.0        SCSI Bus ID7
            dkb600.6.0.108.0      QUANTUM ATLAS10K 9W
    Bus 00  Slot 16: 10B9 5229 C1 IDE Controller M5229 (Acer Labs M1543C)
            dqa.0.0.16.0
            dqa0.0.0.16.0         CD-ROM CDU4011
    Bus 00  Slot 17: 10B9 7101 00 PMU Controller M7101 (Acer Labs M1543C)
        Bus   00  Slot 20: 10B9 5237 03 Serial Bus Controller M5237 (Acer Labs
M1543C)
    Bus 02  Slot 05: 102B 0525 00 VGA Compatible Controller
```

```
ISA
Slot   Device  Name          Type        Enabled  BaseAddr  IRQ
DMA
0
     0       MOUSE         Embedded      Yes     60       12
     1       KBD           Embedded      Yes     60       1
     2       COM1          Embedded      Yes     3f8      4
     3       COM2          Embedded      Yes     2f8      3
     4       LPT1          Embedded      Yes     3bc      7
     5       FLOPPY        Embedded      Yes     3f0      6
2
     6       EIDE          Embedded      Yes     1f0      14
                                                 3f6      15
                                                 170
                                                 376
     8       USB_MANAGEMENT Embedded     Nos
```

show cpu

The **show cpu** command displays the status of the CPU. The syntax is:

show cpu

Example 4-2 Show CPU Command

```
>>>show cpu

Primary CPU:      00
Active CPUs:      00
Configured CPUs:  00
SROM Revision:    V17.31
```

show device

The **show device** command displays status for devices and controllers in the system: SCSI and MSCP devices, the internal floppy drive, and the network. The syntax is:

show device *[controller_name]*

controller_name	The controller name or abbreviation. When abbreviations or wildcards are used, all controllers that match the type are displayed. If no name is given, the display is a list of all devices and controllers in the system.

Example 4-3 Show Device Command

```
>>>show device
dka600.6.0.8.0          DKA600     QUANTUM ATLAS IV 36 WLS  0A0A
dkb600.6.0.108.0        DKB600      QUANTUM ATLAS 10K 9WLS  UCH0
dqa0.0.0.16.0           DQA0       CD-ROM C DU4011  UY0A
dva0.0.0.0.0            DVA0
pka0.7.0.8.0            PKA0        SCSI Bus ID 7
pkb0.7.0.108.0          PKB0        SCSI Bus ID 7
```

An example of a device name is **dka200.2.0.7.**1. Table 4-4 shows the interpretation of this device name.

Table 4-4 Device Naming Convention

Category		Description			
dk	**Driver ID**	**Two-letter designator of port or class driver:**			
		dk	**SCSI device**	**fw**	**FDDI device**
		dq	**ATAPI CD-ROM**	**mk**	**SCSI tape**
		dr	**RAID set device**	**mu**	**DSSI tape**
		du	**DSSI disk**	**pk**	**SCSI port**
		dv	**Diskette drive**	**pu**	**DSSI port**
		ew	**Ethernet port**		
a	Storage adapter ID	One-letter designator of storage adapter (a, b, c...).			
200	**Device unit number**	**Unique number (MSCP unit number). SCSI unit numbers are forced to 100 X node ID.**			
2	Bus node number	Bus node ID.			

Table 4-4 Device Naming Convention (Continued)

	Category	Description
0	**Channel number**	**Used for multi-channel devices.**
7	Logical slot number	Corresponds to PCI slot number.
1	**Hose number**	**0 — PCI 0**

Table 4-5 PCI Address Assignments

Bus	Device #	Description
Bus 0	**0**	**AMD 751 Bridge, System Controller**
	1	AMD 751 Bridge, AGP Controller
	7	**Acer Labs M1543C Bridge, PCI-ISA**
	8	PCI Slot 1
	9	**PC1 Slot 2**
	10	PCI Slot 3
	11	**PCI Slot 4**
	16	Acer Labs M1543C Bridge, IDE
	17	**Acer Labs M1543C Bridge, USB**
	18	Acer Labs M1543C Bridge, PMU
Bus 1		**ISA Slots**
Bus 2		AGP Slot

show memory

The **show memory** command displays information about each memory bank: slot number, size in megabytes, and the starting address. The syntax is:

show memory

Example 4-4 Show Memory Command

```
>>>show memory

Array #      Size     Base Addr
-------   ----------  ---------
   0       128 MB    000000000
   1       128 MB    008000000
   2       128 MB    010000000
```

```
Total Bad Pages = 0
Total Good Memory = 384 MBytes
```

show pal

The **show pal** command displays the versions of PALcode. PALcode is the Privileged Architecture Library (PAL) code, written to support Alpha processors. It implements architecturally defined processor behavior. The syntax is:

show pal

Example 4-5 Show PAL Command

```
>>>show pal
pal                 OpenVMS PALcode V1.69-54, Tru64 UNIX PALcode
V1.62-1
```

show power

The **show power** command displays status information about the power supplies, system fans, CPU fans, and temperature. This command is useful for displaying the error state of a system that shuts down because of a fan, temperature, or power supply failure. If the system can be restarted, use this command. The syntax is:

show power

Example 4-6 Show Power Command

```
>>> show power

                    Status
Power Supply 0      good
Power Supply 1/Fan Tray good
System Fans         good
CPU Fans            good
Temperature         good
```

show version

The **show version** command displays the version of the SRM Console program that is installed on the system. The syntax is:

show version

Example 4-7 Show Version Command

```
>>>show version
version             A5.6-4 Mar 21 2000 22:26:51
```

4.2.4 Booting the Operating System

The **boot** command is used to boot the operating system.

Example 4-8 Boot Command

```
>>> b dka200

(boot dka200.2.0.7.1 -flags 0,0)
block 0 of dka200.2.0.7.1 is a valid boot block
reading 893 blocks from dka200.2.0.7.1
bootstrap code read in
base = 1fa000, image_start = 0, image_bytes = 6fa00
initializing HWRPB at 2000
initializing page table at 1fff0000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code
```

The **boot** command initializes the processor, loads a program image from the specified boot device, and transfers control to that image. The syntax is:

boot [-file *filename***] [-flags [***value***]] [-halt] [-protocols** *enet_protocol***] [***boot_de***v]**

Table 4-6 Boot Command Options

Option	Description
-file *filename*	**The boot file.**
-flags [*value*]	Specifies additional information to the loaded image or operating system.This qualifier overrides the setting of the **boot_osflags** environment variable. See the **boot_osflags** environment variable on page 4-18 for a list of settings and their meanings.
-halt	**Forces the bootstrap operation to halt and invokes the SRM Console program once the bootstrap image is loaded and page tables and other data structures are set up. Operator console* device drivers are not shut down. Transfer control to the image by entering the continue command.**
-protocols *enet_protocol*	Either **mop** or **boot**p (default). This qualifier overrides the setting of the **ew*0_protocols** environment variable (see Table 4-12).
boot_dev	**A device path or list of devices from which the SRM Console program attempts to boot, or a saved boot specification in the form of an environment variable. This qualifier overrides the setting of the** bootdef_dev **environment variable (see page 4-18). Use the** bootdef_dev **environment variable to define the default boot device string.**

Notes: *The operator console is the monitor, keyboard, and mouse. This hardware is used to enter SRM Console commands into the system.

4.2.5 Updating Firmware

The **lfu** command is used to update firmware from the SRM Console prompt. The **lfu** command starts the Loadable Firmware Update (LFU) Utility. The syntax is:

lfu

Note: *If the system has been shut down from a booted program (most commonly, the operating system) or in some other way halted back to the SRM Console, the system must be reset before running LFU.*

Example 4-9 Lfu Command

```
>>>lfu

Checking dqa0.0.0.16.0 for the option firmware files. . .
dqa0.0.0.16.0 has no media present or is disabled via the RUN/STOP
switch
Checking dva0 for the option firmware files. . .

Option firmware files were not found on CD or floppy.
If you want to load the options firmware,
please enter the device on which the files are located(ewa0),
or just hit <return> to proceed with a standard console update: dva0
Please enter the name of the options firmware files list, or
Hit <return> to use the default filename (up1000fw.txt)  :
Copying up1000fw.txt from dva0. . .
Copying Up10Srm.Rom from dva0. . .


            ***** Loadable Firmware Update Utility *****
--------------------------------------------------------------------------------
 Function    Description
--------------------------------------------------------------------------------

 Display     Displays the system's configuration table.
 Exit        Done exit LFU (reset).
 List        Lists the device, revision, firmware name, and update
revision.
 Readme      Lists important release information.
 Update      Replaces current firmware with loadable data image.
 Verify      Compares loadable and hardware images.
 ? or Help   Scrolls this function table.
--------------------------------------------------------------------------------


UPD> list

Device        Current Revision    Filename          Update Revision
```

```
srm          5.6-4      srm_fw          5.6-4

UPD> update

Confirm update on:
srm
[Y/(N)]y
WARNING: updates may take several minutes to complete for each device.

                    DO NOT ABORT!

srm          Updating to 5.6-4...  Verifying 5.6-4...  PASSED.

UPD>
```

4.2.6 Using Environment Variables

Environment variables pass configuration information between the SRM Console and the operating system. Their settings determine how the system powers up, boots the operating system, and operates. You issue an **init** command (see page 4-25 for more details) to activate a new environment variable.

Example 4-10 Set *envar* and Show *envar* Commands

```
>>> show console
console                  graphics
>>> set console serial
>>> show console
console                  serial
>>> init
```

Environment variables are set or changed with the **set *envar*** command and set to default values with the **set -default *envar*** command. Their values are viewed with the **show *envar*** command. User-defined nonvolatile environment variables are created with the **edit** (see Section 4.2.8 on page 4-25 for further information) command.

set *envar*

The **set** command sets or modifies the value of an environment variable. It can also be used to create a new environment variable if the name used is unique. Environment variables are used to pass configuration information between the SRM Console and the operating system. The setting of these variables determines how the system powers up, boots the operating system, and operates. The syntax is:

set [-default] *envar value*

Table 4-7 Set *Envar* Options

Option	Description
-default	**Restores an environment variable to its default setting.**
envar	The name of the environment variable to be modified.
value	**The new value of the environment variable.**

Whenever you modify the value of any of the following environment variables, the new value takes effect only after you reset the system by pressing the **Reset** button or issuing the **initialize** command:

- console
- kbd_hardware_type
- language
- os_type

show *envar*

The **show *envar*** command displays the current value (or setting) of an environment variable. The syntax is:

show *envar*

envar	The name of the environment variable to be displayed. The wildcard * displays all environment variables.

Example 4-11 Using show *envar*

```
>>> show os_type
>>>unix
```

4.2.7 Environment Variable Summary

Environment variables pass configuration information between the SRM Console and the operating system. Their settings determine how the system powers up, boots the operating system, and operates. Environment variables are set or changed with the **set** *envar* command and returned to their default values with the **clear** *envar* command. Their values are viewed with the **show** *envar* command.

Table 4-8 lists the environment variables. Detailed descriptions follow. The environment variables are specific to the SRM Console.

Table 4-8 Environment Variable Summary

Environment Variable	Function
auto_action	**Specifies the SRM Console's action at power-up, a failure, or a reset.**
bootdef_dev	Specifies the default boot device string.
boot_osflags	**Specifies the default operating system boot flags.**
com*_baud	Changes the default baud rate of the COM1 or COM2 serial port.
console	**Specifies the device on which power-up output is displayed (serial terminal or graphics monitor).**
ei_mode	Specifies the connection type of the default Ethernet controller. In this case, the controller is an Intel controller.
ew*0_mode	**Specifies the connection type of the default Ethernet controller. In this case, the controller is a Digital Equipment Corporation controller.**
ew*0_protocols	Specifies network protocols for booting over the Ethernet controller.
kbd_hardware_ type	**Specifies the default operator console keyboard type.**
language	Specifies the operator console keyboard layout.
os_type	**Specifies the operating system. Valid entry is: unix.**
password	A password stored in the NVRAM used to secure the operator console.
pci_parity	**Disables or enables parity checking on the PCI bus.**
pk*0_fast	Enables fast SCSI mode.
pk*0_host_id	**Specifies the default value for a controller host bus node ID.**
pk*0_soft_term	Enables or disables SCSI terminators on systems that use the QLogic ISP1040 SCSI controller.
tt_allow_login	**Enables or disables login to the SRM Console firmware on other operator console ports.**

auto_action

Specifies the action the SRM Console takes any time the system powers up, fails, or resets. When the setting involves autoboot, the system boots from the default boot device specified by the value of the **bootdef_dev** environment variable. The syntax is:

set auto_action *value*

The options for *value* are show in Table 4-9.

Table 4-9 Auto_Action Values

Option	Description
halt	**The system remains in SRM Console mode after power-up or a system crash.**
boot	The system boots automatically when it is turned on and halts after a system failure.
restart	**The system boots automatically when it is turned on or after it fails.**

Note: *If a halt assertion exists, the SRM Console ignores the auto_action setting and halts at the SRM Console.*

bootdef_dev

The **bootdef_dev** environment variable specifies one or more devices for booting the operating system. When more than one device is listed, the system searches in the order listed and boots from the first device with operating system software. The syntax is:

set bootdef_dev *boot_device*

boot_device	The name of the device on which the system software has been loaded. To specify more than one device, separate the names with commas. Enter the command **show bootdef_dev** to display the current default boot device. Enter the command show device for a list of all devices in the system.

boot_osflags

The **boot_osflags** environment variable passes information to the **boot** command. That information is dependent on the operating system to be booted. The syntax is:

set boot_osflags *flags_value*

The options for *flags_value* are shown in Table 4-10.

Table 4-10 Boot_Osflags Options

Option	Description
root=/dev/sda5	**Set the root filesystem to the 5th partition of the first SCSI disk.**
root=/dev/hda2	Set the root filesystem to the 6th partition of the first IDE disk.
1	**Use config number 1 from the /etc/aboot.conf file**

com*_baud

The default baud rate for the system is 9600. With the **com*_baud** environment variable, you can set the baud rate to match that of the device connected to the port.

You will be asked to confirm the change, as shown here:

```
>>> set com1_baud 19200
Embedded Remote Console only supports 9600 baud. Continue?
(Y/[N]) n
bad value - com1_baud not modified
>>>
```

The syntax is:

set com*_baud *baud_value*

baud_value	The new baud rate. A list of possible values is displayed by attempting to set this environment variable to an unacceptable value (for example, **set com2_baud xxx**).

console

The operator console terminal can be either a graphics monitor or a serial terminal. The **console** environment variable specifies which is used. The syntax is:

set console *output_device*

The options for *output_device* are:

graphics (default)	The operator console terminal is a graphics monitor or a device connected to the VGA or TGA module.
serial	The operator console terminal is the device connected to the COM2 port.

Whenever you change the value of **consol**e, you must reset the system by pressing the **Reset** button or issuing the **initialize** command.

ew*0_mode

Sets an Ethernet controller to run an Ethernet network. The default value is **auto-sense**. For the fast setting, the device defaults to fast.

The syntax is:

set ew*0_mode *value*

The options for *value* are shown in Table 4-11.

Table 4-11 ew*0_mode Options

Option	Description
aui	**Device type is AUI.**
auto-sense	Device type is sensed by the SRM Console.
twisted-pair	**Device type is 10BaseT (twisted pair).**
fast duplex, twisted-pair	Device type is duplex 10BaseT
fast	**Device type is fast 100Base TX**
fast FD	Device type is fast full duplex 100Base TX
BNC	**Device type is BNC**
auto-negotiate	DE500-BA provides auto-sensing capabilities

ew*0_protocols

Enables network protocols for booting and other functions. The syntax is:

set ew*0_protocols *protocol_value*

The options for *protocol_value* are show in Table 4-11.

Table 4-12 ew*0_protocols Options

Option	Description
mop	**Sets the network protocol to mop (Maintenance Operations Protocol), the setting typically used with the Linux operating system.**
bootp (default)	Sets the network protocol to bootp, the setting typically used with the Linux operating system.
bootp, mop	**When both are listed, the system attempts to use the mop protocol first, regardless of which is listed first. If not successful, it then attempts the bootp protocol.**

kbd_hardware_type

Used only on systems with the language variant 3C (Français), this environment variable sets the keyboard hardware type as either PCXAL or LK411 and enables the system to interpret the terminal keyboard layout correctly.

Whenever you change the value of **kbd_hardware_typ**e, you must reset the system by pressing the **Reset** button or issuing the **initialize** command.

The syntax is:

set kbd_hardware_type *keyboard_type*

The options for *keyboard_type* are:

pcxal (default)	Selects the default keyboard hardware type.
lk411	Selects the LK411 keyboard layout for use with language variant 3C (Français).

language

Specifies the keyboard layout, which is language dependent. The setting of the **language** environment variable must match the language of the keyboard variant.

Whenever you change the value of **languag**e, you must reset the system by pressing the **Reset** button or issuing the **initialize** command.

The syntax is:

set language *language_code*

The options for *language_code* are show in Table 4-13.

Table 4-13 Language Options

Option	Description
0	**No language (cryptic)**
30	Dansk (Danish)
32	**Deutsch (German)**
34	Deutsch (Schweiz) (Swiss)
36	**English (American)**
38	English (British / Irish)
3A	**Español (Spanish)**
3C	**Français (French)**
3E	**Français (Canadian)**
40	Français (Suisse Romande)
42	**Italiano (Italian)**
44	Nederlands (Netherlands)
46	**Norsk (Norwegian)**
48	Portuguese (Portuguese)
4A	**Suomi (Finnish)**
4C	Svenska (Swedish)
4E	**Belgisch-Nederlands (Dutch)**

os_type

The **os_type** environment variable specifies the default operating system. This variable is set at the factory to the setting for the operating system purchased. Use this command to change the factory default setting.

Whenever you change the value of **os_typ**e, you must reset the system by pressing the **Reset** button or issuing the **initialize** command.

The syntax is:

set os_type *os_type*

The options for *os_type* are:

unix	Linux is the default operating system, and the SRM firmware is started during power-up or reset.

password

Sets or clears the SRM Console password stored in Non-Volatile RAM (NVRAM).

The syntax is:

set password

The password is not an argument to the **set password** command; the SRM Console prompts the user for the string, which must be between 15 and 30 characters.

pci_parity

Disables or enables parity checking on the PCI bus.

Some PCI devices do not implement PCI parity checking, and some have a parity-generating scheme in which the parity is sometimes incorrect or is not fully compliant with the PCI specification. A side effect of this aberrant behavior is that superfluous PCI parity errors are reported by the host PCI bridge. In such cases, the device can be used as long as parity is not checked; disabling PCI parity checking prevents false parity errors that can cause system problems.

The syntax is:

set pci_parity *value*

The options for *value* are:

on (default)	Enables PCI parity checking.
off	Disables PCI parity checking.

pk*0_fast

Enables fast SCSI to perform in either standard or fast mode. If the system has at least one fast SCSI device, set the default controller speed to fast SCSI (1). Devices on a controller that connects to both standard and fast SCSI devices will perform at the appropriate rate for the device. If the system has no fast SCSI devices, set the default controller speed to standard SCSI (0). If a fast SCSI device is on a controller set to standard, it will perform in standard mode.

The syntax is:

set pk*0_fast *scsi_speed*

The options for *scsi_speed* are:

0	The controller is in standard SCSI mode.
1 (default)	The controller is in fast SCSI mode.

pk*0_host_id

Sets the controller host bus node ID to a value between 0 and 7.

Each SCSI bus in the system requires a controller. Buses can theoretically support up to eight devices; however, the eighth device must always be a controller. Each device on the bus, including the controller, must have a unique ID, which is a number between 0 and 7. This is the bus node ID number.

On each bus, the default bus node ID for the controller is set to 7. You do not need to change the controller bus node ID unless you place two or more controllers on the same bus.

To list the controllers on your system, enter the command **show device** (see page 4-9). SCSI devices begin with the letters “pk” (for example, pka0). The third letter is the adapter ID for the controller. When entering the command **set pk*0_host_i**d, replace the asterisk with the adapter ID letter.

The syntax is:

set pk*_host_id *scsi_node_id*

The value for *scsi_node_id* is the bus node ID, a number from 0 to 7.

pk*0_soft_term

Enables or disables SCSI terminators. This command applies to systems that use the QLogic ISP1040 SCSI controller.

The QLogic ISP1040 SCSI controller implements the 16-bit wide SCSI bus. The QLogic module has two terminators, one for the low eight bits and one for the high eight bits.

The syntax is:

set pk*0_soft_term *value*

The options for *value* are shown in Table 4-14.

Table 4-14 pk*0_soft_term Options

Option	Description
off	**Disables termination of all 16 bits.**
low (default)	Enables low eight bits and disables high eight bits.
high	**Enables high eight bits and disables low eight bits.**
on	Enables all 16 bits.
diff	**Places the bus in differential mode.**

tt_allow_login

Enables or disables login to the SRM Console firmware on alternate operator console ports. If the environment variable **console** (see page 4-19) is set to serial, the primary operator console device is the terminal connected through the COM1 port. The command **set tt_allow_login 1** enables logins through either the COM2 port or a graphics monitor.

The syntax is:

set tt_allow_login *value*

The options for *value* are:

0	Disables login through the COM2 port or a graphics monitor.
1 (default)	Enables login through the COM2 port or a graphics monitor.

4.2.8 Finding Help

The **help** command displays basic information about SRM Console commands. The syntax is:

help *[command . . .]*

command . . .	Command or topic for which help is requested. The options are:

none	Displays the complete list of commands for which you can receive help.
command_name	Displays information about the SRM Console command.
argument_string (such as "sh")	Displays information about all commands that begin with that string.

Example 4-12 Help Command

```
>>> help set
NAME
    set
FUNCTION
    Set an option or modify the value of an environment
    variable.
SYNOPSIS
    set <option> <value> or <envar> [-] <value>
    where
    <option>={host,mode}
    where
    <envar>={auto_action,bootdef_dev,boot_osflags,...}
    [-default]
```

4.3 Alpha Diagnostics

The Alpha Diagnostics firmware is used internally by Alpha Processor, Inc. for diagnostic purposes.

Native mode diagnostics depend on various system components to be functioning correctly. When Reset PAL code determines that the UP1000 is capable of supporting the higher level environment, it fetches this image from the firmware and transfers control to it.

An Alpha Slot B Module using an 21264 processor implements a serial communications link directly connected to the processor. This link, called

the Debug Port, can be used for reporting and interacting in the earliest stages of system initialization, after execution passes from PAL mode. It is accessed through J25 on the UP1000 Motherboard (see Figure 2-1 on page 2-2).

The Alpha Diagnostics includes the following tests:

- Interrupt handling—Raise interrupts with a known response
- UP1000 Motherboard components—chipset, Flash ROM integrity, on-board devices
- Memory—stress test
- ISA cards
- PCI bus—Initialization, stressing and interrupts
- SM timer support and EEPROMs
- FDD and IDE disks—DMA

If the Alpha Diagnostics detects a working keyboard and video console, it displays a graphical interface containing a menu of diagnostics. This is the Console interface to the Alpha Diagnostics. If the Alpha Diagnostics does not detect a video console, the Alpha Diagnostics uses the Debug Port interface.

4.4 Installing the Linux Operating System

The firmware initializes the UP1000 system and, via the Alpha SRM Console, enables you to install and boot the Linux operating systems.

As noted at the beginning of Chapter 4 this system supports many OS distributions and vendors. Consult our web site for a complete current list at:

www.alpha-processor.com

1. With your browser pointed at the Alpha Processor, Inc. web site, click on API Partners Program.
2. Scroll down in this page to the link, Linux Solutions Datasheet. Click on this link. This takes you to a datasheet on supported operating systems and applications.
3. Or, click on Software Vendors at the left center of the browser.

Examples of installing commercially available Linux distributions are given in this section. Typical requirements and procedures for Red Hat Linux Versions 6.1 or SuSE Version 6.3 follow.

4.4.1 Requirements

The following disks are required:

- The appropriate Linux operating system distribution CD-ROM disk, either the Red Hat Version 6.1 or SuSE Version 6.3 CD-ROM disk.
- If you are installing SuSE Version 6.3, you will need a ramdisk floppy. See the SuSE Version 6.3 documentation for instructions about creating this disk.
- The UP1000 installation diskette is also required.

Red Hat Installation Requirements

The following items should be observed while performing the standard installation procedures:

1. Be careful when configuring the X server.

   Note: *DO NOT TEST the X server configuration*

2. If you choose the 'Workstation' or 'Server' package, you do not need to partition the disk yourself.

SuSE Installation Requirements

There are no special installation requirements for SuSE.

4.4.2 Setting Environmental Variables

From the SRM Console prompt, >>>, check the device numbers for disk, diskette and CD-ROM drives:

Type **show device**

The SRM Console environmental variables identified in Table 4-15 are set.

Table 4-15 SRM Console Variables

Variable	Setting
bootdef_dev	**Sets default boot device** **Example: DQA0 or DKA0**
boot_osflags	Information passed to Linux kernel via boot Example: root=/dev/hda
boot_file	**Sets file to use as the kernel on the default boot device** **Example for Red Hat 6.1: kernels/generic.gz**

From the SRM Console prompt, >>>, the procedures are as follows:

- To set the default boot device to the floppy drive:

  Type **set bootdef_dev dva0**
- To set the default boot file to the kernel on the CD, choose the command that corresponds to your version of Linux:
  - For Red Hat 6.1 or SuSE Version 6.3:

    Type **set boot_file "vmlinux.gz"**
- To set the default flags to point to the (currently non-existent) root partition on the hard drive:

  Type **set boot_osflags "root=/dev/sda2"**

  Note: *Setting the flags to point to sda1 (Linux terminology for SCSI Disk A Partition 2) assumes that you will create and set the first partition during the installation to be the "root" partition. If you plan to use another name for your "root" partition, set this variable to that name.*
- To check the environmental setting parameters you have chosen:

  Type **show boot***

4.4.3 Starting the Linux OS Installation

To start the Linux OS installation, perform the following:

1. Insert the Red Hat Version 6.1 or SuSE Version 6.3 Alpha CDROM into the drive.
2. From the SRM Console prompt (>>>) for Red Hat Version 6.1:

   Type **boot -flags "root=/dev/hda"**

   or for SuSE Version 6.3:

   Type **boot -flags "root=/dev/dev/fd0 load_ramdisk=1 ramdisk_size=20480**
3. Follow the instructions for your distribution.

Background Information

To the SRM Console, the IDE CD-ROM drive is called DQA0. To the Linux kernel, it is called "/dev/hda".

For this initial installation boot, you use the root directory of the CD-ROM. In this case, by choosing the boot parameter **-flags "root=/dev/hda"** to begin, you bypass the environmental setting made in section 4.4.4.

Device names are different if you are using SCSI adapters or IDE disks. To the Linux kernel:

- SCSI CD-ROM names are "/dev/scd***x***", where ***x*** is the device number
- SCSI hard disk names are "/dev/sd***x***"
- IDE devices are "/dev/hd***x***"

Other Boot Options

Refer to your Linux documentation in order to consider other boot options.

To boot, the Linux kernel must be on an SRM-supported device.

To boot from a diskette, set the environmental variable **bootdef_dev** to the diskette drive (dva0).

To boot from a hard disk drive (dka0), set the environmental variable **boot_file** to the directory and filename of the kernel.

Instructions for creating a SRM bootable diskette or hard disk are available on-line at:

http://www.alphalinux.org/faq/srm.html

Post Installation Check

At this point, Linux is installed on the hard disk. If Partition 1 is the root directory, then the environmental variable **boot_osflags** is correct. If your root directory has another name, take this opportunity to set the variable to the corresponding name.

4.4.4 After Installing Linux

After installing the operating system, you must do the following:

- Copy the kernel to hard disk
- Reset environment variables

The following sections describe these procedures.

Copy Kernel to Hard Disk, Red Hat Versions 5.2, 6.0, and 6.1 or SuSE Versions 6.1 and 6.3

Use the following steps to copy the kernel:

1. Type the following at the SRM Console prompt >>>:

   >>> **boot dva0 -fi vmlinux.gz -f1 "root=/dev/sda2 single"**

   The shell prompt appears.

2. Type the following commands at the bash# prompt:

   For Red Hat:

   bash# **mount -t ext2 /dev/fd0 /mnt/floppy**
   bash# **cp /mnt/floppy/* /boot/**

   For SuSE:

   bash# **mount -t ext2 /dev/fd0 /floppy**
   bash# **cp /floppy/* /boot/**

3. Type the following commands at the bash# prompt:

   bash# **gzip -dc /boot/system.gz > /boot/System.map**
   bash# **ln -s Tsunami /etc/alpha_systype**

4. To configure the monitor and video driver, type the following:

   bash# **whereis Xconfigurator**

The system returns the location of the Xconfiguration, such as shown in the following example:

bash# usr/X11R6/bin/Xconfigurator

Follow the Xconfigurator prompts to set up the monitor and video drivers.

5. When the monitor and video drivers are configured, shutdown the system. Type the following command at the bash# prompt:

   bash# **shutdown -h now**

Reset Environmental Variables for Normal Boot

Reset the SRM Console environmental variables for normal operations after installing the OS.

Type the following at the SRM Console prompt, >>>:

1. >>> **set bootdef_dev dka0**
2. >>> **set boot_file vmlinux.gz**
   (Assumes that the /boot partition is sda1.)
3. >>> **boot**

Chapter 5 Troubleshooting

This chapter discusses troubleshooting aspects for both hardware and software components during the UP1000 system startup.

Topics covered include:

- Video review checklist
- Status LEDs
- POST codes
- Beep codes
- Variable firmware configuration issues
  - Firmware error categories
  - Error recovery jumper settings
  - Error recovery procedure

5.1 Hardware Startup

5.1.1 No Video Present

Use the following steps to diagnose and fix video problems:

1. Check the AC power cord connection to the AC outlet.
2. Ensure that the monitor is connected and switched on.
3. Check the voltage setting on the chassis power supply (115 VAC in the U.S.).

WARNING*: *Always take appropriate electrostatic discharge safety measures when handling boards or modules.

4. Check that the Alpha Slot B Module fans are connected and spinning.
5. Turn the system power OFF.
6. Reseat the video card and ensure that it is connected to the monitor.
7. Reseat the DIMMs.
8. Replace the DIMMs.

5.1.2 LED Status Indicators

Two LED indicators, D8 and D9, provide diagnostic information about a UP1000 system including the status of some Alpha Slot B Module functions.The remaining 8 other LEDs are used by Alpha Processor, Inc.

The LEDs are mounted on the lower edge of the motherboard below the Alpha Slot B Module and to the right of the I/O connector area. Their orientation is shown in Figure 5-1.

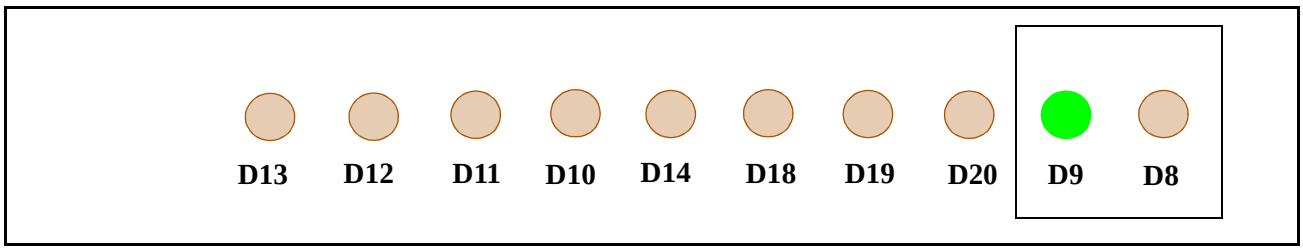

Figure 5-1 LED Status Indicators

Use Table 5-1 to interpret the LED status information.

Table 5-1 LED Status Indicators

LED	Function	Comment
D9	**PAL**	**Green LED ON when PAL codes are loading**
D8	PowerGOOD	ON when power to Alpha Slot B is good

5.1.3 POST (Power On Self Test) Codes

Utilizing an ISA-based POST card module, you can monitor the sequential steps as the system is initialized. Each post code, its source and a description of its message is listed in Table 5-2.

Table 5-2 POST Codes with Source and Message Information

Source	POST Code (hex)	Message
SROM	**20**	**Firmware initialization complete**
	01	CPU speed detected; initialize Southbridge
	02	**Southbridge ready**
	03	Initialize L2 cache
	05	**Start sweep of L2 cache and memory**
	06	L2 cache and memory ready
	14	**Load system code**
	15	Loading uncompressed firmware into memory
	16	**Loading compressed firmware into memory**
	17	Jump to loaded firmware
	3F	**Fatal error. Second code identifies source of error 06 = no memory found or bad memory**

5.1.4 Beep Codes

The UP1000 system delivers several audible troubleshooting messages which are referred to as beep codes. They are described in Table 5-3.

Table 5-3 Beep Codes and Message Information

Beep Code	Message Description
4	**No valid header found in ROM; loading entire ROM**
6	Memory error detected

5.2 Error Recovery Procedures

The UP1000 Motherboard has six configuration jumpers which have selectable settings. These jumpers are all firmware-related. They are identified by the shaded box in Figure 5-2. Changing the variable configuration settings is used to recover from several error conditions.

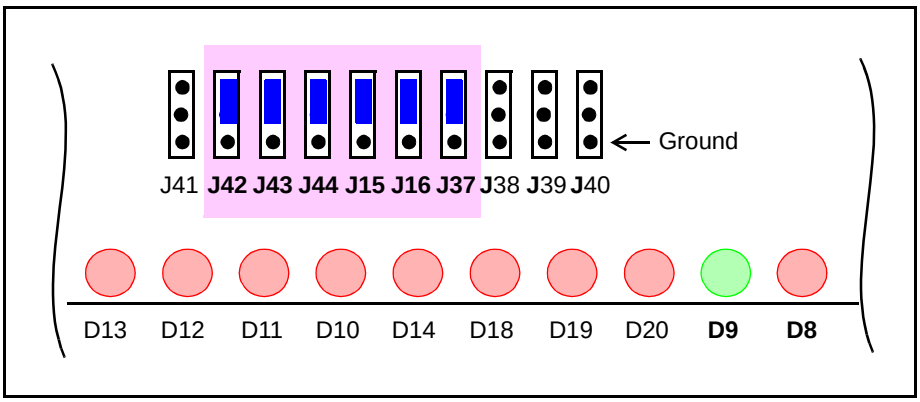

Figure 5-2 Variable Configuration Jumpers

5.2.1 Error Situations

In addition to the factory default setting, there are two other configuration settings which you select based on certain error categories.

Restore Factory Defaults

Some error conditions of this type include:

- Choosing incorrect selections when configuring the SRM Console. These selections prevent the system from booting.
- Forgetting your system password.

Reload Firmware

An error condition of this type may occur during the upgrading of the SRM Console (see Section 4.4.4 in Chapter 4) by an improper system action. An example would be: accidentally powering off the system during this procedure.

For more information, see the FAQs on the Alpha Processor, Inc. web site:

http://www.alpha-processor.com

5.2.2 Error Recovery Jumper Settings

For these error recoveries, select the appropriate settings from Table 5-4:

Table 5-4 Jumper Settings for Various Error Conditions

Error	Function	J42	J43	J44	J15	J16	J37
None = Factory Default	**Boot to Operating System**	**0**	**0**	**0**	**0**	**0**	**0**
Restore Factory Defaults	Restore Factory Defaults	1	0	0	0	0	0
Reload Firmware	**Reload Alpha Diagnostics**	**1**	**1**	**0**	**0**	**0**	**0**

Notes: 1. Pin 1 is closest to the board edge, pin 3 is closest to the Alpha Slot B Modules.
0 = Shunt installed on pins 2 and 3.
1 = Shunt installed on pins 1 and 2.

An enlarged visual representation of these settings is shown in Figure 5-3.

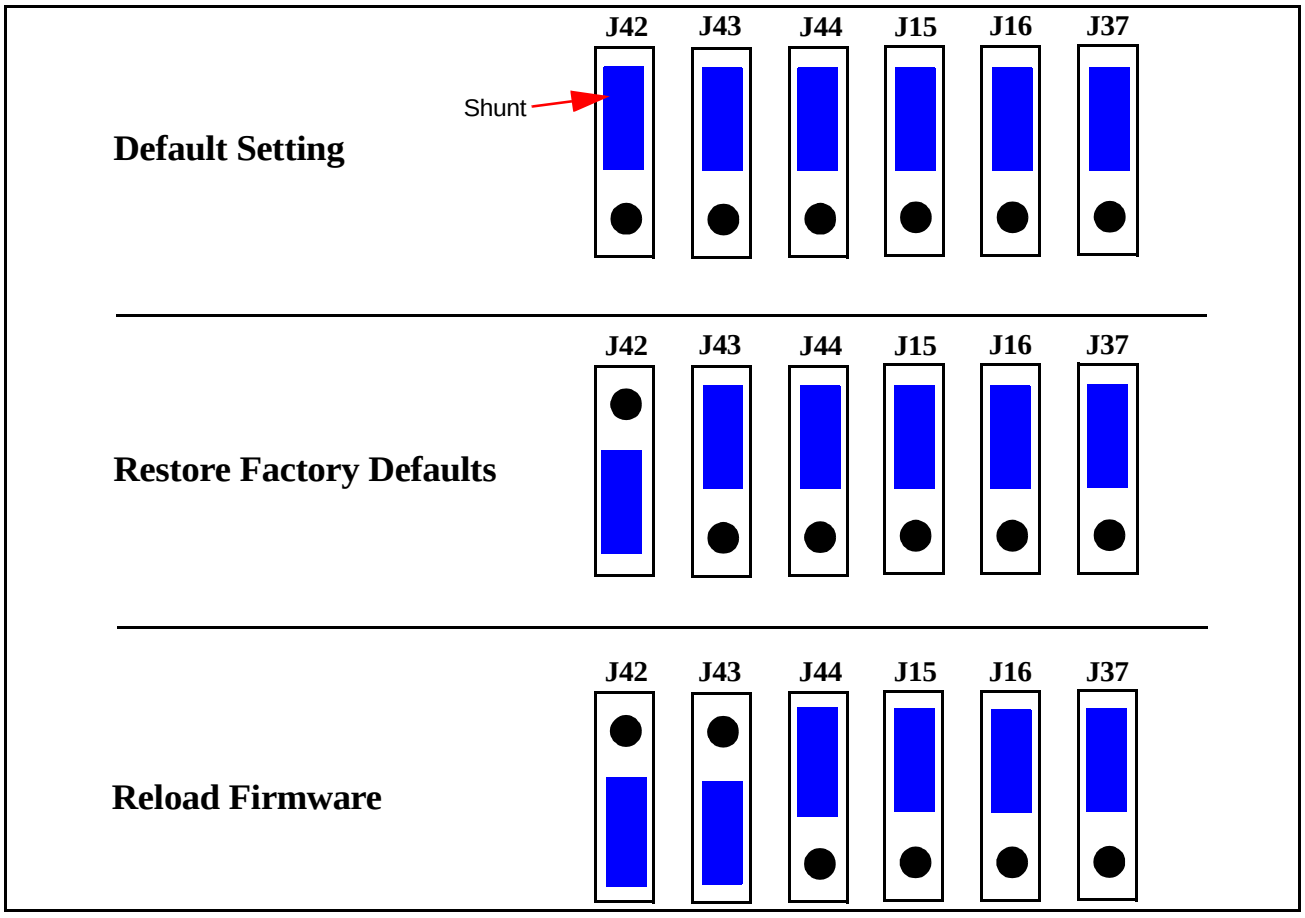

Figure 5-3 Enlarged View, Variable Configuration Jumpers

5.2.3 Error Recovery Procedure

To clear the errors noted in Section 5.2.1, take the following steps:

1. Power off the system.
2. Change the jumper shunts according to the error to be cleared.
3. Start the system.
4. Enter the proper parameters in SRM Console, load the Operating System.
5. Power off the system.
6. Restore the jumper shunts to their default positions.
7. Start the system.

Appendix A

Support,

Products and

Documentation

A.1 Customer Support

Alpha Processor, Inc. provides assistance for their products on their web page at:

http://www.alpha-processor.com

A.2 Supporting Products

Alpha Processor, Inc. maintains a Hardware Compatibility List (HCL) on their web site (www.alpha-processor.com) for components and accessories that are not included with the UP1000. Compatibility for items such as memory, power supplies, and enclosures are listed.

A.3 Alpha Products

Alpha Processor, Inc. maintains information about other Alpha products on their web site (www.alpha-processor.com).

A.4 Alpha Processor, Inc. Documentation

The UP1000 suite of publications available from Alpha Processor, Inc. include the following:

Title	Vendor
***UP1000 Quick Start Installation Guide* (51-0035-0A)**	**Alpha Processor, Inc.**
UP1000 User Manual (51-0036-0A)	Alpha Processor, Inc.
***UP1000 Technical Reference Manual* (51-0034-2A)**	**Alpha Processor, Inc.**

UP1000 Quick Start Installation Guide

The *UP1000 Quick Start Installation Guide* is an illustrated step-by-step set of procedures focused on setting up and configuring a UP1000 system.

UP1000 User Manual

The *UP1000 User Manual* describes the Alpha Processor, Inc. UP1000 product, including the UP1000 Motherboard and the Alpha Slot B Module. In addition, this manual describes the SRM Console firmware user interface.

UP1000 Technical Reference Manual

The *UP1000 Technical Reference Manual* describes the Alpha Processor, Inc. UP1000 product, including the UP1000 Motherboard used with the Alpha Slot B Module, the AMD-71 System Controller, and the ALI M1543C PCI-ISA Bridge controller chips.

A Publication Evaluation Form is available at the end of this manual and on the Alpha Processor, Inc. web page.

A.5 Related Third-Party Publications

The following documents are useful for understanding and navigating the UP1000 system and its user interface.

Linux

Linux for Dummies, 2nd Edition, Jon "maddog" Hall, IDG Books Worldwide, Inc., Foster City, CA 94404

Alpha Architecture

Alpha Architecture Reference Manual, Third Edition, Digital Press, order # EQ-W938E-DP.

Alpha Architecture Handbook, Version 4, Compaq Computer Corporation, order # EC-QD2KC-TE, October, 1998.

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Contents and Organization

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