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THEMIS

Installation Manual



RES-32DCX

3RU 19” Rack-Mount Rugged Enterprise Server
Two Dual-Core Xeon CPUs / Up to 2.33 GHz

RES-32DCX

Two Dual-Core Xeon CPU Platform

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RES-32DCX Installation Manual

Version 1.3— March 2008

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March 2008

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Version 1.3..... March 2008

- Modified *Table 1-2*, page 1-11, to define Overheat/Fan Fail LED function.
- Added a section (German) on Safety Instructions before the Table of Contents.
- Assorted minor edits and changes throughout the manual.

Version 1.2..... February 2008

- Added a section (English) on Safety Instructions before the Table of Contents.

Version 1.1.....August 2007

- Added an introductory Preface at the beginning of the manual.
- Modified *Figure 1-2*, page 1-2, *Figure 1-3*, page 1-3, and *Figure 1-5*, page 1-10, in Chapter 1.
- Added Section 1.2.3, “The Intel 6700 PCI-X 64-Bit Hub (PXH-V),” on page 1-14 of Chapter 1, "Overview and Specifications".
- Revised *Table 1-4*, page 1-16, in Chapter 1.
- Revised Section 2.1.5, “Removable 120-mm Fan Housing,” on page 2-10 of Chapter 2, "Installation and Operation" to correct descriptive text and figures.
- Modified Section A.5, “Gigabit Ethernet LAN Port,” on page A-5 of Appendix A, “Connector Pinouts”.
- Revised *Figure B-1*, page B-1, in Appendix B, “Rack-Mount Slide Installation”, to modify and show additional dimensions.
- Added Appendix C, “BIOS Setup Utility”.
- Added Appendix D, “Red Hat Enterprise Linux Installation”.
- Assorted minor edits and changes throughout the manual.

Version 1.0..... February 2007

Safety Instructions

To maximize user safety and ensure correct device operation, all instructions contained in this section should be read carefully.



Caution: It is important that the user observe all warnings and instructions that are on the device and contained in this manual.

- The device must be used in accordance with the instructions for use.
- Electrical installations in the room must correspond to the requirements of respective regulations.
- Take care that there are no cables, particularly mains cables, in areas where persons can trip over them.
- Do not use a mains connection in sockets shared by a number of other power consumers. Do not use an extension cable.
- Only use the mains cable supplied.
- The unit is completely disconnected from the power source only when the power cord is disconnected from the power source. Therefore the power cord and its connectors must always remain easily accessible.
- Do not set up the device in the proximity of heat sources or in a damp location. Make sure the device has adequate ventilation.
- All plugs on the connection cables must be screwed or locked to the chassis housing.
- The device is designed to be used in horizontal position only.
- The device is no longer safe to operate when
  - — the device has visible damage or
  - — the device no longer functions.
- In these cases, the device must be shut down and secured against unintentional operation.
- Repairs may only be carried out by a person authorized by Themis Computer.

- The device may only be opened for the installation and removal of extension (PCI) cards, memory modules, hard-disk drives, fan housings, power supplies (RES-22 and RES-32 systems only), and the lithium battery—all in accordance with the instructions given in this manual.
- If extensions are made to the device, the legal stipulations and the device specifications must be observed.
- The device must be switched off when removing the top cover; for example, before installing extension (PCI) cards.

Operation of Laser Source Devices

DVD/CD-ROM drives contain laser light-emitting diodes (classified in accordance with IEC 825-1:1993: LASER CLASS 1) and, therefore, must not be opened.

If the enclosure of such a drive is opened, invisible laser radiation is emitted. Do not allow yourself to be exposed to this radiation.

The laser system meets the code of Federal Regulations 21 CFR,1040 for the USA and Canadian Radiation Emitting Devices Act, REDR C 1370.

Electrostatic Discharge (ESD)

A sudden discharge of electrostatic electricity can destroy static-sensitive devices or micro-circuitry. Proper packaging and grounding techniques are necessary precautions to prevent damage. Always take the following precautions:

1. Transport boards in static-safe containers such as boxes or bags.
2. Keep electrostatic-sensitive parts in their containers until they arrive at static-free stations.
3. Always be properly grounded when touching a sensitive board, component, or assembly.
4. Store electrostatic-sensitive boards in protective packaging or on conductive foam.

Grounding Methods

Guard against electrostatic damage at workstations by following these steps:

1. Cover workstations with approved anti-static material. Provide a wrist strap connected to a work surface and properly grounded tools and equipment.
2. Use anti-static mats, heel straps, or air ionizers to give added protection.
3. Handle electrostatic-sensitive components, boards, and assemblies by the case or the PCB edge.
4. Avoid contact with pins, leads, or circuitry.
5. Turn off power and input signals before inserting and removing connectors or test equipment.
6. Keep the work area free of non-conductive materials such as ordinary plastic assembly aids and Styrofoam.
7. Use field service tools, such as cutters, screwdrivers, and vacuums that are conductive.
8. Always place drives and boards PCB-assembly-side down on the foam.

Instructions for the Lithium Battery

RES systems are equipped with a lithium battery installed on the motherboard. To replace this battery, please observe the instructions that are described in this manual.



Warning: There is a danger of explosion when the wrong type of battery is used as a replacement.

Auszug aus RES-32DCX Betriebshandbuch:

Sicherheitshinweise

Hersteller:	Themis Computer 47200 Bayside Parkway Fremont, CA 94538, U.S.A. Tel.-Nr. 001-510-252-0870 Fax-Nr. 001-510-490-5529

Allgemeine Bezeichnung:	Rechner-Arbeitsplatz
Handelsname/Typenbezeichnung:	RES-32DCX (Rugged Enterprise Server)

Deutsche Version Nr. 01/2008 vom 20.03.2008

Sicherheitshinweise

Lesen Sie im Interesse Ihrer eigenen Sicherheit und des bestimmungsgemäßen Gebrauchs diesen Abschnitt sorgfältig durch.



Achtung: Die Warnungen und Hinweise auf dem Gerät und in dieser Anleitung sind unbedingt zu beachten.

- Das Gerät darf nur entsprechend der Gebrauchsanweisung verwendet werden.
- Die elektrische Installation im Raum muss den geltenden Vorschriften entsprechen.
- Kabel (insbesondere Netzkabel) dürfen nicht in Bereichen verlegt werden, in denen Personen darüber stolpern können.
- Für den Netzanschluss dürfen keine Verteilerdosen benutzt werden, an die noch andere Stromverbraucher angeschlossen sind. Verwenden Sie keine Verlängerungskabel.
- Verwenden Sie nur das mitgelieferte Netzkabel.
- Die vollständige Trennung des Gerätes von der Netzspannung ist nur gewährleistet, wenn das Netzkabel vom Netz getrennt wird. Aus diesem Grund muss das Netzkabel samt seinen Anschlüssen jederzeit leicht zugänglich sein.
- Das Gerät darf nicht in der Nähe von Wärmequellen oder an einem feuchten Ort aufgestellt werden. Achten Sie auf eine ausreichende Belüftung des Gerätes.
- Alle Stecker an den Verbindungskabeln müssen am Gehäuse festgeschraubt oder festgeklemmt sein.
- Das Gerät darf nur in horizontaler Lage betrieben werden.
- Die Betriebssicherheit des Gerätes ist nicht mehr gewährleistet, wenn
  - — das Gerät sichtbare Beschädigungen aufweist oder
  - — das Gerät nicht mehr funktioniert.
- In diesen Fällen muss das Gerät ausgeschaltet und gegen unbeabsichtigte Inbetriebnahme gesichert werden.

- Reparaturen dürfen nur von Beauftragten der Firma Themis Computer durchgeführt werden.
- Das Öffnen des Gerätes ist nur zulässig für den Ein- und Ausbau von Erweiterungskarten (PCI), Speichermodulen, Festplatten, Lüftergehäusen, Netzteilen (nur RES-22- und RES-32-Systeme) und der Lithiumbatterie – entsprechend den Anweisungen in dieser Anleitung.
- Bei einer Erweiterung des Gerätes sind die gesetzlichen Bestimmungen und die Gerätespezifikationen zu beachten.
- Vor Abnehmen des Deckels, z.B. für den Einbau von Erweiterungskarten (PCI), erst das Gerät ausschalten.

Betrieb von Lasergeräten

DVD/CD-ROM-Laufwerke enthalten Laserdioden (Klassifizierung gemäß IEC 825-1:1993: LASERKLASSE 1) und dürfen deshalb nicht geöffnet werden.

Beim Öffnen des Laufwerkgehäuses tritt unsichtbare Laserstrahlung aus. Setzen Sie sich dieser Strahlung keinesfalls aus.

Das Lasersystem erfüllt die Anforderungen des Code of Federal Regulations 21 CFR,1040 (für die USA) und des Canadian Radiation Emitting Devices Act, REDR C 1370 (für Kanada).

Elektrostatische Entladung (ESD)

Eine plötzliche elektrostatische Entladung kann empfindliche Geräte oder Mikroschaltungen zerstören. Dem ist durch ordnungsgemäße Verpackung und Erdung unbedingt vorzubeugen. Die folgenden Vorsichtsmaßnahmen sind jederzeit zu beachten:

1. Transportieren Sie Platinen in elektrostatisch sicheren Behältern oder Taschen.
2. Belassen Sie elektrostatisch empfindliche Bauteile bis zum Eintreffen an einem antistatischen Ort in ihrem Behälter.
3. Achten Sie beim Berühren empfindlicher Platinen, Bauteile oder Baugruppen stets auf eine gute Eigenerdung.
4. Lagern Sie elektrostatisch empfindliche Platinen in Schutzverpackungen oder auf leitfähigem Schaumstoff.

Erdungsmethoden

Die folgenden Maßnahmen schützen vor elektrostatischen Schäden am Arbeitsplatz:

1. Legen Sie am Arbeitsplatz geeignete Antistatikmatten aus. Tragen Sie ein Erdungsarmband, das mit dem Arbeitsplatz verbunden ist, und verwenden Sie nur ausreichend geerdete Arbeitsmittel.
2. Verwenden Sie als zusätzlichen Schutz geeignete Antistatikfußmatten, Fersenbänder oder Luftionisatoren.
3. Fassen Sie elektrostatisch empfindliche Bauteile, Platinen und Baugruppen nur am Gehäuse oder am Rand an.
4. Vermeiden Sie den Kontakt mit Stiften, Leitungen und Leiterbahnen.
5. Schalten Sie vor dem Anschließen und Trennen von Steckverbindern oder Prüfgeräten alle Spannungs- und Signalquellen aus.
6. Verwenden Sie am Arbeitsplatz keine nichtleitenden Materialien, wie gewöhnliche Kunststoffmontagehilfen oder Styropor.
7. Benutzen Sie leitende Werkzeuge (z.B. Messer, Schraubendreher und Staubsauger).
8. Legen Sie Laufwerke und Platinen immer mit der Bauteilseite nach unten auf die Schaumstoffunterlage.

Hinweise zur Lithiumbatterie

Auf dem Motherboard von RES-Systemen befindet sich eine Lithiumbatterie. Beim Wechseln dieser Batterie sind die entsprechenden Hinweise in dieser Anleitung zu beachten.



Vorsicht: Beim Einbau einer Ersatzbatterie des falschen Typs besteht Explosionsgefahr.

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Preface

This document, entitled *RES-32DCX Installation Guide*, provides instructions on how to install, configure, power up, boot, and perform diagnostics on the Themis Rugged Enterprise Server RES-32DCX (see photo below), which is based on two dual-core 64-bit Intel® Xeon™ CPUs. These instructions are intended for an experienced system administrator with a knowledge of both networking and high-speed server systems.



Rugged Enterprise Server Model RES-32DCX

The 3RU-high (5.25”) RES-32DCX has been designed to fit into a standard 19” rack and is provided with rack-mount brackets without handles. *Optional* rack-mount brackets with handles and *optional* rack-mount slides are also available. The RES-32DCX is rugged enough to withstand extreme shock (up to 25G), temperature (up to 50°C), and EMI such as that associated with such demanding markets as the military, aerospace, and telecommunications industries.

The two dual-core Intel Xeon CPUs operate up to 2.33 GHz (with a 1333-MHz front-side system bus) and support up to 32 GigaBytes of DDR2 ECC FB-DIMM memory modules. The RES-32DCX is based on the functionality and capability of the Intel 5000X (Greencreek) chipset, which consists of the following three devices:

- Intel 5000X Memory Controller Hub (MCH)
- Intel 6700PXH 64-bit PCI-X Hub (PXH-V)
- Intel 6321 ESB2 (Enterprise South Bridge 2) I/O Controller Hub (ICH)

An overview of RES-32DCX design and specifications is given in Chapter 1, "Overview and Specifications", of this manual.

Website Information

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Notes, Cautions, Warnings, and Sidebars

The following icons and formatted text are included in this document for the reasons described:



Note: A note provides additional information concerning the procedure or action being described.



Caution: A caution describes a procedure or action that may result in injury to the operator or equipment. This may involve—but is not restricted to—heavy equipment or sharp objects. To reduce the risk, follow the instructions accompanying this symbol.



Warning: A warning describes a procedure or action that may cause injury to the operator or equipment as a result of hazardous voltages. To reduce the risk of electrical shock and danger, follow the instructions accompanying this symbol.



Sidebar: A “sidebar” adds detail to the section within which it is placed, but is not absolutely vital to the description or procedure of the section.

General Section

Chapter 1

Overview and Specifications

1.1 Overview

The **RES-32DCX** (see *Figure 1-1* and *Figure 1-2*, page 1-2) is a rack-mounted system designed specifically for above-average shock and vibe environments. The RES-32DCX supports single or dual Intel® 771-pin LGA Xeon™ 64-bit processors (each up to 2.33 GHz with a 1333-MHz system bus), and contains a combination of computer- and graphics-intensive and diverse-I/O capabilities, ideal for a variety of military/aerospace and commercial telecommunications applications.



Figure 1-1. RES-32DCX (with Rack Mounts)

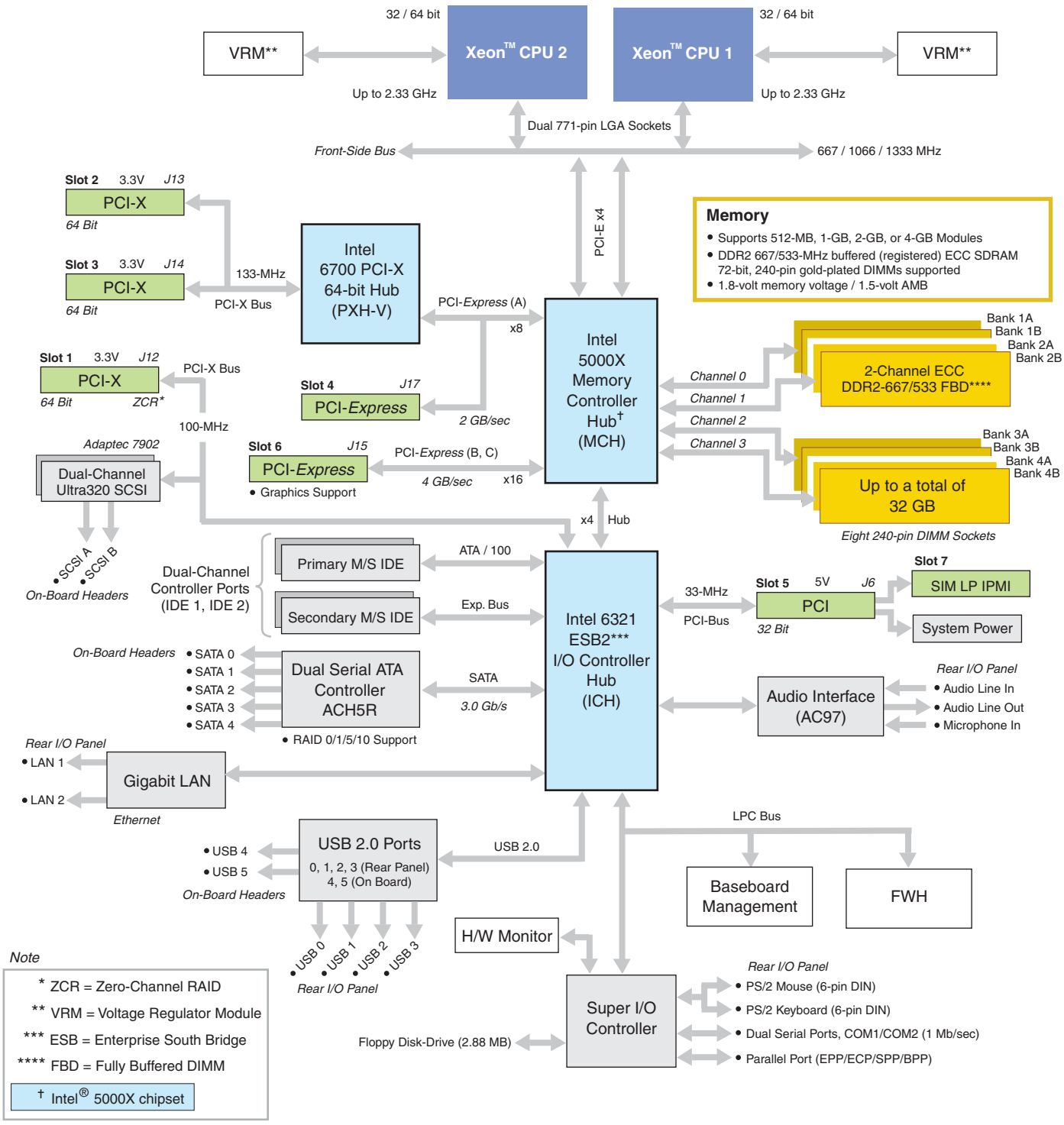


Figure 1-2. RES-32DCX System Block Diagram

The RES-32DCX is designed within a 3RU-high (5.25”) form-factor 20” (50.8 cm) deep and 17” (43.2 cm) wide (which, with mounting brackets, fits a 19”-wide rack) — *see Figure 1-3*. I/O expansion includes three 64-bit PCI-X slots (two PCI-X 133-MHz slots and one PCI-X 100-MHz zero-channel RAID (ZCR) slot), two PCI-*Express* slots (x16 @ 4 GB/s and x4 @ 2 GB/s), one 32-bit/33-MHz PCI slot, and one Low Profile IPMI slot.

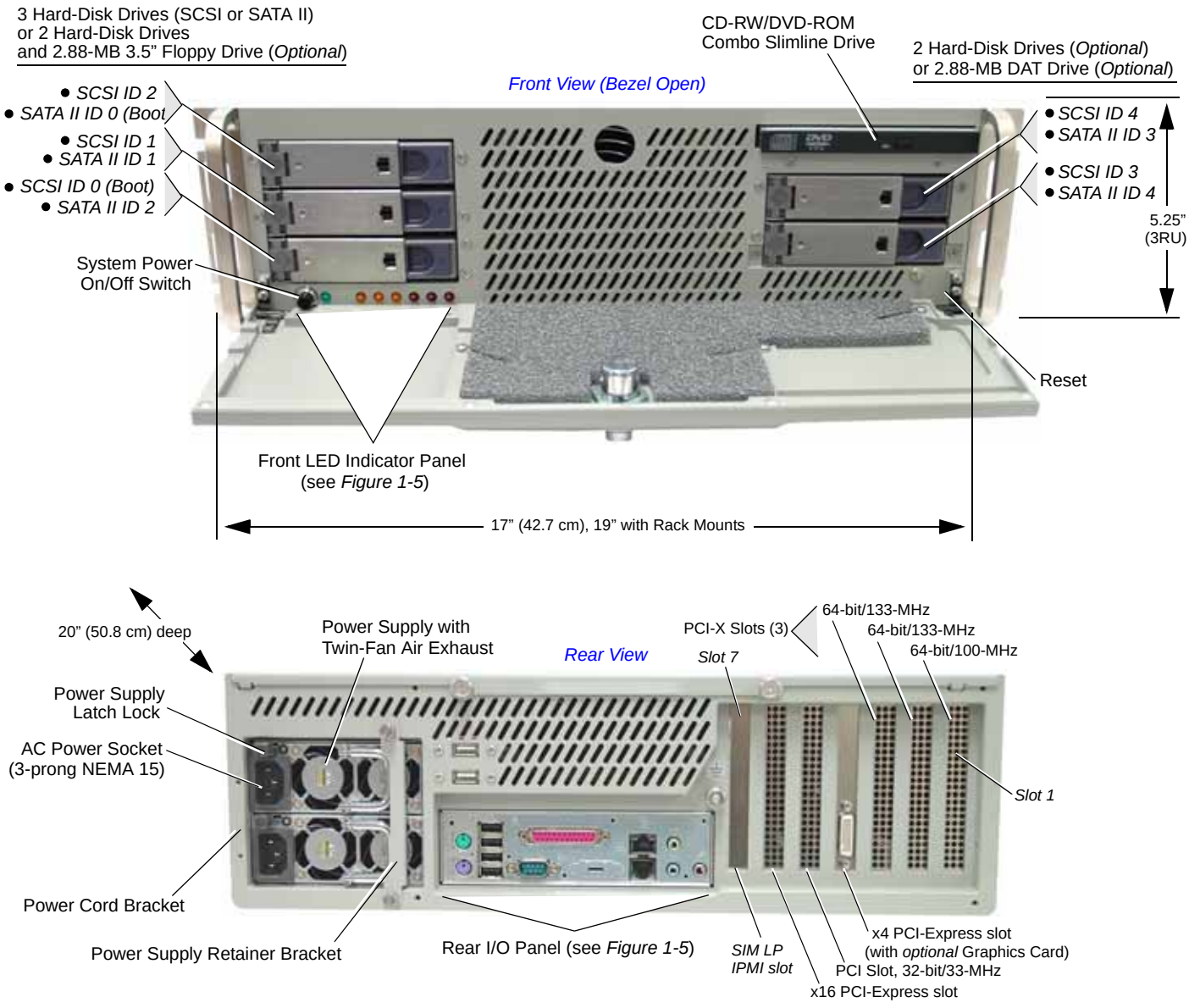


Figure 1-3. External Features of the RES-32DCX (Front and Rear)

The RES-32DCX front panel houses five removable hard-disk drive bays. These drive bays offer a number of hard-disk drive options, consisting of either five Ultra320 SCSI or SATA II drives, or a combination of SCSI/SATA II drives, a 1.44-MB 3.5" floppy-disk drive, and/or a single 2.88-MB DAT drive. Note that a single DAT drive takes up two hard-drive bays, and would be installed in the two right-hand drive bays. A floppy drive can be installed in the upper-left drive bay. Hard-disk drive requirements should be ordered at the time of purchase.

Also included on the front panel is a combination CD-RW/DVD-ROM Slimline drive, a reset switch, and the system power button and LEDs (see *Figure 1-5* on page 1-10). The rear panel contains I/O faceplates for seven PCI cards (graphics, RAID, NIC, etc.), two AC power supplies with latch locks and power-cord sockets, and all I/O connectors (*Figure 1-5*).

Major features of the RES-32DCX are described in *Table 1-1*. Major internal components can be seen in the open top view (cover removed) of *Figure 1-4* on page 1-6.

Table 1-1. Major Features of the RES-32DCX

Feature	Details
Processor (CPU)	● Two dual-core Intel 771-pin Xeon CPUs @ up to 2.33 GHz ● 2-MB or 4-MB L2 cache (per core) ● 667/1066/1333 MHz front-side system bus speed ● On-board Voltage-Regulator Module
Chipset	● Intel 5000X chipset: — Memory Controller Hub (MCH) — PCI-X Hub (PXH-V) — Enterprise South Bridge 2 (ESB2)
Memory	● Eight 240-pin DIMM sockets supporting up to 32 GB of registered ECC DDR2 FBD 667/533 SDRAM
Expansion slots	● Three 64-bit PCI-X slots: two 133-MHz PCI-X (slots 2 & 3) and one 100-MHz PCI-X (slots 1[a]) ● One SIM Low Profile IPMI slot (slot 7) ● Two PCI-*Express* (slot 4, x4 @2-GB/sec; slot 6, x16 @4-GB/sec) ● One 32-bit, 5V, 33-Mhz PCI (slot 5[b])
Peripheral Support	● Five removable Ultra320SCSI or SATA II hard-disk drives ***or*** a combination of SCSI/SATA II hard-disk drives, a 1.44-MB 3.5” floppy-disk drive, and a 2.88-MB DAT drive ● 1 combination CD-RW/DVD-ROM slimline (IDE) drive

Table 1-1. Major Features of the RES-32DCX (Continued)

Feature	Details
Integrated SCSI (no external I/O)	● Dual-channel Ultra320 support for internal SCSI hard-disk drives through cabled on-board headers (*system default*) ● Supports Adaptec zero-channel RAID (ZCR) in PCI-X slot 1
Serial ATA (no external I/O)	● Dual-channel support for internal SATA II drives through cabled on-board headers
Integrated I/O	● 2 serial ports (9-pin)—COM1 (standard) and COM2 (*optional*) ● 1 parallel port (25-pin, EPP/ECP/SPP/BPP) ● 6 USB 2.0 ports (4 from rear I/O panel, 2 from on-board headers[c]) ● 1 PS/2 keyboard port (DIN-6) and 1 PS/2 mouse port (DIN-6) ● 1 Intel 82563 Gigabit Ethernet controller (1 or 2 LAN ports, LAN1/LAN2) ● 1 audio line in, 1 audio line out, 1 audio microphone in ● 1 Adaptec 7902 Ultra 320 zero-channel SCSI RAID controller
Operating temperature	● 0°C to 50°C
Shock endurance	● 25G @ 40-msec duration
Dimensions	● 5.25” (3RU) high, 17” (43.2 cm) wide (19”/48.3 cm with mounting brackets), 20” (50.8 cm) deep
Rack-mount brackets and slides	● Choice of rack-mount brackets with handles (*optional*) or without handles ● *Optional* rack-mount slides
Dual power supplies	● 460 watts each, auto-ranging (100–240 VAC) ● Load-sharing N+1 redundant, hot-pluggable ● Filtered, fuse-protected AC sockets

a—Slot 1 supports SCSI Zero-Channel RAID.

b—Slot 5 supports graphics.

c—The two on-board USB headers are brought out to the rear of the chassis above the I/O Panel (see *Figure 1-3*, page 1-3, and *Figure 1-5*, page 1-10).

Those who wish to customize USB ports should contact a local Themis sales office or info@themis.com.

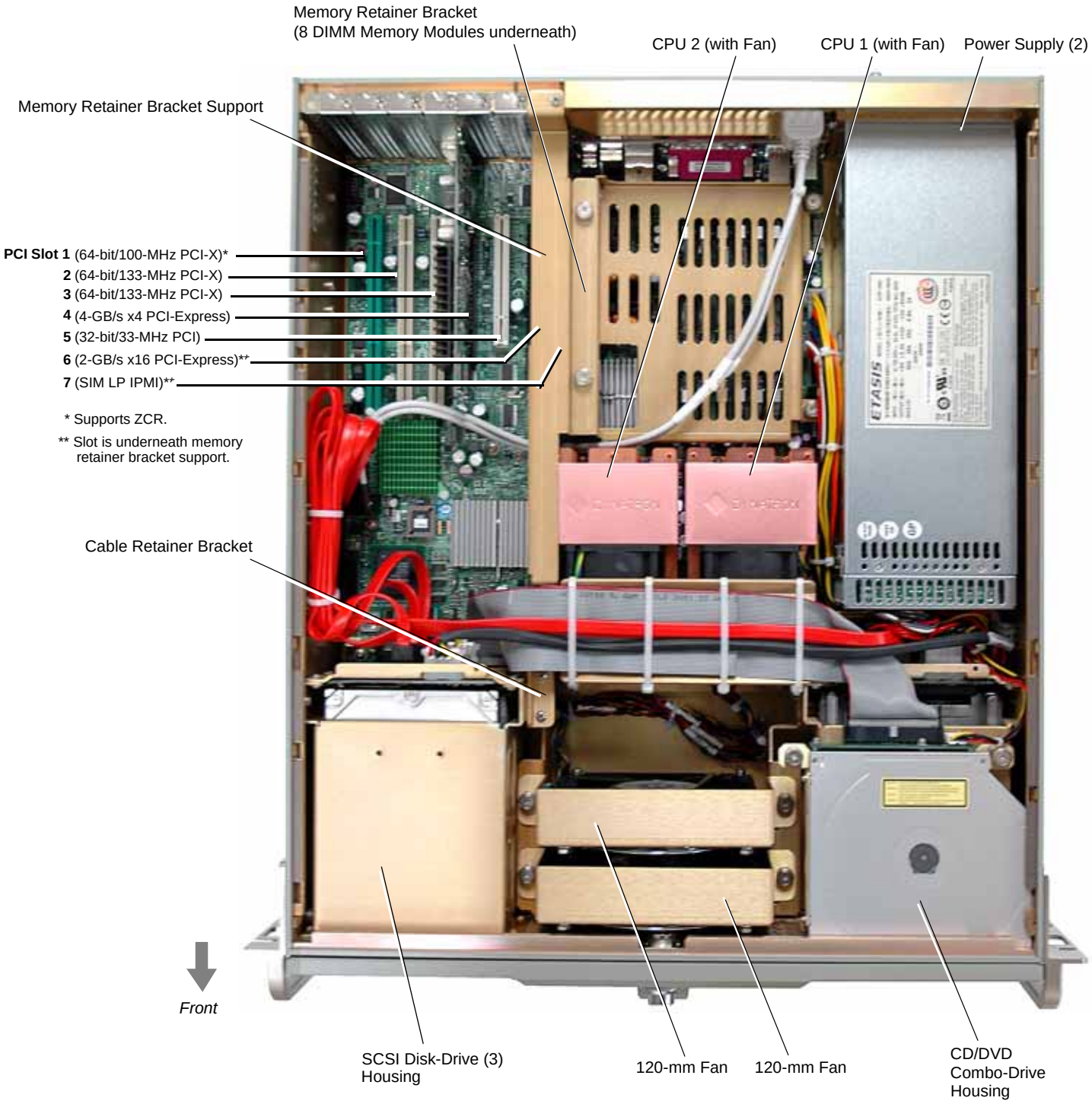


Figure 1-4. Major Components of the RES-32DCX (Open Top View)

1.1.1 Special Features

1.1.1.1 Recovery from AC Power Loss

The BIOS setup can be configured to allow the system, whenever AC power is lost,

- to remain off (in which case, the power switch must be activated by the user) or
- return to a power-on state automatically when power is restored.

The system default is "`Always On`".

1.1.1.2 Voltage Monitors

A built-in voltage monitor continually scans multiple voltages (CPU cores, chipset voltage, +3.3V, +5V, +12V, –12V, and +5V standby) on the motherboard. If a voltage becomes unstable, it issues a warning or sends an error message to the screen. Voltage thresholds can be adjusted through the PC health-monitor utility to define the sensitivity of the voltage monitor.

1.1.1.3 Fan Status Monitor

The RES-32DCX has eight cooling fans—two 120-mm fans at the front of the motherboard, one on each CPU, and two within each power supply. The PC health-monitor utility can be used to check the RPM status of cooling fans. The onboard CPU and chassis fans are controlled by Thermal Management via BIOS.

1.1.1.4 Environmental Temperature Control

The thermal-control sensor monitors CPU temperature in real time and will activate the thermal fan when CPU temperature exceeds a user-defined threshold. Overheat circuitry operates independently from the CPU, and can continue to monitor overheat conditions even when the CPU is in sleep mode.

Once the thermal sensor detects a CPU temperature that is above the set threshold, it automatically turns on the thermal control fan to prevent overheat damage to the CPU. In addition, onboard chassis thermal circuitry can monitor overall system temperature and alert users when chassis temperature exceeds a user-defined threshold.

1.1.1.5 CPU Fan Auto-Off in Sleep (Doze) Mode

The CPU fan activates when power is turned on, and continues to operate when the system enters `Standby` mode. In `Sleep` mode, the CPU will not run at full power, generating less heat. Sleep settings are made through the PC health-monitor utility.

1.1.1.6 CPU Overheat LED and Control

This feature is enabled by the user through the CPU overheat warning function in the BIOS. With it, the user can define an overheat temperature that, when exceeded, activates the overheat fan and the `Overheat` warning LED.

1.1.1.7 IPMI Module Support

The RES-32DCX motherboard contains a special SIM Low Profile IPMI 2.0 slot (see *Figure 1-4*) to install an *optional* Intelligent Platform Management Interface (IPMI) module. This invaluable health-monitoring tool provides full SNMP (including SNMP trap), some power cycle functions (reboot and graceful shutdown), and the ability to control other servers. [This module must be installed at the factory.]

Detailed information on IPMI may be obtained from the following website: http://www.intel.com/design/servers/ipmi/.

1.1.1.8 System Resource Alert (*optional*)

Available only through Supero Doctor III in the Windows OS environment or Supero Doctor II in Linux (an *optional* third-party product), this feature is used to notify the user of certain system events. For example, if the system is running low on virtual memory and there is insufficient hard disk-drive space for saving the data, an alert will be issued warning of the potential problem.

1.1.2 ACPI Features

Advanced Configuration and Power Interface (ACPI) defines a flexible and abstract hardware interface that provides a standard method of integrating power management features throughout the system. This includes the hardware, the operating system, and the application software. As a result, the system can automatically turn peripherals (CD-ROMs, NICs, hard-disk drives, and printers, for example) on or off. This includes any consumer devices that may be connected to the system (VCRs, TVs, telephones, and stereo systems, for example).

In addition to providing operating-system power management, ACPI offers a generic system event mechanism for Plug and Play and an operating-system-independent interface for configuration control. Plug-and-Play BIOS data structures are leveraged, while the implementation is processor-architecture-independent and compatible with both Windows 2000 and Windows NT 5.0.

1.1.2.1 Suspend-State Indicator

When the CPU enters a suspend state, the `Power` LED will start blinking to indicate that the CPU is in suspend mode. Pressing any key on the keyboard will awaken the CPU, at which time the power LED will stop blinking and remain on.

1.1.2.2 Main Switch Override

ATX 2.01 (or higher)-compliant power supply only. If enabled in the system setup, the RES-32DCX power button on the front of the unit functions as a suspend button to make the system enter a SoftOff state. The monitor is suspended, and the hard drive will spin down. Pressing the power button again will cause the system to awaken.

During the `SoftOff` state, the ATX power supply provides only enough power to keep the minimum required circuitry alive. If you want to turn the power off completely, in the event of a system malfunction, for example, depress and hold the power button for four (4) seconds. The system will turn off completely with no power to the motherboard provided. This option can be set in the Power section of the BIOS setup routine.

1.1.2.3 External Modem Ring-On

ATX 2.01 (or higher)-compliant power supply only. When the system is in the `SoftOff` state, it can be awakened by the ringing of an external modem. This feature can only be provided if “External Modem Ring-On” is included in the installed modem card and the corresponding setting is enabled in the system BIOS settings.

1.1.2.4 Wake-On-LAN (WOL)

ATX 2.01-compliant (or higher) power supply only. The `Wake-On-LAN` utility enables a management application to remotely power up a computer that has been powered off. This allows remote PC setup, updates and access tracking to occur after hours and on weekends, so that daily LAN traffic is kept to a minimum and users are uninterrupted. The serverboard employs a 3-pin header (JWOL) to connect to the 3-pin header of any Network Interface Card (NIC) with WOL capability. Wake-On-LAN must be enabled in BIOS.

1.1.3 System LEDs and I/O Connectors

All RES-32DCX system LEDs are located on the front panel (see *Figure 1-5**A***); all I/O connectors are located on the rear panel (see *Figure 1-5**B***). LEDs are described in *Table 1-2* on page 1-11; connectors are described in *Table 1-3*, page 1-12.

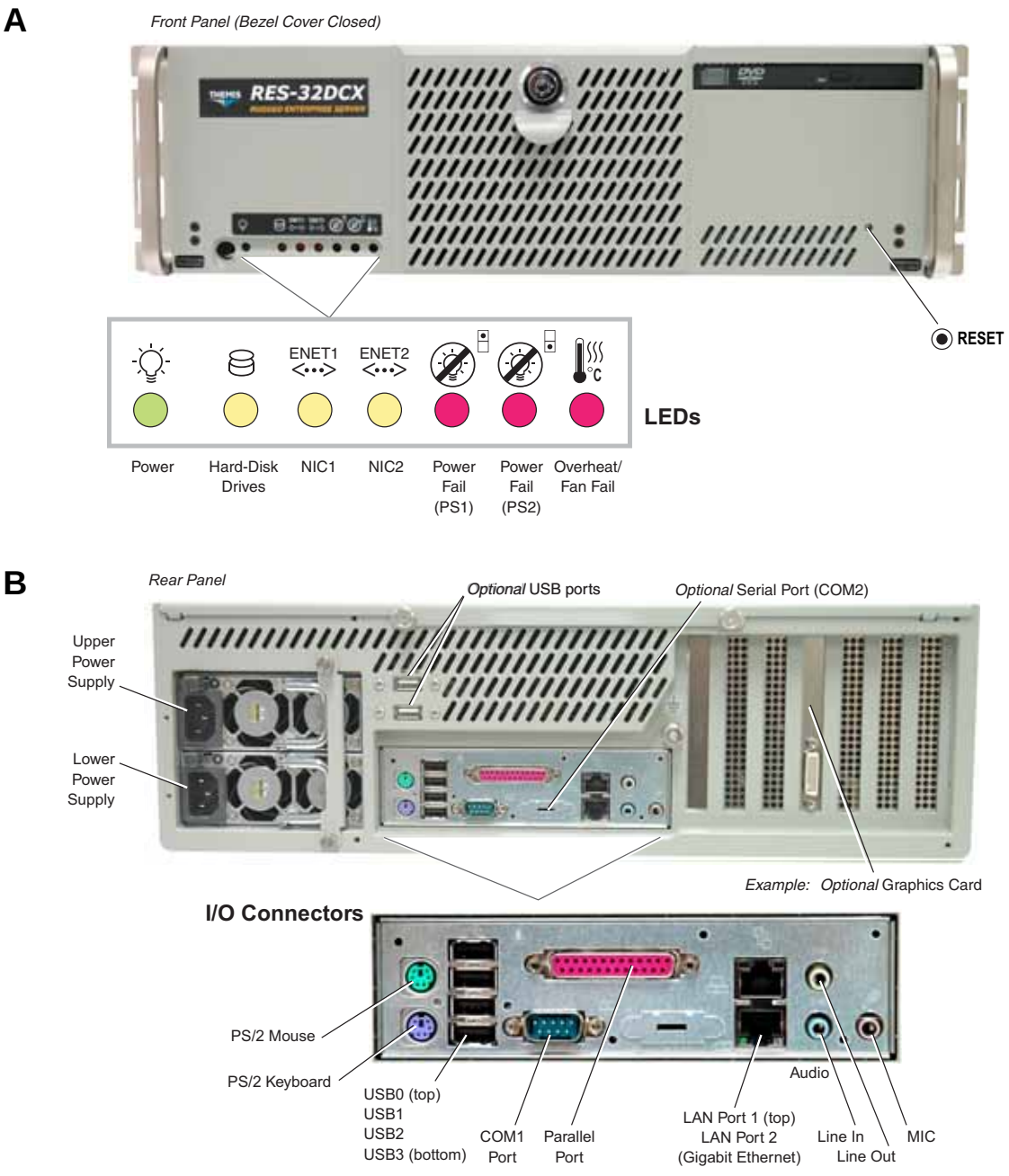


Figure 1-5. RES-32DCX System LEDs and I/O Connectors

Table 1-2. System LEDs

Symbol	LED	Description
	Power	● Indicates that the system is turned on.
	Hard Disk Drive (HDD)	● Indicates SCSI/SATA II hard-drive activity.
	NIC1[a] (Gb Ethernet)	● Indicates network activity on LAN 1.
	NIC2 (Gb Ethernet)	● Indicates network activity on LAN 2.
	Power Fail (Upper Power Supply)	● Warns that there is a failure in the upper power supply.
	Power Fail (Lower Power Supply)	● Warns that there is a failure in the lower power supply.
	Overheat/Fan Fail —Normally OFF —RED light when temperature limits are exceeded	● Warns that the system is exceeding specified temperature parameters. The CPU overheat warning function must be enabled in the BIOS, thus allowing the user to define an overheat temperature, which—when exceeded—triggers the overheat warning LED.
Symbol	**Rear Panel LED(s)**	**Description**
N/A	LAN1 and LAN2	Each Ethernet port contains two LEDs: ● The color of the left LED (when facing the port) indicates the LAN connection speed: - Off = 10 MHz - Green = 100 MHz - Amber = 1 GHz ● The right LED, when lit, indicates LAN activity.

a—NIC = Network Interface Controller.

Table 1-3. I/O Connectors

Connector	Description
PS/2 Mouse	● 6-pin mini-DIN (female) connector to attach a PS/2 mouse device.
PS/2 Keyboard	● 6-pin mini-DIN (female) connector to attach a PS/2 keyboard device.
USB0 to USB3 Hi-Speed USB 2.0 Serial Ports	● Four 4-pin USB connectors to attach serial devices to USB port 0 through port 3. *Note:* Two additional USB ports can be accessed from the rear as an option, and two more directly from the motherboard.
COM1/COM 2 Serial Port	● One DB9 (male) connector on rear panel to attach a serial device to COM1port An *optional* second serial port (COM2) can be ordered.
Parallel Port	● DB25 (female) connector to attach a parallel port device.
Ethernet LAN Ports	● Standard RJ45 connector to attach one or two gigabit Ethernet LAN line(s)—LAN1 and LAN2.
Line In / Line Out / MIC	● One mini-jack to connect an audio line in, one mini-jack for an audio line out, and one mini-jack for a microphone input cable.

1.2 Chipset Overview

Built upon the functionality and the capability of the Intel 5000X chipset, the RES-32DCX provides the performance and feature set required for dual processor-based servers, including optimal configuration options for communications, presentation, storage, computation or database applications. The 5000X chipset supports single or dual Xeon 64-bit dual-core processors with front-side bus speeds of up to 1.333 GHz. The Intel chipset consists of:

- the 5000X Memory Controller Hub (MCH),
- the Intel 6321 Enterprise South Bridge (ESB) I/O Controller Hub (ICH), and
- the 6700 PCI-X 64-bit hub (PXH-V).

In addition, a Super I/O Controller chip offers a range of functions to increase the I/O cabability of the system.

1.2.1 The Intel 5000X Memory Controller Hub (MCH)

The 5000X Memory Controller Hub (MCH) chipset is designed for symmetric multiprocessing across two independent front-side bus interfaces. Each front-side bus uses a 64-bit wide, 1.333 GHz data bus that transfers data at 10.7 GB/sec (for a total bandwidth of 21.3 GB/sec.)

The MCH provides four channels of Fully-Buffered DIMM (FB-DIMM) memory. Each of these channels can support up to four Dual Ranked FB-DIMM DDR2 DIMMs. FB-DIMM memory channels are organized in to two branches for support of RAID 1 (mirroring). The RES-32DCX MCH chipset connects up to 8 fully-buffered DIMM modules, providing a total of 32.0 GB/s for DDR2 667/533 memory. The MCH chipset also provides three x8 PCI-*Express* and one x4 ESI interface to the ESB2. In addition, the 5000X chipset offers a wide range of RAS features, including memory interface ECC, x4/x8 Single Device Data Correction, CRC, parity protection, memory mirroring and memory sparing.

The Xeon dual-core processor is designed to be used in conjunction with the 5000X chipset, and provides the following features:

- L1 Cache Size: Instruction Cache (32KB/16KB), Data Cache (32KB/24KB)
- L2 Cache Size: 4MB/2MB (per core)
- Data Bus Transfer Rate: 8.5 GB/s
- Package: FC-LGA6/FC-LGA4, 771 Lands

1.2.2 The Intel 6321 ESB I/O Controller Hub (ICH)

The Intel 6321 ESB I/O Controller Hub directly attaches to the 5000X MCH through the Extensible SAL (System Abstraction Layer) Interface (ESI) and a x8 or x4 PCI-*Express* link. The Intel 6321 integrates an Ultra ATA 100 controller, six Serial ATA host controller ports, one EHCI host controller, and four UHCI host controllers supporting eight external USB 2.0 ports, LPC interface controller, flash BIOS interface controller, PCI interface controller, Azalia / AC'97 digital controller, integrated LAN controller, an ASF controller and a ESI for communication with the MCH.

The Intel 6321 component provides the data buffering and interface arbitration required to ensure that system interfaces operate efficiently and provide the bandwidth necessary to enable the system to obtain peak performance. The Intel 6321 elevates Serial ATA storage performance to the next level with Intel RAID.

The ACPI compliant Intel 6321 ESB I/O Controller Hub platform can support the Full-on, Stop Grant, Suspend to RAM, Suspend to Disk, and Soft-Off power management states. Through the use of the integrated LAN functions, the Intel 6321 also supports Alert Standard Format for remote management.

1.2.3 The Intel 6700 PCI-X 64-Bit Hub (PXH-V)

The Intel 6700 PXH 64-bit PCI Hub attaches directly to the MCH through a point-to-point PCI-Express x8 link to support PCI and PCI-X interfaces. The Intel 6700 supports two bus segments that can be independently configured to operate in PCI (33 MHz or 66 MHz) or PCI-X mode (66 MHz, 100 MHz, or 133 MHz) for 32-bit or 64-bit PCI/PCI-X devices.

Each PCI/PCI-X interface integrates a PCI standard hot-plug controller. The hub supports multiple PCI-X slots and frequencies for the high-bandwidth I/O connectivity required for today's server market.

1.2.4 Super I/O Controller

The Super I/O chip disk-drive adapter functions include:

- a floppy disk drive controller (industry standard 82077/765 compatible)
- a data separator
- write pre-compensation circuitry
- decode logic
- data rate selection
- clock generator

- drive interface control logic
- interrupt and DMA logic

The wide range of functions integrated onto the Super I/O greatly reduces the number of components required for interfacing with floppy disk drives. The Super I/O supports two 360K, 720K, 1.2M, 1.44M or 2.88M disk drives, and data transfer rates of 250 Kb/s, 500 Kb/s or 1 Mb/s.

It also provides two high-speed, 16550-compatible serial communication ports (UARTs), one of which supports serial infrared communication. Each UART includes a 16-byte send/receive FIFO, a programmable baud rate generator, complete modem control capability, and a processor interrupt system. Both UARTs provide legacy speed with baud rates of up to 115.2 Kbps, as well as an advanced speed with baud rates of 250K, 500K, or 1 Mb/s (for higher speed modems).

The Super I/O supports one PC-compatible printer port (SPP), Bi-directional Printer Port (BPP), Enhanced Parallel Port (EPP) or Extended Capabilities Port (ECP).

Advanced Configuration and Power Interface (ACPI)-compliant functions support legacy and ACPI power management through an SMI or SCI function pin. An auto-power-management feature reduces power consumption.

1.3 Specifications

1.3.1 General

Table 1-4 lists general specifications for the RES-32DCX.

Table 1-4. RES-32DCX General Specifications

Parameter	Description
Dimensions	● 5.25” (3RU) high ● 17” (43.2 cm) wide (19” rack-mountable) ● 20” (50.8 cm) deep
Weight	● Under 42 pounds (19 kg), includes 6 full-length (up to 12.25”) PCI cards, 1 CD-RW/DVD-ROM drive, 5 SCSI/SATA II hard-disk drives or 4 SCSI/SATA II hard-disk drives and 1 floppy disk drive, and 2 power supplies ● Add 8.8 pounds (4 kg) for the shipping container and two AC power cords ● The manual and associated shipping paperwork weighs approximately 1 lb (0.5 kg)
19” Rack-Mountable with Slide capability	● Left and right rack-mount tabs (3 screws each) included with chassis
Temperature Operating: Non-Operating:	 ● 0°C to +50°C ● –40°C to +70°C
Relative Humidity Operating: Non-Operating:	 ● 8% to 90% non-condensing ● 5% to 95% non-condensing
Maximum Wet Bulb Operating: Non-Operating:	 ● 27°C, non-condensing ● 35°C, non-condensing
Altitude Operating: Non-Operating	 ● 0 to 10,000 feet above sea level ● 0 to 40,000 feet above sea level

1.3.2 Electrical

Table 1-5 lists the electrical specifications for the RES-32DCX.

Table 1-5. RES-32DCX Electrical Specifications

Parameter	Description
Input Power	● 657 watts
Input Current	● 8 amperes (115V), 4 amperes (230V); 30 amperes peak
Input Frequency	● 47–63 Hertz
Input Voltage	● 100–240 VAC, internally fused
Input VA Rating	● 660 VA
BTU Rating	● 1280
Power Factor	● 0.99
Input Leakage	● 6 mA maximum @240 VAC
Plug Type	● NEMA 5-15P

1.3.2.1 System Power

The RES-32DCX operates with two N+1 redundant power supplies of 460-watts capacity each that auto-range single-phase AC input from 100 to 240 VAC (47 to 63 Hertz) sources. Filtered and fused (internal) AC is supplied to each power supply from a rear-mounted power connection.

1.3.2.2 Output Voltage

The RES-32DCX power supply provides output voltages that are split between +3.3V, +5V, +$5V_{sb}$, +12V, and -12V rails.

1.3.3 Environmental

1.3.3.1 Shock

The RES-32DCX is designed to survive an elevated shock environment. All structural components are welded together, enabling the system to survive a maximum 3-axis shock load of 25G at 40-ms duration.

1.3.3.2 Electrostatic Discharge

The RES-32DCX is designed to tolerate electrostatic pulses up to 15 kilovolts (KV) with no impact on system operation.

1.3.3.3 Noise Level

Typical noise levels emitted by the RES-32DCX are outlined in *Table 1-6*. The chassis is installed with two 120-mm fans.

Table 1-6. Typical Noise Levels of the RES-32DCX

Measured at:	1 Meter	2 Meters
Front	61.04 dB	57.32 dB
Rear	62.43 dB	58.22 dB

1.4 Packaging and Shipping

The RES-32DCX is packaged in a reusable shipping container. Approximate weight of an empty container and two AC power cords is 8.8 pounds (4 kg).

The approximate weight of a RES-32DCX (loaded with five hard-disk drives or four hard-disk drives and one floppy drive, seven PCI cards, a CD-RW/DVD-ROM drive, and two power supplies) is under 42 pounds (19 kg).

The approximate weight of a manual and associated shipping paperwork is one pound (0.5 kg).

Therefore, both the shipping container and a fully installed RES-32DCX including power cords, manual, and associated paperwork, weigh under 52 pounds (23.6 kg).

1.4.1 Accessory Kit

Each RES-32DCX is packaged with an Accessory Kit, consisting of the following items, shown in *Figure 1-6* on page 1-20:

A. A Power-cord Retainer Bracket

B. Two AC Power Cords

C. Two Front-Bezel Barrel Keys

D. Two Power-cord Retainer Velcro Straps

When you unpack the RES-32DCX, please verify that all of these items are included. If any of these items are missing or not as pictured, please call Themis Technical Support at 510-252-0870, or send an email to support@themis.com.

To learn how to secure the AC power cords, using the power-cord retainer bracket and the velcro straps, refer to Section 2.3.1, “Plugging in and Securing the AC Power Cords,” on page 2-16.



Figure 1-6. RES-32DCX Accessory Kit

1.4.2 Rack-Mount Slides (Optional)

Rack-Mount Slides can be mounted on each side of the RES-32DCX for the purpose of sliding the unit in and out of a rack. Mounting slides are optional and can be ordered at the time of purchase.

To learn how to install rack-mount slides, refer to Appendix B, “Rack-Mount Slide Installation”.

Installation Section

Chapter 2

Installation and Operation

This chapter describes:

- How to install a memory module, SCSI hard-disk drive, PCI card, 120-mm-fan housing, power supply, and lithium battery.
- Rack-mount brackets
- How to turn the RES-32DCX on and off

2.1 Installation Procedures



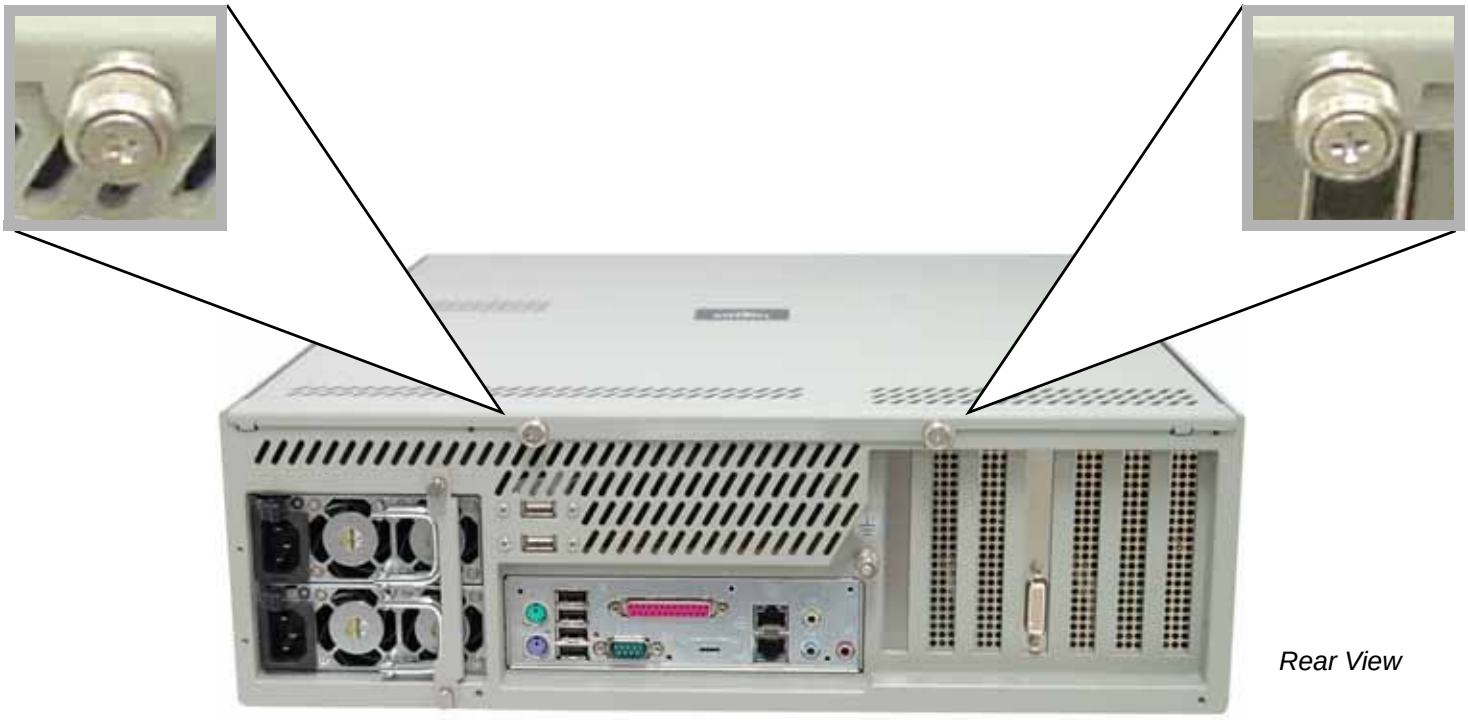
Caution: Use industry-standard ESD grounding techniques when handling all components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface. **Handle all IC cards by the front panel or edges only.**

To install or replace a SCSI **hard-disk drive** or **power supply**, skip the next section and proceed directly to page 2-6 or page 2-12, respectively. Replacement of motherboard components require removal of the chassis protective cover.

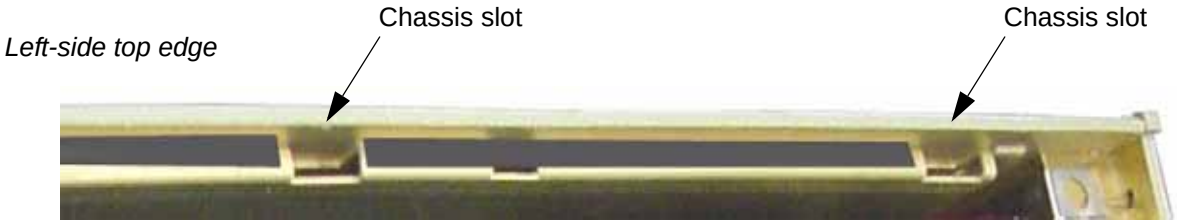
2.1.1 Remove Protective Top Cover

To access a motherboard component, open the RES-32DCX as follows:

1. Loosen the two captive Phillips screws holding the protective top access cover to the rear of the RES-32DCX chassis (see **A**, *Figure 2-1*).
2. Both the front and sides of the cover have flat hooks or tabs underneath that fit under slots on the chassis top edges (see **B**, *Figure 2-1*). Remove the cover by sliding it toward the rear until it is free of these chassis slots.
3. Store the cover in a safe place until it is replaced.



A Loosen the 2 captive access-cover screws . . .



B . . . and slide the top cover toward the rear until the top hooks and tabs clear all chassis slots

Figure 2-1. Remove the RES-32DCX Protective Access Cover

4. Proceed to the appropriate section to install or replace a **memory module** (page 2-3), **PCI card** (page 2-9), **120-mm-fan housing** (page 2-10), or **lithium battery** (page 2-14).

2.1.2 Memory Modules

The RES-32DCX supports up to eight registered ECC DDR2 Fully-buffered DIMM (FBD) Memory Modules (see *Table 2-1*), up to a total memory capacity of 32 GB (see *Figure 2-2* on page 2-4).

Table 2-1. RES-32DCX Memory Modules

RES-32DCX	Memory			
	FBD	Standard	Capacity	Speed
● Eight 240-pin DIMM Sockets	DDR-667	PC2-5300	32 GB	2.67 GB/s
	DDR-533	PC2-4200	32 GB	2.1 GB/s



Caution: Exercise extreme caution when installing or removing FBD Memory Modules to prevent any possible damage.

The dual-channel memory bus can support full-duplex memory bandwidth transfers of up to 3.2 GB/s. When installing memory, follow these rules:

- Two modules must be installed at a time, starting with DIMM 1A and 1B (Bank 1), then 2A and 2B (Bank 2), 3A and 3B (Bank 3), and finally 4A and 4B (Bank 4); see *Figure 2-2* on page 2-4.
- It is strongly recommended that you *do not mix memory modules* of different speeds and sizes. If DIMMs of different speeds have been installed, verify that the BIOS setup is configured for the fastest speed of RAM used.
- Make sure that the correct type of SDRAM is being used (see *Table 2-1*). Other types of SDRAM are not supported.

2.1.2.1 Installation

The following procedure explains how to install the DDR2 FBD Memory Modules.

1. Loosen the four captive screws securing the memory retainer bracket and remove the bracket (see **A**, *Figure 2-2*).
2. Determine the location of the slot into which the Memory Module will be installed (see **B**, *Figure 2-2*).

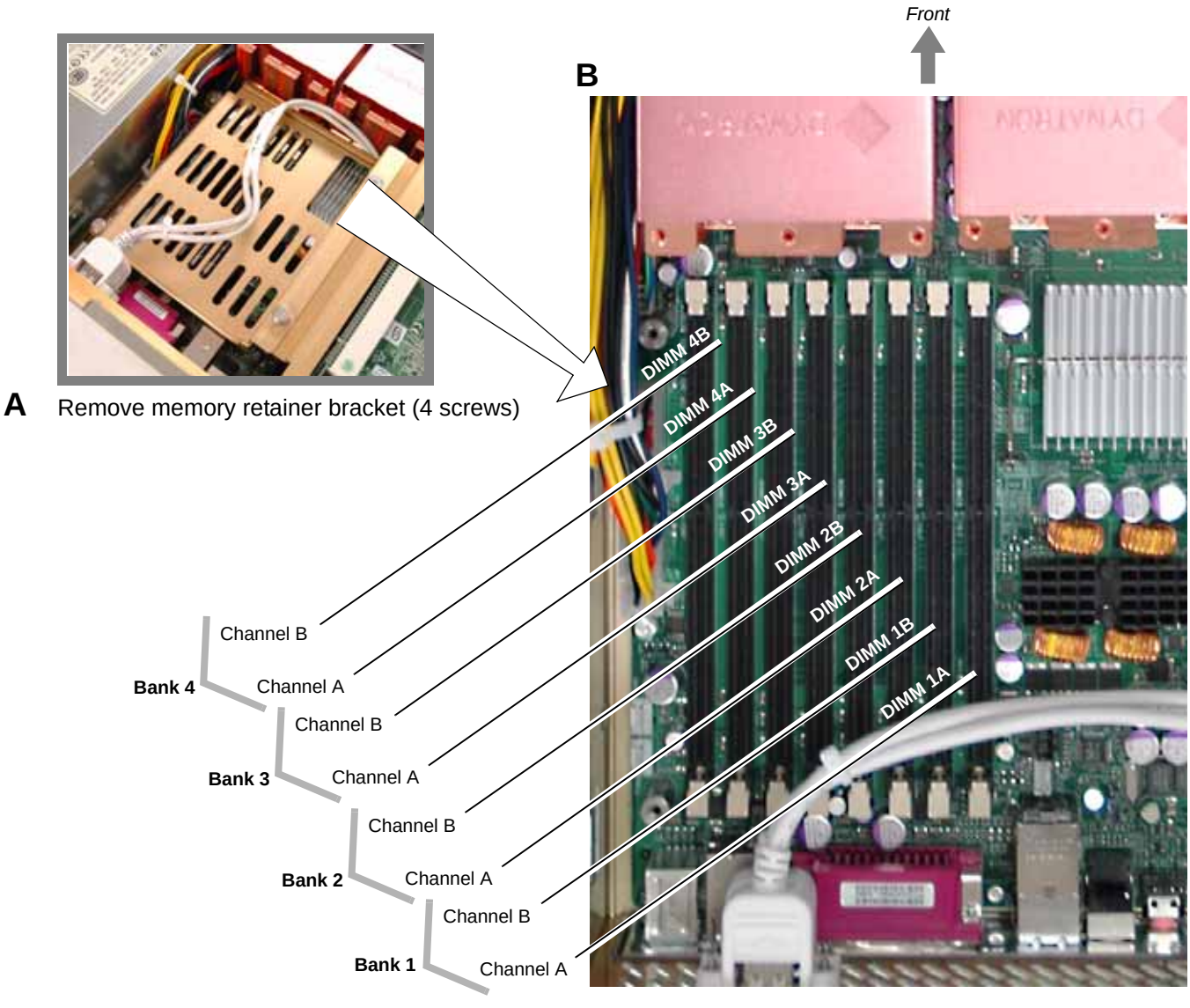


Figure 2-2. Memory Module Slot Location

3. If a module is already seated in the slot you have selected for installation, remove it by gently pressing down and outward on the latches at both ends of the slot (see *Figure 2-3*), then pulling the old module directly up from the slot until it is free of the connector.

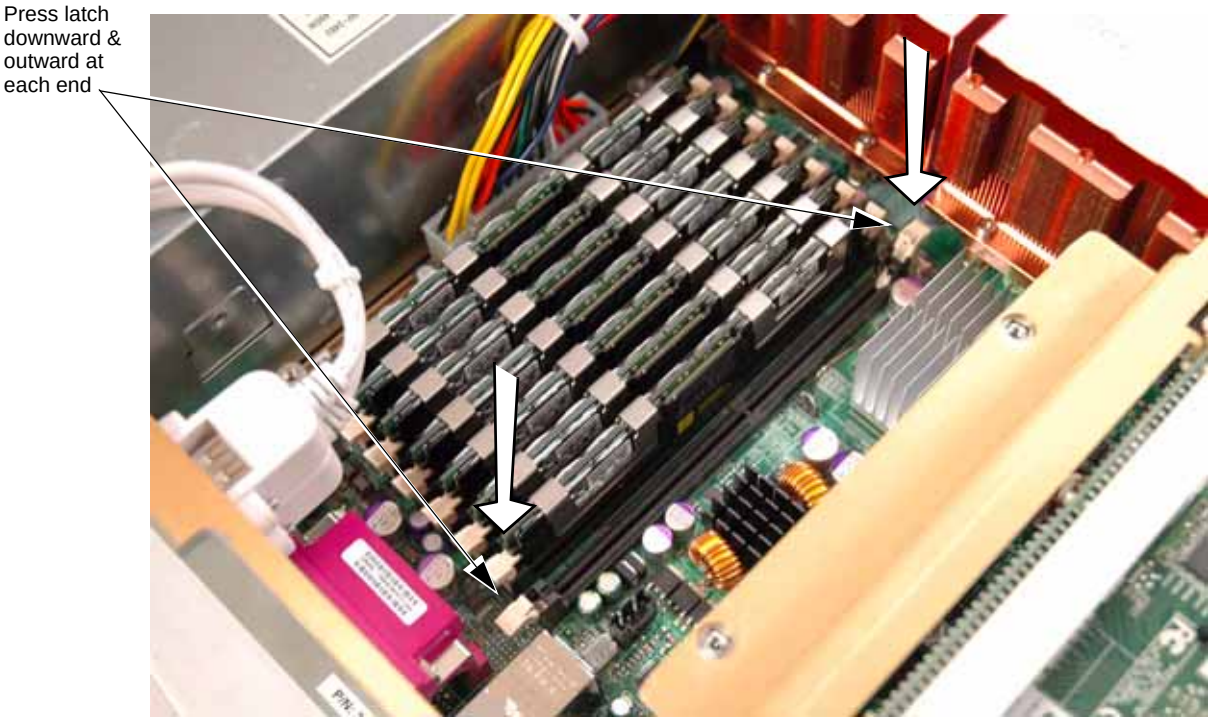


Figure 2-3. Memory Module Removal

4. Before inserting a new memory module into the vacant slot, make sure that the two latches are pulled outward away from the center of the slot.

With the latches in the outward position, gently insert the new module vertically into its slot and press firmly downward until it snaps into place.

Note: Make sure the memory module has the proper orientation by aligning the alignment notch at the bottom edge with its counterpart ridge at the bottom of the slot.

2.1.3 SCSI/SATA II Hard-Disk Drive

Perform the following steps to remove and install a hard-disk drive, which may be either SCSI or SATA II.

Note: For SCSI drives, the lower left-hand removable disk drive (SCSI ID0) is designated as the boot drive. For SATA II drives, the upper left-hand removable disk drive (SATA II ID0) is designated as the boot drive.

The front bezel of the RES-32DCX must be unlocked and opened to access the SCSI/SATA II hard-disk drives.

2.1.3.1 Opening the RES-32DCX Front Bezel (required for Disk Drive access)

To access the removable hard-disk drives (and optional floppy and tape drives), you must first open the Front Bezel (see *Figure 1-3* on page 1-3). The pushbutton lock on the front of the RES-32DCX allows the bezel to open without a key (see *Figure 2-4*). To unlock the pushbutton lock, press the pushbutton and pull the bezel cover away from the chassis.

The accessory kit shipped with your RES-32DCX contains two barrel lock keys (*Figure 1-6* on page 1-20). This provides you the option of locking the front bezel.



Figure 2-4. Pushbutton Lock on the RES-32DCX Front Bezel Cover

After opening the front bezel cover, perform the following steps to remove and install a hard-disk drive.

2.1.3.2 Disk-Drive Removal

To remove a hard-disk drive,

1. Make sure the system is powered off (see “Operation” on page 2-16).
2. Locate the drive to be removed (see **A** in *Figure 2-5*).
3. Place a finger into the latch lock and push to the side; this causes the drive latch handle to spring forward (see **B**) from the front surface of the drive.



Caution: When pulling the hard-disk drive from the chassis, hold it at the bottom to prevent it from falling and damaging the drive.

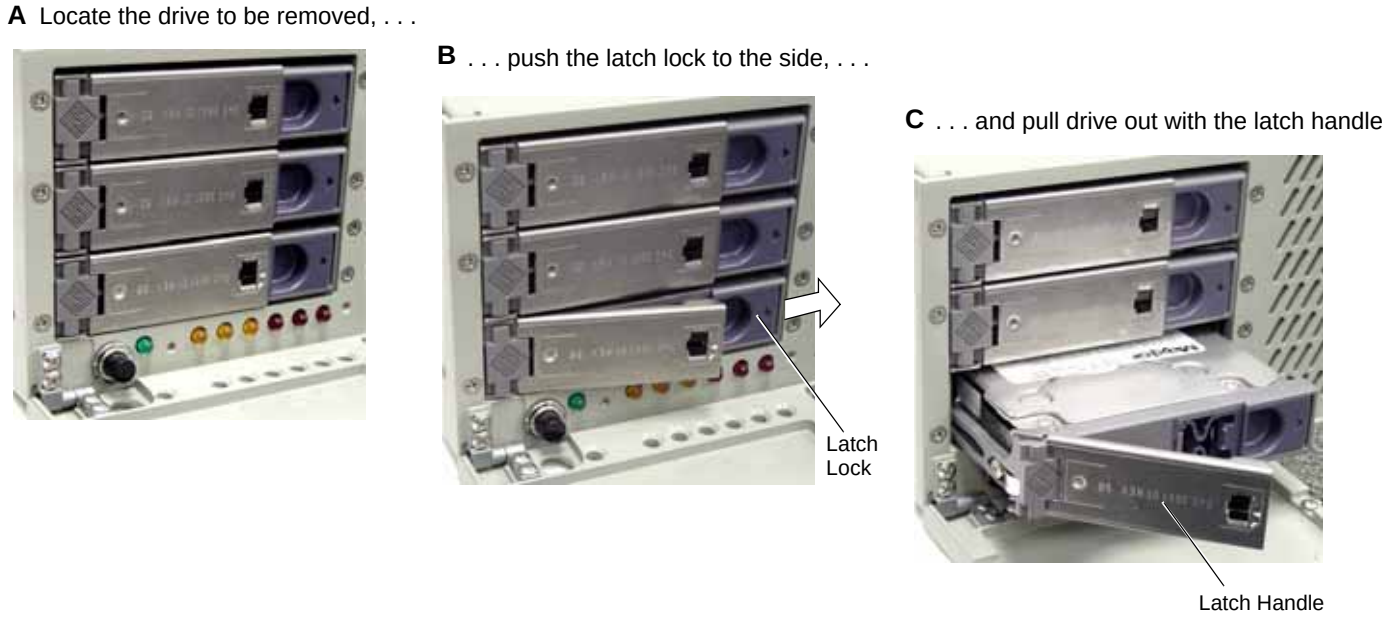


Figure 2-5. RES-32DCX Hard-Disk Drive Removal

4. Carefully pull the latch handle (see **C**) until the drive has cleared the chassis. The drive will automatically disconnect from its backplane connector when pulled forward.

2.1.3.3 Disk-Drive Installation

To install a hard-disk drive,

1. Make sure the latch handle of the drive to be installed is in the open position.
2. Properly orient the new drive and insert it into the vacant drive slot. If the drive cannot be inserted into the slot, rotate it 180 degrees (it is impossible to install the drive incorrectly into its slot).
3. Push the drive toward the rear (DO NOT CLOSE the latch handle while pushing) until the drive is flush with the front of the chassis. The handle will swing closed when it comes into contact with the RES-32DCX chassis.
4. When the drive is fully inserted in its slot, push the latch handle closed until the latch lock has snapped into the locked position.



Caution: When in the closed position, the latch handle secures the drive to the chassis. If the handle is closed before the drive is fully inserted, the latch mechanism may not fully engage to secure the drive.

2.1.4 PCI Cards

The RES-32DCX supports two 3.3V 64-bit/133-MHz and one 3.3V 64-bit/100-MHz PCI-X card slots, one 5V 32-bit/33-MHz PCI card slot, two PCI-*Express* card slots (an x16 for a Graphics Card and an x4), and one SIM Low Profile IPMI slot. All slots support cards up to 12.28-inches long. One of the 100-MHz PCI-X slots (see green slot 1 in *Figure 2-6*) supports an Ultra320-SCSI Zero-Channel RAID card.

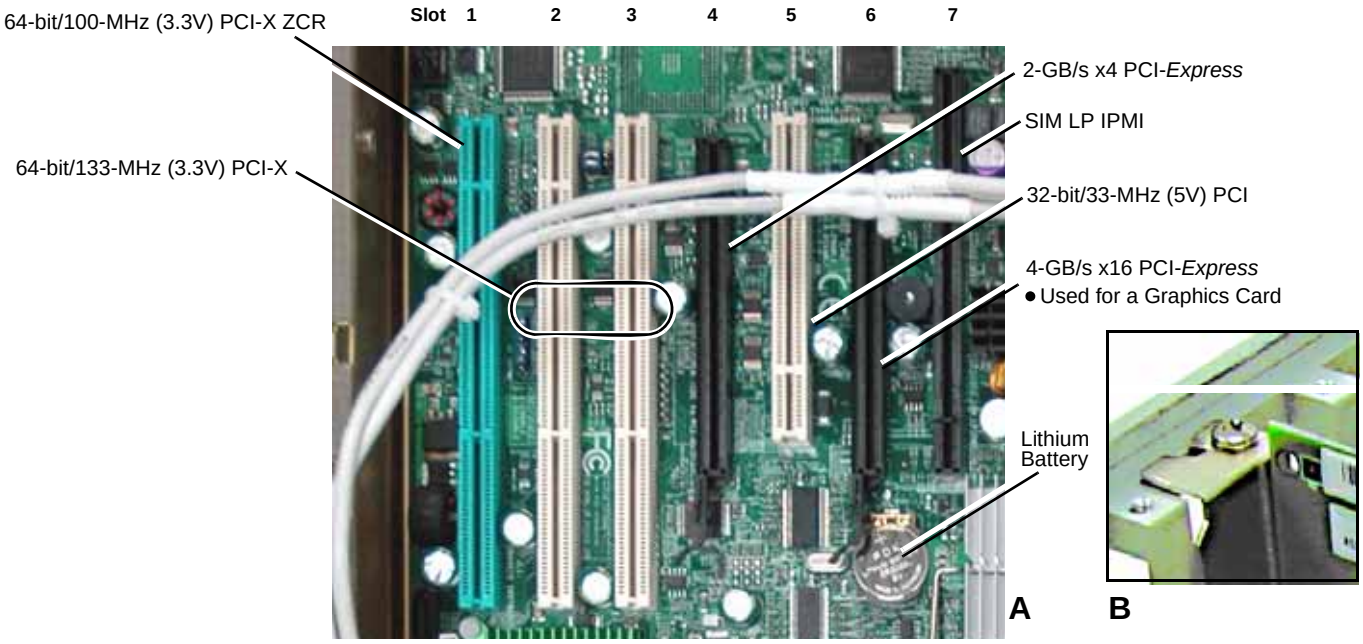


Figure 2-6. PCI Card Installation

2.1.4.1 Installing Cards

Perform the following steps to install a PCI or IPMI card:

1. Locate the slot within which a card will be installed (see **A**, *Figure 2-6*) and remove the Phillips screw holding the blank I/O panel.
2. Remove the blank I/O panel and install the new card, securing its I/O faceplate with the Phillips screw removed in Step 1 (see **B**, *Figure 2-6*).
3. Carefully install each card into the appropriate slot, repeating Step 1 and Step 2, until all cards have been installed.
4. Attach any internal I/O cables to the installed PCI cards, and carefully fold and tuck any exposed ribbon cables into the cabinet.
5. If you have no further installations to perform, close the RES-32DCX chassis by refastening the top cover removed in Step 1 on page 2-2.

2.1.5 Removable 120-mm Fan Housing

The RES-32DCX contains two high-speed 120-mm fans within two separate fan housings (one fan per housing). Both the front and rear fan housings (see *Figure 2-7*) are removable for replacement in the event of a fan failure.

2.1.5.1 Removing the 120-mm Fan Housing

Perform the following steps to remove a 120-mm Fan Housing:

1. Make sure the system is powered off (see "Operation" on page 2-16).
2. Select the 120-mm-fan housing that you want to replace and, with a Phillips screwdriver, loosen the two captive knurled screws (one at each end) until the housing is released from the chassis.
3. Four twisted wires form the cabling system of each housing. Carefully remove the 4-wire cable from its connector on the motherboard, remembering where each cable was attached.
4. The 120-mm-fan housing can now be removed from the RES-32DCX chassis.

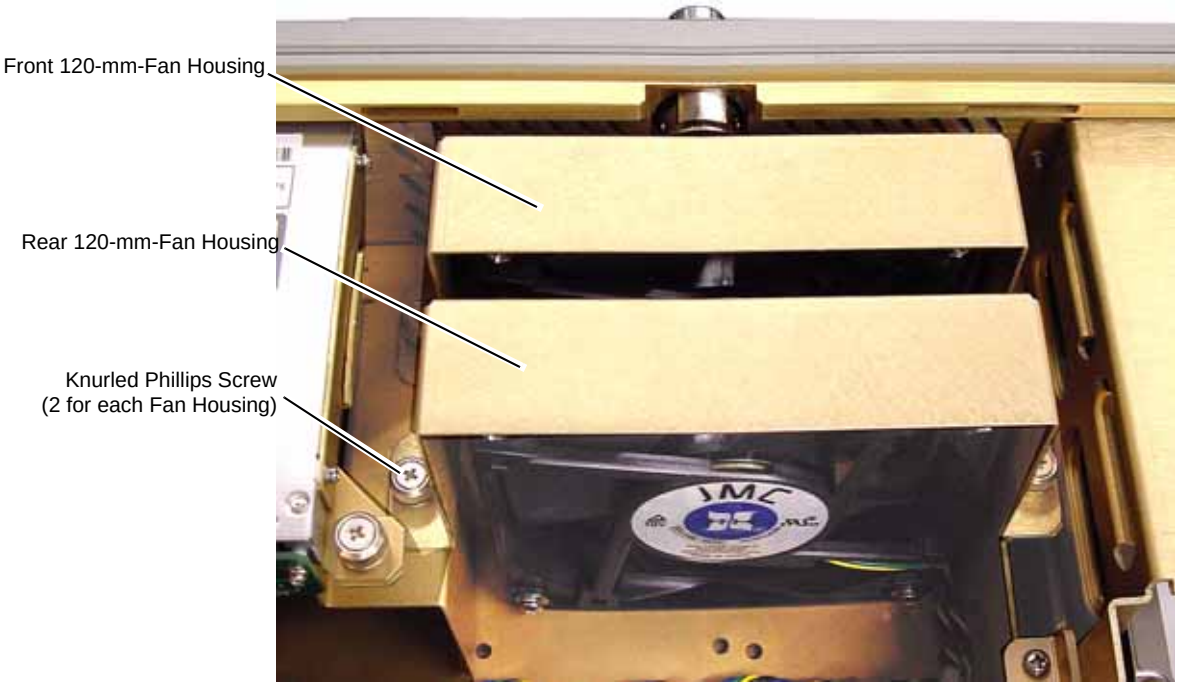


Figure 2-7. The RES-32DCX Front and Rear 120-mm-Fan Housings

2.1.5.2 Installing a 120-mm Fan Housing

Perform the following steps to install a 120-mm Fan Housing:

1. Insert the replacement 120-mm fan housing into the slot formerly occupied by the removed housing, aligning the key at each end of the new housing with the alignment slot (see *Figure 2-8*) in the fan-mounting bracket.
2. Connect the 4-wire cable from the new 120-mm-fan housing to the mother-board connectors from which the replaced housing cables were removed.

   Each cable connector is keyed to prevent incorrect cable insertion.
3. Tighten the two captive screws at each side with a Phillips screwdriver until the 120-mm-fan housing is firmly secured to the fan-mounting bracket.

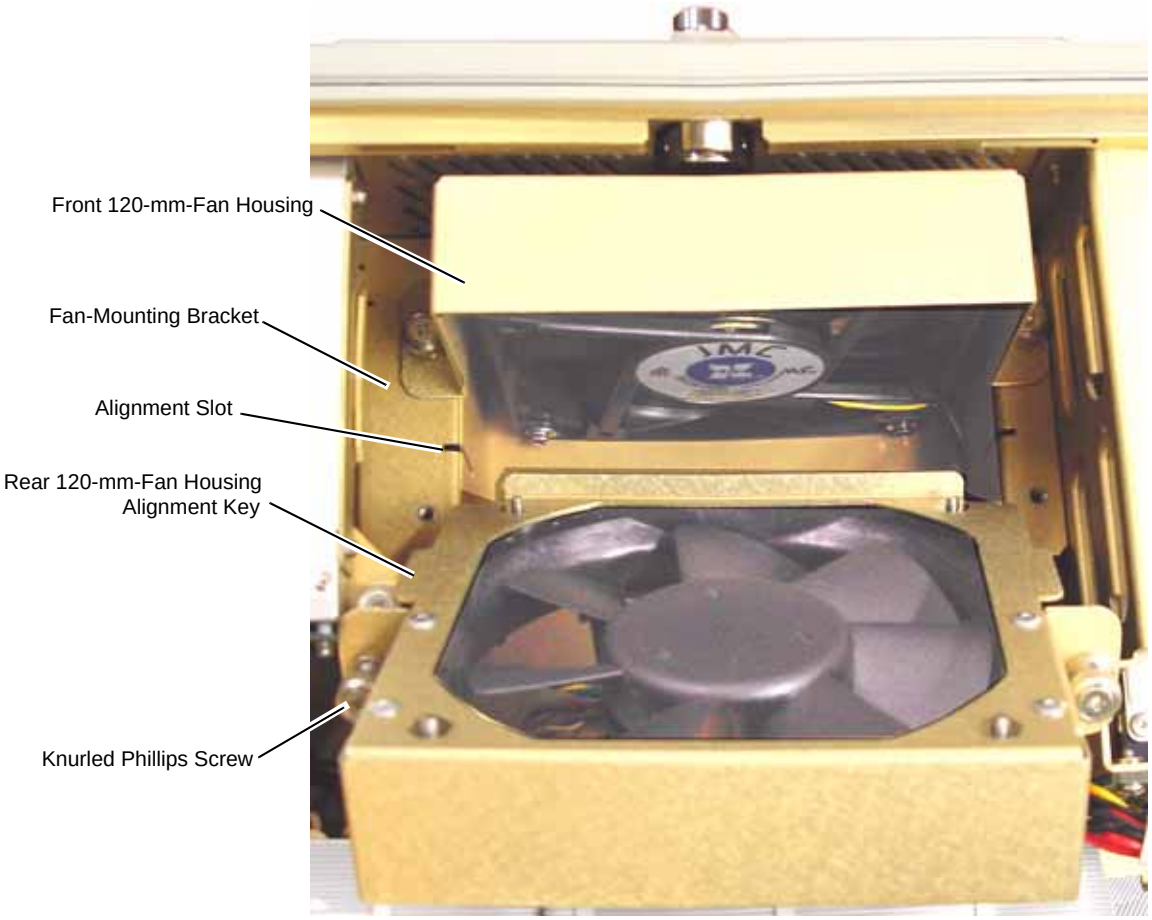


Figure 2-8. Rear 120-mm-Fan Housing Partially Removed

2.1.6 Power Supply

Each 460-watt load-sharing (N+1 redundant) power supply can be hot-swapped while the system is still on and operational.

2.1.6.1 Removing a Power Supply

Perform the following steps to remove a power supply:

1. To remove a power supply, first loosen and remove the two captive screws holding the power supply handle retainer (see **A**, *Figure 2-9*).
2. Loosen and remove the two captive screws holding the power-cord bracket.
3. Hook your right index finger into the extraction handle and pull the locking lever to the right with the right thumb (see **B**, *Figure 2-9*), freeing the power supply from being held within the chassis.
4. Pull the power supply until it is free of the chassis.

Caution: When pulling the power supply from the chassis, hold it at the bottom to prevent it from falling and damaging the unit.

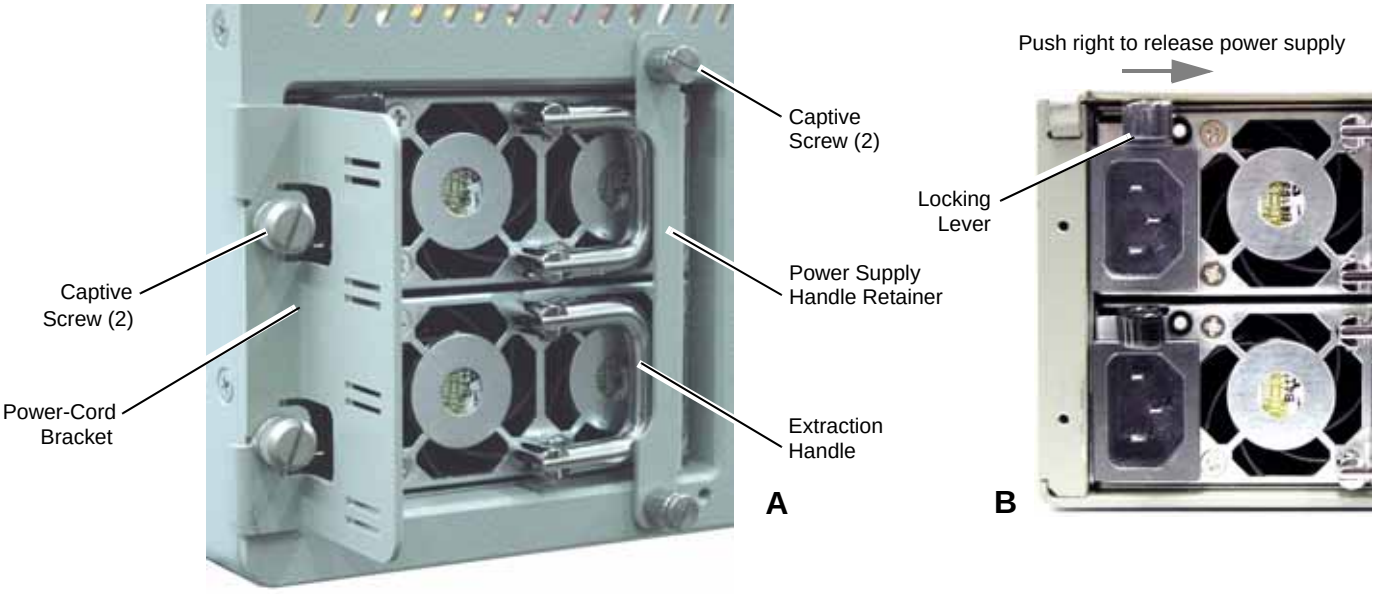


Figure 2-9. The RES-32DCX Power Supply Locking Mechanism

2.1.6.2 Installing a Power Supply

Perform the following steps to install a power supply:

1. Insert the replacement power supply into an empty slot with the extraction handle facing to the right (see *Figure 2-9*).
2. Push the power supply carefully into its slot until it is firmly seated (a click will be heard when the locking lever is securely fastened to the chassis).
3. Replace and tighten the two captive screws to hold the power supply handle retainer to the chassis (see *Figure 2-9*) to secure both power supply handles.
4. Secure the power-cord bracket removed in the previous section by refastening the two captive screws to the chassis.

2.1.7 Lithium Battery

2.1.7.1 Removing the Lithium Battery

Perform the following steps to remove the lithium battery:

1. Make sure the system is powered off (see “Operation” on page 2-16).
2. Locate the lithium battery socket (see *Figure 2-6*, page 2-9) and squeeze the latch (see **A**, *Figure 2-10*) together until the battery lifts out of its socket.
3. Remove the old battery and replace with a new battery (see next section).



A To release, squeeze battery latch together . . . **B** . . . and remove battery from socket

Figure 2-10. The RES-32DCX Lithium Battery and Socket

2.1.7.2 Installing a Lithium Battery

Perform the following steps to insert a new lithium battery:

1. Tilt the replacement battery into the empty socket so that it is angled under the battery latch (see **B**, *Figure 2-10*).
2. Carefully press down on the battery until it clicks firmly into place.

2.2 Rack Mounts

2.2.1 Mounting Brackets

Two types of rack-mount brackets (flanges) can be ordered for the RES-32DCX to secure the chassis to the 19" rack: brackets with handles (see **A**, *Figure 2-11*), and brackets without handles (see **B**, *Figure 2-11*). The chassis contains three threaded screw holes on each side to accommodate #10-32 size screws (included with the bracket package).

Brackets with handles are used to pull the RES-32DCX from the rack when rack-mount slides have been installed on the sides of the chassis (see following section).

A



B



Figure 2-11. Rack-Mount Bracket with (**A**) and without a Handle (**B**)

2.2.2 Rack-Mount Slides (Optional)

Rack-Mount Slides can be mounted on each side of the RES-32DCX, for the purpose of sliding the unit in and out of a rack. Mounting slides are optional and should be ordered at the time your system is purchased.

To learn how to install rack-mount slides, refer to Appendix B, "Rack-Mount Slide Installation".

Caution: Any screws used to mount a slide to a RES-32DCX chassis must not exceed a length of 3/8" to prevent excessive penetration of the chassis.

2.3 Operation

2.3.1 Plugging in and Securing the AC Power Cords

Before powering on the RES-32DCX, plug in and secure the AC power cords as follows:

1. If not already installed, secure the power-cord retainer bracket (see **A**, *Figure 2-13* on page 2-17) to the rear corner of the chassis with the two captive screws.
2. On the rear of the RES-32DCX, plug an AC power cord (shipped with unit) into the AC power socket on each power supply (see *Figure 2-12*).

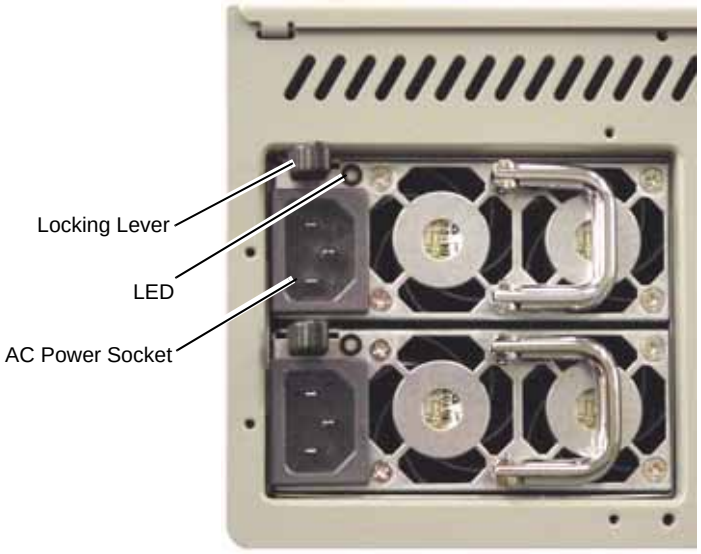


Figure 2-12. AC Power Socket and LED on the RES-32DCX Rear

3. Thread one velcro strap (see **B**, *Figure 2-13*), "fuzzy" side up, through the second slot down from the top of the power-cord bracket (see **C**, *Figure 2-13*).
4. Loop the velcro strap back through the third slot down from the top of the power-cord bracket (see **D**, *Figure 2-13*).
5. Bring the narrow end of the velcro strap (now underneath the power-cord plug) up through the slit in the top of the strap, and back through the top slit on the power-cord bracket. Pull tightly (see **E**, *Figure 2-13*).

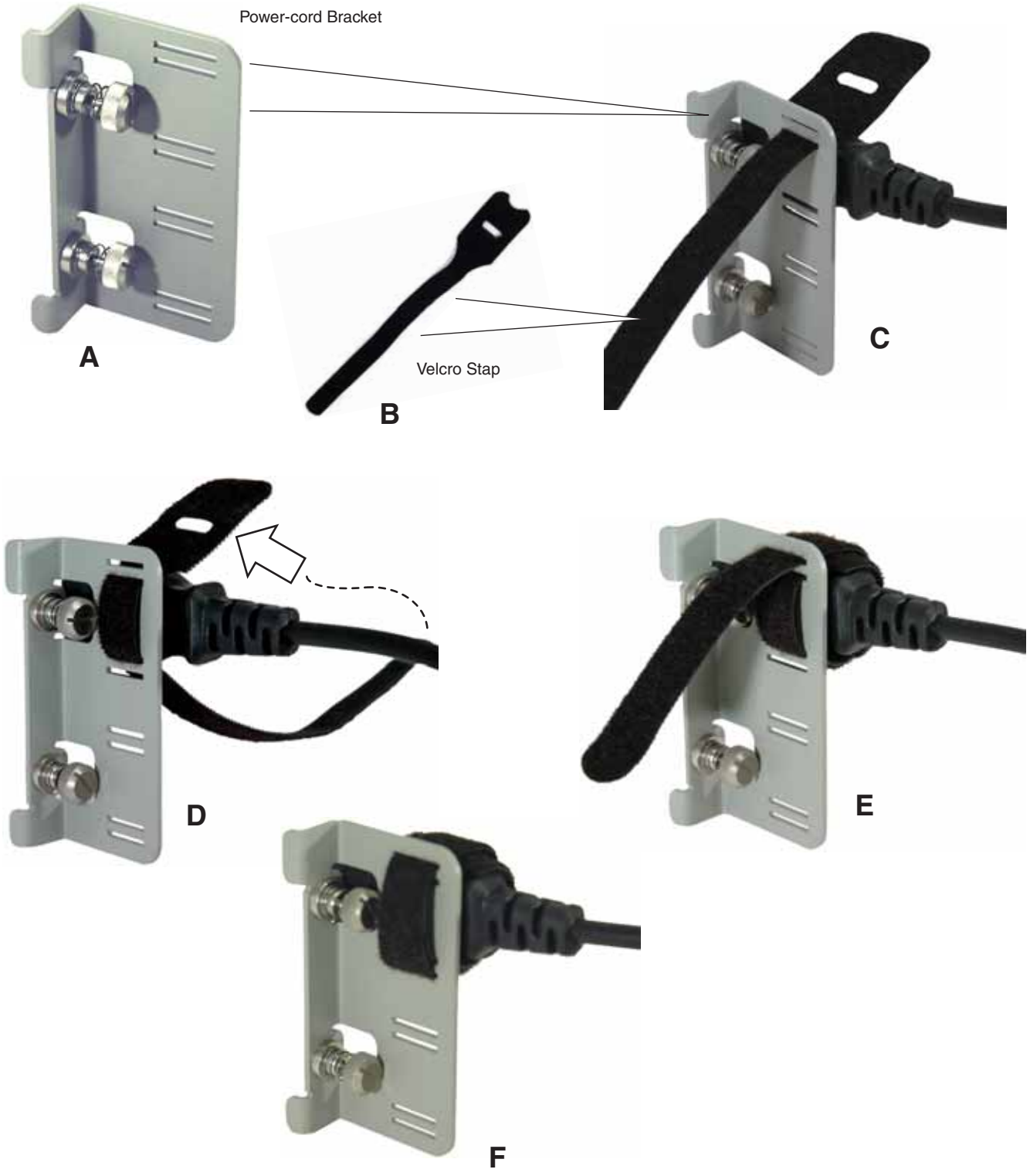


Figure 2-13. Secure all Power Cords with Bracket and Velcro Strap

6. Loop the velcro strap back through the fourth slot down from the top on the power-cord bracket. Pull tightly on the strap and fasten it to itself (see **F**, *Figure 2-13*).

7. Using the bottom 4 slots on the power-cord bracket, repeat steps 3 through 6 to secure the lower AC power cord.

Figure 2-14 shows the two power cords secured in place on the rear of the RES-32DCX.



Figure 2-14. System Power Button and LED on the RES-32DCX Front

2.3.2 Turning the System On

1. Plug the AC power cord from each of the RES-32DCX power supplies into a "live" AC outlet.

   The LED on each power supply will turn on when AC power is enabled.

2. On the front of the RES-32DCX push the system power on/off button (see *Figure 2-15*). This will cause the system POWER LED to light (green).

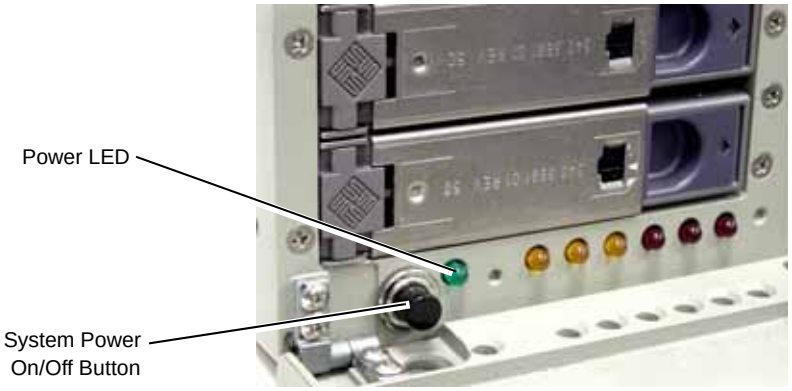


Figure 2-15. System Power Button and LED on the RES-32DCX Front

2.3.3 Getting Started

2.3.3.1 Configuration

1. Make sure all SCSI/SATA II drives are installed (see "SCSI/SATA II Hard-Disk Drive" on page 2-6). The lower (bottom) left drive will be automatically configured as `SCSI ID0 (or SATA II ID2)`, the drive above that will be configured as `SCSI ID1 (or SATA II ID1)`, and the third and highest drive (if installed) `as SCSI ID2 (or SATA II ID0)`. Changes may be made through the BIOS.
2. Make sure that a graphics card is installed in slot 6 (x16 PCI-*Express*; see *Figure 2-6*) and connect a multiscan monitor to the SVGA or DVI connector.
3. Attach a PS/2 keyboard and mouse to the appropriate connectors on the rear I/O panel of the RES-32DCX (see **B**, *Figure 1-5* on page 1-10)
4. Turn the system on (see previous section).

2.3.3.2 Linux Installation

The subject of installing the Linux operating system onto the RES-32DCX is detailed in Appendix D, "Red Hat Enterprise Linux Installation".

2.3.4 Turning the System Off



Caution: Before turning your system off, make sure to save all open files, properly close applications, and broadcast a warning to all users on any active networks.

1. To turn the RES-32DCX power off, press and hold the system power on/off button (see *Figure 2-15*, page 2-18) for at least four (4) seconds. This will shut down the system and turn off the `POWER` LED.

   As an alternative, a modern operating system (Windows 9x or newer and Linux, for example) can turn off the system after a graceful OS software shutdown.

Appendix A

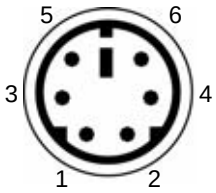
Connector Pinouts

This appendix provides connector pinouts for all standard user I/O interfaces on the RES-32DCX.

A.1 PS/2 Keyboard and Mouse

The RES-32DCX provides a 6-pin **female** mini-DIN connector for the PS/2 keyboard, and another for the PS/2 mouse. Signals for both connectors are defined in *Table A-1*.

Table A-1. PS/2 Keyboard/Mouse Pinouts



Pin	Signal Name
1	Keyboard/mouse data
2	*N/C*
3	Ground
4	Vcc
5	Keyboard/mouse clock
6	*N/C*

A.2 USB Ports

The RES-32DCX supports four USB (Universal Serial Bus) port connectors (see *Figure A-1*), USB 0 through USB 3, on the rear I/O panel, and two optional USB ports mounted above the rear I/O panel. Two additional USB ports can be accessed directly from the system motherboard.

[Those who wish to customize USB ports should contact a local Themis sales office or info@themis.com.].

Pinouts are listed in *Table A-2*.

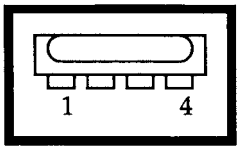


Figure A-1. USB Connector

Table A-2. USB Connector Pinouts

Pin	Signal Name	Pin	Signal Name
1	+5V	3	PO+
2	PO–	4	GND

A.3 Serial Ports

The RES-32DCX supports two **male** DB9 serial port connectors on the rear I/O panel (see *Figure A-2*)—TTYA (COM1) and an *optional* TTYB (COM2).

COM1 and COM2 Pinouts are listed in *Table A-3*, page A-3.

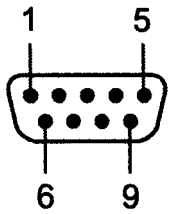


Figure A-2. DB9 Serial Connector

Table A-3. DB9 Serial Connector Pinout

Pin	Signal Name
1	DCD
2	RXD
3	TXD
4	DTR
5	GND

Pin	Signal Name
6	DSR
7	RTS
8	CTS
9	RI

A.4 Parallel Port

The RES-32DCX supports a single **female** DB25 parallel port connector (see *Figure A-3*). Pinouts are listed in *Table A-4*.

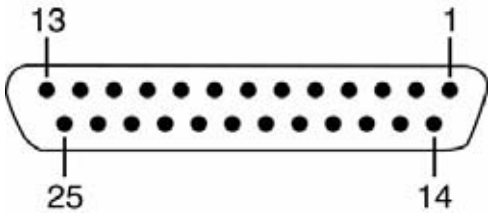


Figure A-3. DB25 Parallel Connector

Table A-4. Parallel Port Connector Pinout

Pin	Signal	Description
1	PAR_DS_L_CONN	Data Strobe Low
2 to 9	PP_DAT[0..7]_CONN	Data0 Thru Data7
10	PAR_ACK_L_CONN	Acknowledge Low
11	PAR_BUSY_CONN	Busy
12	PAR_PE_CONN	Parity Error
13	PAR_SELECT_L_CONN	Select Low
14	PAR_AFXN_L_CONN	Auto Feed Low
15	PAR_ERROR_L_CONN	Error Low
16	PAR_INIT_L_CONN	Initialize Low
17	PAR_IN_L_CONN	Peripheral Input Low
18	Gnd	Chassis ground
19	Gnd	Chassis ground
20	Gnd	Chassis ground
21	Gnd	Chassis ground
22	Gnd	Chassis ground
23	Gnd	Signal ground
24	Gnd	Write Data
25	Gnd	Write Gate

A.5 Gigabit Ethernet LAN Port

The RES-32DCX supports two RJ45 Gigabit Ethernet LAN port connectors with two embedded LEDs (see *Figure A-4*). Pinouts are listed in *Table A-5*.

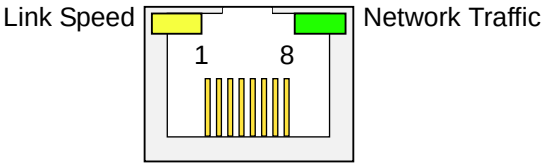


Figure A-4. Ethernet Connector, Type RJ45

Table A-5. RJ45 Ethernet Pinouts

Pin	Signal Name	Pin	Signal Name
1	TRD0+	5	TRD2-
2	TRD0-	6	TRD1-
3	TRD1+	7	TRD3+
4	TRD2+	8	TRD3-

- The color of the left LED indicates the LAN connection speed:
  - — Off = 10 MHz
  - — Green = 100 MHz
  - — Amber = 1 GHz
- The right LED, when lit, indicates LAN activity (network traffic).

A.6 Audio Ports

The RES-32DCX supports three sub-miniature (3.5-mm diameter) audio ports:

- One Audio Line In
- One Audio Line Out
- One Microphone Line in

The microphone jack will support most types (dynamic, condenser, etc.) of microphones now on the market.

Appendix B

Rack-Mount Slide Installation

An *optional* set of two rack-mount slides (left side and right side) is available for all RES-32 systems, and should be ordered at the time of purchase. The RES-32DCX chassis contains six threaded screw holes on each side to accommodate #8-32 size screws (included with the rack-mount slide kit); steel slides require four mounting holes, and aluminum slides require three mounting holes (see *Figure B-1*).

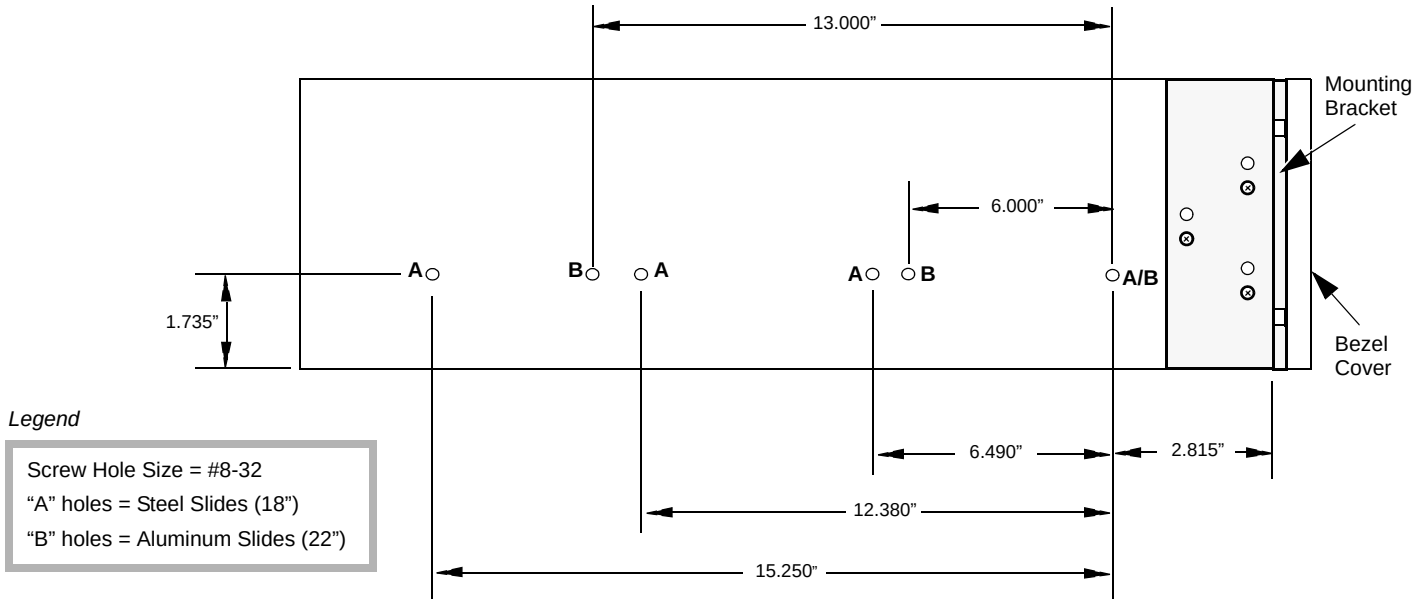


Figure B-1. Screw Locations for Rack-Mount Slides

Dimensions of the screw-hole patterns on the sides of the RES-32DCX chassis for installing rack-mount slides are shown in *Figure B-1*. Holes for steel slides are marked “A” and holes for aluminum (Jonathan) slides are marked “B”.



Caution: Any screws used to mount a slide to a RES-32 chassis must not exceed a length of 3/8” to prevent excessive penetration of the chassis.

The rack-mount slide installation kit includes the following items:

a. Two inside slide sections

b. Two outside slide sections

c. Two front (short) slide brackets

d. Two rear (long) slide brackets

e. Assorted screws, washers, and nuts

Follow these steps to install a steel rack-mount slide to the RES-32DCX chassis:

1. Attach the inside slide section (see *Figure B-2* on page B-3) to both sides of the RES-32DCX chassis using four #8-32 screws per side.
2. Measure the depth of the 19” equipment rack into which the RES-32DCX system will be installed (this can vary from 24” to 30”).
3. Using the depth of the equipment rack, adjust and attach the front and rear slide brackets to the outside slide section using the screws, washers, and nuts provided with the slide kit.
4. With all slide brackets securely attached to both the right and left outside slide sections, install both sections to the inside right and inside left of a 19” rack with two bolts per bracket, making sure there is adequate room for the 3-RU height (5.25”) of a RES-32DCX system.
5. Carefully insert the RES-32DCX system into the 19” rack so that the inside slides on both sides of the chassis travel smoothly into the channels of the outside slide sections. Push the system into the rack until the mounting brackets on the front of the chassis are flush with the front of the rack.
6. Secure the RES-32DCX system to the 19” rack with two bolts on each side.

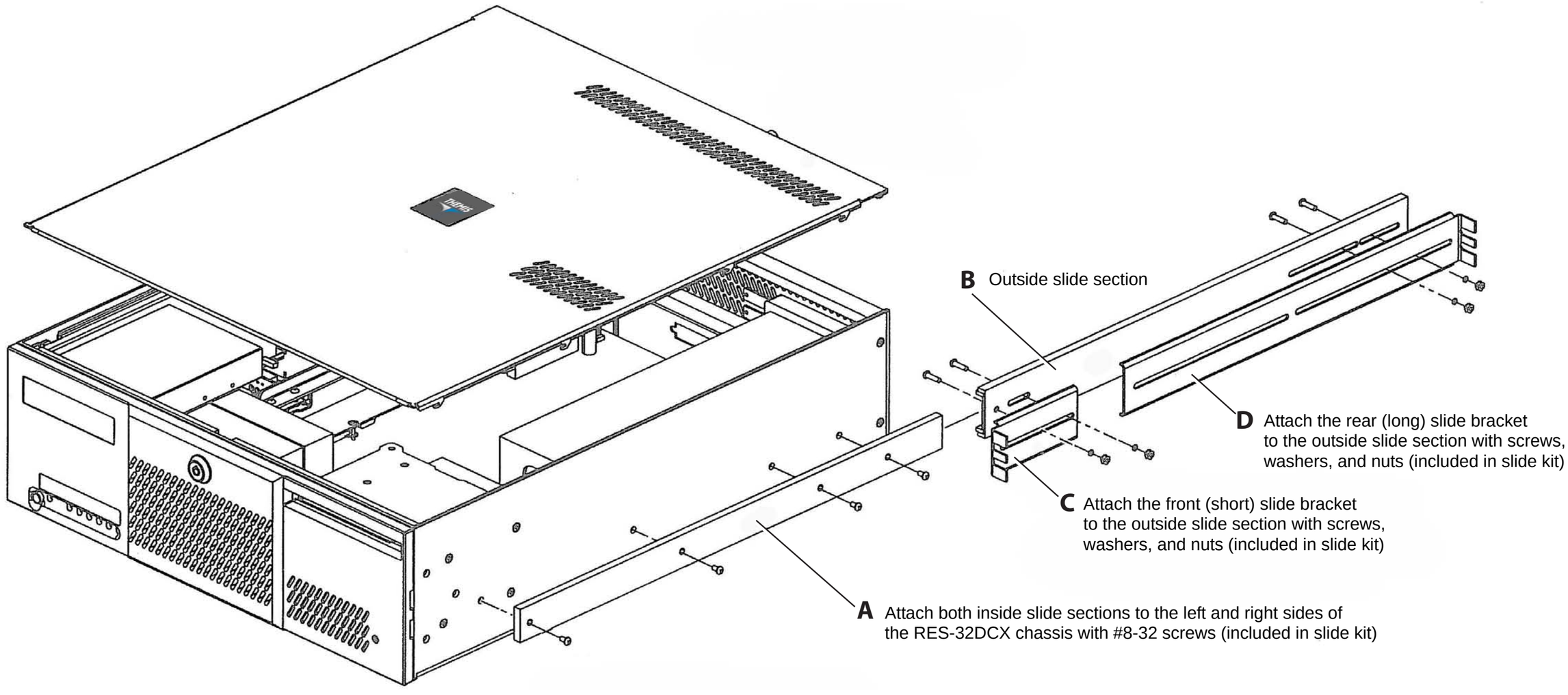


Figure B-2. RES-32DCX Rack-Mount Slide Installation

Appendix C

BIOS Setup Utility

C.1 Introduction

This chapter describes the Phoenix BIOS™ Setup utility for the RES-32DCX. The Phoenix ROM BIOS is stored in a flash chip and can be easily upgraded using a floppy-disk-based program.



Note: Due to periodic changes to the BIOS, some settings may have been added or Deleted and might not yet be recorded in this manual. Please refer to the Manual Download area of the SuperMicro web site http://www.supermicro.com for any changes to the BIOS that may not be reflected in this manual.

C.1.1 System BIOS

The BIOS is the Basic Input Output System used in all IBM® PC, XT™, AT®, and PS/2® compatible computers. The Phoenix BIOS stores the system parameters, types of disk drives, video displays, etc. in the CMOS. The CMOS memory requires very little electrical power. When the computer is turned off, a backup battery provides power to the CMOS logic, enabling it to retain system parameters. Each time the computer is powered on the computer is configured with the values stored in the CMOS logic by the system BIOS, which gains control at boot up.

C.1.2 How To Change the Configuration Data

The CMOS information that determines the system parameters may be changed by entering the BIOS Setup utility. This Setup utility can be accessed by pressing the <Delete> key at the appropriate time during system boot. (See following Section.)

C.1.3 Starting the Setup Utility

Normally, the only visible POST (Power On Self Test) routine is the memory test. As the memory is being tested, press the <Delete> key to enter the main menu of the BIOS Setup utility. From the main menu, you can access the other setup screens, such as the Security and Power menus. Beginning with Section 4-3, detailed descriptions are given for each parameter setting in the Setup utility.



Warning: To prevent possible boot failure, do not shut down or reset the system while updating the BIOS.

C.2 Running Setup



Note: Default settings are shown in **bold** text unless otherwise noted.

The BIOS setup options described in this section are selected by choosing the appropriate text from the main BIOS Setup screen (see *Figure C-1* on page C-3). The screen display is often all you need to understand how to set the options.

When the computer is first powered on, the Phoenix BIOS™ is immediately activated. While the BIOS is in control, the Setup program can be activated in one of two ways:

1. By pressing <Delete> immediately after turning the system on, or
2. When the message shown below appears briefly at the bottom of the screen during the POST (Power On Self-Test), press the <Delete> key to activate the main Setup menu:

```
Press the <Delete> key to enter Setup
```

C.3 Main BIOS Setup

All the main Setup options are described in this section. The main BIOS Setup screen is displayed in *Figure C-1*.

Use the Up/Down arrow keys to move among the different settings in each menu. Use the Left/Right arrow keys to change the options for each setting.

The icon ▶ indicates a submenu. With the item highlighted, press the <Enter> key to access the submenu.

Press the <Esc> key to exit the CMOS Setup Menu. The next section describes in detail how to navigate through the menus.

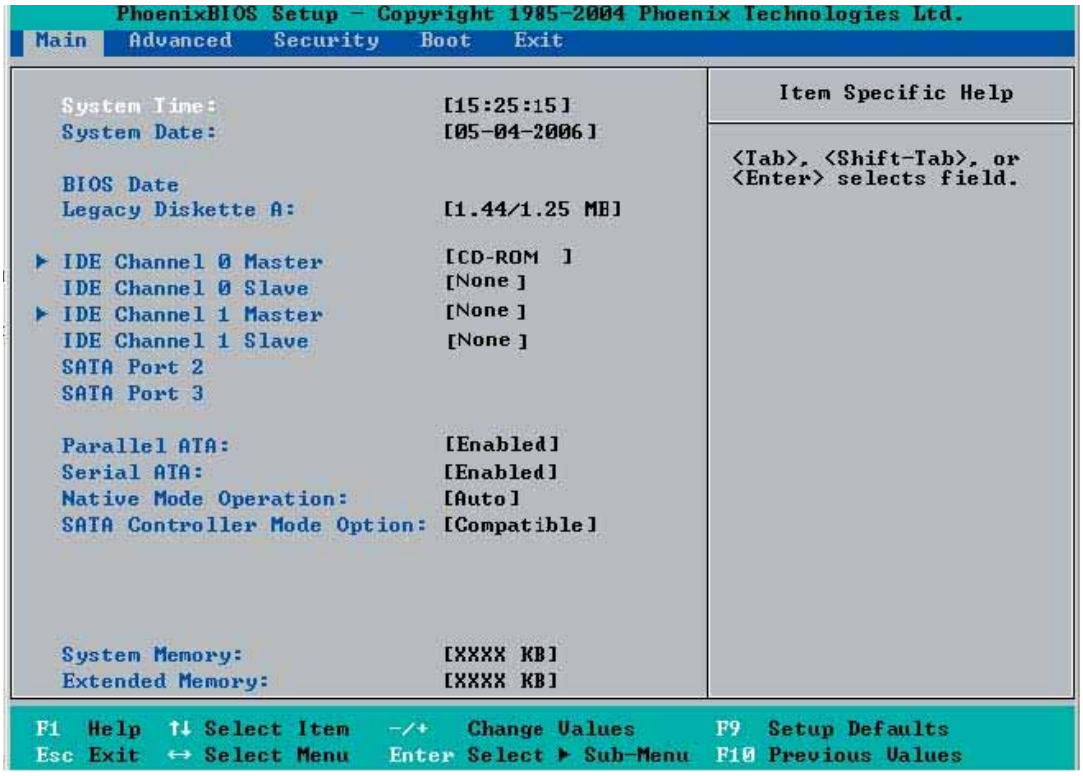


Figure C-1. The Main BIOS Setup Menu

C.3.1 Main Setup Features

C.3.1.1 System Time

To set the system date and time, key in the correct information in the appropriate fields. Then press the <Enter> key to save the data.

C.3.1.2 System Date

Using the arrow keys, highlight the month, day, and year fields, and enter the correct data. Press the <Enter> key to save the data.

C.3.1.3 BIOS Date

The item displays the date that the BIOS was built.

C.3.1.4 Legacy Diskette A

This setting allows the user to set the type of floppy disk drive installed as diskette A. The options are: Disabled, 360Kb 5.25 in, 1.2MB 5.25 in, 720Kb 3.5 in, **1.44/1.25MB**, 3.5 in and 2.88MB 3.5 in.

▶ IDE Channel 0 Master/Slave, IDE Channel 1 Master/Slave, SATA Port2, SATA Port3

These settings allow the user to set the parameters of IDE Channel 0 Master/ Slave, IDE Channel 1 Master/Slave, SATA Port2, SATA Port3 slots. Hit <Enter> to activate the following sub-menu screen for detailed options of these items. Set the correct configurations accordingly. The items included in the submenu are shown in *Figure C-2* on page C-5.

C.3.1.5 Type

Selects the type of IDE hard drive. The options are **Auto**, (which allows the BIOS to automatically determine the hard drive's capacity, number of heads, etc.), a number from 1-39 to select a predetermined type of hard drive, CDROM and ATAPI Removable. The option “User” will allow the user to enter the parameters of the HDD installed at this connection. The option “Auto” will allow the BIOS to automatically configure the parameters of the HDD installed at the connection. Choose the option 1-39 to select a predetermined HDD type. Select CDROM if a CDROM drive is installed. Select ATAPI if a removable disk drive is installed.

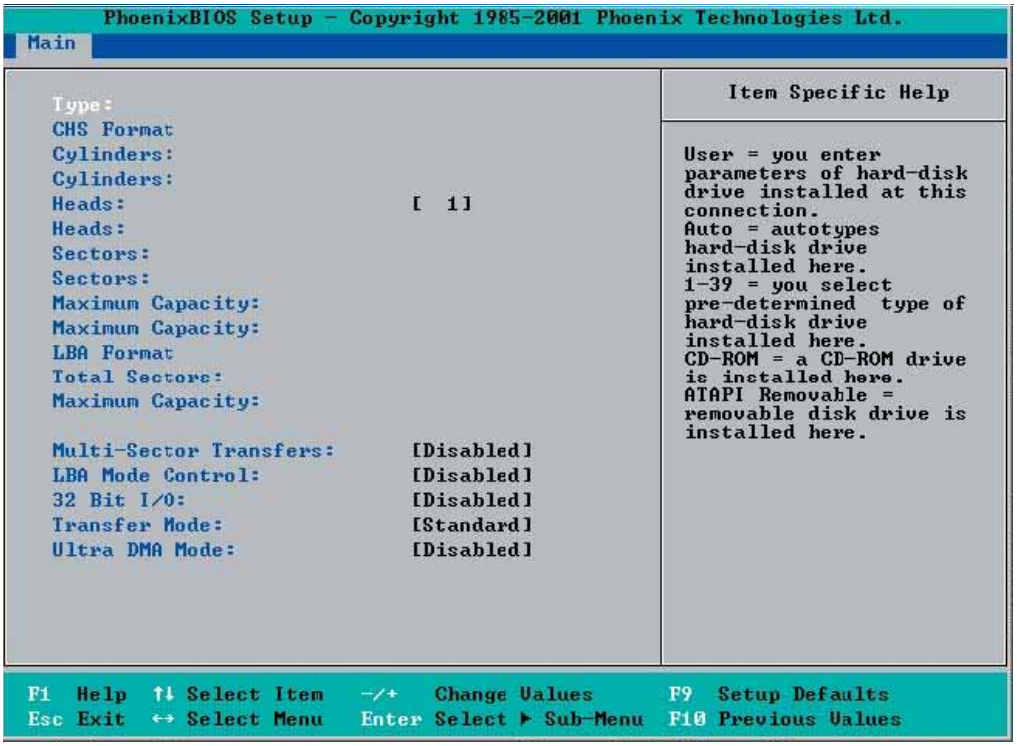


Figure C-2. The Main BIOS Setup Submenu

CHS Format

The following items will be displayed by the BIOS:

TYPE: This item displays the type of IDE or SATA drive.

Cylinders: This item indicates the status of Cylinders.

Headers: This item indicates the number of headers.

Sectors: This item displays the number of sectors.

Maximum Capacity: This item displays the maximum storage capacity of the system.

LBA Format

The following items will be displayed by the BIOS:

Total Sectors: This item displays the number of total sectors available in the LBA Format.

Maximum Capacity: This item displays the maximum capacity in the LBA Format.

C.3.1.6 Multi-Sector Transfer

This item allows the user to specify the number of sectors per block to be used in multi-sector transfer. The options are Disabled, 4 Sectors, 8 Sectors, and **16 Sectors**.

C.3.1.7 LBA Mode Control

This item determines whether the Phoenix BIOS will access the IDE Channel 0 Master Device via the LBA mode. The options are Enabled and **Disabled**.

C.3.1.8 32 Bit I/O

This option allows the user to enable or disable the function of 32-bit data transfer.The options are Enabled and **Disabled**.

C.3.1.9 Transfer Mode

This option allows the user to set the transfer mode. The options are **Standard**, Fast PIO1, Fast PIO2, Fast PIO3, Fast PIO4, FPIO3/DMA1 and FPIO4/DMA2.

C.3.1.10 Ultra DMA Mode

This option allows the user to select Ultra DMA Mode. The options are **Disabled**, Mode 0, Mode 1, Mode 2, Mode 3, Mode 4, and Mode 5.

C.3.1.11 Parallel ATA

This setting allows the user to enable or disable the function of Parallel ATA. The options are Disabled and **Enabled**.

C.3.1.12 Serial ATA

This setting allows the user to enable or disable the function of Serial ATA. The options are Disabled and **Enabled**.

C.3.1.13 Native Mode Operation

Select Serial ATA for SATA or select “Auto” (Native Mode) for ATA. The options are Serial ATA and **Auto**.

C.3.1.14 SATA Controller Mode

Select **Compatible** to allow the SATA and PATA drives to be automatically-detected and be placed in the Legacy Mode by the BIOS. Select Enhanced to allow

the SATA and PATA drives to be to be automatically-detected and be placed in the Native IDE Mode.



Note: The Enhanced mode is supported by the Windows 2000 OS or a later version.

When the SATA Controller Mode is set to “Enhanced”, the following items will display:

C.3.1.15 Serial ATA (SATA) RAID Enable

Select Enable to enable Serial ATA RAID Functions. (*For the Windows OS environment, use the RAID driver if this feature is set to Enabled. When this item is set to Enabled, the item: “ICH RAID Code Base” will be available for you to select either Intel or Adaptec Host RAID firmware to be activated. If this item is set to **Disabled**, the item-SATA AHCI Enable will be available.) The options are Enabled and **Disabled**.

C.3.1.16 ICH RAID Code Base

Select Intel to enable Intel's SATA RAID firmware. Select Adaptec to use Adaptec's HostRAID firmware. The options are **Intel** and Adaptec.

C.3.1.17 SATA AHCI

Select Enable to enable the function of Serial ATA Advanced Host Interface.



Caution: This feature is for advanced programmers only. The options are Enabled and **Disabled**.

C.3.1.18 System Memory

This display informs you how much system memory is recognized as being present in the system.

C.3.1.19 Extended Memory

This display informs you how much extended memory is recognized as being present in the system.

C.4 Advanced Setup

Choose Advanced from the Phoenix BIOS Setup Utility main menu with the arrow keys. You should see the display shown in *Figure C-3*. The items with a triangle beside them have submenus that can be accessed by highlighting the item and pressing <Enter>.

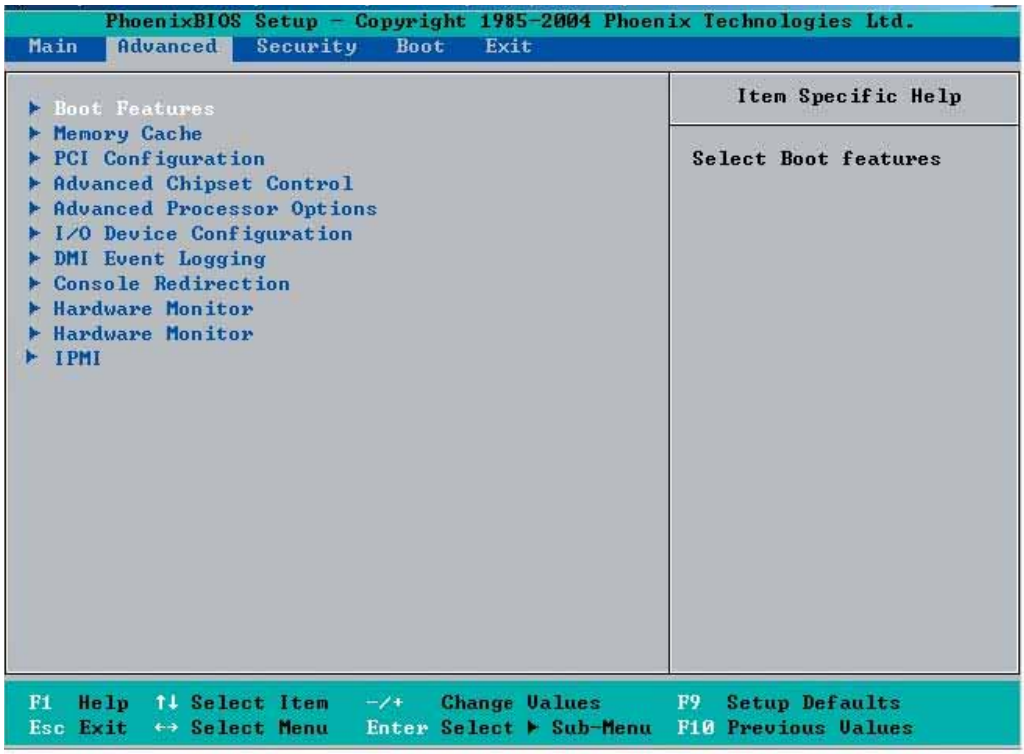


Figure C-3. The Advanced BIOS Setup Menu

C.4.1 ▶ Boot Features

Access the Boot Features submenu to make changes to the following settings.

C.4.1.1 Quick Boot Mode

If enabled, this feature will speed up the POST (Power On Self Test) routine by skipping certain tests after the computer is turned on. The settings are **Enabled** and Disabled. If Disabled, the POST routine will run at normal speed.

C.4.1.2 Quiet Boot

This setting allows you to **Enable** or Disable the graphic logo screen during boot-up.

C.4.1.3 ACPI Mode

Use the setting to determine if you want to employ ACPI (Advanced Configuration and Power Interface) power management on your system. The options are **Yes** and No.

C.4.1.4 ACPI Sleep Mode

Use the setting to determine if you want to employ ACPI (Advanced Configuration and Power Interface) power management on your system when the system goes into the sleep mode. The options are **S1** and S3.

C.4.1.5 Power Button Behavior

If set to **Instant-Off**, the system will power off immediately as soon as the user hits the power button. If set to 4-sec., the system will power off when the user presses the power button for 4 seconds or longer. The options are instant-off and 4-sec override.

C.4.1.6 Resume On Modem Ring

Select On to “wake your system up” when an incoming call is received by your modem. The options are On and **Off**.

C.4.1.7 Power Loss Control

This setting allows you to choose how the system will react when power returns after an unexpected loss of power. The options are Stay Off, Power On, and **Last State**.

C.4.1.8 Watch Dog

If enabled, this option will automatically reset the system if the system is not active for more than 5 minutes. The options are Enabled and **Disabled**.

C.4.1.9 Summary Screen

This setting allows you to **Enable** or Disable the summary screen which displays the system configuration during bootup.

C.4.2 ▶ Memory Cache

C.4.2.1 Cache System BIOS Area

This setting allows you to designate a reserve area in the system memory to be used as a System BIOS buffer to allow the BIOS write (cache) its data into this reserved memory area. Select "**Write Protect**" to enable this function, and this area will be reserved for BIOS ROM access only. Select "Unchecked" to disable this function and make this area available for other devices.

C.4.2.2 Cache Video BIOS Area

This setting allows you to designate a reserve area in the system memory to be used as a Video BIOS buffer to allow the BIOS write (cache) its data into this reserved memory area. Select "**Write Protect**" to enable the function and this area will be reserved for Video BIOS ROM access only. Select "Uncached" to disable this function and make this area available for other devices.

C.4.2.3 Cache Base 0-512K

If enabled, this feature will allow the data stored in the base memory area: block 0-512K to be cached (written) into a buffer, a storage area in the Static DROM (SDROM) or to be written into L1, L2 cache inside the CPU to speed up CPU operations. Select "Uncached" to disable this function. Select "Write Through" to allow data to be cached into the buffer and written into the system memory at the same time. Select "Write Protect" to prevent data from being written into the base memory area of Block 0-512K. Select "Write Back" to allow CPU to write data back directly from the buffer without writing data to the System Memory for fast CPU data processing and operation. The options are Uncached, Write Through, Write Protect, and **Write Back**.

C.4.2.4 Cache Base 512K-640K

If enabled, this feature will allow the data stored in the memory area: 512K-640K to be cached (written) into a buffer, a storage area in the Static DROM (SDROM) or written into L1, L2, L3 cache inside the CPU to speed up CPU operations. Select "Uncached" to disable this function. Select "Write Through" to allow data to be cached into the buffer and written into the system memory at the same time. Select "Write Protect" to prevent data from being written into the base memory area of Block 512K-640K. Select "Write Back" to allow CPU to write data back directly from the buffer without writing data to the System Memory for fast CPU data processing and operation. The options are Uncached, Write Through, Write Protect, and **Write Back**.

C.4.2.5 Cache Extended Memory

If enabled, this feature will allow the data stored in the extended memory area to be cached (written) into a buffer, a storage area in the Static DROM (SDROM) or written into L1, L2, L3 cache inside the CPU to speed up CPU operations.

Select “Uncached” to disable this function. Select “Write Through” to allow data to be cached into the buffer and written into the system memory at the same time. Select “Write Protect” to prevent data from being written into the base memory area of Block 0-512K. Select “Write Back” to allow CPU to write data back directly from the buffer without writing data to the System Memory for fast CPU data processing and operation. The options are Uncached, Write Through, Write Protect, and **Write Back**.

C.4.2.6 Discrete MTRR Allocation

If enabled, MTRRs (-Memory Type Range Registers) are configured as distinct, separate units and cannot be overlapped. If enabled, the user can achieve better graphic effects when using a Linux graphic driver that requires the write-combining configuration with 4GB or more memory. The options are Enabled and **Disabled**.

C.4.3 ▶ PCI Configuration

Access the submenu to make changes to the following settings for PCI devices.

C.4.3.1 Onboard GLAN1/Onboard GLAN2 (Gigabit-LAN) OPROM Configure

Enabling this option provides the capability to boot from GLAN. The options are **Disabled** and Enabled.

C.4.3.2 Onboard SCSI OPROM Configure

Enabling this option provides the capitally to boot from SCSI HDD. The options are Disabled and **Enabled**.

C.4.3.3 PCI Parity Error Forwarding

The feature allows SERR and PERR errors detected in PCI slots to be sent (forwarded) to the BIOS DMI Event Log for the user to review. The options are Enabled and **Disabled**.

C.4.3.4 Reset Configuration Data

If set to Yes, this setting clears the Extended System Configuration Data- (ESCD) area. The options are Yes and **No**.

C.4.3.5 Frequency for PCI-X#1, PCI-X#2-#3

This option allows the user to change the bus frequency for the devices installed in the slot indicated. The options are **Auto**, PCI 33 MHz, PCI 66 MHz, PCI-X 66 MHz, PCI-X 100 MHz, and PCI-X 133 MHz.

C.4.4 ▶ Slot#1 PCI-X 100 MHz ZCR, Slot#2 PCI-X 133MHz, Slot#3 PCI-X 133MHz, Slot#4 PCI-Exp x4, Slot#5 PCI-33MHz, and Slot#6 PCI-Exp x16

Access this submenu for each of the settings to make changes to the following:

C.4.4.1 Option ROM Scan

When enabled, this setting will initialize the device expansion ROM. The options are **Enabled** and Disabled.

C.4.4.2 Enable Master

This setting allows you to enable the selected device as the PCI bus master. The options are **Enabled** and Disabled.

C.4.4.3 Latency Timer

This setting allows you to set the clock rate for Bus Master. A high-priority, high-throughout device may benefit from a greater clock rate. The options are **Default**, 0020h, 0040h, 0060h, 0080h, 00A0h, 00C0h, and 00E0h. For Unix, Novelle and other Operating Systems, please select the option: other. If a drive fails after the installation of a new software, you might want to change this setting and try again. A different OS requires a different Bus Master clock rate.

C.4.4.4 Large Disk Access Mode

This setting determines how large hard drives are to be accessed. The options are **DOS** or Other (for Unix, Novelle NetWare and other operating systems).

C.4.5 ▶ Advanced Chipset Control

Access the submenu to make changes to the following settings.



Caution: Be careful when changing the Advanced settings. Incorrect values entered may cause system malfunction. Also, a very high DRAM frequency or incorrect DRAM timing may cause system instability. When this occurs, revert to the default setting.

C.4.5.1 SERR Signal Condition

This setting specifies the ECC Error conditions that an SERR# is to be asserted. The options are None, **Single Bit**, Multiple Bit, and Both.

C.4.5.2 4GB PCI Hole Granularity

This feature allows you to select the granularity of PCI hole for PCI slots. If MTRRs are not enough, this option may be used to reduce MTRR occupation. The options are: **256 MB**, 512 MB, 1GB and 2GB.

C.4.5.3 Memory Branch Mode

This option determines how the two memory branches operate. System address space can either be interleaved between the two branches or Sequential from one branch to another. Mirror mode allows data correction by maintaining two copies of data in two branches. Single Channel 0 allows a single DIMM population during system manufacturing. The options are **Interleave**, Sequential, Mirroring, and Single Channel 0.

C.4.5.4 Branch 0 Rank Sparing

Select **enable** to enable the sparing feature for Branch 0 of memory bus. The options are Enabled and **Disabled**.

C.4.5.5 Branch 1 Rank Sparing

Select **enable** to enable the sparing feature for Branch 1 of memory bus. The options are Enabled and **Disabled**.

C.4.5.6 Enhanced x8 Detection

Select **Enabled** to enable Enhanced x8 DRAM UC Error Detection. The options are Disabled and **Enabled**.

C.4.5.7 Crystal Beach Features

This feature cooperates with Intel I/O AT (Acceleration Technology) to accelerate the performance of TOE devices. The options are **Enabled** and Disabled.



Note: A TOE device is a specialized, dedicated processor that is installed on an add-on card or a network card to handle some or all packet processing of this add-on card. For the RES-32DCX, the TOE device is built inside the ESB 2 South-Bridge chip.

C.4.5.8 Route Port 80h Cycles

This feature allows the user to decide which bus to send debug information to. The options are Disabled, PCI, and **LPC**.

C.4.5.9 Clock Spectrum Feature

If Enabled, the BIOS will monitor the level of Electromagnetic Interference caused by the components and will attempt to decrease the interference whenever needed. The options are Enabled and **Disabled**.

C.4.5.10 Enabling Multi-Media Timer

Select Yes to activate a set of timers that are alternative to the traditional 8254 timers for the OS use. The options are Yes and **No**.

C.4.5.11 USB Function

Select Enabled to enable the function of USB devices specified. The settings are **Enabled** and Disabled.

C.4.5.12 Legacy USB Support

This setting allows you to enable support for Legacy USB devices. The settings are **Enabled** and Disabled.

C.4.6 ▶ Advanced Processor Options

Access the submenu to make changes to the following settings.

C.4.6.1 CPU Speed

This is a display that indicates the speed of the installed processor.

C.4.6.2 Frequency Ratio (Only when supported by the CPU)

The feature allows the user to set the internal frequency multiplier for the CPU. The options are: **Default**, x12, x13, x14, x15, x16, x17 and x18.

C.4.6.3 Hyper-Threading (Only when supported by the CPU)

Set to Enabled to use the Hyper-Threading Technology, which will result in increased CPU performance. The options are Disabled and **Enabled**.

C.4.6.4 Core-Multi-Processing (Only when supported by the CPU)

Set to Enabled to use a processor's Second Core and beyond. (Please refer to Intel's web site for more information.) The options are Disabled and **Enabled**.

C.4.6.5 Machine Checking (Only when supported by the CPU)

Set to Enabled to activate the function of Machine Checking and allow the CPU to detect and report hardware (machine) errors via a set of model-specific registers (MSRs). The options are Disabled and **Enabled**.

C.4.6.6 Thermal Management 2 (Only when supported by the CPU)

Set to Enabled to use Thermal Management 2 (TM2), which will lower CPU voltage and frequency when the CPU temperature reaches a predefined overheat threshold. Set to **Disabled** to use Thermal Manager 1 (TM1), allowing CPU clocking to be regulated via CPU Internal Clock modulation when the CPU temperature reaches the overheat threshold.

C.4.6.7 C1 Enhanced Mode (Only when supported by the CPU)

Set to Enabled to enable Enhanced Halt State to lower CPU voltage/frequency to prevent overheat. The options are Enabled and **Disabled**.

[Please refer to the Intel website for detailed information.]

C.4.6.8 No Execute Mode Memory Protection (Only when supported by the CPU and the OS)

Set to Enabled to enable Execute Disable Bit and allow the processor to classify areas in memory where an application code can execute and where it cannot, and thus preventing a worm or a virus from inserting and creating a flood of codes to overwhelm the processor or damage the system during an attack.

[This feature is available when your OS and your CPU support the function of Execute Disable Bit.]

The options are **Disabled** and Enabled.

[For more information regarding hardware/software support for this function, please refer to the Intel and Microsoft websites.]

C.4.6.9 Adjacent Cache Line Prefetch (Only when supported by the CPU)

The CPU fetches the cache line for 64 bytes if this option is set to Disabled. The CPU fetches both cache lines for 128 bytes as comprised if Enabled. The options are Disabled and **Enabled**.

C.4.6.10 Hardware Prefetch (Only when supported by the CPU)

Set to this option to enabled to enable the hardware components that are used in conjunction with software programs to prefetch data in order to shorten execution cycles and maximize data processing efficiency. The options are Disabled and **Enabled**.

C.4.6.11 PECI Absent Alarm (Only when supported by the CPU)

If set to Enabled, the PECI Absent Alarm will be activated if the function of PECI (Platform Environment Control Interface) is not available for the onboard processes or for the motherboard. The options are Disabled and **Enabled**.

C.4.6.12 Intel Virtualization Technology (Only when supported by the CPU)

Select Enabled to use the feature of Virtualization Technology to allow one platform to run multiple operating systems and applications in independent partitions, creating multiple “virtual” systems in one physical computer. The options are Enabled and Disabled. (*Note: If there is any change to this setting, you will need to power off and restart the system for the change to take effect.) Please refer to Intel’s web site for detailed information.

C.4.6.13 Intel EIST Support (Only when supported by the CPU)

Select Enabled to use the Enhanced Intel SpeedStep Technology and allows the system to automatically adjust processor voltage and core frequency in an effort to reduce power consumption and heat dissipation. The options are Enabled and **Disabled**.

[Please refer to the Intel website for detailed information.]

C.4.7 ▶ I/O Device Configuration

Access the submenu to make changes to the following settings.

C.4.7.1 KBC Clock Input

This setting allows you to select clock frequency for KBC. The options are 6MHz, 8MHz, **12MHz**, and 16MHz.

C.4.7.2 Serial Port A

This setting allows you to assign control of serial port A. The options are **Enabled** (user defined), Disabled, and Auto (BIOS- or OS- controlled).

C.4.7.3 Base I/O Address

This setting allows you to select the base I/O address for serial port A. The options are **3F8**, 2F8, 3E8, and 2E8.

C.4.7.4 Interrupt

This setting allows you to select the IRQ (interrupt request) for serial port A. The options are IRQ3 and **IRQ4**.

C.4.7.5 Serial Port B

This setting allows you to assign control of serial port B. The options are **Enabled** (user defined), Disabled, Auto (BIOS controlled) and OS Controlled.

C.4.7.6 Mode

This setting allows you to set the type of device that will be connected to serial port B. The options are **Normal** and IR (for an infrared device).

C.4.7.7 Base I/O Address

This setting allows you to select the base I/O address for serial port B. The options are 3F8, **2F8**, 3E8 and 2E8.

C.4.7.8 Interrupt

This setting allows you to select the IRQ (interrupt request) for serial port B. The options are **IRQ3** and IRQ4.

C.4.7.9 Parallel Port

This setting allows you to assign control of the parallel port. The options are **Enabled** (user defined), Disabled and Auto (BIOS-or OS- controlled).

C.4.7.10 Base I/O Address

Select the base I/O address for the parallel port. The options are **378**, 278 and 3BC.

C.4.7.11 Interrupt

This setting allows you to select the IRQ (interrupt request) for the parallel port. The options are IRQ5 and **IRQ7**.

C.4.7.12 Mode

This feature allows you to specify the parallel port mode. The options are Output only, Bi-Directional, EPP and **ECP**.

C.4.7.13 DMA Channel

This item allows you to specify the DMA channel for the parallel port. The options are DMA1 and **DMA3**.

C.4.7.14 Floppy Disk Controller

This setting allows you to assign control of the floppy disk controller. The options are **Enabled** (user defined), Disabled, and Auto (BIOS and OS controlled).

C.4.7.15 Base I/O Address

This setting allows you to select the base I/O address for the parallel port. The options are **Primary** and Secondary.

C.4.8 ▶ DMI Event Logging

Access the submenu to make changes to the following settings.

C.4.8.1 Event Log Validity

This is a display to inform you of the event log validity. It is not a setting.

C.4.8.2 Event Log Capacity

This is a display to inform you of the event log capacity. It is not a setting.

C.4.8.3 View DMI Event Log

Highlight this item and press <Enter> to view the contents of the event log.

C.4.8.4 Event Logging

This setting allows you to **Enable** or Disable event logging.

C.4.8.5 ECC Event Logging

This setting allows you to **Enable** or Disable ECC event logging.

C.4.8.6 Mark DMI Events as Read

Highlight this item and press <Enter> to mark the DMI events as read.

C.4.8.7 Clear All DMI Event Logs

Select Yes and press <Enter> to clear all DMI event logs. The options are Yes and **No**.

C.4.9 ▶ Console Redirection

Access the submenu to make changes to the following settings.

C.4.9.1 COM Port Address

This item allows you to specify to redirect the console to Onboard COM A or Onboard COM B. This setting can also be **Disabled**.

C.4.9.2 BAUD Rate

This item allows you to select the BAUD rate for console redirection. The options are 300, 1200, 2400, 9600, **19.2K**, 38.4K, 57.6K, and 115.2K.

C.4.9.3 Console Type

This item allows you to choose from the available options to select the console type for console redirection. The options are VT100, VT100,8bit, **PC-ANSI**, 7bit, PC ANSI, VT100+, and VT-UTF8.

C.4.9.4 Flow Control

This item allows you to choose from the available options to select the flow control for console redirection. The options are: None, XON/XOFF, and **CTS/RTS**.

C.4.9.5 Console Connection

This item allows you to choose select the console connection: either **Direct** or Via Modem.

C.4.9.6 Continue CR after POST

Choose whether to continue with console redirection after the POST routine. The options are On and **Off**.

C.4.10 ▶ Hardware Monitor Logic [Alternative 1]



Note: The Phoenix BIOS will automatically detect the type of CPU(s) and hardware monitoring chip used on the motherboard and will display the Hardware Monitoring Screen accordingly. Your Hardware Monitoring Screen may look like the one shown on this page, on page C-22, or on page C-23, depending on the type of CPU(s) and HW Monitoring chip you are using.

C.4.10.1 CPU Temperature Threshold

This option allows the user to set a CPU temperature threshold that will activate the alarm system when the CPU temperature reaches this pre-set temperature threshold. The options are 70ºC, 75ºC, **80ºC**, and 85ºC.

Highlight this and hit <Enter> to see monitor data for the following items:

- CPU1 Temperature
- CPU1 Second Core
- CPU2 Temperature
- CPU2 Second Core
- System Temperature
- Fan1–Fan8 Speeds—If the Auto Fan Control feature is enabled, the BIOS will automatically display the status of the fans indicated in this item.

C.4.10.2 Fan Speed Control Modes

This feature allows the user to decide how the system controls the speeds of the onboard fans. The CPU temperature and the fan speed are correlative. When the CPU on-die temperature increases, the fan speed will also increase, and vise versa. If the option is set to “3-pin fan”, the fan speed is controlled by voltage.

If the option is set to “4-pin”, the fan speed will be controlled by Pulse Width Modulation (PWM). Select “3-pin” if your chassis came with 3-pin fan headers. Select “4-pin” if your chassis came with 4-pin fan headers. Select “Workstation”

if your system is used as a Workstation. Select “Server” if your system is used as a Server. Select “Disable” to disable the fan speed control function to allow the onboard fans to run at the full speed (12V) at all the time. The Options are:

1. **Disable**
2. 3-pin (Server)
3. 3-pin (Workstation)
4. 4-pin (Server)
5. 4-pin (Workstation).

C.4.10.3 Voltage Monitoring

The following items will be monitored and displayed:

- P12V_VR0
- P12V_VR1
- FSB VTT
- PXH Vcore

- ES2B Vcore
- CPU1Vcore
- CPU2Vcore
- P3V3

C.4.11 ▶ Hardware Monitor Logic [Alternative 2]

C.4.11.1 CPU Temperature Threshold

This option allows the user to set a CPU temperature threshold that will activate the alarm system when the CPU temperature reaches this pre-set temperature threshold. The options are 70ºC, 75ºC, **80ºC**, and 85ºC.

Highlight this and hit <Enter> to see monitor data for the following items:

- CPU1 Temperature
- CPU1 Second Core
- CPU2 Temperature
- CPU2 Second Core
- System Temperature
- Fan1-Fan8 Speeds—If the feature of Auto Fan Control is enabled, the BIOS will automatically display the status of the fans indicated in this item.

C.4.11.2 Fan Speed Control Modes

This feature allows the user to decide how the system controls the speeds of the onboard fans. The CPU temperature and the fan speed are correlative. When the CPU on-die temperature increases, the fan speed will also increase, and vise versa. If the option is set to “3-pin fan”, the fan speed is controlled by voltage. If the option is set to “4-pin”, the fan speed will be controlled by Pulse Width Modulation (PWM). Select “3-pin” if your chassis came with 3-pin fan headers. Select “4-pin” if your chassis came with 4-pin fan headers. Select “Workstation” if your system is used as a Workstation. Select “Server” if your system is used as a Server. Select “Disable” to disable the fan speed control function to allow the onboard fans to run at the full speed (12V) at all the time. The Options are:

1. **Disable**
2. 3-pin (Server)

3. 3-pin (Workstation)

4. 4-pin (Server)

5. 4-pin (Workstation).

C.4.11.3 Voltage Monitoring

The following items will be monitored and displayed:

- Vcore A
- Vcore B
- -12V
- P1V5
- +3.3V
- +12V
- 5Vsb
- 5VDD
- P_VTT
- Vbat

C.4.12 ▶ Hardware Monitor Logic [Alternative 3]

C.4.12.1 CPU Temperature Threshold

This option allows the user to set a CPU temperature threshold that will activate the alarm system when the CPU temperature reaches this pre-set temperature threshold. The hardcode default setting is **72ºC**.

C.4.12.2 Temperature Monitoring

Highlight this and hit <Enter> to see monitor data for the following items:

- PECI Agent 1 Temperature
- PECI Agent 2 Temperature
- PECI Agent 3 Temperature
- PECI Agent 4 Temperature

- System Temperature
- Fan1-Fan8 Speeds—If the feature of Auto Fan Control is enabled, the BIOS will automatically display the status of the fans indicated in this item.

C.4.12.3 Fan Speed Control Modes

This feature allows the user to decide how the system controls the speeds of the onboard fans. The CPU temperature and the fan speed are correlative. When the CPU on-die temperature increases, the fan speed will also increase, and vise versa. If the option is set to “3-pin fan”, the fan speed is controlled by voltage. If the option is set to “4-pin”, the fan speed will be controlled by Pulse Width Modulation (PWM). Select “3-pin” if your chassis came with 3-pin fan headers. Select “4-pin” if your chassis came with 4-pin fan headers. Select “Workstation” if your system is used as a Workstation. Select “Server” if your system is used as a Server. Select “Disable” to disable the fan speed control function to allow the onboard fans to run at the full speed (12V) at all the time. The Options are:

1. **Disable**
2. 3-pin (Server)
3. 3-pin (Workstation)
4. 4-pin (Server)
5. 4-pin (Workstation).

C.4.12.4 Voltage Monitoring

The following items will be monitored and displayed:

- Vcore A:
- Vcore B:
- -12V
- P1V2_NIC_SEN
- +3.3V
- +12V
- 5Vsb
- 5VDD
- P_VTT
- Vbat

C.4.13 ▶ IPMI (Only when an IPMI card is installed in the system.)

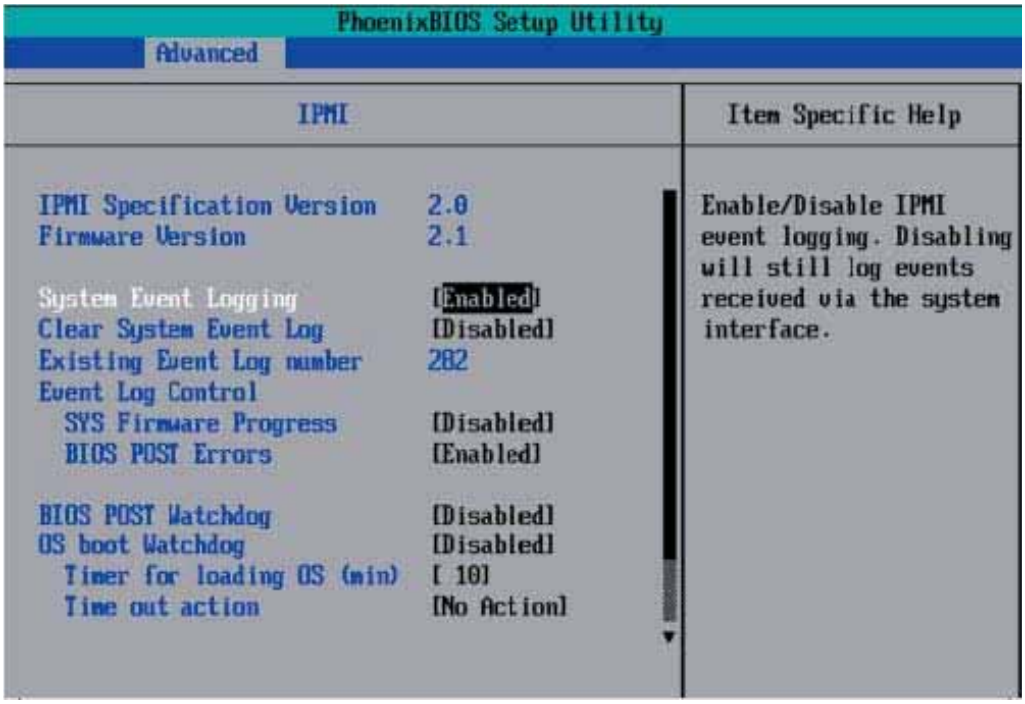


Figure C-4. The Advanced BIOS Setup IPMI Submenu

C.4.13.1 IPMI Specification Version

This item displays the current IPMI Version.

C.4.13.2 Firmware Version

This item displays the current Firmware Version.

C.4.13.3 System Event Logging

Select Enabled to enable IPMI Event Logging. When this function is set to Disabled, the system will continue to log events received via system interface. The options are **Enabled** and Disabled.

C.4.13.4 Clear System Event Logging

Enabling this function to force the BIOS to clear the system event logs during the next cold boot. The options are Enabled and **Disabled**.

C.4.13.5 Existing Event Log Number

This item displays the number of the existing event log.

C.4.13.6 Event Log Control

System Firmware Progress

Enabling this function to log POST progress. The options are Enabled and **Disabled**.

BIOS POST Errors

Enabling this function to log POST errors. The options are Enabled and **Disabled**.

C.4.13.7 BIOS POST Watch Dog

Set to Enabled to enable POST Watch Dog. The options are Enabled and **Disabled**.

C.4.13.8 OS Boot Watch Dog

Set to Enabled to enable OS Boot Watch Dog. The options are Enabled and **Disabled**.

C.4.13.9 Timer for Loading OS (Minutes)

This feature allows the user to set the time value (in minutes) for the previous item: OS Boot Watch Dog by keying-in a desired number in the blank. The default setting is **10** (minutes).

[Ignore this option when OS Boot Watch Dog is set to “Disabled”.]

C.4.13.10 Time Out Option

This feature allows the user to determine what action to take in an event of a system boot failure. The options are No Action, Reset, Power Off and Power Cycles.

C.4.14 ▶ System Event Log/System Event Log (List Mode)

These options display the System Event Log (SEL) and System Event Log (SEL) in List Mode. Items include:

- SEL (System Event Log) Entry Number
- SEL Record ID
- SEL Record Type
- Time Stamp
- Generator ID
- SEL Message Revision
- Sensor Type
- Sensor Number
- SEL Event Type
- Event Description
- SEL Event Data.

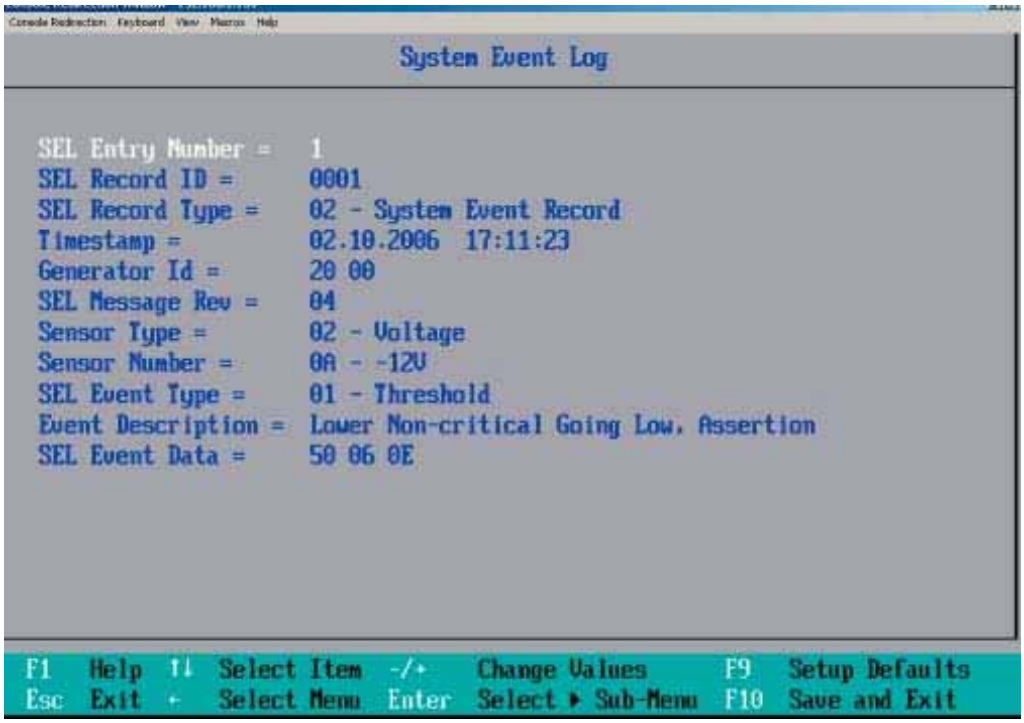


Figure C-5. The System Event Log Submenu

C.4.15 ▶ Realtime Sensor Data

This feature display information from motherboard sensors, such as temperatures, fan speeds and voltages of various components.

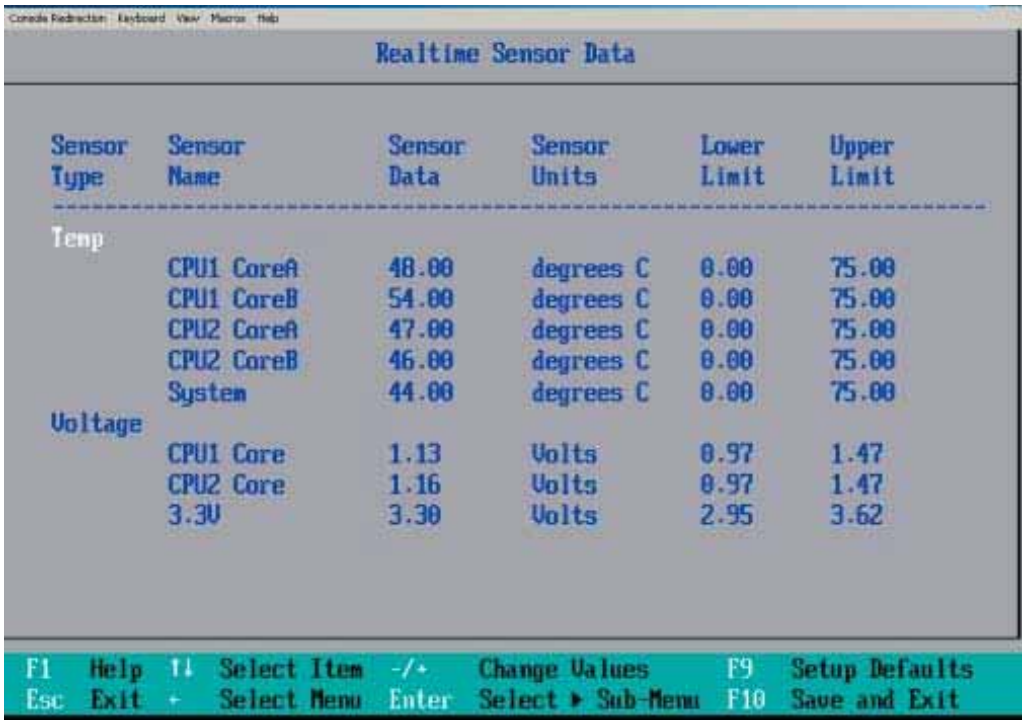


Figure C-6. The Realtime Sensor Data Submenu

C.5 Security Settings

Choose Security from the Phoenix BIOS Setup Utility main menu with the arrow keys. You should see the following display. Security setting options are displayed by highlighting the setting using the arrow keys and pressing <Enter>. All Security BIOS settings are described in this section.

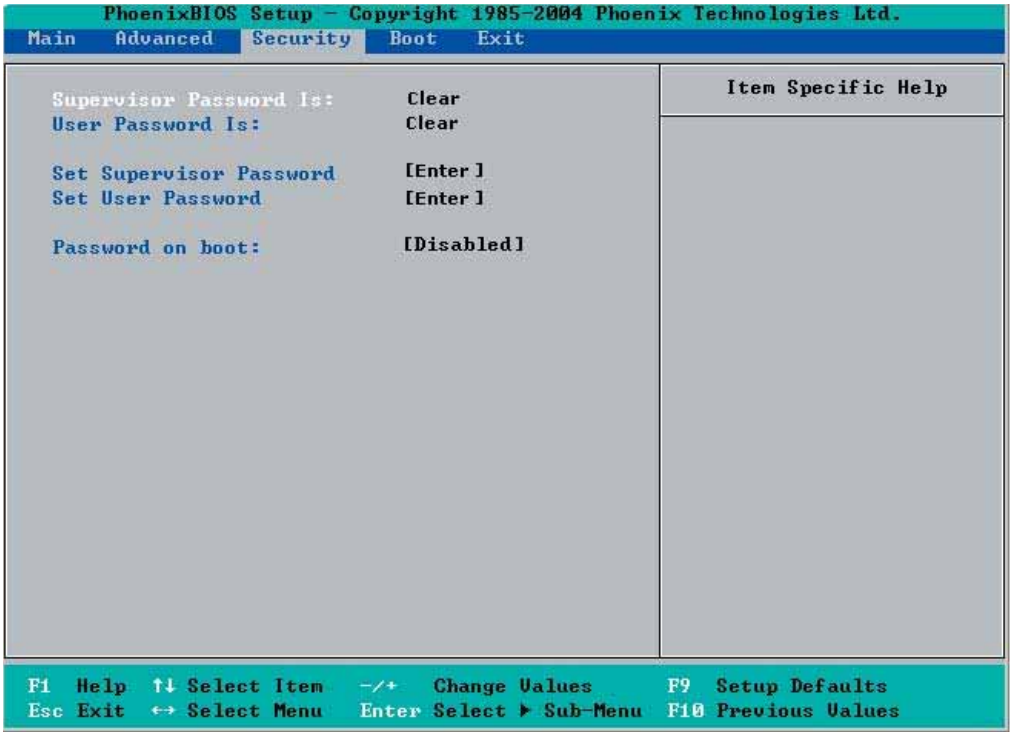


Figure C-7. The BIOS Setup Security Submenu

C.5.1 Supervisor Password Is:

This displays whether a supervisor password has been entered for the system. Clear means such a password has not been used and Set means a supervisor password has been entered for the system.

C.5.2 User Password Is:

This displays whether a user password has been entered for the system. Clear means

such a password has not been used and Set means a user password has been entered for the system.

C.5.3 Set Supervisor Password

When the item “Set Supervisor Password” is highlighted, hit the <Enter> key. When prompted, type the Supervisor's password in the dialogue box to set or to change supervisor's password, which allows access to the BIOS.

C.5.4 Set User Password

When the item “Set User Password” is highlighted, hit the <Enter> key. When prompted, type the user's password in the dialogue box to set or to change the user's password, which allows access to the system at boot-up.

C.5.5 Password on Boot

This setting allows you to require a password to be entered when the system boots up. The options are Enabled (password required) and Disabled (password not required).

C.6 Boot Settings

Choose Boot from the Phoenix BIOS Setup Utility main menu with the arrow keys. You should see the following display. See details on how to change the order and specs of boot devices in the Item Specific Help window. All Boot BIOS settings are described in this section.

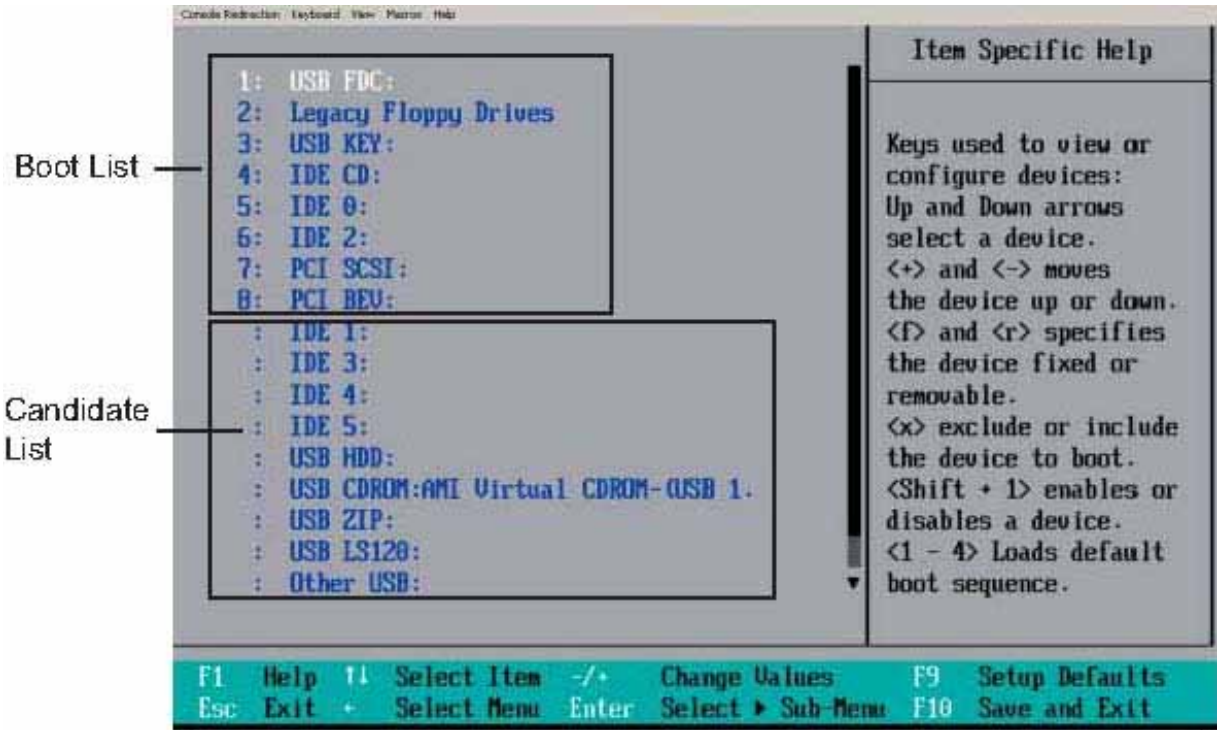


Figure C-8. The BIOS Setup Boot Submenu

C.6.1 Boot Priority Order/Excluded from Boot Orders

The devices included in the boot list section (above) are bootable devices listed in the sequence of boot order as specified. The boot functions for the devices included in the candidate list (above) are currently disabled. Use a <+> key or a <-> key to move the device up or down. Use the <f> key or the <r> key to specify the type of an USB device, either fixed or removable. You can select one item from the boot list and hit the <x> key to remove it from the list of bootable devices (to make its resource available for other bootable devices). Subsequently, you can select an item from the candidate list and hit the <x> key to remove it from the candidate list and put it in the boot list. This item will then become a bootable device. See details on how to change the priority of boot order of devices in the “Item Specific Help” window.

C.7 Exit

Choose Exit from the Phoenix BIOS Setup Utility main menu with the arrow keys. You should see the following display. All Exit BIOS settings are described in this section.

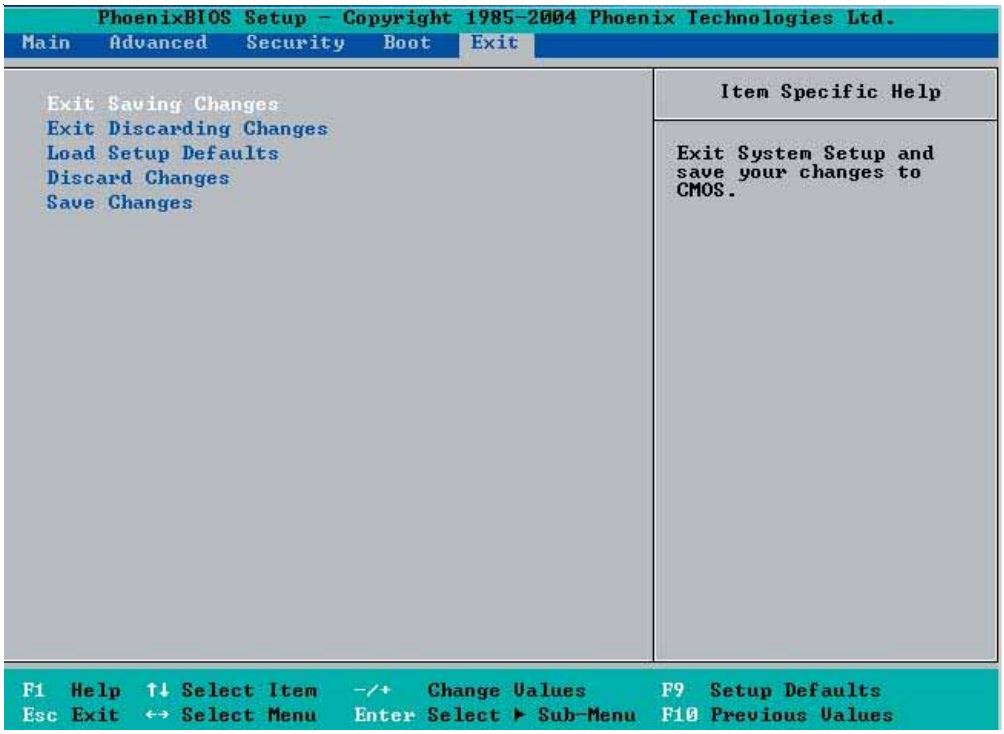


Figure C-9. The BIOS Setup Exit Submenu

C.7.1 Exit Saving Changes

Highlight this item and hit <Enter> to save any changes you made and to exit the BIOS Setup utility.

C.7.2 Exit Discarding Changes

Highlight this item and hit <Enter> to exit the BIOS Setup utility without saving any changes you may have made.

C.7.3 Load Setup Defaults

Highlight this item and hit <Enter> to load the default settings for all items in the BIOS Setup. These are the safest settings to use.

C.7.4 Discard Changes

Highlight this item and hit <Enter> to discard (cancel) any changes you made. You will remain in the Setup utility.

C.7.5 Save Changes

Highlight this item and hit <Enter> to save any changes you made. You will remain in the Setup utility.

C.8 BIOS POST Messages

During the Power-On Self-Test (POST), the BIOS will check for problems. If a problem is found, the BIOS will activate an alarm or display a message. The following is a list of such BIOS messages.

Failure Fixed Disk

Fixed disk is not working or not configured properly. Check to see if fixed disk is attached properly. Run Setup. Find out if the fixed-disk type is correctly identified.

Stuck key

Stuck key on keyboard.

Keyboard error

Keyboard not working.

Keyboard Controller Failed

Keyboard controller failed test. May require replacing keyboard controller.

Keyboard locked - Unlock key switch

Unlock the system to proceed.

Monitor type does not match CMOS - Run SETUP

Monitor type not correctly identified in Setup

Shadow Ram Failed at offset: nnnn

Shadow RAM failed at offset nnnn of the 64k block at which the error was detected.

System RAM Failed at offset: nnnn

System RAM failed at offset nnnn of in the 64k block at which the error was detected.

Extended RAM Failed at offset: nnnn

Extended memory not working or not configured properly at offset nnnn.

System battery is dead - Replace and run SETUP

The CMOS clock battery indicator shows the battery is dead. Replace the battery and run Setup to reconfigure the system.

System CMOS checksum bad - Default configuration used

System CMOS has been corrupted or modified incorrectly, perhaps by an application program that changes data stored in CMOS. The BIOS installed Default Setup Values. If you do not want these values, enter Setup and enter your own values. If the error persists, check the system battery or contact your dealer.

System timer error

The timer test failed. Requires repair of system board.

Real time clock error

Real-Time Clock fails BIOS hardware test. May require board repair.

Check date and time settings

BIOS found date or time out of range and reset the Real-Time Clock. May require setting legal date (1991-2099).

Previous boot incomplete - Default configuration used

Previous POST did not complete successfully. POST loads default values and offers to run Setup. If the failure was caused by incorrect values and they are not corrected, the next boot will likely fail. On systems with control of wait states, improper Setup settings can also terminate POST and cause this error on the next boot. Run Setup and verify that the waitstate configuration is correct. This error is cleared the next time the system is booted.

Memory Size found by POST differed from CMOS

Memory size found by POST differed from CMOS.

Diskette drive A error

Diskette drive B error

Drive A: or B: is present but fails the BIOS POST diskette tests. Check to see that the drive is defined with the proper diskette type in Setup and that the diskette drive is attached correctly.

Incorrect Drive A type - run SETUP

Type of floppy drive A: not correctly identified in Setup.

Incorrect Drive B type - run SETUP

Type of floppy drive B: not correctly identified in Setup.

System cache error - Cache disabled

RAM cache failed and BIOS disabled the cache. On older boards, check the cache jumpers. You may have to replace the cache. See your dealer. A disabled cache slows system performance considerably.

CPU ID:

CPU socket number for Multi-Processor error.

EISA CMOS not writeable

ServerBIOS2 test error: Cannot write to EISA CMOS.

DMA Test Failed

ServerBIOS2 test error: Cannot write to extended **DMA** (Direct Memory Access) registers.

Software NMI Failed

ServerBIOS2 test error: Cannot generate software NMI (Non-Maskable Interrupt).

Fail-Safe Timer NMI Failed

ServerBIOS2 test error: Fail-Safe Timer takes too long.

device Address Conflict

Address conflict for specified **device**.

Allocation Error for: device

Run ISA or EISA Configuration Utility to resolve resource conflict for the specified device.

CD ROM Drive

CD ROM Drive identified.

Entering SETUP . . .

Starting Setup program

Failing Bits: nnnn

The hex number nnnn is a map of the bits at the RAM address which failed the memory test. Each 1 (one) in the map indicates a failed bit. See errors 230, 231, or 232 above for offset address of the failure in System, Extended, or Shadow memory.

Fixed Disk n

Fixed disk n (0-3) identified.

Invalid System Configuration Data

Problem with NVRAM (CMOS) data.

I/O device IRQ conflict

I/O device IRQ conflict error.

PS/2 Mouse Boot Summary Screen:

PS/2 Mouse installed.

nnnn kB Extended RAM Passed

Where **nnnn** is the amount of RAM in kilobytes successfully tested.

nnnn Cache SRAM Passed

Where **nnnn** is the amount of system cache in kilobytes successfully tested.

nnnn kB Shadow RAM Passed

Where **nnnn** is the amount of shadow RAM in kilobytes successfully tested.

nnnn kB System RAM Passed

Where **nnnn** is the amount of system RAM in kilobytes successfully tested.

One or more I2O Block Storage Devices were excluded from the Setup Boot Menu

There was not enough room in the IPL table to display all installed I2O block-storage devices.

Operating system not found

Operating system cannot be located on either drive A: or drive C:. Enter Setup and see if fixed disk and drive A: are properly identified.

Parity Check 1 nnnn

Parity error found in the system bus. BIOS attempts to locate the address and display it on the screen. If it cannot locate the address, it displays **????**. Parity is a method for checking errors in binary data. A parity error indicates that some data has been corrupted.

Parity Check 2 nnnn

Parity error found in the I/O bus. BIOS attempts to locate the address and display it on the screen. If it cannot locate the address, it displays **????**.

Press <F1> to resume, <F2> to Setup, <F3> for previous

Displayed after any recoverable error message. Press <F1> to start the boot process or <F2> to enter Setup and change the settings. Press <F3> to display the previous screen (usually an initialization error of an **Option ROM**; i.e., an add-on card). Write down and follow the information shown on the screen.

Press <F2> to enter Setup

Optional message displayed during POST. Can be turned off in Setup.

PS/2 Mouse:

PS/2 mouse identified.

Run the I2O Configuration Utility

One or more unclaimed block storage devices have the Configuration Request bit set in the LCT. Run an I2O Configuration Utility (e.g., the SAC utility).

System BIOS shadowed

System BIOS copied to shadow RAM.

UMB upper limit segment address: *nnnn*

Displays the address ***nnnn*** of the upper limit of **Upper Memory Blocks**, indicating released segments of the BIOS that can be reclaimed by a virtual memory manager.

Video BIOS shadowed

Video BIOS successfully copied to shadow RAM.

Appendix D

Red Hat Enterprise Linux Installation

D.1 Introduction

Welcome to the Red Hat® Enterprise Linux® Installation Guide. This guide contains useful information to assist you during the installation of Red Hat Enterprise Linux via CDROM device. From fundamental concepts such as installation preparation to the step-by-step installation procedure.

D.2 Installation

D.2.1 BIOS Configuration

Before beginning to install, please check your bios settings.

1. Make sure that the system is set to boot from “cdrom device” under boot menu.
2. Make sure the operating system selection under advanced menu is set to “Linux” or “other” for Linux installation.

D.2.2 Installing from CD-ROM

To install Red Hat Enterprise Linux from a CD-ROM, insert the Red Hat Enterprise

Linux CD into your CD-ROM drive and boot the system. The system will boot from CD-ROM and display the “Boot” prompt. Press [Enter], after which the following message appears:

```
“Welcome to Red Hat Enterprise Linux”
```

Note: The CD-ROM is required when booting the installation program, and again after subsequent CD-ROMs has been processed.

The **Welcome** screen does not prompt you for any input. Read over the help text in the left panel for additional instructions and information on where to register your Red Hat Enterprise Linux product. Notice the **Hide Help** button at the bottom left corner of the screen. The help screen is open by default. To minimize the help text, click on **Hide Help**.

Click on the **Next** button to continue with “Language Selection”.

D.2.2.1 Language Selection

Using your mouse, select a language to use for the installation (see *Figure D-1*) Selecting the appropriate language also helps target your time zone configuration later in the installation. The installation program tries to select the appropriate time zone based on what you specify on this screen.

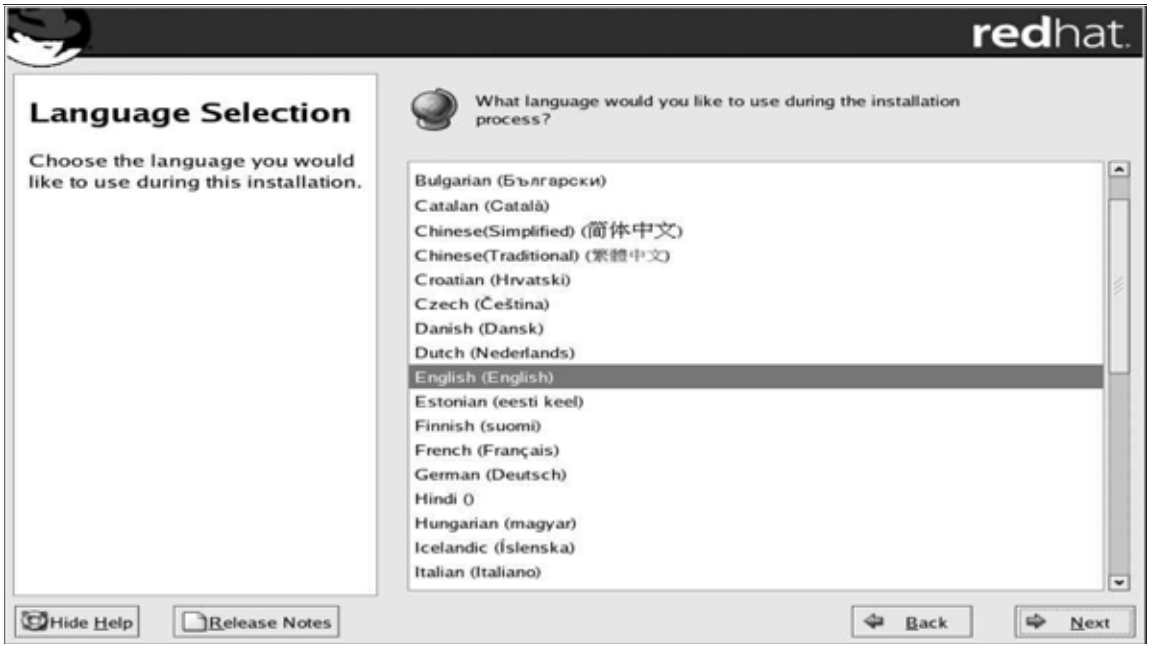


Figure D-1. Language Selection

After you select the appropriate language, click **Next** to continue with **"**Keyboard Configuration**"**.

D.2.2.2 Keyboard Selection

Using your mouse, select the correct layout type (for example, U.S. English) for the keyboard you would prefer to use for the installation and as the system default (see *Figure D-2*). Once you have made your selection, click "Disk Partitioning Setup.

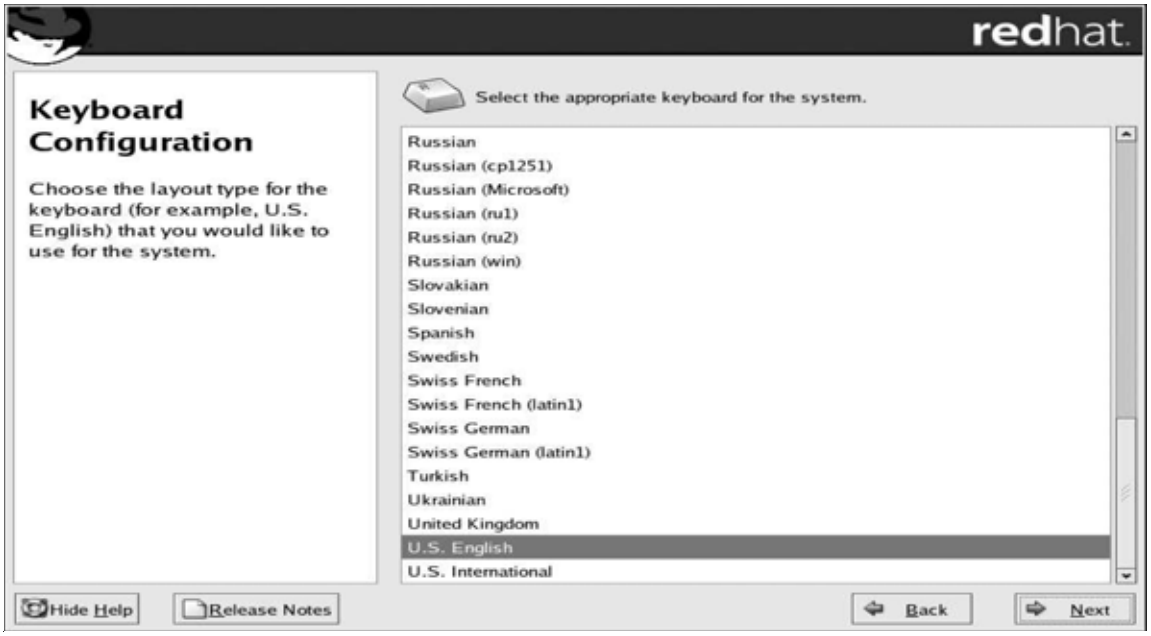


Figure D-2. Keyboard Selection

D.2.2.3 Select Disk Partitioning Setup

Partitioning allows you to divide your hard drive into isolated sections, where each section behaves as its own hard drive. Partitioning is particularly useful if you run multiple operating systems. If you are not sure how you want your system to be partitioned.

On this screen (see *Figure D-3* on page D-4), you can choose to perform automatic partitioning, or manual partitioning using **Disk Druid**.

Automatic partitioning allows you to perform an installation without having to partition your drive(s) yourself. If you do not feel comfortable with partitioning your sys-

tem, it is recommended that you *do not* choose to partition manually and instead let the installation program partition for you. To partition manually, choose the **Disk Druid** partitioning tool.

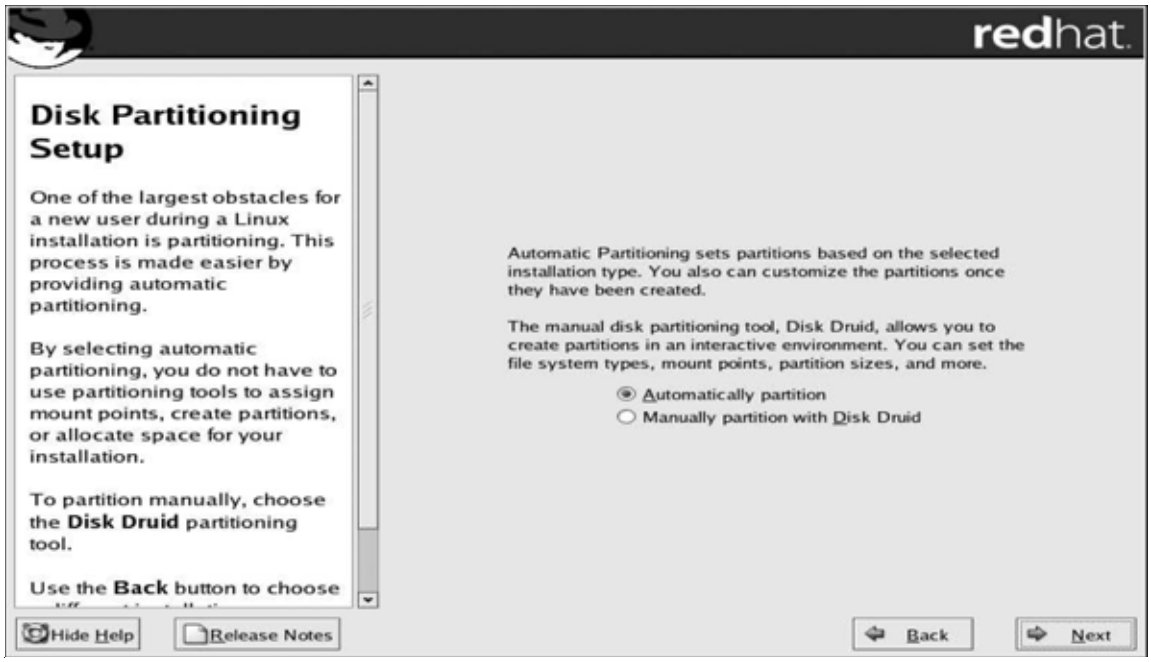


Figure D-3. Disk Partitioning

Note: If you receive an error after the Disk Partitioning Setup phase of the installation saying something similar to:

The partition table on device hda was unreadable. To create new partitions, the disk must first be initialized, causing the loss of ALL DATA on this drive.

As a result, you may not have a partition table on that drive or the partition table that is on the drive may not be recognizable by the partitioning software used in the installation program.

D.2.2.4 Automatic Partitioning

Automatic partitioning (see *Figure D-4*) allows you to have some control concerning what data is removed (if any) from your system.

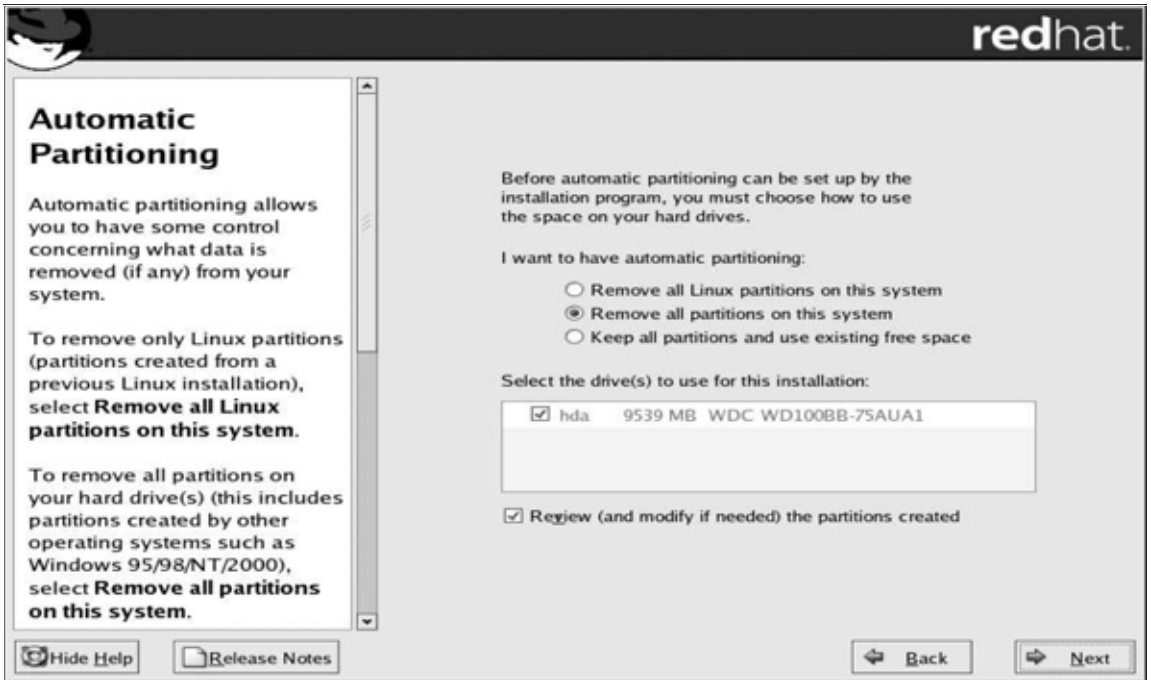


Figure D-4. Automatic Partitioning

Your options are:

Remove all Linux partitions on this system. Select this option to remove only Linux partitions (partitions created from a previous Linux installation). This does not remove other partitions you may have on your hard drive(s) (such as VFAT or FAT32 partitions).

Remove all partitions on this system. Select this option to remove all partitions on your hard drive(s) (this includes partitions created by other operating systems such as Windows VFAT or NTFS partitions).



Note: If you select this option, all data on the selected hard drive(s) is removed by the installation program.

Also, do not select this option if you have information that you want to keep on the hard drive(s) where you are installing Red Hat Enterprise Linux.

Keep all partitions and use existing free space. Select this option to retain your current data and partitions, assuming you have enough free space available on your hard drive(s).

Using your mouse, choose the hard drive(s) on which you want Red Hat Enterprise Linux to be installed. If you have two or more hard drives, you can choose which hard drive(s) should contain this installation. Unselected hard drives, and any data on them, are not touched.



Note: If you have a RAID card, be aware that some BIOS do not support booting from the RAID card. In cases such as these, the /boot/ partition must be created on a partition outside of the RAID array, such as on a separate hard drive. An internal hard drive is necessary to use for partition creation with problematic RAID cards.

A /boot/ partition is also necessary for software RAID setups. If you have chosen to automatically partition your system, you should select **Review** and manually edit your /boot/ partition.

To review and make any necessary changes to the partitions created by automatic partitioning, select the **Review** option. After selecting **Review** and clicking **Next** to move forward, the partitions created for you in **Disk Druid** appear. You can make modifications to these partitions if they do not meet your needs.

Click **Next** once you have made your selections to proceed.

D.2.2.5 Partitioning Your System

If you choose automatic partitioning and did not select **Review**, skip and go ahead.

If you choose automatic partitioning and selected **Review**, you can either accept the current partition settings (click **Next**), or modify the setup using **Disk Druid**, the manual partitioning tool.

If you choose to partition manually, you must tell the installation program where to install Red Hat Enterprise Linux. This is done by defining mount points for one or more disk partitions in which Red Hat Enterprise Linux is installed. You may also need to create and/or delete partitions at this time.

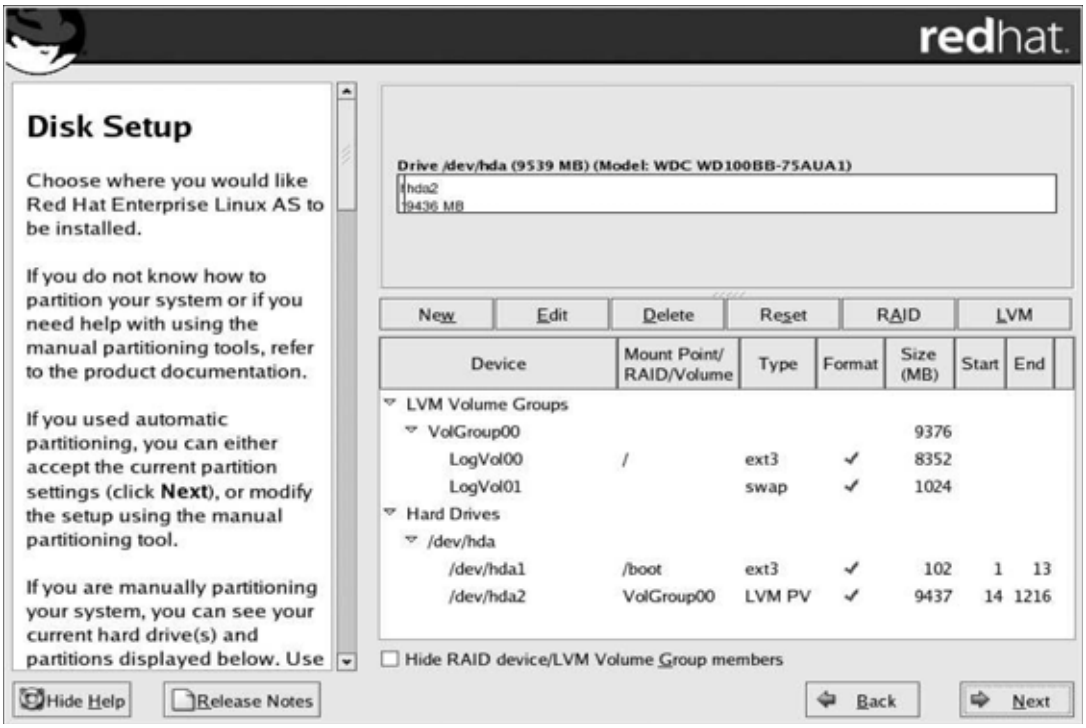


Figure D-5. Disk Setup

D.2.2.6 Adding Partitions

To add a new partition, select the **New** button. The following dialog box appears:

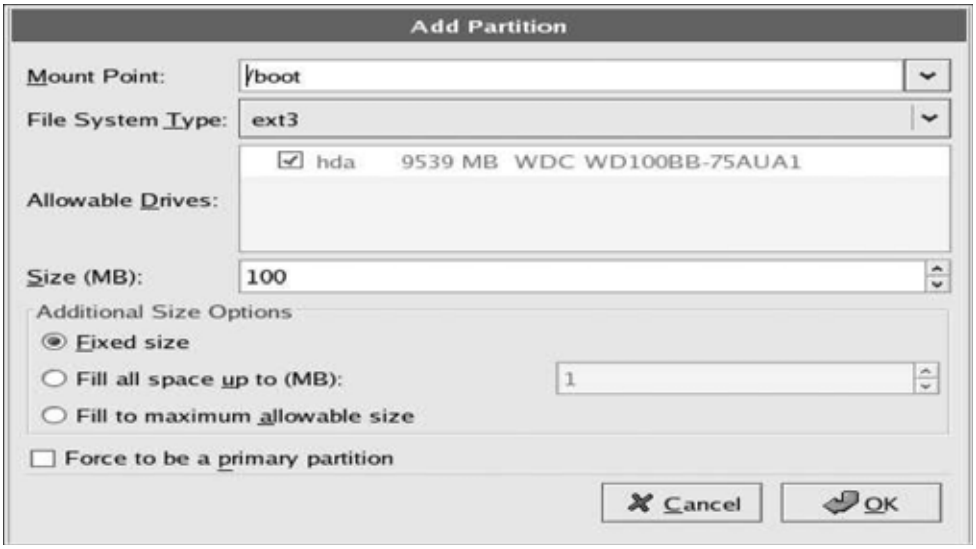


Figure D-6. Add Partition

Mount Point: Enter the partition's mount point. For example, if this partition should be the root partition, enter **/**; enter **/boot** for the /boot partition, and so on. You can also use the pull-down menu to choose the correct mount point for your partition.

File System Type: Using the pull-down menu, select the appropriate file system type for this partition

Allowable Drives: This field contains a list of the hard disks installed on your system. If a hard disk's box is highlighted, then a desired partition can be created on that hard disk. If the box is *not* checked, then the partition will *never* be created on that hard disk. By using different checkbox settings, you can have **Disk Druid** place partitions where you need them, or let **Disk Druid** decide where partitions should go.

Size (MB): Enter the size (in megabytes) of the partition. Note, this field starts with 100 MB; unless changed; only a 100 MB partition will be created.

Additional Size Options: Choose whether to keep this partition at a fixed size, to allow it to "grow" (fill up the available hard drive space) to a certain point, or to allow it to grow to fill any remaining hard drive space available.

If you choose **Fill all space up to (MB)**, you must give size constraints in the field to the right of this option. This allows you to keep a certain amount of space free on your hard drive for future use.

Force to be a primary partition: Select whether the partition you are creating should be one of the first four partitions on the hard drive. If unselected, the partition is created as a logical partition.

OK: Select **OK** once you are satisfied with the settings and wish to create the partition.

Cancel: Select **Cancel** if you do not want to create the partition.

D.2.2.7 Boot Loader Configuration

To boot the system without boot media, you usually need to install a boot loader. A boot loader is the first software program (see *Figure D-7*) that runs when a computer starts. It is responsible for loading and transferring control to the operating system kernel software. The kernel, in turn, initializes the rest of the operating system.

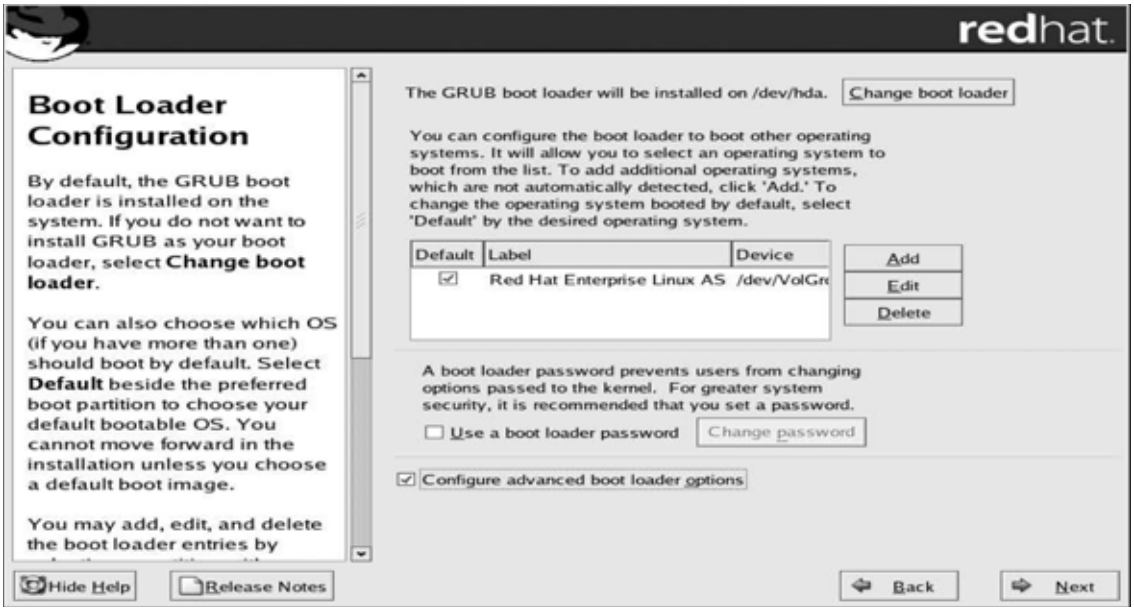


Figure D-7. Boot Loader Configuration

GRUB (Grand Unified Bootloader), which is installed by default, is a very powerful boot loader.

GRUB can load a variety of free operating systems, as well as proprietary operating systems with chain-loading (the mechanism for loading unsupported operating systems, such as DOS or Windows, by loading another boot loader).

D.2.2.8 Advanced Boot Loader Configuration

Now that you have chosen which boot loader to install, you can also determine where you want the boot loader to be installed. You may install the boot loader in one of two places:

The master boot record (MBR). This is the recommended place to install a boot loader, unless the MBR already starts another operating system loader, such as System Commander. The MBR is a special area on your hard drive that is automatically loaded by your computer's BIOS, and is the earliest point at which the boot loader can take control of the boot process. If you install it in the MBR, when your machine boots, GRUB presents a boot prompt. You can then boot Red Hat Enterprise Linux or any other operating system that you have configured the boot loader to boot.

The first sector of your boot partition. This is recommended if you are already using another boot loader on your system. In this case, your other boot loader takes control first. You can then configure that boot loader to start GRUB, which then boots Red Hat Enterprise Linux.

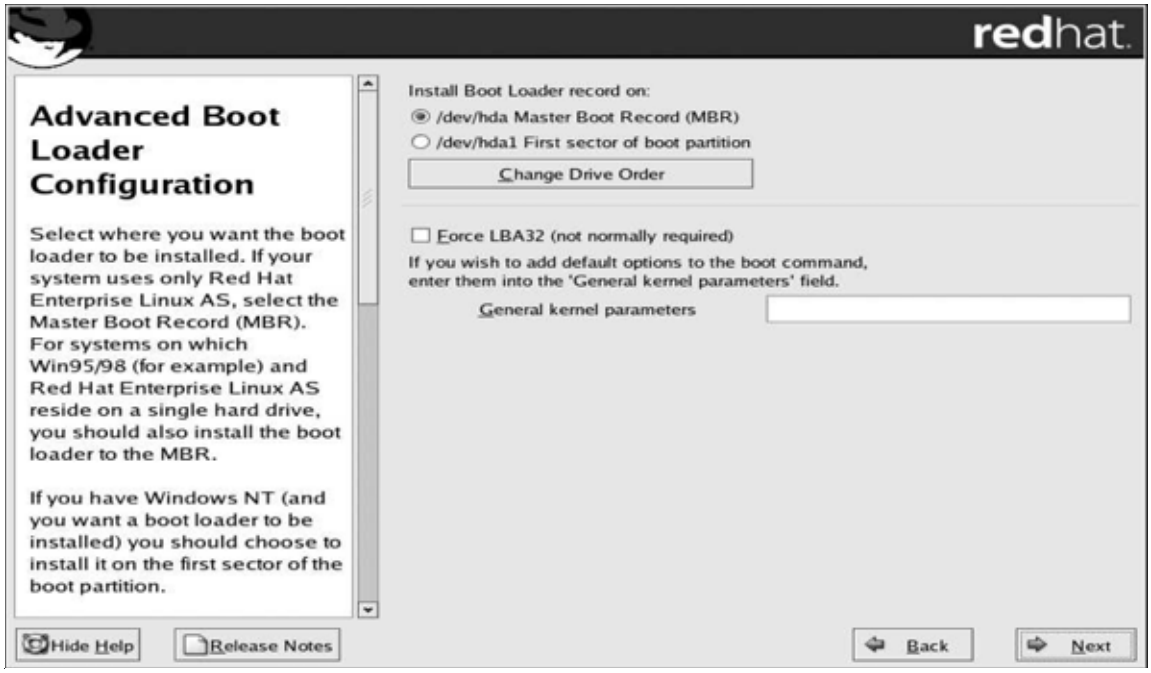


Figure D-8. Advanced Boot Loader Configuration

D.2.2.9 Network Configuration

If you do not have a network device, this screen does not appear during your installation and you should advance to next section

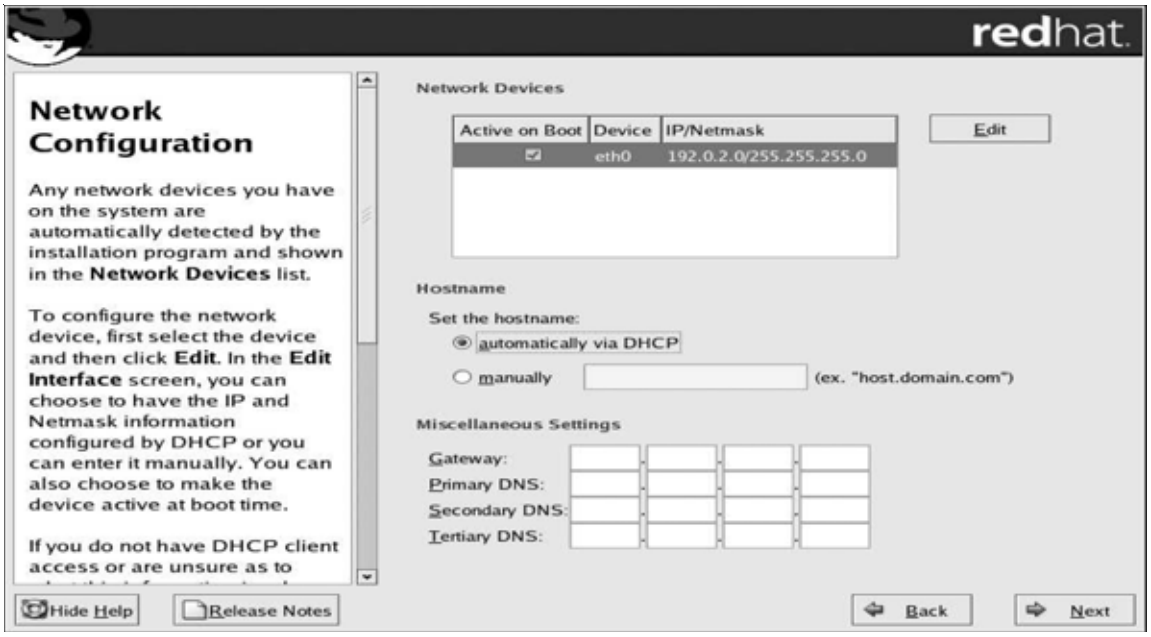


Figure D-9. Network Configuration

The installation program automatically detects any network devices you have and display them in the **Network Devices** list.

Once you have selected a network device, click **Edit**. From the **Edit Interface** pop-up screen, you can choose to configure the IP address and netmask of the device via DHCP (or manually if DHCP is not selected) and you can choose to activate the device at boot time. If you select **Activate on boot**, your network interface is started when you boot. If you do not have DHCP client access or you are unsure what to provide here, please contact your network administrator.

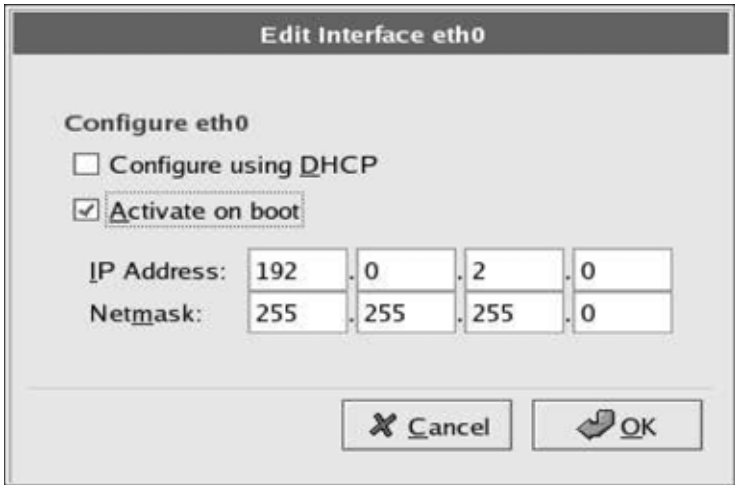


Figure D-10. Editing a Network Device

If you have a hostname (fully qualified domain name) for the network device, you can choose to have DHCP (Dynamic Host Configuration Protocol) automatically detect it or you can manually enter the hostname in the field provided.

Finally, if you entered the IP and Netmask information manually, you may also enter the Gateway address and the Primary, Secondary, and Tertiary DNS addresses.

D.2.2.10 Firewall Configuration

Red Hat Enterprise Linux offers firewall protection for enhanced system security. A firewall exists between your computer and the network, and determines which resources on your computer remote users on the network can access. A properly configured firewall can greatly increase the security of your system.

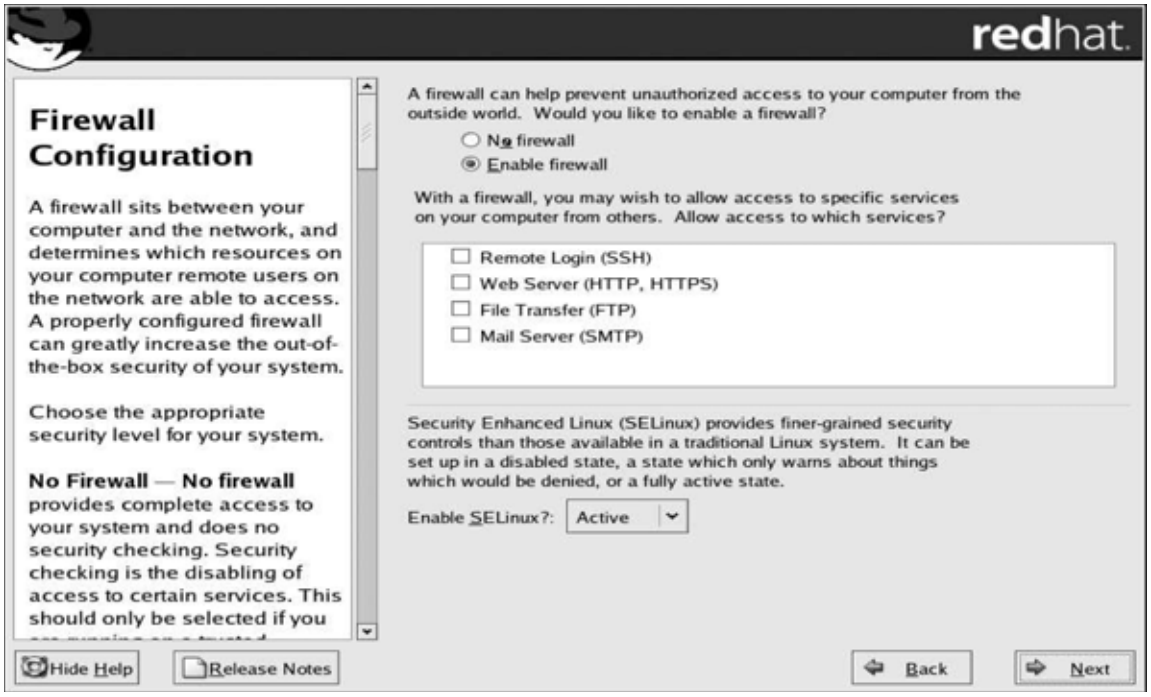


Figure D-11. Firewall Configuration

Next, you can decide whether to enable a firewall for your Red Hat Enterprise Linux system.

D.2.2.11 Time Zone Configuration

Set your time zone by selecting the city closest to your computer's physical location. There are two ways for you to select your time zone:

Using your mouse, click on the interactive map to select a specific city (represented by a yellow dot). A red **X** appears indicating your selection.

You can also scroll through the list at the bottom of the screen to select your time zone. Using your mouse, click on a location to highlight your selection.

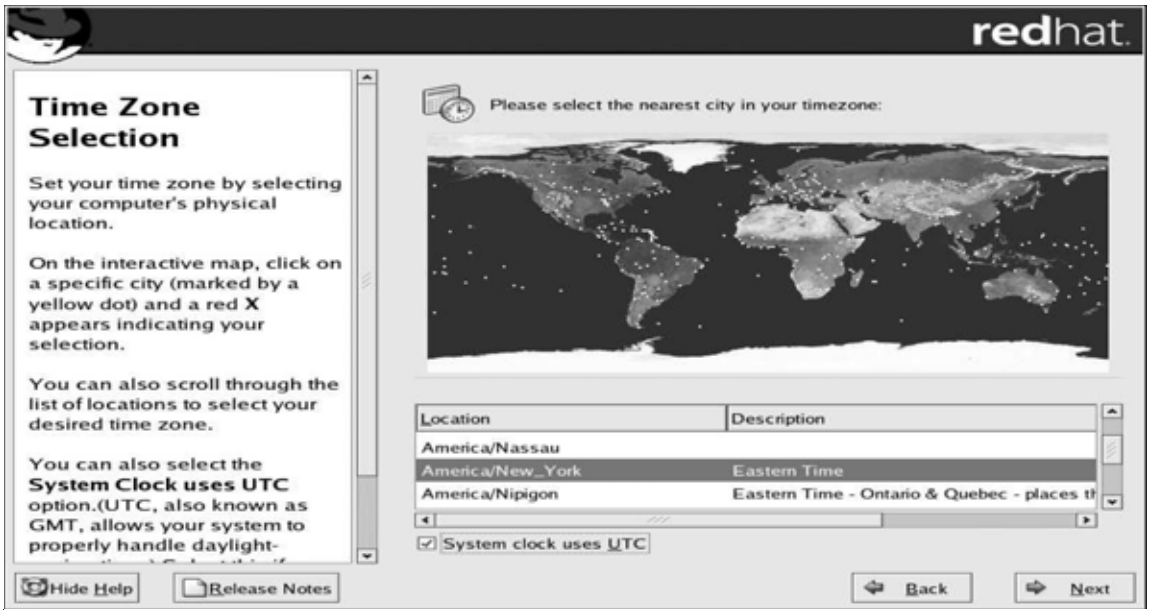


Figure D-12. Time Zone Configuration

Select **System Clock uses UTC** if you know that your system is set to UTC.

D.2.2.12 Set Root Password

Setting up a root account and password is one of the most important steps during your installation.

Your root account is similar to the administrator account used on Windows NT machines. The root account is used to install packages, upgrade RPMs, and perform most system maintenance. Logging in as root gives you complete control over your system.



Figure D-13. Set Root Password

Use the root account only for system administration. Create a non-root account for your general use and “su “- to root when you need to fix something quickly. These basic rules minimize the chances of a typo or an incorrect command doing damage to your system.

Note: To become root, type “su -” at the shell prompt in a terminal window and then press [Enter]. Then, enter the root password and press [Enter].

The installation program prompts you to set a root password for your system. *You cannot proceed to the next stage of the installation process without entering a root password*

The root password must be at least six characters long; the password you type is not echoed to the screen. You must enter the password twice; if the two passwords do not match, the installation program asks you to enter them again.

Note: Remember that the password is case-sensitive. If you write down your password, keep it in a secure place. However, it is recommended that you do not write down this or any password you create.

D.2.2.13 Package Group Selection

Now that you have made most of the choices for your installation, you are ready to confirm the default package selection or customize packages for your system.

After **Next** is selected on the **Set Root Password** screen (see previous section), the **Package Installation Defaults** screen (see *Figure D-14*) appears and details the default package set for your Red Hat Enterprise Linux installation. This screen varies depending on the version of Red Hat Enterprise Linux you are installing.

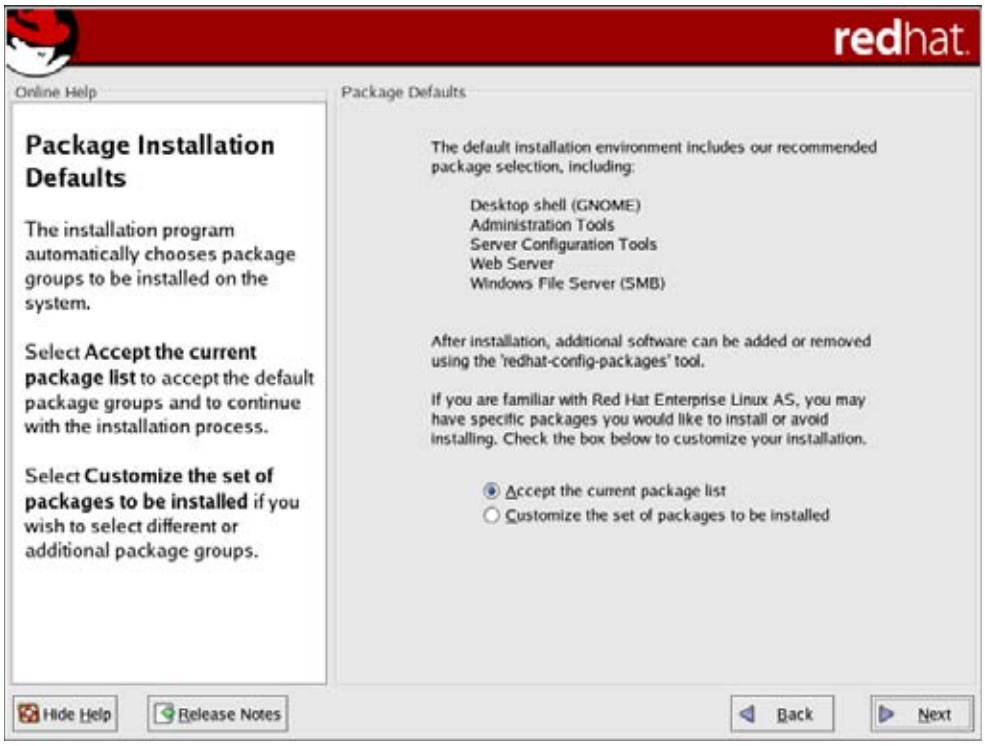


Figure D-14. Package Installation Defaults

If you choose to accept the current package list, skip ahead to the next Section.

To customize your package set further, however, select the **Customize the set of packages to be installed** option on the screen. Clicking **next** takes you to the **Package Group Selection** screen (see *Figure D-15*).

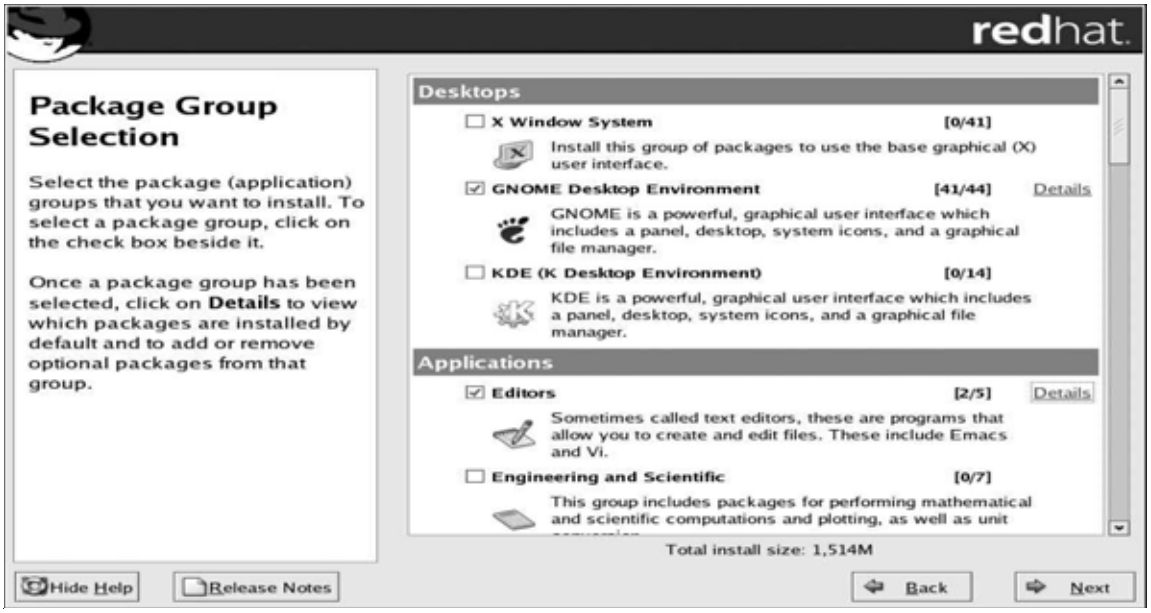


Figure D-15. Package Group Selection

You can select package groups, which group components together according to function (for example, **Xwindows System** and **Editors**), individual packages, or a combination of the two.

Select each component you wish to install. Selecting **Everything** (at the end of the component list) installs all packages included with Red Hat Enterprise Linux.

Once a package group has been selected, click on **Details** to view which packages are installed by default, and to add or remove optional packages from that group (see *Figure D-16* on page D-18).

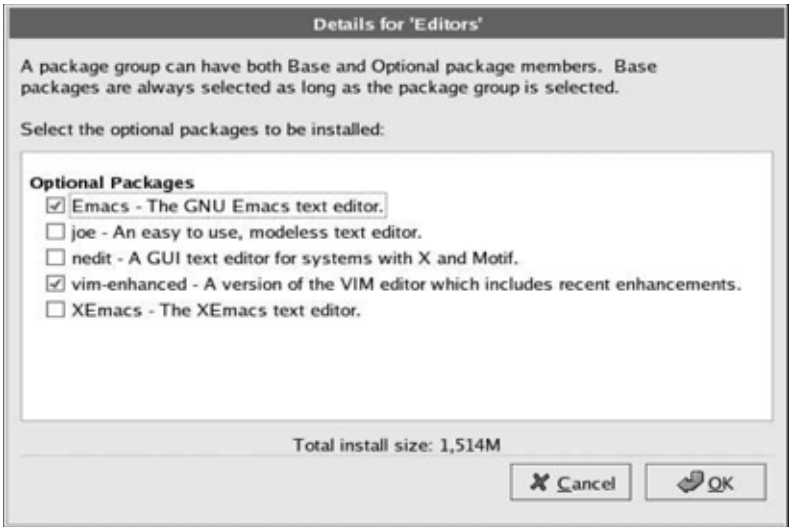


Figure D-16. Package Group Details

D.2.2.14 Preparing to Install

A screen preparing you for the installation of Red Hat Enterprise Linux now appears.

For your reference, a complete log of your installation can be found in /root/install.log once you reboot your system.



Caution: If, for some reason, you would rather not continue with the installation process, this is your *last opportunity* to safely cancel the process and reboot your machine. Once you press the **Next** button, partitions are written and packages are installed. If you wish to abort the installation, you should reboot now before any existing information on any hard drive is rewritten.

To cancel this installation process, press your computer's Reset button or use the [`Control`]-[`Alt`]-[`Delete`] key combination to restart your machine.

D.2.2.15 Installing Packages

At this point there is nothing left for you to do until all the packages have been installed. How quickly this happens depends on the number of packages you have selected and your computer's speed.

Insert CD’s as requested during installation.

D.2.2.16 Installation Complete

After installing all the packages, you will get the following message:

```
Congratulations! Your Red Hat Enterprise Linux
installation is now complete!
```

Finally, the installation program prompts you to prepare your system for reboot. Remember to remove any installation media and press **Reboot** to reboot the system.

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