SGI® Origin® 300 System with NUMAlink™ Module User's Guide

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CONTRIBUTORS

Written by Nancy Heller

Illustrated by Chrystie Danzer, Dan Young, and Kelly Begley

Edited by Cindi Leiser

Production by Glen Traefald

Engineering contributions by Jim Oliver, Charles Skandalis, Mark Koneazny, Lyle Stoll, Mike Brown, Jim Passint, Paul Pedersen, Gary Spilde, Brian Stickney, Pat Hughes, Daniel Gragert, and Dick Brownell.

Cover Design by Sarah Bolles, Sarah Bolles Design, and Dany Galgani, SGI Technical Publications.

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Version	Description
001	November 2001 Initial printing
002	May 2002 Adds information about clustering, the AC-powered NUMAlink module, and connector pinouts

Contents

Figures

Tables

About This Guide

This guide provides an overview of the components that make up the SGI Origin 300 system with NUMAlink module. It also describes how to install, set up, and operate this system. Specifically, it provides the following information:

- Chapter 1, “Introduction”
- Chapter 2, “Installation Procedures”
- Chapter 3, “System Operation”
- Chapter 4, “System Configurations”
- Chapter 5, “Troubleshooting”
- Appendix A, “Technical Specifications”
- Appendix B, “Connector Pinouts”
- Appendix C, “System Controller Commands”
- Appendix D, “Regulatory Specifications”

An index completes this guide.

Audience

This guide is written for owners, system administrators, and users of the SGI Origin 300 system with NUMAlink module. It is written with the assumption that the reader has a general knowledge of computers and computer operations.

Your SGI system support engineer (SSE) should perform the addition or replacement of parts and service of your SGI Origin 300 system, with the exception of the following tasks that you may perform yourself:

- Installing your system.
- Connecting a system console to your Origin 300 base module.
- Connecting a Myrinet-2000 switch (clustered systems only).
- Using your system console to enter commands and perform system functions such as powering on and powering off.
- Installing and removing disk drives.
- Installing and removing PCI option cards.
- Installing and removing DIMMs.
- Using the On/Off, reset, and non-maskable interrupt (NMI) buttons on the front panel of an SGI Origin 300 base module.

Information Sources

This section lists SGI documents that are relevant to the setup and use of the SGI Origin 300 system with NUMAlink module, as follows:

- *SGI Origin 300 System with NUMAlink Module User's Guide* (this manual) (hard copy shipped with system)
- *SGI Origin 300 User's Guide*
- *PCI Expansion Module User's Guide*
- *SGI Total Performance 900 Storage System User's Guide*
- *IRIX Admin Software Installation and Licensing Guide*
- Other SGI documentation
- Man pages (online)
- IRIX Release Notes (on CD)

SGI Origin 300 System with NUMAlink Module User's Guide

Use this guide to become familiar with your system and to learn how to operate, monitor, maintain, and troubleshoot the system. This guide contains information on installing the system, and installing and replacing the following components: PCI cards, disk drives, and memory (DIMMs).

Warning: To ensure your safety and protect your system, do not add or replace any components that this guide does not designate as customer replaceable. Contact your SGI system support engineer (SSE) to install any hardware components that are not designated as customer replaceable in this guide.

SGI Origin 300 User's Guide

This guide provides information about the SGI Origin 300 server. Use it to learn how to operate, monitor, maintain, and troubleshoot your server. This guide contains information on installing the server, and installing and replacing the following components: PCI cards, disk drives, and memory (DIMMs).

PCI Expansion Module User's Guide

This guide provides information about how to operate, monitor, maintain, and troubleshoot the PCI expansion module. This module is an optional component of the SGI Origin 300 system with NUMAlink module that provides additional I/O capabilities for the Origin 300 base modules. This guide also contains information on installing the module, and installing and replacing PCI cards.

SGI Total Performance 900 Storage System User's Guide

This guide provides information about how to operate and maintain the SGI Total Performance 900 (TP900) storage system. This system is an optional component of the SGI Origin 300 system with NUMAlink module that provides a SCSI (small computer system interface) JBOD (just a bunch of disks) storage solution for the Origin 300 base modules.

IRIX Admin: Software Installation and Licensing Guide

This is the complete reference guide on using the installation program, *inst*, to install software. For information on using the Software Manager to install software, refer to the online *Personal System Administration Guide*.

Other SGI Documentation

You can access other SGI documentation in either of the following two ways:

- SGI manuals are available in various formats at:

  http://techpubs.sgi.com

- If you have an SGI workstation running IRIX software, you can use the online documentation package called *IRIS InSight*. Select **Online Books** from the Help toolchest. You will see bookshelves for end-user, developer, and administration manuals. Double-click the name of a book to open it. For descriptions of hard-copy manuals that are available for purchase, double-click **Documentation Catalog**.

Online Man Pages

Your system includes a set of IRIX online manual pages, which are formatted in the standard UNIX "man page" style. These man pages are located online on the internal system disk (or CD-ROM) and are displayed using the `man` command. For example, to display the man page for the `Add_disk` command, enter the following command at a shell prompt:

```
man Add_disk
```

Man pages document important system configuration files and commands. References in SGI documentation to these pages include the name of the command and the section number in which the command is located. For example, "Add_disk(1)" refers to the `Add_disk` command and indicates that it is located in section 1 of the IRIX reference.

For additional information about displaying reference pages using the `man` command, see `man(1)`.

In addition, the `apropos` command locates man pages based on keywords. For example, to display a list of man pages that describe disks, enter the following command at a shell prompt:

```
apropos disk
```

For information about setting up and using `apropos`, see the `apropos`(`1`) and `makewhatis`(`1M`) man pages.

Release Notes

You can view the release notes for various SGI products and software subsystems by using one of two utilities:

`relnotes` Text-based viewer for online release notes.

`grelnotes` Graphics viewer for online release notes.

To see a list of available release notes, type the following command at a shell prompt:

```
relnotes
```

For more information, see the `relnotes`(`1`) and `grelnotes`(`1`) man pages.

Product Support

SGI provides a comprehensive product support and maintenance program for its products:

- If you are in North America and want support for your SGI-supported products, contact the Technical Assistance Center at +1 800 800 4SGI or your authorized service provider.
- If you are outside North America, please contact the SGI subsidiary or authorized distributor in your country.

Conventions

The following conventions are used throughout this document:

Convention	Meaning
`command`	This fixed-space font denotes literal items such as commands, files, routines, path names, signals, messages, and programming language structures.
variable	Italic typeface denotes variable entries and words or concepts being defined.
`user input`	This bold, fixed-space font denotes literal items that the user enters in interactive sessions. Output is shown in nonbold, fixed-space font.
[]	Brackets enclose optional portions of a command or directive line.
...	Ellipses indicate that a preceding element can be repeated.
`manpage`(*x*)	Man page section identifiers appear in parentheses after man page names.

Reader Comments

If you have comments about the technical accuracy, content, or organization of this document, contact SGI. Be sure to include the title and document number of the manual with your comments. (Online, the document number is located in the front matter of the manual. In printed manuals, the document number is located at the bottom of each page.)

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- Use the Feedback option on the Technical Publications Library Web page:

  http://techpubs.sgi.com

- Contact your customer service representative and ask that an incident be filed in the SGI incident tracking system.

- Send mail to the following address:

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  SGI
  1600 Amphitheatre Pkwy., M/S 535
  Mountain View, California 94043-1351

- Send a fax to the attention of “Technical Publications” at +1 650 932 0801.

SGI values your comments and will respond to them promptly.

Introduction

The SGI Origin 300 system with NUMAlink module is a distributed shared memory (DSM) and distributed I/O system. As a DSM system, each Origin 300 base module (2 or 4 processors) has local memory that it shares with the other base modules in the system. Similar to DSM, the interfaces of the I/O devices are distributed among the Origin 300 base modules and are accessible by all base modules.

The key component that makes the distributed shared memory and I/O possible is the NUMAlink 3 interconnect. In this system, the NUMAlink 3 interconnect consists of a NUMAlink module that transfers messages between the Origin 300 base modules (refer to Figure 1-1). In an Origin 300 system that does not have a NUMAlink module, the NUMAlink 3 interconnect consists of a cable that connects two Origin 300 base modules.

Note: The maximum number of base modules in an Origin 300 system that does not contain a NUMAlink module is two (8 processors). In an Origin 300 system that does contain a NUMAlink module, the maximum number of base modules is eight (32 processors).

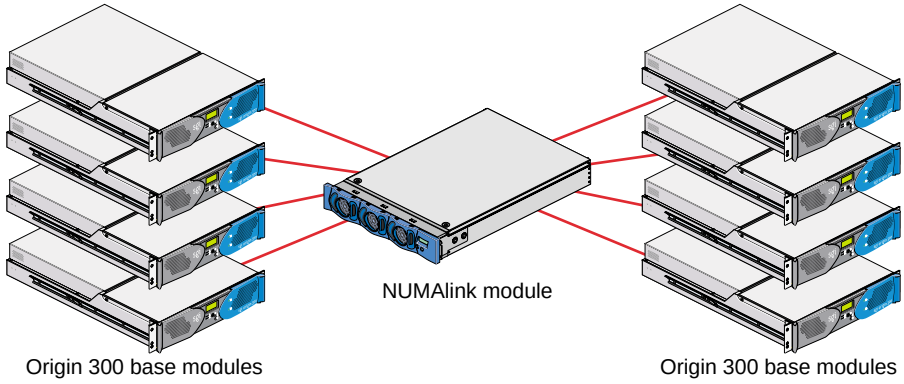


Figure 1-1 Connecting Origin 300 Base Modules via a NUMAlink Module

To increase the number of processors beyond 32, Origin 300 with NUMAlink module systems can be clustered together. The maximum number of processors in a clustered configuration is 128.

The Origin 300 system with NUMAlink module is based on SGI NUMA (formerly ccNUMA), a cache-coherent non-uniform memory access architecture, which ensures that the caches of the processors contain valid data. For example, if a processor alters the data in a cache location and another processor has a copy of that data in its cache, the processor that holds the copy will be notified that the memory location no longer contains valid data. SGI NUMA architecture also supports varied access times for local and remote memory references.

The SGI Origin 300 system with NUMAlink module is a scalable system, which means that you can scale the system in independent dimensions: computing, I/O, and storage (refer to Table 1-1). For example, the computing dimension can range from 4 to 32 processors in a single system image (SSI).

Table 1-1 Minimum and Maximum System Configurations

Dimension	Minimum	Maximum
Computing:		
Base modules	2	8
Processors	4 (two 2-processor Origin 300 base modules)	32 (eight 4-processor Origin 300 base modules)
Memory	1 GB (two Origin 300 base modules)	32 GB (eight Origin 300 base modules)
I/O	4 PCI slots (two Origin 300 base modules)	56 PCI slots (four Origin 300 base modules and four PCI expansion modules)
Storage	2 disk drives (one drive per Origin 300 base module; the second disk drive of a base module is optional)	16 disk drives (eight Origin 300 base modules); however, additional storage can be added to the system. The maximum amount of storage depends on the type of storage expansion device.

The Origin 300 system has many of the same features that are available in the Origin 3000 product line to increase the reliability, availability, and serviceability (RAS) of the system.

- Internal power and temperature are monitored via the L1 controller; the L1 controller automatically shuts down the base module to prevent overheating when necessary.
- Memory and secondary cache are protected by single-bit error correction and double-bit error detection (SECDED).
- Primary cache is protected by parity.
- Memory can be scrubbed when a single-bit error occurs.

- The IRIX operating system can be recovered on some kernel double-bit errors.
- Automatic testing occurs after you power on the system and disables processors and memory that fail these self-tests.
- Boot times are minimized.
- Remote console and maintenance activities are supported.
- System control network for system maintenance and monitoring is supported.
- LED values are readable via the system controller network.

Figure 1-2 shows the Origin 300 system with NUMAlink module.

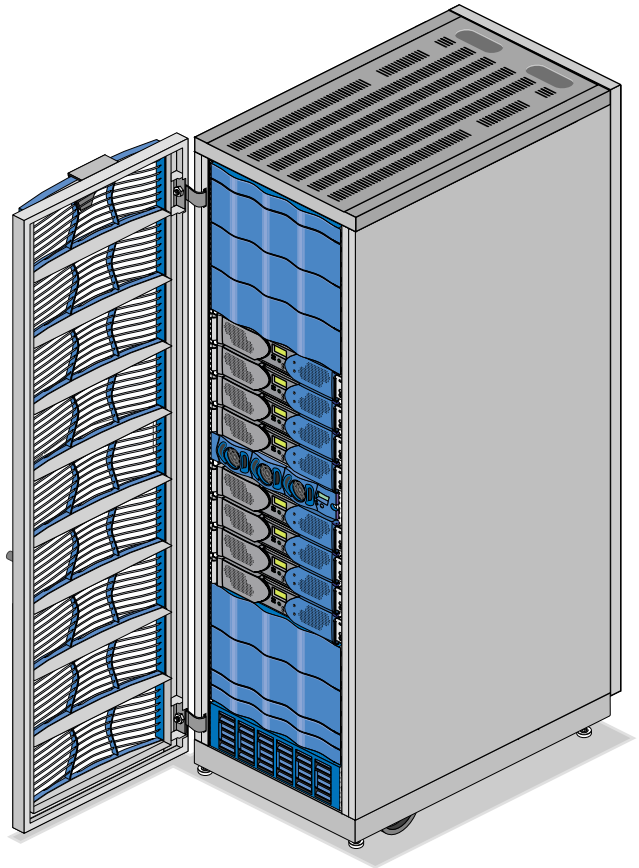


Figure 1-2 SGI Origin 300 System with NUMAlink Module

Base System Components

The SGI Origin 300 system with NUMAlink module consists of the following base components, as shown in Figure 1-3. This section provides a brief overview of the base components; detailed information is provided in Appendix A.

- One rack
- Two to eight SGI Origin 300 base modules (also referred to as servers)
- One NUMAlink module
- One USB hub
- One L2 controller
- One or more power components (for example, power distribution unit (PDU), power strip, and power bay module)

Note: The modules of the SGI Origin 300 system with NUMAlink module are not interchangeable with the SGI Origin 3000 series bricks.

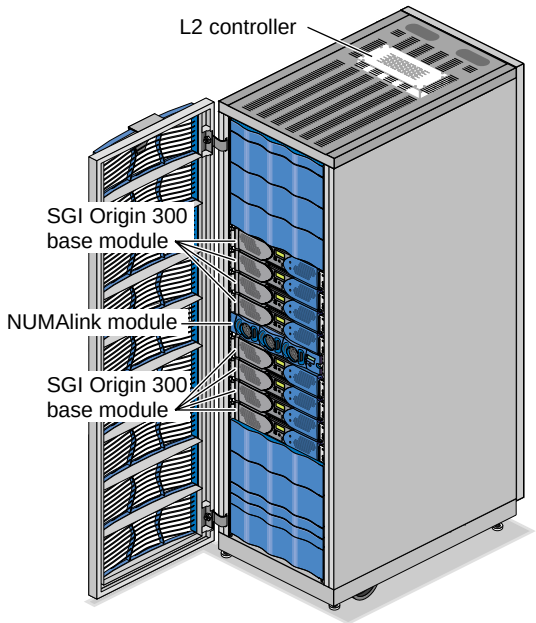


Figure 1-3 Base System Components

Rack

The SGI Origin 300 system with NUMAlink module supports two rack types: a short rack and a tall rack. The racks are measured in standard units (U); one unit is equal to 1.75 in. (4.45 cm). The short rack is a 17U rack and the tall rack is a 39U rack (refer to Figure 1-4).

The components within the rack are identified by the lowest unit number that they occupy. For example, the NUMAlink modules shown in Figure 1-4 are identified as U8 in the short rack and U20 in the tall rack.

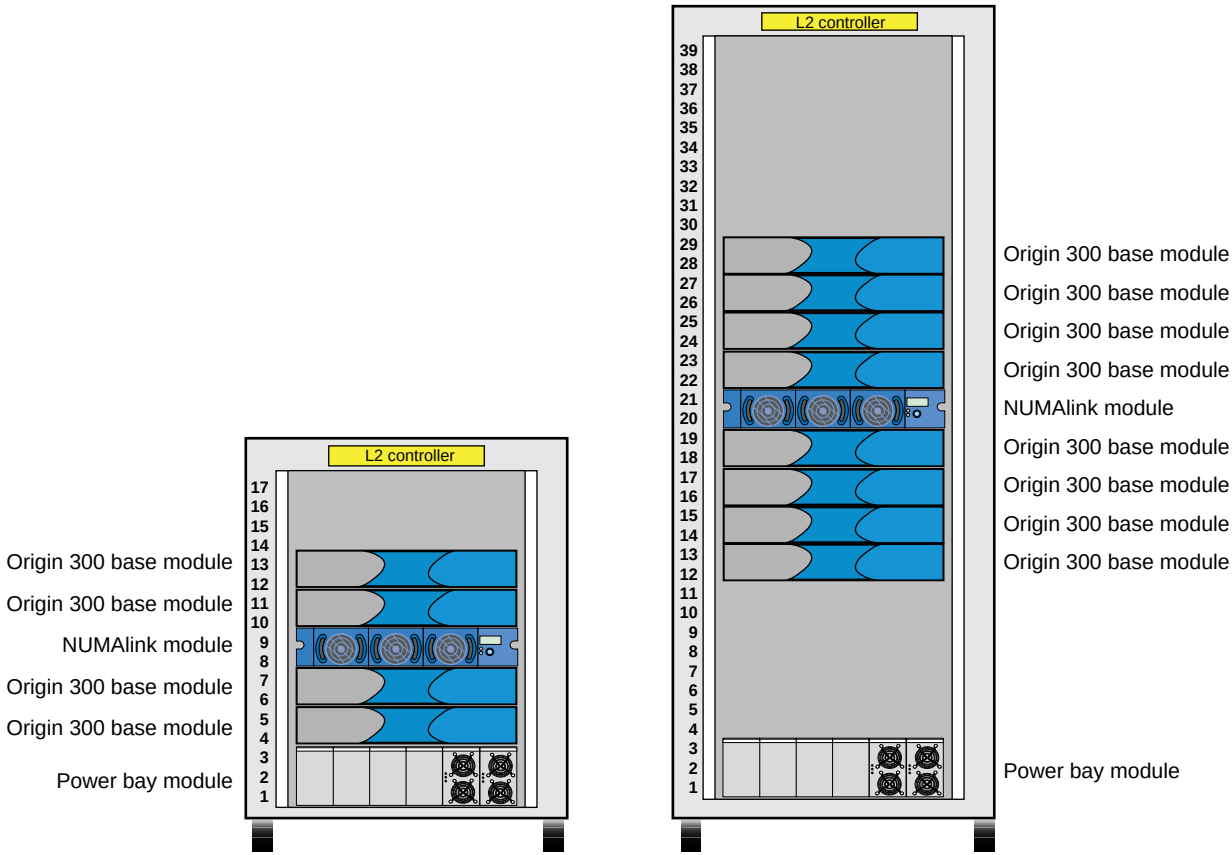


Figure 1-4 Unit Numbering within Rack

Both rack types have the following characteristics:

- 19-in. mounting rails to support the components within the rack.
- Front and rear doors.
- Cable management hardware in the rear of the rack.
- Four castors, two of which are swivel castors.
- Seismic tie-down attachment points.

Note: Tall racks also have leveling pads; short racks do not have leveling pads.

Figure 1-5 shows the front view of the short rack.

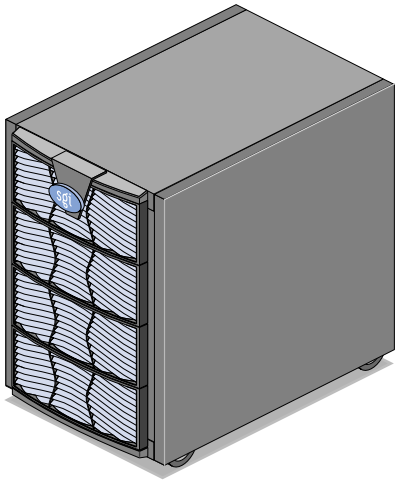


Figure 1-5 Front View of the Short Rack

Figure 1-6 shows the front view of the tall rack.

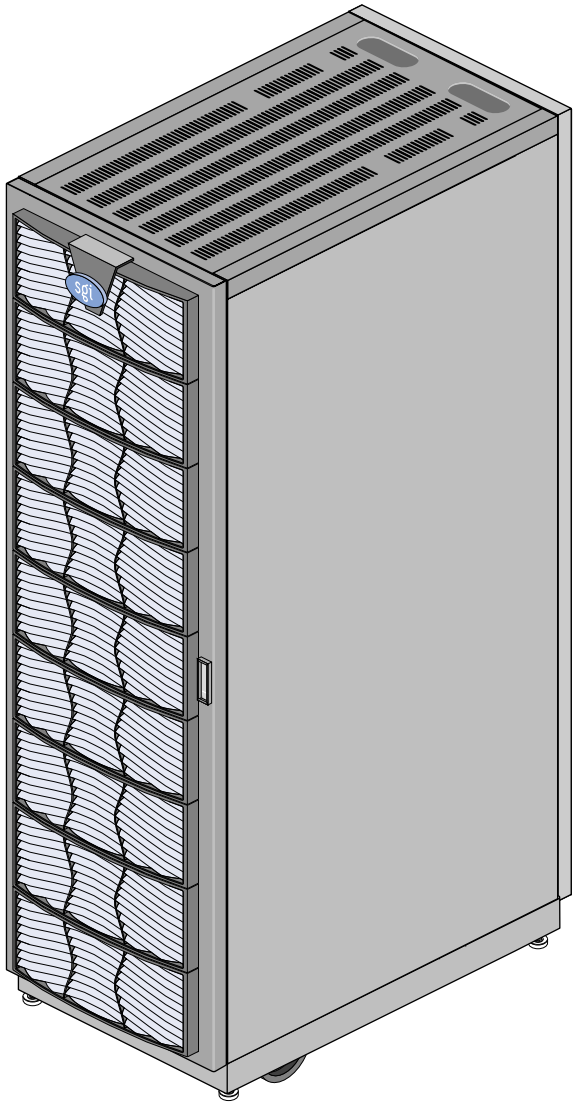


Figure 1-6 Front View of the Tall Rack

SGI Origin 300 Base Modules

The SGI Origin 300 system with NUMAlink module consists of two to eight Origin 300 base modules that provide the compute functionality for the system. These base modules, or servers, communicate with each other via the NUMAlink 3 interconnect.

Each base module consists of:

- Two or four 64-bit MIPS RISC processors
- 2 MB of secondary cache per processor
- 512 MB to 4 GB of memory
- One or two sled-mounted Ultra3 SCSI disk drives
- Zero to two PCI cards

Note: A base module is not limited to two disk drives or two PCI slots. The base module can connect to external devices that expand the I/O and storage capabilities. Information about these devices is provided in "Optional System Components" on page 16.

Each base module also contains an L1 controller that provides the following services:

- Controls and sequences power
- Controls and monitors the environment
- Initiates a reset
- Stores identification and configuration information

Figure 1-7 shows the front and rear views of an SGI Origin 300 base module.

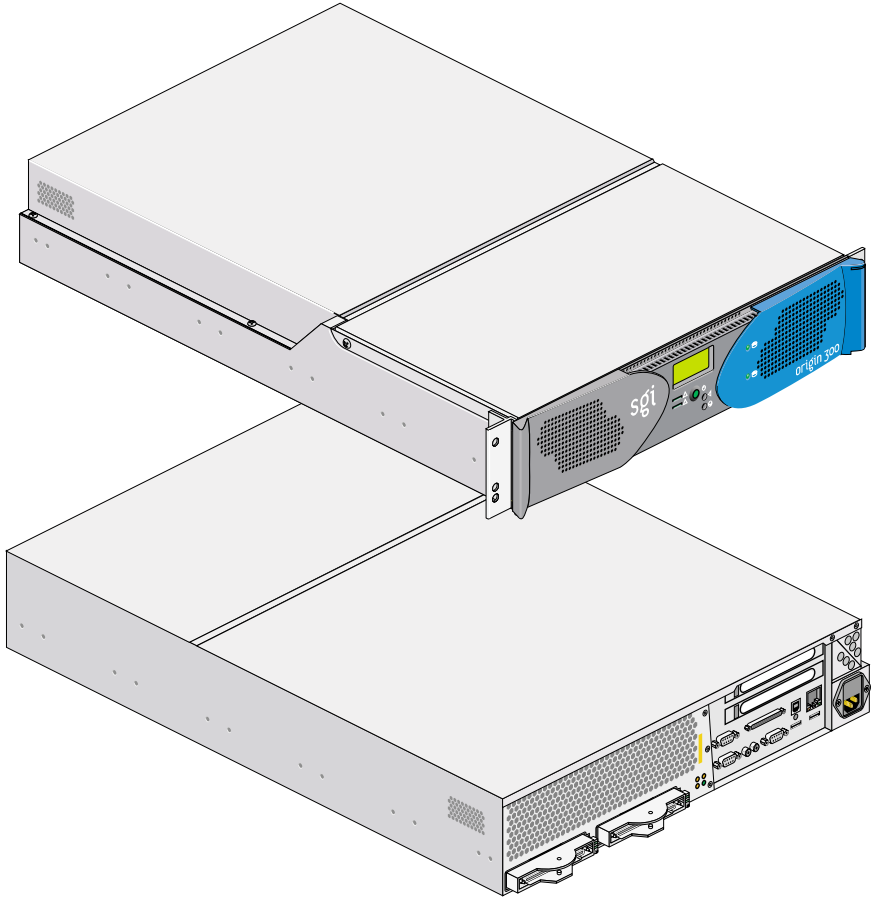


Figure 1-7 Front and Rear Views of an SGI Origin 300 Base Module

NUMAlink Module

The NUMAlink module, shown in Figure 1-8, is an air-cooled device that transfers messages between the Origin 300 base modules via the NUMAlink 3 interconnect. The NUMAlink module consists of eight ports; four ports can connect to four Origin 300 base modules. The other four ports, which carry USB signals, can connect to Origin 300 base modules or PCI expansion modules.

Note: The USB signals enable the Origin 300 base modules and the PCI expansion modules to communicate with the L2 controller. The Origin 300 base modules that connect to the four ports that do not carry USB signals communicate with the L2 controller via a USB hub.

There are two types of NUMAlink modules: an AC-powered NUMAlink module and a DC-powered NUMAlink module. The functionality of these two modules is the same; however, as the names imply, the modules receive power from different sources. The AC-powered router receives AC voltage from a PDU or power strip. The DC-powered NUMAlink module receives DC voltage from a power bay.

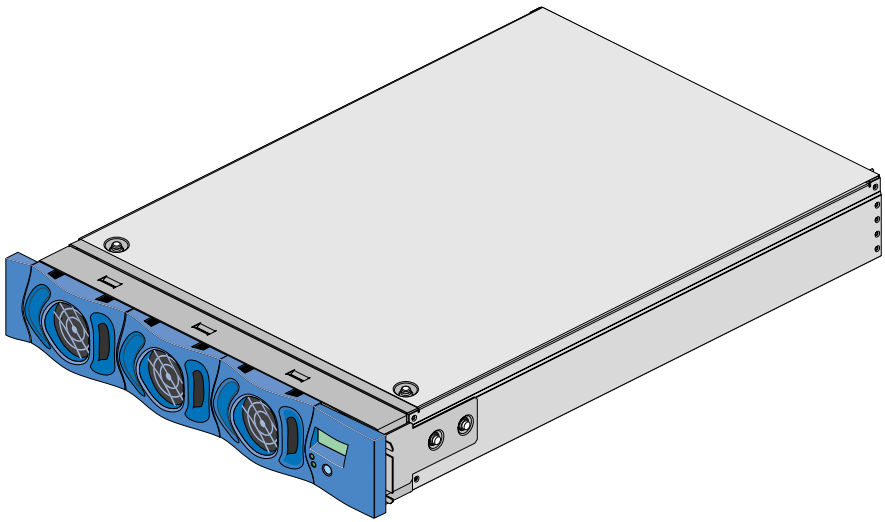


Figure 1-8 NUMAlink Module

USB Hub

The USB hub, shown in Figure 1-9, routes information between the L2 controller and the four Origin 300 base modules that connect to NUMAlink module ports 1, 6, 7, and 8 (the ports that do not carry USB signals).

Note: The USB hub might look different than the one shown in Figure 1-9.

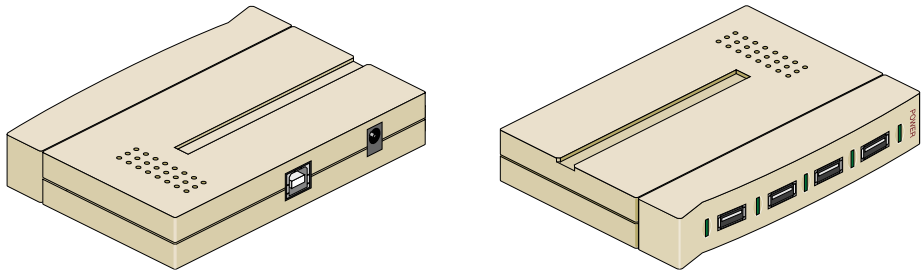


Figure 1-9 USB Hub

L2 Controller

The L2 controller, shown in Figure 1-10, is a rack-level controller that performs the following functions:

- Controls resource sharing.
- Controls L1 controllers.
- Maintains controller configuration and topology information.
- Enables remote maintenance.
- Routes data between upstream and downstream devices, as follows:

  Upstream devices (for example, the system console) provide control for the system, initiate commands for the downstream devices, and act on the messages that they receive from downstream devices.

  Downstream devices (for example, L1 controllers) perform the actions specified by the L2 controller commands, send responses to the L2 controller that indicate the status of the commands, and send error messages to the L2 controller.

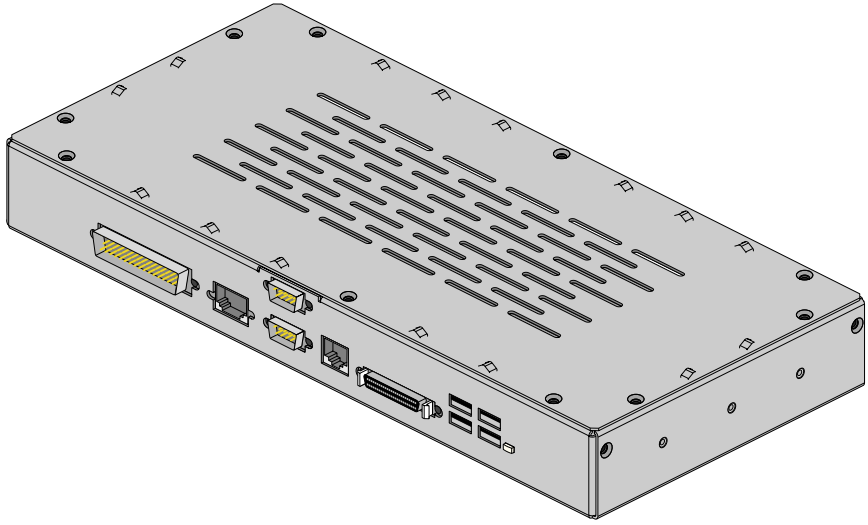


Figure 1-10 L2 Controller

Power Components

The SGI Origin 300 system with NUMAlink module can consist of the following power components:

- One or two power distribution units (PDUs) (refer to Figure 1-11) - The second PDU is added to the system when more than 15 AC power receptacles are needed within the rack.

  The PDU inputs AC voltage from an external power receptacle and it can output AC voltage to the Origin 300 base modules, an AC-powered NUMAlink module, optional SGI Total Performance 900 (TP900) storage modules, USB hub, power bay module, power strip, and Myrinet-2000 switch.

- One power strip - The power strip exists in the system when the system requires 11 to 15 AC power receptacles.

  The power strip inputs AC voltage from the PDU and it can output AC voltage to the Origin 300 base modules, an AC-powered NUMAlink module, optional TP900 storage modules, USB hub, power bay module, and Myrinet-2000 switch.

- One power bay module (refer to Figure 1-12) - The power bay module exists in the system when the system contains a DC-powered NUMAlink module or a PCI expansion module.

  The power bay module inputs AC voltage from a PDU or power strip and converts this AC voltage to 12 Vdc standby voltage and 48 Vdc. The power bay outputs this voltage to the DC-powered NUMAlink module, the L2 controller, and PCI expansion modules. The 48 Vdc powers on the NUMAlink module, the PCI expansion modules, and the L2 controller. The 12 Vdc standby voltage powers on the L1 controller logic within the NUMAlink module and the PCI expansion modules.

  The power bay module can house up to six power supplies; however, this system requires only two or three power supplies. The third power supply is required when the system has four PCI expansion modules. The outputs of the power supplies are bused together. For example, when the power bay contains two power supplies, the supplies provide the following power in an N+1 redundant configuration: 1840 W at 48 Vdc and 90 W at 12 Vdc standby.

- One power supply - When the system has an AC-powered NUMAlink module, the L2 controller receives power from a power supply that is attached to the side of the rack. This power supply receives AC voltage from a PDU or power strip and converts the voltage to 48 Vdc, which is the input voltage that the L2 controller requires.

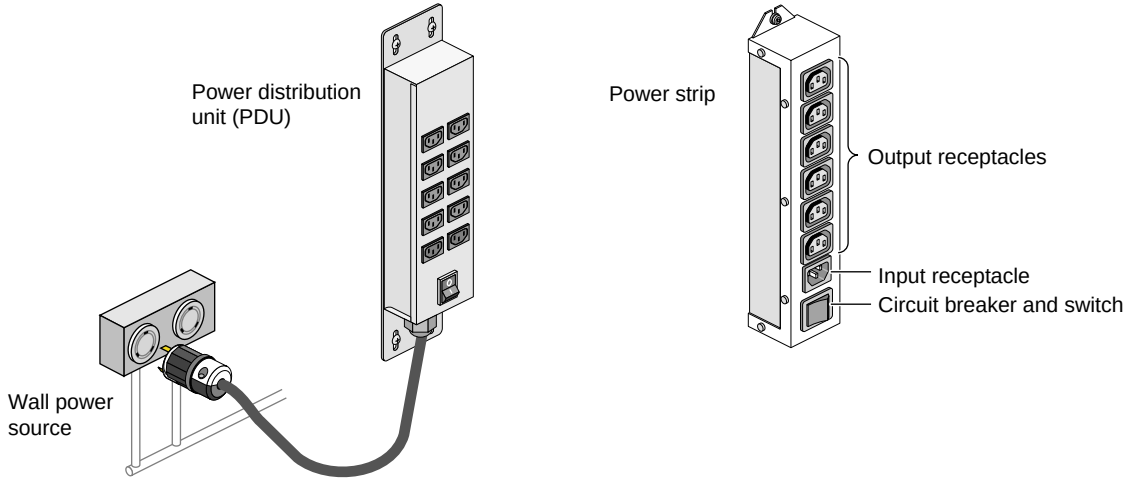


Figure 1-11 Power Distribution Unit and Power Strip

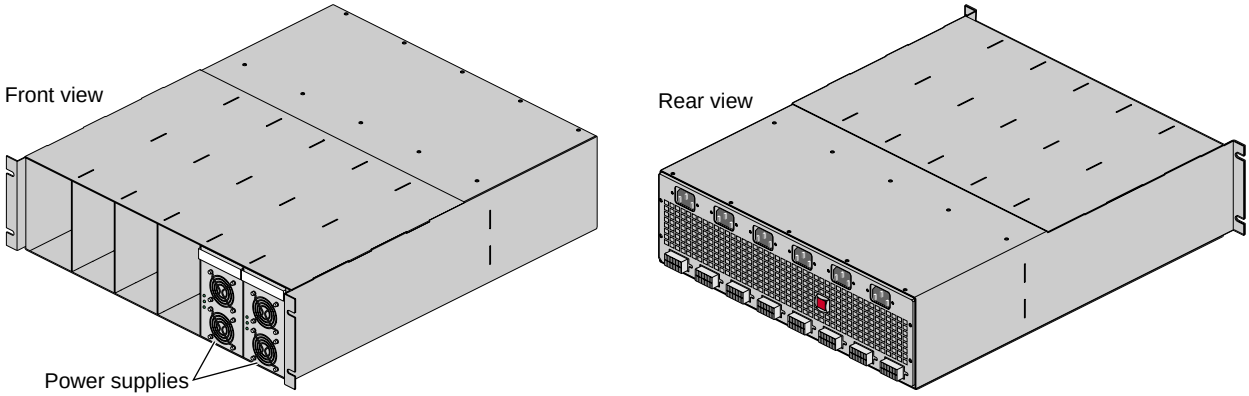


Figure 1-12 Power Bay Module

Optional System Components

The Origin 300 system can contain the following optional components, which are discussed in the subsections that follow.

- PCI expansion modules
- Storage expansion modules
- Tape devices
- CD-ROM
- Myrinet-2000 switch

PCI Expansion Modules

Each Origin 300 base module contains two PCI slots; however, you can expand your I/O capabilities by adding one to four PCI expansion modules to your system. The following rules indicate how many PCI expansion modules you can add to your system:

- You can add one PCI expansion module to a system that contains two to seven base modules.
- You can add two PCI expansion modules to a system that contains two to six base modules.
- You can add three PCI expansion modules to a system that contains three to five base modules.
- You can add four PCI expansion modules to a system that contains four base modules.

The PCI expansion module, shown in Figure 1-13, contains six buses (buses 1 through 6) that can seat as many as twelve 3.3-V or universal PCI cards. Each bus has two PCI slots (refer to Figure 1-14) that are labeled 1 and 2 and support either two 33-MHz PCI cards or two 66-MHz PCI cards.

The PCI expansion module connects to an Origin 300 base module via the NUMAlink module.

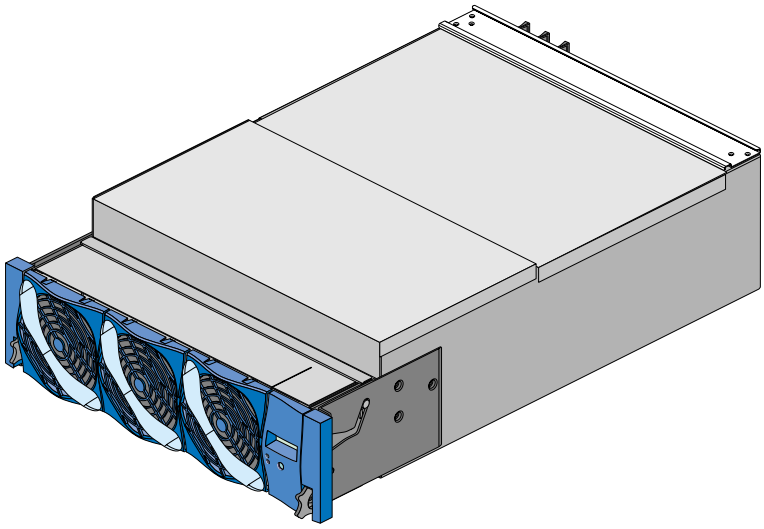


Figure 1-13 PCI Expansion Module

Figure 1-14 shows the PCI card slot numbering on the PCI expansion module.

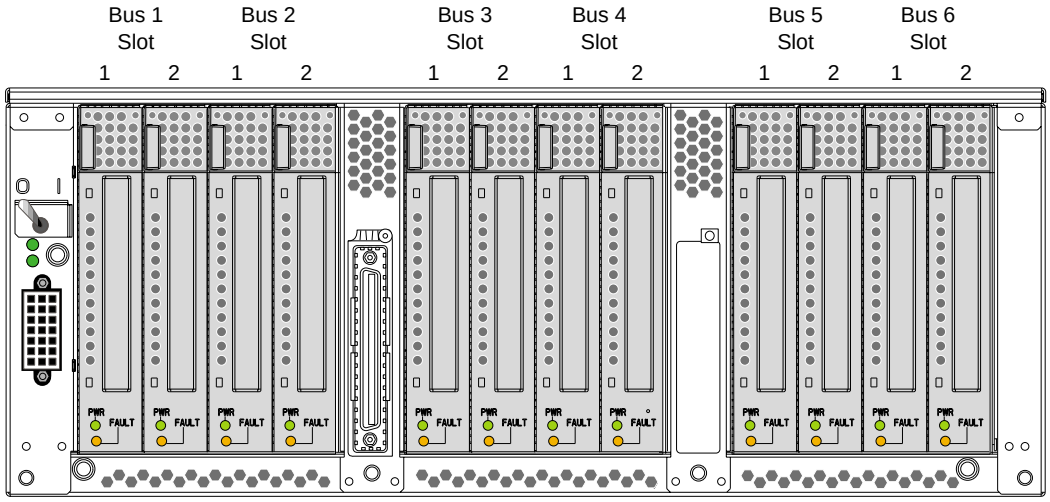


Figure 1-14 PCI Card Slot Numbering on the PCI Expansion Module

Storage Expansion

Each Origin 300 base module contains two disk-drive bays; however, you can add additional storage to the system as follows:

- For a SCSI (small computer system interface) JBOD (just a bunch of disks) solution, SGI offers the SGI Total Performance 900 (TP900) storage module.
- For a Fibre Channel solution that supports both JBOD and RAID configurations, SGI offers the SGI Total Performance 9100 (TP9100) storage system.
- For a Fibre Channel RAID solution, SGI offers the SGI Total Performance 9400 (TP9400) storage system.

These solutions are discussed in the subsections that follow.

SGI TP900 Storage Module

The SGI TP900 storage module, shown in Figure 1-15, is a 2U-high 8-drive storage system that provides compact, high-capacity, high-availability JBOD storage for the Origin 300 base modules. The enclosure backplane connects the 8 drives on one SCSI bus. As an option, the storage module can also be configured on two SCSI buses (two strings of 4 drives).

This storage module has the following features:

- Affordable.
- Mounts in a standard 19-in. rack; available in factory-installed configurations with the Origin 300 base modules.
- Uses SCSI Parallel Interface 3 (SPI-3) capable Low Profile (1-inch high) 3.5-inch disk drives.
- Has drive carriers that accept SGI-qualified 10,000- or 15,000-RPM U160 SCSI disk drives.
- Is AC-powered. Receives 200/240 Vac input power from the PDU or power strip.

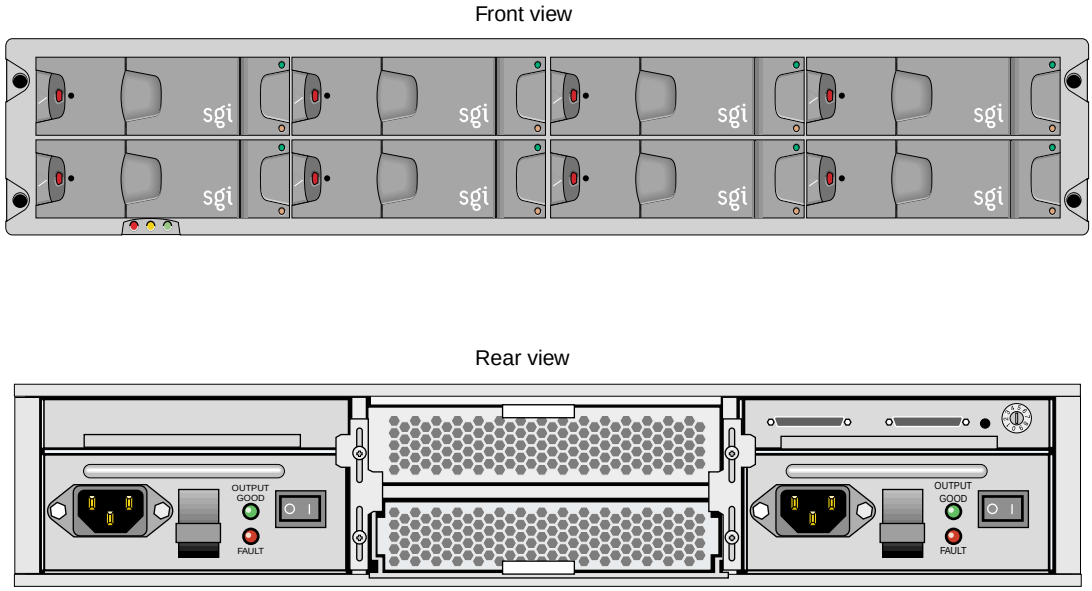


Figure 1-15 SGI TP900 Storage Module

SGI TP9100 Storage System

The SGI Total Performance 9100 (TP9100), shown in Figure 1-16, is an affordable, entry-level RAID storage array that is easily expandable and comes in either a deskside tower or a rackmounted configuration. You can start with a basic JBOD configuration and later add RAID controllers or you can start with a RAID configuration. By purchasing a deskside model, you can start small and scale to a multi-terabyte environment. The drives within the deskside tower can easily slide into a rack to increase storage capacity. The compact design of the TP9100 enables as many as 108 drives to fit in a single cabinet.

This storage system has the following features:

- Converts easily from JBOD to RAID.
- Supports RAID levels 0, 1, 1+0, 3, and 5.
- Has one RAID controller and can be upgraded to two controllers, allowing no single point of failure.
- Supports the latest in high-performance 18-GB, 36-GB, or 73-GB 10,000-RPM FC-AL (Fibre Channel-arbitrated loop) drives.
- Can be configured with as many as 60 drives per controller.
- Supports multi-platform OS-based servers: IRIX, Linux, Microsoft Windows NT, and Microsoft Windows 2000.
- Has been fully tested in SAN and switch environments.
- Supports nine TP9100 arrays in a single cabinet, for a maximum of 108 drives per cabinet.
- Supports uninterrupted data access with automatic failover capability and hot-swappable, redundant components.

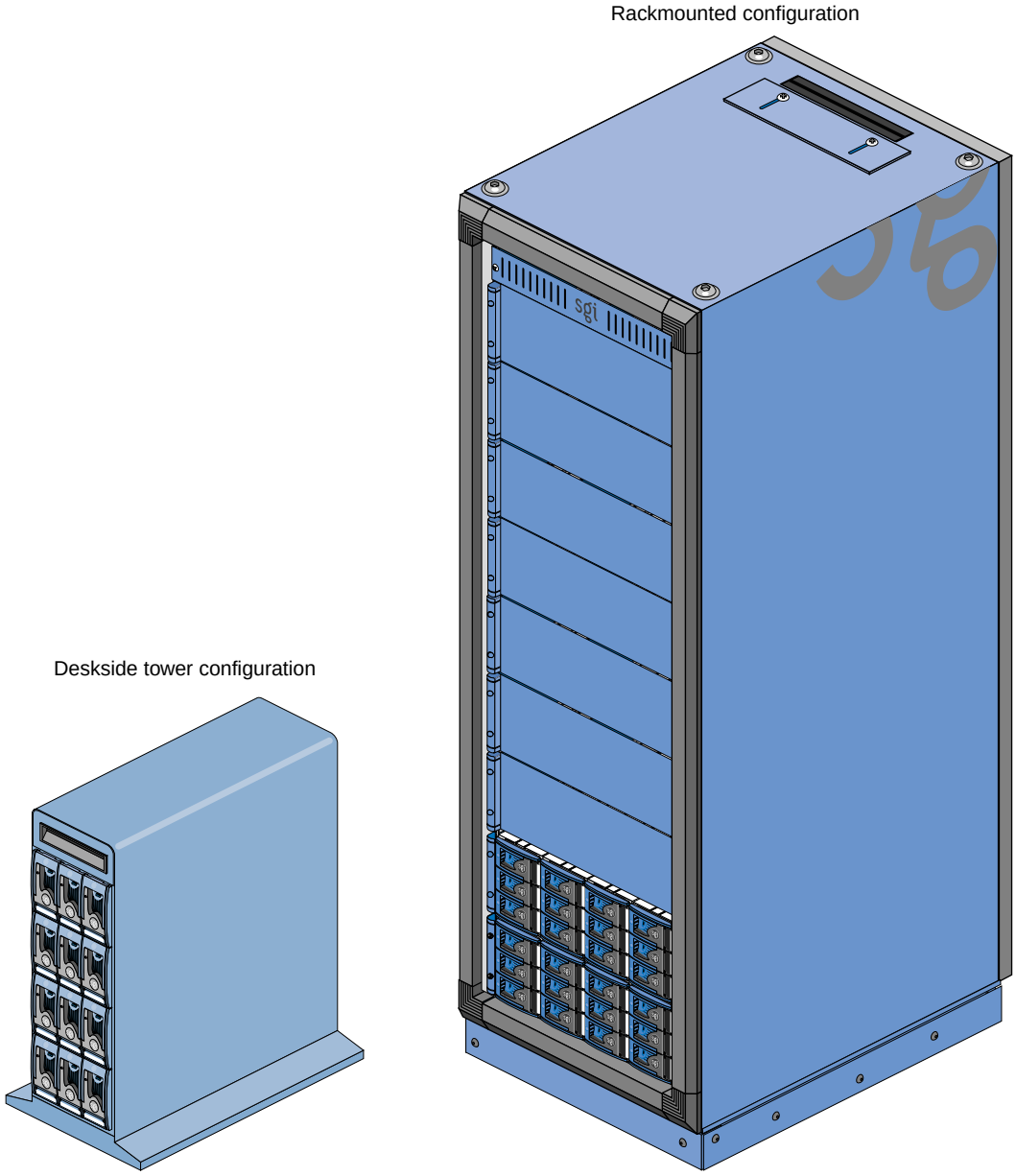


Figure 1-16 SGI TP9100 Storage System

SGI TP9400 Storage System

The SGI Total Performance 9400 (TP9400), shown in Figure 1-17, is a highly scalable RAID storage subsystem. It supports more than 8 TB of fast storage in a 19-inch rack enclosure and can grow from as few as 72 GB of storage to whatever size you require without disruption to normal processing activities. The TP9400 has continuous availability; all active components may be configured redundantly and installed "hot" as customer replaceable or expansion units.

This storage system has the following features:

- Supports full RAID storage, which is implemented in hardware with custom ASICs for performance.
- Has a total Fibre Channel design, including all-fiber dual-ported disk drives.
- Supports as many as eight internal optical fiber hubs for online expansion and connectivity.
- Has four Fibre Channel loops that support I/O reads as fast as 357 MB/s and writes as fast as 239 MB/s.
- Supports direct attachment of up to eight host systems using optical fiber cables.
- Supports all SAN topologies.
- Supports dual active controllers with as much as 1 GB of redundant cache and dual battery backup.
- Has user-friendly GUI or command line interface software for installation and management.
- Has in-band and out-of-band management, including e-mail event notification.
- Supports as many as 110 drives in each rack (36- or 73-GB 10,000-RPM drives).
- Supports system and file clustering.
- Has host failover software that supports logical volume management and load balancing.

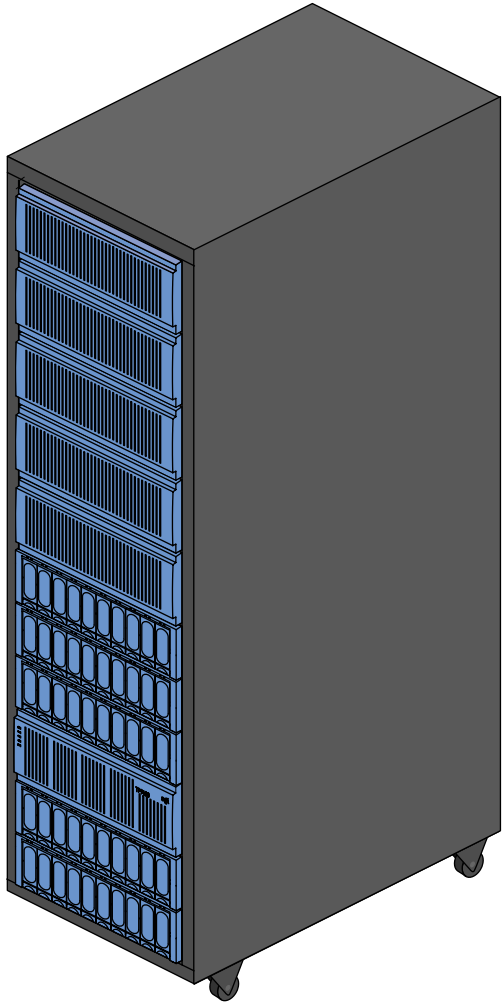


Figure 1-17 SGI TP9400 Storage System

Tape Devices

The Origin 300 base module supports the following DAT (digital audio tape) option:

- **4mm DAT**. Offers a storage capacity of 20 GB (native) and a data transfer rate of 2.36 MB/s. This drive is the least expensive media and is a viable solution for small file sizes and instances when backup time is not an issue.

All of the following tape devices have faster transfer rates, can store larger amounts of data, and in general terms, are more reliable and more scalable than the DAT option. The main differences between these devices is the mode of operation; they are either start/stop devices or streaming devices. Start/stop devices are better suited for HSM (hierarchical storage management) applications where access to the first byte of data is critical and heavy start and stop activity takes place. Streaming devices are better suited for backup and restore applications where massive amounts of data are being written and read in one operation.

The start/stop devices are:

- **9840**. Offers SCSI and native Fibre Channel connectivity, storage capacity of 20 GB (native), and a data transfer rate of 10 MB/s.
- **9840B**. Offers SCSI and native Fibre Channel connectivity, storage capacity of 20 GB (native), and a data transfer rate of 20 MB/s.
- **9940**. Offers SCSI and native Fibre Channel connectivity, storage capacity of 60 GB (native), and a data transfer rate of 10 MB/s.

The streaming devices are:

- **DLT (digital linear tape) 8000 (7000 emulation)**. Offers SCSI connectivity, storage capacity of 35 GB, and a data transfer rate of 5.0 MB/s.
- **DLT 8000 (native mode)**. Offers SCSI connectivity, storage capacity of 40 GB, and a data transfer rate of 6.0 MB/s.
- **ULTRIUM LTO**. Offers SCSI connectivity, storage capacity of 100 GB (native), and a data transfer rate of 15 MB/s.
- **SDLT**. Offers SCSI connectivity, storage capacity of 110 GB, and a data transfer rate of 11 MB/s. The SDLT is backward read compatible (BRC) with DLT 4000, DLT 7000, and DLT 8000 drives; however, SDLT performance is affected when reading legacy media.

The 4mm DAT can be mounted in the Origin 300 rack or placed on a table. All other supported tape devices are housed within one of the following libraries: L20, L40, L80, L180, or L700 (refer to Table 1-2 and Figure 1-18).

Note: In Table 1-2, device transfer rates are dictated by the profile of the data being transferred and are likely to be less than the rated speed, depending on the size of files and the block size.

Table 1-2 Tape Drive Libraries

Library	Specifications
L20	**Number of cartridge slots:** 10 or 20 **Number of drives:** 1 or 2 **Supported drives:** DLT 8000 (native mode), ULTRIUM LTO, and SDLT **Cartridge capacity:** DLT 8000: 800 GB (20 slots, UNC) - 1.6 TB (20 slots, COM) ULTRIUM LTO: 2.0 TB (20 slots, UNC) - 4.0 TB (20 slots, COM) SDLT: 2.2 TB (20 slots, UNC) - 4.4 TB (20 slots, COM) **Drive data rate:** DLT 8000: 43.2 GB/hr (2 drives, UNC) - 86.4 GB/hr (2 drives, COM) ULTRIUM LTO: 108 GB/hr (2 drives, UNC) - 216 GB/hr (2 drives, COM) SDLT: 79.2 GB/hr (2 drives, UNC) - 158.4 GB/hr (2 drives, COM)
L40	**Number of cartridge slots:** 20 or 40 **Number of drives:** 1 to 4 **Supported drives:** DLT 8000 (native mode), ULTRIUM LTO, and SDLT **Cartridge capacity:** DLT 8000: 1.6 TB (40 slots, UNC) - 3.2 TB (40 slots, COM) ULTRIUM LTO: 4.0 TB (40 slots, UNC) - 8.0 TB (40 slots, COM) SDLT: 4.4 TB (40 slots, UNC) - 8.8 TB (40 slots, COM) **Drive data rate:** DLT 8000: 86.4 GB/hr (4 drives, UNC) - 172.8 GB/hr (4 drives, COM) ULTRIUM LTO: 216 GB/hr (4 drives, UNC) - 432 GB/hr (4 drives, COM) SDLT: 158.4 GB/hr (4 drives, UNC) - 316.8 GB/hr (4 drives, COM) **Key:** UNC = uncompressed, COM = compressed

Table 1-2 Tape Drive Libraries **(continued)**

Library	Specifications
L80	**Number of cartridge slots:** 40, 60, or 80 **Number of drives:** 1 to 8 **Supported drives:** DLT 8000 (native mode), ULTRIUM LTO, and SDLT **Cartridge capacity:** DLT 8000: 3.2 TB (80 slots, UNC) - 6.4 TB (80 slots, COM) ULTRIUM LTO: 8.0 TB (80 slots, UNC) - 16.0 TB (80 slots, COM) SDLT: 8.8 TB (80 slots, UNC) - 17.6 TB (80 slots, COM) **Drive data rate:** DLT 8000: 172.8 GB/hr (8 drives, UNC) - 345.6 GB/hr (8 drives, COM) ULTRIUM LTO: 432 GB/hr (8 drives, UNC) - 864 GB/hr (8 drives, COM) SDLT: 316.8 GB/hr (8 drives, UNC) - 633.6 GB/hr (8 drives, COM)
L180	**Number of cartridge slots:** 84, 140, or 174 **Number of drives:** 1 to 10 **Supported drives:** DLT 8000 (native mode), DLT 8000 (7000 emulation), ULTRIUM LTO, and SDLT *or* **Number of drives:** 1 to 6 **Supported drives:** 9840 and 9840B **Cartridge capacity:** DLT 8000 (native): 6.96 TB (174 slots, UNC) - 13.92 TB (174 slots, COM) DLT 8000 (7000 em): 6.09 TB (174 slots, UNC) - 12.18 TB (174 slots, COM) ULTRIUM LTO: 17.4 TB (174 slots, UNC) - 34.8 TB (174 slots, COM) SDLT:- 19.14 TB (174 slots, UNC) - 38.28 TB (174 slots, COM) 9840: 3.48 TB (174 slots, UNC) - 6.96 TB (174 slots, COM) **Drive data rate:** DLT 8000 (native): 216 GB/hr (10 drives, UNC) - 432 GB/hr (10 drives, COM) DLT 8000 (7000 em): 180 GB/hr (10 drives, UNC) - 360 GB/hr (10 drives, COM) ULTRIUM LTO: 540 GB/hr (10 drives, UNC) - 1.08 TB/hr (10 drives, COM) SDLT: 396 GB/hr (10 drives, UNC) - 792 GB/hr (10 drives, COM) 9840: 216 GB/hr (6 drives, UNC) - 432 GB/hr (6 drives, COM) 9840b: 432 GB/hr (6 drives, UNC) - 864 GB/hr (6 drives, COM)

Table 1-2 Tape Drive Libraries **(continued)**

Library	Specifications
L700	**Number of cartridge slots:** 216, 384, or 678 **Number of drives:** 1 to 20 **Supported drives:** DLT 8000 (native mode), DLT 8000 (7000 emulation), ULTRIUM LTO, and SDLT *or* **Number of drives:** 1 to 12 **Supported drives:** 9840, 9840B, and 9940 **Cartridge capacity:** DLT 8000: 27.1 TB (678 slots, UNC) - 54.2 TB (678 slots, COM) DLT 8000 (7000 em): 23.7 TB (678 slots, UNC) - 47.4 TB (678 slots, COM) ULTRIUM LTO: 67.8 TB (678 slots, UNC) - 135.6 TB (678 slots, COM) SDLT: 74.5 TB (678 slots, UNC) - 149 TB (678 slots, COM) 9840: 13.6 TB (678 slots, UNC) - 40.8 TB (678 slots, COM) 9940: 40.68 TB (678 slots, UNC) - 89.5 TB (678 slots, COM) **Drive data rate:** DLT 8000:- 432 GB/hr (20 drives, UNC) - 864 GB/hr (20 drives, COM) DLT 8000 (7000 em): 360 GB/hr (20 drives, UNC) - 720 GB/hr (20 drives, COM) ULTRIUM LTO: 1.08 TB/hr (20 drives, UNC) - 2.16 TB/hr (20 drives, COM) SDLT: 792 GB/hr (20 drives, UNC) - 1.58 TB/hr (20 drives, COM) 9840: 432 GB/hr (12 drives, UNC) - 864 GB/hr (12 drives, COM) 9840b: 864 GB/hr (12 drives, UNC) - 1.73 TB/hr (12 drives, COM) 9940: 432 GB/hr (12 drives, UNC) - 864 GB/hr (12 drives, COM) **Key:** UNC = uncompressed, COM = compressed, em = emulation

Figure 1-18 Tape Drive Libraries

Table 1-3 lists the supported tape options and their specifications.

Table 1-3 Tape Drive Comparison Chart

Tape Device	Interface	Media Capacity	Transfer Rate	Mount Location
4mm DAT	SCSI	20 GB	2.36 MB/s	Origin 300 rack or table
9840	SCSI and Fibre Channel	20 GB	10 MB/s	L180 or L700
9840B	SCSI and Fibre Channel	20 GB	20 MB/s	L180 or L700
DLT 8000 (7000 emulation)	SCSI	35 GB	5 MB/s	L180 or L700
DLT 8000 (native mode)	SCSI	40 GB	6 MB/s	All libraries
9940	SCSI and Fibre Channel	60 GB	10 MB/s	L700
ULTRIUM LTO	SCSI	100 GB	15 MB/s	All libraries
SDLT	SCSI	110 GB	11 MB/s	All libraries

CD-ROM Drive

The 40X CD-ROM drive is a half-height, high capacity (approximately 600 MB, formatted), high-performance device that is packaged in a custom external enclosure designed to match other SGI external peripherals. It is capable of transferring data at up to 6.0 MB/s. It can connect to the Origin 300 base module via the SCSI port connector or a SCSI PCI card.

Myrinet-2000 Switch

The Myrinet-2000 switch is a 16-port switch that provides the network fabric necessary to cluster up to four 32-processor Origin 300 with NUMAlink module systems. It is a high-performance packet communication and switching technology that interconnects the clusters of base modules via full-duplex 2+2 Gb/s links.

The Origin 300 base modules connect to the switch via a fiber cable and a Myrinet PCI card.

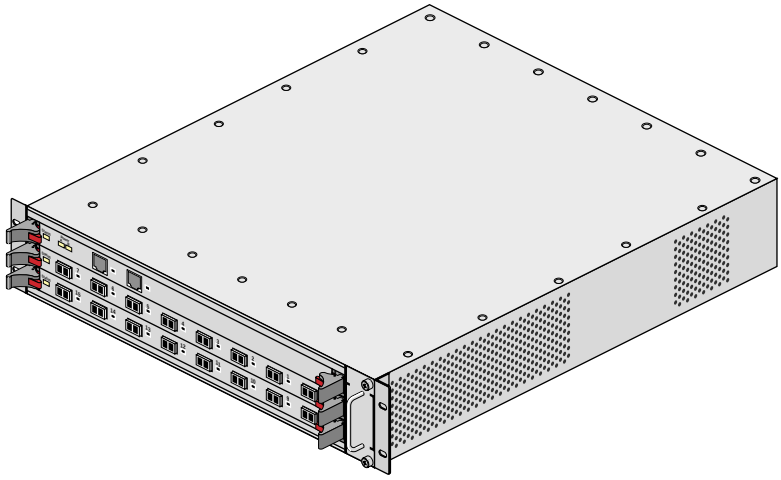


Figure 1-19 Myrinet-2000 Switch

Installation Procedures

This chapter describes the steps you must perform to unload and move the equipment, and to install your tall-rack or short-rack system. Specifically, it describes the following:

Note: Read this entire chapter before you install your system.

Safety Considerations

Before you install an SGI Origin 300 system with NUMAlink module, you should familiarize yourself with the following items, which are discussed in the subsections that follow.

- Hazard statements
- ESD precautions
- Safety precautions
- Preinstallation activities

Hazard Statements

During the installation of the computer system, be alert for hazard advisory statements. The following list describes the hazard statement signal words:

- **Danger** indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.
- **Warning** indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.
- **Caution** indicates a potentially hazardous situation that, if not avoided, can result in minor or moderate injury. This signal word is also used to alert personnel against unsafe practices that can result in equipment damage and/or data corruption.

ESD Precautions

Observe electrostatic discharge (ESD) precautions during the entire installation process to eliminate possible ESD damage to the equipment. Wear an SGI-approved wrist strap when you handle an ESD-sensitive device. Connect the wrist strap cord directly to earth ground.

Caution: Observe all ESD precautions. Failure to do so can result in damage to the equipment.

Safety Precautions

Observe the following safety measures when you install the system.

- Use caution when you remove the system from the shipping crate. Failure to handle the system carefully can result in personal injury or property damage.
- Ensure that the shipping crate is positioned close to its destination before you unpack the crate.
- Do not move the system while it is connected to power.

Danger: Keep fingers and conductive tools away from high-voltage areas. Failure to follow these precautions will result in serious injury or death. The high-voltage areas of the system are indicated with high-voltage warning labels.

- Ensure that a qualified electrician has properly installed the power receptacles.
- Set all circuit breakers to the OFF (0) position before you plug in the system power cord.

Preinstallation Activities

Perform all of the preinstallation activities before you receive your system. You can complete the following preinstallation activities days or weeks before the installation:

- Verify the site plans.
- Ensure that you have the appropriate tools necessary to complete the installation process.
- Ensure that the correct power receptacle is installed and properly wired.

These activities are explained in the subsections that follow.

Site Plan Verification

Ensure that all site requirements are met before your system arrives. If you have questions about the site requirements or would like to order full-size floor templates for your site, send an e-mail message to site@sgi.com. You can also contact a site planning representative by telephone at +1 715 726 2820.

Tools Required

Table 2-1 lists the tools that you need to complete the installation:

Table 2-1 Installation Tools

Tool	Part Number	Purpose
13-mm wrench	7260744	Adjust the leveling pads.
13-mm socket (3/8-in. drive)	7260726	Remove bracket bolts from tall-rack shipping crate.
19-mm socket (3/8-in. drive)	9470618	Remove bolts from short-rack shipping crate.
Extension, 6-in. (3/8-in. drive)	7260655	Used with ratchet and sockets.
Ratchet, reversible. (3/8-in. drive)	7260755	Used with extension and sockets.
Level, 9-in.	9470556	Level the rack.

Power Receptacle Verification

Ensure that a qualified technician installs the correct power receptacles. The SGI Origin 300 system with NUMAlink module uses one or two single-phase power receptacles. For North American sites, the single-phase receptacle is a 30-amp, 200- to 240-volt receptacle that has two phase sockets and one ground socket. For international sites, the single-phase receptacle is a 32-amp, 200-volt receptacle that has one phase socket, one neutral socket, and one ground socket.

For North American sites, use the following procedure to ensure that a single-phase power receptacle is properly wired:

1. Set the voltmeter to a high AC voltage range.
2. Check the voltage between socket X and socket Y (refer to Figure 2-1). The meter should read between 200 and 240 Vac.
3. Check the voltage between socket X and the ground socket. The meter should read approximately 120 Vac.
4. Check the voltage between socket Y and the ground socket. The meter should read approximately 120 Vac.
5. Check the voltage between the ground socket and an earth-ground location. The meter should read 0 Vac.
6. Change the voltmeter to a low-resistance setting.
7. Measure between the ground socket and an appropriate earth-ground location and ensure that resistance is less than 1 ohm.
8. Repeat Steps 1 through 7 for any additional single-phase power receptacles.

Caution: If a voltage reading is incorrect or if the resistance that is measured in Step 7 is more than 1 ohm, contact a site-approved electrician. Do not proceed with the installation procedure.

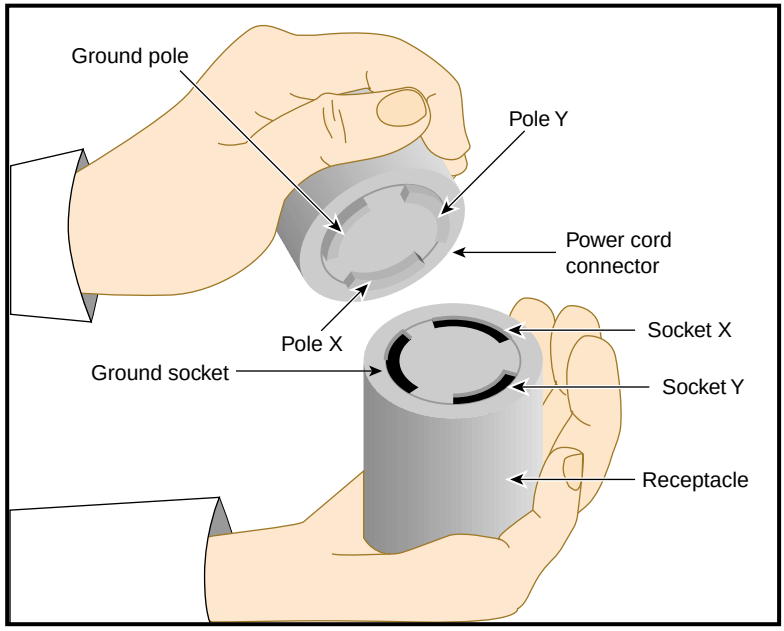


Figure 2-1 30-amp Single-phase Power Receptacle for North American Sites

For international sites, use the following procedure to ensure that a single-phase power receptacle is properly wired:

1. Set the voltmeter to a high AC voltage range.
2. Check the voltage between socket 1 and socket 2 (refer to Figure 2-2). The meter should read between 200 and 240 Vac.
3. Check the voltage between socket 1 (line) and the ground socket. The meter should read between 200 and 240 Vac.
4. Check the voltage between socket 2 (neutral) and the ground socket. The meter should read approximately 0 Vac.
5. Check the voltage between the ground socket and an earth-ground location. The meter should read 0 Vac.
6. Change the voltmeter to a low-resistance setting.
7. Measure between the ground socket and an appropriate earth-ground location and ensure that resistance is less than 1 ohm.
8. Repeat Steps 1 through 7 for any additional single-phase power receptacles.

Caution: If a voltage reading is incorrect or if the resistance that is measured in Step 7 is more than 1 ohm, contact a site-approved electrician. Do not proceed with the installation procedure.

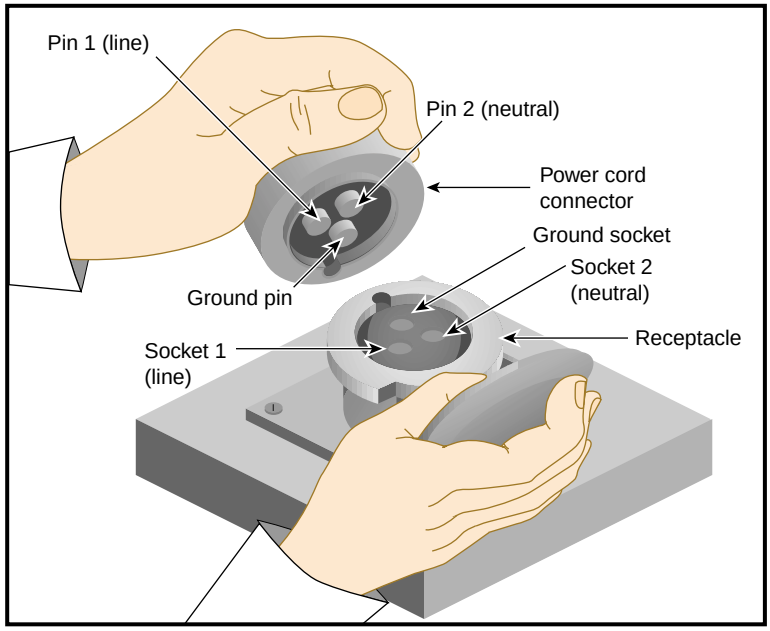


Figure 2-2 32-amp Single-phase Power Plug for International Sites

Unloading and Moving System Equipment

SGI Origin 300 systems arrive at the site in cardboard shipping crates. For a short-rack system, the documentation carton and the accessories carton are packed with the system. The documentation carton contains the system manuals as well as warranty and licensing information. The accessories carton contains the I/O, peripheral, and system cables and any additional connectors or tools that are required for a specific configuration. The PC, workstation, or terminal is shipped in a separate carton.

For a tall-rack system, the system documentation; accessories; and PC, workstation, or terminal arrive in separate cartons.

This section describes how to unload and transport the Origin 300 system with NUMAlink module to its designated location, as follows:

- Unloading the equipment from the truck
- Inspecting the shipping crate
- Transporting the shipping crate

Unloading the Equipment from the Truck

If your loading dock is the same height as the transportation vehicle, use a pallet jack to unload the system from the transportation vehicle. The pallet jack should have 48-in. tines or forks. Follow any instructions that are printed on the packing crates. If the loading dock is not the same height as the vehicle, you must provide a forklift or another approved method to unload the system. A platform or ramp may be used to obtain the desired level as long as the ramp incline does not exceed a ratio of one unit vertical to six units horizontal. For more information on site requirements, contact site planning by e-mail (site@sgi.com) or by telephone (1 715 726 2820).

Warning: Use two or more people to prevent computer equipment from rolling off the transportation vehicle. Failure to do so could result in serious damage to the computer equipment.

If your site does not have a loading dock, arrange for a forklift to unload the system from the transportation vehicle. Ensure that two or three people are available to help unload the equipment. Move all crates slowly and carefully.

Figure 2-3 shows the lift openings and dimensions of a tall-rack shipping crate. This figure also shows where to position the pallet jack.

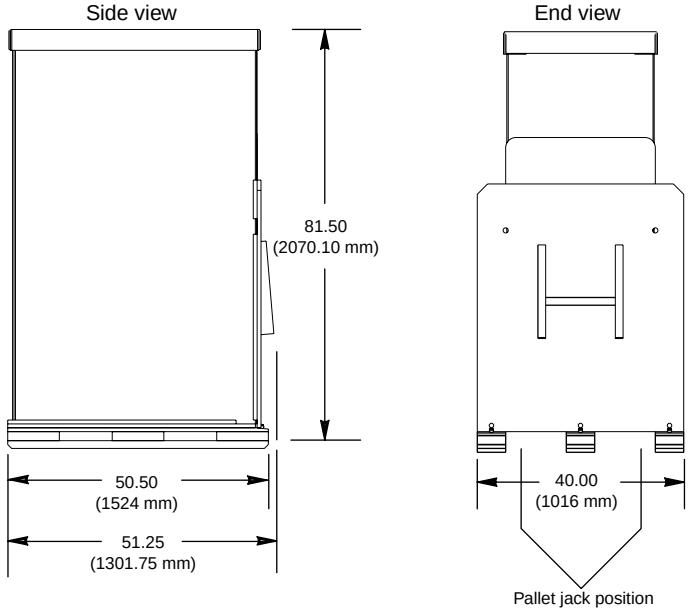


Figure 2-3 Tall-rack Shipping Crate Dimensions

Figure 2-4 shows the lift openings and dimensions of a short-rack shipping crate. This figure also shows where to position the pallet jack.

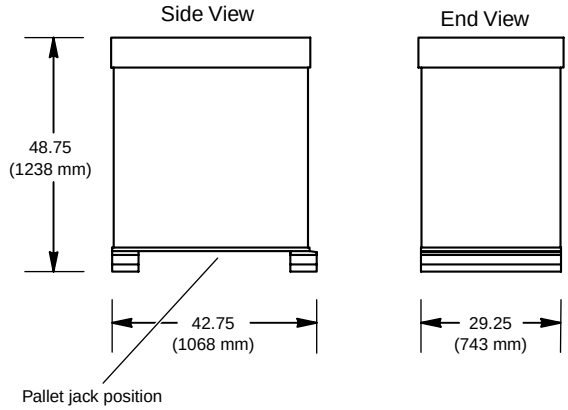


Figure 2-4 Short-rack Shipping Crate Dimensions

Inspecting the Shipping Crate

After the system is unloaded from the truck, follow these steps before you unpack it:

1. Ensure that the crates and cartons arrive unopened.
2. Inspect the shipping crate for signs of external damage such as dents, holes, crushed corners, and water marks.
3. Ensure that the tilt watch has not been tripped.
4. If the crate is damaged, file a damage claim with the carrier immediately. In addition, notify your local Customer Support Center (CSC) for any missing, incorrect, or damaged items.

   CSC contact information is provided at the following URL:
   http://www.sgi.com/support/supportcenters.html

Transporting the Shipping Crate

Use a pallet jack with forks that are 48 in. (122 cm) long or longer to transport the shipping crate to the designated location. Refer to Figure 2-3 and Figure 2-4 for the crate dimensions and location to position the pallet jack. For system weight and dimensions, contact site planning by e-mail (site@sgi.com) or by telephone (1 715 726 2820).

If the crate does not fit through all access doors, you may need to partially disassemble the crate.

Caution: If the system shipping or storage environment is significantly colder than the environment in which it will be installed [40 degrees F (22 degrees C) or greater disparity], leave the rack in its shipping crate for at least 24 hours at room temperature before you start the installation. This acclimation prevents damage to the equipment that could result from thermal shock and condensation.

Installing Your System

Now that you have unloaded the system from the truck and have transported it to its designated location, you are ready to remove the system from the shipping crate. This section provides installation instructions for short-rack and tall-rack systems.

Removing a Short Rack from the Shipping Crate

Warning: Be careful when you unpack and move the short-rack system. Ensure that the rack remains on a level surface and that the rack weight remains evenly distributed across the four casters. If you must lift the casters over an obstacle, such as a door threshold, use proper lifting techniques and employ a minimum of two people.

Caution: Do not subject the rack to any unnecessary shocks or vibration while you unpack and install the system.

Refer to Figure 2-5 as you follow these steps; the numbered illustrations correspond to the numbered steps.

1. Ensure that the temperature of the rack is acclimated to the environment in which you are installing it.
2. Remove the crate cover.
3. Lift the ramp out of the crate and set it aside.
4. Remove the documentation carton, accessories carton, and cardboard packing material.
5. Lift the sidewalls of the crate up and over the system.
6. Remove the four bolts that secure the rack to the crate. You must reach underneath the crate and feel for the bolts.
7. Align the holes in the edge of the ramp with the pegs in the base of the crate. Ensure that the ramp is secure.
8. Remove the gate pins from the left and right ends of the gate. Then remove the gate.
9. Pull the rack down the ramp.

Warning: The maximum weight of the short rack is 488 lbs (221 kg). Use caution when you roll the rack down the ramp.

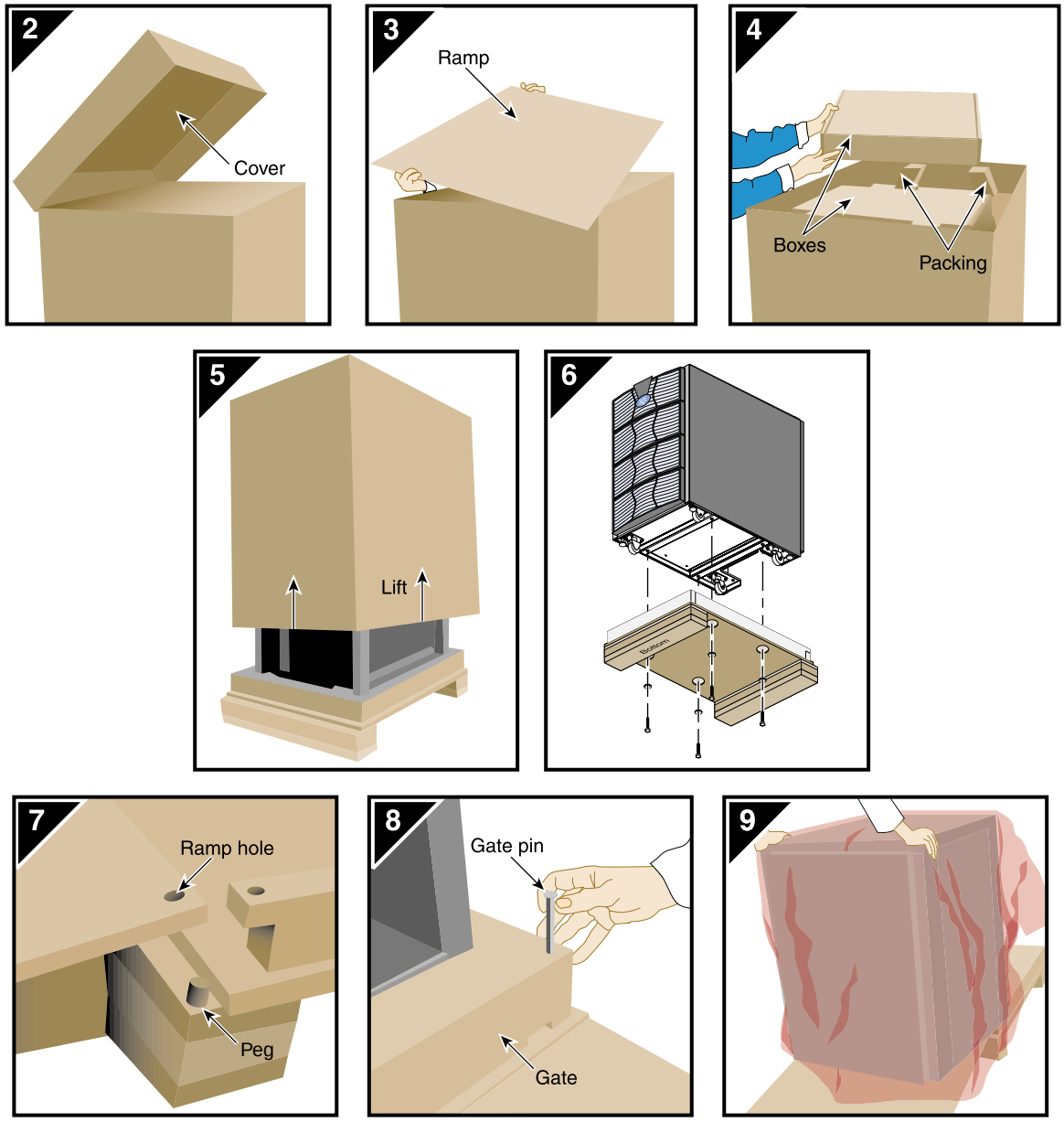


Figure 2-5 Removing a Short Rack from the Shipping Crate

Removing a Tall Rack from the Shipping Crate

Warning: In its maximum configuration, a tall-rack system weighs approximately 1,130 lb (512.56 kg). Use caution when you unpack and move this rack. Ensure that the rack remains on a level surface and that the rack weight remains evenly distributed across the four casters.

To unpack a tall rack, you will need the following tools: extension, 6-inch, 3/8-in. drive; 13-mm standard 3/8-in. drive socket; and ratchet, reversible, 3/8-in. drive.

Refer to Figure 2-6 as you follow these steps; the numbered illustrations correspond to the numbered steps.

1. Ensure that the temperature of the rack is acclimated to the environment in which you are installing it and that the system crate is in a stable, upright position.
2. Remove the bands that secure the crate.

   Note: Brace the wooden ramp as you remove the horizontal band that surrounds the crate and the wooden ramp. The ramp moves freely after you remove this band.

3. Place the ramp so that the three holes in the edge of the ramp align with the pegs in the base of the pallet deck.
4. Remove the cardboard cover, the two cardboard sidewalls, and the foam cushion.
5. Remove the bolts that secure the rack to the pallet deck.
   a. Remove the top four bolts from the rear mounting bracket; do not remove the bottom bolts.
   b. Remove the four bolts that secure the front mounting bracket and tip tray to the bottom of the pallet deck. Set the tip tray aside.
   c. Remove the top four bolts from the front mounting bracket. Set the mounting bracket aside.
6. Use two people to roll the rack out of the crate and down the ramp.

Warning: Use extreme caution when you roll the tall rack down the ramp. Personal injury and system damage could result if the rack becomes unbalanced or gains too much momentum when it rolls down the ramp.

7. Bolt the tip tray to the front of the rack before you move the rack to its designated location. This tray prevents the rack from tipping while you move that rack.

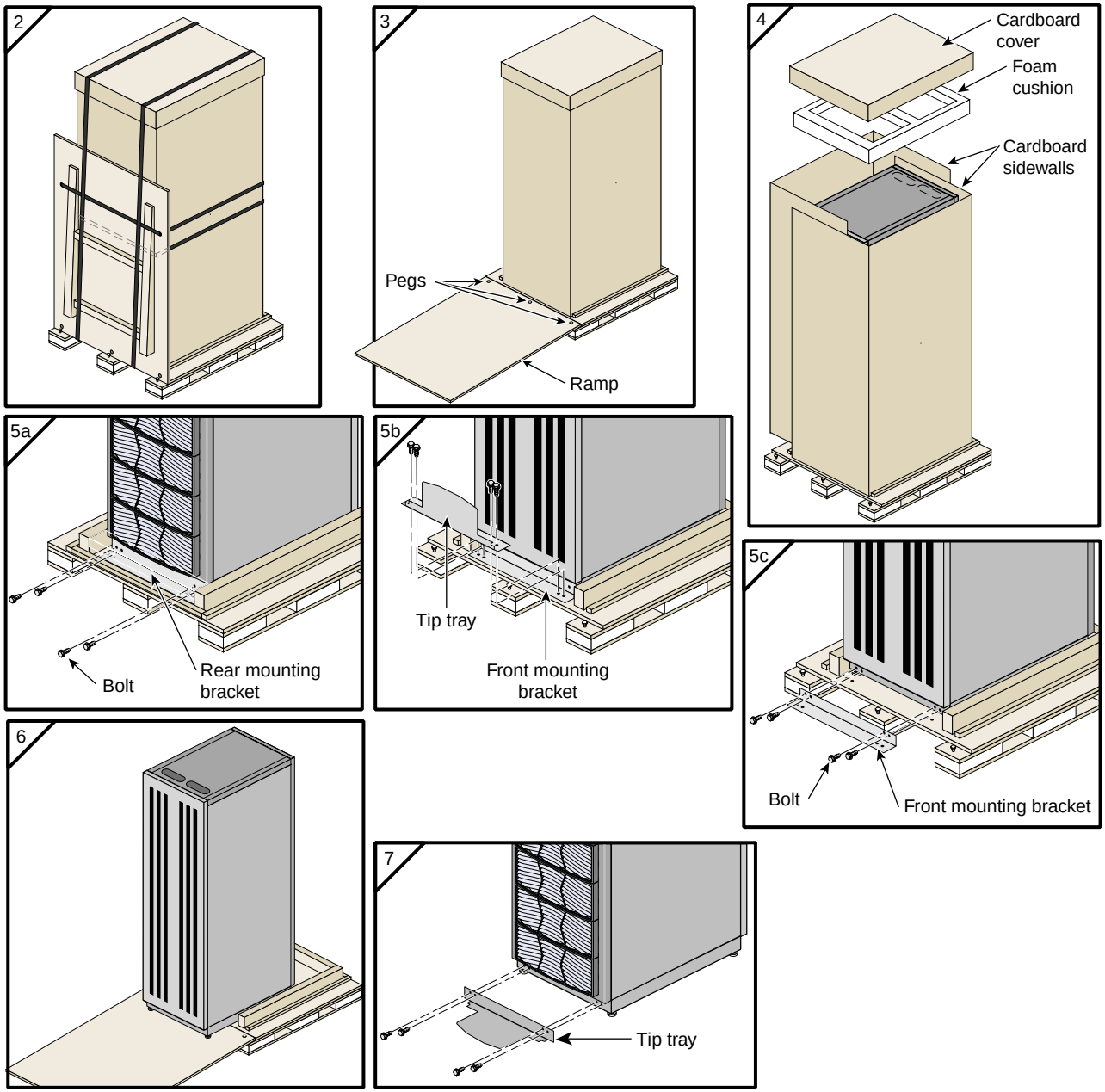


Figure 2-6 Removing a Tall Rack from the Shipping Crate

Positioning and Leveling Single-rack System

Caution: To avoid ESD damage to the electronic components, be sure to position the rack before you remove the ESD bag that covers the rack assembly.

1. Grasp the rear of the rack and roll the rack to its designated location.
2. Remove the ESD bag.
3. If you are installing a tall rack, adjust the leveling bolts, as shown in Figure 2-7, until the rack is level.

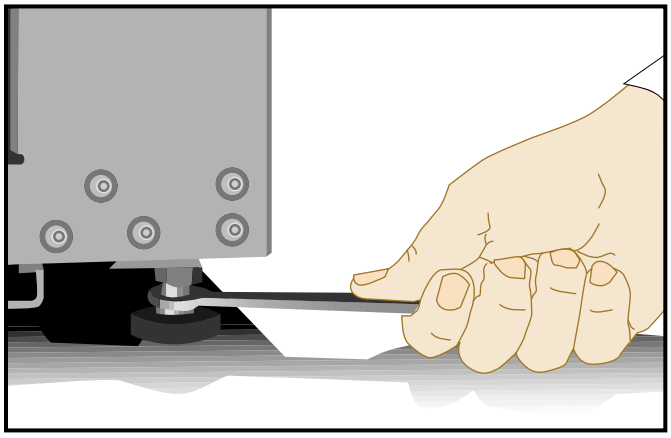


Figure 2-7 Leveling Bolts

4. Ensure that the circuit breaker on the power distribution unit is in the OFF (0) position. Then connect the power cord to a grounded power outlet. Plugging in the power cord grounds the rack.
5. Secure the rack with seismic tie-downs if you are installing the system in an earthquake zone.

Note: Tall and short racks have four threaded holes that are located at the bottom of the rack (refer to Figure 2-8). Use these holes to secure the seismic tie-downs. SGI does not supply the seismic tie-downs.

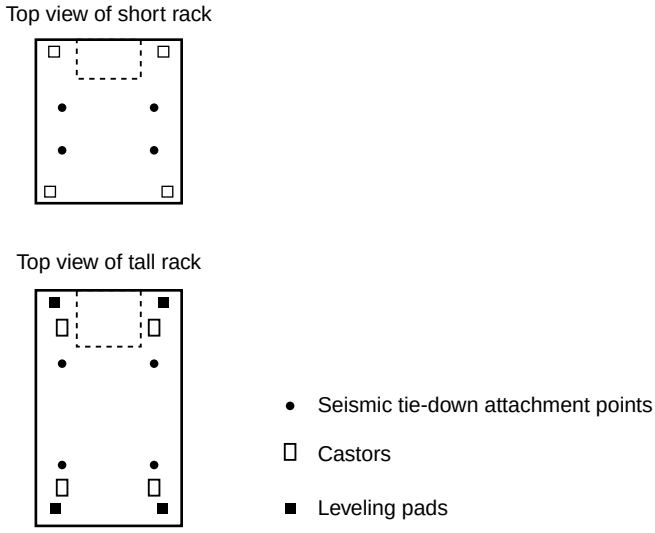


Figure 2-8 Seismic Tie-down Attachment Points

Positioning and Leveling Multiple-rack (Clustered) System

Caution: To avoid ESD damage to the electronic components, be sure to position the racks before you remove the ESD bags that cover the rack assemblies.

1. Grasp the rear of each rack and roll the rack to its designated location. Rack 002 contains the Myrinet-2000 switch.
2. Remove the ESD bags.
3. Adjust the leveling bolts of rack 001, as shown in Figure 2-7, until the rack is level.

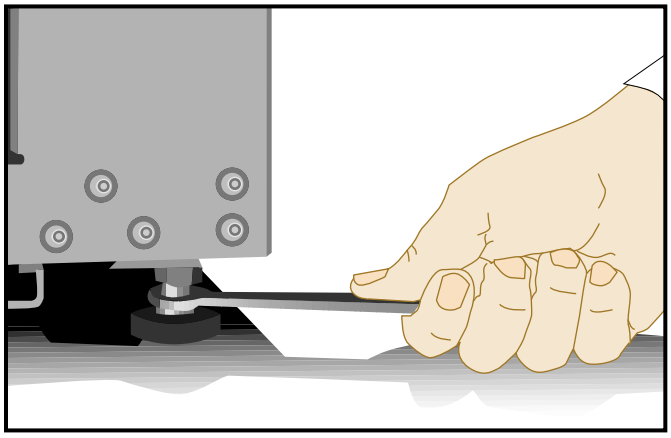


Figure 2-9 Leveling Bolts

4. Using the leveling bolts of rack 002, adjust rack 002 so that the joining holes of rack 002 align with the joining holes of rack 001. Refer to Figure 2-10.
5. Using the provided straps, screws, and washers; bolt the racks together in the four designated locations shown in Figure 2-10.
6. If your system has additional racks, repeat Steps 4 and 5 until all of the racks are bolted together.
7. Ensure that the circuit breakers on the power distribution units are in the OFF (0) position. Then connect the power cords to grounded power outlets. Plugging in the power cords ground the racks.
8. Secure the racks with seismic tie-downs if you are installing the system in an earthquake zone.

Note: Tall racks have four threaded holes that are located at the bottom of the rack (refer to Figure 2-8 on page 49). Use these holes to secure the seismic tie-downs. SGI does not supply the seismic tie-downs.

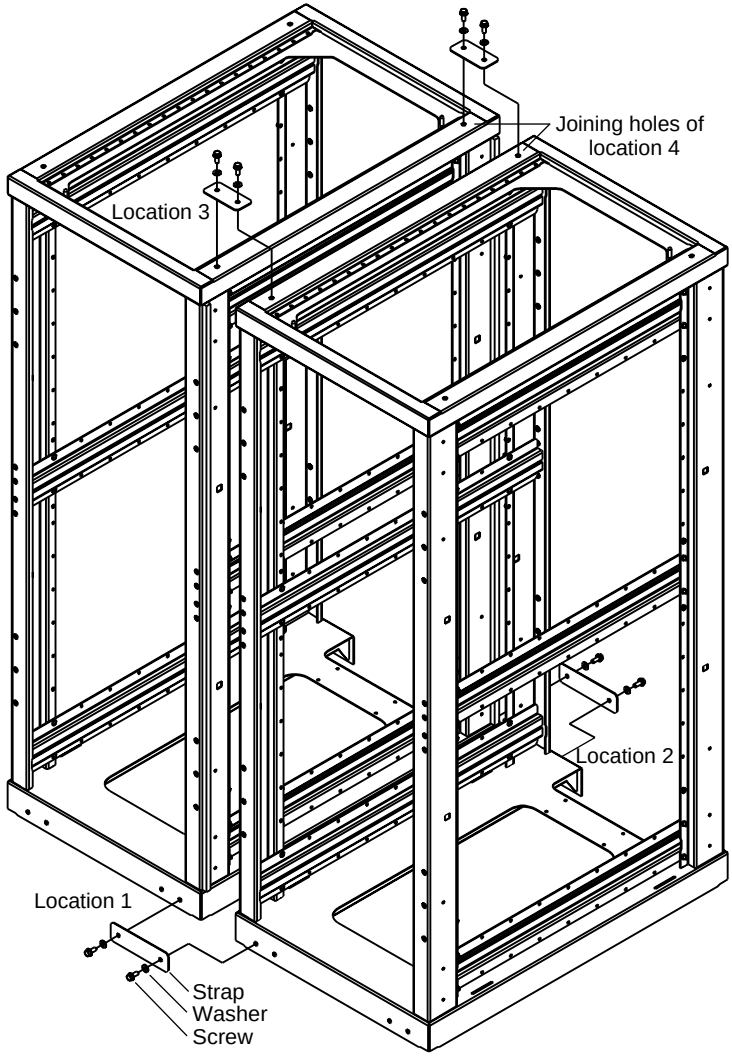


Figure 2-10 Joining Locations

System Operation

This chapter describes how to operate your SGI Origin 300 system with NUMAlink module. Specifically, it explains how to perform the following procedures:

Connecting a System Console to Your System

The system console enables you to perform the following activities:

- Monitor your system by reading the status and error message information that the L1 and L2 controllers generate.
- Enter L1 and L2 controller commands to monitor or change particular system functions. You can, for example, monitor the speed of fans for a particular module.
- Power on or power off individual modules or all modules (except for the storage modules) in your system.
- If you connect a console that contains SGIconsole software, you can perform the functions listed above and have boundary scan capabilities. Boundary scan capabilities enable an SGI system support engineer (SSE) to test the functionality of your system.

To attach a system console that runs the SGIconsole software to your system, connect the system console to the L2 controller Ethernet port connector as shown in Figure 3-1.

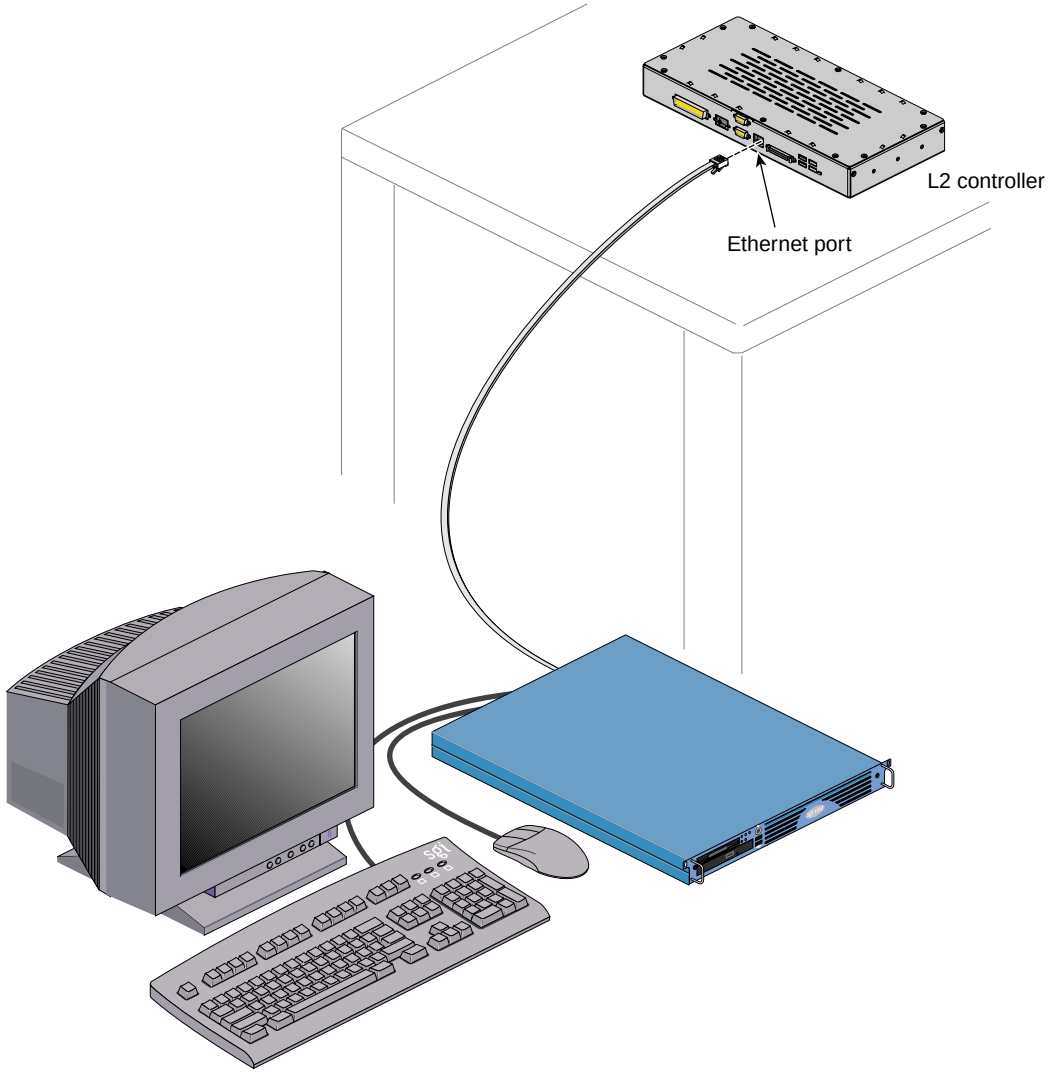


Figure 3-1 Connecting the System Console to the L2 Controller Ethernet Port

Connecting a Myrinet-2000 Switch to Your System (Clustered Systems Only)

SGI ships your system with all Myrinet hardware installed in the rack: the Myrinet PCI cards are installed in the Origin 300 base modules (refer to Figure 3-2), and the Myrinet-2000 switch is installed in rack 001 or 002, depending on your configuration. The system does not ship with the fiber cables attached to the hardware.

To attach the fiber cables, connect one end of a fiber cable to a Myrinet PCI card in an Origin 300 base module. Connect the other end of the fiber cable to a fiber port of one of the port line cards in the Myrinet-2000 switch. It does not matter which fiber port you use.

In addition to attaching the fiber cables, ensure that the Myrinet-2000 switch is connected to a power distribution unit (PDU) or power strip.

For software setup, refer to the release notes (relnotes) that are provided with the Myrinet software. After you install the software, use the relnotes and grelnotes (graphics viewer for online release notes) to configure and validate the Myrinet-2000 switch.

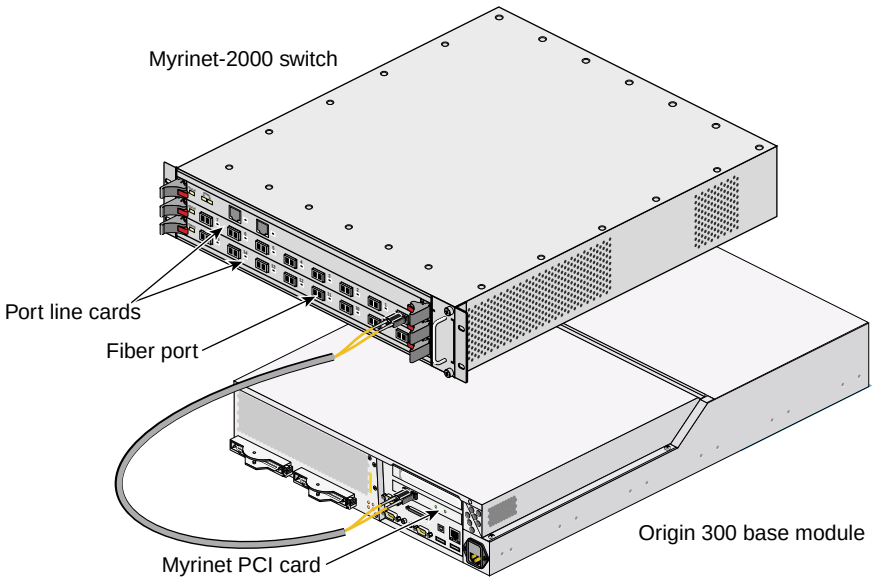


Figure 3-2 Fiber Connection between Origin 300 Base Module and Myrinet-2000 Switch

Figure 3-3 illustrates a 128-processor clustered system.

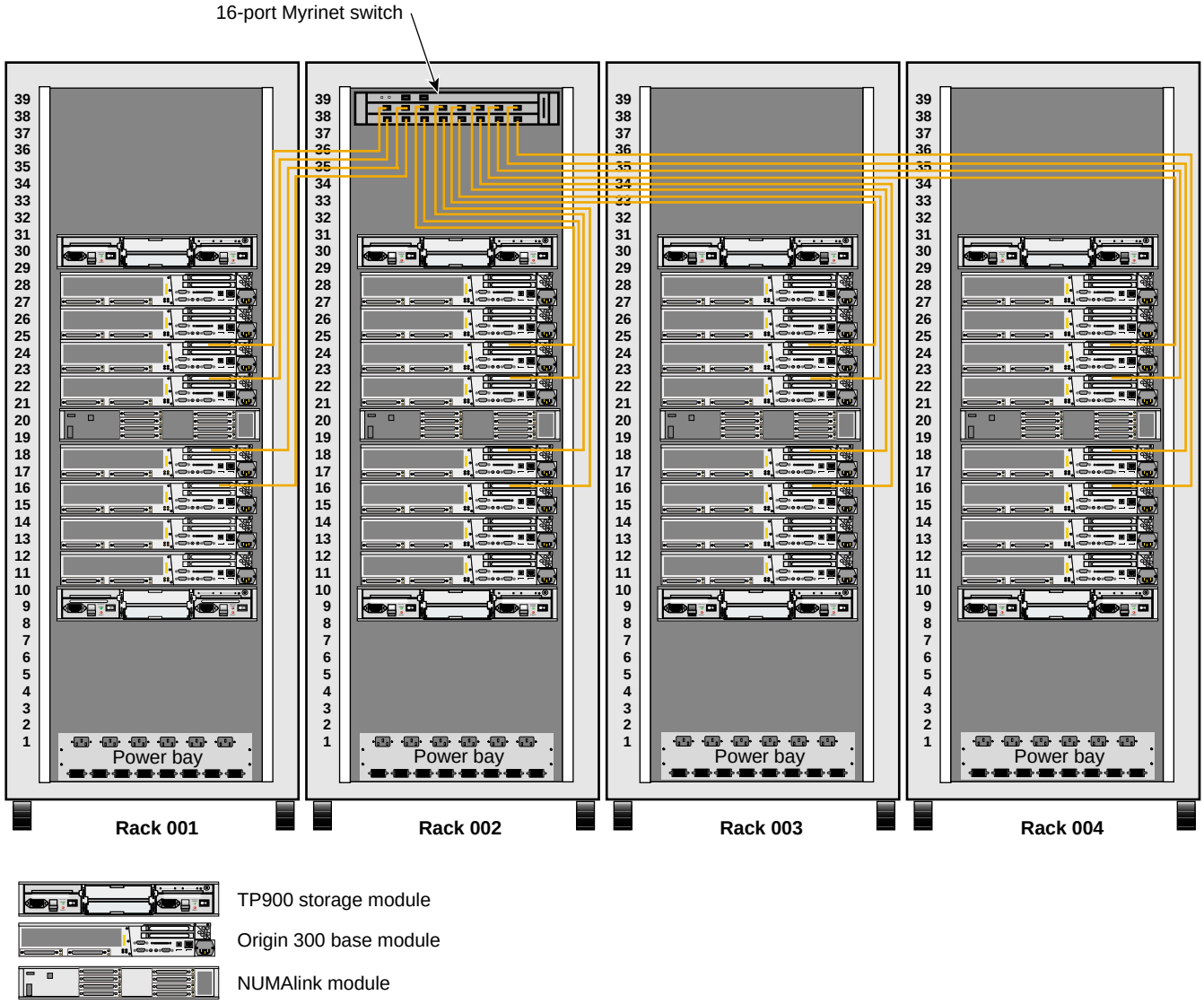


Figure 3-3 Rear View of a 128-processor Clustered Configuration

Installing or Removing PCI Cards, Disk Drives, and Memory

You can install or remove peripheral component interface (PCI) cards, disk drives, and memory that reside in the base modules in your system. This section explains how to perform the following procedures:

- Installing or removing a PCI card
- Installing or removing a disk drive
- Installing or removing memory

Warning: For your safety and the protection of your system, contact your SGI system support engineer (SSE) to install or remove any other hardware components.

Installing or Removing a PCI Card

Each Origin 300 base module has two Universal PCI 2.2-compliant option card slots that are configured on one bus (refer to Figure 3-4). The PCI bus supports both 32- and 64-bit addressing modes at 33 or 66 MHz. Refer to the SGI Supportfolio Online home page for an updated list of supported PCI cards: http://support.sgi.com

Note: The PCI slots of the Origin 300 base module can seat 3.3-V or Universal PCI cards. The Origin 300 base module does not support 5-V only PCI cards.

This section explains how to perform the following procedures:

- Installing a PCI card
- Removing a PCI card

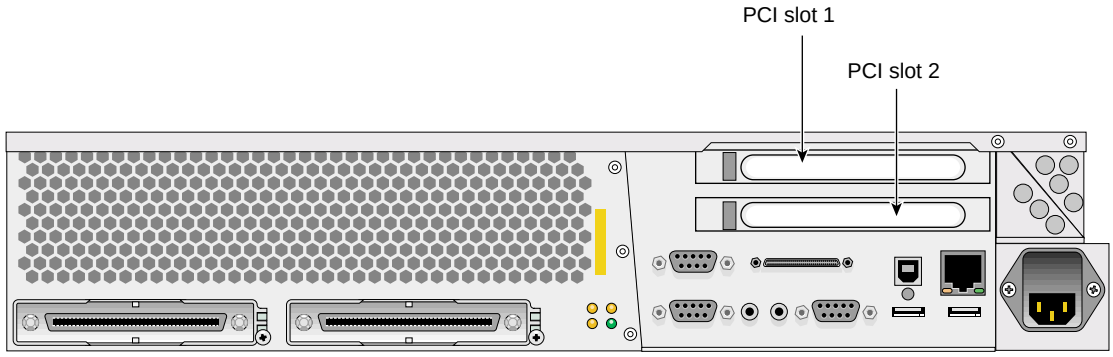


Figure 3-4 PCI Slots Located in the Rear of the Origin 300 Base Module

Tools/Parts Required:

- PCI card
- T10 ballpoint Torx driver P/N 7260650
- T20 ballpoint Torx driver P/N 7260422

Caution: Electronic equipment can be irreparably damaged by electrostatic discharge (ESD). Always follow these preventive measures when you handle a system component:

- Remove a component from its antistatic bag only when you are ready to install it.

- If you handle a component before installation, do not place it on surfaces that produce ESD (carpeting, for example) or near devices that create static electricity.

- Attach a static wrist strap to a grounded connection on your system when you install or remove a component.

Installing a PCI Card

Follow these steps to install a PCI card:

1. Power off the system. For instructions on how to power off the system, refer to "Powering Off" on page 88.
2. Disconnect all of the cables at the rear of the base module.

Warning: Components may be hot. To avoid injury, allow the components to cool for approximately 5 minutes before you proceed with these instructions.

3. Remove the two screws that secure the base module to the front rails of the rack.
4. Pull the base module from the rack until it is stopped by the safety latches.

Note: If you are installing a full-height PCI card in the lower slot (PCI slot 2), you must remove the base module from the rack. For instructions on how to remove a base module from the rack, refer to "Removing a Base Module from a Rack" on page 76.

5. To access the PCI card, remove the two screws shown in Figure 3-5 and lift and remove the hinged cover.

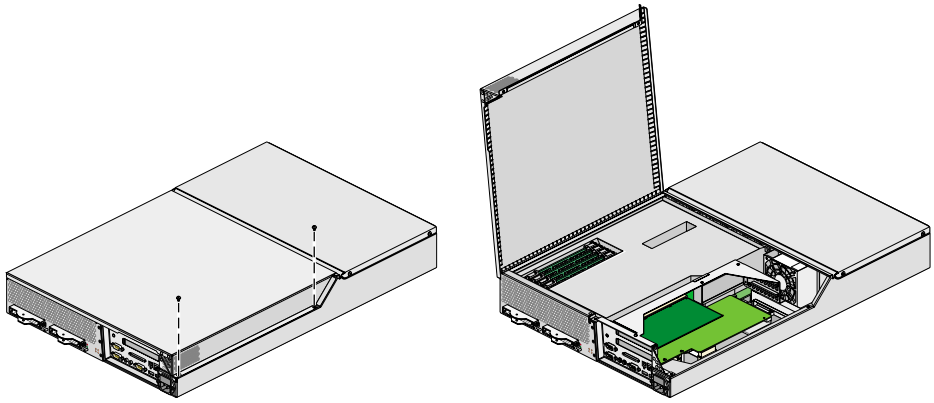


Figure 3-5 Opening Base Module to Install PCI Card

6. If a blanking plate covers the slot that is needed for the installation, remove the retaining screw as shown in Figure 3-6 and the blanking plate.

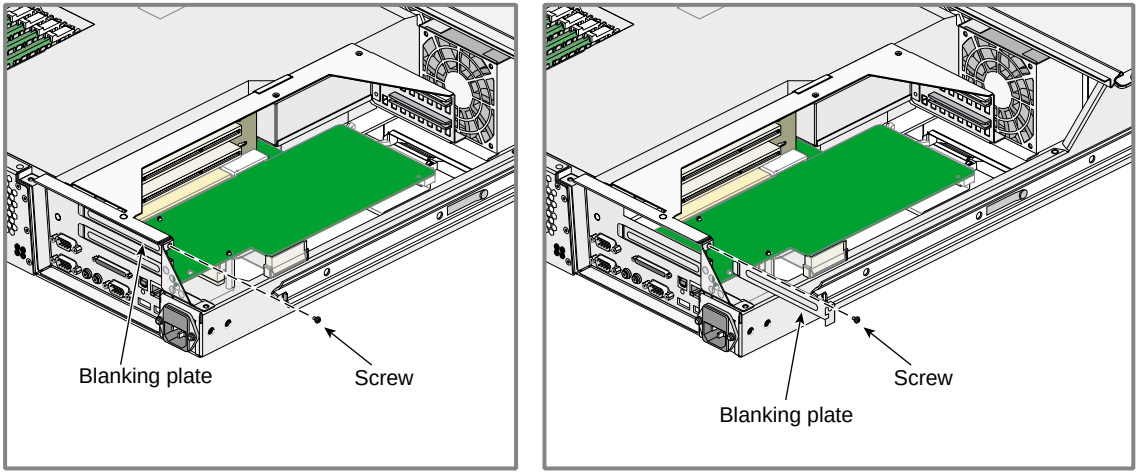


Figure 3-6 Removing Blanking Plate

7. Insert the PCI card into the slot by pushing the card into the connector until it is properly seated.
8. Install the retaining screw as shown in Figure 3-7.
9. Attach the hinged cover and secure it to the base module with two screws.

Note: If you removed the base module from the rack, refer to "Installing a Base Module in a Rack" on page 78 for instructions on how to install the base module in the rack.

---

10. Press the safety latches on both sides of the base module and slide the base module into the rack.
11. Install the two screws that secure the base module to the front rails of the rack.
12. Install all of the cables at the rear of the base module.
13. Power on the system. For instructions on how to power on the system, refer to "Powering On" on page 80.

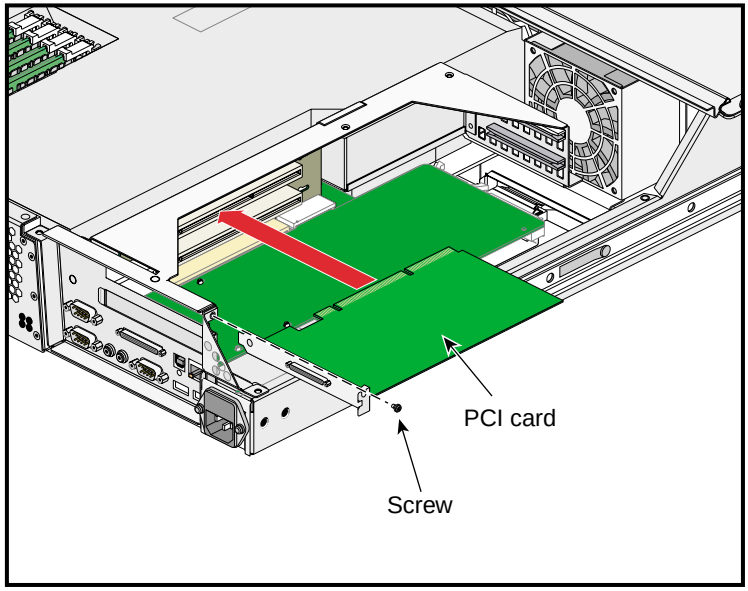


Figure 3-7 Installing a PCI Card

Removing a PCI Card

To remove a PCI card, follow these steps:

1. Power off the system. For instructions on how to power off the system, refer to "Powering Off" on page 88.
2. Disconnect all of the cables at the rear of the base module.

Warning: Components may be hot. To avoid injury, allow the components to cool for approximately 5 minutes before you proceed with these instructions.

3. Remove the two screws that secure the base module to the front rails of the rack.
4. Carefully pull the base module from the rack until it is stopped by the safety latches.

Note: If you are removing a full-height PCI card from the lower slot (PCI slot 2), you must remove the base module from the rack. For instructions on how to remove a base module from the rack, refer to "Removing a Base Module from a Rack" on page 76.

5. To access the PCI card, remove the two screws shown in Figure 3-8 and lift and remove the hinged cover.

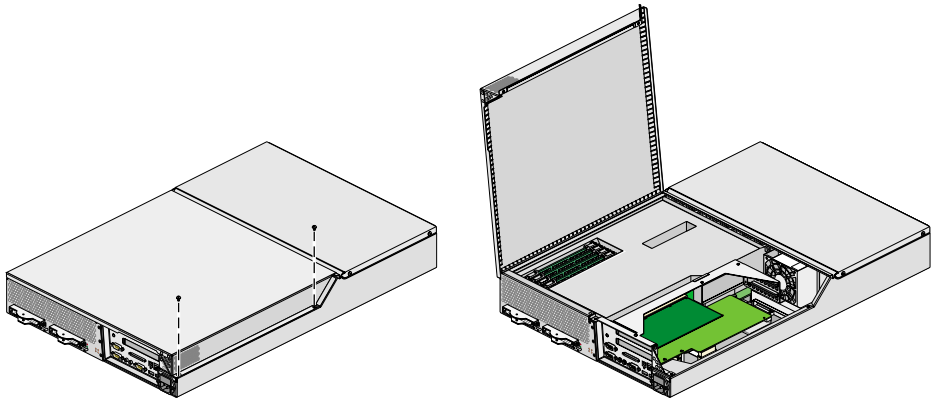


Figure 3-8 Opening Base Module to Remove PCI Card

6. Release the retaining screw of the card as shown in Figure 3-9.
7. Gently pull the card straight out of the slot.
8. Install a new PCI card or a blanking plate as described in "Installing a PCI Card" on page 60.
9. Attach the hinged cover and secure it to the base module with two screws.

Note: If you removed the base module from the rack, refer to "Installing a Base Module in a Rack" on page 78 for instructions on how to install the base module in the rack.

10. Press the safety latches on both sides of the base module and slide the base module into the rack.
11. Install the two screws that secure the base module to the front rails of the rack.
12. Install all of the cables at the rear of the base module.
13. Power on the system. For instructions on how to power on the system, refer to "Powering On" on page 80.

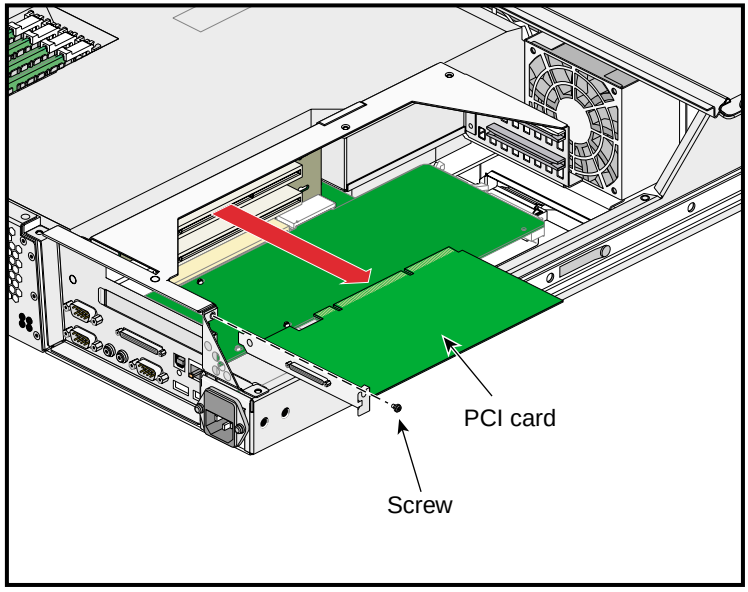


Figure 3-9 Removing a PCI Card

Disk Drives

Each Origin 300 base module can contain one or two sled-mounted Ultra3 SCSI disk drives (refer to Figure 3-10).

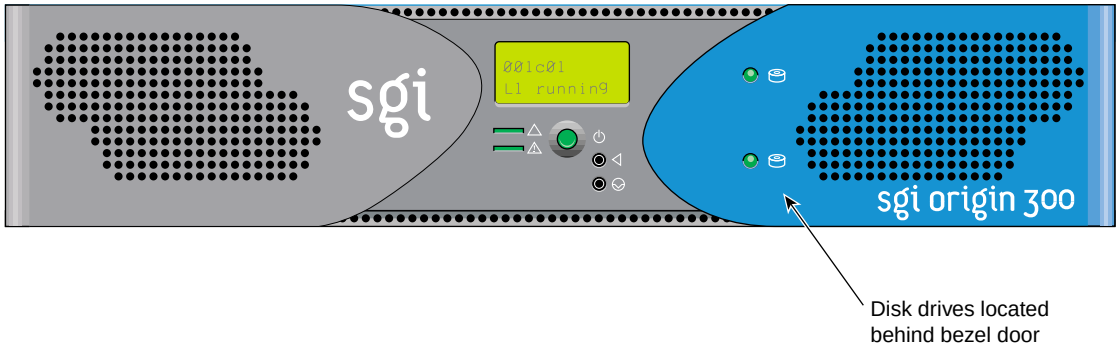


Figure 3-10 Disk Drive Location

Tools/Parts Required:

One or more of the following disk drives/blanks:

- 18-GB disk drive P/N 013-3485-00x
- 73-GB disk drive P/N 013-3486-00x
- Disk drive blank P/N 9470464

Installing a Disk Drive

To install a disk drive, follow these steps:

1. Open the bezel door as shown in Figure 3-11a.
2. Position the drive assembly so that it engages the bay guide rails and gently push the drive into the bay (refer to Figure 3-11b).
3. Swing the locking handle towards the chassis until the locking handle engages the latch (refer to Figure 3-11c).
4. Close the bezel door as shown in Figure 3-11d.

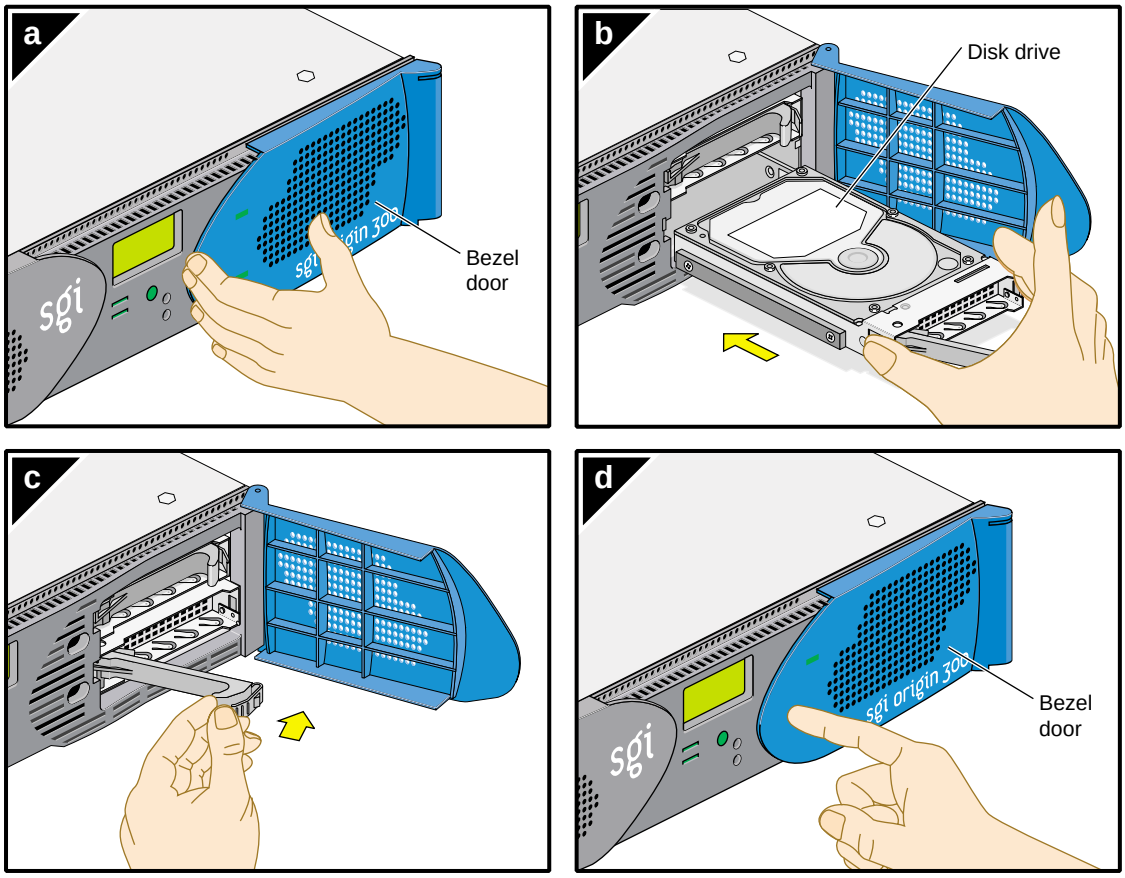


Figure 3-11 Installing a Disk Drive

Removing a Disk Drive

To remove a disk drive, follow these steps:

1. If you are replacing a data drive, ensure that the drive has spun down before removing it.
2. Open the bezel door as shown in Figure 3-12a.
3. Remove the drive by depressing its handle lock with your thumb and pulling the handle away from the chassis until the handle disengages the drive connector from the backplane connector (refer to Figure 3-12b).
4. Carefully slide the drive out of the bay (refer to Figure 3-12c) and place it on an ESD-safe surface. Do not use the handle to pull the drive out of the bay.
5. Close the bezel door as shown in Figure 3-12d.

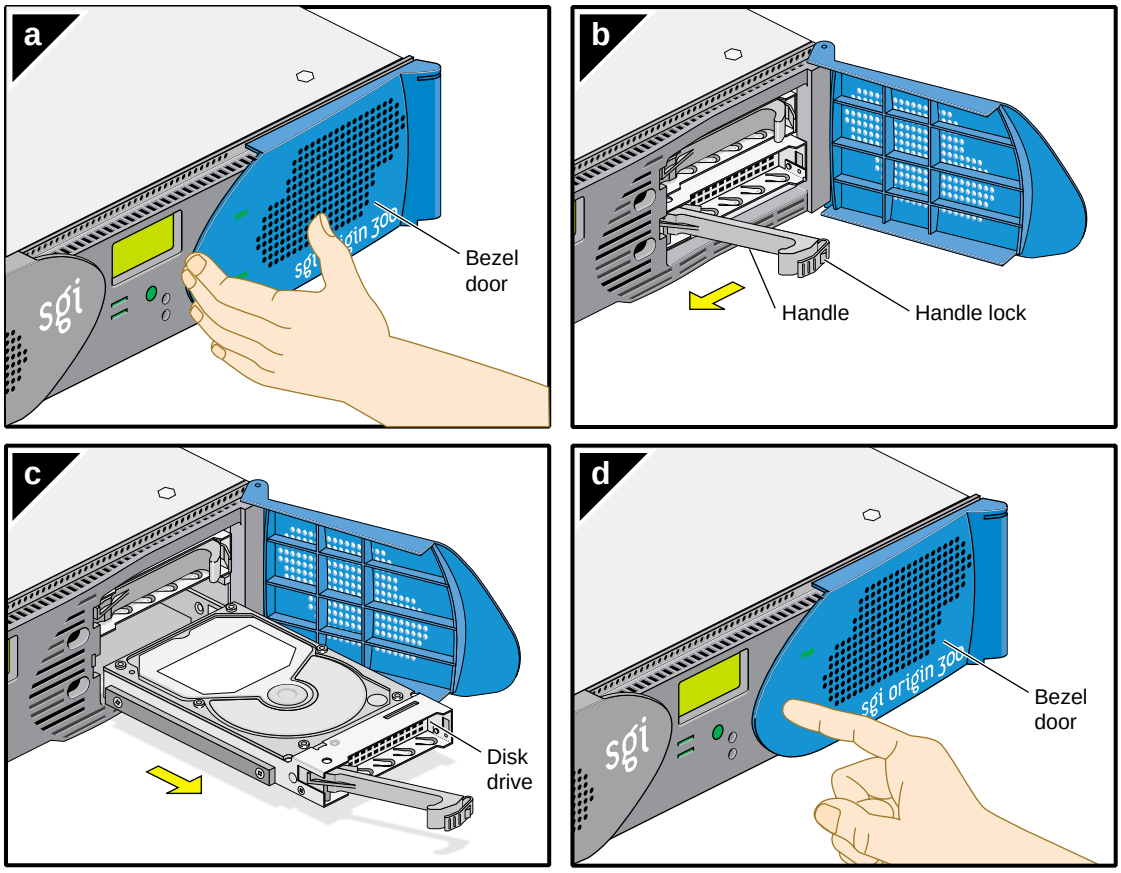


Figure 3-12 Removing a Disk Drive

Memory

Memory is contained on cards that are referred to as DIMMs (dual-inline memory modules). Each Origin 300 base module can contain two or four DIMMs. If you are adding memory to your system, populate the DIMM slots in the following order (refer to Figure 3-13):

1. Slots 1 and 3
2. Slots 2 and 4

The DIMMs that reside in slots 1 and 3 or slots 2 and 4 must be the same memory size; however, the DIMMs in slots 1 and 3 may be a different memory size than the DIMMs in slots 2 and 4.

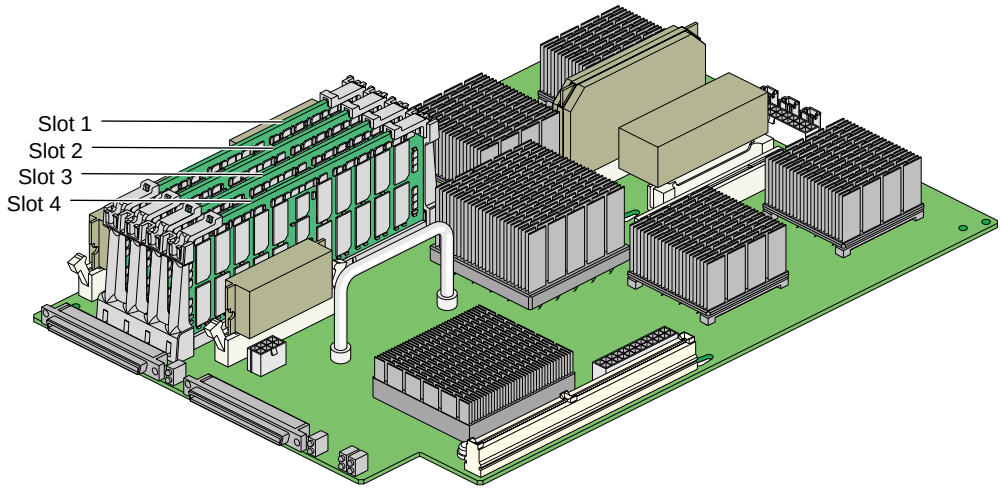


Figure 3-13 DIMM Slots

Note: The DIMMs used in the SGI Origin 300 base module are not compatible with the DIMMs used in Origin 200, Origin 2000, Onyx2, or Octane systems.

Caution: Electronic equipment can be irreparably damaged by electrostatic discharge (ESD). Always follow these preventive measures when you handle a system component:

- Remove a component from its antistatic bag only when you are ready to install it.

- If you handle a component before installation, do not place it on surfaces that produce ESD (carpeting, for example) or near devices that create static electricity.

- Attach a static wrist strap to a grounded connection on your system when you install or remove a component.

Tools/Parts Required:

One or more of the following DIMMs:

- DIMM 256-MB P/N 030-1018-00x
- DIMM 512-MB P/N 030-1044-00x
- DIMM 1-GB P/N 030-1060-00x
- T20 ballpoint Torx driver P/N 7260422

Installing a DIMM

To install a DIMM, follow these steps:

1. Power off the system. For instructions on how to power off the system, refer to "Powering Off" on page 88.
2. Disconnect all of the cables at the rear of the base module.

Warning: Components may be hot. To avoid injury, allow the components to cool for approximately 5 minutes before you proceed with these instructions.

3. Remove the two screws that secure the base module to the front rails of the rack.
4. Pull the base module from the rack until it is stopped by the safety latches.
5. The access the DIMMs, remove the two screws shown in Figure 3-14 and lift and remove the hinged cover.

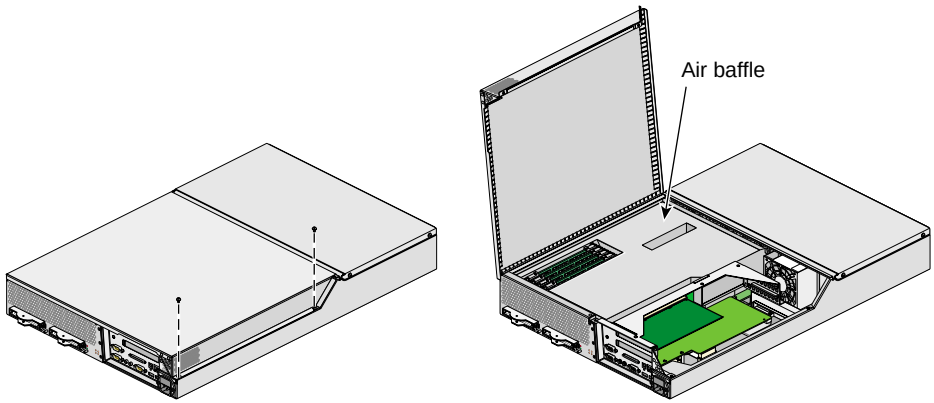


Figure 3-14 Opening Base Module to Install DIMM

6. Install the DIMM, as follows (refer to Figure 3-15):

Note: You do not have to remove the air baffle to install a DIMM.

   a. Ensure that the ejector latches are open.
   b. Holding the DIMM only by its edges, remove it from its antistatic package.

c. Align the three notches in the bottom edge of the DIMM with the keyed socket, as shown in Figure 3-15.

d. Insert the bottom edge of the DIMM into the socket, and then press down on the DIMM until it seats correctly. Use extreme care when installing a DIMM. Applying too much pressure can damage the socket.

e. Gently push the plastic ejector latches down to secure the DIMM, as shown in Figure 3-15. When the DIMM is fully seated in the connector, the ejector latches snap into place.

7. Attach the hinged cover and secure it to the base module with two screws.
8. Press the safety latches on both sides of the base module and slide the base module into the rack.
9. Install the two screws that secure the base module to the front rails of the rack.
10. Install all of the cables at the rear of the base module.
11. Power on the system. For instructions on how to power on the system, refer to "Powering On" on page 80.

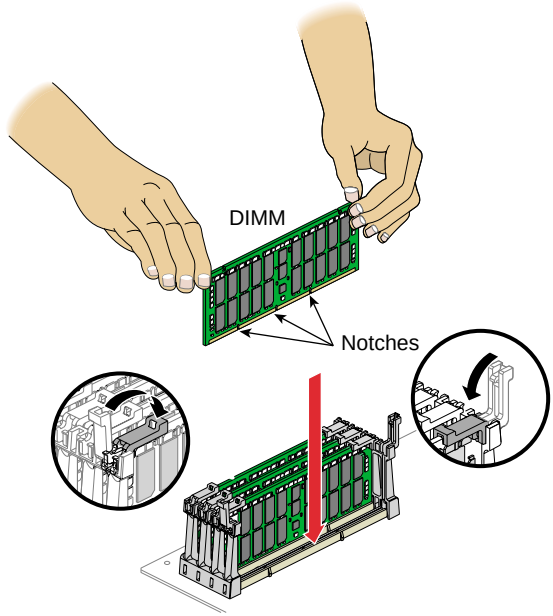


Figure 3-15 Inserting a DIMM

Removing a DIMM

To remove a DIMM, follow these steps:

1. Power off the system. For instructions on how to power off the system, refer to "Powering Off" on page 88.
2. Disconnect all of the cables at the rear of the base module.

Warning: Components may be hot. To avoid injury, allow the components to cool for approximately 5 minutes before you proceed with these instructions.

3. Remove the two screws that secure the base module to the front rails of the rack.
4. Pull the base module from the rack until it is stopped by the safety latches.
5. The access the DIMMs, remove the two screws shown in Figure 3-16 and lift and remove the hinged cover.

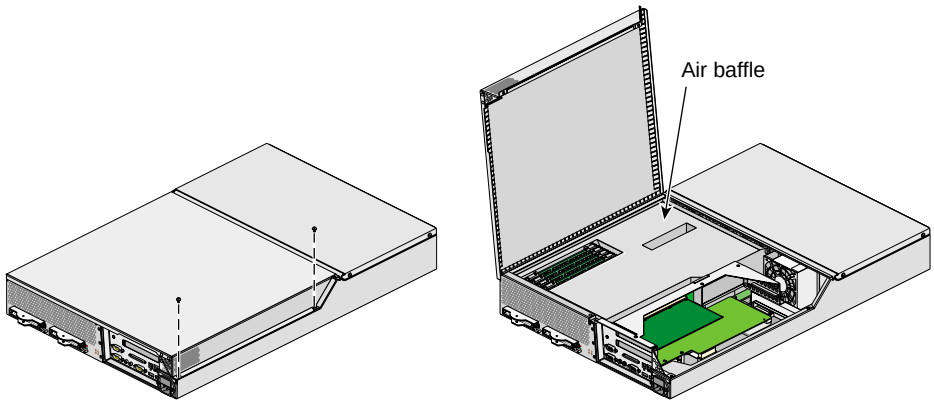


Figure 3-16 Opening Base Module to Remove DIMM

6. Remove the DIMM, as follows (refer to Figure 3-17):

Note: You do not have to remove the air baffle to remove a DIMM.

a. Lift the two ejector latches simultaneously to disengage the DIMM from its connector.

b. Carefully grasp the DIMM and pull it up and out of the guide rails.

Note: Hold the DIMM only by its edges. Be careful not to touch its components or gold edge connectors.

---

c. Place the DIMM on an ESD-safe surface.

7. Insert a new DIMM as described in "Installing a DIMM" on page 72.
8. Attach the hinged cover and secure it to the base module with two screws.
9. Press the safety latches on both sides of the base module and slide the base module into the rack.
10. Install the two screws that secure the base module to the front rails of the rack.
11. Install all of the cables at the rear of the base module.
12. Power on the system. For instructions on how to power on the system, refer to "Powering On" on page 80.

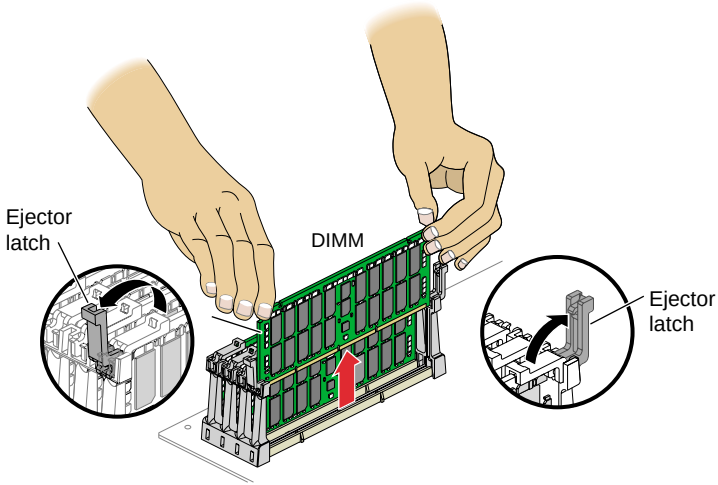


Figure 3-17 Removing a DIMM

Removing a Base Module from a Rack

To remove a base module from the rack, follow these steps:

1. Power off the system. For instructions on how to power off the system, refer to "Powering Off" on page 88.
2. Disconnect all of the cables at the rear of the base module.

Warning: Components may be hot. To avoid injury, allow the components to cool for approximately 5 minutes before you proceed with these instructions.

3. Remove the two screws that secure the base module to the front rails of the rack.
4. With a person on each side of the base module, pull the base module out of the rack until the safety latches stop the base module (refer to Figure 3-18).
5. Press the safety latches on both sides of the base module and pull the base module out of the slide rail (refer to Figure 3-18).
6. Place the base module on a flat, stable surface.
7. To push the slide rail back into the rack, press the slide latch to release the rail. There is one slide latch for each rail. On one rail, the slide latch is located on top of the rail (refer to Figure 3-18). On the other rail, the slide latch is located on the bottom of the rail.

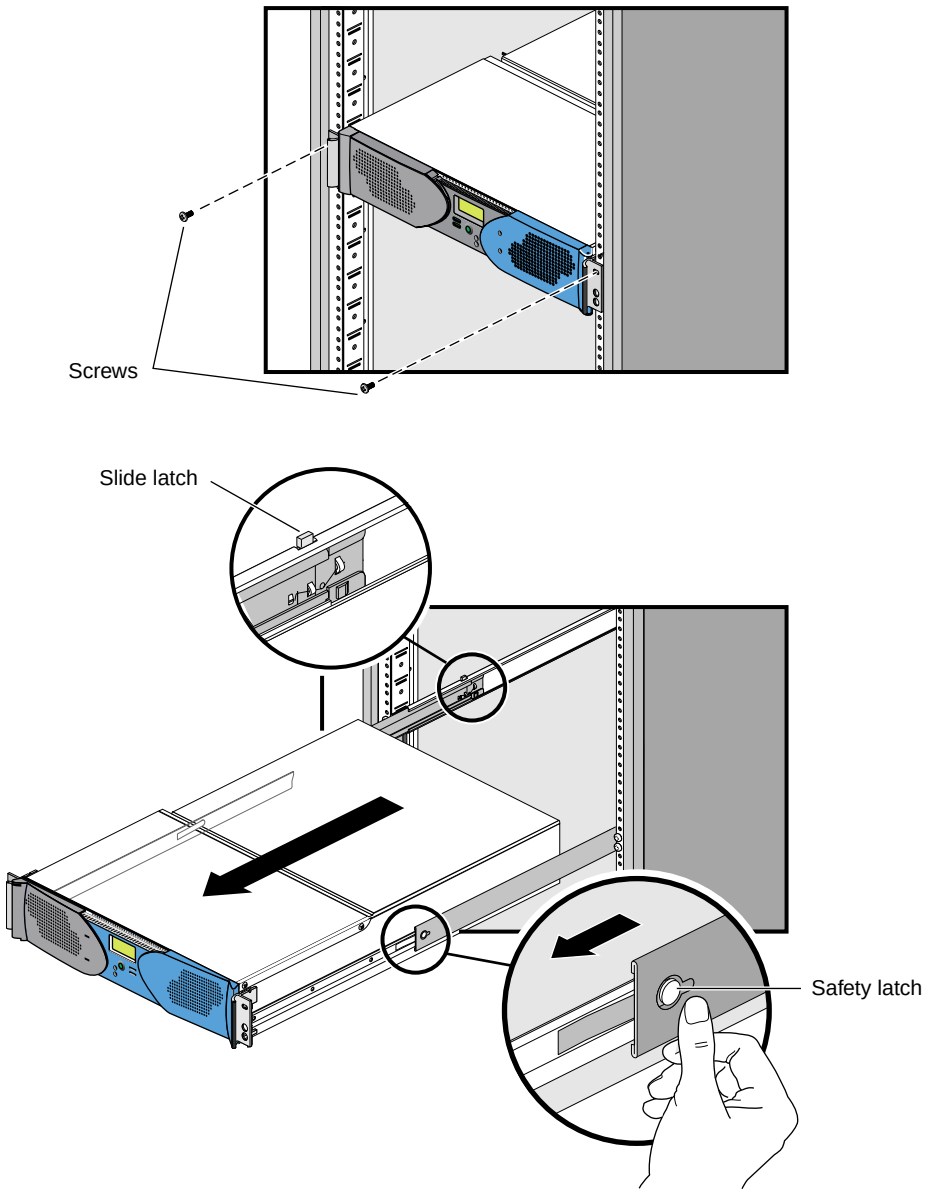


Figure 3-18 Removing Base Module from Rack

Installing a Base Module in a Rack

To install a base module in the rack, follow these steps:

1. Fully extend both the left and right slide rails from the rack until they lock into place (refer to Figure 3-19).
2. Using two people, line up the chassis rails with the slide rails and slide the base module into the rack until the safety latches stop the base module (refer to Figure 3-19).
3. Press the safety latches on both sides of the base module and slide the base module into the rack (refer to Figure 3-19).
4. Install the two screws that secure the base module to the front rails of the rack.
5. Install all of the cables at the rear of the base module.
6. Power on the system. For instructions on how to power on the system, refer to “Powering On” on page 80.

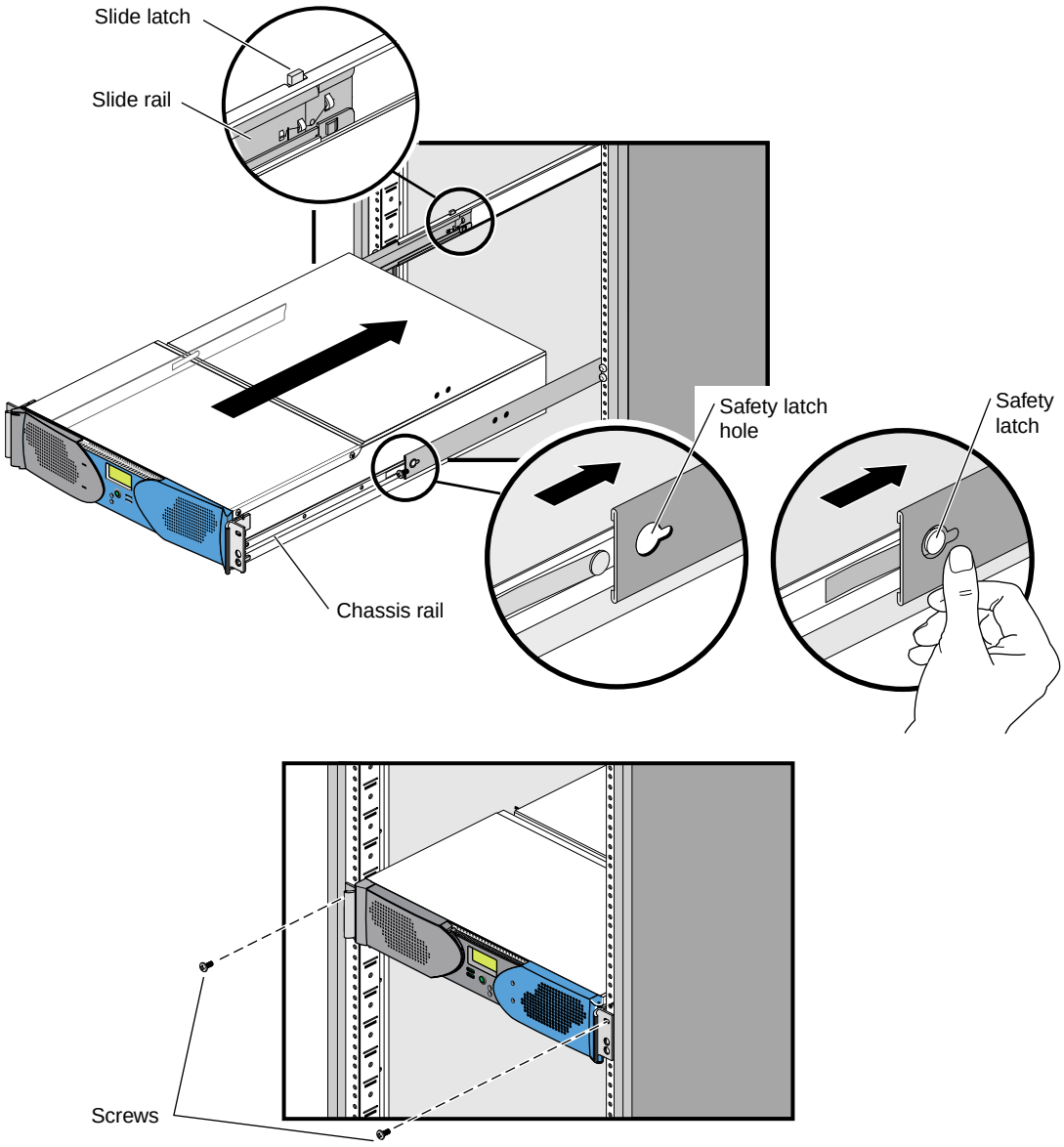


Figure 3-19 Installing Base Module in Rack

Powering Your System On and Off

The following sections describe how to power on and power off individual modules or your entire SGI Origin 300 system.

- "Powering On" on page 80
- "Powering Off" on page 88

You can power on and power off individual modules and the entire system via the system console.

Note: The following information applies to the Origin 300 base modules, the NUMAlink module, and PCI expansion modules. You must manually power on a TP900 storage module by placing the power switch(es) in the **1** position. Refer to Figure 3-20.

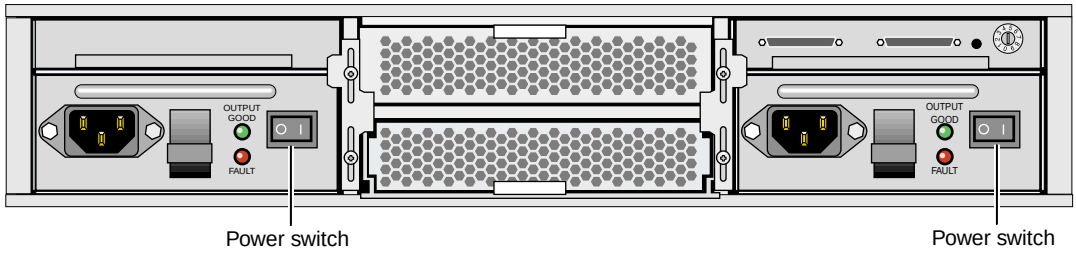


Figure 3-20 TP900 Power Switch (**1** Position)

Powering On

This section describes how to perform the following procedures:

- Preparing to power on
- Powering on at the system console
- Powering on with power buttons

Preparing to Power On

Warning: The rackmount system operates on 200-240 Vac. Use extreme caution when you work near this voltage.

To prepare to power on the system, perform the following tasks:

- Confirm that the power cables between the following components are secure:
  - Between the power distribution unit (PDU) and the external power receptacle.
  - Between the PDU and the following components: Origin 300 base module(s), AC-powered NUMAlink module, USB hub, TP900 storage module(s), power bay, power strip, L2 controller power supply, and Myrinet-2000 switch.
  - Between the power bay and the following modules: DC-powered NUMAlink module, PCI expansion module(s), and L2 controller module (refer to Figure 3-21).

  Note: When the system contains an AC-powered NUMAlink module, the L2 controller does not receive power from a power bay; instead, it receives power from a power supply. This power supply receives AC voltage from a PDU or power strip and converts the voltage to 48 Vdc, which is the input voltage that the L2 controller requires.

  Figure 3-21 shows the PDU and power bay connections to the components within a system that contains a DC-powered NUMAlink module.
- Confirm that the cables between the L2 controller and the following components are secure:
  - NUMAlink module (refer to Figure 3-22)
  - USB hub

  Figure 3-22 shows how the system components connect to the L2 controller.
- Ensure that the power switch on each DC-powered NUMAlink and PCI expansion module that you want to power on is set to the On (**1**) position. The power switch is located in the upper-left corner of the module (refer to Figure 3-23). This switch enables the L1 controllers of the NUMAlink module and PCI expansion modules to power on after you turn on the circuit breaker of the PDU.

  Note: The Origin 300 base and AC-powered NUMAlink modules do not have a power switch; when the PDU circuit breaker is on, their L1 controllers are on.

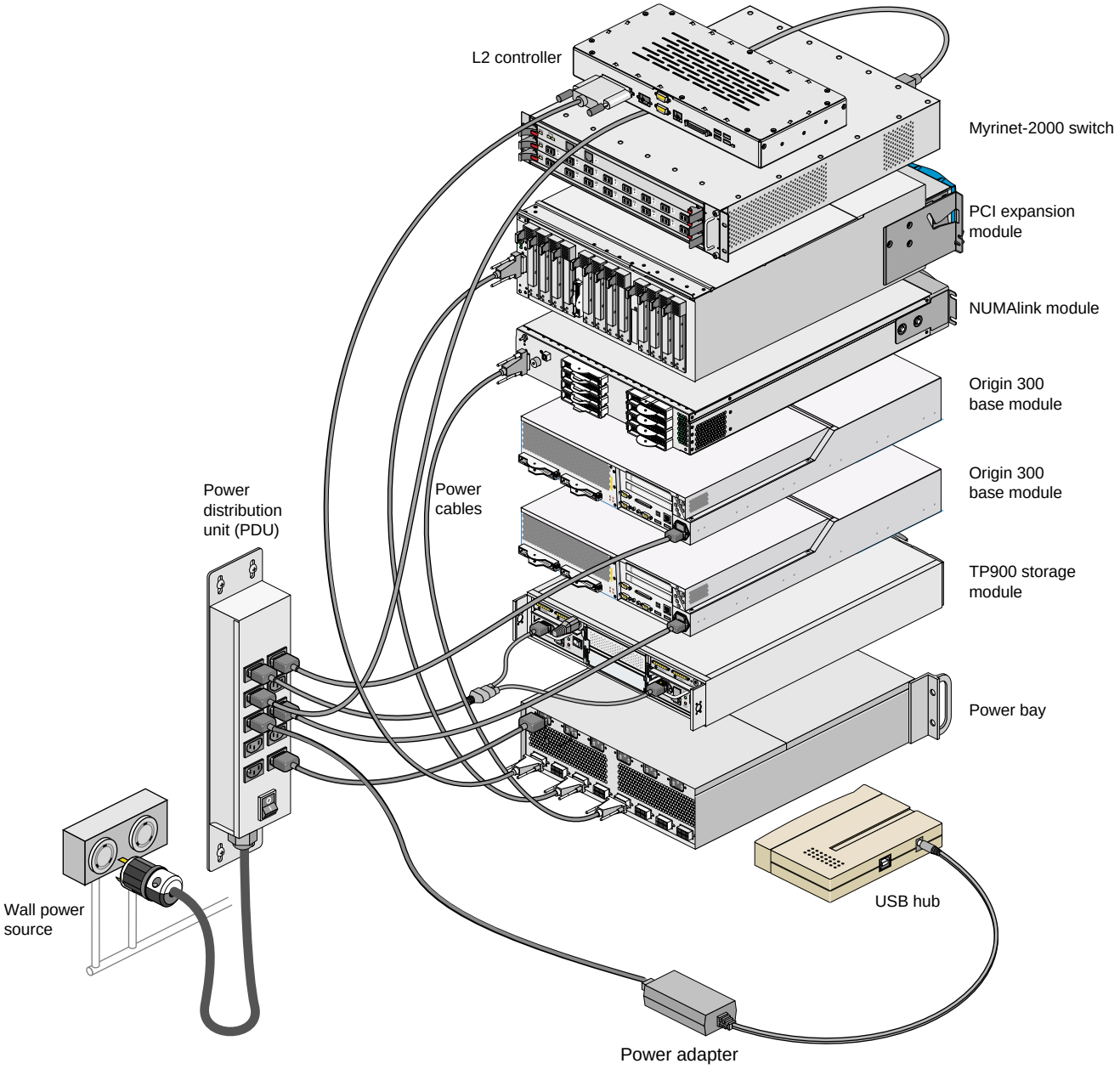


Figure 3-21 Power Connections for a System that Contains a DC-powered NUMAlink Module

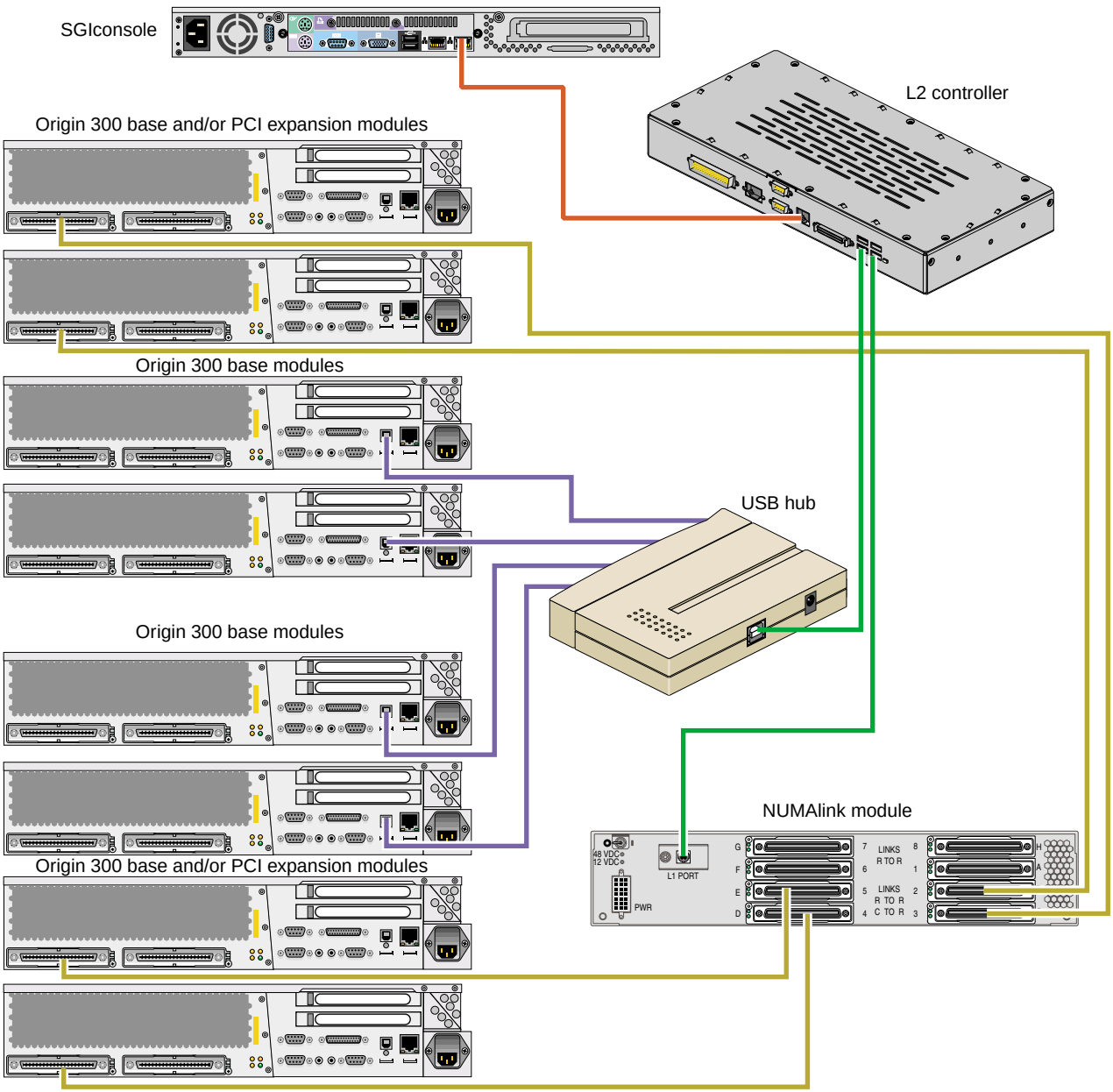


Figure 3-22 NUMAlink Module and USB Hub Connections to the L2 Controller

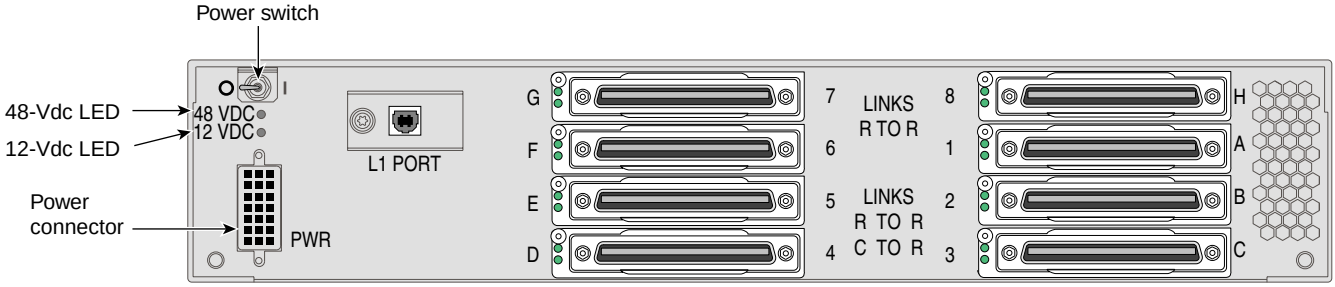


Figure 3-23 DC-powered NUMAlink Module Power Switch

Powering On at the System Console

Power on the system as follows:

1. If the monitors and other peripherals are equipped with voltage select switches, verify that they are set for the appropriate AC voltage and plug them in. Note that they are normally plugged into sources outside the rack system.
2. Turn on the circuit breaker switch of the PDU as shown in Figure 3-24.

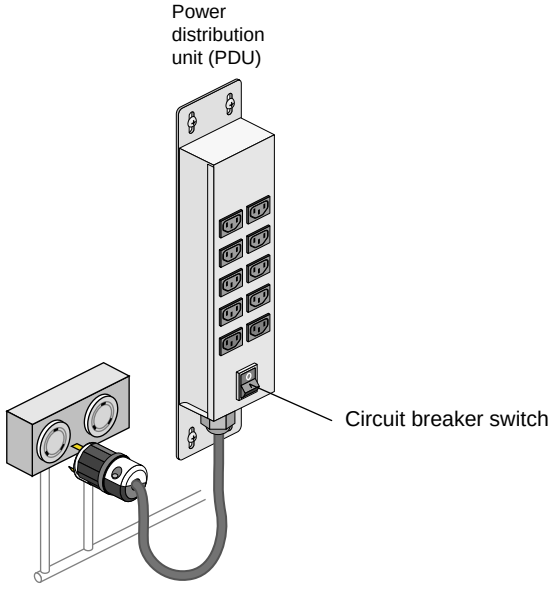


Figure 3-24 PDU Circuit Breaker Switch

3. Verify that all of the L1 controllers display "L1 running." If any L1 controllers are not running, contact your SGI system support engineer (SSE).
4. At the system console, access the L2 controller by entering the following command:

   ```
   $> /stand/sysco/bin/l2term
   ```

5. From the L2 prompt, display the system configuration by entering the following command:

   ```
   L2> cfg
   ```

   This command lists the modules that the L2 controller detects in the system and their system controller addresses. If a module that you want to power on does not appear in the list, it will not power on. Ensure that the module's L1 controller is running and that it is cabled properly.

6. From the L2 prompt (L2>), power on an individual module by entering the following command. (If you want to power on the entire system, proceed to Step 7.)

   ```
   L2> r <rack#> s <slot#> pwr u
   ```

   For example, to power on an Origin 300 base module in rack 1, slot 18, enter the following command:

   ```
   L2> r 1 s 18 pwr u
   ```

   The slot number is the unit number of the module within the rack. For more information about unit numbers, refer to Chapter 1 of this document.

   If you want to power on several selected modules of a rack at the same time, you must enter the rack number followed by the slot numbers of the modules that you want to power on. For example, to power on the modules in slots 18, 20, and 22, enter the following command:

   ```
   L2> r 1 s 18,20,22 pwr u
   ```

7. If you want to power on the entire system, enter the following command:

   ```
   L2> pwr u
   ```

   (The default setting for the `pwr u` **command is all racks and slots.)**

8. When the L2 prompt appears, you will not see the output that is produced during the power-on procedure unless you redirect the keyboard input from the L2 controller to the normal console by typing control d.

   ```
   L2> ctrl d
   ```

9. When the power-on procedure completes, the System Maintenance Menu appears on the system console. Select option 1 "Start System" to boot the IRIX operating system.

Powering On with Power Buttons

If your system does not have a system console, you can power on your system manually by using power buttons. Each module that has an L1 controller has a power button with an LED; this button is located on the front of the module (refer to Figure 3-25). The TP900 storage module power switch(es) are located at the rear of the module (refer again to Figure 3-20 on page 80).

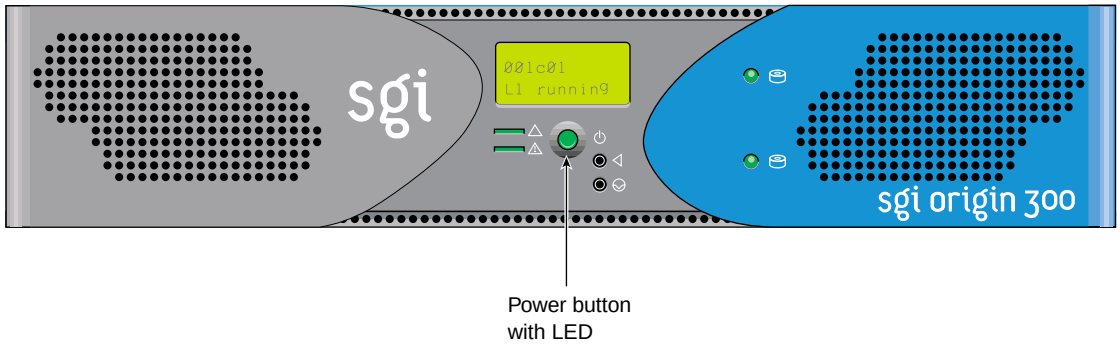


Figure 3-25 Front View of Origin 300 Base Module

Power on the system as follows:

1. If the monitors and other peripherals are equipped with voltage select switches, verify that they are set for the appropriate AC voltage and plug them in. Note that they are normally plugged into power sources outside the rack system.
2. Turn on the circuit breaker switch of the PDU as shown in Figure 3-26.

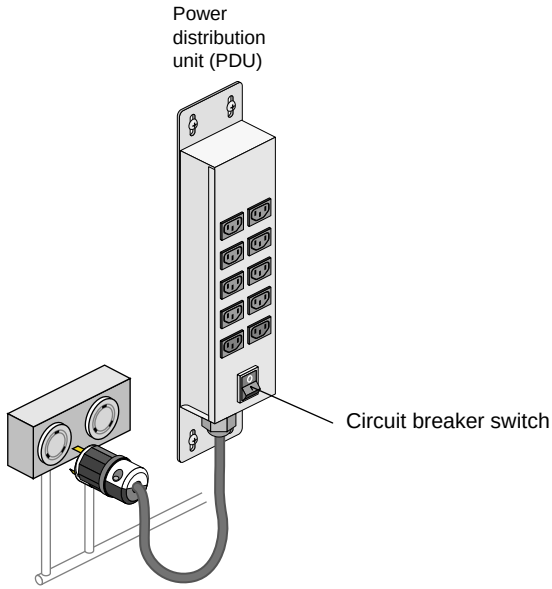


Figure 3-26 PDU Circuit Breaker Switch

3. Set the power switch(es) of the TP900 storage module(s) to the On position.
4. Verify that all of the L1 controllers display "L1 running." If any L1 controllers are not running, contact your SGI system support engineer (SSE).
5. Press the power buttons that are located on the front of the modules that you want to power on. Always power on the PCI expansion modules first. Next, power on the NUMAlink module. Last, power on the Origin 300 base modules starting with the global master (the lowest base module in the rack).

   The power-button LEDs illuminate when the modules are powered on.

Powering Off

This section explains how to power off individual modules or your entire system from the system console or via the power buttons. Power off the system only after the system software has been shut down in an orderly manner.

Caution: If you power off the system before you halt the operating system, you can lose data.

Powering Off at the System Console

Note: The following information applies only to Origin 300 base modules, the NUMAlink module, and PCI expansion modules. You must manually power off the TP900 storage module by placing the power switch(es) in the **0** position. Refer to Figure 3-27.

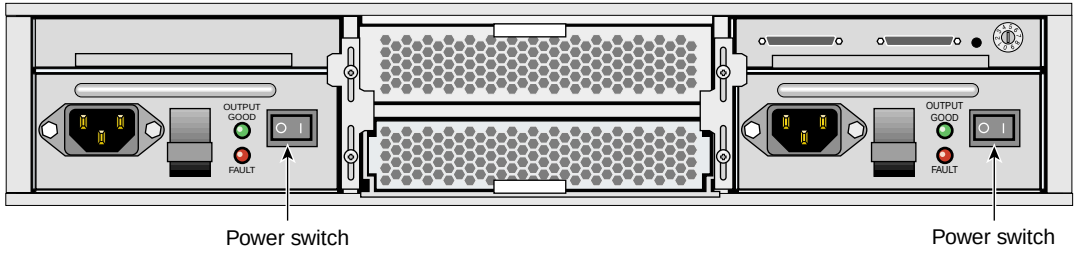


Figure 3-27 TP900 Power Switch (**0** Position)

To power off your system using the system console, follow these steps:

1. Shut down the IRIX operating system by entering the following command:

   ```
   # init 0
   ```

2. To access the L2 prompt, direct the keyboard input to the L2 controller by entering control t.

   ```
   $> ctrl t
   ```

3. From the L2 prompt (L2>), power off an individual module by entering the following command. (If you want to power off the entire system, proceed to Step 4.)

   ```
   L2> r <rack#> s <slot#> pwr d
   ```

   For example, to power off an Origin 300 base module in rack 1, slot 18, enter the following command:

   ```
   L2> r 1 s 18 pwr d
   ```

   The slot number is the unit number of the module within the rack. For more information about unit numbers, refer to Chapter 1 of this document.

   If you want to power off several selected modules from the rack at the same time, enter the rack number followed by the slot numbers of the modules that you want to power off. For example, to power off the modules in slots 18, 20, and 22, enter the following command:

   ```
   L2> r 1 s 18,20,22 pwr d
   ```

4. If you want to power off all of the modules within the rack, enter the following command:

   ```
   L2> pwr d
   ```

   (The default setting for the `pwr d` **command** is all racks and slots.)

   "Powered Down" appears on the L1 display when the module is powered off. The L1 controller is still powered on.

5. To power down an L1 controller of a DC-powered NUMAlink or PCI expansion module, set the power switch to the Off position. The power switch of the NUMAlink or PCI expansion module is located in the upper-left corner of the rear of the module.

Note: The Origin 300 base and AC-powered NUMAlink modules do not have a power switch. To power down their L1 controllers, unplug the modules from the PDU.

Powering Off with Power Buttons

To power off your system manually, follow these steps:

1. Shut down the IRIX operating system by entering the following command:

   ```
   # init 0
   ```

2. Press the power buttons that are located on the front of the modules that you want to power off. You may power off the modules in any order.

3. To power off an L1 controller of a DC-powered NUMAlink or PCI expansion module, set the power switch to the Off position. The power switch of the NUMAlink or PCI expansion module is located in the upper-left corner at the rear of the module.

Note: The Origin 300 base and AC-powered NUMAlink modules do not have a power switch. To power off their L1 controllers, unplug the modules from the PDU.

Monitoring Your System

You can monitor your SGI Origin 300 system from the following sources:

- You can view individual module (base, NUMAlink, and PCI expansion) status and error messages via the module's L1 controller display. For example, you can determine whether the fans of a particular module are operating properly.
- The system console enables you to view the status and error messages that are generated by both the L1 and L2 controllers. Refer to Appendix C for L1 and L2 commands.
- You can monitor the status of the TP900 storage modules by viewing the LEDs on the front and the rear of the storage modules.
- You can use the Embedded Support Partner (ESP) system, which is discussed in the next section.

Using Embedded Support Partner (ESP)

Embedded Support Partner (ESP) automatically detects system conditions that indicate potential future problems and then notifies the appropriate personnel. This enables you and SGI system support engineers (SSEs) to proactively support systems and resolve issues before they develop into actual failures.

ESP enables users to monitor one or more systems at a site from a local or remote connection. ESP can perform the following functions:

- Monitor the system configuration, events, performance, and availability.
- Notify SSEs when specific events occur.
- Generate reports.

ESP also supports:

- Remote support and on-site troubleshooting.
- System group management, which enables you to manage an entire group of systems from a single system.

For more information about ESP, refer to Chapter 5, "Troubleshooting." For information about configuring ESP, refer to the *Embedded Support Partner User Guide*.

System Configurations

This chapter describes the following system configurations:

Compute

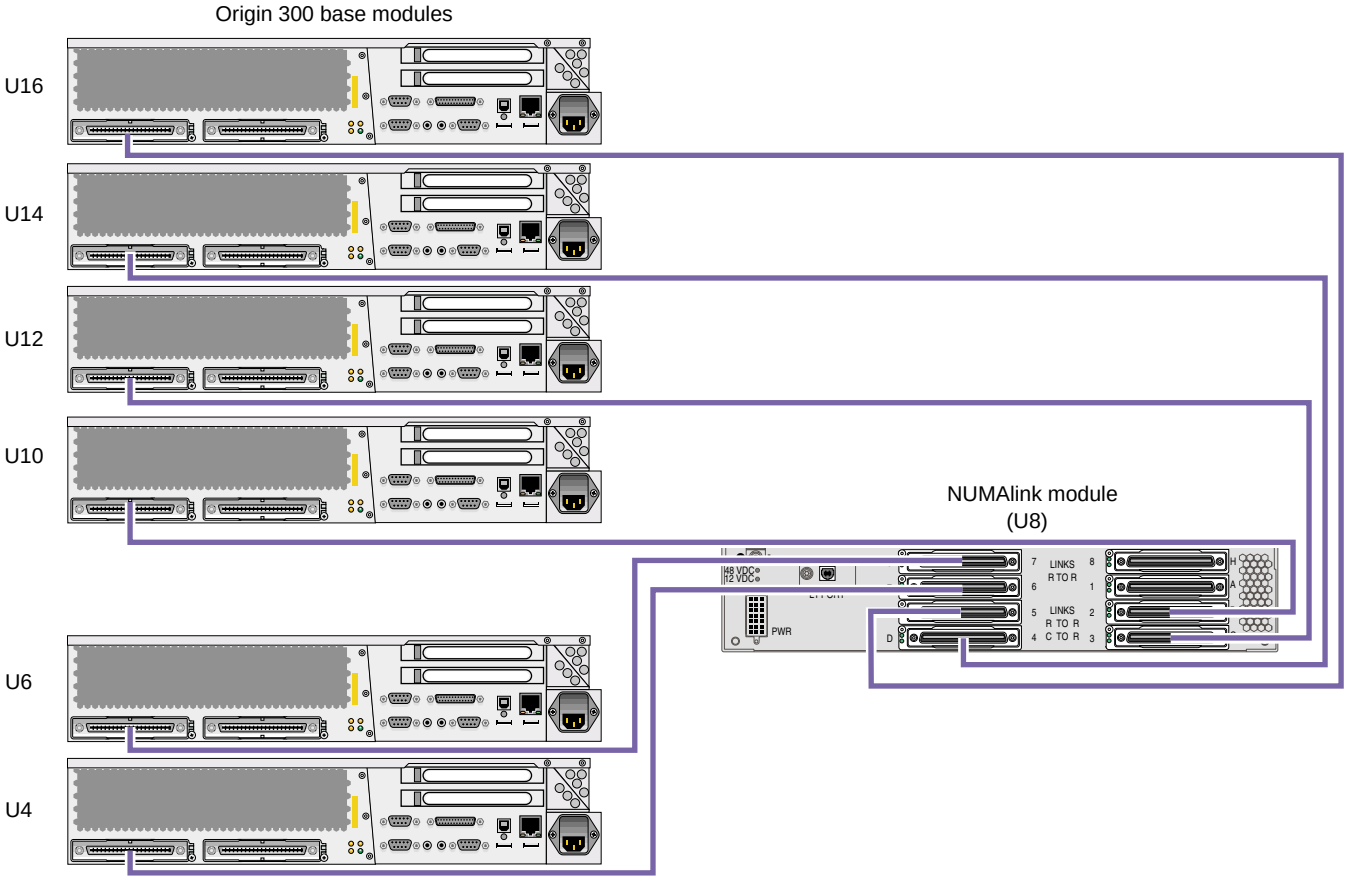
In a tall rack, the SGI Origin 300 system with NUMAlink module consists of two to eight Origin 300 base modules. A short rack can consist of two to six base modules. When only two base modules are present in the system, they reside in the locations that are directly below the NUMAlink module. For example, when the NUMAlink module resides in location U20 (tall rack), the two base modules reside in locations U18 and U16. When the NUMAlink module resides in location U8 (short rack), the two base modules reside in locations U6 and U4.

Note: The global master is the Origin 300 base module that resides in the lowest location in the rack.

Additional base modules are added to the rack by alternating between the top and bottom portions of the rack. For example, the additional base modules can be added to the rack in the following order:

- The third base module is placed in location U22 (tall rack) or U10 (short rack).
- The fourth base module is placed in U24 (tall rack) or U12 (short rack).
- The fifth base module is placed in U14 (tall and short racks).
- The sixth base module is placed in U12 (tall rack) or U16 (short rack).
- The seventh base module is placed in U26 (tall rack).
- The eighth base module is placed in U28 (tall rack).

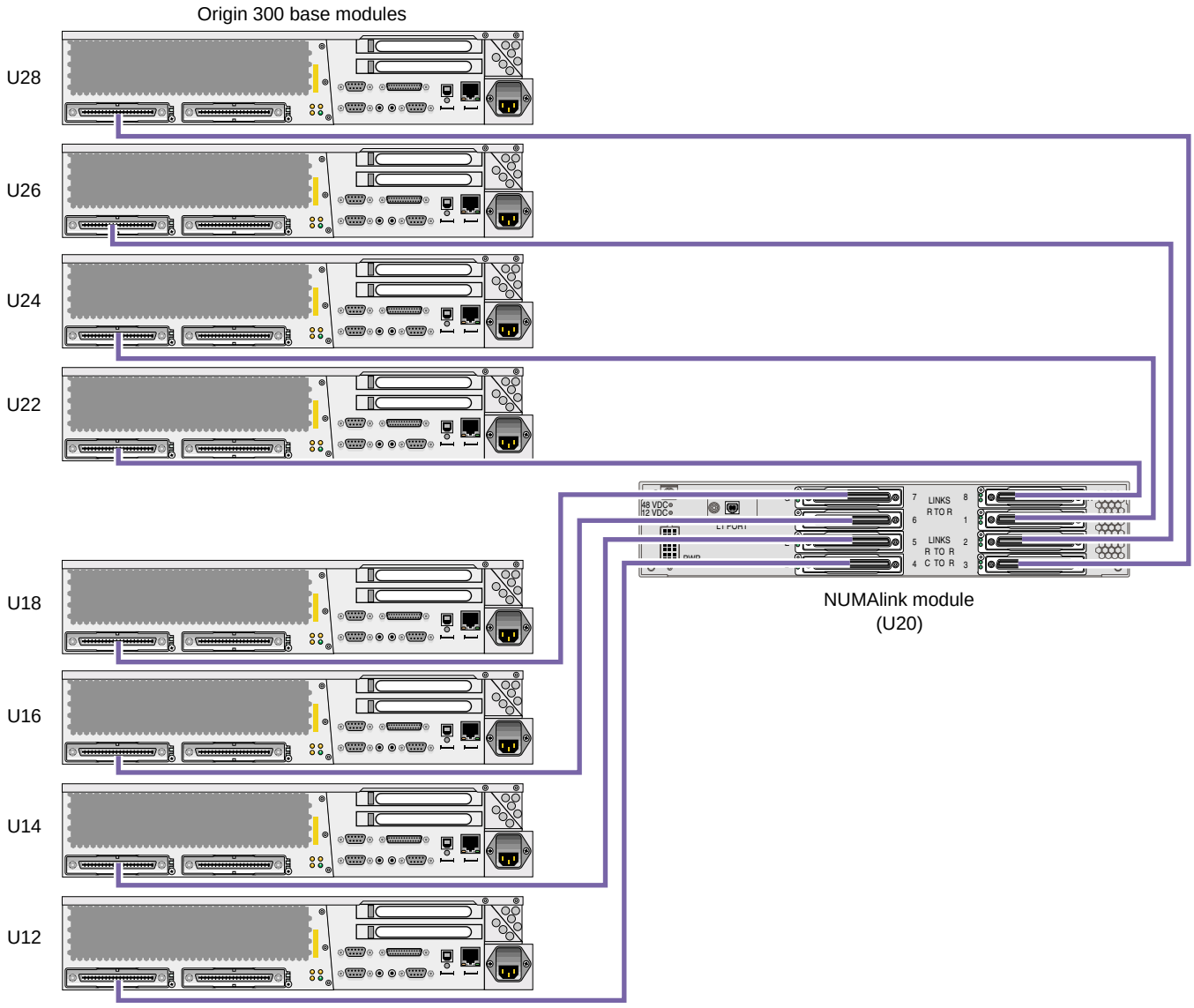
The Origin 300 base modules communicate with each other via the NUMAlink module. Figure 4-1 shows the compute configuration for the short rack.



U*xx* indicates the location of the module within a rack.

Figure 4-1 Short-rack Compute Configuration

Figure 4-2 shows the compute configuration for the tall rack.



U*xx* indicates the location of the module within a rack.

Figure 4-2 Tall-rack Compute Configuration

System Control

The control system for the SGI Origin 300 system with NUMAlink module manages power control and sequencing, provides environmental control and monitoring, initiates system resets, and stores identification and configuration information. The SGI Origin 300 system with NUMAlink module has two levels of control:

- **L1: module-level controller.** The L1 controller is designed into all modules except the TP900 storage module; controller function varies slightly by module. The L1 controllers are not configurable.
- **L2: rack-level controller**. The L2 controller enables remote maintenance. It controls resource sharing and the L1 controllers in the system, and maintains controller configuration and topology information. The L2 controller resides in the top portion of the rack.

The L1 controllers within the system communicate with the L2 controller via the NUMAlink module or via a USB hub (refer to Figure 4-3). The Origin 300 base modules and/or PCI expansion modules that connect to ports 2, 3, 4, and 5 of the NUMAlink module communicate with the L2 controller via the USB signals of these NUMAlink ports. The Origin 300 base modules that connect to ports 1, 6, 7, and 8 of the NUMAlink module communicate with the L2 controller via a USB hub.

You can access the L1 and L2 controllers via the system console. Refer to Appendix C for L1 and L2 controller commands.

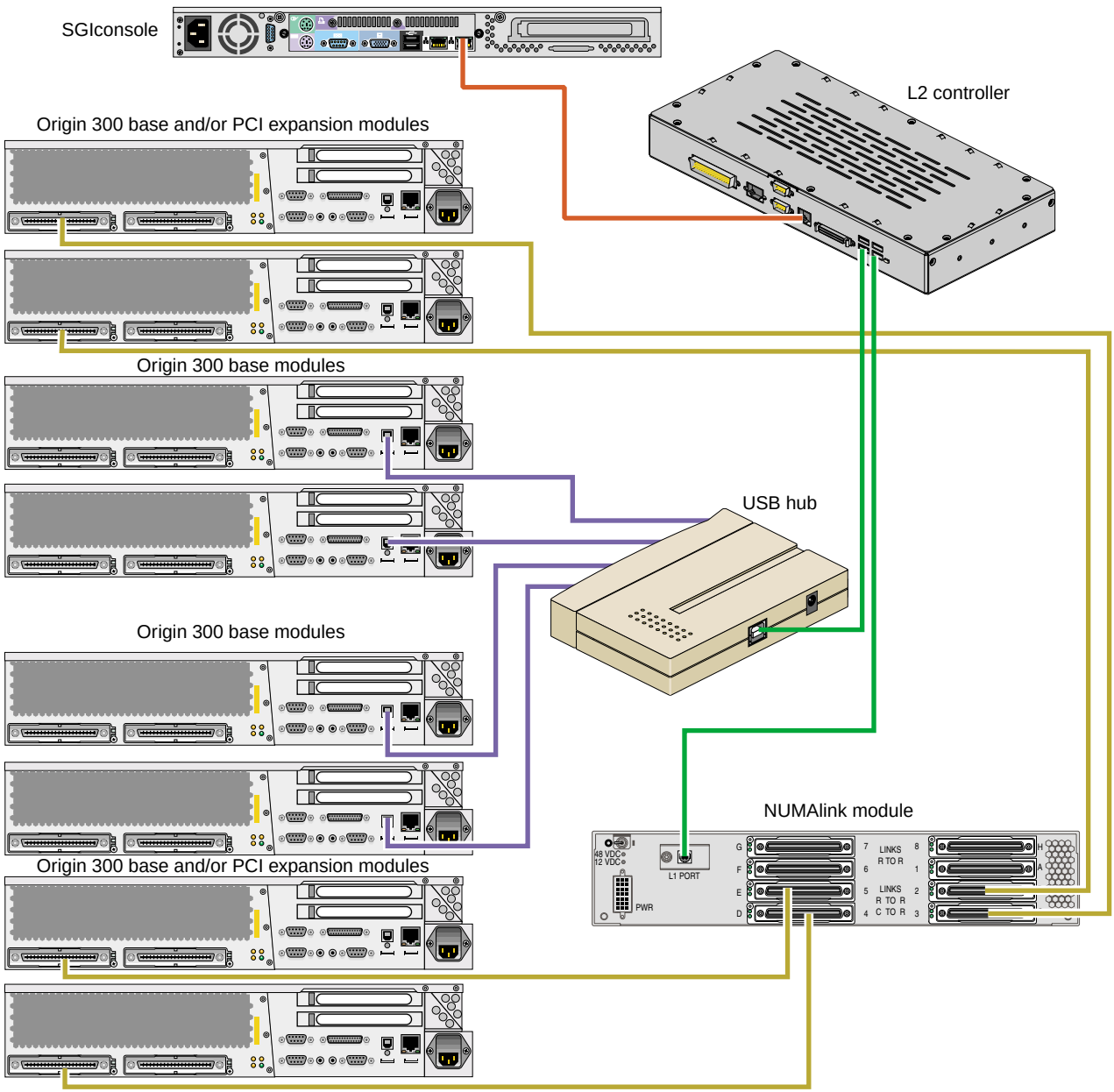


Figure 4-3 System Control Configuration

I/O

Each Origin 300 base module has two PCI slots; however, you can increase the number of PCI slots by adding PCI expansion modules to the system. The Origin 300 system with NUMAlink module supports one or two PCI expansion modules in a short rack and as many as four PCI expansion modules in a tall rack. The following rules indicate how many PCI expansion modules you can add to your tall-rack system:

- You can add one PCI expansion module to a system that contains two to seven base modules.
- You can add two PCI expansion modules to a system that contains two to six base modules.
- You can add three PCI expansion modules to a system that contains three to five base modules.
- You can add four PCI expansion modules to a system that contains four base modules.

In a tall rack, the PCI expansion modules reside directly above and below the NUMAlink module and the Origin 300 base modules. For example, two PCI expansion modules reside in the highest available locations in the bottom section of the rack (U8 and U12). The other two PCI expansion modules reside in the first available locations in the top portion of the rack (for example, U26 and U30).

The following rules indicate how many PCI expansion modules you can add to your short-rack system:

- You can add one PCI expansion module to a system that contains two to four base modules. Valid locations for this module are U10, U12, or U14.
- You can add one or two PCI expansion modules to a system that contains two base modules. These modules reside in locations U10 and U14.

The Origin 300 base modules and L2 controller communicate with the PCI expansion modules via the NUMAlink module. The PCI expansion modules connect to the NUMAlink module via ports 2, 3, 4, and 5, which are the ports that carry NUMAlink and USB signals (refer to Figure 4-4).

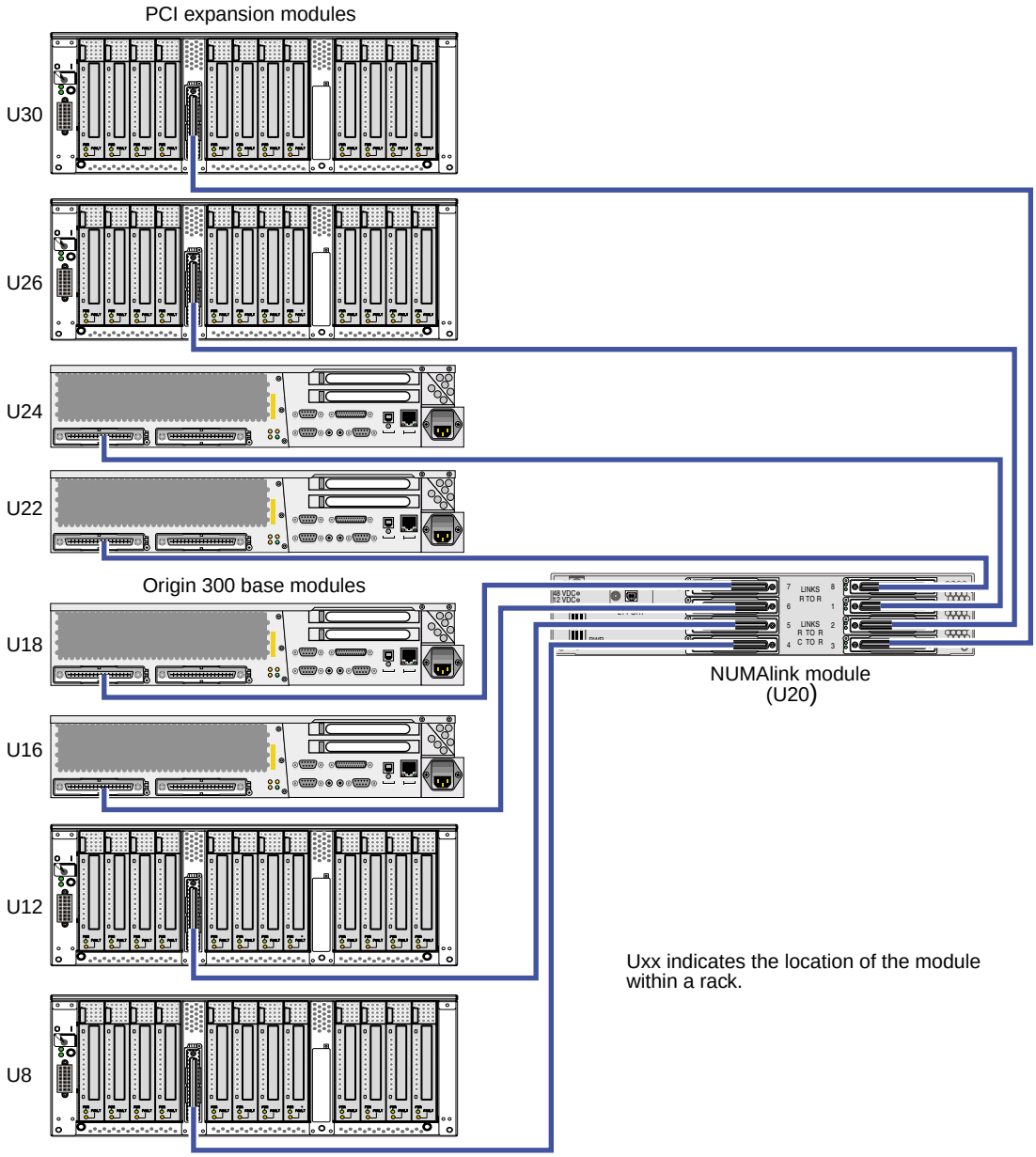


Figure 4-4 I/O Configuration

Storage

Each Origin 300 base module contains two disk-drive bays; however, you can add additional storage to the system. The TP900 storage module provides a SCSI JBOD solution for the Origin 300 system with NUMAlink module. The TP900 can be configured as follows:

- For a single-port configuration (eight drives), one I/O module is required (bay 1/1).
- For a dual-port configuration (four drives per port), use two I/O modules.
- Populate all disk drive bays with a disk drive or a filler plate.
- Install the drives in the following order:

1	3	5	7
2	4	6	8

The TP900 storage module resides in the Origin 300 rack. The placement of the storage modules within the rack depends on the number of other modules in the rack. The following rules apply:

- In the short rack, place the TP900 in the highest available location of the rack. For example, if the short-rack system contains two base modules, one NUMAlink module, and one PCI expansion module, place the TP900 storage module in U16. If you want to add another storage module to the system, place it in U14.
- In the tall rack, the placement of the TP900 storage module alternates between the top and bottom portions of the rack; the storage modules do not have to be grouped together.

  In the bottom portion of the rack, place the first TP900 module in location U10. If this location is not available, place the TP900 in the next available location in the bottom portion of the rack (for example, U8).

  Place the second TP900 in location U30. If this location is not available, place the TP900 in the next available location in the top portion of the rack (for example, U32).

  Continue to alternate between the top and bottom portions of the rack as you place the TP900 modules in the system.

Note: Locations U12 through U29 are reserved for the NUMAlink, Origin 300 base, and PCI expansion modules. If you need additional rack space for storage modules and space is available within U12 through U29, you may place additional TP900 modules within this reserved space.

The Origin 300 base modules can connect to the TP900 storage module via the SCSI port connector on the rear of the Origin 300 base module or via a low-voltage differential (LVD) PCI card (refer to Figure 4-5).

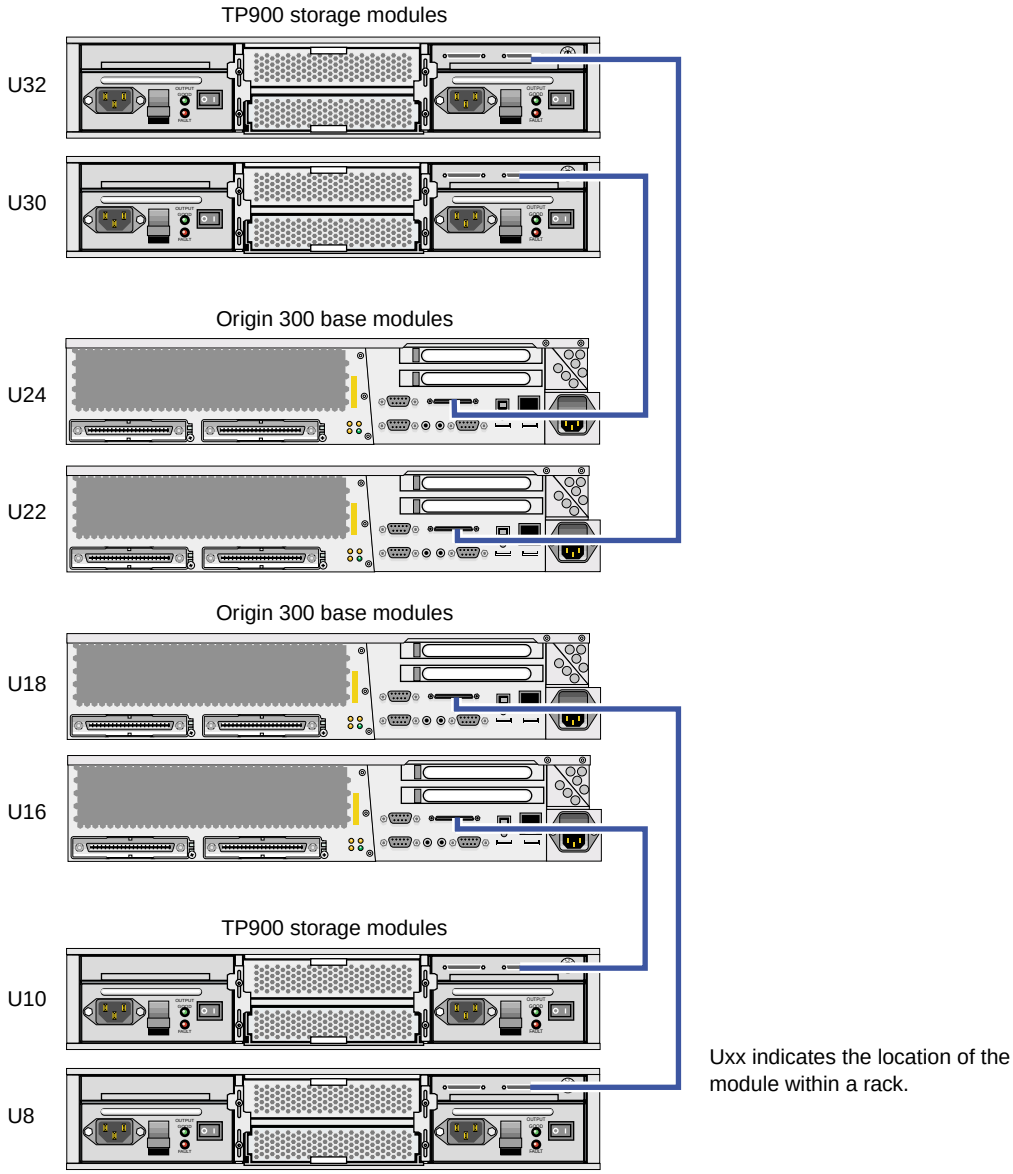


Figure 4-5 Storage Configuration

Power

The standard power component of an Origin 300 with NUMAlink module system is a power distribution unit (PDU). A second PDU or a power strip might also exist in the rack. The power strip exists when the system requires 11 to 15 power receptacles. The second PDU exists when the system requires more than 15 power receptacles.

The PDU inputs AC voltage from an external power receptacle and outputs AC voltage to the Origin 300 base modules, AC-powered NUMAlink module, TP900 storage modules, power adapter of the USB hub, power bay module, Myrinet-2000 switch, L2 controller power supply, and power strip.

Note: In a system that contains an AC-powered NUMAlink module, the L2 controller receives power from a power supply. This power supply receives AC voltage from a PDU or power strip and converts the voltage to 48 Vdc, which is the input voltage that the L2 controller requires. In a system that contains a DC-powered NUMAlink module, the L2 controller receives the 48 Vdc from a power bay.

In addition to the PDUs and power strip, a system that has a DC-powered NUMAlink or PCI expansion module contains one power bay module. The power bay module, which resides in U1 of the short and tall racks, converts AC voltage to 48 Vdc and 12 Vdc standby voltage and outputs this voltage to the NUMAlink module, the PCI expansion modules, and the L2 controller. The power bay contains two power supplies, which reside in locations 5 and 6 of the power bay.

Note: When a system that contains a DC-powered NUMAlink module has four PCI expansion modules, the power bay contains three power supplies. The third power supply resides in location 4 of the power bay.

Note: An AC-powered NUMAlink module system requires a power bay only when it contains a PCI expansion module.

Figure 4-6 illustrates the power configuration of an Origin 300 system that contains an AC-powered NUMAlink module. Figure 4-7 illustrates the power configuration of a system that contains a DC-powered NUMAlink module.

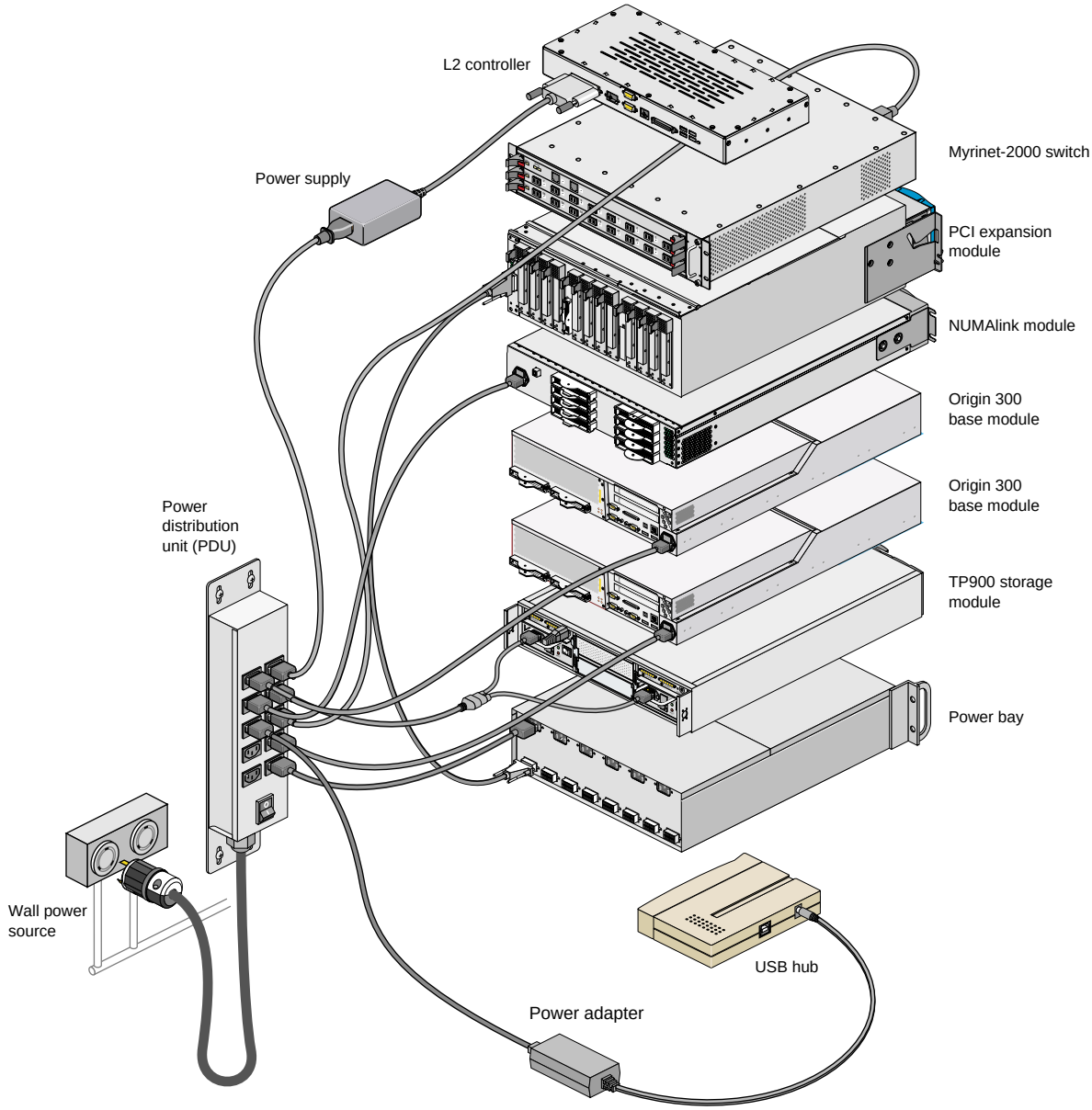


Figure 4-6 Power Configuration of System with AC-powered NUMAlink Module

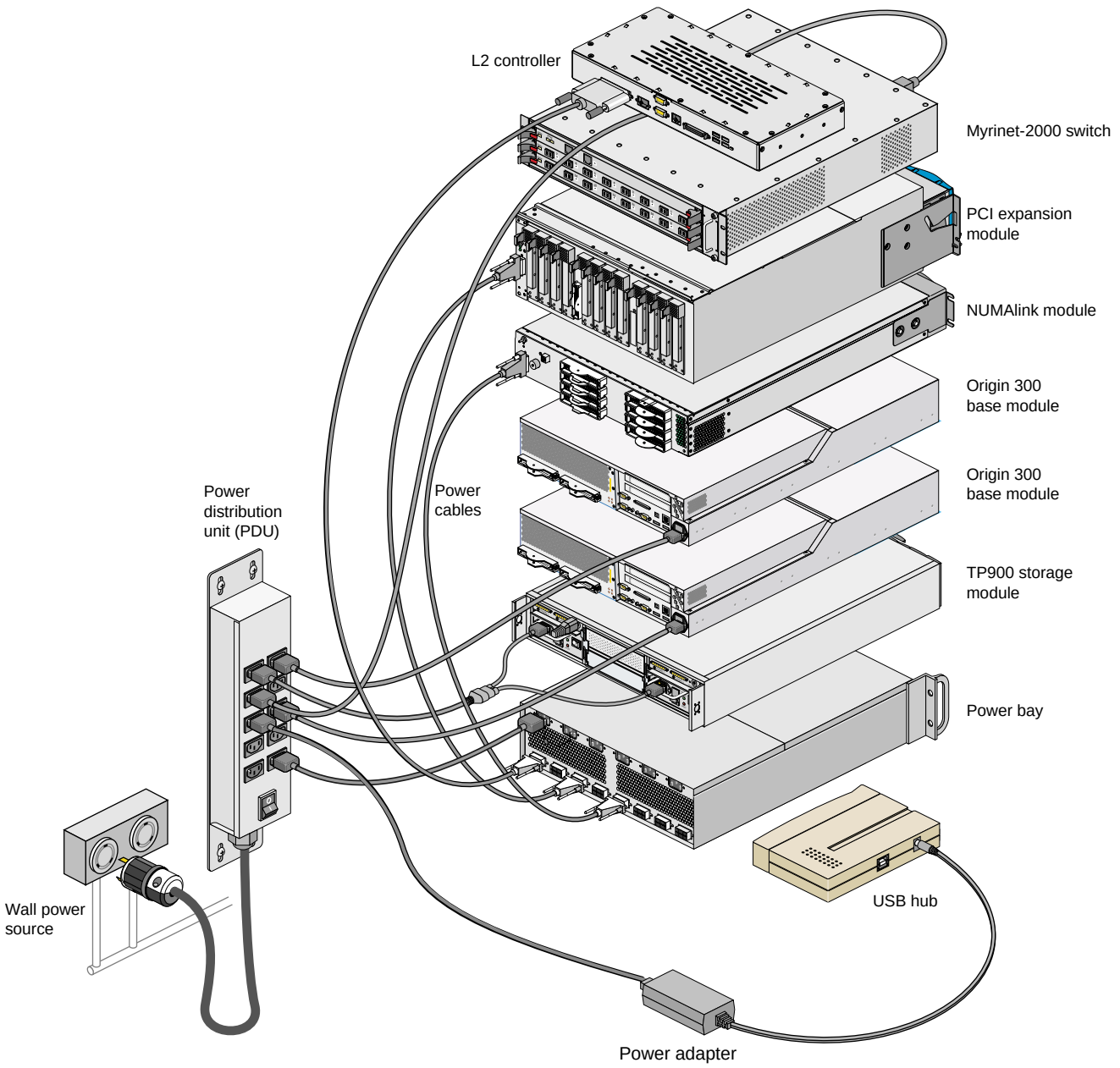


Figure 4-7 Power Configuration of System with DC-powered NUMAlink Module

Troubleshooting

This chapter provides the following sections to help you troubleshoot your system:

Troubleshooting Chart

Table 5-1 lists recommended actions for problems that can occur on your system. For problems that are not listed in this table, use the SGI Electronic Support system to help solve your problem or contact your SGI system support engineer (SSE). More information about the SGI Electronic Support system is provided in this chapter.

Table 5-1 Troubleshooting Chart

Problem Description	Recommended Action
The system will not power on.	Ensure that the power cord of the PDU is seated properly in the power receptacle. Ensure that the PDU circuit breaker is on. If the power cord is plugged in and the circuit breaker in on, contact your SSE.
An individual module will not power on.	Ensure that the power switch at the rear of the module is on (1 position). View the L1 display; refer to Table 5-2 if an error message is present. If the L1 controller is not running, contact your SSE. Check the connection between the module and its power source.
The system will not boot the operating system.	Contact your SSE.
The Service Required LED illuminates on an Origin 300 base, NUMAlink, or a PCI expansion module.	View the L1 display of the failing module; refer to Table 5-2 for a description of the error message.
The Failure LED illuminates on an Origin 300 base, NUMAlink, or a PCI expansion module.	View the L1 display of the failing module; refer to Table 5-2 for a description of the error message.
The green or yellow LED of a NUMAlink port (rear of NUMAlink module) is not illuminated.	Ensure that the NUMAlink cable is seated properly on the NUMAlink module and the destination module.
The PWR LED of a populated PCI slot is not illuminated.	Reseat the PCI card.

Table 5-1 Troubleshooting Chart **(continued)**

Problem Description	Recommended Action
The Fault LED of a populated PCI slot is illuminated (on).	Reseat the PCI card. If the fault LED remains on, replace the PCI card.
The System Status LED of the TP900 is amber.	Contact your SSE.
The Power Status LED of the TP900 is amber.	Contact your SSE to replace the power supply module. The power supply module also has an amber LED that indicates a fault.
The Cooling Status LED of the TP900 is amber.	Contact your SSE to replace the cooling module. The cooling module also has an amber LED that indicates a fault.
The amber LED of a disk drive is on.	Replace the disk drive.

L1 Controller Error Messages

Table 5-2 lists error messages that the L1 controller generates and displays on the L1 display. This display is located on the front of the Origin 300 base modules, the NUMAlink module, and the PCI expansion modules.

Note: In Table 5-2, a voltage warning occurs when a supplied level of voltage is below or above the nominal (normal) voltage by 10 percent. A voltage fault occurs when a supplied level is below or above the nominal voltage by 20 percent.

Table 5-2 L1 Controller Messages

L1 System Controller Message	Message Meaning and Action Needed
Internal voltage messages:	
ATTN: x.xV high fault limit reached @ x.xxV	30-second power-off sequence for the module.
ATTN: x.xV low fault limit reached @ x.xxV	30-second power-off sequence for the module.
ATTN: x.xV high warning limit reached @ x.xxV	A higher than nominal voltage condition is detected.
ATTN: x.xV low warning limit reached @ x.xxV	A lower than nominal voltage condition is detected.
ATTN: x.xV level stabilized @ x.xV	A monitored voltage level has returned to within acceptable limits.
Fan messages:	
ATTN: FAN # x fault limit reached @ xx RPM	A fan has reached its maximum RPM level. The ambient temperature may be too high. Check to see if a fan has failed.
ATTN: FAN # x warning limit reached @ xx RPM	A fan has increased its RPM level. Check the ambient temperature. Check to see if the fan stabilizes.
ATTN: FAN # x stabilized @ xx RPM	An increased fan RPM level has returned to normal.

Table 5-2 L1 Controller Messages **(continued)**

L1 System Controller Message	Message Meaning and Action Needed
Temperature messages: low alt.	
ATTN: TEMP # advisory temperature reached @ xxC xxF	The ambient temperature at the module's air inlet has exceeded 30 °C.
ATTN: TEMP # critical temperature reached @ xxC xxF	The ambient temperature at the module's air inlet has exceeded 35 °C.
ATTN: TEMP # fault temperature reached @ xxC xxF	The ambient temperature at the module's air inlet has exceeded 40 °C.
Temperature messages: high alt.	
ATTN: TEMP # advisory temperature reached @ xxC xxF	The ambient temperature at the module's air inlet has exceeded 27 °C.
ATTN: TEMP # critical temperature reached @ xxC xxF	The ambient temperature at the module's air inlet has exceeded 31 °C.
ATTN: TEMP # fault temperature reached @ xxC xxF	The ambient temperature at the module's air inlet has exceeded 35 °C.
Temperature stable message:	
ATTN: TEMP # stabilized @ xxC/xxF	The ambient temperature at the module's air inlet has returned to an acceptable level.
Power off messages:	
Auto power down in xx seconds	The L1 controller has registered a fault and is shutting down. The message displays every 5 seconds until shutdown.
Base module appears to have been powered down	The L1 controller has registered a fault and has shut down.

SGI Electronic Support

SGI Electronic Support provides system support and problem-solving services that function automatically, which helps resolve problems before they can affect system availability or develop into actual failures. SGI Electronic Support integrates several services so they work together to monitor your system, notify you if a problem exists, and search for solutions to the problem.

Figure 5-1 shows the sequence of events that occurs if you use all of the SGI Electronic Support capabilities.

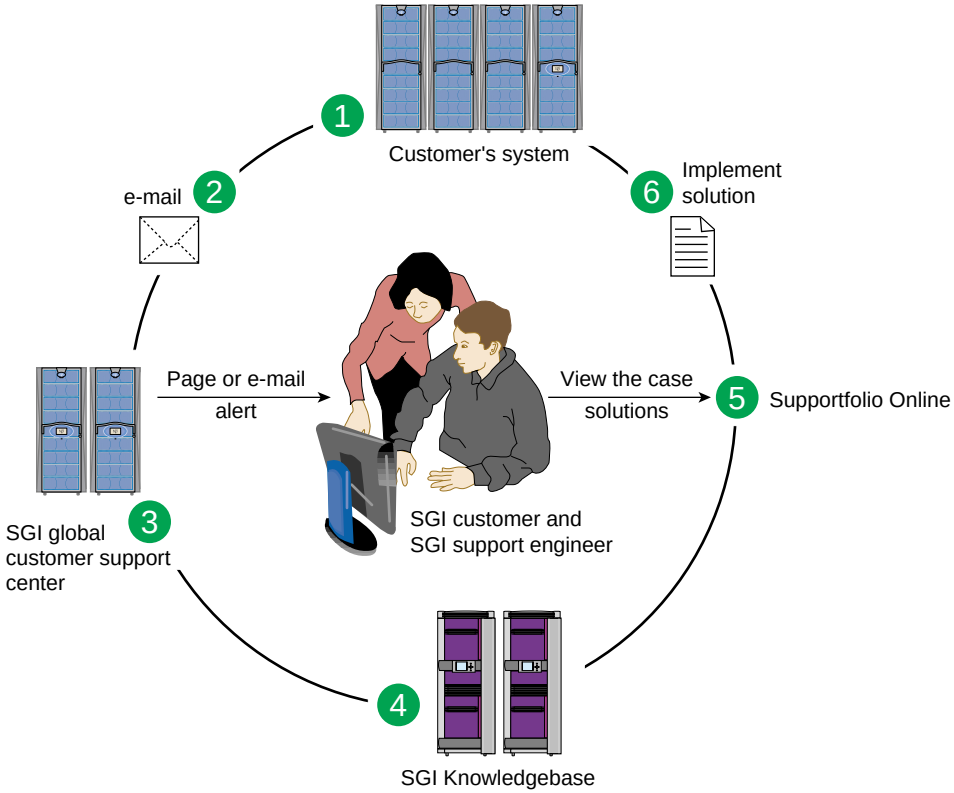


Figure 5-1 Full Support Sequence

The sequence of events can be described as follows:

1. Embedded Support Partner (ESP) monitors your system 24 hours a day.
2. When a specified system event is detected, ESP notifies SGI via e-mail (plain text or encrypted).
3. Applications that are running at SGI analyze the information, determine whether a support case should be opened, and open a case if necessary. You and SGI support engineers are contacted (via pager or e-mail) with the case ID and problem description.
4. SGI Knowledgebase searches thousands of tested solutions for possible fixes to the problem. Solutions that are located in SGI Knowledgebase are attached to the service case.
5. You and the SGI support engineers can view and manage the case by using Supportfolio Online as well as search for additional solutions or schedule maintenance.
6. Implement the solution.

Most of these actions occur automatically, and you may receive solutions to problems before they affect system availability. You also may be able to return your system to service sooner if it is out of service.

In addition to the event monitoring and problem reporting, SGI Electronic Support monitors both system configuration (to help with asset management) and system availability and performance (to help with capacity planning).

The following three components compose the integrated SGI Electronic Support system:

SGI Embedded Support Partner (ESP) is a set of tools and utilities that are embedded in the IRIX operating system. ESP can monitor a single system or group of systems for system events, software and hardware failures, availability, performance, and configuration changes, and then perform actions based on those events. ESP can detect system conditions that indicate potential problems, and then alert appropriate personnel by pager, console messages, or e-mail (plain text or encrypted). You also can configure ESP to notify an SGI call center about problems; ESP then sends e-mail to SGI with information about the event.

SGI Knowledgebase is a database of solutions to problems and answers to questions that can be searched by sophisticated knowledge management tools. You can log on to SGI Knowledgebase at any time to describe a problem or ask a question. Knowledgebase searches thousands of possible causes, problem descriptions, fixes, and how-to instructions for the solutions that best match your description or question.

Supportfolio Online is a customer support resource that includes the latest information about patch sets, bug reports, and software releases.

The complete SGI Electronic Support services are available to customers who have a valid SGI Warranty, FullCare, FullExpress, or Mission-Critical support contract. To purchase a support contract that allows you to use the complete SGI Electronic Support services, contact your SGI sales representative. For more information about the various support contracts, refer to the following Web page:

http://www.sgi.com/support/customerservice.html

For more information about SGI Electronic Support, refer to the following Web page:

http://www.sgi.com/support/es

Technical Specifications

This appendix provides detailed information about the following base components of the SGI Origin 300 system with NUMAlink module.

This appendix also includes detailed information about the following optional components:

Rack

The SGI Origin 300 system with NUMAlink module supports two rack types: a short rack and a tall rack. Both rack types are industry-standard 19-inch racks, and they support two types of mounting rails that support the modules within the rack. For example, the Origin 300 base modules use slide mounting rails (refer to Figure A-1), which enable you to slide the base module from the rack to access PCI cards and memory.

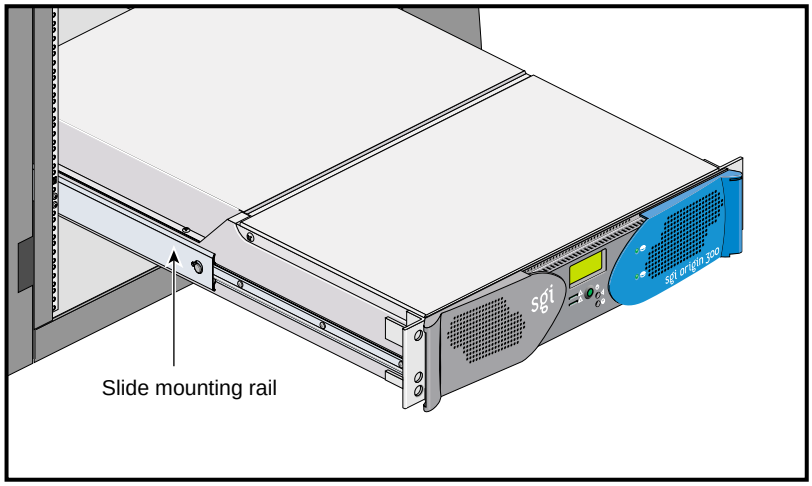


Figure A-1 Slide Mounting Rails

The NUMAlink module, PCI expansion module, and TP900 storage module are supported by two parallel L-shaped mounting rails within the rack (refer to Figure A-2).

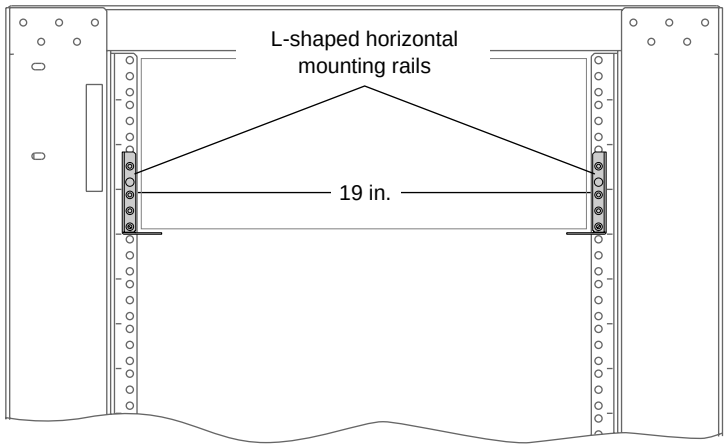


Figure A-2 L-shaped Mounting Rails

Specifications

The SGI Origin 300 system can be housed in one short (17U) rack or one tall (39U) rack (refer to Figure A-3).

Note: One U is 1.75 in. (4.45 cm).

Table A-1 lists the specifications of the short rack.

Table A-1 Short-rack Specifications (with Skins)

Characteristic	Specification
Height	36.06 in. (916.00 mm)
Width	25.38 in. (645.00 mm)
Depth	40.63 in. (1032.00 mm)
Weight (maximum)	488 lb (221 kg)
Shipping weight (maximum)	563 lb (255 kg)

Table A-2 lists the specifications of the tall rack.

Table A-2 Tall-rack Specifications

Characteristic	Specification
Height	75.82 in. (1925.83 mm)
Width	23.62 in. (599.95 mm)
Depth	41.25 in. (1048.00 mm)
Weight (maximum)	1,100 lb (499 kg)
Shipping weight (maximum)	1,281 lb (581 kg)

Components

Both rack types, as shown in Figure A-3, have front and rear doors that have keylocks to prevent unauthorized access of the system. The racks also have cable entry/exit areas at the bottom of the rack and cable management hardware in the rear of the racks.

Both rack types are mounted on four casters, two of which are swivel castors. The castors enable the racks to be rolled out of a shipping crate and to its placement at your site.

The base of the racks have seismic tie-down attachment points. The base of the tall rack also has leveling pads.

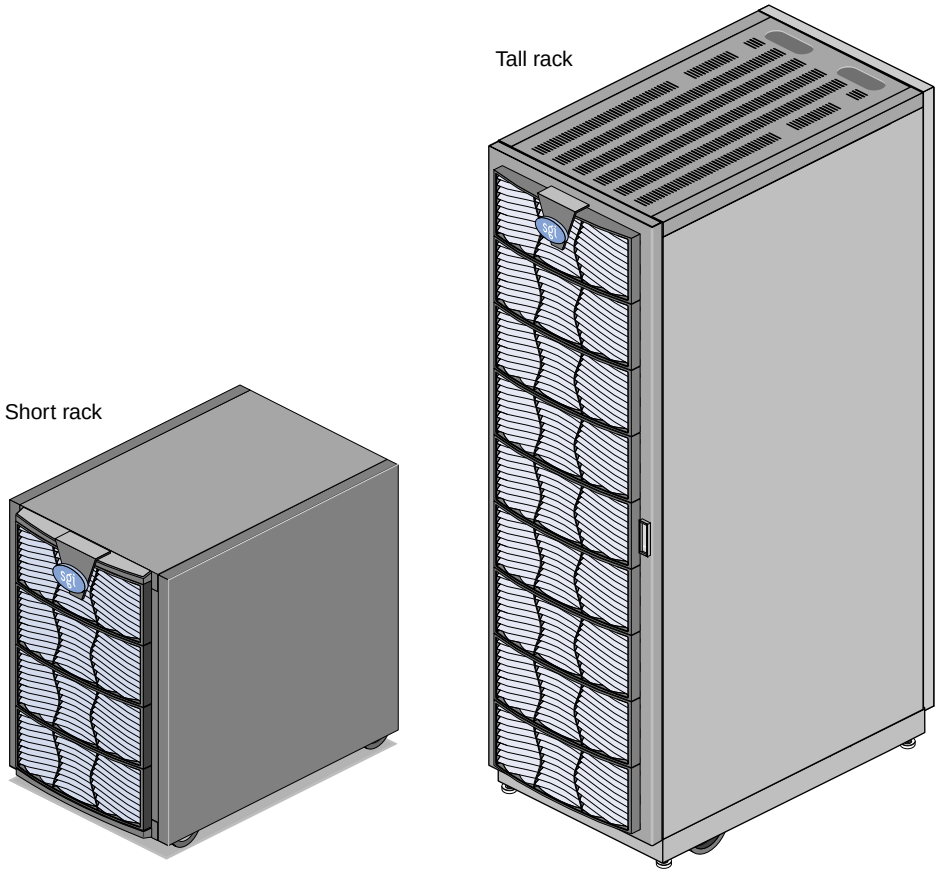


Figure A-3 Front Views of Short and Tall Racks

SGI Origin 300 Base Module

Table A-3 summarizes the general features of the SGI Origin 300 base module. Additional information is provided in the subsections that follow.

Table A-3 General Features of the SGI Origin 300 Base Module

Feature	Specification
MIPS RISC processors	Two or four
Memory	512 MB to 4 GB
Expansion slots	Two 32- or 64-bit (33- or 66-MHz) PCI slots
Serial ports	Two DB-9 RS-232 or RS-422
Ethernet	One 10BaseT or 100BaseT
SCSI channels (internal)	One Ultra3 SCSI, 160 MB/s
SCSI channels (external)	One Ultra3 SCSI (VHDCI)
3.5-in. drive bays	Two
USB ports	Two
RT interrupt input	One
RT interrupt output	One
L1 console port	One
NUMAlink port	One (1.6 GB/s each direction)
XIO port	One (800 MB/s each direction) This port is reserved for InfiniteReality graphics.

Specifications

Table A-4 shows the physical and environmental specifications for the SGI Origin 300 base module.

Table A-4 Physical and Environmental Specifications

Feature	Specification
Height	3.46 in. (8.80 cm)
Width	19.0 in. (48.3 cm) (front panel width) 17.07 in. (43.36 cm) (chassis width)
Depth	26 in. (66 cm) (without bezel) 26.8 in. (68.0 cm) (with bezel)
Weight	36.0 lb (16.4 kg)
Temperature, operating	+5 ˚C (+41 ˚F) to +35 ˚C (+95 ˚F) (up to 1500 m / 5000 ft) +5 ˚C (+41 ˚F) to +30 ˚C (+86 ˚F) (1500 m to 3000 m / 5000 ft to 10000 ft)
Temperature, non-operating	-40 ˚C (-40 ˚F) to +60 ˚C (+140 ˚F)
Humidity	10% to 95% RH, noncondensing
Altitude	Sea level to 40,000 ft (nonoperating) Sea level to 10,000 ft (3000 m) (operating)
Noise	50 dB(A) maximum
Heat dissipation	938 Btu/hr maximum
Input power	110/220 Vac autosensing (~275 W)

Front Chassis Components

Figure A-4 illustrates the front controls and indicators of the SGI Origin 300 base module.

- **L1 controller display** is a liquid crystal display (LCD) that displays status and error messages that the L1 controller generates.
- **Power button with LED** enables you to manually power on and power off the Origin 300 base module. Alternatively, you can power on and off the base module at a system console. The LED illuminates green when the internal components are on.
- **Reset button** resets the internal processors, ASICs, and memory.

Note: This reset causes memory loss. (Refer to the non-maskable interrupt [NMI] to perform a reset without losing memory.)

- **Non-maskable interrupt (NMI) button** resets the internal processors and ASICs without losing memory. Register data and memory are stored in a `/var/adm/crash` file.
- **Service required LED** illuminates yellow to indicate that an item has failed or is not operating properly, but the base module is still operating.
- **Failure LED** illuminates red to indicate that a failure has occurred and the base module is down.
- **Drive LEDs** illuminate green to indicate drive activity.

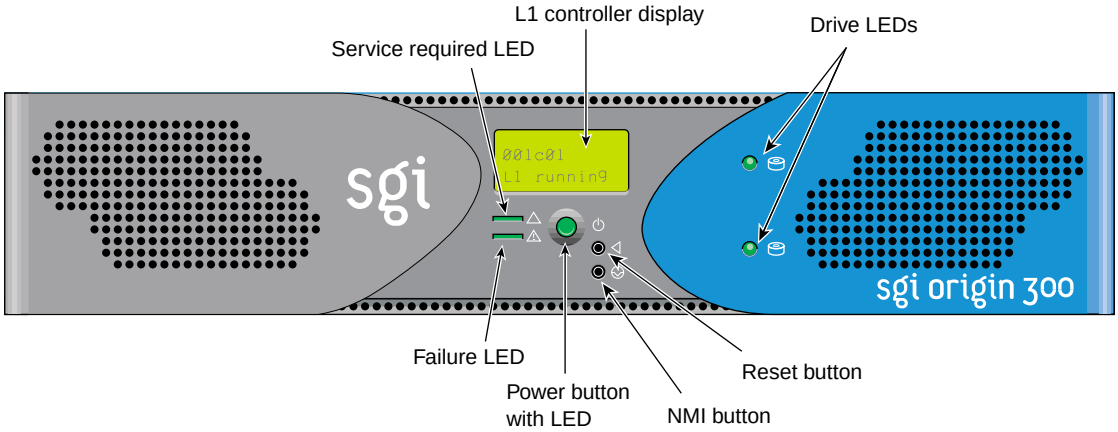


Figure A-4 Front Controls and Indicators

Rear Chassis Components

Figure A-5 illustrates the rear panel I/O ports and features of the SGI Origin 300 base module.

- **Power connector** connects to an AC power outlet.
- **LINK connector (**NUMAlink connector) connects the base module to a NUMAlink module. This connection is made with a NUMAlink 3 cable at 1.6 GB/s in each direction.
- **XIO connector** connects to an InfiniteReality graphics module.
- **L1 console port** (console and diagnostic port) connects the base module's L1 controller to a system console that runs the SGIconsole software.
- **USB L1 port** (universal serial bus) connects the base module's L1 controller to an L2 controller.
- **PCI slots 1 and 2** house PCI cards. The two PCI 2.2-compliant slots are configured on one bus. The PCI bus supports both 32- and 64-bit modes at 33 or 66 MHz. Refer to the SGI Supportfolio Online home page at http://support.sgi.com for an updated list of supported PCI cards.
- **Serial ports 1 and 2** can be used as COM ports to connect modems or other serial devices.
- **USB ports 1 and 2** connect auxiliary equipment such as a keyboard or a mouse.
- **RT interrupt input and output** (real-time interrupts) are used by the graphics cards to keep the graphics synchronized.
- **Ethernet port** (autonegotiating 10BaseT or 100BaseT Ethernet port) connects the base module to an Ethernet network.
- **External SCSI connector** (68-pin VHDCI external SCSI port) connects to SCSI devices (for example, TP900 storage module). Refer to the SGI Supportfolio Online home page at http://support.sgi.com for an updated list of supported SCSI devices.
- **Heartbeat LEDs** (four, one for each processor) indicate processor activity.

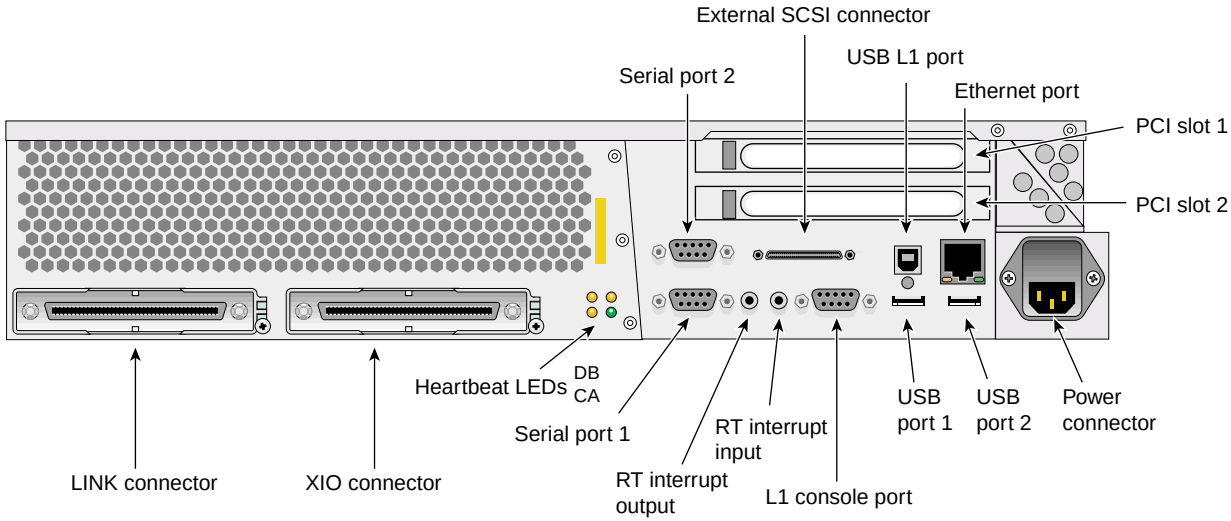


Figure A-5 Rear I/O Ports and Features

Internal Components and Features

The internal components of the SGI Origin 300 base module are shown in Figure A-6 and described in the following subsections:

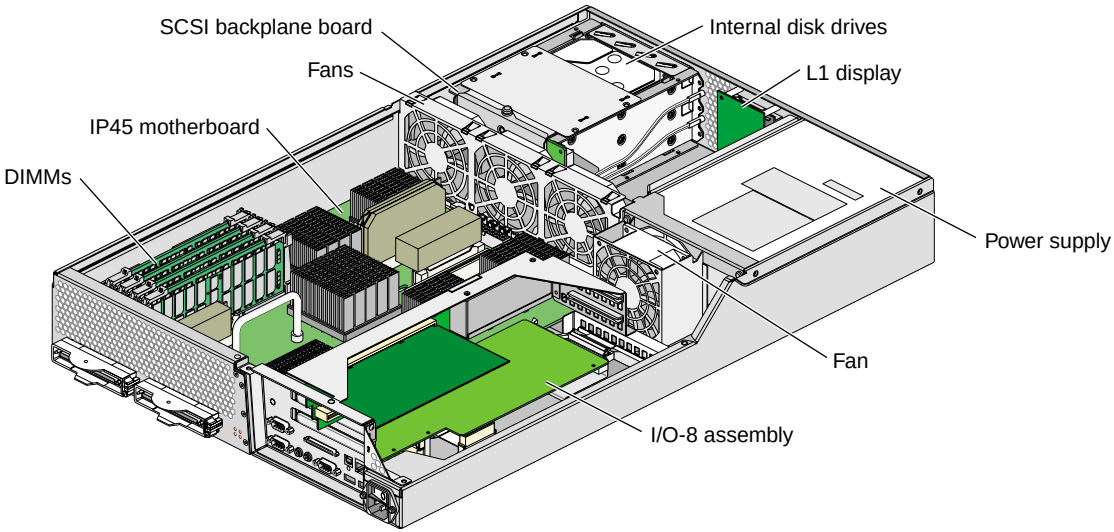


Figure A-6 Internal Components

IP45 Motherboard

The IP45 motherboard houses the following components:

- **Two or four MIPS RISC processors** (2-MB L2 cache per processor).
- **Four dual-inline memory module (DIMM) slots** that are organized as two banks of memory per two DIMM slots (four banks total), and configurable from 512 MB to 4 GB of main memory. Refer to "Dual-inline Memory Modules (DIMMs)" on page 126 for more information on DIMMs.
- **Bedrock ASIC** (or hub ASIC) that enables communication between the processors, memory, and I/O devices.
- **Xbridge ASIC** that is the interface between the Bedrock ASIC and the PCI slots.
- **Serial ID EEPROM** that contains component information.
- **L1 controller logic** that monitors and controls the environment of the base module (for example, fan speed, operating temperature, and system LEDs).
- **VRMs** that convert the incoming voltages to the voltage levels required by the internal components.
- **Light-emitting diodes (LEDs)** that provide information about the NUMAlink port and the processors:
  - Two NUMAlink LEDs, controlled by the L1 controller.
  - Four heartbeat LEDs (one for each processor), controlled by the Bedrock ASIC.
- **Ports** that provide connection to external components.

Note: Ports and LEDs are described in detail in "Rear Chassis Components" on page 122.

Dual-inline Memory Modules (DIMMs)

Each SGI Origin 300 base module has from 512 MB to 4 GB of local memory, which includes main memory and directory memory for cache coherence.

Local memory can consist of two to four banks, which are referred to as banks 0, 1, 2, and 3. The four banks are arranged as two DIMM pairs; DIMM pair 0 and DIMM pair 1. DIMM pair 0 consists of banks 0 and 1; DIMM pair 1 consists of banks 2 and 3. Each pair of banks consists of two dual-inline memory modules (DIMMs) that contain double data rate synchronous dynamic random-access memory (DDR SDRAM) chips.

Memory is increased or decreased in two-DIMM increments only. The two DIMMs that make up a bank pair must be the same memory size; however, each pair of DIMMs can be a different memory size. Figure A-7 shows the layout of the memory banks.

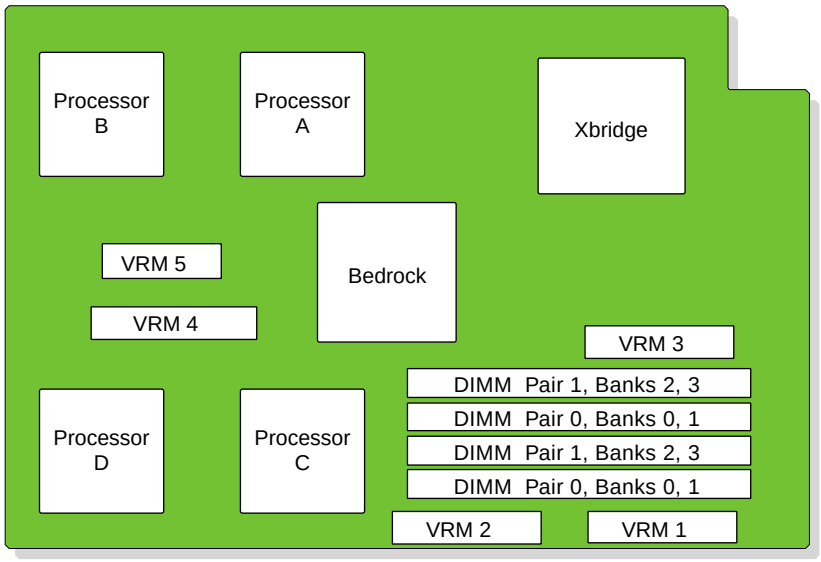


Figure A-7 Memory Bank Layout

The SGI Origin 300 base module supports the following memory kits:

- 512-MB kit with integrated directory memory.
- 1-GB kit with integrated directory memory.
- 2-GB kit with integrated directory memory.

I/O-8 Board Assembly

The I/O-8 board assembly consists of a main I/O-8 printed circuit assembly (PCA), an I/O-8 daughter card, and a PCI riser (refer to Figure A-8). The assembly provides I/O interface functions, the I/O connectors to the system back panel, and the L1 controller functions.

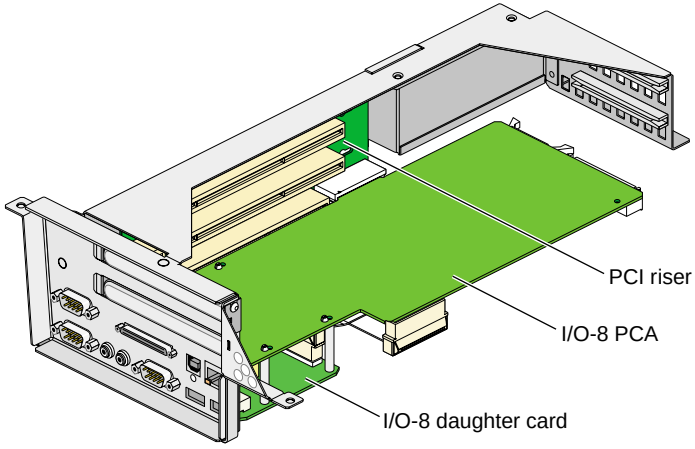


Figure A-8 I/O-8 Board Assembly

The I/O-8 PCA has the following connectors at the bulkhead:

- One external SCSI connector
- One 10BaseT/100BaseT auto-selecting Ethernet connector
- One L1 console connector
- Two USB 4-pin ports
- One USB L1 port
- Two serial ports
- One real-time (RT) interrupt output
- One RT interrupt input

Note: Ports and LEDs are described in detail in "Rear Chassis Components" on page 122.

The PCI riser provides a connection between the IP45 motherboard and the I/O-8 board assembly as well as two PCI card slots. The PCI riser has the following connectors:

- One connector that connects the PCI riser to the IP45 motherboard
- Two 64-bit universal PCI connectors that seat the PCI cards
- One nonstandard PCI connector that connects the PCI riser to the I/O-8 board assembly
- One 50-pin AMP connector that connects the PCI riser to the I/O-8 board assembly

Note: Refer to the SGI Supportfolio Online home page at http://support.sgi.com for a list of supported PCI option cards.

SCSI Backplane Board and Drive Options

The SCSI backplane provides a connection between the internal SCSI interface on the I/O-8 board and up to two disk drives. The SCSI backplane supports Ultra3 SCSI LVD disks with a peak transfer rate of 160 MB/s. Refer to the SGI Supportfolio Online home page at http://support.sgi.com for an updated list of supported drives.

The chassis accommodates up to two sled-mounted 3.5-in. by 1.0-in. Ultra3 SCSI LVD drives. The backplane supports 10,000-RPM and 15,000-RPM drives.

Power Supply

The SGI Origin 300 base module uses a nonredundant modified WTX power supply with an input of 110/220 Vac (auto-sensing) and a maximum output of 460 W (3.3/5/12 Vdc). The DC power from the power supply is delivered via a cable harness, which has multiple connectors for power delivery.

Fans

The Origin 300 base module is cooled by three fans in an N+1 redundant configuration. The power supply also uses an N+1 redundant cooling configuration; it is cooled by two fans. The direction of the airflow is front to back through the enclosure.

NUMAlink Module

The SGI Origin 300 with NUMAlink module system can use an AC-powered NUMAlink module or a DC-powered NUMAlink module. Logically, the AC-powered NUMAlink module and the DC-powered NUMAlink module are the same. Both NUMAlink modules route information between the Origin 300 base modules via the NUMAlink 3 interconnect. The NUMAlink modules consist of eight ports. Four ports can connect to four Origin 300 base modules. The other four ports, which carry USB signals, can connect to Origin 300 base modules or PCI expansion modules.

Physically, the AC-powered NUMAlink module differs from the DC-powered module in the following areas:

- The AC-powered NUMAlink module contains an internal power supply, which receives AC voltage from a PDU or power strip. The DC-powered NUMAlink module receives DC voltage from a power bay.
- The power connector at the rear of the AC-powered NUMAlink module is different from the power connector on the DC-powered NUMAlink module.
- The rear of the AC-powered NUMAlink module does not have a power switch, a 12-Vdc LED, nor a 48-Vdc LED.

Specifications

The NUMAlink modules require 2U of space within the rack and have the specifications that Table A-5 lists.

Table A-5 NUMAlink Module Specifications

Characteristic	Specification
Height	3.3 in. (83.82 mm)
Width	17.38 in. (441.45 mm)
Depth	27.5 in. (609.60 mm)
Weight	20 lb (9 kg)
Input power (AC powered)	110/220 Vac (~60 W)
Input power (DC powered)	+48 Vdc (~60 W)

Front Components

The AC- and DC-powered NUMAlink modules contain the following front-panel items (refer to Figure A-9):

- **L1 display** is a 2-line by 12-character liquid crystal display (LCD) that displays status and error messages that the L1 controller generates.
- **On/Off button with LED** enables you to manually power on and power off the module.
- **L1 controller LEDs** function as follows:
  - **On/Off button LED** illuminates green when the internal components are powered on.
  - **Service required LED** illuminates orange to indicate that an item is not functioning properly (for example, a fan is off), but the NUMAlink module is still operating.
  - **Failure LED** illuminates red to indicate that a failure has occurred and the NUMAlink module is down.
- **Fans** that provide N+1 redundant cooling for the module.

Note: The front of the NUMAlink module appears to display three cooling fans; however, only the middle and right fans are present.

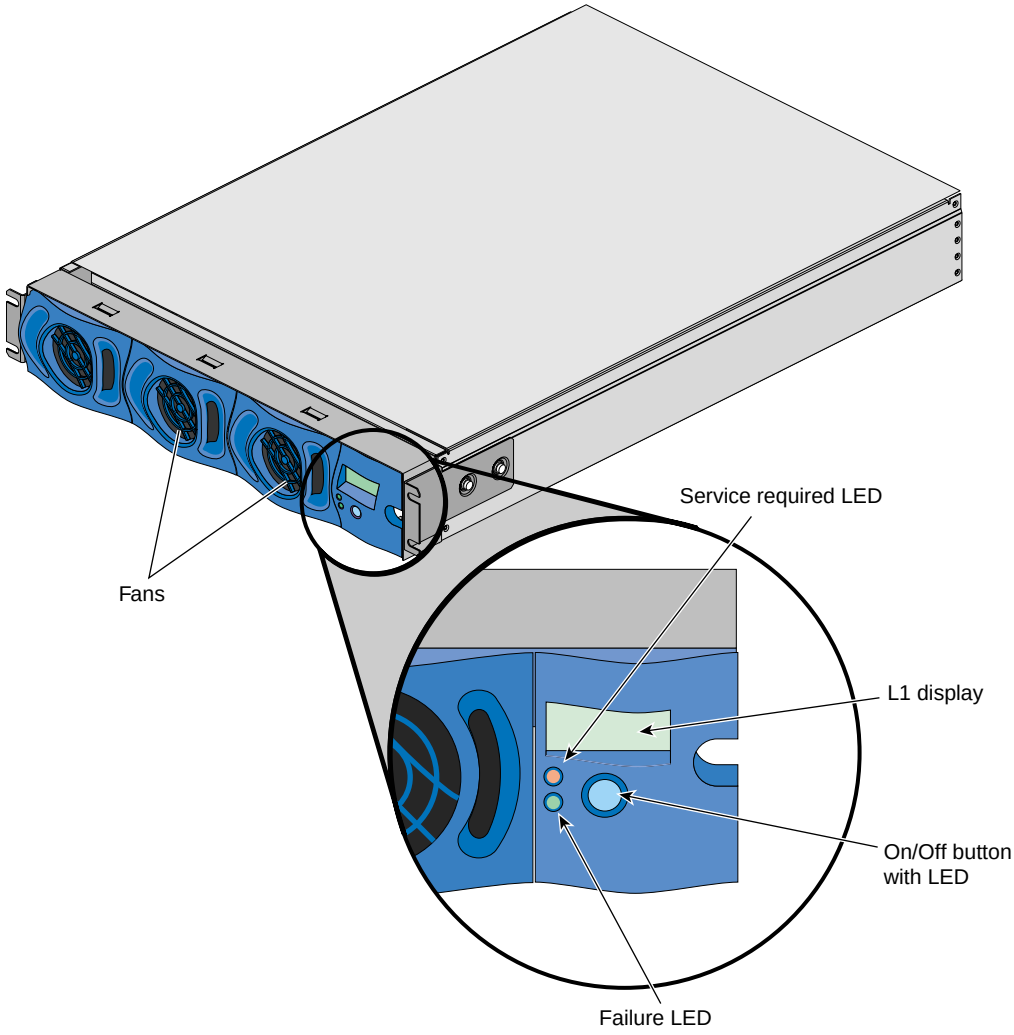


Figure A-9 Front View of the NUMAlink Module

Rear Components

The AC- and DC-powered NUMAlink modules have the following rear-panel items (refer to Figure A-10 and Figure A-11):

- **PWR (power) connector**:
  - Attaches the AC-powered NUMAlink module to the PDU or power strip via a power cable.
  - Attaches the DC-powered NUMAlink module to the power bay module via a DC power cable.
- **L1 port connector** connects the internal USB hub of the NUMAlink module to the L2 controller. The internal USB hub receives the USB signals from the L2 controller via this port and distributes these USB signals to the L1 controllers of the attached Origin 300 base modules and PCI expansion modules.
- **LINKS R to R connectors** (also referred to as ports 1, 6, 7, and 8, or A, F, G, and H) connect Origin 300 base modules to the NUMAlink module.
- **LINKS R to R and C to R connectors** (also referred to as ports 2, 3, 4, and 5, or B, C, D, and E) connect Origin 300 base modules and/or PCI expansion modules to the NUMAlink module.

  Besides NUMAlink signals, ports 2, 3, 4, and 5 transfer USB signals between the USB hub of the NUMAlink module and the L2 controller.
- **LINK connector LEDs.** Each NUMAlink connector has two LEDs:
  - The green LED illuminates to indicate that a cable is connected properly between the NUMAlink module and another module.
  - The yellow LED illuminates to indicate that the L1 controller detected the "Remote Power OK" signal from the module on the other end of the cable.

The DC-powered NUMAlink module also contains the following rear-panel items:

- **Power switch** powers on the L1 controller when moved to the **1** position; moving it to the **0** position powers off the L1 controller.
- **12-Vdc LED** illuminates green when the power switch is in the On position and the power bay supplies 12 Vdc to the module.
- **48-Vdc LED** illuminates green when the power bay supplies 48 Vdc to the module at the request of the L1 controller.

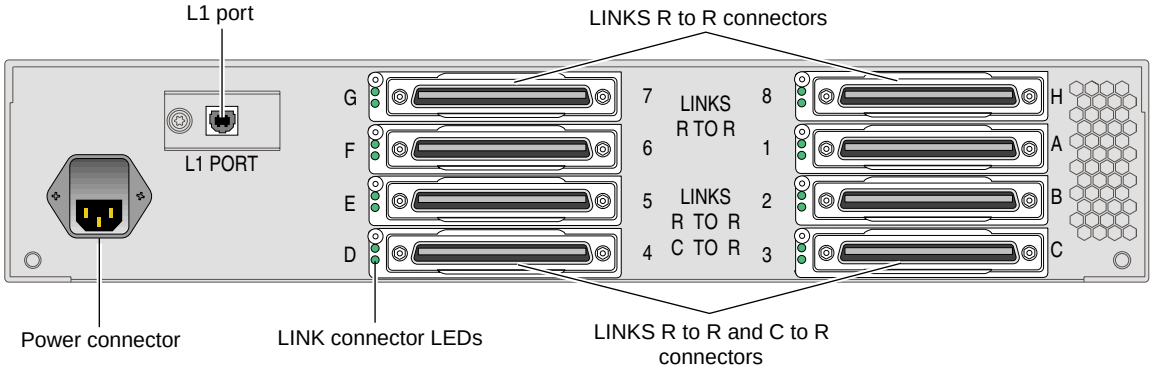


Figure A-10 Rear View of the AC-powered NUMAlink Module

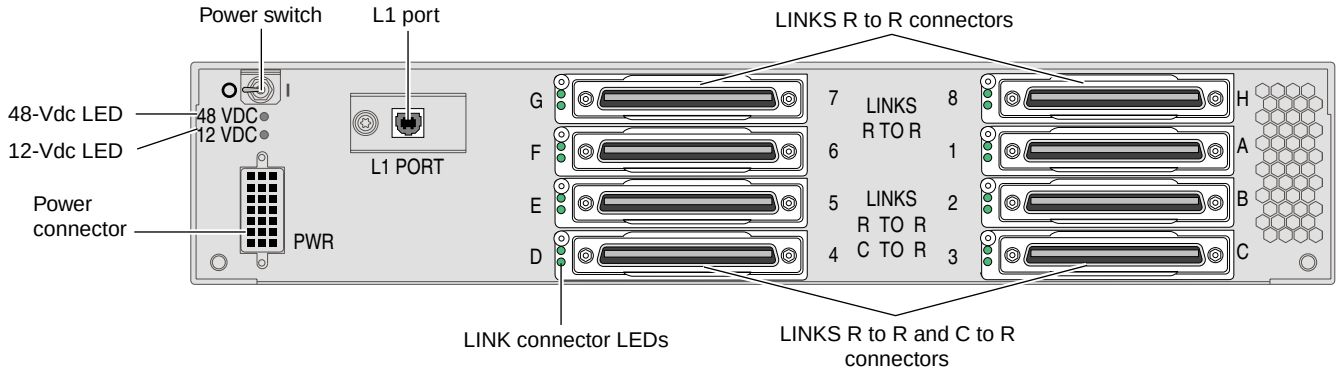


Figure A-11 Rear View of the DC-powered NUMAlink Module

Internal Components

The AC- and DC-powered NUMAlink modules contain the following internal components, which are described in the subsections that follow (refer to Figure A-12 and Figure A-13).

- Router printed circuit board (PCB)
- Power board
- L1 controller

The AC-powered NUMAlink module also contains a power supply (refer again to Figure A-12). The DC-powered NUMAlink module does not have an internal power supply.

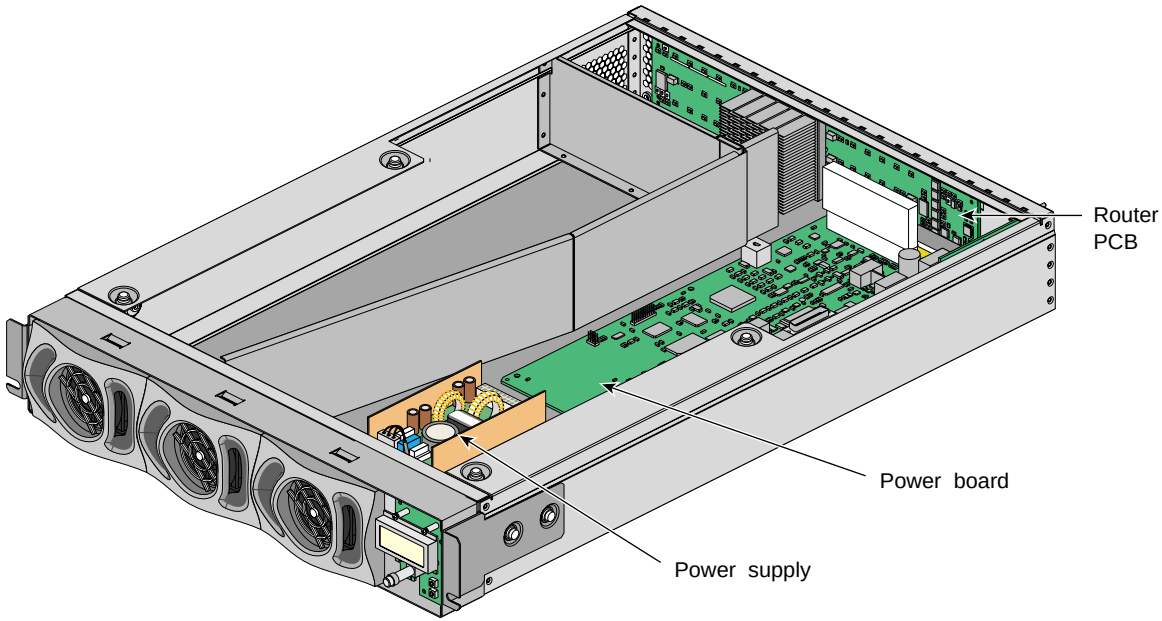


Figure A-12 Internal View of the AC-powered NUMAlink Module

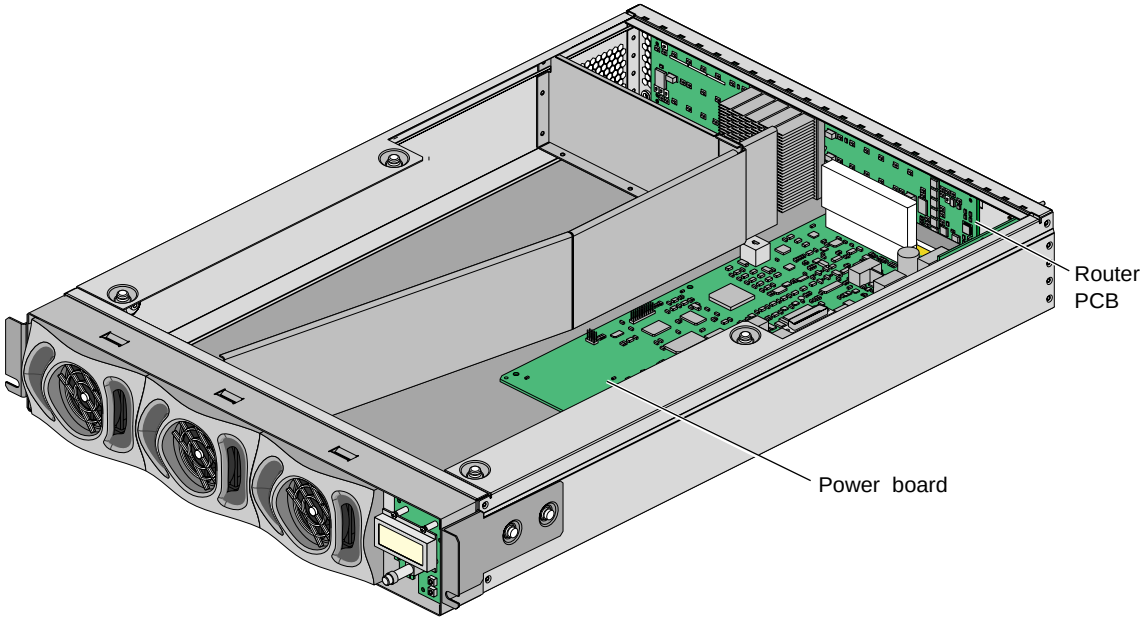


Figure A-13 Internal View of the DC-powered NUMAlink Module

Router PCB

A router PCB contains a router ASIC, a USB hub, and LINK connectors and LEDs. The router ASIC arbitrates for NUMAlink port access and has a crossbar unit that provides connection between the ports.

The USB hub is the interface between the L2 controller and the L1 controllers of the four modules that connect to ports 2, 3, 4, and 5. It receives the USB signals from the L2 controller via a USB port (labeled **L1 Port**). The USB hub is also the interface between the NUMAlink module L1 controller and the L2 controller.

The LINK connectors and LEDs are described in “Rear Components” on page 132.

Power Board

The power board connects to the router PCB via the power connector. It contains a VRM and voltage regulators that convert the incoming 48 Vdc to voltage levels that the components within the module require. The power board also contains a serial ID EEPROM and the L1 controller logic.

L1 Controller

The L1 controller monitors and controls the following environments: operating temperature, voltage margins, and system LEDs.

The L1 controller also reads component information from serial ID EEPROMs, provides a console connection, and interfaces with its own 2-line x 12-character LCD. The NUMAlink module L1 controller connects to the L2 controller via its internal USB hub and 4-pin USB port connector.

The L1 controller consists of the display, logic components, and a display cable. The display is located at the front of the module. The logic components are located on the power board. The cable connects the display to the logic components.

Power Supply (AC-powered NUMAlink Module Only)

The AC-powered NUMAlink module uses a nonredundant switching power supply that inputs 90 to 264 Vac from a PDU or power strip and outputs 48 Vdc (120 W) and 12 Vdc standby. The power supply delivers this voltage to the power board via a cable harness.

USB Hub

The four-port USB hub connects the L2 controller to the Origin 300 base modules that connect to ports 1, 6, 7, and 8 of the NUMAlink module.

Specifications

Table A-6 lists the specifications of the USB hub.

Table A-6 USB Hub Specifications

Characteristic	Specification
Height	0.88 in. (22.23 mm)
Width	4.25 in. (107.95 mm)
Depth	2.75 in. (69.85 mm)

Components

Figure A-14 illustrates the USB hub. It consists of five ports (four ports connect to Origin 300 base modules and one port connects to the L2 controller) and a power adapter that connects the hub to a power distribution unit (PDU) or power strip.

Note: The USB hub might look different than the one shown in Figure A-14.

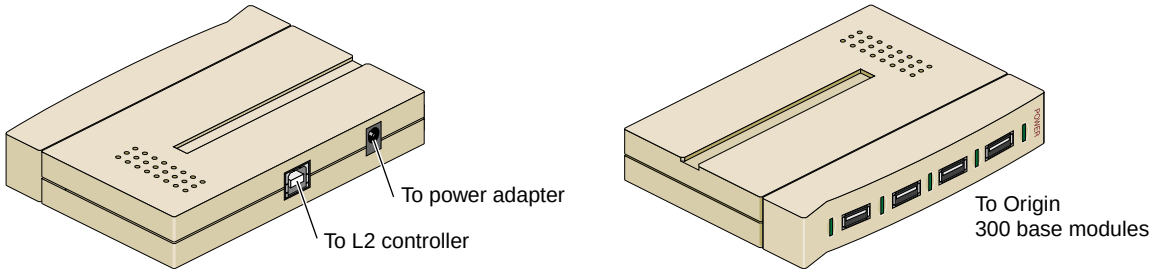


Figure A-14 Side Views of the USB Hub

L2 Controller

The L2 controller is a rack-level controller; it communicates with all of the L1 controllers within the rack. For example, it receives status and error messages from the L1 controllers. The L2 controller is housed in a sheet metal box that is 1U high and is located at the top rear of the rack.

You can access the L2 controller via the system console.

Specifications

Table A-7 lists the specifications of the L2 controller.

Table A-7 L2 Controller Specifications

Characteristic	Specification
Height	1.75 in. (44.45 mm)
Width	14.0 in. (355.6 mm)
Depth	6.0 in. (165.1 mm)
Input power	+48 Vdc (~30 W)

Components

The L2 controller has the following connectors (refer to Figure A-15):

- Power connector that connects the L2 controller to a power bay module or to a stand-alone power supply when the system has an AC-powered NUMAlink module.
- RS-485 connector that is not used.
- Two RS-232 ports (DB-9) that connect the L2 controller to a modem.
- 10BaseT Ethernet port that connects the L2 controller to an Ethernet hub (system console that contains SGIconsole software).
- Rack display port that is not used.
- Four USB ports; two of these ports connect the L2 controller to the L1 port of the NUMAlink module and to the Origin 300 base modules that connect to NUMAlink module ports 1, 6, 7, and 8 via a USB hub.

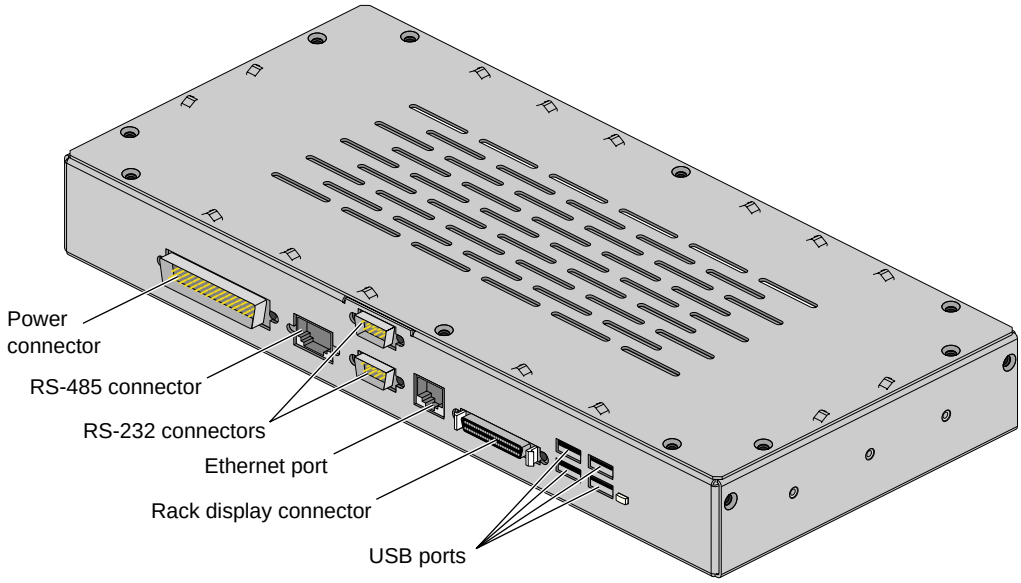


Figure A-15 Front View of the L2 Controller

Power Bay Module

The power bay can monitor, control, and supply AC power to as many as six power supplies; however, in this system, the power bay contains two or three power supplies. The third power supply is required when the system has four PCI expansion modules.

Each power supply inputs single-phase AC voltage and outputs 950 W at 48 Vdc and 42 W at 12 Vdc standby. The outputs of the power supplies are bused together. For example, when the power bay contains two power supplies, the power supplies are bused together to provide 1,840 W at 48 Vdc and 90 W at 12 Vdc standby of available power.

Specifications

The power bay requires 3U of space within the rack and has the specifications that are listed in Table A-8.

Table A-8 Power Bay Module Specifications

Characteristic	Specification
Height	5.12 in. (130.00 mm)
Width	17.5 in. (443.0 mm)
Depth	22.008 in. to 23.898 in. (559.0 mm to 607.0 mm)
Weight (with two power supplies)	42.00 lb (19.05 kg)

Table A-9 lists the specifications of the power supplies.

Table A-9 Power Supply Specifications

Characteristic	Specification
Height	4.86 in. (123.50 mm)
Width	2.74 in. (69.50 mm)
Depth	13.67 in. (347.30 mm)
Weight	7.50 lb (3.38 kg)

Front Components

The front of the power bay seats the distributed power supplies (refer to Figure A-16). When the power bay contains two power supplies, the supplies reside in locations 5 and 6. The third power supply resides in location 4.

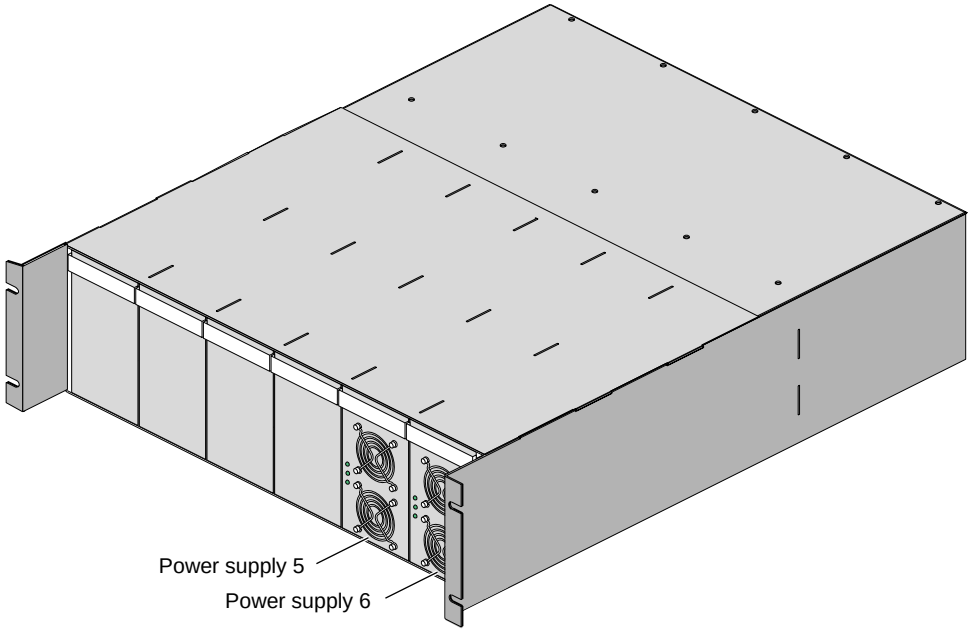


Figure A-16 Front View of Power Bay Module

The power supplies are air-cooled devices; each power supply has two fans that move air from the front of the rack to the rear of the rack.

Each power supply has the following LEDs:

- Power
- Predictive fail (PFAIL)
- Power supply fail (FAIL)

Table A-10 lists conditions of the power supplies and the corresponding states of the LEDs.

Table A-10 Power Supply LED States

Power Supply Condition	LED States		
	Power (Green)	**PFAIL (Amber)**	**FAIL (Amber)**
AC voltage not applied to all power supplies	Off	Off	Off
AC voltage not applied to this power supply	Off	Off	On
AC voltage present; standby voltage on	Blinking	Off	Off
Power supply DC outputs on	On	Off	Off
Power supply failure	Off	Off	On
Current limit reached on 48-Vdc output	On	Off	Blinking
Predictive failure	On	Blinking	Off

Each power supply also contains a serial ID EEPROM that identifies the model and serial number of the supply. The L1 controller of a connecting module reads this information via the DC power cable.

Rear Components

The power bay module has eight output connectors (refer to Figure A-17). A power cord connects one output connector to a DC-powered NUMAlink module, PCI expansion module, or L2 controller. This connection provides 12 Vdc standby, 48 Vdc, and monitoring signals.

Note: The L1 controller of a connecting module can monitor the status and enable the output ports of the power bay.

The power bay module also has six AC input connectors; one for each power supply location. For example, when the power bay contains two power supplies, connectors 5 and 6 connect to the power distribution unit (PDU). When the power bay contains three power supplies, connector 4 also connects to the PDU.

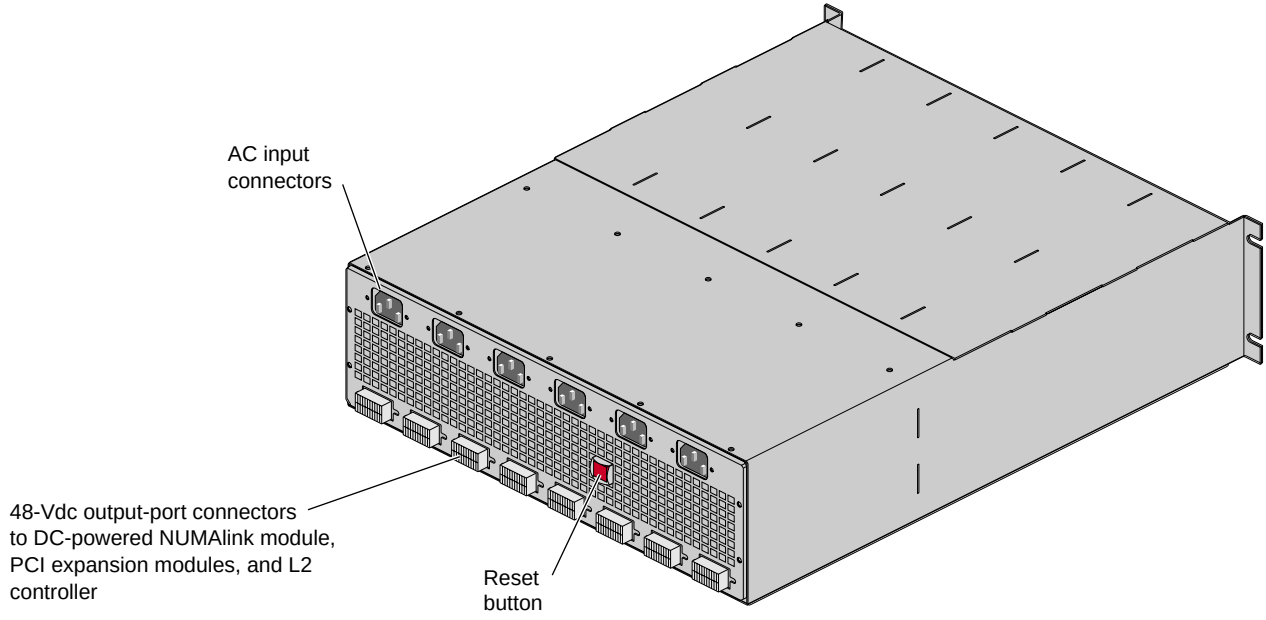


Figure A-17 Rear View of Power Bay Module

Internal Components

The power bay contains a motherboard that connects the power supplies to the connectors at the rear of the power bay; it serves as the power bus that buses the outputs of the power supplies together to produce 48 Vdc and 12 Vdc standby. The power bay motherboard also:

- Contains overcurrent protection circuits for each power port.
- Filters the DC voltage.
- Contains a serial ID EEPROM that indicates the model and serial number of the power bay.
- Seats the system management card.

  The system management card is the control system for the power bay. It contains the logic that powers the power supplies and ports on and off and a serial ID EEPROM that indicates the model and serial number of the unit. The L1 controller uses the RS-485 signals of the DC power cables to read this PROM.

  The system management card also performs the following functions:

  - Interfaces with the L1 controllers.
  - Provides a communication link between the power supplies and the power bay.
  - Monitors faults.
  - Provides access to data for the power bay and power supplies.

PCI Expansion Module

The PCI expansion module is an optional device that provides an additional twelve PCI slots for the Origin 300 system. As many as four PCI expansion modules can reside in this system; the number of PCI expansion modules depends on the number of base modules in the system (refer to Table A-11).

Table A-11 Number of Supported PCI Expansion Modules

Number of Base Modules	Supported PCI Expansion Modules
Two	Two
Three	Three
Four	Four
Five	Three
Six	Two
Seven	One
Eight	Zero

The PCI expansion module contains 6 buses; each bus can seat one or two 3.3-V or universal PCI cards that mount on PCI carriers. Each bus supports either two 33-MHz PCI cards or two 66-MHz PCI cards.

The PCI expansion module communicates with the Origin 300 base modules and the L2 controller via the NUMAlink module. The PCI expansion modules connect to the NUMAlink module via ports 2, 3, 4, and 5.

Note: For more information about the PCI expansion module, refer to the *PCI Expansion Module User's Guide* (007-4499-00x).

Specifications

Table A-12 lists the specifications of the PCI expansion module.

Table A-12 PCI Expansion Specifications

Characteristic	Specification
Height	7.0 in. (177.8 mm)
Width	17.5 in. (444.5 mm)
Depth	27.5 in. (698.5 mm)
Weight	70.0 lb (31.5 kg)
Input power	+48 Vdc (~250 W)

Front Components

The PCI expansion module contains the following front-panel items (refer to Figure A-18):

- **L1 display** is a 2-line by 12-character liquid crystal display (LCD) that displays status and error messages that the L1 controller generates.
- **On/Off button with LED** enables you to manually power on and power off the module.
- **L1 controller LEDs** function as follows:
  - **On/Off button LED** illuminates green when the internal components are powered on.
  - **Service required LED** illuminates orange to indicate that an item is not functioning properly (for example, a fan is off), but the PCI expansion module is still operating.
  - **Failure LED** illuminates red to indicate that a failure has occurred and the PCI expansion module is down.
- **Three fans** that provide N+1 redundant cooling for the module.

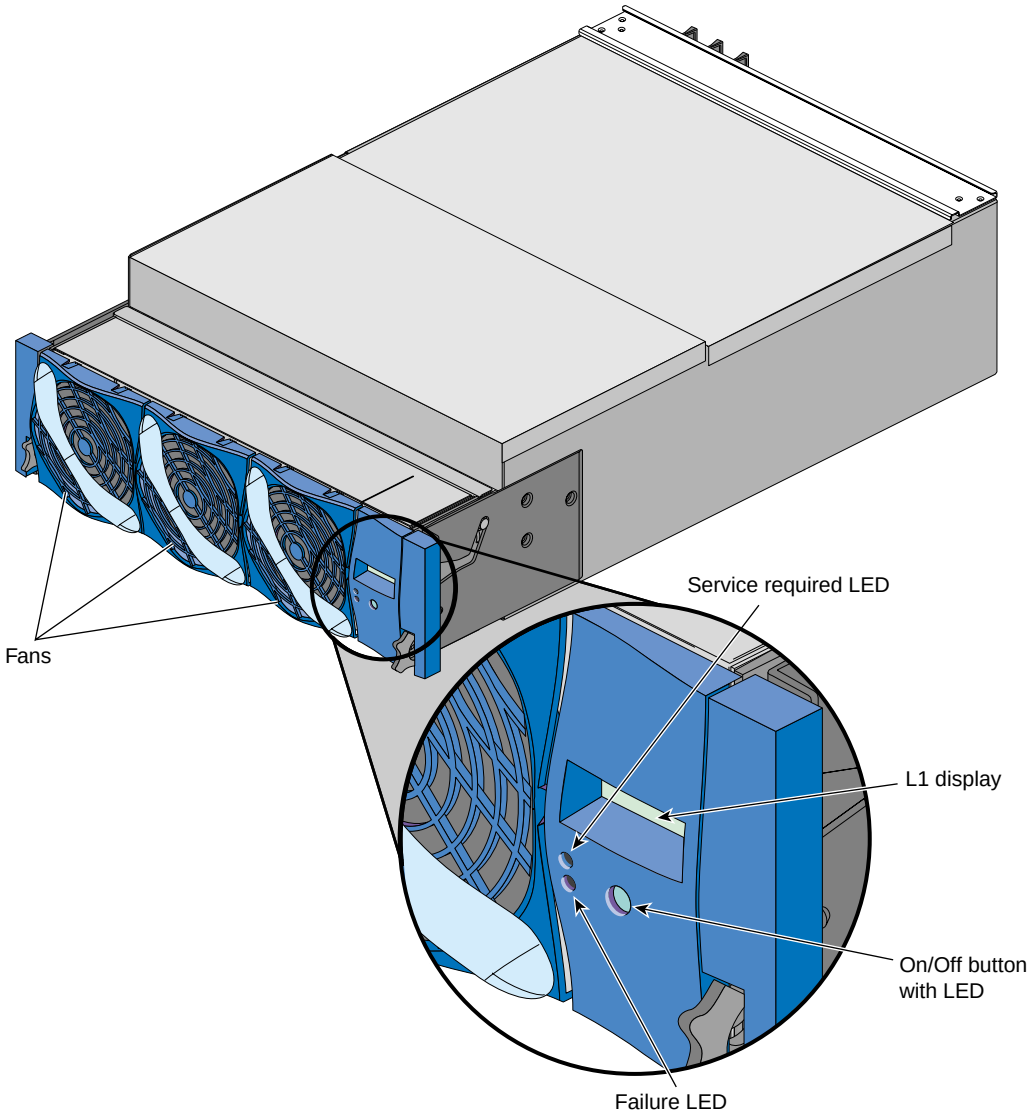


Figure A-18 Front View of PCI Expansion Module

Rear Components

The PCI expansion module has the following rear-panel items (refer to Figure A-19):

- **Power switch** powers on the L1 controller when moved to the **1** position; moving it to the **0** position powers off the L1 controller.
- **12-Vdc LED** illuminates green when the power switch is in the On position and the power bay supplies 12 Vdc to the module.
- **48-Vdc LED** illuminates green when the power bay supplies 48 Vdc to the module at the request of the L1 controller.
- **PWR (power) connector** attaches to the power bay via a DC power cable.
- **PCI slots** seat the PCI cards. Each slot has two LEDs:
  - **PWR (power) LED** illuminates green when the PCI card carrier is installed securely and is receiving power.
  - **Fault LED** illuminates orange when a fault occurs with the PCI card.
- **NUMAlink connector** attaches the PCI expansion module to the NUMAlink module via a NUMAlink cable.
- **Bulkhead filler plate** covers the unused connector slot so that air flows properly through the module.

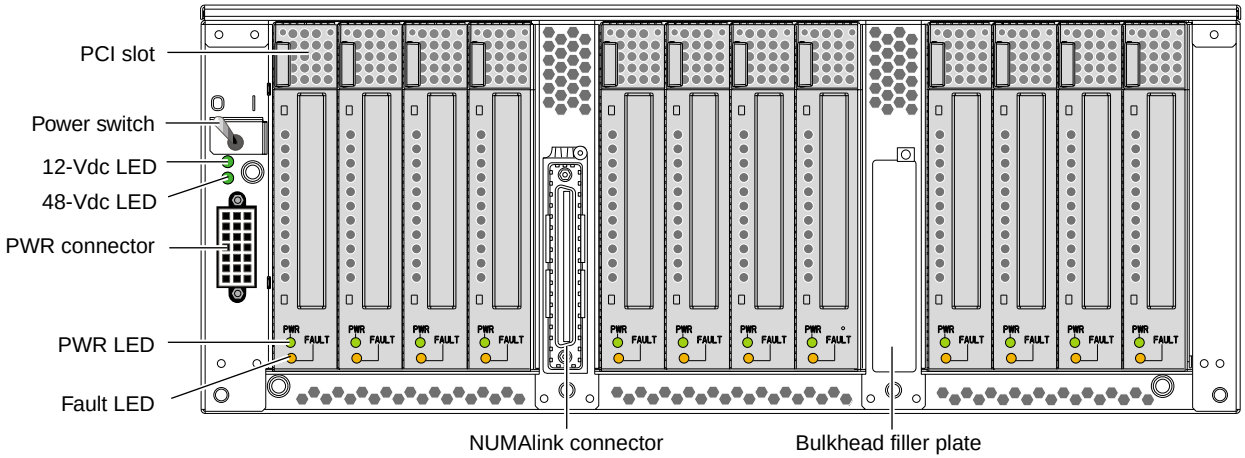


Figure A-19 Rear View of PCI Expansion Module

Internal Components

The PCI expansion module contains the following components, which are shown in Figure A-20 and discussed in the subsections that follow:

- Bedrock interface card
- PCI motherboard
- Power board
- L1 controller

Bedrock Interface Card (BIC)

The PCI expansion module houses one Bedrock interface card (BIC) that contains a Bedrock ASIC, a NUMAlink 3 connector, a power connector, and a connector that connects to the PCI motherboard.

The Bedrock ASIC enables this card to transfer signals between an Origin 300 base module and the PCI expansion module via the NUMAlink module; the Bedrock ASIC passes these signals to the Xbridge ASICs that are located on the PCI motherboard. The Bedrock ASIC receives power from the PCI motherboard via the power connector.

The NUMAlink 3 connector of the BIC is the left connector when you face the rear of the PCI expansion module. The right connector contains a bulkhead filler plate to maintain proper airflow through the module.

PCI Motherboard

The PCI motherboard contains 12 PCI slots and three Xbridge ASICs. The Xbridge ASICs are the interface between the Bedrock ASIC on the BIC and the PCI cards. The PCI motherboard also contains a serial ID EEPROM that contains component information.

Power Board

The power board contains the logic components of the L1 controller, voltage regulator modules (VRMs), and a DC-to-DC converter. The VRMs and the DC-to-DC converter convert the incoming 48 Vdc to voltage levels required by the components within the module.

L1 Controller

The L1 controller monitors and controls the environment of the PCI expansion module. It consists of a display, logic components, and an internal cable. The display is located on the front of the module. The L1 controller logic components are on the power board. The internal cable connects the display to the logic components.

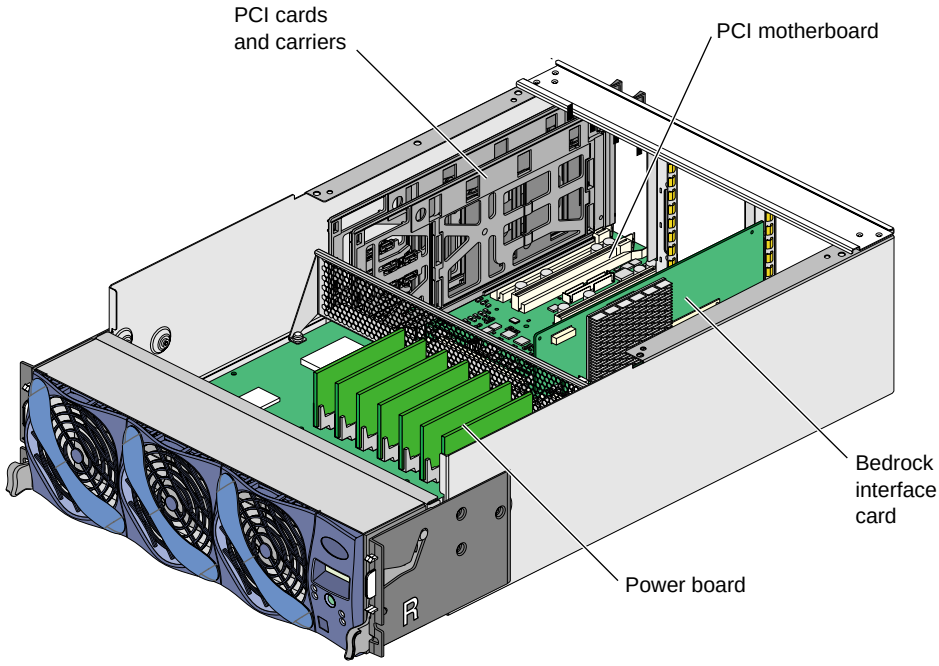


Figure A-20 Internal View of PCI Expansion Module

SGI TP900 Storage Module

The SGI TP900 storage module is a rackmountable, 2U-high, 8-drive storage system that provides JBOD (just a bunch of disks) storage for the Origin 300 base module. The drive backplane connects the 8 drives on one SCSI bus. As an option, the storage system can also be configured on two SCSI buses (2 strings of 4 drives).

Note: For more information about the TP900 storage module, refer to *SGI Total Performance 900 Storage System User's Guide*.

Specifications

Table A-13 lists the specifications of the TP900 storage module.

Table A-13 TP900 Storage Module Specifications

Characteristic	Specification
Height	3.37 in. (85.70 mm)
Width	17.6 in. (447.0 mm)
Depth	21.46 in. (545.00 mm)
Input power	100 - 254 Vac (~175 W)
Weight:	
Maximum configuration	48.5 lb (22.0 kg)
Empty enclosure	14.3 lb (6.5 kg)

Front Components

The front of the SGI TP900 chassis consists of eight drive bays that contain either disk drive carrier modules or dummy carrier modules, which are discussed in the subsections that follow. The front of the TP900 is four bays wide by two bays high. The bays are numbered 1 and 2 from top to bottom and 1 to 4 from left to right. Refer to Figure A-21.

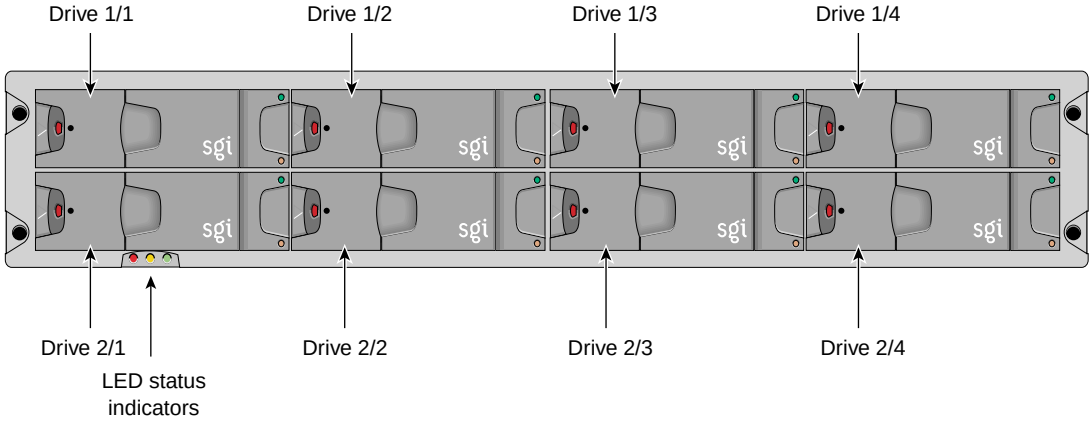


Figure A-21 Front View of TP900 Storage Module

The front of the chassis also contains the three status LEDs that are listed in Table A-14.

Table A-14 Status LEDs

LED	Status
System status	Green signifies that power is applied to the enclosure. Amber signifies that the ESI processor has failed.
Power status	Green signifies that the power supplies are functioning normally. Amber signifies a power supply failure.
Cooling status	Green signifies that all fans are functioning normally. Amber signifies a fan failure.

Disk Drive Carrier Module

The disk drive carrier module is a die-cast aluminum carrier that houses a single 1.0-in. high, 3.5-in. disk drive.

Each drive carrier has two LEDs: a green LED and an amber LED. In normal operation, the green illuminates and flickers as the drive operates. The amber LED illuminates when a fault occurs.

This carrier has a handle that enables you to insert and remove the carrier from the drive bay. The handle also has an anti-tamper lock that locks the handle in place; therefore, the carrier cannot be removed from the drive bay. When the handle is locked, a red indicator is visible in the handle. When carrier is unlocked, a white indicator is visible.

Dummy Carrier Module

All unused drive bays require a dummy carrier module to maintain proper airflow in the system. The dummy carrier module consists of a drive module front cap that contains a handle.

Rear Components

The rear of the TP900 storage module contains six bays that house power supply, cooling, and SCSI I/O modules. Refer to Figure A-22. The rear of the TP900 storage module is three bays wide by two bays high. The bays are numbered 1 and 2 from top to bottom and 1 to 3 from right to left.

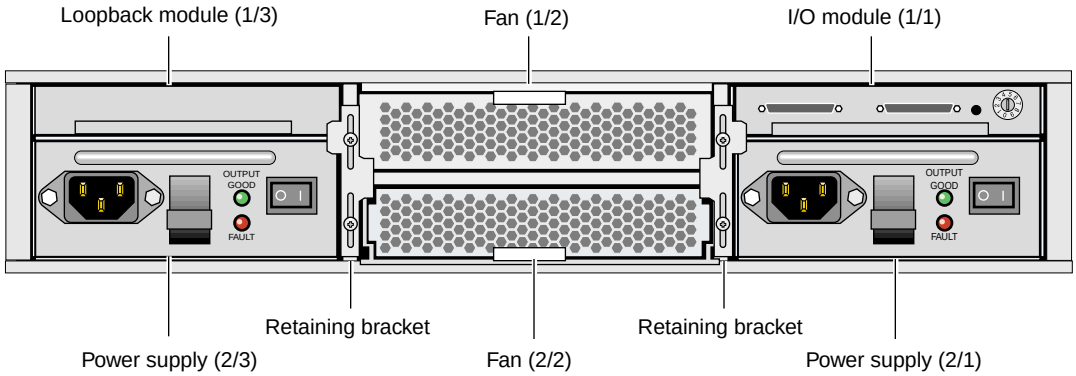


Figure A-22 Rear View of TP900 Storage Module

The TP900 rear bays house the following components, which are discussed in the subsections that follow.

- Power supply module
- Input/output (I/O) module
- Cooling module
- Blank modules

Power Supply Module

The SGI TP900 storage system requires one 350-W power supply module, which is mounted in the rear of the system. Power supply voltage operating ranges are nominally 115 V or 230 V and are selected automatically.

Optionally, a second power supply module can be added to the TP900 system to provide redundant power. In this redundant configuration, the power supply modules operate together; if one power supply module fails, the other module supplies power until the faulty unit is replaced.

The power supply module contains two LEDs that are located on the front panel of the power supply. The green LED indicates power output. The amber LED indicates a power supply failure.

Input/Output (I/O) Module

The I/O module contains two VHDCI connectors and a switch to set the SCSI ID range. The SGI TP900 storage module supports one I/O module for a 1 x 8 configuration and two I/O modules for a 2 x 4 configuration. The 1 x 8 configuration creates a SCSI bus structure with 1 string of 8 drives. The 2 x 4 configuration creates a SCSI bus structure with 2 strings of 4 drives.

Note: When only one I/O module is present in the system, the other I/O module location contains a loopback module that has no external connectors.

Cooling Module

The cooling module consists of fans that pull warm air from a plenum behind the drive backplane and exhaust the warm air at the rear of the enclosure. The cooling modules connect to the backplane for power and status signal connections.

The TP900 system requires one cooling module, which is mounted in the rear of the system. Optionally, a second cooling module can be added to the system to provide redundant cooling. In this redundant configuration, the cooling modules operate together; if one module fails, the other module adequately cools the system until the faulty unit is replaced.

The cooling module has two LEDs that are located on the front panel of the cooling module. The green LED indicates that the cooling module is functioning properly. The amber LED indicates a fan failure.

Blank Modules

Blank modules are placed in all vacant power supply and cooling module bays to maintain proper airflow through the system.

Myrinet-2000 Switch

The Myrinet-2000 switch is a 16-port switch that provides the network fabric necessary to cluster up to four 32-processor Origin 300 with NUMAlink module systems. It is a high-performance packet communication and switching technology that interconnects the clusters of base modules via full-duplex 2+2 Gb/s links.

The Origin 300 base modules connect to the switch via a fiber cable and a Myrinet PCI card.

Specifications

Table A-15 lists the specifications of the Myrinet-2000 switch.

Table A-15 Myrinet-2000 Switch Specifications

Characteristic	Specification
Height	3.40 in. (36.36 mm)
Width	17.0 in. (431.8 mm)
Depth	18.0 in. (457.2 mm)
Input power	220 Vac (~40 W)
Weight	15.0 lbs (6.8 kg)

Front Components

The front of the Myrinet-2000 switch contains the following components:

- Monitoring line card
- Port line cards
- Fan tray

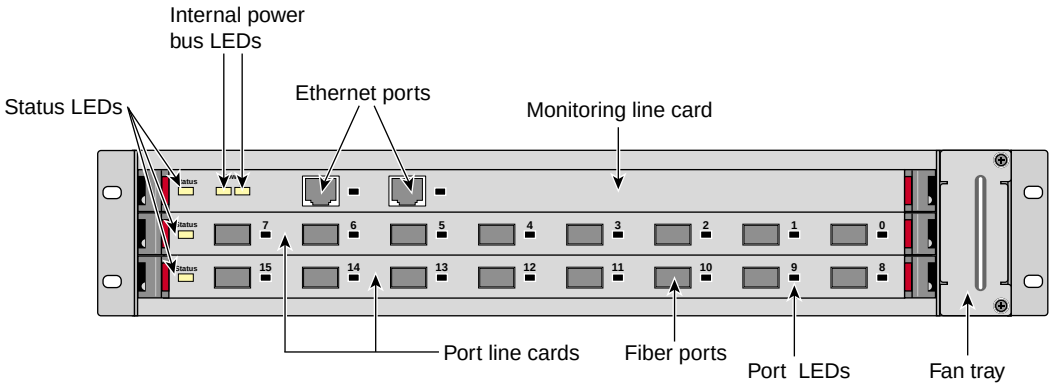


Figure A-23 Front View of Myrinet-2000 Switch

Monitoring Line Card

The monitoring line card monitors and controls the Myrinet-2000 switch. It has two microcontrollers: one microcontroller monitors internal functions, voltages, and temperatures of the monitoring line card, and the second microcontroller communicates with the other internal components of the switch via serial communication links.

The monitoring line card communicates externally via one of the Ethernet ports and uses a standard firmware that runs under VxWorks, a real-time operating system. You can download updated firmware and receive status information via the Ethernet port.

The panel of the monitoring line card includes the following items:

- Two Ethernet ports
- Two Ethernet port LEDs (one LED for each Ethernet port) that illuminate green when the ports are connected to active ports; they blink when there is traffic on the ports
- One status LED that illuminates green when the monitoring line card is operating properly; it illuminates yellow when there is a fault
- Two +12 V power bus LEDs that illuminate green when the power is on
- One label that displays the Ethernet MAC address

Note: The Ethernet ports are redundant; therefore, they have the same MAC address.

Port Line Cards

The Myrinet-2000 switch contains 2 port line cards:

- One spine port line card that contains 8 fiber ports
- One switch port line card that contains 8 fiber ports and one 16-port crossbar

The fiber ports (via fiber cables) connect to Myrinet PCI cards that are installed in the Origin 300 base modules. The 16-port crossbar provides links between the hosts that connect to the fiber ports.

In Figure A-23, the switch port line card is located below the spine card.

The port line cards have the following LEDs:

- Status LED - The status LED illuminates green to indicate that the card has passed its self-test and all voltages, temperatures, and internal status bits are at nominal levels; it illuminates yellow to indicate a fault. The status LED is controlled by the microcontroller of that line card. The monitoring line card can provide more detailed information about the status of the port line card, including the type of port line card, its serial number, and internal voltages and temperature.
- Port LEDs - Each fiber port has an LED that illuminates green when the port is cabled to an active port; it blinks when traffic is flowing.

Fan Tray

The fan tray contains fans that cool the components within the switch (refer to Figure A-24).

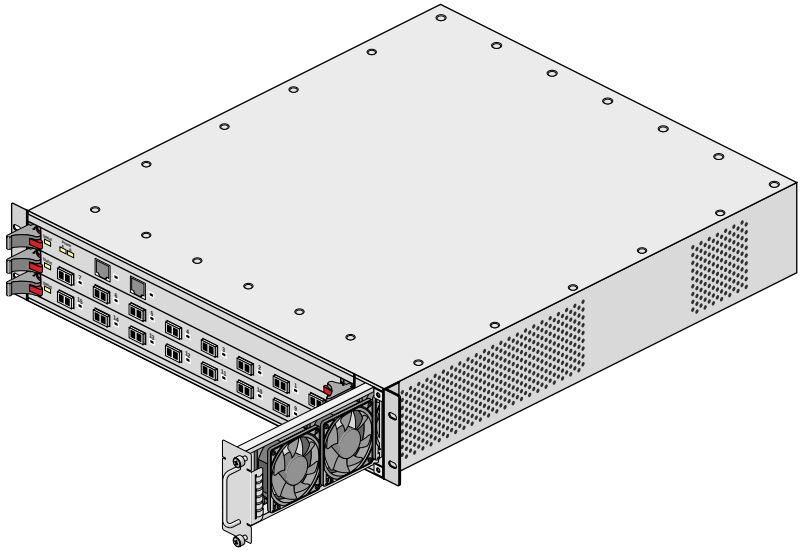


Figure A-24 Fan Tray

Rear Components

The rear of the Myrinet-2000 switch contains an input power plug (refer to Figure A-25). This plug connects to a PDU or power strip within the rack and supplies 220 Vac to an internal power supply.

Figure A-25 Rear View of Myrinet-2000 Switch

Internal Components

Internally, the Myrinet-2000 switch contains a power supply and a backplane. The power supply produces +12 V that is distributed to the components that make up the Myrinet-2000 switch via a backplane. Local voltage regulators use the +12 V to produce +3.3 V, +2.5 V, and/or +1.25 V, which are the voltages required by the internal circuitry.

The backplane connects the internal components of the Myrinet-2000 switch. For example, the backplane supplies the following connections:

- Connections between the monitoring line card and the port line cards (serial links)
- Connections between the port line cards
- Connections among the power supply (+12 V) and the monitoring line card, the port line cards, and the fan tray

Connector Pinouts

This appendix provides pin assignment information for non-proprietary connectors on the following components:

- SGI Origin 300 base module
- L2 controller
- NUMAlink module
- SGI Total Performance 900 (TP900) storage module
- USB hub

SGI Origin 300 Base Module

Table B-1 lists the non-proprietary connectors that are located on the rear panel of the SGI Origin 300 base module (refer to Figure B-1). The third column of the table indicates where you can find the pin assignments for these connectors.

Table B-1 SGI Origin 300 Base Module Connectors

Port	Connector	Pin Assignments
Serial ports 1 and 2	DB9	Refer to Figure B-6 on page 170
L1 console port	DB9	Refer to Figure B-6 on page 170
Ethernet port	RJ-45	Refer to Figure B-7 on page 171
External SCSI port	SCSI 68-pin VHDCI	Refer to Figure B-8 on page 172 and Table B-4 on page 172
RT interrupt input and output ports	Stereo jack	Refer to Figure B-9 on page 174 and Table B-5 on page 174
USB ports 1 and 2	USB type A	Refer to Figure B-10 on page 175 and Table B-6 on page 175
USB L1 port	USB type B	Refer to Figure B-11 on page 176 and Table B-7 on page 176

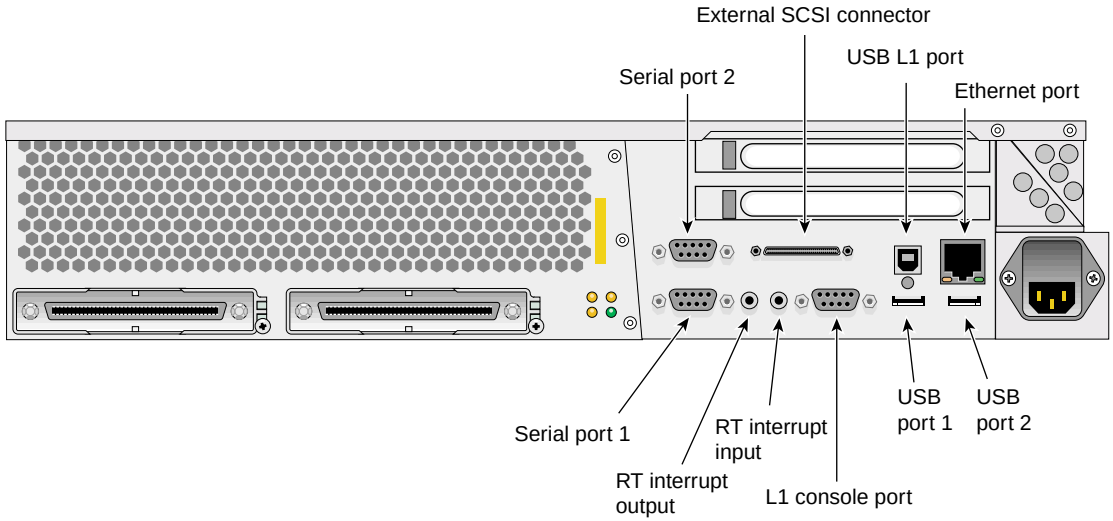


Figure B-1 Rear Panel of Origin 300 Base Module

L2 Controller

Table B-2 lists the non-proprietary connectors that are located on the rear panel of the L2 controller (refer to Figure B-2). The third column of the table indicates where you can find the pin assignments for these connectors.

Table B-2 L2 Controller Connectors

Port	Connector	Pin Assignments
Console (serial port)	DB9	Refer to Figure B-6 on page 170
Modem (serial port)	DB9	Refer to Figure B-6 on page 170
Ethernet port	RJ-45	Refer to Figure B-7 on page 171
L1 ports (four ports)	USB type A	Refer to Figure B-10 on page 175 and Table B-6 on page 175

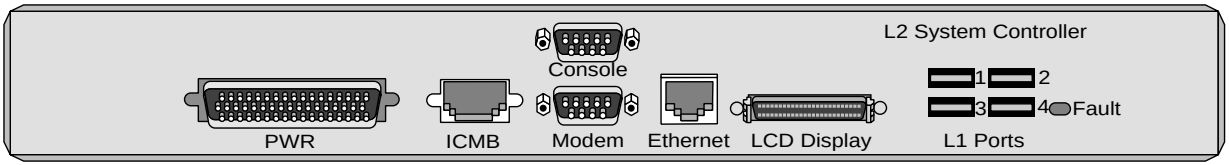


Figure B-2 Rear Panel of L2 Controller

NUMAlink Module

Figure B-3 shows the L1 port (USB type B connector) that is located on the rear panel of the NUMAlink module. For the pin number locations of the connector, refer to Figure B-11 on page 176; Table B-7 on page 176 lists the pin assignments.

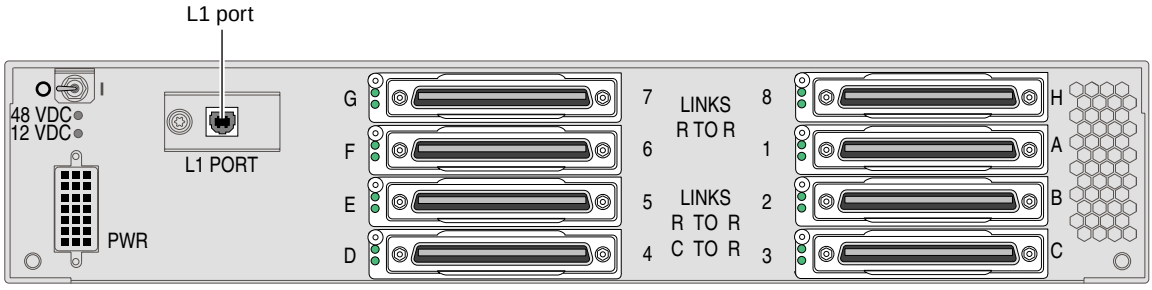


Figure B-3 Rear Panel of NUMAlink Module

SGI Total Performance 900 (TP900) Storage Module

Figure B-4 shows the two SCSI port connectors that are located on the rear panel of the TP900 storage module. Figure B-8 on page 172 shows how the pin numbers are distributed on the SCSI connector, and Table B-4 on page 172 lists the pin assignments.

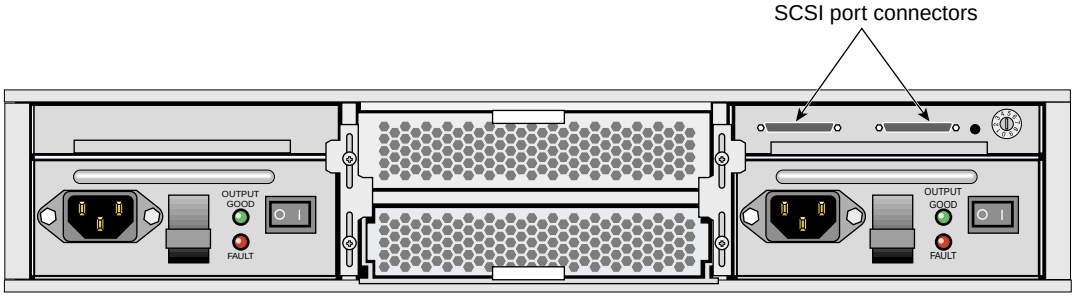


Figure B-4 Rear Panel of TP900 Storage Module

USB Hub

Table B-3 lists the connectors that are located on the USB hub (refer to Figure B-5).

Table B-3 USB Hub Connectors

Connectors	Pin Number Locations	Pin Assignments
USB type A	Refer to Figure B-10 on page 175	Refer to Table B-6 on page 175
USB type B	Refer to Figure B-11 on page 176	Refer to Table B-7 on page 176

Note: The USB hub might look different than the one shown in Figure B-5.

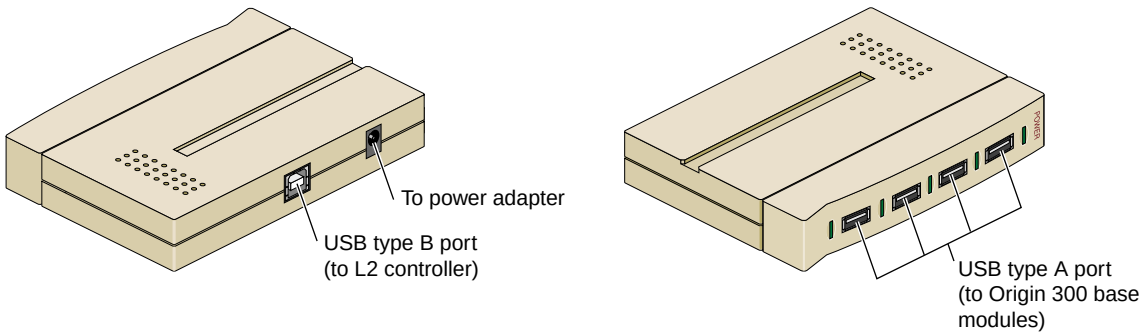


Figure B-5 USB Hub Connectors

DB9 Connector

Figure B-6 shows the DB9 connector pin assignments. This connector is used for the L1 console port and serial ports 1 and 2 of the Origin 300 base module. It is also used as the console and modem ports of the L2 controller.

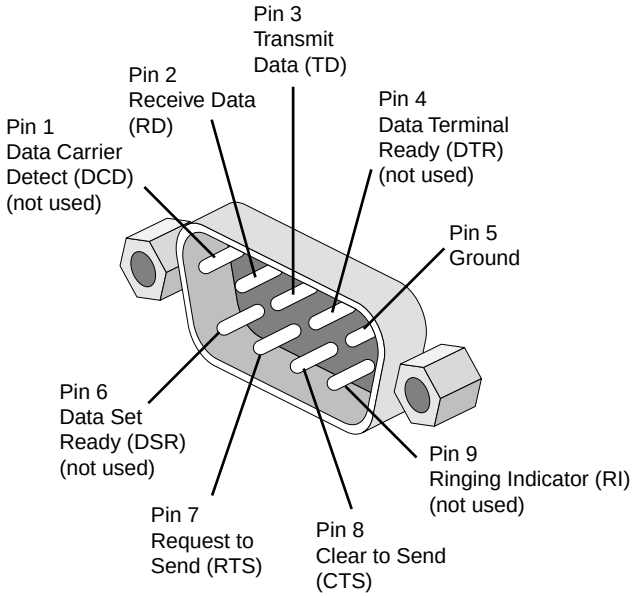


Figure B-6 DB9 Pin Assignments

RJ-45 Connector

Figure B-7 shows the pin assignments for the RJ-45 connector that is located on the rear panel of the SGI Origin 300 base module and L2 controller.

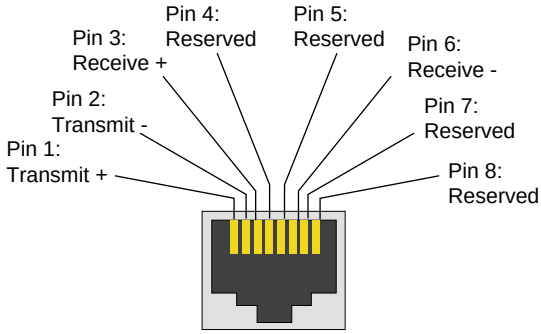


Figure B-7 RJ-45 Connector Pin Assignments

External SCSI Port Connector

Figure B-8 shows the external SCSI VHDCI connector pin locations for the external SCSI connector. This connector is used on the SGI Origin 300 base module and TP900 storage module. Table B-4 lists the pin assignments for this SCSI connector.

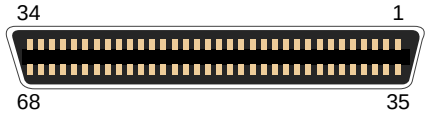


Figure B-8 External SCSI Port Pin Number Locations

Table B-4 SCSI VHDCI Pin Assignments

Pin Number	Signal Name	Pin Number	Signal Name
1	+DB (12)	35	-DB (12)
2	+DB (13)	36	-DB (13)
3	+DB (14)	37	-DB (14)
4	+DB (15)	38	-DB (15)
5	+DB (P1)	39	-DB (P1)
6	+DB (0)	40	-DB (0)
7	+DB (1)	41	-DB (1)
8	+DB (2)	42	-DB (2)
9	+DB (3)	43	-DB (3)
10	+DB (4)	44	-DB (4)
11	+DB (5)	45	-DB (5)
12	+DB (6)	46	-DB (6)
13	+DB (7)	47	-DB (7)
14	+DB (P0)	48	-DB (P0)
15	Ground	49	Ground
16	DIFFSENS	50	Ground

Table B-4 SCSI VHDCI Pin Assignments **(continued)**

Pin Number	Signal Name	Pin Number	Signal Name
17	TERMPWR	51	TERMPWR
18	TERMPWR	52	TERMPWR
19	Reserved	53	Reserved
20	Ground	54	Ground
21	+ATN	55	-ATN
22	Ground	56	Ground
23	+BSY	57	-BSY
24	+ACK	58	-ACK
25	+RST	59	-RST
26	+MSG	60	-MSG
27	+SEL	61	-SEL
28	+CD	62	-CD
29	+REQ	63	-REQ
30	+IO	64	-IO
31	+DB (8)	65	-DB (8)
32	+DB (9)	66	-DB (9)
33	+DB (10)	67	-DB(10)
34	+DB (11)	68	-DB (11)

Stereo Jack Connector Conductor

Figure B-9 shows the stereo jack connector conductors that are used for the RT interrupt input and RT interrupt output ports of the SGI Origin 300 base module. Table B-5 lists the conductor assignments for the stereo jack connector.

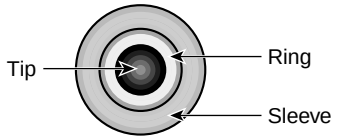


Figure B-9 Stereo Jack Connector Conductors

Table B-5 Stereo Jack Connector Conductor Assignments

Conductor	Function
Tip	Interrupt (active low)
Ring	+5 V
Sleeve	Chassis ground and cable shield

USB Type A Connector

Figure B-10 shows the USB type A connector that is used for USB ports 1 and 2 of the Origin 300 base module and the four USB ports on the USB hub that connect to the Origin 300 base module. Table B-6 lists the pin assignments.

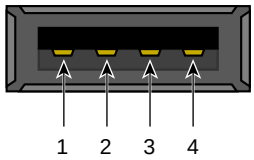


Figure B-10 USB Type A Connector Pin Number Locations

Table B-6 USB Type A Connector Pin Assignments

Signal	Color	Pin Number
VCC	Red	1
-Data	White	2
+Data	Green	3
Ground	Black	4

USB Type B Connector

Figure B-11 shows the USB type B connector that is used for the USB L1 port of the Origin 300 base module, the L1 port on the NUMAlink module, and the port connector on the USB hub that connects to the L2 controller. Table B-7 lists the pin assignments.

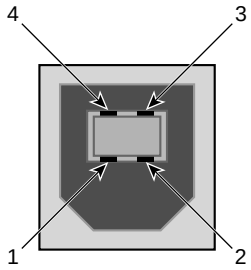


Figure B-11 USB Type B Connector Pin Number Locations

Table B-7 USB Type B Connector Pin Assignments

Signal	Color	Pin Number
VCC	Red	1
-Data	White	2
+Data	Green	3
Ground	Black	4

System Controller Commands

This appendix lists L1 and L2 commands for the SGI Origin 300 system with NUMAlink module:

Note: Online information is available for the L1 and L2 command sets. To view a list of L1 commands, enter `help` at the L1 prompt. To view a list of L2 commands, enter `help` at the L2 prompt. To view information about an individual command, enter `help` and the command name at the appropriate prompt.

L1 Controller Command Set

Using the system console, you may issue L1 controller commands that read status from the controller or set variables that the controller uses. The subsections that follow describe the L1 controller command set. The commands are listed alphabetically.

* (asterisk character)

Use the asterisk character (*) to broadcast a command. A command that is broadcast is sent to the modules that are attached to the SGI Origin 300 base module that issued the command. Example C-1 shows sample output from the `* version` command.

Example C-1 `*` `version` Command Output

```
001c20-L1>* version
001c20:
L1 1.8.l (Image A), Built 09/21/2001 13:06:33
001c22:
L1 1.7.17 (Image B), Built 09/12/2001 12:24:28
```

autopower

The following `autopower` set of commands enable, disable, and abort the feature that enables the system to automatically power up if power is lost. This command also displays the current autopower setting (refer to Example C-2).

- `autopower`
- `autopower on`
- `autopower off`
- `autopower abort`

Example C-2 `autopower` Command Output

```
001c20-L1>autopower
auto power on is disabled.
```

brick

The following `brick` set of commands provides the status of modules and sets the module location.

- `brick`
- `brick slot` <*slotnumber*>

Use the `brick` command to determine the module location. Example C-3 shows sample output from this command.

Example C-3 `brick` Command Output

```
001c20-L1>brick
rack: 001 slot: 20 partition:none,type: C (IP45), serial MHE132,
source: EEPROM
```

Use `brick slot` *<slotnumber>* to set the module position (slot number) in the rack. The variable *<slotnumber>* is a unit number from 01 to 39. Example C-4 shows sample output from the `brick slot 22` command.

Example C-4 `brick slot 22` Command Output

```
001c20-L1>brick slot 22
brick slot set to 22 (takes effect on next L1 reboot/power cycle)
```

Use `brick rack` *<racknumber>* to set the module rack number. The variable *<racknumber>* is the number of a valid rack. For this system, the rack number is 1. Example C-5 shows sample output from the `brick rack 01` command.

Example C-5 `brick rack` *<racknumber>* Command Output

```
001c20-L1>brick rack 1
brick rack set to 001 (takes effect on next L1 reboot/power cycle)
```

config

Use the `config` command to view the L1 controller configuration information. Example C-6 shows sample output from the `config` command.

Example C-6 `config` Command Output

```
001c20-L1>config
0: - 001c20
```

ctc <cmd>

Use the `ctc` *<cmd>* command to send a command to an attached module. Example C-7 shows sample output from the `ctc version` command.

Example C-7 `ctc version` Command Output

```
001c20-L1>ctc version
002c20:
L1 1.8.1 (Image A), Built 09/21/2001 14:59:42    [P1 support]
```

date

Use the following `date` set of commands to view and set the current date and time used by the L1 controller.

- `date`
- `date` *<value>*
- `date tz`
- `date tz` *<value>*

Use the `date` command to view the current date and time value used by the L1 controller. Example C-8 shows sample output from this command.

Example C-8 `date` Command Output

```
001c20-L1>date
10/17/2001 22:47:07 CDT
```

Use `date` *<value>* to set the date and time value used by the L1 controller. The variable *<value>* is a time value in the form *mmddHHMMYYYY.SS* (where *mm* is a two-digit month, *dd* is a two-digit day, *HH* is a two-digit hour, *MM* is a two-digit minute, *YYYY* is the four-digit year, and *SS* is a two-digit second).

Use `date tz` to display the time zone offset used by the L1 controller. Use `date tz` *<value>* to set the time zone offset. The variable *<value>* is a maximum of +12 (for 12 hours ahead of GMT) and a minimum of -12 (for 12 hours behind GMT).

debug

The following `debug` set of commands provides the status of and sets the virtual debug switches.

- `debug`
- `debug` *<switches>*

Use the `debug` command to determine the current settings for the virtual debug switches. Example C-9 shows sample output from this command.

Example C-9 `debug` Command Output

```
001c20-L1>debug
debug switches set to 0x0000
```

Use `debug` *<switches>* to set the virtual debug switches. The variable *<switches>* is a hexadecimal value for the switches.

display

Use the `display` command to view the front panel display status. Example C-10 shows sample output from this command.

Example C-10 `display` Command Output

```
001c20-L1>display
firmware revision: 2.0
line 1: "001c20 /2Powered Up"
line 2: "Powered Up"
```

eeprom

Use the `eeprom` command to view the eeprom data. Example C-11 shows sample output from this command.

Example C-11 `eeprom` Command Output

```
001c20-L1>eeprom
NODE (CH)
00 20 01 06 00 00 00 d9
```

```
NODE (CIA)
00 02 17 c2 4e 41 c2 4e 41 c1 00 00 00 00 00 84
NODE (BIA)
00 09 00 44 c9 2c c9 43 45 4c 45 53 54 49 43 41
c9 49 50 34 35 5f 34 43 50 55 c6 4d 47 59 39 30
39 cc 30 33 30 5f 31 37 32 38 5f 30 30 32 00 c2
5f 42 01 02 c2 30 30 04 00 00 97 6f 04 00 00 00
02 04 00 00 2b 05 c1 bf
NODE (IUA)
00 01 85 01 01 01 02 04 00 00 01 08 04 00 0b 02
13 0a 17 02 2b 04 2f 01 3b 01 3b 01 4a 01 4a 01
4a 01 4a 01 4a 01 4a 01 4a 01 4a 01 4a 01 4a 01
55 01 76 00 2c a0 00 2d a0 00 2e a0 00 2f a0 04
44 01 00 00 00 0f 00 01 01 01 70 00 01 70 04 03
01 01 20 07 01 00 44 00 44 0a 45 01 03 00 20 1f
00 01 02 03 4a 00 03 4a 06 50 26 06 3f fc 06 3f
b7 06 08 88 06 02 46 06 00 ec 04 43 01 03 00 20
07 00 01 02 02 73 00 02 73 00 00 00 00 00 00 48
IO8 (CH)
00 20 01 06 00 00 00 d9
IO8 (CIA)
00 02 17 c2 4e 41 c2 4e 41 c1 00 00 00 00 00 84
IO8 (BIA)
00 0a 00 8f aa 2c c9 43 45 4c 45 53 54 49 43 41
c3 49 4f 38 c6 4d 48 45 35 34 39 cc 30 33 30 5f
31 36 37 33 5f 30 30 33 00 c2 5f 45 01 02 c2 30
30 04 00 00 24 17 04 00 00 00 02 04 00 00 1c 75
cc 30 38 30 30 36 39 31 33 44 30 35 43 c1 00 6c
IO8 (IUA)
00 02 33 01 01 01 01 04 01 06 03 00 09 02 0f 01
13 01 16 01 19 01 24 00 00 00 00 00 00 04 03 01
01 20 07 01 05 ff 00 ff 04 42 01 01 00 20 03 00
01 02 01 4f 00 01 4f f3
DIMM 0 (JEDEC)
80 08 07 0c 0a 02 48 00 04 a0 80 02 80 08 08 01
oe 04 0c 01 02 26 00 00 00 00 00 50 3c 50 30 20
b0 b0 60 60 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 39
ce 00 00 00 00 00 00 00 01 4d 33 20 34 36 4c 33
33 31 33 42 54 31 2d 43 41 30 20 30 42 06 01 26
49 76 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
DIMM 2 (JEDEC)
80 08 07 0c 0a 02 48 00 04 a0 80 02 80 08 08 01
0e 04 0c 01 02 26 00 00 00 00 00 50 3c 50 30 20
```

```
b0 b0 60 60 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 39
ce 00 00 00 00 00 00 00 01 4d 33 20 34 36 4c 33
33 31 33 42 54 31 2d 43 41 30 20 30 42 06 01 26
48 76 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
DIMM 1 (JEDEC)
80 08 07 0c 0a 02 48 00 04 a0 80 02 80 08 08 01
0e 04 0c 01 02 26 00 00 00 00 00 50 3c 50 30 20
b0 b0 60 60 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 39
ce 00 00 00 00 00 00 00 01 4d 33 20 34 36 4c 33
33 31 33 42 54 31 2d 43 41 30 20 30 42 06 01 26
4a 76 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

DIMM 3 (JEDEC)
80 08 07 0c 0a 02 48 00 04 a0 80 02 80 08 08 01
0e 04 0c 01 02 26 00 00 00 00 00 50 3c 50 30 20
b0 b0 60 60 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 39
ce 00 00 00 00 00 00 00 01 4d 33 20 34 36 4c 33
33 31 33 42 54 31 2d 43 41 30 20 30 42 39 00 27
ae 5f 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

env

The following `env` set of commands provides the status of environmental conditions or turns environmental monitoring on and off. This set comprises the following commands:

- `env`
- `env altitude` *<high | low>*
- `env reset`

Use the `env` command to view the status of the voltage, fan speed, and internal temperature. The output of this command is divided into four areas: environmental monitoring and auto start status, voltage status, fan status, and temperature status (refer to Example C-12).

Example C-12 env Command Output

```
001c20-L1>env
Environmental monitoring is enabled and running.

Description    State       Warning Limits     Fault Limits       Current
-------------- ----------  -----------------  -----------------  -------
        12V IO    Enabled  10%  10.80/ 13.20  20%   9.60/ 14.40   12.31
       12V DIG    Enabled  10%  10.80/ 13.20  20%   9.60/ 14.40   12.12
            5V    Enabled  10%   4.50/  5.50  20%   4.00/  6.00    4.99
          3.3V    Enabled  10%   2.97/  3.63  20%   2.64/  3.96    3.34
         5V aux    Enabled  10%   4.50/  5.50  20%   4.00/  6.00    4.99
       3.3V aux    Enabled  10%   2.97/  3.63  20%   2.64/  3.96    3.41
          2.5V    Enabled  10%   2.25/  2.75  20%   2.00/  3.00    2.50
   Speedo2 CPU    Enabled  10%   1.35/  1.65  20%   1.20/  1.80    1.49
          1.5V    Enabled  10%   1.35/  1.65  20%   1.20/  1.80    1.48

Description    State       Warning RPM  Current RPM
-------------- ----------  -----------  -----------
FAN 0     Left    Enabled         2160         3400
FAN 1   Center    Enabled         2160         3543
FAN 2    Right    Enabled         2160         3543
FAN 3       PS    Enabled         2160         3088
FAN 4      PS'    Enabled         2160         3869

                           Advisory  Critical  Fault     Current
Description    State       Temp      Temp      Temp      Temp
-------------- ----------  --------  --------  --------  ---------
NODE 0 TEMP 0   Enabled    30C/ 86F  35C/ 95F  40C/104F  26c/ 78F
NODE 1 TEMP 1   Enabled    30C/ 86F  35C/ 95F  40C/104F  26c/ 78F
```

The environmental monitoring and auto start status area has two statements. The first statement describes the current state of environmental monitoring, which is one of the following states:

- disabled - initialization error
- disabled - configuration error
- disabled - start error
- disabled
- disabled - unknown error (0x00)
- running

The second statement describes the current state of the auto start. The auto start state is `enabled` or `disabled`.

The voltage status contains five columns, as follows:

- The Description column provides the name of the supply voltage (2.5 V, 3.3 V, 5 V, etc.).
- The State column provides the current state of the supply voltage (Enabled, Fault, Warning, Waiting, or Disabled).
- The Warning Limits column provides the range of voltages that, when exceeded, causes a supply voltage to be in a Warning state.
- The Fault Limits column provides the range of voltages that, when exceeded, causes a supply voltage to be in a Fault state.
- The Current column provides the current value of the supply voltage.

The fan status contains four columns, as follows:

- The Description column provides the name of each fan.
- The State column provides the current state of the fan (Warning, Enabled, Waiting, or Disabled).
- The Warning RPM column provides the lowest revolutions-per-minute allowed before a fan enters a Warning state.
- The Current RPM column provides the current value of the revolutions-per-minute for the fan.

The temperature status contains six columns, as follows:

- The Description column provides the name of a temperature sensor.
- The State column provides the current state of the temperature sensor (Fault, Warning, Enabled, or Disabled).
- The Advisory Temp column provides the temperature that, when exceeded, causes a temperature advisory state.
- The Critical Temp column provides the temperature that, when exceeded, causes a critical temperature state.
- The Fault Temp column provides the temperature that, when exceeded, causes the temperature sensor to be in a Fault state.

- The Current Temp column provides the current temperature reading from the temperature sensor.

Use `env altitude` <*high* | *low*> to enable a high- or low-altitude setting for the environmental monitoring. The variable <*high* | *low*> is high or low.

Use `env reset` to reset all current warnings and faults that are set.

Note: For this command, you can use the mnemonic `rst` instead of the word `reset`.

---

fan

Use the `fan` command to determine whether the fans are on or off and to read the fan speeds. In the `fan` command output, the number in parentheses is the counter reading for the fan. The counter reading is a value provided by the fan tachometer. The L1 controller converts the counter reading into a revolutions-per-minute value. Example C-13 shows sample output from the `fan` command.

Example C-13 `fan` Command Output

```
001c20-L1>fan
fans are on.
fan 0 LEFT rpm 3619(93).
fan 1 CENTER rpm 3619 (93).
fan 2 RIGHT rpm 3619 (93).
fan 3 PS rpm 3116 (108).
fan 4 PS’ rpm 3914 (86).
```

flash

The following `flash` set of commands provides status of the firmware images stored in flash memory:

- `flash status`
- `flash default` <*a* | *b*>
- `flash default current`
- `flash default new`

- `flash default old`
- `flash default reset`

Use the `flash status` command to view the status of the two firmware images stored in flash memory. Example C-14 shows sample output from the `flash status` command. Each image has a checksum value that indicates whether an image is valid.

Example C-14 `flash status` Command Output

```
001c20-L1>flash status
Flash image B currently booted

Image      Status        Revision    Built
-----   -------------   ----------   -----
  A     default           1.8.1       09/21/2001 16:41:43
  B     valid             1.7.17      09/12/2001 12:24:28
```

Use `flash default` *<a | b>* to set firmware image A or firmware image B as the default image that the system controller uses when booting. The variable *<a | b>* is A or B. Use `flash default current` to set the current image as the default flash image. Use `flash default new` to set the new image as the default flash image. Use `flash default old` to set the old image as the default flash image.

Use `flash default reset` to set the firmware image with the latest time stamp as the default image that the system controller uses when booting. If the selected firmware image is not valid, the flash default commands will return the following message: `cannot set default--image A (or B) is invalid!`

help

The following `help` set of commands provides helpful information on the system controller commands.

- `help`
- `help` *<command>*

Use the `help` command to generate a list of all of the system controller commands. Use the `help` *<command>* command to display more information on a single command. The variable *<command>* is the name of a command.

history

Use the `history` command to create a list of commands that have been issued. In the `history` command output, the first number in the history length is the number of commands stored in the history array. The second number is the maximum number of commands that can be stored in the history array. Example C-15 shows sample output from this command.

Example C-15 `history` Command Output

```
001c20-L1>history
History length: 3/20

2: fan speed 4
1: fan
0: env
```

istat

Use the following `istat` set of commands to view the status of the memory, queues, tasks, and memory allocation.

- `istat memory`
- `istat queues`
- `istat tasks`
- `istat pmalloc`

Use the `istat memory` command to view the status of the memory. Example C-16 shows sample output from this command.

Example C-16 `istat memory` Command Output

```
001c20-L1>istat memory
SYSMEM   [0x30002cec]    Size:  41024      Avail:  17620
SMLPOOL  [0x30002cb0]    Size:   8704/ 272 Avail:     29
BIGPOOL  [0x30002c74]    Size:  16640/1040 Avail:     15
```

Use `istat queues` to view the status of the queues. Example C-17 shows sample output from this command.

Example C-17 `istat queues` Command Output

```
001c20-L1>istat queues
CMD_REQQ [0x300062f8]    Size: 10   Avail: 10   Msgs:  0
CMD_RSPQ [0x30006340]    Size: 10   Avail: 10   Msgs:  0
SMP_RQUE [0x3000cd48]    Size: 10   Avail: 10   Msgs:  0
SMP_WQUE [0x3000cd90]    Size: 10   Avail: 10   Msgs:  0
SMP_IQUE [0x3000cdd8]    Size: 10   Avail: 10   Msgs:  0
BDR_WQUE [0x3000c974]    Size: 20   Avail: 20   Msgs:  0
B2BQ_CTC [0x30009fc4]    Size: 10   Avail: 10   Msgs:  0
B2BQ_CTI [0x3000a054]    Size: 10   Avail: 10   Msgs:  0
USB_WQUE [0x300098cc]    Size: 10   Avail: 10   Msgs:  0
SCAN_QUE [0x30002534]    Size: 20   Avail: 20   Msgs:  0
FLASH_Q  [0x3000f738]    Size:  5   Avail:  5   Msgs:  0
```

Use `istat tasks` to view the status of the tasks. Example C-18 shows sample output from this command.

Example C-18 `istat tasks` Command Output

```
001c20-L1>istat tasks
MAIN_TSK [0x30001a34] (SLEEP     )  PRI=000  TS=010  STACK: 2048 @
0x30001234 ( 576 used, 1472 free)
USB_CTL0 [0x300050b8] (DRV_SUSP  )  PRI=010  TS=010  STACK: 1536 @
0x30005160 ( 324 used, 1212 free)
DSP_STSK [0x30002a58] (SEM_SUSP  )  PRI=010  TS=010  STACK:  512 @
0x30016d94 ( 208 used,  304 free)
DSP_RTSK [0x30002b28] (SEM_SUSP  )  PRI=010  TS=010  STACK:  512 @
0x30016fa4 ( 304 used,  208 free)
CMD_ITSK [0x30007388] (READY     )  PRI=020  TS=010  STACK: 4096 @
0x30006388 (2160 used, 1936 free)
SMP_RTSK [0x3000e670] (DRV_SUSP  )  PRI=020  TS=010  STACK: 2048 @
0x3000ce70 ( 660 used, 1388 free)
SMP_WTSK [0x3000e718] (QUEUE_SUSP)  PRI=020  TS=040  STACK: 2048 @
0x3000d670 ( 584 used, 1464 free)
SMP_ITSK [0x3000e7c0] (QUEUE_SUSP)  PRI=020  TS=010  STACK: 2048 @
0x3000de70 ( 932 used, 1116 free)
ENV_PITK [0x30007714] (SEM_SUSP  )  PRI=010  TS=010  STACK: 1024 @
0x30007b04 ( 436 used,  588 free)
ENV_FITK [0x300077bc] (SEM_SUSP  )  PRI=010  TS=010  STACK: 1024 @
0x30007f04 ( 312 used,  712 free)
ENV_TITK [0x30007864] (SEM_SUSP  )  PRI=010  TS=010  STACK: 1024 @
0x30008304 ( 312 used,  712 free)
ENV_PMTK [0x3000790c] (SEM_SUSP  )  PRI=010  TS=010  STACK: 1024 @
0x30008704 ( 304 used,  720 free)
```

```
ENV_FMTK [0x300079b4] (SEM_SUSP  )  PRI=010  TS=010  STACK: 1024 @
0x30008b04 ( 320 used,  704 free)
ENV_TMTK [0x30007a5c] (SEM_SUSP  )  PRI=010  TS=010  STACK: 1024 @
0x30008f04 ( 480 used,  544 free)
BDR_RTK0 [0x3000c77c] (DRV_SUSP  )  PRI=025  TS=010  STACK: 2048 @
0x3001738c (1156 used,  892 free)
BDR_WTSK [0x3000c8cc] (QUEUE_SUSP)  PRI=025  TS=010  STACK: 2048 @
0x30017b9c ( 644 used, 1404 free)
B2BR_CTC [0x30009b8c] (DRV_SUSP  )  PRI=025  TS=010  STACK: 2048 @
0x30018444 ( 372 used, 1676 free)
B2BW_CTC [0x3000a21c] (DRV_SUSP  )  PRI=025  TS=010  STACK: 2048 @
0x30018c54 ( 380 used, 1668 free)
B2BR_CTI [0x30009cdc] (DRV_SUSP  )  PRI=025  TS=010  STACK: 2048 @
0x3001949c ( 372 used, 1676 free)
B2BW_CTI [0x3000a36c] (DRV_SUSP  )  PRI=025  TS=010  STACK: 2048 @
0x30019cac ( 380 used, 1668 free)
USB_WTSK [0x3000993c] (QUEUE_SUSP)  PRI=025  TS=010  STACK: 1500 @
0x3001a524 ( 668 used,  832 free)
USB_RTK0 [0x30009778] (READY     )  PRI=025  TS=010  STACK: 1800 @
0x3001ab10 ( 936 used,  864 free)
SCAN_TSK [0x3000248c] (QUEUE_SUSP)  PRI=025  TS=010  STACK: 2048 @
0x30001c8c ( 784 used, 1264 free)
I2C_HIGH [0x300043a4] (SEM_SUSP  )  PRI=005  TS=010  STACK: 1500 @
0x3000444c ( 380 used, 1120 free)
I2C_LOW  [0x30003c7c] (SEM_SUSP  )  PRI=010  TS=010  STACK: 1500 @
0x30003d24 ( 560 used,  940 free)
FLASH_T  [0x3000f690] (QUEUE_SUSP)  PRI=025  TS=020  STACK: 1024 @
0x3000f290 ( 480 used,  544 free)
```

Use the `istat pmalloc` command to view the status of the memory allocation. Example C-19 shows sample output from this command.

Example C-19 `istat pmalloc` Command Output

```
001c20-L1>istat pmalloc

small pool size:   272
small pool avail:   29
small pool used:     2
small pool max:     14

big pool size:    1040
big pool avail:     15
big pool used:       0
big pool max:        3
```

```
pmalloc calls:       0
prealloc calls:      0

history:
```

l1

Use the `l1` command to engage the L1 controller command processor. Press **`Ctrl+D`** to disengage the command processor.

leds

Use the `leds` command to read the value of the group 0 and group 1 status LEDs. These LEDs connect to I/O expanders that monitor group 0 status LEDs 0 through 15 and group 1 status LEDs 0 through 15. In the output of this command, the CPUs correspond to the status LEDs as follows:

- CPU A corresponds to I/O expander A_0100001x - group 0 status LEDs 0 through 7.
- CPU B corresponds to I/O expander A_0100010x - group 0 status LEDs 8 through 15.
- CPU C corresponds to I/O expander A_0100011x - group 1 status LEDs 0 through 7.
- CPU D corresponds to I/O expander A_0100100x - group 1 status LEDs 8 through 15.

The number next to the CPU letter is a hexadecimal value that represents the value of the status LEDs that connect to the I/O expander (a bit set to 1 indicates the LED is on, and a bit set to 0 indicates the LED is off). Example C-20 shows sample output from the `leds` command.

Example C-20 `leds` Command Output

```
001c20-L1>leds
CPU A: 0x00: PLED_RESET: Slave loop (0x00/0x45=okay, solid 0x00=possibly hung)
      0x45: PLED_LAUNCHLOOP:(0x00/0x45=okay, solid 0x45=possibly hung)
CPU B: 0x00: PLED_RESET: Slave loop (0x00/0x45=okay, solid 0x00=possibly hung)
      0x45: PLED_LAUNCHLOOP:(0x00/0x45=okay, solid 0x45=possibly hung)
CPU C: 0x01: PLED_INITCPU: init the processor FP, and COP0 registers.
CPU D: 0xb8: unknown LED status
```

log

The following `log` set of commands displays the contents of the log, resets the log, and writes an entry into the log.

- `log`
- `log reset`
- `log` *<entry>*

Use the `log` command to view the contents of the log. If the log is empty, the output from the `log` command is `log is empty`.

Use `log reset` to empty the log. Use `log` *<entry>* to write a line in the log. The variable *<entry>* is text to enter in the log. Example C-21 shows sample output from the `log Start the Test` command.

Example C-21 `log Start the Test` Command Output

```
001c20-L1>log Start the Test
log entry made.
```

margin

The `margin` set of commands displays the state of the supply margins or sets the state of the supply margins. There are three commands in the `margin` command set: `margin`, `margin default`, and `margin` *<low | norm | high>*. For the `margin` command set, the mnemonic `mgn` may replace the word `margin`.

Use the `margin` command to view the current state of the margin values for the supplies in a module. Example C-22 shows sample output from the `margin` command.

Example C-22 `margin` Command Output

```
001c20-L1>margin
Supply          State Voltage    Margin  Value
--------------  ----- ---------  ------- -----
          2.5V     on    2.483V   normal     3
   Speedo2 CPU     on    1.495V   normal    19
          1.5V     on    1.480V   normal     5
```

Use the `margin default` command to set the margin values for the supplies to their default values. Use the `margin` *<low | norm | high>* command to set the margin values for the supplies to the low-margin, normal-margin, or high-margin values. In this command, the variable *<low | norm | high>* is low (low-margin), norm (normal margin), or high (high margin). Example C-23 shows sample output from the `margin default` command.

Example C-23 `margin default` Command Output

```
001c20-L1>margin default
```

network

The following `network` set of commands displays and sets the mode for the network communication interface.

- `network`
- `network usb`
- `network 422`
- `network autodetect|auto on`
- `network autodetect|auto off`

Use the `network` command to view the current mode of the network communication interface. Example C-24 shows sample output from this command.

Example C-24 `network` Command Output

```
001c20-L1>network
network interface communication is 422
network autodetection is enabled
```

Use `network usb` to set the network communication interface mode to Universal Serial Bus (USB). Use `network 422` to set the network communication interface mode to the RS-422 protocol. Example C-25 shows sample output from the `network usb` command.

Example C-25 `network usb` Command Output

```
001c20-L1>network usb
nvram parameter changed, reset required to affect change.
```

Use `autodetect|auto on` to turn on the autodetection. Use `autodetect|auto off` to turn off the autodetection.

nmi

Use the `nmi` command to issue a non-maskable interrupt (NMI). After the system controller receives an `nmi` command, it displays `NMI...` on the front-panel display and asserts the NMI signal in I/O expander B_0100001x. If no errors occur while the system controller issues the NMI, it displays `NMI done` on the front-panel display (refer to Example C-26 and Figure C-1). If an error occurs, the system controller displays `NMI Fail` on the front panel display.

Example C-26 `nmi` Command Output

```
001c20-L1>nmi
001c20-L1>
```

Figure C-1 Example of `nmi` Front Panel Display Output

nvram reset

The `nvram reset` command returns the NVRAM settings of the L1 controller to the factory default settings.

pbay

The `pbay` set of commands displays information about the power bay, distributed power supplies (DPSs), DC output ports, and FRUs:

- `pbay`
- `pbay version`
- `pbay dps`
- `pbay dps` *<dps number 1 - 6>*
- `pbay dcport`
- `pbay dcport` *<DC port number 1 - 8>*
- `pbay fru`
- `pbay fru` *<0 for power bay, 1 - 6 for DPS>*
- `pbay reset`
- `pbay env`
- `pbay env on|off`
- `pbay init`

Use the `pbay` command to view the status of the power bay (refer to Example C-27).

Example C-27 `pbay` Command Output

```
001r28-L1>pbay
Total current: 16.5 Amps (+/-11%)
```

Use the `pbay version` command to view the firmware version of the power bay (refer to Example C-28).

Example C-28 `pbay version` Command Output

```
001r28-L1>pbay version
PBay FW Version 00.18, Built 09/29/2001 14:00:00
```

Use the other `pbay` commands as follows:

- Use the `pbay dps` command to view the status of all distributed power supplies or an individual supply. The distributed power supplies are identified by a number ranging from 1 to 6.
- Use the `pbay dcport` command to view the status of all DC output ports or an individual DC port. The ports are identified by a number ranging from 1 to 8.
- Use the `pbay fru` command to view information about the power bay and DPS FRUs. To view information about the power bay FRUs, use the number 0. To view information about a distributed power supply FRU, use the numbers 1 through 6.
- Use the `pbay reset` command to reset the power bay and the power supplies.
- Use the `pbay env` command to view the status of the environmental monitoring and to enable or disable environmental monitoring.
- Use the `pbay init` command to initialize communication with the power bay.

pci

The `pci` set of commands displays the status of the PCI cards in an Origin 300 base module or a PCI expansion module. For the PCI expansion module, this command set also powers up, powers down, or resets a PCI card:

- `pci`
- `pci` <*u* | *d*>
- `pci reset`
- `pci` <*bus*> <*u* | *d*>
- `pci` <*bus*> `reset`
- `pci` <*bus*> <*slot*> <*u* | *d*>
- `pci` <*bus*> <*slot*> `reset`

In the `pci` command set, the mnemonic `rst` may replace the word `reset`.

Use the `pci` command to view the power for each PCI card in an Origin 300 server (refer to Example C-29).

Example C-29 pci Command Output

```
001c20-L1>pci
Slot    Power
----    -----
Slot 1  7.5
Slot 2  7.5
```

For a PCI expansion module, the output of the `pci` command contains the following eight columns.

- The Bus column lists the number of the bus for each PCI card.
- The Slot column lists the slot value for each PCI card.
- The Stat column lists the hexadecimal value of the status register for each PCI card.
- The Card Type column lists the card type (7.5 W, 15 W, 25 W, or none) for each slot.
- The Power column lists the value (error & off, error & on, okay & off, or okay & on) of the Power OK and Power On bits.
- The Attn LED column lists the value (off or on) of the Attention LED for the PCI card.
- The Enable column lists the value (off or on) of the Bus Enable bit for the PCI card.
- The Reset column lists the value (off or on) of the Reset bit for the PCI card.

Note: The following commands apply only to the PCI expansion module.

Use the `pci` *<u | d>* command to power up or power down all of the PCI cards. In this command, the variable *<u | d>* is `u` (power up) or `d` (power down).

Use the `pci reset` command to reset all of the PCI cards.

Use the `pci` *<bus> <u | d>* command to power up or power down all of the PCI cards on a bus. In this command, the variable `<u|d>` is `u` (power up) or `d` (power down). The variable `<bus>` is the bus number.

Use the `pci` <*bus*> `reset` command to reset all of the PCI cards on a bus. In this command, the variable <*bus*> is the bus number.

Use the `pci` <*bus*> <*slot*> <*u* | *d*> command to power up or power down an individual PCI card. In this command, the variable <*u* | *d*> is `u` (power up) or `d` (power down). The variable `<bus>` is the bus number and the variable <*slot*> is the slot number.

Use the `pci` <*bus*> <*slot*> `reset` command to reset an individual PCI card. In this command, the variable <*bus*> is the bus number and the variable <*slot*> is the slot number.

port

Use the `port` command to view the value of the status register for each port. As shown in Example C-30, the output of the `port` command contains six columns, as follows:

- The Port column lists the name of each port.
- The Stat column lists the hexadecimal value of the status register for each port.
- The Remote Pwr column lists the value, “okay” or “none,” of the remote power OK bit (bit 0) for each port.
- The Local Pwr column lists the value, “okay” or “none,” of the local power OK bit (bit 1) for each port.
- The Link LED column lists the value, “on” or “off,” of the link LED bit (bit 2) for each port.
- The SW LED column lists the value, “on” or “off,” of the software LED bit (bit 3) for each port.

Note: For this command, you can use the mnemonic `prt` instead of the word `port`.

Example C-30 `port` Command Output

```
001c20-L1>port
Port Stat Remote Pwr Local Pwr  Link LED SW LED
---- ---- ---------- ---------- -------- --------
   A 0x0f       none       okay      on       on
   B 0x02       none       okay      off      off
```

power

The following `power` set of commands displays the status of the supplies and powers on and powers off the supplies.

- `power`
- `power check`
- `power` *<up | down>*
- `power vrm`

Note: For the power command set, you can use the mnemonics `pwr`, `u`, and `d` instead of the words `power`, `up`, and `down`.

Use the `power` command to view the detailed current state of the power and margin values for the supplies in a system. Example C-31 shows sample output from this command.

Example C-31 `power` Command Output

```
001c20-L1>power
Supply          State Voltage    Margin  Value
--------------  ----- ---------  ------- -----
           12V     on       N/A      N/A
        12V IO     NC   12.312V      N/A
       12V DIG     NC   12.125V      N/A
            5V     NC    4.992V      N/A
          3.3V     NC    3.337V      N/A
        5V aux     NC    4.992V      N/A
      3.3V aux     NC    3.406V      N/A
          2.5V     on    2.496V  normal 3
   Speedo2 CPU     on    1.480V   normal 19
          1.5V     on    1.480V  normal 5
```

Use `power check` to view the summary of the current state of the power and margin values for the supplies in a system. Example C-32 shows sample output from this command.

Example C-32 `power check` Command Output

```
001c20-L1>power check
power appears on
```

Use `power` *<up | down>* to power on or power off all of the modules in the system. The variable *<up | down>* is on or off. Use `power vrm` to check the VRM status.

reboot_l1

The `reboot_l1` set of commands reboots the L1 controller. The following commands compose this set:

- `reboot_l1`
- `reboot_l1` *<a | b | old | new>*

Use the `reboot_l1` command to reboot the L1 controller using the newest firmware image (firmware image A or firmware image B). Use `reboot_l1` *<a | b>* to reboot the L1 controller using the specified firmware image. The variable *<a | b>* is a (firmware image A) or b (firmware image B). Use `reboot_l1` *<new>* to reboot the L1 controller with a new A or B image. Use `reboot_l1` *<old>* to reboot the L1 controller with an old image.

reset

Use the `reset` command to perform a reset of the system. After the L1 controller receives a `reset` command, it sets various control and status signals back to their default values and reboots the operating system. Example C-33 shows sample output for this command.

Example C-33 `reset` Command Output

```
001c20-L1>reset
001c20-L1>
```

router

The `router` set of commands displays information about the NUMAlink module and enables you to set the router type of this module. The NUMAlink module is an ordinary router type. This command is valid for the NUMAlink module only.

- `router`
- `router ordinary`

Example C-34 shows sample output from the `router` command.

Example C-34 `router` Command Output

```
001r28-L1>router
router type is ordinary
```

select

The following `select` set of commands displays and sets the mode of console I/O.

- `select`
- `select` *<rack> <slot>*
- `select local`
- `select ctc`
- `select console`
- `select` *<a | b | c | d>*
- `select` *<subchannel>*
- `select filter` *<on | off>*

Use the `select` command to view the current mode of console I/O. Example C-35 shows sample output from this command.

Example C-35 `select` Command Output

```
001c20-L1>select
console input:  001c20 console
console output: not filtered.
```

Use the other `select` commands as follows:

- Use `select` *<rack> <slot>* to set the rack and slot for console I/O.
- Use `select local` to set the system console to the local base module. The L1 controller will then identify the system to which to send console input. If filtering is enabled, the L1 controller identifies the system for which to display output.
- Use `select ctc` to set the attached base module for console I/O.
- Use `select console` to set the mode of console I/O to console.

- Use `select` *<a | b | c | d>* to set the mode of console I/O to a CPU name (a, b, c or d).
- Use `select` *<subchannel>* to set the mode of console I/O to a specified subchannel (0, 1, 2, 3, or 4).
- Use `select filter` *<on | off>* to enable (on) or disable (off) the console output filter.

serial

Use the following `serial` set of commands to view or set the system serial number that is stored in each module.

- `serial`
- `serial all`
- `serial dimm`

Use the `serial` command to view the system serial number (SSN) settings stored in the NVRAM. Use `serial all` to show the brick serial number (BSN) and the SSN settings in NVRAM. Use `serial dimm` to show the dual-inline memory module (DIMM) serial number.

softreset

Use the `softreset` command to issue a software reset. After receiving a `softreset` command, the L1 controller displays `Sft rst...` on the front panel display and asserts the soft reset signal in I/O expander B_0100001x. If no errors occur while the L1 controller issues the soft reset, it displays `Sft rst done` on the front panel display (refer to Example C-36 and Figure C-2). If an error occurs while the L1 controller issues the soft reset, it displays `Sft rst fail` on the front panel display.

Note: For this command, you can use the mnemonic `softrst` instead of the word `softreset`.

Example C-36 `softreset` Command Output

```
001c20-L1>softreset
001c20-L1>
```

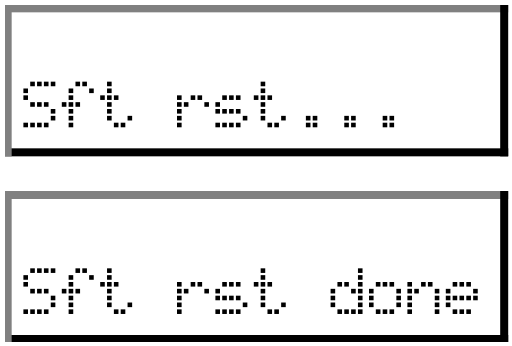


Figure C-2 Example of `softreset` Command Output

uart

The `uart` set of commands displays the status of the following UARTs (universal asynchronous receivers/transmitters): CTI, CTC, SMP, and Bedrock. This command also enables you to reset the UART of the Bedrock ASIC.

- `uart`
- `uart bedrock reset`

Example C-37 shows sample output from the `uart` command.

Example C-37 `uart` Command Output

```
001c20-L1>uart
      Baud    Read    Read    Read     Read   Read   Write   Write   Write
UART  Rate    State   Status  Timeouts Breaks Errors State   Status  Timeouts
----  ----    -----   ------  -------- ------ ------ -----   ------  --------
CTI   107142  Discon  Ready   0        0      0      Discon  Ready   0
CTC   107142  Discon  Ready   0        0      0      Discon  Ready   0
SMP   37500   Discon  Ready   0        0      1      Discon  Ready   0
BED   57692   Connect Suspend 0        0      13     Connect Ready   0
```

usb

The `usb` command displays status information for the USB (universal serial bus) L1 port. SSEs use this port to access L1 controllers in systems that do not have L2 controllers. Example C-38 shows sample output from the `usb` command.

Example C-38 `usb` Command Output

```
001c20-L1>usb
Device: 0  Disconnects: 2  Bus Resets:  13
Endpoint State    Status    Stalls Errors Timeouts
-------- -----    ------    ------ ------ --------
Control  Active   Suspended 43     0      0
Read     Active   Ready     0      0      0
Write    Active   Ready     0      0      0
```

version

Use the `version` command to view the version of the firmware that is running in the L1 controller. Example C-39 shows sample output from this command.

Example C-39 `version` Command Output

```
001c20-L1>version
L1 1.8.1 (Image A), Built 09/21/2001 12:24:28 [P1 support]
```

L2 Controller Command Set

The subsections that follow describe the L2 controller command set. The commands are listed alphabetically and include examples of output where applicable.

autopower

The following `autopower` set of commands enable, disable, and abort the feature that enables the system to automatically power up if power is lost. This command also displays the current autopower setting (refer to Example C-40).

- `autopower`
- `autopower on`
- `autopower off`
- `autopower abort`

Example C-40 `autopower` Command Output

```
L2> autopower
auto power up appears disabled
```

config

The `config` set of commands displays the L2 controller configuration information. There are five commands in the `config` command set:

- `config`
- `config devices`
- `config rescan`
- `config auto`
- `config manual`

Note: For these commands, the mnemonic `cfg` may replace the word `config`.

Use the `config` command to view the L2 controller configuration information (refer to Example C-41). In the `config` command output, the first number is the IP address of the L2 controller (137.38.82.155 in the output below). The number that follows the IP address, after the first colon, is the USB port number.

Example C-41 `config` Command output

```
L2> config
L2 137.38.82.155: - 003 (LOCAL)
L1 137.38.82.155:2:0 - 001c36
L1 137.38.82.155:0:0 - 001c34
L1 137.38.82.155:3:0 - 001c32
L1 137.38.82.155:1:0 - 001c30
L1 137.38.82.155:4:0 - 001r28
L1 137.38.82.155:8:0 - 001c26
L1 137.38.82.155:7:0 - 001c24
L1 137.38.82.155:6:0 - 001c22
L1 137.38.82.155:5:0 - 001c20
```

The number that follows the USB port number, after the second colon, is the L1 index, which for the Origin 300 system with NUMAlink module is 0.

The number that follows the L1 index, after the dash, is the brick identification number (for example, 001c22). The first three digits of the brick identification indicate the rack that the module resides in. The fourth digit of the brick identification indicates the type of module (refer to Table C-1). The last two digits of the brick identification indicate the slot position in which the module resides.

Table C-1 Valid Module Types

Type	Description
c	Origin 300 base module
p	PCI expansion module
r	NUMAlink module
?	Unknown module type

Use the `config rescan` command to force an L1 controller configuration update. Use the `config auto` command to enable automatic configuration updates for the L1 controller. Use the `config manual` command to disable automatic configuration updates for the L1 controller.

Note: For these commands, the mnemonics `re` and `man` may replace the words `rescan` and `manual`.

destination

The `destination` set of commands displays the brick identification numbers of modules that are the destination of L2 commands, or it sets the modules that are the destination for L2 commands. There are four commands in the `destination` command set:

- `destination`
- `r` <*racks*> `destination`
- `r` <*rack*> `s` <*slots*> `destination`
- `destination reset`

Note: For these commands, the mnemonic `dest` may replace the word `destination`. Also, the words `rack` and `slot` may replace the mnemonics `r` and `s`.

Use the `destination` command to view the brick identification numbers of the modules that are the destination of L2 commands. Example C-42 shows sample output from the `destination` command.

Example C-42 `destination` Command Output

```
L2> destination
all racks, all slots
```

Use the `r` <*racks*> `destination` command to set the racks that are the destination for L2 commands (this command selects all of the modules in a rack as the destination modules). In this command, the variable <*racks*> is a rack number, a comma separated list of rack numbers, or a range of rack numbers indicated by a dash character. Example C-43 shows sample output from the `r` <*racks*> `destination` command.

Example C-43 `r` *<racks>* `destination` Command Output

```
L2> r 1 destination
9 default destination(s) set
L2> destination
001r28 (137.38.82.155:4:0)
001c34 (137.38.82.155:0:0)
001c30 (137.38.82.155:1:0)
001c36 (137.38.82.155:2:0)
001c32 (137.38.82.155:3:0)
001c20 (137.38.82.155:5:0)
001c22 (137.38.82.155:6:0)
001c24 (137.38.82.155:7:0)
001c26 (137.38.82.155:8:0)
```

Use the `r` *<rack>* `s` *<slots>* `destination` command to set individual modules that are the destination for L2 commands. In this command, the variable *<rack>* is a rack number. The variable *<slots>* is a slot number, a comma separated list of slot numbers, or a range of slot numbers indicated by a dash character. Example C-44 shows sample output from the `r` *<rack>* `s` *<slots>* `destination` command.

Example C-44 `r` *<rack>* `s` *<slots>* `destination` Command Output

```
L2> r 1 s 24 destination
1 default destination(s) set
L2> destination
001c24 (137.38.82.155:7:0)
```

Use the `destination reset` command to reset the destination modules to all racks and all slots. Example C-45 shows sample output from the `destination reset` command.

Note: For this command, the mnemonic `rst` may replace the word `reset`.

Example C-45 `destination reset` Command Output

```
L2> destination reset
default destination reset to all bricks and slots
```

dhcpserver

The `dhcpserver` set of commands displays the setting for the current DHCP server (refer to Example C-46). This command set also enables and disables the DHCP server.

- `dhcpserver`
- `dhcpserver on|enable`
- `dhcpserver off|disable`

Example C-46 `dhcpserver` Command Output

```
L2>dhcpserver
DHCP server startup enabled (if no other DHCP server is found).
```

env summary

The `env summary` command displays environmental warnings and faults that are reported by the L1 controllers.

help

The `help` set of commands provides helpful information on the system controller commands. There are two commands in the `help` command set:

- `help`
- `help` <*command*>

Use the `help` command to generate a list of all of the system controller commands. Use the `help` <*command*> command to display more information on a single command. In this command, the variable <*command*> is the name of a command.

ip

The `ip` set of commands displays the following static IP (internet protocol) settings: address, netmask, and broadcast address (refer to Example C-47). This command set also enables you to set and clear the settings.

- `ip`

- `ip` *<addr>* *<netmask>*
- `ip` *<addr>* *<netmask>* *<broadcast>*
- `ip clear|reset`

Example C-47 `ip` Command Output

```
L2>ip
addr: 137.38.82.155   netmask: 255.255.255.0   broadcast addr:
137.38.82.255
```

l1

The `l1` set of commands enters L1 mode or sends an L1 controller command to a specified L1 controller. There are three commands in the `l1` command set:

- `r` *<rack>* `s` *<slot>* `l1`
- `r` *<rack>* `s` *<slot>* `l1` *<cmd>*
- `:`*<port>*`:`*<l1>* `l1` *<cmd>*

Note: For these commands, the words `rack` and `slot` may replace the mnemonics `r` and `s`.

Use the `r` *<rack>* `s` *<slot>* `l1` command to engage the L1 command processor for the specified rack and slot. In this command, the variable *<rack>* is a rack number and the variable *<slot>* is a slot number. Example C-48 shows sample output from the `r` *<rack>* `s` *<slot>* `l1` command.

Example C-48 `r` *<rack>* `s` *<slot>* `l1` Command Output

```
L2> r 1 s 30 l1
entering L1 mode 001c30, <CTRL-T> to escape to L2

001c30-L1>
```

Use the `r` *<rack>* `s` *<slot>* `l1` *<cmd>* command to send a command to a destination module without changing the default destination value. In this command, the variable *<rack>* is a rack number, the variable *<slot>* is a slot number, and the variable *<cmd>* is an L1 controller command. Example C-49 shows sample output from the `r` *<rack>* `s` *<slot>* `l1 config` command.

Example C-49 `r` *<rack>* `s` *<slot>* `l1 config` Command Output

```
L2> r 1 s 28 l1 config
001r28:
:0 - 001r28
```

Use the `:`*<port>*`:`*<li>* `l1` *<cmd>* command to send a command to a destination module that does not have a brick identification number assigned to it yet. In this command, the variable *<port>* is the port number, and the variable *<cmd>* is an L1 controller command.

l2

Use the `l2` command to engage and lock the L2 command processor. Example C-50 shows sample output from the `l2` command.

Example C-50 `l2` Command Output

```
L2> l2
L2 command processor engaged, <CTRL-D> for console mode.
```

l2find

The `l2find` command lists all of the L2 controllers that are connected together (refer to Example C-51).

Example C-51 `l2find` Command Output

```
L2>l2find
13 L2's discovered:

IP              SSN      NAME              RACK FIRMWARE
--------------- -------- ---------------- ---- ------------
[ L2's with System Serial Number NOT set ]
  137.38.82.101                             000 L3 controlle
  137.38.82.102                             000 L3 controlle
[ L2's with different System Serial Numbers ]
  137.38.82.156 L1000625                    001 1.8.0
   137.38.82.51 N1000405 itsys1             111 1.7.7
   137.38.82.58 L0000002 klsys2             002 1.7.7
  137.38.82.159 L0000138 klsys4             004 1.7.9
  137.38.82.162 L0000005 klsys5             005 1.7.7
   137.38.82.57 L0000007 klsys7             007 1.8.0
```

```
 137.38.82.55 L0000123 perch            009 1.7.7
137.38.82.158 L0000018 shrimp           018 1.7.7
 137.38.82.50 N0000001 sn2-dbg2         022 1.7.7
 137.38.82.52 M0000114 snapper          015 1.7.7
137.38.82.157 L0000119 whale            008 1.7.7
```

log

The following `log` set of commands displays the contents of the log, resets the log, and writes an entry into the log.

- `log`
- `log reset`
- `log` *<entry>*

Use the `log` command to view the contents of the log. If the log is empty, the output from the `log` command is `log is empty`.

Use `log reset` to empty the log. Use `log` *<entry>* to write a line in the log. The variable *<entry>* is text to enter in the log. Example C-52 shows sample output from the `log Start the Test` command.

Example C-52 `log Start the Test` Command Output

```
L2>log Start the Test
log entry made.
```

loopback

Use the `r` *<rack>* `s` *<slot>* `loopback` *<bytes>* *<count>* command to test the L2-to-L1 connection. In this command, the variable *<rack>* is a rack number, the variable *<slot>* is a slot number, the variable *<bytes>* is the number of bytes to send, and the variable *<count>* is the number of times to run the test.

Note: For these commands, the words `rack` and `slot` may replace the mnemonics `r` and `s`.

---

multisys

The `multisys` set of commands displays the current setting for multiple-system network sharing, enables communication between L2 controllers that have the same system serial number, and enables communication between all L2 controllers.

- `multisys`
- `multisys on` (enables communication between L2 controllers with the same system serial number)
- `multisys off` (enables communication between all L2 controllers)

Example C-53 shows sample output from the `multisys` command.

Example C-53 `multisys` Command Output

```
L2>multisys
L2 multiple system network support enabled.
L2's will only connect to L2's with same system SN
```

nvram reset

The `nvram reset` command returns the NVRAM settings of the L2 controller to the factory default settings.

power

The `power` set of commands displays the status of the supplies or powers up and powers down the supplies:

- `power`
- `power up`
- `power down`
- `r` <*rack*> `s` <*slot*> `power`
- `r` <*rack*> `s` <*slot*> `power up`
- `r` <*rack*> `s` <*slot*> `power down`

For the `power` command set, the mnemonics `pwr`, `u`, and `d` may replace the words `power`, `up`, and `down`.

Use the `power` command to view the power status of each module identified by the destination set of commands. Use the `power up` and `power down` commands to power up or power down each module identified by the destination set of commands. Example C-54 shows sample output from the `power` command.

Example C-54 `power` Command Output

```
L2> power
001c20:
power appears on
001c22:
power appears on
001c24:
power appears on
001c26:
power appears on
001r28:
power appears on
001c30:
power appears on
001c32:
power appears on
001c34:
power appears on
001c36:
power appears on
```

Use the `r` <*rack*> `s` <*slot*> `power` command to view the power status of a specified brick. Use the `r` <*rack*> `s` <*slot*> `power up` and `r` <*rack*> `s` <*slot*> `power down` command to power up or power down specified modules. In these commands, the variable <*rack*> is a rack number, and the variable <*slot*> is a slot number. Example C-55 shows sample output from the `r` <*rack*> `s` <*slot*> `power` command.

Example C-55 `r` <*rack*> `s` <*slot*> `power` Command Output

```
L2> r 1 s 22 power
power appears on
```

quit

Use the `quit` command to exit the L2 command processor.

rackid

The `rackid` set of commands enables you to display and set the rack identification number for the L2 controller. In Example C-56, the rack ID number of the L2 controller is 3.

- `rackid`
- `rackid` <*decimal exp*>

Example C-56 `rackid` Command Output

```
L2>rackid
rack ID is 3
```

reboot_l2

The `reboot_l2` command reboots the L2 controller using the newest firmware image. The `reboot_l2 force` command reboots the L2 controller even if the firmware image is invalid.

- `reboot_l2`
- `reboot_l2 force`

select

The `select` set of commands displays the brick ID number and subchannel that receives console input or sets the brick ID number and subchannel that will receive console input.

- `select`
- `select` <*rack*> <*slot*>
- `select subchannel` <*subchannel*>
- `select filter` and `select syscon` <*value*>

In this command set, the mnemonic `sel` may replace the word `select`.

Use the `select` command to view the brick ID number and subchannel that receives console input. Example C-57 shows sample output from the `select` command. In this example, the brick ID is an Origin 300 base module in rack 1, slot 20 (001c20) and the subchannel is the console channel.

Example C-57 `select` Command Output

```
L2> select
known system consoles (non-partitioned)

001c20 - L2 detected
current system console

console input: 001c20 console
console output: not filtered
```

Use the `select` *<rack>* *<slot>* command to set the brick ID number that receives console input. Example C-58 shows sample output from the `select` *<rack>* *<slot>* command. In this command, the variable *<rack>* is a rack number, and the variable *<slot>* is a slot number. In the example, the brick ID is an Origin 300 base module in rack 1, slot 32 (001c32).

Example C-58 `select` *<rack>* *<slot>* Command Output

```
L2> select 1 32
INFO: default system console override, changed to: 001c32 console
console input: 001c32 console (CAUTION: default overrode!)
console output: not filtered
```

Use the `select subchannel` *<subchannel>* command to set the subchannel for the module that receives console input. Example C-59 shows sample output from the `select` *<subchannel>* command. In this command, the variable *<subchannel>* is the subchannel number (a, b, c, d or console).

Example C-59 `select subchannel` *<subchannel>* Command Output

```
L2> select subchannel c
INFO: system console changed to:001c30 CPU2
console input: 001c30 CPUc (CAUTION: default overrode!)
console output: not filtered
```

Use the `select filter` *<value>* command to turn the console output filter on or off. Example C-60 shows sample output from the `select filter on` command. In this command, the variable *<value>* is on or off.

Example C-60 `select filter` Command Output

```
L2> select filter on
console input: 001c30 console
console output: filtered
```

serial

Use the `serial` set of commands to view the system serial number and to set the system serial number. There are two commands in the `serial` command set:

- `serial`
- `serial` *<snum>*

Use the `serial` command to view the system serial number. Example C-61 shows sample output from the `serial` command.

Example C-61 `serial` Command Output

```
L2> serial
system serial number: M0000010.
```

Use the `serial` *<snum>* command to set the system serial number. In this command, the variable *<snum>* is the system serial number. Example C-62 shows sample output from the `serial` *<snum>* command.

Example C-62 `serial` *<snum>* Command Output

```
L2> serial L0000010
system serial number set to L0000010.
L2> serial
system serial number: L0000010.
```

shell

Use the `shell` command to escape to the L2 operating system. In this command, the character `!` may be used instead of the word `shell`. Example C-63 shows sample output from the `shell` command.

Example C-63 `shell` Command Output

```
L2> shell
bash$ rm core
bash$ exit
exit
L2>
```

smp

The `smp` command shows the status of the system maintenance port (SMP) network connection. Example C-64 shows sample output from the `smp` command.

Example C-64 `smp` Command Output

```
L2>smp
Session Who           Group Mode              Console
------- ------------ ----- ----------------- -----------------
      1 modem port       1   L2                001c20 console (default)
>>>   0 console port    0    L1 (escaped)      001c20 console (default)
```

sysname

The `sysname` set of commands enables you to display and set the name of the system.

- `sysname`
- `sysname` *<name>*

Example C-65 shows sample output from the `sysname` command.

Example C-65 `sysname` Command Output

```
L2>sysname
L2 system name: smelt.
```

version

Use the `version` command to view the version of the firmware running in the L2 controller. In this command, the mnemonic `ver` may replace the word `version`. Example C-66 shows sample output from the `version` command.

Example C-66 `version` Command Output

```
L2> version
L2 version 1.8.0
```

Regulatory Specifications

This appendix presents regulatory information that may be important to the operation of your SGI Origin 300 system with NUMAlink module.

Manufacturer's Regulatory Declarations

The SGI Origin 300 products conform to several national and international specifications and European Directives listed on the "Manufacturer's Declaration of Conformity." The CE insignia displayed on each device is an indication of conformity to the European requirements.

Caution: Each SGI system has several governmental and third-party approvals, licenses, and permits. Do not modify this product in any way that is not expressly approved by SGI. If you do, you may lose these approvals and your governmental agency authority to operate this device.

System Numbers

The CMN (model) number for the system is shown on the system label on the unit. The series number is on the serial number label on the back of the system. You may need both the series number and CMN number to obtain the Manufacturer's Declaration of Conformity from SGI.

Manufacturer's Declaration of Conformity

Look at the regulatory label on the system to determine your CMN (model) number. The serial number label determines your series number. You may need both of these numbers to identify your Manufacturer's Declaration of Conformity.

To obtain the Manufacturer's Declaration of Conformity from SGI, you must either provide the CMN number to your local SGI sales representative or contact the Technical Assistance Center at 1-800-800-4SGI.

CE Notice

The "CE" symbol indicates compliance of the device to directives of the European Community. A "Declaration of Conformity" in accordance with the standards has been made and is available from SGI upon request.

Electromagnetic Emissions

This equipment has been tested and found to comply with the limits of a Class A device, pursuant to Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Note: These Class A limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users will be required to correct the interference at their own expense.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution: Changes or modifications to the equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device also complies with Class A electromagnetic emissions limits of C.I.S.P.R. Publication 22, Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment.

Industry Canada Notice (Canada Only)

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique német pas de perturbations radioélectriques dépassant les normes applicables aux appareils numériques de Classe A préscrites dans le Règlement sur les interferences radioélectriques établi par le Ministère des Communications du Canada.

VCCI Notice (Japan Only)

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Chinese Class A Regulatory Notice

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策．

Korean Class A Regulatory Notice

이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며 만약 잘못 판매 또는 구입하였을 때에는 가정용으로 교환하시기 바랍니다.

Shielded Cables

The SGI Origin 300 product is FCC-compliant under test conditions that include the use of shielded cables between the system and its peripherals. Your system and any peripherals that you purchase from SGI have shielded cables. Shielded cables reduce the possibility of interference with radio, television, and other devices. If you use any cables that are not from SGI, ensure that they are shielded. Telephone cables do not require shielding.

Optional monitor cables that are supplied with your system use additional filtering molded into the cable jacket to reduce radio frequency interference. Always use the cable that is supplied with your system. If your monitor cable becomes damaged, obtain a replacement cable from SGI.

Electrostatic Discharge

SGI designs and tests its products to be immune to the effects of electrostatic discharge (ESD). ESD is a source of electromagnetic interference and can cause problems that range from data errors and lockups to permanent component damage.

While you are operating the system, it is important that you keep all the covers and doors, including the plastics, in place. The shielded cables that came with the system and its peripherals should be installed correctly, with all thumbscrews fastened securely.

An ESD wrist strap may be included with some products, such as memory or PCI upgrades. Use the wrist strap when you install these upgrades to prevent the flow of static electricity; it is designed to protect your system from ESD damage.

Laser Compliance Statements

The CD-ROM drive in this system is a Class 1 laser product. The CD-ROM drive's classification label is located on the drive.

Warning: Invisible laser radiation when open. Avoid exposure to beam.

Warning: Attention: Radiation du faisceau laser invisible en cas d'ouverture. Evitter toute exposition aux rayons.

Warning: Vorsicht: Unsichtbare Laserstrahlung, Wenn Abdeckung geöffnet, nicht dem Strahl aussetzen.

Warning: Advertencia: Radiación láser invisible al ser abierto. Evite exponerse a los rayos.

Warning: **Advarsel: Laserstråling vedåbning se ikke ind i strålen**

Warning: **Varo! Lavattaessa Olet Alttina Lasersåteilylle**

Warning: **Varning: Laserstrålning når denna del år öppnad ålå tuijota såteeseenstirra ej in i strålen.**

Warning: **Varning: Laserstrålning nar denna del år öppnadstirra ej in i strålen.**

Warning: **Advarsel: Laserstråling nar deksel åpnesstirr ikke inn i strålen.**

Lithium Battery Statement

Warning: **Replace the battery with the same or equivalent type as recommended by the manufacturer, or the battery could explode. Discard used batteries according to the manufacturer's instructions.**

Warning: **Advarsel!: Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Léver det brugte batteri tilbage til leverandøren.**

Warning: **Advarsel: Eksplosjonsfare ved feilaktig skifte av batteri. Benytt samme batteritype eller en tilsvarende type anbefalt av apparatfabrikanten. Brukte batterier kasseres i henhold til fabrikantens instruksjoner.**

Warning: **Varning: Explosionsfara vid felaktigt batteribyte. Anvãnd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera anvãnt batteri enligt fabrikantens instruktion.**

Warning: **Varoitus: Päristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.**

Warning: **Vorsicht!: Explosionsgefahr bei unsachgemäßen Austausch der Batterie. Ersatz nur durch denselben oder einen vom Hersteller empfohlenem ähnlichen Typ. Entsorgung gebrauchter Batterien nach Angaben des Herstellers.**

Safety Instructions

Read these instructions carefully:

1. Follow all warnings and instructions marked on the product and noted in this and other documentation included with the product.
2. Unplug this product from the wall outlet before you clean it. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
3. Do not use this product near water.
4. Do not place any component of this product on an unstable cart, stand, or table. The component may fall, causing serious damage to the component.
5. Slots and openings on the cabinets and components of the product are provided for ventilation, reliable operation, and protection from overheating of the product. These slots and openings must not be blocked or covered. This product should never be placed near or over a radiator or heat register, or in a built-in installation unless proper ventilation is provided.
6. This product should be operated from the type of power indicated on the label. If you are not sure of the type of power available, consult your dealer or local power company.

7. Do not allow anything to rest on the power cord. Do not locate this product where individuals will walk on the cord.
8. Do not use extension cords with your SGI system.
9. Never push objects of any kind into this product through cabinet slots because they may touch dangerous voltage points or short out parts that could result in a fire or electric shock.
10. Never spill liquid of any kind on the product.
11. Do not attempt to service this product yourself except as noted in this guide. Opening or removing covers of internal components may expose you to dangerous voltage points or other risks. Refer all servicing to qualified service personnel.
12. Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
    - When the power cord or plug is damaged or frayed.
    - If the product has been exposed to rain, water, or any other type of liquid.
    - If the product does not operate normally when the operating instructions are followed.

      Note: Adjust only those controls that are covered by the operating instructions, because improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to normal condition.

    - If the product has been dropped or the cabinet has been damaged.
    - If the product exhibits a distinct change in performance, indicating a need for service.
13. Use only the proper type of power supply cord set (provided with the system) for this unit.

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