32- to 64-processor Upgrade Procedure

(Origin2000 ™ Systems)

HMU-398-0

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Record of Revision

September 1997

Original printing.

Overview

The following paragraphs provide general background information that you should know before you begin this upgrade procedure.

Description of Upgrade

SGI customers have the option of adding processors to an Origin2000™ system. This procedure is written to aid SGI support personnel (System Support Engineers and Site Analysts) in the tasks of installing, configuring, and verifying the upgrade of a 32-processor Origin2000 system to 64 processors.

Each system upgrade may vary; therefore, not all components of this procedure will pertain to your upgrade process. If you are upgrading the operating system, be sure to build a system disk before you shut down the system. You will also want to ensure that the PROM revisions are flashed to the latest version. You can flash PROMs before you actually perform the upgrade procedure.

Upgrade Prerequisites

The following list describes some requirements for this upgrade procedure:

- IRIX™ 6.4.1 release or above
- Current required patch set
- Node board with Hub Rev 5 (for systems with more than 32 processors)

Training Requirements

SGI service personnel who perform this upgrade must have completed training on the Origin2000 hardware and system administration. If this is not possible, a hardware-trained person must have a system administrator available while performing this upgrade. Experience in installing the IRIX operating system on an Origin2000 system is advised.

Reference Documents

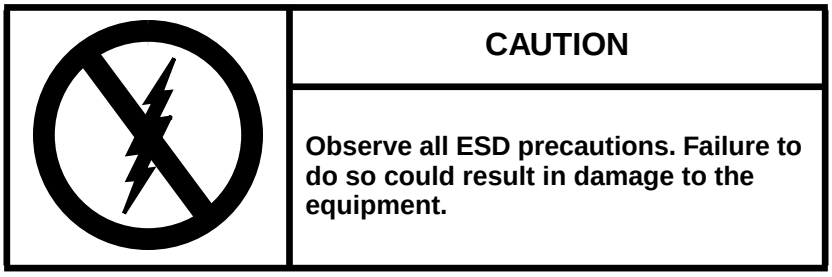
Table 1 lists documents that provide supporting information for this upgrade procedure. You may obtain these documents online from the Technical Publications library (`http://frenzy.engr.sgi.com/`), from the Service Information home page (`http://servinfo.cray.com/`), or from the URLs listed in the table.

Table 1. Origin2000 Reference Documents

Document Title	Document Number	URL
Site Preparation for Origin™ Family and Onyx2™ Systems	007-3452-001	`http://frenzy.engr.sgi.com/lib/makepage.cgi?007-3452-001`
Origin2000 and Onyx2Deskside and Rackmount Installation Instructions	108-0155-003	`http://frenzy.engr.sgi.com/lib/makepage.cgi?108-0155-002`
Diagnostic Roadmap (Draft)	108-0164-001	`http://ganesh.engr.sgi.com/lego/Documentation/`
IRISconsole™ Multiplexer Installation Procedures	007-2839-003	`http://frenzy.engr.sgi.com/lib/makepage.cgi?007-2839-003`
Origin2000 Power-On Diagnostics	108-0161-001	`http://techpubs.engr.sgi.com/lib/makepage.cgi?108-0161-001`
System Verification Program (SVP) Reference Guide	108-0165-001	`http://techpubs.engr.sgi.com/lib/makepage.cgi?108-0165-001`
Origin200/2000 IP27PROM Technical Reference Manual	108-0170-001	`http://babylon.engr/lego/ip27prom/ip27prom.html`
Flashing MMSC Firmware	N/A	`http://homegrown.engr/MMSC/flashing.html`

ESD Precautions

Observe electrostatic discharge (ESD) precautions during the entire upgrade process. You must wear an SGI-approved wrist strap when you handle an ESD-sensitive device to eliminate possible ESD damage to equipment.



CAUTION

Observe all ESD precautions. Failure to do so could result in damage to the equipment.

Connect the wrist strap cord directly to earth ground. Each Origin rack has at least two plug-ins to which you may connect the wrist strap. One plug-in is located behind the CrayLink™ door; the other plug-in is located at the rear of the Origin2000 rack.

NOTE: Some of the early systems had plug-ins that were not actually grounded. Be sure these plug-ins are grounded to avoid ESD damage.

Estimated Time to Install the Upgrade

Table 2 breaks down the upgrade process into nine separate processes. The time to upgrade your system will vary, depending on your present configuration. Use this table to calculate the approximate time that you should request to complete this upgrade.

Table 2. Estimated Times to Install Upgrade

Installation Task	Estimated Time to Install Upgrade
Flashing the PROMs	1 to 2 hours
Installing the Origin2000 Racks	4 hours
Installing the Console Connections Serial Terminal IRISconsole	 1/2 hour 1 hour
Upgrading the IP27 Node boards	4 hours
Cabling the System	1 to 2 hours
Connecting the MMSCs	1/2 hour
Configuring the Rack and Module IDs	1 hour
Initial System Start-up	--
Verifying the System	--

Parts Required

Table 3. Parts Required for the Upgrade

Part number	Quantity	Description
HU1-H6402-4	1 kit per Node board	IP27 node board for systems with more than 32 processors
030-0775-003	Dependent on current memory configuration	16MB SDRAM Directory Memory
030-0781-001	Dependent on current memory configuration	64MB SDRAM Directory Memory
HU-IC-33to64	1 kit	Upgrade kit
013-1710-001	2	Cable Bail Down Assembly
018-0694-001	8	95-in. White Cable Assembly
040-1803-001	2	Bracket Connector
040-1895-001	1	Ethernet Hub Mounting Bracket
560-hub-mmsc	1	VELCRO® Fastener (for securing the Ethernet hub power transformer to the rack floor)
042-0249-001	3	Ground Strap
050-0302-001	1	Cable Comb
050-0311-001	1	Cable Comb Cover
108-0700-001	1 per rack	Cable Assembly FFSC/HUB RJ45 Shielded
9980995	1	Ethernet Hub (8 Port)
9350818	1	Power Cord
7270179	4	10-32x3/8 Screws
7260224	2	10-32 Keps steel nuts
C0-IRISCONS-1.2	1	IRISconsole

Tools Required

- Phillips screwdriver set (P/N 01524900)
- 8-in. adjustable crescent wrench (01524500)
- 10-in. adjustable crescent wrench
- 7/64-in. hex socket ball driver (P/N 37039100)
- 9/64-in. hex socket balldriver (P/N 90442801)
- ESD kit (P/N 01605900)

Software Required

Origin2000 systems with single system image (SSI) with more than 32 processors require the following software: MR of IRIX 6.4.1 for 64-processor Origin2000 systems and the [6.4] Origin200/2000 & Onyx2 Required Patch Set for S2MP+OCTANE™ (September 1997 or later)

The **MR of IRIX 6.4.1 for 64-processor Origin2000 systems** is the first release to offer support for Origin2000 systems with 33 to 64 processors. The product set supported by this release includes:

- Array Services 3.0
- Network File System (NFS®) 6.5
- FDDIXPress™ 6.5
- Bulk Data Service (BDS) 1.1p0
- CHALLENGE Complib 3.1
- CHALLENGE ComplibExecution Environment 3.1
- Performance Co-Pilot Execution only Environment 2.0
- IRIS® Developer's Option (IDO) 7.1.1
- Standard Execution Environment (C++, 7.1)
- Standard Execution Environment (C, 7.1)
- Standard Execution Environment (Fortran 77, 7.1)
- Standard Execution Environment (Fortran 90, 7.1)

Specific asynchronous products supported with the IRIX release 6.4.1 include:

- SpeedShop 1.1
- Developer Magic™: WorkShop 2.6.4
- MPT 1.1
- Network Queuing Environment™ (NQE) 3.2.1.2
- MIPSpro™ 7.1including:
  - C++ 7.1a
  - C 7.1
  - PowerC 7.1
  - Fortran 77 7.1
  - Power Fortran 7.1
  - Fortran 90 7.1
  - Power Fortran 90 7.1

- MIPSpro 7.2 (when released)

The **[6.4] Origin 200/2000 & Onyx2 Required Patch Set for S2MP+OCTANE** may be obtained from the following URL:

```
http://bits.csd.sgi.com/digest/patches/recommended
```

You can also refer to the Product Information Bulletin (PIB) number 100192 Monthly Patch CD's shipped from Customer and Professional Services (CPS). You may obtain this PIB from the following URL:

```
http://bits.csd.sgi.com/cgi-bin/fbs.cgi?msgId=view&number
=100192
```

Before You Begin

Ensure that you perform the following procedures before you perform a 33- to 64-processor upgrade procedure:

- Build a system disk
- Upgrade Origin2000 racks with node boards for systems with more than 32 processors (Hub Rev 5)
- Flash node board and BaseIO PROMs and MMSC PROMs to the latest revision level

Build a System Disk

If you are upgrading to a later version of the IRIX operating system, be sure to build a system disk before you shut down the system. This will enable you to boot the operating system once your 64-processor system is installed.

Upgrade the Node Boards

Each node board in your Origin2000 system needs to be replaced with a new node board for systems with more than 32 processors. This node board contains the Hub revision 5. The node boards you receive are not populated; therefore, you need to move all main memory and all premium (extended) directory memory DIMMs from each old node board to each new node board. If you do not have premium directory memory DIMMs on your existing node boards, you need to install them on the new node boards.

To ensure that node boards and memory are properly installed and functioning, upgrade the node boards in one module at a time, and then power up that module and ensure that the module passes power-on diagnostics. In each module, remove one node board at a time, move the main and premium directory memory, and insert the new node board back into the module. Be sure to move memory to the same location on the new node board.

The following figure shows the main memory and directory memory locations on the node board. Table 4, Table 5, and Table 6 list the main memory DIMMs, the premium directory memory DIMMs, and the memory DIMM configurations.

NOTE: Be sure to wear a wrist strap when you handle node boards and memory DIMMs. Place node boards and DIMMs on the ESD mat to swap memory DIMMs.

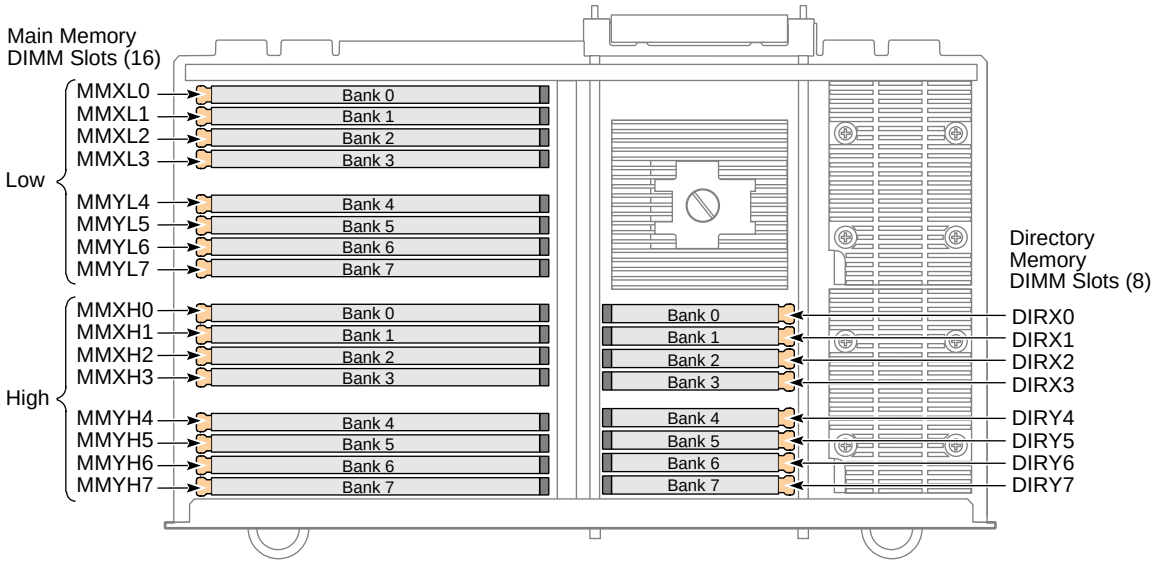


Table 4. Main Memory DIMMs

DIMM Type	Chip Depth	Chip Width	Number of Chips/DIMM	Single DIMM Capacity	Total DIMM Capacity	SDRAM Technology
A Yellow	2 1	8 16	18 1	32 Mbytes	64 Mbytes to 512 Mbytes	16 Mbits
B Green	4 2	4 8	36 2	64 Mbytes	128 Mbytes to 1 Gbytes	16 Mbits
C Red	16 8	4 8	36 2	256 Mbytes	512 Mbytes to 4 Gybtes	64 Mbits

Table 5. Premium (Extended) Directory Memory

DIMM Type	Chip Depth	Chip Width	Number of Chips/DIMM	SDRAM Technology
D White	2	8	8	16 Mbits
E Blue	8	8	8	64 Mbits

Table 6. Main Memory and Premium Memory DIMM Configurations

Main Memory Pair Type			Premium Directory Memory Pair Type	
Low	High	Color	Type	Color
A	A	Yellow	D	White
B	B	Green	D	White
C	C	Red	E	Blue

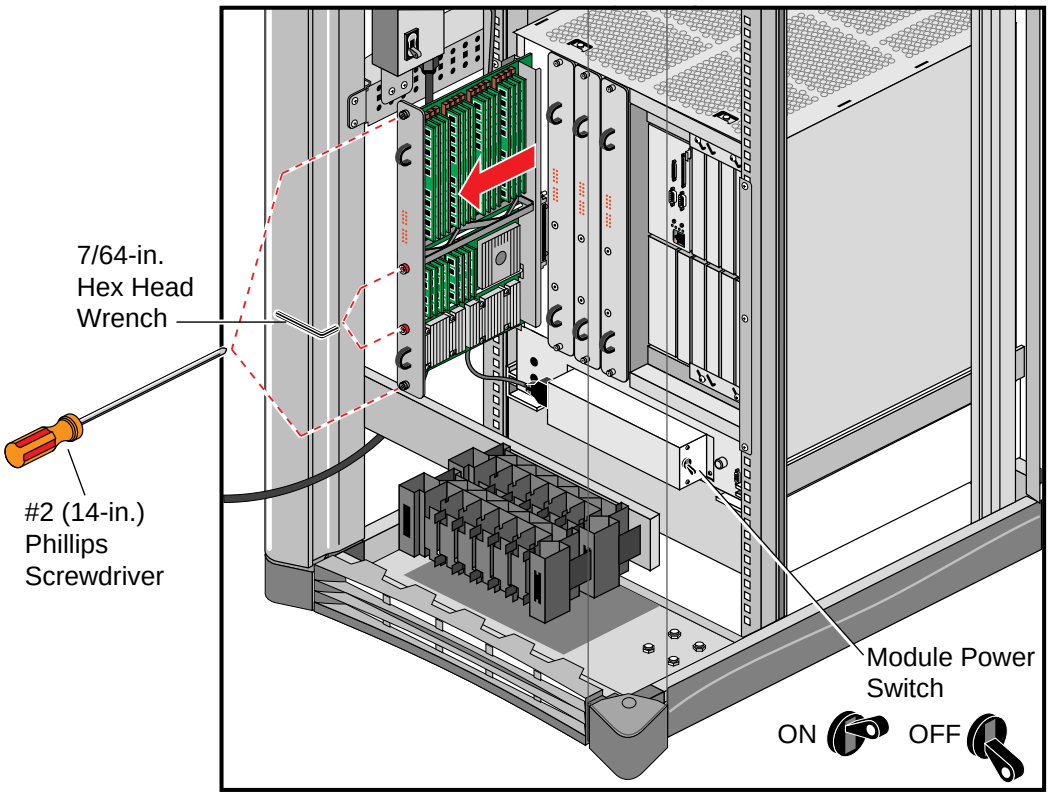
Remove the Old Node Board (Hub Rev 3)

1. Loosen the two hex screws to disengage the CPOP connectors. To avoid damaging the connector, partially loosen each screw by alternating between them until both screws are loose. These screws are spring loaded and captive.

2. Loosen the two Phillips screws. These screws are spring loaded and captive.

3. Slide out the node board and place it on an ESD mat.

NOTE: Be sure to cover the CPOP connector with the connector cover from the new node board. Do not touch the end of the CPOP connector or let it come in contact with anything other than the midplane. The end of the connector is very sensitive and can be easily damaged.

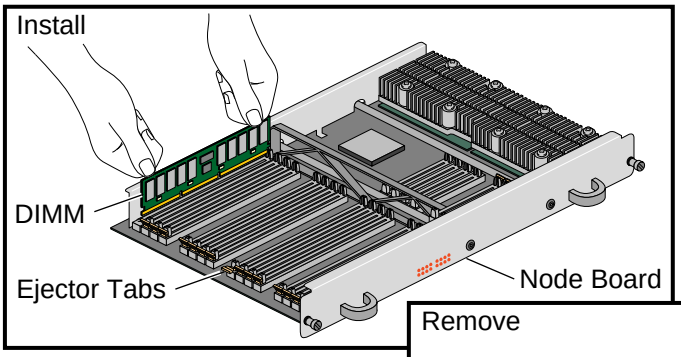


Transfer Memory to the New Node Boards

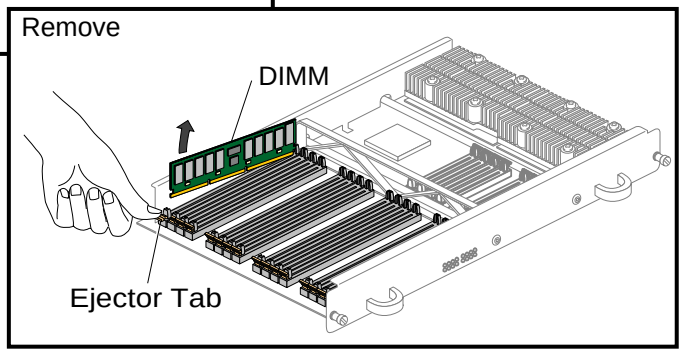
NOTE: Be sure to install memory DIMMs on the new node boards in the same location that they were on the old node boards.

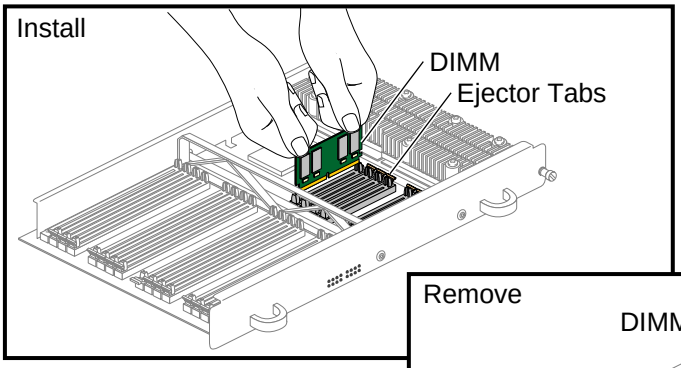
1. Push down the DIMM ejector tab; then, carefully remove the DIMM from the node board.

2. Align the DIMM with the notch at the ejector tab end; then, firmly push down on the DIMM with your thumbs to seat the DIMM.

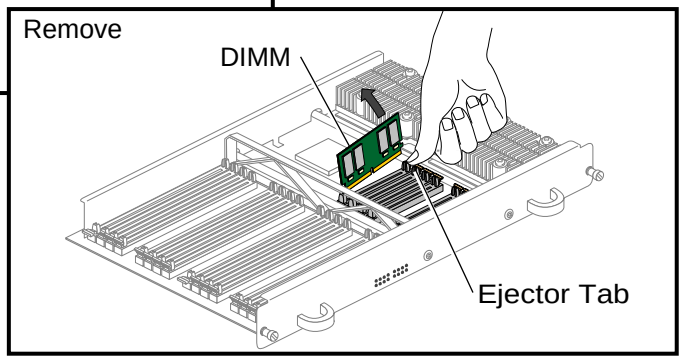


Main Memory DIMM Replacement





Premium Memory DIMM Replacement



Install the Node Boards

1. Remove the CPOP cover from the new node board and place it on the old node board.

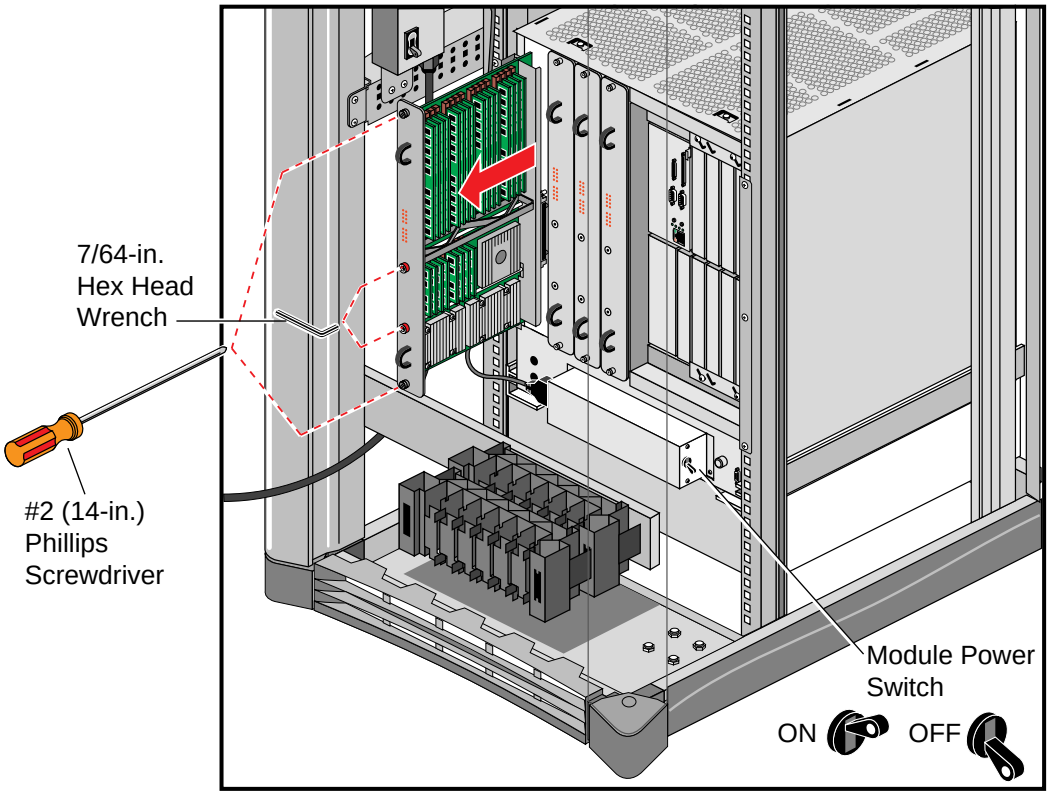
NOTE: Do not touch the end of the CPOP connector or let it come in contact with anything other than the midplane. The end of the connector is very sensitive and can be easily damaged.

2. Align the node board with the board guides at the top and bottom of the slot where you removed it; then, gently slide the node board into the slot.

NOTE: To avoid damaging the EMI gasket, do not seat the node board until all four node boards are installed in the module; then, seat the node boards from left to right.

3. Tighten the two hex screws to engage the CPOP connectors. To avoid cross-threading the screw and to avoid damaging the connector, turn each screw counterclockwise until you hear a click; then, partially tighten each screw and alternate between them until both screws are finger tight (6 in-oz).

4. Tighten the two Phillips screws.



Power Up the Module to Verify Memory Installation and Node Board Functionally

After you upgrade all the node boards in one module, power up the module to ensure that the module powers up and that the power-on diagnostics (POD) have not disabled any banks. If banks are disabled, reseat the failing DIMM(s) and re-enable the bank(s) by issuing the following command from the Command Monitor:

```
>> enable -m <Module> -s <Node Slot> -MEM <Bank Number>
```

Use the following command to ensure that the system recognizes the premium memory installation. When you run the `hinv` command you will see "Premium" instead of "Standard" in the output of the memory description:

```
>> hinv -mvvv
```

Package and Ship Node Boards

Return the node boards with Hub Rev 3 (for systems with less than 32 processors) to Mountain View. Reuse the packaging from the new node board. Follow the guidelines for returning the old materials as documented in the RMA package.

Flash PROMs

Ensure that you flash node board and BaseIO PROMs to the latest revision level. Flash PROMs on existing hardware before you perform the upgrade procedure.

Node Boards/Base IO

Power-on diagnostics will determine whether there is a node board or BaseIO PROM mismatch. Use the `hinv` command to identify the revision levels of the node boards. If your system has a PROM mismatch, you must flash the older version PROMs to match the current PROM revision level. Use the following commands to flash node board and BaseIO board PROMs:

BaseIO:

```
>> flashio dksc(0,1,0)/usr/cpu/firmware/io6prom.img
```

Node Board:

```
>> flashcpu dksc(0,1,0)/usr/cpu/firmware/ip27prom.img
```

MMSC

Origin2000 MMSCs have flash-upgradeable PROMs. You should flash your MMSC firmware to the latest revision level before you begin the upgrade process. Type the following command at the MMSC prompt to determine the revision level of the MMSC firmware:

```
MMSC> r * b * ver
```

The tool that is used to flash MMSC firmware runs under IRIX and is called `flashmmsc`. It ships as part of IRIX 6.4 and can also be obtained from the following location:

```
homegrown.engr:/usr/dist/mmsc
```

The MMSC firmware image typically resides in a file named `mmscfw.bin`. The latest version can often be found in the same directory:

```
homegrown.engr:/usr/dist/mmsc
```

You can use one of two methods to flash the MMSC firmware: Use the serial downloader to flash firmware or flash the firmware from the IRIX operating system. Use the serial downloader method if the nonvolatile storage that holds the MMSC firmware is erased (the MMSC display has a blank screen or PC-style BIOS configuration information). Flash firmware from the IRIX operating system if you are upgrading to a new firmware revision level.

Flash MMSC Firmware Using the Serial Downloader

If an MMSC lost its PROM firmware, which is indicated by a blue screen or the following information, you need to flash the MMSC using the serial downloader.

```
SBC-FFSC Serial Downloader 1.2
(U)pload an application
```

To flash MMSC firmware using the serial downloader, the MMSC must have a display attached to it.

1. Remove the MMSC AC power cable from the PDU power strip.
2. Connect a display cable between the MMSC and the display unit.
3. Copy the following files from the `homegrown.engr:/usr/dist/mmsc` sever into the directory `/usr/cpu/firmware`. You may need to create this directory.

```
flashmmsc-6.4
mmscfw.bin-1.1
```

4. Plug in the AC power cord and within 3 seconds simultaneously hold down the Scroll Down and Execute buttons on the MMSC display panel to enter the serial download mode. Release these buttons after the following message appears on the display:

   ```
   SBC-FFSC Serial Downloader 1.2
   (U)pload an application
   ```

5. Connect a 9-pin DSUB-to-8-pin mini-DIN cable assembly (P/N 018-0644-001) between the TTY1 port on the system, which will run the downloader program, and the ALTERNATE CONSOLE port on the MMSC to which you are flashing the firmware.

6. Type the following command in the `/usr/cpu/firmware` directory; then, press the Enter key:

   `./flashmmsc-6.4 -d -l /dev/ttyd1 -f mmscfw.bin-1.1`

   It will take approximately 20 seconds for the downloading to begin. The MMSC display and the console window will begin to print dots. If you receive a time-out message, check all the cable connections and type the command again.

7. Repeat Step 1 through Step 6 for each MMSC that needs flashing.

Flash MMSC Firmware From IRIX

1. Ensure that the MMSC is correctly cabled. Refer to "Installing a Serial Console" or "Installing an IRISconsole"for cabling information.

2. Boot the IRIX operating system.

3. Log in as root from the system console.

4. Type **`cd /usr/cpu/firmware`** at the prompt. This command accesses the `/usr/cpu/firmware` directory where the `flashmmsc` program and `mmscfw.bin-LATEST` firmware reside.

5. Type **`ls`** at the prompt and verify that you have the correct version of the `flashmmsc-6.`*x* file and the `mmscfw.bin-LATEST` file. Note that you need the correct version of the `flashmmsc-6.`*x* file to match the version of the IRIX operating system that is running on your system (for example, 6.2, 6.3, 6.4).

6. Type **`stty 57600`** to set the serial port speed on TTY1 of the IO6 to 57600 bps; then, immediately type Ctrl-T to escape to the MMSC prompt.

   a. Type **`rack local com 4 speed 57600`** to set COM 4 to 57600 bps.

   b. Press the Enter key to return to the IRIX prompt.

7. Type **`cd /usr/cpu/firmware`** to change to the `firmware` directory.

8. Type **`/etc/init.d/sn0start stop`** to kill the `mmscd` daemon if it is running.

9. Type **`./flashmmsc-6.4 -m -f mmscfw.bin-LATEST`** to flash the MMSC firmware.

10. Press Ctrl-T to return to the MMSC prompt.

11. Type **`rack` *`n`* `flash`**. *n* is the rack number of the MMSC that you need to flash. This takes approximately 3 to 4 minutes. The following information appears:

```
Clearing non-volatile storage
This will take approximately 100 seconds
.........................................
Transferring firmware image
.........................................
```

12. Press the Enter key to return to the IRIX prompt.

13. Repeat Step 9 through Step 12 for each MMSC that you need to flash.

14. Type **`stty 9600`** at the IRIX prompt.

15. Press Ctrl-T to return to the MMSC prompt; then type **`rack local com 4 speed 9600`**.

16. Press Ctrl-T to return to the MMSC prompt; then, type **`reset_nvram`**.

17. Press Ctrl-T to return to the MMSC prompt; then, type **`reset_mmsc`**.

18. Press Ctrl-T to return to the MMSC prompt; then, type **`rack * ver`** to see the revision level of all MMSCs.

Unpack and Inspect the Equipment

Origin2000 Racks

If you are receiving additional Origin2000 racks, they are shipped in either a cardboard crate or a wooden crate. Be sure to inspect the outside of the shipping crate for damage. Check the shock watches to ensure that they are not disassembled and also check the tip indicators to ensure that the crate was not tipped during the shipment. Note any damage on the freight bill when you sign for the equipment.

To avoid ESD damage to the electronic components, be sure to position the rack and plug it in to provide a ground path before you remove the ESD bag that covers the rack assembly.

Node Boards

You should receive one node board with the 2.3 HUB ASIC (for systems with greater than 32 processors) to replace each node board you have installed in your system. Be sure to save all the packing materials; you will reuse these materials to ship the old node board (2.1 HUB ASIC) back to Mountain View, California.

Directory Memory

You should already have the directory memory on your existing node boards; however, if you are receiving directory memory DIMMs, ensure that you receive the correct DIMMs and the correct number of DIMMs for your system configuration. Refer to the section “Upgrade the Node Boards” to identify the correct DIMMs for your system configuration. Each DIMM is packaged in its own shipping container.

HU-IC-33to64 Upgrade Kit

Compare the items in the upgrade kit with the items listed in Table 3. Ensure that a sufficient number of CrayLink cables were shipped with your upgrade kit. You will use existing 58-in. cables (red) and the eight 95-in. white cables shipped in the upgrade kit. Ensure that you have the necessary cable bails, a cable comb, and a cable comb cover.

Also ensure that the Ethernet hub, its associated cables and mounting hardware, and the correct number of ground straps were shipped with your upgrade kit.

IRISconsole

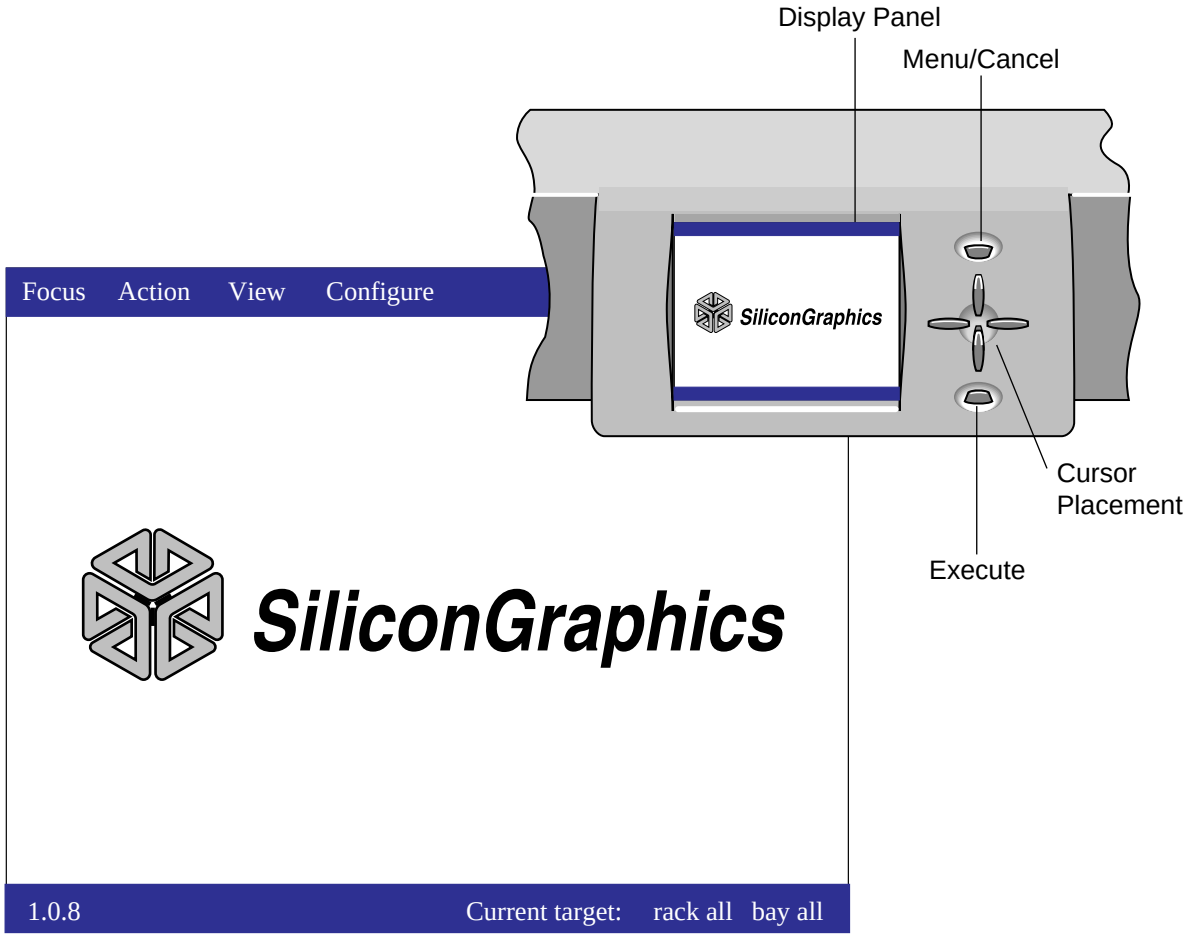
Ensure that you have all the hardware and software that you need to install the IRISconsole. IRISconsole options vary. The following list provides a general overview of what you will need to install the IRISconsole for this upgrade process.

- An O2™ workstation (Indy® workstation can also be used)
  - R5000 180 MHz PC 2GB/32MB O2 (P/N WS-180P-2G32)
  - Monitor (P/N MON-20)
  - Keyboard (P/N KBA-US)
  - Power cord (P/N PWA-NA)
- An ST-1600 (not for use in Europe) or ST-1616 (for use worldwide)
- A cable to connect the workstation to the multiplexer
  - O2 workstation 50-pin to 68-pin cable (P/N 018-8123-001)
  - Indy workstation 50-pin to 50-pin cable (P/N 018-0689-001)
- Two 25-pin to 8-pin serial cables to connect the multiplexer to the MMSC (P/N XVIC-25-02000-RM).
- IRISconsole software
- Software patch 2094

Installing the Hardware

Power Down the Origin2000 32-processor System

1. Ensure that all racks and all bays are selected. You can verify this by reading the “Current Target” message on the MMSC display panel. Use the MMSC Focus Function to make any necessary changes.
2. Select Power Down with the MMSC Action function.
3. Press the Execute button on the MMSC control panel to power down all racks and modules in the system.
4. Move the PDU power switch on each rack to the PDU Off position.
5. Turn off the power switch on each module.

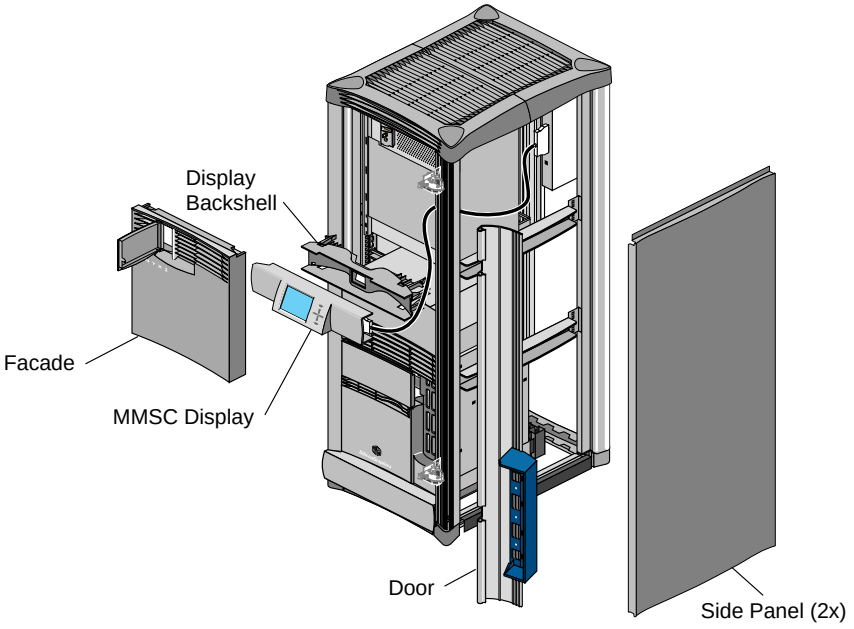


Remove any Extra MMSC Display Panels

NOTE: If your system contains more than one MMSC display panel, remove all display panels except for the display in the far left position. This leftmost rack will be configured as Rack 1.

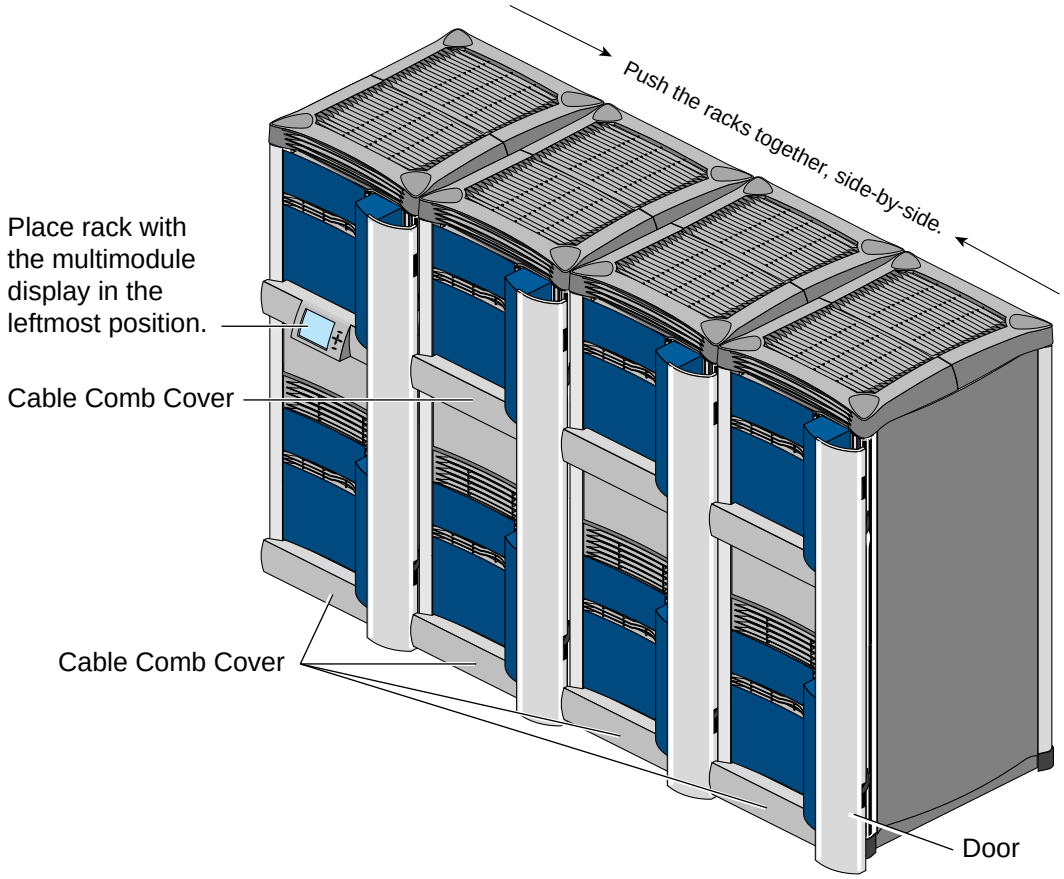
1. Remove the horizontal CrayLink cables, cable bails, and bail clips. You should not need to remove the vertical CrayLink cables.
2. Remove the 9/64 hex screw and then remove the facade.
3. Pull out the MMSC controller display and disconnect the display cable.
4. Remove the display backshell.
5. Remove the plenum behind the display backshell.
6. Unplug the display cable from the MMSC and remove the transorb at the MMSC end of the display cable; then, pull the display cable through the front of the Origin2000 rack.
7. Insert the new cable comb in the position of the display unit; then, install the facade.

NOTE: You do not need to reinstall the horizontal cables; you will connect horizontal cables when you configure the 64-processor system.



Install the Origin2000 Racks

1. Pull off the cable comb covers and remove the doors from each Origin2000 rack.
2. Remove the ground straps and turn up the floor bolts if you are repositioning existing racks.
3. Position the rack with the MMSC display in the leftmost position.
4. Remove the side panels from the inner Origin2000 racks.
5. Position the racks flush with each other so there is little or no space between the racks.
6. Screw down the floor bolts on each rack to stabilize its position on the floor.
7. Adjust the floor bolts to ensure that each rack is level with its adjoining rack. This ensures that the ground straps will align easily between each rack.

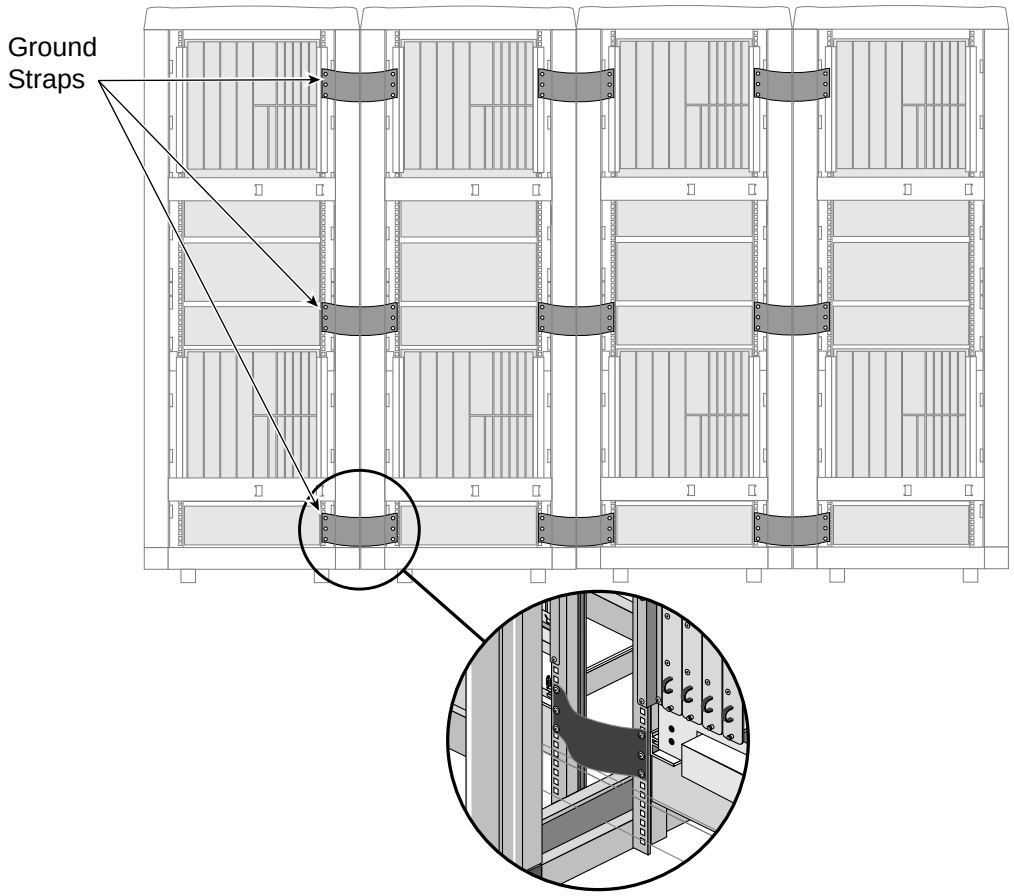


Install Ground Straps

NOTE: Ensure that the racks are correctly positioned and level before you install the ground straps.

1. Install three ground straps between each Origin2000 rack. Ensure that you install these with the metallic or shiny side facing inside, or toward the chassis. Your original system may have had only two ground straps in place.

NOTE: If you have a SCSI box installed in the rack, you may need to position the middle ground strap on the rack either above or below the SCSI box.



Console Connections

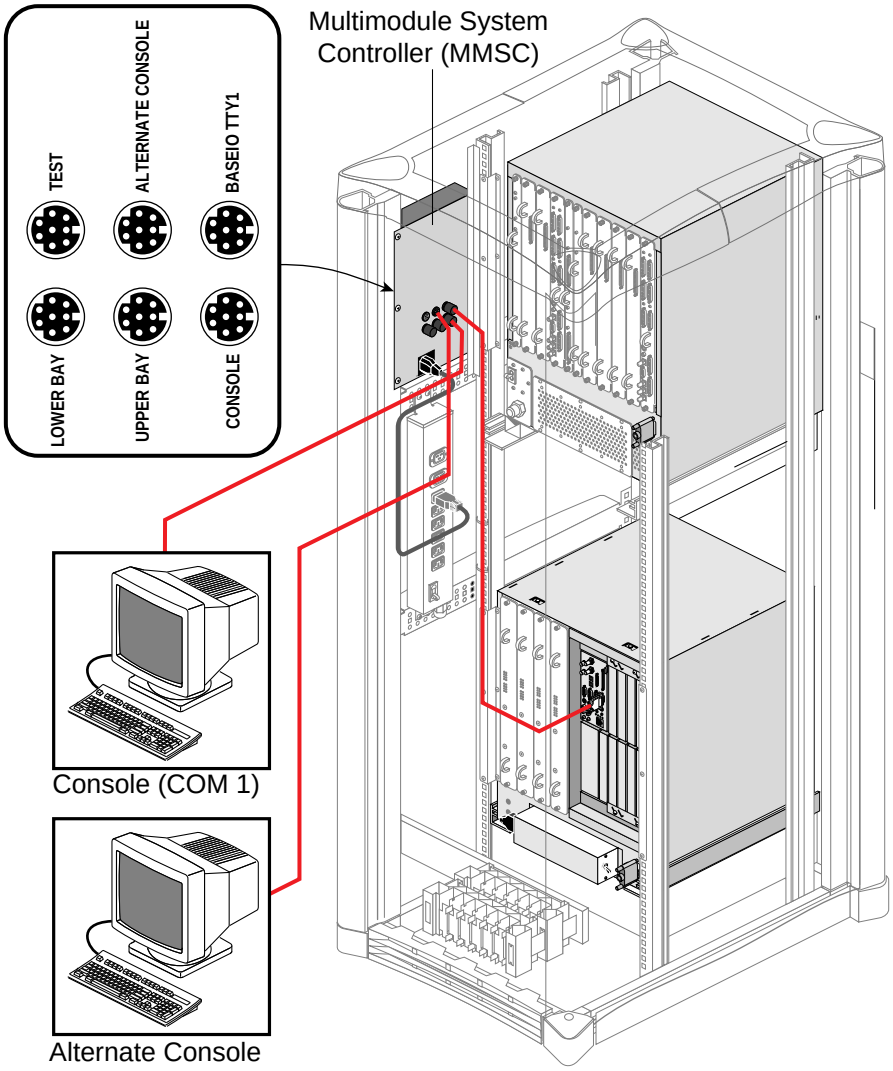
You need to connect your system using either the IRISconsole or a serial console connection. Cray supported systems should be configured with an IRISconsole.

Installing a Serial Console

1. Connect the tty_1 (Console) port on the BaseIO board to the BASEIO TTY port on the MMSC. Use a DIN-8-DB9 cable for this connection to enable remote access to the BaseIO console port through the MMSC.

2. Connect the console to the CONSOLE port on the MMSC. Use a 9-to-25 pin PC-style cable (with the DIN-8-to-DB9 converter).

3. Connect an alternate console to the ALTERNATE CONSOLE port on the MMSC. Use a 9-to-25 pin PC-style cable (with the DIN-8-to-DB9 converter).



Installing an IRISconsole

Load all applicable multiplexer and IRISconsole software and operating system upgrades on the workstation using the CD-ROMs provided with the IRISconsole option.

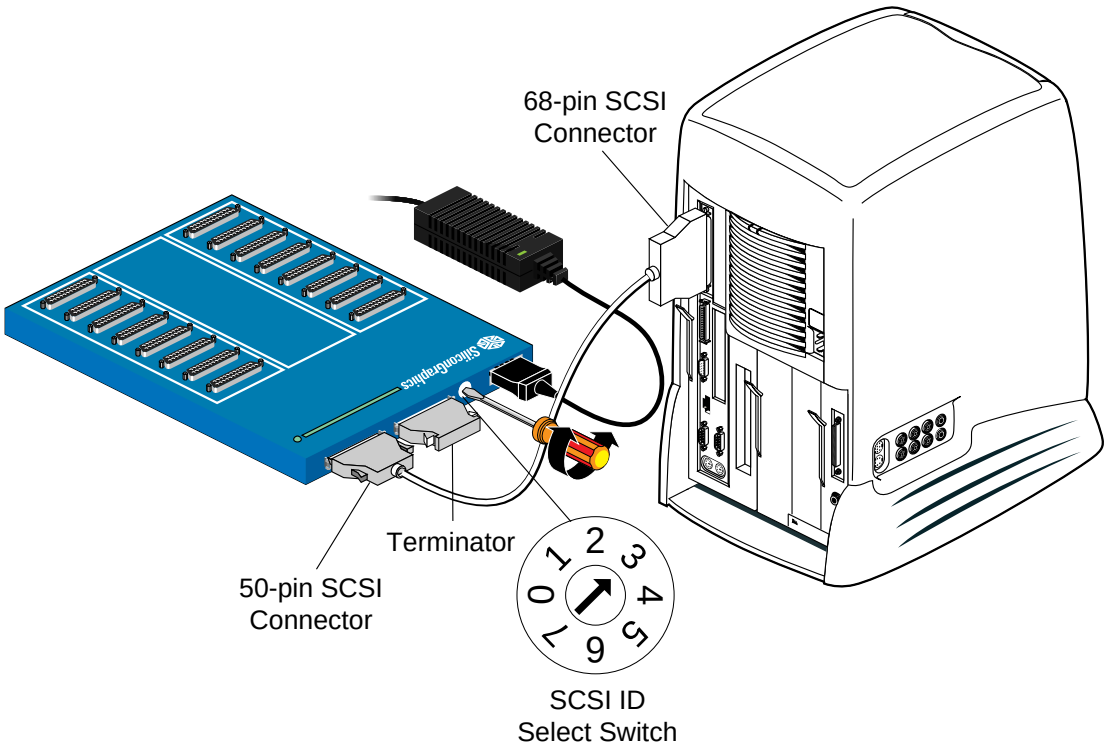
Cable the workstation to the multiplexer

1. Connect the SCSI cable to the SCSI connector on the back of the workstation (68-pin for O2 workstations, 50-pin for Indy workstations); then, connect the other end of the cable to the leftmost 50-pin socket on the back of the multiplexer.

2. Select a SCSI ID number.

NOTE: The multiplexer ID should be set to any unused ID (SCSI ID 0 and the ID numbers used for the system disk and CD-ROM are unavailable. The O2 workstation system disk ID uses SCSI ID 2; the O2 workstation CD-ROM uses SCSI ID 4).

3. Install the terminator on the multiplexer if the multiplexer is the last SCSI device on the workstation's standard external SCSI port.

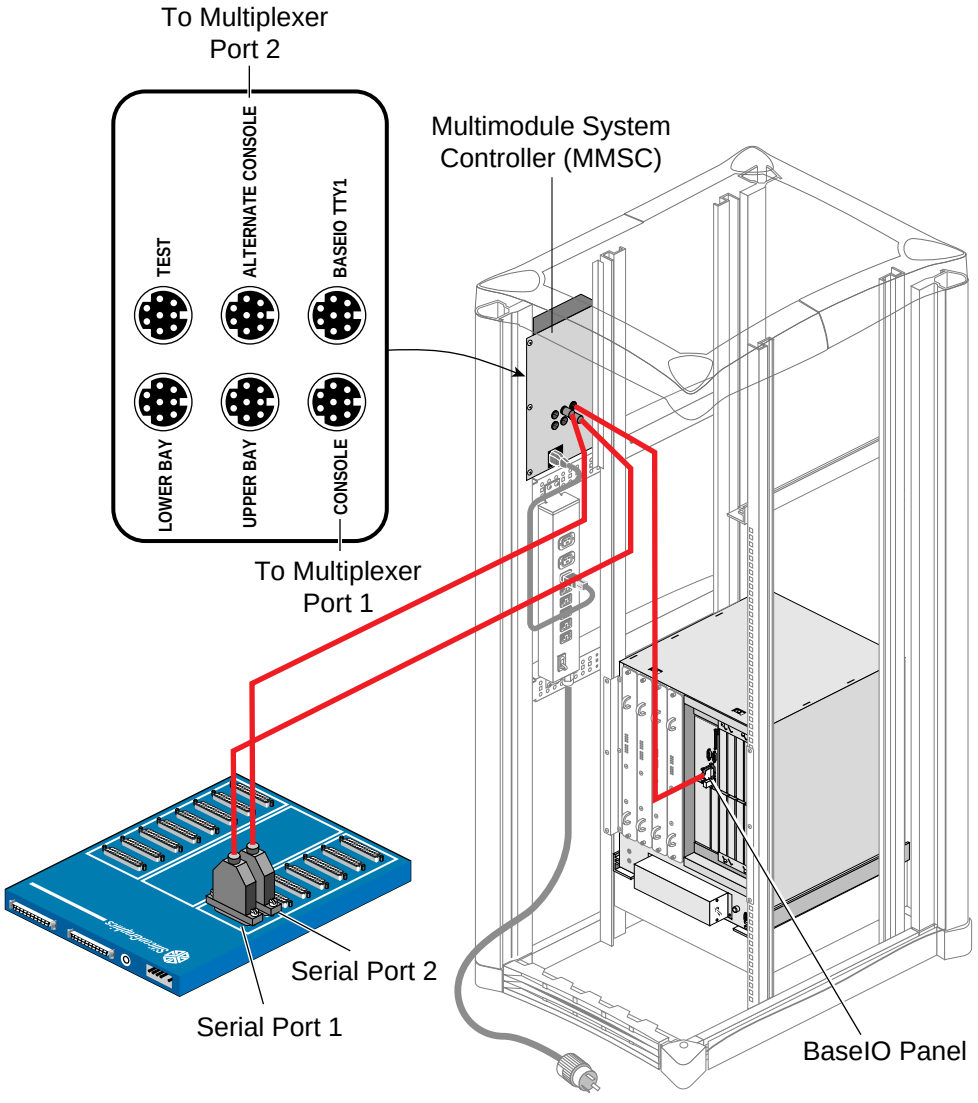


Connect the multiplexer to the Origin2000 system

1. Connect the 25-pin end of one serial cable to port 1 on the multiplexer; then, connect the other end (8-pin) to the CONSOLE port on the MMSC in Rack 1.

2. Connect the 25-pin end of the other serial cable to serial port 2 on the multiplexer; then, connect the other end (8-pin) to the ALTERNATE CONSOLE port on the MMSC in Rack 1.

   NOTE: At sites with multiple Origin2000 systems, additional console connections go to the next physical pair of serial ports. Odd-numbered ports connect to the CONSOLE, and even-numbered ports connect to the ALTERNATE CONSOLE.



Configure the Rack IDs

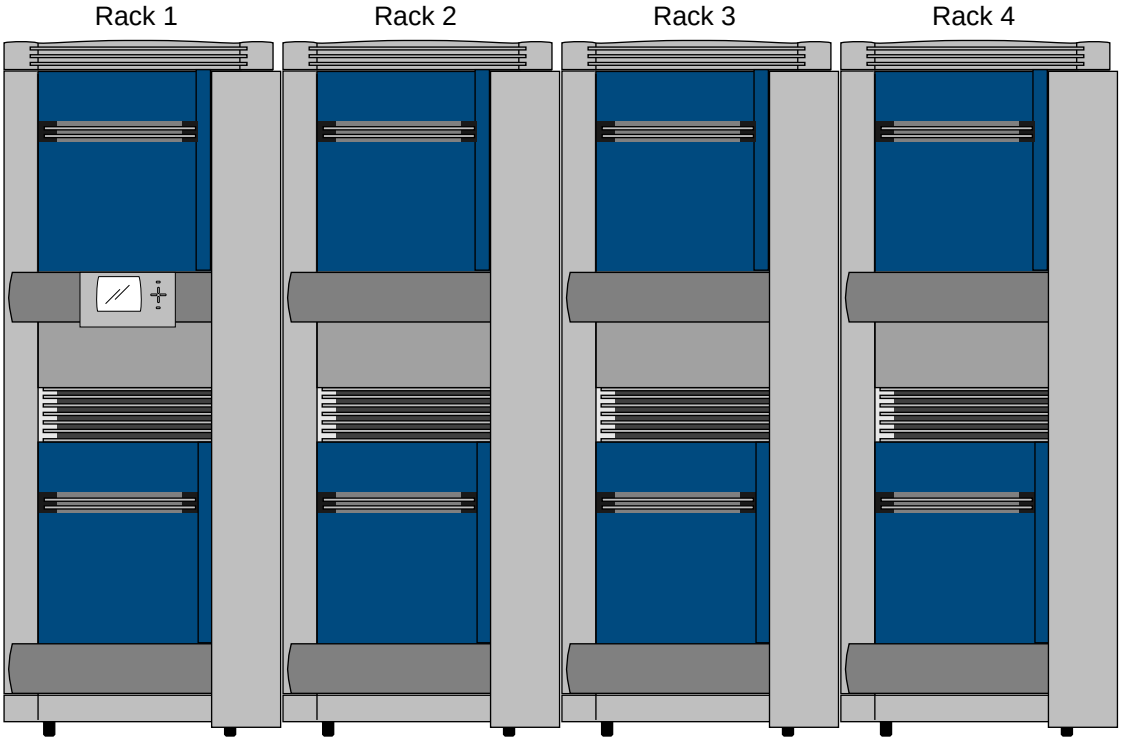
The recommended rack ID configuration is sequential numbering from left to right beginning with the left rack as Rack 1. Because you are configuring two 32-processor systems into one 64-processor configuration, you will have two racks identified as Rack 1 and two as Rack 2. Be sure to number your rack IDs before you make the MMSC connections, or apply power to only one rack at a time and then number the rack.

1. Press Ctrl-T to escape to the MMSC prompt.

2. Type **`r * mod`** at the MMSC prompt to identify the current rack IDs.

3. Type **`r X rackid Y`** at the MMSC prompt, where *X* equals the old rack number and *Y* equals the new rack number. Repeat this step for each rack that requires a new number.

4. Type **`r * mod`** at the MMSC prompt to verify that the racks are numbered according the numbering scheme illustrated in the following figure.



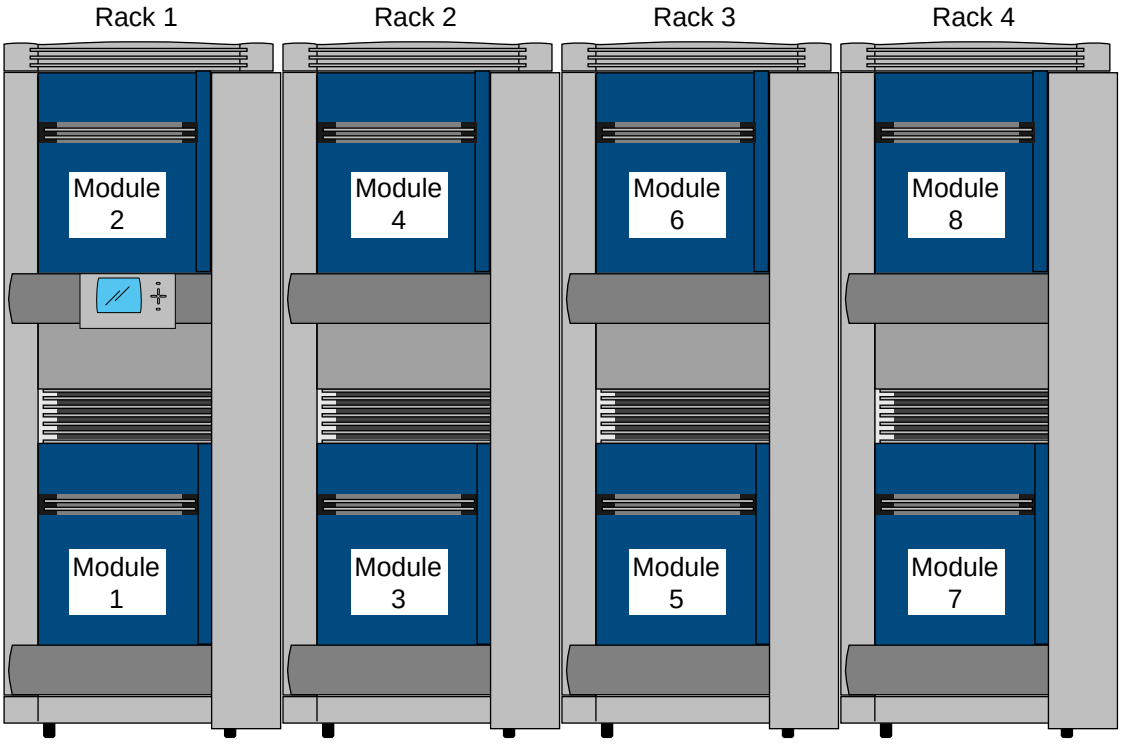
Configure the Module IDs

When you configure two 32-processor systems into one 64-processor system, you have two sets of modules numbered 1 through 4; therefore, you need to renumber the modules according to the numbering scheme in the following figure.

1. Look at each module's MSC display and verify that the module numbers in Rack 1 and Rack 2 are numbered 1, 2, 3, and 4; then, use the following procedure to renumber individual modules in Racks 3 and 4 according to the numbering scheme illustrated in the figure:

   a. Press Ctrl-T to escape to the MMSC prompt.
   b. Type the following command at the MMSC prompt:

```
MMSC> r <rack> b <module bay U/L> mod <module number>
```



Cable the System

Depending on your present system configuration, the process of cabling the system may vary. To cable a 64-processor system, begin with two 32-processor systems. Ensure that each of these systems follows the standard cabling configuration. Then, add the additional 95-in. horizontal cables to configure a 64-processor system.

If you presently have a 32-processor system with Xpress links, you need to remove these CrayLink cables (green or yellow). Xpress links are not used on systems with more than 32 processors.

If you need to reposition a rack, you must remove all of the horizontal cable connections; vertical connections can remain in position.

When cabling a new rack in the system, connect one cable pair at a time; then, power up the system to ensure communication between the links. Cabling in this manner will verify each cable-pair connection and enable easier troubleshooting of cabling problems. If the cables have already been verified in a previously installed rack, do not power up the 64-processor system until after you have finished configuring the cables.

Cable a 32-Processor System

Refer to the following figure of a 32-processor configuration as you cable each 32-processor system.

1. Install the cable bails. Be sure to install them in the correct up and down position.

2. Install the 58-in. cables (red) vertically between the upper and lower modules within a rack:

   a. Module Upper, Router 1, Port 1 to Module Lower, Router 1, Port 1
   b. Module Upper, Router 2, Port 1 to Module Lower, Router 2, Port 1

3. Install the 58-in. red cables horizontally between racks. Be sure to route the cables through the cable combs as designated in the figure:

   a. Rack 1, Module Upper, Router 1, Port 3 to Rack 2, Module Upper, Router 1, Port 3

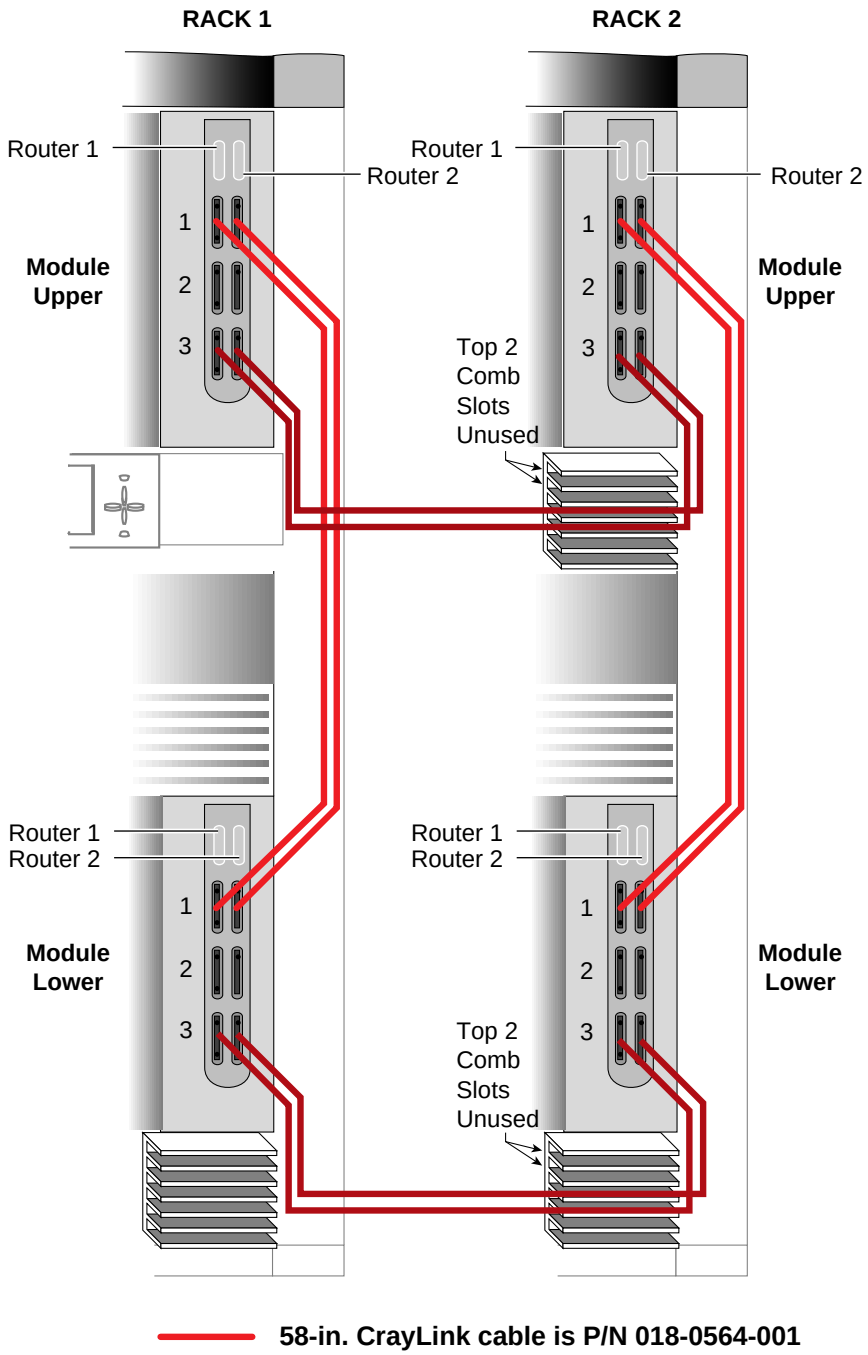
   b. Rack 1, Module Upper, Router 2, Port 3 to Rack 2, Module Upper, Router 2, Port 3

   c. Rack 3, Module Lower, Router 1, Port 3 to Rack 4, Module Lower, Router 1, Port 3

   d. Rack 3, Module Lower, Router 2, Port 3 to Rack 4, Module Lower, Router 2, Port 3

4. Attach the bail clips to the cable bails.

32P configuration



Configure the 64-processor System

Refer to the following figures that illustrate a 64-processor configuration as you cable each 64-processor system. One figure illustrates an overview of cable lengths and the ports to which they connect. The other figure illustrates how you should route the cables through the cable combs.

1. Install the cable bails for the white 95-in. horizontal cables. Be sure to install them in the correct up and down position.

2. Install the 95-in. cables (white) horizontally between Rack 1 and Rack 3:

    a. Rack 1, Module Upper, Router 1, Port 2 to Rack 3, Module Upper, Router 1, Port 2

    b. Rack 1, Module Upper, Router 2, Port 2 to Rack 3, Module Upper, Router 2, Port 2

    c. Rack 1, Module Lower, Router 1, Port 2 to Rack 3, Module Lower, Router 1, Port 2

    d. Rack 1, Module Lower, Router 2, Port 2 to Rack 3, Module Lower, Router 2, Port 2

3. Install the 95-in. cables (white) horizontally between rack 2 and rack 4:

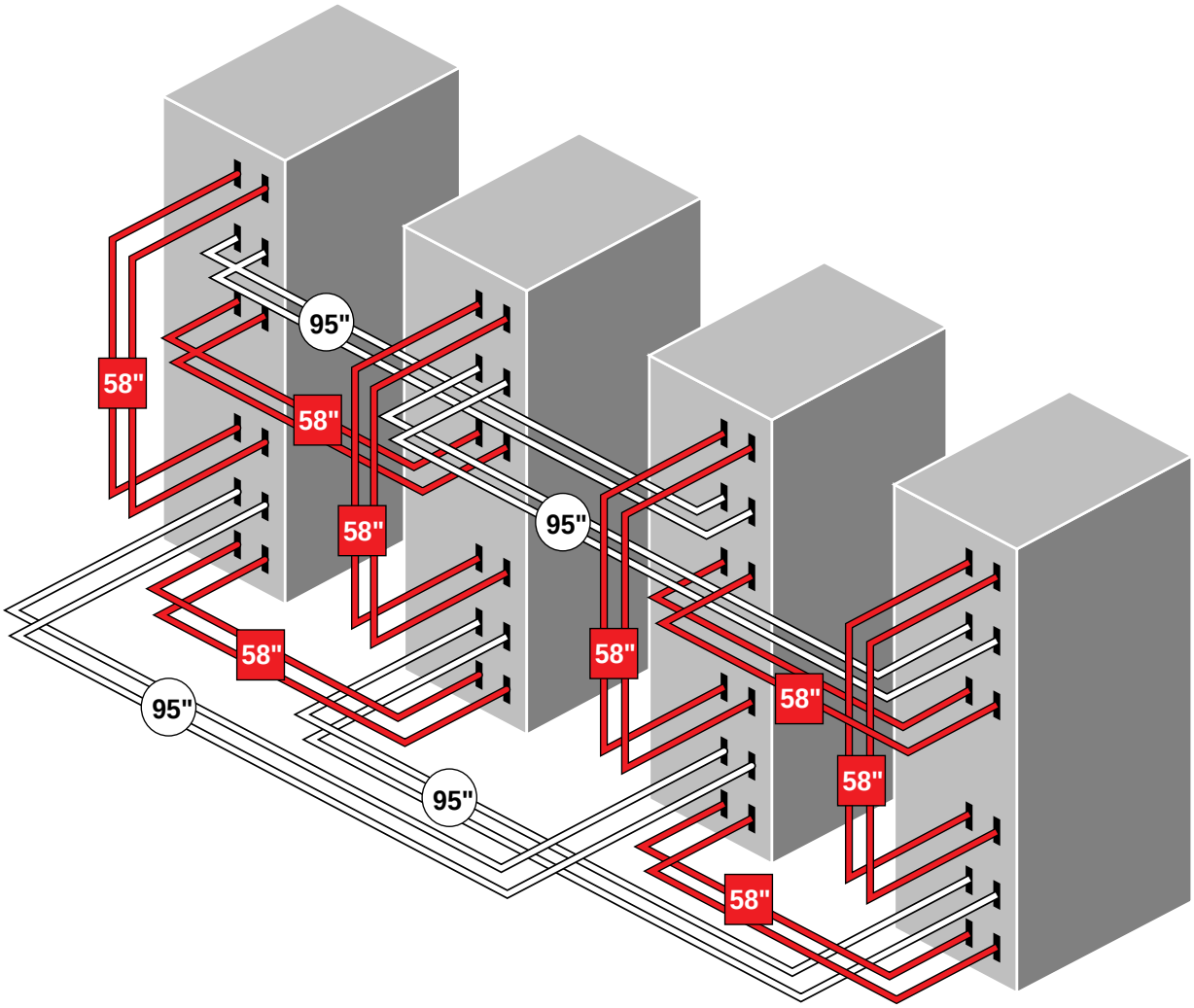
    a. Rack 2, Module Upper, Router 1, Port 2 to Rack 4, Module Upper, Router 1, Port 2

    b. Rack 2, Module Upper, Router 2, Port 2 to Rack 4, Module Upper, Router 2, Port 2

    c. Rack 2, Module Lower, Router 1, Port 2 to Rack 4, Module Lower, Router 1, Port 2

    d. Rack 2, Module Lower, Router 2, Port 2 to Rack 4, Module Lower, Router 2, Port 2

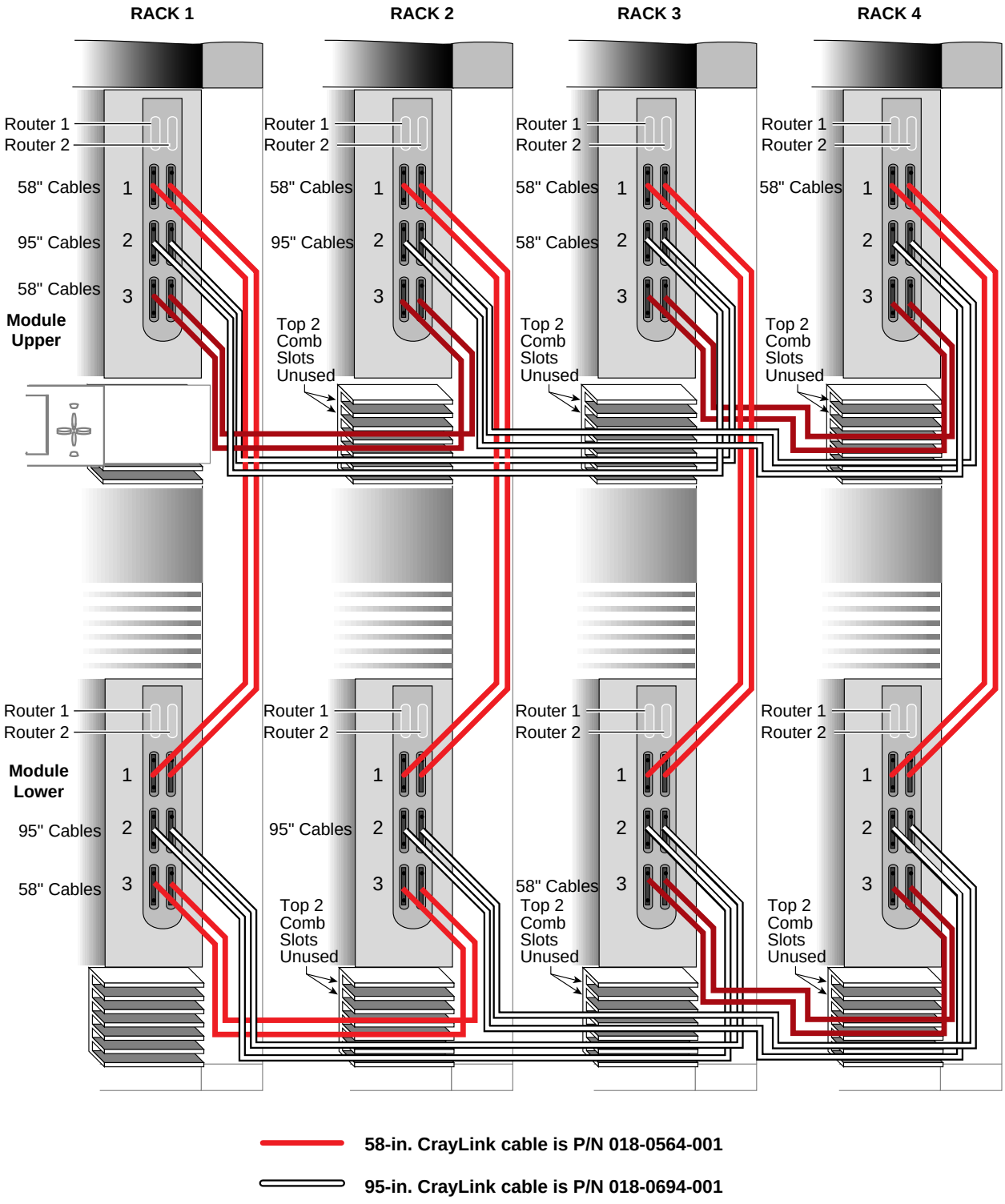
4. Attach the bail clips to the cable bails.



58-in. CrayLink cable is P/N 018-0564-001

95-in. CrayLink cable is P/N 018-0694-001

64P configuration



Install the Ethernet Hub and Connect the MMSCs

1. Install the Ethernet Hub mounting bracket in Rack three across from the PDU.

   a. Insert two spring nuts (P/N 7260103) into the vertical slot of the extrusion.

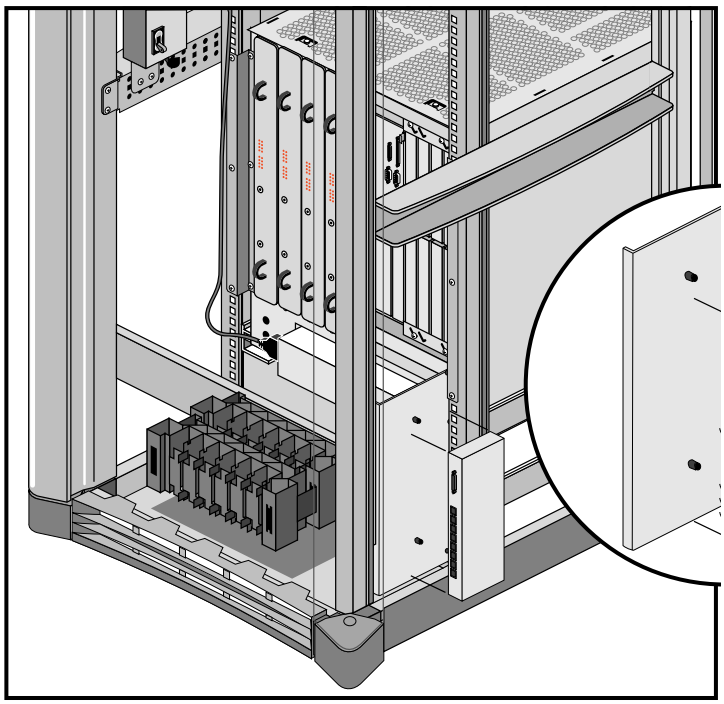
   b. Rest the bracket on the bottom of the rack and slide the spring nuts to align with the holes in the bracket; then, screw in the 10-32 x 1/2 in. screws to attach the bracket to the extrusion.

   c. Orient the hub so the LEDs and connections are facing the rear of the rack; then, install the hub onto the bracket.

2. Attach one piece of the VELCRO strip (hook or loop) to the power transformer and the other piece to the base of the Origin rack; then, lay the power transformer in the bottom of the rack.

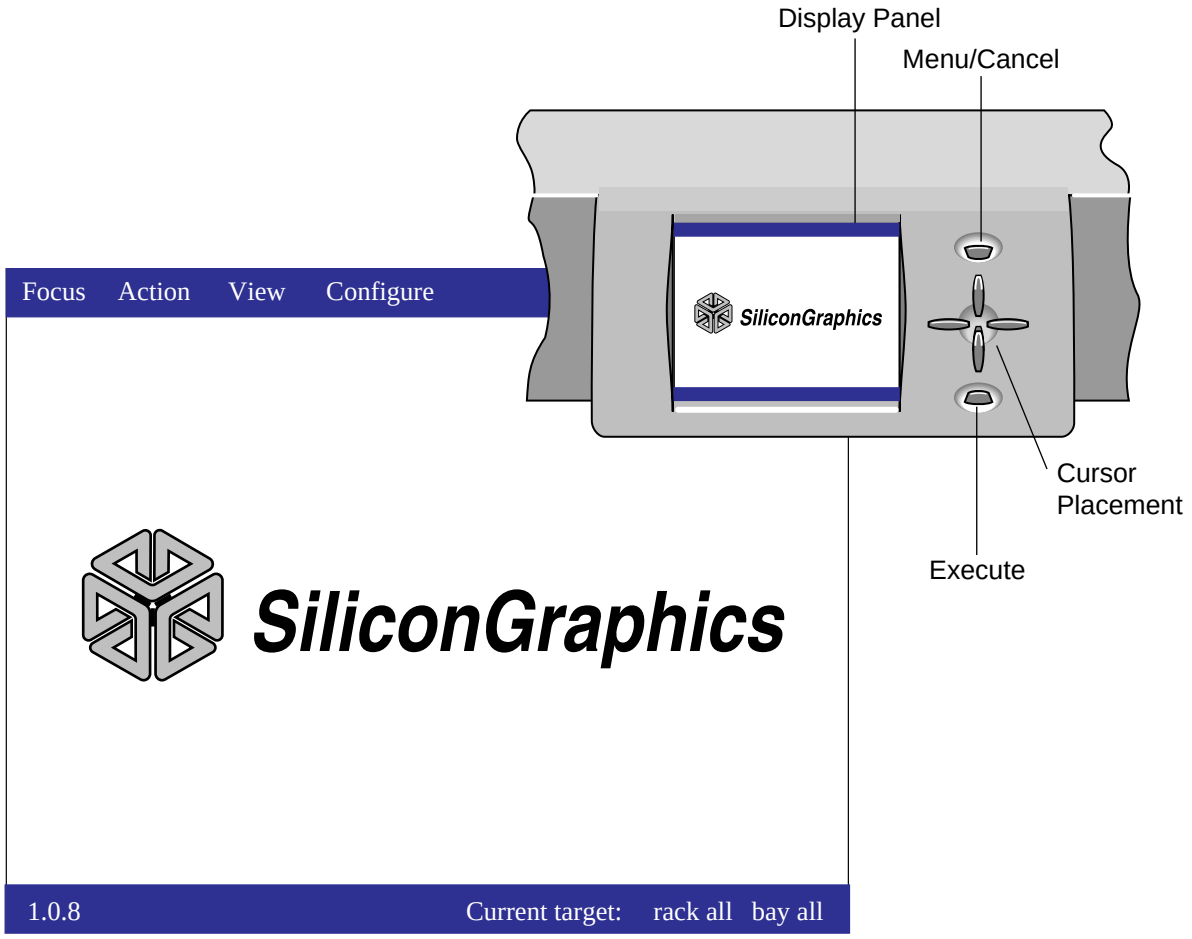
3. Connect an Ethernet cable between each port in the Hub and the MMSC of each rack.

NOTE: The original Ethernet cables that connect two MMSCs directly are special null crossover cables that cannot be used to connect to the Hub. You can discard these original cables and use the shielded cables provided in the upgrade kit.



Power Up the System

1. Move the PDU power switch on each rack to the PDU On position. Wait until the MMSC display shows the SGI logo before you proceed.
2. Move the power switch on each module to the ON position.
3. Select Power Up with the MMSC Action function.
4. Press the Execute button on the MMSC control panel to power up all racks and modules in the system.



Initial System Start-up

These procedures are for an initial start-up of the IRIX operating system, release 6.4.1, on a Silicon Graphics® Origin2000 system.

Establish System Connections

Ensure that your system is correctly connected to the system console. Refer to "Installing a Serial Console" or "Installing an IRISconsole" for procedures on connecting to either a serial console or to the IRISconsole.

Set nvram (IO6/BaseIO PROM) Variables through the System Console Connection

After hardware power-up and basic diagnostics have completed, the System Maintenance Menu displays in the system console window.

1. Select `5) Enter Command Monitor.`
2. Enter the following command:

```
>> printenv
```

This command prints all environment variables and values. These should match the variables/values listed below. If they do not, configure them as follows:

```
>> setenv AutoLoad no
>> setenv root dks0d1s0
>> setenv SystemPartition dksc(0,1,8)
>> setenv OSLoadPartition dksc(0,1,0)
>> setenv TimeZone your_timezone
>> setenv ConsolePath /hw/module/1/slot/io1(where module#1 is the console indicated on the LED display on the MSC)
>> setenv netaddr your_IP_address
>> init (stores into nvram)
>> single (boot IRIX single-user mode)
```

After these commands have been processed, you will be in single-user mode, and a UNIX® prompt will display in your system console window.

Perform Initial System Administration and Establish Network Connectivity

1. Set root and guest passwords with the `passwd(1)` command. (Both passwords are initially set to the null string.)

```
# passwd root
New password: (enter your new password)
Re-enter new password: (reenter your new password)

# passwd guest
New password: (enter your new password)
Re-enter new password: (reenter your new password)
```

2. Set the hostname for this machine.

   ```
   # hostname your_hostname
   ```

3. Set up the `/etc/sys_id` file to store your hostname for future use.

   ```
   # hostname > /etc/sys_id
   ```

4. Insert your hostname in the `/etc/hosts` file as follows:

   ```
   your.address your_hostname
   ```

   (Example: 128.162.101.83 origin2000)

5. Run `chkconfig` to configure the network on.

   ```
   # chkconfig network on
   ```

6. Set up the `/etc/config/netif.options` file.

   This file includes comments on how to modify it. For more information refer to the SGI InSight Book: *SGI Admin - IA_NetwkMail: Modifying the Network Interface Configuration*.

7. Set up the `/etc/config/ifconif-1.options` file.

   This file contains the following line:

   ```
   netmask 0xffffff00
   ```

Netmask is a 32-bit mask that determines the number of bytes representing the network and host portions of the IP address, which is also called a subnet mask. For more information, refer to Chapter 4: Internet Layer, of the IRIS InSight™ Book: *SGI Education - NetworkFun: Routing and Netmasks.*

8. Reboot the system to source your system administration and network connectivity changes. This command performs a `/etc/shutdown -i6 -y -g0`.

   ```
   # reboot
   ```

This reboots you into multi-user mode.

Perform Disk System Administration

For further information, consult *IRIX Admin: Disks and File Systems*, publication number 007-2825-002.

1. Use `dvhtool` to put `sash` in the volume header on at least one secondary disk. `sash` is a boot PROM loader that enables you to boot from a second disk.

   - Copy the `sash` from the current root:

     # **`dvhtool /dev/rdsk/dks0d1vh`**

     ```
     vd
     g sash /tmp/sash
     quit
     ```

   - Write the `sash` to the new root:

     # **`dvhtool /dev/rdsk/dks0d2vh`**

     ```
     vd
     a /tmp/sash sash
     write
     ```

2. Use the following commands to slice your disks:

   `# fx` (maps logical-to-physical devices)

   # **prtvtoc -f** (shows how disks are sliced)
   # **mkfs_xfs** (creates file systems)

3. Enter the following information to create a backup of a root in `/dev/dsk/dks0d2s0` to a root in `/dev/dsk/dks0d2s0`:

   # **`mount /dev/dksk/dks0d2s0 /root_b`**
   # **`xfsdump -l0 - /dev/dsk/dks0d2s0 | xfsrestore - /root_b`**

4. Insert the following line in `/etc/fstab`. The File System Table provides information on how to mount disks.

   ```
   /dev/dsk/dks0d2s0 /root_b
   ```

At this point, the system is running in multi-user mode, and the networks and disks are minimally configured.

How to Boot Off a Second Disk

Perform this procedure to boot off a second disk, as established in Step 1 of the previous procedure. This procedure is not part of Origin2000 software Installation. It may be performed at any time.

1. Enter the following commands to boot off another disk:

   NOTE: This example assumes that:

   - UNIX is present on scsi#0 disk#2 partition#0
   - You put `sash` onto the target disk (see Step 1 of the previous procedure.)

```
>> boot -f dksc(0,2,8)sash dksc(0,2,0)unix
root=dks1d2s0
```

OR

```
>> setenv root dks0d2s0
>> setenv SystemPartition dksc(0.2.8)
>> setenv OSLoadPartition dksc(0,2,0)
>> auto
```

OR, from multi-user mode

```
nvram root dks0d2s0
nvram SystemPartition dksc(0,2,8)
nvram OSLoadPartition dksc(0,2,0)
reboot
```

Apply Additional Patches

Refer to the following URL to obtain information on the required patch set and how to apply the additional patches:

`http://bits.csd.sgi.com/digest/patches/`

Verify the System

1. Power up the system.
2. Boot the IRIX operating system.
3. Run SVP:
   a. Install SVP.
   b. Change to the `/usr/SVP` directory.
   c. Change to superuser (root).
   d. Type **`./svp`** at the IRIX (#) prompt; then, answer the questions that `svp` prompts you to answer.
   e. Run **`./svp_client`** or send an e-mail to `svp@corp.sgi.com /usr/SVP/CONFIG/moasic_data.email` to submit configuration data to SGI.

Submit System Serial Number Data to CRUISE

The system serial number is the serial number of the removable NIC on the midplane of the lowest-numbered module in the system. If you configure two systems into one system (for example, two 32-processor systems to one 64-processor system) and if you followed the recommended rack and module numbering ID sequence, the new system serial number is the serial number of the midplane NIC in module 1, which is located in the lower bay of the rack that contains the MMSC display. (Refer to "Configure the Rack IDs" and "Configure the Module IDs" subsections in this document.)

You can obtain the system serial number using the `amsysinfo` command.

When your 64-processor system is running in production mode, submit the system serial number data to the CRUISE administrator:

1. Generate an e-mail to `cruise_admin@cray.com`.
2. Insert *0rigin2000 Upgrade* in the subject line of the e-mail.
3. Insert the following information in the body of the e-mail message:
   - Old System1 Serial Number:
   - Old System 2 Serial Number:
   - New System Serial Number:
4. Send the e-mail message to `cruise_admin@cray.com`.

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