

# Six IO4 Boards Installation Instructions

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**FCC Warning**

This equipment has been tested and found compliant with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These 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 the user will be required to correct the interference at his own expense.

**Attention**

This product requires the use of external shielded cables in order to maintain compliance pursuant to Part 15 of the FCC Rules.

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Document Number 108-0147-001****Silicon Graphics, Inc.  
Mountain View, California**

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## Introduction

This guide describes how to install up to six IO4 boards into a CHALLENGE® or POWER CHALLENGE™ XL system. Earlier, these rackmount systems could support only four IO4 boards. However, by following strict configuration guidelines outlined in this guide, you can now install six IO4 boards into these systems.

This information is written for Silicon Graphics® system support engineers (SSEs) and third-party field support groups responsible for product installation and testing.

It contains the following chapters:

- Chapter 1, “Configuration Guidelines,” provides a description of the hardware and software configuration requirements that must be observed as well as product limitations.
- Chapter 2, “Installing the Additional IO4 Boards,” describes how to install up to six IO4 boards into a CHALLENGE or POWER CHALLENGE XL system and also discusses special internal cabling considerations.
- Appendix A, “VMEbus Power Issues,” discusses VMEbus power guidelines for cardcage 2 and cardcage 3.

## Safety Information

Be sure to read the following information before you begin installation.



**Warning:** Installation of these upgrades requires specific training and technical knowledge. These instructions are provided for use by Silicon Graphics system support engineers (SSEs) or other Silicon Graphics trained personnel only. This equipment utilizes electrical power internally that is hazardous if the equipment is improperly disassembled.

**Caution:** This equipment is extremely sensitive and susceptible to damage caused by electrostatic discharge (ESD). ESD is an electrical discharge caused by the build-up of electrostatic potential on clothing and other materials. You must use proper measures.

Follow these ESD measures:

- Connect a ground strap to your wrist when installing and removing peripherals.
- Be sure that you and all of the electrical equipment that you handle during this installation remain at a ground potential of zero to avoid damage from ESD.
- Remove a board from its antistatic bag only when you are properly grounded with a ground strap, and only when you are working on the board or installing it.
- Do not use an ohmmeter on a board.

## Typographical Conventions

These type conventions and symbols are used throughout this manual:

*Italics*                Filenames, variables, IRIX command arguments, command flags, titles of publications, icon names.

Screen type        Code examples, file excerpts, and screen displays (including error messages).

**Bold screen type**        User input.

## Configuration Guidelines

You can now configure a CHALLENGE XL or POWER CHALLENGE XL system with up to six IO4 boards. This increased I/O capability enables file servers to more effectively mirror large filesystems, and video servers to provide a higher number ATM data streams to better support video on demand (VOD) applications. A fully configured SCSI setup can provide up to 42 SCSI channels or buses, and a fully configured ATM setup can provide up to 12 ATM channels.

To install up to six IO4 boards, you must observe the configuration restrictions that are described in the following sections and summarized in Figure 1-1.

**Caution:** Be sure that the system has sufficient +5 VDC power to support the additional IO4 boards. Power issues are discussed in Section 1.5 and Section 1.6.

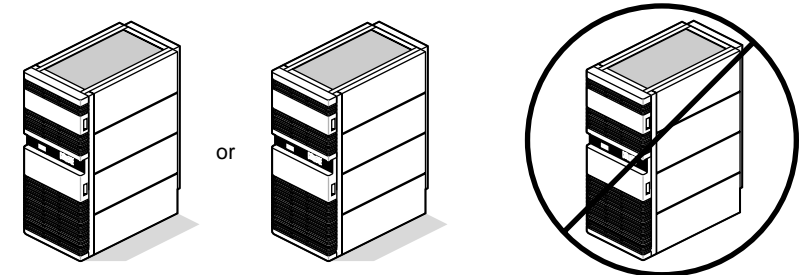
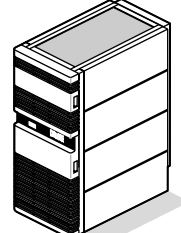
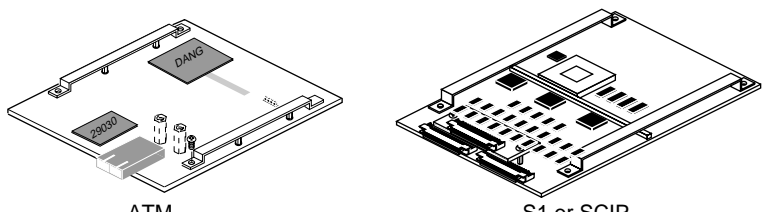
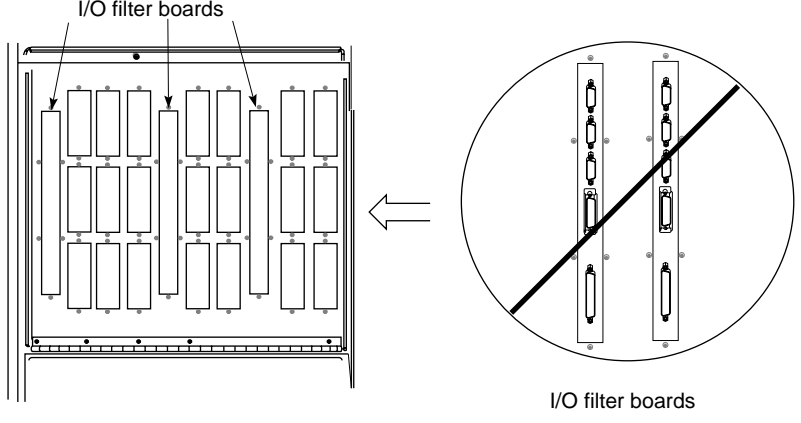
Figure 1-1 Configuration Requirements and Restrictions

### 1.1 System Requirements

The system must adhere to the hardware and software requirements described in Table 1-1 to help assure optimal performance.

Table 1-1 System Hardware and Software Prerequisites

Category	Requirements
System type	CHALLENGE XL or POWER CHALLENGE XL server systems <i>only</i> —no graphics configurations (see Caution below).
Operating system requirements	IRIX 5.3 with required patches, or IRIX 6.1
Number of CPUs	Minimum of eight CPU processors (R4400™ or R8000™)
Amount of main memory	At least 1 GB of main memory (highly recommended)
IO4 PROM version level	3.16 or higher (3.17 is recommended)

<p>Applicable systems</p>	 <p>POWER CHALLENGE XL with IRIX 6.1      or      CHALLENGE XL with IRIX 5.3      No Onyx or POWER CHALLENGE Extreme</p>
<p>Hardware requirements</p>	 <p>CHALLENGE XL or POWER CHALLENGE XL</p> <ul style="list-style-type: none"> <li>- Minimum of 8 CPU processors</li> <li>- At least 1 GB of main memory</li> <li>- IO4 PROM at 3.16 or higher</li> </ul>
<p>Install ATM, S1, or SCIP mezz boards only on fifth and sixth IO4 boards</p>	 <p>ATM      S1 or SCIP</p>
<p>No more I/O filter boards can be added</p>	 <p>I/O filter boards      I/O filter boards</p>

**Caution:** You *cannot* install more than four IO4 boards into an Onyx™ rackmount or a POWER CHALLENGE XL Extreme configuration (with the visualization console option). Silicon Graphics does not support more than four IO4 boards in any graphics configuration.

## 1.2 What the Two Additional IO4 Boards Can and Cannot Support

Table 1-2 lists whether or not a particular I/O device is supported through the 5th and 6th IO4 boards.

**Table 1-2** Supported and Nonsupported I/O Devices on the 5th and 6th IO4 Boards

I/O device	Supported on 5th and 6th IO4 boards?
ATM mezzanine board	Yes
SCSI mezzanine board	Yes (S1 or SCIP)
Additional I/O filter boards (see Figure 1-2)	No. Therefore, you cannot add additional Ethernet, serial, or parallel ports through the 5th and 6th IO4 boards. (See Note and Caution below.)
FDDI	No
HIPPI	No

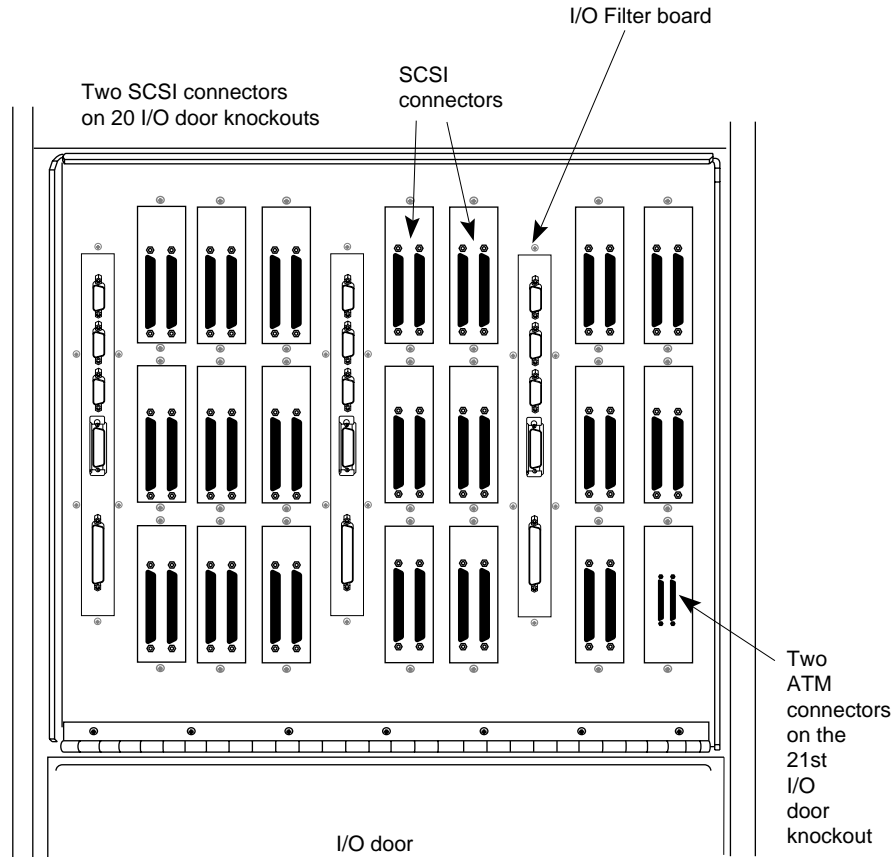
There are no new support restrictions placed on the first four IO4 boards. The first four IO4 boards can continue to operate as they always have.

**Note:** The 5th and 6th IO4 boards do not support I/O filter boards due to a space limitation on the I/O door. The maximum number of I/O filter boards that a rackmount system can support is four (including the main I/O filter board).

**Caution:** Be sure not to reconfigure the software to support additional Ethernet, serial, or parallel ports beyond the maximum number provided through the first four IO4 boards. Otherwise, the system panics when it boots.

**Figure 1-2** Maximum SCSI Connector Allocation (40) With Two ATM Connectors

**Note:** There is a two-port ATM connector plate and a single-port ATM connector plate that are available with the ATM option kit. See Table 1-3 for additional connector plate knockout information.



**Table 1-3** I/O Panel Connections per I/O Device

I/O Device	Interfaces or connectors per device	Knockouts used per interface or connector	Knockouts used per device
SCSI on IO4 BOARD	2	1/2	1
SCSI mezzanine	3	1/2	1 1/2
FDDI mezzanine	2	1	2
ATM	1	1	1
EPLEX	8	1/4	2
HIPPI	2	1/2	1

## 1.3 Maximum Configurations

The additional fifth and sixth IO4 boards provide expanded SCSI and ATM connectivity as described in Table 1-4.

**Table 1-4** Maximum Configurations

Category	Number
Maximum number of SCSI buses	42 buses from a combination of six IO4 boards and 10 SCSI boards
Maximum number of SCSI mezzanine boards (S1 or SCIP)	10 on 5 IO4 boards (Note: SCSI mezzanine boards cannot be installed on all 6 IO4 boards because there are not enough connector knockout panels available on the I/O door, see Figure 1-2.)
Maximum number of SCSI bulkhead connectors	Up to 40 SCSI bulkhead connectors on the I/O door. (Note: There are a maximum of 21 I/O connector knockout panels on the I/O door (see Figure 1-2). Twenty of these connectors are taken up by the SCSI ports--2 per connector knockout. The remaining connector knockout can be used for ATM connectivity.
Maximum number of ATM (asynchronous transfer mode) mezzanine boards	12 boards on 6 IO4 boards. (Note: The ATM uses the DANG chip. The software supports a maximum of 12 DANG interrupt vectors.)

**Caution:** IRIX 6.1 does not support ATM capability.

## 1.4 Allowable System Configurations for Six IO4 Boards

Table 1-5 shows the various maximum configurations for systems with six IO4 boards.

**Table 1-5** Allowable Configurations with Six IO4 Boards

Original configuration (with 4 IO4 boards)	Number of additional SCSI (S1 or SCIP)	Number of additional ATM	Results
4 IO4 boards with 2 SCSI mezz cards each	2 SCSI mezzanine on 1 IO4 board	2 cards on 1 IO4 board	42 SCSI buses (2 are internal) and 2 ATM channels (see Figure 1-3)
4 IO4 boards with 2 SCSI mezz cards each	N/A	4 cards on 2 IO4 boards	36 SCSI buses and 4 ATM channels (see Figure 1-4)
3 IO4 boards with 2 SCSI mezz cards each and 1 IO4 board with 2 ATMs	N/A	4 cards on 2 IO4 boards	28 SCSI buses (2 internal) and 6 ATM channels (see Figure 1-5)

**Table 1-5 (continued)** Allowable Configurations with Six IO4 Boards

Original configuration (with 4 IO4 boards)	Number of additional SCSI (S1 or SCIP)	Number of additional ATM	Results
1 IO4 board with 2 SCSI mezz cards and 3 IO4 boards with 2 ATMs	N/A	4 cards on 2 IO4 boards	18 SCSI buses and 10 ATM channels (see Figure 1-6)
1 IO4 board with 1 SCSI mezz card and 1 ATM and 3 IO4 boards with 2 ATMs	N/A	4 cards on 2 IO4 boards	15 SCSI buses and 11 ATM channels (see Figure 1-7)
4 IO4 boards with 2 ATMs (8 total)	N/A	4 cards on 2 IO4 boards	12 SCSI buses and 12 ATM channels (see Figure 1-8)

**Figure 1-3** 42 SCSI Buses and 2 ATM Channels

**Figure 1-4** 36 SCSI Buses and 4 ATM Channels

**Figure 1-5** 28 SCSI Buses and 6 ATM Channels

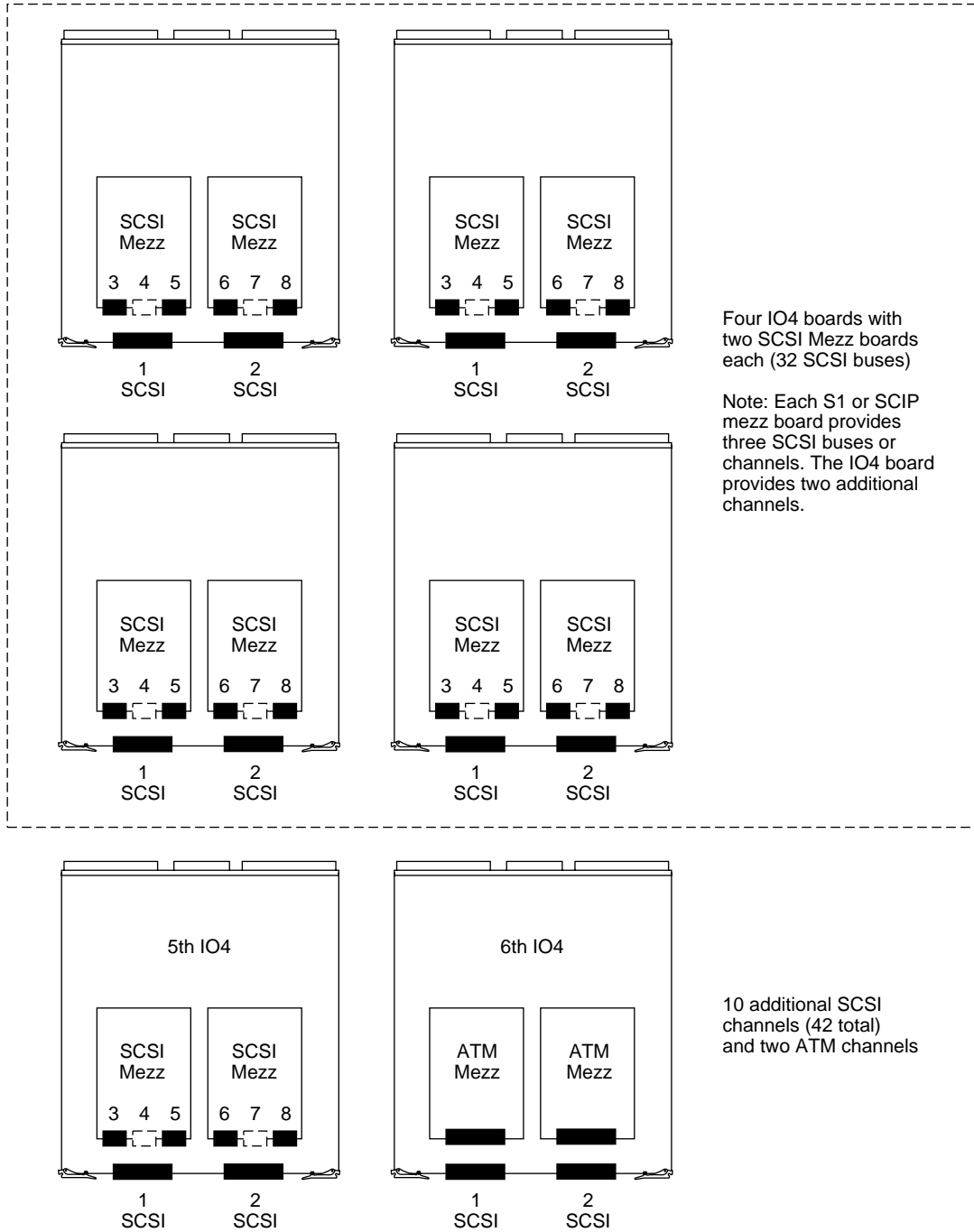
**Figure 1-6** 18 SCSI Buses and 10 ATM Channels

**Figure 1-7** 15 SCSI Buses and 11 ATM Channels

**Figure 1-8** 12 SCSI Buses and 12 ATM Channels

## 1.5 System Power Requirements

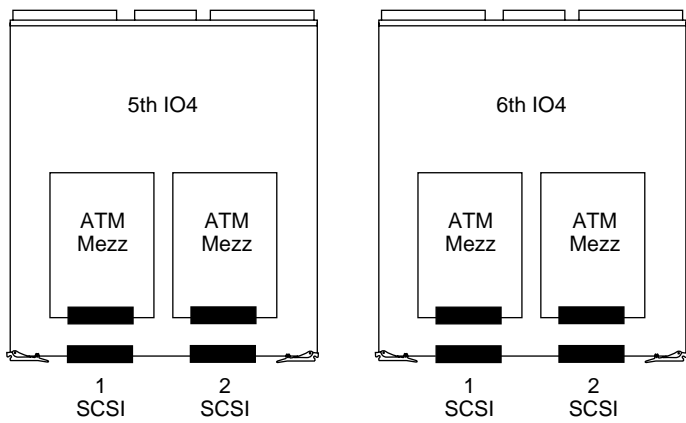
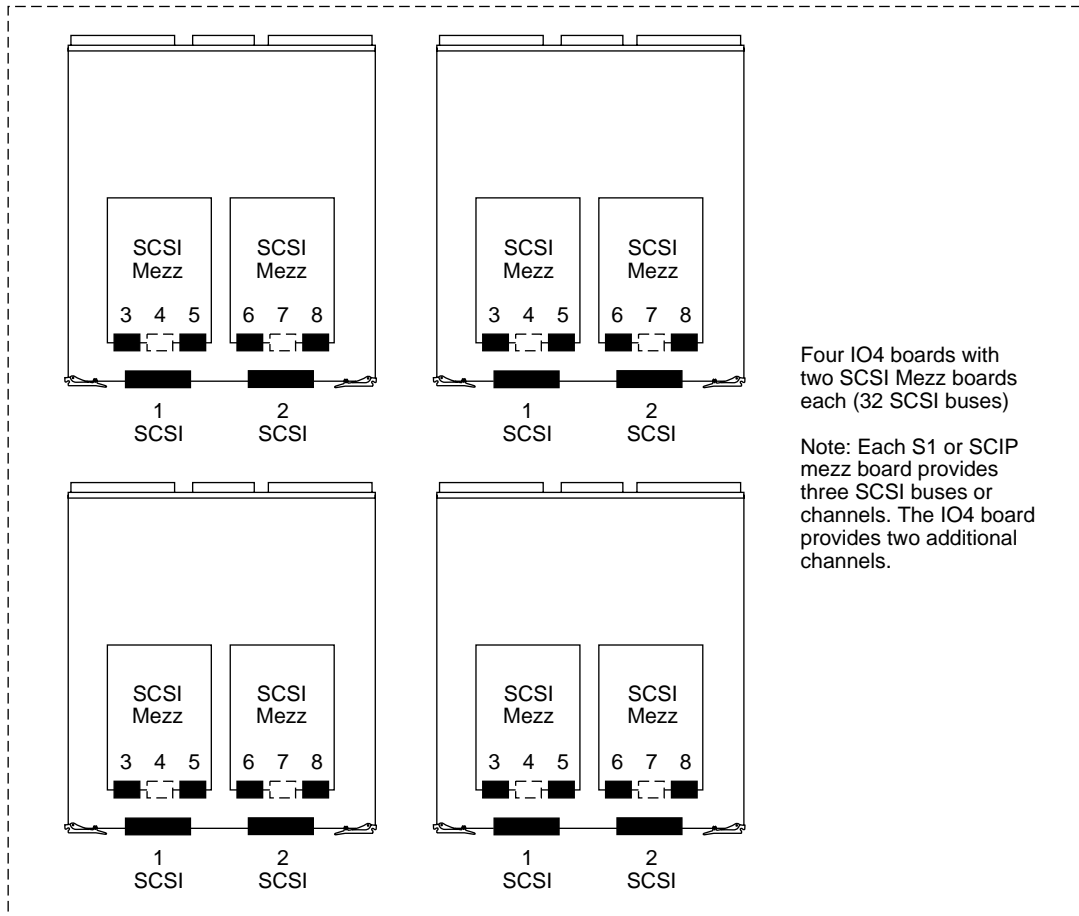
The boards in cardcages 1 and 2 are allotted a *maximum* of 1000 watts of 5 VDC power that are provided through the standard two OLS (off-line switching) power supplies and a set of power boards (see Table 1-6). Of the 1000 watts, approximately 200 watts (5 VDC) may be set aside for VME support in cardcage 2. Cardcage 3 provides approximately 1400 watts of 5 VDC power primarily to support VME connectivity.



**Caution:** Do not exceed the designated power allotment when you are configuring a system.

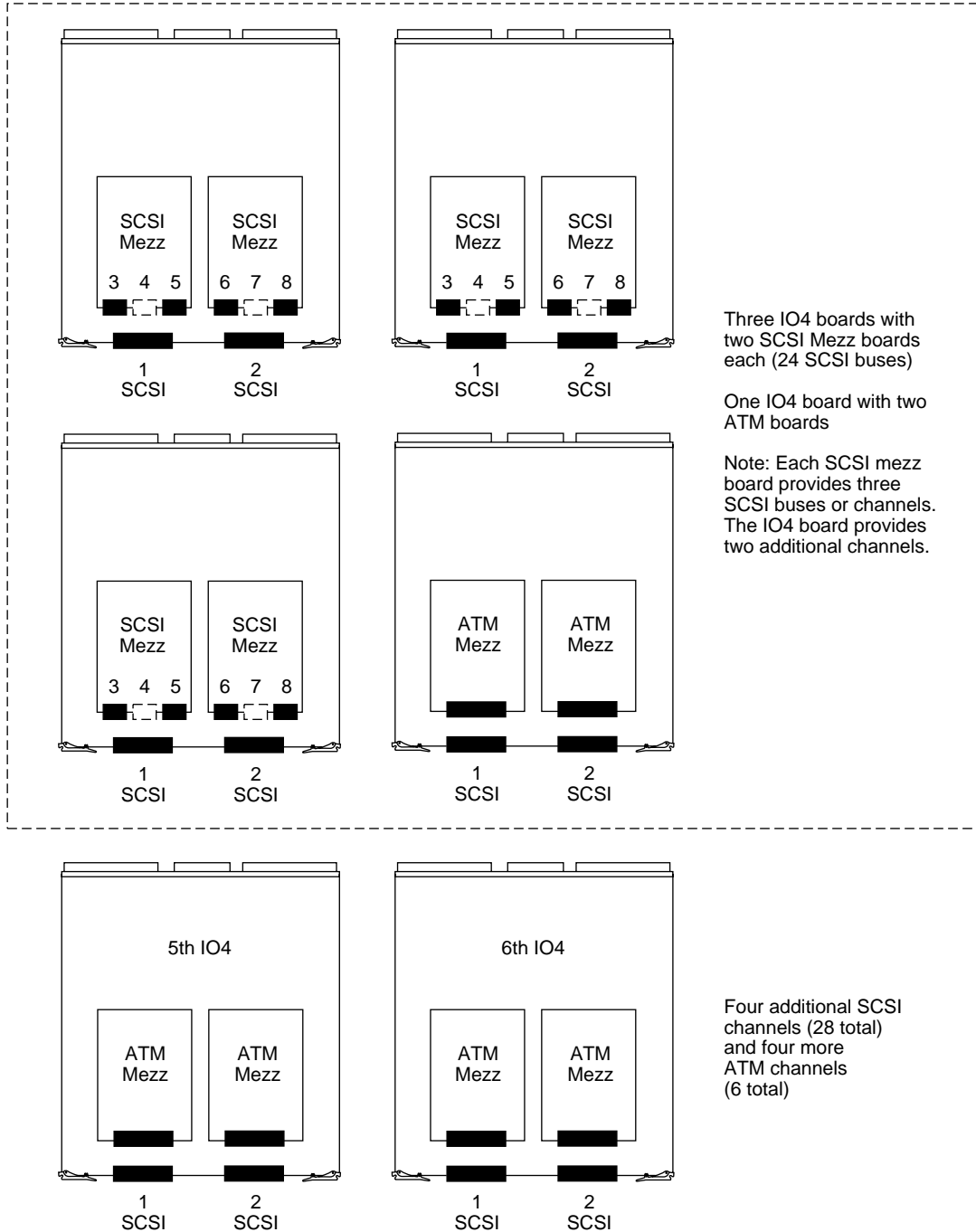
**Table 1-6** OLS and Power Board Configurations for Rackmount Systems

System Configuration	OLSs Installed	Power Boards Installed
CHALLENGE XL or POWER CHALLENGE XL	2	3 (one 512, one dual 505, one System Controller)



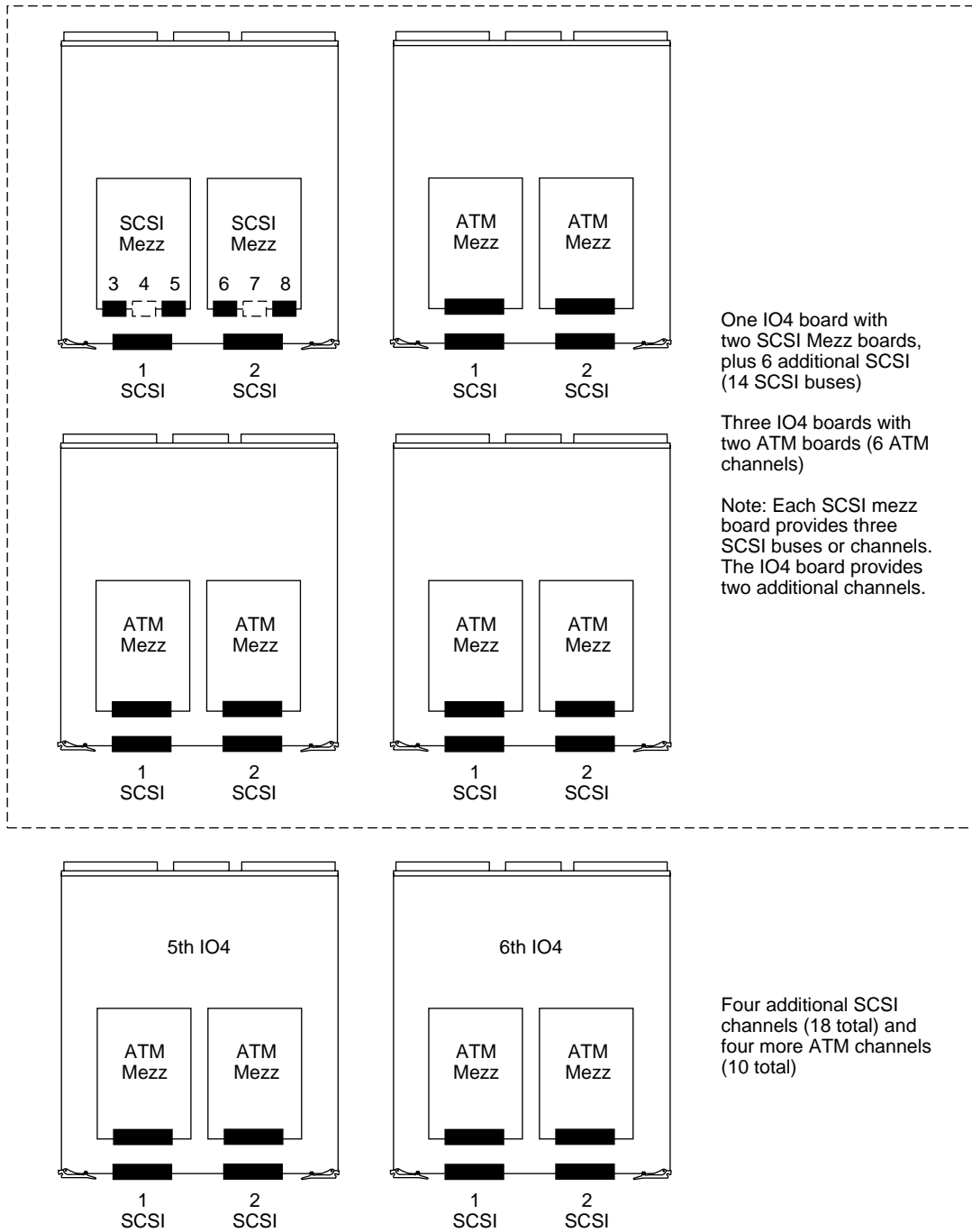
**Table 1-6 (continued)** OLS and Power Board Configurations for Rackmount Systems

System Configuration	OLSs Installed	Power Boards Installed
CHALLENGE XL or POWER CHALLENGE XL with VME cardcage 3	3 (requires 3-phase power)	7 (two 512, one dual 505, three 505, one System Controller)



## 1.6 Determining the System Power Budget

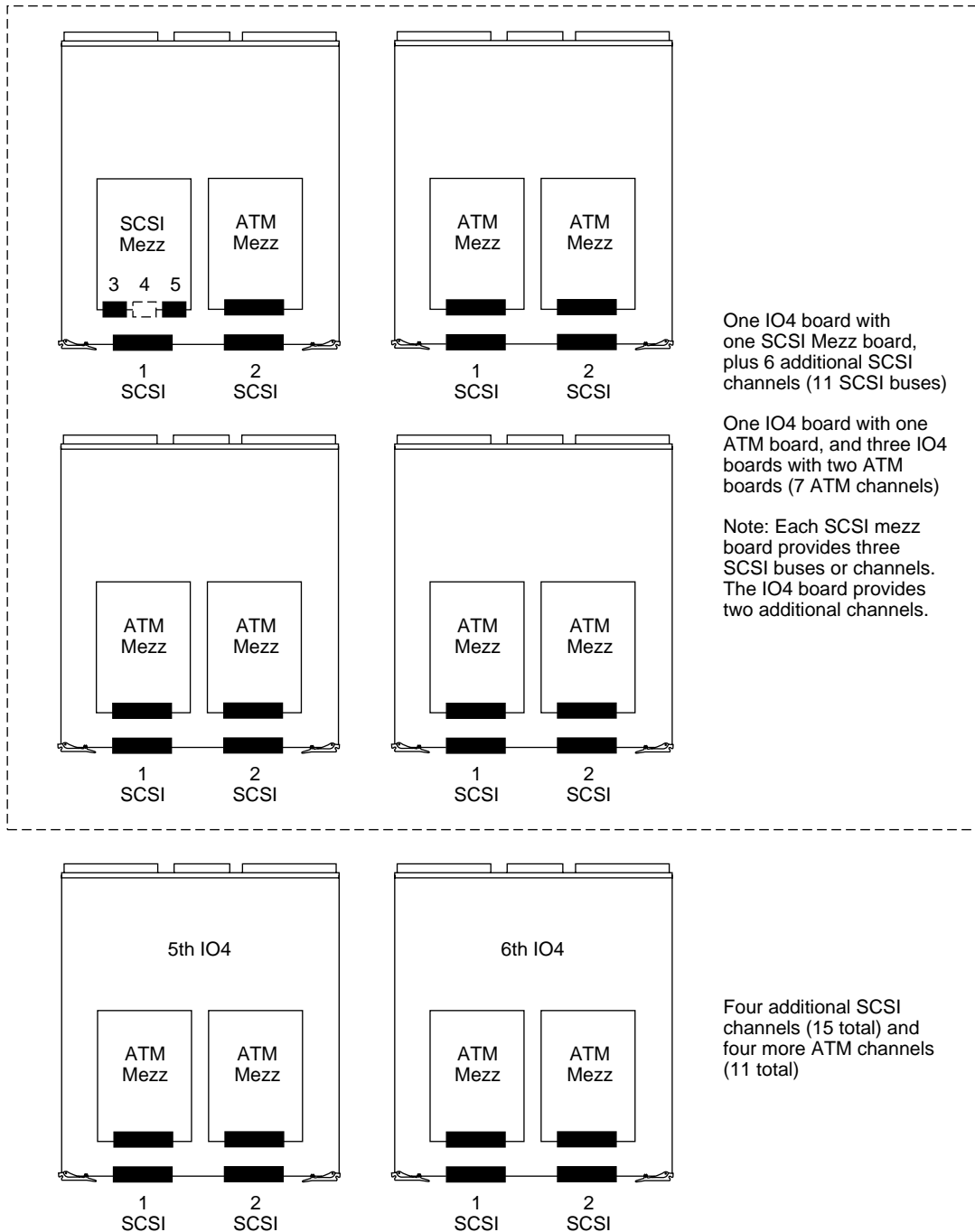
Before you install the additional IO4 boards and mezzanine cards, make sure that the system has sufficient remaining power to support the new configuration. Use the



information in Table 1-7 to help determine the power budget for your system. To get you started, Table 1-8 provides an example of a power budget for a six IO4 board configuration.

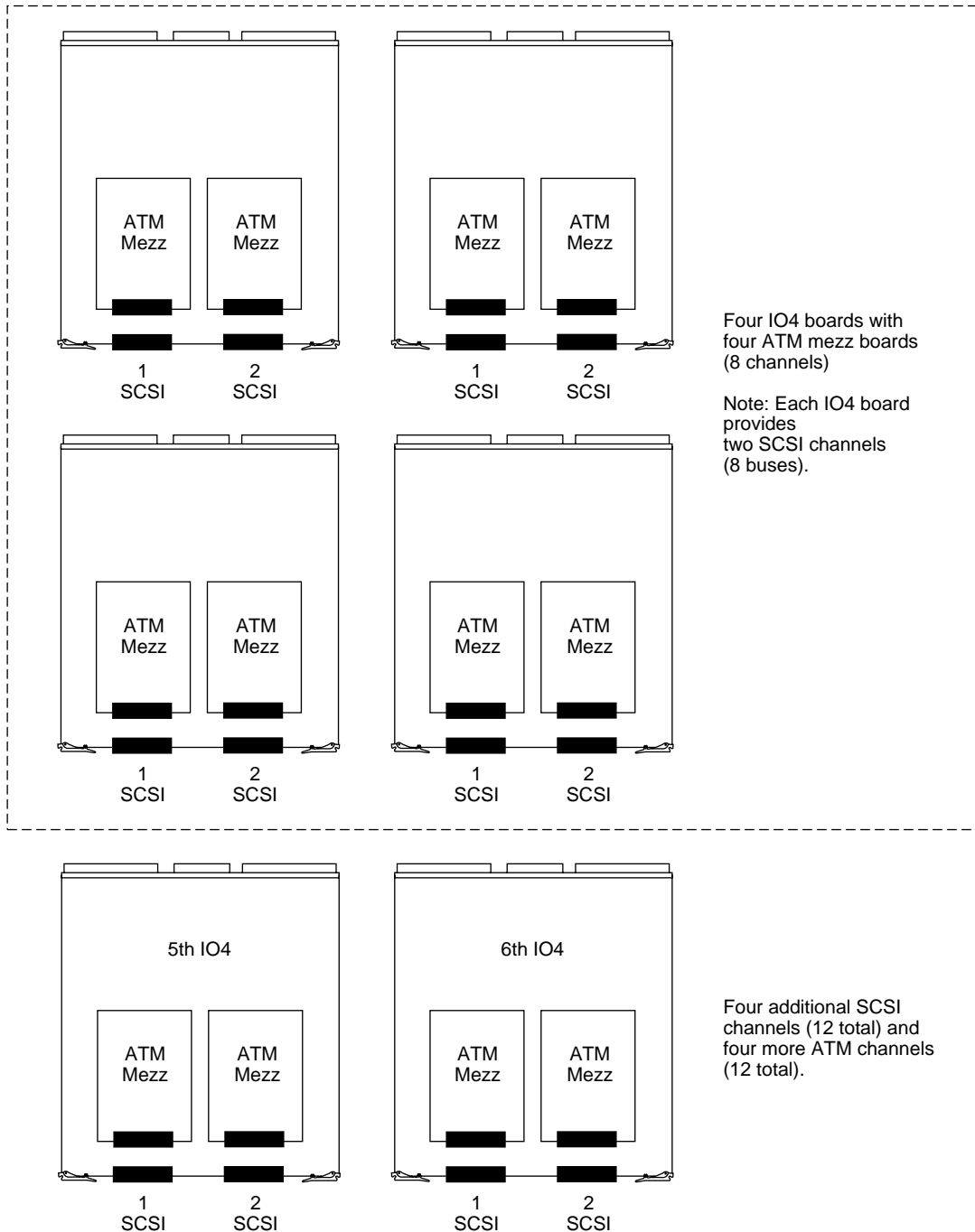
**Table 1-7** 5 VDC Power Consumption Chart for Various System Boards

Board Type	Power Consumption at 5 VDC
Master IO4 board and VCAM	130 watts
Slave IO4 board	47 watts



**Table 1-7 (continued) 5 VDC Power Consumption Chart for Various System Boards**

Board Type	Power Consumption at 5 VDC
Slave IO4 board with 2 ATMs	121 watts
S1 mezzanine board	20 watts
SCIP mezzanine board	20 watts
F-chip mezzanine board	35 watts



**Table 1-7 (continued)** 5 VDC Power Consumption Chart for Various System Boards

Board Type	Power Consumption at 5 VDC
FDDI mezzanine board	25 watts
ATM board	37 watts
HIPPI board	75 watts
VMEbus board (five slots in cardcage 2)	Approximately 200 watts (see Note below)

**Note:** As stated earlier, the VME boards in cardcage 2 are allotted approximately 200 watts of 5 VDC power. Normally, 40 watts is allowed per VME slot in cardcage 2. However, it is possible to exceed this power rating. See Appendix A for further information.

**Table 1-8** Six IO4 Boards With Maximum ATM Configuration and VMEbus Boards

Configuration	Power Consumption at 5 VDC
Master IO4 board (slot 15) with VCAM and two ATM boards	204 watts
Five slave IO4 boards (in slots 13, 11, 9, 7, and 5) with two ATM mezzanine cards on each IO4 board	605 watts (Note: Each slave IO4 board with two ATM mezzanine cards uses 121 watts.)
Four 40-watt VME boards	160 watts
Total	969 watts (must be less than or equal to 1000 watts)



## Installing the Additional IO4 Boards

This chapter describes how to install up to six IO4 boards into a CHALLENGE XL or POWER CHALLENGE XL (rackmount) system and describes the special cable routing considerations that are required for additional SCSI mezzanine cards (S1 or SCIP).

**Note:** Before you install the additional IO4 boards, be sure to check the patch server at *patches.csd* or the patch Web page, <http://www-cse.csd.sgi.com/Projects/patches/>, to determine if software patches are required.

### 2.1 Installation Overview

The fifth and sixth IO4 boards can be installed only in slots 7 and 5 in cardcage 2. The fifth IO4 board must reside in slot 7, and the sixth IO4 board must go into slot 5 (see Figure 2-1). The additional IO4 boards support only ATM or SCSI (S1 or SCIP) mezzanine cards, as described in the following sections.

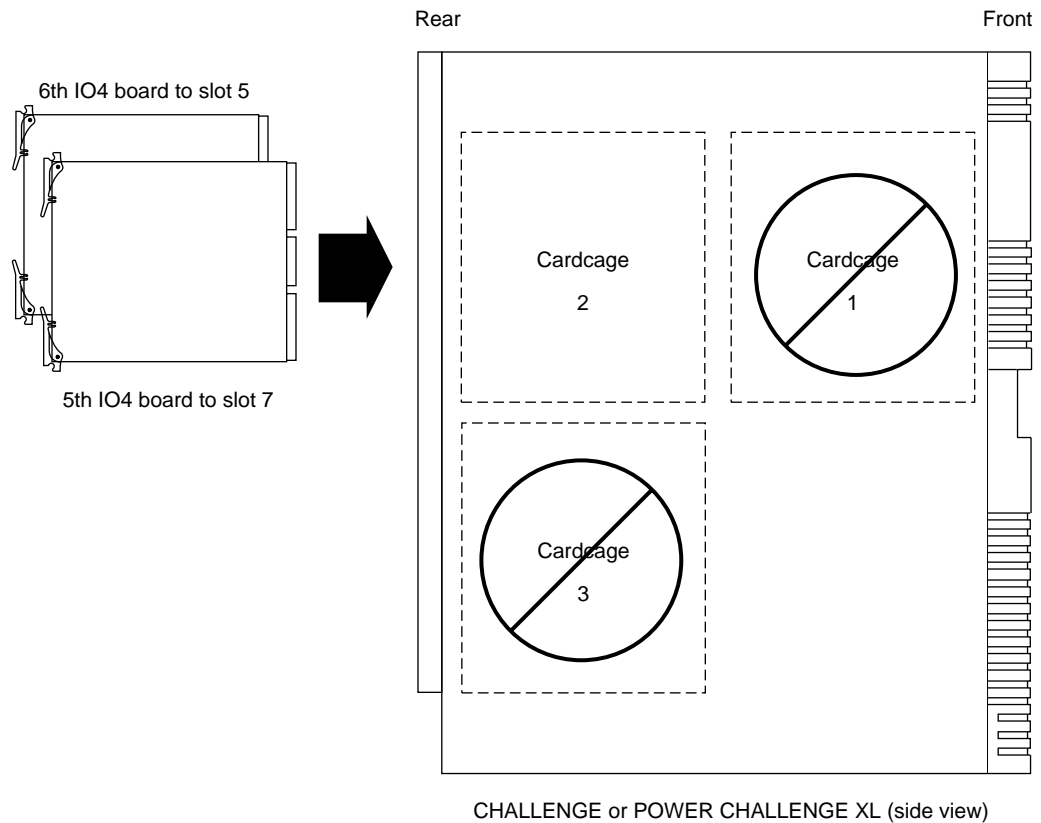
### 2.2 ATM Board Installation

This section briefly describes how to install an ATM board. For complete installation and configuration instructions, see the *IRIS ATM Installation Instructions* (p/n 108-0113-xxx).

#### 2.2.1 Prepare the IRIS ATM Board

The IRIS ATM board has a set of jumpers called the Unit Jumper Set, illustrated in the *IRIS ATM Installation Instructions*. These jumpers must be configured to give the board a unique unit identification number (for example, ATM unit 0, ATM unit 1, and so on.). Follow the instructions in *IRIS ATM Installation Instructions*.

**Note:** If two or more installed boards have the same unit number, the first board that the operating system locates is initialized and brought into operation, but the duplicates are not. When the system encounters each duplicate board, it prints an error message, then skips the board without initializing it. The command */sbin/hinv* does not list uninitialized boards, and they do not have device files in the */dev* directory.



**Figure 2-1** Required Slot Locations for Additional IO4 Boards in Cardcage 2

**Caution:** Do not install the IO4 boards in cardcage 1 or 3.

## 2.2.2 Prepare the CHALLENGE XL or POWER CHALLENGE XL System

Follow the steps in this section to prepare the rackmount system for installation.

**Caution:** This equipment is extremely sensitive and susceptible to damage by electrostatic discharge (ESD), a spark caused by the buildup of electrostatic potential on clothing and other material. You must use proper ESD preventive measures as explained in the “Safety” section of the *CHALLENGE/Onyx XL Rackmount Installation Instructions*.

1. Use the command below to verify that the IRIX™ operating system is the correct version for this IRIS ATM release. The *IRIS ATM Release Notes* indicate the correct version. Do not proceed until the correct version of IRIX is installed.

```
% versions eoel
I eoel date Execution Only Environment 1, version
```

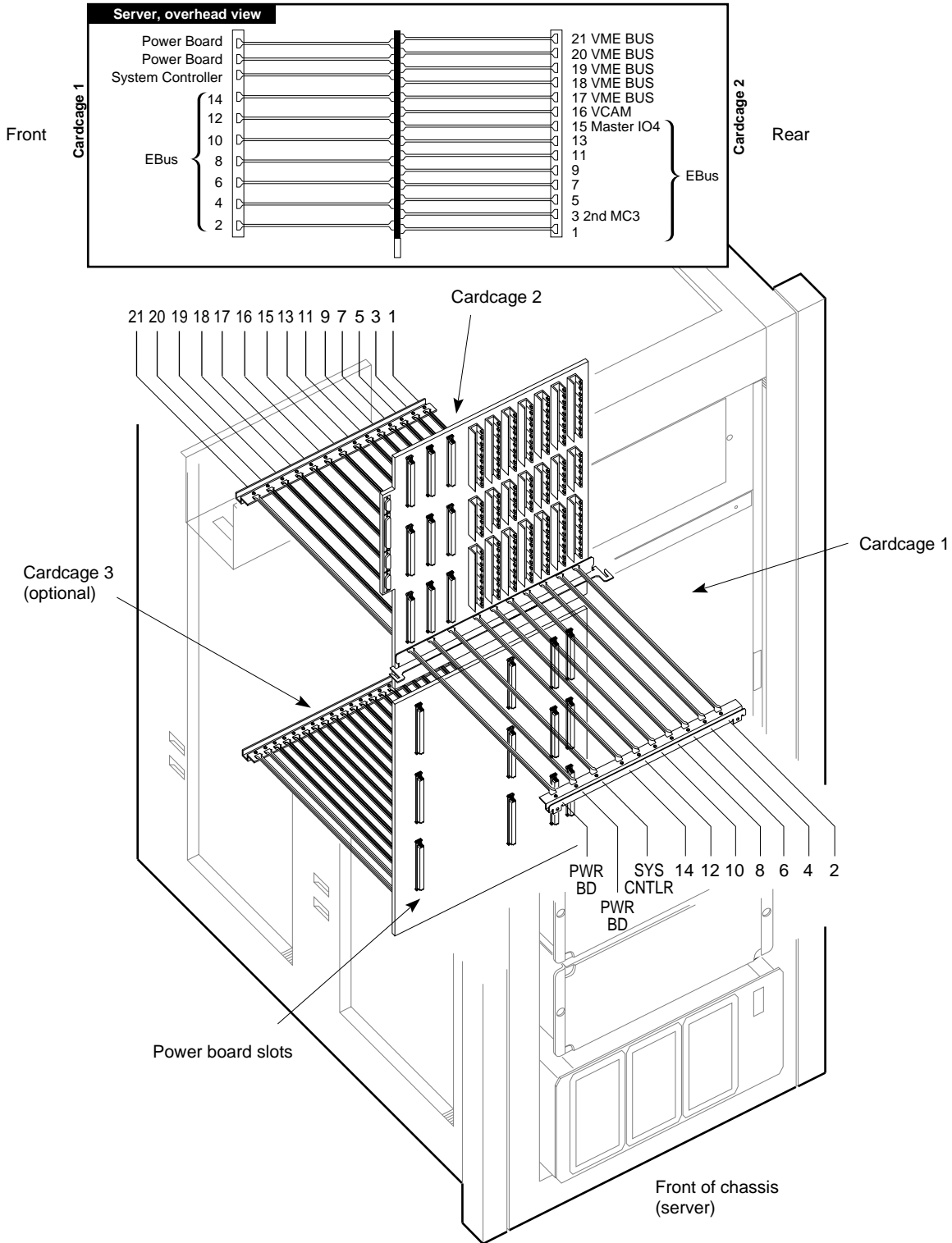
2. Verify that the filesystem is backed up.

3. Shut down the system by turning the key on the System Controller panel (located at the front) to **OFF**.
4. Wait a minute for the system to shut down, then switch the power switch on the lower front corner of the chassis to **OFF**.



**Warning:** Failure to turn off the circuit breaker may result in electrical shock. Failure to wait for the system to shut down may cause irreparable damage to system components or data.

5. Open the back door and pull down the I/O panel for cardcage 2 to expose the IO4 boards and VMEBus slots, as illustrated in Figure 2-2.



**Figure 2-2** CHALLENGE Rackmount Slots for IO4 Boards

### 2.2.3 Selecting a Mezzanine Slot

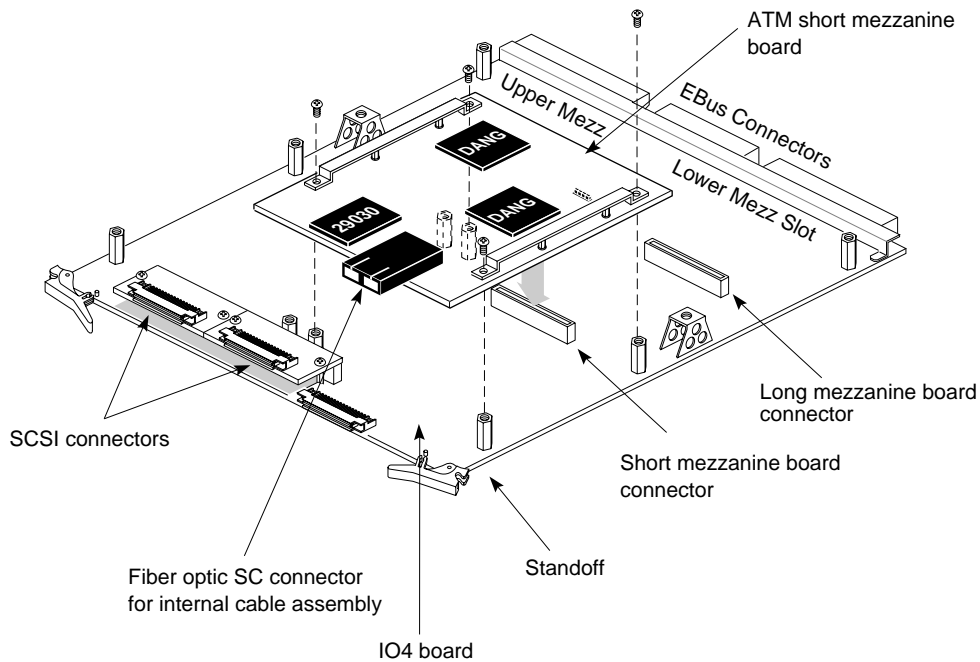
The IRIS ATM board requires one short mezzanine slot on an IO4 board.

### 2.2.4 Installing the Board Into a CHALLENGE XL or POWER CHALLENGE XL

**Caution:** This equipment is extremely sensitive and susceptible to damage by electrostatic discharge (ESD), a spark caused by the buildup of electrostatic potential on clothing and other material. You must use proper ESD preventive measures as explained in the “Safety” section of the *CHALLENGE/Onyx Rackmount Installation Instructions*.

Follow the steps below to install the IRIS ATM board.

1. Remove the IO4 board from the system.
2. Place the board on a flat antistatic surface so that the component side faces up and the SCSI connectors face toward you, as illustrated in Figure 2-3.
3. Locate the selected mezzanine slot (upper or lower) and remove the four screws from the standoffs, as illustrated in Figure 2-3. If the screws are missing, this is not a problem.



**Figure 2-3** IO4 Board with an ATM Mezzanine Board

4. Position the IRIS ATM board onto the selected slot so that the connector on the bottom of the board matches the receptacle on the IO4 board and the standoffs match the ATM board's holes. Figure 2-3 illustrates the correct positioning for the upper and lower slots.
5. Replace the standoff screws. These screws have a "float" feature, and do not tighten. If necessary, use the screws that are shipped with the IRIS ATM package.
6. Reinstall the IO4 board into the chassis. Push the board firmly into the backplane. If the board has a VCAM board, the VCAM board must also seat into the backplane.
7. Create an adapter identification for the ATM mezzanine board. The identification has the format F-XX-5 for the lower slot and F-XX-6 for the upper slot, where XX is the slot number where the IO4 board resides. For example, a mezzanine board in the upper position (IO adapter 6) on the main IO4 board located in slot 15 is labeled F-15-6.
8. From the sheets of labels, remove a small-sized label with the identification created in the previous step. Attach the label to the outside of the ATM I/O panel plate that is attached to the internal cable assembly (illustrated in Figure 2-4).

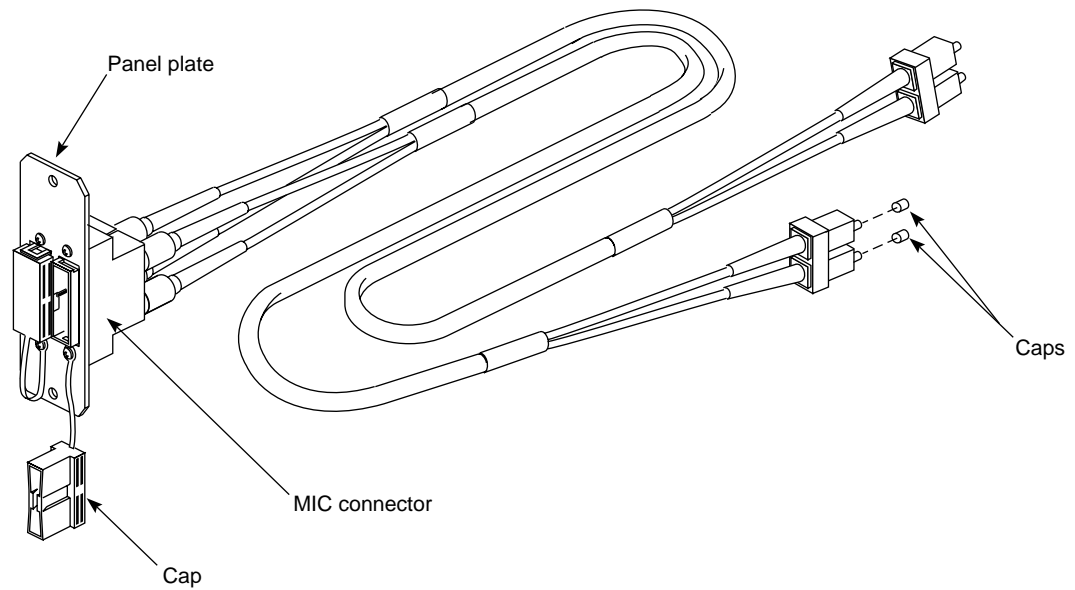
### 2.2.5 Connect Internal ATM Cables

Follow the steps below to attach the internal ATM cables to the ATM board and the panel plate to the cardcage's I/O panel.

**Caution:** Do not touch the fiber optic material exposed at the ends of the cable. Do not leave the cable ends uncapped. Performance of the fiber optic cable can seriously degrade due to grease or dust.

1. Locate the internal cable assembly that consists of two fiber optic lines terminated inside an SC connector at one end and a MIC receptacle attached to the ATM I/O panel plate at the other end, as illustrated in Figure 2-4.

**Note:** For installations with multiple IRIS ATM boards, replace the single-port panel plate on the cable assembly with the two-port panel plate that is shipped with the product.



**Figure 2-4** IRIS ATM Internal Cable Assembly

2. Remove one blank panel plate from the system's I/O panel and install the ATM panel plate.
3. Remove the protective caps from the SC connector.
4. Slide the SC connector into the ATM board's fiber optic receptacle. To ensure proper orientation, the SC plug has guide ridges that must slide into slots in the receptacle.
5. Close the I/O door and the chassis door.

## 2.3 Installing a SCSI Mezzanine Board

The S1 or SCIP mezzanine boards attach to the IO4 baseboard through four standoffs. An IO4 board can house up to two mezzanine boards. Follow these procedures to install or remove a mezzanine board:

1. Remove the IO4 board from the system.
2. Orient the SCSI mezzanine board so that the I/O channels face the same direction as the IO4 baseboard channels, then line the holes on each corner of the mezzanine board with the applicable standoffs (see Figure 2-5).
3. Press down on the mezzanine board so that the connector underneath engages the connector on the IO4 board.
4. Secure the mezzanine board to the IO4 baseboard using the truss-head screws.

**Note:** The mezzanine board may appear to fit very loosely on the IO4 baseboard. This is normal. The mezzanine boards are designed to "float" on the standoffs.

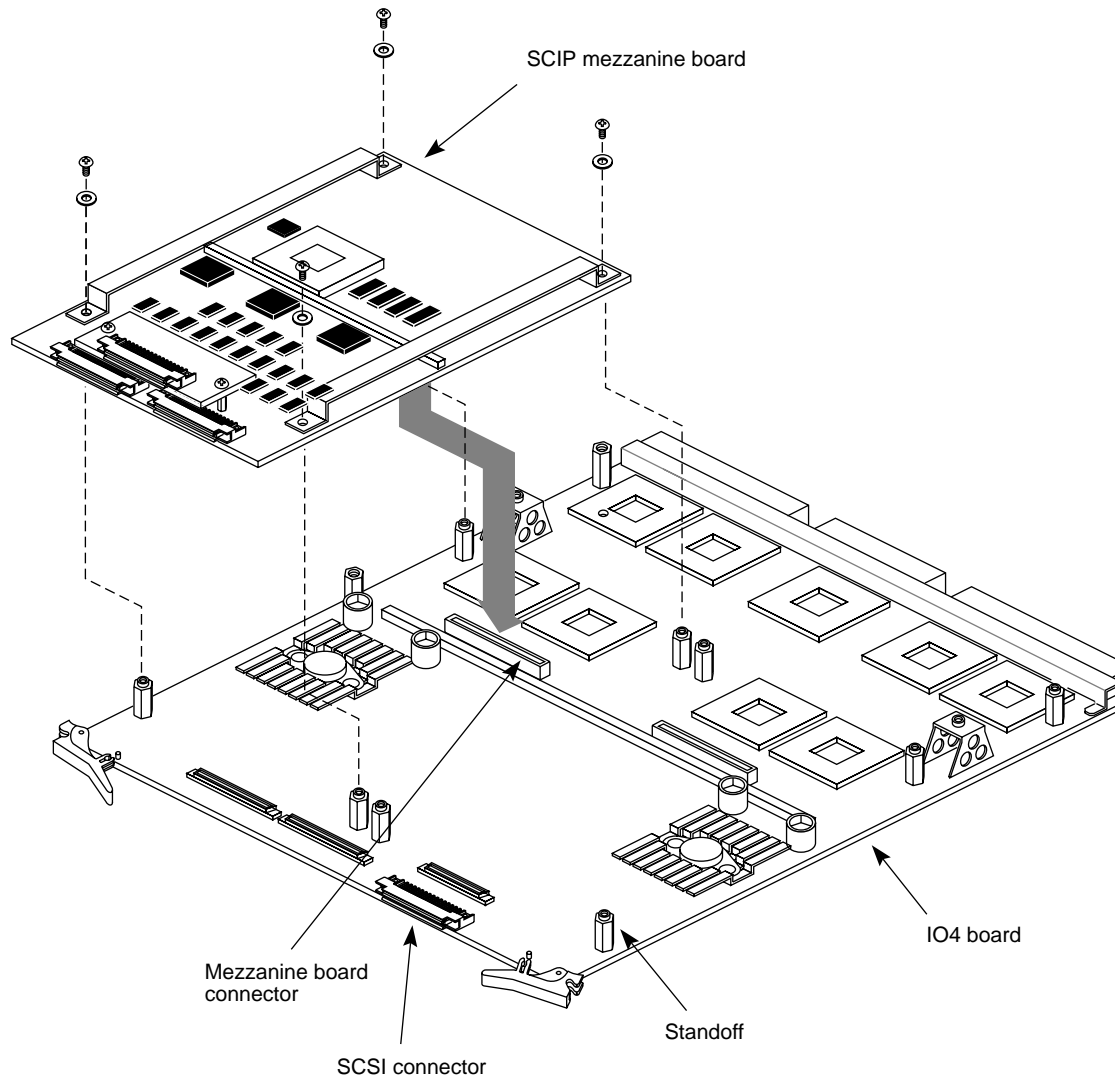


Figure 2-5 Installing a Mezzanine Board

## 2.4 SCSI Cabling Issues

With the additional internal SCSI cables (up to 42 within the chassis), you must be extra careful to route the additional cables so that you can properly close the I/O panel door without damaging the cables or connectors.

**Note:** The overcrowded cabling condition is not a problem in an ATM-intensive configuration. However, there is a potential cabling problem when you add SCSI cables to a system that already has a high number of internal SCSI cables.

## 2.4.1 Routing the Excess Cabling

Figure 2-6 shows how to route the excess SCSI cabling into the cavity well in front of the cardcage. This prevents the cable from bunching up directly in back of the I/O panel door.

## 2.4.2 Labeling the SCSI Cables

Create an adapter identification for the mezzanine board. The identification has the format S-XX-5 (*S* for SCSI) for the lower slot and F-XX-6 (*F* for F-chip mez) for the upper slot, where *XX* is the slot number where the IO4 board resides. For example, a mezzanine board in the upper position (IO adapter 6) on the main IO4 board located in slot 15 is labeled F-15-6.

**Figure 2-6** Routing the Excess Cabling

**Caution:** To prevent damage to the SCSI cables by possible overstretching, always install the SCSI cables from the top of the IO4 board or top mezzanine board to the middle or lower row of connectors on the I/O door, as shown. If you connect a SCSI cable from the top of the IO4 board (or the top mezzanine board) to the top I/O door connectors, the cable could get overstretched, when the I/O door swings down to the fully open position.

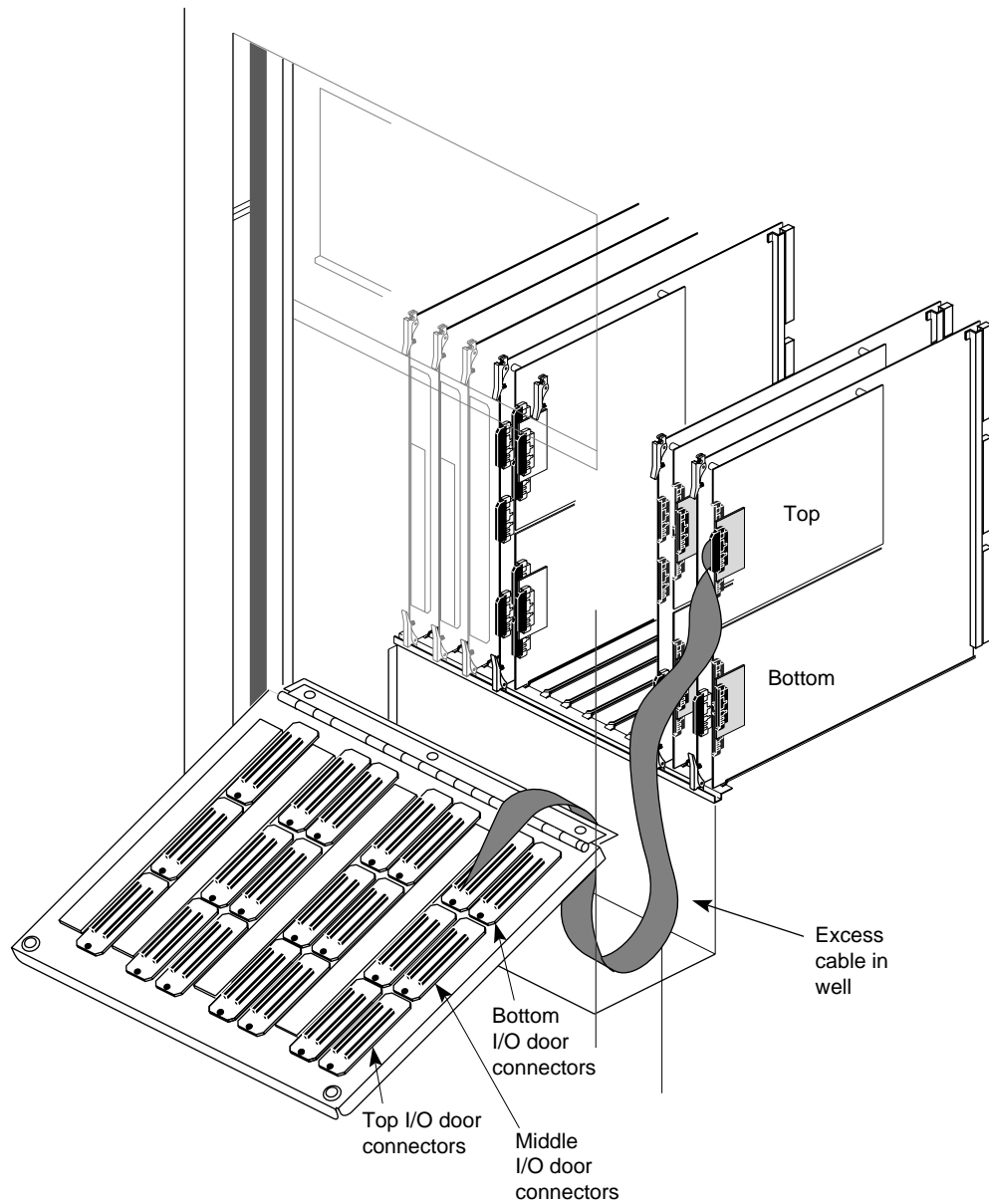
## 2.5 Software Installation

Software patches may be required to help support your new system configuration. Check the patch server at *patches.csd* or the patch Web page at the following location:  
<http://www-cse.csd.sgi.com/Projects/patches/>

## 2.6 Testing Board Installation

Execute the *hinv* command to determine if the additional hardware is recognized by the system.

**Note:** When you attach SCSI devices (such as a CD-ROM) to the additional IO4 boards, these devices are recognized by *hinv* only at the operating system level, and *not* at the PROM level. Only those devices that are attached to the master IO4 in slot 15 are recognized at the PROM level



## 2.7 Addressing Schemes for the Drives

You can address the additional buses with the same method used for existing SCSI channels as described in this section. An IO4 board with two SCSI mezzanine boards can have up to eight SCSI bus interfaces or channels (see Figure 2-7).

## 2.7.1 Addressing Drives Using the PROM

The PROM drive addressing format is *dksc(a,b,c)*, where *a* represents the SCSI bus number, *b* refers to the drive number, and *c* refers to the drive's partition number. The *dksc* designation is the monitor's name for SCSI.

**Note:** The PROM can address only the master IO4 board in a system. In a rackmount system, the master IO4 resides in slot 15. If you need to address a drive connected to another IO4 board, you must do so under IRIX.

## 2.7.2 Addressing Drives Under IRIX

Under IRIX, the format for addressing drives is */dev/dsk/dksSSsdDlSP*, where */dev/dsk* references the IRIX file directory of the drives and *dks* designates SCSI. The *SSS* designator represents the slot number of the IO4 board and/or the SCSI bus number, *dD* refers to the drive number, *lL* is the LUN (logical unit number, see Note below), and *sP* refers to the drive's partition number.

**Note:** The number 10 has been omitted as a LUN and is addressed using */dev/dsk/dksSSsdDsP*.

If you are addressing a drive on the master IO4 board system, you need to specify *only* the applicable SCSI bus number. If you are addressing a drive on another IO4 board, you must specify both the slot number of the board and the applicable SCSI bus number.

For example, if you are addressing a drive connected to an IO4 board in slot 15 and SCSI bus number 5 (on a deskside system), the *SSS* number would be 155.

If *SSS* is a two- or three-digit number, the first one or two digits identify the IO4 board, by the Ebus slot number. The final digit identifies which of the eight possible SCSI buses (0 through 7) on the IO4 board is used. See Figure 2-7 to see how the buses are physically laid out on the IO4 board.

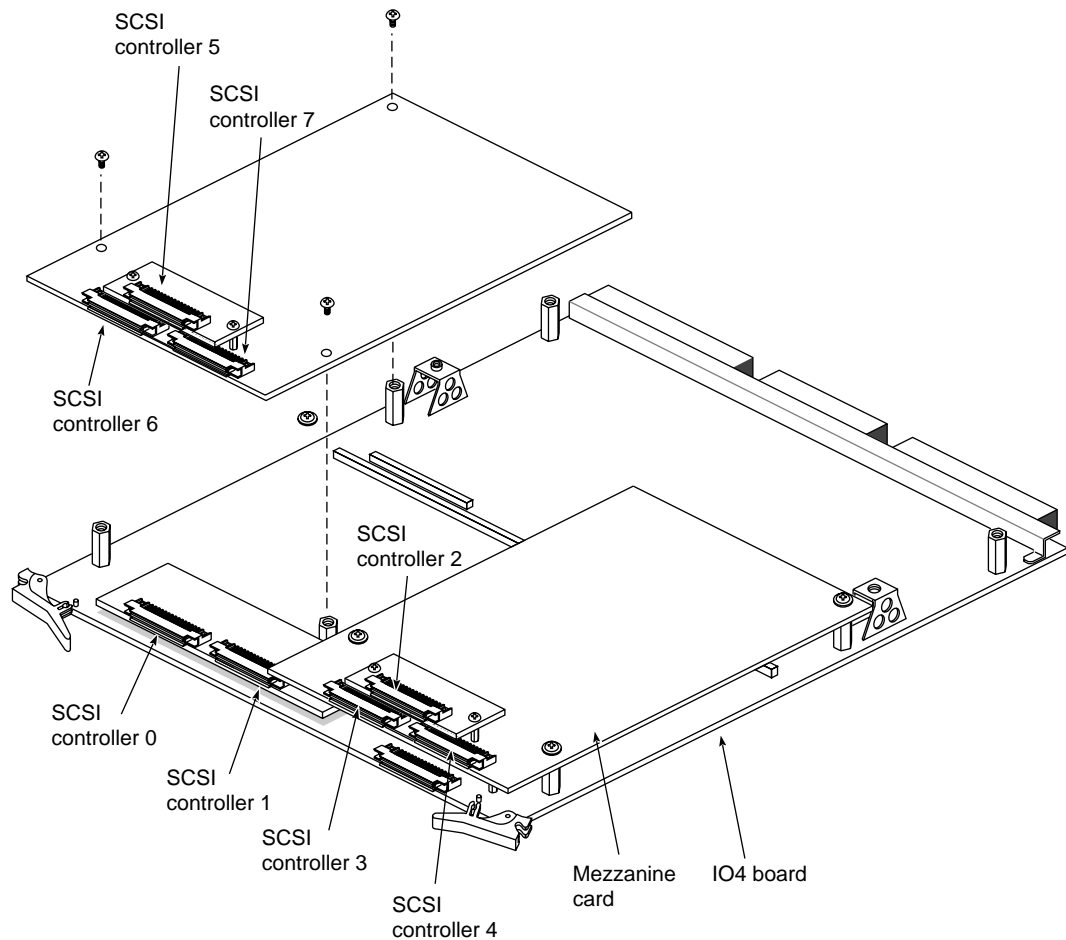


Figure 2-7 SCSI Channels or Bus Interfaces on an IO4 Board With Two Mezzanine Boards

### 2.7.3 Forming the Drive Address

The software drive identification number uses the same form as the addressing scheme described earlier. Use the IO4 board slot number and/or the SCSI bus number, followed by the drive number and partition number as required.

#### 2.7.3.1 PROM Addressing

Assume that you want to address partition 0 on SCSI drive (number 6). This drive connects to SCSI bus number 6. You can also assume that the IO4 resides in slot number 15 in a rackmount system.

The PROM drive address is *dksc(6,6,0)*.

#### 2.7.3.2 IRIX Addressing

Assume that you want to address partition 0 on SCSI drive (number 6). This drive connects to SCSI bus number 6. You can also assume that the IO4 resides in slot number 14.

The IRIX drive address is `/dev/dsk/dks146d6s0`.

### **2.7.3.3 Using the New Address**

You must know this new drive addressing and identification method to run the disk maintenance programs such as `fx` and `MAKEDEV`. For information on running these programs, see the system administration documents for your system.



## *Appendix A*

### **VMEbus Power Issues**

This appendix discusses the pertinent power and airflow issues for VMEbus boards in a CHALLENGE XL or POWER CHALLENGE XL system.

#### **A.1 Cardcage 1 and 2 VME Issues**

Cardcage 2 has five available VME slots and supplies approximately 40 watts of +5 VDC power per VME slot (nominally). It receives approximately 200 to 250 linear feet per minute (LFM) of air flow.

There are no VME slots in the cardcage 1 in the CHALLENGE or POWER CHALLENGE systems.

#### **A.2 Cardcage 3 VME Issues**

The cardcage 3 (CC3), which is optional on the CHALLENGE XL and the POWER CHALLENGE rackmount system, supplies up to 20 additional VME slots. The CC3 provides approximately 70 watts of +5 VDC power per VME slot. This assumes the presence of three 505 power boards and one 512 power board. The power boards are included with the optional CC3 upgrade. Cardcage 3 receives approximately 200 to 250 LFM of air flow through the chassis.

**Note:** The CC3 also provides the capability of having multiple VMEbuses for improved system throughput.

#### **A.3 Exceeding the Normal VME Power Rating Per Slot**

If a VME board requires more than the normal slot power allotment (approximately 40 watts of +5 VDC power per slot in CC2, or approximately 70 watts in a cardcage 3), the board still can be used, provided that the following cooling and power guidelines are met.

### A.3.1 Cooling Guidelines

The user needs to ensure that the board has the proper air flow (for cooling purposes) and sufficient available power. To help maintain proper cooling (according to manufacturer's specifications), the board may need special custom baffles or a set of non-component, enclosure boards to surround it with sufficient air flow.

**Note:** These custom air flow devices must be supplied by the customer.♦

### A.3.2 VME Power Guidelines

To use a third-party VME board that requires more than the normal VME slot power, be sure to observe these guidelines.

- The board does not draw more than the amount of power allocated for VME board use.
- The board does not exceed the power rating for the VME pins (approximately 200 watts).
- The board uses all three P connectors on the system backplane, P1, P2, and P3.

If these guidelines are followed along with the proper cooling requirements, a single VME board can draw as much as 150 watts of +5 VDC power.

In cardcage 2, for example, you can install two 75-watt VME boards (provided the boards are sufficiently cooled). However, as a result, you cannot install additional VME boards, since the VME power allotment would already be saturated. It is also possible to use a single 150-watt VMEbus board in cardcage 2, provided the remaining VME slots are also not used.

In cardcage 3, you can install up to nine 150-watt boards, assuming that all potential power boards (three 505 and one 512) are installed. However, as a result, the remaining VME slots cannot then be used.