

IRIS[®] ATM-OC3c Board for CHALLENGE[®] and Onyx[®] Installation Instructions

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Contributors

Written by Carlin Otto
Illustrated by Dan Young and Carlin Otto
Production by Chris Everett
Engineering contributions by Inwhan Choi

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Attention

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

**IRIS® ATM-OC3c Board for CHALLENGE® and Onyx® Installation Instructions
Document Number 108-0113-003**

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Introduction

The IRIS[®] ATM-OC3c for CHALLENGE[™] and Onyx[™] product is a network interface controller (hardware) and driver (software) providing data communication over the Asynchronous Transfer Mode (ATM) network protocol with AAL5 at the data link layer and the Synchronous Optic Network (SONET) OC3c at the physical layer. The product provides one port of ATM/OC3c connectivity over multimode fiber optic cable for CHALLENGE and POWER CHALLENGE[™] L and XL and Onyx and POWER Onyx[™] platforms.

IRIS ATM provides an application programming interface (API) that customers can use to develop their own upper-layer applications. Customer-developed applications can be designed to coexist with the IRIS TCP/IP stack. See the *IRIS ATM API Programmer's Guide* for details about developing upper-layer applications.

The IRIS ATM hardware must be installed by a Silicon Graphics system support engineer (SSE) or other person trained by Silicon Graphics in installation procedures. This document, *IRIS ATM-OC3c Board for CHALLENGE and Onyx Installation Instructions*, is provided to each SSE and contains complete details for hardware installation.

Installation and configuration of the software can be done by customers and/or SSEs. The online *IRIS ATM Release Notes* provide software installation instructions. Configuration and verification instructions are provided in the online *IRIS ATM Configuration Guide*.

Standards Based

The IRIS ATM network product adheres to the ANSI and CCITT standards listed below, thus ensuring successful interoperability with other ATM/SONET equipment that is standards-compliant:

- ATM: *ATM User-Network Interface Specification*, versions 3.0 and 3.1
- SONET/SDH: *B-ISDN User-Network Interface-Physical Interface Specification*, CCITT Recommendation 1.432, June 1990.

Application Programming Interface

The IRIS ATM product includes an application programming interface (API) that allows customer-developed upper layer applications to control the IRIS ATM subsystem. The API is a character device interface. This interface is described in the *IRIS ATM API Programmer's Guide*.

On-board Intelligence

The IRIS ATM board has an AMD 29030 CPU that handles protocol processing and channel control. The board contains logic for handling transport layer (TCP and UDP) checksumming on both transmission and reception. These features provide two advantages: they increase the rate of data throughput for the board and free the host system's CPUs for work on user application tasks.

Chapter 1

An Introduction to IRIS ATM

This chapter provides an introduction to the IRIS ATM-OC3c for CHALLENGE and Onyx board. For information about the associated protocols (ATM and SONET) and the IRIS ATM software, see the online *IRIS ATM Configuration Guide*.

1.1 Theory of Operations for IRIS ATM Board

1.1.1 Block Diagram

The IRIS ATM-OC3c board supports ATM over SONET OC3c (with a transmission rate of 155.52 megabits per second). Synchronous Optical Network (SONET) is the physical layer protocol. The board is a short (standard) mezzanine board that occupies one position on any IO4 board. The board has a CPU (AMD 29030) and on-board memory to control data processing and TCP and UDP checksumming. Figure 1-1 is a block diagram of the board.

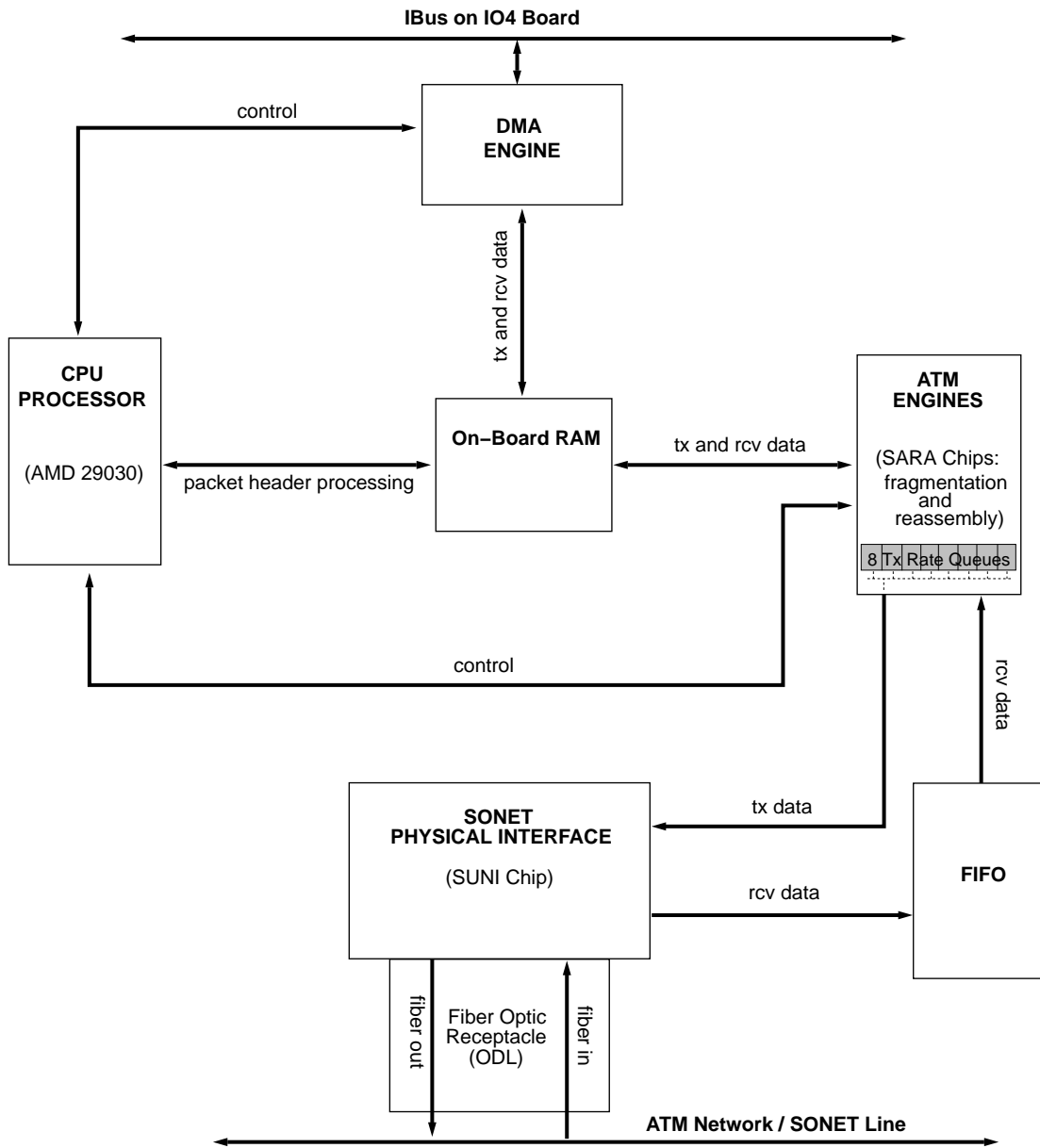


Figure 1-1 Block Diagram for IRIS ATM Board

1.1.2 Cable Support

To use the IRIS ATM board, a site must have installed multimode fiber optic cable terminated in MIC connectors. Both 50 and 62.5 micron fiber optic cables are compatible.

1.1.3 Power Requirements

The IRIS ATM board consumes 7.4 amps at 5 volts.

1.2 Jumpers on IRIS ATM Board

The IRIS ATM board has a number of jumpers; however, the only ones that can be configured are those comprising the 8-pin Unit Jumper Set; these are labeled B5D2, B3D2, B0D2, and A8D2. The location of the Unit Jumper Set is illustrated in Figure 1-2.

Each pair of pins within the Unit Jumper Set configures one bit of the board's 4-bit unit number. The pair of pins labeled B5D2 controls the setting for the most significant bit (for example, for the binary unit number 1000, the B5D2 pins set the 1).

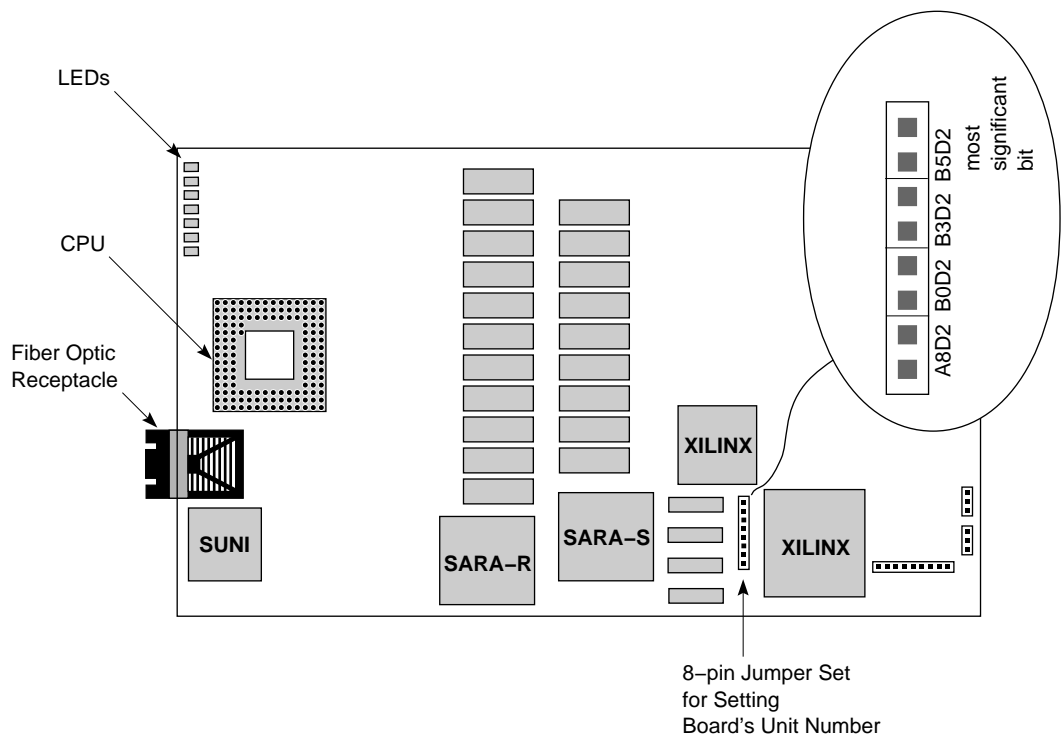


Figure 1-2 Location of Unit Jumper Set on IRIS ATM Board

Installing a jumper over 2 pins sets the associated bit to 0. When 2 pins are open (not jumpered), the associated bit is 1.

When the IRIS ATM board is shipped, all the pins of the Unit Jumper Set are jumpered; this configuration sets 0000 binary (which is displayed by `/sbin/hinv` as ATM unit 0). When more than one IRIS ATM board is installed in a system, you must decide whether to have the boards numbered by the software (the default) or by the jumpers on each board. The `/var/sysgen/master.d/atm` file controls which of these numbering modes is used. The default is dynamic unit assignment by the software; in this mode, installed boards are assigned sequential numbers according to the order the boards are located during power on. For example, the first board that is found is assigned unit 0 and the second is assigned unit 1. The advantages and disadvantages of these two modes is described in the online *IRIS ATM Configuration Guide*.

If you decide to have unit numbers assigned by the jumpers, you must edit the `/var/sysgen/master.d/atm` file, as described in the *IRIS ATM Configuration Guide*, and change each board's Unit Jumper Set to a unique unit number. Figure 1-3 illustrates how to set the jumpers for 16 different unit numbers. In this illustration, jumpers that are illustrated at a right-angle to the line of pins, are stored in the unjumpered position, which is binary 1.

Use the following guidelines to select a proper unit identification number for each board:

- For the first or only IRIS ATM board in the system, verify that the jumpers are all jumpered, so that the unit number is set to 0.
- For each additional IRIS ATM board, assign the next available unit number. Tag each board with its assigned unit number, then, follow the examples in Figure 1-3 to alter the jumpers on each board.
 - If the system currently has no IRIS ATM board installed, tag the first board as unit 0, the next as unit 1, and so on.
 - If the system already has one or more IRIS ATM boards installed, use `/sbin/hinv` to list the current unit numbers for the installed IRIS ATM boards. Then, assign an unused unit number to each new board.

Note: If two or more installed boards have the same unit number and if the IRIS ATM driver is configured to read the unit numbers from the jumpers, the first board that is located with the unit number 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. Other installed IRIS ATM boards with unique unit numbers are not affected by this procedure; they will power-on, initialize, and start functioning.

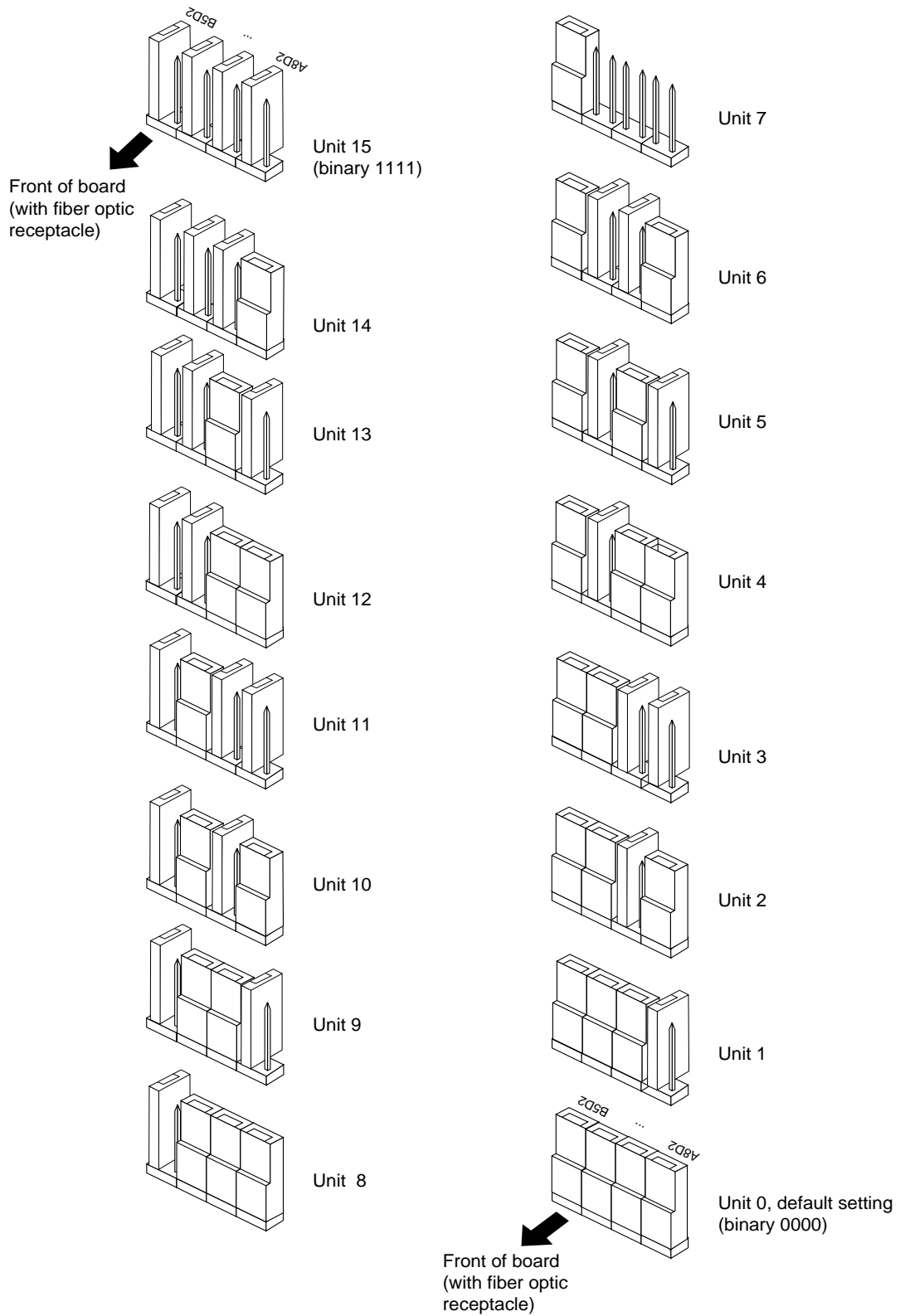


Figure 1-3 Unit Jumper Settings

1.3 Transmission Rates

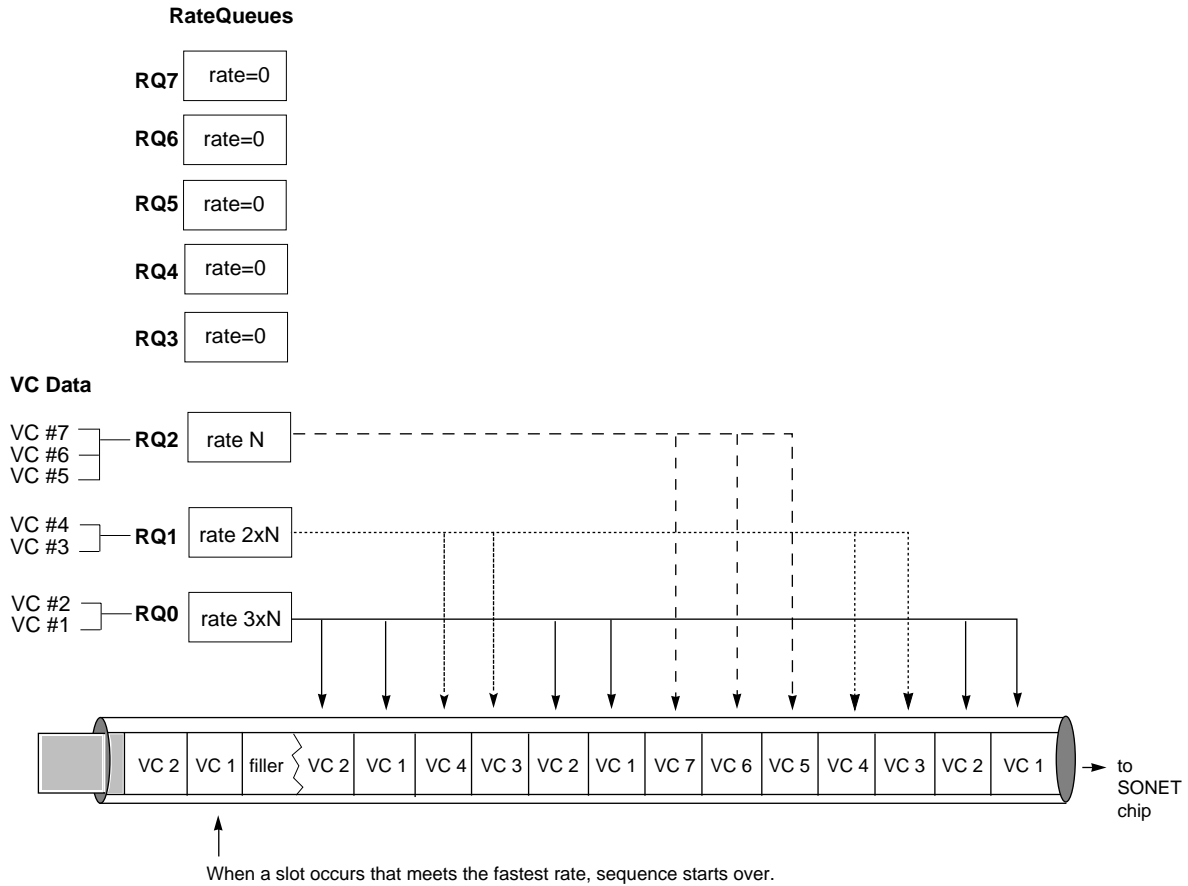
The IRIS ATM product manages virtual channel (VC) transmission rates by configuring (and reconfiguring) the rate queues and divisors on the ATM-OC3c board. This section describes how VC transmission rates work. The online *IRIS ATM Configuration Guide* lists the supported rates, which range from 0 to 135,991,460 bits-per-second of user (upper-layer) payload.

1.3.1 Description of Rate Queues

Each IRIS ATM-OC3c board has 8 rate queues organized as 2 banks: a0-a3 and b0-b3. These queues are illustrated on the block diagram, Figure 1-1. The “a” bank consists of 4 high-priority queues that are designed for constant bit rate traffic (CBR and VBR channels). The other bank contains 4 low-priority queues that are only used for best effort traffic. High-priority queues are serviced before low-priority ones. As long as there is data awaiting transfer on any high-priority queue, low-priority data is not transmitted. This means that, for applications with a constant flow of data, only queues a0-a3 will ever operate.

Each queue can support one peak rate and 63 different sustainable rates. A peak rate (for CBR, VBR, or best-effort traffic) is the rate at which the rate queue is configured. A sustainable rate (for VBR traffic) is the peak rate divided by a divisor. To set the sustainable transmission rate for a particular VC, the IRIS ATM driver divides one of the board’s configured rates by a divisor (ranging between 2 and 64). For example, a rate queue configured for a peak rate of 2000 can support the following sustainable rates (among others): 1000, 666.667, 500, and 40; it cannot support a sustainable rate of 5 (because $2000/64$ is greater than 5).

To summarize, the IRIS ATM-OC3c board simultaneously makes available for selection up to 8 different peak rates and up to 504 ($8*63$) sustainable rates. Multiple virtual channels (VCs) can use a single configured rate, as illustrated in Figure 1-4; all the VCs using that particular queue must have the same peak rate, but they can have different sustainable rates. The rate queues can be reconfigured during operation, as explained in Section 1.3.2, “How IRIS ATM Manages the Transmission Rates.” Not all of the available rates on a board can be actively used simultaneously, since this would exceed the board’s bandwidth, as explained in Section 1.3.3, “Oversubscription.”



NOTE: The configured rates do not have to be multiples of each other or in ascending order (as shown here). This example is very simple for demonstration purposes.

Figure 1-4 Rate Queues on ATM-OC3c Board

1.3.2 How IRIS ATM Manages the Transmission Rates

During startup, the IRIS ATM driver configures each rate queue with either a default setting (summarized in Table 1-1) or with a value read from the `/var/atm/atmhw.conf` file. Then, during operation, the driver reconfigures the queues to meet VC rate requests, to respond to `atmconfig` rate configuration requests, and to respond to application programming interface rate configuration requests. The IRIS ATM driver manages the rate queues as explained below:

- The driver considers some queues as locked at a fixed rate and, after the initial configuration at startup, does not change the rates on these queues. This ensures that

site-specified rates are always available, even when the queues are not actively being used. The following actions cause a queue to become locked:

- any queues that, during startup, are specified in the `/var/atm/atmhw.conf` file
- any queues that, during operation, are configured to a non-zero value by the `atmconfig` command or by a customer-developed application through the IRIS ATM application programming interface
- The driver considers all other queues as unlocked and available for reconfiguration. If a requested VC rate does not exist, the driver searches for an unlocked queue that does not currently have a VC associated with it, and the driver reconfigures the queue to the requested peak rate.

During operation, as VCs are created, the driver associates each newly created VC with the queue whose transmission rate best matches the peak rate requested for that VC. For each request to open a new VC, the driver looks for a queue whose transmission rate best matches the rate requested in the call, following the guidelines explained below:

- For VCs carrying best-effort traffic, the driver uses the low-priority queue whose rate is closest to, but slower than, the requested peak rate. If necessary and if possible, the driver reconfigures a rate queue to meet this request.
- For VCs carrying CBR and VBR traffic, the driver uses the high-priority queue whose configured rate exactly matches the requested peak rate. If necessary and if possible, the driver reconfigures a rate queue to meet this request.

Note: There can be dozens of CBR and VBR virtual channels active on a board, but the peak rate for each one must be one of the four rates that are configured on the high-priority queues.

Table 1-1 summarizes the default settings configured for the IRIS ATM-OC3c board's rates during power on. If any queue is specified in the `/var/atm/atmhw.conf` file, the rate for that queue is fixed at the rate specified in the file; all other queues start out with the default value.

Table 1-1 Default Transmission Rates on ATM-OC3c Queues

Rate Queue	Default Cell Rate	Default Bit Rate	Priority / Use	
Number Id	String Id	(in ATM cells per second)	(in user payload bits per second)	
0	a0	unconfigured	0	High / CBR, VBR ^a
1	a1	unconfigured	0	High / CBR, VBR
2	a2	unconfigured	0	High / CBR, VBR
3	a3	unconfigured	0	High / CBR, VBR
4	b0	26041	10000000	Low / BE
5	b1	78125	30000000	Low / BE
6	b2	178571	68000000	Low / BE
7	b3	357142	135991460	Low / BE

a. CBR = constant bit rate; VBR = variable bit rate; BE = best effort

1.3.3 Oversubscription

A board is oversubscribed when it is servicing VCs that demand more bandwidth than the board can deliver. This occurs when the sum of all the open VCs multiplied times their average rates is greater than the board's total payload bandwidth.* (For best-effort and CBR VCs, the peak rate is used for the average; for VBR VCs, the sustainable rate is used.) The IRIS ATM software contains a number of features that prevent performance degradation due to oversubscription. Whenever there is even one VC open for a CBR traffic contract, the IRIS ATM software refuses to create new VCs once the board's total bandwidth is allocated to open VCs (including the best-effort ones). If all the VCs on a board are best-effort (regardless of which queues they are using), the IRIS ATM software allows the board to become oversubscribed and handles the transmissions in the best manner possible.

Note: The default TCP/IP configuration uses the maximum bandwidth for any connection. Therefore, a single TCP/IP connection can oversubscribe the port and prevent CBR traffic. To prevent this, there are two options: (1) reduce the default TCP/IP bandwidth (for example, by editing the `/var/atm/ifatm.conf` file) or (2) use `ifconfig` to disable the TCP/IP logical network interfaces.

* Total OC3 bandwidth is 155.52 megabits per second; however, of this total, only 135,991,460 is available for user data, which is referred to as the payload bandwidth.

Chapter 2

Installation Instructions

This chapter provides instructions for installing the IRIS ATM network interface controller board into a CHALLENGE™ or Onyx™ server or supercomputer. There is a separate section for each of the following Silicon Graphics' platforms:

- CHALLENGE and POWER CHALLENGE L Deskside
- CHALLENGE and POWER CHALLENGE XL Rackmount
- Onyx and POWER Onyx Deskside
- Onyx and POWER Onyx Rackmount



Warning: Installing this equipment requires specific training and technical knowledge. These instructions are provided for use only by Silicon Graphics system support engineers (SSEs) or other personnel trained by Silicon Graphics. This equipment uses internal electrical power that is hazardous if the equipment is improperly handled.

2.1 Installation for CHALLENGE L Deskside

This section describes installing the IRIS ATM network board into a CHALLENGE or POWER CHALLENGE L Deskside server. These platforms support a maximum of 6 IRIS ATM boards.

2.1.1 Preparing for Installation

Before starting the installation, prepare yourself and the equipment by following the instructions in this section.

2.1.1.1 Check the ATM Package for Completeness

Verify that the IRIS ATM package is complete. It should contain the items listed in Table 2-1. If anything is missing, do not proceed with the installation. Contact the customer or the customer's salesperson.

Table 2-1 ATM Package Contents

Item	Quantity
CD-ROM with IRIS ATM software and <i>IRIS ATM Release Notes</i>	1
IRIS ATM short mezzanine board	1
Internal fiber optic cable assembly with a 1-port panel plate attached	2 fiber optic lines and 1 panel plate
2-port panel plate: replacement for 1-port plate in multiple-board installations	1
Sheets of labels	4
Screws to attach IRIS ATM board to IO4 board	4
<i>IRIS ATM API Programmer's Guide</i> (document)	1
<i>IRIS ATM Configuration Guide</i> (document)	1

2.1.1.2 Prepare the IRIS ATM Board

The IRIS ATM board has a set of jumpers called the Unit Jumper Set, illustrated in Figure 1-2. These jumpers must be configured to give the board a unique unit identification number (for example, ATM unit 0, ATM unit 1, etc.). Follow the instructions in Section 1.2 in Chapter 1 to set the jumpers.

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.

2.1.1.3 Prepare the CHALLENGE System

Follow the steps in this section to prepare the CHALLENGE L Deskside system for installation.

Caution: This equipment is extremely sensitive and susceptible to damage by electrostatic discharge (ESD), a spark caused by the buildup of electrical static potential on clothing and other material. You must use proper ESD preventive measures as explained in the “Safety” section of the *CHALLENGE/Onyx Deskside 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 file system is backed up.
3. Install the IRIS ATM software. Step-by-step instructions are provided in the *IRIS ATM Release Notes*. Do not proceed until the new IRIS ATM software is installed.

Warning: Failure to install the software before installing the board may destroy the MAC address on the board. If this occurs, the board cannot function.

4. Configure the IRIS ATM software. Step-by-step instructions are provided in the *IRIS ATM Configuration Guide*.

Note: You cannot verify successful installation of the board until the software is configured. If you choose not to configure the software now, you will need to do so before you can test the board’s functionality. In addition, selecting to configure later will require an additional reboot of the system.

5. Shut down the system by turning the key on the System Controller panel (located at the front) to **OFF**.
6. Wait a minute for the system to shut down, then switch the circuit breaker on the back 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.

7. Open the front door and pull down the I/O panel in the front of the chassis to expose the IO4 boards, as illustrated in Figure 2-1.

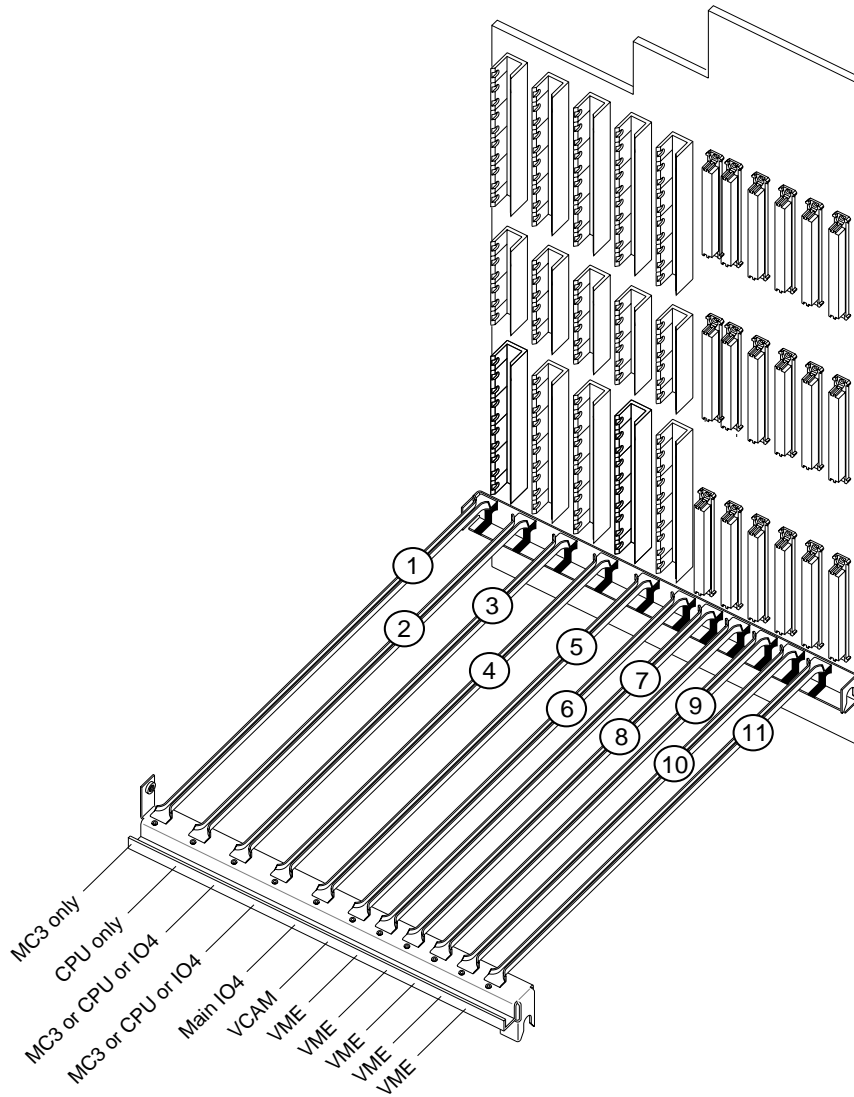


Figure 2-1 CHALLENGE Deskside Slots for IO4 Boards

2.1.2 Selecting a Mezzanine Slot

The IRIS ATM board requires one short mezzanine slot on an IO4 board. This section describes how to select an appropriate slot for each IRIS ATM board.

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

Locate the IO4 boards that are currently installed. Slot 5 always has an IO4 board. (See Figure 2-1 for an illustration of the slots.) In addition, slots 3 and/or 4, may contain IO4 boards. A CHALLENGE L may have one to three IO4 boards installed. Each IO4 board has two mezzanine slots, as illustrated in Figure 2-2. The ATM board may be installed on any of the available mezzanine slots, as detailed below:

- If the system has only one IO4 board, this is the location for the IRIS ATM board. The ATM board may be installed in either the upper or lower position on the IO4 board, as illustrated in Figure 2-2.

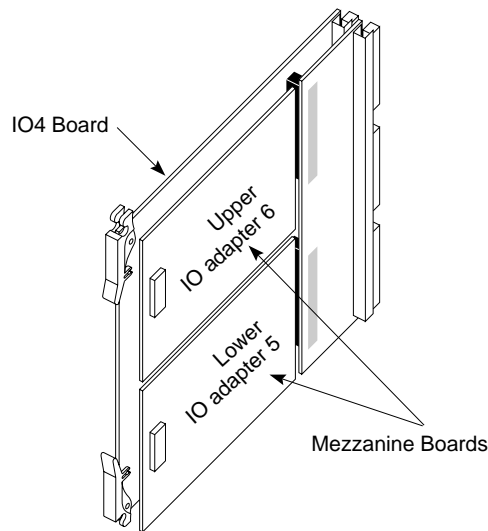


Figure 2-2 Upper and Lower Mezzanine Slots on IO4 Boards

- If the system has more than one IO4 board, you may select any unoccupied mezzanine slot.
- If there are no unoccupied mezzanine slots, you must install another IO4 board. Contact the sales representative to order one. The installation cannot be continued until a mezzanine slot is available.

Note: The maximum number of IO4 boards for a CHALLENGE L Deskside system is three. If three IO4 boards are already installed, and if all the mezzanine slots are occupied, IRIS ATM cannot be installed onto this system.

2.1.3 Installing the Board into a CHALLENGE L Deskside

Follow the steps below to install the IRIS ATM board.

1. Remove the IO4 board that you have selected from the CHALLENGE chassis.
2. Lay 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.

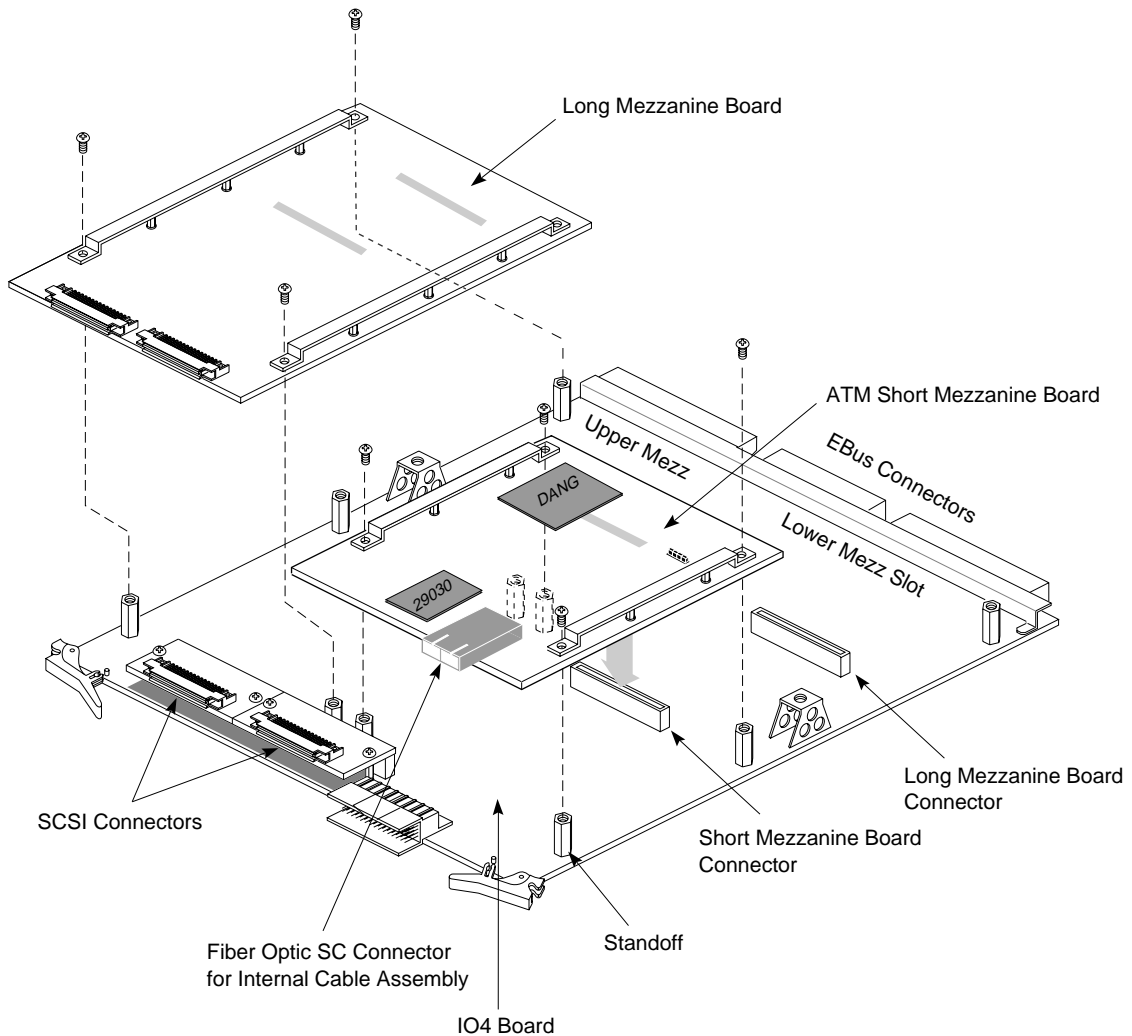


Figure 2-3 IO4 Board with an ATM Mezzanine Board

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, as illustrated in Figure 2-4. 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 5 is labelled F-05-6.
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 2-5).

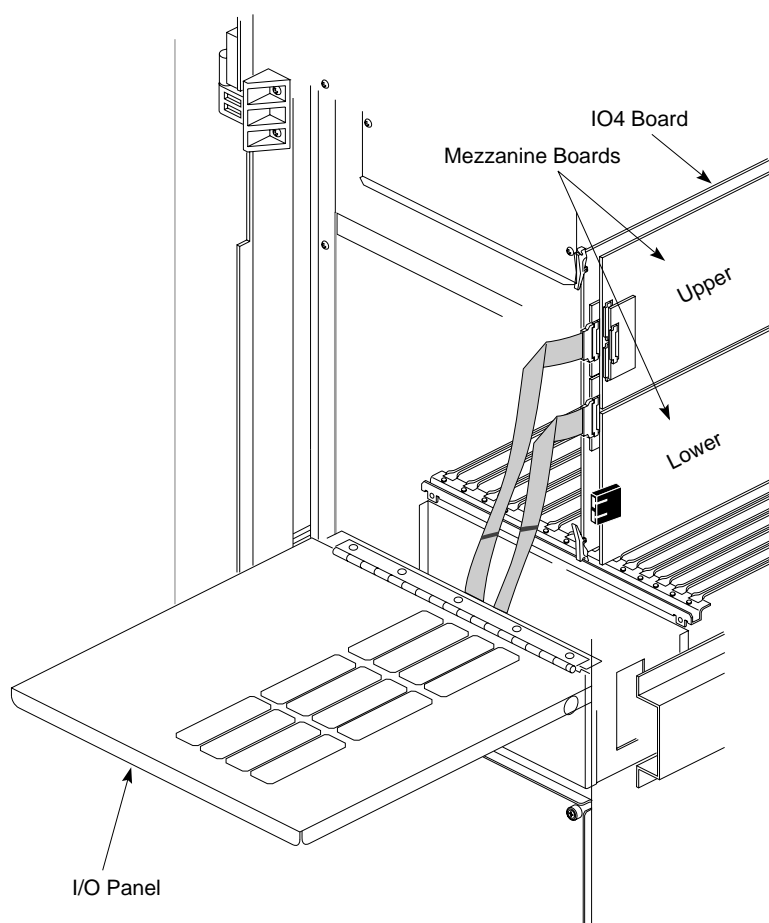


Figure 2-4 Installed IO4 Board

2.1.3.1 Connect Internal ATM Cables

Follow the steps below to attach the internal ATM cables to the ATM board and the panel plate to the card cage'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 2-5.

Note: For installations with multiple IRIS ATM boards, replace the single-port panel plate on the cable assembly with the 2-port panel plate that is shipped with the product.

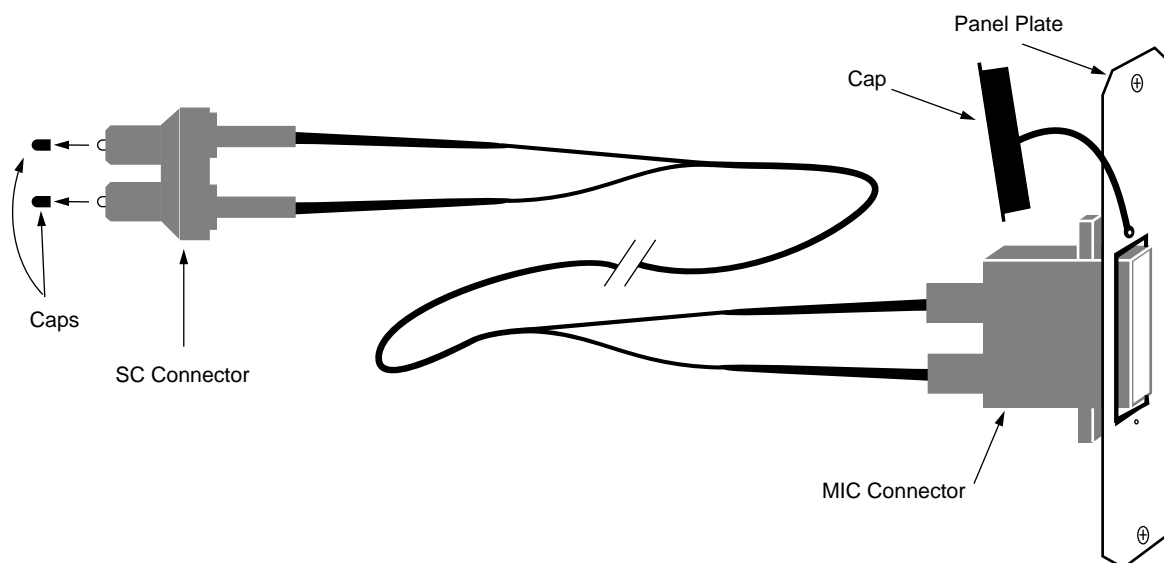


Figure 2-5 IRIS ATM Internal Cable Assembly

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.

2.1.3.2 Connect Site's Fiber Optic Cables

The ATM connector provided at the ATM IO panel plate is a female, S-type MIC connector. The site's ATM cable for this connection must be multi-mode fiber optic cable terminated with a male MIC connector (S-, A-, and B-types are all compatible).

Remove the protective cap from the port on the ATM panel plate and attach the site's fiber optic cable to the system's ATM panel plate, as illustrated in Figure 2-6. The connection should snap (or click) into place.

Note: MIC connectors are “keyed” so that they snap into place only when appropriate types are being connected and correct positioning is being used. If the connection does not snap into place, try a different position. If that does not solve the problem verify that the MIC has been designed to mate with an S-type receptacle.

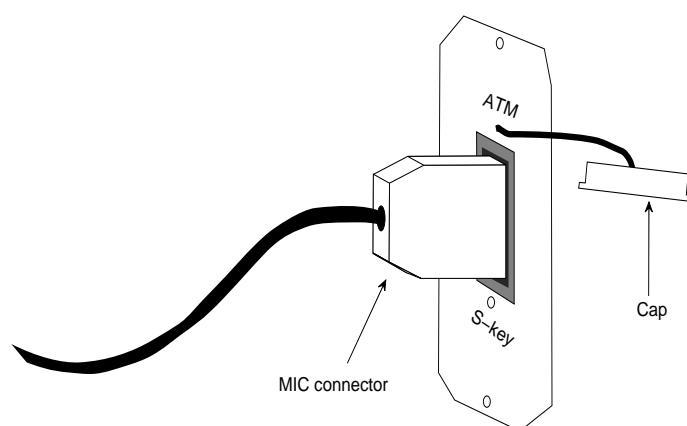


Figure 2-6 Connecting Site's Fiber Optic Cable to I/O Panel Plate

2.1.4 Completing the Installation

To finish the installation, do the following:

1. Flip the circuit breaker on the back of the chassis to **ON**, then turn the key switch on the front to **ON**.
2. When the console prompts you with the question `Automatically reconfigure the operating system?`, answer **yes** or **y** in order to build a new kernel.

Note: If this prompt does not appear, you probably have not installed the IRIS ATM software. Instead of proceeding with the steps below, follow the instructions in the *IRIS ATM Release Notes* to install and configure the software.

3. Logon and reboot (this is the second time this system is being started) to begin using the newly built operating system. The command lines below can be used to accomplish this step:

```
% su
Password: thepassword
# reboot
```

4. Logon and invoke *hinv* to verify that the IRIS ATM hardware is listed:

```
% /sbin/hinv
. . .
ATM OC-3c unit#: slot#, adapter#
```

where *unit#* reflects the current setting of the board's Unit Jumper Set or the unit number assigned by the driver (depending on the assignment mode configured in the */var/sysgen/master.d/atm* file), *slot#* indicates the slot in which the IO4 board resides, and *adapter#* (IO4 adapter) indicates the mezzanine position where the ATM board resides.

Note: If the board is not listed, either (1) the system is running the wrong version of IRIX, (2) the newly installed board's jumpers have the same unit number as one of the ATM boards that are listed, or (3) the board is improperly installed. If no ATM board is listed, use the *versions eoe1* command to verify the version of IRIX. If the version is correct or if other IRIS ATM boards are listed, reinstall the product (the board and all cables) making sure to set the jumpers correctly and to seat all the hardware firmly.

5. Follow the instructions in the *IRIS ATM Configuration Guide* to verify that upper layer applications can send and receive over the ATM subsystem.

2.2 Installation for CHALLENGE XL Rackmount

This section describes installing the IRIS ATM network board into a CHALLENGE or POWER CHALLENGE XL Rackmount server. The maximum number of IRIS ATM boards for this chassis varies, depending on the system's configuration; however, for most configurations the maximum is 8.

2.2.1 Preparing for Installation

Before starting the installation, prepare yourself and the equipment by following the instructions in this section.

2.2.1.1 Check the ATM Package for Completeness

Verify that the IRIS ATM package is complete. It should contain the items listed in Table 2-2. If anything is missing, do not proceed with the installation. Contact the customer or the customer's salesperson.

Table 2-2 ATM Package Contents

Item	Quantity
CD-ROM with IRIS ATM software and <i>IRIS ATM Release Notes</i>	1
IRIS ATM short mezzanine board	1
Internal fiber optic cable assembly with a 1-port panel plate attached	2 fiber optic lines and 1 panel plate
2-port panel plate: replacement for 1-port plate in multiple-board installations	1
Sheets of labels	4
Screws to attach IRIS ATM board to IO4 board	4
<i>IRIS ATM API Programmer's Guide</i> (document)	1
<i>IRIS ATM Configuration Guide</i> (document)	1

2.2.1.2 Prepare the IRIS ATM Board

The IRIS ATM board has a set of jumpers called the Unit Jumper Set, illustrated in Figure 1-2. These jumpers must be configured to give the board a unique unit identification number (for example, ATM unit 0, ATM unit 1, etc.). Follow the instructions in Section 1.2 in Chapter 1 to set the jumpers.

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.

2.2.1.3 Prepare the CHALLENGE System

Follow the steps in this section to prepare the CHALLENGE XL 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 electrical static 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 file system is backed up.
3. Install the IRIS ATM software. Step-by-step instructions are provided in the *IRIS ATM Release Notes*. Do not proceed until the new IRIS ATM software is installed.

Warning: Failure to install the software before installing the board may destroy the MAC address on the board. If this occurs, the board cannot function.

4. Configure the IRIS ATM software. Step-by-step instructions are provided in the *IRIS ATM Configuration Guide*.

Note: You cannot verify successful installation of the board until the software is configured. If you choose not to configure the software now, you will need to do so before you can test the board’s functionality. In addition, selecting to configure later will require an additional reboot of the system.

5. Shut down the system by turning the key on the System Controller panel (located at the front) to **OFF**.
6. 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.

7. Open the back door and pull down the I/O panel for card cage 2 to expose the IO4 boards and VMEBus slots, as illustrated in Figure 2-7.

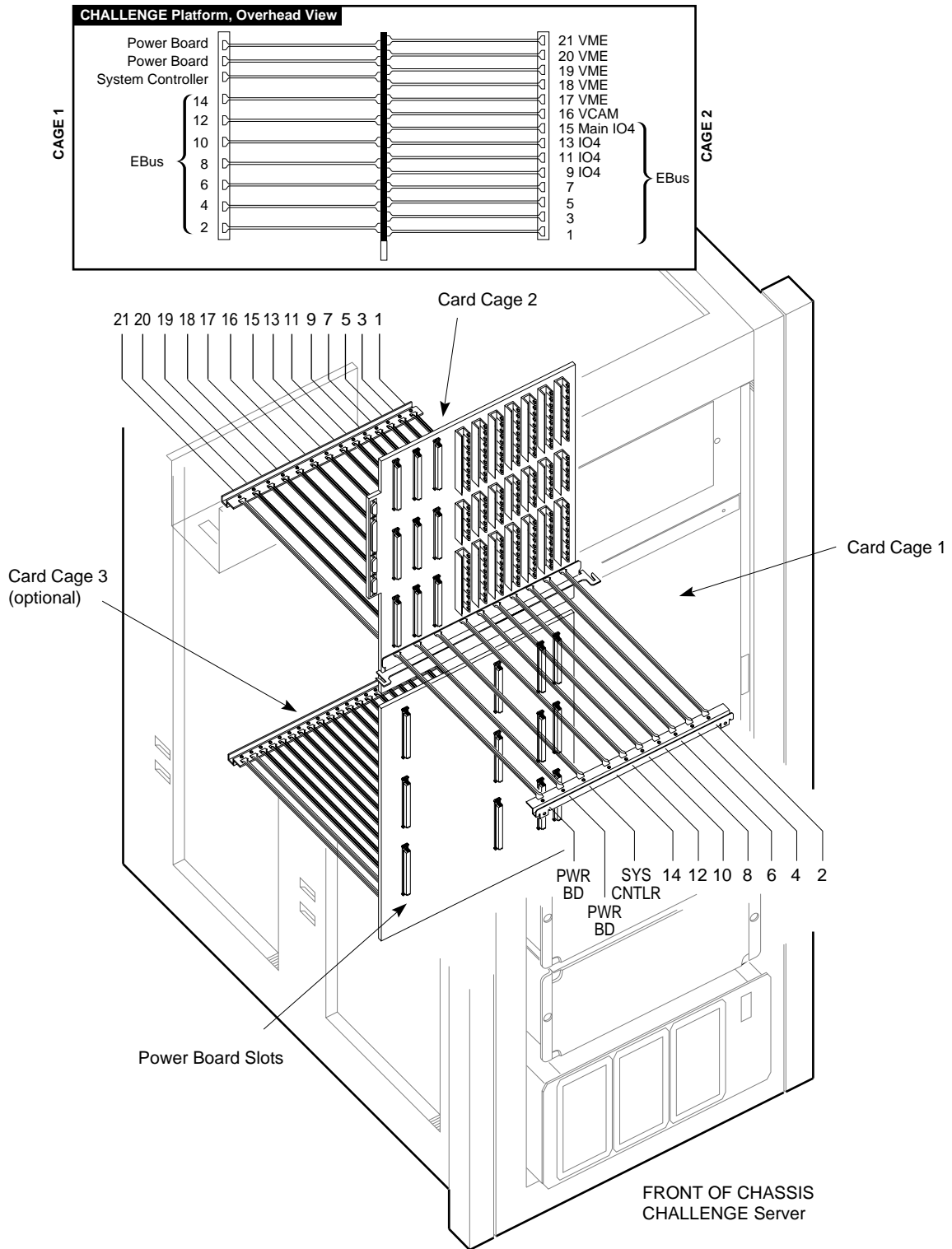


Figure 2-7 CHALLENGE Rackmount Slots for IO4 Boards

2.2.2 Selecting a Mezzanine Slot

The IRIS ATM board requires one short mezzanine slot on an IO4 board. This section describes how to select an appropriate slot for each IRIS ATM board.

Caution: This equipment is extremely sensitive and susceptible to damage by electrostatic discharge (ESD), a spark caused by the buildup of electrical static 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*.

Locate the IO4 boards that are currently installed. Slot 15 always has an IO4 board. (See Figure 2-7 for an illustration of the slots.) In addition, slots 13, 11, 9, 7 and/or 5, may contain IO4 boards. A CHALLENGE XL may have one to six IO4 boards installed. Each IO4 board has two mezzanine slots, as illustrated in Figure 2-8. The ATM board may be installed on any of the available mezzanine slots, as detailed below:

- If the system has only one IO4 board, this is the location for the IRIS ATM board. The ATM board may be installed in either the upper or lower position on the IO4 board, as illustrated in Figure 2-8.

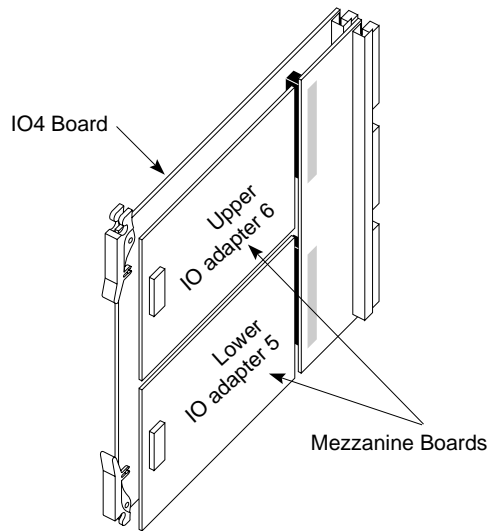


Figure 2-8 Upper and Lower Mezzanine Slots on IO4 Boards

- If the system has more than one IO4 board, you may select any unoccupied mezzanine slot.
- If there are no unoccupied mezzanine slots, you must install another IO4 board. Contact the sales representative to order one. The installation cannot be continued until a mezzanine slot is available.

Note: The maximum number of IO4 boards for a CHALLENGE XL Rackmount system varies, but is usually four. If four IO4 boards are already installed, and if all the mezzanine slots are occupied, IRIS ATM probably cannot be installed onto this system.

2.2.3 Installing the Board into a CHALLENGE XL

Follow the steps below to install the IRIS ATM board.

1. Remove the IO4 board that you have selected from the CHALLENGE chassis.
2. Lay 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 2-9.
3. Locate the selected mezzanine slot (upper or lower) and remove the four screws from the standoffs, as illustrated in Figure 2-9. If the screws are missing, this is not a problem.

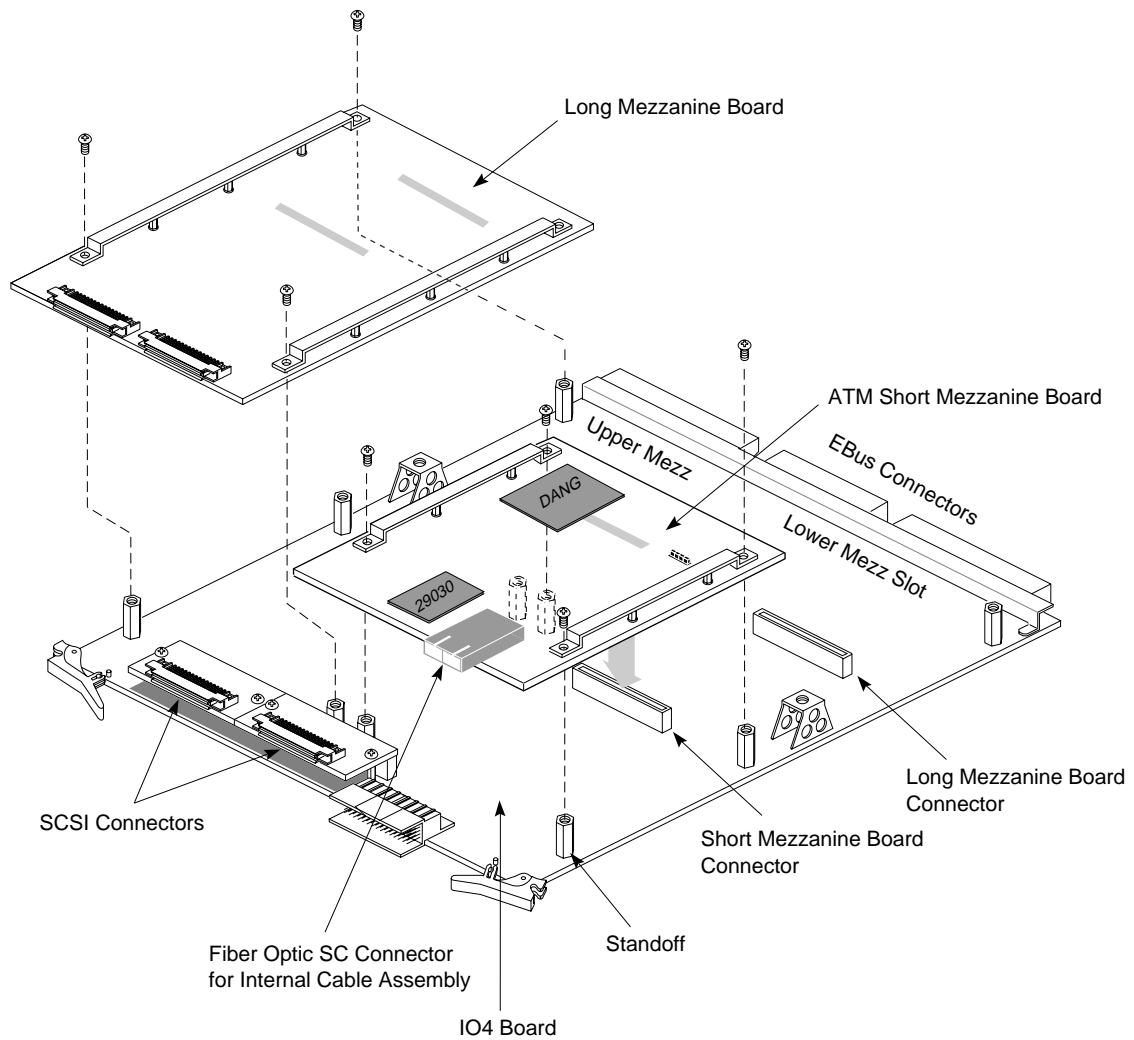


Figure 2-9 IO4 Board with an ATM Mezzanine Board

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 2-9 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, as illustrated in Figure 2-10. 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 labelled 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 2-11).

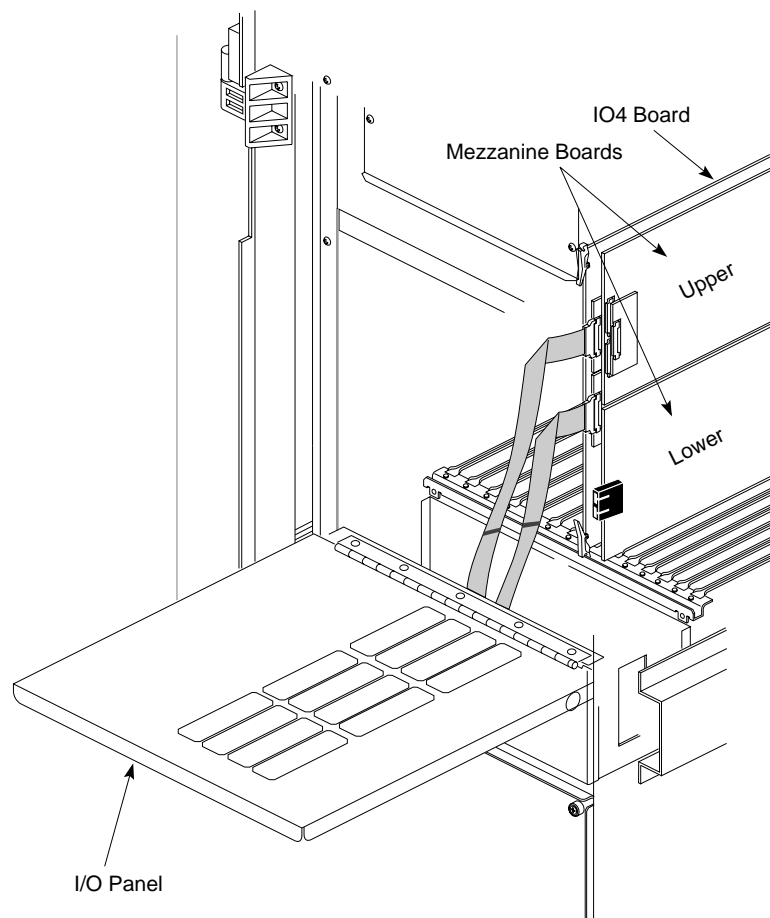


Figure 2-10 Installed IO4 Board

2.2.3.1 Connect Internal ATM Cables

Follow the steps below to attach the internal ATM cables to the ATM board and the panel plate to the card cage'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 2-11.

Note: For installations with multiple IRIS ATM boards, replace the single-port panel plate on the cable assembly with the 2-port panel plate that is shipped with the product.

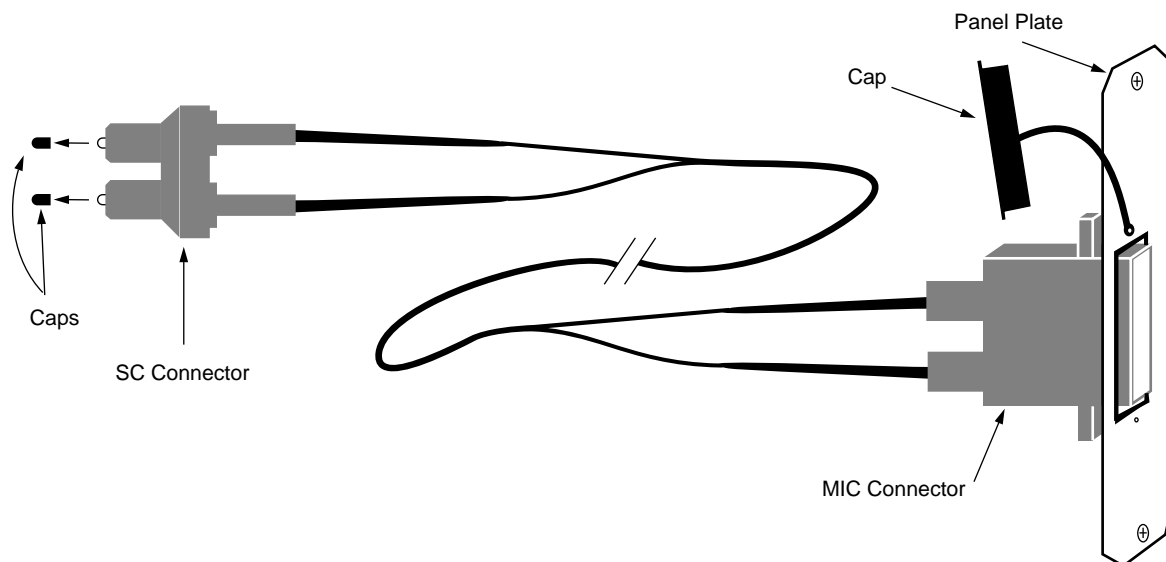


Figure 2-11 IRIS ATM Internal Cable Assembly

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.

2.2.3.2 Connect Site's Fiber Optic Cables

The ATM connector provided at the ATM IO panel plate is a female, S-type MIC connector. The site's ATM cable for this connection must be multi-mode fiber optic cable terminated with a male MIC connector (S-, A-, and B-types are all compatible).

Remove the protective cap from the port on the ATM panel plate and attach the site's fiber optic cable to the system's ATM panel plate, as illustrated in Figure 2-12. The connection should snap (or click) into place.

Note: MIC connectors are "keyed" so that they snap into place only when appropriate types are being connected and correct positioning is being used. If the connection does not snap into place, try a different position. If that does not solve the problem verify that the MIC has been designed to mate with an S-type receptacle.

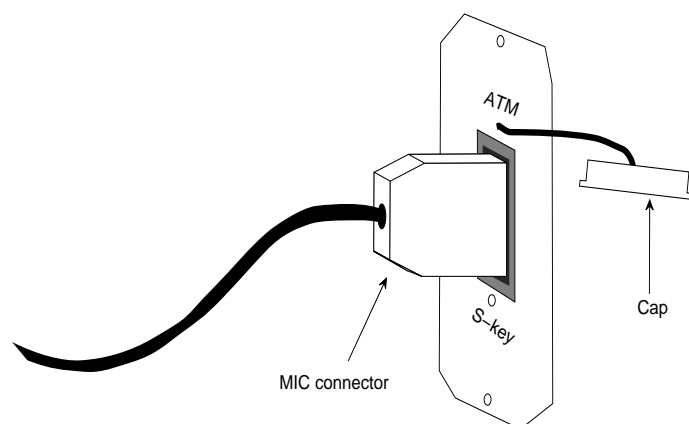


Figure 2-12 Connecting Site's Fiber Optic Cable to I/O Panel Plate

2.2.4 Completing the Installation

To finish the installation, do the following:

1. Flip the circuit breaker on the back of the chassis to **ON**, then turn the key switch on the front to **ON**.
2. When the console prompts you with the question `Automatically reconfigure the operating system?`, answer **yes** or **y** in order to build a new kernel.

Note: If this prompt does not appear, you probably have not installed the IRIS ATM software. Instead of proceeding with the steps below, follow the instructions in the *IRIS ATM Release Notes* to install and configure the software.

3. Logon and reboot (this is the second time this system is being started) to begin using the newly built operating system. The command lines below can be used to accomplish this step:

```
% su
Password: thepassword
# reboot
```

4. Logon and invoke *hinv* to verify that the IRIS ATM hardware is listed:

```
% /sbin/hinv
. . .
ATM OC-3c unit#: slot#, adapter#
```

where *unit#* reflects the current setting of the board's Unit Jumper Set or the unit number assigned by the driver (depending on the assignment mode configured in the */var/sysgen/master.d/atm* file), *slot#* indicates the slot in which the IO4 board resides, and *adapter#* (IO4 adapter) indicates the mezzanine position where the ATM board resides.

Note: If the board is not listed, either (1) the system is running the wrong version of IRIX, (2) the newly installed board's jumpers have the same unit number as one of the ATM boards that are listed, or (3) the board is improperly installed. If no ATM board is listed, use the *versions eoe1* command to verify the version of IRIX. If the version is correct or if other IRIS ATM boards are listed, reinstall the product (the board and all cables) making sure to set the jumpers correctly and to seat all the hardware firmly.

5. Follow the instructions in the *IRIS ATM Configuration Guide* to verify that upper layer applications can send and receive over the ATM subsystem.

2.3 Installation for Onyx Deskside

This section describes installing the IRIS ATM network board into a Onyx or POWER Onyx Deskside server. These platforms support a maximum of 2 IRIS ATM boards.

2.3.1 Preparing for Installation

Before starting the installation, prepare yourself and the equipment by following the instructions in this section.

2.3.1.1 Check the ATM Package for Completeness

Verify that the IRIS ATM package is complete. It should contain the items listed in Table 2-3. If anything is missing, do not proceed with the installation. Contact the customer or the customer's salesperson.

Table 2-3 ATM Package Contents

Item	Quantity
CD-ROM with IRIS ATM software and <i>IRIS ATM Release Notes</i>	1
IRIS ATM short mezzanine board	1
Internal fiber optic cable assembly with a 1-port panel plate attached	2 fiber optic lines and 1 panel plate
2-port panel plate: replacement for 1-port plate in multiple-board installations	1
Sheets of labels	4
Screws to attach IRIS ATM board to IO4 board	4
<i>IRIS ATM API Programmer's Guide</i> (document)	1
<i>IRIS ATM Configuration Guide</i> (document)	1

2.3.1.2 Prepare the IRIS ATM Board

The IRIS ATM board has a set of jumpers called the Unit Jumper Set, illustrated in Figure 1-2. These jumpers must be configured to give the board a unique unit identification number (for example, ATM unit 0, ATM unit 1, etc.). Follow the instructions in Section 1.2 in Chapter 1 to set the jumpers.

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.

2.3.1.3 Prepare the Onyx System

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

Caution: This equipment is extremely sensitive and susceptible to damage by electrostatic discharge (ESD), a spark caused by the buildup of electrical static potential on clothing and other material. You must use proper ESD preventive measures as explained in the “Safety” section of the *CHALLENGE/Onyx Deskside 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 file system is backed up.
3. Install the IRIS ATM software. Step-by-step instructions are provided in the *IRIS ATM Release Notes*. Do not proceed until the new IRIS ATM software is installed.

Warning: Failure to install the software before installing the board may destroy the MAC address on the board. If this occurs, the board cannot function.

4. Configure the IRIS ATM software. Step-by-step instructions are provided in the *IRIS ATM Configuration Guide*.

Note: You cannot verify successful installation of the board until the software is configured. If you choose not to configure the software now, you will need to do so before you can test the board’s functionality. In addition, selecting to configure later will require an additional reboot of the system.

5. Shut down the system by turning the key on the System Controller panel (located at the front) to **OFF**.
6. Wait a minute for the system to shut down, then switch the circuit breaker on the back 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.

7. Open the front door and pull down the I/O panel in the front of the chassis to expose the IO4 boards, as illustrated in Figure 2-13.

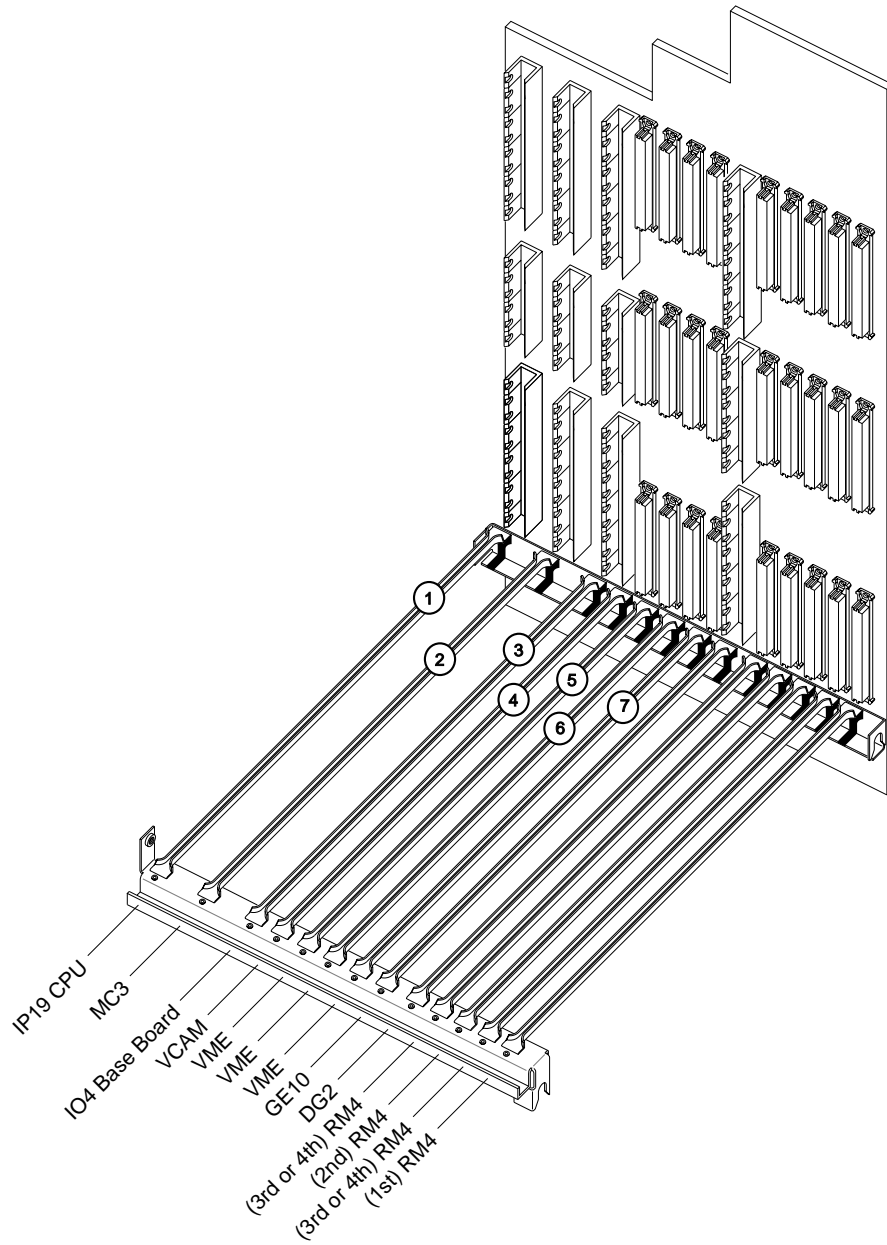


Figure 2-13 Onyx Deskside Slots for IO4 Boards

2.3.2 Selecting a Mezzanine Slot

The IRIS ATM board requires one short mezzanine slot on an IO4 board. This section describes how to select an appropriate slot for each IRIS ATM board.

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

Locate the IO4 board that is installed in Slot 3. The IO4 board has two mezzanine slots, as illustrated in Figure 2-14. The ATM board may be installed on either of these mezzanine slots.

Note: The maximum number of IO4 boards for an Onyx Deskside system is one. If both mezzanine slots are occupied, IRIS ATM cannot be installed onto this system.

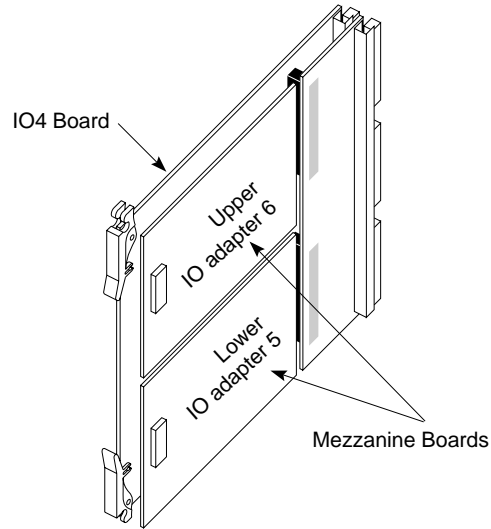


Figure 2-14 Upper and Lower Mezzanine Slots on IO4 Boards

2.3.3 Installing the Board into an Onyx Deskside

Follow the steps below to install the IRIS ATM board.

1. Remove the IO4 board that you have selected from the chassis.
2. Lay 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 2-15.
3. Locate the selected mezzanine slot (upper or lower) and remove the four screws from the standoffs, as illustrated in Figure 2-15. If the screws are missing, this is not a problem.

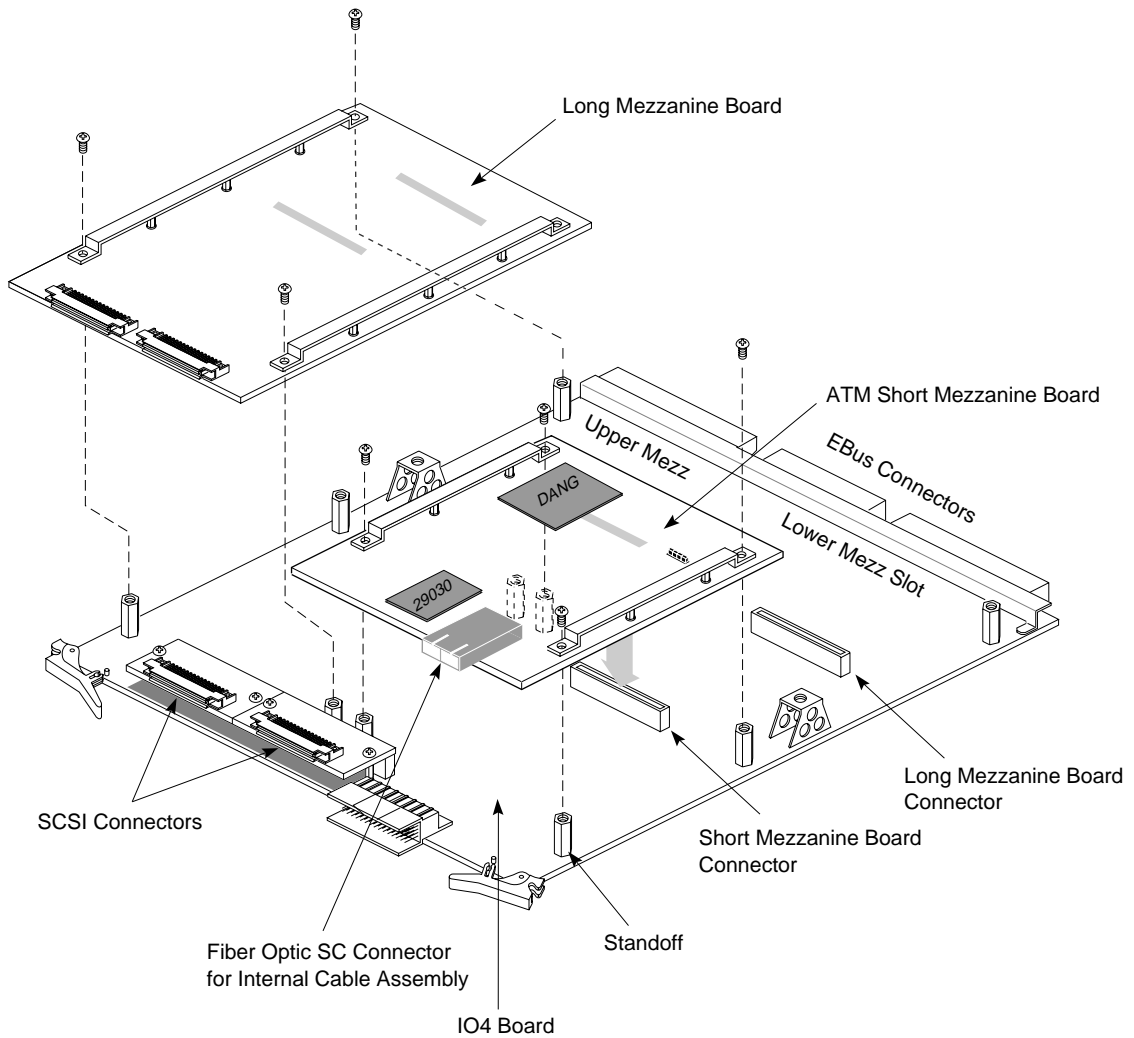


Figure 2-15 IO4 Board with an ATM Mezzanine Board

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 2-15 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, as illustrated in Figure 2-16. 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-03-5 for the lower slot and F-03-6 for the upper slot.
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 2-17).

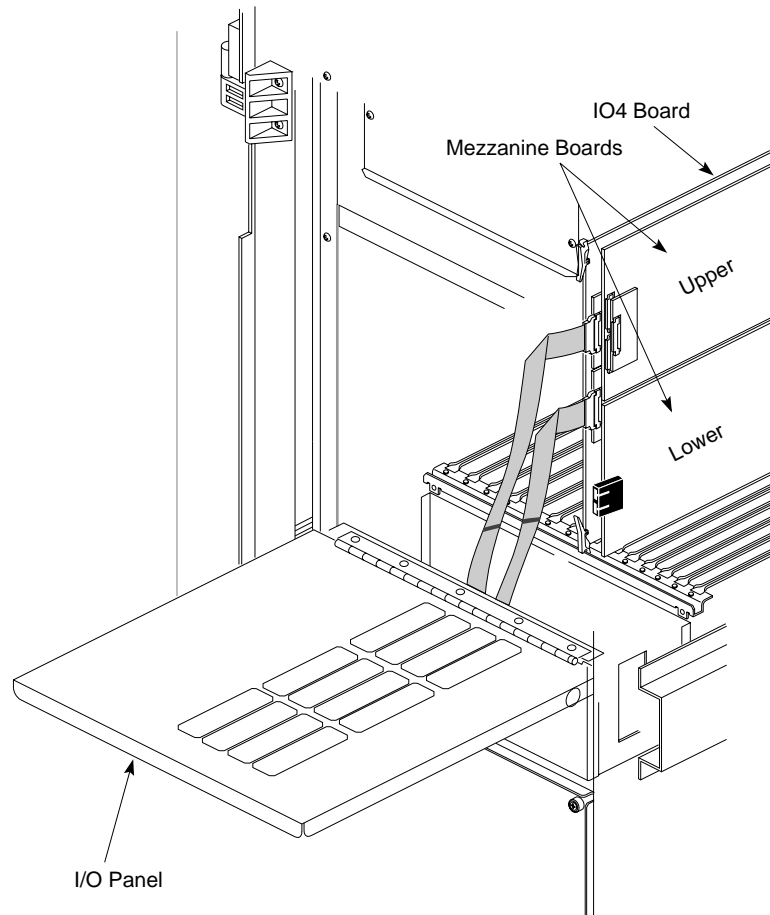


Figure 2-16 Installed IO4 Board

2.3.3.1 Connect Internal ATM Cables

Follow the steps below to attach the internal ATM cables to the ATM board and the panel plate to the card cage'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.

Note: For installations with multiple IRIS ATM boards, replace the single-port panel plate on the cable assembly with the 2-port panel plate that is shipped with the product.

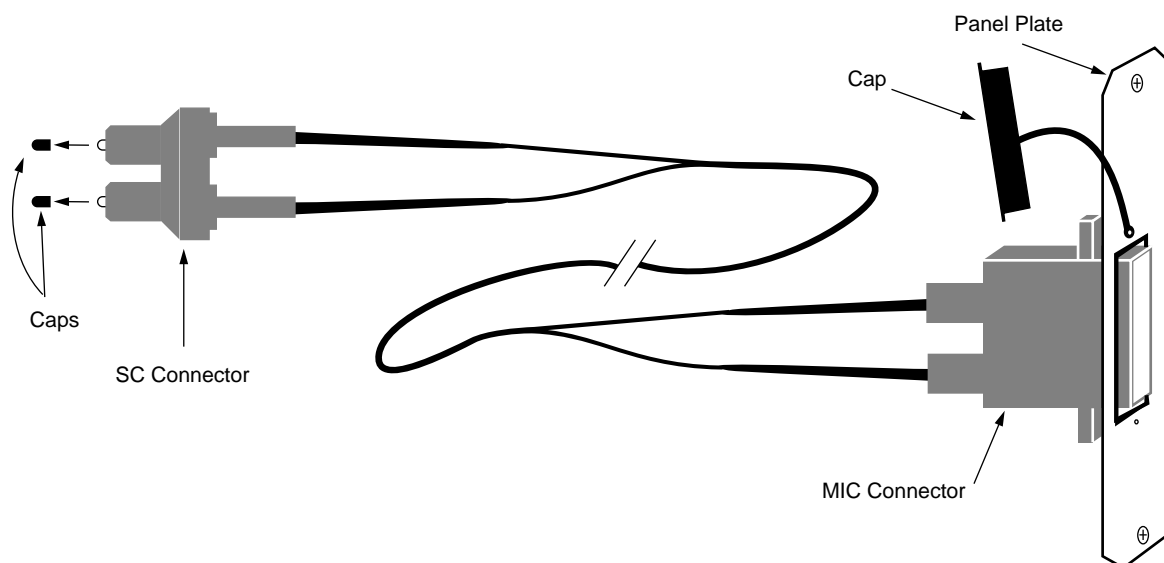


Figure 2-17 IRIS ATM Internal Cable Assembly

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.

2.3.3.2 Connect Site's Fiber Optic Cables

The ATM connector provided at the ATM IO panel plate is a female, S-type MIC connector. The site's ATM cable for this connection must be multi-mode fiber optic cable terminated with a male MIC connector (S-, A-, and B-types are all compatible).

Remove the protective cap from the port on the ATM panel plate and attach the site's fiber optic cable to the system's ATM panel plate, as illustrated in Figure 2-18. The connection should snap (or click) into place.

Note: MIC connectors are “keyed” so that they snap into place only when appropriate types are being connected and correct positioning is being used. If the connection does not snap into place, try a different position. If that does not solve the problem verify that the MIC has been designed to mate with an S-type receptacle.

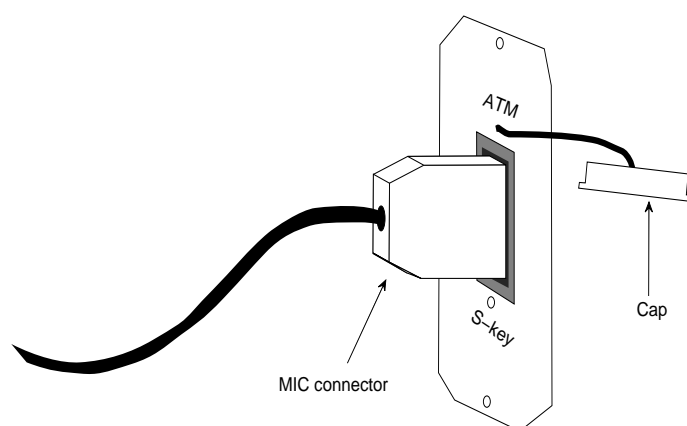


Figure 2-18 Connecting Site's Fiber Optic Cable to I/O Panel Plate

2.3.4 Completing the Installation

To finish the installation, do the following:

1. Flip the circuit breaker on the back of the chassis to **ON**, then turn the key switch on the front to **ON**.
2. When the console prompts you with the question `Automatically reconfigure the operating system?`, answer **yes** or **y** in order to build a new kernel.

Note: If this prompt does not appear, you probably have not installed the IRIS ATM software. Instead of proceeding with the steps below, follow the instructions in the *IRIS ATM Release Notes* to install and configure the software.

3. Logon and reboot (this is the second time this system is being started) to begin using the newly built operating system. The command lines below can be used to accomplish this step:

```
% su
Password: thepassword
# reboot
```

4. Logon and invoke *hin*v to verify that the IRIS ATM hardware is listed:

```
% /sbin/hinv
. . .
ATM OC-3c unit#: slot#, adapter#
```

where *unit#* reflects the current setting of the board's Unit Jumper Set or the unit number assigned by the driver (depending on the assignment mode configured in the */var/sysgen/master.d/atm* file), *slot#* indicates the slot in which the IO4 board resides, and *adapter#* (IO4 adapter) indicates the mezzanine position where the ATM board resides.

Note: If the board is not listed, either (1) the system is running the wrong version of IRIX, (2) the newly installed board's jumpers have the same unit number as one of the ATM boards that are listed, or (3) the board is improperly installed. If no ATM board is listed, use the *versions eoe1* command to verify the version of IRIX. If the version is correct or if other IRIS ATM boards are listed, reinstall the product (the board and all cables) making sure to set the jumpers correctly and to seat all the hardware firmly.

5. Follow the instructions in the *IRIS ATM Configuration Guide* to verify that upper layer applications can send and receive over the ATM subsystem.

2.4 Installation for Onyx Rackmount

This section describes installing the IRIS ATM network board into an Onyx or POWER Onyx Rackmount supercomputer. These platforms support a maximum of 8 IRIS ATM boards.

2.4.1 Preparing for Installation

Before starting the installation, prepare yourself and the equipment by following the instructions in this section.

2.4.1.1 Check the ATM Package for Completeness

Verify that the IRIS ATM package is complete. It should contain the items listed in Table 2-4. If anything is missing, do not proceed with the installation. Contact the customer or the customer's salesperson.

Table 2-4 ATM Package Contents

Item	Quantity
CD-ROM with IRIS ATM software and <i>IRIS ATM Release Notes</i>	1
IRIS ATM short mezzanine board	1
Internal fiber optic cable assembly with a 1-port panel plate attached	2 fiber optic lines and 1 panel plate
2-port panel plate: replacement for 1-port plate in multiple-board installations	1
Sheets of labels	4
Screws to attach IRIS ATM board to IO4 board	4
<i>IRIS ATM API Programmer's Guide</i> (document)	1
<i>IRIS ATM Configuration Guide</i> (document)	1

2.4.1.2 Prepare the IRIS ATM Board

The IRIS ATM board has a set of jumpers called the Unit Jumper Set, illustrated in Figure 1-2. These jumpers must be configured to give the board a unique unit identification number (for example, ATM unit 0, ATM unit 1, etc.). Follow the instructions in Section 1.2 in Chapter 1 to set the jumpers.

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.

2.4.1.3 Prepare the Onyx System

Follow the steps in this section to prepare the Onyx 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 electrical static 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 file system is backed up.

3. Install the IRIS ATM software. Step-by-step instructions are provided in the *IRIS ATM Release Notes*. Do not proceed until the new IRIS ATM software is installed.

Warning: Failure to install the software before installing the board may destroy the MAC address on the board. If this occurs, the board cannot function.

4. Configure the IRIS ATM software. Step-by-step instructions are provided in the *IRIS ATM Configuration Guide*.

Note: You cannot verify successful installation of the board until the software is configured. If you choose not to configure the software now, you will need to do so before you can test the board's functionality. In addition, selecting to configure later will require an additional reboot of the system.

5. Shut down the system by turning the key on the System Controller panel (located at the front) to **OFF**.
6. 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.

7. Open the back door and pull down the I/O panel for card cage 2 to expose the IO4 boards and VMEBus slots, as illustrated in Figure 2-19.

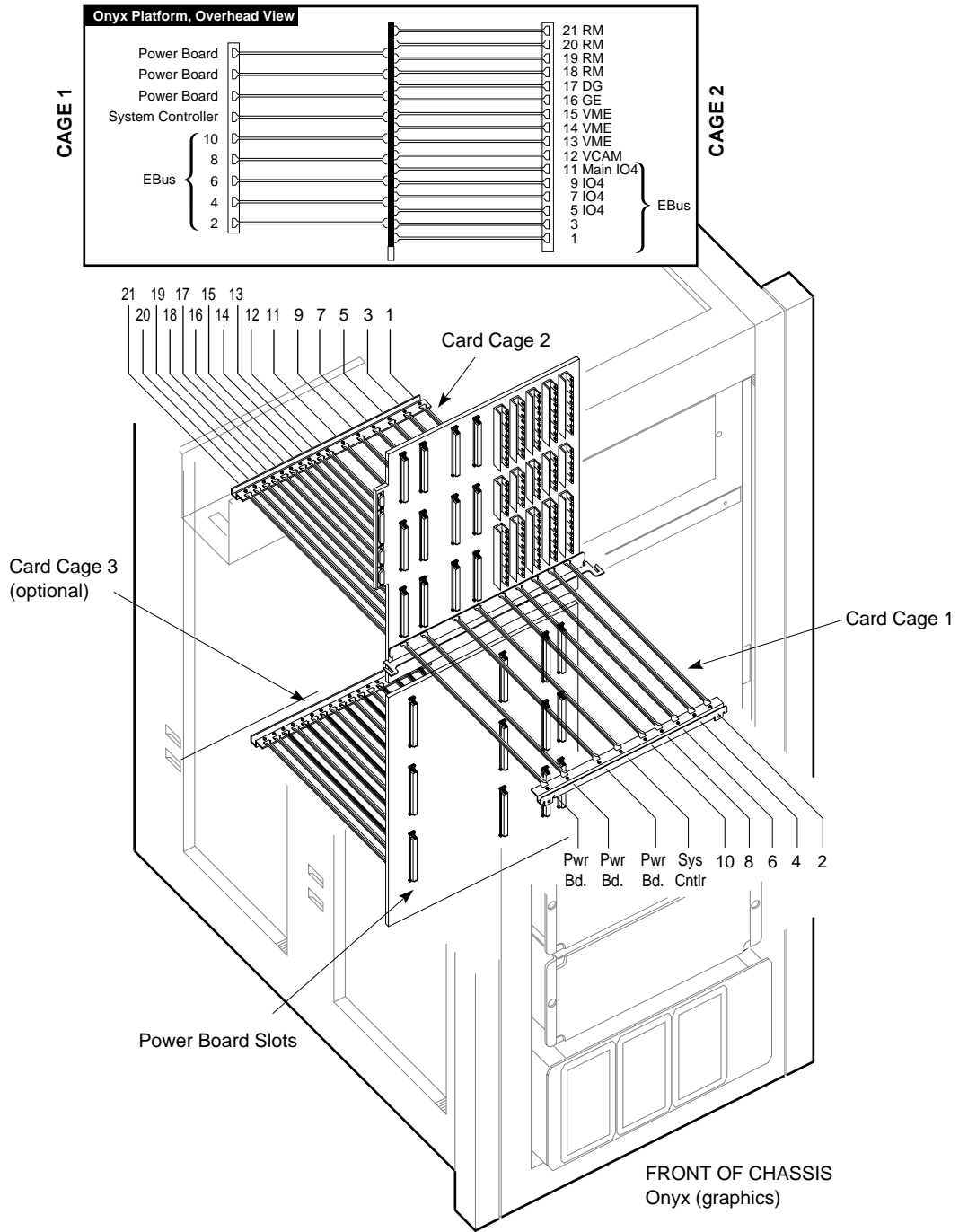


Figure 2-19 Onyx Rackmount Slots for IO4 Boards

2.4.2 Selecting a Mezzanine Slot

The IRIS ATM board requires one short mezzanine slot on an IO4 board. This section describes how to select an appropriate slot for each IRIS ATM board.

Caution: This equipment is extremely sensitive and susceptible to damage by electrostatic discharge (ESD), a spark caused by the buildup of electrical static 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*.

Locate the IO4 boards that are currently installed. Slot 11 always has an IO4 board. (See Figure 2-19 for an illustration of the slots.) In addition, slots 9, 7, and/or 5, may contain IO4 boards. An Onyx Rackmount may have one to four IO4 boards installed. Each IO4 board has two mezzanine slots, as illustrated in Figure 2-20. The ATM board may be installed on any of the available mezzanine slots, as detailed below:

- If the system has only one IO4 board, this is the location for the IRIS ATM board. The ATM board may be installed in either the upper or lower position on the IO4 board, as illustrated in Figure 2-20.

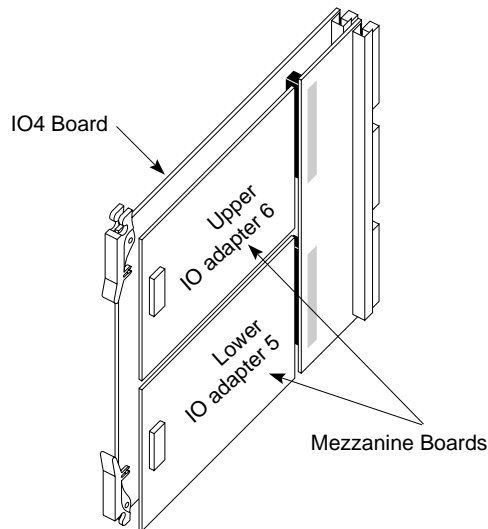


Figure 2-20 Upper and Lower Mezzanine Slots on IO4 Boards

- If the system has more than one IO4 board, you may select any unoccupied mezzanine slot.
- If there are no unoccupied mezzanine slots, you must install another IO4 board. Contact the sales representative to order one. The installation cannot be continued until a mezzanine slot is available.

Note: The maximum number of IO4 boards for an Onyx Rackmount system is four. If four IO4 boards are already installed, and if all the mezzanine slots are occupied, IRIS ATM cannot be installed onto this system.

2.4.3 Installing the Board into an Onyx Rackmount

Follow the steps below to install the IRIS ATM board.

1. Remove the IO4 board that you have selected from the Onyx chassis.
2. Lay 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 2-21.
3. Locate the selected mezzanine slot (upper or lower) and remove the four screws from the standoffs, as illustrated in Figure 2-21. If the screws are missing, this is not a problem.

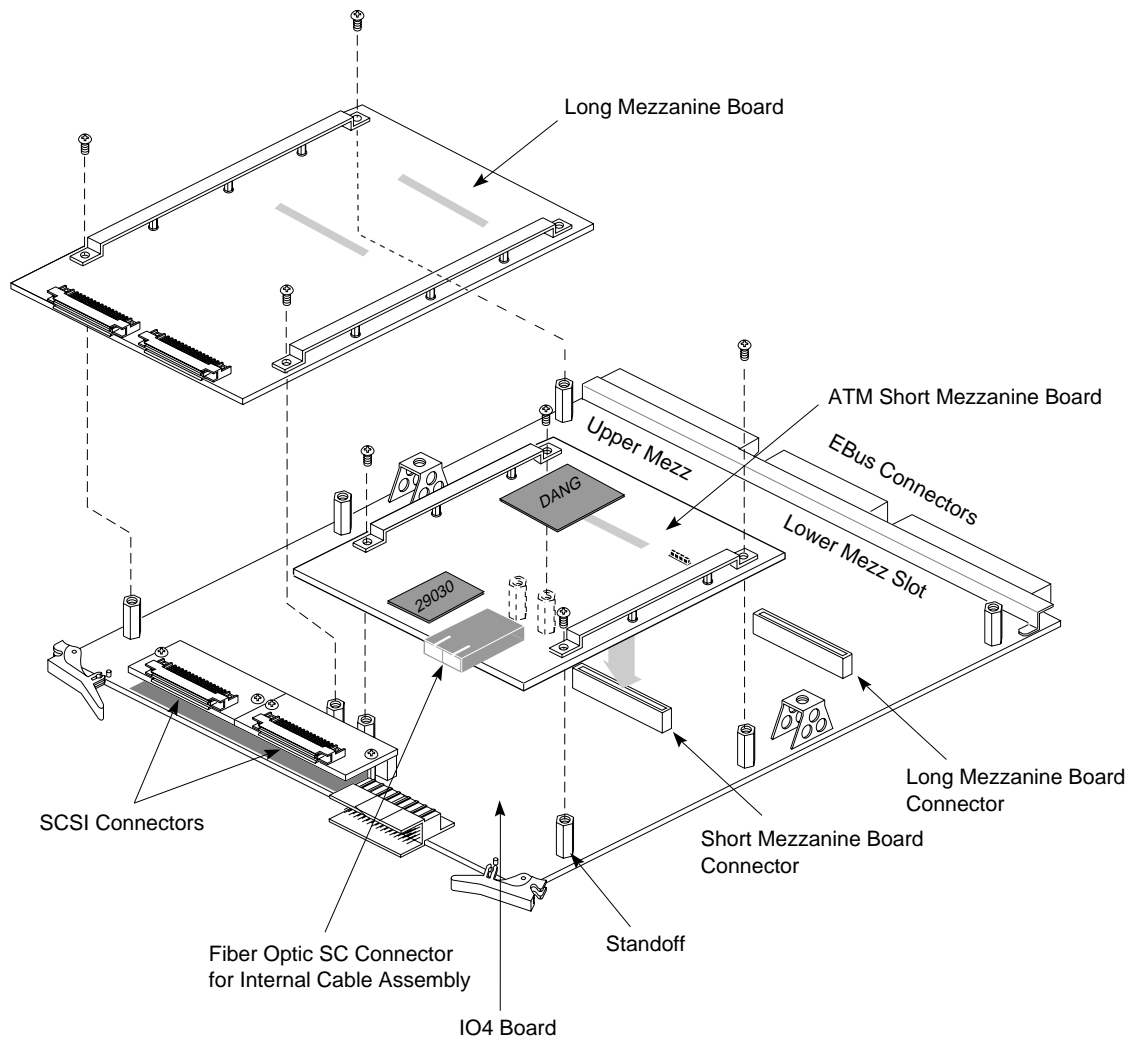


Figure 2-21 IO4 Board with an ATM Mezzanine Board

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 2-21 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, as illustrated in Figure 2-22. 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 on the main IO4 board located in slot 11 is labelled F-11-6.
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 2-23).

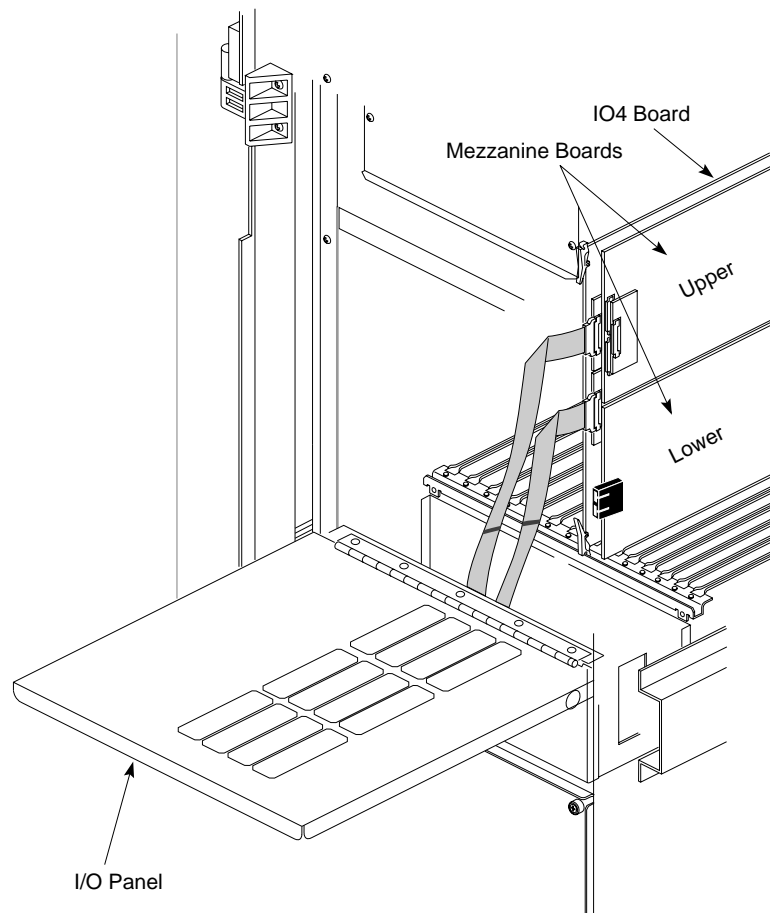


Figure 2-22 Installed IO4 Board

2.4.3.1 Connect Internal ATM Cables

Follow the steps below to attach the internal ATM cables to the ATM board and the panel plate to the card cage'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 2-23.

Note: For installations with multiple IRIS ATM boards, replace the single-port panel plate on the cable assembly with the 2-port panel plate that is shipped with the product.

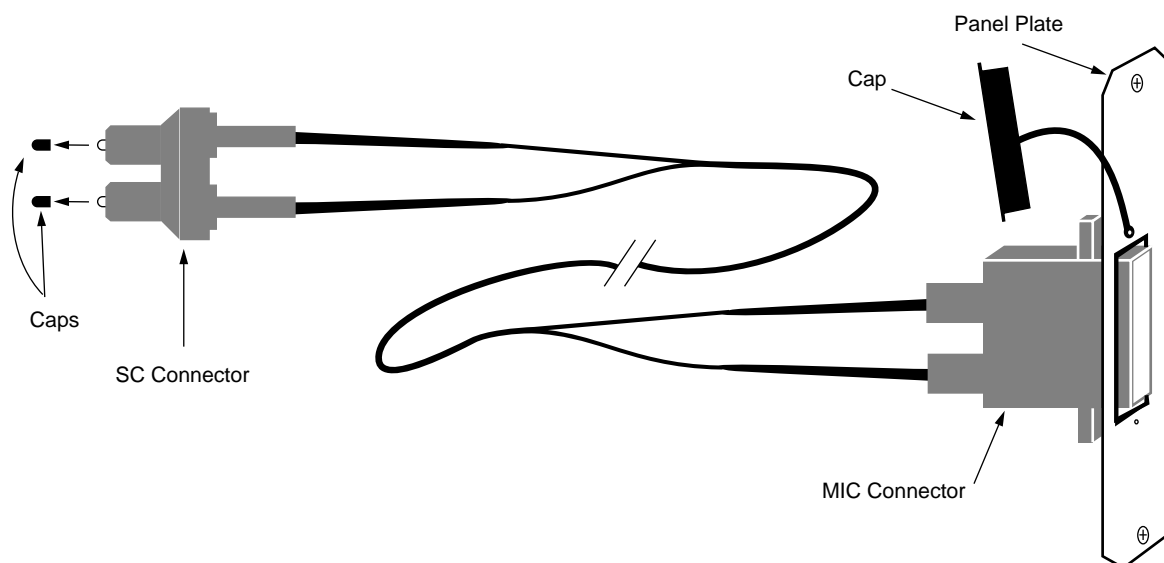


Figure 2-23 IRIS ATM Internal Cable Assembly

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.

2.4.3.2 Connect Site's Fiber Optic Cables

The ATM connector provided at the ATM IO panel plate is a female, S-type MIC connector. The site's ATM cable for this connection must be multi-mode fiber optic cable terminated with a male MIC connector (S-, A-, and B-types are all compatible).

Remove the protective cap from the port on the ATM panel plate and attach the site's fiber optic cable to the system's ATM panel plate, as illustrated in Figure 2-24. The connection should snap (or click) into place.

Note: MIC connectors are “keyed” so that they snap into place only when appropriate types are being connected and correct positioning is being used. If the connection does not snap into place, try a different position. If that does not solve the problem verify that the MIC has been designed to mate with an S-type receptacle.

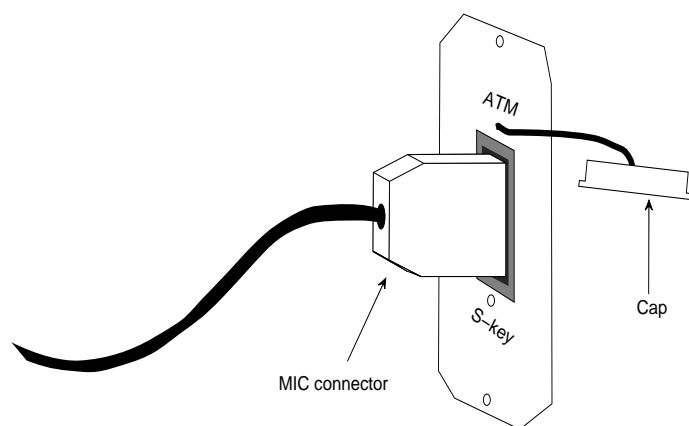


Figure 2-24 Connecting Site's Fiber Optic Cable to I/O Panel Plate

2.4.4 Completing the Installation

To finish the installation, do the following:

1. Flip the circuit breaker on the back of the chassis to **ON**, then turn the key switch on the front to **ON**.
2. When the console prompts you with the question `Automatically reconfigure the operating system?`, answer **yes** or **y** in order to build a new kernel.

Note: If this prompt does not appear, you probably have not installed the IRIS ATM software. Instead of proceeding with the steps below, follow the instructions in the *IRIS ATM Release Notes* to install and configure the software.

3. Logon and reboot (this is the second time this system is being started) to begin using the newly built operating system. The command lines below can be used to accomplish this step:

```
% su
Password: thepassword
# reboot
```

4. Logon and invoke *hinv* to verify that the IRIS ATM hardware is listed:

```
% /sbin/hinv
. . .
ATM OC-3c unit#: slot#, adapter#
```

where *unit#* reflects the current setting of the board's Unit Jumper Set or the unit number assigned by the driver (depending on the assignment mode configured in the */var/sysgen/master.d/atm* file), *slot#* indicates the slot in which the IO4 board resides, and *adapter#* (IO4 adapter) indicates the mezzanine position where the ATM board resides.

Note: If the board is not listed, either (1) the system is running the wrong version of IRIX, (2) the newly installed board's jumpers have the same unit number as one of the ATM boards that are listed, or (3) the board is improperly installed. If no ATM board is listed, use the *versions eoe1* command to verify the version of IRIX. If the version is correct or if other IRIS ATM boards are listed, reinstall the product (the board and all cables) making sure to set the jumpers correctly and to seat all the hardware firmly.

5. Follow the instructions in the *IRIS ATM Configuration Guide* to verify that upper layer applications can send and receive over the ATM subsystem.

IRIS ATM LEDs and Troubleshooting

This chapter describes how the IRIS ATM light-emitting diodes (LEDs) behave, and provides suggestions for troubleshooting.

3.1 Summary of LEDs on IRIS ATM Board

The IRIS ATM board has 7 LEDs. These are illustrated in Figure 3-1 and their behavior is described in Table 3-1.

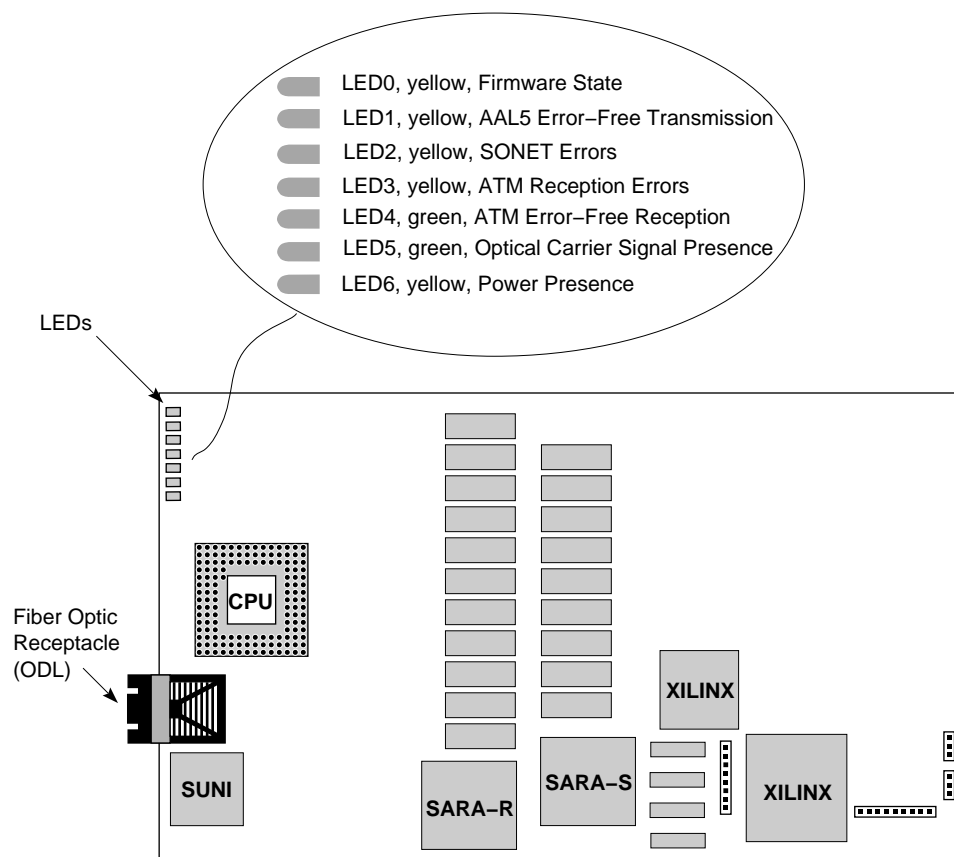


Figure 3-1 IRIS ATM Board's LEDs and Fiber Optic Receptacle (ODL)

Table 3-1 IRIS ATM LED Behavior

LED	Color	Controlled By	Description
LED 0 (topmost)	yellow	firmware	Firmware State: Blinks (changes state) 10 times per second when the firmware and microprocessor are running. When the LED is not blinking (that is, it is stuck on or off), or if it blinks erratically, there is a problem with the firmware or the on-board CPU.
LED 1	yellow	firmware	AAL5 Packet Transmission: Blinks (changes state) once for every 256 successfully transmitted AAL5 packets. When this LED is not blinking (that is, it is stuck either on or off), the board is not transmitting AAL5 packets.
LED 2	yellow	firmware	SONET Errors: Blinks (changes state) whenever SONET errors are noticed. The firmware samples the SONET error counters 10 times per second, and the LED blinks whenever errors have accrued. As long as the LED is steadily on or off, no errors are accruing.
LED 3	yellow	firmware	ATM Packet Reception with Errors: Blinks (changes state) once for every 256 ATM packets that are received with errors. As long as this LED is steadily on or off (not blinking), reception is normal.
LED 4	green	firmware	ATM Error-free Packet Reception: Blinks once for every 256 error-free ATM packets that are received. When this LED is not blinking (that is, it is stuck either on or off), no error-free reception is occurring.
LED 5	green	hardware	Optic Signal: Steadily on when the fiber optic receiver (ODL) on the board sees the carrier signal from a remote transmitter. When this LED is off, the board is not seeing any signal.
LED 6	yellow	hardware	Power Indicator: Steadily on when there is power to the board. When this LED is off, the board does not have power.

See Section 3.2, “Indications of Normal Operation” and Section 3.3, “Troubleshooting with LEDs” for in-context descriptions of these LEDs.

3.2 Indications of Normal Operation

The behaviors described in this section indicate normal operation of the IRIS ATM board. The LEDs use the following signalling sequences to communicate their status information:

- ☀ ○ ☀ Steadily blinking, from on to off to on to off.
- Steady off. Not blinking.
- ☀ Steady on. Not blinking.
- ☀ → ○ Single change in state or erratic blinks.

- ☀ ○ ☀ LED 0, yellow

The board's firmware and CPU are functioning properly.

- ☀ ○ ☀ LED 1, yellow
- or
- or ☀ LED 1, yellow

When blinking, the board is successfully transmitting packets. It is normal for this LED to be off when no local application is sending data through this ATM subsystem. If an application is sending data to this subsystem and this LED is not blinking, there is a problem, in which case see Section 3.3, "Troubleshooting with LEDs."

- or ☀ LEDs 2 and 3, yellow

No errors are being detected.

- ☀ ○ ☀ LED 4, yellow
- or
- or ☀ LED 4, yellow

When blinking, the board is successfully receiving ATM packets. It is normal for this LED to be off whenever there is no incoming data currently on the fiber optic connection. If a remote system is transmitting to the host, and this LED does not blink, there is a problem, in which case see Section 3.3, "Troubleshooting with LEDs."

- ☀ LED 5, green

The carrier signal from the remote system is being seen by the board's fiber optic receiver (ODL).

- ☀ LED 6, yellow

The board has power.

3.3 Troubleshooting with LEDs

This section describes procedures for troubleshooting the IRIS ATM board.

3.3.1 Troubleshooting Equipment

A fiber optic loopback cable is required for some of the procedures. The loopback cable consists of the items listed below and is illustrated in Figure 3-2:

- two fiber optic lines of any length
- at one end, the two lines are terminated with an SC connector
- at the other end, the lines are terminated with two ST[®] connectors (female)
- a male-male (ST-to-ST) adapter to loop the optic signal from one line to the other

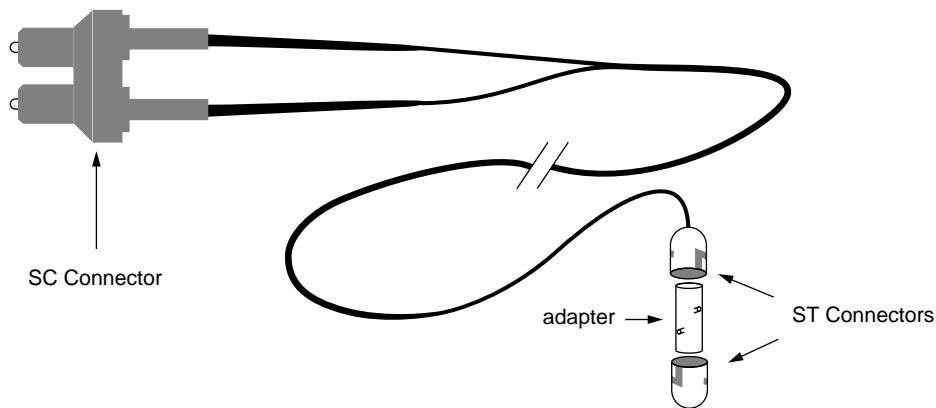


Figure 3-2 Loopback Cable for IRIS ATM Board

Note: Instead of the loopback cable described above, you can use one that attaches to the IO panel with a MIC connector. A loopback cable that attaches to the IO panel plate can be either a low-loss connector (commonly called FDDI station tester) or an assembly like the one in Figure 3-2 except that a male MIC is used instead of the SC connector.

3.3.2 Troubleshooting Procedures

If you experience problems with the IRIS ATM board, check the LEDs, in the order described below, to identify the reason and resolve the problem. Each LED section assumes that the LEDs described before are functioning normally. The LEDs use the following signalling sequences to communicate their status information:

- ☀ ○ ☀ Steadily blinking, from on to off to on to off.
- Steady off. Not blinking.
- ☀ Steady on. Not blinking.
- ☀ → ○ Single change in state or erratic blinks.

○ LED 6, yellow

The IRIS ATM board is not powered on. This can be caused by either no power to the IRIS ATM board or a malfunction of the board.

Do the following steps to remedy this problem. After each step, check to see if the problem has been resolved before performing the next step.

1. Verify that the system has power and is turned on.
2. Verify that the IO4 board to which the IRIS ATM board is attached, has power. If the IO4 board has power, follow the instructions in Chapter 2 to reinstall the IRIS ATM board, taking extra precautions to seat it firmly into the IO4 board. If the IO4 board does not have power, turn off the system power, verify that the power module for the IO4 board's slot is installed properly, then reinstall the IO4 board, making sure to seat it firmly into its slot.

If the IO4 board has power, and you have already reinstalled the IRIS ATM board without solving the problem, the IRIS ATM board might be dysfunctional. Contact the Silicon Graphics Technical Assistance Center.


○ LED 5, green

The optic carrier signal is not detected on the incoming fiber. This can be caused by any of the following: (1) a faulty cable or connection between the IRIS ATM board's ODL and the remote transmitter, (2) a failure in the remote system, or (3) a dysfunctional IRIS ATM board.

Do the following steps to remedy this problem. After each step, check to see if the problem has been resolved before performing the next step.

1. Verify the IRIS ATM board by attaching a loopback cable directly to the ODL on the board, while the board is powered on. If LED 5 turns on, continue with the steps below to locate where the signal is being obstructed. If LED 5 does not turn on, the IRIS ATM board may be dysfunctional. Contact the Silicon Graphics Technical Assistance Center.
2. Verify that the remote ATM hardware is turned on and is functional. If possible, either do a loopback test or connect the remote system to a different system that is known to be functional in order to verify the presence of its carrier signal. When this verification is completed, reconnect the remote system to the IRIS ATM hardware.
3. Verify that all the connectors between the remote ATM hardware and the IRIS ATM board's fiber optic receptacle (ODL) are connected properly. Each connector should click or snap into position. Disconnect and reconnect each connection, making sure that keyed components are properly matched. Be sure to check the IRIS ATM's internal cable assembly connections as well as the cable running between the external IO panel plate and the remote system.
4. One by one, exchange each cable segment between the two ATM systems with cables that are known to be functional.

If the problem persists, the IRIS ATM board might be dysfunctional. Contact the Silicon Graphics Technical Assistance Center.

○ or  LED 0, yellow (not blinking)

The firmware or the CPU on the IRIS ATM board is not functioning. Either the driver has not initialized the board or the board is dysfunctional.

Do the following steps to remedy this problem. After each step, check to see if the problem has been resolved before performing the next step.

1. Using the command line shown below, verify that the operating system includes the IRIS ATM driver. If there are entries for `atm` (for example, `ifatm_mtusize`), the operating system has been built to include IRIS ATM. The board may be dysfunctional. Contact Silicon Graphics Technical Assistance Center. If there are no entries for the IRIS ATM driver, continue to the next step.

```
% grep atm /usr/var/sysgen/master.c
```


2. Use the `versions` command to verify that the IRIS ATM software has been installed. If the IRIS ATM software is not installed, follow the instructions in the *IRIS ATM Release Notes* to install it. If the software is installed, continue to the next step.

```
% versions atm
```

3. Use the `autoconfig` command to build a new operating system (IRIX kernel) that includes the IRIS ATM driver. Then, reboot the system to start using the new operating system.

```
# /etc/autoconfig
...
# Automatically reconfigure the operating system (yes/no)? yes
...
# /etc/reboot
```

If the problem persists, the IRIS ATM board may be dysfunctional. Contact the Silicon Graphics Technical Assistance Center.

○ or  LED 1, yellow (not blinking)

The board is not transmitting. This may be caused by a faulty configuration of the protocol stack, a programming problem in the upper-layer application, or a dysfunctional IRIS ATM board.

Do the following steps to remedy this problem. After each step, check to see if the problem has been resolved before performing the next step.

1. Do this test with either of these configurations:
 - Attached the station to an adjacent ATM switch, and configure the switch to route the incoming PVC from the port (using VPI=0 and VCI=201) back to itself.
 - Attach a loopback cable to the IRIS ATM board, and use `atmconfig -iunit# -o 0` to configure the board to recover the clock from its own transmit clock signal.

2. Use *hinv* to obtain the correct unit number for the problematic ATM subsystem:

```
% /sbin/hinv
...
ATM OC-3c unit #: slot#, adapter#, ...
ATM OC-3c unit #: slot#, adapter#, ...
```

3. Invoke *atmtest* (as superuser) to transmit over the problematic ATM subsystem:

```
# /usr/etc/atmtest -i unit# -Xrw
```

where *unit#* is the digit for the board's unit number.

For example:

```
# /usr/etc/atmtest -i 1 -Xrw
```

If the LED does not start blinking, continue to the next step. If the LED starts blinking, the IRIS ATM board and the IRIS ATM API for PVCs is functional. The problem is a software or configuration problem. Transmissions from other upper-layer applications are not successfully obtaining the services of the subsystem. Verify the protocol stack configuration for IP-based applications or verify the programmatic interface calls within the code for applications using the character device interface.

4. Reboot the system to synchronize the system and the board:

```
# /etc/reboot
```


5. Invoke *atmtest* again. If the problem persists, the board may be dysfunctional. Contact the Silicon Graphics Technical Assistance Center.

 → ○ LED 2, yellow

The board is detecting SONET level errors on incoming data. This indicates corruption or absence of the optical signal, and may be caused by any of the following:

- disconnected or loose connection at the ATM I/O panel plate
- disconnected or loose connection between the internal cable assembly and the IRIS ATM board
- disconnected or loose connection at the transmitting node (for example, the switch)
- faulty fiber optic cable or internal cable assembly
- a dysfunctional ODL on the IRIS ATM board

To remedy this problem, check each of the above connections and cables. Replace any suspect cables with known working ones. If the problem persists, the board may be dysfunctional. Contact the Silicon Graphics Technical Assistance Center.

○ or  LED 4, green (not blinking)

The board is not receiving error-free ATM packets. This may be caused by a problem in the remote transmitting system or a dysfunctional IRIS ATM board.

Do the following steps to remedy this problem:

1. Do this test with either of these configurations:
 - Attached the station to an adjacent ATM switch, and configure the switch to route the incoming PVC from the port (with VPI=0 and VCI=201) back to itself.
 - Attach a loopback cable to the IRIS ATM board, and use `atmconfig -i unit# -o 0` to configure the board to recover the clock from its own transmit clock signal.
2. Use `hinv` to obtain the correct unit number for the problematic ATM subsystem:

```
% /sbin/hinv
...
ATM OC-3c unit #: slot#, adapter#
ATM OC-3c unit #: slot#, adapter#
```

3. Invoke `atmttest` (as superuser) to transmit and receive over the problematic ATM subsystem:

```
# /usr/etc/atmttest -i unit# -Xrw
```

where `unit#` is the digit indicating the unit number

For example, the command line below exercises board unit 1:

```
# /usr/etc/atmttest -i 1 -Xrw
atmttest: /dev/atml:
vpi/vci = 0 201 xmit-rate: 137.14 Mbps Best Eff
- 1000/10000 frames transmitted, total 0 lost
- 2000/10000 frames transmitted, total 0 lost
- 3000/10000 frames transmitted, total 0 lost
- 4000/10000 frames transmitted, total 0 lost
- 5000/10000 frames transmitted, total 0 lost
- 6000/10000 frames transmitted, total 0 lost
- 7000/10000 frames transmitted, total 0 lost
- 8000/10000 frames transmitted, total 0 lost
- 9000/10000 frames transmitted, total 0 lost
---- 10000 frames transmitted, 0 lost ---
```

If the LED blinks, the IRIS ATM board is functional; the problem is probably with the remote ATM hardware. If the LED does not blink, the IRIS ATM board may be dysfunctional; contact the Silicon Graphics Technical Assistance Center.

 → ○ LED 3, yellow

The board is detecting ATM level errors on its incoming data. This indicates a problem with the transmitting station or switch, and may be caused by any of the following:

- the switch is incorrectly configured
- data with the wrong address (VPI/VCI) is being transmitted to this station
- the switch is creating malformed ATM packets

To remedy this problem, check the configuration and performance of the switch to which this system is connected.

Appendix A

Summary of Installation

This appendix contains a summary of the IRIS ATM installation for the different platforms.

A.1 Hardware Configuration Summary

Table A-1 IRIS ATM Hardware Configurations for Various Platforms

Platform	Maximum IRIS ATM Boards	Maximum IO4 Boards
Challenge and POWER Challenge L Deskside	6	3
Challenge and POWER Challenge XL Rackmount	12	6
Onyx and POWER Onyx Deskside	2	1
Onyx and POWER Onyx Rackmount	8	4

A.2 IRIS ATM Board Description

Table A-2 IRIS ATM Board Power Requirements

Typical	Typical
40 watts of power	8 amps at 5 volts

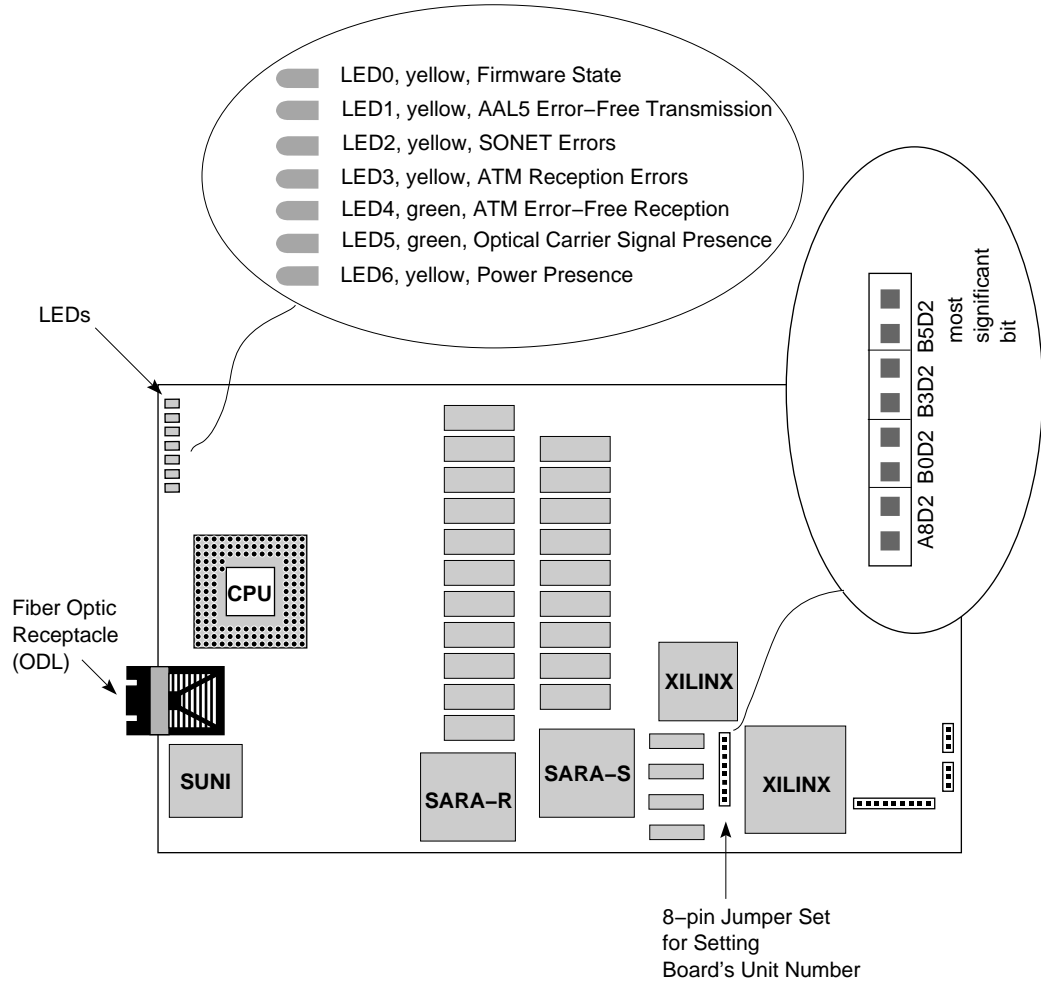


Figure A-1 IRIS ATM Board

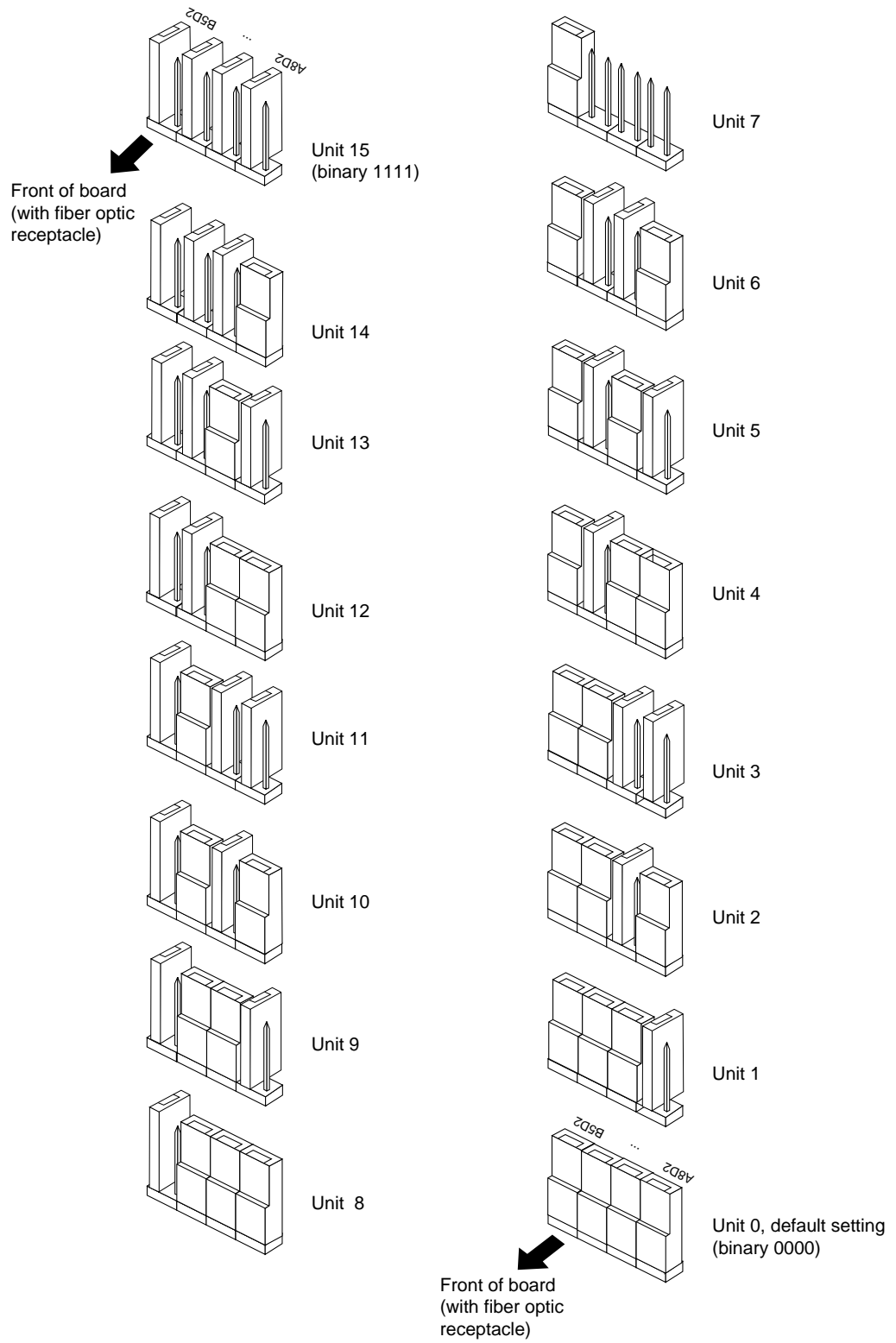


Figure A-2 Unit Jumper Set

A.3 Slot Requirements

Table A-3 Slots for IRIS ATM Installation

Platform	Slots That Can Be Used
CHALLENGE L Deskside	One upper or lower mezzanine slot on an IO4 board in slot 5, 4, or 3
CHALLENGE XL Rackmount	One upper or lower mezzanine slot on an IO4 board in slot 15, 13, 11, or 9
Onyx Deskside	One upper or lower mezzanine slot on IO4 board in slot 3
Onyx Rackmount	One upper or lower mezzanine slot on an IO4 board in slot 11, 9, 7, or 5

A.4 Illustrations of Slot Locations

[figs/chal.dsk.slots.ai_100%](#)

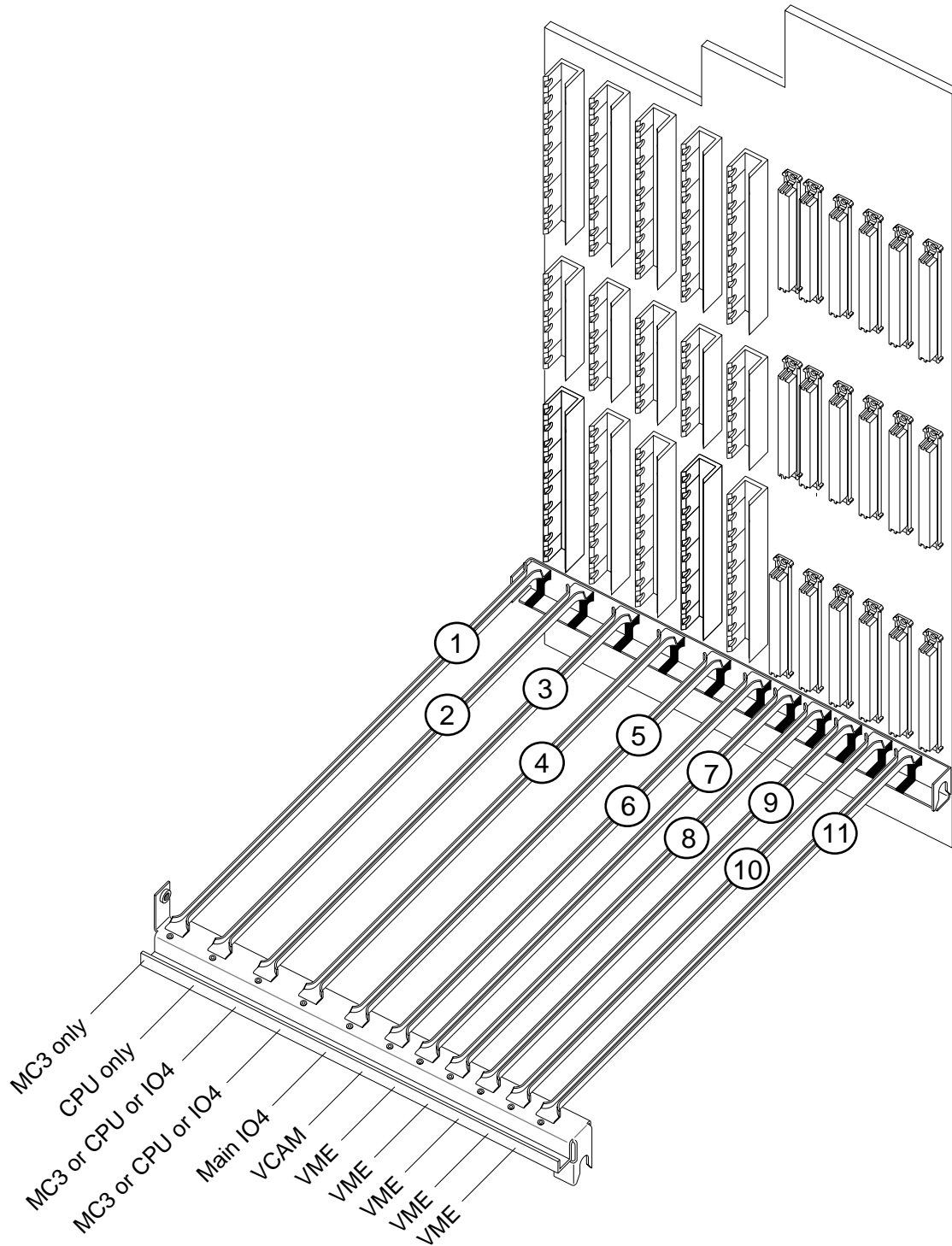


Figure A-3 CHALLENGE L Deskside Card Cage Slots

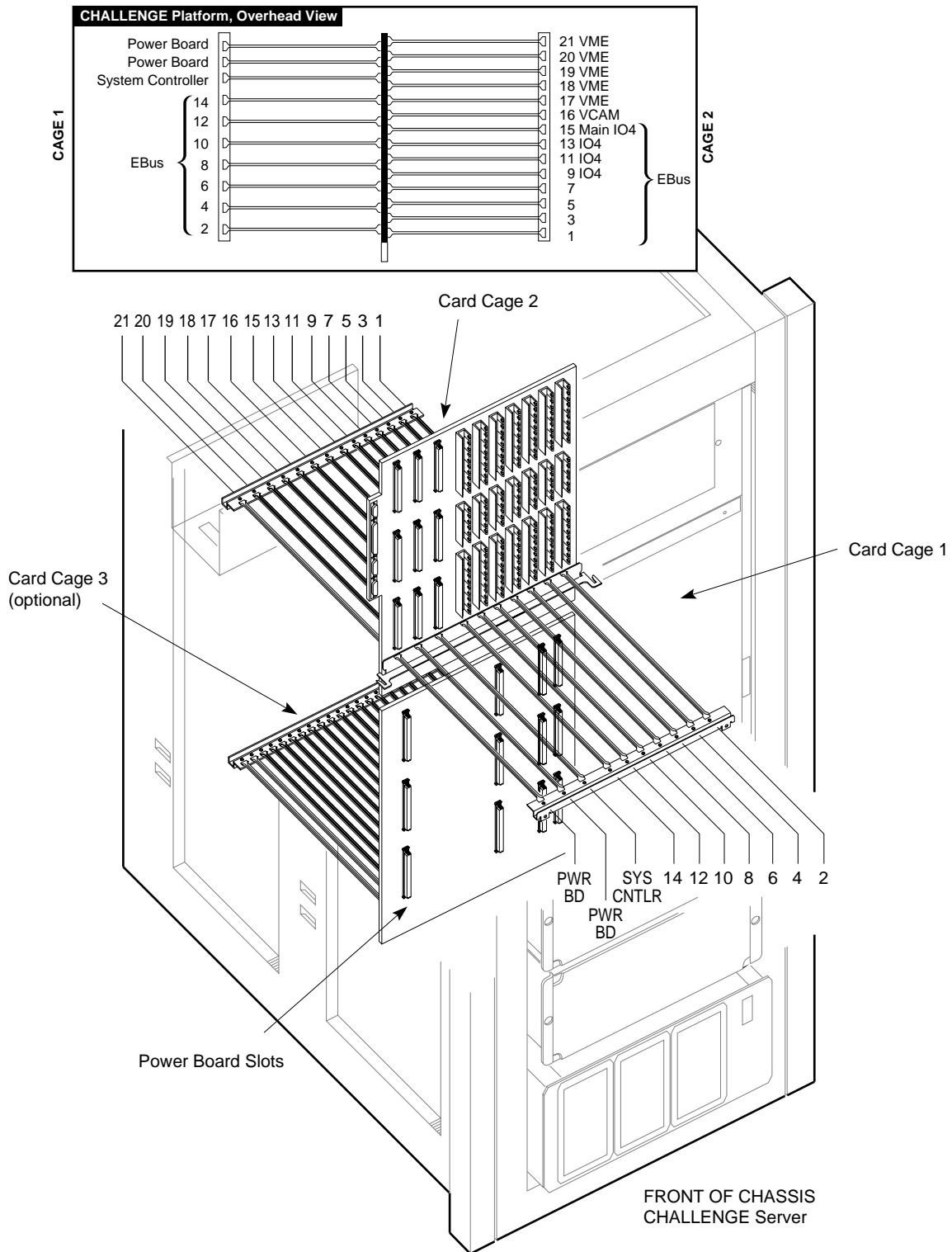


Figure A-4 CHALLENGE XL Rackmount Card Cage Slots

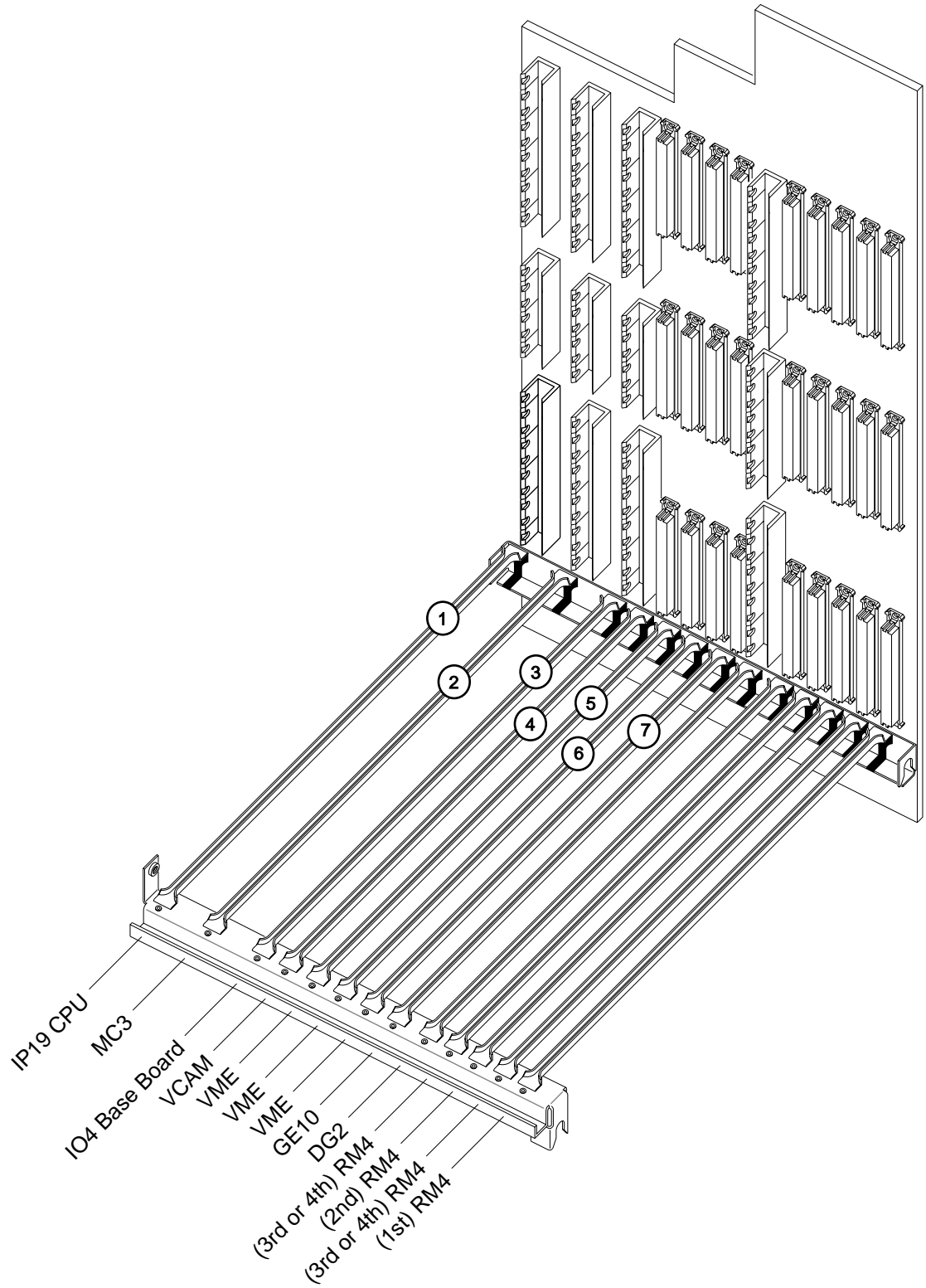


Figure A-5 Onyx Deskside Card Cage Slots

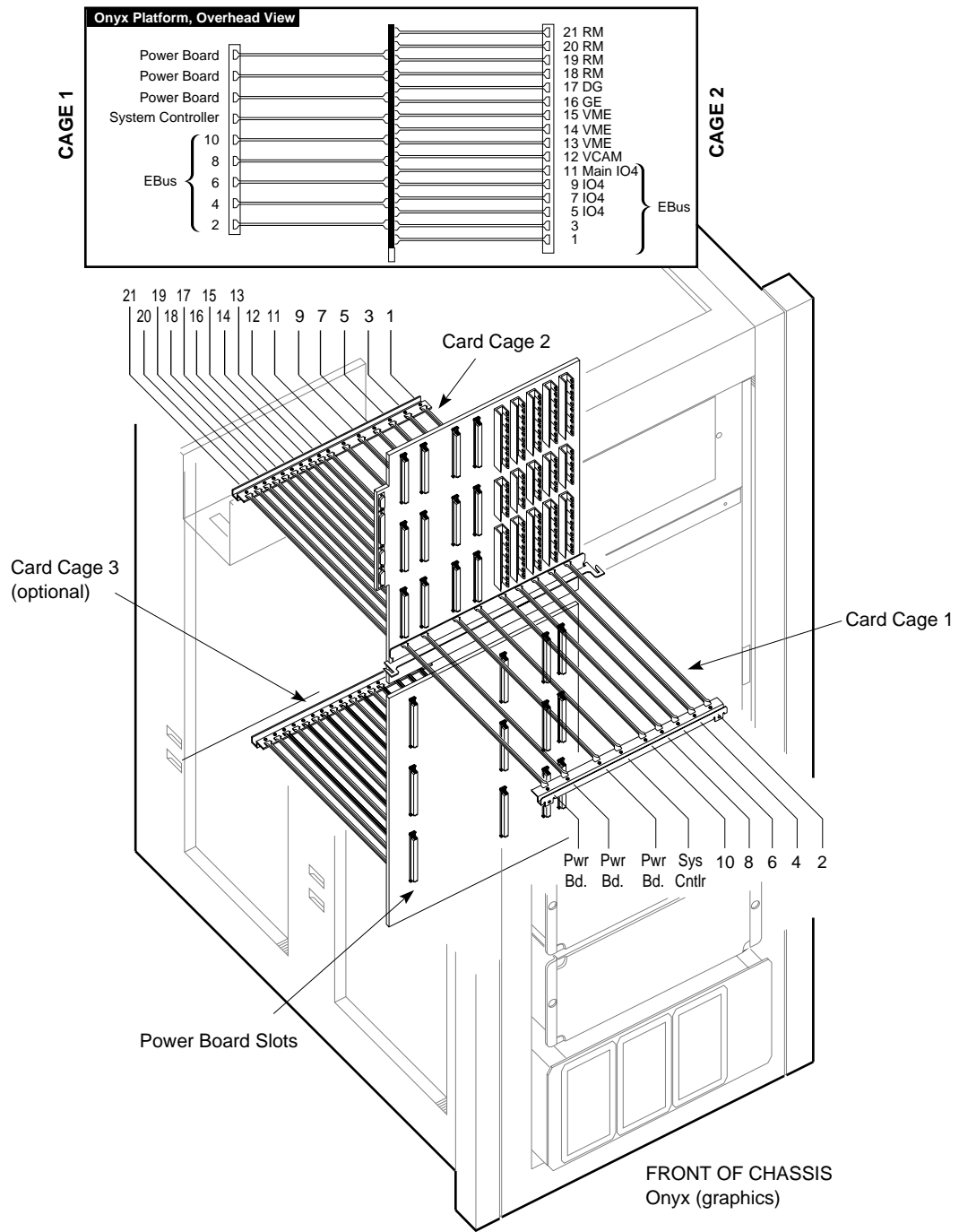


Figure A-6 Onyx Rackmount Card Cages Slots

A.5 Error Messages

This section lists some of the error messages for which SSE troubleshooting procedures are recommended. The online *IRIS ATM Configuration Guide* contains a complete listing of error messages.

```
atm#: no board signature!
```

This message indicates a problem with the firmware currently running on the IRIS ATM board. Use the commands below to download new firmware:

```
%su
Password: thepassword
#/usr/etc/ifconfig atm# down
#/usr/etc/atmconfig -i # download
#/etc/reboot
```

where `atm#` identifies each logical IP network interface that uses the problematic board and `-i #` identifies the problematic board unit (for example, 0 or 1).

If this does not resolve the problem, contact the Silicon Graphics Technical Assistance Center.

```
This interface has no MAC address.
```

This message indicates that the board does not have a media access control (MAC) address burned into the PROM on the board. IRIS ATM cannot function without this address. Contact the Silicon Graphics Technical Assistance Center.

