CHALLENGE™ Vault L
Installation Instructions

Document Number 108-0124-001

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CHALLENGE Vault L Installation Instructions
Document Number 108-0124-001

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About This Guide

This manual, written for Silicon Graphics® system support engineers (SSEs) and third-party field support groups responsible for product installation and testing, provides instructions for installing and operating the CHALLENGE™ Vault L storage box (model no. CMN A014)).

The Vault L houses up to eight SCSI devices for use with the CHALLENGE or Onyx™ L / XL (deskside / rackmount) systems, and also provides front-loading drive capability.

Note: To support this upgrade, the system must have IRIX™ 5.1 or later**.**

The Vault L storage box is essentially a SCSIBox 2 with skins. Most of the installation and operation guidelines are the same for both products.

Structure of This Document

This manual is divided into five chapters and one appendix:

Chapter 1	“Chassis Tour” describes the controls, connectors, indicators, and available product configurations.
Chapter 2	“Components” provides parts lists for the upgrades.
Chapter 3	“Installation” discusses how to install the Vault L and drives.
Chapter 4	“Verifying Installation” describes how to test the installation.
Appendix A	“Specifications” lists pertinent product specifications.

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 have been 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 (spark) caused by the buildup of electrostatic potential on clothing and other materials.

You must use proper ESD preventive measures and observe these precautions:

- Connect a ground strap to your wrist when connecting or disconnecting peripherals.
- Be sure that you and all of the electrical equipment that you handle during this installation are at ground potential to avoid damage from ESD.
- Keep the boards or drives in the antistatic bags provided. Remove a board or drive from its antistatic bag only when you are properly grounded to the chassis ground with a ground strap.
- There are 14 fuses installed on the backplane. For continued protection against risk of fire, replace only with the same type and rating of fuse: Cooper Industries, Bussman Div., P / N MCR-5, rated at 125V, 5A.

Conventions

In command syntax descriptions and examples, square brackets ([ ]) surrounding an argument indicate an optional argument. Variable parameters are in italics. Replace these variables with the appropriate string or value.

In text descriptions, IRIX filenames are in italics. The names of IRIS® keyboard keys are printed in boldface typewriter font and enclosed in angle brackets, such as **<Enter>** or **<Esc>**.

Messages and prompts that appear onscreen are shown in typewriter font. Entries that are to be typed exactly as shown are in boldface typewriter font.

Chapter 1

Chassis Tour

This chapter discusses the configurations, controls and connectors visible from the front, rear, and inside of the Vault L storage box.

1.1 Configurations

The Vault L (Figure 1-1) is available in two configurations:

- a differential storage box
- a mixed-channel storage box that supports both single-ended and differential drives

Note: You can distinguish between a differential and a mixed-channel Vault L storage box by looking at the back of the chassis. The mixed-channel Vault l has an SE TERM: A (singled-ended) label designator, and the differential Vault L does not. See also Figure 1-3 and Figure 1-4.

The Vault L storage box supports 8-bit and 16-bit differential SCSI drives and 8-bit single-ended SCSI drives, but does not currently support 16-bit, single-ended drives.

1.2 Front View

Figure 1-1 shows the front of the Vault L storage box.

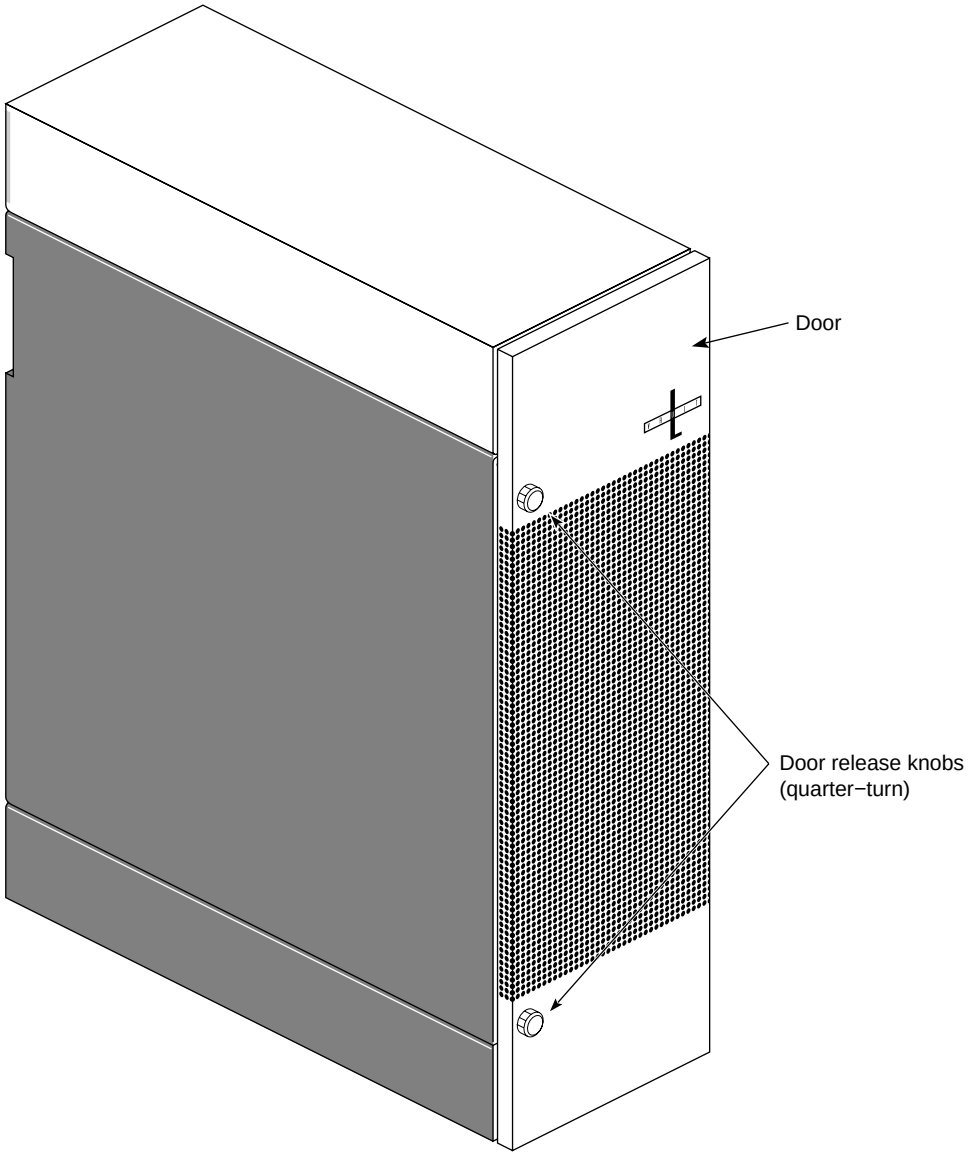


Figure 1-1 Vault L Storage Box (Front View)

The following major components are visible on the front of the Vault L storage box:

Drive door — opens and closes using two quarter-turn. Open the drive door by pushing the knob in and turning it counter-clockwise to open. Close the door by pushing the knob in and turning clockwise.

Caution: The drive door must be in place during operation to comply with FCC regulations and to ensure proper air flow through the drive box.

On / Off switch controls power to all drives. This green switch illuminates when turned on.

Drive shelves house the SCSI drives and drive sled. The shelves are removable to accommodate full-height drives. See Section 3.2, “Removing a Drive Shelf to Install a Full-Height Drive,” in Chapter 3, “Installation,” later in this guide.

Note: The full-height drives require two half-height slots.

Figure 1-2 shows the front of the Vault L storage box with the drive door open.

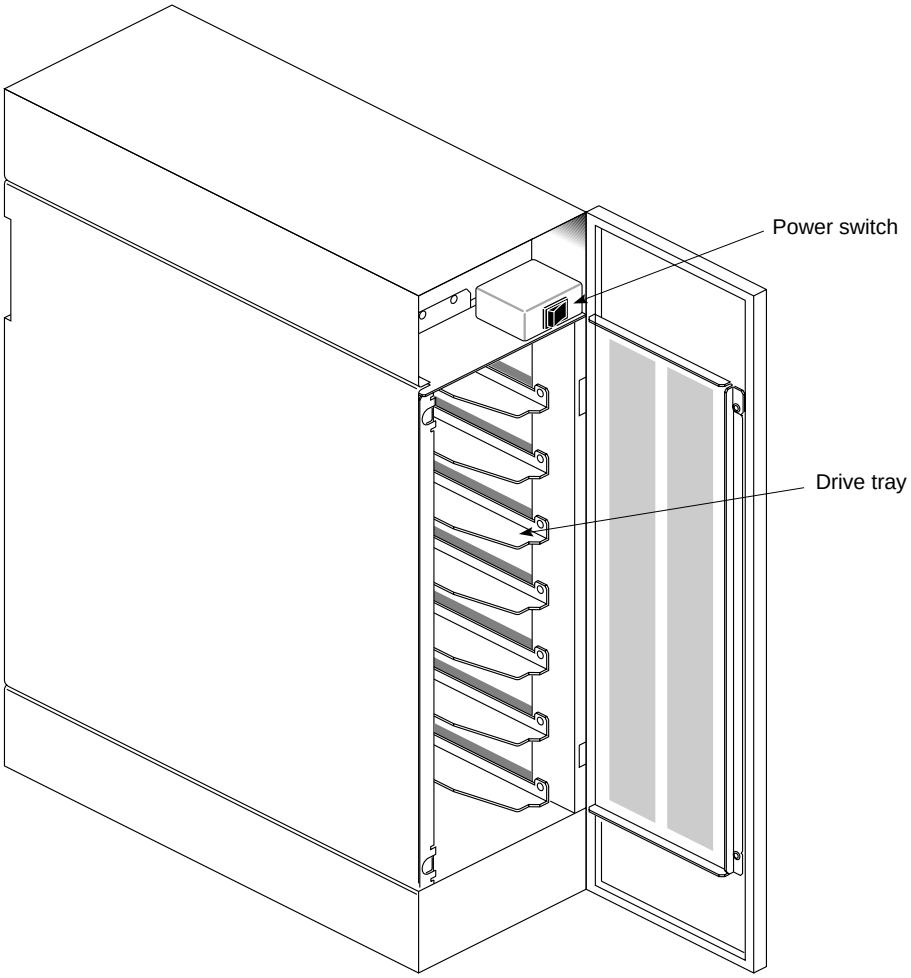


Figure 1-2 Vault L Storage Box, Front View (Drive Door Open)

1.3 Rear View

Figure 1-3 shows the back of the differential-only Vault L storage box. Figure 1-4 shows the back of the mixed-channel Vault L.

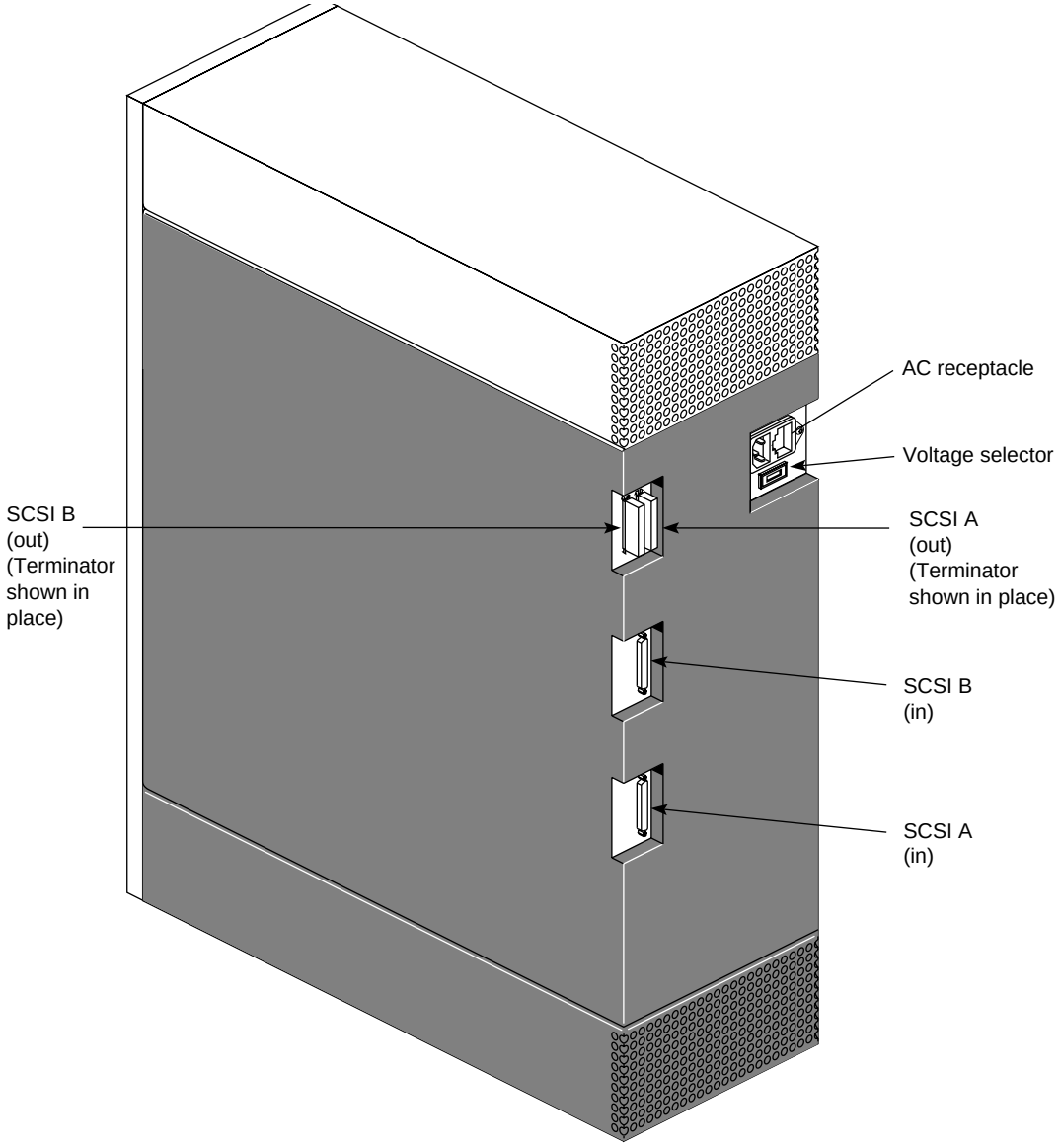


Figure 1-3 Vault L Storage Box (Rear View)

Table 1-1 describes the major components on the back of the differential Vault L storage box. Table 1-2 describes the major components on the back of the mixed-channel Vault L storage box.

Rear Panel Connector/Switch	Function
SCSI In	provides a 68-pin SCSI-2 differential connector
SCSI Out	provides connection for SCSI termination or a daisy-chain connection to another SCSI device
Voltage Selector	selects between 115 and 230 VAC

Table 1-1 Differential Vault L Rear Panel Connectors and Switches

Caution: Ensure that the voltage setting matches the power input source voltage. Damage to the Vault L storage box can result if the setting is incorrect.

Rear Panel Connector/Switch	Function
SCSI In	provides a 68-pin SCSI-2 differential connector
SE TERM: A	provides single-ended SCSI termination
DIFF Out: B	provides connection for SCSI termination or a daisy-chain connection to another differential SCSI device
Voltage Selector	selects between 115 and 230 VAC

Table 1-2 Mixed-Channel Vault L Rear Panel Connectors and Switches

Caution: Ensure that the voltage setting matches the power input source voltage. Damage to the Vault L storage box can result if the setting is incorrect.

Figure 1-4 Mixed-Channel Vault L Storage Box (Rear View)

Note: The mixed-channel Vault L storage box provides connectivity to both single-ended and differential drives. The mixed-channel Vault L has a connector called SE TERM: A; the differential Vault L does have this connector.

1.4 Inside View

These parts are located inside the Vault L (see Figure 1-5 and Figure 1-6):

Power supply provides 5 and 12 volts of power to all drives and fans in the box.

SCSI backplane
enables connection to SCSI devices. This backplane is the same in both mixed-channel and differential Vault L storage boxes.

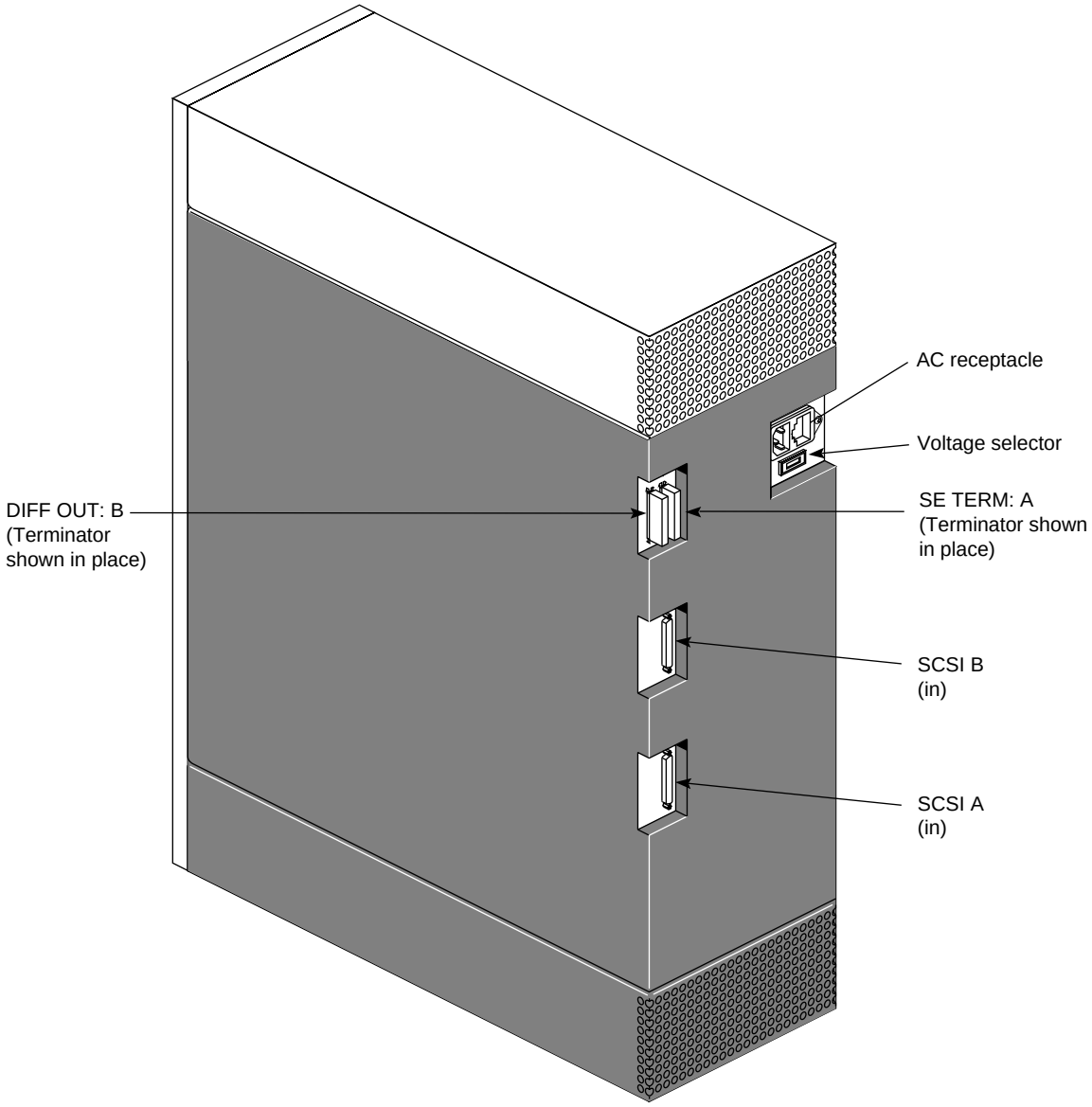


Figure 1-7 shows the front view of the SCSI backplane. Note the pair of green LEDs associated with each drive bay. When illuminated, the top LED signifies that the drive is receiving 5 volts, and the lower LED signifies that the drive is receiving 12 volts.

Figure 1-8 shows the rear view of the SCSI backplane and the required jumper settings.

Differential converter board
: converts the differential SCSI signals from the IO4 to allow connection to single-ended devices.

Note: The differential converter board is present only in the mixed-channel Vault L.

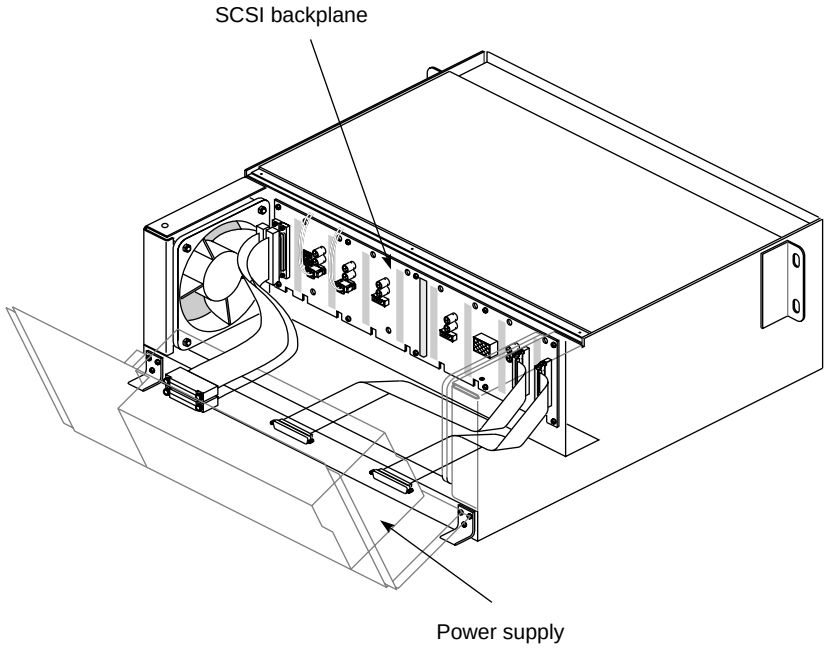


Figure 1-5 Differential Vault L (Inside Box)

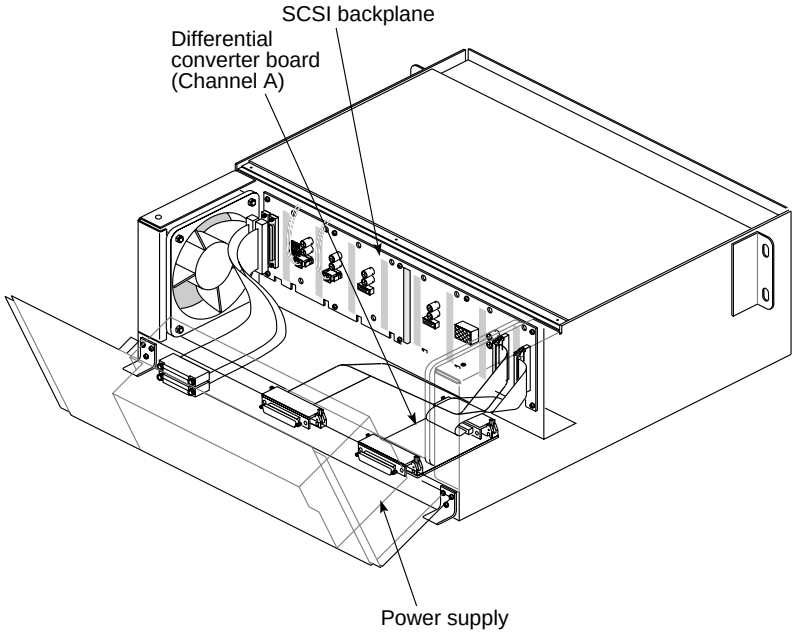


Figure 1-6 Mixed-Channel Vault L (Inside Box)

The SCSI backplane enables connection to SCSI devices. Figure 1-7 shows the front view of the SCSI backplane.

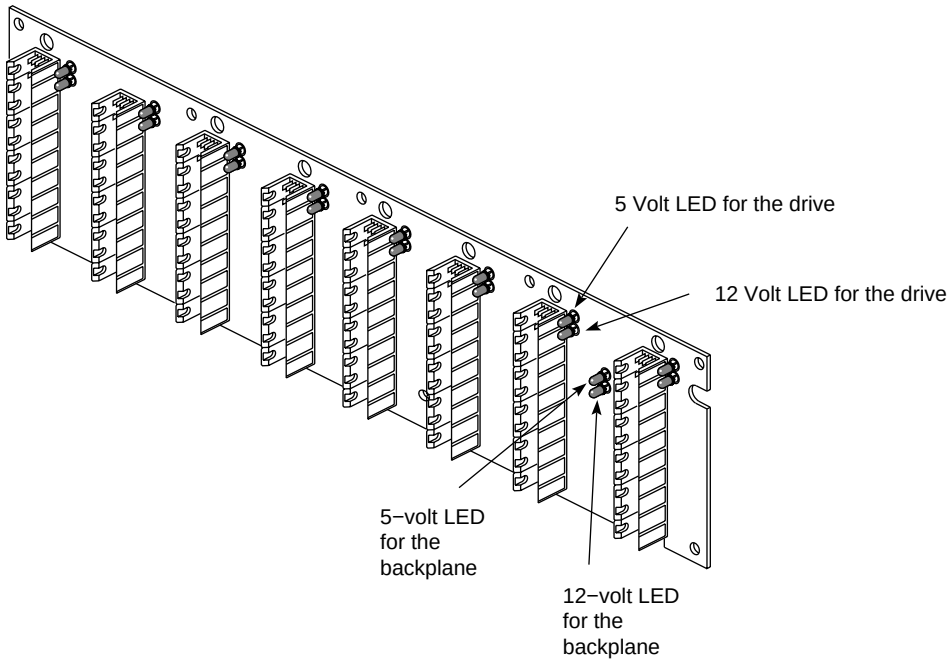


Figure 1-7 SCSI Backplane (Front View)

Note the pair of green LEDs associated with each drive bay. When illuminated, the top LED signifies that the drive is receiving 5 volts, and the lower LED signifies that the drive is receiving 12 volts.

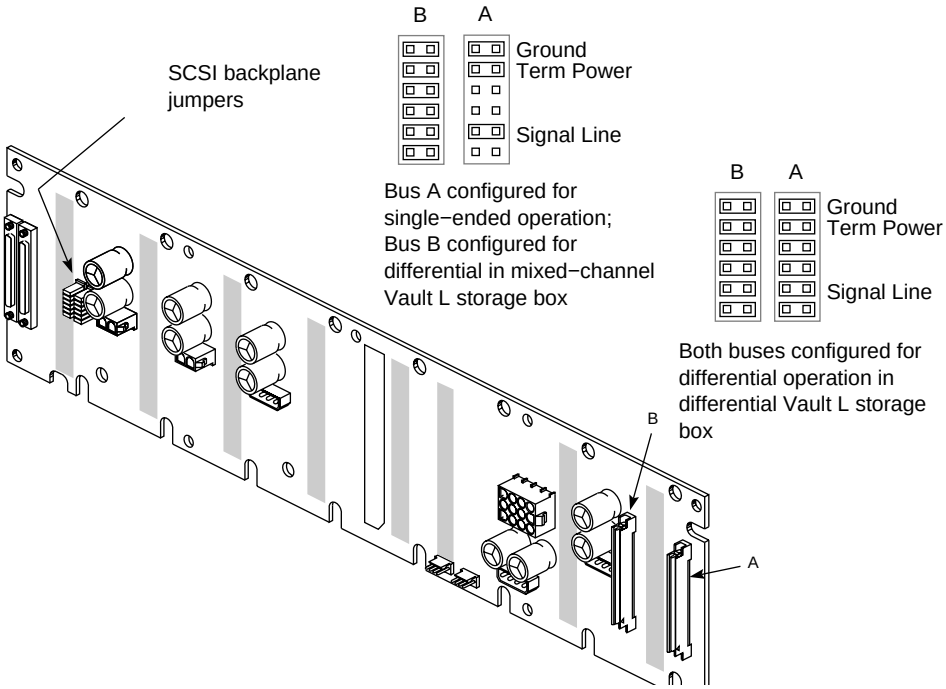


Figure 1-8 SCSI Backplane (Rear View)

Caution: Note the different jumper settings for mixed-channel and differential-only SCSI operation. These jumpers must be correctly set for proper drive operation.

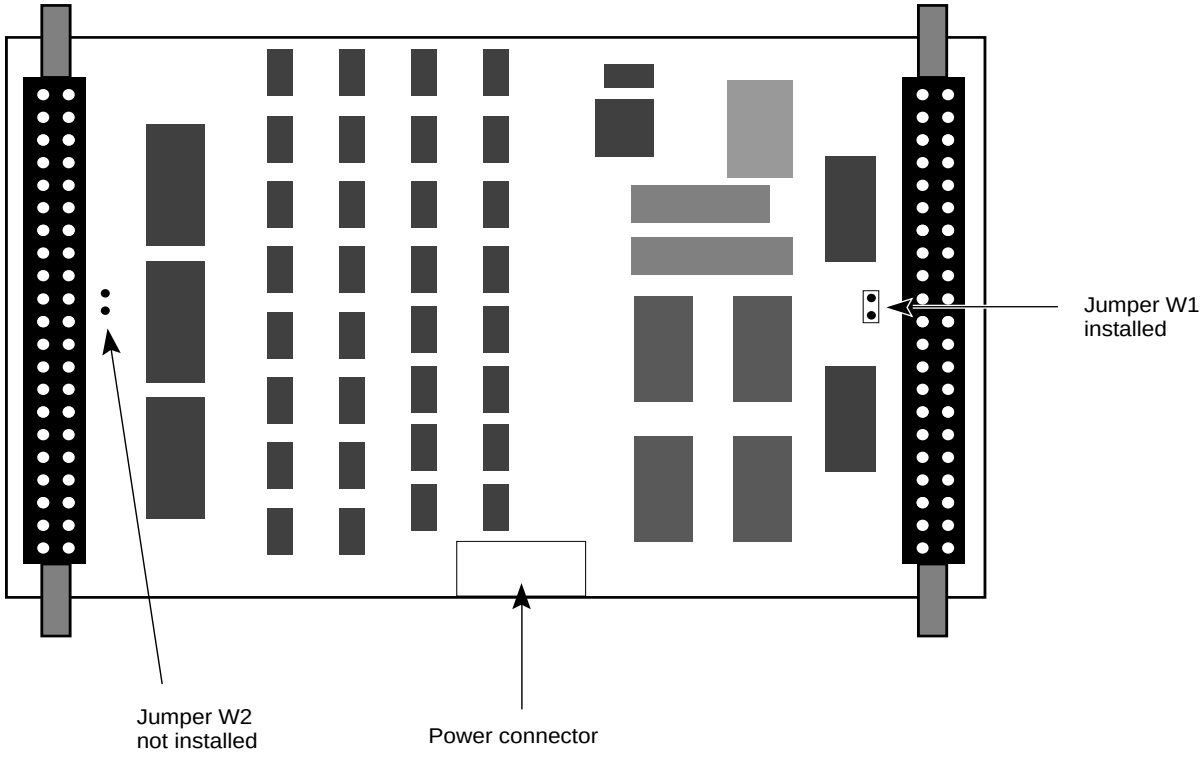
1.5 Differential-to-Single-ended SCSI Converter Boards

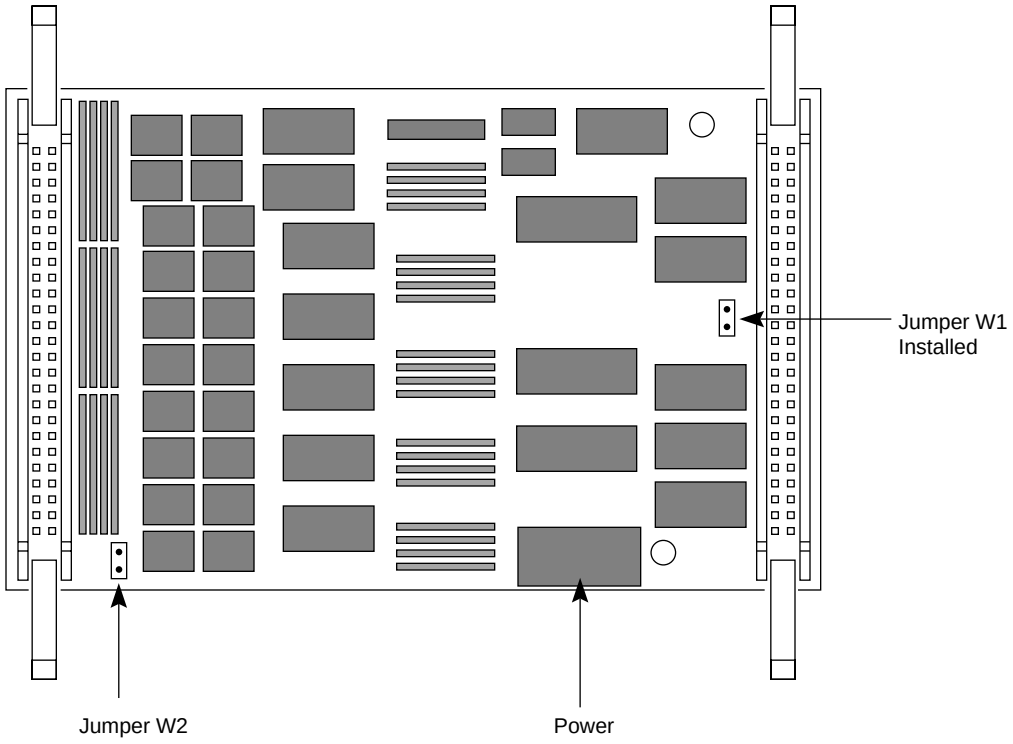
The mixed-channel Vault L storage box can use three versions of the converter board. Two are manufactured by Rancho and the third board is produced by NCR. If you are replacing a converter board in the Vault L, ensure that the replacement board is jumpered according to Figure 1-9 through Figure 1-11.

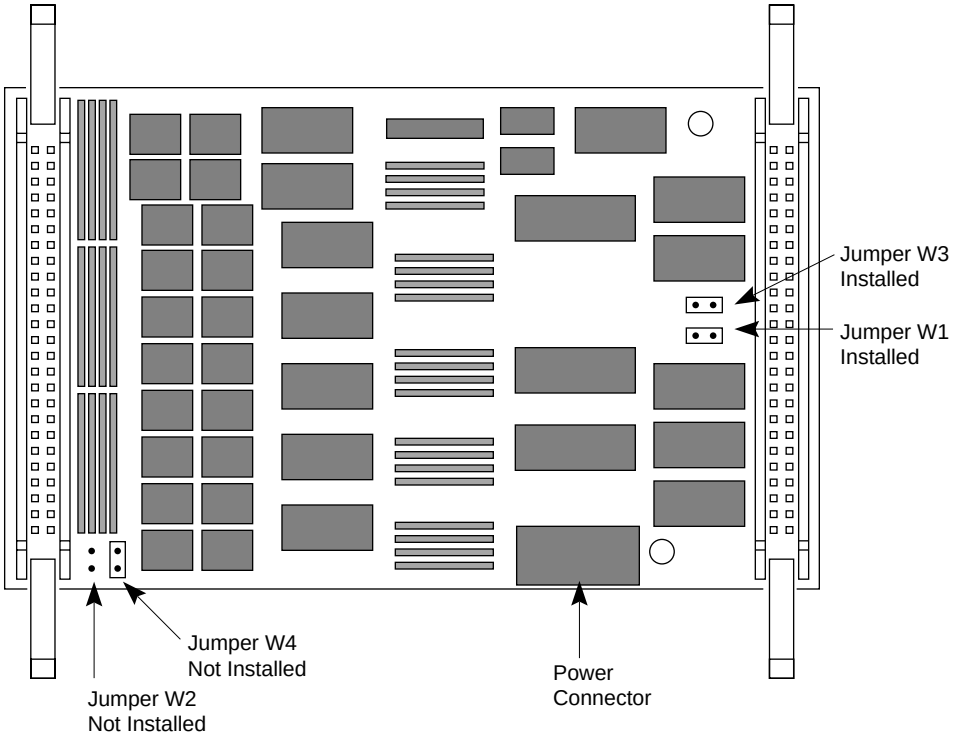
Figure 1-9 NCR Differential Converter Board Jumpering

Figure 1-10 Rancho Differential Converter Board Jumpering (Two Jumper Version)

Figure 1-11 Rancho Differential Converter Board Jumpering (Three Jumper Version)


Jumper W1
installed
Jumper W2
not installed
Power connector


Jumper W1
Installed
Jumper W2
Power


Jumper W3
Installed
Jumper W1
Installed
Jumper W4
Not Installed
Jumper W2
Not Installed
Power
Connector

Chapter 2

Components

This chapter provides parts lists for the Vault L.

Note: Parts and part numbers are subject to change.

Table 2-1 and Table 2-2 list parts for the Vault L. The marketing codes are shown below:

- P-S-B1x2HSL-L (differential with one 2GB drive)
- P-S-B8x2HSL-L (differential with eight 2GB drives)
- P-S-B1x4HS-L (differential with one 4GB drive)
- P-S-B8x4HS-L (differential with eight 4GB drives)
- P-S-VL-SE (mixed-channel configuration with single-ended and differential drive support, no drives are bundled with this upgrade)

Note: The Vault L does not support RAID (random array of inexpensive disks).

Part Number	Description
013-1157-001	Differential Vault L integrated assembly
9290053	50-ft, 68-pin cable assembly (two cables)
9290055	2-ft, 68-pin cable assembly
P8-S-2HSL (Note: This drive is provided in the 2GB upgrade kits: P-S-B1X2HSL-L and P-S-B8X2HSL-L.)	2GB SCSI hard drive (1”)
P8-S-4HS (Note: This drive is provided in the 4GB upgrade kits: P-S-B1X4HSL-L and P-S-B8X4HSL-L.)	4GB SCSI hard drive (1.6”)
007-2443-001	CHALLENGE Vault L Owner’s Guide

Table 2-1 Differential Vault L Upgrade Parts List

Part Number	Description
013-1158-001	Mixed-channel Vault L integrated assembly
9290053	50-ft, 68-pin cable assembly (two cables)
007-2443-001	CHALLENGE Vault L Owner's Guide

Table 2-2 Mixed-Channel Vault L Upgrade Parts List

Chapter 3

Installation

This chapter covers the following procedures:

- installing and removing drives
- removing a drive shelf to install a full-height drive
- connecting the Vault L storage box to the host system
- daisy-chaining Vault L storage boxes
- labeling SCSI channels

Perform the following before you actually begin the installation:

- Check the number of available differential SCSI ports on the host system. Do you have a sufficient number of channels to support the configuration?

  Each Vault L storage box requires at least one dedicated channel, or two channels for disk striping.
- Ensure that you are using only differential SCSI channels on the I/O panel.
- Check that you have the required cabling. Do you have enough external SCSI cables (P/N 9290053) to handle your configuration? Are you planning to daisy-chain between Vault L storage boxes? If so, do you have enough 2-foot cables (P/N 9290055)?

Caution: The differential Vault L storage box supports differential drives *only*, and the mixed-channel Vault L supports *both* single-ended and differential drives. *However, neither configuration supports RAID.* Do not attempt to install RAID devices into the Vault L. In addition, the total cable length from the IO4 board to the last device in these configurations cannot exceed 81 feet (25 meters).

3.1 Installing and Removing Drives

The Vault L storage box uses front-loading drives mounted on drive sleds for easy installation and removal. Before you install drives into the storage box, you must

- select the SCSI ID for the drives
- select the correct channel (A or B) on the drive sled
- ensure that the drive sled jumpers are set correctly

Note: A set of jumpers is also located on the SCSI backplane of the Vault L storage box; however, these jumpers should already be properly set at the factory.

The drive and drive sled assembly are one modular unit. To install the drive and drive sled assembly in the drive box, follow these steps:

1. Jumper the SCSI ID for each drive to avoid addressing conflicts. For complete drive jumpering information, refer to the *Peripherals Guide*.
2. Determine which channel (A or B) you want the drive to occupy, then plug the SCSI cable from the drive into the proper channel connector (see Figure 3-1 or Figure 3-1.)

   Set the drive sled for either a single-ended or differential interface. Figure 3-1 and Figure 3-1 show jumper configurations. Ensure the sled is jumpered accordingly for proper drive operation.

   Caution: Channel A on the mixed-channel Vault L must be always be set up for single-ended operation and channel B must always be set up for differential operation.
3. To install a drive, orient the front-loading drive relative to the Vault L so that the drive is facing up (see Figure 3-3).

Caution: Always install drives beginning from the bottom drive bay to prevent the Vault L storage box from tipping over.

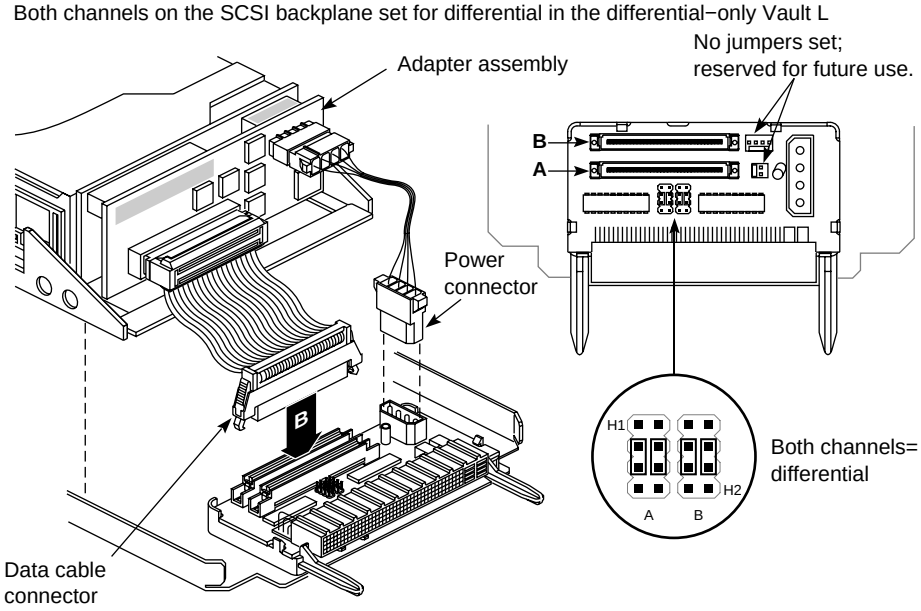
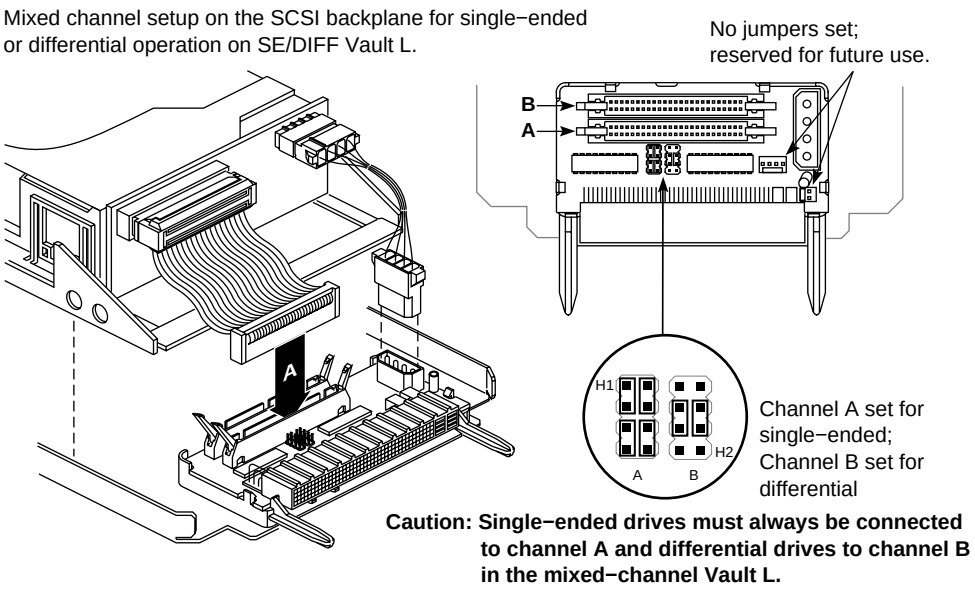


Figure 3-1 SCSI Drive Sled Board Setup for the Differential Vault L Storage Box

Figure 3-2 SCSI Drive Sled Board Setup for the Mixed-Channel Vault L Storage Box

4. Install the drive module into the drive shelf and slide the module all the way into place, then push the drive lever all the way to the right. The drive module should click into place, flush with the slot, and should not come out when you pull it.



5. Close and screw in (one quarter-turn) the Vault L door after you install all of the drives.

   Caution: The front door must be closed during operation to comply with FCC regulations.

6. To remove the drive, push the drive lever to the left and then slide the module out as shown in Figure 3-3.

Figure 3-3 Installing and Removing a Vault L Storage Box Drive

Caution: Always load drives starting from the bottom drive bay to avoid tipping the Vault L storage box over.

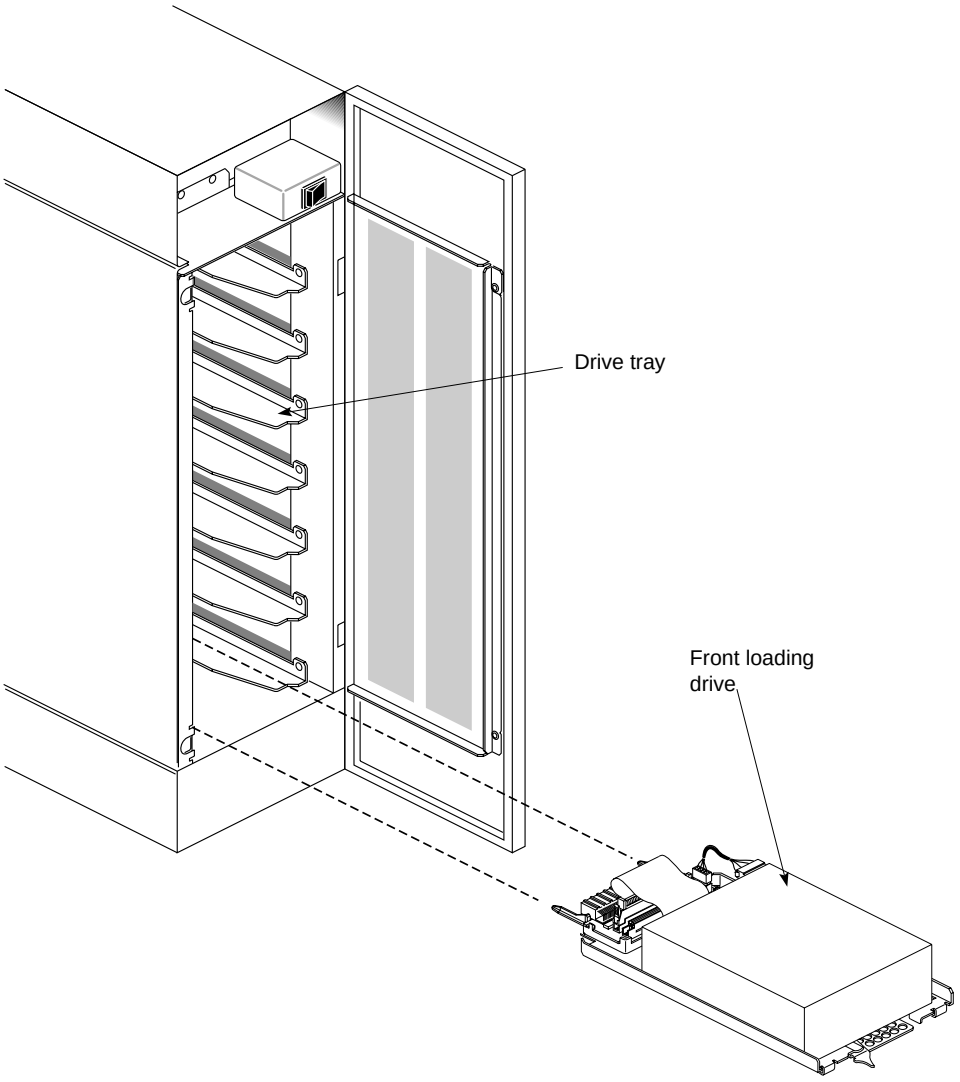
3.2 Removing a Drive Shelf to Install a Full-Height Drive

Each full-height drive requires two half-height drive slots. To accommodate the greater size of the full-height drive, remove a drive shelf from the Vault L storage box. Follow these instructions:

1. Open the front door of the Vault L storage box.
2. Select a drive shelf; remove the two Phillips screws (No. 0 or 1) that secure the drive shelf at the sides of the Vault L chassis, as shown in Figure 3-4.

Figure 3-4 Removing a Drive Shelf From the Vault L Storage Box

3. Pull the drive shelf out of the chassis and store it for later possible use.

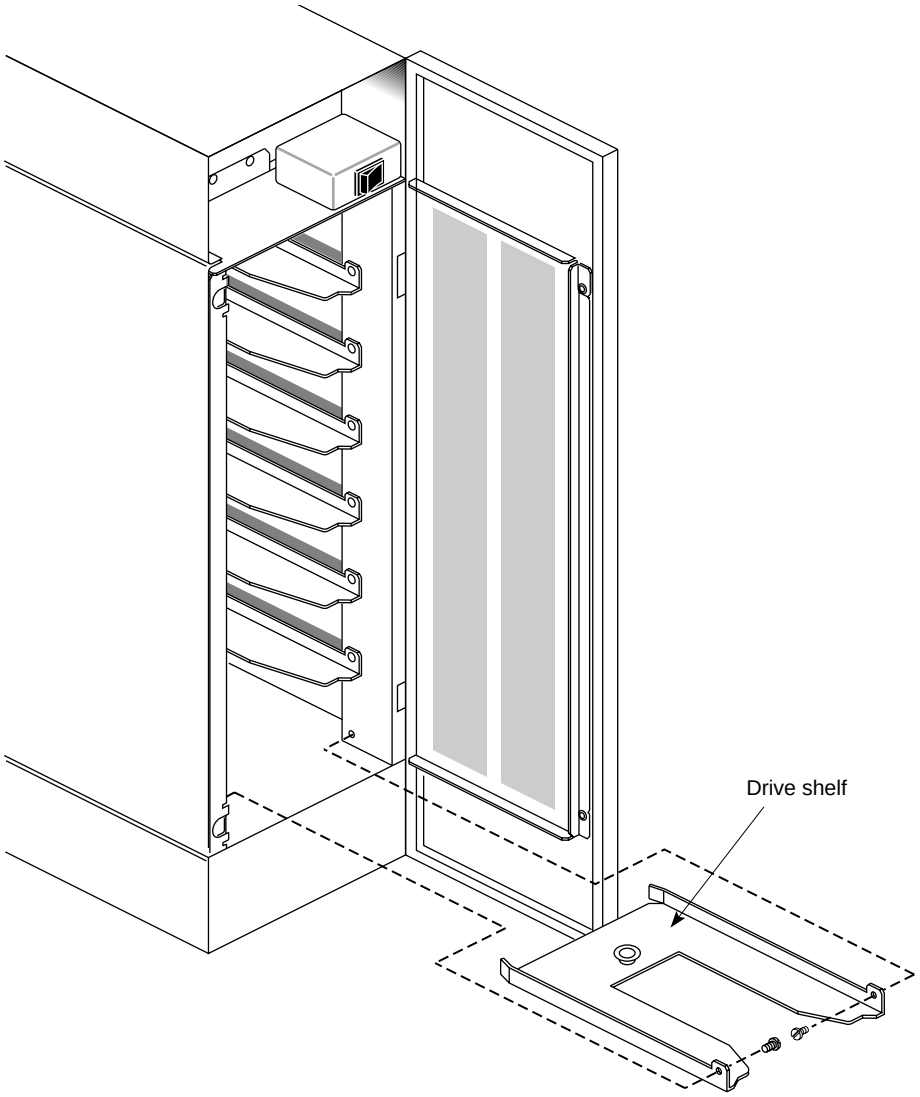


3.3 Connecting the Vault L Storage Box to the Host System

This section explains connecting the SCSI cables from the Vault L storage box to the host system

Caution: Make sure that the system power is turned off before beginning these steps.

1. The Vault L storage box has two SCSI channels (A and B) to help provide disk striping throughput capability. Select an A or B channel for each drive in the storage box, as explained in step 2 of Section 3.1, “Installing and Removing Drives,” earlier in this chapter.
2. Facing the rear of the Vault L storage box, find the SCSI A or B connector.



3. Label the connectors on the SCSI cable (external 68-pin 50-foot cable SCSI cable, P / N 9290053) you're using to connect the Vault L storage box to the host. An extra set of SCSI labels (P / N 024-0640-001) is provided for this purpose.
4. Attach one end of the external 68-pin 50-foot cable SCSI cable (P / N 9290053) to the A or B connector, as shown in Figure 3-5.
5. Open the front door of the deskside host system or rear door of the rackmount host system to access the I / O door. Attach the other end of the SCSI cable to a SCSI port on the I / O panel.
6. Label the SCSI connector for identification.

   Note: The Vault L requires a differential SCSI connection.
7. Connect a terminator into the unused SCSI port on the Vault L storage box.
8. After installation, make sure all drives and SCSI cables are properly labeled. See Section 3.5, "Labeling SCSI Channels," for more information.

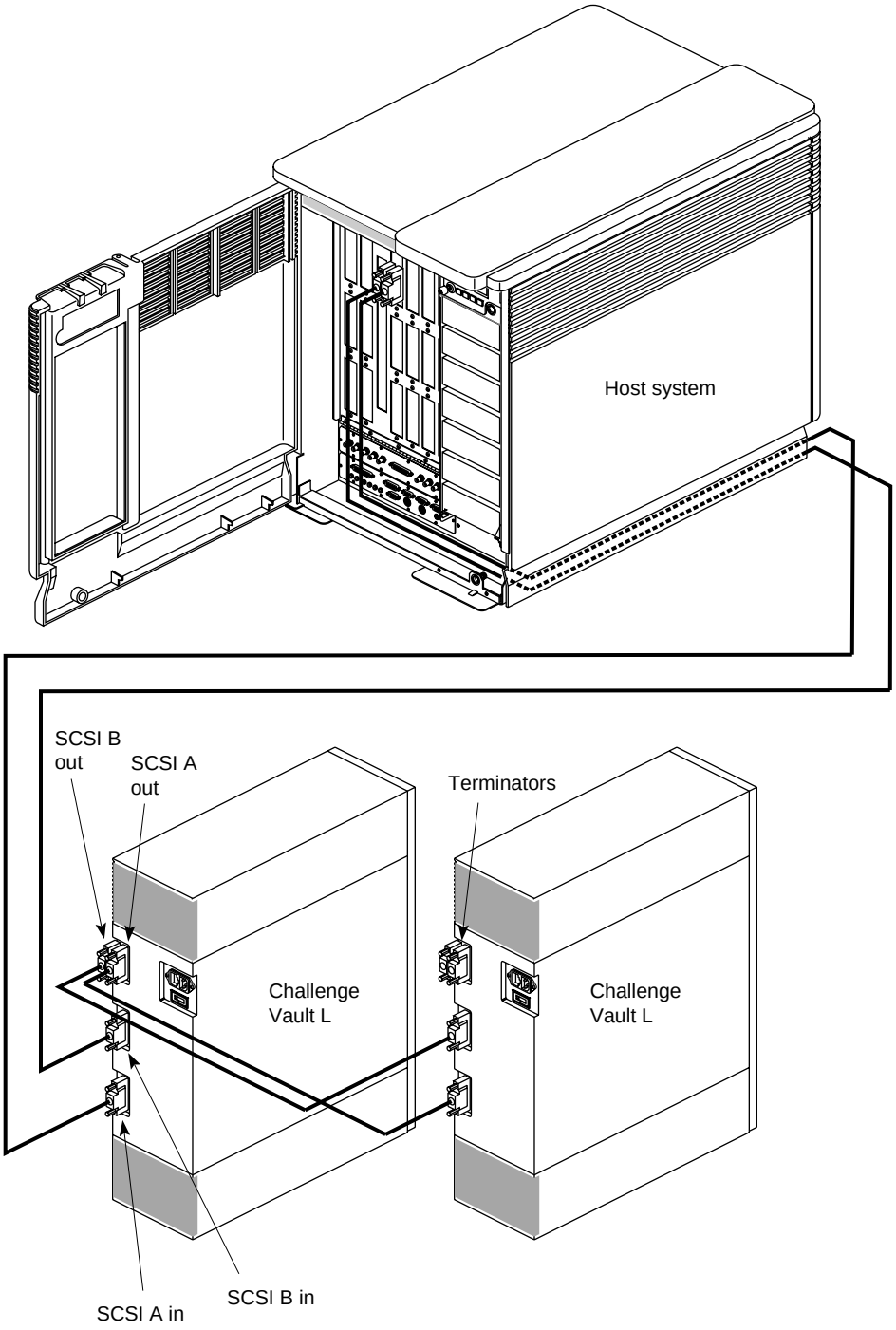


Figure 3-5 Connecting the Vault L Storage Box to the Host System

Note: You can daisy-chain up to two Vault L storage boxes.

3.4 Daisy-Chaining Vault L Storage Boxes

Use a 2-foot cable to daisy-chain differential Vault L storage boxes together. You may daisy-chain up to two Vault L storage boxes. Follow these steps:

1. Plug one end of a 2-foot cable (P/N 9290055) into an A or B channel on one Vault L storage box.

   Caution: You can only daisy-chain differential SCSI devices. Do not attempt to daisy-chain from the SE TERM:A (output) on the mixed-channel Vault L.

2. Plug the other end of the cable into the same channel on the other Vault L storage box.
3. Plug a terminator into each unused A or B channel on the Vault L storage boxes.

Note: One channel cannot accommodate more than 15 daisy-chained drives.

3.5 Labeling SCSI Channels

This section describes the SCSI channel labels for individuals who need to determine the configuration of a SCSI channel or who need to modify the SCSI labels for a deskside, rackmount, or Vault L.

To simplify SCSI channel identification, I/O panel SCSI connectors, cables, SCSI devices, SCSI boxes, and terminators are labeled. Depending on the component in question, a label might provide

- a channel number to identify the I/O board that provides the SCSI signal
- a channel protocol to identify whether the channel is single-ended or differential
- a bus number to identify the bus—A or B—inside a SCSI box that supplies the SCSI channel

To determine the protocol of a SCSI channel with missing or unreadable labels, check the configuration of one or more components on the channel using the information in the system's installation instructions.

The easiest component to reach is the drive adapter board. Channel adapter boards are color-coded to simplify identification:

- single-ended channel adapter boards are green
- differential channel adapter boards are red

The next three figures show SCSI labels:

- Figure 3-6 shows CHALLENGE Vault L internal SCSI channel components.
- Figure 3-7 shows the location of labels on SCSI devices.
- Figure 3-8 shows the location of labels on SCSI cables.

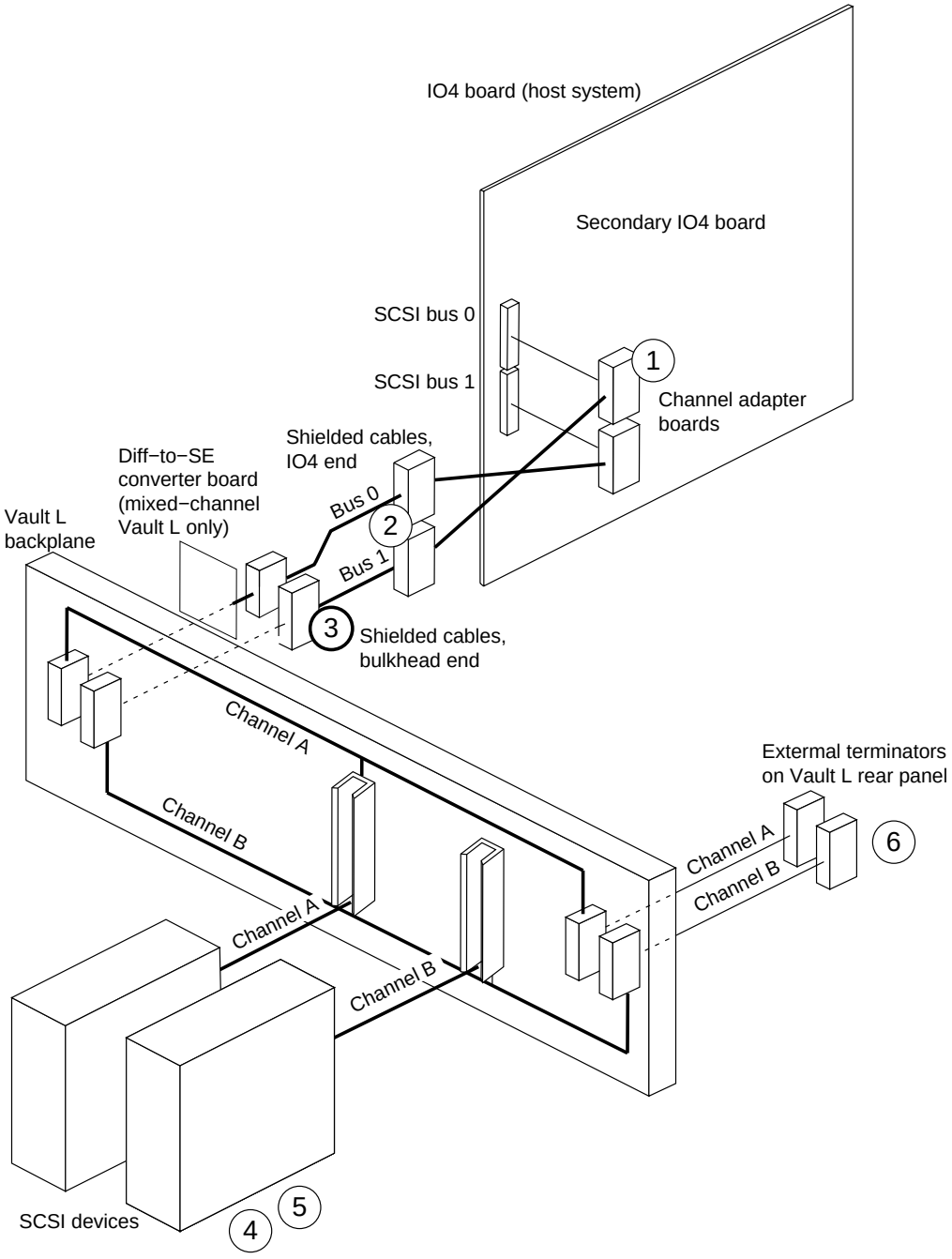


Figure 3-6 CHALLENGE Vault L Internal SCSI Channel Components

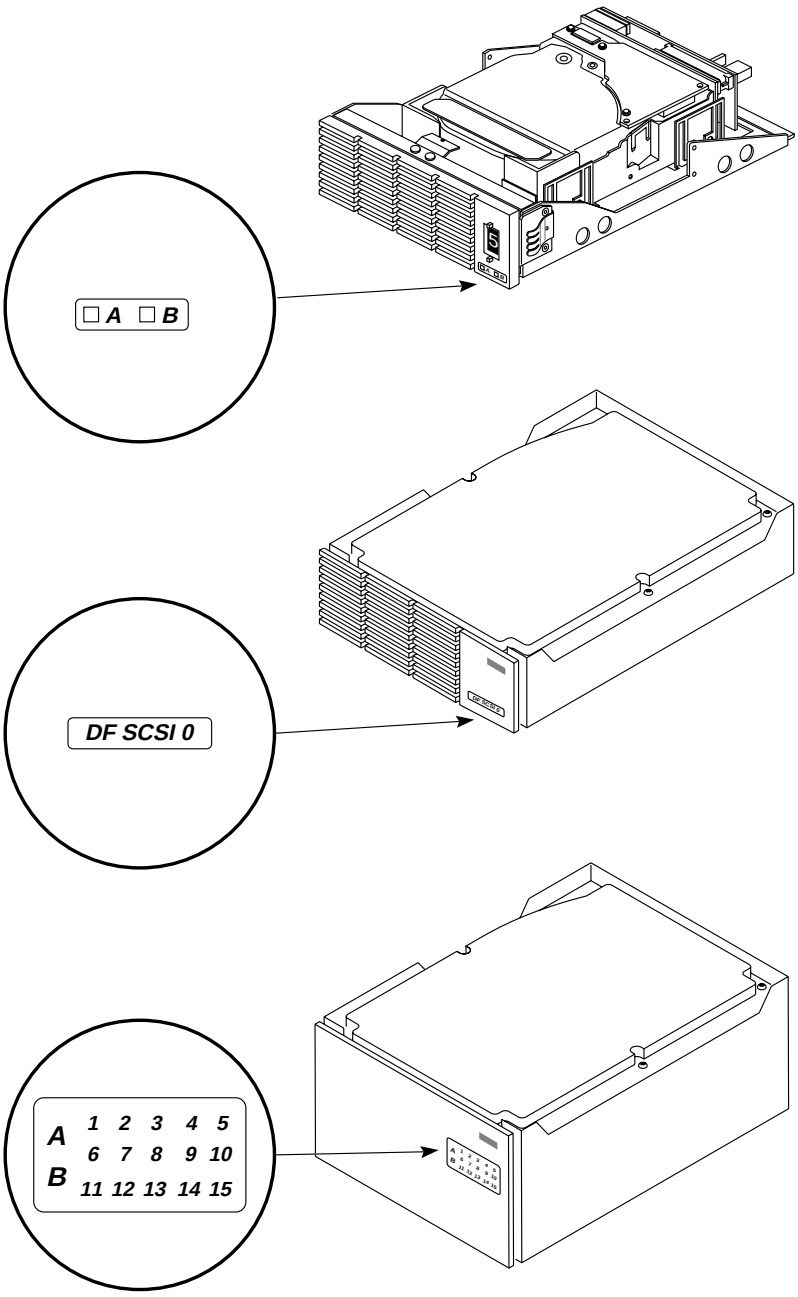


Figure 3-7 SCSI Device Label Placement

Figure 3-8 SCSI Cable Label Placement

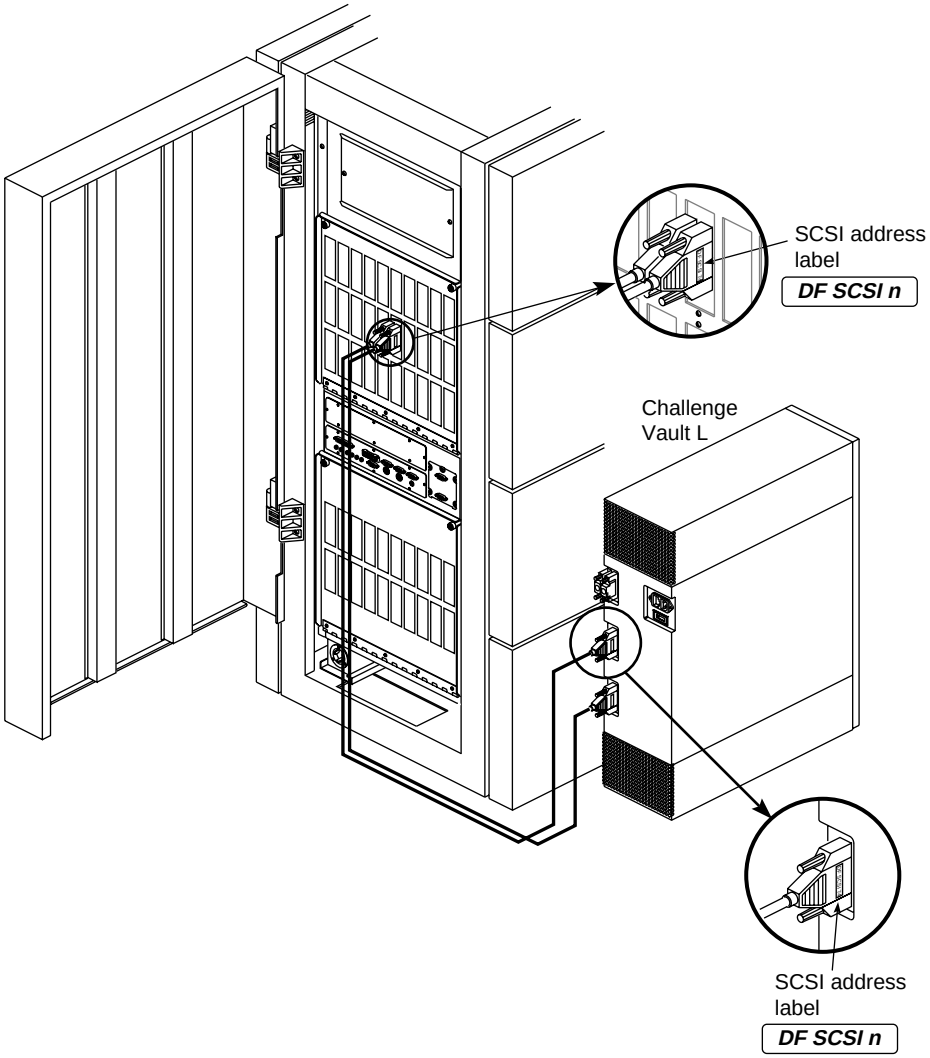


Table 3-1 summarizes the use of SCSI labels. The key numbers in the leftmost column refer to callouts in Figure 3-6 earlier in this chapter.

Key	Description	Procedure
1	Channel adapter board label; identifies SCSI protocol—SE (single-ended) or DF (differential)—and bus number (0-7); SE SCSI 0 label is part number 024-0637-xxx; DF SCSI 1 label is part number 024-0640-xxx; secondary SCSI boxes are labeled from label set part numbers 024-0610-xxx through 024-0654-xxx.	Select label based on the slot and bus number of the IO board. For example, bus 0 on an IO4 board in slot 13 gets the label DF SCSI 130. Place label on the flat face of the cable connector, aligning the bottom of the text along the outer long edge of the connector.

Table 3-1 SCSI Labels

Key	Description	Procedure
2	SCSI cable label, board end; identifies SCSI protocol (SE or DF) and the bus number (0-7); SE SCSI 0 label is part number 024-0637-xxx; DF SCSI 1 label is part number 024-0640-xxx; secondary SCSI boxes are labeled from label set part numbers 024-0610-xxx through 024-0654-xxx.	Select label based on the slot and bus number of the IO board. For example, bus 0 on an IO4 board in slot 13 has the label DF SCSI 130. Place label on the flat face of the cable connector, aligning the bottom of the text along the inner, long edge of the connector.
3	SCSI cable label, bulkhead end; identifies SCSI protocol (SE or DF) and the bus number (0-7); SE SCSI 0 label is part number 024-0637-xxx; DF SCSI 1 label is part number 024-0640-xxx; secondary SCSI boxes are labeled from label set part numbers 024-0610-xxx through 024-0654-xxx.	Select label based on the slot and bus number of the IO board. For example, bus 0 on an IO4 board in slot 13 gets the label DF SCSI 130. Place label on the flat face of the cable connector, aligning the bottom of the text along the inner, long edge of the connector.
4a	SCSI device label for devices with large front bezels; identifies the SCSI channel (A or B), and the device ID number (1-15); part number 024-0632-xxx.	Place label on the inner face of the drive door, along the hinged edge of the door and as close as possible to the corresponding drive.
4b	SCSI device label for devices with restricted space on the front bezel; identifies the SCSI protocol (SE or DF) and bus number (0-7); SE SCSI 0 label is part number 024-0637-xxx; DF SCSI 1 label is part number 024-0640-xxx; secondary SCSI boxes are labeled from label set part numbers 024-0610-xxx (shown) through 024-0654-xxx.	Select label based on the slot and bus number of the IO board. For example, bus 0 on an IO4 board in slot 13 gets the label DF SCSI 130. Place label on the flat face of the cable connector, aligning the bottom of the text along the inner, long edge of the connector.
4c	SCSI device label for devices with minimal space on the front bezel; identifies the SCSI channel (A or B); part number 024-0671-xxx.	Place label directly on the face of the drive, ensuring that it does not block any airflow. Indicate whether the device is configured for channel A or B.
5a	SCSI box base label; part number 024-0655-xxx.	Place label on the inner face of the drive door, in the upper left corner. For each channel, indicate the channel protocol (SE for single-ended, DF for differential) and the SCSI bus number (0 or 1).
5b	SCSI box cover label; identifies SCSI protocol and bus number (0-7); SE SCSI 0 label is part number 024-0637-xxx; DF SCSI 1 label is part number 024-0640-xxx; secondary SCSI boxes are labeled from label set part numbers 024-0610-xxx (shown) through 024-0654-xxx.	Select label based on the slot and bus number of the IO board. For example, bus 0 on an IO4 board in slot 13 gets the label DF SCSI 130. Place label on the flat face of the cable connector, aligning the bottom of the text along the inner, long edge of the connector.

Table 3-1 (continued) SCSI Labels

Key	Description	Procedure
6	SCSI terminator connector label; identifies SCSI protocol (SE or DF) and bus number (0-7); SE SCSI 0 label is part number 024-0637-xxx; DF SCSI 1 label is part number 024-0640-xxx.	Select label based on the slot and bus number of the IO board. For example, bus 0 on an IO4 board in slot 13 gets the label DF SCSI 130. Place label on the flat face of the cable connector, aligning the bottom of the text along the inner, long edge of the connector.

Table 3-1 (continued) SCSI Labels

Figure 3-9 depicts SCSI labels. The key numbers in the leftmost column refer to callouts in Figure 3-6 earlier in this chapter.

Key	Label for	Label
1 2 3 4b 5b 6	Channel adapter board SCSI cable, board end SCSI cable, connector end SCSI device with restricted space on front bezel SCSI box cover SCSI terminator connector	SE SCSI 0 or DF SCSI 0
4a	SCSI device with large front bezel	A 1 2 3 4 5 6 7 8 9 10 B 11 12 13 14 15
4c	SCSI device with minimal space on front bezel	☐ A ☐ B
5a	SCSI box base	A = ☐ SE ☐ DF SCSI B = ☐ SE ☐ DF SCSI 024-0655-001 A

Figure 3-9 SCSI Labels

Chapter 4

Verifying Installation

This chapter discusses how to verify the installation of the Vault L storage box:

- general procedures
- running *MAKEDEV*
- running the *fx* utility

4.1 General Procedures

After you complete the installation, follow these steps:

1. Connect the main power cord to the Vault L storage box.
2. Turn on the main power switch to the system and rack (if present).
3. Boot the operating system and install the new software, if needed.
4. A message asks if you wish to automatically reconfigure the operating system. Type **y** (yes).
5. After reconfiguration, you must reboot the system. Become superuser, then type **reboot**.
6. At the IRIX prompt, type **hinv -c disk** to make sure the drives are recognized. YA list similar to the following (depending on the configuration) appears:

```
hinv -c disk
........
Disk drive: unit 12 on VME-SCSI controller 0
Disk drive: unit 11 on VME-SCSI controller 0
Disk drive: unit 10 on VME-SCSI controller 0
Disk drive: unit 9 on VME-SCSI controller 0
Interphase 4210 VME-SCSI controller 1: Firmware revision 01D
Integral SCSI controller 1: Version WD33C93A
Disk drive: unit 1 on SCSI controller 0
Integral SCSI controller 0: Version WD33C93A
```

7. If the drives are not acknowledged, check the connections.

4.2 Running *MAKEDEV*

The M*AKEDEV* command creates the specified device files for additional drives in the */dev* directory. To execute this command, follow this procedure:

Note: If you have just installed the option tape or a newer version of the operating system, you do not need to run the *MAKEDEV* command. The software installation process automatically updates the */dev* directory.

1. At the IRIX prompt, type **`cd /dev.`**
2. Become superuser.
3. Type **`./MAKEDEV`**. This command adds the newly installed drives into the */dev* directory.

   Note: The *MAKEDEV* command takes about 10 minutes to execute.
4. To verify that the drives have been added, type **`cd /dev/dsk`**.

   Note: *dsk* refers to disks.
5. Type **`ls`** (list) and check to see if the hard disk type is listed.

4.3 Running the *fx* Utility

It is recommended that you run *fx* to test the new drive to ensure proper operation. If you are unfamiliar with using *fx*, follow the instructions in this section.

Caution: Remember, if you run *fx* in the extended mode (*fx -x*), you may overwrite existing files and destroy data. Be careful to specify only the new drives during this test.

The *fx* utility should be run in single-user mode. To enter this mode, reboot the system and invoke the command monitor (option 5) from the System Maintenance menu. At the prompt, type **`single`**, and press **`<Enter>`**.

After running *fx*, to switch from single-user to the standard multiuser mode, reboot the system, invoke the command monitor, and type **`multi`**.

Follow these procedures to run the *fx* utility:

1. Become superuser and type **`fx`** at the prompt. You should see a display similar to the following:

   ```
   fx version 3.3; Mon Nov 5 06:55:54 PST 1991
   fx: "device-name" = (dksc)
   ```

   Note: The information in parentheses is the default value. To select this value, press **`<Enter>`**.
2. Enter the device name; “dksc” is the default name for a SCSI hard disk connected to the IO4 board.

3. After specifying the drive name, press **<Enter>**. A message like the following appears:

   ```
   fx: ctrl# = (0)
   ```

4. Type the port number that the drive is connected to, then press **<Enter>**. A message like the following appears:

   ```
   fx: drive# = (1)
   ```

5. Select the drive number and press **<Enter>**.

6. After the test configuration is set, the following menu is displayed:

   ```
      ----- please choose one of -----

         1) exit  2) badblock/   3) debug/     4) exercise/    5) label/
   fx>
   ```

7. At the prompt, type **4** (for `exercise`); select the desired test when you are prompted by the menu options.

   Note: To terminate a test, press **<Ctrl-C>**; then type **/exit** to terminate the *fx* utility.

Chapter 5

Software Guidelines

This chapter provides software guidelines to operate the Vault L storage box:

- disk striping
- drive addressing

Note: The Vault L storage box requires IRIX 5.1 or later.***QUESTION??????***

5.1 Disk Striping

Disk striping increases workstation throughput by distributing file data across multiple disk drives through logical volumes. For detailed software descriptions of how hard drives are configured to support disk striping, see the "Logical Volumes" subsection in the *IRIX Advanced Site and Server Administration Guide*.

Caution: Systems utilizing disk striping must have a well-tested and maintained backup plan. If a single disk drive failure occurs, the entire file structure can be affected because sections of the file system are distributed among different disk drives.

5.2 Drive Addressing

An IO4 board can have up to eight SCSI bus interfaces (or channels). In addition, the new, wider 68-pin SCSI connector on the chassis now enables connectivity with up to 15 devices per channel.

Due to this expanded connectivity, the IRIX and PROM monitor drive addressing scheme has been modified to accommodate the increased number of drives and channels. This section explains:

- addressing drives using the PROM
- addressing drives under the IRIX operating system
- forming the drive address

5.2.1 Addressing Drives Using the PROM

The previous PROM drive addressing format remains in place; for example:

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 deskside system, the master IO4 resides in either slot 3 (Onyx) or slot 5 (CHALLENGE). 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.

5.2.2 Addressing Drives Under the IRIX Operating System

Under the IRIX operating system, the addressing scheme has changed as shown in the following new format:

/dev/dsk/dksSSSdDsP

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 (see Note below), *dD* refers to the drive number, and *sP* refers to the drive's partition number.

Note: 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.

If, for example, you are addressing a drive connected to an IO4 board in slot 4 and SCSI bus number 5 (on a deskside system), the *SSS* number would be 45.

With the earlier IO3 boards, the software required only single digits to differentiate drives; however, with the IO4 and new version of the software, the SCSI bus or *SSS* number can contain up to three digits. 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.

5.2.3 Forming the Drive Address

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

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 master IO4 resides in slot number 15 in a rackmount system.

The PROM drive address is:

dksc(6,6,0)

IRIX Addressing

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

The IRIX drive address is:

/dev/dsk/dks146d6s0

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 the computer.

Appendix A

Specifications

Table A-1 lists electrical and environmental requirements and specifications for the Vault L storage box.

Note: The Vault L storage box supports 8-bit and 16-bit differential SCSI drives and 8-bit single-ended SCSI drives.

Specification Type	Parameter	Characteristics
Physical dimensions	Height x width x depth, in inches	25.75 (65.4 cm) x 7.5 (19 cm) x 20.5 (52 cm); with feet, width is 13.45 (34.2 cm)
	Weight	63 lb (29 kg)
	Device weight	4.5 to 7.6 lb (2.04 to 3.45 kg)
Electrical	Power supplies	5 VDC at 16 A 12 VDC at 20 A
	Voltage	208 to 230 VAC single phase 110 VAC single phase
	Frequency	50 Hz (minimum) to 60 Hz (maximum), single phase
	Line current	1.5 A / 3.0 A (maximum)
Safety	UL	UL 1950
	CSA	CSA C22.2 No. 154-M1983 or CAN / CSA-C22.2 No. 950-M89
	TUV	EN 60 950 / 09.87
	EMI	FCC, Part 15, Class A VDE 0871 / 6.78, Level A V.C.C.I., Class 1 Limits
Environmental	Temperature operating nonoperating	 5 to 35 degrees C at sea level –15 to +65 degrees C at sea level
	Relative humidity operating nonoperating	 20 to 80%, noncondensing 10 to 90%, noncondensing

Table A-1 Vault L Storage Box Specifications

Specification Type	Parameter	Characteristics
Vibration		
	Sustained vibration, operating (sinusoidal)	5 to 22 Hz at 0.01”; 22 to 500 Hz at 0.25 g
	Nonoperating vibration	5 to 10 Hz at 0.1”; 10 to 500 Hz at 0.5 g

Table A-1 (continued) Vault L Storage Box Specifications