



2530 Getting Started Guide

Copyright Protected Material 2002-2009. All rights reserved. R/Evolution and the R/Evolution logo are trademarks of Dot Hill Systems Corp. All other trademarks and registered trademarks are proprietary to their respective owners.

The material in this document is for information only and is subject to change without notice. While reasonable efforts have been made in the preparation of this document to assure its accuracy, changes in the product design can be made without reservation and without notification to its users.



Adobe PostScript

Contents

Preface	7
Before You Read This Book	7
Typographic Conventions	8
Related Documentation	8
1. Unpacking and Checking the Contents of the Enclosure Package	9
Opening the Enclosure Package	10
Checking the Package Contents	10
Ordered Options	11
Ethernet Cables	11
2. Installing and Cabling Enclosures	13
Required Tools	13
Safety Precautions	13
Installation Checklist	14
Installing Enclosures Into a Rack	15
Preparing the Rack	15
Assembling and Installing the Rackmount Kit	16
Attaching the Ear Caps	20
Connecting Controller and Drive Enclosures	21
Connecting AC Power	24
Connecting DC Power	24
Connecting DC Power Cords	25
Disconnecting a DC Power Cable	25

DC Ground Cable Connections	26
DC Wiring and DC Power Requirements	26
DC Power System Warnings	26
Cabling requirements	27
Testing the Enclosure Connections	28
General Practice for Powering the System Off and On	28
Obtaining IP Values for Your Storage System	29
Correcting Enclosure IDs	29
Next Steps	30
3. Connecting Hosts	31
Host System Requirements	31
Installing the R/Evolution SES Driver for Microsoft Windows Hosts	32
Connecting the Enclosure Directly to Data Hosts	32
Connecting Remote Management Hosts	34
Next Steps	34
4. Configuring a System for the First Time	35
Setting Management Port IP Addresses Using the CLI	36
Configuring Your Web Browser for RAIDar	40
Logging in to RAIDar from a Local Management Host	40
Setting the Date and Time	41
Creating Virtual Disks	42
Mapping a Data Host to a Volume	43
Testing the Configuration	44
Logging Out of RAIDar	44
Next Steps	44

- A. Hardware Components and LEDs45**
 - Controller Components and LEDs45
 - Drive Enclosure Components and LEDs51

- B. Additional Cabling Configuration Examples55**

Preface

This guide describes how to install and initially configure a R/Evolution™ 2000 Series storage system, and applies to the following enclosures:

- 2530 SAS Controller Enclosure
- SAS Drive Enclosure

Before You Read This Book

Before you begin to follow the procedures in this book, you must prepare the site and learn of any late-breaking information related to installation as described in the following documents:

- *R/Evolution Storage System Site Planning Guide*
- *R/Evolution 2530 Release Notes*

Refer to the R/Evolution™ 2000 Series storage system product documentation on the Dot Hill Systems Customer Resource Center for more information. If you require additional assistance, contact Dot Hill Systems' Customer Service at +1-877-368-7924 or support@dothill.com.

Typographic Conventions

Typeface ¹	Meaning	Examples
<i>AaBbCc123</i>	Book title, new term, or emphasized word	See the <i>release notes</i> . A virtual disk (<i>vdisk</i>) can You <i>must</i> ...
AaBbCc123	Directory or file name, value, command, or on-screen output	The default file name is <code>store.logs</code> . The default user name is <code>manage</code> . Type <code>exit</code> .
AaBbCc123	Text you type, contrasted with on-screen output	# set password Enter new password:
<i>AaBbCc123</i>	Variable text you replace with an actual value	Use the format <code>user@domain</code> .

¹ The fonts used in your viewer might differ.

Related Documentation

Application	Title	Part Number
Site planning information	<i>R/Evolution Storage System Site Planning Guide</i>	83-00004283
Late-breaking information not included in the documentation set	<i>R/Evolution 2530 Release Notes</i>	83-00004396
Configuring and managing storage	<i>R/Evolution 2000 Series Reference Guide</i>	83-00004289
Using the command-line interface (CLI)	<i>R/Evolution 2000 Series CLI Reference Manual</i>	83-00004288
Troubleshooting	<i>R/Evolution 2000 Series Troubleshooting Guide</i>	83-00004287
Recommendations for maximizing reliability, accessibility, and serviceability	<i>R/Evolution 2000 Series Best Practices Guide</i> (FC and iSCSI only)	83-00004286

Unpacking and Checking the Contents of the Enclosure Package

The R/Evolution 2530 SAS Controller Enclosure and SAS Drive Enclosure are high-performance storage solutions that combine outstanding performance with high reliability, availability, flexibility, and manageability.

Supported configurations include a controller enclosure with or without attached drive enclosures. A controller enclosure can contain two controller modules that interact and provide failover capability for the data path. The controller enclosure can use SATA or SAS disk drive modules.



Figure 1-1 2530 SAS Controller Enclosure

This chapter describes the procedure for unpacking your enclosure package and checking its contents, and includes the following topics:

- “Opening the Enclosure Package” on page 10
- “Checking the Package Contents” on page 10
- “Ordered Options” on page 11

Opening the Enclosure Package



Caution – Two people are needed to lift and move the enclosure. An enclosure with all drives installed can weigh approximately pounds (kilograms). Use care to avoid injury.

1. Select a suitable area for unpacking.
2. Open and carefully unpack the enclosure package.
3. Store all packing material and boxes for possible equipment returns.
4. Carefully remove packaged items from the box.



Caution – Because the ear caps are not installed on the ear boards upon shipment, be careful when removing the enclosure from the package so as not to damage the ear boards.

Checking the Package Contents

Inspect the enclosure package for standard items as well as purchased items. Depending on the enclosure package, verify the contents of the box against the items listed in the following tables.

Table 1-1 Contents of a Controller Enclosure Package

Item	Quantity
Controller enclosure	1 or 2 as ordered
6-foot (1.83 m) power cord	2 per enclosure
6-foot (1.83 m) serial cable, RS-232 micro-DB9	1 per controller module
Ear caps	1 right 1 left
Documentation: <ul style="list-style-type: none">• <i>Setup poster</i>• <i>R/Evolution 2530 Getting Started Guide</i>• <i>EIP Environmental Information</i>	1 of each

Table 1-2 Contents of a Drive Enclosure Package

Item	Quantity
Drive enclosure	1 or 2 as ordered
6-foot (1.83 m) power cord	2 per enclosure
1.9-foot (0.6 m) SAS-to-SAS cascading cable. (You might need to order additional or longer cables if you are cabling a fault-tolerant configuration.)	1 per expansion module
Ear caps	1 right 1 left

Ordered Options

Options ordered at the time of purchase, which can include, for example, disk drives, SAS cables, FC cables, and Ethernet cables (various lengths) will be in a separate shipment from the enclosure.

Ethernet Cables

To connect a controller enclosure to an Ethernet network, use the Dot Hill shielded Ethernet cable (straight through with metallic RFI/EMI connector hoods designated CAT-5 or higher), FRU part number CLB-ENET-SHLD-20, which has been tested for regulatory compliance with the product.

Installing and Cabling Enclosures

This chapter describes how to install and cable enclosures in a standard 19-inch EIA rack cabinet.

Before you begin installing the system, you must prepare the site as described in the *site planning guide* and learn of any late-breaking information in the *release notes* for your system.

Required Tools

The installation procedures in this chapter require the following tools:

- #2 Phillips screwdriver
- Allen wrench (provided; used with 6-mm screws)
- Antistatic protection devices

Safety Precautions

For your protection, observe the following safety precautions when setting up your equipment:

- Install the system in accordance with the local safety codes and regulations at the facility site. Follow all cautions and instructions marked on the equipment.
- Ensure that the voltage and frequency of your power source match the voltage and frequency inscribed on the equipment's electrical rating label.
- Never push objects of any kind through openings in the equipment. Dangerous voltages may be present. Conductive foreign objects could produce a short circuit that could cause fire, electric shock, or damage to your equipment.

Note – Do not make mechanical or electrical modifications to the product. The vendor is not responsible for the safety or regulatory compliance of a modified product.



Caution – Two people are needed to lift and move the enclosure. Use care to avoid injury. An enclosure with all drives installed can weigh 65 pounds (29.5 kilograms).



Caution – Electrostatic discharge can damage sensitive components. Be sure you are properly grounded before touching a static-sensitive component or assembly.

Installation Checklist

Table 2-1 outlines the steps required to install and initially configure the system. To ensure a successful installation, perform the tasks in the order they are presented.

Table 2-1 Installation Checklist

Step	Installation Task	Where to Find Procedure
1.	Prepare the rack for installation.	“Preparing the Rack” on page 15
2.	Assemble the rackmount bracket kit and install the controller enclosure and optional drive enclosures in the rack.	“Assembling and Installing the Rackmount Kit” on page 16 Note: If the rackmount bracket kit you are installing includes assembly instructions, use them in place of the instructions in this guide.
3.	Connect the enclosures.	“Connecting Controller and Drive Enclosures” on page 21
4.	Connect the power cords.	“Connecting AC Power” on page 24
5.	Test the enclosure connections.	“Testing the Enclosure Connections” on page 28
6.	Obtain IP values.	“Obtaining IP Values for Your Storage System” on page 29
7.	Install required host software and drivers, including: <ul style="list-style-type: none">• HBA drivers• R/Evolution MPIO DSM• R/Evolution SES Driver	“Host System Requirements” on page 31

Table 2-1 Installation Checklist (*Continued*)

Step	Installation Task	Where to Find Procedure
8.	Connect the data hosts.	“Connecting Hosts” on page 31
9.	Connect the management host.	“Connecting the Enclosure Directly to Data Hosts” on page 32
10.	Perform initial configuration tasks: <ul style="list-style-type: none">• Set management port IP properties on the controller enclosure• Set the date and time on the controller enclosure• Configure host ports on the controller enclosure• Create virtual disks and map volumes• Test the configuration	“Configuring a System for the First Time” on page 35

Installing Enclosures Into a Rack

This section describes how to install the enclosures into a standard 19-inch rack cabinet with a 28 to 36-inch (71.12 to 91.44-cm) depth.

Preparing the Rack

Before installing enclosures in a rack cabinet, ensure the rack is installed according to its installation instructions and that the installation complies with local safety codes.

1. Stabilize the rack as described in its documentation.
2. If the rack has casters, make sure the casters are locked to prevent the rack from rolling.
3. Remove or open the top front panel and the vented back panel.

Assembling and Installing the Rackmount Kit

Each enclosure occupies two units (2U) of rack space and requires rackmounting hardware (ordered separately).

Available rackmount kits include FHDW001-R1 (22-inch to 28-inch depth), and FHDW002-R2 (28-inch to 36-inch depth) until they are superseded by the newer rackmount kit assemblies: FHDW017-02 (22.5-inch to 31-inch depth), and FHDW018-02 (25-inch to 36-inch depth).

Note – If the rackmount bracket kit you are installing includes assembly instructions, use them in place of the instructions in this guide.

Figure 2-1 provides a visual overview of the rackmount kit assembly components and corresponds to the steps that follow.

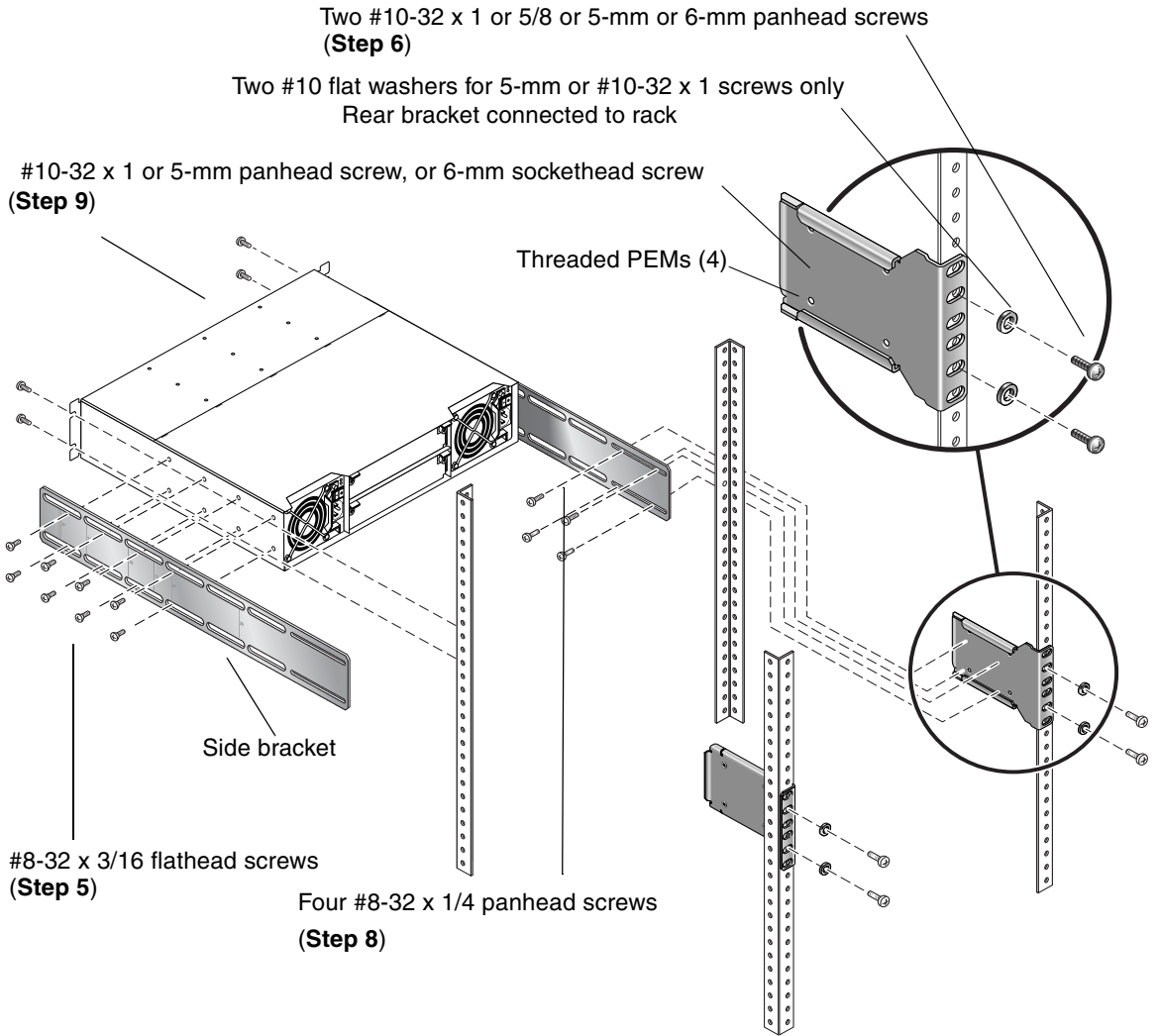


Figure 2-1 Overview of Standard 19-Inch EIA Rackmounting Components

Use the following procedure and refer to Figure 2-1 to install each enclosure into the rack.

Note – If the rackmount bracket kit you are installing includes assembly instructions, use them in place of the instructions in this guide.

When positioning an enclosure in the rack, do not block the air vents at the front or back of the enclosure.



Caution – If you only have one person to perform the installation, remove the power and cooling modules and drive modules from an enclosure before installation, and use the optional nylon front support brackets. If possible, position the enclosure on top of another device or shelf in the rack to hold the enclosure as you attach the front brackets.

1. Considering your system configuration and weight distribution in the rack, determine where you will install each enclosure in the rack.
2. Confirm that you have cables of adequate length to connect to hosts and to power outlets.
3. (Square-cut European-style racks only) Insert the cage nuts in the corresponding holes on the front and rear of the rack.
4. (Optional one-person installation) Screw the front support nylon brackets into position on the rack face using #10-32 x 5/8 screws (two per bracket).
These brackets enable one person to easily position and support the front of the enclosure in the rack during installation.
5. Attach the side brackets to each side of the enclosure using #8-32 x 3/16 flathead screws (four to eight on each side). The right and left side brackets are identical.

Note – To allow adjustment of the brackets, do not tighten the screws completely until the enclosure is mounted in the rack.

- a. Use the alignment marks (Figure 2-2) stamped into the side brackets to position the brackets and screws. The alignment marks show depth in inches.
Determine the depth you require and align the rear-most alignment mark on the side bracket with the rear-most threaded holes on the enclosure. Make sure that the alignment mark corresponding to the depth you want lines up with both the top and bottom holes.



Figure 2-2 Side Bracket With Alignment Marks

- b. On one side, insert the first two screws through the side bracket slots above and below the alignment mark into the rear-most threaded holes in the enclosure.
For example, to mount the enclosure in a 27-inch deep rack, position the side bracket so that the 27-inch alignment mark is aligned with the rear-most threaded holes in the enclosure.
 - c. Insert up to six more screws through the side bracket slots into the other threaded holes in the side of the enclosure.
 - d. Repeat Step b and Step c to attach the other side bracket to the enclosure.
6. Attach the rear brackets to the rear vertical posts of the rack. Use two screws and two washers, if required, to attach each bracket to a post.
Use the appropriate fasteners for the posts; either:
 - Four #10-32 x 1 panhead screws with #10 washers
 - Four #10 x 5/8 truss screws
 - Four 5-mm panhead screws with #10 washers
 - Four 6-mm panhead screws (no washers required)
 7. Lift the enclosure and slide the side brackets into the rear brackets, which are attached to the rear posts.
Adjust the depth of the side brackets so that the slots nearest the ends of the *side brackets* align with the four PEM nuts in the *rear brackets*.
 8. Attach each side bracket to a rear bracket using #8-32 x 1/4 screws (four per bracket).
 9. Make sure that the enclosure is level and then secure the mounting ears on the front of the enclosure to the rack face. Use two screws for each ear.
Use the appropriate screws for the rack; either:
 - Four #10-32 x 1 panhead screws
 - Four #10 x 5/8 truss screws
 - Four 5-mm panhead screws
 - Four 6-mm socket cap screws
 10. Tighten the screws in the side brackets.
 11. If you removed modules from the enclosure, reinsert them.

12. If you attached the optional front support brackets to the rack face, remove those brackets.

Note – When you finish installing an enclosure, you may have unused screws left in your rack kit. Screws are included for different rack types and configurations, and extra screws are provided in case any are misplaced.

Attaching the Ear Caps

The plastic ear caps are snap-on parts that require some care when attaching or removing them. After the enclosure has been installed in the rack cabinet, attach the ear caps, which are located in a plastic bag included in the controller and drive enclosure packages.

1. Remove the ear caps from the plastic package.
2. As you attach each ear cap, hold it so that its indent is closest to the chassis.
3. Apply gentle pressure to snap the caps onto the chassis' ears.

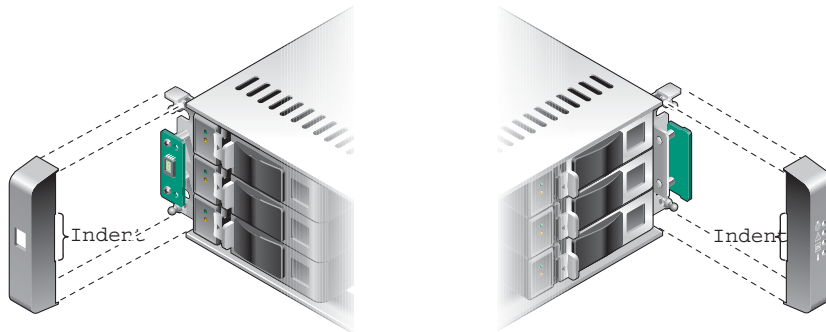


Figure 2-3 Installing Ear Caps

Connecting Controller and Drive Enclosures

Use the supplied SAS cables to connect a controller enclosure to up to four drive enclosures. Figure 2-4 and Figure 2-5 show the recommended fault-tolerant cabling patterns. In an enclosure, the upper module is designated *A* and the lower module is designated *B*.

When connecting multiple drive enclosures, use reverse cabling to ensure the highest level of fault tolerance. For example, Figure 2-5 shows controller *A* connected to expansion module 1A, and the chain of connections continuing down. Controller *B* is connected to the lower module (*B*) of the last drive enclosure in the chain, with connections moving in the opposite direction.

Fault-tolerant cabling is recommended because it enables the controllers to access remaining drive enclosures if any one drive enclosure fails. However, the system also supports non-fault-tolerant cabling using the supplied SAS cables.

Figure 2-6 shows non-fault-tolerant cabling between a controller and up to four drive enclosures.

Note – For clarity, the schematic illustrations of the controllers shown in this section show only relevant details such as expansion ports. For detailed illustrations showing all components, see “Hardware Components and LEDs” on page 45.

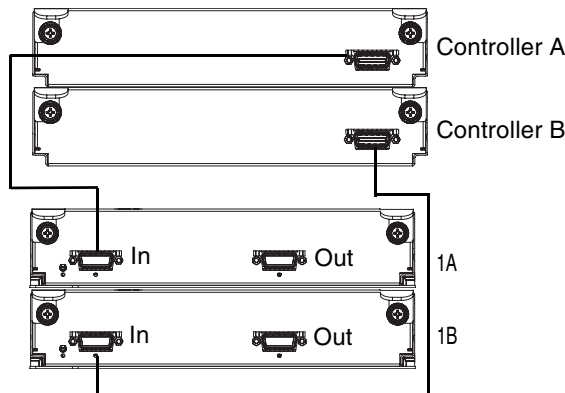


Figure 2-4 Cabling Connections Between One Controller Enclosure and One Drive Enclosure

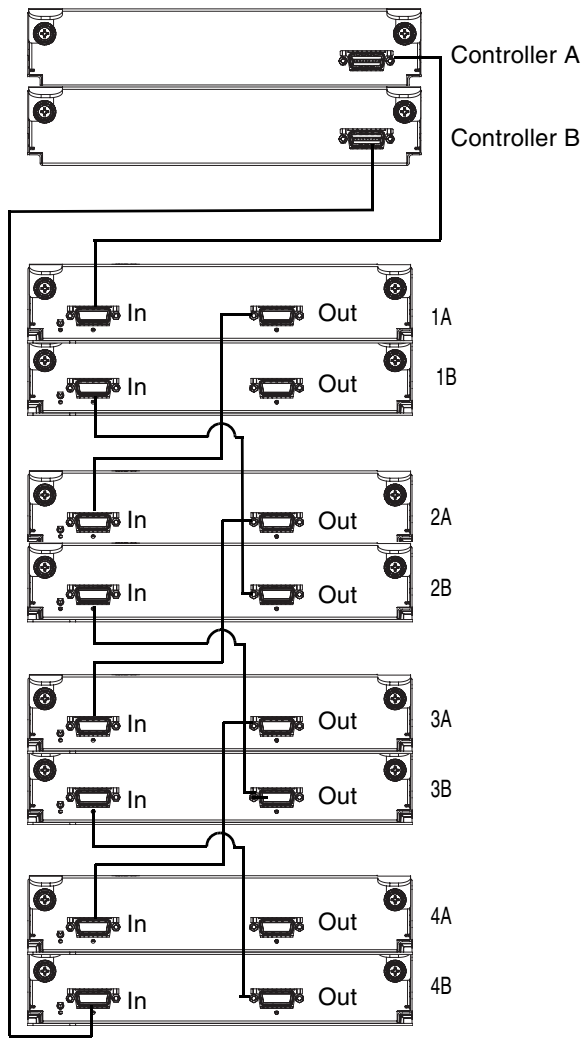


Figure 2-5 Fault-Tolerant Cabling Connections Between One Controller Enclosure and Up to Four Drive Enclosures

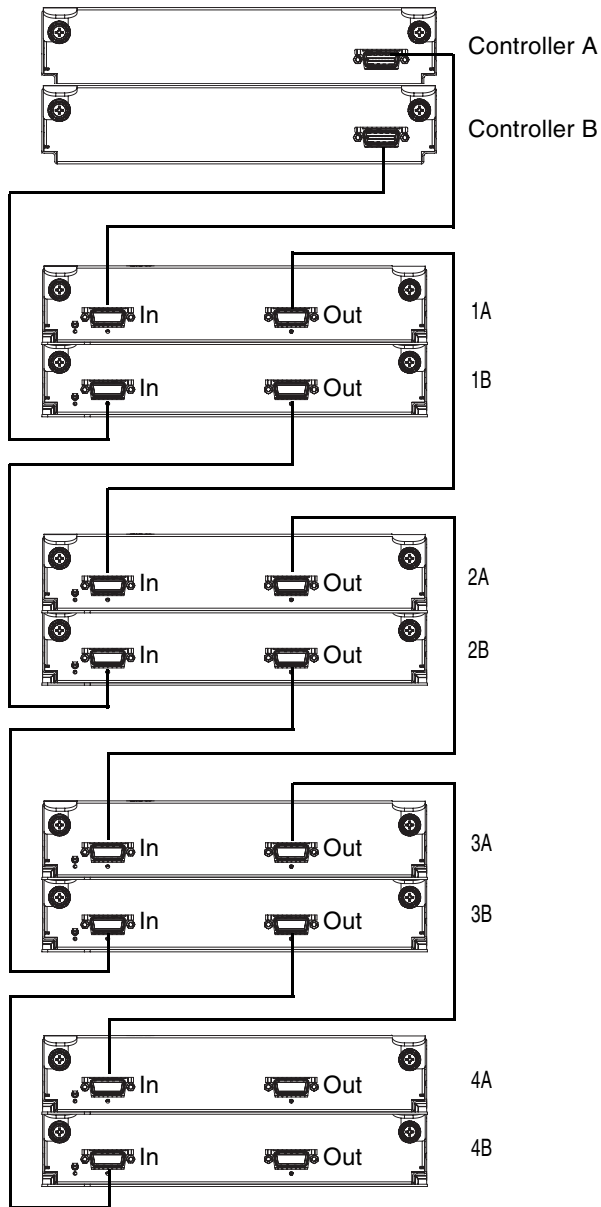
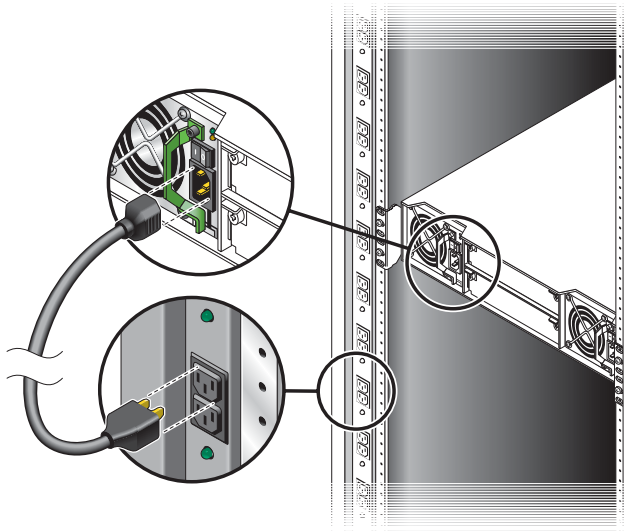


Figure 2-6 Non-Fault-Tolerant Cabling Connections Between One Controller and Up to Four Drive Enclosures

Connecting AC Power

Use this procedure to connect AC power to the enclosures.

1. Verify that both power switches are off.
2. Using the AC power cords, for each enclosure, connect one power and cooling module to one power source in the rack, and the other power and cooling module to a separate power source in the rack.



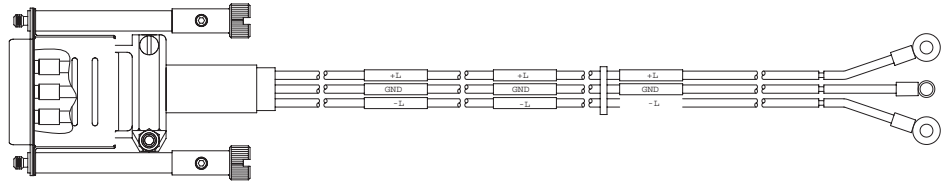
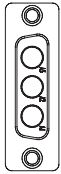
3. Connect the primary power cords from the rack to separate external power sources.
Power on the system as described in the following section.

Connecting DC Power

Except for connecting and disconnecting power cords, power supply installation and removal instructions are the same for DC and AC power supplies.

Connecting DC Power Cords

If your 5730 or 5130 enclosure uses DC power rather than AC power, two DC power cords (part number 35-0000223) are packaged with each DC enclosure.



1. Use only the DC power cables provided with the array.
2. Check the DC cable part number and wire labels carefully before connecting the cable to the source.
3. Connect a DC power cable to the first power supply and then to a power outlet.



Caution – If the array is connected to DC power sources not within the designated –48V DC (–36 VDC to –72 VDC) range, the unit might be damaged.

4. Tighten the cable-locking screws to attach the cable securely to the power supply power outlet.
5. Connect the second power cable to the second power supply and to a second power outlet.
6. Tighten the cable-locking screws.

If one power supply fails, the second power supply automatically takes the full load.

Disconnecting a DC Power Cable

1. Turn the power switch off and carefully disconnect the power cable from the DC power supply.
2. Loosen the cable-locking screws attaching the D-shell connector to the power-and-cooling module.
3. Disconnect the power cable from the power-and-cooling module.

DC Ground Cable Connections

DC-powered versions of the 5730 and 5130 have a pair of ground studs on the right rail bracket to which the ground cable connects. The other end of the ground cable connects to the cabinet grounding rail. In addition, there is a ground cable in the unterminated end of DC input power cable that connects from the power supply to the fuse panel or breaker panel. The ground cable in this cable must also connect to the cabinet grounding rail.

DC Wiring and DC Power Requirements

The system is suitable for installation as part of the Common Bonding Network (CBN).

The system's Battery Return (BR) Input Terminals are considered to be an Isolated DC Return (DC-I). The following are required for all installations:

- All DC mains and supply conductors to power distribution boxes for the rack-mounted system must be enclosed in a metal conduit or raceway when specified by local, national, or other applicable government codes and regulations.
- Ensure that the voltage of your power source matches the voltage inscribed on the equipment's electrical rating label.
- To ensure redundancy, provide two separate power sources for the enclosures. These power sources must be independent of each other, and each must be controlled by a separate circuit breaker at the power distribution point.
- The system requires voltages within minimum fluctuation. The customer-supplied facilities' voltage must maintain a voltage with not more than ± 5 percent fluctuation. The customer facilities must also provide suitable surge protection.
- Site wiring must include an earth ground connection to the DC power source. The supply conductors and power distribution boxes (or equivalent metal enclosure) must be grounded at both ends.
- Power circuits and associated circuit breakers must provide sufficient power and overload protection. To prevent possible damage to the DC power distribution boxes and other components in the rack, use an external, independent power source that is isolated from large switching loads.

DC Power System Warnings

To reduce the risk of electric shock or damage to the equipment DC power supplies must be installed in accordance with the following guidelines:

- This product is intended to be installed only in a restricted access location.
- This product is intended to be connected to a DC power source that can be classified as a secondary circuit in accordance with applicable National requirements for Information Technology Equipment. Generally, these requirements are based on the International Standard for Safety of for Information Technology Equipment, IEC 60950-1.
- This product must be connected to a power distribution device that provides a means for disconnecting power from the branch supply circuit. The power distribution device must be provided with an over-current protective device suitable for interrupting fault currents available from the main source.
- The rack must be connected to site ground.
- Ground cable assemblies for enclosures in the racks must be connected to the cabinet grounding rail. Do not rely on the rack or cabinet chassis to provide adequate ground/earth continuity.
- Never connect cables to a terminal when there is power supplied to that circuit.

Cabling requirements

- Keep power and interface cables clear of foot traffic. Route cables in locations that protect the cables from damage.
- Route interface cables away from motors and other sources of magnetic or radio frequency interference.
- Stay within the cable length limitations.
- This product is suitable for installation in Network Telecommunication Facilities and locations where the NEC applies. The N2S2A is not suitable for Outside Plant (OSP) installations

Testing the Enclosure Connections

Use this procedure to power on the newly installed system.

1. Press the power switches at the back of each drive enclosure to the On position.

This ensures that the disks in the enclosures have enough time to completely spin up before being scanned by the RAID modules in the controller enclosure.

While enclosures power up, their LEDs blink. After the LEDs stop blinking, if no LEDs on the front and back of the enclosure are yellow, the power-on sequence is complete and no faults have been detected.

For a description of LED behavior and status, see “Hardware Components and LEDs” on page 45.

2. Press the power switches at the back of the controller enclosure to the On position.

Depending on the number and type of drives in the system, it can take several minutes for the system to power up.

If the enclosure’s power-on sequence succeeds as described in Step 1, the system is ready to use.

General Practice for Powering the System Off and On

The system rarely needs to be powered off. You remove power only when you plan to physically move the system to another location.

Use this procedure when you need to power off the system.

1. Stop all I/O from hosts to the system.
2. Use RAIDar to shut down both controllers.
Wait until RAIDar indicates that processing is complete.
3. Press the power switches at the back of the controller enclosure to the Off position.
4. Press the power switches at the back of each drive enclosure to the Off position.

When powering on the system, make sure to power up the enclosures and associated data host in the following order:

1. Drive enclosures first

2. Controller enclosure next
3. Data hosts last (if they are powered down for maintenance purposes)

Obtaining IP Values for Your Storage System

Before installing or configuring your system, obtain IP, gateway, and subnet mask addresses for the Ethernet management ports on your R/Evolution storage system from your network administrator.

A different IP address should be assigned for each Ethernet management port (one each for controller A and controller B).

You will use these values when you set IP addresses for Ethernet management ports during initial configuration (see “Setting Management Port IP Addresses Using the CLI” on page 36).

Note – You can also obtain IP values for Ethernet management ports from a DHCP server if one is available. For more information, see the *reference guide*.

Correcting Enclosure IDs

When installing a system with drive enclosures attached, the enclosure IDs might not agree with the physical cabling order. This is because the controller might have been previously attached to some of the same enclosures and it attempts to preserve the previous enclosure IDs if possible. To correct this condition, make sure that both controllers are up and perform a rescan using RAIDar or the CLI. This will reorder the enclosures, but can take up to two minutes for the enclosure IDs to be corrected.

To perform a rescan using the CLI, type the following command:

```
rescan
```

To rescan using RAIDar:

1. Select Manage > General Config > Enclosure Management > Reorder Enclosure IDs.
2. In the Reorder Enclosure IDs panel, click Rescan.

Next Steps

Now you are ready to connect the data and management hosts, as described in Chapter 3.

Connecting Hosts

This chapter describes how to connect data and management hosts to controller enclosures. It contains the following sections:

- “Host System Requirements” on page 31
- “Connecting the Enclosure Directly to Data Hosts” on page 32
- “Connecting Remote Management Hosts” on page 34

Host System Requirements

Data hosts connected to controller enclosures must meet the following requirements:

- To configure an HBA that is directly attached to controller enclosure host ports, set the HBA parameters as specified in your storage system’s *release notes*. This ensures the HBA can identify the system.
- Depending on your system configuration, data host operating systems may require that multipathing is supported.

If fault tolerance is required, then multipathing software may be required. Host-based mutipath software should be used in any configuration where two logical paths between the host and nay storage volume may exist at the same time. This would include most configurations where there are multiple connections to the host or multiple connections between a switch and the storage.

For information on installing the R/Evolution MPIO DSM, see *Installing Optional Software for Microsoft Windows Server* available at the following location:

crc.dothill.com

- To prevent Microsoft Windows® data hosts from displaying the Found New Hardware Wizard when the storage system is discovered, install the R/Evolution SCSI Enclosure Services driver. For more information, see “Installing the R/Evolution SES Driver for Microsoft Windows Hosts” on page 32.

Installing the R/Evolution SES Driver for Microsoft Windows Hosts

Installing the R/Evolution SCSI Enclosure Services (SES) driver prevents Microsoft Windows hosts from displaying the Found New Hardware Wizard when the storage system is discovered.

1. In a web browser, go to crc.dothill.com and download the R/Evolution SCSI Enclosure Services (SES) driver package, `r-evo-ses-version.zip`, to a location that the data host can access.
2. Extract the package contents to a temporary folder on the host.
3. In that folder, double-click `Setup.exe` to install the driver.
4. Click Finish.
The driver is installed.
5. Optionally, delete the extracted files and the SES driver package.

Connecting the Enclosure Directly to Data Hosts

This section illustrates the preferred configurations for connecting the controller enclosure directly to data hosts. The controller enclosure has four host connections, two per controller.

For additional cabling configurations, see “Additional Cabling Configuration Examples” on page 55.

Note – For clarity, the schematic illustrations of the controllers shown in this section show only relevant details such as host ports. For detailed illustrations showing all components, see “Hardware Components and LEDs” on page 45.

Figure 3-1 shows the preferred redundant configuration. In this configuration, both hosts have redundant connections to all volumes. If a controller were to fail, the hosts maintain access to all of the volumes through the host ports on the surviving controller.

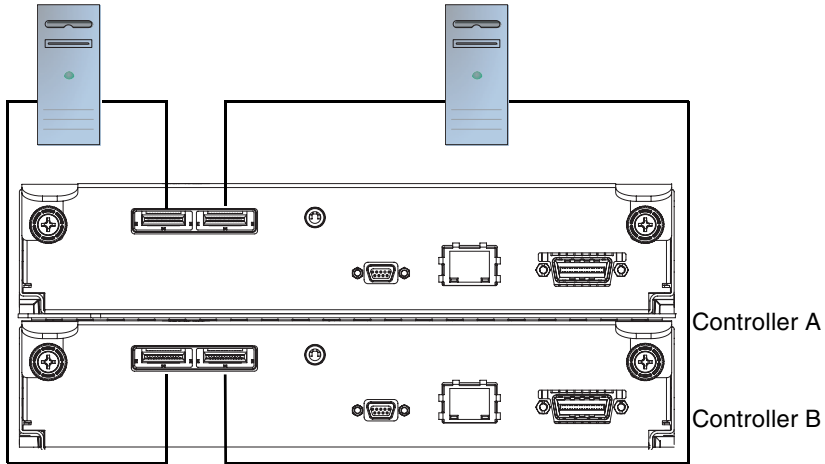


Figure 3-1 High-Availability, Dual-Controller, Direct Attach Connection to Two Dual-Port Data Hosts

In the configuration shown in Figure 3-2, the host has redundant connections to the volumes assigned to each controller. If a controller were to fail, the host maintains access to all the volumes through the host port on the surviving controller.

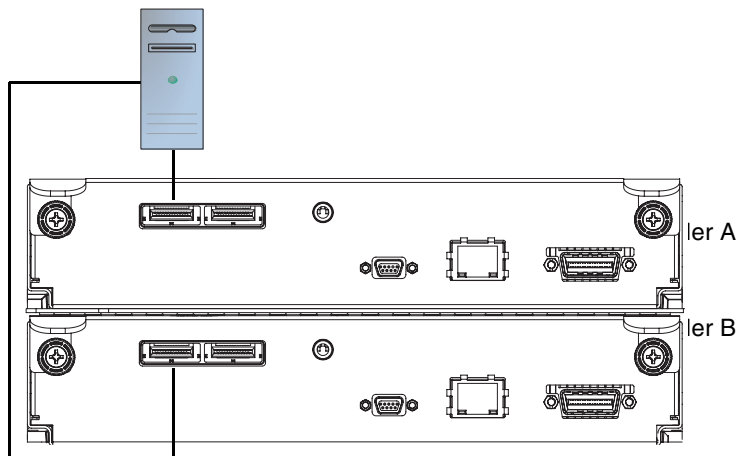


Figure 3-2 High-Availability, Dual-Controller, Direct Attach Connection to One Dual-Port Data Host

Connecting Remote Management Hosts

The management host directly manages systems out-of-band over an Ethernet network. This section describes how to connect the Ethernet cables to the management host.

1. Connect an Ethernet cable to the Ethernet management port on each controller.
2. Connect the other end of each Ethernet cable to a network that your management host can access (preferably on the same subnet).

Next Steps

After you have connected the management host and data hosts, you are ready to perform first-time configuration on the storage system as described in Chapter 4.

Configuring a System for the First Time

This chapter describes how to perform first-time configuration on the storage system using RAIDar, which is the primary interface for configuring and managing the system. It also describes how to perform basic storage configuration to verify that your system is working.

This chapter includes the following topics:

- “Setting Management Port IP Addresses Using the CLI” on page 36
- “Configuring Your Web Browser for RAIDar” on page 40
- “Logging in to RAIDar from a Local Management Host” on page 40
- “Setting the Date and Time” on page 41
- “Creating Virtual Disks” on page 42
- “Mapping a Data Host to a Volume” on page 43
- “Testing the Configuration” on page 44
- “Logging Out of RAIDar” on page 44
- “Next Steps” on page 44

For information about additional configuration and management tasks, including changing the manage user’s password, see RAIDar’s online help or the *reference guide*.

Setting Management Port IP Addresses Using the CLI

Ethernet Management ports on controller module A and controller module B are configured with the following default values:

- **Management Port IP Address:** 10.0.0.2 (controller A), 10.0.0.3 (controller B)
- **IP Subnet Mask:** 255.255.255.0
- **Gateway IP Address:** 10.0.0.1

If the default IP addresses are not compatible with your network, you must set an IP address for each management port using the command-line interface (CLI) embedded in each controller module. The CLI enables you to access the system using RS-232 communication and terminal emulation software.

Use the CLI commands described in the steps below to set the IP address for the Ethernet management port on each controller module.

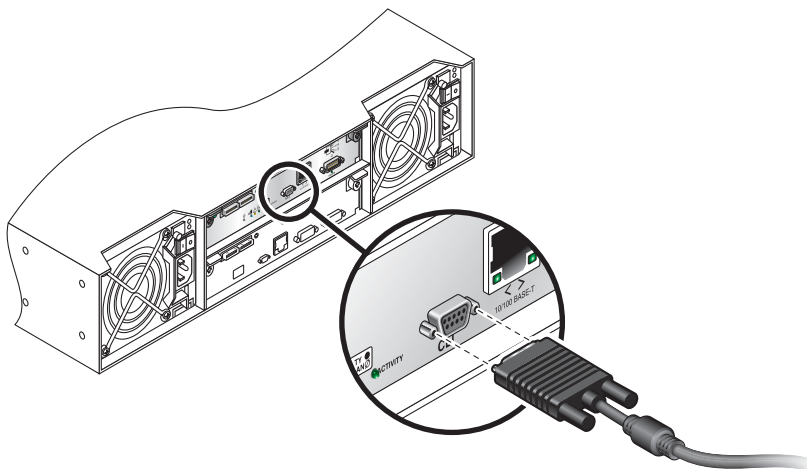
Once new IP addresses are set, you can change them as needed using RAIDar.

Note – Changing IP settings can cause management hosts to lose access to the storage system.

Note – The *site planning guide* provides installation and configuration worksheets that you can use to record values. You can download this guide at the following location:

crc.dothill.com

1. From your network administrator obtain an IP address, subnet mask, and gateway address for controller A and controller B.
2. Use the provided micro-DB9 serial cable to connect controller A to a serial port on a host computer.



Your package contents include a micro-DB9-to-DB9 serial cable. If necessary, use a DB9-to-DB25 adapter (not included) for connecting the serial cable to a DB25 serial port on the host computer.

3. Start and configure a terminal emulator, such as HyperTerminal or VT-100, using the display settings in Table 4-1 and the connection settings in Table 4-2.

Table 4-1 Terminal Emulator Display Settings

Parameter	Value
Terminal Emulation Mode	VT-100 or ANSI (for color support)
Font	Terminal
Translations	None
Columns	80

Table 4-2 Terminal Emulator Connection Settings

Parameter	Value
Connector	COM1 (typically)
Baud rate (bits/sec)	115,200
Data bits	8
Parity	None
Stop bits	1
Flow control	None

4. In the terminal emulator, connect to controller A.
5. Press Enter to display the CLI prompt (#).
6. At the prompt, type the following command to set the values you obtained in for each Ethernet management port, first for controller A and then for controller B:

```
set network-parameters ip address netmask netmask gateway gateway
controller a|b
```

where:

- *address* is the IP address of the controller
- *netmask* is the subnet mask, in dotted-decimal format
- *gateway* is the IP address of the subnet router
- a|b specifies the controller whose network parameters you are setting

For example:

```
# set network-parameters ip 192.168.0.10 netmask 255.255.255.0
gateway 192.168.0.1 controller a

# set network-parameters ip 192.168.0.11 netmask 255.255.255.0
gateway 192.168.0.1 controller b
```

7. Type the following command to verify the new IP addresses:

```
show network-parameters
```

As shown in the following example, network parameters, including the IP address, gateway address, and subnet mask are displayed for each controller.

```
Network Parameters Controller A
-----
IP Address       : 192.168.0.10
Gateway         : 192.168.0.1
Subnet Mask     : 255.255.0.0
MAC Address     : 00:00:FF:D5:01:4D
Addressing Mode : Manual

Network Parameters Controller B
-----
IP Address       : 192.168.0.11
Gateway         : 192.168.0.1
Subnet Mask     : 255.255.0.0
MAC Address     : 00:C0:FF:D5:01:15
Addressing Mode : Manual
```

8. In the host computer's command window, type the following command to verify Ethernet connectivity, first for controller A and then for controller B:

```
ping IP-address
```

If you cannot access your system three minutes after changing the IP address, your network might require you to restart the management controller using the CLI. When you restart a management controller, communication with it is temporarily lost until it successfully restarts.

Type the following command to restart the management controller on both controllers:

```
restart mc both
```

9. After you have verified Ethernet connectivity, disconnect the serial cable and exit the emulator.

Configuring Your Web Browser for RAIDar

Before using RAIDar to perform remaining steps, ensure that your web browser is properly configured according to the following guidelines:

- Use one of the following browsers:
 - Microsoft Internet Explorer 5.5 or later
 - Mozilla Firefox 1.0.7 or later
- Because RAIDar uses popup windows to indicate the progress of user-requested tasks, disable any browser features or tools that block popup windows.
- For optimal performance, set your browser to use stored (cached) web pages.

Note – Changing your browser cache setting might affect other sites you visit with your browser.

- To optimize display, use a color monitor and set its color quality to the highest setting.
- For Internet Explorer, to ensure you can navigate beyond RAIDar login page, set the local-intranet security option to medium or medium-low.

Logging in to RAIDar from a Local Management Host

To log in to RAIDar from a local management host:

1. In your web browser's address field, type the IP address of one of the controller enclosure's Ethernet management ports and press Enter.

The RAIDar Login page is displayed. If the Login page does not display, verify that you have entered the correct IP address.

2. On the login page, type the default management user name `manage` and default password `!manage`
3. Click Log In.

The Status Summary page is displayed.

Setting the Date and Time

You can set the date and time manually or configure the system to use Network Time Protocol (NTP) to obtain them from a network-attached server. When NTP is enabled, and if an NTP server is available, the system time and date can be obtained from the NTP server. This allows multiple storage devices, hosts, log files, and so forth to be synchronized.

NTP server time is provided in Universal Time (UT), which provides several options:

- If you want to synchronize the times and logs between storage devices installed in multiple time zones, set all the storage devices to use UT.
- If you want to use the local time for the device, set its time zone appropriately.
- If a time server can provide local time rather than UT, configure the storage devices to use that time server, with no further time adjustment.

If no NTP server is present, the date and time are maintained as if NTP had not been enabled.

To manually set the system date and time:

1. Select **Manage > General Config > Set Date/Time**.
2. In the **Set System Date** panel, select the current month, day, and year.
3. In the **Set System Time** panel, type time values using a 24-hour clock (where hour 8 represents 8 a.m. and hour 20 represents 8 p.m.) and select the proper time zone.
4. Click **Change Date/Time**.

To obtain the date and time from an NTP server:

1. Select **Manage > General Config > Set Date/Time**.
2. In the **Obtain Time With NTP** panel, set **Network Time Protocol** to **Enable** and optionally type the IP address of an NTP server.

If no IP server address is set, the system listens for time messages sent by an NTP server in broadcast mode.

3. In the **Set System Time** panel, select the proper time zone.
4. Click **Change Date/Time**.

You might have to refresh the page to display updated values from the NTP server.

Creating Virtual Disks

Two or more disk drives can be logically combined to form a virtual disk. The combined storage capacity can then be partitioned into volumes. RAIDar provides both manual and automatic methods for creating virtual disks, as described in its online help and in the *reference guide*.

As an example, the following steps use the *manual* method to create two virtual disks with the following characteristics:

- RAID 5, in which parity is distributed across all disk drives in the virtual disk
- Five disk drives per virtual disk
- One spare disk drive dedicated to each virtual disk
- One volume per virtual disk, where the volume is not visible to data hosts

To create both virtual disks:

1. Select Manage > Virtual Disk Config > Create A Vdisk.
2. Select Manual Virtual Disk Creation.
3. Type a name for the virtual disk.
The name is case-sensitive and can include 17 characters. Allowed characters include letters, numbers, hyphens, underscores, and spaces.
4. Select RAID 5 – Parity RAID, Parity Distributed.
5. Click Create New Virtual Disk.
6. Select five drives of the same size and type (all SAS or all SATA).
7. For the dedicated spare drive option, select Yes and click Continue.

You can add a maximum of four available drives to a redundant virtual disk (RAID 1, 3, 5, 6, 10, and 50) for use as spares. If a drive in the virtual disk fails, one of these *vdisk spares* is automatically used to reconstruct the virtual disk. A spare drive must have sufficient capacity to replace the smallest drive in the virtual disk. Vdisk spares are also called *dedicated spares*.

The controller automatically uses the vdisk spare for reconstruction of the critical virtual disk to which it belongs. The virtual disk remains in Critical status until the parity or mirror data is completely written to the spare, at which time the virtual

disk returns to Fault Tolerant status. For RAID 50 virtual disks, if more than one sub-vdisk becomes critical, reconstruction and use of vdisk spares occur in the order sub-vdisks are numbered.

Although using a vdisk spare is the most secure way to provide spares for your virtual disks, it is also expensive to keep a spare assigned to each virtual disk. An alternative method is to enable dynamic spares or to assign one or more unused drives as global spares.

8. Select a drive to be the spare and click Continue.
9. For the number of volumes, select 1.
Notice that by default the volume will not be presented to (accessible by) hosts.
10. Click Create Virtual Disk.
A page is displayed that shows the progress of initializing the virtual disk.
11. Click the link to create another virtual disk.
12. Repeat Step 2 to Step 10 to create a second virtual disk with a different name.

Mapping a Data Host to a Volume

To enable a data host to access a volume you created, you must map the volume to the host. The port World Wide Name (WWN) of each host connected to the system is automatically added to the system's global host port list.

Before mapping a data host to a volume you must identify the data host's port WWN and a LUN that the host is not using.

To map a data host to a volume:

1. Select Manage > Volume Management > Volume Mapping > Map Hosts To Volume.
Notice that your first virtual disk and its volume are selected, and the volume's host mapping values are set to None.
2. In the Add or Modify a Mapping panel:
 - a. Select the host WWN value that you identified before beginning.
 - b. Type the LUN.
 - c. Leave the access type set as read-write.
 - d. Select all ports.
 - e. Click Map It.

The host has read-write access to the volume through any controller host port.

Testing the Configuration

To determine that your system is ready for use, test the configuration as follows:

1. In RAIDar, select Monitor > Vdisk Status and view the configuration information for each virtual disk.

The virtual disk status is Critical during initialization but you can perform I/O to the volume.

2. From the data host:
 - a. Create a file system on the volume.
 - b. Verify that you can access the mapped volume and the volume size shown on the data host matches the size shown in RAIDar.
 - c. Verify that you can write data to the volume.

If the above tests succeed, your system is ready for use.

3. Optionally, unmount the volume and delete the vdisks created for test.

Logging Out of RAIDar

If you do not log out of RAIDar when you have finished using it, other manage users cannot log in to the same controller module and your IP address stays logged in for 30 minutes (the default auto-logout timeout setting).

To log out of RAIDar:

1. Click Log Off at the bottom of the menu.

The Log Off page is displayed.

2. Click Log Off.

Next Steps

You have completed the initial configuration tasks covered in this guide. For additional information on configuring your system and performing administrative tasks, see RAIDar's online help or the *reference guide*. If you encounter problems with the operation of your system, see the *troubleshooting guide*.

Hardware Components and LEDs

This chapter describes the main hardware components of R/Evolution storage system enclosures.

Controller Components and LEDs

Table A-1 describes the enclosure components.

Table A-1 Controller Enclosure Components

Description	Quantity
Controller (I/O) module	1 or 2 ¹
SAS or SATA drive module	2–12 per enclosure
AC power-and-cooling module	2 per enclosure
3-Gbps, 4-lane host ports (SFF-8088 standard interface)	2 per controller module
3-Gbps, 4-lane SAS expansion port (SFF-8470 standard interface)	1 per controller module
Ethernet port (RJ-45)	1 per controller module
CLI port (RS-232 micro-DB9)	1 per controller module

¹ Air-management system drive blanks or I/O blanks must fill empty slots to maintain optimum airflow through the chassis.

Figure A-1 shows the LEDs on the front of a controller enclosure.

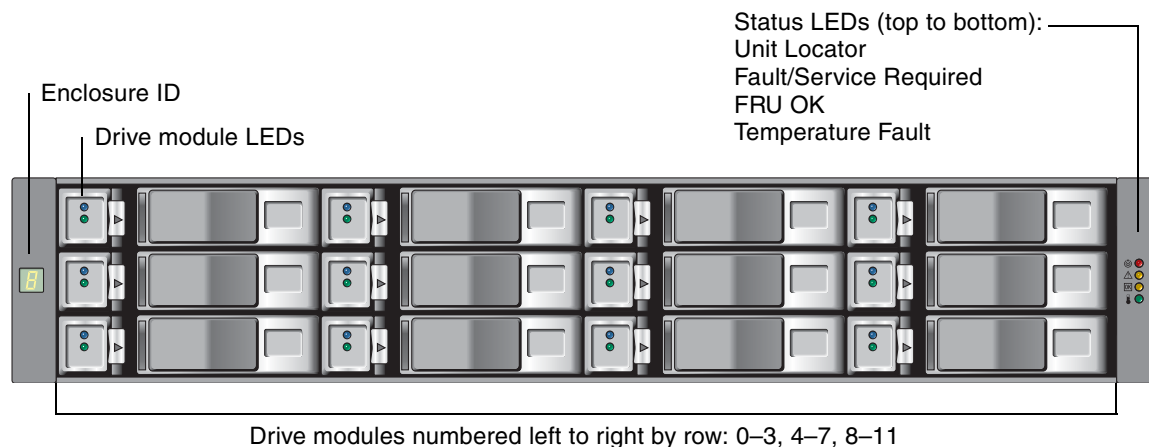


Figure A-1 Enclosure (Front View)

Table A-2 describes the LEDs on the front of an enclosure.

Table A-2 Enclosure LEDs (Front)

Location	LED	Color	Operating State	Description
Left ear	Enclosure ID	Green	On	Shows the enclosure ID, which enables you to correlate an enclosure with logical views presented by management software. The enclosure ID for a controller enclosure is zero (0); the enclosure ID for an attached drive enclosure is nonzero.
Drive module	OK to Remove (Upper LED)	Blue	Off	The drive module is not prepared for removal.
			On	The drive module has been removed from any active virtual disk, spun down, and prepared for removal.
Drive module	Power/Activity/Fault (Lower LED)	Green	Off	If neither green nor yellow, the drive module is not powered on.
			On	The drive module is operating normally.
			Blink	The drive module is active and processing I/O or is performing a media scan.

Table A-2 Enclosure LEDs (Front) *(Continued)*





Location	LED	Color	Operating State	Description
Drive module	Power/Activity/ Fault (Lower LED)	Yellow	Off	If neither green nor yellow, the drive module is not powered on.
			On	<ul style="list-style-type: none"> • The drive module has experienced a fault or has failed • The vdisk is initializing or rebuilding • The vdisk is down or critical.
			Blink	Physically identifies the drive module.
Right ear	 Unit Locator	White	Off	Normal operation.
			Blink	Physically identifies the enclosure.
Right ear	 Fault/Service Required	Yellow	Off	No fault.
			On	An enclosure-level fault occurred. Service action is required. The event has been acknowledged but the problem needs attention.
Right ear	 FRU OK	Green	On	The enclosure is powered on with at least one power and cooling module operating normally.
			Off	Both power and cooling modules are off.
Right ear	 Temperature Fault	Green	Off	The enclosure temperature is normal.
			Yellow	The enclosure temperature is above threshold.

Figure A-2 shows the ports and switches at the back of the controller enclosure.

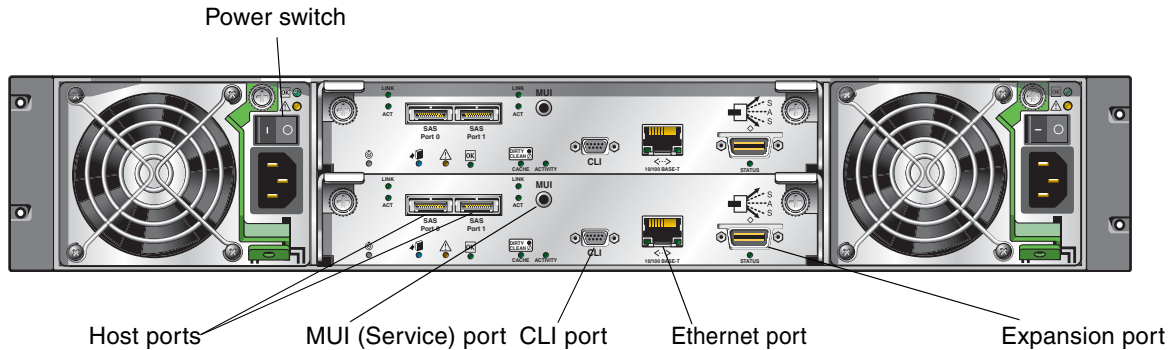


Figure A-2 Controller Enclosure Ports and Switches (Back View)

Table A-3 describes the ports and switches on the back of the controller enclosure.

Table A-3 Controller Enclosure Ports and Switches (Back)

Location	Port/Switch	Description
Power and cooling module	Power switch	On/Off toggle
Controller module	Host ports	1-GbE Ethernet ports used to connect to data hosts through Ethernet switches. Host port 0 and 1 correspond to host channel 0 and 1, respectively.
Controller module	Expansion port	3-Gbps, 4-lane (12 Gbps total) table-routed SAS Out port used to connect SAS drive enclosures.
Controller module	Ethernet port	10/100BASE-T Ethernet port used for TCP/IP-based out-of-band management of the RAID controller. An internal Ethernet device provides standard 10 Mbit/second and 100 Mbit/second full-duplex connectivity.
Controller module	CLI port	Micro-DB9 port used to connect the controller enclosure to a local management host using RS-232 communication for out-of-band configuration and management.
Controller module	MUI (Service) port	3.5-mm jack port used by service personnel only.

Figure A-3 shows the LEDs at the back of the controller enclosure.

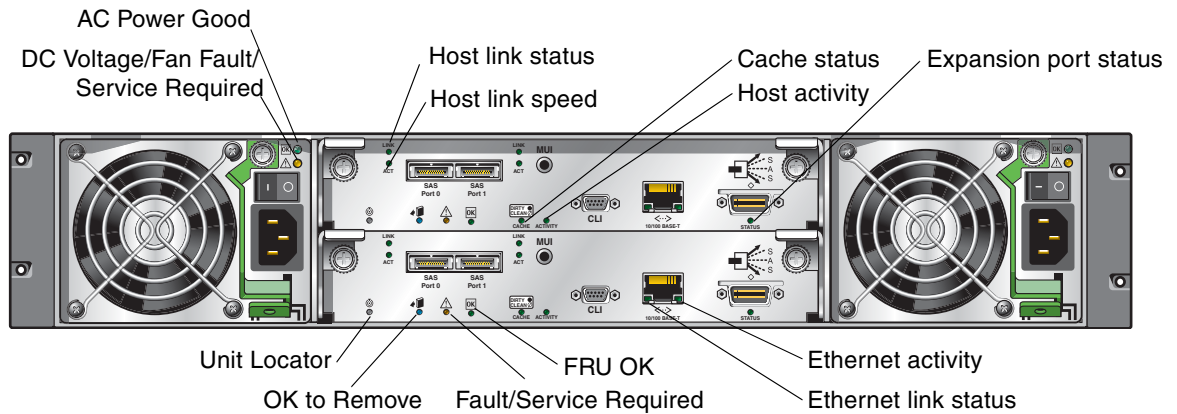






Figure A-3 Controller Enclosure LEDs (Back View)

Table A-4 describes the LEDs on the back of the controller enclosure

Table A-4 Controller Enclosure LEDs (Back)

Location	LED	Color	State	Description
Power and cooling module	AC Power Good	Green	Off	AC power is off or input voltage is below the minimum threshold.
			On	AC power is on and input voltage is normal.
Power and cooling module	DC Voltage/ Fan Fault/ Service Required	Yellow	Off	DC output voltage is normal.
			On	DC output voltage is out of range or a fan is operating below the minimum required RPM.
Controller module	Host link status	Green	Off	The port is empty or the link is down.
			On	The port link is up and connected.
Controller module	Host link speed	Green	Off	The data transfer rate is 2 Gbps.
			On	The data transfer rate is 4 Gbps.

Table A-4 Controller Enclosure LEDs (Back) *(Continued)*

Location	LED	Color	State	Description
Controller module	 Unit Locator	White	Off	Normal operation.
			Blink	Physically identifies the controller module.
Controller module	 OK to Remove	Blue	Off	The controller module is not prepared for removal.
			On	The controller module can be removed.
Controller module	 Fault/Service Required	Yellow	On	A fault has been detected or a service action is required.
			Blink	Indicates a hardware-controlled power up or a cache flush or restore error.
Controller module	 FRU OK	Green	Off	Controller module is not OK.
			On	Controller module is operating normally.
			Blink	System is booting.
Controller module	Cache status	Green	Off	Cache is clean (contains no unwritten data).
			On	Cache is dirty (contains unwritten data) and operation is normal.
			Blink	A Compact Flash flush or cache self-refresh is in progress. Indicates cache activity.
Controller module	Host activity	Green	Off	The host ports have no I/O activity.
			Blink	At least one host port has I/O activity.
Controller module	Ethernet link status	Green	Off	The Ethernet port is not connected or the link is down.
			On	The Ethernet link is up.
Controller module	Ethernet activity	Green	Off	The Ethernet link has no I/O activity.
			Blink	The Ethernet link has I/O activity.
Controller module	Expansion port status	Green	Off	The port is empty or the link is down.
			On	The port link is up and connected.

Drive Enclosure Components and LEDs

A drive enclosure can be connected to a controller enclosure or to another drive enclosure to provide additional disk storage capacity. Table A-5 describes the drive enclosure components.

Table A-5 Drive Enclosure Components

Description	Quantity
Expansion (I/O) module	1 or 2 ¹
SAS or SATA drive module	2–12 per enclosure
AC power and cooling module	2 per enclosure
3-Gbps, 4-lane SAS In port	1 per expansion module
3-Gbps, 4-lane SAS Out port	1 per expansion module
Service port (RS-232 micro-DB9)	1 per expansion module

¹ Air-management system drive blanks or I/O blanks must fill empty slots to maintain optimum airflow through the chassis.

The components and LEDs on the front of a drive enclosure are the same as on a controller enclosure; see Figure A-1 and Table A-2.

Figure A-4 shows the ports and switches at the back of the drive enclosure.

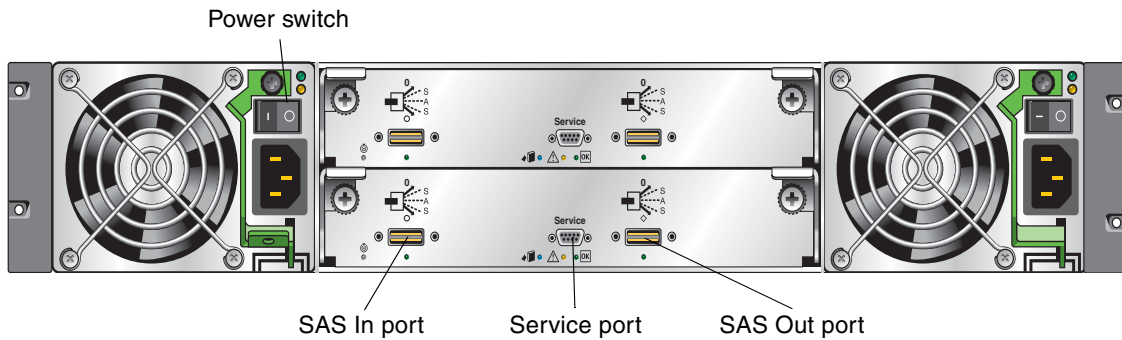


Figure A-4 Drive Enclosure Ports and Switches (Back View)

Table A-6 describes the ports and switches on the back of the drive enclosure.

Table A-6 Drive Enclosure Ports and Switches (Back)

Location	Port/Switch	Description
Power and cooling module	Power switch	On/Off toggle
Expansion module	SAS In port	3-Gbps, 4-lane (12 Gbps total) subtractive ingress port used to connect to a controller enclosure.
Expansion module	SAS Out port	3-Gbps, 4-lane (12 Gbps total) table-routed egress port used to connect to another drive enclosure.
Expansion module	Service port	Micro-DB9 port used by service personnel only.

Figure A-5 shows the LEDs at the back of the drive enclosure.

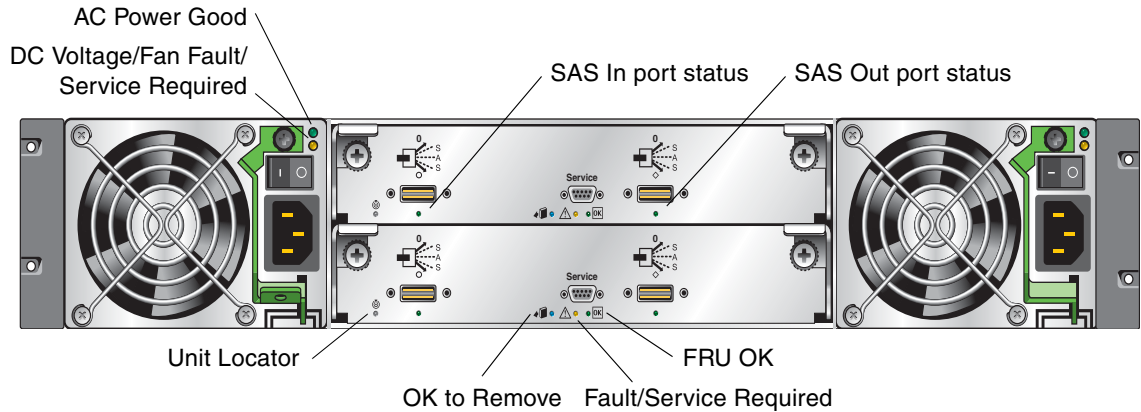




Figure A-5 Drive Enclosure LEDs (Back View)

Table A-7 describes the LEDs on the back of the drive enclosure.

Table A-7 Drive Enclosure LEDs (Back)

Location	LED	Color	State	Description
Power and cooling module	AC Power Good	Green	Off	AC power is off or input voltage is below the minimum threshold.
			On	AC power is on and input voltage is normal.
Power and cooling module	DC Voltage/ Fan Fault/ Service Required	Yellow	Off	DC output voltage is normal.
			On	DC output voltage is out of range or a fan is operating below the minimum required RPM.
Expansion module	SAS In port status	Green	Off	The port is empty or the link is down.
			On	The port link is up and connected.
Expansion module	Unit Locator	White	Off	Normal operation.
			Blink	Physically identifies the expansion module.
Expansion module	OK to Remove	Blue	Off	Not implemented.

Table A-7 Drive Enclosure LEDs (Back) *(Continued)*

Location	LED	Color	State	Description
Expansion module	 Fault/Service Required	Yellow	On	A fault has been detected or a service action is required.
			Blink	Indicates a hardware-controlled power up or a cache flush or restore error.
Expansion module	 FRU OK	Green	Off	Expansion module is not OK.
			On	Expansion module is operating normally.
			Blink	System is booting.
Expansion module	SAS Out port status	Green	Off	The port is empty or the link is down.
			On	The port link is up and connected.

Additional Cabling Configuration Examples

The following configuration examples demonstrate cabling best practices for the specified connection. The standard default configuration for high-availability is shown in “Connecting the Enclosure Directly to Data Hosts” on page 32.

Note – For information on how controllers present volumes to data hosts, see the *reference guide*.

Note – For clarity, the schematic illustrations of the controllers shown in this section show only relevant details such as host ports.

Connection: Single-Controller, Direct Attach, One Single-Port Data Host

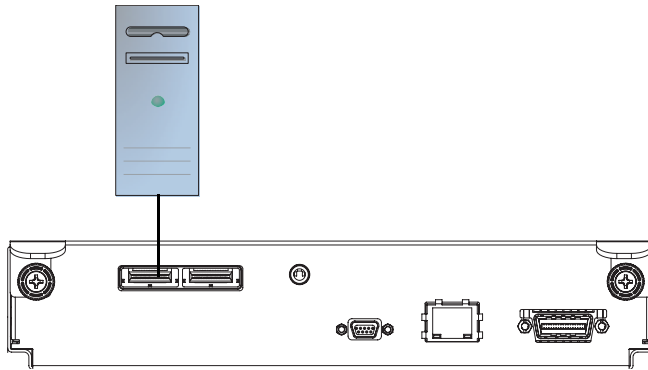


Figure 4-1 Single-Controller, Direct Attach Connection to One Single-Port Data Host

Connection: Single-Controller, Direct Attach, Two Single-Port Data Hosts

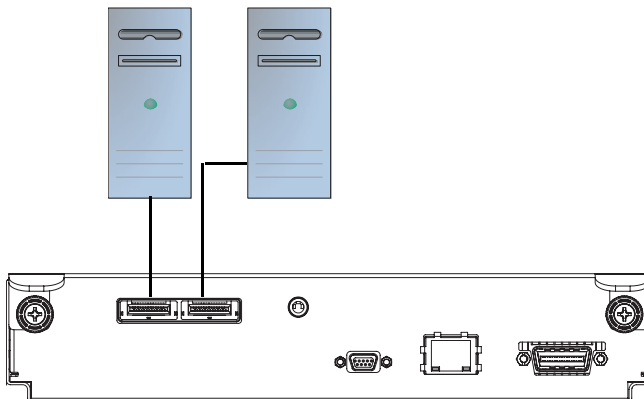


Figure 4-2 Single-Controller, Direct Attach Connection to Two Single-Port Data Hosts

Connection: High-Performance, Dual-Controller, Direct Attach Connection to Four Single-Port Data Hosts

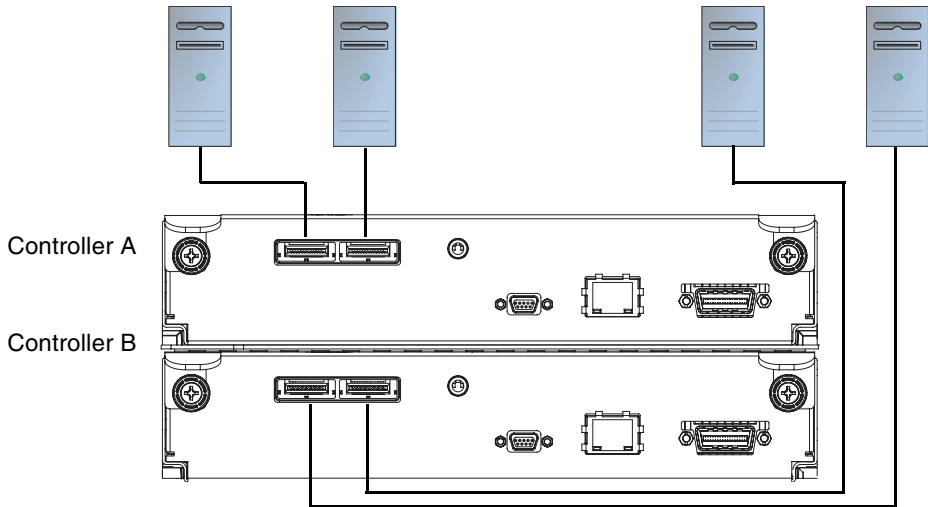


Figure 4-3 High-Performance, Dual-Controller, Direct Attach Connection to Four Single-Port Data Hosts

