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Hitachi Unified Storage
Hardware Service Guide

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Hitachi Data Systems

MK-91DF8302-16

Equipment warranty

The term of guarantee of normal operation of the storage system and free service is one year from date of purchase.

Even when a failure occurs in duplicate only, the storage system may shut off to avoid a serious accident.

Notice of export controls

Export of technical data contained in this document may require an export license from the United States government and/or the government of Japan. Contact the Hitachi Legal Department for any export compliance questions.

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The indication is given based on the Requirements for Controlling Pollution Caused by Electronic Information Products Regulation.

CBXSS/CBXSL/CBSS/CBSL/ CBL/CBLE/CBLD/DBS/DBSD/ DBL/DBLD/DBF/DBX	DBW
	

Toxic and Hazardous Substances and Elements

	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr (VI))	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
CBXSS/ CBXSL/ CBSS/ CBSL/ CBL/ CBLE/ CBLD	x	o	o	o	o	o
DBS/ DBSD/ DBL/ DBLD/ DBF/ DBX	x	o	o	o	o	o
DBW	x	o	o	o	o	o

x = this toxic or hazardous substances contained in all of the homogeneous materials for this part is below this limit requirement in SJ/T 11363-2006.

o = this toxic or hazardous substances contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T 11363-2006.

Backup

Hitachi cannot guarantee against data loss due to failures. Therefore, make backup copies of your data to minimize chances for data loss.

Data backup is also critical when hardware components are added or replaced, since performing such hardware procedures restores parameter settings that can affect how data is managed on the storage systems.

Disposal

This symbol on the product or on its packaging means that your electrical and electronic equipment should be disposed at the end of life separately from your household wastes.

There are separate collection systems for recycling in EU. For more information, contact the local authority or the dealer where you purchased the product.

Recycling

A Nickel-hydride battery is used as a battery in the Cache Backup Battery.

A Nickel-hydride battery is a resource that is can be recycled. When you want to replace the Cache Backup Battery, call the service personnel. They will dispose it for you. (This nickel hydride battery, which is designated as a recycling product, needs to be recycled.)

The mark posted on the Cache Backup Battery is a three-arrow mark that means a recyclable part.

Ni-MH

Equipment with Network Equipment-Building System Specifications

In the Hitachi Unified Storage 150 Disk Array System, the CBLD, DBSD or DBLD are the equipment with the Network Equipment-Building System (NEBS) specifications.

The equipment with the NEBS specifications is suitable for use in Telecommunications Facilities.

The equipment with the NEBS specifications is suitable for use in the CBN (Common Bonding Network).

Open software license

1. This product includes software developed by the OpenSSL project for use in the OpenSSL Toolkit (http://www.openssl.org/).
2. This product includes cryptographic software written by Eric Young (eay@cryptsoft.com).
3. This product includes software written by Tim Hudson (tjh@cryptsoft.com).
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The OpenSSL toolkit stays under a dual license, i.e. both the conditions of the OpenSSL License and the original SSLeay license apply to the toolkit.

See below for the actual license texts. Actually both licenses are BSD-style Open Source licenses. In case of any license issues related to OpenSSL contact openssl-core@openssl.org.

OpenSSL License

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 * This library is free for commercial and non-commercial use as long as
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```

Notes on use:

When using the Hitachi Unified Storage 100 Series Disk Array System, be sure to read this guide and understand the operating procedures and instructions described herein thoroughly before starting your operation. Understand, in particular, the descriptions in the Chapter Safety Precautions thoroughly and follow the instructions in this guide.

Windows 95, Windows 98, Windows 2000, Me, XP, and Windows NT Version 4.0 are abbreviated to Windows in the guide.

The array complies with FDA radiation performance standards 21CFR subchapter J.

EMI regulation

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference in which case the user will be required to correct the interference at his own expense. Testing was done with shielded cables. Therefore, in order to comply with the FCC regulations, you must use shielded cables with you installation.

The EMI test was done in the following configuration.

If trouble occurs in another configuration, a user may be requested to take appropriate preventive measures.

- DF850-CBXSS/CBXSL+DBS/DBL(x2)+RK40
- DF850-CBSS+DBS/DBL(x4)+RK40
- DF850-CBL+ DBS/DBL(x4)+RK40
- DF850-CBSS/CBSL+ DBS/DBL(x4)+DBX(x2)+RK40
- DF850-CBL+ DBW(x4)+RK40
- DF850-CBLD+ DBSD/DBLD(x4)+RK40

This product must not be used in residential areas.

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Hazard warning statements

When purchasing the AC power cable, make sure that the cable has proper rating and meets the country's safety requirement. Otherwise, an electric shock or machine failure may be caused.

1. ANSI: American National Standards Institute
2. NEMA: National Electrical Manufacturers Association
3. IEC: International Electrotechnical Commission
4. CEE: International Commission on Rules for the Approval of Electrical Equipment
5. BS: British Standard Institution
6. AS: Standards Association of Australia

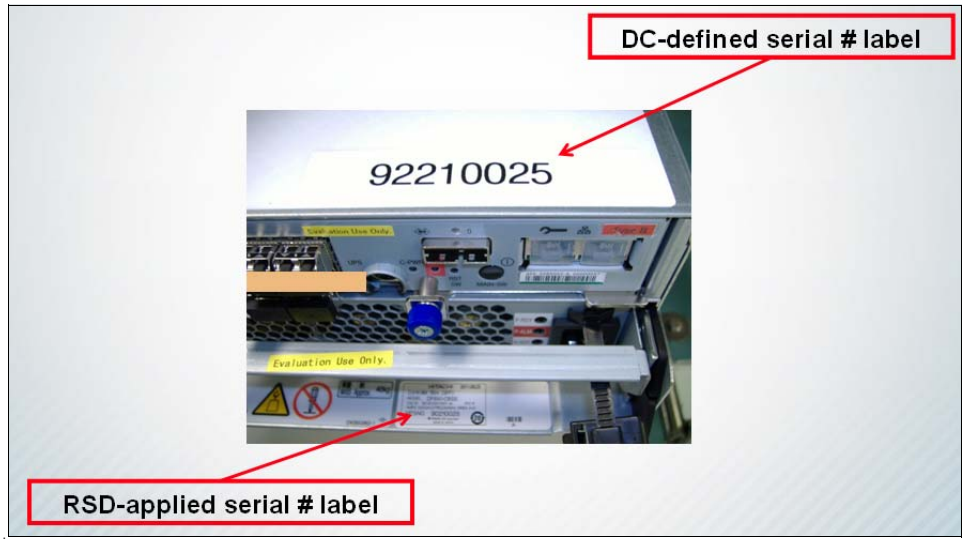
Warning labels on equipment

Warning labels are pasted on portions of the equipment where special care is required. These warnings are for service personnel, not customers.

The following table describes the symbols shown in warning labels.

Label	Description
	Do not disassemble the equipment.
	Exercise care when handling the heavy equipment.
	Handling precautions due to static electricity.
	Exercise care to avoid injuring your fingers.
	Do not place items on this surface of the storage system.

Serial Numbers (Hitachi Unified Storage Models 110 and 130)

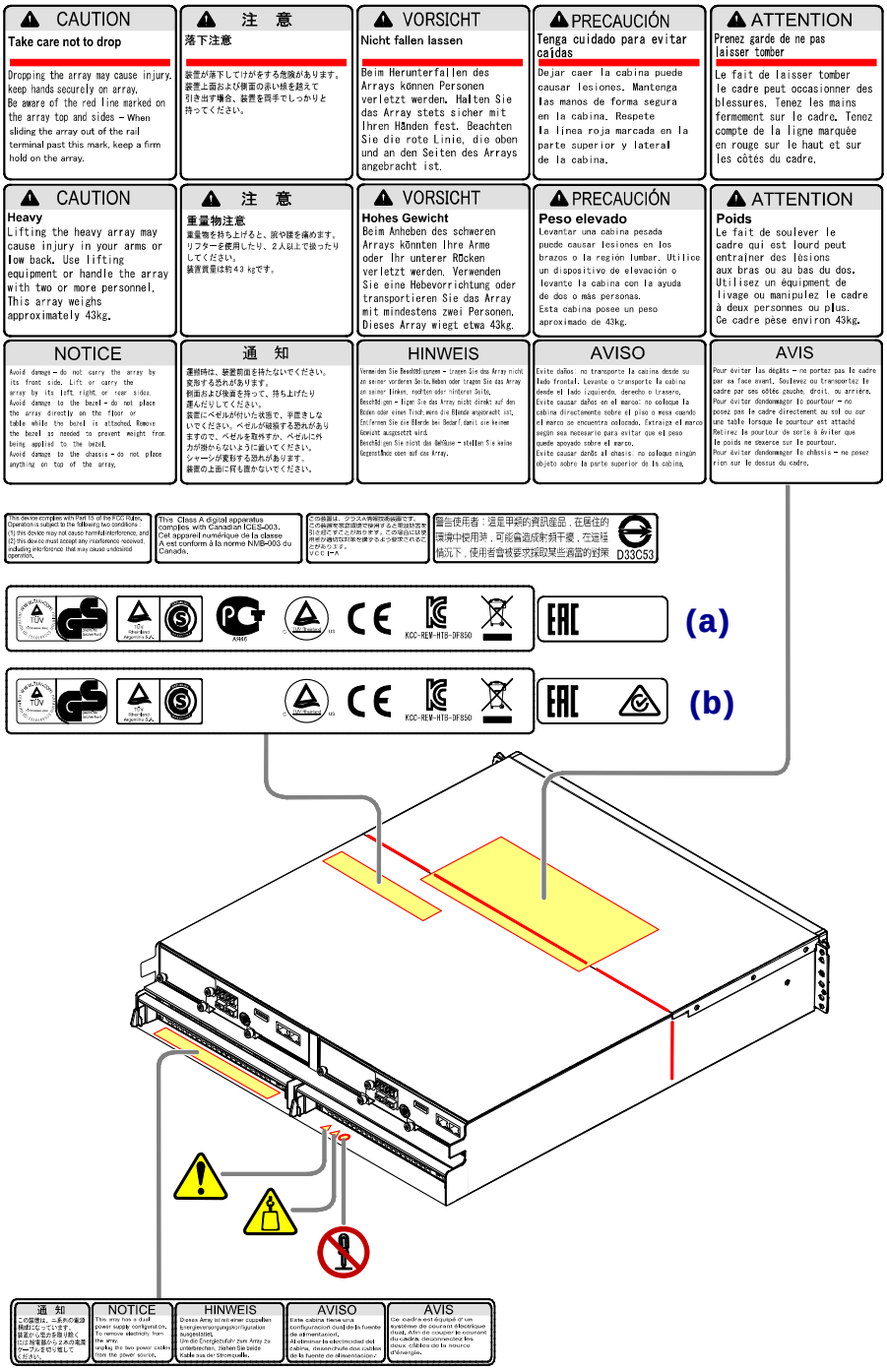


Labels on the CBXSS

Either (a) or (b) is affixed.

Labels on the CBXSL

Either (a) or (b) is affixed.



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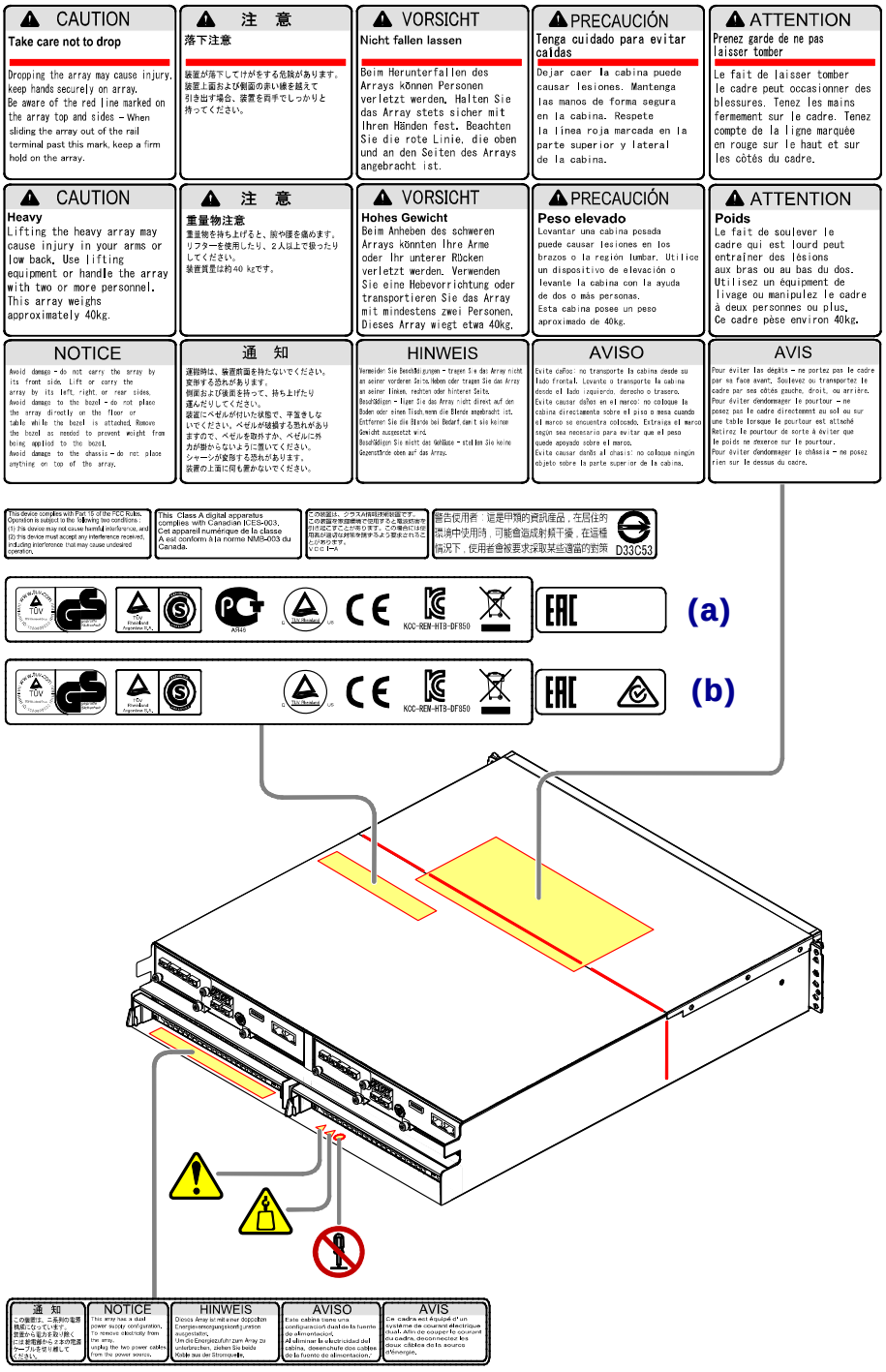

Labels on the CBSL

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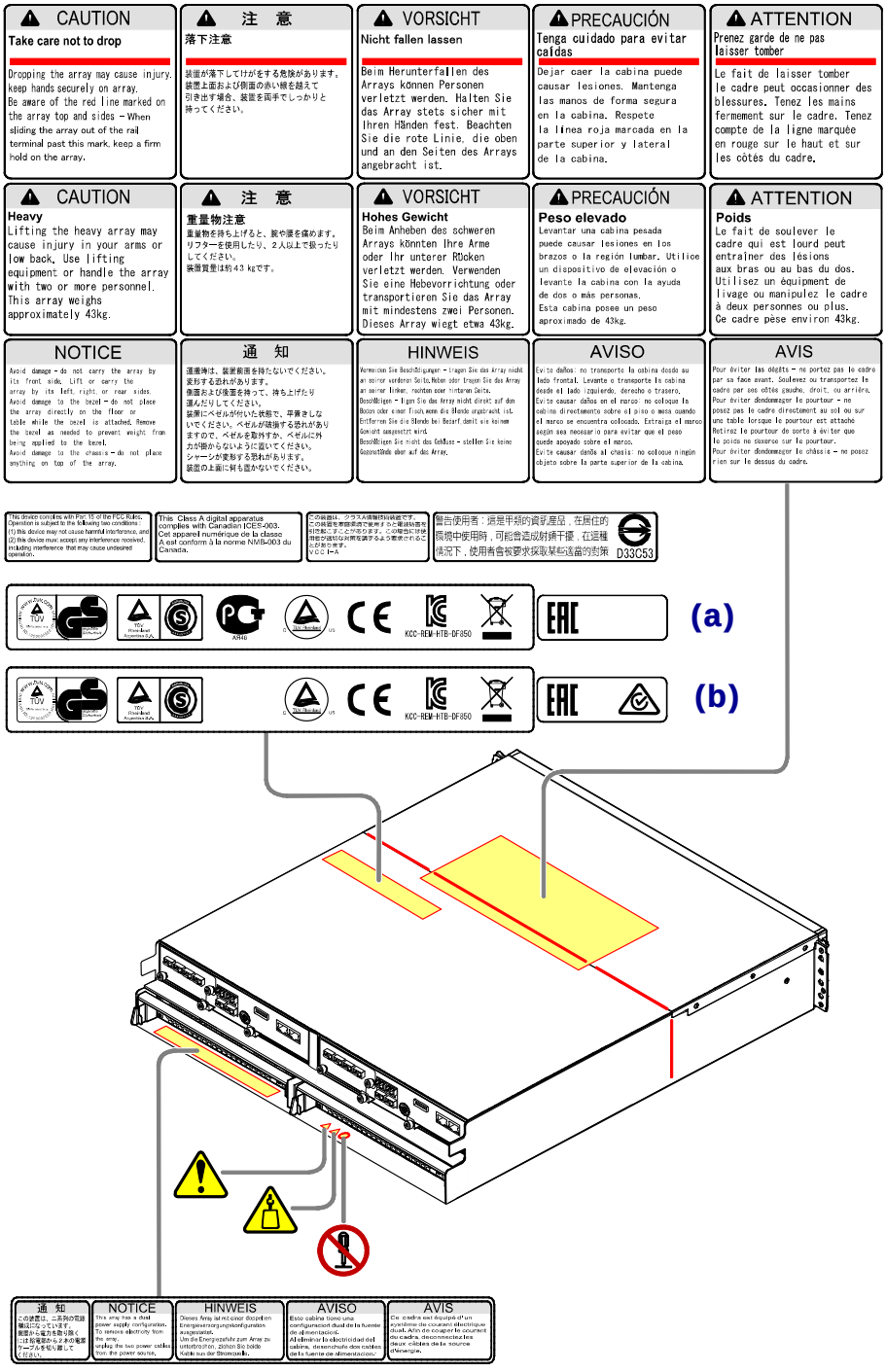

Labels on the CBL / CBLE / CBLD

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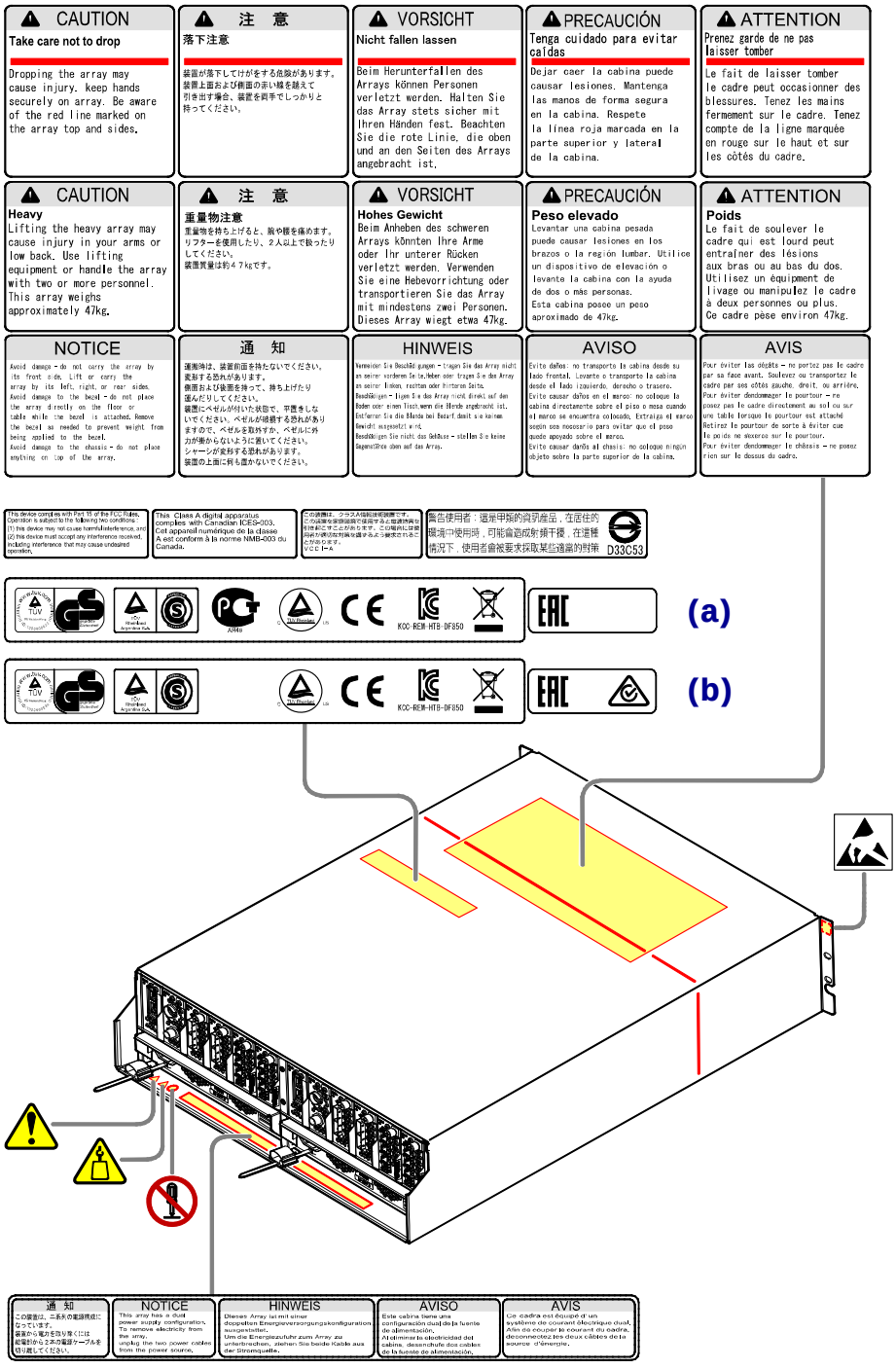

Labels on the DBS / DBSD

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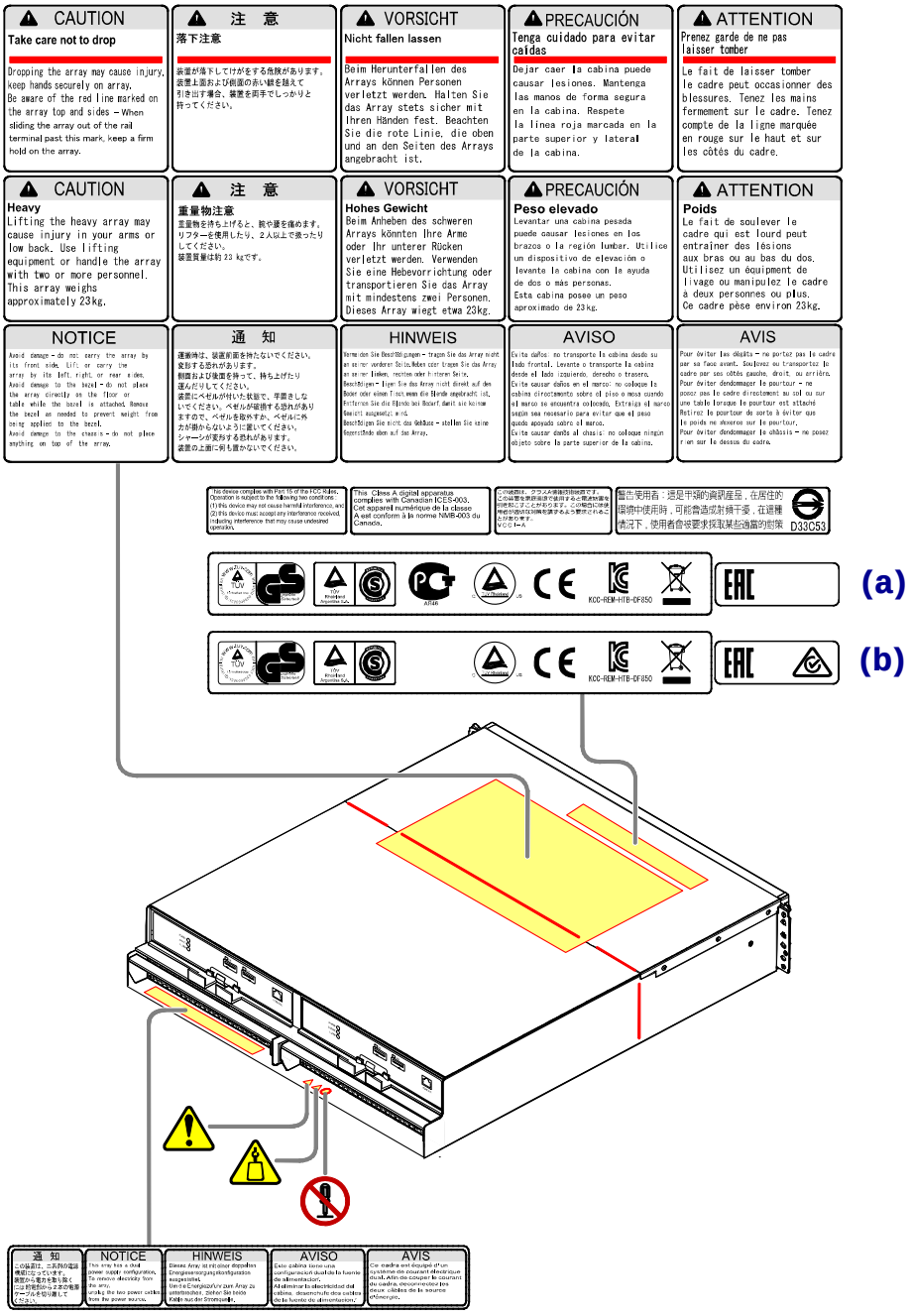

Labels on the DBL/DBLD

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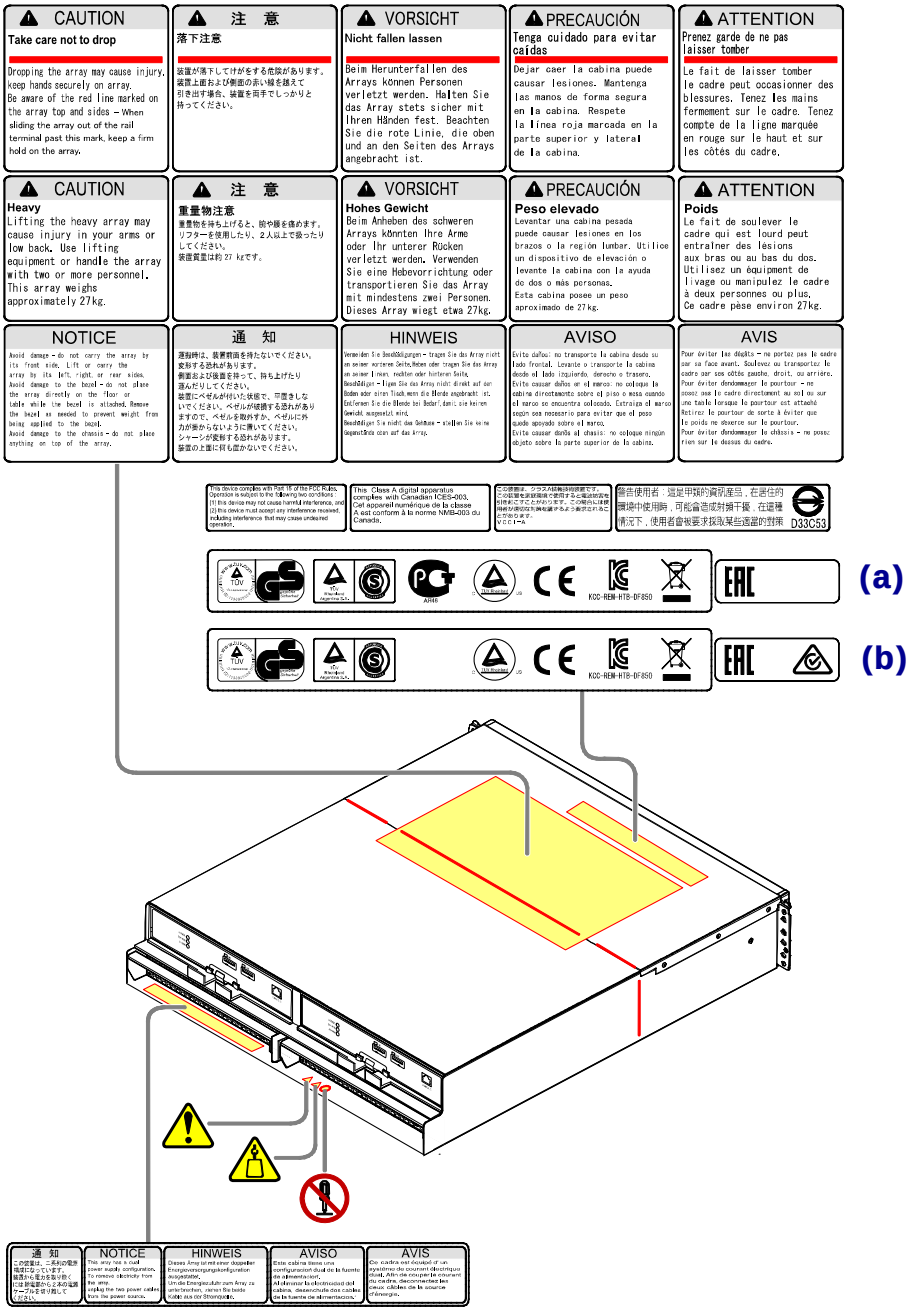
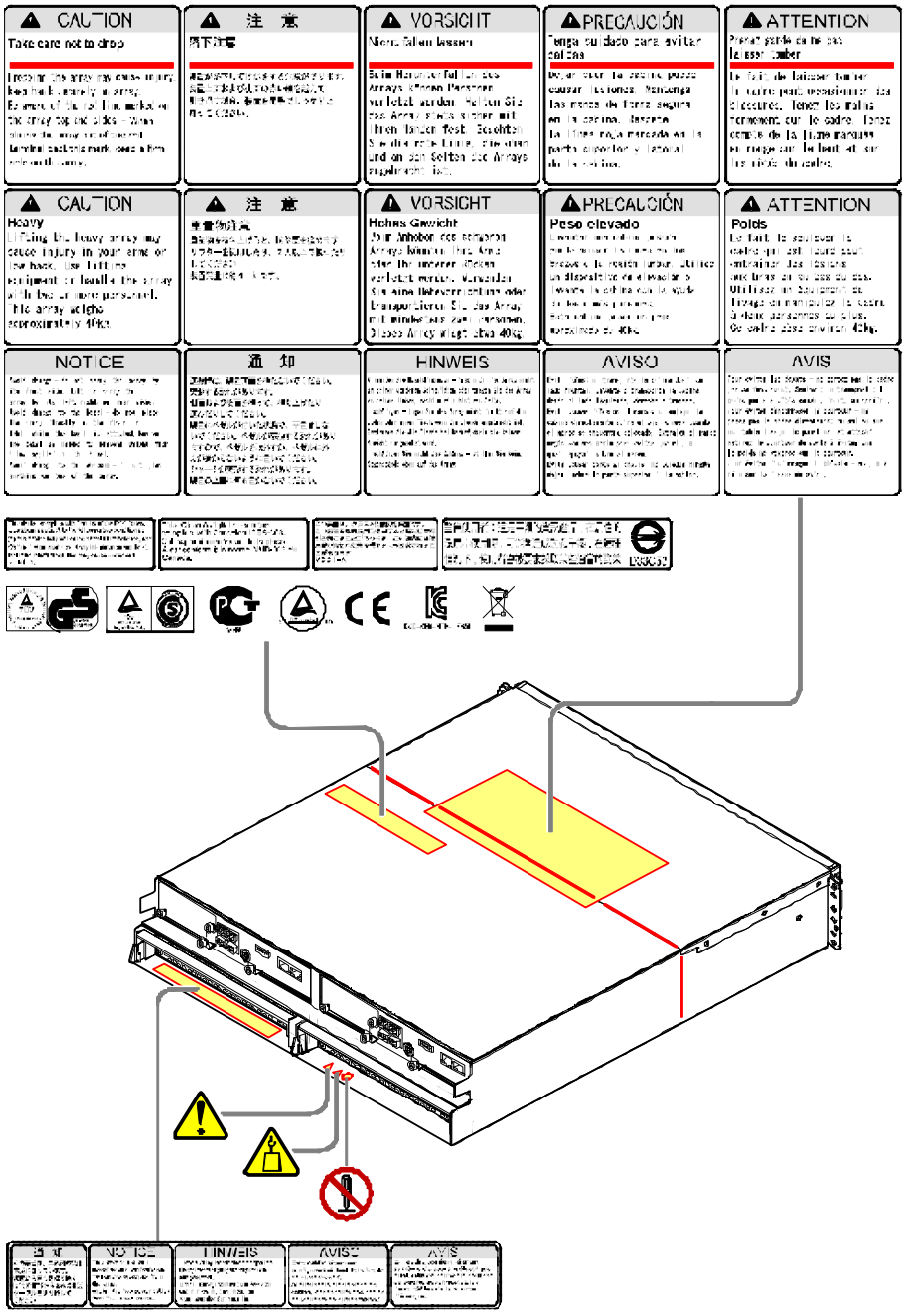


Labels on the CBXSS



Labels on the DBF

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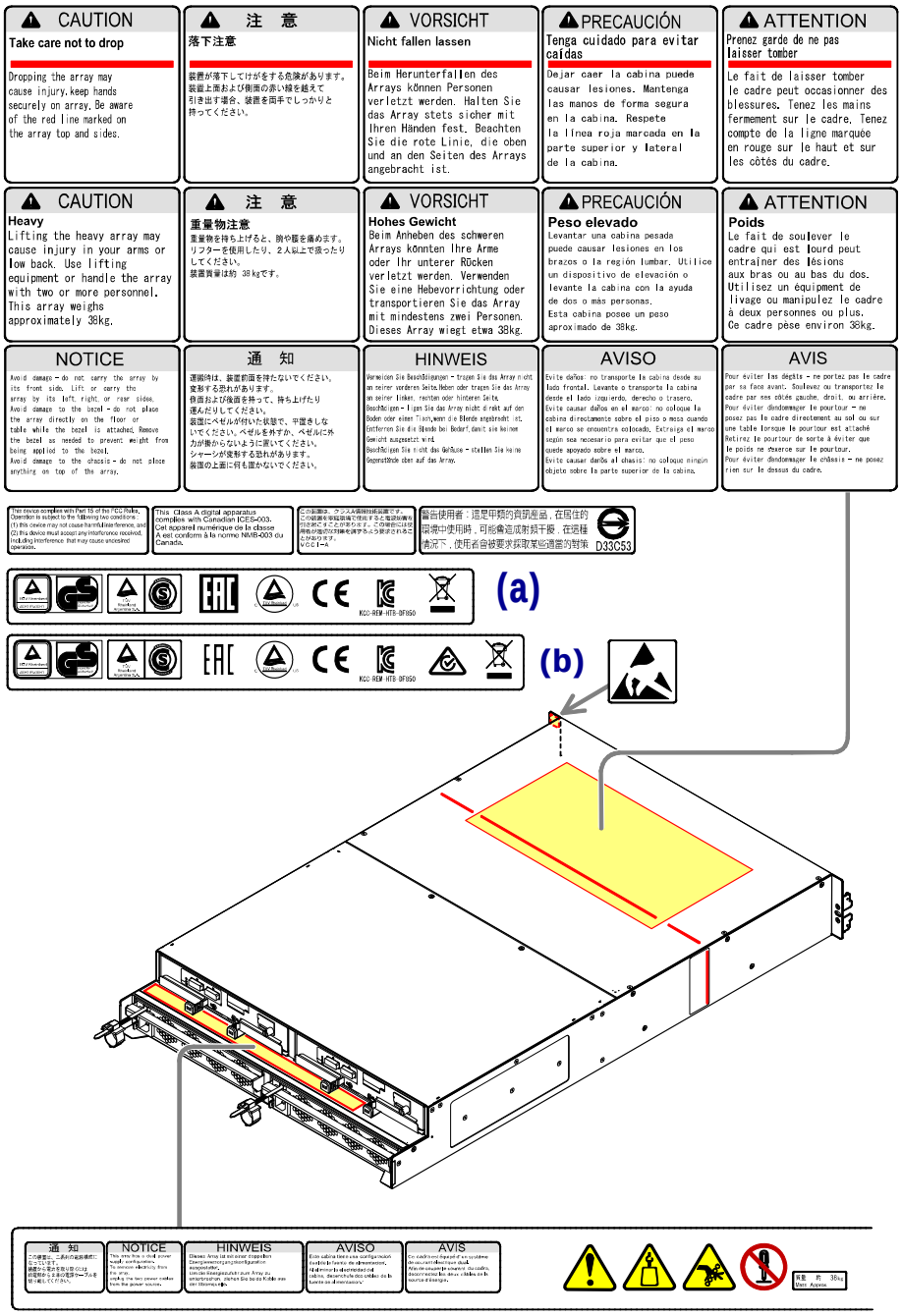

Labels on the DBX

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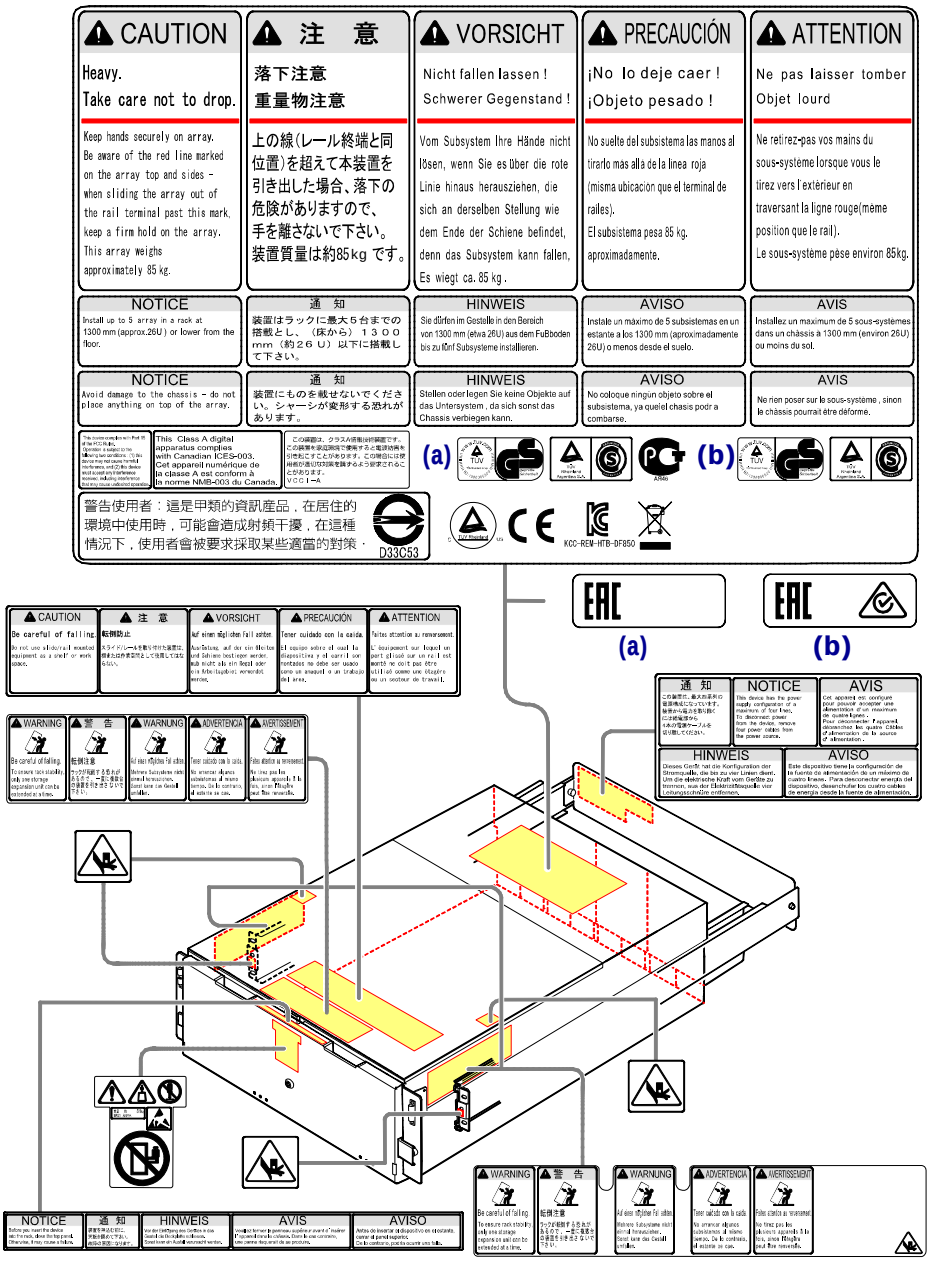
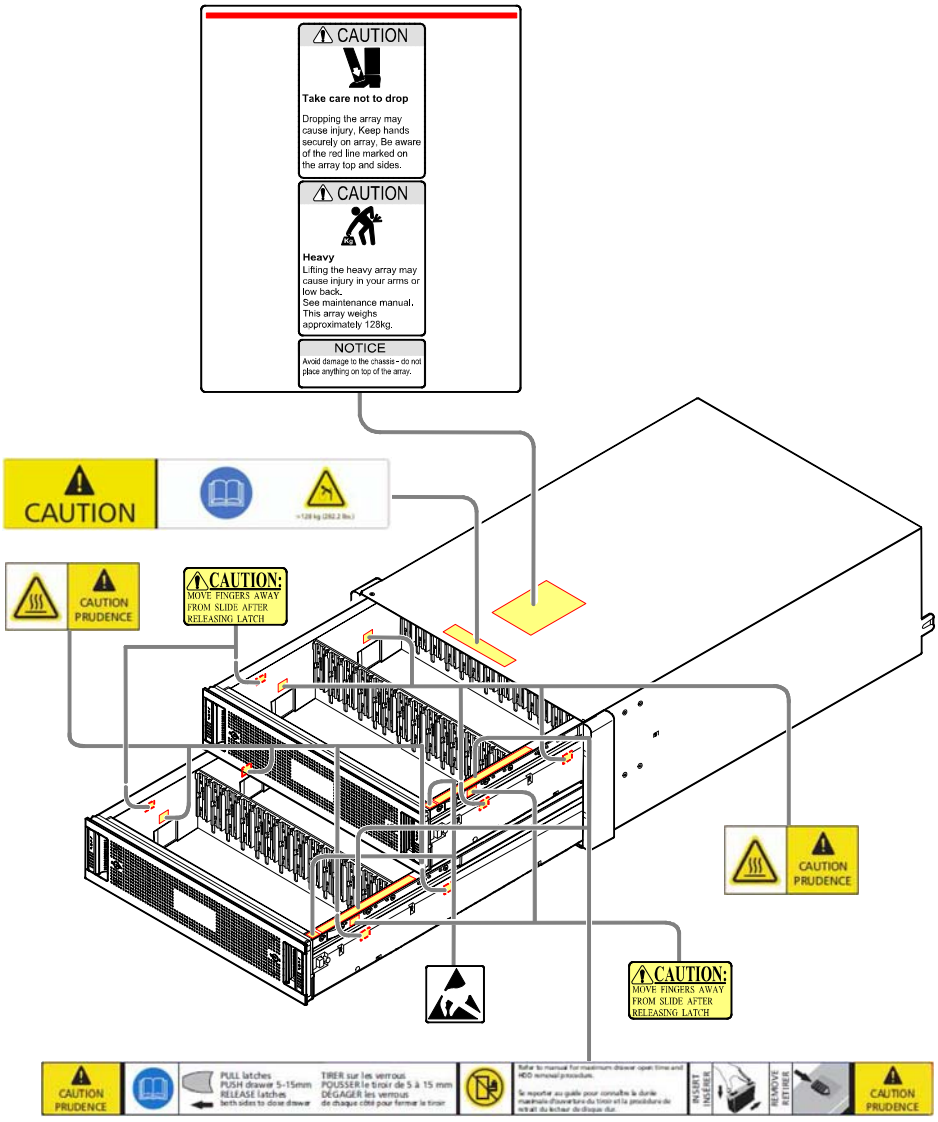
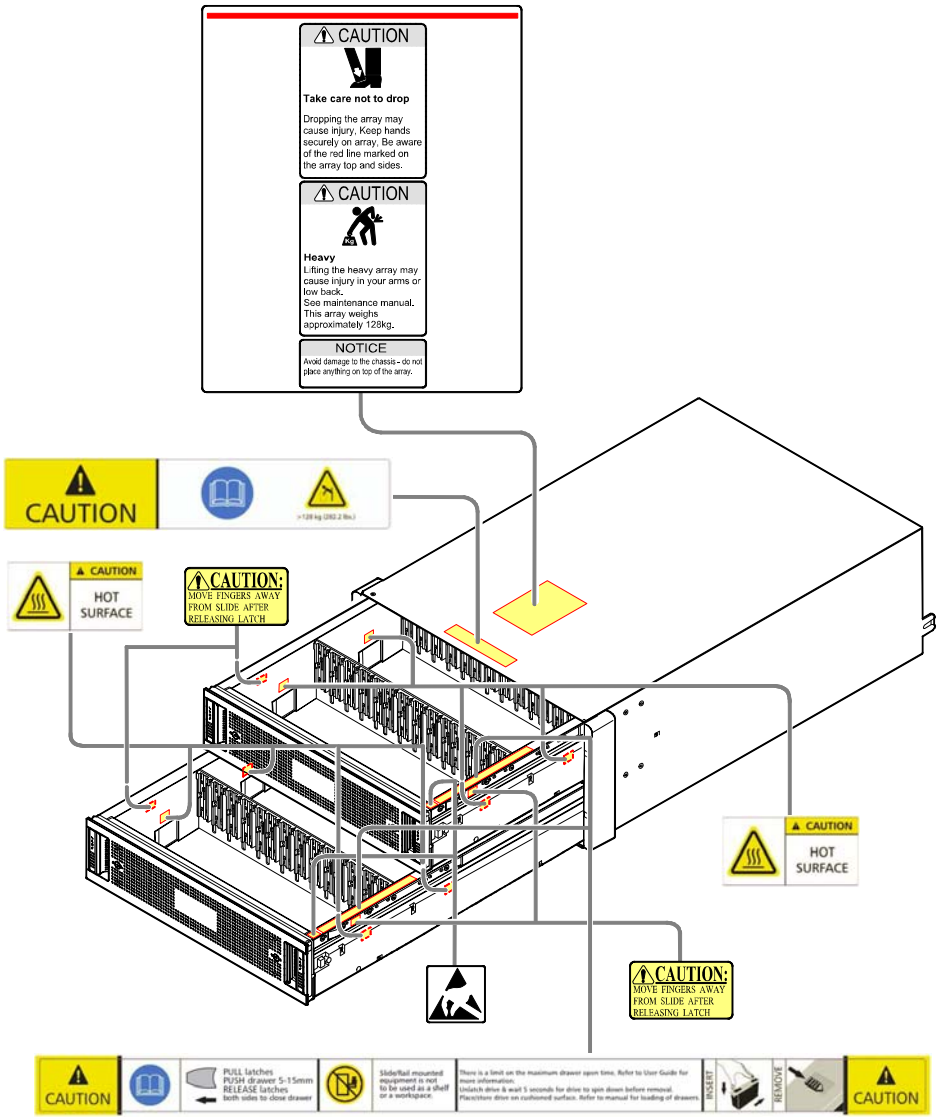


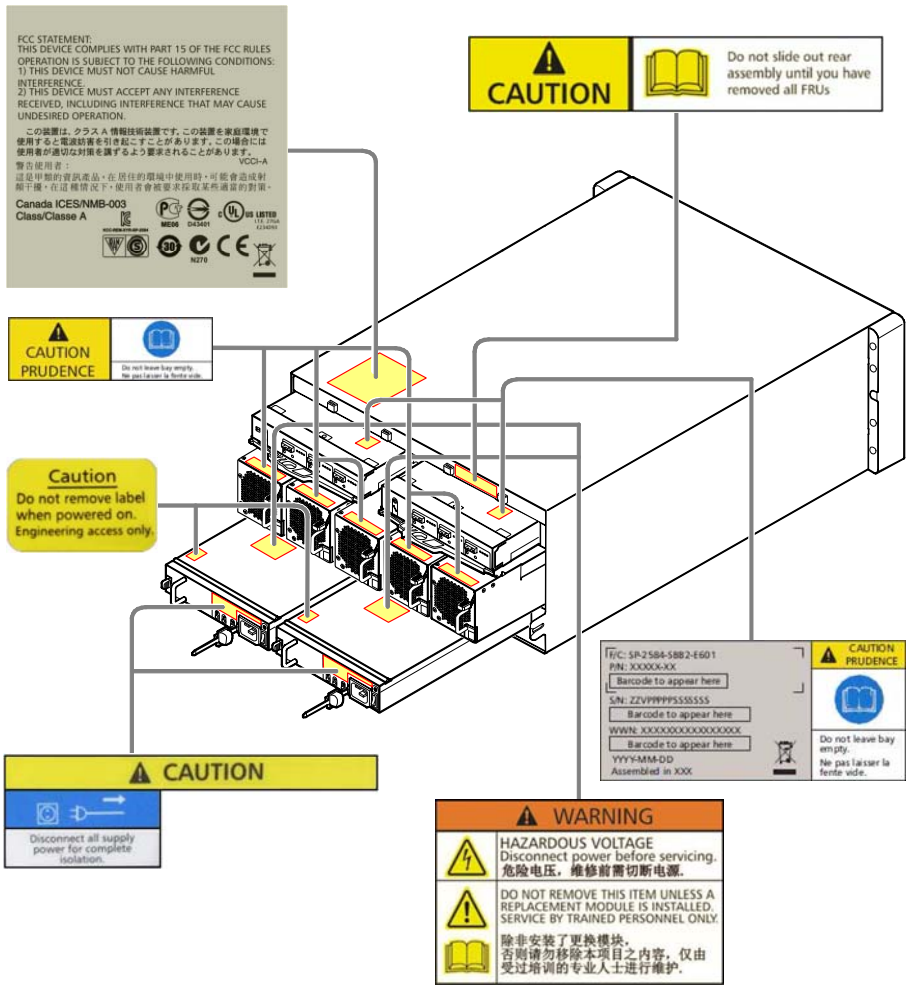
Labels on front of the DBW (added on April 2014)



Labels on front of the DBW (effective until end of March 2014)



Labels on rear of the DBW (added on April 2014)



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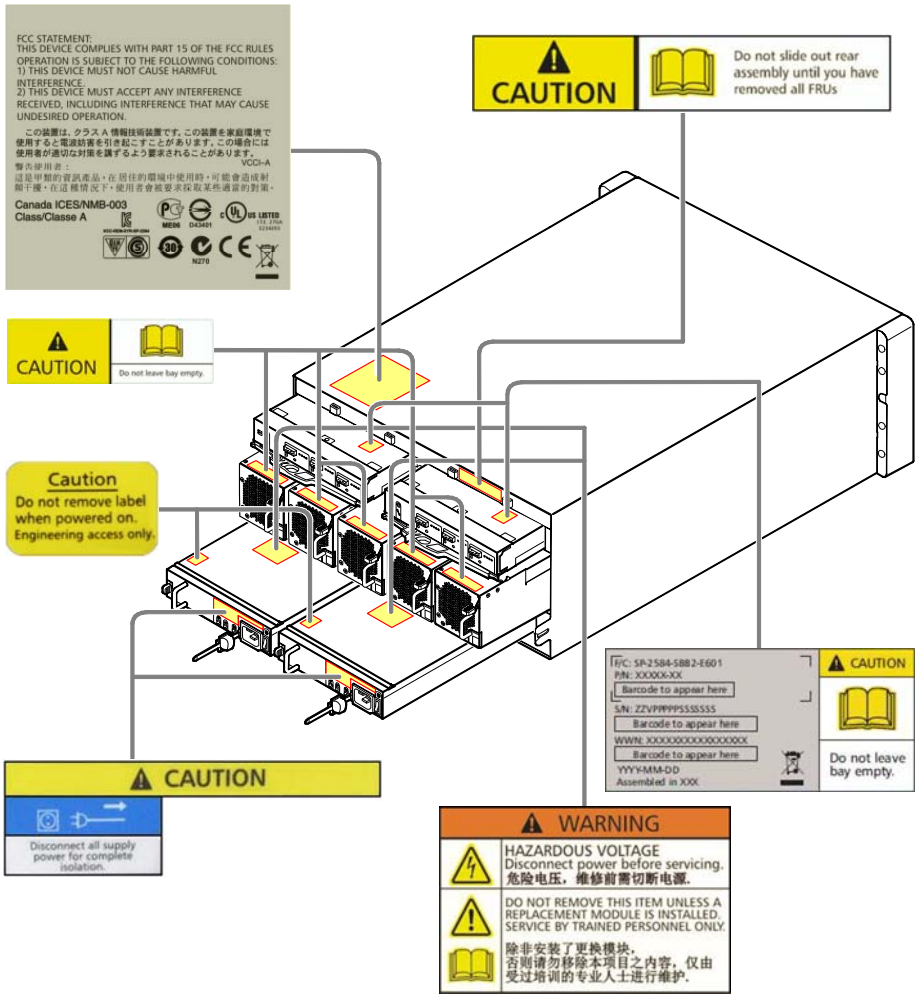
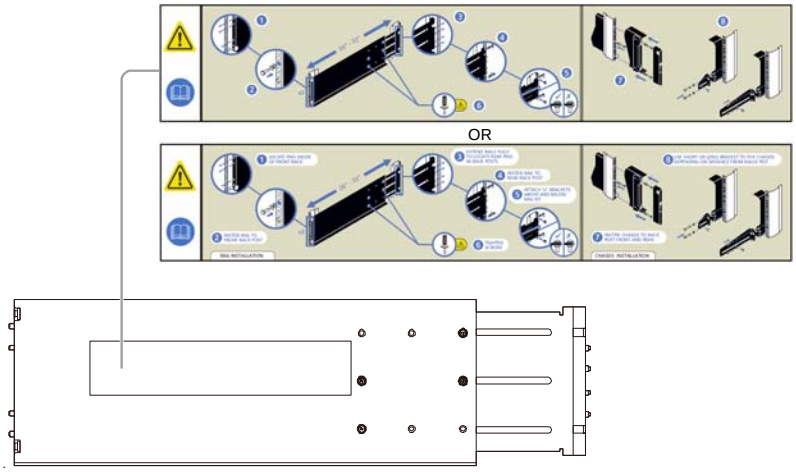
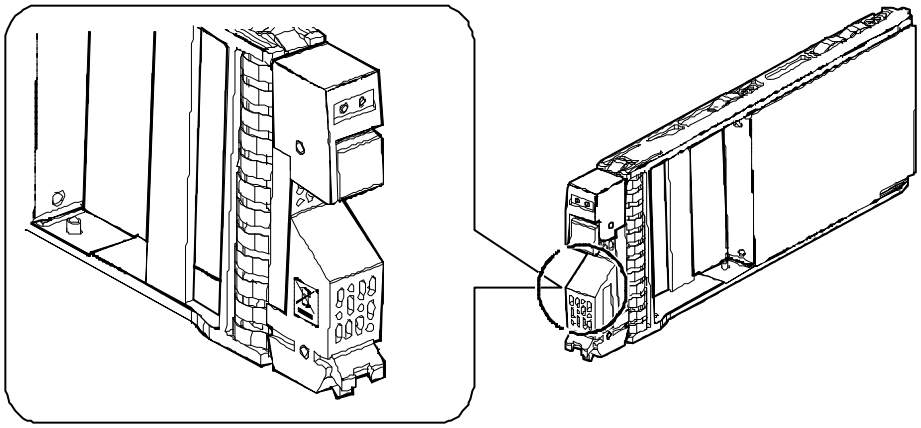


Label position and contents on DBW rail

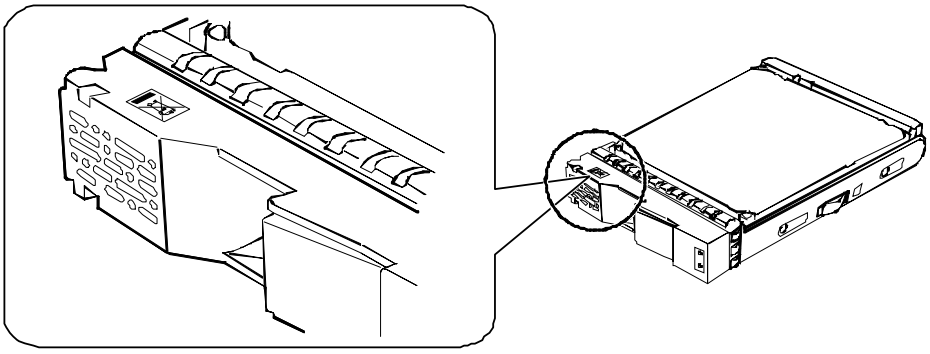


Labels on the drives

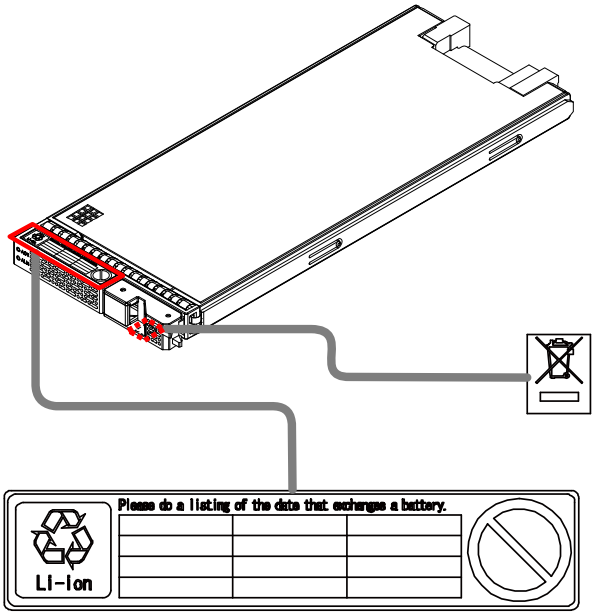
CBXSS / CBSS / DBS / DBSD



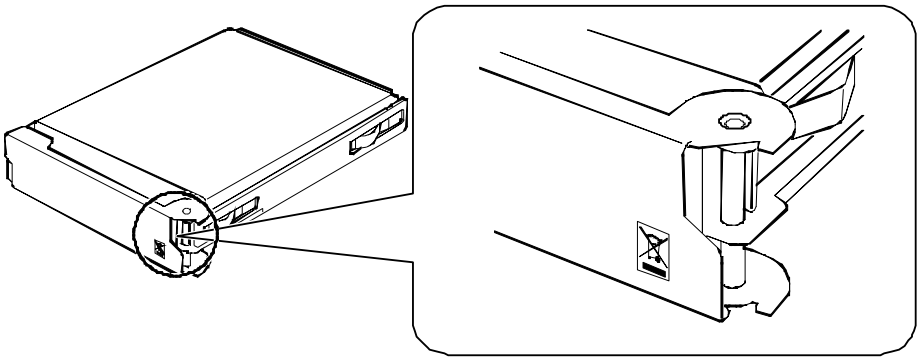
CBXSL / CBSL / DBL / DBLD



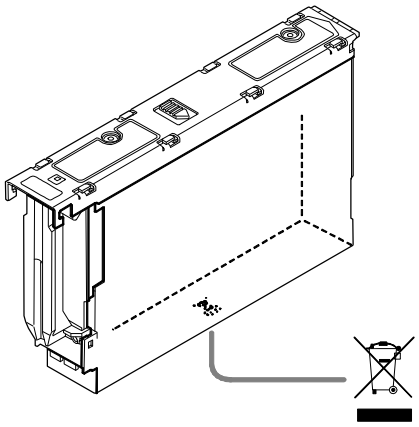
DBF



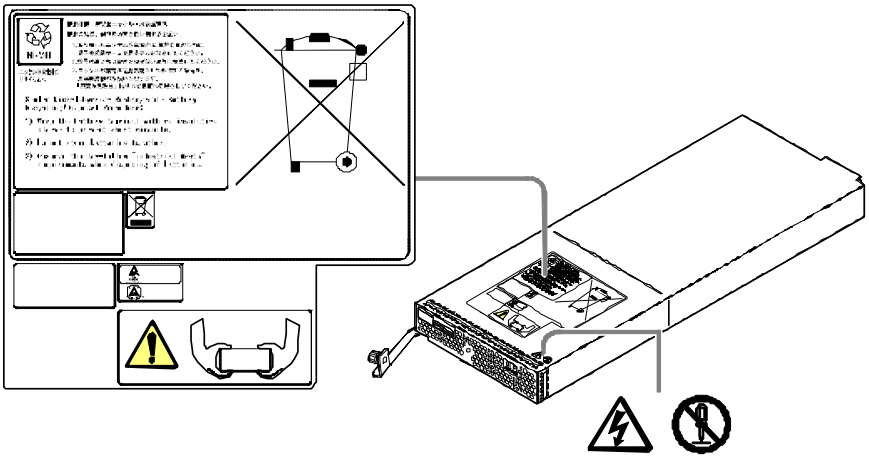
DBX



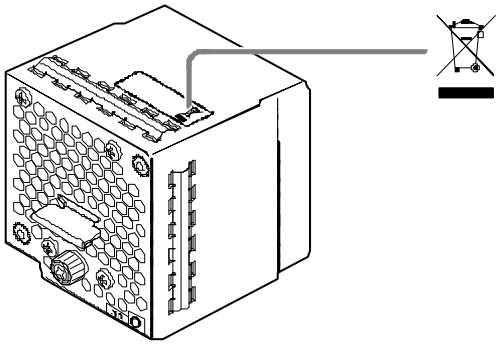
DBW



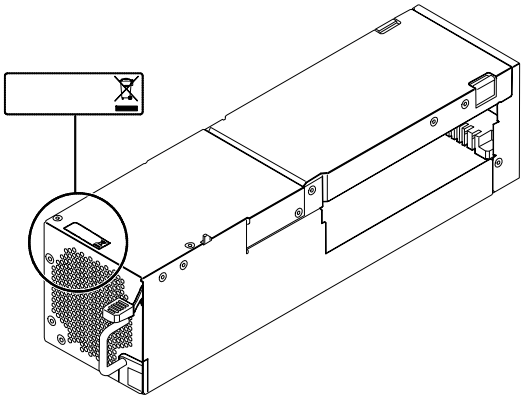
Labels on cache backup battery (CBL/CBLE/CBLD)



Labels on fan module (CBL/CBLE/CBLD)

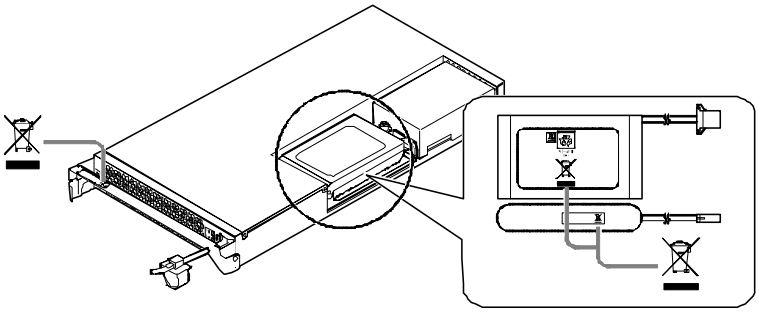


Labels on DBW

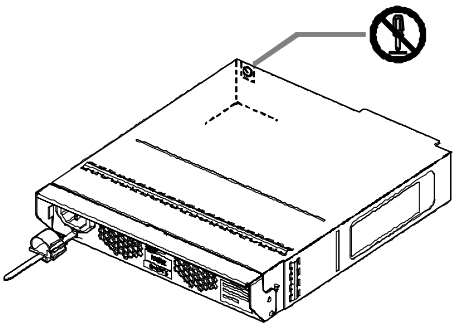


Labels on the power unit

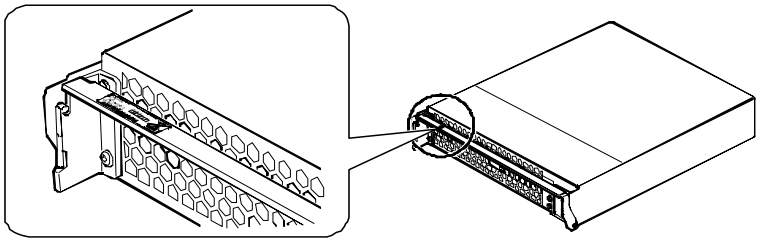
CBXSS/CBXSL/CBSS/CBSL



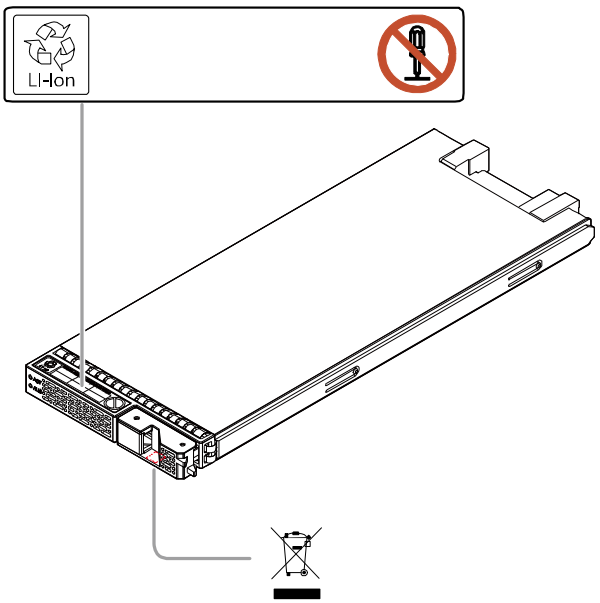
CBL / CBLE / CBLD



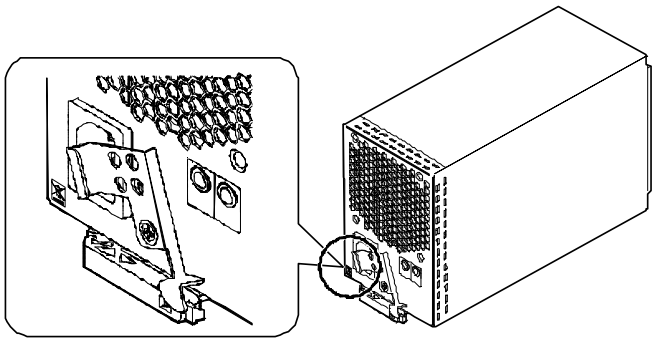
DBS / DBSD / DBL / DBLD



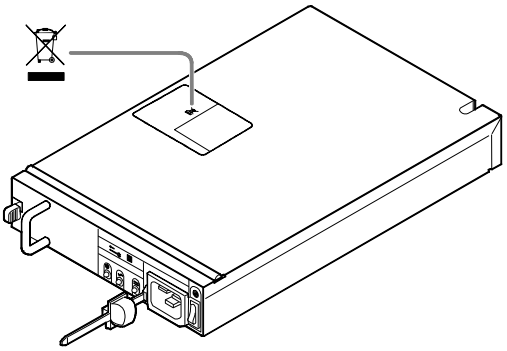
DBF



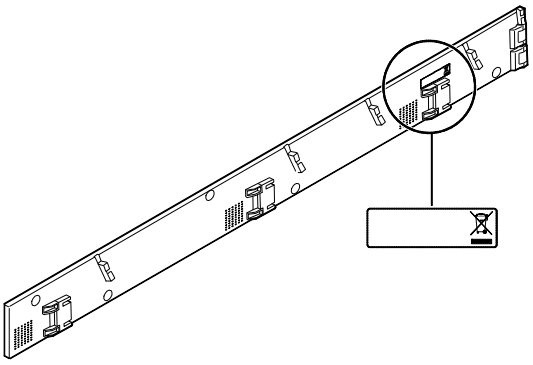
DBX



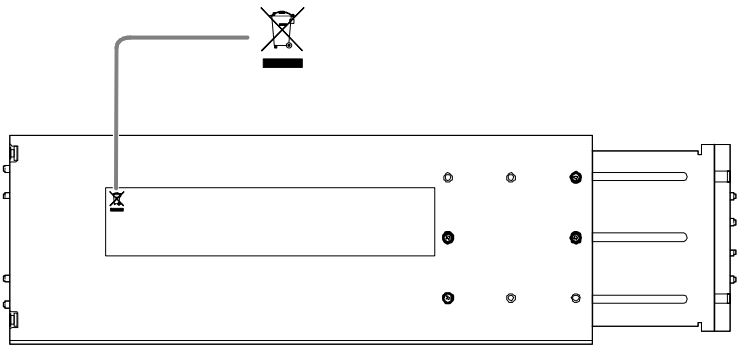
DBW



Positions and contents of labels on DBW side card

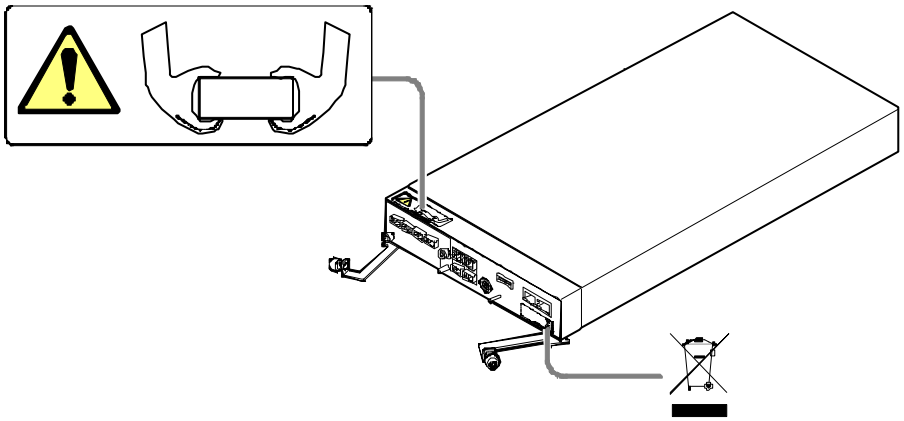


Positions and Contents of Labels on DBW rail

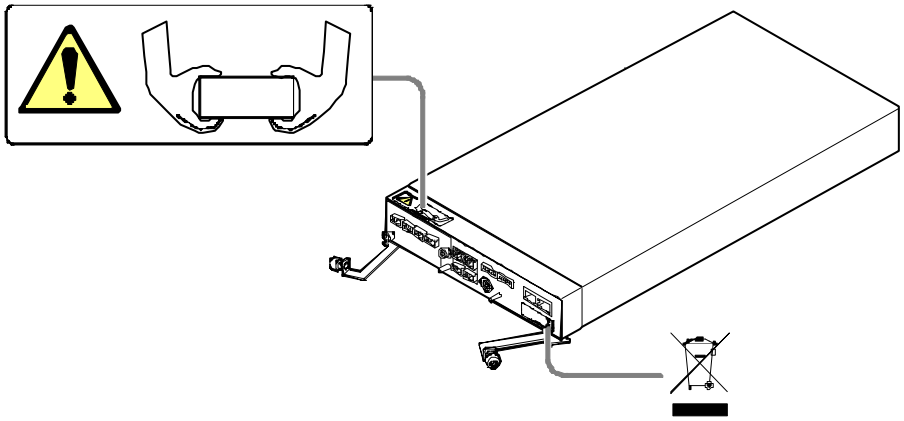


Labels on the controller

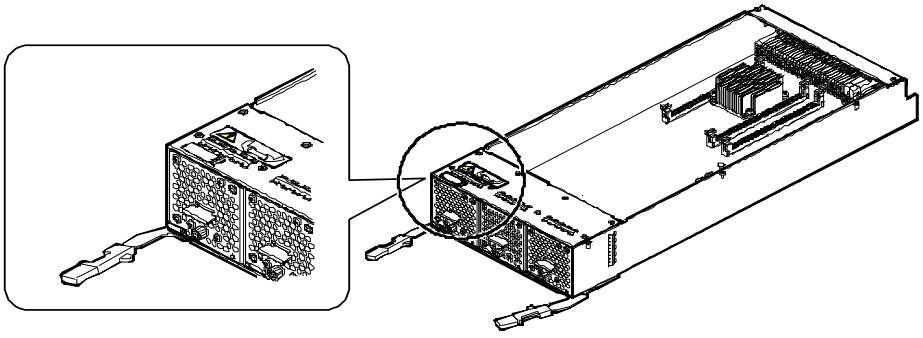
CBXSS / CBXSL



CBSS / CBSL

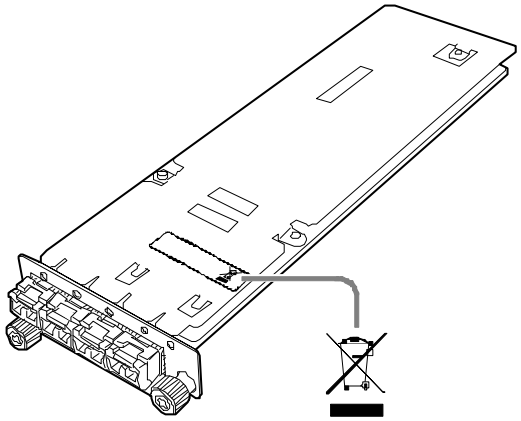


CBL / CBLE / CBLD



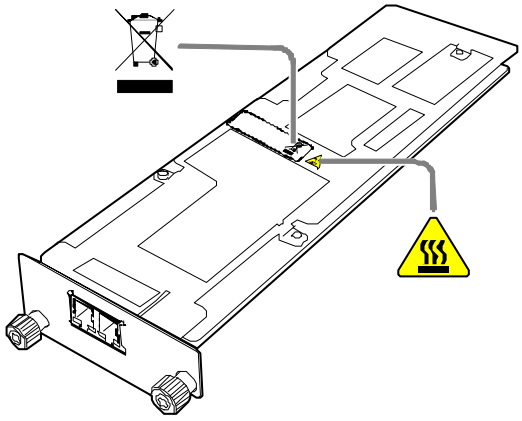
Labels on Host I/O Boards (CBSS/CBSL)

Host I/O Board (Fibre Channel)

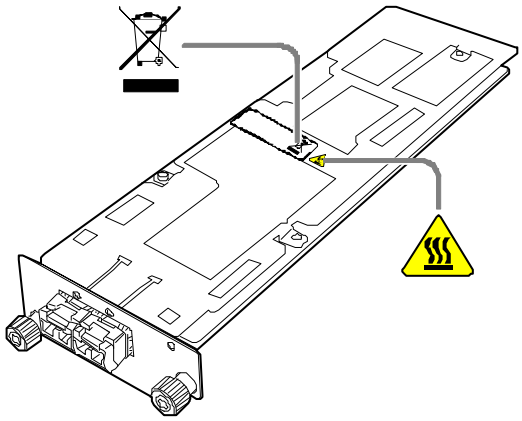


Labels on Host I/O Boards (CBXSS/CBXSL/CBSS/CBSL)

1 Gbps iSCSI

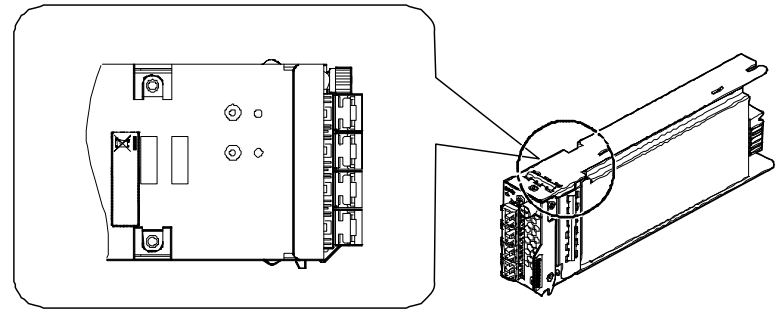


10 Gb iSCSI

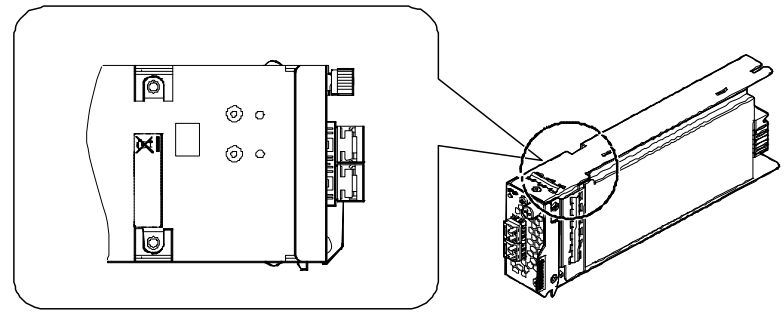


Labels on Host I/O Module (CBL/CBLE/CBLD)

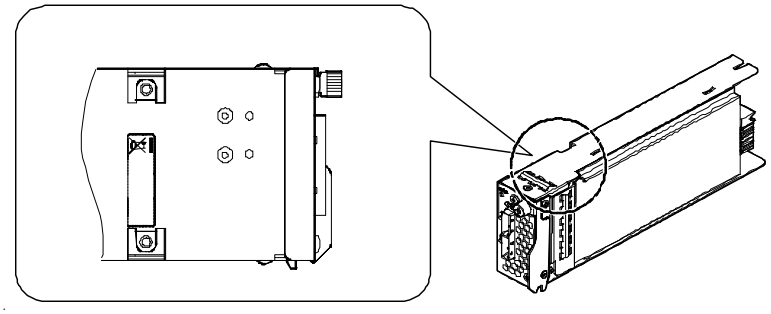
Fibre Channel



iSCSI

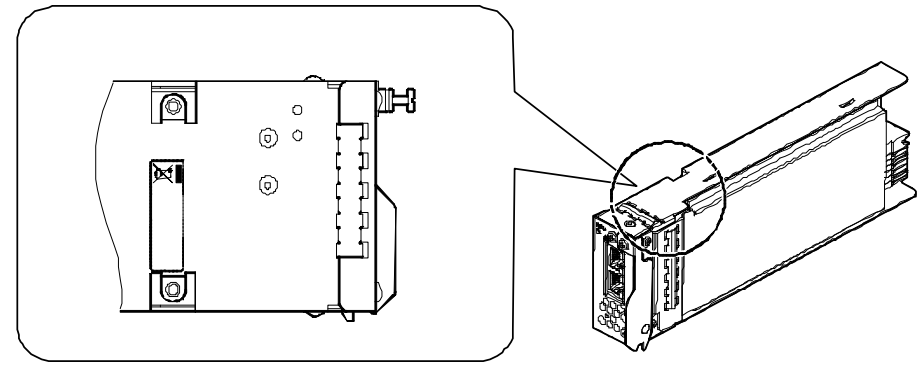


Labels on Drive I/O Module (CBL/CBLE/CBLD)

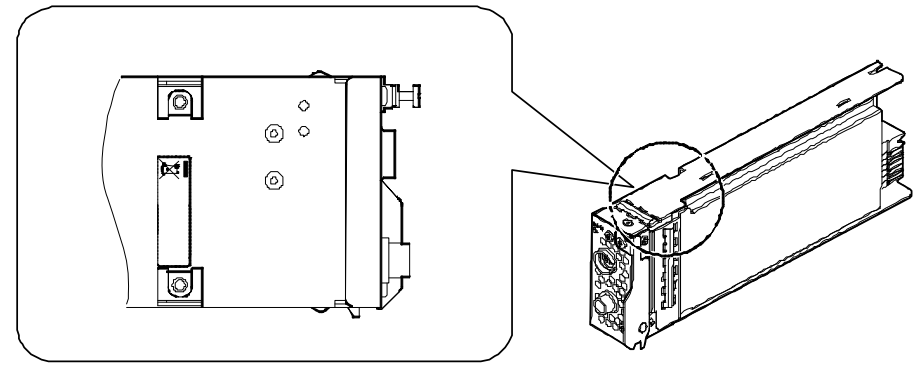


Labels on Management Module (CBL/CBLE/CBLD)

LAN

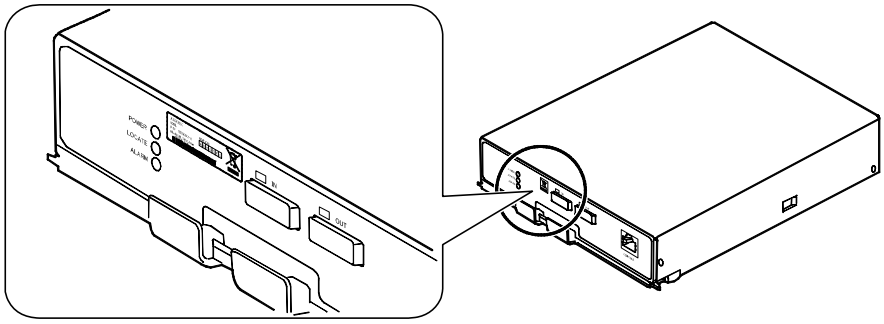


UPS

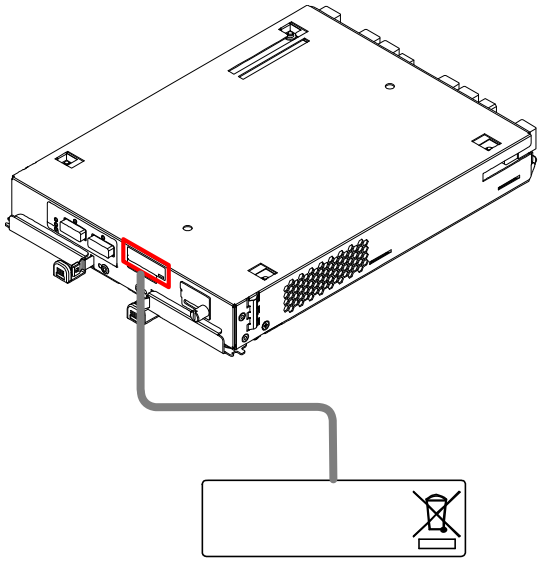


Labels on I/O Module (ENC)

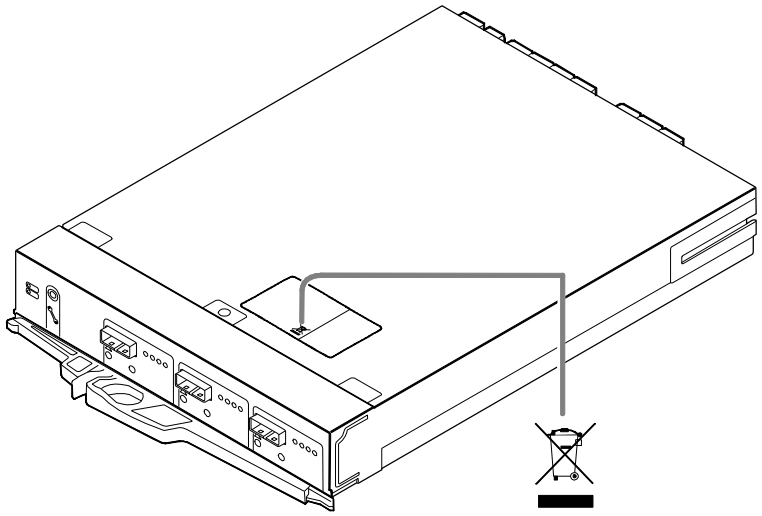
(DBS/DBSD/DBL/DBLD)



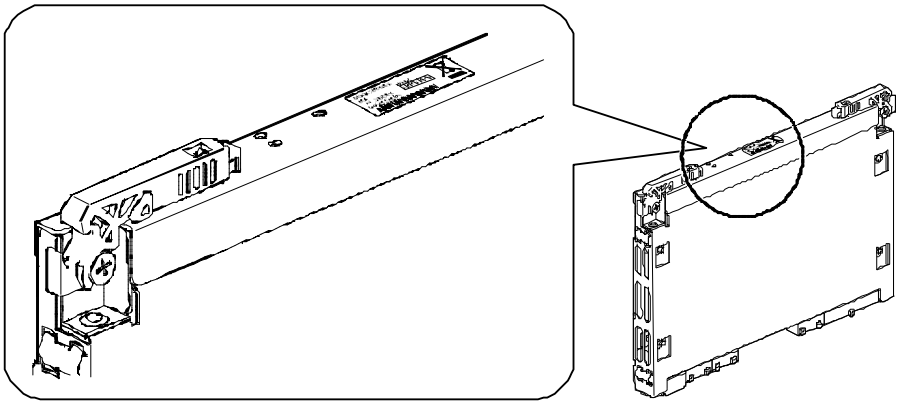
DBF



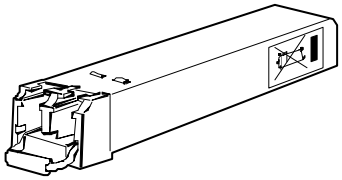
DBW



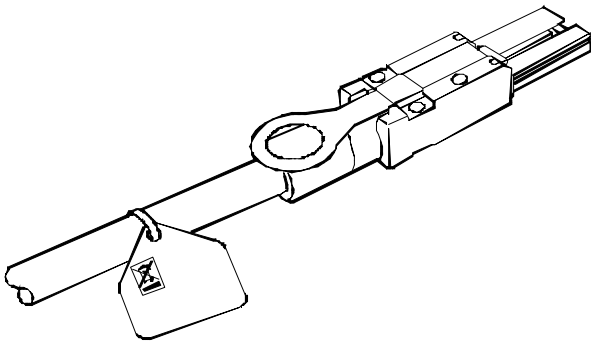
Labels on I/O Card (ENC) (DBX)



Labels on Host Connector

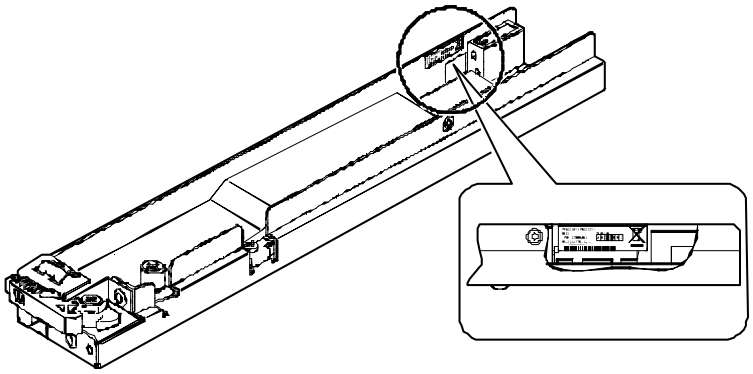


Labels on SAS (ENC) Cable

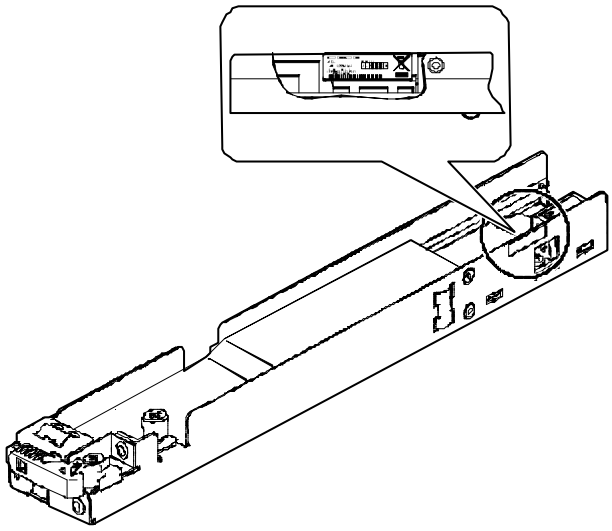


Labels on cable holder (DBX)

In



Out



Contents

Preface

Welcome to the Hitachi Unified Storage Hardware Service Guide.

This document describes how to service and replace field-replaceable units (FRUs) in Hitachi Unified Storage systems. It is intended for end users, system operators and administrators, and service personnel responsible for maintaining, troubleshooting, and servicing the hardware.

This document includes a full table of contents, index, chapter task lists, and numerous cross-references to help you find specific information. Read this document carefully to understand how to use this product, and maintain a copy for reference purposes.

This preface includes the following information:

Intended audience

Readers should be familiar with computer system operation, maintenance and repair, and understand disk array, Redundant Array of Independent Disks (RAID), network, and iSCSI or Fibre Channel technologies. This document assumes users have basic hardware skills for storage-area networks (SANs).

NOTE: Although this document contains procedures for replacing components for all Hitachi Unified Storage systems, Hitachi supports customer servicing of Hitachi Unified Storage 110 systems only. Procedures for replacing components for Hitachi Unified Storage 130 and 150 systems are provided in this document for reference purposes only; to service these systems, please contact the Hitachi Global Solutions Center.

Product version

This document applies to Hitachi Unified Storage firmware version 0982/D or later.

Changes in this revision

- Under Removing and replacing the front bezel (page 3-10), added the note about the front bezel.

Related documents

This Hitachi Unified Storage documentation set consists of the following documents.

Hitachi Unified Storage Firmware Release Notes, RN-91DF8304

Contains late-breaking information about the storage system firmware.

Hitachi Storage Navigator Modular 2 Release Notes, RN-91DF8305

Contains late-breaking information about the Storage Navigator Modular 2 software.

Read the release notes before installing and using this product. They may contain requirements and restrictions not fully described in this document, along with updates and corrections to this document.

Hitachi Unified Storage Getting Started Guide, MK-91DF8303

Describes how to get Hitachi Unified Storage systems up and running in the shortest period of time. For detailed installation and configuration information, refer to the Hitachi Unified Storage Hardware Installation and Configuration Guide.

Hitachi Unified Storage Hardware Installation and Configuration Guide, MK-91DF8273

Contains initial site planning and pre-installation information, along with step-by-step procedures for installing and configuring Hitachi Unified Storage systems.

Hitachi Unified Storage Hardware Service Guide, MK-91DF8302 — **this document**

Provides removal and replacement procedures for the components in Hitachi Unified Storage systems.

Hitachi Unified Storage Operations Guide, MK-91DF8275

Describes the following topics:

- Adopting virtualization with Hitachi Unified Storage systems
- Enforcing security with Account Authentication and Audit Logging
- Creating DP-Vols, standard volumes, Host Groups, provisioning storage, and utilizing spares
- Tuning storage systems by monitoring performance and using cache partitioning
- Monitoring storage systems using email notifications and Hi-Track
- Using SNMP Agent and advanced functions such as data retention and power savings
- Using functions such as data migration, volume expansion and volume shrink, RAID Group expansion, DP pool expansion, and mega VOLs

Hitachi Unified Storage Replication User Guide, MK-91DF8274

Describes how to use the four types of Hitachi replication software to meet your needs for data recovery:

- ShadowImage In-system Replication
- Copy-on-Write SnapShot
- TrueCopy Remote Replication
- TrueCopy Extended Distance

Hitachi Unified Storage Command Control Interface Installation and Configuration Guide, MK-91DF8306

Describes Command Control Interface installation, operation, and troubleshooting.

Hitachi Unified Storage Provisioning Configuration Guide, MK-91DF8277

Describes how to use virtual storage capabilities to simplify storage additions and administration.

Hitachi Unified Storage Command Line Interface Reference Guide, MK-91DF8276

Describes how to perform management and replication activities from a command line.

Document organization

Thumbnail descriptions of the chapters are provided in the following table. Click the chapter title in the first column to go to that chapter. The first page of every chapter or appendix contains links to the contents.

Chapter / Appendix Title	Description
Chapter 1, Verifying component failures	Describes the ways hardware fault conditions are brought to the attention of Hitachi Unified Storage system users.
Chapter 2, Hardware description	Describes the connectors, LEDs, and switches on the Unified Storage system hardware.
Chapter 3, Procedures before and after replacing components	Describes the steps to take prior to replacing a component on Hitachi Unified Storage systems.
Chapter 4, Replacing drives	Provides instructions for replacing a drive in Hitachi Unified Storage systems.
Chapter 5, Replacing a cache backup battery	Provides instructions for replacing the cache backup battery in Hitachi Unified Storage systems.
Chapter 6, Replacing a Fan Module	Provides instructions for replacing the Fan Module in Hitachi Unified Storage systems.
Chapter 7, Replacing a Power Unit	Provides instructions for replacing the Power Unit in Hitachi Unified Storage systems.
Chapter 8, Adding and replacing controllers	Provides instructions for replacing controllers in Hitachi Unified Storage systems.
Chapter 9, Replacing cache memory	Provides instructions for replacing cache memory in Hitachi Unified Storage systems.
Chapter 10, Replacing a Host I/O Board or Host I/O Module	Provides instructions for replacing a Host I/O Board in Hitachi Unified Storage systems.
Chapter 11, Replacing the Host connector	Provides instructions for replacing the Host Connector in Hitachi Unified Storage systems.
Chapter 12, Replacing the Drive I/O Module	Provides instructions for replacing the Drive I/O Module in Hitachi Unified Storage systems.
Chapter 13, Replacing the I/O Module (ENC)	Provides instructions for replacing the I/O Module (ENC) in Hitachi Unified Storage systems.
Chapter 14, Replacing the SAS (ENC) cable	Provides instructions for replacing the SAS (ENC) cable in Hitachi Unified Storage systems.
Chapter 15, Upgrading a Hitachi Unified Storage 130 system	Describes how to upgrade a Hitachi Unified Storage 130 system to a Hitachi Unified Storage 150 system.
Chapter 16, General maintenance and best practices	Covers maintenance information for Hitachi Unified Storage systems.
Chapter 17, Troubleshooting	Provides troubleshooting suggestions related to Hitachi Storage Navigator Modular 2 and the replacement of components in Hitachi Unified Storage systems.

Document conventions

The following typographic conventions are used in this document.

Convention	Description
Bold	Indicates text on a window, other than the window title, including menus, menu options, buttons, fields, and labels. Example: Click **OK**.
Italic	Indicates a variable, which is a placeholder for actual text provided by you or the system. Example: copy *source-file target-file* Angled brackets (< >) are also used to indicate variables.
screen or code	Indicates text that is displayed on screen or entered by you. Example: `# pairdisplay -g oradb`
< > angled brackets	Indicates a variable, which is a placeholder for actual text provided by you or the system. Example: `# pairdisplay -g <group>` Italic font is also used to indicate variables.
[ ] square brackets	Indicates optional values. Example: [a | b] indicates that you can choose a, b, or nothing.
{ } braces	Indicates required or expected values. Example: { a | b } indicates that you must choose either a or b.
| vertical bar	Indicates that you have a choice between two or more options or arguments. Examples: [a | b] indicates that you can choose a, b, or nothing. { a | b } indicates that you must choose either a or b.
underline	Indicates the default value. Example: [a | b]

This document uses the following symbols to draw attention to important safety and operational information.

Symbol	Meaning	Description
	Tip	Tips provide helpful information, guidelines, or suggestions for performing tasks more effectively.
	Note	Notes emphasize or supplement important points of the main text.
	Caution	Cautions indicate that failure to take a specified action could result in damage to the software or hardware.
	WARNING	Warns that failure to take or avoid a specified action could result in severe conditions or consequences (for example, loss of data).

Convention for storage capacity values

Physical storage capacity values (for example, disk drive capacity) are calculated based on the following values:

Physical capacity unit	Value
1 KB	1,000 bytes
1 MB	1,000 KB or $1{,}000^2$ bytes

Physical capacity unit	Value
1 GB	1,000 MB or $1,000^3$ bytes
1 TB	1,000 GB or $1,000^4$ bytes
1 PB	1,000 TB or $1,000^5$ bytes
1 EB	1,000 PB or $1,000^6$ bytes

Logical storage capacity values (for example, logical device capacity) are calculated based on the following values:

Logical capacity unit	Value
1 block	512 bytes
1 KB	1,024 (2^{10}) bytes
1 MB	1,024 KB or 1024^2 bytes
1 GB	1,024 MB or 1024^3 bytes
1 TB	1,024 GB or 1024^4 bytes
1 PB	1,024 TB or 1024^5 bytes
1 EB	1,024 PB or 1024^6 bytes

Accessing product documentation

The Hitachi Unified Storage user documentation is available on the HDS Support Portal: https://portal.hds.com. Please check this site for the most current documentation, including important updates that may have been made after the release of the product.

Getting help

The Hitachi Data Systems customer support staff is available 24 hours a day, seven days a week. If you need technical support, log on to the HDS Support Portal for contact information: https://portal.hds.com

Comments

Please send us your comments on this document: doc.comments@hds.com. Include the document title and number, including the revision level (for example, -07), and refer to specific sections and paragraphs whenever possible. All comments become the property of Hitachi Data Systems.

Thank you!

1

Verifying component failures

This chapter describes how to use Hitachi Storage Navigator Modular 2 to confirm part failures in Hitachi Unified Storage systems.

The following topics are covered in this chapter:

- Replaceable parts
- Identifying hardware faults
- Using Storage Navigator Modular 2 to identify failures

Replaceable parts

The following list shows the components that you can replace on site for Hitachi Unified Storage 110 storage systems.

- Drives
- Cache backup batteries
- Fan Module for CBL
- Power Units
- Controllers
- Cache memory
- Host I/O Board for CBXSS/CBXSL/CBSS/CBSL
- Host I/O Module for CBL
- Host Connector
- Drive I/O Module for CBL
- I/O Module (ENC) for DBS/DBL
- SAS (ENC) cable for DBS/DBL

For Hitachi Unified Storage 130 and 150 storage systems, please contact your Hitachi representative.

NOTE: These procedures are for the CBXSS/CBXSL Controllers and DBS/DBL Drive Boxes only.

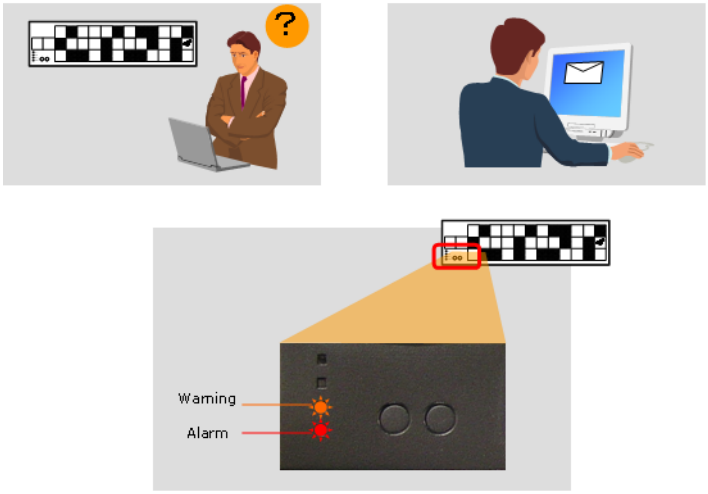
Identifying hardware faults

The light-emitting diodes (LEDs) on Hitachi Unified Storage system components show the condition of the components and whether you can safely remove them.

You might also receive alerts to hardware faults in the following ways:

- By email if you configured email notifications in Storage Navigator Modular 2.
- Via the Simple Network Management Protocol (SNMP) if your SNMP application is configured to provide such alerts.

The following sections show the locations of the LEDs and components on the Hitachi Unified Storage systems, and provide tables that describe the meanings of the LEDs and components.



Using Storage Navigator Modular 2 to identify failures

You can use Storage Navigator Modular 2 to identify the following Hitachi Unified Storage system component failures:

- When notified of an error by email (if previously configured in Storage Navigator Modular 2) or via the Simple Management Network Protocol (SNMP).
- When a failure is indicated by the LED (WARNING or ALARM LEDs go ON or READY LED does not go ON).
- When performance deterioration or other anomaly is recognized by the host system connected to the Hitachi Unified Storage system.
- When a volume cannot be recognized or becomes unstable.

In these cases, use Figure 1-1 on page 1-4 to recover the storage system.

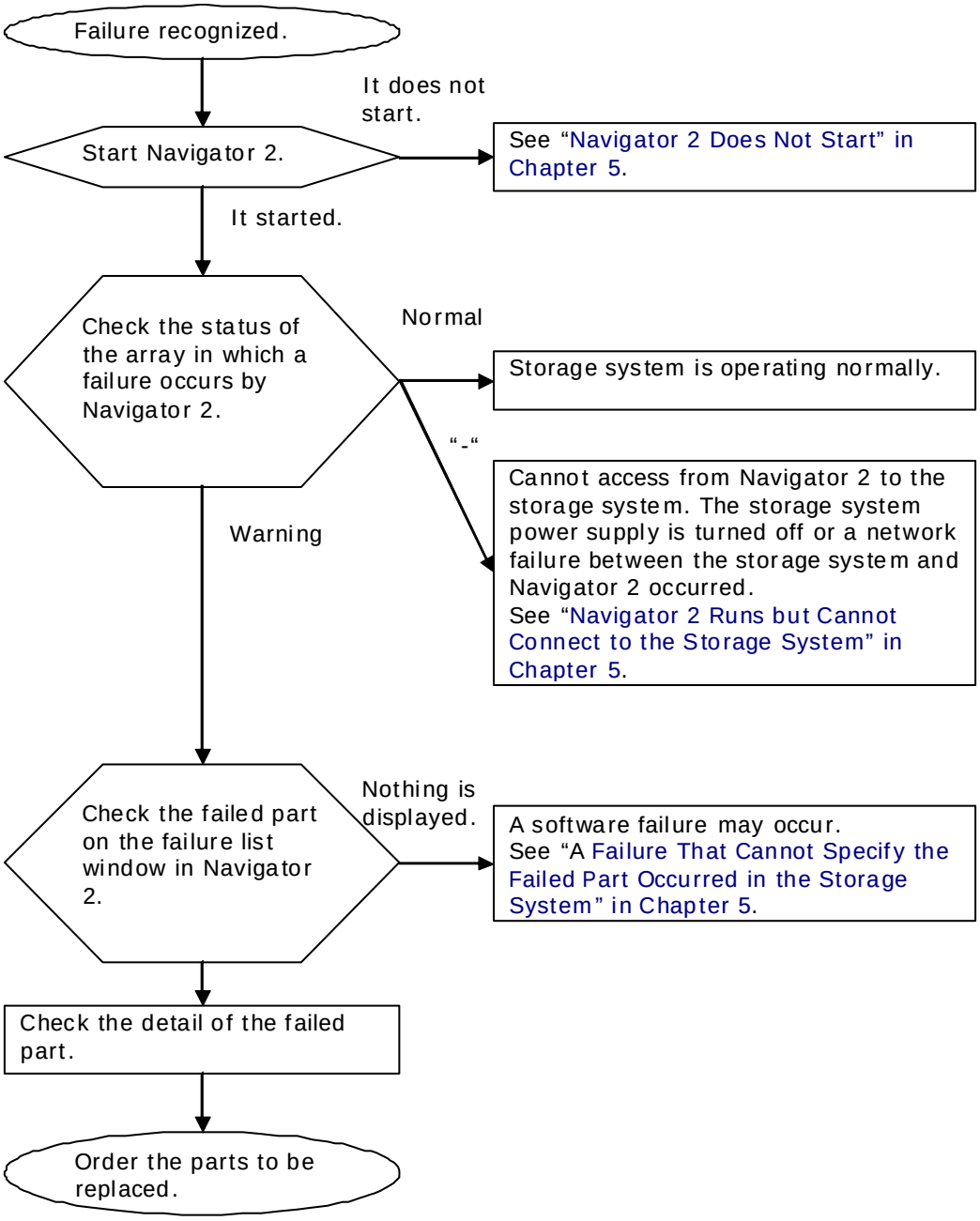


Figure 1-1: Flowchart for troubleshooting hardware faults

When a failure is recognized, use the following procedure to recover the failure.

1. If Storage Navigator Modular 2 is not running, launch a Web browser, and then start and log in to Storage Navigator Modular 2.

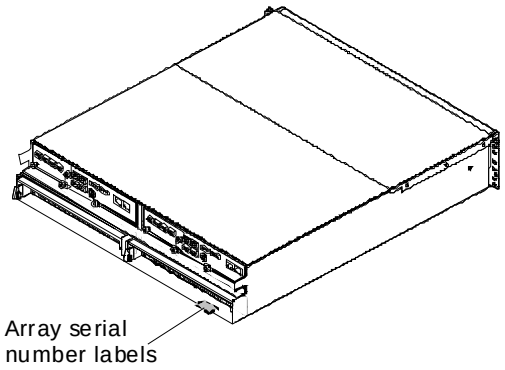
   If Storage Navigator Modular 2 is running, in the **Explorer** pane, click **Arrays**, and then return to the Storage Navigator Modular 2 main window.

NOTE: If Storage Navigator Modular 2 does not start, a communication failure with the Storage Navigator Modular 2 host might have occurred or the Storage Navigator Modular 2 host might not have started normally. See Hitachi Storage Navigator Modular 2 does not start on page 17-2.

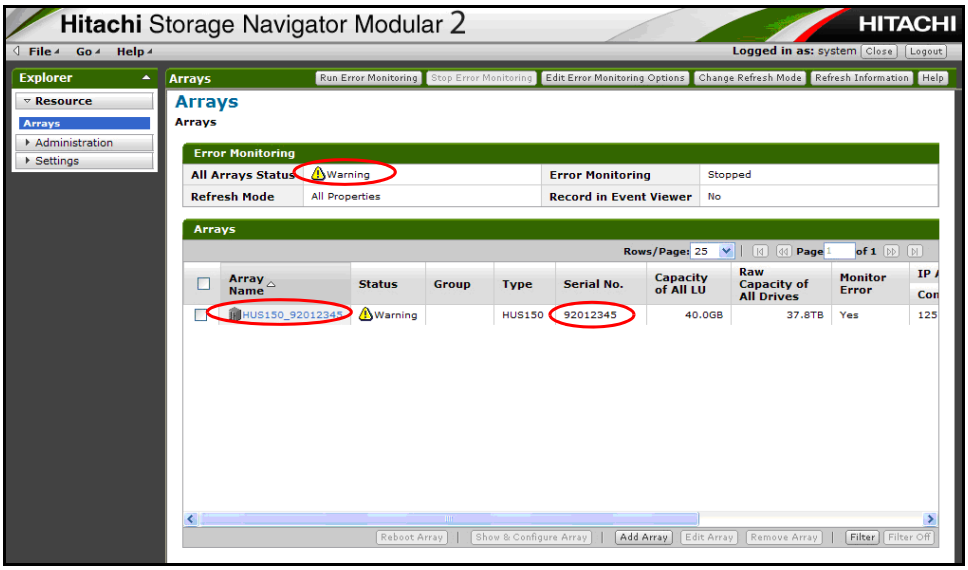
2. Using Storage Navigator Modular 2, check the status of the storage system where the failure occurred.
3. Check the email or SNMP alert that notified you about the failure, or check the serial number on the label attached on the subsystem where the failure occurred.

Mail or SNMP text
.....
Hardware serial number: 92012345
.....

Serial number label



4. In the Storage Navigator Modular 2 Arrays window, check the **Status** of the storage system array where the failure occurred.



5. If the **Status = Warning**, click the **Array Name**.

   If **Status** = **Normal**, a network failure between the storage system might have occurred.

   If **Status** = three dashes (**---**), Storage Navigator Modular 2 cannot access the storage system. The storage system power supply might be turned off or a network failure between the storage system and Storage Navigator Modular 2 might have occurred. See Hitachi Storage Navigator Modular 2 cannot connect to storage system on page 17-4.

6. In Storage Navigator Modular 2, go to the Alert & Events window and check the failed part (see Collecting trace information on page 3-13).

7. Order the replacement part.

2

Hardware description

This chapter provides a tour of the Hitachi Unified Storage hardware.

The following topics are covered in this chapter:

Matching Controller Boxes and Drive Boxes

Hardware components on Hitachi Unified Storage systems vary, depending on the Controller Box and Drive Box. To find the hardware components on your Hitachi Unified Storage system, use Table 2-1 to find your storage system's Controller Box and Drive Box(es). Then refer to the page number in the See Page column for information about the hardware components.

A detailed description of the hardware components starts on page 2-26.

Table 2-1: Matching Controller Boxes and Drive Boxes

This Hitachi Unified Storage model	Can use these Controller Boxes	And these Drive Boxes	See page
110	CBXSS		2-5
	CBXSL		2-7
		DBS	2-15
		DBL	2-17
130	CBSS		2-9
	CBSL		2-11
		DBS	2-15
		DBL	2-17
		DBX	2-21
		DBW	2-24
150	CBL/CBLD		2-13
		DBS/DBSD	2-15
		DBL/DBLD	2-17
		DBF	2-19
		DBX	2-21
		DBW	2-24

Storage system dimensions

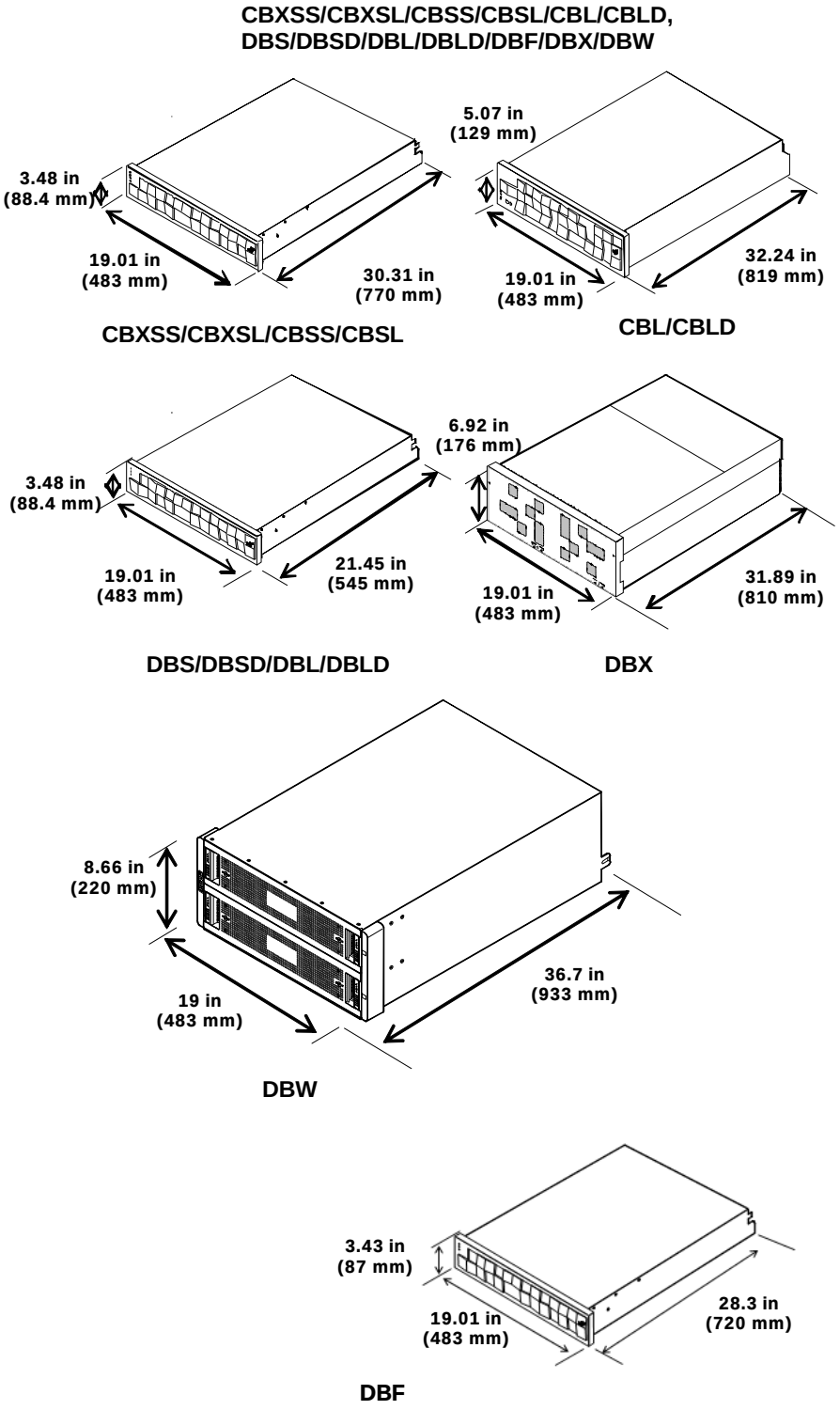


Figure 2-1: Hitachi Unified Storage system dimensions

NOTE: When rack-mounting a DBX Drive Box, leave at least 6 inches (152 mm) for the required cable guides.

Controller Boxes at a glance

The following Controller Boxes are described in this section:

- CBXSS Controller Box (DF850-CBSSR) (see the section below)
- CBXSL Controller Box (DF850-CBSLR) on page 2-7
- CBSS Controller Box (DF850-CBSSR) on page 2-9
- CBSL Controller Box (DF850-CBSLR) on page 2-11
- CBL (DF850-CBLR) and CBLD (DF850-CBLD) Controller Boxes on page 2-13

CBXSS Controller Box (DF850-CBSSR)

Front panel bezel

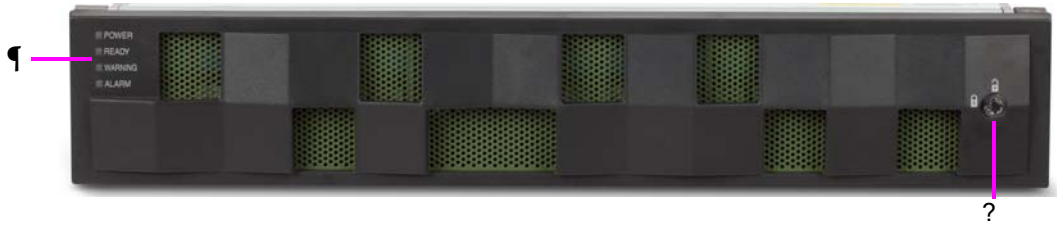


Figure 2-2: CBXSS Controller Box front panel bezel

Legend:

¶	**POWER, READY, WARNING, ALARM LEDs** See Table 2-2 on page 2-26.
?	**Lock**

Front panel without bezel

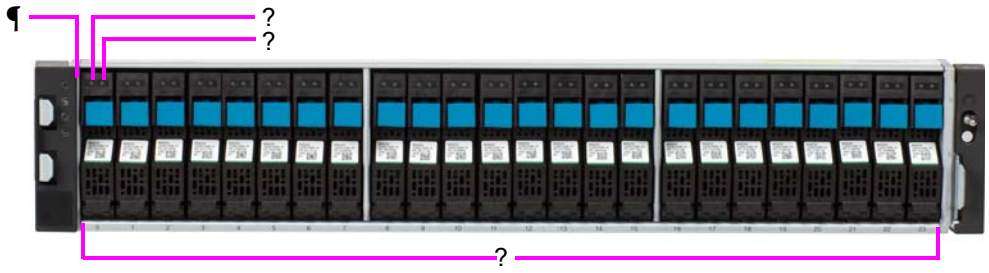


Figure 2-3: CBXSS Controller Box front panel without bezel

Legend:

¶	**POWER, READY, WARNING, ALARM LEDs** See Table 2-2 on page 2-26.
?	**ALM LED** Drive display LED above each drive slot. See Table 2-6 on page 2-30.
?	**ACT LED** Drive display LED above each drive slot. See Table 2-6 on page 2-30.
?	**Small Form Factor Drives** 24 2.5-inch small form factor drives oriented vertically. Slots are designated 0 - 23 going from left to right.

Rear panel

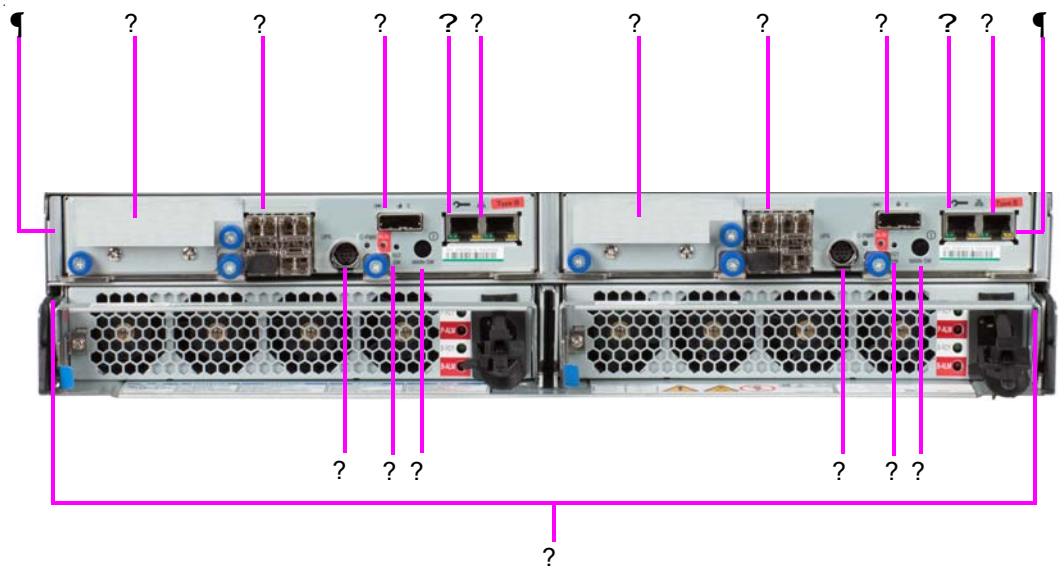


Figure 2-4: CBXSS Controller Box rear panel

Legend:

¶ **Two Controllers**
Controller 0 (left) and Controller 1 (right)

? **Host Interface Option**
See Host I/O Boards for CBXSS and CBXSL Controller Boxes on page 2-38.

? **Fibre Channel Ports**
See Fibre Channel ports on page 2-35.

? **PATH 0 Expansion Port**
Connects to a DBS or DBL Drive Box. Do not connect to a DBX Drive Box. LED above port shows when a link is made:
- BLUE ON = Drive Box is connected and link status is normal.
- ORANGE ON = a Hitachi Storage Navigator Modular 2 wizard indicates that a SAS (ENC) cable must to be inserted into the port.

? **LAN 0 Maintenance Port**
- Left LED: Link Status (green)
- Right LED: Port Activity (yellow)

See Maintenance port on page 2-37.

? **LAN 1 Management Port**
- Left LED: Link Status (green)
- Right LED: Port Activity (yellow)

See Management port on page 2-37.

? **Power Unit**
See Power Unit for CBXSS, CBXSL, CBSS, and CBSL Controller Boxes on page 2-45.

? **Main Switch**
Powers the storage system ON and OFF. When power is OFF, turn on power by holding this switch longer than 1 second. When power is ON, turn off power by holding this switch longer than 3 seconds.

? **Reset Switch and Controller LEDs**
Use the Reset switch only when instructed by Hitachi Support. For LEDs, see CBXSS/CBXSL controller LEDs on page 2-34.

? **Uninterruptible Power Supply Port**

CBXSL Controller Box (DF850-CBSLR)

Front panel bezel

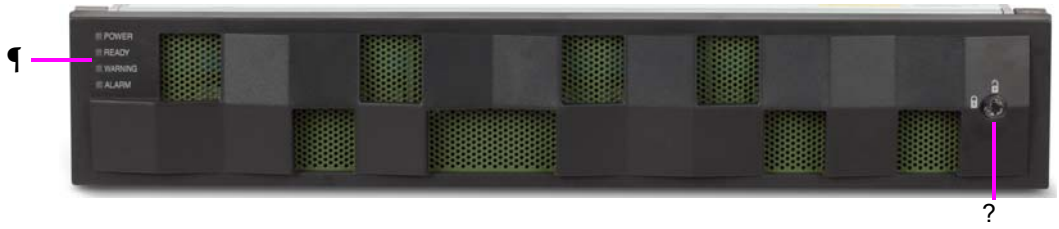


Figure 2-5: CBXSL Controller Box front panel bezel

Legend:

¶	**POWER, READY, WARNING, ALARM LEDs** See Table 2-2 on page 2-26.
?	**Lock**

Front panel without bezel

Figure 2-6: CBXSL Controller Box front panel without bezel

Legend:

¶	**POWER, READY, WARNING, ALARM LEDs** See Table 2-2 on page 2-26.
?	**ACT LED** Drive display LED above each drive slot. See Table 2-7 on page 2-30.
?	**ALM LED** Drive display LED above each drive slot. See Table 2-7 on page 2-30.
?	**Large Form Factor Drives** 12 3.5-inch large form factor drives stacked horizontally. Slots are designated in the following way: 8 9 10 11 4 5 6 7 0 1 2 3

Rear panel

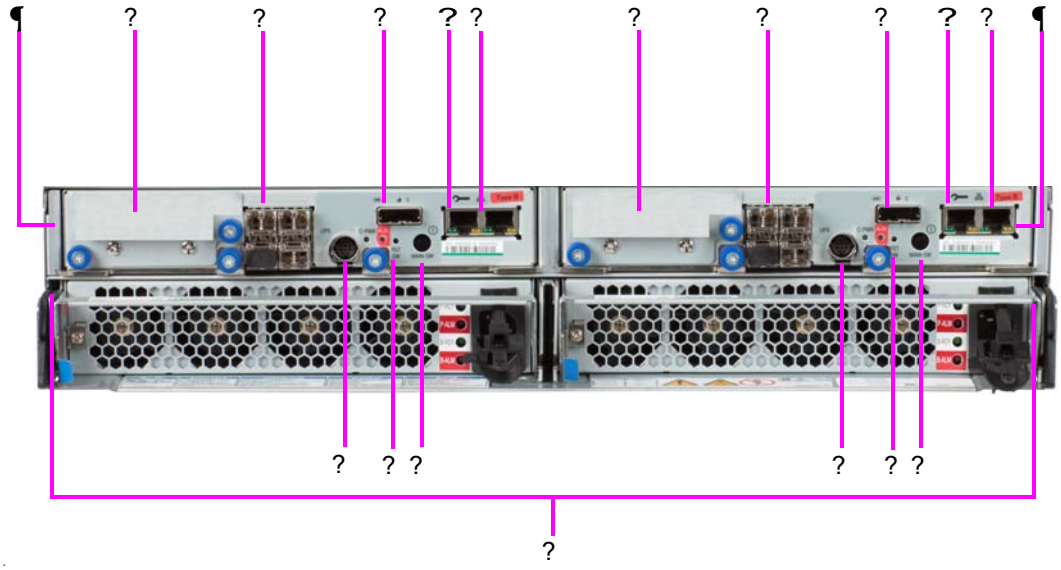


Figure 2-7: CBXSL Controller Box rear panel

Legend:

¶ **Two Controllers**
Controller 0 (left) and Controller 1 (right)

? **Host Interface Option**
See Host I/O Boards for CBXSS and CBXSL Controller Boxes on page 2-38.

? **Fibre Channel Ports**
See Fibre Channel ports on page 2-35.

? **PATH 0 Expansion Port**
Connects to a DBS or DBL Drive Box. Do not connect to a DBX Drive Box. LED above port shows when a link is made:
- BLUE ON = Drive Box is connected and link status is normal.
- ORANGE ON = a Storage Navigator Modular 2 wizard indicates that a SAS (ENC) cable must to be inserted into the port.

? **LAN 0 Maintenance Port**
- Left LED: Link Status (green)
- Right LED: Port Activity (yellow)

See Maintenance port on page 2-37.

? **LAN 1 Management Port**
- Left LED: Link Status (green)
- Right LED: Port Activity (yellow)

See Management port on page 2-37.

? **Power Unit**
See Power Unit for CBXSS, CBXSL, CBSS, and CBSL Controller Boxes on page 2-45.

? **Main Switch**
Powers the storage system ON and OFF. When power is OFF, turn on power by holding this switch longer than 1 second. When power is ON, turn off power by holding this switch longer than 3 seconds.

? **Reset Switch and Controller LEDs**
Use the Reset switch only when instructed by Hitachi Support. For LEDs, see CBXSS/CBXSL controller LEDs on page 2-34.

? **Uninterruptible Power Supply Port**

CBSS Controller Box (DF850-CBSSR)

Front panel bezel

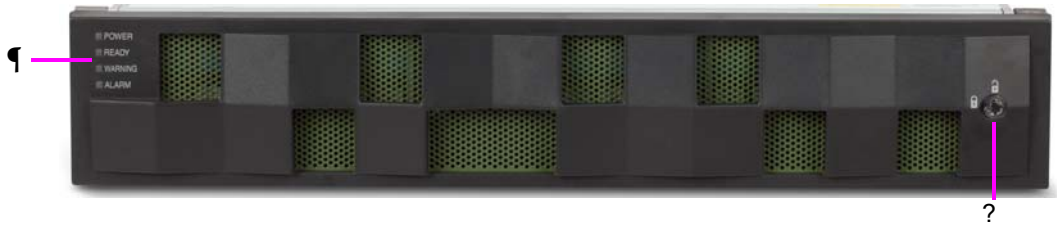


Figure 2-8: CBSS Controller Box front panel bezel

Legend:

¶	**POWER, READY, WARNING, ALARM LEDs** See Table 2-2 on page 2-26.
?	**Lock**

Front panel without bezel

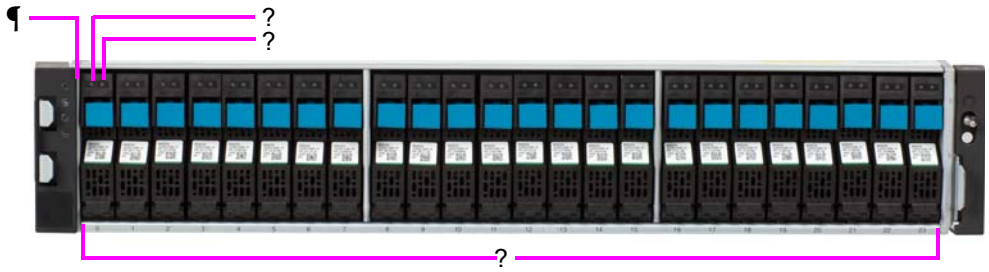


Figure 2-9: CBSS Controller Box front panel without bezel

Legend:

¶	**POWER, READY, WARNING, ALARM LEDs** See Table 2-2 on page 2-26.
?	**ALM LED** Drive display LED above each drive slot. See Table 2-6 on page 2-30.
?	**ACT LED** Drive display LED above each drive slot. See Table 2-6 on page 2-30.
?	**Small Form Factor Drives** 24 2.5-inch small form factor drives oriented vertically. Slots are designated 0 - 23 going from left to right.

Rear panel

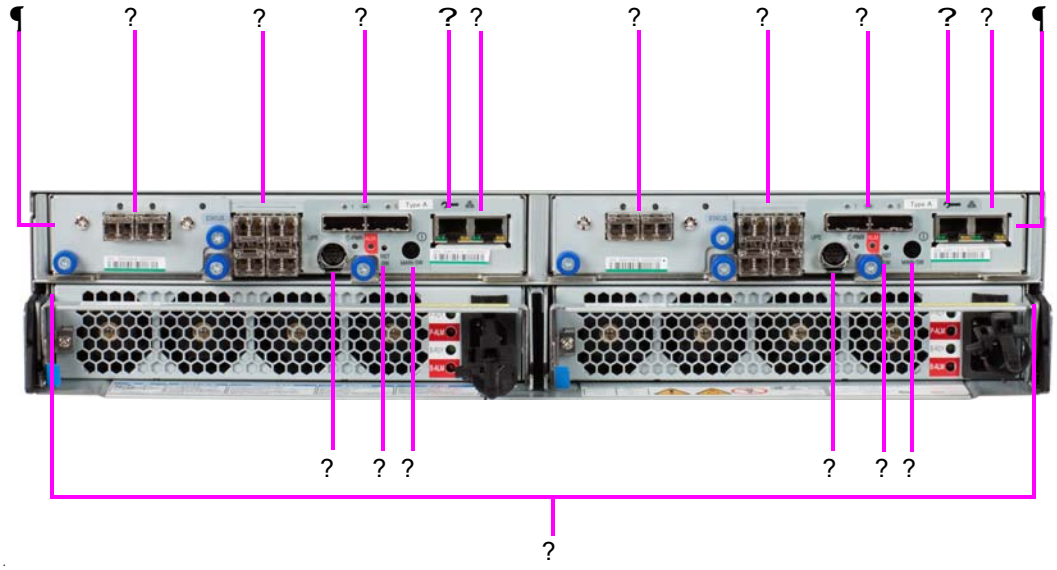


Figure 2-10: CBSS Controller Box rear panel

Legend:

¶ **Two Controllers**
Controller 0 (left) and Controller 1 (right)

? **Host Interface Option**
See Host I/O Boards for CBSS and CBSL Controller Boxes on page 2-40.

? **Fibre Channel Ports**
See Fibre Channel ports on page 2-35.

? **PATH 0 (left) and PATH 1 (right) Expansion Ports**
Connect to a DBS, DBL, or DBX Drive Box. LED above each port shows when a link is made:
- BLUE ON = Drive Box is connected and link status is normal.
- ORANGE ON = a Storage Navigator Modular 2 wizard indicates that a SAS (ENC) cable must to be inserted into the port.

? **LAN 0 Maintenance Port**
- Left LED: Link Status (green)
- Right LED: Port Activity (yellow)

See Maintenance port on page 2-37.

? **LAN 1 Management Port**
- Left LED: Link Status (green)
- Right LED: Port Activity (yellow)

See Management port on page 2-37.

? **Power Unit**
See Power Unit for CBXSS, CBXSL, CBSS, and CBSL Controller Boxes on page 2-45.

? **Main Switch**
Powers the storage system ON and OFF. When power is OFF, turn on power by holding this switch longer than 1 second. When power is ON, turn off power by holding this switch longer than 3 seconds.

? **Reset Switch and Controller LEDs**
Use the Reset switch only when instructed by Hitachi Support. For LEDs, see CBSS/CBSL controller LEDs on page 2-34.

? **Uninterruptible Power Supply Port**

CBSL Controller Box (DF850-CBSLR)

Front panel bezel

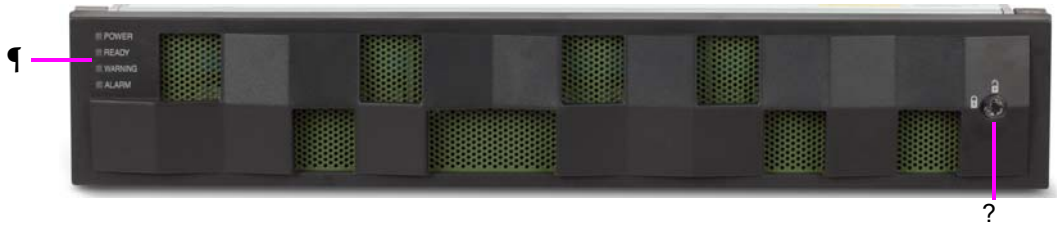


Figure 2-11: CBSL Controller Box front panel bezel

Legend:

¶	**POWER, READY, WARNING, ALARM LEDs** See Table 2-2 on page 2-26.
?	**Lock**

Front panel without bezel

Figure 2-12: CBSL Controller Box front panel without bezel

Legend:

¶	**POWER, READY, WARNING, ALARM LEDs** See Table 2-2 on page 2-26.
?	**ACT LED** Drive display LED above each drive slot. See Table 2-7 on page 2-30.
?	**ALM LED** Drive display LED above each drive slot. See Table 2-7 on page 2-30.
?	**Large Form Factor Drives** 12 3.5-inch large form factor drives stacked horizontally. Slots are designated in the following way: 8 9 10 11 4 5 6 7 0 1 2 3

Rear panel

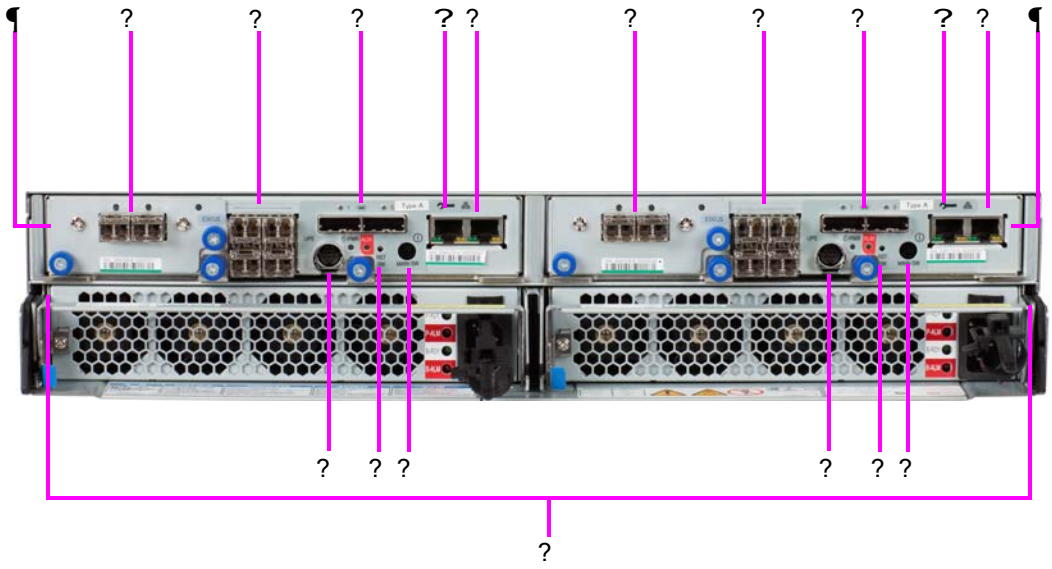


Figure 2-13: CBSL Controller Box rear panel

Legend:

¶ **Two Controllers**
Controller 0 (left) and Controller 1 (right)

? **Host Interface Option**
See Host I/O Boards for CBSS and CBSL Controller Boxes on page 2-40.

? **Fibre Channel Ports**
See Fibre Channel ports on page 2-35.

? **PATH 0 (left) and PATH 1 (right) Expansion Ports**
Connect to a DBS, DBL, or DBX Drive Box. LED above each port shows when a link is made:
- BLUE ON = Drive Box is connected and link status is normal.
- ORANGE ON = a Storage Navigator Modular 2 wizard indicates that a SAS (ENC) cable must to be inserted into the port.

? **LAN 0 Maintenance Port**
- Left LED: Link Status (green)
- Right LED: Port Activity (yellow)

See Maintenance port on page 2-37.

? **LAN 1 Management Port**
- Left LED: Link Status (green)
- Right LED: Port Activity (yellow)

See Management port on page 2-37.

? **Power Unit**
See Power Unit for CBXSS, CBXSL, CBSS, and CBSL Controller Boxes on page 2-45.

? **Main Switch**
Powers the storage system ON and OFF. When power is OFF, turn on power by holding this switch longer than 1 second. When power is ON, turn off power by holding this switch longer than 3 seconds.

? **Reset Switch and Controller LEDs**
Use the Reset switch only when instructed by Hitachi Support. For LEDs, see CBSS/CBSL controller LEDs on page 2-34.

? **Uninterruptible Power Supply Port**

CBL (DF850-CBLR) and CBLD (DF850-CBLD) Controller Boxes

Front panel bezel

Figure 2-14: CBL/ CBLD Controller Box front panel bezel

Legend:

¶ **POWER, READY, WARNING, ALARM LEDs**
See Table 2-2 on page 2-26.

? **Main Switch**
Powers the storage system ON (right button) or OFF (left button).

? **Lock**

Front panel without bezel

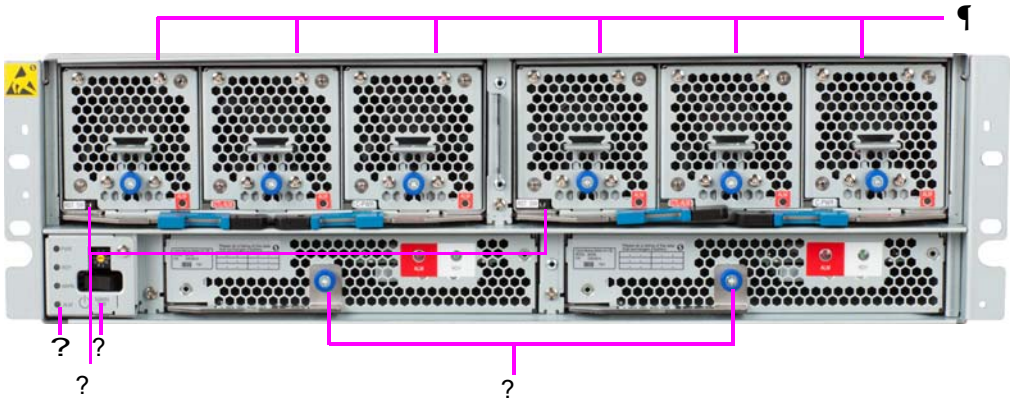


Figure 2-15: CBL/CBLD Controller Box without bezel

Legend:

¶ **Fan Module**
See Fan Module on page 2-49.

? **Cache Backup Battery**
See Cache backup battery on page 2-50.

? **MAIN SW**

? **Reset Switches**
Use the Reset switches only when instructed by Hitachi Support.

? **PWR, RDY, WARN and ALM LEDs**
See Panel assembly on page 2-49.

Rear panel

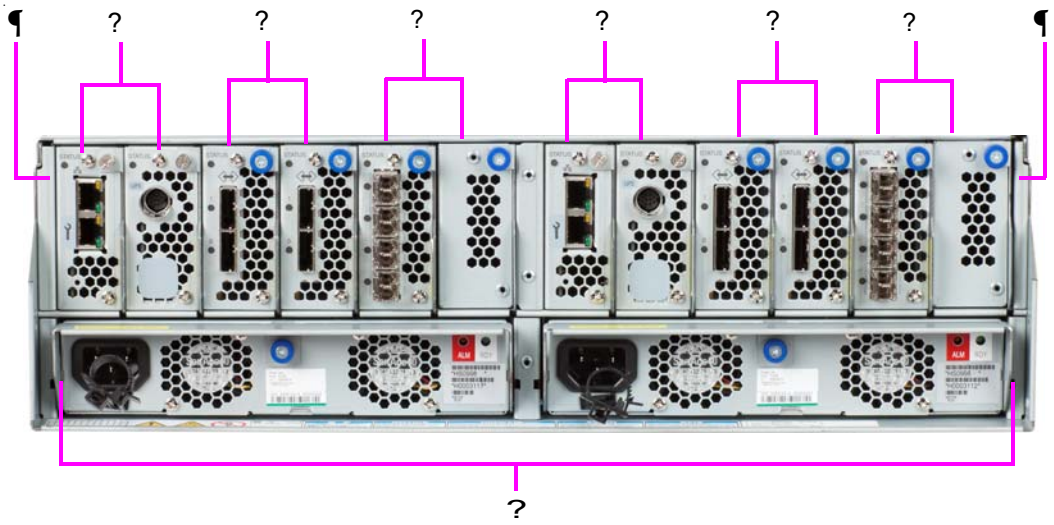


Figure 2-16: CBL / CBLD Controller Box rear panel

Legend:

¶	**Two Controllers** Controller 0 (left) and Controller 1 (right)
?	**Management Module** See Management Module for CBL/CBLD Controller Box on page 2-53.
?	**Drive I/O Module** See Drive I/O Module for CBL/CBLD Controller Box on page 2-54.
?	**Host I/O Modules** See Host I/O Modules for CBLCBLD Controller Box on page 2-55.
?	**Power Unit** See Power Unit for CBL Controller Box on page 2-46.

NOTE: The CBLD rear panel is identical to the figure above, except the AC receptacles are replaced by receptacles for accommodating DC power.

Drive Boxes at a glance

The following Drive Boxes are described in this section

- DBS/DBSD Drive Box, see the section below
- DBL/DBLD Drive Box on page 2-17
- DBF Drive Box on page 2-19
- DBX Drive Box on page 2-21
- DBW Drive Box on page 2-24

DBS/DBSD Drive Box

Front panel bezel

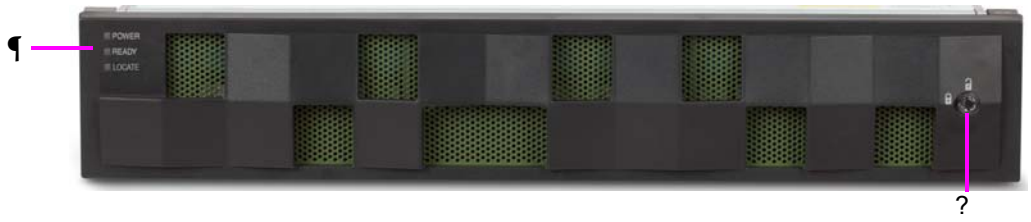


Figure 2-17: DBS/DBSD front panel bezel

Legend:

¶	**POWER, READY, LOCATE LEDs** See Table 2-3 on page 2-27.
?	**Lock**

Front panel without bezel

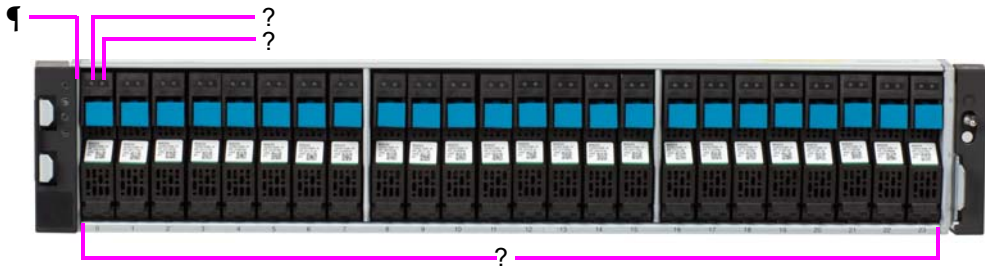


Figure 2-18: DBS/DBSD front panel without bezel

Legend:

¶	**POWER, READY, LOCATE LEDs** See Table 2-3 on page 2-27.
?	**ALM LED** Drive display LED above each drive slot. See Table 2-8 on page 2-31.
?	**ACT LED** Drive display LED above each drive slot. See Table 2-8 on page 2-31.
?	**Small Form Factor Drives** 24 2.5-inch small form factor drives oriented vertically. Slots are designated 0 - 23 going from left to right.

Rear panel

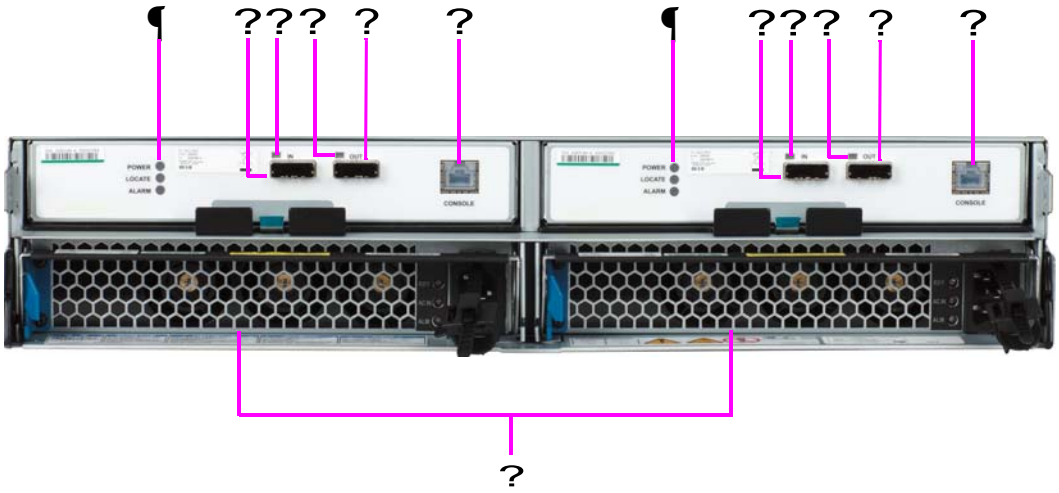


Figure 2-19: DBS rear panel

Legend:

¶	**POWER, LOCATE, ALARM LEDs** See I/O Module (ENC), DBS, DBSD, DBL, and DBLD Drive Boxes on page 2-42.
?	**IN Port** Connects to a CBSS, CBSL, CBL, or CBLD Controller Box or a DBS, DBL, DBX, or DBF Drive Box.
?	**IN Port LED** ON when IN port is connected to a CBSS, CBSL, CBL, CBLD, DBS, DBSD, DBL, DBLD, DBX, or DBF.
?	**Out Port LED** See I/O Module (ENC), DBS, DBSD, DBL, and DBLD Drive Boxes on page 2-42.
?	**OUT Port** See I/O Module (ENC), DBS, DBSD, DBL, and DBLD Drive Boxes on page 2-42.
?	**Console Port** Not used.
?	**Power Unit** See Power Unit for CBXSS, CBXSL, CBSS, and CBSL Controller Boxes on page 2-45 and Power Unit for DBSD/DBLD Drive Box on page 2-46.

NOTE: The DBSD rear panel is identical to the figure above, except the AC receptacles are replaced by receptacles for accommodating DC power.

DBL/DBLD Drive Box

Front panel bezel

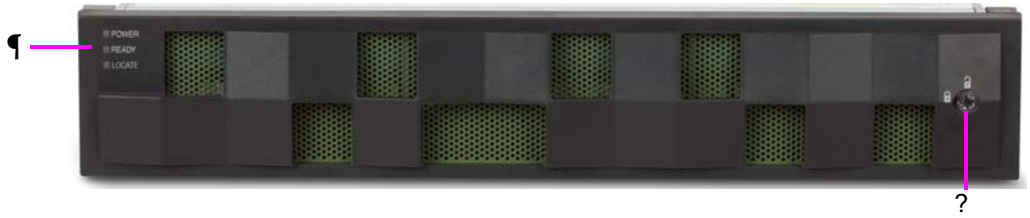


Figure 2-20: DBL/DBLD front panel bezel

Legend:

¶ **POWER, READY, LOCATE LEDs**
See Table 2-3 on page 2-27.

? **Lock**

Front panel without bezel

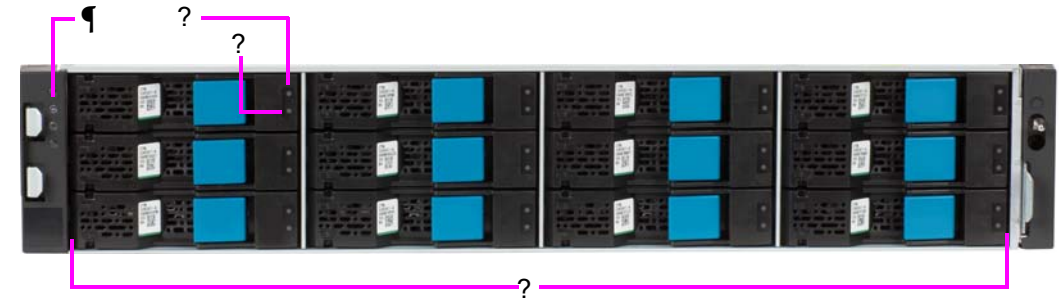


Figure 2-21: DBL/DBLD front panel without bezel

Legend:

¶ **POWER, READY, LOCATE LEDs**
See Table 2-3 on page 2-27.

? **ACT LED**
Drive display LED above each drive slot. See Table 2-9 on page 2-31.

? **ALM LED**
Drive display LED above each drive slot. See Table 2-9 on page 2-31.

? **Large Form Factor Drives**
12 3.5-inch large form factor drives stacked horizontally. Slots are designated in the following way:

8	9	10	11
4	5	6	7
0	1	2	3

Rear panel

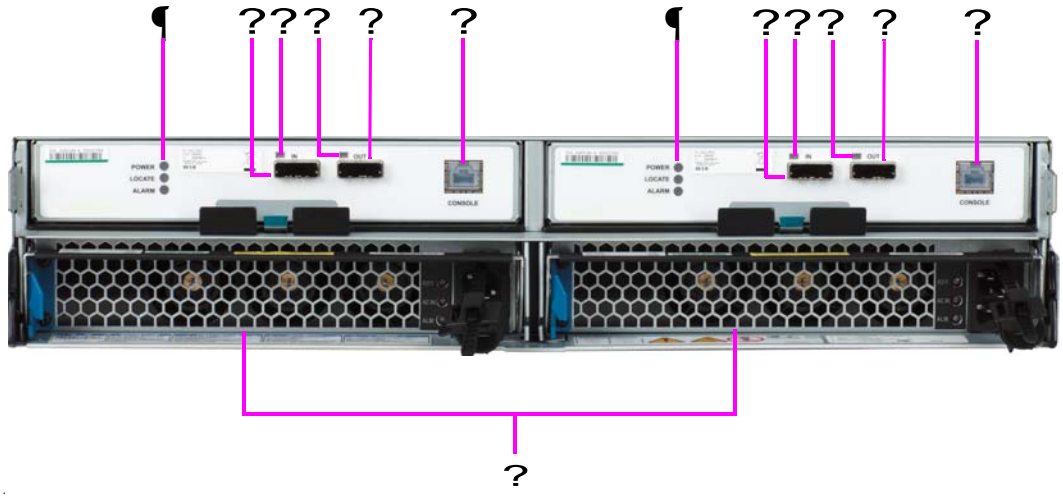


Figure 2-22: DBL rear panel

Legend:

¶	**POWER, LOCATE, ALARM LEDs** See I/O Module (ENC), DBS, DBSD, DBL, and DBLD Drive Boxes on page 2-42.
?	**IN Port** Connects to a CBSS or CBSL Controller Box or a DBS, DBL, or DBX Drive Box.
?	**IN Port LED** ON when IN port is connected to a CBSS, CBSL, DBS, DBL, or DBX.
?	**OUT Port LED** ON when OUT port is connected to a DBS, DBL, or DBX.
?	**OUT Port** Connects to a DBS, DBL, or DBX Drive Box.
?	**Console Port** Not used.
?	**Power Unit** See Power Unit for DBS and DBL Drive Boxes on page 2-45 and Power Unit for DBSD/DBLD Drive Box on page 2-46.

NOTE: The DBLD rear panel is identical to the figure above, except the AC receptacles are replaced by receptacles for accommodating DC power.

DBF Drive Box

Front panel bezel

Figure 2-23: DBF front panel bezel

Legend:

¶	**POWER, READY, LOCATE LEDs** See Table 2-3 on page 2-27.
?	**Lock**

Front panel without bezel

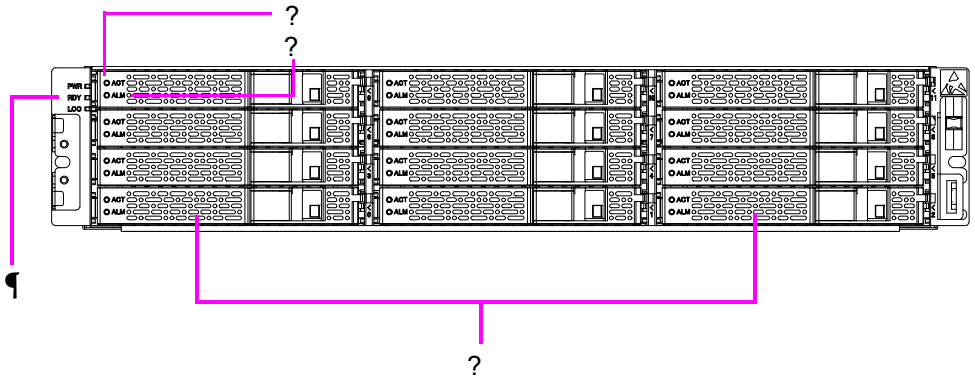


Figure 2-24: DBF front panel without bezel

Legend:

¶	**POWER, READY, LOCATE LEDs** See Table 2-3 on page 2-27.
?	**ALM LED** Drive display LED above each drive slot. See Table 2-10 on page 2-32.
?	**ACT LED** Drive display LED above each drive slot. See Table 2-10 on page 2-32.
?	**Large Form Factor Drives** 12 3.5-inch large form factor drives stacked horizontally. Slots are designated in the following way: 9 10 11 6 7 8 3 4 5 0 1 2

Rear panel

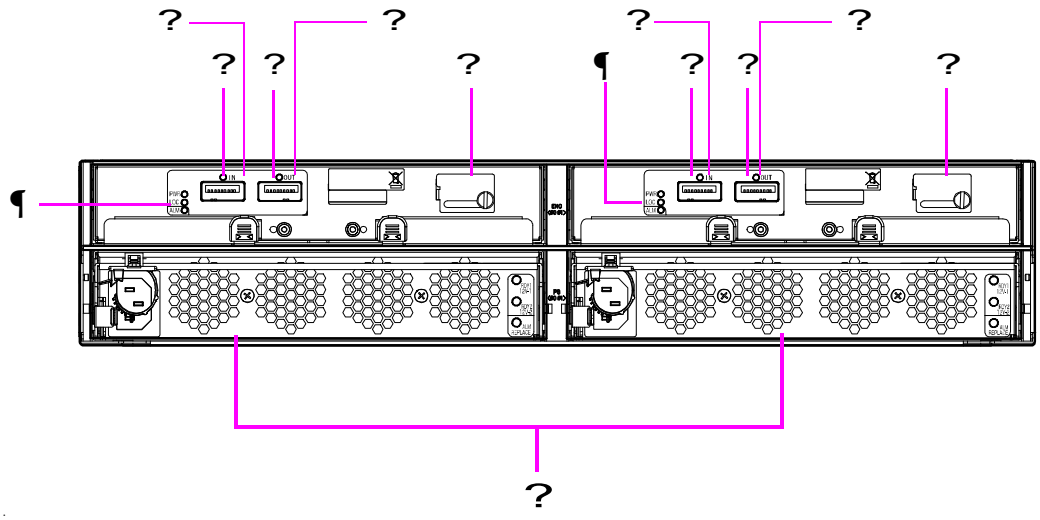


Figure 2-25: DBF rear panel

Legend:

¶ **POWER, LOCATE, ALARM LEDs**
See I/O Module (ENC), DBF Drive Box on page 2-44.

? **IN Port**
Connects to a CBSS, CBSL, CBL, or CBLD Controller Box or a DBS, DBL, DBX, or DBF Drive Box.

? **IN Port LED**
ON when IN port is connected to a CBSS, CBSL, CBL, CBLD, DBS, DBSD, DBL, DBLD, DBX, or DBF.

? **Out Port LED**
See I/O Module (ENC), DBF Drive Box on page 2-44.

? **OUT Port**
See I/O Module (ENC), DBF Drive Box on page 2-44.

? **Console Port**
Not used.

? **Power Unit**
See Power Unit for DBF Drive Box on page 2-46.

DBX Drive Box

Front panel bezel

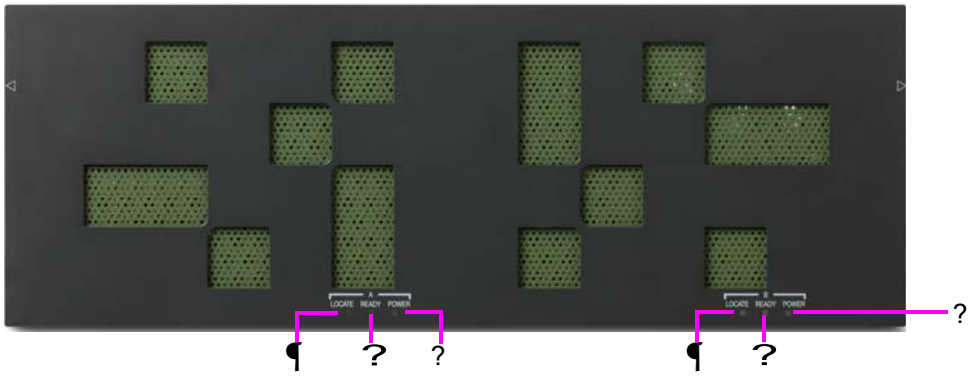


Figure 2-26: DBX front panel with bezel

Legend:

¶ **LOCATE LED**
See Table 2-4 on page 2-28.

? **READY LED**
See Table 2-4 on page 2-28.

? **POWER LED**
See Table 2-4 on page 2-28.

Rear panel

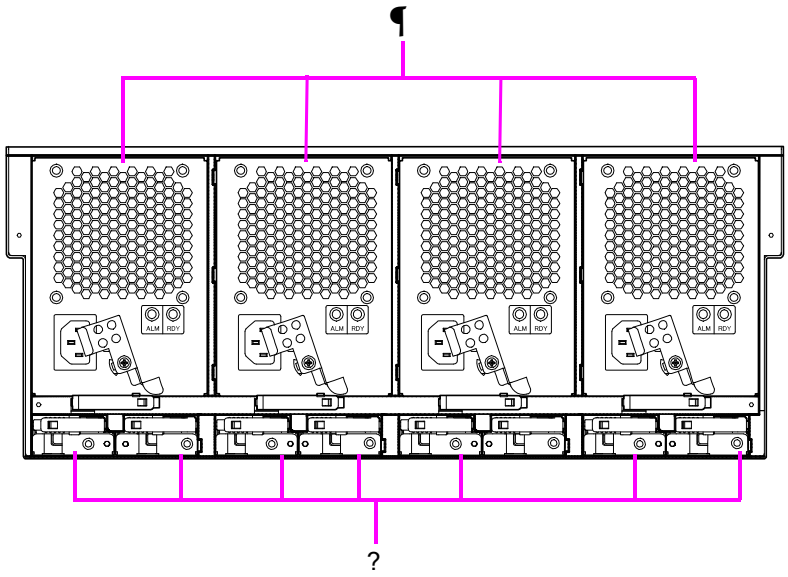


Figure 2-27: DBX rear panel

Legend:

¶	**Power Unit** See Power Unit for DBX Drive Box on page 2-47.
?	**I/O Card (ENC)** See I/O Card (ENC), DBX Drive Box on page 2-43.

Top view

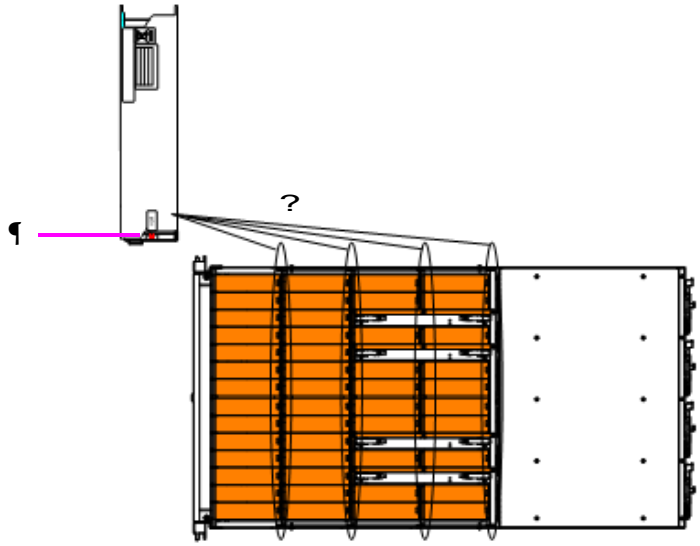


Figure 2-28: DBX top view

Legend:	
¶	**ALM LED** See Table 2-11 on page 2-32.
?	**Drive Indication**

DBW Drive Box

Front panel bezel

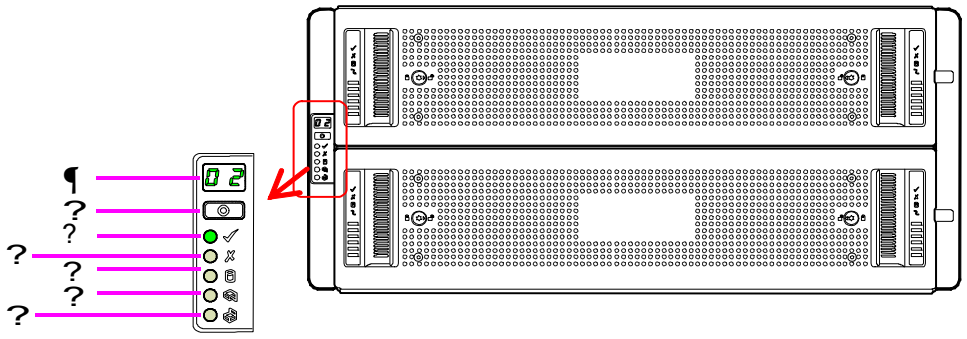


Figure 2-29: DBW front panel with bezel

Legend:

¶ **Unit ID Display LED**
Not used. (The displayed number may change when you press the Input Switch. However, it does not affect storage system operations.)

? **Input Switch**
Not used.

? **Power On / Standby LED**
See Table 2-5 on page 2-29.

? **Module WNG LED**
See Table 2-5 on page 2-29.

? **Logical ALM LED**
See Table 2-5 on page 2-29.

? **Drawer 1 ALM LED**
See Table 2-5 on page 2-29 and DBW Drive Box on page 2-57.

? **Drawer 2 ALM LED**
See Table 2-5 on page 2-29 and DBW Drive Box on page 2-57.

Rear panel

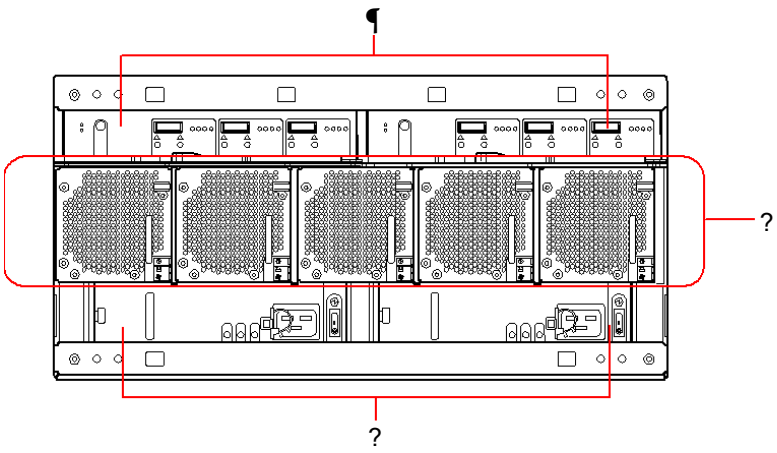


Figure 2-30: DBW rear panel

Legend:

¶ **I/O Module (ENC)**
See I/O Module (ENC) for DBW Drive Box on page 2-57.

? **Fan Module**
See DBW Fan Module on page 2-60.

? **Power Unit**
See Power Unit for DBW Drive Box on page 2-58.

Top view

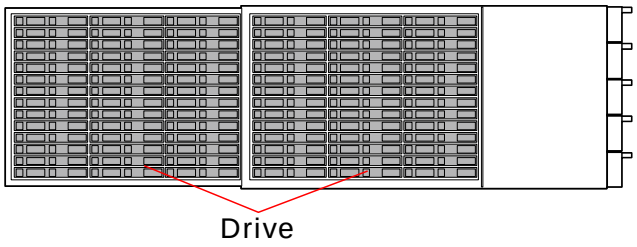


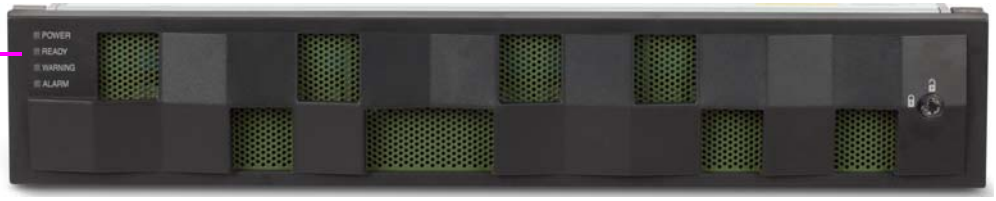
Figure 2-31: DBW top view

Hardware descriptions

LED definitions

Front panel LEDs

CBXSS, CBXSL, CBSS, and CBSL Controller Boxes



POWER
READY
WARNING
ALARM

CBL/CBLD Controller Box

POWER
READY
WARNING
ALARM

Table 2-2: Front panel LEDs (CBXSS, CBXSL, CBSS, CBSL, CBL, and CBLD Controller Boxes)

LED	Color	Description
POWER	Green	ON = power-on in progress after main switch has been pushed. Stays ON after system is operational.
	Orange	ON = Controller Box power cables are connected and power is supplied.
READY	Green	ON = normal operation. Storage system is operational. Fast blink = firmware downloading (do not turn off system). Slow blink = download processing of the ENC firmware completed offline.
WARNING	Orange	OFF = normal operation ON or slow blink = failure, but storage system can remain operating. Fast blink = flash is updating. For single-controller storage systems, the system is on, receiving power, and performing internal processing.
ALARM	Red	OFF = normal operation ON = failure that prevents the storage system from operating. Visit the HDS Support Portal at portal.hds.com. Slow blink = serious failure. Visit the HDS Support Portal at portal.hds.com.

Table 2-3: Front panel LEDs (DBS, DBSD, DBL, DBLD, and DBF Drive Boxes)

LED	Color	Description
POWER	Green	ON = power is being supplied to the storage system.
READY	Green	ON = normal operation. Storage system is operational. Fast blink = internal processing. Storage system is operational. Slow blink = offline download processing completed (displayed during maintenance).
LOCATE	Orange	ON = nonfatal error. Storage system can remain operating. Visit the HDS Support Portal at portal.hds.com. LED goes ON when adding the chassis with the power turned on (this is not an error)

DBX Drive Box

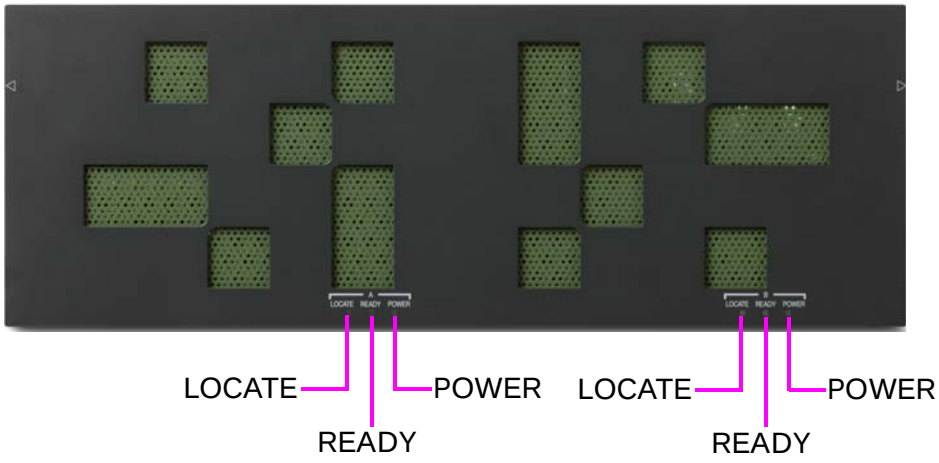


Table 2-4: Front panel LEDs (DBX Drive Box)

LED	Color	Description
POWER	Green	ON = power is being supplied to the storage system.
	Orange	ON = power cables are attached to the rear of the Drive Box and power is being supplied.
READY	Green	ON = normal operation. Storage system is operational. Fast blink = internal processing. Storage system is operational. Slow blink = offline download processing completed (displayed during maintenance).
LOCATE	Orange	ON = nonfatal error. Storage system can remain operating. Visit the HDS Support Portal at portal.hds.com. If adding a chassis with power ON, LED indicates the addition of the chassis (this is not an error).

DBW Drive Box

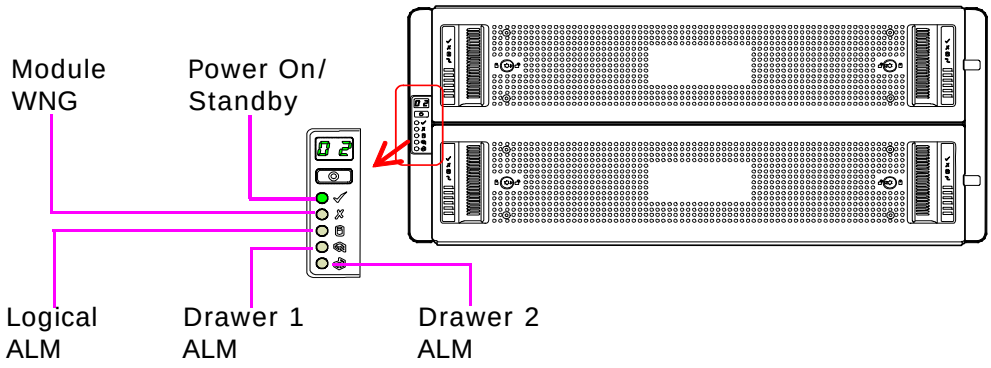


Table 2-5: Front panel LEDs (DBW Drive Box)

LED	Color	Description
Power On/ Standby	Green	ON = normal Drive Box status.
	Orange	ON = abnormal Drive Box status. Visit the HDS Support Portal at portal.hds.com.
Module WNG	Orange	ON = abnormal Drive Box condition. Visit the HDS Support Portal at portal.hds.com.
Logical ALM	Orange	ON = logical fault has been detected. Visit the HDS Support Portal at portal.hds.com.
Drawer 1 ALM	Orange	ON = abnormal top drawer condition. Visit the HDS Support Portal at portal.hds.com.
Drawer 2 ALM	Orange	ON = abnormal bottom drawer condition. Visit the HDS Support Portal at portal.hds.com.

Drive display LEDs

CBXSS and CBSS Controller Boxes

Table 2-6: Drive display LEDs (CBXSS and CBSS Controller Boxes)

LED	Color	Description
ALM	Red	ON = fatal error. Visit the HDS Support Portal at portal.hds.com.
ACT	Green	ON or blink = drive is being accessed.

CBXSL and CBSL Controller Boxes

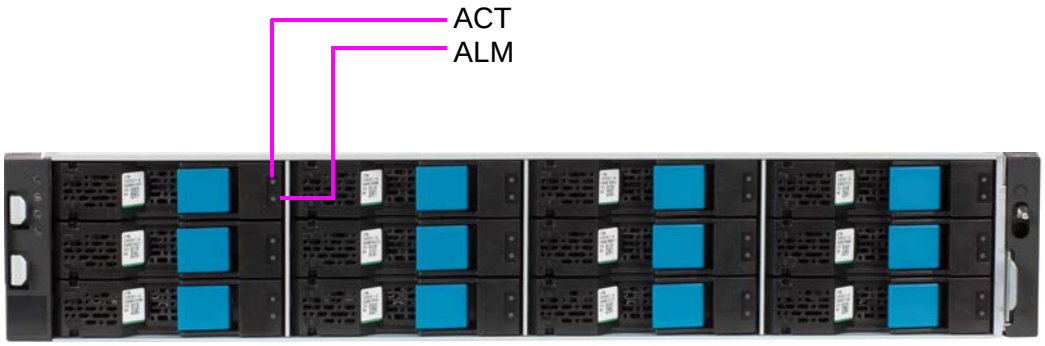


Table 2-7: Drive display LEDs (CBXSL and CBSL Controller Boxes)

LED	Color	Description
ACT	Green	ON or blink = drive is being accessed.
ALM	Red	ON = fatal error. Visit the HDS Support Portal at portal.hds.com.

DBS/DBSD Drive Box

Table 2-8: Drive display LEDs (DBS/DBSD Drive Box)

LED	Color	Description
ALM	Red	ON = fatal error. Visit the HDS Support Portal at portal.hds.com.
ACT	Green	ON or blink = drive is being accessed.

DBL/DBLD Drive Box

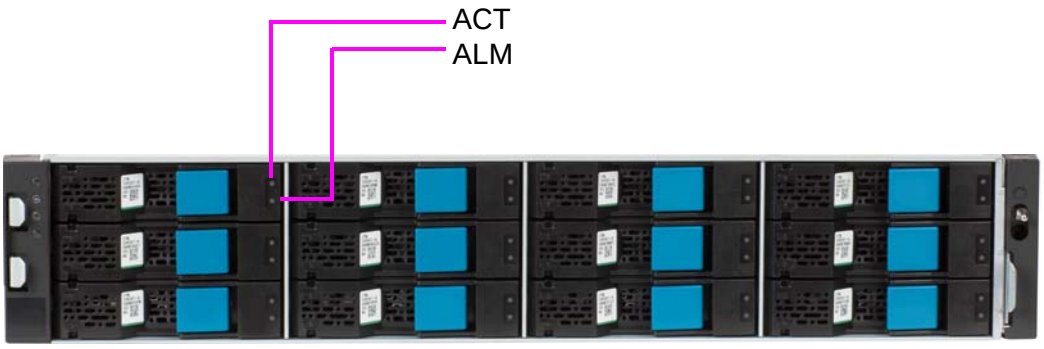


Table 2-9: Drive display LEDs (DBL/DBLD Drive Box)

LED	Color	Description
ACT	Green	ON or blink = drive is being accessed.
ALM	Red	ON = fatal error. Visit the HDS Support Portal at portal.hds.com.

DBF Drive Box

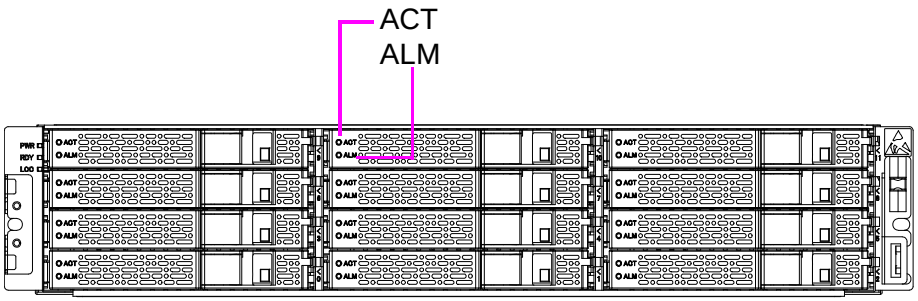


Table 2-10: Drive display LEDs (DBF Drive Box)

LED	Color	Description
ACT	Green	ON or blink = drive is being accessed.
ALM	Red	ON = fatal error. Visit the HDS Support Portal at portal.hds.com.

DBX Drive Box

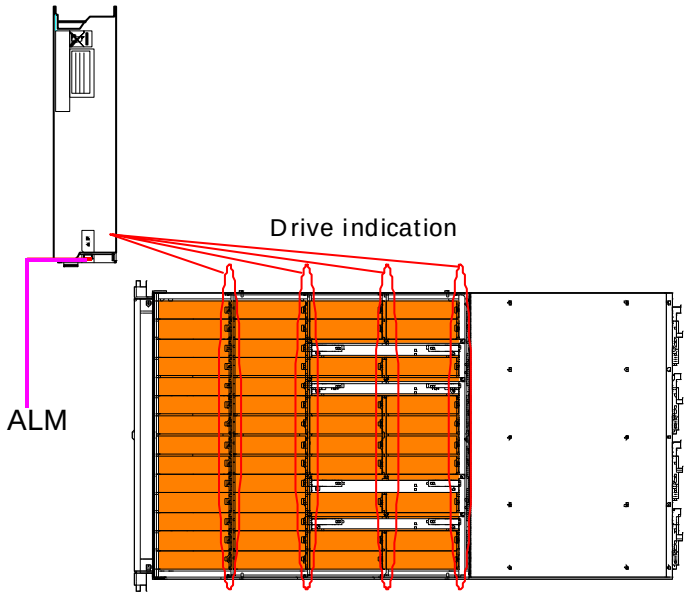


Table 2-11: Drive display LED (DBX Drive Box)

LED	Color	Description
ALM	Red	ON = fatal error. Visit the HDS Support Portal at portal.hds.com.

DBW Drive Box

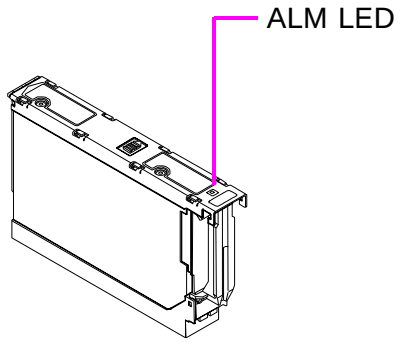


Table 2-12: Drive display LED (DBW Drive Box)

LED	Color	Description
ALM	Orange	ON = drive is blocked. Visit the HDS Support Portal at portal.hds.com.

Controller LEDs

The following LEDs appear on the rear panel of the CBXSS/CBXSL and CBSS/CBSL controllers.

CBXSS/CBXSL controller LEDs

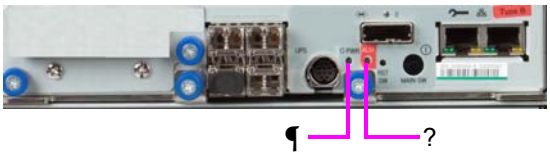


Table 2-13: CBXSS/CBXSL controller LEDs

Legend	LED	Color	Description
¶	C-PWR	Green	ON = controller status is normal. Blink = data in cache memory is stored in the backup controller.
?	ALM	Red Orange	ON = fatal error. Visit the HDS Support Portal at portal.hds.com. ON = controller is in reset mode.

CBSS/CBSL controller LEDs

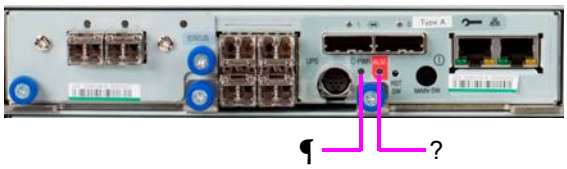


Table 2-14: CBSS/CBSL controller LEDs

Legend	LED	Color	Description
¶	C-PWR	Green	ON = controller status is normal. Blink = data in cache memory is stored in the backup controller.
?	ALM	Red Orange	ON = fatal error. Visit the HDS Support Portal at portal.hds.com. ON = controller is in reset mode.

Data port descriptions

Hitachi Unified Storage Controller Boxes support the following data port connections:

- Fibre Channel
- 1 Gb iSCSI
- 10 Gb iSCSI

Fibre Channel ports

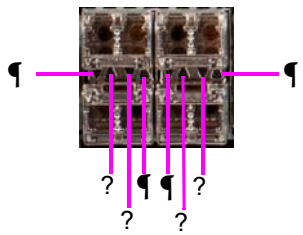
CBXSS, CBXSL, CBSS, and CBSL Controller Boxes have four standard Fibre Channel ports. These Controller Boxes also support a Fibre Channel Host I/O Module that contains four additional Fibre Channel ports (see Host I/O Boards for CBXSS and CBXSL Controller Boxes on page 2-38 and Host I/O Boards for CBSS and CBSL Controller Boxes on page 2-40). The ports are designated in the following way:

B	D
A	C

Each Fibre Channel port provides an 8-Gigabit auto-sensing Fibre Channel interface for connecting to storage systems, Fibre Channel switches, Fibre Channel hosts, or other storage networking products. All Fibre Channel ports support fallback speeds of 4 Gigabits and 2 Gigabits.

Each Fibre Channel port has LEDs to indicate its status.

NOTE: The CBL/CBLD Controller Box provides four Fibre Channel ports as an optional Host I/O Board. See Fibre Channel Host I/O Module on page 2-56.



Legend	LED	Color	Description
¶	HALM	Red	Red = Host Connector is operating abnormally. Visit the HDS Support Portal at portal.hds.com.
?	LINK	Blue	ON = normal link status at 8 Gbps.
		Green	ON = normal link status at 2 or 4 Gbps.

1 Gb iSCSI ports

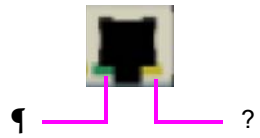
CBXSS and CBXSL Controller Boxes support an optional 1 Gb iSCSI Host/IO Module that contains two 1 Gb iSCSI ports (see Host I/O Boards for CBXSS and CBXSL Controller Boxes on page 2-38). Each port provides a 1-Gigabit Ethernet interface for connecting to IP hosts that require IP access to storage.

Both iSCSI ports support fallback speeds of 100 Mbits and 10 Mbits. The ports are designated in the following way:

E	F

Each port uses an RJ-45 port for connection to the port's physical medium. The ports support Auto-MDI/MDIX technology, allowing you to use either standard (straight-through) or crossover Category 5 or better Ethernet cables.

Each 1 Gb iSCSI port has LEDs to indicate its status.

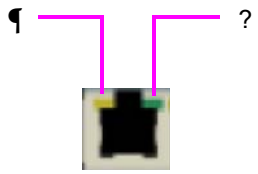


Legend	LED	Color	Description
¶	LINK LED	Green	OFF = link status error. Visit the HDS Support Portal at portal.hds.com. ON = link status is normal.
?	ACT LED	Yellow	OFF = data is not being sent or received on the port. ON = data is being sent or received on the port.

Management port

All Controller Boxes provide a 10/100/1000 Ethernet RJ-45 management port labeled **LAN 1**. This port is a 10BaseT/100Base-TX/1000BaseT Ethernet management interface that connects to a PC that will be used to configure the storage system using Storage Navigator Modular 2 software.

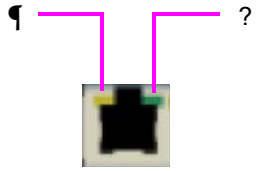
The management port supports Auto-MDI/MDIX technology, allowing you to use either standard (straight-through) or crossover Ethernet cable. It also has port activity and link status LEDs that indicate its status.



Legend	LED	Color	Description
¶	ACT LED	Yellow	OFF = data is not being sent or received on the port. ON = data is being sent or received on the port.
?	LINK LED	Green	OFF = link status error. Visit the HDS Support Portal at portal.hds.com. ON = link status is normal.

Maintenance port

All Controller Boxes provide a 10/100/1000 Ethernet RJ-45 maintenance port labeled **LAN 0**. This port is used to perform troubleshooting procedures. Do not use this port unless instructed by Hitachi Customer Service. This port has port activity and link status LEDs that indicate its status.



Legend	LED	Color	Description
¶	ACT LED	Yellow	OFF = data is not being sent or received on the port. ON = data is being sent or received on the port.
?	LINK LED	Green	OFF = link status error. Visit the HDS Support Portal at portal.hds.com. ON = link status is normal.

Host I/O Board and Host I/O Module

The following Host I/O Boards and Host I/O Modules are available for Hitachi Unified Storage systems:

- A Host I/O Board for CBXSS and CBXSL Controller Boxes that comes in two versions (see page 2-38):
  - 1 Gb iSCSI Host I/O Board with two 1 Gb iSCSI ports
  - 10 Gb iSCSI Host I/O Board with two 10 Gb iSCSI ports
- A Host I/O Board for CBSS and CBSL Controller Boxes that comes in three versions (see page 2-40):
  - 1 Gb iSCSI Host I/O Board with two 1 Gb iSCSI ports
  - 10 Gb iSCSI Host I/O Board with two 10 Gb iSCSI ports
  - Fibre Channel Host I/O Board with four Fibre Channel ports
- A Host I/O Module for the CBL/CBLD Controller Box that comes in two versions (see page 2-55):
  - 10 Gb iSCSI Host I/O Module with two 10 Gb iSCSI ports
  - Fibre Channel Host I/O Module with four Fibre Channel ports

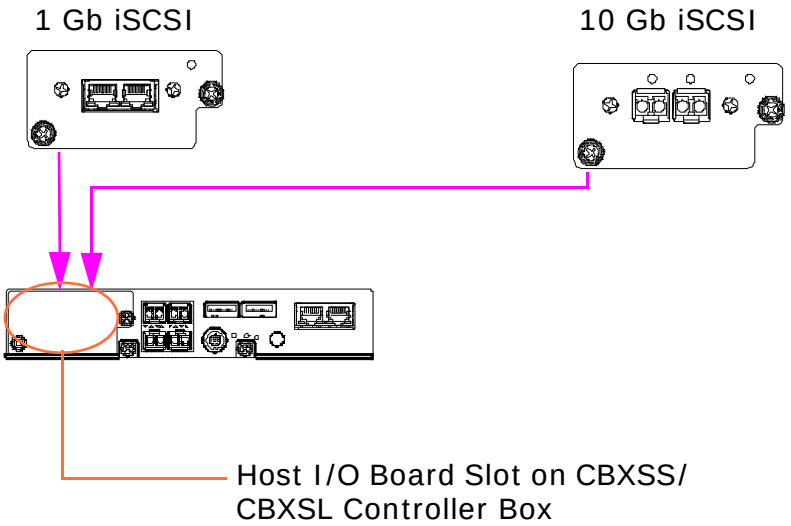
A CBXSS, CBXSL, CBSS, and CBSL Controller Box supports two Host I/O Boards. Facing the rear panel, the ports on the Host I/O Boards can be accessed at the top-left area of the controller.

The CBL/CBLD Controller Box supports four Host I/O Modules. Facing the rear panel of the CBL/CBLD Controller Box, the ports on the Host I/O Modules are located to the right of the Drive I/O Module.

Host I/O Boards for CBXSS and CBXSL Controller Boxes

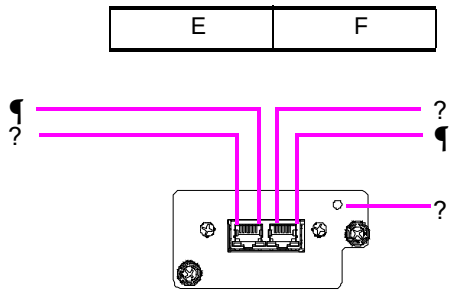
Host I/O Board options for CBXSS and CBXSL Controller Boxes are:

- 1 Gb iSCSI
- 10 Gb iSCSI



1 Gb iSCSI Host I/O Board

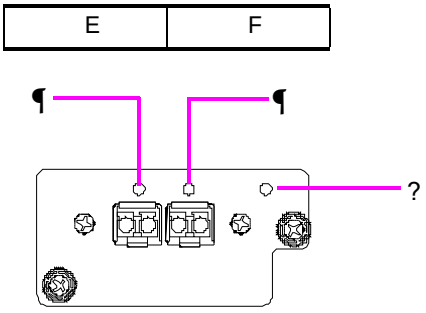
The 1 Gb iSCSI Host I/O Board for CBXSS and CBXSL Controller Boxes has two 1 Gb RJ-45 iSCSI ports. The ports are designated in the following way when the module is installed:



Legend	LED	Color	Description
¶	ACT	Yellow	ON = data is being transferred.
?	LINK	Green	ON = link status is normal.
?	STATUS	Green	ON = Host I/O Board is in the power-on status.
		Red	ON = Host I/O Board is operating abnormally. Visit the HDS Support Portal at portal.hds.com.

10 Gb iSCSI Host I/O Board

The 10 Gb iSCSI Host I/O Board for CBXSS and CBXSL Controller Boxes has two 10 Gb optical iSCSI ports. The ports are designated in the following way when the module is installed:

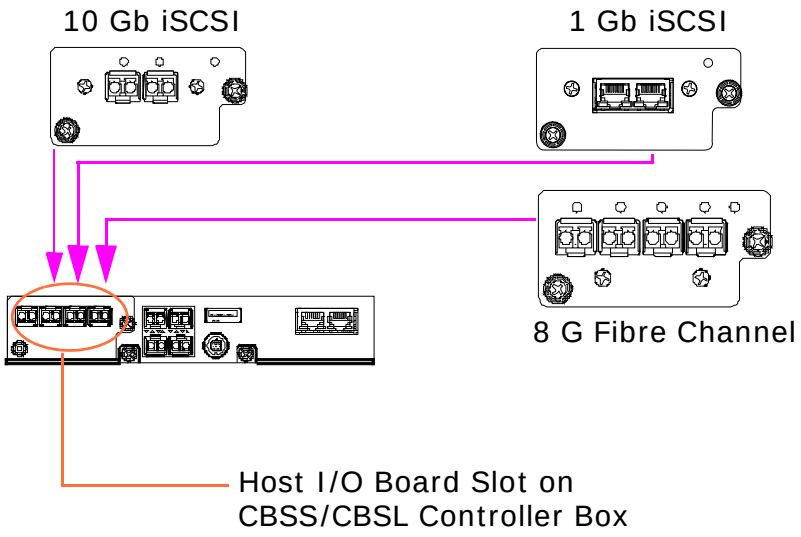


Legend	LED	Color	Description
¶	HSTS	Blue	ON = normal link status.
		Red	ON = abnormal operating status. Visit the HDS Support Portal at portal.hds.com.
?	STATUS	Green	ON = Host I/O Board is in the power-on status.
		Red	ON = Host I/O Board is operating abnormally. Visit the HDS Support Portal at portal.hds.com.

Host I/O Boards for CBSS and CBSL Controller Boxes

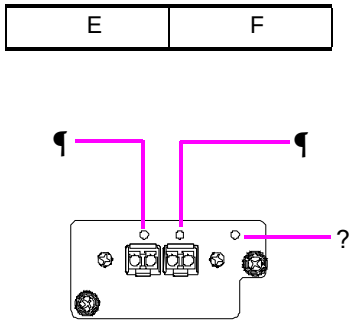
Host I/O Board options for CBSS and CBSL Controller Boxes are:

- 1 Gb iSCSI
- 10 Gb iSCSI
- 8 G Fibre Channel



10 Gb iSCSI Host I/O Board

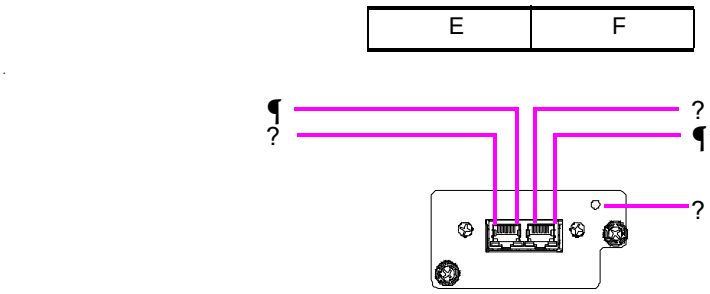
The 10 Gb iSCSI Host I/O Board for CBSS and CBSL Controller Boxes has two 10 Gb iSCSI ports. The ports are designated in the following way when the module is installed:



Legend	LED	Color	Description
¶	HSTS	Blue	ON = normal link status.
		Red	ON = abnormal operating status. Visit the HDS Support Portal at portal.hds.com.
?	STATUS	Green	ON = Host I/O Board is in the power-on status.
		Red	ON = Host I/O Board is operating abnormally. Visit the HDS Support Portal at portal.hds.com.

1 Gb iSCSI Host I/O Board

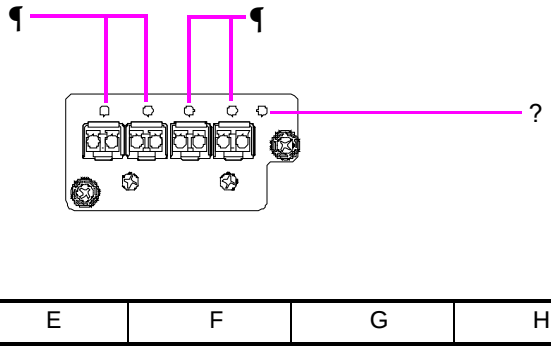
The 1 Gb iSCSI Host I/O Board for CBSS and CBSL Controller Boxes has two 1 G RJ45 iSCSI ports. The ports are designated in the following way when the module is installed:



Legend	LED	Color	Description
¶	ACT	Yellow	ON = data is being transferred.
?	LINK	Green	ON = link status is normal.
?	STATUS	Green	ON = Host I/O Board is in the power-on status.
		Red	ON = Host I/O Board is operating abnormally. Visit the HDS Support Portal at portal.hds.com.

Fibre Channel Host I/O Board

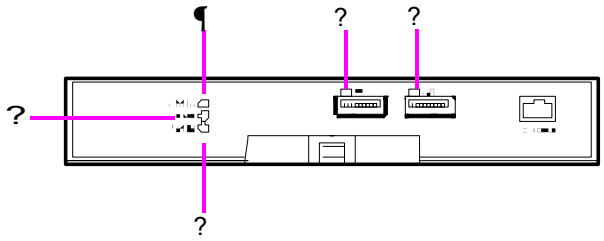
The Fibre Channel Host I/O Board for CBSS and CBSL Controller Boxes has four Fibre Channel ports. The ports support speeds up to 8 Gigabits, and automatically fall back to 4 and 2 Gigabits. The ports are designated in the following way when the module is installed:



Legend	LED	Color	Description
¶	HALM	Red	ON = Host Connector is operating abnormally. Visit the HDS Support Portal at portal.hds.com.
		Blue	ON = normal link status at 8 Gbps.
		Green	ON = normal link status at 2 or 4 Gbps.
?	STATUS	Green	ON = Host I/O Board is in the power-on status.
		Red	ON = Host I/O Board is operating abnormally. Visit the HDS Support Portal at portal.hds.com.

I/O Module (ENC) and I/O Card (ENC)

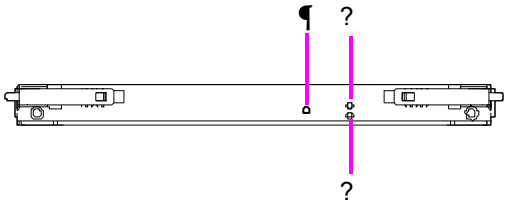
I/O Module (ENC), DBS, DBSD, DBL, and DBLD Drive Boxes



Legend	LED	Color	Description
¶	POWER	Green	ON = AC power is being provided to the I/O Module (ENC).
?	PATH 0 (IN)	Green	ON = IN port is linked as follows: • DBS/DBL connected to CBXSS/CBXSL/ CBSS/CBSL/CBL/DBS/DBL/DBX. • DBSD/DBLD connected to CBLD/DBSD/ DBLD.
?	PATH 0 (OUT)	Green	ON = OUT port is linked as follows: • DBS/DBL connected to DBS/DBL/DBX. • DBSD/DBLD connected to DBSD/DBLD.
?	ALM	Red	ON = error with I/O Module (ENC) or I/O Card (ENC), rendering the module or card unusable. Visit the HDS Support Portal at portal.hds.com.
?	LOC	Orange	ON = CUDG, RAM, or I/O configuration error. Visit the HDS Support Portal at portal.hds.com. • Fast blinking 2 times: CUDG error in ENC card. • Fast blinking 3 times: firmware error in flash memory.

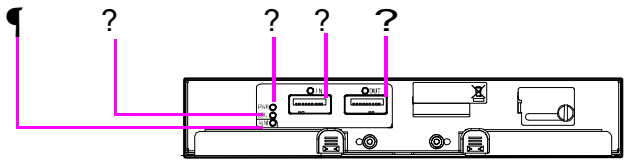
NOTE: A CBXSS/CBXSL cannot connect to a DBX/DBW. A CBLD can connect to a DBSD/DBLD only.

I/O Card (ENC), DBX Drive Box



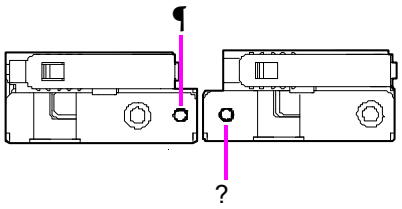
Legend	LED	Color	Description
¶	PWR	Green	ON = AC power is being provided to the I/O Card (ENC).
?	LOCATE	Orange	ON when adding chassis with power turned on = chassis is being added. This is not an error. ON = CUDG or RAM error detected by ENC firmware, or ENC error. Visit the HDS Support Portal at portal.hds.com. • Fast blinking 2 times: CUDG error in ENC. • Fast blinking 3 times: firmware error in flash memory.
		Blue	ON = SAS OUT side has made a link.
?	ALARM	Red	ON = error with I/O Module (ENC) or I/O Card (ENC), rendering the module or card unusable. Visit the HDS Support Portal at portal.hds.com.

I/O Module (ENC), DBF Drive Box



Legend	LED	Color	Description
¶	LOCATE	Orange	ON when adding chassis with power turned on = chassis is being added. This is not an error. ON = CUDG or RAM error detected by ENC firmware, or ENC error. Visit the HDS Support Portal at portal.hds.com. • Fast blinking 2 times: CUDG error in ENC. • Fast blinking 3 times: firmware error in flash memory.
?	ALARM	Red	ON = error with I/O Module (ENC) or I/O Card (ENC), rendering the module or card unusable. Visit the HDS Support Portal at portal.hds.com.
?	PWR	Green	ON = AC power is being provided to the I/O Card (ENC).
?	PATH (IN)	Green	ON = IN port is linked.
?	PATH (OUT)	Green	ON = OUT port is linked.

Cable Holder (ENC), DBX

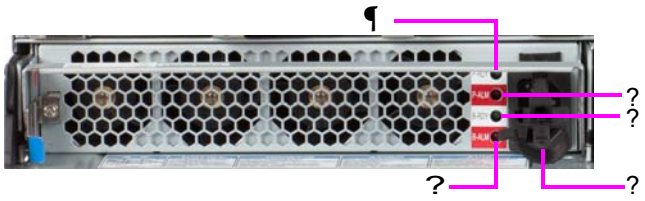


Legend	LED	Color	Description
¶	ALM	Red	ON = I/O Card (ENC) error. Visit the HDS Support Portal at portal.hds.com.
		Blue	ON = SAS IN side has made a link.
?	LOCATE	Orange	ON = CUDG, RAM, or I/O configuration error. Visit the HDS Support Portal at portal.hds.com. • High-speed blinking 2 times: CUDG error in ENC card. • High-speed blinking 3 times: firmware error in flash memory.
		Blue	ON = SAS OUT side has made a link.

Power Unit

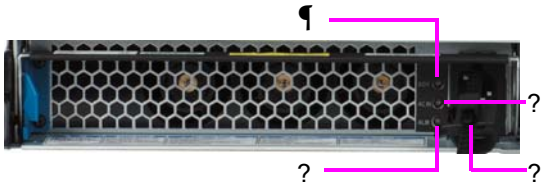
The Power Unit provides the power sockets for connection to an AC power source. The Power Unit also provides LEDs to indicate its status.

Power Unit for CBXSS, CBXSL, CBSS, and CBSL Controller Boxes



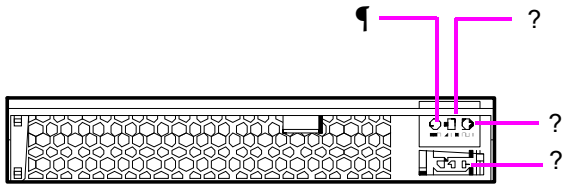
Legend	Component	Color	Description
¶	P-RDY	Green	ON = Power Unit is operating normally.
?	P-ALM	Red	ON = Power Unit is experiencing trouble. Visit the HDS Support Portal at portal.hds.com.
?	B-RDY	Green	ON = battery status is normal. Blinking = battery status is charged at start-up. OFF = battery status is abnormal or battery is not installed. If the battery is installed, visit the HDS Support Portal at portal.hds.com.
?	Power Socket		Connects to AC power source.
?	B-ALM	Red	ON = cache backup battery has failures. Visit the HDS Support Portal at portal.hds.com.

Power Unit for DBS and DBL Drive Boxes



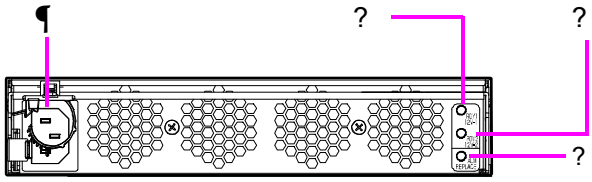
Legend	Component	Color	Description
¶	RDY	Green	ON = Power Unit is operating normally.
?	AC IN	Green	ON = AC input is normal.
?	Power Socket		Connects to AC power source.
?	ALM	Red	ON = Power Unit is experiencing trouble. Visit the HDS Support Portal at portal.hds.com.

Power Unit for DBSD/DBLD Drive Box



Legend	Component	Color	Description
¶	RDY	Green	ON = Power Unit is operating normally.
?	DC IN	Green	ON = DC input is normal.
?	ALM	Red	ON = Power Unit is experiencing trouble. Visit the HDS Support Portal at portal.hds.com.
?	Power Socket		Connects to DC power source.

Power Unit for DBF Drive Box

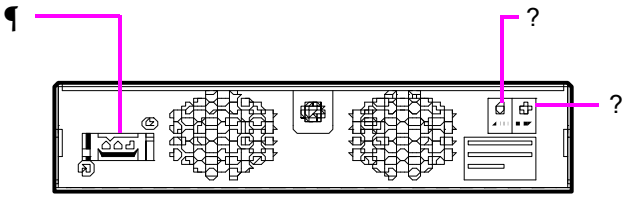


Legend	Component	Color	Description
¶	Power Socket		Connects to AC power source.
?	RDY 1	Green	ON = Power Unit is operating normally.
?	RDY 2	Green	ON = Power Unit is operating normally.
?	ALM	Red	ON = Power Unit is experiencing trouble. Visit the HDS Support Portal at portal.hds.com.

Power Unit for CBL Controller Box

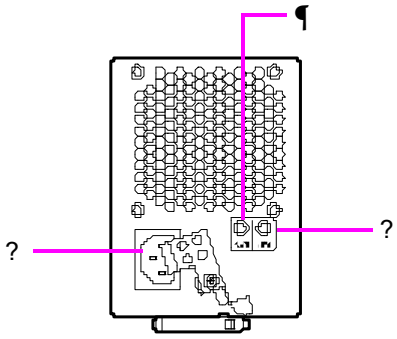
Legend	Component	Color	Description
¶	Power Socket		Connects to AC power source.
?	ALM	Red	ON = Power Unit is experiencing trouble. Visit the HDS Support Portal at portal.hds.com.
?	RDY	Green	ON = Power Unit is operating normally.

Power Unit for CBLD Controller Box



Legend	Component	Color	Description
¶	Power Socket		Connects to DC power source.
?	ALM	Red	ON = Power Unit is experiencing trouble. Visit the HDS Support Portal at portal.hds.com.
?	RDY	Green	ON = Power Unit is operating normally.

Power Unit for DBX Drive Box



Legend	Component	Color	Description
¶	ALM	Red	ON = Power Unit is experiencing trouble. Visit the HDS Support Portal at portal.hds.com.
?	RDY	Green	ON = Power Unit is operating normally.
?	Power Socket		Connects to AC power source.

CBL/CBLD Controller Box

The front of the CBL/CBLD Controller Box provided access to:

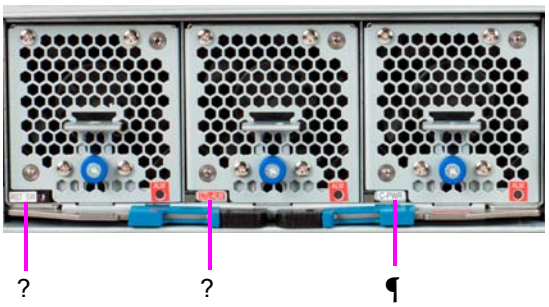
- Controller - see CBL/CBLD controller, below
- Fan Module - see Fan Module on page 2-49
- Panel Assembly - see Panel assembly on page 2-49
- Cache backup battery - see Cache backup battery on page 2-50

The rear of the CBL/CBLD Controller Box provides access to:

- Management Module — see page 2-53
- Drive I/O Module — see page 2-54
- Host I/O Module — see page 2-55

Front of CBL/CBLD Controller Box

CBL/CBLD controller



Legend	Component	Color	Description
¶	C-PWR LED	Green	ON = controller status is normal. Blink = data in cache memory is stored in the backup controller.
?	CTL-ALM LED	Red	ON = fatal error. Visit the HDS Support Portal at portal.hds.com.
		Orange	ON = controller is in the reset status.
?	Reset Switch		Use the Reset switch only when instructed by Hitachi Support.

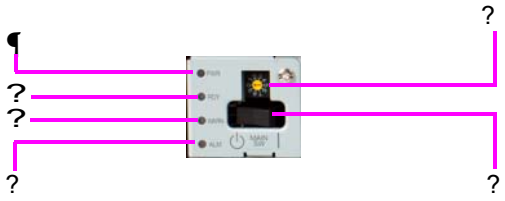
Fan Module

The CBL/CBLD Controller Box has Fan Modules for cooling. Each Fan Module has an **ALM** LED that shows its operating status.

Legend	LED	Color	Description
¶	ALM	Red	ON = abnormal operating status. Visit the HDS Support Portal at portal.hds.com. OFF = normal operation.

Panel assembly

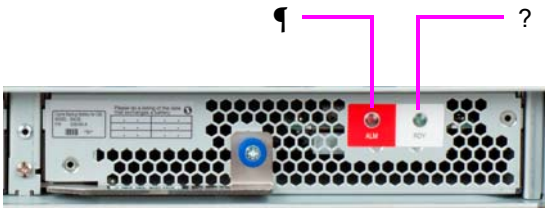
The CBL/CBLD panel assembly contains four LEDs and a switch. The switch should be left in its current position and should not be changed.



Legend	Component	Color	Description
¶	PWR LED	Green	ON = storage system is receiving AC power.
?	Mode Switch	Not used	
?	Main Switch	Turns power on or off. = power on. = power off.	
?	ALM LED	Red	ON = fatal error. Visit the HDS Support Portal at portal.hds.com.
?	WARN LED	Orange	ON = fatal error. Visit the HDS Support Portal at portal.hds.com.
?	RDY LED	Green	ON = storage system is operational.

Cache backup battery

The cache backup battery on the CBL/CBLD Controller Box has two LEDs: ALM and RDY.



Legend	Component	Color	Description
¶	ALM LED	Red	ON = problem with cache backup battery. Visit the HDS Support Portal at portal.hds.com. OFF = normal operation for cache backup battery.
?	RDY LED	Green	ON = normal condition for battery. Blinking = battery is charging at start-up. OFF = abnormal status due to: Cache backup battery not being installed. Cache backup battery voltage being abnormal. Battery temperature being abnormal. Visit the HDS Support Portal at portal.hds.com.

Rear panel of CBL/CBLD Controller Box

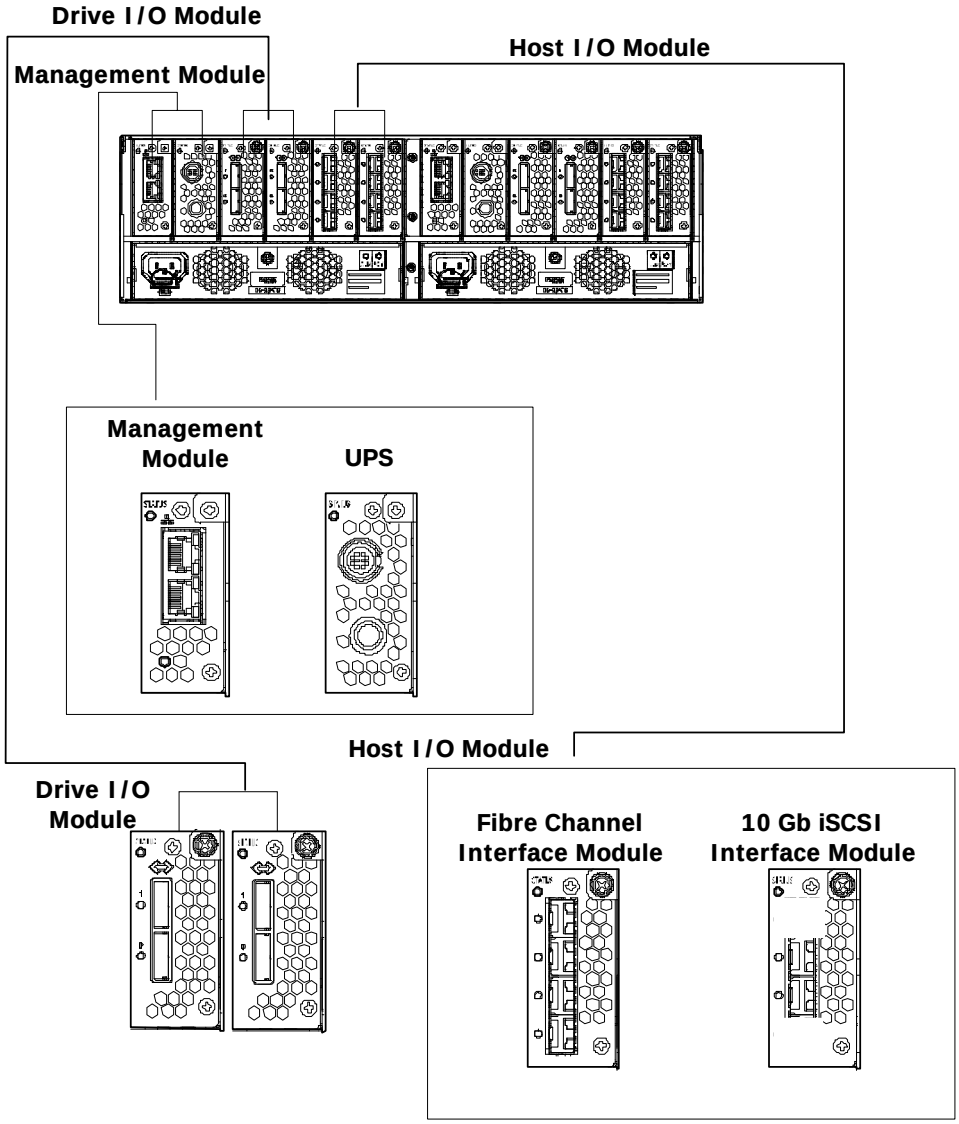


Figure 2-32: Modules on rear of CBL Controller Box

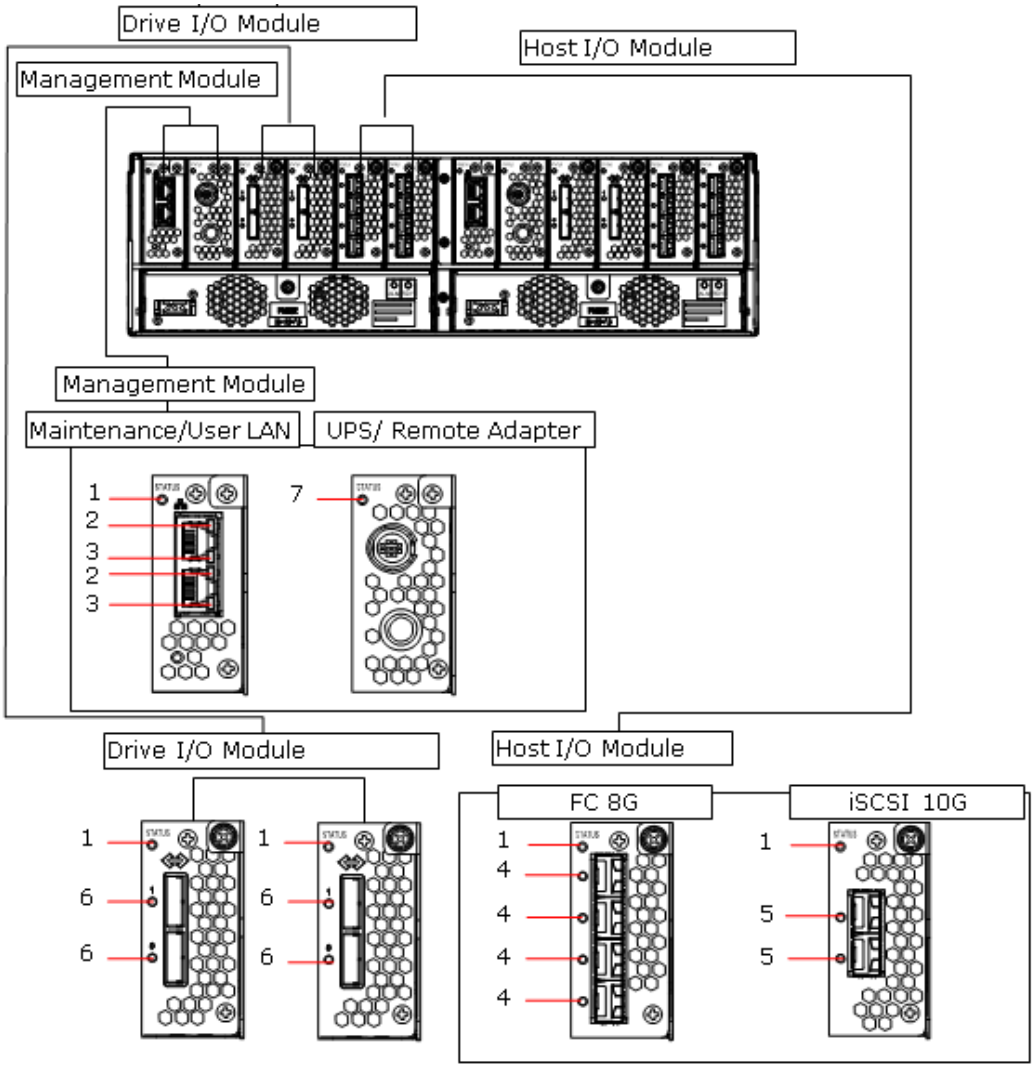


Figure 2-33: Modules on rear of CBLD Controller Box

Management Module for CBL/CBLD Controller Box

The Management Module consists of two side-by-side modules. Facing the back of the CBL/CBLD Controller Box:

- The left module has a status LED, management port, and maintenance port.
- The right module has a status LED and an uninterruptible power supply port.

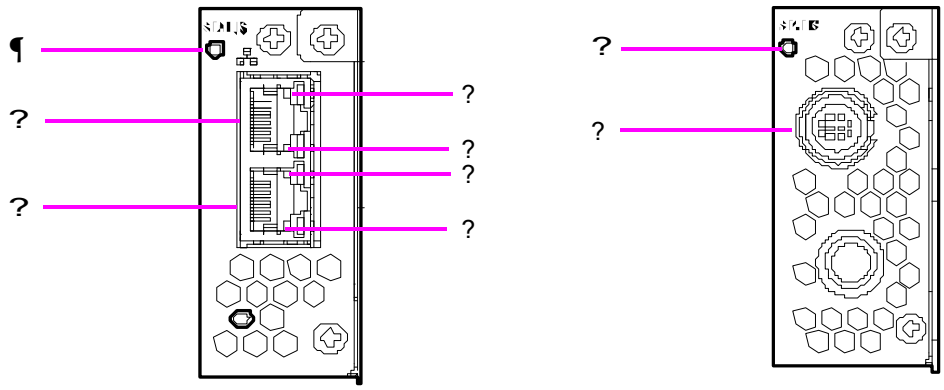


Figure 2-34: CBL/CBLD Management Module

Legend	Component	Color	Description
¶	STATUS LED	Green	ON = power-on status.
		Red	ON = abnormal operating status. Visit the HDS Support Portal at portal.hds.com.
?	ACT LED	Yellow	ON = data is being transferred.
?	LINK LED	Green	ON = link status is normal.
?	**LAN 0 Maintenance Port** See Maintenance port on page 2-37.		
?	**LAN 1 Management Port** See Management port on page 2-37.		
?	STATUS LED	Green	ON = power-on status.
?	UPS Connector	—	Connects to an uninterruptible power supply. (This connector is not used on the CBLD Controller.)

Drive I/O Module for CBL/CBLD Controller Box

The Drive I/O Module consists of two identical modules that each contain a status LED and two connectors for attaching Drive Boxes.

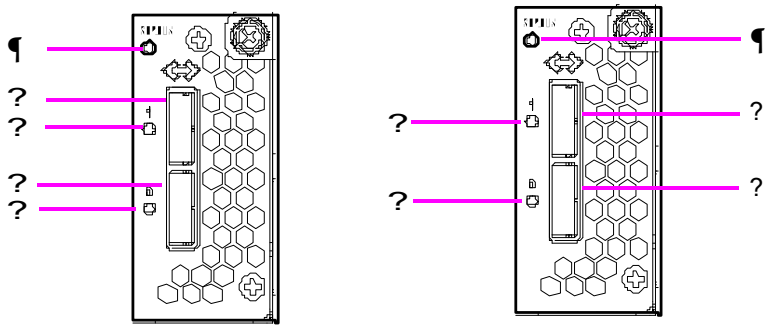


Figure 2-35: CBL/CBLD Drive I/O Module

Legend	Component	Color	Description
¶	Status LED	Green	ON = power-on.
		Red	ON = abnormal operating status. Visit the HDS Support Portal at portal.hds.com.
?	PATH 3 Drive Box Port		Connector for connecting: • CBL to DBS/DBL/DBF/DBX/DBW. • CBLD to DBSD/DBLD.
?	PATH 2 Drive Box Port		Connector for connecting: • CBL to DBS/DBL/DBF/DBX/DBW. • CBLD to DBSD/DBLD.
?	Link/Locate LED	Blue	ON = Drive Box is connected and link status is normal.
		Orange	ON = a Storage Navigator Modular 2 wizard indicates that a SAS (ENC) cable must to be inserted into the port.
?	PATH 1 Drive Box Port		Connector for connecting: • CBL to DBS/DBL/DBF/DBX/DBW. • CBLD to DBSD/DBLD.
?	PATH 0 Drive Box Port		Connector for connecting: • CBL to DBS/DBL/DBF/DBX/DBW. • CBLD to DBSD/DBLD.

Host I/O Modules for CBLCBLD Controller Box

Host I/O Modules consist of two side-by-side modules. Each module contains either two 10 Gb iSCSI connectors or four Fibre Channel connectors for interfacing to the storage network.

10 Gb iSCSI Host I/O Module

Two 10 Gb iSCSI ports are offered as an optional Host I/O Module. The 10 Gb iSCSI ports are oriented vertically and reside to the right of the Drive I/O Module. The ports are designated in the following way:

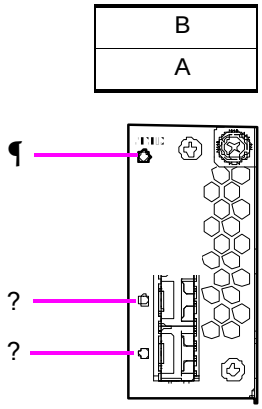


Figure 2-36: 10 Gb iSCSI Host I/O Module

Legend	LED	Color	Description
¶	STATUS	Green	ON = Host I/O Module is in the power-on status.
		Red	ON = Host I/O Module is operating abnormally. Visit the HDS Support Portal at portal.hds.com.
?	HSTS	Blue	ON = normal link status.
		Red	ON = abnormal operating status. Visit the HDS Support Portal at portal.hds.com.

Fibre Channel Host I/O Module

Four Fibre Channel ports are offered as an optional Host I/O Module. The ports support speeds up to 8 Gigabits, and can automatically fall back to 4 and 2 Gigabits.

The Fibre Channel ports are oriented vertically and reside to the right of the Drive I/O Module. The ports are designated in the following way:

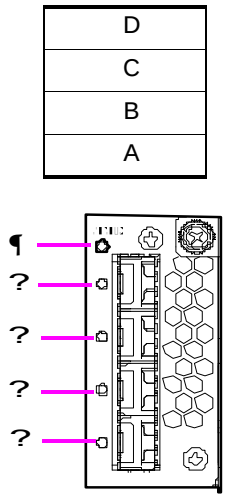


Figure 2-37: Fibre Channel Host I/O Module

Legend	LED	Color	Description
¶	STATUS	Green	ON = Host I/O Module is in the power-on status.
		Red	ON = Host I/O Module is operating abnormally. Visit the HDS Support Portal at portal.hds.com.
?	HALM	Red	ON = abnormal operating status. Visit the HDS Support Portal at portal.hds.com.
		Blue	ON = normal operation at 8 Gbps.
		Green	ON = normal operation at 2 or 4 Gbps.

DBW Drive Box

This section describe the following components on the DBW Drive Box:

- I/O Module ENC — see I/O Module (ENC) for DBW Drive Box, below
- Power Unit — Power Unit for DBW Drive Box on page 2-58
- Drive Box drawer — DBW Drive Box drawer on page 2-59
- Fan Module — DBW Fan Module on page 2-60

I/O Module (ENC) for DBW Drive Box

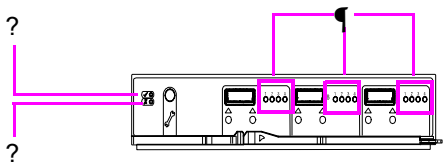


Figure 2-38: DBW I/O Module (ENC) LEDs

Legend	LED	Color	Description
¶	External Port Activity	Green	ON = port is linked up. Blinking = data is being transferred.
?	ALM	Orange	ON = failure with I/O Module (ENC), rendering the module unusable. Visit the HDS Support Portal at portal.hds.com. Blinking = after an I/O Module (ENC) failure, logs are collected from the failed I/O Module (ENC). During the collection, this LED blinks. When log collection completes, this LED goes ON.
?	RDY	Green	ON = I/O Module is operating normally.

The DBW I/O Module has a Drive Box with the connectors shown and described in Figure 2-39.

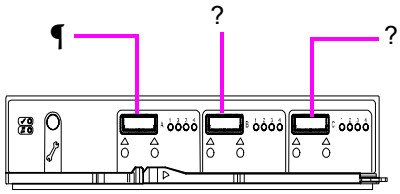


Figure 2-39: DBW Drive I/O Module connectors

Legend	Connector	Description
¶	SAS Port A (IN)	Connects to CBSS, CBSL, CBL, DBS, DBL, DBF, DBX, or DBW.
?	SAS Port B (OUT)	Connects to DBS, DBL, DBF, DBX, or DBW.
?	SAS Port C	Not used.

NOTE: A CBXSS/CBXSL Controller Box cannot connect to a DBX/DBW Drive Box

Power Unit for DBW Drive Box

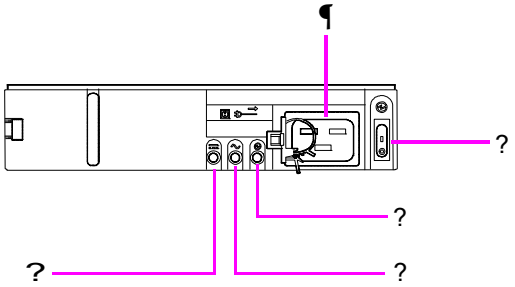


Figure 2-40: DBW Drive Box Power Unit

Legend	Component	Color	Description
¶	Receptacle	—	Accommodates power cable.
?	Switch	—	Press ON to apply power to the DBW Drive Box. Press OFF to remove power from the DBW Drive Box.
?	Power OK LED	Green	ON = Power Unit is operating normally.
?	AC ALM LED	Orange	ON = Power Unit is experiencing trouble. Visit the HDS Support Portal at portal.hds.com.
?	PSU ALM LED	Orange	ON = Power Supply Unit is experiencing trouble. Visit the HDS Support Portal at portal.hds.com.

DBW Drive Box drawer

The DBW Drive Box has a top drawer and a bottom drawer. Each drawer has the LEDS shown and described in Figure 2-41.

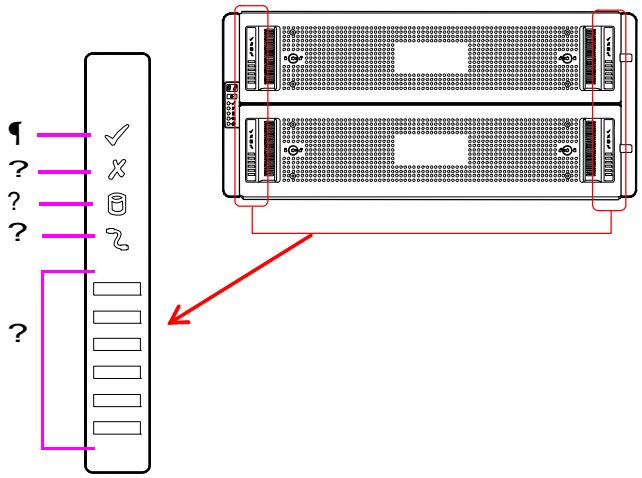


Figure 2-41: DBW Drive Box drawer

Legend	LED	Color	Description
¶	Sideplane OK/Power Good	Green	ON = normal sideplane operation.
?	Sideplane ALM	Orange	ON = drive failure. Visit the HDS Support Portal at portal.hds.com.
?	Logical ALM	Orange	ON = logical failure. Visit the HDS Support Portal at portal.hds.com.
?	Cable ALM	Orange	ON = cable between the drawer and the I/O Module (ENC) is operating abnormally. Visit the HDS Support Portal at portal.hds.com.
?	Activity Bar Graph	Green	Not used.

DBW Fan Module

The DBW Drive Box has Fan Modules for cooling. Each Fan Module has the LEDs shown and described in Figure 2-42.

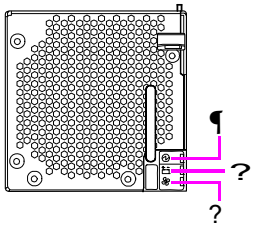


Figure 2-42: DBW Fan Module LEDs

Legend	LED	Color	Description
¶	Module OK	Green	ON = normal fan operation.
?	Battery Fault	Orange	Not used.
?	FAN ALM	Orange	ON = fan module is operating abnormally. Visit the HDS Support Portal at portal.hds.com. OFF = fan module is operating normally.

3

Procedures before and after replacing components

This chapter describes the steps to take before replacing a component. It also describes how to check that the system has recovered after replacing components.

The following topics are covered in this chapter:

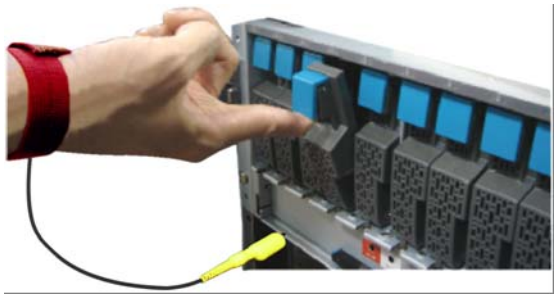
- Electrostatic discharge precautions
- Unpacking replacement components
- Follow appropriate power on/off work procedures
- Safety considerations
- Guidelines to follow when replacing a component
- Guidelines to follow after replacing a component
- Replacement parts
- Locating hardware components
- Removing and replacing the front bezel
- Collecting trace information
- Checking recovery after replacing components

Electrostatic discharge precautions

Static electricity can damage the storage system's static-sensitive components. To prevent damage, follow these precautions:

When performing the service procedures in this document, observe the following electrostatic discharge (ESD) precautions:

- Wear an antistatic wrist strip at all times when handling any field-replaceable unit (FRU). Clip the end of the wrist strap to exposed metal on frame. For convenience, a wrist strap is supplied with the storage system. Do not remove the wrist strap until the removal or replacement procedure has been completed.



- Before handling any FRU, such as a drive, controller, Host I/O Board, Host I/O Module, Drive I/O Module, or I/O Module (ENC), discharge any static electricity by touching a grounded surface. Grounded surfaces include static-dissipating mats (already grounded) or grounded workstations.
- Remove all plastic, vinyl, and foam material from the work area.
- Remove only one FRU at a time from an operating storage system. Removing more than one FRU can cause too much cooling air to be lost from the storage system. After several minutes, this can cause the storage system to overheat or fail.
- Do not remove a FRU from its antistatic protective bag until you are ready to install it.
- After removing a FRU from the cabinet, immediately place it in an antistatic bag or antistatic packaging.
- Handle any card FRU only by its edges and avoid touching the components or circuitry.
- Do not slide a FRU over any surface.
- Limit body movement (which builds up static electricity) during the removal and replacement of a FRU.
- Use conductive field-service tools.
- To avoid electric shock when performing a "hot replacement" of a part, do not wear metallic accessories or a watch and avoid touching "live" parts of the storage system with a screwdriver or similar tools.

Unpacking replacement components

Unpack replacement components in a dry location that is not exposed to moisture, direct sunlight, dust, and temperature extremes. If the part to be added has been exposed to high or low temperature during transport, the part might not operate properly.

Follow appropriate power on/off work procedures

If a replacement procedure requires power off and power on steps, follow the steps carefully to ensure the security of data.

After powering off the storage system, remove the power cables from the two Power Units on the storage system.

Safety considerations

Observe the following guidelines to ensure safety when replacing parts. Failure to follow these guidelines could result in bodily injury or damage to the chassis or components.

- Use the host to back up user data on the storage system before replacing components.
- When performing any installation, comply with all local health and safety requirements.
- Wear protective footwear when moving storage system hardware.
- Do not wear loose clothing that could get caught in the chassis or mounting hardware. Fasten ties and scarves and roll up sleeves.
- Wear safety glasses when working under conditions that are hazardous to your eyes.
- Keep walkways clear of tools, cables, and parts to prevent them from being stepped on or causing people to trip and fall.
- Do not work on the equipment or disconnect cables during a thunderstorm, when wearing a wool sweater or other heavy wool clothing, or when power is applied.
- Always turn off the storage system and unplug all data and power cables before lifting the storage system.
- Keep floors dry to prevent slips and falls.
- Do not use ungrounded power cables.
- Only use the power cables supplied with this product. Do not use power cables for other products. Otherwise, unexpected failures or accidents can occur.
- If you encounter unusual odors, heat generation, or smoke emission, shut off power to the equipment and inform the appropriate personnel Leaving such conditions unattended can cause electric shock or fire.
- Keep the area clean and dust-free when replacing components.

- Do not block or cover the openings of the storage system hardware. Never place a unit near a radiator or heat register. Failure to follow these guidelines can cause overheating and affect the unit's reliability.
- After a component has been replaced, secure the chassis cover to the storage system. The chassis is designed to let cooling air flow effectively within it. An open chassis allows air leaks that might interrupt and redirect the flow of cooling air from internal components.
- Do not make mechanical or electrical modifications or repairs to the equipment. Such actions can cause an electric shock or cause the storage system to malfunction. Hitachi is not responsible for regulatory compliance of a modified Hitachi product.
- When removing cables, hold the cable connector and leave enough slack in the cables, so they do not bend to a diameter of less than 76 mm (3") or a radius less than 38 mm (1.5") when extended and do not become pinched when retracted.
- A DBW can reach 80 dB at a temperature of 32°C, with a maximum decibel level of 85dB. When a DBW is connected to a CBL, refrain from working on the DBW for a prolonged period of time.

Guidelines to follow when replacing a component

Observe the following guidelines when replacing a component in Hitachi Unified Storage systems.

- Replace components after the green **READY** LED on the controller front panel goes ON.
- Use only the replacement parts specified in this guide.
- Do not perform maintenance when the green **READY** LED on the controller front panel blinks quickly because the ENC firmware is being downloaded. Wait for the **READY** LED on the Controller Box to go ON before performing maintenance (wait time can be up to 50 minutes, 60 minutes for the CBL, or 180 minutes if the DBW is connected to the CBL).
- If you turn on a single controller and the orange **WARNING** LED on the controller front panel blinks quickly, do not perform maintenance. Wait for the **WARNING** LED to go OFF and the green **READY** LED to go ON (30-to-85 minutes) before performing maintenance.
- If an allowable time limit for replacing a component is specified in the replacement instructions, observe the time limit.
- When replacing a drive, controller, Host I/O Board, Host I/O Module, cache backup battery, Drive I/O Module, I/O Module (ENC), Fan module, or Power Unit with the storage system powered on, wait at least 30 seconds before replacing the failed component.

  If the storage system is turned on, complete the replacement within 10 minutes. Otherwise, a power-off (system-down) condition can occur.

  If a Power Unit and another module fail at the same time, replace the Power Unit first and then replace the module. Otherwise, a power-off (system-down) condition can occur.

- If only the main switch power is off, power is provided by the basic supply. Do not leave components removed from the storage system for long periods of time, as this can trigger a power supply alarm.
- Never replace components when powering on the storage system.

Guidelines to follow after replacing a component

Observe the following guidelines after replacing a component in the Hitachi storage system.

- When restarting the storage system, wait for the **POWER** LED to go OFF and then turn off the main switch. Wait at least one minute before turning on the main switch.
- If the storage system is used at the remote end of a TrueCopy Remote Replication or TrueCopy Extended Distance configuration, restarting the storage system causes the following conditions:
  - The paths of TrueCopy Remote Replication or TrueCopy Extended Distance are both blocked.
  - E-mail alert, SNMP Agent Support Function, and TRAP notifications occur when the path is blocked.

  Follow the instructions in the notifications. The blocked path recovers automatically after restarting the storage system.
  - If the status of the pair of TrueCopy Remote Replication or TrueCopy Extended Distance is PAIR or COPY, the pair changes to PSUE. Suspend the pairs before restarting the array.
- For storage systems that have the Power Saving/Power Saving Plus option, performing a spin-down and then restarting the storage system before the spin-down completes can cause the spin-down to fail. Check that no RAID Group has a power saving status of **Normal (command monitoring)** after performing the spin-down, and then restart the array. If the spin-down fails, perform the spin-down again.
- When you finish replacing components, close all the external storage system covers.

Replacement parts

Table 3-1 on page 3-6 lists information about replacement parts for Hitachi Unified Storage systems. In the table, the status definitions of the host and the storage system are as follows:

- With I/O = there is I/O activity from the host.
- Without I/O: there is no I/O activity from the host.

NOTE: In Table 3-1 on page 3-6, an asterisk next to the model name indicates that the part complies with the Restriction of Hazardous Substances Directive (RoHS).

Table 3-1: Replacement parts

Part name	Part number	Model	Status of host / storage system (see Note on next page)		See page
			With I/O	Without I/O	
Drives					
287.62 G bytes (contains BNST)	3282390-C	DF-F850-3HGSS	O	O	4-4
287.62 G bytes	3282390-P	DF-F850-3HGSSC	O	O	
287.62 G bytes (contains BNST)	3285276-A	DF-F850-3HGSSH	O	O	
287.62 G bytes	3285276-P	DF-F850-3HGSSHC	O	O	
575.30 G bytes (contains BNST)	3282390-A	DF-F850-6HGSS	O	O	
575.30 G bytes	3282390-Q	DF-F850-6HGSSC	O	O	
879.98 G bytes (contains BNST)	3282390-D	DF-F850-9HGSS	O	O	
879.98 G bytes	3282390-R	DF-F850-9HGSSC	O	O	
1173.71 G bytes (contains BNST)	3282390-E	DF-F850-12HGSS	O	O	
1173.71 G bytes	3282390-S	DF-F850-12HGSSC	O	O	
1,956.94 G bytes (contains BNST)	3285067-A	DF-F850-2TNL	O	O	
1,956.94 G bytes	3285067-P	DF-F850-2TNLC	O	O	
2,935.96 G bytes (contains BNST)	3285067-B	DF-F850-3TNL	O	O	
2,935.96 G bytes	3285067-Q	DF-F850-3TNLC	O	O	
3,915.01 G bytes (contains BNST)	3285067-C	DF-F850-4TNL	O	O	
3,915.01 G bytes	3285067-R	DF-F850-4TNLC	O	O	
Flash Drive (195.82 G bytes)	3285262-A	DF-F850-2HGDM	O	O	
Flash Drive (392.73 G bytes)	3285262-B	DF-F850-4HGDM	O	O	
Flash Drive (195.82 G bytes)	3285461-A	DF-F850-2HGDML	O	O	
Flash Drive (392.73 G bytes)	3285461-B	DF-F850-4HGDML	O	O	
287.62 G bytes (contains BNST)	3285461-D	DF-F850-3HGSLH	O	O	
287.62 G bytes	3285461-Q	DF-F850-3HGSLHC	O	O	
879.98 G bytes (contains BNST)	3285461-G	DF-F850-9HGSL	O	O	
879.98 G bytes	3285461-GP	DF-F850-9HGSLC	O	O	
Cache Backup Battery					
CBXSS/CBXSL/CBSS/CBSL	3285118-A	—	O	O	5-3
CBL	3285167-A	—	O	O	5-6
Fan Module					
CBL	3285131-A	—	O	O	6-1
Power Unit					
CBXSS/CBXSL/CBSS/CBSL	3285122-A	—	O	O	7-2
CBL	3285165-A	—	O	O	7-5
DBS/DBL (contains BNST)	3285197-A	—	O	O	7-2
DBSC/DBLC	3285197-P	—	O	O	7-2
Controller					

Table 3-1: Replacement parts (Continued)

Part name	Part number	Model	Status of host / storage system (see Note on next page)		See page
			With I/O	Without I/O	
CBXSS/CBXSL	3285173-A	DF-F850-CTLXS	O	O	—
	3285173-E	DF-F850-CTLXSR*	O	O	8-7
CBSS/CBSL	3285172-A	DF-F850-CTLS	O	O	—
	3285172-E	DF-F850-CTLSR*	O	O	8-7
CBL	3285168-A	DF-F850-CTLL	O	O	8-10
Cache Memory					
4,096 M bytes (CBXSS/CBXSL/CBSS/CBSL)	3285136-A	DF-F850-CMM4	O	O	9-2
8,192 M bytes (CBSS/CBSL)	3285367-A	DF-F850-CMM8	O	O	9-2
4,096 M bytes (CBL)	3285124-A	DF-F850-4GB	O	O	9-6
8,192 M bytes (CBL)	3285126-A	DF-F850-8GB	O	O	9-6
Host I/O Board and Host I/O Module					
Fibre Channel 8 G bps (CBSS/CBSL)	3285133-A	DF-F850-HBF84	O	O	—
	3285133-E	DF-F850-HBF84R*	O	O	10-3
iSCSI 1 G bps (CBXSS/CBXSL/CBSS/CBSL)	3285186-A	DF-F850-HBS12	O	O	10-3
iSCSI 10 Gb (CBXSS/CBXSL/CBSS/CBSL)	3285158-B	DF-F850-HBS	O	O	10-3
Fibre Channel 8 G bps (CBL)	3285153-A	DF-F850-HF8G	O	O	—
	3285153-E	DF-F850-HF8GR*	O	O	10-5
iSCSI 10 Gb (CBL)	3285158-A	DF-F850-HS10G	O	O	10-5
Host Connector					
8 G bps	3285226-E	—	O	O	11-2
10 G bps	3276337-C	—	O	O	11-2
	3285396-A	—	O	O	11-2
Drive I/O Module					
CBL	3285154-A	DW-F700-BS6G	O	O	12-2
I/O Module (ENC)					
DBS/DBL	3285196-A	—	O	O	13-2
SAS (ENC) Cable					
1 m	3285194-A	DF-F850-SC1	O	O	14-2
3 m	3285194-B	DF-F850-SC3	O	O	14-2
5 m	3285194-C	DF-F850-SC5	O	O	14-2

NOTE: The status definitions of the host and the array are:

With I/O = status that there is I/O from the host.
Without I/O = status that there is no I/O from the host.

Locating hardware components

The following sections apply to CBXSS/CBXSL/CBSS/CBSL, CBL, and DBS/DBL only.

Refer to the following figures to find the location of the field-replaceable components on Hitachi Unified Storage systems.

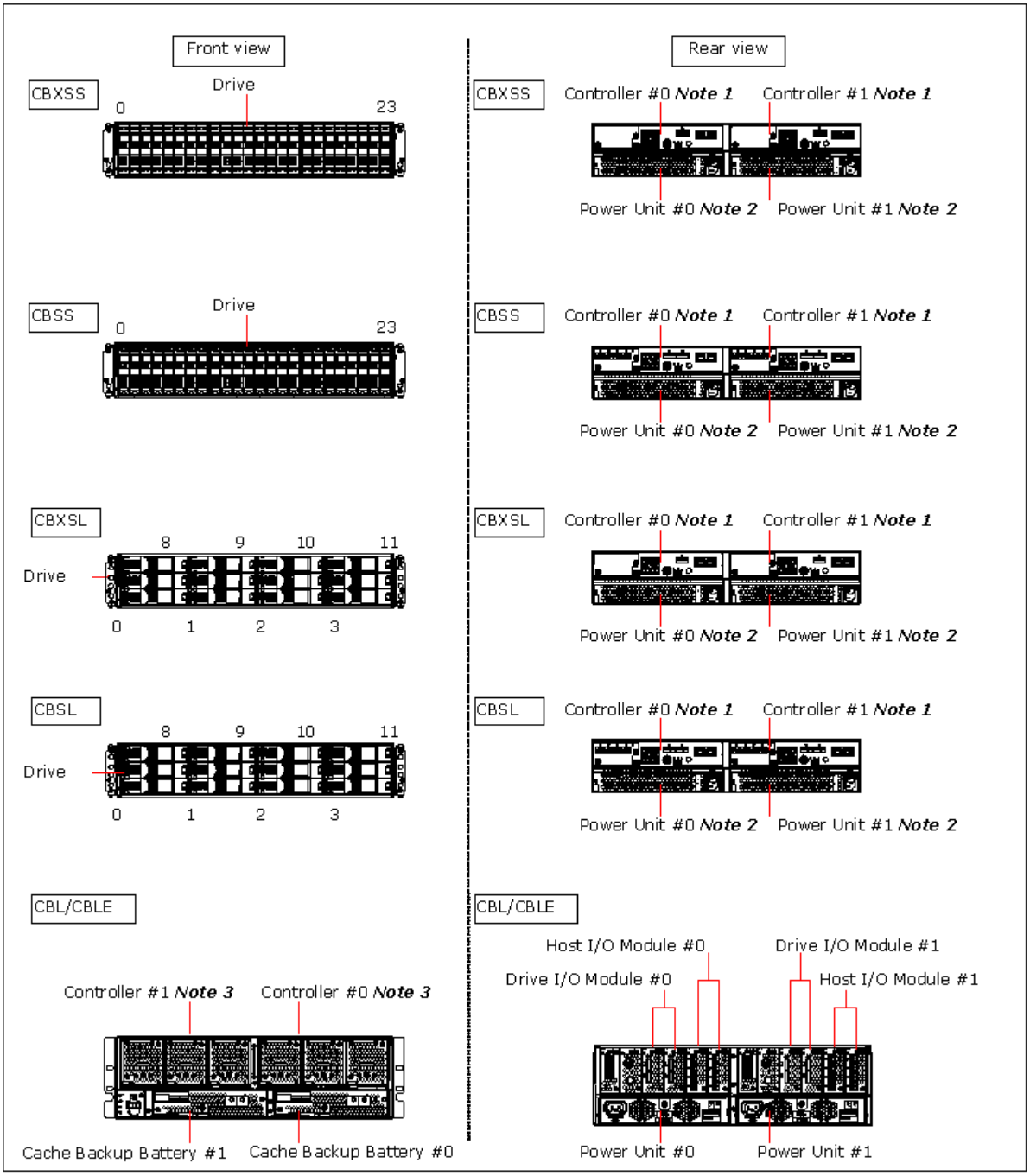


Figure 3-1: Location of replaceable parts on the Controller Box

NOTE 1: Cache memory for CBXSS/CBXSL/CBSS/CBSL is installed in the controller. The Host I/O Board for CBSS/CBSL is installed in the controller.

NOTE 2: The cache backup battery for the CBXSS/CBXSL/CBSS/CBSL Controller Boxes is installed in the controller.

NOTE 3: The CBL controller contains three Fan Modules.

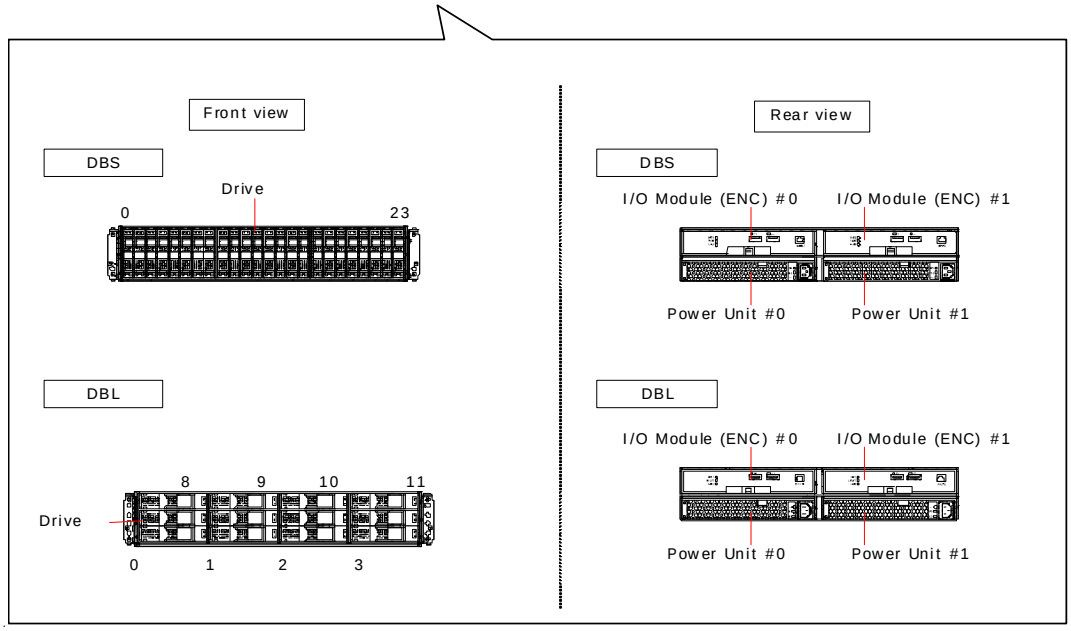


Figure 3-2: Location of replaceable parts on the Drive Box

Removing and replacing the front bezel

To gain access to a Hitachi Unified Storage system, remove the front bezel. After replacing the component, replace the front bezel.

Removing the front bezel on a CBXSS/CBXSL/CBSS/CBSL/DBS/DBL

To remove the front bezel from the CBXSS/CBXSL/CBSS/CBSL/DBS/DBL:

1. Use the supplied key to unlock the bezel.
2. Holding the lower right part of the bezel, gently pull the key toward you and disengage the right side of the bezel from the ball catch.

NOTE: If the lock cannot be released, turn the key while pressing firmly on the plate part at the lower left side of the keyhole. If you press an area other than the plate, you can damage the front bezel. When disengaging the front bezel, do not open the bezel more than 45 degrees; otherwise, you can damage the bezel.

3. Disengage the front bezel from the left tabs and then remove the bezel.

To replace the front bezel:

1. Use the supplied key to unlock the front bezel. Hold the key and the bottom of the bezel with both hands, so the front of the bezel is facing you.
2. Insert the tabs on the left-front side of the storage system into the tab holes on the front bezel.
3. Push the right side of the bezel to engage it with the ball catch on the front of the storage system to secure the bezel.
4. Use the supplied key to lock the front bezel.

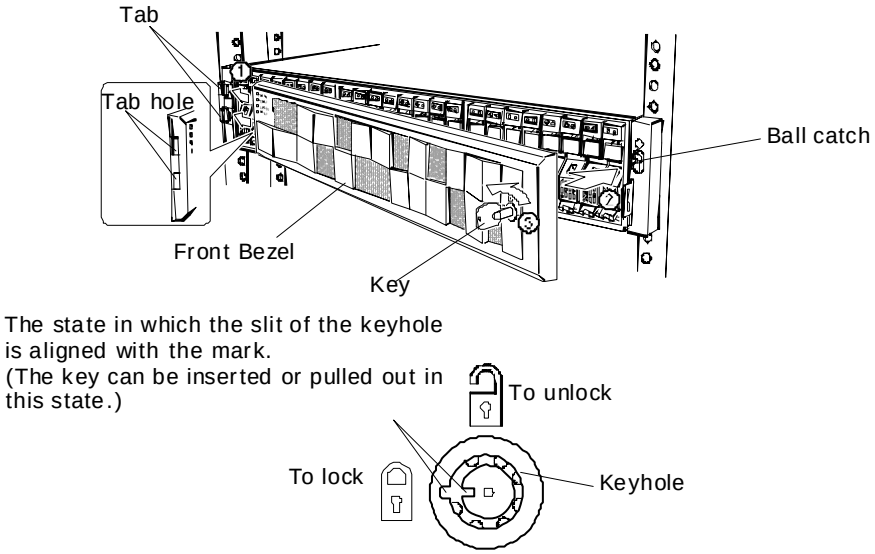
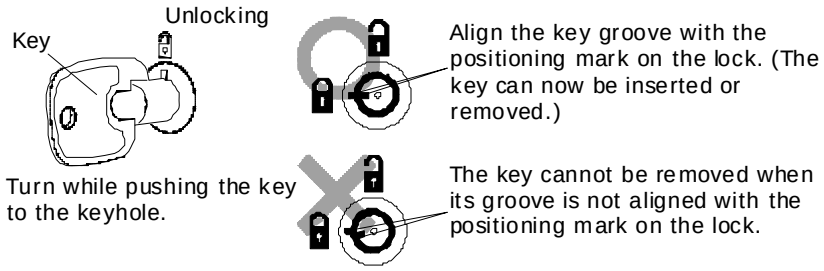


Figure 3-3: Front bezel on 2U Controller Box

Before turning the key, be sure it is inserted completely into the lock. Otherwise, you can damage the key.



When removing the key after locking the front bezel, align its groove with the positioning mark on the lock. Otherwise, you can damage the lock.

Removing the front bezel on a CBL

To remove the front bezel from the CBL:

1. Use the supplied key to unlock the bezel.
2. Holding the lower right part of the bezel, gently pull the key toward you and disengage the right side of the bezel from the ball catch.

NOTE: When disengaging the front bezel, do not open the bezel more than 45 degrees; otherwise, you can damage the bezel.

3. Disengage the front bezel from the left tabs and then remove the bezel.

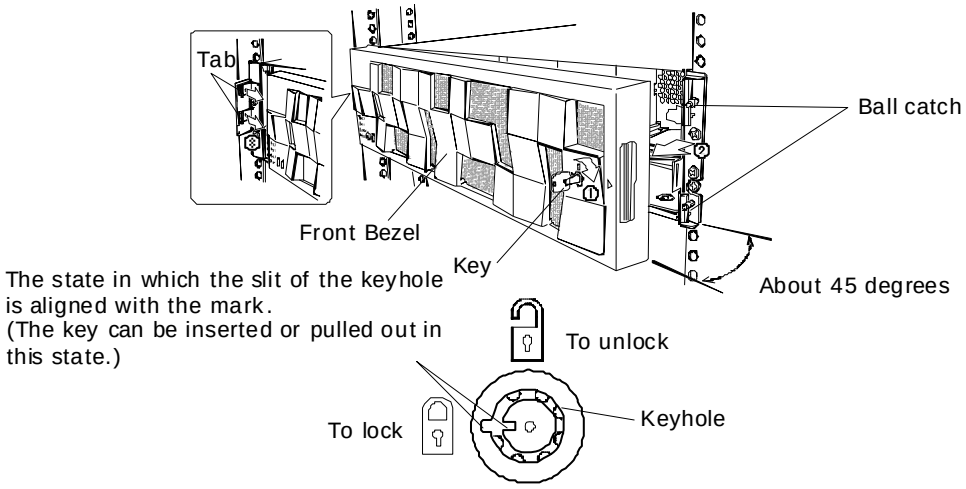
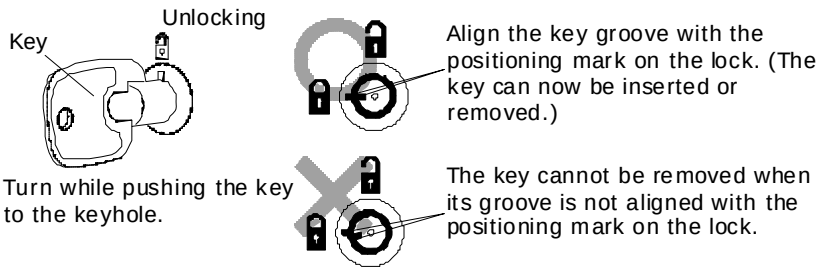


Figure 3-4: Front bezel on CBL

To replace the front bezel:

1. Use the supplied key to unlock the front bezel. Hold the bottom of the bezel with both hands, so the front of the bezel is facing you.
2. Insert the tabs on the left-front side of the storage system into the tab holes on the front bezel.
3. Push the right side of the bezel to engage it with the ball catch on the front of the storage system to secure the bezel.
4. Use the supplied key to lock the bezel.

Before turning the key, be sure it is inserted completely into the lock. Otherwise, you can damage the key.



When removing the key after locking the front bezel, align its groove with the positioning mark on the lock. Otherwise, you can damage the lock.

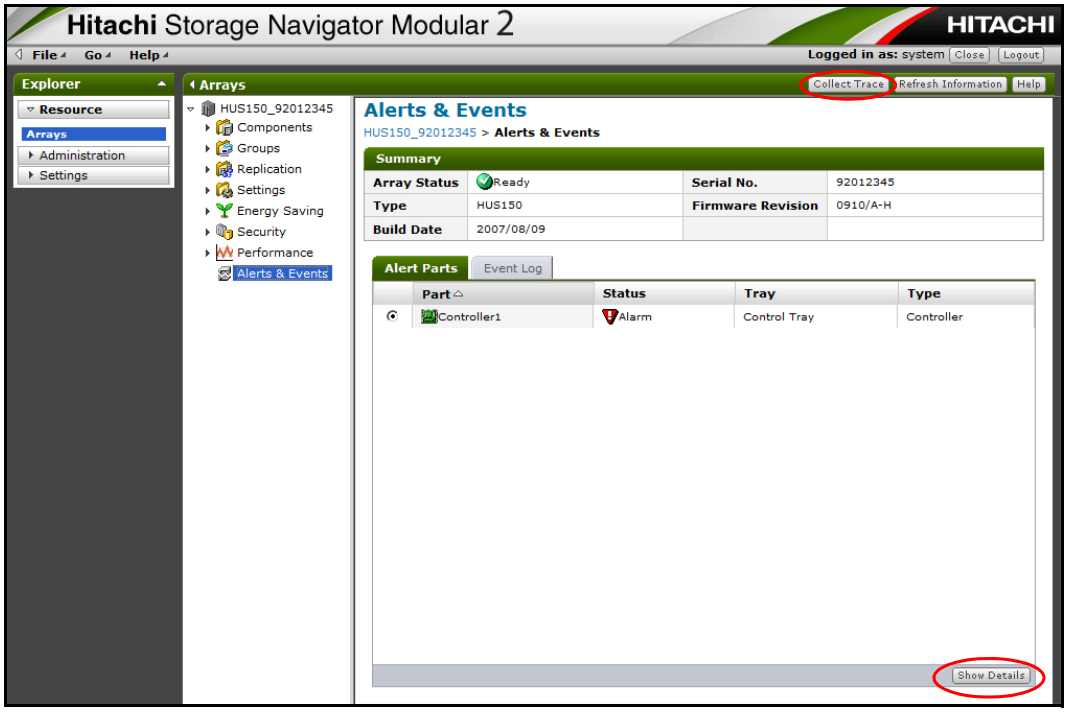
Collecting trace information

Hitachi Storage Navigator Modular 2 supports a trace feature that is used before replacing the following components:

- Controllers
- Drives
- I/O Modules (ENC)

To use this feature to collect trace information:

1. Perform steps 1 through 6 under Using Storage Navigator Modular 2 to identify failures on page 1-3.
2. From the Alerts & Events window, click the **Collect Trace** button in the top-right area of the Alerts & Events window, and then download the trace information.



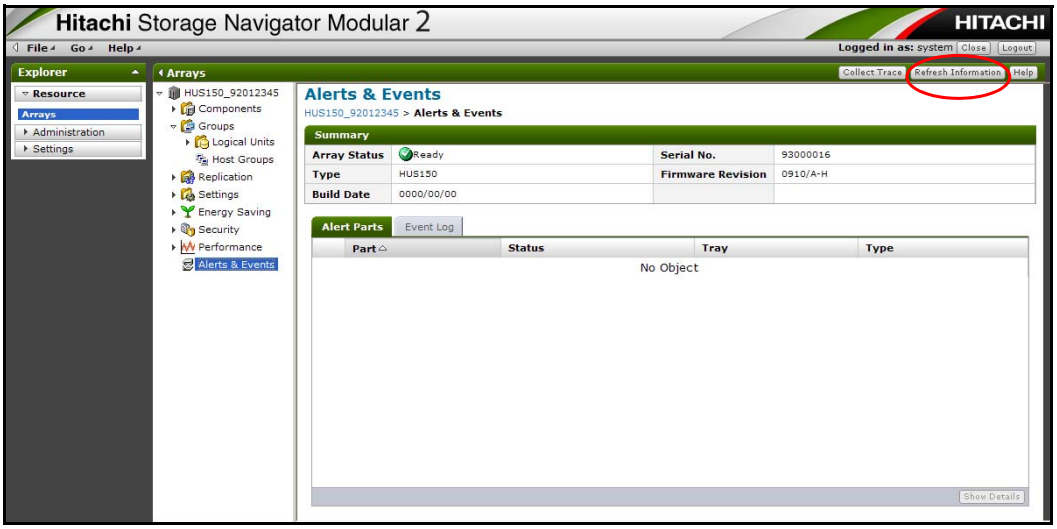
3. After the download completes, store the trace information on a CD-R, and then send the CD-R and failed part according to the instructions on the System Returns Packet that came with the replacement component.
4. To view details about the failure, click **Show Details** in the bottom-right corner of the **Alert Parts** tab. Provide this information to the Global Support Center.

NOTE: For additional assistance, contact the Global Support Center. For a list of in-country toll-free phone numbers, go to https://portal.hds.com/index.php/contact-us/in-country-toll-free-numbers.

Checking recovery after replacing components

After you replace one or more components, check that the storage system has recovered.

1. In Storage Navigator Modular 2, display the Alerts & Events window.
2. Click the **Refresh Information** button at the top-right side of the window.
3. Confirm that the component no longer appears in the **Alert Parts** tab.



4. In the Alerts & Events window, click the **Event Log** tab and confirm that recovery procedures are completed and that there are no events that require your attention.

4

Replacing drives

This chapter describes how to replace a drive on Hitachi Unified Storage systems.

The following topics are covered in this chapter:

- Precautions when replacing a drive
- Locating drives
- Drive-replacement instructions

NOTE: This chapter assumes you have read the electrostatic guidelines and other information in Chapter 3, Procedures before and after replacing components. If you have not, review this information and then return to this chapter.

Precautions when replacing a drive

The procedure for replacing a drive varies, depending on the spare drive setting, RAID configuration, data recovery setting mode, and spare drive operation mode (variable or fixed).

Observe the following guidelines when replacing a drive.

- Back up all data before replacing a drive in a RAID 0 configuration. Otherwise, the user data on the drives being replaced will be lost.
- Drives are replaced only while power to the storage system is on. Complete the drive replacement within 10 minutes. Otherwise, an abnormal rise in temperature can power off the storage system.
- To prevent part failures caused by static electrical charge built up on your body, wear a wrist strap connected to the storage system before starting and do not remove it until you finish. Otherwise, the static electrical charge on your body might damage the drive or other hardware components.
- When you install a disk drive, support its metal frame with one hand and touch the metal frame with the hand that is wearing the wrist strap, as shown in Figure 4-1.

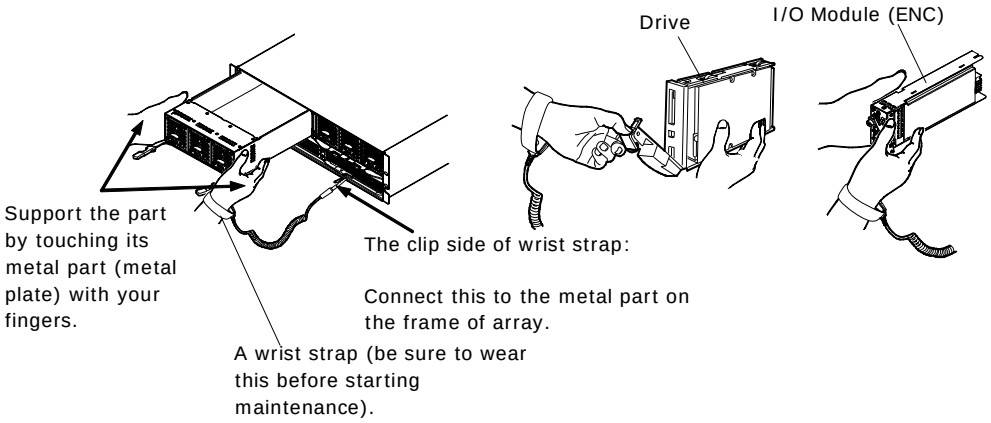


Figure 4-1: Precautions when handling drives

- Drives are precision components and should not be exposed to shock or rough movements.
- When you install a drive, hold it by its metal part using your hand that has the wrist strap. To discharge static electricity, touch the metal plate.
- If you replace drives #0 to #4 on the CBXSS/CBXSL/CBSS/CBSL, or drives #0 to #4 on the DBS/DBL Drive Box corresponding to unit ID#0 on the CBL, do not remove drives #0 to #4 at the same time when the storage system power is turned on. Otherwise, the storage system might go down.
- If you receive an alert about other problems with the storage system either prior to or after installing the drive, perform the maintenance procedures in the alert until the problem is corrected.
- Store the collected simple trace information on CD-R (see Collecting trace information on page 3-13).

Locating drives

CBXSL/CBSL Controller Boxes and DBL Drive Box

For CBXSL/CBSL Controller Boxes and the DBL Drive Box, drive numbering is from #0 to #11. Facing the front of the units, #0 is at the bottom-left of the unit and #11 is at the top right of the unit.

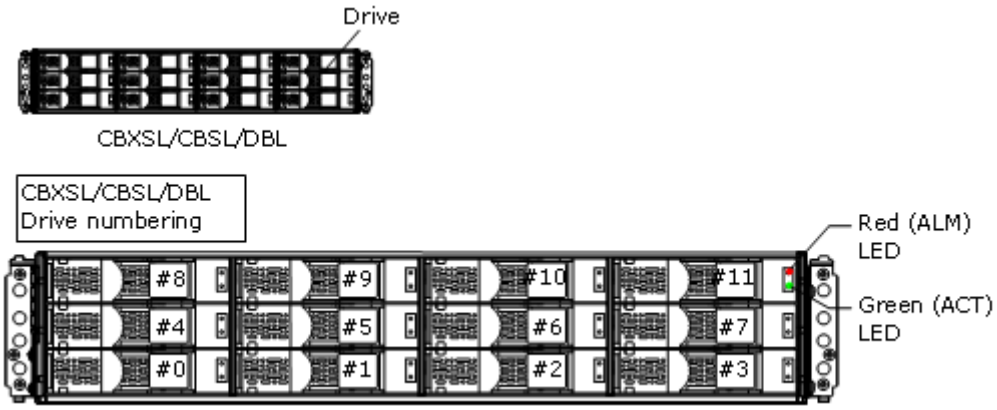


Figure 4-2: Drive locations on a CBXSL/CBSL/DBL

CBXSS/CBSS Controller Boxes and DBS Drive Box

For CBXSS/CBSS Controller Boxes and the DBS Drive Box, drive numbering is from #0 to #23. Facing the front of the units, #0 is at the left of the unit and #23 is at the right of the unit.

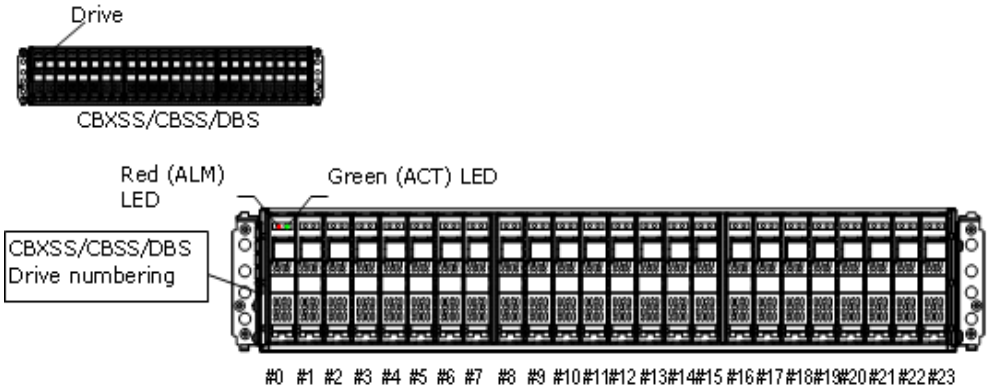


Figure 4-3: Drive locations on a CBXSS/CBSS/DBS

Drive-replacement instructions

See Table 4-1 to find the appropriate instructions for replacing drives:

Table 4-1: Drive-replacement instructions

If the Spare Drive...	And the RAID Level is...	Perform This Step...
Is set	RAID 0 (see Note 1 below), RAID 1, RAID 5, RAID 6, and RAID 1+0	If the red **ALM** LED on the drive to be replaced is ON, see Spare drive is set on page 4-5.
Is not set or there is no spare drive that can be used	RAID 0 (see Note 2 below)	Replacement of drive under Replacing a drive in a RAID 0 configuration on page 4-8.
	RAID 1, RAID 5, RAID 6, and RAID 1+0	If the red **ALM** LED on the drive to be replaced is ON, see Spare drive is not set or there is no spare drive that can be used on page 4-6.

NOTE 1: You can replace the drive using the procedure under Spare drive is set on page 4-5 for RAID 0 configurations that use a spare drive only when data migration to the spare drive completes successfully using dynamic sparing. If data migration to the spare drive fails, replace the drive using the procedure described in Spare drive is not set or there is no spare drive that can be used on page 4-6.

NOTE 2: Back up user data before replacing a drive in a RAID 0 configuration. When the RAID group and volume are deleted or formatted, user data will be deleted.

Spare drive is set

If the red **ALM** LED on the drive to be replaced is ON, perform the procedure in Figure 4-4. If two or more drives need to be replaced, including data spare drive, replace from the data drives. If two or more data and/or spare drives need to be replaced, replace the data drives first.

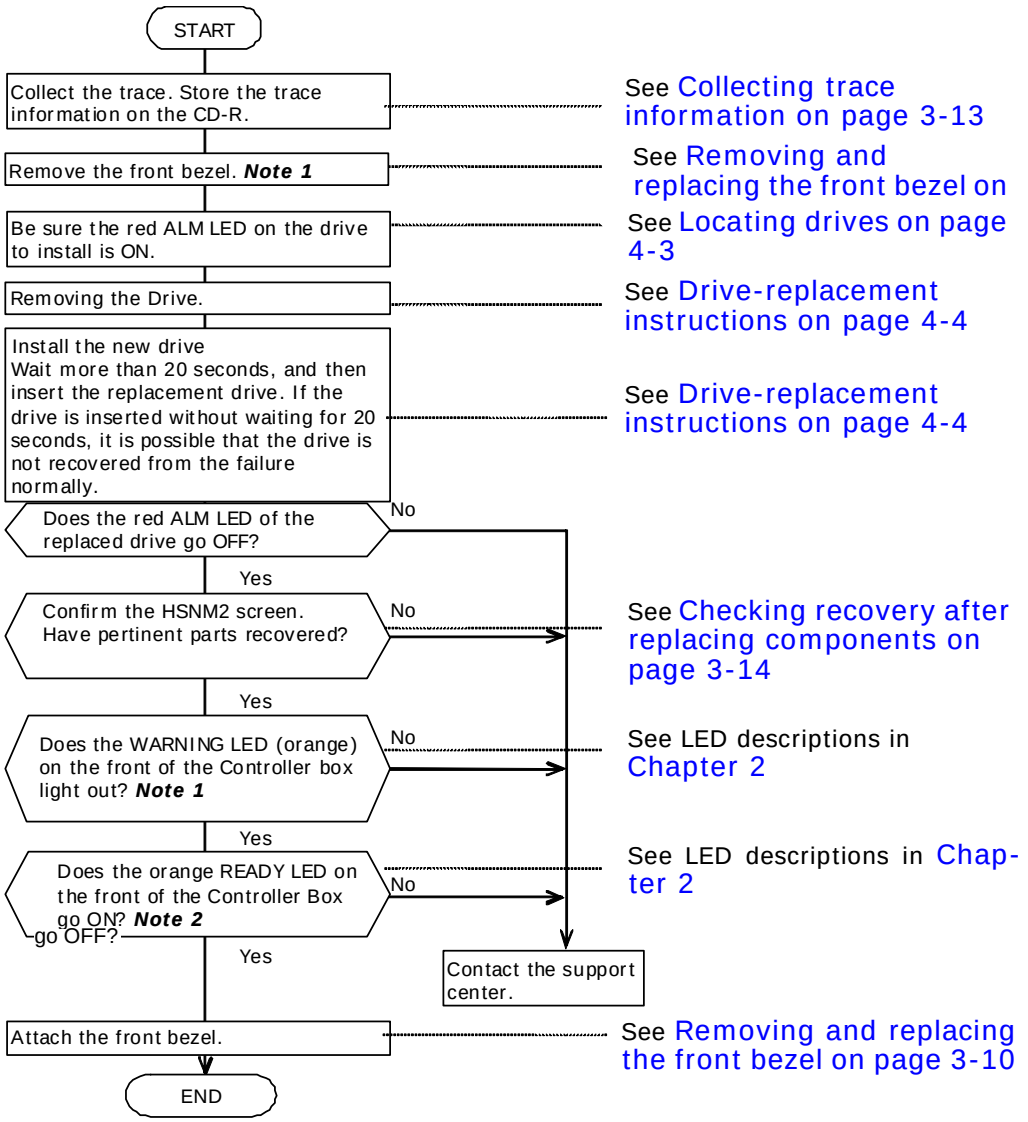


Figure 4-4: Drive replacement flowchart

NOTE 1: The red **ALM** LED on the drive goes OFF within about five minutes after the drive is inserted into the drive slot on the storage system. If the red **ALM** LED does not go OFF, remove the inserted drive from the storage system, wait at least 30 seconds, and then insert it again.

NOTE 2: If the green **READY** LED on the front of the Controller Box is blinking quickly for 30-to-50 minutes, 40-to-60 minutes for the CBL Controller Box, or 80-to-180 minutes when the DBW is connected to the CBL, wait for the LED to stop blinking before replacing drives.

Spare drive is not set or there is no spare drive that can be used

Perform the procedure in Figure 4-5 when replacing a drive in a storage system that has a RAID 1, 5, 6, or 1+0 configuration and the red **ALM** LED is ON. If two or more data and/or spare drives need to be replaced, replace the data drives first.

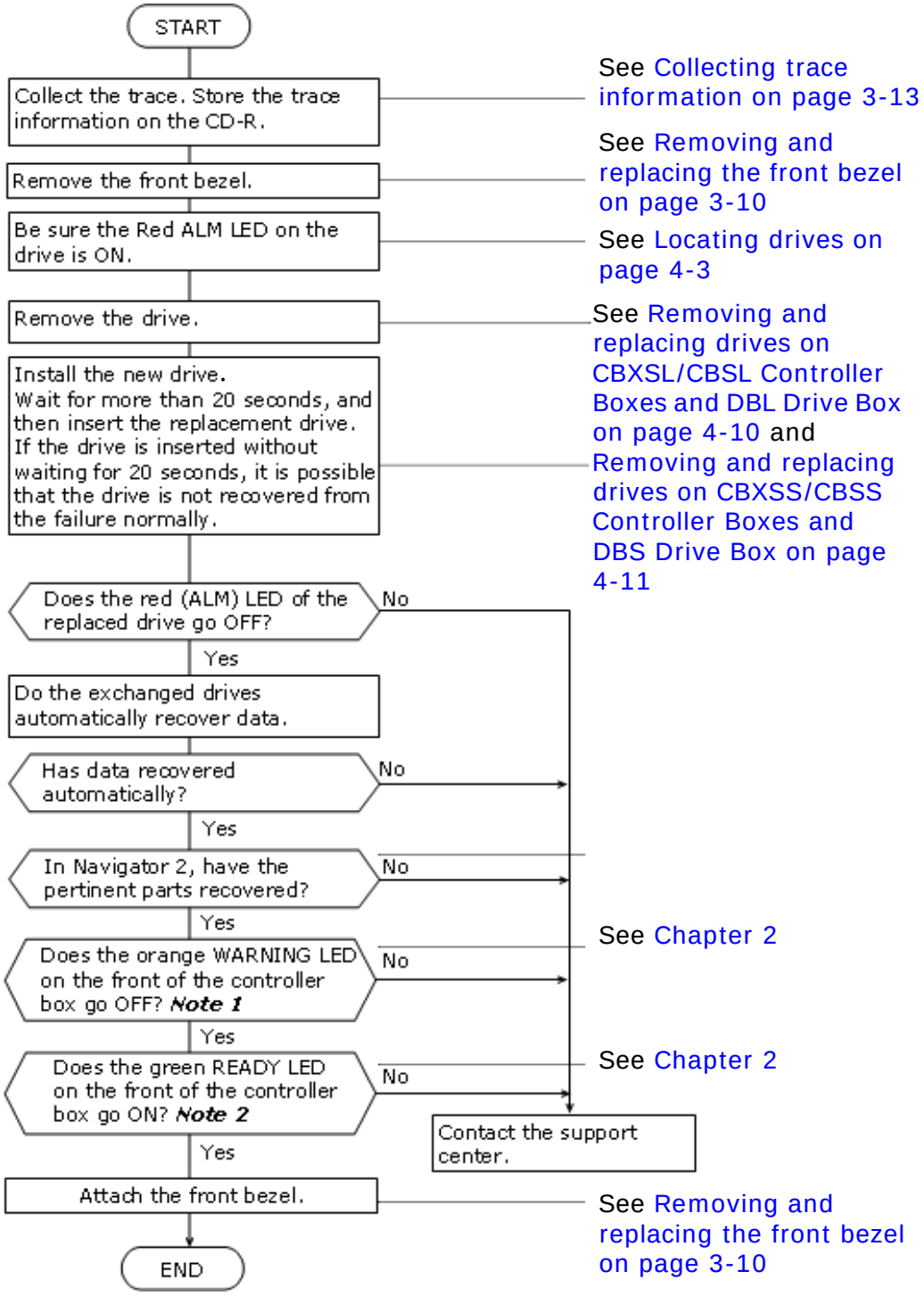


Figure 4-5: Drive replacement flowchart

NOTE 1: The red **ALM** LED on the drive goes OFF within about five minutes after the drive is inserted into the drive slot on the storage system. If the red **ALM** LED does not go OFF, remove the inserted drive from the storage system, wait at least 30 seconds, and then insert it again.

NOTE 2: If the green **READY** LED on the front of the Controller Box is blinking quickly for 30-to-50 minutes, 40-to-60 minutes for the CBL Controller Box, or 80-to-180 minutes when the DBW is connected to the CBL, wait for the LED to stop blinking before replacing drives.

Replacing a drive in a RAID 0 configuration

Perform the procedure in Figure 4-5 when replacing a drive in a storage system that has a RAID 0 configuration.

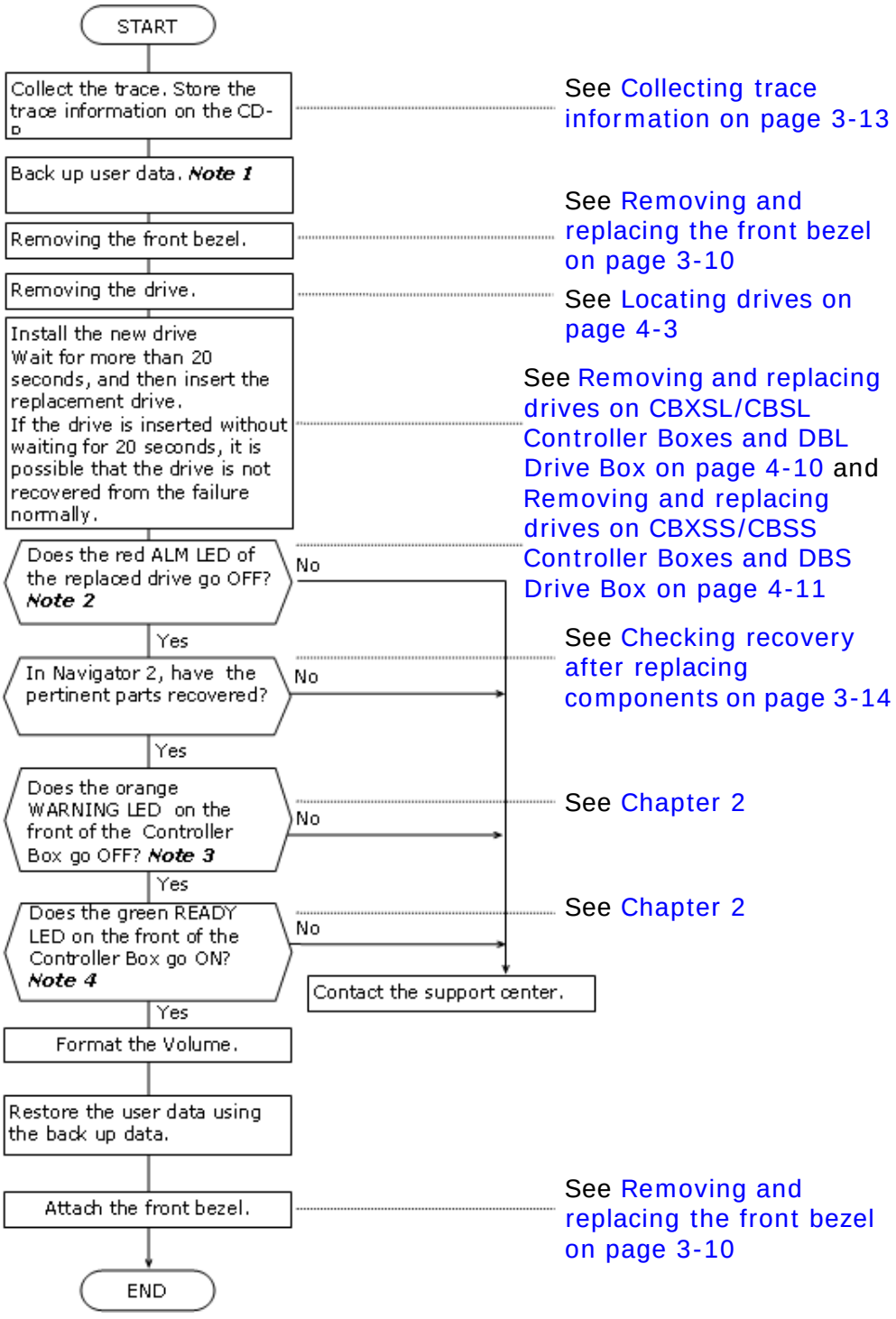


Figure 4-6: Drive replacement flowchart

NOTE 1: User data cannot be backed up when a drive to be replaced is blocked or when the drive belongs to a RAID Group that contains a blocked drive.

NOTE 2: The red **ALM** LED on the drive goes OFF within about five minutes after the drive is inserted into the drive slot on the storage system. If the red **ALM** LED does not go OFF, remove the inserted drive from the storage system, wait at least 30 seconds, and then insert it again.

NOTE 3: If the orange **WARNNG** LED is blinking slowly, visit the HDS Support Portal at portal.hds.com.

NOTE 4: If the green **READY** LED on the front of the Controller Box is blinking quickly for 30-to-50 minutes, 40-to-60 minutes for the CBL Controller Box, or 80-to-180 minutes when the DBW is connected to the CBL, wait for the LED to stop blinking before replacing drives.

Removing and replacing drives on CBXSL/CBSL Controller Boxes and DBL Drive Box

To remove a drive from a CBXSL or CBSL Controller Box or DBL Drive Box:

1. With the storage system powered on and running, pull the stopper on the drive handle toward you to release the lock (①).
2. Open the handle toward you, and then pull out and remove the drive to be replaced. Handle the drive carefully to avoid exposing it to shock or rough movement.

NOTE: Hold the drive by the rail side because the shield spring is subject to breakage.

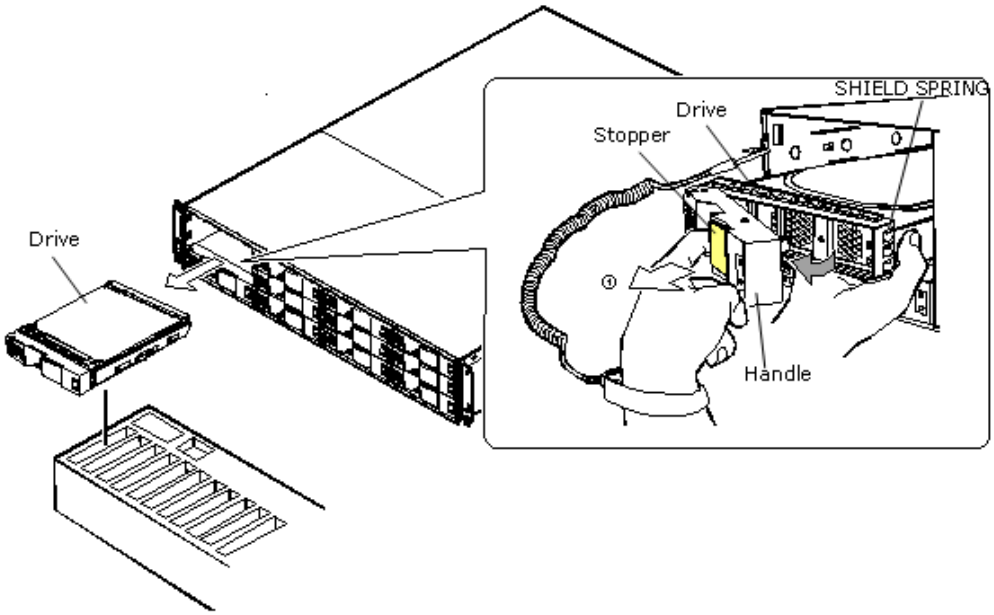


Figure 4-7: Removing a drive from a CBXSL/CBSL/DBL

Instructions for replacing a drive on a CBXSL or CBSL Controller Box or DBL Drive Box vary, depending on the storage system. Check the storage system and drive before replacing the drive.

1. With the storage system powered on and running, insert the drive into the guide rail and slide it in the direction of the arrow (①). Handle the drive carefully to avoid exposing it to shock or rough movement.
2. Push the drive until it reaches the position where a hook of the handle can enter into the rectangular hole (?) at the lower part of a frame on the front side of the drive.
3. Raise the stopper, which has been titled toward you, and then press the stopper (?) to lock the drive. If the handle is raised so the hook of the handle cannot enter into each hole, the drive meets to the drive frame and cannot be installed.

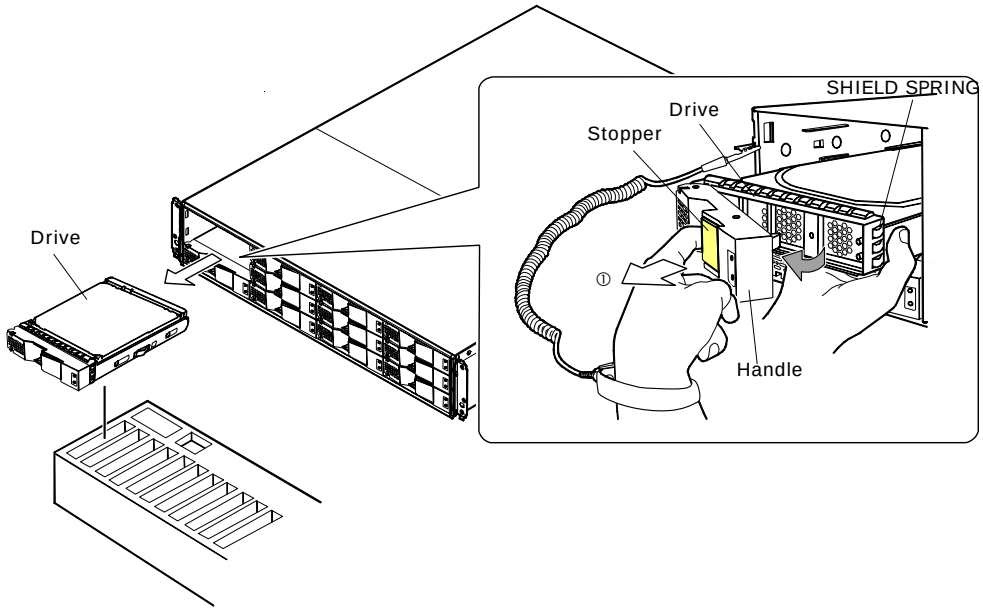


Figure 4-8: Removing a drive on a CBXSL/CBSL/DBL

Removing and replacing drives on CBXSS/CBSS Controller Boxes and DBS Drive Box

To remove a drive from a CBXSS or CBSS Controller Box or DBS Drive Box:

1. With the storage system powered on and running, pull the stopper on the drive handle toward you to release the lock (①).
2. Open the handle toward you, and then pull out and remove the drive. Handle the drive carefully to avoid exposing it to shock or rough movement.

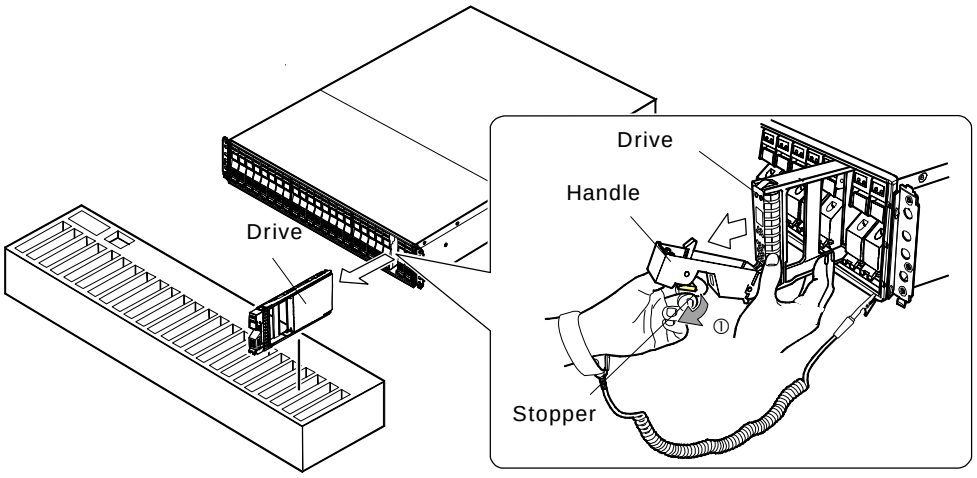


Figure 4-9: Removing a drive from a CBXSS/CBSS/DBS

To replace a drive on a CBXSS or CBSS Controller Box or DBS Drive Box:

1. With the storage system powered on and running, insert the drive into the guide rail and slide it in the direction of the arrow (①). Handle the drive carefully to avoid exposing it to shock or rough movement.
2. Push the drive until it reaches the position where a hook of the handle can enter into the rectangular hole (②) at the lower part of a frame on the front side of the drive.
3. Raise the stopper, which has been titled toward you, and then press the stopper (②) to lock the drive. If the handle is raised so the hook of the handle cannot enter into each hole, the drive meets to the drive frame and cannot be installed.

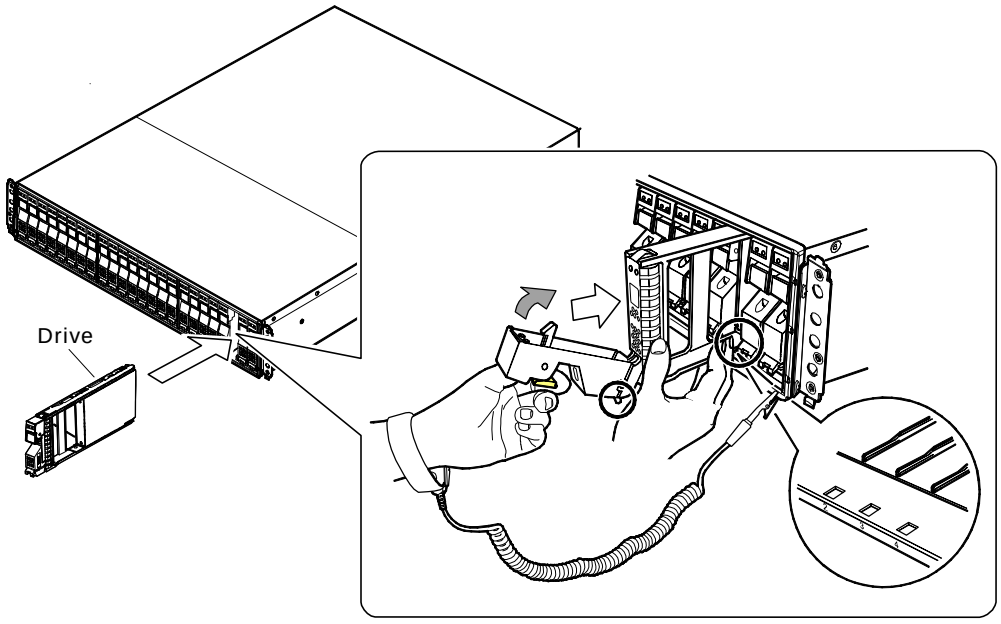


Figure 4-10: Replacing a drive on a CBXSS/CBSS/DBS

5

Replacing a cache backup battery

Hitachi Unified Storage systems contain cache backup batteries that protect cache data against a system crash and power loss. This chapter describes how to replace the cache backup battery on Hitachi Unified Storage systems.

The following topics are covered in this chapter:

- Precautions when replacing cache backup battery
- Replacing the cache backup battery on CBXSS/CBXSL/CBSS/CBSL Controller Boxes
- Replacing the cache backup battery on a CBL Controller Box

NOTE: This chapter assumes you have read the electrostatic guidelines and other information in Chapter 3, Procedures before and after replacing components. If you have not, review this information and then return to this chapter.

Precautions when replacing cache backup battery

Observe the following guidelines when replacing cache backup battery.

- When the storage system power is turned off during the replacement, user data on the cache backup battery that has not been written to disk is not backed up.
- Complete the cache backup battery replacement within 10 minutes. Otherwise, an abnormal rise in temperature can power off the storage system.
- On the CBSL/CBSS/CBXSL/CBXSS Controller Boxes, you must turn off power to the storage system.
- On the CBL Controller Box, you can replace two cache backup batteries while the storage system is operating. However, the cache changes to Write Through mode and read/write performance deteriorates slightly. With Write Through mode, write operations to the drive and responses to the host occur as soon as the storage system receives data from the host computer, and response times to the host computer are delayed. Therefore, replace the cache backup battery as quickly as possible.
- When you remove cache backup batteries from the Controller Box, a Warning condition occurs on the storage system. The Warning status goes away automatically when the cache backup batteries recover.
  - Cache memory comes in a nickel-hydrogen battery. A closed type nickel-hydrogen battery can cause an electric shock or explosion if it is handled wrongly. Observe the following requirements when handling the battery.
  - Do not disassemble or remake the battery.
  - Do not deform the battery.
  - Do not connect plus and minus poles with a metallic article such as a wire.
  - Do not reverse the connections of plus and minus poles.
  - Do not peel off the covering tube.
  - Do not connect the battery directly to the outlet.
  - Do not connect the battery to anything other than this array for charging/discharging.
  - Store the battery in a dark and cool place. Avoid exposure to hot places.
  - Do not discard a used battery at the site where it was removed for replacement.

NOTE: If the storage system is turned off longer than six months, the battery may become discharged excessively. To avoid this condition, charge the battery for more than three hours every six months.

Replacing the cache backup battery on CBXSS/CBXSL/CBSS/CBSL Controller Boxes

Two cache backup batteries on a CBXSS/CBXSL/CBSS/CBS Controller Box are installed in a Power Unit. When the storage system power is turned on (Ready status), two cache backup batteries cannot be replaced at the same time.

To replace cache backup batteries on a CBXSS/CBXSL/CBSS/CBS Controller Box, perform the following steps:

1. Remove the Power Unit.
2. Remove the old cache backup battery from the Power Unit.
3. Install a new cache backup battery.
4. Insert the Power Unit into the storage system.

Removing the Power Unit

Use the following procedure to remove the Power Unit on which the red **B-ALM** LED for the cache backup battery is ON (and see Figure 5-1 on page 5-5).

1. Hold up the latch on the Power Unit cable holder to release the lock, and then slide the cable holder forward.
2. Remove the power cable from the Power Unit on which the red **B-ALM** LED for the cache backup battery is ON.
3. Open the lever (②) toward you while pressing the latch on the Power Unit inward with right thumb (①). When the lever is opened completely, the Power Unit can be removed by pulling it forward.
4. Hold the body of the Power Unit with both hands, and then pull out and remove the Power Unit.

Removing the cache backup battery

Use the following procedure to remove the cache backup battery (and see Figure 5-1 on page 5-5):

1. Loosen the blue screw on the cache backup battery cover, and then open the cover.
2. Remove the cable for the cache backup battery from the cable clamp.
3. Remove the cable for the cache backup battery from the connector on the Power Unit.
4. Remove the cache backup battery.

Installing a new cache backup battery

Use the following procedure to install a new cache backup battery (and see Figure 5-1 on page 5-5):

1. Insert a new cache backup battery on the Power Unit, and then connect the cable for the cache backup battery to the connector on the Power Unit.

2. Use the cable clamp to secure the cable for the cache backup battery.
3. Close the cache backup battery cover and then tighten the blue screw.

Installing the Power Unit

Wait at least 30 seconds after removing the Power Unit. Then use the following procedure to install the Power Unit, which includes the new cache backup battery.

NOTE: If you install the Power Unit with the new cache backup battery without waiting at least 30 seconds, it might not recover normally. If this occurs, remove the inserted Power Unit from the storage system, wait at least 30 seconds, and then re-insert the Power Unit into the storage system.

1. With the lever opened completely, insert the Power Unit into the slot.
2. Push the Power Unit all the way in.
3. Close the lever completely, and then secure the Power Unit.
4. Connect the power cable to the installed Power Unit.
5. Secure the cable holder with the power cable, and then push the cable holder in.
6. Charge the cache backup battery until the green **B-RDY** LED on the Power Unit stops blinking and goes ON. The green **B-RDY** LED blinks when the cache backup battery is charging and then goes ON when the cache backup battery is fully charged. Charging time takes approximately 3 hours.
7. Confirm the status of the following LEDs:
   - Green **B-RDY** LED on the Power Unit is ON.
   - Green **READY** LED on the front of the Controller Box is ON.
   - Red **ALARM** LED and orange **WARNING** LED (orange) are OFF. If the LED in Figure 5-1 on page 5-5 is blinking slowly, visit the HDS Support Portal at portal.hds.com. The green **READY** LED on the front of the Controller Box might blink quickly for 30-to-50 minutes.
8. In Hitachi Storage Navigator Modular 2, check the recovery after replacing components (see Checking recovery after replacing components on page 3-14).

Recycle the old cache backup battery.

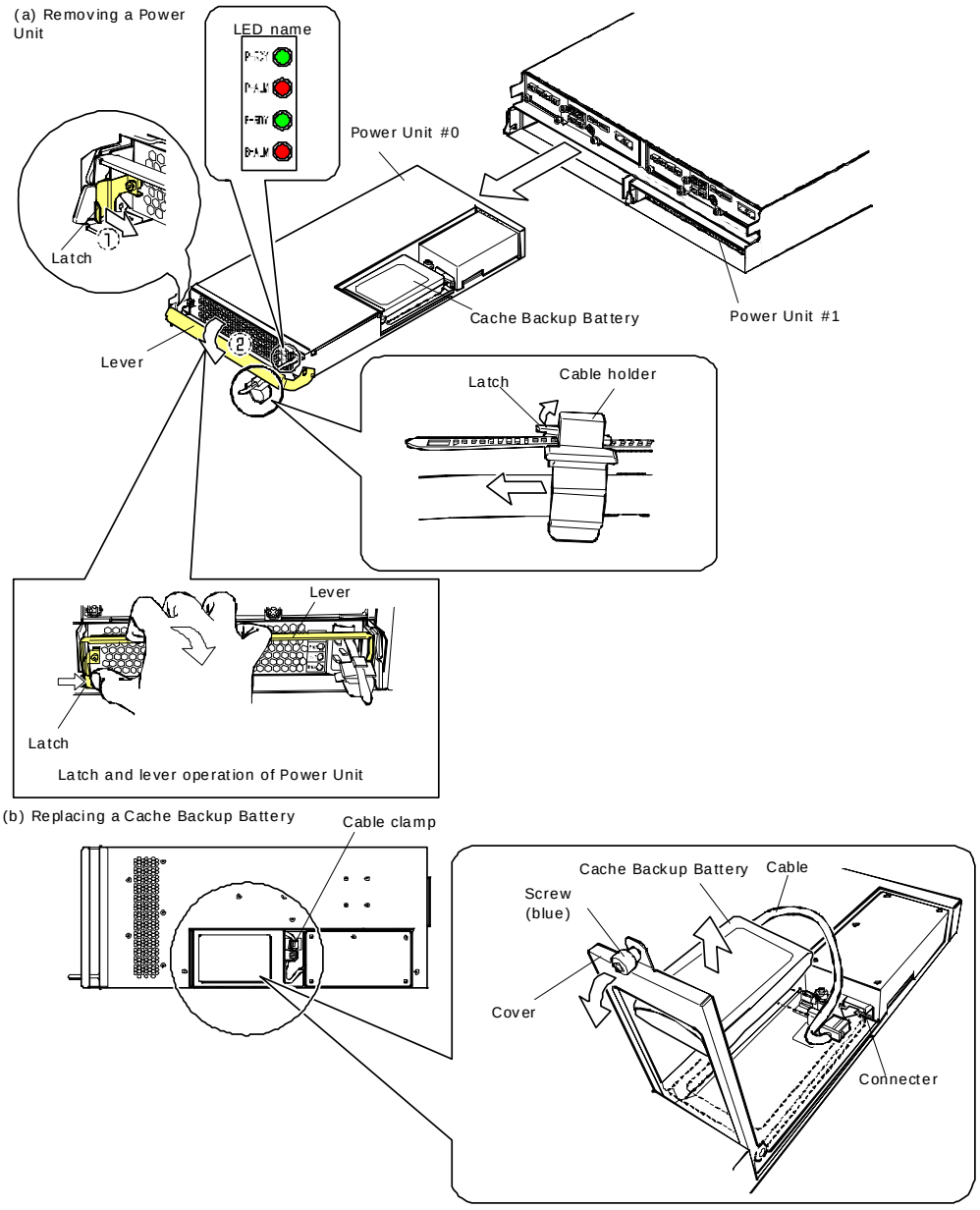


Figure 5-1: Replacing a cache backup battery on a CBXSS/CBXSL/CBSS/CBSL

Replacing the cache backup battery on a CBL Controller Box

To replace cache backup batteries on a CBL Controller Box, perform the following steps:

1. Remove the front bezel. See Removing and replacing the front bezel on page 3-10.
2. Remove the cache backup battery.
3. Install a new cache backup battery.
4. Replace the front bezel. See Removing and replacing the front bezel on page 3-10.

Removing the cache battery backup

Use the following procedure to remove the cache battery backup (and see Figure 5-2 on page 5-7):

1. Remove the Power Unit on which the red **ALM** LED for the cache backup battery is ON.
2. Loosen the blue screw that secures the cache backup battery.
3. Open the lever, and then pull out and remove the cache backup battery.

NOTE: The cache backup battery is about 19.2 inches (488 mm) deep and weighs approximately 11 lbs (5.0 kg), so remove it carefully.

Installing the new cache backup battery

Wait at least 30 seconds after removing the cache backup battery from the storage system. Then use the following procedure to install the new cache backup battery.

NOTE: If you insert the new cache backup battery without waiting at least 30 seconds, it might not recover normally. If this occurs, remove the inserted cache backup battery from the storage system, wait at least 30 seconds and then re-insert the cache backup battery into the storage system.

1. With the lever opened completely, insert the cache backup battery into the slot.
2. Push the cache backup battery all the way in.
3. Close the lever and tighten the blue screw you loosened earlier to secure the cache backup battery.
4. Charge the cache backup battery until the green **RDY** LED on the Power Unit stops blinking and goes ON. The green **RDY** LED blinks when the cache backup battery is charging and then goes ON when the cache backup battery is fully charged. Charging time takes approximately 3 hours.

5. Confirm the status of the following LEDs:
   - Green **RDY** LED on the cache backup battery is ON.
   - Green **READY** LED on the front of the Controller Box is ON. This LED might blink quickly for 40-to-60 minutes or 80-to-180 minutes if the DBW is connected to the CBL.
   - Red **ALARM** LED and orange **WARNING** LED on the front of the Controller Box are OFF. If the LED in Figure 5-2 is blinking slowly, visit the HDS Support Portal at portal.hds.com.
6. In Storage Navigator Modular 2, check the recovery after replacing components (see Checking recovery after replacing components on page 3-14).
7. Attach the front bezel.
8. Recycle the old cache backup battery.

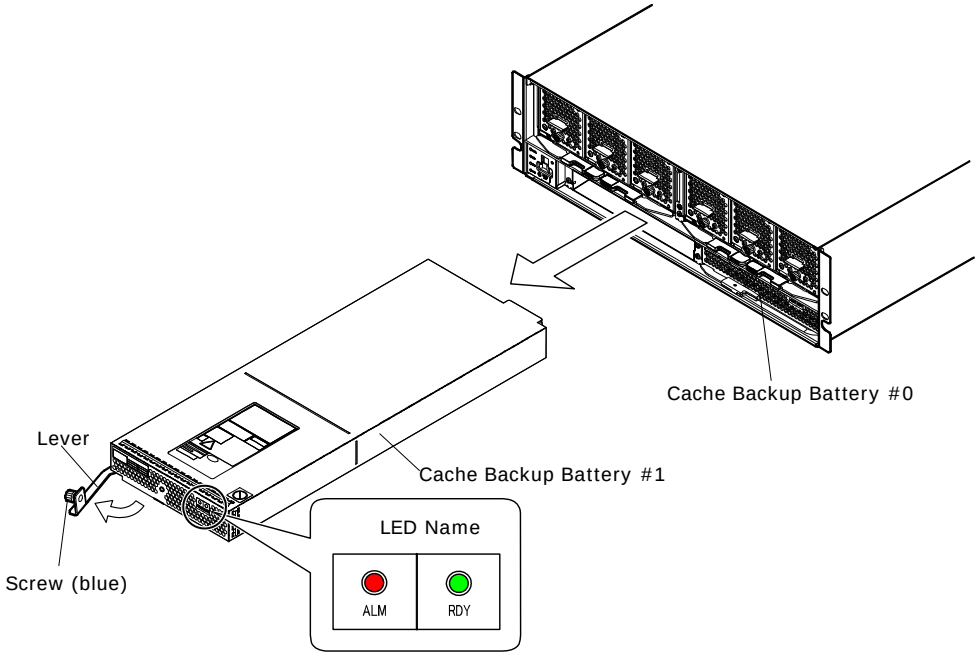


Figure 5-2: Replacing a cache backup battery on a CBL

6

Replacing a Fan Module

CBL Controller Boxes have three customer-replaceable Fan Modules. This chapter describes how to replace a Fan Module on a CBL Controller Box.

The following topics are covered in this chapter:

- Precautions when replacing the Fan Module
- Replacing the Fan Module on a CBL Controller Box

NOTE: This chapter assumes you have read the electrostatic guidelines and other information in Chapter 3, Procedures before and after replacing components. If you have not, review this information and then return to this chapter.

Precautions when replacing the Fan Module

Observe the following guidelines when replacing a Fan Module.

- Complete the Fan Module replacement within 10 minutes. Otherwise, an abnormal rise in temperature can power off the storage system.
- If the **ALM** LED on the controller is ON while the **ALM** LED of the Fan Module is ON, resolve the problem with the controller before resolving the problem with the Fan Module.
- If the Power Unit and Fan Module fail at the same time, replace the Power Unit first before resolving the problem with the Fan Module.
- If three fans fail, visit the HDS Support Portal at portal.hds.com.
- If you shut down the storage system and turn off the power supply as part of a planned shutdown, do not remove three Fan Modules from the storage system.
- For storage systems that have the Power Saving/Power Saving Plus option, removing and inserting a Fan Module during drive spin-up might prevent the Module from recovering fully. If the Fan Module does not recover, wait for all the drives to spin up, and then remove the Fan Module from the storage system, wait at least 30 seconds, and reinsert it.

Replacing the Fan Module on a CBL Controller Box

To replace the Fan Module on a CBL Controller Box:

1. Remove the front bezel (see Removing and replacing the front bezel on page 3-10).
2. Be sure the red **ALM** LED on the Fan Module is ON. This is the Fan Module you will remove.
3. Loosen the blue screw securing the Fan Module.
4. Slide the Fan Module forward by sliding the latch upward, and then remove the Fan Module from the slot.

DANGER! Wait at least 30 seconds after removing the fan, as the wings can continue to rotate for a few seconds after the fan is removed. Keep fingers away from the fan at all times.

5. After waiting at least 30 seconds, install a new Fan Module into the slot.

NOTE: If you insert the Fan Module without waiting at least 30 seconds, the Fan Module might not recover normally. If this occurs, remove the inserted Fan Module from the storage system, wait at least 30 seconds, and then re-insert the Fan Module into the storage system.

6. Be sure the red **ALM** LED on the new Fan Module is OFF.
7. Confirm that the fans on the new Fan Module are rotating.
8. On the Controller Box, confirm the status of the following LEDs:

- Green **READY** LED is ON. This LED might blink quickly for up to 60 minutes or 80-to-180 minutes if the DBW is connected to the CBL before the LED goes ON.
- Red **ALARM** LED and orange **WARNING** LED are OFF.

9. In Hitachi Storage Navigator Modular 2, check the recovery after replacing components (see Checking recovery after replacing components on page 3-14).
10. Attach the front bezel (see Removing and replacing the front bezel on page 3-10).

NOTE: If the LED in Figure 6-1 is blinking slowly, visit the HDS Support Portal at portal.hds.com.

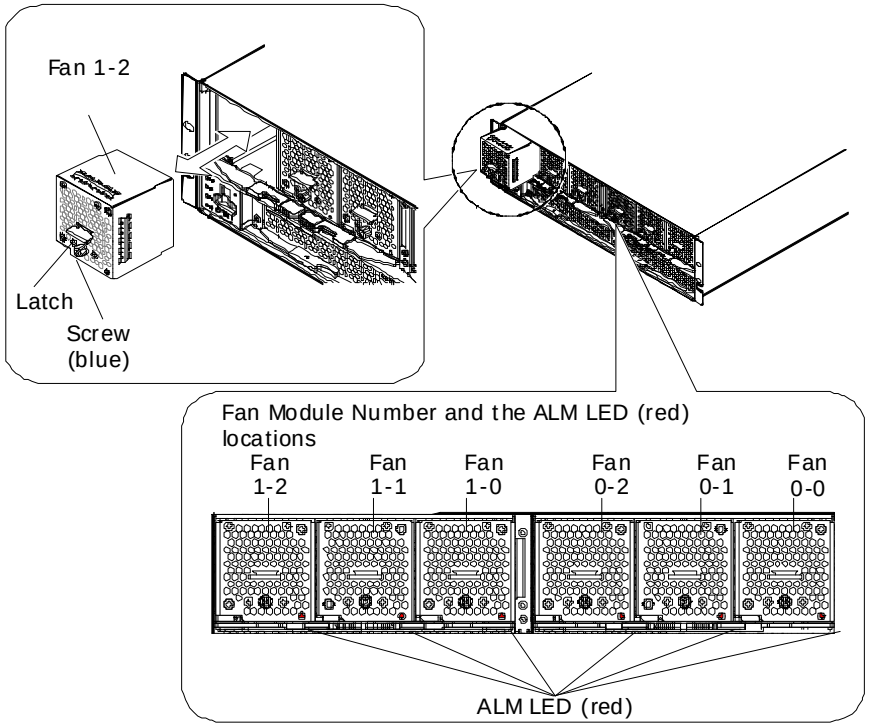


Figure 6-1: Replacing a fan module

7

Replacing a Power Unit

CBXSS/CBXSL/CBSS/CBSL/CBL Controller Boxes and DBS/DBL Drive Boxes have a customer-replaceable Power Unit. This chapter describes how to replace Power Units on these base and Drive Boxes.

The following topics are covered in this chapter:

- Precautions when replacing the Power Unit
- Replacing the Power Unit on CBXSS/CBXSL/CBSS/CBSL Controller Boxes
- Replacing the Power Unit on a CBL Controller Box
- Replacing the Power Unit on a DBL/DBS Drive Box

NOTE: This chapter assumes you have read the electrostatic guidelines and other information in Chapter 3, Procedures before and after replacing components. If you have not, review this information and then return to this chapter.

Precautions when replacing the Power Unit

The procedure for replacing the Power Unit is different for each storage system model, so be sure to follow the instructions for the appropriate storage system. Observe the following guidelines when replacing a Power Unit.

- Complete the Power Unit replacement within 10 minutes. Otherwise, an abnormal rise in temperature can power off the storage system.
- For storage systems that have the Power Saving/Power Saving Plus option, removing and inserting a Power Unit during drive spin-up might prevent the Power Unit from recovering fully. If this occurs, wait for all the drives to spin up, and then remove the Power Unit from the storage system, wait at least 30 seconds, and reinsert it.
- If the Power Unit encounters problems when you replace the Fan Module, it does not mean the Power Unit is faulty and must be replaced. Remove the Power Unit and then re-insert it to see whether the problem is resolved.
- If the Power Unit and another module fail at the same time, replace the Power Unit first. Otherwise, an abnormal temperature condition can occur.

Replacing the Power Unit on CBXSS/CBXSL/CBSS/CBSL Controller Boxes

To replace the Power Unit on a CBXSS/CBXSL/CBSS/CBSL Controller Box:

1. Confirm the status of the following LEDs:
   - Red **P-ALM** LED on the Power Unit to be replaced is ON.
   - Green **P-RDY** LED on the Power Unit not to be replaced is ON.

NOTE: If the red **ALM** LEDs on the Power Unit of both controllers are ON, visit the HDS Support Portal at portal.hds.com.

2. Hold up the latch on the Power Unit cable holder to release the lock, and then slide the cable holder forward.
3. Disconnect the power cables connected to the Power Unit to be replaced. You cannot remove the Power Unit with the power cable connected.
4. Wait at least 30 seconds before installing the new Power Unit.

NOTE: If you do not wait at least 30 seconds, the Power Unit might not recover normally. If you fail to wait at least 30 seconds and the Power Unit does not recover, remove the Power Unit, wait at least 30 seconds, and then reinstall it.

5. Open the lever toward you (②) while using your thumb to press the Power Unit latch inward (①). When the lever is opened completely, the Power Unit can be removed by pulling it forward,
6. Hold the Power Unit with both hands, then pull and remove it.

7. Loosen the blue screw on the cache backup battery cover and then open the cover.
8. Remove the cable for the cache backup battery from the cable clamp.
9. Remove the cable for the cache backup battery from the connector of the Power Unit to be replaced.
10. Remove the cache backup battery and add it to the replacement Power Unit. Connect the cable for the cache backup battery to the connector on the Power Unit.
11. Use the cable clamp to secure the cable for the cache backup battery.
12. Close the cache backup battery cover and then use the blue screw to tighten the cover.
13. With the lever opened completely, insert the replacement Power Unit all the way into the slot.
14. Push the Power Unit all the way in.
15. Close the lever completely and fasten the Power Unit.
16. Connect the power cable.
17. Confirm the status of the following LEDs:
    - Green **P-RDY** LED on the Power Unit is ON.
    - Green **READY** LED on the front of the Controller Box is ON. This LED may blink rapidly for up to 50 minutes.
    - Red **ALARM** LED and orange **WARNING** LED are OFF. If these two LEDs blink slowly, visit the HDS Support Portal at portal.hds.com.
18. In Hitachi Storage Navigator Modular 2, check the recovery after replacing components (see Checking recovery after replacing components on page 3-14).

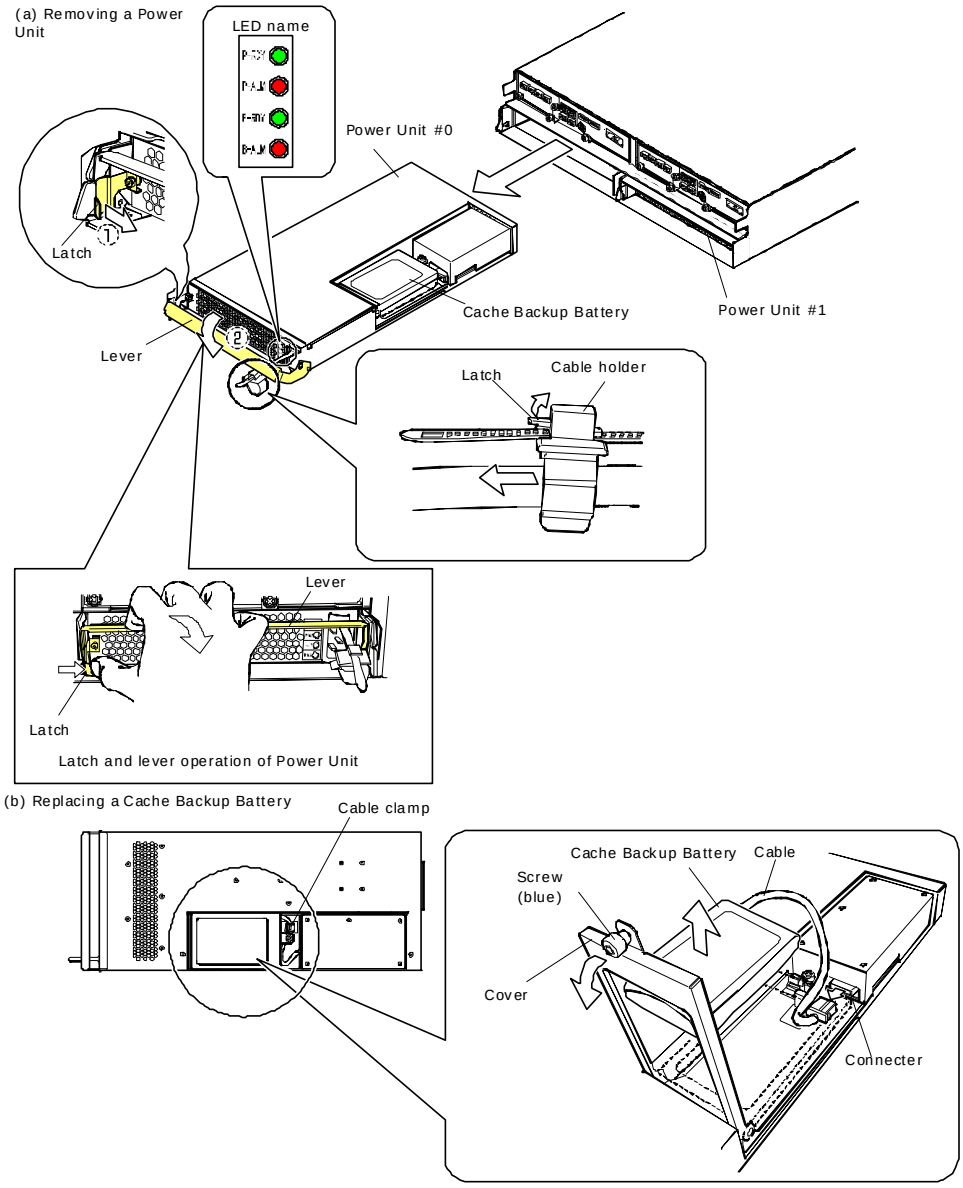


Figure 7-1: Replacing a Power Unit on a CBXSS/CBXSL/CBSS/CBSL

Replacing the Power Unit on a CBL Controller Box

To replace the Power Unit on a CBL Controller Box:

1. Confirm the status of the following LEDs:
   - Red **ALM** LED on the Power Unit to be replaced is ON.
   - Green **RDY** LED on the Power Unit not to be replaced is ON.

NOTE: If the red **ALM** LEDs on the Power Unit of both controllers are ON, visit the HDS Support Portal at portal.hds.com.

2. Loosen the blue screw securing the Power Unit.
3. Open the lever to pull out and remove the Power Unit. When the lever is opened completely, the Power Unit can be removed.
4. Hold the Power Unit with both hands, then pull and remove it.
5. Wait at least 30 seconds before installing the new Power Unit.

NOTE: If you do not wait at least 30 seconds, the Power Unit might not recover normally. If you fail to wait at least 30 seconds and the Power Unit does not recover, remove the Power Unit, wait at least 30 seconds, and then reinstall it.

6. With the lever opened completely, insert the replacement Power Unit into the slot.
7. Push the Power Unit all the way in. Do not catch the SAS (ENC) Cable when inserting the Power Unit.
8. Close the lever and tighten the blue screw to secure the Power Unit.
9. Connect the power cable.
10. Confirm the status of the following LEDs:
    - Green **RDY** LED on the Power Unit is ON.
    - Green **READY** LED on the front of the Controller Box is ON. This LED may blink rapidly for up to 60 minutes or up to 80-to-180 minutes when the DBW is connected to the CBL.
    - Red **ALARM** LED and orange **WARNING** LED are OFF. If these two LEDs blink slowly, visit the HDS Support Portal at portal.hds.com.
11. In Storage Navigator Modular 2, check the recovery after replacing components (see Checking recovery after replacing components on page 3-14).

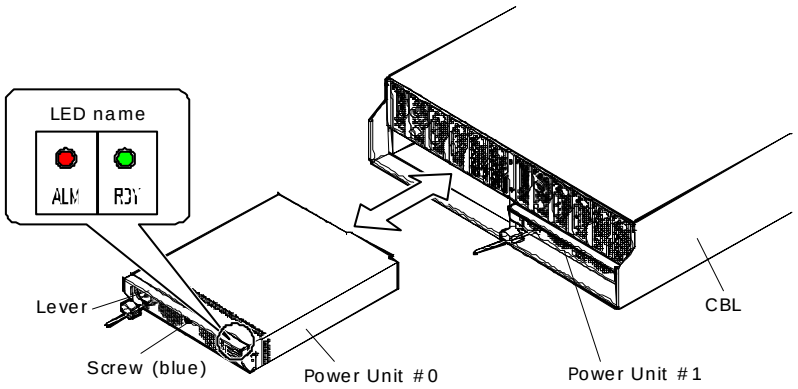


Figure 7-2: Replacing the Power Unit on a CBL

Replacing the Power Unit on a DBL/DBS Drive Box

To replace the Power Unit on a DBL/DBS Drive Box:

1. Confirm the status of the following LEDs:
   - Red **ALM** LED on the Power Unit to be replaced is ON.
   - Green **RDY** LED on the Power Unit not to be replaced is ON.

NOTE: If the red **ALM** LEDs on the Power Unit of both controllers are ON, visit the HDS Support Portal at portal.hds.com.

2. Hold up the latch on the Power Unit cable holder to release the lock, and then slide the cable holder forward.
3. Disconnect the power cables connected to the Power Unit to be replaced. You cannot remove the Power Unit with the power cable connected.
4. Wait at least 30 seconds before installing the new Power Unit.

NOTE: If you do not wait at least 30 seconds, the Power Unit might not recover normally. If you fail to wait at least 30 seconds and the Power Unit does not recover, remove the Power Unit, wait at least 30 seconds, and then reinstall it.

5. Open the lever toward you (②) while pressing the latch on the Power Unit inward with your thumb (①). When the lever is opened completely, the Power Unit can be removed by pulling it forward.
6. Hold the Power Unit with both hands, then pull and remove it.
7. With the lever opened completely, insert the replacement Power Unit into the slot. If you cannot insert the Power Unit into the slot easily, adjust the position by returning the lever slightly, and then insert it.
8. Push the Power Unit all the way. Do not catch the SAS (ENC) Cable when inserting the Power Unit.
9. Close the lever and tighten the Power Unit.
10. Connect the power cable.
11. Confirm the status of the following LEDs:
    - Green **RDY** LED on the Power Unit is ON.
    - Green **READY** LED on the front of the Controller Box is ON. This LED may blink rapidly for up to 50 minutes.
    - Red **ALARM** LED and orange **WARNING** LED are OFF. If these two LEDs blink slowly, visit the HDS Support Portal at portal.hds.com.
12. In Storage Navigator Modular 2, check the recovery after replacing components (see Checking recovery after replacing components on page 3-14).

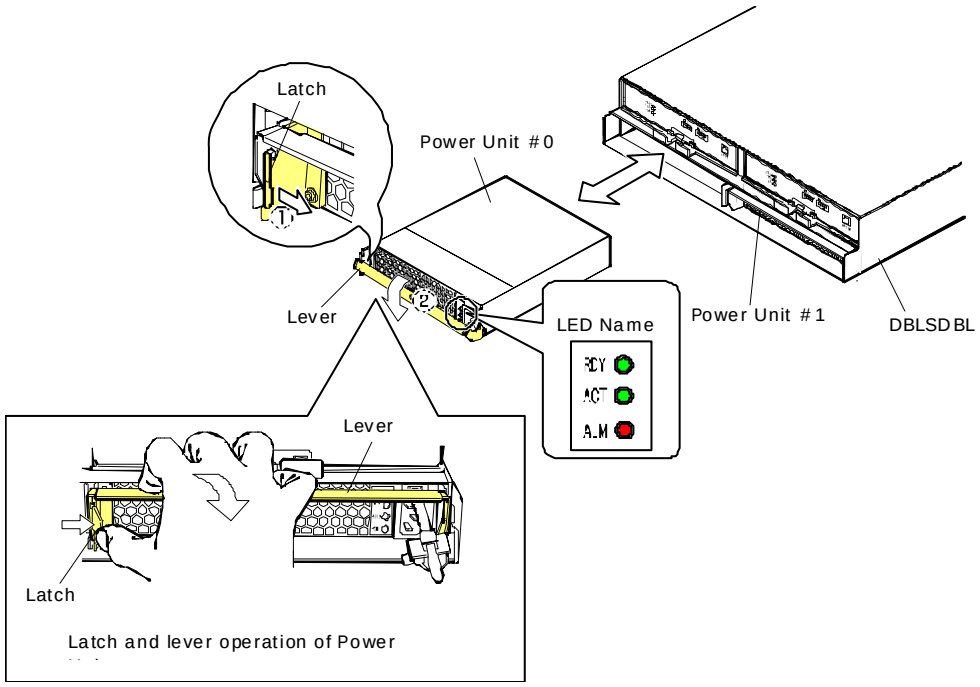


Figure 7-3: Replacing the Power Unit on a DBS/DBL

8

Adding and replacing controllers

This chapter describes how to add a controller to a single-controller Hitachi Unified Storage system and how to replace Hitachi Unified Storage system controllers.

The following topics are covered in this chapter:

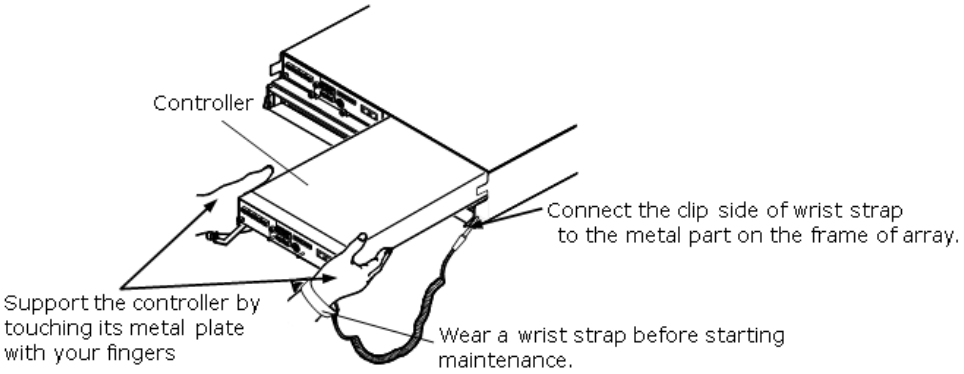
- Precautions when adding or replacing a controller
- Adding a controller to a single-controller CBXSS/CBXSL
- Replacing the controller in CBXSS/CBXSL/CBSS/CBSL Controller Boxes
- Replacing the controller in a CBL Controller Box
- Confirming and setting the date and time

NOTE: This chapter assumes you have read the electrostatic guidelines and other information in Chapter 3, Procedures before and after replacing components. If you have not, review this information and then return to this chapter.

Precautions when adding or replacing a controller

Observe the following guidelines when adding or replacing a controller.

- Avoid touching heat sinks or integrated circuits to avoid getting burned. Handle all components with care.
- A controller can be replaced while the storage system is turned on. If you will be replacing both controllers in a storage system, visit the HDS Support Portal at portal.hds.com.
- To avoid electrostatic damage to the controller, wear a grounded wrist strap any time you handle a controller. To discharge static electricity, touch the metal plate on the controller.



- Avoid touching heat sinks and integrated circuits. Otherwise, you could burn yourself.
- Do not install or replace a controller if the orange **WARNING** LED on the front of the Controller Box blinks rapidly. This indicates that flash is being updated or internal processing is occurring after a storage system with a single controller has been turned on. Install or replace the controller after the orange **WARNING** LED on the front of the Controller Box goes OFF and the green **READY** LED goes ON (this can take up to 85 minutes).
- If replacing a faulty controller, block the faulty controller to place it out of service before replacing it.
- Complete the controller replacement within 10 minutes. Otherwise, an abnormal rise in temperature can power off the storage system.
- If you replace a controller while the storage system is formatting a volume, the time it takes to restore the new controller might be delayed until the volume-formatting operation completes.
- If the **ALM** LED on the controller is ON while the **ALM** LED of the Fan Module is ON, resolve the problem with the controller before resolving the problem with the Fan Module.
- For storage systems that have the Power Saving/Power Saving Plus option, removing and inserting a controller during drive spin-up might prevent the controller from recovering fully. If this occurs, wait for all the drives to spin up, and then remove the controller from the storage system, wait at least 30 seconds, and reinsert it.
- Store the collected simple trace information on CD-R (see Collecting trace information on page 3-13).

Adding a controller to a single-controller CBXSS/CBXSL

This section describes how to add a second controller to CBXSS and CBXSL storage systems equipped with a single controller. See Figure 8-1 and Figure 8-2 as you perform this procedure.

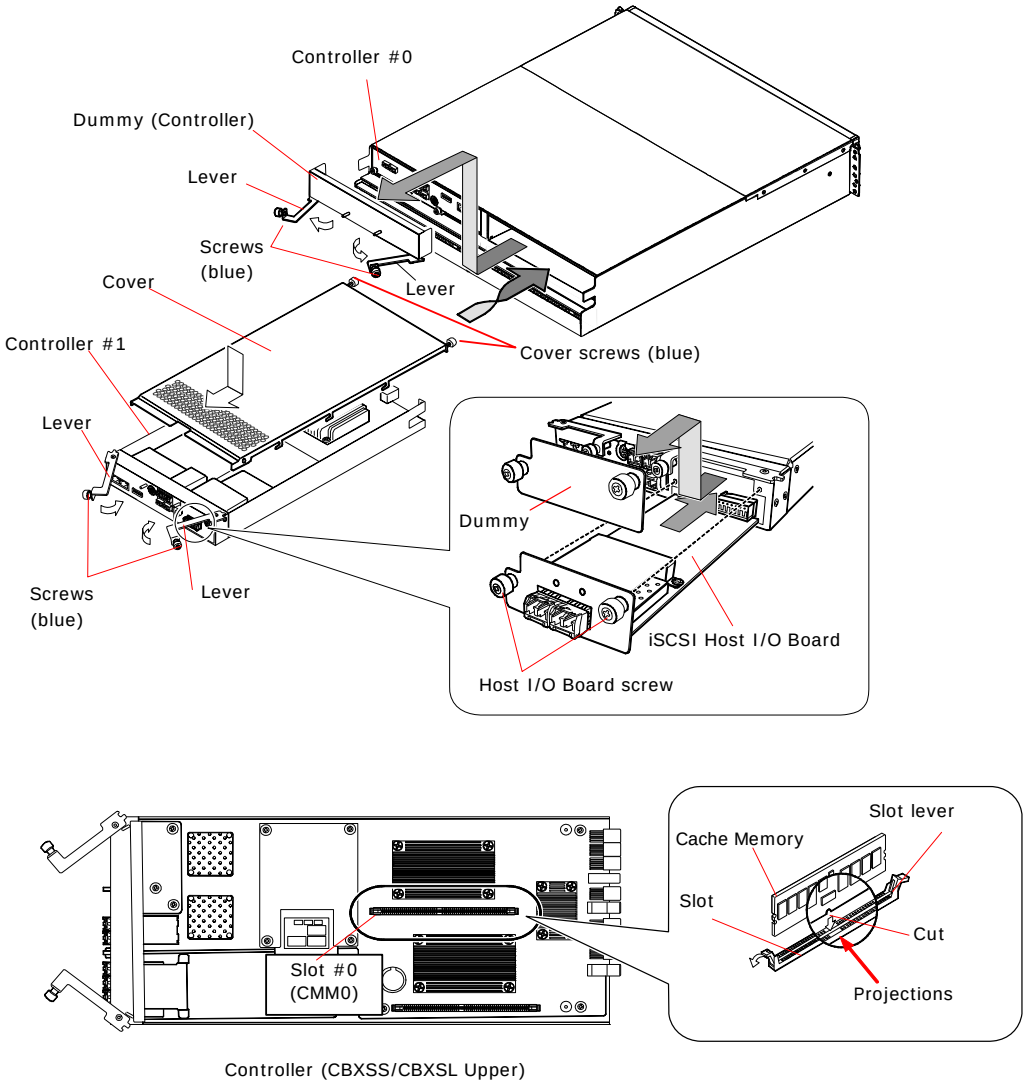


Figure 8-1: Adding a Controller

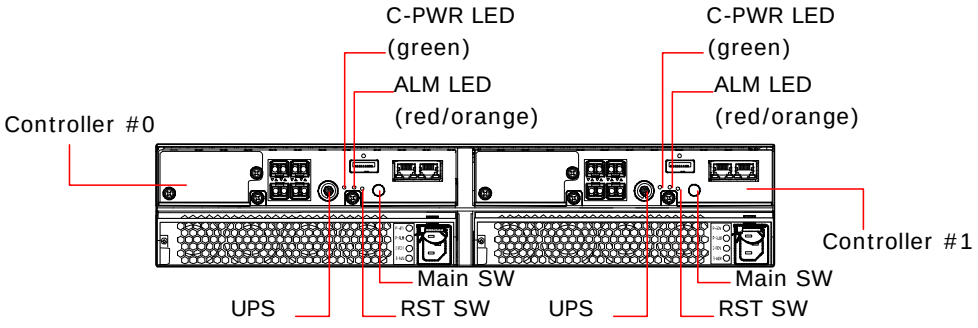


Figure 8-2: LEDs on the CBXSS/CBXSL Controllers

1. Collect a Simple Trace of the following information (all configuration information is retained when adding controllers). For more information, see Collecting trace information on page 3-13.
   - Host Group Information/Target Information
   - Host Group Option/Target Option
   - Mapping Information
   - Fibre Channel Information Port Setting Information/iSCSI port setting information
   - CHAP security information (iSCSI)
2. Press the main switch on Controller #0 for at least three seconds. The controller's green **C-PWR** LED blinks for three seconds and then goes ON.
3. Confirm that the **POWER** LED on the front bezel changes from green to orange (this can take up to up to 10 minutes). If you cannot turn off the power, visit the HDS Support Portal at portal.hds.com.

NOTE: If the controller's green **C-PWR** LED blinks quickly, it indicates that contents of cache memory are being written to a drive. Wait for the **C-PWR** LED to go OFF before proceeding.

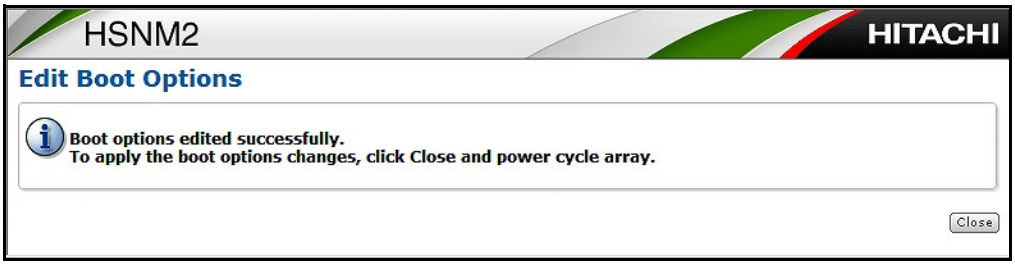
4. Remove the power cables from the two Power Units. Otherwise, the storage system will not recover properly after you add the controller.
5. Remove the mock ("dummy") controller.
6. Loosen the blue right and left screws that secure the dummy controller, open the lever toward you and remove the dummy controller.
7. Configure the new controller (Controller #1) to match the configuration of the existing controller (Controller #0).
   a. Install cache memory in Controller #1.
   - Orient the controller with its module-revision label facing down.
   - Loosen the two blue screws from the rear of the controller.
   - Remove the cover by sliding it in the direction shown by the arrow (⟶).

   b. If the iSCSI Host I/O Board is installed in the Controller #0, install the iSCSI Host I/O Board in the Controller #1.
   - Loosen the two screws securing the dummy iSCSI Host I/O Board and remove the dummy board.
   - Insert and push the iSCSI Host I/O Board into the slot in Controller #1.
   - Tighten the two screws to secure the iSCSI Host I/O Board.
8. Orient Controller #1 with its module-revision label facing up. Then insert and push Controller #1 all the way into the controller slot in the storage system, with its right and left levers completely open.

NOTE: When inserting the controller, be carefully not to catch a SAS (ENC) cable.

9. Close the levers, and then tighten the right and left blue screws to secure Controller #1.
10. Connect the interface cables, LAN cables, or the SAS (ENC) cables to the controller.
    - When bending a SAS (ENC) cable for connection, bend the cable with a long curve (not less than 30 mm) to avoid stress to the cable and connector.
    - When connecting Fibre Channel interface cables, insert the cables until they are securely attached to the host connectors. If the cables are inserted halfway into the host connectors, the controller will detect the Fibre Channel failures, and I/O processing can deteriorate.
11. Connect the power cables to the Power Units.
12. Press the main switch on Controller #0 for at least one second.
13. Confirm that the green **READY** LED on the front of the Controller Box goes ON.
14. Connect a personal computer running Hitachi Storage Navigator Modular 2 to the LAN maintenance port on Controller #0 using a crossover Ethernet LAN cable.
15. Set the **System Startup Attribute** of **Boot Options** to **Dual Active Mode**. When the following page appears, check the check box and click **Confirm**.

16. At the next page, click **Close**.



17. Turn off the main switch.
18. Press the main switch on Controller #0 for at least three seconds. The controller's green **C-PWR** LED blinks for three seconds, and then goes ON.
19. Confirm that the **POWER** LED on the front bezel changes from green to orange. If you cannot turn off the power, visit the HDS Support Portal at portal.hds.com.

20. Wait more than one minute, and then turn on the main switch.
21. Confirm that the green **READY** LED on the front of the Controller Box goes ON.
22. Remove the crossover cable from Controller #0 and connect it to the LAN maintenance port for Controller #1.
23. Register the IP address for Controller #1 in the array after deleting the target array in which the Hitachi Storage Navigator Modular 2 is registered (refer to the configuration chapter in the *Hitachi Unified Storage Hardware Installation and Configuration Guide*).
24. Reset the configuration for Controller #1.
25. Configure the dual controller for Controller #1 (refer to *Hitachi Unified Storage Hardware Installation and Configuration Guide*).
26. Press the main switch on Controller #0 or Controller #1 for at least three seconds.
27. Confirm that the **POWER** LED on the front bezel changes from green to orange. If you cannot turn off the power, visit the HDS Support Portal at portal.hds.com.
28. Remove the LAN crossover cable from Controller #1.
29. Press the main switch on Controller #0 or Controller #1 for at least one second.
30. Confirm that the green **READY** LED on the front of the Controller Box goes ON.

Replacing the controller in CBXSS/CBXSL/CBSS/CBSL Controller Boxes

To replace a controller in CBXSS/CBXSL/CBSS/CBSL Controller Boxes, perform the following steps:

1. Remove the faulty controller from the storage system.
2. Remove the cache memory and Host I/O Board from the faulty controller.
3. Install the cache memory and Host I/O Board on the replacement controller.
4. Install the new controller into the storage system.

Removing the faulty controller

To remove the faulty controller from the storage system:

1. Be sure the red **ALM** LED is ON at the controller to be replaced.
2. Loosen the right and left blue screws.
3. Open the right and left levers forward. When the levers are opened completely, the controller can be removed.
4. Remove all the cables connected to the controller. If the Drive Box is connected, remove the SAS (ENC) cable.

NOTE: If the cable cannot be removed easily, do not pull it by force. Otherwise, you can damage the cable. When removing Fibre Channel Interface cables, pull out the cables completely from the host connectors. If the Fibre Channel Interface cables are inserted halfway into the host connectors, the controller continues to detect Fibre Channel failures and I/O processing can deteriorate.

5. Slide the controller forward and then remove it.
6. Place the old controller on a flat surface with its safety label facing up, and remove the six screws that secure the cover to the controller. Remove the cover by sliding it in the direction shown by the arrow (⟶).

Removing cache memory and Host I/O Board from the old controller

Use the following procedure to remove the cache memory and Host I/O Board from the controller you removed (and see Figure 8-3 on page 8-9):

1. Orient the controller so its safety label faces up. Then loosen the two blue screws at the rear of the controller and slide the cover in the direction shown by the arrow (⟶) and remove it.
2. Before removing the cache memory, record the slots where it is installed, as you will need to install the same modules in the equivalent slots in the new controller.
3. Push the slot levers that secure the cache memory.

4. Hold both ends of the cache memory and gently pull up at both ends to remove the cache memory from the slots. Place the cache memory in a temporary location where anti-static measures are observed.
5. Loosen the two blue screws that secure the Host I/O Board, then hold the screws as you pull out and remove the Host I/O Board. Place the old controller in a location where anti-static measures are observed.

Installing the cache memory and Host I/O Board on the new controller

After removing the cache memory and Host I/O Board from the old controller, install them on the replacement controller.

1. Orient the new controller so its module-revision label faces down. Then loosen the two blue screws at the rear of the controller and slide the cover in the direction shown by the arrow (⟶) and remove it
2. Using both hands, hold the cache memory you removed from the old controller and insert it into the new controller. Insert the modules into the same slots where they were installed in the controller you removed. Align the projection inside the slot with the cut on the cache memory, and then gently push the cache memory into the slot until the slot levers close completely.
3. Insert the Host I/O Board you removed into the slot of the new controller and gently push. Tighten the two blue screws to secure the Host I/O Board.
4. Slide the cover to attach it and then tighten the two blue screws at the rear of the controller to secure.

Installing the new controller

Confirm that at least 30 seconds have elapsed since you removed the old controller. Then install the new controller into the storage system; otherwise, the new controller might not recover. Ignore the red **ALM** LED if it is ON after you insert the new controller; it will go OFF after the controller recovers.

1. If the rear of the new controller has a connector cover installed, remove the connector cover.
2. With its module-revision label facing up, insert and push the new controller all the way into the slot, with its right and left levers opened completely.
3. Push the levers at the same time in the direction shown by the arrows (⟵) at the same time. Otherwise, the controller might not recover and you will have to repeat the replacement procedure.

NOTE: When inserting the controller, do not catch the controller on a SAS (ENC) cable.

4. Close the levers, and tighten the right and left blue screws to secure the controller.
5. Connect all the cables you removed, including the SAS (ENC) cable if you removed it from the Drive Box.

NOTE: When connecting Fibre Channel interface cables, insert the cables until they are securely connected to the host connectors. If the Fibre Channel interface cables are inserted half way into the host connectors, the controller detects Fibre Channel failures and I/O processing can deteriorate

6. Confirm that the green **READY** LED on the front of the Controller Box is ON. This LED might blink quickly for 30-to-50 minutes before it goes ON.
7. In Hitachi Storage Navigator Modular 2, check the recovery after replacing components (see Checking recovery after replacing components on page 3-14).
8. Check the system date and time (see Confirming and setting the date and time on page 8-14).

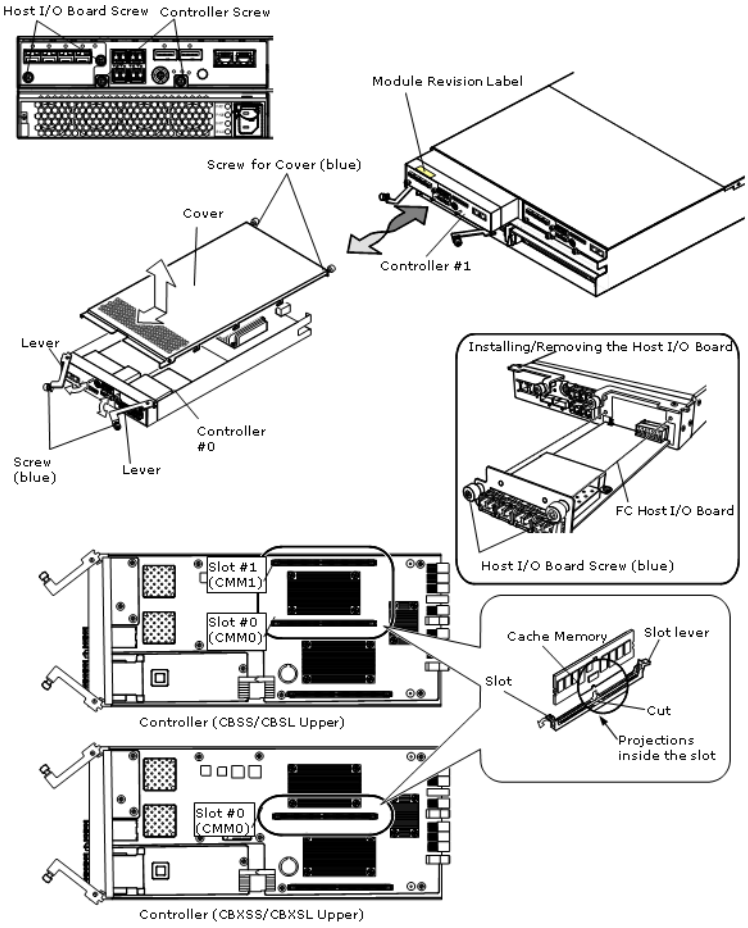


Figure 8-3: Replacing a controller on a CBXSS/CBXSL/CBSS/CBSL

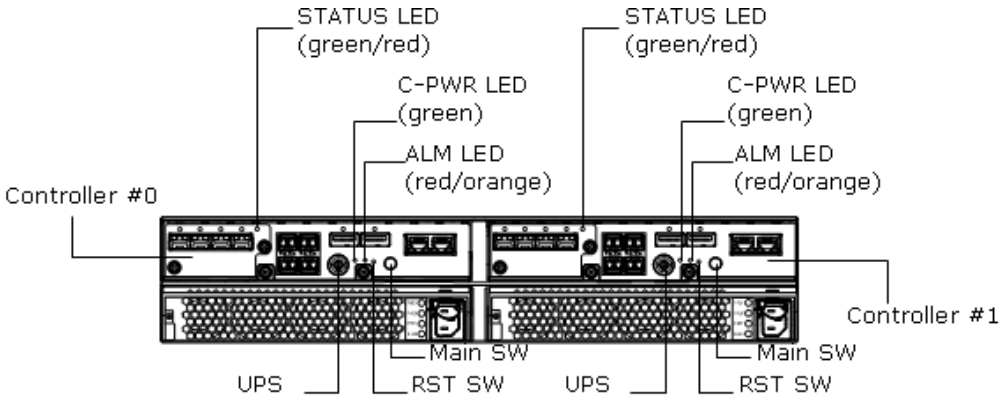


Figure 8-4: Controller LEDs on a CBXSS/CBXSL/CBSS/CBSL

Replacing the controller in a CBL Controller Box

To replace a controller in CBL Controller Boxes, perform the following steps:

1. Remove the faulty controller from the storage system.
2. Remove all fan modules from the faulty controller.
3. Remove the cache memory from the faulty controller.
4. Install the cache memory on the replacement controller.
5. Install the new controller into the storage system.

Removing the faulty controller

To remove the faulty controller:

1. Slide the right and left blue latches, and then open the levers forward.
2. Open the right and left levers forward. When the levers are completely open, the controller can be removed by sliding it forward.

CAUTION! To avoid getting burned, do not touch heat sinks or integrated circuits. Handle component with care.

3. Slide the controller forward and remove it.
4. Remove all the components from the controller to be replaced and install them on the new Controller.

Removing the fan modules from the faulty controller

To remove all fan modules from the controller:

1. Loosen the blue screw that secures the fan module, slide the latch up, and then pull out and remove the fan module.
2. Take the fan modules you removed and insert them in the new controller. Install the fan modules in the same location where they were installed in the faulty controller.

3. After inserting the fan module into the slot, tighten the blue screw to secure the fan module.

Removing cache memory from the faulty controller

To remove the cache memory from the faulty controller:

1. Before removing the cache memory, record the slots where it is installed, as you will need to install the same modules in the equivalent slots in the new controller.
2. Push the slot levers that secure the cache memory.
3. Using both hands, gently pull up the cache memory and remove it.
4. Place the cache memory in a temporary location where anti-static measures are observed.

Installing the cache memory on the new controller

After removing the cache memory from the old controller, install it on the replacement controller.

1. Using both hands, hold the cache memory you removed from the old controller and insert it into the new controller. Insert the modules into the same slots where they were installed in the controller you removed.
2. Align the projection inside the slot with the cut on the cache memory, and then gently push the cache memory into the slot until the slot levers close completely.

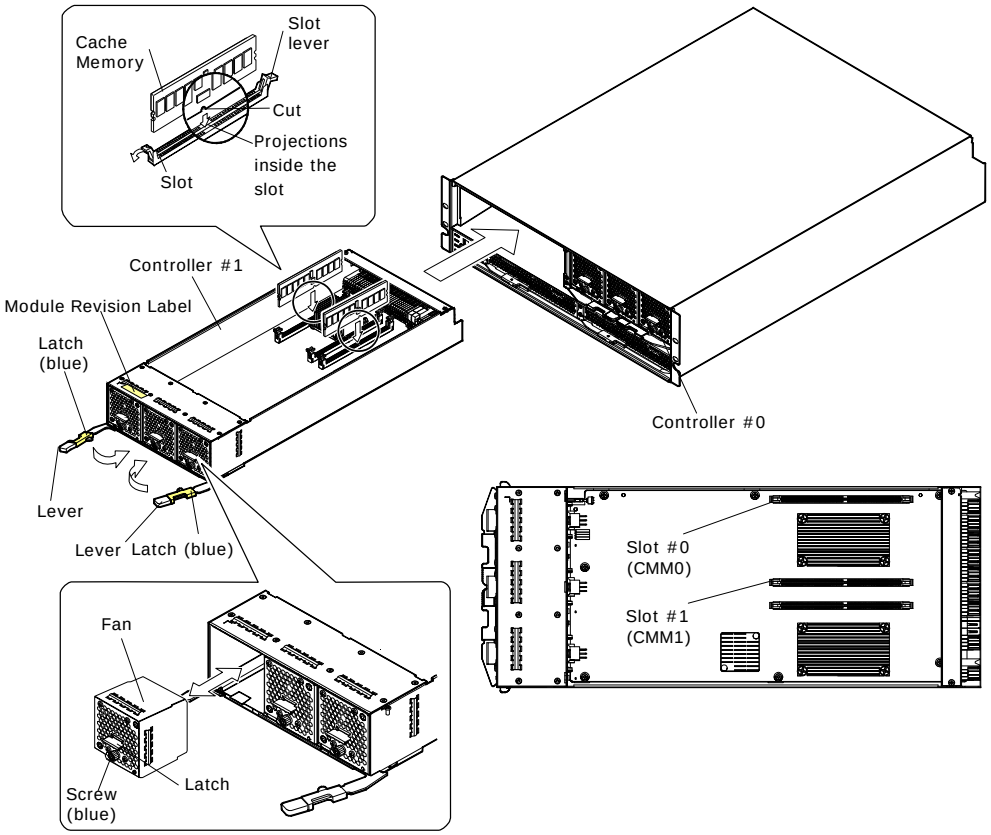


Figure 8-5: Installing cache memory on a CBL

Installing the new controller

Confirm that at least 30 seconds have elapsed since you removed the old controller. Then install the new controller into the storage system; otherwise, the new controller might not recover. Ignore the red **ALM** LED if it is ON after you insert the new controller; it will go OFF after the controller recovers.

1. Push the controller all the way into the slot, with its right and left levers open completely.
2. Push the levers at the same time in the direction shown by the arrows (←—) at the same time. Otherwise, the controller might not recover and you will have to repeat the replacement procedure.
3. Close the levers and slide the right and left blue latches to secure the controller.
4. Be sure the orange **WARNING** LED on the front bezel is OFF. The controller usually recovers in about three minutes; however, if I/O from the host computer is high, it might take about 30 minutes to recover. If this LED blinks slowly, visit the HDS Support Portal at portal.hds.com.
5. Confirm that the green **READY** LED on the front of the controller is ON. This LED might blink quickly for 40-to-60 minutes or 80-to-180 minutes when the DBW is connected to the CBL before the LED goes ON.

6. In Storage Navigator Modular 2, check the recovery after replacing components (see Checking recovery after replacing components on page 3-14).
7. Check the system date and time (see Confirming and setting the date and time on page 8-14).

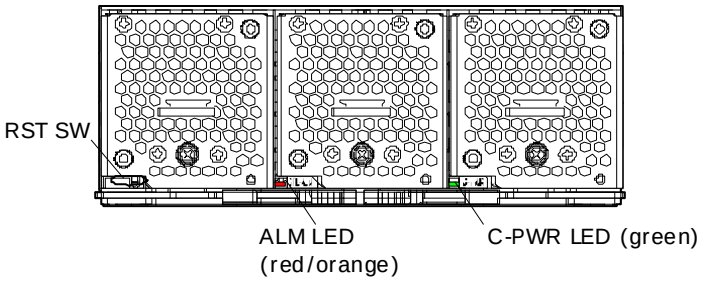
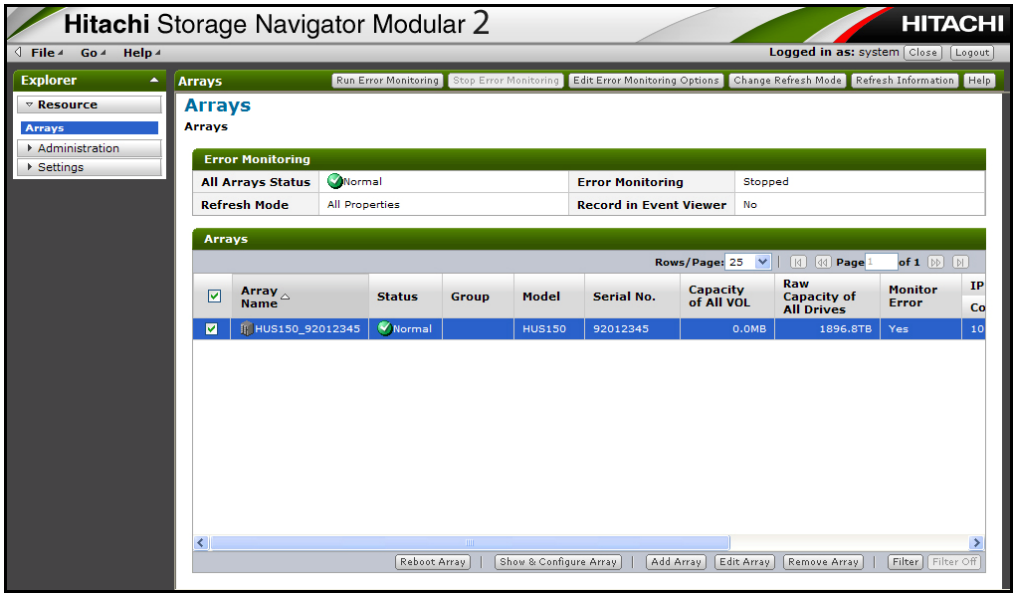


Figure 8-6: Controller LEDs on a CBL

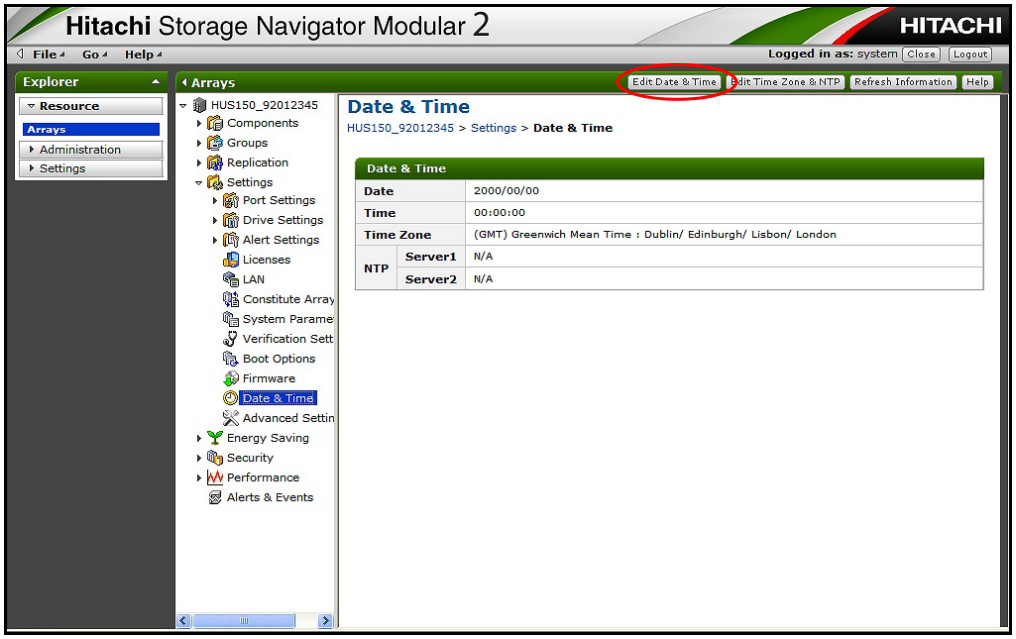
Confirming and setting the date and time

After you replace a controller, use Storage Navigator Modular 2 to check the system date and time. If the date and time are not accurate, set them appropriately.

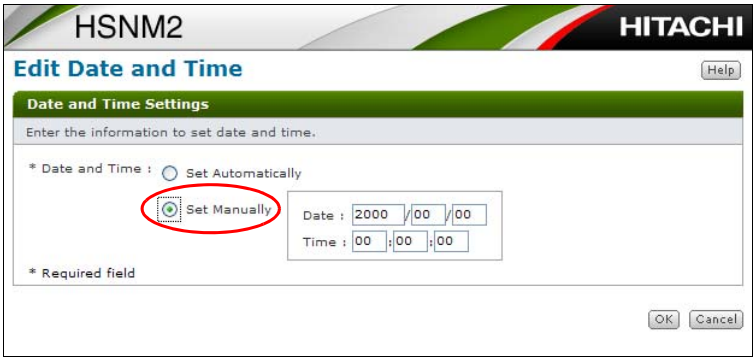
1. Start and log in to Storage Navigator Modular 2.
2. In the center pane, click the storage system array.



3. In the center pane, click **Settings > Date & Time**.



4. At the top right side of the Date & Time window, click the **Edit Date & Time** button.
5. When the Edit Date and Time window appears, click **Set Manually**, enter the current date and time in their respective fields, and then click the **OK** button.



6. When the completion message appears, click **Close**.

9

Replacing cache memory

This chapter describes how to replace cache memory on Hitachi Unified Storage system controllers.

The following topics are covered in this chapter:

- Precautions when replacing cache memory
- Replacing cache on CBXSS/CBXSL/CBSS/CBSL Controller Boxes
- Replacing cache memory on a CBL Controller Box

NOTE: This chapter assumes you have read the electrostatic guidelines and other information in Chapter 3, Procedures before and after replacing components. If you have not, review this information and then return to this chapter.

Precautions when replacing cache memory

Observe the following guidelines when replacing cache memory.

- The CBXSS/CBXSL/CBXX/CBSL and CBL use different cache memory modules. When replacing cache memory, be sure to use the appropriate module for the Hitachi Unified Storage system.
- Insert the new cache memory in the slot number appropriate for the cache memory being replaced.
- Complete the cache replacement within 10 minutes. Otherwise, an abnormal rise in temperature can power off the storage system.
- To replace cache memory, you must remove the controller where the faulty cache memory is installed. Before removing the controller, bock it to place it out of service.
- When replacing cache memory, the new cache memory must be the same capacity as the cache memory being replaced.
- If you replace a controller while the storage system is formatting a volume, the time it takes to restore the new controller might be delayed until the volume-formatting operation completes.
- To replace cache, you must remove the storage system controller. For storage systems that have the Power Saving/Power Saving Plus option, removing and inserting a controller during drive spin-up might prevent the controller from recovering fully. If this occurs, wait for all the drives to spin up, and then remove the controller from the storage system, wait at least 30 seconds, and reinsert it.

NOTE: You cannot replace two cache backup batteries on the CBSL/CBSS/CBXSL/CBXSS at the same time when the storage system is powered on (Ready status). You can replace two cache backup batteries on the CBL while the storage system is operating; however, the cache switches to write-through mode and read/write performance degrades slightly.

Replacing cache on CBXSS/CBXSL/CBSS/CBSL Controller Boxes

To replace cache on CBXSS/CBXSL/CBSS/CBSL Controller Boxes:

1. Be sure the red **ALM** LED is ON at the controller whose cache memory you want to replace. If it is not ON, visit the HDS Support Portal at portal.hds.com.
2. Loosen the right and left blue screws.
3. Open the right and left levers forward.
4. Remove all the cables connected to the controller. If the Drive Box is connected, remove the SAS (ENC) cable.

NOTE: If the cable cannot be removed easily, do not pull it by force. Otherwise, you can damage the cable. When removing Fibre Channel Interface cables, pull out the cables completely from the host connectors. If the Fibre Channel Interface cables are inserted halfway into the host connectors, the controller continues to detect Fibre Channel failures and I/O processing can deteriorate.

5. Slide the controller forward and then remove it.
6. Place the old controller on a flat surface with its module-revision label facing down. Loosen the two blue screws at the rear of the controller and then slide the cover in the direction shown by the arrow (⟶).
7. Before removing the cache memory, record the slots where it is installed, its capacity, and its model name.
8. Push the slot levers securing the cache memory, then hold both ends of the cache memory and gently pull up at both ends to remove the cache memory.
9. Using both hands, hold the new cache memory and insert the modules into the same slots where the old cache memory was installed, according to the slot information you recorded earlier. Align the projection inside the slot with the cut on the cache memory, and then gently push the cache memory into the slot until the slot levers close completely.
10. Slide and install the cover of the controller, then secure using the two blue screws at the rear of the controller.
11. If you removed the SAS (ENC) cable earlier, connect it to the new controller.
12. Wait at least 30 seconds.

NOTE: If you do not wait at least 30 seconds, the controller might not recover normally. If you fail to wait at least 30 seconds and the controller does not recover, perform this replacement procedure again.

13. With its module-revision label facing up, insert and push the controller all the way into the slot, with its right and left levers opened completely.

When installing the controller, do not catch it on a SAS (ENC) cable and ignore the red **ALM** LED if it is ON; the LED will go OFF after the controller recovers.

14. Push the levers at the same time in the direction shown by the arrows (⟵) at the same time. Otherwise, the controller might not recover and you will have to repeat the replacement procedure
15. Close the levers and slide the right and left blue latches to secure the controller.
16. Replace all of the cables you removed from the controller.

NOTE: When connecting the Fibre Channel interface cables, insert the cables until they are secure with the host connectors. If the cables are inserted half into the host connectors, the controller continues to detect the Fibre Channel failures and I/O processing may deteriorate.

17. Confirm the status of the following LEDs:
    - Red **ALM** LED on the controller is OFF.
    - Orange **WARNING** LED on the front bezel is OFF. If this LED blinks slowly, visit the HDS Support Portal at portal.hds.com.
    - Green **READY** LED on the front of the Controller Box is ON. This LED may blink rapidly for up to 50 minutes before going ON.

NOTE: The controller usually recovers in about three minutes; however, if I/O from the host is high, it may take up to 30 minutes to recover.

18. In Hitachi Storage Navigator Modular 2, check the recovery after replacing components (see Checking recovery after replacing components on page 3-14).

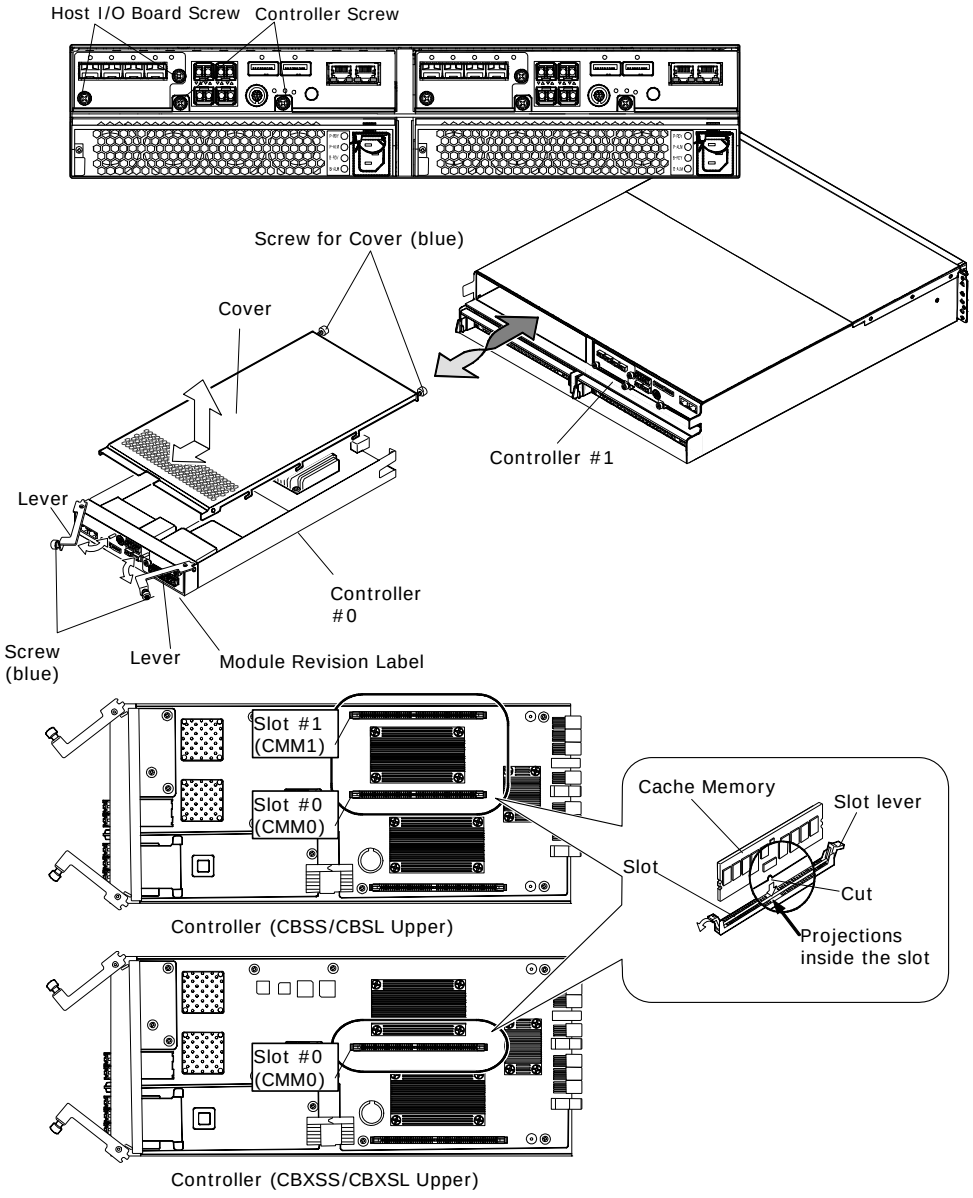


Figure 9-1: Replacing cache memory in a CBXSS/CBXSL/CBSS/CBSL

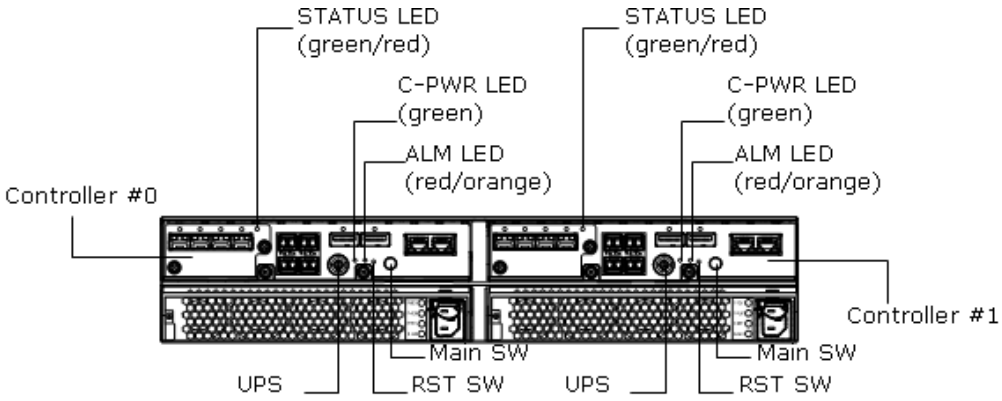


Figure 9-2: Controller LEDs on a CBXSS/CBXSL/CBSS/CBSL

Replacing cache memory on a CBL Controller Box

To replace cache memory on CBL Controller Boxes:

1. Be sure the red **ALM** LED or orange **RST** LED is ON at the controller whose cache memory you want to replace. If either LED is not ON, visit the HDS Support Portal at portal.hds.com.
2. Slide the right and left blue latches, and then open the levers forward. When the levers are opened completely, the controller can be removed.
3. Slide the controller forward and remove it.
4. Before removing the cache memory, record the slots where it is installed, its capacity, and its model name.
5. Push the slot levers that secure the cache memory.
6. Using both hands, gently pull up the cache memory and remove it.
7. Using both hands, hold the new cache memory and insert the modules into the same slots where the old cache memory was installed, according to the slot information you recorded earlier.
8. Align the projection inside the slot with the cut on the cache memory, and then gently push the cache memory into the slot until the slot levers close completely.

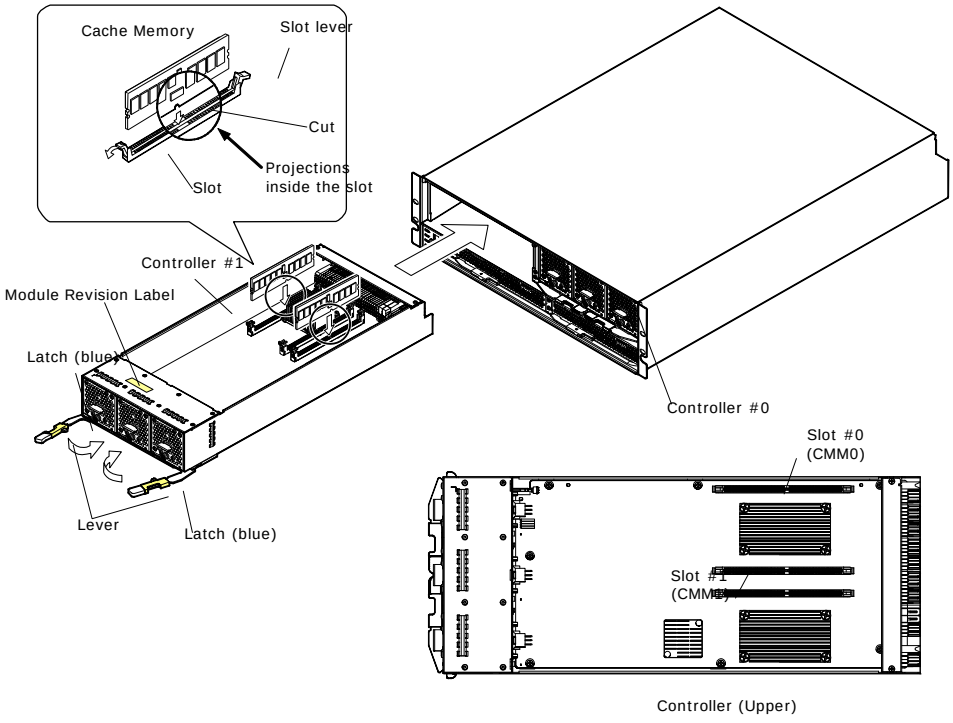


Figure 9-3: Installing cache memory on a CBL

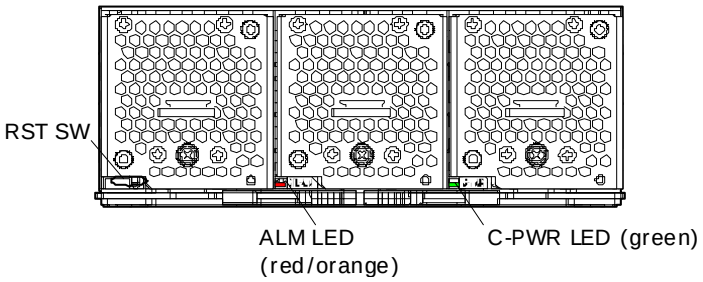


Figure 9-4: Controller LEDs on a CBL

9. Push the controller all the way into the slot, with its right and left levers open completely.
10. Push the levers at the same time in the direction shown by the arrows (⟵) at the same time. Otherwise, the controller might not recover and you will have to repeat the replacement procedure.
11. Close the levers and slide the right and left blue latches to secure the controller.
12. Replace all of the cables you removed from the controller.

NOTE: When connecting the Fibre Channel interface cables, insert the cables until they are secure with the host connectors. If the cables are inserted half into the host connectors, the controller continues to detect the Fibre Channel failures and I/O processing may deteriorate.

13. Confirm the status of the following LEDs:
    - Red **ALM** LED on the controller is OFF.
    - Orange **WARNING** LED on the front bezel is OFF. If this LED blinks slowly, visit the HDS Support Portal at portal.hds.com.
    - Green **READY** LED on the front of the Controller Box is ON. This LED might blink quickly for 40-to-60 minutes or 80-to-180 minutes when the DBW is connected to the CBL before the LED goes ON before the LED goes ON.

NOTE: The controller usually recovers in about three minutes; however, if I/O from the host is high, it may take up to 30 minutes to recover.

14. In Storage Navigator Modular 2, check the recovery after replacing components (see Checking recovery after replacing components on page 3-14).

10

Replacing a Host I/O Board or Host I/O Module

Hitachi Unified Storage systems support Host I/O Boards and Host I/O Module that contain ports that support Fibre Channel and iSCSI interfaces. This chapter describes how to replace Host I/O Boards and Host I/O Modules in Hitachi Unified Storage systems.

The following topics are covered in this chapter:

- Precautions when replacing a Host I/O Board or Module
- Replacing a Host I/O Board on CBXSS/CBXSL/CBSS/CBSL Controller Boxes
- Replacing a Host I/O Module on a CBL Controller Box

NOTE: This chapter assumes you have read the electrostatic guidelines and other information in Chapter 3, Procedures before and after replacing components. If you have not, review this information and then return to this chapter.

Precautions when replacing a Host I/O Board or Module

Observe the following guidelines when replacing a Host I/O Board or Host I/O Module.

- Collect simple trace and port information (see Collecting trace information on page 3-13).
- Confirm that the red **STATUS** LED on the Host I/O Board or Host I/O Module is ON. If it is not ON, visit the HDS Support Portal at portal.hds.com.
- Complete the replacement within 10 minutes. Otherwise, an abnormal rise in temperature can power off the storage system.
- Remove all interface cables connected to the Host I/O Board or Host I/O Module to be replaced.

NOTE: If the cable cannot be removed easily, do not pull it by force. Otherwise, you can damage the cable. When removing Fibre Channel Interface cables, pull out the cables completely from the host connectors. If the Fibre Channel Interface cables are inserted halfway into the host connectors, the controller continues to detect Fibre Channel failures and I/O processing can deteriorate.

Replacing a Host I/O Board on CBXSS/CBXSL/CBSS/CBSL Controller Boxes

To replace a Host I/O Board on CBXSS/CBXSL/CBSS/CBSL Controller Boxes:

1. Remove the host connector from the Host I/O Board to be removed.
2. Loosen the two blue screws that secure the Host I/O Board.
3. Pull out and remove the Host I/O Board.
4. Place the removed Host I/O Board and host connector in a temporary location where anti-static measures are observed.
5. Wait at least 30 seconds, and then install the new Host I/O Board. If you insert the Host I/O Board without waiting at least 30 seconds, the controller might not recover normally. If this occurs, remove the inserted Host I/O Board from the storage system, wait at least 30 seconds and then re-insert it into the storage system.

NOTE: Although the red **ALM** LED might be ON when you insert the Host I/O Board, it goes OFF after the controller recovers.

6. Remove the host connector on the new Host I/O Board.
7. Insert and push the new Host I/O Board into the slot on the controller.
8. Push the levers at the same time in the direction shown by the arrows (⟵) at the same time. Otherwise, the replacement part might not recover and you will have to repeat the replacement procedure.
9. Tighten the two blue screws to secure the Host I/O Board.
10. Install the host connector on the Host I/O Board.
11. Be sure the red **STATUS** LED on the Host I/O Module goes OFF and the orange **WARNING** LED on the front side of the Controller Box is OFF.
12. Be sure the orange **WARNING** LED on the front side of the Controller Box is OFF. If it blinks slowly, visit the HDS Support Portal at portal.hds.com. The controller usually recovers in about three minutes; however, if the I/O load from the host computer is high, it may take about 30 minutes to recover.
13. Connect all the cables you removed.

NOTE: When connecting Fibre Channel interface cables, insert the cables until they are securely connected to the host connectors. If the Fibre Channel interface cables are inserted half way into the host connectors, the controller detects Fibre Channel failures and I/O processing can deteriorate

14. Confirm that the green **READY** LED on the front of the Controller Box is ON. This LED might blink quickly for 30-to-50 minutes before it goes ON. If this LED blinks slowly, visit the HDS Support Portal at portal.hds.com.
15. In Hitachi Storage Navigator Modular 2, check the recovery after replacing components (see Checking recovery after replacing components on page 3-14).

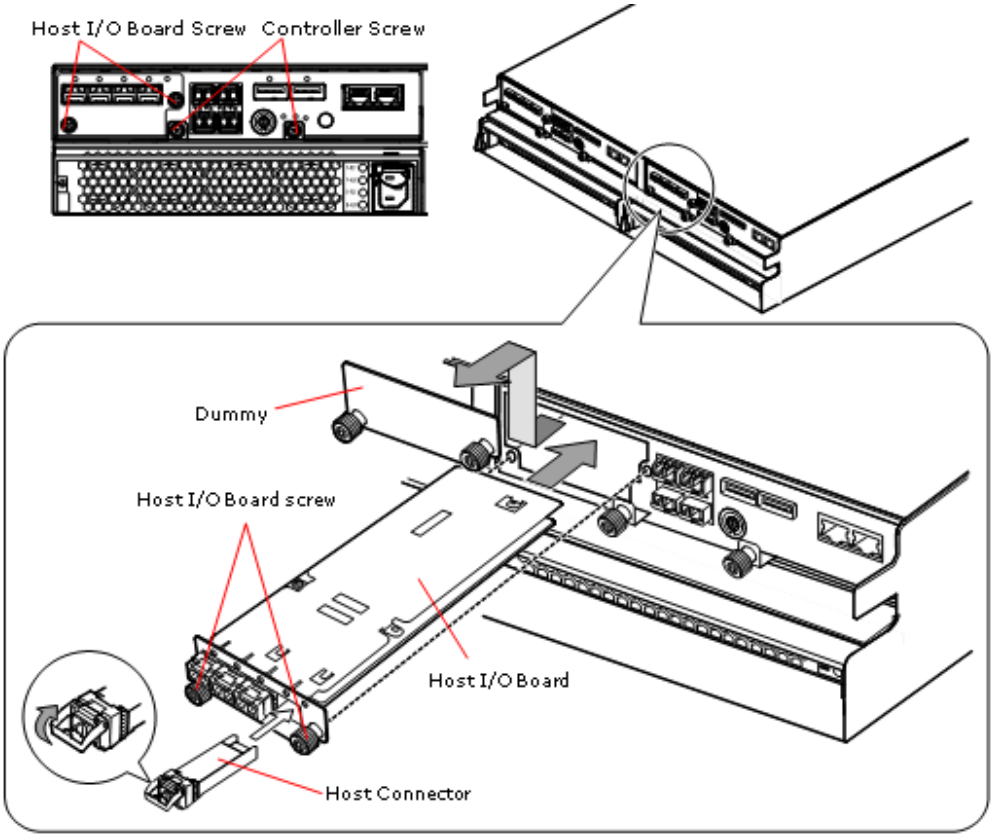


Figure 10-1: Replacing a Host I/O Board on a CBXSS/CBXSL/CBSS/CBSL

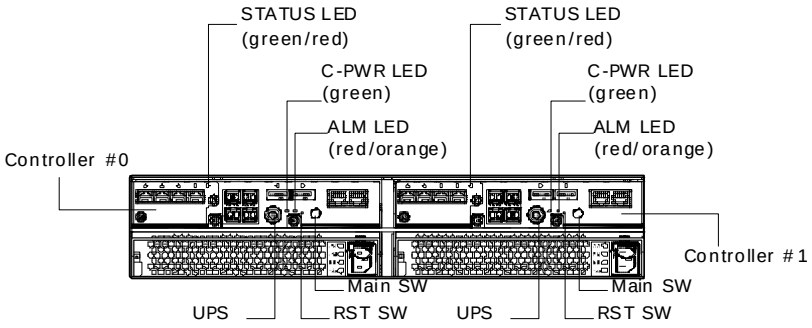


Figure 10-2: Controller LEDs on a CBXSS/CBXSL/CBSS/CBSL with a Fibre Channel Host I/O Board installed

Replacing a Host I/O Module on a CBL Controller Box

To replace a Host I/O Module on CBL Controller Boxes:

1. Loosen one blue screw that secures the Host I/O Module, and then pull the lever open. When the lever is opened completely, the Host I/O Module can be removed.
2. Pull out and remove the Host I/O Module.
3. Place the removed Host I/O Module in a temporary location where anti-static measures are observed.
4. Wait at least 30 seconds, and then install the new Host I/O Module. If you insert the Host I/O Module without waiting at least 30 seconds, the controller might not recover normally. If this occurs, remove the inserted Host I/O Module from the storage system, wait at least 30 seconds and then re-insert it into the storage system.
5. Push the Host I/O Module into the slot, with its levers opened completely.
6. Close the lever and tighten the blue screw you loosened earlier to secure the Host I/O Module.
7. Be sure the red **STATUS** LED on the Host I/O Module goes OFF and the orange **WARNING** LED on the front side of the Controller Box is OFF.
8. Be sure the orange **WARNING** LED on the front side of the Controller Box is OFF. If it blinks slowly, visit the HDS Support Portal at portal.hds.com. The controller usually recovers in about three minutes; however, if the I/O load from the host computer is high, it may take about 30 minutes to recover.
9. Connect all the cables you removed.

NOTE: When connecting Fibre Channel interface cables, insert the cables until they are securely connected to the host connectors. If the Fibre Channel interface cables are inserted half way into the host connectors, the controller detects Fibre Channel failures and I/O processing can deteriorate

10. Confirm that the green **READY** LED on the front of the Controller Box is ON. This LED might blink quickly for 40-to-60 minutes or 80-to-180 minutes when the DBW is connected to the CBL before the LED goes ON.
11. In Storage Navigator Modular 2, check the recovery after replacing components (see Checking recovery after replacing components on page 3-14).

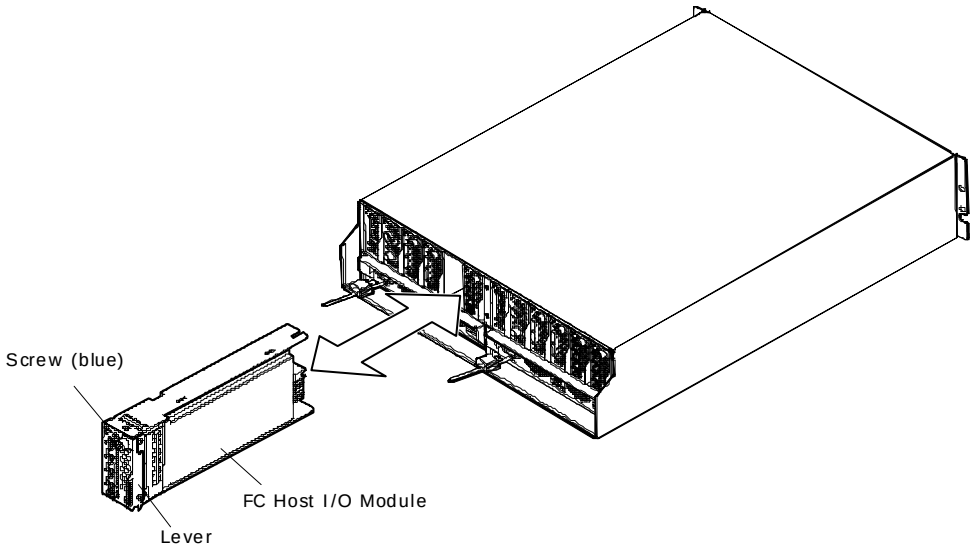


Figure 10-3: Replacing a Host I/O Module on a CBL

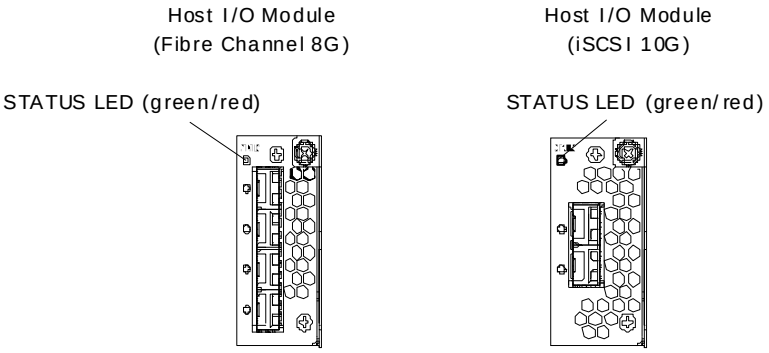


Figure 10-4: Host I/O Module LEDs on a CBL

11

Replacing the Host connector

This chapter describes how to replace a Host Connector on Hitachi Unified Storage systems.

The following topics are covered in this chapter:

- Precautions when replacing a Host Connector
- Replacing the Host Connector

NOTE: This chapter assumes you have read the electrostatic guidelines and other information in Chapter 3, Procedures before and after replacing components. If you have not, review this information and then return to this chapter.

Precautions when replacing a Host Connector

Observe the following guidelines when replacing a Fan Module.

- The Host Connector can be replaced with the storage system power turned on.
- If SNMP Agent Support is running on a storage system whose Host Connector will be replaced, an SNMP trap is sent if the Host Connector is blocked or removed.
- Hitachi Unified Storage systems support the following Host Connector interfaces:
  - Fibre Channel 8 G bps
  - iSCSI 10 Gb

  The replacement Host Connector must be the same type as the faulty one you remove. Be sure you do not replace the faulty Host Connector
- Do not replace the Host Connector during a firmware update. Before you attempt to replace the Host Connector, confirm in Hitachi Storage Navigator Modular 2 that the storage system firmware is not being updated.

Replacing the Host Connector

To replace the Host Connector:

1. Confirm that the red **HALM / HSTS** LED on the connector is ON. If it is not ON, visit the HDS Support Portal at portal.hds.com.
2. Remove the cables connected to the controller mounting the Host Connector to be replaced.

NOTE: If the cable cannot be removed easily, do not pull it by force. Otherwise, you can damage the cable.

3. Raise the level and remove the Host Connector. The direction in which the Host Connector is removed depends on the storage system. For the CBXSS/CBSS/CBXSL/CBSL, use the lever of the Host Connector for #0A, 1A, 0C, 1C located between the Power Unit lever and the storage system.
4. Wait at least 30 seconds. Otherwise, the new Host Connector may not recover. The new Host Connector must be the same type as the faulty one you removed
5. Orient the new Host Connector in the appropriate direction for installation. Then insert the new Host Connector.
6. Connect the cables.
7. On the CBXSS/CBSS/CBXSL/CBSL, check that the red **HALM** LED for ports #A, B, C, D goes OFF.
8. On the CBXSS/CBSS/CBXSL/CBSL or CBL, check that the red **HALM** LED or red **HSTS** LED for ports #E, F, G, H does not go ON.

9. In Storage Navigator Modular 2, check the recovery after replacing components (see Checking recovery after replacing components on page 3-14).

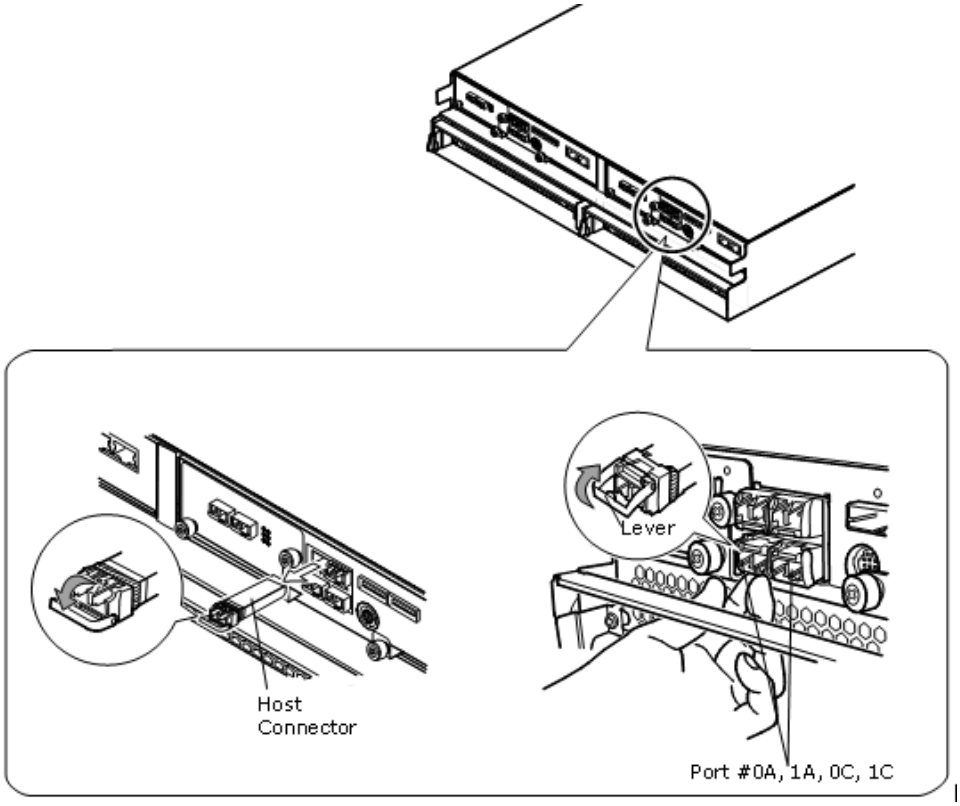


Figure 11-1: Replacing the Host Connector on a CBXSS/CBXSL/CBSS/CBSL

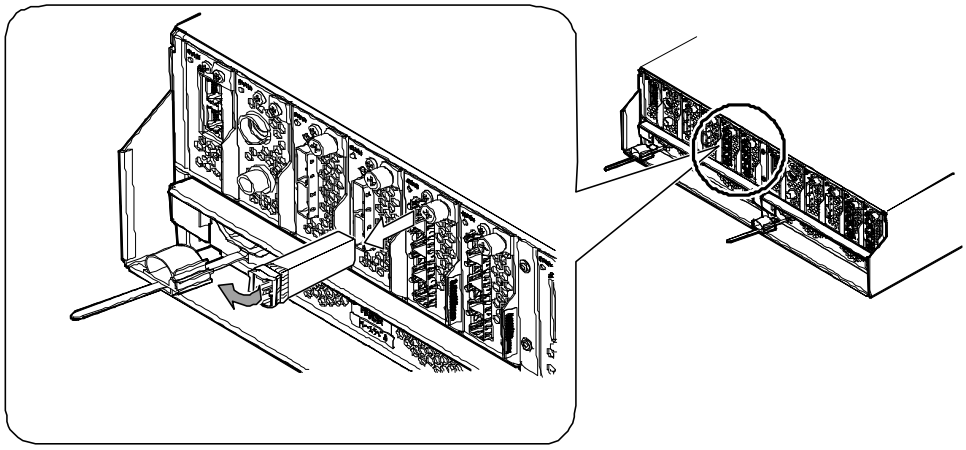


Figure 11-2: Replacing the Host Connector on a CBL

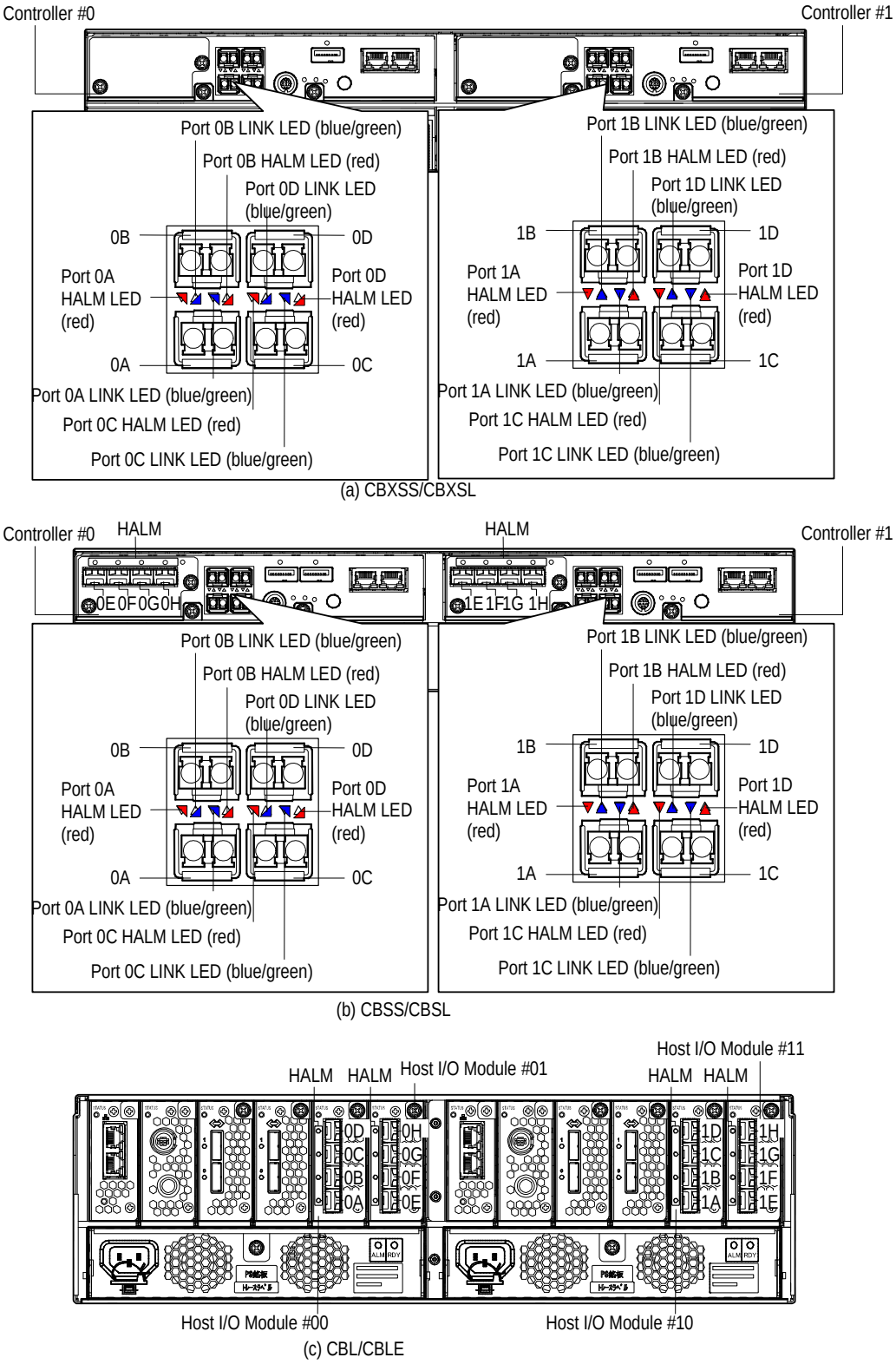


Figure 11-3: Port and HALM LEDs for Fibre Channel interface

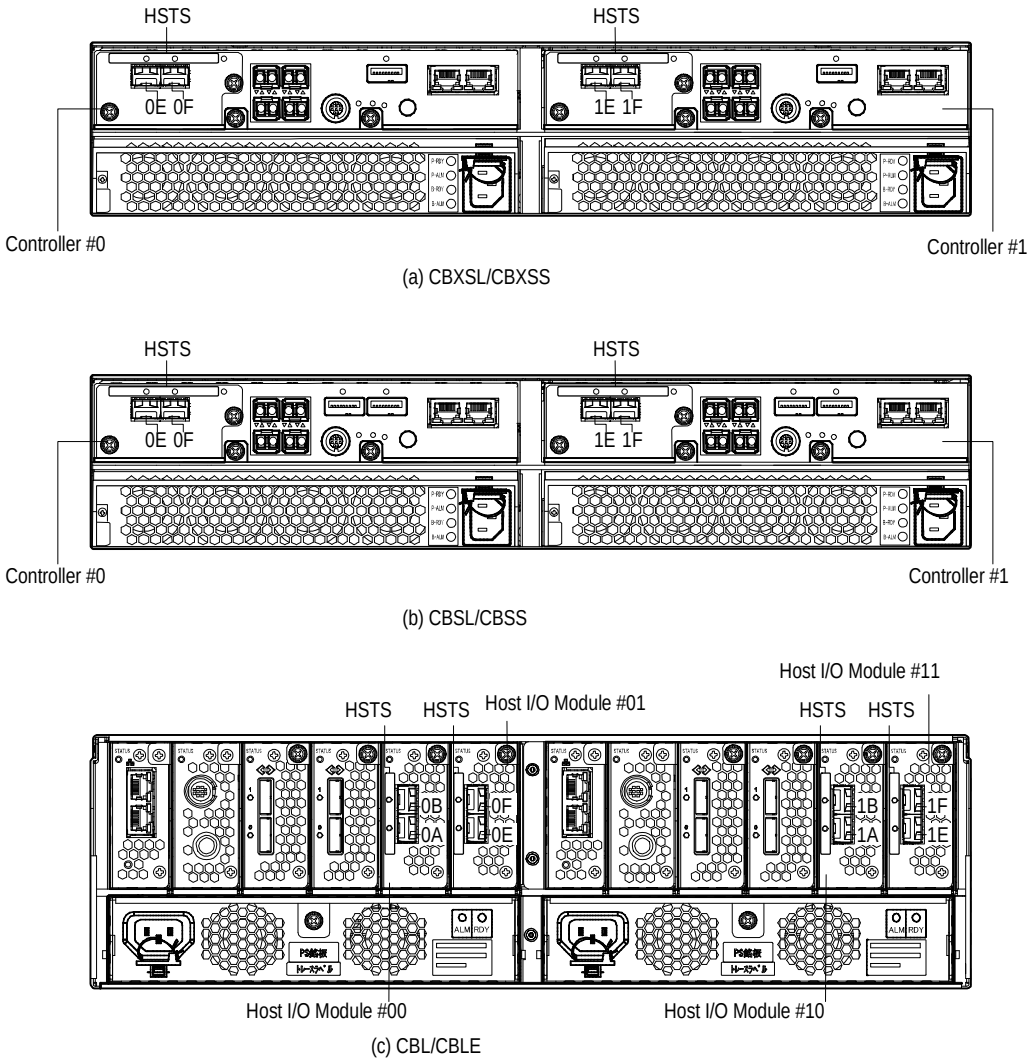


Figure 11-4: Port and HALM LEDs for 10 Gb iSCSI interface

12

Replacing the Drive I/O Module

CBL Controller Boxes have a Drive I/O Module. This chapter describes how to replace a Drive I/O Module in a CBL Controller Box on Hitachi Unified Storage system.

The following topics are covered in this chapter:

- Precautions when replacing the Drive I/O Module
- Replacing the Drive I/O Module on a CBL Controller Box

NOTE: This chapter assumes you have read the electrostatic guidelines and other information in Chapter 3, Procedures before and after replacing components. If you have not, review this information and then return to this chapter.

Precautions when replacing the Drive I/O Module

Observe the following guidelines when replacing a Drive I/O Module.

- Complete the Drive I/O Module replacement within 10 minutes. Otherwise, an abnormal rise in temperature can power off the storage system.
- Before replacing the Drive I/O Module, block the controller associated with the faulty Drive I/O Module.
- For storage systems that have the Power Saving/Power Saving Plus option, removing and inserting a controller during drive spin-up might prevent the controller from recovering fully. If this occurs, wait for all the drives to spin up, and then remove the controller from the storage system, wait at least 30 seconds, and reinsert it.
- System parameters are loaded onto the replacement controller automatically from the internal drive, obviating the need to configure settings manually.

Replacing the Drive I/O Module on a CBL Controller Box

To replace the Drive I/O Module on a CBL Controller Box:

1. Be sure the red **STATUS** LED on the Drive I/O Module is ON. If it is not ON, visit the HDS Support Portal at portal.hds.com.
2. Remove the SAS (ENC) cable connected to the Drive I/O Module to be replaced.

NOTE: If the cable cannot be removed easily, do not pull it by force. Otherwise, you can damage the cable.

3. Loosen one blue screw securing the Drive I/O Module, then open the lever toward you. When the lever is open, the Drive I/O Module can be removed.
4. Pull out and remove the Drive I/O Module. Place the module in a location where anti-static measures are observed.
5. Wait at least 30 seconds, and then install the new Drive I/O Module. Do not push the module in completely.

NOTE: If you insert the Drive I/O Module without waiting at least 30 seconds, the controller may not recover normally. If this occurs, remove the controller from the storage system, wait at least 30 seconds, and then re-insert the controller into the storage system.

6. Connect the SAS (ENC) cable you removed to the new Drive I/O Module.
7. Close the lever, and then push the Drive I/O Module all the way into the slot.
8. Tighten the Drive I/O Module using the blue screw you loosened earlier.

9. Be sure the red **STATUS** LED on the Drive I/O Module is OFF and the orange **WARNING** LED on the front side of the Controller Box is OFF. If the **WARNING** LED is blinking slowly, visit the HDS Support Portal at portal.hds.com.

NOTE: The controller usually recovers in about three minutes; however, if I/O from the host computer is high, it might take about 30 minutes to recover.

10. Connect the SAS (ENC) cables to the Drive I/O Module.
11. Check that the green **READY** LED on the front of the Controller Box is ON. The **READY** LED may blink quickly for 40-to-60 minutes or 80-to-180 minutes when the DBW is connected to the CBL before it goes ON.
12. In Hitachi Storage Navigator Modular 2, check the recovery after replacing components (see Checking recovery after replacing components on page 3-14).

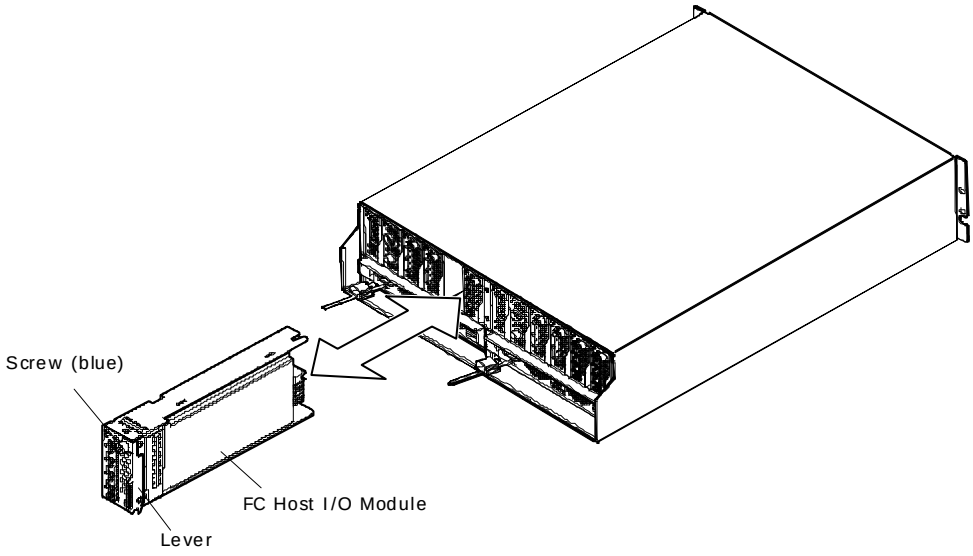


Figure 12-1: Replacing the Drive I/O Module

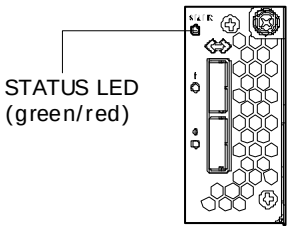


Figure 12-2: Status LED on the Drive I/O Module

13

Replacing the I/O Module (ENC)

DBL and DBS Drive Boxes have customer-replaceable I/O Module (ENC) components. This chapter describes how to replace an I/O Module (ENC) component on DBL and DBS Drive Boxes.

The following topics are covered in this chapter:

- Precautions when replacing the I/O Module (ENC)
- Replacing the I/O Module (ENC)

NOTE: This chapter assumes you have read the information in Chapter 3, Procedures before and after replacing components. If you have not, review this information and then return to this chapter.

Precautions when replacing the I/O Module (ENC)

Observe the following guidelines when replacing an I/O Module (ENC) component.

- Complete the I/O Module (ENC) component replacement within 10 minutes. Otherwise, a thermal alarm condition will stop the storage system from operating.
- When replacing an I/O Module (ENC) component, the storage system must be in the following condition:
  - Firmware is not being updated.
  - Controller is not being replaced.
  - Any part other than the I/O Module (ENC) is not being replaced.
- If two or more I/O Modules (ENCs) must be replaced on the same PATH:
  - First replace the Controller Box (controller for CBXSS/CBXSL/CBSS/CBSL, Drive I/O Module for CBL).
  - Then replace the I/O Module (ENC) for the Drive Box.
  - If replacing the I/O Module (ENC) for two or more Drive Boxes, replace the Drive Box whose the array number is smaller.

  If you encounter a problem with the CBL I/O module #0 (controller) and the Drive I/O module, replace the CBL I/O module first and then replace the Drive I/O module. If the problem persists after replacing the Drive I/O Module, replace the controller.

  If you encounter a problem with both the I/O Module (ENC) #1 in the first DBS/DBL (unit #0) connected to the CBL and controller #1 in the CBL, replace the I/O Module (ENC) #1 first and then replace the Drive I/O Module. If the problem persists after replacing the Drive I/O Module, replace the controller.
- If the battery system fails, recover the storage system from the battery system failure before replacing the I/O Module (ENC).
- Store the collected simple trace information on CD-R (see Collecting trace information on page 3-13).

Replacing the I/O Module (ENC)

To replace the I/O Module (ENC) on a DBL/DBS Drive Box:

1. Be sure the red **ALM** LED on the I/O Module (ENC) to be replaced is ON. If this LED is OFF, visit the HDS Support Portal at portal.hds.com.
2. Open the right and left levers toward you.
3. When the levers are open completely, the I/O Module (ENC) can be removed.
4. Remove the SAS (ENC) cable connected to the I/O Module (ENC) to be replaced.

NOTE: If the cable cannot be removed easily, do not pull it by force. Otherwise, you can damage the cable.

5. Hold the I/O Module (ENC) with both hands, and then pull it toward you.
6. Wait at least 30 seconds, and then insert a new I/O Module (ENC) until its right and left levers are slightly opened to the set position. Do not insert the I/O Module (ENC) completely. If the I/O Module (ENC) is inserted without waiting at least 30 seconds, the I/O Module (ENC) might not recover from the failure.

When installing the I/O Module (ENC), do not catch it on a SAS (ENC) cable.

7. Connect the SAS (ENC) cable to the new I/O Module (ENC).
8. Push the right and left levers toward the I/O Module (ENC) at the same time. Otherwise, the I/O Module (ENC) might not recover and you will have to repeat the replacement procedure
9. Confirm the status of the following LEDs:
   - Red **ALM** LED on the I/O Module (ENC) is OFF.
   - Green **READY** LED on the front of the Controller Box is ON. This LED might blink quickly for 30-to-50 minutes, 40-to-60 minutes for the CBL, or 80-to-180 minutes when the DBW is connected to the CBL before it goes ON.
   - Red **ALARM** LED and orange **WARNING** LED on the front of the Controller Box are OFF.

NOTE: If the Power Saving/Power Saving Plus function is enabled on the storage system, the orange **WARNING** LED might go ON or blink slowly during the ENC automatic download. If the **WARNING** LED is ON or blinks slowly after completing the ENC automatic download, visit the HDS Support Portal at portal.hds.com.

10. In Hitachi Storage Navigator Modular 2, check the recovery after replacing components (see Checking recovery after replacing components on page 3-14).

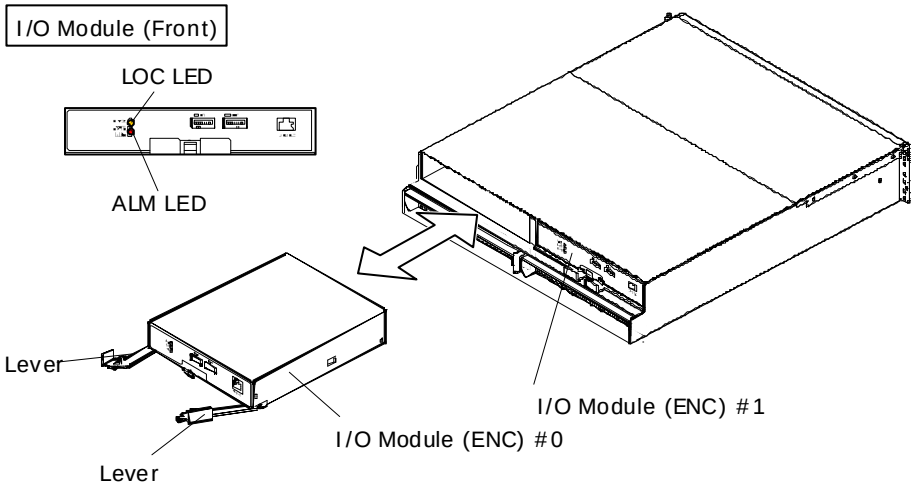


Figure 13-1: Replacing the I/O Module (ENC)

14

Replacing the SAS (ENC) cable

DBL and DBS Drive Boxes have a field-replaceable SAS (ENC) cable. This chapter describes how to replace an I/O Module (ENC) component on Hitachi Unified Storage systems.

The following topics are covered in this chapter:

- Precautions when replacing the SAS (ENC) cable
- Replacing the SAS (ENC) cable on a DBL/DBS Drive Box

NOTE: This chapter assumes you have read the information in Chapter 3, Procedures before and after replacing components. If you have not, review this information and then return to this chapter.

Precautions when replacing the SAS (ENC) cable

Observe the following guidelines when replacing a SAS (ENC) cable.

- When replacing a SAS (ENC) cable, the storage system must be in the following condition:
  - Firmware is not being updated.
  - Controller is not being replaced.
  - Any part other than the I/O Module (ENC) is not being replaced.
- If the system battery fails, recover the storage system from the battery system failure before replacing the SAS (ENC) cable.
- For storage systems that have the Power Saving/Power Saving Plus option, removing and inserting a SAS (ENC) cable during drive spin-up might prevent the controller from recovering fully. If this occurs, wait for all the drives to spin up, and then remove the SAS (ENC) cable from the storage system, wait at least 30 seconds, and reinsert it. Otherwise, you will have to repeat the replacement procedure.

Replacing the SAS (ENC) cable on a DBL/DBS Drive Box

To replace the SAS (ENC) cable on a DBL/DBS Drive Box:

1. Among the I/O Module (ENC) connected to the SAS (ENC) cables to be replaced, find the right and left levers of the I/O Module (ENC) with the largest array number. Then open the right and left levers of the I/O Module (ENC) toward you at the same time. When the lever is open completely, the I/O Module (ENC) can be removed.
2. Remove the SAS (ENC) cable while pulling the tab of the SAS (ENC) cable.

NOTE: If the cable cannot be removed easily, do not pull it by force. Otherwise, you can damage the cable.

3. Connect a new SAS (ENC) cable.
4. Wait at least 20, and then push the right and left levers in towards the I/O Module (ENC) completely at the same time. If you insert the I/O Module (ENC) without waiting at least 30 seconds, the I/O Module (ENC) might not recover from the failure and you will have to remove the I/O Nodule (ENC), wait at least 30 seconds, and then reinsert the module.

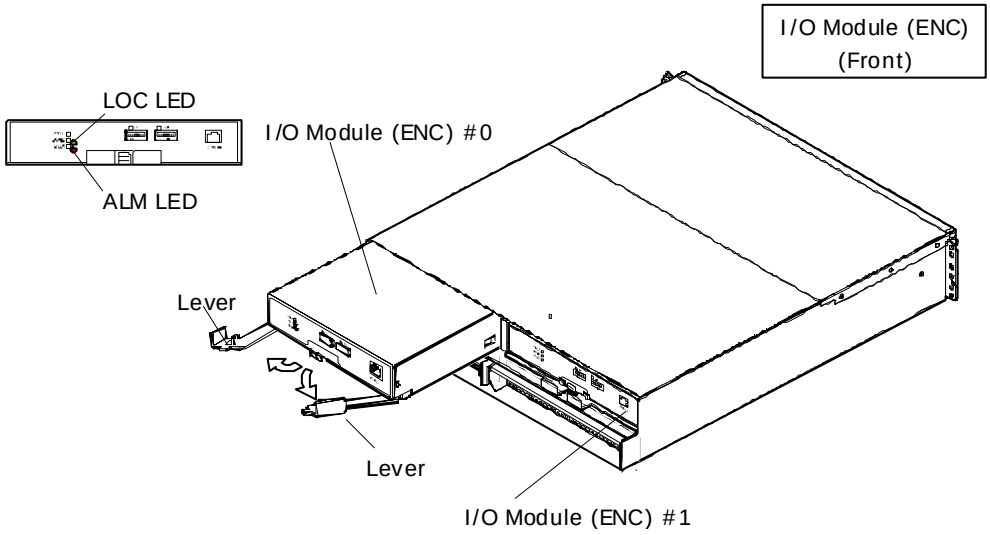
When installing the I/O Module (ENC), do not catch it on a SAS (ENC) cable.

5. Confirm the status of the following LEDs:
   - Red **ALM** LED on the I/O Module (ENC) is OFF.
   - Green **READY** LED on the front of the Controller Box is ON. This LED might blink quickly for 30-to-50 minutes, 40-to-60 minutes for the CBL, or 80-to-180 minutes when the DBW is connected to the CBL before the LED goes ON.

- Red **ALARM** LED and orange **WARNING** LED on the front of the Controller Box are OFF. If the **WARNING** LED blinks slowly, visit the HDS Support Portal at portal.hds.com.

6. In Hitachi Storage Navigator Modular 2, check the recovery after replacing components (see Checking recovery after replacing components on page 3-14).

Figure 14-1: LEDs on the I/O Module



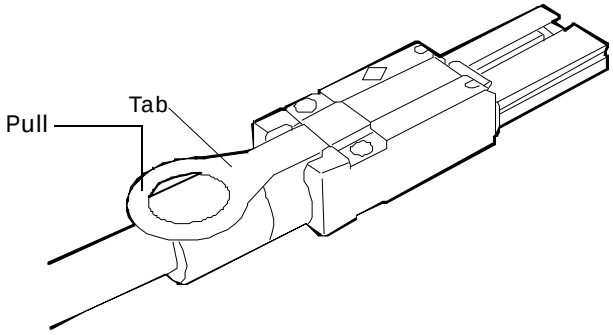


Figure 14-2: Locations of the tab on the SAS (ENC) cable

15

Upgrading a Hitachi Unified Storage 130 system

This chapter describes how to upgrade a Hitachi Unified Storage 130 system to a Hitachi Unified Storage 150 system.

Upgrade procedure at-a-glance

The following steps summarize the procedures to follow when upgrading a Hitachi Unified Storage 130 to a Hitachi Unified Storage 150. Some steps are performed at the Hitachi Unified Storage 130, while other steps are performed at the Hitachi Unified Storage 150.

Getting started

1. Reviewing prerequisites on page 15-3
2. Preparing for the upgrade on page 15-4
3. Unpacking the CBL and Drive Box on page 15-5

Steps performed at the Hitachi Unified Storage 130

1. Starting Hitachi Storage Navigator Modular 2 on page 15-7
2. Registering the Hitachi Unified Storage system on page 15-7
3. Locking extra-cost options on page 15-9
4. Install firmware on the CBSL/CBSS on page 15-12
5. Removing drives from the Hitachi Unified Storage 130 on page 15-16

Steps performed at the Hitachi Unified Storage 150

1. Installing drives in the Hitachi Unified Storage 150 on page 15-26
2. Mounting the CBL on page 15-29
3. Power on the Hitachi Unified Storage on page 15-30
4. Installing firmware on the Hitachi Unified Storage 150 on page 15-32
5. Changing the number of Drive I/O Modules on page 15-34
6. Configuring the storage system serial number on page 15-36
7. Registering the Hitachi Unified Storage 150 on page 15-38
8. Completing the upgrade on page 15-38

Reviewing prerequisites

Before upgrading a CBSL or CBSS to a CBL, observe the following guidelines:

- The upgrade operation is performed with the storage system offline. Because host access to the storage system must stop before upgrading the storage system, determine a planned shutdown for the storage system, such as at night or over a weekend or holiday.
- The storage system must be operational, with no failures or failed parts.
- The most recent version of Hitachi Storage Navigator Modular 2 must be used when performing the upgrade.
- If extra-cost options other than Dynamic Provisioning and Data Retention Utility are used with the storage system, uninstall (or "lock") the option before starting the upgrade operation (see Locking extra-cost options on page 15-9). The license key for an option cannot be used after the Hitachi Unified Storage system is upgraded.

NOTE: Since Dynamic Provisioning and Data Retention Utility can be upgraded in the unlocked status, they do not need to be locked. If TrueCopy Remote Replication/TrueCopy Extended Distance was used with the storage system, stop the operation, resynchronize the pair, and lock the option after recording the option setting. If you will use the SNMP Agent Support Function after the upgrade, you might need to review the SNMP environment information file.

Preparing for the upgrade

To prepare for the upgrade:

1. Stop all I/O between the host computer and the Hitachi Unified Storage.
2. Back up all data from the Hitachi Unified Storage.
3. Obtain the following tools for performing the upgrade:
   - Phillips screwdriver (number 2)
   - Allen wrench (number 3)
   - Allen wrench (number 4)
   - Spanner (number 22)
   - M8 socket wrench (number 13)
   - Wrist strap
   - Category 5 Ethernet cross-over cable
   - Maintenance personal computer (PC) with a boot drive of C
4. Obtain the parts required to perform the upgrade (see Table 15-1).
5. Obtain the *Hitachi Unified Storage Hardware Installation and Configuration Guide*. This guide has information about racks you will find valuable when mounting the Hitachi Unified Storage hardware.

Table 15-1: Parts required for upgrading to a CBL

Component	Model	Unit per assembly
(1) Controller Box	DF850-MH	1
Cache Memory	Choose from the following (see Note):	
DF-F850-16GB	Cache Memory (4 G bytes) (4)	1
DF-F850-32GB	Cache Memory (8 G bytes) (4)	1
Host I/O Module	Choose from the following (see Note)	
DF-F850-HF8G	Host I/O Module (8G-FC) (1)	4
DF-F850-HS10G	Host I/O Module (10G-iSCSI) (1)	4
Drive Box	Choose from the following (see Note)	
DF-F850-DBS	Drive Box (2.5-inch) (1)	1
DF-F850-DBL	Drive Box (3.5-inch) (1)	1

NOTE: Prior to the upgrade, order the required cache memory, Host I/O Module, and Drive Box according to the customer's configuration. When ordering parts, a DVD with the latest firmware is supplied with the parts.

Unpacking the CBL and Drive Box

Drives cannot be installed in a CBL Controller Box. Therefore, during this upgrade:

- drives installed in a CBSL enclosure rotate to a DBL Drive Box.
- Drives installed in a CBSS enclosure rotate to a DBS Drive Box.

After receiving the CBL and Drive Box, perform the following steps to ensure that your contents arrived safely.

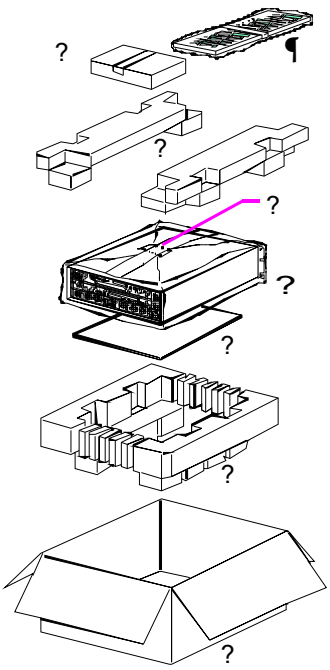
If the CBL and Drive Box arrived in cold weather, do not unpack them until they come to room temperature (one to two hours). Immediately exposing them to warm temperature could cause condensation to occur, which could damage the electronics. If you notice any condensation, allow the CBL and Drive Box to stand unattended for one to two hours and then unpack them.

1. Inspect all shipping cartons for signs of damage. If you spot damage, contact the shipper.
2. Loosen the band around the cartons and open all cartons.
3. Compare the items received to the packing list. If an item is missing or damaged, contact your place of purchase.
4. Remove all packing materials, envelopes, and boxes from the cartons. Your carton should include an accessory box located under the packed storage system with rail kits for rack-mounting the storage system

Due to the weight of the hardware, unpacking should be done by two or more persons. Approximate weights are:

- **CBSL = 94.8 pound (43 kg)**
- **CBSS = 88 pounds (40 kg)**
- **CBL = 103.6 pounds (47 kg)**
- **DBL = 59.5 pounds (27 kg)**
- **DBS = 50.7 pounds (23 kg)**
- **DBX = 187.3 (85 kg)**

5. Open and remove the bag in which the CBL and Drive Box are enclosed.
6. Confirm that the items and quantity of items received match the hardware required by the customer.
7. Keep all packing materials and cartons in case you need to transport or ship the CBL and Drive Box.
8. Keep the key supplied with the storage system in a safe place. The key for the front bezel is used to mount and dismount the CBSL/CBSS/DBL/DBS front bezel.



Legend:	
¶	Front Bezel and Key (in polyethylene bag)
?	Accessory Box
?	Buffer Pads
?	Desiccating Agent
?	Storage System
?	Pad
?	Lower Buffer Pad
?	Shipping Box

Starting Hitachi Storage Navigator Modular 2

Configuration activities associated with the upgrade are performed using Hitachi Storage Navigator Modular 2. Some activities require you to configure Hitachi Storage Navigator Modular 2 for Maintenance Mode, while other procedures are performed in Normal Mode.

To start Hitachi Storage Navigator Modular 2:

1. Connect an Ethernet cross-over cable to the **LAN 0** maintenance port on the rear of the CBSS or CBSL Controller Box. Connect the other end of the cable to a maintenance PC that has an installed version of Hitachi Storage Navigator Modular 2.
2. Start Internet Explorer on the maintenance PC, and then start Hitachi Storage Navigator Modular 2 and log in.

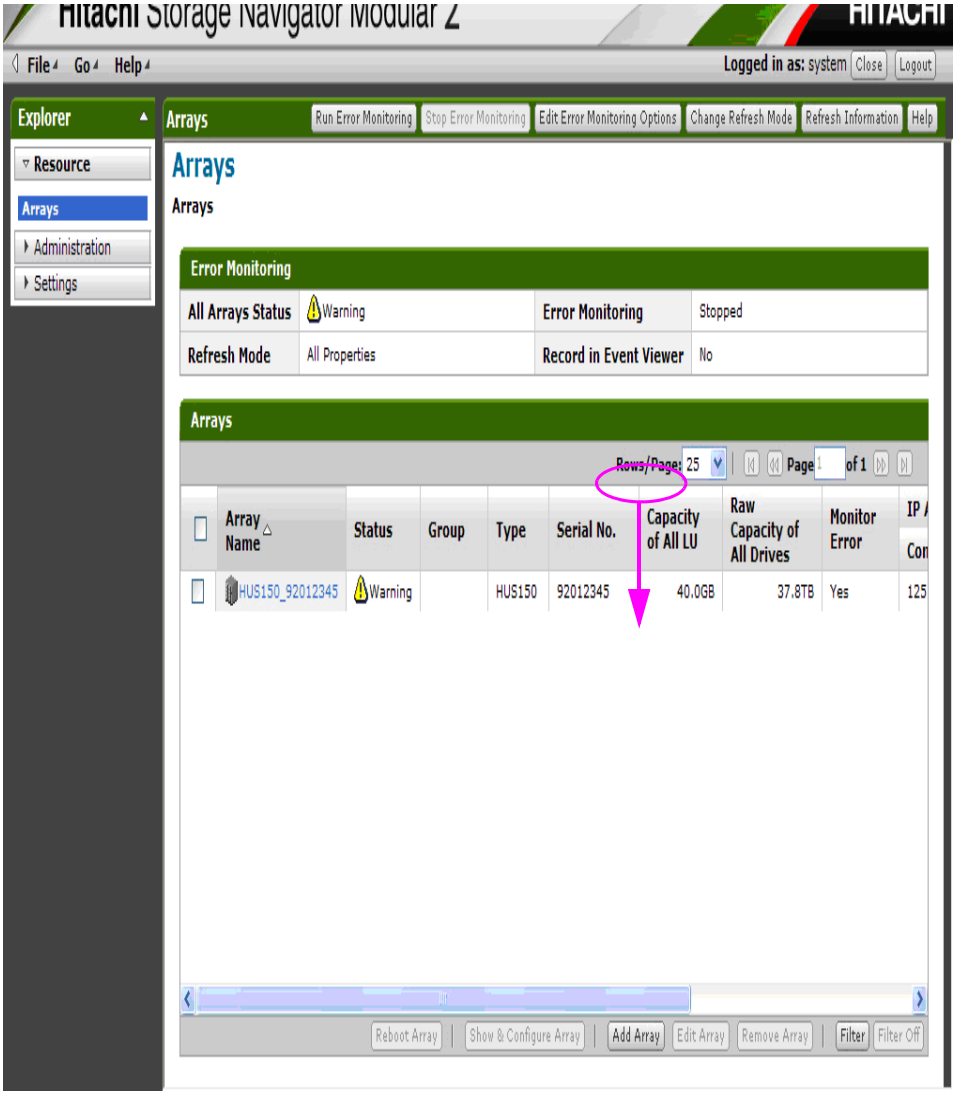
NOTE: Use Internet Explorer because it supports Hitachi Storage Navigator Modular 2 in Maintenance Mode. Firefox and Chrome do not support Maintenance Mode.

3. Perform a simple trace (see Collecting trace information on page 3-13). This will help you troubleshoot in the unlikely event the firmware upgrade (described later in this chapter) fails.
4. Remove all Fibre Channel and iSCSI cables from the rear of the CBSL or CBSS. Leave the other end of the cables connected to their respective devices.
5. Leave Hitachi Storage Navigator Modular 2 running and proceed to Locking extra-cost options, below.

Registering the Hitachi Unified Storage system

Use the following procedure to register the Hitachi Unified Storage system containing the CBSL or CBSS that will be upgraded.

1. In Hitachi Storage Navigator Modular 2, click the **Add Array** button in the Arrays screen.



2. In the introduction page, click **Next**.

3. In the next page:
   a. Enter the following default IP address in the **Specific IP Address or Array Name** fields for each storage system management port.

      Controller 0: type **192.168.0.16**

      Controller 1: type **192.168.0.17**

NOTE: If your management console is directly connected to a maintenance port, enter the default IP address just for that port (Controller 0 = **10.0.0.16**, Controller 1 = **10.0.0.17**).

   b. In the **Using Ports** area, select whether the ports are secure, nonsecure, or both.
   c. Click **Next**.
4. In the next page:
   a. Enter a storage system name in the **Array Name** field.
   b. Click **Next**.
5. Click **Finish**.
6. At the Arrays page, confirm that the status of the Hitachi Unified Storage system is **Normal**.

Locking extra-cost options

If one or more extra-cost (or “priced”) options other than Dynamic Provisioning and Data Retention Utility are used with the CBSL or CBSS, uninstall (or “lock”) the option prior to performing the upgrade. This procedure requires you to use Hitachi Storage Navigator Modular 2 and the key code or key file supplied with the option.

If the CBSL or CBSS does not have priced options, skip this procedure and go to Registering the Hitachi Unified Storage system on page 15-7.

1. Record the settings of the option for future reference.
2. At the Hitachi Storage Navigator Modular 2 Arrays page, check the storage system that has the extra-cost option.
3. Press the Ctrl, Shift, and E keys at the same time to switch Hitachi Storage Navigator Modular 2 to Maintenance Mode. Confirm that **Maintenance Mode** appears next to **Operation Mode** on the Arrays page (see Figure 15-1 on page 15-10).

NOTE: If **Maintenance Mode** does not appear next to **Operation Mode**, click a blank area in the Arrays page (away from GUI components such as buttons and check boxes), and then press the Ctrl, Shift, and E keys at the same time.

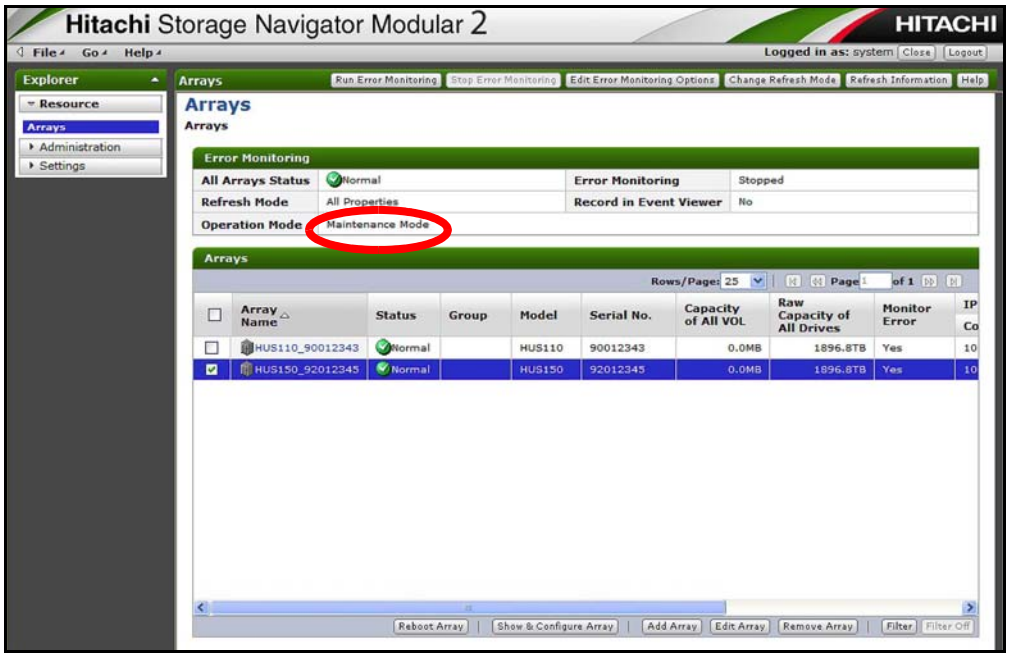
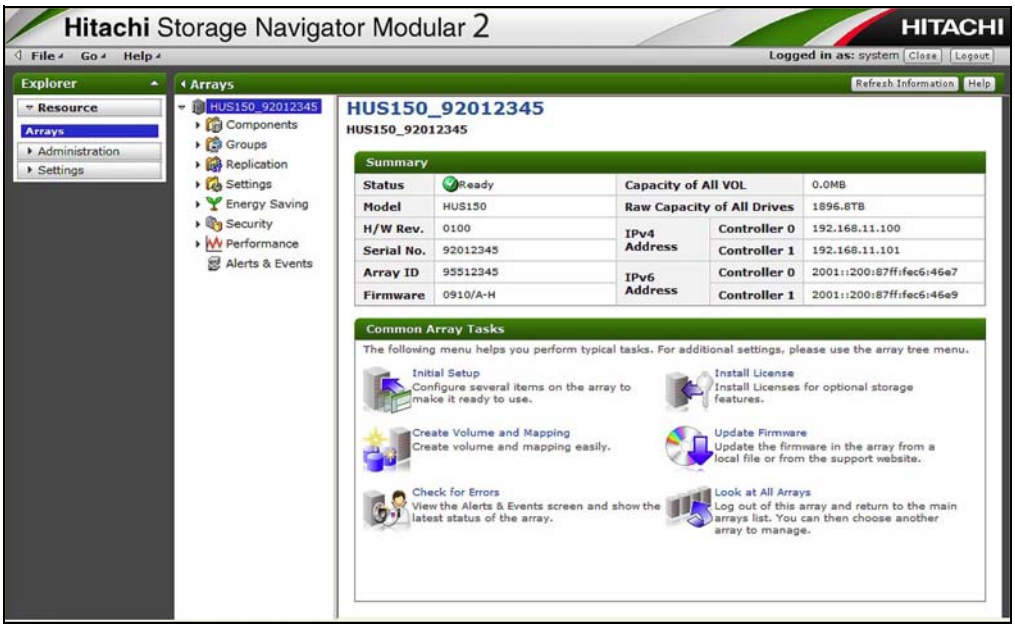
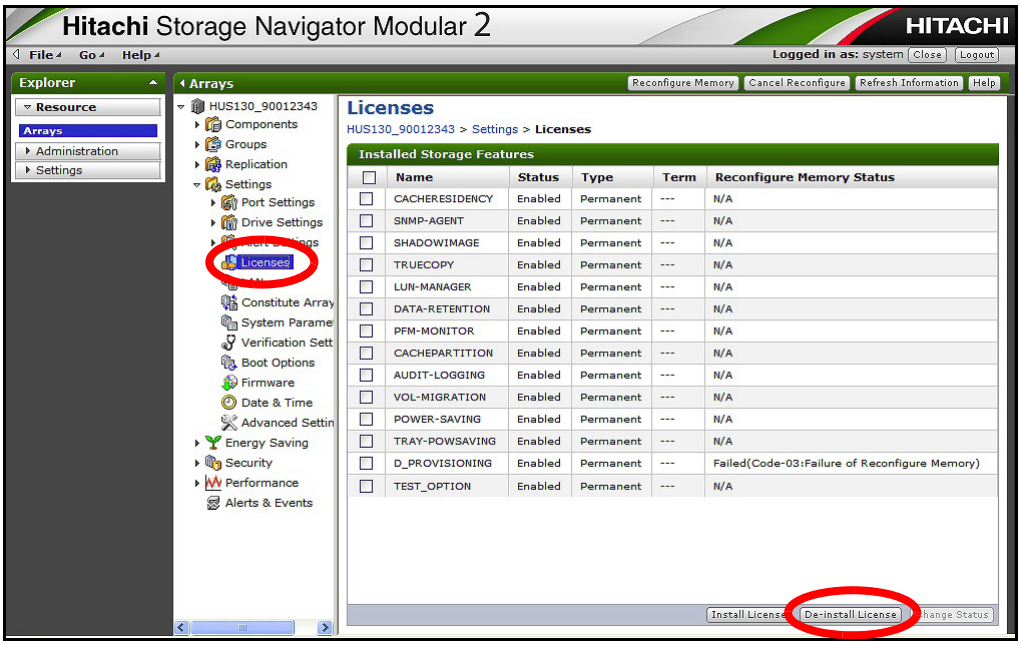


Figure 15-1: Confirming Maintenance Mode

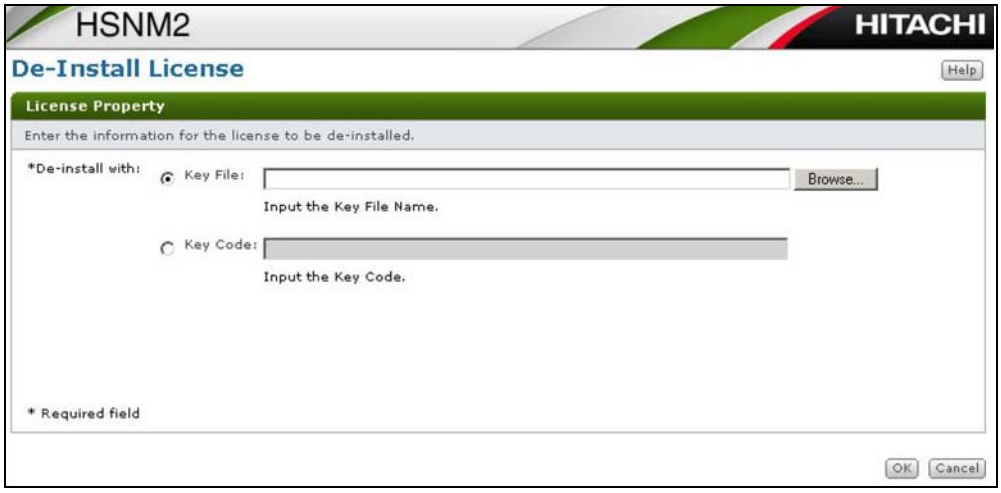
4. Under the **Array Name** column, click the name of the Hitachi Unified Storage system.



5. In the middle pane, click **Settings > Licenses**.



6. At the lower left side of the page, click **De-Install License**.
7. At the De-Install License page, perform one of the following steps:
   - To lock the option using a key file, click the **Key File** button. Then use the **Browse** button to locate and select the key file for the option you want to lock.
   - To lock the option using the key code, click the **Key Code** button, then enter the key code for the option you want to lock.



8. Click **OK**.
9. When the De-Install License page confirms that the de-installation of the license is completed successfully, click **Close**.
10. To return to normal mode, log out of Hitachi Storage Navigator Modular 2 and then log back in.

Install firmware on the CBSL/CBSS

Use Hitachi Storage Navigator 2 and the firmware provided on the supplied DVD to install firmware on the CBSL/CBSS.

Installing Java Runtime Environment

If the maintenance PC does not have Java Runtime Environment (JRE) v6 update 29 installed, perform the following procedure. Otherwise, skip this procedure and go to Copying and installing firmware on page 15-13.

1. If the maintenance PC has a version of JRE other than version 6 update 29 is installed on the maintenance PC, uninstall it using Add/Remove Programs.
2. Install the `program\DFJavaSetup.exe` from the supplied firmware installation DVD.
3. At the Welcome screen, click **Next**.
4. At the Ready to Install window, click **Install**.
5. Follow the on-screen instructions to install Java.

NOTE: If a Java Setup window says the software has already been installed on your computer and asks whether you would like to reinstall it, click **No** and proceed to the next step.

6. When the installation completes, the following screen appears, Click **Finish** to close the screen.

Copying and installing firmware

The firmware is located in a compressed (zip) file under `Firmware\program\microprogram` on the supplied DVD. Copy it to the following location on the maintenance PC:

`C:\diskarray-microprogram\microprogram`

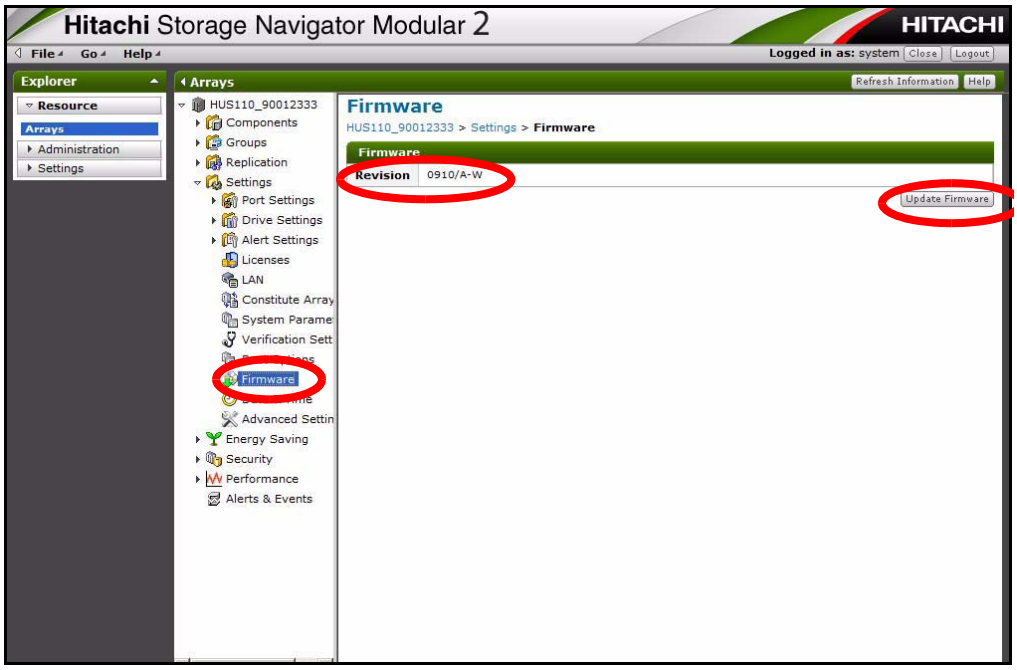
Table 15-2: DVD File Structure

Root level	First subfolder	Second subfolder
manual	hostInst	manual file
	UG	
program	microprogram	Firmware zip file
	`DFJavaSetup.exe` (Java setup file)	–

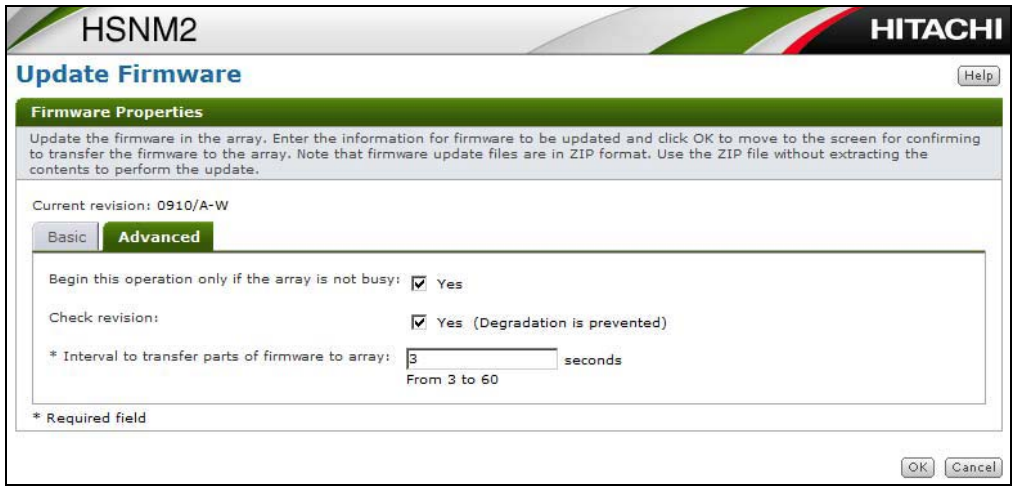
After copying the firmware file, use the following procedure to install the firmware on the CBSL/CBSS. You perform this configuration two times.

1. At the Hitachi Storage Navigator Modular 2 Arrays page, check the storage system on which you will install the firmware.
2. Press the Ctrl, Shift, and E keys at the same time to switch to Maintenance Mode. Confirm that **Maintenance Mode** appears next to **Operation Mode** on the Arrays page (see Figure 15-1 on page 15-10).
3. Under the **Array Name** column, confirm that the name of the Hitachi Unified Storage system is checked in the Arrays page.
4. In the middle pane, click **Settings > Firmware**.
5. On the right side of the Firmware page, find the firmware revision shown next to **Revision** and record it below

   Record the local file revision here: .....
6. Click the **Update Firmware** button. The Update Firmware page appears, with the **Basic** tab displayed.

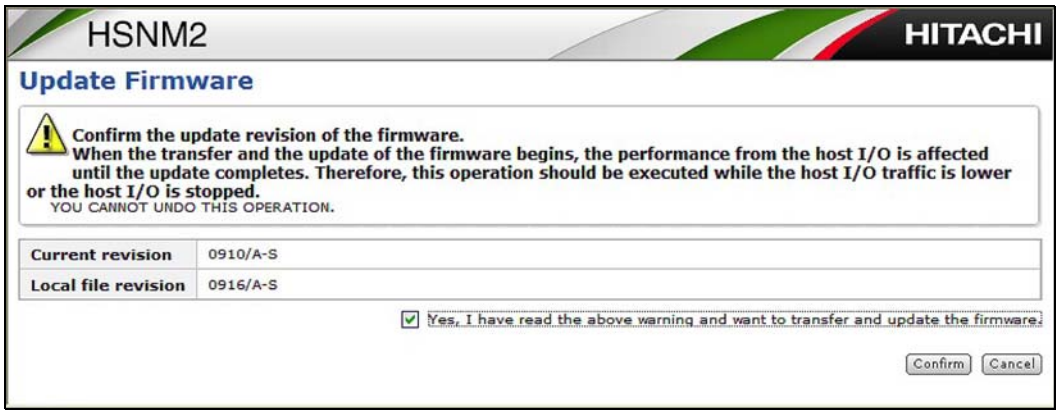


7. On the **Basic** tab, click the **Transfer and update Firmware button**.
8. Click the **Browse** button, go to the location where you copied the firmware file, and then click the file and click **Open**.
9. Click the **Advanced** tab and complete the **Interval to transfer parts of firmware to array** option on the tab.



10. Click **OK**.
11. At the confirmation window, confirm that the last letter (model type) of the firmware revision shown in the **Local File Revision** and **Current Revision** fields is the same. In the following example, the last letter is **S** and appears in both fields.

    Record the local file revision here: .....



12. Check the confirmation message and click **Confirm** to update the firmware.
13. When a message tells you that the firmware transferred successfully, click **Close**.

NOTE: If the firmware upgrade fails, repeat this procedure.

14. In the middle pane, click **Settings > Firmware**.
15. Confirm that the firmware version shown on the right side of the page matches the local file revision you recorded in step 11.
16. Repeat this procedure from step 4.

NOTE: If the message **I14000 System copy started (Unit-x, HDU-y)** appears two or more times in Information Message on the WEB, you can ignore it. This does not indicate a problem.

Removing drives from the Hitachi Unified Storage 130

The Hitachi Unified Storage 130 enclosure contains system drives in trays 0-4 and can contain additional drives in trays 5-14. The Hitachi Unified Storage 150 does not contain drives within its enclosure and requires a separately connected DBS, DBL, or DBX Drive Box.

During the upgrade, you move the row of drives from the Hitachi Unified Storage 130 CBSL/CBSS to a DBS, DBL, or DBX Drive Box connected to the Hitachi Unified Storage 150. Typically, this row of drives is the first drive box, with unit ID#0, attached to the Hitachi Unified Storage 150.

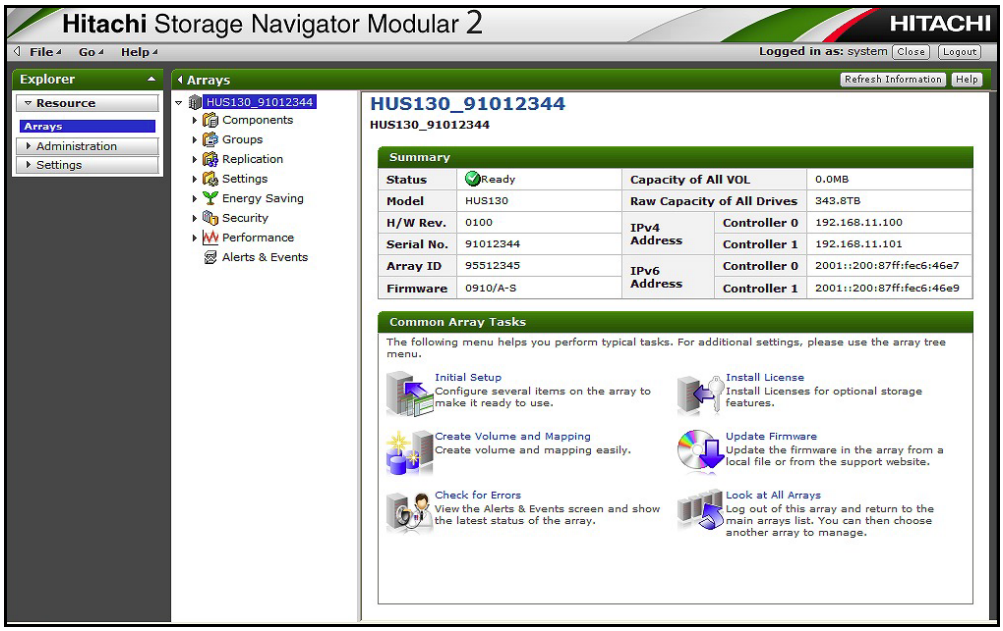
Because the Hitachi Unified Storage 150 enclosure does not contain drives, the first 15 drives, including the system drives, in the Hitachi Unified Storage 130 must be rotated into the first DBS or DBL connected to the Hitachi Unified Storage 150.

- Drives installed in a CBSL Controller Box rotate to a DBL Drive Box.
- Drives installed in a a CBSS Controller Box rotate to a DBS Drive Box.

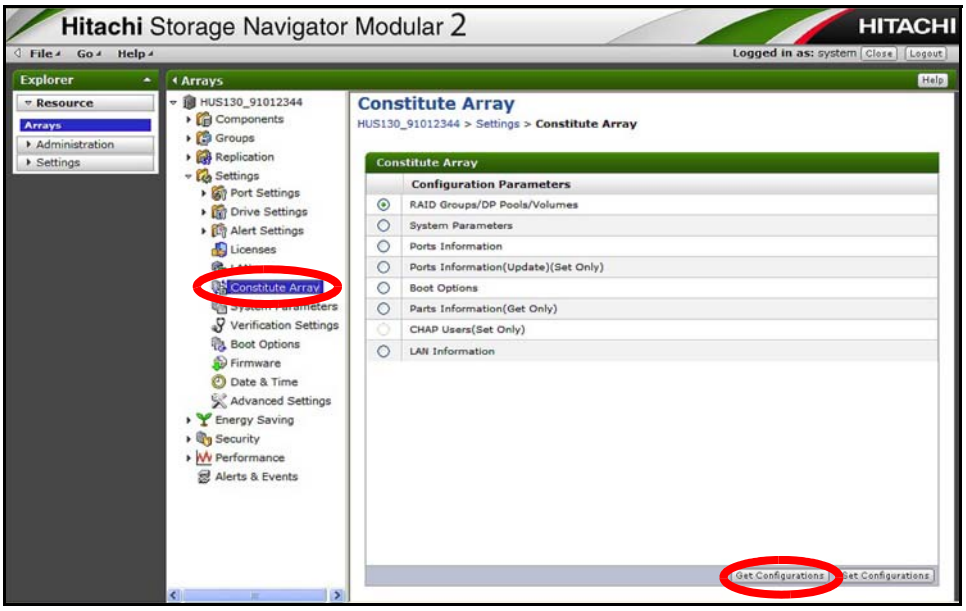
Collecting drive serial numbers

When you rotate drives, drives from the Hitachi Unified Storage 130 must be installed into the corresponding slots in the Hitachi Unified Storage 150 Drive Box. To ensure that the drives are rotated into the appropriate drive slots, use Hitachi Storage Navigator Modular 2 to collect information about the slots where the drives are installed in the Hitachi Unified Storage 130.

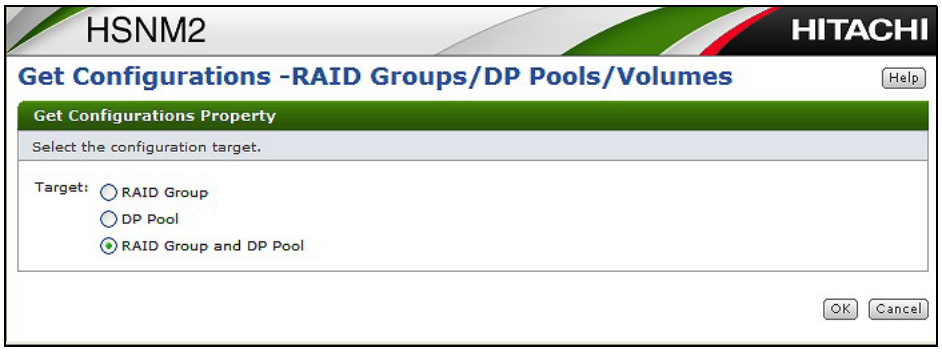
1. With Hitachi Storage Navigator Modular 2 operating in Maintenance Mode, under the **Array Name** column, click the name of the Hitachi Unified Storage system in the Arrays page.



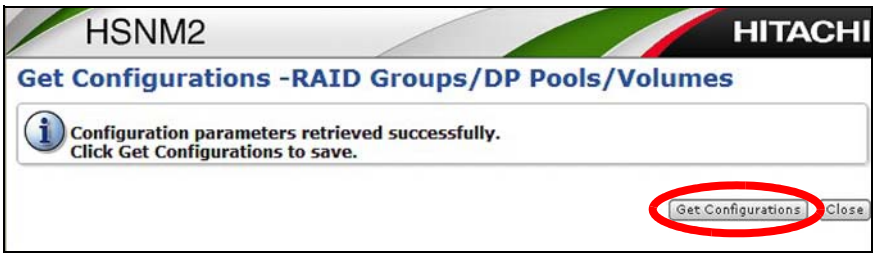
2. In the middle pane, click **Settings > Constitute Array**.



3. On the Constitute Array page, click the **Raid Groups/DP Pools/ Volumes** button and click **Get Configurations**.
4. At the Get Configurations page, click the **RAID Group and DP Pool** button, and then click **OK**.



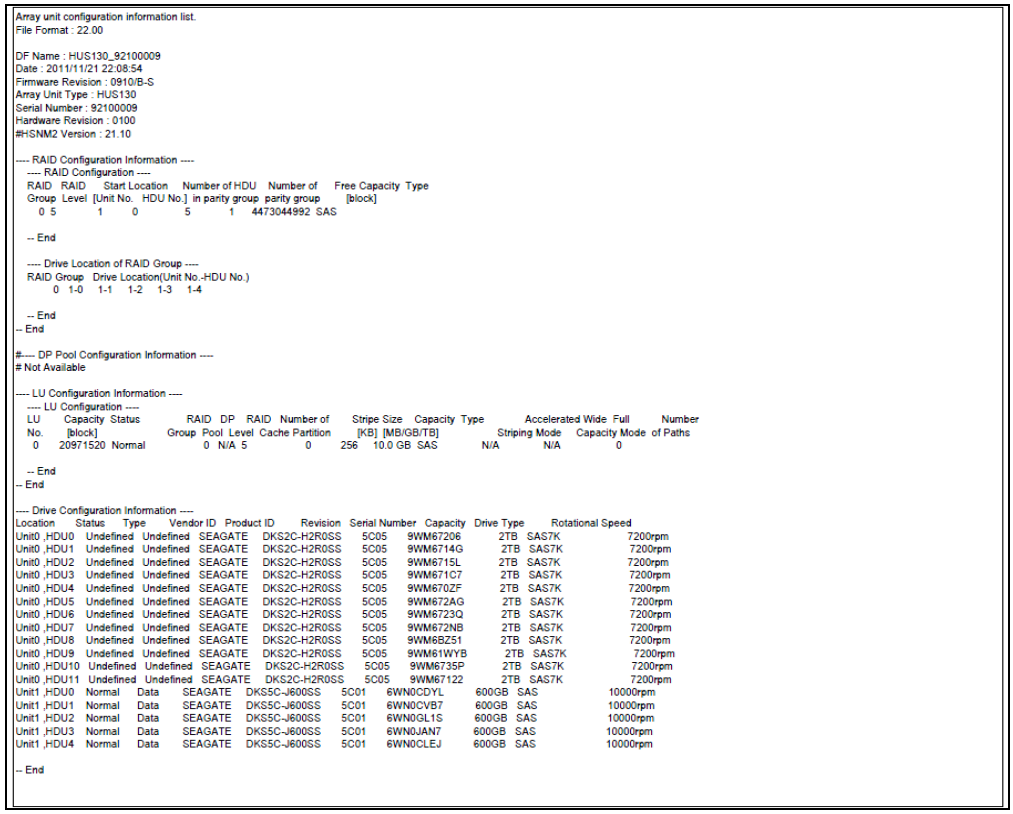
5. At the next screen, click **Get Configurations**. The specify a location to save the file.



6. Open the configuration information file received from the previous step and confirm the following information is displayed under **Drive Configuration Information**:
   - **Location** = location where a drive is installed
   - **Unit** = unit ID number
   - **HDU** = drive number
   - **Serial Number** = serial number of drive

The RAID Group/DP Pool/Volume information is stored as a text file that is named as shown above.

Store this file in a safe place because you will refer to it after you perform the upgrade.



```
Array unit configuration information list.
File Format : 22.00

DF Name : HUS130_92100009
Date : 2011/11/21 22:08:54
Firmware Revision : 0910/B-S
Array Unit Type : HUS130
Serial Number : 92100009
Hardware Revision : 0100
#HSNM2 Version : 21.10

---- RAID Configuration Information ----
  ---- RAID Configuration ----
  RAID  RAID    Start Location    Number of HDU   Number of     Free Capacity  Type
  Group  Level  [Unit No.  HDU No.]  in parity group  parity group      [block]
    0  5          1       0            5           1    4473044992  SAS

  -- End

  ---- Drive Location of RAID Group ----
  RAID Group  Drive Location(Unit No.-HDU No.)
        0  1-0   1-1   1-2   1-3   1-4

  -- End
-- End

#---- DP Pool Configuration Information ----
# Not Available

---- LU Configuration Information ----
  ---- LU Configuration ----
  LU      Capacity  Status          RAID  DP   RAID  Number of      Stripe Size   Capacity  Type          Accelerated Wide  Full        Number
  No.       [block]               Group  Pool  Level  Cache Partition      [KB]  [MB/GB/TB]              Striping Mode    Capacity Mode  of Paths
    0     20971520  Normal            0  N/A  5                0       256    10.0 GB  SAS           N/A             N/A             0

  -- End
-- End

---- Drive Configuration Information ----
Location      Status     Type       Vendor ID  Product ID       Revision  Serial Number  Capacity  Drive Type       Rotational Speed
Unit0 ,HDU0   Undefined  Undefined  SEAGATE    DKS2C-H2R0SS     5C05      9WM67206        2TB  SAS7K                 7200rpm
Unit0 ,HDU1   Undefined  Undefined  SEAGATE    DKS2C-H2R0SS     5C05      9WM6714G        2TB  SAS7K                 7200rpm
Unit0 ,HDU2   Undefined  Undefined  SEAGATE    DKS2C-H2R0SS     5C05      9WM6715L        2TB  SAS7K                 7200rpm
Unit0 ,HDU3   Undefined  Undefined  SEAGATE    DKS2C-H2R0SS     5C05      9WM671C7        2TB  SAS7K                 7200rpm
Unit0 ,HDU4   Undefined  Undefined  SEAGATE    DKS2C-H2R0SS     5C05      9WM670ZF        2TB  SAS7K                 7200rpm
Unit0 ,HDU5   Undefined  Undefined  SEAGATE    DKS2C-H2R0SS     5C05      9WM672AG        2TB  SAS7K                 7200rpm
Unit0 ,HDU6   Undefined  Undefined  SEAGATE    DKS2C-H2R0SS     5C05      9WM6723Q        2TB  SAS7K                 7200rpm
Unit0 ,HDU7   Undefined  Undefined  SEAGATE    DKS2C-H2R0SS     5C05      9WM672NB        2TB  SAS7K                 7200rpm
Unit0 ,HDU8   Undefined  Undefined  SEAGATE    DKS2C-H2R0SS     5C05      9WM6BZ51        2TB  SAS7K                 7200rpm
Unit0 ,HDU9   Undefined  Undefined  SEAGATE    DKS2C-H2R0SS     5C05      9WM61WYB        2TB  SAS7K                 7200rpm
Unit0 ,HDU10  Undefined  Undefined  SEAGATE    DKS2C-H2R0SS     5C05      9WM6735P        2TB  SAS7K                 7200rpm
Unit0 ,HDU11  Undefined  Undefined  SEAGATE    DKS2C-H2R0SS     5C05      9WM67122        2TB  SAS7K                 7200rpm
Unit1 ,HDU0   Normal     Data       SEAGATE    DKS5C-J600SS     5C01      6WN0CDYL      600GB  SAS                10000rpm
Unit1 ,HDU1   Normal     Data       SEAGATE    DKS5C-J600SS     5C01      6WN0CVB7      600GB  SAS                10000rpm
Unit1 ,HDU2   Normal     Data       SEAGATE    DKS5C-J600SS     5C01      6WN0GL1S      600GB  SAS                10000rpm
Unit1 ,HDU3   Normal     Data       SEAGATE    DKS5C-J600SS     5C01      6WN0JAN7      600GB  SAS                10000rpm
Unit1 ,HDU4   Normal     Data       SEAGATE    DKS5C-J600SS     5C01      6WN0CLEJ      600GB  SAS                10000rpm

-- End
```

Shutting down the storage system

After collecting drive serial numbers, a clean power down of the Hitachi Unified Storage 130 storage system (CBSS or CBSL) from the main power off switch is required. The clean power down must be performed from the main Power Off switch on Controller #0 or Controller #1. Do not power down using the power cables.

1. Confirm the following:

   - Do not power off the storage system if the green **READY** LED on the front of the Controller Box is blinking quickly (it can remain blinking up to 50 minutes).
   - If the Power Saving option is used, initiate a spin-down, and then power off the storage system before spin-down completes, the spin-down may fail. Therefore, wait for spin-down to complete before powering off the storage system.

     Confirm that no RAID Group has a power saving status of **Normal (command monitoring)** after executing the spin-down.

     If the spin-down fails, perform the spin-down again.
   - Confirm that there are no drives whose status is **Blocked**. If there are, resolve the block before powering off the storage system.

2. On the CBSL or CBSS, press the main switch on either Controller #0 or Controller #1 for three seconds or more using a pen or similar object. The CBSS/CBSL green **C-PWR** LED blinks for three seconds and then goes ON.
3. If a DBW is connected to the CBSL or CBSS, turn off the Power Switch. However, if the power interlock mode is set to the UPS interlock mode1/2/3, remove the UPS interlock cable connected to the CBSL/CBSS, and then turn off the main switch.

NOTE: When you remove the UPS interlock cable, an email alert notification is sent (if configured in Hitachi Storage Navigator Modular 2) and a TRAP is received by the SNMP Agent Support Function.

4. Confirm that the **POWER** LED on the front of the storage system changes from green to orange (this should take approximately 10 minutes).
   - The green **READY** LED on the DBL/DBS/DBX does not go OFF when the main switch is turned off in the Maintenance mode. This is normal and does not indicate a problem.
   - The green **ACT** LED on a drive might continue to blink after the orange **POWER** LED goes ON. This is normal and does not indicate a problem.
5. Power off the storage system as follows:
   - If the storage system power cables are connected to a PDB, check whether other devices, such as switches, are also connected to the PDB.

     If the storage system is the only device connected to the PDB, power off the circuit breakers of the PDB.

     If other devices are connected to the PDB, check whether they can be powered off. If they cannot be powered off, remove two power cables (four power cables for DBX) from the power units of the Controller Box and Drive Box.
   - If the power cables are connected to something other than a PDB, remove two power cables (four power cables for DBX) of the Controller Box and Drive Box, or turn off the input power.
6. Remove all Fibre Channel and iSCSI cables from the rear of the CBSL/CBSS. Leave the other end of the cables connected to their respective devices.

Removing power cables

After you shut down the storage system, remove the power cables from the Hitachi Unified Storage 130.

1. Remove the Hitachi Unified Storage 130 front bezel (see Removing and replacing the front bezel on page 3-10).
2. Remove all power cables from the Hitachi Unified Storage 130.

3. For Drive Boxes other than the DBX:
   a. Check that the power cable connected to the chassis of the Drive Box with the last unit ID number does not have a scratch or flaw.
   b. Gently remove the cable from the Drive Box. If the cable cannot be removed easily, do not pull it by force; pull out the part slightly, and then remove the cable.
4. For the DBX Drive Box:
   a. Turn the right and left screws 90 degrees and remove them according to the direction of arrow ?in Figure 15-2 on page 15-20.
   b. Remove the stopper at the rear of the storage system and the cable tray, open the cable routing cover, and remove the power cable.

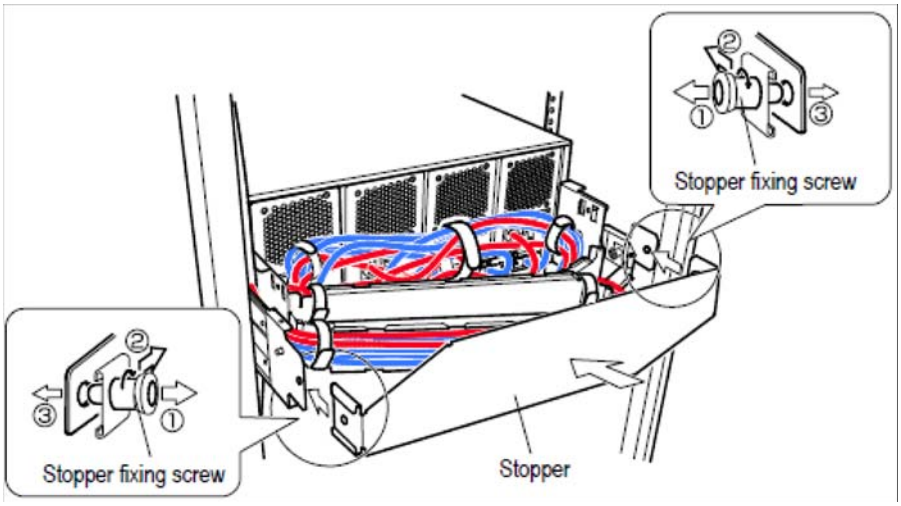


Figure 15-2: Removing the stopper

   c. Release the screw securing the cable tray.

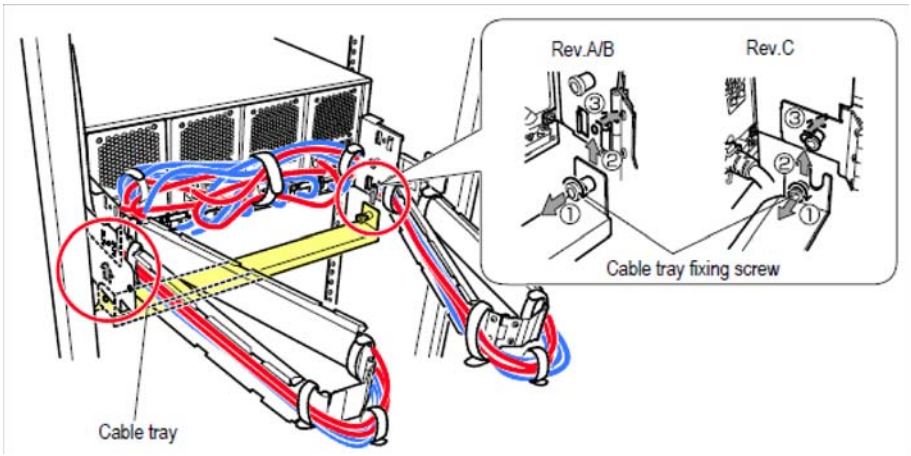


Figure 15-3: Removing the cable tray

   d. Remove the power cable.

Removing SAS (ENC) cables

After removing power cables, use the following procedure to remove the SAS (ENC) cables.

1. For all Drive Boxes other than the DBX, remove the SAS (ENC) cable by gently pulling the tab of the SAS(ENC) cables connecting the chassis.

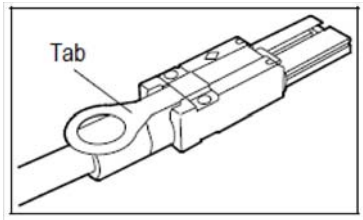


Figure 15-4: SAS (ENC) cable

2. For the DBX Drive Box:
   a. Open the cable routing bar and remove the cable holder to which the SAS (ENC) cable is connected.
   b. Loosen the blue screws securing the holder cover of the cable holder, and then remove the holder cover.

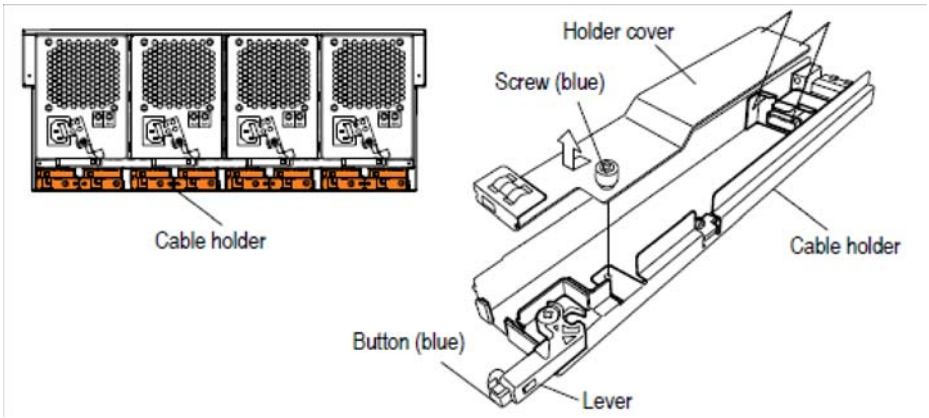


Figure 15-5: Removing the holder cover

   c. Gently pull the tab of the SAS(ENC) cable to remove the cable.
   d. Pull the screws of the stopper in the direction of arrow ?in Figure 15-6 on page 15-22 and remove the cable routing from the rails.

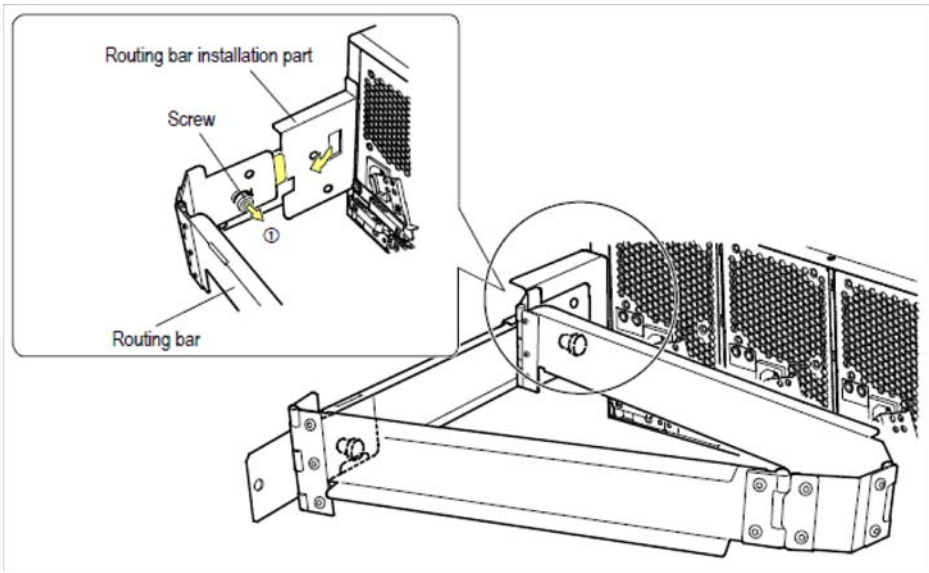


Figure 15-6: Removing the routing bar

e. Pull the screws in the direction of arrow ?in Figure 15-7 and remove the cable routing from the routine installation part.

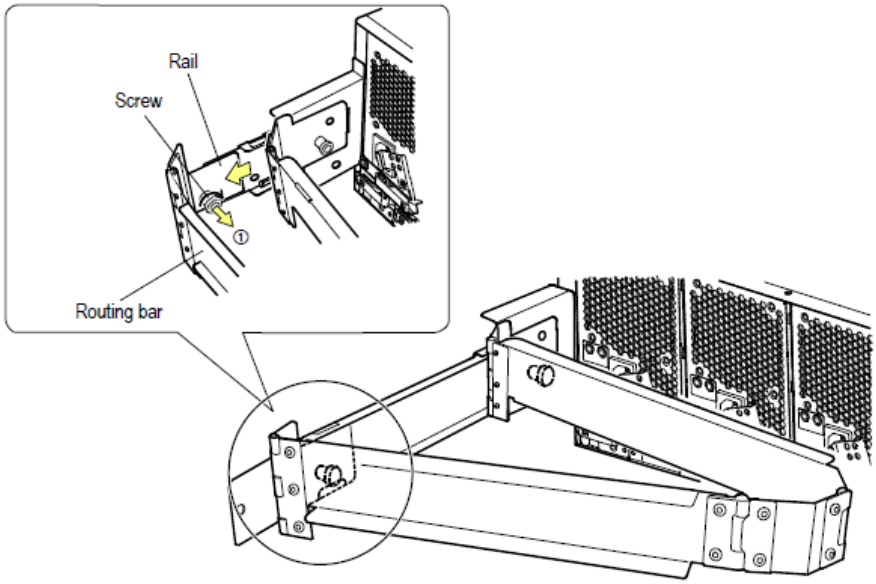
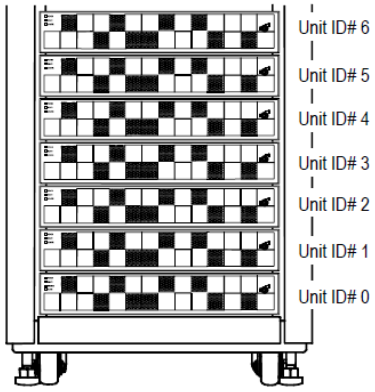


Figure 15-7: Releasing the routing bar (left side of DBX shown)

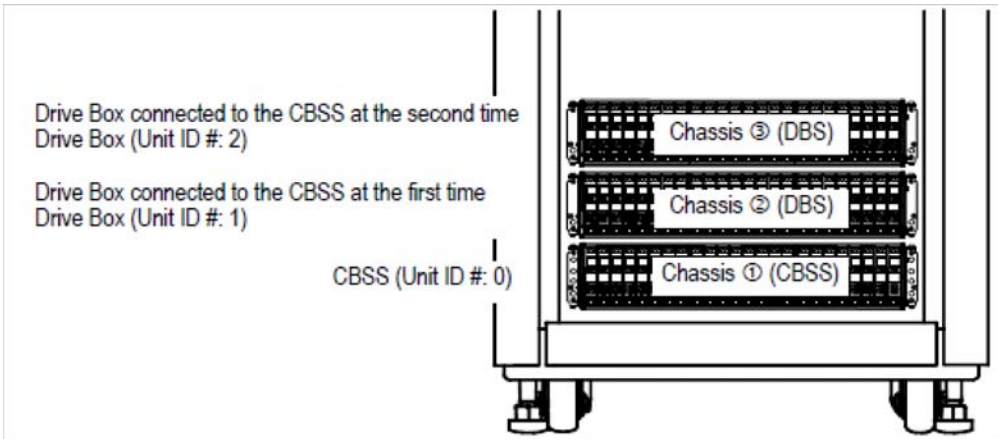
Removing drives

After recording drive serial numbers in the Hitachi Unified Storage 130 and removing the power and SAS (ENC) cables, you are ready to remove drives from the Hitachi Unified Storage 130. This procedure assumes that unit ID numbers on the storage system chassis are arranged in ascending order from the bottom of the rack prior to the upgrade, as shown in the following example.



Observe the following guidelines when removing drives:

- Use labels with drive numbers to identify drives removed from the Hitachi Unified Storage 130.
- Handle drives carefully. They contain sensitive components that can be easily damaged if the drive is not handled carefully.
- Wear a wrist strap at all times and discharge static electricity from your body before handling drives.
- After removing a drive, place it in the drive box for safekeeping until you install it in the Hitachi Unified Storage Drive Box.
- Keep all unused parts for the CBL.
- Mounted Drive Boxes should have a free area of 3 U for the CBSL/ CBSS. In the following example, which shows a configuration consisting of a CBSS and a DBS:
  - Chassis ? = the CBSL/CBSS Controller Box.
  - Chassis ? = the drive box connected to the CBSL/CBSS.
  - Chassis ? = the Drive Box connected to the CBSL/CBSS after the upgrade.



- If your upgrade includes a DBX Drive Box, note that this Drive Box is 4U high compared to the DBS and DBL Drive Boxes, which are 2U high. Take this height difference into consideration when mounting the DBX Drive Box in the rack.

1. Remove the drives installed in the chassis of the Drive Box with the last unit ID number.
2. Attach labels with the drive numbers to all drives installed in the chassis of the Drive Box with the last unit ID number.

Removing a drive from the DBL Drive Box

To remove a drive from the DBL Drive Box:

1. Pull the stopper of the handle toward you to set the lock off (?in Figure 15-8 on page 15-24).
2. Tilt the handle toward you and remove the drive by pulling it out.

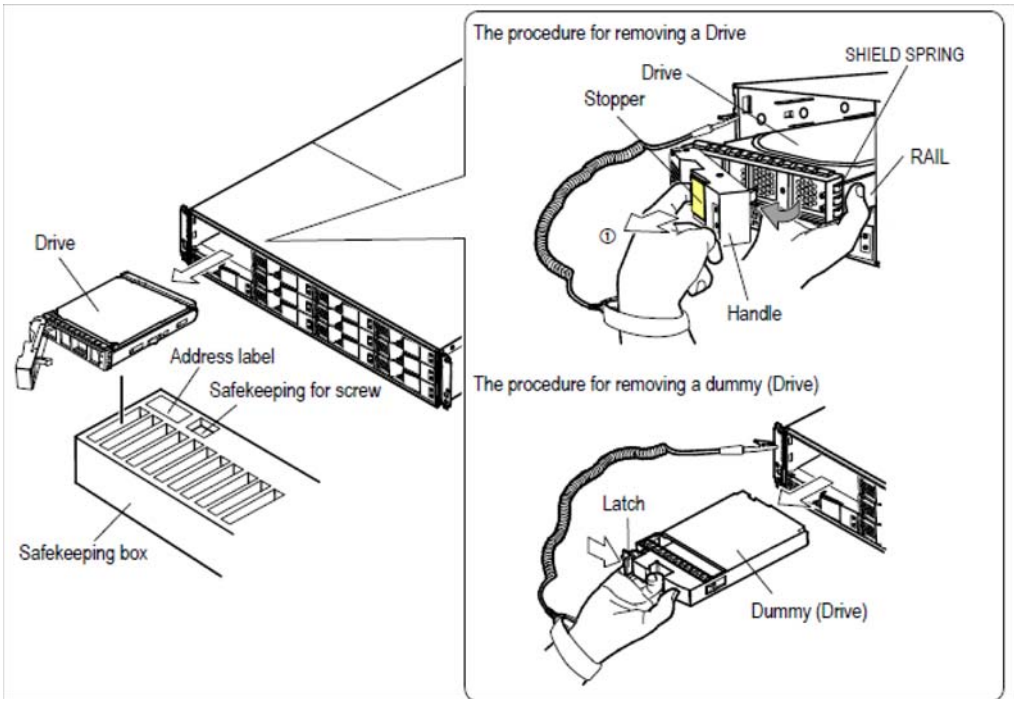


Figure 15-8: Removing a drive from a DBL Drive Box

3. Pressing the latch on the left side of the real drive or the mock (“dummy”) drive in the direction of the arrow, hold the right (rail) side of the dummy drive, pull it out, and then remove it. Do not:
   - Hold the rail side of the drive, because the side with the shield spring is susceptible to breakage.
   - Do nor apply shock or vibration to the drive when removing it.
4. Keep the drive in the component box at the location shown on the address label, with the drive’s handle returned to its original state and locked by the stopper.

Removing a drive from the DBS Drive Box

To remove a drive from the DBS Drive Box:

1. Pull the stopper of the handle toward you to set the lock off (?in Figure 15-9).
2. Tilt the handle toward you and remove the drive by pulling it out.

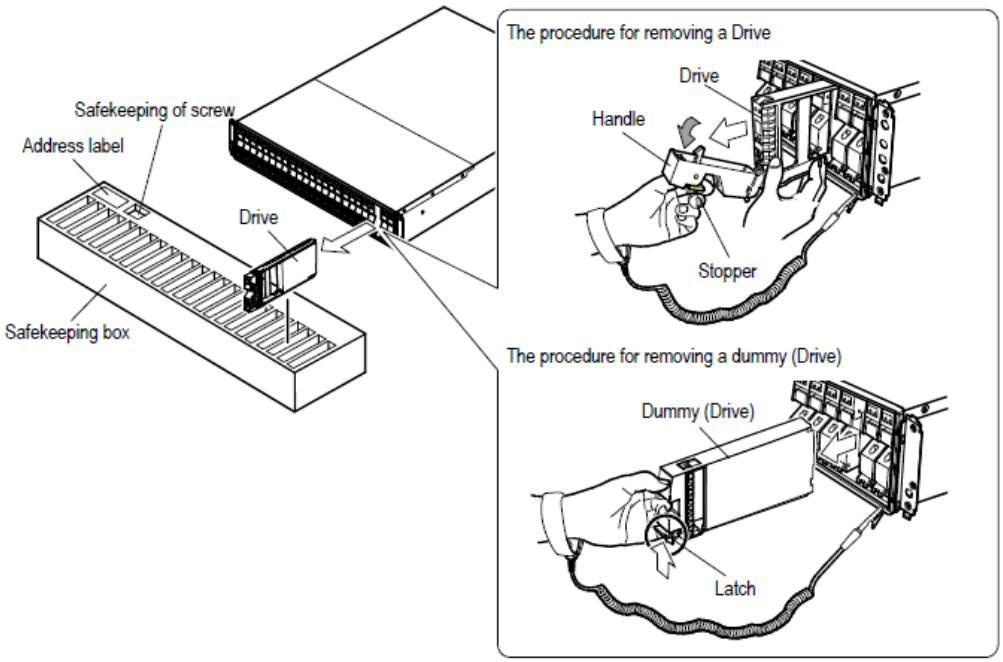


Figure 15-9: Removing a drive from a DBS Drive Box

3. Pressing the latch on the lower side of the real or mock (“dummy”) drive in the direction of the arrow, hold the top part of the drive, pull it out, and then remove it. Do not apply shock or vibration to the drive when removing it.
4. Keep the drive in the component box at the location shown on the address label, with the drive’s handle returned to its original state and locked by the stopper.

Removing a drive from the DBX Drive Box

To remove a drive from the DBX Drive Box:

1. Remove the top cover of the DBX (see Removing and replacing the front bezel on page 3-10).
2. Slide the blue latch on the real or mock (“dummy”) drive, open the handle, and then pull out and remove the real or dummy drive. Do not apply shock or vibration to the drive when removing it.
3. Keep the drive in the component box at the location shown on the address label, with the drive’s handle returned to its original state and locked by the stopper.
4. Attach the top cover of the DBX (see Removing and replacing the front bezel on page 3-10).

If you drop a screw or other part into the DB, remove it immediately. If you leave it unattended, the part will short out the DBX and can cause a fire or a failure.

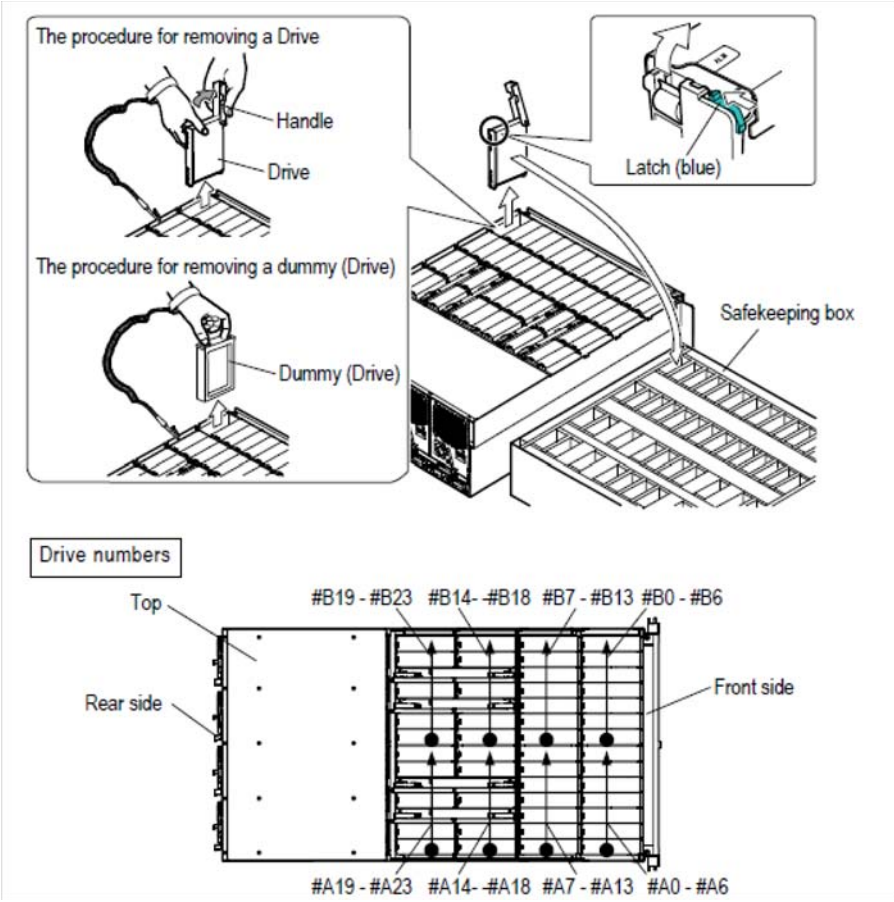


Figure 15-10: Removing a drive from a DBX Drive Box

Installing drives in the Hitachi Unified Storage 150

After removing the drives from the Hitachi Unified Storage 130, install them into either a DBL Drive Box (if they were removed from a CBSL) or a DBS Drive Box (if they were removed from a CBSS). Be sure to install the drives into the appropriate drive slots based on the record you made under Collecting drive serial numbers on page 15-16.

Installing drives in the DBL

To install drives in the DBL:

1. Hold the rail side of the drive.
2. Open the handle completely, fit the drive into the guide rail, and slide it in the direction shown by the arrow.
3. Push until the hook of the handle can be inserted into the square hole on the storage system frame.

4. Pull the stopper gently, close the handle, and press the stopper to lock the drive into place.

NOTE: If the handle is raised so that its hook cannot be inserted into the square hole, the drive cannot be installed correctly because it runs into the frame of the disk array unit.

5. Pull the handle gently to ensure the drive cannot be pulled out.
6. If a drive slot does not contain a drive, insert a dummy drive slowly into the slot until the drive latch moves to the left side.

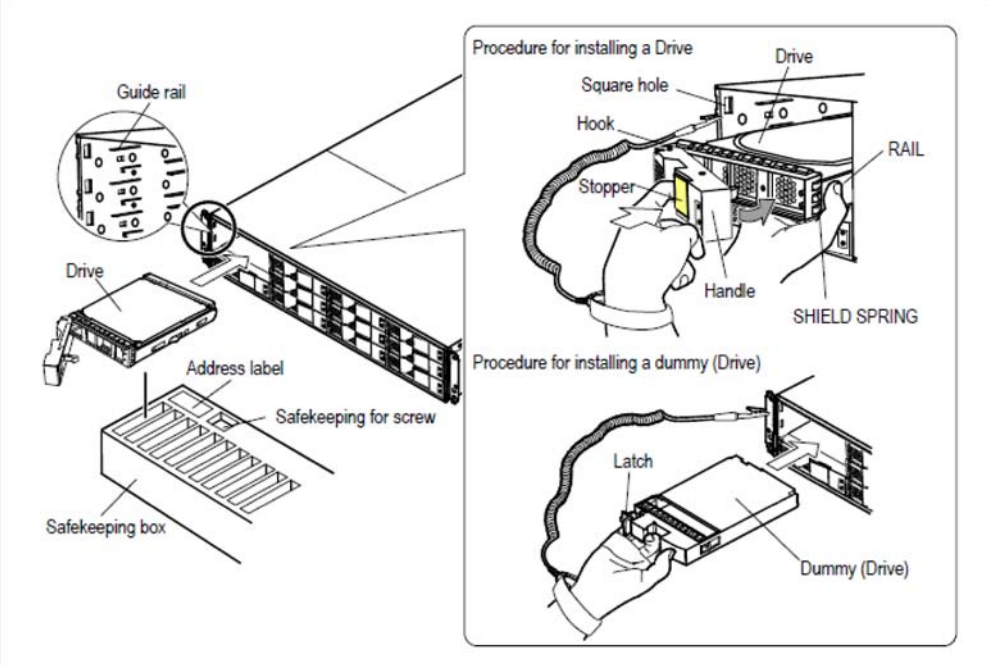


Figure 15-11: Installing a drive in a CBXSL/CBSL/DBL

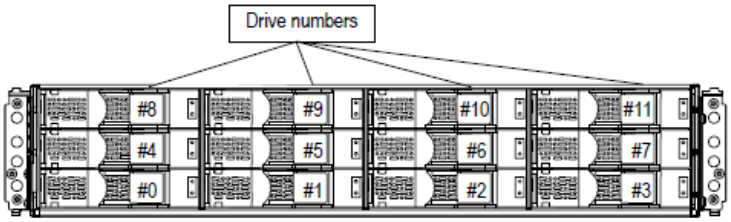


Figure 15-12: Drive mounting locations on a CBXSL/CBSL/DBL

Installing drives in the DBS

To install drives in the DBS:

1. Insert the drive into the guide rail of the slot from which the drive was removed. Then slide the drive and guide rail in the direction shown by the arrow.
2. Push until the hook of the handle can be inserted into the rectangular hole at the lower part of a frame on the front side of the DBS.
3. Raise the stopper, which is tilted toward you, and then press the stopper to lock the drive into place.

NOTE: If the raised handle prevents the hook from being inserted into the rectangular hole, the drive cannot be installed properly because it is blocked by the frame of the disk array unit

4. Pull the handle gently to ensure the drive cannot be pulled out.
5. If a drive slot does not contain a drive, insert a dummy drive slowly into the slot until the drive latch moves to the lower side.
6. Attach the front bezel (see Removing and replacing the front bezel on page 3-10).

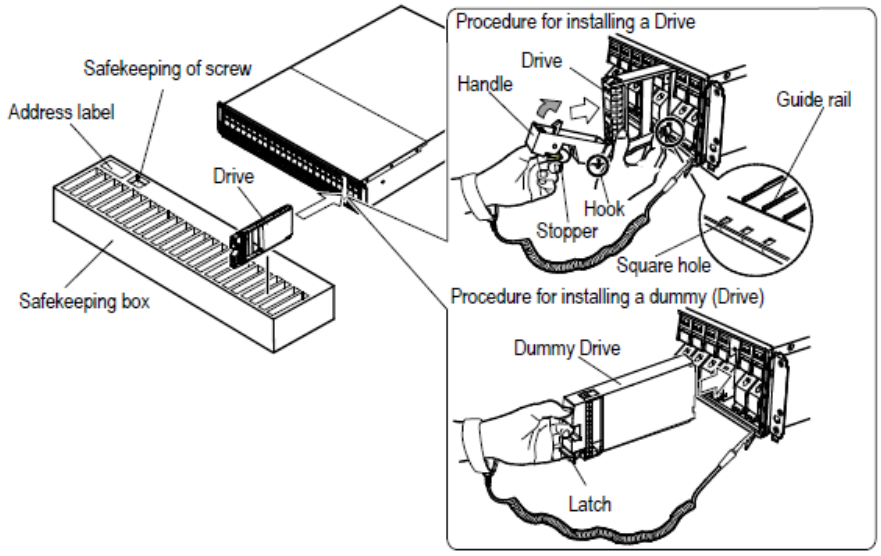


Figure 15-13: Installing a drive in the DBS

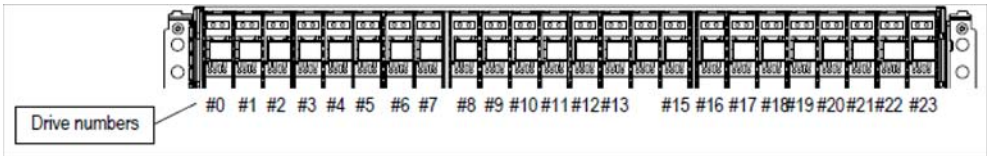


Figure 15-14: Drive mounting locations on a CBXSS/CBSS/DBS

Installing drives in the DBX

To install drives in the DBX:

1. Pull the DBX out of the rack and remove the top cover (see Removing and replacing the front bezel on page 3-10).
2. Hold the drive with both hands and insert the drive into the slot from where it was removed.
3. Close the handle.
4. If a drive slot does not contain a drive, insert a dummy drive slowly into the slot.
5. Attach the front bezel (see Removing and replacing the front bezel on page 3-10).
6. Return the DBX to the rack.

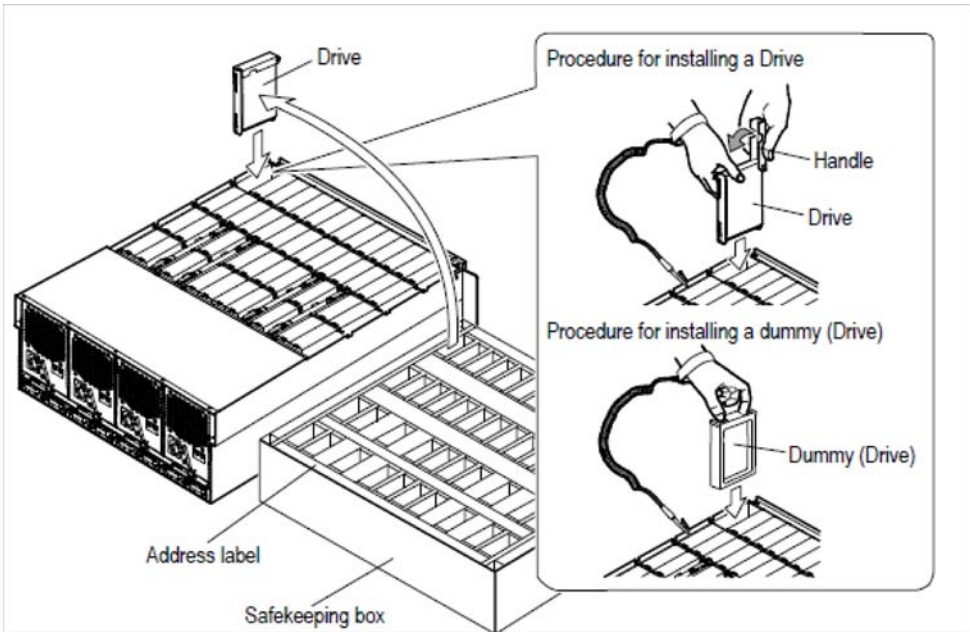


Figure 15-15: Installing a dummy drive in the DBX

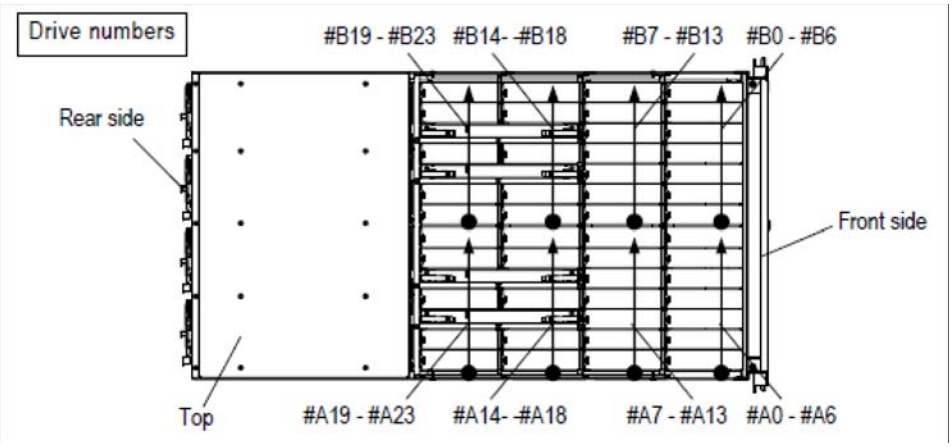


Figure 15-16: Drive locations in a DBX

7. Attach the front bezel (see Removing and replacing the front bezel on page 3-10).

Mounting the CBL

Mount the CBL into the rack and adjust the components in the rack as necessary to accommodate the CBL and DBL, DBS, or DBX Drive Trays. For more information, refer to the *Hitachi Unified Storage Hardware Installation and Configuration Guide*.

After mounting the CBL, connect the SAS (ENC) cables, power cables, and data interface cables. For more information about these interfaces, see Chapter 2, Hardware description and refer to the *Hitachi Unified Storage Hardware Installation and Configuration Guide*.

Power on the Hitachi Unified Storage

To power on the Hitachi Unified Storage:

1. Turn on all PDB breakers.
2. For the DBW Drive Box, turn on the power switch.
3. Power on the CBL Controller Box:
   a. Press the main switch on the front bezel. See Figure 15-17. Turning on the main switch with connected the UPS interlock cable starts the storage system.
   b. Verify that the green **READY** LED on the front bezel is ON (usually five-to-10 minutes after attaching power cables). See Figure 15-17.
   c. Verify that the green **POWER** LED on the front of the Controller Box goes ON. This indicates that the power is turned on. In the unlikely event that the **POWER** LED is OFF:

   - Turn off the main switch.
   - Turn on the circuit breaker of the PDB.
   - Turn on the main switch.
   - Confirm that the red **ALARM** LED goes ON and the orange **WARNING** LED blinks on the upgraded storage system. (If you check the WEB window connecting the maintenance PC to each LAN port on Controller #0 and Controller #1, the orange **WARNING** LED may go OFF.)

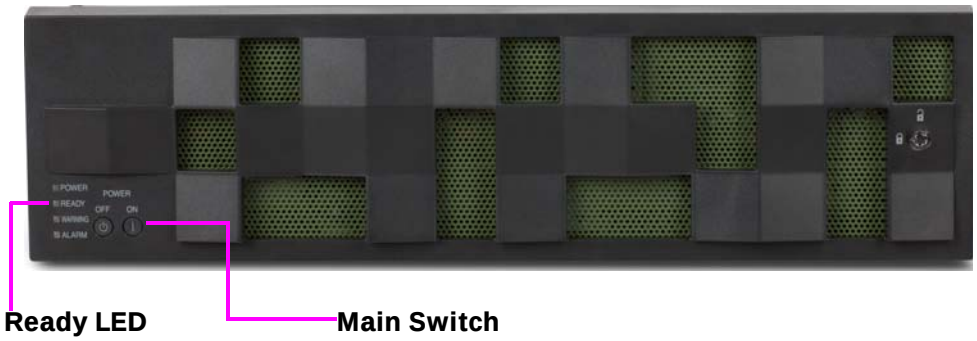


Figure 15-17: READY LED and main switch on CBL Controller Box

4. Drive Boxes power on when you attach power cables to the Drive Box power socket.

   For DBS/DBL Drive Boxes, verify that the:

   a. Green **READY** LED on the front bezel goes ON (usually four minutes after attaching power cables). See Figure 15-18.
   b. LED above the rear panel Drive Box Drive Box ports goes ON when the port links up.

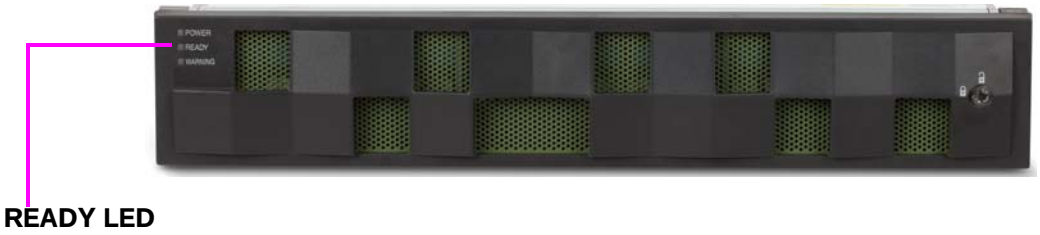


Figure 15-18: READY LED on DBSS and DBL Drive Boxes

For DBX Drive Boxes, verify that the:

a. Green **READY** LED on the front bezel goes ON (usually five minutes after attaching power cables). See Figure 15-19 on page 15-31.

b. LED above the rear panel Drive Box ports goes ON when the port links up.

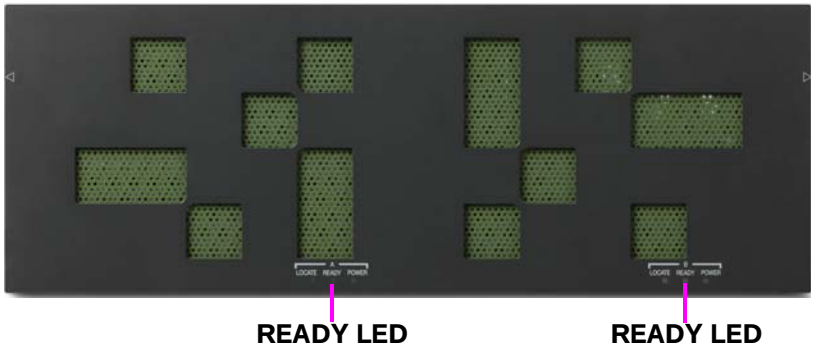


Figure 15-19: READY LED on DBX Drive Box

For DBW Drive Boxes, turn on all Power Units and verify the following:

a. Green **Power OK** LED goes ON (see Figure 15-20).

b. DBW Power Unit goes ON.

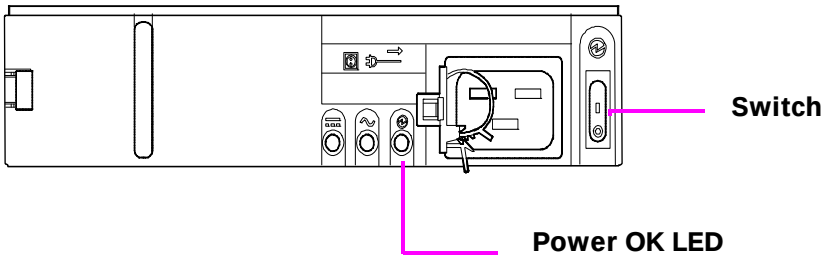


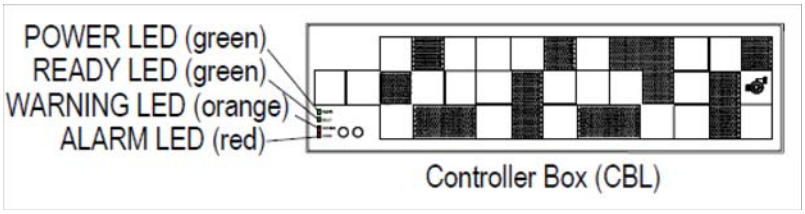
Figure 15-20: Power OK LED and Switch on DBW Drive Box

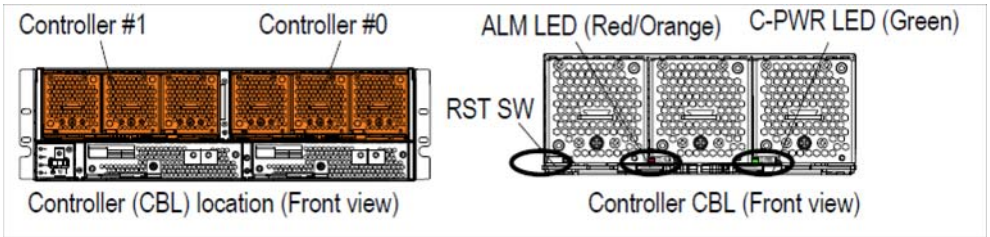
Installing firmware on the Hitachi Unified Storage 150

After powering on the Hitachi Unified Storage 150, use WEB to install the same firmware version you installed on the Hitachi Unified Storage 130 prior to performing the upgrade.

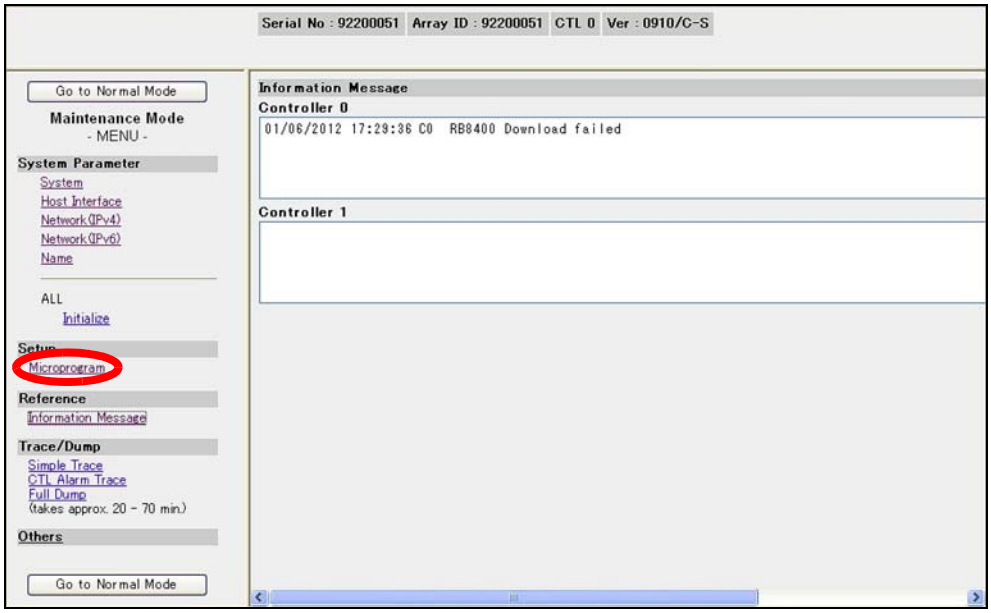
1. On the maintenance PC:
   - Disable DNS in the PC's TCP/IP settings; otherwise, connections to the storage system can take a long time.
   - Configure the browser to not use a proxy server.

1. Use a tool with a thin tip, such as a narrow screwdriver, to press the RST SW on Controller #0. The orange **RST** LED goes ON.
2. Wait for the controller's red **ALM** LED to go ON (typically 10 seconds after you press the RST switch). Then press the RST SW of the other controller. Be sure the red **ALARM** LED on the front of the storage system goes OFF. If it does not go OFF, repeat step 1. When the green **READY** LED on the front bezel goes OFF, the system is in Maintenance Mode.

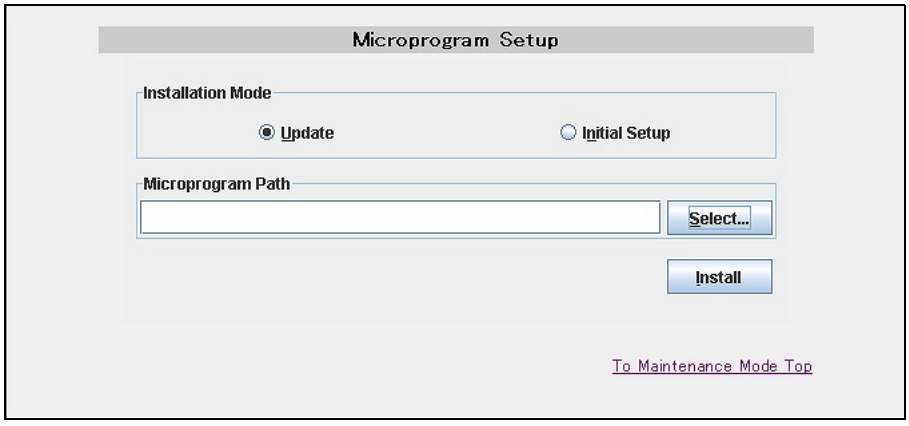




3. Connect a Ethernet cross-over cable to the CBL maintenance port and connect the array to the Web.
4. Start a browser on the maintenance PC and enter the IP address of the controller.
5. If a Enter Network Password screen prompts you for a user name and password, enter them and click **OK**.
6. At the following page, in the left pane, under **Setup**, click **Microprogram**.



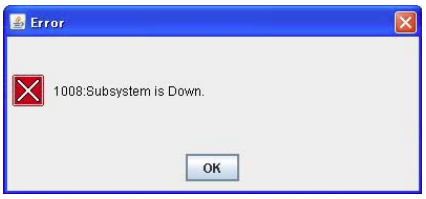
7. At the Microprogram Setup page, under **Installation Mode**, click **Update**.



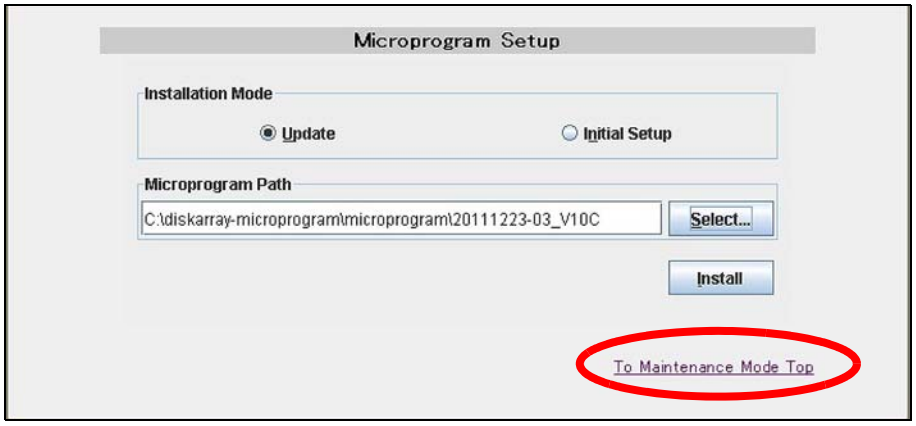
NOTE: If the Microprogram Setup page does not appear, JRE 1.6.0 may not be installed. To install JRE, see Installing Java Runtime Environment on page 15-12.

8. Unzip the firmware zip file to the directory `C:\diskarraymicroprogram\microprogram`.
9. Click the **Select** button, go to the directory where the uncompressed firmware files are located, click the firmware file, and click **Open**.
10. Click **Install** and follow the on-screen instructions for completing the firmware installation.

NOTE: If either of the following messages appears, click **OK** to close the message, and then repeat this procedure to confirm the storage system is in Maintenance Mode.



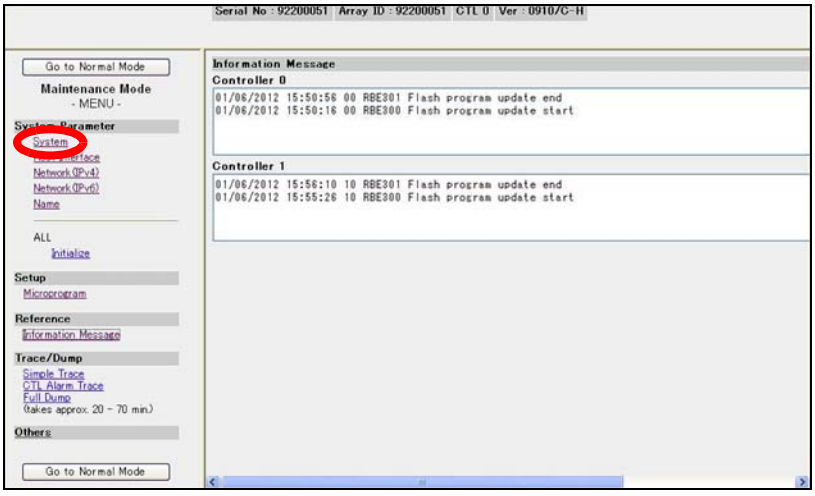
11. When a message states that the firmware installation has completed, click **OK** to close the message.
12. At the Microprogram Setup page, click **To Maintenance Mode Top** and proceed to Changing the number of Drive I/O Modules, below.



Changing the number of Drive I/O Modules

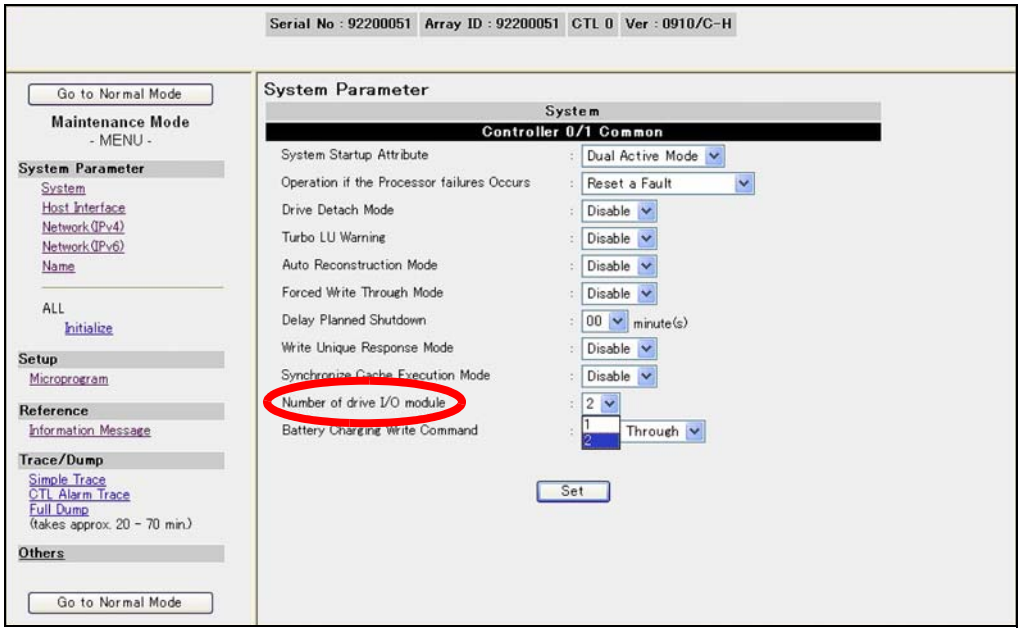
Continue with the previous procedure to change the number of Drive I/O Modules.

1. At the Maintenance Mode page, in the left pane, under **System Parameter**, click **System**.



2. At the next screen click **Change**.

3. Using the **Number of drive I/O module** drop-down list, change the setting **2** and click the **Set**.

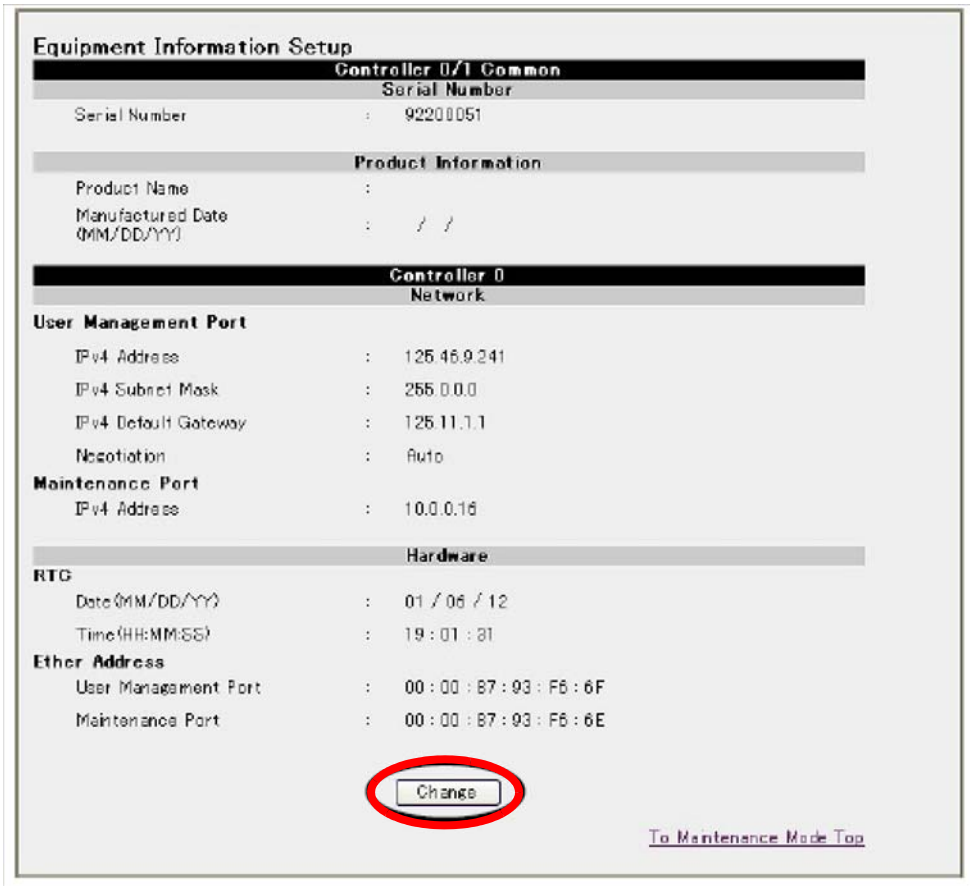


4. At the confirmation window, click **Save**.
5. At the next two windows, click **OK**.

Configuring the storage system serial number

Use the following procedure to change the serial number for the Hitachi Unified Storage 150.

1. In your browser, type **http:*//<IP address of the array>/*equip_set** and click **Go**. In this URL, ***<IP address of the array>*** is the IP address of the storage system prior to the upgrade.
2. If prompted for a user name and password, enter the appropriate user name and password.
3. At the Equipment Information Setup page, click **Change**.



4. At the next page, enter the 8-digit serial number in the **Serial Number** field and click **Set**. The serial number is the 8-digit number on the storage system (see Figure 15-21 on page 15-37).

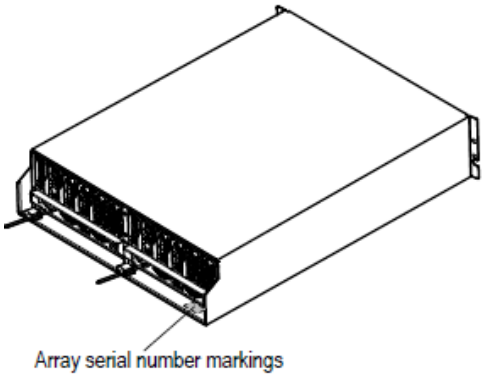
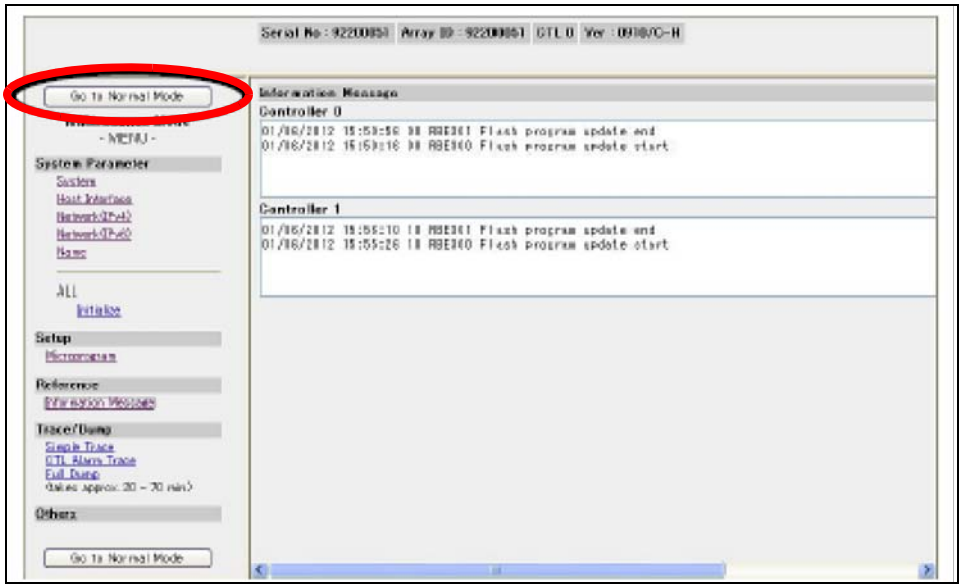


Figure 15-21: Serial number location on the CBL

5. At the next screen, confirm that the serial number you entered is correct, and then click **Save**.
6. At the next two messages, click **OK**.
7. At the Equipment Information Setup page, click **To Maintenance Mode Top**.
8. In the left pane, click **Go to Normal Mode** to switch from Maintenance Mode to Normal Mode.



9. The next page shows that rebooting is executing. When the reboot completes, a page prompts you to set system parameters. Click **OK**. The storage system will become ready in approximately4-to-15 minutes.
10. Confirm that the green **READY** LED on the front of the Controller Box is ON. This LED may blink quickly for up to 60 minutes. The orange **WARNING** LED may blink quickly for up to 85 minutes) before the **READY** LED goes ON. If the **READY** LED does not go on, the installation may have failed and you will have to repeat the procedure.
11. Exit the WEB.

Registering the Hitachi Unified Storage 150

After upgrading the Hitachi Unified Storage 150, use Hitachi Navigator Modular 2 to register the storage system

1. Connect the maintenance PC to the storage system and start Hitachi Storage Navigator Modular 2, and log in.
2. At the Arrays page, check the storage system.
3. Press the Ctrl, Shift, and E keys at the same time to switch to Maintenance Mode. Confirm that **Maintenance Mode** appears next to **Operation Mode** on the Arrays page.
4. Confirm that the Hitachi Unified Storage 150 appears on the Arrays page.
5. Click the **Remove Array** button at the bottom-right side of the Arrays page.
6. Click **Close**.
7. When a message tells you that the array was removed successfully, click **Close**.
8. Confirm that the Hitachi Unified Storage 150 has been removed from the Arrays page.

The storage system is now registered following the upgrade.

Completing the upgrade

To complete the upgrade, perform the following procedure.

1. If you configured Hitachi Storage Navigator Modular 2 to send email alert notifications, change the device model name displayed in the email alerts. Refer to the *Hitachi Unified Storage Hardware Installation and Configuration Guide* and the Hitachi Storage Navigator Modular 2 online help.
2. If you use SNMP Agent Support Function, change the device model name displayed in the alerts sent by this application. Refer to the *Hitachi Unified Storage Operations Guide* and the Hitachi Storage Navigator Modular 2 online help.
3. Disconnect the maintenance PC from the Hitachi Unified Storage 150.
4. Attach the front bezel to the Hitachi Unified Storage 150 (see Removing and replacing the front bezel on page 3-10).
5. If you purchased a priced option, contact Hitachi Support for instructions about installing (or “unlocking”) it for use. You cannot use the license key of the priced option that was used prior to the upgrade.
6. Reboot the host computer and prepare it for use with the Hitachi Unified Storage 150.

This completes the procedure for upgrading a Hitachi Unified Storage 130 to a Hitachi Unified Storage 150.

16

General maintenance and best practices

To keep your Hitachi Unified Storage system operating at peak performance, please review and perform the general maintenance and best practices procedures in this chapter.

This chapter covers general maintenance procedures for Hitachi Unified Storage systems.

The following topics are covered in this chapter:

Periodic maintenance procedures

Table 16-1 describes periodic maintenance tasks for the storage system. Inspect and clean the storage system regularly, as dictated by your environment.

Table 16-1: Periodic maintenance procedures

Task	Interval	Approximate time required
Inspect fans on Fan Unit	Y1	5 minutes
Inspect fans on Power Unit		
Clean the front bezel	Y1	5 minutes
Clean the rack	Y1	5 minutes

Inspecting the fans

A Fan Unit is only installed in the CBL. The fan for the CBXSS/CBXSL/CBSS/CBSL is built into the Power Unit. Inspect the fans when the storage system power is turned on.

WARNING! The storage system fans rotate at high speed. Exercise extreme caution to avoid getting anything caught in the rotation of the fans.

Cleaning the storage system

To clean the storage system, check whether the air vents are clogged by dust. If they are clogged, remove the dust with a vacuum cleaner or wipe the dust with a dry cloth.

Keep the internal and external sides of the front bezel (you may need to remove the front bezel as described in Removing and replacing the front bezel on page 3-10) and keep the rear panel clean. Otherwise, the ventilation passing through the storage system can be affected, causing the storage system temperature to rise and result in a failure or possibly a fire.

Do not move the storage system during cleaning.

WARNING: Do not touch a live part on the storage system. Otherwise, you can receive an electric shock.

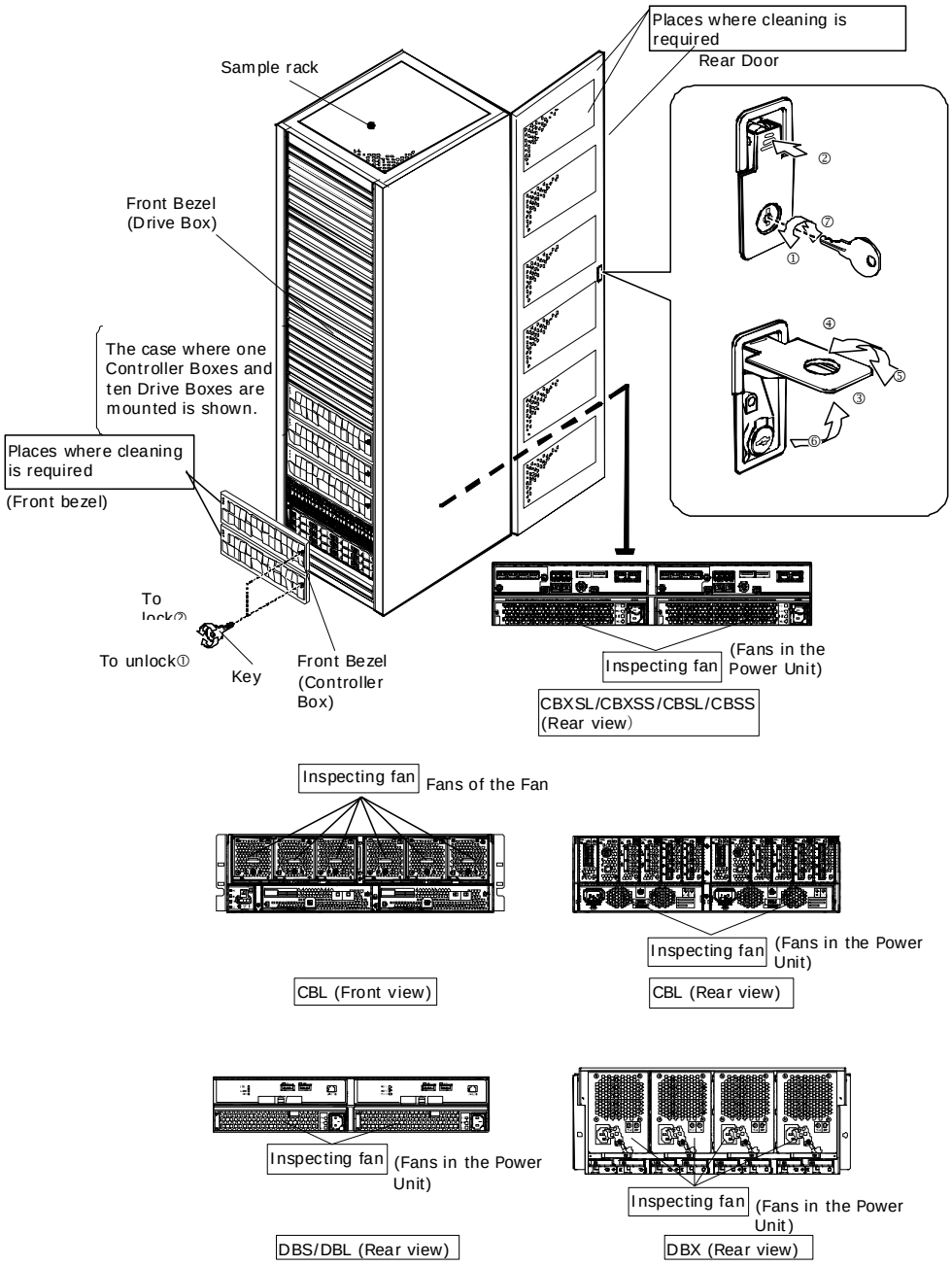


Figure 16-1: Inspecting and cleaning the storage system (rack is shown for demonstration purposes only)

Replacing the battery

Hitachi Unified Storage systems contain a limited-life battery that will eventually need to be replaced. Do not use the storage system once the usable battery time has expired.

- To replace the battery on a CBXSL/CBXSS/CBSL/CBSS, you replace the cache backup battery installed in the Power Unit (see Replacing the cache backup battery on CBXSS/CBXSL/CBSS/CBSL Controller Boxes on page 5-3).
- To replace the battery on a CBL, you replace the cache backup battery (see Replacing the cache backup battery on a CBL Controller Box on page 5-6).

WARNING: Do not disassemble the battery; otherwise, you could get burned or receive an electric shock. To prevent the battery from exploding, handle the battery according to the procedures in this section.

NOTE: If a storage system is powered off for more than six months, the battery may sustain unrecoverable damage. To avoid this situation, charge the battery more than three hours every six months.

Procedure when moving the storage system

If you need to move the Hitachi Unified Storage system, review the figures in this chapter before moving the hardware.

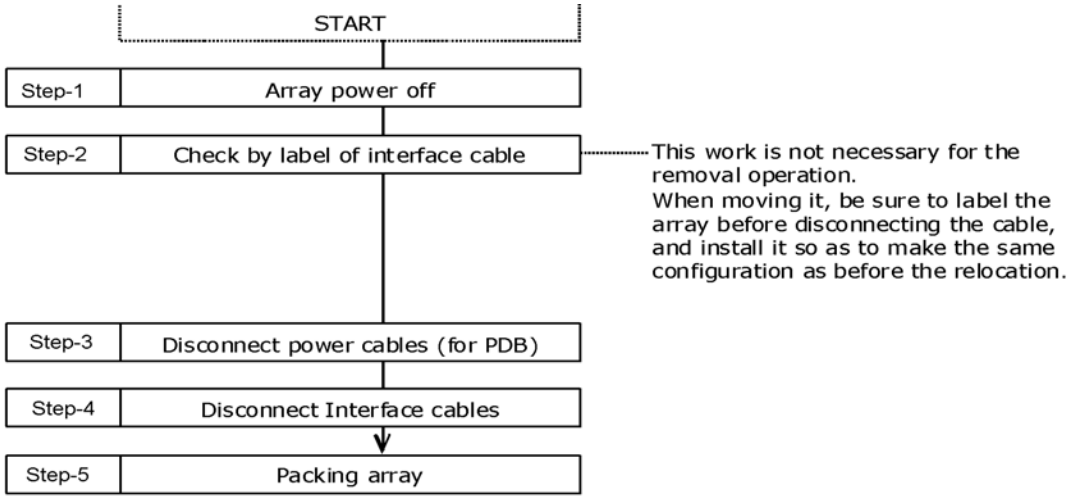


Figure 16-2: Moving the Storage System and Rack Together

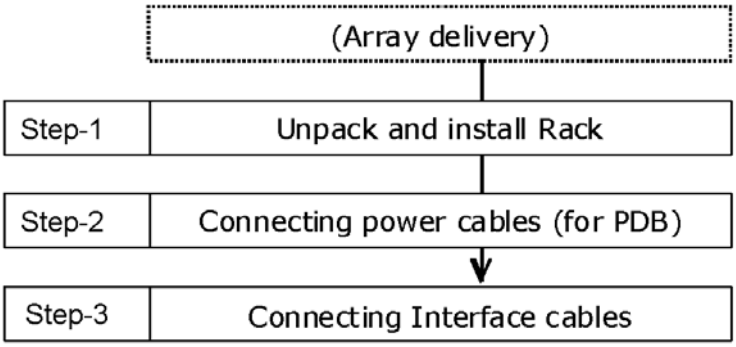


Figure 16-3: Tasks to perform at new location before moving the storage system

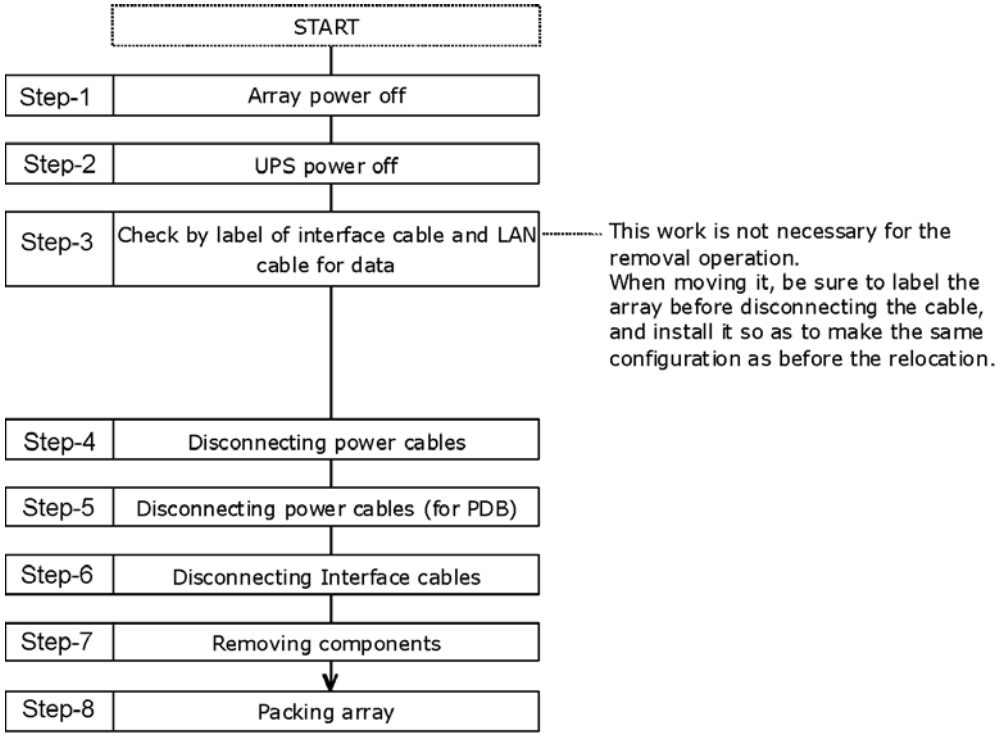


Figure 16-4: Moving the storage system with moving parts

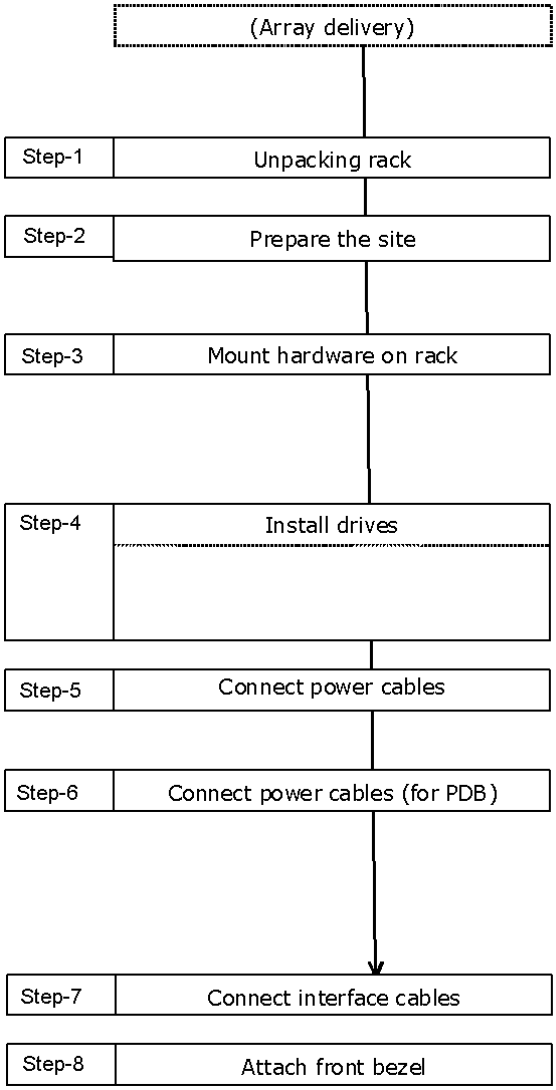


Figure 16-5: Installing the storage system at the new location

Disconnecting cables

Use the following procedure when disconnecting cables from the HItachi Unified Storage system.

Disconnecting power cables from the Power Unit

WARNING! Be sure there is no scratch or bend on a power cable that can cause an electric shock or fire. If the cable cannot be removed easily, do not pull it by force; gently pull out as much of the cable as you can, repeating this action until the cable is removed.

To disconnect the power cable from the Power Unit:

1. Disconnect the power cable connected to the PDB.
2. Remove the power cable secured to the Repeat Binder.
3. Disconnect the power cable connected to the Power Unit.

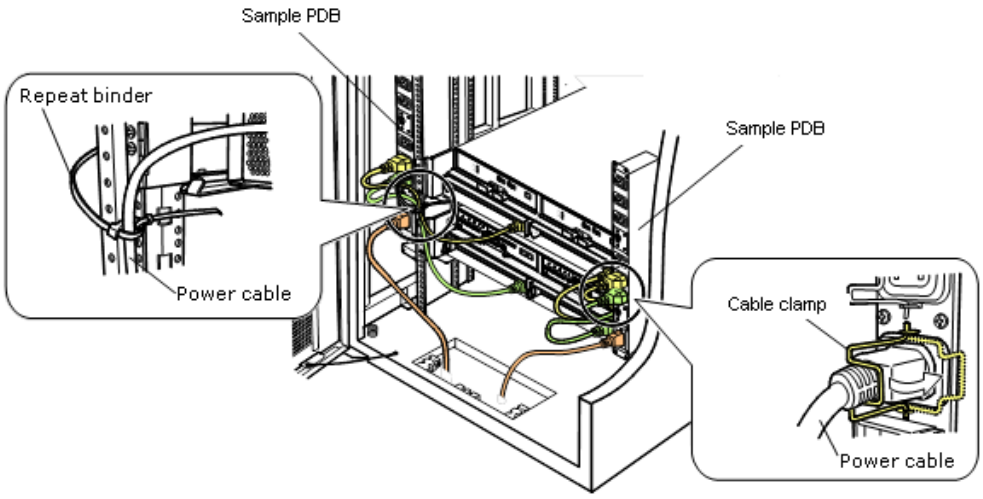


Figure 16-6: Example of disconnecting power cables

Disconnecting Fibre Channel interface cables

NOTE: If the cable cannot be removed easily, do not pull it by force; gently pull out as much of the cable as you can, repeating this action until the cable is removed.

To disconnect Fibre Channel interface cables:

1. Disconnect the Fibre Channel interface cable from the clamp.
2. Disconnect the Fibre Channel interface cable connected to the controller.

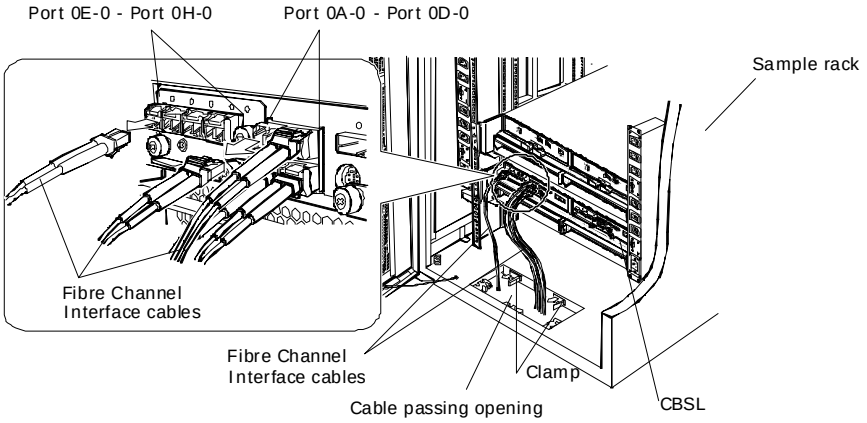


Figure 16-7: Example of disconnecting Fibre Channel cables on a CBSL

Disconnecting iSCSI interface cables

NOTE: If the cable cannot be removed easily, do not pull it by force; gently pull out as much of the cable as you can, repeating this action until the cable is removed.

To disconnect iSCSI interface cables:

1. Disconnect the iSCSI interface cable from the clamp.
2. Disconnect the iSCSI interface cable connected to the controller.

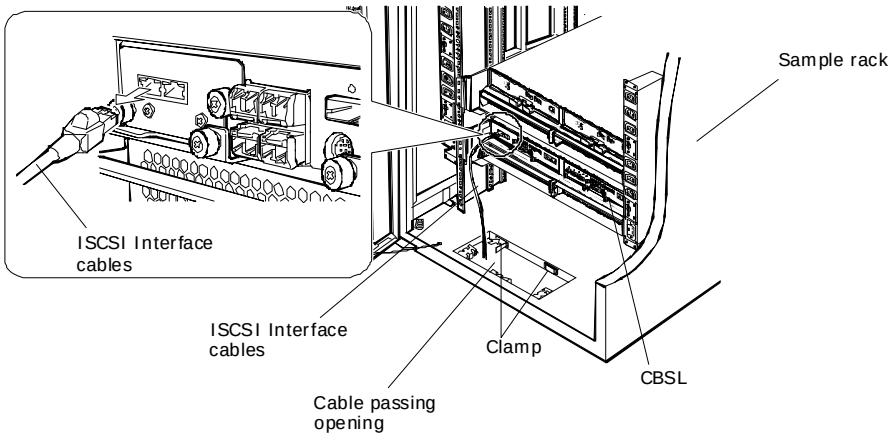


Figure 16-8: Example of disconnecting iSCSI cables on a CBSL

Storing a Hitachi Unified Storage system

If the storage system is not used for more than six months, the battery may become overcharged and suffer unrecoverable damage. To avoid this situation, charge the battery more than three hours at least once six months.

17

Troubleshooting

This chapter covers troubleshooting topics related to the replacement of components in Hitachi Unified Storage systems.

The following topics are covered in this chapter:

Hitachi Storage Navigator Modular 2 does not start

In the unlikely event that Hitachi Storage Navigator Modular 2 does not start, check for a communication failure between the Storage Navigator Modular 2 and the host may occur. If the connection is good, Storage Navigator Modular 2 may not have been started in the normal way.

Figure 17-1 on page 17-3 shows the steps to follow when troubleshooting Storage Navigator Modular 2.

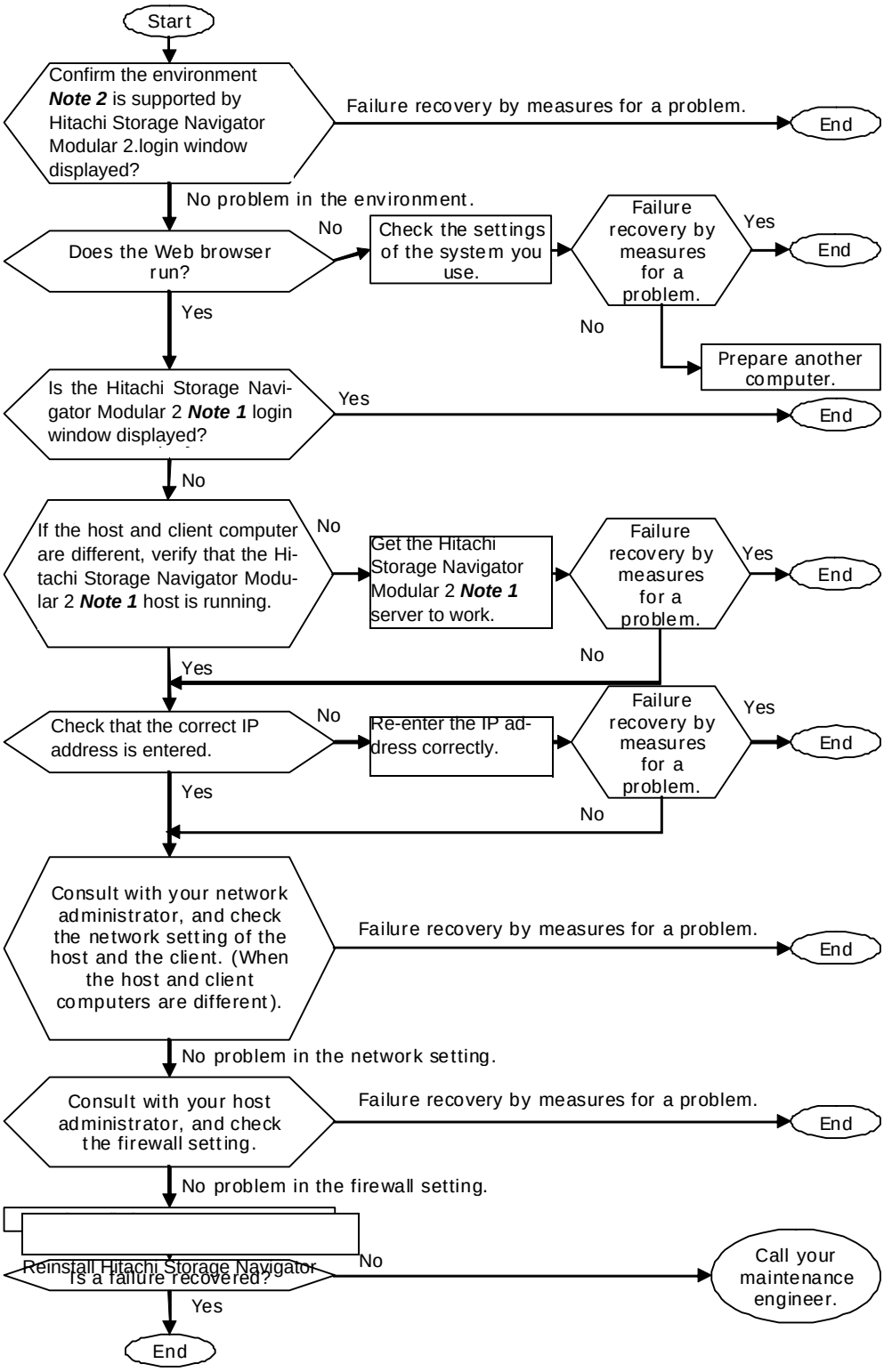


Figure 17-1: Troubleshooting workflow if Storage Navigator Modular 2 will not start

NOTE: Refer to the Hitachi Unified Storage Hardware Installation and Configuration Guide.

Hitachi Storage Navigator Modular 2 cannot connect to storage system

If Storage Navigator Modular 2 is not able to connect to a Hitachi Unified Storage system, use the storage system light-emitting diodes (LEDs) and the workflow in Figure 17-2 on page 17-5 to determine the failure.

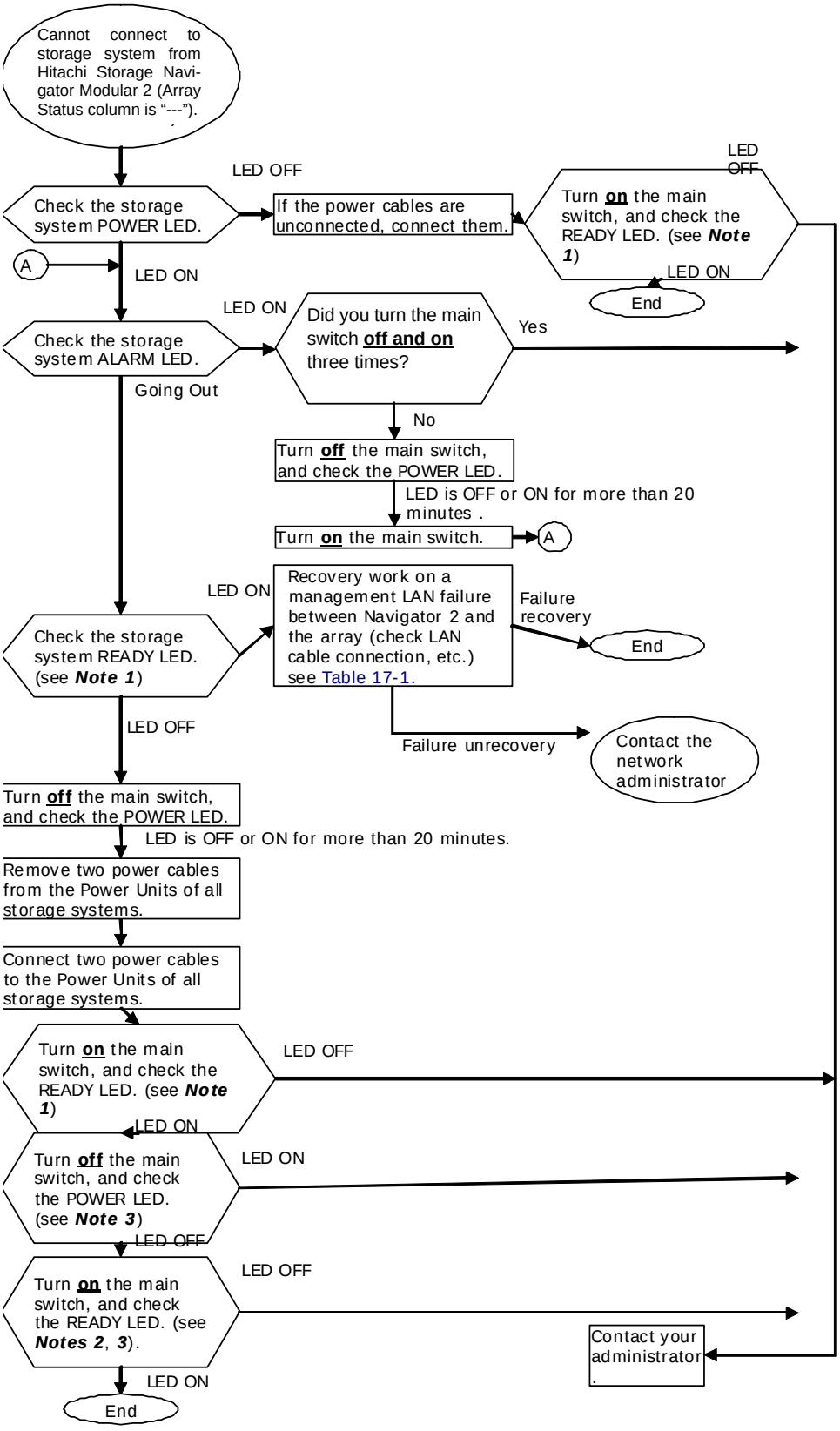


Figure 17-2: Troubleshooting workflow if Storage Navigator Modular 2 cannot connect

NOTE 1: The **READY** LED goes ON for approximately four minutes when the storage system starts. However, it may take 20 minutes for the LED to go ON, depending on the status of the storage system. If the **READY** LED does not go ON after waiting 20 minutes, check whether the **POWER** LED is ON. If the **POWER** LED is OFF, check that the power cables are connected securely.

NOTE 2: Turn off the main switch before performing this procedure. It is possible that the storage system did not power off properly, so turn off the main switch again and then turn it on.

After taking the proper action, use Table 17-1 to confirm that the problem has been resolved.

Table 17-1: Correcting Storage Navigator Modular 2 problems

Item to check	Description
Is the negotiation setting for the storage system set correctly in Storage Navigator Modular 2?	Set the same negotiation setting for the storage system and the customer devices. Otherwise, the storage system and customer devices might not be able to communicate. The default value for negotiation is Auto.
Are the storage system IP address, subnet mask, and default gateway specified correctly in Storage Navigator Modular 2?	Set appropriate values for the customer environment when configuring the storage system IP address, subnet mask, and default gateway. [IPv4 default value] Controller #0: IP Address:192.168.0.16 Subnet Mask:255.255.255.0 Default Gateway:0.0.0.0 Controller #1: IP Address:192.168.0.17 Subnet Mask:255.255.255.0 Default Gateway:0.0.0.0 [IPv6 default value] Controller #0: IP Address: Auto Controller #1: IP Address: Auto

Table 17-1: Correcting Storage Navigator Modular 2 problems

Item to check	Description
Is the storage system configured to use the DHCPv4 server?	When the storage system is configured to use a DHCPv4 server, use the IP addresses assigned by the DHCP v4 server. When using a DHCP v4 server, we recommend you configure the storage system to use static IP addresses. If the IP address is not assigned by a DHCP v4 server, but the storage system is configured to use DHCP v4 server-supplied IP addresses, Storage Navigator Modular 2 will not be able to connect to the storage system. Consult your administrator and review the DHCP v4 server settings. [default value] DHCP v4:Off (Static IP Address)
Is the IP address of the storage system assigned to other storage systems or hosts?	If a storage system uses the same IP address used by other storage systems and hosts, Storage Navigator Modular 2 cannot connect to the storage system. Assign different unused IP addresses to the storage system.
Are the correct values set for the IP address, subnet mask, or default gateway of the host where Storage Navigator Modular 2 is installed?	Set the IP address, subnet mask and default gateway that allows the storage system to communicate with the host.
Is the network switch performing TCP/UDP port filtering?	The default TCP port number for Storage Navigator Modular 2 is 2000. Set a suitable value for the customer environment. [the default port number]:2000(standard) 28355(secure) Change the port number in environments that use the Cisco SIP Phone.
Is the Search Array function being performed across the IPv6 routers?	The Auto Search Array used by IPv6 uses link-local scope multicast. The IPv6 router cannot transfer this multicast to other local links, so the IPv6 router is unable to search the storage system across the IPv6 router. If different local links are used, register the storage system using a static IP address search.
Is packet filtering enabled?	There may be times when a connection to the storage system cannot be made temporarily. Wait at least one minute, and then update it again.

Storage system failures

A storage system failure may have occurred if one or more of the following conditions occurs:

- The storage system sends an email alerting you to a failure.
- The **Alarm** or **Warning** LED on the front panel goes ON.
- The **Ready** LED on the front panel is OFF.
- You experience performance deterioration with the storage system.
- A VOL cannot be recognized.
- A host cannot see a data port on the storage system.

If one or more of these actions occurs, perform the following steps to recover from the failure:

1. Log in to Storage Navigator Modular 2:

NOTE: If Storage Navigator Modular 2 does not start:

- A communication failure with the Storage Navigator Modular 2 server may have occurred or the Storage Navigator Modular 2 server may not be started normally. See the “Storage Navigator Modular 2 will not start” topic in Table on page 17-2.
- The storage system may be turned off or there may be a network failure between Storage Navigator Modular 2 and the storage system. See the “Storage Navigator Modular 2 cannot communicate with the storage system” topic in Table on page 17-4.

2. Go to the Explorer pane and click **Arrays**.
3. In the **Arrays** area, check the status and serial number of the storage system where the failure occurred.
4. If you received an email message about the failure, check that the hardware serial number in the email matches the one on the storage system.
5. Check the status column of the system that matches the hardware serial number checked in the previous step.
   - **Normal** = The storage system is operating normally. The fault may have occurred between the storage system and the host. See “Host cannot access storage” in Table 17-1 on page 17-6.
   - **---** = Storage Navigator Modular 2 cannot access the storage system. The main switch may be set to the OFF position or a network failure may have occurred between the host and the storage system.See Hitachi Storage Navigator Modular 2 cannot connect to storage system on page 17-4.
6. From the Arrays page, click the name of the storage system. When the next screen appears, click either **Alerts & Events** in the Arrays pane or **Check for Errors** in the Common Array Tasks area. In the **Alert Parts** tab, check for the failed part, such as a disk drive.

7. If an entry appears in the failure parts list window, select the part and click **Show Details** in the lower right corner of the screen for detailed information. To remove the information, click the **Close** button.

Using LEDs to diagnose problems

Table 17-2 describes how to troubleshoot problems using the LEDs on Hitachi Unified Storage systems.

If the storage system used in a remote TrueCopy Remote Replication/ TrueCopy Extended Distance configuration restarts with the TrueCopy Remote Replication/TrueCopy Extended Distance status of enabled, the following occur.

- The path used by TrueCopy Remote Replication/TrueCopy Extended Distance becomes blocked. Notifications from the Storage Navigator Modular 2 e-mail alert function, SNMP Agent Support function, and TRAP occur when the path is blocked. Follow the instructions in the notification. The blocked path recovers automatically after restarting the storage system.
- If the TrueCopy Remote Replication/TrueCopy Extended Distance pair status is PAIR or COPY, the pair changes to PSUE. In this case, suspend the pairs before restarting the storage system.
- If using Power Saving/Power Saving Plus and the power saving setting **I/O interlock disabled** is executed, starting the storage system with the power saving status set to **Normal (Command Monitoring)** changes the status to **Normal (Spindown Failed: PS OFF/ON)**. After performing the **I/O interlock disabled** operation, check that there is no RAID group whose power saving status is **Normal (Command Monitoring)** and then restart the storage system.

Table 17-2: Using LEDs to diagnose problems

Problem	Corrective action
POWER LED does not go ON	1. Set the main switch to on. 2. Is the **POWER** LED on the Controller Box ON? • Yes: Go to step 10. • No: Power on the host computer. 3. Is the **POWER** LED on the Controller Box ON? • Yes: Go to step 10. • No: Set the main switch to off. 4. Check that the storage system is receiving power. 5. Verify that the AC cable is correctly connected to the plug socket and the equipment. 6. Set the main switch to on. 7. Is the **POWER** LED on the Controller Box ON? • Yes: Go to step 10. • No: Set the main switch to off. 8. Contact your administrator. Go to step 10. 9. Is the READY LED ON? • Yes: Continue to use the equipment, even if the green **READY** LED blinks fast. • No: See READY LED does not go ON or READY LED went ON and then OFF on page 17-12. 10. End of procedure.

Table 17-2: Using LEDs to diagnose problems (Continued)

Problem	Corrective action
POWER LED turned OFF	1. Is AC power being supplied? • Yes: Go to step 2. • No: Supply AC power to the storage system and restart the storage system. Go to step 2. 2. Set the main switch to off. 3. Wait over a minute and then set the main switch to ON. 4. Is the **POWER** LED on the Controller Box ON? • Yes: go to step 6. • No: Set the main switch to OFF. 5. Contact your administrator. Go to step 7. 6. Is the **READY** LED on the Controller Box ON? • Yes: Use the equipment in its current operational state, even if the green **READY** LED blinks fast. • No: See READY LED does not go ON or READY LED went ON and then OFF on page 17-12. 7. End of procedure.

Table 17-2: Using LEDs to diagnose problems (Continued)

Problem	Corrective action
READY LED does not go ON or READY LED went ON and then OFF	1. Is the **POWER** LED on the Controller Box ON? • Yes: Go to step 2. • No: Go to step 4 in POWER LED does not go ON on page 17-10. 2. Is the ALARM LED on the controller ON? • Yes: See ALARM LED is ON on page 17-12. • No: Go to step 3. 3. Does the green **READY** LED on the Controller Box blink fast? • Yes: Internal processing is occurring. Wait for the green **READY** LED on the Controller Box to go ON (up to 50 minutes, 60 minutes for the CBL/CBLD, or 180 minutes when the DBW is connected to the CBL). The storage system will be operational even if the **READY** LED blinks fast. • No: Go to step 4. 4. Does the orange **WARNING** LED blinks fast • Yes: Storage system is updating flash or internal processing is occurring on a single-controller storage system after the system has been turned on. Wait for the orange **WARNING** LED on the Controller Box to go OFF and the green **READY** LED on the controller to go ON because flash is being updated. • No: Go to step 5. 5. Turn OFF the main switch. 6. Wait more than one minute and then set the main switch to ON. 7. Is the **READY** LED on the Controller Box ON? • Yes: Continue to use the equipment. If the green **READY** LED blinks fast, the storage system is operational. Go to step 10. • No: Go to step 8. 8. Set the main switch to OFF. 9. Contact your administrator. 10. End of procedure.
ALARM LED is ON	1. Identify which components failed. 2. Contact your administrator and do not disturb the equipment

Table 17-2: Using LEDs to diagnose problems (Continued)

Problem	Corrective action
WARNING LED goes ON or blinks	1. Does the orange **WARNING** LED on the Controller Box blink fast? • Yes: Flash program is executing. Wait for the orange **WARNING** LED on the Controller Box to go OFF and the green **READY** LED on the Controller Box to go ON. • No: Go to step 2. 2. Does the orange **WARNING** LED on the Controller Box blink slowly? • Yes: Use Storage Navigator Modular 2 to identify the failed components. • No: Go to step 3. 3. Is the green **READY** LED on the controller ON? • Yes: Go to step 4. • No: See READY LED does not go ON or READY LED went ON and then OFF on page 17-12. 4. Continue to use the equipment and contact your administrator. 5. End of procedure.

Glossary

This glossary provides definitions for replication terms as well as terms related to the technology that supports your Hitachi storage system. Click the letter of the glossary section to display the related page.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

A

Arbitrated loop

A Fibre Channel topology that requires no Fibre Channel switches. Devices are connected in a one-way loop fashion. Also referred to as FC-AL.

Array

A set of hard disks mounted in a single enclosure and grouped logically together to function as one contiguous storage space.

B

bps

Bits per second. The standard measure of data transmission speeds.

C

Cache

A temporary, high-speed storage mechanism. It is a reserved section of main memory or an independent high-speed storage device. Two types of caching are found in computers: memory caching and disk caching. Memory caches are built into the architecture of microprocessors and often computers have external cache memory. Disk caching works like memory caching; however, it uses slower, conventional main memory that on some devices is called a memory buffer.

Capacity

The amount of information (usually expressed in megabytes) that can be stored on a disk drive. It is the measure of the potential contents of a device. In communications, capacity refers to the maximum possible data transfer rate of a communications channel under ideal conditions.

CCI

See command control interface.

Challenge Handshake Authentication Protocol

An authentication technique for confirming the identity of one computer to another. Described in RFC 1994.

CHAP

See Challenge Handshake Authentication Protocol.

CLI

See command line interface.

Controller Box

The enclosure that contains the storage system controller. For some models, disk drives may be included as well. Controller Boxes come in 2U and 3U versions.

- CBL: AC-powered 3U Controller Box.
- CBLD: DC-powered 3U Controller Box.
- CBSL Controller Box: A 3U Controller Box that can contain a maximum of 12 3.5-inch drives.
- CBSS Controller Box: A 2U Controller Box that can contain a maximum of 24 2.5-inch drives.
- CBXSL Controller Box: A 3U Controller Box that can contain a maximum of 12 3.5-inch drives.
- CBXSS Controller Box: A 2U Controller Box that can contain a maximum of 24 2.5-inch drives.

Cluster

A group of disk sectors. The operating system assigns a unique number to each cluster and then keeps track of files according to which clusters they use.

Cluster capacity

The total amount of disk space in a cluster, excluding the space required for system overhead and the operating system. Cluster capacity is the amount of space available for all archive data, including original file data, metadata, and redundant data.

Command devices

Dedicated logical volumes that are used only by management software such as CCI, to interface with the storage systems. Command devices are not used by ordinary applications. Command devices can be shared between several hosts.

Command line interface (CLI)

A method of interacting with an operating system or software using a command line interpreter. With Hitachi Storage Navigator Modular Command Line Interface, CLI is used to interact with and manage Hitachi storage and replication systems.

Controller Box

The enclosure that contains the storage system controller. Some Controller Boxes also include drives. Controller Boxes come in 2U and 3U versions.

CRC

Cyclic Redundancy Check. An error-correcting code designed to detect accidental changes to raw computer data.

D

Disaster recovery

A set of procedures to recover critical application data and processing after a disaster or other failure. Disaster recovery processes include failover and failback procedures.

DMLU

See Differential Management-Logical Unit.

Drive Box

Chassis for mounting drives that connect to the Controller Box.

- Drive Boxes with AC power supply:

  DBS, DBL, DBF: Drive Box (2U)

  DBX: Drive Box (4U)

  DBW: Drive Box (5U)
- Drive Boxes with DC power supply:

  DBSD Drive Box (2U)

  DBLD: Drive Box (2U)

Drive I/O Module

I/O module for the CBL that has drive interfaces.

Duplex

The transmission of data in either one or two directions. Duplex modes are full-duplex and half-duplex. Full-duplex is the simultaneous transmission of data in two direction. For example, a telephone is a full-duplex device, because both parties can talk at once. In contrast, a walkie-talkie is a half-duplex device because only one party can transmit at a time.

E

Ethernet

A computer networking technology for local-area networks.

Extent

A contiguous area of storage in a computer file system that is reserved for writing or storing a file.

F

Fabric

Hardware that connects workstations and servers to storage devices in a Storage-Area Network (SAN)N. The SAN fabric enables any-server-to-any-storage device connectivity through the use of Fibre Channel switching technology.

Failover

The automatic substitution of a functionally equivalent system component for a failed one. The term failover is most often applied to intelligent controllers connected to the same storage devices and host computers. If one of the controllers fails, failover occurs, and the survivor takes over its I/O load.

Fallback

Refers to the process of restarting business operations at a local site using the P-VOL. It takes place after the storage systems have been recovered.

Fault tolerance

A system with the ability to continue operating, possibly at a reduced level, rather than failing completely, when some part of the system fails.

FC

See Fibre Channel.

FC-AL

See Arbitrated Loop.

FCOE

See Fibre Channel over Ethernet.

Fibre Channel

A gigabit-speed network technology primarily used for storage networking.

Fibre Channel over Ethernet

A way to send Fiber Channel commands over an Ethernet network by encapsulating Fiber Channel calls in TCP packets.

Firmware

Software embedded into a storage device. It may also be referred to as Microcode.

Full-duplex

Transmission of data in two directions simultaneously. For example, a telephone is a full-duplex device because both parties can talk at the same time.

G

Gbps

Gigabit per second.

Gigabit Ethernet

A version of Ethernet that supports data transfer speeds of 1 gigabit per second. The cables and equipment are very similar to previous Ethernet standards.

GUI

Graphical user interface.

H

HA

High availability.

Half-duplex

Transmission of data in just one direction at a time. For example, a walkie-talkie is a half-duplex device because only one party can talk at a time.

HBA

See Host bus adapter.

Host

A server connected to the storage system via Fibre Channel or iSCSI ports.

Host bus adapter

An I/O adapter located between the host computer's bus and the Fibre Channel loop that manages the transfer of information between the two channels. To minimize the impact on host processor performance, the host bus adapter performs many low-level interface functions automatically or with minimal processor involvement.

Host I/O Module

I/O Module for the CBL/CBLD. The Host I/O Module provides interface functions for the host.

I

IEEE

Institute of Electrical and Electronics Engineers (read “I-Triple-E”). A non-profit professional association best known for developing standards for the computer and electronics industry. In particular, the IEEE 802 standards for local-area networks are widely followed.

I/O

Input/output.

I/O Card (ENC)

The I/O Card (ENC) is installed in a DBX. It provides interface functions for the Controller Box or Drive Box.

I/O Module (ENC)

The I/O Module (ENC) is installed in a DBS/DBSD/DBL/DBLD/DBF/DBW. It provides interface functions for the Controller Box or Drive Box.

IOPS

Input/output per second. A measurement of hard disk performance.

initiator

See iSCSI initiator.

IOPS

I/O per second.

iSCSI

Internet-Small Computer Systems Interface. A TCP/IP protocol for carrying SCSI commands over IP networks.

iSCSI initiator

iSCSI-specific software installed on the host server that controls communications between the host server and the storage system.

iSNS

Internet Storage Naming Service. An automated discovery, management and configuration tool used by some iSCSI devices. iSNS eliminates the need to manually configure each individual storage system with a specific list of initiators and target IP addresses. Instead, iSNS automatically discovers, manages, and configures all iSCSI devices in your environment.

L

LAN

Local-area network. A computer network that spans a relatively small area, such as a single building or group of buildings.

Load

In UNIX computing, the system load is a measure of the amount of work that a computer system is doing.

Logical

Describes a user's view of the way data or systems are organized. The opposite of logical is physical, which refers to the real organization of a system. A logical description of a file is that it is a quantity of data collected together in one place. The file appears this way to users. Physically, the elements of the file could live in segments across a disk.

M

Microcode

The lowest-level instructions directly controlling a microprocessor. Microcode is generally hardwired and cannot be modified. It is also referred to as firmware embedded in a storage subsystem.

Microsoft Cluster Server

Microsoft Cluster Server is a clustering technology that supports clustering of two NT servers to provide a single fault-tolerant server.

P

Pair

Refers to two volumes that are associated with each other for data management purposes (for example, replication, migration). A pair is usually composed of a primary or source volume and a secondary or target volume as defined by you.

Pair status

Internal status assigned to a volume pair before or after pair operations. Pair status transitions occur when pair operations are performed or as a result of failures. Pair statuses are used to monitor copy operations and detect system failures.

Parity

The technique of checking whether data has been lost or corrupted when it's transferred from one place to another, such as between storage units or between computers. It is an error detection scheme

that uses an extra checking bit, called the parity bit, to allow the receiver to verify that the data is error free. Parity data in a RAID array is data stored on member disks that can be used for regenerating any user data that becomes inaccessible.

Parity groups

RAID groups can contain single or multiple parity groups where the parity group acts as a partition of that container.

Point-to-Point

A topology where two points communicate.

Port

An access point in a device where a link attaches.

Primary or local site

The host computer where the primary data of a remote copy pair (primary and secondary data) resides. The term “primary site” is also used for host failover operations. In that case, the primary site is the host computer where the production applications are running, and the secondary site is where the backup applications run when the applications on the primary site fail, or where the primary site itself fails.

R

RAID

Redundant Array of Independent Disks. A storage system in which part of the physical storage capacity is used to store redundant information about user data stored on the remainder of the storage capacity. The redundant information enables regeneration of user data in the event that one of the storage system's member disks or the access path to it fails.

RAID group

A set of disks on which you can bind one or more volumes.

Remote path

A route connecting identical ports on the local storage system and the remote storage system. Two remote paths must be set up for each storage system (one path for each of the two controllers built in the storage system).

S

SAN

See Storage-Area Network

SAS

Serial Attached SCSI. An evolution of parallel SCSI into a point-to-point serial peripheral interface in which controllers are linked directly to disk drives. SAS delivers improved performance over traditional SCSI because SAS enables up to 128 devices of different sizes and types to be connected simultaneously.

SAS (ENC) Cable

Cable for connecting a controller box and drive box.

Secure Sockets Layer (SSL)

A protocol for transmitting private documents via the Internet. SSL uses a cryptographic system that uses two keys to encrypt data - a public key known to everyone and a private or secret key known only to the recipient of the message.

Snapshot

A term used to denote a copy of the data and data-file organization on a node in a disk file system. A snapshot is a replica of the data as it existed at a particular point in time.

SNM2

See Storage Navigator Modular 2.

Storage-Area Network

A dedicated, high-speed network that establishes a direct connection between storage systems and servers.

Storage Navigator Modular 2

A multi-featured scalable storage management application that is used to configure and manage the storage functions of Hitachi storage systems.

Striping

A way of writing data across drive spindles.

T

Target

The receiving end of an iSCSI conversation, typically a device such as a disk drive.

TCP

Transmission Control Protocol. A common Internet protocol that ensures packets arrive at the end point in order, acknowledged, and error-free. Usually combined with IP in the phrase TCP/IP.

10 Gb

10 gigabit Ethernet computer networking standard, with a nominal data rate of 10 Gbit/s, 10 times as fast as gigabit Ethernet

U

URL

Uniform Resource Locator. A standard way of writing an Internet address that describes both the location of the resource, and its type.

W

World Wide Name

A unique identifier that identifies a particular Fibre Channel target.

Z

Zoning

A logical separation of traffic between host and resources. By breaking up into zones, processing activity is distributed evenly.

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Hitachi Data Systems

Corporate Headquarters
2845 Lafayette Street
Santa Clara, California 95050-2639
U.S.A.
www.hds.com

Regional Contact Information

Americas
+1 408 970 1000
info@hds.com

Europe, Middle East, and Africa
+44 (0)1753 618000
info.emea@hds.com

Asia Pacific
+852 3189 7900
hds.marketing.apac@hds.com

Hitachi Data Systems

MK-91DF8302-16