Quantum®

Replacing a Drawer in Base System/Expansion Unit

StorNext QD7000

Firmware 8.30.xx.xx

Replacing a Drawer in Base System/Expansion Unit, 6-68569-01 Rev A, April 2017 Product of USA.

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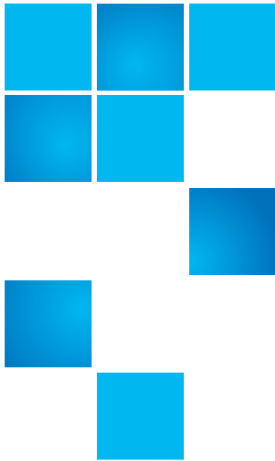
Preface

This section provides the following information:

- Audience
- Prerequisites
- NetApp to Quantum Naming Decoder
- Product Safety Statements
- Contacts
- Comments
- Quantum Global Services

Audience

This manual is intended for storage customers and technicians.

Prerequisites

Prerequisites for installing and using this product include knowledge of:

- Servers and computer networks
- Network administration
- Storage system installation and configuration
- Storage area network (SAN) management and direct attach storage (DAS)
- Fibre Channel (FC) and Ethernet protocols

NetApp to Quantum Naming Decoder

Use Table 1 to correlate the NetApp product nomenclature to the equivalent Quantum-storage naming conventions.

Table 1 Product Nomenclature

E-Series NetApp Product	Quantum-Storage	Description
Controller-Drive Tray	Base System	Quantum uses Base System when referring to a drive tray with the RAID controllers.
Drive Tray	Expansion Unit	Quantum uses Expansion Unit when referring to a drive tray with the environmental services modules (ESMs).
E5600 (Code Name: Titan)	RAID Controller	Four 16Gb/s FC SFP+ host ports
E5500 (Code Name: Soyuz)	RAID Controller	Four 16Gb/s FC SFP+ host ports
E5400 (Code Name: Pikes Peak)	RAID Controller	Four 8Gb/s FC SFP+ host ports
DE6600 (Code Name: Wembley)	4U 60-drive enclosure	Sixty 3.5 inch disk drives

E-Series NetApp Product	Quantum-Storage	Description
E5560 or E5660 (DE6600 4U drive enclosure with E5500 or E5600 RAID controllers)	Quantum StorNext QD7000	
E5460 (DE6600 4U drive enclosure with E5400 RAID controllers)	Quantum StorNext QD6000	
E5424 (DE5600 24-drive 2U drive enclosure (Code Name: Camden with E5400 RAID controllers)	Quantum StorNext QS2400	
E5412 (DE1600 12-drive 2U drive enclosure (Code Name: Ebbets with E5400 RAID controllers)	Quantum StorNext QS1200	

Product Safety Statements

Quantum will not be held liable for damage arising from unauthorized use of the product. The user assumes all risk in this aspect.

This unit is engineered and manufactured to meet all safety and regulatory requirements. Be aware that improper use may result in bodily injury, damage to the equipment, or interference with other equipment.

WARNING: Before operating this product, read all instructions and warnings in this document and in the system, safety, and regulatory guide.

警告 在使用本产品之前，请先阅读本文档及系统、安全和法规信息指南中所有的说明和警告信息。

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ADVERSAL Læs alle instruktioner og advarsler i dette dokument og i *Vejledning om system-sikkerheds- og lovgivningsoplysninger*, før produktet betjenes.

AVERTISSEMENT Avant d'utiliser ce produit, lisez la totalité des instructions et avertissements de ce document et du *Guide d'informations sur le système, la sécurité et la réglementation*.

HINWEIS Lesen Sie vor der Verwendung dieses Produkts alle Anweisungen und Warnhinweise in diesem Dokument und im System, Safety, and Regulatory Information Guide (Info-Handbuch: System, Sicherheit und Richtlinien).

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Replacing a Drive Drawer in a 60-Drive Tray

The steps to replace a failed drive drawer in an E-Series 60-drive tray depend on whether the volumes in the drawer are protected by Drawer Loss Protection. If all volumes in the drive drawer are in volume groups or disk pools that have Drawer Loss Protection, you can perform this procedure online. Otherwise, you must stop all host I/O activity and power off the tray before replacing the drive drawer.
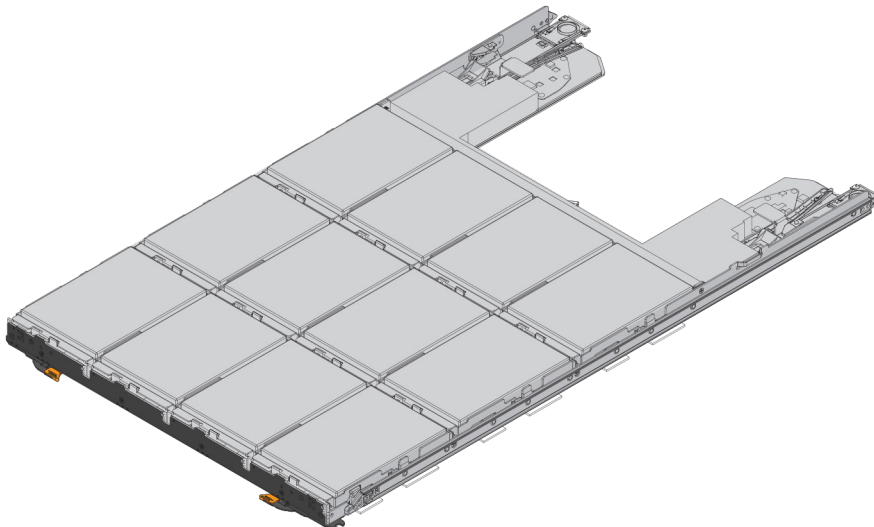
This procedure applies to the following controller-drive trays and expansion drive trays:

• E2660 controller-drive tray

• E2760 controller-drive tray

• E5460 controller-drive tray

• E5560 controller-drive tray

• E5660 controller-drive tray

• DE6600 drive tray

Each of these 60-drive trays has five drive drawers.
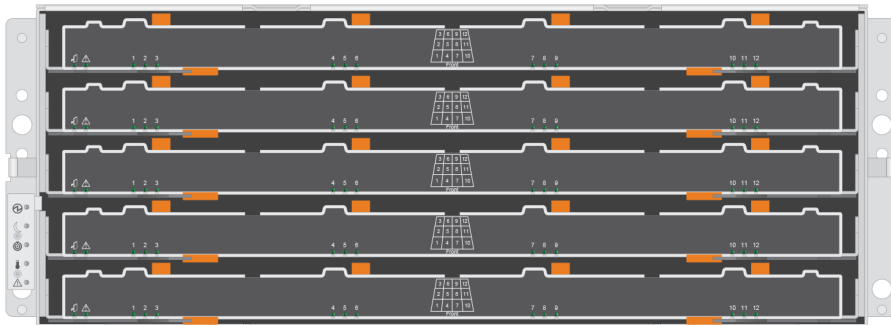
And each of the five drawers can hold up to 12 drives.

Before you begin

You need these items for this procedure:

- Antistatic protection

   Attention: Possible hardware damage – To prevent electrostatic discharge damage to the drive tray, use proper antistatic protection when handling drive tray components.

- Replacement drive drawer

- Replacement left and right cable chains

- Orange cable chain removal tool

   Note: The cable chain removal tool makes it easier to reach into the enclosure and easier to unplug the cable chain connectors. If you do not have the tool, you can use your fingers to unplug the connectors.

- Flashlight

- Permanent marker

Steps

Preparing to remove a drive drawer

If the drive tray is powered on, you must issue the `Set Drawer Service Action Allowed Indicator` CLI command to prevent the controller from accessing the drive drawer. This command also allows you to determine if the drives in the drawer are in volume groups or disk pools protected by Drawer Loss Protection.

Before you begin

Before issuing the CLI command, confirm that the drive tray meets all of these conditions:

- The drive tray cannot be over temperature.

- Both fans must be installed and have a status of Optimal.

- All drive tray components must be in place.

- The volumes in the drive drawer cannot be in a Degraded state.

   Attention: Possible loss of data access – If a volume is already in a Degraded state, and you remove drives from the drive drawer, the volume can fail.

About this task

When you issue the `Set Drawer Service Action Allowed Indicator` CLI command, all drives in the affected drive drawer are checked to ensure they belong to volume groups or disk pools that have Drawer Loss Protection, as follows:

- If all drives in the drawer are in volume groups or disk pools that have Drawer Loss Protection, the command succeeds, and the blue Service Action Allowed LED for the drive drawer is illuminated. You do not need to stop host I/O activity or power down the drive tray to perform this procedure.

- If any drives in the drawer are in volume groups or disk pools that do not have Drawer Loss Protection, a warning is displayed, indicating that this command should not be completed. To avoid data loss, you must stop all host I/O activity and power down the drive tray before removing the drive drawer.

Steps

1. Determine if the drive tray is powered on.

   - If the power is off, you do not need to issue the CLI command. Go to *Removing the cable chains* on page 4.

   - If the power is on, go to the next step.

2. Type this command on the command line, and press **Enter**:

   ```
   SMcli <ctlr_IP1> -c "set tray [trayID] drawer [drawerID]
   serviceAllowedIndicator=on;"
   ```

   In this command:

   <ctlr_IP1>

   is the identifier of the controller.

   [trayID]

   is the identifier of the drive tray that contains the drive drawer that you want to replace. Drive tray ID values are 0 to 99. You must enclose the value for `trayID` in square brackets.

   [drawerID]

   is the identifier of the drive drawer that you want to replace. Drawer ID values are 1 (top drawer) to 5 (bottom drawer). You must enclose the value for `drawerID` in square brackets.

   Example

   This command turns on the blue Service Action Allowed LED for the top-most drawer in drive tray 10:

   ```
   SMcli <ctlr_IP1> -c "set tray [10] drawer [1]
   serviceAllowedIndicator=on;"
   ```

3. Determine if you need to stop host I/O activity, as follows:

   - If the command succeeds, and the blue Service Action Allowed LED is illuminated, you do not need to stop host I/O activity. All drives in the drawer are in volume groups or disk pools that have Drawer Loss Protection. Go to *Removing the cable chains* on page 4.

     Attention: **Possible damage to drives** – Wait 30 seconds after the blue Service Action Allowed LED comes on before you open the drive drawer. Waiting 30 seconds allows the drives to spin down, which prevents possible damage to the hardware.

   - If a warning is displayed indicating that this command should not be completed, you must stop host I/O activity before removing the drawer. The warning is displayed because one or more drives in the affected drawer are in volume groups or disk pools that do not have Drawer Loss Protection. To avoid losing data, you must complete the next steps to stop host I/O activity and to power off the tray.

4. Ensure that no I/O operations are occurring between the storage array and all connected hosts. For example, you can perform these steps:

- Stop all processes that involve the LUNs mapped from the storage to the hosts.

- Ensure that no applications are writing data to any LUNs mapped from the storage to the hosts.

- Unmount all file systems associated with volumes on the array.

    Note: The exact steps to stop host I/O operations depend on the host operating system and the configuration, which are beyond the scope of these instructions. If you are not sure how to stop host I/O operations in your environment, consider shutting down the host.

    Attention: Possible data loss – If you continue this procedure while I/O operations are occurring, you might lose data.

5. If the storage array participates in a mirroring relationship, stop all host I/O operations on the secondary storage array.

6. Wait for five minutes to allow any data in cache memory to be flushed to disk.

7. From the title bar of the **Array Management Window**, select **Monitor > Reports > Operations in Progress**.

8. Wait for all operations shown on the **Operations in Progress** window to complete before continuing with the next step.

9. Power off the tray as follows:

If you are...	Follow these steps...
Replacing a drive drawer in a controller-drive tray	**a.** Turn off both power switches on the controller-drive tray. **b.** Wait for all LEDs on the controller-drive tray to go dark.
Replacing a drive drawer in an expansion drive tray	**a.** Turn off both power switches on the drive tray. **b.** Wait two minutes for drive activity to stop.

Related information

SANtricity Storage Manager 11.20 Command Line Interface and Script Commands Programming Guide

Removing the cable chains

Left and right cable chains for each drive drawer in the 60-drive trays allow the drawers to slide in and out. Before you can remove a drive drawer, you must remove both cable chains.

Before you begin

- You have issued the `Set Drawer Service Action Allowed Indicator` CLI command to turn on the blue Service Action Allowed LED for the drawer, or you have stopped host I/O activity and powered off the tray.

- You have obtained the following items:

  - Antistatic protection

    Attention: Possible hardware damage – To prevent electrostatic discharge damage to the tray, use proper antistatic protection when handling tray components.

  - Flashlight

  - Orange cable chain removal tool, which is included with the replacement drawer

Replacing a Drive Drawer in a 60-Drive Tray

Note: The cable chain removal tool makes it easier to reach into the enclosure and easier to unplug the cable chain connectors. If you do not have the tool, you can use your fingers to unplug the connectors.

About this task

Each drive drawer has left and right cable chains. The metal ends on the cable chains slide into corresponding vertical and horizontal brackets inside the enclosure, as follows:

• The left and right vertical brackets connect the cable chain to the enclosure's midplane.

• The left and right horizontal brackets connect the cable chain to the individual drawer.

Note: For a helpful overview of this procedure, watch the following video, which shows how to remove and replace the cable chains in a system that is powered down: *https://forums.netapp.com/videos/3967*. Note that the video does not show how to use the cable chain removal tool. It also does not describe the safety precautions that are required when the system is powered on.

Attention: Possible hardware damage — If you are replacing a drive drawer and the tray is powered on, you must read and follow the instructions in this document.

Steps

1. Put on antistatic protection.

2. From the rear of the drive tray, remove the right fan canister, as follows:

   a. Press the orange tab to release the fan canister handle.
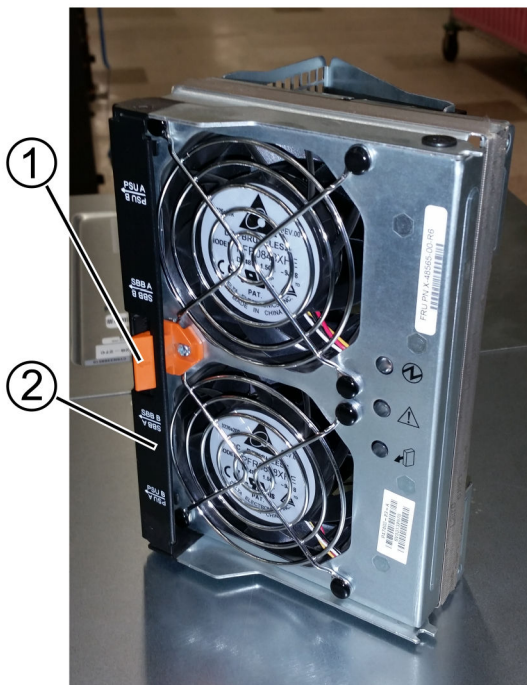
1	Orange tab
2	Fan canister handle

   b. Using the handle, pull the fan canister out of the drive tray, and set it aside.

c. If the tray is powered on, ensure that the left fan goes to its maximum speed.

> **Attention: Possible equipment damage due to overheating** – If the tray is powered on, do not remove both fans at the same time. Otherwise, the equipment might overheat.

3. Determine which drive drawer you need to replace, as follows:

- If the power is on, the blue Service Action Allowed LED indicates the cable chain you need to disconnect.

- If the power is off, you must manually determine which of the five cable chains to disconnect.

The figure shows the right side of the drive tray with the fan canister removed. With the fan canister removed, you can see the five cable chains and the vertical and horizontal connectors for each drawer.

1	Cable chain
2	Vertical connector (connected to the midplane)
3	Horizontal connector (connected to the drive drawer)

The top cable chain is attached to drive drawer 1. The bottom cable chain is attached to drive drawer 5.

4. Follow these steps to disconnect any of the right cable chains from its corresponding vertical bracket.

> **Attention: Possible hardware damage** — If the drive tray is powered on, the cable chain is energized until both ends are unplugged. To avoid shorting out the equipment, do not allow the unplugged cable chain connector to touch the metal chassis if the other end of the cable chain is still plugged in.

a. Using a flashlight, locate the orange ring on the end of the cable chain that is connected to the vertical bracket in the enclosure.

b. Insert the hooked end of the cable chain removal tool into the orange ring. The hook should point in, toward the bracket.
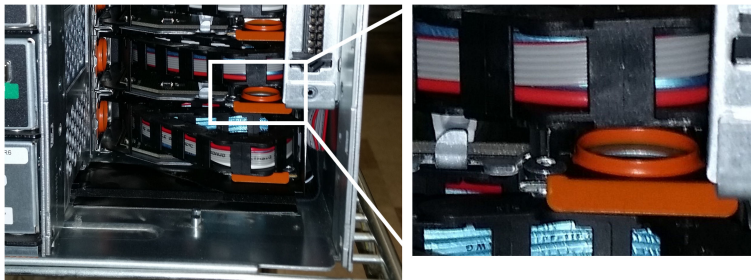

If you do not have a cable chain removal tool, insert your finger into the orange ring.

c. To unplug the cable chain, carefully pull the tool (or your finger) toward you approximately 1 inch (2.5 cm), but leave the cable chain connector within the vertical bracket.

> **Attention: Possible hardware damage** — If the drive tray is powered on, do not allow the cable chain connector to touch the metal chassis.

5. Follow these steps to disconnect the other end of the cable chain:

a. Using a flashlight, locate the orange ring on the end of the cable chain that is attached to the horizontal bracket in the enclosure.

b. Insert the hooked end of the cable chain removal tool into the orange ring. The hook should point down.
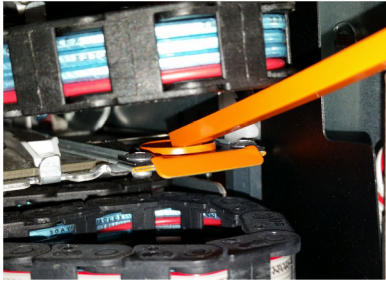
If you do not have a cable chain removal tool, insert your finger into the orange ring.

c. Pull the tool (or your finger) toward you to unplug the cable chain.

6. Pull the entire cable chain out of the drive tray.

7. Follow these steps to replace the right fan canister:

   a. Slide the fan canister all the way into the tray.

   b. Move the fan canister handle until it latches with the orange tab.

   c. If the drive tray is receiving power, confirm that the green LED on the back of the fan is illuminated and that air is coming out the back of the fan.

8. From the back of the drive tray, remove the left fan canister.

9. If the drive tray is receiving power, ensure that the right fan goes to its maximum speed.

   Attention: Possible equipment damage due to overheating – If the tray is powered on, do not remove both fans at the same time. Otherwise, the equipment might overheat.

10. Follow these steps to disconnect the left cable chain from its vertical bracket:

    a. Using a flashlight, locate the orange ring on the end of the cable chain attached to the vertical bracket.

    b. Insert the hooked end of the cable chain removal tool into the orange ring. The hook should point in, toward the bracket.

    If you do not have a cable chain removal tool, insert your finger into the orange ring.

    c. To unplug the cable chain, pull the tool (or your finger) toward you approximately 1 inch (2.5 cm), but leave the cable chain connector within the vertical bracket.

       Attention: Possible hardware damage — If the drive tray is powered on, the cable chain is energized until both ends are unplugged. To avoid shorting out the equipment, do not allow the unplugged cable chain connector to touch the metal chassis if the other end of the cable chain is still plugged in.

11. Using the cable chain removal tool, disconnect the left cable chain from the horizontal bracket, and pull the entire cable chain out of the drive tray.

    Note: If you are performing this procedure with the power on, all LEDs go off when you disconnect the last cable chain connector, including the blue Service Action Allowed LED.

12. Replace the left fan canister. If the drive tray is receiving power, confirm that the green LED on the back of the fan is illuminated and that air is coming out the back of the fan.

Replacing a Drive Drawer in a 60-Drive Tray

Removing a drive drawer

After removing the right and left cable chains, you can remove the drive drawer from the drive tray. Removing a drive drawer entails sliding the drawer part of the way out, recording the locations of the drives, removing the drives, and removing the drive drawer.

Before you begin

- You have removed the right and left cable chains for the drive drawer.

- You have replaced the right and left fan canisters.

- You have obtained a permanent marker to note the exact location of each drive as you remove the drive from the drawer.

Steps

1. Remove the bezel from the front of the drive tray.

2. Unlatch the drive drawer by pulling out on both levers.

3. Using the extended levers, carefully pull the drive drawer out until it stops. Do not completely remove the drive drawer from the drive tray.

4. If logical unit numbers (LUNs) have already been created and assigned, use a permanent marker to note the exact location of each drive. For example, using the following drawing as a reference, write the appropriate slot number on the top of each drive.

   Attention: Possible loss of data access – Make sure to record the exact location of each drive before removing it.

5. Follow these steps to remove the drives from the drive drawer:

   a. Raise the drive handle to vertical.

   b. Use the handle to lift the drive from the drive drawer.
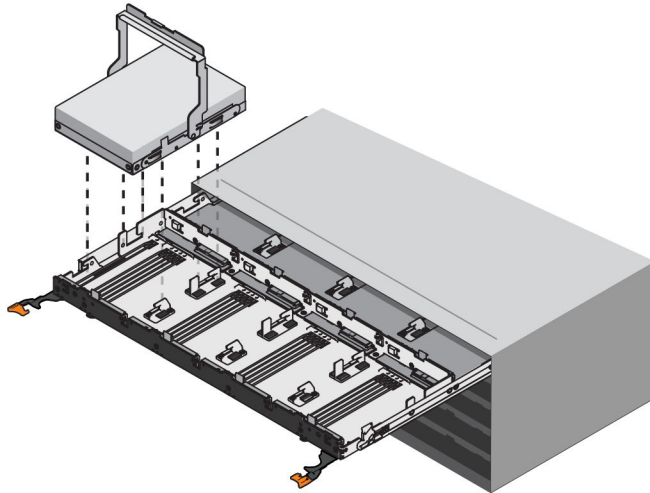
c. Place the drive on a flat, static-free surface and away from magnetic devices.

> **Attention: Possible loss of data access** – Magnetic fields can destroy all data on the drive and cause irreparable damage to the drive circuitry. To avoid loss of data access and damage to the drives, always keep drives away from magnetic devices.

6. Follow these steps to remove the drive drawer:

a. Locate the plastic release lever on each side of the drive drawer.
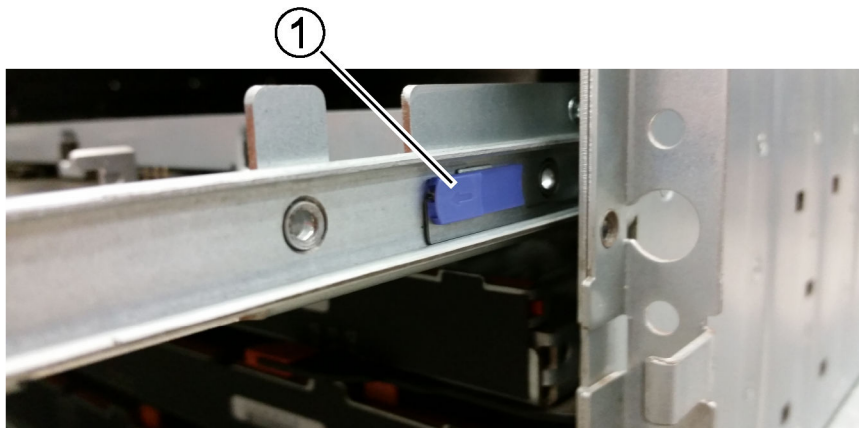
1	Drive drawer release lever

b. Open both release levers by pulling the latches toward you.

c. While holding both release levers, pull the drive drawer toward you.

d. Remove the drive drawer from the drive tray.

Installing a drive drawer

Installing a drive drawer into a drive tray entails sliding the drawer into the empty slot, installing the drives, and replacing the front bezel.

Before you begin

- You know where to install each drive.

- You have obtained the following items:

  ◦ Replacement drive drawer

  ◦ Flashlight

Steps

1. From the front of the drive tray, shine a flashlight into the empty drawer slot, and locate the lock-out tumbler for that slot.

   The lock-out tumbler assembly is a safety feature that prevents you from being able to open more than one drive drawer at one time.
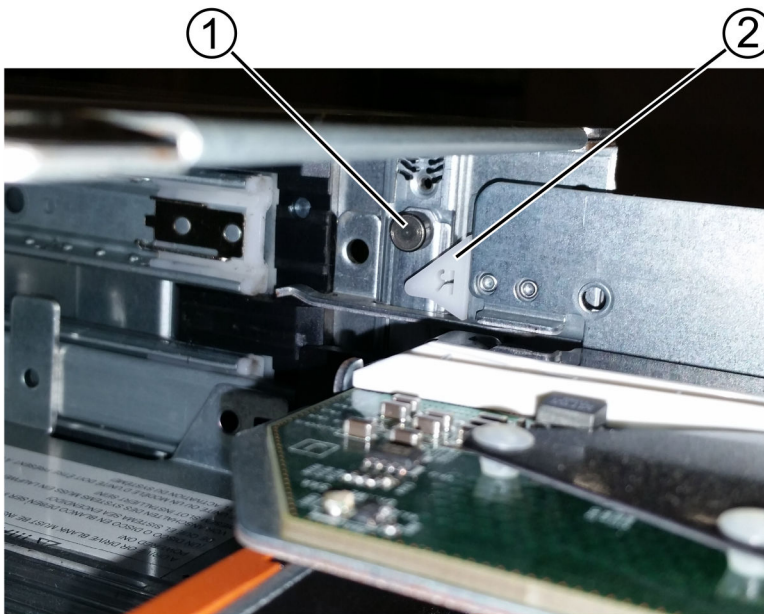
1	Lock-out tumbler
2	Drawer guide

2. Position the replacement drive drawer in front of the empty slot and slightly to the right of center.

   Positioning the drawer slightly to the right of center helps to ensure that the lock-out tumbler and the drawer guide are correctly engaged.

3. Slide the drive drawer into the slot, and ensure that the drawer guide slides under the lock-out tumbler.

   Attention: Risk of equipment damage – Damage occurs if the drawer guide does not slide under the lock-out tumbler.

4. Carefully push the drive drawer all the way in until the latch fully engages.

> **Attention: Risk of equipment damage —** Stop pushing the drive drawer if you feel excessive resistance or binding. Use the release levers at the front of the drawer to slide the drawer back out. Then, reinsert the drawer into the slot, and ensure that it slides in and out freely.

5. Follow these steps to reinstall the drives in the drive drawer:

   a. Unlatch the drive drawer by pulling out on both levers at the front of the drawer.

   b. Using the extended levers, carefully pull the drive drawer out until it stops. Do not completely remove the drive drawer from the drive tray.

   c. Determine which drive to install in each slot by using the notes you made when removing the drives.

> **Attention: Possible loss of data access –** You must install each drive in its original location in the drive drawer.

   d. Raise the handle on the drive to vertical.

   e. Align the two raised buttons on the drive with the notches on the drawer.

   f. Lower the drive straight down, and then rotate the drive handle down until the drive snaps into place.
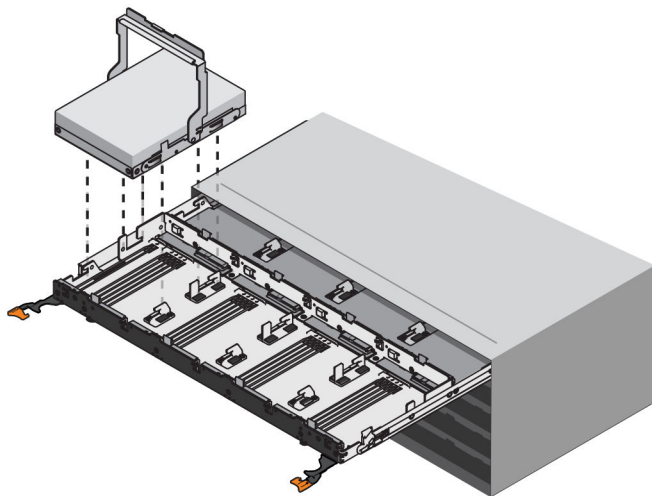
   g. Repeat Step *5.d* through Step *5.f* to install all of the drives.

6. Slide the drawer back into the drive tray by pushing it from the center and closing both levers.

    Attention: Risk of equipment malfunction – Make sure to completely close the drive drawer by pushing both levers. You must completely close the drive drawer to allow proper airflow and prevent overheating.

7. Attach the bezel to the front of the drive tray.

Attaching the cable chains

The final step in installing a drive drawer is attaching the left and right cable chains to the drive tray. When attaching a cable chain, reverse the order you used when disconnecting the cable chain. You must insert the chain's horizontal connector into the horizontal bracket in the enclosure before inserting the chain's vertical connector into the vertical bracket in the enclosure.

Before you begin

- You have replaced the drive drawer and all of the drives.

- You have two replacement cable chains, marked as L (left) and R (right).
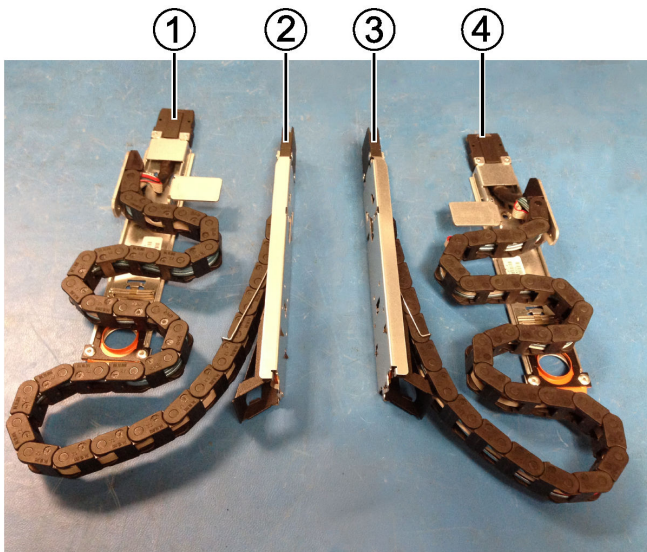
Callout	Cable chain	Connector	Connects to
1	Left	Horizontal	Drive drawer
2		Vertical	Midplane
3	Right	Vertical	Midplane
4		Horizontal	Drive drawer

Steps

1. From the back of the drive tray, remove the fan canister on the left side, and set it aside.

2. If the tray is powered on, ensure that the right fan goes to its maximum speed.

    Caution: Possible equipment damage due to overheating – If the tray is powered on, do not remove both fans at the same time. Otherwise, the equipment might overheat.

3. Follow these steps to attach the left cable chain:

a. Locate the horizontal and vertical connectors on the left cable chain and the corresponding horizontal and vertical brackets inside the enclosure.

b. Align both cable chain connectors with their corresponding brackets.

c. Slide the cable chain's horizontal connector under the guide rail on the horizontal bracket, and push it in as far as it can go.

> **Caution: Risk of equipment malfunction** — Make sure to slide the connector underneath the guide rail on the bracket (shown in the figure on the left). If the connector rests on the top of the guide rail (shown in the figure on the right), problems might occur when the system runs.

Correct position (connector under guide rail)	Incorrect position (connector on top of guide rail)
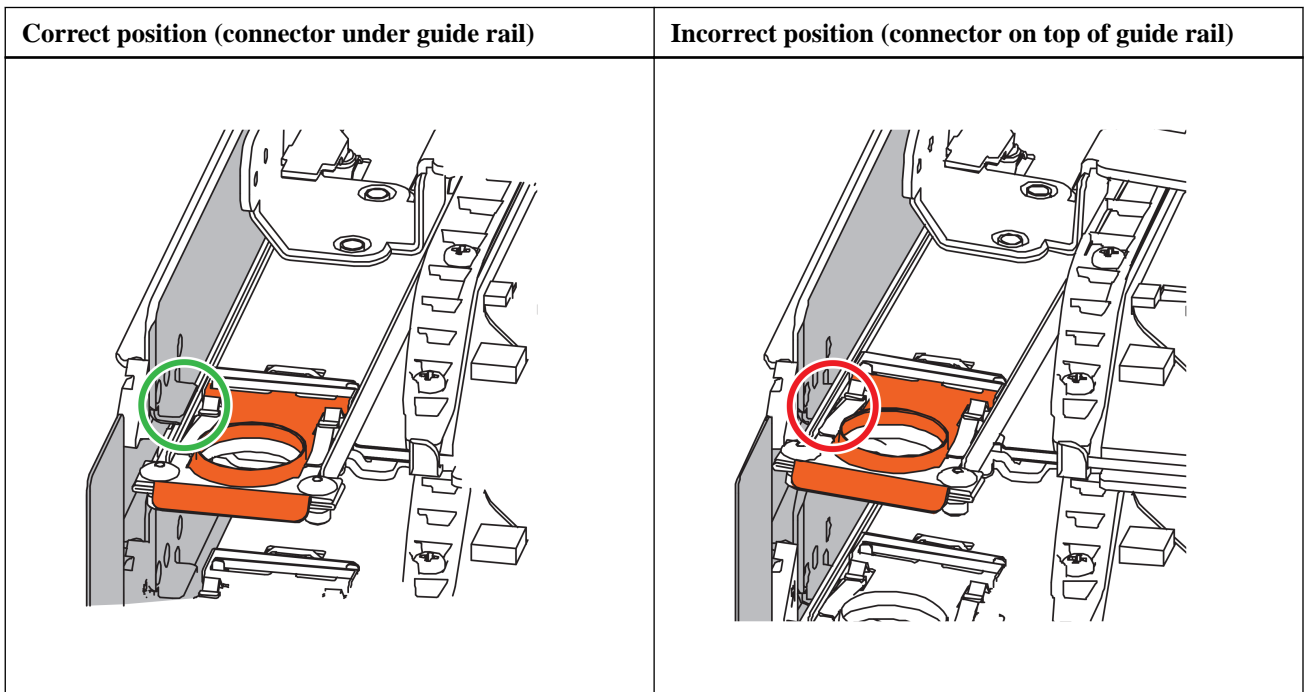
d. Slide the vertical connector on the left cable chain into the vertical bracket.

> If the power is on, the drives automatically spin up as soon as the first cable chain is connected.

e. After you have reconnected both ends of the cable chain, carefully pull on the cable chain to verify that both connectors are latched.

> **Attention: Risk of equipment malfunction** — If the connectors are not latched, the cable chain might come loose during drawer operation.

4. Reinstall the left fan canister. If the drive tray is receiving power, confirm that the green LED on the back of the fan is now on and that air is now coming out of the back.

5. From the back of the drive tray, remove the fan canister on the right side of the tray.

6. If the tray is powered on, ensure that the left fan goes to its maximum speed.

> **Caution: Possible equipment damage due to overheating** – If the tray is powered on, do not remove both fans at the same time. Otherwise, the equipment might overheat.

7. Follow these steps to reattach the right cable chain:

a. Locate the horizontal and vertical connectors on the cable chain and their corresponding horizontal and vertical brackets inside the enclosure.

b. Align both cable chain connectors with their corresponding brackets.

Replacing a Drive Drawer in a 60-Drive Tray

c. Slide the cable chain's horizontal connector under the guide rail on the horizontal bracket and push it in as far as it will go.

> **Caution: Risk of equipment malfunction** — Make sure to slide the connector underneath the guide rail on the bracket. If the connector rests on the top of the guide rail, problems might occur when the system runs.

d. Slide the vertical connector on the right cable chain into the vertical bracket.

e. Once you have reconnected both ends of the cable chain, carefully pull on the cable chain to verify that both connectors are latched.

> **Attention: Risk of equipment malfunction** — If the connectors are not latched, the cable chain might come loose during drawer operation.

8. Reinstall the right fan canister. If the drive tray is receiving power, confirm that the green LED on the back of the fan is now on and that air is now coming out of the back.

9. If the power to the drive tray is off, reapply power, as follows:

If you...	Follow these steps...
Replaced a drive drawer in a controller-drive tray	**a.** Turn on both power switches on the controller-drive tray. **b.** Wait 10 minutes for the power-on process to complete. **c.** Confirm that both fans come on and that the green LEDs on the back of the fans are illuminated.
Replaced a drive drawer in an expansion drive tray	**a.** Turn on both power switches on the drive tray. **b.** Confirm that both fans come on and that the green LEDs on the back of the fans are illuminated.

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