StorageTek 1U Rackmount Tape Enclosure

Setup, Operator, and Service Guide

E58300-01

April 2016

ORACLE

Note!
Before using this information and the product it supports, be sure to read the general information in the "Notices" chapter of this book.

First Edition (April 2016)

This edition, E58300-01, applies to the StorageTek 1U Rackmount Tape Enclosure and to all subsequent releases and modifications until otherwise indicated in new editions. This edition applies only to the specified model of the device.

Contents

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Warning: 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.

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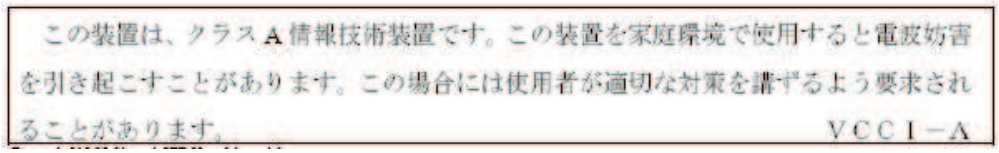

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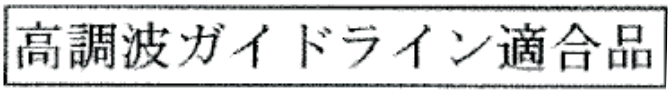
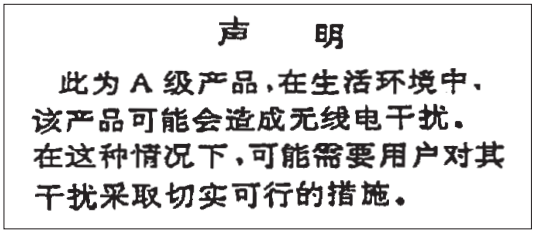


Electromagnetic Interference (EMI) Statement - People's Republic of China



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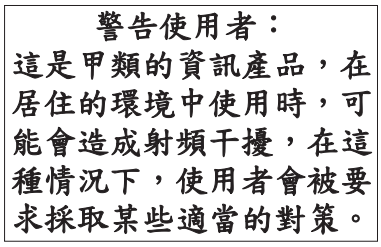

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- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
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Tel: 914-499-1900

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About This Guide

This guide describes how to install and use Oracle's StorageTek 1U Rackmount Tape Enclosure. It contains the following chapters:

Chapter 1, "General Information," describes the 1U Rackmount Tape Enclosure, discusses cables, and lists hardware specifications.

Chapter 2, "Installing the 1U Rackmount Tape Enclosure into a Rack," describes the steps required to install or remove the 1U Rackmount Tape Enclosure in a rack system.

Chapter 3, "Attaching the 1U Rackmount Tape Enclosure to a Host System," describes step-by-step instructions on how to properly attach and configure the 1U Rackmount Tape Enclosure to a host system.

Chapter 4, "Removing the 1U Rackmount Tape Enclosure from a Host System," describes how to remove the 1U Rackmount Tape Enclosure after it has been installed.

Chapter 5, "The Half High LTO-7 Tape Drive Feature," describes the Half-High LTO-7 SAS Tape Drive.

Chapter 6, "Troubleshooting," provides the procedures required to service the 1U Rackmount Tape Enclosure.

Chapter 7, "Installation and Removal Procedures," provides the installation and removal procedures required to service and upgrade the 1U Rackmount Tape Enclosure.

Appendix A, “Power Cables,” provides power cable information for different countries.

Appendix B, “Safety Inspection Procedures,” provides procedures to identify unsafe conditions when servicing the 1U Rackmount Tape Enclosure.

Store this guide with your system manuals.

Related Publications

- *Systems Safety Notices* G229-9054, provides translations of danger notices.

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Chapter 1. General Information

The 1U Rackmount Tape Enclosure is designed to mount in 1 EIA Unit (1.75") of a standard 19-inch rack using the rack mount hardware kit. The design of the 1U Rackmount Tape Enclosure allows for easy customer setup, installation and service. The 1U Rackmount Tape Enclosure can accommodate two tape drives.

Note: The SAS LTO tape drive does not come with an existing external SAS cable.

Figure 1 shows the 1U Rackmount Tape Enclosure with an LTO tape drive.

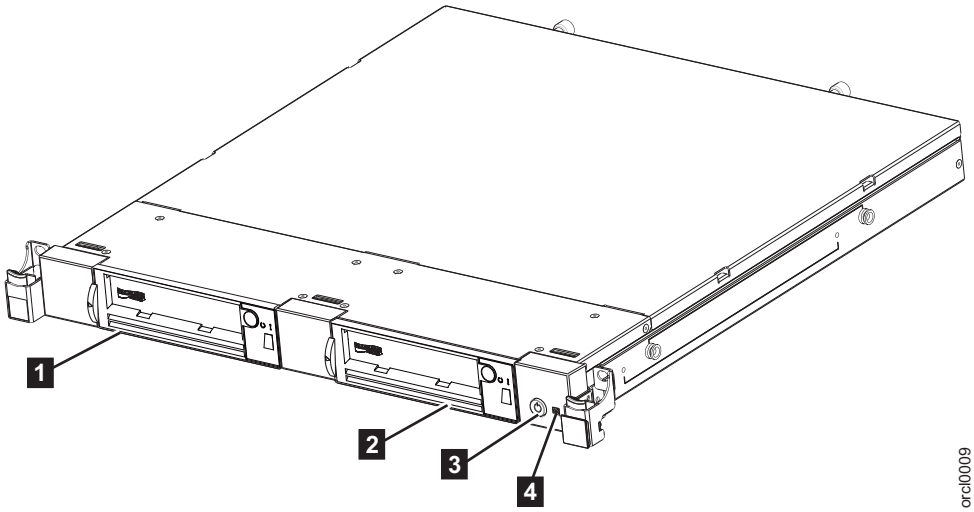


Figure 1. Front view of the 1U Rackmount Tape Enclosure

The 1U Rackmount Tape Enclosure has the following components on the front of the unit:

Bays 1 and 2
1 and **2** on the front of the 1U Rackmount Tape Enclosure (see Figure 1), can each accommodate an LTO tape drive or a bay blank.

Power Switch and LED
The power switch **3** is a push button switch that enables the power to be turned on or off. Push and release the button to toggle power to the 1U Rackmount Tape Enclosure on and off. The green power-on LED on the power switch is illuminated when the 1U Rackmount Tape Enclosure is powered on.

Note: If power to the 1U Rackmount Tape Enclosure is lost, the user may need to press the power switch to again provide power to the devices in the 1U Rackmount Tape Enclosure.

Fan Fault LED
The amber fan fault LED **4** indicates a fan fault when lit.

The rear of the 1U Rackmount Tape Enclosure has the following components:

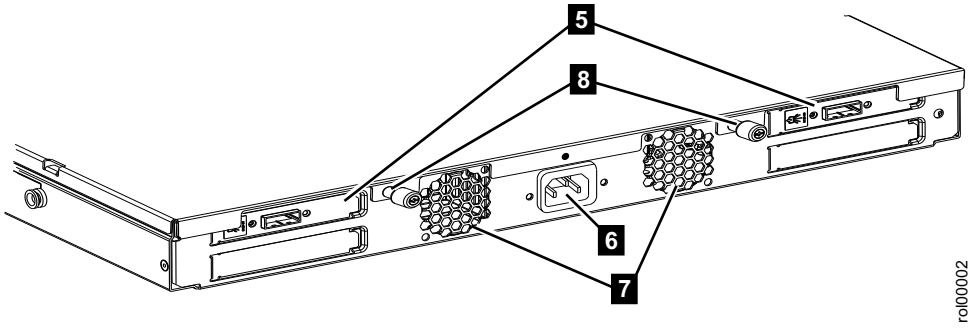


Figure 2. Rear view of the 1U Rackmount Tape Enclosure

Back Plates

Back Plates **5** provide rear mounted cable connectors for the storage devices in the 1U Rackmount Tape Enclosure.

Power Cable Connector

The 1U Rackmount Tape Enclosure receives power from a power source through a cable connected to the power cable connector **6**.

Cooling Fans

The 1U Rackmount Tape Enclosure utilizes two internal cooling fans to regulate the internal temperature of the enclosure. Air exits the 1U Rackmount Tape Enclosure at the cooling fan locations **7**.

Notes:

- To ensure proper operation, place the 1U Rackmount Tape Enclosure so that the front of the enclosure and the cooling fan exits at the rear of the enclosure have sufficient clearance to ensure airflow.
- The cooling fans are a part of the enclosure assembly and cannot be replaced separately.

Thumbscrews

The Thumbscrews are used to attach or remove the top cover of the 1U Rackmount Tape Enclosure **8**.

Ownership Requirements

The 1U Rackmount Tape Enclosure is a precision instrument designed to meet your highest data storage expectations. In purchasing this product you expect to be able to configure and use it reliably. Oracle strives to deliver to you a product that meets this expectation. As with all mechanical devices, this product requires more periodic maintenance and care than the electronics in your computer. And to ensure a reliable operation of your enclosure, Oracle also requires that it be installed and used properly. The following list outlines several required actions that become your responsibility in the ownership of this device, and if followed, can not only increase its availability, but may positively affect your warranty:

- Install the enclosure in a clean environment.
- Use only high-quality, data-grade media.
- Ensure that the media is properly handled and stored.
- Clean the installed storage devices regularly, as recommended.

Specifications

Table 1. Specifications for the 1U Rackmount Tape Enclosure

Physical Specifications		
Width	438 mm (17.5 in.) 480 mm (18.9 in.) Including Right and Left Latch assemblies	
Depth	454 mm (17.9 in.)	
Height	43 mm (1.69 in.)	
Weight	5.1 kg (10.2 lbs.) Empty Enclosure 7.1 kg (15.6 lbs.) Typical Configuration	
Power Specifications		
kVA	0.047 @ 120 V AC	
V AC	100 to 240	
Hertz	50 to 60	
Btu Maximum (watts)	478 Btu/hr (140 watts) @ 240 V AC	
Power Factor	0.75 to 0.9	
Altitude Maximum	3058 m (10000 ft.)	
Performance Specifications		
Dependant on device, media type, and configuration.		
Recommended Environment		
Environmental Factor	**Operating**	**Non-operating**
Temperature	10 to 40°C (50 to 104°F)	-40 to 65°C (-40 to 149°F)
Relative Humidity (non-condensing)	20 to 80% non-condensing	5 to 95% (excluding rain)
Maximum Wet Bulb	26°C (79°F)	29°C (84°F)

Media Drive Environment and Use

Oracle's goal is to provide you with a product that you can configure and use reliably. Removable media drives require specific maintenance and environmental conditions to operate well over time. Using high quality, data grade media, handling and storing this media properly, operating the removable media drive in a clean environment and keeping the removable media drive properly cleaned can help you to avoid problems with the product.

Media Handling and Storage

Most media is supplied in a sealed cartridge so that the media will remain clean. Opening the cartridge allows dirt and airborne particles to enter and then become a source of contamination. The cartridge should only be opened by the drive, not an operator. The media is held under proper tension inside the cartridge. If the cartridge is dropped, this tension will be relaxed.

Attention: Inserting a dropped cartridge into a drive can cause incorrect loading and result in a jam. This will ruin the media and can cause physical damage if the cartridge is not removed correctly.

When the media is stored, it must be replaced in the protective containers and stored on the end. The storage area must be clean, dry, at normal room temperature and away from any magnetic fields. Improper use, storage, or handling of drives or media might void your warranty or service agreement.

Environmental Considerations

Removable media drives are designed to operate in a clean environment. Problem factors are dirt, dust, fibers and airborne particles. Airborne particles are the most difficult to address. When media is installed in the drive, the clearance between the heads and the media is measured in microns. Particles can damage the media or the head if they come in contact with either. Customers are responsible to provide a clean operating environment for the drive and system.

Tape Drive Cleaning

No matter how clean the environment, debris may build up on the heads of any tape drive. Over time, this builds up and causes errors in reading and writing. Customers are responsible to clean the drive in accordance with the cleaning information provided with the drive.

Cleaning cartridges can be used a limited number of times. After a cleaning cartridge has been used to its maximum number of times, the cartridge is considered expired. When cartridges expire, they must be replaced. Never reuse an expired cleaning cartridge. Doing so allows previously removed dirt to be reintroduced to the tape drive. Place a mark on the cleaning cartridge after each use, to best determine when your cleaning cartridge has expired.

Microcode Updates

Oracle constantly works to provide the best possible products. To make certain that the drives work their very best, Oracle occasionally releases changed microcode for the drives. When a microcode change is developed, Oracle makes it available to you through My Oracle Support: https://support.oracle.com.

Summary

Your drive must be installed in the cleanest possible environment. Additionally, LTO drives require high quality, data grade media and cleaning on a regular basis. Media must also be stored and handled properly. Improper use, storage or handling of drives or media may void your warranty or service agreement.

Chapter 2. Installing the 1U Rackmount Tape Enclosure into a Rack

The 1U Rackmount Tape Enclosure is designed to be installed in one EIA unit (1U) of a standard 19-inch rack using the rack-mount hardware kit.

Complete a parts inventory. The following illustration shows the items that you need to install the 1U Rackmount Tape Enclosure into the rack cabinet. If any items are missing or damaged, contact your place of purchase.

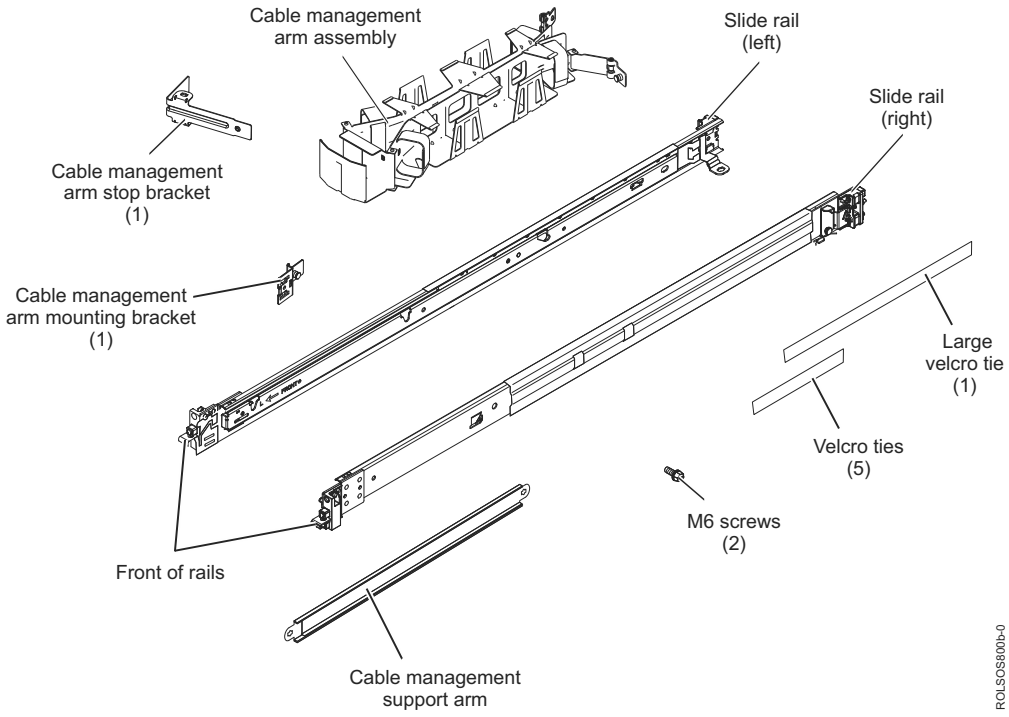


Figure 3. Parts Inventory

Before starting the rack-mount installation, read the entire installation procedure.

Safety Considerations

When the 1U Rackmount Tape Enclosure is installed in a rack system, special care should be taken to ensure a safe work environment is maintained. The following information should be considered when working with a rack-installed enclosure:

Consideration should be given to the electrical power connection to the rack. Ensure that the rack electrical power circuits are not overloaded so the wiring and over-current protection is not compromised. Refer to the rating labels located on the equipment installed the rack to determine the total power requirement for the supply circuit.

Do not install this unit in a rack where the internal rack ambient temperatures will exceed 40 degrees Celsius.

Do not install this unit in a rack where the air flow is compromised.

To ensure proper cooling, place the unit so that the cooling fan exits at the rear of the unit and the air inlet holes at the front of the unit have sufficient clearance to ensure airflow.

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (D004)

DANGER

Observe the following precautions when working on or around your IT rack system:

- **Heavy equipment—personal injury or equipment damage might result if mishandled.**
- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.** 
- **Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.**
- **Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.**
- **An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.**

(R001 part 1 of 2)

CAUTION:

- **Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.**
- **Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.**
- **Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.**
- *(For sliding drawers)***: Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.**
- *(For fixed drawers)***: This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack.**

(R001 part 2 of 2)

Installing the Slide Rails

To install the Slide Rails into a rack, complete the following steps:

Notes:

- You may need to move other components in the rack to provide access for this installation. You will need to access both the front and rear of the rack.
- The slide rails may be installed in a rack with round or square holes.

1. Ensure that the system and the 1U Rackmount Tape Enclosure are powered off.
2. Each slide rail is marked with either an R (right) or an L (left) **1** . Select one of the slide rails and push up on the front movable tab **2** ; then, pull out the front latch **3** . Make sure that the front latch remains extended and does not click back into place.

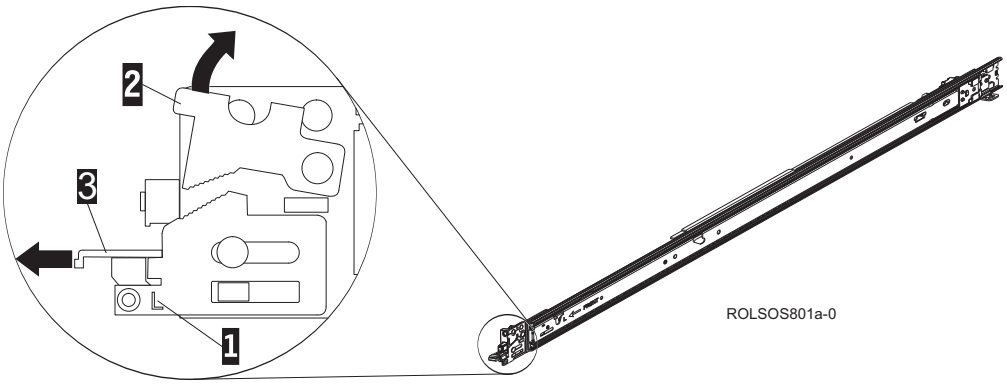


Figure 4. Slide rail and movable tab

3. Align the three pins on the rear of the slide rail with the three holes in the selected U on the rear of the rack. Push the rails so that the pins go into the

holes 1 , and drop the slide rail down 2 until it latches into place.

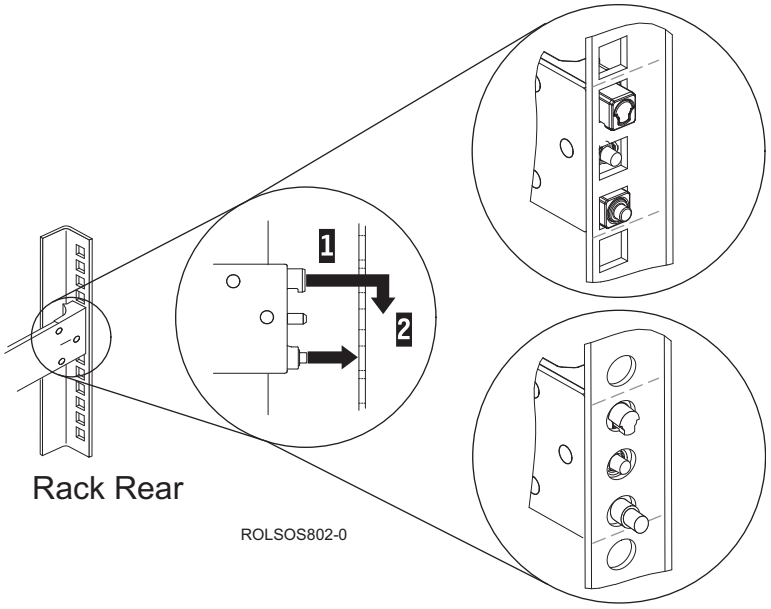


Figure 5. Rack rear rail and pins

4. Pull the slide rail forward and insert the two pins on the front of the rail into the two lower holes in the U on the front of the rack. Drop the rail into place 1 until it clicks into place. Push the front latch 2 in all the way.

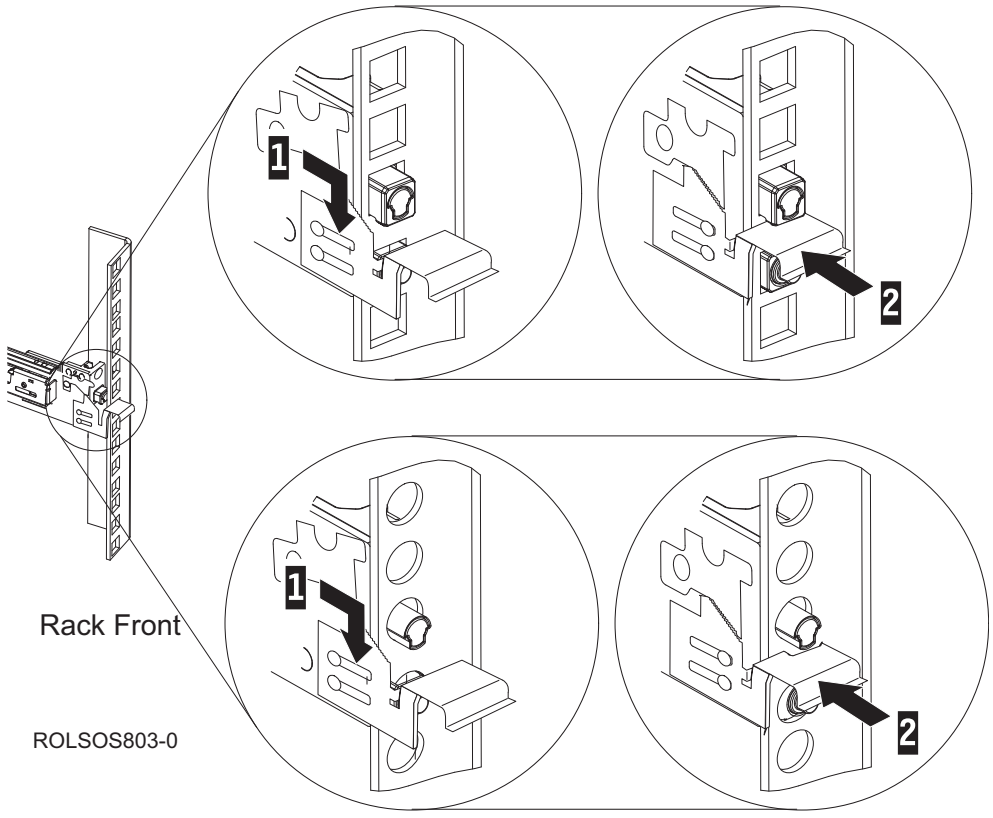


Figure 6. Rack front rail and pins

5. Repeat steps 1 on page 7 through 3 on page 7 to install the other rail into the rack. Make sure that each front latch is fully seated.

Installing the 1U Rackmount Tape Enclosure Onto the Slide Rails

To install the 1U Rackmount Tape Enclosure onto the slide rails, complete the following steps:

1. Ensure that the system and the 1U Rackmount Tape Enclosure are powered off.
2. Ensure that the slide rails are correctly installed. See "Installing the Slide Rails" on page 7.
3. Pull the slide rails forward **1** until they click, twice, into place. Carefully lift the 1U Rackmount Tape Enclosure and tilt it into position over the slide rails so that the rear posts **2** on the 1U Rackmount Tape Enclosure line up with the rear slots **3** on the slide rails. Slide the server down until the rear posts slip into the two rear slots, and then slowly lower the front of the 1U Rackmount Tape Enclosure **4** until the other posts slip into the other slots on the slide rails. Make sure that the front latch **5** slides over the posts.

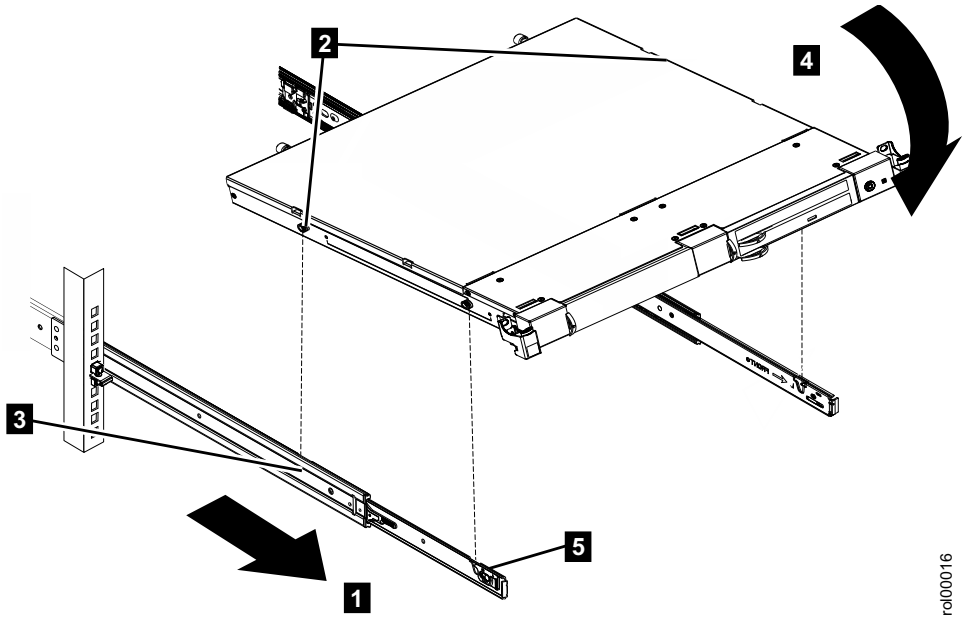


Figure 7. Slide rails extended, 1U Rackmount Tape Enclosure posts aligned with slots in rail

4. Lift the blue release latches **1** on the slide rails and push the 1U Rackmount Tape Enclosure **2** all the way into the rack until it clicks into place.

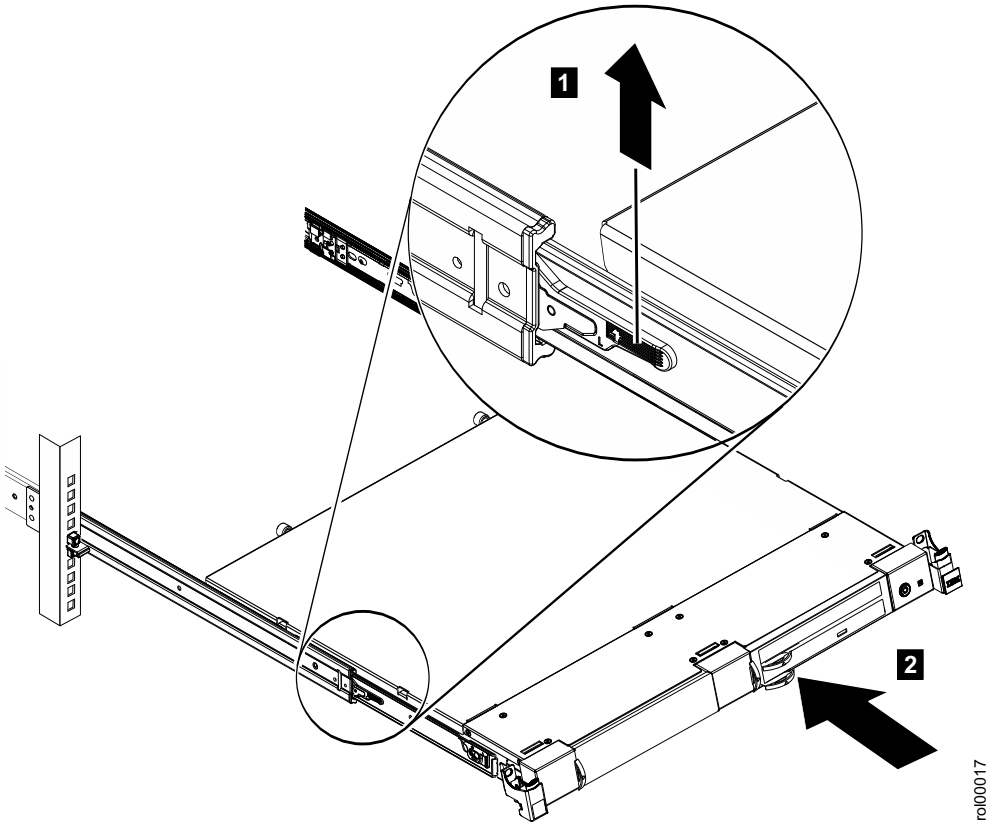


Figure 8. Release latches and 1U Rackmount Tape Enclosure

5. **Note:** This step is optional. The screws are only necessary for shipping or in vibration-prone areas.

   The M6 screws may be inserted into the front of the Right Slide Rail **1** and the Left Slide Rail **2** using a flat-head or Phillips screwdriver.

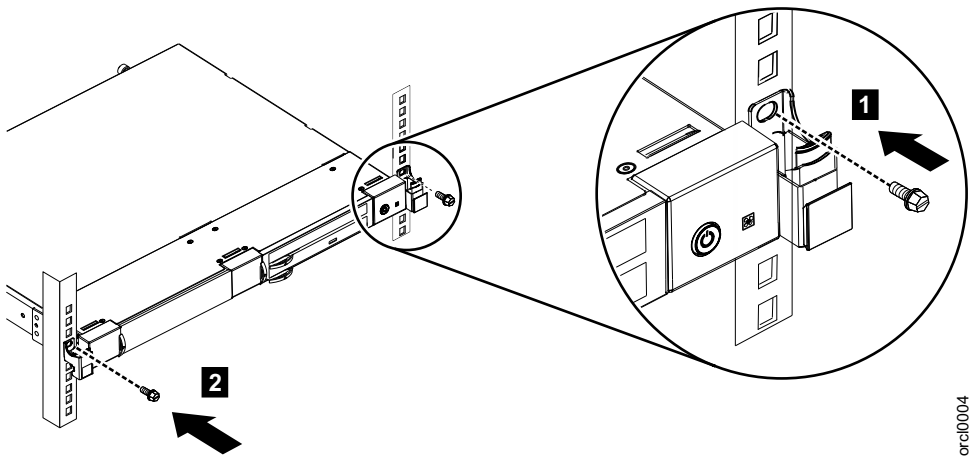


Figure 9. M6 Screws into the Slide Rails

Installing the Cable Management Arm

To install the Cable Management Arm, complete the following steps:

Note: Do not attach the power cord or other cables to the 1U Rackmount Tape Enclosure until you are instructed to do so. The 1U Rackmount Tape Enclosure and the computer system that it is attached to will be powered off before the cables are attached.

1. Ensure that the slide rails are correctly installed. See "Installing the Slide Rails" on page 7.
2. The cable-management arm can be installed on either side of the 1U Rackmount Tape Enclosure. The following figure shows it being installed on the left side. To install the cable-management arm on the right side, follow the instructions and install the hardware on the opposite side. Connect the end of the support arm with the "UP" designation **1** to the same slide rail to which you plan to attach the cable-management arm so that you can swing the other end of the support arm **2** toward the rack.

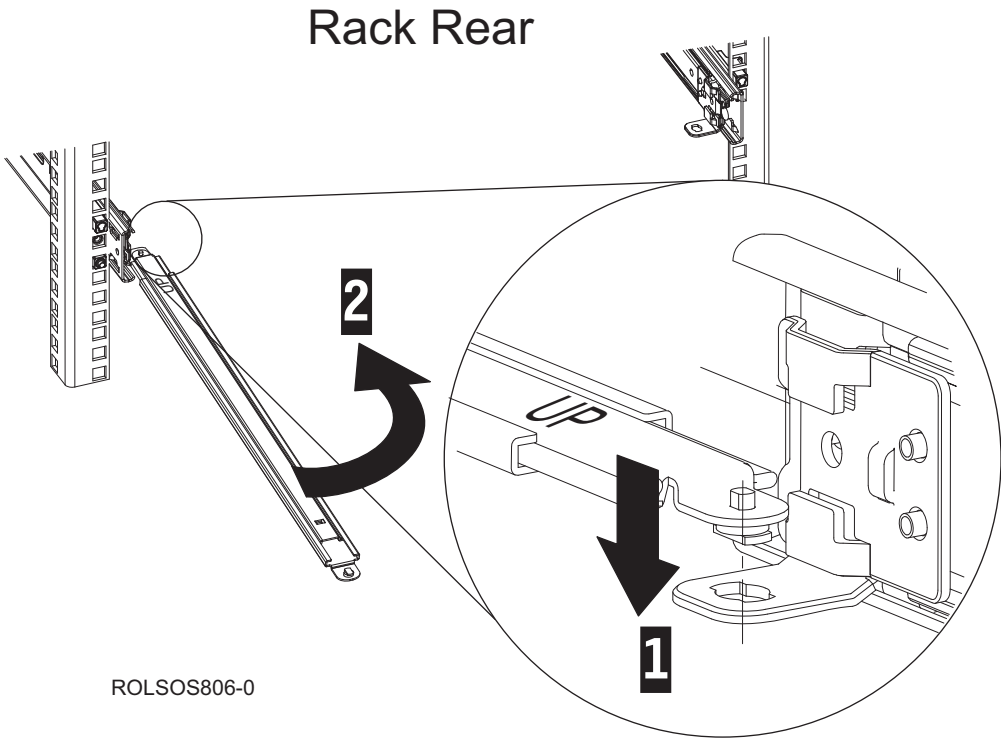


Figure 10. Support arm connection

3. Install the L-shaped cable-management stop bracket **1** on the unattached end of the support arm (the end with the "DOWN" designation). Turn the bracket **2** to secure it to the support arm.

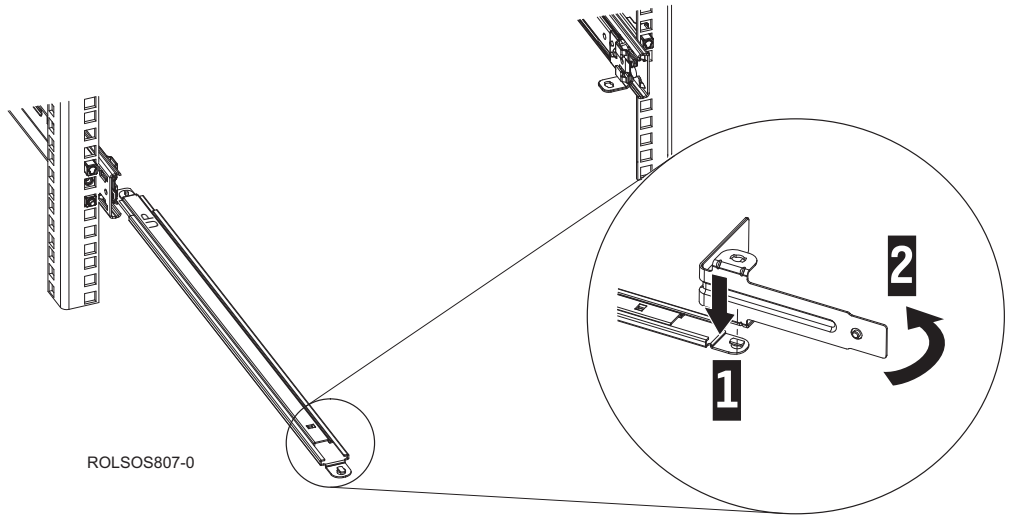


Figure 11. Cable-management stop bracket secured to the support arm

4. To attach the other side of the support arm to the backside of the slide rail, pull the pin out **1**, and then slide the bracket **2** into the slide rail.

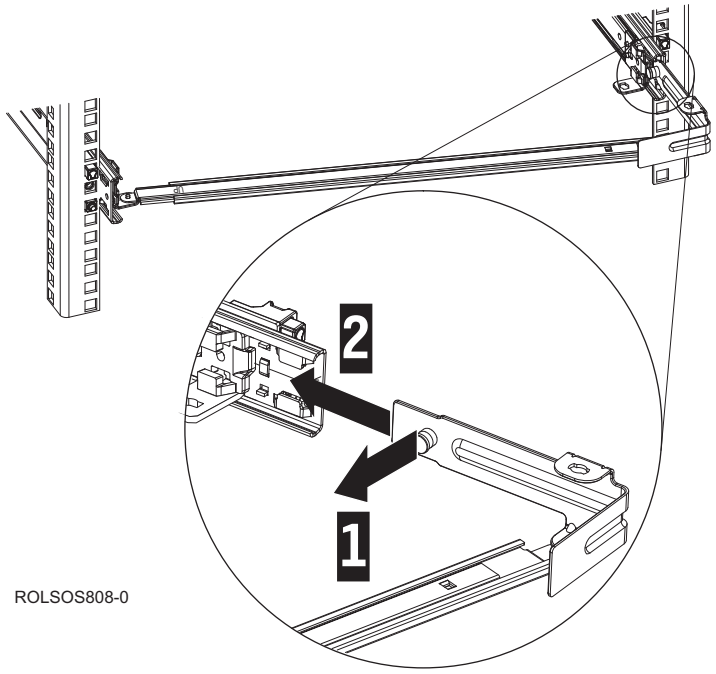


Figure 12. Pin extended, bracket installed into slide rail

5. Pull out the mounting bracket pin **1** and slide the mounting bracket **2** into the slide rail onto which you are installing the cable-management arm. Push the bracket into the slide rail until the spring-loaded pin snaps into place.

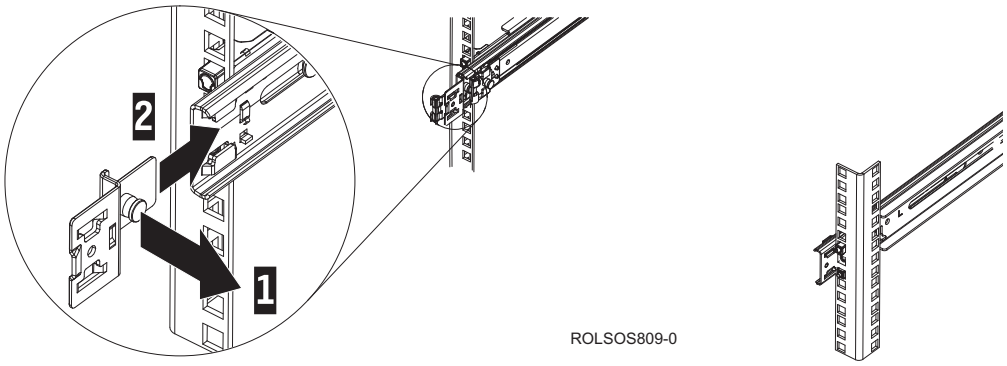


Figure 13. Mounting bracket pin extended and mounting bracket installed into slide rail

6. Place the cable-management arm on the support arm. Pull out the cable-management arm pin **1**, and then slide the cable-management arm tab **2** into the slot on the inside of the slide rail. Push the tab until it snaps into place. Pull out the other cable-management arm pin **3**, and then slide that cable management arm tab into the slot **4** on the outside of the slide rail. Push the tab until it snaps into place.

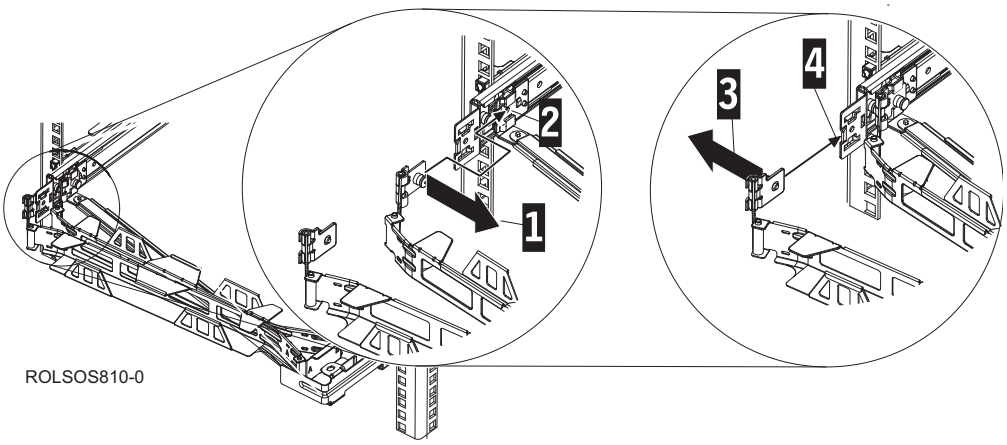


Figure 14. Cable-management arm connection

7. Ensure that the system and the 1U Rackmount Tape Enclosure are powered off.
8. Attach the power cords and other cables to the rear of the 1U Rackmount Tape Enclosure **1**. Route the cables and power cords on the cable-management arm and secure them with cable ties or hook-and-loop fasteners **2**.

   Note: Allow slack in all cables to avoid tension in the cables as the cable-management arm moves.

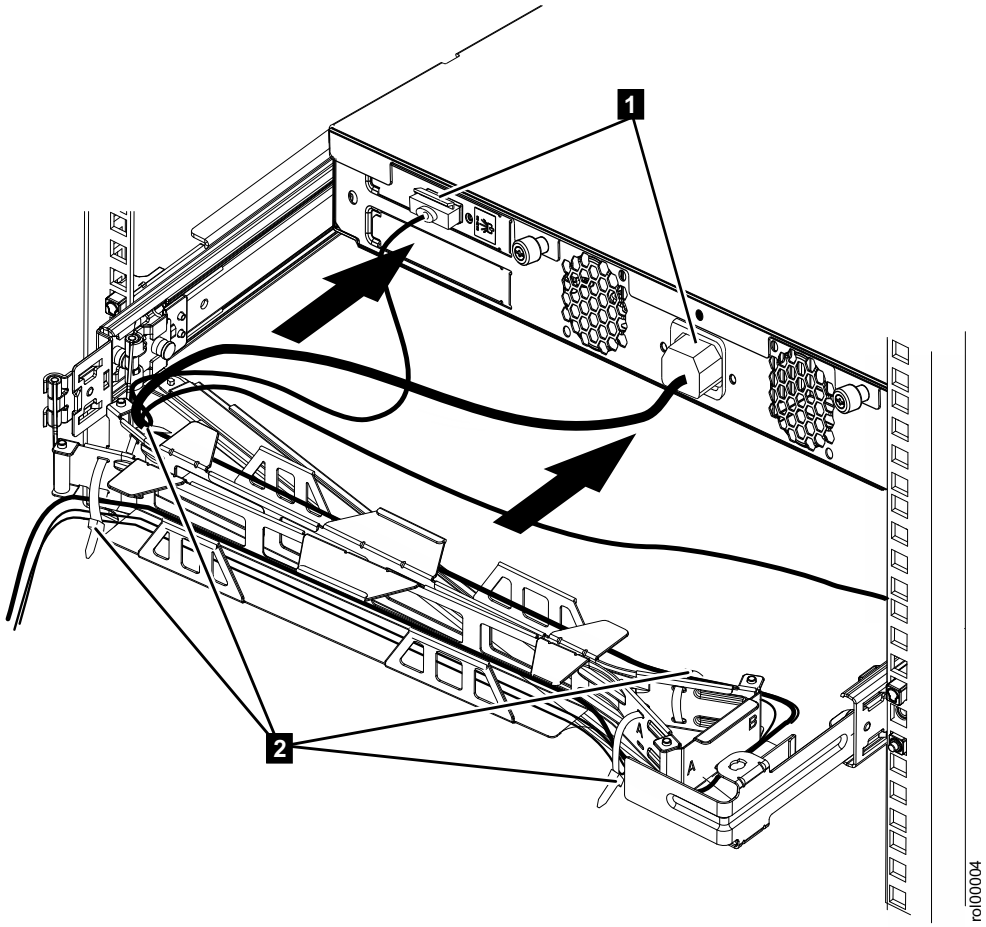


Figure 15. Power cord attachment and routing

9. Slide the 1U Rackmount Tape Enclosure into the rack until it snaps into place.

Removing the 1U Rackmount Tape Enclosure from a Rack

To remove the 1U Rackmount Tape Enclosure from the rack, complete the following steps:

1. Ensure that the system and the 1U Rackmount Tape Enclosure are powered off and the cables have been disconnected from the rear of the device.
2. If they are installed, remove the M6 screws from the front of the Right Slide Rail **1** and the Left Slide Rail **2** using a flat-head or Phillips screwdriver.

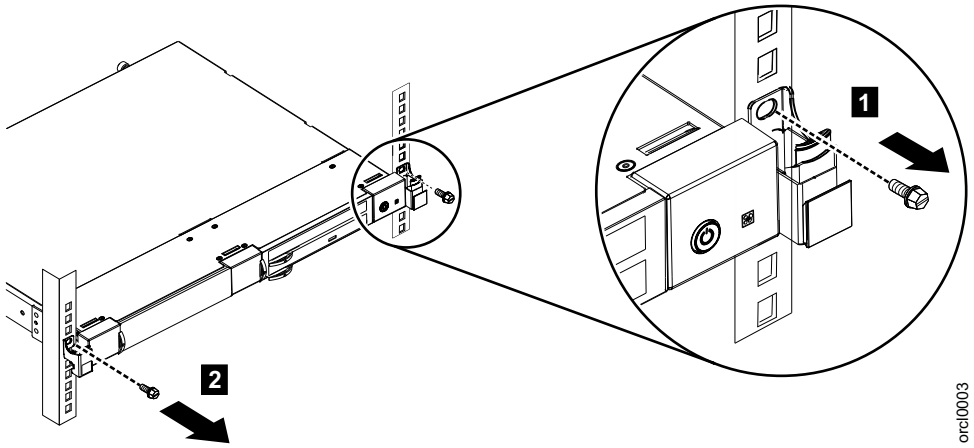


Figure 16. Remove M6 Screws from the Slide Rails

3. Press both rack latches **1** and pull the 1U Rackmount Tape Enclosure **2** out from the rack until the rails click, twice into place.

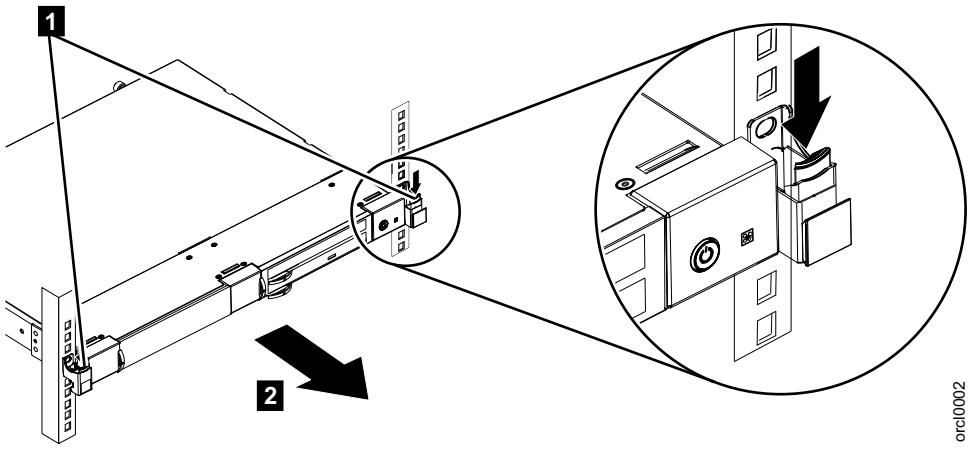


Figure 17. Release latches

4. Pull the front locks forward **1** and tilt up the front of the 1U Rackmount Tape Enclosure **2** until the front posts slip out of the two front slots. Lift the 1U Rackmount Tape Enclosure **3** until the rear posts slip out of the two rear slots and place it in its new location.

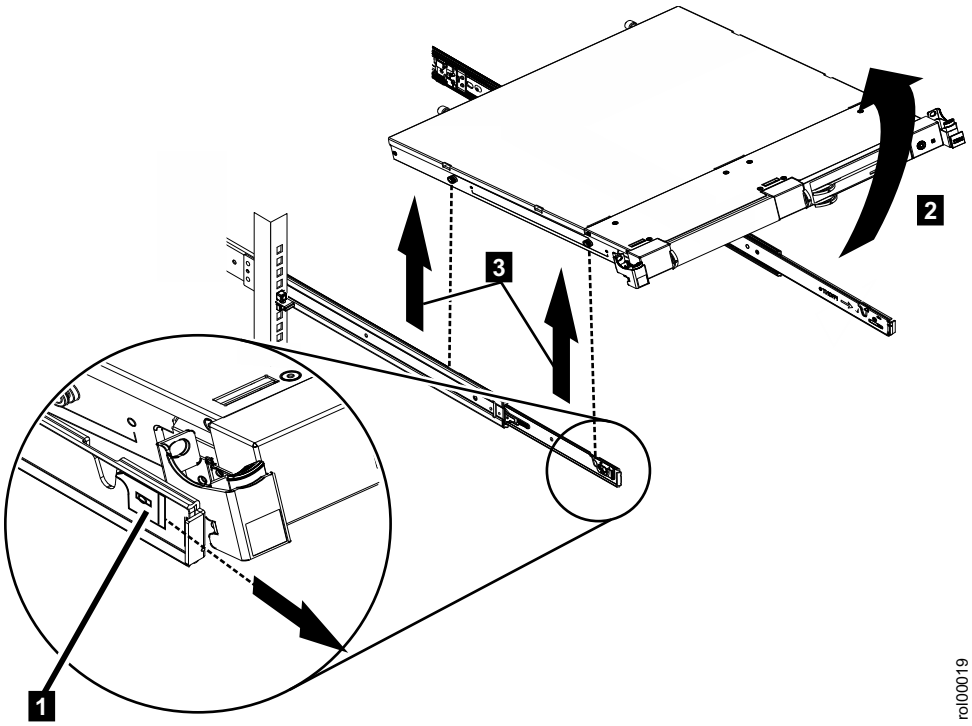


Figure 18. Slide rails extended, 1U Rackmount Tape Enclosure posts aligned with slots in rail

Removing the Cable Management Arm

To remove the Cable Management Arm, complete the following steps:

Note: The cable-management arm can be installed on either side of the server. The following figures show it being removed from the left side. To remove the cable-management arm from the right side, follow the instructions and remove the hardware from the opposite side.

1. Ensure that the system and the 1U Rackmount Tape Enclosure are powered off.
2. Remove the power cords and other cables from the rear of the 1U Rackmount Tape Enclosure **1** . Remove the cable ties and fasteners from the cable-management arm **2** and remove the power cords and other cables from the cable-management arm.

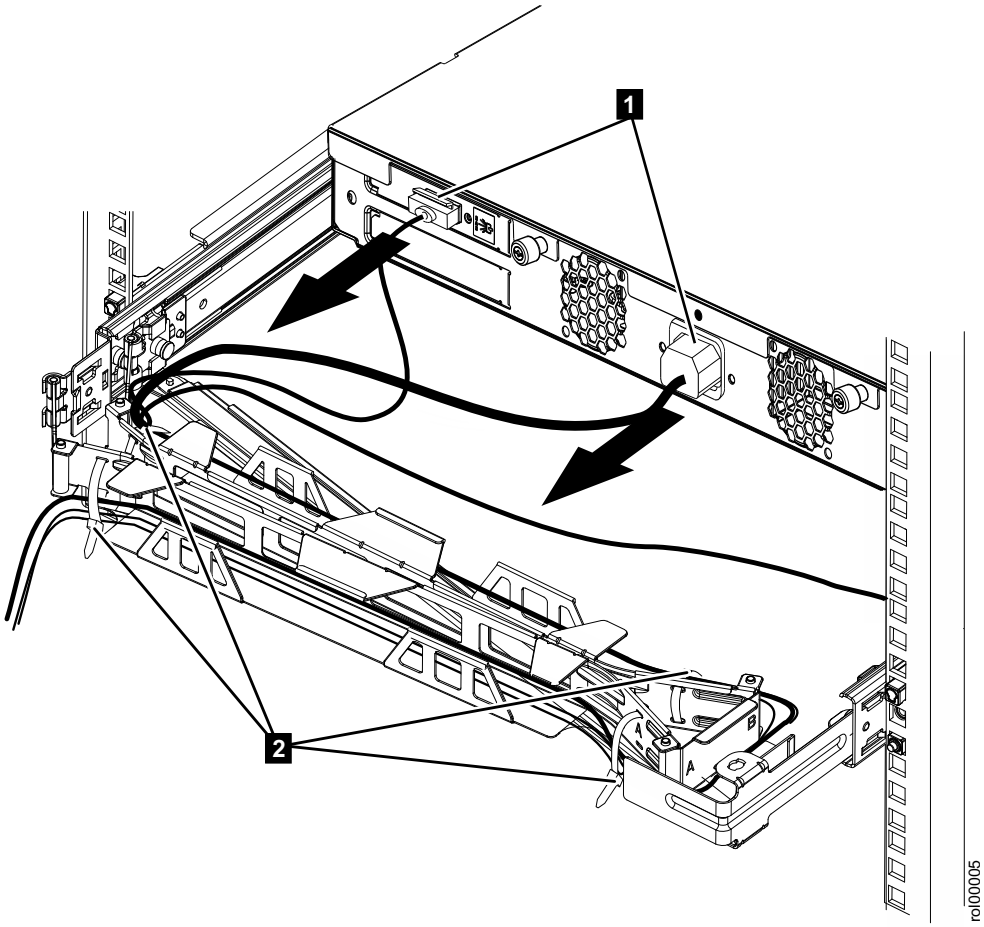


Figure 19. Disconnect Cables

3. Pull out the cable-management arm pin **1**, and then slide that cable management arm tab out of the slot **2** on the outside of the slide rail. Pull out the other cable-management arm pin **3**, and then slide the cable-management arm tab **4** out of the slot on the inside of the slide rail. Lift the cable-management arm off the support arm.

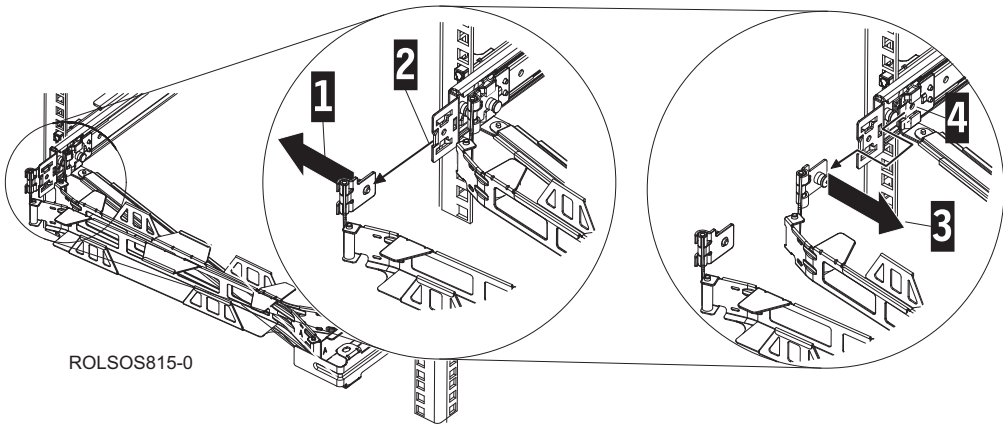


Figure 20. Slide rail and movable tab

4. Pull out the mounting bracket pin **1** and slide the mounting bracket **2** out of the slide.

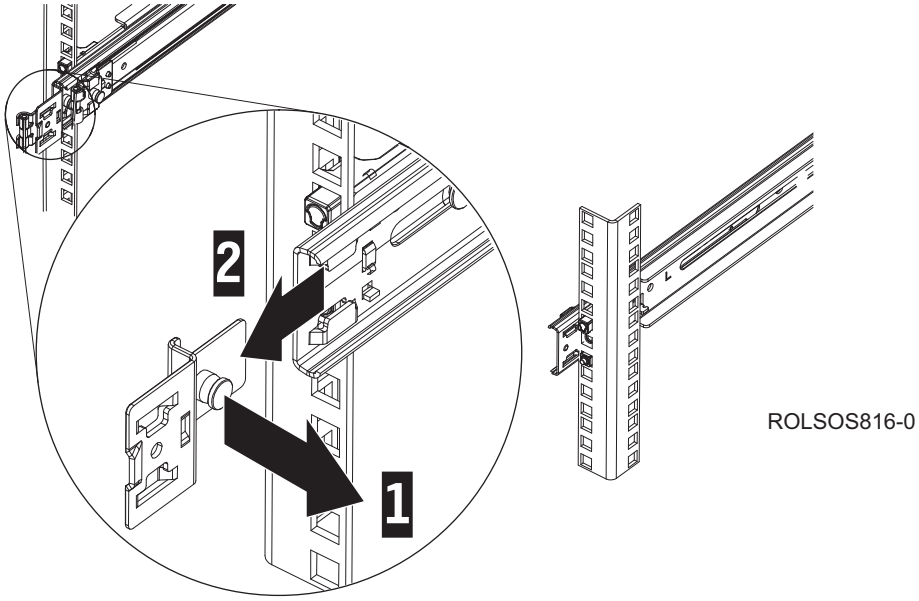


Figure 21. Cable Management Arm

5. To remove the support arm bracket, pull the pin out **1**, and then slide the bracket **2** out of the slide rail.

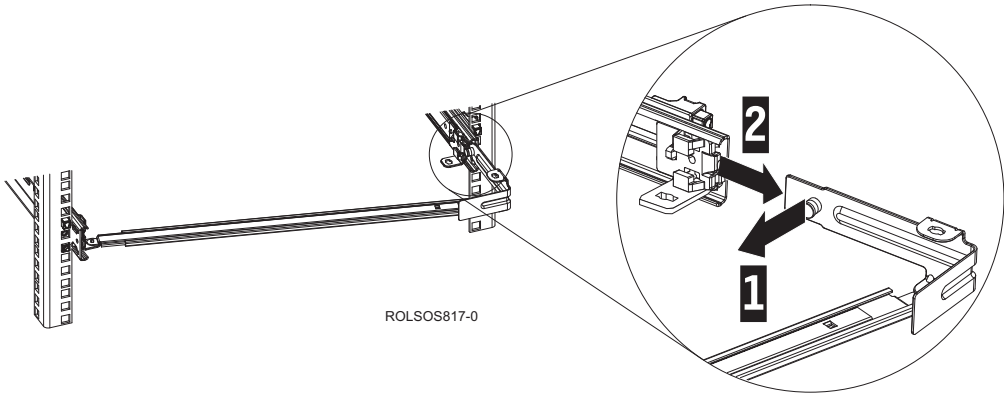


Figure 22. Support Arm Bracket

6. To remove the cable-management stop bracket, turn the bracket **1** and lift it **2** to release it from the support arm.

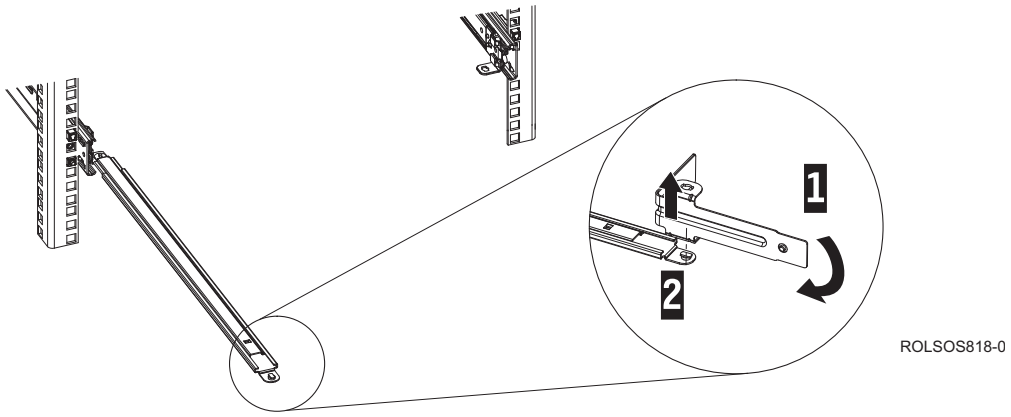


Figure 23. Stop Bracket

7. Swing the support arm **2** away from the rack and remove it from the slide rail.

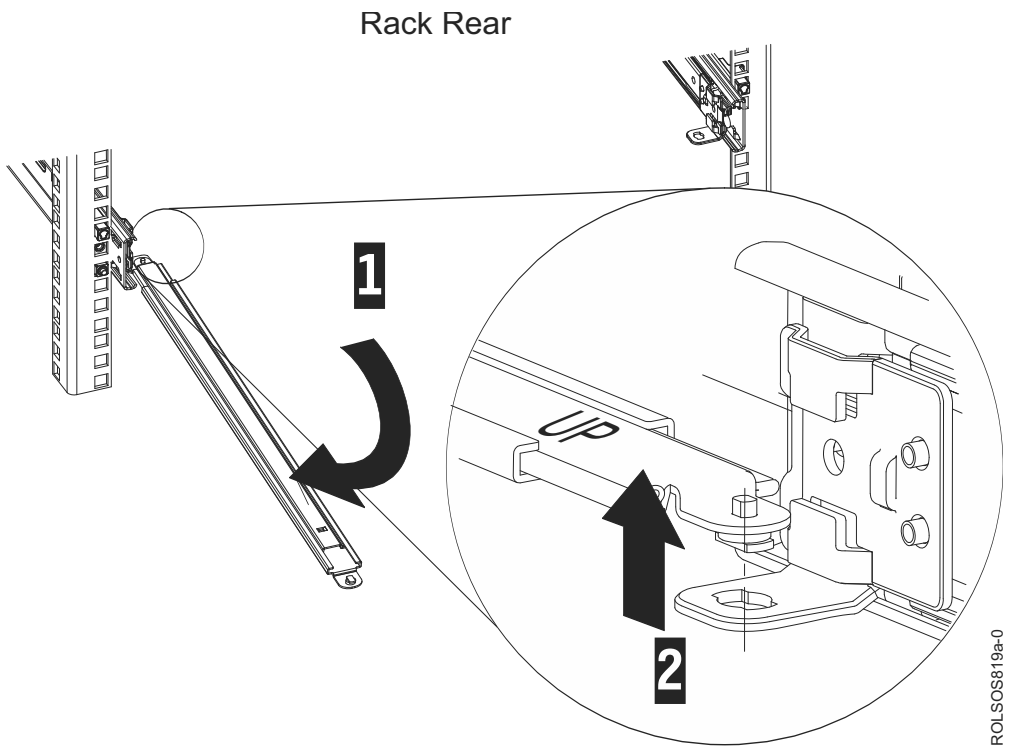


Figure 24. Support Arm

Removing the Slide Rails from a Rack

To remove the Slide Rails from a rack, complete the following steps:

Note: Remove the 1U Rackmount Tape Enclosure and the Cable Management Arm before removing the slide rails.

1. Each slide rail is marked with either an R (right) or an L (left). Select one of the slide rails and push up on the front movable tab **1**; then, pull out the front latch **2** to slide out the front side rail.

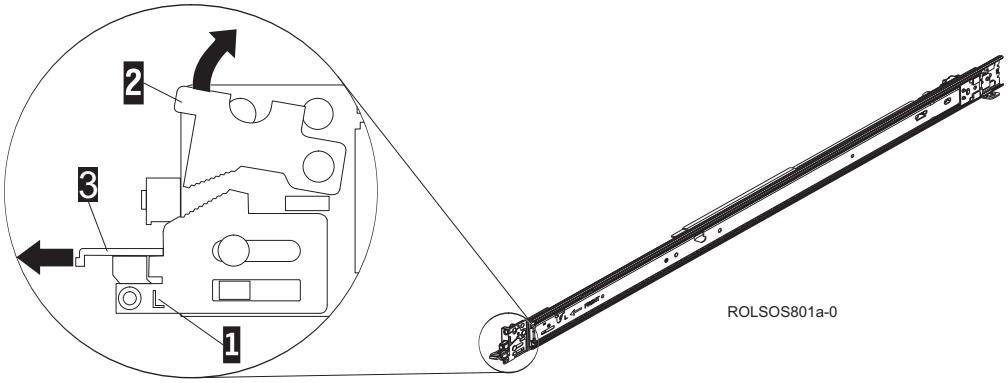


Figure 25. Slide rail and movable tab

Note: Make sure that the movable tab remains extended and does not click back into place.

2. Push the bottom pin in **1** . At the same time, push the slide rail up and in **2** until it releases from the rack.

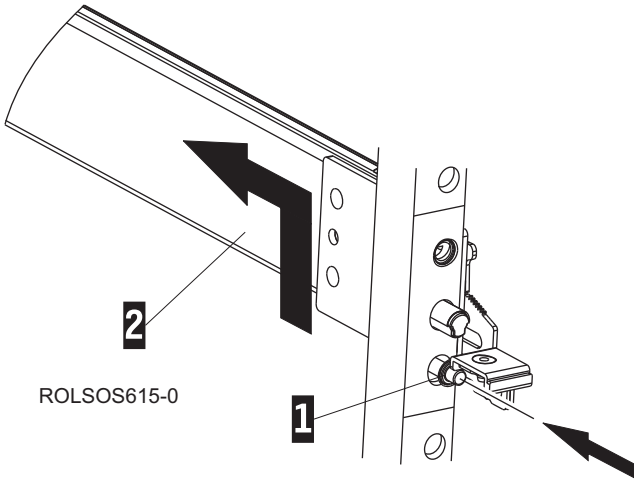


Figure 26. Front of slide rail and pins

3. Locate the rear of the slide rail.
4. Push the middle pin in firmly **1** . At the same time, push the bottom pin in **2** and push the slide rail in **3** until it releases from the rack.

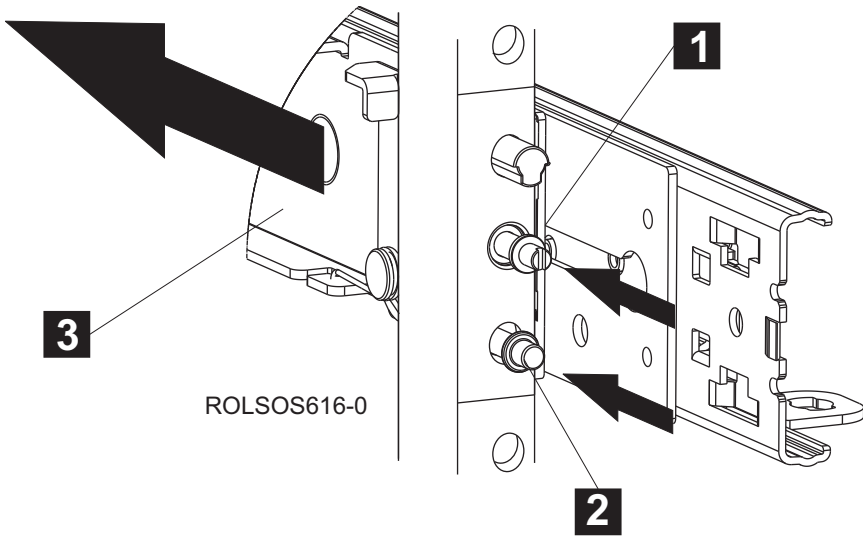


Figure 27. Rear of the slide rail and pins

5. Repeat steps 1 on page 19 though 4 on page 20 for the other slide rail.

Chapter 3. Attaching the 1U Rackmount Tape Enclosure to a Host System

This chapter provides step-by-step instructions on how to properly attach and configure the 1U Rackmount Tape Enclosure to a host system.

DANGER

When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:

- **Connect power to this unit only with the provided power cord. Do not use the provided power cord for any other product.**
- **Do not open or service any power supply assembly.**
- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.**
- **Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.**
- **Connect any equipment that will be attached to this product to properly wired outlets.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.**

  To disconnect:

  1. **Turn off everything (unless instructed otherwise).**
  2. **Remove the power cords from the outlets.**
  3. **Remove the signal cables from the connectors.**
  4. **Remove all cables from the devices.**

  To connect:

  1. **Turn off everything (unless instructed otherwise).**
  2. **Attach all cables to the devices.**
  3. **Attach the signal cables to the connectors.**
  4. **Attach the power cords to the outlets.**
  5. **Turn on the devices.**
- **Sharp edges, corners and joints may be present in and around the system. Use care when handling equipment to avoid cuts, scrapes and pinching.**

(D005)

Attention: The 1U Rackmount Tape Enclosure is a precision device that requires reasonable care in handling to prevent data loss or permanent damage to the device. Avoid bumping or dropping the 1U Rackmount Tape Enclosure. Ensure all media is removed from the device before the enclosure is moved.

Performing the Installation

To install the 1U Rackmount Tape Enclosure, complete the following steps.

Step 1. Using the Inventory Checklist

Make sure that you received the following items:

- Power cable (for the appropriate cable see Appendix A, "Power Cables," on page 93)
- The *External Devices Warranty Information* (U.S., Canada, and Puerto Rico only)
- The *StorageTek 1U Rackmount Tape Enclosure Setup, Operator, and Service Guide* (this guide)
- The *IBM Systems Safety Notices G229-9054* manual
- The SAS cables purchased separately

Step 2. Checking the Electrical Outlets

Make sure that the electrical outlets you use are properly grounded.

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (D004)

Step 3. Assembling the Materials

Refer to your system management or system hardware manuals to locate the information that you need to install the 1U Rackmount Tape Enclosure.

1. **Get your system unit manuals now.** You may find the needed information under the topics:
   - SAS controllers
   - External SAS devices
2. **Do not continue** until you have verified where the SAS controllers are located (where you make the cable connection).

Record the controllers' locations here.

Step 4. Placing the 1U Rackmount Tape Enclosure

The 1U Rackmount Tape Enclosure should be installed in a system rack in a clean environment. Consider the length of the power cord and the SAS cables and ensure that the media can be easily inserted when selecting the location.

The 1U Rackmount Tape Enclosure should be installed at least 30 inches above the floor to reduce contamination that can affect the drives.

To place the 1U Rackmount Tape Enclosure, complete the following steps:

1. Mount the 1U Rackmount Tape Enclosure in the rack as described in Chapter 2, "Installing the 1U Rackmount Tape Enclosure into a Rack," on page 5.

2. Connect the power cable to the 1U Rackmount Tape Enclosure. **(Do not plug it into the electrical outlet at this time.)** Route the power cable through the cable management arm as described in Chapter 2, "Installing the 1U Rackmount Tape Enclosure into a Rack," on page 5.

Note: Heavy objects should not be stacked on the 1U Rackmount Tape Enclosure.

Step 5. Connecting the SAS Cables

To connect the SAS cables, perform the following steps:

Note: If installed, remove the connector covers.

DANGER

To prevent a possible shock from touching two surfaces with different protective ground (earth), use one hand, when possible, to connect or disconnect signal cables. (D001)

1. There is one SAS cable connector for each drive installed in the 1U Rackmount Tape Enclosure. On the rear of the 1U Rackmount Tape Enclosure (**1** in Figure 28), insert the device connector end of each cable into the cable connector **2** . Route the power cable through the cable management arm as described in Chapter 2, "Installing the 1U Rackmount Tape Enclosure into a Rack," on page 5.

   Note: The 1U Rackmount Tape Enclosure only supports the use of SAS cables that are included with the tape drives. The use of other cables are not recommended or supported.
2. Make sure that the connector is fully engaged.

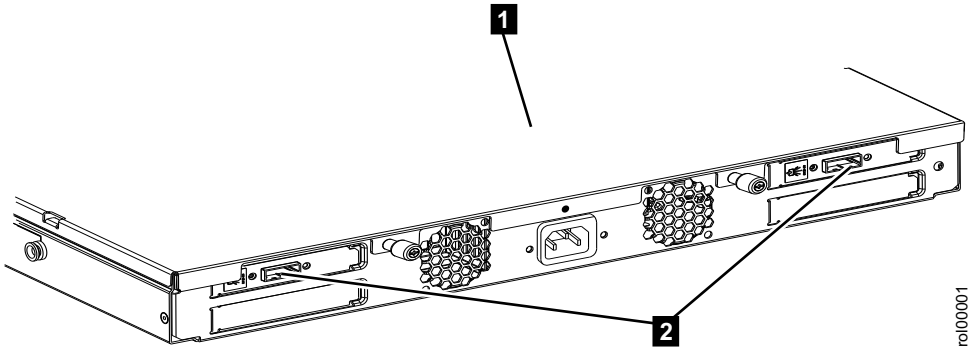


Figure 28. Connecting the SAS Cables to the 1U Rackmount Tape Enclosure

3. Connect the other end of the cable to the host system.

Step 6. Connecting the Power Cables

To connect the power cables, complete the following steps:

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (D004)

1. Plug the 1U Rackmount Tape Enclosure power cable into an electrical outlet.

2. Plug the power cables for all external devices and the system unit into electrical outlets.
3. Turn on the power to all of the external devices.
4. Review the information concerning each drive status LED, then turn on the power to the 1U Rackmount Tape Enclosure and watch for the following occurrences:
   - The 1U Rackmount Tape Enclosure power-on LED comes on and stays on.
   - The drive status LEDs blink for up to 60 seconds and go out, indicating that the Power-On Self Test (POST) has completed successfully.

Chapter 4. Removing the 1U Rackmount Tape Enclosure from a Host System

This chapter describes how to remove the 1U Rackmount Tape Enclosure after it has been installed.

DANGER

When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:

- **Connect power to this unit only with the provided power cord. Do not use the provided power cord for any other product.**
- **Do not open or service any power supply assembly.**
- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.**
- **Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.**
- **Connect any equipment that will be attached to this product to properly wired outlets.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.**

  To disconnect:

  1. **Turn off everything (unless instructed otherwise).**
  2. **Remove the power cords from the outlets.**
  3. **Remove the signal cables from the connectors.**
  4. **Remove all cables from the devices.**

  To connect:

  1. **Turn off everything (unless instructed otherwise).**
  2. **Attach all cables to the devices.**
  3. **Attach the signal cables to the connectors.**
  4. **Attach the power cords to the outlets.**
  5. **Turn on the devices.**
- **Sharp edges, corners and joints may be present in and around the system. Use care when handling equipment to avoid cuts, scrapes and pinching.**

(D005)

Removal Checklist

To remove the 1U Rackmount Tape Enclosure, complete the following steps:

Attention: Failure to complete the following steps in sequence before you add or delete a device may result in data loss or system failure.

1. If loaded, remove any media from the tape drive installed in the 1U Rackmount Tape Enclosure by pressing the unload button while the power is on.
2. Remove the 1U Rackmount Tape Enclosure from the system configuration. (For instructions, refer to your system manuals.)

   Attention: Failure to inform the operating system before you add or delete a device may result in data loss or a system fault.
3. Ensure that the system and the 1U Rackmount Tape Enclosure are powered off.

   DANGER

   An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (D004)
4. Unplug the power cable for the 1U Rackmount Tape Enclosure from the electrical outlet.

   DANGER

   To prevent a possible shock from touching two surfaces with different protective ground (earth), use one hand, when possible, to connect or disconnect signal cables. (D001)
5. Disconnect the SAS cables from the system unit.
6. Disconnect the SAS cables from the 1U Rackmount Tape Enclosure.
7. To remove the 1U Rackmount Tape Enclosure from the rack, see "Removing the 1U Rackmount Tape Enclosure from a Rack" on page 14.
8. If reinstalling the 1U Rackmount Tape Enclosure, see Chapter 3, "Attaching the 1U Rackmount Tape Enclosure to a Host System," on page 23.

Chapter 5. The Half High LTO-7 Tape Drive Feature

This chapter describes the 1U Rackmount Tape Enclosure Half High LTO-7 Tape Drives. It describes operator controls and indicator LEDs, gives instructions for loading and unloading a tape cartridge, and tells how to clean the tape drive. These tape drives are streaming tape storage devices that use LTO technology.

LTO Features

The LTO-7 Tape Drive is a high-performance, high-capacity data-storage device that is designed to backup and restore open systems applications. These files can include multimedia, imaging, transaction processing, large databases, and other storage-intensive applications. Each tape cartridge can store up to 6 TB of data (uncompressed), or up to 15 TB of data (compressed), assuming a 2.5 to 1 compression ratio. It is the seventh generation in the Ultrium series of products, and is available with a Serial Attached SCSI interface (SAS). This model incorporates the Linear Tape-Open (LTO) Ultrium-7 Half-High Tape Drive.

Note: The actual capacity varies depending on the application, the type of data, and the tape cartridge. 6 TB is typical and 15 TB is possible when the Data Compression setting is activated. The default setting of Data Compression is controlled by the host system. The user and the application software can control the activation or deactivation of the data compression setting. The drive can optimally achieve a 2.5:1 compression ratio.

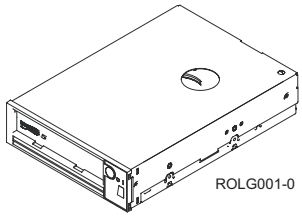
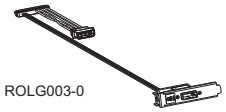
The LTO half high tape drive features:

- Single port 6 Gbps Serial Attached Small Computer Systems Interface (SAS). (Auto-negotiation to lower speeds is assumed.)
- Half height form factor
- Native storage capacity of 6 TB per cartridge (15 TB at 2.5:1 compression)
- Maximum native data transfer rate of up to 300 MB per second
- Burst data transfer rate:
  - SAS 600 MB per second
- 1024 MB read-and-write cache
- Support for encryption on Ultrium-6 and 7 tape cartridges
- Single Character Display (SCD) operator panel
- Ready and Fault status LEDs
- Maintenance Mode functions
- Downward read and write compatibility with earlier LTO-type data cartridges
- Can be used as a bootable device, depending on the host system configuration

Feature Kit Contents

The 1U Rackmount Tape Enclosure drive provides an LTO-7 tape drive kit with the following contents:

Table 2. LTO-7 Tape Drive Kit Contents

Description		Quantity
LTO-7 SAS Tape Drive		1
SAS Interface Assembly		1
Drive Power Cable		1

Operation Features

The half high LTO tape drive has the following operator controls.

Unload Button

The unload button (**1** in Figure 29) is used to eject an installed tape cartridge, perform maintenance functions, and reset the drive. The unload button operates only when the power is on. For more information on the Unload Button functions, see "Unload Button" on page 39.

Indicator LEDs

The half high LTO has the following indicator LEDs.

Status LEDs

Two status LEDs and their ISO symbols appear on the drive as follows:

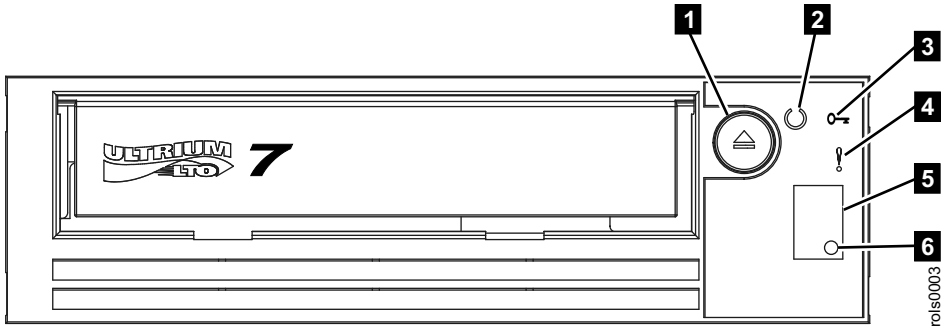


Figure 29. Front View of the half high LTO Drive

1 Cartridge Unload Button

2 Ready LED

3 Encryption Key

4 Fault LED

5 Single-character display (SCD)

6 SCD dot

Notes:

1. The recommended preventative maintenance cleaning frequency is approximately 100 tape motion hours or when the drive indicates cleaning is required. Tape motion hours are defined as the time the tape drive is moving tape.
2. When the tape drive indicates that the drive needs to be cleaned, it is the customer's responsibility to clean the tape drive with the recommended cleaning cartridge.

Single Character Display (SCD) Panel

The Single Character Display (SCD) Panel 4 and the SCD dot 5 are used to report permanent errors occurring on the drive.

Rear View of the LTO Tape Drive

Figure 30 shows the connector locations on the drive.

Note: This view is of the connections on rear of the drive assembly, located inside the 1U Rackmount Tape Enclosure.

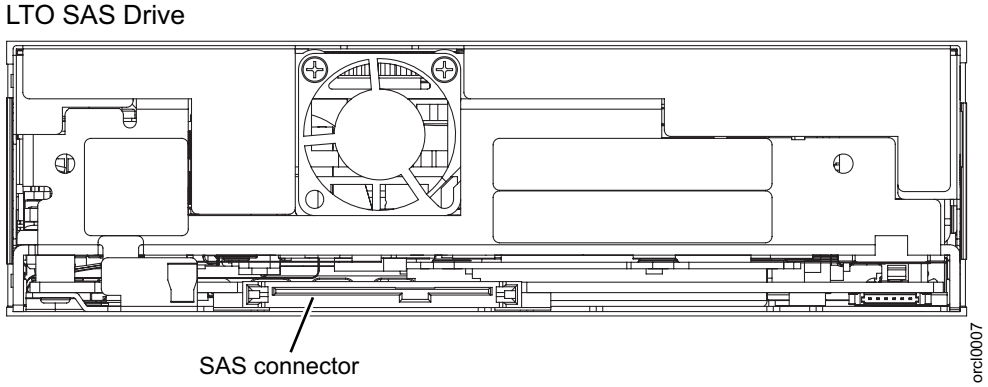


Figure 30. Connector Locations on the Drive

Operating the LTO-7 Tape Drive

Operating the drive involves using the following front panel items:

- Single-character Display (SCD)
- SCD Dot
- Ready and Fault Status LEDs
- Unload Button

Operating Modes

The drive functions in the following modes:

- Operation mode - functions include reading and writing data, cartridge manipulation, error reporting, and firmware updating using an field microcode replacement (FMR) cartridge. For more information, see "Status LEDs."
- Maintenance mode - functions include drive diagnostic, creation/unmake FMR cartridge, and drive dump manipulation (force to RAM, copy to tape, copy to flash memory, and erase flash). For more information, see "Diagnostic and Maintenance Functions" on page 40.

The Unload button is used to switch between modes.

Single-Character Display (SCD)

The SCD presents a single-character code for:

- Error conditions and informational messages
- Diagnostic or maintenance functions (while in maintenance mode only)

"Error Codes and Messages" on page 48 lists the codes for error conditions and informational messages. If multiple errors occur, the code with the highest priority (represented by the lowest number) displays first. When the error is corrected, the code with the next highest priority displays, and so on until no errors remain.

"Diagnostic and Maintenance Functions" on page 40 lists the single-character codes that represent diagnostic or maintenance functions. To initiate a function the unit must be in maintenance mode.

The SCD is blank during normal operation.

SCD Dot

If a drive dump is present while the drive is in maintenance mode, a single amber dot illuminates in the lower right corner of the SCD. To copy the dump, see "Function Code 5: Copy Drive Dump" on page 42.

The SCD Dot is on solid if the dump is in RAM memory. The SCD Dot flashes if the dump is in FLASH memory.

The SCD Dot turns off when you obtain a dump (by using ITDT or a SCSI command) or update the drive firmware.

Note: If the drive dump is stored in RAM memory (SCD Dot on solid), the dump will be lost when you turn OFF the power or reset the drive.

Status LEDs

The Status LEDs (**2** and **3** in Figure 29 on page 34) provide information about the state of the drive. The Ready status LED is green and the Fault status LED is amber, and (when lit) solid or flashing.

Table 3. Status LED Combinations

Mode	SCD	Ready LED (green)	Fault LED (amber)
Operational	Blank	On	Off
Activity (tape movement) in Operational Mode	Blank	Flashing	Off

Table 3. Status LED Combinations (continued)

Mode	SCD	Ready LED (green)	Fault LED (amber)
Maintenance	Solid character	Off	On
Executing Maintenance Selection	Flashing character	Off	On
Error Condition	Solid character	Off	Flashing
Power-On/Reset Initialization	random segments	Off	On

Table 4 lists the conditions of the Status LEDs and Single-character Display (SCD) and provides an explanation of what each condition means.

Table 4. Meaning of Status LEDs and Single-character Display (SCD)

If the green Ready Status LED is...	and the amber Fault status LED is...	and the SCD is...	and the SCD Dot is...	Meaning
Off	Off	Off	Off	The drive has no power or is powered off.
Green/ Solid	Off	Off	Off	The drive is powered on and in an idle state.
Flashing Green (once per second)	Off	Off	Off	The drive is reading from the tape, writing to the tape, rewinding the tape, locating data on the tape, loading the tape, or unloading the tape.
Flashing Green (once per second)	Off	Off	Off	If the drive contains a cartridge during the power-on cycle, the drive completes POST and slowly rewinds the tape. (The process may take up to ten minutes.) The LED stops blinking and becomes solid when the drive completes the recovery and ejects the cartridge.
Off	Amber/Solid	Displaying an error code or Maintenance Mode Function	On/Off	The drive is displaying error code(s) from the error code log on the SCD. **1** Maximum operating temperature exceeded. Reduce drive temperature. **2** Input voltage failure. Check input power connections. **6** Drive or media failure. Clean drive, replace cartridge, or both, if needed. Retry operation. **7** Media error. Replace cartridge. Possible expired cleaning cartridge. **A** Recoverable drive error. Clean drive and retry operation. **J** Incorrect media. Insert correct media type. **F** Incorrect firmware update tape used. Replace firmware update tape. **P** Write operation was attempted and media is write-protected. Use media that is not write-protected.

Table 4. Meaning of Status LEDs and Single-character Display (SCD) (continued)

If the green Ready Status LED is...	and the amber Fault status LED is...	and the SCD is...	and the SCD Dot is...	Meaning
Off/On	Off/On	Displaying random segments/ Blank/ displaying random segments/ displaying 8/Blank	Off	During power on, or a drive reset, the drive front panel will display drive progress as follows: 1. SCD will display random segments (no LEDs ON). 2. SCD will go blank (LEDs - Green ON, Amber OFF). 3. SCD will display random segments (LEDs - Green OFF, Amber ON). 4. SCD will display 8 (LEDs - Green OFF, Amber ON). 5. SCD will go blank (LEDs - Green ON, Amber OFF) after a successful power on or reset. If an error is detected during the power on or reset, the tape drive posts an error code to the SCD. To determine the error, locate the code in "Error Codes and Messages" on page 48.
Off	Amber/Solid	Displaying 0	Off/On	The drive is entering or exiting from maintenance mode.
Off	Amber/Solid	Flashing selected function	Off/On	The drive is executing the selected function while in maintenance mode.
Off	Flashing Amber (once per second)	Displaying error code	Off	An error occurred and the drive or media may require service, or it may require cleaning. Note the code on the SCD, then go to "Error Codes and Messages" on page 48 to determine the action that is required.
Off	Flashing Amber	Flashing C	Off	The drive needs cleaning.
Off	Flashing Amber	Displaying 2	Off	The drive is updating firmware.
Off	Flashing Amber (twice per second)	Off	Off	The drive detected an error and is performing a firmware recovery. It will reset automatically.
Off	Amber/Solid	Flashing C	Off	The drive is requesting a cartridge to be loaded.
Off	Flashing Amber (twice per second)	Off	On	There is a drive dump in flash memory.

Unload Button

The Unload Button (**1** in Figure 29 on page 34) performs the following functions:

Table 5. Unload Button Functions

Unload Button Function	**How to Initiate the Function**
Rewind the tape into the cartridge and eject the cartridge from the drive	Press the Unload Button once. The Status LED flashes green while the drive is rewinding and unloading. **Note:** During a rewind and eject operation, the drive does not accept SCSI commands from the server.
Place the drive in maintenance mode	Ensure that the drive is unloaded. Then, press the Unload Button 3 times within 2 seconds. The drive is in maintenance mode when the Status LED becomes solid amber and 0 appears in the SCD. **Notes:** 1. While in maintenance mode, the drive does not accept SCSI interface commands. 2. If you attempt to enter Maintenance Mode with a cartridge in the drive, the drive will rewind and eject the cartridge. Remove the cartridge and repeat the steps for entering Maintenance Mode.
Scroll through the maintenance functions	While in maintenance mode, press the Unload Button once per second to increment the display characters by one. When you reach the character of the diagnostic or maintenance function that you want (see "Diagnostic and Maintenance Functions" on page 40), press and hold the Unload Button for three seconds.
Exit maintenance mode	Press the Unload Button once per second until 0 displays. Then press and hold the Unload Button for three seconds. Maintenance mode is exited when the Status LED becomes solid green and the SCD becomes blank.
Force a drive dump (part of the maintenance mode)	**Attention:** If the drive detects a permanent error and displays an error code, it automatically forces a drive dump (also known as a save of the firmware trace). If you force a drive dump, the existing dump will be overwritten and data will be lost. After you force a drive dump, do not turn off the power to the drive or you may lose the dump data. Choose one of the following procedures: • If the drive is in maintenance mode (Status LED is solid amber), refer to "Function Code 4: Force a Drive Dump" on page 42. • If the drive is in operating mode (Status LED is solid or flashing green), press and hold the Unload Button for ten seconds. If captured dump data exists, the drive places it into a dump area.
Reset the drive	Press and hold the Unload Button until the drive begins the reset procedure. (Status LED will be amber.) **Note:** If a tape cartridge is loaded in the drive the drive will unload the tape. Repeat the reset procedure after the tape is unloaded. The drive saves a dump of the current drive state, then reboots to allow communication. Do not cycle power as this will erase the contents of the dump.

Diagnostic and Maintenance Functions

The drive can:

- Run diagnostics
- Test write and read functions
- Test a suspect tape cartridge
- Update firmware
- Perform other diagnostic and maintenance functions

The drive must be in maintenance mode to perform these functions.

Attention: Maintenance functions cannot be performed concurrently with read or write operations. While in maintenance mode, the tape drive does not accept SCSI commands from the server.

Note: During normal operation the fan only runs when cooling is required. The fan will be turned on/off during the POST and Run Drive Diagnostics to demonstrate the fan is operational.

Entering Maintenance Mode

The drive must be in maintenance mode to run drive diagnostics or maintenance functions. To place the unit in maintenance mode:

1. Make sure that no cartridge is in the drive.
2. Press the Unload Button 3 times within 2 seconds. A 0 appears in the Single-character Display (SCD), and the Fault LED turns amber.

Note: If a cartridge is in the tape drive, it will eject the first time that you press the Unload Button and the drive will not be placed in maintenance mode. To continue placing the drive in maintenance mode, perform the preceding step. While in Maintenance Mode, the drive will not accept a cartridge unless the drive requests it. The SCD will display a flashing `C` to indicate a cartridge needs to be inserted.

Maintenance functions cannot be performed concurrently with read or write operations. While in maintenance mode, the drive does not receive commands from the server.

Exiting Maintenance Mode

The drive must be in maintenance mode to run drive diagnostics or maintenance functions. To exit maintenance mode:

1. Press and hold the Unload Button for 3 or more seconds then release the button to take the drive out of maintenance mode. If no error is detected, 0 temporarily appears in the SCD, then goes blank. The drive then exits maintenance mode and the Status LED will return to Green.
2. If an error is detected, the SCD shows an error code but still exits maintenance mode. To determine the error, locate the code in “Error Codes and Messages” on page 48. To clear the error, turn the power off, then on again.

Note: The drive also exits maintenance mode automatically after it completes a maintenance function or after 10 minutes if no action has occurred.

Function Code 0: Maintenance Mode

Function Code 0 makes the drive available for running drive diagnostics or maintenance functions (see "Entering Maintenance Mode" on page 40 and "Exiting Maintenance Mode" on page 40).

The drive exits Maintenance Mode automatically after it completes a maintenance function or after 10 minutes if no action has occurred.

Function Code 1: Run Drive Diagnostics

Function Code 1 runs tests that determine whether the drive can properly load and unload cartridges and read and write data. This test runs 10 loops with each loop taking approximately 20 minutes to complete.

Once you begin this test, the diagnostics begin the loop sequence. Time the first loop by pressing the Unload Button once to stop the diagnostics after the completion of the first loop, then record the time it takes for the test to complete. Compare the recorded time with the *Approximate Run Time* above. If the test runs successfully but the execution time is significantly longer than the *Approximate Run Time*, run "Function Code F: Write Performance Test" on page 44. If the Write Performance Test fails, replace the media and exit maintenance mode.

Attention: For this test, insert only a scratch (blank) data cartridge or a cartridge that may be overwritten. During the test, the drive overwrites the data on the cartridge.

Note: If you inserted an invalid tape cartridge (Gen1 or WORM media, for example), error code 7 appears in the SCD. If you inserted a write-protected cartridge, or the media has read-only compatibility (Gen2 media, for example), error code P appears in the SCD. In either case, the tape drive unloads the cartridge and exits Maintenance Mode after the cartridge is removed.

Steps to Execute Run Drive Diagnostics:

1. Place the drive in Maintenance Mode. For instructions, see "Entering Maintenance Mode" on page 40.
2. Press the Unload Button once per second until 1 appears in the SCD. (If you cycle past the code that you want, press the Unload Button once per second until the code reappears.)
3. Press and hold the Unload Button for three or more seconds, then release it to select function 1 . Wait for the SCD to change to a flashing C .
4. Insert a scratch (blank) data cartridge. The SCD changes to a flashing 1 and the test begins. During the test, the drive will Unload/Load the cartridge. Do not remove the cartridge during the test.
   - If no error is detected, the diagnostics will loop and begin again. To stop the loop, press the Unload Button for one second and release. When the loop ends, 0 temporarily appears in the SCD.
   - If an error is detected, the Status LED flashes amber and the drive posts an error code to the SCD. To determine the error, locate the code in "Error Codes and Messages" on page 48. To clear the error either turn the power off and then on again, or reboot the drive by pressing and holding the Unload Button for 10 seconds.

Function Code 4: Force a Drive Dump

Function Code 4 performs a dump of data collected by the drive. (This process is also known as saving a microcode trace.)

1. Place the drive in Maintenance Mode. For instructions, see "Entering Maintenance Mode" on page 40.
2. Press the Unload Button once per second until 4 appears in the SCD. (If you cycle past the code that you want, press the Unload Button once per second until the code reappears.)
3. Press and hold the Unload Button for three or more seconds, then release it to select the function. The drive performs the dump. The SCD shows 0 , then goes blank, and the drive exits Maintenance Mode. To access the contents of the dump, see "Function Code 5: Copy Drive Dump."

Note: You can also force a drive dump when the tape drive is in normal operating mode. Simply press and hold the Unload Button for ten seconds. This causes the drive to reboot.

Function Code 5: Copy Drive Dump

Function Code 5 copies data from a drive dump (captured in Function Code 4) to the beginning of a scratch (blank) data cartridge.

Attention: For this function, insert only a scratch (blank) data cartridge or a cartridge that may be overwritten. During the test, the drive overwrites the data on the cartridge.

Note: If you inserted an invalid tape cartridge (Gen1 or WORM media, for example), error code 7 appears in the SCD. If you inserted a write-protected cartridge, or the media has read-only compatibility (Gen2 media, for example), error code P appears in the SCD. In either case, the tape drive unloads the cartridge and exits Maintenance Mode after the cartridge is removed.

1. Place the drive in Maintenance Mode. (For instructions, see "Entering Maintenance Mode" on page 40.) Index through the Maintenance Mode options until 5 is displayed on the SCD. Press and hold the Unload Button for three seconds to select Function Code 5. After selecting Function Code 5 the SCD will display option 5 - 1. Press the Unload Button within 5 seconds to make a different selection. If no other selection is made, the drive will perform option 5 - 1.
2. Press the Unload Button once per second to cycle through the following functions:
   - 5 - 1 : copy dump to tape; clears RAM dump
   - 5 - 8 : copy dump to flash memory; clears RAM dump
   - 5 - 3 : erase flash memory
   - 5 - 0 : no function

   If you cycle past the code that you want, press the Unload Button once per second until the code reappears.
3. Press and hold the Unload Button for three or more seconds, then release it to select one of the above functions.
4. If you selected 5 - 0 the drive will exit Maintenance Mode. If you selected 5 - 8 or 5 - 3 the SCD will change to a flashing 5 while the procedure is being performed. After the procedure is completed the drive will exit Maintenance Mode. If you selected 5 - 1 the SCD will change to a flashing C indicating that a data cartridge is to be inserted.

5. Insert a scratch (blank) data cartridge within 60 seconds, or the drive will exit Maintenance Mode. Ensure the scratch cartridge is not write protected (or the tape drive exits maintenance mode). The SCD flashes the selection number while performing the function.
   - If the copy operation completes successfully, the tape drive rewinds and unloads the tape, and exits Maintenance Mode after the cartridge is removed.
   - If the copy operation fails, an error code appears in the SCD. To determine the error, locate the code in "Error Codes and Messages" on page 48. The tape drive unloads the tape cartridge and exits Maintenance Mode after the cartridge is removed.

Function Code 9: Display Error Code Log

Function Code 9 displays the last ten error codes, one at a time (the codes are ordered; the most recent is presented first and the oldest is presented last). If there are no errors in the log, function code 0 displays in the Single-character Display (SCD) and exits Maintenance Mode.

1. Place the drive in Maintenance Mode. For instructions, see "Entering Maintenance Mode" on page 40.
2. Press the Unload Button once per second until 9 appears in the SCD. (If you cycle past the code that you want, press the Unload Button once per second until the code reappears.)
3. Press the Unload Button, then release it to view the most recent error code.
4. Press and release the Unload Button again to view successive error codes. Let two to three seconds pass between each depression. The Green Ready LED and Amber Fault LED will flash On/Off once for each successive error code. The SCD will display 0 when all the error codes have been displayed.
5. After viewing all error codes, exit this function by pressing the Unload Button again. The SCD will display 0 and exit Maintenance Mode.

Function Code A: Clear Error Code Log

Function Code A erases the contents of the error code log.

1. Place the drive in Maintenance Mode. For instructions, see "Entering Maintenance Mode" on page 40.
2. Press the Unload Button once per second until A appears in the SCD. (If you cycle past the code that you want, press the Unload Button once per second until the code reappears.)
3. Press and hold the Unload Button for three or more seconds, then release it to select the function. A flashes in the SCD, followed by 0 . The tape drive erases all errors from the error code log and exits Maintenance Mode.

Function Code C: Insert Cartridge into Tape Drive

This function cannot be selected by itself, but is part of other maintenance functions (such as Run Tape Drive Diagnostics and Create FMR Tape) that require a tape cartridge to be inserted.

Function Code E: Test Cartridge & Media

Function Code E performs tests that determine whether a suspect cartridge and its magnetic tape are acceptable. This test runs 10 loops at approximately 15 minutes per loop.

Press the Unload Button to stop the diagnostics and exit maintenance mode. Pressing the Unload Button once will stop the test at the end of the current test loop. Pressing the Unload Button twice will stop the test immediately. Wait for the drive to rewind the tape and unload the cartridge.

Attention: When you perform this test, data on the suspect tape will be overwritten.

Note: If you inserted an invalid tape cartridge (Gen1 or WORM media, for example), error code 7 appears in the SCD. If you inserted a write-protected cartridge, or the media has read-only compatibility (Gen2 media, for example), error code P appears in the SCD. In either case, the tape drive unloads the cartridge and exits Maintenance Mode after the cartridge is removed.

1. Place the drive in Maintenance Mode. For instructions, see "Entering Maintenance Mode" on page 40.
2. Press the Unload Button once per second until E appears in the SCD. (If you cycle past the code that you want, press the Unload Button once per second until the code reappears.)
3. Press and hold the Unload Button for three or more seconds, then release it to select the function. The SCD changes to a flashing C requesting a cartridge.
4. Ensure that the write-protect switch on the cartridge is off, then insert the cartridge (or the tape drive exits maintenance mode). The SCD changes to flashing E . The tape drive runs the tests.
   - If no error is detected, the diagnostics will loop and begin again. To stop the loop, press the Unload Button for one second and release. When the loop ends, 0 temporarily appears in the SCD.
   - If an error is detected, the Status LED flashes amber and the drive posts an error code to the SCD. To determine the error, locate the code in "Error Codes and Messages" on page 48. To clear the error either turn the power off and then on again, or reboot the drive by pressing and holding the Unload Button for 10 seconds.

Function Code F: Write Performance Test

Function Code F performs tests to ensure that the drive can read from and write to tape. This test runs 10 loops at approximately 5 minutes per loop.

Press the Unload Button to stop the diagnostics and exit maintenance mode. Pressing the Unload Button once will stop the test at the end of the current test loop. Pressing the Unload Button twice will stop the test immediately. Wait for the drive to rewind the tape and unload the cartridge.

Attention: For this test, insert only a scratch (blank) data cartridge or a cartridge that may be overwritten. During the test, the drive overwrites the data on the cartridge.

Note: If you inserted an invalid tape cartridge (Gen1 or WORM media, for example), error code 7 appears in the SCD. If you inserted a write-protected cartridge, or the media has read-only compatibility (Gen2 media, for example), error code P appears in the SCD. In either case, the tape drive unloads the cartridge and exits Maintenance Mode after the cartridge is removed.

1. Place the drive in Maintenance Mode. For instructions, see "Entering Maintenance Mode" on page 40.

2. Press the Unload Button once per second until F appears in the SCD. (If you cycle past the code that you want, press the Unload Button once per second until the code reappears.)
3. Press and hold the Unload Button for three or more seconds, then release it to select the function. The SCD changes to a flashing C.
4. Insert a scratch (blank) data cartridge. The SCD changes to a flashing F and the tape drive runs the tests.

   Note: If you inserted an invalid tape cartridge (Gen1 or WORM media, for example), error code 7 appears in the SCD. If you inserted a write-protected cartridge, or the media has read-only compatibility (Gen2 media, for example), error code P appears in the SCD. In either case, the tape drive unloads the cartridge and exits Maintenance Mode after the cartridge is removed.

   - If no error is detected, the diagnostics will loop and begin again. To stop the loop, press the Unload Button for one second and release. When the loop ends, 0 temporarily appears in the SCD.
   - If an error is detected, the Status LED flashes amber and the drive posts an error code to the SCD. To determine the error, locate the code in "Error Codes and Messages" on page 48. To clear the error either turn the power off and then on again, or reboot the drive by pressing and holding the Unload Button for 10 seconds.

Function Code H: Test Head

Function Code H performs tests to ensure that the tape drive's head and tape-carriage mechanics work correctly. This test runs 10 loops at approximately 10 minutes per loop.

Once you begin this test, the diagnostics begin the loop sequence. Time the first loop by pressing the Unload Button once to stop the diagnostics after the completion of the first loop, then record the time it takes for the test to complete. Compare the recorded time with the *Approximate Run Time* above. If the test runs successfully but the execution time is significantly longer than the *Approximate Run Time*, run "Function Code F: Write Performance Test" on page 44. If the Write Performance Test fails, replace the media and exit maintenance mode.

Press the Unload Button to stop the diagnostics and exit maintenance mode. Pressing the Unload Button once will stop the test at the end of the current test loop. Pressing the Unload Button twice will stop the test immediately. Wait for the drive to rewind the tape and unload the cartridge.

Attention: For this test, insert only a scratch (blank) data cartridge or a cartridge that may be overwritten. During the test, the drive overwrites the data on the cartridge.

Note: If you inserted an invalid tape cartridge (Gen1 or WORM media, for example), error code 7 appears in the SCD. If you inserted a write-protected cartridge, or the media has read-only compatibility (Gen2 media, for example), error code P appears in the SCD. In either case, the tape drive unloads the cartridge and exits Maintenance Mode after the cartridge is removed.

1. Place the drive in Maintenance Mode. For instructions, see "Entering Maintenance Mode" on page 40.
2. Press the Unload Button once per second until H appears in the SCD. (If you cycle past the code that you want, press the Unload Button once per second until the code reappears.)

3. Press and hold the Unload Button for three or more seconds, then release it to select the function. The SCD changes to a flashing C.
4. Insert a scratch (blank) data cartridge. The SCD changes to a flashing H. The tape drive runs the tests.
   - If no error is detected, the diagnostics will loop and begin again. To stop the loop, press the Unload Button for one second and release. When the loop ends, 0 temporarily appears in the SCD.
   - If an error is detected, the Status LED flashes amber and the drive posts an error code to the SCD. To determine the error, locate the code in "Error Codes and Messages" on page 48. To clear the error either turn the power off and then on again, or reboot the drive by pressing and holding the Unload Button for 10 seconds.

Function Code J: Fast Read/Write Test

Function Code J performs tests to ensure that the drive can read from and write to tape. This test runs 10 loops at approximately 5 minutes per loop.

Once you begin this test, the diagnostics begin the loop sequence. Time the first loop by pressing the Unload Button once to stop the diagnostics after the completion of the first loop, then record the time it takes for the test to complete. Compare the recorded time with the *Approximate Run Time* above. If the test runs successfully but the execution time is significantly longer than the *Approximate Run Time*, run "Function Code F: Write Performance Test" on page 44. If the Write Performance Test fails, replace the media and exit maintenance mode.

Press the Unload Button to stop the diagnostics and exit maintenance mode. Pressing the Unload Button once will stop the test at the end of the current test loop. Pressing the Unload Button twice will stop the test immediately. Wait for the drive to rewind the tape and unload the cartridge.

Attention: For this test, insert only a scratch (blank) data cartridge or a cartridge that may be overwritten. During the test, the drive overwrites the data on the cartridge.

Note: If you inserted an invalid tape cartridge (Gen1 or WORM media, for example), error code 7 appears in the SCD. If you inserted a write-protected cartridge, or the media has read-only compatibility (Gen2 media, for example), error code P appears in the SCD. In either case, the tape drive unloads the cartridge and exits Maintenance Mode after the cartridge is removed.

1. Place the drive in Maintenance Mode. For instructions, see "Entering Maintenance Mode" on page 40.
2. Press the Unload Button once per second until J appears in the SCD. (If you cycle past the code that you want, press the Unload Button once per second until the code reappears.)
3. Press and hold the Unload Button for three or more seconds, then release it to select the function. The SCD changes to a flashing C.
4. Insert a scratch (blank) data cartridge. The SCD changes to a flashing H . The tape drive runs the tests.
   - If no error is detected, the diagnostics will loop and begin again. To stop the loop, press the Unload Button for one second and release. When the loop ends, 0 temporarily appears in the SCD.
   - If an error is detected, the Status LED flashes amber and the drive posts an error code to the SCD. To determine the error, locate the code in "Error

Codes and Messages" on page 48. To clear the error either turn the power off and then on again, or reboot the drive by pressing and holding the Unload Button for 10 seconds.

Function Code L: Load/Unload Test

Function Code L tests the drive's ability to load and unload a tape cartridge. This test runs 10 loops at approximately 15 seconds per loop.

Press the Unload Button to stop the diagnostics and exit maintenance mode. Pressing the Unload Button once will stop the test at the end of the current test loop. Pressing the Unload Button twice will stop the test immediately. Wait for the drive to rewind the tape and unload the cartridge.

Attention: Even though no data is written during this test, it is recommended that you use a blank (scratch) cartridge for this test.

1. Place the drive in Maintenance Mode. For instructions, see "Entering Maintenance Mode" on page 40.
2. Press the Unload Button once per second until L appears in the SCD. (If you cycle past the code that you want, press the Unload Button once per second until the code reappears.)
3. Press and hold the Unload Button for three or more seconds, then release it to select the function. The SCD changes to a flashing C.
4. Insert a scratch (blank) data cartridge. The SCD changes to a flashing L. The tape drive runs the tests.
   - If no error is detected, the diagnostics will loop and begin again. To stop the loop, press the Unload Button for one second and release. When the loop ends, 0 temporarily appears in the SCD.
   - If an error is detected, the Status LED flashes amber and the drive posts an error code to the SCD. To determine the error, locate the code in "Error Codes and Messages" on page 48. To clear the error either turn the power off and then on again, or reboot the drive by pressing and holding the Unload Button for 10 seconds.

Function Code P: Post Error Reporting Enabled

When Post Error Reporting is enabled, deferred-check conditions are reported to the host and temporary errors are reported in the sense data.

Function Code P will be displayed in Maintenance Mode when the drive has Post Error Reporting enabled.

This selection is normally used as a request from support personnel.

1. Place the drive in Maintenance Mode. For instructions, see "Entering Maintenance Mode" on page 40.
2. Press the Unload Button once per second until P or U appears in the SCD. Function Code P or U will appear in the SCD to indicate the current setting for Post Error Reporting. If you cycle past the code that you want, press the Unload Button once per second until the code reappears.
3. Exit Maintenance Mode if you do not want to change the current setting for Post Error Reporting. For instructions, see "Exiting Maintenance Mode" on page 40.

4. To disable Post Error Reporting, Press and hold the Unload Button for three seconds while P appears in the SCD. The SCD changes to U after you release the Unload Button.
5. Press the Unload Button once per second to select another Maintenance Mode Function. To exit Maintenance Mode, refer to "Exiting Maintenance Mode" on page 40.

Function Code U: Post Error Reporting Disabled

When Post Error Reporting is disabled, deferred-check conditions are not reported to the host and temporary errors are not reported in the sense data. This is the normal (default) setting for the drive. When the drive has Post Error Reporting disabled, Function Code U will be displayed in Maintenance Mode. The drive will default to Post Error Reporting disabled after a reboot or power off/on cycle.

1. Place the drive in Maintenance Mode. For instructions, see "Entering Maintenance Mode" on page 40.
2. Press the Unload Button once per second until P or U appears in the SCD. Function Code P or U will appear in the SCD to indicate the current setting for Post Error Reporting. If you cycle past the code that you want, press the Unload Button once per second until the code reappears.
3. Exit Maintenance Mode if you do not want to change the current setting for Post Error Reporting. For instructions, see "Exiting Maintenance Mode" on page 40.
4. To disable Post Error Reporting, Press and hold the Unload Button for three seconds while P appears in the SCD. The SCD changes to U after you release the Unload Button.
5. Press the Unload Button once per second to select another Maintenance Mode Function. To exit Maintenance Mode, refer to "Exiting Maintenance Mode" on page 40.

Error Codes and Messages

If the drive detects a permanent error, it will display the error code on the SCD and flash the Amber Fault LED. (Green Ready LED will be Off.)

- Make note of the SCD error code prior to removing a cartridge or clearing the SCD error code.
- If an error occurred with a cartridge in the drive, push the Unload Button to eject the cartridge.
- To clear the SCD error code and power cycle the drive, press the Unload Button for ten seconds. A drive dump will be created.

Attention: If the drive detects a permanent error and displays an error code other than 0 , it automatically performs a drive dump. If you force a drive dump, the existing dump will be overwritten and data will be lost. After you force a drive dump, do not turn off the power to the drive or you may lose the dump data.

Table 6. LTO-7 Tape Drive Error Codes

Error Code	Cause and Action
0	No error occurred and no action is required. This code displays when diagnostics have finished running and no error occurred. **Note:** The Single-character Display is blank during normal operation of the tape drive.

Table 6. LTO-7 Tape Drive Error Codes (continued)

Error Code	Cause and Action
1	Temperature problem. The tape drive detected that the recommended operating temperature was exceeded. Perform one or more of the following actions: • Ensure that the cooling fan is rotating and is quiet. If not, refer to your enclosure documentation. • Remove any blockage that prevents air from flowing freely through the tape drive. • Ensure that the operating temperature and airflow is within the specified range. Clear the error code by power cycling the tape drive or placing the drive in Maintenance Mode. If the operating temperature and airflow are within the specified range, and the problem persists, replace the drive.
2	Power problem. The tape drive detected that the externally supplied power is outside the specified voltage limits (the tape drive is not operating). Perform the following actions: • Ensure that the power connector is properly seated. • Ensure that the proper dc voltages are being applied within the tolerances allowed. • If the proper voltages are not being applied, service the power supply. • If the proper voltages are being applied, power off/on the tape drive to see if the problem repeats. • Replace the tape drive if the problem persists. The error code clears when you place the tape drive in maintenance mode.
3	Firmware problem. The tape drive determined that a firmware error occurred. Perform the following actions: • Collect a drive dump using one of the following ways: **Note:** Do not force a new dump; the tape drive has already created one. – Server's host interface by using a device driver utility or system tool. • Power the tape drive off and on, then retry the operation that produced the error. • If the problem persists, download new firmware and retry the operation. • If the problem persists, send the drive dump that you collected to your Support Center. The error code clears when you place the tape drive in maintenance mode.
4	Firmware or hardware problem. The tape drive determined that a firmware or tape drive hardware failure occurred. Perform the following actions: • Collect a drive dump using one of the following ways: **Note:** Do not force a new dump; the tape drive has already created one. – Server's host interface by using a device driver utility or system tool. – Ultrium Tape Drive (copy and read a drive dump) • Power the tape drive off and on, then retry the operation that produced the error. The error code clears when you place the tape drive in maintenance mode. • If the problem persists, download new firmware and retry the operation; if new firmware is not available, replace the drive.

Table 6. LTO-7 Tape Drive Error Codes (continued)

Error Code	Cause and Action
5	Tape drive hardware problem. The drive determined that a tape path or read/write error occurred. To prevent damage to the drive or tape, the tape drive will not allow you to insert a cartridge if the current cartridge was successfully ejected. The error code may clear when you cycle power to the tape drive or place it in maintenance mode. If the problem persists, replace the drive. **Note:** Copy the drive dump to flash memory before returning the drive.

Table 6. LTO-7 Tape Drive Error Codes (continued)

Error Code	Cause and Action
6	Tape drive or media error. The tape drive determined that an error occurred, but it cannot isolate the error to faulty hardware or to the tape cartridge. Ensure the tape cartridge is the correct media type: • Ultrium-1, Ultrium-2, Ultrium-3 and Ultrium-4 tape cartridges are not supported in Ultrium-7 tape drives. • Drive will not accept an expired Cleaning Cartridge. • Drive will not accept a WORM cartridge when running diagnostic tests in Maintenance Mode. • Drive will not write over existing datasets on a WORM cartridge. Ensure you are appending datasets on WORM media rather than attempting to write over existing datasets. If the tape cartridge is the correct media type, perform the following actions: **For Problems with Writing Data:** If the problem occurred while the tape drive was writing data to the tape, retry the operation with a different cartridge: • If the operation succeeds, the original cartridge was defective. Copy data from the defective cartridge and discard it. • If the operation fails and another tape drive is available, insert the cartridge into the other unit and retry the operation. – If the operation fails, discard the defective cartridge. – If the operation succeeds, insert a scratch data cartridge into the first unit and run the drive diagnostics. - If the diagnostics fail, replace the tape drive. - If the diagnostics succeed, the error was temporary. • If the operation fails and another tape drive is not available, insert a scratch data cartridge into the unit and run the drive diagnostics. – If the diagnostics fail, replace the tape drive. – If the diagnostics succeed, discard the cartridge. If the problem occurs with multiple tape cartridges, run the drive diagnostics. The error code clears when you remove the tape cartridge or place the tape drive in maintenance mode. **For Problems with Reading Data:** If the problem occurred while the tape drive was reading data from the tape, perform one of the following procedures: • If another tape drive is available, insert the cartridge into the other unit and retry the operation. – If the operation fails, discard the defective cartridge. – If the operation succeeds, insert a scratch data cartridge into the first unit and run the drive diagnostics. - If the diagnostics fail, replace the tape drive. - If the diagnostics succeed, the error was temporary. • If another tape drive is not available, insert a scratch data cartridge into the unit and run the drive diagnostics. – If the diagnostics fail, replace the tape drive. – If the diagnostics succeed, discard the cartridge. If the problem occurs with multiple tape cartridges, run the drive diagnostics.

Table 6. LTO-7 Tape Drive Error Codes (continued)

Error Code	Cause and Action
7	Media error. The tape drive determined an error occurred because of a faulty tape cartridge or an invalid tape cartridge. Ensure the tape cartridge is the correct media type: • Ultrium-1, Ultrium-2, Ultrium-3 and Ultrium -4 tape cartridges are not supported in Ultrium-7 tape drives. • Drive will not accept an expired Cleaning Cartridge. • Drive will not accept a WORM cartridge when running diagnostic tests in Maintenance Mode. • Drive will not accept an FMR tape. • Drive will not write over existing datasets on a WORM cartridge. Ensure you are appending datasets on WORM media rather than attempting to write over existing datasets. If the tape cartridge is the correct media type, try another tape cartridge. If the problem occurs with multiple tape cartridges, use the following procedure: If possible, run the tape cartridge in a different tape drive. If the operation in the other unit fails and 6 or 7 displays, replace the media. If the operation succeeds, run "Function Code E: Test Cartridge & Media" on page 43. **Attention:** When you run the Test Cartridge & Media diagnostics, data on the suspect tape is overwritten. Use only a scratch data cartridge to run the test. • If the diagnostics fail, replace the media. • If the diagnostics succeed, clean the drive head (see "Cleaning the Tape Drive" on page 58) and run "Function Code 1: Run Drive Diagnostics" on page 41. – If the drive diagnostics fail, replace the drive. – If the drive diagnostics succeed, perform the operation that produced the initial media error. The error code clears when you remove the tape cartridge or place the tape drive in maintenance mode.
8	Interface problem. The tape drive determined that a failure occurred in the tape drive's hardware or in the host bus.
9	Tape drive or RS-422 error. The tape drive determined that a failure occurred in the tape drive's hardware or in the RS-422 connection. Refer to the Library procedures to isolate the problem to the drive. The error code clears when you place the tape drive in maintenance mode.

Table 6. LTO-7 Tape Drive Error Codes (continued)

Error Code	Cause and Action
A	Degraded operation. The tape drive determined that a problem occurred which degraded the operation of the tape drive, but it did not restrict continued use. If the problem persists, determine whether the problem is with the drive or the media. **Note:** The drive is usable, though the Single-character Display continues to indicate an error and the Status LED flashes amber. The error code may clear when you cycle power to the tape drive or place it in maintenance mode. To determine if the problem is with the drive hardware, or the tape media, perform the following procedures: 1. If possible, run the tape cartridge in a different drive. If the operation in the other drive fails and 6 or 7 displays, replace the media. If the operation succeeds, run the Test Cartridge & Media diagnostics (see "Function Code E: Test Cartridge & Media" on page 43). 2. If the Test Cartridge & Media diagnostics fail, replace the media. If it runs successfully, clean the failing drive and run the drive diagnostics (see "Cleaning the Tape Drive" on page 58 and "Function Code 1: Run Drive Diagnostics" on page 41). Once you begin this test, the diagnostics begin the loop sequence. Time the first loop by pressing the Unload Button once to stop the diagnostics after the completion of the first loop, then record the time it takes for the test to complete. Compare the recorded time with the *Approximate Run Time*. If the test runs successfully but the execution time is significantly longer than the *Approximate Run Time*, run "Function Code F: Write Performance Test" on page 44. If the Write Performance Test fails, replace the media and exit maintenance mode. If the drive diagnostics run successfully, perform the operation that produced the initial drive error. 3. If the problem persists replace the drive. If it is not possible to run the tape cartridge in a different drive, perform the following procedures: 1. Clean the failing drive and run the drive diagnostics (see "Cleaning the Tape Drive" on page 58). Once you begin this test, the diagnostics begin the loop sequence. Time the first loop by pressing the Unload Button once to stop the diagnostics after the completion of the first loop, then record the time it takes for the test to complete. Compare the recorded time with the *Approximate Run Time*. If the test runs successfully but the execution time is significantly longer than the *Approximate Run Time*, run "Function Code F: Write Performance Test" on page 44. If the Write Performance Test fails, replace the media and exit maintenance mode. If the drive diagnostics run successfully, run the Test Cartridge & Media diagnostics (see "Function Code E: Test Cartridge & Media" on page 43). 2. If the Test Cartridge & Media diagnostics fail, replace the media. If it runs successfully, perform the operation that produced the initial drive error. 3. If the problem persists replace the drive.
C	The tape drive needs to be cleaned. Clean the tape drive. The error code clears when you clean the tape drive or place it in maintenance mode.
d	Fiber AL_PA conflict. NOT SUPPORTED ON THIS DRIVE.

Table 6. LTO-7 Tape Drive Error Codes (continued)

Error Code	Cause and Action
e	Encryption Error. Displayed when the drive detects an error associated with a encryption operation. If the problem occurred while the tape drive was writing data to, or reading data from, tape: 1. Check the host application to ensure the host application is providing the correct encryption key. • Refer to the LTO Ultrium Tape Drive SCSI Reference documentation for the Sense Data returned for an encryption operation. • Retry the encryption operation after the host application problems have been resolved. 2. Check the operation of the tape drive by resetting the drive and running POST. • Refer to the error code displayed on the SCD if the drive reset and POST fails. • Retry the encryption operation if the drive reset and POST complete without errors. 3. Check the media. • Ensure the correct media is being used. Data encryption is supported with LTO Ultrium-5, Ultrium-6, and Ultrium-7 Data Cartridges only. • Retry the encryption operation with the tape cartridge in another encryption enabled drive. Replace the media if the problem repeats with the same tape cartridge in multiple drives. If the problem occurred while the tape drive was running POST or diagnostics, replace the drive. The error code clears with the first attempted write/read after the encryption key is changed, or when the drive is placed in maintenance mode.
E	Fiber Port offline. NOT SUPPORTED ON THIS DRIVE.
F	Fiber Channel Error. NOT SUPPORTED ON THIS DRIVE.
J	Incompatible Media. Media that the drive cannot execute commands on has been loaded.
P	Write operation to a write protected cartridge has been attempted (this includes any attempt to overwrite a WORM protected tape). Ensure the tape cartridge is the correct media type. Writes to Ultrium-5 tape cartridges are not supported in Ultrium-7 tape drives. If the tape cartridge is the correct media type, check the write-protect switch on the cartridge. The drive will not write to a write-protected cartridge. The error code clears when you remove the tape cartridge or place the tape drive in maintenance mode.
Bouncing o	Broken or excessive slack tape. Drive has encountered a condition where it cannot unload the tape or determine that the tape is in the path of the head. Manual intervention required.
Figure 8	Mid Tape Recovery. Drive is recovering from a power cycle with a tape in the drive. The 'figure 8' is broken up with a countdown indicating progress in ten's percentage to completion: 9, 8, 7, 6, 5, 4, 3, 2, 1.

Troubleshooting

This section describes problems you might encounter while operating the half-high LTO-7 tape drive, and provides suggestions for resolving those common problems.

Clean Indicator is On

When a `C` is displayed on the SCD, it indicates that the drive head is dirty and needs cleaning. See "Cleaning the Tape Drive" on page 58 for information about cleaning the LTO-7 tape drive.

Tape Drive will not eject a Tape Cartridge

If the tape drive does not eject a cartridge when you press the eject button, complete the following steps:

1. Reset the tape drive. To reset the drive, press and hold the eject button for 20 seconds, until one or more LEDs begins to flash. In addition to resetting the tape drive, this procedure clears any errors, and ejects any cartridge that is inside the drive (unless a hardware error has occurred, and the drive is unable to do so).

   Note: You may need to allow up to 2 minutes for the drive to rewind the tape to the beginning before it can eject the cartridge.
2. Confirm that the drive is operating with latest-level firmware. Download new firmware from the My Oracle Support website, if needed.
3. If you are unable to eject the cartridge, contact your authorized service representative.

Fault LED is Flashing

A flashing Fault LED (!) indicates that a tape drive error has been detected. Perform the following steps:

1. Note which character is displayed in the SCD. Refer to the "Error Codes and Messages" on page 48 for more information and take appropriate action for the error indicated.
2. Confirm that your drive is operating with latest-level firmware. Download new firmware from the My Oracle Support website, if needed.
3. Perform the Drive SELF-TEST Procedure (see "Function Code 1: Run Drive Diagnostics" on page 41). This test is a good way to check the performance of your LTO-7 tape drive, without impacting server operation.

The Fault LED is On Solid

The solid Fault LED indicates that the tape drive maximum operating temperature has been exceeded. To protect your media, the drive automatically ejects the current tape cartridge, and the drive must cool down before operation can resume.

Wait for the tape drive to cool down and for the Fault LED to turn off. After the tape drive cools down, you can load a tape cartridge and restart your backup or restore job. Confirm that the server is in a cool, well-ventilated environment.

Tape Drive Does Not Accept a Cartridge

If the tape drive does not accept a cartridge, complete the following steps:

1. Verify that the tape drive is not indicating an error state. If a character is displayed on the SCD, refer to "Error Codes and Messages" on page 48 and take appropriate action for the error indicated.
2. Inspect your tape cartridge. Verify that it is not damaged, and the leader pin is correctly positioned inside the cartridge door.

3. Verify that you are attempting to load a compatible cartridge type. LTO-7 drives are write-compatible with Ultrium-6 and Ultrium-7 media only. Other cartridge types will automatically be ejected by the drive, if a write operation is attempted.
4. Verify that another cartridge is not already loaded in the drive. Press the eject button, if needed.

The Host System Backup Application is Reporting an Error

The host system backup application may report an error as a result of a failure by the tape drive to write or read data. If your backup application reports a media error, complete the following steps:

1. Clean the drive (see "Cleaning the Tape Drive" on page 58).
2. Verify that the data cartridge you are using for your backup job is a good one.

   Note: The Drive SELF-TEST Procedure can also be used to check the integrity of your media.
3. Try using another LTO data cartridge for your backup job. Mark any cartridge that fails. If you notice that the same cartridge is involved in multiple failures, it may be time to replace that cartridge. In some cases, media suppliers will replace a defective cartridge at no cost.
4. If you are trying to backup (write) data, verify that your cartridge is not write-protected. Check the red write-protect switch on the edge of the cartridge, and confirm that it is in the unlocked position (see "Setting the Write-Protect Switch" on page 61).

Using LTO Ultrium Media

Use only LTO Ultrium tape cartridges in the LTO tape drive. The LTO Ultrium Data Cartridges cannot be interchanged with the media used in other non-LTO Ultrium tape products.

Figure 31 on page 57 shows the LTO Ultrium Data Cartridge and its components.

1	LTO cartridge memory	A chip that contains information about the cartridge and the tape, as well as statistical information about the cartridge's use.
2	Cartridge door	Protects the tape from contamination when the cartridge is out of the drive.
3	Leader pin	The tape is attached to a leader pin, behind the cartridge door. When the cartridge is inserted into the drive, a threading mechanism pulls the pin (and tape) out of the cartridge, across the drive head, and onto a non-removable take-up reel. The head can then read or write data from or to the tape.
4	Write-protect switch	Prevents data from being written to the tape cartridge. (For more information, see "Setting the Write-Protect Switch" on page 61.)
5	Label area	Provides a location to place a label. (To obtain tape cartridges and bar code labels, see "Ordering Tape Cartridges" on page 63.) **Note:** For more information about placing the cartridge labels, see "Placing the Cartridge Labels" on page 62.

6	Insertion guide	A large, notched area that prevents the cartridge from being inserted incorrectly.

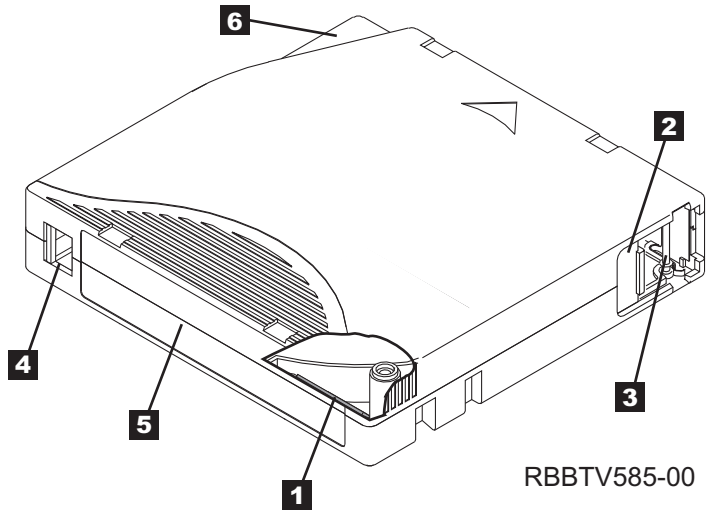


Figure 31. LTO Ultrium Cartridge Components

Cartridge Memory Chip (LTO-CM)

All generations of the LTO Ultrium Data Cartridges include a Linear Tape-Open Cartridge Memory (LTO-CM) chip (1 in Figure 31), that contains information about the cartridge and the tape (such as the name of the manufacturer that created the tape), as well as statistical information about the cartridge use. This chip is located inside the cartridge housing and is not visible. The LTO-CM enhances the efficiency of the cartridge. For example, the LTO-CM stores the end-of-data location which, when the next time this cartridge is inserted and the Write command is issued, enables the drive to quickly locate the recording area and begin recording. The LTO-CM also aids in determining the reliability of the cartridge by storing data about its age, how many times it has been loaded, and how many errors it has accumulated. Whenever a tape cartridge is unloaded, the tape drive writes any pertinent information to the cartridge memory. The storage capacity of the LTO-CM is 4096 bytes.

Loading and Unloading a Tape Cartridge

Use the following instructions to load and unload a tape cartridge. For information about the type of media to use, refer to "Types of Tape Cartridges" on page 59.

Note: To avoid problems with loading and unloading, use only one label on a cartridge. Multiple or poorly placed labels can clog the drive load mechanism.

Loading a Tape Cartridge

To load a tape cartridge:

1. Make sure that the LTO tape drive power is on.
2. Grasp the cartridge by the outer edges, with the write-protect switch to the left.

   Note: See "Setting the Write-Protect Switch" on page 61 to make sure that the write-protect switch is properly set.

3. Slide the cartridge into the opening on the front of the LTO tape drive as the arrow on the top of the cartridge indicates. Push the cartridge fully into the drive to seat the cartridge. The drive will then engage the tape cartridge.

Once the tape cartridge has been inserted, the tape drive loads the tape, during which time, the **ready** LED flashes green. When the tape is loaded, the **ready** LED will come on steady and the tape drive is ready to begin write and read operations.

Unloading a Tape Cartridge

To unload a tape cartridge:

1. Make sure that the tape drive power is on. (The power-on LED should be on.)
2. Press the unload button.

The LTO tape drive rewinds, unloads, and ejects the tape cartridge. The process may take from 15 seconds to several minutes, depending on the position of the tape and the amount of data written.

Cleaning the Tape Drive

Clean the LTO-7 tape drive whenever `C` displays on the Single-character Display and the Status LED is flashing amber once per second or when a system I/O error related to the device occurs. It is not recommended that you clean the drive head on a periodic basis; only when the drive requests to be cleaned. The LTO-7 tape drive monitors the amount of time between cleaning operations and displays the `C` when required.

Attention: Use only the recommended cleaning cartridge to clean the tape drive. Use of other than recommended cleaning cartridges can damage your drive and may void the warranty.

Note: In Maintenance Mode, a flashing `C` with the solid amber Fault LED indicates that a cartridge should be inserted. This does not indicate that the drive head requires cleaning.

To clean the LTO tape drive:

1. Make sure that the power is on to the LTO tape drive.
2. If a tape cartridge is in the LTO tape drive, eject and remove the cartridge.

   Note: The cleaning cartridge is designed to be used for 50 cleanings. Once a cleaning cartridge has been used to its maximum number of uses, the cartridge is considered expired. When the cleaning cartridge has been used 50 times, discard the cleaning cartridge. The LTO tape drive will detect, and automatically eject, an expired cartridge. Using the cleaning cartridge more than 50 times can cause debris to be deposited on the drive head, which may result in errors or inferior data quality.
3. Grasp the cleaning cartridge by the outer edges, with the label end out and the write protect switch to the left.
4. Slide the cartridge into the opening on the front of the LTO tape drive, as indicated by the arrow on the cartridge. Push the cartridge fully into the drive until the cartridge is engaged and the **activity** LED flashes green.

After the cleaning cartridge has been inserted, the remainder of the cleaning process is automatic. The tape drive:

1. Loads the cleaning cartridge into the tape drive.

2. Cleans the drive using the cleaning tape. Cleaning time may take from 30 seconds to 3 minutes, depending upon the number of times that the cleaning cartridge has been used.
3. Unloads the cleaning cartridge when the cleaning operation is complete.

Types of Tape Cartridges

Data Cartridge
Use the Ultrium-7 data cartridge to save or restore programs or data.

Test Cartridge
Use the specially labeled LTO test cartridge to run the host system diagnostics. (For information about running diagnostics, refer to your host manuals.) The test cartridge should ***not*** be used to save or restore customer programs or data.

WORM Cartridge
Use the specially labeled LTO Write Once, Read Many (WORM) cartridge for certain records retention and data security applications. The LTO Ultrium generation 5, 6, and 7 drives enable WORM support when a WORM tape cartridge is loaded into the drive. Because standard read/write media are incompatible with the WORM feature, a specially formatted WORM tape cartridge is required. Each WORM cartridge has a unique, worldwide cartridge identifier (WWCID), which comprises the unique CM chip serial number and the unique tape media serial number.

Cleaning Cartridge
Use the specially labeled LTO cleaning cartridge to clean the LTO tape drive. For instructions about how to clean the LTO tape drive, see "Cleaning the Tape Drive" on page 58.

Attention: Use of other than the LTO cleaning cartridge can damage your LTO tape drive and may void your warranty.

Recommendations for Data Cartridge Usage

The following list describes recommended guidelines that will help to protect your data and prolong the life of your tape cartridges and the LTO tape drive:

- Remove the tape cartridge from the drive when the drive is not in use.
- Back up and then discard any tape cartridge that repeatedly produces error messages. (The error information is in the System Error Log.)
- On the data cartridge, do not open the door that covers the tape. The door protects the tape from dirt, dust, and damage.
- Do not touch the tape. Any substance transferred to the tape by touching could cause loss of data.
- To avoid problems with loading and unloading, use only one label on a cartridge. Multiple or poorly placed labels can clog the drive load mechanism.
- Do not use poor-quality tape cartridges. They can cause excessive read or write errors, and may damage the tape drive.
- Discard any tape cartridges that are dropped, as the impact may damage the tape's internal mechanism.
- Make sure the environment is kept clean and constant. Do not operate in a dusty environment and always maintain a constant environment. A consistent storage and operating environment reduces media exposure to climatic stress.

Attention: Use only the recommended cleaning cartridge to clean the tape drive. Use of other than recommended cleaning cartridges can damage your drive and may void the warranty.

- Printers and copiers can produce paper and toner dust. Locate the tape unit away from these items. High traffic areas near hallways and doors can also produce excess dust and dirt.
- All important information should be recorded on the tape label. Information, such as the model and number of the system or tape drive, the date, the density, any error statistics, and a log number should be included. The operating environment and compression mode should also be noted.

Data Cartridge Erasure

Do not attempt to bulk erase an LTO data cartridge for reuse. Bulk eraser devices cannot properly erase an LTO data cartridge and will permanently damage the cartridge.

Storage and Shipping Environments

Before using a tape cartridge, let it acclimate to the operating environment by placing the cartridge in the operating environment for as long as it has been away from the environment or for 24 hours, whichever is less. (To determine the appropriate operating environment, see Table 1 on page 3.)

Acclimation is necessary for any data cartridge exposed to a different humidity environment or to temperature changes of 11°C (20°F) or more.

Retrieval of archived data should be performed on a tape unit that is clean and fully operational. Try to make the recovery environment the same as the operating environment. Allow tapes at least 24 hours to acclimate to environment of the tape unit.

The recommended environment for storage and shipment of LTO data cartridges is shown in Table 7.

Table 7. Recommended Environment for LTO Data Cartridges

Environmental Factor	Storage	Shipping
Temperature	5°C to 32°C (41° to 90°F)	–40 to 52°C (–40 to 125°F)
Relative Humidity (noncondensing)	20 to 60%	5 to 90%
Maximum Wet Bulb	26°C (79°F)	27°C (80°F)

Tape Cartridge Storage

Tape drives record data using densities similar to hard disk drives. Because most computer systems are not located in a dust-free, climate-controlled environment, you must exercise special care when dealing with tape cartridges and tape drives. They need to be treated as a valuable asset used to protect your business data.

Use the following guidelines for storing your tape cartridges:

- Temperature and humidity should be kept constant at a level comfortable for you.
- Tape cartridges should always be stored in their protective cases. The storage case helps prevent damage from dust and physical misuse. When the tape cartridges are not in use or being stored, they should be in their storage cases and stood on edge in a designated storage location. Do not stack cartridges on the flat side or stack other items on top of the tape cartridges. Handle your tape cartridges with care to reduce archival problems.
- Tape cartridge protective cases should be kept closed except when inserting or removing a cartridge. Contamination can build up and be transferred to the tape cartridge if the protective case is left open.
- Stored tapes should be exercised at least once every 12 months. Run the tape from Beginning of Data (BOD) to End of Data (EOD) and back to BOD at normal operating speeds. Tapes stored in a warmer environment should be exercised more frequently.
- Sunlight can damage the tape and the cartridge shell. Store tape cartridges out of the direct sunlight.

Attention: Operation outside of the recommended environment can result in possible loss of data or failure of the drive.

Operating in Harsh Environments

Do not use as an archival tape any tape that has been used outside of the operating ranges specified in Table 1 on page 3 for an extended period of time. The magnetic and physical strength of the tape will have deteriorated as a result of its exposure to the environment. Do not store important data on such a tape; transfer the data to a newer tape for reliable archiving.

Attention: Do not operate the LTO tape drive in a poor air-quality environment.

Setting the Write-Protect Switch

The position of the write-protect switch on the tape cartridge determines when you can write to the tape (see Figure 32 on page 62). Before loading cartridges into magazines, you should set the write-protect switch of each cartridge to enable or disable data recording.

- To enable data recording, slide the write-protect to the left so that the write-protect window is open.
- To disable data recording, slide the write-protect switch to the right so that the locked icon appears on the switch.

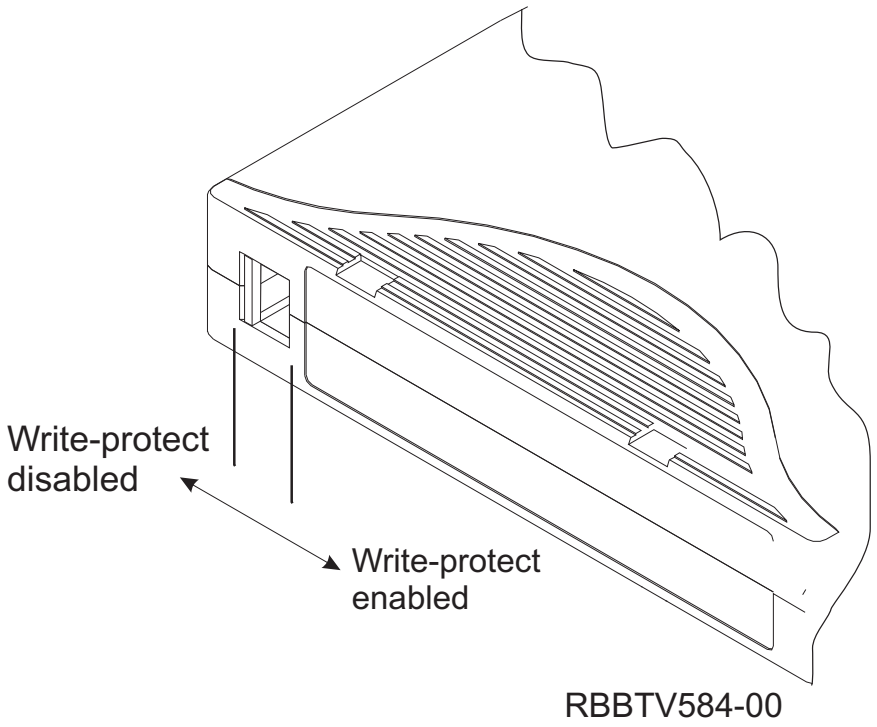


Figure 32. Setting the Write-Protect Switch

Guidelines for Using Labels on Ultrium Cartridges

Apply the following guidelines whenever using labels:

- Do not reuse a label or reapply a used label over an existing label.
- Before you apply a new label, remove the old label by slowly pulling it at a right angle to the cartridge case.
- Use peel-clean labels that do not leave a residue after being removed. If there is glue residue on the cartridge, remove it by gently rubbing it with your finger. Do not use a sharp object, water, or a chemical to clean the label area.
- When using bar code labels examine the label before applying it to the cartridge. Do not use the label if it has voids or smears in the printed characters or bar code. (A library's inventory operation will take much longer if the bar code label is not readable.)
- Remove the label from the label sheet carefully. Do not stretch the label or cause the edges to curl.
- Position the label within the recessed label area with light finger pressure, smooth the label so that no wrinkles or bubbles exist on its surface. Verify that the label is smooth and parallel, and has no roll-up or roll-over. The label must be flat to within 0.5 mm (0.02 in.) over the length of the label and have no folds, missing pieces, or smudges.
- Do not place labels on other surfaces of the cartridge. They may interfere with the ability of the drive to load the cartridge.

Placing the Cartridge Labels

Use care when placing the cartridge labels on the LTO tape cartridge. Use the following guidelines for tape cartridge labels.

- Place labels only in the designated locations.
- Do not adhere a label on top of an existing label. Poorly placed or multiple labels can clog the drive mechanism.

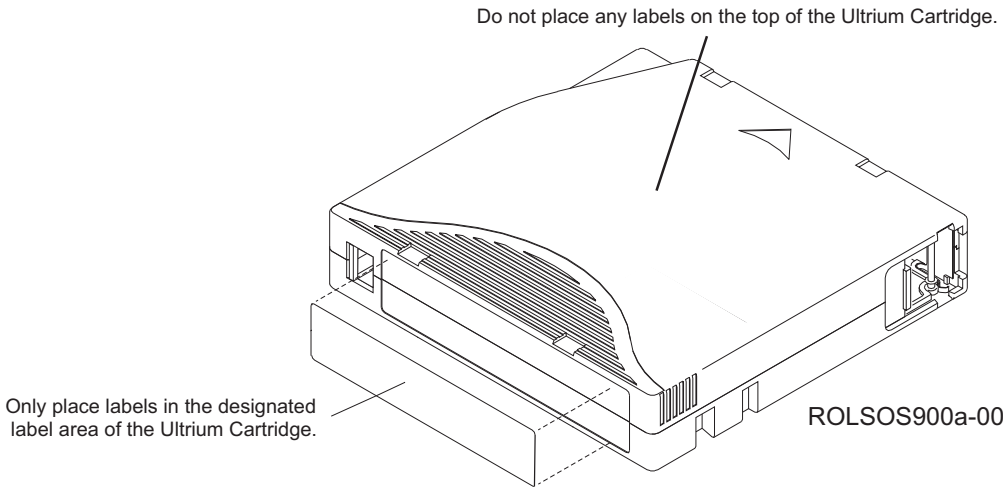


Figure 33. LTO Ultrium Cartridge Label Placement

Ordering Tape Cartridges

To order tape cartridges or labels:

- Call 1.877.STK.TAPE
- E-mail tapemediaorders_ww@oracle.com

For additional information, visit the Oracle tape storage website: http://www.oracle.com/us/products/servers-storage/storage/tape-storage/overview/index.html.

Chapter 6. Troubleshooting

DANGER

To prevent a possible shock from touching two surfaces with different protective ground (earth), use one hand, when possible, to connect or disconnect signal cables. (D001)

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (D004)

DANGER

Observe the following precautions when working on or around your IT rack system:

- **Heavy equipment—personal injury or equipment damage might result if mishandled.**
- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.** 
- **Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.**
- **Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.**
- **An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.**

(R001 part 1 of 2)

CAUTION:

- **Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.**
- **Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.**
- **Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.**
- *(For sliding drawers)***: Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.**
- *(For fixed drawers)***: This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack.**

(R001 part 2 of 2)

Purpose of the Flowchart

The flowchart is used to check the:

Enclosure	Configuration	Interface Assemblies (SAS)	Power source
SAS cables	Power cord	Drives	

The 1U Rackmount Tape Enclosure and Drive Features include several LED's that indicate the presence and source of a fault. The drives have the capability to report faults to the operating system. These should be the primary sources for fault identification. If these prove insufficient then the flowchart should be used, especially to identify faulty cables or cable connections. If a problem is detected, the procedure isolates the problem to the failing field replaceable unit (FRU).

For instructions about removing or replacing a FRU, refer to Chapter 7, “Installation and Removal Procedures,” on page 75.

The following flowchart provides graphics to be used as a guide. For detailed instructions on how to perform each procedure safely and correctly, refer to the steps in this chapter.

Flowchart

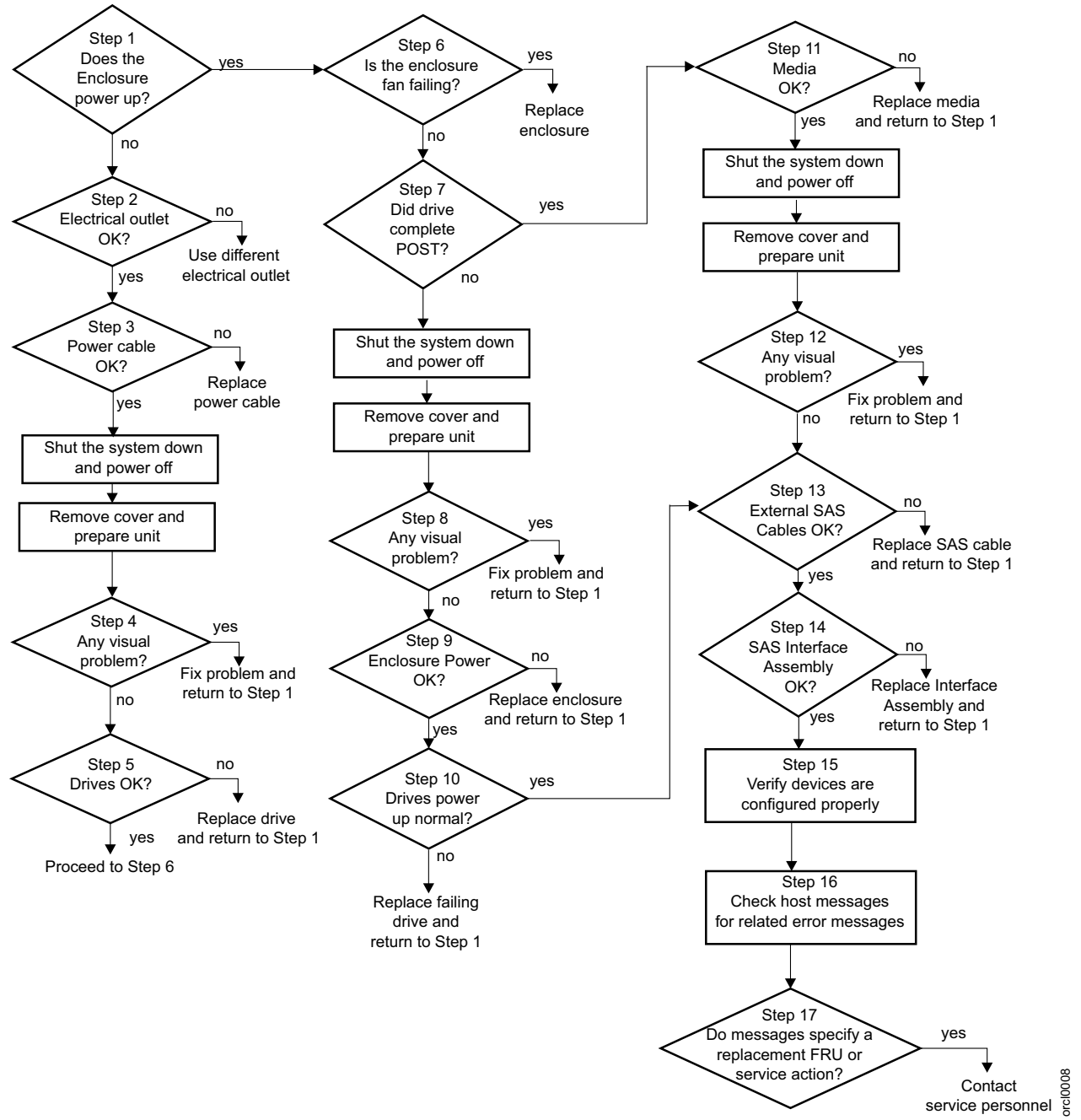


Figure 34. Flowchart

Step 1

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (D004)

This step verifies whether the power is operating properly.

1. Make sure that the 1U Rackmount Tape Enclosure power cable is plugged into an electrical outlet.
2. Check the power cable connections at the rear of the 1U Rackmount Tape Enclosure and at the electrical outlet.
3. Press the power switch on the 1U Rackmount Tape Enclosure.
4. Check the state of the power-on LED on the front of the 1U Rackmount Tape Enclosure.

   Note: The power-on LED is located on the power switch.

Table 8. Status LED States

Power-On LED Status	Service Action
Off	Repeat "Step 1" several times. If the LED does not illuminate, then go to "Step 2."
Green	This indicates normal operation. Go to "Step 6" on page 69.

Step 2

This step tests the electrical outlet.

1. Plug the 1U Rackmount Tape Enclosure power cable into a different electrical outlet and press the power-on switch.

Does the 1U Rackmount Tape Enclosure power on?

YES The problem is fixed.

NO Go to "Step 3."

Step 3

This step determines whether the external power cable is functional.

Replace the power cable and press the power switch.

Does the 1U Rackmount Tape Enclosure power on?

YES The problem is fixed.

NO Go to "Step 4."

Step 4

This step performs a visual and physical check in an attempt to fix the problem.

1. Prepare the 1U Rackmount Tape Enclosure for Service. See “Preparing the 1U Rackmount Tape Enclosure for Removal or Installation of a Storage Device or Other Component” on page 76 for the correct procedure.
2. Open the 1U Rackmount Tape Enclosure for Service. See “Opening the 1U Rackmount Tape Enclosure for Service” on page 87 for the correct procedure.
3. Visually inspect all of the internal components in the enclosure. Look for any signs of wear, damage, contamination, or excessive heat. Replace any component that appears to be damaged.
4. Physically check each cable connection and ensure all cables are fully seated and secured.
5. Plug the enclosure into an electrical outlet and press the power switch.

Does the 1U Rackmount Tape Enclosure power on?

NO Go to “Step 5.”

YES Reassemble the enclosure. The problem is fixed.

Step 5

This step checks the power supply voltage levels as the possible source of the problem.

1. Press the power switch to turn off the power to the 1U Rackmount Tape Enclosure.
2. Unplug the 1U Rackmount Tape Enclosure from the electrical outlet.
3. Disconnect the power connectors from the drives and interface assemblies.
4. Connect the power cable to both the 1U Rackmount Tape Enclosure and to the electrical outlet.
5. Press the power switch to turn on the power.

Does the 1U Rackmount Tape Enclosure power up and is air flowing from both fans?

NO Replace the enclosure (see Chapter 7, “Installation and Removal Procedures,” on page 75), and then return to “Step 1” on page 68

YES Reconnect the power supply to all cables and continue.

1. Press the power switch to turn off the power to the 1U Rackmount Tape Enclosure.
2. Disconnect the power connector from the drive in Bay A.
3. Press the power switch to turn on the power.

Does the 1U Rackmount Tape Enclosure power up?

NO Turn off the power, reconnect the power connector to the drive in Bay A, and then disconnect the power connector from the back of the drive in Bay B. If the drive in Bay A then powers on normally, replace the drive in Bay B and then return to “Step 1” on page 68. If not, go to “Step 6.”

YES Replace the drive in Bay A and then return to “Step 1” on page 68.

Step 6

This step examines the enclosure cooling fan as the possible source of the problem.

1. Press the power switch to turn on the power to the 1U Rackmount Tape Enclosure.
2. **Is the Fan Fault LED on?**

   YES Replace the Enclosure.

   NO Continue
3. Observe the cooling fans at the rear of the enclosure. Ensure the fans are blowing air out of the enclosure and that it is operating at a constant speed, not making abnormal noises.

Is the fan operating abnormally?

YES Go to "Step 7."

NO Replace the enclosure (see Chapter 7, "Installation and Removal Procedures," on page 75), and then return to "Step 1" on page 68.

Step 7

This step examines the drive as the possible source of the problem.

1. Press the power switch to turn on the power to the 1U Rackmount Tape Enclosure.
2. Observe each of the drive status indicator LEDs during & after POST.

Do the drives power up and complete the Power On Self Test (POST) normally?

NO If the drives do not power up, go to "Step 8." If the drives power up, but with status LEDs reporting an error condition, follow the recommended drive service action as appropriate (refer to the drive descriptive chapters).

YES Go to "Step 11" on page 71.

Step 8

This step performs a visual and physical check in an attempt to fix the problem.

1. Prepare the 1U Rackmount Tape Enclosure for Service. See "Preparing the 1U Rackmount Tape Enclosure for Removal or Installation of a Storage Device or Other Component" on page 76 for the correct procedure.
2. Open the 1U Rackmount Tape Enclosure for Service. See "Opening the 1U Rackmount Tape Enclosure for Service" on page 87 for the correct procedure.
3. Visually inspect all of the internal components in the enclosure. Look for any signs of wear, damage, contamination, or excessive heat. Replace any component that appears to be damaged.
4. Physically check each cable connection and ensure all cables are fully seated and secured.

Are their any signs of damage, wear, or loose cables?

NO Plug the enclosure into an electrical source and press the power switch to determine if the connection inspection fixed the problem. If the enclosure does not power up normally, go to "Step 10" on page 71. If the enclosure powers on and appears to run normally, reassemble the enclosure, and then return to "Step 1" on page 68.

YES Replace the damaged component or reseat the cable, reassemble the enclosure and then return to "Step 1" on page 68.

Step 9

This step checks the enclosure power as the possible source of the problem.

1. Press the power switch to turn off the power to the 1U Rackmount Tape Enclosure.
2. Disconnect the power cables from the Tape Drives and SAS Interface Assemblies.
3. Connect the power cable to both the 1U Rackmount Tape Enclosure and to the electrical outlet.
4. Press the power switch to turn on the power.

Does the 1U Rackmount Tape Enclosure power up?

NO Replace the enclosure (see "Replacing an Enclosure" on page 82), and then return to "Step 1" on page 68.

YES Reattach the power supply cables to the Tape Drives and SAS Interface Assemblies. Then go to "Step 10."

Step 10

This step examines the drives as the possible source of the problem.

1. Press the power switch to turn off the power to the 1U Rackmount Tape Enclosure.
2. Disconnect the power connector from the drive in Bay A.
3. Press the power switch to turn on the power.

Does the drive in Bay B power up and complete the Power On Self Test (POST) normally?

NO Turn off the power, reconnect the power connector the drive in Bay A, and then disconnect the power connector from the back of the drive in Bay B. If the drive in Bay A then powers on normally, replace the drive in Bay B and then return to "Step 1" on page 68. If not, go to "Step 13" on page 72.

YES Replace the drive in Bay A and then return to "Step 1" on page 68.

Step 11

This step checks whether the media is the source of the problem.

1. Press the media unload button on the drive (refer to the drive descriptive chapters).
2. Remove the used media. If the media fails to unload, refer to drive specific chapters in this manual for manual media unload procedures.
3. Power the 1U Rackmount Tape Enclosure off and then back on. Insert new media and then power the 1U Rackmount Tape Enclosure off and then back on.

Do the installed drives power up and complete the POST normally?

NO If the drives do not power up, go to "Step 9." If the drives power up, but with status LEDs reporting an error condition, follow the recommended drive service action (refer to the drive descriptive chapters), and then go to "Step 1" on page 68.

YES Discard the used media and then go to "Step 12" on page 72.

Step 12

This step performs a visual and physical check in an attempt to fix the problem.

1. Prepare the 1U Rackmount Tape Enclosure for Service. See “Preparing the 1U Rackmount Tape Enclosure for Removal or Installation of a Storage Device or Other Component” on page 76 for the correct procedure.
2. Open the 1U Rackmount Tape Enclosure for Service. See “Opening the 1U Rackmount Tape Enclosure for Service” on page 87 for the correct procedure.
3. Visually inspect all of the internal components in the enclosure. Look for any signs of wear, damage, contamination, or excessive heat.
4. Physically check each cable connection and ensure all cables are fully seated and secured.
5. Ensure that the cables are connected correctly for the configuration that you want.

Are their any signs of damage, wear, or loose cables?

NO Plug the enclosure into an electrical source and press the power On switch to determine if the connection inspection fixed the problem. If the enclosure does not power up normally, go to “Step 13.” If the enclosure powers on and appears to run normally, reassemble the enclosure, and then return to “Step 1” on page 68.

YES Replace the damaged component or reseat the cable, reassemble the enclosure and then return to “Step 1” on page 68.

Step 13

This step checks that the external SAS cables are plugged into the device correctly.

Perform a visual check of the external SAS cables. Is the cable plugged securely and is the cable in good condition?

NO Replace or reseat the cable, if necessary, and then return to “Step 1” on page 68.

YES Go to “Step 14.”

Step 14

This step determines whether an internal SAS Interface Assembly is the source of the problem.

1. Press the power switch to turn off the power to the 1U Rackmount Tape Enclosure.
2. Disconnect the internal SAS Interface Assemblies from the media devices.
3. Inspect the SAS Interface Assemblies for signs of damage, such as bent pins or damaged wires.

Are the internal SAS Interface Assemblies in good condition?

NO Replace the Interface Assembly (see Chapter 7, “Installation and Removal Procedures,” on page 75), reassemble the enclosure, and then return to “Step 1” on page 68.

YES Reassemble the enclosure.

Step 15

To verify that the devices installed in 1U Rackmount Tape Enclosure have been configured correctly by completing the following steps:

Linux Operating System

1. You can get general information about the tape device from the message log file. At the command prompt, type

   ```
   dmesg | grep st
   ```

   You will see the similar information about the tape device on your screen.

   ```
   st 0:4:0:0: Attached scsi tape st0
   ```

2. At the command prompt, type

   ```
   lsscsi
   ```

   and press Enter. The Command lists all of the devices that are installed in 1U Rackmount Tape Enclosure and systems. The output of lsscsi command is:

   ```
   [0:0:0:0] disk ORACLE SSM PMAP /dev/sda
   [1:0:0:0] disk HITACHI H109060SESUN600G A690 /dev/sdb
   [1:0:1:0] disk HITACHI H109060SESUN600G A690 /dev/sdc
   [1:0:2:0] disk HITACHI H109060SESUN600G A690 /dev/sdd
   [7:0:0:0] cd/dvd TEAC DV-W28S-A 9.2A /dev/sr0
   [12:0:5:0] tape IBM ULTRIUM-HH5 E6Q7 /dev/st3
   [12:0:6:0] tape IBM ULTRIUM-HH6 E6RF /dev/st4
   ```

3. From above list, you can identify that there are two Tape drives in the 1U Rackmount Tape Enclosure.

Solaris Operating System

1. You can get general information about the tape device from the message log file. At the command prompt, type

   ```
   ls /dev/rmt
   You will see similar information about the tape device on your screen.
   10@ 10c@ 10cn@ 10hbn@ 10lb@ 10m@ 10mn@ 10ub@ 9@ 9c@ 9cn@
   9hbn@ 9lb@ 9m@ 9mn@ 9ub@
   10b@ 10cb@ 10h@ 10hn@ 10lbn@ 10mb@ 10n@ 10ubn@ 9b@ 9cb@ 9h@
   9hn@ 9lbn@ 9mb@ 9n@ 9ubn@
   10bn@ 10cbn@ 10hb@ 10l@ 10ln@ 10mbn@ 10u@ 10un@ 9bn@ 9cbn@
   9hb@ 9l@ 9ln@ 9mbn@ 9u@ 9un@
   ```

2. At the command prompt, type

   ```
   mt -f /dev/rmt/10 status
   ```

   and press Enter. mt status displays if a tape drive is online and loaded (drive must be loaded). The output of the mt status command is:

   ```
   IBM ULTRIUM-HH5 tape drive:
   sense key(0x0)= No Additional Sense residual= 0 retries= 0
   file no= 0 block no= 0
   ```

Windows Operating System

1. You can get general information about the tape device from the **Device Manager**. From the Control Panel select **Device Manager**. In the **Device Manager** select **Tape drive**. You will see the information about the tape device on your screen.

```
Tape drives
IBM ULTRIUM 7 HH TAPE DRIVE
```

2. If there are no tape drives under **Device Manager/Tape drives**, see if the tape drives are under **Other devices**. If they are, the appropriate device driver for the drive and Windows Operating system needs to be install.

Step 16

For related error messages:

Linux Operating System

Check var/log/messages for related error messages.

Solaris Operating System

Check var/adm/messages for related error messages.

Windows Operating System

Check Event Viewer for related error messages.

Step 17

Do any messages specify a replacement FRU or service action?

YES Replace FRU or contact service personnel.

NO Contact service personnel.

Chapter 7. Installation and Removal Procedures

This chapter provides step-by-step instructions on how to physically install and remove the storage device features and other components in the 1U Rackmount Tape Enclosure.

DANGER

When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:

- **Connect power to this unit only with the provided power cord. Do not use the provided power cord for any other product.**
- **Do not open or service any power supply assembly.**
- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.**
- **Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.**
- **Connect any equipment that will be attached to this product to properly wired outlets.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.**

  To disconnect:

  1. **Turn off everything (unless instructed otherwise).**
  2. **Remove the power cords from the outlets.**
  3. **Remove the signal cables from the connectors.**
  4. **Remove all cables from the devices.**

  To connect:

  1. **Turn off everything (unless instructed otherwise).**
  2. **Attach all cables to the devices.**
  3. **Attach the signal cables to the connectors.**
  4. **Attach the power cords to the outlets.**
  5. **Turn on the devices.**
- **Sharp edges, corners and joints may be present in and around the system. Use care when handling equipment to avoid cuts, scrapes and pinching.**

(D005)

Handling Static-Sensitive Devices

Attention: Electronic assemblies are sensitive to static electricity discharge. When handling an electronic component, wrap it an antistatic bag to prevent damage.

Take the following precautions:

- Do not remove the electronic component from the antistatic bag until you are ready to install it.
- With the component still in its antistatic bag, touch it to the metal frame of an electrically grounded surface.
- Hold the component by the frame. Avoid touching the solder joints or pins.
- Handle the component carefully to prevent permanent damage.

Preparing the 1U Rackmount Tape Enclosure for Removal or Installation of a Storage Device or Other Component

Use the following procedure to prepare the 1U Rackmount Tape Enclosure for removal or installation of a storage device or other component.

Note: Before performing this procedure, ensure that there is no activity between the host system and the installed devices or operations being performed by the installed devices. Turning off the 1U Rackmount Tape Enclosure power during activity could result in loss of data.

1. Remove any media from the installed devices.

   Note: ***Device*** means either drive or bay blank.
2. Turn off the power to the 1U Rackmount Tape Enclosure.
3. Remove the 1U Rackmount Tape Enclosure from the host system configuration. (For instructions, refer to your system manuals.)
4. Unplug the 1U Rackmount Tape Enclosure power cable from the electrical outlet.

The 1U Rackmount Tape Enclosure is now prepared for removal or installation of a storage device or other component. Refer to the appropriate procedure in this chapter.

Installing a Tape Drive Feature

1. Prepare the 1U Rackmount Tape Enclosure for Service. See “Preparing the 1U Rackmount Tape Enclosure for Removal or Installation of a Storage Device or Other Component” for the correct procedure.
2. Open the 1U Rackmount Tape Enclosure for Service. See “Opening the 1U Rackmount Tape Enclosure for Service” on page 87 for the correct procedure.
3. To remove the Half High Bay Blank, push the drive latch **1** toward the Half High Bay Blank and begin to pull the blank out of the enclosure. Grasp the Bay Blank **2** and pull it out of the enclosure.

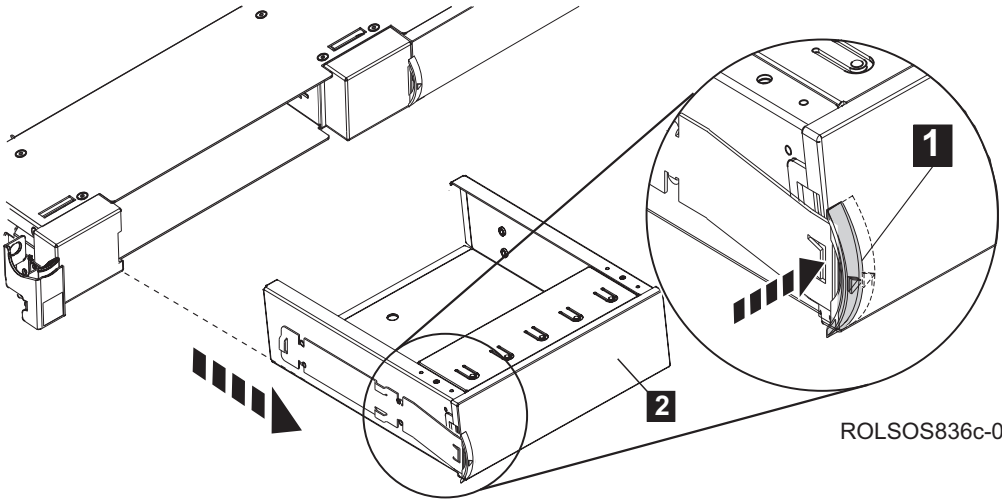


Figure 35. Remove Half-High Bay Blank

4. Attach the Drive Latch **1** to the Drive **2** and insert both into the drive bay until they click into place.

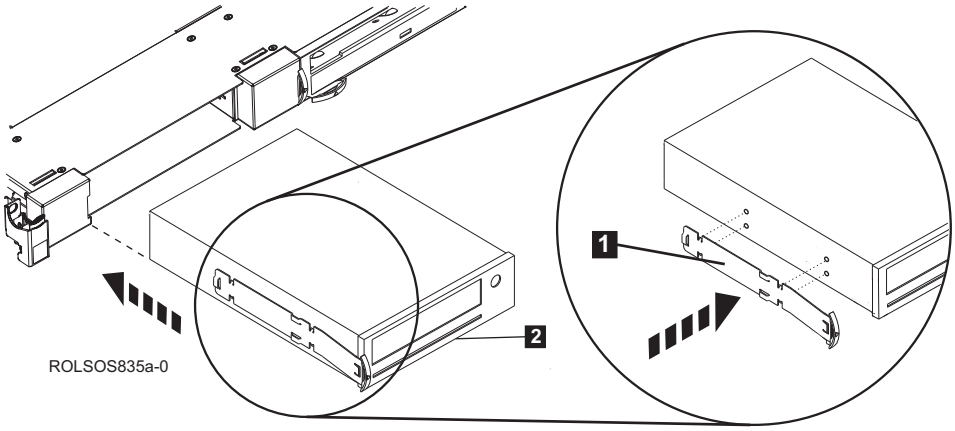


Figure 36. Insert Drive

5. Attach the Interface Assembly to the drive connector **1**, and attach the Power Connector **2**.

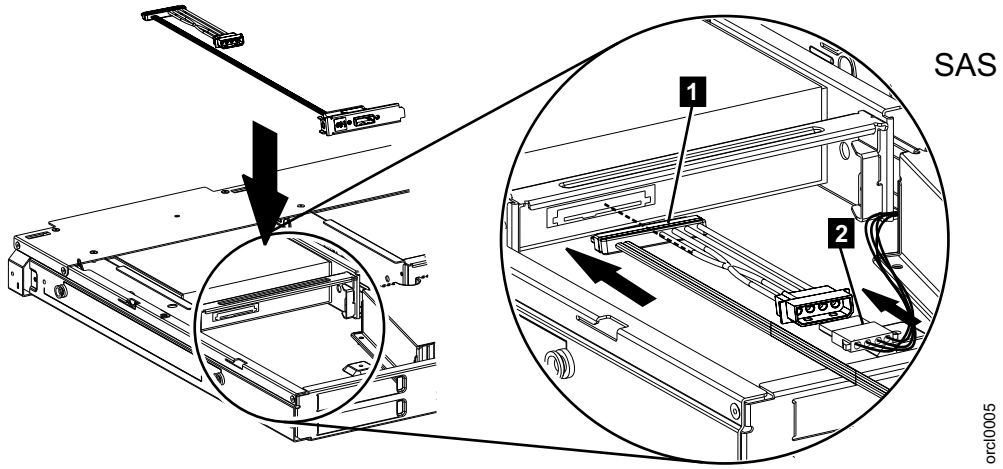


Figure 37. Attach Interface Assembly and Power Cable

6. To remove the Blank Back Plate, pull the back plate pin **1** to release the Blank Back Plate, and remove the Blank Back Plate **2** from the rear panel slot.

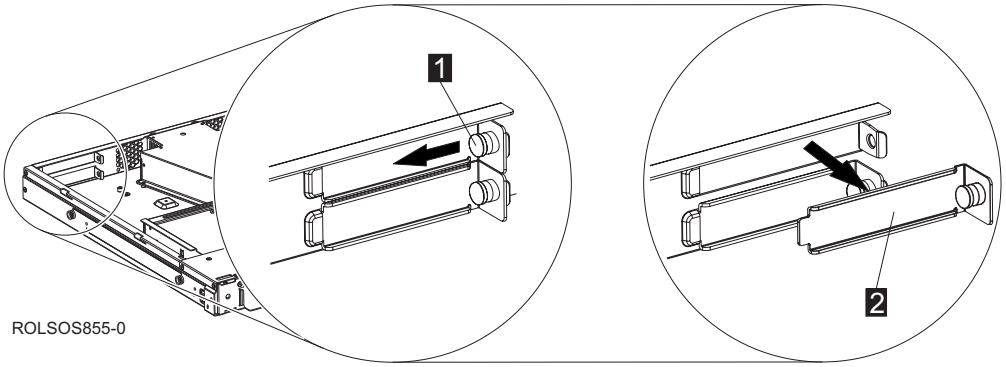


Figure 38. Remove Blank Back Plate

7. To Insert the SAS Interface Assembly into the rear panel slot, insert the tab on the back plate into the indent in the back panel opening **1**, pull the pin on the back plate **2** and push the back plate into the back panel opening **3** until it clicks into place.

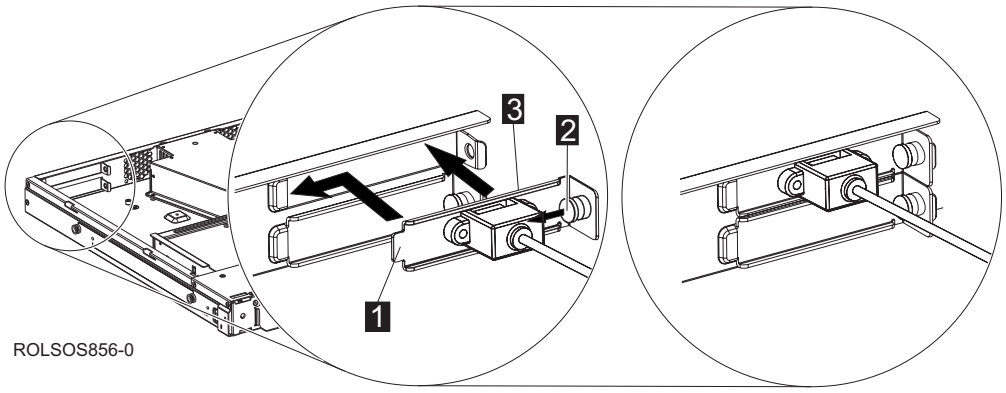


Figure 39. Insert Interface Assembly Back Plate

8. Complete the 1U Rackmount Tape Enclosure Service Procedure. See "Completing the 1U Rackmount Tape Enclosure Service Procedure" on page 89 for the correct procedure.

Replacing a Tape Drive Feature

1. Prepare the 1U Rackmount Tape Enclosure for Service. See "Preparing the 1U Rackmount Tape Enclosure for Removal or Installation of a Storage Device or Other Component" on page 76 for the correct procedure.

   Note: The 1U Rackmount Tape Enclosure does not need to be extended from the rack for this procedure.
2. Determine the location for the drive to be replaced.
3. To remove the drive, push the drive latch **1** toward the drive and begin to pull the drive out of the enclosure. Grasp the drive **2** and pull the assembly out of the drive bay. Disconnect the cables **3** from the drive assembly.

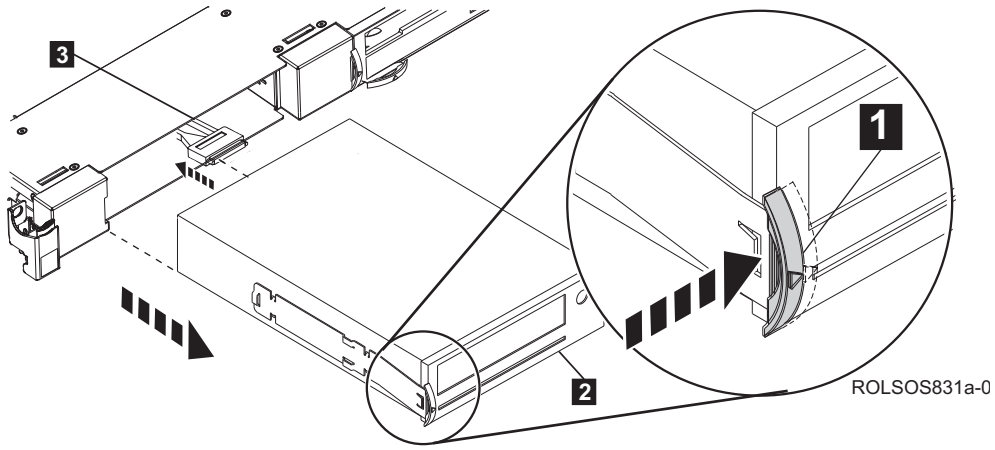


Figure 40. Removing a Drive

4. Place the drive assembly on an ESD protected work surface.
5. Locate the new drive.
6. Attach the connectors **1** to the drive assembly. Attach the Drive Latch **2** to the Drive **3** and insert both into the drive bay until they click into place.

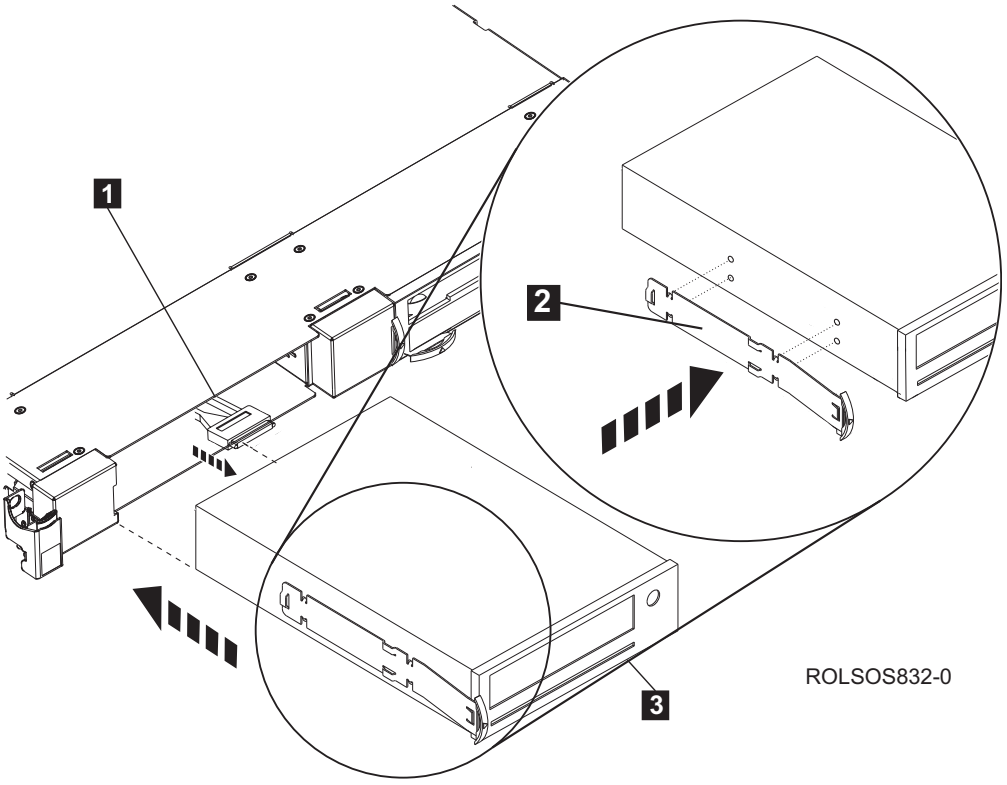


Figure 41. Inserting a Drive

7. Attach the power cord and other cables to the rear of the enclosure.
8. Power on the 1U Rackmount Tape Enclosure.
9. Refer to your system manuals to verify installation.

Replacing a SAS Interface Assembly

1. Prepare the 1U Rackmount Tape Enclosure for Service. See "Preparing the 1U Rackmount Tape Enclosure for Removal or Installation of a Storage Device or Other Component" on page 76 for the correct procedure.
2. Open the 1U Rackmount Tape Enclosure for Service. See "Opening the 1U Rackmount Tape Enclosure for Service" on page 87 for the correct procedure.
3. Locate the Interface assembly to be replaced.
4. To remove the Interface assembly Back Plate, pull the back plate pin **1** to release the Back Plate, and remove the Back Plate **2** from the rear panel slot.

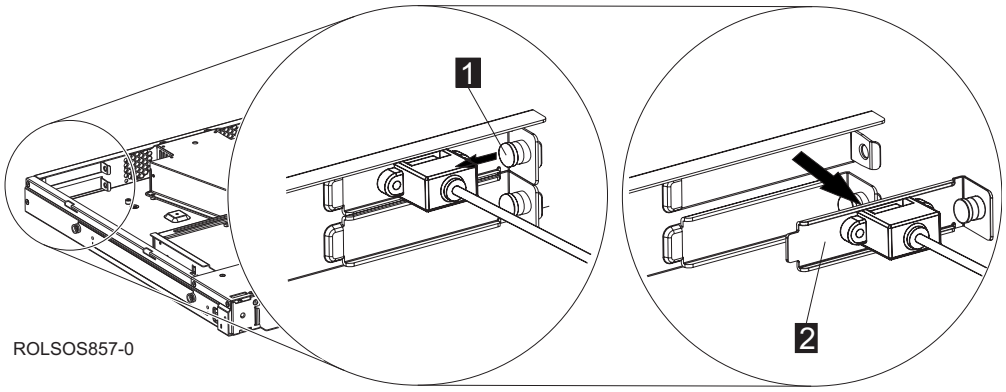


Figure 42. Remove Interface Assembly Back Plate

5. Remove the Interface Assembly **1** and internal power connector **2**.

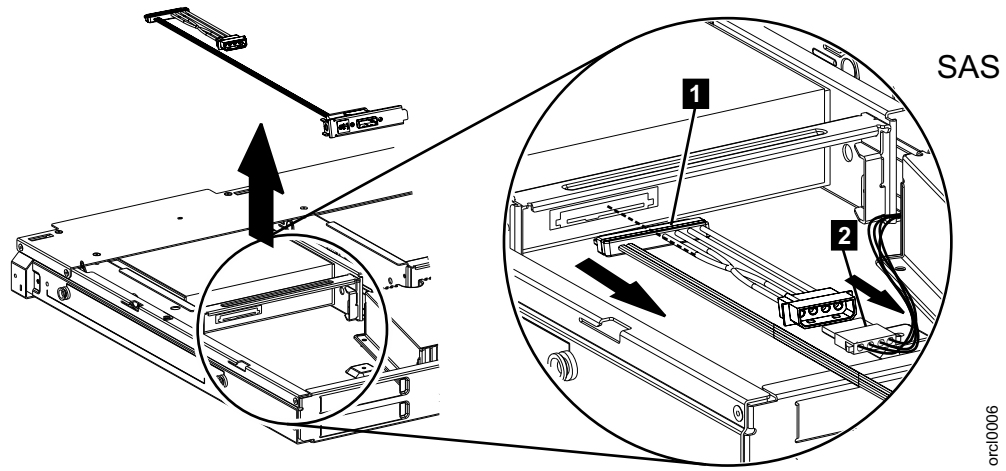


Figure 43. Remove Interface Assembly and Power Cable

6. Locate the new interface assembly.
7. Attach the Interface Assembly **1** to the drive connector, and attach the Power Connector **2**.

   Note: The power connector is only attached to the SAS Interface Assembly.

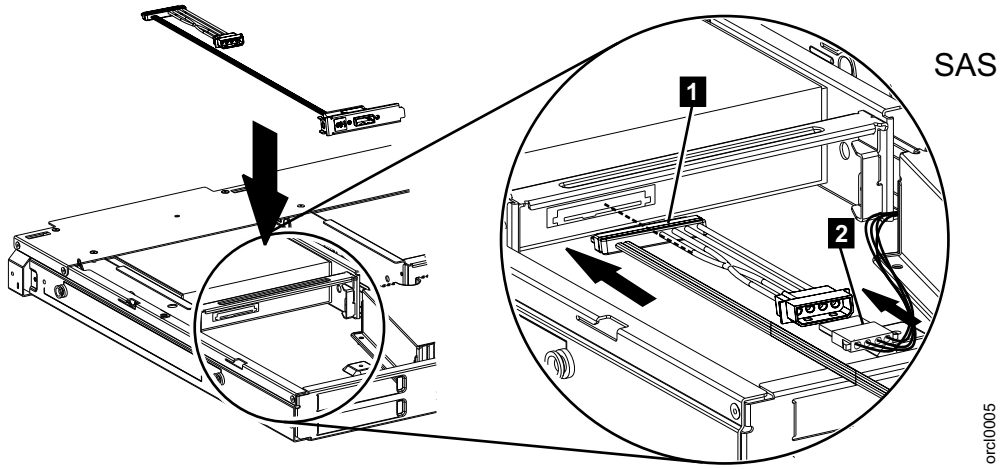


Figure 44. Attach Interface Assembly

8. To Insert the Interface Assembly into the rear panel slot, insert the tab on the back plate into the indent in the back panel opening **1**, pull the pin on the back plate **2** and push the back plate into the back panel opening **3** until it clicks into place.

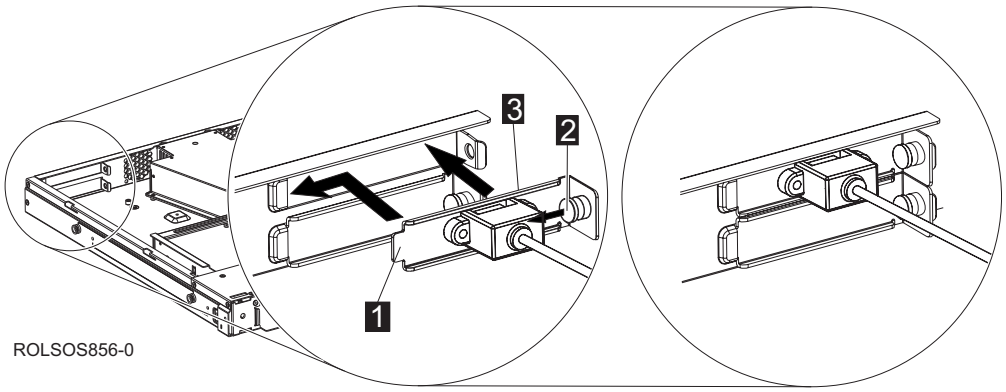


Figure 45. Insert Interface Assembly Back Plate

9. Complete the 1U Rackmount Tape Enclosure Service Procedure. See "Completing the 1U Rackmount Tape Enclosure Service Procedure" on page 89 for the correct procedure.

Replacing an Enclosure

1. Prepare the 1U Rackmount Tape Enclosure for Service. See "Preparing the 1U Rackmount Tape Enclosure for Removal or Installation of a Storage Device or Other Component" on page 76 for the correct procedure.
2. Remove the 1U Rackmount Tape Enclosure from the rack (see "Removing the 1U Rackmount Tape Enclosure from a Rack" on page 14) and place it on an ESD protected work surface.
3. Remove the new Enclosure FRU from its packaging and install it onto the slide rails. Pull the slide rails forward **1** until they click, twice, into place. Carefully lift the Enclosure FRU and tilt it into position over the slide rails so that the rear posts **2** on the Enclosure FRU line up with the rear slots **3** on the slide rails. Slide the server down until the rear posts slip into the two rear

slots, and then slowly lower the front of the Enclosure FRU **4** until the other posts slip into the other slots on the slide rails. Make sure that the front latch **5** slides over the posts.

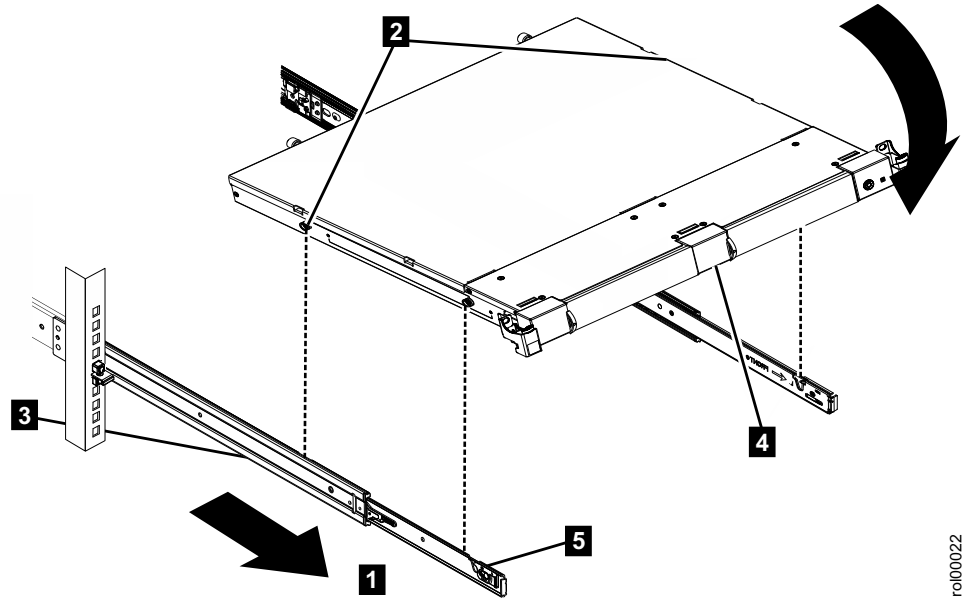


Figure 46. Install Enclosure FRU on Slide Rails

4. Note the location of the devices in the old 1U Rackmount Tape Enclosure. Remove the Half High Bay Blanks from those locations in the Enclosure FRU. To remove the Half High Bay Blank, push the drive latch **1** toward the Half High Bay Blank and begin to pull the blank out of the enclosure. Grasp the Bay Blank **2** and pull it out of the enclosure.

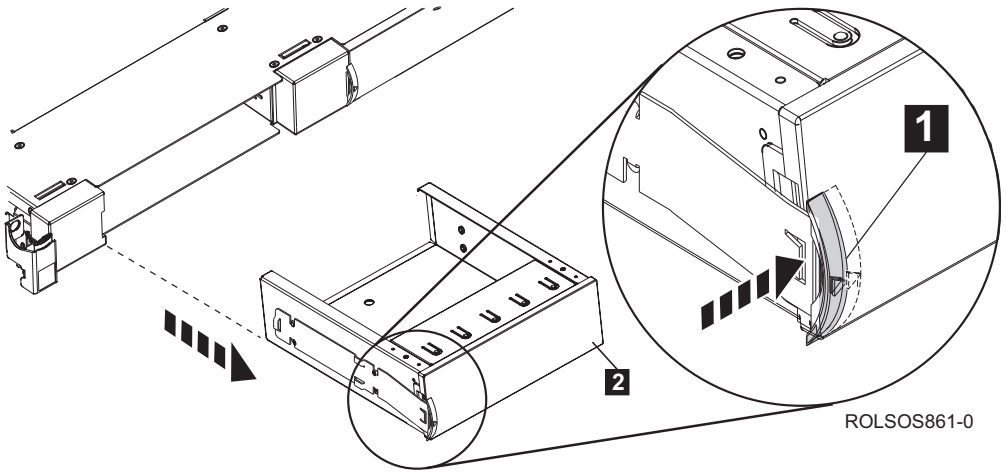


Figure 47. Remove Half-High Bay Blanks

5. Remove the Tape Drives from the 1U Rackmount Tape Enclosure. To remove the devices, push the drive latch **1** toward the drive assembly and begin to pull the drive out of the enclosure. Grasp the drive **2** and pull the assembly out of the drive bay. Disconnect the cables **3** from the drive assembly.

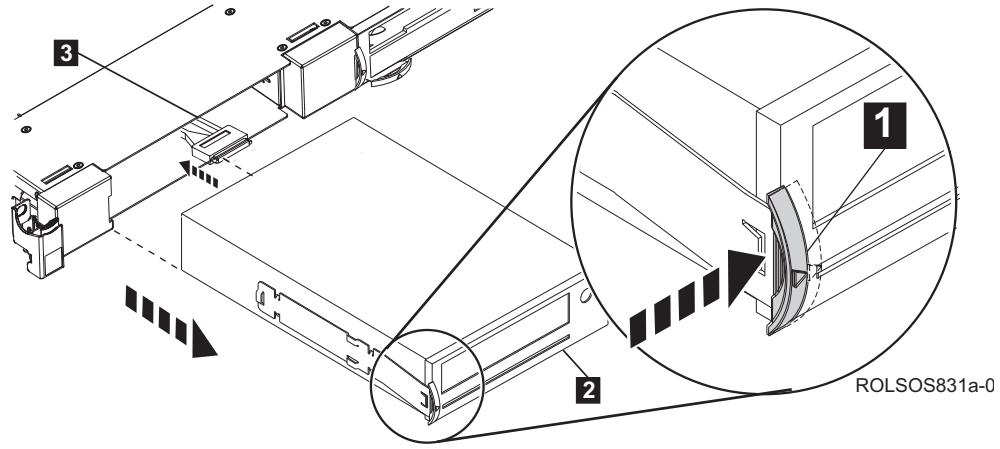


Figure 48. Removing a Drive Assembly

6. Install each device into the Enclosure FRU into its noted location. To install the drive assemblies, attach the Drive Latch **1** to the drive assembly **2** and insert both into the drive bay until they click into place.

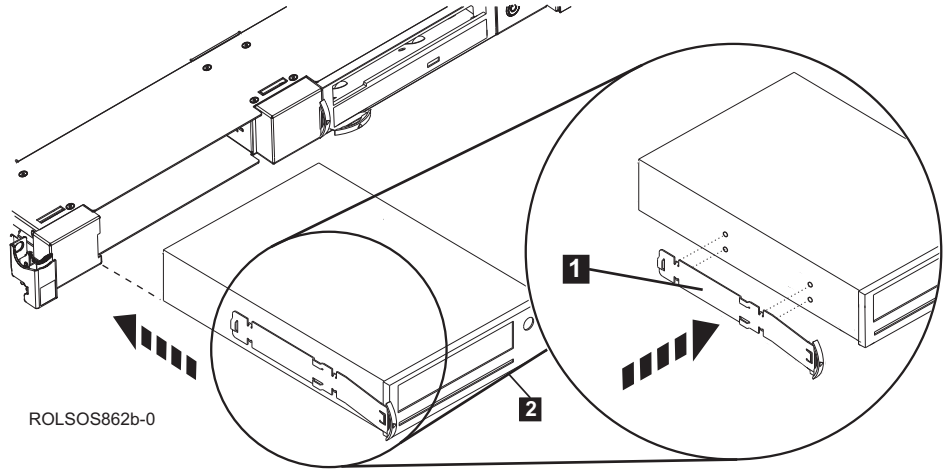


Figure 49. Inserting a Drive

7. To remove the Top Cover of the Enclosure FRU, loosen the Top Cover Thumb Screws **1** .

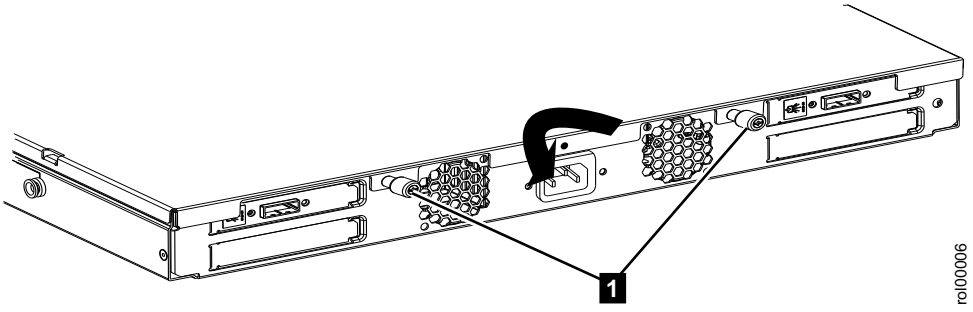


Figure 50. Top Cover Thumb Screws

8. Slide the Enclosure FRU Top Cover toward the rear of the enclosure **1** and lift to remove **2**.

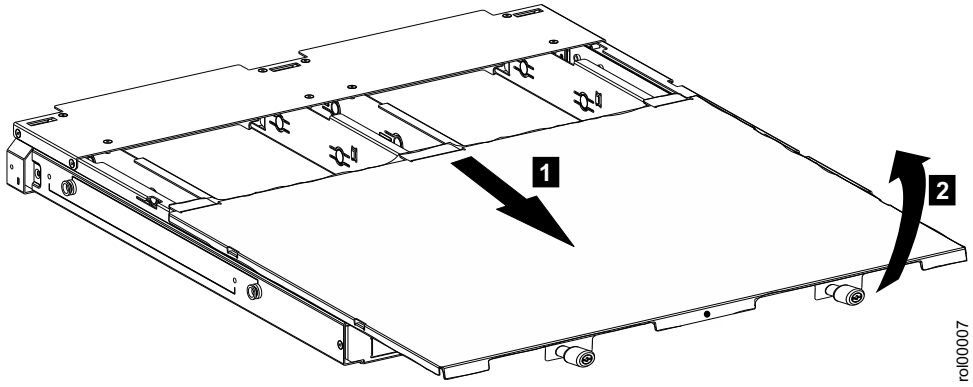


Figure 51. Top Cover

9. Note the location of each Interface Assembly in the 1U Rackmount Tape Enclosure. To remove each Interface assembly from the 1U Rackmount Tape Enclosure, remove the Interface Assembly from the drive connector **1** and remove the power connector **2**.

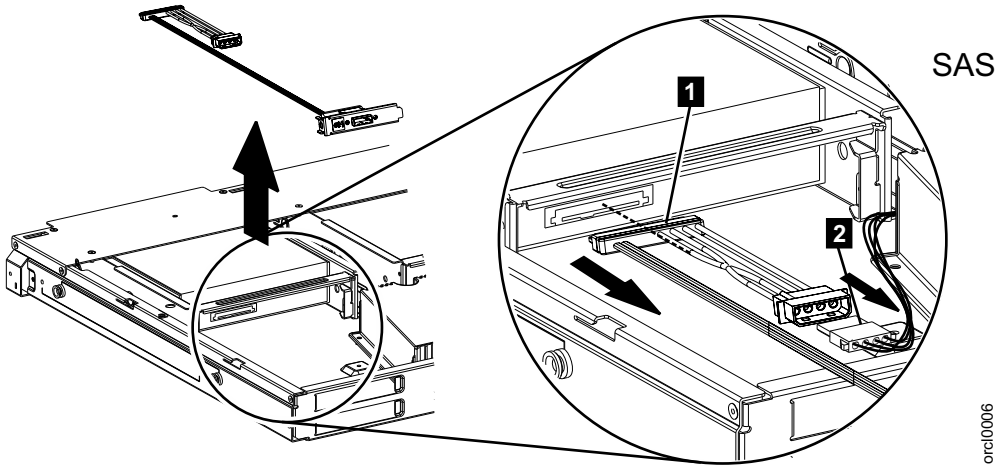


Figure 52. Remove Interface Assembly

10. Note the locations of the Blank Back Plates to be removed from the new Enclosure FRU. To remove a Blank Back Plate, pull the back plate pin **1** to release the Blank Back Plate, and remove the Blank Back Plate **2** from the rear panel slot.

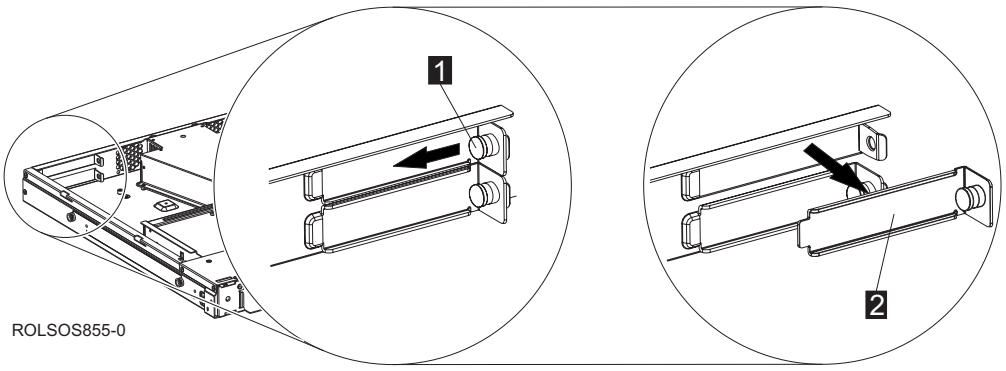


Figure 53. Remove Blank Back Plate

11. Install each Interface Assembly into the Enclosure FRU. Attach the Interface Assembly to the drive connector **1**, and attach the Power Connector **2**.

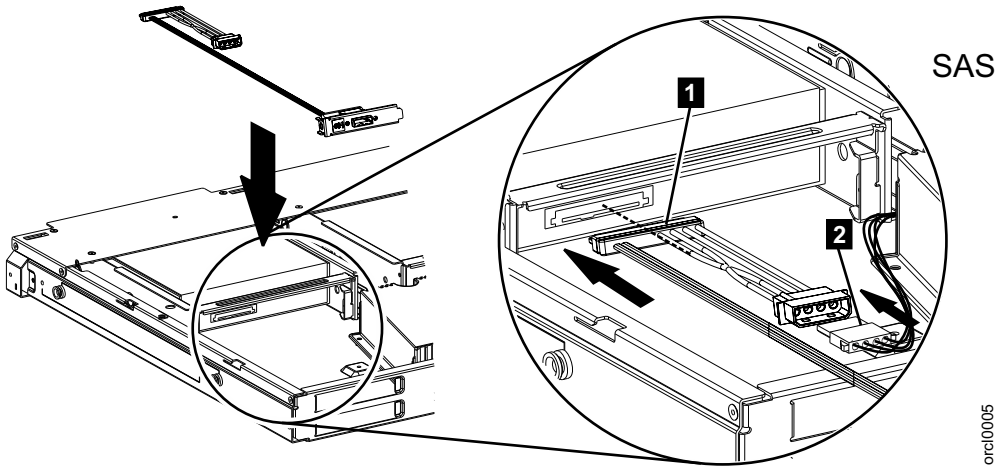


Figure 54. Attach Interface Assembly

12. To Insert the Interface Assembly into the rear panel slot, insert the tab on the back plate into the indent in the back panel opening **1**, pull the pin on the back plate **2** and push the back plate into the back panel opening **3** until it clicks into place.

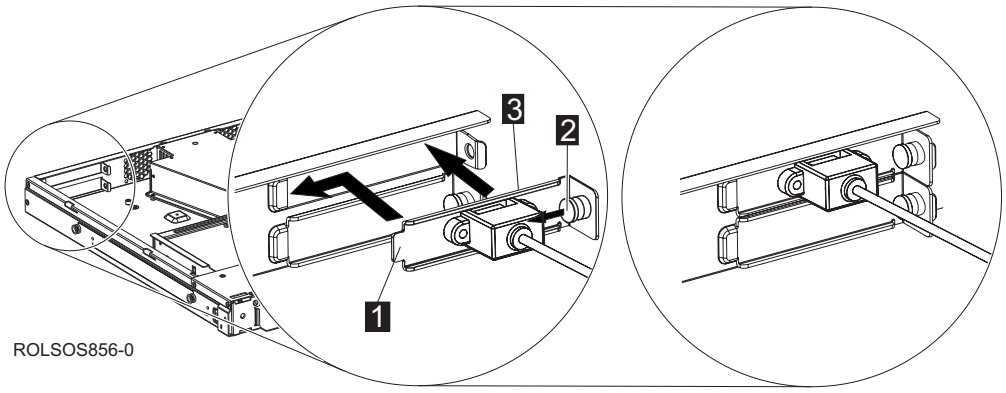


Figure 55. Insert Interface Assembly Back Plate

13. Complete the 1U Rackmount Tape Enclosure Service Procedure. See "Completing the 1U Rackmount Tape Enclosure Service Procedure" on page 89 for the correct procedure.

Opening the 1U Rackmount Tape Enclosure for Service

Use the following procedure to extend the 1U Rackmount Tape Enclosure from the rack and remove the top cover.

Note: Only perform this procedure if you are directed here by another service procedure. Some procedures may be performed without accessing the inside of the 1U Rackmount Tape Enclosure.

1. If they are installed, remove the M6 screws from the front of the Right Slide Rail **1** and the Left Slide Rail **2** with a flat-head or Phillips screwdriver.

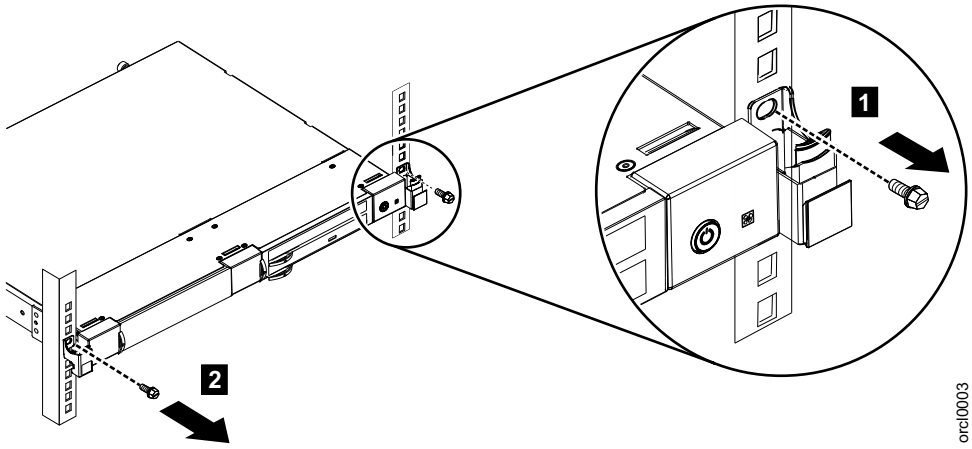


Figure 56. Remove M6 Screws from the Slide Rails

2. Press both rack latches **1** and pull the 1U Rackmount Tape Enclosure **2** out from the rack until the rails click, twice into place.

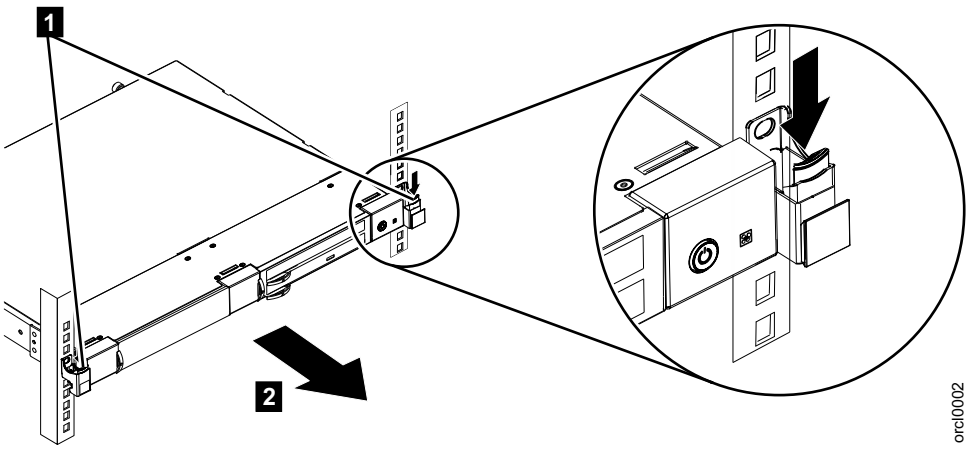


Figure 57. Release latches and 1U Rackmount Tape Enclosure

3. Pull the 1U Rackmount Tape Enclosure out from the rack until the slide rails are fully extended and click into place.

Note: Do not remove the 1U Rackmount Tape Enclosure from the slide rails.

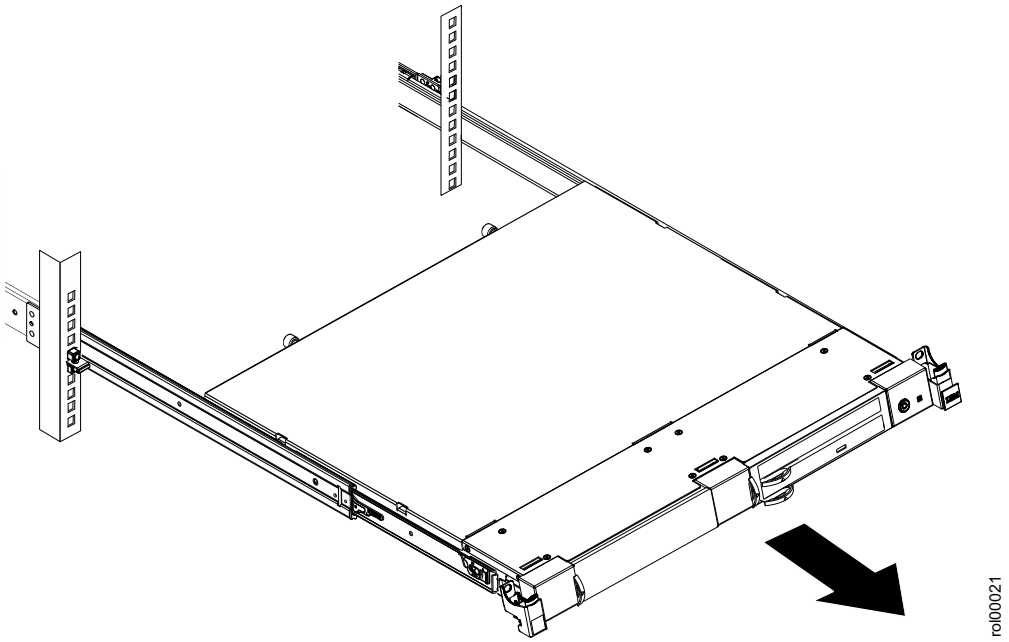


Figure 58. Pull the 1U Rackmount Tape Enclosure out from the Rack

4. Loosen the Top Cover Thumb Screws **1** .

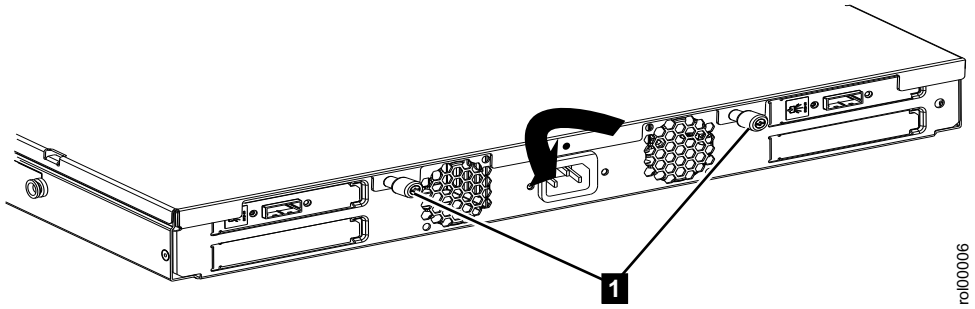


Figure 59. Top Cover Thumb Screws

5. Slide the Top Cover toward the rear of the 1U Rackmount Tape Enclosure **1** and lift to remove **2** .

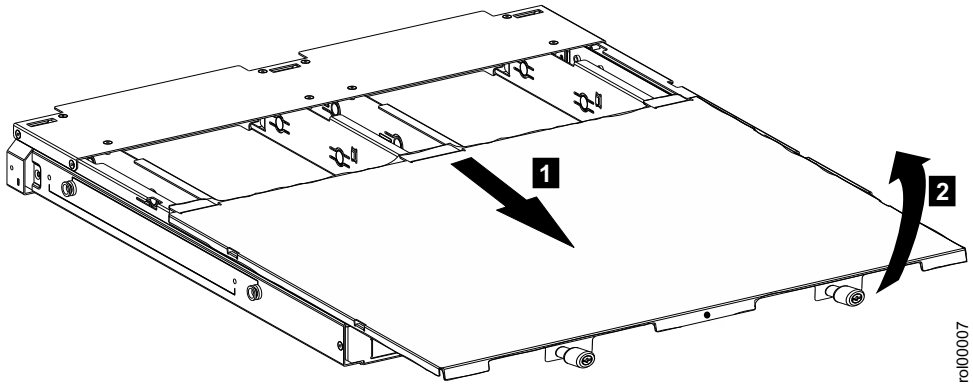


Figure 60. Top Cover

The 1U Rackmount Tape Enclosure is now prepared for service.

Completing the 1U Rackmount Tape Enclosure Service Procedure

Use the following procedure to install the top cover and insert the 1U Rackmount Tape Enclosure into the rack.

1. Place the Top Cover on the 1U Rackmount Tape Enclosure **1** . Slide it forward **2** until the tabs are fully engaged **3** .

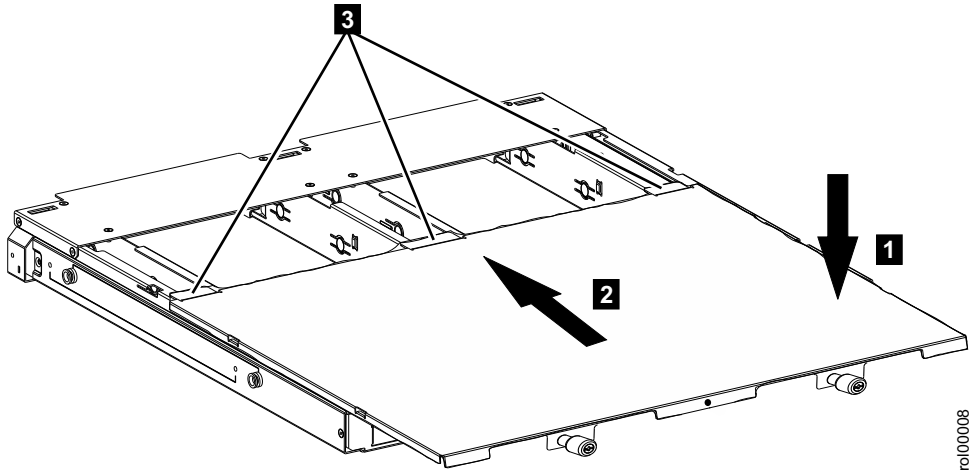


Figure 61. Top Cover

2. Tighten the Top Cover Thumbscrews **1** .

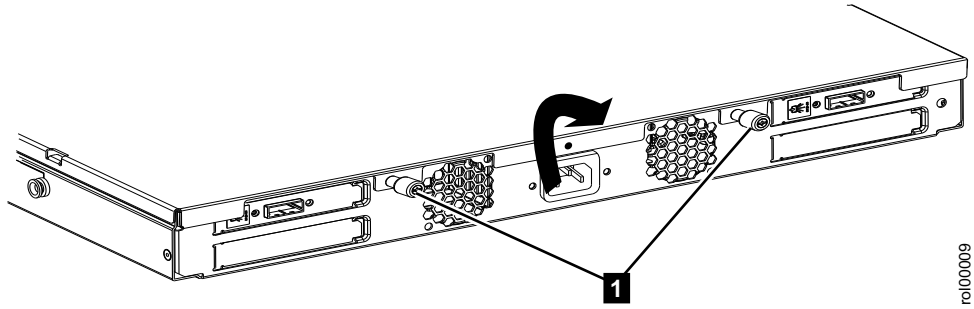


Figure 62. Top Cover Thumb Screws

3. Lift the blue release latches **1** on the slide rails and push the 1U Rackmount Tape Enclosure **2** all the way into the rack until it clicks into place.

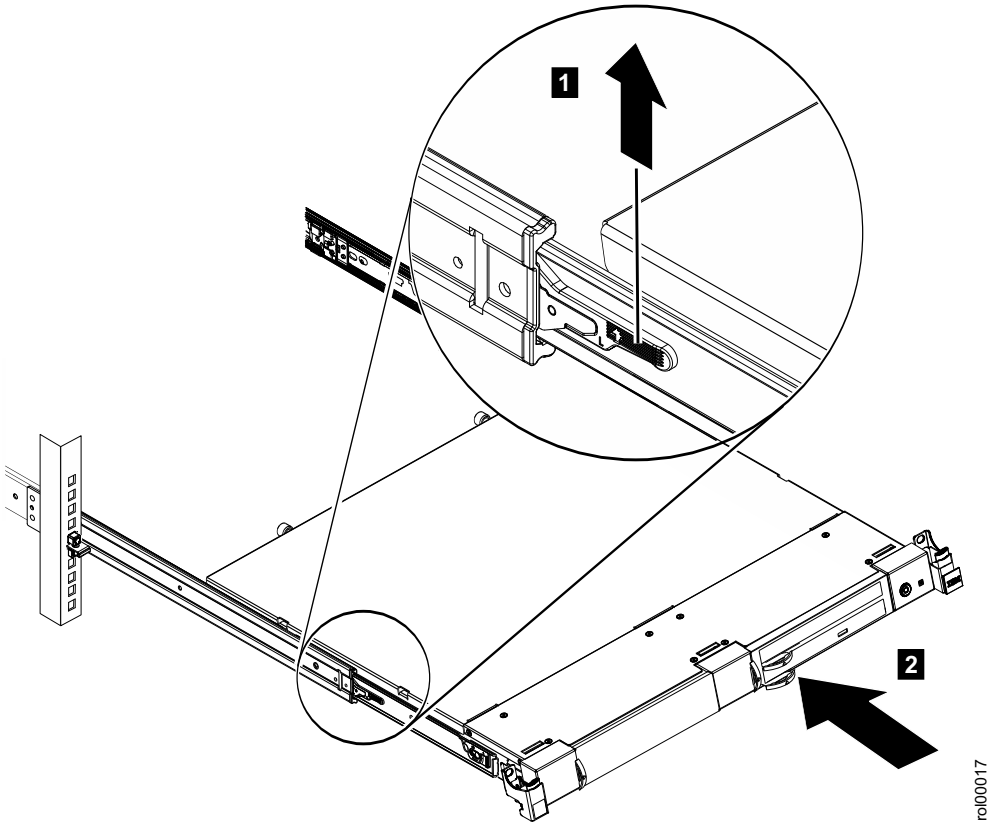


Figure 63. Release latches and 1U Rackmount Tape Enclosure

4. The M6 screws may be installed into the front of the Right Slide Rail **1** and the Left Slide Rail **2** using a flat-head or Phillips screwdriver.

   Note: This step is optional. The screws are only necessary for shipping or in vibration-prone areas.

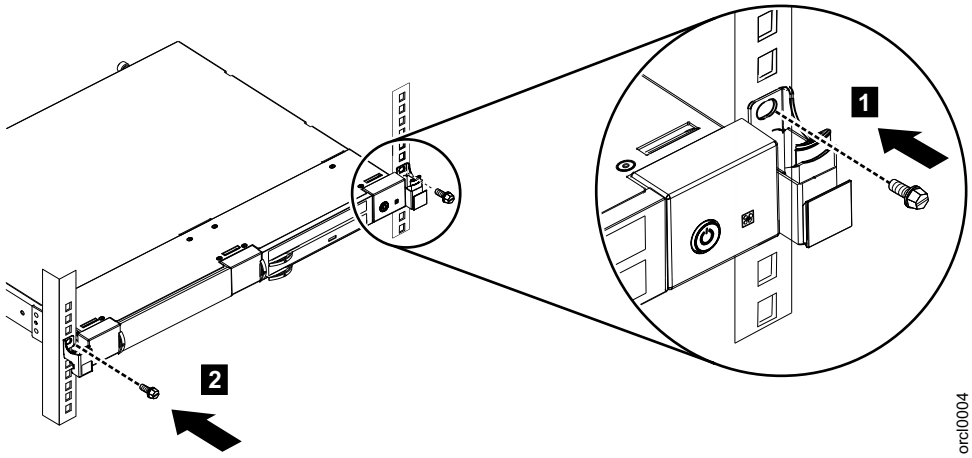


Figure 64. M6 Screws into the Slide Rails

5. Attach the power cords and other cables to the rear of the enclosure **1** . Route the cables and power cord on the cable-management arm and secure them with cable ties or hook-and-loop fasteners **2** .

   Note: Allow slack in all cables to avoid tension in the cables as the cable-management arm moves.

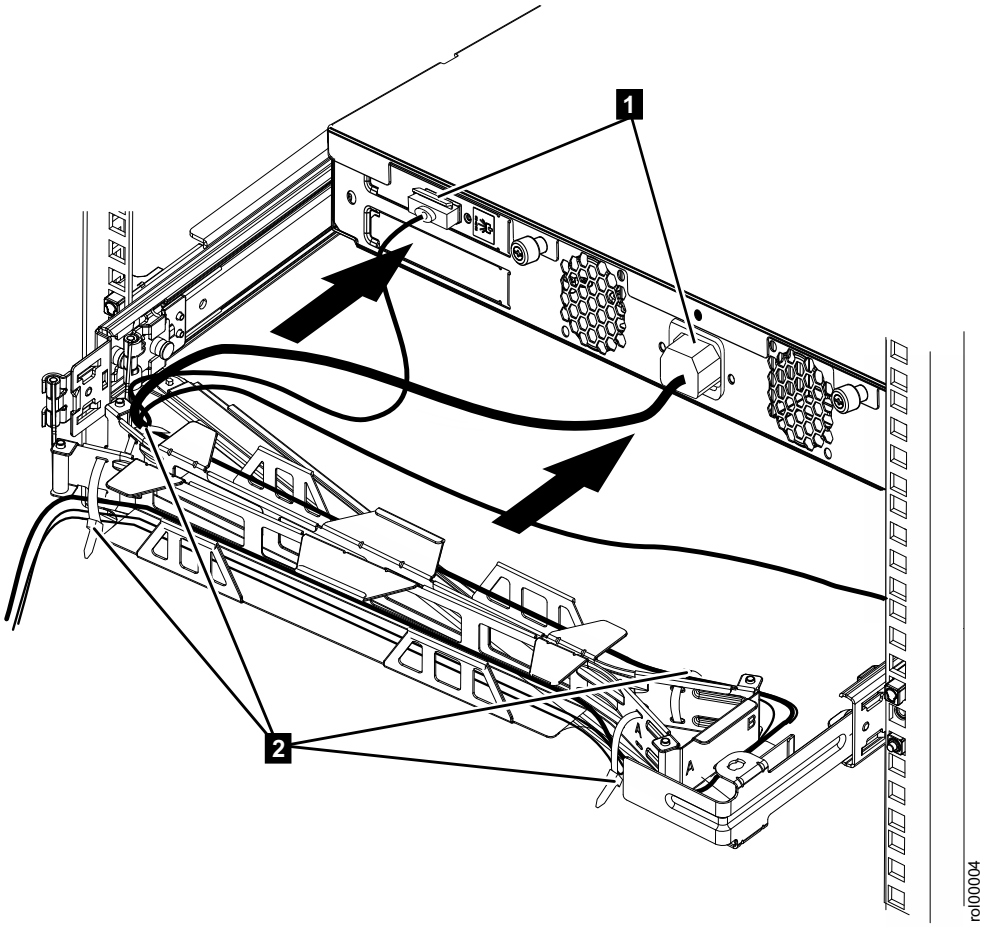


Figure 65. Cable Routing

6. Power on the 1U Rackmount Tape Enclosure.
7. Refer to your system manuals to verify installation.

Servicing the 1U Rackmount Tape Enclosure is now complete.

Appendix A. Power Cables

To avoid electrical shock, a power cable with a grounded attachment plug has been provided. Use only properly grounded outlets.

Power cables used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA). The power cables consist of:

- Electrical cables, type SVT or SJT.
- Attachment plugs complying with National Electrical Manufacturers Association (NEMA) 5-15P, that is:

  "For 115 V operation use a UL Listed Cable Set consisting of a minimum 18 AWG, Type SVT or SJT three conductor cable a maximum of 15 feet in length and a parallel blade, grounding type attachment plug rated at 15 A, 125 V."

  "For 230 V operation in the United States use a UL Listed Cable Set consisting of a minimum 18 AWG, Type SVT or SJT three conductor cable a maximum of 15 feet in length, and a tandem blade, grounding type attachment plug rated at 15 A, 250 V."
- Appliance couplers complying with International Electrotechnical Commission (IEC) Standard 320, Sheet C13.

Power cables used in other countries consist of:

- Electrical cables, type HD21.
- Attachment plugs approved by the appropriate testing organization for the specific countries where they are used.

  "For units set at 230 V (outside of U.S.): Use a Cable Set consisting of a minimum 18 AWG cable and grounding type attachment plug rated 15 A, 250 V. The Cable Set should have the appropriate safety approvals for the country in which the equipment is to be installed and marked 'HAR'."

Table 9 lists the power cable part number, the country where the power cable can be used, and an index number to be matched with the receptacles shown in Figure 66 on page 95. If your power cable does not match this information, contact your local dealer.

Table 9. Power Cable Information

Part Number	Country or Region	Index
39M5095 Japan	Bahamas, Barbados, Bolivia, Brazil, Canada, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Netherlands Antilles, Panama, Peru, Philippines, Taiwan, Thailand, Tobago, Trinidad, U.S.A. (except Chicago), Venezuela	1

Table 9. Power Cable Information (continued)

Part Number	Country or Region	Index
39M5081 US/Canada	Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Puerto Rico, Saudi Arabia, Suriname, Taiwan, Trinidad, U.S.A. (except Chicago), Venezuela	2
39M5102 Australia	Australia, New Zealand, Uruguay	3
39M5123 France	Abu Dhabi, Austria, Belgium, Bulgaria, Botswana, Egypt, Finland, France, Germany, Greece, Iceland, Indonesia, Korea (South), Lebanon, Luxembourg, Macau, Netherlands, Norway, Portugal, Saudi Arabia, Spain, Sudan, Sweden, Turkey, Yugoslavia	4
39M5130 Denmark	Denmark	5
39M5144 South Africa	Bangladesh, Burma, Pakistan, South Africa, Sri Lanka	6
39M5151 United Kingdom	Bahrain, Bermuda, Brunei, Channel Islands, Cyprus, Ghana, Hong Kong, India, Iraq, Ireland, Jordan, Kenya, Kuwait, Malawi, Malaysia, Nigeria, Oman, People's Republic of China, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Arab Emirates (Dubai), United Kingdom, Zambia	7
39M5158 Switzerland	Liechtenstein, Switzerland	8
39M5165 Italy	Chile, Ethiopia, Italy	9
39M5172 Israel	Israel	10
39M5068 Colombia	Colombia, Paraguay, Argentina	11
39M5206 China	China (PRC)	
39M5247 Taiwan	Taiwan	
39M5254 Taiwan	Taiwan	
39M5199 Japan	Japan	
39M5186 Japan	Japan	

Table 9. Power Cable Information (continued)

Part Number	Country or Region	Index
39M5219 Korea	Korea	
39M5226 India	India	
39M5240 Brazil	Brazil	
39M5378 Rack Power Cord	Rack Power Cord	

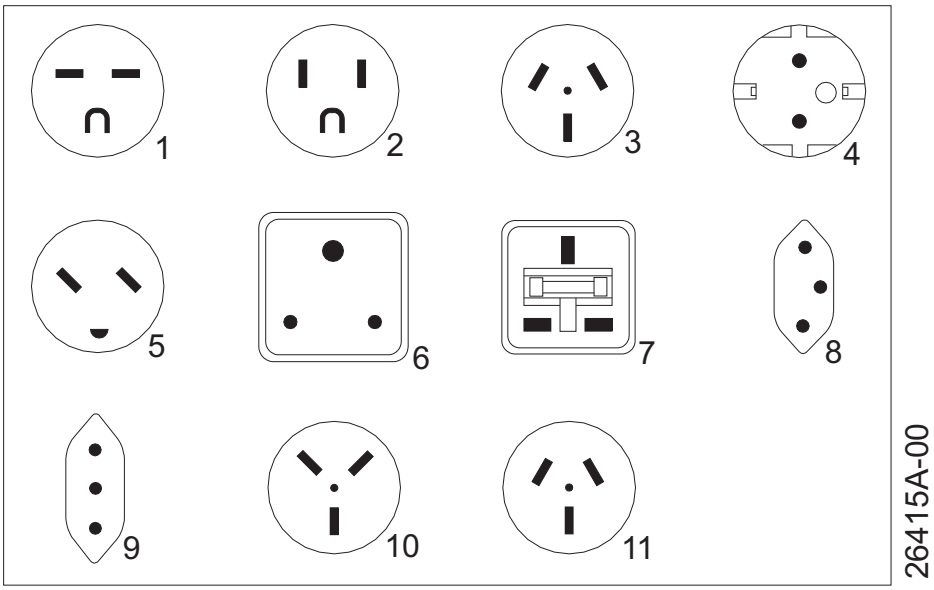


Figure 66. Type of Receptacles

Appendix B. Safety Inspection Procedures

DANGER

To prevent a possible shock from touching two surfaces with different protective ground (earth), use one hand, when possible, to connect or disconnect signal cables. (D001)

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (D004)

DANGER

When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:

- **Connect power to this unit only with the provided power cord. Do not use the provided power cord for any other product.**
- **Do not open or service any power supply assembly.**
- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.**
- **Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.**
- **Connect any equipment that will be attached to this product to properly wired outlets.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.**

  To disconnect:

  1. **Turn off everything (unless instructed otherwise).**
  2. **Remove the power cords from the outlets.**
  3. **Remove the signal cables from the connectors.**
  4. **Remove all cables from the devices.**

  To connect:

  1. **Turn off everything (unless instructed otherwise).**
  2. **Attach all cables to the devices.**
  3. **Attach the signal cables to the connectors.**
  4. **Attach the power cords to the outlets.**
  5. **Turn on the devices.**
- **Sharp edges, corners and joints may be present in and around the system. Use care when handling equipment to avoid cuts, scrapes and pinching.**

(D005)

Use the following procedures to identify unsafe conditions. Be cautious of potential safety hazards not covered by the procedures. If unsafe conditions are present, determine how serious the hazards are and whether you should continue before correcting the problem.

Perform the following safety checks.

1. Do a controlled system shutdown. Refer to the instructions in your system manuals.

2. Turn off the power to all external devices connected to the system unit.
3. Turn off the power to the 1U Rackmount Tape Enclosure.
4. Turn off the power to the system unit.
5. Unplug the 1U Rackmount Tape Enclosure external power cable from the electrical outlet.
6. Unplug the system unit power cable from the electrical outlet.
7. Check the 1U Rackmount Tape Enclosure external power cable for damage.
8. Check the external SAS (signal) cables for damage.
9. Check the covers for sharp edges, damage, or alterations that expose the internal parts of the 1U Rackmount Tape Enclosure.
10. Check the covers for proper fit. They should be in place and secure.
11. Check the product label at the back of the 1U Rackmount Tape Enclosure to make sure it matches the voltage at your outlet.
12. Check the voltage level at the outlet and also check for proper grounding.
13. With the external power cable (**1** in Figure 67) connected to the 1U Rackmount Tape Enclosure, check to ensure 1.0 ohm or less resistance between the ground lug on the external power cable plug and the metal frame.

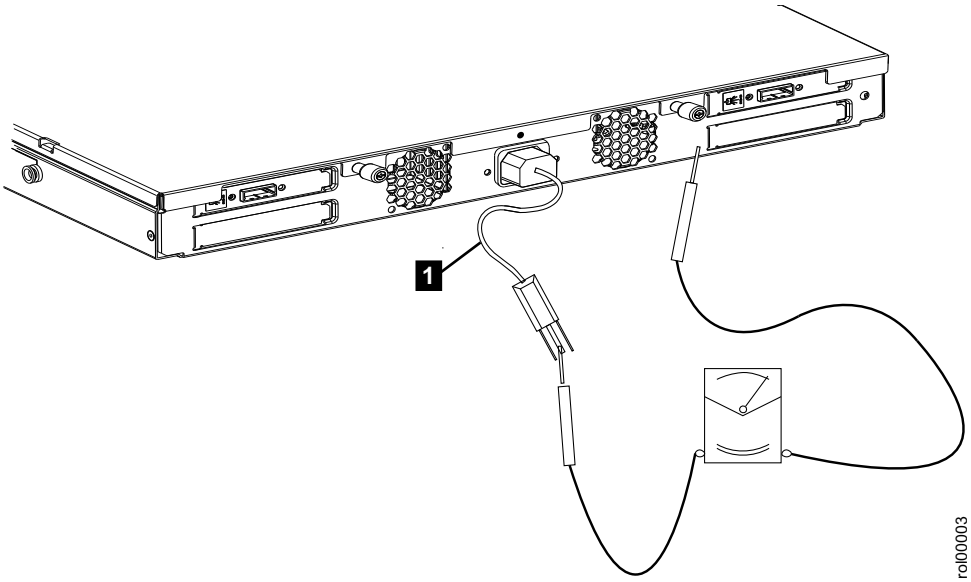
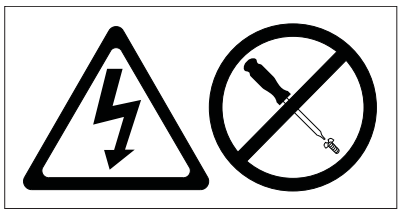


Figure 67. Rear View of the 1U Rackmount Tape Enclosure

Note: Use an analog meter to measure grounding resistance; do not use a digital multimeter.

14. If the 1U Rackmount Tape Enclosure passes the test in the previous step, plug its external power cable into the electrical outlet. If the 1U Rackmount Tape Enclosure does not pass the test, see Chapter 6, "Troubleshooting," on page 65. If problems persist, contact your service representative.

Note: The Safety Information Label located on top of the power supply under the top cover, shows the following symbol:



ROLSOS874-00

This symbol indicates a hazard arising from dangerous voltage inside. Do not open.