This document describes how to replace a faulted storage processor assembly in the Unity 300/300F, Unity 400/400F, Unity 500/500F, and Unity 600/600F.

Two storage processor (SP) assemblies are located at and removed from the rear of the disk processor enclosure (DPE). During this procedure you will transfer certain parts from the faulted SP into the replacement SP.

**NOTICE**

This procedure involves storage processor (SP) reboots coordinated to ensure that at least one SP is running at all times. During an SP reboot, data will be unavailable to front- or back-end connections that are not duplicated on the peer SP.

**WARNING**

On a system with Data at Rest Encryption enabled, follow the standard process to replace faulted parts. Improperly removing hardware can cause data to be inaccessible.

Replacing the DPE and both SPs requires a special procedure since the keystore is tied to the hardware. Do not replace all three parts at once, rather retain an SP until the DPE is online before replacing it. If all hardware was replaced, restore the keystore from a backup.
Before you start

Before you begin this procedure, ensure that you have received the new part and have correctly identified its intended location in the system. Refer to your Unisphere Service section for instruction on how to identify failures, order new parts and handle hardware components.

**NOTICE**

This procedure involves storage processor (SP) reboots coordinated to ensure that at least one SP is running at all times. During an SP reboot, data will be unavailable to front-or back-end connections that are not duplicated on the peer SP.

Additional resources

As part of an effort to improve its product lines, EMC periodically releases revisions of its software and hardware. Therefore, some functions described in this document might not be supported by all versions of the software or hardware currently in use. The product release notes provide the most up-to-date information on product features. Contact your EMC technical support professional if a product does not function properly or does not function as described in this document.

**Where to get help**

Support, product, and licensing information can be obtained as follows:

**Product information**

For product and feature documentation or release notes, go to Unity Technical Documentation at: [www.emc.com/en-us/documentation/unity-family/index.htm](http://www.emc.com/en-us/documentation/unity-family/index.htm). You can also access this page from the Unity product family page at: [www.emc.com/en-us/storage/unity.htm](http://www.emc.com/en-us/storage/unity.htm). In the Why Unity section, click **Unity Product Resources**.

**Troubleshooting**

For information about EMC products, software updates, licensing, and service, go to EMC Online Support (registration required) at: [https://Support.EMC.com](https://Support.EMC.com). After logging in, locate the appropriate **Support by Product** page.

**Technical support**

For technical support and service requests, go to EMC Online Support at: [https://Support.EMC.com](https://Support.EMC.com). After logging in, locate **Create a service request**. To open a service request, you must have a valid support agreement. Contact your EMC Sales Representative for details about obtaining a valid support agreement or to answer any questions about your account.

**Special notice conventions used in this document**

EMC uses the following conventions for special notices:

**DANGER**

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

**WARNING**

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
Handling replaceable units

This section describes the precautions that you must take and the general procedures that you must follow when removing, installing, and storing any replaceable unit.

Avoiding electrostatic discharge (ESD) damage

When replacing or installing hardware units, you can inadvertently damage the sensitive electronic circuits in the equipment by simply touching them. Electrostatic charge that has accumulated on your body discharges through the circuits. If the air in the work area is very dry, running a humidifier in the work area will help decrease the risk of ESD damage. Follow the procedures below to prevent damage to the equipment.

Be aware of the following requirements:

- Provide enough room to work on the equipment.
- Clear the work site of any unnecessary materials or materials that naturally build up electrostatic charge, such as foam packaging, foam cups, cellophane wrappers, and similar items.
- Do not remove replacement or upgrade units from their antistatic packaging until you are ready to install them.
- Before you begin service, gather together the ESD kit and all other materials you will need.
- Once servicing begins, avoid moving away from the work site; otherwise, you may build up an electrostatic charge.
- Use ESD anti-static gloves or an ESD wristband (with strap). If using an ESD wristband with a strap:
  - Attach the clip of the ESD wristband to the ESD bracket or bare metal on a cabinet/rack or enclosure.
  - Wrap the ESD wristband around your wrist with the metal button against your skin.
  - If a tester is available, test the wristband.
- If an emergency arises and the ESD kit is not available, follow the procedures in Emergency Procedures (without an ESD kit).

Emergency procedures (without an ESD kit)

In an emergency when an ESD kit is not available, use the following procedures to reduce the possibility of an electrostatic discharge by ensuring that your body and the subassembly are at the same electrostatic potential.
These procedures are not a substitute for the use of an ESD kit. Follow them only in the event of an emergency.

- Before touching any unit, touch a bare (unpainted) metal surface of the cabinet/rack or enclosure.
- Before removing any unit from its antistatic bag, place one hand firmly on a bare metal surface of the cabinet/rack or enclosure, and at the same time, pick up the unit while it is still sealed in the antistatic bag. Once you have done this, do not move around the room or touch other furnishings, personnel, or surfaces until you have installed the unit.
- When you remove a unit from the antistatic bag, avoid touching any electronic components and circuits on it.
- If you must move around the room or touch other surfaces before installing a unit, first place the unit back in the antistatic bag. When you are ready again to install the unit, repeat these procedures.

Hardware acclimation times

Systems and components must acclimate to the operating environment before applying power. This requires the unpackaged system or component to reside in the operating environment for up to 16 hours in order to thermally stabilize and prevent condensation.

Refer to the table, Table 1 on page 4, to determine the precise amount of stabilization time required.

<table>
<thead>
<tr>
<th>If the last 24 hours of the TRANSIT/STORAGE environment was this:</th>
<th>...and the OPERATING environment is this:</th>
<th>...then let the system or component acclimate in the new environment this many hours:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>Humidity</td>
<td></td>
</tr>
<tr>
<td>Nominal 68-72°F (20-22°C)</td>
<td>Nominal 40-55% RH</td>
<td>Nominal 68-72°F (20-22°C) 40-55% RH</td>
</tr>
<tr>
<td>Cold &lt;68°F (20°C)</td>
<td>Dry &lt;30% RH</td>
<td>≤86°F (30°C)</td>
</tr>
<tr>
<td>Cold &lt;68°F (20°C)</td>
<td>Damp ≥30% RH</td>
<td>≤86°F (30°C)</td>
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<tr>
<td>Hot &gt;72°F (22°C)</td>
<td>Dry &lt;30% RH</td>
<td>≤86°F (30°C)</td>
</tr>
<tr>
<td>Hot &gt;72°F (22°C)</td>
<td>Humid 30-45% RH</td>
<td>≤86°F (30°C)</td>
</tr>
<tr>
<td></td>
<td>Humid 45-60% RH</td>
<td>≤86°F (30°C)</td>
</tr>
<tr>
<td></td>
<td>Humid ≥60% RH</td>
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</tr>
<tr>
<td>Unknown</td>
<td></td>
<td>≤86°F (30°C)</td>
</tr>
</tbody>
</table>
Removing, installing, or storing replaceable units

Use the following precautions when removing, handling, or storing replaceable units:

**CAUTION**

Some replaceable units have the majority of their weight in the rear of the component. Ensure that the back end of the replaceable unit is supported while installing or removing it. Dropping a replaceable unit could result in personal injury or damage to the equipment.

**NOTICE**

- For a module that must be installed into a slot in an enclosure, examine the rear connectors on the module for any damage before attempting its installation.
- A sudden jar, drop, or even a moderate vibration can permanently damage some sensitive replaceable units.

- Do not remove a faulted replaceable unit until you have the replacement available.
- When handling replaceable units, avoid electrostatic discharge (ESD) by wearing ESD anti-static gloves or an ESD wristband with a strap. For additional information, refer to Avoiding electrostatic discharge (ESD) damage on page 3.
- Avoid touching any exposed electronic components and circuits on the replaceable unit.
- Never use excessive force to remove or install a replaceable unit. Take time to read the instructions carefully.
- Store a replaceable unit in the antistatic bag and the specially designed shipping container in which you received it. Use the antistatic bag and special shipping container when you need to return the replaceable unit.
- Replaceable units must acclimate to the operating environment before applying power. This requires the unpackaged component to reside in the operating environment for up to 16 hours in order to thermally stabilize and prevent condensation. Refer to Hardware acclimation times on page 4 to ensure the replaceable unit has thermally stabilized to the operating environment.
NOTICE

Your storage system is designed to be powered on continuously. Most components are hot swappable; that is, you can replace or install these components while the storage system is running. However, the system requires that:

- Front bezels should always be attached to ensure EMI compliance. Make sure you reattach the bezel after replacing a component.
- Each slot should contain a component or filler panel to ensure proper air flow throughout the system.

Unpacking a part

**Procedure**

1. Wear ESD gloves or attach an ESD wristband to your wrist and the enclosure in which you are installing the part.
2. Unpack the part and place it on a static-free surface.
3. If the part is a replacement for a faulted part, save the packing material to return the faulted part.

Handling disks

Disks are extremely sensitive electronic components. Always handle a disk gently, and observe the following guidelines:

- Follow the instructions described in Removing, installing, or storing replaceable units on page 5.
- Do not stack disks upon one another, or place them on hard surfaces.
- Make sure that the replacement disk has the same part number or the part number of an approved replacement for the faulted disk. The part number (PN005xxxxxx) appears on the disk. A replacement disk should be the same type (example: SAS, FLASH) and have the same capacity (size and speed) as the disk it is replacing.
- When removing a disk, pull the disk partially out of the slot, then wait 30 seconds for the drive to spin down before removing it.
- When installing multiple disks in a powered up system, wait at least 10 seconds before sliding the next disk into position.
- Place disks on a soft, antistatic surface, such as an industry-standard antistatic foam pad or the container used to ship the disk.

Standard touch point colors

Touch points are component locations where you can:

- Grip the hardware to remove or install a component.
- Open or close a latch.
- Turn a knob to open, close, or adjust a component.

Standard touch point colors are terra-cotta (orange) or blue.

**Note**

Within this documentation, the color orange is used instead of terra-cotta for simplicity.
Identifying and locating the faulted storage processor assembly

Before you replace a faulted storage processor assembly, you must locate its placement within the storage system by using Unisphere.

Using Unisphere, locate the faulted storage processor assembly in the enclosure.

Procedure

1. In Unisphere, select System View.
2. Select the Enclosures page.
3. Locate the faulted storage processor assembly marked orange and displayed in the Enclosure view shown.

Unisphere automatically displays the view showing the storage processor assembly requiring service.

Figure 1 Faulted storage processor A - example location

Preparing the storage processor (SP) for service

To protect your system from accidental data loss during this maintenance activity, you must prepare the SP for service. You prepare an SP for service by putting it in Service Mode.

Entering Service Mode stops I/O on the SP so that service tasks can be safely performed.
Note

Both SPs must NOT be in Service mode at the same time.

Procedure

1. Open Unisphere and select Service, then Service Tasks.
2. Under the name of the storage processor where you will install the new storage processor assembly, select Enter Service Mode and then click Execute.
3. When prompted, enter the Service Password to put the SP into Service Mode.
4. (Optional) Either refresh your browser or follow the on-screen instructions to restore full-functionality to Unisphere.
   When placing the primary storage processor into Service Mode, Unisphere will become momentarily unresponsive (about one minute) as the management services transfer over to the other SP.
5. Return to cabinet with the system and locate the SP in the DPE from the back of the cabinet.
6. Wait until the SP fault LED is flashing alternating amber and blue before continuing to the next task.
   The SP fault LED will flash alternating amber and blue while the SP remains in Service mode and is receiving active power.

Figure 2 SP fault LED
Replacing the faulted storage processor assembly

Take the following actions to remove the faulted storage processor assembly and install the replacement storage processor assembly into the system.

Removing an SP assembly

This procedure describes how to remove an SP assembly from the enclosure. There are two SP assemblies. The top SP assembly is considered to be “upside-down” and will mirror the bottom SP assembly. The illustration shows removal of the top SP assembly. The procedure for removing the bottom SP assembly is the same.

Before you begin

Locate the faulted SP assembly with the amber Fault LED.

**NOTICE**

DO NOT REMOVE an SP assembly while the "Unsafe to remove SP" LED shown below is lit.

---

Procedure

1. Rotate the power cord bail to the right (left for bottom power supply). Disconnect the AC power cord from the power supply.

   **Note**

   If the I/O module and network cables are not already labeled, label them clearly for reconnecting them later.

2. Disconnect the network and all other cables from the back of the I/O modules and network ports on the SP assembly.

   **NOTICE**

   Do not remove any cables from the other SP assembly.

3. Pull the torque limit screw handle out of the SP assembly (1).
4. Turn the handle counterclockwise to release the SP assembly from the enclosure (1). As the handle is turned, the SP assembly extracts out of the enclosure. When outward movement stops, the SP assembly is ready for removal.

**CAUTION**

The SP assembly comes completely out of the enclosure. Be prepared to support the SP assembly to avoid dropping it.

**Figure 3** Remove an SP assembly

5. Use the handle to pull the SP assembly outward enough to grasp the sides with both hands (2). Then with both hands supporting the SP assembly, pull the SP assembly fully out of the enclosure.

6. Place the SP assembly, with topside upward, on a clean, flat static-free work surface.
7. Verify that all SP assembly LEDs are off to ensure that the SP has completed its power off after the removal from the DPE.

It takes about three minutes for the SP assembly to deplete internal power once removed from the power source.

**CAUTION**

Do not remove the SP top cover until the automatic vaulting process has completed and all SP LEDs are off. If the top cover is opened while the vaulting process is occurring, it triggers a power down of the SP and its components, interrupting the vaulting process.

---

**Transferring reusable SP parts**

You must perform the following tasks to transfer the reusable parts from the faulted SP assembly to the replacement SP assembly:

1. One at a time, transfer the rear parts from the faulted SP assembly and install it in the corresponding slot in the replacement SP assembly.
   a. Transfer the power supply module to the replacement SP assembly.
   b. Transfer each installed I/O module to the exact same slot in the replacement SP assembly.

2. Next, transfer the internal parts from the faulted SP assembly and install it into the replacement SP assembly.
   a. Transfer each memory module to the exact same slot in the replacement SP assembly.
   b. Transfer the BBU to the replacement SP assembly.
   c. Transfer the m.2 SSD internal disk to the replacement SP assembly.
   d. Transfer each cooling fan module to the exact same slot in the replacement SP assembly.

This section describes how to perform each of these tasks.

**Transferring a power supply**

This procedure describes how to transfer a power supply from a faulted SP assembly to a replacement SP assembly.

**Procedure**

1. Push and hold the orange release tab (1) to the left (to the right for the top power supply) and grasp the power supply by its handle. Remove the power supply by pulling it from the faulted SP assembly (2).
2. Align the power supply with the slot in the replacement SP assembly.
3. Push the power supply into the SP assembly (1) until it clicks in place (2).
Transferring an I/O module or a filler module

This procedure describes how to transfer an I/O module or a filler module from a faulted SP assembly to a replacement SP assembly. There are different types of I/O modules that may be present. The procedure for transferring each one is the same. This procedure describes a procedure that is representative and applicable for each type of I/O module.

Procedure

1. Pull the trigger mechanism on the I/O module handle to release it.
2. Gently pull the module from the slot.
3. At the replacement SP assembly, align the module with the empty slot and carefully push the module into the slot.

4. When the module appears seated, push and release the small button on the handle.
   - If the button remains in, the module is fully seated.
   - If the button springs back, gently push the module further into the chassis, then push it again.
   - If the button still does not rest flush with its handle, remove the module and repeat steps 1 and 2.

Removing the top cover from the SP assembly

Procedure

1. While pushing down the blue release button (1), slide the top cover rearward approximately ½ inch until it stops (2).
2. Lift the top cover upward and remove it from the SP assembly (3).

**Figure 8** Removing top cover from SP assembly

Removing the air flow baffle

**Before you begin**

Ensure that the SP assembly has exhausted all internal power before removing the top air baffle.

**Procedure**

1. Press in on the tabs on both sides of the air flow baffle (1).
2. Lift the air flow baffle upward and remove it from the SP assembly (2).
Removing a DIMM (Memory Module)

There are four slots for DIMM modules. The procedure for removing any of the DIMMs is the same.

Procedure

1. Attach an ESD wristband to your wrist and the enclosure.
2. Depress the two retaining tabs downward to free the DIMM module from its slot.
3. Remove the DIMM module from the slot. Repeat for any other DIMM modules as required.
Installing a DIMM (Memory Module)

Procedure

1. Attach an ESD wristband to your wrist and the enclosure.
2. Touching only the DIMM’s outside edges, align the module with the connector.
3. Firmly push the DIMM straight down into the connector. When the DIMM is fully seated you will hear a snap and feel the connector latches click into place.

Figure 11 Installing a DIMM
4. Repeat this procedure for other DIMMs as required.

Removing the battery on bus module

This procedure describes how to remove the battery on bus module.

**Procedure**

1. Locate the cable that connects the battery on bus module to the motherboard.

   **Note**

   For the next step, you may find it easier to disconnect the cable from the motherboard. Then, after performing the next step, transfer the cable to the replacement battery on bus module.

2. On the battery on bus module, press the release tab on the cable connector and disconnect it from the battery on bus module.

3. Using one hand, press out on the two retaining tabs at the base of the battery on bus module (1).

4. At the same time, use the other hand to lift the front of the battery on bus module up at an angle and remove it from the motherboard (2).

   **Figure 12** Removing the battery on bus module
Installing the battery on bus module

This procedure describes how to install the Battery Module.

Procedure
1. Angle the bottom end of the battery on bus module into the housing on the motherboard (1).
2. Align the battery on bus module with the front two locator pins, and press down on the front end of the battery on bus module (1) to secure it with the two retaining tabs at the base of the module (2).

Figure 13 Installing the battery on bus module

3. Connect the motherboard battery cable to the connector on the battery on bus module.

Removing an m.2 SATA board

Procedure
1. Connect an ESD strap to your wrist and to the enclosure.
2. On the m.2 SATA board, rotate the retaining knob counter-clockwise until it is free from the mounting stud (1).
3. Lift the end of the m.2 SATA board at slight angle (2), then remove it completely from the slot (3).
4. Place the m.2 SATA board on a static-free surface.

Installing an m.2 SATA board

Procedure

1. Connect an ESD strap to your wrist and to the enclosure.
2. Insert the terminal end of the m.2 SATA board into the slot on the motherboard (1).
3. Place the latch retaining screw into the mounting hole (2) and secure the m.2 Sata board to the motherboard by turning the screw clockwise.
Removing a cooling fan

This procedure describes how to remove a fan from the SP assembly. There are five fans in the SP assembly and this procedure can be used to remove any of the fans.

Procedure

1. Disconnect the cooling fan power cable from the motherboard.
2. Press in on the blue release button on the front of the module (1).
3. Lift the cooling fan upward from the motherboard (2).
Figure 16  Removing a cooling fan from the SP assembly

4. Repeat for any other cooling fans as required.

Installing a cooling fan

This procedure describes how to install a fan in the SP assembly. There are five fans in the SP assembly and this procedure can be used to install any of the fans.

Procedure

1. Position the cooling fan so that the rear is angled down into the fan mounting position in the SP assembly (1).
2. Press downward on the cooling fan to lock it in position (2).
3. Connect the cooling fan power cable to the connector on the motherboard.

Figure 17  Installing cooling fan in the SP assembly

4. Repeat for installing any other cooling fans as required.

Installing the air flow baffle

Note
The left side of the air baffle mounts over the coin cell battery.

Procedure

1. Align the two retaining clips on the air flow baffle with the slots on sides of the SP assembly (1).
2. Push downward on the air flow baffle to secure it to the SP assembly (2).

*Figure 18* Installing the air baffle

---

Installing the top cover on the SP assembly

**Procedure**

1. Position the top cover over the SP assembly and align it with the slots in the sides at rear of the assembly (1).
2. Pull the top cover forward approximately ½ inch to secure it in place (2).

Figure 19 Installing the top cover

Installing an SP assembly

This procedure describes how to install an SP assembly in the enclosure.

Procedure
1. Align the SP assembly with the enclosure slot and slide it into the slot until it stops (1).
2. Turn the orange torque limit screw handle clockwise until you hear a click sound from the handle (1). The click sound indicates the torque limit is reached and the SP assembly is seated in the enclosure.
3. Push the orange torque limit screw handle into the SP assembly until you hear a click sound from the handle (2). The click sound indicates screw handle is secured in the assembly.
4. Connect each I/O module cable and network cable into the same port from which it was removed.

5. Connect the AC power cord to the power supply and secure the cord with the retention bail at the connector.
   The power supply fault LED turns off after about 2 seconds.

---

**Rebooting an SP into Normal Mode**

**Before you begin**

Wait about 10-15 minutes after reinserting the SP into the system to allow the fully reboot into Service Mode and the SP fault LED is flashing alternating amber and blue (1 hz) before continuing.

---

**Note**

If you attempt this task before the SP has completed its automatic reboot into Service Mode the attempt to reboot into Normal mode will fail.

Reboot the recently serviced SP into Normal Mode using the procedure that follows:

**Procedure**

1. Open Unisphere and select Service, then Service Tasks.
2. Under the name of the storage processor where you installed the new storage processor assembly, select Reboot and the click Execute.
3. When prompted, enter the Service Password to put the SP into Normal Mode. It may take up to 15 minutes for the system to complete its reboot to return to normal mode.

Verifying the operation of the storage processor assembly

Verify that the new storage processor assembly is recognized by your system, and operating correctly using the procedure that follows.

Procedure
1. In Unisphere, select System View.
2. On the Summary page, confirm that the system status is OK.
3. Select the Enclosures page.
4. Verify that the storage processor assembly appears with OK status in the enclosure view.
   
   Select the DPE in the Enclosure dropdown menu and select the Rear view of the enclosure. Select the new storage processor shown in this enclosure view.

   Figure 21  Healthy storage processor A - example location

If the system health monitor shows the part as faulted, contact your service provider.

Returning a faulted part

We appreciate the return of defective material within 5 business days (for US returns). For International customers, please return defective material within 5-10 business days. All instructions and material required to return your defective part were supplied with your good part shipment.

Procedure
1. Package the faulted part in the shipping box that contained the replacement part, and seal the box.
2. Ship the failed part to your service provider as described in the instructions that were included with the replacement part.
3. (Optional) For more information about returning customer-replaceable parts, from Unisphere, click Support > Replace Disk Drives, Power Supplies, and Other Parts > Return a Part to display the part return instructions.

   If your screen does not show the Return a Part option, contact your service provider for instructions on what to do next.
Replacing a faulted storage processor assembly

Returning a faulted part