NetApp

Controller

Install and maintain

NetApp
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Controller

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Controller replace requirements - AFF C80

You must review the requirements for the controller replacement procedure and select the correct one for your version of the ONTAP operating system.

- All drive shelves must be working properly.
- The healthy controller must be able to take over the controller that is being replaced (referred to in this procedure as the "impaired controller").
- If your system is in a MetroCluster configuration, you must review the section Choosing the correct recovery procedure to determine whether you should use this procedure.
- You must replace the failed component with a replacement FRU component you received from your provider.

- You must replace a controller module with a controller module of the same model type. You cannot upgrade your system by just replacing the controller module.

- You cannot change any drives or drive shelves as part of this procedure.

- Because the boot device is located on the System Management module that is installed in the back of the system, you do not need to move the boot device when replacing a controller module.

- It is important that you apply the commands in these steps on the correct systems:

  ◦ The *impaired* controller is the controller that is being replaced.

  ◦ The *replacement* controller is the new controller that is replacing the impaired controller.

  ◦ The *healthy* controller is the surviving controller.

- You must always capture the controller's console output to a text log file.

  This provides you a record of the procedure so that you can troubleshoot any issues that you might encounter during the replacement process.

Shut down the impaired controller - AFF C80

Shut down or take over the impaired controller using the appropriate procedure for your configuration.

Option 1: Most systems

To shut down the impaired controller, you must determine the status of the controller and, if necessary, take over the controller so that the healthy controller continues to serve data from the impaired controller storage.

About this task

- If you have a SAN system, you must have checked event messages (`cluster kernel-service show`) for the impaired controller SCSI blade. The `cluster kernel-service show` command (from priv advanced mode) displays the node name, quorum status of that node, availability status of that node, and operational status of that node.

  Each SCSI-blade process should be in quorum with the other nodes in the cluster. Any issues must be resolved before you proceed with the replacement.

- If you have a cluster with more than two nodes, it must be in quorum. If the cluster is not in quorum or a healthy controller shows false for eligibility and health, you must correct the issue before shutting down the impaired controller; see Synchronize a node with the cluster.

Steps

1. If AutoSupport is enabled, suppress automatic case creation by invoking an AutoSupport message: `system node autosupport invoke -node * -type all -message MAINT=<# of hours>h`

   The following AutoSupport message suppresses automatic case creation for two hours: `cluster1:> system node autosupport invoke -node * -type all -message MAINT=2h`

2. Disable automatic giveback from the console of the healthy controller: `storage failover modify -node local -auto-giveback false`

   > ⓘ When you see *Do you want to disable auto-giveback?*, enter `y`.

3. Take the impaired controller to the LOADER prompt:

If the impaired controller is displaying…	Then…
The LOADER prompt	Go to the next step.
Waiting for giveback…	Press Ctrl-C, and then respond `y` when prompted.
System prompt or password prompt	Take over or halt the impaired controller from the healthy controller: `storage failover takeover -ofnode impaired_node_name` When the impaired controller shows Waiting for giveback…, press Ctrl-C, and then respond `y`.

Option 2: Controller is in a MetroCluster

To shut down the impaired controller, you must determine the status of the controller and, if necessary,

take over the controller so that the healthy controller continues to serve data from the impaired controller storage.

- If you have a cluster with more than two nodes, it must be in quorum. If the cluster is not in quorum or a healthy controller shows false for eligibility and health, you must correct the issue before shutting down the impaired controller; see Synchronize a node with the cluster.

- You must have confirmed that the MetroCluster Configuration State is configured and that the nodes are in an enabled and normal state (`metrocluster node show`).

Steps

1. If AutoSupport is enabled, suppress automatic case creation by invoking an AutoSupport message:
   `system node autosupport invoke -node * -type all -message MAINT=number_of_hours_downh`

   The following AutoSupport message suppresses automatic case creation for two hours:
   `cluster1:*> system node autosupport invoke -node * -type all -message MAINT=2h`

2. Disable automatic giveback from the console of the healthy controller: `storage failover modify -node local -auto-giveback false`

3. Take the impaired controller to the LOADER prompt:

| If the impaired controller is displaying…	Then…
The LOADER prompt	Go to the next section.
Waiting for giveback…	Press Ctrl-C, and then respond `y` when prompted.
System prompt or password prompt (enter system password)	Take over or halt the impaired controller from the healthy controller: `storage failover takeover -ofnode impaired_node_name` When the impaired controller shows Waiting for giveback…, press Ctrl-C, and then respond `y`.

Replace the controller module - AFF C80

To replace the controller, you must remove the impaired controller, move FRU components from the impaired controller module to the replacement controller module, install the replacement controller module in the chassis, and then boot the system to Maintenance mode.

Step 1: Remove the controller module

You must remove the controller module from the chassis when you replace the controller module or replace a component inside the controller module.

1. On the front of the chassis, use your thumbs to firmly push each drive in until you feel a positive stop. This ensures that the drives are firmly seated against the chassis midplane.
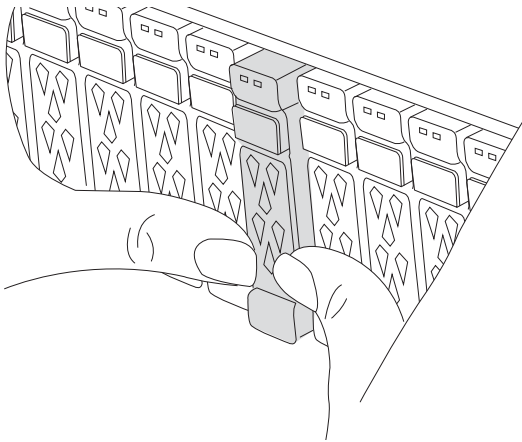
2. Check the amber NVRAM that status LED located in slot 4/5 on the back of the impaired controller module is off. Look for the NV icon.
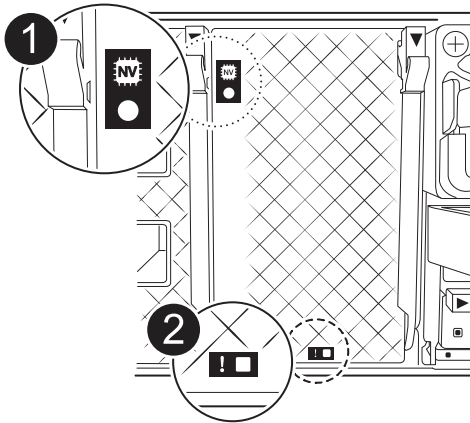
❶	NVRAM status LED
❷	NVRAM attention LED

   ◦ If the NV LED is off, go to the next step.
   ◦ If the NV LED is flashing, wait for the flashing to stop. If flashing continues for longer than 5 minutes, contact Technical Support for assistance.

3. If you are not already grounded, properly ground yourself.

4. Unplug the controller module power supply cables from the controller module power supplies (PSU).

   ⓘ   If your system has DC power, disconnect the power block from the PSUs.

5. Unplug the system cables and SFP and QSFP modules (if needed) from the controller module, keeping track of where the cables were connected.

   Leave the cables in the cable management device so that when you reinstall the cable management

device, the cables are organized.

6. Remove the cable management device from the controller module.

7. Press down on both of the locking latches, and then rotate both latches downward at the same time.

   The controller module moves slightly out of the chassis.
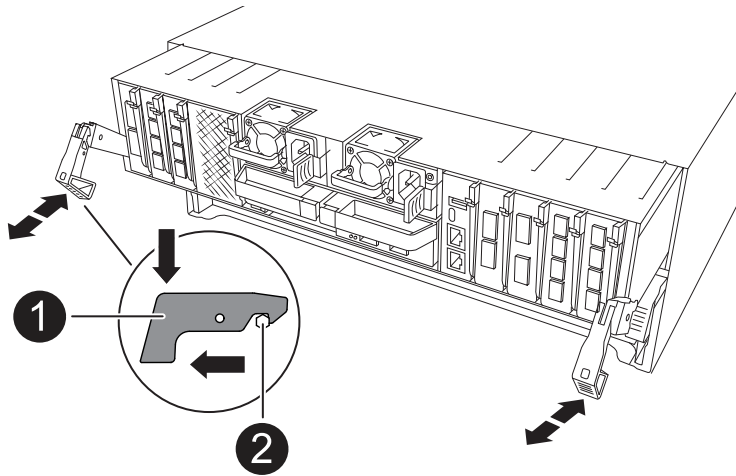
1	Locking latch
2	Locking pin

8. Slide the controller module out of the chassis and place it on a flat, stable surface.

   Make sure that you support the bottom of the controller module as you slide it out of the chassis.

Step 2: Move the power supplies

Move the power supplies to the replacement controller.

1. Rotate the cam handle such that it can be used to pull power supply out of the controller module while pressing the locking tab.

   > ⚠ The power supply is short. Always use two hands to support it when removing it from the controller module so that it does not suddenly swing free from the controller module and injure you.
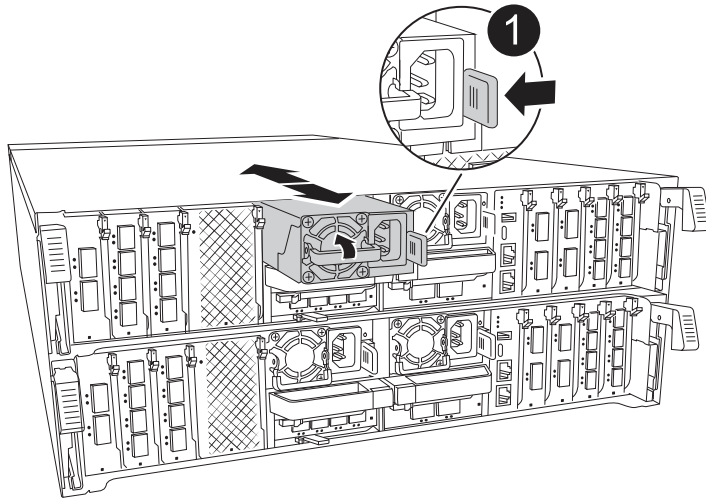
❶	Terracotta PSU locking tab
❷	Power supply

2. Move the power supply to the new controller module, and then install it.

3. Using both hands, support and align the edges of the power supply with the opening in the controller module, and then gently push the power supply into the controller module until the locking tab clicks into place.

   The power supplies will only properly engage with the internal connector and lock in place one way.

   > ⓘ   To avoid damaging the internal connector, do not use excessive force when sliding the power supply into the system.

Step 3: Move the fans

Move the fans modules to the replacement controller module.

1. Remove the fan module by pinching the locking tabs on the side of the fan module, and then lifting the fan module straight out of the controller module.
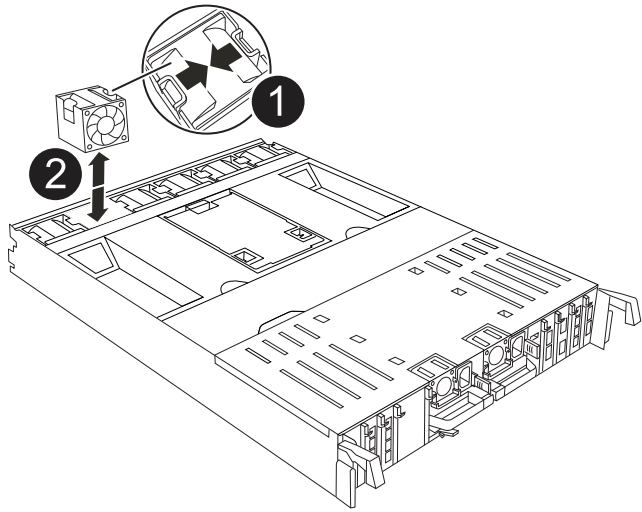
❶	Fan locking tabs
❷	Fan module

2. Move the fan module to the replacement controller module, and then install the fan module by aligning its edges with the opening in the controller module, and then sliding the fan module into the controller module until the locking latches click into place.

3. Repeat these steps for the remaining fan modules.

Step 4: Move the NV battery

Move the NV battery to the replacement controller module.

1. Open the air duct cover in the middle of the controller module and locate the NV battery.
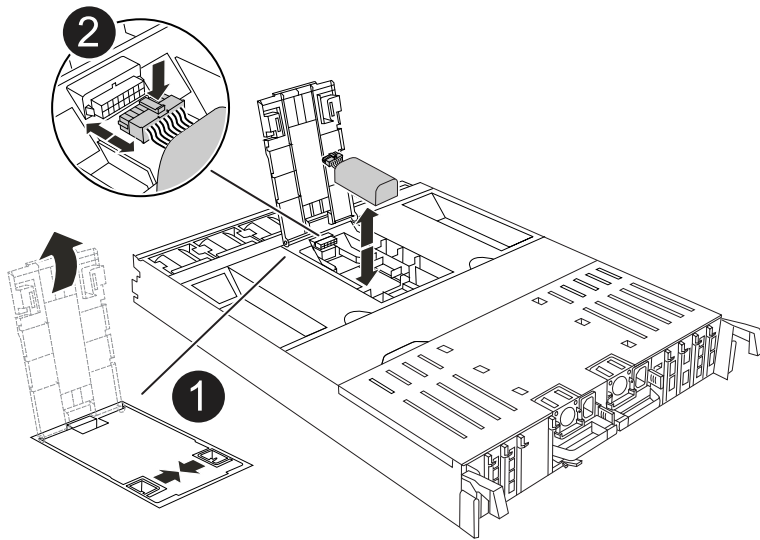
|	
❶	NV battery air duct

②	NV battery pack plug

Attention: The NV module LED blinks while destaging contents to the flash memory when you halt the system. After the destage is complete, the LED turns off.

2. Lift the battery up to access the battery plug.

3. Squeeze the clip on the face of the battery plug to release the plug from the socket, and then unplug the battery cable from the socket.

4. Lift the battery out of the air duct and controller module.

5. Move the battery pack to the replacement controller module and then install it in the replacement controller module:

   a. Open the NV battery air duct in the replacement controller module.

   b. Plug the battery plug into the socket and make sure that the plug locks into place.

   c. Insert the battery pack into the slot and press firmly down on the battery pack to make sure that it is locked into place.

   d. Close the NV battery air duct.

Step 5: Move system DIMMs

Move the DIMMs to the replacement controller module.

1. Open the controller air duct on the top of the controller.

   a. Insert your fingers in the recesses at the far ends of the air duct.

   b. Lift the air duct and rotate it upward as far as it will go.

2. Locate the system DIMMs on the motherboard.
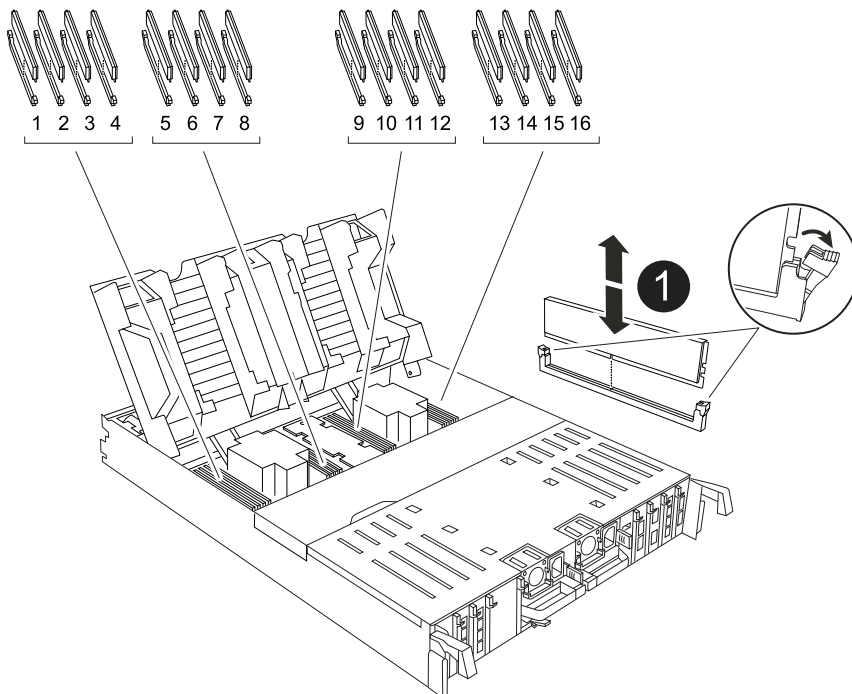
1	System DIMM

3. Note the orientation of the DIMM in the socket so that you can insert the DIMM in the replacement controller module in the proper orientation.

4. Eject the DIMM from its slot by slowly pushing apart the two DIMM ejector tabs on either side of the DIMM, and then slide the DIMM out of the slot.

> ℹ️ Carefully hold the DIMM by the edges to avoid pressure on the components on the DIMM circuit board.

5. Locate the slot on the replacement controller module where you are installing the DIMM.

6. Insert the DIMM squarely into the slot.

The DIMM fits tightly in the slot, but should go in easily. If not, realign the DIMM with the slot and reinsert it.

> ℹ️ Visually inspect the DIMM to verify that it is evenly aligned and fully inserted into the slot.

7. Push carefully, but firmly, on the top edge of the DIMM until the ejector tabs snap into place over the notches at the ends of the DIMM.

8. Repeat these steps for the remaining DIMMs.

9. Close the controller air duct.

Step 6: Move the I/O modules

Move the I/O modules to the replacement controller module.
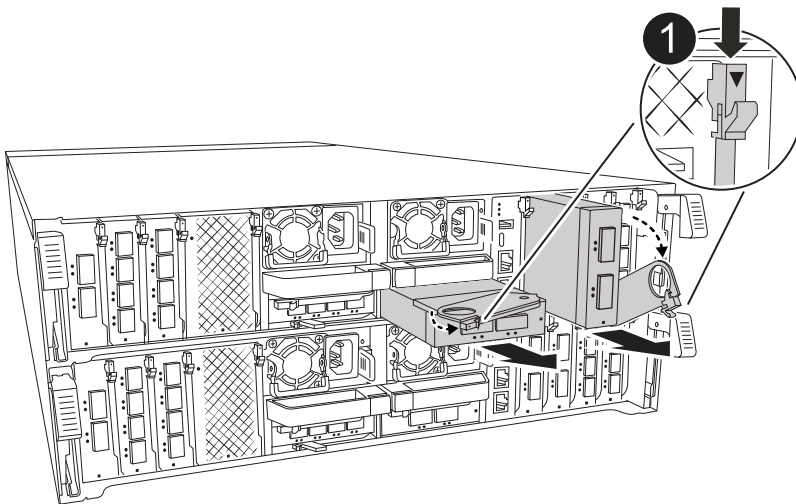
1	I/O module cam lever

1. Unplug any cabling on the target I/O module.

Make sure that you label the cables so that you know where they came from.

2. Rotate the cable management arm down by pulling the buttons on the inside of the cable management arm and rotating it down.

3. Remove the I/O modules from the controller module:

   a. Depress the target I/O module cam latch button.

   b. Rotate the cam latch down as far as it will go. For horizontal modules, rotate the cam away from the module as far as it will go.

   c. Remove the module from the controller module by hooking your finger into the cam lever opening and pulling the module out of the controller module.

      Make sure that you keep track of which slot the I/O module was in.

   d. Install the replacement I/O module into the replacement controller module by gently sliding the I/O module into the slot until the I/O cam latch begins to engage with the I/O cam pin, and then push the I/O cam latch all the way up to lock the module in place.

4. Repeat these steps to move the remaining I/O modules, except the modules in slots 6 and 7, to the replacement controller module.

   > ⓘ To move the I/O modules from slots 6 and 7, you must move the carrier containing these I/O modules from the impaired controller module to the replacement controller module.

5. Move the carrier containing the I/O modules in slots 6 and 7 to the replacement controller module:

   a. Press the button on the right-most handle on the carrier handle. ..Slide the carrier out of the impaired controller module insert it into the replacement controller module in the same position it was in the impaired controller module.

   b. Gently push the carrier all the way into the replacement controller module until it locks into place.

Step 7: Move the System Management module

Move the System Management module to the replacement controller module.
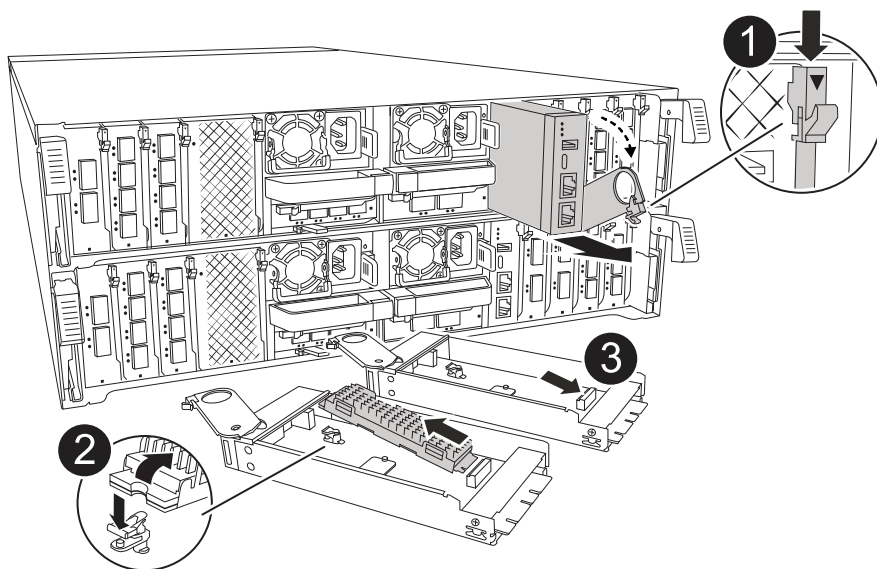
❶	System Management module cam latch

②	Boot media locking button
③	Replacement System Management module

1. Remove the System Management module from the impaired controller module:

    a. Depress the system management cam button.

    b. Rotate the cam lever all the way down.

    c. Loop your finger into the cam lever and pull the module straight out of the system.

2. Install the system management module into the replacement controller module in the same slot that it was in on the impaired controller module:

    a. Align the edges of the System Management module with the system opening and gently push it into the controller module.

    b. Gently slide the module into the slot until the cam latch begins to engage with the I/O cam pin, and then rotate the cam latch all the way up to lock the module in place.

Step 8: Move the NVRAM module

Move the NVRAM module to the replacement controller module.
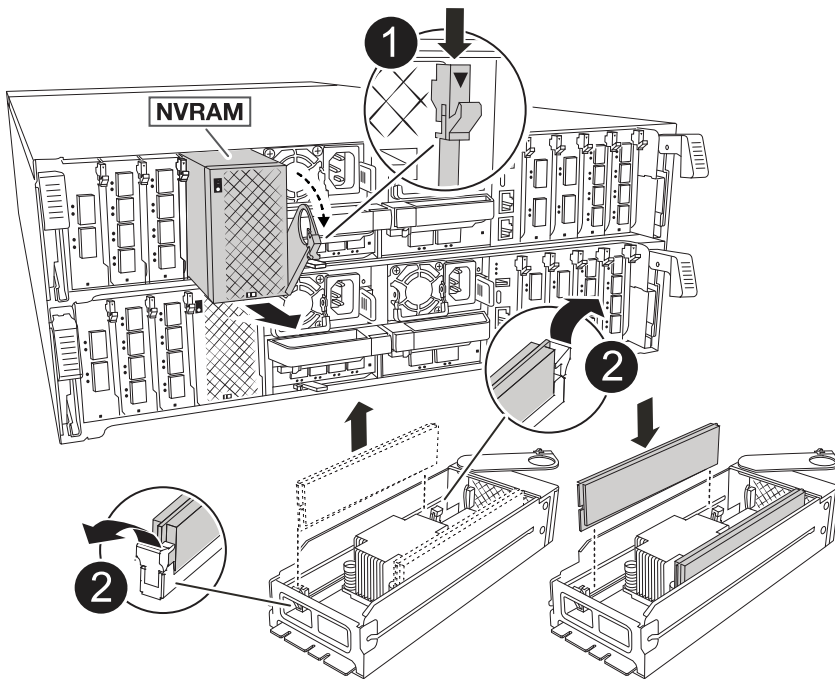
①	Cam locking button
②	DIMM locking tab

1. Remove the NVRAM module from the impaired controller module:

    a. Depress the cam latch button.

The cam button moves away from the chassis.

    b. Rotate the cam latch as far as it will go.

    c. Remove the NVRAM module from the enclosure by hooking your finger into the cam lever opening and pulling the module out of the enclosure.

2. Install the NVRAM module into slot 4/5 in the replacement controller module:

    a. Align the module with the edges of the chassis opening in slot 4/5.

    b. Gently slide the module into the slot all the way, and then push the cam latch all the way up to lock the module in place.

Step 9: Install the controller module

Reinstall the controller module and reboot it.

1. Ensure the air duct is completely closed by rotating it down as far as it will go.

   It must lie flush against the controller module sheet metal.

2. Align the end of the controller module with the opening in the chassis, and then gently push the controller module halfway into the system.

   (i) Do not completely insert the controller module in the chassis until instructed to do so.

3. Reinstall the cable management arm, if removed, but do not reconnect any cables to the replacement controller.

4. Plug the console cable into the console port of the replacement controller module and reconnect it to the laptop so that so that it receives console messages when it reboots. The replacement controller receives power from the healthy controller and begins to reboot as soon as it is seated completely in the chassis.

5. Complete the reinstallation of the controller module:

    a. Firmly push the controller module into the chassis until it meets the midplane and is fully seated.

    The locking latches rise when the controller module is fully seated.

    (i) Do not use excessive force when sliding the controller module into the chassis to avoid damaging the connectors.

    b. Rotate the locking latches upward into the locked position.

    (i) The controller boots to the LOADER prompt as soon as it is fully seated.

6. From the LOADER prompt, enter `show date` to display the date and time on the replacement controller. Date and time are in GMT.

   (i) Time displayed is local time not always GMT and is displayed in 24hr mode.

7. Set the current time in GMT with the `set time hh:mm:ss` command. You can get the current GMT from the partner node the `date -u` command.

8. Recable the storage system, as needed.

If you removed the transceivers (QSFPs or SFPs), remember to reinstall them if you are using fiber optic cables.

9. Plug the power cords into the power supplies.

> ⓘ If you have DC power supplies, reconnect the power block to the power supplies after the controller module is fully seated in the chassis.

Restore and verify the system configuration - AFF C80

Verify the low-level system configuration of the replacement controller and reconfigure the system settings as necessary.

Step 1: Verify HA config settings

You must verify the `HA` state of the controller module and, if necessary, update the state to match your system configuration.

1. Boot to maintenance mode: `boot_ontap maint`

   a. Enter `y` when you see *Continue with boot?*.

      If you see the *System ID mismatch* warning message, enter `y`.

2. Enter `sysconfig -v` and capture the display contents.

   > ⓘ if you see *PERSONALITY MISMATCH* contact customer support.

3. From the `sysconfig -v` output, compare the adapter card information with the cards and locations in the replacement controller.

4. Verify that all components display the same `HA` state: `ha-config show`

   The HA state should be the same for all components.

5. If the displayed system state of the controller module does not match your system configuration, set the `HA` state for the controller module: `ha-config modify controller ha-state`

   The value for HA-state can be one of the following:

   ◦ `ha`

   ◦ `mcc` (not supported)

   ◦ `mccip` (not supported in ASA systems)

   ◦ `non-ha` (not supported)

6. Confirm that the setting has changed: `ha-config show`

Step 2: Verify disk list

1. Verify that the adapter lists the paths to all disks with the `storage show disk -p`.

If you see any issues, check cabling and reseat cables.

2. Exit Maintenance mode: `halt`.

Recable and give back the controller - AFF C80

Verify the storage and network connections, and then give back the controller.

Give back the controller

Reset encryption if enabled and return the controller to normal operation.

No encryption

1. From the LOADER prompt, enter `boot_ontap`.

2. Press <enter> when console messages stop.

    - If you see the *login* prompt, go to the next step at the end of this section.

    - If you see *Waiting for giveback*, press the <enter> key, log into the partner node, and then go to the next step at the end of this section.

3. Return the impaired controller to normal operation by giving back its storage: `storage failover giveback -ofnode` *impaired_node_name.*

4. If automatic giveback was disabled, reenable it: `storage failover modify -node local -auto-giveback true`.

5. If AutoSupport is enabled, restore/unsuppress automatic case creation: `system node autosupport invoke -node * -type all -message MAINT=END`.

Onboard encryption (OKM)

1. From the LOADER prompt, enter `boot_ontap maint`.

2. Boot to the ONTAP menu from the LOADER prompt `boot_ontap menu` and select option 10.

3. Enter the OKM passphrase. You can get this passphrase from the customer, or contact NetApp Support.

    > (i)   You will be prompted twice for the passphrase.

4. Enter the backup key data when prompted.

5. At the boot menu, enter option `1` for normal boot.

6. Press <enter> when *Waiting for giveback* is displayed.

7. Move the console cable to the partner node and login as `admin`.

8. Ensure any core dumps on the repaired node are saved by going to advanced mode" `set -privilege advanced` and then `run local partner savecore`.

9. Return to admin lever: `set privilege admin`.

10. Give back only the CFO aggregates (the root aggregate): `storage failover giveback -fromnode local -only-cfo-aggregates true`

    - If you encounter errors, contact NetApp Support.

11. Wait 5 minutes after the giveback report completes, and check failover status and giveback status: `storage failover show` and `storage failover show-giveback`.

12. Move the console cable to the replacement node and enter `security key-manager onboard sync`

    > (i)   You will be prompted for the cluster-wide passphrase of OKM for the cluster.

13. Check status of the keys with the following command: `security key-manager key query -key -type svm-KEK`.

    If the *Restored* column shows anything but *true*, contact NetApp Support.

14. Return the impaired controller to normal operation by giving back its storage: `storage failover giveback -ofnode` *`impaired_node_name`*.

15. If automatic giveback was disabled, reenable it: `storage failover modify -node local -auto-giveback true`.

16. If AutoSupport is enabled, restore/unsuppress automatic case creation: `system node autosupport invoke -node * -type all -message MAINT=END`.

External key manager (EKM))

1. If the root volume is encrypted with External Key Manager and the console cable is connected to the replacement node, enter `boot_ontap menu` and select option `11`.

2. Answer `y` or `n` to the following questions:

   Do you have a copy of the /cfcard/kmip/certs/client.crt file? {y/n}

   Do you have a copy of the /cfcard/kmip/certs/client.key file? {y/n}

   Do you have a copy of the /cfcard/kmip/certs/CA.pem file? {y/n}

   OR

   Do you have a copy of the /cfcard/kmip/servers.cfg file? {y/n}

   Do you know the KMIP server address? {y/n}

   Do you know the KMIP port? {y/n}

   > ⓘ | Contact NetApp Support if you have issues.

3. Supply the information for:
   - The client certificate (client.crt) file contents.
   - The client key (client.key) file contents.
   - The KMIP server CA(s) (CA.pem) file contents.
   - The IP address for the KMIP server.
   - The port for the KMIP server.

4. Once the system processes, you will see the Boot Menu. Select '1' for normal boot.

5. Check the takeover status: `storage failover show`.

6. Ensure any core dumps on the repaired node are saved by going to advanced mode" `set -privilege advanced` and then `run local partner savecore`.

7. Return the impaired controller to normal operation by giving back its storage: `storage failover giveback -ofnode` *`impaired_node_name`*.

8. If automatic giveback was disabled, reenable it: `storage failover modify -node local -auto-giveback true`.

9. If AutoSupport is enabled, restore/unsuppress automatic case creation: `system node autosupport invoke -node * -type all -message MAINT=END`.

Complete controller replacement - AFF C80

To restore your system to full operation, you must verify the LIfs, check cluster health, and return the failed part to NetApp.

Step 1: Verify LIFs and check cluster health

Before returning the *replacement* node to service, you should verify that the LIFs are on their home ports, check the cluster health, and reset automatic giveback.

Steps

1. Verify that the logical interfaces are reporting to their home server and ports: `network interface show -is-home false`

   If any LIFs are listed as false, revert them to their home ports: `network interface revert -vserver * -lif *`

2. Check the health of your cluster. See the How to perform a cluster health check with a script in ONTAP KB article for more information.

3. If automatic giveback was disabled, reenable it: `storage failover modify -node local -auto -giveback true`

Step 2: Return the failed part to NetApp

Return the failed part to NetApp, as described in the RMA instructions shipped with the kit. See the Part Return and Replacements page for further information.