Boot media

Install and maintain

NetApp
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Overview of boot media replacement - AFF C190

Learn about boot media replacement on an AFF C190 system and understand the different replacement methods. The boot media stores primary and secondary boot image files that the system uses during startup. Depending on your network configuration, you can perform either a nondisruptive replacement (HA pair connected to network) or a disruptive replacement (requires two reboots).

The AFF C190 system supports only manual boot media recovery procedures. Automated boot media recovery is not supported.

You must have a USB flash drive, formatted to FAT32, with the appropriate amount of storage to hold the `image_xxx.tgz` file.

- The nondisruptive and disruptive methods for replacing a boot media both require you to restore the var file system:
  - For nondisruptive replacement, the HA pair must be connected to a network to restore the var file system.
  - For disruptive replacement, you do not need a network connection to restore the var file system, but the process requires two reboots.
- You must replace the failed component with a replacement FRU component you received from your provider.
- It is important that you apply the commands in these steps on the correct controller:
  - The *impaired* controller is the controller on which you are performing maintenance.
  - The *healthy* controller is the HA partner of the impaired controller.

Check encryption key support and status - AFF C190

Verify encryption key support and status before shutting down the impaired controller on an AFF C190 system. This procedure includes checking ONTAP version compatibility with NetApp Volume Encryption (NVE), verifying the key manager configuration, and backing up encryption information to ensure data security during boot media recovery.

The AFF C190 system supports only manual boot media recovery procedures. Automated boot media recovery is not supported.

Step 1: Check NVE support and download the correct ONTAP image

Determine whether your ONTAP version supports NetApp Volume Encryption (NVE) so you can download the correct ONTAP image for the boot media replacement.

Steps

1. Check if your ONTAP version supports encryption:

   ```
   version -v
   ```

If the output includes `1Ono-DARE`, NVE is not supported on your cluster version.

2. Download the appropriate ONTAP image based on NVE support:
   - If NVE is supported: Download the ONTAP image with NetApp Volume Encryption
   - If NVE is not supported: Download the ONTAP image without NetApp Volume Encryption

   Download the ONTAP image from the NetApp Support Site to your HTTP or FTP server or a local folder. You will need this image file during the boot media replacement procedure.

Step 2: Verify key manager status and back up configuration

Before shutting down the impaired controller, verify the key manager configuration and back up the necessary information.

Steps

1. Determine which key manager is enabled on your system:

ONTAP version	Run this command
ONTAP 9.14.1 or later	`security key-manager keystore show` • If EKM is enabled, `EKM` is listed in the command output. • If OKM is enabled, `OKM` is listed in the command output. • If no key manager is enabled, `No key manager keystores configured` is listed in the command output.
ONTAP 9.13.1 or earlier	`security key-manager show-key-store` • If EKM is enabled, `external` is listed in the command output. • If OKM is enabled, `onboard` is listed in the command output. • If no key manager is enabled, `No key managers configured` is listed in the command output.

2. Depending on whether a key manager is configured on your system, do one of the following:

   If no key manager is configured:

   You can safely shut down the impaired controller and proceed to the shutdown procedure.

   If a key manager is configured (EKM or OKM):

   a. Enter the following query command to display the status of the authentication keys in your key manager:

      ```
      security key-manager key query
      ```

   b. Review the output and check the value in the `Restored` column. This column indicates whether the

authentication keys for your key manager (either EKM or OKM) have been successfully restored.

3. Complete the appropriate procedure based on your key manager type:

External Key Manager (EKM)

Complete these steps based on the value in the `Restored` column.

If all keys show `true` in the Restored column:

You can safely shut down the impaired controller and proceed to the shutdown procedure.

If any keys show a value other than `true` in the Restored column:

a. Restore the external key management authentication keys to all nodes in the cluster:

   `security key-manager external restore`

   If the command fails, contact NetApp Support.

b. Verify that all authentication keys are restored:

   `security key-manager key query`

   Confirm that the `Restored` column displays `true` for all authentication keys.

c. If all keys are restored, you can safely shut down the impaired controller and proceed to the shutdown procedure.

Onboard Key Manager (OKM)

Complete these steps based on the value in the `Restored` column.

If all keys show `true` in the Restored column:

a. Back up the OKM information:
   i. Switch to advanced privilege mode:

      `set -priv advanced`

      Enter `y` when prompted to continue.

   ii. Display the key management backup information:

      `security key-manager onboard show-backup`

   iii. Copy the backup information to a separate file or your log file.

      You will need this backup information if you need to manually recover OKM during the replacement procedure.

   iv. Return to admin mode:

      `set -priv admin`

b. You can safely shut down the impaired controller and proceed to the shutdown procedure.

If any keys show a value other than `true` in the Restored column:

a. Synchronize the onboard key manager:

```
security key-manager onboard sync
```

Enter the 32-character alphanumeric onboard key management passphrase when prompted.

> This is the cluster-wide passphrase you created when you initially configured the Onboard Key Manager. If you do not have this passphrase, contact NetApp Support.

b. Verify all authentication keys are restored:

```
security key-manager key query
```

Confirm that the `Restored` column displays `true` for all authentication keys and the `Key Manager` type shows `onboard`.

c. Back up the OKM information:

i. Switch to advanced privilege mode:

```
set -priv advanced
```

Enter `y` when prompted to continue.

ii. Display the key management backup information:

```
security key-manager onboard show-backup
```

iii. Copy the backup information to a separate file or your log file.

You will need this backup information if you need to manually recover OKM during the replacement procedure.

iv. Return to admin mode:

```
set -priv admin
```

d. You can safely shut down the impaired controller and proceed to the shutdown procedure.

Shut down the controller - AFF C190

Shut down the impaired controller on an AFF C190 system after completing encryption checks. This procedure includes taking the controller to the LOADER prompt, capturing boot environmental variables for reference, and preparing the controller for boot media replacement.

The AFF C190 system supports only manual boot media recovery procedures. Automated boot media recovery is not supported.

After completing the NVE or NSE tasks, you need to complete the shutdown of the impaired controller.

Steps

a. Take the impaired controller to the LOADER prompt:

If the impaired controller displays…	Then…
The LOADER prompt	Go to Remove controller module.
`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`.

b. From the LOADER prompt, enter: `printenv` to capture all boot environmental variables. Save the output to your log file.

This command may not work if the boot device is corrupted or non-functional.

Replace the boot media - AFF C190

Replace the failed boot media on an AFF C190 controller module. This procedure includes removing the controller module from the chassis, physically replacing the boot media component, transferring the boot image to the replacement media using a USB flash drive, and restoring the system to normal operation.

The AFF C190 system supports only manual boot media recovery procedures. Automated boot media recovery is not supported.

Step 1: Remove the controller

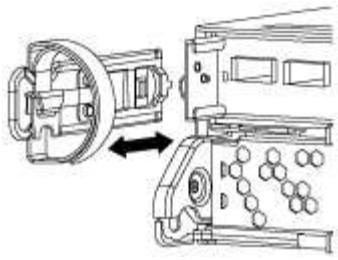
To access components inside the controller module, you must first remove the controller module from the system, and then remove the cover on the controller module.

Steps

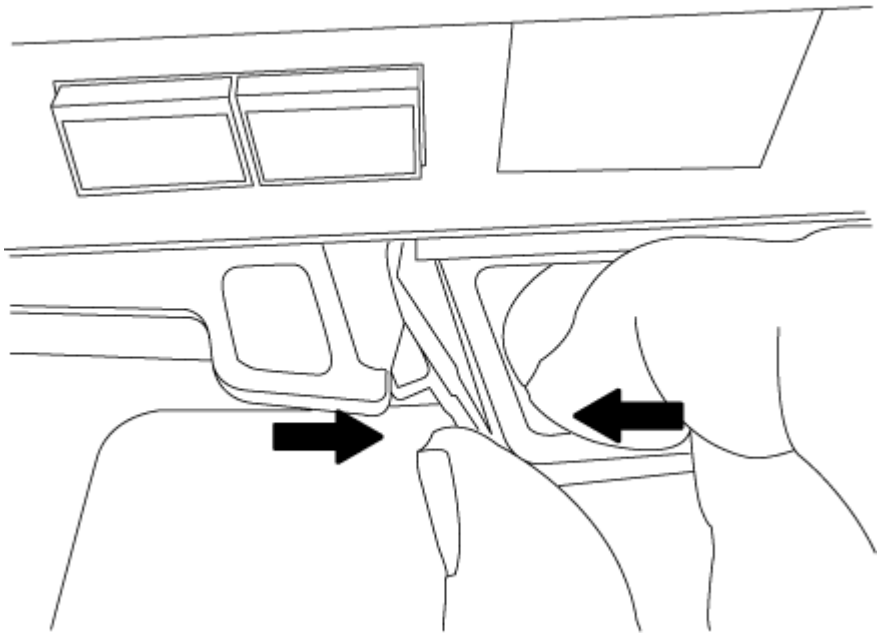
1. If you are not already grounded, properly ground yourself.
2. Loosen the hook and loop strap binding the cables to the cable management device, and then unplug the system cables and SFPs (if needed) from the controller module, keeping track of where the cables were connected.

   Leave the cables in the cable management device so that when you reinstall the cable management device, the cables are organized.

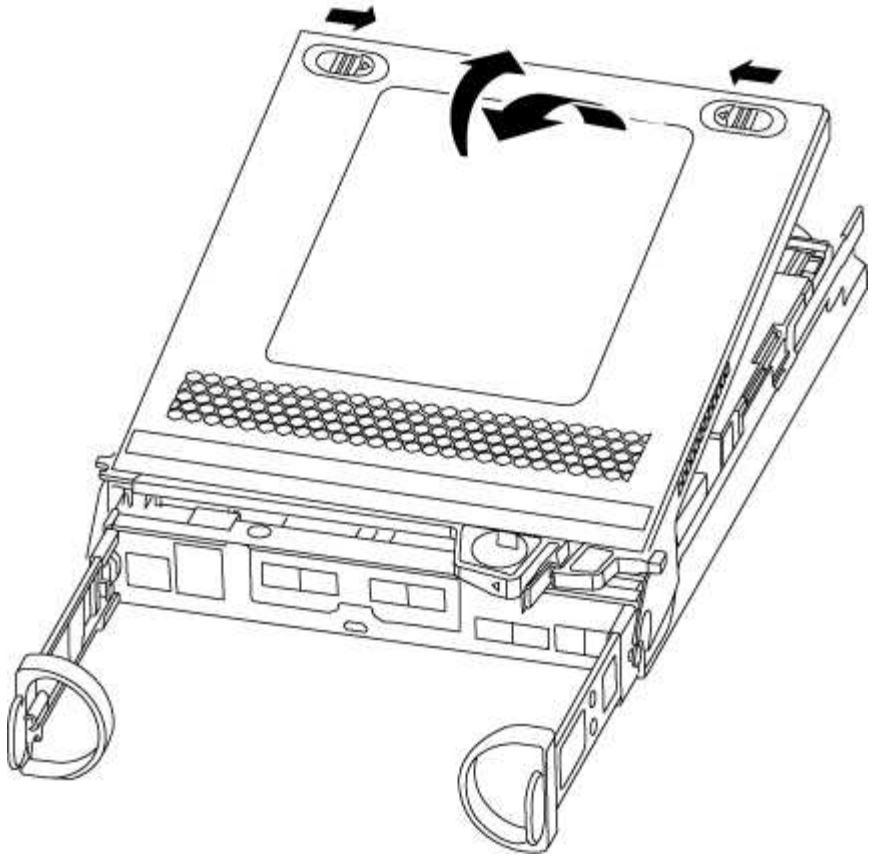
3. Remove and set aside the cable management devices from the left and right sides of the controller module.



4. Squeeze the latch on the cam handle until it releases, open the cam handle fully to release the controller module from the midplane, and then, using two hands, pull the controller module out of the chassis.



5. Turn the controller module over and place it on a flat, stable surface.
6. Open the cover by sliding in the blue tabs to release the cover, and then swing the cover up and open.



Step 2: Replace the boot media

You must locate the boot media in the controller module, and then follow the directions to replace it.

1. Locate the boot media using the following illustration or the FRU map on the controller module:
2. Press the blue button on the boot media housing to release the boot media from its housing, and then gently pull it straight out of the boot media socket.

   Do not twist or pull the boot media straight up, because this could damage the socket or the boot media.

3. Align the edges of the replacement boot media with the boot media socket, and then gently push it into the socket.
4. Check the boot media to make sure that it is seated squarely and completely in the socket.

   If necessary, remove the boot media and reseat it into the socket.

5. Push the boot media down to engage the locking button on the boot media housing.
6. Close the controller module cover.

Step 3: Transfer the boot image to the boot media

You can install the system image to the replacement boot media using a USB flash drive with the image installed on it. However, you must restore the `var` file system during this procedure.

- You must have a USB flash drive, formatted to FAT32, with at least 4GB capacity.
- A copy of the same image version of ONTAP as what the impaired controller was running. You can download the appropriate image from the **Downloads** section on the NetApp Support Site
  - If NVE is enabled, download the image with NetApp Volume Encryption, as indicated in the download button.
  - If NVE is not enabled, download the image without NetApp Volume Encryption, as indicated in the download button.
- If your system is an HA pair, you must have a network connection.
- If your system is a stand-alone system you do not need a network connection, but you must perform an additional reboot when restoring the var file system.

Steps

1. Align the end of the controller module with the opening in the chassis, and then gently push the controller module halfway into the system.
2. Reinstall the cable management device and recable the system, as needed.

   When recabling, remember to reinstall the media converters (SFPs) if they were removed.
3. Insert the USB flash drive into the USB slot on the controller module.

   Make sure that you install the USB flash drive in the slot labeled for USB devices, and not in the USB console port.
4. Push the controller module all the way into the system, making sure that the cam handle clears the USB flash drive, firmly push the cam handle to finish seating the controller module, push the cam handle to the closed position, and then tighten the thumbscrew.

   The controller begins to boot as soon as it is completely installed into the chassis.
5. Interrupt the boot process to stop at the LOADER prompt by pressing Ctrl-C when you see `Starting AUTOBOOT press Ctrl-C to abort….`

   If you miss this message, press Ctrl-C, select the option to boot to Maintenance mode, and then `halt` the controller to boot to LOADER.
6. Boot the recovery image:

   `boot_recovery` *`ontap_image_name`*`.tgz`

   > If the `image.tgz` file is named something other than image.tgz, such as `boot_recovery 9_4.tgz`, you need to include the different file name in the `boot_recovery` command.

   The system boots to the boot menu and prompts you for the boot image name.
7. Enter the boot image name that is on the USB flash drive:

   ***`image_name`*`.tgz`**

   After `image_name.tgz` is installed, the system prompts you to restore the backup configuration (the `var` file system) from the healthy controller.

8. Restore the `var` file system:

If your system has…	Then…
A network connection	a. Press **`y`** when prompted to restore the backup configuration. b. Set the healthy controller to advanced privilege level: **`set -privilege advanced`** c. Run the restore backup command: **`system node restore-backup -node local -target -address`** ***`impaired_node_IP_address`*** d. Return the controller to admin level: **`set -privilege admin`** e. Press **`y`** when prompted to use the restored configuration. f. Press **`y`** when prompted to reboot the controller.
No network connection	a. Press **`n`** when prompted to restore the backup configuration. b. Reboot the system when prompted by the system. c. Select the **Update flash from backup config** (sync flash) option from the displayed menu. If you are prompted to continue with the update, press **`y`**.

9. Verify that the environmental variables are set as expected.
   a. Take the controller to the LOADER prompt.

      From the ONTAP prompt, you can issue the command `system node halt -skip-lif -migration-before-shutdown true -ignore-quorum-warnings true -inhibit -takeover true`.

   b. Check the environment variable settings with the `printenv` command.
   c. If an environment variable is not set as expected, modify it with the `setenv` *`environment_variable_name changed_value`* command.
   d. Save your changes using the `saveenv` command.
   e. Reboot the controller.
10. The next step depends on your system configuration:

If your system is in…	Then…
A stand-alone configuration	You can begin using your system after the controller reboots.

If your system is in…	Then…
An HA pair	After the impaired controller is displaying the `Waiting for Giveback…` message, perform a giveback from the healthy controller: a. Perform a giveback from the healthy controller: **`storage failover giveback -ofnode`** ***`partner_node_name`*** This initiates the process of returning ownership of the impaired controller's aggregates and volumes from the healthy controller back to the impaired controller. If the giveback is vetoed, you can consider overriding the vetoes. HA pair management b. Monitor the progress of the giveback operation by using the `storage failover show`-giveback` command.  c. After the giveback operation is complete, confirm that the HA pair is healthy and that takeover is possible by using the `storage failover show` command.  d. Restore automatic giveback if you disabled it by using the `storage failover modify` command.

Boot the recovery image - AFF C190

Boot the ONTAP recovery image from the USB drive on an AFF C190 system to restore the boot media. This procedure includes booting from the USB flash drive, restoring the file system, verifying environmental variables, and returning the controller to normal operation after boot media replacement.

The AFF C190 system supports only manual boot media recovery procedures. Automated boot media recovery is not supported.

Steps

1. From the LOADER prompt, boot the recovery image from the USB flash drive:

   `boot_recovery`

   The image is downloaded from the USB flash drive.

2. When prompted, either enter the name of the image or accept the default image displayed inside the brackets on your screen.
3. Restore the `var` file system:

If your system has…	Then…

A network connection	a. Press **y** when prompted to restore the backup configuration.
	b. Set the healthy controller to advanced privilege level:
	`set -privilege advanced`
	c. Run the restore backup command:
	`system node restore-backup -node local -target -address impaired_node_IP_address`
	d. Return the controller to admin level:
	`set -privilege admin`
	e. Press **y** when prompted to use the restored configuration.
	f. Press **y** when prompted to reboot the controller.

No network connection	a. Press **n** when prompted to restore the backup configuration. b. Reboot the system when prompted by the system. c. Select the **Update flash from backup config** (sync flash) option from the displayed menu. If you are prompted to continue with the update, press **y**.

4. Ensure that the environmental variables are set as expected:
   a. Take the controller to the LOADER prompt.
   b. Check the environment variable settings with the `printenv` command.
   c. If an environment variable is not set as expected, modify it with the `setenv environment_variable_name changed_value` command.
   d. Save your changes using the `saveenv` command.
5. The next depends on your system configuration:
   - If your system has onboard keymanager, NSE or NVE configured, go to Restore OKM, NSE, and NVE as needed
   - If your system does not have onboard keymanager, NSE or NVE configured, complete the steps in this section.
6. From the LOADER prompt, enter the `boot_ontap` command.

If you see…	Then…
The login prompt	Go to the next Step.

If you see…	Then…
Waiting for giveback…	a. Log into the partner controller. b. Confirm the target controller is ready for giveback with the `storage failover show` command.

7. Connect the console cable to the partner controller.
8. Give back the controller using the `storage failover giveback -fromnode local` command.
9. At the cluster prompt, check the logical interfaces with the `net int -is-home false` command.

   If any interfaces are listed as "false", revert those interfaces back to their home port using the `net int revert` command.

10. Move the console cable to the repaired controller and run the `version -v` command to check the ONTAP versions.
11. Restore automatic giveback if you disabled it by using the `storage failover modify -node local -auto-giveback true` command.

Restore encryption - AFF C190

Restore encryption configuration on the replacement boot media for an AFF C190 system. This procedure includes completing post-replacement steps for systems with Onboard Key Manager (OKM), NetApp Storage Encryption (NSE), or NetApp Volume Encryption (NVE) enabled to ensure secure data access and proper system operation.

The AFF C190 system supports only manual boot media recovery procedures. Automated boot media recovery is not supported.

Complete the appropriate steps to restore encryption on your system based on your key manager type. If you are unsure which key manager your system uses, check the settings you captured at the beginning of the boot media replacement procedure.

Onboard Key Manager (OKM)

Restore the Onboard Key Manager (OKM) configuration from the ONTAP boot menu.

Before you begin

Ensure you have the following information available:

- Cluster-wide passphrase entered while enabling onboard key management
- Backup information for the Onboard Key Manager
- Verification that you have the correct passphrase and backup data using the How to verify onboard key management backup and cluster-wide passphrase procedure

Steps

On the impaired controller:

1. Connect the console cable to the impaired controller.
2. From the ONTAP boot menu, select the appropriate option:

ONTAP version	Select this option
ONTAP 9.8 or later	Select option 10. **Show example boot menu** Please choose one of the following: (1) Normal Boot. (2) Boot without /etc/rc. (3) Change password. (4) Clean configuration and initialize all disks. (5) Maintenance mode boot. (6) Update flash from backup config. (7) Install new software first. (8) Reboot node. (9) Configure Advanced Drive Partitioning. (10) Set Onboard Key Manager recovery secrets. (11) Configure node for external key management. Selection (1-11)? 10

ONTAP version	Select this option

ONTAP 9.7 and earlier	Select the hidden option `recover_onboard_keymanager`
	
	Show example boot menu
	
	`Please choose one of the following:`
	
	`(1) Normal Boot.`
	`(2) Boot without /etc/rc.`
	`(3) Change password.`
	`(4) Clean configuration and initialize all disks.`
	`(5) Maintenance mode boot.`
	`(6) Update flash from backup config.`
	`(7) Install new software first.`
	`(8) Reboot node.`
	`(9) Configure Advanced Drive Partitioning.`
	`Selection (1-19)?`
	`recover_onboard_keymanager`

3. Confirm that you want to continue the recovery process when prompted:

   Show example prompt

   ```
   This option must be used only in disaster recovery procedures. Are you sure? (y or n):
   ```

4. Enter the cluster-wide passphrase twice.

   While entering the passphrase, the console does not show any input.

   Show example prompt

   ```
   Enter the passphrase for onboard key management:

   Enter the passphrase again to confirm:
   ```

5. Enter the backup information:

   a. Paste the entire content from the BEGIN BACKUP line through the END BACKUP line, including the dashes.

Show example prompt

```
Enter the backup data:

--------------------------BEGIN
BACKUP--------------------------
01234567890123456789012345678901234567890123456789012345678901
23
12345678901234567890123456789012345678901234567890123456789012
34
23456789012345678901234567890123456789012345678901234567890123
45
34567890123456789012345678901234567890123456789012345678901234
56
45678901234567890123456789012345678901234567890123456789012345
67
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
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AA
01234567890123456789012345678901234567890123456789012345678901
23
12345678901234567890123456789012345678901234567890123456789012
34
23456789012345678901234567890123456789012345678901234567890123
45
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AA

---------------------------END
BACKUP---------------------------
```

b. Press Enter twice at the end of the input.

   The recovery process completes and displays the following message:

   ```
   Successfully recovered keymanager secrets.
   ```

Show example prompt

```
Trying to recover keymanager secrets....
Setting recovery material for the onboard key manager
Recovery secrets set successfully
Trying to delete any existing km_onboard.wkeydb file.

Successfully recovered keymanager secrets.

*******************************************************************
********************
* Select option "(1) Normal Boot." to complete recovery
process.
*
* Run the "security key-manager onboard sync" command to
synchronize the key database after the node reboots.
*******************************************************************
********************
```

Do not proceed if the displayed output is anything other than `Successfully recovered keymanager secrets`. Perform troubleshooting to correct the error.

6. Select option `1` from the boot menu to continue booting into ONTAP.

Show example prompt

```
*****************************************************************
******************
* Select option "(1) Normal Boot." to complete the recovery
process.
*
*****************************************************************
******************


(1)  Normal Boot.
(2)  Boot without /etc/rc.
(3)  Change password.
(4)  Clean configuration and initialize all disks.
(5)  Maintenance mode boot.
(6)  Update flash from backup config.
(7)  Install new software first.
(8)  Reboot node.
(9)  Configure Advanced Drive Partitioning.
(10) Set Onboard Key Manager recovery secrets.
(11) Configure node for external key management.
Selection (1-11)? 1
```

7. Confirm that the controller's console displays the following message:

   `Waiting for giveback…(Press Ctrl-C to abort wait)`

   On the partner controller:

8. Giveback the impaired controller:

   `storage failover giveback -fromnode local -only-cfo-aggregates true`

   On the impaired controller:

9. After booting with only the CFO aggregate, synchronize the key manager:

   `security key-manager onboard sync`

10. Enter the cluster-wide passphrase for the Onboard Key Manager when prompted.

Show example prompt

```
Enter the cluster-wide passphrase for the Onboard Key Manager:

All offline encrypted volumes will be brought online and the
corresponding volume encryption keys (VEKs) will be restored
automatically within 10 minutes. If any offline encrypted
volumes are not brought online automatically, they can be
brought online manually using the "volume online -vserver
<vserver> -volume <volume_name>" command.
```

If the sync is successful, the cluster prompt is returned with no additional messages. If the sync fails, an error message appears before returning to the cluster prompt. Do not continue until the error is corrected and the sync runs successfully.

11. Verify that all keys are synced:

    ```
    security key-manager key query -restored false
    ```

    The command should return no results. If any results appear, repeat the sync command until no results are returned.

    On the partner controller:

12. Giveback the impaired controller:

    ```
    storage failover giveback -fromnode local
    ```

13. Restore automatic giveback if you disabled it:

    ```
    storage failover modify -node local -auto-giveback true
    ```

14. If AutoSupport is enabled, restore automatic case creation:

    ```
    system node autosupport invoke -node * -type all -message MAINT=END
    ```

External Key Manager (EKM)

Restore the External Key Manager configuration from the ONTAP boot menu.

Before you begin

Gather the following files from another cluster node or from your backup:

- `/cfcard/kmip/servers.cfg` file or the KMIP server address and port
- `/cfcard/kmip/certs/client.crt` file (client certificate)
- `/cfcard/kmip/certs/client.key` file (client key)
- `/cfcard/kmip/certs/CA.pem` file (KMIP server CA certificates)

Steps

On the impaired controller:

1. Connect the console cable to the impaired controller.
2. Select option `11` from the ONTAP boot menu.

   Show example boot menu

   ```
   (1)  Normal Boot.
   (2)  Boot without /etc/rc.
   (3)  Change password.
   (4)  Clean configuration and initialize all disks.
   (5)  Maintenance mode boot.
   (6)  Update flash from backup config.
   (7)  Install new software first.
   (8)  Reboot node.
   (9)  Configure Advanced Drive Partitioning.
   (10) Set Onboard Key Manager recovery secrets.
   (11) Configure node for external key management.
   Selection (1-11)? 11
   ```

3. Confirm you have gathered the required information when prompted:

   Show example prompt

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

4. Enter the client and server information when prompted:
   a. Enter the client certificate (client.crt) file contents, including the BEGIN and END lines.
   b. Enter the client key (client.key) file contents, including the BEGIN and END lines.
   c. Enter the KMIP server CA(s) (CA.pem) file contents, including the BEGIN and END lines.
   d. Enter the KMIP server IP address.
   e. Enter the KMIP server port (press Enter to use the default port 5696).

Show example

```
Enter the client certificate (client.crt) file contents:
-----BEGIN CERTIFICATE-----
<certificate_value>
-----END CERTIFICATE-----

Enter the client key (client.key) file contents:
-----BEGIN RSA PRIVATE KEY-----
<key_value>
-----END RSA PRIVATE KEY-----

Enter the KMIP server CA(s) (CA.pem) file contents:
-----BEGIN CERTIFICATE-----
<certificate_value>
-----END CERTIFICATE-----

Enter the IP address for the KMIP server: 10.10.10.10
Enter the port for the KMIP server [5696]:

System is ready to utilize external key manager(s).
Trying to recover keys from key servers....
kmip_init: configuring ports
Running command '/sbin/ifconfig e0M'
..
..
kmip_init: cmd: ReleaseExtraBSDPort e0M
```

The recovery process completes and displays the following message:

```
Successfully recovered keymanager secrets.
```

Show example

```
System is ready to utilize external key manager(s).
Trying to recover keys from key servers....
Performing initialization of OpenSSL
Successfully recovered keymanager secrets.
```

5. Select option `1` from the boot menu to continue booting into ONTAP.

Show example prompt

```
*****************************************************************
***********
* Select option "(1) Normal Boot." to complete the recovery
process.
*
*****************************************************************
***********

(1)  Normal Boot.
(2)  Boot without /etc/rc.
(3)  Change password.
(4)  Clean configuration and initialize all disks.
(5)  Maintenance mode boot.
(6)  Update flash from backup config.
(7)  Install new software first.
(8)  Reboot node.
(9)  Configure Advanced Drive Partitioning.
(10) Set Onboard Key Manager recovery secrets.
(11) Configure node for external key management.
Selection (1-11)? 1
```

6. Restore automatic giveback if you disabled it:

   ```
   storage failover modify -node local -auto-giveback true
   ```

7. If AutoSupport is enabled, restore automatic case creation:

   ```
   system node autosupport invoke -node * -type all -message MAINT=END
   ```

Return the failed part to NetApp - AFF C190

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. The AFF C190 system supports only manual boot media recovery procedures. Automated boot media recovery is not supported.

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