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Hitachi Freedom Storage™ Thunder 9200™

FlashAccess 9200 User's Guide

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Document Revision Level

Revision	Date	Description
MK-91DF553-0	June 2001	Initial Release.

Source Document Revision Level

The following source document was used to produce this FlashAccess 9200 user guide:

DF-F500-WLU Turbo LU function User's Guide, Third Edition.

Preface

Before using FlashAccess 9200, read the operating procedures and notices included in this guide. Carefully follow the safety precautions and instructions.

The *Hitachi Freedom Storage™ Thunder 9200™ FlashAccess 9200 User's Guide* assumes that:

- The user has a background in data processing and understands direct-access storage device subsystems and their basic functions.
- The user is familiar with the Hitachi Freedom Storage™ Thunder 9200™ array subsystem.

For further information on Hitachi Data Systems products and services, please contact your Hitachi Data Systems account team, or visit the Hitachi Data Systems worldwide web site at http://www.hds.com. For specific information on the supported host systems and platforms for the 9200, please refer to the user documentation for the product, or contact the vendor's customer support service.

Note: The term "9200" refers to the Hitachi Thunder 9200™ subsystem, unless otherwise noted. Please refer to the *Hitachi Thunder 9200™ User and Reference Guide* (MK-90DF504) for further information on the 9200 disk array subsystem.

Note: The use of FlashAccess 9200 and all other Hitachi Data Systems products is governed by the terms of your license agreement(s) with Hitachi Data Systems.

Safety Precautions

Note the following when using FlashAccess 9200:

- Only administrators, system engineers, and field engineers who are familiar with Hitachi Data Systems disk array units are allowed to run the FlashAccess 9200 function.
- Make certain you read and fully understand this guide before you operate the FlashAccess 9200 function.
- Carefully follow instructions included with the "CAUTION" label.

  CAUTION

  Failure to follow these instructions can result in serious system damage and/or the loss of system data.

COMMENTS

Please send us your comments on this document: doc.comments@hds.com.

Make sure to include the document title, number, and revision.
Please refer to specific page(s) and paragraph(s) whenever possible.

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Thank you!

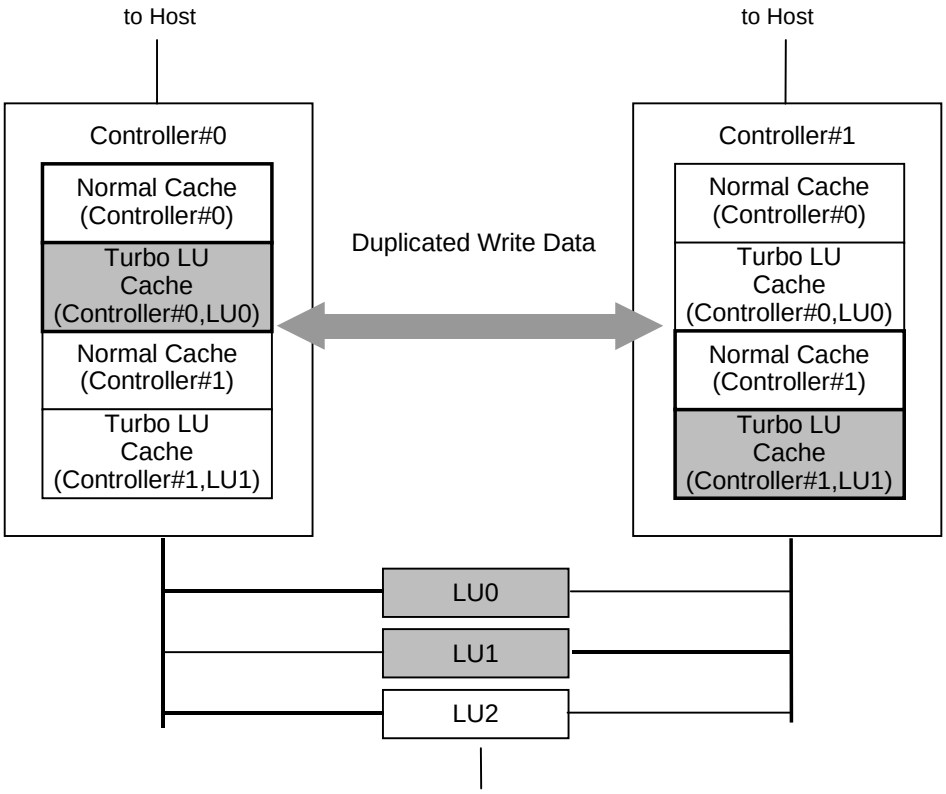
Contents

List of Tables

Chapter 1 Introducing FlashAccess 9200

The FlashAccess 9200 function ensures that all data in an LU (Logical Unit) is stored in cache memory. All read/write commands to the LU can be executed by cache hit 100% without accessing the drive. The system throughput is improved when this function is applied to an LU that contains data accessed frequently because no latency period is needed to access the disk drive.

As shown in the following figure, part of cache memory installed in the controller is used for the FlashAccess 9200 function. Cache memory utilizes a battery backup on both controllers, and the data is duplicated on each controller for safety against power failure and cache package failure, etc.



Note: FlashAccess 9200 requires initial preplanning due to rules regarding cache capacity. (See "Capacity of the LU with FlashAccess 9200".)

This document includes the following information:

- FlashAccess 9200 Functions
- Installing and Uninstalling FlashAccess 9200
- Enabling/Disabling FlashAccess 9200
- Setting/Referring/Canceling LUs with FlashAccess 9200
- Capacity of the LU with FlashAccess 9200

Chapter 2 FlashAccess 9200 Functions

This section contains the following:

- FlashAccess 9200 Characteristics
- Conditions Necessary for FlashAccess 9200 Operation
- Conditions that Terminate FlashAccess 9200 Operation
- Conditions that Disable FlashAccess 9200 Operation

2.1 FlashAccess 9200 Characteristics

The controller operates read/write commands to the LU with FlashAccess 9200 function as follows.

- Read data accessed by the host is stored in the cache memory until the array unit is turned off. Therefore, subsequent host access to the previously accessed area is guaranteed to hit the cache.
- Write data from the host is stored in the cache memory, and not written to disk drives until the array unit is turned off.
- The cache memory utilizes a battery back-up and the write data is duplicated (stored in the cache memory on both controllers).
- Write data stored in the cache memory is written to disk drives when the array unit is turned off, and when the FlashAccess 9200 operation is stopped by failures.

As described previously, read/write commands to the LU with the FlashAccess 9200 function can be processed without a substantial delay. However, the internal controller operation is the same as that of commands issued to other LUs, except that the read/write command to the LU with the FlashAccess 9200 function can hit the cache.

A delay may be observed in the following cases even if the FlashAccess 9200 function is applied to the LU.

- The command execution may wait for the completion of commands issued to other LUs.
- The command execution may wait for the completion of commands other than read/write commands (such as the Mode Select command) issued to the same LU.
- The command execution may wait for the completion of processing for internal operation such as data reconstruction, etc.

Conditions that permit FlashAccess 9200 operation or stop its operation are explained in detail in this chapter.

2.2 Conditions Necessary for FlashAccess 9200 Operation

To use FlashAccess 9200, all of the following conditions must be met. Verify these conditions are present before you use FlashAccess 9200.

Table 2.1 Conditions Necessary for FlashAccess 9200

No.	Item	Conditions	Remarks
1	Controller Configuration	• Dual Controller configuration	
2	RAID Level	• RAID5, RAID0+1(A), or RAIDC	
3	LU Size	• Hot Standby Configuration Less than (available Cache Capacity - 64MB) • Dual Active Configuration Less than (available Cache Capacity - 64MB)/2	Refer to "Capacity of LU with FlashAccess 9200" in this guide.
4	Number of LUs with Turbo Cache Function	• Hot Standby Configuration 1/Subsystem • Dual Active Configuration 1/Controller	

Note: This function cannot be used when each controller does not have more than or equal to 512MB cache.

2.3 Conditions that Terminate FlashAccess 9200 Operation

When the array unit is working without failure, the FlashAccess 9200 operation continues until the power-off of the array unit. However, FlashAccess 9200 operation stops for the following configuration changes or failures:

Table 2.2 Conditions that Terminate FlashAccess 9200

No.	Conditions	Remarks
1	When the array unit is powered off.	Normal case
2	When the cache capacity is changed and the available capacity of the cache memory is less than LU size.	Cache uninstallation
3	when a controller failure occurs.	Failures
4	When one of the cache packages has failed.	
5	When the battery alarm occurs.	
6	When a battery backup circuit failure occurs.	
7	When the number of PIN data (data unable to be written to disk drives because of some failures) exceeded the threshold value.	

When the failures are recovered, FlashAccess 9200 operation will be restarted.

2.4 Conditions that Disable FlashAccess 9200 Operation

Even if you do not intentionally disable FlashAccess 9200, this function is disabled under the following conditions. **Pay special attention when you change the configuration of the array unit and reset the LU with FlashAccess 9200.**

Table 2.3 Conditions that Terminate FlashAccess 9200

No.	Conditions	Remarks
1	When the setting of FlashAccess 9200 is cleared.	All of these conditions are caused by the operator.
2	When FlashAccess 9200 is disabled or uninstalled (locked).	
3	When the default ownership of FlashAccess 9200 is changed.	
4	When the LU with FlashAccess 9200 is deleted or the RAID group of the LU is deleted.	
5	When the controller configuration is changed (Dual IActive mode to/from Hot Standby mode).	

Chapter 3 Installing and Uninstalling FlashAccess 9200

This section includes the following:

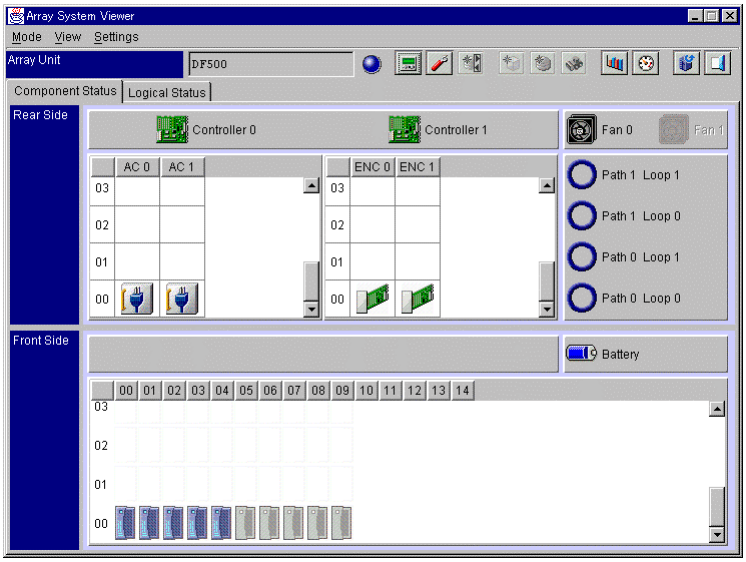
- Installing FlashAccess 9200
- Uninstalling FlashAccess 9200

3.1 Installing FlashAccess 9200

The FlashAccess 9200 function is optional, therefore, the functions provided cannot be selected with the standard configuration. The FlashAccess 9200 function needs to be installed before associated functions are accessible. To install the FlashAccess 9200 function, the optional floppy disk (FD) for FlashAccess, or the key code is necessary.

The following instructions describe how to install FlashAccess 9200, using the GUI version of Resource Manager 9200:

1. Start Resource Manager 9200 and change the mode of operation to **Management Mode**.
2. Register the array unit in which you will install “FlashAccess 9200”. Connect to this array unit; the following window is displayed.

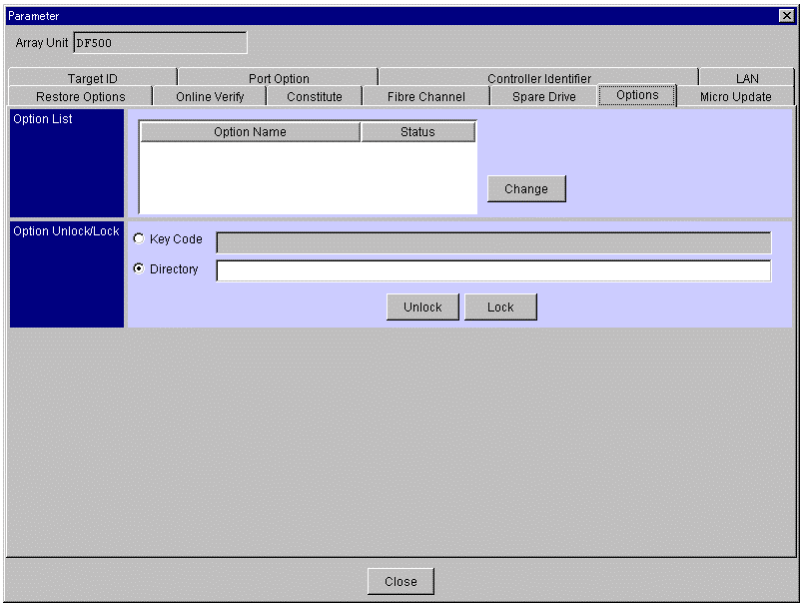


3. From the **Settings** menu, select **Configuration Settings**.

   Alternatively, from the tool bar, select the **Configuration Settings** button.

   The Parameter dialog box is displayed.

1. Click the **Option** tab.



4. Unlock the optional features by using either of the following:
   - Key FD
   - Key Code

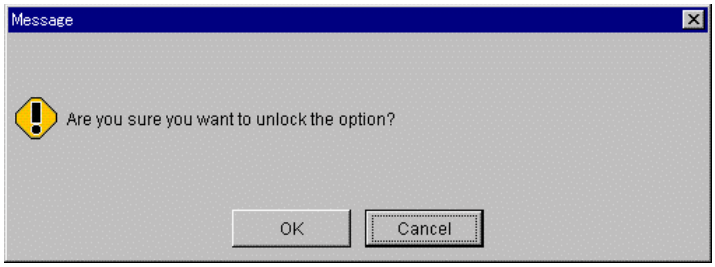
   Key FD

   a) Insert the key FD into the FDD of the system where Resource Manager 9200 is installed.

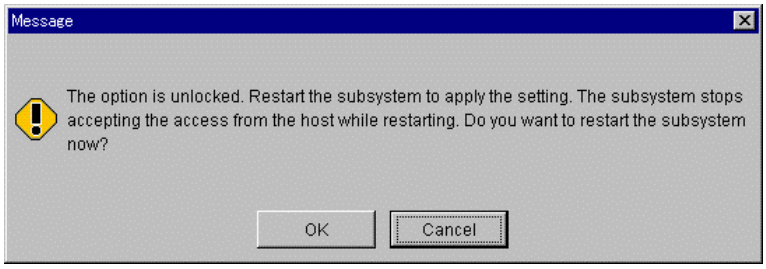
   b) Click the **Directory** radio button to enter a path to the FD.

   c) Click the **Unlock** button.

   d) A screen appears, requesting confirmation to unlock this option. Click the **OK** button.



   e) A screen appears, stating that the FlashAccess 9200 option has been unlocked. A message indicating a request for rebooting is displayed. Click the **OK** button.



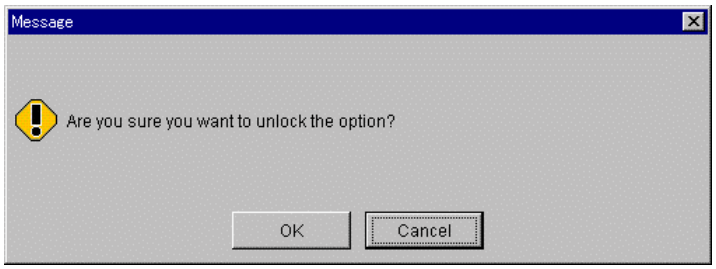
Note: To validate the unlocking of this optional feature, reboot the array unit. The previous setting stays valid until rebooting. The array unit cannot access the host until the reboot is completed and the system restarts. Therefore, be certain the host has stopped accessing data before starting the reboot process.

Key Code

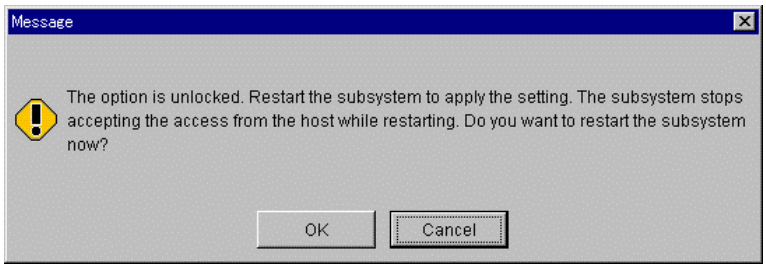
a) Click the **Key Code** radio button to enter a key code in the text box.

b) Click the **Unlock** button.

c) A screen appears, requesting a confirmation to unlock the FlashAccess 9200 option. Click the **OK** button.

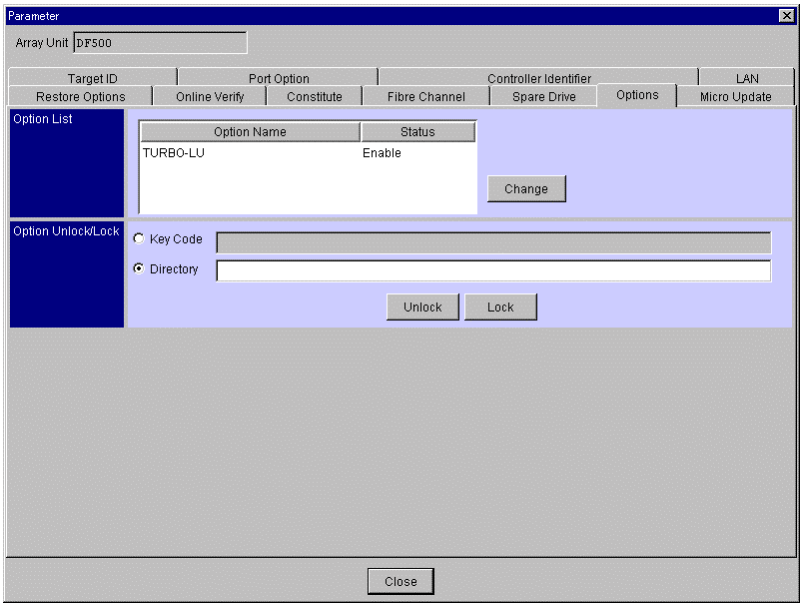


d) A message appears, confirming that this optional feature is unlocked. Click the **OK** button. A message indicating a request for rebooting is displayed. Click the **OK** button to reboot.

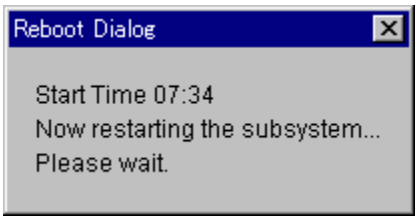


Note: To validate the unlocking of this optional feature, reboot the array unit. The previous setting stays valid until rebooting. The array unit cannot access the host until the reboot is completed and the system restarts. Therefore, be certain the host has stopped accessing data before starting the reboot process.

5. When a reboot is not in process, this set-up optional feature will be updated and displayed.

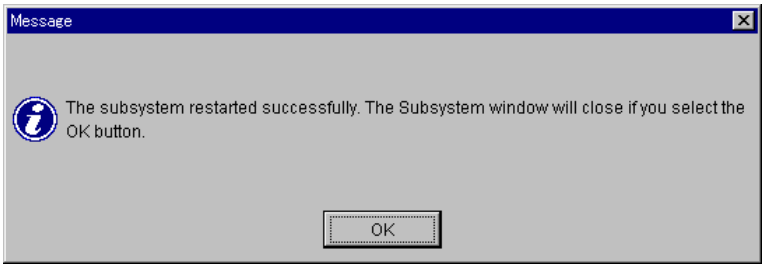


When you choose to reboot the array unit, the time the reboot began is displayed. Rebooting takes approximately two to six minutes.



Note: It may take up to six minutes for an array unit to respond, depending on the configuration of the array unit.

A message appears, stating that the reboot was successful. Click the **OK** button.



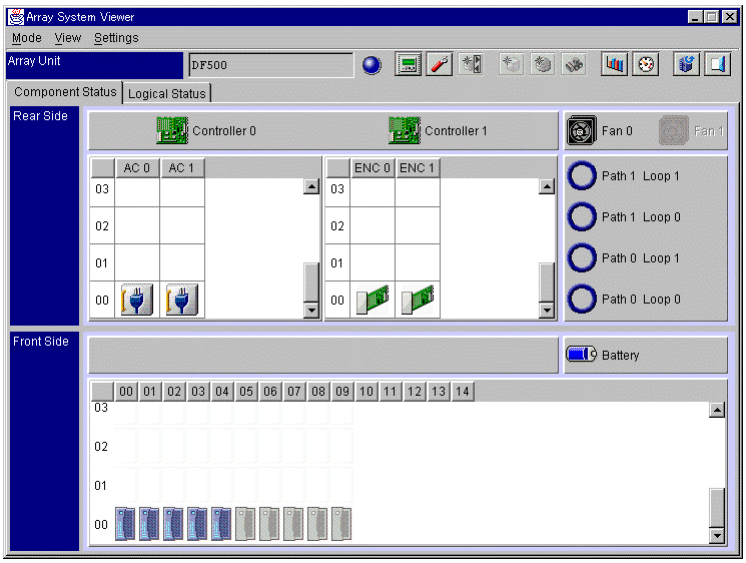
The unit window closes. To perform other operations, select from the Main Window.

3.2 Uninstallation

Follow the instructions below to uninstall FlashAcces. This function is installed and uninstalled using Resource Manager 9200. For the operating procedures of the Resource Manager 9200, refer to the *Resource Manager 9200 (for GUI) User's Guide*.

Follow the instructions below to uninstall the FlashAccess function. When this function is uninstalled, the FlashAccess function is not available (locked) until it is opened by the Option floppy disk or the key code.

1. Start the Resource Manger 9200 program and switch the mode of operation to **Management Mode**.
2. Register an array unit in which to install the FlashAccess function and connect to the registered array unit. A unit window for the connected array unit will be displayed.

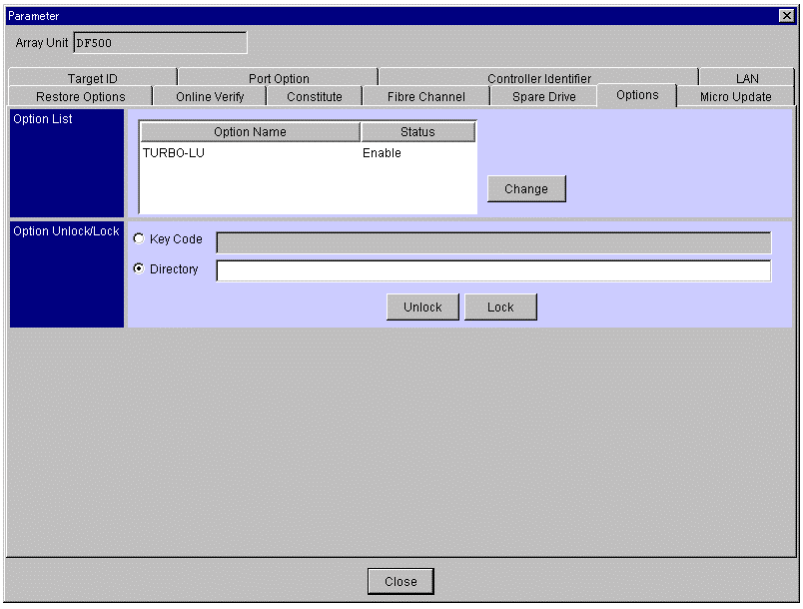


3. From the **Settings** menu, select **Configuration Settings**.

   Alternatively, from the tool bar, select the **Configuration Settings** button.

   The Parameter dialog box is displayed.

4. Click the **Option** tab.



5. Lock the optional features by using either of the following:
   - Key FD
   - Key Code

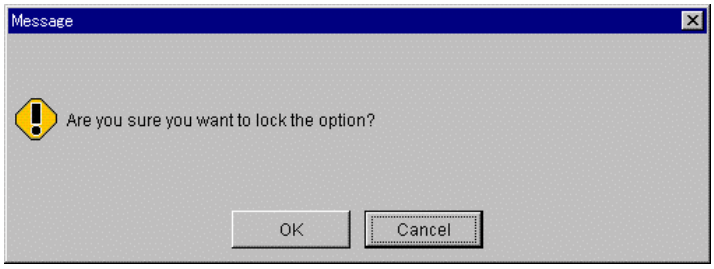
   Key FD

   a) Insert the key FD into the FDD of the system where Resource Manager 9200 is installed.

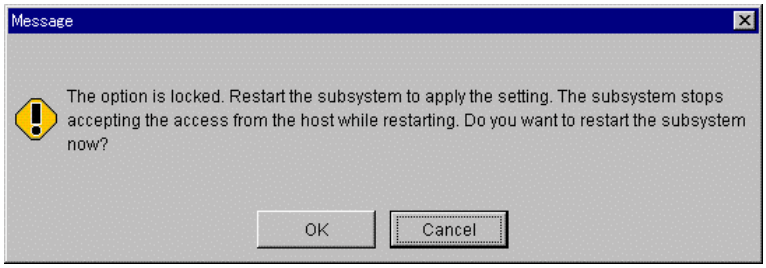
   b) Click the **Directory** radio button to enter a path to the FD.

   c) Click the **Lock** button.

   d) A screen appears, requesting confirmation to lock this option. Click the **OK** button.



   e) A message appears, confirming that this optional feature is locked. Click the **OK** button. A message indicating a request for rebooting is displayed. Click the **OK** button to reboot.



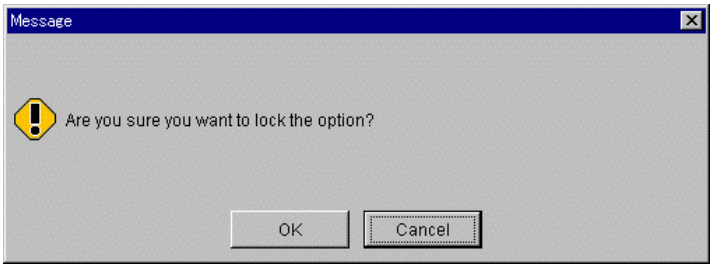
Note: To validate the locking of this optional feature, reboot the array unit. The previous setting stays valid until rebooting. The array unit cannot access the host until the reboot is completed and the system restarts. Therefore, be certain the host has stopped accessing data before starting the reboot process.

Key Code

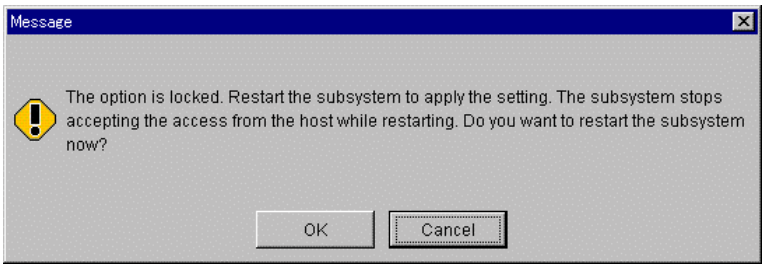
a) Click the **Key Code** radio button to enter a key code in the text box.

b) Click the **Lock** button.

c) A screen appears, requesting a confirmation to lock the FlashAccess 9200 option. Click the **OK** button.

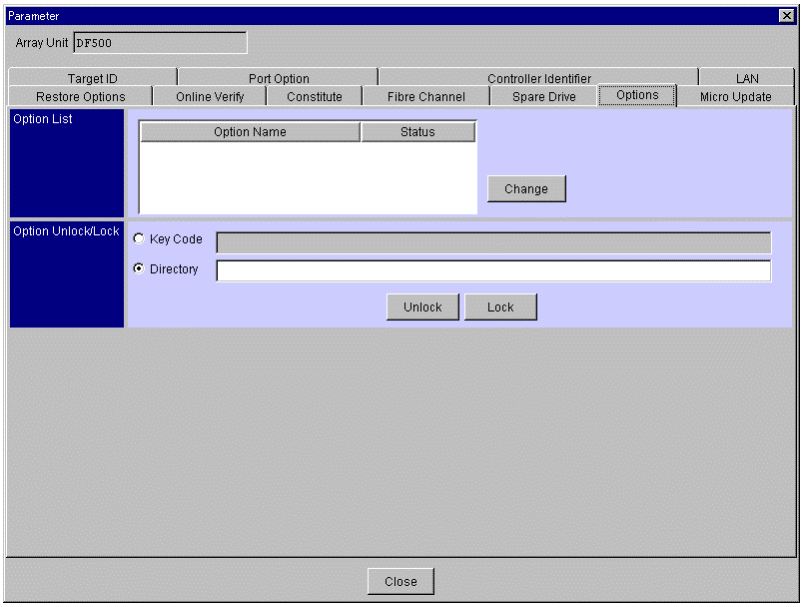


d) A message appears, confirming that this optional feature is locked. Click the **OK** button. A message indicating a request for rebooting is displayed. Click the **OK** button to reboot.

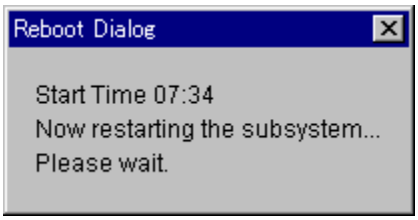


Note: To validate the locking of this optional feature, reboot the array unit. The previous setting stays valid until rebooting. The array unit cannot access the host until the reboot is completed and the system restarts. Therefore, be certain the host has stopped accessing data before starting the reboot process.

6. When a reboot is not in process, this set-up optional feature will be updated and displayed.

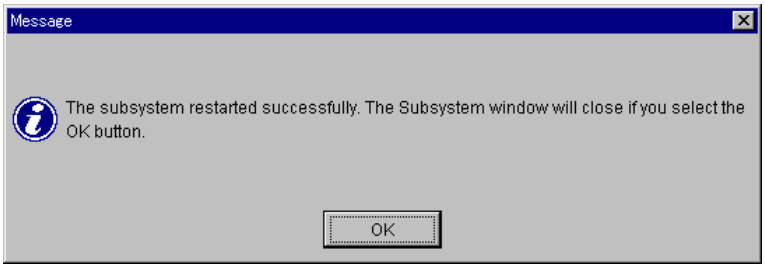


When you choose to reboot the array unit, the time the reboot began is displayed. Rebooting takes approximately two to six minutes.



Note: It may take up to six minutes for an array unit to respond, depending on the configuration of the array unit.

A message appears, stating that the reboot was successful. Click the **OK** button.

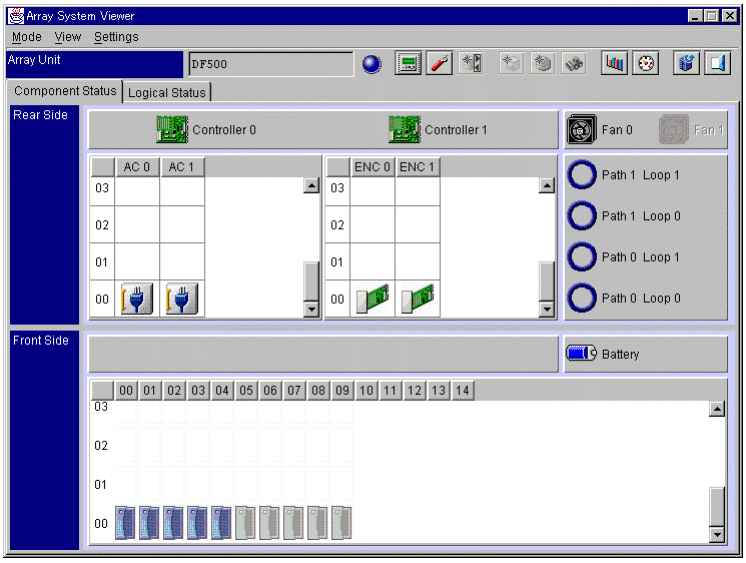


The unit window closes. To perform other operations, select from the Main Window.

Chapter 4 Enabling/Disabling FlashAccess 9200

FlashAccess 9200 can be enabled or disabled without uninstalling this function. The following instructions describe how to enable or disable FlashAccess 9200 without uninstalling this function, using the GUI version of Resource Manager 9200.

1. Start the Resource Manager 9200 program and switch to **Management Mode**.
2. Register the array unit in which you will uninstall FlashAccess 9200. A unit window for the connected array unit will be displayed.

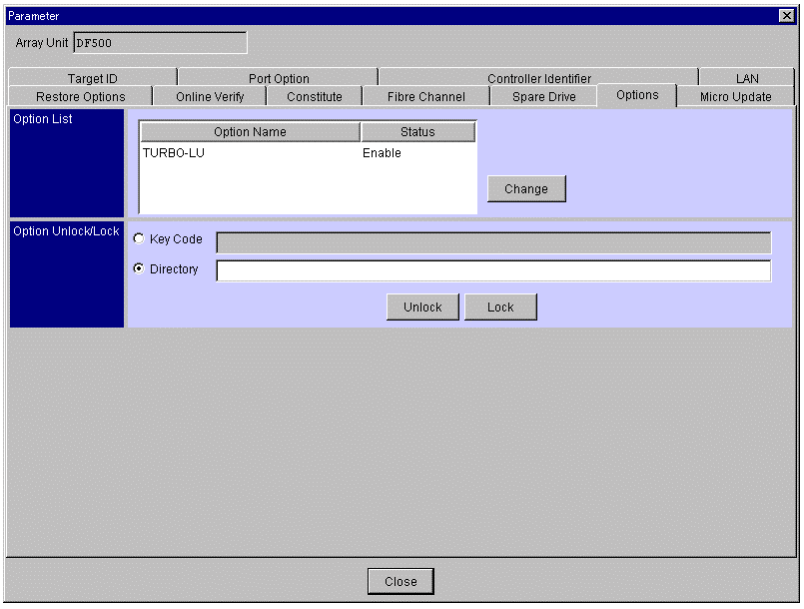


3. From the **Settings** menu, select **Configuration Settings**.

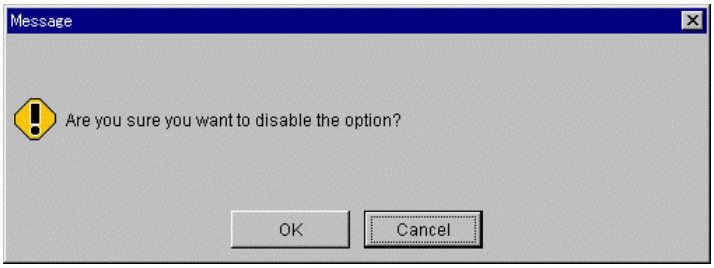
   Alternatively, from the tool bar, select the **Configuration Settings** button.

   The Parameter dialog box is displayed.

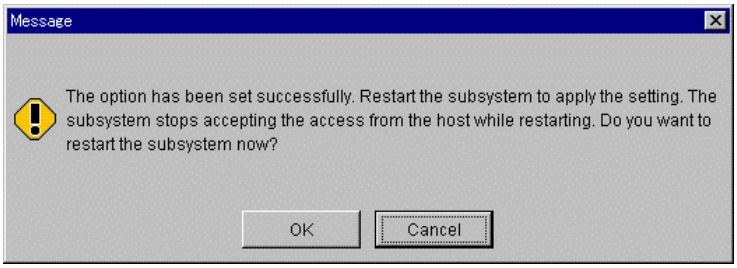
4. Click the **Option** tab.



5. Click **TURBO-LU** in the **Option Name** text box, then click the **Change** button.
6. Click **OK**.

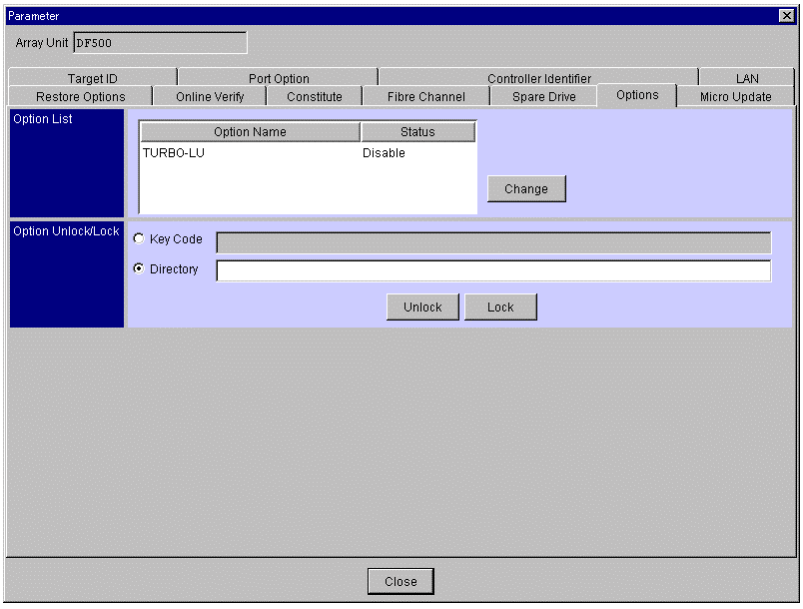


7. A message appears, confirming that this optional feature is set. Click the **OK** button. A message indicating a request for rebooting is displayed. Click the **OK** button to reboot.

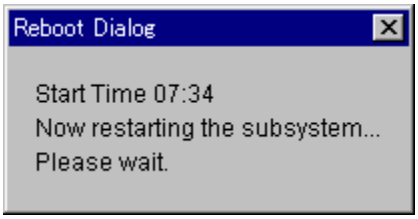


Note: This setting is not active until the system is rebooted. The 9200 subsystem cannot access the host until the reboot is completed and the system restarts. Therefore, be certain the host has stopped accessing data before starting the reboot process.

7. When a reboot is not in process, this set-up optional feature will be updated and displayed.

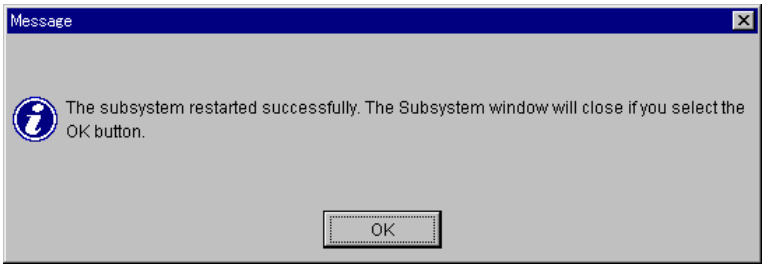


When you choose to reboot the array unit, the time the reboot began is displayed. Rebooting takes approximately two to six minutes.



Note: It may take up to six minutes for an array unit to respond, depending on the configuration of the array unit.

A message appears, stating that the reboot was successful. Click the **OK** button.



The unit window closes. To perform other operations, select from the Main Window.

Chapter 5 Setting/Referring/Canceling LUs with FlashAccess 9200

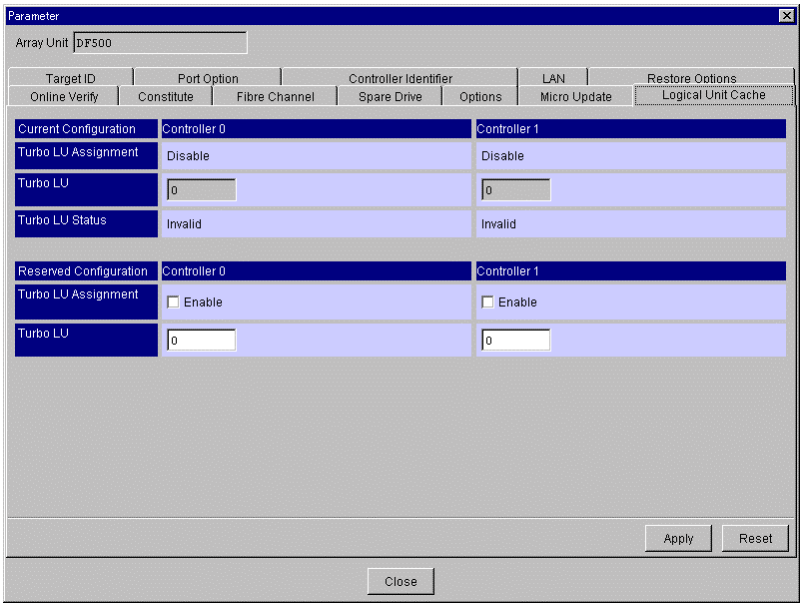
You can set an LU using Resource Manager 9200 by installing the FlashAccess 9200 Function. The LU that is set for the FlashAccess 9200 function must be previously defined. If the LU is not defined, define the LU by using the LU CONFIG menu in the Resource Manager 9200 program. Confirm that the conditions you need to use the FlashAccess 9200 function are present before performing the operation.

1. From the **Settings** menu, select **Configuration Settings**.

   Alternatively, from the tool bar, select the **Configuration Settings** button.

   The Parameter dialog box is displayed.

2. Click the **Logical Unit Cache** tab.



3. Enter the options for the **Reserved Configuration**. You can check the setup information by viewing the **Current Configuration** after rebooting the array unit.

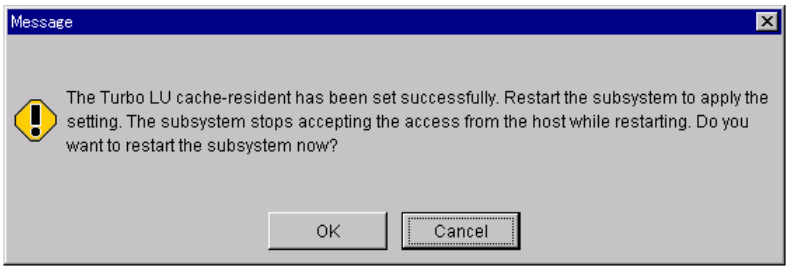
This menu contains the following:

- **Current Configuration:** The current configuration setup is displayed.
  - **LU cache resident mode:** Displays the LU cache resident state (enabled or disabled).
    Enable: The LU cache resident function is set.
    Disable: The LU cache resident function is canceled.
  - **Designated LU:** The number of an LU in which LU cache is resident.
  - **LU cache resident status:** Displays the status of an LU in which LU cache is resident. If the LU cache resident mode is disabled, LU information is not displayed.
    Available: The LU in which LU cache is resident is available.
    Unavailable: The LU in which LU cache is resident is unavailable.

- **Reserved Configuration:** A configuration to be reserved is displayed.
  - **LU cache resident mode:** Displays the LU cache resident state (enabled or disabled).
    Enable: The LU cache resident function is set.
    Disable: The cache resident function is canceled.
  - **Designated LU:** The number of an LU in which LU cache is resident.

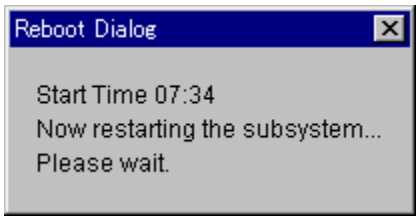
Note: If an array unit has a standby configuration, only one setup can be specified for Controller 0. If a setup is specified for Controller 1, it is ignored.

4. Click the **OK** button.
5. A message appears, confirming that LU cache is set. A message also asks you to reboot the system. Click the **OK** button.



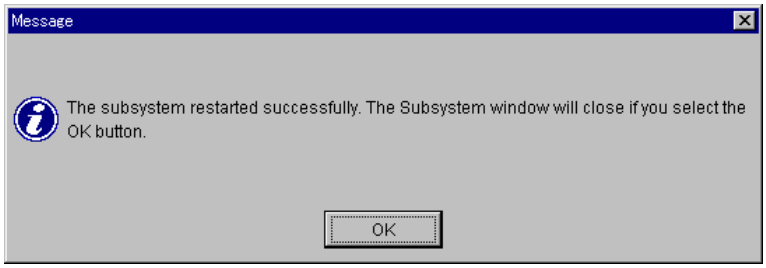
Note: To validate the LU cache resident condition, reboot the array unit. The previous setting remains valid until the system is rebooted. The 9200 subsystem cannot access the host until the reboot is completed and the system restarts. Therefore, be certain the host has stopped accessing data before starting the reboot process.

When you choose to reboot the array unit, the time the reboot began is displayed. Rebooting takes approximately two to six minutes.



Note: It may take time for an array unit to respond. Do not manually power off the array unit. However, if it does not respond after 10 minutes or more, check the condition of the array unit.

A message appears, stating that the reboot has terminated. Click the **OK** button; the unit window closes. To perform other operations on the main window, select an array unit from the main window and open the selected unit.



Note: The LU cache resident function is available as a priced optional feature. If the LU cache resident function in not installed or the priced optional feature is not validated, LU cache cannot be set resident.

Appendix A Capacity of the LU with FlashAccess 9200

The maximum size of the LU that is used for the FlashAccess 9200 function depends on the capacity of the installed cache memory; FlashAccess 9200 uses part of the cache memory. The following table shows the maximum size (Number of Blocks) of the LU that is used for the FlashAccess 9200 function.

Table A.1 Maximum Capacity of LU with FlashAccess 9200 (Number of Logical Blocks)

Installed Cache Capacity MB/ Controller	256	512	768	1024	1280	2048
Hot Standby mode	N/A	359,616	774,656	1,189,696	1,604,736	2,849,824
Dual Active mode	N/A	179,776	387,296	594,816	802,336	1,424896

The number of blocks specified at the LU definition is rounded up to the boundary fixed for each RAID configuration. Therefore, when you use the number of blocks to define an LU for the FlashAccess 9200 function, the capacity of the LU may exceed the value (as specified in Table 5.1).

Note: When you define an LU for the FlashAccess 9200 function, specify the number of blocks which are a multiple of the boundary value, and less than or equal to the value in Table A.1.

Number of data disks x 128 data blocks = Number of boundary blocks