System Parameter

This "System Parameter" volume describes the setting of the system parameter of the array, etc.

Contents

Chapter 1.   Setting (Hitachi Storage Navigator Modular 2)

This chapter explains method of setting the parameters using Hitachi Storage Navigator Modular 2. The Hitachi Storage Navigator Modular 2 can execute the setting function or the reference function by connecting it to the array when the array is in the Ready status.

The procedures for setting parameters are described below.

```
                          ( START )
                              |
+-------------------------------------------------------------+
| When the firmware has not been installed in the array,      |
| install it newly. (Refer to WEB "3.3 Setup" (WEB 03-0270).) |
| Usually, the array is shipped with the firmware installed.  |
+-------------------------------------------------------------+
                              |
+-------------------------------------------------------------+
| Make a connection to the array using Hitachi Storage        |
| Navigator Modular 2. (Refer to "1.1 Procedure for Connecting|
| Hitachi Storage Navigator Modular 2 with the Array" (SYSPR  |
| 01-0020).)                                                  |
+-------------------------------------------------------------+
                              |
+-------------------------------------------------------------+
| Make the setting of the system parameter from the Hitachi   |
| Storage Navigator Modular 2. (Refer to "Chapter 8. Setting  |
| of the Basic Parameter of the System" (SYSPR 08-0000).)     |
+-------------------------------------------------------------+
                              |
+-------------------------------------------------------------+
| Make the setting of the Host Group/Targets from the Hitachi |
| Storage Navigator Modular 2. (Refer to "Chapter 5. Setting  |
| Host Group/Targets" (SYSPR 05-0000).)                       |
+-------------------------------------------------------------+
                              |
+-------------------------------------------------------------+
| Make the setting of the RAID/Volume/Spare Drive from the    |
| Hitachi Storage Navigator Modular 2. (Refer to "Chapter 4.  |
| Setting the RAID/Volume/Spare Drive" (SYSPR 04-0000).)      |
+-------------------------------------------------------------+
                              |
+-------------------------------------------------------------+
| Make the setting of the Configuration Information from the  |
| Hitachi Storage Navigator Modular 2. (Refer to "Chapter 7.  |
| Setting LAN Related" (SYSPR 07-0000).)                      |
+-------------------------------------------------------------+
                              |
+-------------------------------------------------------------+
| Make the setting of the priced optional feature from the    |
| Hitachi Storage Navigator Modular 2. (Refer to "Chapter 14. |
| Setting Licenses" (SYSPR 14-0000).)                         |
+-------------------------------------------------------------+
                              |
+-------------------------------------------------------------+
| Make the setting of the E-mail Alert Function from the      |
| Hitachi Storage Navigator Modular 2. (Refer to "Chapter 9.  |
| E-mail Alert Function" (SYSPR 09-0000).)                    |
+-------------------------------------------------------------+
                              |
+-------------------------------------------------------------+
|                    Restart an array.                        |
+-------------------------------------------------------------+
                              |
                          ( END )
```
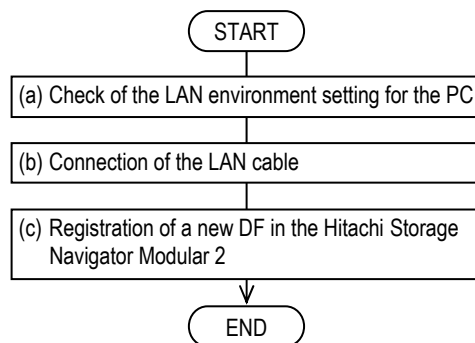
Precautions when restarting

• If the array used for a remote side of TrueCopy remote replication/TrueCopy Extended Distance restarts in the status that TrueCopy remote replication/TrueCopy Extended Distance is enabled, the following phenomena occur.

- The paths of TrueCopy remote replication/TrueCopy Extended Distance are both blocked. The notice of E-mail Alert Function, SNMP Agent Support Function, and TRAP occur at the time of the path blockade.
Perform the notice and the check to the Failure Monitoring Department in advance.
The path blockade automatically recovers after restarting.

- When the status of the pair of TrueCopy remote replication/TrueCopy Extended Distance is PAIR or COPY, the pair changes to PSUE.
If the Pair status of TrueCopy remote replication/TrueCopy Extended Distance is either PAIR or COPY, suspend the pairs before restarting the array.

• When using the priced option, Power Saving/Power Saving Plus, and the power saving instruction of the I/O interlock disabled is executed, if the array restarts while the power saving status is "Normal (Command Monitoring)", the status is changed to "Normal (Spindown Failed: PS OFF/ON)".
After executing the power saving instruction of the I/O interlock disabled, check that there is no RAID group whose power saving status is "Normal (Command Monitoring)" and then restart the array.
If the spin-down fails, execute the spin-down again.

1.1   Procedure for Connecting Hitachi Storage Navigator Modular 2 with the Array

The procedure for connecting Hitachi Storage Navigator Modular 2 with the array is shown below.

NOTE : If there is no problem on the LAN connection or the IP address setting and the array cannot be registered in the following procedure, it is necessary to change the LAN Port Number of the PC referring to the LAN Port Number set in the array. Refer to "7.3 Setting LAN Port Number" (SYSPR 07-0100).

```
                    ┌─────────────┐
                    │    START    │
                    └─────────────┘
                           │
    ┌──────────────────────────────────────────────┐
    │ (a) Check of the LAN environment setting for the PC │
    └──────────────────────────────────────────────┘
                           │
    ┌──────────────────────────────────────────────┐
    │ (b) Connection of the LAN cable              │
    └──────────────────────────────────────────────┘
                           │
    ┌──────────────────────────────────────────────┐
    │ (c) Registration of a new DF in the Hitachi Storage │
    │     Navigator Modular 2                      │
    └──────────────────────────────────────────────┘
                           ▼
                    ┌─────────────┐
                    │     END     │
                    └─────────────┘
```

(1) Checking the LAN environment setting

(a) Make sure that the Hitachi Storage Navigator Modular 2 has been installed.

(b) Check the LAN environment setting for the PC

Make sure that the following settings have been made, or change the settings to the following.

(b-1) In case of the IPv4 environment

(i) Make the setting of the IP Address to be set to the PC as Item 1 in Table 1.1.1.
   • CTL0: 10.0.0.16 (Input example : http://10.0.0.16/)

(ii) If it is not connectable, by setting the values of Item 2 to Item 5 in Table 1.1.1, specify the connectable value and perform the WEB connection.
   • According to the setting value of "Maintenance PC" of Items 2 to 5 on Table 1.1.1, set the IP Address and the Subnet Mask of the Maintenance PC.
   • According to the "Array (LAN port for maintenance)" information of Items 2 to 5 on Table 1.1.1, enter into "Address" of the WEB browser and connect with the array.

(iii) If not connected yet, refer to Troubleshooting "3.4 Procedure for Specifying Maintenance Port IP Address" (TRBL 03-0120).

Table 1.1.1   Operational Environment (IPv4)

No.	Array (LAN port for maintenance)		Maintenance PC	
	IP Address	Subnet Mask	IP Address	Subnet Mask
1	CTL 0: 10.0.0.16 CTL 1: 10.0.0.17 (At the time of shipment)	255.255.255.0 (At the time of shipment)	10.0.0.2 to 0.0.0.9	255.255.255.0
2	CTL 0: 192.168.0.16 CTL 1: 192.168.0.17	255.255.255.0	192.168.0.2 to 192.168.0.9	255.255.255.0
3	CTL 0: 192.168.233.16 CTL 1: 192.168.233.17	255.255.255.0	192.168.233.2 to 192.168.233.9	255.255.255.0
4	CTL 0: 172.23.211.16 CTL 1:172.23.211.17	255.255.255.0	172.23.211.2 to 172.23.211.9	255.255.255.0
5	CTL 0: 10.197.181.16 CTL 1:10.197.181.17	255.255.255.0	10.197.181.2 to 10.197.181.9	255.255.255.0

(b-2) In case of the IPv6 environment

（ⅰ）Make the setting of the IP Address to be set to the PC as Item 1 in Table 1.1.2.
- CTL0: fe80::16 (Input example : http://[fe80::16]/)
  When connecting on WEB by the IPv6 address, put the address in brackets ([ ]).

(ⅱ) If it is not connectable, set the value of Item 2 in Table 1.1.2, and perform the WEB connection.
- According to the setting value of "Maintenance PC" of Item 2 on Table 1.1.2, set the IP Address and the Subnet Mask of the Maintenance PC.
- According to the "Array (LAN port for maintenance)" information of Item 2 on Table 1.1.2, enter into "Address" of the WEB browser and connect with the array.

(ⅲ) If not connected yet, refer to Troubleshooting "3.4 Procedure for Specifying Maintenance Port IP Address" (TRBL 03-0120).

Table 1.1.2   Operational Environment (IPv6)

| No. | Array (LAN port for maintenance) | | Maintenance PC | |
	IP Address	Length of subnet prefix	IP Address	Subnet prefix
1	CTL0: fe80::16 CTL1: fe80::17 (At the time of shipment)	64 (At the time of shipment)	Automatic	Automatic
2	CTL0: fe80::f6 CTL1: fe80::f7	64	Automatic	Automatic

- Manual change of the network parameter of the Maintenance port
  When the User management port is set as the same network address as the Maintenance port, the communication cannot be made normally. Prepare five patterns of the network parameter fixed values to be used in the Maintenance port, and change the network parameter fixed values to be used in the Maintenance port manually by the network parameter of the User management port.
  Therefore, in the work other than the installation work of the array at shipment, the maintenance LAN Port for the WEB connection is set to any of Items 1 to 5 in Table 1.1.1 in case of the IPv4 environment and set to either Item 1 or 2 in Table 1.1.2 in case of the IPv6 environment.

> NOTE : When the network address of the LAN device, which is connected via the Gateway in the extension of the user management port, is the same as that of the Maintenance port, the communication cannot be made normally because of the conflict between them.
> Therefore, use a value other than the network address set to the maintenance port for the LAN device connected to the port for the user management via Gateway. Or change the IP address of the maintenance port to a value other than the network address of the LAN device connected via Gateway by Hitachi Storage Navigator Modular 2. (Refer to "7.1 Setting Maintenance LAN" (SYSPR 07-0000).)

(c) Make sure that negotiation of Maintenance PC is set to auto negotiation.
  To check negotiation of Maintenance PC, refer to Troubleshooting "3.1 (6) Procedure for setting negotiation" (TRBL 03-0060).

(2) Connecting the LAN cross cable
Connect the maintenance LAN connector of Controller #0 (Management Module #0 in case of CBL) and the LAN connector of the service PC via the LAN cross cable.
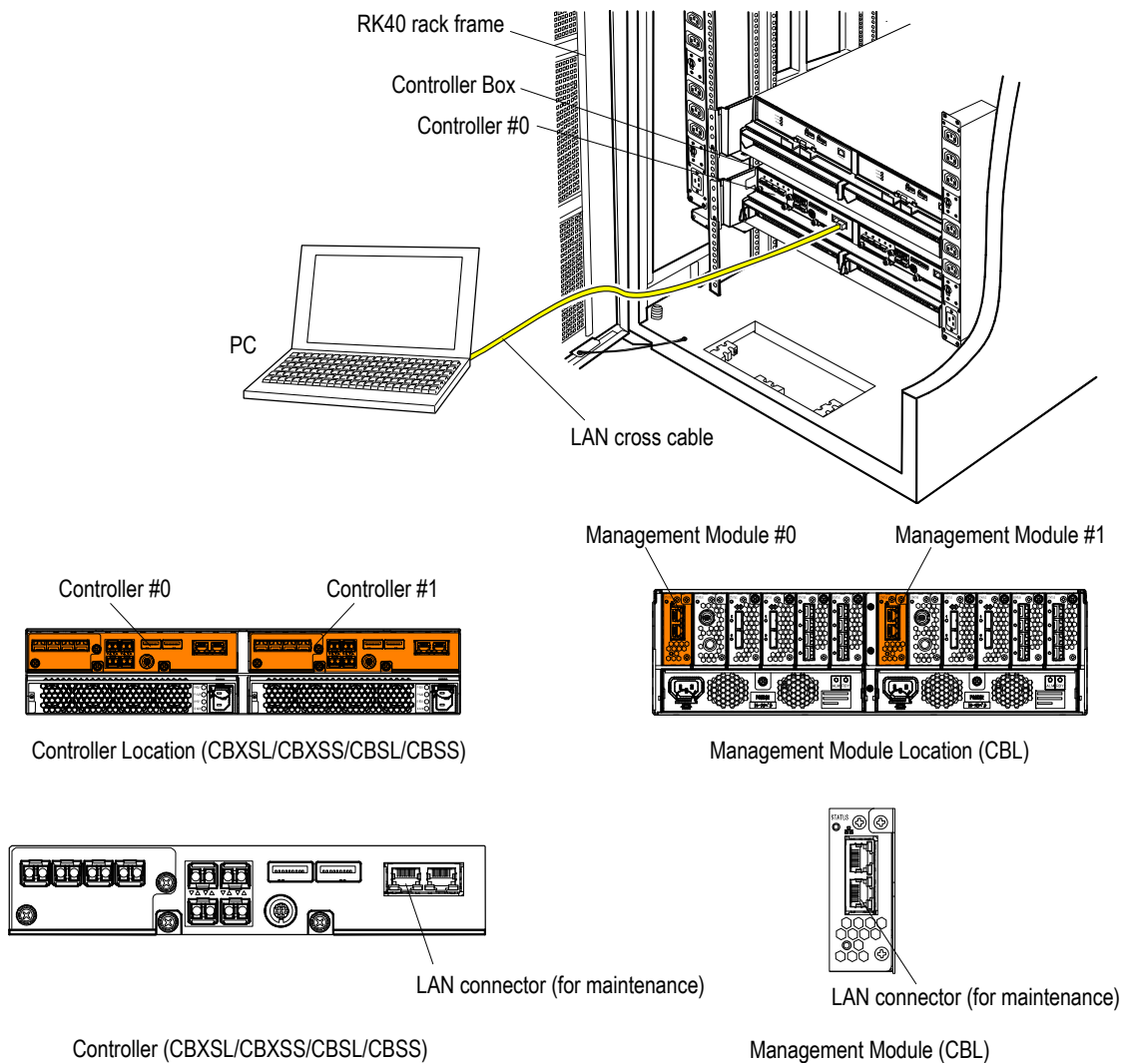

Figure 1.1.1   Connecting the LAN Cable

(3) Cautions at the time of Hitachi Storage Navigator Modular 2 use

  (a) Installing a JRE (Java Runtime Environment)

    Installing a JRE and setting a parameter are necessary to display the Applet screen of the Hitachi Storage Navigator Modular 2.

    The JRE download from "http://java.com/en/download/, and then install JRE".

    Set the parameter according to the following procedures.

    (i) In the Windows Start menu, select the [Settings] - [Control Panel].

    (ii) From the Control Panel, select the [Java].

    (iii) Click [View] of the upper position in the Java tab.

    (iv) Enter "-Xmx464m" to the Java Runtime Parameters field.

       It is necessary to set the Java Runtime Parameters to display the Applet screen.

    (v) Click [OK].

    (vi) Click [OK] in the Java tab.

    (vii) Close the Control Panel.

  (b) Changing the Connection Address for Applet Screen

    Make the change only when you want to change the IP address of the service PC in which Hitachi Storage Navigator Modular 2 has been already installed. If you only change the connection address, the Applet screen will not be displayed.

    To change the connection address used to display the Applet screen of Hitachi Storage Navigator Modular 2, operate it in the following procedure. The address specified at the time of the installation is set for the default address. Specify the IP address of the installed service PC.

    (i) Open [Setting] - [Control Panel] from the start menu of Windows of the Service PC. Select the "SNM2 Server" from the service (local) lists of the [Administrative Tools] - [Services], and select the stop.

    (ii) If there are other products to use HiCommand Suite Common Components, stop the service (daemon process) [‡1].

    (iii) Stop the service (daemon process) for the HiCommand Suite Common Components.

    (iv) Edit setting file (servery\snmserver.properties) and change the connection address. For Windows:

       The jp.co.Hitachi.strdiskarray.rmi.hostname in the "C:\Program Files\HiCommand\StorageNavigatorModular\server\snmserver.properties" file specifies the connection address.   Rewrite to a connection address you want to change.

    (v) Start the service (daemon process) for the HiCommand Suite Common Components.

    (vi) Open [Setting] - [Control Panel] from the start menue of Windows of the Service PC. Select the "SNM2 Server" from the service (local) lists of the [Administrative Tools] - [Services], and select the start.

    (vii) If there are other products to use HiCommand Suite Common Components, start the service (daemon process) [‡1].

---

‡1 : For more information about how to stop or start the service (daemon process), refer to "Hitachi Storage Navigator Modular 2 Graphical User Interface (GUI) User's Guide".

(c) Changing the Web screen function is not supported.

Hitachi Storage Navigator Modular 2 does not support the window change function of a Web browser.

The following operation procedures are for Internet Explorer to return to the Web window displayed at the last minute. However, if Hitachi Storage Navigator Modular operates them, the window may not change.

(i) Press the Back space key.

(ii) Press ← key while holding down the Alt key.

(iii) Select "Back" of the menu displayed by right-clicking.

If you perform any of the above (i), (ii) and (iii) on the window displayed by clicking the Create or Edit button with Hitachi Storage Navigator Modular 2, the window of "Now loading." is displayed and it may not change. In this case, press the ✕ (Close) button at the top right of the window to close it, and operate it again.

(4) Registering the newly introduced array in the Hitachi Storage Navigator Modular 2

  (a) Activating the Hitachi Storage Navigator Modular 2

    (ⅰ) Check if "SNM2 Server" of the service PC is started from "Services" of "Administrative Tools" of the Control Panel of the Windows.
If not started, make it "Start".

    (ii) Start the browser, and specify an address as follows.
<When connecting with http>
"http://xxxx:23015/StorageNavigatorModular/"
<When connecting with https>
"https://xxxx:23016/StorageNavigatorModular/"
xxxx : IP address of the service PC.

> NOTE : • The https is invalid in the status immediately after the installation. Refer to the "Hitachi Storage Navigator Modular 2 Graphical User Interface (GUI) User's Guide" for the method to enable https.
> • When the display of the menu, etc. on the window is broken, select the color palette from the property of the window, and make it other than True Color and 65536 or less.

    (ⅲ) Two windows, a title window and a login window, are displayed automatically.
When the user is registered in Hitachi Storage navigator Modular 2, enter the registered contents in the user ID and the password, and click the login button.

> NOTE : • When Hitachi Storage Navigator Modular 2 was newly installed, enter the temporarily registered user ID "system" and password "manager".
> • If the login window is not displayed automatically, the popup may be blocked. Cancel the popup block.
> Usually, "Popup is blocked" is displayed on the top of the browser. Click this display and select "Popup in this site is always allowed".

(iv) The Hitachi Storage Navigator Modular 2 is activated in the Normal Mode and the main window is displayed[‡1].

When the device is not registered, operate it from "(b) Array registration (ii)" (SYSPR 01-0090).

You can execute the display of the Hitachi Storage Navigator Modular 2 Operation Mode and state of the failure monitoring and the following functions in the main window.
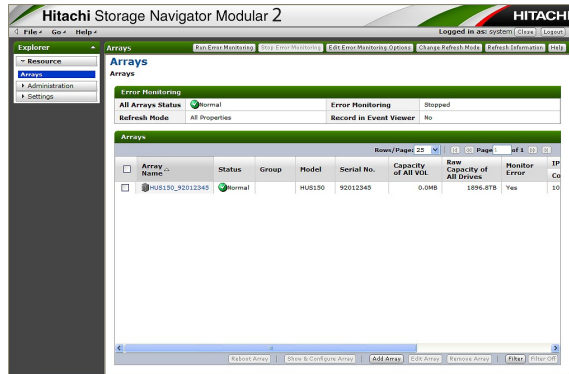For the operation of each function, refer to the page explaining each function.

- Registration of the disk array system (registration, deletion, change, and properties display)
- Execution of the failure monitoring and setting of the failure monitoring option
- Change of the Operation Mode
- Display of the version

---

‡1 : The mode change cannot be done at the time of the initial activation of the Hitachi Storage Navigator Modular 2.
A registration of a password validates the mode change.

(b) Array registration

Register the array to be operated in order to operate it from the Hitachi Storage Navigator
Modular 2. A registration of a non-existent array cannot be done.

（ⅰ）Click the [Add Array] button in the "Arrays" window of the main window.

(ⅱ) "HSNM2_Add Array Wizard" window is displayed.

(ⅲ) The array register is searched. Specify a search method and a range to search by a host
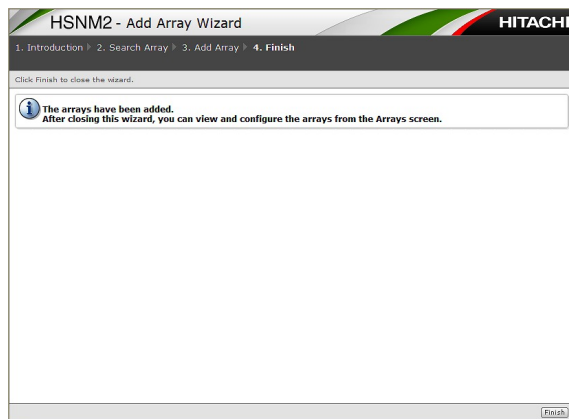name or an IP address.

(iv) The search result is displayed. Specify the array to register, and click the [Next] button.
When the "IP Address or Array Name" is selected, this window is not displayed.

NOTE : • The array with the dual system can also be used with a single Controller only.
• Enter the IP address only in the Controller to which the LAN cable is
connected. If the IP address is entered in a Controller to which the LAN cable
is not connected, an error is caused.
• In the single Controller configuration, the array whose status on Controller #0
side is uninstalled, the array registration cannot be performed.

(v) When a message informing of a completion of the registration is displayed, click the
[Finish] button.

(vi) The updated main window is displayed.

(c) Changing the Maintenance Mode

Hitachi Storage Navigator Modular 2 has three Active Modes, that is, the Normal Mode, Management Mode, and Maintenance Mode. In the Normal Mode, the program displays the configuration and statuses of the array. In the Management or Maintenance Mode, it can set the configuration of the array in addition to the function in the Normal Mode. The mode when Hitachi Storage Navigator Modular 2 starts is a Management Mode.

(i) Changing the Normal Mode to the Maintenance Mode

Change the Operation Mode from the Normal Mode to the Maintenance Mode.

① Check that the "mode" file exists in the following directory.

If it exists, go to Procedure ④.

\HiCommand\StorageNavigatorModular\conf

② If there is no mode file, create a mode file (without extension) and write the following letters in one line. However, do not insert line feeds.

StorageNavigatorModular

Figure 1.1.2   Mode File

③ Store the created mode file in the following place.

\HiCommand\StorageNavigatorModular\conf

④ Put a checkmark in the array to operate on the main window, and press the [Ctrl] key, [Shift] key and the [E] key at the same time.[‡1]

It is displayed as "maintenance mode" in [Operation Mode] of the upper part of the main window, and Hitachi Storage Navigator Modular 2 is operated in the maintenance mode.

---

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2

When it cannot be accessed the array from the Hitachi Storage Navigator Modular 2 due to the duplication of the LAN Port Number, the access will be possible by changing the LAN Port Number which the Hitachi Storage Navigator Modular 2 uses.

- "Inspect skinny" option that is the VoIP function option of firewall of Cisco is effective, and the Hitachi Storage Navigator Modular 2 cannot access to the array through the firewall. In this case, it is necessary to change in LAN port number.

(1) Prerequisites

The LAN Port Number can be changed by the Hitachi Storage Navigator Modular 2 only when the prerequisites described below are all satisfied.

- The Hitachi Storage Navigator Modular 2 is available connecting to the LAN port of both Controllers.

> NOTE : It is possible to change the LAN port number for every Controller from the user port management port. Refer to "7.3 Setting LAN Port Number" (SYSPR 07-0100).

(2) Restrictions

The LAN Port Number cannot be changed in the following conditions.

- While the LAN port to be changed is used in the other application or the failure monitor. In this case, change the LAN Port Number after stopping the program that is activated.

(3) Points of concern

When using this function, consider the following points.

- Use the number not used in the connected network in the range of 1024 to 49151 for the LAN Port Number that can be changed.
- When the HiCommand are used, the setting needs to be changed.
- When the initialization of the array and initial setup of the firmware are performed, the set LAN Port Number returns to the initial value (2000).
- When changing the LAN Port Number, set the same LAN Port Number for both Controllers, and change the port number of all the arrays at the site concerned to the same number.
- When the LAN Port Number set to the array and the LAN Port Number described in the services file in the PC to be connected do not correspond, the PC cannot be connected to the LAN port of array. When the PC cannot be connected to the LAN port of array after changing the LAN Port Number, check the LAN Port Number of the array and the LAN Port Number described in the services file in the PC.

(4) Procedure of changing LAN Port Number
Refer to "7.3 Setting LAN Port Number" (SYSPR 07-0100).
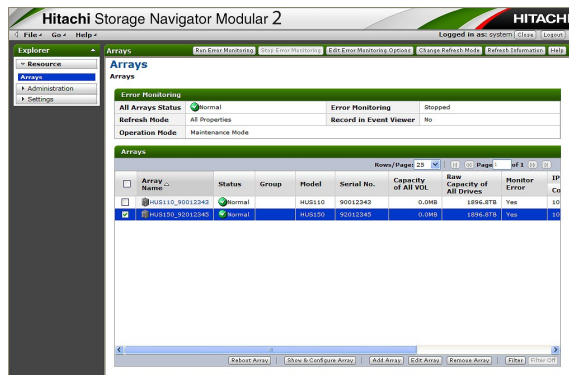
Chapter 2.   Component Status

Display the array component status and information by using icons.

When you double-click each icon, the information of the component part indicated by the icon is displayed.
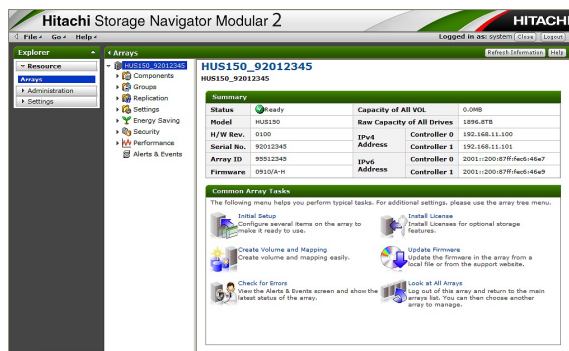
(1) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode". [‡1]

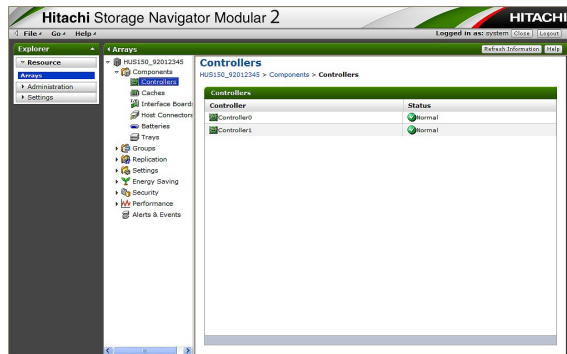Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(2) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

---

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(3) When displaying components, click [Component].

(4) A status is displayed by clicking [Controllers], [Caches], [I/O Modules], [Host Connectors], [Batteries] or [Trays] of the tree.
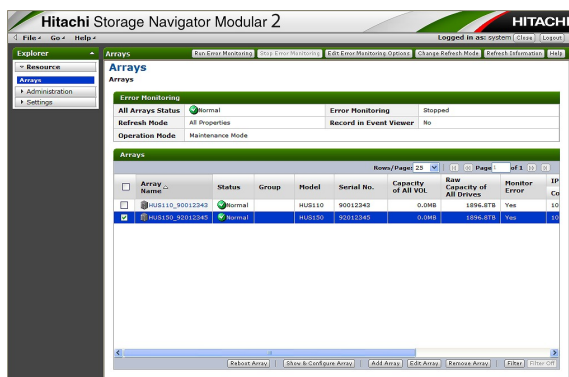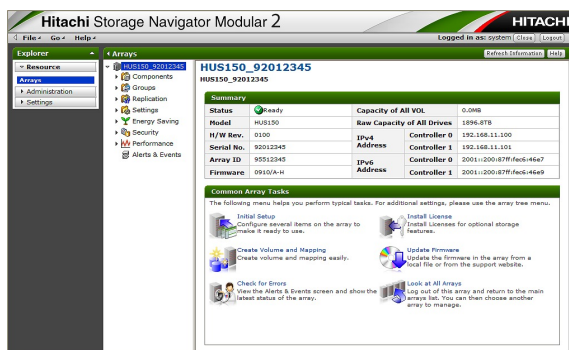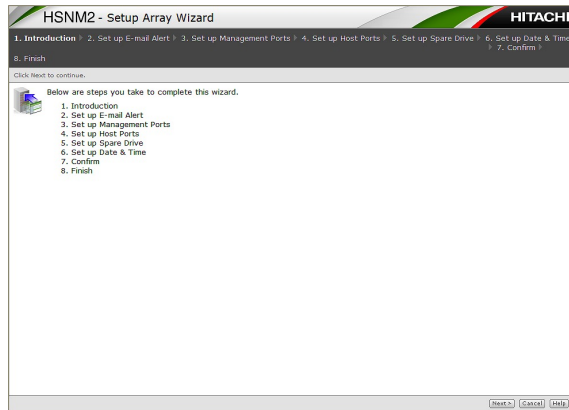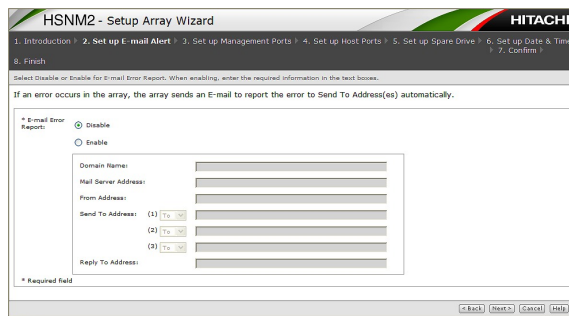
Chapter 3.   Wizard

3.1   Initial Setup

(1) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(2) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

(3) Click the [Initial Setup] in the window.

---

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

---

(4) Make the set up following the procedure in the widow.

(5) Click the [Next] button.

(6) Set the "E-mail Alert".

(7) Click the [Next] button.

(8) Set the "Management Ports".

① [Protocol]   : Selects protocol.
- Go to ② when selecting IPv4 protocol.
- Go to ④ when selecting IPv6 protocol.

<When selecting IPv4 protocol>

② [Controller 0] : Sets the LAN parameter of Controller 0.
Select a setting method. If [Use DHCP] is checked, the DHCP mode is enabled.
If [Set Manually] is checked, it is specified manually.

[IPv4 Address]   : The IP Address is set.
The IP address in the same network address as the network address of the IP address currently specified for the port for the maintenance cannot be set.

[IPv4 Subnet Mask] : Subnet Mask is set.

[IPv4 Default Gateway] : Default Gateway is set.
The same IP address as the IP address currently specified for the port for the maintenance cannot be set to the default gateway.
When network address of the default gateway is different from network address of IP address, the gateway address cannot be set. If no Gateway address is specified, set "0.0.0.0".

[Negotiation]   : Set the negotiation with the device connecting to the array.
Set it to match with the device to connect.
You cannot set different values for IPv4 protocol and IPv6 protocol because the negotiation setting is common to the case where IPv6 protocol is used.

③ [Controller 1] : Sets the LAN parameter of Controller 1.

Select a setting method. If [Use DHCP] is checked, the DHCP mode is enabled.

If [Set Manually] is checked, it is specified manually.

[IPv4 Address]   : The IP Address is set.

The IP address in the same network address as the network address of the IP address currently specified for the port for the maintenance cannot be set.

[IPv4 Subnet Mask] : Subnet Mask is set.

[IPv4 Default Gateway] : Default Gateway is set.

The same IP address as the IP address currently specified for the port for the maintenance cannot be set to the default gateway.

When network address of the default gateway is different from network address of IP address, the gateway address cannot be set. If no Gateway address is specified, set "0.0.0.0".

[Negotiation]   : Set the negotiation with the device connecting to the array.

Set it to match with the device to connect.

You cannot set different values for IPv4 protocol and IPv6 protocol because the negotiation setting is common to the case where IPv6 protocol is used.

< When selecting IPv6 protocol >

④ [Controller 0] : Sets the LAN parameter of Controller 0.

Select a setting method. When you check [Set Automatically], the IPv6 address automatic acquisition mode is enabled.

If [Set Manually] is checked, it is specified manually.

[IPv6 Address]   : The IP Address is set.

The IP address in the same network address as the network address of the IP address currently specified for the port for the maintenance cannot be set.

Set the IP address other than the multicast address (fe00::/8), loopback address (::1) and unset (::). Do not set the link local address (fe80::/10) because it may duplicate the link local address that the array automatically generates.

[IPv6 Default Gateway] : Default Gateway is set.

The same IP address as the IP address currently specified for the port for the maintenance cannot be set to the default gateway.

When network address of the default gateway is different from network address of IP address, the gateway address cannot be set. Input is not required when the default gateway is unused.

[Negotiation] : Set the negotiation with the device connecting to the array.
Set it to match with the device to connect.
You cannot set different values for IPv4 protocol and IPv6 protocol because the negotiation setting is common to the case where IPv4 protocol is used.

⑤ [Controller 1] : Sets the LAN parameter of Controller 1.
Select a setting method. When you check [Set Automatically], the IPv6 address automatic acquisition mode is enabled.
If [Set Manually] is checked, it is specified manually.

[IPv6 Address] : The IP Address is set.
The IP address in the same network address as the network address of the IP address currently specified for the port for the maintenance cannot be set.
Set the IP address other than the multicast address (fe00::/8), loopback address (::1) and unset (::). Do not set the link local address (fe80::/10) because it may duplicate the link local address that the array automatically generates.

[Length of Subnet Prefix] : Set the length of subnet prefix. The standard length is 64.

[IPv6 Default Gateway] : Default Gateway is set.
The same IP address as the IP address currently specified for the port for the maintenance cannot be set to the default gateway.
When network address of the default gateway is different from network address of IP address, the gateway address cannot be set. Input is not required when the default gateway is unused.

[Negotiation] : Set the negotiation with the device connecting to the array.
Set it to match with the device to connect.
You cannot set different values for IPv4 protocol and IPv6 protocol because the negotiation setting is common to the case where IPv4 protocol is used.

Table 3.1.1 Operational Environment (IPv4)

No.	Array (LAN port for maintenance)		Maintenance PC	
	IP Address	Subnet Mask	IP Address	Subnet Mask
1	CTL 0: 10.0.0.16 CTL 1: 10.0.0.17 (At the time of shipment)	255.255.255.0 (At the time of shipment)	10.0.0.2 to 0.0.0.9	255.255.255.0
2	CTL 0: 192.168.0.16 CTL 1: 192.168.0.17	255.255.255.0	192.168.0.2 to 192.168.0.9	255.255.255.0
3	CTL 0: 192.168.233.16 CTL 1: 192.168.233.17	255.255.255.0	192.168.233.2 to 192.168.233.9	255.255.255.0
4	CTL 0: 172.23.211.16 CTL 1:172.23.211.17	255.255.255.0	172.23.211.2 to 172.23.211.9	255.255.255.0
5	CTL 0: 10.197.181.16 CTL 1:10.197.181.17	255.255.255.0	10.197.181.2 to 10.197.181.9	255.255.255.0

Table 3.1.2   Operational Environment (IPv6)

No.	Array (LAN port for maintenance)		Maintenance PC	
---	IP Address	Length of subnet prefix	IP Address	Subnet prefix
1	CTL0: fe80::16 CTL1: fe80::17 (At the time of shipment)	64 (At the time of shipment)	Automatic	Automatic
2	CTL0: fe80::f6 CTL1: fe80::f7	64	Automatic	Automatic

(9) Click the [Next] button.

(10) Set the "Host Ports".

(a) In case of FC

(b) In case of iSCSI(IPv4)

(c) In case of iSCSI(IPv6)

(11) Click the [Next] button.

(12) Set the "Spare Drive".

(13) Click the [Next] button.

(14) Set the "Date & Time".

(15) Click the [Next] button.

(16) Confirm the set contents.

  (a) Verifying E-mail Alert

  (b) Verifying Management Ports

    (i) In case of IPv4

(ii) In case of IPv6

(c) Verifying Host Ports

(i) In case of FC

(ii) In case of iSCSI(IPv4)

(iii) In case of iSCSI(IPv6)

(d) Verifying Spare Drives, Date & Time

(17) Click the [Confirm] button.

(18) Click the [Finish] button.

3.2 Creating and Mapping Volume

(1) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]
Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(2) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

(3) Click the [Create Volume and Mapping] in the window.

---

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(4) Make the setup following the procedure in the widow.

(5) Click the [Next] button.

(6) Set the "Create or select RAID group/DP pool".

Hitachi Storage Navigator Modular 2 is less than Ver.23.00

Hitachi Storage Navigator Modular 2 is Ver.23.00 or more, less than 23.70.

Hitachi Storage Navigator Modular 2 is Ver.23.70 or more, less than 27.00.

Hitachi Storage Navigator Modular 2 is Ver.27.00 or more

(7) Click the [Next] button.

(8) Set the "Create or select volumes".

(9) Click the [Next] button.

(10) Set the "Create or select host group/iSCSI target".

(a) In case of FC

(b) In case of iSCSI

(11) Click the [Next] button.

(12) Set the "Connect to hosts".

(13) Click the [Next] button.

(14) Confirm "Create or select RAID group", "Create or select DP pool".

(15) Click the [Next] button.

(16) Confirm "Create or select volumes".

(17) Click the [Next] button.

(18) Confirm "Create or select host group", "Connect to hosts".

(19) Click the [Confirm] button.
(20) Click the [Finish] button.

For additionally creating volumes, click the [Create & Map More VOL] button.

3.3 Install License

(1) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]
Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(2) Click the array name, and open the unit window.

NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

(3) Click the [Install License] in the window.

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(4) "License" is unlocked.

- • When you unlock the options using the key file, click the [Key File:] radio button, and then set up the path for the key file. The [Browse] button is used, the path to a key file can be set correctly.
- • When you unlock the option using the key code, click the [Key Code:] radio button, then set up the key code. For the key code of the priced optional features, refer to the priced optional features manual.

(5) Click the [OK] button.

(6) The confirmation message is displayed. Click the [Confirm] button.

(7) The confirmation message is displayed. Click the [Close] button.

(8) Click the [OK] button.

Chapter 4.   Setting the RAID/Volume/Spare Drive

This function performs the RAID group setting, Volume setting, Volume formatting, and Spare Drive setting.

4.1   Flow of Setting the RAID Group/Volume/Spare Drive

```
                              ( START )
                                  │
                     ┌────────────────────────┐  No
                     │ Is a RAID group newly   ├────────────┐
                     │ created?                │            │
                     └────────────┬───────────┘            │
                              Yes │                         │
          ┌───────────────────────┐       ┌────────────────────────┐  No
          │ Preparing of setting   │       │ Is change of RAID group ├──────────────┐
          │ RAID group             │       │ required?               │              │
          │ "4.2.1 Preparing and   │       └────────────┬───────────┘              │
          │ Confirming RAID Group  │                Yes │                          │
          │ Setting" (SYSPR        │       ┌────────────────────────┐  No          │
          │ 04-0030)               │       │ Do you expand the RAID  ├──────────┐   │
          └───────────┬───────────┘       │ group?                  │          │   │
                      │                    └────────────┬───────────┘          │   │
          ┌───────────────────────┐              Yes │                         │   │
          │ Creating RAID group    │       ┌────────────────────────┐  ┌────────────────────────┐
          │ "4.2.2 Creating RAID   │       │ Expansion RAID group    │  │ Preparing of setting    │
          │ Group" (SYSPR          │       │ "4.2.5 Expanding the    │  │ RAID group              │
          │ 04-0050)               │       │ RAID Group"             │  │ "4.2.1 Preparing and    │
          └───────────┬───────────┘       │ (SYSPR 04-0130)         │  │ Confirming RAID Group   │
                      │                    └────────────┬───────────┘  │ Setting" (SYSPR 04-0030)│
          ┌───────────────────────┐       ┌────────────────────────┐  └────────────┬───────────┘
          │ Verifying RAID group   │       │ Verifying RAID group    │  ┌────────────────────────┐
          │ "4.2.3 Verifying the   │       │ "4.2.3 Verifying the    │  │ Deleting RAID group     │
          │ RAID Group" (SYSPR     │       │ RAID Group" (SYSPR      │  │ "4.2.4 Deleting RAID    │
          │ 04-0090)               │       │ 04-0090)                │  │ Group" (SYSPR 04-0100)  │
          └───────────┬───────────┘       └────────────┬───────────┘  └────────────┬───────────┘
                      │                                 │               ┌────────────────────────┐
                      │                                 │               │ Creating RAID group     │
                      │                                 │               │ "4.2.2 Creating RAID    │
                      │                                 │               │ Group" (SYSPR 04-0050)  │
                      │                                 │               └────────────┬───────────┘
                      │                                 │               ┌────────────────────────┐
                      │                                 │               │ Verifying RAID group    │
                      │                                 │               │ "4.2.3 Verifying the    │
                      │                                 │               │ RAID Group" (SYSPR      │
                      │                                 │               │ 04-0090)                │
                      │◄────────────────────────────────┴───────────────┘
                      │
          ┌───────────────────────┐  No
          │ Verify RAID group OK?  ├───────────────────────────────────────┐
          └───────────┬───────────┘                                        │
                  Yes │◄────────────────────────────────────────────────────┘
          ┌───────────────────────┐  Yes
          │ Is a volume newly      ├────────────┐
          │ created?               │            │
          └───────────┬───────────┘            │
                   No │                         │
                  ( A ) To SYSPR 04-0010     ( B ) To SYSPR 04-0010
```

From SYSPR 04-0000 (A)

From SYSPR 04-0000 (B)

Preparing of setting volume
"4.3.1 Preparing for Setting Volume"
(SYSPR 04-0290)

Creating volume
"4.3.2 Creating Volume" (SYSPR 04-0310)

Verifying volume
"4.3.3 Verifying the Volume" (SYSPR 04-0250)

Verify volume OK? —— Yes ——→ (C) To SYSPR 04-0020

No

Is a volume deleted? —— No ——→

Yes

Deleting volume
"4.3.4 Deleting Volume" (SYSPR 04-0430)

Do you expand the volume? —— No ——→

Yes

Preparing of setting volume
"4.3.1 Preparing for Setting Volume"
(SYSPR 04-0290)

Expanding volume
"4.3.5 Changing the Capacity of Volumes" (SYSPR 04-0460)

Creating volume
"4.3.2 Creating Volume" (SYSPR 04-0310)

Yes —— Do you reduce the volume?

Reducing volume
"4.3.5 Changing the Capacity of Volumes" (SYSPR 04-0460)

No

Verifying volume
"4.3.3 Verifying the Volume" (SYSPR 04-0420)

No —— Verify volume OK?

Yes

(C) To SYSPR 04-0020

From SYSPR 04-0010

(C)

```
┌─────────────────────────────────┐
│    Formatting volume            │
│ "4.3.6  Formatting Volume" (SYSPR 04-│
│ 0500)                           │
└─────────────────────────────────┘
```

⬡ Is Spare Drive change required? ───── No

Yes

```
┌─────────────────────────────────┐
│  Preparing of setting Spare Drive│
│ "4.4.1  Preparing for Setting Spare│
│ Drive" (SYSPR 04-0640)          │
└─────────────────────────────────┘
```

```
┌─────────────────────────────────┐   ┌─────────────────────────────────┐
│    Setting Spare Drive          │   │    Deleting Spare Drive         │
│ "4.4.2  Setting Spare Drive" (SYSPR 04-│   │ "4.4.3  Deleting Spare Drive" (SYSPR│
│ 0650)                           │   │ 04-0660)                        │
└─────────────────────────────────┘   └─────────────────────────────────┘
```

```
┌─────────────────────────────────┐
│    Verifying Spare Drive        │
│ "4.4.4  Verifying the Spare Drive"│
│ (SYSPR 04-0670)                 │
└─────────────────────────────────┘
```

⬡ Verify Spare Drive OK? ───── No

Yes

(END)

4.2   Setting RAID Group

This function is used for creating, expanding, deleting and referring to the RAID group. This function is available in the array ready state. (The array does not need to be re-booted.)

> NOTE : Deletion of a RAID group indicates that all the user data of the deleted RAID group are lost. Before deleting the RAID group, back up the user data.
> For the RAID group and RAID levels which can be set by this device, refer to Introduction "3.7 Setting RAID Group" (INTR 03-0420).

4.2.1   Preparing and Confirming RAID Group Setting

(1) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]
Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(2) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

---

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(3) Select [Groups] – [Volumes] on the unit window, and click the [RAID Groups] tab.

Volumes and RAID groups defined for the arrays are displayed.

        [Volumes]   : Information on all Volumes defined for the array is displayed.

        [RAID Groups]   : Information on all RAID groups defined for the array is displayed.

[RAID Groups]   : [RAID Group]   : A number of the RAID group is displayed.

                     [RAID Level]   : A RAID level that has been specified is displayed.

                     [Total Capacity] : A whole capacity of a RAID group is displayed.

                     [Free Capacity]   : A remaining capacity of a RAID group is displayed.

                     [Drive Type/RPM]: A type of a drive assigned to a RAID group is displayed.

                     [Encryption][‡1]   : An encryption of the RAID group is displayed.

                     [RG Expansion Priority]: The priority when performing the RAID Group expansion is displayed.

                     [Status]   : The status of the RAID Group expansion is displayed.

                     [Reconstruction Progress] : The progress ratio of the RAID group is displayed or the number of recoverable Drives (HDU) and volume is displayed.

• When creating the RAID group, go to "4.2.2 Creating RAID group" (SYSPR 04-0050).

• When deleting the RAID group, go to "4.2.4 Deleting RAID group" (SYSPR 04-0100).

• When expanding the RAID group, go to "4.2.5 Expanding the RAID group" (SYSPR 04-0130).

• When verifying RAID group [OK], go to "4.3 Setting Volume" (SYSPR 04-0250).

---

‡1 : It is displayed in the Hitachi Storage Navigator Modular 2 Ver.27.00 or more and firmware Ver.0970/A or more.

4.2.2   Creating RAID Group

(1) When creating a RAID group by selecting a drive manually

(a) Select the [RAID Groups] tab on the unit window, and then click the [Create RG] button.

(b) The [Create RAID Group] dialog is displayed. Select or enter [RAID Group], [RAID Level], [Combination], and [Number of Parity Groups].

(c) Select [Manual Selection] in [Drives], and put checkmarks in all Drives to set in the RAID Group from [Assignable Drives].

(d) Click the [OK] button.

(e) The confirmation window is displayed. Click the [Close] button.

(f) The screen from which a RAID group was updated is displayed.

- When creating two or more RAID groups, return to "4.2.2 Creating RAID group" (SYSPR 04-0050), and set RAID groups as needed.
- When verifying RAID group [OK], go to "4.3 Setting Volume" (SYSPR 04-0250).
- When verifying RAID group [NG], go to "4.2.4 Deleting RAID group" (SYSPR 04-0100).

(2) When the Drive is selected automatically and the RAID group is created

    (a) Select the [RAID Groups] tab on the unit window, and then click the [Create RG] button.

    (b) The [Create RAID Group] dialog is displayed. Select or enter [RAID Group], [RAID Level], [Combination] and [Number of Parity Groups].

    (c) Check [Automatic Selection] in [Drives], select [Drive Type/RPM] and [Drive Capacity], and then click the [OK] button.

    (d) When the capacity of the Drive (single unit) to be created in the RAID group exceeds the capacity of the Spare Drive in the array, the error message is displayed.[‡1]
       When the confirmation window is displayed, click the [Close] button.

‡1 : Check the Drive capacity (referring to Subsection "4.6 Checking the Drive which Configures the RAID Group" (SYSPR 04-0710).), replace the Drive with that having the appropriate capacity, and set the RAID group again.

(e) The screen from which a RAID group was updated is displayed.

- When creating two or more RAID groups, return to "4.2.2 Creating RAID group" (SYSPR 04-0050), and set RAID groups as needed.
- When verifying RAID group [OK], go to "4.3 Setting Volume" (SYSPR 04-0250).
- When verifying RAID group [NG], go to "4.2.4 Deleting RAID group" (SYSPR 04-0100)

4.2.3 Verifying the RAID Group

(1) Select [Groups] – [Volumes] on the unit window, and click the [RAID Groups] tab.

(2) Double-click the icon of the generated RAID Groups.

(3) Select the [Assigned Drives] tag. The setting made in "4.2.2 Creating RAID Group" (SYSPR 04-0050) can be referred.

- When creating two or more RAID groups, return to "4.2.2 Creating RAID group" (SYSPR 04-0050), and set RAID groups as needed.
- When verifying RAID group [OK], go to "4.3 Setting Volume" (SYSPR 04-0250).
- When verifying RAID group [NG], go to "4.2.4 Deleting RAID group" (SYSPR 04-0100).

4.2.4 Deleting RAID Group

The RAID Group can be deleted even when volumes are defined in the specified RAID group.

> NOTE : All user data is lost by deleting the RAID group and its associated volume.
> Backup user data before deleting the RAID group.

[Conditions of deletion]
- When the volume, whose status of the forced parity correction is any of "Parity Correction", "Waiting Parity Correction", "Waiting Drive Reconstruction", "Uncorrected", "Uncorrected and Drive Detached" and "Correction Aborted", is in the RAID group of the deletion target, this RAID group cannot be deleted.
  Change the status of the volume to "Restored" or "Correction Skipped" by executing or skipping the forced parity correction for this volume, and then delete the RAID group which has this volume.
- The RAID group cannot be deleted when Sub volumes of the Unified volume remain in the RAID group to be deleted. In the case of the finally defined Sub volume, delete the RAID group after separating the Sub volume from the Unified volume. If it is not the finally unified Sub volume, separate all the unified Sub volumes from the Main volume, and delete the RAID group after separating them from the Unified volume.
- The RAID group cannot be deleted when there are the following volumes in the RAID group to be deleted.
  - Volumes set to the pair of ShadowImage in-system replication
  - Volumes set to the pair of Copy-on-write SnapShot
  - Volumes set to the pair of TrueCopy remote replication
  - Volumes set to the pair of TrueCopy Extended Distance
  - Volumes set to the command device
  - DMLUs
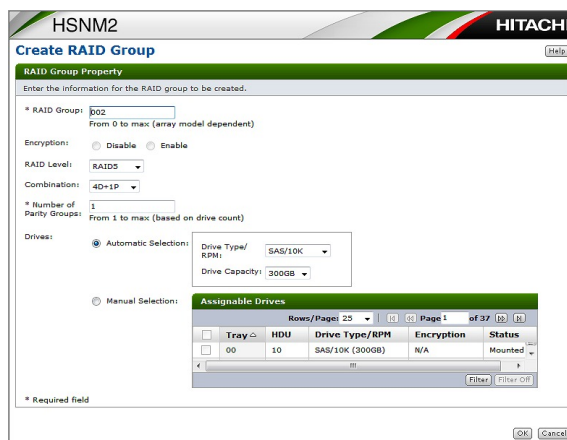 - Reserve volumes of Modular Volume Migration
  - Volumes registered in the data pool
- When the Dynamic sparing/Correction copy/Copy back is operating, delete the RAID group after the Drives are restored.
- When there are volumes executing the volume switching processing in the RAID group to be deleted, the RAID group cannot be deleted because the firmware is executing the internal processing. Wait for one minute or so, and delete the RAID group.
- When there are volumes of the pair whose status of Modular Volume Migration is COPY in the RAID group to be deleted, the RAID group cannot be deleted. Delete the RAID group after the pair status of Modular Volume Migration becomes PSUS.
- The RAID group cannot be deleted when there volumes whose attribute is any of "Read Only", "Protect" and "Can't Guard" in the Data Retention Utility setting, whose S-VOL setting is "Setting impossible (invalid)", and whose mode is either of "Read Capacity 0 (Zer)" and "Inquiry command shielding (Zer/Inv)". Set the attribute to "Read/Write" in the Data Retention Utility setting, the S-VOL setting to "Setting possible (valid)" and the mode to "Unset", and delete the RAID group.

- The RAID group whose power saving instruction is set by the Power Saving/Power Saving Plus functions cannot be deleted.
  Confirm with the customer that the power saving instruction is canceled and the power saving status is "Normal (Spinup)" and then delete the RAID group.
- You cannot delete the RAID group while rewriting the drive firmware. Delete the RAID Group after checking that "IZ0100 HDU firmware download end" is displayed in the Information Message on WEB.

(1) Select the [RAID Groups] tab on the unit window, and then click the [Delete RG] button.

(2) If the confirmation message is displayed. Click the [Confirm] button.
- When there is no formatted volume in a RAID group

- When there is a formatted volume in a RAID group

(3) Click the [Close] button.

(4) The screen from which selected RAID groups were deleted is displayed.

• When creating the RAID group, go to "4.2.2 Creating RAID group" (SYSPR 04-0050).

4.2.5 Expanding the RAID Group

For expanding the RAID group, you can expand the capacity of the RAID group online (access from the host is continued) by adding the drive to the specified RAID group. It also takes time because the reallocation of the user's data is executed in the background.
For expanding the RAID group, Hitachi Storage Navigator Modular 2 instructs the execution.
Only one RAID group is expanded in one execution instruction, but two or more instructions can be executed.
However, the RAID group expansion processing operates for the maximum of two RAID groups and other RAID groups become waiting.

[Notes]
- The host access performance deteriorates during the RAID group expansion. Especially, the volume in the RAID group which is expanding the RAID group is largely affected. Execute the RAID group expansion in a time zone with little host access.
- For expanding the RAID group, you can specify whether to give priority to the host access or the RAID group expansion (refer to "[Setting the priority of RAID group expansion]" (SYSPR 04-0200)). You can change the specification concerned online.
- If the data on the Cache memory volatilizes and data lost occurs as well as a drive failure occurs during the RAID group expansion due to a power failure, etc., the volume during the RAID group expansion may be unformatted. Therefore, obtain a backup before executing the RAID group expansion.
- The RAID group expansion is a function to expand the number of data drives (n of nD+mP) of the RAID group. You cannot change a RAID level (e.g. 4D+1P→4D+2P). However, you can expand the RAID group from RAID 1 to RAID 1+0. You cannot expand the RAID group of RAID 0.
- You can use the RAID group expansion only when the number of parity groups is one.
- You can use the added capacity at the time when the expansion processing of the RAID group concerned is completed.
- In one RAID group expansion, the number of drives that you can add is eight drives per RAID group.
- The Drive to add should be the same Drive type (SAS, SAS7.2K or Flash Drive) with the RAID group of the expansion target. Moreover, the capacity more than or equal to the minimum capacity drive in the RAID group of the expansion target is required.
- We strongly recommend that the Drive to add should be the same capacity and rotational speed as the RAID group of the expansion target to maximize the performance.
- When expanding the RAID group of RAID 1 or RAID 1+0, add Drives of 2×n (multiple number of 2).
- The progress and operational status of the RAID group expansion are taken over although the Sequential shutdown is executed.
- When PIN OVER occurs during the RAID group expansion, the RAID group expansion processing stops. The RAID group expansion processing restarts automatically after PIN Over recovers. (Refer to Troubleshooting "11.1.11 A Failure Occurred during Operation : Case 1 (PIN Over) (TRBL 11-0760)".)

- When the dynamic sparing/correction copy/copy back operates during the RAID group expansion, the RAID group expansion processing stops. If the dynamic sparing/correction copy/copy back is completed, the RAID group expansion processing restarts automatically.
- When the host I/O is executed for the volume during the RAID group expansion, the termination processing of the RAID group expansion may delay (maximum of 400 seconds).

[Conditions of expansion]
- When the volume whose status of the forced parity correction is any of "Parity Correction", "Waiting Parity Correction", "Waiting Drive Reconstruction", "Uncorrected", "Uncorrected and Drive Detached" and "Correction Aborted" is in the RAID group of the expansion target, you cannot expand this RAID group.
  Execute the forced parity correction for this volume, change the volume status to "Restored", and then execute the RAID group expansion.
- When the volume during the format is in the RAID group of the expansion target, you cannot expand the RAID group. Execute it after completing the format.
- If the following volumes are in the RAID group of the expansion target, you cannot expand the RAID group. Make the volume statuses other than the following, and then expand the RAID group.
  - Volumes set for a pair other than PSUS of ShadowImage in-system replication
  - Volumes set for a pair other than PAIR of Copy-on-write SnapShot
  - Volumes set for a pair other than PSUS of TrueCopy remote replication
  - Volumes set for a pair other than PSUS of TrueCopy Extended Distance
  - Volumes or reserve volume during Modular Volume Migration
  - Volumes in which Cache Residency Manager is set
  - DMLU
- If the array reboot is not executed after setting/changing Cache Partition Manager, you cannot expand the RAID group. Expand the RAID group after rebooting the array.
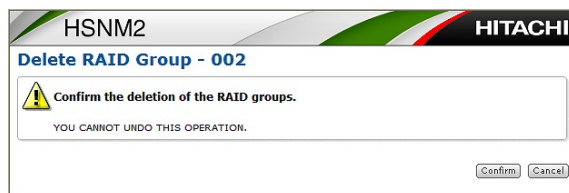- The RAID group whose power saving instruction is set by the Power Saving/Power Saving Plus functions cannot be expanded.
  Confirm with the customer that the power saving instruction is canceled and the power saving status is "Normal (Spinup)" and then expand the RAID group.
- When the volume under execution of the volume switching processing is in the RAID group of the expansion target, you cannot expand the RAID group because the firmware is executing the internal processing. Wait for about one minute, and then expand the RAID group.
- When the dynamic sparing/correction copy/copy back is operating, expand the RAID group after the drive is restored.
- You cannot expand the RAID group during the degeneration (drive failure occurs) and the RAID group that requires the copy back even though the data recovery to the spare drive is completed. Execute it after completing the Drive restoration.
- You cannot expand the RAID group while installing the firmware. Expand the RAID group after completing the firmware installation.
- You cannot expand the RAID group while rewriting the drive firmware. Expand the RAID group after checking that "IZ0100 HDU firmware download end" is displayed in the Information Message on WEB.

<Standard of RAID group expansion processing time>

The RAID group expansion takes a long time from the beginning to the end of the processing. The following table shows the standard of the required time of the RAID group expansion for each RAID group configuration before the expansion. The required time of the RAID group expansion increases according to the addition of SAS, SAS7.2K or Flash Drives which configure the RAID group.

> NOTE : This data shows a standard of the processing time when expanding one RAID group. For the expansion of two RAID groups, the processing time is almost equal to the expansion of one RAID group because of the parallel operation by each Controller.

Table 4.2.1   Standard of RAID Group Expansion Processing Time [‡1] (SAS Drive)

Unit : min

Configuration before Expansion			Drives (G byte) [*1]	287.62			575.30	879.98		1,173.71
				3HGSS	3HGSSH	3HGSLH	6HGSS	9HGSS	9HGSL	12HGSS
HUS150 HUS130 HUS110	4 Drives	RAID 6	(2D+2P)	160			320	490		640
	6 Drives		(4D+2P)	280			560	860		1120
	10 Drives		(8D+2P)	520			1040	1590		2080
	14 Drives		(12D+2P)	710			1420	2170		2840
	3 Drives	RAID 5	(2D+1P)	160			320	500		640
	5 Drives		(4D+1P)	270			540	830		1080
	9 Drives		(8D+1P)	490			980	1500		1960
	13 Drives		(12D+1P)	710			1420	2170		2840
	4 Drives	RAID 1+0	(2D+2D)	210			420	640		840
	8 Drives		(4D+4D)	300			600	920		1200
	2 Drives	RAID 1	(1D+1D)	120			240	370		480

*1 : The drive capacity values are calculated as 1 G byte =1,000,000,000 bytes.   This definition is different from that calculated as 1 k byte =1,024 bytes, which are actually displayed on PCs that you are using.
The RAID group capacity values displayed in the Hitachi Storage Navigator Modular 2 are calculated as 1 k byte =1,024 bytes.

‡1 : This is a standard without the I/O operation from the host computer. It takes more time with the I/O operation from the host computer.

Table 4.2.2   Standard of RAID Group Expansion Processing Time (‡1) (SAS7.2K Drive)

Unit : min

Configuration before Expansion			Drives (G byte) (*1)	1,956.94		2,935.96			3,915.01		
				2TNL	2TNX	3TNL	3TNX	3TNW	4TNL	4TNX	4TNW
HUS150 HUS130 HUS110	4 Drives	RAID 6	(2D+2P)	1120		1680			2240		
	6 Drives		(4D+2P)	1960		2940			3920		
	10 Drives		(8D+2P)	3630		5460			7260		
	14 Drives		(12D+2P)	4960		7450			9920		
	3 Drives	RAID 5	(2D+1P)	1120		1680			2240		
	5 Drives		(4D+1P)	1890		2830			3780		
	9 Drives		(8D+1P)	3420		5140			6840		
	13 Drives		(12D+1P)	4960		7450			9920		
	4 Drives	RAID 1+0	(2D+2D)	1470		2210			2940		
	8 Drives		(4D+4D)	2100		3150			4200		
	2 Drives	RAID 1	(1D+1D)	840		1260			1680		

*1 : The drive capacity values are calculated as 1 G byte =1,000,000,000 bytes. This definition is different from that calculated as 1 k byte =1,024 bytes, which are actually displayed on PCs that you are using. The RAID group capacity values displayed in the Hitachi Storage Navigator Modular 2 are calculated as 1 k byte =1,024 bytes.

Table 4.2.2.1   Standard of RAID Group Expansion Processing Time (‡1) (Flash Drive) (SSD)

Unit : min

Configuration before Expansion			Drives (G byte) (*1)	195.82	392.73	786.59
				2HGDM	4HGDM	4HGDM
HUS150 HUS130 HUS110	4 Drives	RAID 6	(2D+2P)	100	190	380
	6 Drives		(4D+2P)	150	300	600
	10 Drives		(8D+2P)	290	580	1160
	14 Drives		(12D+2P)	440	880	1760
	3 Drives	RAID 5	(2D+1P)	100	190	380
	5 Drives		(4D+1P)	150	300	600
	9 Drives		(8D+1P)	290	580	1160
	13 Drives		(12D+1P)	440	880	1760
	4 Drives	RAID 1+0	(2D+2D)	110	220	440
	8 Drives		(4D+4D)	170	330	660
	2 Drives	RAID 1	(1D+1D)	80	160	320

*1 : The drive capacity values are calculated as 1 G byte =1,000,000,000 bytes. This definition is different from that calculated as 1 k byte =1,024 bytes, which are actually displayed on PCs that you are using. The RAID group capacity values displayed in the Hitachi Storage Navigator Modular 2 are calculated as 1 k byte =1,024 bytes.

‡1 : This is a standard without the I/O operation from the host computer. It takes more time with the I/O operation from the host computer.

Table 4.2.2.2   Standard of RAID Group Expansion Processing Time [‡1] (Flash Drive) (FMD)

Unit : min

Configuration before Expansion				Drives (G byte) [*1] 1,758.12 / 1R6FM
HUS150	4 Drives	RAID 6	(2D+2P)	800
	6 Drives		(4D+2P)	1200
	10 Drives		(8D+2P)	2320
	14 Drives		(12D+2P)	3520
	3 Drives	RAID 5	(2D+1P)	800
	5 Drives		(4D+1P)	1200
	9 Drives		(8D+1P)	2320
	13 Drives		(12D+1P)	3520
	4 Drives	RAID 1+0	(2D+2D)	880
	8 Drives		(4D+4D)	1360
	2 Drives	RAID 1	(1D+1D)	640

*1 : The drive capacity values are calculated as 1 G byte =1,000,000,000 bytes. This definition is different from that calculated as 1 k byte =1,024 bytes, which are actually displayed on PCs that you are using.
The RAID group capacity values displayed in the Hitachi Storage Navigator Modular 2 are calculated as 1 k byte =1,024 bytes.

‡1 : This is a standard without the I/O operation from the host computer. It takes more time with the I/O operation from the host computer.

[Execution procedure for expanding RAID group]

(a) Click the [RAID Groups] tab in the unit window, check the RAID Group to expand, and click the [Expand RG] button.

(b) The setting window of the Expand RAID Group is displayed. Select a Drive to add and click the [OK] button.
    If there is no Drive to add, execute the drive addition (refer to Addition/Removal/Relocation "1.4.2 Adding a Drive (ADD 01-0120)"), and then execute from (a) again.

(c) A confirmation message whether to expand the selected RAID group is displayed. If you check the confirmation checkbox and click the [Confirm] button, the Expand RAID Group starts.

(d) The RAID group expansion is starts. Click the [Close] button displayed at the lower right of the window.

(e) When the RAID group expansion starts, the progress of the expansion processing executed in background is displayed in [Status] of the RAID group in the window.

> NOTE : The percentage is not updated unless you acquire the array status by [View] – [Refresh].

Table 4.2.3   Status Items of RAID Group Expansion

No.	Status	Content	Remarks
1	Normal	• Status that execution of the RAID group expansion is not instructed • Status that the RAID group expansion is completed normally	–
2	Expanding(xx%)	• Status that the RAID group expansion processing is executing	( ) indicates the progress ratio.
3	Waiting expansion(1)(0%)	• Status that the RAID group expansion is waiting • Status that the RAID group expansion processing is waiting for the order • Status that RAID group expansion processing stops due to a failure, etc.	• The first ( ) indicates the priority of the next execution. • The second ( ) indicates the progress ratio.

[Setting the priority of RAID group expansion]

(a) Click the [RAID Groups] tab in the unit window and click the [Change Priority] button.

(b) The Change Priority of RAID Group Expansion window is displayed.

Table 4.2.4   Priority of RAID Group Expansion

No.	Priority of RG Expansion	Content
1	Host Access	The RAID group expansion processing is executed in at regular interval according to the load of the host I/O. The deterioration of the host I/O performance is reduced.
2	RAID Group Expansion [*1]	This is a mode to minimize the effect of the host access and to complete the RAID group expansion quickly. The RAID group expansion processing is executed continuously regardless of the load of the host I/O. In the meantime, the host access performance may deteriorate because the host I/O processing executable per unit time decreases sharply.

*1 : Please be noticed that the priority "RAID Group Expansion" which restricts commands from the host greatly affects the host access performance.

In the following cases, if you set the priority to "RAID Group Expansion", the host access performance deteriorates drastically or commands may time out. Therefore, do not set the priority to "RAID Group expansion".

- When executing the RAID group expansion for the volume of the RAID group in which the RAID group expansion is not performed while using ShadowImage in-system replication, TrueCopy remote replication, TrueCopy Extended Distance or Copy-on-write SnapShot
- When executing the RAID group expansion and forced parity correction at the same time
- When executing the RAID group expansion and format at the same time

The host performance and standard of the RAID group expansion time when specifying each priority of the RAID group expansion are shown below.

No.	Mode	Host Access Unavailable	Host access available	
		RAID group expansion performance [*1]	Host performance [*2]	RAID group expansion performance [*1]
1	Host Access	100 %	90%	20%
2	RAID Group Expansion	100 %	30%	80%

*1 : The RAID group expansion performance is described as 100% if the priority is set to "host access" and the RAID group expansion is executed in the condition that there is no access from the host computer.

*2 : The host performance is described as 100% if the RAID group expansion is not executed. The comparison performance is in the case of the following configuration, and the comparison performance changes according to the configuration and the amount of host access.
Configuration of Performance Measurement
Random RD/WR=70%:30%, Length 4 k bytes, and 8 multiplex host I/O are executed.

(c) Check that the changed content is correct and click the [OK] button.

(d) A confirmation message is displayed. Check the confirmation checkbox and click the [Confirm] button.

(e) A normal termination message appears. Click the [Close] button.

[Deleting instruction of RAID group expansion]

> For deleting the instruction of the RAID group expansion, the operation changes according to the operation mode of Hitachi Storage Navigator Modular 2 as shown below.
>
> • Normal mode : The RAID group expansion processing is not performed after executing the RAID group expansion instruction, and you can only delete the waiting RAID group.
>
> • Maintenance mode : The RAID group expansion is stopped forcibly including the RAID groups under execution of the RAID group expansion processing.
> When deleting the instruction of the RAID group under execution of the RAID group expansion processing, the volume is unformatted.

> NOTE : The user data of the volume may be erased by deleting the instruction of the RAID group expansion in the maintenance mode. Therefore, <u>do not delete the instruction of the RAID group expansion in the maintenance mode except for the case that there is any instructions by the Technical Support Center.</u>

(a) Click the [RAID Groups] tab in the unit window, check the RAID group to delete the instruction of the RAID group expansion, and click the [Remove Expansion] button.

(b) When the operation mode of Hitachi Storage Navigator Modular 2 is the maintenance mode, the RAID group expansion instruction deletion window is displayed

When suspending the RAID group expansion forcibly and returning it to the original RAID group configuration, check the checkbox and click the [OK] button.
If not returning it, uncheck the checkbox and click the [OK] button.

No.	Checkbox to stop the RAID group expansion forcibly and return to the original RAID group configuration	Content
1	Unchecked	This changes the RAID group configuration forcibly to the one after completing the RAID group expansion and stops. The volume in which the RAID group is expanded is usable. The volume in which the RAID group is not expanded becomes the unformatted status.
2	Checked	This returns the RAID group configuration forcibly to the original one before expanding the RAID group and stops. The volume in which the RAID group is not expanded is usable. The volume in which the RAID group is expanded becomes the unformatted status.

(c) When the operation mode of Hitachi Storage Navigator Modular 2 is the maintenance mode, the warning window is displayed. <u>Check the confirmation checkbox only when instructed by Technical Support Center, and click the [Confirmation] button.</u>

(d) The completion window is displayed. Click the [Close] button to close it.
   • When the operation mode is the normal mode

HSNM2   **HITACHI**
Remove Instruction of RAID Group Expansion - 000

(i) The RAID group expansion was cancelled successfully.

                                                              [Close]

   • When the operation mode is the maintenance mode

HSNM2   **HITACHI**
Remove Instruction of RAID Group Expansion - 000

(i) The RAID group expansion was cancelled successfully.

Remove instruction of RAID group expansion

LUN	Status
0000	Unformat
0001	Normal
0002	Normal

Result of remove instruction of RAID group expansion

                                                              [Close]

4.3   Setting Volume

This is used to create, delete, change the capacity of (expand, reduce), refer to volumes and execute volume format. This function can be used in the array ready state.

> NOTE : The RAID group whose power saving instruction is set by the Power Saving/Power Saving Plus function is set cannot be set.
> Confirm with the customer that the power saving instruction is canceled and the power saving status is "Normal (Spinup)" and then set the volume.

[Notes on volume setting]

(1) Volume formatting

  (a) Volume creation (with format specification)

  If the volume creation (with format specification) becomes an error, the volumes are created, but the formatting is not executed and [Status] of the [Volume] tab becomes "Unformat". After checking that the status of volumes which are already executing the other formatting or extending the other volumes becomes "Normal", execute only the formatting for the volumes which performed the volume creation.

  (b) Volume formatting

  If the formatting of volumes becomes an error, the formatting is not executed and [Status] of the [Volume] tab is still kept as before the execution. After checking that the status of volumes which are already executing the other formatting or extending the other volumes becomes "Normal", execute the formatting again.

  (c) Volume expansion

  If the volume expansion becomes an error, the expansion is not executed and [Status] of the [Volume] tab is still kept as before the expansion. After checking that the status of volumes which are already executing the other formatting or extending the other volumes becomes "Normal", execute the expansion again.

[The areas of volumes]

The areas of volumes are shown in Figure 4.3.1.

(1) Created areas of volumes

- The areas where volumes can be created are "unused free area" and "Free area created by deleting/reducing volumes". At the time when the RAID Group is created, the user data area all becomes "unused free area".

- You can create volumes without being conscious of continuity/discontinuity of free areas. When explaining it with Figure 4.3.1 as an example, you can create volumes up to the capacity totaling the free areas (A), (B) and (C). Internally, create volumes of the capacity necessary for each free area, and unify them.

  The free areas are used as needed in order from the free area of the small LBA (Logical Block Address) in default. Moreover, when using two or more free areas, the leading volume serves as the volume specified at the time of the creation, and other volumes are automatically assigned to the maximum unused volume, and they are unified to be one volume.

  You can specify the free areas to use. You can also specify volumes other than the leading volume which is assigned automatically.

- The volume capacity becomes the value entered with the Hitachi Storage Navigator Modular 2 at the time of the volume creation. The volume capacity that can be confirmed from the Hitachi Storage Navigator Modular 2 or the host computer is the value entered with the Hitachi Storage Navigator Modular 2. However, when the RAID Group which creates volumes is nD+mP or nD+qD, the user data area is ensured on the firmware management with the value of multiples of 1[M byte] $\times$ n. Therefore, the volume capacity which can be created or expand may be less than that calculated by the value entered with the Hitachi Storage Navigator Modular 2. Therefore, the capacity of volumes that can be created or expanded may be less than the calculated value entered with Hitachi Storage Navigator Modular 2.

RAID group

User data area	The area where volumes are set
	Free area created by deleting/reducing volumes (A)
	The area where volumes are set
	Free area created by deleting/reducing volumes (B)
	The area where volumes are set
	The unused free area (C)

The areas where the setting/resetting of volumes are possible
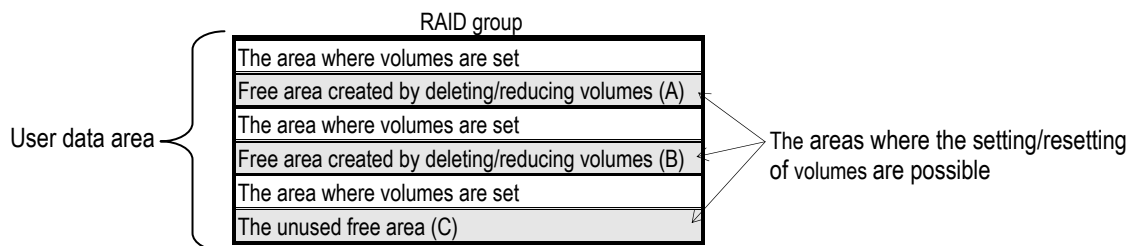
Figure 4.3.1   The Areas of Volumes

(2) Deleted areas of volumes
- The volumes other than the volumes of the value whose LBA (logical block address) at the head of the area is the largest can also be deleted.
- volumes may not be able to be deleted depending on the setting or status of the volumes (example: volumes set to the pair of ShadowImage in-system replication).
- The free capacity of the user data area increases by only the capacity of the deleted volumes by deleting volumes.
- When two or more "Free area created by deleting/reducing volumes" are consecutive on the address by deleting volumes, those areas are merged, and they become one "Free area created by deleting/reducing volumes".
- When "Free area created by deleting/reducing volumes" and "unused free area" are consecutive on the address, those free areas are merged, and become one "unused free area". Although volumes other than the volumes adjacent to "unused free area" shown in Figure 4.3.1 are deleted, the capacity of "unused free area" does not increase.
- If the volumes created between the user data areas are deleted/reducing, the areas where volumes are deleted ((A) and (B)) are made. Volumes can be created again in each divided free area of (A) and (B) within the capacity range of each free area.

> NOTE : Changing (Deletion) of volume and formatting of volume indicates that all the user data of the deleted RAID group are lost.
> Before deleting the RAID group, back up the user data.

(3) Expanded areas of volume capacity
- The areas that can be used for expanding volumes are "Unused free area", "Free area created by deleting volumes" and "Free area created by reducing volumes" of the same RAID Group as the expansion target volume.
- You can expand volumes without being conscious of continuation/discontinuity of free areas. When explaining it with Figure 4.3.1 as an example, you can create volumes up to the capacity totaling the free areas (A), (B) and (C). Internally, create volumes of the capacity necessary for each free area, and unify them to the target volume. The free areas are used as needed in order from the free area of the small LBA (Logical Block Address) in default. Moreover, the unused maximum volume is automatically assigned to the volume newly created in each free area, and they are unified to the target volume to make one volume. You can specify the free areas to use. You can also specify volumes which are assigned automatically.
- The capacity after expanding volumes becomes the value entered with Hitachi Storage Navigator Modular 2 at the time of the volume expansion. The volume capacity that you can check from Hitachi Storage Navigator Modular 2 and host computer is the value entered with Hitachi Storage Navigator Modular 2. However, when the RAID Group to expand the volume is nD+mP or nD+qD, the user data area is secured by the value of the multiple number of 1[M bytes] $\times$ n for the firmware management. Therefore, the capacity of the volume that can be created and expanded may be smaller than the calculated value entered with Hitachi Storage Navigator Modular 2.
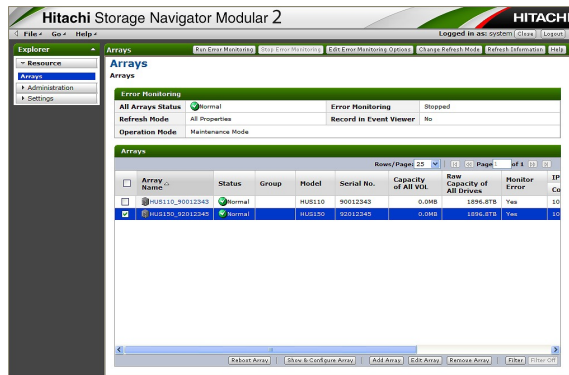
(4) Reduced areas of volume capacity
- Volume reduction is possible regardless of the value of the leading LBA (Logical Block Address) of volumes.
- Volumes may not be able to be reduced depending on the setting or status of the volumes (for example, volumes set to the pair of ShadowImage in-system replication).
- The free capacity of the user data area is increased by only the reduced capacity.
- When two or more "free areas created by deleting/reducing volumes" are consecutive on the address by reducing volumes, those areas are merged and become one "free area created by deleting/reducing volumes".
- When the "free area created by deleting/reducing volumes" and "unused free area" are consecutive on the address, those free areas are merged and become one "unused free area". Although volumes other than the volume adjacent to the "unused free area" shown in Figure 4.3.1 are reduced, the capacity of "unused free area" does not increase.
- If the volumes created between the user data areas are reduced, the areas (A) and (B), where the volumes are reduced, are made. You can create the volumes again in each divided free area of (A) and (B) within the capacity range of each free area.
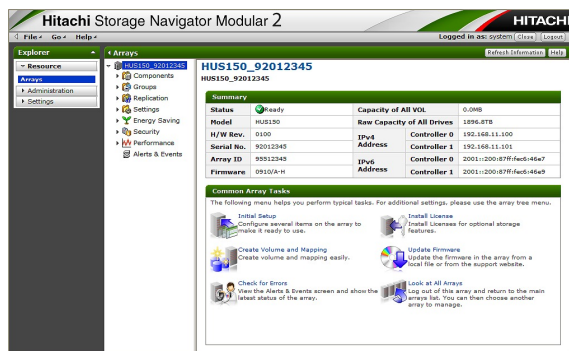
4.3.1   Preparing for Volume Setting

(1) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]
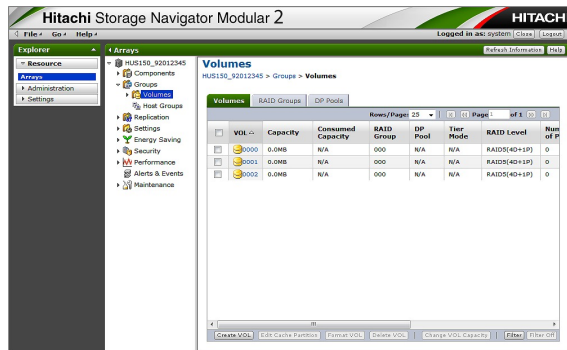Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(2) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

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(3) Select [Groups] – [Volumes] on the unit window, and click the [Volumes] tab.

Volumes defined for the arrays are displayed.

[Volumes] : Information on all the volumes, to which the arrays is assigned, is displayed.

[VOL] : Displays a volume number (xxx).

[Capacity] : Displays the capacity set for the volume.

[Consumed Capacity] : Displays the usage capacity of the volume.

[RAID Group] : Displays the RAID group number in which the volume is defined.

[DP Pool] : Displays the DP Pool number in which the volume is defined.

[Tier Mode](‡1) : Displays the status of the DP Pool tier mode in which the volume is defined.

[RAID Level] : Displays the RAID level of the RAID group in which the volume is defined.

[Number of Paths] : Displays the number of the volumes mapped to the host group/iSCSI target.

[Stripe Size] : Displays the stripe size of the volume.

[Cache Partition] : Displays the cache partition number which is set in current.

[Pair Cache Partition] : Displays the pair cache partition number or setting.

[Drive Type/RPM] : Displays the types of Drives in which the volumes are set.

[Encryption][‡2] : An encryption of the RAID group is displayed.

[Status] : Displays the status of the volume.

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‡1 : It is displayed in the Hitachi Storage Navigator Modular 2 Ver.23.00 or more and firmware Ver.0930/A or more.
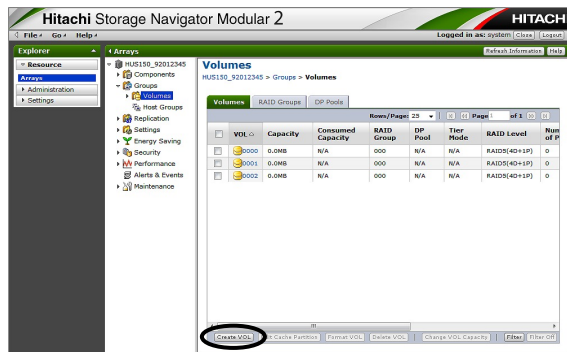
‡2 : It is displayed in the Hitachi Storage Navigator Modular 2 Ver.27.00 or more and firmware Ver.0970/A or more.

4.3.2   Creating Volume

[Conditions of creation]
- You cannot create volumes in the RAID Group during the RAID Group expansion. Execute it after completing the RAID Group expansion.
- The RAID group whose power saving instruction is set by the Power Saving/Power Saving Plus functions cannot be create volumes.
  Confirm with the customer that the power saving instruction is canceled and the power saving status is "Normal (Spinup)" and then create the volumes.
- You cannot create volumes while rewriting the drive firmware. Check that "IZ0100 HDU firmware download end" is displayed in the Information Message on WEB, and then create the volumes.

(1) Click the [Create VOL] button.

(2) Specify RAID Group, VOL and Capacity to set the volume. Specify the setting of Cache Partition as needed.

For volume, the volume to be created is displayed, and for RAID Group Number, the number of a RAID group to be created is displayed. A volume with any number can be created.

When setting the volume, enter the volume number you want to create in the volume setting dialog box.

(a) Capacity specification method

When specifying the value expressly, specify it in units of All, MB, GB, TB or Block.

You can create volumes up to the capacity totaling all free areas without specifying the areas where the volumes were deleted or reduced.

(ｉ) Select [RAID Group] with the [Basic] tab and enter [Capacity]. Then, click the [Advanced] tab.

(ii) Set the "Stripe Size", "Partition Settings", "Format the Volume", "Select free space" with the Advanced tab, and click the [OK] button. (Refer to "Table 4.3.1 List of Detailed Setting Items" (SYSPR 04-0321).) A volume is created.

Table 4.3.1   List of Detailed Setting Items

No.	Item	Content
1	Stripe Size	Specify the stripe size of volumes. We recommend the default size (256 k bytes).
2	Partition Settings	This is displayed only when installing Cache Partition Manager. • Cache partition : Specify the default Cache partition of volumes. • Pair Cache partition : Specify the destination partition when moving for load balancing, etc.
3	Format the Volume	Select whether to format automatically after instructing volume creation.

4	Select free space	• Automatic :
		  The free areas are used as needed in order from the free area of the small LBA (Logical Block Address) in default. Moreover, when using two or more free areas, the leading volume serves as the volume specified at the time of creation, and other volumes are automatically assigned to the maximum unused volume.
		• Manual :
		  The free areas needed for creating volumes are specified. You can select two or more free areas. Moreover, the volume other than the volume created in the leading free area is specified.
		  (e.g. When setting 1000 to the first volume used for creating the volume and creating the volume of the capacity for four free areas, volume 998, 999 and 1000 are set respectively for 3 volume s created in the free areas except for the first volume)

(b) Setting value of the number of logical blocks

(ⅰ) Volumes can split all the RAID Groups to the maximum of 2,048 (CBXSS/CBXSL) or 4,096 (CBSS/CBSL/CBL), respectively.

(ⅱ) Set the number of logical blocks set for each volume using the following multiples in accordance with RAID levels.

Table 4.3.2   Number of Logical Blocks and RAID Levels

RAID level	RAID width	Logical block number	RAID level	RAID width	Logical block number
RAID 0	2D	4,096	RAID 6	4D+2P	8,192
	3D	6,144		5D+2P	10,240
	4D	8,192		6D+2P	12,288
	5D	10,240		7D+2P	14,336
	6D	12,288		8D+2P	16,384
	7D	14,336		9D+2P	18,432
	8D	16,384		10D+2P	20,480
	9D	18,432		11D+2P	22,528
	10D	20,480		12D+2P	24,576
	11D	22,528		13D+2P	26,624
	12D	24,576		14D+2P	28,672
	13D	26,624		15D+2P	30,720
	14D	28,672		16D+2P	32,768
	15D	30,720		17D+2P	34,816
	16D	32,768		18D+2P	36,864
RAID 1	1D+1D	2,048		19D+2P	38,912
RAID 5	2D+1P	4,096		20D+2P	40,960
	3D+1P	6,144		21D+2P	43,008
	4D+1P	8,192		22D+2P	45,056
	5D+1P	10,240		23D+2P	47,104
	6D+1P	12,288		24D+2P	49,152
	7D+1P	14,336		25D+2P	51,200
	8D+1P	16,384		26D+2P	53,248
	9D+1P	18,432		27D+2P	55,296
	10D+1P	20,480		28D+2P	57,344
	11D+1P	22,528	RAID 1+0	2D+2D	4,096
	12D+1P	24,576		3D+3D	6,144
	13D+1P	26,624		4D+4D	8,192
	14D+1P	28,672		5D+5D	10,240
	15D+1P	30,720		6D+6D	12,288
RAID 6	2D+2P	4,096		7D+7D	14,336
	3D+2P	6,144		8D+8D	16,384

(ⅲ) When dividing RAID groups into multiple volumes, set the sum total of the number of logical blocks of each volume below the number of logical blocks per parity shown below. However, when creating multiple parity groups in each RAID group, set them below the number of logical blocks of one parity group multiplied by the number of parity groups.

(iv) The number of logical blocks of one parity group is shown below.

Table 4.3.3   Number of Logical Blocks of One Parity Group (SAS Drive)

Drive capacity (*1) RAID configuration		287.62 G bytes Number of Logical Blocks	575.30 G bytes Number of Logical Blocks	879.98 G bytes Number of Logical Blocks	1.173.71 G bytes Number of Logical Blocks
RAID 0	2D	1,123,282,944	2,247,008,256	3,437,162,496	4,584,566,784
	3D	1,684,924,416	3,370,512,384	5,155,743,744	6,876,850,176
	4D	2,246,565,888	4,494,016,512	6,874,324,992	9,169,133,568
	5D	2,808,207,360	5,617,520,640	8,592,906,240	11,461,416,960
	6D	3,369,848,832	6,741,024,768	10,311,487,488	13,753,700,352
	7D	3,931,490,304	7,864,528,896	12,030,068,736	16,045,983,744
	8D	4,493,131,776	8,988,033,024	13,748,649,984	18,338,267,136
	9D	5,054,773,248	10,111,537,152	15,467,231,232	20,630,550,528
	10D	5,616,414,720	11,235,041,280	17,185,812,480	22,922,833,920
	11D	6,178,056,192	12,358,545,408	18,904,393,728	25,215,117,312
	12D	6,739,697,664	13,482,049,536	20,622,974,976	27,507,400,704
	13D	7,301,339,136	14,605,553,664	22,341,556,224	29,799,684,096
	14D	7,862,980,608	15,729,057,792	24,060,137,472	32,091,967,488
	15D	8,424,622,080	16,852,561,920	25,778,718,720	34,384,250,880
	16D	8,986,263,552	17,976,066,048	27,497,299,968	36,676,534,272
RAID 1	1D+1D	561,641,472	1,123,504,128	1,718,581,248	2,292,283,392
RAID 5	2D+1P	1,123,282,944	2,247,008,256	3,437,162,496	4,584,566,784
	3D+1P	1,684,924,416	3,370,512,384	5,155,743,744	6,876,850,176
	4D+1P	2,246,565,888	4,494,016,512	6,874,324,992	9,169,133,568
	5D+1P	2,808,207,360	5,617,520,640	8,592,906,240	11,461,416,960
	6D+1P	3,369,848,832	6,741,024,768	10,311,487,488	13,753,700,352
	7D+1P	3,931,490,304	7,864,528,896	12,030,068,736	16,045,983,744
	8D+1P	4,493,131,776	8,988,033,024	13,748,649,984	18,338,267,136
	9D+1P	5,054,773,248	10,111,537,152	15,467,231,232	20,630,550,528
	10D+1P	5,616,414,720	11,235,041,280	17,185,812,480	22,922,833,920
	11D+1P	6,178,056,192	12,358,545,408	18,904,393,728	25,215,117,312
	12D+1P	6,739,697,664	13,482,049,536	20,622,974,976	27,507,400,704
	13D+1P	7,301,339,136	14,605,553,664	22,341,556,224	29,799,684,096
	14D+1P	7,862,980,608	15,729,057,792	24,060,137,472	32,091,967,488
	15D+1P	8,424,622,080	16,852,561,920	25,778,718,720	34,384,250,880

*1 : The drive capacity values are calculated as 1 G byte =1,000,000,000 bytes. This definition
is different from that calculated as 1 k byte =1,024 bytes, which are actually displayed on
PCs that you are using.
The RAID group capacity values displayed in the Hitachi Storage Navigator Modular 2 are
calculated as 1 k byte =1,024 bytes.

	Drive capacity (*1) RAID configuration	287.62 G bytes Number of Logical Blocks	575.30 G bytes Number of Logical Blocks	879.98 G bytes Number of Logical Blocks	1.173.71 G bytes Number of Logical Blocks
RAID 6	2D+2P	1,123,282,944	2,247,008,256	3,437,162,496	4,584,566,784
	3D+2P	1,684,924,416	3,370,512,384	5,155,743,744	6,876,850,176
	4D+2P	2,246,565,888	4,494,016,512	6,874,324,992	9,169,133,568
	5D+2P	2,808,207,360	5,617,520,640	8,592,906,240	11,461,416,960
	6D+2P	3,369,848,832	6,741,024,768	10,311,487,488	13,753,700,352
	7D+2P	3,931,490,304	7,864,528,896	12,030,068,736	16,045,983,744
	8D+2P	4,493,131,776	8,988,033,024	13,748,649,984	18,338,267,136
	9D+2P	5,054,773,248	10,111,537,152	15,467,231,232	20,630,550,528
	10D+2P	5,616,414,720	11,235,041,280	17,185,812,480	22,922,833,920
	11D+2P	6,178,056,192	12,358,545,408	18,904,393,728	25,215,117,312
	12D+2P	6,739,697,664	13,482,049,536	20,622,974,976	27,507,400,704
	13D+2P	7,301,339,136	14,605,553,664	22,341,556,224	29,799,684,096
	14D+2P	7,862,980,608	15,729,057,792	24,060,137,472	32,091,967,488
	15D+2P	8,424,622,080	16,852,561,920	25,778,718,720	34,384,250,880
	16D+2P	8,986,263,552	17,976,066,048	27,497,299,968	36,676,534,272
	17D+2P	9,547,905,024	19,099,570,176	29,215,881,216	38,968,817,664
	18D+2P	10,109,546,496	20,223,074,304	30,934,462,464	41,261,101,056
	19D+2P	10,671,187,968	21,346,578,432	32,653,043,712	43,553,384,448
	20D+2P	11,232,829,440	22,470,082,560	34,371,624,960	45,845,667,840
	21D+2P	11,794,470,912	23,593,586,688	36,090,206,208	48,137,951,232
	22D+2P	12,356,112,384	24,717,090,816	37,808,787,456	50,430,234,624
	23D+2P	12,917,753,856	25,840,594,944	39,527,368,704	52,722,518,016
	24D+2P	13,479,395,328	26,964,099,072	41,245,949,952	55,014,801,408
	25D+2P	14,041,036,800	28,087,603,200	42,964,531,200	57,307,084,800
	26D+2P	14,602,678,272	29,211,107,328	44,683,112,448	59,599,368,192
	27D+2P	15,164,319,744	30,334,611,456	46,401,693,696	61,891,651,584
	28D+2P	15,725,961,216	31,458,115,584	48,120,274,944	64,183,934,976
RAID 1+0	2D+2D	1,123,282,944	2,247,008,256	3,437,162,496	4,584,566,784
	3D+3D	1,684,924,416	3,370,512,384	5,155,743,744	6,876,850,176
	4D+4D	2,246,565,888	4,494,016,512	6,874,324,992	9,169,133,568
	5D+5D	2,808,207,360	5,617,520,640	8,592,906,240	11,461,416,960
	6D+6D	3,369,848,832	6,741,024,768	10,311,487,488	13,753,700,352
	7D+7D	3,931,490,304	7,864,528,896	12,030,068,736	16,045,983,744
	8D+8D	4,493,131,776	8,988,033,024	13,748,649,984	18,338,267,136

*1 : The drive capacity values are calculated as 1 G byte =1,000,000,000 bytes. This definition is different from that calculated as 1 k byte =1,024 bytes, which are actually displayed on PCs that you are using.
The RAID group capacity values displayed in the Hitachi Storage Navigator Modular 2 are calculated as 1 k byte =1,024 bytes.

Table 4.3.4   Number of Logical Blocks of One Parity Group (SAS7.2K Drive)

RAID configuration	Drive capacity (*1)	1,956.94 G bytes Number of Logical Blocks	2,935.96 G bytes Number of Logical Blocks	3,915.01 G bytes Number of Logical Blocks
RAID 0	2D	7,644,049,408	11,468,337,152	15,292,755,968
	3D	11,466,074,112	17,202,505,728	22,939,133,952
	4D	15,288,098,816	22,936,674,304	30,585,511,936
	5D	19,110,123,520	28,670,842,880	38,231,889,920
	6D	22,932,148,224	34,405,011,456	45,878,267,904
	7D	26,754,172,928	40,139,180,032	53,524,645,888
	8D	30,576,197,632	45,873,348,608	61,171,023,872
	9D	34,398,222,336	51,607,517,184	68,817,401,856
	10D	38,220,247,040	57,341,685,760	76,463,779,840
	11D	42,042,271,744	63,075,854,336	84,110,157,824
	12D	45,864,296,448	68,810,022,912	91,756,535,808
	13D	49,686,321,152	74,544,191,488	99,402,913,792
	14D	53,508,345,856	80,278,360,064	107,049,291,776
	15D	57,330,370,560	86,012,528,640	114,695,669,760
	16D	61,152,395,264	91,746,697,216	122,342,047,744
RAID 1	1D+1D	3,822,024,704	5,734,168,576	7,646,377,984
RAID 5	2D+1P	7,644,049,408	11,468,337,152	15,292,755,968
	3D+1P	11,466,074,112	17,202,505,728	22,939,133,952
	4D+1P	15,288,098,816	22,936,674,304	30,585,511,936
	5D+1P	19,110,123,520	28,670,842,880	38,231,889,920
	6D+1P	22,932,148,224	34,405,011,456	45,878,267,904
	7D+1P	26,754,172,928	40,139,180,032	53,524,645,888
	8D+1P	30,576,197,632	45,873,348,608	61,171,023,872
	9D+1P	34,398,222,336	51,607,517,184	68,817,401,856
	10D+1P	38,220,247,040	57,341,685,760	76,463,779,840
	11D+1P	42,042,271,744	63,075,854,336	84,110,157,824
	12D+1P	45,864,296,448	68,810,022,912	91,756,535,808
	13D+1P	49,686,321,152	74,544,191,488	99,402,913,792
	14D+1P	53,508,345,856	80,278,360,064	107,049,291,776
	15D+1P	57,330,370,560	86,012,528,640	114,695,669,760

*1 : The drive capacity values are calculated as 1 G byte =1,000,000,000 bytes. This
definition is different from that calculated as 1 k byte =1,024 bytes, which are
actually displayed on PCs that you are using.
The RAID group capacity values displayed in the Hitachi Storage Navigator
Modular 2 are calculated as 1 k byte =1,024 bytes.

RAID configuration	Drive capacity (*1)	1,956.94 G bytes Number of Logical Blocks	2,935.96 G bytes Number of Logical Blocks	3,915.01 G bytes Number of Logical Blocks
RAID 6	2D+2P	7,644,049,408	11,468,337,152	15,292,755,968
	3D+2P	11,466,074,112	17,202,505,728	22,939,133,952
	4D+2P	15,288,098,816	22,936,674,304	30,585,511,936
	5D+2P	19,110,123,520	28,670,842,880	38,231,889,920
	6D+2P	22,932,148,224	34,405,011,456	45,878,267,904
	7D+2P	26,754,172,928	40,139,180,032	53,524,645,888
	8D+2P	30,576,197,632	45,873,348,608	61,171,023,872
	9D+2P	34,398,222,336	51,607,517,184	68,817,401,856
	10D+2P	38,220,247,040	57,341,685,760	76,463,779,840
	11D+2P	42,042,271,744	63,075,854,336	84,110,157,824
	12D+2P	45,864,296,448	68,810,022,912	91,756,535,808
	13D+2P	49,686,321,152	74,544,191,488	99,402,913,792
	14D+2P	53,508,345,856	80,278,360,064	107,049,291,776
	15D+2P	57,330,370,560	86,012,528,640	114,695,669,760
	16D+2P	61,152,395,264	91,746,697,216	122,342,047,744
	17D+2P	64,974,419,968	97,480,865,792	129,988,425,728
	18D+2P	68,796,444,672	103,215,034,368	137,634,803,712
	19D+2P	72,618,469,376	108,949,202,944	145,281,181,696
	20D+2P	76,440,494,080	114,683,371,520	152,927,559,680
	21D+2P	80,262,518,784	120,417,540,096	160,573,937,664
	22D+2P	84,084,543,488	126,151,708,672	168,220,315,648
	23D+2P	87,906,568,192	131,885,877,248	175,866,693,632
	24D+2P	91,728,592,896	137,620,045,824	183,513,071,616
	25D+2P	95,550,617,600	143,354,214,400	191,159,449,600
	26D+2P	99,372,642,304	149,088,382,976	198,805,827,584
	27D+2P	103,194,667,008	154,822,551,552	206,452,205,568
	28D+2P	107,016,691,712	160,556,720,128	214,098,583,552
RAID 1+0	2D+2D	7,644,049,408	11,468,337,152	15,292,755,968
	3D+3D	11,466,074,112	17,202,505,728	22,939,133,952
	4D+4D	15,288,098,816	22,936,674,304	30,585,511,936
	5D+5D	19,110,123,520	28,670,842,880	38,231,889,920
	6D+6D	22,932,148,224	34,405,011,456	45,878,267,904
	7D+7D	26,754,172,928	40,139,180,032	53,524,645,888
	8D+8D	30,576,197,632	45,873,348,608	61,171,023,872

*1 : The drive capacity values are calculated as 1 G byte =1,000,000,000 bytes. This definition is different from that calculated as 1 k byte =1,024 bytes, which are actually displayed on PCs that you are using.
The RAID group capacity values displayed in the Hitachi Storage Navigator Modular 2 are calculated as 1 k byte =1,024 bytes.

Table 4.3.4.1   Number of Logical Blocks of One Parity Group (Flash Drive)

RAID configuration	Drive capacity (*1)	195.82 G bytes Number of Logical Blocks	392.73 G bytes Number of Logical Blocks	786.59 G bytes Number of Logical Blocks
RAID 0	2D	764,665,856	1,533,865,984	3,072,389,120
	3D	1,146,998,784	2,300,798,976	4,608,583,680
	4D	1,529,331,712	3,067,731,968	6,144,778,240
	5D	1,911,664,640	3,834,664,960	7,680,972,800
	6D	2,293,997,568	4,601,597,952	9,217,167,360
	7D	2,676,330,496	5,368,530,944	10,753,361,920
	8D	3,058,663,424	6,135,463,936	12,289,556,480
	9D	3,440,996,352	6,902,396,928	13,825,751,040
	10D	3,823,329,280	7,669,329,920	15,361,945,600
	11D	4,205,662,208	8,436,262,912	16,898,140,160
	12D	4,587,995,136	9,203,195,904	18,434,334,720
	13D	4,970,328,064	9,970,128,896	19,970,529,280
	14D	5,352,660,992	10,737,061,888	21,506,723,840
	15D	5,734,993,920	11,503,994,880	23,042,918,400
	16D	6,117,326,848	12,270,927,872	24,579,112,960
RAID 1	1D+1D	382,332,928	766,932,992	1,536,194,560
RAID 5	2D+1P	764,665,856	1,533,865,984	3,072,389,120
	3D+1P	1,146,998,784	2,300,798,976	4,608,583,680
	4D+1P	1,529,331,712	3,067,731,968	6,144,778,240
	5D+1P	1,911,664,640	3,834,664,960	7,680,972,800
	6D+1P	2,293,997,568	4,601,597,952	9,217,167,360
	7D+1P	2,676,330,496	5,368,530,944	10,753,361,920
	8D+1P	3,058,663,424	6,135,463,936	12,289,556,480
	9D+1P	3,440,996,352	6,902,396,928	13,825,751,040
	10D+1P	3,823,329,280	7,669,329,920	15,361,945,600
	11D+1P	4,205,662,208	8,436,262,912	16,898,140,160
	12D+1P	4,587,995,136	9,203,195,904	18,434,334,720
	13D+1P	4,970,328,064	9,970,128,896	19,970,529,280
	14D+1P	5,352,660,992	10,737,061,888	21,506,723,840
	15D+1P	5,734,993,920	11,503,994,880	23,042,918,400

*1 : The drive capacity values are calculated as 1 G byte =1,000,000,000 bytes. This
     definition is different from that calculated as 1 k byte =1,024 bytes, which are
     actually displayed on PCs that you are using.
     The RAID group capacity values displayed in the Hitachi Storage Navigator
     Modular 2 are calculated as 1 k byte =1,024 bytes.

RAID configuration	Drive capacity (*1)	195.82 G bytes Number of Logical Blocks	392.73 G bytes Number of Logical Blocks	786.59 G bytes Number of Logical Blocks
RAID 6	2D+2P	764,665,856	1,533,865,984	3,072,389,120
	3D+2P	1,146,998,784	2,300,798,976	4,608,583,680
	4D+2P	1,529,331,712	3,067,731,968	6,144,778,240
	5D+2P	1,911,664,640	3,834,664,960	7,680,972,800
	6D+2P	2,293,997,568	4,601,597,952	9,217,167,360
	7D+2P	2,676,330,496	5,368,530,944	10,753,361,920
	8D+2P	3,058,663,424	6,135,463,936	12,289,556,480
	9D+2P	3,440,996,352	6,902,396,928	13,825,751,040
	10D+2P	3,823,329,280	7,669,329,920	15,361,945,600
	11D+2P	4,205,662,208	8,436,262,912	16,898,140,160
	12D+2P	4,587,995,136	9,203,195,904	18,434,334,720
	13D+2P	4,970,328,064	9,970,128,896	19,970,529,280
	14D+2P	5,352,660,992	10,737,061,888	21,506,723,840
	15D+2P	5,734,993,920	11,503,994,880	23,042,918,400
	16D+2P	6,117,326,848	12,270,927,872	24,579,112,960
	17D+2P	6,499,659,776	13,037,860,864	26,115,307,520
	18D+2P	6,881,992,704	13,804,793,856	27,651,502,080
	19D+2P	7,264,325,632	14,571,726,848	29,187,696,640
	20D+2P	7,646,658,560	15,338,659,840	30,723,891,200
	21D+2P	8,028,991,488	16,105,592,832	32,260,085,760
	22D+2P	8,411,324,416	16,872,525,824	33,796,280,320
	23D+2P	8,793,657,344	17,639,458,816	35,332,474,880
	24D+2P	9,175,990,272	18,406,391,808	36,868,669,440
	25D+2P	9,558,323,200	19,173,324,800	38,404,864,000
	26D+2P	9,940,656,128	19,940,257,792	39,941,058,560
	27D+2P	10,322,989,056	20,707,190,784	41,477,253,120
	28D+2P	10,705,321,984	21,474,123,776	43,013,447,680
RAID 1+0	2D+2D	764,665,856	1,533,865,984	3,072,389,120
	3D+3D	1,146,998,784	2,300,798,976	4,608,583,680
	4D+4D	1,529,331,712	3,067,731,968	6,144,778,240
	5D+5D	1,911,664,640	3,834,664,960	7,680,972,800
	6D+6D	2,293,997,568	4,601,597,952	9,217,167,360
	7D+7D	2,676,330,496	5,368,530,944	10,753,361,920
	8D+8D	3,058,663,424	6,135,463,936	12,289,556,480

*1 : The drive capacity values are calculated as 1 G byte =1,000,000,000 bytes. This definition is different from that calculated as 1 k byte =1,024 bytes, which are actually displayed on PCs that you are using.
The RAID group capacity values displayed in the Hitachi Storage Navigator Modular 2 are calculated as 1 k byte =1,024 bytes.

Table 4.3.4.2   Number of Logical Blocks of One Parity Group (Flash Drive) (FMD)

RAID configuration	Drive capacity (*1)	1,758.12 G bytes Number of Logical Blocks
RAID 0	2D	6,867,415,040
	3D	10,301,122,560
	4D	13,734,830,080
	5D	17,168,537,600
	6D	20,602,245,120
	7D	24,035,952,640
	8D	27,469,660,160
	9D	30,903,367,680
	10D	34,337,075,200
	11D	37,770,782,720
	12D	41,204,490,240
	13D	44,638,197,760
	14D	48,071,905,280
	15D	51,505,612,800
	16D	54,939,320,320
RAID 1	1D+1D	3,433,707,520
RAID 5	2D+1P	6,867,415,040
	3D+1P	10,301,122,560
	4D+1P	13,734,830,080
	5D+1P	17,168,537,600
	6D+1P	20,602,245,120
	7D+1P	24,035,952,640
	8D+1P	27,469,660,160
	9D+1P	30,903,367,680
	10D+1P	34,337,075,200
	11D+1P	37,770,782,720
	12D+1P	41,204,490,240
	13D+1P	44,638,197,760
	14D+1P	48,071,905,280
	15D+1P	51,505,612,800

*1 : The drive capacity values are calculated as 1 G byte =1,000,000,000 bytes. This definition is different from that calculated as 1 k byte =1,024 bytes, which are actually displayed on PCs that you are using.
The RAID group capacity values displayed in the Hitachi Storage Navigator Modular 2 are calculated as 1 k byte =1,024 bytes.

Drive capacity (*1) RAID configuration		1,758.12 G bytes Number of Logical Blocks
RAID 6	2D+2P	6,867,415,040
	3D+2P	10,301,122,560
	4D+2P	13,734,830,080
	5D+2P	17,168,537,600
	6D+2P	20,602,245,120
	7D+2P	24,035,952,640
	8D+2P	27,469,660,160
	9D+2P	30,903,367,680
	10D+2P	34,337,075,200
	11D+2P	37,770,782,720
	12D+2P	41,204,490,240
	13D+2P	44,638,197,760
	14D+2P	48,071,905,280
	15D+2P	51,505,612,800
	16D+2P	54,939,320,320
	17D+2P	58,373,027,840
	18D+2P	61,806,735,360
	19D+2P	65,240,442,880
	20D+2P	68,674,150,400
	21D+2P	72,107,857,920
	22D+2P	75,541,565,440
	23D+2P	78,975,272,960
	24D+2P	82,408,980,480
	25D+2P	85,842,688,000
	26D+2P	89,276,395,520
	27D+2P	92,710,103,040
	28D+2P	96,143,810,560
RAID 1+0	2D+2D	6,867,415,040
	3D+3D	10,301,122,560
	4D+4D	13,734,830,080
	5D+5D	17,168,537,600
	6D+6D	20,602,245,120
	7D+7D	24,035,952,640
	8D+8D	27,469,660,160

*1 : The drive capacity values are calculated
as 1 G byte =1,000,000,000 bytes. This
definition is different from that
calculated as 1 k byte =1,024 bytes,
which are actually displayed on PCs that
you are using.
The RAID group capacity values displayed
in the Hitachi Storage Navigator Modular
2 are calculated as 1 k byte =1,024
bytes.

(v) Number of logical blocks per Drive.

Table 4.3.5　　Number of Blocks (m) and Capacity per Drive (SAS Drive)

Drive model name		DF-F850-3HGSS/ DF-F850-3HGSSH/ DF-F850-3HGSLH	DF-F850-6HGSS	DF-F850-9HGSS/ DF-F850-9HGSL	DF-F850-12HGSS
Capacity (user area size) per Drive	Number of blocks (m)	561,641,472	1,123,504,128	1,718,581,248	2,292,283,392
	Capacity (bytes)	287,560,433,664	575,234,113,536	879,913,598,976	1,173,649,096,704

Table 4.3.6　　Number of Blocks (m) and Capacity per Drive (SAS7.2K Drive)

Drive model name		DF-F850-2TNL DF-F850-2TNX	DF-F850-3TNL DF-F850-3TNX DF-F850-3TNW	DF-F850-4TNL DF-F850-4TNX DF-F850-4TNW
Capacity (user area size) per Drive	Number of blocks (m)	3,822,024,704	5,734,168,576	7,646,377,984
	Capacity (bytes)	1,956,876,648,448	2,935,894,310,912	3,914,945,527,808

Table 4.3.6.1　　Number of Blocks (m) and Capacity per Drive (Flash Drive)

Drive model name		DF-F850-2HGDM/ DF-F850-2HGDML	DF-F850-4HGDM/ DF-F850-4HGDML	DF-F850-8HGDM/ DF-F850-8HGDML
Capacity (user area size) per Drive	Number of blocks (m)	382,332,928	766,932,992	1,536,194,560
	Capacity (bytes)	195,754,459,136	392,669,691,904	786,531,614,720

Table 4.3.6.2　　Number of Blocks (m) and Capacity per Drive (Flash Drive) (FMD)

Drive model name		DKC-F170I-1R6FM
Capacity (user area size) per Drive	Number of blocks (m)	3,433,840,640
	Capacity (bytes)	1,758,126,407,680

(3) If you have put a checkmark in [Format the Volume], it is formatted automatically after setting the volume. After completion of the setting, click [OK] button.

(4) A normal termination message appears. Click the [Close] button.

(5) Preset volume information is updated and the screen is displayed.

(6) When the array are configured with Fibre Channel and iSCSI interfaces mixed, be sure to perform volume mapping on all created volumes, and make sure to map the volumes used by Fibre Channel/iSCSI interface so that each of them is excluded.
For details on how to do volume mapping, refer to "5.2 Setting Volume Mapping" (SYSPR 05-0100).

4.3.3 Verifying the Volume

(1) Click the [Volumes] tab.

(2) The setting made in "4.3.2 Creating Volume" (SYSPR 04-0310) can be referred to by a clicking on the [Volume] of the RAID group created.

- If the confirmation of volume is OK, go to the "4.3.6 Formatting Volume" (SYSPR 04-0500).
- If the setting of default volume controller, go to the "4.3.4 Deleting Volume"(SYSPR 04-0430).

4.3.4   Deleting Volume

> NOTE : All user data is lost by deleting the volume. Backup user data before deleting
> the RAID group.

[Conditions of deletion]
- When the volume, whose status of the forced parity correction is any of "Parity
  Correction", "Waiting Parity Correction", "Waiting Drive Reconstruction", "Uncorrected",
  "Uncorrected and Drive Detached" and "Correction Aborted", this volume cannot be
  deleted.
  Change the status of the volume to "Restored" or "Correction Skipped" by executing or
  skipping the forced parity correction for this volume, and then delete this volume.
- You cannot delete the Unified volume configured by Sub volumes of the Unified volume and
  volumes of two or more RAID Groups. Delete it after separating the Unified volumes.
- You cannot delete the following volumes. Delete the volumes after waiting for the
  cancellation or termination of the.
  - Volumes set to the pair of ShadowImage in-system replication
  - Volumes set to the pair of Copy-on-write SnapShot
  - Volumes set to the pair of TrueCopy remote replication
  - Volumes set to the pair of TrueCopy Extended Distance
  - Volumes in which Cache Residency Manager is set
  - Volumes set to the command device
  - DMLUs
  - Reserve volumes of Modular Volume Migration
  - Volumes registered in the data pool
  - Volumes in the RAID group during the RAID group expansion
- When the Dynamic sparing/Correction copy/Copy back is operating, delete the volumes
  after the Drives are restored.
- When there are volumes executing the volume switching processing, the volumes cannot be
  deleted because the firmware is executing the internal processing. Wait for one minute or
  so, and delete the volumes.
- The volumes of the pair whose status of Modular Volume Migration is COPY cannot be
  deleted. Delete the volumes after the pair status of Modular Volume Migration becomes
  PSUS.
- The volumes whose attribute is any of "Read Only", "Protect" and "Can't Guard" in the
  Data Retention Utility setting, whose S-VOL setting is "Setting impossible (invalid)", and
  whose mode is either of "Read Capacity 0 (Zer)" and "Inquiry command shielding (Zer/Inv)"
  cannot be deleted. Set the attribute to "Read/Write" in the Data Retention Utility, the S-
  VOL setting to "Setting possible (valid)", and the mode to "Unset", and delete the volumes.
- The RAID group whose power saving instruction is set by the Power Saving/Power Saving
  Plus functions cannot be delet volumes.
  Confirm with the customer that the power saving instruction is canceled and the power
  saving status is "Normal (Spinup)" and then delete the volumes.

• You cannot delete volumes while rewriting the drive firmware. Check that "IZ0100 HDU firmware download end" is displayed in the Information Message on WEB, and then delete the volumes.
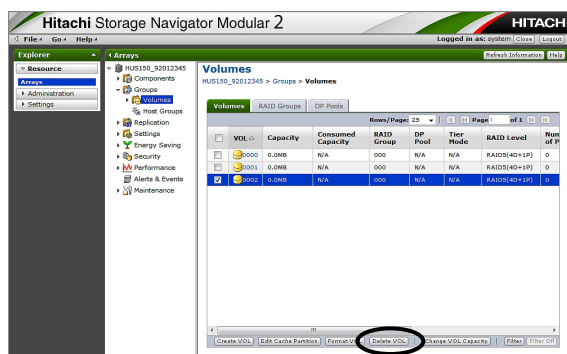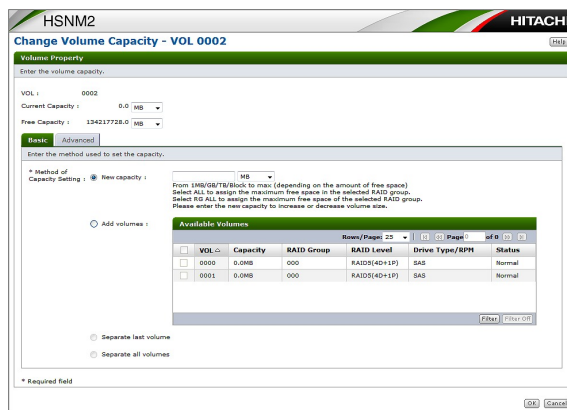
[Execution procedure for deleting volumes]

(1) Click the [Volumes] tab, and then put checkmarks in all volumes to delete.

(2) Click the [Delete VOL] button.

(3) A confirmation message is displayed indicating whether last volumes should be deleted or not. When the confirmation window is displayed, click the [Close] button.

• When there is no formatted VOL in a RAID group

• When there is a formatted VOL exists

(4) The volume information in which last volumes have been deleted is updated and the window is displayed.

- When creating the volume, go to "4.3.2 Creating Volume" (SYSPR 04-0310).

4.3.5 Changing the Capacity of Volumes

For changing capacity of volumes, you can expand or reduce the capacity of the specified volumes.

[Note]
- The volume reduction physically reduces the capacity. Therefore, the data such as file system may not be created depending on the host or OS. Use this function after checking that the OS allows the volume reduction.
- The free areas that you can use for volume expansion is only the free areas of the RAID group same as the expansion target volume. When you want to use the free areas of another RAID Groups, use the volume unification. (Refer to "4.7 Volume Unification" (SYSPR 04-0730).)

[Conditions of expansion]
- When the volume whose status of the forced parity correction is any of "Parity Correction", "Waiting Parity Correction", "Waiting Drive Reconstruction", "Uncorrected", "Uncorrected and Drive Detached" and "Correction Aborted" exists, you cannot expand this volume. Execute the forced parity correction for this volume or skip it to change the volume status to "Restored" or "Correction Skipped", and then expand this volume
- You cannot execute the volume expansion for the volumes during format. Execute it after completing the format.
- You cannot execute the volume expansion for the Unified volume configured by volumes of two or more RAID groups. When you want to expand the capacity of such volumes, use the volume unification. (Refer to "4.7 Volume Unification" (SYSPR 04-0730).)
- You cannot execute the volume expansion to the volumes during saving (a drive failure occurs). Execute it after completing the drive restoration.
- You cannot expand the following volumes. Expand the volumes after waiting for the cancellation or termination for the volumes.
  - Volumes set to the pair of ShadowImage in-system replication
  - Volumes set to the pair of Copy-on-write SnapShot
  - Volumes set to the pair of TrueCopy remote replication
  - Volumes set to the pair of TrueCopy Extended Distance
  - Volumes and reserve volumes of Modular Volume Migration
  - Volumes in which Cache Residency Manager is set
  - Volumes during format
  - Volumes set to the command device
  - DMLUs
  - Volumes registered in the data pool
  - Volumes in the RAID group during the RAID group expansion
- If the array reboot is not executed after setting/changing Cache Partition Manager, you cannot expand the volumes. Expand the volumes after rebooting the array.

- The RAID group whose power saving instruction is set by the Power Saving/Power Saving Plus functions cannot be expand volumes.
Confirm with the customer that the power saving instruction is canceled and the power saving status is "Normal (Spinup)" and then expand the volumes.
- In the Data Retention Utility setting, you cannot expand the volume whose attribution is any of "Read Only", "Protect", and "Can't Guard", the S-VOL setting is "Setting Impossible (disabled)", and the mode is any of "Read Capacity 0 (Zer)" and "Inquiry Command Shielding (Zer/Inv)". In the Data Retention Utility setting, set the attribution to "Read/Write", the S-VOL to the "Setting Possible (Enabled)", and mode to "Unset", and then expand volumes.
- When the volumes under execution of the volume switching processing exist, you cannot expand the volumes because the firmware is executing the internal processing. Wait for about one minute, and then expand the volumes.
- You cannot expand volumes while rewriting the drive firmware. Check that "IZ0100 HDU firmware download end" is displayed in the Information Message on WEB, and then expand the volumes.

[Conditions of reduction]
- When the volume whose status of the forced parity correction is any of "Parity Correction", "Waiting Parity Correction", "Waiting Drive Reconstruction", "Uncorrected", "Uncorrected and Drive Detached" and "Correction Aborted" exists, you cannot reduce this volume. Execute the forced parity correction for this volume or skip it to change the volume status to "Restored" or "Correction Skipped", and then reduce this volume.
- You cannot reduce the following volumes. Reduce the volumes after waiting for the cancellation or termination for the volumes.
  - Volumes set to the pair of ShadowImage in-system replication
  - Volumes set to the pair of Copy-on-write SnapShot
  - Volumes set to the pair of TrueCopy remote replication
  - Volumes set to the pair of TrueCopy Extended Distance
  - Volumes or reserve volumes of Modular Volume Migration
  - Volumes in which Cache Residency Manager is set
  - Volumes during format
  - Volumes set to the command device
  - DMLUs
  - Volumes registered in the data pool
  - Volumes in the RAID group during the RAID group expansion
- In the Data Retention Utility setting, you cannot reduce the volume whose attribution is any of "Read Only", "Protect" and "Can't Guard", the S-VOL setting is "Setting Impossible (disabled)", and the mode is any of "Read Capacity 0 (Zer)" and "Inquiry Command Shielding (Zer/Inv)". In the Data Retention Utility setting, set the attribution to "Read/Write", the S-VOL to the "Setting Possible (Enabled)", and mode to "Unset", and then reduce volumes.

- When there are volumes under execution of the volume switching processing, you cannot reduce the volumes because the firmware is executing the internal processing. Wait for about one minute, and then reduce the volumes.
- When the dynamic sparing/correction copy/copy back is operating, reduce volumes after the drive is restored.
- You cannot reduce volumes while rewriting the drive firmware. Check that "IZ0100 HDU firmware download end" is displayed in the Information Message on WEB, and then reduce the volumes.

[Execution procedure for changing volume capacity]

(a) Click the [Volumes] tab, check the volume to change capacity, and click the [Change VOL Capacity] button.

(b) The capacity change window of the volume is displayed. Click the [Basic] tab.

(c) Check [New capacity] of the capacity setting method, and set the total capacity after changing the capacity.
When the set capacity is larger than the current capacity, it becomes volume expansion.
When it is smaller, it becomes volume reduction.

(d) You can select a free area with the [Advanced] tab.

Table 4.3.7   List of Items for Selecting Free Areas

No.	Item		Content
1	Automatic		The free areas are used as needed in order from the free area of the small LBA (Logical Block Address) in default. Moreover, the unused maximum volume is automatically assigned to the volume newly created in each free area.
2	Manual	Use free space(s)	The free areas needed for expanding volumes are specified. You can specify two or more free areas.
		Starting VOL to assign to created volumes	The volume newly created in each free area is specified. (E.g. When setting 1000 to the first volume used for creating the volume and expanding the capacity for three free areas, volume 998, 999 and 1000 are set respectively for 3 volumes created in the free areas)

(e) Click the [OK] button. The following confirmation message is displayed in case of volume reduction. Check the confirmation checkbox, and click the [Confirmation] button.

(f) The completion window is displayed. Click the [Close] button to close it.

4.3.6 Formatting Volume

(1) Formatting while online

The format data, the parity data and the check code are written in the entire area of the volume. The array ensures the consistency of the data by writing this check code in the Drive. Executing the format in the background allows the host to use the specified volumes immediately and it enables to operate the system at an early stage.

The maximum number of volumes in which the format can be specified at the same time is the number of volumes that can be created for per array. Also, when the number of volumes executing the format is less than the number of volumes that can be created per array, the volume to be formatted can be added from the Hitachi Storage Navigator Modular 2. However, the volume that internally executes the format at the same time becomes a maximum of 6 volumes per Controller.

Even when Hitachi Storage Navigator Modular 2 is quit while the formatting is being executed, the formatting is continued.

Table 4.3.8   Volume Formatting Mode and while Online Description of Operation

No.	Connection mode of array disk management mode and device configuration Single system Dual system	Restriction
	Can be executed during online processing.	• For ShadowImage in-system replication, TrueCopy remote replication, TrueCopy Extended Distance and Copy-on-write SnapShot, pair definition cannot be executed when volume is in quick format. • The unification and the separation of a volume cannot be executed for a volume in format. • The data pool cannot be set for a volume in format. • Copy-on-write SnapShot, and P-VOL of image (V-VOL) cannot be specified for a volume in the format. • The forced parity correction cannot be executed for a volume in format. • When a data loss occurs owing to a power failure and battery exhaustion, a volume being formatted enters the Unrestored status. Basically, use the volume after the formatting is completed.

Prerequisites : • Host access performance deteriorates during format.

Formatting will impact the host access performance, especially on the volume being formatted and on the volume in the same RAID Group as the volume being formatted. Please do formatting during off-hours with less host access.

• The RAID group whose power saving instruction is set by the Power Saving/Power Saving Plus functions cannot be formatted.

Confirm with the customer that the power saving instruction is canceled and the power saving status is "Normal (Spinup)" and then format the volumes.

NOTE : • The progress and the operation status of the format are succeeded over the
           planned shutdown.
        • When PIN OVER occurs during format, a formatting is interrupted.
           The formatting is resumed automatically after PIN OVER is recovered.
           Refer to Troubleshooting "11.1.11 A failure Occurred during Operation : Case
           1 (PIN Over)" (TRBL 11-0760).
        • When the host I/O is executed to the volumes being formatted, the
           termination processing may delay. In that case, the termination processing of
           the format may take the maximum of 400 seconds after the progress ratio of
           the format becomes 99 %.
        • If the LU Ownership is switched, the formatting operation becomes standby
           status depending on the number of operations in the Controller in charge.
           When the Controller with the LU Ownership is formatting five or less in case
           that the LU Ownership being formatted is switched or when the Controller is
           not executing the format, whose LU Ownership is switched continues to be
           formatted.
           When the Controller with the LU Ownership is formatting six or more in case
           that the LU Ownership being formatted is switched, the Controller formats
           the volumes in order of specifying the format from the Hitachi Storage
           Navigator Modular 2. At this time, whose LU Ownership is switched is
           continuously formatted or becomes the standby status.

The volume format cannot be executed in the following cases. When formatting them, follow
the actions to be taken for each case.
• The volume format cannot be performed when the array is restarting. Restart the array, and
  perform the format after it becomes the Ready status.
• The volume format cannot be performed for the P-VOL or the S-VOL of ShadowImage in-
  system replication, TrueCopy remote replication and TrueCopy Extended Distance. Perform
  the volume format after releasing the pair.
• The volume format cannot be performed for the P-VOL or the V-VOL (SnapShot image) of
  Copy-on-write SnapShot. Perform the volume format after releasing the pair.
• The volume format cannot be performed in the status that the firmware of only one
  Controller is replaced in the dual controller system. Perform the volume format after
  completing the replacement of the firmware of both Controllers.
• When the specified volumes do not exist, perform the volume format after specifying correct
  volumes in CLI.
• The Sub volumes of the Unified volume cannot be formatted. Specify the Main volume of the
  Unified volume, and format it. When you want to format the Sub volumes of the Unified
  volume, separate the Sub volumes from the Unified volume, and format the Sub volumes.

- The volume format cannot be performed for the P-VOL or the S-VOL which executing Modular Volume Migration. Perform the volume format after completing Modular Volume Migration. If you want to format it immediately, cancel Modular Volume Migration, and then perform the volume format.
- The volumes registered in the data pool cannot be formatted. Delete the volumes from the data pool, and perform the volume format.
- When the Drive Detach Mode is set to valid, if the status of the specified volumes are Normal or Regression, it cannot be formatted. Set the Drive Detach Mode to invalid, and perform the volume format. Return the Drive Detach Mode to valid after executing the format.
- When either of the "Read Only" or "Protect" is set for the access attribute of the volumes in Data Retention Utility, either of "Read Capacity 0 (Zer)" or "Inquiry command shielding (Zer/Inv)" is set for the mode, and "Setting impossible (invalid)" is set for the S-VOL setting, the volume format cannot be performed. Return the access attribute of the volumes to "Read/Write (default)", and perform the volume format.
- If two or more volumes are formatted using the Drives whose capacity is 500 Gbytes or more, the resources to format the volumes may be insufficient inside the array. Perform the volume format after completing the volume format which is being executed.
- The volume format cannot be performed when the status of the forced parity correction of the specified volumes is any of "Uncorrected", "Parity Correction", "Waiting Parity Correction", "Waiting Drive Reconstruction", "Uncorrected and Drive Detached" and "Correction Aborted". Perform the volume format after changing the status of the forced parity correction of the volume to "Correction Skipped" or "Restored" referring to Troubleshooting "11.1.3 The Failure Occurred Immediately after Being Ready (Forced Parity Correction)" (TRBL 11-0150).

When you specify the formatting, you can specify which of the formatting or host access you give priority throughout the system. (Refer to "4.3.7 Setting the Format Mode" (SYSPR 04-0600).) The specification can be changed in the online status.

Although the format priority mode is set to "Standard" by default, the copy performance or the restore performance may be deteriorated substantially when any one of ShadowImage in-system replication, TrueCopy remote replication, TrueCopy Extended Distance and Copy-on-write SnapShot of the priced options is executing the copy or restore for the pair at the time of the format execution. In that case, set the format priority mode to "Host" and restrict the format processing.

When the formatting is specified, whether the formatted data is made default or 0 (zero) can be specified for the entire system. (Refer to "4.3.7 Setting the Format Mode" (SYSPR 04-0600).) The specification concerned can be changed online, but it is formatted by the format data of the point in time when the format is indicated.

< Standard time required for a volume formatting >

A volume Formatting takes a long time from start to completion.

The following table shows the standard of the time required of the volume formatting when selecting optional numbers of the Drives which configure the RAID Group. The time required of the volume formatting also increases as the number of the SAS, SAS7.2K or Flash Drives that configures the RAID Group increases.

NOTE : The data above are standard times required for a volume formatting for one or two RAID groups.

Further, the times required for the restoration vary depending on the Drive capacity, number of Drives, and RAID configuration. Besides, as to some types of Drives, the times required for the restoration is shortened by 10 to 20 percent.

Table 4.3.9   Standard Time Required for a Volume Formatting [‡1] [‡2] (SAS Drive)

Unit: min

Item	Drives (G bytes)[*1]			287.62			575.30	879.98		1,173.71
				3HGSS	3HGSSH	3HGSLH	6HGSS	9HGSS	9HGSL	12HGSS
HUS150 HUS130 HUS110	4 Drives	RAID 6	(2D+2P)	50			100	150		160
	6 Drives		(4D+2P)	110			190	280		300
	10 Drives		(8D+2P)	160			340	510		550
	14 Drives		(12D+2P)	250			490	750		800
	18 Drives		(16D+2P)	320			640	990		1060
	30 Drives		(28D+2P)	550			1100	1680		1800
	3 Drives	RAID5	(2D+1P)	50			100	150		160
	5 Drives		(4D+1P)	80			170	250		270
	9 Drives		(8D+1P)	140			290	440		470
	11 Drives		(10D+1P)	180			350	520		560
	13 Drives		(12D+1P)	200			410	620		670
	16 Drives		(15D+1P)	250			500	760		810
	4 Drives	RAID1+0	(2D+2D)	50			100	150		160
	8 Drives		(4D+4D)	90			190	280		300
	16 Drives		(8D+8D)	180			350	530		570
	2 Drives	RAID1	(1D+1D)	50			100	150		160

*1 : The drive capacity values are calculated as 1 G byte =1,000,000,000 bytes. This definition is different from that calculated as 1 k byte =1,024 bytes, which are actually displayed on PCs that you are using.

The RAID group capacity values displayed in the Hitachi Storage Navigator Modular 2 are calculated as 1 k byte =1,024 bytes.

‡1 : This is a standard without the I/O operation from the host computer. It takes more time with the I/O operation from the host computer.

‡2 : It is the standard of the format time when executing one volume at a time. When the multiple formatting is performed for two or more volumes (n volumes), it is completed less than the time of which n times the standard time.

Table 4.3.10   Standard Time Required for a Volume Formatting [‡1] [‡2] (SAS7.2K Drive)

Unit: min

Item				1,956.94		2,935.96			3,915.01		
				2TNL	2TNX	3TNL	3TNX	3TNW	4TNL	4TNX	4TNW
HUS150 HUS130 HUS110	4 Drives	RAID 6	(2D+2P)	290		430			580		
	6 Drives		(4D+2P)	520		780			1040		
	10 Drives		(8D+2P)	950		1420			1900		
	14 Drives		(12D+2P)	1390		2080			2780		
	18 Drives		(16D+2P)	1830		2740			3660		
	30 Drives		(28D+2P)	3160		4730			6320		
	3 Drives	RAID5	(2D+1P)	290		430			580		
	5 Drives		(4D+1P)	480		710			960		
	9 Drives		(8D+1P)	820		1220			1640		
	11 Drives		(10D+1P)	990		1480			1980		
	13 Drives		(12D+1P)	1170		1750			2340		
	16 Drives		(15D+1P)	1420		2130			2840		
	4 Drives	RAID1+0	(2D+2D)	300		440			600		
	8 Drives		(4D+4D)	540		810			1080		
	16 Drives		(8D+8D)	1000		1490			2000		
	2 Drives	RAID1	(1D+1D)	290		430			580		

*1 : The drive capacity values are calculated as 1 G byte =1,000,000,000 bytes. This definition is different
from that calculated as 1 k byte =1,024 bytes, which are actually displayed on PCs that you are using.
The RAID group capacity values displayed in the Hitachi Storage Navigator Modular 2 are calculated as 1 k
byte =1,024 bytes.

‡1 : This is a standard without the I/O operation from the host computer. It takes more time with the I/O operation
from the host computer.
‡2 : It is the standard of the format time when executing one volume at a time. When the multiple formatting is
performed for two or more volumes (n volumes), it is completed less than the time of which n times the standard
time.

Table 4.3.10.1 Standard Time Required for a Volume Formatting [‡1] [‡2] (Flash Drive) (SSD)

Unit: min

Item	Drives (G bytes)[*1]			195.82	392.73	786.5
				2HGDM	4HGDM	8HGDM
HUS150 HUS130 HUS110	4 Drives	RAID 6	(2D+2P)	30	60	120
	6 Drives		(4D+2P)	45	90	180
	10 Drives		(8D+2P)	80	160	320
	14 Drives		(12D+2P)	125	250	500
	18 Drives		(16D+2P)	160	320	640
	30 Drives		(28D+2P)	300	600	1200
	3 Drives	RAID5	(2D+1P)	30	60	120
	5 Drives		(4D+1P)	40	80	160
	9 Drives		(8D+1P)	75	150	300
	11 Drives		(10D+1P)	100	200	400
	13 Drives		(12D+1P)	120	240	480
	16 Drives		(15D+1P)	145	290	580
	4 Drives	RAID1+0	(2D+2D)	25	50	100
	8 Drives		(4D+4D)	50	100	200
	16 Drives		(8D+8D)	100	200	400
	2 Drives	RAID1	(1D+1D)	15	30	60

*1 : The drive capacity values are calculated as 1 G byte =1,000,000,000 bytes. This definition
is different from that calculated as 1 k byte =1,024 bytes, which are actually displayed on
PCs that you are using.
The RAID group capacity values displayed in the Hitachi Storage Navigator Modular 2 are
calculated as 1 k byte =1,024 bytes.

‡1 : This is a standard without the I/O operation from the host computer. It takes more time with the I/O operation
from the host computer.
‡2 : It is the standard of the format time when executing one volume at a time. When the multiple formatting is
performed for two or more volumes (n volumes), it is completed less than the time of which n times the standard
time.

Table 4.3.10.2 Standard Time Required for a Volume Formatting [‡1] [‡2] (Flash Drive) (FMD)

Unit: min

Item				1,758.12
		Drives (G bytes)[*1]		1R6FM
HUS150	4 Drives	RAID 6	(2D+2P)	250
	6 Drives		(4D+2P)	370
	10 Drives		(8D+2P)	650
	14 Drives		(12D+2P)	1050
	18 Drives		(16D+2P)	1360
	30 Drives		(28D+2P)	2400
	3 Drives	RAID5	(2D+1P)	230
	5 Drives		(4D+1P)	350
	9 Drives		(8D+1P)	610
	11 Drives		(10D+1P)	850
	13 Drives		(12D+1P)	960
	16 Drives		(15D+1P)	1150
	4 Drives	RAID1+0	(2D+2D)	210
	8 Drives		(4D+4D)	420
	16 Drives		(8D+8D)	850
	2 Drives	RAID1	(1D+1D)	110

*1 : The drive capacity values are calculated as 1 G byte
=1,000,000,000 bytes. This definition is different from that
calculated as 1 k byte =1,024 bytes, which are actually
displayed on PCs that you are using.
The RAID group capacity values displayed in the Hitachi
Storage Navigator Modular 2 are calculated as 1 k byte =1,024
bytes.

‡1 : This is a standard without the I/O operation from the host computer. It takes more time with the I/O operation
from the host computer.
‡2 : It is the standard of the format time when executing one volume at a time. When the multiple formatting is
performed for two or more volumes (n volumes), it is completed less than the time of which n times the standard
time.

(a) Click the [Volumes] tab on the unit window, and then put a checkmark in the volume to format and click the [Format VOL] button.

(b) The message to confirm if it may format all the selected volumes is displayed.
• When a volume that has been "Quick" formatted does not exist

• When a volume that has been "Quick" formatted exists

(c) If [Close] is clicked, the specified volume is formatted[‡1].
At this point, this volume can be recognized from the host computer.

---

‡1 : When a specified volume is formatted, the user data within the specified volume is lost. When incorrectly specifying a volume, press the [Cancel] button and redo processing by selecting a volume to be reformatted.

(d) When the format starts, the progress of the volume format executed in the background is displayed in [Status] of the volume on the window. The message in the format is displayed in the column of the status of the volume.

> NOTE : The value of percentage is not updated unless the array status is referred to through selections of [Display] and [Latest Information] in this order.

If formatting terminates abnormally, refer to Table 4.3.11.

Table 4.3.11   Contents of Display of Execution Result Screen

No.	Status		Result
1	"Abnormal end"	"CHECK CONDITION (xx-xxxx)" is displayed(*1) Sense key Sense co	Unsuccessful Format Unit Unsuccessful command
2		A message is displayed.	Unsuccessful Other errors than the above

*1 : Because this function internally uses the Format Unit command, it displayers a sense key and a sense code when the pertinent command returns the Check Condition status.

When "Abnormal" is indicated on "Status", sense-key, sense-code or message-text is indicated.

When sense key and sense code = 02-xx xx, 03-xx xx, 04-xx xx or 0B-xx xx;

For the above code, a hardware fault is assumed. When the array is not recovered from the failure after retrying, remove the cause of the error considering the type and meaning of the error. (Refer to Message "Chapter 9. Failure Analysis by Sense Data" (MSG 09-0000) of the Maintenance Manual.

When sense key and sense code = 05-xxxx;

    For the above code, an operation error is assumed. Upon checking the following items and re-execute processing. If the error is not recovered, contact our company.

      ① Is volume 0 defined? Codes which will occur are 05-25 00 and 25-25 81.

      ② In spite of none of drive mounted states, is ALL RAID specified and is a volume specified for ALL CAPA formatted? A code which will occur is 05-26 00.

      ③ Is an attempt made to define a volume exceeding the capacity of the defined RAID group? A code which will occur is 05-25 80.

When sense key and sense code = 0B-FD01;

    Switching of a controller in charge of a volume occurred during formatting. Check the controller in charge and re-execute formatting from the controller in charge.

When message-text is indicated, take measure according to the message.

(e) Preset volume information is updated and the screen is displayed.

4.3.7   Setting the Format Mode

To set the Format Priority mode, follow these steps.

(1) Select [Groups] – [Volumes] – [Format Mode], and click the [Edit Format Mode] button.

(2) Click the "Edit Format Mode" button at the upper right of the window.

[Format Priority Mode]   : Select a mode for giving/not giving priority to a formatting.

[Normal]   : When the load of the host I/O is low, the format processing is executed continuously, and if not, it is executed in every constant interval. This is the setting of default.

[Host Access] : When the format priority mode is "Normal" and the format is performed during the copy/restoration of ShadowImage in-system replication, TrueCopy remote replication, TrueCopy Extended Distance, or Copy-on-write SnapShot, the copy/restoration performance may be greatly deteriorated. In that case, make the format priority mode "Host Access" and limit the operation of the format.
The format processing is executed in every constant interval according to the load of the host I/O. The deterioration of the host I/O performance is reduced.

[Format]   : The "Format" of the format priority mode is a mode that makes the effect by the host access a minimum and completes the format quickly for the format online by the Drive addition or the format online by the recovery work for the dual failures of the Drive.
The format processing is executed regardless of the load of the host I/O. The host access performance may be deteriorated in the meantime because the host I/O processing which can be executed per unit of time decreases substantially.

[Format Data]   : Select to a format Data.

   [Non-Zero Data(Default)]   : A formatting is performed when default Data.

   [Zero Data] : A formatting is performed when 0.

   NOTE : Be careful that "Format" or the format priority mode which restricts the command from the host significantly influences the access performance of the host.
   Also, in the case shown below, if the format priority mode is made "Format", the host access performance may be greatly deteriorated, or the command may be time-out, so that do not set the format priority mode to "Format".

   • When the host access is performed for volume in the RAID Group which is the same as the volume in format

   • When the format is performed while ShadowImage in-system replication, TrueCopy remote replication, TrueCopy Extended Distance, or Copy-on-write SnapShot is in use

   • When the format is performed during execution of the forced parity correction.

The host performance and the standard of the format time when each format priority mode is specified are shown below. [‡1]

No.	Mode	1 volume/CTL format			6 volume/CTL format		
		Without host access	With host access		Without host access	With host access	
		Format performance (*1)	Host performance (*2)	Format performance (*1)	Format performance (*1)	Host performance (*2)	Format performance (*1)
1	Normal (*1)	100 %	85 %	2 %	100 %	90 %	4 %
2	Host	2 %	90 %	2 %	4 %	90 %	4 %
3	Format	100 %	50 %	90 %	100 %	50 %	90 %

   *1 : The format performance is described as 100 % when the format priority mode is set to "Standard" and the format is executed in the condition that there is no access from the host computer.
   *2 : The host performance is 100 % when the format is not performed.

‡1 : The comparative performance is for the following configuration, and it changes according to the configuration or the amount of the host access. Also, the comparative performance changes for the host access for the volume in format.
   Configuration of the performance measurement and explanation of the condition
   • All the volumes are created in another RAID Group, and the host I/O of random RD/WR=75 %:25 %, length 4 k bytes and TAG8 is executed in the volume (3 volume/CTL) that the format is not performed.

(3) Click the [OK] button to terminate the setting.
(4) Click the [Close] button.

4.4   Setting Spare Drive

This setting is used to set, delete and reference a Spare Drive.

The Drive that can be set as the Spare Drive is a data drive.

The Drive that can reconfigure the data to Spare Drive is only any one of the following types of Drives; SAS, SAS7.2K or Flash Drive which is the same type of Drive as the one that requires restoration. For the Spare Drive setting, consider the Drive type.

NOTE : • If the Power Saving function is enabled, copy back is performed in the following four cases even if Spare Drive Operation Mode has been set to the default mode, which is copy back less.
  Furthermore, the operation differs depending on whether the firmware version is more than or equal to 0940/A or less than 0940/A. (In the version of 0970/A or more, a Flash Drive operates according to the Spare Drive Operation Mode setting.)

License key status			Target Spare Drive			
		Source data drive	Less than 0940/A		0940/A or more	
			System drive	Non system drive	System drive	Non system drive
Power Saving/ Power Saving Plus	Enable	System drive	As specified	As specified	As specified	As specified
		Non system drive	As specified	As specified	As specified	As specified
	Disable	System drive	Copy back	As specified	As specified	Copy back
		Non system drive	Copy back	As specified	Copy back	As specified

* : System drives correspond to Drives #0 to #4 in CBSS/CBSL/CBSXS/CBXSL, Drives #0 to #4 of Unit ID#0 in DBS/DBL/DBW/DBF connected to CBL, or Drives #A0 to #A4 in DBX, Drives #0 to #4 of Unit ID#0 in DBSD/DBLD connected to CBLD.

(The copy-back operates for maintaining the power saving status that can be changed in the version less than 0940/A. The specification changed to remedy the problems such as the useless copy-back operation among system drives and the biased Spare Drives for the system drives.)

• If it is operated in the copy-back-less setting, the Drive positions which configure the RAID groups are replaced due to the Drive failure recovery.
In the Power Saving/Power Saving Plus function, even if the RAID groups have the same RAID level and the number of Drives, the spinup time from the power saving status may differ depending on the Drive positions which configure the RAID groups. Therefore, when the RAID groups are configured considering the spinup time from the power saving status, it is recommended to set the copy-back mode. (Refer to "11.1 Setting Drive Recovery" (SYSPR 11-0000).)

• If the Drive restoration to the Spare Drive operates between the Drives of CBSL/DBL/DBX and DBW at the time of the Drive failure restoration of the RAID group executes the power saving instruction of the I/O interlock enables, the copy-back-less function does not operate and the copy-back function operates surely after replacing the Drives. (In case the firmware version is 0940/A or more.)

4.4.1 Preparing for Spare Drive Setting

(1) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]
Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.
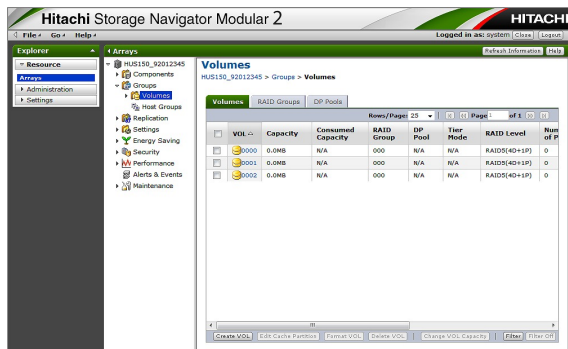

(2) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(3) Select [Settings] – [Drive Settings] – [Spare Drives] on the unit window,

(4) Click the [Add Spare Drive] button displayed at the lower right of the window.

4.4.2   Setting Spare Drive

(1) Select an HDU you want to specify as a spare drive from the [Assignable Drives] list and click the [Add] button.

(2) The selected HDU is moved to the [To be assigned Spare Drives] list. Click the [OK] button.

(3) Click the [Close] button.

- When verifying the Spare Drive, go to "4.4.4 Verifying the Spare Drive" (SYSPR 04-0670).

4.4.3   Deleting Spare Drive

(1) Select [Settings] – [Drive Settings] – [Spare Drives] on the unit window.

(2) Select a spare drive to be released and click the [Remove Spare Drive] button.

(3) The following message is displayed. Click the [Close] button.

- When setting the Spare Drive, go to "4.4.2 Setting Spare Drive" (SYSPR 04-0650).

    NOTE : When you set the configuration of [RAID Group] or [Volumes], be sure to click
            the [Update Information] button after closing the parameter window to make
            the icon of the RAID Group in the unit window the latest information.

4.4.4　Verifying the Spare Drive

(1) Select [Settings] – [Drive Settings] – [Spare Drives] on the unit window.
You can check the spare drive set on the right side of the selection window.

- If confirmation is OK, go to "Chapter 5. Setting Host Group/Targets" (SYSPR 05-0000)
- If confirmation is NG, go to "4.4.3 Deleting Spare Drive" (SYSPR 04-0660)

4.5   Checking the Status of Drive

Display the array unit component status and information by using icons. When you double-click each icon, the information of the component part indicated by the icon is displayed.

(1) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(2) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

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(3) When updating the display of the components to the most recent one, click [Components] – [Trays].

(4) When you click [Tray 00], the tray 00 window is displayed.

(5) When you click [HDU] that you want to check the status, the detailed information of the HUD (Drive) is displayed.

NOTE : The Vender ID, Product ID and Firmware Revision may not be displayed depending on the installation of the drive and the status of the drive.

[Part]   : This field displays the name of the HUD (Drive).

[Tray]   : This field displays the name of the tray that the contains the HUD (Drive).

[Status]   : This field displays the current operational status of the HUD (Drive).

[Part Type] : This field displays the type of HUD (Drive).

[Part Number] : This field displays the manufacturers part number for the type of HUD (Drive).

[Part Serial No] : This field displays the serial number assigned to the HUD (Drive) at the factory.

[RPM] : This field displays the rotational speed of the drive in revolutions per minute.

[Vendor ID] : This is the name of the HUD (Drive) manufacturer.

[Product ID] : This field displays.

[Firmware Revision] : This field displays the revision of the firmware installed in the HUD (Drive).

4.6   Checking the Drive which Configures the RAID Group

(1) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

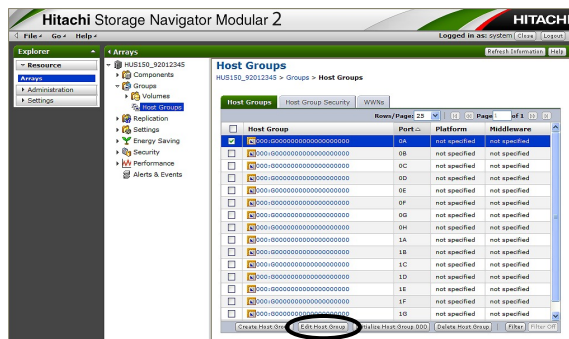Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(2) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

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(3) Select [Groups] – [Volumes] on the unit window, and click the [RAID Groups] tab.

(4) Select the target RAID Group icon from the list view in the unit window.

(5) Select the [Assigned Drives] tab.
State of Drive is displayed.

4.7   Volume Unification

This is used to add, delete or refer to the Unified Volume.

> NOTE : Since you will be unable to use the volume specified as the sub volume after unifying the volume, fully confirm it.

4.7.1   Preparing for Volume Unification Setting

(1) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]
Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(2) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

4.7.2 Creating Unified Volume

(1) Select [Groups] – [Volumes] on the unit window, and click the [Volumes] tab.

(2) Check the volume to be a source of the unification, and click the [Change VOL Capacity] button.

(3) The "Change VOL Capacity" window is displayed. Click the [Basic] tab.

(4) Check [Add volumes] of the Method of Capacity Setting, and check the volume to be unified from "Available Volumes".

(5) Click the [OK] button.

(6) The confirmation message is displayed. For adding volumes, check the checkbox, and click the [Confirm] button.

(7) The capacity change is completed. Click the [Close] button displayed in the lower right of the window.

(8) Check that the volume unification is done.
Select the expanded volume in the volumes window.

(9) The VOL window is displayed. Click the [Sub Volumes] tab.

(10) Check that the unified volume is displayed.

4.7.3 Separating Unified Volume

[Separate Last Volume Only]

(1) Select [Groups] – [Volumes] on the unit window, and click the [Volumes] tab.

(2) Check the LU that you want to release the unification, and click the [Change VOL Capacity] button.

(3) The "Change VOL Capacity" window is displayed. Click the [Basic] tab.
(4) Check [Separate last volume] of the capacity setting method, and click the [OK] button.

(5) The confirmation message is displayed. For releasing the volume, check the checkbox, and click the [Confirm] button displayed in the lower right of the window.

(6) The change volume capacity is completed. Click the [Close] button displayed in the lower right of the window.

(7) Check that the volume is released. Select the released volume in the volumes window.

(8) The VOL window is displayed. Click the [Sub Volumes] tab.

(9) Check that the released volume is not displayed.

[Separate All Volumes]

(1) Select [Groups] – [Volumes] on the unit window, and click the [Volumes] tab.

(2) Check the volume that you want to release the unification, and click the [Change VOL Capacity] button.

(3) The "Change VOL Capacity" window is displayed. Click the [Basic] tab.

(4) Check [Separate all volumes] of the capacity setting method, and click the [OK] button.

(5) The confirmation message is displayed. For releasing all the volumes, check the checkbox, and click the [Confirm] button displayed in the lower right of the window.

(6) The change volume capacity is completed. Click the [Close] button displayed in the lower right of the window.

(7) Check that the volume is released. Select the released volume in the volumes window.

(8) The VOL window is displayed. Click the [Sub Volumes] tab.

(9) Check that the released volume is not displayed.

Chapter 5.   Setting Host Group/Targets

- This chapter describes the procedures to make a setting for making the array recognized by a server.
- The setting of the host group/targets must be made for each port.

5.1   Setting Host Group/Target Options

- When Controller Box connects to host computer with the FC interface.
  : Go to "5.1 (1) For Fibre model" (SYSPR 05-0000)

- When Controller Box connects to host computer with the iSCSI interface.
  : Go to "5.1 (2) For iSCSI model" (SYSPR 05-0050)

(1) For Fibre model

There are two methods for setting the options, that is, the simple setting and detail setting. When making the simple setting, select elements of an environment of the host computer to be connected. When the selection is made, the host group options necessary for the host computer to be connected are set automatically.

Set the directly required host group option for the detailed setting.

(a) Simple setting

Set the host group options necessary for the host computer to be connected by selecting elements of the environment of the host, that is, platform, alternative path, fail-over, and additional parameter. Since some host environments require detail setting as well as the simple setting, refer to the table of host connection parameters.

(ⅰ) Turn on the power supply.

(ⅱ) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(iii) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

(iv) Select the [Groups] - [Host Groups] on the unit window.

(v) When [000:G000] is displayed, click the port that you want to set the connection mode with the host computer. Click the [Edit Host Group] button.

(vi) Click the [Options] tab.

(vii) Set a [Platform (Only one mode can be selected.)] and a [Middleware (Two or more modes may be selected.)] on the applet window. Click the [OK] button.
　　Common Setting : See No. 1 in Table 5.1.2, "List of Mode Setting Items".
　　Additional Setting : See No. 2 in Table 5.1.2, "List of Mode Setting Items".

When setting multiple ports, select a port number by clicking [Edit to :] and check the checkbox of "Forced set to all selected ports".

Table 5.1.1   Simple Setting Item List

No.	Menu item	Contents		Factory setting
		Parameter[*1]	How to set	
1	Platform	Not specified	Select one of the items	Not selected
		HP-UX		
		Solaris		
		AIX		
		Windows		
		Linux		
		VMware		
		NetWare		
2	Middle ware	Not specified	Select one of the items	Not selected
		VCS		
		Tru Cluster		

*1 : When the host to be connected is Windows XP, select "Not specified" for all the items.

Table5.1.2   List of Mode Setting Items

No.	Menu item	Contents		How to set	Factory setting
		Parameter		How to set	Factory setting
1	Common Setting (Only one mode can be selected.)	Standard Mode : Open system emulation mode		Select	Basic mode
		Open VMS Mode : VMS mode			
		TRESPASS Mode : TRESPASS mode			
		Wolfpack Mode : WolfPack mode			
2	Additional Setting (Two or more modes may be selected.)	HP-UX Mode: This mode makes volumes that are 8 up to 63 recognized when the array is connected to the HP server.		Select	Not selected
		PSUE Read Reject Mode : Set it when the fence level of TrueCopy remote replication is used with Data and the pair status suppresses the read access to P-VOL at the time of PSUE transition.		Select	Not selected
		Mode Parameters Changed Notification Mode : Unit attention (06/2A00) is reported.		Select	Not selected
		NACA Mode : Supports NACA (Normal Auto Contingent Allegiance) that is a standard on SCSI-3.		Select	Not selected
		Capacity Data Changed Notification Mode[*1] : This is set when extending the volume capacity in AIX.		Select	Not selected
		Task Management Isolation Mode : Set it when the own port also does not reset the command while another port received the command reset instruction.		Select	Not selected
		Unique Reserve Mode 1 : This is set when supporting the Persistent Reserve command.		Select	Not selected
		Unique Reserve Mode 2[*2] : This is set when supporting Type-7h and Type-8h of the Persistent Reserve command.		Select	Not selected
		Port-ID Conversion Mode: This mode enables Port-ID that reported by Inquiry command is converted. Do not set it usually.		Select	Not selected
		Tru Cluster Mode: When using Tru Cluster, you need to set this mode.		Select	Not selected
		Product Serial Response Mode : This mode enables each volume to be assigned a unique DID in the SUN Cluster 3.0 system.		Select	Not selected
		Same Node Name Mode : This mode enables that each port of same array responses same World Wide Node Name.		Select	Not selected
		CCHS Mode : CCHS convert Mode		Select	Not selected
		NOP-In Suppress Mode : This mode enables suppression that NOP-In is transmitted.		Select	Not selected
		S-VOL Disable Advanced Mode : The restore command can be executed for the ShadowImage S-VOL of "S-VOL Disable" attribute by setting of "S-VOL Disable Advanced Mode". Do not set it usually.		Select	Not selected

*1 : It is supported in the firmware Ver.0935/A or more.

*2 : It is supported in the firmware Ver.0940/A or more.

No.	Menu item	Contents		Factory setting
		Parameter	How to set	
2	Additional Setting (Two or more modes may be selected.)	Discovery CHAP Mode : Supports iSCSI Discovery with CAHP.	Select	Not selected
		Unique Extended COPY Mode : Supports XCOPY Command issued from the VMware.	Select	Not selected
		Unique Write Same Mode : Supports Write Same Command issued from the VMware.	Select	Not selected
		Unique Compare Write Mode : Supports Compare and Write Command issued from the VMware.	Select	Not selected
		Standard VAAI Command Mode(*2) : This is set when supporting the T10 compliant VAAI command (XCOPY, ATS, Receive Copy Results).	Select	Not selected
		DP Depletion Detail Reply Mode : The response of the array is made detailed further by selecting this mode when Thin Provisioning is used. When Thin Provisioning is used, it is recommended to select it.	Select	Selected
		Unit Attention Change Mode : Suppresses the report to the Unit Attention (06/2900 (Power on Reset)).	Select	Not selected
		HNAS Option Mode(*1) : Reports the volume owner right of Inquiry E0 Page by the HNAS connection.	Select	Not selected
		Allocation Length Expand Mode(*3) : Set this when supporting 2-byte Allocation Length of the Inquiry command.	Select	Not selected
		UNMAP Short Length Mode(*4) : Set this when connecting to the host which supports the UNMAP command. Required for Windows Server 2012 connection. When ShadowImage in-system replication, Copy-on-write SnapShot, TrueCopy remote replication, TrueCopy Extended Distance, TrueCopy Modular Distributed, or Modular Volume Migration is enabled, it is recommended that you enable UNMAP Short Length Mode.	Select	Not selected
		Change Response for Replication Mode(*5): When background copy of a replication pair is timed-out, the host may stop accessing the pair. This option changes the Sense key/Sense code the array will return to the host so that the host will continue to access the pair.	Select	Not selected

*1 : It is supported in the firmware Ver.0935/A or more.
*2 : It is supported in the firmware Ver.0940/A or more.
*3 : It is supported in the firmware Ver.0945/A or more.
*4 : It is supported in the firmware Ver.0945/D or more.
*5 : It is supported in the firmware Ver.0955/A or more.

(viii) The confirmation window is displayed. Click the [Confirm] button.

If multiple ports are selected for [* Edit to] in the window of the procedure (vi), the following window is displayed. Check the checkbox and click the [Confirm] button.

Hitachi Storage Navigator Modular 2 is less than Ver.24.53

Hitachi Storage Navigator Modular 2 is Ver.24.53 or more

(ix) The confirmation window is displayed. Click the [Close] button.

(x) The detail of the setting that has been made is displayed.
Make sure that the setting that has been made is reflected on the display.

(xi) Make the setting for the other ports in the same way.

(2) For iSCSI model

There are two methods for setting the options, that is, the simple setting and detail setting. When making the simple setting, select elements of an environment of the host computer to be connected. When the selection is made, the targets options necessary for the host computer to be connected are set automatically.

When making the detail setting, directly set the necessary targets options in the same way as conventional one.

(a) Simple setting

Set the host group options necessary for the host computer to be connected by selecting elements of the environment of the host, that is, platform, alternative path, fail-over, and additional parameter. Since some host environments require detail setting as well as the simple setting, refer to the table of host connection parameters.

(i) Turn on the power supply.

(ii) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

---

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(iii) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

(iv) Select the [Groups] - [iSCSI Targets] on the unit window.

(ⅴ) Display the [000:TARGET000] by clicking the port through for which you want to set the host connection mode. Click the [Edit Target] button of the window.

(vi) Select the [Option] tab.

(vii) Set a [Common Setting (Only one mode can be selected.)] and a [Additional Setting (Two or more modes may be selected.)] on the applet window. Click the [OK] button.
Common Setting : See No. 1 in Table 5.1.4, "List of Mode Setting Items".
Additional Setting : See No. 2 in Table 5.1.4, "List of Mode Setting Items".

When setting multiple ports, select a port number by clicking [Edit to :] and check the checkbox of "Forced set to all selected ports".

Table 5.1.3   Simple Setting Item List

No.	Menu item	Contents		How to set	Factory setting
		Parameter(*1)			
1	Platform	Not specified		Select one of the items	Not selected
		HP-UX			
		Solaris			
		AIX			
		Windows			
		Linux			
		VMware			
		NetWare			
2	Middle ware	Not specified		Select one of the items	Not selected
		VCS			
		Tru Cluster			
		*1 : When the host to be connected is Windows XP, select "Not specified" for all the items.			

Table 5.1.4   List of Mode Setting Items

No.	Menu item	Contents		How to set	Factory setting
		Parameter			
1	Common Setting (Only one mode can be selected.)	Standard Mode : Open system emulation mode		Select	Basic mode
		Open VMS Mode : VMS mode			
		TRESPASS Mode : TRESPASS mode			
		Wolfpack Mode : WolfPack mode			
2	Additional Setting (Two or more modes may be selected.)	HP-UX Mode: This mode makes volumes are 8 up to 63 recognized when the array is connected to the HP server.		Select	Not selected
		PSUE Read Reject Mode : Set it when the fence level of TrueCopy remote replication is used with Data and the pair status suppresses the read access to P-VOL at the time of PSUE transition.		Select	Not selected
		Mode Parameters Changed Notification Mode : Unit attention (06/2A00) is reported.		Select	Not selected
		NACA Mode : Supports NACA (Normal Auto Contingent Allegiance) that is a standard on SCSI-3.		Select	Not selected
		Capacity Data Changed Notification Mode[*1] : This is set when extending the volume capacity in AIX.		Select	Not selected
		Task Management Isolation Mode : Set it when the own port also does not reset the command while another port received the command reset instruction.		Select	Not selected
		Unique Reserve Mode 1 : This is set when supporting the Persistent Reserve command.		Select	Not selected
		Unique Reserve Mode 2[*2] : This is set when supporting Type-7h and Type-8h of the Persistent Reserve command.		Select	Not selected
		Port-ID Conversion Mode: This mode enables Port-ID that reported by Inquiry command is converted. Do not set it usually.		Select	Not selected
		Tru Cluster Mode: When using Tru Cluster, you need to set this mode.		Select	Not selected
		Product Serial Response Mode : This mode enables each volume to be assigned a unique DID in the SUN Cluster 3.0 system.		Select	Not selected
		Same Node Name Mode : This mode enables that each port of same array responses same World Wide Node Name.		Select	Not selected
		CCHS Mode : CCHS convert Mode		Select	Not selected
		NOP-In Suppress Mode : This mode enables suppression that NOP-In is transmitted.		Select	Not selected
		S-VOL Disable Advanced Mode : The restore command can be executed for the ShadowImage S-VOL of "S-VOL Disable" attribute by setting of "S-VOL Disable Advanced Mode". Do not set it usually.		Select	Not selected

*1 : It is supported in the firmware Ver.0935/A or more.

*2 : It is supported in the firmware Ver.0940/A or more.

No.	Menu item	Contents		Factory setting
		Parameter	How to set	
2	Additional Setting (Two or more modes may be selected.)	Discovery CHAP Mode : Supports iSCSI Discovery with CAHP.	Select	Not selected
		Unique Extended COPY Mode : Supports XCOPY Command issued from the VMware.	Select	Not selected
		Unique Write Same Mode : Supports Write Same Command issued from the VMware.	Select	Not selected
		Unique Compare and Write Mode : Supports Compare and Write Command issued from the VMware.	Select	Not selected
		Standard VAAI Command Mode[*2] : This is set when supporting the T10 compliant VAAI command (XCOPY, ATS, Receive Copy Results).	Select	Not selected
		Report iSCSI Full Portal List Mode : When the discovery is issued from the initiator, the access to the target is permitted, and it reports on target information on all ports where the initiator name is corresponding to the host.	Select	Not selected
		DP Depletion Detail Reply Mode : The response of the array is made detailed further by selecting this mode when Thin Provisioning is used. When Thin Provisioning is used, it is recommended to select it.	Select	Selected
		Unique Compare Write Mode: Suppresses the report to the Unit Attention (06/2900 (Power on Reset)).	Select	Not selected
		HNAS Option Mode[*1] : Reports the volume owner right of Inquiry E0 Page by the HNAS connection.	Select	Not selected
		Allocation Length Expand Mode[*3] : Set this when supporting 2-byte Allocation Length of the Inquiry command.	Select	Not selected
		UNMAP Short Length Mode[*4] : Set this when connecting to the host which supports the UNMAP command. Required for Windows Server 2012 connection.	Select	Not selected
		Change Response for Replication Mode[*5]: When background copy of a replication pair is timed-out, the host may stop accessing the pair. This option changes the Sense key/Sense code the array will return to the host so that the host will continue to access the pair.	Select	Not selected

*1 : It is supported in the firmware Ver.0935/A or more.

*2 : It is supported in the firmware Ver.0940/A or more.

*3 : It is supported in the firmware Ver.0945/A or more.

*4 : It is supported in the firmware Ver.0945/D or more.

*5 : It is supported in the firmware Ver.0955/A or more.

(viii) The confirmation window is displayed. Click the [Confirm] button.

If multiple ports are selected for [* Edit to] in the window of the procedure (vi), the following window is displayed. Check the checkbox and click the [Confirm] button.

Hitachi Storage Navigator Modular 2 is less than Ver.24.53   Hitachi Storage Navigator Modular 2 is Ver.24.53 or more

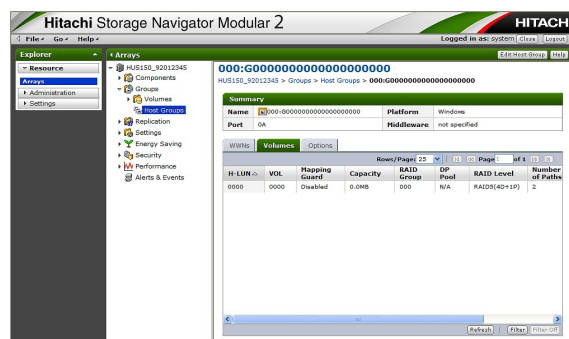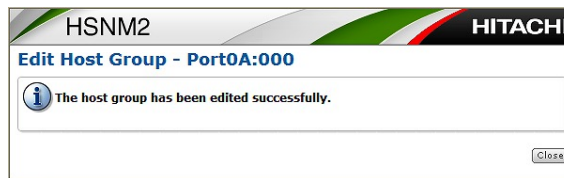(ix) The confirmation window is displayed. Click the [Close] button.

(x) The detail of the setting that has been made is displayed.
     Make sure that the setting that has been made is reflected on the display.

(xi) Make the setting for the other ports in the same way.

5.2   Setting Volume Mapping

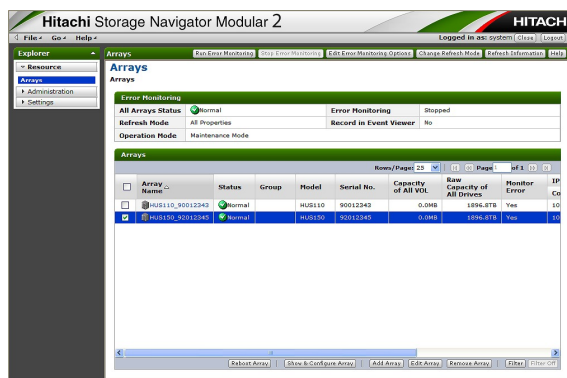### 5.2.1   Assigning and Releasing Volume for the Fibre Model

(1) Assigning volumes

Assign the Port ID and Host LUN (H-LUN) to a volume so that they are used in the configuration set by a host computer. The setting of the mapping can be modified while an I/O is being executed using the existing mapping setting. However enabling mapping stops host I/O temporarily.

> NOTE : When the array and the host computer are connected with the Fibre Channel interface, the volume in the array cannot be recognized depending on the host computer if the volume of number 0 is not created in the array.
> When using this host computer, create the volume of number 0 or assign the volume to Host LUN (H-LUN) 0.

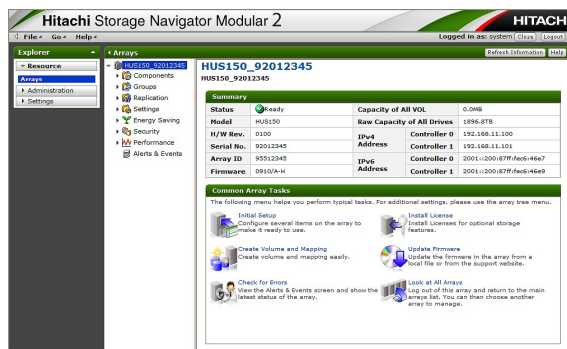(a) Turn on the power supply.

(b) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.
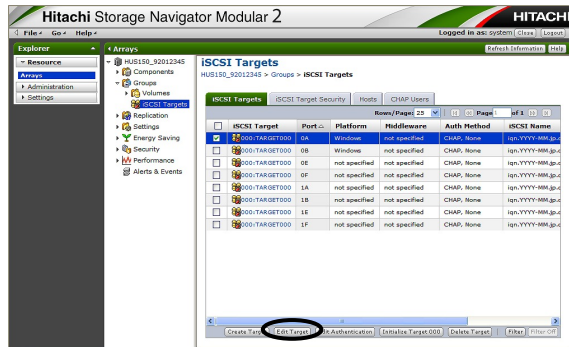
(c) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)
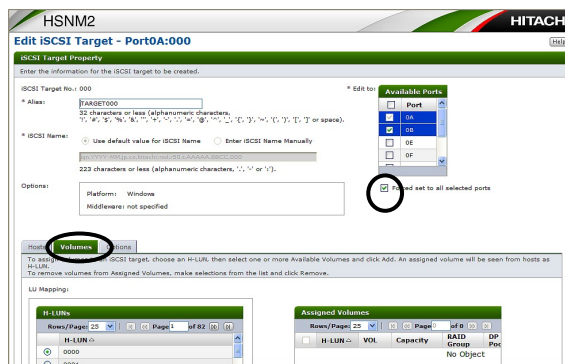

(d) Select the [Groups] - [Host Groups] on the unit window.
(e) Check the checkbox of the port to be set and click the [Edit Host Group] button.

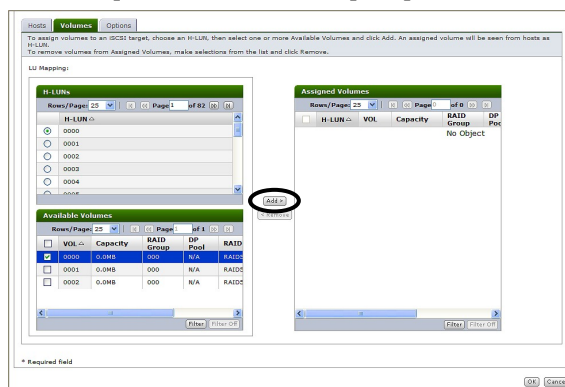

(f) Click the [Volumes] tab.

When setting multiple ports, select a port number by clicking [Edit to :] and check the checkbox of "Forced set to all selected ports". When not setting multiple ports, go to the next step.

(g) Select the [Volumes] tab on the unit window.
Select one H-LUN from the [H-LUNs] list. Then select one volume you want to assign to the
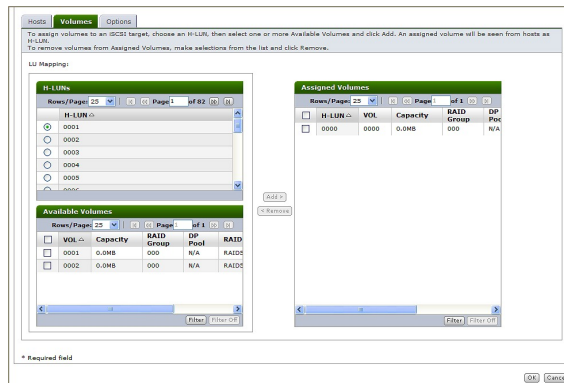H-LUN from the list of the [Available Volumes] and click the [Add] button.
Moreover, you can assign the two or more selected volumes to the H-LUNs in serial and
ascending order starting from the lowest number of the selected H-LUNs.
Select an H-LUN from the [H-LUNs] list, select two or more volumes from the [Available
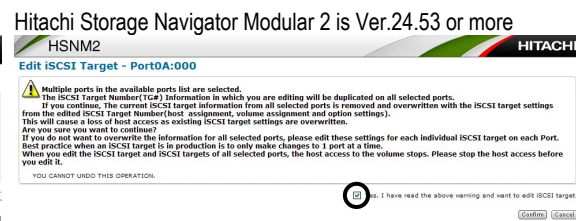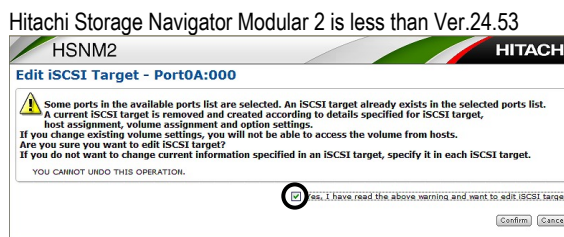Volumes] list, and click the [Add] button.

The H-LUN and volume that were selected are moved to the [Assigned Volumes] list.
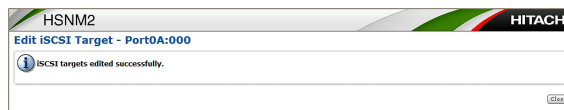
(h) Repeat the step (g). Move all volumes that you want to assign to [Assigned Volumes], and
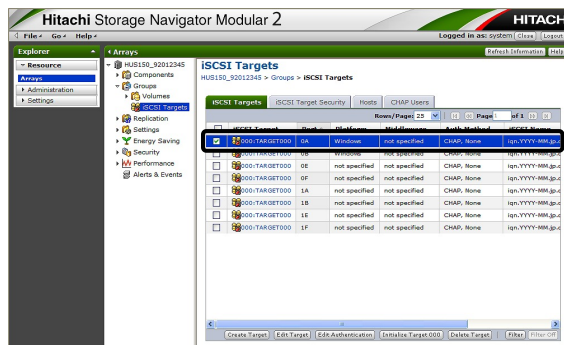then click the [OK] button.

(i) If multiple ports are selected for [* Edit to] in the window of the procedure (f), the following window is displayed. Check the checkbox and click the [Confirm] button.

Hitachi Storage Navigator Modular 2 is less than Ver.24.53   Hitachi Storage Navigator Modular 2 is Ver.24.53 or more

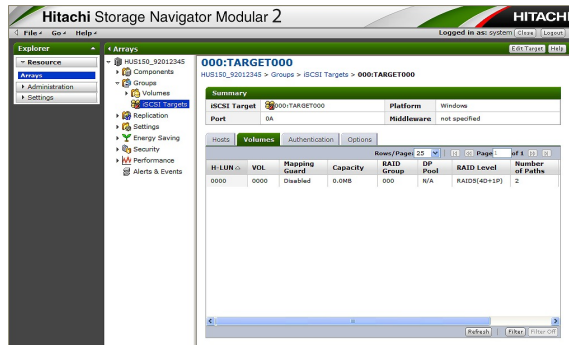(j) The confirmation window is displayed. Click the [Close] button.

(k) Click [Groups] – [Host Groups] in the unit window, click the port to check (host group).

(l) Select the [Volumes] tab.
The content set to the [Assigned Volumes] is displayed. Check that the setting is correctly reflected.
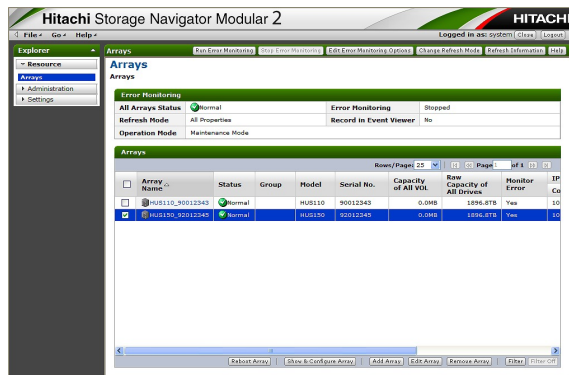
(2) Releasing volume assignment
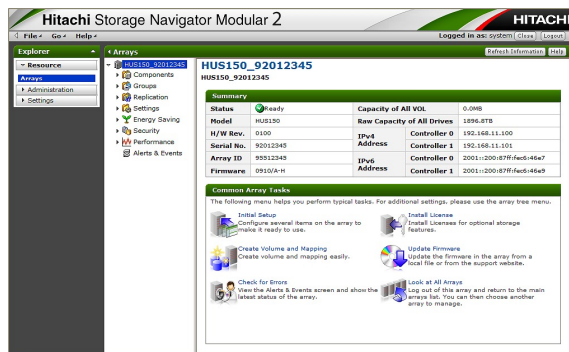
(a) Turn on the power supply.

(b) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(c) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(d) Select [Groups] – [Host Groups] in the unit window, check the checkbox of the port to be set
   and click the [Edit Host Group] button.

(e) Click the [Volumes] tab.

When setting multiple ports, select a port number by clicking [Edit to :] and check the
checkbox of "Forced set to all selected ports". When not setting multiple ports, go to the
next step.

(f) Check the checkboxes of the volumes to release from the list of [Assigned Volumes], and
   click the [Remove] button.

(g) Click the [OK] button.

(h) If multiple ports are selected for [* Edit to] in the window of the procedure (e), the following window is displayed. Check the checkbox and click the [Confirm] button.

Hitachi Storage Navigator Modular 2 is less than Ver.24.53   Hitachi Storage Navigator Modular 2 is Ver.24.53 or more

(i) The confirmation window is displayed. Click the [Close] button.

5.2.2 Assigning and Releasing Volume for the iSCSI Model

(1) Assigning volumes

Assign the Port ID and Host LUN to a volume so that they are used in the configuration set by a host computer. The setting of the mapping can be modified while an I/O is being executed using the existing mapping setting.

(a) Turn on the power supply.

(b) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]
Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(c) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

---

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(d) Select [Groups] – [iSCSI Targets] in the unit window, check the checkbox of the port to be set and click the [Edit Target] button.
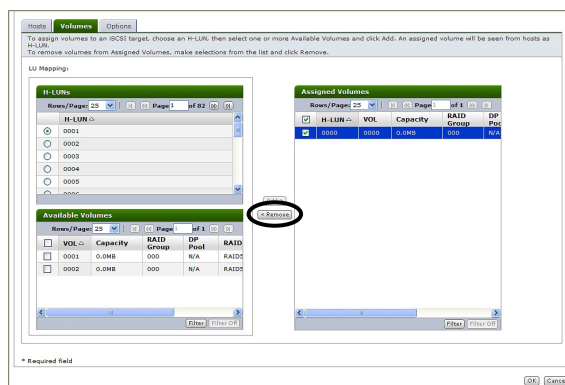

(e) Click the [Volumes] tab.

When setting multiple ports, select a port number by clicking [Edit to :] and check the checkbox of "Forced set to all selected ports". When not setting multiple ports, go to the next step.

(f) Select one H-LUN from the [H-LUNs] list. Then select one volume you want to assign to the H-LUN from the [Available Volumes] list and click the [Add] button.
Moreover, you can assign the two or more selected volumes to the H-LUNs in serial and ascending order starting from the lowest number of the selected H-LUNs.
Select one H-LUN from the [H-LUNs] list, select two or more volumes from the [Available Volumes] list, and click the [Add] button.

The H-LUN and volume that were selected are moved to the [Assigned Volumes] list.

(g) Repeat the step (f). Move all volumes that you want to assign to [Assigned Volumes], and then click the [OK] button.

(h) If multiple ports are selected for [* Edit to] in the window of the procedure (e), the following window is displayed. Check the checkbox and click the [Confirm] button.

Hitachi Storage Navigator Modular 2 is less than Ver.24.53   Hitachi Storage Navigator Modular 2 is Ver.24.53 or more

(i) The confirmation window is displayed. Click the [Close] button.

(i) Click [Groups] – [iSCSI Targets] in the unit window, click the port to check (iSCSI Targets).

(k) Select the [Volumes] tab.

The content set to the [Assigned Volumes] is displayed. Check that the setting is correctly reflected.
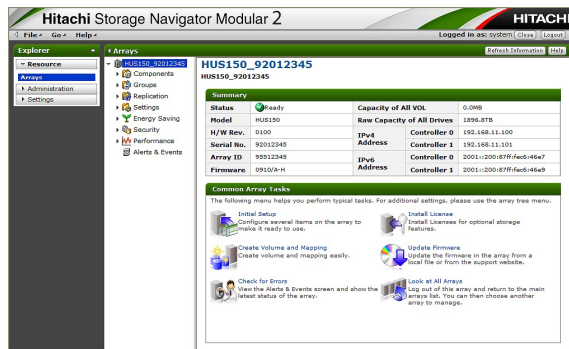
(2) Releasing volume assignment

  (a) Turn on the power supply.

  (b) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

     Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

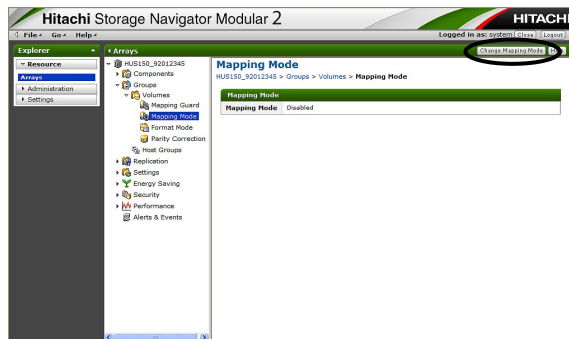 (c) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.
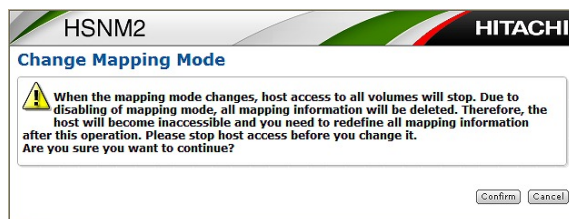
(d) Select [Groups] – [iSCSI Targets] in the unit window, check the checkbox of the port to be set and click the [Edit Target] button.

(e) Click the [Volumes] tab.

When setting multiple ports, select a port number by clicking [Edit to :] and check the checkbox of "Forced set to all selected ports". When not setting multiple ports, go to the next step.

(f) Check the checkboxes of the volumes to release from the list of [Assigned Volumes], and click the [Remove] button.

(g) Click the [OK] button.

(h) If multiple ports are selected for [* Edit to] in the window of the procedure (e), the following window is displayed. Check the checkbox and click the [Confirm] button.

Hitachi Storage Navigator Modular 2 is less than Ver.24.53

Hitachi Storage Navigator Modular 2 is Ver.24.53 or more

(i) The confirmation window is displayed. Click the [Close] button.
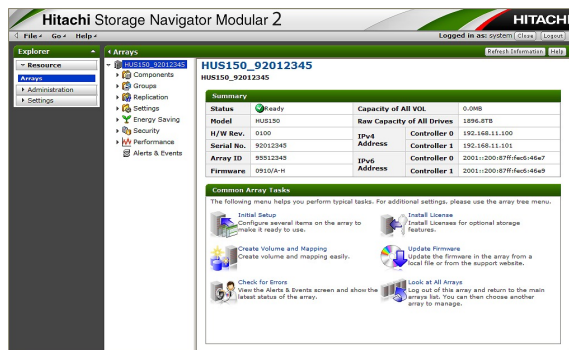
5.2.3 Setting Mapping Mode

(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]
Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.
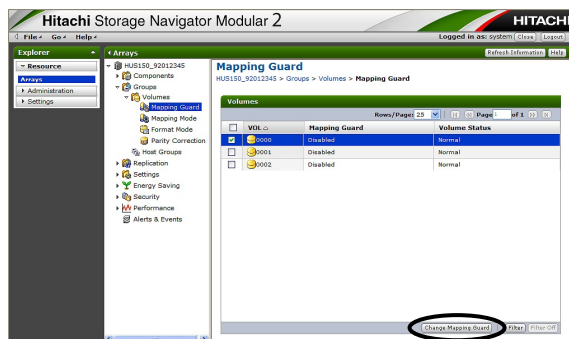

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)
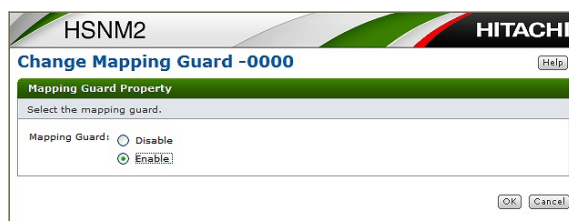

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(4) Select the [Groups] - [Volumes] - [Mapping Mode] in the unit window.
Select the volume to enable the Mapping Guard, click the [Change Mapping Mode] button at the upper right of the window.

(5) Check the [Enable] in the "Change Mapping Mode" window, and click the [OK] button.

(6) The confirmation message is displayed. Click the [Confirm] button.

(7) The following message is displayed. Click the [Close] button.

(8) Check that the Mapping Mode is "Enabled".

5.2.4 Setting Mapping Guard

Volume Mapping Guard function prevents a wrong operation in the mapping setting. Setting this function makes the mapping operation for the volume with the mapping enabled from Hitachi Storage Navigator Modular 2 unavailable. Specify to enable or disable volume mapping guard. Disabled is set by default.

(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.
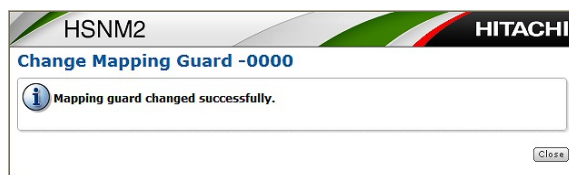
(4) Select the [Groups] - [Volumes] - [Mapping Guard] in the unit window.
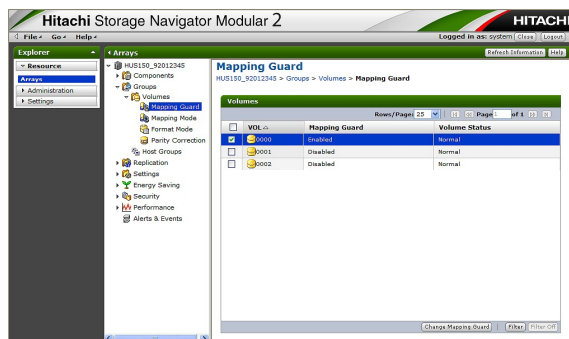Select the volume to enable the Mapping Guard, click the [Change Mapping Guard] button.

(5) Check the [Enable] in the "Change Mapping Guard" window, and click the [OK] button.

(6) The following message is displayed. Click the [Close] button.
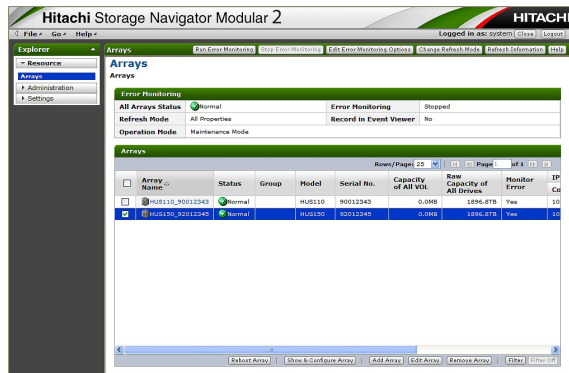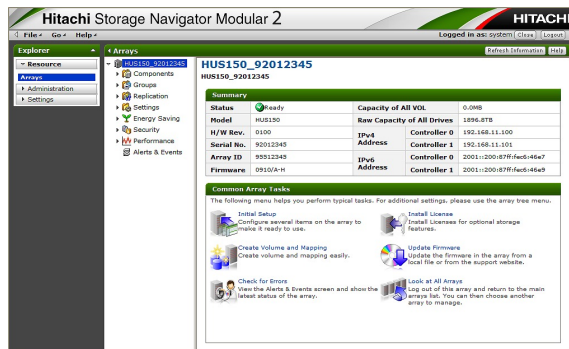

(7) Check that the Mapping Guard is "Enabled".

5.3   Setting Fibre Channel

(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

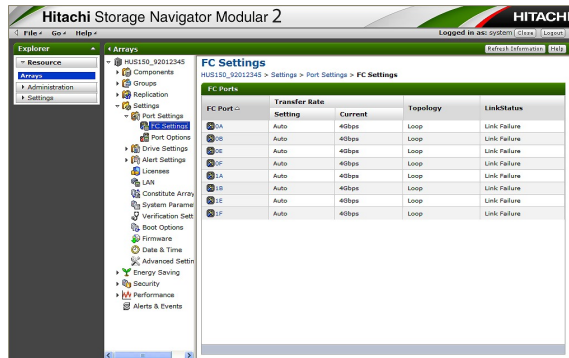Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)
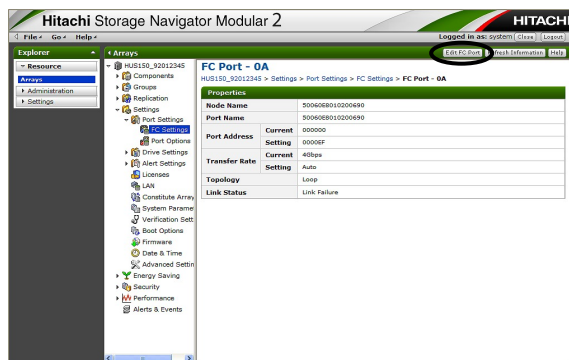

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.
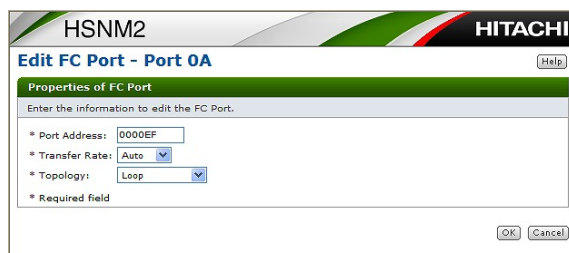
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(4) Select [Settings] – [Port Settings] – [FC Settings] in the unit window. The "FC Settings" window is displayed.

(5) Click [FC Ports] to set.

(6) Click the [Edit FC Port] button at the upper right of the window.

(7) Enter the information of the FC port to edit.

     ① [Address of Port]   : A port address is displayed or set with a six-figure hexadecimal number.

       <Current Value>

         A current port address is displayed with a six-figure hexadecimal number.

       <Setting>

         A port address you want to set with a six-figure hexadecimal number.

② [Transfer Rate]   : A transfer rate of the Fibre Channel can be displayed or set.
   <Current Value>
     A current transfer rate of the Fibre Channel is displayed.
   <New Value>
     [2Gbps]   : Set this when using the Fibre Channel at a fixed transfer rate of 2Gbps.
     [4Gbps]   : Set this when using the Fibre Channel at a fixed transfer rate of 4Gbps.
     [8Gbps]   : Set this when using the Fibre Channel at a fixed transfer rate of 8Gbps.
     [Auto]   : Set this when using the Fibre Channel at a transfer rate that is changed
                    automatically.

NOTE : Set the "Transfer Rate" of Fibre Channel corresponding to the transfer rate of
        devices connected directly with an array to each port according to the following
        table. When the Array is connected directly and externally with the Hitachi
        Universal Storage Platform V/ the Hitachi Universal Storage Platform VM, set
        the port transfer rate of both the Hitachi Universal Storage Platform V/ the
        Hitachi Universal Storage Platform VM and the Array to the fixed transfer rate
        (the same value for the Hitachi Universal Storage Platform V/ the Hitachi
        Universal Storage Platform VM and the Array selecting any one of 2 Gbps, 4
        Gbps or 8 Gbps.).

Transfer Rate of Devices of Each Port Connected with an Array	Transfer Rate of an Array
2G bps	2G bps
4G bps	4G bps
8G bps	8G bps
Auto (Maximum speed 8G bps)	8G bps
Auto (Maximum speed 4G bps)	4G bps
Auto (Maximum speed 2G bps)	2G bps

NOTE : In case that the transfer rate of the Fibre Channel port of the Array is set to
        "Auto" an automatic negotiation is executed to determine the max transfer
        rate. When turn off and on the Array, the HBA or the switch, check the transfer
        rate by Hitachi Storage Navigator Modular 2. If the transfer rate is not max
        speed, pull and inset the Fibre Channel cable or change the transfer rate by
        Hitachi Storage Navigator Modular 2.

③ [Topology]   : The topological setting value is specified through a selection from
                    a pull down menu.

NOTE : When connecting the Array directly and externally with the Hitachi Universal
        Storage Platform V/ the Hitachi Universal Storage Platform VM, set the
        topologies of the both devices to "Loop".

(8) When completing the change, click the [OK] button.

(9) The setting confirmation message is displayed. Check that I/O from the host computer is stopped, and then click the [Confirm] button.
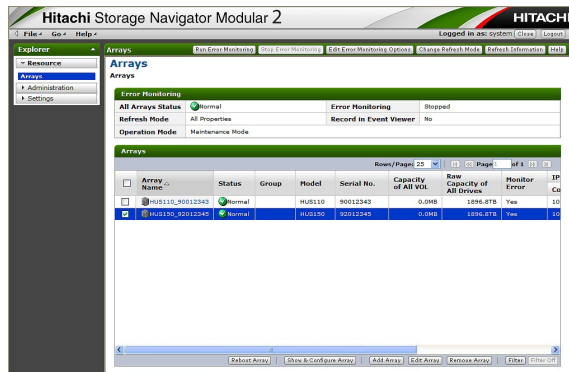

(10) Click the [Close] button.

(11) Execute the same procedure for the remaining ports.

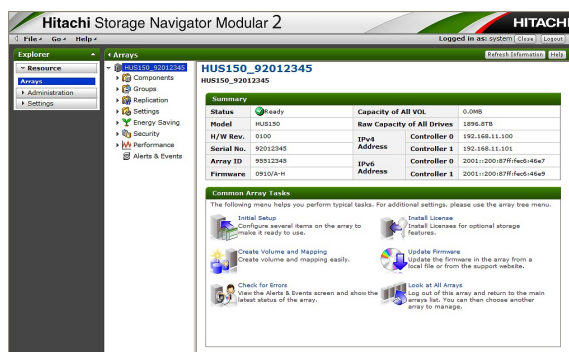## 5.4   Setting iSCSI

5.4.1   Setting iSCSI Port Information

(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

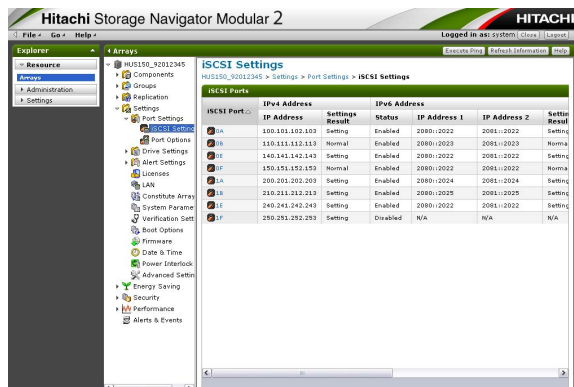Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)
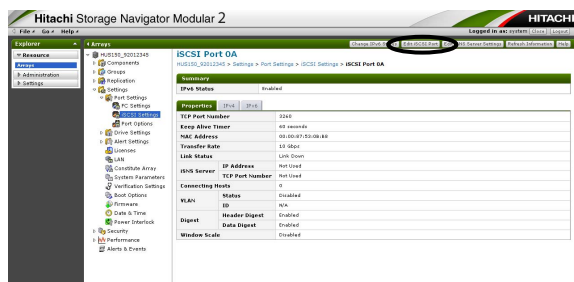

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.
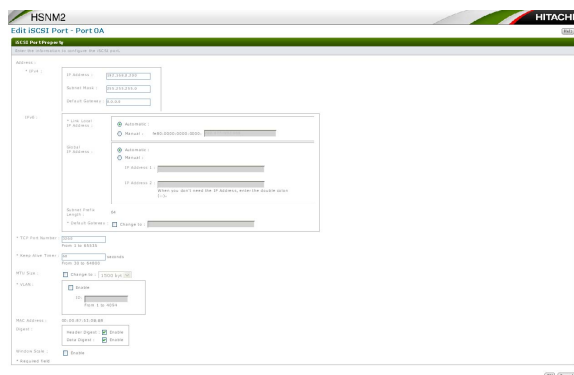
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(4) Select [Settings] – [Port Settings] – [iSCSI Settings]in the unit window. The "iSCSI Settings"
    window is displayed.

(5) Click [iSCSI Ports] to set.
(6) Click the [Edit iSCSI Port] button at the upper right of the window.

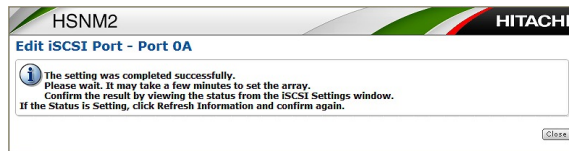(7) Enter the information of the iSCSI port to edit.

① [IP Address]	: The IP Address can be set in the decimal number form.
② [Subnet Mask]	: The Subnet Mask can be set in the decimal number form.
③ [Default Gateway]	: The Default Gateway can be set in the decimal number form.
④ [Link Local IP Address]	: This field shows a link local IP address which is valid in the same link.
⑤ [Global IP Address]	: This field shows a unique global IP address which does not overlap with other addresses.
⑥ [Subnet Prefix Length]	: This field shows subnet prefix length.
⑦ [Default Gateway]	:This field shows the default gateway of the selected iSCSI port.
⑧ [TCP Port Number]	: The TCP Port Number can be set in the decimal number form.
⑨ [Keep Alive Timer]	: You can set the interval (in seconds) by the decimal number to check that communication with host is possible.
⑩ [MTU Size]	: This is an abbreviation of Maximum Transmission Unit, and the maximum value of the data that can be transmitted once can be selected from 1500(default) or 9000.
⑪ [VLAN]	: The Virtual LAN can set a VLAN ID by the network split function in the switch.
⑫ [MAC Address]	: The MAC address is displayed.
⑬ [Header Digest]	: This enables the function which performs a CRC check for the header part of iSCSI Protocol Data Unit (PDU) in network path.
⑭ [Data Digest]	: This enables the function which performs a CRC check for the data part of iSCSI Protocol Data Unit (PDU) in network path.
⑮ [Window Scale]	: This enables the function which extended to Window Size.

(8) When completing the change, click the [OK] button.

(9) The setting confirmation message is displayed. Check that I/O from the host computer is stopped, and then click the [Confirm] button.

(10) Click the [Close] button.

(11) Execute the same procedure for the remaining ports.

5.4.2   Setting Target Information

The Host Group Option, the mapping information of volume, and security information are set to the targets, not to the ports at the time of iSCSI interface addition.
This enables you to select the host computer to which the array is connected depending on each target.

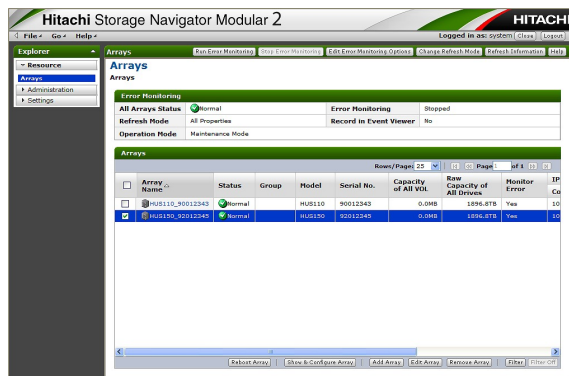For targets, only the "000:TARGET000" is supported.
Up to 255 targets can be set when the LUN Manager, which is an extra cost optional feature, is used.

(1) Changing the Target Information
This enables you to change the iSCSI Name and Alias.
  (a) Turn on the power supply.
  (b) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]
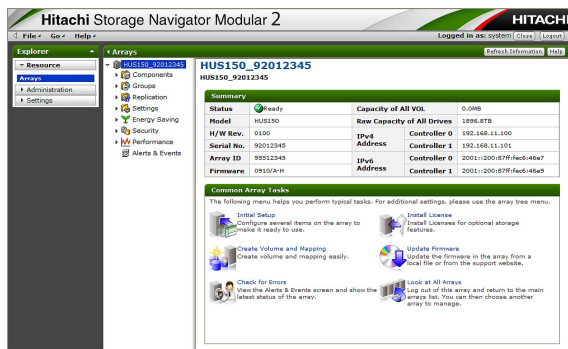Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.
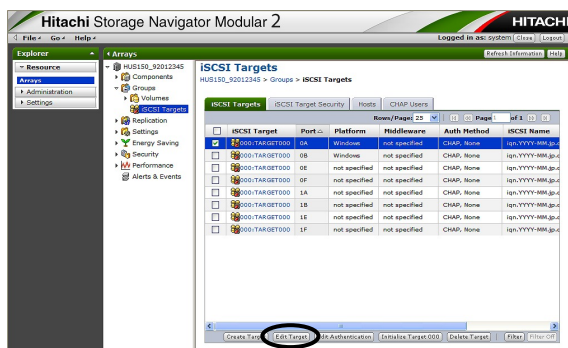
(c) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

(d) Select the [Groups] - [iSCSI Targets] on the unit window.

(e) Click the port through for which you want to change the target information. Click the [Edit Target] button.

(f) In the "Target" dialog, enter the "Alias" and "iSCSI Name".
When setting multiple ports, select a port number by clicking [Edit to :] and check the checkbox of "Forced set to all selected ports".

(g) Click the [OK] button.

(h) If multiple ports are selected for [* Edit to] in the window of the procedure (f), the following window is displayed. Check the checkbox and click the [Confirm] button.

Hitachi Storage Navigator Modular 2 is less than Ver.24.53   Hitachi Storage Navigator Modular 2 is Ver.24.53 or more
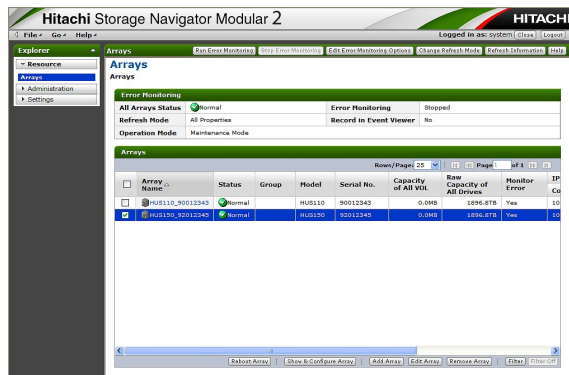

(i) The confirmation message is displayed. Select the [Close] button.

(2) Initializing the Target information
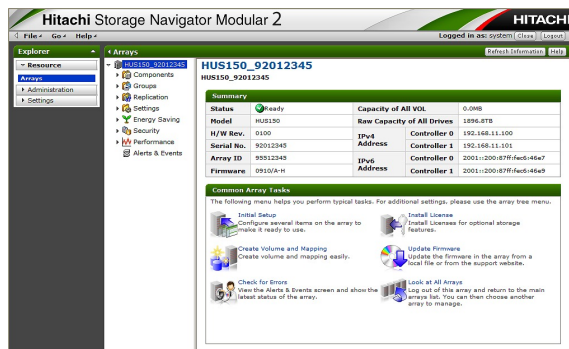
   (a) Turn on the power supply.

   (b) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

      Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.
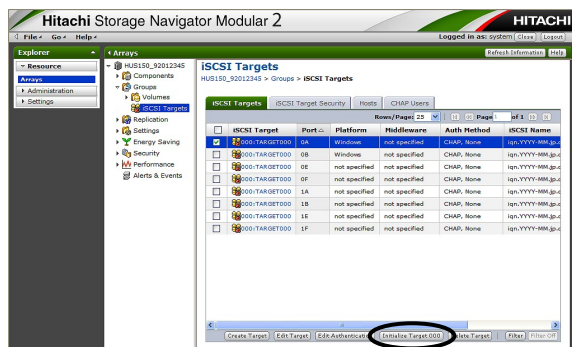

   (c) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)
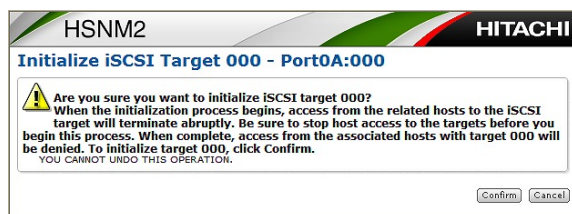

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.
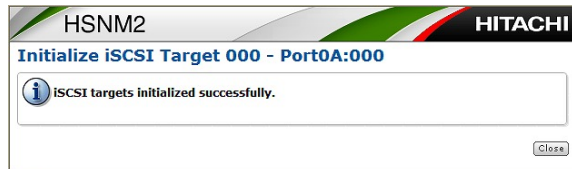
(d) Select the [Groups] - [iSCSI Targets] on the unit window.

(e) Put a checkmark to the port to initialize the target information, and click the [Initialize Target 000] button.

(f) The confirmation message is displayed. Select the [Confirm] button.
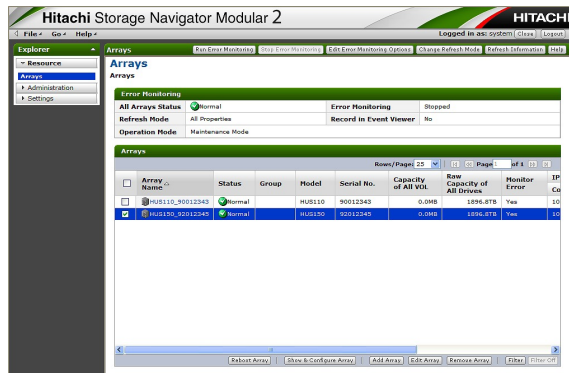

(g) Select the [Close] button.

(3) Changing authentication

You can change the authentication method and the iSCSI user information of two-way authentication.
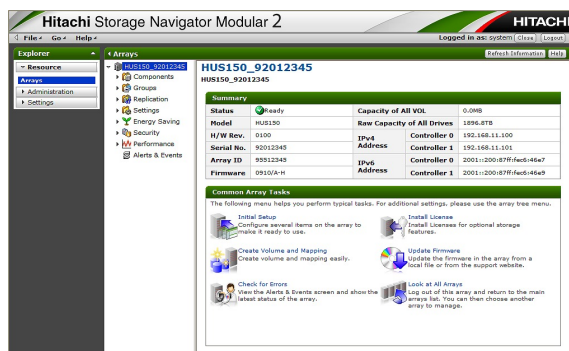
(a) Turn on the power supply.

(b) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(c) Click the array name, and open the unit window.

NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(d) Select the [Groups] - [iSCSI Targets] on the unit window.

(e) Put a checkmark to the port to the authentication information, and click the [Edit Authentication] button.

(f) Select "CHAP", "None" or "CHAP, None" for the authentication method.

(g) Put a checkmark to "Enable Mutual Authentication".

(h) Select the [OK] button.

(i) The confirmation message is displayed. Select the [Close] button.

5.4.3   Setting CHAP Authentication

The disk array system can authenticate the iSCSI User both Initiator Authentication and Two-Way Authentication (Target Authentication) with the CHAP (Challenge Handshake Authentication Protocol).

Set the same iSCSI User information (User Name/Secret) both host side and disk array system side for Initiator Authentication.

Set the same iSCSI User information (User Name/Secret) both host side and disk array system side for Two-Way Authentication (Target Authentication).

(1) Adding a CHAP User

  To authenticate the initiator, set the CHAP User to the port and assign it to the Target.

  (a) Turn on the power supply.

  (b) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

   Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(c) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)
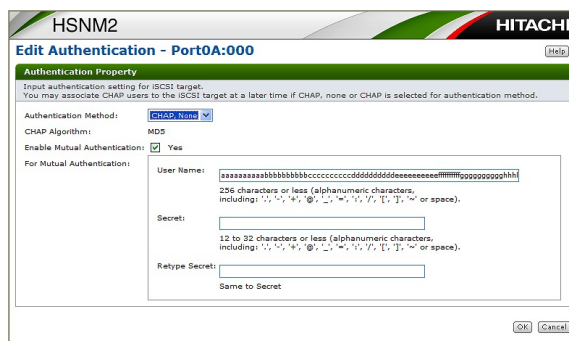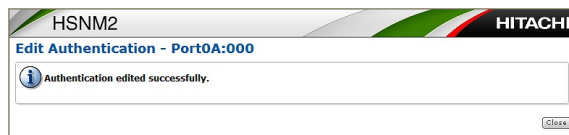

(d) Select the [Groups] - [iSCSI Targets] on the unit window, and click the [CHAP Users] tab.

(e) Click the [Create CHAP User] button.

(f) Displayed the "Create CHAP User" dialog.

(g) Enter the [User Name], [Secret], and [Retype Secret].

(h) Put a checkmark to the port to be created from the selectable ports.

(i) Click the [OK] button.

(j) The confirmation message is displayed. Select the [Close] button.

(2) Changing the CHAP User

  (a) Turn on the power supply.

  (b) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]
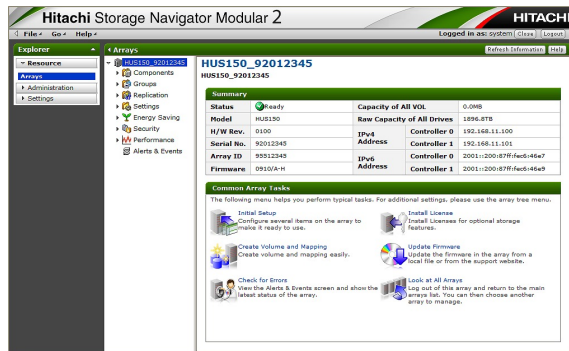
    Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

  (c) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)
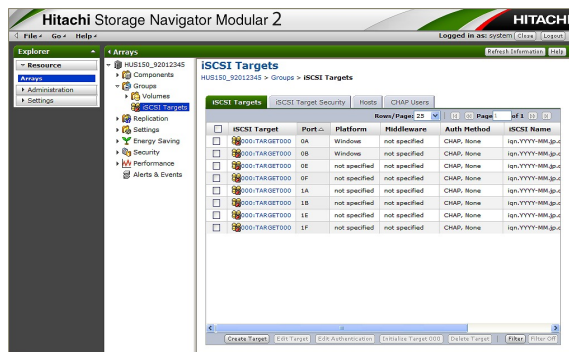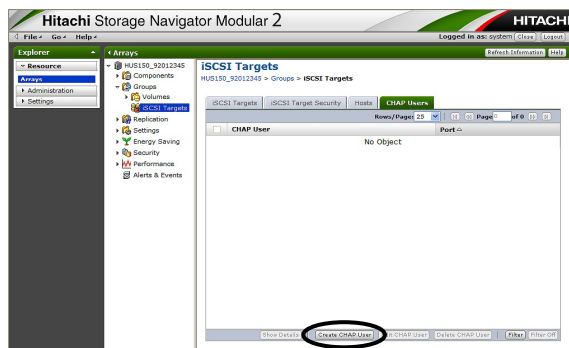

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(d) Select the [Groups] - [iSCSI Targets] on the unit window, and click the [CHAP Users] tab.

(e) Click the port through for which you want to change the CHAP User. Click the [Edit CHAP User] button.

(f) The "Create CHAP User" dialog is displayed.

(g) As necessary, enter the [User Name], [Secret], and [Secret (re-input)].
    And then select the [OK] button.

(h) The confirmation message is displayed. Select the [Close] button.

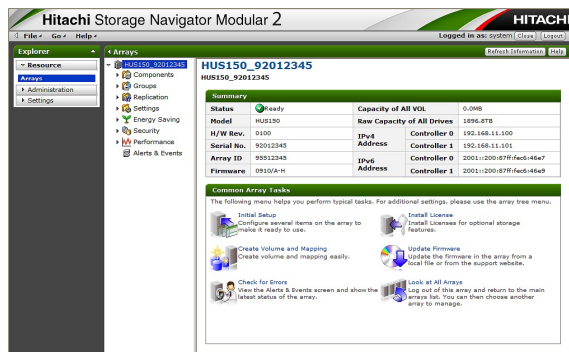(3) Deleting the CHAP User

   (a) Turn on the power supply.

   (b) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

      Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

   (c) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(d) Select the [Groups] - [iSCSI Targets] on the unit window, and click the [CHAP Users] tab.

(e) Click the port through for which you want to delete the CHAP User. Click the [Delete CHAP User] button.

(f) The confirmation message is displayed. Select the [Confirm] button.

(g) Click the [Close] button.

5.4.4   Setting iSNS

iSNS(Internet Storage Name Service) provides the same function as the Name Server of the Fabric Switch on the Fibre Channel interface.

The disk array system registers the iSCSI port information on the iSNS Server. The host as iSCSI initiator discovers the iSCSI target with iSCSI disk array system information registered on the iSNS Server.

(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)
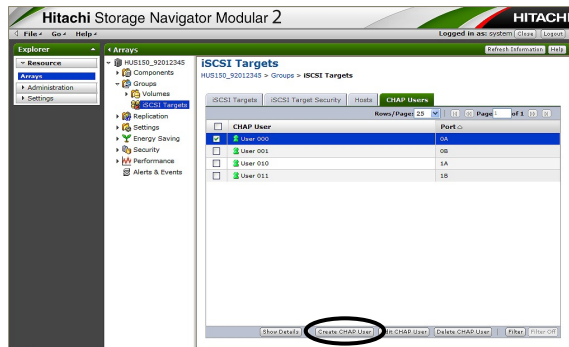

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.
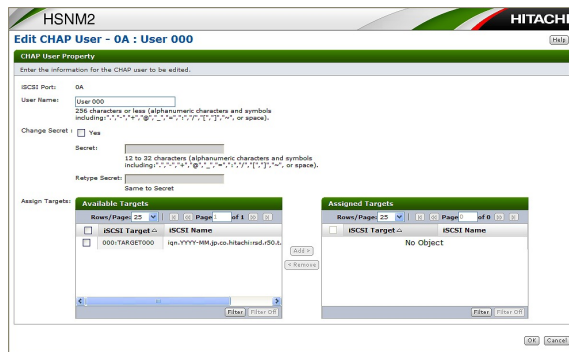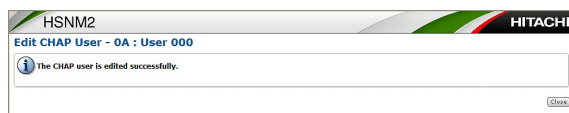
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(4) Select [Settings] – [Port Settings] – [iSCSI Settings], and click the iSCSI port to be set.

(5) Click the [Edit iSNS Server Settings] button at the upper right of the window.

(6) Set the iSNS server.

① [Use iSNS Server] : Specify whether to use iSNS Server or not.
When using the iSNS server, specify the "IP Address of iSNS Server"and "TCP Port Number" of the iSNS Server.

(7) When the changes are completed, click the [OK] button at the lower right of the window. The content of the change is canceled by clicking the [Cancel] button.

(8) The message of the setting confirmation is displayed. Click the [Close] button.

5.4.5   Sending Ping

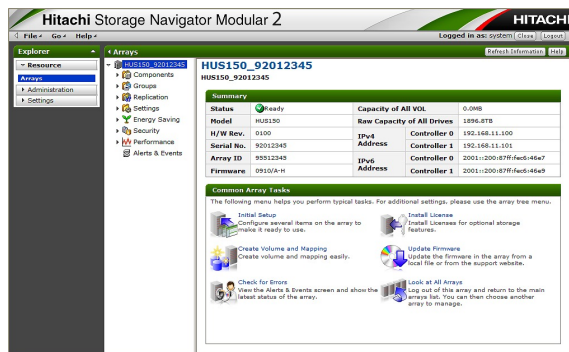Sends the ping to the initiator (host) and displays the result of the sending.

(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

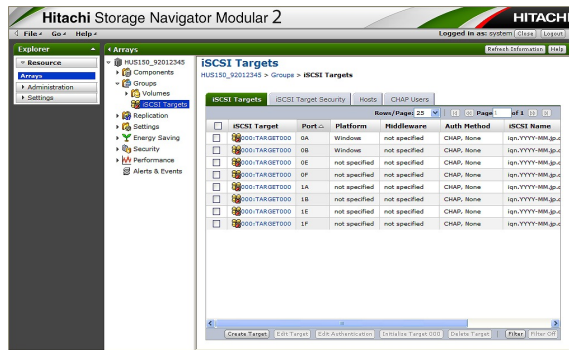Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)
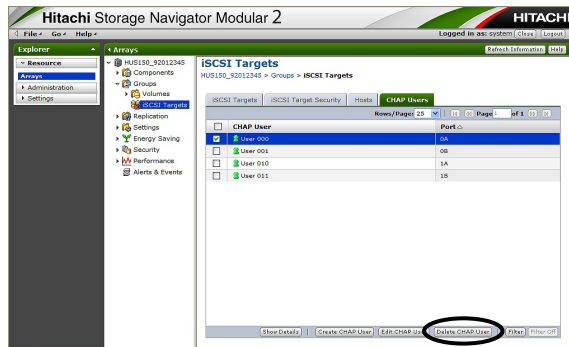

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

---

(4) Select [Settings] – [Port Settings] – [iSCSI Settings], and click the [Execute Ping] button.

(5) "Execute Ping" window is displayed.

Enter the Destination IP address, and click the [OK] button.

(6) Check the confirmation message, and click the [Confirm] button.

(7) Check the message in the displayed window, and click the [Confirm] button.

5.5 System Parameter Setting List

The following table lists the connection parameter settings using Hitachi Storage Navigator Modular 2.

Table5.5.1 Host Connection Parameters Setting

Host Group Option/iSCSI Target Option										
Simple Setting : The platform/middleware to connect are selected.										
1 Platforms		Windows	Linux	Solaris	HP-UX	AIX	VMware	Net Ware	Not specified	----	
2 Middleware		Not specified								VCS	Tru Cluster

Detail Setting : The following parameters will be selected automatically according to Simple Setting.
Even when you have selected "Not Specified" in the platform of Simple Setting, if you select the same parameter as the specified platform in Detail Setting, it operates in the same way as specified.

		Windows	Linux	Solaris	HP-UX	AIX	VMware	Net Ware	Not specified	VCS	Tru Cluster
Basic Setting (Select one of these modes)	Standard Mode	✓	✓	✓	✓	✓	✓	✓	✓		
	Open VMS Mode										
	Wolfpack Mode										
	TRESPASS Mode										
Detail Setting (Multiple selections)	HP-UX Mode				✓						
	PSUE Read Reject Mode				✓						
	Mode Parameters Changed Notification Mode										
	NACA Mode					✓					
	Capacity Data Changed Notification Mode										
	Task Management Isolation Mode										
	Unique Reserve Mode 1									✓	
	Unique Reserve Mode 2										
	Port ID Conversion Mode										
	Tru Cluster Mode										✓
	Product Serial Response Mode										
	Same Node Name Mode										
	CCHS Mode										
	NOP-In Suppress Mode							✓			
	S-VOL Disable Advanced Mode										
	Discovery CHAP Mode						✓				
	Unique Extended Copy Mode						✓				
	Unique Write Same Mode						✓				
	Unique Compare Write Mode						✓				
	Standard VAAI Command Mode						✓				
	Report iSCSI Full Portal List Mode										
	DP Depletion Detail Reply Mode	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Unit Attention Change Mode										
	HNAS Option Mode										
	Allocation Length Expand Mode										
	UNMAP Short Length Mode	✓									
	Change Response for Replication Mode										

✓ : Parameter that is selected automatically by Simple Setting.
Blank : Parameter that is selected manually if needed.
Not specified : All other supported are specified.

NOTE : • Using the Hitachi Storage Navigator Modular 2, specify the platform
(operating system) and the Middleware (cluster software).
The remaining parameters are automatically set by the system based on the
combination of the platform and the cluster option you specify.

• Combination of platform and middleware shown on gray backgrounds to be
selected in Simple Setting is not related to the support availability.

• When extending the volume capacity by AIX, select AIX as a platform, check
"Capacity Data Changed Notification Mode" from the detailed settings. This
is enabled in both Fibre Channel and iSCSI.
In the platform other than AIX, there is no effect even if "Capacity Data
Changed Notification Report Mode" is selected.

• When supporting Type7h/8h of the Persistent Reserve command, check
"Unique Reserve Mode 2" from the detailed settings. This is enabled in both
Fibre Channel and iSCSI.

• When supporting 2-byte Allocation Length of the Inquiry command, check
"Allocation Length Expand Mode" from the detailed settings. This is enabled
in both Fibre Channel and iSCSI.

• When connecting it with winBoot/i of emBoot Ine. by the iSCSI connection,
check "NOP-In Suppress Mode" from the detailed settings.

• When connecting it with Open Enterprise Server of Novell, Inc. by the iSCSI
connection, check "NOP-In Suppress Mode" from the detailed settings.

• When using CHAP(Discovery session) by VMware of the iSCSI connection, check
"Discovery CHAP Mode" from the detailed settings. In case of the Fibre
Channel connection, "Discovery CHAP Mode" is unable even if "Discovery
CHAP Mode" is enabled option.

• When connecting it with Tru64, please select "Not specified" in Platform of
Simple Setting.
It is not necessary to select "HP-UX" in Platform of Simple Setting for Tru64.

• If the added volumes cannot be recognized from the host when creating host
groups newly and adding volumes using the LUN Manager function, enable the
"Autodiscover New HG Mode". (Refer to "8.3 Setting Port Options" (SYSPR 08-
0080).)
If either "WWN addition or deletion operation for host group" or "Change
operation for the simple setting mode" is performed with this mode enabled,
a Linkdown message (For the switch configuration, RSCN (Status change
notification) is issued, or for the direct-connected configuration, LIP is issued)
may be left in a host log, etc. not only for the host group concerned but also
for the overall port.

• The "HNAS Option Mode" can be used only when HNAS is connected. When
setting the "HNAS Option Mode", check that the HNAS platform is connected
to the relevant host group.

- When it is configuration with many volumes, OS booting time may become long if OS issues PLOGI several times for every volume. Select the "PLOGI Response Quick Mode" in Port Options, in order to make this phenomenon avoid. (Refer to "8.3 Setting Port Options" (SYSPR 08-0080).)
- The following setting is required when using the storage linkage function connecting to VMware.
  - Enable the Special Extended Copy Mode, Special Write Same Mode and Special Compare and Write Mode. When using the storage linkage function without applying the VAAI plug-in, enable the Standard VAAI Command Mode in addition to the above. The standard VAAI command mode is supported when the firmware is 0940/A or more.
  - When VMware is selected for the platform of the simple options, even if updating the firmware to 0940/A or more, the standard VAAI command mode is not enabled automatically. Set it manually as needed. (Refer to "5.1 Setting Host Group/Target Options" (SYSPR 05-0000).)
- When using the storage linkage function connecting to VMware, if the clone operation of the virtual machine is executed, the data copy processing operates by the ExtendedCOPY command. The host I/O performance may deteriorate significantly during the data copy processing.
  When prioritizing the host I/O performance during the data copy processing by the ExtendedCOPY command, enable the Extended COPY Low-speed Mode of the tuning parameter. (Refer to "13.2.2 Setting System Tuning" (SYSPR 13-0110).)
  However, if it is enabled, it takes more time to complete the clone operation.
- [When the firmware version is 0945/D or more]
  - The default status of the port option "UNMAP Short Length Mode" is as follows:
    ・ The port which includes the host group for which the Windows is selected as platform: Enable (selected status)
    ・ The ports other than the one described above: Disable (unselectable status)
  - For Windows Server 2012 connections, check "UNMAP Short Length Mode". Otherwise, the UNMAP command may time out and not terminate. (Refer to "5.1 Setting Host Group/Target Options" (SYSPR 05-0000).)
  - When changing "UNMAP Short Length Mode", be sure to restart the host. Otherwise, the host operation is not changed correctly.

Chapter 6.   Setting Date and Time

> NOTE : If data loss happens with all data in the cache memory gone due to a problem such as
> system down and the combination of power outage and battery failure, the setting done
> from the start of the array to the occurrence of data loss will return to where it was
> before the start of the array. So it is necessary to check and reconfigure the Date &
> Time setting after maintenance work for a failure that leads to data loss.

(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl]
key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance
Mode".[‡1]

Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main
window.

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is
> not displayed even though the icon of the array is clicked, use the changed LAN
> Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by
> Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

---

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the
"Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

---

(4) Select [Settings] – [Date & Time] on the unit window.

(5) Click the [Edit Date & Time] button in the upper right of the window.

(6) The Edit Date and Time window is displayed.

Specify the setting method and click the [OK] button.

[Date and Time] : Specifies the setting method.

• Select "Set Automatically" unless it is especially required to set it manually.

• When you have selected "Set Manually", enter [Date] (you can display or set the date that is set now) and [Time] (you can display or set the time that is set now).

(7) The completion message is displayed. Click the [Close] button.

(8) Click the [Edit Time Zoon and NTP] button at the upper right of the window.

(9) "Edit Time Zone and NTP" window is displayed.
Select or input "Time Zone" and "IP Address of NTP Server" and click the [OK] button.

(10) The completion message is displayed. Click the [Close] button.

(11) The detail of the setting that has been made is displayed.
Make sure that the setting that has been made is reflected on the display.

Chapter 7.   Setting LAN Related

NOTE : If the setting is changed while an I/O is being executed, the I/O may be abnormally stopped or the succeeding I/O may be unable to be executed. Therefore, change the setting after stopping the I/O.
Besides, the setting on the host computer side must be changed depending on the host computer.

7.1   Setting Maintenance LAN

Refer to/set the maintenance port IP address.

NOTE : • Do not make the setting of the Maintenance LAN while the READY LED (green) on the front of the Controller Box is blinking at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the CBL (80 to 180 minutes when the DBW is connected to the CBL)), or the WARNING LED (orange) is blinking at high speed (for the maximum of 30 to 85 minutes).
• When there is a connection in the maintenance port, the setting of the Maintenance LAN cannot be changed (it becomes "Connection waiting time-out"). Close all the programs which perform the communication to the maintenance port when changing the setting of the Maintenance LAN.
• If setting of user port is incorrect, the setting of maintenance port will be failed. Set correct setting for user port according to error message. (Refer to "7.2 Setting LAN" (SYSPR 07-0040).)
• If "Maintenance Port IP Address Automatic Change Mode" is enabled, the IP address of maintenance port can not be changed.
If you change maintenance LAN setting, set "Maintenance Port IP Address Automatic Change Mode" to "Disable". (Refer to "7.2 Setting LAN" (SYSPR 07-0040).)
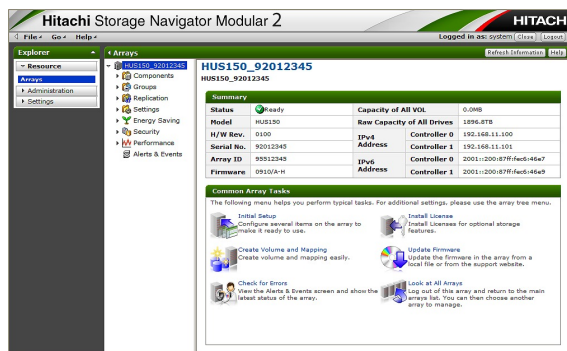
(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

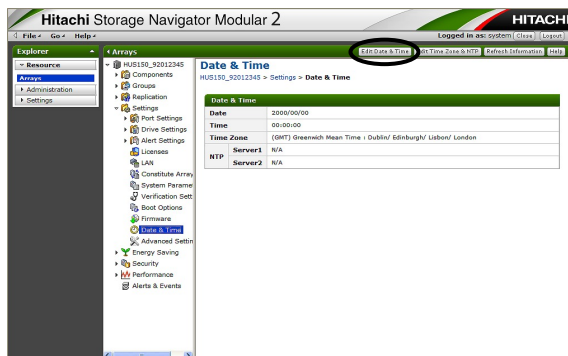Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

---

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

---

(4) Select [Settings] – [LAN] on the unit window, and select the [Maintenance Port] tab.

(5) Click the [Change Maintenance Port].

The "Maintenance Port" setting window is displayed.

[Protocol]   : Selects protocol.

[IPv4 Address]

    [Controller 0] : By default, it is set to "10.0.0.16".

          Sets the network address and host address of Controller 0.

          The same addresses as the network address and host address specified

          for other maintenance port cannot be set now.

    [Controller 1] : By default, it is set to "10.0.0.17".

          Sets the network address and host address of Controller 1.

          The same addresses as the network address and host address specified

          for other maintenance port cannot be set now.

[IPv6 Address]

    [Controller 0] : By default, it is set to "fe80::16".

          Set the network address and host address of Controller 0.

          You cannot set the same addresses as the network address and host

          address which are currently specified for other maintenance ports.

    [Controller 1] : By default, it is set to "fe80::17".

          Set the network address and host address of Controller 1.

          You cannot set the same addresses as the network address and host

          address which are currently specified for other maintenance ports.

(6) Check that the set contents are correct.

If the [Cancel] button is clicked, the change content is cancelled. Click the [OK] button to terminate the setting.

(7) Check the contents of the confirmation message window, and click the [Close] button.

NOTE : When Controller 0 is set, Controller 1 is set automatically.

(8) Check that the connection from Hitachi Storage Navigator Modular 2 to the array is possible by the set IP address. (Refer to "1.1 Procedure for Connecting Hitachi Storage Navigator Modular 2 with the Array" (SYSPR 01-0020).)

7.2   Setting LAN

This section describes the reference and setting of the LAN configuration information.

> NOTE : • Do not perform setting of LAN while the READY LED (green) on the front of the Controller Box is blinking at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the CBL (80 to 180 minutes when the DBW is connected to the CBL)), or the WARNING LED (orange) is blinking at high speed (for the maximum of 30 to 85 minutes).
>
> • When the TrueCopy remote replication/TrueCopy Extended Distance is enabled, and the arrays to be restarted is the remote, transit the pair status (S-VOL) of the TrueCopy remote replication/TrueCopy Extended Distance to the PSUS, and then perform the restart.
> If the restart is executed, it becomes a path blockade, and the notice of E-mail Alert Function, SNMP Agent Support Function, and TRAP occur. Perform the notice and the check to the Failure Monitoring Department in advance.
> The path blockade of TrueCopy remote replication/TrueCopy Extended Distance automatically recovers after restarting.
>
> • When using the priced option, Power Saving/Power Saving Plus, and the power saving instruction of the I/O interlock disabled is executed, if the array restarts while the power saving status is "Normal (Command Monitoring)", the status is changed to "Normal (Spindown Failed: PS OFF/ON)".
> After executing the power saving instruction of the I/O interlock disabled, check that there is no RAID group whose power saving status is "Normal (Command Monitoring)" and then restart the array.
> If the spin-down fails, execute the spin-down again.

(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]
Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.
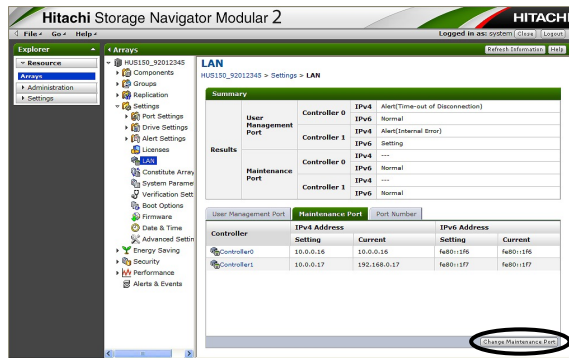
(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)
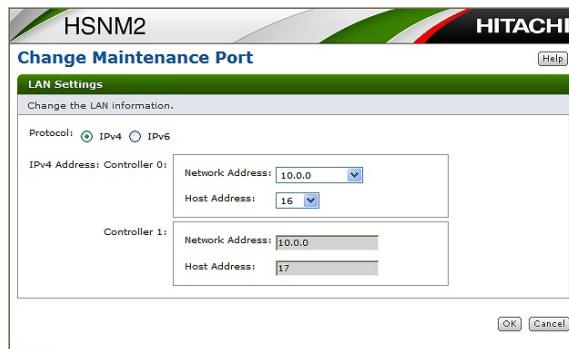

(4) Select [Settings] – [LAN] on the unit window, and select the [User Management Port] tab.

(5) Click the [Edit User Management Port] button.
The "LAN" setting window is displayed.

(6) Perform the setting of the LAN information.

   ① [Protocol]　: Selects protocol.

      • Go to ② when selecting IPv4 protocol.

      • Go to ⑤ when selecting IPv6 protocol.

   <When selecting IPv4 protocol>

   ② [Controller 0]　: Sets the LAN parameter of Controller 0.

                Select a setting method.

                If [Use DHCP] is checked, the DHCP mode is enabled.

                If [Set Manually] is checked, it is specified manually.

      [IPv4 Address]　　: The IP Address is set.

                The IP address in the same network address as the network address of the IP address currently specified for the port for the maintenance cannot be set.

      [IPv4 Subnet Mask] : Subnet Mask is set.

      [IPv4 Default Gateway]　: Default Gateway is set.

                The same IP address as the IP address currently specified for the port for the maintenance cannot be set to the default gateway.

                When network address of the default gateway is different from network address of IP address, the gateway address cannot be set. If no Gateway address is specified, set "0.0.0.0".

      [Negotiation]　　: Set the negotiation with the device connecting to the array.

                Set it to match with the device to connect.

                You cannot set different values for IPv4 protocol and IPv6 protocol because the negotiation setting is common to the case where IPv6 protocol is used.

   ③ [Controller 1]　: Sets the LAN parameter of Controller 1.

                Select a setting method.

                If [Use DHCP] is checked, the DHCP mode is enabled.

                If [Set Manually] is checked, it is specified manually

      [IPv4 Address]　　: The IP Address is set.

                The IP address in the same network address as the network address of the IP address currently specified for the port for the maintenance cannot be set.

      [IPv4 Subnet Mask] : Subnet Mask is set.

      [IPv4 Default Gateway]　: Default Gateway is set.

                The same IP address as the IP address currently specified for the port for the maintenance cannot be set to the default gateway.

                When network address of the default gateway is different from network address of IP address, the gateway address cannot be set. If no Gateway address is specified, set "0.0.0.0".

[Negotiation]   : Set the negotiation with the device connecting to the array.
                       Set it to match with the device to connect.
                       You cannot set different values for IPv4 protocol and IPv6
                       protocol because the negotiation setting is common to the case
                       where IPv6 protocol is used.
④   [Enable to Maintenance IP Address Automatic Switch Mode]: If the [Yes] checkbox is
                                                             checked, the maintenance IP
                                                             address to be switched is
                                                             selected automatically.

< When selecting IPv6 protocol >
⑤ [Controller 0] : Sets the LAN parameter of Controller 0.
                     Select a setting method.
                     If [Set Automatically] is checked, the IPv6 address automatic acquisition
                     mode is enabled.
                     If [Set Manually] is checked, it is specified manually.
   [IPv6 Address]   : The IP Address is set.
                           The IP address in the same network address as the network
                           address of the IP address currently specified for the port for the
                           maintenance cannot be set.
                           Set the IP address other than the multicast address (fe00::/8),
                           loopback address (::1) and unset (::). Do not set the link local
                           address (fe80::/10) because it may duplicate the link local
                           address that the array automatically generates.
   [Length of Subnet Prefix] : Set the length of subnet prefix. The standard length is 64.
   [IPv6 Default Gateway] : Default Gateway is set.
                             The same IP address as the IP address currently specified for
                             the port for the maintenance cannot be set to the default
                             gateway.
                             When network address of the default gateway is different
                             from network address of IP address, the gateway address
                             cannot be set. Input is not required when the default
                             gateway is unused.
   [Negotiation]   : Set the negotiation with the device connecting to the array.
                          Set it to match with the device to connect.
                          You cannot set different values for IPv4 protocol and IPv6
                          protocol because the negotiation setting is common to the case
                          where IPv4 protocol is used.

    ⑥ [Controller 1] : Sets the LAN parameter of Controller 1.

                         Select a setting method.

                         If [Set Automatically] is checked, the IPv6 address automatic acquisition mode is enabled.

                         If [Set Manually] is checked, it is specified manually.

       [IPv6 Address]   : The IP Address is set.

                         The IP address in the same network address as the network address of the IP address currently specified for the port for the maintenance cannot be set.

                         Set the IP address other than the multicast address (fe00::/8), loopback address (::1) and unset (::). Do not set the link local address (fe80::/10) because it may duplicate the link local address that the array automatically generates.

       [Length of Subnet Prefix] : Set the length of subnet prefix. The standard length is 64.

       [IPv6 Default Gateway] : Default Gateway is set.

                         The same IP address as the IP address currently specified for the port for the maintenance cannot be set to the default gateway.

                         When network address of the default gateway is different from network address of IP address, the gateway address cannot be set. Input is not required when the default gateway is unused.

       [Negotiation]   : Set the negotiation with the device connecting to the array. Set it to match with the device to connect.
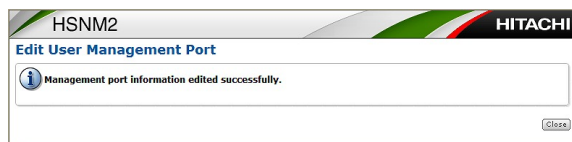
                         You cannot set different values for IPv4 protocol and IPv6 protocol because the negotiation setting is common to the case where IPv4 protocol is used.

(7) Check that the set contents are correct.
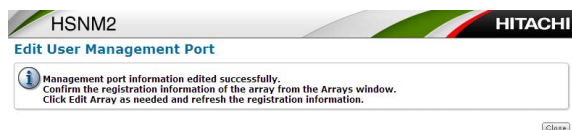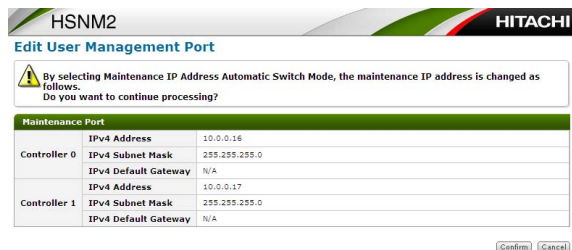
If the [Cancel] button is clicked, the change content is cancelled. Click the [OK] button to terminate the setting.

(8) Check the contents of the confirmation message window, and click the [Confirm] or [Close] button.

• When setting the [Enable to Maintenance IP Address Automatic Switch Mode] to invalid

• When setting the [Enable to Maintenance IP Address Automatic Switch Mode] to valid

7.3 Setting LAN Port Number

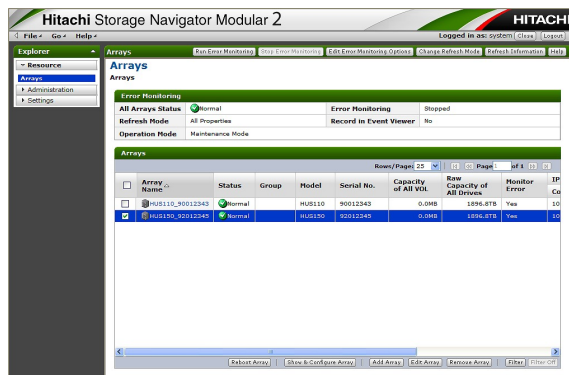Do the setting of the LAN Port Number on the array side.

The port number of the TCP/IP connection used for the communication between the array and the Hitachi Storage Navigator Modular 2 can be set with the optional LAN Port Number (the range of 1024 to 49151). (The array default value is "2000".)
The LAN port number of the array is set in the Hitachi Storage Navigator Modular 2, and the LAN port number which the Hitachi Storage Navigator Modular 2 uses is set by editing the "services" file of the computer in which the Hitachi Storage Navigator Modular 2 is installed. It is required that each LAN port number communicated between the array and the Hitachi Storage Navigator Modular 2 is set to the same value. Also, the LAN port number of the array can be set per Controller. This LAN port number is common to the LAN port for the user control and the LAN port for the maintenance per Controller.

7.3.1 Changing the Setting with LAN Connection to Both Controllers

(1) Turn on the power supply.
(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]
Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

---

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

(4) Select [Settings] – [LAN] on the unit window, and select the [Port Number] tab.

(5) Click the [Change Port Numbers] button.
The "Change Port Numbers" window is displayed.

(6) Set [Non-secure port number] and [Secure port number] for each of Controller 0 and Controller 1. After confirming it, click the [OK] button.

(7) Check the content of the displayed message (when the port number was changed, if you do not work as described in the message, it may not be able to connect with the arrays (refer to (9) (SYSPR 07-0120)), and click the [Close] button.

(8) The window moves to the Arrays window in about 10 seconds after clicking the [Close] button.

(9) After creating the backup file of the services file for the service PC, open the original services file, add the LAN port number which the Hitachi Storage Navigator Modular 2 uses (underlined part), and then overwrite and save it. Enter the same number as the set number in the array for the LAN Port Number.

When adding it to the last line, the return code is needed at the end of the input line.

- Windows 2000 (C:\WINNT\system32\drivers\etc\services),

  Windows XP (C:\WINDOWS\system32\drivers\etc\services)

```
# Copyright (c) 1993-1999 Microsoft Corp.
#
# This file contains port numbers for well-known services defined by IANA
#
# Format:
#
# <service name>  <port number>/<protocol>  [aliases...]  [#<comment>]
#

echo              7/tcp
echo              7/udp
  :
  :
radacct           1813/udp                   # RADIUS accounting protocol
df-damp-snm       2001/tcp                   # Hitachi Storage Navigator Modular 2
nfsd              2049/udp    nfs             # NFS server
knetd             2053/tcp                   # Kerberos de-multiplexor
man               9535/tcp                   # Remote Man Server
  :
df-damp-snm-ssl   22222/tcp                  # Hitachi Storage Navigator Modular 2 (ssl)
  :
```

When changing "Normal port number"

When changing "Secure port number"

• UNIX (/etc/services)

```
# /etc/services:
# $Id: services,v 1.31 2002/04/03 16:53:20 notting Exp $
#
# Network services, Internet style
#
# Note that it is presently the policy of IANA to assign a single well-known
# port number for both TCP and UDP; hence, most entries here have two entries
# even if the protocol doesn't support UDP operations.
# Updated from RFC 1700, ``Assigned Numbers'' (October 1994).  Not all ports
# are included, only the more common ones.
#
# The latest IANA port assignments can be gotten from
#            http://www.iana.org/assignments/port-numbers
# The Well Known Ports are those from 0 through 1023.
# The Registered Ports are those from 1024 through 49151
# The Dynamic and/or Private Ports are those from 49152 through 65535
#
# Each line describes one service, and is of the form:
#
# service-name  port/protocol  [aliases ...]   [# comment]

tcpmux              1/tcp                       # TCP port service multiplexer
tcpmux              1/udp                       # TCP port service multiplexer
:
:                                                            When changing "Normal port number"
 gdp-port           1997/tcp                    # Cisco Gateway Discovery Protocol
gdp-port    1       997/udp                     # Cisco Gateway Discovery Protocol
df-damp-snm         2001/tcp                    # Hitachi Storage Navigator Modular 2  ←
nfs                 2049/tcp    nfsd
nfs                 2049/udp    nfsd                                When changing "Secure port number"
:
df-damp-snm-ssl     22222/tcp                   # Hitachi Storage Navigator Modular 2 (ssl)  ←
:
```

NOTE : When there is no line of "df-damp-snm" in the services file, use the LAN Port
Number of "2000" and connect it.

Also, when it cannot be connected with the LAN Port Number specified in the
file, use "2000" and connect it again.

(10) After starting the Hitachi Storage Navigator Modular 2, click the icon of the array whose LAN
Port Number was changed in the main window of the Hitachi Storage Navigator Modular 2, and
then check that the unit window is displayed.

When it is necessary to change the LAN port number used in the Hitachi Storage Navigator
Modular 2 installed in the customer's computer, add the port information which the Hitachi
Storage Navigator Modular 2 uses (In case of the normal port, a line shows [service-name] as
"df-damp-snm", [port/protocol] as "<Set LAN Port Number>/tcp", and [comment] as "# Hitachi
Storage Navigator Modular 2". In case of the secure port, a line shows [service-name] as "df-
damp-snm-ssl", [port/protocol] as "<Set LAN Port Number>/tcp", and [comment] as "# Hitachi
Storage Navigator Modular 2 (ssl)".), to the services file, and then request the customer's
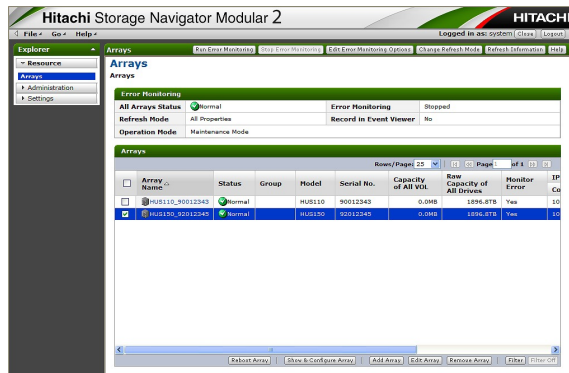network administrator to check that the unit window of the array is displayed.
Also, when the LAN port number used in the Hitachi Storage Navigator Modular 2 is set to other
than "2000" for the services file for the service PC, reset the LAN port number to the default
value "2000" after completing all works, and then save the services file.
Delete the backup file of the services file for the service PC as needed.

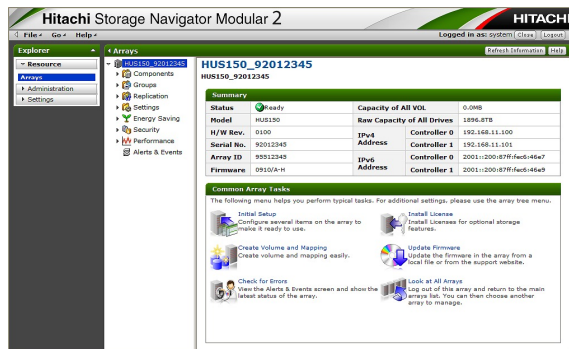### 7.3.2 Changing the Setting with LAN Connection to One of the Controllers

(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.
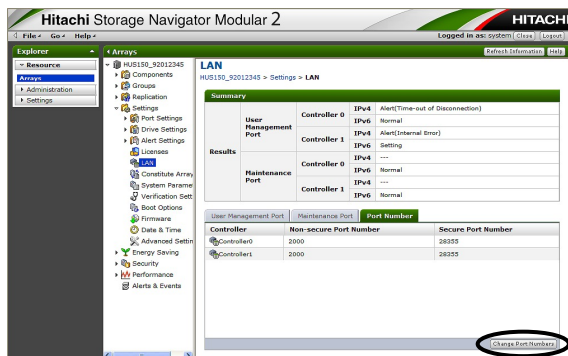

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)
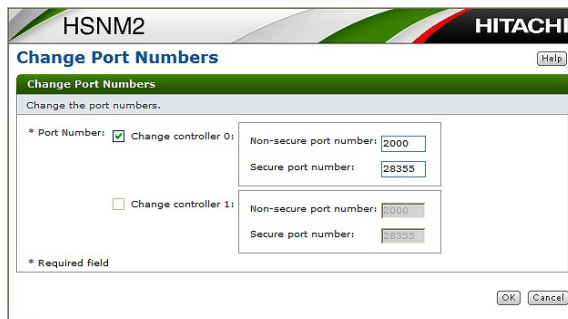

---

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

---

(4) Select [Settings] – [LAN] on the unit window, and select the [Port Number] tab.

(5) Click the [Change Port Numbers] button.
   The "Change Port Numbers" window is displayed.

(6) The information on the Controller-side connected to the service PC via LAN is displayed in the activated status.
   The operation procedure is shown here on the assumption that the service PC is connected to Controller #0 of the arrays.
   Set [Normal Port Number] and [Secure Port Number] for Controller 0. After confirming it, click the [OK] button.

(7) Check the content of the displayed message, and click the [Close] button displayed at the lower right of the window.

(8) The window moves to the Arrays window in about 10 seconds after clicking the [Close] button.

(9) Switch the LAN cable connection of Hitachi Storage Navigator Modular 2 to the Controller #1-side. Edit the arrays concerned in the array list window and set the IP address of Controller #1. After the edit, select the arrays concerned in the array list window.
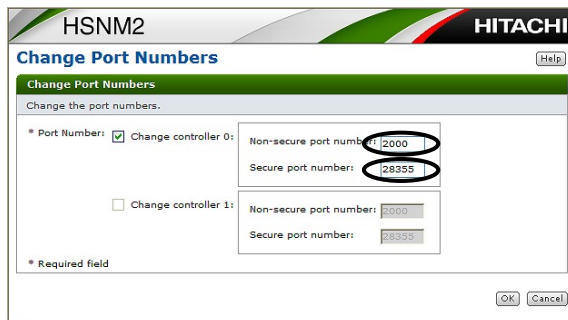
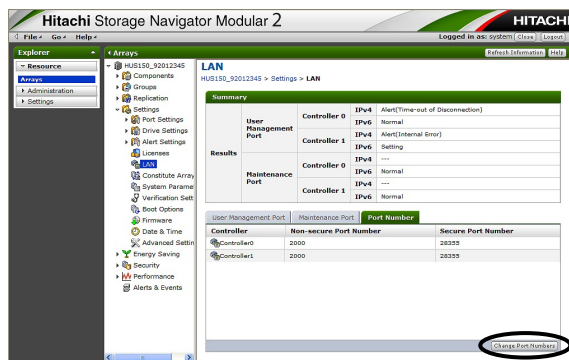(10) Select [Settings] – [LAN] on the unit window, and select the [Port Number] tab.

(11) Click the [Change Port Numbers] button.

The "Change Port Numbers" window is displayed.

(12) Set [Normal Port Number] and [Secure Port Number] for Controller 1. After confirming it, click the [OK] button.

(13) Check the content of the displayed message (when the port number was changed, if you do not work as described in the message, it may not be able to connect with the array (refer to (15) (SYSPR 07-0170)), and click the [Close] button displayed at the lower right of the window.

(14) The window moves to the Arrays window in about 10 seconds after clicking the [Close] button.

(15) After creating the backup file of the services file for the service PC, open the original services file, add the LAN port number which the Hitachi Storage Navigator Modular 2 uses (underlined part), and then overwrite and save it. Enter the same number as the set number in the array for the LAN Port Number.
When adding it to the last line, the return code is needed at the end of the input line.

- Windows 2000 (C:\WINNT\system32\drivers\etc\services),
  Windows XP (C:\WINDOWS\system32\drivers\etc\services)

```
# Copyright (c) 1993-1999 Microsoft Corp.
#
# This file contains port numbers for well-known services defined by IANA
#
# Format:
#
# <service name>  <port number>/<protocol>  [aliases...]  [#<comment>]
#

echo              7/tcp
echo              7/udp
  :
  :                                                         ┌──────────────────────────────────┐
  :                                                         │ When changing "Normal port number" │
radacct           1813/udp               # RADIUS accounting protocol
df-damp-snm       2001/tcp               # Hitachi Storage Navigator Modular 2  ←
nfsd              2049/udp   nfs          # NFS server
knetd             2053/tcp               # Kerberos de-multiplexor
man               9535/tcp               # Remote Man Server    ┌──────────────────────────────────┐
  :                                                            │ When changing "Secure port number" │
df-damp-snm-ssl   22222/tcp              # Hitachi Storage Navigator Modular 2 (ssl)  ←
  :
```

• UNIX (/etc/services)

```
# /etc/services:
# $Id: services,v 1.31 2002/04/03 16:53:20 notting Exp $
#
# Network services, Internet style
#
# Note that it is presently the policy of IANA to assign a single well-known
# port number for both TCP and UDP; hence, most entries here have two entries
# even if the protocol doesn't support UDP operations.
# Updated from RFC 1700, ``Assigned Numbers'' (October 1994).  Not all ports
# are included, only the more common ones.
#
# The latest IANA port assignments can be gotten from
#             http://www.iana.org/assignments/port-numbers
# The Well Known Ports are those from 0 through 1023.
# The Registered Ports are those from 1024 through 49151
# The Dynamic and/or Private Ports are those from 49152 through 65535
#
# Each line describes one service, and is of the form:
#
# service-name  port/protocol  [aliases ...]   [# comment]

tcpmux            1/tcp                        # TCP port service multiplexer
tcpmux            1/udp                        # TCP port service multiplexer
:
:                                                      When changing "Normal port number"
gdp-port          1997/tcp                     # Cisco Gateway Discovery Protocol
gdp-port    1     997/udp                      # Cisco Gateway Discovery Protocol
df-damp-snm       2001/tcp                     # Hitachi Storage Navigator Modular 2  ←
nfs               2049/tcp    nfsd
nfs               2049/udp    nfsd                       When changing "Secure port number"
:
df-damp-snm-ssl   22222/tcp                    # Hitachi Storage Navigator Modular 2 (ssl) ←
:
```

NOTE : When there is no line of "df-damp-snm" in the services file, use the LAN Port
       Number of "2000" and connect it.
       Also, when it cannot be connected with the LAN Port Number specified in the
       file, use "2000" and connect it again.

(16) After starting the Hitachi Storage Navigator Modular 2, click the icon of the array whose LAN
     Port Number was changed in the main window of the Hitachi Storage Navigator Modular 2, and
     then check that the unit window is displayed.

     When it is necessary to change the LAN port number used in the Hitachi Storage Navigator
     Modular 2 installed in the customer's computer, add the port information which the Hitachi
     Storage Navigator Modular 2 uses (In case of the normal port, a line shows [service-name] as
     "df-damp-snm", [port/protocol] as "<Set LAN Port Number>/tcp", and [comment] as "# Hitachi
     Storage Navigator Modular 2". In case of the secure port, a line shows [service-name] as "df-
     damp-snm-ssl", [port/protocol] as "<Set LAN Port Number>/tcp", and [comment] as "# Hitachi
     Storage Navigator Modular 2 (ssl)".), to the services file, and then request the customer's
     network administrator to check that the unit window of the array is displayed.
     Also, when the LAN port number used in the Hitachi Storage Navigator Modular 2 is set to other
     than "2000" for the services file for the service PC, reset the LAN port number to the default
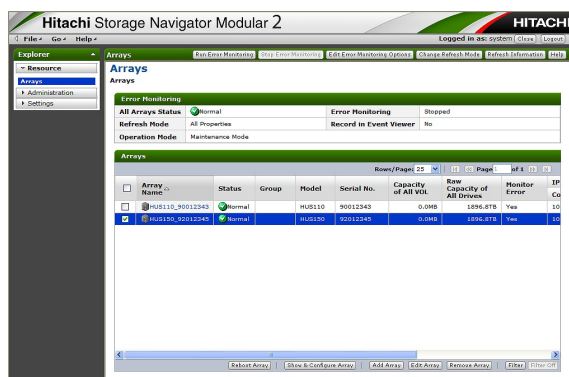   value "2000" after completing all works, and then save the services file.
     Delete the backup file of the services file for the service PC as needed.

7.3.3 Recovery Method

When a problem occurs during the LAN Port Number change work, recover it according to the following procedure.

(1) When the setting of either Controller failed (Or, when setting the LAN Port Number for every Controller) Connect the LAN cable only to the Controller to be set and perform the setting change of the LAN Port Number.

(a) Set the LAN Port Number of the Controller to be set in the services file.
If it is unknown, check it using the WEB browser. (Refer to WEB "2.6 Network Information" (WEB 02-0160).)

(b) Connect the LAN cable only to the Controller to be set, and register it in the Hitachi Storage Navigator Modular 2 with the IP address of the Controller concerned.

(c) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]
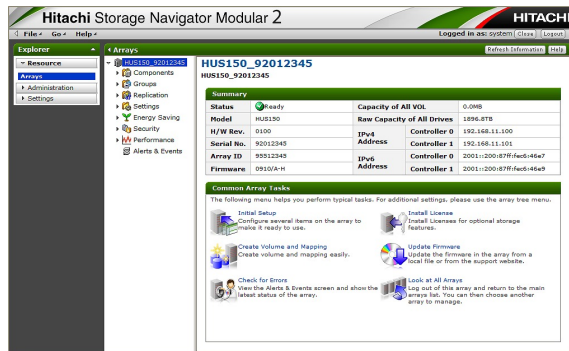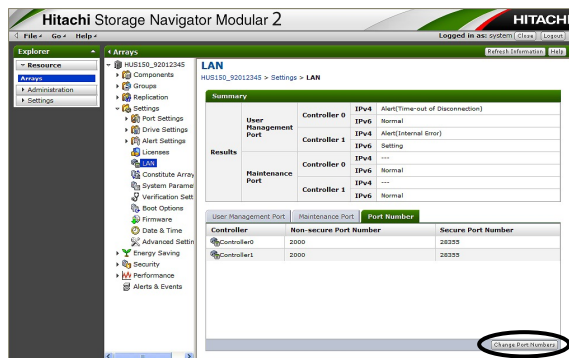Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

---

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.
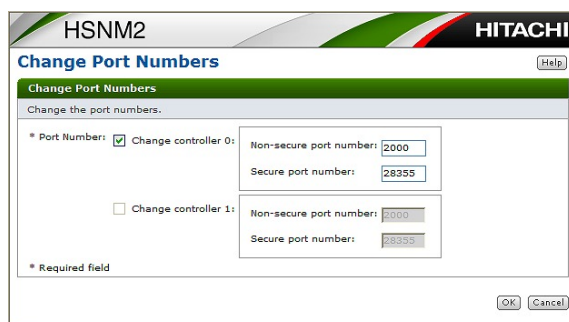
(d) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)
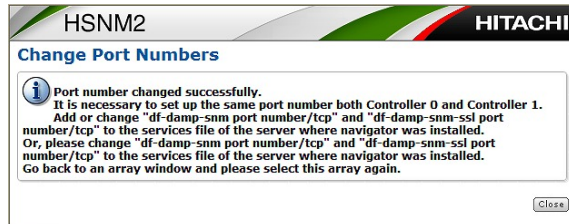

(e) Select [Settings] – [LAN] on the unit window, and select the [Port Number] tab.

(f) Click the [Change Port Numbers] button.
The "Change Port Numbers" window is displayed.

(g) Select the radio button of the Controller to be set, and enter the LAN Port Number to be set in the text file of the [Port Number].
Setting the LAN Port Number of the other Controller which has already performed the setting change.

(h) Click the [OK] button.

(i) Check the content of the displayed message, and click the [Close] button.

(j) Edit the services file to the new LAN Port Number.

(k) Check that the Hitachi Storage Navigator Modular 2 can be started again.

(2) Although the LAN Port Number of the services file and the LAN Port Number set in the array are same, the Hitachi Storage Navigator Modular 2 cannot be accessed to the array.

(a) Check the LAN Port Number of the services file and the LAN Port Number of the array by the WEB browser again. (Refer to WEB "2.6 Network Information" (WEB 02-0160).)

(3) Already when it is not possible to accessed it from Hitachi Storage Navigator Modular 2 to the array.

(a) Confirm both Controllers are same LAN Port Number. (Refer to WEB "2.6 Network Information" (WEB 02-0160).)
Register to the services file, and start Hitachi Storage Navigator Modular 2.

(b) If they are still same, there is a possibility that LAN Port Number overlaps with other equipment.
When this is verified, connect LAN crossing cable directly with the LAN port of the Controller in the array and change the LAN port number.
Please set it by one. (Refer to "7.3.2 When LAN is Connected to One of the Controllers and the Setting Change is Performed]" (SYSPR 07-0140).)

7.4   Setting of the secure LAN

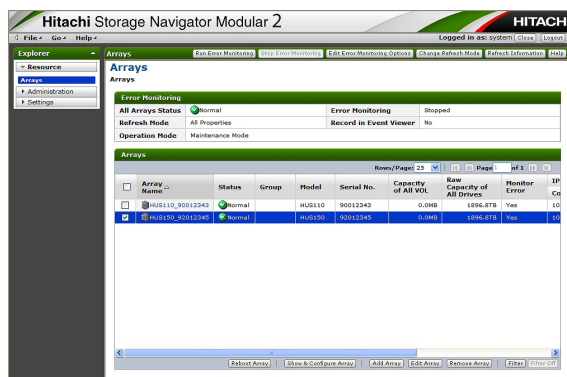Refer to/set the secure LAN information.

The secure LAN has the function to change the normal port status and the packet filtering function.

7.4.1   Changing the normal port status

NOTE : For changing the normal port status, it is necessary to connect Hitachi Storage Navigator Modular 2 and the array by the secure port. For changing how to connect to the array, click the [Edit Array] button in the [Array] window and select [Secure Port] from [Port to Use].

(1) Turn on the power of the array.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]
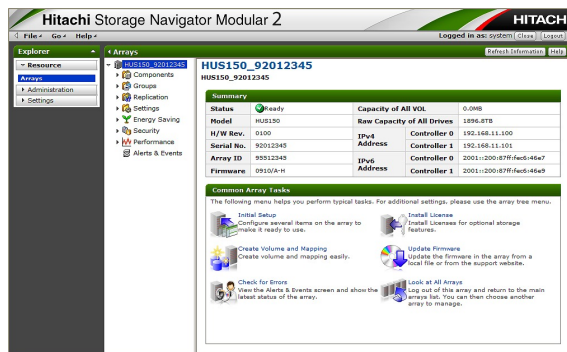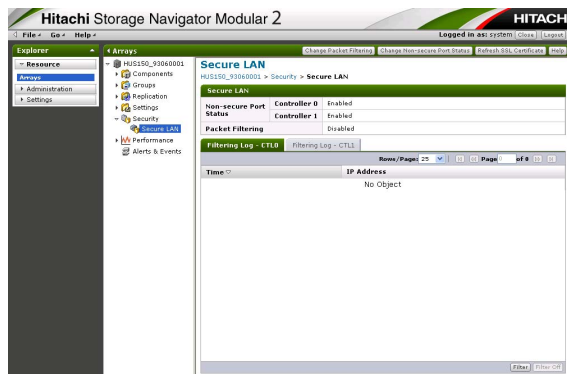Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

---

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

---

(3) Click the array name, and open the unit window.

> NOTE : • For changing the normal port status, it is necessary to connect Hitachi Storage Navigator Modular 2 and the array by the secure port. For changing how to connect to the array, click the [Edit Array] button in the [Array] window and select [Secure Port] from [Port to Use].
>
> • When the main window is not displayed even if clicking the array icon, check whether the LAN port number is changed or not. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).) Execute it again using the changed LAN port number.
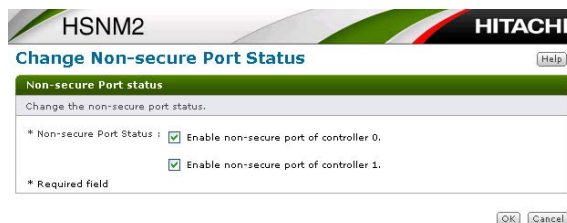

(4) Select [Security] – [Secure LAN] on the unit window.

(5) Click the [Change Normal Port Status] button.
The setting window of "Normal Port Status" is displayed.

(6) Set the normal port status.

[Enable Normal Port of Controller 0]: When the checkbox is checked, the normal port is released.

[Enable Normal Port of Controller 1]: When the checkbox is checked, the normal port is released.

(7) Check that the set contents are correct.

If the [Cancel] button is clicked, the change content is cancelled. Click the [OK] button to terminate the setting.

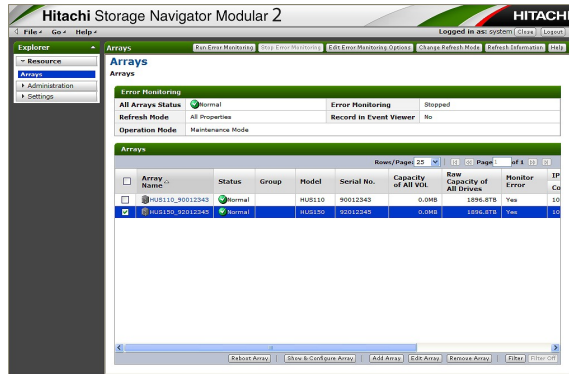(8) The completion message is displayed. Click the [Close] button.

7.4.2   Changing the packet filtering

The packet filtering controls the access to the LAN installed in the array and, when illegal access from outside is detected, the access from the illegal access source server is blocked out temporarily.

> NOTE : • For using the packet filtering, the firmware version 0940/A or more and Hitachi Storage Navigator Modular 2 version 24.00 or more are required.
> • Since the IP address is used for blocking out the illegal access, if there is access from another application of the same server, the access is blocked out temporarily.
> • The illegal access means (a) access from outside to unreleased LAN port number and (b) receiving huge traffic from outside to the released port number.
> • The packet filtering operates for the access from the IPv4 address.
> • When the array is in the maintenance mode, the packet filtering does not operate.
> • When packet filtering is enabled and you use netstat command with enabling NetBIOS over TCP/IP on Windows environment, the access to array is blocked by packet filtering feature.
> Disable NetBIOS over TCP/IP or specify -n option to execute netstat command.
> • If data loss happens with all data in the cache memory gone due to a problem such as system down and the combination of power outage and battery failure, the setting done from the start of the array to the occurrence of data loss will return to where it was before the start of the array. So it is necessary to check and reconfigure the Packet Filtering setting after maintenance work for a failure that leads to data loss.
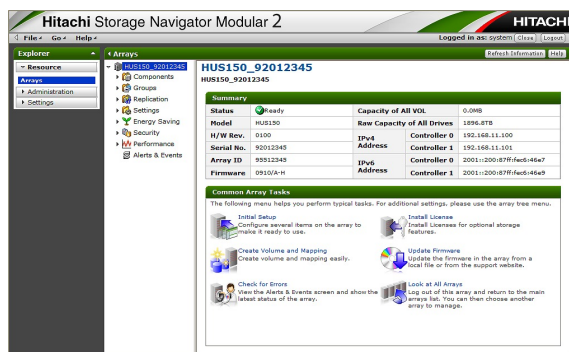
(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.
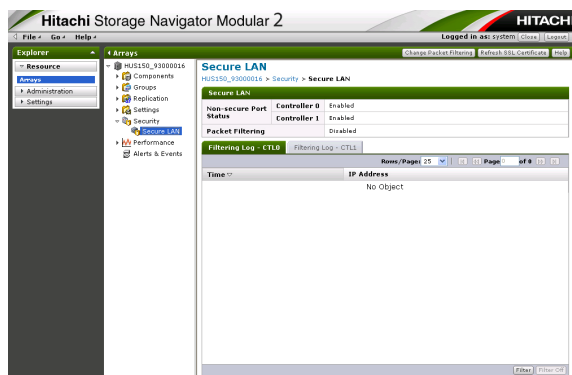

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)
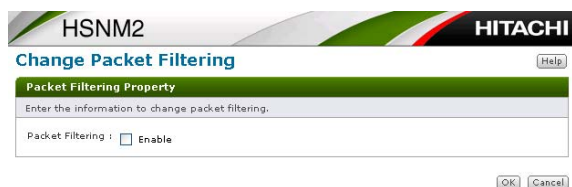

---

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(4) Select [Security] – [Secure LAN] on the unit window.

(5) Click the [Change Packet Filtering Change Maintenance Port].

The "Packet Filtering Property" window is displayed.

(6) Set the packet filtering.

[Packet Filtering]: When the checkbox is checked, the packet filtering operates.

(7) Check that the set contents are correct.

If the [Cancel] button is clicked, the change content is cancelled. Click the [OK] button to terminate the setting.

(8) Check the contents in the confirmation message window and click the [Confirm] or [Close] button.

(9) The completion message is displayed. Click the [Close] button.

7.4.3   Changing the Port 80 Block

The Port 80 Block blocks out the access to 80th port used for the LAN (Local Area Network) http access of the array.

> NOTE : • For using the Port 80 Block, the firmware version 0940/A or more and Hitachi Storage Navigator Modular 2 version 24.00 or more are required.
> • The Port 80 Block is executed by using the CLI function of Hitachi Storage Navigator Modular 2.
> • The Port 80 Block blocks out the access to 80th port of the LANs of both the management port and the maintenance port. Therefore, the connection to the array by using the Web browser becomes impossible. When collecting the trace, disable the Port 80 Block and then connect to the array. When using other functions, use https to connect them.
> • When changing the Port 80 Block to enabled, the packet filtering becomes enabled automatically.
> • The Port 80 Block blocks out the access of both IPv4 and IPv6 addresses.
> • When the array is in the maintenance mode, the Port 80 Block does not operate.

(1) Start Hitachi Storage Navigator Modular 2 (for CLI) (migrate HSNM2 (for CLI) to the installed directory by the command prompt and execute startsnm).

(2) Execute "aulanportblock -unit array name -refer" and check the current setting of the array.

(3) Execute "aulanportblock -unit array name –set –blockport80 enable" and instruct the Port 80 Block validation of the array.
   • Example of command execution
   Array name: Enable the Port 80 Block of HUS_91234567.

```
% aulanportblock -unit HUS_91234567 -set -blockport80 enable
Set the LAN port block information.
Is it OK? (y/n [n]): y
When the Port 80 Block is enabled, the packet filtering becomes enabled.
Furthermore, the LAN access may be impossible temoporarily.
Is it OK? (y/n [n]): y
The LAN port block information was set.
%
```

(4) Execute "aulanportblock -unit array name -refer" and check the current setting of the array.

For disabling the Port 80 Block, instruct to replace the above-mentioned enable to disable.

Chapter 8.   Setting Basic Parameters for the System

8.1   Setting Boot Options

> NOTE : If the setting is changed while an I/O is being executed, the I/O may be
> abnormally stopped or the succeeding I/O may be unable to be executed.
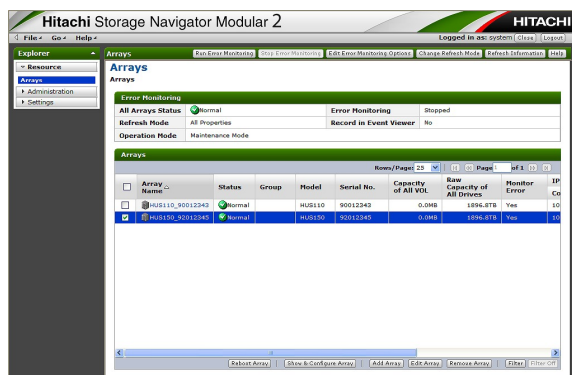> Therefore, change the setting after stopping the I/O.
> Besides, the setting on the host computer side must be changed depending on
> the host computer.

When any of the Boot Options is changed, the array becomes unable to receive access from a host computer until the reboot is completed. Reset the Boot Options after making sure that access from the host computer has been stopped.

> NOTE : Do not perform setting Boot Options while the READY LED (green) on the front
> of the Controller Box lights up is blinking at high speed (for the maximum of 30
> to 50 minutes, or 40 to 60 minutes in case of the CBL (80 to 180 minutes when
> the DBW is connected to the CBL)).

(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]
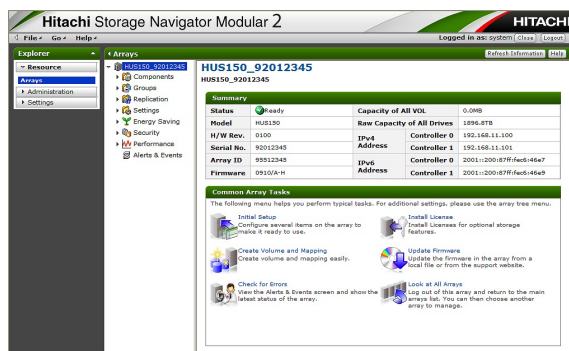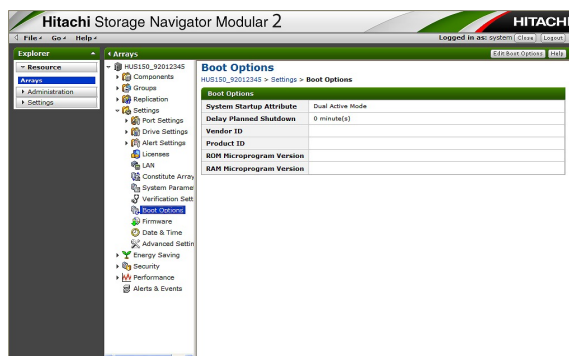Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

---

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)
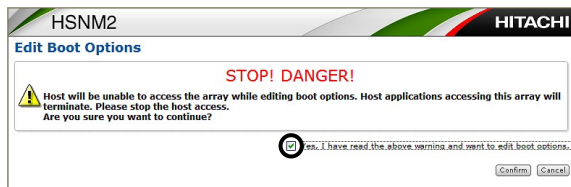

(4) Select the [Settings] – [Boot Options] on the unit window, and click the [Edit Boot Options] button at the upper right of the window.
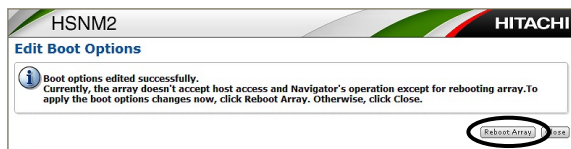
(5) An "Edit Boot Options" window is displayed.

No	Parameter name	Construction	Kind of parameter		Default setting
1	System Startup Attribute	Specifies the System Startup Attribute.	Single Mode	Made in the case of the single Controller configuration.	Depending on the configuration at shipment
			Dual Active Mode	Made in the case of the dual Controller configuration.	
2	Delay Planned Shutdown	Specifies the Delay Planned Shutdown.	0 to 60 minutes	Specifies the delay time until the start of the deliberate shutdown by the minute.	0 minute
3	Vender ID	Specifies the Vender ID	8 or less half size alphabetic characters and/ or numerals.	The value that has been set is reported at 8th to 15th bytes of the Standard Inquiry. Normally, no change from the default value, "HITACHI", is required.	HITACHI
4	Product ID	Specifies the Product ID	16 or less half size alphabetic characters and/ or numerals.	The value that has been set is reported at 16th to 31st bytes of the Standard Inquiry. Normally, no change from the default value, "DF600F", is required.	DF600F
5	ROM Microprogram Version	Specifies the ROM Firmware Version	2 or less half size alphabetic characters and/ or numerals.	The value that has been set is reported at 32nd to 35th bytes of the Standard Inquiry. Normally, no change from the default value, "Not set", is required.	Not set
6	RAM Microprogram Version	Specifies the RAM Firmware Version	2 or less half size alphabetic characters and/ or numerals.		

(6) Verify that the settings that have been made are correct and click the [OK] button.
When the [Cancel] button is clicked, the change is canceled.

(7) The former setting is valid until the array is restarted.
When the array is restarted, it does not accept accesses from a host computer until the restarting is completed. So, after making sure that access from a host computer has ceased, check the checkbox, and then click the [Confirm] button.

(8) The confirmation of the Boot Options edit is displayed. Click the [Reboot Array] button.
To enable the setting, click the [Reboot Array] button.
When you want to make the setting enabled later, click the [Close] button.

(9) A "Reboot Array" window is displayed.
After confirming the message, check the checkbox, and then click the [Reboot Array] button.

(10) A message appears, stating that the restart is successful. Click the [Close] button.
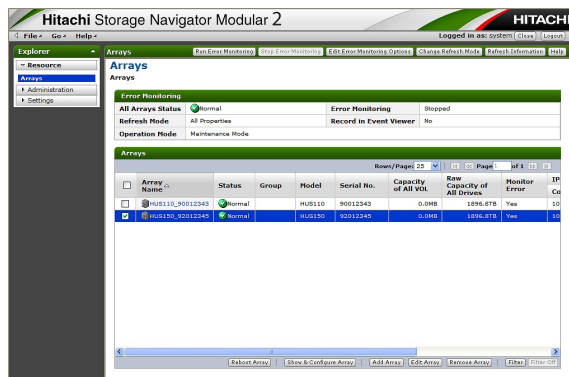
8.2   Setting System Parameters

This section describes system parameter settings.

> NOTE : If the setting is changed while an I/O is being executed, the I/O may be
> abnormally stopped or the succeeding I/O may be unable to be executed.
> Therefore, change the setting after stopping the I/O.
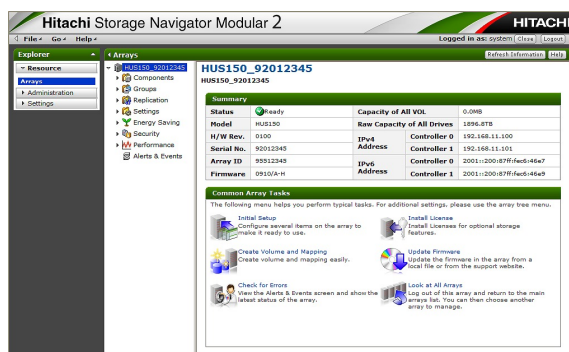> Besides, the setting on the host computer side must be changed depending on
> the host computer.

(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

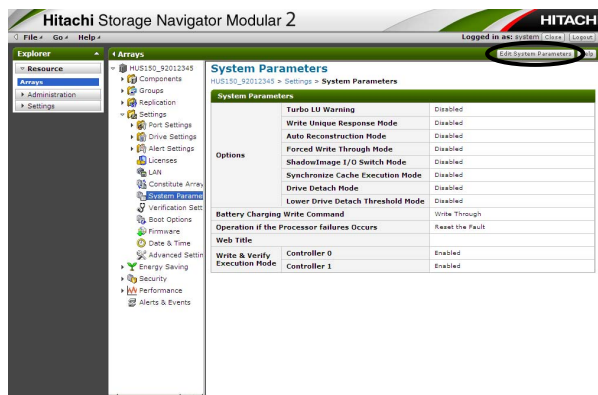Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is
> not displayed even though the icon of the array is clicked, use the changed LAN
> Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by
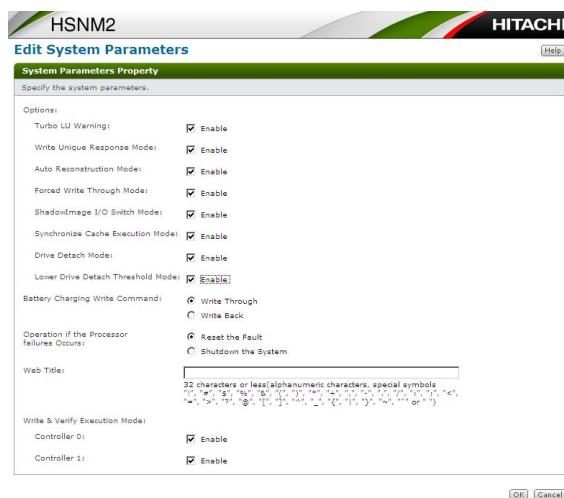> Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the
    "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(4) Select [Settings] – [System Parameters] on the unit window, and click the [Edit System Parameters] button in the upper right of the window.

(5) The "Edit System Parameters" window is displayed.
Make the setting of the system parameters.

No.		Parameter name	Construction	Kind of parameter		Default setting
1	Option	Turbo LU Warning	This parameter is to be specified when the Cache Residency Manager function is used.	Disable (Not checked)	When the write operation is received within the PIN range, the write command is executed in the Write-Through mode [*1].	Disable
				Enable (Checked)	Even if the write operation is received within the PIN range, the write-after processing [*2] is performed when the write command is received.	
2		Write Unique Response Mode	This parameter is to be specified when a host of the NX series is connected.	Disable (Not checked)	The write-after processing [*2] is performed at the time of write command receipt.	Disable
				Enable (Checked)	The write command is unconditionally returned to the host computer after parity creation. (However, the write command for the volumes of RAID 1 and RAID 1+0 are excluded.)	

*1 : Write-Through is an operation responding to a host computer after writing write data to Drives when the array receives the write data from the host computer. Therefore, the response time of the command to the host computer delays when the array executes the Write-Through.

*2 : Write-after is an operation to return the completion report to the host computer at the time of completing data write to a Cache memory once the array receives the write data from the host computer.

No.	Parameter name	Construction	Kind of parameter		Default setting
3	Auto Reconstruction Mode	This parameter specifies operations to be performed when a Drive is pulled out.	Disable (Not checked)	Even when a Drive is pulled out, the correction copy to a Spare Drive is not performed.	Disable
			Enable (Checked)	When a Drive is pulled out, the correction copy to a Spare Drive is performed.	
4	Forced Write Through Mode	This parameter specifies the way to execute the write command to be used after the CTL detachment or a power failure occurs.	Disable (Not checked)	Even if the CTL detachment or a power failure has occurred, the write-after processing [*1] is performed when the write command is received.	Disable
			Enable (Checked)	When the CTL detachment or a power failure has occurred, the write command is executed in the Write-Through mode. [*2]	
5	ShadowImage I/O Switch Mode	This parameter specifies an operation of a ShadowImage in-system replication P-VOL to be performed when a Drive double failure occurs.	Disable (Not checked)	When a double failure occurs in Drives of a P-VOL in the PAIR status of ShadowImage in-system replication, the status is changed to PSUE.	Disable
			Enable (Checked)	When a double failure occurs in Drives of a P-VOL in the PAIR status of ShadowImage in-system replication, the executor of the host I/O is switched to an S-VOL to continue the execution.	
6	Synchronize Cache Execution Mode	This parameter specifies an operation to be performed when the Synchronize Cache command is received.	Disable (Not checked)	No operation is performed when the Synchronize Cache command is received.	Disable
			Enable (Checked)	When the Synchronize Cache command is received, the whole data in the cache memory is written to Drives.	
7	Drive Detach Mode	Specifies an operation to be performed when a drive failure occurs in the same RAID group.	Disable (Not checked)	When a failure occurs in the second(third) Drive in the same RAID Group while one Drive of RAID 1/1+0/5 (or two Drives of RAID 6) is blocked due to a failure, do not make the second(third) Drive blocked.	Disable
			Enable (Checked)	When a failure occurs in the second(third) Drive in the same RAID Group while one Drive of RAID 1/1+0/5 (or two Drives or RAID 6) is blocked due to a failure, block the second(third) Drive and make the volumes in the RAID Group concerned blocked (unformatted status).	
8	Lower Drive Detach Threshold Mode	Drive can be blocked early by lowering each error threshold which controls a drive blockage.	Disable (Not checked)	Drive is blocked not by lowering each error threshold which controls a drive blockage but by default threshold.	Disable
			Enable (Checked)	Drive is blocked by lowering each error threshold which controls a drive blockage.	
9	Battery Charging Write Command	This parameter specifies an operation for the write command at the time of battery charging.	Write through	The write command is processed by write-through[*2].	Write through
			Write back	The write command is processed by write-back (write-after[*1].)	

*1 : Write-after is an operation to return the completion report to the host computer at the time of completing data write to a Cache memory once the array receives the write data from the host computer.
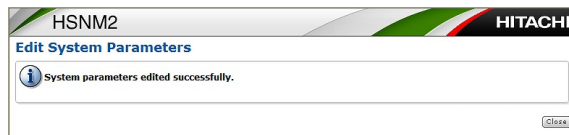
*2 : Write-Through is an operation responding to a host computer after writing write data to Drives when the array receives the write data from the host computer. Therefore, the response time of the command to the host computer delays when the array executes the Write-Through.

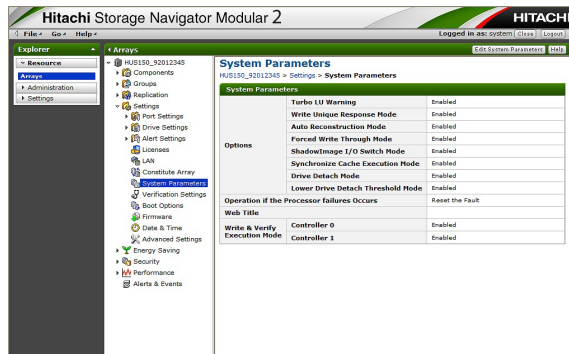| No.	Parameter name		Construction	Kind of parameter		Default setting
10	Operation if the processor failure occurs		This parameter specifies an operation to be performed when a processor failure occurs.	Reset of occurred	The parameter resets the failure and reboots the Controller. (If the power supply is not turned off after the first reboot, the Controller is blocked when the processor failure occurs at the second time.)	Reset of occurred
				System down	The parameter blocks the Controller where the failure occurred.	
11	WEB Title		In the case where the Web function that is built in the disk array system is displayed with the browser, this parameter specifies characters to be displayed on the title bar of the browser.	32 or less alphanumeric characters and special symbols	Characters to be entered are alphanumeric characters, and following special symbols ("!", "#", "$", "%", "&", "(", ")", "*", "+", ",", "-", ".", "/", ":", ";", "<", "=", ">", "?", "@", "[", "]", "^", "_", "{", "|", "}", "~", """, and space).	Not set
12	Write & Verify Execution Mode	Controller 0	This parameter specifies an execution mode for write and verify operation for the Controller #0 or Controller #1.	Disable (Not checked)	Only the write operation is executed skipping the verify operation to the write and verify command issued by the host.	Disable
		Controller 1		Enable (Checked)	Both the write and verify operations are executed to the write and verify command issued by the host.	

(6) Check that the set contents are correct.
   If the [Cancel] button is clicked, the change content is cancelled. Click the [OK] button to terminate the setting.

(7) The confirmation message is displayed. Click the [Close] button.

(8) The screen from which a System Parameter was updated is displayed.

8.3   Setting Port Options

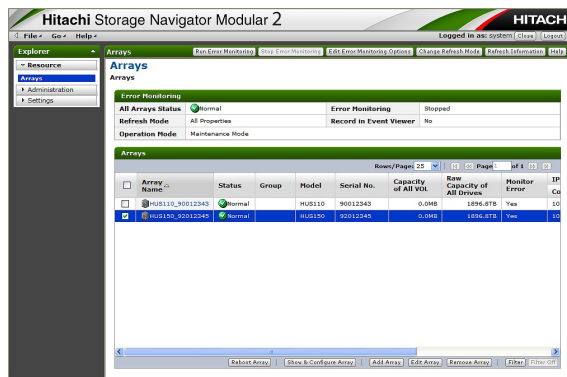This section describes Port Option settings.

> NOTE : If the setting is changed while an I/O is being executed, the I/O may be
> abnormally stopped or the succeeding I/O may be unable to be executed.
> Therefore, change the setting after stopping the I/O.
> Besides, the setting on the host computer side must be changed depending on
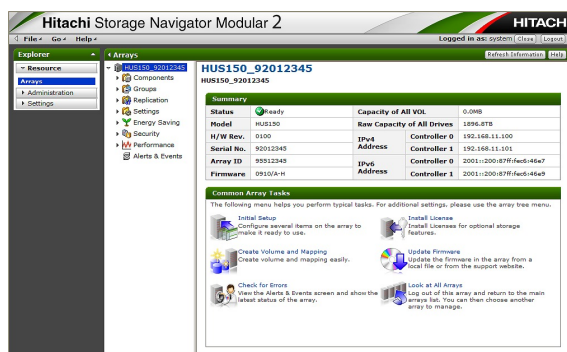> the host computer.

(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]
Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is
> not displayed even though the icon of the array is clicked, use the changed LAN
> Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by
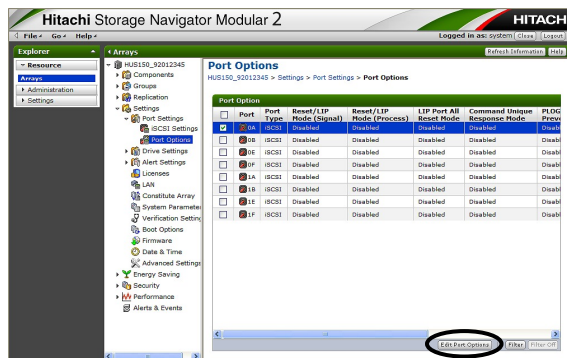> Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the
"Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.
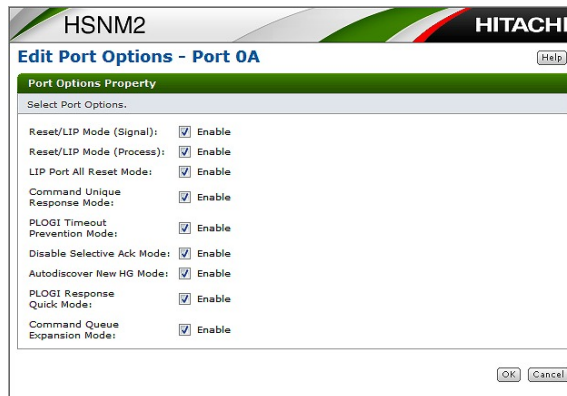
(4) Select [Settings] – [Port Settings] – [Port Option] on the unit window.

(5) Select the checkbox of the port to be set, click the [Edit Port Option] button.

(6) The "Edit Option" is displayed. Select the checkbox of the port option to be set, click the [OK] button.
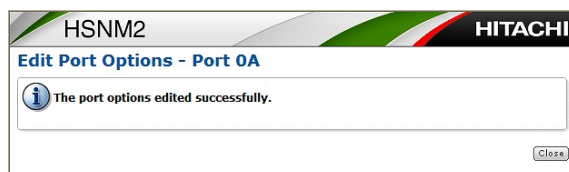

[Reset/LIP Mode 'Signal]	: This is a mode for transmitting the Reset/LIP signal to another port.
[Reset/LIP Mode (Process)]	: This is a mode for propagating the reset operation to another port.
[LIP Port All Reset]	: This is a mode for executing the reset operation when the LIP is received.

[Command Unique Response Mode] : This is a mode for returning the check condition to the host when it is takes time to respond to the command received during volume switching (B/C000).

[PLOGI Timeout Prevention Mode] : This is a mode for preventing the FC port from being a Loop time out between the LILP processing and PLOGI processing in the early stage of the Link. (FC port only)

[Disable Selective Ack] : This is a mode to change the method of resending only the packet whose Ack is not received to the method of resending all packets subsequent to the packets whose Ack is not received. (iSCSI port only)

[Autodiscover New HG Mode] : This is a mode that issues the LIP/RSCN by port and enables volume recognition from the Host when the conditions for the change of the appropriate host group are met. (FC port only)

[PLOGI Response Quick Mode][‡1] : This is a mode for reducing the response time of PLOGI and link service with reset process on Fibre Channel, when connecting with OS which issues many Fibre Channel PLOGIs during the server boot.

[Command Queue Expansion Mode][‡1] : A mode to extend the number of commands to be processed at the same time by the relevant port to 1024.
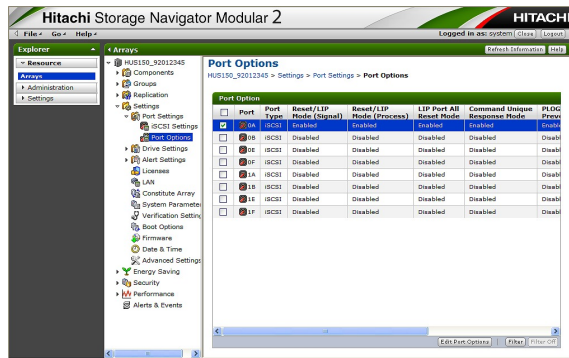
NOTE : The Reset/LIP Mode (Signal) is effective when the Reset/LIP Mode (Process) is set.

(7) When the setting is completed, the following message is displayed. Click the [Close] button.

---

‡1 : It is supported in the Hitachi Storage Navigator Modular 2 Ver.23.50 or more and the firmware Ver.0935/A or more.
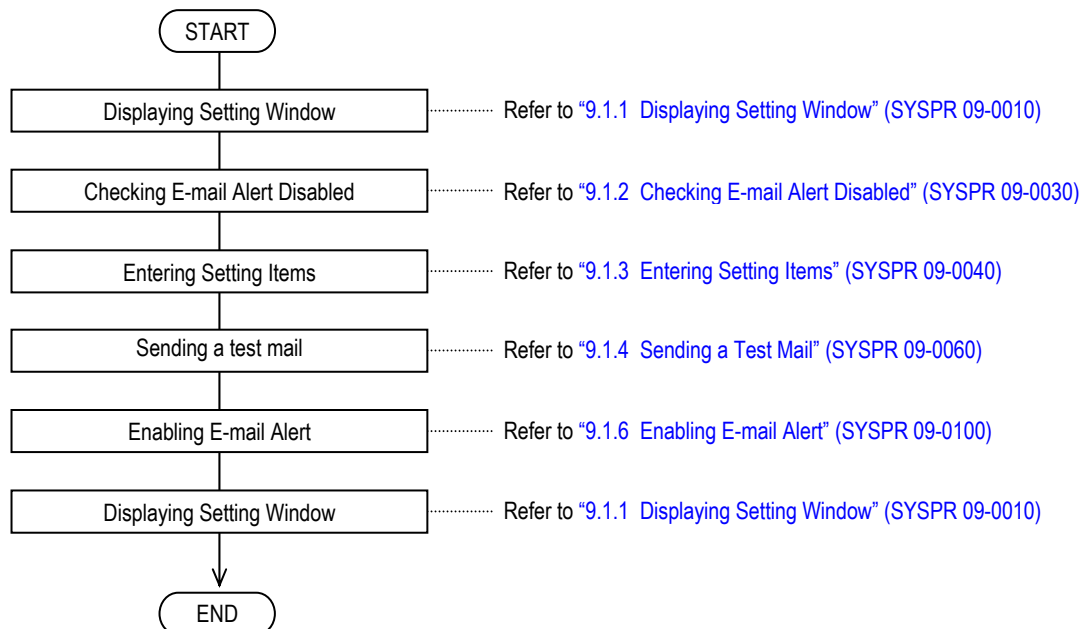
---

(8) The screen from which a Port Option was updated is displayed.

Chapter 9.　　E-mail Alert Function

9.1　Setting Procedure

The work outline flow is shown below.

```
        ( START )
            │
┌───────────────────────────┐
│  Displaying Setting Window │ ········  Refer to "9.1.1  Displaying Setting Window" (SYSPR 09-0010)
└───────────────────────────┘
            │
┌───────────────────────────┐
│ Checking E-mail Alert Disabled │ ········ Refer to "9.1.2  Checking E-mail Alert Disabled" (SYSPR 09-0030)
└───────────────────────────┘
            │
┌───────────────────────────┐
│   Entering Setting Items  │ ········  Refer to "9.1.3  Entering Setting Items" (SYSPR 09-0040)
└───────────────────────────┘
            │
┌───────────────────────────┐
│     Sending a test mail   │ ········  Refer to "9.1.4  Sending a Test Mail" (SYSPR 09-0060)
└───────────────────────────┘
            │
┌───────────────────────────┐
│    Enabling E-mail Alert  │ ········  Refer to "9.1.6  Enabling E-mail Alert" (SYSPR 09-0100)
└───────────────────────────┘
            │
┌───────────────────────────┐
│  Displaying Setting Window │ ········  Refer to "9.1.1  Displaying Setting Window" (SYSPR 09-0010)
└───────────────────────────┘
            │
            ▼
         ( END )
```

9.1.1　Displaying Setting Window

Set the E-mail Alert function using Hitachi Storage navigator Modular 2.
Refer to "1.1 Procedure for Connecting Hitachi Storage Navigator Modular 2 with the Array"
(SYSPR 01-0020) for how to connect Hitachi Storage Navigator Modular 2.
You can set the E-mail Alert function without restarting the array.

> NOTE : If data loss happens with all data in the cache memory gone due to a problem such as
> system down and the combination of power outage and battery failure, the setting done
> from the start of the array to the occurrence of data loss will return to where it was
> before the start of the array. So it is necessary to check and reconfigure the E-mail Alert
> setting after maintenance work for a failure that leads to data loss.

(1) Check the array to be set in the main window and press the [Ctrl] key and [E] key at the same
time, and change the operation mode to "Maintenance Mode".[‡1]
Maintenance Mode is displayed in [Operation Mode] on the top of the window.
Hitachi Storage Navigator Modular 2 operates in the maintenance mode.

---

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the
"Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

---

(2) Click the array name, and open the unit window.

> NOTE : When the main window is not displayed even if you click the name of the array
> name, check whether the LAN port number is changed. (Refer to "1.2 LAN Port
> Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)
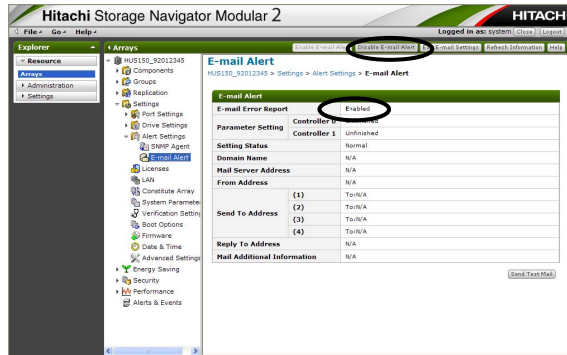> Execute it again using the change LAN port number.

(3) Select [Settings] – [Alert Settings] – [E-mail Alert] in the unit window.
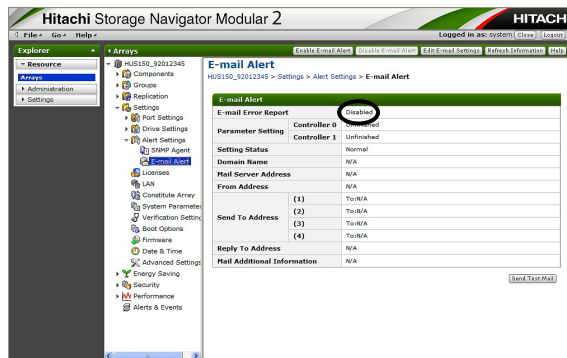The "E-mail Alert" window is displayed.

9.1.2 Checking E-mail Alert Disabled

(1) Check that E-mail alert is [Disabled].
If it is "Enabled", click the [Disable E-mail Alert] button in the upper right of the window and change the E-mail alert to "Disabled".

(2) Check that the E-mail alert is "Disabled".

9.1.3 Entering Setting Items

(1) Click the [Edit E-mail Settings] button in the upper right of the window and move to the "E-mail Setting Edit" window.

(2) Enter each parameter of E-mail according to the following description.
[Reply To Address] is not an indispensable parameter to input, but be sure to enter other parameters.

① [Domain Name]:
Enter the domain name of the mail server. Enter it within 255 alphanumeric numbers.

② [Mail Server Address]:
Enter the IP address of mail server.
In case of IPv4, enter it with decimal numbers.
In case of IPv6, delimit the numerical value indicated by the hexadecimal number in unit of 16 bits by a colon (:) and enter it. The input by abbreviated notation is also acceptable.
Do not add "0 (zero)" to the head of the IP address.

③ [From Address]:
Enter the mail address of the sender. The value entered in From: header of the mail to send is set. Enter it within 63 alphanumeric numbers.

④ [Send To Address]:
Enter destination mail address. The value entered in To: header of the mail to send is set. Enter it within 63 alphanumeric characters. You can set up to four mail addresses.
You may input it any place in (1) to (4).

⑤ [Replay To Address]:
Enter the return mail address. The value is set in Reply To: header. Enter it within 63 alphanumeric numbers. The input is not indispensable for this parameter.

NOTE : Do not set it unless otherwise instructed.

⑥ [Mail Additional Information]:
Enter the customer's specific information. The setting value is reflected in the mail text to send. Enter it within 63 alphanumeric numbers.

NOTE : Because it is case sensitive, be careful of it at the input.

UNIT_Cinf_HT-4065-CBL_12345678_00_0119 (Reserved area)
　　①　　　②　　　　③　　④　⑤　　⑥

No.	Item	Description format
①	Customer information start code	UNIT_Cinf (Fastening)
②	Formal device model name	One-byte capital alphanumeric numbers, variable length
③	Serial number (serial #)	One-byte capital alphanumeric numbers, variable length (No "0 (zero)" at the head of characters) Array as per nameplate
④	Faction	00 (Fastening)
⑤	Site code	One-byte capital alphanumeric numbers of four digits, fixed length
⑥	(Reserved area) (*1)	One-byte alphanumeric numbers, variable length (omissible)

*1 : Be sure to start with a delimiter symbol ("_" underscore) when you input it in the reserved area.
When you omit the input in the reserved area, do not enter a delimiter symbol ("_" underscore) after the site code ⑤.

NOTE : When you clear all the parameter values, click the [Initialize Parameters] button.
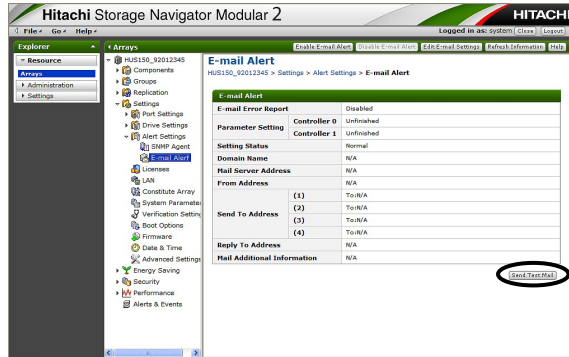All the parameter values currently input are cleared.

(3) After completing the input of all the parameters, check the contents and click the [OK] button.
The "Setting Completed" window is displayed. Click the [Close] button.
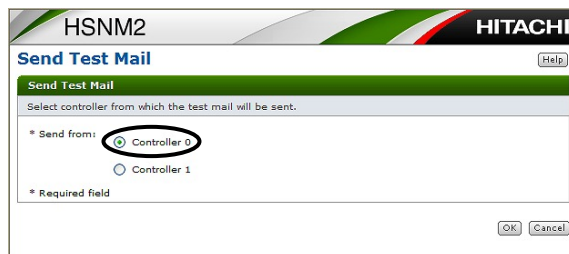The parameter input is completed.

(4) An error message may be displayed from Hitachi Storage Navigator Modular 2 when setting or changing this function. In this case, take actions according to the message content.

9.1.4   Sending a Test Mail

(1) Send a test mail to check if you can actually send a mail with the set content. You can send a test mail only when the E-mail alert is "Disabled".[‡1]
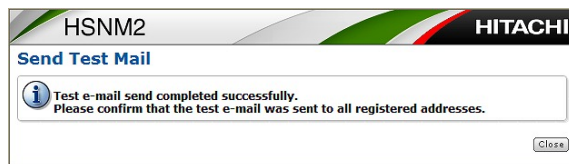Click the [Send Test Mail] button to send a test mail.

(2) The "Send Test Mail" window is displayed. Select [Controller 0] for the sender and click the [OK] button to send a test mail.
If you click the [Cancel] button, you can stop sending the test mail.

(3) If you click the [OK] button, the "Send Test Mail" window is displayed. Click the [Close] button.

> NOTE : In the dual configuration, select [Controller 1] and sent a test mail in the same way.

(4) Check if the test mail is actually sent with the person of [Send To Address] set in the parameter input window in "9.1.3 Entering Setting Items" (SYSPR 09-0040). If it is not sent, refer to "9.1.5 Maintenance when the Mail Does Not Reach the Destination" (SYSPR 09-0070).
In the dual configuration, send the test mail again, and then send a test mail by selecting [Controller 1].
If there is no problem on the test mail sending on the Controller #1 side, go to "9.1.6 Enabling E-mail Alert" (SYSPR 09-0100).

‡1 : When the firmware version is 0945/A or more, a test mail can be issued even if the E-mail Alert is "Enabled".
However, in this procedure, issue it in the "Disabled" status.

9.1.5   Maintenance when the Mail Does Not Reach the Destination

The failure analysis procedure by the simple trace and the actions to be taken when the mail does not reach the destination are shown here.

The workflow of the failure analysis by the simple trace is shown below.
Specify the failed part and deal with it according to the following procedure.

```
                          ┌─────────┐
                          │  START  │
                          └─────────┘
                               │
         No    ╱ Is it a failure of the E-mail error ╲
        ◄──────  report?
               ╲                                     ╱
                           │ Yes
                           ▼
              ╱ Is the E-mail alert set effectively? ╲   No     ┌────────────────────────────────────┐
              ╲                                       ╱─────────►│ The mail cannot be sent because the │
                           │ Yes                                 │ E-mail alert is disabled.  Enabling  │
                           ▼                                     │ it allows the mail sending.          │
                                                                 │ However, continue working according  │
                                                                 │ to the flow to check if there is any │
                                                                 │ other problem.                       │
                                                                 └────────────────────────────────────┘
              ┌─────────────────────────────────────┐
              │ Collecting Simple Trace              │
              │ (Refer to Troubleshooting "5.3 Collecting Simple │
              │       Trace" (TRBL 05-0040).)        │
              └─────────────────────────────────────┘
              ┌─────────────────────────────────────┐
              │ Send the simple trace to the Technical Support │
              │ Center and check the status.         │
              │ (Refer to (SYSPR 09-0080).)          │
              └─────────────────────────────────────┘
              ┌─────────────────────────────────────┐
              │ Canceling E-mail Error Report        │
              │ (Refer to "9.2  Procedure for Canceling E-mail │
              │     Error Report" (SYSPR 09-0110))   │
              └─────────────────────────────────────┘
              ┌─────────────────────────────────────┐
              │ Execute the maintenance work based on the │
              │ analysis result.                     │
              │ (Refer to (SYSPR 09-0080).)          │
              └─────────────────────────────────────┘
              ┌─────────────────────────────────────┐
              │ Send the test mail from all the Controllers. │
              │ (Refer to "9.1.4  Sending a Test Mail" │
              │       (SYSPR 09-0060).)              │
              └─────────────────────────────────────┘
         No    ╱ Is the test mail sending ╲
        ◄──────  successful?
               ╲                           ╱
                        │ Yes
              ┌─────────────────────────────────────┐
              │ Set it in the E-mail error report mode │
              │ (Refer to "9.1.6  Enabling E-mail Alert" │
              │       (SYSPR 09-0100).)              │
              └─────────────────────────────────────┘
                           │
                      ┌─────────┐
                      │   END   │
                      └─────────┘
```

Perform the maintenance work based on the analysis result of the simple trace.

Send the simple trace to the Technical Support Center and request the analysis.
Check the status (mail sending status) value acquired from the analysis and perform the maintenance work according to the following table.

No.	Status (Mail sending status)	Description	Suspected failure part	Recovery methods	Reference page
1	eRmMsgPending	Main sending is in process	-	Send the test mail, and collect the simple trace again after a while and analyze it.	Troubleshooting "5.3 Collecting Simple Trace" (TRBL 05-0040)
2	eRmMsgSent	Message sending from the array is successful.	① Destination address setting error	Refer to the E-mail sending parameter table and check if the destination address is correctly described. If it is incorrect, correct the address from Hitachi Storage Navigator Modular 2 and sent the test mail again.	"9.1.3 Entering Setting Items" (SYSPR 09-0040)
			② Failure between the mail server and ASSIST Center	Check if there is no error in the hardware and the path including the intermediate device.	-
3	eRmMsgInvalidBody	Message data cannot be received.	① Controller	Contact the Technical Support Center.	-
4	eRmMsgMissingAddress	Message address unsetting	① Destination address is invalid	Refer to the E-mail sending parameter table and check if the IP address of the mail server is correctly entered. If it is incorrect, correct the address from Hitachi Storage Navigator Modular 2 and sent the test mail again.	"9.1.3 Entering Setting Items" (SYSPR 09-0040)
5	eRmMsgAbortNoServer	The connection cannot be established to the mail server.	① IP address setting error of the mail server	Refer to the E-mail sending parameter table and check if the IP address of the mail server is correctly entered. If it is incorrect, correct the address from Hitachi Storage Navigator Modular 2 and sent the test mail again.	"9.1.3 Entering Setting Items" (SYSPR 09-0040)
			② Setting error of the mail server	Check the setting of the mail server and set it so that the communication from the array is allowed.	-
6	eRmMsgAbortTcpError	TCP error	① Failure between the array and mail server	Check if there is no error in the hardware and the path including the intermediate device.	-
			② Abnormality of the communication port	Replace the Controller.	Replacement "2.2.5 Replacing Controller" (REP 02-0700)

No.	status (Mail sending status)	Description	Suspected failure part	Recovery methods	Reference page
7	eRmMsgCancelled	The mail sending was cancelled in the user application	① Controller	Contact the Technical Support Center.	-
8	eRmMsgAbortGeneral	Errors other than the one mentioned above.	① Controller	Collect the simple trace and replace the Controller. Sent the collected simple trace to the Technical Support Center.	Replacement "2.2.5 Replacing Controller" (REP 02-0700)

9.1.6   Enabling E-mail Alert

(1) Enable the E-mail alert. Click the [Enable E-mail Alert] button at the upper right of the window to change the E-mail alert "Enabled".

(2) Check that the E-mail alert is "Enabled".

The setting is completed above.

> NOTE : When E-mail Alert function becomes effective, the failure information that
> occurred before becoming effective may be notified.

9.2 Procedure for Canceling E-mail Error Report

(1) Check that the E-mail alert is "Enabled". If it is "Disabled", it is already cancelled.
   If it is "Enables", click the [Disable E-mail Alert] button at the upper right of the window and change the E-mail alert to "Enable".

(2) Check that the E-mail alert is "Disabled".

The setting is completed above.

9.3   Correspondence by Report Messages

Prepare the maintenance parts described in the presumed failure part corresponding to the failure report message when the array fails, and perform the maintenance work according to "Troubleshooting" after arriving at the local site.

No.	Failure report message[*1]	Failure content	Presumed failure part[*2]
1	ARRAY Controller Detached. ARRAY DeviceType ZZ.	The Controller was regressed (It had a failure or was not connected), or a failure was detected in the Controller of another system during the initial setting operation.[*3]	Controller FC Host I/O Board iSCSI Host I/O Board (There may be a double failure) Narrow down the failed parts in the Information Message on WEB (refer to Troubleshooting "4.3 Confirm Log Messages" (TRBL 04-0120). However, when "ARRAY Cache Memory Alarm." is notified at the same time, the failed part is the Cache memory.
2	ARRAY Battery Alarm. ARRAY DeviceType ZZ.	An error occurred in the Cache Backup Battery.	Cache Backup Battery
3	ARRAY Fan Alarm. ARRAY DeviceType ZZ.	An error occurred in the Fan Module.	Fan Module
4	ARRAY ACDC Power Supply Failure. ARRAY Unit No.XX Box No.YY. ARRAY Power Supply Type V. ARRAY DeviceType ZZ.	An error occurred in the Power Unit.	Power Unit
5	ARRAY Drive Detached. ARRAY Detached Drive Position Unit No.XX HDU No.YY. ARRAY DriveType WW. ARRAY DeviceType ZZ.	A Drive blockade occurred.	Drive
6	ARRAY Drive Detached. ARRAY Detached Drive Position Unit No.XX HDU No.YY. ARRAY Drive Type WW. ARRAY DeviceType ZZ.	A Spare Drive blockade occurred.	Drive
7	ARRAY ENC Alarm. ARRAY Unit No.XX ENC No.YY. ARRAY ENCType W. ARRAY DeviceType ZZ.	An error occurred in the I/O Module(ENC) or I/O Card(ENC).	I/O Module(ENC) or I/O Card(ENC)
8	ARRAY HostConnector Alarm.↲ ARRAY DeviceType ZZ.	An error occurred in the Host Connector.	Host Connector
9	ARRAY Cache Memory Alarm. ARRAY MemoryType Y. ARRAY DeviceType ZZ.	A Cache access error occurred. (Unrecoverable)	Cache Memory

*1： The Unit No. (Unit Number) "XX" and HDU No. (Drive Number) "YY" of failure report message are displayed in 2 digit hexadecimal number.

*2： For details of the Copy backless function, refer to Introduction "3.5.2 (3) Details of Sent Mails" (INTR 03-0270).

*3： When the failure of the message code "W01z0x CTL alarm (CTL-x)" occurs, the Controller blockade and array Warning are notified, and the array is changed from the Ready status to Warning status. The Warning status of the array may recover automatically to the Ready status depending of the failure factors.

No.	Failure report message[*1]	Failure content	Presumed failure part[*2]
10	ARRAY Interface Board Alarm. ARRAY InterfaceType YY. ARRAY DeviceType ZZ.	An error occurred in the Host I/O Board.	FC Host I/O Board iSCSI Host I/O Board
11	ARRAY Host IO Module Alarm. ARRAY Host IO Module Type YY. ARRAY DeviceType ZZ.	An error occurred in the host I/O module.	Host I/O Module
12	ARRAY Drive IO Module Alarm. ARRAY Drive IO Module Type YY. ARRAY DeviceType ZZ.	An error occurred in the drive I/O module.	Drive I/O Module
13	ARRAY Management Module Alarm. ARRAY Management Module Type YY. ARRAY DeviceType ZZ.	An error occurred in the management module.	Management Module
14	ARRAY CTL failure by related parts alarm. ARRAY DeviceType ZZ.	The pseudo blockade of the controller was executed. (The controller concerned becomes inaccessible from the host and the management program because the controller operation stops.)	Controller
15	ARRAY Path Alarm. ARRAY RemoteArray UUUUUUUU. ARRAY DeviceType ZZ.	A path blockade occurred between the arrays (Hitachi Unified Storage).	Errors of the remote array to be paired. (Refer to Troubleshooting "11.1.17 Path Blockade Occurs in the TrueCopy remote replication/TrueCopy Extended Distance Function" (TRBL 11-0910).)
16	ARRAY Warning. ARRAY DeviceType ZZ.	An error occurred in the array.	When only this message is notified, it is required to isolate the failed parts in the Information Message on WEB. (Refer to Troubleshooting "4.3 Confirm Log Messages" (TRBL 04-0120) or Troubleshooting "Chapter 7. Trouble Analysis by LED Indication" (TRBL 07-0000).)
17	ARRAY Please replace the Air Filter of Bezel. ARRAY DeviceType ZZ.	The request for replacing Power Unit (DC) Filter is issued.	Power Unit (DC) Filter
18	ARRAY Pool Consumed Capacity Ealry Alert Pool number XX. ARRAY DeviceType ZZ.	DP pool consumed capacity exceeded the Early Alert threshold.	DP pool DP pool capacity becomes smaller, or the threshold setting value is small. If the DP pool remaining capacity is little, extend the DP pool capacity. If the threshold setting value is small, change the setting value to larger.
19	ARRAY Pool Consumed Capacity Depletion Alert Pool number XX. ARRAY DeviceType ZZ.	DP pool consumed capacity exceeded the Depletion Alert threshold.	DP pool DP pool capacity becomes smaller, or the threshold setting value is small. If the DP pool remaining capacity is little, extend the DP pool capacity. If the threshold setting value is small, change the setting value to larger.

*1 : The Unit No. (Unit Number) "XX" and HDU No. (Drive Number) "YY" of failure report message are displayed in 2 digit hexadecimal number.

*2 : For details of the Copy backless function, refer to Introduction "3.5.2 (3) Details of Sent Mails" (INTR 03-0270).

No.	Failure report message[*1]	Failure content	Presumed failure part[*2]
20	ARRAY Pool Consumed Capacity Over Pool number XX. ARRAY DeviceType ZZ.	DP pool consumed capacity reaches the upper limit, and the DP pool unused capacity was depleted.	DP pool DP pool capacity is depleted. Extend the DP pool capacity. DP pool capacity can be increased by deleting or formatting the volume being used. When creating or extending DP Volume, increase the pool capacity, or set a large threshold value.
21	ARRAY Pool Over Provisioning Warning Pool number XX. ARRAY DeviceType ZZ.	The capacity of DP Volume in a DP pool exceeded the Fore Warning threshold for Over Provisioning.	DP Volume The capacity of DP Volume allocated to DP pool exceeds threshold. If the pool capacity is not depleted, there is no problem with its use.
22	ARRAY Pool Over Provisioning Limit Pool number XX. ARRAY DeviceType ZZ.	The capacity of DP Volume in a DP pool exceeded the Over Warning threshold for Over Provisioning.	DP Volume The capacity of DP Volume allocated to DP pool exceeds threshold. If the pool capacity is not depleted, there is no problem with its use. When creating or extending DP Volume, increase the pool capacity, or set a large threshold value.
23	ARRAY Port Error Threshold Over. ARRAY DeviceType ZZ.	Capture port error count alert for CTL0	There was a failure on the channel port path between the array and the host, and the number of times of detecting the failure exceeded the threshold value. Check the connection status of the Fibre Channel cable and others.
24	ARRAY Port Error Threshold Over. ARRAY DeviceType ZZ.	Capture port error count alert for CTL1	There was a failure on the channel port path between the array and the host, and the number of times of detecting the failure exceeded the threshold value. Check the connection status of the Fibre Channel cable and others.
25	ARRAY TrueCopy Extended Distance Cycle Time Threshold Over. ARRAY DeviceType ZZ.	The threshold value of the cycle time was exceeded.	No failed part exists The update copy is not completed within the cycle time. Increase the cycle time or reduce the I/O amount to the P-VOL.
26	ARRAY Replication Depletion Alert Pool number XX. ARRAY DeviceType ZZ.	The replication was depleted.	DP pool This is a status where the used capacity of the DP pool is decreasing or the setting value of the threshold value is small. When the remaining capacity of the DP pool is small, expand the DP pool capacity or resynchronize/cancel the SnapShot pair. When the setting value of the threshold value is small, increase the setting value.

*1 : The Unit No. (Unit Number) "XX" and HDU No. (Drive Number) "YY" of failure report message are displayed in 2 digit hexadecimal number.

*2 : For details of the Copy backless function, refer to Introduction "3.5.2 (3) Details of Sent Mails" (INTR 03-0270).

No.	Failure report message[*1]	Failure content	Presumed failure part[*2]
27	ARRAY Replication Data Released Pool number XX. ARRAY DeviceType ZZ.	The replication data was released.	DP pool This is a status where the used capacity of the DP pool is decreasing or the setting value of the threshold value is small. Furthermore, all SnapShot pairs belonging to the DP pool are in the Failure status. When the remaining capacity of the DP pool is small, expand the DP pool capacity. When the setting value of the threshold value is small, increase the setting value. Secure the enough usable capacity of the DP pool, and then generate the pair again.
28	ARRAY SSD Write Count Early Alert. ARRAY DeviceType ZZ.	The write count of the Flash Drive (SSD) reached the threshold value of the endurance count.	Flash Drive (SSD) This is a status where the lifetime of the Flash Drive (SSD) is shorter. Replace the Flash Drive (SSD). (Refer to Replacement "2.2.1 Replacing a Drive" (REP 02-0050).)
29	ARRAY HDU Mounting Alarm. ARRAY Unit No.XX. ARRAY DeviceType ZZ.	The Drive mounting location error has occurred in the DBW.	This is the mounting location error of the Drive. The DBW has the heat problem and the Drive location specification. Refer to Installation "2.4.7 (1) Installing the Drive (1-4) DBW" (INST 02-0711) and modify the Drive mounting location.
30	ARRAY Page Relocation Failed. ARRAY DeviceType ZZ.	The page relocation failed due to the destage time-out of the pool management information	No failed part exists Refer to the Information Message window on WEB and check that "IAIR00 The destage of the DP management information by the page relocation restarted." is displayed after "IAIS00 The page relocation failed to time-out of the destage of the DP management information". If it is displayed, the maintenance is unnecessary. If it is not displayed, perform the planned shutdown of the array, and then restart the array. (Refer to Installation "1.5 Power On/Off Procedure" (INST 01-0220).) For the opportunity to perform the planned shutdown of the array, determine it by consulting with the customer/SE.

*1 : The Unit No. (Unit Number) "XX" and HDU No. (Drive Number) "YY" of failure report message are displayed in 2 digit hexadecimal number.

*2 : For details of the Copy backless function, refer to Introduction "3.5.2 (3) Details of Sent Mails" (INTR 03-0270).

No.	Failure report message[*1]	Failure content	Presumed failure part[*2]
31	ARRAY FMD Write Count Early Alert. ARRAY DeviceType ZZ.	The write count of the Flash Drive (FMD) reached the threshold value of the endurance count.	Flash Drive (FMD) This is a status where the lifetime of the Flash Drive (FMD) is shorter. Replace the Flash Drive (FMD). (Refer to Replacement "2.2.1 Replacing a Drive" (REP 02-0050).)
32	ARRAY FMD battery Early Alert. ARRAY DeviceType ZZ.	The battery life ratio of the Flash Drive (FMD) reached the threshold value of the battery life ratio.	Flash Drive (FMD) This is a status where the lifetime of the Flash Drive (FMD) is shorter. Replace the Flash Drive (FMD). (Refer to Replacement "2.2.1 Replacing a Drive" (REP 02-0050).)
33	ARRAY Tray Power Saving PDU connection error. ARRAY DeviceType ZZ.	The following operation failed due to a connection failure among the array, the LAN HUB and the Raritan-made PDU in the Tray Power Saving function. • Tray power OFF of the Tray Power Saving function • Tray power ON of the Tray Power Saving function • Connection test of the Tray Power Saving function	Connection failure among the array, the LAN HUB and the Raritan-made PDU A connection failure has occurred among the array, the LAN HUB and the Raritan-made PDU. Perform the maintenance in accordance with the message "IAJ400 A PDU connection error was detected in Tray Power Saving (Unit-x, PS-y, code-z)" and the failure factor code (code-z) in the message.
34	ARRAY Tray Power Saving health check error CTL No.0. ARRAY DeviceType ZZ.	The health check function among the array, the LAN HUB and the Raritan-made PDU in the Tray Power Saving detected a connection failure on the controller 0 side.	Connection failure among the array, the LAN HUB and the Raritan-made PDU A connection failure has occurred among the array, the LAN HUB and the Raritan-made PDU on the controller 0 side. Request the customer/SE to confirm the connection. For the details of the confirmation request items, refer to the maintenance procedure of "IAJ30x A health check error was detected in array, PDU, and/or their connection (CTL-x)".
35	ARRAY Tray Power Saving health check error CTL No.1. ARRAY DeviceType ZZ.	The health check function among the array, the LAN HUB and the Raritan-made PDU in the Tray Power Saving detected a connection failure on the controller 1 side.	Connection failure among the array, the LAN HUB and the Raritan-made PDU A connection failure has occurred among the array, the LAN HUB and the Raritan-made PDU on the controller 1 side. Request the customer/SE to confirm the connection. For the details of the confirmation request items, refer to the maintenance procedure of "IAJ30x A health check error was detected in array, PDU, and/or their connection (CTL-x)".

*1 : The Unit No. (Unit Number) "XX" and HDU No. (Drive Number) "YY" of failure report message are displayed in 2 digit hexadecimal number.
*2 : For details of the Copy backless function, refer to Introduction "3.5.2 (3) Details of Sent Mails" (INTR 03-0270).

Chapter 10.   Setting Constitute Array

> NOTE : If the setting is changed while an I/O is being executed, the I/O may be
>   abnormally stopped or the succeeding I/O may be unable to be executed.
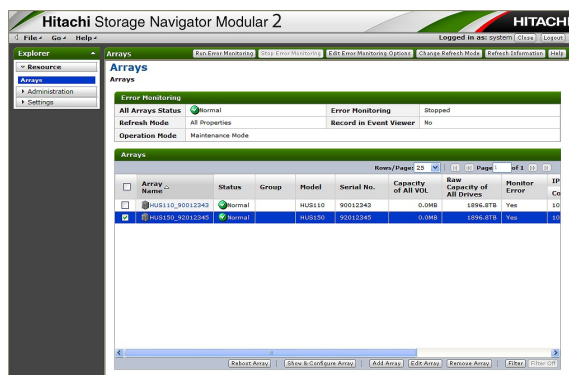>   Therefore, change the setting after stopping the I/O.
>   Besides, the setting on the host computer side must be changed depending on
>   the host computer.

Writes system parameters and configuration information such as the RG/Volume onto (a) file(s) or reads them from (a) file(s).

Output configuration information of the disk array system to a text file or set the configuration by using the text file.

The configuration information to be output (configuration acquisition) to a text file includes RAID group/DP Pool/Volume, System parameters, Ports information, Boot Options, parts information, and LAN information.

The configuration to be set includes RAID group/DP Pool/Volume, System parameters, Ports information, Boot Options, CHAP User (for the iSCSI), and LAN information.

Each element of the configuration, that is, RAID group/DP Pool/Volume, System parameters, Ports information, Boot Options, Parts information, or LAN information is operated by a respective file.

You can copy the configuration from/to the array by outputting the configuration information from the array to a text file and setting it for another array using the text file that has been output.
You can set an array by editing the text file. Use this function to create the same array. Change the element of the configuration using a respective function.

> NOTE : Do not perform the text input (configuration acquisition) of Boot Options of the
>   configuration copy information while the READY LED (green) on the front of the
>   Controller Box is blinking at high speed (for the maximum of 30 to 50 minutes,
>   or 40 to 60 minutes in case of the CBL (80 to 180 minutes when the DBW is
>   connected to the CBL)). (Do not select [Input] or [Boot Options].)

(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]
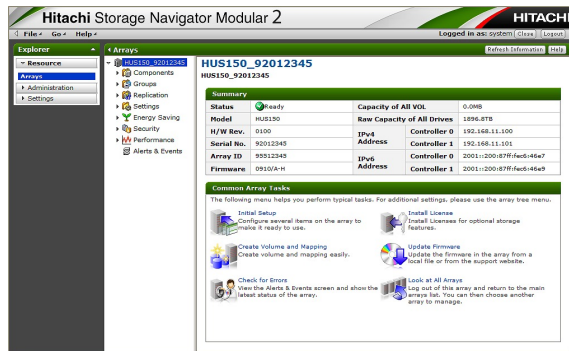
Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)
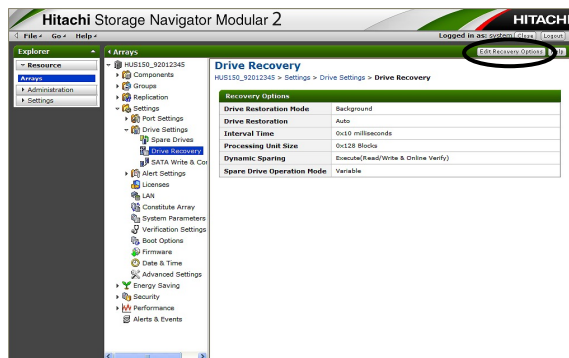

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(4) Select [Settings] – [Constitute Array] on the unit window.

(5) When the configuration information is output to a text file (configuration acquisition), select the radio button of the information to be acquired from the Configuration Parameters, and click the [Get Configurations] button.

      [RAID Groups/DP Pools/volumes] :

                This is information on definition of the RAID groups/DP Pools/ Volumes set for the array.

      [System Parameters]   : This is the setting of system parameters made for the array.

      [Ports Information]   : This is information on the port/host group set for the array.

      [Boot Options]   : This is the setting of Boot Option made for the array.

      [Parts Information (Ger Only)] : This is the setting of parts information made for the array.

      [LAN Information]   : This is the setting of LAN information for user management port and maintenance port.

(6) When the RAID Groups/DP Pools/Volumes is selected in the Configuration Parameters, select the configuration target, and click the [OK] button.

(7) To save the configuration information, click the [Get Configurations] button. Specify a location to save the file.

(8) Click the [Close] button.

(9) When setting the configuration using a text file, select the radio button of the information to be acquired from the Configurations Parameters, click the [Set Configurations] button.

[RAID Groups/DP Pools/Volumes]   : This is information on definition of the RAID groups/DP Pools/Volumes set for the array.

[System Parameters]   : This is the setting of system parameters made for the array.

[Ports Information]   : This is information on the port/host group set for the array.

[Ports Information (Update) (Set Only)] : This is port/host group information to be set for the array.
Specifies the setting information of Fibre or iSCSI.

[Boot Options]   :This is the setting of Boot Option made for the array.

[CHAP Users]   : This is information on the CHAP User set for the array.

[LAN Information]   : This is the setting of LAN information for user management port and maintenance port.

NOTE : • When you input LAN Information file, note following.
- If the "Maintenance Port IP Address Automatic Change Mode" is "ON" in the file; the IP address of maintenance port written in the file will be ignored. However, do not delete the setting of maintenance port written in the file.
- If "Maintenance Port IP Address Automatic Change Mode" is "OFF" in the file; only the network address for the IP address of maintenance port written in the file is reflected.

> NOTE : When setting the iSCSI port information, perform it without the iSCSI host logged into an array.
> If it is set while the iSCSI host logs into an array, the array cannot perform a command from the iSCSI host, and an I/O time-out or an abnormal termination occurs in the iSCSI host.

(10) Specify the path that the text file, where the configuration information is described, saves. When the RAID Groups/DP Pools/Volumes is selected in the Configuration Parameters, select the configuration target. When the Port Information (Update) (Set Only) is selected, specify the setting information of Fibre or iSCSI.
Click the [OK] button.

• When selecting the RAID Groups/DP Pools/Volumes

• When selecting the Ports Information (Update)

• When the parameter other than the RAID Groups/DP Pools/Volumes and Ports Information (Update) (Set Only) is selected:

(11) When the RAID Groups/DP Pools/Volumes is selected in the Configuration Parameters, a warning screen is displayed. After confirming the description on the screen, turn on the checkbox, and then click the [Confirm] button.

When the Ports Information (Update) is selected in the Configuration Parameters, a caution screen is displayed. After confirming the description on the screen, click the [Confirm] button.

(12) When the setting ends, the following message is displayed. Click the [Close] button.

Chapter 11.   Setting Drive

11.1   Setting Drive Recovery

Refers to and/or sets an option of drive restoration.
When an option is set up using this function during the drive recovery execution, it will become enabled immediately.

> NOTE : • If the setting is changed while an I/O is being executed, the I/O may be abnormally stopped or the succeeding I/O may be unable to be executed. Therefore, change the setting after stopping the I/O.
> Besides, the setting on the host computer side must be changed depending on the host computer.
> • Drive Restoration Mode, Interval Time, and Processing Unit size are effective among Dynamic Sparing, Copy Back, and Correction Copy.
> • Changes in the Restore Options settings will be effective right after you push the "OK" button following "Apply".
> For example, if you change Drive Restoration Mode, the change will take effect immediately even on Dynamic Sparing/Copy Back/Correction Copy which is currently running.
> • A change of Spare Drive Operation Mode is only effective if it is done before an HDD has completed the sparing process.

(1) Turn on the power supply.
(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]
Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

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(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

(4) Select the [Settings] – [Drive Settings] – [Drive Recovery].

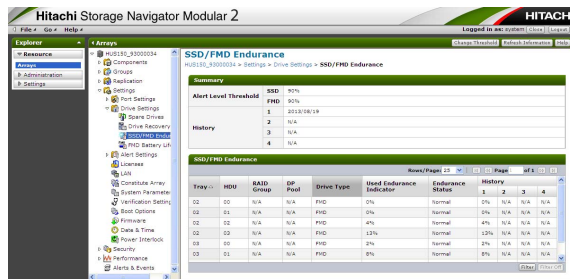(5) Click the [Edit Recovery Options] button at the upper right of the window.

① [Drive Restoration Mode]   : Specify a method of drive restoration.

    [Background]   : The restoration is performed at a free time when no host I/O operation is performed.

    [Interleave (Normal)]   : This is set by default.
The restoration is performed regularly (at fixed intervals) in a manner in which priority is given to a host command. (The restoration is performed after a host command execution is completed.)

    [Interleave (Prior)]   : The restoration is performed regularly (at fixed intervals) in a manner in which priority is taken to a host command.

② [Drive Restoration]   : Specify whether to start operations (data restoration onto a failed drive, data restoration onto a spare drive, data copying from a spare drive to an original drive, and dynamic sparing) automatically or manually.

    [Manual]   : A data restoration and data copying from a Spare Drive to an original drive are started manually. (Not supported)

    [Auto]   : This is set by default.
A data restoration and data copying from a Spare Drive to an original drive are started automatically.

NOTE : Hitachi Storage Navigator Modular 2 does not support the manual start. Be sure to set it to the automatic start.

③ [Interval Time]   : Specify an interval of the restoration.
The default value is 0x10 ms. Concurrently with I/Os from the host, the restorations are performed in succession.
Treat 10ms as the unit and specify a multiplier within a range of 0 to 255.

④ [Processing Unit Size] : Specify a size of data to be restored.
The default value is 128 blocks; data of 64kbytes is restored at a time. When "Interleave" is specified, specified size of data is restored, a time specified as the "interval time" is waited for, and the next restoration is performed.
Treat 512 bytes (1 block) as the unit and specify a multiplier within a range of 1 to 511.

⑤ [Dynamic Sparing] : Specify a mode (for restoring data onto a Spare Drive) to be used when the failure count exceeds a threshold value controlled in the preventive maintenance.

[Execute (Read/Write & Online Verify)] : This is set by default.
When the count of read/write errors or online verification errors exceeds a threshold value, data is restored onto a spare drive (in the case where the spare drive is unused) and failed drive is detached.

[Execute (Read/Write)] : When the count of read/write errors exceeds a threshold value, data is restored onto a Spare Drive (in the case where the Spare Drive is unused) and failed drive is detached.
When the count of online verification errors exceeds a threshold value, the dynamic sparing is not performed.

[Do not Execute] : When the count of read/write errors or online verification errors exceeds a threshold value, the dynamic sparing is not performed.

⑥ [Spare Drive Operation Mode] : Set whether to make the copy backless function [‡1] enable or disable.
It is set as [Variable] in default, and the Copy backless function is enabled.

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‡1 : For details of the Copy backless function, refer to Introduction "3.6 (3) Operation after replacing the failed Drive" (INTR 03-0350).

Table 11.1.1 Setting of "Spare Drive Operation Mode" and the Operation Specification

Spare Drive Operation Mode	Operation specification				
	The relationship between the Failed Drive and the Spare Drive				Restrictions / Notes
	The capacity and the rotational speed are corresponding	The capacity and the rotational speed are not corresponding	Only the capacity is corresponding	Only the rotational speed is corresponding	
Fixing (Fixed)	Copy back	Copy back	Copy back	Copy back	The location of the Drive which configures the RAID Group never changes from the time of creating the RAID Group. Therefore, this parameter is set when fixing the location of the Drive which configures the RAID Group.
Variable (Variable) (*1) (*2) (*3) (This is set in default.)	Copy backless	Copy back	Copy back	Copy back	(This is set in default.)

*1 : If the Power Saving function is enabled, copy back is performed in the following four cases even if Spare Drive Operation Mode has been set to the default mode, which is copy back less.

Furthermore, the operation differs depending on whether the firmware version is more than or equal to 0940/A or less than 0940/A. (In the version of 0970/A or more, a Flash Drive operates according to the Spare Drive Operation Mode setting.)

License key status			Target Spare Drive			
		Source data drive	Less than 0940/A		0940/A or more	
			System drive	Non system drive	System drive	Non system drive
Power Saving/ Power Saving Plus	Enable	System drive	As specified	As specified	As specified	As specified
		Non system drive	As specified	As specified	As specified	As specified
	Disable	System drive	Copy back	As specified	As specified	Copy back
		Non system drive	Copy back	As specified	Copy back	As specified

* : System drives correspond to Drives #0 to #4 in CBSS/CBSL/CBSXS/CBXSL, Drives #0 to #4 of Unit ID#0 in DBS/DBL/DBW/DBF connected to CBL, or Drives #A0 to #A4 in DBX, Drives #0 to #4 of Unit ID#0 in DBSD/DBLD connected to CBLD.

(The copy-back operates for maintaining the power saving status that can be changed in the version less than 0940/A. The specification changed to remedy the problems such as the useless copy-back operation among system drives and the biased Spare Drives for the system drives.)

*2 : If it is operated in the copy-back-less setting, the Drive positions which configure the RAID groups are replaced due to the Drive failure recovery.

In the Power Saving/Power Saving Plus function, even if the RAID groups have the same RAID level and the number of Drives, the spinup time from the power saving status may differ depending on the Drive positions which configure the RAID groups. Therefore, when the RAID groups are configured considering the spinup time from the power saving status, it is recommended to set the copy-back mode.

*3 : If the Drive restoration to the Spare Drive operates between the Drives of CBSL/DBL/DBX and DBW at the time of the Drive failure restoration of the RAID group executes the power saving instruction of the I/O interlock enables, the copy-back-less function does not operate and the copy-back function operates surely after replacing the Drives.

(6) Click the [OK] button.

(7) Click the [Close] button.

(8) The detail of the setting that has been made is displayed.

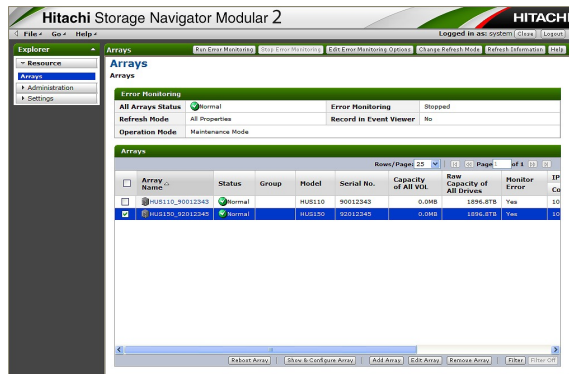Make sure that the setting that has been made is reflected on the display.

11.2 Setting the Flash Drive Write Endurance Threshold

- Hitachi Storage Navigator Modular 2 Ver. 25.50 or more can set the write capacity life threshold value for Flash Drives (FMDs).
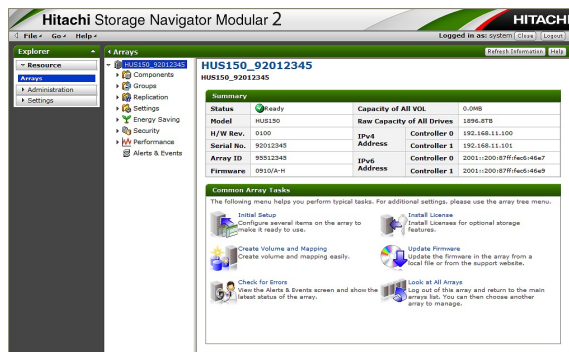- Hitachi Storage Navigator Modular 2 Ver. 22.00 or more can set the write capacity life threshold value for Flash Drives.

(1) When the Hitachi Storage Navigator Modular 2 Ver. is 25.50 or more

　(a) Turn on the power supply.

　(b) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]
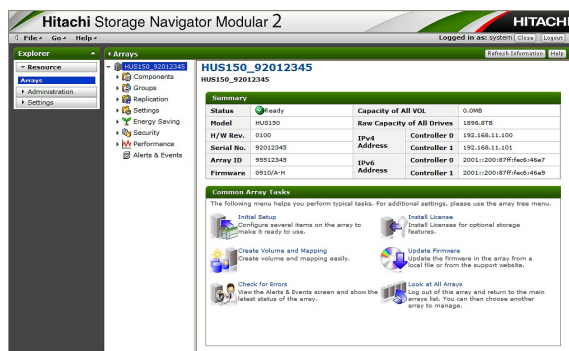Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

　(c) Click the array name, and open the unit window.

NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)
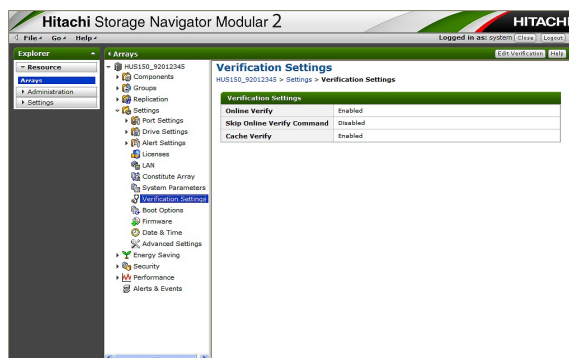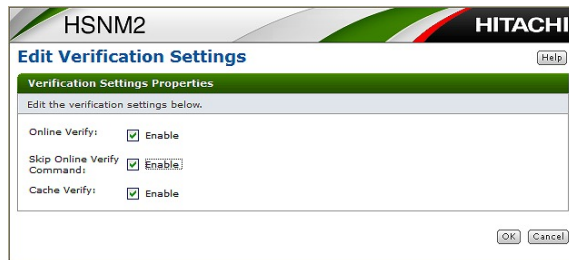

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(d) Select the [Settings] – [Drive Settings] – [SSD/FMD Endurance].

In the SSD/FMD Endurance window, the current write endurance status is displayed.

Endurance status

    Normal : Normal (The threshold is not reached)
    Over   : Excess (The threshold is reached)
    N/A   : Blockage or 99 % of the write endurance limit is reached.
    ---   : The threshold cannot be obtained.

(e) Click the [Change Threshold] button at the upper right of the window.

(f) Specify the Alert Level Threshold, and then click the [OK] button.

(g) The confirmation window of the threshold change is displayed. Click the [Close] button.

(2) When the Hitachi Storage Navigator Modular 2 Ver. is 22.00 or more
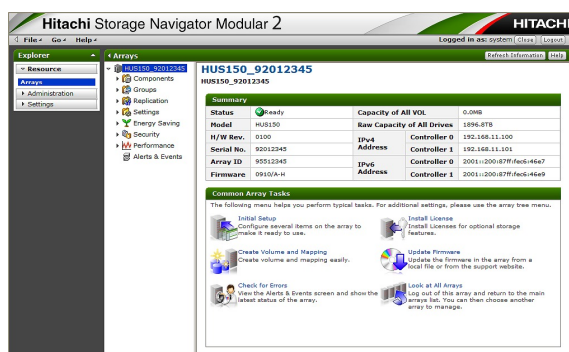
   (a) Turn on the power supply.

   (b) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

       Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.
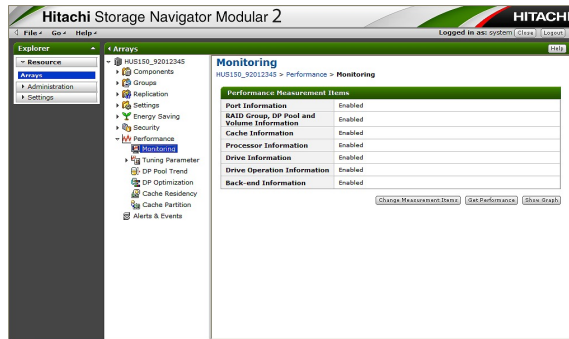

   (c) Click the array name, and open the unit window.

          NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)
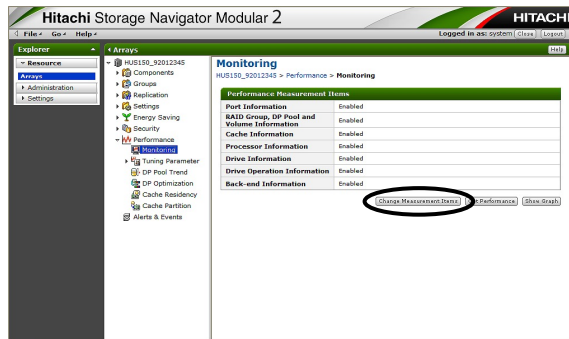

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(d) Select the [Settings] – [Drive Settings] – [SSD Endurance].

In the SSD Endurance window, the current write endurance status is displayed.

Endurance status

   Normal : Normal (The threshold is not reached)

   Over   : Excess (The threshold is reached)

   N/A   : Blockage or 99 % of the write endurance limit is reached.

   ---   : The threshold cannot be obtained.

(e) Click the [Change Threshold] button at the upper right of the window.

(f) Specify the Alert Level Threshold, and then click the [OK] button.

(g) The confirmation window of the threshold change is displayed. Click the [Close] button.

11.3 Setting the Flash Drive (FMD) Battery Life Threshold Value

Hitachi Storage Navigator Modular 2 Ver. 25.50 or more can set the battery capacity life threshold value for Flash Drives (FMDs).

(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]
Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

---

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

---

(4) Select the [Settings] – [Drive Settings] – [FMD Battery Life].

In the FMD Battery Life window, the current write battery life status is displayed.

Battery life status

Normal : Normal (The threshold is not reached)

Over : Excess (The threshold is reached)

N/A : Blockage or 99 % of the write endurance limit is reached.

--- : The threshold cannot be obtained.

(5) Click the [Change Threshold] button at the upper right of the window.

(6) Specify the Alert Level Threshold, and then click the [OK] button.

(7) The confirmation window of the threshold change is displayed. Click the [Close] button.

Chapter 12.   Setting Verification

This chapter describes how to refer to and set the validity or invalidity of the online verify, skip online verify command and cache verify.

> NOTE : If the setting is changed while an I/O is being executed, the I/O may be abnormally stopped or the succeeding I/O may be unable to be executed. Therefore, change the setting after stopping the I/O.
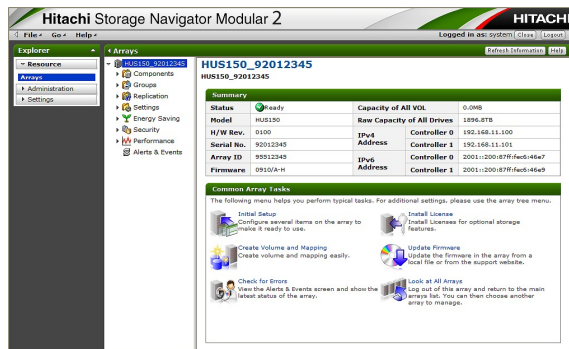> Besides, the setting on the host computer side must be changed depending on the host computer.

(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

---

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

(4) Select the [Settings] – [Verification Settings].

(5) Click the [Edit Verification] button at the upper right of the window.

    ① [Online Verify]   : This is set at [Enable] by default.
                                 Set whether or not to carry out the online verification test.
                                 When the check box is checked, the test is carried out.
                                 However, the online verify test is not executed for the Drives
                                 in the RAID Group to which the Power Saving/Power Saving
                                 Plus function is set.

    ② [Skip Online Verify Command] : This is set at [Enable] by default.
                                      Sets whether or not to skip the verification test.
                                      When [ON] is selected, the test is skipped.

    ③ [Cache Verify]   : This is set at [Enable] by default.
                                 Sets whether to execute the Cache Verify or not. If [ON] is
                                 selected, the Cache Verify is executed.

(6) Click the [OK] button.
(7) Click the [Close] button.

(8) The detail of the setting that has been made is displayed.
    Make sure that the setting that has been made is reflected on the display.

Chapter 13.   Setting Performance

13.1   Setting Monitoring

(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]
Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(4) Select the [Performance] – [Monitoring] on the unit window.

13.1.1 Changing Measurement Items

(1) To obtain the performance data, select the [Change Measurement Items].

(2) Select the item to obtain the performance data. Click the [OK] button.

(3) The confirmation window is displayed. Click the [Close] button.

(4) Click the [Close] button.

(5) The refreshed window is displayed.

13.1.2 Getting Performance

(1) To obtain the performance data, select the [Get Performance].

(2) Select the [Performance Measurement Mode], and then click the [Start] button.

(3) To obtain the performance data, click the [Get] button.
To terminate the setting, click the [Stop] button.

(4) Click the [Stop] button.

(5) A normal termination message appears. Click the [Close] button.

13.2 Setting Tuning Parameter

(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

---

(4) Select [Performance] – [Tuning Parameters] on the unit window.

The setting of the tuning parameter has the other functions as shown below.

Table 13.2.1   The Menu Items of Setting Parameter

No.	Menu item	Use	Contents	Factory setting	Reference page
1	Multi Stream	Parameters of Multi Stream and pre-fetching are set.	1. Setting a scope	System	"13.2.1 Setting Multi Stream" (SYSPR 13-0070)
			2. Selecting a mode	Changes the Multi Stream mode Read	
			3. Selecting next pre-fetching	Changes the next pre-fetching Enable	
			4. Selecting a pre-fetching standard	Changes the pre-fetching standard Base	
			5. Setting an amount of pre-fetching (it can be set only when "Volumes" is selected for "Range of Application")	Changes the amount of the fixed pre-fetching 256 Changes the amount of the basic pre-fetching 128	
			6. Setting sequential determination	Changes the number of sequential determination 3	
2	System Tuning	System turning parameters are set.	1. Setting a dirty flushing opportunity	5	"13.2.2 Setting System Tuning" (SYSPR 13-0110)
			2. Setting a dirty flushing stop opportunity	5	
			3. Selecting a Cache control mode	FIFO	
			4. Selecting a trace strengthening mode	ON	
			5. Selecting load balancing	Enable	
			6. Selecting load balancing monitoring time	3	
			7. Dirty Data Flush Number Limit	Disable	
			8. Load Reduction for Changing Configuration Mode	Disable	
			9. Extended COPY Low-Speed Mode	Disable	
			10. I/O Overload Report Mode[*1]	Disable	
			11. iSCSI Timeout Reset Time[*2]	45	

*1 : It is displayed in the Hitachi Storage Navigator Modular 2 Ver.27.00 or more and firmware Ver.0970/A or more.
*2 : It is displayed in the Hitachi Storage Navigator Modular 2 Ver.27.77 or more and firmware Ver.0977/J or more.

No.	Menu item	Use	Contents	Factory setting	Reference page
3	LU Ownership	An owner right of volumes is set.	① Selecting a controller in charge of volumes	Depends on the configuration at shipment	"13.2.3 Setting LU Ownership" (SYSPR 13-0130)

13.2.1 Setting Multi Stream

(1) Select [Performance] – [Tuning Parameters] on the unit window, and select [Multi Stream].

(2) Select [Scope].

When selecting [System] for [Scope], select the [System] tab.

When selecting [Volume] for [Scope], select the [Volume] tab.

(2-1) When selecting [System]

(a) Click the [Edit System Multi Stream] button.

(b) The parameter in the system Multi Stream window is set.

[System Multi Stream] : Selects Multi Stream in units of system.

       [Mode]　　　　　 : The operation mode of Multi Stream is displayed. Read and
　　　　　　　　　　　　 Read/Write can be set. Read is selected by default.

Read : Performs sequential determination individually for two or more sequential read.

Read/Write : Performs sequential determination individually for two or more sequential read and flushes data to drives as a whole as much as possible when accessing two or more sequential write.

[Prefetch Next] : Whether the prefetch next is performed is displayed.
Enabled/Disabled can be set. Enabled is selected by default.

[Prefetch Criteria] : The prefetch criteria is displayed. Fixed/Basic can be set. Basic is selected by default.

[Count of Judgment Sequential] : The count of judgment sequential is displayed. This is used as a threshold value to determine that a series of commands is sequential.

A number from 0 to 10 can be set.   Three is entered by default.

- 0 : Does not prefetch.
- 1 : Prefetches surely.
- 2 or more : Prefetches when receiving the consecutive commands more than or equal to the specified number.

(c) Check that the set contents are correct.

If the [Cancel] button is clicked, the change content is cancelled.

Click the [OK] button to terminate the setting.

(d) Check the contents of the confirmation message window, and click the [Close] button.

(e) Check that the content set in the Multi Stream window is reflected.

(2-2) When selecting [Volumes]
    (a) Select a VOL to be set (two or more are allowed), and click the [Edit VOL Multi Stream]
        button.

(b) The parameter in the Edit Volume Multi Stream window is set.

[Edit Volume Multi Stream] : Selects Multi Stream in units of volume.

    [Mode]   : The operation mode of Multi Stream is displayed. Read and
                          Read/Write can be set. Read is selected by default.
                          Read : Performs sequential determination individually for two or
                                 more sequential read.
                          Read/Write : Performs sequential determination individually for
                                 two or more sequential read and flushes data to
                                 drives as a whole as much as possible when accessing
                                 two or more sequential write.
    [Prefetch Next]   : Whether the prefetch next is performed is displayed.
                          Enabled/Disabled can be set. Enabled is selected by default.
    [Prefetch Criteria] : The prefetch criteria is displayed. Fixed/Basic can be set. Basic is
                          selected by default.

[Prefetch Criteria] : The prefetch criteria is displayed. Fixed/Basic can be set. Basic is selected by default.

[Count of Judgment Sequential] : The count of judgment sequential is displayed. This is used as a threshold value to determine that a series of commands is sequential.

A number from 0 to 10 can be set.   Three is entered by default.

- 0 : Does not prefetch.
- 1 : Prefetches surely.
- 2 or more : Prefetches when receiving the consecutive commands more than or equal to the specified number.
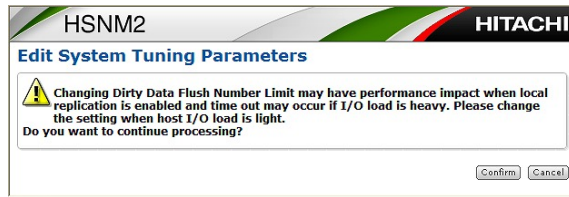
(c) Check that the set contents are correct.

If the [Cancel] button is clicked, the change content is cancelled.
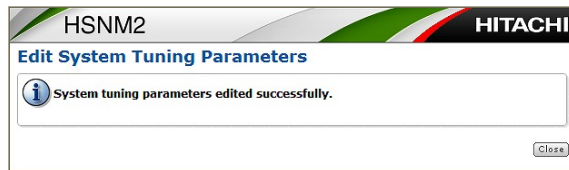
Click the [OK] button to terminate the setting.

(d) Check the contents of the confirmation message window, and click the [Close] button.

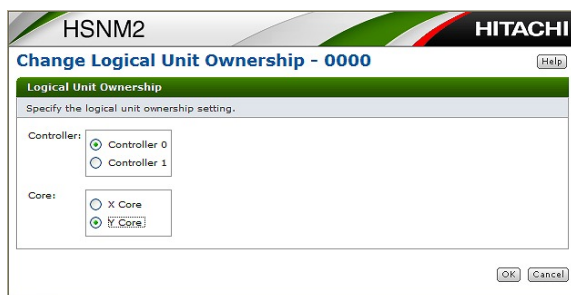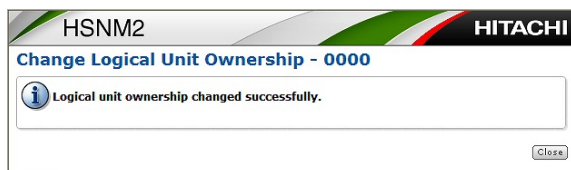(e) Check that the content set in the Multi Stream window is reflected.

13.2.2 Setting System Tuning

(1) Select [Performance] – [Tuning Parameters] on the unit window, and select [System Tuning].

(2) Click the [Edit System Tuning Parameters] button.

(3) The parameter in the System Tuning window is set.

    [System Tuning]   : The dirty flushing, Cache control mode, trace strengthening mode and load balancing can be changed in the system turning window.

        [Dirty Data Opportunity]   : The dirty data opportunity is displayed.
                                         It can be entered in the range from 0% to 50%.

        [Dirty Data Stop Opportunity]   : The dirty data stop opportunity is displayed.
                                         It can be entered in the range from 0% to 50%.

[Cache Control Mode] : The cache control mode is displayed.
FIFO or LRU can be selected.
FIFO is selected by default.
[Detailed Trace Mode] : The detailed trace mode is displayed.
Enabled or Disabled can be selected.
Enable is selected by default.
[Load Balancing] : The load balancing is displayed.
Enabled or Disabled can be selected.
Enabled is selected by default.
[Load Balancing Monitoring Time] : The load balancing monitoring time is displayed.
The time of 0, 3, 10, 15, 30, 60, 120, or 180
(minutes) can be selected.
Three minutes is selected by default.
[Dirty Data Flush Number Limit] : It limits the number of the concurrent execution of
the processing which flushes the dirty data in the
Cache Unit to the Drive.
Enable or Disable can be selected.
Disable is selected by default.
[Load Reduction for Changing Configuration Mode] :
This reduces the effect on the host I/O by the
configuration change of the array from Hitachi
Storage Navigator Modular 2.
Enable or Disable can be selected.
Disable is selected by default.
When this is enabled, the host I/O processing is
prioritized and the access from Hitachi Storage
Navigator Modular 2 and LAN should wait. This may
prevent the acquisition of the performance
information.
Furthermore, when Dynamic Provisioning/Dynamic
Tiering is used, the time until the DP-VOL operation
has been completed lengthens.

[Extended COPY Low-Speed Mode]: When operating the VMware linkage function, the data copy processing by the Extended COPY command is operated at low speed.
Enabled or Disabled can be selected.
The Disabled is selected in default.
The Extended COPY command is issued by operating the clone of the virtual machine, Storage vMotion and others.
When it is enabled, the host I/O processing is prioritized and the data copy processing by the Extended COPY command operates at low speed.
This takes more time to complete the operations such as clone of the virtual machine and Storage vMotion.

[I/O Overload Report Mode][‡1]   : The following message is output when command response delay occurs due to I/O overload.
Enabled or Disabled can be selected.
Disable is selected by default.
When it is enabled, if the command response delay occurs due to the inflow restriction, the following WEB messages are displayed.

    Non-HDP : IAJG00 Command response delay occurs due to overload (LU-x, RG-y, PTT-z)
    HDP   : IAJH00 Command response delay occurs due to overload (LU-x, DP-y, PTT-z)

[iSCSI Timeout Reset Time][‡2]   : iSCSI transmission timeout value is displayed.
It can be entered in the range from 45(s) to 20(s).
Forty five seconds is selected by default.
iSCSI Interface is reset when iSCSI transmission timeout occurs.
This parameter is valid in iSCSI transmission only.

(4) Check that the set contents are correct.
    If the [Cancel] button is clicked, the change content is cancelled.
    Click the [OK] button to terminate the setting.

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‡1 : It is displayed in the Hitachi Storage Navigator Modular 2 Ver.27.00 or more and firmware Ver.0970/A or more.
‡2 : It is displayed in the Hitachi Storage Navigator Modular 2 Ver.27.77 or more and firmware Ver.0977/J or more.

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(5) When the [Dirty Data Flush Number Limit] is enabled, the confirmation message is displayed. Check the contents of the confirmation message window, and click the [Confirm] button.

(6) Check the contents of the confirmation message window, and click the [Close] button.

(7) Check that the content set in the System Tuning window is reflected.

13.2.3   Setting LU Ownership

(1) Select [Performance] – [Tuning Parameters] on the unit window, and select [LU Ownership].

(2) Select a volume to be set (two or more are allowed), and click the [Change LU Ownership] button.

(3) Set the Controller or the Core in the Change Logical Unit Ownership window.

(4) Check that the set contents are correct.

 If the [Cancel] button is clicked, the change content is cancelled.

 Click the [OK] button to terminate the setting.

(5) Check the contents of the confirmation message window, and click the [Close] button.

(6) The detail of the setting that has been made is displayed.

 Make sure that the setting that has been made is reflected on the display.

Chapter 14.   Setting Licenses

14.1   Procedure for Unlocking the License of Priced Option

(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]
Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

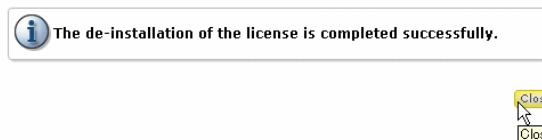(4) Select the [Settings] - [Licenses] on the Unit window.

(5) Click the [Install License] button.

(6) When you unlock the option using the key code, click the [Key Code:] radio button, then set up the key code. For the key code of the priced optional features, refer to the priced optional features manual.
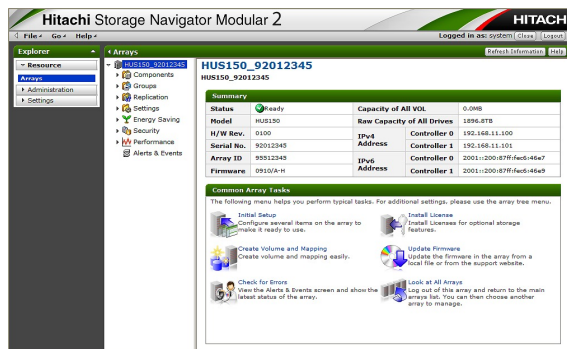When you unlock the options using the key file, click the [Key File:] radio button, and then set up the path for the key file. The [Browse] button is used, the path to a key file can be set correctly.

(7) Click the [OK] button.

> NOTE : Depending on the option, the array may need to be restarted in order to set the unlocking feature effective.

14.2 Procedure for Locking the License of Priced Option

A key code is required for the lock.

The key code is included in a key file. The key file is stored in the DVD attached to Basic Operating System for Modular or the CD-ROM attached to each priced option.

(1) Start Hitachi Storage Navigator Modular 2.

(2) Put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

It is displayed as "maintenance mode" in [Operation Mode] of the upper part of the window, and Hitachi Storage Navigator Modular 2 is operated in the maintenance mode.

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.
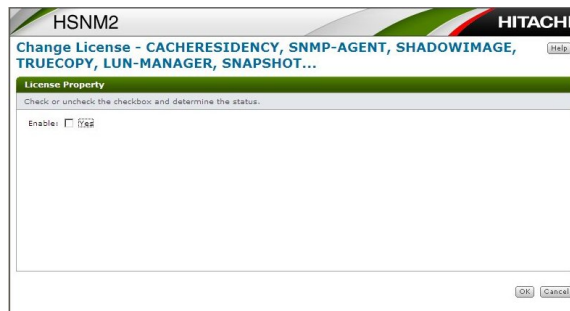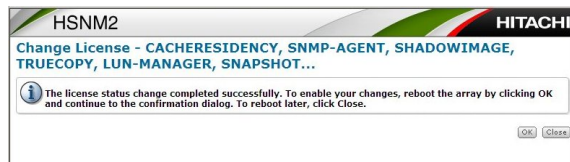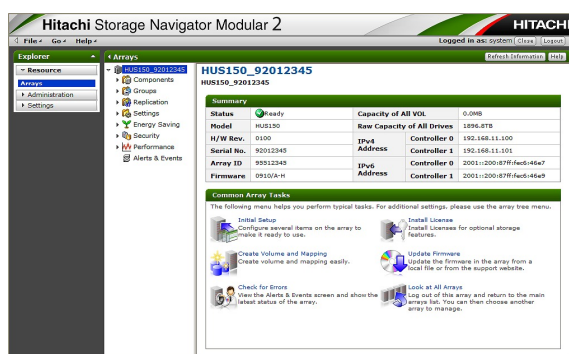
(4) Select the [Settings] - [Licenses] on the unit window.

(5) Click "De-install License".
The "De-Install License" screen appears.

(6) When you lock the options using the key file, click the [Key File:] radio button, and then set up the path for the key file. The [Browse] button is used, the path to a key file can be set correctly.
When you lock the option using the key code, click the [Key Code:] radio button, then set up the key code. For the key code of the priced optional features, refer to the priced optional features manual.

(7) The following window is displayed. Click the [Close] button.

14.3   Setting Enabling or Disabling of the License

(1) Start Hitachi Storage Navigator Modular 2.

(2) Put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same
     time, and change the operation mode to "Maintenance Mode".[‡1]
     It is displayed as "maintenance mode" in [Operation Mode] of the upper part of the window,
     and Hitachi Storage Navigator Modular 2 is operated in the maintenance mode.

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is
> not displayed even though the icon of the array is clicked, use the changed LAN
> Port Number, and execute it again. (Refer to 1.2 LAN Port Number Change by
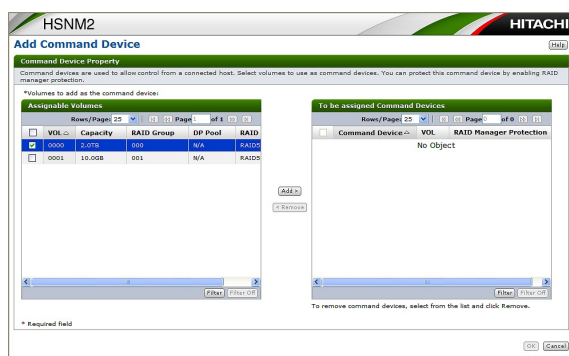> Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the
      "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.
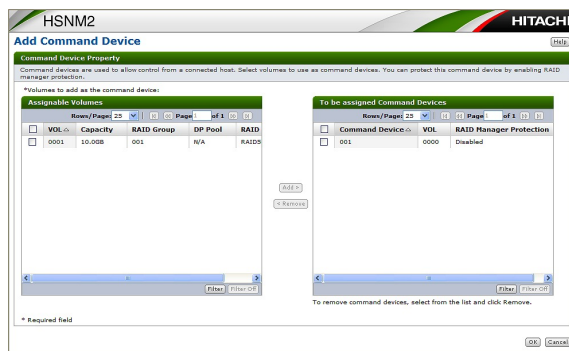
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(4) Select the [Settings] - [Licenses] on the unit window.

(5) Click the [Change Status] button.

(6) To disable, uncheck the checkbox.
To enable, check the checkbox and click the [OK] button.

(7) A message appears, confirming that this feature is set. Click the [Close] button.

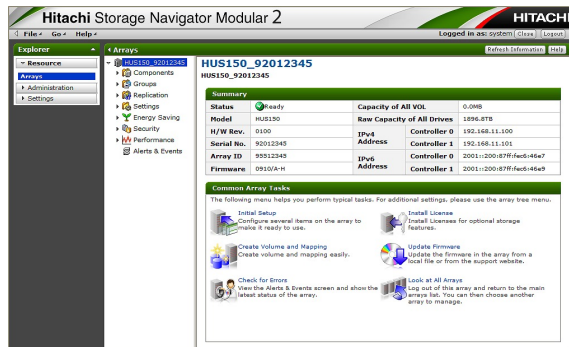# Chapter 15.   Setting Command Device and DMLU

15.1   Setting Command Device

(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.
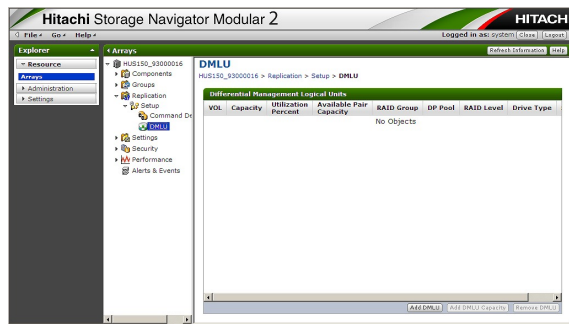

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)
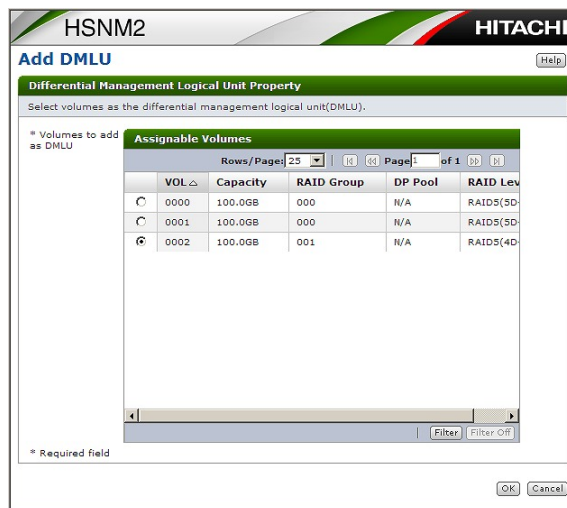

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.
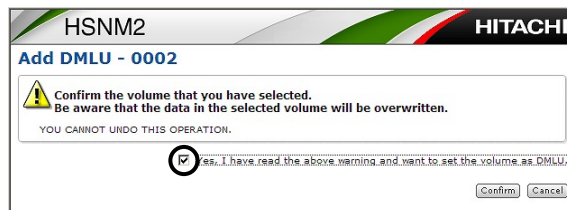
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(4) Select the [Replication] - [Settings] - [Command Devices] on the Unit screen.

(5) Click the [Add Command Device] button.

Enter the command device to be added.

(6) The selected HDU is moved to the [To be assigned Spare Drives] list. Click the [OK] button.

(7) Click the [Close] button.

(8) The detail of the setting that has been made is displayed.
    Make sure that the setting that has been made is reflected on the display.

15.2   Setting DMLU

(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(4) Select the [Replication] - [Setup] - [DMLU] on the Unit screen.

(5) Click the [Add DMLU] button.

Select the volume to be added.

(6) Click the [OK] button.

(7) A confirmation message is displayed. Check the confirmation checkbox and click the [Confirm] button.
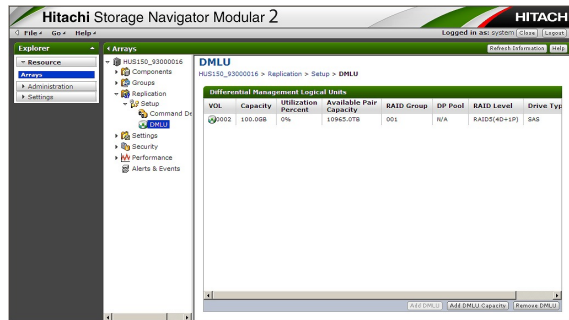

(8) A normal termination message appears. Click the [Close] button.

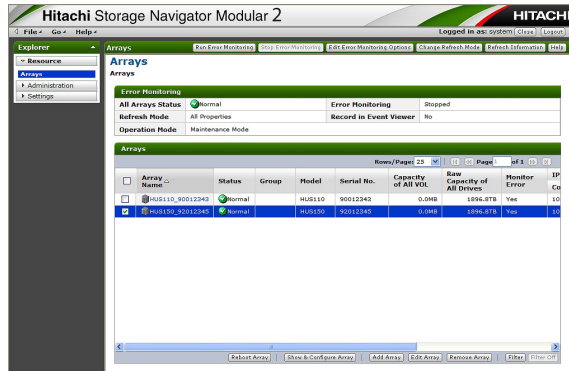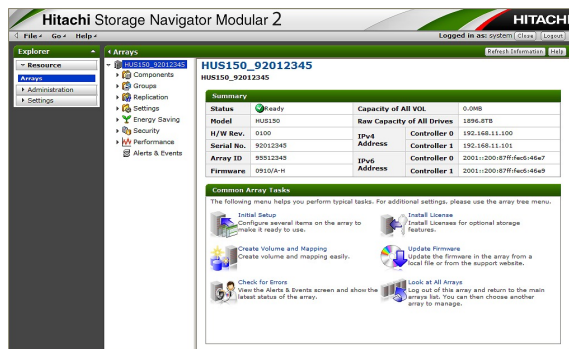(9) The detail of the setting that has been made is displayed.
     Make sure that the setting that has been made is reflected on the display.

Chapter 16.   Setting Power Interlock

(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

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(4) Select the [Settings] - [Power Interlock] on the Unit screen.

Current : The mode in which the array runs currently

Setting : The mode which becomes effective from restarting the array after planned shutdown

(5) Click the [Change Power Interlock Mode] button.
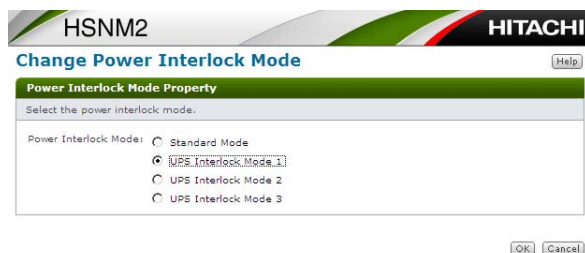Select a mode to set to the Power Interlock Mode. Click the [OK] button.
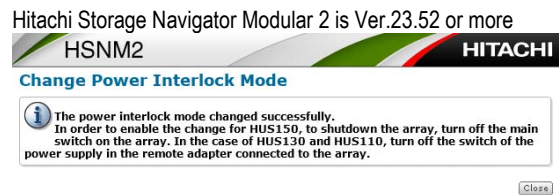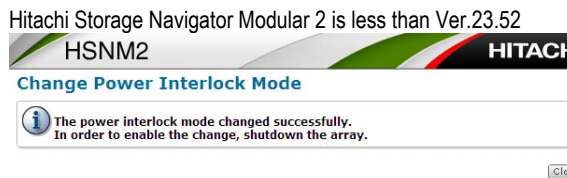

Table 16.1 Power Interlock Mode

Mode Name	Description
Standard Mode	Set at the factory
UPS Interlock Mode 1	Interlocking mode 1 with an UPS exclusive for the array To set the mode, connect Power Unit #0 to the UPS and Power Unit #1 to an external power supply or the PDB of the RK40 rack frame respectively.
UPS Interlock Mode 2	Interlocking mode 2 with an UPS exclusive for the array To set the mode, connect Power Unit #0 and Power Unit #1 to the one UPS.(*1)
UPS Interlock Mode 3	Interlocking mode 3 with an UPS exclusive for the array To set the mode, connect each of Power Unit #0 and Power Unit #1 to the different UPSs.(*2)

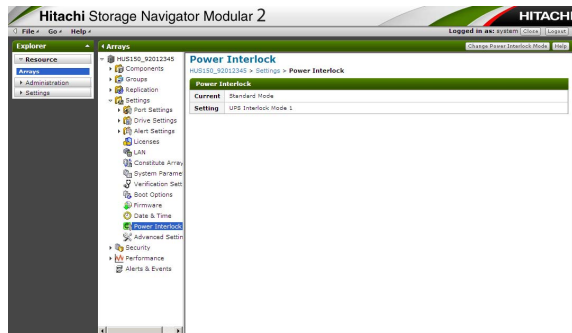▭ : Do not make this setting when the UPS is not connected.

*1 : The duplication of the power supply system becomes unable to be done.

*2 : This cannot be used in the case of the single Controller.

(6) Click the [Close] button.

Hitachi Storage Navigator Modular 2 is less than Ver.23.52

Hitachi Storage Navigator Modular 2 is Ver.23.52 or more

(7) The settings that have been made for the setting value are displayed.

Make sure that the settings that have been made are reflected on the display.

Chapter 17. Setting Air Filter Information

When the Hitachi Storage Navigator Modular 2 is Ver.24.00 or more, the Air Filter information can be set.

Air Filter is installed inside the Front Bezel (front side cover of the array). The Air Filter can be installed when the power supply (DC current) is used. This Air Filter needs to be changed depending on the array operation period (8800 hours). Therefore, when performing this setting, perform the E-mail Alert setting together, and monitor the time for replacement. (Refer to "Chapter 9. E-mail Alert Function" (SYSPR 09-0000).)

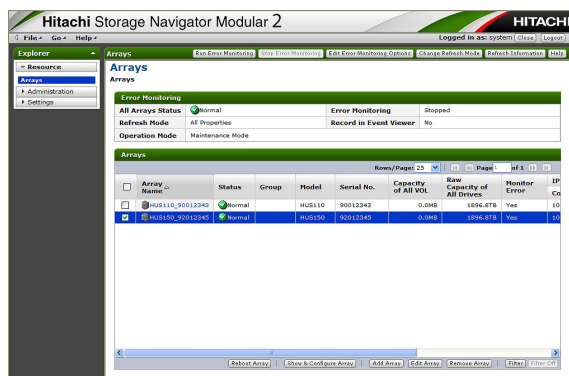The setting of the Air Filter information has the items as shown below.

No.	Menu item		Contents	Factory setting
	Setting name	Use		
1	Air Filter [*1]	Setting Air Filter Information	① Setting Air Filter Timer function	Disabled
			② Displaying the Expiration Time (hours)	8800 (Fixed value, unmodifiable)
			③ Displaying the Running Time (hours)	0 (Setting impossible, possible to clear it only by 0.)
*1 : It displays when the version of Hitachi Storage Navigator Modular 2 is Ver.24.00 or more				

17.1   Changing Air Filter timer function

(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]
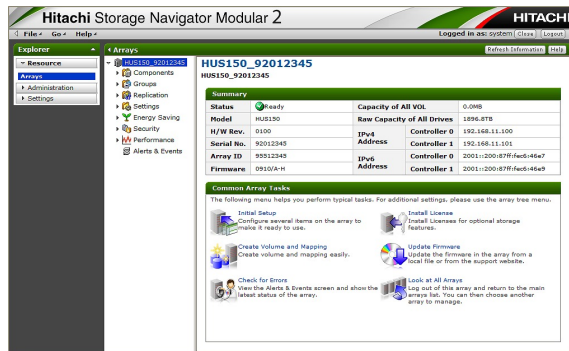
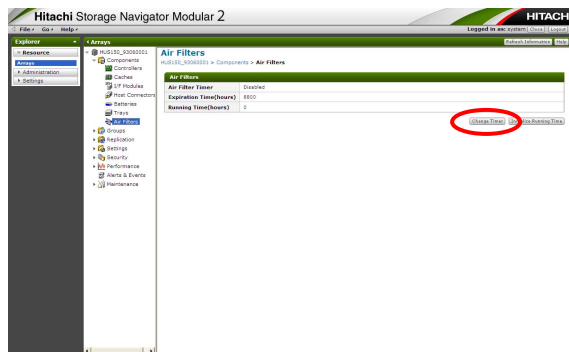Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

(3) Click the array name, and open the unit window.
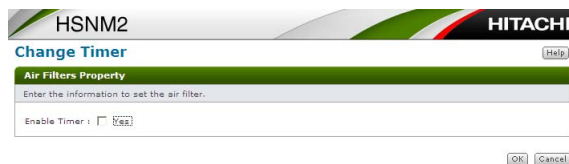
> NOTE : There is a case that the LAN Port Number is changed. When the main screen is
> not displayed even though the icon of the array is clicked, use the changed LAN
> Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by
> Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

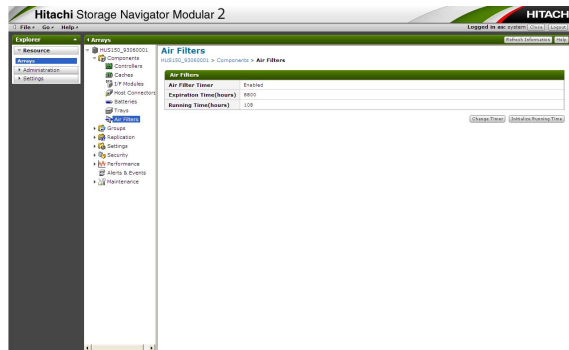(4) Select [Components] – [Air Filters] on the unit window, and click the [Change Timer] button.

(5) To make the [Enable Timer] checkbox in the Change Timer window enabled, check the
checkbox. To make it disabled, uncheck the checkbox and click the [OK] button.

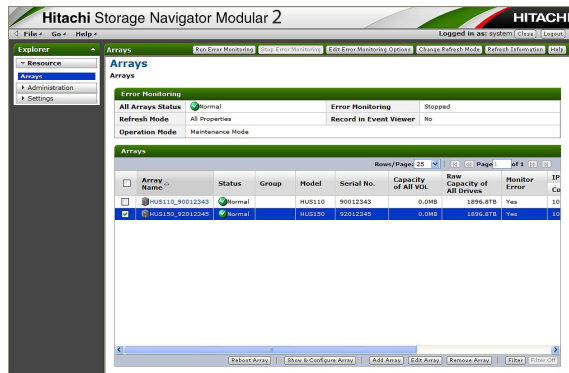(6) Check the contents in the confirmation message window, and click the [Close] button.

(7) Check that the content set in the Air Filters window is reflected.
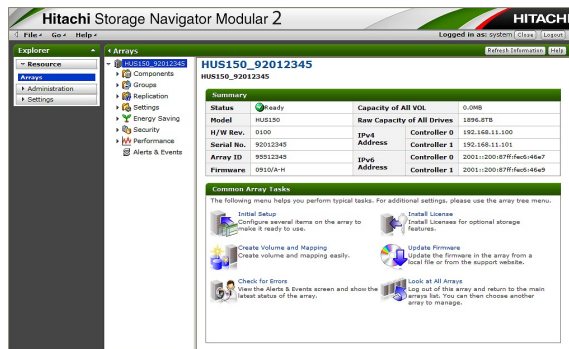
17.2   Initializing Air Filter Running Time

(1) Turn on the power supply.

(2) Start Hitachi Storage Navigator Modular 2, put a checkmark to the array to set, press the [Ctrl] key, [Shift] key and [E] key at the same time, and change the operation mode to "Maintenance Mode".[‡1]

Check that "Maintenance Mode" is displayed in [Operation Mode] on the top of the main window.
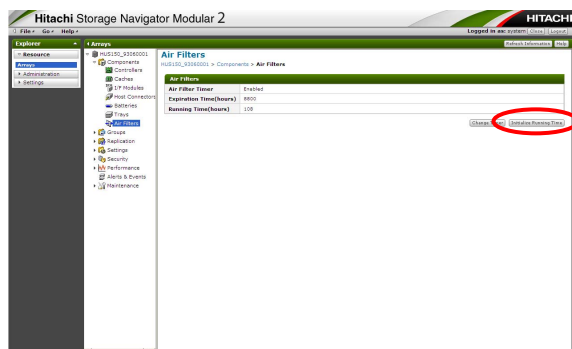

(3) Click the array name, and open the unit window.

> NOTE : There is a case that the LAN Port Number is changed. When the main screen is not displayed even though the icon of the array is clicked, use the changed LAN Port Number, and execute it again. (Refer to "1.2 LAN Port Number Change by Hitachi Storage Navigator Modular 2" (SYSPR 01-0120).)

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‡1 : When the array to operate is not registered, click the blank area (other than buttons and characters) in the "Arrays" window, and press the [Ctrl] key, [Shift] key and [E] key at the same time.

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(4) Select [Components] – [Air Filters] on the unit window, and click the [Initialize Running Time] button.

(5) Check the contents in the confirmation message window, and click the [Confirm] button.

(6) Check the completion of Initializing Running Time, and click the [Close] button.

(7) Check that the content set in the Air Filters window is reflected.