Replacement

This “Parts Replacement” volume describes the replacement work of each part and the periodic maintenance, etc.

Contents

Chapter 1. Before Starting Maintenance Work

This chapter explains procedures for replacing parts which is specified as maintenance parts and identified as failed parts through troubleshooting, etc..
The DF850 is used in a form of rackmount model.

1.1 Before Starting Maintenance Work

Take notice of the following when performing a maintenance work for the array. Read and understand them well before performing the maintenance.

1.1.1 Cautionary Notes

(1) Note at the time of the unpacking
- Unpack it indoor.
  Especially, do not unpack it in such places with the outdoor dust, the direct sunlight, and the infiltration of rainwater.
- Work on the unpacking in the place where a rapid difference of temperature does not occur.
  It may have dew condensation when it is unpacked in the place where a difference of temperature is extreme.
  Further, if the part that remains at high or low temperature in transport is installed in the array, it may not operate normally.

(2) Notes on turning off the power
The user data may be lost unless the power is turned off in the correct procedure.
Since the power feeding to the array is duplicated, when turning off the power, remove the power cables from two Power Units per array.

⚠ CAUTION

When doing a hot replacement of a part, do not wear metallic accessories or a watch so as to avoid an electric shock. Be careful not to touch any of live parts with a screwdriver, etc.

NOTICE

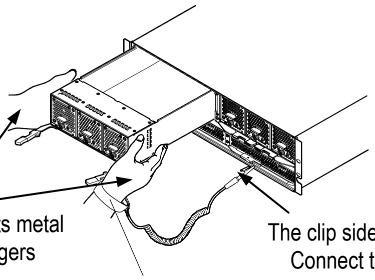
- **Do not disassemble or remodel parts for maintenance. Otherwise, a failure or a serious accident may be caused. Be sure to replace parts in units of formally defined maintenance part.**
- **When replacing the Power Unit, do it in haste after preparing a replacement Power Unit and arranging cables, etc. so that they do not disturb the replacement.**

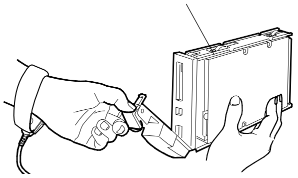
(3) Notes when unpacking, installing or removing the parts

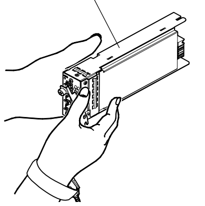
For installing or removing the parts, do not apply any shock as the precise parts are installed. A failure may be caused by the electric shock since the Drive, Controller, I/O Module(ENC) and I/O Card(ENC) are precision instrument. Be sure to put on the wrist strap before starting work in order to protect Drive, Controller, I/O Module(ENC), and I/O Card(ENC) from electrostatic discharge.

NOTICE

- **To prevent part failures caused by static electrical charge built up on your own body, be sure to wear a wrist strap connected to the chassis before starting and do not take it off until you finish.**
- **Be sure to wear a wrist strap connected to the chassis whenever you unpack parts from a case. Otherwise, the static electrical charge on your body may damage the parts.**
- **When you install Drive, Controller, I/O Module(ENC) and I/O Card(ENC), support its metal part with your hand that has the wrist strap. You can discharge static electricity by touching the metal plate.**


Support the part by touching its metal part (metal plate) with your fingers
The clip side of wrist strap:
Connect this to the metal part on the frame of array
A wrist strap (Be sure to wear this before starting maintenance.)





(4) Notes on cable routing

(a) Handling of cables placed on the installation floor

- Protect the cables, which cannot be accommodated by the array and thus laid on the floor or cross a passage, with the cable protection duct.
- For cables that relay between the arrays, lay them on the floor and do not leave them from the floor.

(b) Handling of under floor cables when the array is installed on the free access floor.

- Give extra lengths to cables routed under the floor and do not make them float in the air.

(c) Routing method

- Give a room for routing as earthquake and the like are considered.
- Give a room for routing not to disturb the part replacement for maintenance.
- Make the AC cables apart from each other and when they should be adjacent, do not make them in parallel but make them cross at right angle.
- When using a cable protection duct, be careful not to damage or cut cables by catching them.

(d) Hold the connector to insert or pull out a cable. If the cable part is pulled, it may cause a failure.

(e) For connecting the FC I/F cable or the SAS(ENC) cable, bend it with a long radius (not less than 30mm) and do not give the load to the cable and the connector.

(5) Note on restarting

When restarting the array, turn off the main switch (after the POWER LED lights off), and then turn on the main switch after waiting for one minute or more.

- 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.

(6) Note on completing the work

Close all the external covers when the work is completed. (The cover is to maintain the performance of the array (radio wave noise suppression and others), so that be sure to keep all the external covers closed to operate the array normally.)

(7) Backup user data.
Backup user data in the array by the operation on the host computer side.

(8) When replacing a Drive, Controller, Cache Memory, I/O Module(ENC), I/O Card(ENC), Cache Backup Battery, I/O Module(ENC), I/O Card(ENC), Fan Module, and Power Unit while an array unit is powered on, replace those units 20 seconds or more after their respective failed units are removed.

(9) When replacing the Drive, Controller, Cache Memory, I/O Module(ENC), I/O Card(ENC), Cache Backup Battery, I/O Module(ENC), I/O Card(ENC), Fan Module, and Power Unit while the array power is turned on, complete the replacement within ten minutes. Otherwise, an array down may occur because of an abnormal temperature rise. Perform the part replacement in haste.

(10) When the Power Unit and another module fail at the same time, replace the Power Unit first, duplicate the power supply again, and then replace the module. Otherwise, an array down may occur because of an abnormal temperature rise.

(11) When inserting a component, do it completely to the end and quickly. If the insertion is made incompletely or extremely slowly, it is possible that the recovery from the error fails.

(12) When an allowable time limit for part replacement is specified in the replacement procedure, observe the time limit.

(13) With only the main switch power off, BS power supply is supplied. In this situation, do not leave the components removed from the array for a long time. Because of an abnormal temperature, the power supply alarm can be given.

(14) Do not make the maintenance work when the READY LED (green) on the front of the Controller Box is blinking at high speed. When it is high-speed blinking, either the ENC firmware is being downloaded or the deletion process of the store data inside the backup controller is being performed. Perform the maintenance work after checking that the READY LED (green) on the front of the Controller Box lights up after waiting for the maximum of 30 to 50 minutes (or 40 to 60 minutes in case of CBL (80 to 180 minutes when the DBW is connected to the CBL)).

(15) When the WARNING LED (orange) on the front of the Controller Box is blinking at high speed, do not perform the maintenance work. While this WARNING LED (orange) is blinking at high speed, the update of the flash program or the automatic download of the ENC firmware and the backup controller firmware at the time of turning the power on in the single controller configuration is being executed. Perform the maintenance work after checking that the WARNING LED (orange) on the front of the Controller Box goes out and the READY LED (green) lights up in the maximum of 30 to 85 minutes.

(16) Please execute the maintenance work according to the instruction when an abnormal device and another trouble message have been generated the diagnosis and after the diagnosis ends.

(17) Notes while the array is being started
Because the status where the array is being started is in the middle of the transition to the status of the array power turned on (Ready status) from the status of the array power turned off, do not replace the parts while the array is being started.
Replace the parts after the array become the Ready status.

(18) Connect only the regular parts defined in the maintenance manual for the maintenance parts.

(19) When there is a cover on the connector of the new parts, remove the cover of the connector part that is going to be used.

(20) In case of one DBW, 80 dB at the temperature of 32°C, the maximum level is 85 dB.
Do not work behind DBW for a long time.

1.1.2 Procedure for Making Sure of Model Name and Drive Firmware of Drive

When it is required to make sure of a model name and/or drive firmware of the Drive in the case of Drive replacement, etc., make sure of them following the procedure shown below.

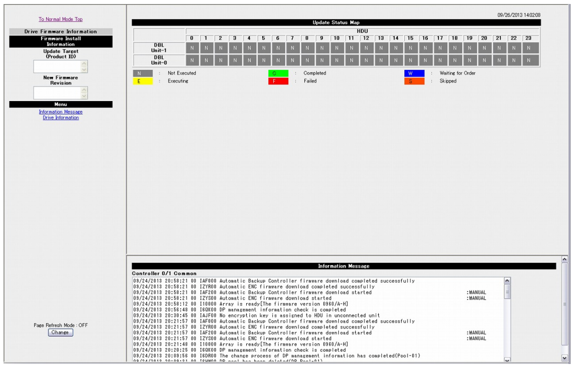
(1) Displaying the reference window

To display the reference window, enter "http://(IP address)/drvfirm" in the [Address] of the WEB browser.

In the case of the dual system configuration, enter an IP address of any one of the Controllers.

When the connection is made, the following window is displayed.

A [User Name] and a [Password] may be requested at the time of Web connection or Web operation. In that case, input "maintenance" for the [User Name] and "hosyu9500" for the [Password].



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Update Status Map

	HDU 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
DBL Unit-1	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
DBL Unit-0	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

N : Not Executed
E : Executing
C : Completed
F : Failed
W : Waiting for Order
S : Skipped

Information Message

Controller 0/1 Common

```
09/24/2013 20:58:21 00 IAF000 Automatic Backup Controller firmware download completed successfully
09/24/2013 20:58:21 00 IZYR00 Automatic ENC firmware download completed successfully
09/24/2013 20:58:21 00 IAF200 Automatic Backup Controller firmware download started                 :MANUAL
09/24/2013 20:58:21 00 IZYS00 Automatic ENC firmware download started                               :MANUAL
09/24/2013 20:58:12 00 I10000 Array is ready[The firmware version 0960/A-H]
09/24/2013 20:56:48 00 I6QK00 DP management information check is completed
09/24/2013 20:30:45 00 IAJF00 No encryption key is assigned to HDU in unconnected unit
09/24/2013 20:21:57 00 IAF000 Automatic Backup Controller firmware download completed successfully
09/24/2013 20:21:57 00 IZYR00 Automatic ENC firmware download completed successfully
09/24/2013 20:21:57 00 IAF200 Automatic Backup Controller firmware download started                 :MANUAL
09/24/2013 20:21:57 00 IZYS00 Automatic ENC firmware download started                               :MANUAL
09/24/2013 20:21:48 00 I10000 Array is ready[The firmware version 0960/A-H]
09/24/2013 20:20:25 00 I6QK00 DP management information check is completed
09/24/2013 20:09:56 00 I6DR00 The change process of DP management information has completed(Pool-01)
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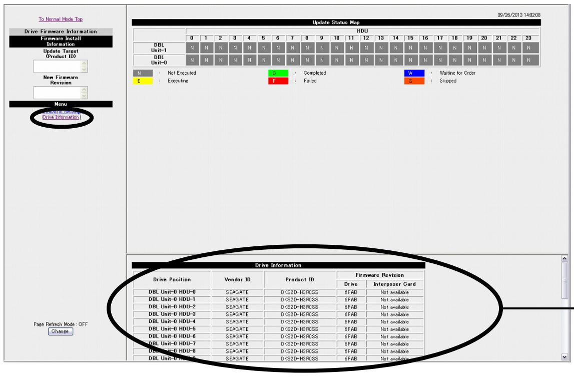
(2) Displaying the list of model names and drive firmware revisions of Drives click [Drive Information] in the [Menu] of the [Drive Firmware Information].



09/26/2013 14:02:08

Update Status Map

	HDU 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
DBL Unit-1	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
DBL Unit-0	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

N : Not Executed
E : Executing
C : Completed
F : Failed
W : Waiting for Order
S : Skipped

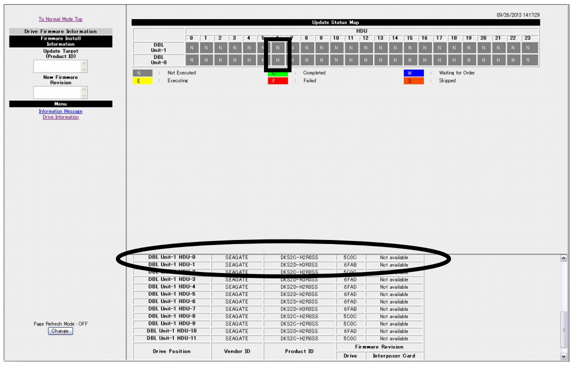
Drive Information

Drive Position	Vendor ID	Product ID	Firmware Revision	
			Drive	Interposer Card
DBL Unit-0 HDU-0	SEAGATE	DKS2D-H3R0SS	6FAB	Not available
DBL Unit-0 HDU-1	SEAGATE	DKS2D-H3R0SS	6FAB	Not available
DBL Unit-0 HDU-2	SEAGATE	DKS2D-H3R0SS	6FAB	Not available
DBL Unit-0 HDU-3	SEAGATE	DKS2D-H3R0SS	6FAB	Not available
DBL Unit-0 HDU-4	SEAGATE	DKS2D-H3R0SS	6FAB	Not available
DBL Unit-0 HDU-5	SEAGATE	DKS2D-H3R0SS	6FAB	Not available
DBL Unit-0 HDU-6	SEAGATE	DKS2D-H3R0SS	6FAB	Not available
DBL Unit-0 HDU-7	SEAGATE	DKS2D-H3R0SS	6FAB	Not available
DBL Unit-0 HDU-8	SEAGATE	DKS2D-H3R0SS	6FAB	Not available
DBL Unit-0 [illegible]	SEAGATE	DKS2D-H3R0SS	6FAB	Not available

List of model names and drive firmware revisions of the Drives.

Product ID : Drive Model name.
Revision : Drive firmware revision.

(3) Making sure of a model name and drive firmware revision of the Drive concerned.
Since information on the Drive concerned is displayed at the top of the list when the position of the Drive concerned is clicked, make sure of the model name and drive firmware revision of the Drive concerned. (The following figure shows an example in which HDU-6 are selected.)



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Update Status Map

	HDU																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
DBL Unit-1	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
DBL Unit-0	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

N : Not Executed
E : Executing
C : Completed
F : Failed
W : Waiting for Order
S : Skipped

Drive Position	Vendor ID	Product ID	Firmware Revision	
			Drive	Interposer Card
DBL Unit-1 HDU-0	SEAGATE	DKS2C-H2R0SS	5C0C	Not available
DBL Unit-1 HDU-1	SEAGATE	DKS2D-H3R0SS	6FAB	Not available
DBL Unit-1 HDU-2	SEAGATE	DKS2C-H2R0SS	5C0C	Not available
DBL Unit-1 HDU-3	SEAGATE	DKS2D-H3R0SS	6FAD	Not available
DBL Unit-1 HDU-4	SEAGATE	DKS2D-H2R0SS	6FAD	Not available
DBL Unit-1 HDU-5	SEAGATE	DKS2D-H2R0SS	6FAD	Not available
DBL Unit-1 HDU-6	SEAGATE	DKS2D-H2R0SS	6FAD	Not available
DBL Unit-1 HDU-7	SEAGATE	DKS2D-H3R0SS	6FAB	Not available
DBL Unit-1 HDU-8	SEAGATE	DKS2C-H2R0SS	5C0C	Not available
DBL Unit-1 HDU-9	SEAGATE	DKS2C-H2R0SS	5C0C	Not available
DBL Unit-1 HDU-10	SEAGATE	DKS2D-H2R0SS	6FAD	Not available
DBL Unit-1 HDU-11	SEAGATE	DKS2C-H2R0SS	5C0C	Not available

When checking the two or more Drives concern, make sure of the necessary information by clicking each position of them.

Chapter 2. Parts Replacement

2.1 Locations of Replacement Components

Check the installed parts and the power supply status at the time of replacement in Table 2.1.1 and replace the parts.

Table 2.1.1 Locations of the Parts to be Replaced and Power Supply Status

No.	Part name	Part No.	Model	Status of the host/array(*1)			Replacement time (Unit: Minute) (*2)	Reference section
				With I/O	Without I/O			
				On line	On line	Off line		
1	Drive (287.62 G bytes)	3282390-C	DF-F850-3HGSS	○	○	×	5	“2.2.1 Replacing a Drive” (REP 02-0050)
	Drive (287.62 G bytes)	3285276-A	DF-F850-3HGSSH	○	○	×		
	Drive (287.62 G bytes)	3285461-D	DF-F850-3HGSLH	○	○	×		
	Drive (575.30 G bytes)	3282390-A	DF-F850-6HGSS	○	○	×		
	Drive (879.98 G bytes)	3282390-D	DF-F850-9HGSS	○	○	×		
	Drive (879.98 G bytes)	3285461-G	DF-F850-9HGSL	○	○	×		
	Drive (1,173.71 G bytes)	3282390-E	DF-F850-12HGSS	○	○	×		
	Drive (1,956.94 G bytes)	3285067-A	DF-F850-2TNL	○	○	×		
	Drive (1,956.94 G bytes) (DBX)	3285134-A	DF-F850-2TNX	○	○	×		
	Drive (2,935.96 G bytes)	3285067-B	DF-F850-3TNL	○	○	×		
	Drive (2,935.96 G bytes) (DBX)	3285134-B	DF-F850-3TNX	○	○	×		
	Drive (2,935.96 G bytes) (DBW)	3285311-A	DF-F850-3TNW	○	○	×		
	Drive (3,915.01 G bytes)	3285067-C	DF-F850-4TNL	○	○	×		
	Drive (3,915.01 G bytes) (DBX)	3285134-C	DF-F850-4TNX	○	○	×		
	Drive (3,915.01 G bytes) (DBW)	3285311-B	DF-F850-4TNW	○	○	×		
	2.5-inch Flash Drive (195.82 G bytes)	3285262-A	DF-F850-2HGDM	○	○	×		
	2.5-inch Flash Drive (392.73 G bytes)	3285262-B	DF-F850-4HGDM	○	○	×		
	2.5-inch Flash Drive (786.59 G bytes)	3285262-C	DF-F850-8HGDM	○	○	×		
	3.5-inch Flash Drive (195.82 G bytes)	3285461-A	DF-F850-2HGDML	○	○	×		
	3.5-inch Flash Drive (392.73 G bytes)	3285461-B	DF-F850-4HGDML	○	○	×		
	3.5-inch Flash Drive (786.59 G bytes)	3285461-C	DF-F850-8HGDML	○	○	×		
	Flash Drive (FMD) (1.6 T bytes)	3286549-A	DKC-F170I-1R6FM	○	○	×		

*1 : The status definitions of the host and the array are as shown below.

- With I/O: Status that there is I/O from the host
- Without I/O: Status that there is no I/O from the host
- Online: Status of the array powering on
- Off-line: Status of the array powering off

*2 : This indicates a target of the time it takes from the beginning of the replacement procedure until confirming the recovery on the WEB Information when executing the online replacement (in the status where the power is turned on). However, it does not include the time for collecting the error information, unpacking the replaced parts and restoring the drives. For the target of the drive restoration time, refer to “2.2.1 (6) Confirming completion of data recovery or copy back” (REP 02-0370).

No.	Part name	Part No.	Model	Status of the host/array(*1)			Replacement time (Unit: Minute) (*2)	Reference section
				With I/O	Without I/O			
				On line	On line	Off line		
2	Cache Backup Battery (CBXSL/CBXSS/CBSL/CBSS)	3285118-A	DF-F850-BACBS	○	○	×	5	“2.2.2 Replacing a Cache Backup Battery” (REP 02-0430)
	Cache Backup Battery (CBL)	3285167-A	–	○	○	×		
3	Fan Module (CBL)	3285131-A	–	○	○	○	5	“2.2.3 Replacing a Fan Module” (REP 02-0520)
	Fan Module (DBW)	3285306-A	–	○	○	○		
4	Power Unit (CBXSL/CBXSS/CBSL/CBSS)	3285122-A	–	○	○	×	5	“2.2.4 Replacing a Power Unit” (REP 02-0560)
	Power Unit (CBL)	3285165-A	–	○	○	×		
	Power Unit (CBLD)	3285428-A	–	○	○	×		
	Power Unit (DBL/DBS)	3285197-A	–	○	○	○		
	Power Unit (DBLD/DBSD)	3285426-A	–	○	○	○		
	Power Unit (DBX)	3285145-A	–	○	○	○		
	Power Unit (DBW)	3285305-A	–	○	○	○		
	Power Unit (DBF)	3286613-A	–	○	○	○		
5	Controller (CBXSL/CBXSS)	3285173-A/ 3285173-E(*5)	DF-F850-CTLXS/ DF-F850-CTLXSR(*5)	○(*3)	○(*3)	○(*4)	20	“2.2.5 Replacing a Controller” (REP 02-0700)
	Controller (CBSL/CBSS)	3285172-A/ 3285172-E(*5)	DF-F850-CTLS/ DF-F850-CTLSR(*5)	○(*3)	○(*3)	○(*4)		
	Controller (CBL)	3285168-A	DF-F850-CTLL	○(*3)	○(*3)	○(*4)		
6	Cache Memory (4,096 M bytes)	3285136-A	DF-F850-CMM4	○(*3)	○(*3)	○(*4)	20	“2.2.6 Replacing a Cache Memory” (REP 02-0920)
		3285124-A	DF-F850-4GB	○(*3)	○(*3)	○(*4)		
	Cache Memory (8,192 M bytes)	3285367-A	DF-F850-CMM8	○(*3)	○(*3)	○(*4)		
		3285126-A	DF-F850-8GB	○(*3)	○(*3)	○(*4)		
7	Host I/O Board (FC 8 G bps) (CBSL/CBSS)	3285133-A/ 3285133-E(*5)	DF-F850-HBF84/ DF-F850-HBF84R(*5)	○(*3)	○(*3)	○	5	“2.2.7 Replacing a Host I/O Board /Module” (REP 02-1100)
	Host I/O Board (iSCSI 1 G bps) (CBXSL/CBXSS/CBSL/CBSS)	3285186-A	DF-F850-HBS12	○(*3)	○(*3)	○		
	Host I/O Board (iSCSI 10 G bps) (CBXSL/CBXSS/CBSL/CBSS)	3285158-B	DF-F850-HBS102	○(*3)	○(*3)	○		
	Host I/O Module (FC 8 G bps) (CBL)	3285153-A/ 3285153-E(*5)	DF-F850-HF8G/ DF-F850-HF8GR(*5)	○(*3)	○(*3)	○		
	Host I/O Module (iSCSI 10 G bps) (CBL)	3285158-A	DF-F850-HS10G	○(*3)	○(*3)	○		

*1 : The status definitions of the host and the array are as shown below.

- With I/O: Status that there is I/O from the host
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- Online: Status of the array powering on
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*2 : This indicates a target of the time it takes from the beginning of the replacement procedure until confirming the recovery on the WEB Information when executing the online replacement (in the status where the power is turned on). However, it does not include the time for collecting the error information, unpacking the replaced parts and restoring the drives. For the target of the drive restoration time, refer to “2.2.1 (6) Confirming completion of data recovery or copy back” (REP 02-0370).

*3 : The power can be off if the Controller is duplicated.

*4 : When Web cannot be connected, Controller, which is powering off in the dual controller configuration, cannot be replaced.

*5 : RoHS2 compliant parts.

No.	Part name	Part No.	Model	Status of the host/array(*1)			Replacement time (Unit: Minute) (*2)	Reference section
				With I/O	Without I/O			
				On line	On line	Off line		
8	Host Connector (8 G bps)	3285226-B/ 3285226-E(*5)	–	○(*3)	○(*3)	○	5	“2.2.8 Replacing a Host Connector” (REP 02-1230)
	Host Connector (10 G bps iSCSI)	3276337-C/ 3285396-A	–	○(*3)	○(*3)	○		
9	Drive I/O Module (CBL)	3285154-A	DF-F850-BS6G	○	○	○	10	“2.2.9 Replacing a Drive I/O Module” (REP 02-1320)
	Drive I/O Module (CBLE)	3285154-A	DW-F700-BS6G	○	○	○		
	Drive I/O Module (Encryption) (CBLE)	3284394-N	DW-F700-BS6GE	○	○	○		
10	Management Module (LAN)	3285138-A	DF-F850-MMA	○(*3)	○(*3)	○	5	“2.2.10 Replacing a Management Module” (REP 02-1410)
	Management Module (UPS)	3285192-A	DF-F850-MMB	○(*3)	○(*3)	○	20	
11	I/O Module(ENC) (DBL/DBS)	3285196-A	–	○	○	○	10	“2.2.11 Replacing an I/O Module(ENC) or I/O Card(ENC)” (REP 02-1500)
	I/O Module(ENC) (DBW)	3285307-A	–	○	○	○		
	I/O Card(ENC) (DBX)	3285139-A	–	○	○	○		
	I/O Module(ENC) (DBF)	3286612-A	–	○	○	○		
12	SAS(ENC) Cable (5 m)	3285194-C	DF-F850-SC5	○	○	○	–	“2.2.12 Replacing SAS(ENC) Cable” (REP 02-1680)
	SAS(ENC) Cable (3 m)	3285194-B	DF-F850-SC3	○	○	○		
	SAS(ENC) Cable (1 m)	3285194-A	DF-F850-SC1	○	○	○		
13	Controller Box	3285137-A/ 3285137-E(*3)	DF850-CBSS/ DF850-CBSSR(*3)	×	×	○	–	“2.2.13 Replacing a Controller Box” (REP 02-1840)
		3285128-A/ 3285128-E(*3)	DF850-CBSL/ DF850-CBSLR(*3)	×	×	○		
		3285176-A/ 3285176-E(*3)	DF850-CBL/ DF850-CBLR(*3)	×	×	○		
		3285176-A/ 3285176-E(*3)	DF850-CBLD	×	×	○		
14	Drive Box	3285141-A	DF850-DBS/ DF850-DBSD	×	×	○	–	“2.2.14 Replacing a Drive Box” (REP 02-1900)
		3285140-A	DF850-DBL/ DF850-DBLD	×	×	○		
		3285205-A	DF850-DBX	×	×	○		
		3285304-A	DF850-DBW	×	×	○		
		3286611-A	DF850-DBF	×	×	○		

*1 : The status definitions of the host and the array are as shown below.

- With I/O: Status that there is I/O from the host
- Without I/O: Status that there is no I/O from the host
- Online: Status of the array powering on
- Off-line: Status of the array powering off

*2 : This indicates a target of the time it takes from the beginning of the replacement procedure until confirming the recovery on the WEB Information when executing the online replacement (in the status where the power is turned on). However, it does not include the time for collecting the error information, unpacking the replaced parts and restoring the drives. For the target of the drive restoration time, refer to “2.2.1 (6) Confirming completion of data recovery or copy back” (REP 02-0370).

*3 : RoHS2 compliant parts.

No.	Part name	Part No.	Model	Status of the host/array(*1)			Replacement time (Unit: Minute) (*2)	Reference section
				With I/O	Without I/O			
				On line	On line	Off line		
15	Front Bezel (CBSL/CBSS/CBXSL/CBSXX)	3285062-B	–	○	○	○	–	“2.2.15 Replacing a Front Bezel” (REP 02-1980)
	Front Bezel (CBL)	3285163-A	–	○	○	○		
	Front Bezel (CBLD)	3285163-D	–	○	○	○		
	Front Bezel (DBL/DBS)	3285062-A	–	○	○	○		
	Front Bezel (DBLD/DBSD)	3285062-G	–	○	○	○		
	Front Bezel (DBX)	3285129-A	–	○	○	○		
	Front Bezel (DBF)	3286592-A	–	○	○	○		
16	Side Card-A	3285309-A	–	×	×	○	–	“2.2.16 Replacing a Side Card” (REP 02-2030)
	Side Card-B	3285308-A	–	×	×	○		

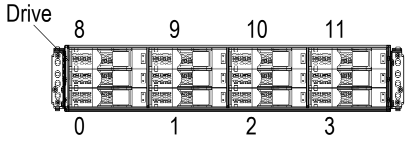
*1 : The status definitions of the host and the array are as shown below.
- With I/O: Status that there is I/O from the host
- Without I/O: Status that there is no I/O from the host
- Online: Status of the array powering on
- Off-line: Status of the array powering off

*2 : This indicates a target of the time it takes from the beginning of the replacement procedure until confirming the recovery on the WEB Information when executing the online replacement (in the status where the power is turned on). However, it does not include the time for collecting the error information, unpacking the replaced parts and restoring the drives. For the target of the drive restoration time, refer to “2.2.1 (6) Confirming completion of data recovery or copy back” (REP 02-0370).

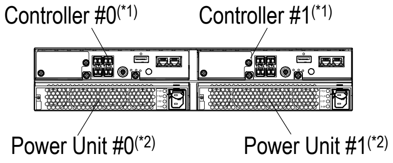
2.1.1 Parts Locations

(1) CBXSL

Front view



Rear view

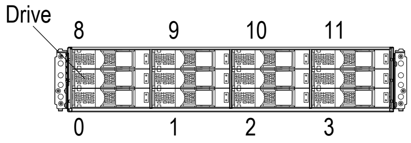


*1 : Cache Memory and Host I/O Board are installed in the Controller.

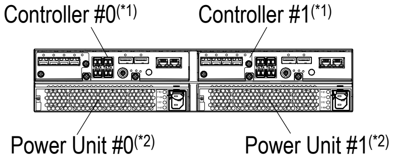
*2 : Cache Backup Battery is installed in the Controller.

(2) CBSL

Front view



Rear view

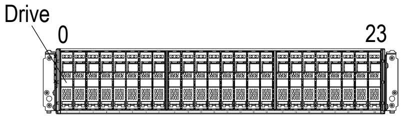


*1 : Cache Memory and Host I/O Board are installed in the Controller.

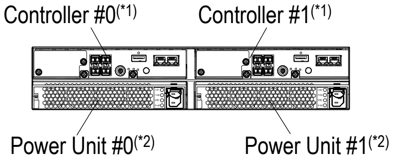
*2 : Cache Backup Battery is installed in the Controller.

(3) CBXSS

Front view



Rear view

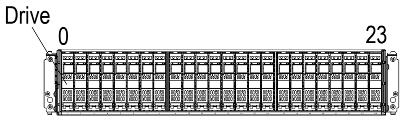


*1 : Cache Memory and Host I/O Board are installed in the Controller.

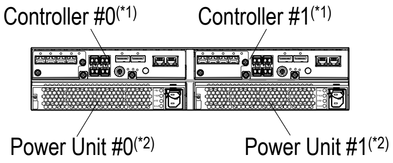
*2 : Cache Backup Battery is installed in the Controller.

(4) CBSS

Front view



Rear view

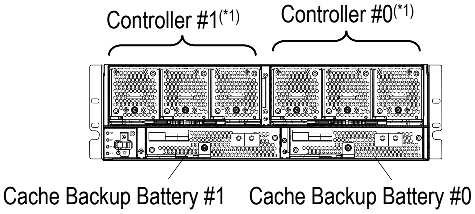


*1 : Cache Memory and Host I/O Board are installed in the Controller.

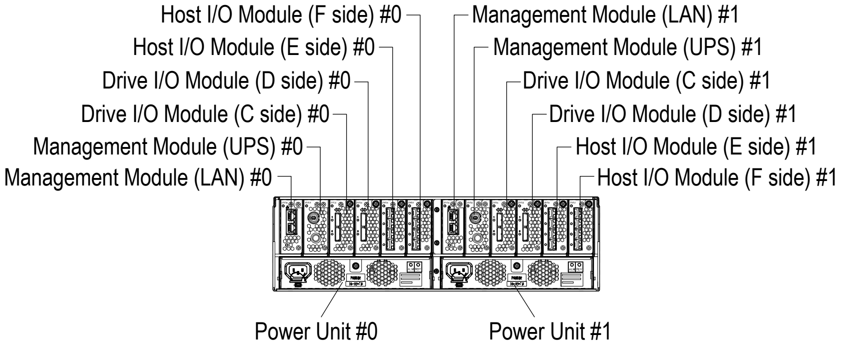
*2 : Cache Backup Battery is installed in the Controller.

(5) CBL/CBLD

Front view



Rear view

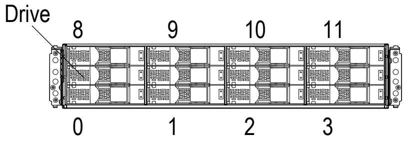

Host I/O Module (F side) #0
Host I/O Module (E side) #0
Drive I/O Module (D side) #0
Drive I/O Module (C side) #0
Management Module (UPS) #0
Management Module (LAN) #0
Management Module (LAN) #1
Management Module (UPS) #1
Drive I/O Module (C side) #1
Drive I/O Module (D side) #1
Host I/O Module (E side) #1
Host I/O Module (F side) #1
Power Unit #0
Power Unit #1

*1 : Three FANs for CBL are installed in the Controller.

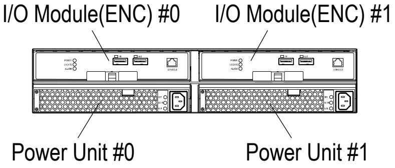
*2 : The figure shows the CBL.

(6) DBL/DBLD

Front view



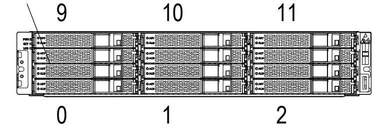
Rear view



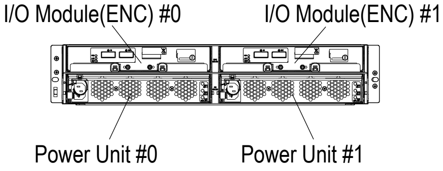
*1 : The figure shows the DBL.

(7) DBF

Front view

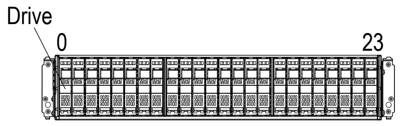


Rear view

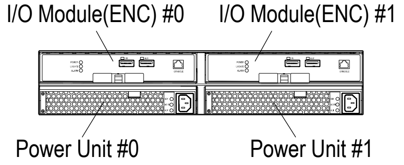


(8) DBS/DBSD

Front view



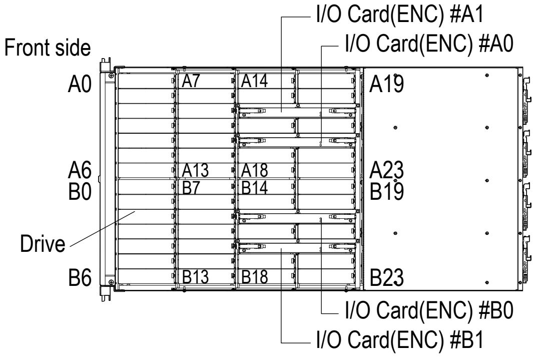
Rear view



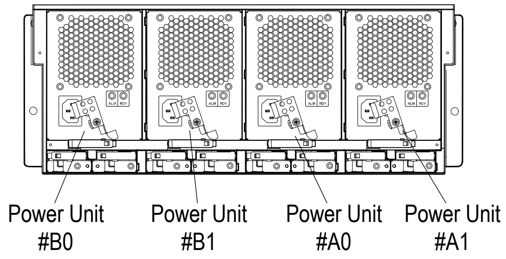
*1 : The figure shows the DBS.

(9) DBX

Top view

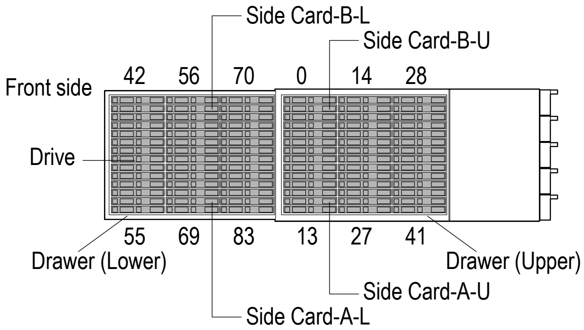


Rear view

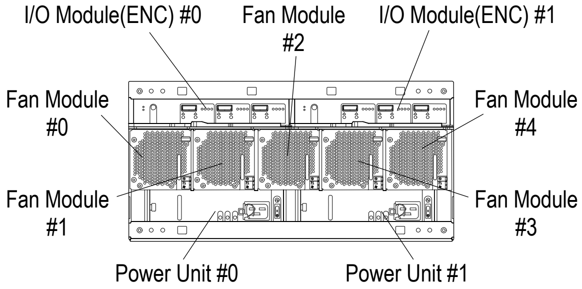


(10) DBW

Top view



Rear view



2.2 Components Replacement

For the installation locations, refer to "2.1 Locations of Replacement Components" (REP 02-0000).

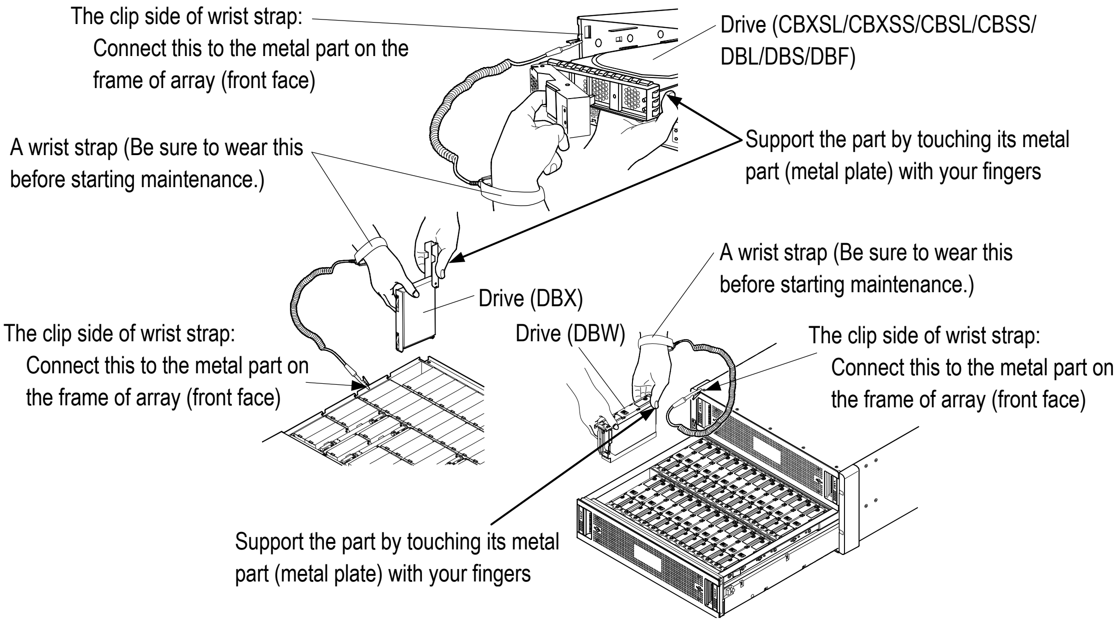
2.2.1 Replacing a Drive

⚠ CAUTION

- **Do not pull out multiple DBXs/DBWs at a time because the rack can fall over.**
- **Do not put objects on the DBX which has been pulled out of the rack or use it as working space because the rack can fall over.**
- **Do not put objects in the open drawer of the DBW or use it as working space because the rack can fall over.**

The replacement procedure for the Drive differs depending on the Spare Drive setting, RAID configuration, data recovery setting mode, or the Spare Drive Operation Mode (‡1) (variable or fixed). Check the array status, and then perform the replacement according to the following procedure.
A failure may be caused by the electric shock since Drives are precision instrument. Be sure to put on the wrist strap before starting work in order to protect Drive from electrostatic discharge.

NOTE : Before unpacking and replacing maintenance components, be sure to wear a wrist strap and connect to ground the grounding clip in the opposite end of the wrist strap to the chassis frame (metal part).
When you insert a Drive into the array, support the Drive as touching its metal part with fingers of your hand that wears a wrist strap.


The clip side of wrist strap:
Connect this to the metal part on the frame of array (front face)
Drive (CBXSL/CBXSS/CBSL/CBSS/DBL/DBS/DBF)
A wrist strap (Be sure to wear this before starting maintenance.)
Support the part by touching its metal part (metal plate) with your fingers
A wrist strap (Be sure to wear this before starting maintenance.)
Drive (DBX)
Drive (DBW)
The clip side of wrist strap:
Connect this to the metal part on the frame of array (front face)
The clip side of wrist strap:
Connect this to the metal part on the frame of array (front face)
Support the part by touching its metal part (metal plate) with your fingers

---

‡1 : Spare Drive Operation Mode : Set whether to make the Copy backless function enable or disable. (Refer to Introduction "3.6 (3) Operation after replacing the failed Drive" (INTR 03-0350).)

NOTE :
- When replacing a Drive for DBX/DBW, check that the stabilizer is installed in the front side of the rack.
  If the stabilizer is not installed, install the stabilizer in the rack. (Refer to Installation “2.2.1 (7) Installing the stabilizer” (INST 02-0150).)
- When pulling out or storing the DBX, perform it for only one DBX at a time slowly and surely. (Refer to Installation “1.4.1 (3) In the case of DBX. (a) How to pull the DBX out of the rack frame” (INST 01-0190) or “1.4.1 (3) In the case of DBX. (b) How to store the DBX in the rack frame.” (INST 01-0200).)
- When pulling out or putting a drawer of DBW back, perform it for only one drawer at a time slowly and surely. (Refer to Installation “1.4.1 (4 In the case of DBW. (a) How to open a drawer of DBW out” (INST 01-0201) or “1.4.1 (4) In the case of DBW. (b) How to close a drawer of DBW.” (INST 01-0202).)

(1) Locations and numbers of Drives

(1-1) For CBXSL/CBSL/DBL

The Drive numbering in an array is #0 to #11 from the lower left to the upper right viewed from the front side of the array.

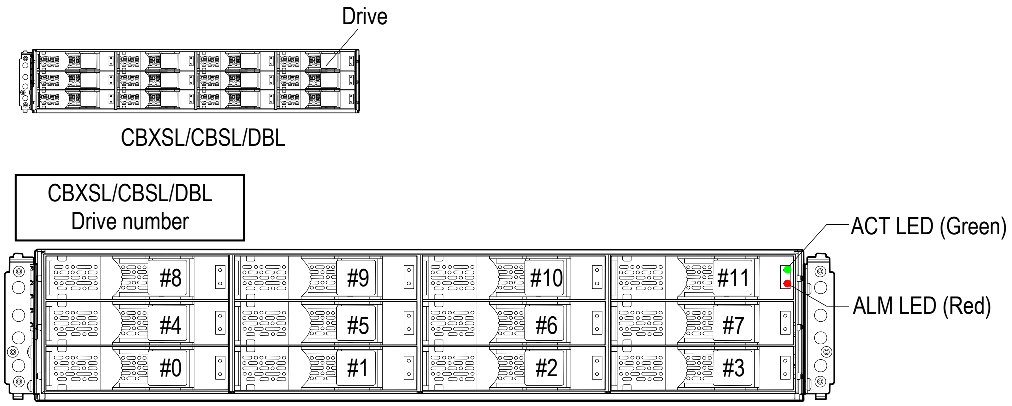


Figure 2.2.1 Drive Installing Location (CBXSL/CBSL/DBL)

(1-2) For DBF

The Drive numbering in an array is #0 to #11 from the lower left to the upper right viewed from the front side of the array.

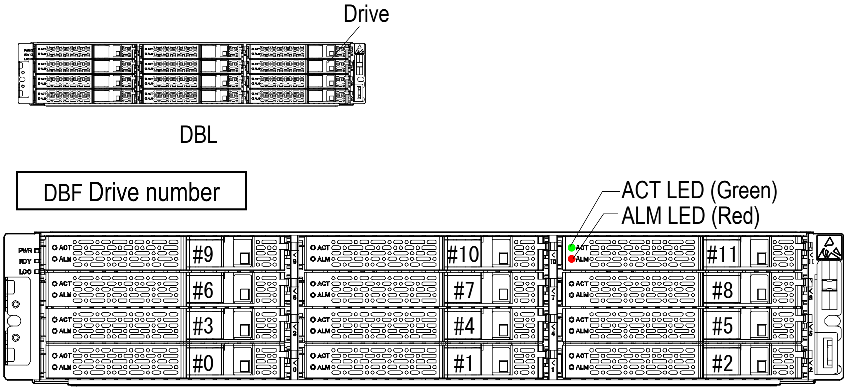


Figure 2.2.1.1 Drive Installing Location (DBF)

(1-3) For CBXSS/CBSS/DBS

The Drive numbering in an array is #0 to #23 from the left to the right viewed from the front side of the array.

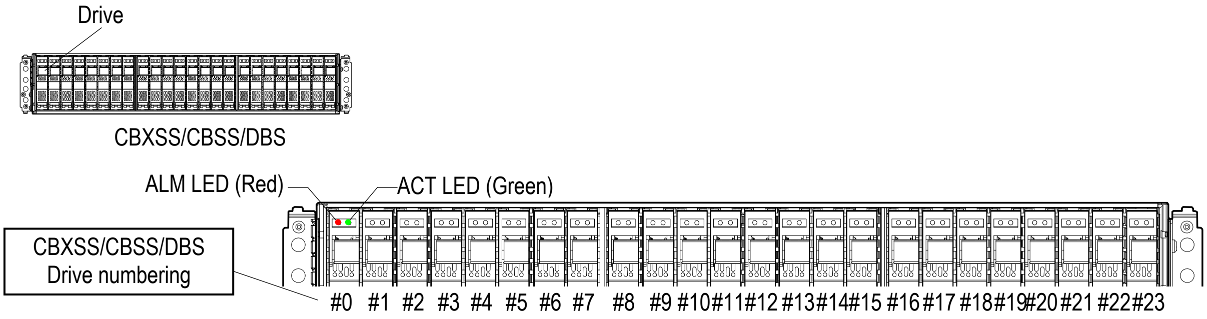
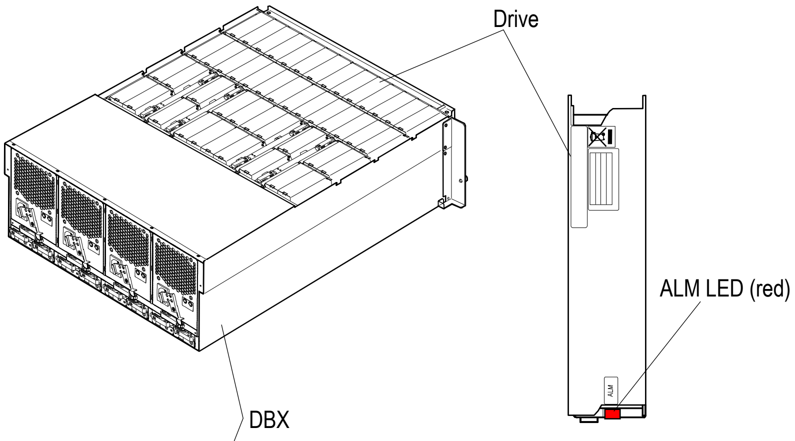


Figure 2.2.2 Drive Installing Location (CBXSS/CBSS/DBS)

(1-4) For DBX

The Drive numbering in an array is #A0 to #A23, #B0 to #B23 viewed from the top side of the array.

Drive installing location



Drive numbering

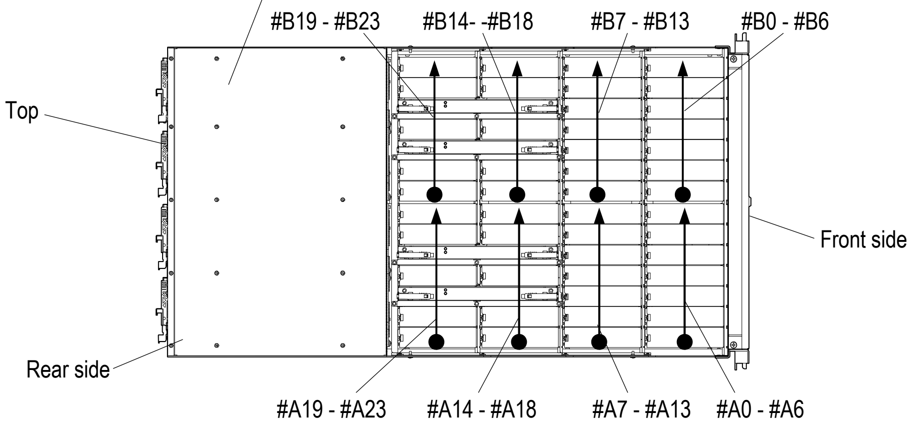


Figure 2.2.3 Drive Installing Location (DBX)

(1-5) For DBW

The Drive numbering is #0 to #41 from the front side of the upper drawer and #42 to #83 from the front side of the lower drawer.

Drive installation location

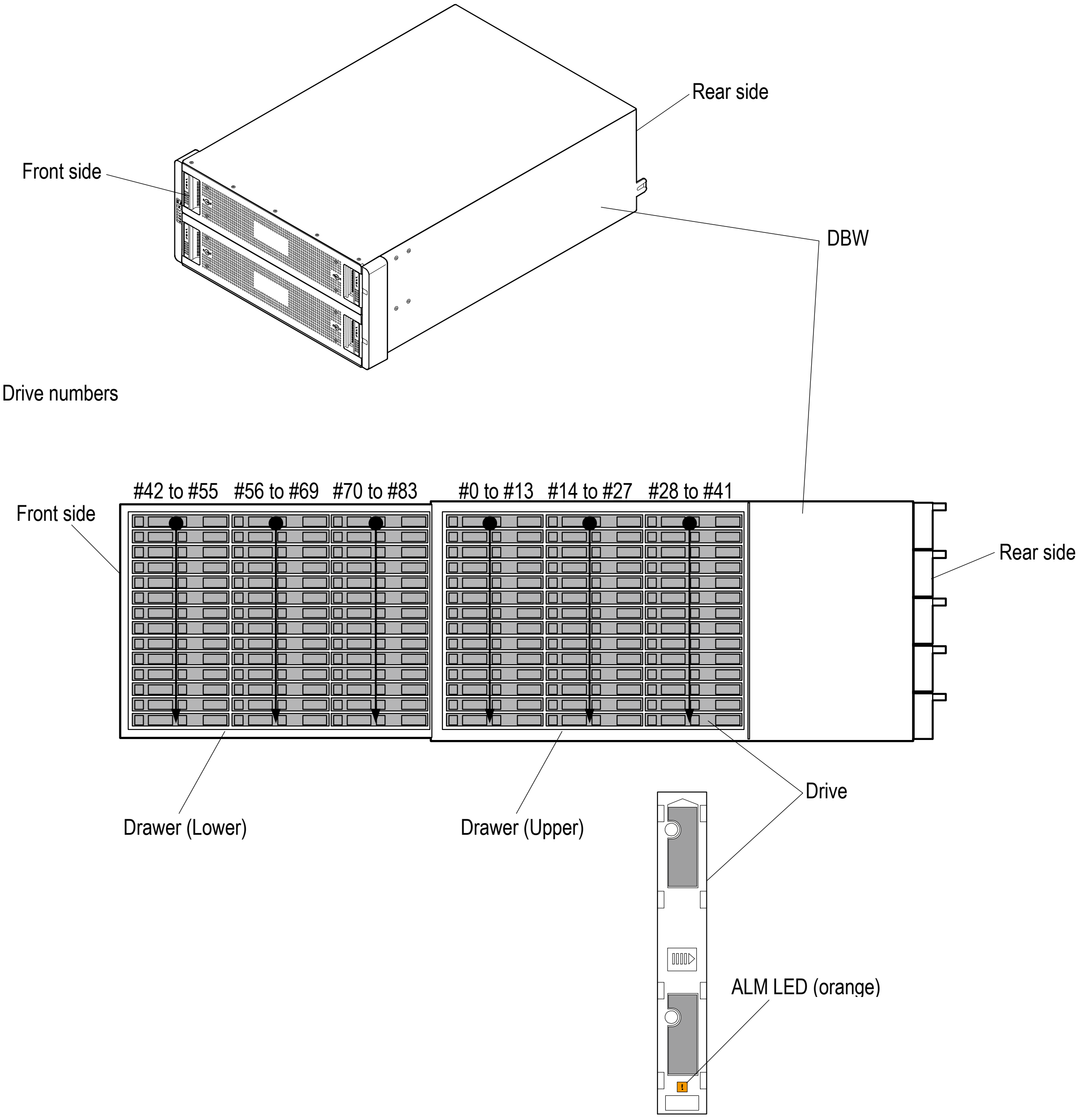


Figure 2.2.3.1 Drive Installing Location (DBW)

(2) Replacing a Drive

NOTICE

- **To prevent part failures caused by static electrical charge built up on your own body, be sure to wear a wrist strap connected to the chassis before starting and do not take it off until you finish.**
- **Be sure to wear a wrist strap connected to the chassis whenever you unpack parts from a case. Otherwise, the static electrical charge on your body may damage the parts.**
- **Drives are precision components.**
  Be careful not to expose drives to hard shock.
- **When you install a Drive, support its metal part with your hand that has the wrist strap. You can discharge static electricity by touching the metal plate.**
- **For the system Drives (The Drives #0 to #4 of the CBXSL/CBXSS/CBSL/CBSS, or the Drives #0 to #4 of the DBL/DBS/DBF/DBW or the Drive #A0 to #A4 of the DBX corresponding to the unit ID#0 connected to the CBL) regardless of the data drives, the Spare Drives and the Drives which do not configure the RAID group, do not remove the Drives #0 to #4 at the same time with the array power turned on.**
  If removed, the array may go down.

NOTE : Please execute the maintenance work according to the instruction when an abnormal device and another trouble message have been generated during the diagnosis and after the completion of the diagnosis.

Select a procedure from the following and execute it.

No.	Power status during the replacement	Restrictions	RAID level		Reference section
1	Replacement with the power turned on (hot replacement)	1. Replaceable only while power is on 2. Complete the replacement within ten minutes(*3) (for DBW, five minutes(*3)). Otherwise, a powering off may occur because of an abnormal temperature rise. Perform the part replacement in haste. 3. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 4. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box usually goes out about 30 seconds later. 5. When using Tray Power Saving, check that the DBW to replace the drives is not in the power saving status, and then replace it. ([Tray Power Saving Status] on the table of [Energy Saving] – [Tray Power Saving] of Hitachi Storage Navigator Modular 2 is "Normal")	The Spare Drive is set	RAID 0(*1) RAID 1, RAID 5, RAID 6, and RAID 1+0	When the ALM LED (red) on the Drive to be replaced is on. See "(a-1) When the ALM LED (red) on the Drive to be replaced is on." (REP 02-0100). When the ALM LED (red) on the Drive to be replaced is off. See "(a-2) When the ALM LED (red) on the Drive to be replaced is off." (REP 02-0190).
			The Spare Drive is not set or there is no Spare Drive that can be used	RAID 0(*2)	See "(b-3) Replacement of Drive under RAID 0 configuration" (REP 02-0260).
				RAID 1, RAID 5, RAID 6, and RAID 1+0	When the ALM LED (red) on the Drive to be replaced is on. See "(b-1) Replacing Drive in RAID 1, 5, 6, or 1+0 configuration (When the ALM LED (red) is on)" (REP 02-0200). When the ALM LED (red) on the Drive to be replaced is off. See "(b-2) Replacing a Drive in the RAID 1, 5, 6, or RAID 1+0 configuration (when the ALM LED (red) is off)" (REP 02-0250).
2	Replacement with the power turned off	Not applicable			—

*1 : Be sure to backup the user data before replacing a Drive in RAID 0 configuration. When the set RAID group and Volume are deleted or formatted, related user data will be lost.
(A backing up and restoration of user data are operations to be performed by users.)

*2 : You can replace the Drive using the procedure (a) for the case of RAID 0 with a Spare Drive only when the data migration to the Spare Drive by means of the dynamic sparing has terminated normally.
When the data migration to the Spare Drive has failed, replace the Drive using the procedure (b-2) for the case of RAID 0 without Spare Drive.

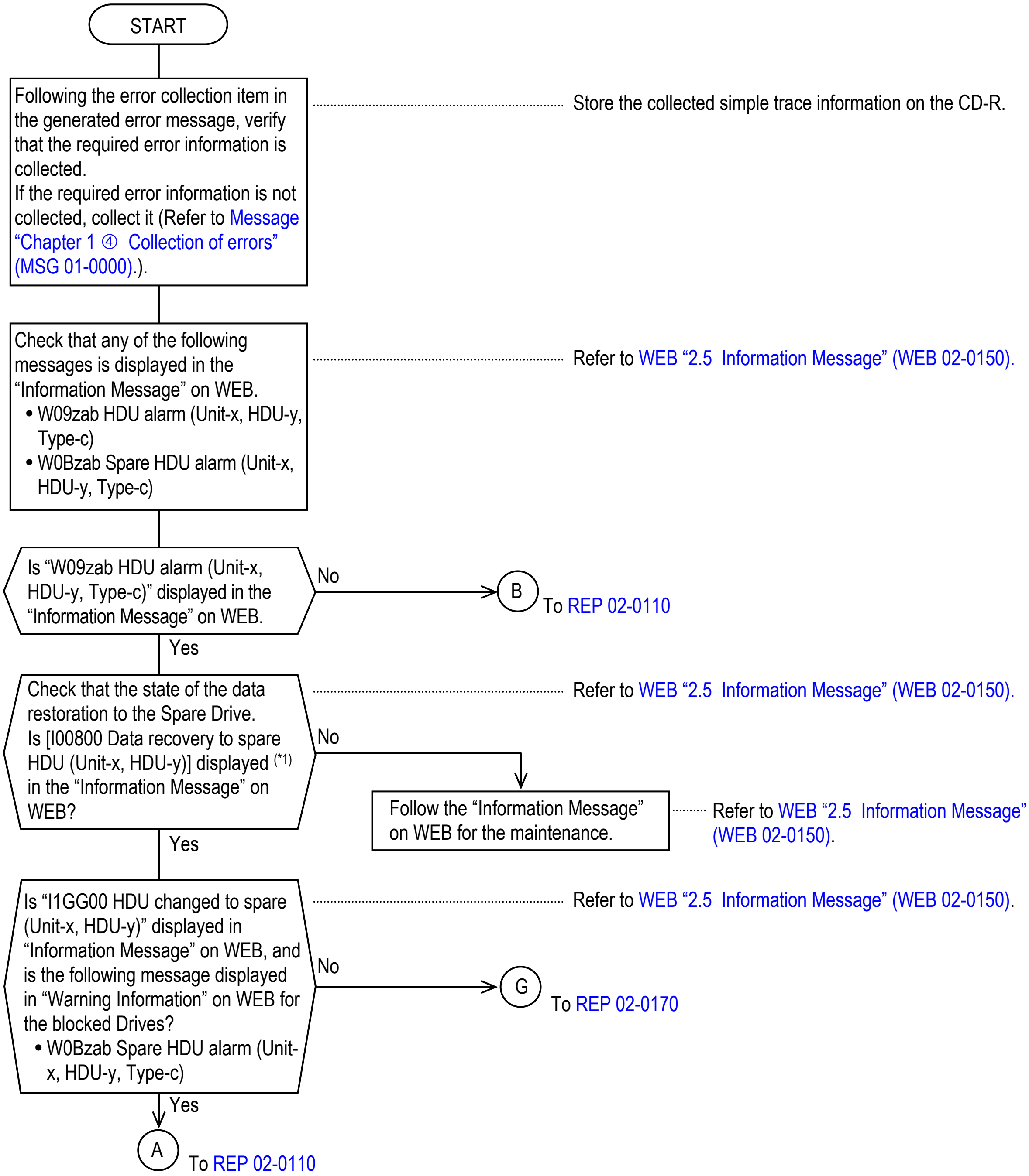
*3 : It's the time it takes to replace part itself.
This time does not include the time needed to perform the operation other than replacement.

If no Spare Drive is provided, go to (b).

(a) The Spare Drive is set

(a-1) When the ALARM (red) LED on the Drive to be replaced is on.

NOTE : When there are two or more Drives to be replaced and both Data Drive and Spare Drive are included in them, replace from the Data Drives.



Following the error collection item in the generated error message, verify that the required error information is collected. If the required error information is not collected, collect it (Refer to Message "Chapter 1 ④ Collection of errors" (MSG 01-0000).).

Store the collected simple trace information on the CD-R.

Check that any of the following messages is displayed in the "Information Message" on WEB.

- W09zab HDU alarm (Unit-x, HDU-y, Type-c)
- W0Bzab Spare HDU alarm (Unit-x, HDU-y, Type-c)

Refer to WEB "2.5 Information Message" (WEB 02-0150).

Is "W09zab HDU alarm (Unit-x, HDU-y, Type-c)" displayed in the "Information Message" on WEB.

To REP 02-0110

Check that the state of the data restoration to the Spare Drive. Is [I00800 Data recovery to spare HDU (Unit-x, HDU-y)] displayed (*1) in the "Information Message" on WEB?

Refer to WEB "2.5 Information Message" (WEB 02-0150).

Follow the "Information Message" on WEB for the maintenance.

Refer to WEB "2.5 Information Message" (WEB 02-0150).

Is "I1GG00 HDU changed to spare (Unit-x, HDU-y)" displayed in "Information Message" on WEB, and is the following message displayed in "Warning Information" on WEB for the blocked Drives?

- W0Bzab Spare HDU alarm (Unit-x, HDU-y, Type-c)

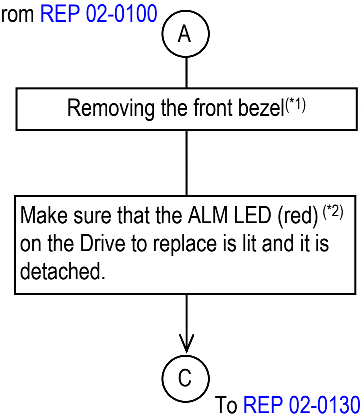
Refer to WEB "2.5 Information Message" (WEB 02-0150).

To REP 02-0170

To REP 02-0110

*1 : It will take time until this message is displayed. Refer to "(6) Confirming completion of data recovery or copy back" (REP 02-0370) for the standard of the time required.

From REP 02-0100


A
Removing the front bezel(*1)
Make sure that the ALM LED (red) (*2) on the Drive to replace is lit and it is detached.
C

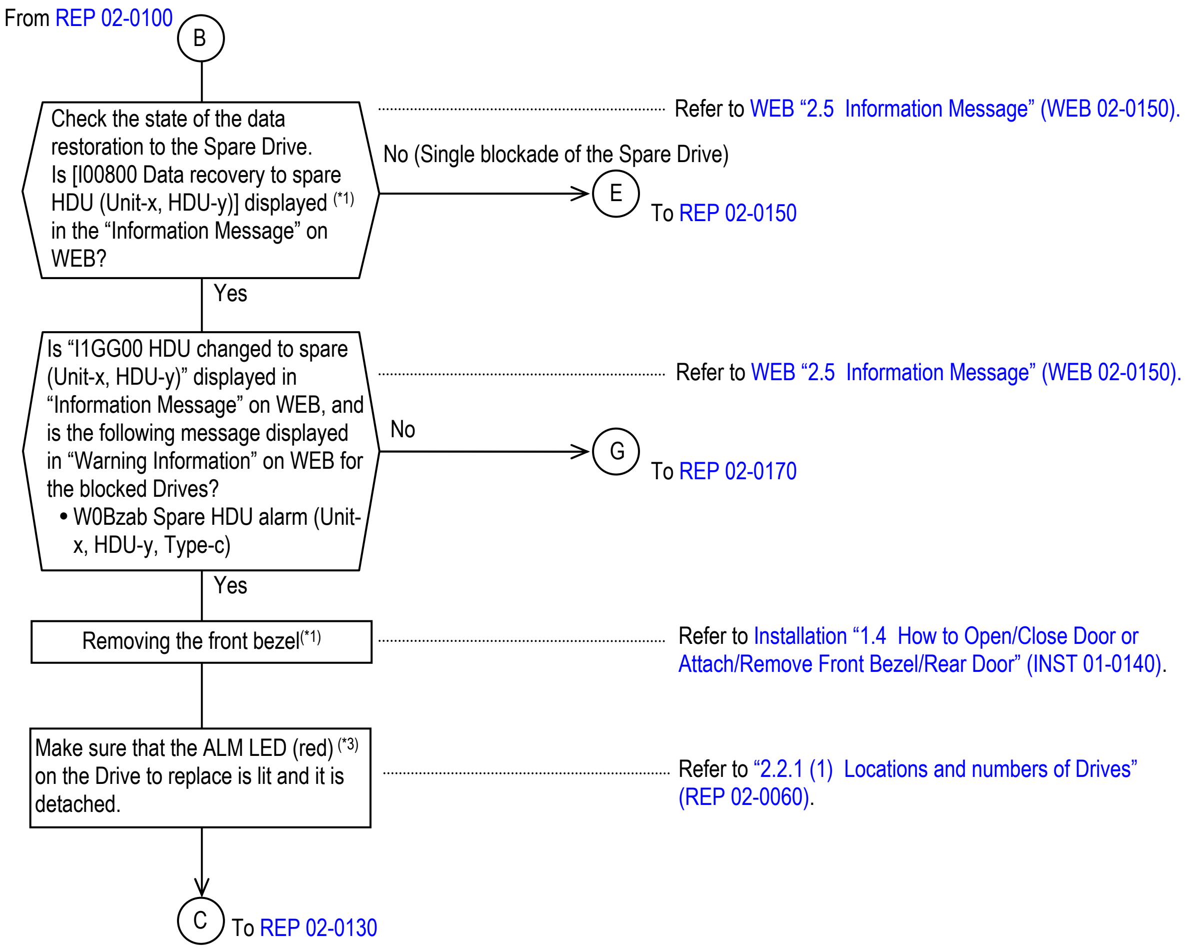
Refer to Installation “1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door” (INST 01-0140).

Refer to “2.2.1 (1) Locations and numbers of Drives” (REP 02- 0060).

To REP 02-0130

*1 : For the DBX, remove the front bezel, pull the array out of the rack, and remove the top cover.
For the DBW, the front bezel does not need to be removed. Pull the drawer out of the array.

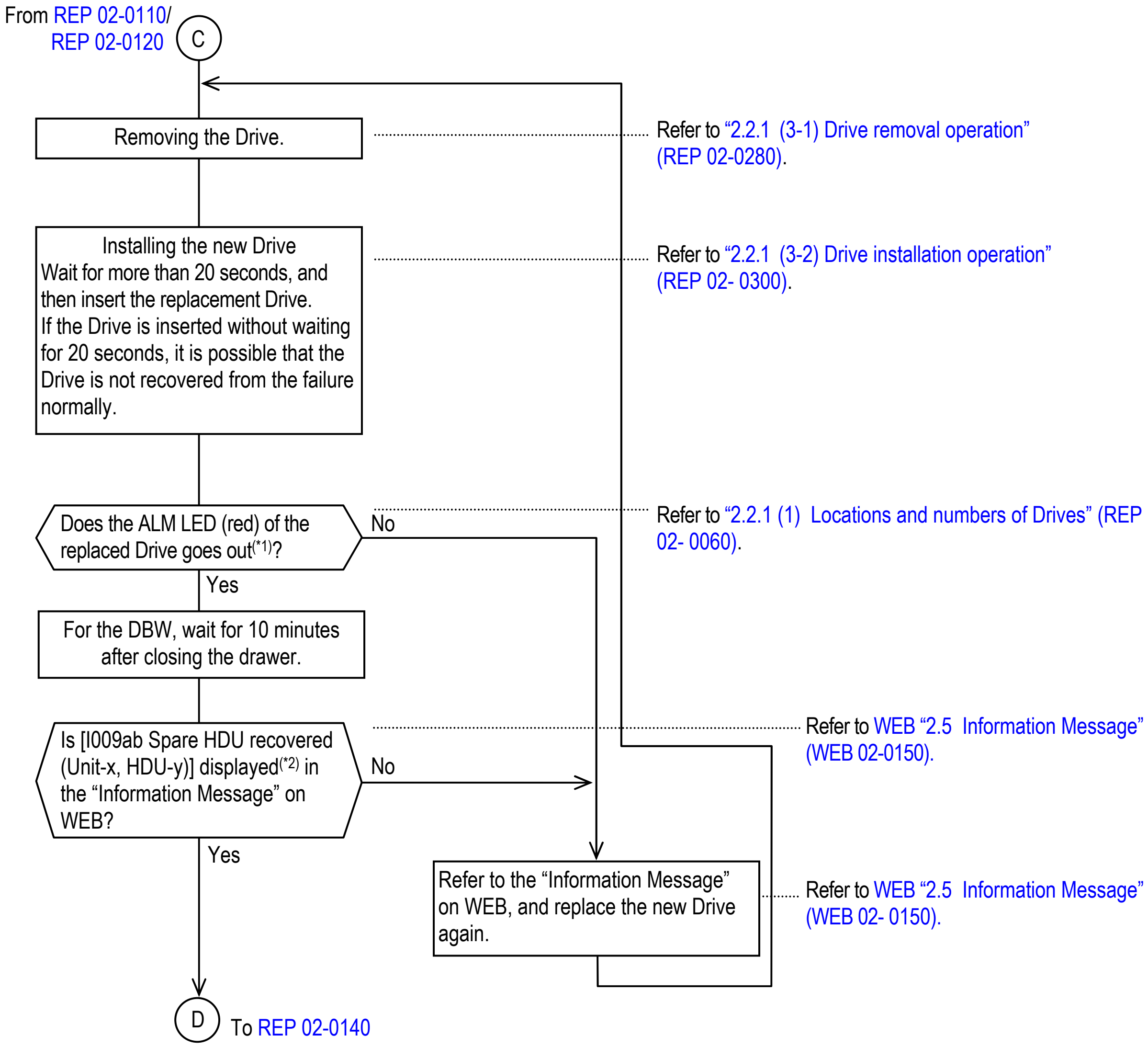
*2 : For the DBW, ALM LED is orange.


From REP 02-0100
B
Check the state of the data restoration to the Spare Drive. Is [I00800 Data recovery to spare HDU (Unit-x, HDU-y)] displayed (*1) in the "Information Message" on WEB?
Refer to WEB "2.5 Information Message" (WEB 02-0150).
No (Single blockade of the Spare Drive)
E
To REP 02-0150
Yes
Is "I1GG00 HDU changed to spare (Unit-x, HDU-y)" displayed in "Information Message" on WEB, and is the following message displayed in "Warning Information" on WEB for the blocked Drives?
• W0Bzab Spare HDU alarm (Unit-x, HDU-y, Type-c)
Refer to WEB "2.5 Information Message" (WEB 02-0150).
No
G
To REP 02-0170
Yes
Removing the front bezel(*1)
Refer to Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door" (INST 01-0140).
Make sure that the ALM LED (red) (*3) on the Drive to replace is lit and it is detached.
Refer to "2.2.1 (1) Locations and numbers of Drives" (REP 02-0060).
C
To REP 02-0130

*1 : It will take time until this message is displayed. Refer to "(6) Confirming completion of data recovery or copy back" (REP 02-0370) for the standard of the time required.

*2 : For the DBX, remove the front bezel, pull the array out of the rack, and remove the top cover.
For the DBW, the front bezel does not need to be removed. Pull the drawer out of the array.

*3 : For the DBW, ALM LED is orange.



From REP 02-0110/ REP 02-0120

Removing the Drive.

Refer to "2.2.1 (3-1) Drive removal operation" (REP 02-0280).

Installing the new Drive
Wait for more than 20 seconds, and then insert the replacement Drive.
If the Drive is inserted without waiting for 20 seconds, it is possible that the Drive is not recovered from the failure normally.

Refer to "2.2.1 (3-2) Drive installation operation" (REP 02- 0300).

Does the ALM LED (red) of the replaced Drive goes out[*1]?

Refer to "2.2.1 (1) Locations and numbers of Drives" (REP 02- 0060).

For the DBW, wait for 10 minutes after closing the drawer.

Is [I009ab Spare HDU recovered (Unit-x, HDU-y)] displayed[*2] in the "Information Message" on WEB?

Refer to WEB "2.5 Information Message" (WEB 02-0150).

Refer to the "Information Message" on WEB, and replace the new Drive again.

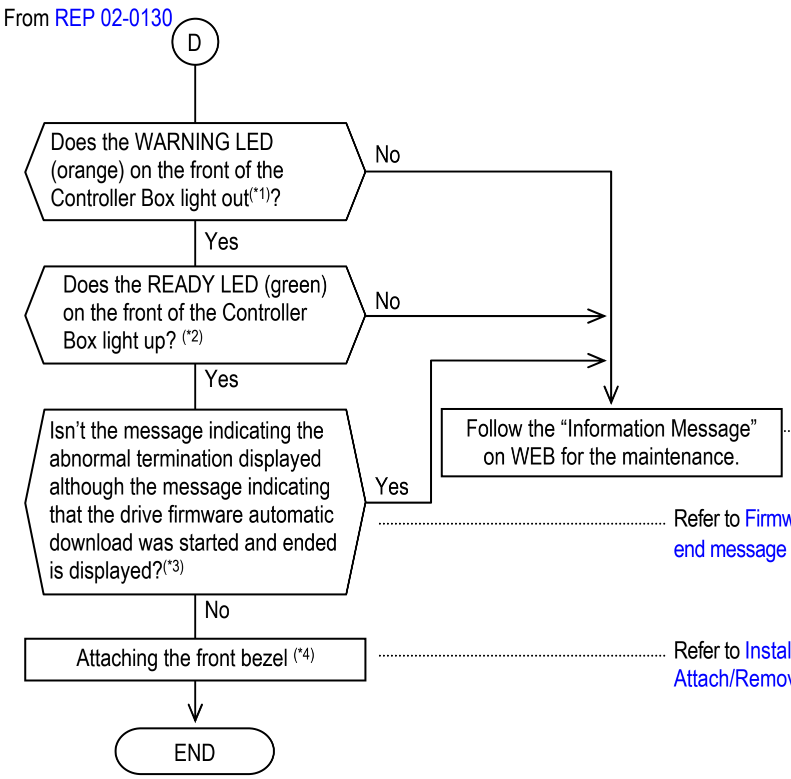
Refer to WEB "2.5 Information Message" (WEB 02- 0150).

To REP 02-0140

*1: For the DBW, make sure that the ALM LED (orange) is off.
The ALM LED (red) or the ALM LED (orange) of the Drive goes out within about five minutes after the Drive is inserted.
When the ALM LED (red) or the ALM LED (orange) is not turned off, remove the inserted Drive from the chassis, and insert it again after 20 seconds or more passed.
However, in the following cases, the ALM LED (red) or the ALM LED (orange) may not go out. After taking the action according to each case, check that the ALM LED (red) or the ALM LED (orange) is turned off.

- When the Controller is blocked during the Drive recovery, replace the blocked Controller and then check that the Controller has recovered.

*2 : This message is displayed within about five minutes after the ALM LED (red) or the ALM LED (orange) of the Drive goes out.


From REP 02-0130
D
Does the WARNING LED (orange) on the front of the Controller Box light out(*1)?
No
Yes
Does the READY LED (green) on the front of the Controller Box light up? (*2)
No
Yes
Isn't the message indicating the abnormal termination displayed although the message indicating that the drive firmware automatic download was started and ended is displayed?(*3)
Yes
No
Follow the "Information Message" on WEB for the maintenance.
Attaching the front bezel (*4)
END

Refer to WEB "2.5 Information Message" (WEB 02- 0150).

Refer to Firmware "1.6 (4) Checking the start message and end message of the automatic download" (FIRM 01-1620).

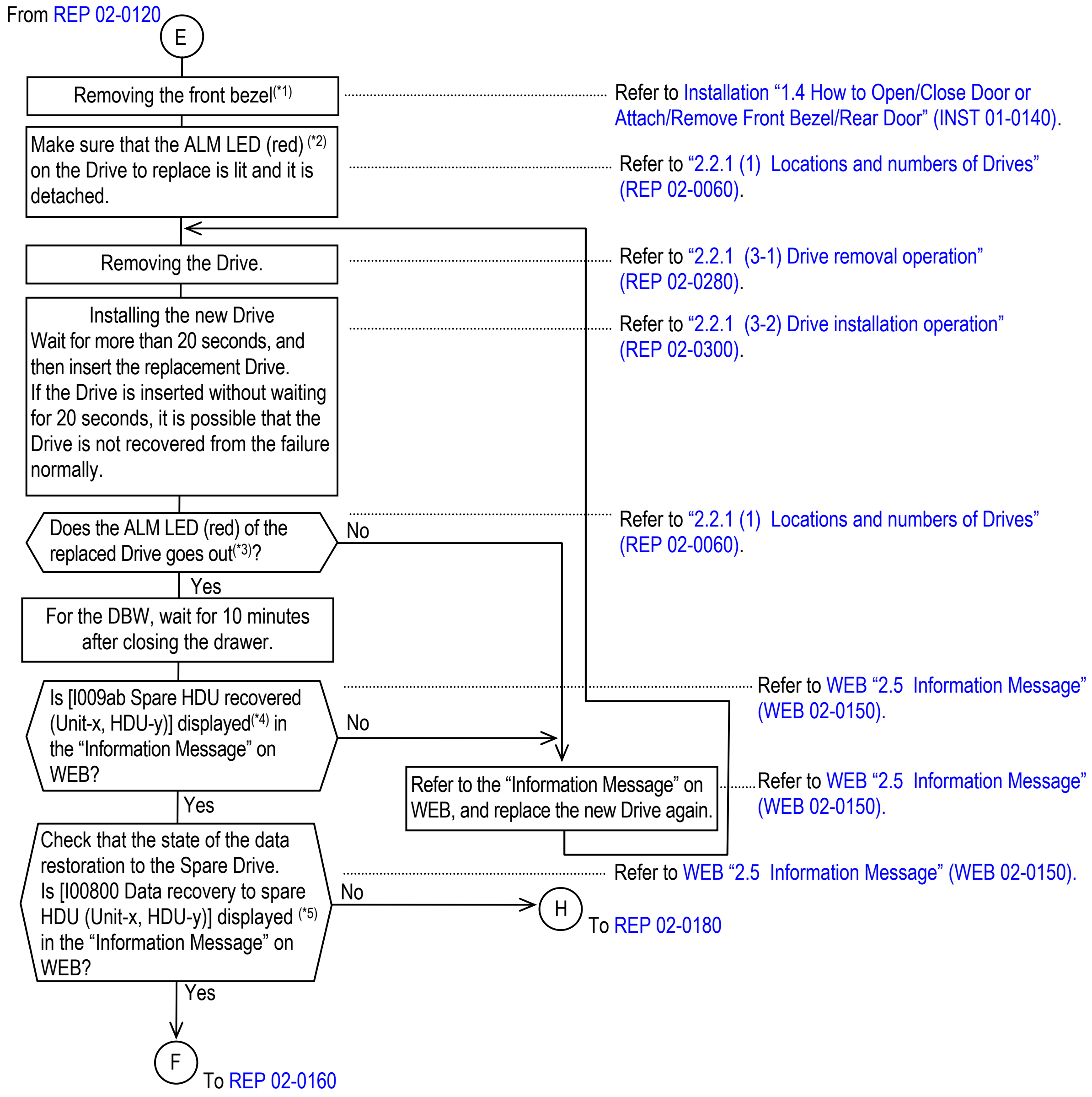
Refer to Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door" (INST 01-0140).

*1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

*2 : Wait if 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).

*3 : When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed.

*4 : For the DBX, attach the top cover, store the array in the rack, and then attach the front bezel.
For the DBW, put the drawer back in the array. The front bezel does not need to be attached.


From REP 02-0120
E
Removing the front bezel(*1)
Refer to Installation “1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door” (INST 01-0140).
Make sure that the ALM LED (red) (*2) on the Drive to replace is lit and it is detached.
Refer to “2.2.1 (1) Locations and numbers of Drives” (REP 02-0060).
Removing the Drive.
Refer to “2.2.1 (3-1) Drive removal operation” (REP 02-0280).
Installing the new Drive
Wait for more than 20 seconds, and then insert the replacement Drive.
If the Drive is inserted without waiting for 20 seconds, it is possible that the Drive is not recovered from the failure normally.
Refer to “2.2.1 (3-2) Drive installation operation” (REP 02-0300).
Does the ALM LED (red) of the replaced Drive goes out(*3)?
No
Refer to “2.2.1 (1) Locations and numbers of Drives” (REP 02-0060).
Yes
For the DBW, wait for 10 minutes after closing the drawer.
Is [I009ab Spare HDU recovered (Unit-x, HDU-y)] displayed(*4) in the “Information Message” on WEB?
No
Refer to WEB “2.5 Information Message” (WEB 02-0150).
Refer to the “Information Message” on WEB, and replace the new Drive again.
Refer to WEB “2.5 Information Message” (WEB 02-0150).
Yes
Check that the state of the data restoration to the Spare Drive.
Is [I00800 Data recovery to spare HDU (Unit-x, HDU-y)] displayed (*5) in the “Information Message” on WEB?
No
Refer to WEB “2.5 Information Message” (WEB 02-0150).
H
To REP 02-0180
Yes
F
To REP 02-0160

*1 : For the DBX, remove the front bezel, pull the array out of the rack, and remove the top cover.
For the DBW, the front bezel does not need to be removed. Pull the drawer out of the array.

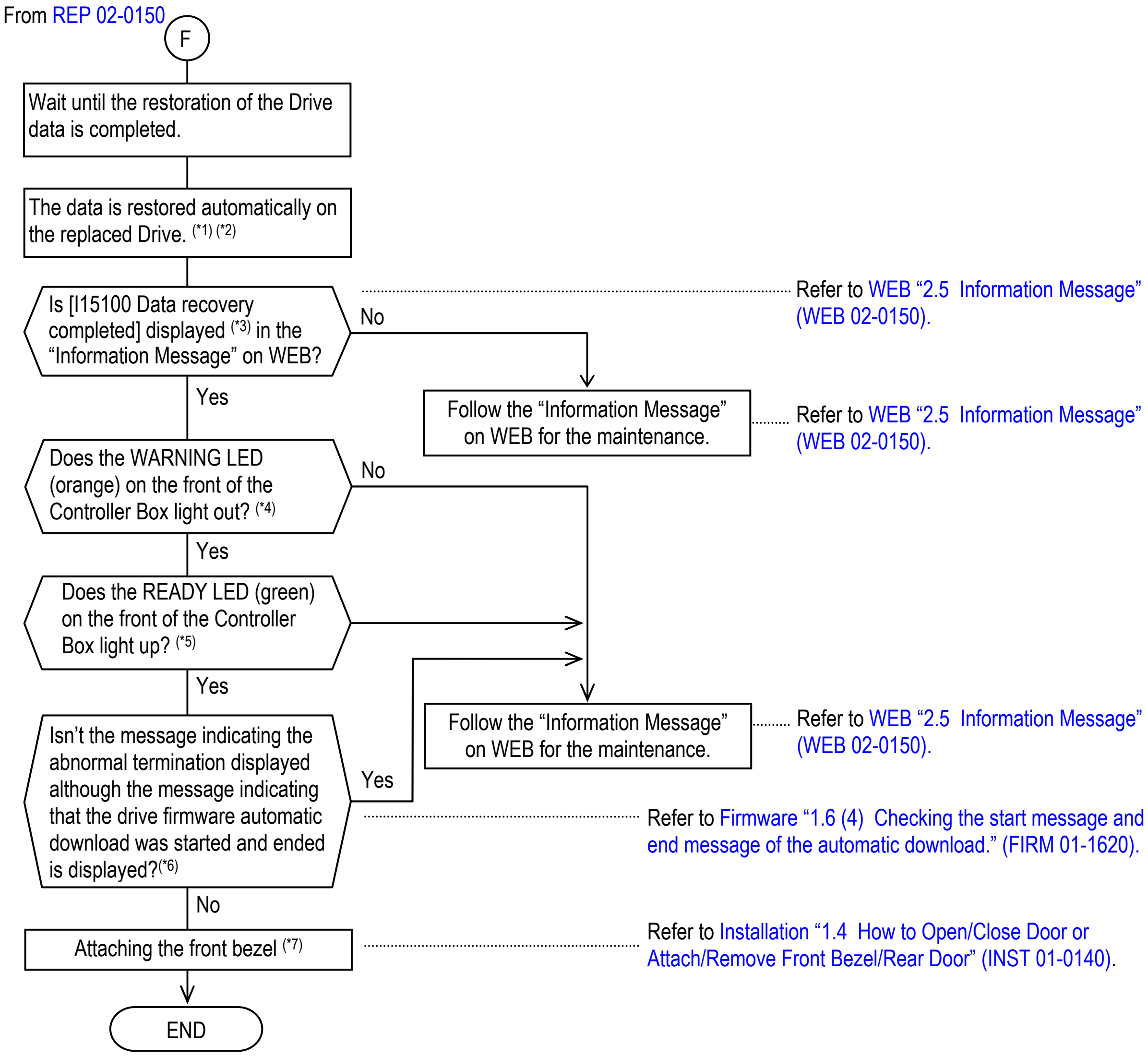
*2 : For the DBW, ALM LED is orange.

*3 : For the DBW, make sure that the ALM LED (orange) is off.
The ALM LED (red) or the ALM LED (orange) of the Drive lights off within about five minutes after the Drive is inserted.
When the ALM LED (red) or the ALM LED (orange) is not turned off, remove the inserted Drive from the chassis, and insert it again after 20 seconds or more passed.
However, in the following cases, the ALM LED (red) or the ALM LED (orange) may not go out. After taking the action according to each case, check that the ALM LED (red) or the ALM LED (orange) is turned off.

- When the Controller is blocked during the Drive recovery, replace the blocked Controller and then check that the Controller has recovered.

*4 : This message is displayed within about five minutes after the ALM LED (red) or the ALM LED (orange) of the Drive lights off.

*5 : It will take time until this message is displayed. Refer to “(6) Confirming completion of data recovery or copy back” (REP 02-0370) for the standard of the time required.


From REP 02-0150
F
Wait until the restoration of the Drive data is completed.
The data is restored automatically on the replaced Drive. (*1) (*2)
Is [I15100 Data recovery completed] displayed (*3) in the “Information Message” on WEB?
No
Yes
Follow the “Information Message” on WEB for the maintenance.
Does the WARNING LED (orange) on the front of the Controller Box light out? (*4)
No
Yes
Does the READY LED (green) on the front of the Controller Box light up? (*5)
Yes
Follow the “Information Message” on WEB for the maintenance.
Isn’t the message indicating the abnormal termination displayed although the message indicating that the drive firmware automatic download was started and ended is displayed?(*6)
Yes
No
Attaching the front bezel (*7)
END

Refer to WEB “2.5 Information Message” (WEB 02-0150).

Refer to WEB “2.5 Information Message” (WEB 02-0150).

Refer to WEB “2.5 Information Message” (WEB 02-0150).

Refer to Firmware “1.6 (4) Checking the start message and end message of the automatic download.” (FIRM 01-1620).

Refer to Installation “1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door” (INST 01-0140).

*1 : In case of it is set to automatic recovery mode. However, the copy back does not operate until completing the RAID group expansion in case of the Drive during the RAID group expansion. The copy back starts automatically after completing the RAID group expansion.

*2 : Open the Unit screen in the Storage Navigator Modular 2. Double click the Drive under recovery procedure (indicated in yellow) in the Component Status Tag, then the progress of data recovery can be checked. (For detail, refer to System Parameter “4.5 Checking the Status of Drive” (SYSPR 04-0680).)

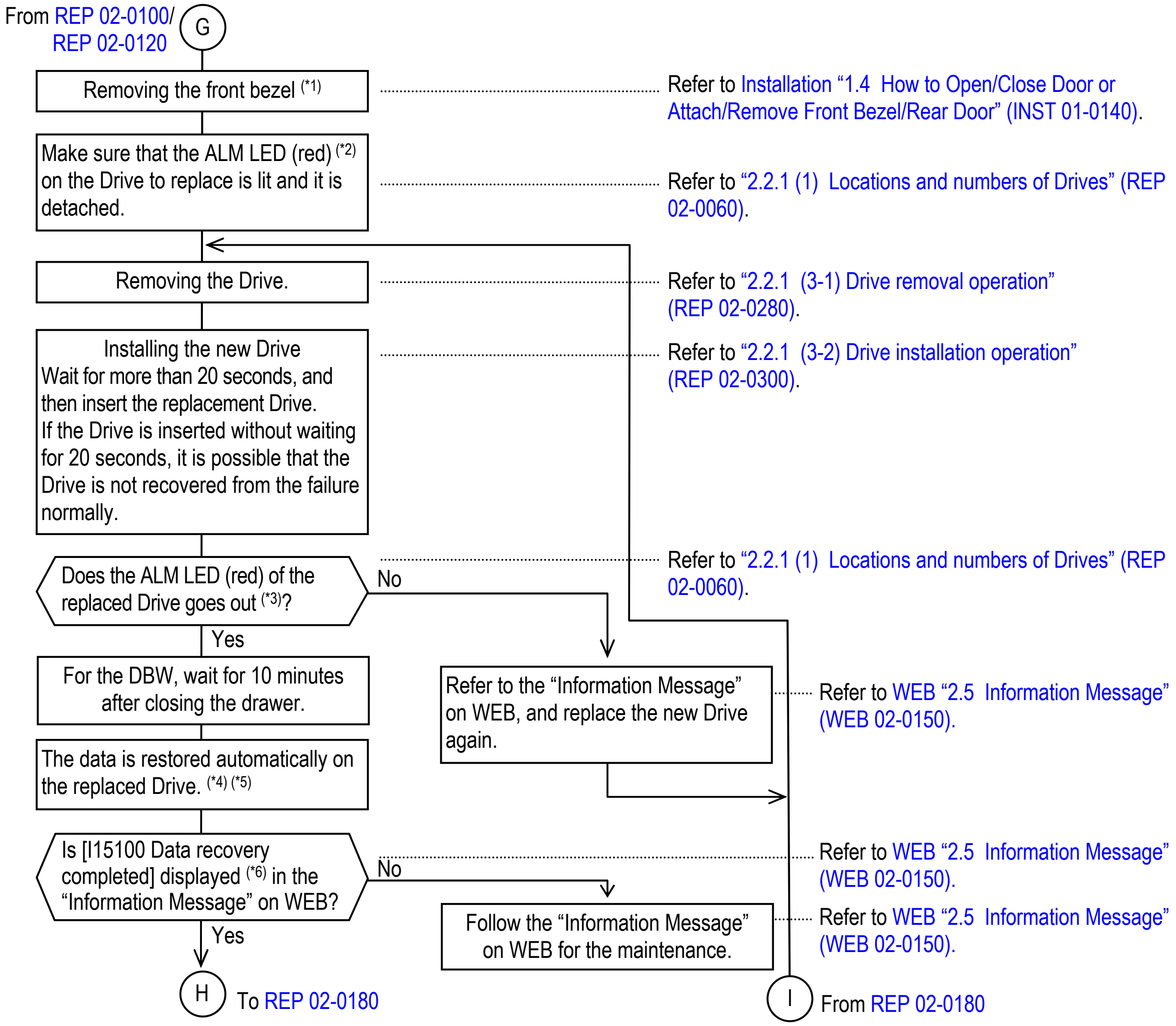
*3 : It will take time until this message is displayed. Refer to “(6) Confirming completion of data recovery or copy back” (REP 02-0370) for the standard of the time required.

*4 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

*5 : Wait if 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)).

*6 : When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed.

*7 : For the DBX, attach the top cover, store the array in the rack, and then attach the front bezel.
For the DBW, put the drawer back in the array. The front bezel does not need to be attached.



From REP 02-0100/ REP 02-0120

G

Removing the front bezel (*1)

Refer to Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door" (INST 01-0140).

Make sure that the ALM LED (red) (*2) on the Drive to replace is lit and it is detached.

Refer to "2.2.1 (1) Locations and numbers of Drives" (REP 02-0060).

Removing the Drive.

Refer to "2.2.1 (3-1) Drive removal operation" (REP 02-0280).

Installing the new Drive
Wait for more than 20 seconds, and then insert the replacement Drive.
If the Drive is inserted without waiting for 20 seconds, it is possible that the Drive is not recovered from the failure normally.

Refer to "2.2.1 (3-2) Drive installation operation" (REP 02-0300).

Does the ALM LED (red) of the replaced Drive goes out (*3)?

Refer to "2.2.1 (1) Locations and numbers of Drives" (REP 02-0060).

No: Refer to the "Information Message" on WEB, and replace the new Drive again.

Refer to WEB "2.5 Information Message" (WEB 02-0150).

Yes: For the DBW, wait for 10 minutes after closing the drawer.

The data is restored automatically on the replaced Drive. (*4) (*5)

Is [I15100 Data recovery completed] displayed (*6) in the "Information Message" on WEB?

Refer to WEB "2.5 Information Message" (WEB 02-0150).

No: Follow the "Information Message" on WEB for the maintenance.

Refer to WEB "2.5 Information Message" (WEB 02-0150).

Yes: H To REP 02-0180

I From REP 02-0180

*1 : For the DBX, remove the front bezel, pull the array out of the rack, and remove the top cover.
For the DBW, the front bezel does not need to be removed. Pull the drawer out of the array.

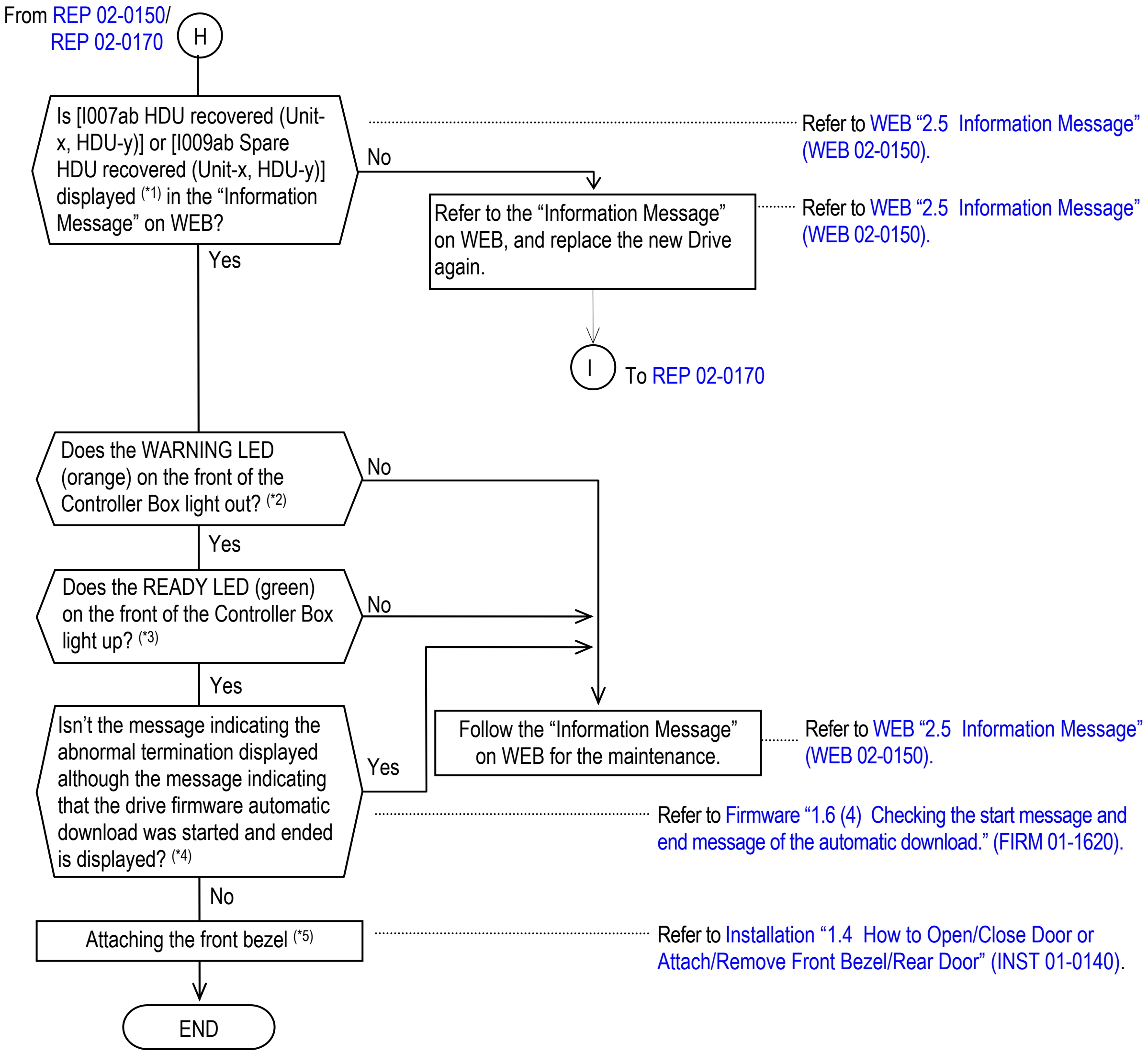
*2 : For the DBW, ALM LED is orange.

*3 : For the DBW, make sure that the ALM LED (orange) is off.
The ALM LED (red) or the ALM LED (orange) of the Drive lights off within about five minutes after the Drive is inserted.
When the ALM LED (red) or the ALM LED (orange) is not turned off, remove the inserted Drive from the chassis, and insert it again after 20 seconds or more passed.
However, in the following cases, the ALM LED (red) or the ALM LED (orange) may not go out. After taking the action according to each case, check that the ALM LED (red) or the ALM LED (orange) is turned off.
- When the Controller is blocked during the Drive recovery, replace the blocked Controller and then check that the Controller has recovered.

*4 : In case of it is set to automatic recovery mode. However, the copy back does not operate until completing the RAID group expansion in case of the Drive during the RAID group expansion. The copy back starts automatically after completing the RAID group expansion.

*5 : Open the Unit screen in the Storage Navigator Modular 2. Double click the Drive under recovery procedure (indicated in yellow) in the Component Status Tag, then the progress of data recovery can be checked. (For detail, refer to System Parameter "4.5 Checking the Status of Drive" (SYSPR 04-0680).)

*6 : It will take time until this message is displayed. Refer to "(6) Confirming completion of data recovery or copy back" (REP 02-0370) for the standard of the time required.


From REP 02-0150/
REP 02-0170
H
Is [I007ab HDU recovered (Unit-x, HDU-y)] or [I009ab Spare HDU recovered (Unit-x, HDU-y)] displayed (*1) in the "Information Message" on WEB?
No
Refer to WEB "2.5 Information Message" (WEB 02-0150).
Refer to the "Information Message" on WEB, and replace the new Drive again.
Refer to WEB "2.5 Information Message" (WEB 02-0150).
I
To REP 02-0170
Yes
Does the WARNING LED (orange) on the front of the Controller Box light out? (*2)
No
Yes
Does the READY LED (green) on the front of the Controller Box light up? (*3)
No
Yes
Isn't the message indicating the abnormal termination displayed although the message indicating that the drive firmware automatic download was started and ended is displayed? (*4)
Yes
Follow the "Information Message" on WEB for the maintenance.
Refer to WEB "2.5 Information Message" (WEB 02-0150).
Refer to Firmware "1.6 (4) Checking the start message and end message of the automatic download." (FIRM 01-1620).
No
Attaching the front bezel (*5)
Refer to Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door" (INST 01-0140).
END

*1 : This message is displayed within about five minutes after "I15100 Data recovery completed" is displayed in the "Information Message" on WEB.

*2 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

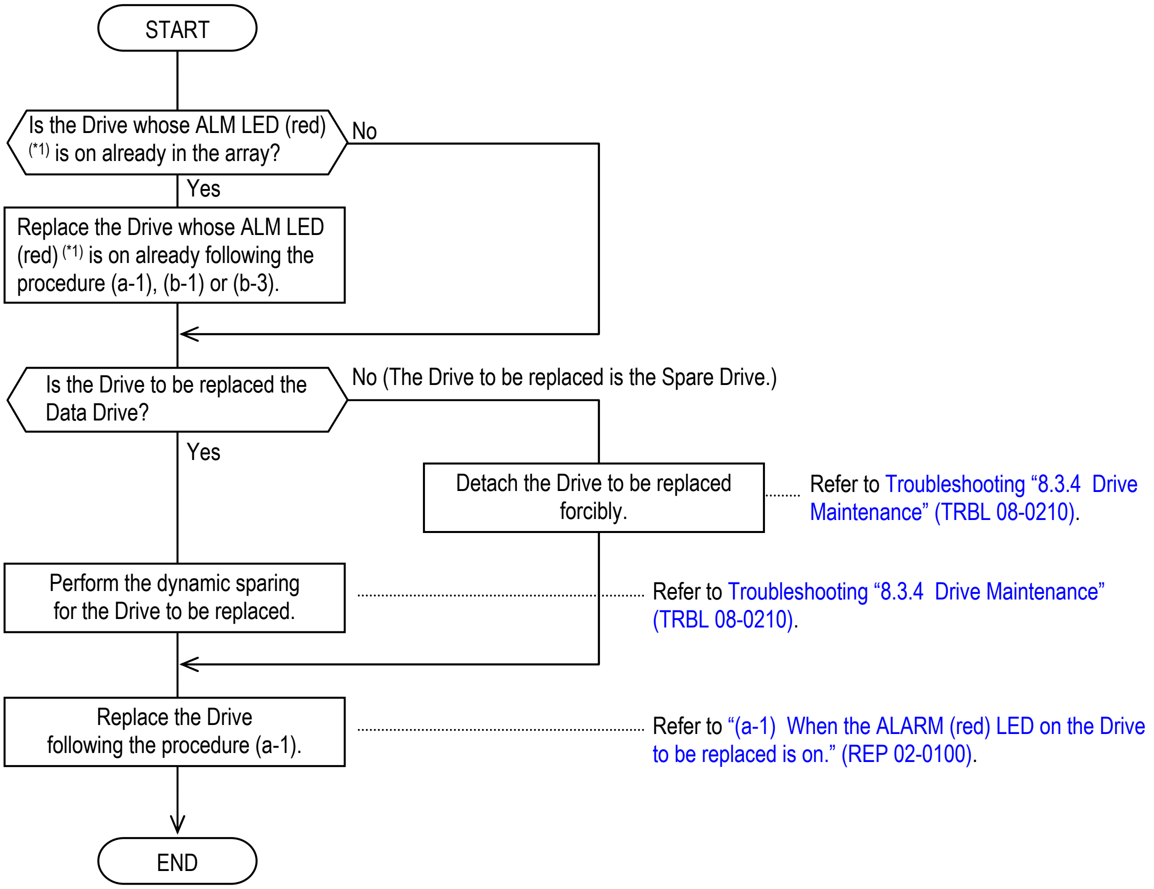
*3 : Wait if the READY LED (green) on the front of the Controller Box is blinking at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the CBL (80 to 180 minutes when the DBW is connected to the CBL).

*4 : When the drive firmware version of the drive is new, the start message and completion message of the drive firmware automatic download are not displayed.

*5 : For the DBX, attach the top cover, store the array in the rack, and then attach the front bezel.
For the DBW, put the drawer back in the array. The front bezel does not need to be attached.

(a-2) When the ALM LED (red) on the Drive to be replaced is off.

NOTE : For the DBW, the ALM LED (orange) is off.

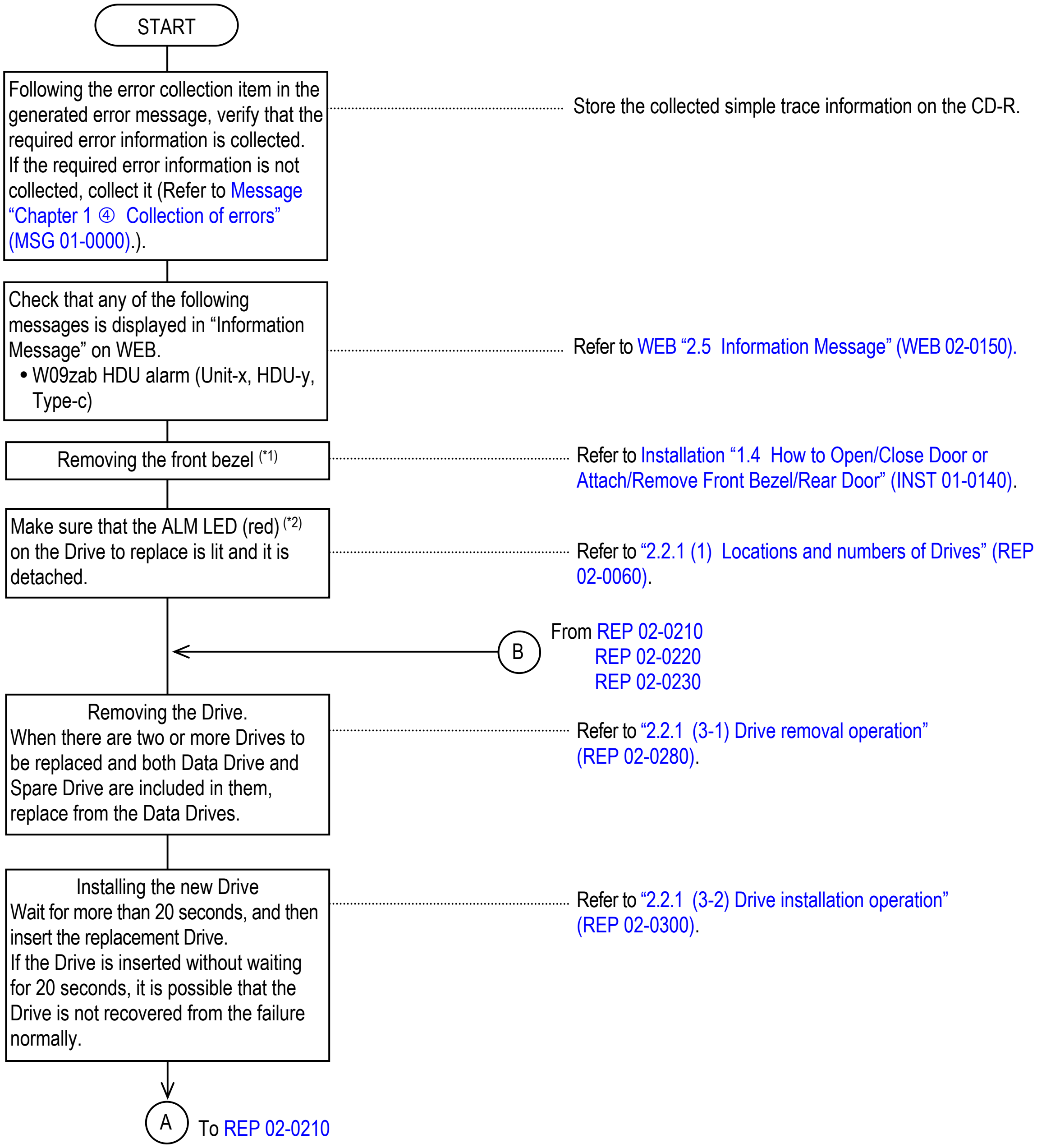

START
Is the Drive whose ALM LED (red) (*1) is on already in the array?
No
Yes
Replace the Drive whose ALM LED (red) (*1) is on already following the procedure (a-1), (b-1) or (b-3).
Is the Drive to be replaced the Data Drive?
No (The Drive to be replaced is the Spare Drive.)
Yes
Detach the Drive to be replaced forcibly.
Refer to Troubleshooting "8.3.4 Drive Maintenance" (TRBL 08-0210).
Perform the dynamic sparing for the Drive to be replaced.
Refer to Troubleshooting "8.3.4 Drive Maintenance" (TRBL 08-0210).
Replace the Drive following the procedure (a-1).
Refer to "(a-1) When the ALARM (red) LED on the Drive to be replaced is on." (REP 02-0100).
END

*1 : For the DBW, ALM LED is orange.

(b) The Spare Drive is not set or there is no Spare Drive that can be used

(b-1) Replacing Drive in RAID 1, 5, 6, or 1+0 configuration
(When the ALM LED (red) is on)

NOTE :
- For the DBW, the ALM LED (orange) is on.
- When there are two or more Drives to be replaced and both Data Drive and Spare Drive are included in them, replace from the Data Drives.



Following the error collection item in the generated error message, verify that the required error information is collected. If the required error information is not collected, collect it (Refer to Message “Chapter 1 ④ Collection of errors” (MSG 01-0000).).

Store the collected simple trace information on the CD-R.

Check that any of the following messages is displayed in “Information Message” on WEB.
- W09zab HDU alarm (Unit-x, HDU-y, Type-c)

Refer to WEB “2.5 Information Message” (WEB 02-0150).

Removing the front bezel (*1)

Refer to Installation “1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door” (INST 01-0140).

Make sure that the ALM LED (red) (*2) on the Drive to replace is lit and it is detached.

Refer to “2.2.1 (1) Locations and numbers of Drives” (REP 02-0060).

From REP 02-0210
REP 02-0220
REP 02-0230

Removing the Drive.
When there are two or more Drives to be replaced and both Data Drive and Spare Drive are included in them, replace from the Data Drives.

Refer to “2.2.1 (3-1) Drive removal operation” (REP 02-0280).

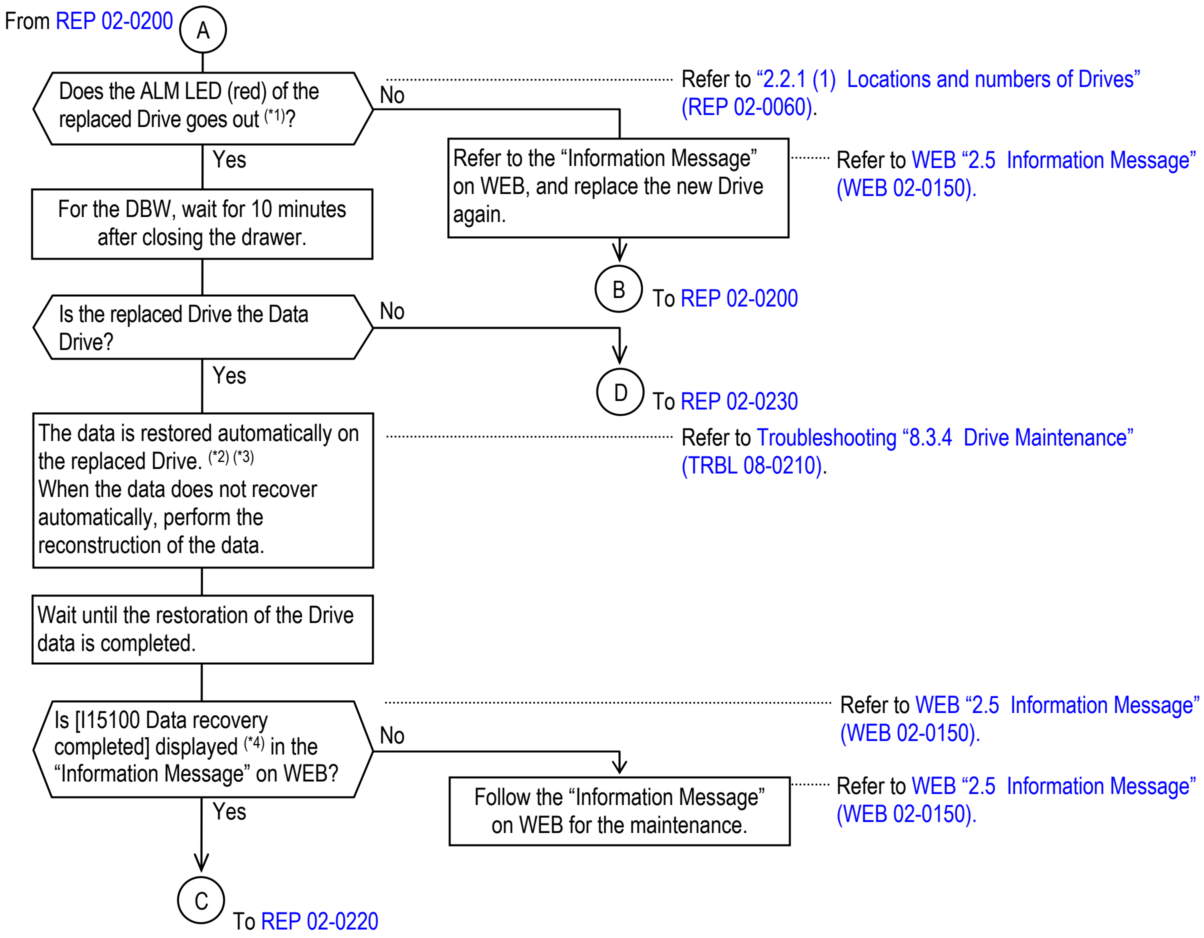
Installing the new Drive
Wait for more than 20 seconds, and then insert the replacement Drive.
If the Drive is inserted without waiting for 20 seconds, it is possible that the Drive is not recovered from the failure normally.

Refer to “2.2.1 (3-2) Drive installation operation” (REP 02-0300).

To REP 02-0210

*1 : For the DBX, remove the front bezel, pull the array out of the rack, and remove the top cover.
For the DBW, the front bezel does not need to be removed. Pull the drawer out of the array.

*2 : For the DBW, ALM LED is orange.


From REP 02-0200
A
Does the ALM LED (red) of the replaced Drive goes out (*1)?
No
Refer to "2.2.1 (1) Locations and numbers of Drives" (REP 02-0060).
Yes
For the DBW, wait for 10 minutes after closing the drawer.
Refer to the "Information Message" on WEB, and replace the new Drive again.
Refer to WEB "2.5 Information Message" (WEB 02-0150).
B
To REP 02-0200
Is the replaced Drive the Data Drive?
No
Yes
D
To REP 02-0230
The data is restored automatically on the replaced Drive. (*2) (*3)
When the data does not recover automatically, perform the reconstruction of the data.
Refer to Troubleshooting "8.3.4 Drive Maintenance" (TRBL 08-0210).
Wait until the restoration of the Drive data is completed.
Is [I15100 Data recovery completed] displayed (*4) in the "Information Message" on WEB?
Refer to WEB "2.5 Information Message" (WEB 02-0150).
No
Follow the "Information Message" on WEB for the maintenance.
Refer to WEB "2.5 Information Message" (WEB 02-0150).
Yes
C
To REP 02-0220

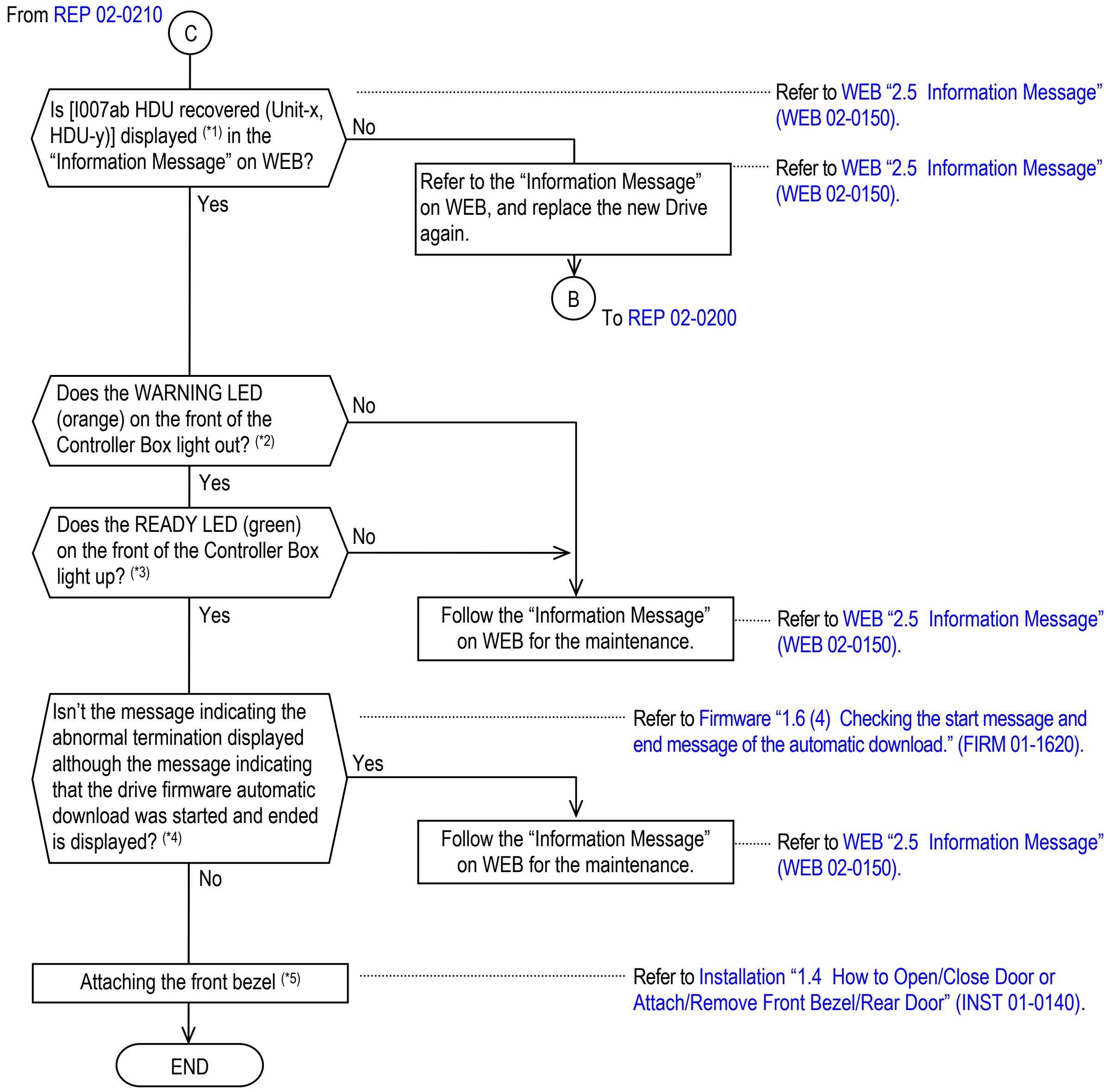
*1 : For the DBW, make sure that the ALM LED (orange) is off.
The ALM LED (red) or the ALM LED (orange) of the Drive lights off within about five minutes after the Drive is inserted.
When the ALM LED (red) or the ALM LED (orange) is not turned off, remove the inserted Drive from the chassis, and insert it again after 20 seconds or more passed.
However, in the following cases, the ALM LED (red) or the ALM LED (orange) may not go out. After taking the action according to each case, check that the ALM LED (red) or the ALM LED (orange) is turned off.

- When the Controller is blocked during the Drive recovery, replace the blocked Controller and then check that the Controller has recovered.

*2 : In case of it is set to automatic recovery mode.

*3 : Open the Unit screen in the Storage Navigator Modular 2. Double click the Drive under recovery procedure (indicated in yellow) in the Component Status Tag, then the progress of data recovery can be checked. (For detail, refer to System Parameter "4.5 Checking the Status of Drive" (SYSPR 04-0680).)

*4 : It will take time until this message is displayed. Refer to "(6) Confirming completion of data recovery or copy back" (REP 02-0370) for the standard of the time required.


From REP 02-0210
C
Is [I007ab HDU recovered (Unit-x, HDU-y)] displayed (*1) in the "Information Message" on WEB?
No
Refer to WEB "2.5 Information Message" (WEB 02-0150).
Refer to the "Information Message" on WEB, and replace the new Drive again.
Refer to WEB "2.5 Information Message" (WEB 02-0150).
B
To REP 02-0200
Yes
Does the WARNING LED (orange) on the front of the Controller Box light out? (*2)
No
Yes
Does the READY LED (green) on the front of the Controller Box light up? (*3)
No
Follow the "Information Message" on WEB for the maintenance.
Refer to WEB "2.5 Information Message" (WEB 02-0150).
Yes
Isn't the message indicating the abnormal termination displayed although the message indicating that the drive firmware automatic download was started and ended is displayed? (*4)
Refer to Firmware "1.6 (4) Checking the start message and end message of the automatic download." (FIRM 01-1620).
Yes
Follow the "Information Message" on WEB for the maintenance.
Refer to WEB "2.5 Information Message" (WEB 02-0150).
No
Attaching the front bezel (*5)
Refer to Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door" (INST 01-0140).
END

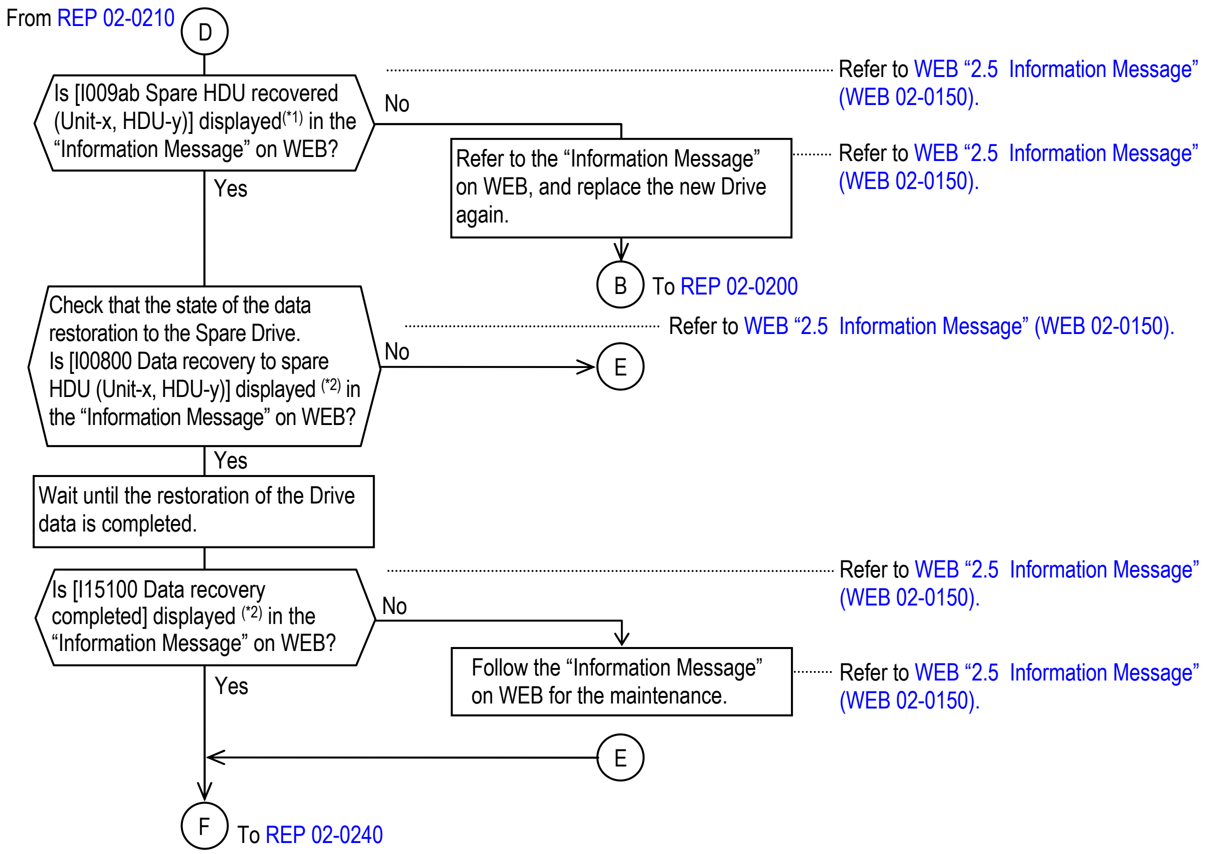
*1 : This message is displayed within about five minutes after "I15100 Data recovery completed" is displayed in the "Information Message" on WEB.

*2 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

*3 : Wait if 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).

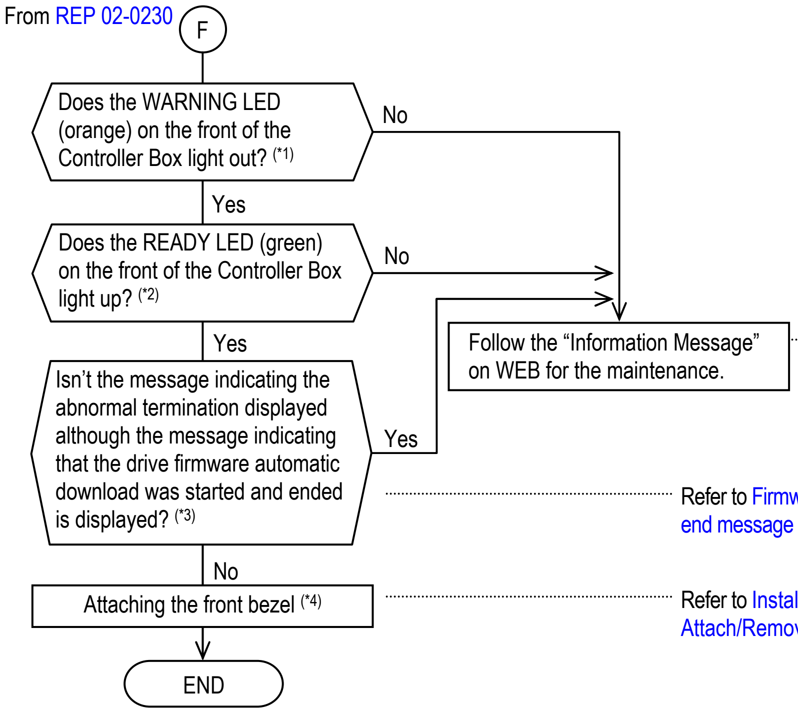
*4 : When the drive firmware version of the drive is new, the start message and completion message of the drive firmware automatic download are not displayed.

*5 : For the DBX, attach the top cover, store the array in the rack, and then attach the front bezel.
For the DBW, put the drawer back in the array. The front bezel does not need to be attached.


From REP 02-0210
D
Is [I009ab Spare HDU recovered (Unit-x, HDU-y)] displayed(*1) in the "Information Message" on WEB?
No
Refer to WEB "2.5 Information Message" (WEB 02-0150).
Refer to the "Information Message" on WEB, and replace the new Drive again.
Refer to WEB "2.5 Information Message" (WEB 02-0150).
B
To REP 02-0200
Yes
Check that the state of the data restoration to the Spare Drive. Is [I00800 Data recovery to spare HDU (Unit-x, HDU-y)] displayed (*2) in the "Information Message" on WEB?
No
E
Refer to WEB "2.5 Information Message" (WEB 02-0150).
Yes
Wait until the restoration of the Drive data is completed.
Is [I15100 Data recovery completed] displayed (*2) in the "Information Message" on WEB?
No
Refer to WEB "2.5 Information Message" (WEB 02-0150).
Follow the "Information Message" on WEB for the maintenance.
Refer to WEB "2.5 Information Message" (WEB 02-0150).
Yes
E
F
To REP 02-0240

*1 : This message is displayed within about five minutes after the ALM LED (red) of the Drive lights off.

*2 : It will take time until this message is displayed. Refer to "(6) Confirming completion of data recovery or copy back" (REP 02-0370) for the standard of the time required.



From REP 02-0230

Does the WARNING LED (orange) on the front of the Controller Box light out? (*1)

Does the READY LED (green) on the front of the Controller Box light up? (*2)

Isn't the message indicating the abnormal termination displayed although the message indicating that the drive firmware automatic download was started and ended is displayed? (*3)

Follow the "Information Message" on WEB for the maintenance.

Attaching the front bezel (*4)

Refer to WEB "2.5 Information Message" (WEB 02-0150).

Refer to Firmware "1.6 (4) Checking the start message and end message of the automatic download." (FIRM 01-1620).

Refer to Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door" (INST 01-0140).

*1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

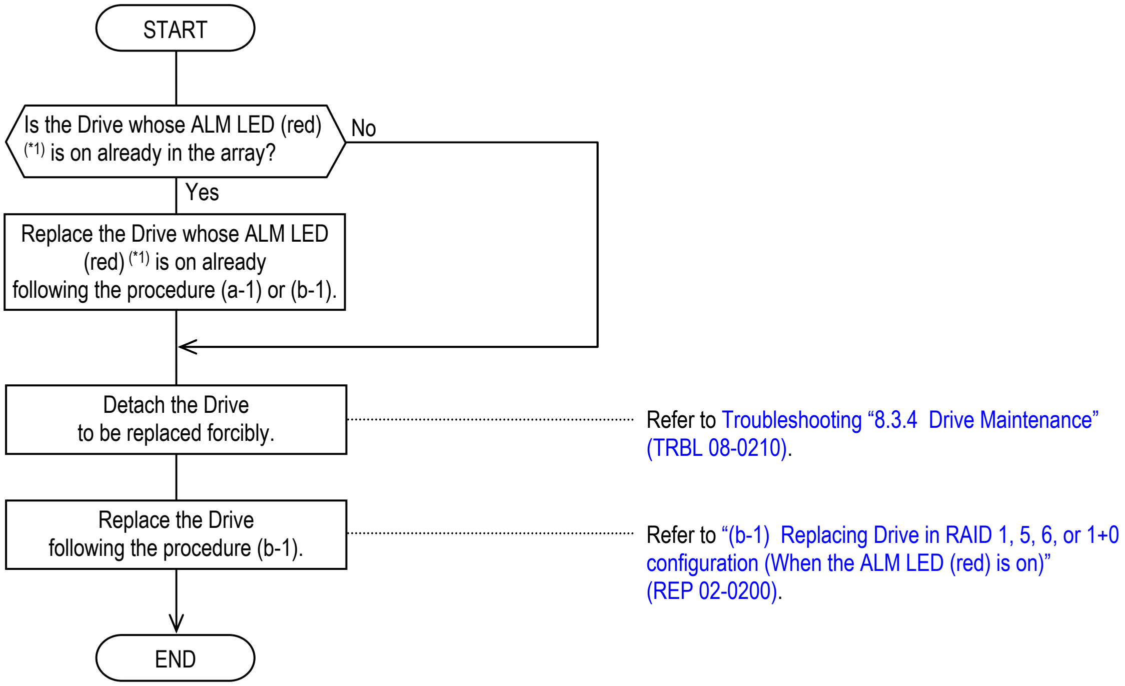
*2 : Wait if the READY LED (green) on the front of the Controller Box is blinking at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the CBL (80 to 180 minutes when the DBW is connected to the CBL).

*3 : When the drive firmware version of the drive is new, the start message and completion message of the drive firmware automatic download are not displayed.

*4 : For the DBX, attach the top cover, store the array in the rack, and then attach the front bezel.
For the DBW, put the drawer back in the array. The front bezel does not need to be attached.

(b-2) Replacing a Drive in the RAID 1, 5, 6, or RAID 1+0 configuration (when the ALM LED (red) is off)

NOTE : For the DBW, the ALM LED (orange) is off.

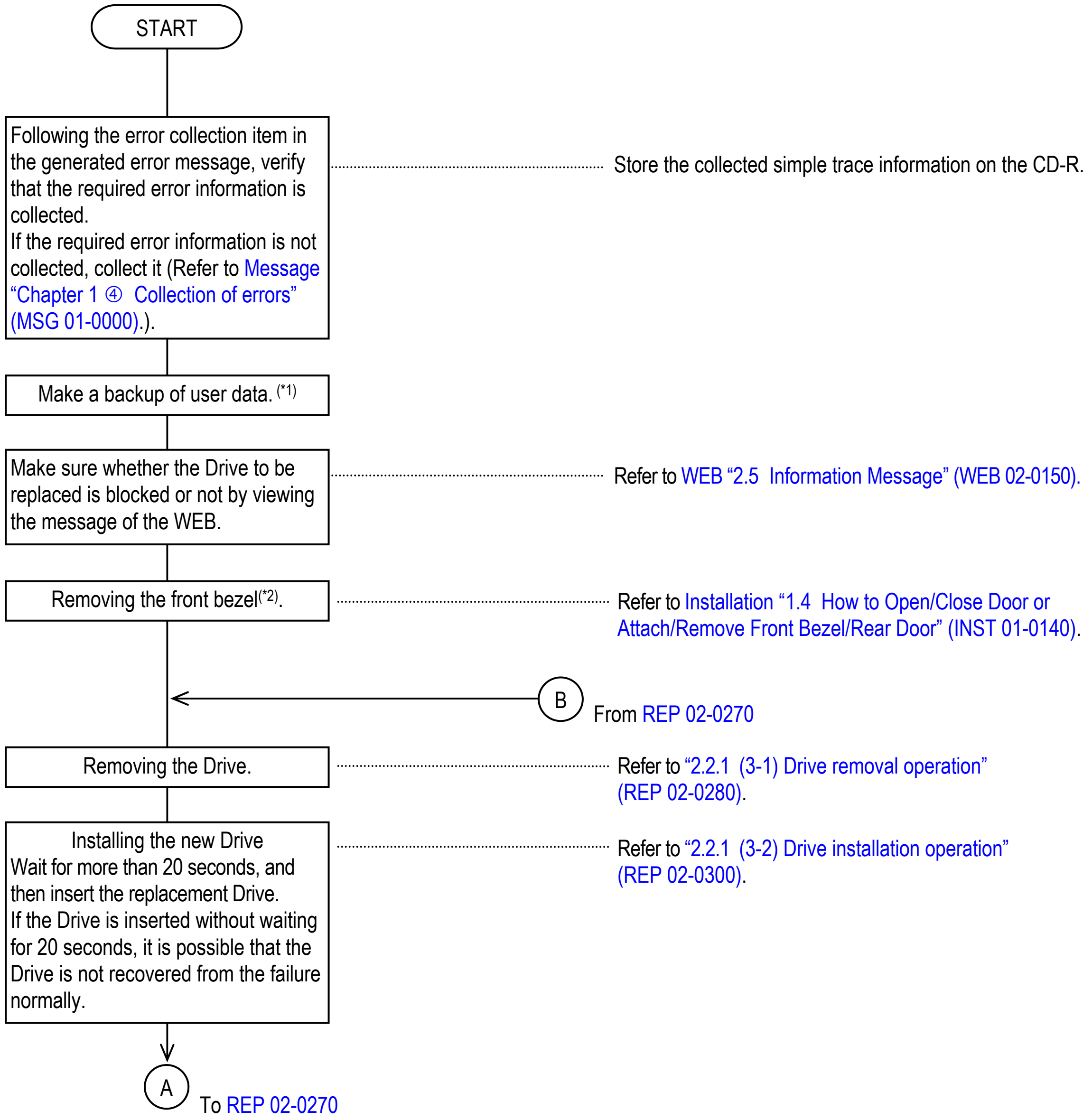

START
Is the Drive whose ALM LED (red) (*1) is on already in the array?
No
Yes
Replace the Drive whose ALM LED (red) (*1) is on already following the procedure (a-1) or (b-1).
Detach the Drive to be replaced forcibly.
Replace the Drive following the procedure (b-1).
END

Refer to Troubleshooting “8.3.4 Drive Maintenance” (TRBL 08-0210).

Refer to “(b-1) Replacing Drive in RAID 1, 5, 6, or 1+0 configuration (When the ALM LED (red) is on)” (REP 02-0200).

*1 : For the DBW, ALM LED is orange.

(b-3) Replacement of Drive under RAID 0 configuration



Following the error collection item in the generated error message, verify that the required error information is collected. If the required error information is not collected, collect it (Refer to Message "Chapter 1 ④ Collection of errors" (MSG 01-0000).).

Store the collected simple trace information on the CD-R.

Make a backup of user data. (*1)

Make sure whether the Drive to be replaced is blocked or not by viewing the message of the WEB.

Refer to WEB "2.5 Information Message" (WEB 02-0150).

Removing the front bezel(*2).

Refer to Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door" (INST 01-0140).

From REP 02-0270

Removing the Drive.

Refer to "2.2.1 (3-1) Drive removal operation" (REP 02-0280).

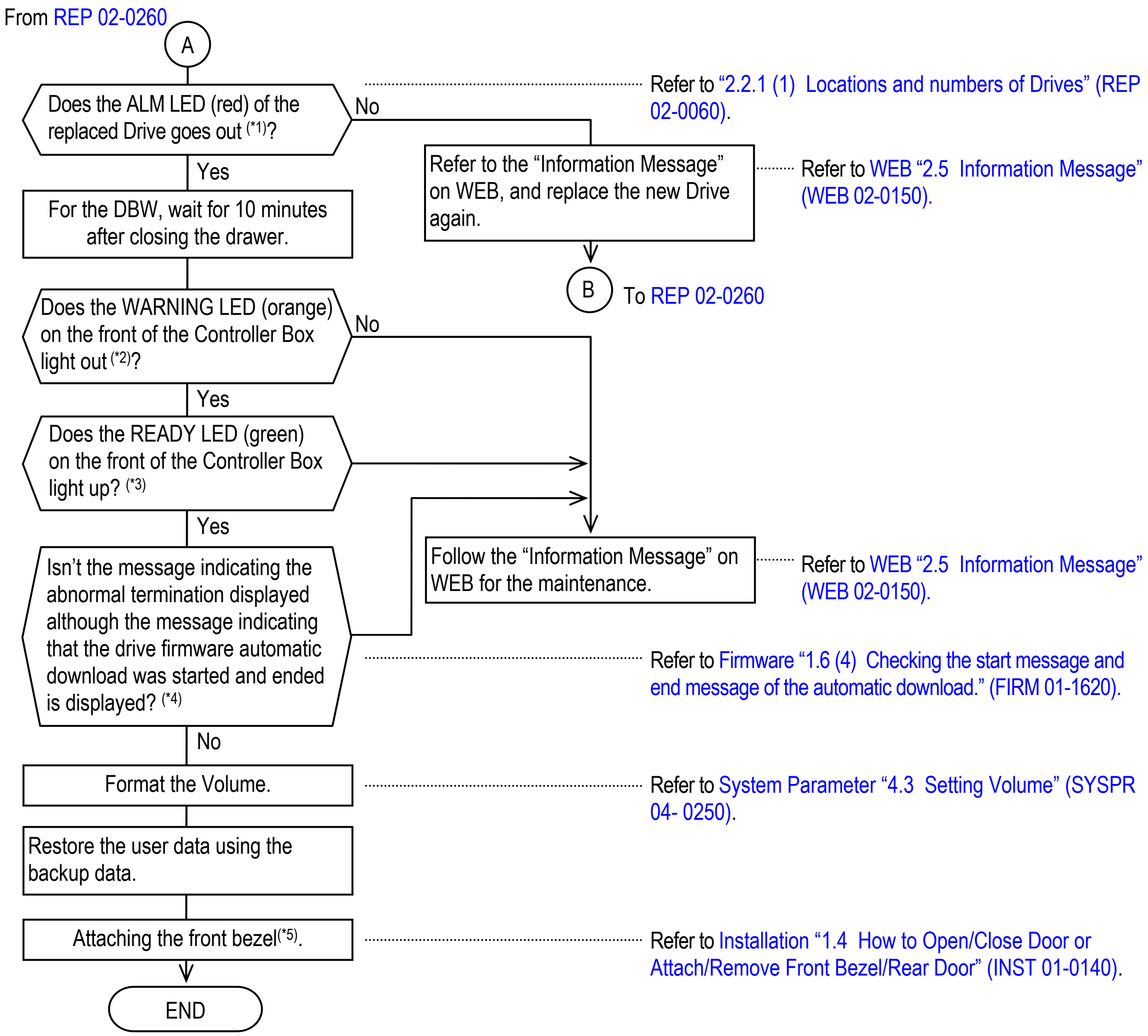
Installing the new Drive
Wait for more than 20 seconds, and then insert the replacement Drive.
If the Drive is inserted without waiting for 20 seconds, it is possible that the Drive is not recovered from the failure normally.

Refer to "2.2.1 (3-2) Drive installation operation" (REP 02-0300).

To REP 02-0270

*1 : The user data cannot be backed up when a Drive targeted for the replacement is blocked or when there is a blocked Drive in the RAID Group to which the Drive targeted for the replacement belongs.

*2 : For the DBX, remove the front bezel, pull the array out of the rack, and remove the top cover.
For the DBW, the front bezel does not need to be removed. Pull the drawer out of the array.


From REP 02-0260
A
Does the ALM LED (red) of the replaced Drive goes out (*1)?
No
Refer to "2.2.1 (1) Locations and numbers of Drives" (REP 02-0060).
Refer to the "Information Message" on WEB, and replace the new Drive again.
Refer to WEB "2.5 Information Message" (WEB 02-0150).
B
To REP 02-0260
Yes
For the DBW, wait for 10 minutes after closing the drawer.
Does the WARNING LED (orange) on the front of the Controller Box light out (*2)?
No
Yes
Does the READY LED (green) on the front of the Controller Box light up? (*3)
Yes
Follow the "Information Message" on WEB for the maintenance.
Refer to WEB "2.5 Information Message" (WEB 02-0150).
Isn't the message indicating the abnormal termination displayed although the message indicating that the drive firmware automatic download was started and ended is displayed? (*4)
Refer to Firmware "1.6 (4) Checking the start message and end message of the automatic download." (FIRM 01-1620).
No
Format the Volume.
Refer to System Parameter "4.3 Setting Volume" (SYSPR 04- 0250).
Restore the user data using the backup data.
Attaching the front bezel(*5).
Refer to Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door" (INST 01-0140).
END

*1 : For the DBW, make sure that the ALM LED (orange) is off.
The ALM LED (red) or the ALM LED (orange) of the Drive lights off within about five minutes after the Drive is inserted.
When the ALM LED (red) or the ALM LED (orange) is not turned off, remove the inserted Drive from the chassis, and insert it again after 20 seconds or more passed.
However, in the following cases, the ALM LED (red) or the ALM LED (orange) may not go out. After taking the action according to each case, check that the ALM LED (red) or the ALM LED (orange) is turned off.

- When the Controller is blocked during the Drive recovery, replace the blocked Controller and then check that the Controller has recovered.

*2 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

*3 : Wait if 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)).

*4 : When the drive firmware version of the drive is new, the start message and completion message of the drive firmware automatic download are not displayed.

*5 : For the DBX, attach the top cover, store the array in the rack, and then attach the front bezel.
For the DBW, put the drawer back in the array. The front bezel does not need to be attached.

(3) Drive removing and installing operation

NOTICE

- **To prevent part failures caused by static electrical charge built up on your own body, be sure to wear a wrist strap connected to the chassis before starting and do not take it off until you finish.**
- **Be sure to wear a wrist strap connected to the chassis whenever you unpack parts from a case. Otherwise, the static electrical charge on your body may damage the parts.**
- **Drives are precision components. Be careful not to expose drives to hard shock.**
- **When you install a Drive, support its metal part with your hand that has the wrist strap. You can discharge static electricity by touching the metal plate.**

(3-1) Drive removal operation

The Drive size and removal operation vary depending on the array to be installed. Check the array and the Drive before starting the work.

(a) Drive for CBXSL/CBSL/DBL/DBF

Pull the stopper of the handle toward you to have the lock off (①), tilt the handle toward you, and then remove the Drive by pulling it out taking care not to apply a shock to it.

NOTE :
- When handling the Drive, hold the RAIL side because the SHIELD SPRING is subject to breakage.
- When the Flash Drives (FMD) is removed in replacing procedure, the fans of the Power Unit equipped in the rear of the DBF rotate at the highest speed. When the spare Flash Drives (FMD) is installed, the fans of the Power Unit rotate at the speed suitable for environmental temperature.

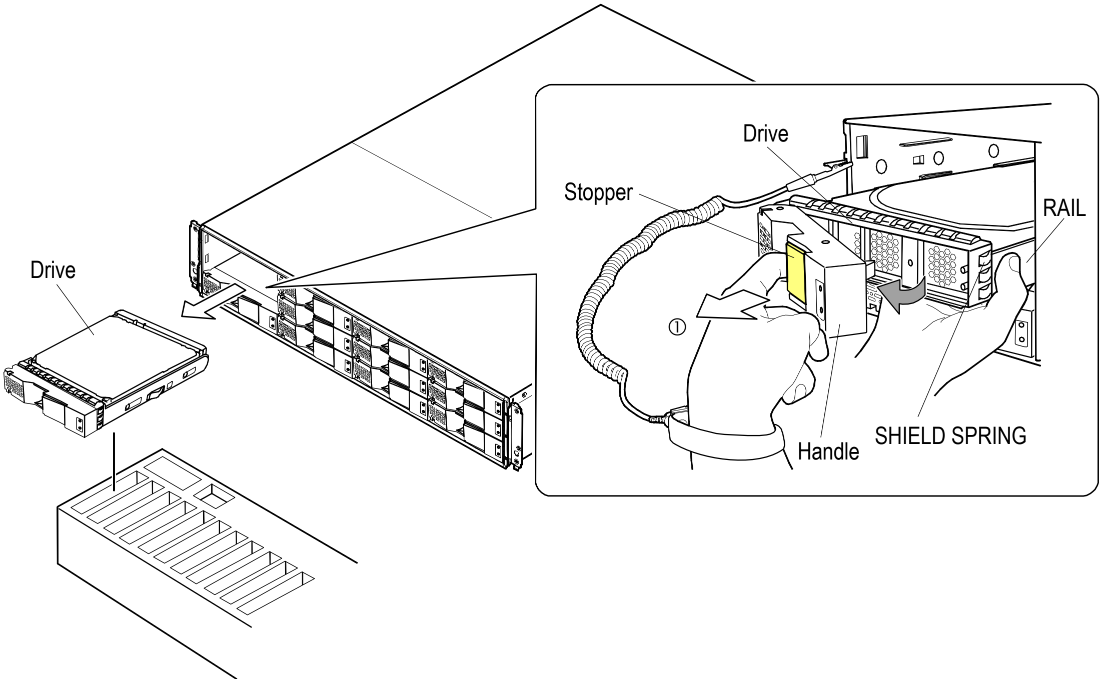


Figure 2.2.4 Drive Removal Operation (CBXSL/CBSL/DBL/DBF)

For a Drive for DBF, determine whether a failure has occurred in the Flash Drive (FMD) built-in battery following "(7) Removing a Flash Drive (FMD) built-in battery" (REP 02-0423). If the failure has occurred remove the battery.

NOTE : The service personnel must work on the removal of a Flash Drive (FMD) built-in battery. Do not give the written material supplied with the Drives to the customers.

(b) Drive for CBXSS/CBSS/DBS

Pull up the stopper of the handle toward you to release the lock (①).
Open the handle toward you, and then pull out and remove the Drive to be replaced not to give a shock.

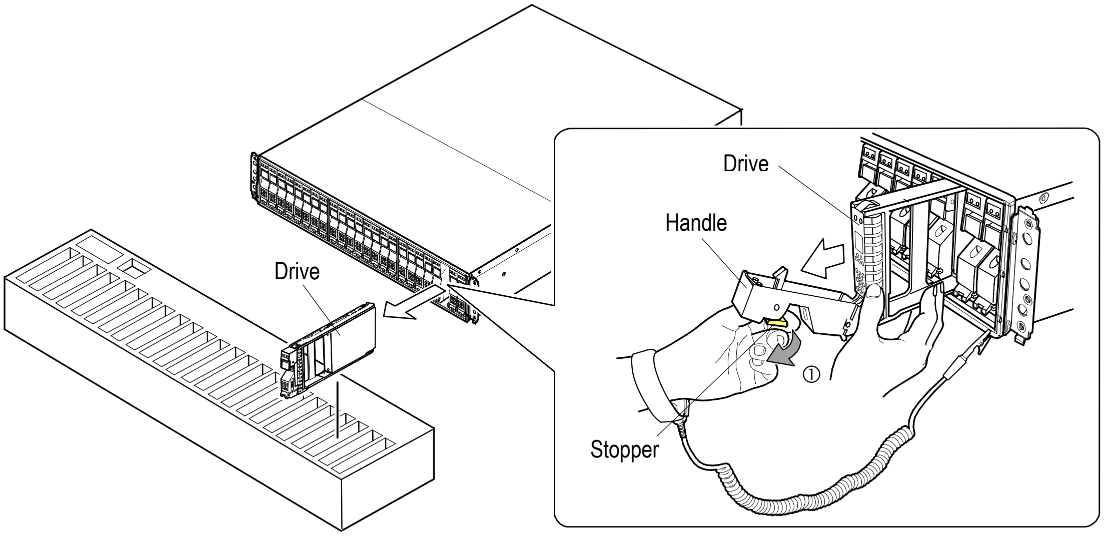


Figure 2.2.5 Drive Removal Operation (CBXSS/CBSS/DBS)

(c) Drive for DBX

Slide the latch (blue) on the Drive and open the handle, and then pull out and remove the Drive to be replaced taking care not to apply a shock to it.

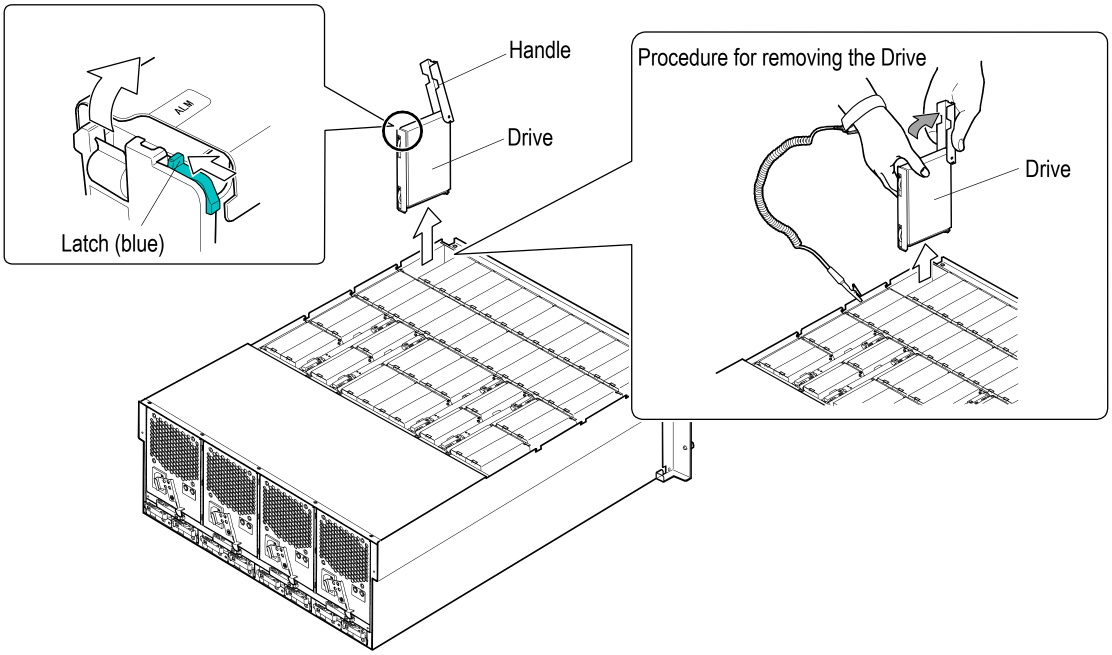


Figure 2.2.6 Drive Removal Operation (DBX)

(d) Drive for DBW

Slide the release button and the Drive will pop up slightly from the slot. Lift the Drive out of the slot, and then remove the Drive to be replaced not to apply any shock to it.

When the Drive is not lifted after sliding the release button, slide the latch on the Drive toward you (①) while sliding the release button, so that the Drive will be lifted up.

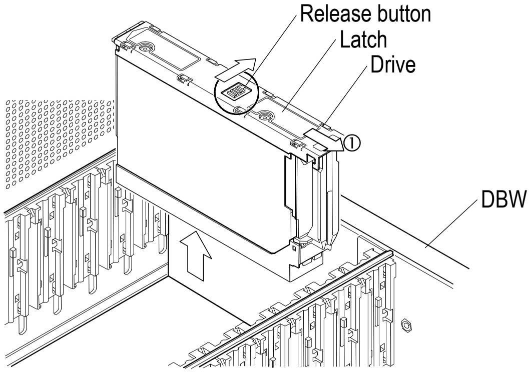


Figure 2.2.6.1 Drive Removal Operation (DBW)

(3-2) Drive installation operation

The Drive size and installation operation vary depending on the array to be installed. Check the array and the Drive before starting the work.

(a) Drive for CBXSL/CBSL/DBL

NOTE : When handling the Drive, hold the RAIL side because the SHIELD SPRING is subject to breakage.

(i) Open the handle fully and fit the Drive in the guide rail and slide it in the direction shown by the arrow (①) not to give a shock.

(ii) Push the Drive in until it reaches the position where a hook of the handle can be entered into the square hole (②) on a frame.

(iii) Pull the stopper lightly and close the handle, and then press the stopper (③) to have the lock on.

If the handle is closed in the state where the hook of the handle cannot enter into the square hole, the Drive cannot be installed correctly because it runs into the frame of the Drive array unit.

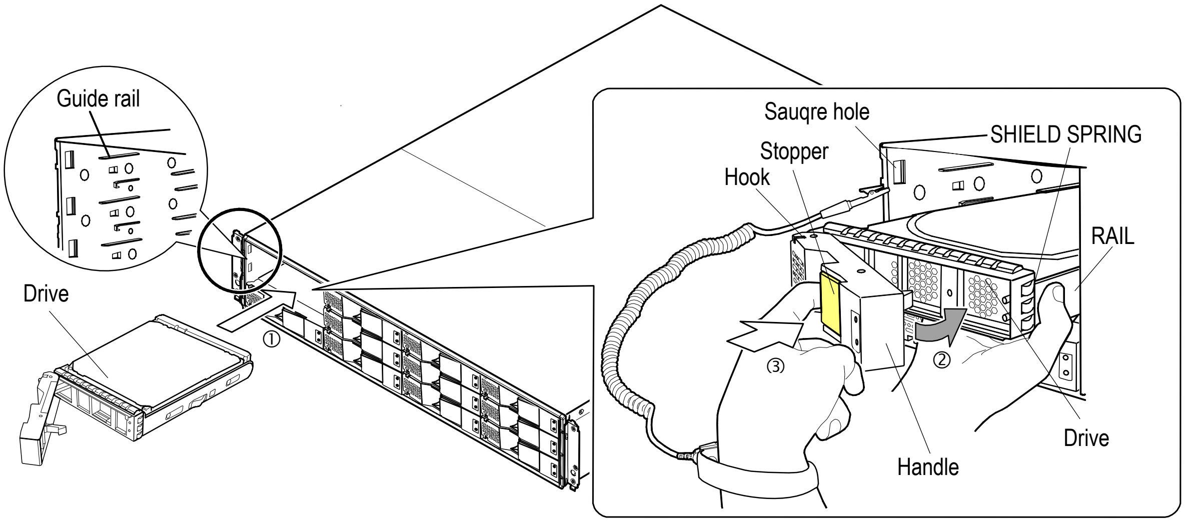


Figure 2.2.7 Drive Installation Operation (CBXSL/CBSL/DBL)

(b) Drive for CBXSS/CBSS/DBS

(i) Fit the Drive in the guide rail and slide it in the direction shown by the arrow (①) not to give a shock.

(ii) Push the Drive in until it reaches the position where a hook of the handle can be entered into the square hole (②) at the lower part of a frame on the front side of the Drive array unit.

(iii) Raise the stopper, which has been tilted toward you, and then press the stopper (③) to have the lock on.
If the handle is raised in the state where the hook of the handle cannot enter into each hole, the Drive cannot be installed correctly because it runs into the frame of the Drive array unit.

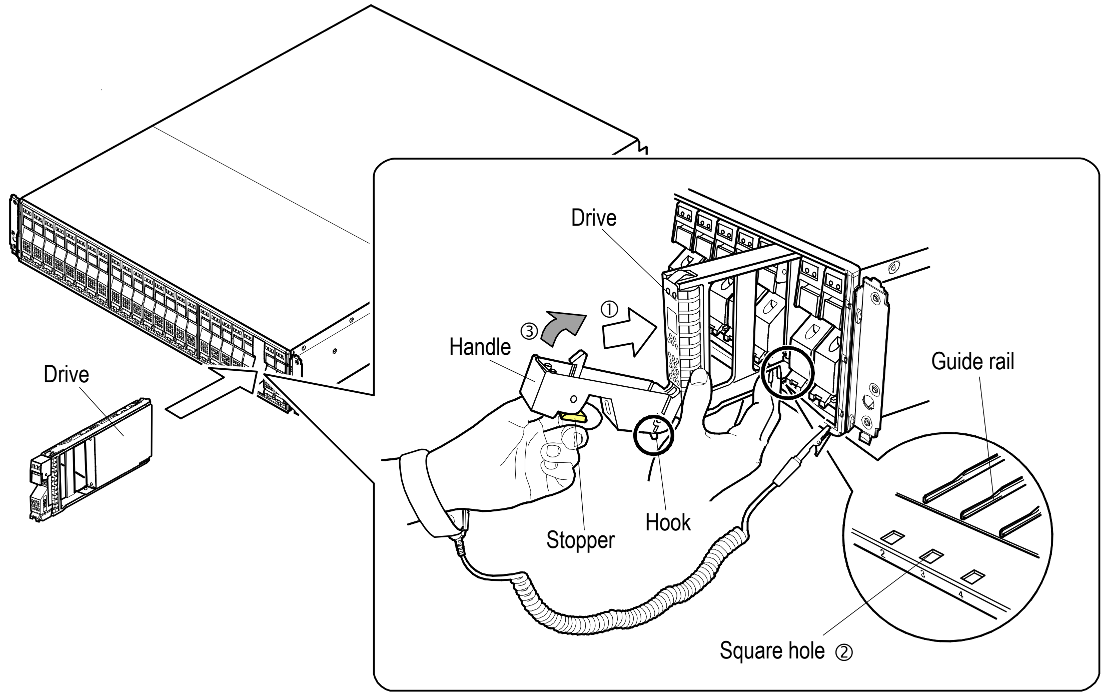


Figure 2.2.8 Drive Installation Operation (CBXSS/CBSS/DBS)

(c) Drive for DBX

(i) Open the handle, and insert the Drive holding it with both hands (①).

NOTE : Check that there is no foreign substance near the connector and in the array before inserting the Drive.

(ii) Close the handle (②).

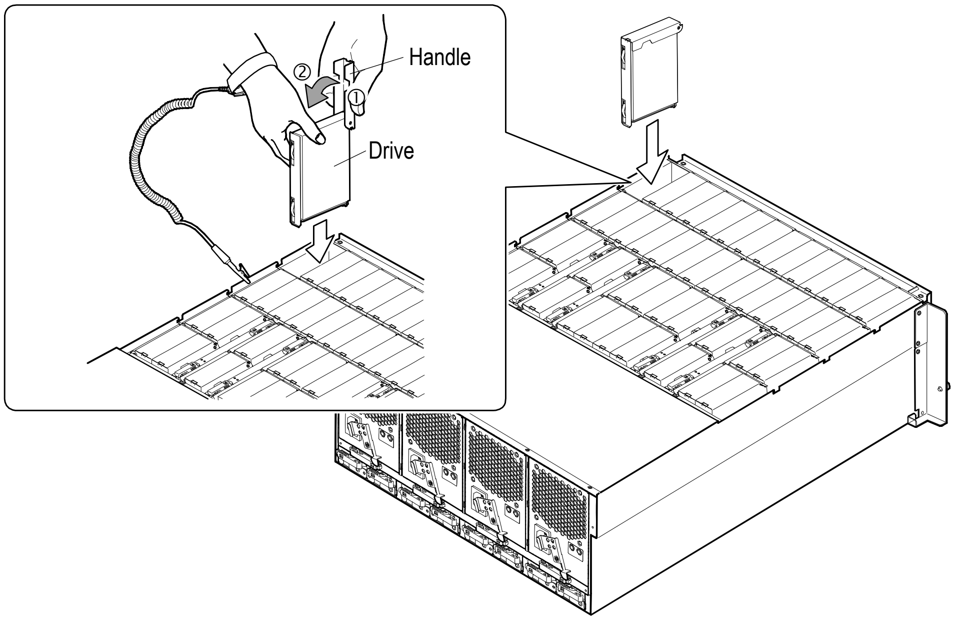


Figure 2.2.9 Drive Installation Operation (DBX)

(d) Drive for DBW

(i) Insert the Drive into the slot, and then push it down until it stops (①).

NOTE : Install the Drive so that the ALM LED is on the near side of you.

(ii) Slide the top of the Drive in the direction of the arrow until the latch clicks into place (②).

NOTE : Make sure that the release button of the Drive is securely locked (yellow part is not visible).

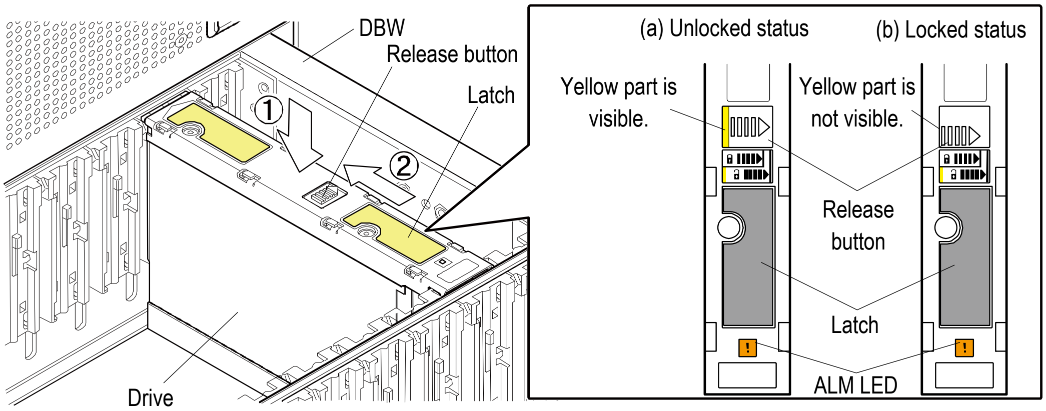


Figure 2.2.9.1 Drive Installation Operation (DBW)

(iii) After replacing the Drive, push the upper part of the Drive again in the direction of the arrow to make sure that the release button of the Drive is securely locked (②).

NOTE : If the release button of the Drive is unlocked (yellow part is visible), the Drive may be pulled out inside the array. This prevents the drawer from being opened/closed.

(4) Drive threshold

Errors counted in this array and default threshold values are listed below.
The dynamic sparing functions when the error count threshold value is exceeded. After the dynamic sparing operation is completed, the failed Drive is detached.

Table 2.2.1 Error and Threshold Value (Default)

No.	Kind of error	Threshold (Default) (Once/24 hours)					
		The Spare Drive is set			The Spare Drive is not set		
		SAS	SAS7.2K	Flash Drive	SAS	SAS7.2K	Flash Drive
1	Drive mechanical error. (Recovered)	50	-	50	50	-	50
2	Drive mechanical error. (Un-recovered)	2	-	2	2	-	2
3	A Drive failure that becomes a factor to execute reassignment • Drive medium error. (Recovered) • Drive medium error. (Un-recovered) • Collectable errors in online verify. • Un-correctable errors in online verify.	25	-	25	200	-	200
4	Drive R/W error. (Recovered)	10	-	10	10	-	10
5	Drive R/W error. (Un-recovered)	2	-	2	2	-	2
6	Drive I/F error. (Recovered)	50	-	50	50	-	50
7	Drive I/F error. (Un-recovered)	2	-	2	2	-	2
8	Drive hardware error. (Recovered)	50	-	50	50	-	50
9	Drive hardware error. (Un-recovered)	2	-	2	2	-	2
10	Drive SCSI I/F error. (Recovered)	50	-	50	50	-	50
11	Drive SCSI I/F error. (Un-recovered)	2	-	2	2	-	2

There threshold values above can be referred to and updated from the Hitachi Storage Navigator Modular 2 (‡1).
However, the recovered or un-recovered drive media errors and the correctable or uncorrectable errors in online verify operations are count up together in the reassigned count, so that the threshold value can be updated but it is not effective.
The accumulated number of errors is not cleared even if the power supply of the array is turned off (the array performs the planned shutdown).

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‡1 : For the details of the Hitachi Storage Navigator Modular 2, refer to the "Hitachi Storage Navigator Modular 2 (for GUI) User's Guide".

(5) Transition of WEB of spare recovery operation of the [Information Message]

When the recovery completes normally, the “Information Message” from the WEB (WEB “2.5 Information Message” (WEB 02-0150)) change successively as shown below.

(a) Data recover (Data recovery onto the Spare Drive when a Drive blocked is detected)

W09zab HDU alarm (Unit-x, HDU-y, Type-c)
······························: Data Drive blocked

I15000 Data recovery started (Unit-x, HDU-y)
······························: Start of data area recovery

I15100 Data recovery completed (Unit-x, HDU-y)
······························: Completion of data area recovery

I00800 Data recovery to spare HDU (Unit-x, HDU-y)
······························: Completion of recovery onto Spare Drive

I1GG00 HDU changed to spare (Unit-x, HDU-y)
······························: The blocked data drive is changed to the Spare Drive, and the Spare Drive before the failure is changed to the data drive. (‡1)

W0Bzab Spare HDU alarm(Unit-x, HDU-y, Type-c)
······························: Spare Drive is blocked(‡1) (‡2)

---

‡1 : When the “Spare Drive Operation Mode” from [Settings] - [Drive Settings] - [Drive Recovery] - [Edit Recovery Options] in Hitachi Storage Navigator Modular 2 is set to variable (default value), if the blocked Drive and the Spare Drive of the data recovery destination are matched in the capacity and rotational speed, this message is displayed after completing the Drive restoration.
Furthermore, when the “Spare Drive Operation Mode” is set to variable, if the blocked Drive and the Spare Drive of the data recovery destination are matched in the capacity, this message is displayed after completing the Drive restoration.
However, if the Power Saving function is enabled, copy back is performed in the following four cases.
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		Source data drive	Target Spare 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 : This message is displayed in the Warning Information.

(b) Data recover (Dynamic sparing from data drive to Spare Drive)

I6QS00 Dynamic sparing start (Unit-x, HDU-y, Type-c) [z](‡1)

I15A00 Dynamic sparing start (Unit-x, HDU-y) [z]

······························: Start of Dynamic sparing

I15000 Data recovery started (Unit-x, HDU-y)

······························: Start of drive recovery

I15100 Data recovery completed (Unit-x, HDU-y)

······························: Completion of data recovery

I00800 Data recovery to spare HDU (Unit-x, HDU-y)

······························: Completion of recovery onto Spare Drive

I1GG00 HDU changed to spare (Unit-x, HDU-y)

······························: The blocked data drive is changed to the Spare Drive, and the Spare Drive before the failure is changed to the data drive.(‡2)

W09zab HDU alarm(Unit-x, HDU-y, Type-c)

······························: Data Drive blocked(‡3)

W0Bzab Spare HDU alarm(Unit-x, HDU-y, Type-c)

······························: Spare Drive blocked(‡4) (‡5)

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‡1 : It is displayed in the Hitachi Storage Navigator Modular 2 Ver.27.00 or more.

‡2 : This message is displayed in the Warning Information.

‡3 : This message is displayed only when “I1GG00 HDU changed to spare(Unit-x, HDU-y)” is not displayed before this.

‡4 : When the “Spare Drive Operation Mode” from [Settings] – [Drive Settings] – [Drive Recovery] – [Edit Recovery Options] in Hitachi Storage Navigator Modular 2 is set to variable (default value), if the blocked Drive and the Spare Drive of the data recovery destination are matched in the capacity and rotational speed and, this message is displayed after completing the Drive restoration.
Furthermore, when the “Spare Drive Operation Mode” is set to variable, if the blocked Drive and the Spare Drive of the data recovery destination are matched in the capacity, this message is displayed after completing the Drive restoration.
However, if the Power Saving function is enabled, copy back is performed in the following four cases.
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.)

‡5 : This message is displayed only when “I1GG00 HDU changed to spare(Unit-x, HDU-y)” is displayed before this.

(c) Copy back

I14000 System copy started (Unit-x, HDU-y)
······························: Start of system area recovery(‡1)
I14100 System copy completed (Unit-x, HDU-y)
······························: Completion of system area recovery(‡1)
I15000 Data recovery started (Unit-x, HDU-y)
······························: Start of data area recovery
I15100 Data recovery completed (Unit-x, HDU-y)
······························: Completion of data area recovery

When the recovery terminates abnormally, whichever [I14200 System copy failed (Unit-x, HDU-y)] or [I15200 Data recover failed (Unit-x, HDU-y)] is displayed. Take a recovery action following the messages.

---

‡1 : This message is displayed only when the Drives, including the Drives #0 to #4 of the CBXSL/DBXSS/CBSL/CBSS, or the Drives #0 to #4 of the DBL/DBS/DBF corresponding to the unit ID #0 connected to the CBL, the Drive #A0 to #A4 of the DBX, are replaced.

(6) Confirming completion of data recovery or copy back

Select “Information Message” from the WEB (WEB “2.5 Information Message” (WEB 02-0150)) and make sure that the data recovery is completed normally.

Table 2.2.2 and Table 2.2.4.2 show the standard of the time required of the Correction copy and the Copy back when selecting optional numbers of the Drives which configure the RAID Group. The time required of the Correction copy and the Copy back also increases as the number of the FC or S-ATA Drives that configures the RAID Group increases.

The correction copy, copy back and dynamic sparing do not operate mutually at the same time and also they do not operate at the same time for two or more Drives. Therefore, when the data of two or more Drives (*n* Drives) was recovered, the time that it takes to complete recovering all the data of the *n* Drives becomes *n* times the standard time.

Table 2.2.2 Standard of the Correction Copy Time/Copy Back Time whose Firmware Version is 0920/B or More[‡1] (SAS Drive)

Unit : min

Item				Drive (G byte)[*1]	287.62			575.30	879.98		1,173.71
					3HGSS	3HGSSH	3HGSLH	6HGSS	9HGSS	9HGSL	12HGSS
Correction copy[*2]	HUS150 HUS130 HUS110	4 Drives	RAID 6	(2D+2P)	100	90		190	280		300
		6 Drives		(4D+2P)	130	120		260	390		420
		10 Drives		(8D+2P)	220	200		430	640		690
		14 Drives		(12D+2P)	300	270		590	880		940
		18 Drives		(16D+2P)	370	340		740	1110		1190
		30 Drives		(28D+2P)	620	560		1230	1840		1970
		3 Drives	RAID 5	(2D+1P)	110	100		210	310		330
		5 Drives		(4D+1P)	140	130		280	410		440
		9 Drives		(8D+1P)	210	190		410	610		650
		11 Drives		(10D+1P)	240	220		480	710		760
		13 Drives		(12D+1P)	280	260		560	830		890
		16 Drives		(15D+1P)	330	300		660	990		1060
		4 Drives	RAID 1+0	(2D+2D)	90	90		180	260		280
		8 Drives		(4D+4D)	120	110		240	350		380
		16 Drives		(8D+8D)	180	170		360	530		570
		2 Drives	RAID 1	(1D+1D)	90	90		180	260		280
Copy back[*2]	HUS150 HUS130 HUS110	6 Drives	RAID 6	(4D+2P)	100	90		200	290		310
		30 Drives		(28D+2P)	120	110		240	360		390
		5 Drives	RAID5	(4D+1P)	100	90		200	290		310
		16 Drives		(15D+1P)	110	100		220	330		360
		4 Drives	RAID1+0	(2D+2D)	100	90		200	290		310
		16 Drives		(8D+8D)	105	100		210	310		330
		2 Drives	RAID1	(1D+1D)	100	90		200	290		310

*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.

*2 : 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.

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‡1 : It is the standard of the correction copy time when data of one Drive was recovered.

Table 2.2.2.1 Standard of the Correction Copy Time/Copy Back Time whose Firmware Version is Less than 0920/B(‡1) (SAS Drive)

Unit : min

Item				Drive (G byte)(*1)	287.62			575.30	879.98		1,173.71
					3HGSS	3HGSSH	3HGSLH	6HGSS	9HGSS	9HGSL	12HGSS
Correction copy(*2)	HUS150 HUS130 HUS110	4 Drives	RAID 6	(2D+2P)	90 (160)	82 (150)		180 (320)	280 (470)		360 (640)
		6 Drives		(4D+2P)	140 (200)	126 (180)		240 (400)	370 (590)		480 (800)
		10 Drives		(8D+2P)	180 (290)	162 (270)		360 (580)	560 (870)		720 (1160)
		14 Drives		(12D+2P)	240 (370)	216 (340)		490 (740)	750 (1100)		980 (1480)
		18 Drives		(16D+2P)	310 (450)	280 (410)		610 (900)	930 (1350)		1220 (1800)
		30 Drives		(28D+2P)	490 (720)	442 (650)		980 (1440)	1500 (2150)		1960 (2880)
		3 Drives	RAID 5	(2D+1P)	100 (170)	90 (160)		200 (340)	310 (510)		400 (680)
		5 Drives		(4D+1P)	130 (210)	118 (190)		270 (420)	400 (630)		540 (840)
		9 Drives		(8D+1P)	200 (290)	180 (270)		390 (580)	600 (870)		780 (1160)
		11 Drives		(10D+1P)	230 (340)	208 (310)		460 (670)	700 (1000)		920 (1340)
		13 Drives		(12D+1P)	260 (380)	234 (350)		520 (760)	800 (1130)		1040 (1520)
		16 Drives		(15D+1P)	310 (440)	280 (400)		620 (880)	950 (1310)		1240 (1760)
		4 Drives	RAID 1+0	(2D+2D)	90 (300)	82 (270)		180 (600)	280 (900)		360 (1200)
		8 Drives		(4D+4D)	120 (300)	108 (270)		250 (600)	380 (900)		500 (1200)
		16 Drives		(8D+8D)	190 (300)	172 (270)		380 (600)	580 (900)		760 (1200)
		2 Drives	RAID 1	(1D+1D)	90 (300)	82 (270)		180 (600)	280 (900)		360 (1200)
Copy back(*2)	HUS150 HUS130 HUS110	6 Drives	RAID 6	(4D+2P)	100 (350)	90 (320)		210 (690)	320 (1030)		420 (1380)
		30 Drives		(28D+2P)	170 (350)	154 (320)		260 (690)	400 (1030)		520 (1380)
		5 Drives	RAID5	(4D+1P)	100 (350)	90 (320)		210 (690)	320 (1030)		420 (1380)
		16 Drives		(15D+1P)	120 (350)	108 (320)		240 (690)	360 (1030)		480 (1380)
		4 Drives	RAID1+0	(2D+2D)	100 (350)	90 (320)		210 (690)	320 (1030)		420 (1380)
		16 Drives		(8D+8D)	120 (350)	108 (320)		230 (690)	340 (1030)		460 (1380)
		2 Drives	RAID1	(1D+1D)	90 (350)	82 (320)		210 (690)	320 (1030)		420 (1380)

*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.

*2 : 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.
The time required may extend depending on the configuration. The maximum value is shown in ( ).

---

‡1 : It is the standard of the correction copy time when data of one Drive was recovered.

Table 2.2.3 Standard of the Correction Copy Time/Copy Back Time whose Firmware Version is 0920/B or More(‡1) (SAS7.2K Drive)

Unit : min

Item				Drive (G byte)(*1)	1,956.94		2,935.96			3,915.01		
					2TNL	2TNX	3TNL	3TNX	3TNW	4TNL	4TNX (*3)	4TNW
Correction copy(*2)	HUS150 HUS130 HUS110	4 Drives	RAID 6	(2D+2P)	420		620			840		
		6 Drives		(4D+2P)	580		870			1160		
		10 Drives		(8D+2P)	950		1420			1900		
		14 Drives		(12D+2P)	1300		1950			2600		
		18 Drives		(16D+2P)	1670		2500			3340		
		30 Drives		(28D+2P)	2750		4120			5500		
		3 Drives	RAID 5	(2D+1P)	460		690			920		
		5 Drives		(4D+1P)	620		920			1240		
		9 Drives		(8D+1P)	920		1380			1840		
		11 Drives		(10D+1P)	1070		1600			2140		
		13 Drives		(12D+1P)	1240		1850			2880		
		16 Drives		(15D+1P)	1480		2220			2960		
		4 Drives	RAID 1+0	(2D+2D)	420		620			840		
		8 Drives		(4D+4D)	420		620			840		
		16 Drives		(8D+8D)	420		620			840		
		2 Drives	RAID 1	(1D+1D)	420		620			840		
Copy back(*2)	HUS150 HUS130 HUS110	6 Drives	RAID 6	(4D+2P)	560		830			1120		
		30 Drives		(28D+2P)	700		1040			1400		
		5 Drives	RAID 5	(4D+1P)	590		880			1180		
		16 Drives		(15D+1P)	590		880			1180		
		4 Drives	RAID 1+0	(2D+2D)	420		630			840		
		16 Drives		(8D+8D)	420		630			840		
		2 Drives	RAID 1	(1D+1D)	420		630			840		

*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.

*2 : 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.

*3 : It is support in the Firmware Ver. 0950/A or more.

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‡1 : It is the standard of the correction copy time when data of one Drive was recovered.

Table 2.2.3.1 Standard of the Correction Copy Time/Copy Back Time whose Firmware Version is Less than 0920/B(‡1) (SAS7.2K Drive)

Unit : min

Item				Drive (G byte)(*1)	1,956.94	2,935.96
					2TNL 2TNX	3TNL 3TNX
Correction copy(*2)	HUS150 HUS130 HUS110	4 Drives	RAID 6	(2D+2P)	410 (680)	620 (1020)
		6 Drives		(4D+2P)	550 (880)	830 (1320)
		10 Drives		(8D+2P)	840 (1300)	1250 (1950)
		14 Drives		(12D+2P)	1120 (1650)	1680 (2470)
		18 Drives		(16D+2P)	1400 (2040)	2100 (3050)
		30 Drives		(28D+2P)	2250 (3210)	3370 (4810)
		3 Drives	RAID 5	(2D+1P)	460 (760)	690 (1130)
		5 Drives		(4D+1P)	610 (950)	910 (1420)
		9 Drives		(8D+1P)	900 (1320)	1360 (1970)
		11 Drives		(10D+1P)	1050 (1500)	1580 (2240)
		13 Drives		(12D+1P)	1200 (1680)	1800 (2520)
		16 Drives		(15D+1P)	1430 (1960)	2130 (2930)
		4 Drives	RAID 1+0	(2D+2D)	410 (1320)	650 (1980)
		8 Drives		(4D+4D)	570 (1320)	850 (1980)
		16 Drives		(8D+8D)	870 (1320)	1330 (1980)
		2 Drives	RAID 1	(1D+1D)	410 (1320)	620 (1980)
Copy back(*2)	HUS150 HUS130 HUS110	6 Drives	RAID 6	(4D+2P)	650 (1500)	980 (2250)
		30 Drives		(28D+2P)	1110 (1500)	1660 (2250)
		5 Drives	RAID 5	(4D+1P)	650 (1520)	980 (2280)
		16 Drives		(15D+1P)	780 (1520)	1180 (2280)
		4 Drives	RAID 1+0	(2D+2D)	650 (1260)	980 (1890)
		16 Drives		(8D+8D)	780 (1260)	1180 (1890)
		2 Drives	RAID 1	(1D+1D)	590 (1260)	880 (1890)

*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.

*2 : 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.
The time required may extend depending on the configuration. The maximum value is shown in ( ).

---

‡1 : It is the standard of the correction copy time when data of one Drive was recovered.

Table 2.2.4 Standard of the Correction Copy Time/Copy Back Time whose Firmware Version is 0920/B or More(‡1) (Flash Drive) (SSD)

Unit : min

Item				Drive (G byte)(*1)	195.82	392.73	786.59
					2HGDM	4HGDM	8HGDM(*3)
Correction copy(*2)	HUS150 HUS130 HUS110	4 Drives	RAID 6	(2D+2P)	35	70	140
		6 Drives		(4D+2P)	55	110	220
		10 Drives		(8D+2P)	85	170	340
		14 Drives		(12D+2P)	120	240	480
		18 Drives		(16D+2P)	160	320	640
		30 Drives		(28D+2P)	290	580	1160
		3 Drives	RAID 5	(2D+1P)	35	70	140
		5 Drives		(4D+1P)	55	110	220
		9 Drives		(8D+1P)	85	170	340
		11 Drives		(10D+1P)	110	220	440
		13 Drives		(12D+1P)	130	260	520
		16 Drives		(15D+1P)	150	300	600
		4 Drives	RAID 1+0	(2D+2D)	55	110	220
		16 Drives		(8D+8D)	55	110	220
		2 Drives	RAID 1	(1D+1D)	55	110	220
Copy back(*2)	HUS150 HUS130 HUS110	6 Drives	RAID 6	(4D+2P)	55	110	220
		30 Drives		(28D+2P)	90	180	360
		5 Drives	RAID 5	(4D+1P)	60	120	240
		16 Drives		(15D+1P)	75	150	300
		4 Drives	RAID 1+0	(2D+2D)	55	110	220
		16 Drives		(8D+8D)	55	110	220
		2 Drives	RAID 1	(1D+1D)	55	110	220

*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.

*2 : 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.

*3 : It is support in the Firmware Ver. 0940/A or more.

---

‡1 : It is the standard of the correction copy time when data of one Drive was recovered.

Table 2.2.4.1 Standard of the Correction Copy Time/Copy Back Time whose Firmware Version is Less than 0920/B(‡1) (Flash Drive) (SSD)

Unit : min

Item				Drive (G byte)(*1)	195.82	392.73
					2HGDM	4HGDM
Correction copy(*2)	HUS150 HUS130 HUS110	4 Drives	RAID 6	(2D+2P)	40 (70)	80 (140)
		6 Drives		(4D+2P)	60 (100)	120 (200)
		10 Drives		(8D+2P)	100 (160)	200 (320)
		14 Drives		(12D+2P)	140 (210)	280 (420)
		18 Drives		(16D+2P)	160 (240)	320 (470)
		30 Drives		(28D+2P)	260 (380)	520 (750)
		3 Drives	RAID 5	(2D+1P)	40 (70)	80 (140)
		5 Drives		(4D+1P)	60 (100)	120 (190)
		9 Drives		(8D+1P)	100 (150)	200 (290)
		11 Drives		(10D+1P)	120 (170)	240 (340)
		13 Drives		(12D+1P)	140 (200)	280 (400)
		16 Drives		(15D+1P)	160 (220)	320 (440)
		4 Drives	RAID 1+0	(2D+2D)	80 (190)	160 (380)
		16 Drives		(8D+8D)	80 (190)	160 (380)
		2 Drives	RAID 1	(1D+1D)	80 (190)	160 (380)
Copy back(*2)	HUS150 HUS130 HUS110	6 Drives	RAID 6	(4D+2P)	80 (190)	160 (380)
		30 Drives		(28D+2P)	80 (190)	160 (380)
		5 Drives	RAID 5	(4D+1P)	80 (190)	160 (380)
		16 Drives		(15D+1P)	80 (190)	160 (380)
		4 Drives	RAID 1+0	(2D+2D)	80 (190)	160 (380)
		16 Drives		(8D+8D)	80 (190)	160 (380)
		2 Drives	RAID 1	(1D+1D)	80 (190)	160 (380)

*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.

*2 : 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.
The time required may extend depending on the configuration. The maximum value is shown in ( ).

---

‡1 : It is the standard of the correction copy time when data of one Drive was recovered.

Table 2.2.4.2 Standard of the Correction Copy Time/Copy Back Time whose Firmware Version is 0955/A or More(‡1) (Flash Drive) (FMD)

Unit : min

Item				Drive (G byte)(*1)	1,758.12
					1R6FM
Correction copy(*2)	HUS150	4 Drives	RAID 6	(2D+2P)	300
		6 Drives		(4D+2P)	430
		10 Drives		(8D+2P)	700
		14 Drives		(12D+2P)	1060
		18 Drives		(16D+2P)	1350
		30 Drives		(28D+2P)	2350
		3 Drives	RAID 5	(2D+1P)	300
		5 Drives		(4D+1P)	440
		9 Drives		(8D+1P)	710
		11 Drives		(10D+1P)	900
		13 Drives		(12D+1P)	1100
		16 Drives		(15D+1P)	1300
		4 Drives	RAID 1+0	(2D+2D)	450
		16 Drives		(8D+8D)	450
		2 Drives	RAID 1	(1D+1D)	450
Copy back(*2)	HUS150	6 Drives	RAID 6	(4D+2P)	460
		30 Drives		(28D+2P)	750
		5 Drives	RAID 5	(4D+1P)	480
		16 Drives		(15D+1P)	600
		4 Drives	RAID 1+0	(2D+2D)	450
		16 Drives		(8D+8D)	450
		2 Drives	RAID 1	(1D+1D)	450

*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.

*2 : 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.

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‡1 : It is the standard of the correction copy time when data of one Drive was recovered.

(7) Removing a Flash Drive (FMD) built-in battery

Follow the flowchart shown below. If a failure has occurred, remove the battery.

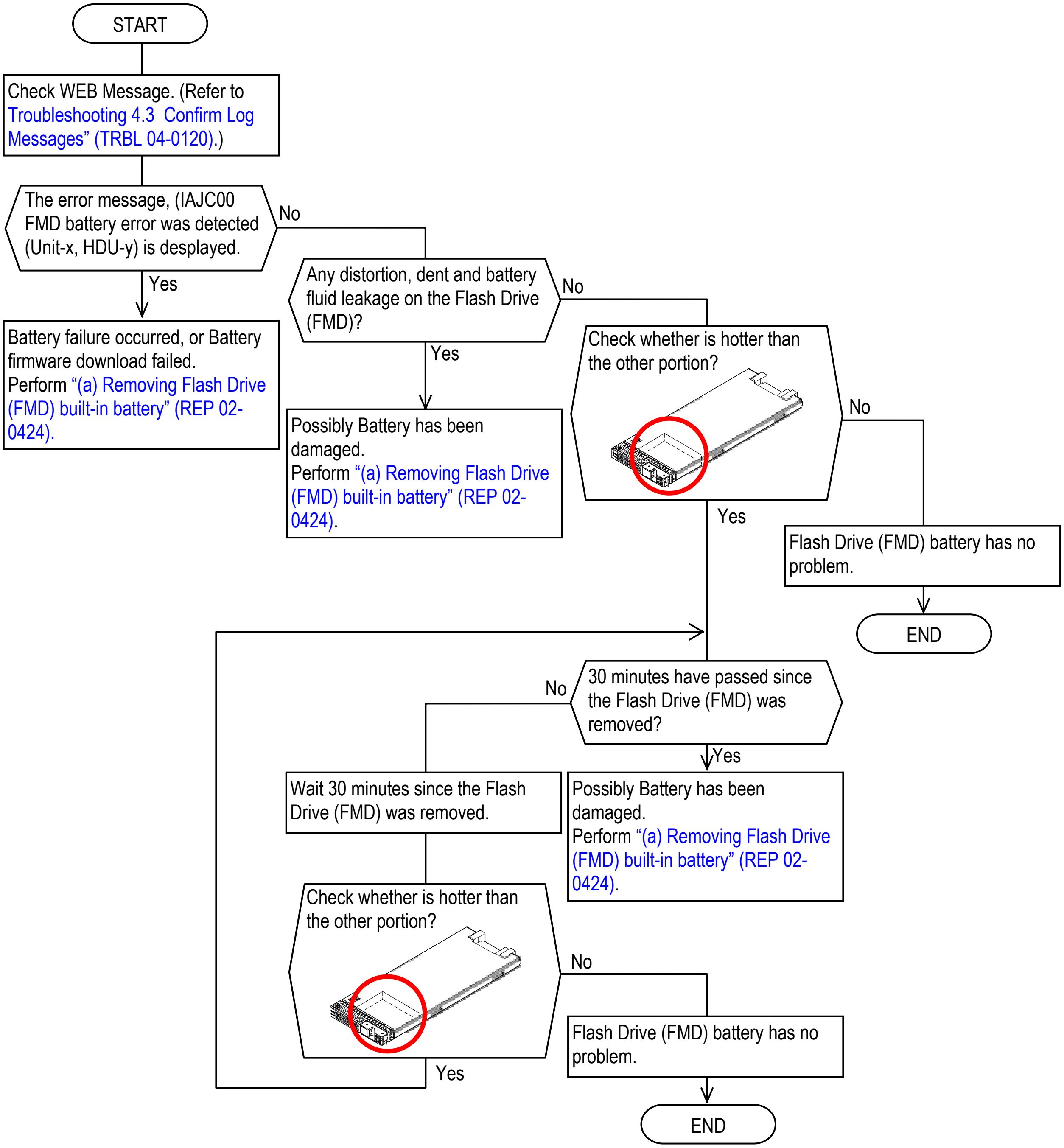

START
Check WEB Message. (Refer to Troubleshooting 4.3 Confirm Log Messages" (TRBL 04-0120).)
The error message, (IAJC00 FMD battery error was detected (Unit-x, HDU-y) is desplayed.
No
Yes
Battery failure occurred, or Battery firmware download failed. Perform "(a) Removing Flash Drive (FMD) built-in battery" (REP 02-0424).
Any distortion, dent and battery fluid leakage on the Flash Drive (FMD)?
No
Yes
Possibly Battery has been damaged. Perform "(a) Removing Flash Drive (FMD) built-in battery" (REP 02-0424).
Check whether is hotter than the other portion?
No
Yes
Flash Drive (FMD) battery has no problem.
END
No
30 minutes have passed since the Flash Drive (FMD) was removed?
Yes
Wait 30 minutes since the Flash Drive (FMD) was removed.
Possibly Battery has been damaged. Perform "(a) Removing Flash Drive (FMD) built-in battery" (REP 02-0424).
Check whether is hotter than the other portion?
No
Yes
Flash Drive (FMD) battery has no problem.
END

Figure 2.2.9.2 Flowchart for Determining whether a Flash Drive (FMD) built-in battery Failure has Occurred

(a) Removing Flash Drive (FMD) built-in battery

(i) Remove 4 Screws (SB310N) on the bottom side of Flash Drive (FMD) by using cross-head screw driver.

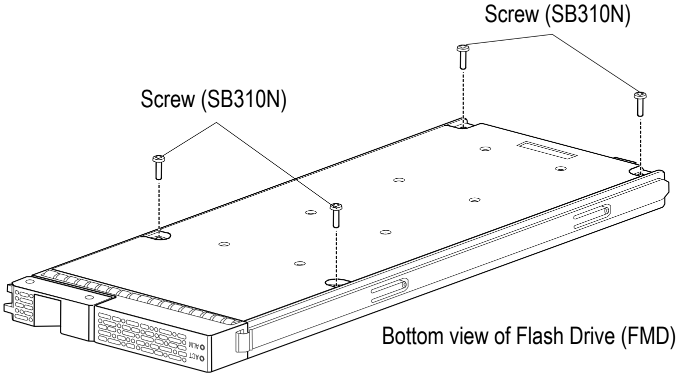


Figure 2.2.9.3 Removing Screws

(ii) Remove ①TOP COVER and ②BOTTOM COVER.

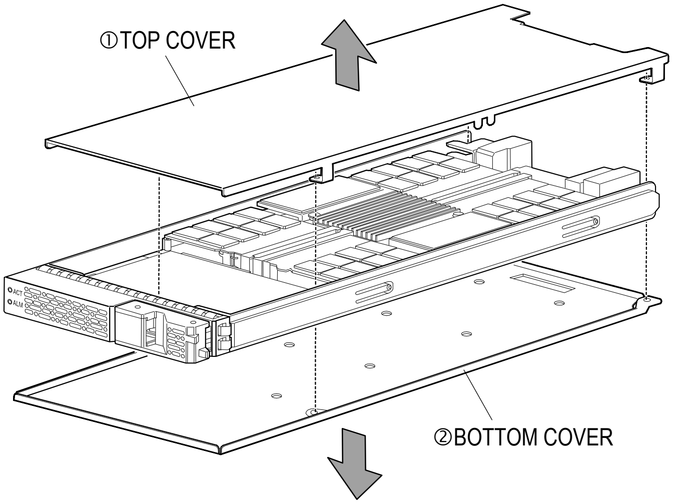


Figure 2.2.9.4 Removing Covers.

(iii) Remove 2 sets of Tapping-screw and Washer by using cross-head screw driver.

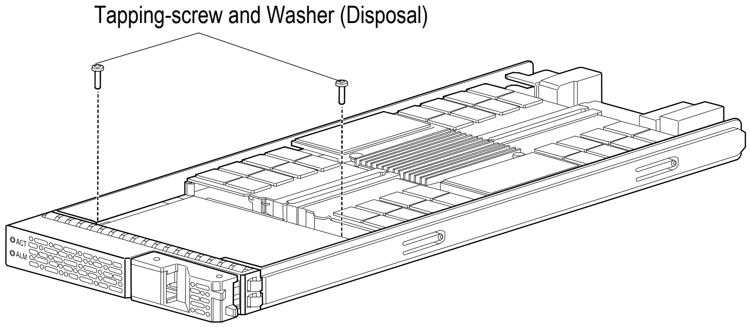


Figure 2.2.9.5 Removing Tapping-Screws and Washers

(iv) Move the Battery to the front bezel side and disconnect the Battery from the circuit board.

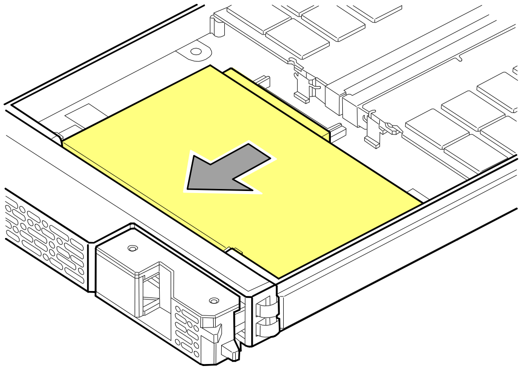


Figure 2.2.9.6 Disconnecting from the Connector

(v) Remove the Battery to the bottom side of Flash Drive (FMD). (After the connector comes off, battery is lowered below.)

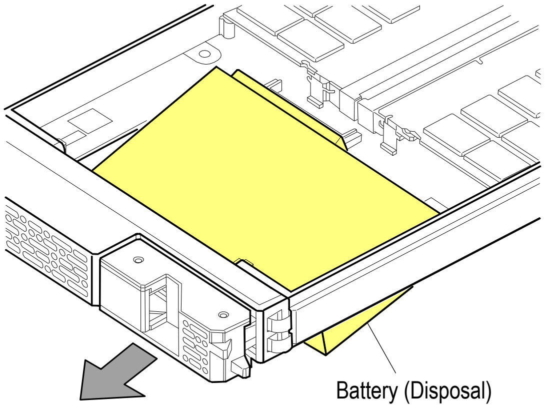


Figure 2.2.9.7 Removing the Battery

(vi) Installing the ①TOP COVER and ②BOTTOM COVER.

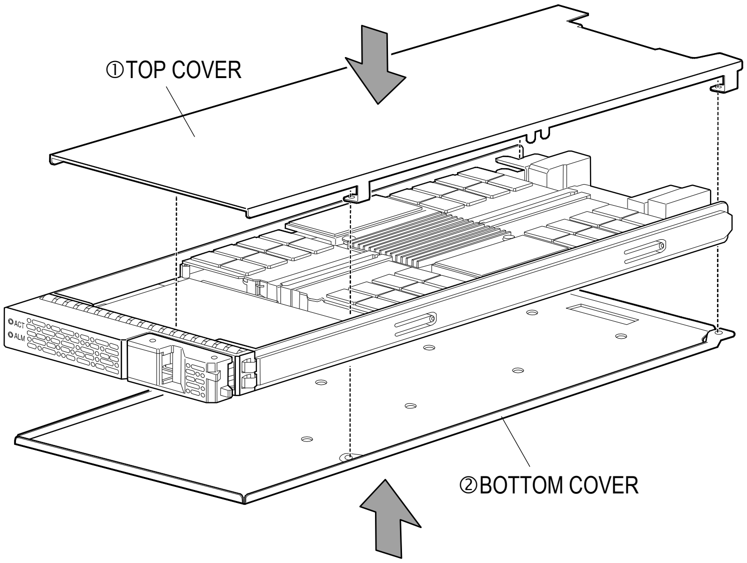


Figure 2.2.9.8 Reassemble the Flash Drive (FMD)

(vii) Installing the 4 Screws (SB310N) on the bottom side of Flash Drive (FMD) by using cross-head.

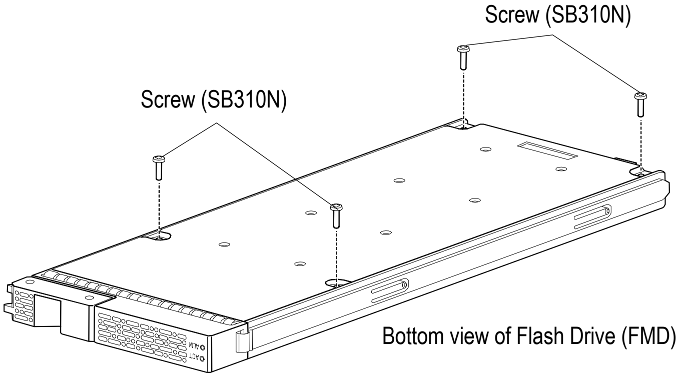


Figure 2.2.9.9 Installing Screws

(viii) Dispose of the Tapping-screws, Washers and Battery removed in procedures (iii) and (v). When dispose of the Battery, follow the directions given by the local law where the product is used. (Also refer to "Chapter 5. Recycling" (REP 05-0000).)

2.2.2 Replacing a Cache Backup Battery

Replacing a Cache Backup Battery is an operation for Controller Box (CBXSL/CBXSS/CBLS/CBSS/CBL).
The replacement procedure for CBXSL/CBXSS/CBLS/CBSS and for CBL is different.

(1) Replacing a Cache Backup Battery for CBXSL/CBXSS/CBLS/CBSS
Select a procedure from the following and execute it.

NOTE :
- The Cache Backup Battery for CBXSL/CBXSS/CBSL/CBSS is installed in a Power Unit.
- With the power turned on (Ready status), two Cache Backup Batteries cannot be replaced at the same time.

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on (hot replacement)	1. When the power is turned off during the replacement, user data on the cache that has not been written on a Drive is not backed up because the power is not supplied from the battery. 2. Complete the replacement within ten minutes. Otherwise, a powering off may occur because of an abnormal temperature rise. Perform the part replacement in haste. 3. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the preventive replacement after the LED lights on. 4. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box usually goes out about 30 seconds later.	Refer to "(1-1) Procedure for replacement with the power turned on " (REP 02-0450).
2	Replacement with the power turned off	Cannot be performed.	—

⚠ CAUTION

- **A closed type nickel-hydrogen battery can cause an electric shock or explosion if it is handled wrongly. Observe the following requirements for handling.**
  - **Do not disassemble or remake the battery.**
  - **Do not deform the battery.**
  - **Do not connect plus and minus poles with a metallic article such as a wire.**
  - **Do not reverse the connections of plus and minus poles.**
  - **Do not peel off the covering tube.**
  - **Do not connect the battery directly to the outlet.**
  - **Do not connect the battery to anything other than this array for charging/discharging.**
  - **Do not leave the battery in a hot place. Store it in a dark and cool place.**
  - **Do not discard a used battery at the site where it was removed for replacement.**

(1-1) Procedure for replacement with the power turned on

Refer to "Figure 2.2.10 Replacing a Cache Backup Battery" (REP 02-0470).

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).). In case of the preventive replacement, the collection of the error information is not required.

(a) Remove the Power Unit on which the B-ALM LED (red) for the Cache Backup Battery is on.
In case of the preventive replacement, although the B-ALM LED (red) does not light up, the procedure is the same. Check again that the cache backup battery to be replaced is the target part and then remove it.

NOTE : When the Power Unit is removed, "W07zyC PS alarm (Unit-0, PS-x)" is displayed in the Information Message on Web. However, the maintenance work for Power Unit is not necessary.

(i) Hold up the latch on the cable holder of the Power Unit to release the lock, and then slide the cable holder forward.
(ii) Remove the power cable from the Power Unit.
(iii) Pull the lever open (②) while pressing the latch on the Power Unit inward with right thumb (①).
When the lever is completely opened, the Power Unit comes out forward.
(iv) Pull out and remove the Power Unit while holding its body with both hands.

(b) Remove the Cache Backup Battery.
(i) Loosen the screw (blue) on the Cache Backup Battery cover and then open it.
(ii) Remove the cable for Cache Backup Battery from the cable clamp.
(iii) Remove the cable for the Cache Backup Battery from the connector on the Power Unit.
(iv) Remove the Cache Backup Battery.

(c) Install a new Cache Backup Battery.
(i) Put a new Cache Backup Battery on the Power Unit, and then connect the cable for the Cache Backup Battery to the connector on the Power Unit.
(ii) Fix the cable for the Cache Backup Battery with the cable clamp.

NOTE : Bend the cable for the Cache Backup Battery with a long radius not to apply the cable and the connector excessive stresses.

(iii) Close the Cache Backup Battery cover and then tighten the screw (blue).

(d) Install the Power Unit which includes a new Cache Backup Battery.

> NOTE : Install the Power Unit in 20 seconds or more after removing the Power Unit. If you insert the Power Unit without waiting for more than 20 seconds, the Power Unit may not be recovered normally (‡1).

- (i) With the lever opened completely, insert the Power Unit into the slot.
- (ii) Push the Power Unit in all the way.
- (iii) Close the lever completely, and then fix the Power Unit.
- (iv) Connect the power cable to the installed Power Unit.
- (v) Fix the cable holder with the power cable, and then push the cable holder in.

(e) Charge the Cache Backup Battery after the B-RDY LED (green) on the Power Unit blinks until it changes to lighting. (Although the RDY LED (green) blinks during the charge, it changes to lighting when the charge is completed. It is about 3 hours at the maximum.)

(f) Check that the B-RDY LED (green) on the Power Unit is on.

(g) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡2). The READY LED (green) on the front of the Controller Box may blink at high speed (for a maximum of 30 to 50 minutes).

(h) Refer to “Information Message” on WEB, and check to see that “I0030x Battery recovered (Battery-x)” is indicated. (Refer to WEB “2.5 Information Message” (WEB 02-0150).)
This message appears usually about 1 minute and 30 seconds after inserting the Power Unit.
After that, check that “I006z0 PS recovered” is indicated.
When this is indicated, the replacement of Cache Backup Battery has completed.

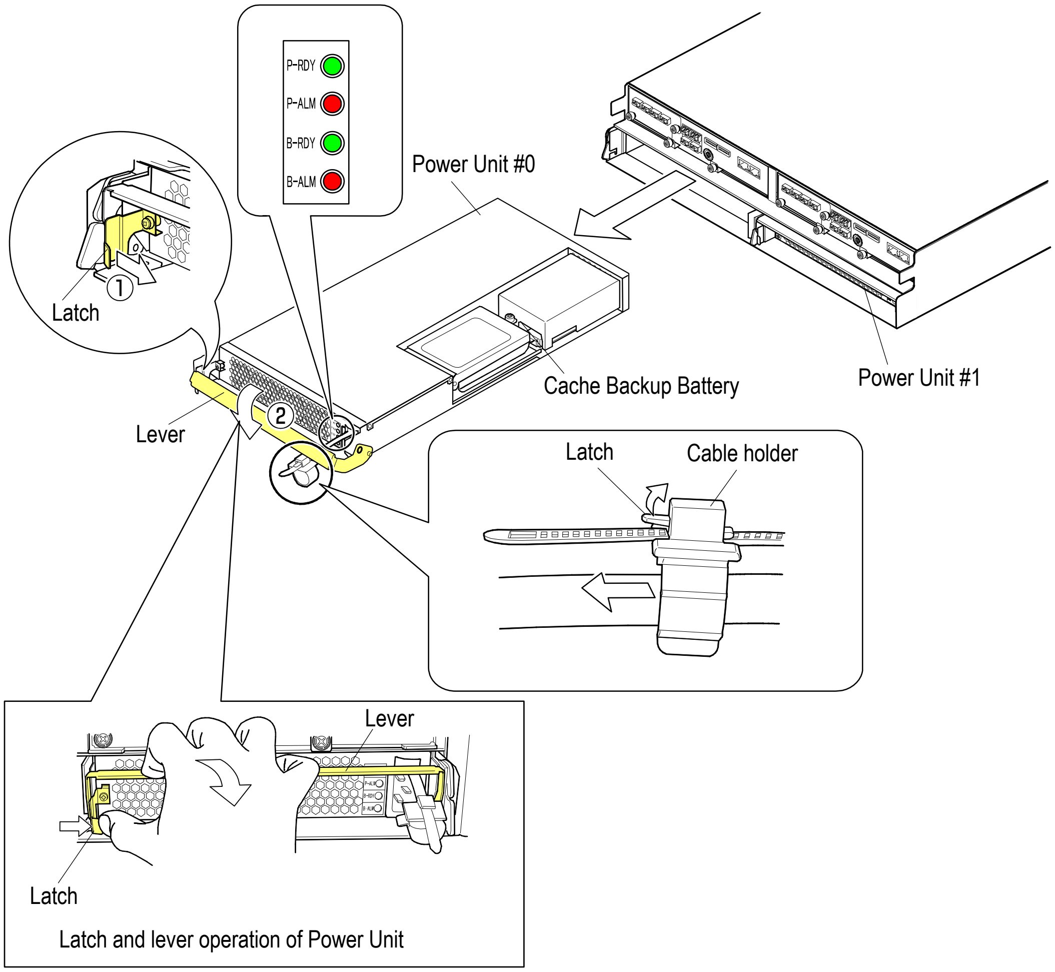
(i) Dispose of the removed Cache Backup Battery by recycling. For recycling, refer to “Chapter 5. Recycling” (REP 05-0000).

---

‡1 : Remove the inserted Power Unit, and insert it again after 20 seconds or more passed.

‡2 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(a) Removing a Power Unit



(b) Replacing a Cache Backup Battery

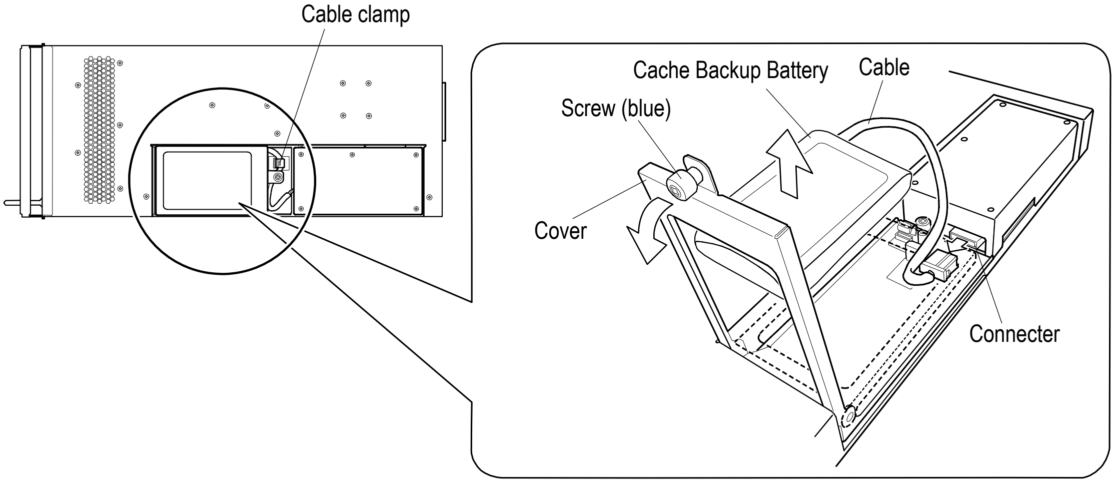


Figure 2.2.10 Replacing a Cache Backup Battery (CBXSL/CBXSS/CBLS/CBSS)

(2) Replacing a Cache Backup Battery for CBL

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on (hot replacement)	1. When the power is turned off during the replacement, user data on the cache that has not been written on a Drive is not backed up because the power is not supplied from the battery. 2. Complete the replacement within ten minutes. Otherwise, a powering off may occur because of an abnormal temperature rise. Perform the part replacement in haste. 3. When replacing two Cache Backup Batteries at the same time, the Cache is changed to the Write-Through mode (*1) and the R/W performance is somewhat deteriorated, so that replace them quickly. Also, if the Cache Backup Batteries are all removed from the Controller Box, the array becomes the Warning status. However, when the Cache Backup Batteries are all recovered normally, the Warning status of the array is released. 4. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the preventive replacement after the LED lights on. 5. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box usually goes out about 30 seconds later.	Refer to "(2-1) Procedure for replacement with the power turned on " (REP 02-0500).
2	Replacement with the power turned off	Cannot be performed.	—

*1 : The Write-Through means the operation to write the write data to the Drive and respond to the host computer immediately after the array received 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. Refer to Introduction "3.3.1 Command Execution" (INTR 03-0130) for the conditions to execute the Write-Through.

⚠ CAUTION

- **A closed type nickel-hydrogen battery can cause an electric shock or explosion if it is handled wrongly. Observe the following requirements for handling.**
  - **Do not disassemble or remake the battery.**
  - **Do not deform the battery.**
  - **Do not connect plus and minus poles with a metallic article such as a wire.**
  - **Do not reverse the connections of plus and minus poles.**
  - **Do not peel off the covering tube.**
  - **Do not connect the battery directly to the outlet.**
  - **Do not connect the battery to anything other than this array for charging/discharging.**
  - **Do not leave the battery in a hot place. Store it in a dark and cool place.**
  - **Do not discard a used battery at the site where it was removed for replacement.**

(2-1) Procedure for replacement with the power turned on

Refer to "Figure 2.2.10 Replacing a Cache Backup Battery" (REP 02-0470).

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).). In case of the preventive replacement, the collection of the error information is not required.

(a) Remove the Front Bezel. (Refer to Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door" (INST 01-0140).)

(b) Remove the Cache Backup Battery whose the ALM LED (red) is on.

In case of the preventive replacement, although the ALM LED (red) does not light up, the procedure is the same. Check again that the cache backup battery to be replaced is the target part and then remove it.

(i) Loosen the screw (blue) which fixes the Cache Backup Battery.

(ii) Open the lever, and then pull out and remove the Cache Backup Battery.

NOTE : Since the depth of a Cache Backup Battery is as long as about 488 mm and it is as heavy as about 5.0 kg, please pull out carefully.

(c) Install a new Cache Backup Battery.

NOTE : Install a new Cache Backup Battery in 20 seconds or more after removing the Cache Backup Battery. If you insert the Cache Backup Battery without waiting for more than 20 seconds, the Cache Backup Battery may not be recovered normally(‡1).

(i) With the lever opened completely, insert the Cache Backup Battery into the slot.

(ii) Push the Cache Backup Battery in all the way.

(iii) Close the lever, and tighten the screw (blue) to fix the Cache Backup Battery.

(d) Charge the Cache Backup Battery after the RDY LED (green) on the Cache Backup Battery blinks until it changes to lighting. (Although the RDY LED (green) blinks during the charge, it changes to lighting when the charge is completed. It is about 3 hours at the maximum.)

(e) Check that the RDY LED (green) on the Cache Backup Battery is on.

(f) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡2). The READY LED (green) on the front of the Controller Box may blink at high speed (for a maximum of 40 to 60 minutes (80 to 180 minutes when the DBW is connected to the CBL)).

---

‡1 : Remove the inserted Cache Backup Battery, and insert it again after 20 seconds or more passed.

‡2 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(g) Refer to “Information Message” on WEB, and check to see that “I0030x Battery recovered (Battery-x)” is indicated. (Refer to WEB “2.5 Information Message” (WEB 02-0150).)
This message appears usually about 1 minute after inserting the Cache Backup Battery.
When this is indicated, the replacement of Cache Backup Battery has completed.

(h) Attach the Front Bezel. (Installation “1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door” (INST 01-0140).)

(i) Dispose of the removed Cache Backup Battery by recycling. For recycling, refer to “Chapter 5. Recycling” (REP 05-0000).

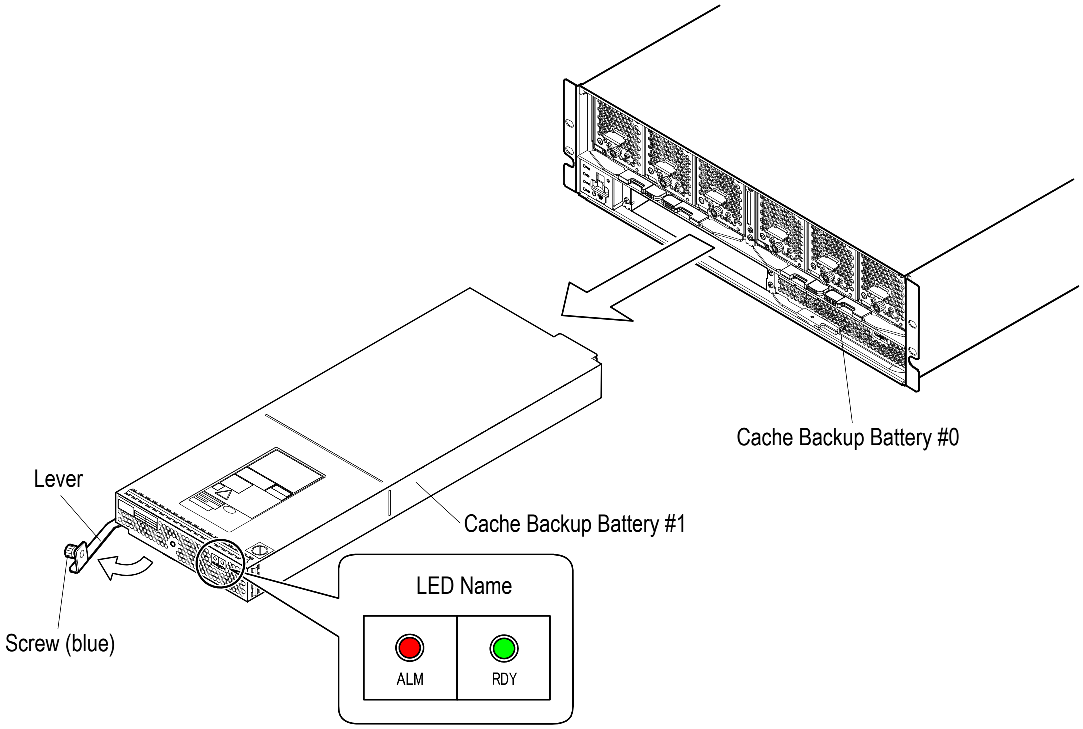


Figure 2.2.11 Replacing a Cache Backup Battery (CBL)

2.2.3 Replacing a Fan Module

The replacement of a Fan Module is only for the CBL and the DBW.

(1) Replacing a Fan Module for the CBL

⚠ CAUTION

Since each fan is rotating with high-speed, be careful not to be caught by it.

Select a procedure from the following and execute it.

NOTICE

- **The replacement of the component is restricted in time. This operation requires referring to the manual. If the array is left with this component removed for more than 10 minutes, it will stop by detecting the thermal alarm.**
- **When the ALM LED on the Controller is on while the ALM LED of the Fan Module is on, be sure to solve the trouble of the Controller first.**
- **When replacing the Fan Module, do it promptly after preparing a replacement Fan Module and arranging cables, etc. so that they do not disturb the replacement.**

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on (hot replacement)	1. Complete the replacement within ten minutes and restart the fans of the Fan Module to rotate. Otherwise, a powering off may occur because of an abnormal temperature rise. Perform the part replacement in haste. 2. Be sure to replace the Power Unit first when the Power Unit and the Fan Module fail at the same time. 3. Replace them with the power turned off in case of failures of three fans. 4. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 5. The array becomes a planned shutdown and the power supply is turned off, so that, work so not to pull out three Fan Modules. 6. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box usually goes out about 30 seconds later.	See "(1-1) Procedure for replacement with the power turned on" (REP 02-0530)

To be continued to the next page.

No.	Power status during the replacement	Restriction	Reference section
2	Replacement with the power turned off	1. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program or the automatic download of the ENC firmware and the backup controller firmware at the time of turning the power on in the single controller configuration is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box goes out at the maximum of 30 to 85 minutes later and the READY LED (green) lights up.	See "(1-2) Procedure for replacement with the power turned off" (REP 02-0550)

(1-1) Procedure for replacement with the power turned on

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).). In case of the preventive replacement, the collection of the error information is not required.

(a) Remove the Front Bezel. (Refer to Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door" (INST 01-0140).)

(b) Make sure that the ALM LED (red) on the Fan Module is on.
In case of the preventive replacement, although the ALM LED (red) does not light up, the procedure is the same.

(c) Remove the Fan Module whose the ALM LED (red) is on.
In case of the preventive replacement, because the ALM LED (red) does not light up, check again that the fan module to be replaced is the target part and then remove it.
  (i) Loosen the screw (blue) which fixes the Fan Module.
  (ii) Slide the Fan Module forward by sliding the latch upward, and remove it.

NOTE : About 10 seconds after removing the Fan Module, there is possibility for the blades to be still rotating. Make sure not to insert a finger in the Fan Module.

(d) Install a new Fan Module.

NOTE : Install a Fan Module in 20 seconds or more after removing the Fan Module.
If you insert the Fan Module without waiting for more than 20 seconds, the Fan Module may not be recovered normally (‡1).

  (i) Insert the Fan Module into the slot.
  (ii) Tighten the screw (blue) to fix the Fan Module.

---

‡1 : Remove the inserted Fan Module, and insert it again after 20 seconds or more passed.

(e) Make sure that the ALM LED (red) on the new Fan Module is off.

(f) Check that the fans of the new Fan Module are rotating.

(g) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) on the front of the Controller Box may blink at high speed (for the maximum of 40 to 60 minutes (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.

(h) Refer to "Information Message" on WEB, and check to see that "I00500 FAN recovered (CTL-Unit, FAN-xy)" is indicated. (Refer to WEB "2.5 Information Message"(WEB 02-0150).)
This message appears usually about 1 minute and 30 seconds after inserting the Fan Module. When this is indicated, the replacement of Fan Module has completed.

(i) Attach the Front Bezel. (Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door" (INST 01-0140).)

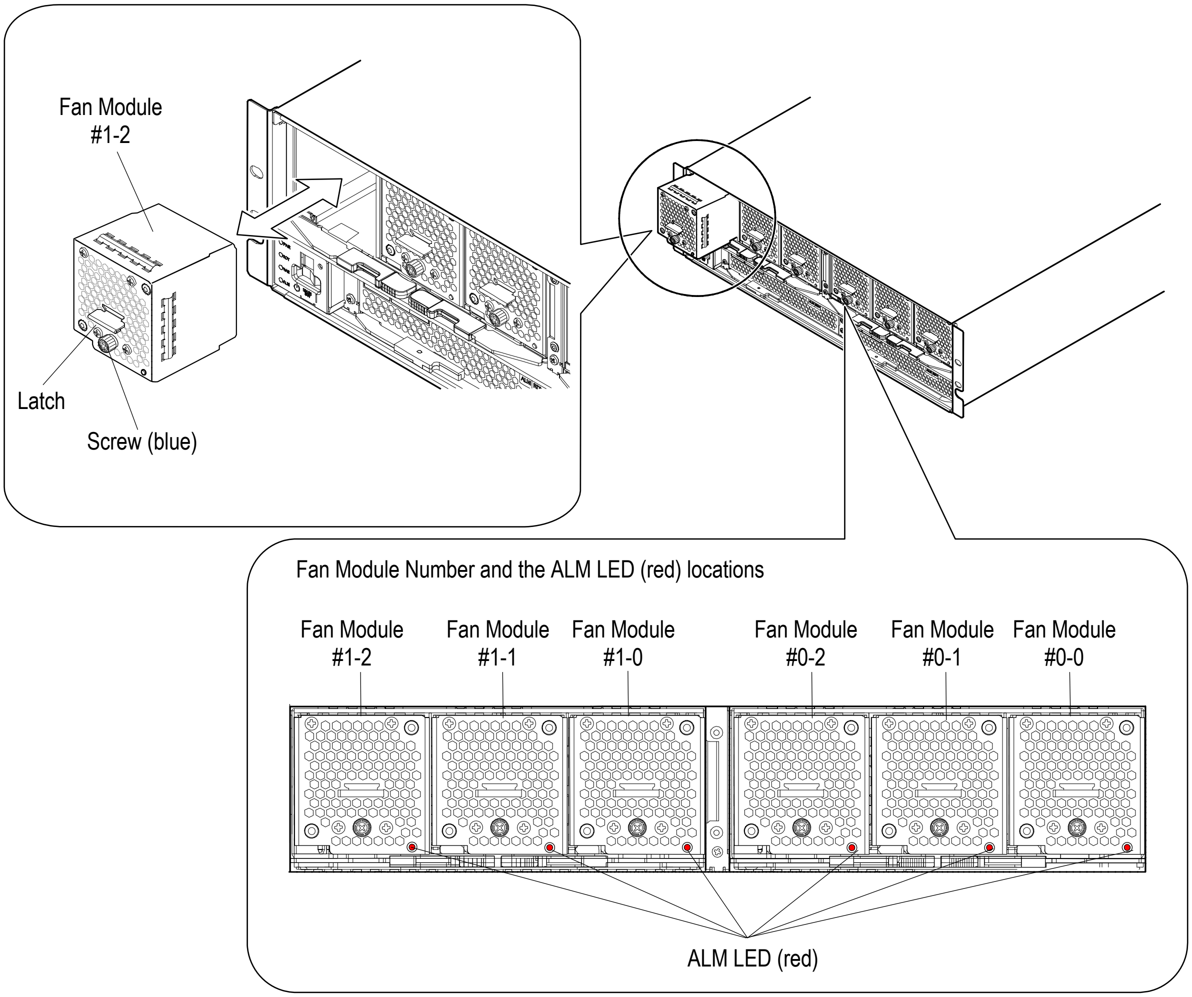


Figure 2.2.12 Replacing Fan Module (CBL)

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(1-2) Procedure for replacement with the power turned off

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message “Chapter 1 ③ Collecting Error Information” (MSG 01-0000).).

(a) Turn off the main switch.

Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If you cannot turn off the power, troubleshoot the failure by connecting to the WEB.

NOTE : If the C-PWR LED (green) on the Controller blinks, it may be that some of the Cache Memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.
If the Controller is removed from the array when the C-PWR LED (green) blinks, user data may be lost.

(b) Remove the Front Bezel. (Refer to Installation “1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door” (INST 01-0140).)

(c) Remove the Fan Module.
  (i) Loosen the screw (blue) which fixes the Fan Module.
  (ii) Slide the Fan Module forward by sliding the latch upward, and remove it.

(d) Install a new Fan Module.
  (i) Insert the Fan Module into the slot.
  (ii) Tighten the screw (blue) to fix the Fan Module.

(e) Turn on the main switch (the array usually recovers in about 5 to 7 minutes for CBXSL/CBXSS, about 5 to 8 minutes for CBSL/CBSS, and about 5 to 10 minutes for CBL).
Check that the status of the ALM LED (red) on the new Fan Module is off.

(f) Check that the fans of the new Fan Module are rotating.

(g) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) on the front of the Controller Box may blink at high speed (for the maximum of 40 to 60 minutes (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.

(h) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware “1.6 (4) Checking the start message and end message of the automatic download” (FIRM 01-1620).)

(i) Attach the Front Bezel. (Installation “1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door” (INST 01-0140).)

---

‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(2) Replacing a Fan Module for the DBW

⚠ **CAUTION**

Since each fan is rotating with high-speed, be careful not to be caught by it.

Select a procedure from the following and execute it.

NOTICE

- **The replacement of the component is restricted in time. This operation requires referring to the manual. If the array is left with this component removed for more than 5 minutes, it will stop by detecting the thermal alarm.**
- **When the ALM LED on the Controller is on while the ALM LED of the Fan Module is on, be sure to solve the trouble of the Controller first.**
- **When replacing the Fan Module, do it promptly after preparing a replacement Fan Module and arranging cables, etc. so that they do not disturb the replacement.**

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on (hot replacement)	1. Complete the replacement within five minutes and restart the fans of the Fan Module to rotate. Otherwise, a powering off may occur because of an abnormal temperature rise. Perform the part replacement in haste. 2. Be sure to replace the Power Unit first when the Power Unit and the Fan Module fail at the same time. 3. Replace them with the power turned off in case of failures of two fans. 4. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 5. The array becomes a planned shutdown and the power supply is turned off, so that, work so not to pull out three Fan Modules. 6. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box usually goes out about 30 seconds later. 7. When using Tray Power Saving, check that the DBW to replace the FAN is not in the power saving status, and then replace it. ([Tray Power Saving Status] on the table of [Energy Saving] – [Tray Power Saving] of Hitachi Storage Navigator Modular 2 is "Normal")	See "(2-1) Procedure for replacement with the power turned on" (REP 02-0553)
2	Replacement with the power turned off	1. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program or the automatic download of the ENC firmware and the backup controller firmware at the time of turning the power on in the single controller configuration is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box goes out at the maximum of 30 to 85 minutes later and the READY LED (green) lights up.	See "(2-2) Procedure for replacement with the power turned off" (REP 02-0555)

(2-1) Procedure for replacement with the power turned on

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message “Chapter 1 ③ Collecting Error Information” (MSG 01-0000).).

(a) Remove the Fan Module.

Push down and hold the retaining latch and pull the Fan Module out by its handle.

NOTE : About 10 seconds after removing the Fan Module, there is possibility for the blades to be still rotating. Make sure not to insert a finger in the Fan Module.

(b) Install a new Fan Module.

Insert the new Fan Module into the slot until the latch clicks into place.

NOTE : Install a Fan Module in 20 seconds or more after removing the Fan Module. If you insert the Fan Module without waiting for more than 20 seconds, the Fan Module may not be recovered normally (‡1).

(i) Pull the lever of the new Fan Module down completely (the latch is released), and insert it into the slot.

NOTE : Check that the latch of the new Fan Module is down.

(ii) After inserting the new Fan Module until it stops, return the lever to the original position (the latch is locked).

(iii) Pull the handle of new Fan Module, and check that the FAN Module does not come off.

(c) Check that the fans of the new Fan Module are rotating.

(d) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡2). The READY LED (green) on the front of the Controller Box may blink at high speed (for the maximum of 40 to 60 minutes (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.

(e) Refer to “Information Message” on WEB, and check to see that “I00500 FAN recovered (Unit-x, FAN-y)” is indicated. (Refer to WEB “2.5 Information Message”(WEB 02-0150).)

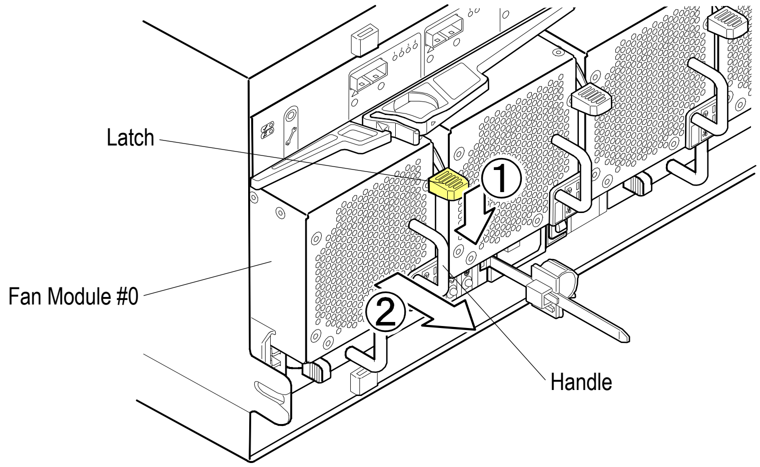
This message appears usually about 1 minute and 30 seconds after inserting the Fan Module. When this is indicated, the replacement of Fan Module has completed.

---

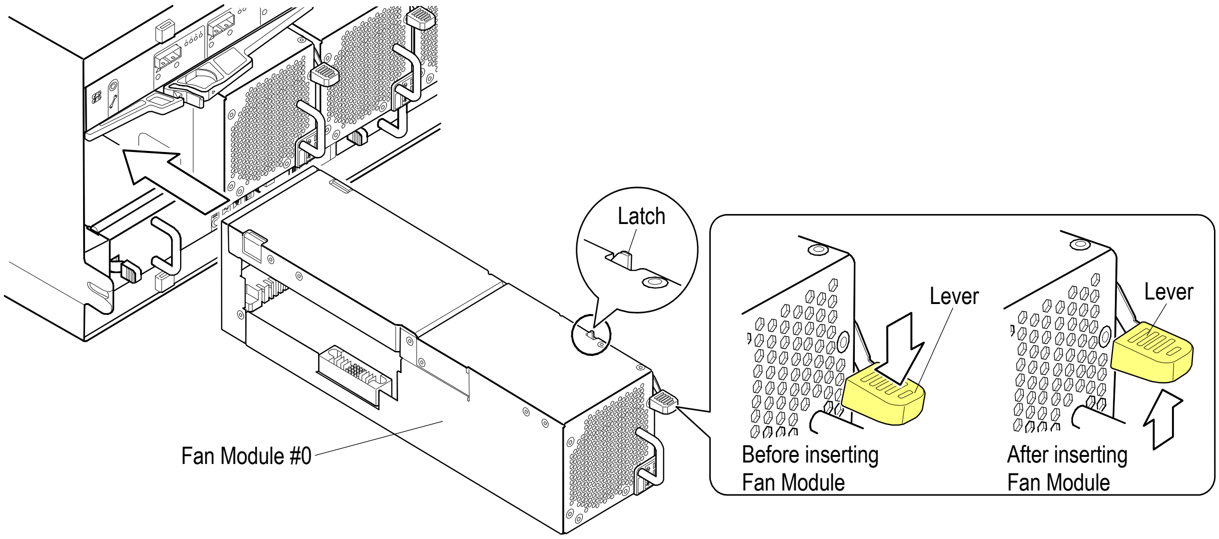
‡1 : Remove the inserted Fan Module, and insert it again after 20 seconds or more passed.

‡2 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

Fan Module removal procedure



Fan Module installation procedure



Fan Module numbering and ALM LED (red) location

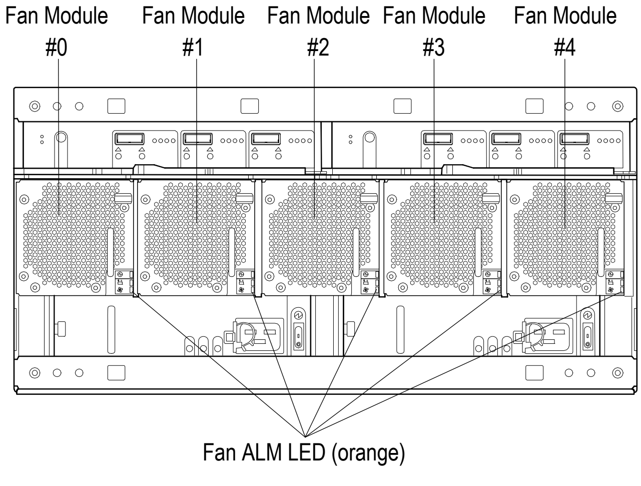


Figure 2.2.12.1 Replacing Fan Module (DBW)

(2-2) Procedure for replacement with the power turned off

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message “Chapter 1 ③ Collecting Error Information” (MSG 01-0000).).

(a) Turn off the main switch on the Controller Box.

Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If you cannot turn off the power, troubleshoot the failure by connecting to the WEB.

NOTE : If the C-PWR LED (green) on the Controller blinks, it may be that some of the Cache Memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.
If the Controller is removed from the array when the C-PWR LED (green) blinks, user data may be lost.

(b) Turn off the power switches on the two Power Units in the DBW.

(c) Remove the Fan Module.

Push down and hold the retaining latch and pull the Fan Module out by its handle.

(d) Install a new Fan Module.

(i) Pull the lever of the new Fan Module down completely (the latch is released), and insert it into the slot.

NOTE : Check that the latch of the new Fan Module is down.

(ii) After inserting the new Fan Module until it stops, return the lever to the original position (the latch is locked).

(iii) Pull the handle of new Fan Module, and check that the FAN Module does not come off.

(e) Turn on the power switches on the two Power Units in the DBW.

(f) Turn on the main switch on the Controller Box (the array usually recovers in about 5 to 10 minutes for CBL).

(g) Check that the fans of the new Fan Module are rotating.

(h) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) on the front of the Controller Box may blink at high speed (for the maximum of 40 to 60 minutes (80 to 180 minutes when the DBW is connected to the CBL)) or the WARNING LED (orange) may blink at high speed (for the maximum of 30 to 85 minutes) before READY LED (green) lights up.

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(i) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware “1.6 (4) Checking the start message and end message of the automatic download” (FIRM 01-1620).)

2.2.4 Replacing a Power Unit

The procedure for replacing the Power Unit is different in the CBXSL/CBXSS/CBSL/CBSS/CBL/DBL/DBS/DBF, DBX, and DBW.
Be careful not to make mistakes on the type names of the parts.

(1) Replacing the Power Unit of the CBXSL/CBXSS/CBSL/CBSS/CBL/DBL/DBS/DBF

NOTICE

- **The replacement of the component is restricted in time. This operation requires referring to the manual. If the array is left with this component removed for more than 10 minutes, it will stop by detecting the thermal alarm.**
- **When a trouble of the Power Unit is detected due to a trouble of the Fan Module, the Power Unit does not need to be replaced.**
  When a trouble of the Power Unit is detected during replacement of the Fan Module, pull out and then insert the Power Unit.
- **When replacing the Power Unit, do it in haste after preparing a replacement Power Unit and arranging cables, etc. so that they do not disturb the replacement.**
- **Check the type of the power supply before replacing the Power Unit. Do not install the DC power unit to the AC Power Supply Model.**

Select a procedure from the following and execute it.

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on (hot replacement)	1. Complete the replacement within ten minutes. 2. When the Power Unit and another module fail at the same time, replace the Power Unit first. Otherwise, an array down may occur because of an abnormal temperature rise. 3. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 4. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box usually goes out about 30 seconds later.	Refer to "(1-1) Procedure for replacement with the power turned on" (REP 02-0570)
		When both of the two Power Units are required to be replaced, be sure to replace each one of them at a time, or replace them while the power is turned off (in case of DBL/DBS/DBF).	Refer to "(1-1) Procedure for replacement with the power turned on" (REP 02-0570)

To be continued to the next page.

No.	Power status during the replacement	Restriction	Reference section
2	Replacement with the power turned off	1. For the CBXSL/CBXSS/CBSL/CBSS/CBL, Power Unit cannot be replaced with the power turned off. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 3. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program or the automatic download of the ENC firmware and the backup controller firmware at the time of turning the power on in the single controller configuration is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box goes out at the maximum of 30 to 85 minutes later and the READY LED (green) lights up.	Refer to "(1-2) Procedure for replacement with the power turned off" (REP 02-0620)

(1-1) Procedure for replacement with the power turned on
(Be sure to perform the following operations (a) to (h) within 10 minutes.) (
Following the error collection item in the generated error message, verify that the required error information is collected.
If the required error information is not collected, collect it (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).). In case of the preventive replacement, the collection of the error information is not required.

(a) Check that ALM LED (red) (For the CBXSL/CBXSS/CBSL/CBSS, P-ALM LED (red)) of the Power Unit to be replaced is on.
Check that RDY LED (green) (For the CBXSL/CBXSS/CBSL/CBSS, P-RDY LED (green)) of the Power Unit not to be replaced is on.
In case of the preventive replacement, although the ALM LED (red) (For the CBXSL/CBXSS/CBSL/CBSS, P-ALM LED (red)) does not light up, the procedure is the same.
Check again that the Power Unit to be replaced is the target part and then remove it.

NOTE : When the ALM LEDs (red) on the Power Unit of the DBL/DBS/DBF are on, replace the Power Unit with the power turned off.

(b) Hold up the latch on the cable holder of the Power Unit to release the lock, and then slide the cable holder forward.

(c) Disconnect the power cables connected to the Power Unit to be replaced.

NOTE : Power Unit cannot be removed with the power cable inserted.

(d) Remove the Power Unit.

(d-1) For CBXSL/CBXSS/CBSL/CBSS

NOTE : When the Power Unit is removed, “W03z0x Battery alarm (Battery-x)” is displayed in the Information Message on Web. However, the maintenance work for Cache Backup Battery is not necessary.

(i) Pull the lever open (②) while pressing the latch on the Power Unit inward with right thumb (①).
When the lever is completely opened, the Power Unit comes out forward.
(ii) Pull out and remove the Power Unit while holding its body with both hands.
(iii) Loosen the screw (blue) on the Cache Backup Battery cover and then open it.
(iv) Remove the cable for Cache Backup Battery from the cable clamp.
(v) Remove the cable for the Cache Backup Battery from the connector of the Power Unit to be replaced.
(vi) Remove the Cache Backup Battery.

(d-2) For DBL/DBS/DBF
(i) Pull the lever open (②) while pressing the latch on the Power Unit inward with right thumb (①).
When the lever is completely opened, the Power Unit comes out forward.
(ii) Pull out and remove the Power Unit while holding its body with both hands.

(d-3) For CBL
(i) Loosen the screw (blue) which fixes the Power Unit.
(ii) Open the lever to pull out and remove the Power Unit.
When the lever is completely opened, the Power Unit comes out forward.
(iii) Pull out and remove the Power Unit while holding its body with both hands.

(e) Install a new Power Unit.

NOTE : Install a Power Unit in 20 seconds or more after removing the Power Unit.
If you insert the Power Unit without waiting for more than 20 seconds, the Power Unit may not be recovered normally (‡1).

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‡1 : Remove the inserted Power Unit, and insert it again after 20 seconds or more passed.

(e-1) For CBXSL/CBXSS/CBSL/CBSS

(i) Put the Cache Backup Battery removed from the Power Unit to be replaced on the new Power Unit, and then connect the cable for the Cache Backup Battery to the connector on the Power Unit.

(ii) Fix the cable for the Cache Backup Battery with the cable clamp.

NOTE : Bend the cable for the Cache Backup Battery with a long radius not to apply the cable and the connector excessive stresses.

(iii) Close the Cache Backup Battery cover and then tighten the screw (blue).

(iv) With the lever opened completely, insert the Power Unit into the slot.

(v) Push the Power Unit in all the way.

NOTE : Do not catch the SAS(ENC) cable when inserting the Power Unit.

(vi) Close the lever completely, and fasten the Power Unit.

(e-2) For DBL/DBS/DBF

(i) With the lever opened completely, insert the Power Unit into the slot.
If you cannot insert the Power Unit into the slot easily, insert it after adjusting the position by slightly returning the lever.

(ii) Push the Power Unit in all the way.

NOTE : Do not catch the SAS(ENC) cable when inserting the Power Unit.

(iii) Close the lever completely, and tighten the Power Unit.

(e-3) For CBL

(i) With the lever opened completely, insert the Power Unit into the slot.

(ii) Push the Power Unit in all the way.

NOTE : Do not catch the SAS(ENC) cable when inserting the Power Unit.

(iii) Close the lever, and tighten the screw (blue) to fix the Power Unit.

(f) Connect the removed power cable.
Check that the RDY LED (green) (For the CBXSL/CBXSS/CBSL/CBSS, P-RDY LED (green)) of the Power Unit is on.

(g) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) on the front of the Controller Box may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.

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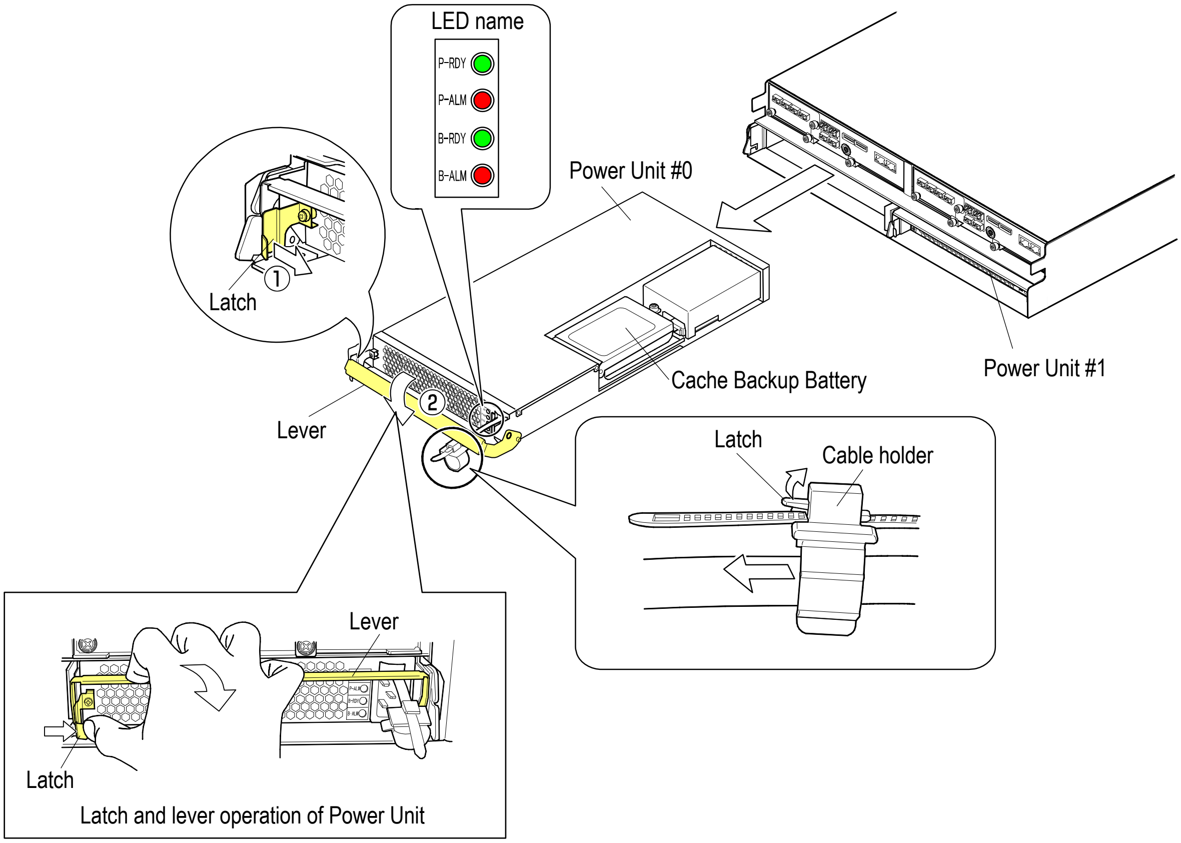
‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(h) Refer to “Information Message” on WEB, and check to see that “I006z0 PS recovered” is indicated. (Refer to WEB “2.5 Information Message”(WEB 02-0150).)
In case of CBXSL/CBXSS/CBSL/CBSS, this message appears usually about 1 minute and 30 seconds after inserting the Power Unit.
In case of CBL, this message appears usually about 10 seconds after inserting the Power unit.
When this is indicated, the replacement of Power Unit has completed.

(a) Replacing a Power Unit



(b) Removing a Cache Backup Battery

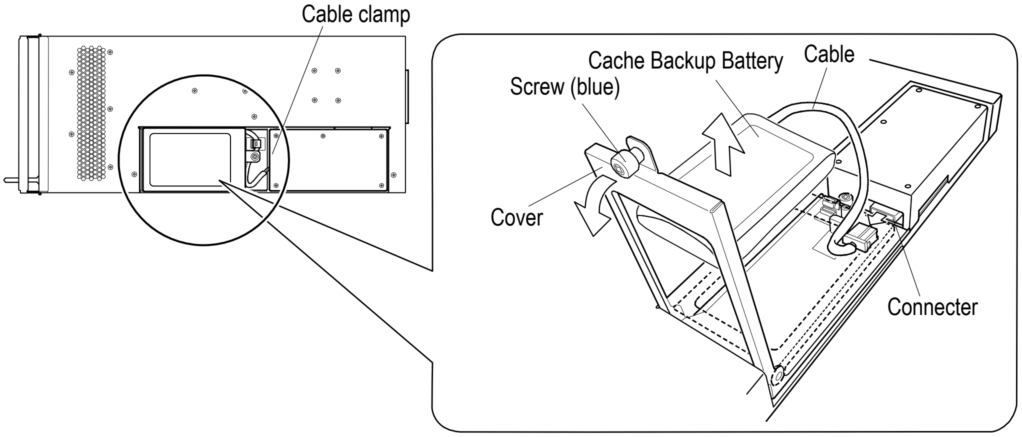


Figure 2.2.13 Replacing the Power Unit for the CBXSL/CBXSS/CBSL/CBSS

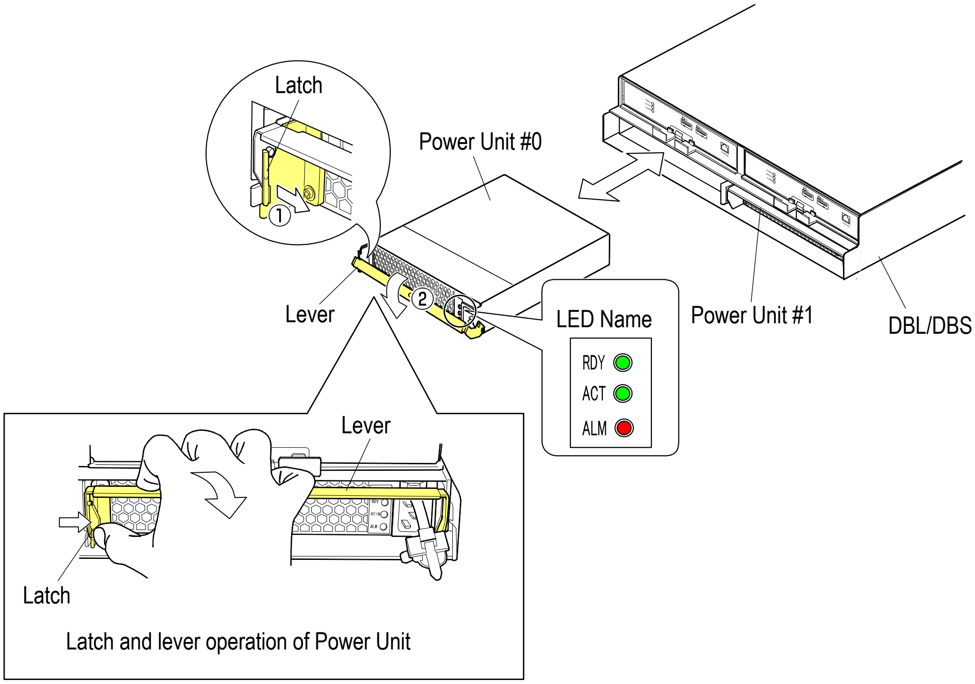


Figure 2.2.14 Replacing the Power Unit for the DBL/DBS

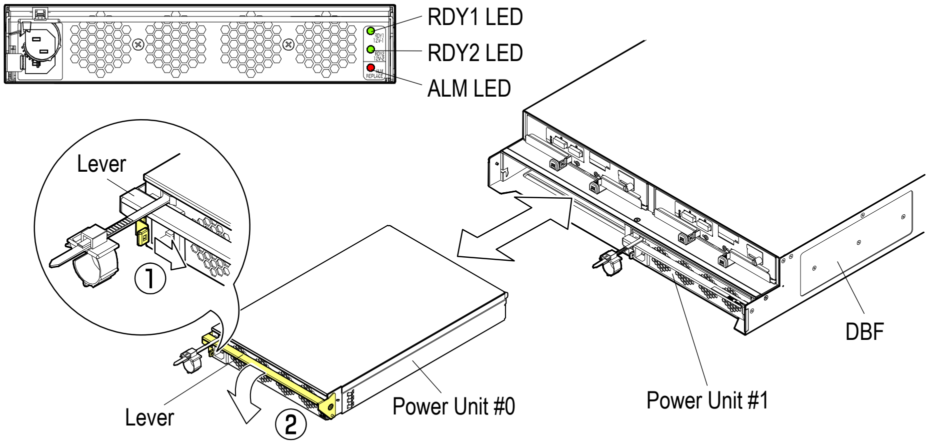


Figure 2.2.14.1 Replacing the Power Unit for the DBF

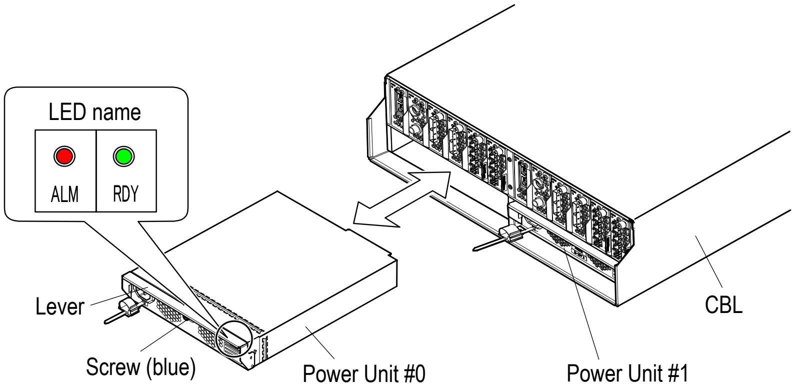


Figure 2.2.15 Replacing the Power Unit for the CBL

(1-2) Procedure for replacement with the power turned off

The following procedures is for DBL/DBS/DBF.

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message “Chapter 1 ③ Collecting Error Information” (MSG 01-0000).).

(a) Turn off the main switch.

For the CBXSL/CBXSS/CBSL/CBSS, press the main switch on either Controller #0 or Controller #1 for three seconds or more using a pen, key for the bezel and so on.

Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the C-PWR LED (green) on the Controller blinks at high speed, it may be that some of the Cache Memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.

If the Power Unit is removed from the array when the C-PWR LED (green) blinks at high speed, user data may be lost.

(b) Remove all the cables connected to the Power Unit to be replaced.

NOTE : Power Unit cannot be removed with the power cable inserted.

(c) Remove the Power Unit.

(i) Pull the lever open (②) while pressing the latch on the Power Unit inward with right thumb (①).

When the lever is completely opened, the Power Unit comes out forward.

(ii) Pull out and remove the Power Unit while holding its body with both hands.

(d) Install a new Power Unit.

(i) With the lever opened completely, insert the Power Unit into the slot.

If you cannot insert the Power Unit into the slot easily, insert it after adjusting the position by slightly returning the lever.

(ii) Push the Power Unit in all the way.

NOTE : Do not catch the SAS(ENC) cable when inserting the Power Unit.

(iii) Close the lever completely, and tighten the Power Unit.

(e) Connect the removed power cable.

(f) Turn on the main switch (the array usually recovers in about 5 to 7 minutes for CBXSL/CBXSS, about 5 to 8 minutes for CBSL/CBSS, and about 5 to 10 minutes for CBL).

For the CBXSL/CBXSS/CBSL/CBSS, press the main switch on either Controller #0 or Controller #1 for one second or more using a pen, key for the bezel and so on.

Check that the RDY LED (green) of all two Power Units lights up.

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(g) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) on the front of the Controller Box may blink at high speed (for a maximum of 30 to 50 minutes, or 40 to 60 minutes for CBL (80 to 180 minutes when the DBW is connected to the CBL)) or the WARNING LED (orange) may blink at high speed (for the maximum of 30 to 85 minutes) before the READY LED (green) on the front of the Controller Box lights up.

(h) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware “1.6 (4) Checking the start message and end message of the automatic download” (FIRM 01-1620).)

(2) Replacing the Power Unit of the DBX

NOTICE

- **The replacement of the component is restricted in time. This operation requires referring to the manual. If the array is left with this component removed for more than 10 minutes, it will stop by detecting the thermal alarm.**
- **When a trouble of the Power Unit is detected due to a trouble of the Fan Module, the Power Unit does not need to be replaced.**
  When a trouble of the Power Unit is detected during replacement of the Fan Module, pull out and then insert the Power Unit.
- **When replacing the Power Unit, do it in haste after preparing a replacement Power Unit and arranging cables, etc. so that they do not disturb the replacement.**

Select a procedure from the following and execute it.

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on (hot replacement)	1. Complete the replacement within ten minutes(*1). 2. When the Power Unit and another module fail at the same time, replace the Power Unit first. Otherwise, an array down may occur because of an abnormal temperature rise. When the Fan Module and Power Unit fail at the same time, be sure to replace the Power Unit first. 3. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the READY LED (green) lights on. 4. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box usually goes out about 30 seconds later.	Refer to "(2-1) Procedure for replacement with the power turned on (Be sure to perform the following operations (a) to (j) within 10 minutes.)" (REP 02-0650)
		When both of the two power supplies are required to be replaced, be sure to replace each one of them at a time, or replace them while the power is turned off.	Refer to "(2-1) Procedure for replacement with the power turned on (Be sure to perform the following operations (a) to (j) within 10 minutes.)" (REP 02-0650)

*1 : It's the time it takes to replace part itself.
This time does not include the time needed to perform the operation other than replacement.

To be continued to the next page.

No.	Power status during the replacement	Restriction	Reference section
2	Replacement with the power turned off	1. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the READY LED (green) lights on. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program or the automatic download of the ENC firmware and the backup controller firmware at the time of turning the power on in the single controller configuration is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box goes out at the maximum of 30 to 85 minutes later and the READY LED (green) lights up.	Refer to "(2-2) Procedure for replacement with the power turned off" (REP 02-0671)

(2-1) Procedure for replacement with the power turned on

Be sure to perform the following operations (f) to (l) within 10 minutes.

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).). In case of the preventive replacement, the collection of the error information is not required.

(a) Remove the stopper on the rear side of the array (Refer to Installation "2.4.14 (6) Attaching the stopper" (INST 02-1390)).

(b) Open the cable routing bar toward you.

(c) Check that ALM LED (red) of the Power Unit to be replaced is on.
Check that RDY LED (green) of the Power Unit not to be replaced is on.
In case of the preventive replacement, although the ALM LED (red) does not light up, the procedure is the same. Check again that the Power Unit to be replaced is the target part and then remove it.

NOTE : When the ALM LEDs (red) of Power Unit of the both systems are on, replace the Power Unit in the state in which the power is turned off.

(d) If the cable tray is attached, remove it (Refer to Installation "2.4.14 (5) Attaching the cable tray" (INST 02-1380)).

(e) Remove the repeat binder which fixes the power cables and SAS(ENC) cables in the middle (Refer to Installation "2.4.14 (4) Fixing the cables in the middle" (INST 02-1370)).

(f) Remove the cable routing bar because it disturbs the operation if the Power Unit #B0 or Power Unit #A1 is replaced (Refer to Installation "2.4.8 (2) Fixing the cable routing bars" (INST 02-0830)).
- When replacing the Power Unit #B0: the cable routing bar #0
- When replacing the Power Unit #A1: the cable routing bar #1

(g) Disconnect the power cable connected to the Power Unit to be replaced.

(h) Open the lever toward you while pressing the button (blue) which fixes the lever of the Power Unit.
When the levers are completely opened, the Power Unit comes out forward.

NOTE : The levers cannot be operated with the power cables inserted.

(i) Pull out and remove it while holding the body of the Power Unit with both hands.

(j) After waiting for 20 seconds or more, insert a Power Unit until its lever is slightly opened, and then close it completely until you hear the button (blue), which fixes the lever, clicks.
If you insert the Power Unit without waiting for more than 20 seconds, Power Unit may not be recovered (‡1).

NOTE : Do not catch a SAS(ENC) cable when inserting the Power Unit.

(k) Connect the removed power cables.
Check that the RDY LED (green) of the Power Unit is on.

(l) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡2). The READY LED (green) on the front of the Controller Box may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.

(m) Refer to “Information Message” on WEB, and check to see that “I006z0 PS recovered” is indicated. (Refer to WEB “2.5 Information Message”(WEB 02-0150).)
This message appears usually about 10 seconds after inserting the Power Unit.
When this is indicated, the replacement of Power Unit has completed.

(n) If the Power Unit #B0 or Power Unit #A1 is replaced, install the cable routing bar (Refer to Installation “2.4.8 (2) Fixing the cable routing bars” (INST 02-0830)).

(o) Return the power cables and SAS(ENC) cables to the original state, and fix them with the repeat binder in the middle. (Refer to Installation “2.4.14 (4) Fixing the cables in the middle” (INST 02-1370)).

NOTE : Bundle and fix the cables so that they do not hang loosely under the array.

(p) If the cable tray is removed, attach it. (Refer to Installation “2.4.14 (5) Attaching the cable tray” (INST 02-1380).)

(q) Close the cable routing bar.

---

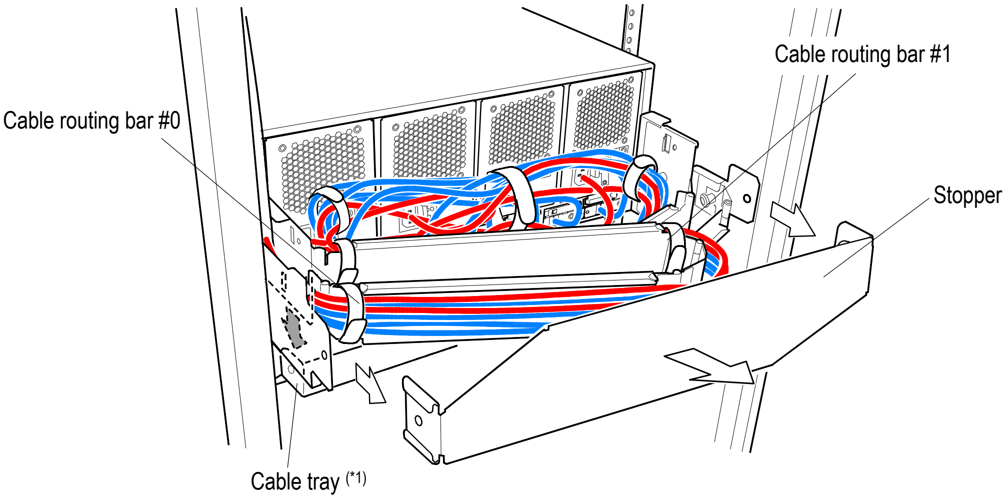
‡1 : Remove the inserted Power Unit, and insert it again after 20 seconds or more passed.

‡2 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(r) Attach the stopper on the rear side of the array. (Refer to Installation “2.4.14 (6) Attaching the stopper” (INST 02-1390).)

NOTE : Check that the cables of other array are not being caught.

(s) Pull out the array and check that the routing is performed correctly. (Refer to Installation “2.4.14 (7) Checking the Routing” (INST 02-1390).)



*1 : The cable tray is attached to the rack rail for Rev.B.

Figure 2.2.16 Locations of the Cable Routing Bar, the Stopper, and the Cable Tray

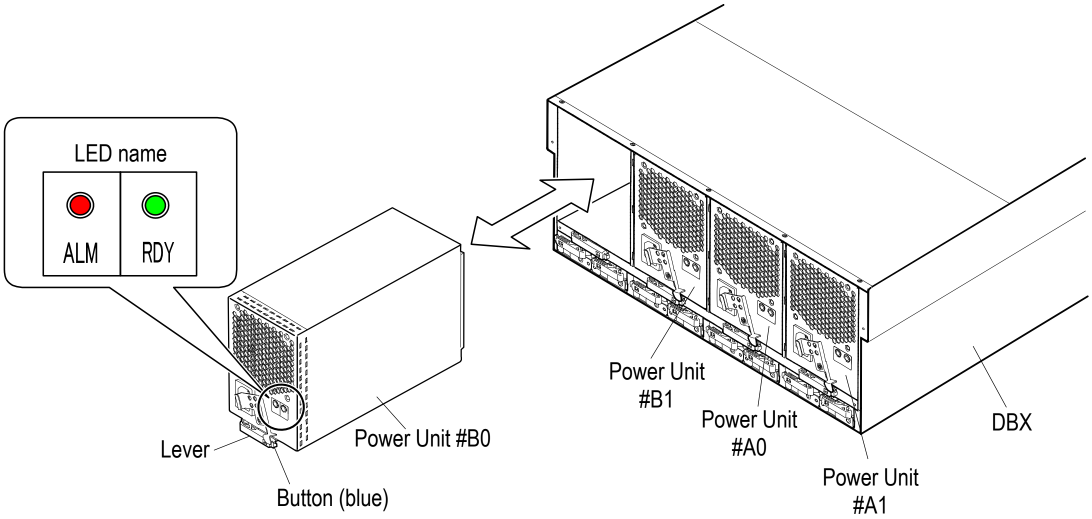


Figure 2.2.17 Replacing Power Unit of the DBX

(2-2) Procedure for replacement with the power turned off

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message “Chapter 1 ③ Collecting Error Information” (MSG 01-0000).).

(a) Turn off the main switch.

For the CBXSL/CBXSS/CBSL/CBSS, press the main switch on either Controller #0 or Controller #1 for three seconds or more using a pen, key for the bezel and so on.

Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the C-PWR LED (green) on the Controller blinks at high speed, it may be that some of the Cache Memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.

(b) Remove the stopper on the rear side of the array (Refer to Installation “2.4.14 (6) Attaching the stopper” (INST 02-1390)).

(c) Open the cable routing bar toward you.

(d) If the cable tray is attached, remove it (Refer to Installation “2.4.14 (5) Attaching the cable tray” (INST 02-1380)).

(e) Remove the repeat binder which fixes the power cables and SAS(ENC) cables in the middle (Refer to Installation “2.4.14 (4) Fixing the cables in the middle” (INST 02-1370)).

(f) Remove the cable routing bar because it disturbs the operation if the Power Unit #B0 or Power Unit #A1 is replaced (Refer to Installation “2.4.8 (2) Fixing the cable routing bars” (INST 02-0830)).

- When replacing the Power Unit #B0: the cable routing bar #0
- When replacing the Power Unit #A1: the cable routing bar #1

(g) Disconnect all the power cables connected to the Power Unit to be replaced.

(h) Open the lever toward you while pressing the button (blue) which fixes the lever of the Power Unit.

When the levers are completely opened, the Power Unit comes out forward.

NOTE : The levers cannot be operated with the power cables inserted.

(i) Pull out and remove it while holding the body of the Power Unit with both hands.

(j) Insert a new Power Unit until its lever is slightly opened, and then close it completely until you hear the button (blue), which fixes the lever, clicks.

NOTE : Do not catch a SAS(ENC) cable when inserting the Power Unit.

(k) Connect the removed power cables.

(l) Turn on the main switch (the array usually recovers in about 5 to 7 minutes for CBXSL/CBXSS, about 5 to 8 minutes for CBSL/CBSS, and about 5 to 10 minutes for CBL).

For the CBXSL/CBXSS/CBSL/CBSS, press the main switch on either Controller #0 or Controller #1 for one second or more using a pen, key for the bezel and so on.

Check that the READY LED (green) of both Power Units lights up.

(m) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) on the front of the Controller Box may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.

(n) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed. When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware "1.6 (4) Checking the start message and end message of the automatic download" (FIRM 01-1620).)

(o) If the Power Unit #B0 or Power Unit #A1 was replaced, install the cable routing bar (Refer to Installation "2.4.8 (2) Fixing the cable routing bars" (INST 02-0830)).

(p) Return the power cables and SAS(ENC) cables to the original state, and fix them with the repeat binder in the middle Refer to Installation "2.4.14 (4) Fixing the cables in the middle" (INST 02-1370)).

NOTE : Bundle and fix the cables so that they do not hang loosely under the array.

(q) If the cable tray is removed, attach it (Refer to Installation "2.4.14 (5) Attaching the cable tray" (INST 02-1380)).

(r) Close the cable routing bar.

(s) Attach the stopper on the rear side of the array (Refer to Installation "2.4.14 (6) Attaching the stopper" (INST 02-1390)).

NOTE : Check that the cables of other array are not being caught.

(t) Pull out the array and check that the routing is performed correctly (refer to Installation "2.4.14 (7) Checking the Routing'" (INST 02-1390)).

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(3) Replacing the Power Unit of the CBLD/DBLD/DBSD

NOTICE

- **The replacement of the component is restricted in time. This operation requires referring to the manual. If the array is left with this component removed for more than 10 minutes, it will stop by detecting the thermal alarm.**
- **In CBLD, when a trouble of the Power Unit is detected due to a trouble of the Fan Module, the Power Unit does not need to be replaced.**
  When a trouble of the Power Unit is detected during replacement of the Fan Module, pull out and then insert the Power Unit.
- **When replacing the Power Unit, do it in haste after preparing a replacement Power Unit and arranging cables, etc. so that they do not disturb the replacement.**
- **Check the type of the power supply before replacing the Power Unit. Do not install the AC power unit to the DC Power Supply Model.**

Select a procedure from the following and execute it.

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on (hot replacement)	1. Complete the replacement within ten minutes. 2. When the Power Unit and another module fail at the same time, replace the Power Unit first. Otherwise, an array down may occur because of an abnormal temperature rise. 3. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 4. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box usually goes out about 30 seconds later.	Refer to "(3-1) Procedure for replacement with the power turned on" (REP 02-0681)
		When both of the two Power Units are required to be replaced, be sure to replace each one of them at a time, or replace them while the power is turned off (in case of DBLD and DBSD).	Refer to "(3-1) Procedure for replacement with the power turned on" (REP 02-0681)

To be continued to the next page.

No.	Power status during the replacement	Restriction	Reference section
2	Replacement with the power turned off	1. For the CBLD, Power Unit cannot be replaced with the power turned off. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 3. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program or the automatic download of the ENC firmware and the backup controller firmware at the time of turning the power on in the single controller configuration is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box goes out at the maximum of 30 to 85 minutes later and the READY LED (green) lights up.	Refer to "(3-2) Procedure for replacement with the power turned off" (REP 02-0686)

(3-1) Procedure for replacement with the power turned on

(Be sure to perform the following operations (a) to (g) within 10 minutes.)

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).). In case of the preventive replacement, the collection of the error information is not required.

(a) Check that ALM LED (red) of the Power Unit to be replaced is on.

Check that RDY LED (green) of the Power Unit not to be replaced is on.

In case of the preventive replacement, although the ALM LED (red) does not light up, the procedure is the same. Check again that the Power Unit to be replaced is the target part and then remove it.

NOTE : When the ALM LEDs (red) on the Power Unit of the DBLD and DBSD are on, replace the Power Unit with the power turned off.

⚠ CAUTION

- **Here exists a hazard that can cause an electric shock. Start the work after making sure that the breaker in the power distribution box connected to the Power Unit to be replaced has been turned off.**
- **When replacing the Power Unit and the power cables together, make sure to request the customer to block out the input power before removing the terminal screws from the distribution board which provides power. And check that no voltage is applied to the terminals, then replace them.**

(b) Request the customer to block out the input power connected to the Power Unit to be replaced.

(c) Pick up both ends of the socket (①), release the latch and remove the socket from the Power Unit (②). (Refer to “Figure 2.2.17.1 Removing/Installing Power Cable” (REP 02-0684).)

NOTE : Power Unit cannot be removed with the power cable inserted.

(d) Remove the Power Unit.

(d-1) For CBLD (Refer to “Figure 2.2.17.2 Replacing Power Unit of the CBLD” (REP 02-0684).)

(i) Loosen the screw (blue) which fixes the Power Unit.

(ii) Open the lever to pull out and remove the Power Unit.
When the lever is completely opened, the Power Unit comes out forward.

(iii) Pull out and remove the Power Unit while holding its body with both hands.

(d-2) For DBLD/DBSD (Refer to “Figure 2.2.17.3 Replacing Power Unit of the DBLD/DBSD” (REP 02-0685).)

(i) Pull the lever open (②) while pressing the latch on the Power Unit inward with right thumb (①).
When the lever is completely opened, the Power Unit comes out forward.

(ii) Pull out and remove the Power Unit while holding its body with both hands.

(e) Install a new Power Unit.

NOTE : Install a Power Unit in 20 seconds or more after removing the Power Unit.
If you insert the Power Unit without waiting for more than 20 seconds, the Power Unit may not be recovered normally (‡1).

(e-1) For CBLD

(i) With the lever opened completely, insert the Power Unit into the slot.

(ii) Push the Power Unit in all the way.

NOTE : Do not catch the SAS(ENC) cable when inserting the Power Unit.

(iii) Close the lever, and tighten the screw (blue) to fix the Power Unit.

(e-2) For DBLD/DBSD

(i) With the lever opened completely, insert the Power Unit into the slot.
If you cannot insert the Power Unit into the slot easily, insert it after adjusting the position by slightly returning the lever.

(ii) Push the Power Unit in all the way.

NOTE : Do not catch the SAS(ENC) cable when inserting the Power Unit.

(iii) Close the lever completely, and tighten the Power Unit.

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‡1 : Remove the inserted Power Unit, and insert it again after 20 seconds or more passed.

⚠ CAUTION

- **DC input to this array is required reinforced insulation between a primary and a secondary power source. Use the ones that are reinforced insulation to the DC power supply.**
- **This array needs to be directly connected to the grounding electrode bar of the DC power system or directly connected to the grounding terminal bar connecting to the grounding electrode of the DC power system or jumper wiring from the grounding bus.**
- **This array needs to be installed in the same adjacent part (e.g. adjacent cabinet) of the other device connecting to the grounding power supply and grounding wiring of the same DP power circuit. Furthermore, it needs to be grounded to the grounding point of the DC power system. The DC power system does not have to be grounded other than this part.**
- **The DC power supply needs to be set up in the same building as this array.**
- **Do not set the switching or shutoff devices for the grounded circuit wire which connects the DC power supply and the grounding point of the grounding electrode bar.**

(f) Be sure to insert the socket of the power cable all the way until the latch of the socket clicks and connect the power cable.
Insert the socket straight to the connector, make sure that the latches on both sides of the socket are locked.

(g) Request the customer to supply the input power.
Turn on the circuit breaker of the distribution board.
Check that the RDY LED (green) of the Power Unit is on.

(h) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) on the front of the Controller Box may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.

(i) Refer to “Information Message” on WEB, and check to see that “I006z0 PS recovered (Unit-x, PS-y)” is indicated. (Refer to WEB “2.5 Information Message”(WEB 02-0150).)
This message appears usually about 10 seconds after inserting the Power Unit.
When this is indicated, the replacement of Power Unit has completed.

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

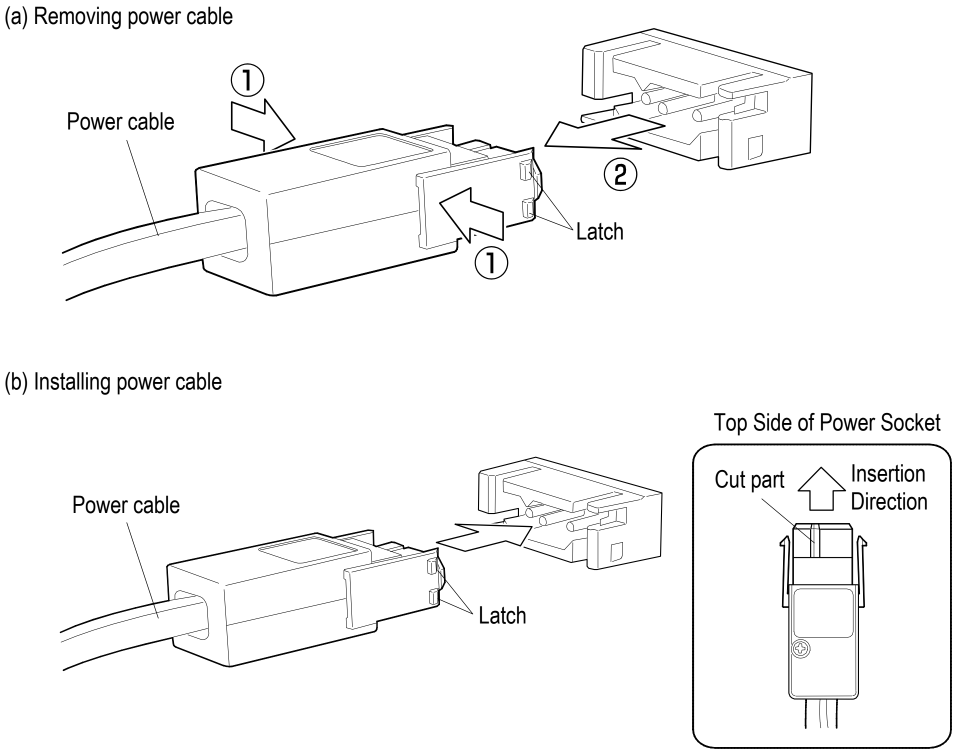

Figure 2.2.17.1 Removing/Installing Power Cable

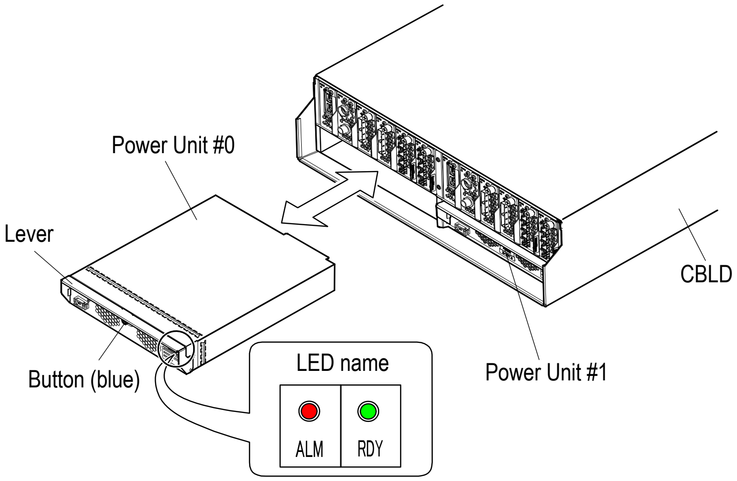

Figure 2.2.17.2 Replacing Power Unit of the CBLD

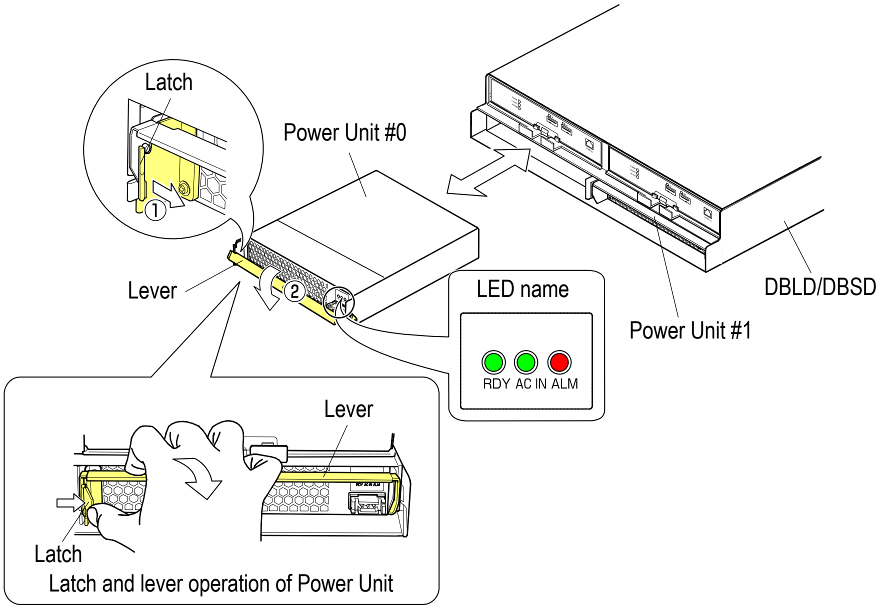

Figure 2.2.17.3 Replacing Power Unit of the DBLD/DBSD

(3-2) Procedure for replacement with the power turned off

The following procedures is for DBS and DBL.

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).).

(a) Turn off the main switch.

For the DBLD/CBSD, press the main switch on either Controller #0 or Controller #1 for three seconds or more using a pen, key for the bezel and so on.

Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the C-PWR LED (green) on the Controller blinks at high speed, it may be that some of the Cache Memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.

If the Power Unit is removed from the array when the C-PWR LED (green) blinks at high speed, user data may be lost.

(b) Request the customer to block out the input power connected to the Power Unit to be replaced.

(c) Pick up both ends of the socket (①), release the latch and remove the socket from the Power Unit (②). (Refer to "Figure 2.2.17.1 Removing/Installing Power Cable" (REP 02-0684).)

NOTE : Power Unit cannot be removed with the power cable inserted.

(d) Remove the Power Unit.

(d-1) For CBLD (Refer to "Figure 2.2.17.2 Replacing Power Unit of the CBLD" (REP 02-0684).)

(i) Loosen the screw (blue) which fixes the Power Unit.

(ii) Open the lever to pull out and remove the Power Unit.

When the lever is completely opened, the Power Unit comes out forward.

(iii) Pull out and remove the Power Unit while holding its body with both hands.

(d-2) For DBLD/DBSD (Refer to "Figure 2.2.17.3 Replacing Power Unit of the DBLD/DBSD" (REP 02-0685).)

(i) Pull the lever open (②) while pressing the latch on the Power Unit inward with right thumb (①).

When the lever is completely opened, the Power Unit comes out forward.

(ii) Pull out and remove the Power Unit while holding its body with both hands.

(e) Install a new Power Unit.

NOTE : Install a Power Unit in 20 seconds or more after removing the Power Unit. If you insert the Power Unit without waiting for more than 20 seconds, the Power Unit may not be recovered normally (‡1).

(e-1) For CBLD

(i) With the lever opened completely, insert the Power Unit into the slot.
(ii) Push the Power Unit in all the way.

NOTE : Do not catch the SAS(ENC) cable when inserting the Power Unit.

(iii) Close the lever, and tighten the screw (blue) to fix the Power Unit.

(e-2) For DBLD/DBSD

(i) With the lever opened completely, insert the Power Unit into the slot. If you cannot insert the Power Unit into the slot easily, insert it after adjusting the position by slightly returning the lever.
(ii) Push the Power Unit in all the way.

NOTE : Do not catch the SAS(ENC) cable when inserting the Power Unit.

(iii) Close the lever completely, and tighten the Power Unit.

⚠ CAUTION

- **DC input to this array is required reinforced insulation between a primary and a secondary power source. Use the ones that are reinforced insulation to the DC power supply.**
- **This array needs to be directly connected to the grounding electrode bar of the DC power system or directly connected to the grounding terminal bar connecting to the grounding electrode of the DC power system or jumper wiring from the grounding bus.**
- **This array needs to be installed in the same adjacent part (e.g. adjacent cabinet) of the other device connecting to the grounding power supply and grounding wiring of the same DP power circuit. Furthermore, it needs to be grounded to the grounding point of the DC power system. The DC power system does not have to be grounded other than this part.**
- **The DC power supply needs to be set up in the same building as this array.**
- **Do not set the switching or shutoff devices for the grounded circuit wire which connects the DC power supply and the grounding point of the grounding electrode bar.**

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‡1 : Remove the inserted Power Unit, and insert it again after 20 seconds or more passed.

(f) Be sure to insert the socket of the power cable all the way until the latch of the socket clicks and connect the power cable.
Insert the socket straight to the connector, make sure that the latches on both sides of the socket are locked.

(g) Request the customer to supply the input power.
Turn on the circuit breaker of the distribution board.
Check that the RDY LED (green) of the Power Unit is on.

(l) Turn on the main switch (the array usually recovers in about 5 to 10 minutes).
Check that the READY LED (green) of both Power Units lights up.

(h) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) on the front of the Controller Box may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.

(i) Refer to “Information Message” on WEB, and check to see that “I006z0 PS recovered (Unit-x, PS-y)” is indicated. (Refer to WEB “2.5 Information Message”(WEB 02-0150).)
This message appears usually about 10 seconds after inserting the Power Unit.
When this is indicated, the replacement of Power Unit has completed.

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(4) Replacing the Power Unit of the DBW

NOTICE

- **The replacement of the component is restricted in time. This operation requires referring to the manual. If the array is left with this component removed for more than 5 minutes, it will stop by detecting the thermal alarm.**
- **When replacing the Power Unit, do it in haste after preparing a replacement Power Unit and arranging cables, etc. so that they do not disturb the replacement.**

Select a procedure from the following and execute it.

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on (hot replacement)	1. Complete the replacement within five minutes(*1). 2. When the Power Unit and another module fail at the same time, replace the Power Unit first. Otherwise, an array down may occur because of an abnormal temperature rise. When the Fan Module and Power Unit fail at the same time, be sure to replace the Power Unit first. 3. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the READY LED (green) lights on. 4. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box usually goes out about 30 seconds later. 5. When using Tray Power Saving, check that the DBW to replace the Power Unit is not in the power saving status, and then replace it. ([Tray Power Saving Status] on the table of [Energy Saving] – [Tray Power Saving] of Hitachi Storage Navigator Modular 2 is “Normal”)	Refer to “(4-1) Procedure for replacement with the power turned on” (REP 02-0691)
		When both of the two power supplies are required to be replaced, be sure to replace each one of them at a time, or replace them while the power is turned off.	Refer to “(4-1) Procedure for replacement with the power turned on” (REP 02-0691)

*1 : It's the time it takes to replace part itself.
This time does not include the time needed to perform the operation other than replacement.

To be continued to the next page.

No.	Power status during the replacement	Restriction	Reference section
2	Replacement with the power turned off	1. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the READY LED (green) lights on. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program or the automatic download of the ENC firmware and the backup controller firmware at the time of turning the power on in the single controller configuration is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box goes out at the maximum of 30 to 85 minutes later and the READY LED (green) lights up.	Refer to "(4-2) Procedure for replacement with the power turned off" (REP 02-0694)

(4-1) Procedure for replacement with the power turned on

Be sure to perform the following operations (a) to (f) within 5 minutes.

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).).

(a) Turn off the Power Switch on the Power Unit to be displayed error information.

(b) Pinch the latch on the cable holder for the Power Unit and then release the lock. Pull the cable holder toward you.

(c) Remove the power cable connected to the Power Unit to be replaced.

NOTE : The Power Unit cannot be removed with the power cable inserted.

(d) Remove the Power Unit.

(i) Push the retaining latch to the right, and then pull the Power Unit handle.

(ii) Pull out and remove the Power Unit while holding its body with both hands.

(e) Install a new Power Unit.

NOTE : Install the new Power Unit 20 seconds or more after removing the Power Unit. If you insert the Power Unit without waiting for more than 20 seconds, Power Unit may not be recovered normally(‡1).

(i) Insert the Power Unit slowly.
(ii) Push the Power Unit all the way in.

NOTE :
- Ensure that the Power Unit retaining latch clicks into place.
- Do not catch the SAS(ENC) cable when inserting the Power Unit.

(f) Connect the removed power cable.
(g) Turn on the Power Switch on the new Power Unit.
(h) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡2). The READY LED (green) on the front of the Controller Box may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.
(i) Refer to "Information Message" on WEB, and check to see that "I006z0 PS recovered (Unit-x, PS-y)" is indicated. (Refer to WEB "2.5 Information Message"(WEB 02-0150).)
This message appears usually about 10 seconds after inserting the Power Unit.
When this is indicated, the replacement of Power Unit has completed.

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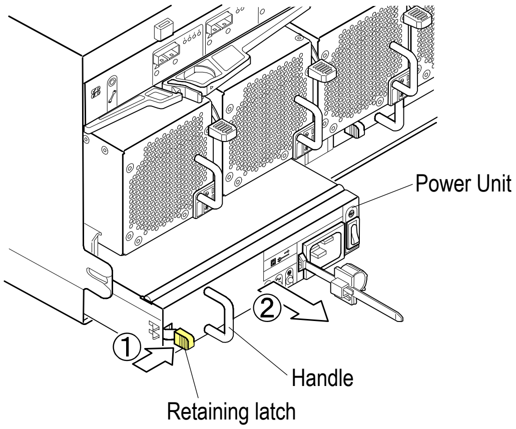
‡1 : Remove the inserted Power Unit, and insert it again after 20 seconds or more passed.

‡2 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(a) Removing a Power Unit



(b) Installing a Power Unit

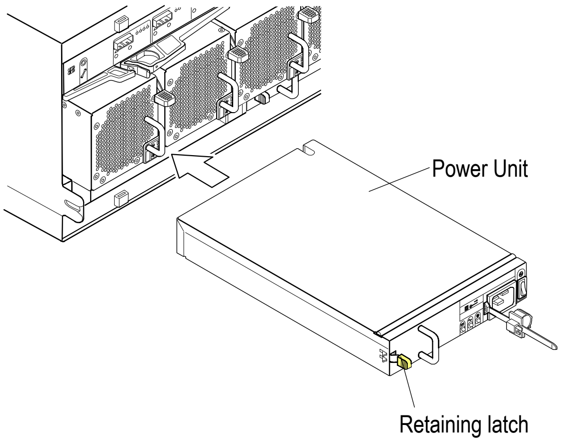


Figure 2.2.17.4 Replacing Power Unit of the DBW

(4-2) Procedure for replacement with the power turned off

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).).

(a) Turn off the main switch on the Controller Box.

Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the C-PWR LED (green) on the Controller blinks at high speed, it may be that some of the Cache Memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.

If the Power Unit is removed from the array when the C-PWR LED (green) blinks at high speed, user data may be lost.

(b) Turn off the power switches on the two Power Units in the DBW.

(c) Remove the cable connected to the Power Unit to be replaced.

NOTE : Power Unit cannot be removed with the power cable inserted.

(d) Remove the Power Unit.

(i) Push the retaining latch to the right, and then pull the Power Unit handle.

(ii) Pull out and remove the Power Unit while holding its body with both hands.

(e) Install a new Power Unit.

(i) Insert the Power Unit slowly.

(ii) Push the Power Unit all the way in.

NOTE :
- Ensure that the Power Unit retaining latch clicks into place.
- Do not catch the SAS(ENC) cable when inserting the Power Unit.

(f) Connect the removed power cable.

(g) Turn on the power switches on the two Power Units in the DBW.

(h) Turn on the main switch on the Controller Box (the array usually recovers in about 5 to 10 minutes for CBL).

(i) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) on the front of the Controller Box may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.

---

‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(j) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed. When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware "1.6 (4) Checking the start message and end message of the automatic download" (FIRM 01-1620).)

2.2.5 Replacing a Controller

CAUTION

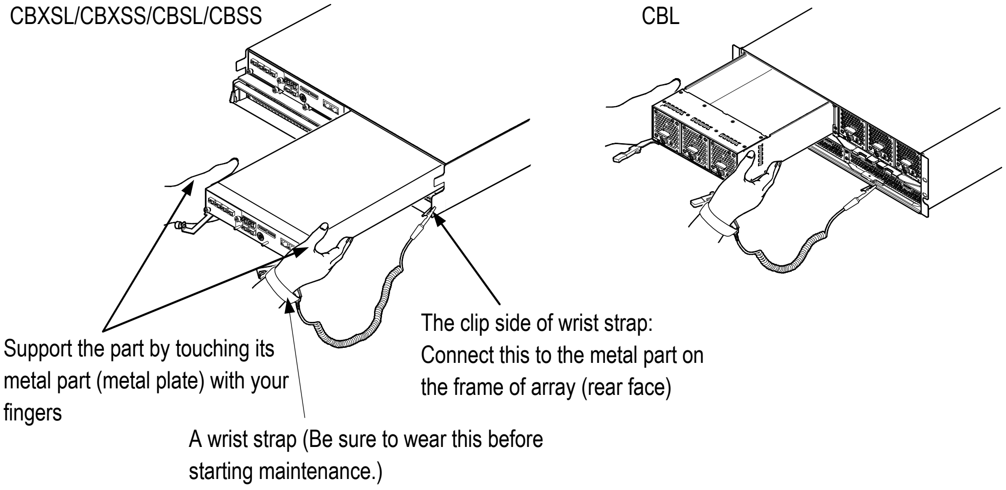
Touching heat sinks or ICs may cause getting burned. Be sure to handle with care.

NOTICE

- **To prevent part failures caused by static electrical charge built up on your own body, be sure to wear a wrist strap connected to the chassis before starting and do not take it off until you finish.**
- **Be sure to wear a wrist strap connected to the chassis whenever you unpack parts from a case. Otherwise, the static electrical charge on your body may damage the parts.**
- **When you install a Controller, support its metal part with your hand that has the wrist strap. You can discharge static electricity by touching the metal plate.**

A failure may be caused by the electric shock since the Controller is a precision instrument. Be sure to put on the wrist strap before starting work in order to protect Controller from electrostatic discharge.

NOTE : Before unpacking and replacing maintenance components, be sure to wear a wrist strap and connect to ground the grounding clip in the opposite end of the wrist strap to the chassis frame (metal part).
When you insert a Controller into the array, support the Controller as touching its metal part with fingers of your hand that wears a wrist strap.


CBXSL/CBXSS/CBSL/CBSS

CBL

Support the part by touching its metal part (metal plate) with your fingers
The clip side of wrist strap: Connect this to the metal part on the frame of array (rear face)
A wrist strap (Be sure to wear this before starting maintenance.)

Select a procedure from the following and execute it.

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on (hot replacement)	1. Complete the replacement within ten minutes. Otherwise, a powering off may occur because of an abnormal temperature rise. Perform the part replacement in haste. 2. The procedure varies depending on whether the ALM LED (red) is on or off. 3. Replace the Controller after blocking the Controller to be replaced. 4. When replacing Controller of both systems (CTL 0 and CTL 1), power off the array before the replacement. 5. In the single Controller configuration, perform the replacement after turning off the power. 6. At the time of preventive replacement, there may be an error report in the host computer depending on the operating conditions of the host computer. The prior contact to the customer is required. 7. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because either the deletion process of the data stored inside the backup controller or the automatic download of the ENC firmware and the backup controller firmware are being executed. Make the replacement after the LED lights on. 8. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box usually goes out about 30 seconds later. 9. At the time of the preventive replacement, do not perform the preventive replacement work while the drive firmware replacement is being executed. Work after the drive firmware replacement ends.	When the ALM LED (red) is on "(1-1) When the ALM LED (red) is on" (REP 02-0720). When the ALM LED is off (Preventive replacement) "(1-2) When the ALM LED(red) is off"" (REP 02-0810).
2	Replacement with the power turned off	1. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because either the deletion process of the data stored inside the backup controller or the automatic download of the ENC firmware and the backup controller firmware are being executed. Make the replacement after the READY LED (green) lights on. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program or the automatic download of the ENC firmware and the backup controller firmware at the time of turning the power on in the single controller configuration is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box goes out at the maximum of 30 to 85 minutes later and the READY LED (green) lights up. 3. At the time of the preventive replacement, do not perform the preventive replacement work while the drive firmware replacement is being executed. Work after the drive firmware replacement ends.	"(2) Procedure for replacement with the power turned off" (REP 02-0870).

(1) Procedure for replacement with the power turned on

In the dual Controller configuration only, a controller can be replaced with the power turned on.

(1-1) When the ALM LED (red) is on

Refer to "Figure 2.2.18 Controller Replacement (CBXSL/CBXSS/CBSL/CBSS)" (REP 02-0780), "Figure 2.2.19 Position of the LED on the Controller (CBXSL/CBXSS/CBSL/CBSS)" (REP 02-0790), "Figure 2.2.20 Controller Replacement (CBL)" (REP 02-0800), and "Figure 2.2.21 Position of the LED on the Controller (CBL)" (REP 02-0800).

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).).

NOTE :
- Do not replace the Controller which operates normally. Before replacing a Controller, check that it is the ALM LED (red) in on.
- When replacing the Controller while the array power is turned on, be sure to replace each one of them at a time. When replacing both Controllers (Controller#0 and Controller#1) at the same time, follow the procedure explained in "(2) Procedure for replacement with the power turned off" (REP 02-0870).
- System parameters are automatically loaded to the new Controller from the internal Drive. Accordingly, no setting s by manual operation is required.
- If you replace a Controller while the array is performing the Volume formatting, the restoration of the inserted Controller may be delayed until the Volume formatting is completed.
- When the special UPS is connected, replace the Controller after recovering the UPS if the Controller is not recovered after the Controller replacement and a failure occurs in the UPS.

(a) Make sure that the ALM LED (red) on the Controller to be replaced is on.

(b) Remove the Controller.

(b-1) For the CBXSL/CBXSS/CBSL/CBSS

(i) Loosen the right and left screws (blue).

(ii) Open the right and left levers forward.
When the levers are completely opened, the Controller comes out forward.

(iii) Remove all the cables connected to the Controller (When the Drive Box is connected, remove the SAS(ENC) cable, too.)

NOTE :
- When the cable cannot be removed easily, do not pull it by force.
  Besides, the cable can be damaged if it is bent upward or downward forcibly.
- When removing the Fibre Channel Interface cables, pull out the Fibre Channel interface cables completely from the host connectors.
  If the Fibre Channel Interface cables are inserted half in the host connectors, the Controller continues to detect the Fibre Channel failures, and the I/O processing of the Controller may be deteriorated.

⚠ **CAUTION**

Touching heat sinks or ICs may cause getting burned. Be sure to handle with care.

(iv) Slide the Controller forward to remove it.

(b-2) For the CBL

(i) Slide the right and left latches (blue), and then open the levers forward.

(ii) Open the right and left levers forward.
When the levers are completely opened, the Controller comes out forward.

⚠ **CAUTION**

Touching heat sinks or ICs may cause getting burned. Be sure to handle with care.

(iii) Slide the Controller forward, and then remove it.

(c) Remove all the components from the Controller to be replaced, and then install them in a new Controller.

(c-1) For the CBXSL/CBXSS/CBSL/CBSS

(i) Place the Controller with it's safety label facing up and loosen the two screws (blue) from the rear side of the Controller, and then slide the cover to the direction shown by the arrow (⟶) and remove it.

(ii) Remove the Cache Memory on the Controller.
Push the slot levers which fix the Cache Memory and pull up the Cache Memory by holding its both ends to remove the Cache Memory.

NOTE : Place the removed Cache Memory temporarily in the place where anti-static measures are taken.

(iii) Loosen two screws (blue) which fix the Host I/O Board, pull out and remove the Host I/O Board holding these screws.

NOTE : Place the removed Host I/O Board temporarily in the place where anti-static measures are taken.

(iv) Place the new Controller with it's Module revision label facing down and loosen the two screws (blue) from the rear side of the Controller, and then slide the cover to the direction shown by the arrow (⟶) and remove it.

(v) Install the Cache Memory removed from the Controller to be replaced in the new Controller.
Fit the projection inside the slot to the cut of Cache Memory, and push the Cache Memory in by holding both ends of Cache Memory until the slot levers are completely closed.

NOTE : Be sure to install the removed Cache Memory in the position with the same slot number as before in the new Controller.

(vi) Insert and push the removed Host I/O Board into the slot in the new Controller.

(vii) Tighten two screws (blue) to fix the Host I/O Board.

(viii) Slide and install the cover of the Controller, then fix the two screws (blue) from the rear side of the Controller to fix it.

(c-2) For the CBL

(i) Remove all the Fan Modules from the controller.
Loosen the screw (blue) which fixes the Fan Module, slide the latch upwards and pull out and remove the FAN Module.

(ii) Install the removed Fan Modules in the new Controller.
Insert the Fan Module into the slot and tighten the screw (blue) to fix the Fan Module.

NOTE : Install the removed Fan Modules in the same place on the new Controller.

(iii) Remove the Cache Memory on the Controller.
Push the slot levers which fix the Cache Memory and pull up the Cache Memory by holding both ends of the Cache Memory to remove the Cache Memory.

NOTE : Place the removed Cache Memory temporarily in the place where anti-static measures are taken.

(iv) Install the removed Cache Memory from the Controller to be replaced in the new Controller.
Fit the projection inside the slot to the cut of Cache Memory, and push the Cache Memory in by holding both ends of Cache Memory until the slot levers are completely closed.

NOTE : Be sure to install the removed Cache Memory in the position with the same slot number as before in the new Controller.

(d) Connect the interlocking cable removed from the CBXSL/CBXSS/CBSL/CBSS to the new Controller when the special UPS is connected.

(e) If the SAS(ENC) cable has been removed from the CBXSL/CBXSS/CBSL/CBSS, connect it to the new Controller.

(f) Check that 20 seconds or longer has passed after the Controller was taken out.

(g) Install the new Controller.

Although the ALM LED (red) lights up when you insert the Controller, it goes out after the Controller recovers.

If the Controller is inserted without waiting for 20 seconds, it is possible that the Controller is not recovered from the failure normally.

When it is not recovered even if 30 minutes or more has passed, perform the dummy replacement(‡1) of the Controller which was inserted.

When the Controller is not recovered (30 minutes or more has passed) even if “I1G300 CTL recovery start (CTL-x)” is displayed in the Information Message of WEB after the dummy replacement, perform the dummy replacement of the Controller which was inserted, again.

When it is not recovered after another 30 minutes, connect the inserted Controller to the WEB and take recovery actions according to “Information Message” on WEB. (There may be a problem on the inserted Controller or the Cache Memories installed in the inserted Controller.)

When any error messages about the Controller or the Cache Memories installed are displayed on WEB, connects the other Controller to the WEB and takes recovery actions according to “Information Message” on WEB.

If no error message is displayed for the inserted Control Unit and the other one, the running Control Unit may have a failure. Consult with the customer/SE, and perform the planned shutdown and replace the running Control Unit (the subsystem cannot be replaced with the power turned on). After the replacement, turn on the subsystem power.

(g-1) For the CBXSL/CBXSS/CBSL/CBSS

(i) In case the connector on the rear face of the new Controller has a connector cover installed, remove the connector cover.

(ii) Insert and push the Controller all the way into the slot with its right and left levers completely opened.

NOTE :
- Do not catch a SAS(ENC) cable when the Controller is inserted.
- Install the Controller for the CBXSL/CBXSS/CBSL/CBSS with its Module revision label facing up.
- When pushing the levers at the same time in the direction shown by the arrows (←—), perform this operation within one second. If it has taken more than one second to perform the operation, it may not be recovered. In this case, execute the replacement procedure again. Nevertheless, if it is not recovered, perform the Controller replacement since the failure may be caused in the Controller.

(iii) Close the levers and tighten the right and left screws (blue) to fix the Controller.

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‡1 : This means that the part concerned is removed, and it is reinstalled after 20 seconds or more passed.

(g-2) For the CBL

(i) Push the Controller all the way into the slot with its right and left levers completely opened.

NOTE : When pushing the levers at the same time in the direction shown by the arrows (←—), perform this operation within one second. If it has taken more than one second to perform the operation, it may not be recovered. In this case, execute the replacement procedure again. Nevertheless, if it is not recovered, perform the Controller replacement since the failure may be caused in the Controller.

(ii) Close the levers and slide the right and left latches (blue) to fix the Controller.

(h) Make sure that the WARNING LED (orange) on the Front Bezel is off(‡1).
(The Controller usually recovers in about three minutes, but if the I/O load from the host computer is high, it may take about 30 minutes to recover.)

(i) For the CBXSL/CBXSS/CBSL/CBSS, connect all the removed cables to the Controller.

NOTE : When connecting the Fibre Channel interface cables, insert the Fibre Channel interface cables until they are fixed to the host connectors.
If the Fibre Channel Interface cables are inserted half in the host connectors, the Controller continues to detect the Fibre Channel failures, and the I/O processing of the Controller may be deteriorated.

(j) Check that the READY LED (green) on the front of the Controller Box lights up. The READY LED (green) on the front of the Controller Box may blink at high speed (for a maximum of 30 to 50 minutes, 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.

(k) Refer to “Information Message” on WEB, and check that “I0010x CTL recovered (CTL-x)]” is indicated. (Refer to WEB “2.5 Information Message”(WEB 02-0150).)
When this is indicated, the replacement of Controller has completed.

(l) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware “1.6 (4) Checking the start message and end message of the automatic download” (FIRM 01-1620).)

(m) Check the date and time of the array. If they are not correct, set them.
(Refer to Troubleshooting “2.2 Confirming and Setting RTC (Real Time Clock)” (TRBL 02-0010).)

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(n) If your customer has signed up for the “HDD data erase service after maintenance replacement”, remove the data in the backup controller (flash memory) in the Controller (Refer to “DEEFS Operation Procedure Manual”.)

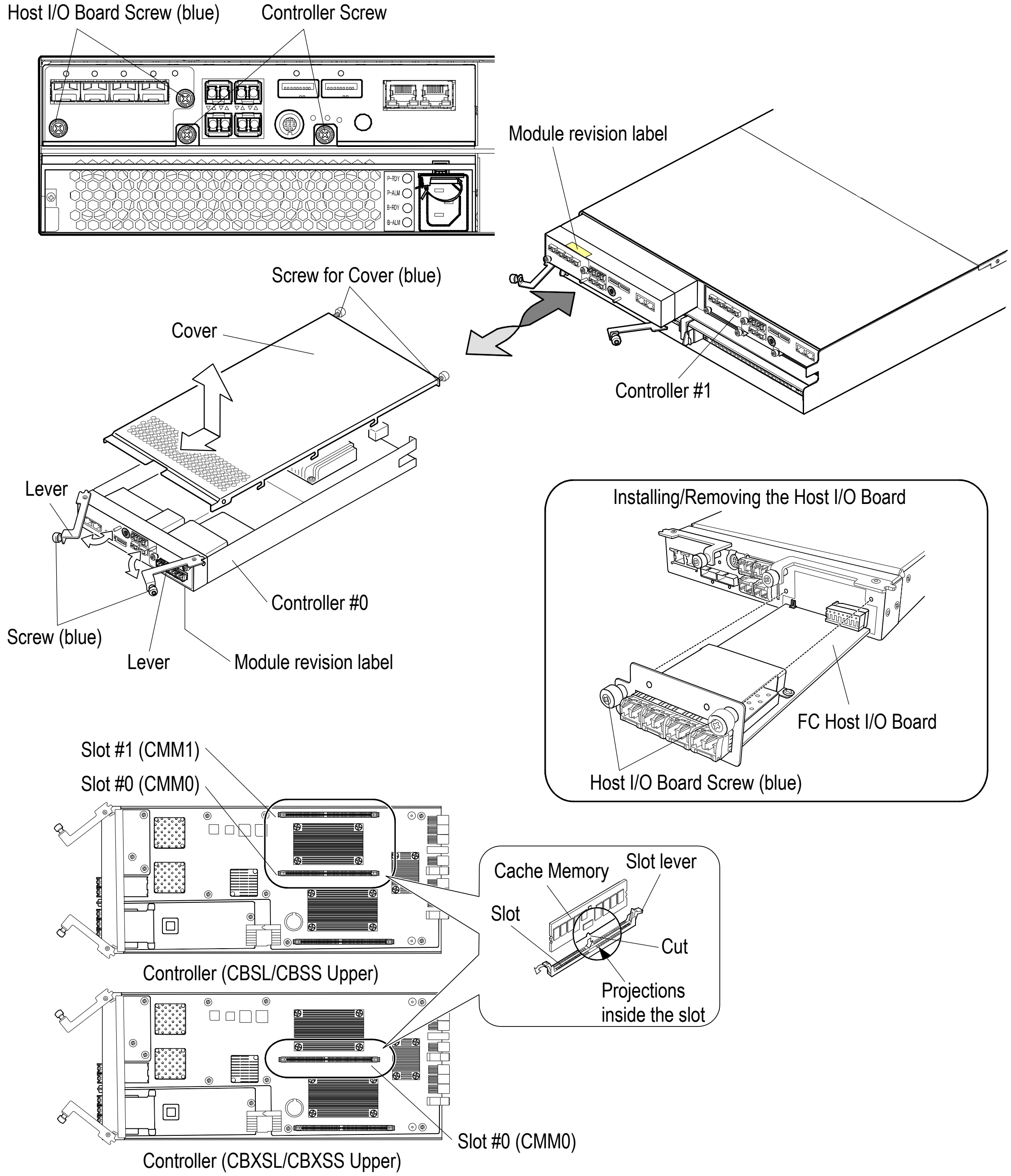

Figure 2.2.18 Controller Replacement (CBXSL/CBXSS/CBSL/CBSS)

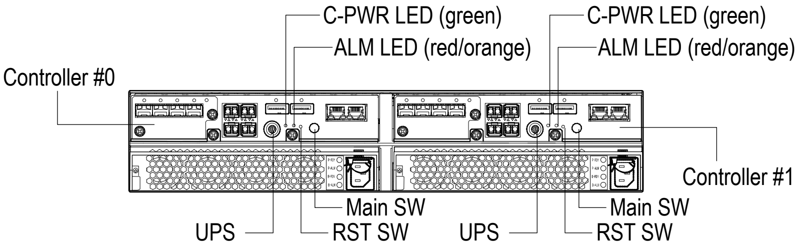

Figure 2.2.19 Position of the LED on the Controller (CBXSL/CBXSS/CBSL/CBSS)

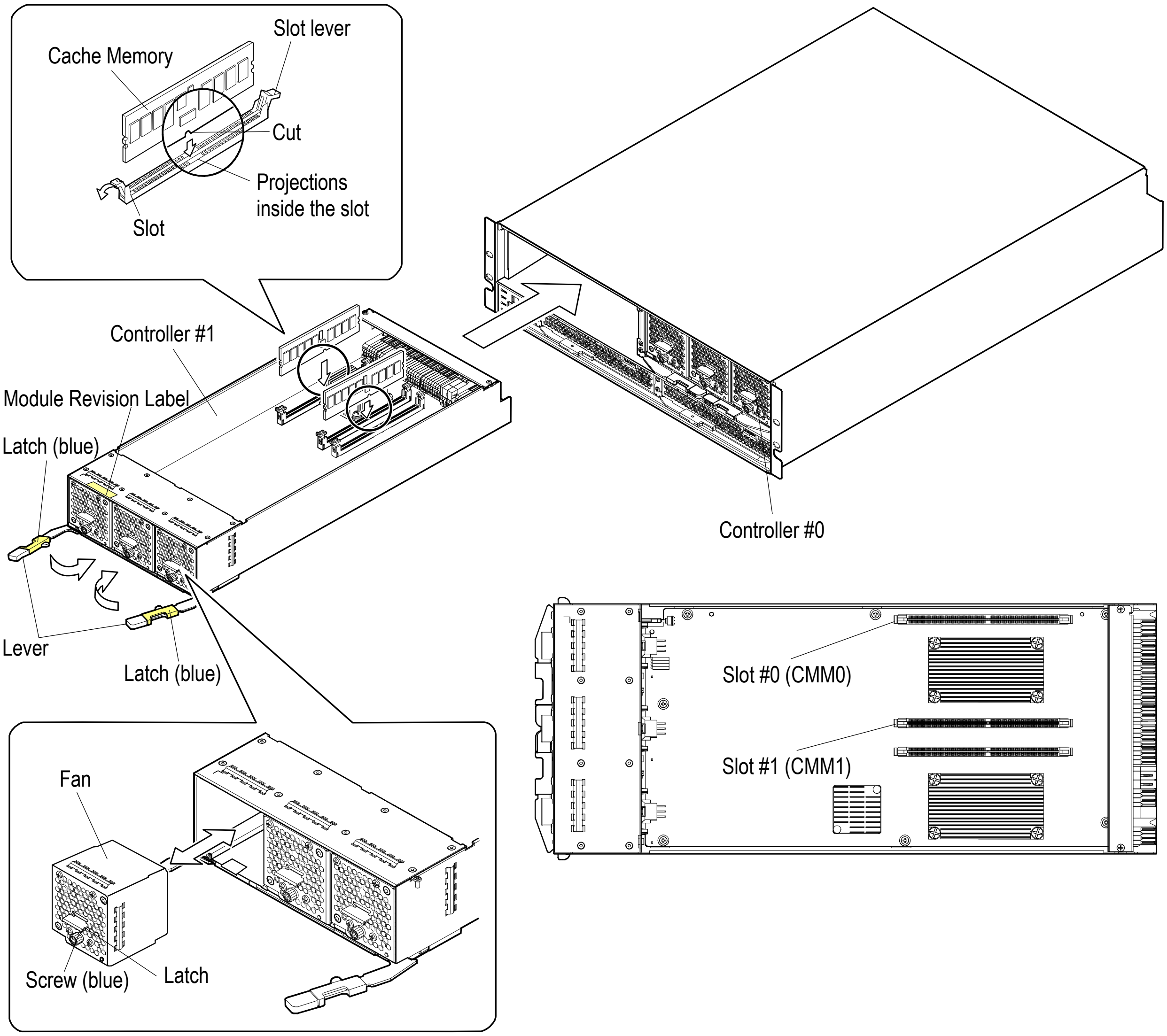

Figure 2.2.20 Controller Replacement (CBL)

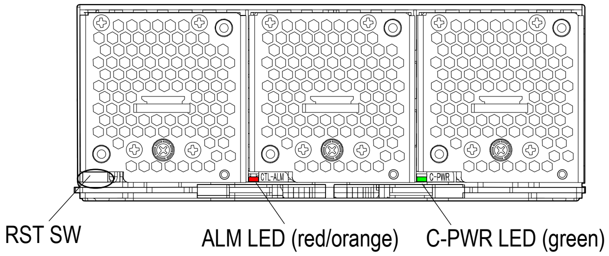

Figure 2.2.21 Position of the LED on the Controller (CBL)

(1-2) When the ALM LED (red) is off

Refer to "Figure 2.2.18 Controller Replacement (CBXSL/CBXSS/CBSL/CBSS)" (REP 02-0780), "Figure 2.2.19 Position of the LED on the Controller (CBXSL/CBXSS/CBSL/CBSS)" (REP 02-0790), "Figure 2.2.20 Controller Replacement (CBL)" (REP 02-0800), and "Figure 2.2.21 Position of the LED on the Controller (CBL)" (REP 02-0800) and replace the Controller.

NOTE :
- When replacing the Controller while the array power is turned on, be sure to replace each one of them at a time. When replacing the Controller of the both systems (Controller#0 and Controller#1) at the same time, follow the procedure explained in "(2) Procedure for replacement with the power turned off" (REP 02-0870).
- System parameters are automatically loaded to the new Controller from the internal Drive. Accordingly, no setting by manual operation is required.
- When the Controller is replaced while the array performs the Volume formatting, the restoration of the inserted Controller may be delayed until the Volume formatting is completed.
- There may be an error report in the host computer depending on the operating conditions of the host computer. The prior contact to the customer is required.
- When the special UPS is connected, replace the Controller after recovering the UPS if the Controller is not recovered after the Controller replacement and a failure occurs in the UPS.

(a) For detaching the Controller for prevention, press the RST SW.
Use a tool with a thin tip (such as a precise screwdriver) because the hole of RST SW is small (3 mm in diameter). Check that the ALM LED (red) lights up within one second and the WARNING LED (orange) on the Front Bezel blinks.

(b) Remove the Controller.

(b-1) For the CBXSL/CBXSS/CBSL/CBSS

(i) Loosen the right and left screws (blue).

(ii) Open the right and left levers forward.
When the levers are completely opened, the Controller comes out forward.

(iii) Remove all the cables connected to the Controller which has been detached for prevention
(When the Drive Box is connected, remove the SAS(ENC) cable, too.)

NOTE :
- When the cable cannot be removed easily, do not pull it by force.
  Besides, the cable can be damaged if it is bent upward or downward forcibly.
- When removing the Fibre Channel Interface cables, pull out the Fibre Channel interface cables completely from the host connectors.
  If the Fibre Channel Interface cables are inserted half in the host connectors, the Controller continues to detect the Fibre Channel failures, and the I/O processing of the Controller may be deteriorated.

⚠ CAUTION

Touching heat sinks or ICs may cause getting burned. Be sure to handle with care.

(iv) Slide the Controller forward to remove it.

(b-2) For the CBL

(i) Slide the right and left latches (blue), and then open the levers forward.

(ii) Open the right and left levers forward.
When the levers are completely opened, the Controller comes out forward.

⚠ CAUTION

Touching heat sinks or ICs may cause getting burned. Be sure to handle with care.

(iii) Slide the Controller forward, and then remove it.

(c) Remove all the components from the Controller to be replaced, and then install them in a new Controller.

(c-1) For the CBXSL/CBXSS/CBSL/CBSS

(i) Place the Controller with it's Module revision label facing down and tighten the two screws (blue) from the rear side of the Controller, and then slide the cover to the direction shown by the arrow (⟶) and remove it.

(ii) Remove the Cache Memory on the Controller.
Push the slot levers which fix the Cache Memory and pull up the Cache Memory by holding its both ends to remove the Cache Memory.

NOTE : Place the removed Cache Memory temporarily in the place where anti-static measures are taken.

(iii) Loosen two screws (blue) which fix the Host I/O Board, pull out and remove the Host I/O Board holding these screws.

NOTE : Place the removed Host I/O Board temporarily in the place where anti-static measures are taken.

(iv) Place the new Controller with it's Module revision label facing down and loosen the two screws (blue) from the rear side of the Controller, and then slide the cover to the direction shown by the arrow (⟶) and remove it.

(v) Install the Cache Memory removed from the Controller to be replaced in the new Controller.
Fit the projection inside the slot to the cut of Cache Memory, and push the Cache Memory in by holding both ends of Cache Memory until the slot levers are completely closed.

NOTE : Be sure to install the removed Cache Memory in the position with the same slot number as before in the new Controller.

(vi) Insert and push the removed Host I/O Board into the slot in the new Controller.

(vii) Tighten two screws (blue) to fix the Host I/O Board.

(viii) Slide and install the cover of the Controller, then fix the two screws (blue) from the rear side of the Controller to fix it.

(c-2) For the CBL

(i) Remove all the Fan Modules from the Controller.
Tighten the screw (blue) which fixes the Fan Module, slide the latch upwards and pull out and remove the FAN Module.

(ii) Install the removed Fan Modules in the new Controller.
Insert the Fan Module into the slot and tighten the screw (blue) to fix the Fan Module.

NOTE : Install the removed Fan Modules in the same place on the new Controller.

(iii) Remove the Cache Memory on the Controller.
Push the slot levers which fix the Cache Memory and pull up the Cache Memory by holding both ends of the Cache Memory to remove the Cache Memory.

NOTE : Place the removed Cache Memory temporarily in the place where anti-static measures are taken.

(iv) Install the removed Cache Memory from the Controller to be replaced in the new Controller.
Fit the projection inside the slot to the cut of Cache Memory, and push the Cache Memory in by holding both ends of Cache Memory until the slot levers are completely closed.

NOTE : Be sure to install the removed Cache Memory in the position with the same slot number as before in the new Controller.

(d) Connect the interlocking cable removed from the CBXSL/CBXSS/CBSL/CBSS to the new Controller when the special UPS is connected.

(e) If the SAS(ENC) cable has been removed from the CBXSL/CBXSS/CBSL/CBSS, connect it to the new Controller.

(f) Check that 20 seconds or longer has passed after the Controller was taken out.

(g) Install the new Controller.
Although the ALM LED (red) lights up when you insert the Controller, it goes out after the Controller recovers.
If the Controller is inserted without waiting for 20 seconds, it is possible that the Controller is not recovered from the failure normally.
When it is not recovered even if 30 minutes or more has passed, perform the dummy replacement(‡1) of the Controller which was inserted.
When the Controller is not recovered (30 minutes or more has passed) even if "I1G300 CTL recovery start (CTL-x)" is displayed in the Information Message of WEB after the dummy replacement, perform the dummy replacement of the Controller which was inserted, again.
When it is not recovered after another 30 minutes, connect the inserted Controller to the WEB and take recovery actions according to "Information Message" on WEB. (There may be a problem on the inserted Controller or the Cache Memories installed in the inserted Controller.)
When any error messages about the Controller or the Cache Memories installed are displayed on WEB, connects the other Controller to the WEB and takes recovery actions according to "Information Message" on WEB.
If no error message is displayed for the inserted Control Unit and the other one, the running Control Unit may have a failure. Consult with the customer/SE, and perform the planned shutdown and replace the running Control Unit (the subsystem cannot be replaced with the power turned on). After the replacement, turn on the subsystem power.

(g-1) For the CBXSL/CBXSS/CBSL/CBSS

(i) In case the connector on the rear face of the new Controller has a connector cover installed, remove the connector cover.

(ii) Insert and push the Controller all the way into the slot with its right and left levers completely opened.

NOTE :
- Do not catch a SAS(ENC) cable when the Controller for the CBXSL/CBXSS/CBSL/CBSS is inserted.
- Install the Controller for the CBXSL/CBXSS/CBSL/CBSS with its Module revision label facing up.
- When pushing the levers at the same time in the direction shown by the arrows (←—), perform this operation within one second. If it has taken more than one second to perform the operation, it may not be recovered. In this case, execute the replacement procedure again. Nevertheless, if it is not recovered, perform the Controller replacement since the failure may be caused in the Controller.

(iii) Close the levers and loosen the right and left screws (blue) to fix the Controller.

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‡1 : This means that the part concerned is removed, and it is reinstalled after 20 seconds or more passed.

(g-2) For the CBL

(i) Push the Controller all the way into the slot with its right and left levers completely opened.

NOTE : When pushing the levers at the same time in the direction shown by the arrows (←—), perform this operation within one second. If it has taken more than one second to perform the operation, it may not be recovered. In this case, execute the replacement procedure again. Nevertheless, if it is not recovered, perform the Controller replacement since the failure may be caused in the Controller.

(ii) Close the levers and slide the right and left latches (blue) to fix the Controller.

(h) Wait for about three minutes, and then make sure that the WARNING LED (orange) on the Front Bezel is off(‡1). (The Controller usually recovers in about three minutes, but if the I/O load from the host computer is high, it may take about 30 minutes to recover.)
If the WARNING LED (orange) lights up, replace the Controller again.
If the WARNING LED (orange) blinks, refer to WEB and make sure that the WARNING LED (orange) goes out.

(i) For the CBXSL/CBXSS/CBSL/CBSS, connect all the removed cables to the Controller.

NOTE : When connecting the Fibre Channel interface cables, insert the Fibre Channel interface cables until they are fixed to the host connectors.
If the Fibre Channel Interface cables are inserted half in the host connectors, the Controller continues to detect the Fibre Channel failures, and the I/O processing of the Controller may be deteriorated.

(j) Check that the READY LED (green) on the front of the Controller Box lights up. The READY LED (green) on the front of the Controller Box may blink at high speed (for a maximum of 30 to 50 minutes, 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.

(k) Refer to “Information Message” on WEB, and check that “I0010x CTL recovered (CTL-x)” is indicated. (Refer to WEB “2.5 Information Message”(WEB 02-0150).)
When this is indicated, the replacement of Controller has completed.

(l) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware “1.6 (4) Checking the start message and end message of the automatic download” (FIRM 01-1620).)

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(m) Check the date and time of the array. If they are not correct, set them.
(Refer to Troubleshooting "2.2 Confirming and Setting RTC (Real Time Clock)" (TRBL 02-0010).)

(n) If your customer has signed up for the "HDD data erase service after maintenance replacement", remove the data in the backup controller (flash memory) in the Controller (Refer to "DEEFS Operation Procedure Manual".)

(2) Procedure for replacement with the power turned off

Replace the Controller referring to "Figure 2.2.18 Controller Replacement (CBXSL/CBXSS/CBSL/CBSS)" (REP 02-0780), "Figure 2.2.19 Position of the LED on the Controller (CBXSL/CBXSS/CBSL/CBSS)" (REP 02-0790), "Figure 2.2.20 Controller Replacement (CBL)" (REP 02-0800), and "Figure 2.2.21 Position of the LED on the Controller (CBL)" (REP 02-0800).

Against the error collection items in the generated error message, check that the required error information is collected.

If the required error information is not collected, collect it. (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).)

Store the collected simple trace information on the CD-R.

(a) Confirm the installation location of the Controller which ALM LED (red) is on.

(b) Turn off the main switch.

For the CBXSL/CBXSS/CBSL/CBSS, press the main switch on either Controller #0 or Controller #1 for three seconds or more.

Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the C-PWR LED (green) on the Controller blinks at high speed, it may be that some of the Cache Memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.

If the Controller is removed from the array when the C-PWR LED (green) blinks at high speed, user data may be lost.

(c) Remove the two power cables from the Controller Box which includes the Controller to be replaced.

(d) Remove the Controller.

(d-1) For the CBXSL/CBXSS/CBSL/CBSS
  (i) Loosen the right and left screws (blue).
  (ii) Open the right and left levers forward.
    When the levers are completely opened, the Controller comes out forward.
  (iii) Remove all the cables connected to the Controller which has been detached for prevention. (When the Drive Box is connected, remove the SAS(ENC) cable, too.)

NOTE :
- When the cable cannot be removed easily, do not pull it by force. Besides, the cable can be damaged if it is bent upward or downward forcibly.
- When removing the Fibre Channel Interface cables, pull out the Fibre Channel interface cables completely from the host connectors. If the Fibre Channel Interface cables are inserted half in the host connectors, the Controller continues to detect the Fibre Channel failures, and the I/O processing of the Controller may be deteriorated.

⚠ **CAUTION**

Touching heat sinks or ICs may cause getting burned. Be sure to handle with care.

  (iv) Slide the Controller forward to remove it.

(d-2) For the CBL
  (i) Slide the right and left latches (blue), and then open the levers forward.
  (ii) Open the right and left levers forward.
    When the levers are completely opened, the Controller comes out forward.

⚠ **CAUTION**

Touching heat sinks or ICs may cause getting burned. Be sure to handle with care.

  (iii) Slide the Controller forward, and then remove it.

(e) Remove all the components from the Controller to be replaced, and then install them in a new Controller.
(e-1) For the CBXSL/CBXSS/CBSL/CBSS
  (i) Place the Controller with it’s Module revision label facing down and loosen the two screws (blue) from the rear side of the Controller, and then slide the cover to the direction shown by the arrow (⟶) and remove it.
  (ii) Remove the Cache Memory on the Controller.
    Push the slot levers which fix the Cache Memory and pull up the Cache Memory by holding its both ends to remove the Cache Memory.

NOTE : Place the removed Cache Memory temporarily in the place where anti-static measures are taken.

(iii) Loosen two screws (blue) which fix the Host I/O Board, pull out and remove the Host I/O Board holding these screws.

NOTE : Place the removed Host I/O Board temporarily in the place where anti-static measures are taken.

(iv) Place the new Controller with it’s Module revision label facing down and loosen the two screws (blue) from the rear side of the Controller, and then slide the cover to the direction shown by the arrow (⟶) and remove it.

(v) Install the Cache Memory removed from the Controller to be replaced in the new Controller.
Fit the projection inside the slot to the cut of Cache Memory, and push the Cache Memory in by holding both ends of Cache Memory until the slot levers are completely closed.

NOTE : Be sure to install the removed Cache Memory in the position with the same slot number as before in the new Controller.

(vi) Insert and push the removed Host I/O Board into the slot in the new Controller.

(vii) Tighten two screws (blue) to fix the Host I/O Board.

(viii) Slide and install the cover of the controller, then fix the two screws (blue) from the rear side of the controller to fix it.

(e-2) For the CBL

(i) Remove all the Fan Modules from the Controller.
Tighten the screw (blue) which fixes the Fan Module, slide the latch upwards and pull out and remove the FAN Module.

(ii) Install the removed Fan Modules in the new Controller.
Insert the Fan Module into the slot and tighten the screw (blue) to fix the Fan Module.

NOTE : Install the removed Fan Modules in the same place on the new Controller.

(iii) Remove the Cache Memory on the Controller.
Push the slot levers which fix the Cache Memory and pull up the Cache Memory by holding both ends of the Cache Memory to remove the Cache Memory.

NOTE : Place the removed Cache Memory temporarily in the place where anti-static measures are taken.

(iv) Install the removed Cache Memory from the Controller to be replaced in the new Controller.
Fit the projection inside the slot to the cut of Cache Memory, and push the Cache Memory in by holding both ends of Cache Memory until the slot levers are completely closed.

NOTE : Be sure to install the removed Cache Memory in the position with the same slot number as before in the new Controller.

(f) Install the new Controller.

(f-1) For the CBXSL/CBXSS/CBSL/CBSS

(i) In case the connector on the rear face of the new Controller has a connector cover installed, remove the connector cover.

(ii) Insert and push the Controller all the way into the slot with its right and left levers completely opened.

NOTE :
- Do not catch a SAS(ENC) cable when the Controller for the CBXSL/CBXSS/CBSL/CBSS is inserted.
- Install the Controller for the CBXSL/CBXSS/CBSL/CBSS with its Module revision label facing up.
- When pushing the levers at the same time in the direction shown by the arrows (←—), perform this operation within one second. If it has taken more than one second to perform the operation, it may not be recovered. In this case, execute the replacement procedure again. Nevertheless, if it is not recovered, perform the Controller replacement since the failure may be caused in the Controller.

(iii) Close the levers and tighten the right and left screws (blue) to fix the Controller.

(f-2) For the CBL

(i) Push the Controller all the way into the slot with its right and left levers completely opened.

NOTE : When pushing the levers at the same time in the direction shown by the arrows (←—), perform this operation within one second. If it has taken more than one second to perform the operation, it may not be recovered. In this case, execute the replacement procedure again. Nevertheless, if it is not recovered, perform the Controller replacement since the failure may be caused in the Controller.

(ii) Close the levers and slide the right and left latches (blue) to fix the Controller.

(g) When replacing the other Controller, return to the step (d) and perform the replacement task for the other Controller.

(h) For the CBXSL/CBXSS/CBSL/CBSS, connect all the removed cables to the Controller.

NOTE : When connecting the Fibre Channel interface cables, insert the Fibre Channel interface cables until they are fixed to the host connectors.
If the Fibre Channel Interface cables are inserted half in the host connectors, the Controller continues to detect the Fibre Channel failures, and the I/O processing of the Controller may be deteriorated.

(i) Connect two power cables to the Controller Box whose Controller was replaced.

(j) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) or the WARNING LED (orange) may blink at high speed (for the maximum of 30 to 85 minutes) before the READY LED (green) on the front of the Controller Box lights up.

(k) Check that “I10000 Array is ready [The firmware version ********]” is displayed referring to the Information Message on WEB.

(l) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware “1.6 (4) Checking the start message and end message of the automatic download” (FIRM 01-1620).)

(m) Check the date and time of the array. If they are not correct, set them.
(Refer to Troubleshooting “2.2 Confirming and Setting RTC (Real Time Clock)” (TRBL 02-0010).)

(n) If your customer has signed up for the “HDD data erase service after maintenance replacement”, remove the data in the backup controller (flash memory) in the Controller (Refer to “DEEFS Operation Procedure Manual”.)

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

2.2.6 Replacing a Cache Memory

CAUTION

Touching heat sinks or ICs may cause getting burned. Be sure to handle with care.

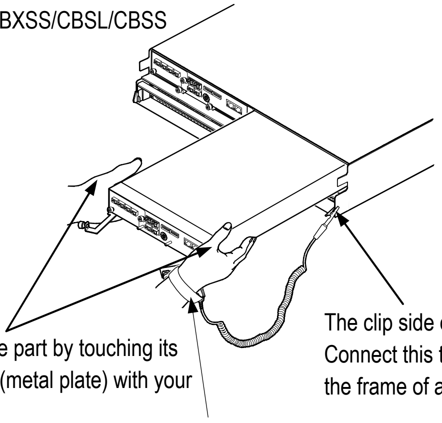
NOTICE

- **To prevent part failures caused by static electrical charge built up on your own body, be sure to wear a wrist strap connected to the chassis before starting and do not take it off until you finish.**
- **Be sure to wear a wrist strap connected to the chassis whenever you unpack parts from a case. Otherwise, the static electrical charge on your body may damage the parts.**
- **When you install a Controller, support its metal part with your hand that has the wrist strap. You can discharge static electricity by touching the metal plate.**

A failure may be caused by the electric shock since the Controller is a precision instrument. Be sure to put on the wrist strap before starting work in order to protect Controller from electrostatic discharge.

NOTE : Before unpacking and replacing maintenance components, be sure to wear a wrist strap and connect to ground the grounding clip in the opposite end of the wrist strap to the chassis frame (metal part).
When you insert a Controller into the array, support the Controller as touching its metal part with fingers of your hand that wears a wrist strap.

CBXSL/CBXSS/CBSL/CBSS

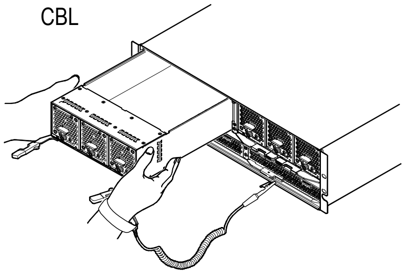


Support the part by touching its metal part (metal plate) with your fingers

A wrist strap (Be sure to wear this before starting maintenance.)

The clip side of wrist strap: Connect this to the metal part on the frame of array (rear face)

CBL



Select a procedure from the following and execute it.

NOTE : • Cache Memory has the following types; for CBSS/CBSL and for CBL. Be careful not to use the wrong one at the time of replacement.
• Replace the specified slot number only for the Cache Memory replacement.

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on (hot replacement)	1. Complete the replacement within ten minutes. Otherwise, a powering off may occur because of an abnormal temperature rise. Perform the part replacement in haste. 2. The procedure varies depending on whether the ALM LED (red) on the controller is on or off. 3. Replace the Controller after blocking the Controller to be replaced. 4. When replacing Controller of both systems (CTL 0 and CTL 1), power off the array before the replacement. 5. In the case of the single controller configuration, perform the replacement after turning off the power. 6. In the case of Preventive replacement, there may be an error report in the host computer depending on the operating conditions of the host computer. The prior contact to the customer is required. 7. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because either the deletion process of the data stored inside the backup controller or the automatic download of the ENC firmware and the backup controller firmware are being executed. Make the replacement after the LED lights on. 8. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box usually goes out about 30 seconds later. 9. At the time of the preventive replacement, do not perform the preventive replacement work while the drive firmware replacement is being executed. Work after the drive firmware replacement ends.	When the ALM LED is on • See "(1-1) When the ALM LED is on" (REP 02-0940). When the ALM LED is off (Preventive replacement) • See "(1-2) When the ALM LED is off" (REP 02-1010).
2	Replacement with the power turned off	1. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because either the deletion process of the data stored inside the backup controller or the automatic download of the ENC firmware and the backup controller firmware are being executed. Make the replacement after the LED lights on. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program or the automatic download of the ENC firmware and the backup controller firmware at the time of turning the power on in the single controller configuration is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box goes out at the maximum of 30 to 85 minutes later and the READY LED (green) lights up. 3. At the time of the preventive replacement, do not perform the preventive replacement work while the drive firmware replacement is being executed. Work after the drive firmware replacement ends.	• See "(2) Procedure for replacement with the power turned off" (REP 02-1060).

(1) Procedure for replacement with the power turned on

(1-1) When the ALM LED is on

Replace the Cache Memory referring to “Figure 2.2.22 Cache Memory Replacement (CBXSL/CBXSS/CBSL/CBSS)” (REP 02-0990), “Figure 2.2.23 Position of the LED on the Controller (CBXSL/CBXSS/CBSL/CBSS)” (REP 02-0990), “Figure 2.2.24 Cache Memory Replacement (CBL)” (REP 02-1000) and “Figure 2.2.25 Position of the LED on the Controller (CBL)” (REP 02-1000).

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message “Chapter 1 ③ Collecting Error Information” (MSG 01-0000).).

Store the collected simple trace information on the CD-R.

(a) Make sure that ALM LED (red) or RST LED (orange) on the Controller installing the Cache Memory to be replaced lights up. If it does not light up, replace the Cache Memory following “(1-2) When the ALM LED on the Controller is off” (REP 02-1010).

(b) Remove the Controller.

(b-1) For the CBXSL/CBXSS/CBSL/CBSS

(i) Loosen the right and left screws (blue).

(ii) Open the right and left levers forward.
When the levers are completely opened, the Controller comes out forward.

(iii) Remove all the cables connected to the Controller (When the Drive Box is connected, remove the SAS(ENC) cable, too.)

NOTE :
- When the cable cannot be removed easily, do not pull it by force.
  Besides, the cable can be damaged if it is bent upward or downward forcibly.
- When removing the Fibre Channel Interface cables, pull out the Fibre Channel interface cables completely from the host connectors.
  If the Fibre Channel Interface cables are inserted half in the host connectors, the Controller continues to detect the Fibre Channel failures, and the I/O processing of the Controller may be deteriorated.

⚠ CAUTION

Touching heat sinks or ICs may cause getting burned. Be sure to handle with care.

(iv) Slide the Controller forward, and then remove it.

(b-2) For the CBL

(i) Slide the right and left latches (blue), and then open the levers forward.

(ii) Open the right and left levers forward.
When the levers are completely opened, the Controller comes out forward.

⚠ CAUTION

Touching heat sinks or ICs may cause getting burned. Be sure to handle with care.

(iii) Slide the Controller forward, and then remove it.

(c) Replace the Cache Memory.

(c-1) For the CBXSL/CBXSS/CBSL/CBSS

(i) Place the Controller with it’s Module revision label facing down and loosen the two screws (blue) from the rear side of the Controller, and then slide the cover to the direction shown by the arrow (⟶) and remove it.

(ii) Remove the Cache Memory on the Controller.
Push the slot levers which fix the Cache Memory and pull up the Cache Memory by holding its both ends to remove the Cache Memory.

NOTE :
- Write down the installation position, capacity, and model name of the Cache Memory before removing the Cache Memory where a failure occurs.
- Place the removed Cache Memory temporarily in the place where anti-static measures are taken.

(iii) Install a new Cache Memory in the Controller.
Fit the projection inside the slot to the cut of Cache Memory, and push the Cache Memory in by holding both ends of Cache Memory until the slot levers are completely closed.

NOTE :
- Install the Cache Memory in the location with the slot number indicated on the Controller.
- Install the new Cache Memory with the same capacity as the removed one.

(iv) Slide and install the cover of the Controller, then fix the two screws (blue) from the rear side of the Controller to fix it.

(c-2) For the CBL

(i) Remove the Cache Memory on the Controller.
Push the slot levers which fix the Cache Memory and pull up the Cache Memory by holding both ends of the Cache Memory to remove the Cache Memory.

NOTE :
- Write down the installation position, capacity, and model name of the Cache Memory before removing the Cache Memory where a failure occurs.
- Place the removed Cache Memory temporarily in the place where anti-static measures are taken.

(ii) Install a new Cache Memory in the Controller.
Fit the projection inside the slot to the cut of Cache Memory, and push the Cache Memory in by holding both ends of Cache Memory until the slot levers are completely closed.

NOTE :
- Install the Cache Memory in the location with the slot number indicated on the Controller.
- Install the new Cache Memory with the same capacity as the removed one.

(d) Connect the interlocking cable removed from the CBXSL/CBXSS/CBSL/CBSS to the new Controller when the special UPS is connected.

(e) If the SAS(ENC) cable has been removed from the CBXSL/CBXSS/CBSL/CBSS, connect it to the new Controller.

(f) Check that 20 seconds or longer has passed after the Controller was taken out.

(g) Install the Controller.
Although the ALM LED (red) lights up when you insert the Controller, it goes out after the Controller recovers.
If the Controller is inserted without waiting for 20 seconds, it is possible that the Controller is not recovered from the failure normally.
When it is not recovered even if 30 minutes or more has passed, perform the dummy replacement(‡1) of the Controller which was inserted.
When the Controller is not recovered (30 minutes or more has passed) even if “I1G300 CTL recovery start (CTL-x)” is displayed in the Information Message of WEB after the dummy replacement, perform the dummy replacement of the Controller which was inserted, again.
When it is not recovered after another 30 minutes, connect the inserted Controller to the WEB and take recovery actions according to “Information Message” on WEB.
When any error messages about the Controller or the Cache Memories installed are displayed on WEB, connects the other Controller to the WEB and takes recovery actions according to “Information Message” on WEB.
If no error message is displayed for the inserted Control Unit and the other one, the running Control Unit may have a failure. Consult with the customer/SE, and perform the planned shutdown and replace the running Control Unit (the subsystem cannot be replaced with the power turned on). After the replacement, turn on the subsystem power.

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‡1 : This means that the part concerned is removed, and it is reinstalled after 20 seconds or more passed.

(g-1) For the CBXSL/CBXSS/CBSL/CBSS

(i) Insert and push the Controller all the way into the slot with its right and left levers completely opened.

NOTE :
- Do not catch a SAS(ENC) cable when the Controller is inserted.
- Install the Controller for the CBXSL/CBXSS/CBSL/CBSS with its Module revision label facing up.
- When pushing the levers at the same time in the direction shown by the arrows (←—), perform this operation within one second. If it has taken more than one second to perform the operation, it may not be recovered. In this case, execute the replacement procedure again. Nevertheless, if it is not recovered, perform the Controller replacement since the failure may be caused in the Controller.

(ii) Close the levers and tighten the right and left screws (blue) to fix the Controller.

(g-2) For the CBL

(i) Insert and push the Controller all the way into the slot with its right and left levers completely opened.

NOTE : When pushing the levers at the same time in the direction shown by the arrows (←—), perform this operation within one second. If it has taken more than one second to perform the operation, it may not be recovered. In this case, execute the replacement procedure again. Nevertheless, if it is not recovered, perform the Controller replacement since the failure may be caused in the Controller.

(ii) Close the levers and slide the right and left latches (blue) to fix the Controller.

(h) Make sure that the ALM LED (red) on the Controller is off.

(i) Make sure that the WARNING LED (orange) on the Front Bezel is off(‡1).
(The Controller usually recovers in about three minutes, but if the I/O load from the host computer is high, it may take about 30 minutes to recover.)

(j) For the CBXSL/CBXSS/CBSL/CBSS, connect all the removed cables to the Controller.

NOTE : When connecting the Fibre Channel interface cables, insert the Fibre Channel interface cables until they are fixed to the host connectors.
If the Fibre Channel Interface cables are inserted half in the host connectors, the Controller continues to detect the Fibre Channel failures, and the I/O processing of the Controller may be deteriorated.

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(k) Check that the READY LED (green) on the front of the Controller Box lights up. The READY LED (green) on the front of the Controller Box may blink at high speed (for a maximum of 30 to 50 minutes, 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.

(l) Check that “I0010x CTL recovered (CTL-x)” is displayed referring to the Information Message window on WEB. (Refer to WEB “2.5 Information Message”(WEB 02-0150).)
When it is indicated, the replacement of the Cache Memory has completed.

(m) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware “1.6 (4) Checking the start message and end message of the automatic download” (FIRM 01-1620).)

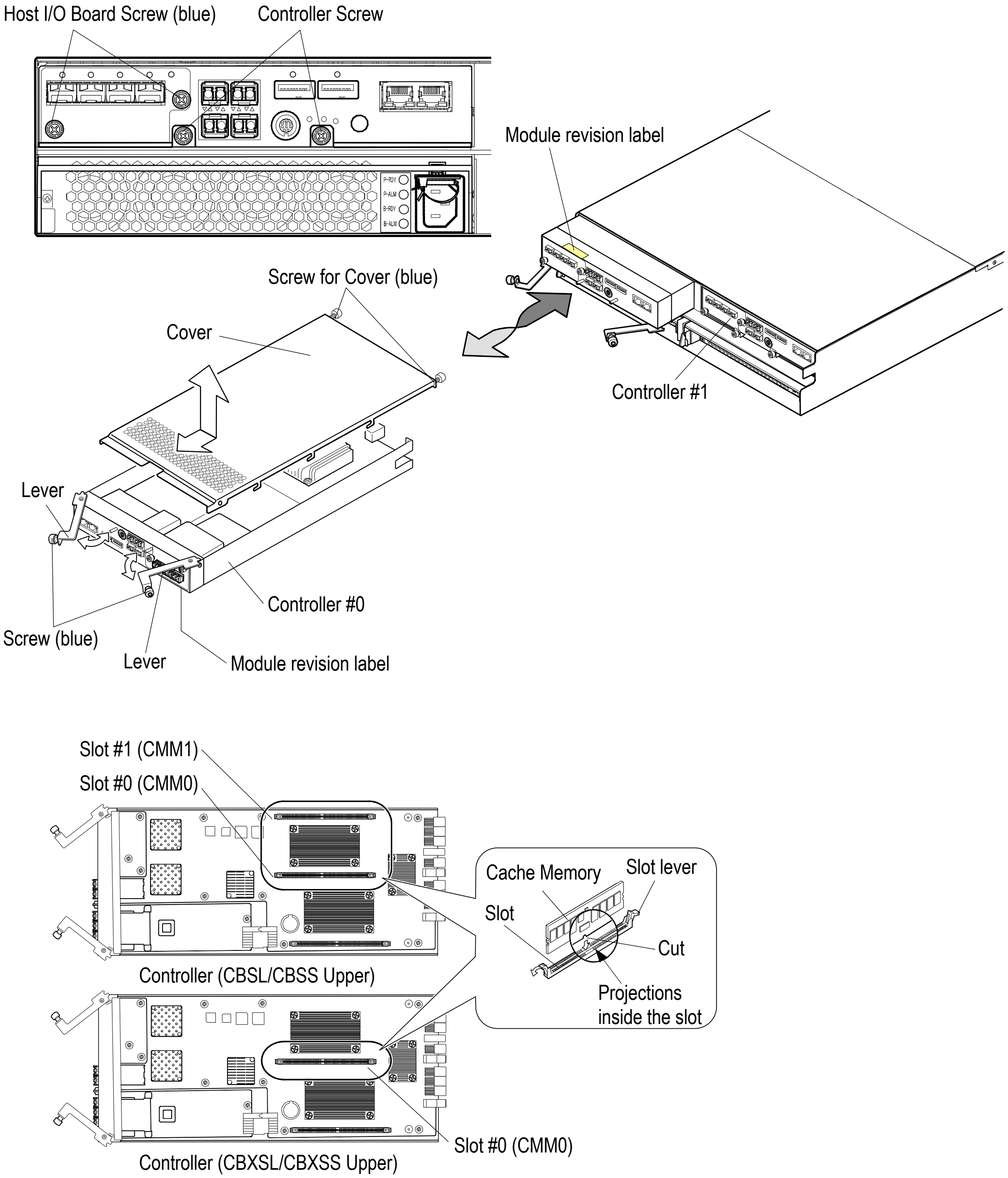

Figure 2.2.22 Cache Memory Replacement (CBXSL/CBXSS/CBSL/CBSS)

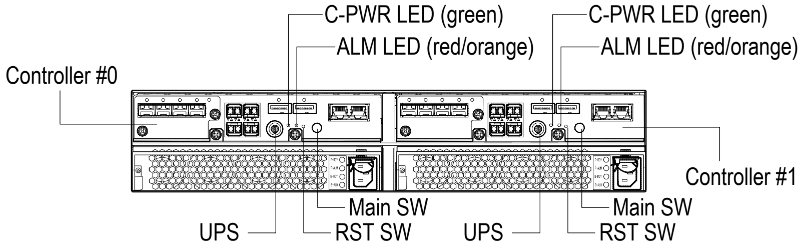

Figure 2.2.23 Position of the LED on the Controller (CBXSL/CBXSS/CBSL/CBSS)

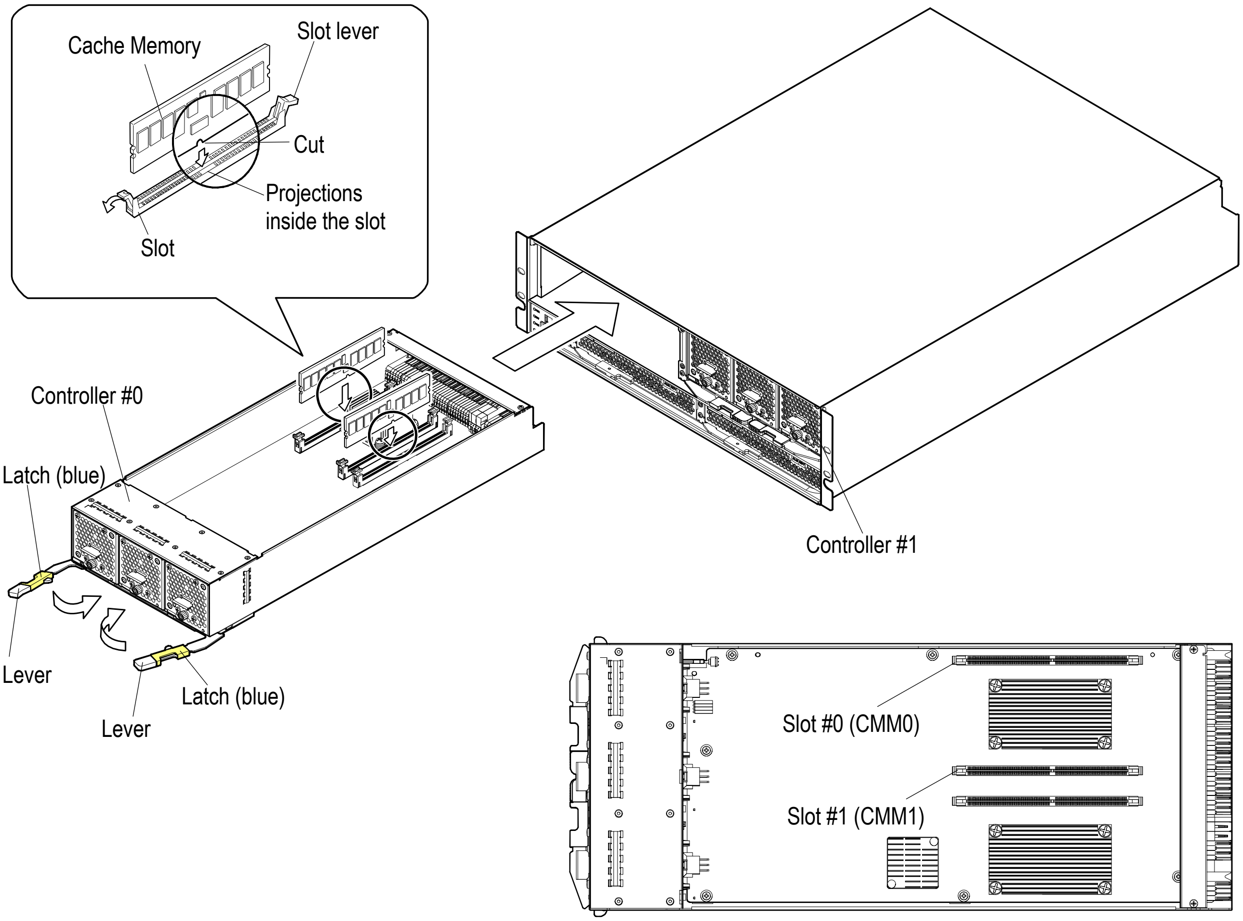

Figure 2.2.24 Cache Memory Replacement (CBL)

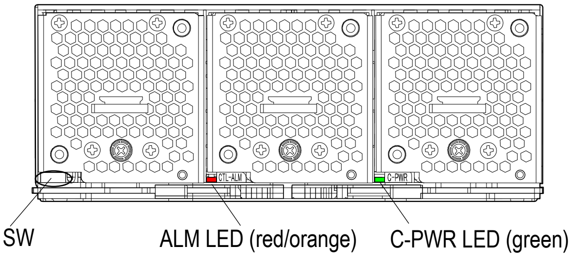

Figure 2.2.25 Position of the LED on the Controller (CBL)

(1-2) When the ALM LED on the Controller is off

Replace the Cache Memory referring to "Figure 2.2.22 Cache Memory Replacement (CBXSL/CBXSS/CBSL/CBSS)" (REP 02-0990), "Figure 2.2.23 Position of the LED on the Controller (CBXSL/CBXSS/CBSL/CBSS)" (REP 02-0990), "Figure 2.2.24 Cache Memory Replacement (CBL)" (REP 02-1000) and "Figure 2.2.25 Position of the LED on the Controller (CBL)" (REP 02-1000).

(a) To detach the Controller for prevention, press the RST SW.

Press the RST SW on the Controller including the Cache Memory to be replaced for prevention, and make sure that the ALM LED (red) comes on. Use a tool with a thin tip (such as a precise screwdriver) because the hole of RST SW is small (3 mm in diameter). If not, remove the Cache Memory following the "2.2.5 (2) Procedure for replacement with the power turned off" (REP 02-0870).

(b) Remove the Controller.

(b-1) For the CBXSL/CBXSS/CBSL/CBSS

(i) Loosen the right and left screws (blue).

(ii) Open the right and left levers forward.

When the levers are completely opened, the Controller comes out forward.

(iii) Remove all the cables connected to the Controller which includes the Cache Memory to be replaced for prevention. (When the Drive Box is connected, remove the SAS(ENC) cable, too.)

NOTE :
- When the cable cannot be removed easily, do not pull it by force.
  Besides, the cable can be damaged if it is bent upward or downward forcibly.
- When removing the Fibre Channel Interface cables, pull out the Fibre Channel interface cables completely from the host connectors.
  If the Fibre Channel Interface cables are inserted half in the host connectors, the Controller continues to detect the Fibre Channel failures, and the I/O processing of the Controller may be deteriorated.

⚠ CAUTION

Touching heat sinks or ICs may cause getting burned. Be sure to handle with care.

(iv) Slide the Controller forward, and then remove it.

(b-2) For the CBL

(i) Slide the right and left latches (blue), and then open the levers forward.

(ii) Open the right and left levers forward.
When the levers are completely opened, the Controller comes out forward.

⚠ CAUTION

Touching heat sinks or ICs may cause getting burned. Be sure to handle with care.

(iii) Slide the Controller forward, and then remove it.

(c) Replace the Cache Memory.

(c-1) For the CBXSL/CBXSS/CBSL/CBSS

(i) Place the Controller with it’s Module revision label facing down and loosen the two screws (blue) from the rear side of the Controller, and then slide the cover to the direction shown by the arrow (⟶) and remove it.

(ii) Remove the Cache Memory on the Controller.
Push the slot levers which fix the Cache Memory and pull up the Cache Memory by holding its both ends to remove the Cache Memory.

NOTE :
- Write down the installation position, capacity, and model name of the Cache Memory before removing the Cache Memory where a failure occurs.
- Place the removed Cache Memory temporarily in the place where anti-static measures are taken.

(iii) Install a new Cache Memory in the Controller.
Fit the projection inside the slot to the cut of Cache Memory, and push the Cache Memory in by holding both ends of Cache Memory until the slot levers are completely closed.

NOTE :
- Install the Cache Memory in the location with the slot number indicated on the Controller.
- Install the new Cache Memory with the same capacity as the removed one.
- Install the Cache Memory of the same capacity in the slot #0, slot #1 and slot #2, slot #3, respectively, and make the capacity and the installation position of the Controller #0 and the Controller #1 the same.

(iv) Slide and install the cover of the Controller, then fix the two screws (blue) from the rear side of the Controller to fix it.

(c-2) For the CBL

(i) Remove the Cache Memory on the Controller.
Push the slot levers which fix the Cache Memory and pull up the Cache Memory by holding both ends of the Cache Memory to remove the Cache Memory.

NOTE :
- Write down the installation position, capacity, and model name of the Cache Memory before removing the Cache Memory where a failure occurs.
- Place the removed Cache Memory temporarily in the place where anti-static measures are taken.

(ii) Install a new Cache Memory in the Controller.
Fit the projection inside the slot to the cut of Cache Memory, and push the Cache Memory in by holding both ends of Cache Memory until the slot levers are completely closed.

NOTE :
- Install the Cache Memory in the location with the slot number indicated on the Controller.
- Install the new Cache Memory with the same capacity as the removed one.

(d) Connect the interlocking cable removed from the CBXSL/CBXSS/CBSL/CBSS to the Controller when the special UPS is connected.

(e) If the SAS(ENC) cable has been removed from the CBXSL/CBXSS/CBSL/CBSS, connect it to the new Controller.

(f) Check that 20 seconds or longer has passed after the Controller was taken out.

(g) Install the Controller.
Although the ALM LED (red) lights up when you insert the Controller, it goes out after the Controller recovers.
If the Controller is inserted without waiting for 20 seconds, it is possible that the Controller is not recovered from the failure normally.
When it is not recovered even if 30 minutes or more has passed, perform the dummy replacement(‡1) of the Controller which was inserted.
When the Controller is not recovered (30 minutes or more has passed) even if "I1G300 CTL recovery start (CTL-x)" is displayed in the Information Message of WEB after the dummy replacement, perform the dummy replacement of the Controller which was inserted, again.
When it is not recovered after another 30 minutes, connect the inserted Controller to the WEB and take recovery actions according to "Information Message" on WEB.
When any error messages about the Controller or the Cache Memories installed are displayed on WEB, connects the other Controller to the WEB and takes recovery actions according to "Information Message" on WEB.
If no error message is displayed for the inserted Control Unit and the other one, the running Control Unit may have a failure. Consult with the customer/SE, and perform the planned shutdown and replace the running Control Unit (the subsystem cannot be replaced with the power turned on). After the replacement, turn on the subsystem power.

(g-1) For the CBXSL/CBXSS/CBSL/CBSS

(i) Insert and push the Controller all the way into the slot with its right and left levers completely opened.

NOTE :
- Do not catch a SAS(ENC) cable when the Controller is inserted.
- Install the Controller for the CBXSL/CBXSS/CBSL/CBSS with its Module revision label facing up.
- When pushing the levers at the same time in the direction shown by the arrows (←——), perform this operation within one second. If it has taken more than one second to perform the operation, it may not be recovered. In this case, execute the replacement procedure again. Nevertheless, if it is not recovered, perform the Controller replacement since the failure may be caused in the Controller.

(ii) Close the levers and tighten the right and left screws (blue) to fix the Controller.

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‡1 : This means that the part concerned is removed, and it is reinstalled after 20 seconds or more passed.

(g-2) For the CBL

(i) Push the Controller all the way into the slot with its right and left levers completely opened.

NOTE : When pushing the levers at the same time in the direction shown by the arrows (←—), perform this operation within one second. If it has taken more than one second to perform the operation, it may not be recovered. In this case, execute the replacement procedure again. Nevertheless, if it is not recovered, perform the Controller replacement since the failure may be caused in the Controller.

(ii) Close the levers and slide the right and left latches (blue) to fix the Controller.

(h) Make sure that the ALM LED (red) on the Controller is off.

(i) Make sure that the WARNING LED (orange) on the Front Bezel is off(‡1).
(The Controller usually recovers in about three minutes, but if the I/O load from the host computer is high, it may take about 30 minutes to recover.)

(j) For the CBXSL/CBXSS/CBSL/CBSS, connect all the removed cables to the Controller.

NOTE : When connecting the Fibre Channel interface cables, insert the Fibre Channel interface cables until they are fixed to the host connectors.
If the Fibre Channel Interface cables are inserted half in the host connectors, the Controller continues to detect the Fibre Channel failures, and the I/O processing of the Controller may be deteriorated.

(k) Check that the READY LED (green) on the front of the Controller Box lights up. The READY LED (green) on the front of the Controller Box may blink at high speed (for a maximum of 30 to 50 minutes, 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.

(l) Check that "I0010x CTL recovered (CTL-x)" is displayed referring to the Information Message window on WEB. (Refer to WEB "2.5 Information Message"(WEB 02-0150).)
When it is indicated, the replacement of the Cache Memory has completed.

(m) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware "1.6 (4) Checking the start message and end message of the automatic download" (FIRM 01-1620).)

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(2) Procedure for replacement with the power turned off

Replace the Cache Memory referring to "Figure 2.2.22 Cache Memory Replacement (CBXSL/CBXSS/CBSL/CBSS)" (REP 02-0990), "Figure 2.2.23 Position of the LED on the Controller (CBXSL/CBXSS/CBSL/CBSS)" (REP 02-0990), "Figure 2.2.24 Cache Memory Replacement (CBL)" (REP 02-1000) and "Figure 2.2.25 Position of the LED on the Controller (CBL)" (REP 02-1000).

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).).

Store the collected simple trace information on the CD-R.

(a) Turn off the main switch.

For the CBXSL/CBXSS/CBSL/CBSS, press the main switch on either Controller #0 or Controller #1 for three seconds or more.

Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the C-PWR LED (green) on the Controller blinks at high speed, it may be that some of the Cache Memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.
If the Controller is removed from the array when the C-PWR LED (green) blinks at high speed, user data may be lost.

(b) Remove the power cables (two) from the Controller Box in which the Cache Memory to be replaced is installed.

(c) Remove the Controller.

(c-1) For the CBXSL/CBXSS/CBSL/CBSS

(i) Loosen the right and left screws (blue).

(ii) Open the right and left levers forward.
When the levers are completely opened, the Controller comes out forward.

(iii) Remove all the cables connected to the Controller (When the Drive Box is connected, remove the SAS(ENC) cable, too.)

NOTE :
- When the cable cannot be removed easily, do not pull it by force.
  Besides, the cable can be damaged if it is bent upward or downward forcibly.
- When removing the Fibre Channel Interface cables, pull out the Fibre Channel interface cables completely from the host connectors.
  If the Fibre Channel Interface cables are inserted half in the host connectors, the Controller continues to detect the Fibre Channel failures, and the I/O processing of the Controller may be deteriorated.

⚠ **CAUTION**

Touching heat sinks or ICs may cause getting burned. Be sure to handle with care.

(iv) Slide the Controller forward to remove it.

(c-2) For the CBL

(i) Slide the right and left latches (blue), and then open the levers forward.

(ii) Open the right and left levers forward.
When the levers are completely opened, the Controller comes out forward.

⚠ CAUTION

Touching heat sinks or ICs may cause getting burned. Be sure to handle with care.

(iii) Slide the Controller forward, and then remove it.

(d) Replace the Cache Memory.

(d-1) For the CBXSL/CBXSS/CBSL/CBSS

(i) Place the Controller with it's Module revision label facing down and loosen the two screws (blue) from the rear side of the Controller, and then slide the cover to the direction shown by the arrow (⟶) and remove it.

(ii) Remove the Cache Memory on the Controller.
Push the slot levers which fix the Cache Memory and pull up the Cache Memory by holding its both ends to remove the Cache Memory.

NOTE :
- Write down the installation position, capacity, and model name of the Cache Memory before removing the Cache Memory where a failure occurs.
- Place the removed Cache Memory temporarily in the place where anti-static measures are taken.

(iii) Install a new Cache Memory in the Controller.
Fit the projection inside the slot to the cut of Cache Memory, and push the Cache Memory in by holding both ends of Cache Memory until the slot levers are completely closed.

NOTE :
- Install the Cache Memory in the location with the slot number indicated on the Controller.
- Install the new Cache Memory with the same capacity as the removed one.

(iv) Slide and install the cover of the controller, then fix the two screws (blue) from the rear side of the controller to fix it.

(d-2) For the CBL

(i) Remove the Cache Memory on the Controller.
Push the slot levers which fix the Cache Memory and pull up the Cache Memory by holding both ends of the Cache Memory to remove the Cache Memory.

NOTE :
- Write down the installation position, capacity, and model name of the Cache Memory before removing the Cache Memory where a failure occurs.
- Place the removed Cache Memory temporarily in the place where anti-static measures are taken.

(ii) Install a new Cache Memory in the Controller.
Fit the projection inside the slot to the cut of Cache Memory, and push the Cache Memory in by holding both ends of Cache Memory until the slot levers are completely closed.

NOTE :
- Install the Cache Memory in the location with the slot number indicated on the Controller.
- Install the new Cache Memory with the same capacity as the removed one.

(e) Install the new Controller.

(e-1) For the CBXSL/CBXSS/CBSL/CBSS

(i) Insert and push the Controller all the way into the slot with its right and left levers completely opened.

NOTE :
- Do not catch a SAS(ENC) cable when the Controller for the CBXSL/CBXSS/CBSL/CBSS is inserted.
- Install the Controller for the CBXSL/CBXSS/CBSL/CBSS with its Module revision label facing up.
- When pushing the levers at the same time in the direction shown by the arrows (←—), perform this operation within one second. If it has taken more than one second to perform the operation, it may not be recovered. In this case, execute the replacement procedure again. Nevertheless, if it is not recovered, perform the Controller replacement since the failure may be caused in the Controller.

(ii) Close the levers and tighten the right and left screws (blue) to fix the Controller.

(e-2) For the CBL

(i) Push the Controller all the way into the slot with its right and left levers completely opened.

NOTE : When pushing the levers at the same time in the direction shown by the arrows (⟵), perform this operation within one second. If it has taken more than one second to perform the operation, it may not be recovered. In this case, execute the replacement procedure again. Nevertheless, if it is not recovered, perform the Controller replacement since the failure may be caused in the Controller.

(ii) Close the levers and slide the right and left latches (blue) to fix the Controller.

(f) For the CBXSL/CBXSS/CBSL/CBSS, connect all the removed cables to the Controller.

NOTE : When connecting the Fibre Channel interface cables, insert the Fibre Channel interface cables until they are fixed to the host connectors.
If the Fibre Channel Interface cables are inserted half in the host connectors, the Controller continues to detect the Fibre Channel failures, and the I/O processing of the Controller may be deteriorated.

(g) Connect two power cables to the Controller Box where Cache Memory was replaced.

(h) Turn on the main switch (the array usually recovers in about 5 to 7 minutes for CBXSL/CBXSS, about 5 to 8 minutes for CBSL/CBSS, and about 5 to 10 minutes for CBL).

(i) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) on the front of the Controller Box may blink at high speed (for a maximum of 30 to 50 minutes, or 40 to 60 minutes for CBL (80 to 180 minutes when the DBW is connected to the CBL)) or the WARNING LED (orange) may blink at high speed (for the maximum of 30 to 85 minutes) before the READY LED (green) on the front of the Controller Box lights up.

(j) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware "1.6 (4) Checking the start message and end message of the automatic download" (FIRM 01-1620).)

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

2.2.7 Replacing a Host I/O Board/Module

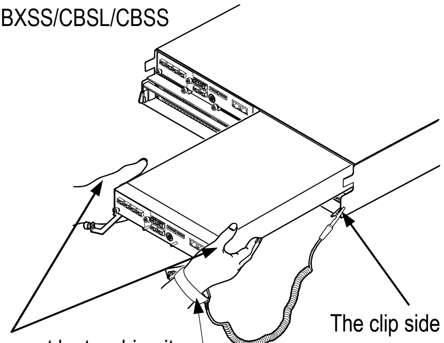
NOTICE

- **To prevent part failures caused by static electrical charge built up on your own body, be sure to wear a wrist strap connected to the chassis before starting and do not take it off until you finish.**
- **Be sure to wear a wrist strap connected to the chassis whenever you unpack parts from a case. Otherwise, the static electrical charge on your body may damage the parts.**
- **When you install a Host I/O Board/Module, support its metal part with your hand that has the wrist strap. You can discharge static electricity by touching the metal plate.**

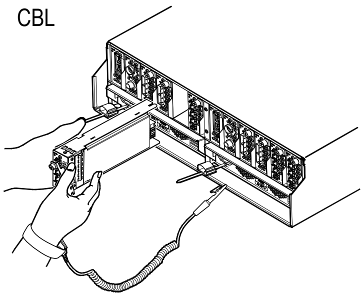
A failure may be caused by the electric shock since the Controller is a precision instrument. Be sure to put on the wrist strap before starting work in order to protect Controller from electrostatic discharge.

NOTE : Before unpacking and replacing maintenance components, be sure to wear a wrist strap and connect to ground the grounding clip in the opposite end of the wrist strap to the chassis frame (metal part).
When you insert a Controller into the array, support the Controller as touching its metal part with fingers of your hand that wears a wrist strap.

CBXSL/CBXSS/CBSL/CBSS


Support the part by touching its metal part (metal plate) with your fingers
The clip side of wrist strap: Connect this to the metal part on the frame of array (rear face)
A wrist strap (Be sure to wear this before starting maintenance.)

CBL



Select a procedure from the following and execute it.

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on (hot replacement)	1. Complete the replacement within ten minutes. Otherwise, a powering off may occur because of an abnormal temperature rise. Perform the part replacement in haste. 2. The procedure varies depending on whether the STATUS LED (red) is on or off. 3. In the case of Preventive replacement, there may be an error report in the host computer depending on the operating conditions of the host computer. The prior contact to the customer is required. 4. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 5. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box usually goes out about 30 seconds later. 6. At the time of the preventive replacement, do not perform the preventive replacement work while the drive firmware replacement is being executed. Work after the drive firmware replacement ends.	When the STATUS LED (red) is on • See "(1-1) When the STATUS LED (red) is on" (REP 02-1120). When the STATUS LED (red) is off (Preventive replacement) • See "(1-2) When the STATUS LED (red) is off" (REP 02-1170).
2	Replacement with the power turned off	1. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the READY LED (green) lights on. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program or the automatic download of the ENC firmware and the backup controller firmware at the time of turning the power on in the single controller configuration is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box goes out at the maximum of 30 to 85 minutes later and the READY LED (green) lights up. 3. At the time of the preventive replacement, do not perform the preventive replacement work while the drive firmware replacement is being executed. Work after the drive firmware replacement ends.	See "(2) Procedure for replacement with the power turned off" (REP 02-1200).

(1) Procedure for replacement with the power turned on

(1-1) When the STATUS LED (red) is on

Replace the Host I/O Board/Module referring to "Figure 2.2.26 Replacing Host I/O Board(CBXSL/CBXSS/CBSL/CBSS)" (REP 02-1150), "Figure 2.2.27 Position of the STATUS LED on the Host I/O Board (CBXSL/CBXSS/CBSL/CBSS)" (REP 02-1150), "Figure 2.2.28 Replacing Host I/O Module (CBL)" (REP 02-1160) and "Figure 2.2.29 Position of the STATUS LED on the Host I/O Module (CBL)" (REP 02-1160).

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).).

(a) Collect Simple Trace and Constitute Array (Port Information). (Refer to Troubleshooting "5.3 Collecting Simple Trace" (TRBL 05-0040) and System Parameter "Chapter 10. Setting of Constitute Array" (SYSPR 10-0000).)

NOTE : If you change the installation position of Host I/O Board/Module, all the following information is cleared. Therefore, make sure to collect simple trace and obtain configuration information to keep configuration information before change.

- Host Group Information / Target Information
- Host Group Option/Target Option
- Mapping Information
- Fibre Channel Information Port Setting Information/iSCSI port setting information
- CHAP security information (iSCSI)

(b) Make sure that the STATUS LED (red) on the Host I/O Board/Module to be replaced lights up. If it does not light up, replace it following "(1-2) When the STATUS LED is off" (REP 02-1170).

(c) Remove all the Interface cables connected to the Host I/O Board/Module.

NOTE :
- When the cable cannot be removed easily, do not pull it by force.
  Besides, the cable can be damaged if it is bent upward or downward forcibly.
- When removing the Fibre Channel Interface cables, pull out the Fibre Channel interface cables completely from the host connectors.
  If the Fibre Channel Interface cables are inserted half in the host connectors, the Controller continues to detect the Fibre Channel failures, and the I/O processing of the Controller may be deteriorated.

(d) Remove the Host I/O Board/Module.

(d-1) For the CBXSL/CBXSS/CBSL/CBSS
  (i) Remove the Host Connector installed in the Host I/O Board to be removed.
  (ii) Loosen the two screws (blue) which fix the Host I/O Board.
  (iii) Pull out and remove the Host I/O Board.

NOTE : Place the removed Host I/O Board and Host Connector temporarily in the place where anti-static measures are taken.

(d-2) For the CBL
  (i) Loosen one screw (blue) which fixes the Host I/O Module, and then tilt the lever toward you. When the lever is completely tilted, the Host I/O Module comes out forward.
  (ii) Pull out and remove the Host I/O Module.

NOTE : Place the removed Host I/O Module temporarily in the place where anti-static measures are taken.

(e) Check that 20 seconds or more has been passed since the Host I/O Board/Module was removed.

(f) Install the new Host I/O Board/Module.

(f-1) For the CBXSL/CBXSS/CBSL/CBSS
  (i) Remove the Host Connector installed in a new Host I/O Board.
  (ii) Insert and push the new Host I/O Board into the slot in the Controller.

NOTE : When pushing the levers at the same time in the direction shown by the arrows (←—), perform this operation within one second. If it has taken more than one second to perform the operation, it may not be recovered. In this case, execute the replacement procedure again. Nevertheless, if it is not recovered, perform the Controller replacement since the failure may be caused in the Controller.

  (iii) Tighten the two screws (blue) to fix the Host I/O Board.
  (iv) Install the Host Connector in the Host I/O Board.

(f-2) For the CBL
  (i) Push the Host I/O Module into the slot with its lever completely opened.
  (ii) Close the lever and tighten one screw (blue) to fix the Host I/O Module.

(g) Make sure that the STATUS LED (red) on the Host I/O Board/Module is off.

(h) Make sure that the WARNING LED (orange) on the front side of the Controller Box is off(‡1). (The Controller usually recovers in about three minutes, but if the I/O load from the host computer is high, it may take about 30 minutes to recover.)

(i) Connect the removed Interface Cables to the Host I/O Board or Host I/O Module.

NOTE : When connecting the Fibre Channel interface cables, insert the Fibre Channel interface cables until they are fixed to the host connectors.
If the Fibre Channel Interface cables are inserted half in the host connectors, the Controller continues to detect the Fibre Channel failures, and the I/O processing of the Controller may be deteriorated.

(j) Check that the READY LED (green) on the front of the Controller Box lights up. The READY LED (green) on the front of the Controller Box may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.

(k) Refer to “Information Message” on WEB, and check to see that, In the case of CBXSL/CBXSS/ CBSL/CBSS, “IAIHhy Interface Board recovered (CTL-x, I/F -y)” is indicated.
In the case of CBL, “IAA1i0 Host I/O module recovered (CTL-x, Slot-l)” is indicated (Refer to WEB “2.5 Information Message” (WEB 02-0150).)
When this is indicated, the replacement of the Host I/O Board/Module has completed.

(l) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware “1.6 (4) Checking the start message and end message of the automatic download” (FIRM 01-1620).)

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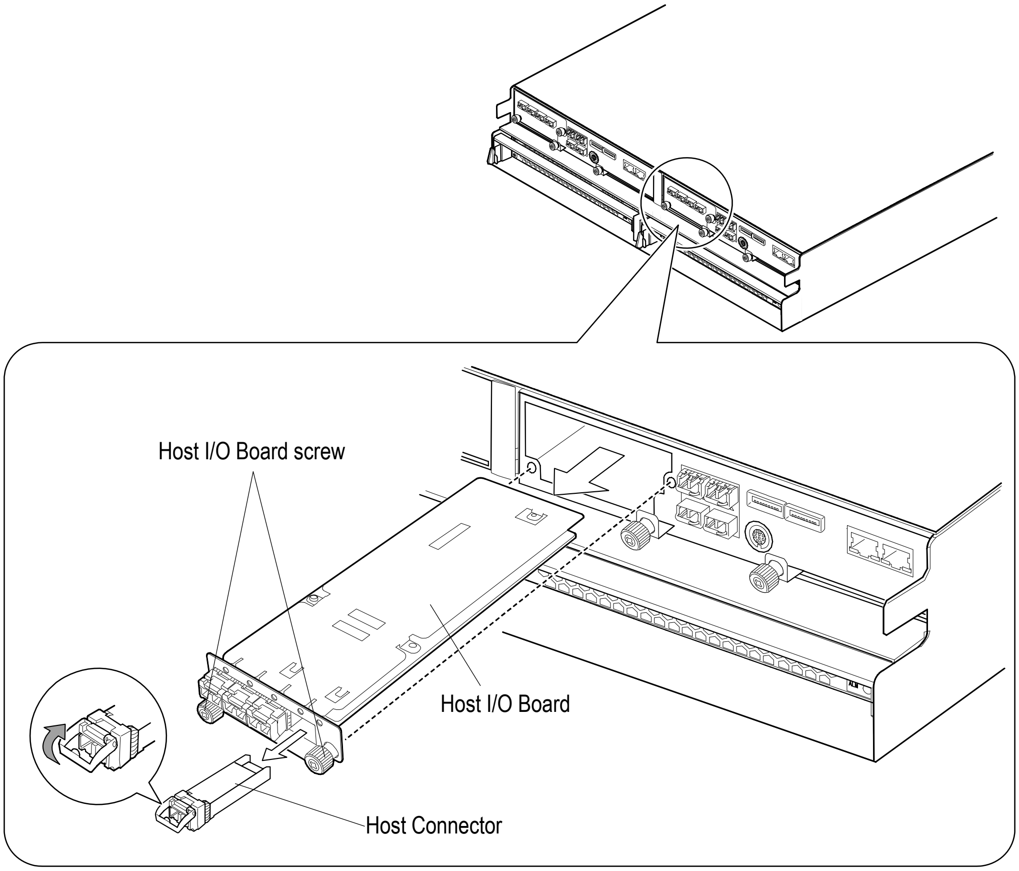
‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.



*1 : The figure shows the case where the FC Host I/O Board is installed in the Controller of the CBSL.

Figure 2.2.26 Replacing Host I/O Board (CBXSL/CBXSS/CBSL/CBSS)

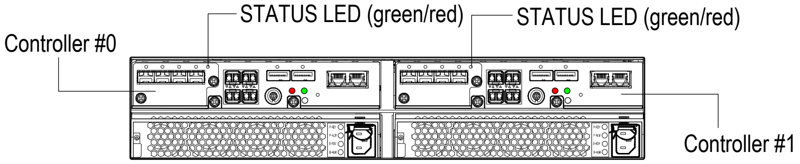
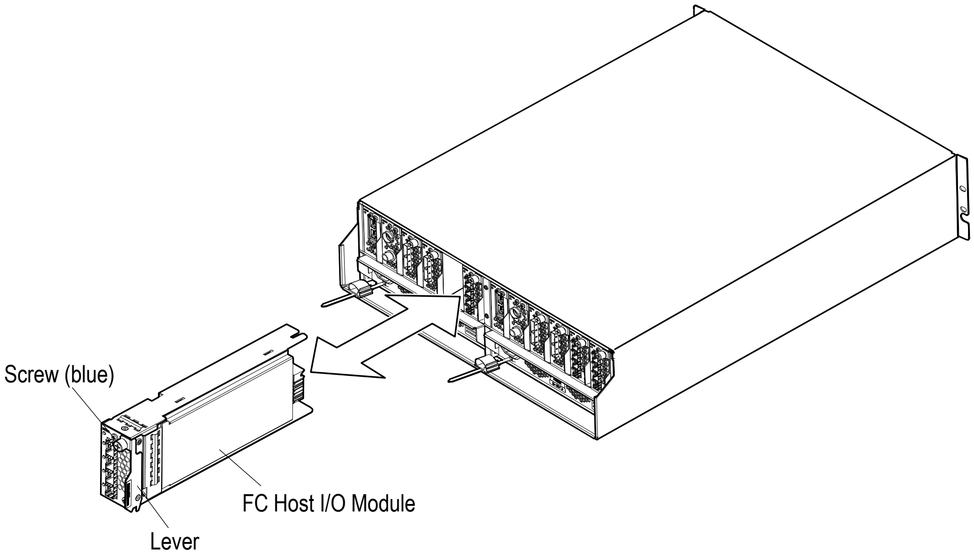


Figure 2.2.27 Position of the STATUS LED on the Host I/O Board (CBXSL/CBXSS/CBSL/CBSS)



*1 : The figure shows the case where the FC Host I/O Module is installed.

Figure 2.2.28 Replacing Host I/O Module (CBL)

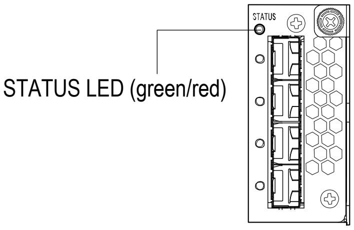


Figure 2.2.29 STATUS LED Locations on the Host I/O Module (CBL)

(1-2) When the STATUS LED (red) is off

Replace the Host I/O Board/Module referring to "Figure 2.2.26 Replacing Host I/O Board(CBXSL/CBXSS/CBSL/CBSS)" (REP 02-1150), "Figure 2.2.27 Position of the STATUS LED on the Host I/O Board (CBXSL/CBXSS/CBSL/CBSS)" (REP 02-1150), "Figure 2.2.28 Replacing Host I/O Module (CBL)" (REP 02-1160) and "Figure 2.2.29 Position of the STATUS LED on the Host I/O Module (CBL)" (REP 02-1160).

NOTE : Connect the LAN cable to the Controller other than the one which includes the module to be replaced for prevention (For example, when the module #0 side is replaced for prevention, connect the LAN cable to the Controller #1 side.)
After that, set the IP address of the Controller with the LAN cable connected from the Hitachi Storage Navigator Modular 2, and then register the array.

(a) Collect Simple Trace and Constitute Array (Port Information). (Refer to Troubleshooting "5.3 Collecting Simple Trace" (TRBL 05-0040) and System Parameter "Chapter 10. Setting of Constitute Array" (SYSPR 10-0000).)

NOTE : If you change the installation position of Host I/O Board/Module, all the following information is cleared. Therefore, make sure to collect simple trace and obtain configuration information to keep configuration information before change.

- Host Group Information/Target Information
- Host Group Option/Target Option
- Mapping Information
- Fibre Channel Information Port Setting Information/iSCSI port setting information
- CHAP security information (iSCSI)

(b) Detach for prevention

NOTE :

- When the firmware version is less than 0925/A, if the relevant module is blocked, the operation of the Controller which controls the relevant module stops. Therefore, the host and the management program cannot access the relevant Controller.
- When the firmware version is 0925/A or more, even if the relevant module is blocked, the operation of the Controller which controls the relevant module does not stop. Therefore, the management program can access the relevant Controller.

(b-1) For the CBXSL/CBXSS/CBSL/CBSS

(i) Select the [Components] – [Interface Boards] on the unit window of Hitachi Storage Navigator Modular 2, and click the [Detach I/F Board] button after selecting the Interface Board to be changed. A confirmation message is displayed. If it is OK, click the [Confirm] button.
Although the ALM LED (red) on the Controller lights up for about three seconds, there is no problem.
Check that the STATUS LED (red) on the Host I/O Board lights up.

(b-2) For the CBL

(i) Select the [Components] – [I/F Modules] on the unit window of Hitachi Storage Navigator Modular 2, and click the [Detach I/F Module] button after selecting the module to be changed. A confirmation message is displayed. If it is OK, click the [Confirm] button. Although the ALM LED (red) on the Controller lights up for about three seconds, there is no problem.
Check that the STATUS LED (red) on the Host I/O Module lights up.

(c) Remove the Interface cables connected to the Host I/O Board/Module to be replaced.

NOTE :
- When the cable cannot be removed easily, do not pull it by force. Besides, the cable can be damaged if it is bent upward or downward forcibly.
- When removing the Fibre Channel Interface cables, pull out the Fibre Channel interface cables completely from the host connectors. If the Fibre Channel Interface cables are inserted half in the host connectors, the Controller continues to detect the Fibre Channel failures, and the I/O processing of the Controller may be deteriorated.

(d) Remove the Host I/O Board/Module.

(d-1) For the CBXSL/CBXSS/CBSL/CBSS

(i) Remove the Host Connector installed in the Host I/O Board to be removed.

(ii) Loosen the two screws (blue) which fix the Host I/O Board.

(iii) Pull out and remove the Host I/O board.

NOTE : Place the removed Host I/O Board and Host Connector temporarily in the place where anti-static measures are taken.

(d-2) For the CBL

(i) Loosen one screw (blue) which fixes the Host I/O Module, and then pull the lever open. When the lever is completely opened, the Host I/O Module comes out forward.

(ii) Pull out and remove the Host I/O Module.

NOTE : Place the removed Host I/O Module temporarily in the place where anti-static measures are taken.

(e) Check that 20 seconds or more has been passed since the Host I/O Board/Module was removed.

(f) Install the new Host I/O Board/Module.

(f-1) For the CBXSL/CBXSS/CBSL/CBSS

(i) Remove the Host Connector installed in a new Host I/O Board.

(ii) Insert and push the new Host I/O Board into the slot in the Controller.

NOTE : When pushing the levers at the same time in the direction shown by the arrows (←—), perform this operation within one second. If it has taken more than one second to perform the operation, it may not be recovered. In this case, execute the replacement procedure again. Nevertheless, if it is not recovered, perform the Controller replacement since the failure may be caused in the Controller.

(iii) Tighten the two screws (blue) to fix the Host I/O Board.
(iv) Install the Host Connector in the Host I/O Board.

(f-2) For the CBL
(i) Push the Host I/O Module into the slot with its lever completely opened.
(ii) Close the lever and tighten one screw (blue) to fix the Host I/O Module.

(g) Make sure that the STATUS LED (red) on the Host I/O Board/Module is off.

(h) Make sure that the WARNING LED (orange) on the front side of the Controller Box is off(‡1). (The Controller usually recovers in about three minutes, but if the I/O load from the host computer is high, it may take about 30 minutes to recover.)

(i) Connect the remove Interface Cables to the Host I/O Board/Module.

NOTE : When connecting the Fibre Channel interface cables, insert the Fibre Channel interface cables until they are fixed to the host connectors.
If the Fibre Channel Interface cables are inserted half in the host connectors, the Controller continues to detect the Fibre Channel failures, and the I/O processing of the Controller may be deteriorated.

(j) Check that the READY LED (green) on the front of the Controller Box lights up. The READY LED (green) on the front of the Controller Box may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.

(k) Refer to “Information Message” on WEB, and check to see that In the case of CBXSL/CBXSS/CBSL/CBSS, “IAIHhy Interface Board recovered (CTL-x, I/F –y)” is indicated.
In the case of CBL, “IAA1i0 Host I/O module recovered (CTL-x, Slot-l)” is indicated is indicated. (Refer to WEB “2.5 Information Message” (WEB 02-0150).)
When this is indicated, the replacement of The Host I/O Board/Module has completed.

(l) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware “1.6 (4) Checking the start message and end message of the automatic download” (FIRM 01-1620).)

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(2) Procedure for replacement with the power turned off

Replace the Host I/O Board/Module referring to "Figure 2.2.26 Replacing Host I/O Board(CBXSL/CBXSS/CBSL/CBSS)" (REP 02-1150), "Figure 2.2.27 Position of the STATUS LED on the Host I/O Board (CBXSL/CBXSS/CBSL/CBSS)" (REP 02-1150), "Figure 2.2.28 Replacing Host I/O Module (CBL)" (REP 02-1160) and "Figure 2.2.29 Position of the STATUS LED on the Host I/O Module (CBL)" (REP 02-1160).

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).).

(a) Collect Simple Trace and Constitute Array (Port Information). (Refer to Troubleshooting "5.3 Collecting Simple Trace" (TRBL 05-0040) and System Parameter "Chapter 10. Setting of Constitute Array" (SYSPR 10-0000).)

NOTE : If you change the installation position of Host I/O Board/Module, all the following information is cleared. Therefore, make sure to collect simple trace and obtain configuration information to keep configuration information before change.

- Host Group Information/Target Information
- Host Group Option/Target Option
- Mapping Information
- Fibre Channel Information Port Setting Information/iSCSI port setting information
- CHAP security information (iSCSI)

(b) Turn off the main switch.

For the CBXSL/CBXSS/CBSL/CBSS, press the main switch on either Controller #0 or Controller #1 for three seconds or more.

Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the C-PWR LED (green) on the Controller blinks at high speed, it may be that some of the Cache Memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.

(c) Remove the two power cables from the Controller Box in which the Host I/O Board/Module to be replaced is installed.

(d) Remove the Interface cables connected to the Host I/O Board/Module to be replaced.

NOTE :
- When the cable cannot be removed easily, do not pull it by force. Besides, the cable can be damaged if it is bent upward or downward forcibly.
- When removing the Fibre Channel Interface cables, pull out the Fibre Channel interface cables completely from the host connectors. If the Fibre Channel Interface cables are inserted half in the host connectors, the Controller continues to detect the Fibre Channel failures, and the I/O processing of the Controller may be deteriorated.

(e) Remove the Host I/O Board/Module.

(e-1) For the CBXSL/CBXSS/CBSL/CBSS

(i) Remove the Host Connector installed in the Host I/O Board to be removed.

(ii) Loosen the two screws (blue) which fix the Host I/O Board.

(iii) Pull out and remove the Host I/O Board.

NOTE : Place the removed Host I/O Board and Host Connector temporarily in the place where anti-static measures are taken.

(e-2) CBL

(i) Loosen one screw (blue) which fixes the Host I/O Module, and then pull the lever open. When the lever is completely opened, the Host I/O Module comes out forward.

(ii) Pull out and remove the Host I/O Module.

NOTE : Place the removed Host I/O Module temporarily in the place where anti-static measures are taken.

(f) Install the new Host I/O Module or Host I/O Board.

(f-1) For the CBXSL/CBXSS/CBSL/CBSS

(i) Remove the Host Connector installed in a new Host I/O Board.

(ii) Insert and push the removed Host I/O Board into the slot in the new Controller.

NOTE : When pushing the levers at the same time in the direction shown by the arrows (←—), perform this operation within one second. If it has taken more than one second to perform the operation, it may not be recovered. In this case, execute the replacement procedure again. Nevertheless, if it is not recovered, perform the Controller replacement since the failure may be caused in the Controller.

(iii) Tighten the two screws (blue) to fix the Host I/O Board.

(iv) Install the Host Connector in the Host I/O Board.

(f-2) For the CBL

(i) Push the Host I/O Module into the slot with its lever completely opened.

(ii) Close the lever and tighten one screw (blue) to fix the Host I/O Module.

(g) Connect the remove Interface cables to the Host I/O Board or Host I/O Module.

NOTE : When connecting the Fibre Channel interface cables, insert the Fibre Channel interface cables until they are fixed to the host connectors.
If the Fibre Channel Interface cables are inserted half in the host connectors, the Controller continues to detect the Fibre Channel failures, and the I/O processing of the Controller may be deteriorated.

(h) Connect the remove power cables to the Controller Box where the Host I/O Board or Host I/O Module was replaced.

(i) Turn on the main switch (the array usually recovers in about 5 to 7 minutes for CBXSL/CBXSS, about 5 to 8 minutes for CBSL/CBSS, and about 5 to 10 minutes for CBL).

(j) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) on the front of the Controller Box may blink at high speed (for a maximum of 30 to 50 minutes, or 40 to 60 minutes for CBL (80 to 180 minutes when the DBW is connected to the CBL)) or the WARNING LED (orange) may blink at high speed (for the maximum of 30 to 85 minutes) before the READY LED (green) on the front of the Controller Box lights up.

(k) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware "1.6 (4) Checking the start message and end message of the automatic download" (FIRM 01-1620).)

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

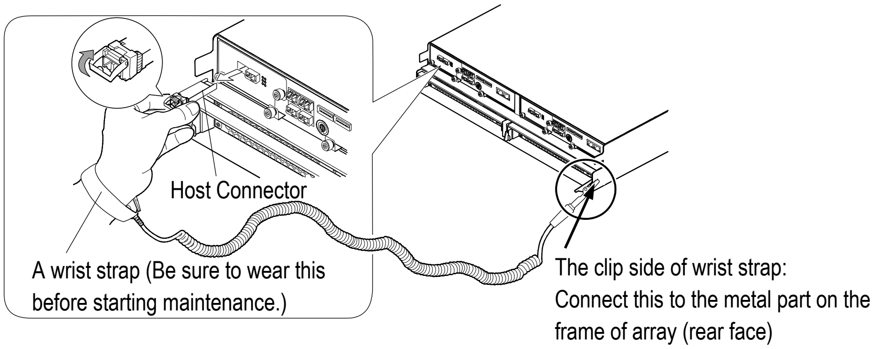
2.2.8 Replacing a Host Connector

NOTICE

- **To prevent part failures caused by static electrical charge built up on your own body, be sure to wear a wrist strap connected to the chassis before starting and do not take it off until you finish.**
- **Be sure to wear a wrist strap connected to the chassis whenever you unpack parts from a case. Otherwise, the static electrical charge on your body may damage the parts.**

A failure may be caused by the electric shock since the Host Connector is a precision instrument. Be sure to put on the wrist strap before starting work in order to protect Host Connector from electrostatic discharge.

NOTE : Before unpacking and replacing maintenance components, be sure to wear a wrist strap and connect to ground the grounding clip in the opposite end of the wrist strap to the chassis frame (metal part).


Host Connector
A wrist strap (Be sure to wear this before starting maintenance.)
The clip side of wrist strap: Connect this to the metal part on the frame of array (rear face)

Host Connector can be replaced with the power turned on.
When the SNMP Agent Support Function is enabled, the SNMP Trap is sent if the Host Connector is blocked or removed.

Select a procedure from the following and execute it.

NOTE : Host Connector has the following types; for 8 G bps Fibre Channel Interface and for 10 G bps iSCSI Interface. Be careful not to use the wrong one at the time of replacement.

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on (hot replacement)	1. The procedure varies depending on whether the HALM LED/HSTS LED is on or off. 2. In the case of Preventive replacement, there may be an error report in the host computer depending on the operating conditions of the host computer. The prior contact to the customer is required. 3. There are the following types of Host Connectors; for 8 G bps Fibre Channel Interface and for 10 G bps iSCSI Interface. When replacing each of them, be careful not to use a wrong one. 4. You cannot replace the Host Connector during the firmware update. Check that the firmware is not being updated with Hitachi Storage Navigator Modular 2 before replacing the Host Connector.	When the HALM LED (red) /HSTS LED (red) is on • See "(1-1) When the HALM LED (red)/HSTS LED (red) is on" (REP 02-1250) When the HALM LED (red)/ HSTS LED (red) does not light up (Preventive replacement) • See "(1-2) When the HALM LED (red)/HSTS LED (red) does not light up" (REP 02-1290).
2	Replacement with the power turned off	1. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program or the automatic download of the ENC firmware and the backup controller firmware at the time of turning the power on in the single controller configuration is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box goes out at the maximum of 30 to 85 minutes later and the READY LED (green) lights up.	See "(2) Procedure for replacement with the power turned off" (REP 02-1300).

(1) Procedure for replacement with the power turned on

(1-1) When the HALM LED (red)/HSTS LED(red) on the Host Connector is on

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).).

NOTE : • Do not replace the Host Connector which operates normally.

(a) When replacing the Host Connector, confirm that the HALM LED (red)/HSTS LED (red) on the Host Connector is on.
If it does not light up, remove the Host Connector following "(1-2) When the HALM LED (red) /HSTS LED (red) on the Host Connector does not light up" (REP 02-1290).

(b) Remove the interface cables connected to the Controller mounting the Host Connector to be replaced.

NOTE : When the cable cannot be removed easily, do not pull it by force.
Besides, the cable can be damaged if it is bent upward or downward forcibly.

(c) Remove the Host Connector.
Pull out the Host Connector after raising the Lever.

NOTE :
- The installing direction of Host Connector is different depending on the array.
- When the Host Connector cannot be removed, remove it pushing the lever down.
- For the CBXSL/CBSL/CBXSS/CBSS, operate the lever of the Host Connector for #0A, 1A, 0C, 1C from between the lever of Power Unit and the array.

(d) Make sure that 20 seconds or longer has elapsed after the Host Connector was taken out.
If the Host Connector is inserted before 20 seconds has elapsed, the Host Connector may not be recovered normally.

(e) Check the insertion direction of the Host Connector, and then insert the Host Connector in the port until it clicks.

NOTE : Be sure to install the same type of the Host Connector as the removed one.

(f) Connect the interface cables.

(g) For the ports #A, B, C, D on the CBXSL/CBSL/CBXSS/CBSS, check that the HALM LED (red) is off.
For the ports #E, F, G, H on the CBXSL/CBSL/CBXSS/CBSS or the CBL, check that the HALM LED (red)/HSTS LED (red) does not light up.

(h) If the Link LED for the ports #A, B, C, D on the CBXSL/CBSL/CBXSS/CBSS does not come on or the HALM LED (blue/green)/HSTS LED (blue) for the ports #E, F, G, H on the CBXSL/CBSL/CBXSS/CBSS or the CBL does not come on, the other failure may be considered. Therefore, restore it following Troubleshooting "Chapter 1. Flowchart for Troubleshooting" (TRBL 01-0000).

(i) Refer to "Information Message" on WEB, and check to see that "I53A0g Host Connector recovered (Port xy)" is indicated. (Refer to WEB "2.5 Information Message" (WEB 02-0150).) This message appears usually about 10 seconds after inserting the Host Connector. When this is indicated, the replacement of Host Connector has completed.

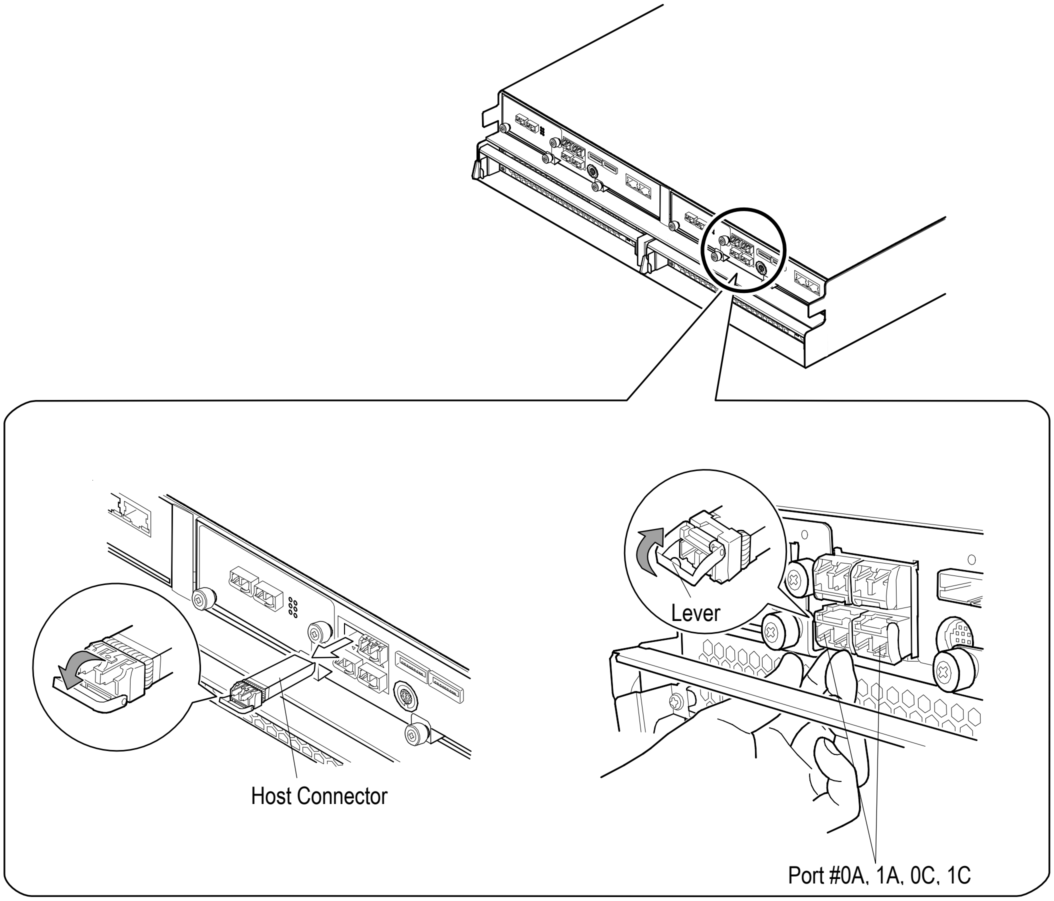


Figure 2.2.30 Replacing Host Connector (CBXSL/CBSL/CBXSS/CBSS)

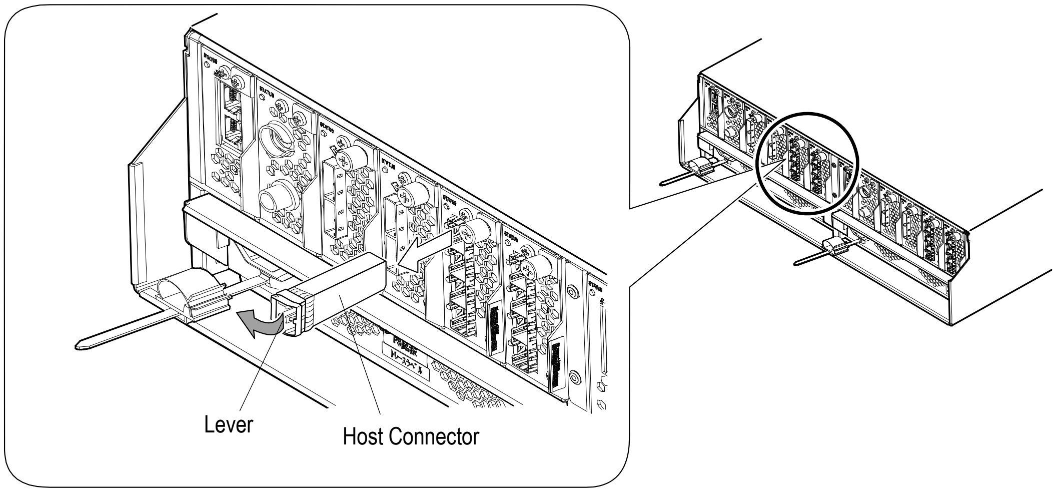
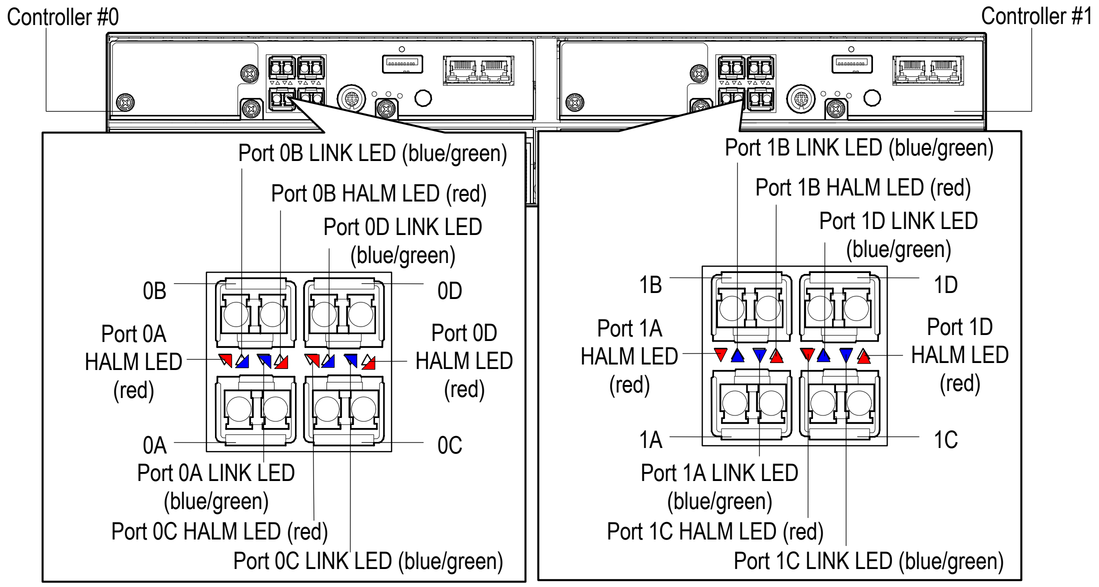
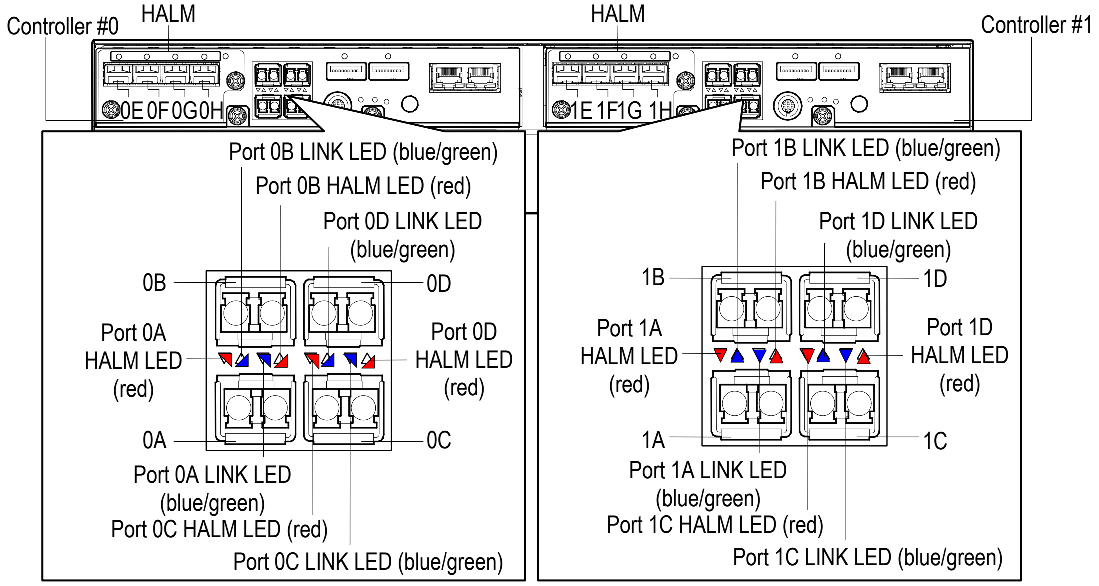


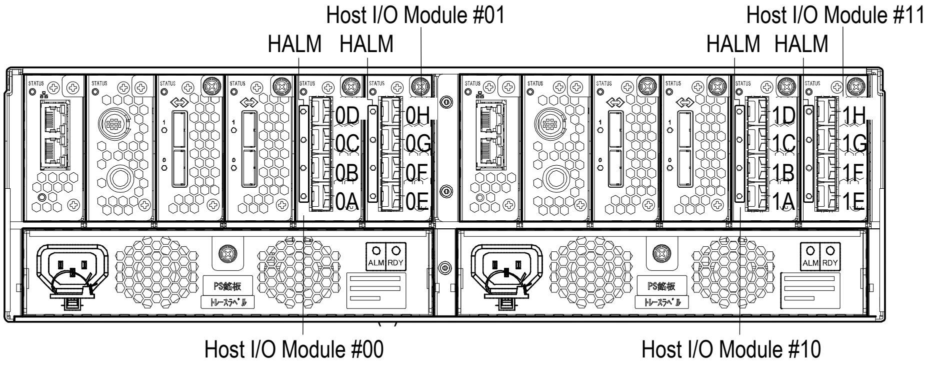
Figure 2.2.31 Replacing Host Connector (CBL)


Controller #0
Controller #1
Port 0B LINK LED (blue/green)
Port 0B HALM LED (red)
Port 0D LINK LED (blue/green)
0B
0D
Port 0A HALM LED (red)
Port 0D HALM LED (red)
0A
0C
Port 0A LINK LED (blue/green)
Port 0C HALM LED (red)
Port 0C LINK LED (blue/green)
Port 1B LINK LED (blue/green)
Port 1B HALM LED (red)
Port 1D LINK LED (blue/green)
1B
1D
Port 1A HALM LED (red)
Port 1D HALM LED (red)
1A
1C
Port 1A LINK LED (blue/green)
Port 1C HALM LED (red)
Port 1C LINK LED (blue/green)

(a) CBXSL/CBXSS

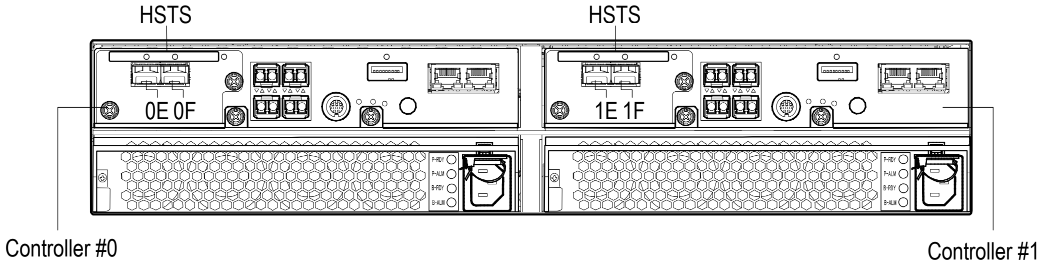


(b) CBSL/CBSS

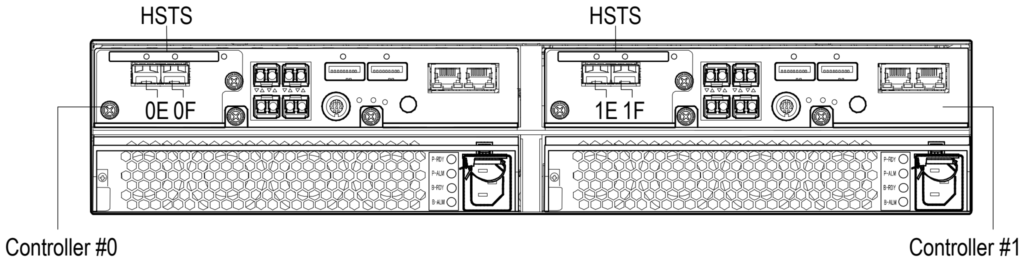


(c) CBL

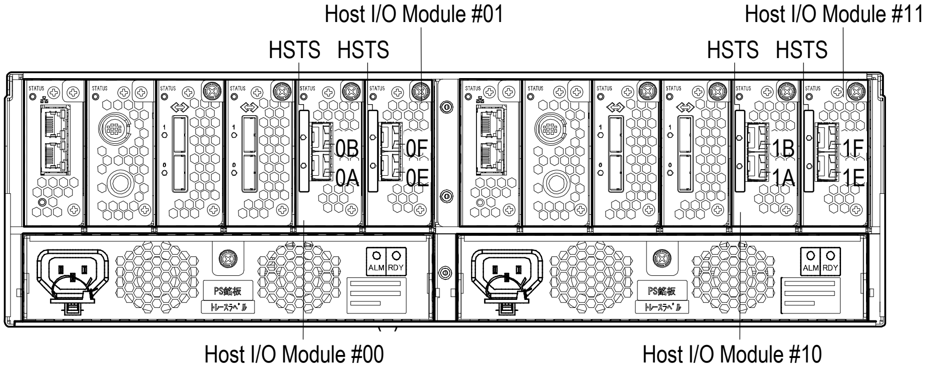
Figure 2.2.32 Port and HALM LED for FC Interface



(a) CBXSL/CBXSS



(b) CBSL/CBSS



(c) CBL

Figure 2.2.33 Port and HALM LED for 10 Gbps iSCSI Interface

(1-2) When the HALM LED (red)/HSTS LED (red) on the Host Connector does not light up

NOTE : There may be an error report in the host computer depending on the operating conditions of the host computer.
The prior contact to the customer is required.

(a) Remove the interface cables connected to the Controller mounting the Host Connector to be replaced.

NOTE : When the cable cannot be removed easily, do not pull it by force.
Besides, the cable can be damaged if it is bent upward or downward forcibly.

(b) Remove the Host Connector.
Pull out the Host Connector after raising the Lever.
At this time, the HALM LED (red)/HSTS (red) comes on.

NOTE :
- The installing direction of Host Connector is different depending on the array.
- When the Host Connector cannot be removed, remove it pushing the lever down.
- For the CBXSL/CBSL/CBXSS/CBSS, operate the lever of the Host Connector for #0A, 1A, 0C, 1C from between the lever of Power Unit and the array.

(c) Make sure that 20 seconds or longer has elapsed after the Host Connector was taken out.
If the Host Connector is inserted before 20 seconds has elapsed, the Host Connector may not be recovered normally.
(d) Check the insertion direction of the Host Connector and inset the Host Connector in the port until it clicks.

NOTE : Be sure to install the same type of the Host Connector as the removed one.

(e) Connect the interface cables.
(f) For the ports #A, B, C, D on the CBXSL/CBSL/CBXSS/CBSS, check that the HALM LED (red) is off.
For the ports #E, F, G, H on the CBXSL/CBSL/CBXSS/CBSS or the CBL, check that the HALM LED (red)/HSTS LED (red) does not light up.
(g) If the Link LED for the ports #A, B, C, D on the CBXSL/CBSL/CBXSS/CBSS does not come on or the HALM LED (blue/green)/HSTS LED (blue) for the ports #E, F, G, H on the CBXSL/CBSL/CBXSS/CBSS or the CBL does not come on, the other failure may be considered. Therefore, restore it following Troubleshooting “Chapter 1. Flowchart for Troubleshooting” (TRBL 01-0000).
(h) Refer to “Information Message” on WEB, and check to see that “I I53A0g Host Connector recovered (Port xy)” is indicated. (Refer to WEB “2.5 Information Message” (WEB 02-0150).)
This message appears usually about 10 seconds after inserting the Host Connector.
When this is indicated, the replacement of Host Connector has completed.

(2) Procedure for replacement with the power turned off

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message “Chapter 1 ③ Collecting Error Information” (MSG 01-0000).).

(a) Turn off the main switch.

For the CBXSL/CBXSS/CBSL/CBSS, press the main switch on either Controller #0 or Controller #1 for three seconds or more.

Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the C-PWR LED (green) on the Controller blinks, it may be that some of the Cache Memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.

If the Controller is removed from the array when the C-PWR LED (green) blinks, user data may be lost.

(b) Remove the interface cables connected to the Controller mounting the Host Connector to be replaced.

NOTE : When the cable cannot be removed easily, do not pull it by force.

Besides, the cable can be damaged if it is bent upward or downward forcibly.

(c) Remove the Host Connector.

Pull out the Host Connector after raising the Lever.

NOTE :
- The installing direction of Host Connector is different depending on the array.
- When the Host Connector cannot be removed, remove it pushing the lever down.
- For the CBXSL/CBSL/CBXSS/CBSS, operate the lever of the Host Connector for #0A, 1A, 0C, 1C from between the lever of Power Unit and the array.

(d) Check the insertion direction of the Host Connector and inset the Host Connector in the port until it clicks.

NOTE : Be sure to install the same type of the Host Connector as the removed one.

(e) Connect the interface cables.

(f) Turn on the main switch (the array usually recovers in about 5 to 7 minutes for CBXSL/CBXSS, about 5 to 8 minutes for CBSL/CBSS, and about 5 to 10 minutes for CBL).

(g) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) or the WARNING LED (orange) may blink at high speed (for the maximum of 30 to 85 minutes) before the READY LED (green) on the front of the Controller Box lights up.

(h) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware "1.6 (4) Checking the start message and end message of the automatic download" (FIRM 01-1620).)

(i) If the Link LED does not light on, the other failure may be considered. Therefore, restore it following Troubleshooting "Chapter 1. Flowchart for Troubleshooting" (TRBL 01-0000).

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

2.2.9 Replacing a Drive I/O Module

This work is only for CBL.

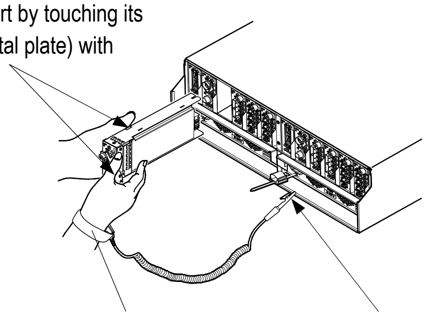
NOTICE

- **To prevent part failures caused by static electrical charge built up on your own body, be sure to wear a wrist strap connected to the chassis before starting and do not take it off until you finish.**
- **Be sure to wear a wrist strap connected to the chassis whenever you unpack parts from a case. Otherwise, the static electrical charge on your body may damage the parts.**
- **When you install a Drive I/O Module, support its metal part with your hand that has the wrist strap. By so doing, you can discharge the static electricity from your body may change the parts.**

A failure may be caused by the electric shock since the Drive I/O Module is a precision instrument. Be sure to put on the wrist strap before starting work in order to protect Drive I/O Module from electrostatic discharge.

NOTE : Before unpacking and replacing maintenance components, be sure to wear a wrist strap and connect to ground the grounding clip in the opposite end of the wrist strap to the chassis frame (metal part).
When you insert a Drive I/O Module into the array, support the Drive I/O Module as touching its metal part with fingers of your hand that wears a wrist strap.

CBL



Support the part by touching its metal part (metal plate) with your fingers

A wrist strap (Be sure to wear this before starting maintenance.)

The clip side of wrist strap:
Connect this to the metal part on the frame of array (rear face)

Select a procedure from the following and execute it.

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on (hot replacement)	1. Complete the replacement within ten minutes. Otherwise, a powering off may occur because of an abnormal temperature rise. Perform the part replacement in haste. 2. The procedure varies depending on whether the STATUS LED is on or off. 3. In the case of Preventive replacement, there may be an error report in the host computer depending on the operating conditions of the host computer. The prior contact to the customer is required. 4. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 5. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box usually goes out about 30 seconds later. 6. At the time of the preventive replacement, do not perform the preventive replacement work while the drive firmware replacement is being executed. Work after the drive firmware replacement ends.	When the STATUS LED (red) of the Drive I/O Module to be replaced is on Refer to "(1-1) When the STATUS LED (red) is on" (REP 02-1340) When the STATUS LED (red) of the Drive I/O Module to be replaced is off (Preventive replacement) Refer to "(1-2) When the STATUS LED (red) is off" (REP 02-1370)
2	Replacement with the power turned off	1. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program or the automatic download of the ENC firmware and the backup controller firmware at the time of turning the power on in the single controller configuration is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box goes out at the maximum of 30 to 85 minutes later and the READY LED (green) lights up. 3. At the time of the preventive replacement, do not perform the preventive replacement work while the drive firmware replacement is being executed. Work after the drive firmware replacement ends.	Refer to "(2) Procedure for replacement with the power turned off" (REP 02-1390)

(1) Procedure for replacement with the power turned on

(1-1) When the STATUS LED (red) is on

Replace the Drive I/O Module referring to "Figure 2.2.34 Replacing Drive I/O Module" (REP 02-1360), "Figure 2.2.35 Position of the STATUS LED Drive I/O Module" (REP 02-1360).
Following the error collection item in the generated error message, verify that the required error information is collected.
If the required error information is not collected, collect it (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).).
Store the collected simple trace information on the CD-R.

(a) Make sure that STATUS LED (red) on the Drive I/O Module to be replaced lights up. If it does not light up, replace it following "(1-2) When the STATUS LED on the Controller is off" (REP 02-1370).

(b) In the following cases, proceed to (c).

- If the Drive I/O Module to replace is not Drive I/O Module (Encryption)
- If that is Drive I/O Module (Encryption), confirm "I6QI0x Encryption key initialization was completed (CTL-x, Slot-l)" is displayed in "Information Message" on WEB
- If "I6QH0x Encryption key initialization failed (CTL-x, Slot-l)" is displayed in "Information Message" on WEB
- If these messages are not displayed in 10 minutes

NOTE : "I6QH0x Encryption key initialization failed (CTL-x, Slot-l)" or "I6QI0x Encryption key initialization was completed (CTL-x, Slot-l)" messages show the completion/failure of the initialization of the encryption key in the module that is processed automatically when Drive I/O Module (Encryption) is blocked.

(c) Remove the SAS(ENC) cable connected to the Drive I/O Module to be replaced.

NOTE : When the cable cannot be removed easily, do not pull it by force.
Besides, the cable can be damaged if it is bent upward or downward forcibly.

(d) Remove the Drive I/O Module.

(i) Loosen one screw (blue) which fixes the Drive I/O Module, and then pull the lever open. When the lever is completely opened, the Drive I/O Module comes out forward.

(ii) Pull out and remove the Drive I/O Module.

NOTE : Place the removed Drive I/O Module temporarily in the place where anti-static measures are taken.

(e) Check that 20 seconds or more has been passed since the Drive I/O Module was removed.

(f) Install the new Drive I/O Module.

(i) Insert the new Drive I/O Module into the slot with its lever completely opened. At this time, do not push it in all the way.

(ii) Connect the removed SAS(ENC) cables to the Drive I/O Module.

(iii) Close the lever and then push the Drive I/O Module in.

(iv) Tighten one screw (blue) to fix the Drive I/O Module.

(g) Make sure that the STATUS LED (red) on the Drive I/O Module is off.

(h) Make sure that the WARNING LED (orange) on the front side of the Controller Box is off(‡1). (The Controller usually recovers in about three minutes, but if the I/O load from the host computer is high, it may take about 30 minutes to recover.)

(i) Check that the READY LED (green) on the front of the Controller Box lights up. The READY LED (green) on the front of the Controller Box may blink at high speed (40 to 60 minutes (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.

(j) Refer to "Information Message" on WEB, and check to see that "IAA0j0 Drive I/O module recovered (CTL-x, Slot-l)" is indicated (Refer to WEB "2.5 Information Message" (WEB 02-0150).)

When this is indicated, the replacement of The Drive I/O Board/Module has completed.

(k) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the drive is new, the start message and completion message of the drive firmware automatic download are not displayed.

When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware "1.6 (4) Checking the start message and end message of the automatic download" (FIRM 01-1620).)

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

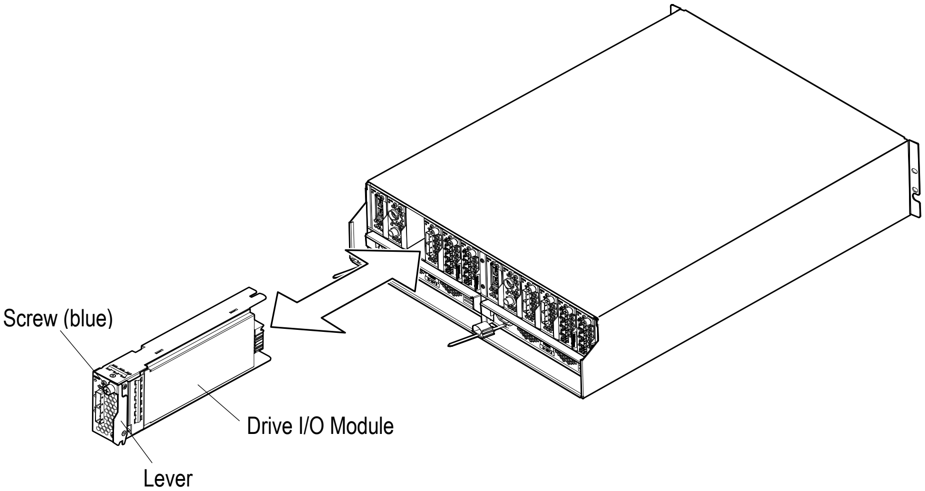

Figure 2.2.34 Replacing Drive I/O Module

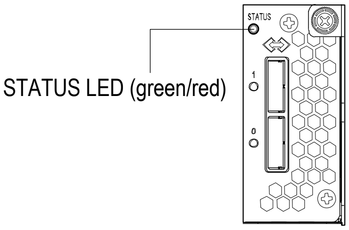

Figure 2.2.35 Position of the STATUS LED on the Drive I/O Module

(1-2) When the STATUS LED (red) is off

Replace the Drive I/O Module referring to "Figure 2.2.34 Replacing Drive I/O Module" (REP 02-1360), "Figure 2.2.35 Position of the STATUS LED Drive I/O Module" (REP 02-1360).

NOTE : Connect the LAN cable to the Controller other than the one which includes the module to be replaced for prevention (For example, when the module #0 side is replaced for prevention, connect the LAN cable to the Controller #1 side.)
After that, set the IP address of the Controller with the LAN cable connected from the Hitachi Storage Navigator Modular 2, and then register the array.

(a) Detach the Drive I/O Module for prevention.

NOTE : When the module concerned is detached, the Controller concerned becomes inaccessible from the host and the management program because the operation of the Controller which manages the module concerned stops.

Select the [Components] – [I/F Modules] on the unit window of Hitachi Storage Navigator Modular 2, and click the [Detach I/F Module] button after selecting the module to be changed. A confirmation message is displayed. If it is OK, click the [Confirm] button. Although the ALM LED (red) on the Controller lights up for about three seconds, there is no problem.
Check that the STATUS LED (red) on the Drive I/O Module lights up.

(b) In the following cases, proceed to (c).

- If the Drive I/O Module to replace is not Drive I/O Module (Encryption)
- If that is Drive I/O Module (Encryption), confirm "I6QI0x Encryption key initialization was completed (CTL-x, Slot-l)" is displayed in "Information Message" on WEB
- If "I6QH0x Encryption key initialization failed (CTL-x, Slot-l)" is displayed in "Information Message" on WEB
- If these messages are not displayed in 10 minutes

NOTE : "I6QH0x Encryption key initialization failed (CTL-x, Slot-l)" or "I6QI0x Encryption key initialization was completed (CTL-x, Slot-l)" messages show the completion/failure of the initialization of the encryption key in the module that is processed automatically when Drive I/O Module (Encryption) is blocked.

(c) Remove the SAS(ENC) cable connected to the Drive I/O Module to be replaced.

NOTE : When the cable cannot be removed easily, do not pull it by force.
Besides, the cable can be damaged if it is bent upward or downward forcibly.

(d) Remove the Drive I/O Module.

(i) Loosen one screw (blue) which fixes the Drive I/O Module, and then pull the lever open. When the lever is completely opened, the Drive I/O Module comes out forward.

(ii) Pull out and remove the Drive I/O Module.

NOTE : Place the removed Drive I/O Module temporarily in the place where anti-static measures are taken.

(e) Check that 20 seconds or more has been passed since the Drive I/O Module was removed.

(f) Install the new Drive I/O Module.

  (i) Insert the new Drive I/O Module into the slot with its lever completely opened. At this time, do not push it in all the way.

  (ii) Connect the removed SAS(ENC) cables to the Drive I/O Module.

  (iii) Close the lever and then push the Drive I/O Module in all the way.

  (iv) Tighten one screw (blue) to fix the Drive I/O Module.

(g) Make sure that the STATUS LED (red) on the Drive I/O Module is off.

(h) Make sure that the WARNING LED (orange) on the front side of the Controller Box is off(‡1). (The Controller usually recovers in about three minutes, but if the I/O load from the host computer is high, it may take about 30 minutes to recover.)

(i) Check that the READY LED (green) on the front of the Controller Box lights up. The READY LED (green) on the front of the Controller Box may blink at high speed (40 to 60 minutes (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.

(j) Refer to "Information Message" on WEB, and check to see that "IAA0j0 Drive I/O module recovered (CTL-x, Slot-l)" is indicated. (Refer to WEB "2.5 Information Message" (WEB 02-0150).)

When this is indicated, the replacement of Drive I/O Module has completed.

(k) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the drive is new, the start message and completion message of the drive firmware automatic download are not displayed.

When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware "1.6 (4) Checking the start message and end message of the automatic download" (FIRM 01-1620).)

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(2) Procedure for replacement with the power turned off

Replace the Drive I/O Module referring to “Figure 2.2.34 Replacing Drive I/O Module” (REP 02-1360), “Figure 2.2.35 Position of the STATUS LED Drive I/O Module” (REP 02-1360).

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it. (Refer to Message “Chapter 1 ③ Collecting Error Information” (MSG 01-0000).)

(a) Turn off the main switch.

Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the C-PWR LED (green) on the Controller blinks, it may be that some of the Cache Memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.
If the Controller is removed from the array when the C-PWR LED (green) blinks, user data may be lost.

(b) Remove the two power cables from the Controller Box in which the Drive I/O Module to be replaced is installed.

(c) Remove the SAS(ENC) cables from the Drive I/O Module to be replaced.

NOTE : When the cable cannot be removed easily, do not pull it by force.
Besides, the cable can be damaged if it is bent upward or downward forcibly.

(d) Remove the Drive I/O Module.

(i) Loosen one screw (blue) which fixes the Drive I/O Module, and then pull the lever open. When the lever is completely opened, the Drive I/O Module comes out forward.

(ii) Pull out and remove the Drive I/O Module.

NOTE : Place the removed Drive I/O Module temporarily in the place where anti-static measures are taken.

(e) Install the new Drive I/O Module.

(i) Push the Drive I/O Module into the slot with its lever completely opened.

(ii) Close the lever and tighten one screw (blue) to fix the Drive I/O Module.

(f) Connect the removed SAS(ENC) cables to the Drive I/O Module.

(g) Connect two power cables to the Controller Box in which the Drive I/O Module was replaced.

(h) Turn on the main switch (the array usually recovers in about 5 to 7 minutes for CBXSL/CBXSS, about 5 to 8 minutes for CBSL/CBSS, and about 5 to 10 minutes for CBL).

(i) Check that the READY LED (green) on the front of the Controller Box lights up. The READY LED (green) on the front of the Controller Box may blink at high speed (for the maximum of 40 to 60 minutes (80 to 180 minutes when the DBW is connected to the CBL)) or the WARNING LED (orange) may blink at high speed (for the maximum of 30 to 85 minutes) before the READY LED (green) on the front of the Controller Box lights up.

(j) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware "1.6 (4) Checking the start message and end message of the automatic download" (FIRM 01-1620).)

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

2.2.10 Replacing a Management Module

This work is only for CBL.

The Management Module has the following two types; the one equipped with the User LAN port and Maintenance LAN port and the one with the UPS port. The replacement procedure is different for the Management Module (Maintenance/User LAN) and the Management Module (UPS).

The Management Module replacement needs a tool.

(1) Replacing a Management Module (Maintenance/User LAN)

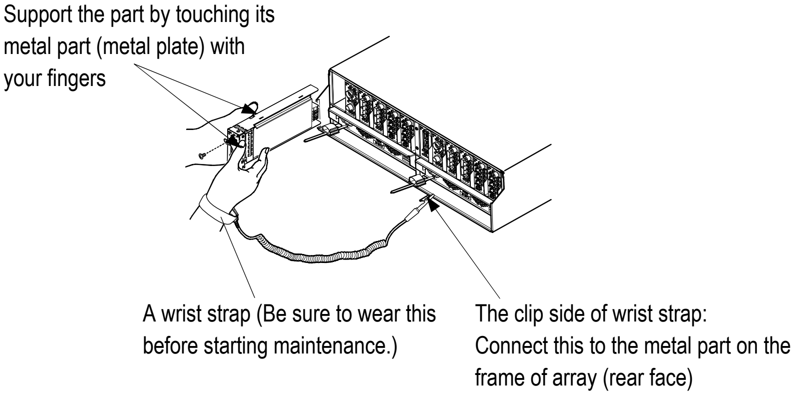
NOTICE

- **To prevent part failures caused by static electrical charge built up on your own body, be sure to wear a wrist strap connected to the chassis before starting and do not take it off until you finish.**
- **Be sure to wear a wrist strap connected to the chassis whenever you unpack parts from a case. Otherwise, the static electrical charge on your body may damage the parts.**
- **When you install a Management Module, support its metal part with your hand that has the wrist strap. By so doing, you can discharge the static electricity from your body may change the parts.**

A failure may be caused by the electric shock since the Management Module is a precision instrument. Be sure to put on the wrist strap before starting work in order to protect Management Module from electrostatic discharge.

NOTE : Before unpacking and replacing maintenance components, be sure to wear a wrist strap and connect to ground the grounding clip in the opposite end of the wrist strap to the chassis frame (metal part).
When you insert a Management Module into the array, support the Management Module as touching its metal part with fingers of your hand that wears a wrist strap.

CBL


Support the part by touching its metal part (metal plate) with your fingers
A wrist strap (Be sure to wear this before starting maintenance.)
The clip side of wrist strap: Connect this to the metal part on the frame of array (rear face)

Select a procedure from the following and execute it.

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on (hot replacement)	1. Complete the replacement within ten minutes. Otherwise, a powering off may occur because of an abnormal temperature rise. Perform the part replacement in haste. 2. The procedure varies depending on whether the STATUS LED is on or off. 3. In the case of preventive replacement, there may be an error report in the host computer depending on the operating conditions of the host computer. The prior contact to the customer is required. 4. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 5. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box usually goes out about 30 seconds later. 6. At the time of the preventive replacement, do not perform the preventive replacement work while the drive firmware replacement is being executed. Work after the drive firmware replacement ends.	When the STATUS LED (red) of the Drive I/O Module to be replaced is on Refer to "(a-1) When the STATUS LED (red) is on" (REP 02-1430) When the STATUS LED (red) of the Drive I/O Module to be replaced is off (Preventive replacement) Refer to "(a-2) When the STATUS LED (red) is off" (REP 02-1460)
2	Replacement with the power turned off	1. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program or the automatic download of the ENC firmware and the backup controller firmware at the time of turning the power on in the single controller configuration is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box goes out at the maximum of 30 to 85 minutes later and the READY LED (green) lights up. 3. At the time of the preventive replacement, do not perform the preventive replacement work while the drive firmware replacement is being executed. Work after the drive firmware replacement ends.	Refer to "(b) Procedure for replacement with the power turned off" (REP 02-1480)

(a) Procedure for replacement with the power turned on

(a-1) When the STATUS LED (red) is on

Replace the Management Module referring to "Figure 2.2.36 Replacing Management Module" (REP 02-1450), "Figure 2.2.37 STATUS LED Locations on the Management Module" (REP 02-1450).

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).).

Store the collected simple trace information on the CD-R.

(i) Make sure that STATUS LED (red) on the Management Module to be replaced lights up. If it does not light up, replace it following "(1-2) When the STATUS LED(red) on the Controller is off" (REP 02-1460).

(ii) Remove the cables connected to the Management Module to be replaced.

NOTE : When the cable cannot be removed easily, do not pull it by force.
Besides, the cable can be damaged if it is bent upward or downward forcibly.

(iii) Remove the screw which fixes the Management Module using a tool.

(iv) Pull the lever open. When the lever is completely opened, the Power Unit comes out forward.

(v) Pull out and remove the Management Module.

NOTE : Place the removed Management Module temporarily in the place where anti-static measures are taken.

(vi) Check that 20 seconds or more has been passed since the Management Module was removed.

(vii) Push the new Management Module into the slot with its lever completely opened.

(viii) Close the lever and tighten one screw using a tool to fix the Management Module.

(ix) Make sure that the STATUS LED (red) on the Management Module is off.

(x) Make sure that the WARNING LED (orange) on the front side of the Controller Box is off(‡1). (The Controller usually recovers in about three minutes, but if the I/O load from the host computer is high, it may take about 30 minutes to recover.)

(xi) Connect the removed cables to the Management Module.

(xii) Check that the READY LED (green) on the front of the Controller Box lights up. The READY LED (green) on the front of the Controller Box may blink at high speed (40 to 60 minutes (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.

---

‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(xiii) Refer to “Information Message” on WEB, and check to see that “IAA2k0 Management module recovered (CTL-x, Slot-l)” is indicated. (Refer to WEB “2.5 Information Message” (WEB 02-0150).)

(xiv) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware “1.6 (4) Checking the start message and end message of the automatic download” (FIRM 01-1620).)

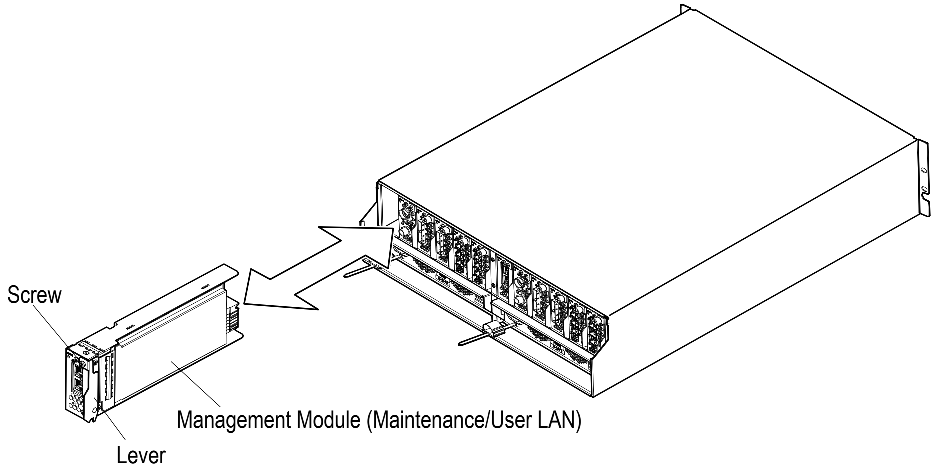


Figure 2.2.36 Replacing Management Module

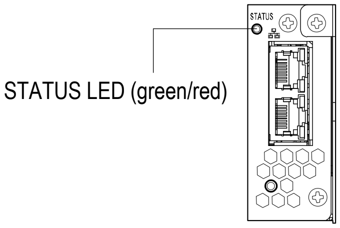


Figure 2.2.37 STATUS LED Locations on the Management Module

(a-2) When the STATUS LED (red) is off

Replace the Management Module referring to "Figure 2.2.36 Replacing Management Module" (REP 02-1450), "Figure 2.2.37 STATUS LED Locations on the Management Module" (REP 02-1450).

NOTE : Connect the LAN cable to the Controller other than the one which includes the module to be replaced for prevention (For example, when the module #0 side is replaced for prevention, connect the LAN cable to the Controller #1 side.)
After that, set the IP address of the Controller with the LAN cable connected from the Hitachi Storage Navigator Modular 2, and then register the array.

(i) Detach the Management Module for prevention.

NOTE : When the module concerned is detached, the Controller concerned becomes inaccessible from the host and the management program because the operation of the Controller which manages the module concerned stops.

Select the [Components] – [I/F Modules] on the unit window of Hitachi Storage Navigator Modular 2, and click the [Detach I/F Module] button after selecting the module to be changed. A confirmation message is displayed. If it is OK, click the [Confirm] button. Although the ALM LED (red) on the Controller lights up for about three seconds, there is no problem.
Check that the STATUS LED (red) on the Management Module lights up.

(ii) Remove the cables connected to the Management Module to be replaced.

NOTE : When the cable cannot be removed easily, do not pull it by force.
Besides, the cable can be damaged if it is bent upward or downward forcibly.

(iii) Remove the screw which fixes the Management Module using a tool.
(iv) Pull the lever open. When the lever is completely opened, the Power Unit comes out forward.
(v) Pull out and remove the Management Module.

NOTE : Place the removed Management Module temporarily in the place where anti-static measures are taken.

(vi) Check that 20 seconds or more has been passed since the Management Module was removed.
(vii) Push the new Management Module into the slot with its lever completely opened.
(viii) Close the lever and tighten one screw to fix the Management Module.
(ix) Make sure that the STATUS LED (red) on the Management Module is off.
(x) Make sure that the WARNING LED (orange) on the front side of the Controller Box is off(‡1).
(The Controller usually recovers in about three minutes, but if the I/O load from the host computer is high, it may take about 30 minutes to recover.)

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(xi) Connect the removed cables to the Management Module.

(xii) Check that the READY LED (green) on the front of the Controller Box lights up. The READY LED (green) on the front of the Controller Box may blink at high speed (40 to 60 minutes (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.

(xiii) Refer to “Information Message” on WEB, and check to see that “IAA2k0 Management module recovered (CTL-x, Slot-l)” is indicated. (Refer to WEB “2.5 Information Message” (WEB 02-0150).)

When this is indicated, the replacement of the Management Module has completed.

(xiv) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the drive is new, the start message and completion message of the drive firmware automatic download are not displayed.

When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware “1.6 (4) Checking the start message and end message of the automatic download” (FIRM 01-1620).)

(b) Procedure for replacement with the power turned off

Replace the Management Module referring to "Figure 2.2.36 Replacing Management Module" (REP 02-1450), "Figure 2.2.37 STATUS LED Locations on the Management Module" (REP 02-1450).

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it. (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).)

(i) Turn off the main switch.
Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the C-PWR LED (green) on the Controller blinks, it may be that some of the Cache Memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.
If the Controller is removed from the array when the C-PWR LED (green) blinks, user data may be lost.

(ii) Remove the two power cables from the Controller Box in which the Management Module to be replaced is installed.

(iii) Remove the cables from the Management Module to be replaced.

NOTE : When the cable cannot be removed easily, do not pull it by force.
Besides, the cable can be damaged if it is bent upward or downward forcibly.

(iv) Remove the screw which fixes the Management Module using a tool.

(v) Pull the lever open. When the lever is completely opened, the Power Unit comes out forward.

(vi) Pull out and remove the Management Module.

NOTE : Place the removed Management Module temporarily in the place where anti-static measures are taken.

(vii) Push the Management Module into the slot with its lever completely opened.

(viii) Close the lever and tighten one screw to fix the Management Module.

(ix) Connect the removed cables to the Management Module.

(x) Connect the two power cables to the Control Unit where the Management Module was replaced.

(xi) Turn on the main switch (the array usually recovers in about 5 to 7 minutes for CBXSL/CBXSS, about 5 to 8 minutes for CBSL/CBSS, and about 5 to 10 minutes for CBL).

(xii) Check that the READY LED (green) on the front of the Controller Box lights up and the ALARM LED (green) and WARNING LED (orange) are off(‡1).
The READY LED (green) on the front of the Controller Box may blink at high speed (for the maximum of 40 to 60 minutes (80 to 180 minutes when the DBW is connected to the CBL)) or the WARNING LED (orange) may blink at high speed (for the maximum of 30 to 85 minutes) before the READY LED (green) on the front of the Controller Box lights up.

(xiii) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware "1.6 (4) Checking the start message and end message of the automatic download" (FIRM 01-1620).)

---

‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(2) Replacing a Management Module (UPS)

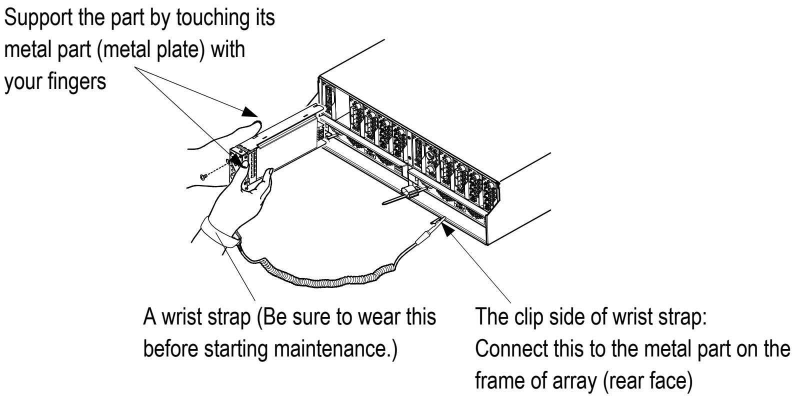
NOTICE

- **To prevent part failures caused by static electrical charge built up on your own body, be sure to wear a wrist strap connected to the chassis before starting and do not take it off until you finish.**
- **Be sure to wear a wrist strap connected to the chassis whenever you unpack parts from a case. Otherwise, the static electrical charge on your body may damage the parts.**
- **When you install a Management Module, support its metal part with your hand that has the wrist strap. By so doing, you can discharge the static electricity from your body may change the parts.**

A failure may be caused by the electric shock since the Management Module is a precision instrument. Be sure to put on the wrist strap before starting work in order to protect Management Module from electrostatic discharge.

NOTE : Before unpacking and replacing maintenance components, be sure to wear a wrist strap and connect to ground the grounding clip in the opposite end of the wrist strap to the chassis frame (metal part).
When you insert a Management Module into the array, support the Management Module as touching its metal part with fingers of your hand that wears a wrist strap.

CBL


Support the part by touching its metal part (metal plate) with your fingers
A wrist strap (Be sure to wear this before starting maintenance.)
The clip side of wrist strap: Connect this to the metal part on the frame of array (rear face)

Select a procedure from the following and execute it.

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on (hot replacement)	1. Complete the replacement within ten minutes. Otherwise, a powering off may occur because of an abnormal temperature rise. Perform the part replacement in haste.	Refer to "(a) Procedure for replacement with the power turned on" (REP 02-1493)
2	Replacement with the power turned off	—	Refer to "(b) Procedure for replacement with the power turned off" (REP 02-1495)

(a) Procedure for replacement with the power turned on

Replace the Management Module referring to "Figure 2.2.37.1 Replacing Management Module" (REP 02-1494).

(i) Remove the cables connected to the Management Module to be replaced.

NOTE : When the cable cannot be removed easily, do not pull it by force.
Besides, the cable can be damaged if it is bent upward or downward forcibly.

(ii) Remove the screw which fixes the Management Module using a tool.
(iii) Pull the lever open. When the lever is completely opened, the Power Unit comes out forward.
(iv) Pull out and remove the Management Module.

NOTE : Place the removed Management Module temporarily in the place where anti-static measures are taken.

(v) Check that 20 seconds or more has been passed since the Management Module was removed.
(vi) Push the new Management Module into the slot with its lever completely opened.
(vii) Close the lever and tighten one screw using a tool to fix the Management Module.
(viii) Connect the removed cables to the Management Module.
(ix) When UPS is connected, make sure that the UPS connected the Management Module is operating normally.

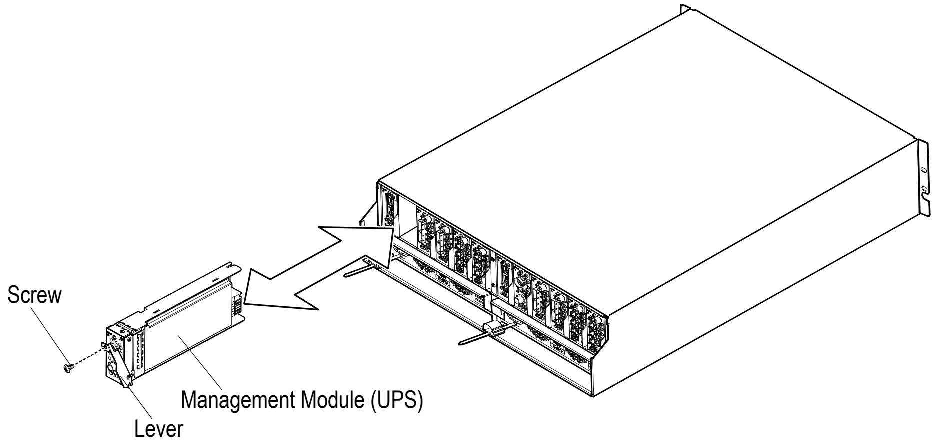


Figure 2.2.37.1 Replacing Management Module

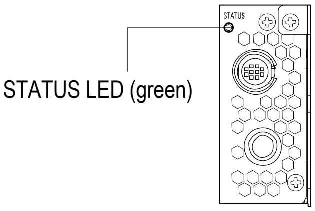


Figure 2.2.37.2 STATUS LED Locations on the Management Module

(b) Procedure for replacement with the power turned off

Replace the Management Module referring to "Figure 2.2.37.1 Replacing Management Module" (REP 02-1494).

(i) Turn off the main switch.
Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the C-PWR LED (green) on the Controller blinks, it may be that some of the Cache Memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.

(ii) Remove the two power cables from the Controller Box in which the Management Module to be replaced is installed.

(iii) Remove the cables from the Management Module to be replaced.

NOTE : When the cable cannot be removed easily, do not pull it by force.
Besides, the cable can be damaged if it is bent upward or downward forcibly.

(iv) Remove the screw which fixes the Management Module using a tool.

(v) Pull the lever open. When the lever is completely opened, the Power Unit comes out forward.

(vi) Pull out and remove the Management Module.

NOTE : Place the removed Management Module temporarily in the place where anti-static measures are taken.

(vii) Push the Management Module into the slot with its lever completely opened.

(viii) Close the lever and tighten one screw to fix the Management Module.

(ix) Connect the removed cables to the Management Module.

(x) Connect the two power cables to the Control Unit where the Management Module was replaced.

(xi) Turn on the main switch (the array usually recovers in about 5 to 7 minutes for CBXSL/CBXSS, about 5 to 8 minutes for CBSL/CBSS, and about 5 to 10 minutes for CBL).

(xii) Check that the READY LED (green) on the front of the Controller Box lights up and the ALARM LED (green) and WARNING LED (orange) are off(‡1).
The READY LED (green) on the front of the Controller Box may blink at high speed (for the maximum of 40 to 60 minutes (80 to 180 minutes when the DBW is connected to the CBL)) or the WARNING LED (orange) may blink at high speed (for the maximum of 30 to 85 minutes) before the READY LED (green) on the front of the Controller Box lights up.

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(xiii) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware "1.6 (4) Checking the start message and end message of the automatic download" (FIRM 01-1620).)

2.2.11 Replacing an I/O Module(ENC) or I/O Card(ENC)

Replacement procedures are different in the I/O Module(ENC) (DBL/DBS/DBF), the I/O Module(ENC) (DBW), and the I/O Card(ENC) (DBX).

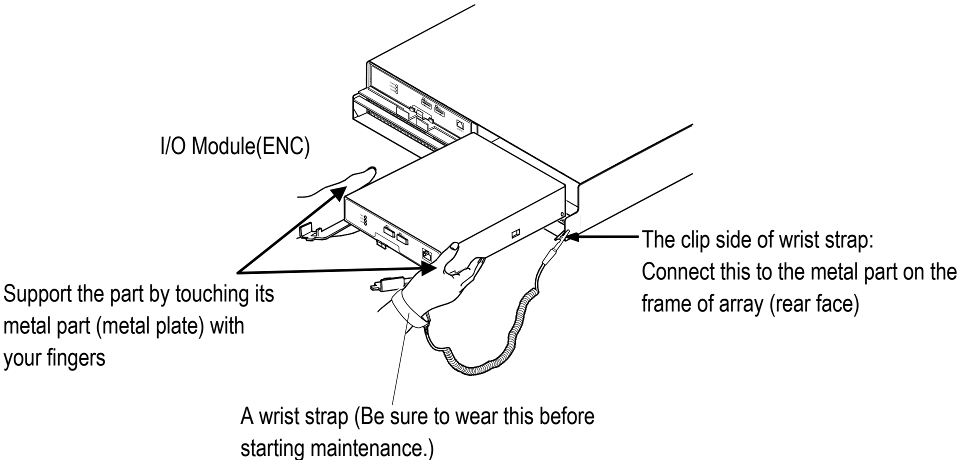
(1) Replacing the I/O Module(ENC) (DBL/DBS/DBF)

NOTICE

- **To prevent part failures caused by static electrical charge built up on your own body, be sure to wear a wrist strap connected to the chassis before starting and do not take it off until you finish.**
- **Be sure to wear a wrist strap connected to the chassis whenever you unpack parts from a case. Otherwise, the static electrical charge on your body may damage the parts.**
- **When you install a Drive, I/O Module(ENC) or I/O Card(ENC), support its metal part with your hand that has the wrist strap. You can discharge static electricity by touching the metal plate.**

A failure may be caused by the electric shock since the I/O Module(ENC) is a precision instrument. Be sure to put on the wrist strap before starting work in order to protect I/O Module(ENC) from electrostatic discharge.

NOTE : Before unpacking and replacing maintenance components, be sure to wear a wrist strap and connect to ground the grounding clip in the opposite end of the wrist strap to the chassis frame (metal part).
When you insert an I/O Module(ENC) into the array, support the I/O Module(ENC) as touching its metal part with fingers of your hand that wears a wrist strap.


I/O Module(ENC)
The clip side of wrist strap: Connect this to the metal part on the frame of array (rear face)
Support the part by touching its metal part (metal plate) with your fingers
A wrist strap (Be sure to wear this before starting maintenance.)

Select a procedure from the following and execute it.

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on (hot replacement)	1. Complete the replacement within ten minutes. Otherwise, a powering off may occur because of an abnormal temperature rise. Perform the part replacement in haste. 2. When replacing the I/O Module(ENC), the array must be in the status shown below. • The firmware is not being performed. • The Controller is not being replaced. • Any part other than the above is not being replaced. 3. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 4. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box usually goes out about 30 seconds later.	When the ALM LED (red) of the I/O Module(ENC) to be replaced is on Refer to "(1-1) Procedure for replacement with the power turned on (When the ALM LED of the I/O Module(ENC) to be replaced is on)" (REP 02-1530) When the ALM LED (red) of the I/O Module(ENC) to be replaced is off (Preventive replacement) Refer to "(1-2) Procedure for replacement with the power turned on (When the ALM LED of the I/O Module(ENC) to be replaced is off)" (REP 02-1550)
2	Replacement with the power turned off	1. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the READY LED lights on. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program or the automatic download of the ENC firmware and the backup controller firmware at the time of turning the power on in the single controller configuration is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box goes out at the maximum of 30 to 85 minutes later and the READY LED (green) lights up.	Refer to "(1-3) Procedure for replacement with the power turned off" (REP 02-1570)

NOTE :
- When bending the SAS(ENC) cable to connect it, give it a bend with a long radius (not less than 30 mm) so as not to apply the cable and the connector excessive stresses.
- When two or more I/O Modules(ENC) need to be replaced on the same PATH, replace the Controller Box (the Controller of CBXSL/CBXSS/CBSL/CBSS, Drive I/O Module for CBL, the Controller for CBL) first, and then replace the I/O Module(ENC) for Drive Box. Also, when replacing the I/O Module(ENC) of two or more Drive Boxes, replace the Drive Box whose the Unit ID # is smaller. However, when failures occur in both the I/O Module(ENC) #0/I/O Card(ENC)#A0 or #B0 in the first DBL/DBS/DBF/DBX (unit #0) connected to the CBL and the Controller #0 in the CBL, replace the I/O Module(ENC) #0/I/O Card(ENC)#A0 or #B0 first, and then replace the Drive I/O Module. If the failures have not recovered even though the Drive I/O Module was replaced, replace the Controller.

  Also, when failures occur in both the I/O Module(ENC) #1/I/O Card(ENC)#A1 or #B1 in the first DBL/DBS/DBF/DBX (unit #0) connected to the CBL and the Controller #1 in the CBL, replace the I/O Module(ENC) #1/I/O Card(ENC)#A1 or #B1 first, and then replace the Drive I/O Module. If the failures have not recovered even though the Drive I/O Module was replaced, replace the Controller.
- When a failure of the battery system (whose message code is W03z0x or W0400x) has occurred, recover the array from the battery system failure before replacing the I/O Module(ENC).
- When UPS interlock is used, if you turn off the array power other than the regular procedure in case of an I/O Module(ENC) failure, the power may not be turned on later. Turn off/on the output of the UPS, and then turn on the array power. If you cannot turn off/on the UPS, remove the interlock cable between the UPS and the array (it becomes the Waning status), and then turn off the array power.

(1-1) Procedure for replacement with the power turned on (When the ALM LED of the I/O Module(ENC) to be replaced is on)

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message "Chapter 1 (2) (c) Collecting Error Information" (MSG 01-0010).).

Store the collected simple trace information on the CD-R.

(a) If the I/O Module(ENC) to be replaced is for the DBF, set the DIP-Switch of the new I/O Module(ENC).

(i) Loosen the screw on the DIP-Switch of the new I/O Module(ENC) and then open the DIP-Switch cover.

(ii) Set the DIP-Switch #3 to ON using a precision screwdriver, and set three other DIP-Switches to OFF. Be sure to check that it is set correctly.

NOTE : If the DIP-Switch setting is wrong, the I/O Module does not operate normally.

(iii) Close the DIP-Switch cover and then tighten the screw to fix the DIP-Switch cover.

(b) Make sure that the ALM LED (red) of the I/O Module(ENC) to be replaced lights up.

When ALM LED (red) on the I/O Module(ENC) is off, remove the I/O Module(ENC) following "(1-2) Procedure for replacement with the power turned on (When the ALM LED of the I/O Module(ENC) to be replaced is off)" (REP 02-1550).

(c) Open the right and left levers toward you.

When the levers are completely opened, the I/O Module(ENC) comes out forward.

NOTE : In the case of the DBF, when removing the I/O Module(ENC), the cover at the insertion opening may be raised. However, this is not a problem in function.

(d) Remove the SAS(ENC) cable connected to the I/O Module(ENC) to be replaced.

NOTE : When the cable cannot be removed easily, do not pull it by force.
Besides, the cable can be damaged if it is bent upward or downward forcibly.

(e) Remove the I/O Module(ENC) by pulling it out toward you holding it with both hands.

(f) In case the connector on the rear face of the new I/O Module(ENC) has a connector cover installed, remove the connector cover.

(g) After waiting for 20 seconds or more, insert a new I/O Module(ENC) until its right and left levers are slightly opened to the set position.

When doing this, do not insert the I/O Module(ENC) completely.

If the I/O Module(ENC) is inserted without waiting for 20 seconds or longer, it is possible that the I/O Module(ENC) is not recovered from the failure normally(‡1).

NOTE : Do not catch a SAS(ENC) cable when the I/O Module(ENC) is inserted.

(h) Connect the SAS(ENC) cable to new I/O Module(ENC).

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‡1 : Remove the inserted I/O Module(ENC), and insert it again after 20 seconds or more passed.

(i) Push the right and left levers toward the I/O Module(ENC).

NOTE : When closing the lever, perform the operation of the lever within one second. If the returning of the levers takes longer time, it is possible that the recovery from the error fails. When this happens, execute the replacement procedure again.
If the array is not recovered from the failure nevertheless, replace the I/O Module(ENC) because the I/O Module(ENC) is considered to have failed.

(j) Make sure that the ALM LED (red) on the I/O Module(ENC) is off.

(k) Check that the READY LED (green) on the front of the Controller Box is on and the ALARM LED (red) and WARNING LED (orange) goes out(‡1). The READY LED (green) on the front of the Controller Box may blink at high speed (for the maximum of 30 to 50 minutes, 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.
When the Power Saving/Power Saving Plus function is enabled, the WARNING LED (orange) may light up or blinking at low speed while executing the ENC automatic download. If the WARNING LED still lights up or blinking at low speed after completing the ENC automatic download, refer to Information Message on WEB and perform the maintenance according to the recovery method of the message.

(l) Refer to "Information Message" on WEB, and check to see that "I00Bf0 ENC recovered (Unit-x, ENC-y)" is indicated. (Refer to WEB "2.5 Information Message" (WEB 02-0150).)
This message appears usually about 30 seconds after inserting the I/O Module(ENC).
When this is indicated, the replacement of I/O Module(ENC) has completed.

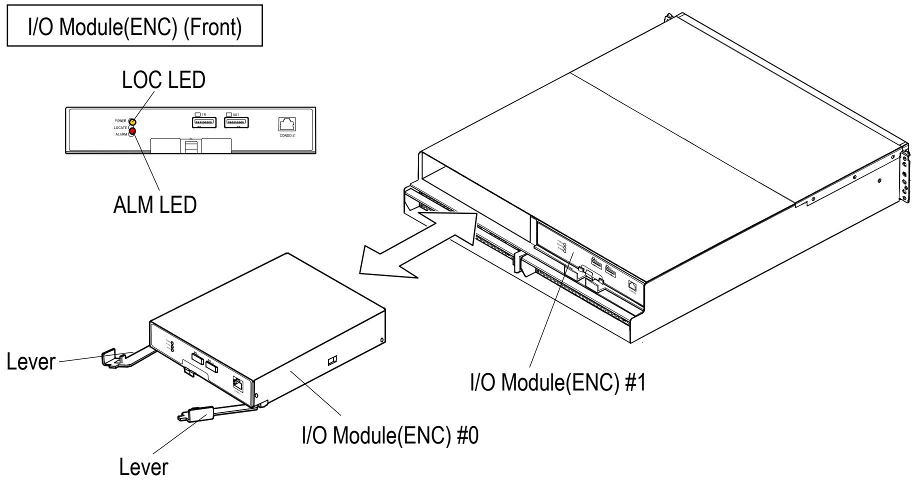

Figure 2.2.38 Replacing I/O Module(ENC) (DBL/DBS)

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

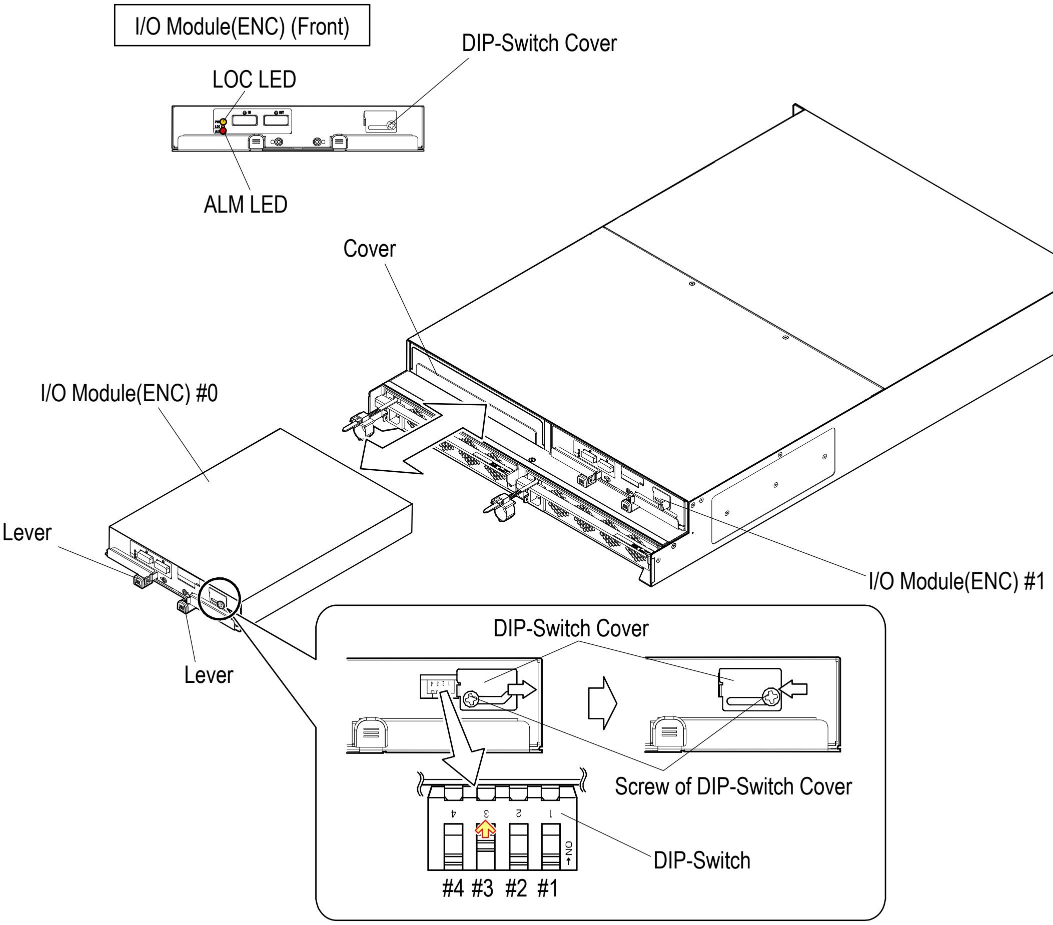

Figure 2.2.38.1 Replacing I/O Module(ENC) (DBF)

(1-2) Procedure for replacement with the power turned on (When the ALM LED of the I/O Module(ENC) to be replaced is off)

(a) If the I/O Module(ENC) to be replaced is for the DBF, set the DIP-Switch of the new I/O Module(ENC).

(i) Loosen the screw on the DIP-Switch of the new I/O Module(ENC) and then open the DIP-Switch cover.

(ii) Set the DIP-Switch #3 to ON using a precision screwdriver, and set three other DIP-Switches to OFF. Be sure to check that it is set correctly.

NOTE : If the DIP-Switch setting is wrong, the I/O Module does not operate normally.

(iii) Close the DIP-Switch cover and then tighten the screw to fix the DIP-Switch cover.

(b) Open the right and left levers which fix the I/O Module(ENC) toward you.
When the lever is completely opened, the I/O Module(ENC) comes out forward.

NOTE :
- When opening the lever, perform the operation of the lever within one second.
- In the case of the DBF, when removing the I/O Module(ENC), the cover at the insertion opening may be raised. However, this is not a problem in function.

(c) Remove the SAS(ENC) cable connected to the I/O Module(ENC) to be replaced.

(d) Remove the I/O Module(ENC) by pulling it out toward you holding it with both hands.

(e) In case the connector on the rear face of the new I/O Module(ENC) has a connector cover installed, remove the connector cover.

(f) After waiting for 20 seconds or more, insert a new I/O Module(ENC) until its lever is slightly opened to the set position.
When doing this, do not insert the I/O Module(ENC) completely.
If the I/O Module(ENC) is inserted without waiting for 20 seconds or longer, it is possible that the I/O Module(ENC) is not recovered from the failure normally(‡1).

NOTE : Do not catch a SAS(ENC) cable when the I/O Module(ENC) is inserted.

(g) Connect the SAS(ENC) cable to new I/O Module(ENC).

(h) Push the right and left levers toward the I/O Module(ENC).

NOTE : When closing the lever, perform the operation of the lever within one second.
If the returning of the levers takes longer time, it is possible that the recovery from the error fails. When this happens, execute the replacement procedure again.
If the array is not recovered from the failure nevertheless, replace the I/O Module(ENC) because the I/O Module(ENC) is considered to have failed.

(i) Make sure that the ALM LED (red) on the I/O Module(ENC) is off.

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‡1 : Remove the inserted I/O Module(ENC), and insert it again after 20 seconds or more passed.

(j) When an I/O Module(ENC) other than the one to be replaced is detached in the replacement of the Controller for CBXSL/CBXSS/CBSL/CBSS or removal of the SAS(ENC) cable connected to the Drive I/O Module(ENC) installed in the CBL, remove the SAS(ENC) cable connected to the detached I/O Module(ENC). (You may replace the SAS(ENC) cables in any order because the I/O Module(ENC) to be replaced is detached. An I/O Module(ENC) other than that to be replaced cannot be detached no matter which cable connected to the front or rear I/O Module(ENC) is removed first.)
Perform a restoration of the detached I/O Module(ENC) following the procedure starting from step (ii).
When the I/O Module(ENC) cannot be restored because of a wrong restoration procedure, restore it by turning off the main switch and disconnecting the power cable, and connecting the power cable and turning on the main switch.

(k) Check that the READY LED (green) on the front of the Controller Box is on and the ALARM LED (red) and WARNING LED (orange) goes out(‡1). The READY LED (green) on the front of the Controller Box may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.
When the Power Saving/Power Saving Plus function is enabled, the WARNING LED (orange) may light up or blinking at low speed while executing the ENC automatic download. If the WARNING LED still lights up or blinking at low speed after completing the ENC automatic download, refer to Information Message on WEB and perform the maintenance according to the recovery method of the message.

(l) Refer to "Information Message" on WEB, and check to see that "I00Bf0 ENC recovered (Unit-x, ENC-y)" is indicated. (Refer to WEB "2.5 Information Message" (WEB 02-0150).)
This message appears usually about 30 seconds after inserting the I/O Module(ENC).
When this is indicated, the replacement of I/O Module(ENC) has completed.

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(1-3) Procedure for replacement with the power turned off

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it. (Refer to Message "Chapter 1 (2) (c) Collecting Error Information" (MSG 01-0010).).

Store the collected simple trace information on the CD-R.

(a) If the I/O Module(ENC) to be replaced is for the DBF, set the DIP-Switch of the new I/O Module(ENC).

(i) Loosen the screw on the DIP-Switch of the new I/O Module(ENC) and then open the DIP-Switch cover.

(ii) Set the DIP-Switch #3 to ON using a precision screwdriver, and set three other DIP-Switches to OFF. Be sure to check that it is set correctly.

NOTE : If the DIP-Switch setting is wrong, the I/O Module does not operate normally.

(iii) Close the DIP-Switch cover and then tighten the screw to fix the DIP-Switch cover.

(b) Turn off the main switch.

For the CBXSL/CBXSS/CBSL/CBSS, press the main switch on either Controller #0 or Controller #1 for three seconds or more.

Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the C-PWR LED (green) on the Controller blinks, it may be that some of the Cache Memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.

If the Controller is removed from the array when the C-PWR LED (green) blinks, user data may be lost.

(c) Open the right and left levers toward you.

When the levers are completely opened, the I/O Module(ENC) comes out forward.

NOTE : In the case of the DBF, when removing the I/O Module(ENC), the cover at the insertion opening may be raised. However, this is not a problem in function.

(d) Remove the SAS(ENC) cable connected to the I/O Module(ENC) to be replaced.

NOTE : When the cable cannot be removed easily, do not pull it by force.

Besides, the cable can be damaged if it is bent upward or downward forcibly.

(e) Remove the I/O Module(ENC) by pulling it out toward you holding it with both hands.

(f) In case the connector on the rear face of the new I/O Module(ENC) has a connector cover installed, remove the connector cover.

(g) Insert a new I/O Module(ENC) until its right and left levers are slightly opened to the set position. <u>When doing this, do not insert the I/O Module(ENC) completely.</u>

NOTE : Do not catch a SAS(ENC) cable when the I/O Module(ENC) is inserted.

(h) Connect the SAS(ENC) cable to new I/O Module(ENC).

(i) Push the right and left levers toward the I/O Module(ENC).

(j) Turn on the main switch (the array usually recovers in about 5 to 7 minutes for CBXSL/CBXSS, about 5 to 8 minutes for CBSL/CBSS, and about 5 to 10 minutes for CBL).
Make sure that the ALM LED (red) on the I/O Module(ENC) has not gone out.

(k) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) or the WARNING LED (orange) may blink at high speed (for the maximum of 30 to 85 minutes) before the READY LED (green) on the front of the Controller Box lights up.
When the Power Saving/Power Saving Plus function is enabled, the WARNING LED (orange) may light up or blinking at low speed while executing the ENC automatic download. If the WARNING LED still lights up or blinking at low speed after completing the ENC automatic download, refer to Information Message on WEB and perform the maintenance according to the recovery method of the message.

(l) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed. When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware "1.6 (4) Checking the start message and end message of the automatic download" (FIRM 01-1620).)

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

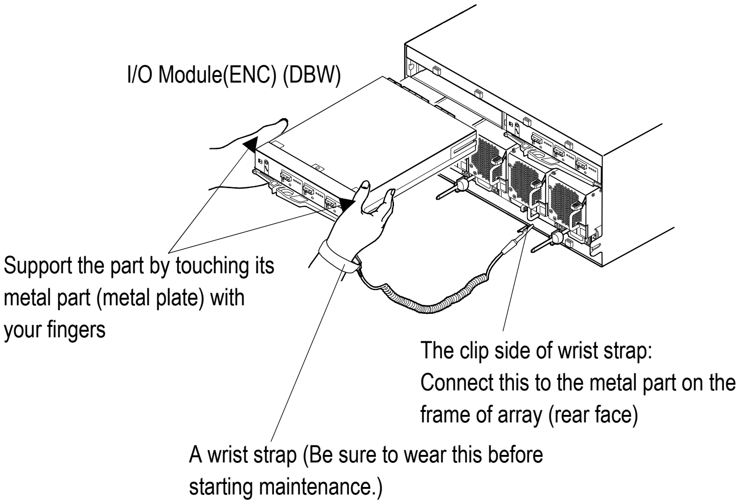
(2) Replacing the I/O Module(ENC) (DBW)

NOTICE

- **To prevent part failures caused by static electrical charge built up on your own body, be sure to wear a wrist strap connected to the chassis before starting and do not take it off until you finish.**
- **Be sure to wear a wrist strap connected to the chassis whenever you unpack parts from a case. Otherwise, the static electrical charge on your body may damage the parts.**
- **When you install a Drive, I/O Module(ENC) or I/O Card(ENC), support its metal part with your hand that has the wrist strap. You can discharge static electricity by touching the metal plate.**

A failure may be caused by the electric shock since the I/O Module(ENC) is a precision instrument. Be sure to put on the wrist strap before starting work in order to protect I/O Module(ENC) from electrostatic discharge.

NOTE : Before unpacking and replacing maintenance components, be sure to wear a wrist strap and connect to ground the grounding clip in the opposite end of the wrist strap to the chassis frame (metal part).
When you insert an I/O Module(ENC) into the array, support the I/O Module(ENC) as touching its metal part with fingers of your hand that wears a wrist strap.


I/O Module(ENC) (DBW)
Support the part by touching its metal part (metal plate) with your fingers
The clip side of wrist strap: Connect this to the metal part on the frame of array (rear face)
A wrist strap (Be sure to wear this before starting maintenance.)

Select a procedure from the following and execute it.

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on (hot replacement)	1. Complete the replacement within five minutes. Otherwise, a powering off may occur because of an abnormal temperature rise. Perform the part replacement in haste. 2. When replacing the I/O Module(ENC), the array must be in the status shown below. • The firmware is not being performed. • The Controller is not being replaced. • Any part other than the above is not being replaced. 3. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 4. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box usually goes out about 30 seconds later. 5. When using Tray Power Saving, check that the DBW to replace the I/O Module(ENC) is not in the power saving status, and then replace it. ([Tray Power Saving Status] on the table of [Energy Saving] – [Tray Power Saving] of Hitachi Storage Navigator Modular 2 is "Normal")	When the ALM LED (orange) of the I/O Module(ENC) to be replaced is on Refer to "(a-1) When the ALM LED of the I/O Module(ENC) to be replaced is on" (REP 02-1584) When the ALM LED (orange) of the I/O Module(ENC) to be replaced is off (Preventive replacement) Refer to "(a-2) When the ALM LED of the I/O Module(ENC) to be replaced is off" (REP 02-1587)
2	Replacement with the power turned off	1. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the READY LED lights on. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program or the automatic download of the ENC firmware and the backup controller firmware at the time of turning the power on in the single controller configuration is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box goes out at the maximum of 30 to 85 minutes later and the READY LED (green) lights up.	Refer to "(b) Procedure for replacement with the power turned off" (REP 02-1589)

NOTE :

- When bending the SAS(ENC) cable to connect it, give it a bend with a long radius (not less than 30 mm) so as not to apply the cable and the connector excessive stresses.
- When two or more I/O Modules(ENC) need to be replaced on the same PATH, replace the Controller Box (the Drive I/O Module for CBL, the Controller for CBL) first, and then replace the I/O Module(ENC) for Drive Box. Also, when replacing the I/O Module(ENC) of two or more Drive Boxes, replace the Drive Box whose the Unit ID # is smaller.
  However, when failures occur in both the I/O Module(ENC) #0 in the first DBW (unit #0) connected to the CBL and the Controller #0 in the CBL, replace the I/O Module(ENC) #0 first, and then replace the Drive I/O Module. If the failures have not recovered even though the Drive I/O Module was replaced, replace the Controller.
  Also, when failures occur in both the I/O Module(ENC) #1 in the first DBW (unit #0) connected to the CBL and the Controller #1 in the CBL, replace the I/O Module(ENC) #1 first, and then replace the Drive I/O Module. If the failures have not recovered even though the Drive I/O Module was replaced, replace the Controller.
- When a failure of the battery system (whose message code is W03z0x or W0400x) has occurred, recover the array from the battery system failure before replacing the I/O Module(ENC).
- When UPS interlock is used, if you turn off the array power other than the regular procedure in case of an I/O Module(ENC) failure, the power may not be turned on later. Turn off/on the output of the UPS, and then turn on the array power. If you cannot turn off/on the UPS, remove the interlock cable between the UPS and the array (it becomes the Waning status), and then turn off the array power.

(a) Procedure for replacement with the power turned on

(a-1) When the ALM LED (orange) of the I/O Module(ENC) to be replaced is on

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message “Chapter 1 ③ Collecting Error Information” (MSG 01-0000).).

Store the collected simple trace information on the CD-R.

(i) Make sure that the ALM LED (orange) of the I/O Module(ENC) to be replaced lights up. When the ALM LED (orange) on the I/O Module(ENC) is off, remove the I/O Module(ENC) following “(a-2) When the ALM LED of the I/O Module(ENC) to be replaced is off” (REP 02-1587).

NOTE : Do not remove the I/O Module(ENC) when the ALM LED(orange) of the I/O Module(ENC) is blinking. Wait until the ALM LED(orange) lights up (the maximum of 20 minutes for one DBW).

(ii) Grasp the I/O Module(ENC) latch between the thumb and forefinger and squeeze them together to release the latch (①).

(iii) Pull the handle toward you and then pull the I/O Module(ENC) out slightly (②).

(iv) Remove the SAS(ENC) cable connected to the I/O Module(ENC) to be replaced.

NOTE : When the cable cannot be removed easily, do not pull it by force.
Besides, the cable can be damaged if it is bent upward or downward forcibly.

(v) Remove the I/O Module(ENC) by pulling it out toward you holding it with both hands.

(vi) In case the connector on the rear face of the new I/O Module(ENC) has a connector cover installed, remove the connector cover.

(vii) After waiting for 20 seconds or more, insert a new I/O Module(ENC) with its handle opened to the set position.

When doing this, do not insert the I/O Module(ENC) completely.

If the I/O Module(ENC) is inserted without waiting for 20 seconds or longer, it is possible that the I/O Module(ENC) is not recovered from the failure normally(‡1).

NOTE : Do not catch a SAS(ENC) cable when the I/O Module(ENC) is inserted.

(viii) Leave the SAS(ENC) cable connected to the new I/O Module(ENC).

(ix) Close the handle to lock the I/O Module(ENC) into place.

NOTE :
- Ensure that the I/O Module(ENC) clicks into place.
- Perform the operation of the handle within one second. If it takes longer time, it is possible that the recovery from the error fails. When this happens, execute the replacement procedure again.
  If the array is not recovered from the failure nevertheless, replace the I/O Module(ENC) because the I/O Module(ENC) is considered to have failed.

---

‡1 : Remove the inserted I/O Module(ENC), and insert it again after 20 seconds or more passed.

(x) Check that the READY LED (green) on the front of the Controller Box is on and the ALARM LED (red) and WARNING LED (orange) goes out(‡1). The READY LED (green) on the front of the Controller Box may blink at high speed (for the maximum of 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.
When the Power Saving/Power Saving Plus function is enabled, the WARNING LED (orange) may light up or blinking at low speed while executing the ENC automatic download. If the WARNING LED still lights up or blinking at low speed after completing the ENC automatic download, refer to Information Message on WEB and perform the maintenance according to the recovery method of the message.

(xi) Refer to “Information Message” on WEB, and check to see that “I00Bf0 ENC recovered (Unit-x, ENC-y)” is indicated. (Refer to WEB “2.5 Information Message” (WEB 02-0150).)
This message appears usually about 30 seconds after inserting the I/O Module(ENC).
When this is indicated, the replacement of I/O Module(ENC) has completed.

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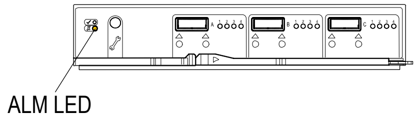
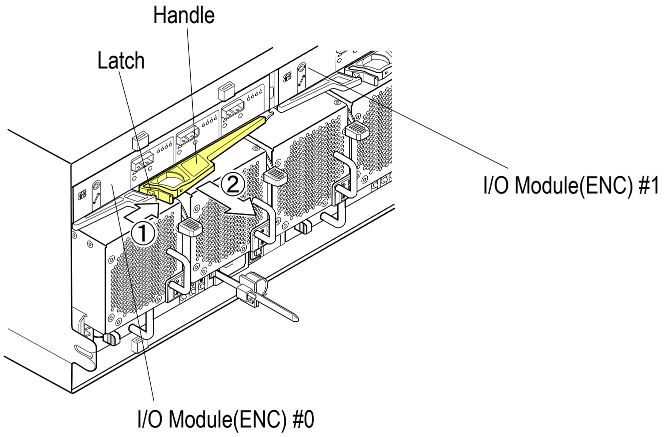
‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

Front side of the I/O Module(ENC)



(a) Removing the I/O Module(ENC)



(b) Installing the I/O Module(ENC)

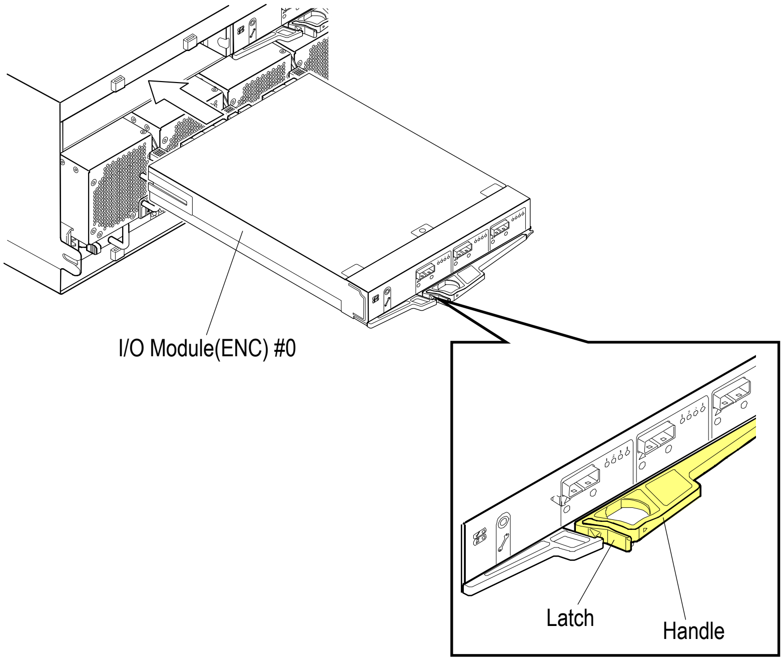


Figure 2.2.38.1 Replacing I/O Module(ENC) (DBW)

(a-2) When the ALM LED of the I/O Module(ENC) to be replaced is off

NOTE : Do not remove the I/O Module(ENC) when the ALM LED(orange) of the I/O Module(ENC) is blinking. Wait until the ALM LED(orange) lights up (the maximum of 20 minutes for one DBW).

(i) Grasp the I/O Module(ENC) latch between the thumb and forefinger and squeeze them together to release the latch (①).

(ii) Pull the handle toward you and then pull the I/O Module(ENC) out slightly (②).

NOTE : Perform the operation of the handle within one second.

(iii) Remove the SAS(ENC) cable connected to the I/O Module(ENC) to be replaced.

(iv) Remove the I/O Module(ENC) by pulling it out toward you holding it with both hands.

(v) In case the connector on the rear face of the new I/O Module(ENC) has a connector cover installed, remove the connector cover.

(vi) After waiting for 20 seconds or more, insert a new I/O Module(ENC) with its handle opened to the set position.
When doing this, do not insert the I/O Module(ENC) completely.
If the I/O Module(ENC) is inserted without waiting for 20 seconds or longer, it is possible that the I/O Module(ENC) is not recovered from the failure normally(‡1).

NOTE : Do not catch a SAS(ENC) cable when the I/O Module(ENC) is inserted.

(vii) Leave the SAS(ENC) cable connected to the new I/O Module(ENC).

(viii) Close the handle to lock the I/O Module(ENC) into place.

NOTE :
- Ensure that the I/O Module(ENC) clicks into place.
- Perform the operation of the handle within one second. If it takes longer time, it is possible that the recovery from the error fails. When this happens, execute the replacement procedure again.
  If the array is not recovered from the failure nevertheless, replace the I/O Module(ENC) because the I/O Module(ENC) is considered to have failed.

(ix) When an I/O Module(ENC) other than the one to be replaced is detached in the removal of the SAS(ENC) cable connected to the Drive I/O Module(ENC) installed in the CBL, remove the SAS(ENC) cable connected to the detached I/O Module(ENC). (You may replace the SAS(ENC) cables in any order because the I/O Module(ENC) to be replaced is detached. An I/O Module(ENC) other than that to be replaced cannot be detached no matter which cable connected to the front or rear I/O Module(ENC) is removed first.)
Perform a restoration of the detached I/O Module(ENC) following the procedure starting from the procedure (b).
When the I/O Module(ENC) cannot be restored because of a wrong restoration procedure, restore it by turning off the main switch and disconnecting the power cable, and connecting the power cable and turning on the main switch.

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‡1 : Remove the inserted I/O Module(ENC), and insert it again after 20 seconds or more passed.

(x) Check that the READY LED (green) on the front of the Controller Box is on and the ALARM LED (red) and WARNING LED (orange) goes out(‡1). The READY LED (green) on the front of the Controller Box may blink at high speed (for the maximum of 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.
When the Power Saving/Power Saving Plus function is enabled, the WARNING LED (orange) may light up or blinking at low speed while executing the ENC automatic download. If the WARNING LED still lights up or blinking at low speed after completing the ENC automatic download, refer to Information Message on WEB and perform the maintenance according to the recovery method of the message.

(xi) Refer to "Information Message" on WEB, and check to see that "I00Bf0 ENC recovered (Unit-x, ENC-y)" is indicated. (Refer to WEB "2.5 Information Message" (WEB 02-0150).)
This message appears usually about 30 seconds after inserting the I/O Module(ENC).
When this is indicated, the replacement of I/O Module(ENC) has completed.

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(b) Procedure for replacement with the power turned off

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it. (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).)

Store the collected simple trace information on the CD-R.

(i) Turn off the main switch on the Controller Box.
Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the C-PWR LED (green) on the Controller blinks, it may be that some of the Cache Memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.
If the Controller is removed from the array when the C-PWR LED (green) blinks, user data may be lost.

(ii) Turn off the power switches on the two Power Units in the DBW.

(iii) Grasp the I/O Module(ENC) latch between the thumb and forefinger and squeeze them together to release the latch (①).

(iv) Pull the handle toward you and then pull the I/O Module(ENC) out slightly (②).

(v) Remove the SAS(ENC) cable connected to the I/O Module(ENC) to be replaced.

NOTE : When the cable cannot be removed easily, do not pull it by force.
Besides, the cable can be damaged if it is bent upward or downward forcibly.

(vi) Remove the I/O Module(ENC) by pulling it out toward you holding it with both hands.

(vii) In case the connector on the rear face of the new I/O Module(ENC) has a connector cover installed, remove the connector cover.

(viii) Insert a new I/O Module(ENC) with its handle opened to the set position.
When doing this, do not insert the I/O Module(ENC) completely.

(ix) Leave the SAS(ENC) cable connected to the new I/O Module(ENC).

(x) Close the handle to lock the I/O Module(ENC) into place.

NOTE :
- Ensure that the I/O Module(ENC) clicks into place.
- Perform the operation of the handle within one second. If it takes longer time, it is possible that the recovery from the error fails. When this happens, execute the replacement procedure again.
  If the array is not recovered from the failure nevertheless, replace the I/O Module(ENC) because the I/O Module(ENC) is considered to have failed.

(xi) Turn on the power switches on the two Power Units in the DBW.

(xii) Turn on the main switch on the Controller Box (the array usually recovers in about 5 to 10 minutes for CBL).

(xiii) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) may blink at high speed (for the maximum of 40 to 60 minutes (80 to 180 minutes when the DBW is connected to the CBL)) or the WARNING LED (orange) may blink at high speed (for the maximum of 30 to 85 minutes) before the READY LED (green) on the front of the Controller Box lights up.
When the Power Saving/Power Saving Plus function is enabled, the WARNING LED (orange) may light up or blinking at low speed while executing the ENC automatic download. If the WARNING LED still lights up or blinking at low speed after completing the ENC automatic download, refer to Information Message on WEB and perform the maintenance according to the recovery method of the message.

(xiv) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed. When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware "1.6 (4) Checking the start message and end message of the automatic download" (FIRM 01-1620).)

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(3) Replacing an I/O Card(ENC) (DBX)

⚠ CAUTION

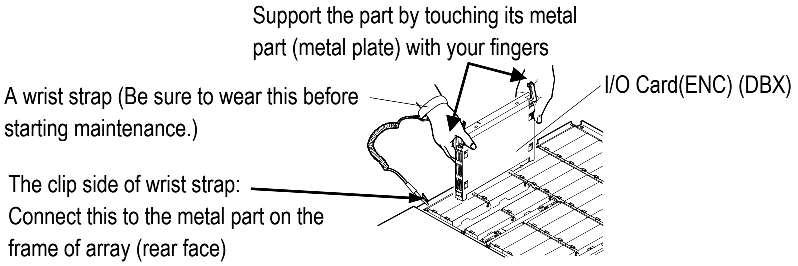
- **Do not pull out multiple DBXs at a time because the rack can fall over.**
- **Do not put objects on the DBXs which has been pulled out of the rack or use it as working space because the rack can fall over.**

NOTICE

- **To prevent part failures caused by static electrical charge built up on your own body, be sure to wear a wrist strap connected to the chassis before starting and do not take it off until you finish.**
- **Be sure to wear a wrist strap connected to the chassis whenever you unpack parts from a case. Otherwise, the static electrical charge on your body may damage the parts.**
- **When you install an I/O Card(ENC), support its metal part with your hand that has the wrist strap. By so doing, you can discharge the static electricity from your body may change the parts.**

A failure may be caused by the electric shock since the I/O Card(ENC) is a precision instrument. Be sure to put on the wrist strap before starting work in order to protect I/O Card(ENC) from electrostatic discharge.

NOTE : Before unpacking and replacing maintenance components, be sure to wear a wrist strap and connect to ground the grounding clip in the opposite end of the wrist strap to the chassis frame (metal part).
When you insert an I/O Card(ENC) into the array, support the I/O Card(ENC) as touching its metal part with fingers of your hand that wears a wrist strap.


Support the part by touching its metal part (metal plate) with your fingers
I/O Card(ENC) (DBX)
A wrist strap (Be sure to wear this before starting maintenance.)
The clip side of wrist strap: Connect this to the metal part on the frame of array (rear face)

NOTE :
- When removing the Drive to the DBX, check that the stabilizer is installed to the front side of the rack.
  If the stabilizer is not installed, install the stabilizer to the rack. (Refer to Installation "2.2.1 (1) (g) Installing the stabilizer" (INST 02-0150).)
- When pulling out or storing the DBX, perform it for only one DBX at a time slowly and surely. (Refer to Installation "1.4.1 (3) In the case of DBX. (a) How to pull the DBX out of the rack frame" (INST 01-0190) or "1.4.1 (3) In the case of DBX. (b) How to store the DBX in the rack frame." (INST 01-0200).)

Select a procedure from the following and execute it.

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on (hot replacement)	1. Complete the replacement within ten minutes(*1). Otherwise, a powering off may occur because of an abnormal temperature rise. Perform the part replacement in haste. 2. When replacing the I/O Card(ENC), the array must be in the status shown below. • The firmware is not being performed. • The Controller is not being replaced. • Any part other than the above is not being replaced. 3. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 4. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box usually goes out about 30 seconds later.	When the ALM LED (red) of the I/O Card(ENC) to be replaced is on Refer to "(a-1) When the ALM LED of the I/O Card(ENC) to be replaced is on" (REP 02-1620) When the ALM LED (red) of the I/O Card(ENC) to be replaced is off (Preventive replacement) Refer to "(a-2) When the ALM LED of the I/O Card(ENC) to be replaced is off" (REP 02-1640)
2	Replacement with the power turned off	1. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program or the automatic download of the ENC firmware and the backup controller firmware at the time of turning the power on in the single controller configuration is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box goes out at the maximum of 30 to 85 minutes later and the READY LED (green) lights up.	Refer to "(b) Procedure for replacement with the power turned off" (REP 02-1660)

*1 : It's the time it takes to replace part itself.
This time does not include the time needed to perform the operation other than replacement.

NOTE :
- When bending the SAS(ENC) cable to connect it, give it a bend with a long radius (not less than 30 mm) so as not to apply the cable and the connector excessive stresses.
- When two or more I/O Cards(ENC) need to be replaced on the same PATH, replace the Controller Box (the Controller of CBXSL/CBXSS/CBSL/CBSS, Drive I/O Module for CBL, the Controller for CBL) first, and then replace the I/O Card(ENC) for Drive Box. Also, when replacing the I/O Card(ENC) of two or more Drive Boxes, replace the Drive Box whose the Unit ID # is smaller.
- When a failure of the battery system (whose message code is W03z0x or W0400x) has occurred, recover the array from the battery system failure before replacing the I/O Card(ENC).
- When UPS interlock is used, if you turn off the array power other than the regular procedure in case of an I/O Card(ENC) failure, the power may not be turned on later. Turn off/on the output of the UPS, and then turn on the array power. If you cannot turn off/on the UPS, remove the interlock cable between the UPS and the array (it becomes the Waning status), and then turn off the array power.

(a) Procedure for replacement with the power turned on

(a-1) When the ALM LED of the I/O Card(ENC) to be replaced is on

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it (Refer to Message “Chapter 1 ③ Collecting Error Information” (MSG 01-0000).).

Store the collected simple trace information on the CD-R.

(i) Pull the DBX out of the rack, and remove the top cover. (Refer to Installation “1.4.1 How to Attach/Remove Front Bezel” (INST 01-0140).)

(ii) Make sure that the ALM LED (red) of the I/O Card(ENC) to be replaced is lit.
When ALM LED (red) on the I/O Card(ENC) is off, remove the I/O Card(ENC) following “(a-2) When the ALM LED of the I/O Card(ENC) to be replaced is off” (REP 02-1640).

(iii) Open the right and left levers toward you at the same time while pressing the right and left buttons (blue) which fix the levers of the I/O Card(ENC), and remove the I/O Card(ENC) by pulling it out.

(iv) After waiting for 20 seconds or more, insert a new I/O Card(ENC) until its lever is slightly opened.
When doing this, do not insert the I/O Card(ENC) completely.
If the I/O Card(ENC) is inserted without waiting for 20 seconds or longer, it is possible that the I/O Card(ENC) is not recovered from the failure normally(‡1).

NOTE :
- When closing the lever, perform the operation of the lever within one second. If the returning of the levers takes longer time, it is possible that the recovery from the error fails. When this happens, execute the replacement procedure again. If the array is not recovered from the failure nevertheless, replace the I/O Card(ENC) because the I/O Card(ENC) is considered to have failed.
- Check that there is no foreign substance near the connector and in the array before inserting the new I/O Card(ENC).

(v) Make sure that the ALM LED (red) on the I/O Card(ENC) is off.

(vi) Check that the READY LED (green) on the front of the Controller Box is on and the ALARM LED (red) and WARNING LED (orange) goes out(‡3). The READY LED (green) on the front of the Controller Box may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.
When the Power Saving/Power Saving Plus function is enabled, the WARNING LED (orange) may light up or blinking at low speed while executing the ENC automatic download. If the WARNING LED still lights up or blinking at low speed after completing the ENC automatic download, refer to Information Message on WEB and perform the maintenance according to the recovery method of the message.

---

‡1 : Remove the inserted I/O Card(ENC), and insert it again after 20 seconds or more passed.

(vii) Refer to "Information Message" on WEB, and check to see that "I00Bf0 ENC recovered (Unit-x, ENC-y)" is indicated. (Refer to WEB "2.5 Information Message" (WEB 02-0150).)
This message appears usually about 30 seconds after inserting the I/O Card(ENC).
When this is indicated, the replacement of I/O Card(ENC) has completed.

(viii) Return the DBX into the rack after attaching its cover. (Refer to Installation "1.4.1 How to Attach/Remove Front Bezel" (INST 01-0140).)

NOTE : Do not drop a screw and such in the array.
If you dropped it, immediately remove it.
If you leave it unattended, the parts will short out, and it will cause a fire or a failure.

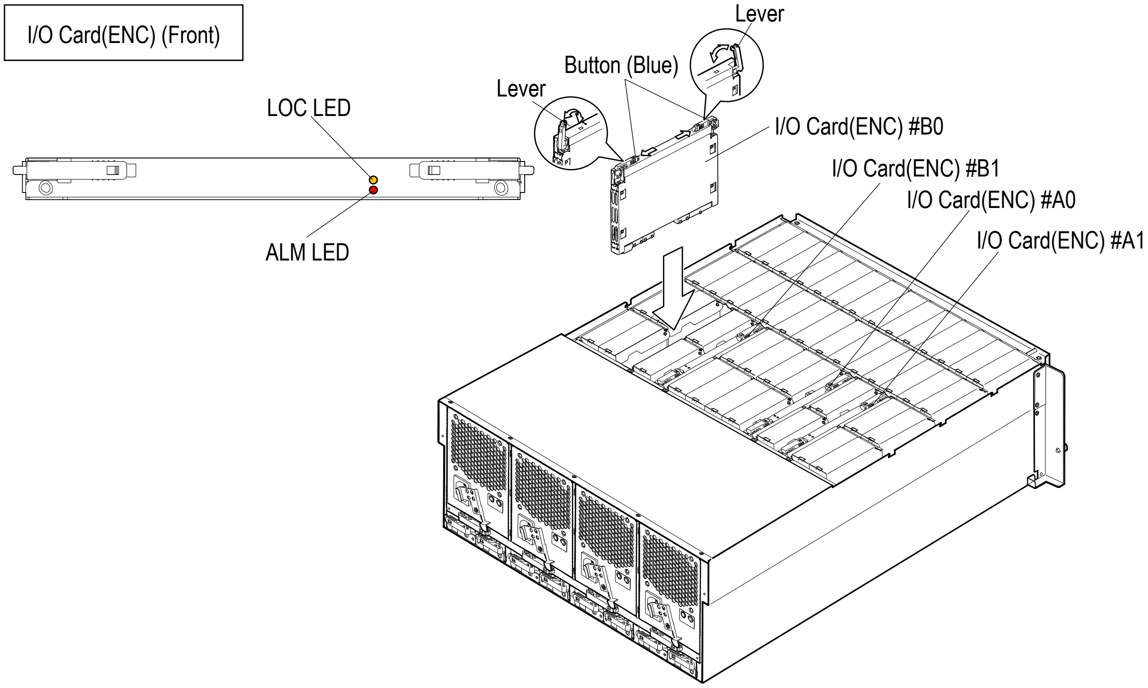


Figure 2.2.39 Replacing of I/O Card(ENC) (DBX)

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‡3 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(a-2) When the ALM LED of the I/O Card(ENC) to be replaced is off

(i) Pull the DBX out of the rack, and remove the top cover. (Refer to Installation "1.4.1 How to Attach/Remove Front Bezel" (INST 01-0140).)

(ii) Open the right and left levers toward you at while pressing the buttons (blue) which fix the levers of the I/O Card(ENC), and remove the I/O Card(ENC) by pulling it out.

(iii) After waiting for 20 seconds or more, insert a new I/O Card(ENC) until its lever is slightly opened to the set position, and then open the levers completely while pressing the button (blue), which fixes the lever。

If the I/O Card(ENC) is inserted without waiting for 20 seconds or longer, it is possible that the I/O Card(ENC) is not recovered from the failure normally(‡1).

NOTE :
- When closing the lever, perform the operation of the lever within one second. If the returning of the levers takes longer time, it is possible that the recovery from the error fails. When this happens, execute the replacement procedure again. If the array is not recovered from the failure nevertheless, replace the I/O Card(ENC) because the I/O Card(ENC) is considered to have failed.
- Check that there is no foreign substance near the connector and in the array before inserting the new I/O Card(ENC).

(iv) Make sure that the ALM LED (red) on the I/O Card(ENC) is off.

(v) When an I/O Card(ENC) other than that to be replaced is detached in the replacement of the Controller installed in the CBXSL/CBXSS/CBSL/CBSS or removal of the SAS(ENC) cable connected to the Drive I/O Module for CBL, remove the SAS(ENC) cable connected to the detached I/O Card(ENC). (You may replace the SAS(ENC) cables in any order because the I/O Card(ENC) to be replaced is detached. An I/O Card(ENC) other than that to be replaced cannot be detached no matter which cable connected to the front or rear I/O Card(ENC) is removed first.)

Perform a restoration of the detached I/O Card(ENC) following the procedure starting from step (ii).

When the I/O Card(ENC) cannot be restored because of a wrong restoration procedure, restore it by turning off the main switch and disconnecting the power cable, and connecting the power cable and turning on the main switch.

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‡1 : Remove the inserted I/O Card(ENC), and insert it again after 20 seconds or more passed.

(vi) Check that the READY LED (green) on the front of the Controller Box is on and the ALARM LED (red) and WARNING LED (orange) goes out(‡1). The READY LED (green) on the front of the Controller Box may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.
When the Power Saving/Power Saving Plus function is enabled, the WARNING LED (orange) may light up or blinking at low speed while executing the ENC automatic download. If the WARNING LED still lights up or blinking at low speed after completing the ENC automatic download, refer to Information Message on WEB and perform the maintenance according to the recovery method of the message.

(vii) Refer to “Information Message” on WEB, and check to see that “I00Bf0 ENC recovered (Unit-x, ENC-y)” is indicated. (Refer to WEB “2.5 Information Message” (WEB 02-0150).)
This message appears usually about 30 seconds after inserting the I/O Card(ENC).
When this is indicated, the replacement of I/O Card(ENC) has completed.

(viii) Return the DBX into the rack after attaching its cover. (Refer to Installation “1.4.1 How to Attach/Remove Front Bezel” (INST 01-0140).)

NOTE : Do not drop a screw and such in the array.
If you dropped it, immediately remove it.
If you leave it unattended, the parts will short out, and it will cause a fire or a failure.

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(b) Procedure for replacement with the power turned off

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it. (Refer to Message “Chapter 1 ③ Collecting Error Information” (MSG 01-0000).)

Store the collected simple trace information on the CD-R.

(i) Turn off the main switch.
For the CBXSL/CBXSS/CBSL/CBSS, press the main switch on either Controller #0 or Controller #1 for three seconds or more.
Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If you cannot turn off the power, troubleshoot the failure by connecting to the WEB.

NOTE : If the C-PWR LED (green) on the Controller blinks, it may be that some of the Cache memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.
If the Controller is removed from the array when the C-PWR LED (green) blinks, user data may be lost.

(ii) Remove the four power cables from the DBX in which the I/O Card(ENC) to be replaced is installed.

(iii) Pull the DBX out of the rack, and remove the top cover. (Refer to Installation “1.4.1 How to Attach/Remove Front Bezel” (INST 01-0140).)

(iv) Open the right and left levers toward you at the same time while pressing the right and left buttons (blue) which fix the levers of the I/O Card(ENC), and remove the I/O Card(ENC) by pulling it out.

(v) Insert the new I/O Card(ENC) until its lever is slightly closed to the set position, and then close it completely until you hear the buttons (blue), which fix the lever, click.

NOTE : Check that there is no foreign substance near the connector and in the array before inserting the new I/O Card(ENC).

(vi) Connect the four power cables to the DBX whose I/O Card(ENC) was replaced.

(vii) Return the DBX into the rack after attaching its cover. (Refer to Installation “1.4.1 How to Attach/Remove Front Bezel” (INST 01-0140).)

NOTE : Do not drop a screw and such in the array.
If you dropped it, immediately remove it.
If you leave it unattended, the parts will short out, and it will cause a fire or a failure.

(viii) Turn on the main switch (the array usually recovers in about 5 to 7 minutes for CBXSL/CBXSS, about 5 to 8 minutes for CBSL/CBSS, and about 5 to 10 minutes for CBL).
Make sure that the ALM LED (red) has not gone out.

(ix) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) or the WARNING LED (orange) may blink at high speed (for the maximum of 30 to 85 minutes) before the READY LED (green) on the front of the Controller Box lights up.
When the Power Saving/Power Saving Plus function is enabled, the WARNING LED (orange) may light up or blinking at low speed while executing the ENC automatic download. If the WARNING LED still lights up or blinking at low speed after completing the ENC automatic download, refer to Information Message on WEB and perform the maintenance according to the recovery method of the message.

(x) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware “1.6 (4) Checking the start message and end message of the automatic download” (FIRM 01-1620).)

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

2.2.12 Replacing a SAS(ENC) Cable

Working procedures are different in the DBL/DBS/DBF, the DBW and the DBX.
For the DBX, replace the SAS(ENC) cable and the cable holder together.

(1) Replacing the SAS(ENC) cable of the DBL/DBS/DBF

NOTICE

To prevent part failures caused by static electrical charge built up on your own body, be sure to wear a wrist strap connected to the chassis before starting and do not take it off until you finish.

Select a procedure from the following and execute it.

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on	1. When replacing the I/O Module(ENC), the array must be in the status shown below. • The firmware is not being performed. • The Controller is not being replaced. • Any part other than the above is not being replaced. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 3. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box usually goes out about 30 seconds later.	Refer to "(1-1) Procedure for replacement with the power turned on" (REP 02-1690)
2	Replacement with the power turned off	1. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program or the automatic download of the ENC firmware and the backup controller firmware at the time of turning the power on in the single controller configuration is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box goes out at the maximum of 30 to 85 minutes later and the READY LED (green) lights up.	Refer to "(1-2) Procedure for replacement with the power turned off" (REP 02-1720)

NOTE :
- When bending the SAS(ENC) cable to connect it, give it a bend with a long radius (not less than 30 mm) so as not to apply the cable and the connector excessive stresses.
- When a failure of the battery system (whose message code is W03z0x or W0400x) has occurred, recover the array from the battery system failure before replacing the SAS(ENC) cable.
- When UPS interlock is used, if you turn off the array power other than the regular procedure in case of an I/O Module(ENC) failure, the power may not be turned on later. Turn off/on the output of the UPS, and then turn on the array power. If you cannot turn off/on the UPS, remove the interlock cable between the UPS and the array (it becomes the Waning status), and then turn off the array power.

(1-1) Procedure for replacement with the power turned on

Replace the SAS(ENC) cable referring to Figure 2.2.40.

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it. (Refer to Message “Chapter 1 ③ Collecting Error Information” (MSG 01-0000).)

(a) Among the I/O Modules(ENC) which are connected to the SAS(ENC) cables to be replaced, open the right and left levers of the I/O Module(ENC) of the one whose the Unit ID # is larger toward you at the same time.

When the lever is completely opened, the I/O Module(ENC) comes out forward.

NOTE : When opening the lever, perform the operation of the lever within one second.

(b) Remove the SAS(ENC) cable to be replaced.

Remove the SAS(ENC) cable while pulling the tab of the SAS(ENC) cable.

NOTE : When the cable cannot be removed easily, do not pull it by force.
Besides, the cable can be damaged if it is bent upward or downward forcibly.

(c) Connect a new SAS(ENC) cable. (Refer to Installation “2.4.11 Connecting the SAS(ENC) cables” (INST 02-0990).)

(d) After waiting for 20 seconds or more, push the right and left levers in toward the I/O Module(ENC) completely.
If the I/O Module(ENC) is inserted without waiting for 20 seconds or longer, it is possible that the I/O Module(ENC) is not recovered from the failure normally. (‡1).

NOTE : • Operate the levers within one second.
If the returning of the levers takes longer time, it is possible that the recovery from the error fails. When this happens, execute the replacement procedure again. If the array is not recovered from the failure nevertheless, replace the I/O Module(ENC) because the I/O Module(ENC) is considered to have failed.
• Do not catch an SAS(ENC) cable, when the I/O Module(ENC) is inserted.

(e) Check that the ALM LED (red) on the I/O Module(ENC) is off.

(f) Check that the READY LED (green) on the front of the Controller Box is on and the ALARM LED (red) and WARNING LED (orange) goes out(‡2). The READY LED (green) on the front of the Controller Box may blink 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)) before it lights up.

(g) Refer to “Information Message” on WEB, and check to see that “I00Bf0 ENC recovered (Unit-x, ENC-y)” is indicated. (Refer to WEB “2.5 Information Message” (WEB 02-0150).)
This message appears usually about 30 seconds after inserting the SAS(ENC) cable.
When this is indicated, the replacement of SAS(ENC) cable has completed.

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‡1 : Remove the inserted I/O Module(ENC), and insert it again after 20 seconds or more passed.

‡2 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

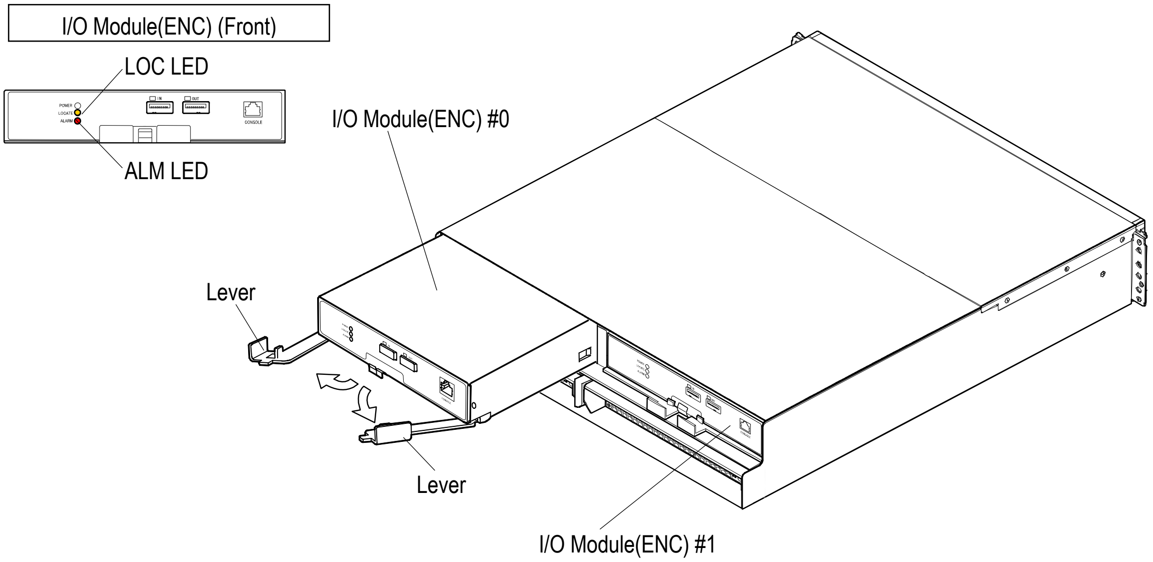

Figure 2.2.40 Locations of LEDs on the I/O Module(ENC) (DBL/DBS/DBF)

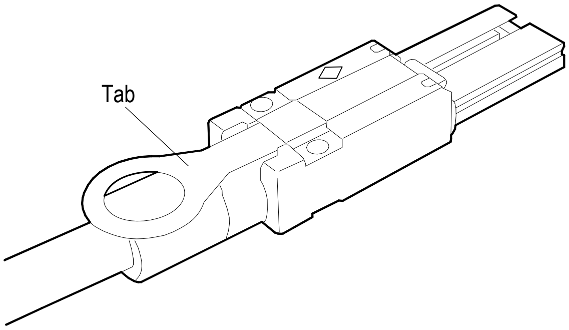

Figure 2.2.41 Locations of tab on the SAS(ENC) cable

(1-2) Procedure for replacement with the power turned off

Replace the SAS(ENC) cable referring to Figure 2.2.40.

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it. (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).)

(a) Turn off the main switch.

For the CBXSL/CBXSS/CBSL/CBSS, press the main switch on either Controller #0 or Controller #1 for three seconds or more.

Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If you cannot turn off the power, troubleshoot the failure by connecting to the WEB.

NOTE : If the C-PWR LED (green) on the Controller blinks, it may be that some of the Cache Memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.

If the Controller is removed from the array when the C-PWR LED (green) blinks, user data may be lost.

(b) Among the I/O Modules(ENC) which are connected to the SAS(ENC) cables to be replaced, open the right and left levers toward you at the same time while pressing the right and left buttons (blue) which fix the levers of the I/O Module(ENC) of the one whose the Unit ID # is larger.

When the lever is completely opened, the I/O Module(ENC) comes out forward.

(c) Remove the SAS(ENC) cable to be replaced.

Remove the SAS(ENC) cable while pulling the tab of the SAS(ENC) cable.

NOTE : When the cable cannot be removed easily, do not pull it by force.

Besides, the cable can be damaged if it is bent upward or downward forcibly.

(d) Connect a new SAS(ENC) cable. (Refer to Installation "2.4.11 Connecting the SAS(ENC) cables" (INST 02-0990).)

(e) Push the right and left levers in toward the I/O Module(ENC) completely.

NOTE : Do not catch a SAS(ENC) cable when the I/O Module(ENC) is inserted.

(f) Turn on the main switch (the array usually recovers in about 5 to 7 minutes for CBXSL/CBXSS, about 5 to 8 minutes for CBSL/CBSS, and about 5 to 10 minutes for CBL).

After doing this, make sure that the ALM LED (red) on the I/O Module(ENC) does not light up.

(h) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) or the WARNING LED (orange) may blink at high speed (for the maximum of 30 to 85 minutes) before the READY LED (green) on the front of the Controller Box lights up.

(j) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware “1.6 (4) Checking the start message and end message of the automatic download” (FIRM 01-1620).)

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(2) Replacing the SAS(ENC) cable of the DBW

NOTICE

To prevent part failures caused by static electrical charge built up on your own body, be sure to wear a wrist strap connected to the chassis before starting and do not take it off until you finish.

Select a procedure from the following and execute it.

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on	1. When replacing the I/O Module(ENC), the array must be in the status shown below. • The firmware is not being performed. • The Controller is not being replaced. • Any part other than the above is not being replaced. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 3. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box usually goes out about 30 seconds later. 4. When using Tray Power Saving, check that the DBW to replace the SAS(ENC) cable is not in the power saving status, and then replace it. ([Tray Power Saving Status] on the table of [Energy Saving] – [Tray Power Saving] of Hitachi Storage Navigator Modular 2 is “Normal”)	Refer to “(2-1) Procedure for replacement with the power turned on” (REP 02-1732)
2	Replacement with the power turned off	1. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program or the automatic download of the ENC firmware and the backup controller firmware at the time of turning the power on in the single controller configuration is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box goes out at the maximum of 30 to 85 minutes later and the READY LED (green) lights up.	Refer to “(2-2) Procedure for replacement with the power turned off” (REP 02-1735)

NOTE : • When bending the SAS(ENC) cable to connect it, give it a bend with a long radius (not less than 30 mm) so as not to apply the cable and the connector excessive stresses.

- When a failure of the battery system (whose message code is W03z0x or W0400x) has occurred, recover the array from the battery system failure before replacing the SAS(ENC) cable.
- When UPS interlock is used, if you turn off the array power other than the regular procedure in case of an I/O Module(ENC) failure, the power may not be turned on later. Turn off/on the output of the UPS, and then turn on the array power. If you cannot turn off/on the UPS, remove the interlock cable between the UPS and the array (it becomes the Waning status), and then turn off the array power.

(2-1) Procedure for replacement with the power turned on
Replace the SAS(ENC) cable referring to Figure 2.2.41.1.
Following the error collection item in the generated error message, verify that the required error information is collected.
If the required error information is not collected, collect it. (Refer to Message “Chapter 1 ③ Collecting Error Information” (MSG 01-0000).)

(a) Among the I/O Modules(ENC) which are connected to the SAS(ENC) cables to be replaced, Grasp the latch of the I/O Module(ENC) whichever of the Unit ID # is larger and squeeze them together to release the latch. Pull the handle toward you and then pull the I/O Module(ENC) out slightly.
When the handle is completely opened, the I/O Module(ENC) comes out forward.

NOTE : Perform the operation of the handle within one second.

(b) Remove the SAS(ENC) cable to be replaced.
Remove the SAS(ENC) cable while pulling the tab of the SAS(ENC) cable.

NOTE : When the cable cannot be removed easily, do not pull it by force.
Besides, the cable can be damaged if it is bent upward or downward forcibly.

(c) Connect a new SAS(ENC) cable. (Refer to Installation “2.4.11 Connecting the SAS(ENC) cables” (INST 02-0990).)

(d) After waiting for 20 seconds or more, close the handle to lock the I/O Module(ENC) into place.
If the I/O Module(ENC) is inserted without waiting for 20 seconds or longer, it is possible that the I/O Module(ENC) is not recovered from the failure normally. (‡1).

NOTE :
- Ensure that the I/O Module(ENC) clicks into place.
- Perform the operation of the handle within one second. If it takes longer time, it is possible that the recovery from the error fails. When this happens, execute the replacement procedure again.
  If the array is not recovered from the failure nevertheless, replace the I/O Module(ENC) because the I/O Module(ENC) is considered to have failed.
- Do not catch an SAS(ENC) cable, when the I/O Module(ENC) is inserted.

(e) Check that the READY LED (green) on the front of the Controller Box is on and the ALARM LED (red) and WARNING LED (orange) goes out(‡2). The READY LED (green) on the front of the Controller Box may blink at high speed (for the maximum of 40 to 60 minutes in case of the CBL (80 to 180 minutes when the DBW is connected to the CBL)) before it lights up.

(f) Refer to “Information Message” on WEB, and check to see that “I00Bf0 ENC recovered (Unit-x, ENC-y)” is indicated. (Refer to WEB “2.5 Information Message” (WEB 02-0150).)
This message appears usually about 30 seconds after inserting the SAS(ENC) cable.
When this is indicated, the replacement of SAS(ENC) cable has completed.

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‡1 : Remove the inserted I/O Module(ENC), and insert it again after 20 seconds or more passed.

‡2 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

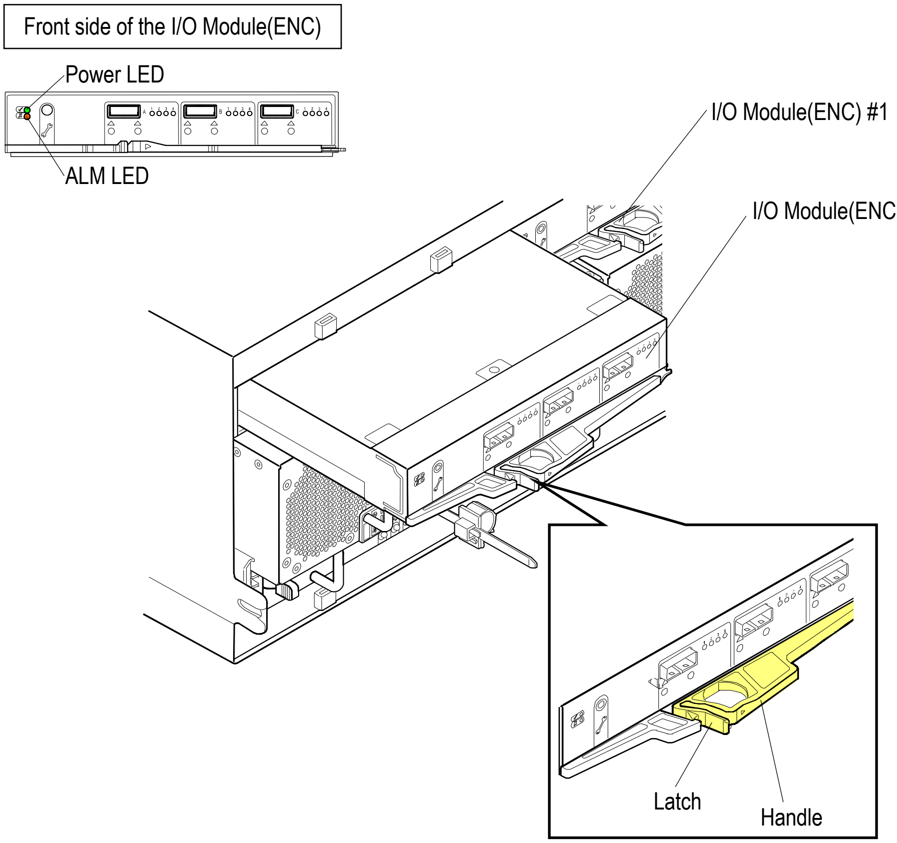

Figure 2.2.41.1 Locations of LEDs on the I/O Module(ENC) (DBW)

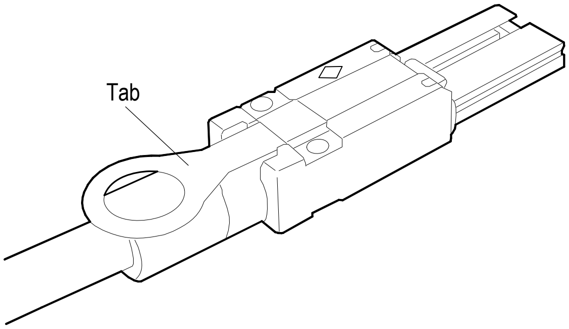

Figure 2.2.41.2 Locations of tab on the SAS(ENC) cable

(2-2) Procedure for replacement with the power turned off

Replace the SAS(ENC) cable referring to Figure 2.2.41.1.

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it. (Refer to Message “Chapter 1 ③ Collecting Error Information” (MSG 01-0000).)

(a) Turn off the main switch.

Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If you cannot turn off the power, troubleshoot the failure by connecting to the WEB.

NOTE : If the C-PWR LED (green) on the Controller blinks, it may be that some of the Cache Memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.

If the Controller is removed from the array when the C-PWR LED (green) blinks, user data may be lost.

(b) Grasp the latch of the I/O Module(ENC) whichever of the Unit ID # is larger and squeeze them together to release the latch. Pull the handle toward you and then pull the I/O Module(ENC) out slightly.

When the handle is completely opened, the I/O Module(ENC) comes out forward.

(c) Remove the SAS(ENC) cable to be replaced.

Remove the SAS(ENC) cable while pulling the tab of the SAS(ENC) cable.

NOTE : When the cable cannot be removed easily, do not pull it by force.

Besides, the cable can be damaged if it is bent upward or downward forcibly.

(d) Connect a new SAS(ENC) cable. (Refer to Installation “2.4.11 Connecting the SAS(ENC) cables” (INST 02-0990).)

(e) Close the handle to lock the I/O Module(ENC) into place.

NOTE :
- Ensure that the I/O Module(ENC) clicks into place.
- Do not catch an SAS(ENC) cable, when the I/O Module(ENC) is inserted.

(f) Turn on the main switch (the array usually recovers in about 5 to 10 minutes).

(g) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) or the WARNING LED (orange) may blink at high speed (for the maximum of 30 to 85 minutes) before the READY LED (green) on the front of the Controller Box lights up.

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(h) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware “1.6 (4) Checking the start message and end message of the automatic download” (FIRM 01-1620).)

(3) Replacing the SAS(ENC) cable of the DBX

⚠ CAUTION

- **Do not pull out multiple DBXs at a time because the rack can fall over.**
- **Do not put objects on the DBX which has been pulled out of the rack or use it as working space because the rack can fall over.**

NOTICE

To prevent part failures caused by static electrical charge built up on your own body, be sure to wear a wrist strap connected to the chassis before starting and do not take it off until you finish.

Select a procedure from the following and execute it.

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on	1. When replacing the I/O Card(ENC), the array must be in the status shown below. • The firmware is not being performed. • The Controller is not being replaced. • Any part other than the above is not being replaced. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 3. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box usually goes out about 30 seconds later.	Refer to "(3-1) Procedure for replacement with the power turned on" (REP 02-1750)
2	Replacement with the power turned off	1. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program or the automatic download of the ENC firmware and the backup controller firmware at the time of turning the power on in the single controller configuration is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box goes out at the maximum of 30 to 85 minutes later and the READY LED (green) lights up.	Refer to "(3-2) Procedure for replacement with the power turned off" (REP 02-1810)

NOTE :
- When bending the SAS(ENC) cable to connect it, give it a bend with a long radius (not less than 30 mm) so as not to apply the cable and the connector excessive stresses.
- When a failure of the battery system (whose message code is W03z0x or W0400x) has occurred, recover the array from the battery system failure before replacing the SAS(ENC) cable.
- When UPS interlock is used, if you turn off the array power other than the regular procedure in case of an I/O Card(ENC) failure, the power may not be turned on later. Turn off/on the output of the UPS, and then turn on the array power. If you cannot turn off/on the UPS, remove the interlock cable between the UPS and the array (it becomes the Waning status), and then turn off the array power.
- When replacing a SAS(ENC) cable for the DBX, check that the stabilizer is installed to the front side of the rack.
  If the stabilizer is not installed, install the stabilizer to the rack. (Refer to Installation "2.2.1 (1) (g) Installing the stabilizer" (INST 02-0150).)

(3-1) Procedure for replacement with the power turned on

Replace the SAS(ENC) cable referring to Figure 2.2.42 to Figure 2.2.49.

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it. (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).)

(a) Remove the stopper on the rear side of the array. (Refer to Installation "2.4.14 (6) Attaching the stopper" (INST 02-1390).)

(b) Open the cable routing bar toward you.

(c) If the cable tray is attached, remove it. (Refer to Installation "2.4.14 (5) Attaching the cable tray" (INST 02-1380).)

(d) Make sure that the ALM LED (red) of the cable holder to which the SAS(ENC) cable to be replaced is connected is lit. (Refer to Figure 2.2.42.)
Make sure that the ALM LED (red) for the cable holder not to be replaced is off.

(e) Remove the repeat binder which fixes the power cables and SAS(ENC) cables in the middle. (Refer to Installation "2.4.14 (4) Fixing the cables in the middle" (INST 02-1370).)

(f) Remove the cable routing bar because it disturbs the operation if the cable holder #B0 or cable holder #A1 is replaced. (Refer to Installation "2.4.8 (2) Fixing the cable routing bars" (INST 02-0830).)
- When replacing the cable holder #B0: the cable routing bar #0
- When replacing the cable holder #A1: the cable routing bar #1

(g) Remove the repeat binders (6 places) on the cable routing bar, and release the routing of the SAS(ENC) cables and power cables.
When replacing the cable holder #A0/#A1, release the routing referring to Installation "2.4.14 (2) Routing of the cable routing bar#0" (INST 02-1330).
When replacing the cable holder #B0/#B1, release the routing referring to Installation "2.4.14 (3) Routing of the cable routing bar#1" (INST 02-1350).

(h) Open the lever toward you pressing the button (blue) which fixes the cable holder to which the SAS(ENC) cable to be replaced is connected, and remove the cable holder.

NOTE: When using the lever, be sure not to push the button (blue) of other cable holders (Refer to Figure 2.2.44.)

(i) Loosen the screw (blue) which fixes the holder cover for the new cable holder, and remove it.
(j) Connect a new SAS(ENC) cable to a new cable holder

NOTE : Pull the SAS(ENC) cable lightly to check if it is surely connected to the cable holder.

(k) Attach the holder cover to the cable holder, and tighten the screw (blue) to fix the cover.

NOTE :
- Set and attach the tip of the holder cover to the correct position in the claw of the cable holder.
- There are cable holder A and cable holder B with their different shapes near the claw to which the holder cover is set.
  Work after confirming their shapes.

(l) Attach the cable holder to the DBX.
Insert the cable holder until its lever is slightly closed, and then close the lever completely while pressing the button (blue), which fixes the lever.

NOTE : Connect the cable holder to the correct connector (IN/OUT).

(m) Affix the cable label to the cable. (Refer to Installation “2.4.11 (2) (d) Attaching cable labels” (INST 02-1260).)
(n) Pull the DBX out of the rack, and remove the top cover. (Refer to Installation “1.4.1 How to Attach/Remove Front Bezel” (INST 01-0140).)
(o) Open the levers toward you at the same time while pressing the right and left buttons (blue) which fix the levers of the I/O Card(ENC) whose the ALM LED (red) is on.
When the levers are completely opened, the I/O Card(ENC) comes out forward.

NOTE : When opening the lever, perform the operation of the lever within one second.

(p) After waiting for 20 seconds or more, insert the I/O Cards(ENC) until its lever is slightly closed, and then close it completely while pressing the button (blue), which fixes the lever.
If the I/O Card(ENC) is inserted without waiting for 20 seconds or longer, it is possible that the I/O Card(ENC) is not recovered from the failure normally. (‡1).

NOTE : Operate the levers within one second.
If the returning of the levers takes longer time, it is possible that the recovery from the error fails. When this happens, execute the replacement procedure again. If the array is not recovered from the failure nevertheless, replace the I/O Card(ENC) because the I/O Card(ENC) is considered to have failed.

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‡1 : Remove the inserted I/O Card(ENC), and insert it again after 20 seconds or more passed.

(q) Check that the ALM LED (red) on the I/O Card(ENC) is off.

(r) Check that the READY LED (green) on the front of the Controller Box is on and the ALARM LED (red) and WARNING LED (orange) goes out(‡1). The READY LED (green) on the front of the Controller Box may blink 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)) before it lights up.

(s) Refer to “Information Message” on WEB, and check to see that “I00Bf0 ENC recovered (Unit-x, ENC-y)” is indicated. (Refer to WEB “2.5 Information Message” (WEB 02-0150).)
This message appears usually about 30 seconds after inserting the SAS(ENC) cable.
When this is indicated, the replacement of SAS(ENC) cable has completed.

(t) Return the DBX into the rack after attaching its cover. (Refer to Installation “1.4.1 How to Attach/Remove Front Bezel” (INST 01-0140).)

NOTE : Do not drop a screw and such in the array.
If you dropped it, immediately remove it.
If you leave it unattended, the parts will short out, and it will cause a fire or a failure.

(u) Route the replaced SAS(ENC) cable, and fix it with the repeat binder.
When replacing the cable holder #A0/#A1, release the routing referring to Installation “2.4.14 (2) Routing of the cable routing bar#0” (INST 02-1330).
When replacing the cable holder #B0/#B1, release the routing referring to Installation “2.4.14 (3) Routing of the cable routing bar#1” (INST 02-1350).

(v) Return the power cables and SAS(ENC) cables to the original state, and fix them with the repeat binder in the middle. (Refer to Installation “2.4.14 (4) Fixing the cables in the middle” (INST 02-1370).)

(w) If the cable tray is removed, attach it. (Refer to Installation “2.4.14 (5) Attaching the cable tray” (INST 02-1380).)

(x) Close the cable routing bar.

(y) Attach the stopper on the rear side of the array. (Refer to Installation “2.4.14 (6) Attaching the stopper” (INST 02-1390).)

NOTE : Check that the cables of other array are not being caught.

(z) Pull out the array and check that the routing is performed correctly. (Refer to Installation “2.4.14 (7) Checking the routing” (INST 02-1390).)

---

‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

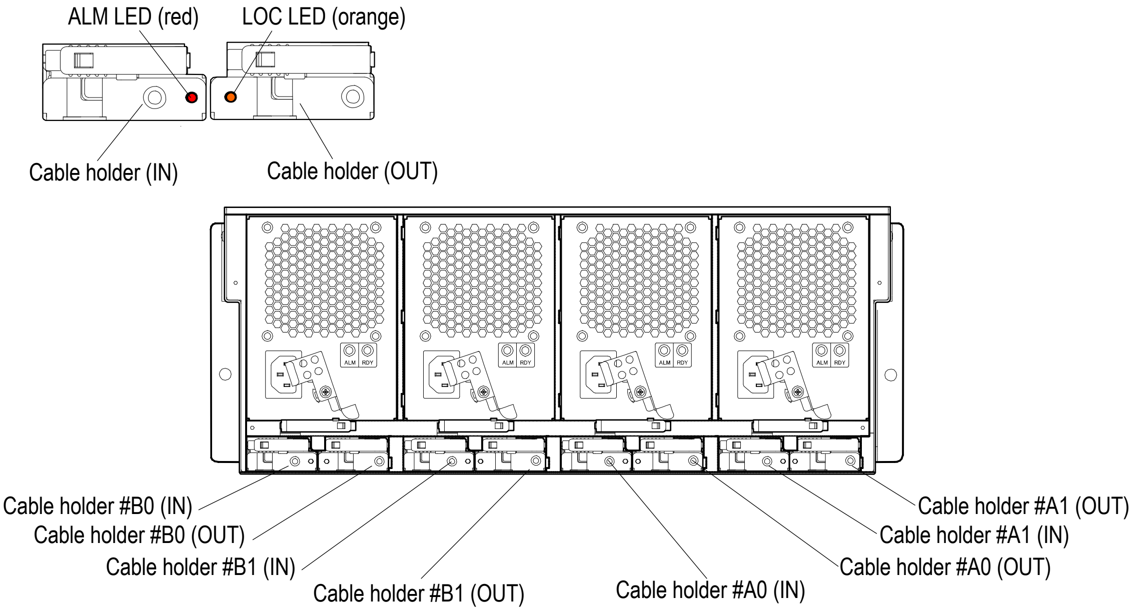


Figure 2.2.42 Locations of the LEDs on the Cable Holder

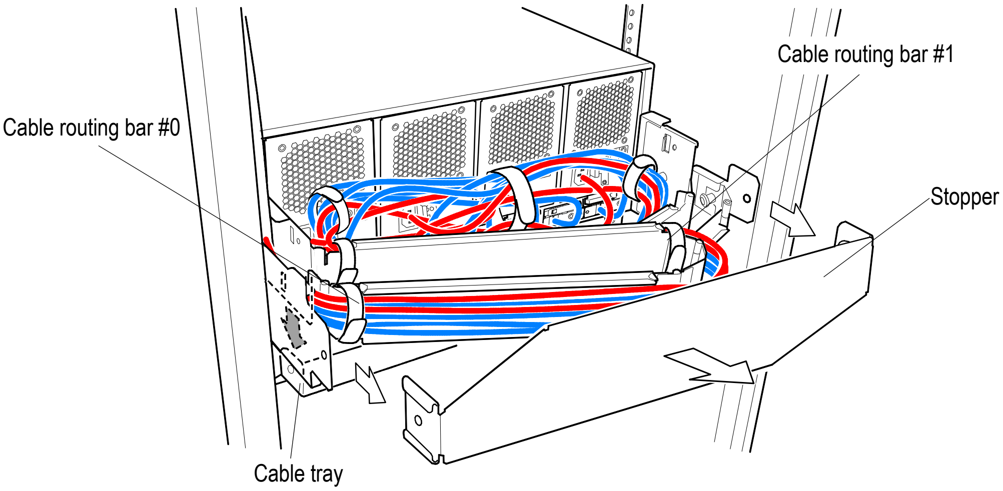


Figure 2.2.43 Locations of the Cable Routing Bar, the Stopper, and the Cable Tray

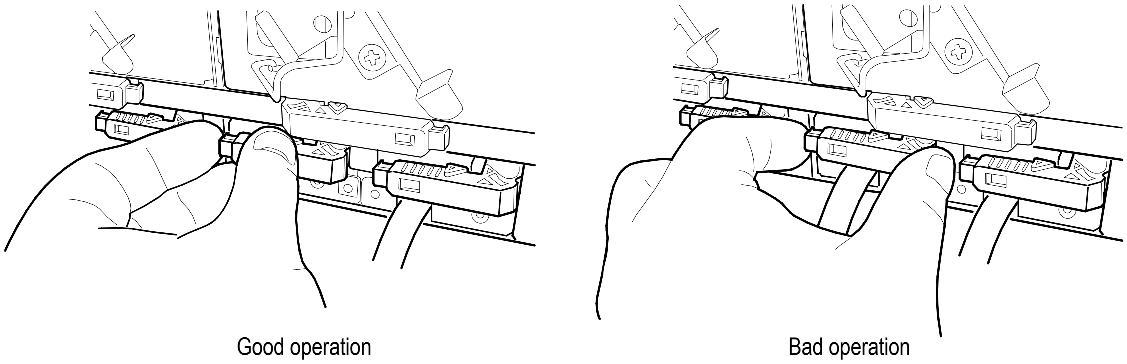

Good operation
Bad operation

Figure 2.2.44 Cable Holder Button (blue) Operation

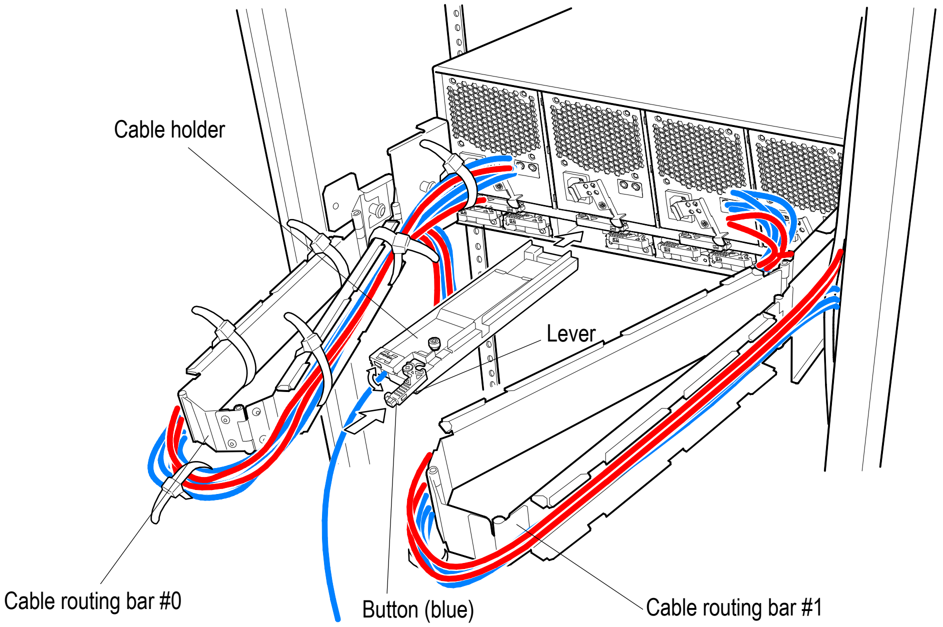


Figure 2.2.45 Replacing the SAS(ENC) cable/Cable Holder

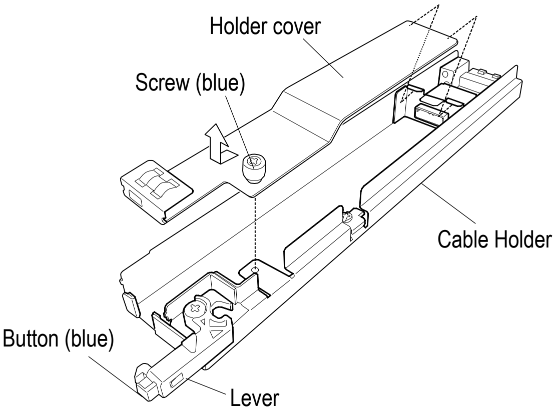


Figure 2.2.46 Removing the Cable Holder and the Holder Cover

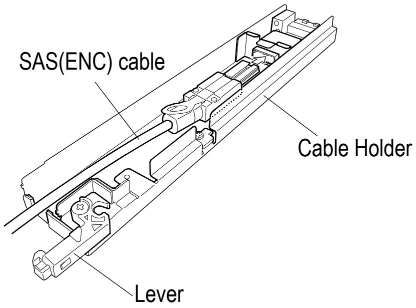
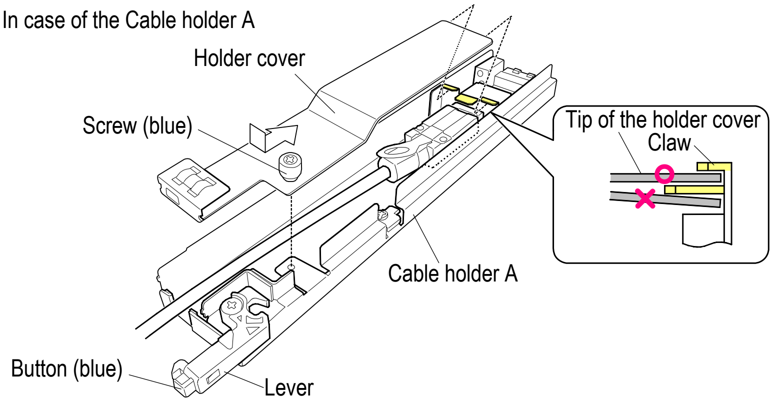


Figure 2.2.47 Connecting the SAS(ENC) cable

- In case of the Cable holder A



- In case of the Cable holder B

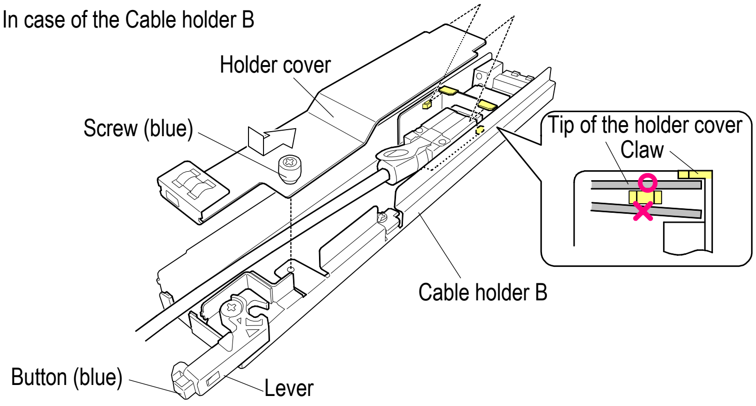


Figure 2.2.48 Attaching the Cable Holder and the Holder Cover

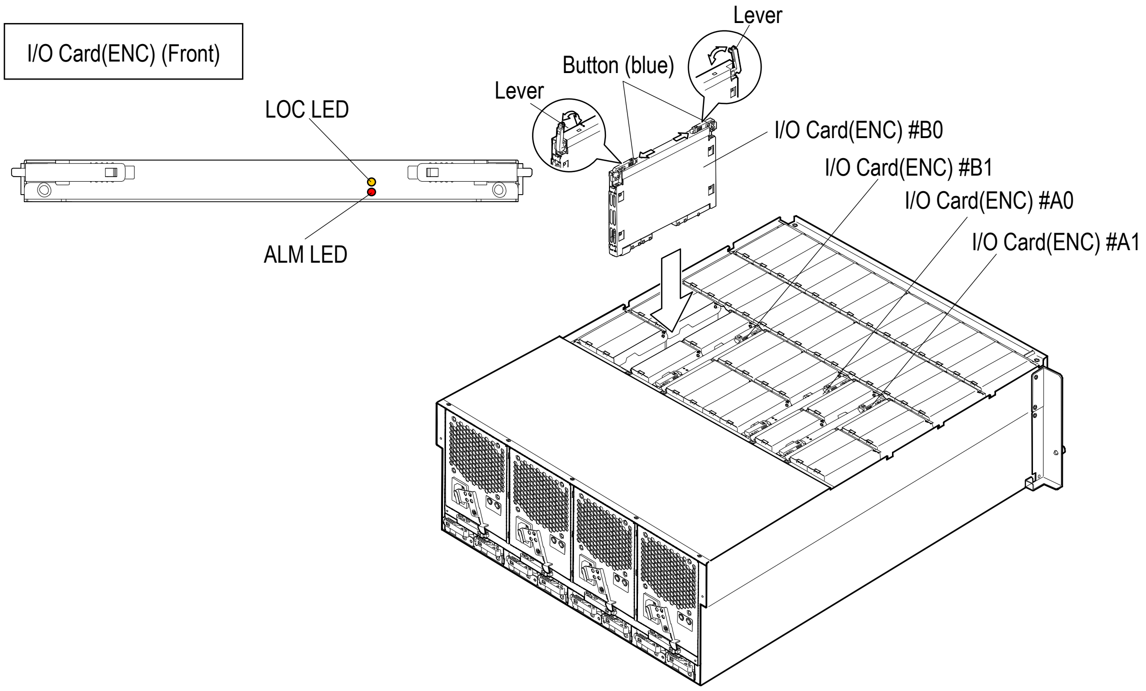


Figure 2.2.49 LED Locations of I/O Card(ENC) (DBX)

(3-2) Procedure for replacement with the power turned off

Replace the SAS(ENC) cable referring to Figure 2.2.42 to Figure 2.2.49.

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it. (Refer to Message “Chapter 1 ③ Collecting Error Information” (MSG 01-0000).)

(a) Turn off the main switch.

For the CBXSL/CBXSS/CBSL/CBSS, press the main switch on either Controller #0 or Controller #1 for three seconds or more.

Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If you cannot turn off the power, troubleshoot the failure by connecting to the WEB.

NOTE : If the C-PWR LED (green) on the Controller blinks, it may be that some of the Cache Memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.

If the Controller is removed from the array when the C-PWR LED (green) blinks, user data may be lost.

(b) Remove the stopper on the rear side of the array. (Refer to Installation “2.4.14 (6) Attaching the stopper” (INST 02-1390).)

(c) Open the cable routing bar toward you.

(d) If the cable tray is attached, remove it. (Refer to Installation “2.4.14 (5) Attaching the cable tray” (INST 02-1380).)

(e) Remove the repeat binder which fixes the power cables and SAS(ENC) cables in the middle. (Refer to Installation “2.4.14 (4) Fixing the cables in the middle” (INST 02-1370).)

(f) Remove the power cables (four) from the DBX to which the SAS(ENC) cable to be replaced is connected.

(g) Remove the cable routing bar because it disturbs the operation if the cable holder #B0 or cable holder #A1 is replaced. (Refer to Installation “2.4.8 (2) Fixing the cable routing bars” (INST 02-0830).)

- When replacing the cable holder #B0: the cable routing bar #0
- When replacing the cable holder #A1: the cable routing bar #1

(h) Remove the repeat binders (6 places) on the cable routing bar, and release the routing of the SAS(ENC) cables and power cables.

When replacing the cable holder #A0/#A1, release the routing referring to Installation “2.4.14 (2) Routing of the cable routing bar#0” (INST 02-1330).

When replacing the cable holder #B0/#B1, release the routing referring to Installation “2.4.14 (3) Routing of the cable routing bar#1” (INST 02-1350).

(i) Open the lever toward you pressing the button (blue) which fixes the cable holder to which the SAS(ENC) cable to be replaced is connected, and remove the cable holder.

NOTE: When using the lever, be sure not to push the button (blue) of other cable holders (Refer to Figure 2.2.44.)

(j) Loosen the screw (blue) which fixes the holder cover for a new cable holder, and remove it.
(k) Connect a new SAS(ENC) cable to a new cable holder.

NOTE : Pull the SAS(ENC) cable lightly to check if it is surely connected to the cable holder.

(l) Attach the holder cover to the cable holder, and tighten the screw (blue) to fix the cover.

NOTE :
- Set and attach the tip of the holder cover to the correct position in the claw of the cable holder.
- There are cable holder A and cable holder B with their different shapes near the claw to which the holder cover is set.
  Work after confirming their shapes.

(m) Attach the cable holder to the DBX.
Insert the cable holder into the DBX, and then close the lever completely while pressing the button (blue), which fixes the lever.

NOTE : Connect the cable holder to the correct connector (IN/OUT).

(n) Affix the cable label to the cable. (Refer to Installation “2.4.11 (2) (d) Attaching cable labels” (INST 02-1260).)
(o) Connect the power cables (four) to the DBX whose SAS(ENC) cable was replaced.
(p) Turn on the main switch (the array usually recovers in about 5 to 7 minutes for CBXSL/CBXSS, about 5 to 8 minutes for CBSL/CBSS, and about 5 to 10 minutes for CBL).
Make sure that the ALM LED (red) on the I/O Card(ENC) goes out.
(q) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) may blink 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) may blink at high speed (for the maximum of 30 to 85 minutes) before the READY LED (green) on the front of the Controller Box lights up.
(r) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware “1.6 (4) Checking the start message and end message of the automatic download” (FIRM 01-1620).)
(s) Route the replaced SAS(ENC) cable, and fix it with the repeat binder.
When replacing the cable holder #A0/#A1, release the routing referring to Installation “2.4.14 (2) Routing of the cable routing bar#0” (INST 02-1330).
When replacing the cable holder #B0/#B1, release the routing referring to Installation “2.4.14 (3) Routing of the cable routing bar#1” (INST 02-1350).

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(t) Return the power cables and SAS(ENC) cables to the original state, and fix them with the repeat binder in the middle. (Refer to Installation “2.4.14 (4) Fixing the cables in the middle” (INST 02-1370)).

(u) If the cable tray is removed, attach it. (Refer to Installation “2.4.14 (5) Attaching the cable tray” (INST 02-1380).)

(v) Close the cable routing bar.

(w) Attach the stopper on the rear side of the array. (Refer to Installation “2.4.14 (6) Attaching the stopper” (INST 02-1390).)

NOTE : Check that the cables of other array are not being caught.

(x) Pull out the array and check that the routing is performed correctly. (Refer to Installation “2.4.14 (7) Checking the routing’” (INST 02-1390).)

2.2.13 Replacing a Controller Box

Perform this work only when an instruction is given by the Technical Support Center for coping with troubles.

⚠ CAUTION

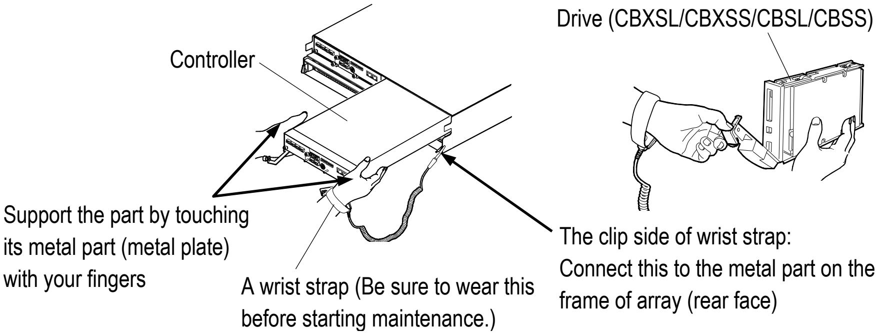
Be sure to perform the operation with two or more workers.

NOTICE

- **To prevent part failures caused by static electrical charge built up on your own body, be sure to wear a wrist strap connected to the chassis before starting and do not take it off until you finish.**
- **Drives are precision components. Be careful not to expose drives to hard shock.**
- **When you install a Drive or Controller, support its metal part with your hand that has the wrist strap. You can discharge static electricity by touching the metal plate.**

A failure may be caused by the electric shock since the Drive and Controller is precision instrument. Be sure to put on the wrist strap before starting work in order to protect Drive and Controller from electrostatic discharge.

NOTE : Before unpacking and replacing maintenance components, be sure to wear a wrist strap and connect to ground the grounding clip in the opposite end of the wrist strap to the chassis frame (metal part).
When you insert a Drive or Controller into the array, support the Drive or Controller as touching its metal part with fingers of your hand that wears a wrist strap.


Controller
Drive (CBXSL/CBXSS/CBSL/CBSS)
Support the part by touching its metal part (metal plate) with your fingers
A wrist strap (Be sure to wear this before starting maintenance.)
The clip side of wrist strap: Connect this to the metal part on the frame of array (rear face)

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on (hot replacement)	Not applicable	—
2	Replacement with the power turned off	1. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program or the automatic download of the ENC firmware and the backup controller firmware at the time of turning the power on in the single controller configuration is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box goes out at the maximum of 30 to 85 minutes later and the READY LED (green) lights up.	Refer to "(1) Procedure for replacement with the power turned off" (REP 02-1860)

(1) Procedure for replacement with the power turned off

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it. (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).)

NOTE : Write down the serial number of the array before the replacement. Write down the same serial number as the removed array in the new array.

(a) Turn off the main switch.

For the CBXSL/CBXSS/CBSL/CBSS, press the main switch on either Controller #0 or Controller #1 for three seconds or more.

Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If the power cannot be turned off, have the Web be connected and find out a cause of the trouble

NOTE : If the C-PWR LED (green) on the Controller blinks, it may be that some of the Cache Memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.

If the Controller is removed from the array when the C-PWR LED (green) blinks, user data may be lost.

(b) Remove the Front Bezel. (Refer to Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door" (INST 01-0140).)

(c) Remove all the cables connected to the components (Controller and Power Unit).

NOTE : When the cable cannot be removed easily, do not pull it by force.

Pull out the Controller and Power Unit a little, and then perform the cable removal again. Besides, the cable can be damaged if it is bent upward or downward forcibly.

(d) Remove parts (Drives, Cache Backup Battery, Fan Module, Controller, and Power Unit) referring to each removal procedure of them.
Affix labels bearing HDD numbers on the removed Drives and put the drives in the box for temporary storage arranging them in the same order as they were installed in the array.
The Drive is not installed in CBL.

(e) Remove the frame and replace it with a new one. (The weight of the frame whose each part is removed is 13 kg.)
Refer to Installation "2.4.3 Mounting on Rack Frame" (INST 02-0530) in the for Installation.

(f) Reinstall the parts. (Refer to "2.2 Components Replacement" (REP 02-0050).)
Reinstall all the removed parts in the same positions where they were installed before.

(g) Return all the removed cables as they were before.

(h) Turn on the main switch (the array usually recovers in about 5 to 7 minutes for CBXSL/CBXSS, about 5 to 8 minutes for CBSL/CBSS, and about 5 to 10 minutes for CBL).

(i) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) may blink 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) may blink at high speed (for the maximum of 30 to 85 minutes) before the READY LED (green) on the front of the Controller Box lights up.

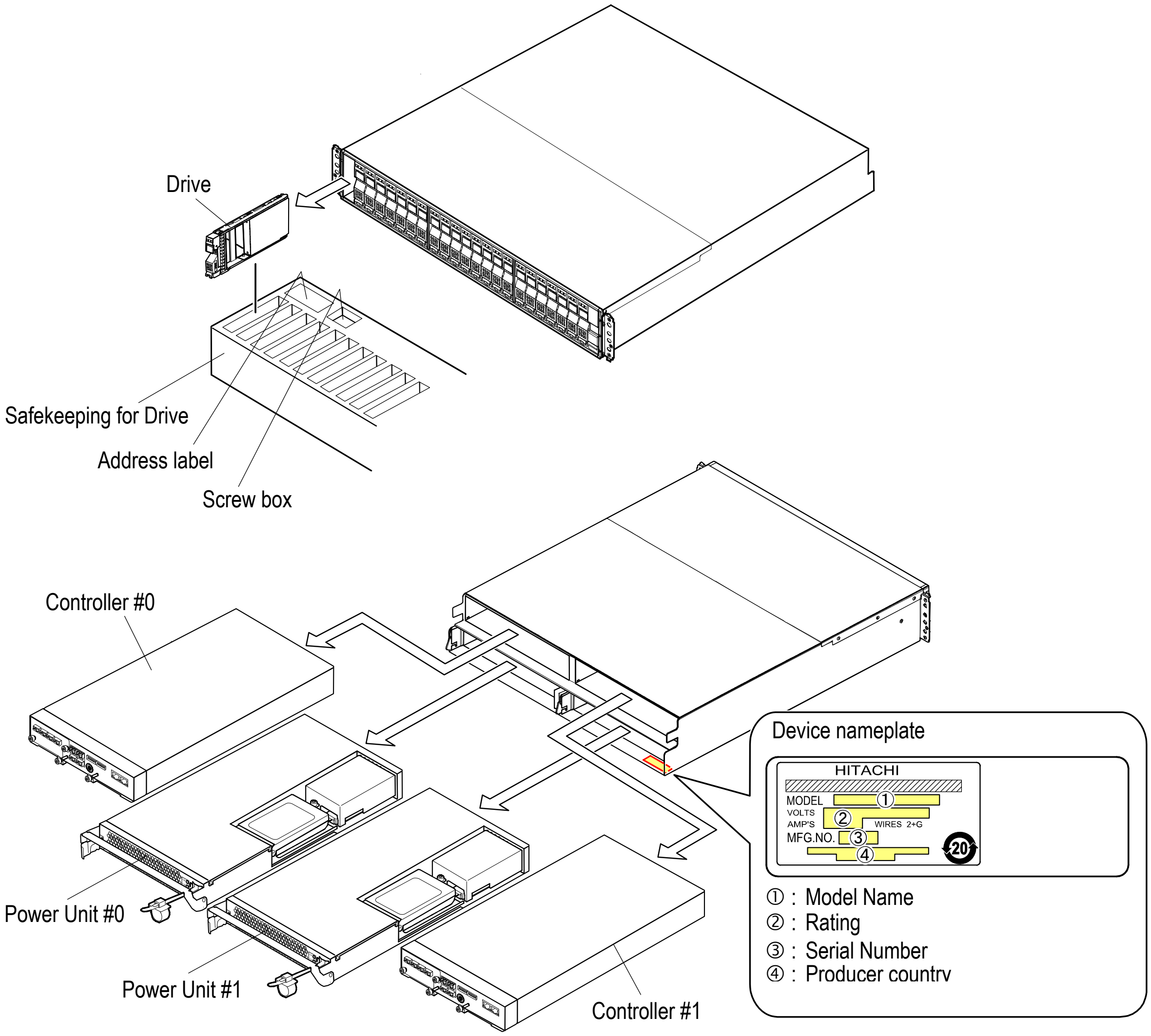
(j) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware "1.6 (4) Checking the start message and end message of the automatic download" (FIRM 01-1620).)

(k) Take out the device nameplate in which the same model name as the removed chassis is described from the device nameplates attached to the new chassis. Write down the same serial number as the removed chassis in the device nameplate, and then affix the device nameplate to the new chassis.
When the device nameplate in which the same model name as the removed chassis is described is not attached, take out the device nameplate in which the same rating and producer country as the removed chassis are described and which the model name is not described. Write down the same model name and serial number as the removed chassis in the device nameplate, and then affix it to the new chassis.
To fill in the device nameplate, use the RoHS-compliant marker pen.

(l) Attach the Front Bezel.

---

‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.



*1 : The figure shows CBSS.

Figure 2.2.50 Replacing Controller Box (CBXSL/CBXSS/CBSL/CBSS)

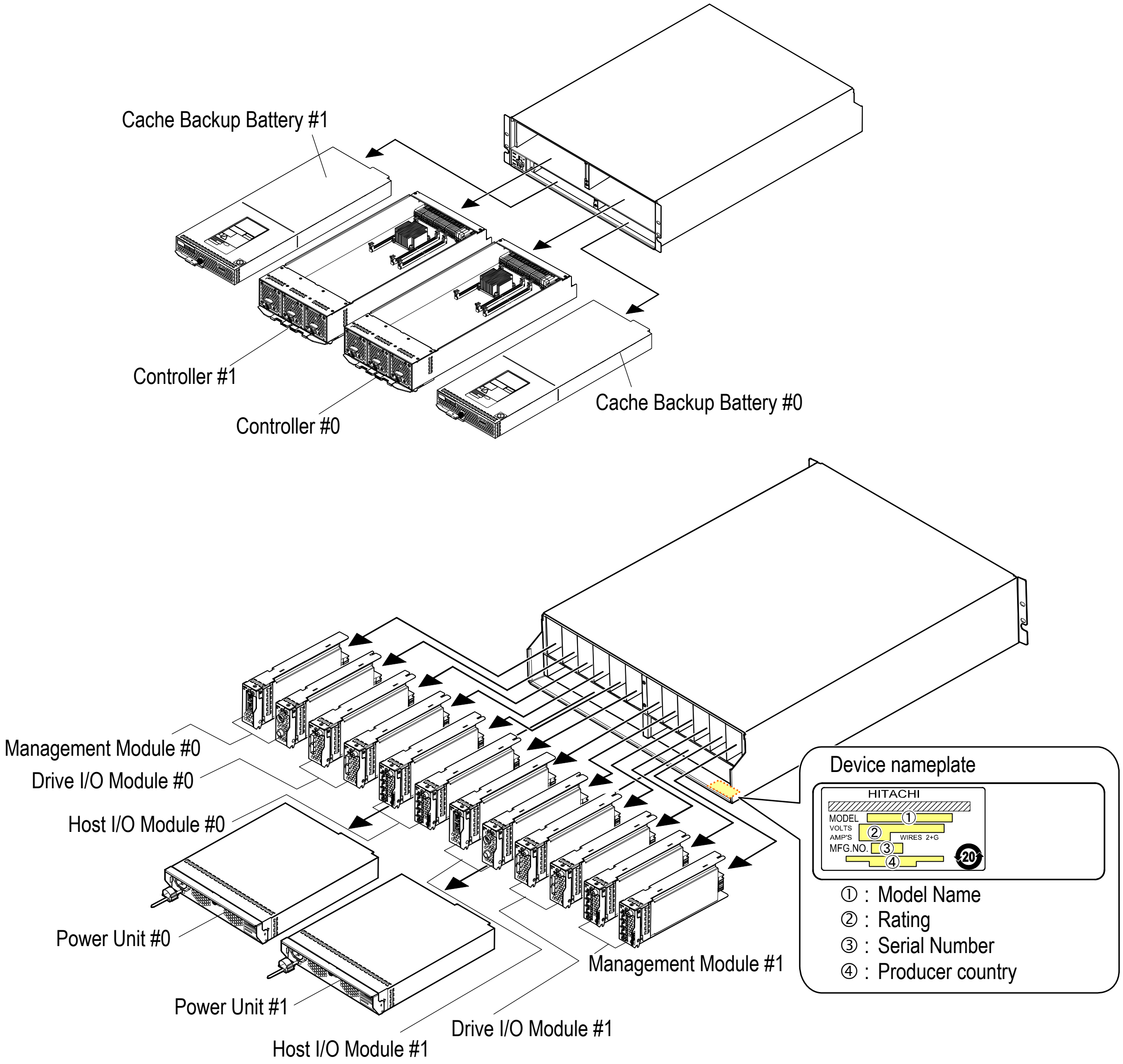


Figure 2.2.51 Replacing Controller Box (CBL)

2.2.14 Replacing a Drive Box

Perform this work only when an instruction is given by the Technical Support Center for coping with troubles.

⚠ CAUTION

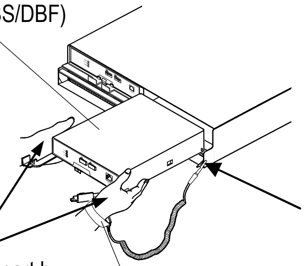
- **Be sure to perform the operation with two or more workers.**
- **Be sure to lift the DBW with no components installed (about 46 kg) with three or more workers.**
- **Do not pull out multiple DBXs/DBWs at a time because the rack can fall over.**
- **Do not put objects on the DBX which has been pulled out of the rack or use it as working space because the rack can fall over.**
- **Do not put objects in the open drawer of the DBW or use it as working space because the rack can fall over.**

NOTICE

- **To prevent part failures caused by static electrical charge built up on your own body, be sure to wear a wrist strap connected to the chassis before starting and do not take it off until you finish.**
- **Drives are precision components. Be careful not to expose drives to hard shock.**
- **When you install a Drive, I/O Module(ENC) or I/O Card(ENC), support its metal part with your hand that has the wrist strap. You can discharge static electricity by touching the metal plate.**

A failure may be caused by the electric shock since the Drive, I/O Module(ENC) and I/O Card(ENC) are a precision instrument. Be sure to put on the wrist strap before starting work in order to protect Drive, I/O Module(ENC), or I/O Card(ENC) from electrostatic discharge.

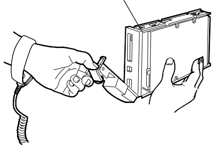
NOTE : Before unpacking and replacing maintenance components, be sure to wear a wrist strap and connect to ground the grounding clip in the opposite end of the wrist strap to the chassis frame (metal part).
When you insert a Drive, I/O Module(ENC), or I/O Card(ENC) into the array, support the Drive, I/O Module(ENC), or I/O Card(ENC) as touching its metal part with fingers of your hand that wears a wrist strap.

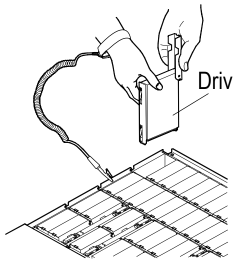


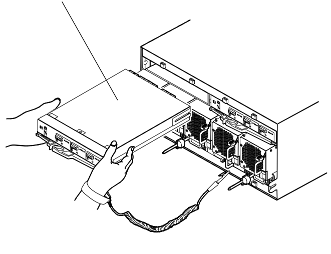
The clip side of wrist strap: Connect this to the metal part on the frame of array

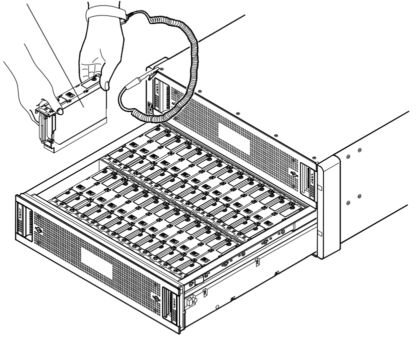
Support the part by touching its metal part (metal plate) with your fingers

A wrist strap (Be sure to wear this before starting maintenance.)









NOTE : • When removing the DBX/DBW, check that the stabilizer is installed to the front side of the rack.
If the stabilizer is not installed, install the stabilizer to the rack. (Refer to Installation “2.2.1 (1) (g) Installing the stabilizer” (INST 02-0150).)

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on (hot replacement)	Not applicable	—
2	Replacement with the power turned off	1. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the LED lights on. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program or the automatic download of the ENC firmware and the backup controller firmware at the time of turning the power on in the single controller configuration is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box goes out at the maximum of 30 to 85 minutes later and the READY LED (green) lights up.	Refer to "(1) Procedure for replacement with the power turned off" (REP 02-1920)

(1) Procedure for replacement with the power turned off

(1-1) Replacing the DBL/DBS/DBF

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it. (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).)

NOTE : When the power has already been turned off, make sure that the cache is not in the cache backup mode.
When the cache is in the cache backup mode, make the replacement after canceling the mode.

(a) Turn off the main switch

For the CBXSL/CBXSS/CBSL/CBSS, press the main switch on either Controller #0 or Controller #1 for three seconds or more.

Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the C-PWR LED (green) on the Controller blinks, it may be that some of the Cache Memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.
If the Controller is removed from the array when the C-PWR LED (green) blinks, user data may be lost.

(b) Remove the Front Bezel. (Refer to Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door" (INST 01-0140).)

(c) Remove all the cables connected to the components (Controller, Power Unit, and I/O Module(ENC)).

> NOTE : When the cable cannot be removed easily, do not pull it by force.
> Pull out the Controller, Power Unit, and I/O Module(ENC) a little, and then perform the cable removal again.
> Besides, the cable can be damaged if it is bent upward or downward forcibly.

(d) Remove parts (Drives, Power Units, and I/O Modules(ENC)) referring to each removal procedure of them.
Affix labels bearing HDD numbers on the removed Drives and put the drives in the box for temporary storage arranging them in the same order as they were installed in the array.

(e) For the DBF, affix the new standard mark label attached to the new chassis, on the existing standard mark label of the new chassis.

(f) Remove the frame and replace it with a new one. (The weight of the frame whose each part has been removed is DBL/DBS: 13 kg, DBF: 10kg.)
Refer to Installation "2.4.3 Mounting on Rack Frame" (INST 02-0530) in the Maintenance Manual for Installation.

(g) Install all the removed parts in the same positions as before in the new chassis. (Refer to "2.2 Components Replacement" (REP 02-0050).)

(h) Return all the removed cables as they were before.

(i) Turn on the main switch (the array usually recovers in about 5 to 7 minutes for CBXSL/CBXSS, about 5 to 8 minutes for CBSL/CBSS, and about 5 to 10 minutes for CBL).

(j) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) or the WARNING LED (orange) may blink at high speed (for the maximum of 30 to 85 minutes) before the READY LED (green) on the front of the Controller Box lights up.

(k) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware "1.6 (4) Checking the start message and end message of the automatic download" (FIRM 01-1620).)

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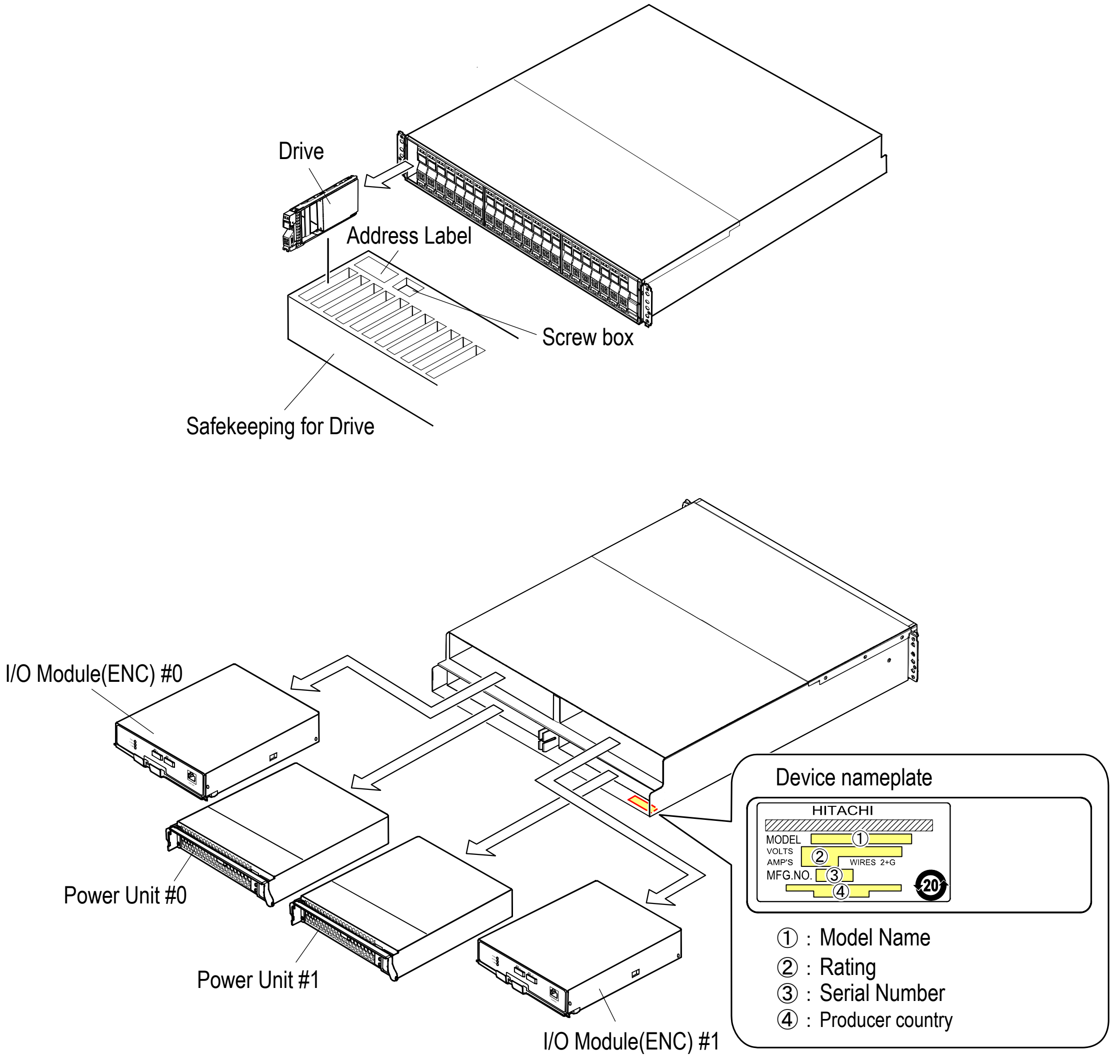
‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(l) Take out the device nameplate in which the same model name as the removed chassis is described from the device nameplates attached to the new chassis. Write down the same serial number as the removed chassis in the device nameplate, and then affix the device nameplate to the new chassis.
When the device nameplate in which the same model name as the removed chassis is described is not attached, take out the device nameplate in which the same rating and producer country as the removed chassis are described and which the model name is not described. Write down the same model name and serial number as the removed chassis in the device nameplate, and then affix it to the new chassis.
To fill in the device nameplate, use the RoHS-compliant marker pen.

(m) Attach the Front Bezel.



*1 : The figure shows DBS.

Figure 2.2.52 Replacing Drive Box (DBL/DBS/DBF)

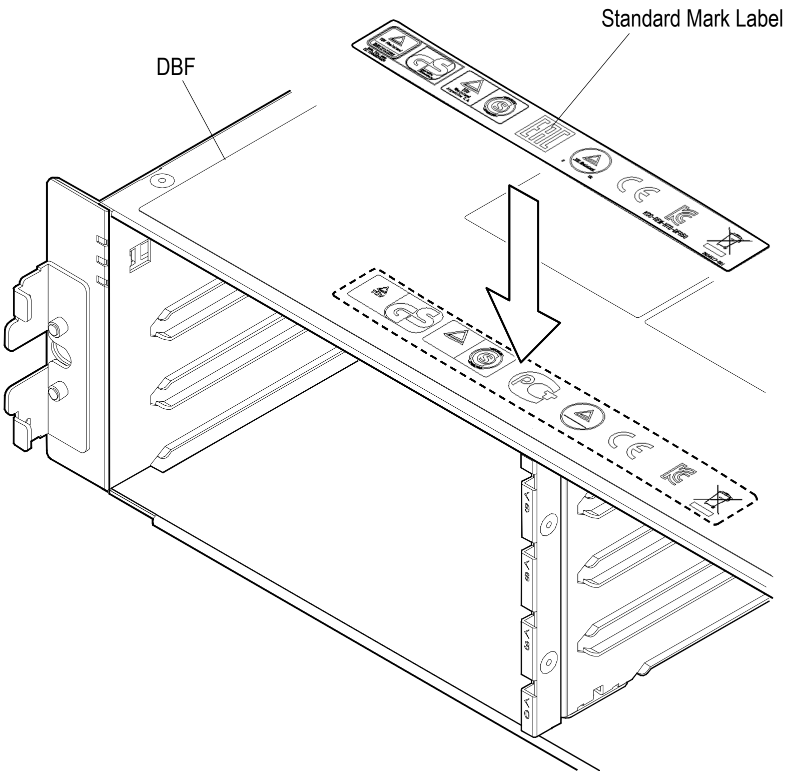


Figure 2.2.52.1 Affixing the Standard Mark Label

(1-2) Replacing the DBX

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it. (Refer to Message "Chapter 1 ③ Collecting Error Information" (MSG 01-0000).)

NOTE : When the power has already been turned off, make sure that the cache is not in the cache backup mode.
When the cache is in the cache backup mode, make the replacement after canceling the mode.

(a) Turn off the main switch. (The POWER LED goes out.)
For the CBXSL/CBXSS/CBSL/CBSS, press the main switch on either Controller #0 or Controller #1 for three seconds or more.
Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the C-PWR LED (green) on the Controller blinks, it may be that some of the Cache Memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.
If the Controller is removed from the array when the C-PWR LED (green) blinks, user data may be lost.

(b) Remove the cables and other parts on the rear side of the array.
(i) Remove the stopper on the rear side of the array. (Refer to Installation "2.4.14 (6) Attaching the stopper" (INST 02-1390).)
(ii) Open the cable routing bar toward you.
(iii) If the cable tray is attached, remove it. (Refer to Installation "2.4.14 (5) Attaching the cable tray" (INST 02-1380).)
(iv) Release the routing of the SAS(ENC) cables and power cables. (Refer to Installation "2.4.14 Routing the Cables for DBX" (INST 02-1330).)
(v) Remove all the power cables connected to the DBX.

NOTE : When the cable cannot be removed easily, do not pull it by force.

(vi) Remove all the cable holders connected to the DBX to be replaced referring to the procedures for replacing the SAS(ENC) cable.
(vii) Remove the cable routing bar. (Refer to Installation "2.4.8 Installing the Cables Routing Bars" (INST 02-0820).)

(c) Remove all the Power Units connected to the DBX to be replaced referring to the procedures for replacing the Power Unit.

(d) Pull the DBX out of the rack, and remove the top cover. (Refer to Installation "1.4.1 How to Attach/Remove Front Bezel" (INST 01-0140).)

(e) Remove all the Drives and I/O Cards(ENC) installed in the DBX to be replaced referring to each removal procedure of them.
Put the removed Drives in the box for temporary storage arranging them in the same Drive numbering order as they were installed in the array.

(f) Remove the frame from the rack. (Refer to Installation "2.4 Installing the Rackmount Model" (INST 02-0410).)

(g) Install the inners in a new frame. (Refer to Installation "2.2.2 (4) (a) Installing the Inners" (INST 02-0350).)

(h) Remove the rack rails from the rack and install new ones in the rack. (Refer to Installation "2.2.2 (4) Installing rack rails for Drive Box (4U)" (INST 02-0340).)

(i) Mount the new frame in the rack. (The weight of the frame whose each part has been removed is 31 kg.)
Refer to Installation "2.4 Installing the Rackmount Model" (INST 02-0410) in the Maintenance Manual for Installation.

(j) Install all the removed Drives and I/O Cards(ENC) in the same positions as before in the new chassis. (Refer to "2.2 Components Replacement" (REP 02-0050).)

(k) Take out the device nameplate in which the same model name as the removed chassis is described from the device nameplates attached to the new chassis. Write down the same serial number as the removed chassis in the device nameplate, and then affix the device nameplate to the new chassis.
When the device nameplate in which the same model name as the removed chassis is described is not attached, take out the device nameplate in which the same rating and producer country as the removed chassis are described and which the model name is not described. Write down the same model name and serial number as the removed chassis in the device nameplate, and then affix it to the new chassis.
To fill in the device nameplate, use the RoHS-compliant marker pen.

(l) Attach its cover to the DBX, and return the DBX into the rack. (Refer to Installation "1.4.1 How to Attach/Remove Front Bezel" (INST 01-0140).)

NOTE : Do not drop a screw and such in the array.
If you dropped it, immediately remove it.
If you leave it unattended, the parts will short out, and it will cause a fire or a failure.

(m) Install all the removed Power Units in the same positions as before in the new chassis. (Refer to "2.2 Components Replacement" (REP 02-0050).)

(n) Connect the cables on the rear side of the array, and install other parts.
  (i) Connect all the removed cable holders in the same positions as before in the new chassis. (Refer to "2.2 Components Replacement" (REP 02-0050).)
  (ii) Connect all the removed power cables in the same positions as before in the new chassis. (Refer to "2.2 Components Replacement" (REP 02-0050).)
  (iii) Install the cable routing bar. (Refer to Installation "2.4.8 Installing the Cables Routing Bars" (INST 02-0820).)
  (iv) If the cable tray is removed, attach it (Refer to Installation "2.4.14 (5) Attaching the cable tray" (INST 02-1380)).
  (v) Route the power cables and the SAS(ENC) cables, and attach the stopper. (Refer to Installation "2.4.14 Routing the Cables for DBX" (INST 02-1330).)

(o) Turn on the main switch (the array usually recovers in about 5 to 7 minutes for CBXSL/CBXSS, about 5 to 8 minutes for CBSL/CBSS, and about 5 to 10 minutes for CBL).

(p) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes for the CBL (80 to 180 minutes when the DBW is connected to the CBL)) or the WARNING LED (orange) may blink at high speed (for the maximum of 30 to 85 minutes) before the READY LED (green) on the front of the Controller Box lights up.

(q) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware "1.6 (4) Checking the start message and end message of the automatic download" (FIRM 01-1620).)

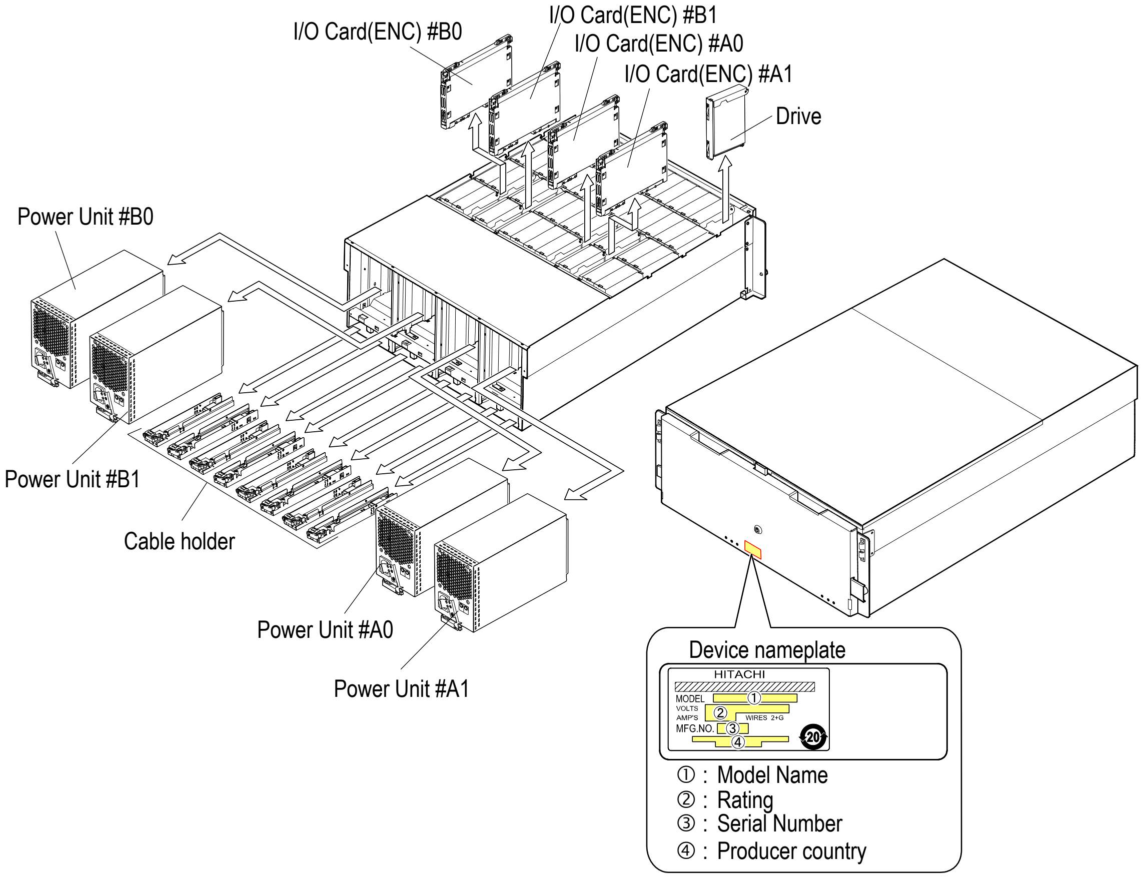


Figure 2.2.53 Replacing Drive Box (DBX)

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

(1-3) Replacing the DBW

Following the error collection item in the generated error message, verify that the required error information is collected.

If the required error information is not collected, collect it. (Refer to Message “Chapter 1 ③ Collecting Error Information” (MSG 01-0000).)

NOTE : When the power has already been turned off, make sure that the cache is not in the cache backup mode.
When the cache is in the cache backup mode, make the replacement after canceling the mode.

(a) Turn off the main switch on the Controller Box.
Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the C-PWR LED (green) on the Controller blinks, it may be that some of the Cache Memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.
If the Controller is removed from the array when the C-PWR LED (green) blinks, user data may be lost.

(b) Turn off the power switches on the two Power Units in the DBW.
(c) Pull the drawer out (Refer to Installation “1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door” (INST 01-0140).)
(d) Remove all the cables connected to the components (Power Unit, and I/O Module(ENC)).

NOTE : When the cable cannot be removed easily, do not pull it by force.
Pull out the Controller, Power Unit, and I/O Module(ENC) a little, and then remove the cable again.

(e) Remove the parts (Drives, Power Units, and I/O Modules(ENC)) referring to each removal procedure of them.
Refer to Installation “2.4. Installing the Rackmount Model” (INST 02-0410).
(f) Remove the frame and replace it with a new one. (The weight of the frame whose each part has been removed is 46 kg.)
Refer to Installation “2.4. Installing the Rackmount Model” (INST 02-0410).
(g) Install all the removed parts in the same positions as before in the new chassis. (Refer to “2.2 Components Replacement” (REP 02-0050).)
(h) Return all the removed cables as they were before.
(i) Turn on the power switches on the two Power Units in the DBW.
(j) Turn on the main switch on the Controller Box (the array usually recovers in about 5 to 10 minutes).

(k) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) may blink at high speed (for the maximum of 40 to 60 minutes (80 to 180 minutes when the DBW is connected to the CBL)) or the WARNING LED (orange) may blink at high speed (for the maximum of 30 to 85 minutes) before the READY LED (green) on the front of the Controller Box lights up.

(l) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware "1.6 (4) Checking the start message and end message of the automatic download" (FIRM 01-1620).)

(m) Take out the device nameplate in which the same model name as the removed chassis is described from the device nameplates attached to the new chassis. Write down the same serial number as the removed chassis in the device nameplate, and then affix the device nameplate to the new chassis.
When the device nameplate in which the same model name as the removed chassis is described is not attached, take out the device nameplate in which the same rating and producer country as the removed chassis are described and which the model name is not described. Write down the same model name and serial number as the removed chassis in the device nameplate, and then affix it to the new chassis.
To fill in the device nameplate, use the RoHS-compliant marker pen.

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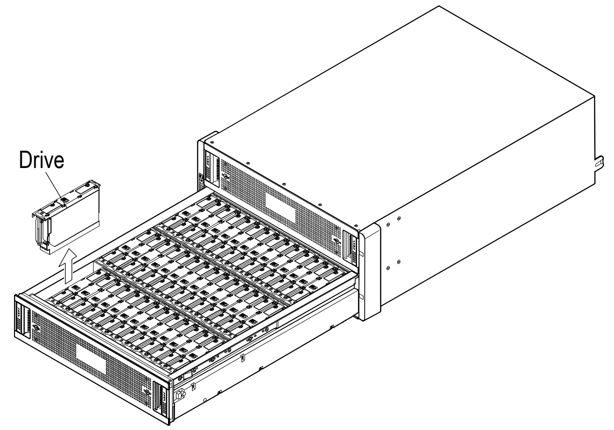
‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.



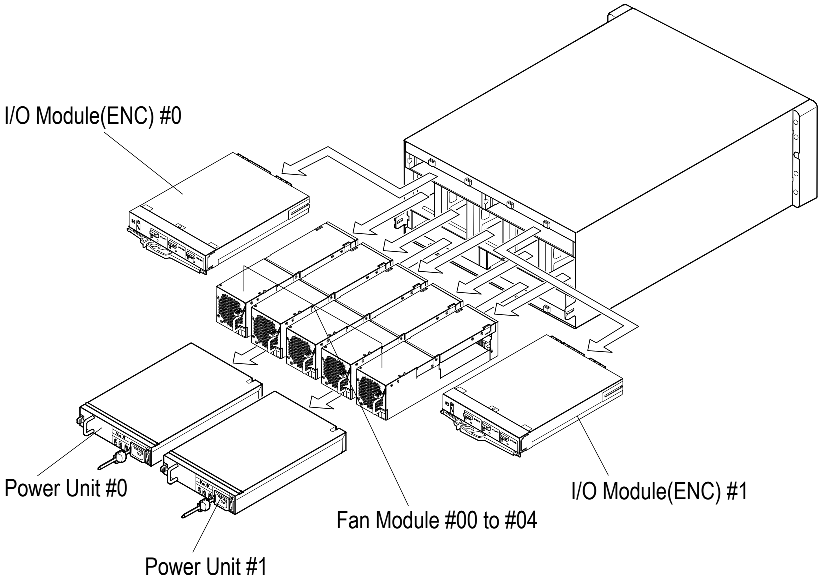


Figure 2.2.53.1 Replacing Drive Box (DBW)

2.2.15 Replacing a Front Bezel

⚠ CAUTION

Attach or remove the Front Bezel carefully following the procedure. Otherwise, you may hurt your fingers by pinching them.

NOTICE

- **To prevent part failures caused by static electrical charge built up on your own body, be sure to wear a wrist strap connected to the chassis before starting and do not take it off until you finish.**
- **The Front Bezels of the Controller Box and the Drive Box are different in design.**
- **The Front Bezels of the CBXSL/CBXSS/CBSL/CBSS and the CBL are different in size.**
- **When installing or removing the Front Bezel, try not to operate the main switch incorrectly with the hook or the ON/OFF button of the Front Bezel.**

(1) For CBXSL/CBXSS/CBSL/CBSS/DBL/DBS/DBF

A key is necessary to attach or remove a Front Bezel.

(a) Insert the key into the keyhole on the Front Bezel, and then release the lock of the Front Bezel (①).

(b) Pull the key toward you while holding the lower right portion of the Front Bezel, and then disengage the right side of the Front Bezel from the ball catch (②).

NOTE : When disengaging the Front Bezel, work with the opening angle between the Front Bezel and the array of up to 45 degrees.
Do not force the Front Bezel open too wide. Otherwise, a damage of Front Bezel may be caused.

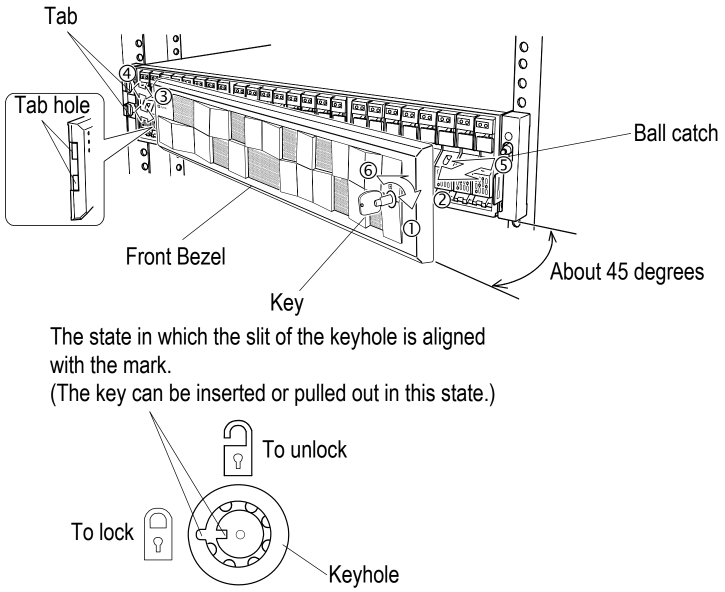
(c) Disengage the Front Bezel from the left tabs and then remove it (③).

(d) Hold the key and the bottom of a new Front Bezel with both hands.

(e) Insert the tabs on the left front side of the array into the tab holes on the new Front Bezel (④).

(f) Fix the Front Bezel by pressing the right side of the new Front Bezel to engage it with the ball catch on the front side of the array (⑤).

(g) Lock the installed Front Bezel with the key (⑥).

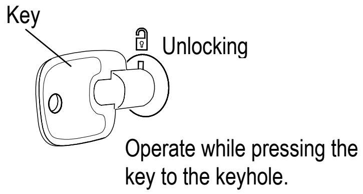


The state in which the slit of the keyhole is aligned with the mark.
(The key can be inserted or pulled out in this state.)

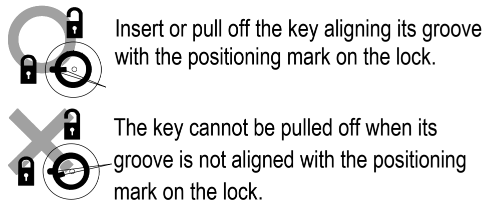
*1 : This figure shows the Front Bezel for the 2U Controller Box.

Figure 2.2.54 Procedure for Replacing Front Bezel (CBXSL/CBXSS/CBSL/CBSS/DBL/DBS)

NOTE :
- When inserting and turning the key, have it inserted completely. If it is turned when it is inserted half way, a damage of it may be caused.



Operate while pressing the key to the keyhole.



Insert or pull off the key aligning its groove with the positioning mark on the lock.

The key cannot be pulled off when its groove is not aligned with the positioning mark on the lock.

- When removing the key after locking up the Front Bezel, pull it off aligning its groove with the positioning mark on the lock.
  When the key is pulled off in the state where its groove is not aligned with the positioning mark on the lock, a damage of the lock may be caused.

(2) For CBL

A key is necessary to attach or remove a Front Bezel.

(a) Insert the key into the hole on the Front Bezel, and then release the lock of the Front Bezel (①).

(b) Pull the key toward you while holding the lower right portion of the Front Bezel, and then disengage the right side of the Front Bezel from the ball catches (②).

NOTE : When disengaging the Front Bezel, work with the opening angle between the Front Bezel and the array of up to 45 degrees.
Do not force the Front Bezel open too wide. Otherwise, a damage of Front Bezel may be caused.

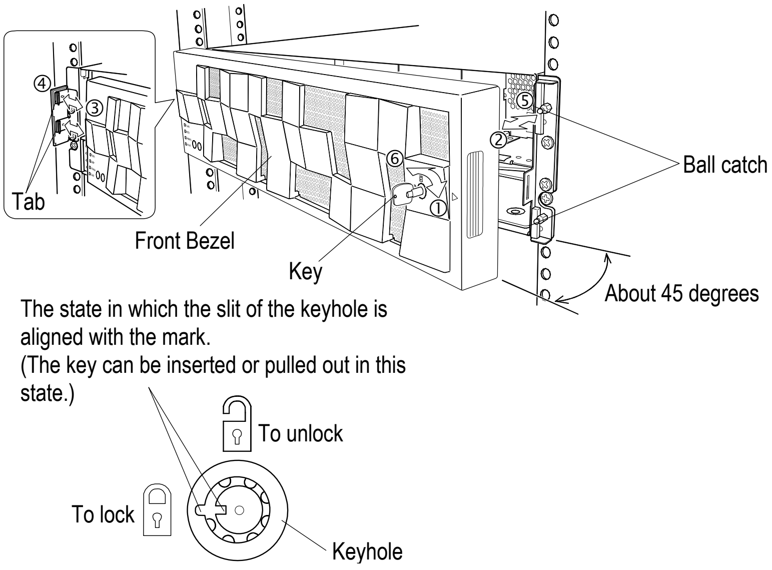
(c) Disengage the Front Bezel from the left tabs and then remove it (③).

(d) Hold the key and the bottom of a new Front Bezel with both hands.

(e) Insert the tabs on the left front side of the array into the tab holes on the new Front Bezel (④).

(f) Fix the Front Bezel by pressing the right side of the new Front Bezel to engage it with the ball catches on the front side of the array (⑤).

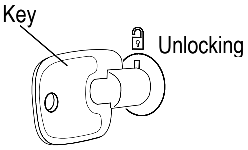
(g) Lock the installed Front Bezel with the key (⑥).



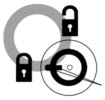
The state in which the slit of the keyhole is aligned with the mark.
(The key can be inserted or pulled out in this state.)

Figure 2.2.55 Procedure for Replacing Front Bezel (CBL)

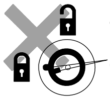
NOTE : • When inserting and turning the key, have it inserted completely. If it is turned when it is inserted half way, a damage of it may be caused.



Operate while pressing the key to the keyhole.



Insert or pull off the key aligning its groove with the positioning mark on the lock.



The key cannot be pulled off when its groove is not aligned with the positioning mark on the lock.

- When removing the key after locking up the Front Bezel, pull it off aligning its groove with the positioning mark on the lock.
  When the key is pulled off in the state where its groove is not aligned with the positioning mark on the lock, a damage of the lock may be caused.

(3) For DBX

(a) Pull the Front Bezel toward you holding its sides and disengage it from the ball catches to remove the Front Bezel.

(b) Disengage its two hooks by shifting the Front Bezel upward and then remove the Front Bezel.

(c) Hold the side of new Front Bezel with both hands.

(d) After making the hooks of the new Front Bezel engaged, press the Front Bezel against the main body until it is stopped.

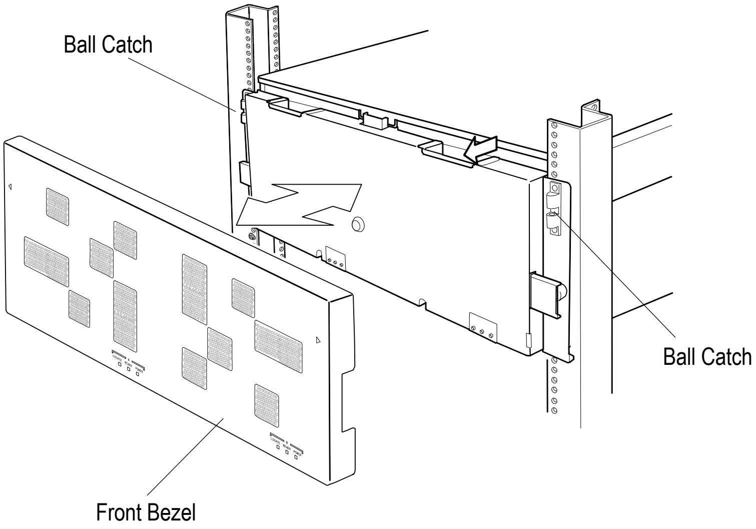


Figure 2.2.56 Procedure for Replacing Front Bezel (DBX)

2.2.16 Replacing a Side Card

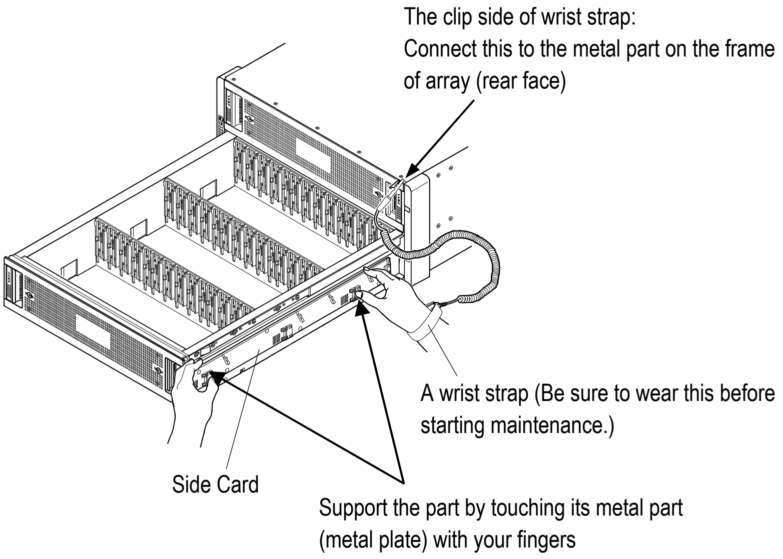
This work is only for DBW.

NOTICE

- **To prevent part failures caused by static electrical charge built up on your own body, be sure to wear a wrist strap connected to the chassis before starting and do not take it off until you finish.**
- **Be sure to wear a wrist strap connected to the chassis whenever you unpack parts from a case. Otherwise, the static electrical charge on your body may damage the parts.**
- **When you install a Drive, I/O Module(ENC) or I/O Card(ENC), support its metal part with your hand that has the wrist strap. You can discharge static electricity by touching the metal plate.**

A failure may be caused by the electric shock since the Side Card is a precision instrument. Be sure to put on the wrist strap before starting work in order to protect Side card from electrostatic discharge.

NOTE : Before unpacking and replacing maintenance components, be sure to wear a wrist strap and connect to ground the grounding clip in the opposite end of the wrist strap to the chassis frame (metal part).
When you insert a Side Card into the array, support the Side Card as touching its metal part with fingers of your hand that wears a wrist strap.


The clip side of wrist strap:
Connect this to the metal part on the frame of array (rear face)
A wrist strap (Be sure to wear this before starting maintenance.)
Side Card
Support the part by touching its metal part (metal plate) with your fingers

Select a procedure from the following and execute it.

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on (hot replacement)	Not applicable	—
2	Replacement with the power turned off7	1. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Controller Box is blinking at high speed because the automatic download of the ENC firmware and the backup controller firmware is being executed. Make the replacement after the READY LED lights on. 2. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Controller Box is blinking at high speed because the update of the flash program or the automatic download of the ENC firmware and the backup controller firmware at the time of turning the power on in the single controller configuration is being executed. Perform the preventive replacement work after checking that the WARNING LED (orange) on the front of the Controller Box goes out at the maximum of 30 to 85 minutes later and the READY LED (green) lights up.	Refer to "(1) Procedure for replacement with the power turned off" (REP 02-2050)

(1) Procedure for replacement with the power turned off

Replace a Side Card referring to Figure 2.2.57 to Figure 2.2.59.

(a) Turn off the main switch on the Controller Box.

Make sure that the POWER LED on the Front Bezel changes from green to orange. It takes about 10 minutes at the maximum before the POWER LED turns orange. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the C-PWR LED (green) on the Controller blinks, it may be that some of the Cache Memory data has not been written into the Drive. Wait until the C-PWR LED (green) goes off.

If the Controller is removed from the array when the C-PWR LED (green) blinks, user data may be lost.

(b) Turn off the power switches on the two Power Units in the DBW.

(c) Remove the Side Card to be replaced.

(i) Open the drawer in which the Side Card to be replaced is installed (Refer to Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door" (INST 01-0140).)

(ii) Loosen the five screws on the Side Card to be replaced, and then remove the Side Card cover.

(iii) Remove the three power connectors on the Side Card to be replaced from the socket.
Pinch the latch on the power connector (①), and slide it out of the socket to remove it (②).

(iv) Pull the removed power cables away from the cable clips.

(v) Pull the Side Card toward you holding the power socket to remove it.

NOTE :
- The connection terminals are at three places. Pull each of them little by little not to pull it at a time and remove them slowly. Otherwise, the connection terminals may be damaged.
- Be careful not to drop the Side Card because the Side Card is with the ENC cables connected.

(vi) Remove the two ENC connectors on the Side Card to be replaced from the socket.
Push connector forward against its stops in the socket (①).
Push the connector part to release the latch (②) and then slide it (③) to remove it.

(vii) Remove the five cable clips from the Side Card that was removed.
Pinch the projection of the cable clip from the back side of the Side Card, and pull the cable clip while pushing it out toward the outside, and then remove it.

(d) Install a new Side Card.

(i) Install the five cable clips that were removed to the new Side Card.
Insert the cable clip in the mounting hole so as to be in the state before removing it.

(ii) Remove the cover in the ENC socket of the new Side Card.

(iii) Connect the connection terminals of the new Side Card to the array.

NOTE : The connection terminal is located on the side of the power connector.
Ensure that the connection terminal is securely installed by pressing its back side.

(iv) Connect the two ENC connectors to the sockets.
Slide the connector to the socket to connect it.

NOTE :
- The upper side and lower side of ENC connector differ in form. Be careful not to insert it incorrectly.
- Ensure that the ENC connector is securely connected to the socket and the latch locks into place.

(v) Insert the three power connectors into the socket.

NOTE : Ensure that the power connector is securely connected to the socket and the latch locks into place.

(vi) Fix the power cables by securing them with cable clips to keep cables from sagging.
(vii) Install the Side Card cover with five screws to fix the Side Card.
(viii) Close the drawer (Refer to Installation “1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door” (INST 01-0140).)

(e) Turn on the power switches on the two Power Units in the DBW.

(f) Turn on the main switch on the Controller Box (the array usually recovers in about 5 to 10 minutes).
Make sure that the ALM LED (orange) on the I/O Module(ENC) does not light up.

(g) Check that the READY LED (green) on the front of the Controller Box lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) may blink at high speed (for the maximum of 40 to 60 minutes (80 to 180 minutes when the DBW is connected to the CBL)) or the WARNING LED (orange) may blink at high speed (for the maximum of 30 to 85 minutes) before the READY LED (green) on the front of the Controller Box lights up.

(h) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Drive is new, the start message and completion message of the drive firmware automatic download are not displayed. When the message indicating the abnormal termination is displayed, perform the maintenance according the recovery method in the message code. (Refer to Firmware “1.6 (4) Checking the start message and end message of the automatic download” (FIRM 01-1620).)

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‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the array is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Controller Box lights up, and if the array is not in the Warning status, the WARNING LED (orange) goes out.

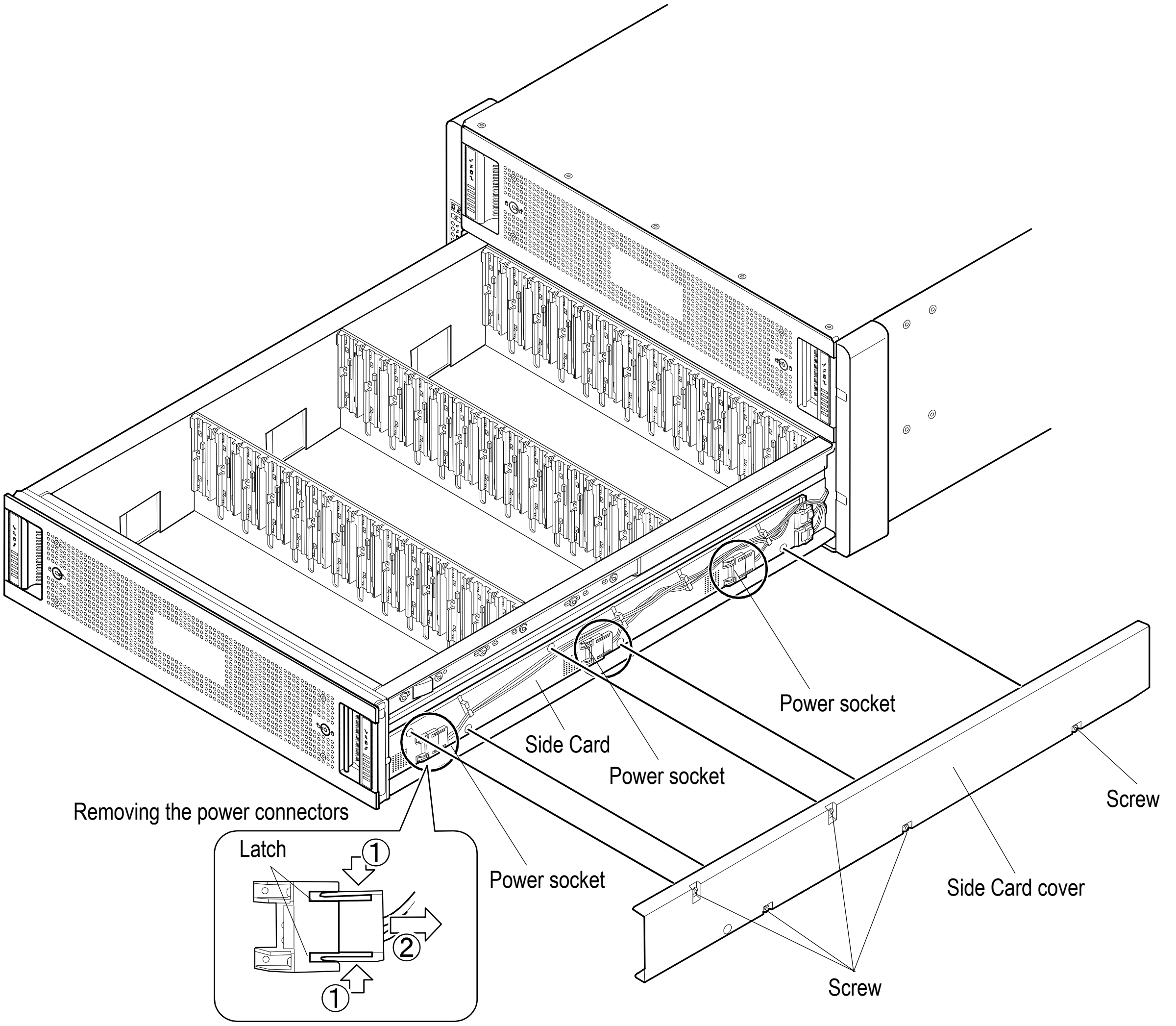


Figure 2.2.57 Removing Side Card Cover and Power Connectors

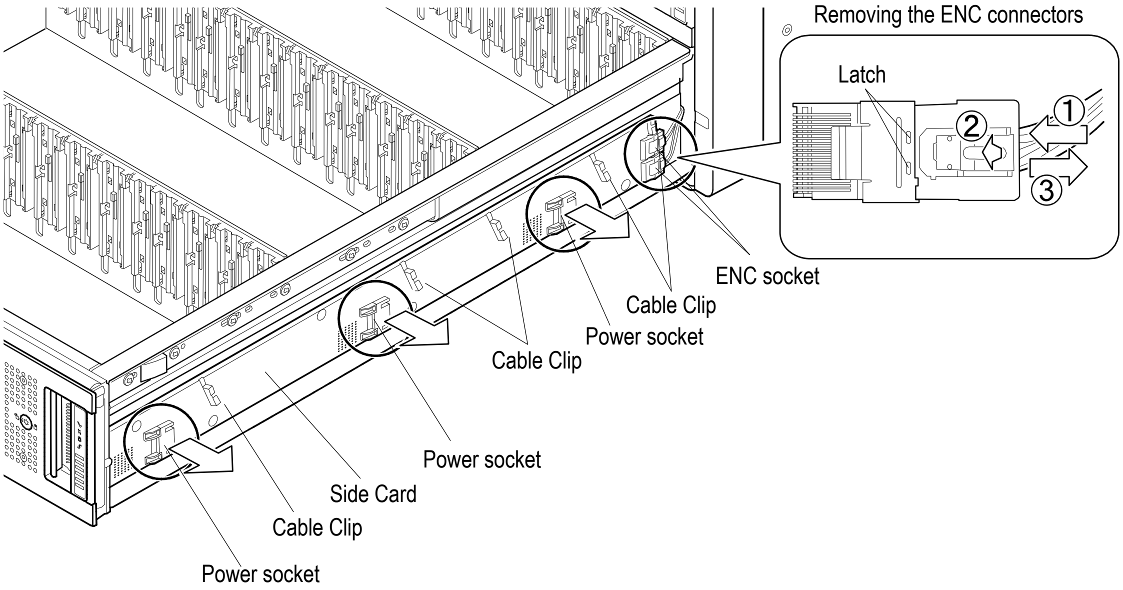


Figure 2.2.58 Removing Side Card and ENC Connectors

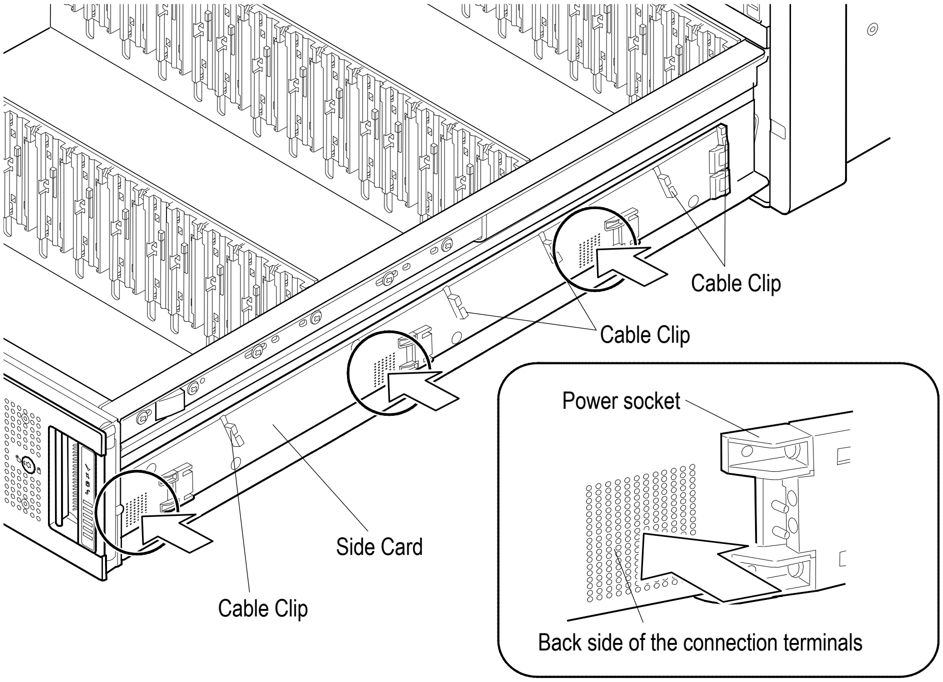


Figure 2.2.59 Installing Side Card

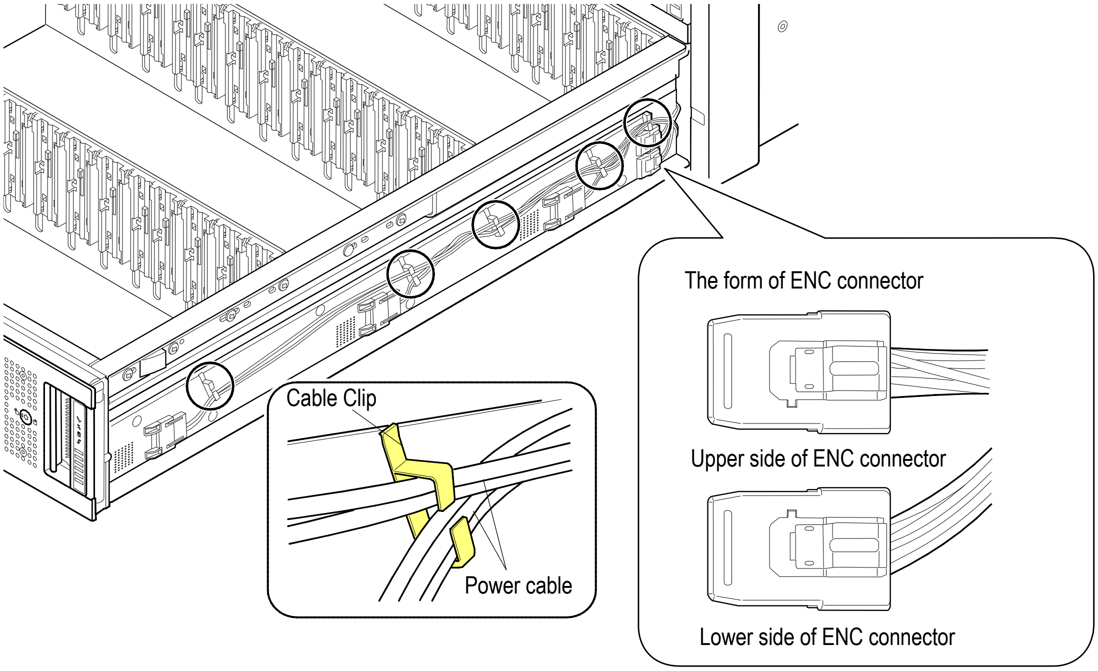

Cable Clip
Power cable
The form of ENC connector
Upper side of ENC connector
Lower side of ENC connector

Figure 2.2.60 Form of ENC Connector and Fixing Power Cables

Chapter 3. Periodic Maintenance

This chapter contains information on items of periodical maintenance which is performed to prevent failures of the array from occurring and to maintain operation performance.

3.1 Periodic Maintenance Items

Table 3.1.1 shows periodical maintenance items of the array. Inspect and clean the array regularly according to the operation environment.

Table 3.1.1 Periodic Maintenance Items

No.	Item			Interval (*1)	Inspection item for each model	Standard time required(*2)
					Rackmount Model	
					Rackmount Model (RK40)	
1	Inspection	Inspecting Fans	Fan Module	Y1	"3.2.1 Inspecting Fans" (REP 03-0010)	5 min
			Power Unit			
2	Cleaning	Cleaning	Front bezel	Y1	"3.2.2 Cleaning" (REP 03-0020)	5 min
			Rear door	Y1	"3.2.2 Cleaning" (REP 03-0020)	5 min
3	Replacement of periodical replacement part		Battery	Y5	"3.3.1 Replacing Battery" (REP 03-0040)	10 min
			Air Filter	Y1	"3.3.2 Replacing the Air Filter of the Front Bezel" (REP 03-0050)	5 min

*1 : The maintenance intervals were set on the assumption that the average operation hours of the array is 400 hours/month. Therefore, in the following cases, consult the customer to decide whether to change the intervals or not taking the actual operation hours in consideration. (Refer to Table 3.1.2.)

*2 : The work hours change by the case of inspecting one Controller Box only and the number of Drive Boxes.

Table 3.1.2 Change of Maintenance Interval

Object item	Factors requiring change of maintenance interval		Remarks
	Case of shortening the interval	Case of lengthening the interval	
• Inspection of fans • Cleaning	• Operation hours are long. • Installation environment is bad. • To fit the interval for user's operation schedule. • To improve service for user • Necessity to shorten the interval is recognized for other reason.	• Operation hours are short. • Installation environment is excellent.	Also examine items to be added to the factors shown on the left such as the frequency of the array failure occurrence and items common to the array and a connected system.
Periodic replacement of battery	• Environmental temperature is high. (Ambient temperature of the array exceeds 30°C in average.) • Many times power failure occurs. • Keeping array with power-off for more than six months.	-	-

3.2 Inspecting and Cleaning Rackmount Model with RK40 Rack Frame

3.2.1 Inspecting Fans

There are a fan built into the Power Unit and a fan of Fan Module.
A Fan Module is only installed in the CBL.
Inspect the fans in the status where the array power is turned on.

⚠ **CAUTION**

Since each fan is rotating with high-speed, be careful not to be caught by it.

(1) Open the rear door. (Refer to Figure 3.2.1.)
  (a) Insert the key to the keyhole on the rear door, and turn the key to the left to open lock (①).
  (b) Push the upper part of the lever, and raise the lower part of the lever toward (②,③).
  (c) Turn the lever to the left, and pull the lever toward, and then open the rear door (④).
(2) Make sure that the fans are rotating.
  Make sure that the fans of the Power Unit in the rear of the mounted unit are rotating.
  In the case of the CBL, make sure that the fans of the Fan Module in the front of the mounted unit are rotating.
(3) Close the rear door.
  (a) Close the rear door, and push and turn the lever to the right (⑤).
  (b) Push down the lever, and push the lower part of the lever (⑥).
  (c) Insert the key to the keyhole on the rear door, and turn the key to the right to lock (⑦).

3.2.2 Cleaning

To clear the array, check whether or not air vents are clogged by dust. If they are clogged, remove the dust with a vacuum cleaner or wipe the dust out from it with a dry cloth.

⚠ CAUTION

- **Be sure to keep the Front Bezel and rear panel clean.**
  Or else, the ventilation is deteriorated so that the temperature inside the array may rise causing a failure or even a fire.
- **Be careful not to move the array during cleaning.**

⚠ CAUTION

If you touch a live part, it is feared that you receive an electric shock.

(1) Clean the outside of the Front Bezel.
(2) Insert the key in the Front Bezel and turn it in the direction shown by the arrow ① (⟶) to unlatch the bezel.

⚠ CAUTION

Attach or remove the Front Bezel carefully following the procedure. Otherwise, you may hurt your fingers by pinching them.

(3) Remove the Front Bezel. (Refer to Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door" (INST 01-0140.)
(4) Clean the internal surfaces of the Front Bezel.
(5) Attach the Front Bezel.
(6) Turn the key in the direction shown by the allow ② (⟵) to latch the Front Bezel.
(7) Clean the external surfaces of the rear door.
(8) Open the rear door.
   (a) Insert the key to the keyhole on the rear door, and turn the key to the left to open lock (①).
   (b) Push the upper part of the lever, and raise the lower part of the lever toward (②,③).
   (c) Turn the lever to the left, and pull the lever toward, and then open the rear door (④).
(9) Clean the internal surfaces of the rear door.
(10) Close the rear door.
   (a) Close the rear door, and push and turn the lever to the right (⑤).
   (b) Push down the lever, and push the lower part of the lever (⑥).
   (c) Insert the key to the keyhole on the rear door, and turn the key to the right to lock (⑦).

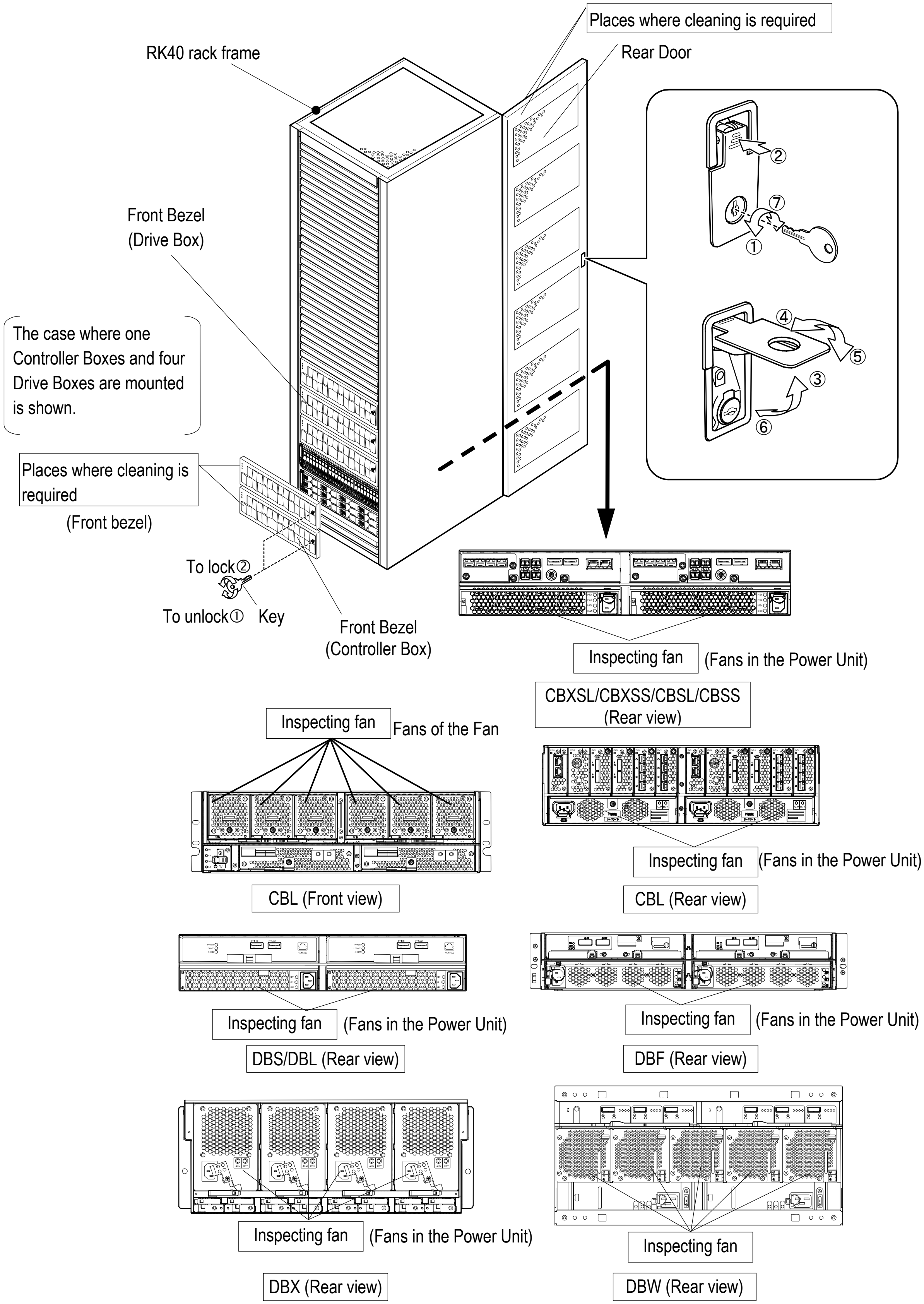


Figure 3.2.1 Inspecting and Cleaning Rackmount Model with RK40 Rack Frame

3.3 Replacing Periodical Replacement Parts

- In the array, a Battery, which is a part with limited life, is used and it must be replaced periodically.
  The procedure for replacing a Battery is to replace a Cache Backup Battery installed in the Power Unit for CBXSL/CBXSS/CBSL/CBSS, a Cache Backup Battery for CBL.
  The battery has a usable period. Confirm the time limit and do not use the battery which passed the time limit.
  At the same time, two Cache Backup Batteries for CBSL/CBSS/CBXSL/CBXSS cannot be replaced with the array power on (Ready status).
  When replacing two Cache Backup Batteries for CBL, it can be performed during the operation (being used for the customer's business), but the Cache becomes the write through mode and the R/W performance is slightly deteriorated.

3.3.1 Replacing Battery

⚠ CAUTION

- **Do not disassemble the battery, or a burn or electric shock may be caused.**
- **If a battery is handled wrongly, it is feared that an explosion is caused.**

NOTICE

- **When a device is kept with power-off for more than six months, the battery may be excessively discharged, and it may cause an unrecoverable damage.**
  In such a storing condition, the battery must be charged once every six months for more than three hours.

(1) For the procedure for replacing a Cache Backup Battery, refer to "2.2.2 Replacing a Cache Backup Battery" (REP 02-0430).

(2) For disposing and keeping the used battery, refer to "Chapter 5. Recycling" (REP 05-0000).

3.3.2 Replacing the Air Filter of the Front Bezel

The following work is for the CBLD whose the Front Bezel type name is DF-F850-FBCBLD and for the DBLD/DBSD whose the Front Bezel type name is DF-F850-FBDBD/DF-F850-FBDBBD.

(1) Remove the Front Bezel. (Refer to Installation "1.4.1 How to Attach/Remove Front Bezel" (INST 01-0140).)

(2) Replace the Air Filter.

(2-1) In the case of CBLD

(a) Remove the stopper fixing the Air Filter from the cut parts (seven places) of the Front Bezel and remove the Air Filter.

(b) Set a new Air Filter on the reverse side of the Front Bezel so that the lock latch and the main switch of the Front Bezel can be seen.

(c) Set the stopper in the cut parts (seven places) of the Front Bezel and fix the Air Filter.

NOTE : Check the cut part positions by pushing the set Air Filter lightly and fix it by the stopper.

(2-1) In the case of DBLD/DBSD

(a) Remove the Air Filter from the reverse side of the Front Bezel.

NOTE : The Air Filter is fixed by hanging on the hooks (four places) on the reverse side of the Front Bezel. Remove the Air Filter without extra force.

(b) Set the new Air Filter on the reverse side of the Front Bezel so that the location label can be seen.

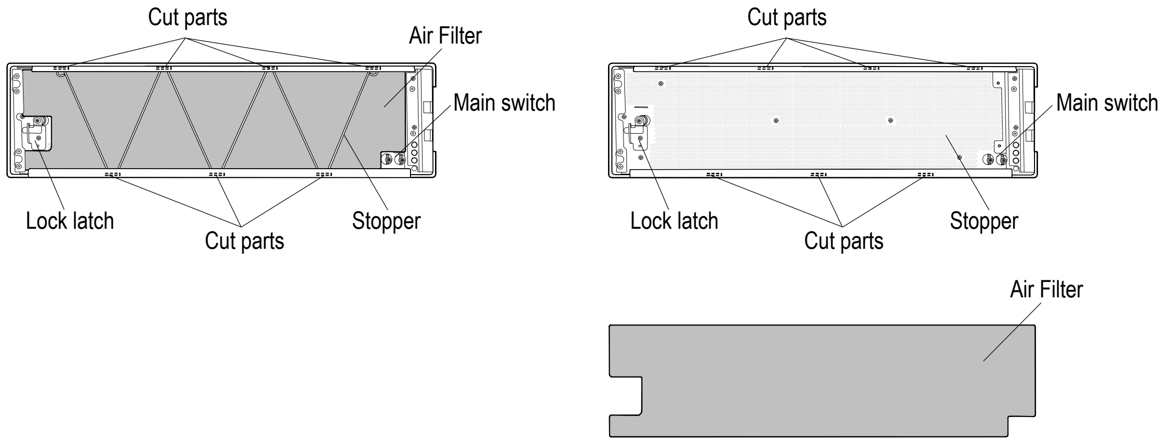
(c) Hang the new Air Filter on the hooks and fix it.

NOTE : The Air Filer is fixed by pushing the set air filter lightly to make the hooks (four places) on the reverse side of the Front Bezel can be seen.

(3) Attach the Front Bezel. (Refer to Installation "1.4.1 How to Attach/Remove Front Bezel" (INST 01-0140).)

(4) Using the Hitachi Storage Navigator Modular 2, set the Air Filter information. (Refer to System Parameter "Chapter 17. Setting Air Filter Information" (SYSPR 17-0000).)

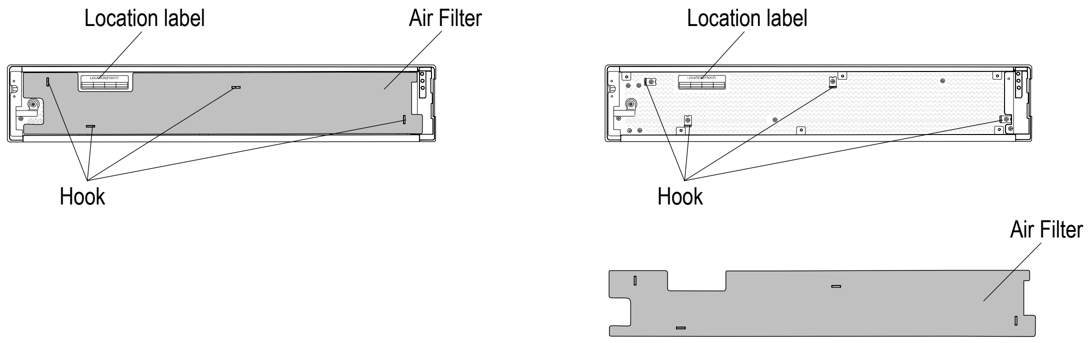
(a) Back Side of Front Bezel for the CBLD



[Air Filter is set in]

[Air Filter is removed]

(b) Back Side of Front Bezel for the DBLD/DBSD



[Air Filter is set in]

[Air Filter is removed]

Figure 3.3.1 Replacing a Air Filer

Chapter 4. Maintenance Tools

4.1 Maintenance Tools for Hardware

Names and usages of maintenance tools to be used for installation and maintenance are shown below.

No.	Tool name	Specification	Usage
1	Phillips screwdriver	No.2	General use
2	Allen wrench	No.4	For fastening of power cable.
3	Spanner	No.22	For adjusting leveling bolt (of RK40 rack frame)
4	Wrist strap	–	For discharge static electricity
5	RoHS-compliant marker pen	–	To write in the cable label/device nameplate
6	Allen wrench	No.2	For replacing the Side Card of the DBW.

4.2 Maintenance Tools for Software

Maintenance tool consists of Hitachi Storage Navigator Modular 2 or Array's built-in Web, trace analysis tool (TDCONV), and back-end diagnostic tool.

The following describes the outline of each maintenance tool.

(1) Hitachi Storage Navigator Modular 2
Hitachi Storage Navigator Modular 2 is operated on the terminal device (RC and WEB etc) connected through a LAN with Array unit. This program enables you to perform the operation for Array unit such as referencing the state of Array unit and setting a configuration.
For details, refer to "Hitachi Storage Navigator Modular 2 (for GUI) User's Guide".

(2) Array's built-in WEB
By having WEB function in Array unit, you can access the Array unit from the terminal device connected through a LAN using a WEB browser. Array's built-in WEB enables you to perform the maintenance operations such as confirming a failure status of the array, referencing an error message, installing the firmware, and collecting failure information.
For details, refer to "Maintenance manual for WEB".

Connection of maintenance tools for software is shown in Figure 4.2.1.

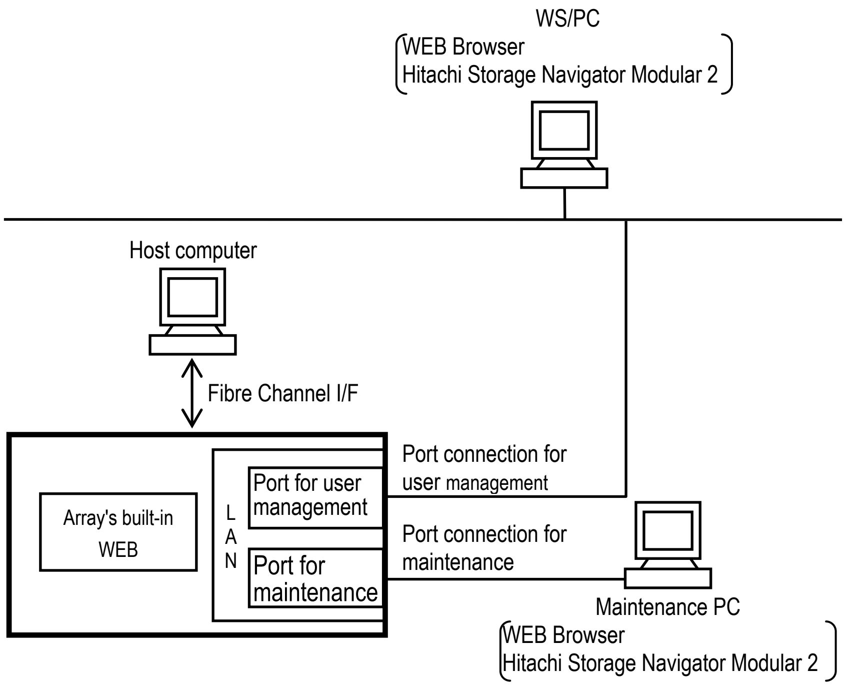


Figure 4.2.1 Connection of Maintenance Tool for Software

Chapter 5. Recycling

(1) Parts to be recycled
The battery used in the array is a sealed Nickel-hydride rechargeable battery and Lithium ion battery.
The lead battery is a valuable resource which can be recycled.
When you replace it or dispose of a used array, please cooperate in the recycling.
How to dispose of the battery or Cache Backup Battery which becomes useless owing to replacement etc. is shown below.

⚠ DANGER

- **Do not disassemble the case, do not modify it, or do not peel off the label. There are high voltage parts inside: If you attempt any of these actions, you may get an electrical shock or burn.**
- **Do not disassemble the battery; this may cause short circuits inside or outside of the battery. If the components are exposed to the air, the battery may cause overheat, burst or ignite. Disassembling the battery may expose you to its alkaline solution, which can be dangerous.**
- **Do not cut the output cable. Do not modify the connector. If you attempt any of these actions, you may get an electrical shock or burn. A short-circuit may cause abnormal chemical reactions inside the battery which leads to overheating, bursting or ignition.**
- **Follow the instructions when you recharge the battery pack. If you recharge it in a way different from specified here, it may cause the following problems: The battery may become charged excessively; excessive current may be produced; or the battery cannot be recharged. As a result, the battery may leak, become overheated, burst, or ignite.**
- **Do not use excessive force when you connect the battery pack to the charger or other devices. If you cannot connect it easily, check the positive and negative are correct for the connector. If you connect the battery in reverse, it will be charged incorrectly and abnormal chemical reactions may occur inside. As a result, the battery may become overheated, burst or ignite.**
- **Do not connect the battery to a power receptacle. If you apply an excessive amount of voltage to the battery, it may produce excessive current making the battery overheat, burst or ignite.**
- **Do not use or leave the battery where the temperature can become high, such as, near a fire or a heating element. High temperatures may damage the battery's separator, which may cause short circuit, making it overheat, burst or ignite.**
- **Do not incinerate the battery pack or heat it. If you do so, the insulator may melt, the safety fuse/mechanism may be damaged, or the electrolyte may gush out. As a result, the battery may become burst, explode or ignite.**

⚠ DANGER

- Do not connect the negative terminal to the positive with metal wire. Do not carry or store the battery with other metal parts. This may cause a short circuit or produce excessive current which can cause the battery to leak, overheat, burst or ignite.
- Do not let the battery become wet by soaking it in the water or seawater. If the battery gets wet, a short circuit may occur and an excessive amount of current may be produced causing abnormal chemical reactions inside. As a result, the battery may become overheated, burst or ignite.
- Do not nail the battery, hit it with a hammer, or stamp on it. The battery may be broken or dented and a short circuit may occur inside. As a result, the battery may become overheated, burst or ignite.
- Do not solder directly to the battery. If you do so, heat will melt the insulator and damage the safety fuse/mechanism. As a result, the battery may leak or may become overheated, burst or ignite.
- Do not recharge the battery where there is a high temperature, such as near a fire.
  This may cause abnormal chemical reactions inside the battery and it may become overheated, burst or ignite. High temperatures may also cause deterioration of performance/life of the battery.

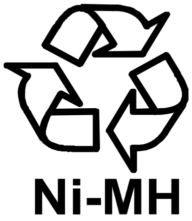
⚠ WARNING

- Do not place the battery pack in the microwave oven or under high pressure. Either of these actions will rapidly heat the battery or break its seals: As a result, the battery may become overheated, burst or ignite.
- If you find anything strange or unusual with the battery when you use/carry/store it, remove the battery from the device and stop using it. For example, strange smells, strange colors, or deformation are a sign you must stop using the battery.
- If it takes longer than the specified time to complete recharging, stop recharging the battery: Otherwise, the battery may become overheated, burst or ignite.
- If the battery leaks and gets into your eyes, immediately flush your eyes with clean water (tap water) and do not rub your eye. Then visit the doctor immediately. If you do not seek any treatment for your eyes, problems may occur later. Because the battery uses highly concentrated alkaline as electrolyte, it may burn or you may lose your sight if it contacts your skin or eyes. If the battery’s liquid contacts your skin or eyes, you must flush them with plenty of clean water and visit the doctor at once.

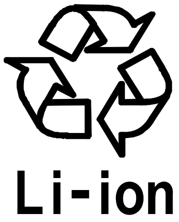
(2) Display of recycling mark

The following three-arrow recycling mark shows that the sealed Nickel-hydride rechargeable battery and Lithium ion battery are a part to be recycled. A label bearing the mark is affixed on the battery and Flash Drive (FMD).

Nickel-hydride rechargeable battery



Lithium ion battery



(3) Specifications of lead battery

Table 5.1 Specifications of Sealed Nickel-hydride Rechargeable Battery

No.	Specification	Cache Backup Battery (CBXSL/CBXSS/CBSL/CBSS)	Cache Backup Battery (CBL)
1	Manufacturer	Matsushita Battery Industrial Co., Ltd.	
2	Model	HHR-33AH7W1	HHR-33AH14W1
3	Voltage (V)	10.8	10.8
4	Capacity (mAh)	3200	6400

(4) Specifications of Lithium ion battery

Table 5.1.1 Specifications of Lithium ion battery

No.	Specification	Flash Drive (FMD)
1	Manufacturer	FMD (Hitachi, Ltd.) / Battery (Hitachi Information & Telecommunication Engineering, Ltd.)
2	Model	DKC-F170I-1R6FM
3	Voltage (V)	11.1
4	Capacity (mAh)	2500

(5) Disposal and safety in storage

Before storing a sealed Nickel-hydride rechargeable battery and Lithium ion battery (Flash Drive (FMD)), cover its terminals with electric tape, etc. to prevent a short circuit. Store it separately from batteries of other type such as dry battery.

(6) Method of storage

Table 5.2 Storage Method

No.	Item	Requirement
1	Storage method	Store a Cache Backup Battery and Flash Drive (FMD) being packed in the following conditions. • Do not apply it any unusual vibration or shock. • Do not put it on its side. • In the case of the Cache Backup Battery, keep it in a place where the temperature is at 25 °C or less in average. • In the case of the Flash Drive, keep it in a place where the temperature of -10 to 35 degrees Celsius.
2	Allowable storage term	The expiration date of the storage able term is a date indicated on the usable term label.
3	Stock management(*1)	Manage stored batteries or Cache Backup Battery in the way of FIFO. Since a label for entering the usable time limit is affixed on each package, please utilize it.

*1 : When replacing the Cache Backup Battery and Flash Drive (FMD), check the usable time limit of it following “(7) Checking usable term of maintenance part” (REP 05-0030).

(7) Checking usable term of maintenance part

If the battery is left uncharged for longer than six months (Flash Drive(FMD) is one year), it will discharge excessively and becomes unable to be fully recharged. Therefore, when the battery and Flash Drive (FMD) are stored as a maintenance part, it must be stored on charge under the following condition.

In the case of the Cache Backup Battery and Flash Drive (FMD), it is necessary to use it within one year. (Concerning the batteries and Flash Drive (FMD) mounted on the array, since they are charged while the array power is on, no problem will occur.)

Table 5.3 Term of Maintenance Part

No.	Items	Conditions	
		Cache Backup Battery	Flash Drive (FMD)
1	Period of Long-term storage	One year	One year
2	Storage temperature	25 °C or less in average	Temperature of -10 to 35 degrees Celsius.
3	Supplemental charge interval	Once per six months	Once per one year

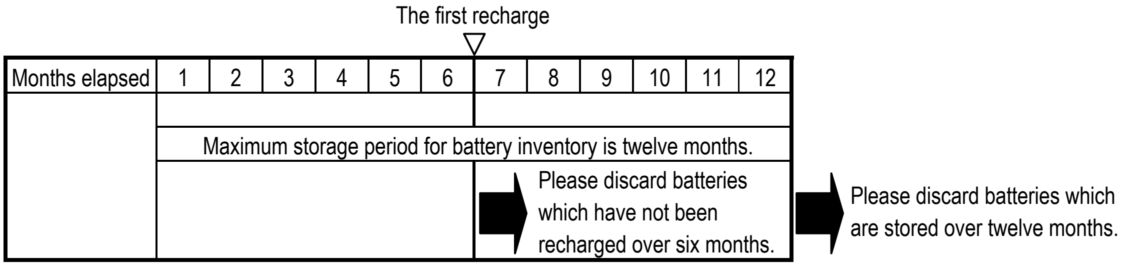
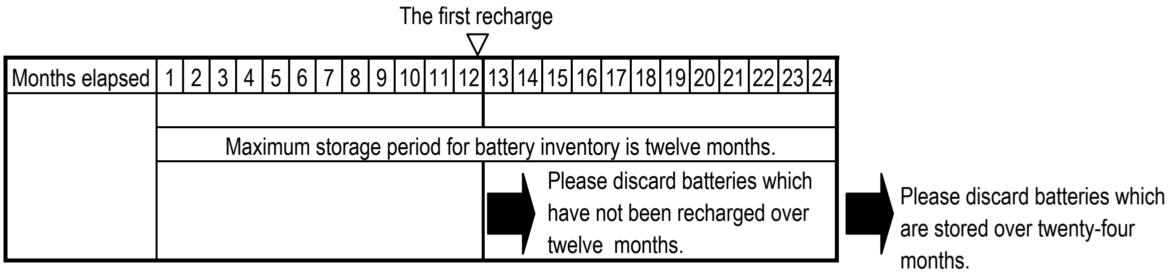

The first recharge
Months elapsed
1
2
3
4
5
6
7
8
9
10
11
12
Maximum storage period for battery inventory is twelve months.
Please discard batteries which have not been recharged over six months.
Please discard batteries which are stored over twelve months.

Figure 5.1 The Chart for Recharging (Cache Backup Battery)



Maximum storage period for battery inventory is twelve months.

Please discard batteries which have not been recharged over twelve months.

Please discard batteries which are stored over twenty-four months.

Figure 5.2 The Chart for Recharging (Flash Drive (FMD))