Replacement

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

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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 DF800 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 subsystem.
Take notice of the following when performing a maintenance work for the subsystem. 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.

(2) Perform the powering on/off work correctly.
Perform the powering on/off operation following the procedure specified for each part replacement work. It is feared that user data is lost if the powering on/off operation is not done following the procedure correctly.
The power supplying condition applicable to the parts replacement varies depending on the part to be replaced. The powering on/off procedure also varies depending on the power supplying condition.
Since the power supply to the subsystem is duplicated, when turning on/off the power, remove the power cables from two Power Units per chassis.

⚠ CAUTION

- **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 supply, do it in haste after preparing a replacement power supply and arranging cables, etc. so that they do not disturb the replacement.**

⚠ CAUTION

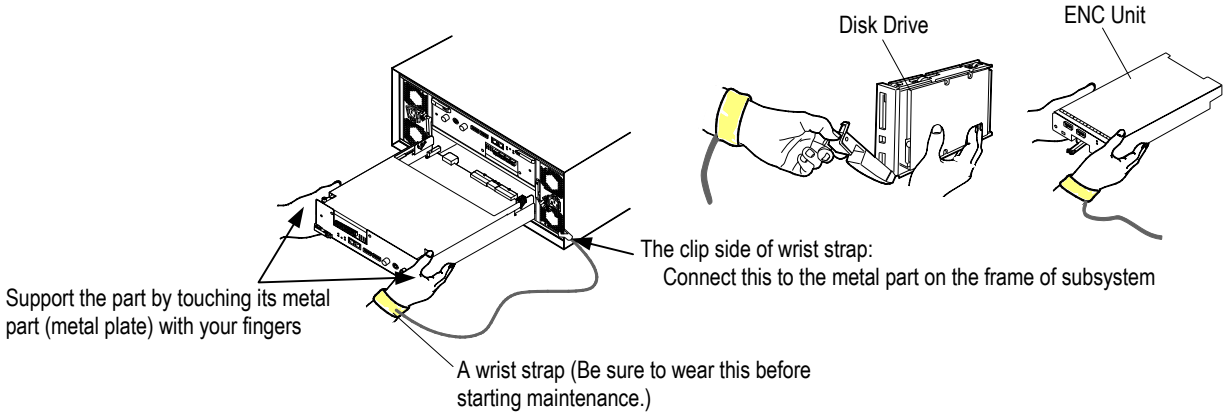
- **When doing a hot replacement of a part, do not wear metallic accessories or a watch so as to avoid an electric shock. Be careful not to touch any of live parts with a screwdriver, etc.**

(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 Disk Drive, Control Unit and ENC Unit is precision instrument. Be sure to put on the wrist strap before starting work in order to protect Disk Drive, Control Unit and ENC Unit from electrostatic discharge.

CAUTION

- **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 are Disk Drive, Control Unit and ENC Unit, support its metal part with your hand that has the wrist strap. You can discharge static electricity by touching the metal plate.**



(4) Notes on cable routing

(a) Handling of cables placed on the installation floor

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

(b) Handling of under floor cables when the subsystem 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 FC (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 subsystem, 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 subsystem 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 subsystem.

- When Power Saving of the priced option is used, if you restart the subsystem after executing the spin-down and before completing it, the spin-down may fail because of the recognition processing of the host immediately after the subsystem starts.
  Check that there is no RAID Group whose power saving status is “Normal (command monitoring)” after executing the spin-down, and then restart the subsystem. 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 subsystem (radio wave noise suppression and others), so that be sure to keep all the external covers closed to operate the subsystem normally.)

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

(8) When replacing a Disk Drive, Control Unit, Cache Unit, Interface Board, Cache Backup Battery, an ENC Unit, a FAN Unit, and an 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 Disk Drive, Control Unit, Cache Unit, Interface Board, Cache Backup Battery, ENC Unit, FAN Unit, and Power Unit while the subsystem power is turned on, complete the replacement within five minutes. Otherwise, a powering off (subsystem 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, a powering off (subsystem 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 subsystem 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 Basic Chassis is blinking at high speed. When it is high-speed blinking, the ENC firmware is being downloaded. Perform the maintenance work after checking that the READY LED (green) on the front of the Basic Chassis lights up after waiting for the maximum of 30 to 50 minutes (or 40 to 60 minutes in case of RKH).

(15) When the WARNING LED (orange) on the front of the Basic Chassis 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 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 Basic Chassis 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 subsystem is being started
Because the status where the array subsystem is being started is in the middle of the transition to the status of the subsystem power turned on (Ready status) from the status of the subsystem power turned off, do not replace the parts while the array subsystem is being started.
Replace the parts after the array subsystem become the Ready status.

(18) The equipment with the NEBS specifications is designed for use in an Isolated Battery return configuration (DC-I). Connect the DC Return leads directly to the Central Office Power Return buss. Do not connect the return leads to the chassis or ground.

(19) The SAS(SED) drive cannot be used in other arrays after the following work.
To avoid getting the wrong array to be replaced, check the array before replacing the SAS(SED) drive.
- The SAS(SED) drive is installed in the array whose the Data At Rest Encryption, which is a priced option, is unlocked.

If you are mistaken, the SAS(SED) drive repair is necessary. Request the Technical Support Center to repair the SAS(SED) drive.

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

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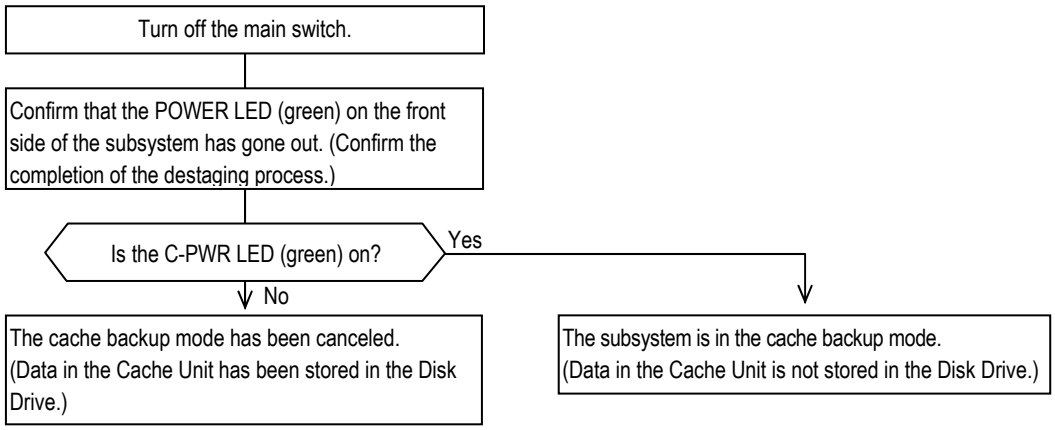
1.1.2 Checking Cache Memory in the Back-up State

Before turning off the power, be sure to check the state of the cache memory backup, and perform the work in the state that the cache backup mode is canceled.

The Cache memory installed in this subsystem performs the write after control. Therefore, it writes data on the Cache memory, which is not written in the Disk Drive, to the Disk Drive automatically when turning off the main switch. This is called destage processing. At the time when this processing is completed, the POWER LED (green) goes out, and the power supply to each installation part stops. However, if the destage processing is not completed due to the power-off by an unexpected power failure or coming off of the power cables, the Cache memory changes to the status where it is backed up by the battery for the data security. If it is not backed up correctly, the configuration information on the Cache memory is lost, and the user data is broken.

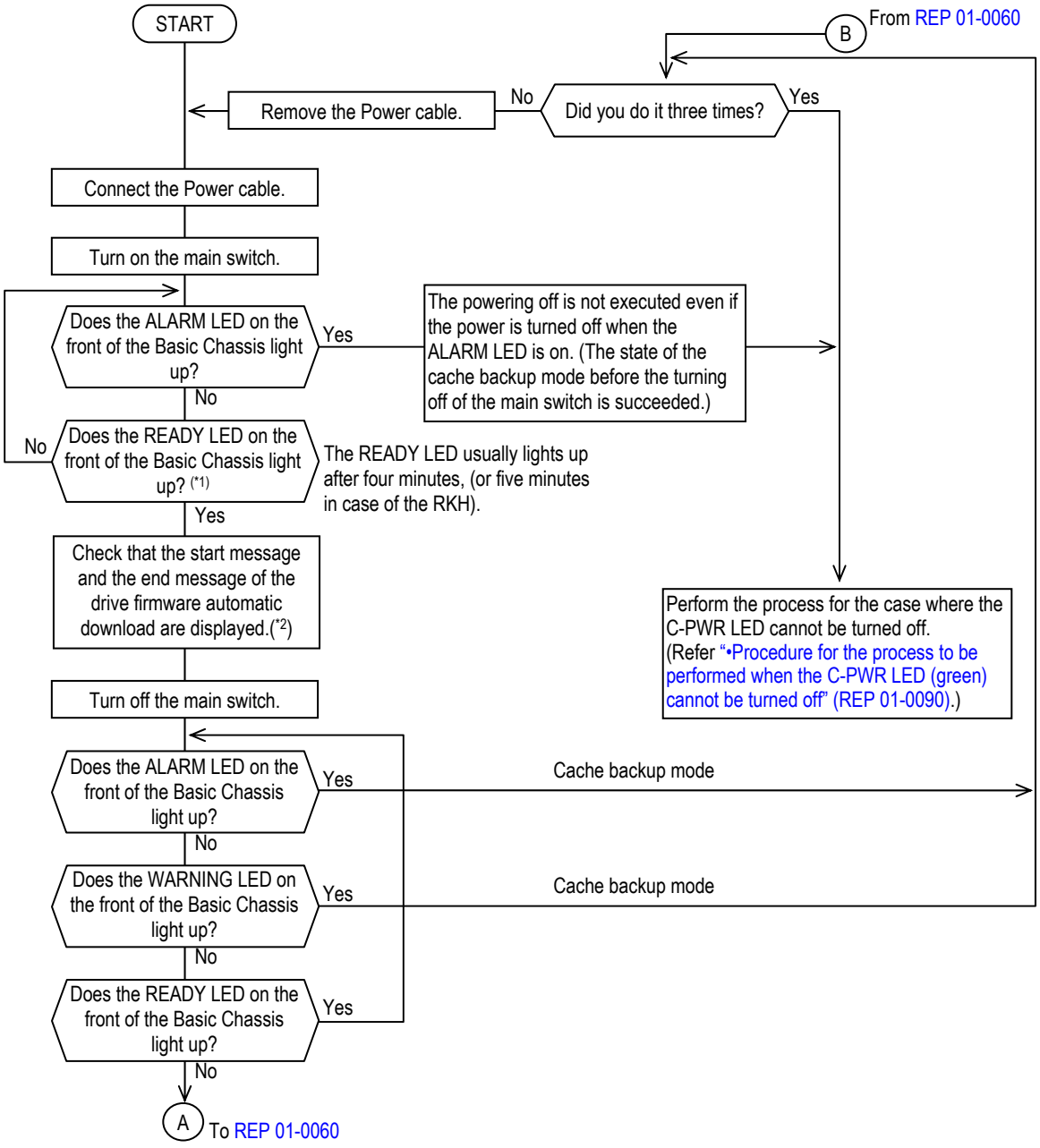
- Confirming state of the Cache Unit backup
  You can confirm whether the subsystem is in the cache backup state by viewing the indication of the C-PWR LED (green) on the Control Unit.
  The state of the cache backup can be confirmed in the following procedure. The location of components referred to in the flow chart is shown in "Figure 1.1.3 Indication Name (Basic Chassis)" (REP 01-0070), and "Figure 1.1.4 Indication Name (Additional Chassis)" (REP 01-0080).



*1 : Remove the power cables from the Power Units, and release the backup status according to "• Procedure for canceling the cache backup state of the Cache memory" (REP 01-0050).

Figure 1.1.1 Procedure for Confirming State of Cache Backup

- Procedure for canceling the cache backup state of the Cache memory
  Follow the powering off procedure shown below to cancel the cache backup state of the Cache memory. The location of components referred to in the flow chart is shown in Figure 1.1.3 and Figure 1.1.4.



*1 : Wait if the READY LED (green) on the front of the Basic Chassis is blinking at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH), or the WARNING LED (orange) is blinking at high speed (for the maximum of 30 to 85 minutes).

*2 : When the drive firmware version of the disk drive is new, the start message and completion message of the drive firmware automatic download are not displayed. To check the drive firmware automatic download, refer to Firmware "1.6 (4) Checking the start message and end message of the automatic download (FIRM 01-0890)".

Figure 1.1.2 Procedure for Canceling the Cache Backup Mode of the Cache Memory (1/2)

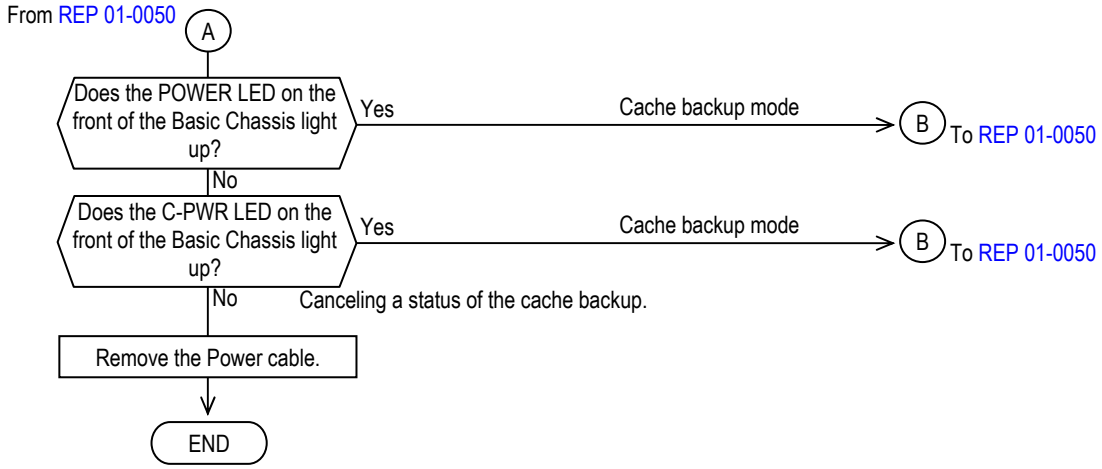
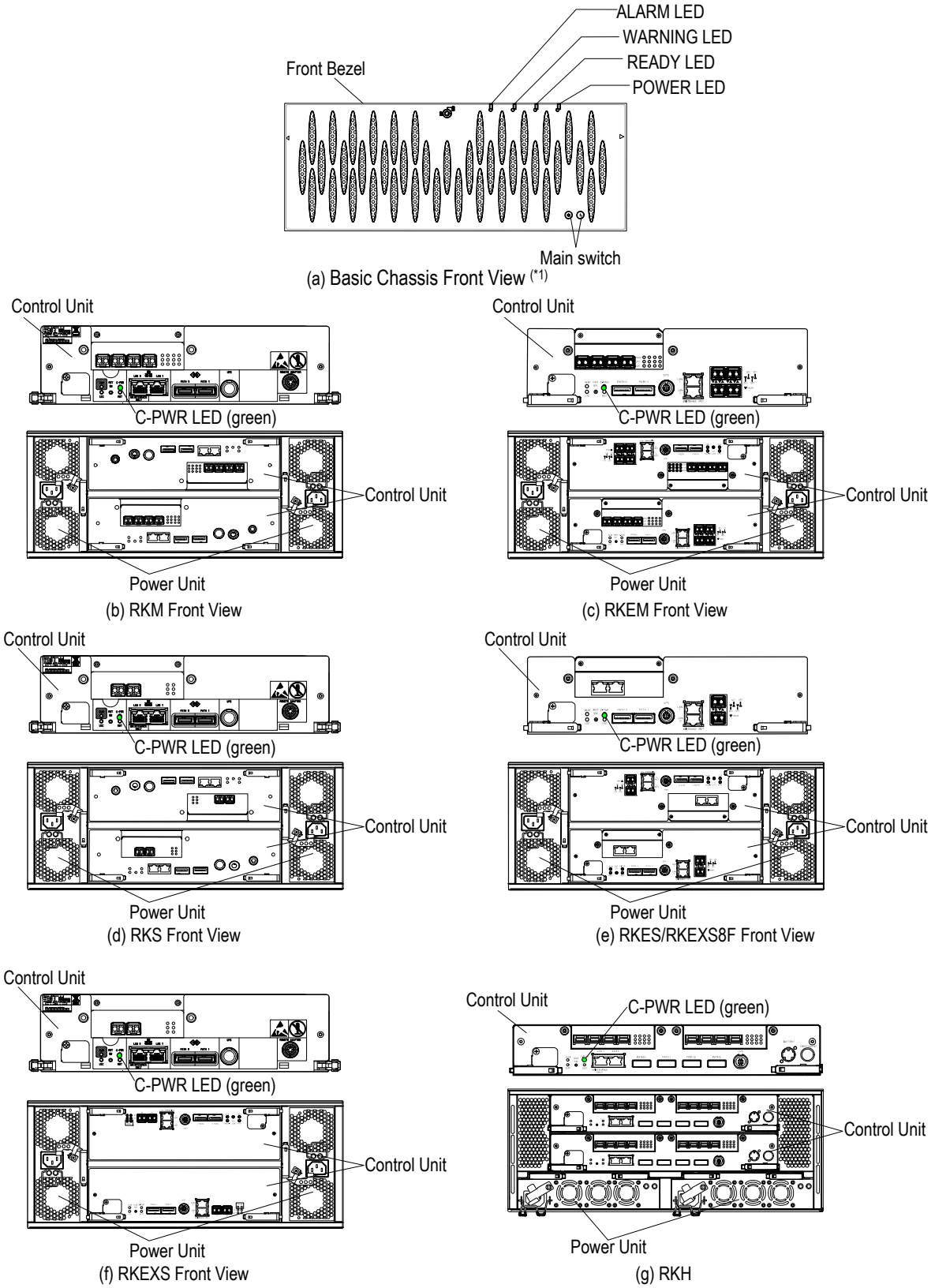


Figure 1.1.2 Procedure for Canceling the Cache Backup Mode of the Cache Memory (2/2)



*1 : The locations of LEDs/Switches on the front side of Basic Chassis are the same in all the models

Figure 1.1.3 Indication Name (Basic Chassis)

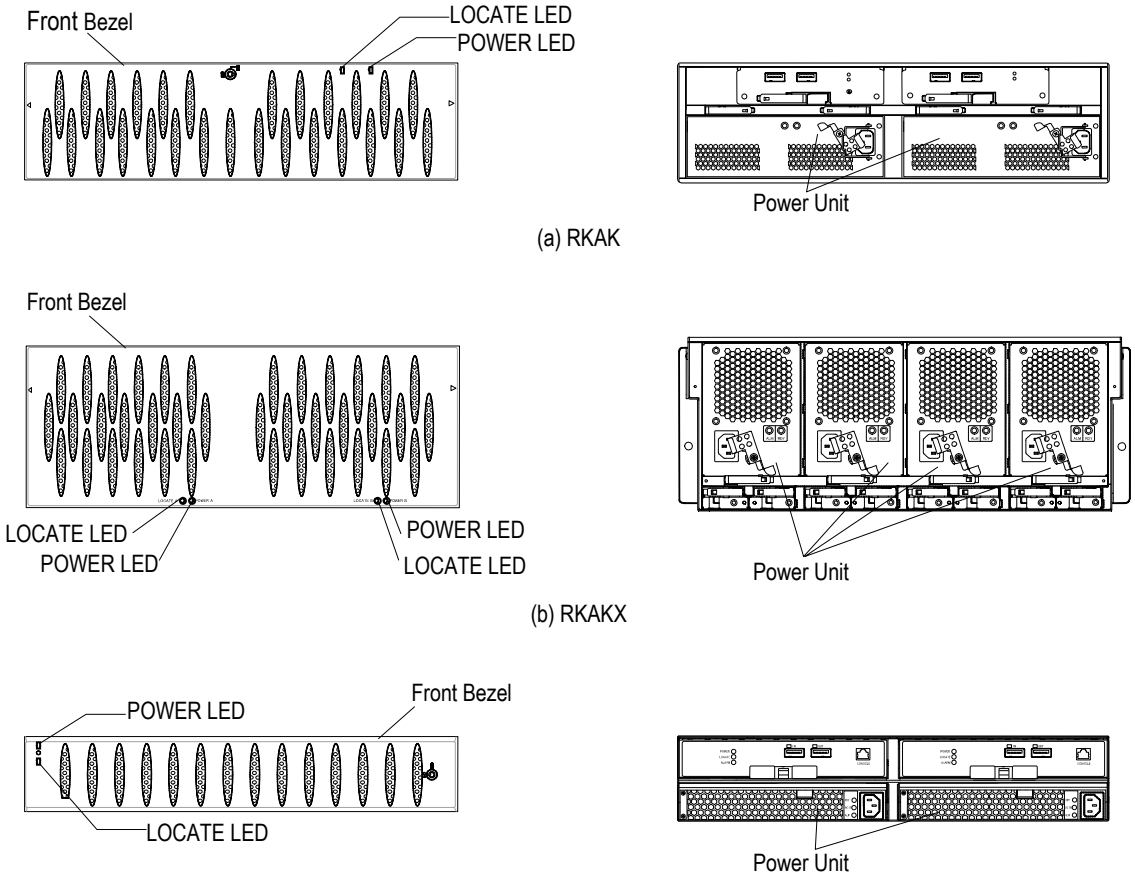


Figure 1.1.4 Indication Name (Additional Chassis)

- Procedure for the process to be performed when the C-PWR LED (green) cannot be turned off
  - ■ Items to be informed or asked the customer before starting the work
    - Inform that user data in the cache memory will be lost owing to the replacement of the Cache memory.
    - Ask whether backup data exists or not.
    - Ask whether it is permitted to erase user data entirely and restore it using user's backup data.
    - Inform that data recovery and verification will be required.
  - ■ Effect

    User data in the Cache memory which has not been written onto the Disk Drive will be lost owing to the replacement of the Controller.
  - ■ Processing procedures

    Either of the two procedures is used; a procedure using the forced parity correction(‡1) or that in which the data is entirely erased once, and then recovered.

(1) Procedure using the forced parity correction

It takes long times at the longest from start to completion of the process to execute the forcible parity correction.

For a standard time required for the forced parity correction, refer to Troubleshooting "< Standard time required for the forced parity correction >" (TRBL 06-0490).

(2) Procedure not using the forced parity correction

When the forced parity correction takes a long time depending on the system configuration, it is faster to restore data using the backup data after erasing and resetting configuration information than to do it by executing the procedure in (1).

NOTE : When not performing Forced Parity Correction, be sure to format the LU. (Refer to System Parameter "3.3 [Procedure ③-F] Formatting LU" (SYSPR 03-0290).) If formatting is not performed, parity consistency is lost and data inconsistency may occur.

‡1 : A process to ensure the Disk Drive data consistency which has been lost owing to a loss of cache data. It cannot recover the data unwritten onto the Disk Drive completely when an error occurs, therefore, verification of user data and restoration of backup data are necessary.

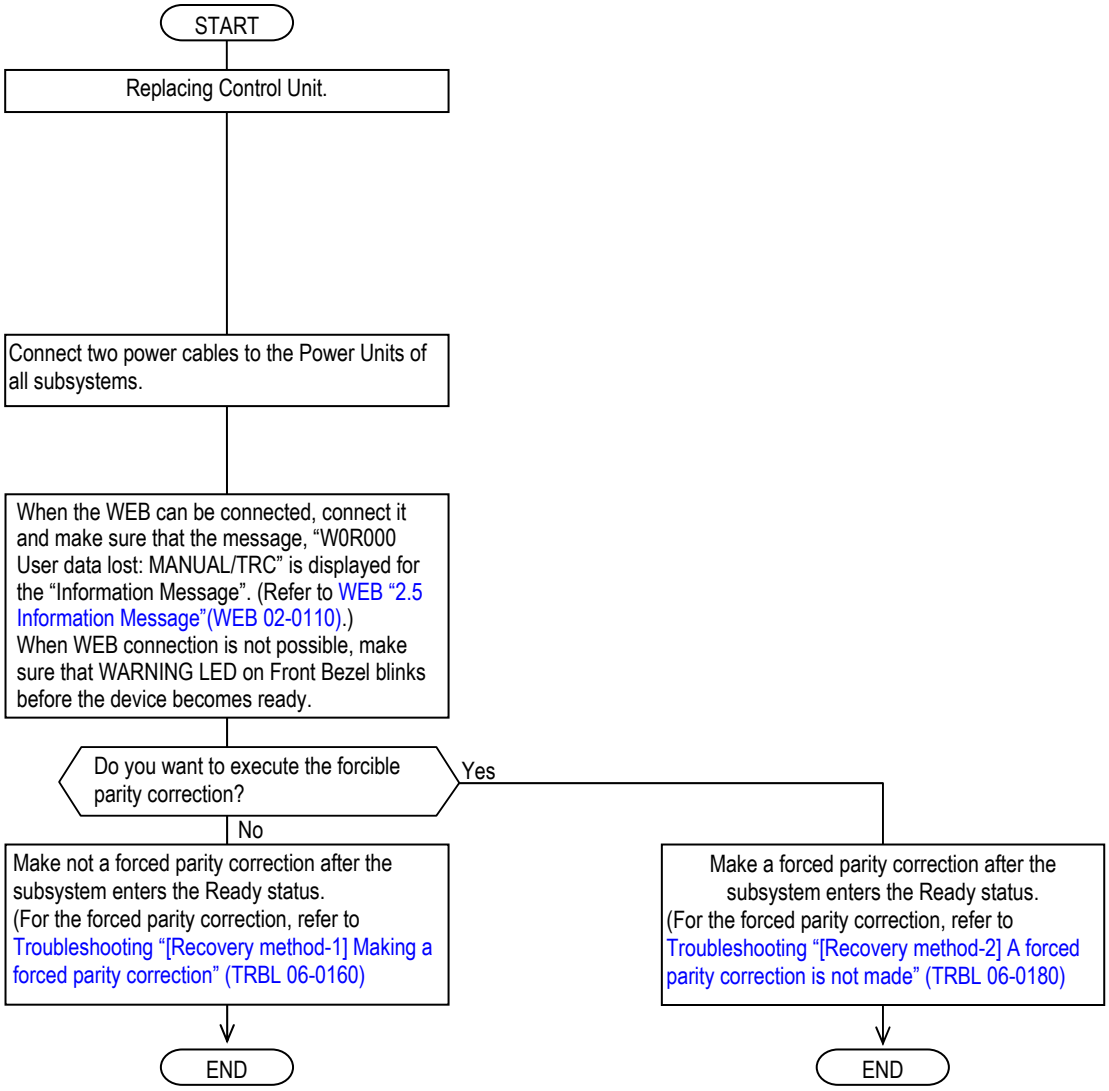


Figure 1.1.5 Procedure for the Process to be Performed when the C-PWR LED cannot be Turned Off

1.1.3 Procedure for Making Sure of Model Name and Drive Firmware of Disk Drive

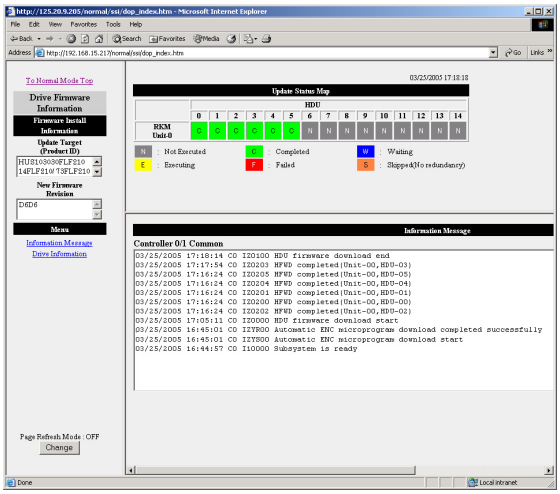
When it is required to make sure of a model name and/or drive firmware of the Disk Drive in the case of Disk Drive replacement, etc., make sure of them following the procedure shown below.

(1) Displaying the reference window

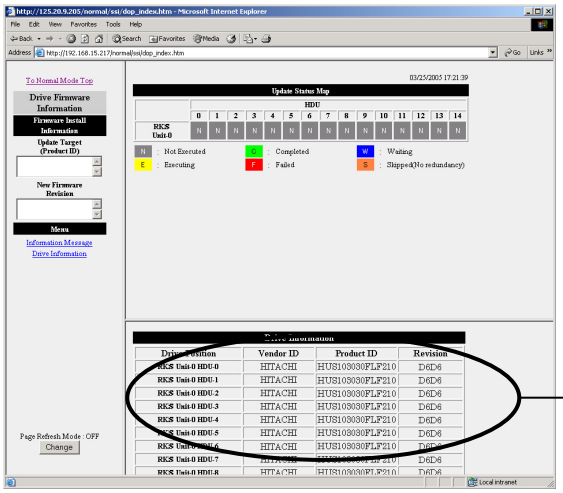
To display the reference window, enter “http://(IP address)/drvfirm” in the [Address] of the WEB browser.

In the case of the dual system configuration, enter an IP address of any one of the control units. 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].



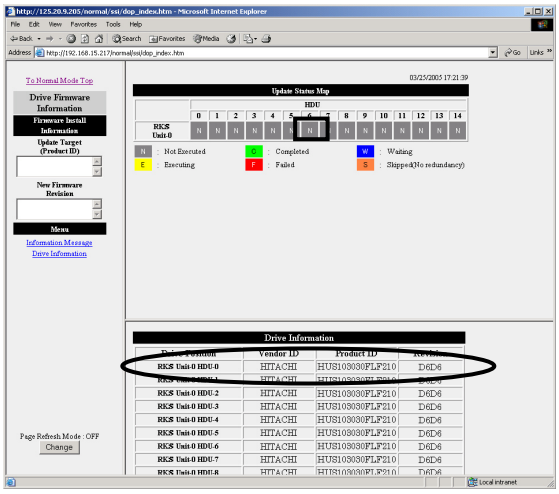
(2) Displaying the list of model names and drive firmware revisions of Disk Drives click [Drive Information] in the [Menu] of the [Drive Firmware Information].



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

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

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



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

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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/subsystem(*1)			Replacement time (Unit: Minute) (*2)	Reference section
				With I/O	Without I/O			
				On line	On line	Off line		
1	Disk Drive (142.61 G bytes)	3276138-A	DF-F800-AKH146	○	○	×	5	"2.2.1 Replacing Disk Drive" (REP 02-0030)
	Disk Drive (287.62 G bytes)	3276138-B	DF-F800-AKH300	○	○	×		
		3282389-C	DF-F800-AMF300	○	○	×		
	Disk Drive (392.73 G bytes)	3276308-A	DF-F800-AKF400	○	○	×		
	Disk Drive (439.44 G bytes)	3276138-C	DF-F800-AKH450	○	○	×		
	Disk Drive (439.44 G bytes) (RKAKX)	3282265-A	DF-F800-AKH450X	○	○	×		
	Disk Drive (575.30 G bytes)	3276138-D	DF-F800-AKH600	○	○	×		
		3282360-A	DF-F800-ANH600	○	○	×		
		3282389-A	DF-F800-AMF600	○	○	×		
	Disk Drive (575.30 G bytes) (RKAKX)	3282265-B	DF-F800-AKH600X	○	○	×		
		3282361-A	DF-F800-ANH600X	○	○	×		
	Disk Drive (491.25 G bytes)	3276139-A	DF-F800-AVE500	○	○	×		
	Disk Drive (737.49 G bytes)	3276139-B	DF-F800-AVE750	○	○	×		
	Disk Drive (983.69 G bytes)	3276139-C	DF-F800-AVE1K	○	○	×		
	Disk Drive (983.69 G bytes) (RKAKX)	3282101-A	DF-F800-AVE1KX	○	○	×		
	Disk Drive (1,956.94 G bytes)	3282279-A	DF-F800-AWE2K	○	○	×		
	Disk Drive (1,956.94 G bytes) (RKAKX)	3282280-A	DF-F800-AWE2KX	○	○	×		
	Disk Drive (1,968.52 G bytes)	3276139-D	DF-F800-AVE2K	○	○	×		
	Disk Drive (1,968.52 G bytes) (RKAKX)	3282101-D	DF-F800-AVE2KX	○	○	×		
	Disk Drive (2,953.31 G bytes)	3276139-E	DF-F800-AVE3K	○	○	×		
	Disk Drive (2,953.31 G bytes) (RKAKX)	3282101-E	DF-F800-AVE3KX	○	○	×		
	Flash Drive (195.82 G bytes)	3282195-B	DF-F800-AKS200	○	○	×		
2	Cache Backup Battery (RKM/RKS/RKH)	3276079-A	DF-F800-N1K	○	○	○	5	"2.2.2 Replacing Cache Backup Battery" (REP 02-0280)

*1 : The status definitions of the host and the subsystem 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 subsystem powering on
- Off-line: Status of the subsystem 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 02-0240).

No.	Part name	Part No.	Model	Status of the host/subsystem(*1)			Replacement time (Unit: Minute) (*2)	Reference section
				With I/O	Without I/O			
				On line	On line	Off line		
3	FAN Unit (RKH)	3276374-A	–	○	○	○	5	"2.2.3 Replacing FAN Unit" (REP 02-0350)
4	Power Unit (RKM/RKS)	3276080-A	–	○	○	○	5	"2.2.4 Replacing Power Unit" (REP 02-0390)
	Power Unit (RKH)	3276255-A	–	○	○	○		
	Power Unit (RKAK)	3276081-A	–	○	○	○		
	Power Unit (RKAKX)	3282102-A	–	○	○	○		
	Power Unit (RKHED)	3282061-A	–	○	○	○		
	Power Unit (RKAKD)	3282076-A	–	○	○	○		
	Power Unit (RKAKS)	3282444-A	–	○	○	○		
5	Control Unit (RKM)	3282005-A	HDF-F800-MFC4	○(*3)	○(*3)	○(*4)	20	"2.2.5 Replacing Control Unit" (REP 02-0450)
		3282005-B	HDF-F800-MIS4	○(*3)	○(*3)	○(*4)		
		3282005-E	HDF-F800-MFC8	○(*3)	○(*3)	○(*4)		
		3282005-F	HDF-F800-MIS8	○(*3)	○(*3)	○(*4)		
		3282005-J	HDF-F800-M8FC4	○(*3)	○(*3)	○(*4)		
		3282005-K	HDF-F800-M8FC8	○(*3)	○(*3)	○(*4)		
	Control Unit (RKEM)	3282247-A	DF-F800-F1KEM	○(*3)	○(*3)	○(*4)		
	Control Unit (RKS)	3282005-C	HDF-F800-SFC2	○(*3)	○(*3)	○(*4)		
		3282005-D	HDF-F800-SIS2(*5)	○(*3)	○(*3)	○(*4)		
		3282005-G	HDF-F800-SFC4	○(*3)	○(*3)	○(*4)		
		3282005-H	HDF-F800-SIS4	○(*3)	○(*3)	○(*4)		
	Control Unit (RKES)	3282248-A	DF-F800-F1KES(*6)	○(*3)	○(*3)	○(*4)		
	Control Unit (RKEXS)	3282246-A	DF-F800-F1KEXS	○(*3)	○(*3)	○(*4)		
	Control Unit (RKEXSA)	3282005-D	HDF-F800-SIS2	○(*3)	○(*3)	○(*4)		
	Control Unit (RKEXSB)	3282248-A	DF-F800-F1KES	○(*3)	○(*3)	○(*4)		
	Control Unit (RKH/RKHE)	3282006-A	–	○(*3)	○(*3)	○(*4)		
		3282006-B	–	○(*3)	○(*3)	○(*4)		
	Control Unit (RKEH)	3282249-A	–	○(*3)	○(*3)	○(*4)		
6	Cache Unit (1,024 M bytes)	3276125-A	DF-F800-C1GK	○(*3)	○(*3)	○	20	"2.2.6 Replacing Cache Unit" (REP 02-0640)
	Cache Unit (2,048 M bytes)	3276125-B	DF-F800-C2GK	○(*3)	○(*3)	○		
	Cache Unit (4,096 M bytes)	3276125-J	DF-F800-C4GK	○(*3)	○(*3)	○		

*1 : The status definitions of the host and the subsystem 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 subsystem powering on
- Off-line: Status of the subsystem 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 02-0240).

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

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

*5 : This model is also used as Control Unit of RKEXSA.

*6 : This model is also used as Control Unit of RKEXS8F.

No.	Part name	Part No.	Model	Status of the host/subsystem(*1)			Replacement time (Unit: Minute) (*2)	Reference section
7	FC Interface Board	A3276123-A	DF-F800-DKF44	○(*3)	○(*3)	○	20	"2.2.7 Replacing Interface Board" (REP 02-0800)
	FC Interface Board (RKS)	A3276122-A	DF-F800-DKF42	○(*3)	○(*3)	○		
	FC Interface Board (8 G bps)	3282085-A	DF-F800-DKF84	○(*3)	○(*3)	○		
	FC Interface Board (8 G bps)	3282263-A	DF-F800-DKF82	○(*3)	○(*3)	○		
	iSCSI Interface Board (1 G bps)	3276278-B	DF-F800- DKS12	○(*3)	○(*3)	○		
	iSCSI Interface Board (10 G bps)	3282370-A	DF-F800-DKSA2	○(*3)	○(*3)	○		
8	Host Connector (4 G bps)	3276337-A	–	○(*3)	○(*3)	○	5	"2.2.8 Replacing Host Connector" (REP 02-0950)
	Host Connector (8 G bps)	3276337-B	–	○(*3)	○(*3)	○		
	Host Connector (10 G bps iSCSI)	3276337-C	–	○(*3)	○(*3)	○		
9	ENC Unit (RKAK)	3276159-A	–	○	○	○	10	"2.2.9 Replacing ENC Unit" (REP 02-1020)
	ENC Unit (RKAKX)	3282103-A	–	○	○	○		
	ENC Unit (RKAKS)	3282443-A	–	○	○	○		
10	ENC Cable (5 m)	3276151-A	DF-F800-K5BS	○	○	○	–	"2.2.10 Replacing ENC Cable" (REP 02-1110)
	ENC Cable (3 m)	3276151-B	DF-F800-K3BS	○	○	○		
	ENC Cable (1 m)	3276137-A	–	○	○	○		
11	Basic Chassis of Rack Mount Style	3282173-A	DF800-RKM	×	×	○	–	"2.2.11 Replacing Basic Chassis of Rack Mount Style" (REP 02-1160)
		3282173-A	DF800-RKS	×	×	○		
		3282173-A	DF800-RK	×	×	○		
		3282173-A	DF800-RK2	×	×	○		
		3282174-A	DF800-RKH	×	×	○		
		3282174-A	DF800-RKH2	×	×	○		
		3282174-A	DF800-RKHE	×	×	○		
		3282174-A	DF800-RKHE2	×	×	○		
		3282174-A	DF800-RKHED	×	×	○		
		3282174-A	DF800-RKHE2D	×	×	○		
12	Additional Chassis of Rack Mount Style	3282175-A	DF-F800-RKAK	×	×	○	–	"2.2.12 Replacing Additional Chassis of Rack Mount Style" (REP 02-1220)
		3282175-A	DF-F800-RKAKD	×	×	○		
		3282176-A	DF-F800-RKAKX	×	×	○		
		3282448-A	DF-F800-RKAKS	×	×	○		

*1 : The status definitions of the host and the subsystem 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 subsystem powering on
- Off-line: Status of the subsystem 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 02-0240).

*3 : The power can be on as long as the Power Unit is duplicated.

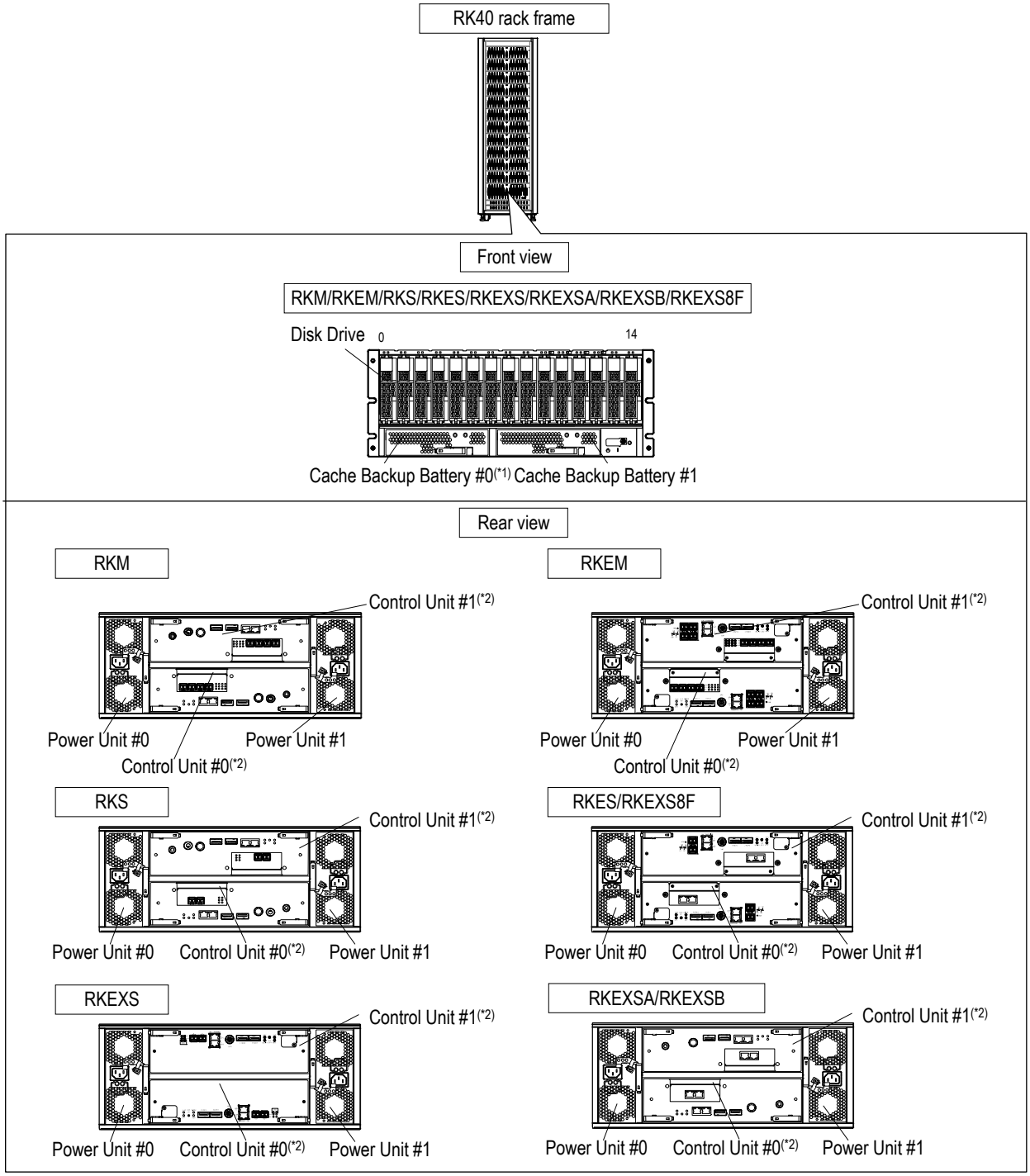
No.	Part name	Part No.	Model	Status of the host/subsystem(*1)			Replacement time (Unit: Minute) (*2)	Reference section
13	Remote Adapter	3274538-A	DF-F800-VR4A (Main unit)	○(*3)	○(*3)	○	5	"2.2.13 Replacing Remote Adapter" (REP 02-1260)
		3274538-B	DF-F800-VR4H (Hub)	○(*3)	○(*3)	○		
14	Additional Battery Box (AC power supply model)	3276126-A	DF-F800-N1RK	○	○	○	–	"2.2.14 Replacing an Additional Battery Box" (REP 02-1280)
	Additional Battery Box (DC power supply model)	3276126-B	DF-F800-N1RKD	○	○	○		
15	Front Bezel (RKM/RKS/RKH/RKHED)	3276156-A	–	○	○	○	–	"2.2.15 Replacing Front Bezel" (REP 02-1360)
		3276156-G						
		3282107-A						
		3282058-A	DF-F800-UBKD					
	Front Bezel (RKAK/RKAKD)	3276156-B	–	○	○	○		
		3276156-H						
		3282107-B						
		3282058-B	DF-F800-UBKAD					
	Front Bezel (RKAKX)	3282121-A	–	○	○	○		
	Front Bezel (RKAKS)	3276156-J	–	○	○	○		

*1 : The status definitions of the host and the subsystem 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 subsystem powering on
- Off-line: Status of the subsystem 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 02-0240).

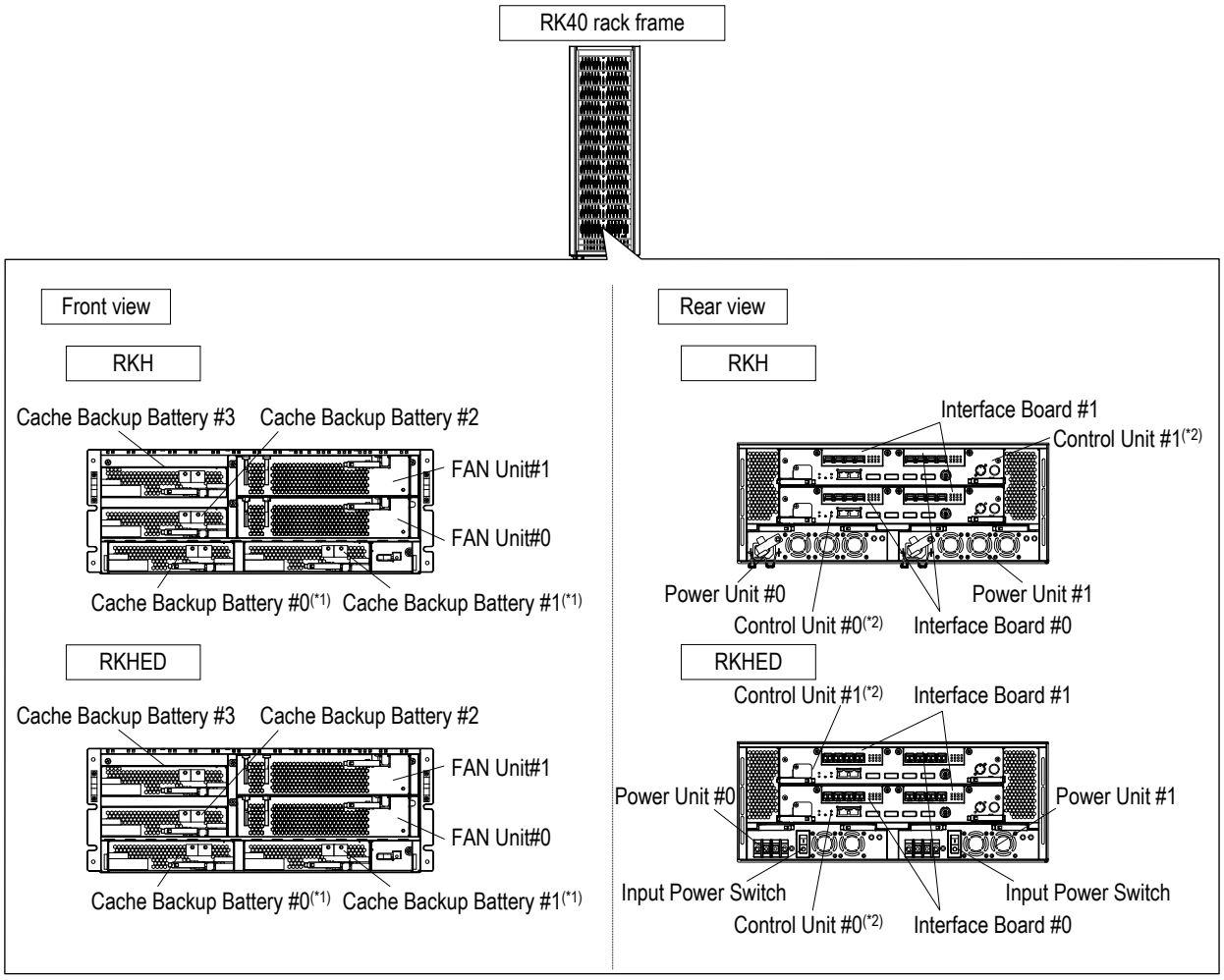
*3 : The power can be on as long as the Power Unit is duplicated.

2.1.1 Part Locations of Rackmount Model



*1 : Only one Cache Backup Battery is installed in the RKM/RKEM/RKS/RKES in standard. Install it left side of the subsystem.
In the case of the DF800-RK2, two batteries are installed as a standard.
*2 : Cache Memory and Interface Board are installed in the Control Unit.

Figure 2.1.1 Replaceable Part Locations of Rackmount Model (1)



*1 : Two Cache Backup Batterys are installed in the RKH/RKHED in standard, and it is installed under the subsystem. In the case of the DF800-RKH2 and the DF800-RKHE2/DF800-RKHE2D, four batteries are installed as a standard.

*2 : Cache Memory and Interface Board are installed in the Control Unit.

Figure 2.1.1.1 Replaceable Part Locations of Rackmount Model (2)

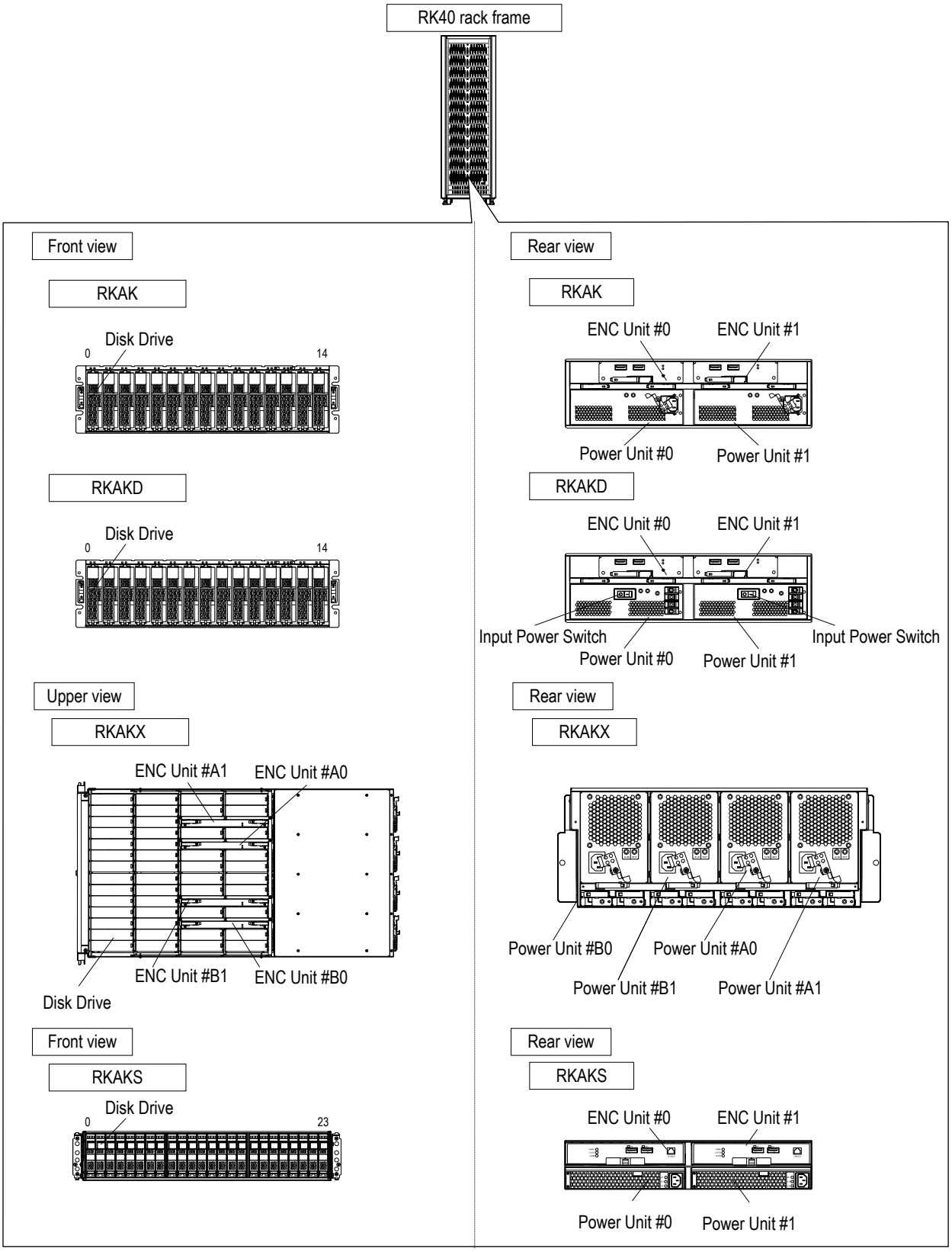


Figure 2.1.1.2 Replaceable Part Locations of Rackmount Model (3)

2.2 Replacement of Components

The parts replacements here are illustrated using a rackmount model.
Where to install a component is shown in "2.1 Locations of Replacement Components" (REP 02-0000).

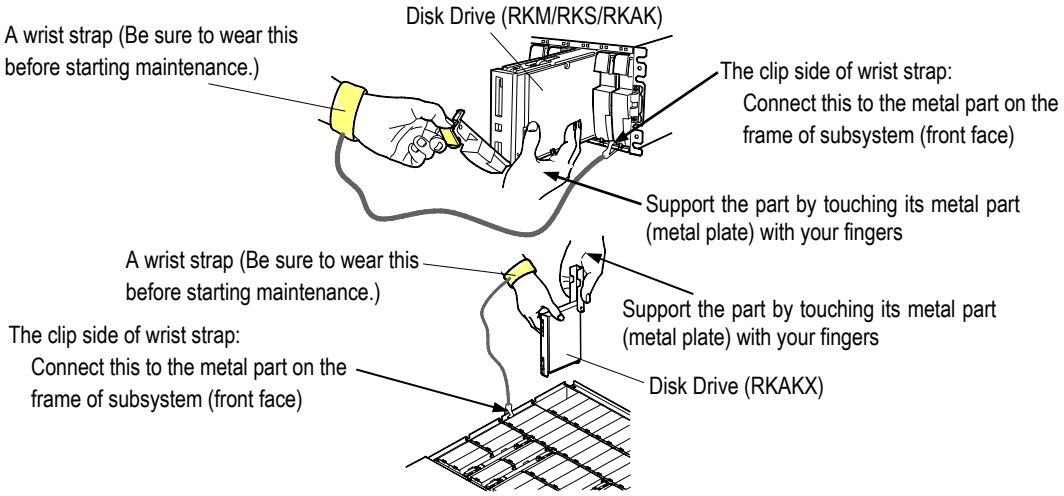
2.2.1 Replacing Disk Drive

⚠ CAUTION

- **Do not pull out multiple RKAKXs at a time because the rack can fall over.**
- **Do not put objects on the RKAKX which has been pulled out of the rack or use it as working space because the rack can fall over.**

The replacement procedure for the Disk Drive differs depending on the Spare Disk setting, RAID configuration, data recovery setting mode, or the Spare Drive Operation Mode(‡1) (variable or fixed). Perform the replacement following the procedure shown below.
A failure may be caused by the electric shock since the Disk Drive is precision instrument. Be sure to put on the wrist strap before starting work in order to protect Disk 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 Disk Drive into the subsystem, support the Disk Drive as touching its metal part with fingers of your hand that wears a wrist strap.



NOTE : • When removing the Disk Drive to the RKAKX, 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 (7) Installing the stabilizer" (INST 02-0090).)
• When pulling out or storing the RKAKX, perform it for only one RKAKX at a time slowly and surely. (Refer to Installation "1.4.1 (1) How to pull the RKAKX out of the rack frame" (INST 01-0111) or "1.4.1 (2) How to store the RKAKX in the rack frame." (INST 01-0112).)

‡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 Disk Drive" (INTR 03-0270).)

(1) Locations and numbers of Disk Drives

(1-1) In the case of RKM/RKS/RKAK

The Disk Drive number is #0 to #14 from the left sequentially seen sideways.

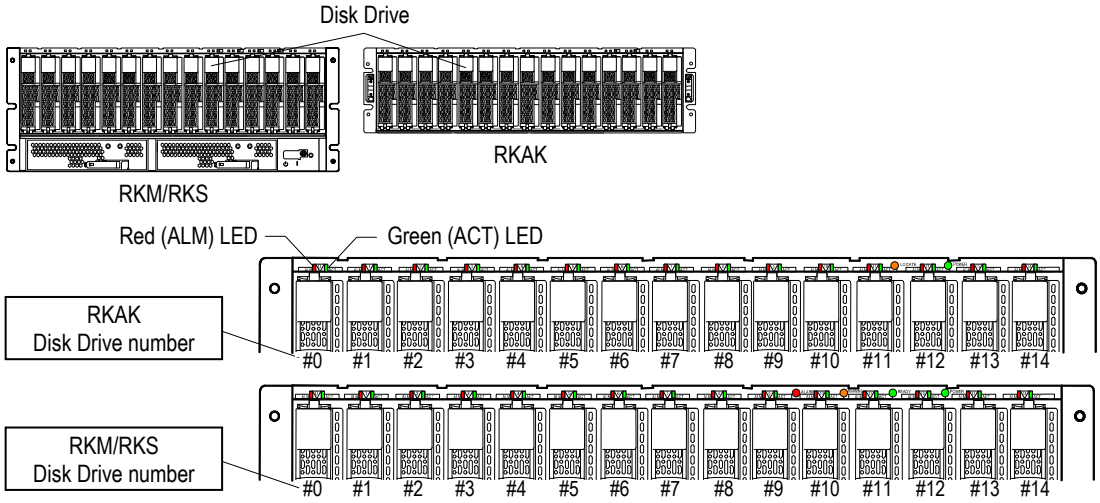


Figure 2.2.1 Disk Drive Mounting Location (RKM/RKS/RKAK)

(1-2) In the case of RKAKX

The Disk Drive numbering is #A0 to #A23, #B0 to #B23 sequentially viewed from the above of the subsystem.

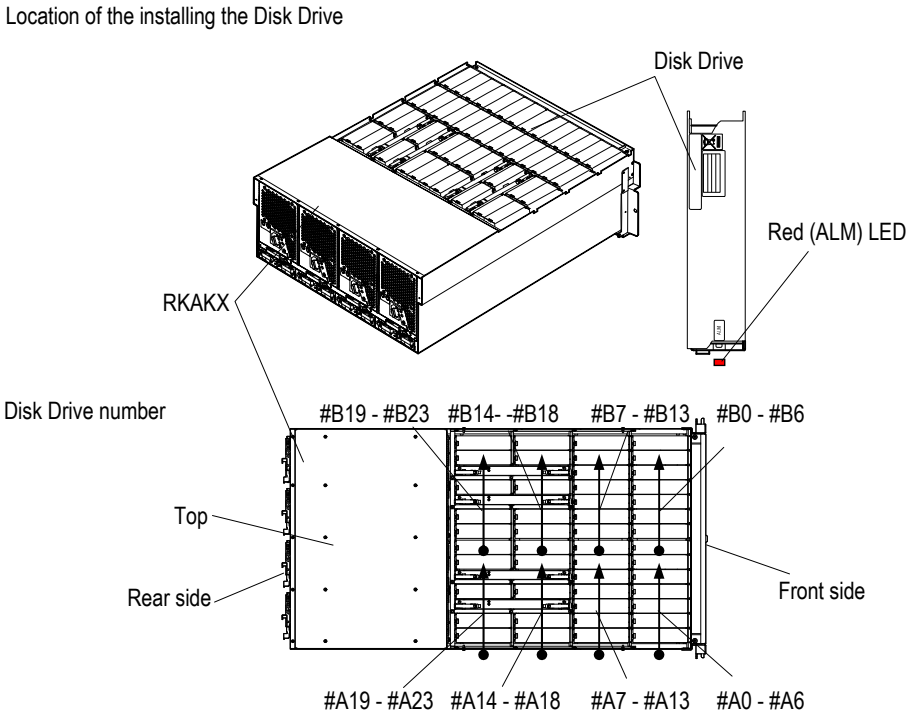


Figure 2.2.1.1 Disk Drive Mounting Location (RKAKX)

(1-3) In the case of RKAKS

The Disk Drive number is #0 to #23 from the left sequentially seen sideways.

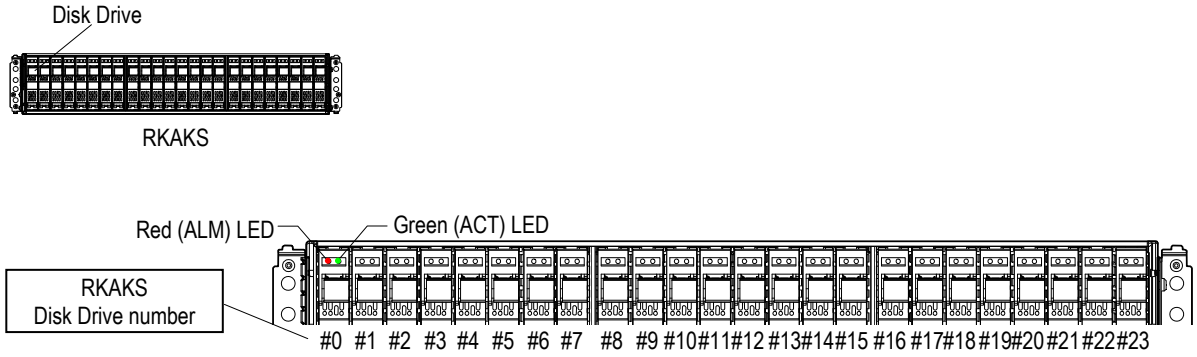


Figure 2.2.1.2 Disk Drive Mounting Location (RKAKS)

This page is for editorial purpose only.

(2) Replacing Disk Drive

CAUTION

- **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.**
- **Disk Drives are precision components.**
  Be careful not to expose drives to hard shock.
- **When you install a Disk 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 Disk Drives (The Disk Drives #0 to #4 of the RKM/RKS or the Disk Drives #0 to #4 of the RKAK/RKAKS corresponding to the unit ID#0 connected to the RKH, the Disk Drive #A0 to #A4 of the RKAKX) regardless of the data Disk Drives, the Spare Drives and the Disk Drives which do not configure the RAID group, do not remove the Disk Drives #0 to #4 at the same time with the subsystem power turned on.**
  There is a possibility of downing the subsystem if removing them.

NOTE : • 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.

• The drive DF-F800-ACE3KX installed in the RKAKX connected with the RKEXC is the same one as the drive DF-F800-AVE3KX. Therefore, there is no problem if the drive ACE3KX is replaced with the drive AVE3KX.

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). 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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis 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 Basic Chassis usually goes out about 30 seconds later.	The Spare Disk is set	RAID 0(*1) RAID 1, RAID 5, RAID 6, and RAID 1+0	When the red (ALM) LED on the disk drive to be replaced is on. See "(a-1) When the red (ALM) LED on the Disk Drive to be replaced is on." (REP 02-0070).
					When the red (ALM) LED on the disk drive to be replaced is off. See "(a-2) When the red (ALM) LED on the Disk Drive to be replaced is off." (REP 02-0120).
			The Spare Disk is not set or there is no Spare Disk that can be used	RAID 0(*2)	See "(b-3) Replacement of Disk Drive under RAID 0 configuration" (REP 02-0160).
				RAID 1, RAID 5, RAID 6, and RAID 1+0	When the red (ALM) LED on the disk drive to be replaced is on. See "(b-1) Replacing Disk Drive in RAID 1, 5, 6, or 1+0 configuration (When the red (ALM) LED is on)" (REP 02-0130).
					When the red (ALM) LED on the disk drive to be replaced is off. See "(b-2) Replacing a Disk Drive in the RAID 1, 5, 6, or RAID 1+0 configuration (when the red (ALM) LED is off)" (REP 02-0150).
2	Replacement with the power turned off	Not applicable			—

*1 : Be sure to backup the user data before replacing a Disk Drive in RAID 0 configuration. When the set RAID group and LU 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 Disk Drive using the procedure (a) for the case of RAID 0 with a Spare Disk only when the data migration to the Spare Disk by means of the dynamic sparing has terminated normally.
When the data migration to the Spare Disk has failed, replace the Disk Drive using the procedure (b-2) for the case of RAID 0 without Spare Disk.

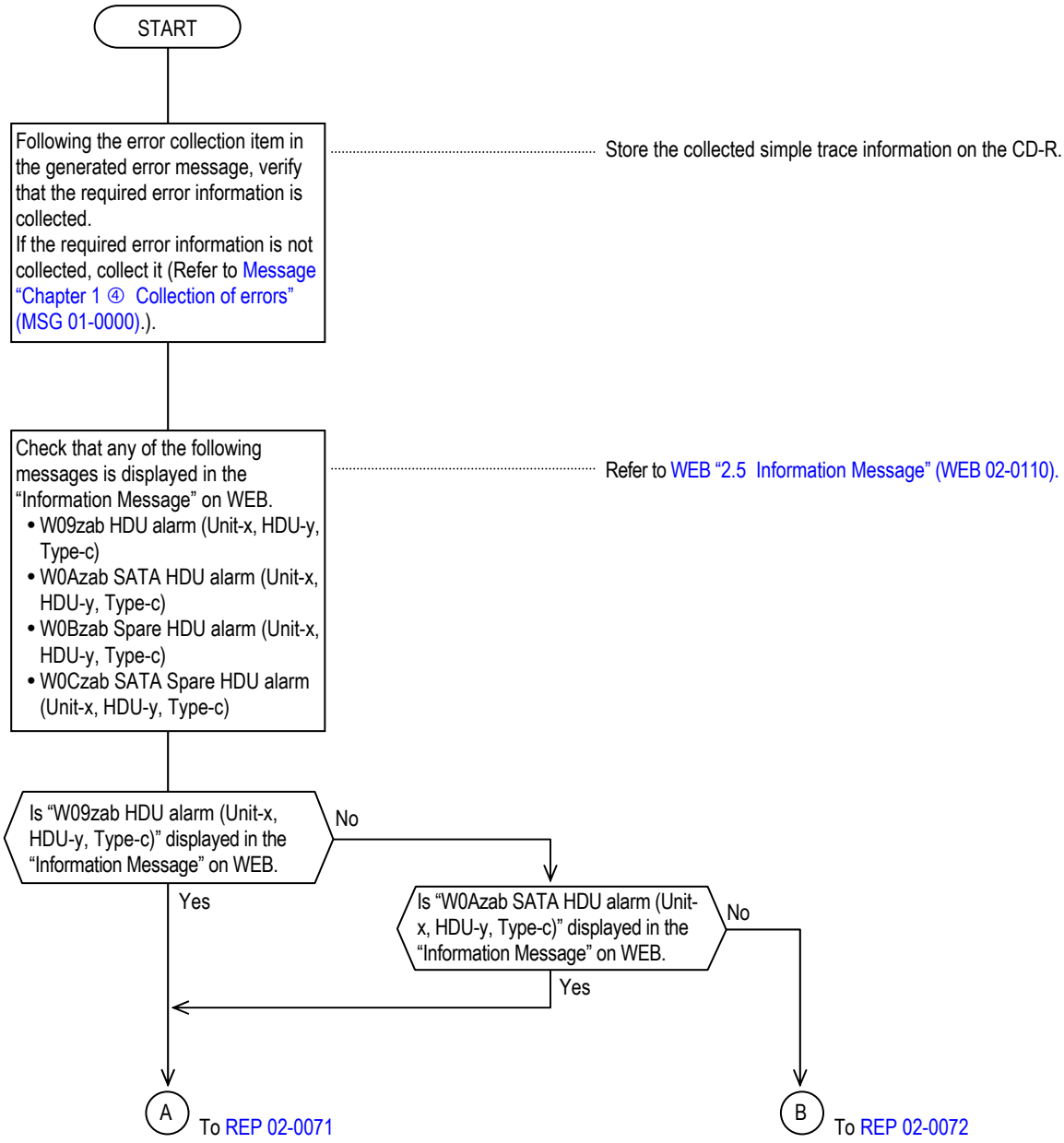
*3 : It's the time it takes to replace part itself.
This time doesn't include the time needed to perform the operation other than replacement.

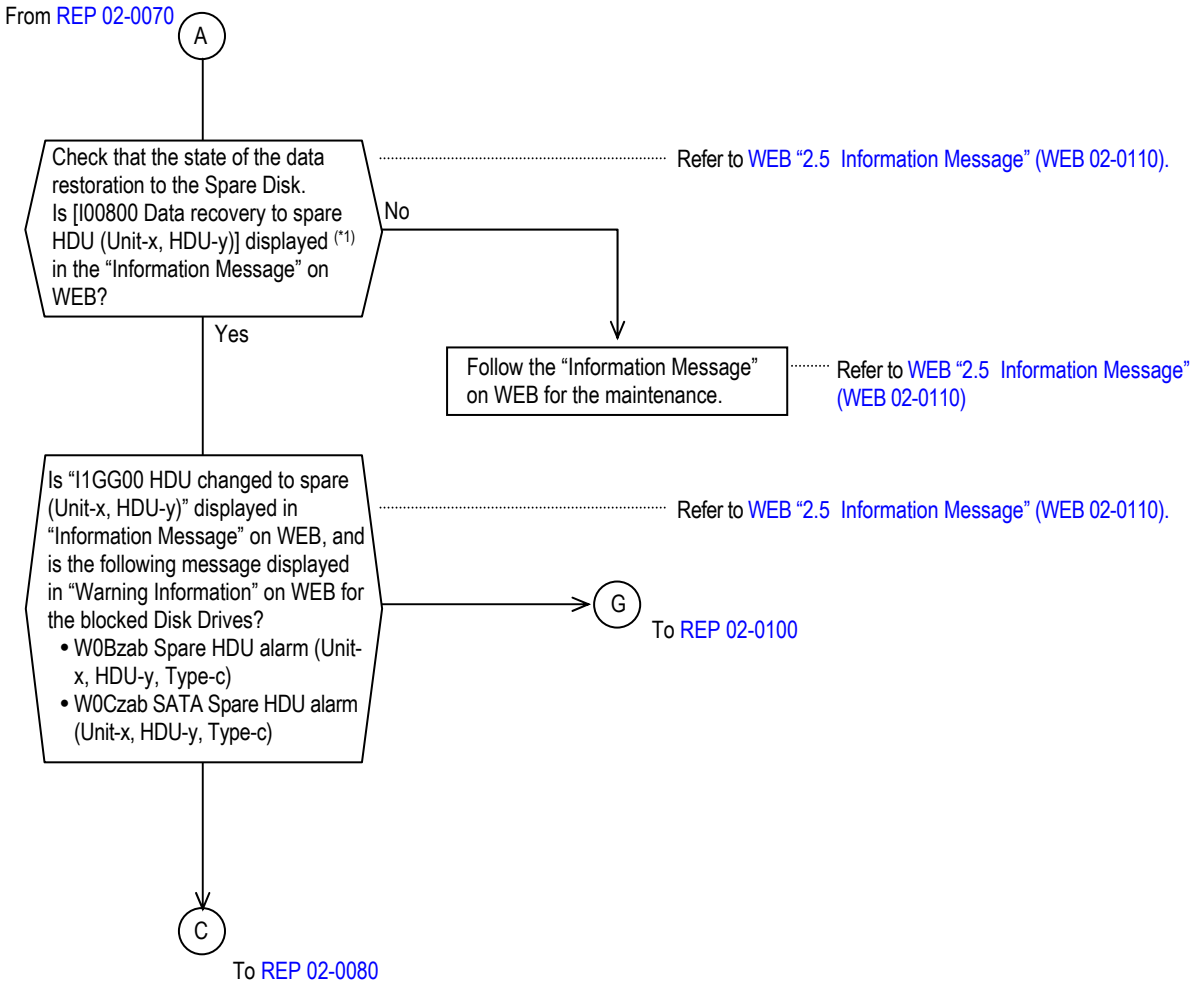
If no Spare Disk is provided, go to (b).

(a) The Spare Disk is set

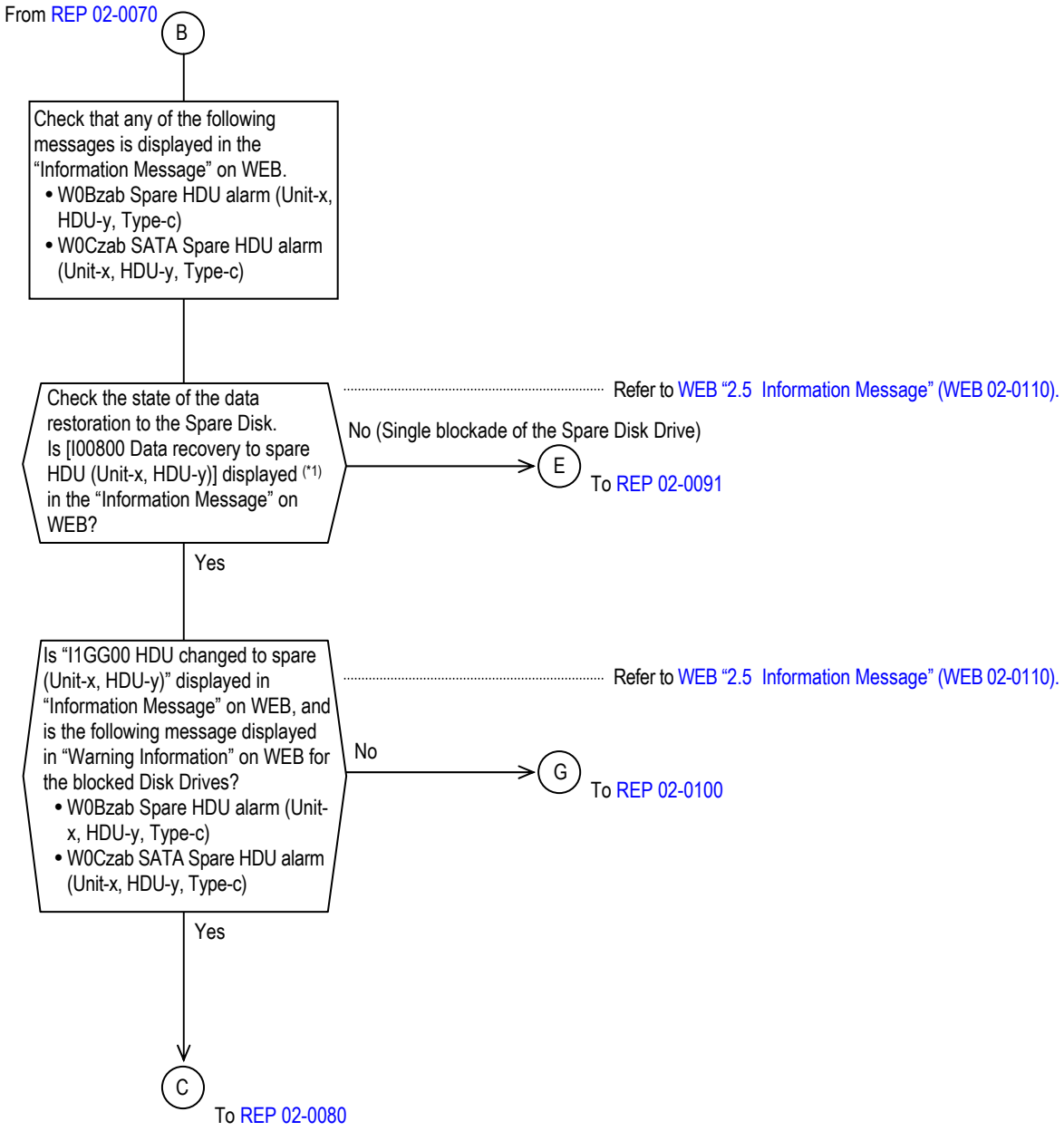
(a-1) When the red (ALARM) LED on the Disk Drive to be replaced is on.

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

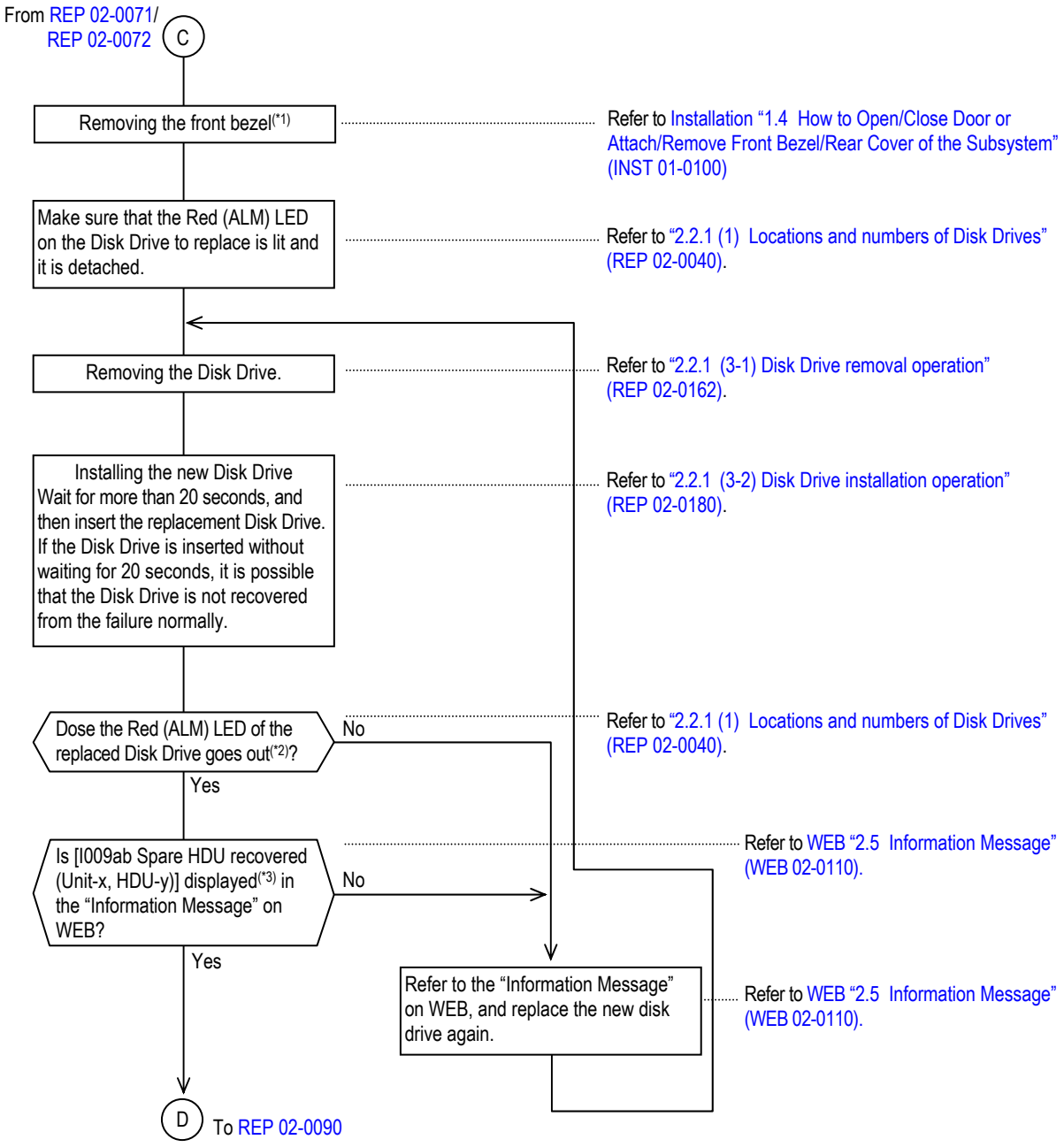




*1 : It will take time until this message is displayed. Refer to "Table 2.2.2 Standard Time Required for the Correction Copy or Copy Back (SAS Disk Drive)" (REP 02-0240)/"Table 2.2.2.1 Standard Time Required for the Correction Copy or Copy Back (SAS(SED) Disk Drive)" (REP 02-0251)/"Table 2.2.3 Standard Time Required for the Correction Copy or Copy Back (SATA Disk Drive)" (REP 02-0260)/"Table 2.2.3.1 Standard Time Required for the Correction Copy or Copy Back (SAS7.2K Disk Drive)" (REP 02-0271)/"Table 2.2.3.2 Standard Time Required for the Correction Copy or Copy Back (Flash Drive)" (REP 02-0273) for the standard of the time required.



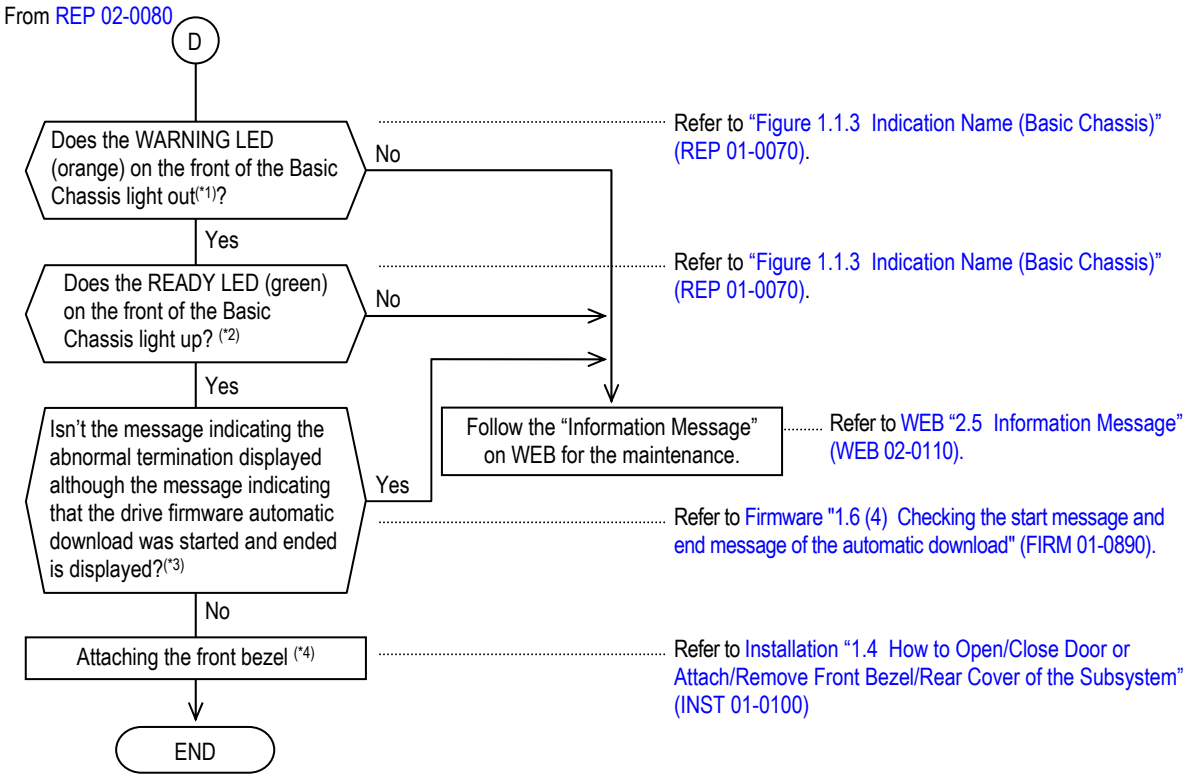
*1 : It will take time until this message is displayed. Refer to "Table 2.2.2 Standard Time Required for the Correction Copy or Copy Back (SAS Disk Drive)" (REP 02-0240)/"Table 2.2.2.1 Standard Time Required for the Correction Copy or Copy Back (SAS(SED) Disk Drive)" (REP 02-0251)/"Table 2.2.3 Standard Time Required for the Correction Copy or Copy Back (SATA Disk Drive)" (REP 02-0260)/"Table 2.2.3.1 Standard Time Required for the Correction Copy or Copy Back (SAS7.2K Disk Drive)" (REP 02-0271)/"Table 2.2.3.2 Standard Time Required for the Correction Copy or Copy Back (Flash Drive)" (REP 02-0273) for the standard of the time required.



*1 : For the RKAKX, remove the front bezel, pull the subsystem out of the rack, and remove the top cover.

*2 : The red (ALM) LED of the Disk Drive lights off within about five minutes after the Disk Drive is inserted.
When the Red (ALM) LED is not turned off, remove the inserted Disk Drive from the chassis, and insert it again after 20 seconds or more passed.
However, if the Disk Drive is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the Red (ALM) LED of the replaced Disk Drive may not be turned off.
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted Disk Drive from the chassis, and insert it again after 20 seconds or more passed.

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

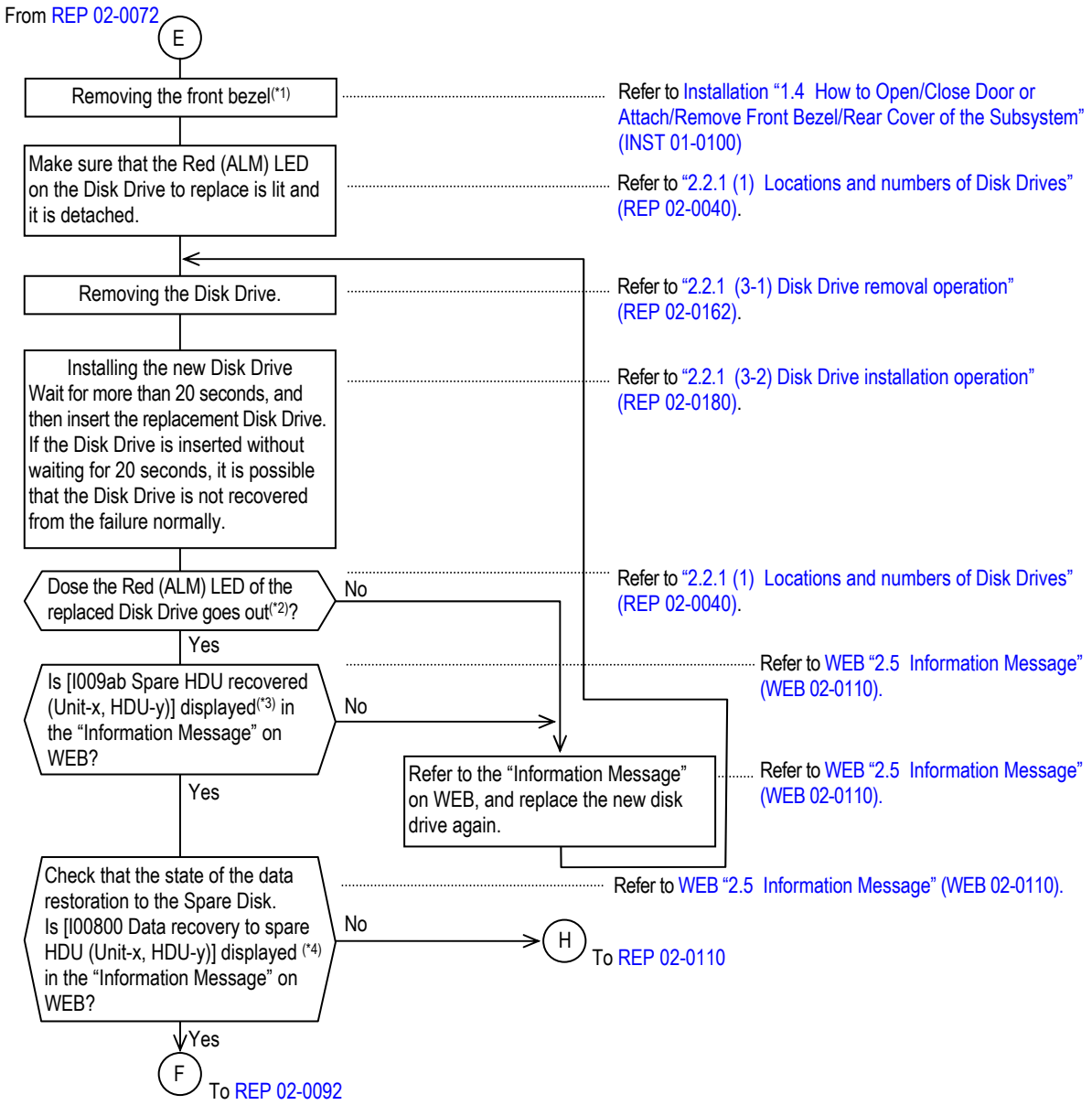


*1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic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

*2 : Wait if the READY LED (green) on the front of the Basic Chassis is blinking at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH.

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

*4 : For the RKAKX, attach the top cover, store the subsystem in the rack, and then attach the front bezel.

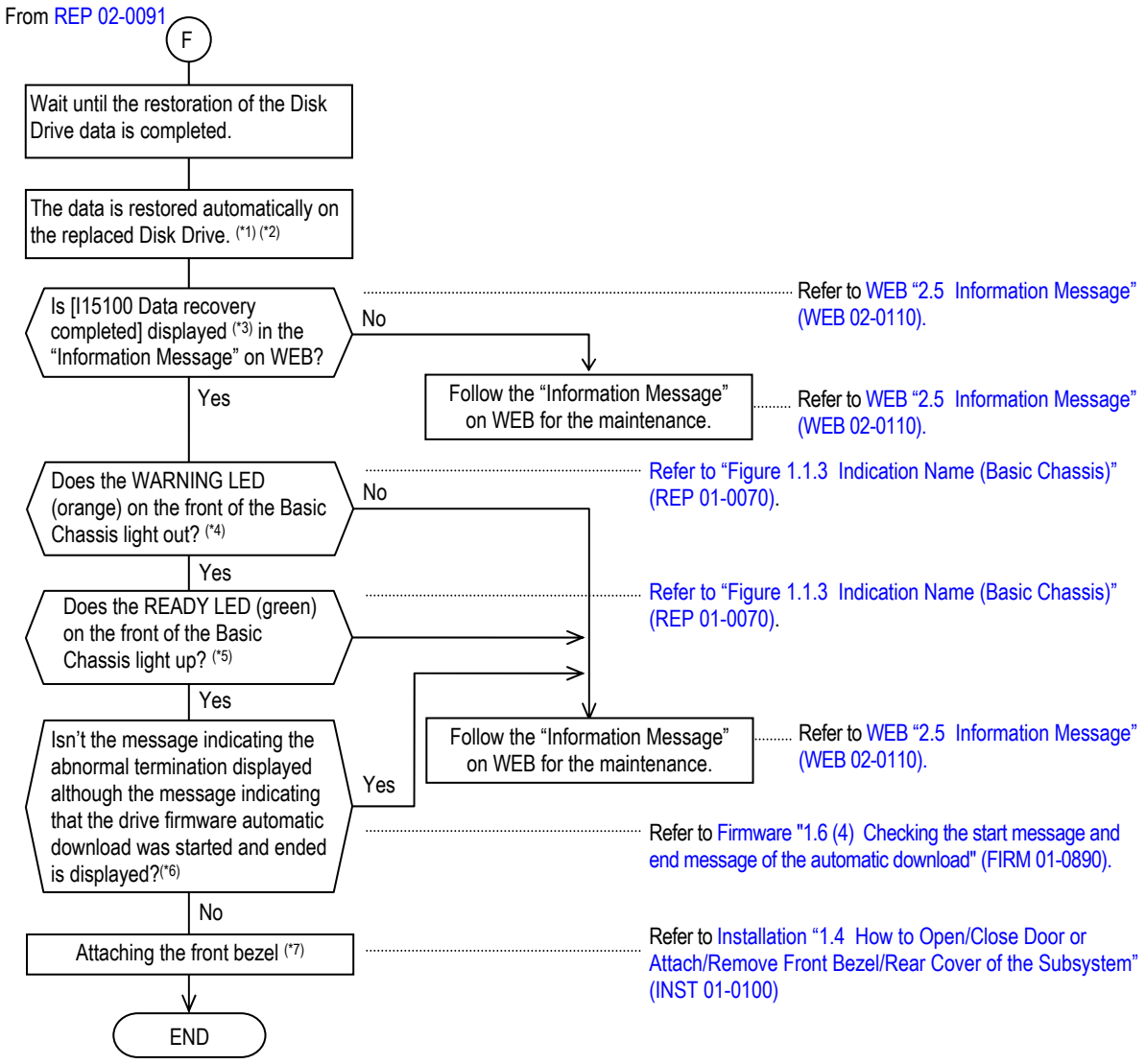


*1 : For the RKAKX, remove the front bezel, pull the subsystem out of the rack, and remove the top cover.

*2 : The red (ALM) LED of the Disk Drive lights off within about five minutes after the Disk Drive is inserted.
When the Red (ALM) LED is not turned off, remove the inserted Disk Drive from the chassis, and insert it again after 20 seconds or more passed.
However, if the Disk Drive is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the Red (ALM) LED of the replaced Disk Drive may not be turned off.
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted Disk Drive from the chassis, and insert it again after 20 seconds or more passed.

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

*4 : It will take time until this message is displayed. Refer to "Table 2.2.2 Standard Time Required for the Correction Copy or Copy Back (SAS Disk Drive)" (REP 02-0240)/"Table 2.2.2.1 Standard Time Required for the Correction Copy or Copy Back (SAS(SED) Disk Drive)" (REP 02-0251)/"Table 2.2.3 Standard Time Required for the Correction Copy or Copy Back (SATA Disk Drive)" (REP 02-0260)/"Table 2.2.3.1 Standard Time Required for the Correction Copy or Copy Back (SAS7.2K Disk Drive)" (REP 02-0271)/"Table 2.2.3.2 Standard Time Required for the Correction Copy or Copy Back (Flash Drive)" (REP 02-0273) for the standard of the time required.



*1 : In case of it is set to automatic recovery mode. However, the copy back does not operate until completing the RAID group expansion incase of the Disk 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 Disk 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 "3.5 Checking the Status of Disk Drive" (SYSPR 03-0430).)

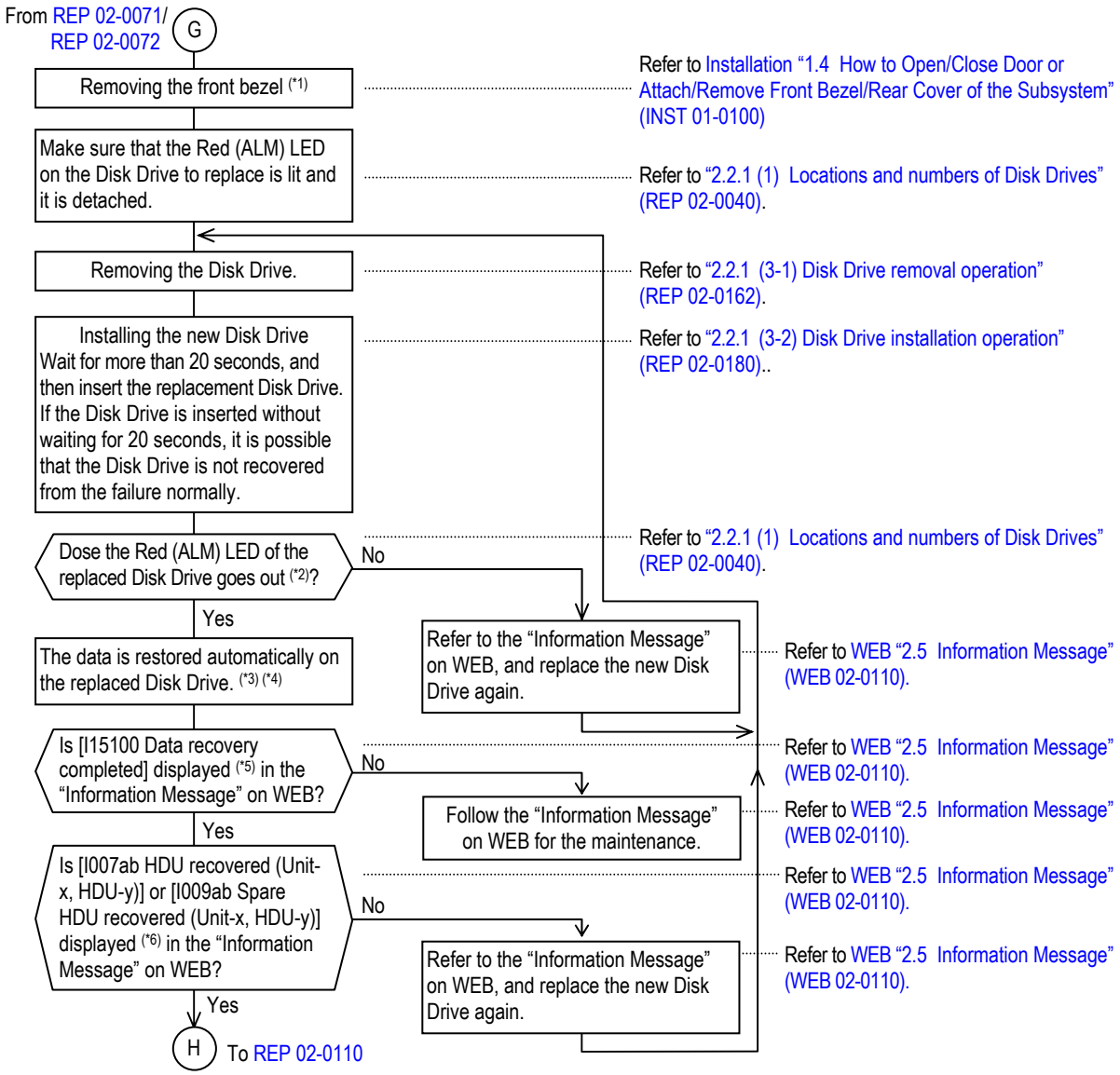
*3 : It will take time until this message is displayed. Refer to "Table 2.2.2 Standard Time Required for the Correction Copy or Copy Back (SAS Disk Drive)" (REP 02-0240)/"Table 2.2.2.1 Standard Time Required for the Correction Copy or Copy Back (SAS(SED) Disk Drive)" (REP 02-0251)/"Table 2.2.3 Standard Time Required for the Correction Copy or Copy Back (SATA Disk Drive)" (REP 02-0260)/"Table 2.2.3.1 Standard Time Required for the Correction Copy or Copy Back (SAS7.2K Disk Drive)" (REP 02-0271)/"Table 2.2.3.2 Standard Time Required for the Correction Copy or Copy Back (Flash Drive)" (REP 02-0273) 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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

*5 : Wait if the READY LED (green) on the front of the Basic Chassis is blinking at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH).

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

*7 : For the RKAKX, attach the top cover, store the subsystem in the rack, and then attach the front bezel.



*1 : For the RKAKX, remove the front bezel, pull the subsystem out of the rack, and remove the top cover.

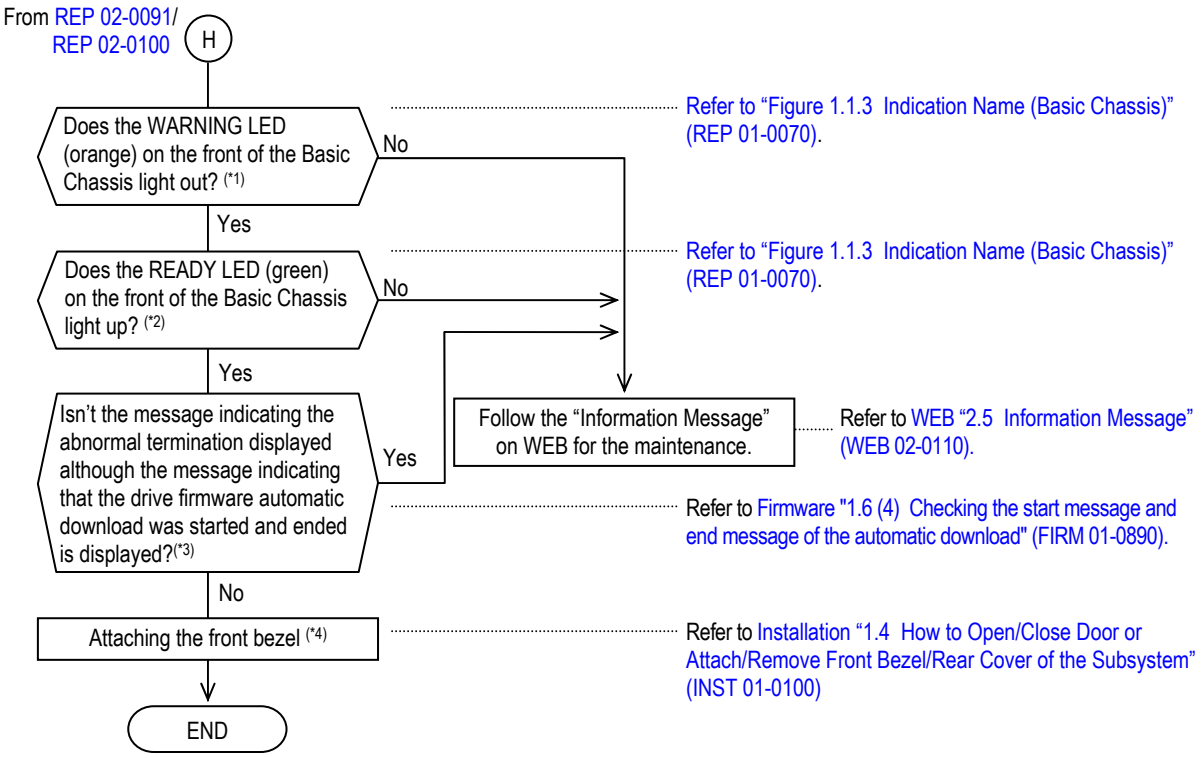
*2 : The red (ALM) LED of the Disk Drive lights off within about five minutes after the Disk Drive is inserted. When the Red (ALM) LED is not turned off, remove the inserted Disk Drive from the chassis, and insert it again after 20 seconds or more passed. However, if the Disk Drive is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the Red (ALM) LED of the replaced Disk Drive may not be turned off. After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted Disk Drive from the chassis, and insert it again after 20 seconds or more passed.

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

*4 : Open the Unit screen in the Storage Navigator Modular 2. Double click the Disk 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 "3.5 Checking the Status of Disk Drive" (SYSPR 03-0430).)

*5 : It will take time until this message is displayed. Refer to "Table 2.2.2 Standard Time Required for the Correction Copy or Copy Back (SAS Disk Drive)" (REP 02-0240)/"Table 2.2.2.1 Standard Time Required for the Correction Copy or Copy Back (SAS(SED) Disk Drive)" (REP 02-0251)/"Table 2.2.3 Standard Time Required for the Correction Copy or Copy Back (SATA Disk Drive)" (REP 02-0260)/"Table 2.2.3.1 Standard Time Required for the Correction Copy or Copy Back (SAS7.2K Disk Drive)" (REP 02-0271)/"Table 2.2.3.2 Standard Time Required for the Correction Copy or Copy Back (Flash Drive)" (REP 02-0273) for the standard of the time required.

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



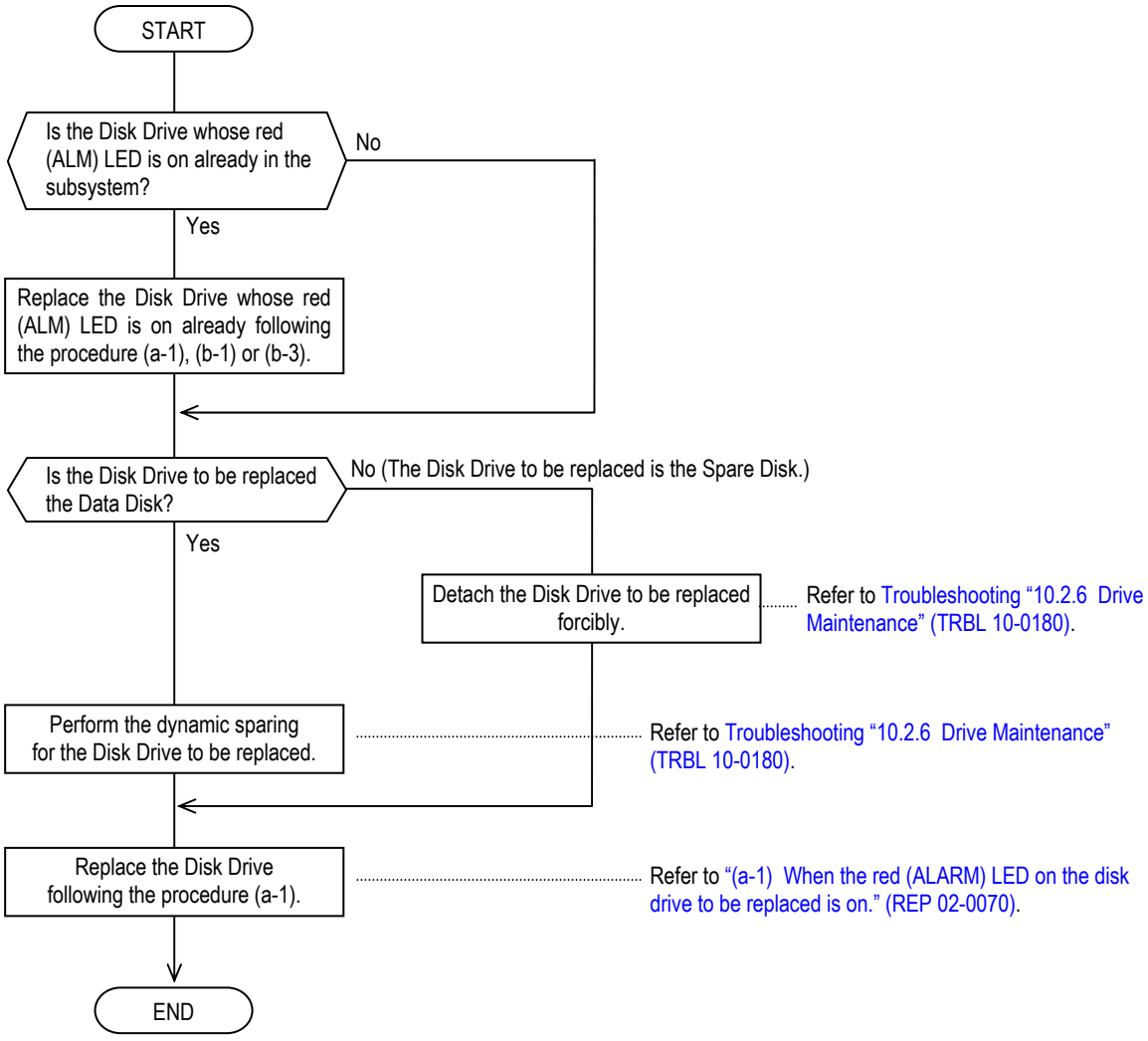
*1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic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

*2 : Wait if the READY LED (green) on the front of the Basic Chassis is blinking at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH.

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

*4 : For the RKAKX, attach the top cover, store the subsystem in the rack, and then attach the front bezel.

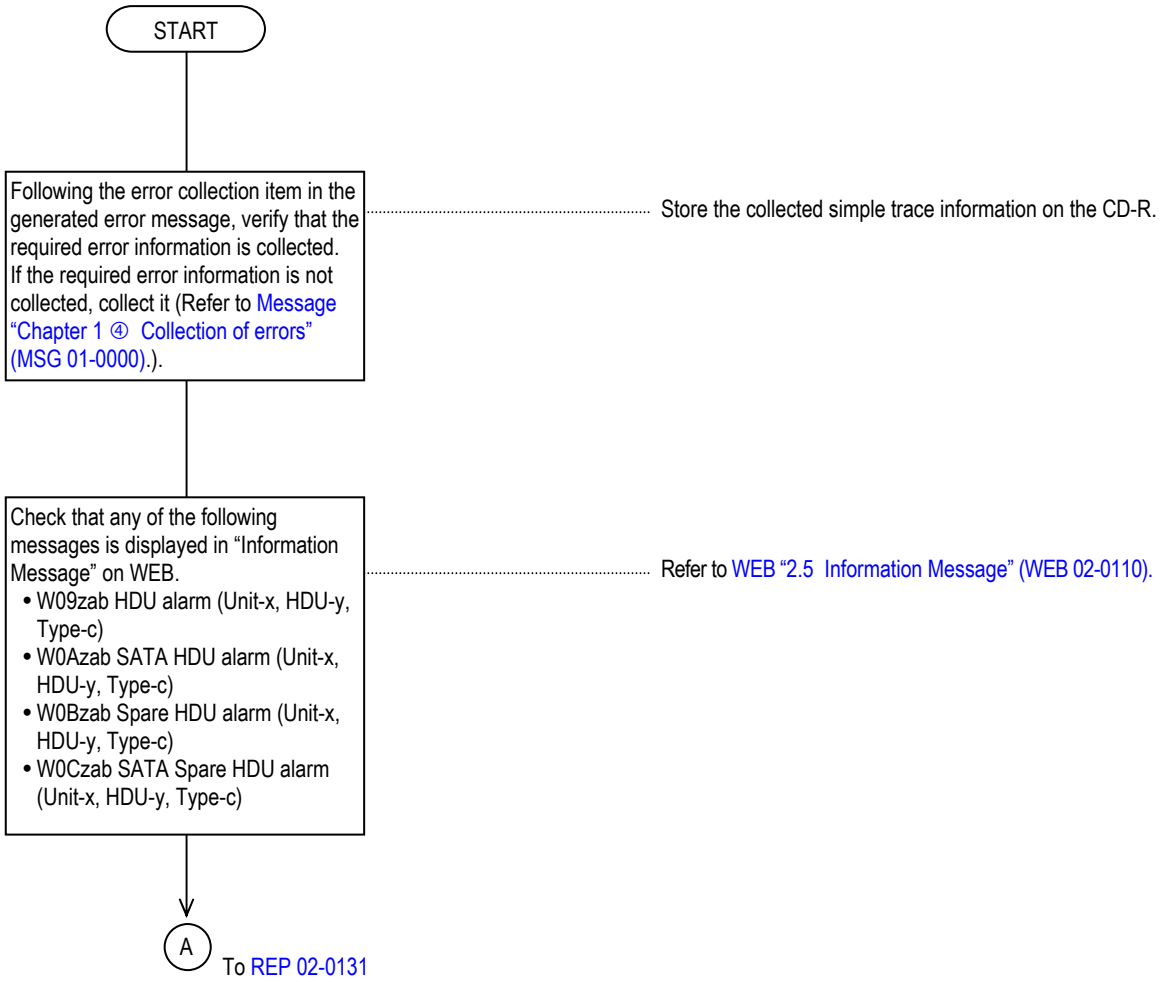
(a-2) When the red (ALM) LED on the Disk Drive to be replaced is off.

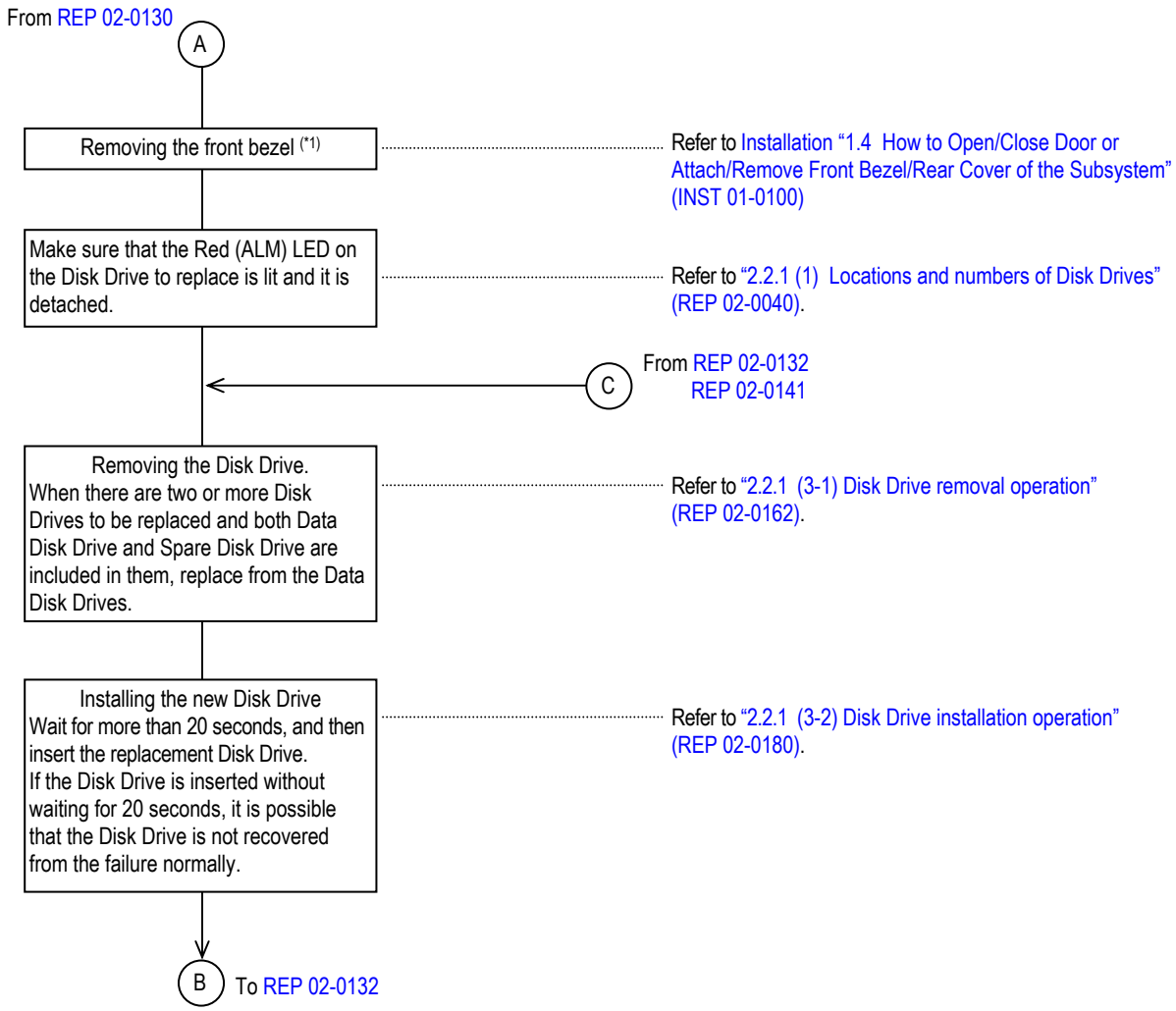


(b) The Spare Disk is not set or there is no Spare Disk that can be used

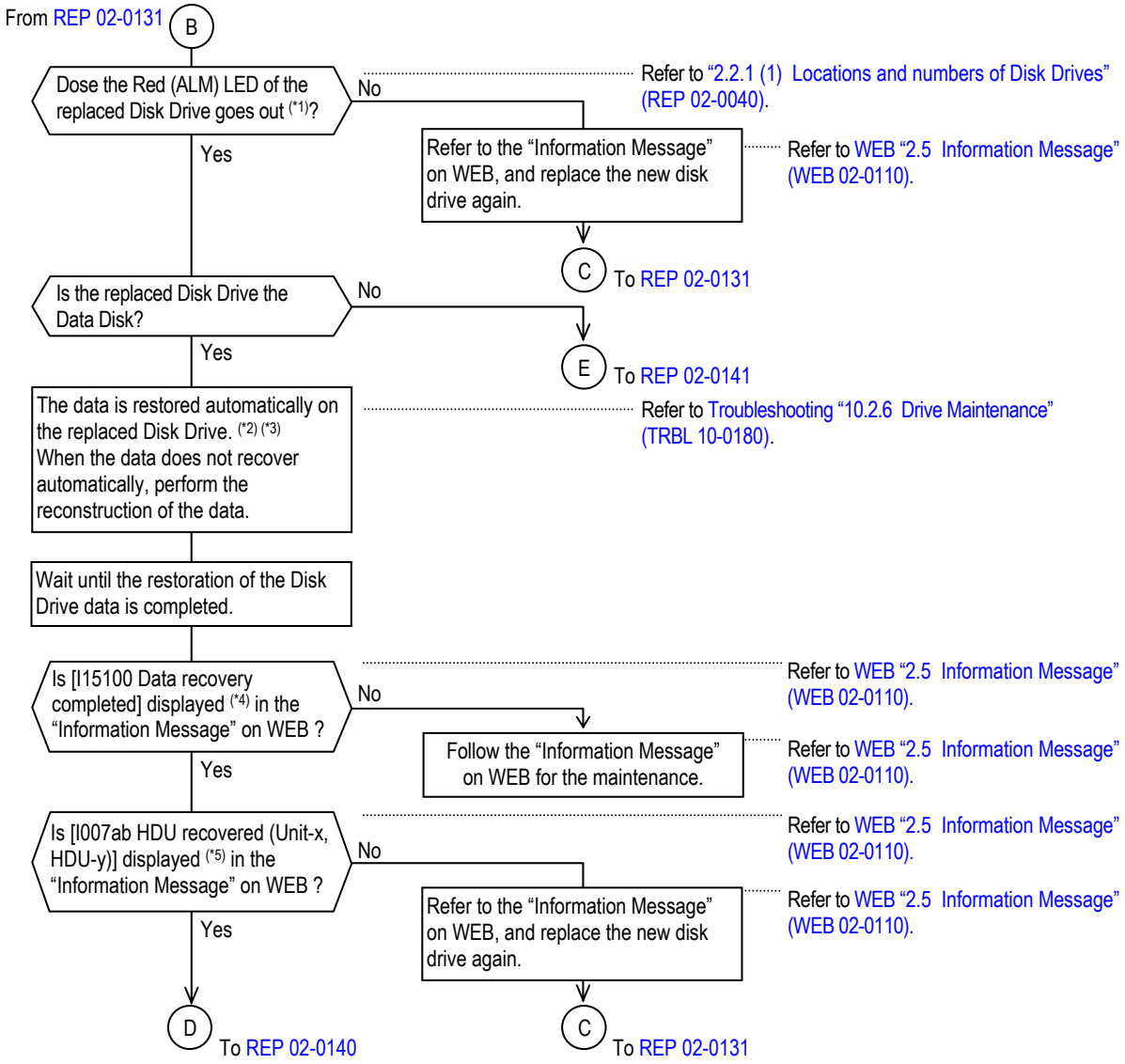
(b-1) Replacing Disk Drive in RAID 1, 5, 6, or 1+0 configuration
(When the red (ALM) LED is on)

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





*1 : For the RKAKX, remove the front bezel, pull the subsystem out of the rack, and remove the top cover.



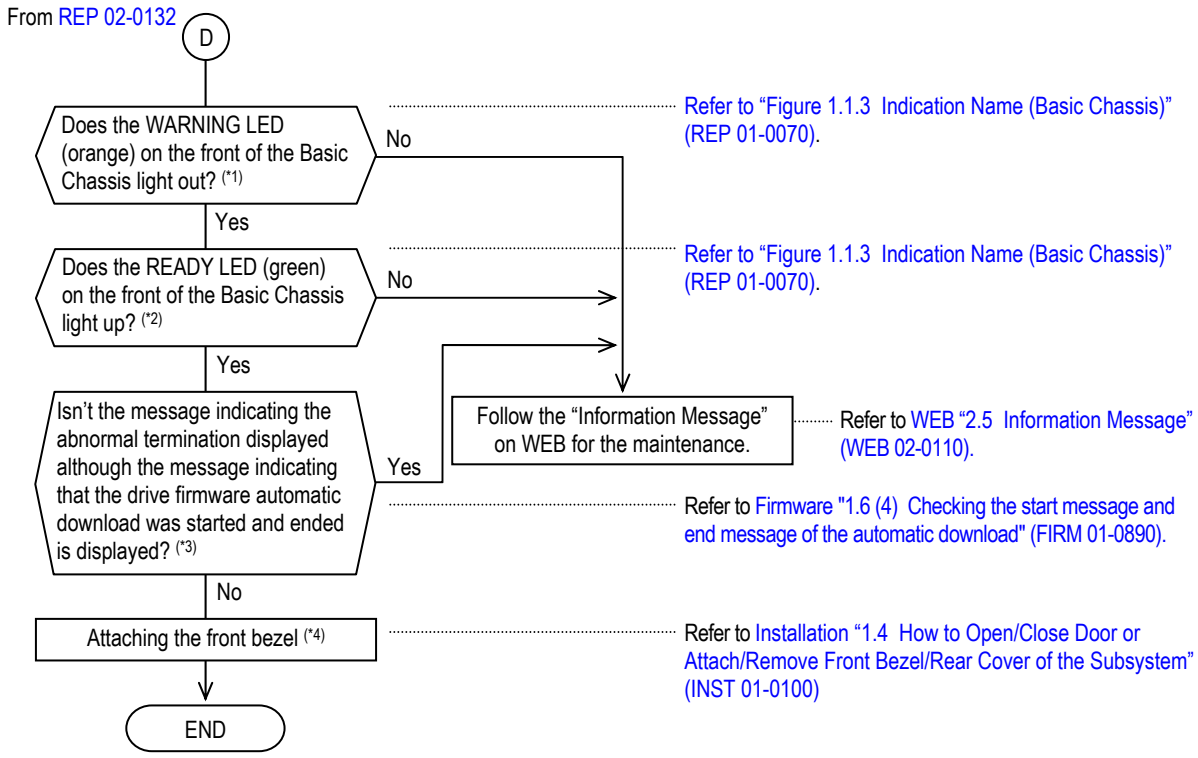
*1 : The red (ALM) LED of the Disk Drive lights off within about five minutes after the Disk Drive is inserted.
When the Red (ALM) LED is not turned off, remove the inserted Disk Drive from the chassis, and insert it again after 20 seconds or more passed.
However, if the Disk Drive is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the Red (ALM) LED of the replaced Disk Drive may not be turned off.
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted Disk Drive from the chassis, and insert it again after 20 seconds or more passed.

*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 Disk 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 "3.5 Checking the Status of Disk Drive" (SYSPR 03-0430).)

*4 : It will take time until this message is displayed. Refer to "Table 2.2.2 Standard Time Required for the Correction Copy or Copy Back (SAS Disk Drive)" (REP 02-0240)/"Table 2.2.2.1 Standard Time Required for the Correction Copy or Copy Back (SAS(SED) Disk Drive)" (REP 02-0251)/"Table 2.2.3 Standard Time Required for the Correction Copy or Copy Back (SATA Disk Drive)" (REP 02-0260)/"Table 2.2.3.1 Standard Time Required for the Correction Copy or Copy Back (SAS7.2K Disk Drive)" (REP 02-0271)/"Table 2.2.3.2 Standard Time Required for the Correction Copy or Copy Back (Flash Drive)" (REP 02-0273) for the standard of the time required.

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

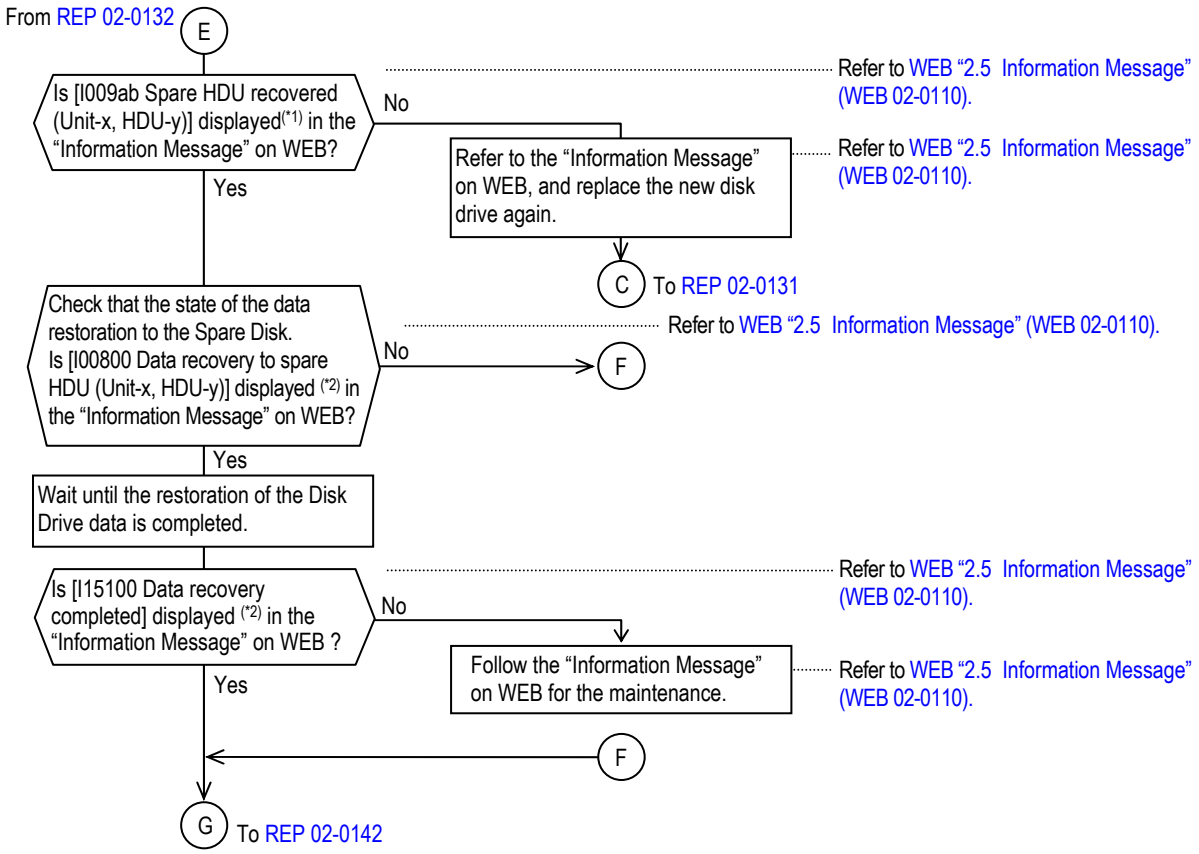


*1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic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

*2 : Wait if the READY LED (green) on the front of the Basic Chassis is blinking at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH.

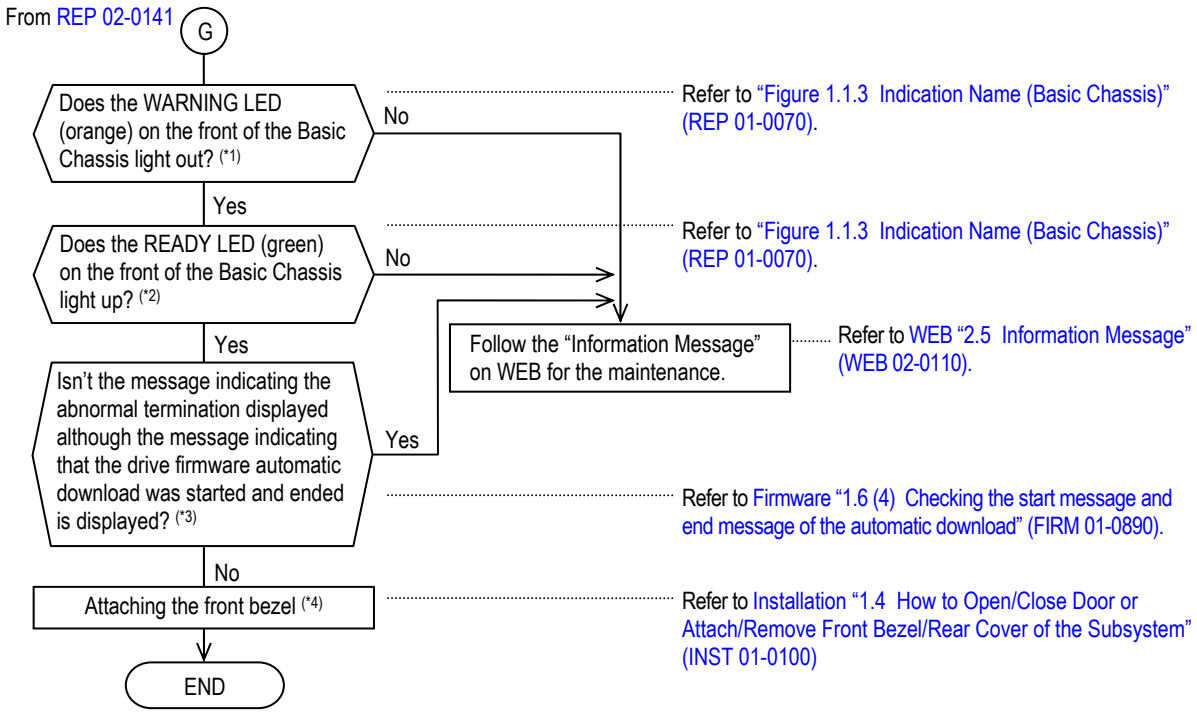
*3 : When the drive firmware version of the disk drive is new, the start message and completion message of the drive firmware automatic download are not displayed.

*4 : For the RKAKX, attach the top cover, store the subsystem in the rack, and then attach the front bezel.



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

*2 : It will take time until this message is displayed. Refer to "Table 2.2.2 Standard Time Required for the Correction Copy or Copy Back (SAS Disk Drive)" (REP 02-0240)/"Table 2.2.2.1 Standard Time Required for the Correction Copy or Copy Back (SAS(SED) Disk Drive)" (REP 02-0251)/"Table 2.2.3 Standard Time Required for the Correction Copy or Copy Back (SATA Disk Drive)" (REP 02-0260)/"Table 2.2.3.1 Standard Time Required for the Correction Copy or Copy Back (SAS7.2K Disk Drive)" (REP 02-0271)/"Table 2.2.3.2 Standard Time Required for the Correction Copy or Copy Back (Flash Drive)" (REP 02-0273) for the standard of the time required.



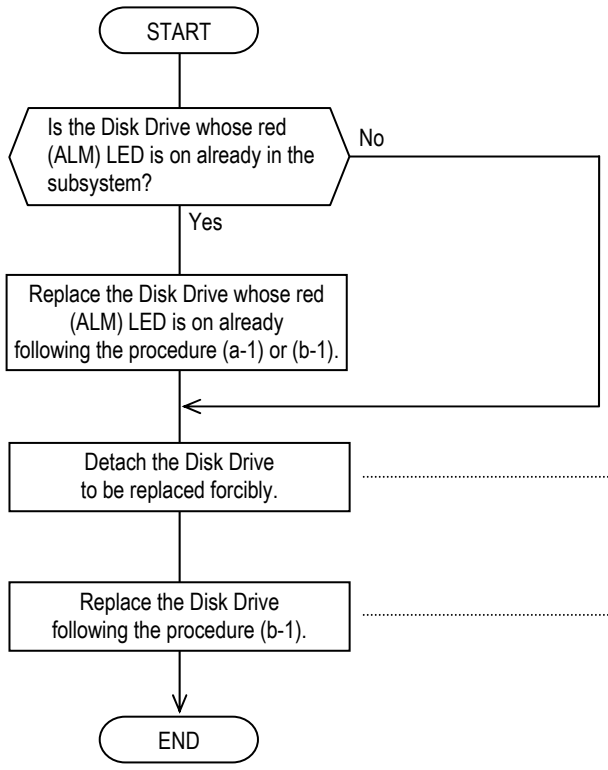
*1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic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

*2 : Wait if the READY LED (green) on the front of the Basic Chassis is blinking at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH.

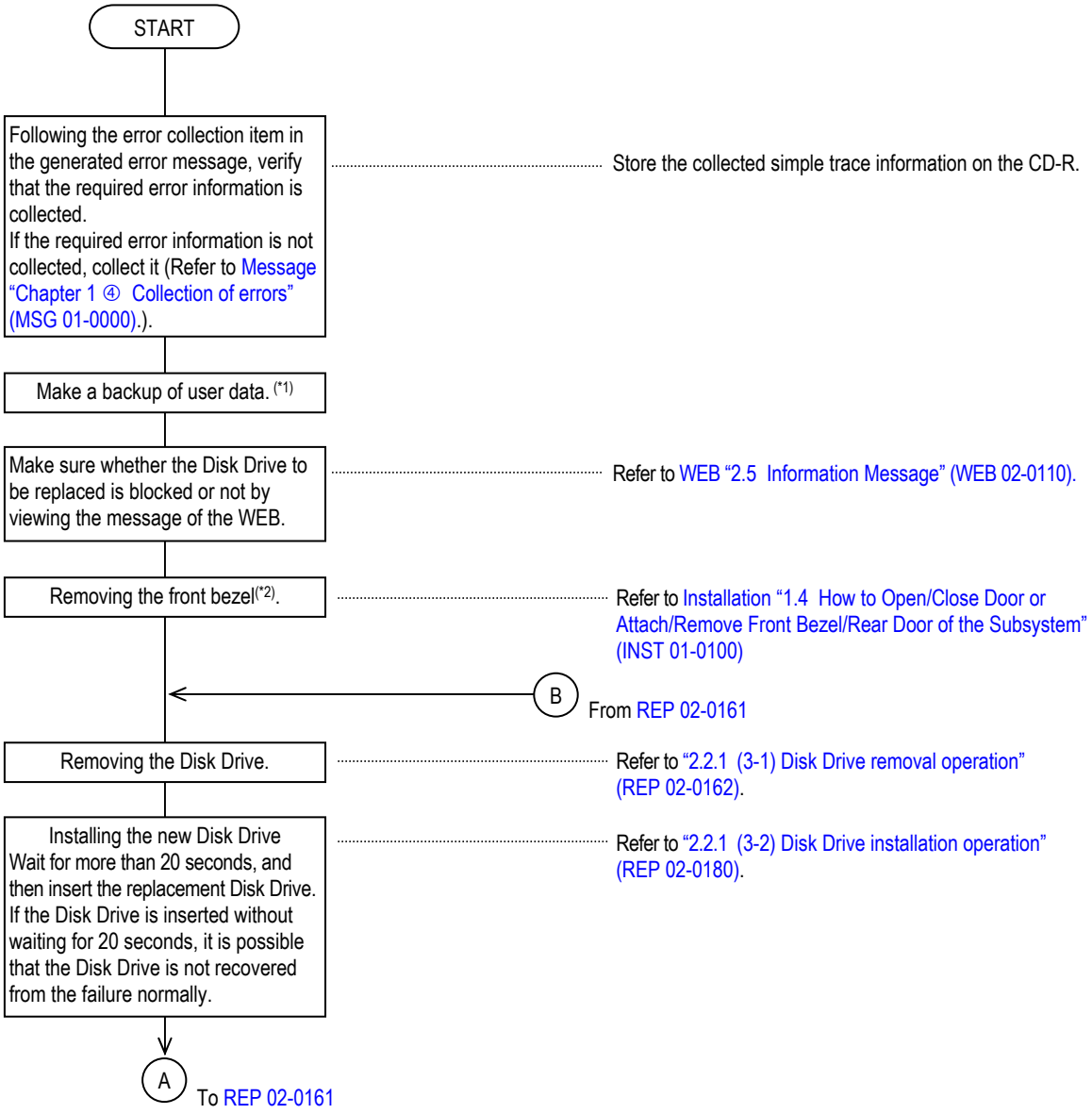
*3 : When the drive firmware version of the disk drive is new, the start message and completion message of the drive firmware automatic download are not displayed.

*4 : For the RKAKX, attach the top cover, store the subsystem in the rack, and then attach the front bezel.

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

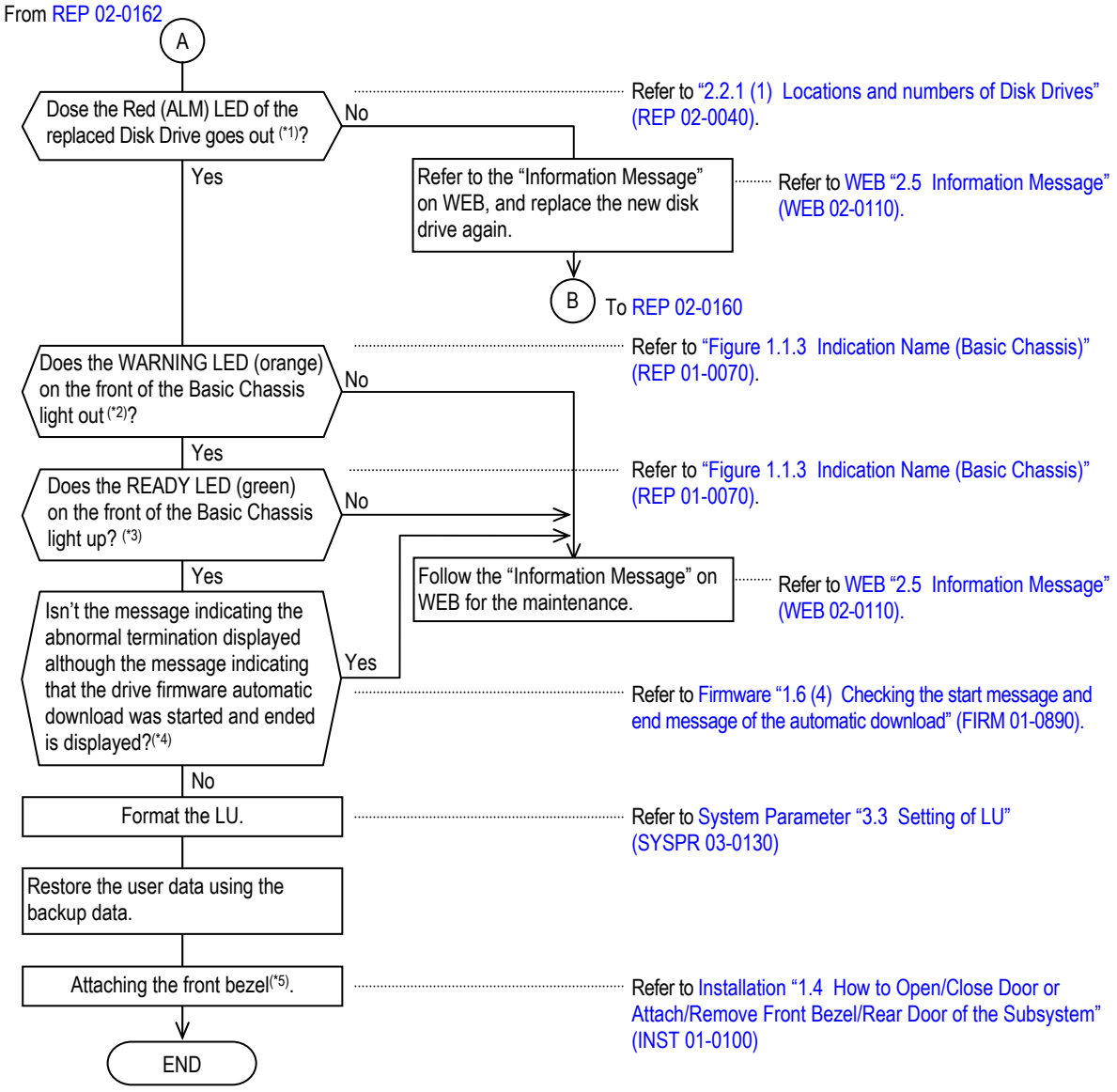


(b-3) Replacement of Disk Drive under RAID 0 configuration



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

*2 : For the RKAKX, remove the front bezel, pull the subsystem out of the rack, and remove the top cover.



*1 : The red (ALM) LED of the Disk Drive lights off within about five minutes after the Disk Drive is inserted.
When the Red (ALM) LED is not turned off, remove the inserted Disk Drive from the chassis, and insert it again after 20 seconds or more passed.
However, if the Disk Drive is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the Red (ALM) LED of the replaced Disk Drive may not be turned off.
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted Disk Drive from the chassis, 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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

*3 : Wait if the READY LED (green) on the front of the Basic Chassis is blinking at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH).

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

*5 : For the RKAKX, attach the top cover, store the subsystem in the rack, and then attach the front bezel.

(3) Disk Drive removing and installing operation

CAUTION

- **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.**
- **Disk Drives are precision components. Be careful not to expose drives to hard shock.**
- **When you install Control Unit, support its metal part with your hand that has the wrist strap. You can discharge static electricity by touching the metal plate.**

(3-1) Disk Drive removal operation

The size and removal operation of Disk Drive vary depending on the subsystem to be installed.

Check the subsystem and the Disk Drive before starting the work.

(a) Disk Drive for RKM/RKS/RKAK

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

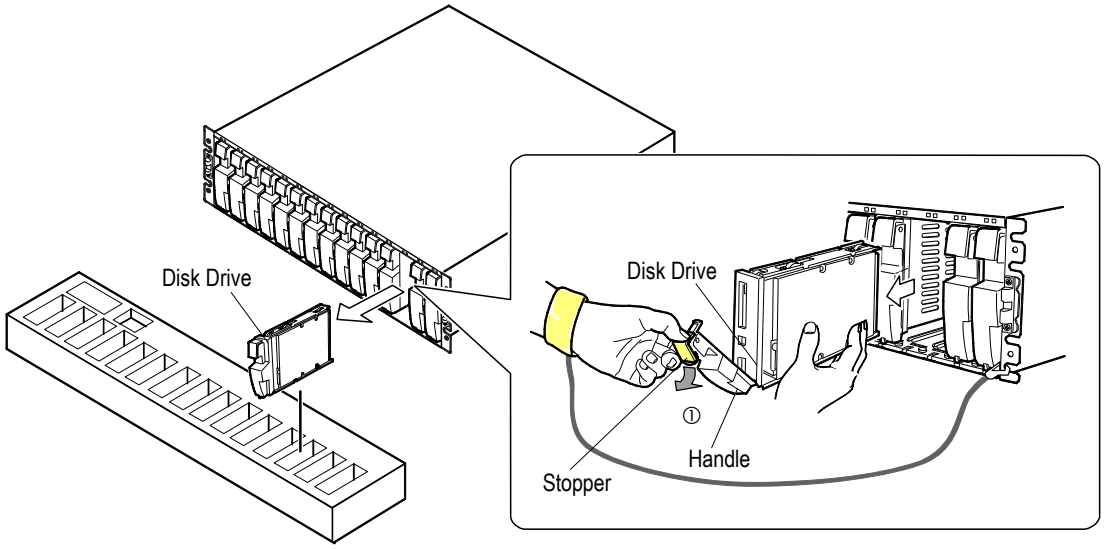


Figure 2.2.3.1 Disk Drive Removal Operation (RKM/RKS/RKAK)

(b) Disk Drive for RKAKX

Open the handle (①) toward you, and then pull up and remove the Disk Drive to be replaced not to give a shock.

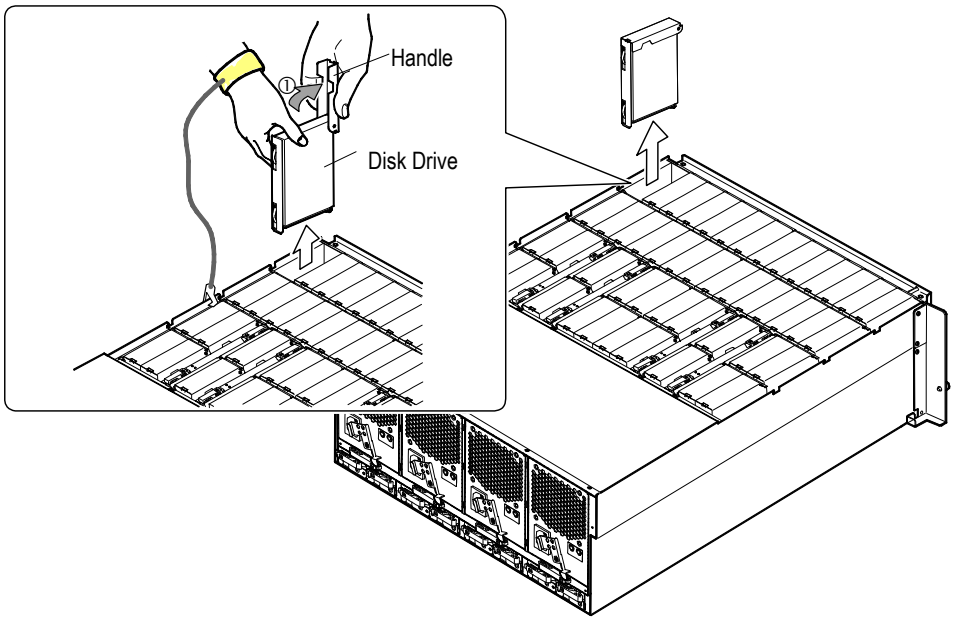


Figure 2.2.3.2 Disk Drive Removal Operation (RKAKX)

(c) Disk Drive for RKAKS

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

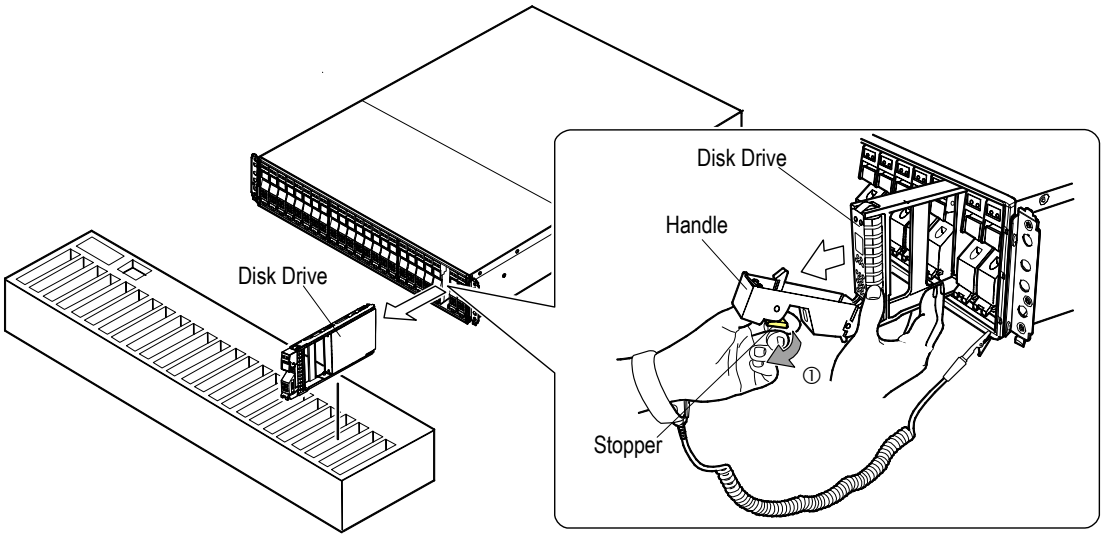


Figure 2.2.3.3 Disk Drive Removal Operation (RKAKS)

(3-2) Disk Drive installation operation

The size and installation operation of Disk Drive vary depending on the subsystem to be installed.

Check the subsystem and the Disk Drive before starting the work.

(a) Disk Drive for RKM/RKS/RKAK

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

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

(iii) Raise the stopper, which has been titled 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 Disk Drive cannot be installed correctly because it runs into the frame of the disk array unit.

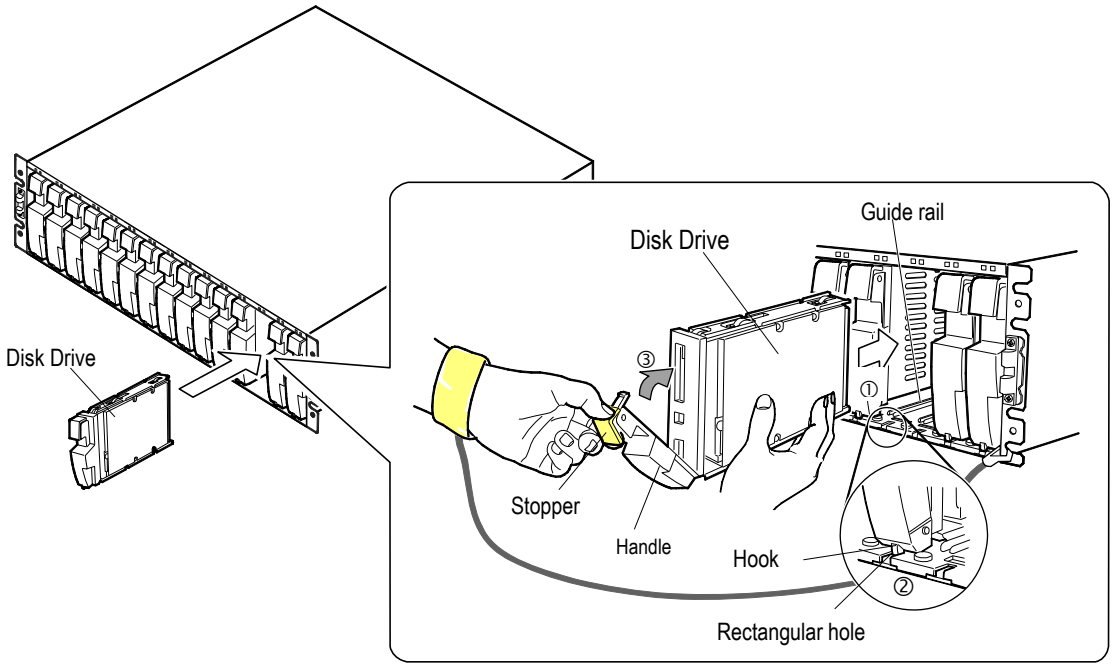


Figure 2.2.3.4 Disk Drive Installation Operation (RKM/RKS/RKAK)

(b) Disk Drive for RKAKX

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

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

(ii) Close the handle (②).

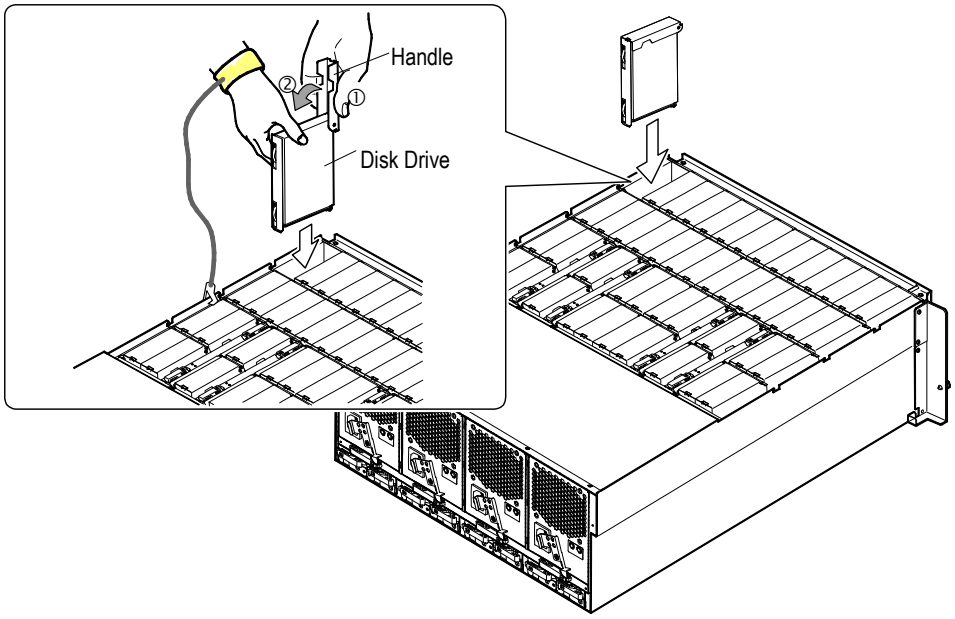


Figure 2.2.3.5 Disk Drive Installation Operation (RKAKX)

(c) Disk Drive for RKAKS

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

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

(iii) Raise the stopper, which has been titled 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 Disk Drive cannot be installed correctly because it runs into the frame of the disk array unit.

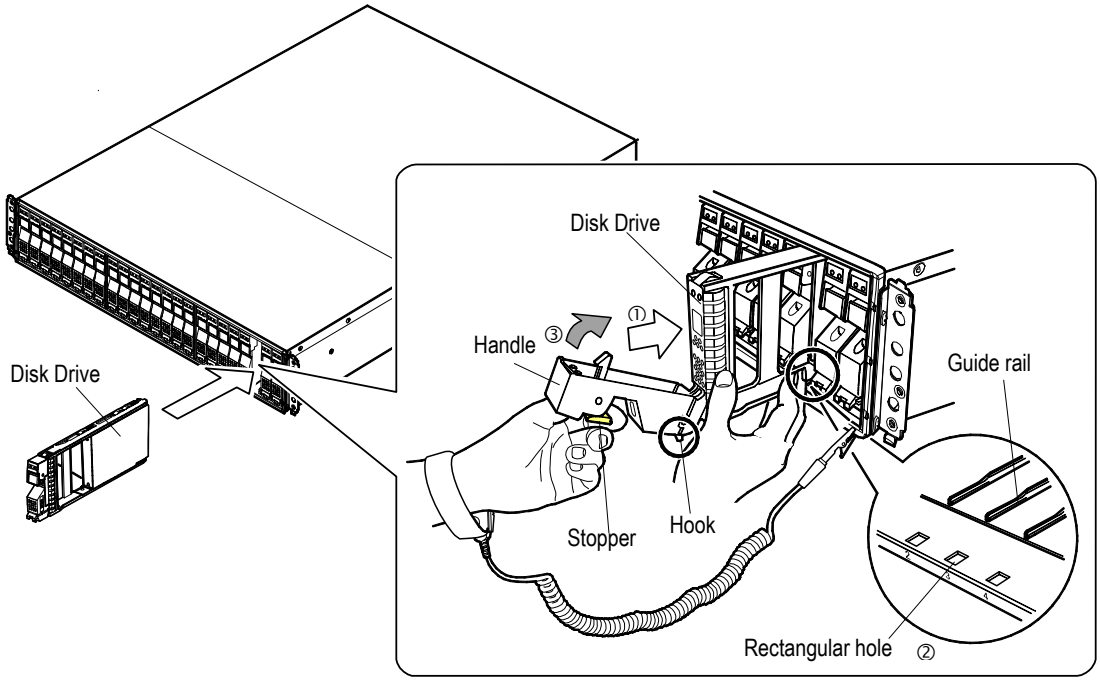


Figure 2.2.3.6 Disk Drive Installation Operation (RKAKS)

This page is for editorial purpose only.

(4) Disk Drive threshold

Errors counted in this subsystem 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 Disk Drive is detached.

Table 2.2.1 Error and Threshold Value

No.	Kind of error	Threshold (Default) (Once/24 hours)							
		The Spare Disk is set				The Spare Disk is not set			
		SAS/ SAS(SED)	SATA	SAS7.2K	Flash Drive	SAS/ SAS(SED)	SATA	SAS7.2K	Flash Drive
1	Disk mechanical error. (Recovered)	50	50	-	50	50	50	-	50
2	Disk mechanical error. (Un-recovered)	2	2	-	2	2	2	-	2
3	A Disk Drive failure that becomes a factor to execute reassignment • Disk medium error. (Recovered) • Disk medium error. (Un-recovered) • Collectable errors in online verify. • Un-correctable errors in online verify.	25	50	-	25	200	100	-	200
4	Disk R/W error. (Recovered)	10	10	-	10	10	10	-	10
5	Disk R/W error. (Un-recovered)	2	2	-	2	2	2	-	2
6	Disk I/F error. (Recovered)	50	50	-	50	50	50	-	50
7	Disk I/F error. (Un-recovered)	2	2	-	2	2	2	-	2
8	Disk hardware error. (Recovered)	50	50	-	50	50	50	-	50
9	Disk hardware error. (Un-recovered)	2	2	-	2	2	2	-	2
10	Disk SCSI I/F error. (Recovered)	50	50	-	50	50	50	-	50
11	Disk SCSI I/F error. (Un-recovered)	2	2	-	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 disk 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 subsystem is turned off (the subsystem performs the planned shutdown).

‡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 02-0110)) change successively as shown below.

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

W09zab HDU alarm (Unit-x, HDU-y, Type-c)
W0Azab SATA HDU alarm (Unit-x, HDU-y, Type-c)
…… : Data Disk 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 Disk

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

W0Bzab Spare HDU alarm (Unit-x, HDU-y, Type-c)
W0Czab SATA Spare HDU alarm (Unit-x, HDU-y, Type-c)
…… : Spare Disk blocked(‡1) (‡2)

‡1 : This message has set "Spare Drive Operation Mode" of "Configuration Settings" – "Restore Options" of the Hitachi Storage Navigator Modular 2 to variable (default value), and it is displayed after the Disk Drive restoration is completed if the capacity and the rotational speed of the blocked Disk Drive and the Spare Disk at the data recovery destination are matched and both of them are not the Disk Drives of the RKAK/RKAKX/RKAKS when "Applying No Copy Back Mode on All the Units" is set to disable. Also, this message is displayed after the Disk Drive restoration is completed if the Disk Drive capacity of the blocked Disk Drive and the Spare Disk at the data recovery destination is matched when "Spare Drive Operation Mode" is variable and "Applying No Copy Back Mode on All the Units" is set to enable.
However, if the Power Saving function is enabled, copy back is performed in the following four cases even if Spare Drive Operation Mode has been set to the default mode, which is copy back less.
Furthermore, the operation differs depending on whether the firmware version is more than or equal to 08C4/A or less than 08C4/A. (In the version of 08C4/J or more, a Flash Drive operates according to the Spare Drive Operation Mode setting.)

License key status			Target Spare Disk			
		Source data drive	Less than 08C4/A		08C4/A or more	
			System drive	Non system drive	System drive	Non system drive
Power Saving	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 Disk Drives #0 to #4 in RKM/RKS, Disk Drives #0 to #4 of Unit ID#0 in RKAK/RKAKS connected to RKH, or Disk Drives #A0 to #A4 in RKAKX.

(The copy-back operates for maintaining the power saving status that can be changed in the version less than 08C4/A. The specification changed to remedy the problems such as the useless copy-back operation among system drives and the biased Spare Disk for the system drives.)

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

(b) Data recover (Dynamic sparing from data disk to Spare Disk)

I6JM00 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 disk 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 Disk

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

…… : The blocked data disk is changed to the Spare Disk, and the Spare Disk before the failure is changed to the data disk.(‡2)

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

W0Azab SATA HDU alarm (Unit-x, HDU-y, Type-c)

…… : Data Disk blocked(‡3)

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

W0Czab SATA Spare HDU alarm (Unit-x, HDU-y, Type-c)

…… : Spare Disk blocked(‡4) (‡5)

‡1 : It is displayed in the Hitachi Storage Navigator Modular 2 Ver.12.50 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 : This message has set "Spare Drive Operation Mode" of "Configuration Settings" – "Restore Options" of the Hitachi Storage Navigator Modular 2 to variable (default value), and it is displayed after the Disk Drive restoration is completed if the capacity and the rotational speed of the blocked Disk Drive and the Spare Disk at the data recovery destination are matched and both of them are not the Disk Drives of the RKAK/RKAKX/RKAKS when "Applying No Copy Back Mode on All the Units" is set to disable. Also, this message is displayed after the Disk Drive restoration is completed if the Disk Drive capacity of the blocked Disk Drive and the Spare Disk at the data recovery destination is matched when "Spare Drive Operation Mode" is variable and "Applying No Copy Back Mode on All the Units" is set to enable.

However, if the Power Saving function is enabled, copy back is performed in the following four cases even if Spare Drive Operation Mode has been set to the default mode, which is copy back less.

Furthermore, the operation differs depending on whether the firmware version is more than or equal to 08C4/A or less than 08C4/A. (In the version of 08C4/J or more, a Flash Drive operates according to the Spare Drive Operation Mode setting.)

License key status			Target Spare Disk			
		Source data drive	Less than 08C4/A		08C4/A or more	
			System drive	Non system drive	System drive	Non system drive
Power Saving	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 Disk Drives #0 to #4 in RKM/RKS, Disk Drives #0 to #4 of Unit ID#0 in RKAK/RKAKS connected to RKH, or Disk Drives #A0 to #A4 in RKAKX.

(The copy-back operates for maintaining the power saving status that can be changed in the version less than 08C4/A. The specification changed to remedy the problems such as the useless copy-back operation among system drives and the biased Spare Disk 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 Disk Drives, including the Disk Drives #0 to #4 of the RKM/RKS or the Disk Drives #0 to #4 of the RKAK/RKAKS corresponding to the unit ID #0 connected to the RKH, the Disk Drive #A0 to #A4 of the RKAKX, are replaced.

(6) Confirming completion of data recovery or copy back

Select "Information Message" from the WEB (WEB "2.5 Information Message" (WEB 02-0110)) and make sure that the data recovery is completed normally.

Table 2.2.2 or Table 2.2.3 shows the standard of the time required of the Correction copy and the Copy back when selecting optional numbers of the Disk 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 Disk 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 Disk Drives. Therefore, when the data of two or more Disk Drives (n Disk Drives) was recovered, the time that it takes to complete recovering all the data of the n Disk Drives becomes n times the standard time.

Table 2.2.2 Standard Time Required for the Correction Copy or Copy Back(‡1) (3.5-type SAS Disk Drive)

Unit : min

Item				Disk Drive (G byte)(*1)	142.61	287.62	392.73	439.44	575.30
Correction copy(*2)	AMS2300 AMS2100 AMS2010(*3)	4 Disk Drives	RAID 6	(2D+2P)	40	80	130	120	160
		6 Disk Drives		(4D+2P)	60	100	190	170	200
		10 Disk Drives		(8D+2P)	90	150	280	260	300
		14 Disk Drives		(12D+2P)	120	240	380	360	480
		18 Disk Drives		(16D+2P)	160	320	500	480	640
		30 Disk Drives		(28D+2P)	250	500	780	750	1000
		3 Disk Drives	RAID 5	(2D+1P)	30	60	110	90	120
		5 Disk Drives		(4D+1P)	50	100	160	150	200
		9 Disk Drives		(8D+1P)	80	160	250	240	320
		11 Disk Drives		(10D+1P)	100	200	310	300	400
		13 Disk Drives		(12D+1P)	120	240	380	360	480
		16 Disk Drives		(15D+1P)	140	280	440	420	560
		4 Disk Drives	RAID 1+0	(2D+2D)	40	80	130	120	160
		8 Disk Drives		(4D+4D)	40	80	130	120	160
		16 Disk Drives		(8D+8D)	40	80	130	120	160
		2 Disk Drives	RAID 1	(1D+1D)	40	80	130	120	160

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

*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 : RKEXS/RKEXSA/RKEXSB does not support 142.61 G bytes, 287.62 G bytes, and 392.73 G bytes Disk Drives.
RKEXS8F does not support 142.61 G bytes, and 392.73 G bytes Disk Drives.

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

Unit : min

Item				Disk Drive (G byte)(*1)	142.61	287.62	392.73	439.44	575.30
Correction copy(*2)	AMS2500	4 Disk Drives	RAID 6	(2D+2P)	30	60	90	90	120
		6 Disk Drives		(4D+2P)	50	100	160	150	200
		10 Disk Drives		(8D+2P)	80	160	250	240	320
		14 Disk Drives		(12D+2P)	120	240	380	360	480
		18 Disk Drives		(16D+2P)	150	300	470	450	600
		30 Disk Drives		(28D+2P)	250	500	780	750	1000
		3 Disk Drives	RAID5	(2D+1P)	30	60	90	90	120
		5 Disk Drives		(4D+1P)	50	100	160	150	200
		9 Disk Drives		(8D+1P)	80	160	250	240	320
		11 Disk Drives		(10D+1P)	100	200	310	300	400
		13 Disk Drives		(12D+1P)	120	240	380	360	480
		16 Disk Drives		(15D+1P)	140	280	440	420	560
		4 Disk Drives	RAID1+0	(2D+2D)	40	80	130	120	160
		8 Disk Drives		(4D+4D)	40	80	130	120	160
		16 Disk Drives		(8D+8D)	40	80	130	120	160
		2 Disk Drives	RAID1	(1D+1D)	40	80	130	120	160
Copy back(*2)	AMS2300 AMS2100 AMS2010(*3)	6 Disk Drives	RAID 6	(4D+2P)	40	80	130	120	160
		30 Disk Drives		(28D+2P)	40	80	130	120	160
		5 Disk Drives	RAID 5	(4D+1P)	40	80	130	120	160
		16 Disk Drives		(15D+1P)	40	80	130	120	160
		4 Disk Drives	RAID 1+0	(2D+2D)	40	80	130	120	160
		16 Disk Drives		(8D+8D)	40	80	130	120	160
		2 Disk Drives	RAID 1	(1D+1D)	40	80	130	120	160
	AMS2500	6 Disk Drives	RAID 6	(4D+2P)	40	80	130	120	160
		30 Disk Drives		(28D+2P)	40	80	130	120	160
		5 Disk Drives	RAID5	(4D+1P)	40	80	130	120	160
		16 Disk Drives		(15D+1P)	40	80	130	120	160
		4 Disk Drives	RAID1+0	(2D+2D)	40	80	130	120	160
		16 Disk Drives		(8D+8D)	40	80	130	120	160
		2 Disk Drives	RAID1	(1D+1D)	40	80	130	120	160

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

*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 : RKEXS/RKEXSA/RKEXSB does not support 142.61 G bytes, 287.62 G bytes, and 392.73 G bytes Disk Drives.
RKEXS8F does not support 142.61 G bytes, and 392.73 G bytes Disk Drives.

Table 2.2.2.1 Standard Time Required for the Correction Copy or Copy Back(‡1) (2.5-type SAS Disk Drive)

Unit : min

Item		Disk Drive (G byte)(*1)			287.62	575.30
Correction copy(*2)	AMS2300 AMS2100 AMS2010	4 Disk Drives	RAID 6	(2D+2P)	100	200
		6 Disk Drives		(4D+2P)	150	290
		10 Disk Drives		(8D+2P)	210	420
		14 Disk Drives		(12D+2P)	290	570
		18 Disk Drives		(16D+2P)	380	750
		30 Disk Drives		(28D+2P)	590	1170
		3 Disk Drives	RAID 5	(2D+1P)	90	170
		5 Disk Drives		(4D+1P)	120	240
		9 Disk Drives		(8D+1P)	190	380
		11 Disk Drives		(10D+1P)	240	470
		13 Disk Drives		(12D+1P)	290	570
		16 Disk Drives		(15D+1P)	330	660
		4 Disk Drives	RAID 1+0	(2D+2D)	100	200
		8 Disk Drives		(4D+4D)	100	200
		16 Disk Drives		(8D+8D)	100	200
		2 Disk Drives	RAID 1	(1D+1D)	100	200
Correction copy(*2)	AMS2500	4 Disk Drives	RAID 6	(2D+2P)	70	140
		6 Disk Drives		(4D+2P)	120	240
		10 Disk Drives		(8D+2P)	190	380
		14 Disk Drives		(12D+2P)	290	570
		18 Disk Drives		(16D+2P)	360	710
		30 Disk Drives		(28D+2P)	590	1170
		3 Disk Drives	RAID5	(2D+1P)	70	140
		5 Disk Drives		(4D+1P)	120	240
		9 Disk Drives		(8D+1P)	190	380
		11 Disk Drives		(10D+1P)	240	470
		13 Disk Drives		(12D+1P)	290	570
		16 Disk Drives		(15D+1P)	330	660
		4 Disk Drives	RAID1+0	(2D+2D)	100	200
		8 Disk Drives		(4D+4D)	100	200
		16 Disk Drives		(8D+8D)	100	200
		2 Disk Drives	RAID1	(1D+1D)	100	200

*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.

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

Unit : min

Item				Disk Drive (G byte)(*1)	287.62	575.30
Copy back(*2)	AMS2300 AMS2100 AMS2010	6 Disk Drives	RAID 6	(4D+2P)	100	200
		30 Disk Drives		(28D+2P)	100	200
		5 Disk Drives	RAID 5	(4D+1P)	100	200
		16 Disk Drives		(15D+1P)	100	200
		4 Disk Drives	RAID 1+0	(2D+2D)	100	200
		16 Disk Drives		(8D+8D)	100	200
		2 Disk Drives	RAID 1	(1D+1D)	100	200
	AMS2500	6 Disk Drives	RAID 6	(4D+2P)	100	200
		30 Disk Drives		(28D+2P)	100	200
		5 Disk Drives	RAID5	(4D+1P)	100	200
		16 Disk Drives		(15D+1P)	100	200
		4 Disk Drives	RAID1+0	(2D+2D)	100	200
		16 Disk Drives		(8D+8D)	100	200
		2 Disk Drives	RAID1	(1D+1D)	100	200

*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.

Table 2.2.2.2 Standard Time Required for the Correction Copy or Copy Back(‡1) (SAS(SED) Disk Drive)

Unit : min

Item		Disk Drive (G byte)(*1)			575.30
Correction copy(*2)	AMS2300 AMS2100	4 Disk Drives	RAID 6	(2D+2P)	160
		6 Disk Drives		(4D+2P)	200
		10 Disk Drives		(8D+2P)	300
		14 Disk Drives		(12D+2P)	480
		18 Disk Drives		(16D+2P)	640
		30 Disk Drives		(28D+2P)	1000
		3 Disk Drives	RAID 5	(2D+1P)	120
		5 Disk Drives		(4D+1P)	200
		9 Disk Drives		(8D+1P)	320
		11 Disk Drives		(10D+1P)	400
		13 Disk Drives		(12D+1P)	480
		16 Disk Drives		(15D+1P)	560
		4 Disk Drives	RAID 1+0	(2D+2D)	160
		8 Disk Drives		(4D+4D)	160
		16 Disk Drives		(8D+8D)	160
		2 Disk Drives	RAID 1	(1D+1D)	160
Correction copy(*2)	AMS2500	4 Disk Drives	RAID 6	(2D+2P)	120
		6 Disk Drives		(4D+2P)	200
		10 Disk Drives		(8D+2P)	320
		14 Disk Drives		(12D+2P)	480
		18 Disk Drives		(16D+2P)	600
		30 Disk Drives		(28D+2P)	1000
		3 Disk Drives	RAID5	(2D+1P)	120
		5 Disk Drives		(4D+1P)	200
		9 Disk Drives		(8D+1P)	320
		11 Disk Drives		(10D+1P)	400
		13 Disk Drives		(12D+1P)	480
		16 Disk Drives		(15D+1P)	560
		4 Disk Drives	RAID1+0	(2D+2D)	160
		8 Disk Drives		(4D+4D)	160
		16 Disk Drives		(8D+8D)	160
		2 Disk Drives	RAID1	(1D+1D)	160

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

*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.

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

Unit : min

Item				Disk Drive (G byte)(*1)	575.30
Copy back(*2)	AMS2300 AMS2100	6 Disk Drives	RAID 6	(4D+2P)	160
		30 Disk Drives		(28D+2P)	160
		5 Disk Drives	RAID 5	(4D+1P)	160
		16 Disk Drives		(15D+1P)	160
		4 Disk Drives	RAID 1+0	(2D+2D)	160
		16 Disk Drives		(8D+8D)	160
		2 Disk Drives	RAID 1	(1D+1D)	160
	AMS2500	6 Disk Drives	RAID 6	(4D+2P)	160
		30 Disk Drives		(28D+2P)	160
		5 Disk Drives	RAID5	(4D+1P)	160
		16 Disk Drives		(15D+1P)	160
		4 Disk Drives	RAID1+0	(2D+2D)	160
		16 Disk Drives		(8D+8D)	160
		2 Disk Drives	RAID1	(1D+1D)	160

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

*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.

Table 2.2.3 Standard Time Required for the Correction Copy or Copy Back(‡1) (SATA Disk Drive)

Unit : min

Item					Disk Drive (G byte)(*1) 491.25	737.49	983.69	1,968.52	2,953.31
Correction copy(*2)	AMS2300 AMS2100 AMS2010(*3)	4 Disk Drives	RAID 6	(2D+2P)	390	580	770	1540	2310
		6 Disk Drives		(4D+2P)	470	700	930	1860	2790
		10 Disk Drives		(8D+2P)	600	890	1180	2360	3540
		14 Disk Drives		(12D+2P)	810	1200	1590	3180	4770
		18 Disk Drives		(16D+2P)	980	1450	1930	3860	5790
		30 Disk Drives		(28D+2P)	1480	2190	2910	5820	8730
		3 Disk Drives	RAID 5	(2D+1P)	380	560	750	1500	2250
		5 Disk Drives		(4D+1P)	450	670	890	1780	2670
		9 Disk Drives		(8D+1P)	580	860	1140	2280	3420
		11 Disk Drives		(10D+1P)	660	980	1300	2600	3900
		13 Disk Drives		(12D+1P)	730	1080	1440	2880	4320
		16 Disk Drives		(15D+1P)	830	1230	1630	3260	4890
		4 Disk Drives	RAID 1+0	(2D+2D)	440	650	870	1740	2610
		8 Disk Drives		(4D+4D)	440	650	870	1740	2610
		16 Disk Drives		(8D+8D)	440	650	870	1740	2610
		2 Disk Drives	RAID 1	(1D+1D)	440	650	870	1740	2610
	AMS2500	4 Disk Drives	RAID 6	(2D+2P)	390	580	770	1540	2310
		6 Disk Drives		(4D+2P)	470	700	930	1860	2790
		10 Disk Drives		(8D+2P)	600	890	1180	2360	3540
		14 Disk Drives		(12D+2P)	810	1200	1590	3180	4770
		18 Disk Drives		(16D+2P)	980	1450	1930	3860	5790
		30 Disk Drives		(28D+2P)	1480	2190	2910	5820	8730
		3 Disk Drives	RAID5	(2D+1P)	380	560	750	1500	2250
		5 Disk Drives		(4D+1P)	450	670	890	1780	2670
		9 Disk Drives		(8D+1P)	580	860	1140	2280	3420
		11 Disk Drives		(10D+1P)	660	980	1300	2600	3900
		13 Disk Drives		(12D+1P)	730	1080	1440	2880	4320
		16 Disk Drives		(15D+1P)	830	1230	1630	3260	4890
		4 Disk Drives	RAID1+0	(2D+2D)	440	650	870	1740	2610
		8 Disk Drives		(4D+4D)	440	650	870	1740	2610
		16 Disk Drives		(8D+8D)	440	650	870	1740	2610
		2 Disk Drives	RAID1	(1D+1D)	440	650	870	1740	2610

*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 : AMS 2010 does not support 491.25 G bytes and 737.49 G bytes Disk Drives.

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

Unit : min

Item					Disk Drive (G byte)(*1) 491.25	737.49	983.69	1,968.52	2,953.31
Copy back(*2)	AMS2300 AMS2100 AMS2010(*3)	6 Disk Drives	RAID 6	(4D+2P)	440	650	870	1740	2610
		30 Disk Drives		(28D+2P)	440	650	870	1740	2610
		5 Disk Drives	RAID 5	(4D+1P)	440	650	870	1740	2610
		16 Disk Drives		(15D+1P)	440	650	870	1740	2610
		4 Disk Drives	RAID 1+0	(2D+2D)	440	650	870	1740	2610
		16 Disk Drives		(8D+8D)	440	650	870	1740	2610
		2 Disk Drives	RAID 1	(1D+1D)	440	650	870	1740	2610
	AMS2500	6 Disk Drives	RAID 6	(4D+2P)	440	650	870	1740	2610
		30 Disk Drives		(28D+2P)	440	650	870	1740	2610
		5 Disk Drives	RAID5	(4D+1P)	440	650	870	1740	2610
		16 Disk Drives		(15D+1P)	440	650	870	1740	2610
		4 Disk Drives	RAID1+0	(2D+2D)	440	650	870	1740	2610
		16 Disk Drives		(8D+8D)	440	650	870	1740	2610
		2 Disk Drives	RAID1	(1D+1D)	440	650	870	1740	2610

*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 : AMS 2010 does not support 491.25 G bytes and 737.49 G bytes Disk Drives.

Table 2.2.3.1 Standard Time Required for the Correction Copy or Copy Back(‡1) (SAS7.2K Disk Drive)

Unit : min

Item		Disk Drive (G byte)(*1)			1,956.94
Correction copy(*2)	AMS2300 AMS2100 AMS2010	4 Disk Drives	RAID 6	(2D+2P)	740
		6 Disk Drives		(4D+2P)	920
		10 Disk Drives		(8D+2P)	1390
		14 Disk Drives		(12D+2P)	2220
		18 Disk Drives		(16D+2P)	2960
		30 Disk Drives		(28D+2P)	4630
		3 Disk Drives	RAID 5	(2D+1P)	550
		5 Disk Drives		(4D+1P)	920
		9 Disk Drives		(8D+1P)	1480
		11 Disk Drives		(10D+1P)	1850
		13 Disk Drives		(12D+1P)	2220
		16 Disk Drives		(15D+1P)	2590
		4 Disk Drives	RAID 1+0	(2D+2D)	740
		16 Disk Drives		(8D+8D)	740
		2 Disk Drives	RAID 1	(1D+1D)	740
	AMS2500	4 Disk Drives	RAID 6	(2D+2P)	550
		6 Disk Drives		(4D+2P)	920
		10 Disk Drives		(8D+2P)	1480
		14 Disk Drives		(12D+2P)	2220
		18 Disk Drives		(16D+2P)	2780
		30 Disk Drives		(28D+2P)	4630
		3 Disk Drives	RAID5	(2D+1P)	550
		5 Disk Drives		(4D+1P)	920
		9 Disk Drives		(8D+1P)	1480
		11 Disk Drives		(10D+1P)	1850
		13 Disk Drives		(12D+1P)	2220
		16 Disk Drives		(15D+1P)	2590
		4 Disk Drives	RAID1+0	(2D+2D)	740
		16 Disk Drives		(8D+8D)	740
		2 Disk Drives	RAID1	(1D+1D)	740

*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.

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

Unit : min

Item				Disk Drive (G byte)(*1)	1,956.94
Copy back(*2)	AMS2300 AMS2100 AMS2010	6 Disk Drives	RAID 6	(4D+2P)	740
		30 Disk Drives		(28D+2P)	740
		5 Disk Drives	RAID 5	(4D+1P)	740
		16 Disk Drives		(15D+1P)	740
		4 Disk Drives	RAID 1+0	(2D+2D)	740
		16 Disk Drives		(8D+8D)	740
		2 Disk Drives	RAID 1	(1D+1D)	740
	AMS2500	6 Disk Drives	RAID 6	(4D+2P)	740
		30 Disk Drives		(28D+2P)	740
		5 Disk Drives	RAID5	(4D+1P)	740
		16 Disk Drives		(15D+1P)	740
		4 Disk Drives	RAID1+0	(2D+2D)	740
		16 Disk Drives		(8D+8D)	740
		2 Disk Drives	RAID1	(1D+1D)	740

*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.

Table 2.2.3.2 Standard Time Required for the Correction Copy or Copy Back(‡1) (Flash Drive)

Unit : min

Item		Disk Drive (G byte)(*1)			195.82
Correction copy(*2)	AMS2300 AMS2100	4 Disk Drives	RAID 6	(2D+2P)	40
		6 Disk Drives		(4D+2P)	60
		10 Disk Drives		(8D+2P)	100
		14 Disk Drives		(12D+2P)	140
		18 Disk Drives		(16D+2P)	160
		30 Disk Drives		(28D+2P)	260
		3 Disk Drives	RAID 5	(2D+1P)	40
		5 Disk Drives		(4D+1P)	60
		9 Disk Drives		(8D+1P)	100
		11 Disk Drives		(10D+1P)	120
		13 Disk Drives		(12D+1P)	140
		16 Disk Drives		(15D+1P)	160
		4 Disk Drives	RAID 1+0	(2D+2D)	80
		16 Disk Drives		(8D+8D)	80
		2 Disk Drives	RAID 1	(1D+1D)	80
	AMS2500	4 Disk Drives	RAID 6	(2D+2P)	40
		6 Disk Drives		(4D+2P)	60
		10 Disk Drives		(8D+2P)	100
		14 Disk Drives		(12D+2P)	140
		18 Disk Drives		(16D+2P)	160
		30 Disk Drives		(28D+2P)	260
		3 Disk Drives	RAID5	(2D+1P)	40
		5 Disk Drives		(4D+1P)	60
		9 Disk Drives		(8D+1P)	100
		11 Disk Drives		(10D+1P)	120
		13 Disk Drives		(12D+1P)	140
		16 Disk Drives		(15D+1P)	160
		4 Disk Drives	RAID1+0	(2D+2D)	80
		16 Disk Drives		(8D+8D)	80
		2 Disk Drives	RAID1	(1D+1D)	80

*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.

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

Unit : min

Item				Disk Drive (G byte)(*1)	195.82
Copy back(*2)	AMS2300 AMS2100	6 Disk Drives	RAID 6	(4D+2P)	80
		30 Disk Drives		(28D+2P)	80
		5 Disk Drives	RAID 5	(4D+1P)	80
		16 Disk Drives		(15D+1P)	80
		4 Disk Drives	RAID 1+0	(2D+2D)	80
		16 Disk Drives		(8D+8D)	80
		2 Disk Drives	RAID 1	(1D+1D)	80
	AMS2500	6 Disk Drives	RAID 6	(4D+2P)	80
		30 Disk Drives		(28D+2P)	80
		5 Disk Drives	RAID5	(4D+1P)	80
		16 Disk Drives		(15D+1P)	80
		4 Disk Drives	RAID1+0	(2D+2D)	80
		16 Disk Drives		(8D+8D)	80
		2 Disk Drives	RAID1	(1D+1D)	80

*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.

2.2.2 Replacing Cache Backup Battery

The replacement of the Cache Backup Battery is work of a Basic Subsystem (RKM/RKS/RKH). Select a procedure from the following and execute it.

NOTE : • Only one Cache Backup Battery is installed in the RKM/RKS in standard (the Cache Backup Battery #0 side).
• In the case of the DF800-RK2, two batteries are installed as a standard.
• Two Cache Backup Batteries are installed in the RKH in standard (the Cache Backup Battery #0 and #1 side).
• In the case of the DF800-RKH2 and the DF800-RKHE2, four batteries are installed as a standard.

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on (hot replacement) (In the case of RKM/RKS/RKH)	1. When the power is turned off during the replacement, user data on the cache that has not been written on a disk 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 Battery at the same time (replacing Cache Backup Battery for the RKS, replacing four Cache Backup Battery at the same time for the RKH), 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 Battery) are all removed from the Basic Chassis, the subsystem becomes the Warning status. However, when the Cache Backup Battery are all recovered normally, the Waning status of the subsystem 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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis 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 Basic Chassis usually goes out about 30 seconds later.	Refer to "(1) Procedure for replacement with the power turned on " (REP 02-0290).
2	Replacement with the power turned off	—	Refer to "(2) Procedure for replacement with the power turned off " (REP 02-0320).

*1 : The Write-Through means the operation to write the write data to the Disk Drive and respond to the host computer immediately after the subsystem received the write data from the host computer. Therefore, the response time of the command to the host computer delays when the subsystem executes the Write-Through. Refer to Introduction "3.3.1 Command Execution" (INTR 03-0080) 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 subsystem 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) Procedure for replacement with the power turned on
(Refer to "Figure 2.2.4 Replacing Cache Backup Battery" (REP 02-0310).)
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).).

(a) Remove the Front Bezel. (Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door of the Subsystem" (INST 01-0100).)

(b) Open the lever toward you while pressing the button (blue) which fixes the lever of the Cache Backup Battery.
When the lever is completely opened, the Cache Backup Battery comes out forward.

(c) Remove the Cache Backup Battery while holding the body of the Cache Backup Battery with both hands.

NOTE : Since the depth of a Cache Backup Battery is as short as about 200 mm and it is as heavy as about 2.0 kg, please pull out carefully.

(d) After waiting for 20 seconds or more, insert (‡1) a new Cache Backup Battery until its lever is slightly opened, and then close it completely until you hear the button (blue), which fixes the lever, click.
If the Cache Backup Battery is inserted without waiting for 20 seconds, it is possible that the Cache Backup Battery is not recovered from the failure normally(‡2).

(e) Charge the battery after the RDY LED (green) on the Cache Backup Battery blinks until it changes to lighting. (Although the RDY LED (green) on the Cache Backup Battery blinks during the charge, it changes to lighting when the charge is completed. It is about 24 hours at the maximum.)

(f) Check that the RDY LED (green) on the Cache Backup Battery is on.
Check that the READY LED (green) on the front of the Basic Chassis is on and the ALARM LED (red) and WARNING LED (orange) are off(‡3).
The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH).

(g) Refer to “Information Message” on WEB, and check to see that [I00300 Battery recovered] or [I0030x Battery recovered (Battery-x)] is indicated. (Refer to WEB “2.5 Information Message” (WEB 02-0110).)
When this is indicated, the replacement of Cache Backup Battery has completed.

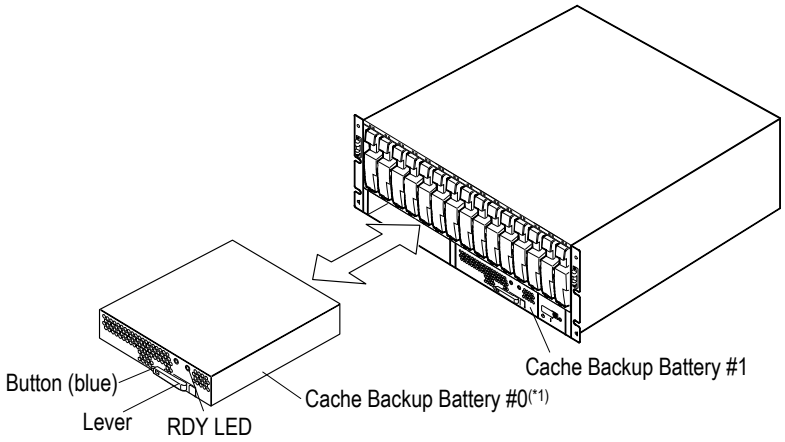
(h) Attach the front bezel. (Installation “1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door of the Subsystem” (INST 01-0100).)

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

‡1 : If the Cache Backup Battery is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until “I1GZ00 The spin up of disk drives completed” is displayed for the RAID Group that “I1GY00 The request of spin up of disk drives is accepted” is displayed in “Information Message” on WEB), the Cache Backup Battery may not recover normally.
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted Cache Backup Battery from the chassis, and insert it again after 20 seconds or more passed.

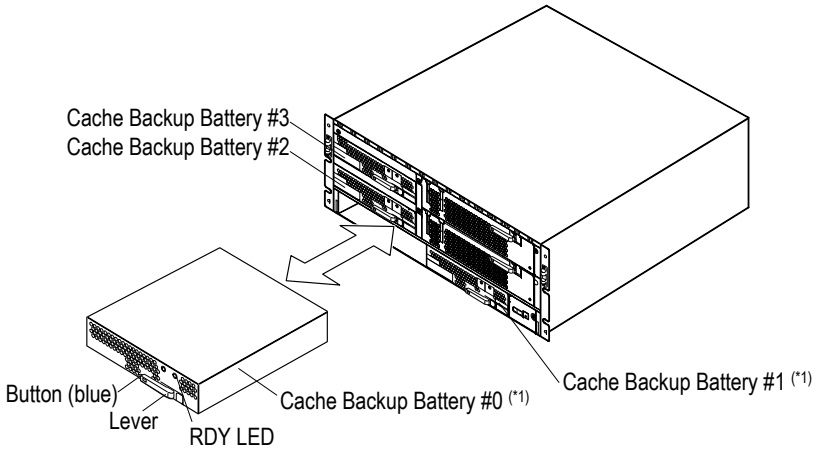
‡2 : Remove the inserted Cache Backup Battery, and insert it again after 20 seconds or more passed.

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.



*1 : The Cache Backup Battery of the RKM/RKS is only one in standard, and it is installed on the left side of the subsystem.
In the case of the DF800-RK2, two batteries are installed as a standard.

Figure 2.2.4 Replacing Cache Backup Battery (RKM/RKS)



*1 : The Cache Backup Battery of the RKH is two in standard, and it is installed on the #0 and #1 of the subsystem.
In the case of the DF800-RKH2 and the DF800-RKHE2, four batteries are installed as a standard.

Figure 2.2.5 Replacing Cache Backup Battery (RKH)

(2) Procedure for replacement with the power turned off
Check the state of Device main switch at first.
- When main switch is on ····· (2-1)
- When main switch is off ····· (2-2)

(2-1) When main switch 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 ④ Collection of errors" (MSG 01-0000).).

(a) Turn off the main switch
(b) Check to see that PWR LED (green) on the Front Bezel turns off (POWER OFF).
If it does not go POWER OFF, connect the Maintenance PC to WEB (Refer to Troubleshooting "Chapter 3. Before Starting WEB Connection" (TRBL 03-0000).), and analyze the cause of failure.
(c) After turning off the main switch, check to see that C-PWR LED (green) on the Controller is off.

NOTE : If the C-PWR LED (green) is lit, it may be that some of the Cache memory data has not been written into the disk. In this case, removing the Control Unit may cause a loss of user data.
If the power has already been turned off, check that Cache memory is not in the back-up state. (To check for the back-up state, refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)

(d) Remove the Front Bezel. (Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door of the Subsystem" (INST 01-0100))
(e) Open the lever toward you while pressing the button (blue) which fixes the lever of the Cache Backup Battery.
When the lever is completely opened, the Cache Backup Battery comes out forward.
(f) Remove the Cache Backup Battery while holding the body of the Cache Backup Battery with both hands.

NOTE : Since the depth of a Cache Backup Battery is as short as about 200 mm and it is as heavy as about 2.0 kg, please pull out carefully.

(g) Insert a new Cache Backup Battery until its lever is slightly opened, and then close it completely until you hear the button (blue), which fixes the lever, click.
(h) Turn on the main switch (the subsystem usually recovers in about five minutes).
(i) Charge the battery after the RDY LED (green) on the Cache Backup Battery blinks until it changes to lighting. (Although the RDY LED (green) on the Cache Backup Battery blinks during the charge, it changes to lighting when the charge is completed. It is about 24 hours at the maximum.)

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

(k) Check that the READY LED (green) on the front of the Basic Chassis 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 RKH) 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 Basic Chassis 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 disk 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 01-0890)").

(m) Attach the Front Bezel. (Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door of the Subsystem" (INST 01-0100).)

(n) Recycle the removed battery. For the recycling procedure, refer to "Chapter 5. Recycling" (REP 05-0000).

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

(2-2) When main switch is off

(a) Check that Cache memory is not in the back-up state. (To check for the back-up state, refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
If the memory is still being backed up, first release it from the back-up state, and then replace the Control Unit.

(b) Remove the Front Bezel. (Refer to Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door of the Subsystem" (INST 01-0100).)

(c) Open the lever toward you while pressing the button (blue) which fixes the lever of the Cache Backup Battery.
When the lever is completely opened, the Cache Backup Battery comes out forward.

(d) Remove the Cache Backup Battery while holding the body of the Cache Backup Battery with both hands.

NOTE : Since the depth of a Cache Backup Battery is as short as about 200 mm and it is as heavy as about 2.0 kg, please pull out carefully.

(e) Insert a new Cache Backup Battery until its lever is slightly opened, and then close it completely until you hear the button (blue), which fixes the lever, click.

(f) Turn on the main switch (the subsystem usually recovers in about five minutes).

(g) Charge the battery after the RDY LED (green) on the Cache Backup Battery blinks until it changes to lighting. (Although the RDY LED (green) on the Cache Backup Battery blinks during the charge, it changes to lighting when the charge is completed. It is about 24 hours at the maximum.)

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

(i) Check that the READY LED (green) on the front of the Basic Chassis 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 RKH) 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 Basic Chassis 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 disk 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 01-0890)").

(k) Attach the Front Bezel. (Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door of the Subsystem" (INST 01-0100).)

(l) Recycle the removed battery. For the recycling procedure, refer to "Chapter 5. Recycling" (REP 05-0000).

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

2.2.3 Replacing FAN Unit

The replacement of the FAN Unit is work of the RKH.

⚠ 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.

CAUTION

- **The replacement of the component is restricted in time. This operation requires referring to the manual. If the subsystem 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 Control Unit is on while the ALM LED of the FAN Unit is on, be sure to solve the trouble of the Control Unit first.**
- **When replacing the FAN Unit, do it in haste after preparing a replacement FAN Unit 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 Unit 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 Unit 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 Basic Chassis is blinking at high speed because the automatic download of the ENC firmware is being executed. Make the replacement after the LED lights on. 5. The array subsystem becomes a planned shutdown and the power supply is turned off, so that, work so not to pull out two FAN Units. 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 Basic Chassis 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 Basic Chassis usually goes out about 30 seconds later.	See "(1) Procedure for replacement with the power turned on" (REP 02-0360)

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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis is blinking at high speed because the update of the flash program or the automatic download of the ENC 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 Basic Chassis 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 02-0380)

(1) Procedure for replacement with the power turned on
(In the case of the RKH, refer to "Figure 2.2.6 Replacing FAN Unit (RKH)" (REP 02-0370).)
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).).

(a) Remove the Front Bezel. (Refer to Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door of the Subsystem" (INST 01-0100).)
(b) Make sure that the ALM LED (red) on the FAN Unit is on.
(c) Open the lever toward you while pressing the button (blue) which fixes the lever of the FAN Unit.
When the lever is completely opened, the FAN Unit comes out forward.
(d) Remove the FAN Unit while holding the body of the FAN Unit with both hands.
(e) Open the lever of the new FAN Unit toward you.
(f) After waiting for longer than 20 seconds, and then insert the new FAN Unit until its lever is slightly closed, and then close it completely until you hear the button (blue), which fixes the lever, click (‡1).
If the FAN Unit is inserted without waiting for 20 seconds, it is possible that the FAN Unit is not recovered from the failure normally (‡2).

‡1 : If the Fan Unit is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the FAN Unit may not recover normally.
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted FAN Unit from the chassis, and insert it again after 20 seconds or more passed.
‡2 : Remove the inserted FAN Unit, and insert it again after 20 seconds or more passed.

(g) Check that the status of the ALM LED (red) on the FAN Unit changes from on to off.
(h) Check if the fans of the mounted FAN Unit are rotating.
(i) Check that the READY LED (green) on the front of the Basic Chassis lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH) before it lights up.
(j) Refer to "Information Message" on WEB, and check to see that [I00500 FAN recovered] is indicated. (Refer to WEB "2.5 Information Message"(WEB 02-0110).)
When this is indicated, the replacement of FAN Unit has completed.
(k) Attach the Front Bezel. (Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door of the Subsystem" (INST 01-0100).)

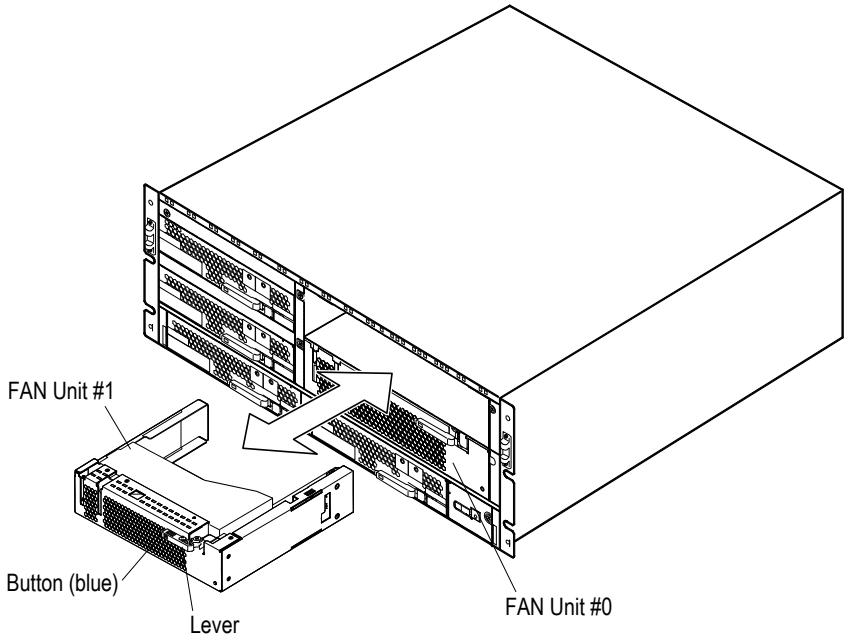


Figure 2.2.6 Replacing FAN Unit (RKH)

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

(2) Procedure for replacement with the power turned off
(In the case of the RKH, refer to "Figure 2.2.6 Replacing FAN Unit (RKH)" (REP 02-0370).)
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).).

(a) Turn off the main switch.
Make sure that the POWER LED (green) on the Front Bezel go off. If you cannot turn off the power, troubleshoot the failure by connecting to the WEB.

NOTE : If the power has already been turned off, check that Cache memory is not in the back-up state. (To check for the back-up state, refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
If the memory is still being backed up, first release it from the back-up state, and then replace the Control Unit.

In this case, check that the C-PWR LED (green) on Control Unit is extinguished.

NOTE : If the C-PWR LED (green) is lit, it may be that some of the Cache memory data has not been written into the disk. In this case, removing the Control Unit may cause a loss of user data.

(b) Remove the Front Bezel. (Refer to Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door of the Subsystem" (INST 01-0100).)
(c) Open the lever toward you while pressing the button (blue) which fixes the lever of the FAN Unit.
When the lever is completely opened, the FAN Unit comes out forward.
(d) Remove the FAN Unit while holding the body of the FAN Unit with both hands.
(e) Open the lever of the new FAN Unit toward you.
(f) Insert the new FAN Unit until its lever is slightly closed, and then close it completely until you hear the button (blue), which fixes the lever, click
(g) Turn on the main switch (the subsystem usually recovers in about five minutes).
Check that the status of the ALM LED (red) changes from on to off.
(h) Check if the fans of the mounted FAN Unit are rotating.
(i) Check that the READY LED (green) on the front of the Basic Chassis 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 RKH) or the WARNING LED (orange) may blink at high speed (for the maximum of 30 to 85 minutes) before

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem 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 disk 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 01-0890)").

(k) Attach the Front Bezel. (Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door of the Subsystem" (INST 01-0100).)

This page is for editorial purpose only.

2.2.4 Replacing Power Unit

The Power Units differ respectively in each subsystem.
Be careful not to make mistakes on the part type names.

(1) Replacing the Power Unit of the RKM/RKS/RKH/RKAK

CAUTION

- **The replacement of the component is restricted in time. This operation requires referring to the manual. If the subsystem 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 Unit, the Power Unit does not need to be replaced.**
  When a trouble of the Power Unit is detected during replacement of the FAN Unit, 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.**

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, a powering off (subsystem 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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis 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 Basic Chassis usually goes out about 30 seconds later.	Refer to "(1-1) Procedure for replacement with the power turned on (Be sure to perform the following operations (a) to (j) within 10 minutes.)" (REP 02-0391)
		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 "(1-1) Procedure for replacement with the power turned on (Be sure to perform the following operations (a) to (j) within 10 minutes.)" (REP 02-0391)

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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis is blinking at high speed because the update of the flash program or the automatic download of the ENC 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 Basic Chassis 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 02-0401)

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

(Be sure to perform the following operations (a) to (h) within 10 minutes.) (Refer to "Figure 2.2.7 Replacing Power Unit of the RKM/RKS/RKH/RKAK" (REP 02-0400).)

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).).

(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.

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.

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

(c) Open the levers toward you while pressing the buttons (blue) which fix the levers of the Power Unit.
When the levers are completely opened, the Power Unit comes out forward.

NOTE : • The levers of the Power Unit of the RKH/RKAK are at right and left. Operate a right and left lever at the same time.
• The levers cannot be operated with the power cables done to the Power Unit in.

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

(e) After waiting for 20 seconds or more, insert (‡1) a Power Unit until its lever is slightly opened, and then close it completely until you hear the button (blue), which fixes the lever, click.
If you insert the Power Unit without waiting for more than 20 seconds, Power Unit may not be recovered (‡2).

NOTE : • Install the same Power Units of RKM/RKS in the right and left of the subsystem making them face reverse direction.
Do not make a mistake in the installation direction.
• Do not catch an ENC cable, when the Power Unit for the inserted.

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

(g) Check that the READY LED (green) on the front of the Basic Chassis lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡3). The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH) before it lights up.

(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 02-0110).)
When this is indicated, the replacement of Power Unit has completed.

‡1 : If the Power Unit is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until “I1GZ00 The spin up of disk drives completed” is displayed for the RAID Group that “I1GY00 The request of spin up of disk drives is accepted” is displayed in “Information Message” on WEB), the Power Unit may not recover normally.
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted Power Unit from the chassis, and insert it again after 20 seconds or more passed.

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

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

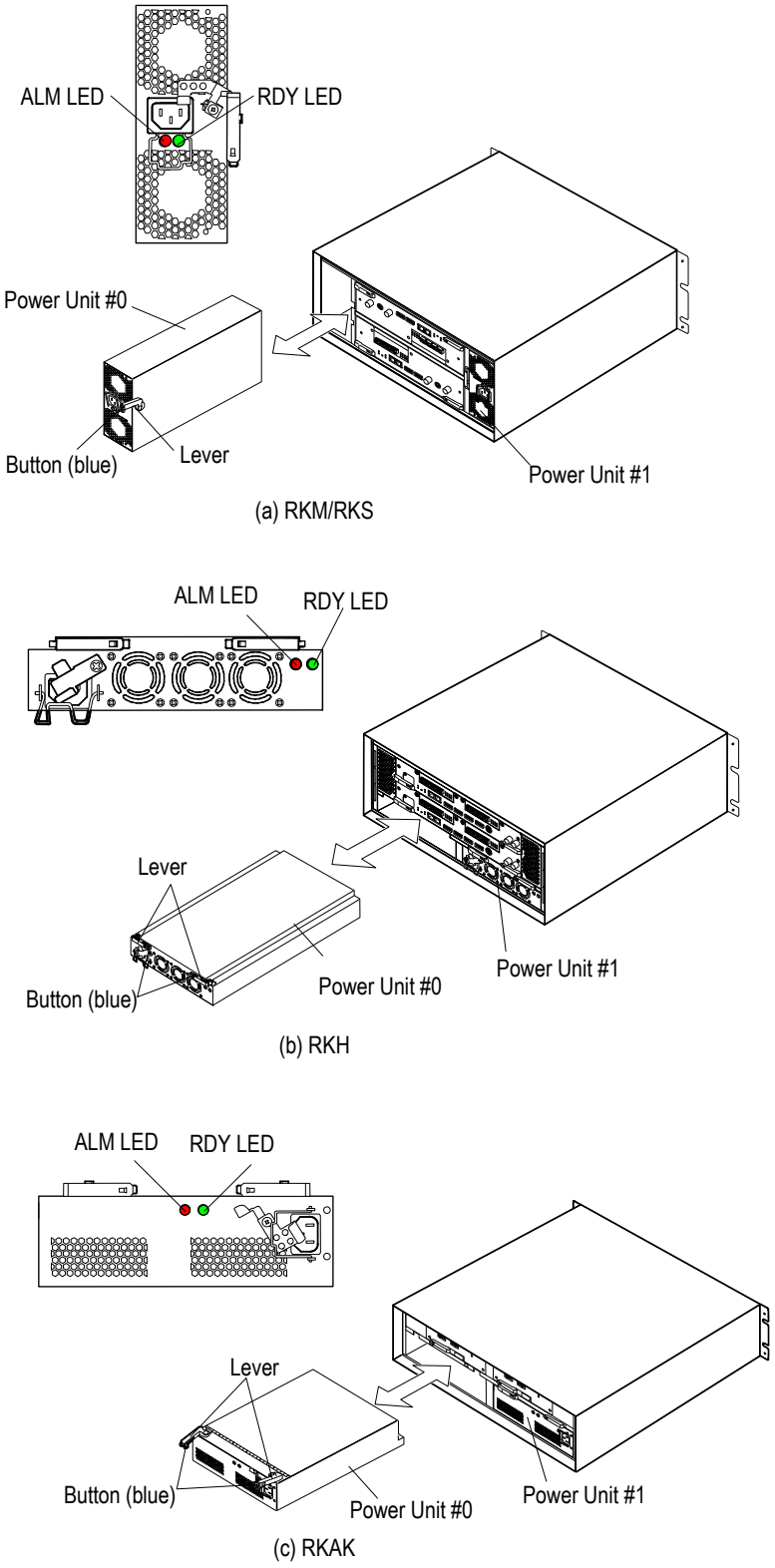


Figure 2.2.7 Replacing Power Unit of the RKM/RKS/RKH/RKAK

(1-2) Procedure for replacement with the power turned off
(Refer to "Figure 2.2.7 Replacing Power Unit of the RKM/RKS/RKH/RKAK" (REP 02-0400).)
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).).

(a) Turn off the main switch.
Make sure that the POWER LED (green) on the Front Bezel go off. If you cannot turn off the power, troubleshoot the failure by connecting to the WEB.

NOTE : If the power has already been turned off, check that Cache memory is not in the back-up state. (To check for the back-up state, refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
If the memory is still being backed up, first release it from the back-up state, and then replace the Control Unit.

In this case, check that the C-PWR LED (green) on Control Unit is extinguished.

NOTE : If the C-PWR LED (green) is lit, it may be that some of the Cache memory data has not been written into the disk. In this case, removing the Control Unit may cause a loss of user data.

(b) Remove all the cables connected to the Power Unit to be replaced.
(c) Open the levers toward you while pressing the buttons (blue) which fix the levers of the Power Unit.
When the levers are completely opened, the Power Unit comes out forward.

NOTE : The levers of the Power Unit of the RKH/RKAK are at right and left.
Operate a right and left lever at the same time.

(d) Pull out and remove it while holding the body of the Power Unit with both hands.
(e) 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, click.

NOTE : • Install the same Power Units of RKM/RKS in the right and left of the subsystem making them face reverse direction.
Do not make a mistake in the installation direction.
• Do not catch an ENC cable, when the Power Unit for the inserted.

(f) Connect the all cables as they were before.
(g) Turn on the main switch.
Check that the RDY LEDs (green) of the both Power Units are on (the subsystem usually recovers in about five minutes).

(h) Check that the READY LED (green) on the front of the Basic Chassis 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 RKH) 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 Basic Chassis lights up.

(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 disk 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 01-0890)").

(j) When the remote adapter is connected, check that the LED of the Remote Adapter connected is on.

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

(2) Replacing the Power Unit of the RKHED/RKAKD

The Power Unit of the RKHED/RKAKD is a Power Unit (DC).

CAUTION

- **The replacement of the component is restricted in time. This operation requires referring to the manual. If the subsystem 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 Unit, the Power Unit does not need to be replaced.**
  When a trouble of the Power Unit is detected during replacement of the FAN Unit, 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.**

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, a powering off (subsystem 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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis 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 Basic Chassis 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 02-0411)
		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 02-0411)

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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis is blinking at high speed because the update of the flash program or the automatic download of the ENC 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 Basic Chassis 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 02-0420)

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

(Be sure to perform the following operations (a) to (h) within 10 minutes.) (Refer to "Figure 2.2.7.1 Replacing Power Unit of the RKHED/RKAKD" (REP 02-0414).)

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).).

(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.

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.

(b) Turn off the Power Unit Switches on the Power Unit to be replaced.

⚠ 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 has been turned off.

(c) Ask the customer to turn off the input power connected to the Power Unit to be replaced.
(d) Measure the terminal with a tester, and verify that the power is not supplied (0 V).
(e) Record the relation of terminals and cable connection (The location of FG and positive and negative terminals, and the color of cables).
(f) After waiting for one minute or longer, remove the terminal block cover of the Power Unit to be replaced.
(g) Remove the cable connected to the plus and minus power input terminals on the terminal block.

(h) Remove the FG cable from the frame ground (FG).
(i) Open the levers toward you pressing the right and left buttons (blue) which fixes the levers of the Power Unit. When the levers are completely opened, the Power Unit comes out forward.

NOTE : Operate the right and left levers at the same time.

(j) Pull out and remove it while holding the body of the Power Unit with both hands.
(k) Check that the Power Unit Switches (breaker) on the new Power Unit is turned off.
(l) After waiting for 20 seconds or more, insert (‡1) a Power Unit until its lever is slightly opened, and then close it completely until you hear the button (blue), which fixes the lever, click. If you insert the Power Unit without waiting for more than 20 seconds, Power Unit may not be recovered (‡2).

NOTE : Do not catch an ENC cable, when inserting the Power Unit.

(m) Remove the cover of the terminal block.

⚠ CAUTION

- **This subsystem shall be connected directly to the d.c. supply system earthing electrode conductor or to a bonding jumper from an earthing terminal bar or bus to which the d.c. supply system earthing electrode conductor is connected.**
- **This subsystem shall be located in the same immediate area (such as, adjacent cabinets) as any other subsystem that has a connection between the earthed conductor of the same d.c. supply circuit and the earthing conductor, and also the point of earthing of the d.c. system. The d.c. system shall not be earthed elsewhere.**
- **The d.c. supply source is to be located within the same premises as this subsystem.**
- **Switching or disconnecting devices shall not be in the earthed circuit conductor between the d.c. source and the point of the connection of the earthing electrode conductor.**

(n) Connect the FG cable to the frame ground (FG).
(o) Connect the cable to the plus and minus power input terminals on the terminal block. When doing this, take care not to confuse the plus and minus terminals.
(p) Reinstall the cover of the terminal block.
(q) Ask the customer to turn on the input power.

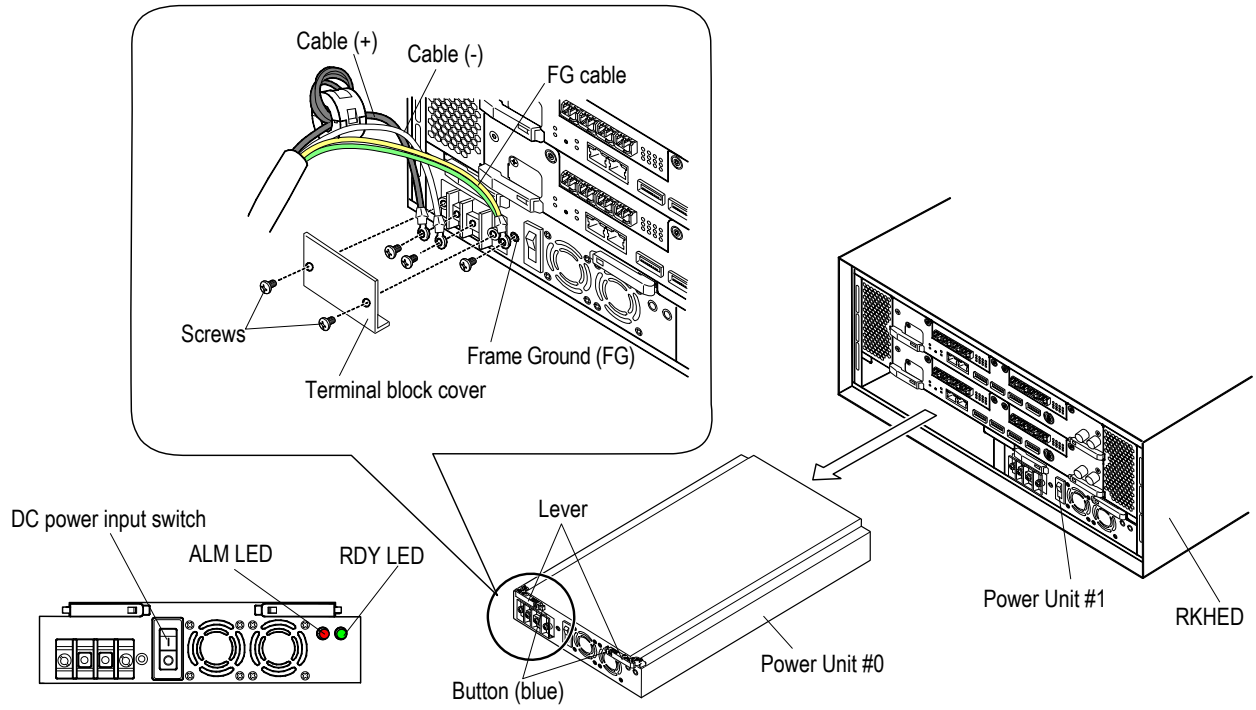
‡1 : If the Power Unit is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the Power Unit may not recover normally.
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted Power Unit from the chassis, and insert it again after 20 seconds or more passed.
‡2 : Remove the inserted Power Unit, and insert it again after 20 seconds or more passed.

(r) Turn on the Power Unit Switches (breaker) of the installed Power Unit.
Check that the READY LED (green) of the Power Unit is on.

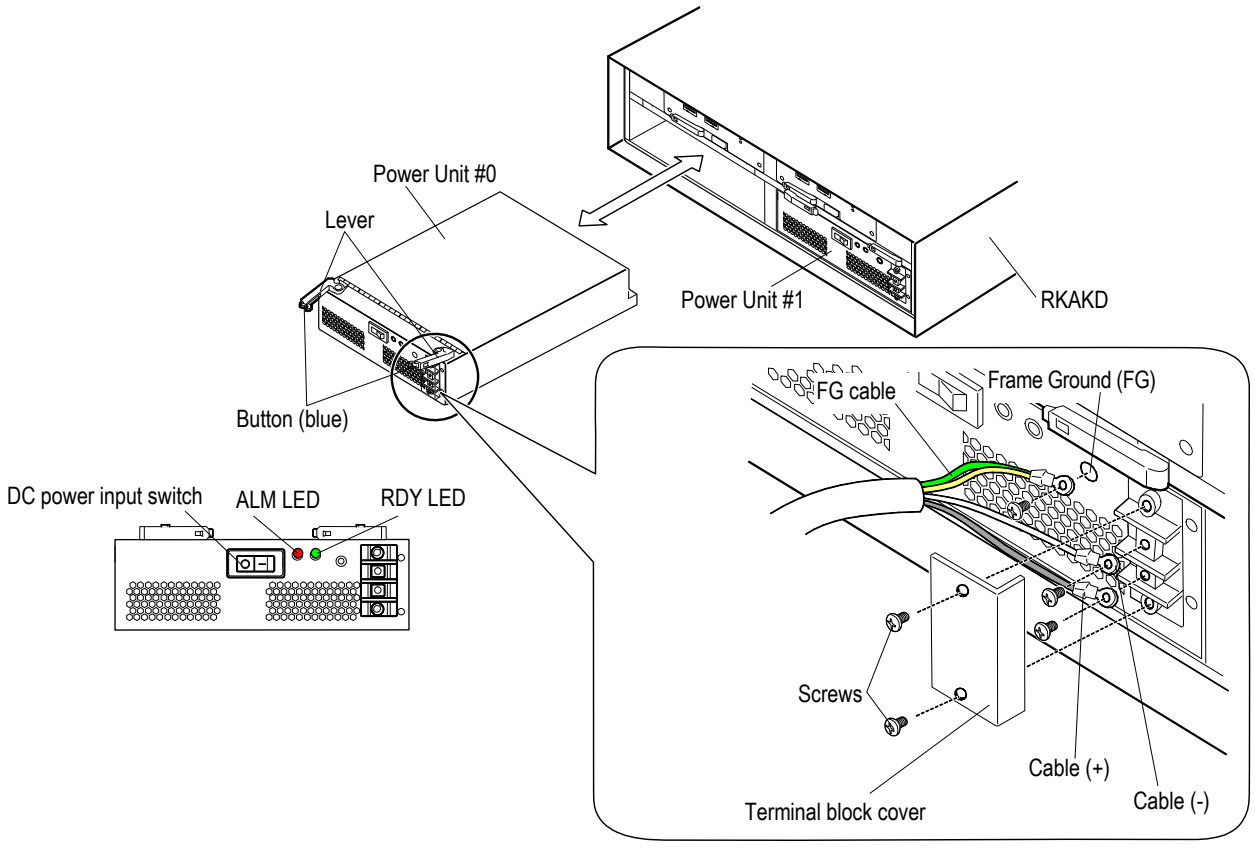
(s) Check that the READY LED (green) on the front of the Basic Chassis lights up, and the ALARM LED (red) and the WARNING LED (orange) go out[‡3]. The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH) before it lights up.

(t) Refer to "Information Message" on WEB, and check to see that [I006z0 PS recovered] is indicated. (Refer to WEB "2.5 Information Message"(WEB 02-0110).)
When this is indicated, the replacement of Power Unit has completed.

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.



(a) RKHED



(b) RKAKD

Figure 2.2.7.1 Replacing Power Unit of the RKHED/RKAKD

(2-2) Procedure for replacement with the power turned off
(Refer to "Figure 2.2.7.1 Replacing Power Unit of the RKHED/RKAKD" (REP 02-0414).)
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).).

(a) Turn off the main switch.
Make sure that the POWER LED (green) on the Front Bezel goes off. If you cannot turn off the power, troubleshoot the failure by connecting to the WEB.

NOTE : If the power has already been turned off, check that Cache memory is not in the back-up state. (To check for the back-up state, refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
If the memory is still being backed up, first release it from the back-up state, and then replace the Control Unit.

In this case, check that the C-PWR LED (green) on Control Unit is extinguished.

NOTE : If the C-PWR LED (green) is lit, it may be that some of the Cache memory data has not been written into the disk. In this case, removing the Control Unit may cause a loss of user data.

(b) Turn off the Power Unit Switches of all two Power Units.

⚠ 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 has been turned off.

(c) Ask to turn off the input power connected to the Power Unit to be replaced.
(d) Measure the terminal with a tester, and verify that the power is not supplied (0 V).
(e) Record the relation of terminals and cable connection (The location of FG and positive and negative terminals, and the color of cables).
(f) After waiting for one minute or longer, remove the terminal block cover of the Power Unit to be replaced.
(g) Remove the cable connected to the plus and minus power input terminals on the terminal block.
(h) Remove the FG cable from the frame ground (FG).
(i) Open the levers toward you pressing the right and left buttons (blue) which fixes the levers of the Power Unit. When the levers are completely opened, the Power Unit comes out forward.

NOTE : Operate the right and left levers at the same time.

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

(k) Check that the Power Unit Switches (breaker) on the new Power Unit is turned off.
(l) After waiting for 20 seconds or more, insert (‡1) a Power Unit until its lever is slightly opened, and then close it completely until you hear the button (blue), which fixes the lever, click. If you insert the Power Unit without waiting for more than 20 seconds, Power Unit may not be recovered (‡2).

NOTE : Do not catch an ENC cable, when inserting the Power Unit.

(m) Remove the cover of the terminal block.

⚠ CAUTION

- **This subsystem shall be connected directly to the d.c. supply system earthing electrode conductor or to a bonding jumper from an earthing terminal bar or bus to which the d.c. supply system earthing electrode conductor is connected.**
- **This subsystem shall be located in the same immediate area (such as, adjacent cabinets) as any other subsystem that has a connection between the earthed conductor of the same d.c. supply circuit and the earthing conductor, and also the point of earthing of the d.c. system. The d.c. system shall not be earthed elsewhere.**
- **The d.c. supply source is to be located within the same premises as this subsystem.**
- **Switching or disconnecting devices shall not be in the earthed circuit conductor between the d.c. source and the point of the connection of the earthing electrode conductor.**

(n) Connect the FG cable to the frame ground (FG).
(o) Connect the cable to the plus and minus power input terminals on the terminal block. When doing this, take care not to confuse the plus and minus terminals.
(p) Reinstall the cover of the terminal block.
(q) Ask the customer to turn on the input power.
(r) Turn on the Power Unit Switches (breaker) of all two Power Units.
(s) Turn on the main switch (the subsystem usually recovers in about five minutes). Check that the READY LED (green) of all two Power Units lights up.
(t) Check that the READY LED (green) on the front of the Basic Chassis lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKHED) before it lights up.
(u) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the disk 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 01-0890)”).

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

(3) Replacing the Power Unit of the RKAKX

CAUTION

- **The replacement of the component is restricted in time. This operation requires referring to the manual. If the subsystem 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 Unit, the Power Unit does not need to be replaced.**
  When a trouble of the Power Unit is detected during replacement of the FAN Unit, 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.**

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, a powering off (subsystem 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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis 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 Basic Chassis usually goes out about 30 seconds later.	Refer to "(3-1) Procedure for replacement with the power turned on (Be sure to perform the following operations (a) to (j) within 10 minutes.)" (REP 02-0423)
		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 "(3-1) Procedure for replacement with the power turned on (Be sure to perform the following operations (a) to (j) within 10 minutes.)" (REP 02-0423)

*1 : It's the time it takes to replace part itself.
This time doesn't 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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis is blinking at high speed because the update of the flash program or the automatic download of the ENC 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 Basic Chassis 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 02-0440)

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

(Be sure to perform the following operations (f) to (l) within 10 minutes.) (Refer to "Figure 2.2.7.2 Replacing Power Unit of the RKAKX" (REP 02-0430).)

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).).

(a) Remove the stopper on the rear side of the subsystem (Refer to Installation "2.5.8 (6) Attaching the stopper" (INST 02-1290)).

(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.

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 "2.5.8 (5) Attaching the cable tray" (INST 02-1280)).

(e) Remove the repeat binder which fixes the power cables and ENC cables in the middle (Refer to Installation "2.5.8 (4) Fixing the cables in the middle" (INST 02-1270)).

(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 "2.5.4 (2) Fixing the cable routing bars" (INST 02-1020)).
- 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 done to the Power Unit in.

(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 (‡1) a Power Unit until its lever is slightly opened, and then close it completely until you hear the button (blue), which fixes the lever, click. If you insert the Power Unit without waiting for more than 20 seconds, Power Unit may not be recovered (‡2).

NOTE : Do not catch an ENC cable, when the Power Unit for the inserted.

(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 Basic Chassis lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡3). The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH) 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 02-0110).)
When this is indicated, the replacement of Power Unit has completed.
(n) If the Power Unit #B0 or Power Unit #A1 was replaced, install the cable routing bar (Refer to Installation "2.5.4 (2) Fixing the cable routing bars" (INST 02-1020)).
(o) Return the power cables and ENC cables to the original state, and fix them with the repeat binder in the middle. (Refer to Installation "2.5.8 (4) Fixing the cables in the middle" (INST 02-1270)).

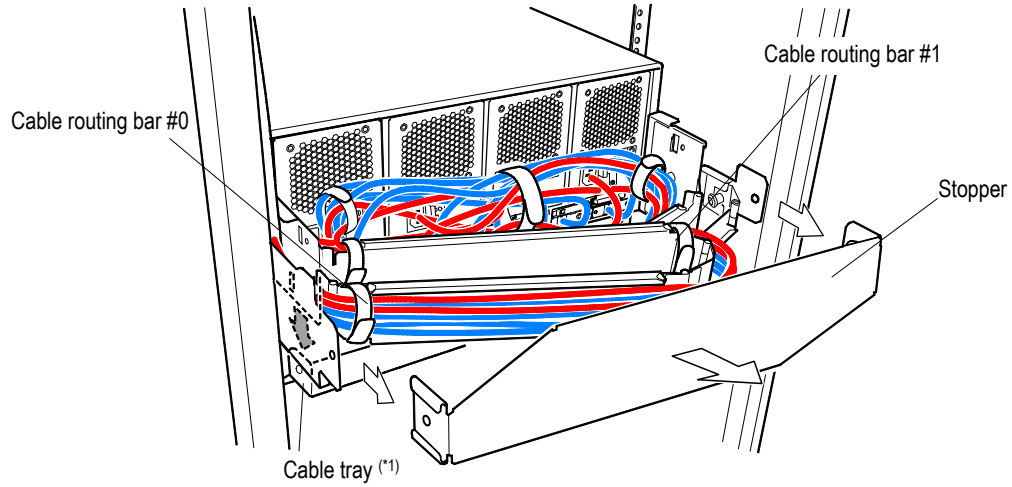
NOTE : Bundle and fix the cables so that they do not hang down below the subsystem.

(p) If the cable tray is removed, attach it (Refer to Installation "2.5.8 (5) Attaching the cable tray" (INST 02-1280)).
(q) Close the cable routing bar.
(r) Attach the stopper on the rear side of the subsystem (Refer to Installation "2.5.8 (6) Attaching the stopper" (INST 02-1290)).

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

(s) Pull out the subsystem and check that the routing is performed correctly (refer to Installation "2.5.8 (7) Checking Routing'" (INST 02-1290)).

‡1 : If the Power Unit is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the Power Unit may not recover normally.
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted Power Unit from the chassis, and insert it again after 20 seconds or more passed.
‡2 : Remove the inserted Power Unit, and insert it again after 20 seconds or more passed.
‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.



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

Figure 2.2.7.2 Locations of the Cable Routing Bar, the Stopper, and the Cable Tray

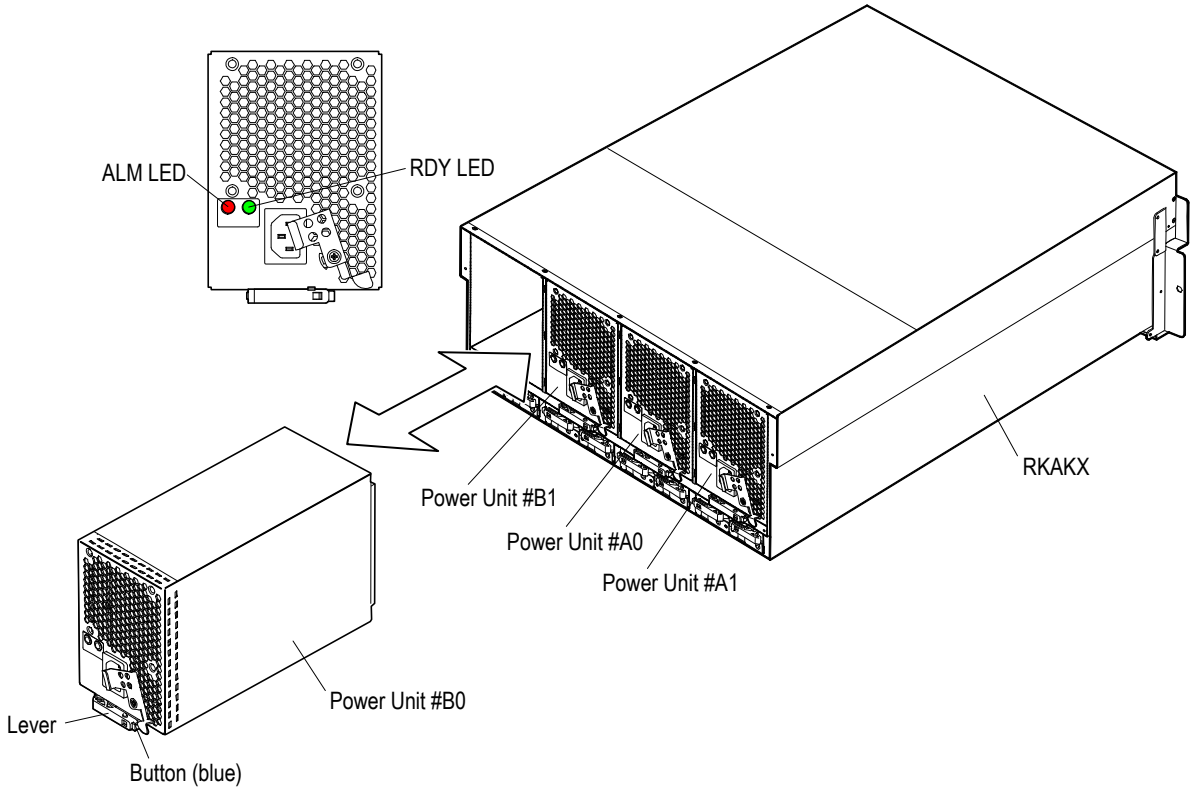


Figure 2.2.7.3 Replacing Power Unit of the RKAKX

(3-2) Procedure for replacement with the power turned off
(Refer to "Figure 2.2.7.3 Replacing Power Unit of the RKAKX" (REP 02-0430).)
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).).

(a) Turn off the main switch.
Make sure that the POWER LED (green) on the Front Bezel goes off. If you cannot turn off the power, troubleshoot the failure by connecting to the WEB.

NOTE : If the power has already been turned off, check that Cache memory is not in the back-up state. (To check for the back-up state, refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
If the memory is still being backed up, first release it from the back-up state, and then replace the Control Unit.

In this case, check that the C-PWR LED (green) on Control Unit is extinguished.

NOTE : If the C-PWR LED (green) is lit, it may be that some of the Cache memory data has not been written into the disk. In this case, removing the Control Unit may cause a loss of user data.

(b) Remove the stopper on the rear side of the subsystem (Refer to Installation "2.5.8 (6) Attaching the stopper" (INST 02-1290)).
(c) Open the cable routing bar toward you.
(d) If the cable tray is attached, remove it (Refer to Installation "2.5.8 (5) Attaching the cable tray" (INST 02-1280)).
(e) Remove the repeat binder which fixes the power cables and ENC cables in the middle (Refer to Installation "2.5.8 (4) Fixing the cables in the middle" (INST 02-1270)).
(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 "2.5.4 (2) Fixing the cable routing bars" (INST 02-1020)).
• 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 done to the Power Unit in.

(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, click.

NOTE : Do not catch an ENC cable, when the Power Unit for the inserted.

(k) Connect the removed power cables.
(l) Turn on the main switch (the subsystem usually recovers in about five minutes). Check that the READY LED (green) of both Power Units lights up.
(m) Check that the READY LED (green) on the front of the Basic Chassis lights up, and the ALARM LED (red) and the WARNING LED (orange) go out[‡1]. The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH) 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 disk 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 01-0890)").
(o) When the remote adapter is connected, check that the LED of the Remote Adapter connected is on.
(p) If the Power Unit #B0 or Power Unit #A1 was replaced, install the cable routing bar (Refer to Installation "2.5.4 (2) Fixing the cable routing bars" (INST 02-1020)).
(q) Return the power cables and ENC cables to the original state, and fix them with the repeat binder in the middle Refer to Installation "2.5.8 (4) Fixing the cables in the middle" (INST 02-1270)).

NOTE : Bundle and fix the cables so that they do not hang down below the subsystem.

(r) If the cable tray is removed, attach it (Refer to Installation "2.5.8 (5) Attaching the cable tray" (INST 02-1280)).
(s) Close the cable routing bar.
(t) Attach the stopper on the rear side of the subsystem (Refer to Installation "2.5.8 (6) Attaching the stopper" (INST 02-1290)).

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

(u) Pull out the subsystem and check that the routing is performed correctly (refer to Installation "2.5.8 (7) Checking Routing'" (INST 02-1290)).

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

(4) Replacing the Power Unit of the RKAKS

CAUTION

- **The replacement of the component is restricted in time. This operation requires referring to the manual. If the subsystem 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 Unit, the Power Unit does not need to be replaced.**
  When a trouble of the Power Unit is detected during replacement of the FAN Unit, 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.**

No.	Power status during the replacement	Restriction	Reference section
1	Replacement with the power turned on (READY status) (hot replacement)	1. Complete the replacement within ten minutes. Otherwise, power supply may be disconnected due to thermal abnormality. Immediately, perform the parts replacement work. 2. When the Power Unit and another module fail at the same time, replace the Power Unit first. Otherwise, a powering off (subsystem down) may occur because of an abnormal temperature rise. When the Fan Unit and the 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 Basic Chassis is blinking at high speed because the automatic download of the ENC firmware is being executed. Start the work after the READY LED (green) lights up. 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 Basic Chassis 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 Basic Chassis usually goes out about 30 seconds later.	Refer to "(4-1) Procedure for replacement with the power turned on" (REP 02-0443)
		When both of the two Power Units need 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 Refer to "(4-1) Procedure for replacement with the power turned on" (REP 02-0443)

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 Basic Chassis is blinking at high speed because the automatic download of the ENC firmware is being executed. Start the work after the READY LED (green) lights up. 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 Basic Chassis is blinking at high speed because the update of the flash program or the automatic download of the ENC 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 Basic Chassis 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 02-0445)

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

(Be sure to perform the following operations (a) to (h) within 10 minutes.) (Refer to "Figure 2.2.7.4 Replacing Power Unit of the RKAKS" (REP 02-0444).)

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).).

(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.

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

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

(c) Open the lever toward you which fixes 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 done to the Power Unit in.

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

(e) After waiting for 20 seconds or more, insert(‡1) the Power Unit until its lever is slightly opened, and then push the lever toward the Power Unit.
If you cannot insert the Power Unit into the slot easily, insert it after adjusting the position by slightly returning the lever.
If you insert the Power Unit without waiting for more than 20 seconds, Power Unit may not be recovered (‡2).

NOTE : When inserting the Power Unit, do not catch an ENC cable.

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

(g) Check that the READY LED (green) on the front of the Basic Chassis lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡3). The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 30 to 50 minutes or 40 to 60 minutes in case of the RKH) before it lights up.

(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 02-0110).)
When this is indicated, the replacement of Power Unit has completed.

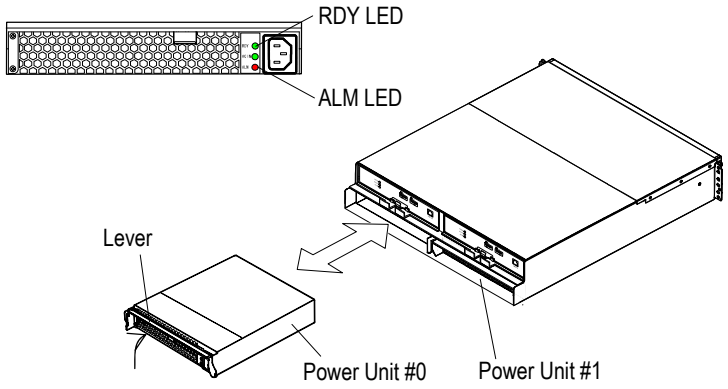


Figure 2.2.7.4 Replacing Power Unit of the RKAKS

‡1 : If the Power Unit is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the Power Unit may not recover normally.
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted Power Unit from the chassis, and insert it again after 20 seconds or more passed.

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

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

(4-2) Procedure for replacement with the power turned off
(Refer to "Figure 2.2.7.4 Replacing Power Unit of the RKAKS" (REP 02-0444).)
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).).

(a) Turn off the main switch.
Make sure that the POWER LED (green) on the Front Bezel go off. If you cannot turn off the power, troubleshoot the failure by connecting to the WEB.

NOTE : If the power has already been turned off, check that Cache memory is not in the back-up state. (To check for the back-up state, refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
If the memory is still being backed up, first release it from the back-up state, and then replace the Control Unit.

In this case, check that the C-PWR LED (green) on Control Unit is extinguished.

NOTE : If the C-PWR LED (green) is lit, it may be that some of the Cache memory data has not been written into the disk. In this case, removing the Control Unit may cause a loss of user data.

(b) Remove all the cables connected to the Power Unit to be replaced.
(c) Open the lever toward you which fixes the Power Unit.
When the levers are completely opened, the Power Unit comes out forward.
(d) Pull out and remove it while holding the body of the Power Unit with both hands.
(e) Insert the Power Unit until its lever is slightly opened, and then push the lever toward the Power Unit.
If you cannot insert the Power Unit into the slot easily, insert it after adjusting the position by slightly returning the lever.

NOTE : When inserting the Power Unit, do not catch an ENC cable.

(f) Connect the all cables as they were before.
(g) Turn on the main switch.
Check that the RDY LEDs (green) of the both Power Units are on (the subsystem usually recovers in about five minutes).
(h) Check that the READY LED (green) on the front of the Basic Chassis 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 RKH) 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 Basic Chassis lights up.

(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 disk 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 01-0890)").

(j) When the remote adapter is connected, check that the LED of the Remote Adapter connected is on.

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

2.2.5 Replacing Control Unit

⚠ CAUTION

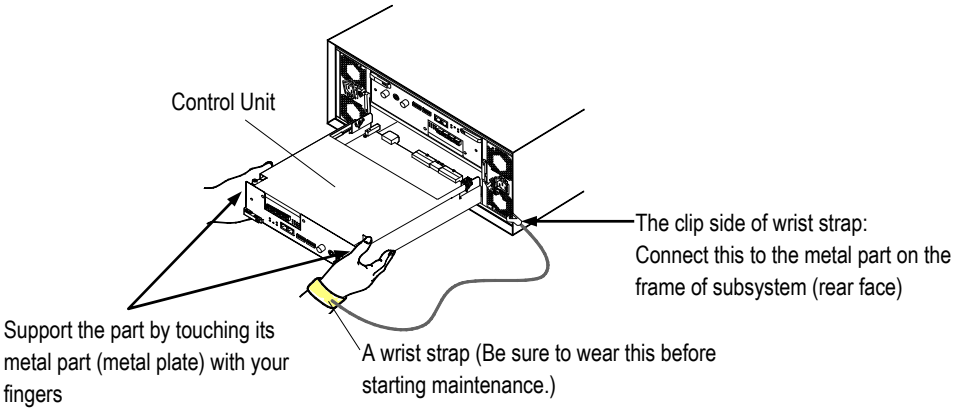
Touching heat sinks or ICs may cause getting burned. Be sure to handle with care.

CAUTION

- **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 is Control Unit, 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 Control Unit is precision instrument. Be sure to put on the wrist strap before starting work in order to protect Control Unit 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 Control Unit into the subsystem, support the Control Unit as touching its metal part with fingers of your hand that wears a wrist strap.



[Notes for the case where NAS Unit (DKN-200-NGW1) is connected to this device]

Prior to this operation, if all of the following three cases apply to this device, execute [Correspondence when connecting the NAS Unit].

[Points to be checked in advance]

- NAS Unit is connected to this device.
  Confirm with the disk array device administrator.
- NAS Unit is in operation.
  Confirm with the NAS Unit administrator.
- A failure has not occurred on the NAS Unit.
  Ask the NAS Unit administrator to check whether failure has occurred or not by checking with the NAS administration software, NAS Manager GUI, List of RAS Information, etc.
  In case of failure, execute the maintenance operation together with the NAS maintenance personnel.

[Correspondence when connecting the NAS Unit]

Confirm with the NAS Unit administrator whether it is possible to terminate the NAS service.
Determine how to react according to the confirmation result.

- When the NAS service can be terminated
  Before starting this operation, ask the NAS Unit administrator for the planned shutdown of the NAS Unit.
  After completing this operation, ask the NAS Unit administrator to reboot the NAS Unit.
- When the NAS service cannot be terminated
  When this operation executed for the Control Unit connected by the NAS Unit is completed, the FC path (Fibre Channel path) of the NAS Unit might go into the Failure status.
  Contact the NAS Unit administrator, refer to "Recovering from FC path errors" of "Hitachi NAS Manager User's Guide", confirm the FC path status and, if the status is Failure, ask for the recovery of the FC path.
  In addition, if there are any personnel for the NAS Unit maintenance, ask the NAS Unit maintenance personnel to refer to "NAS IMS 2.9.8 Displaying LU Path Setting Screen" (NAS IMS 02-0490) in "DKN-200-NGW1 NAS Unit Maintenance Manual", and ask to check the status of the FC path and to recover the FC path if it is in a failure status after completing this operation for one of the Control Unit connected by the NAS Unit.

This page is for editorial purpose only.

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) or RST LED is on or off. 3. Replace the Control Unit after blocking the Control Unit to be replaced. 4. When replacing Control Unit of both systems (CTL 0 and CTL 1), power off the subsystem 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 Basic Chassis is blinking at high speed because the automatic download of the ENC firmware is 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 Basic Chassis 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 Basic Chassis 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 "(1-1) When the ALM LED or RST LED of the RKM/RKS/RKH is on" (REP 02-0470). When the ALM LED is off (Preventive replacement) "(1-2) When the ALM LED or RST LED of the RKM/RKS/RKH is off"" (REP 02-0540).
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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis is blinking at high speed because the update of the flash program or the automatic download of the ENC 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 Basic Chassis 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 02-0580).

No.	Power status during the replacement	Restriction	Reference section
3	Replacement to be made with the power turned off (with the cache memory data volatilized forcibly)	1. Make the replacement after getting a permission of the Technical Support Center because user data in the cache will be lost. 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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis is blinking at high speed because the update of the flash program or the automatic download of the ENC 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 Basic Chassis goes out at the maximum of 30 to 85 minutes later and the READY LED (green) lights up. 4. 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.	"(3) Procedure for replacement with the power turned off (with the cache memory data volatilized forcibly)" (REP 02-0610).

(1) Procedure for replacement with the power turned on (for the case of the dual Controller configuration only)

(1-1) When the ALM LED or RST LED of the RKM/RKS/RKH is on

(Refer to "Figure 2.2.8 Control Unit Replacement (RKM/RKS/RKEXSA/RKEXSB)" (REP 02-0510), "Figure 2.2.8.1 Control Unit Replacement (RKEM/RKES/RKEXS/RKEXS8F)" (REP 02-0511), "Figure 2.2.9 Position of the LED on the Control Unit (RKM/RKEM/RKS/RKES/RKEXS/RKEXSA/RKEXSB/RKEXS8F)" (REP 02-0512), "Figure 2.2.10 Control Unit Replacement (RKH)" (REP 02-0520), "Figure 2.2.10.1 Control Unit Replacement (RKEH)" (REP 02-0530) and "Figure 2.2.11 Position of the LED on the Control Unit (RKH)" (REP 02-0530).)

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.

NOTE : • Do not replace the Control Unit which operates normally.
Before replacing the Control Unit, confirm that it is the ALM LED (red) or RST LED (orange) in on.
- When replacing the Control Unit while the subsystem power is turned on, be sure to replace them one by one. When replacing the Control Unit of the both systems (Control Unit#0 and Control Unit#1) at the same time, follow the procedure explained in "(2) Procedure for replacement with the power turned off" (REP 02-0580).
- System parameters are automatically loaded to the new Control Unit from the built in Disk Drive. Accordingly no setting, such as operating manually is required.
- When the Control Unit is replaced while the LU of the subsystem is being formatted, restoration of the Control Unit which is inserted may be delayed until the LU formatting is completed.
- Replace the Control Unit after recovering the UPS when the special UPS is connected and a failure occurs in the UPS.

(a) Make sure that the ALM LED (red) or RST LED (orange) on the Control Unit to be replaced is on.
(b) Connect OUT (J100-J10x) of the remote adaptor in the final steps and the connector (REMOTE ADAPTER) of the Control Unit are connected with the remote cable (VRCx) when the remote adaptor is connected. Check that the LED of the connected remote adaptor lights on when the remote cable has already been connected. Next, remove the remote cable connected to the Control Unit to be replaced is installed.
(c) 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 Control Unit.
When the levers are completely opened, the Control Unit comes out forward.
(d) Remove the all cables connected to the Control Unit. (When the Additional Chassis of Rack Mount Style is connected, disconnect the ENC cable also.)

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 Control Unit continues to detect the Fibre Channel failures, and the I/O processing of the Control Unit may be deteriorated.
- Remove the cable for the Additional Battery Box by inserting the connector into the Control Unit side completely and pressing the latch of the connector.

⚠ CAUTION

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

(e) Remove the Control Unit by pulling it out toward you.

(f) For the RKEH/RKEHD/RKEM/RKES/RKEXS/RKEXS8F, remove the Cache Unit and Interface Board from the Control Unit to be replaced.
For the subsystem excluding RKEH/RKEHD/RKEM/RKES/RKEXS/RKEXS8F, proceed to the step (g).

(i) Loosen two cover fixing screws (blue) on the top of the cover, and open the cover to the arrow (⟶) direction.
You can fix the cover at a perpendicular position and, furthermore, you can lift the cover a little from this position and fall it to the opposite side.

(ii) Remove the Cache Unit on the Control Unit.
Push the slot levers which fix the Cache Unit, and pull up the Cache Unit by holding both the end of the Cache Unit, and then the cache memory can be removed.

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

(iii) Remove the Interface Board mounted on the Control Unit.
Loosen the fixing screws ① to ④(four places) of the Interface Board installed in the Control Unit, operate the latch lever slowly to the arrow direction (⟶), remove the connector while lifting up the Interface Board, and remove it from the Control Unit.
For the RKEXS, and RKEM/RKES/RKEXS8F that does not install the Interface Board, this work is not required.

NOTE : Place the removed Interface Board in the place where anti-static measures are taken.

(iv) Loosen two cover fixing screws (blue) on the top of the cover of the new Control Unit, and open the cover to the arrow (⟶) direction.

(v) Be sure to Install the removed Cache Unit in the position with the same slot number as before in the new Control Unit.

(vi) Place the removed Interface Board according to the positioning pin of the new Control Unit, and fix the fixing screw ① temporarily. Press the label (PUSH HERE) part, and insert it in the connector. At this time, verify that the connector is inserted surely. Install the Interface Board making its sheet metal part face inside of the Control Unit.
For the RKEXS, and RKEM/RKES/RKEXS8F that does not install the Interface Board in the step (iii), this work is not required.

NOTE : When installing the Interface Board, insert the connector after checking the locations of the positioning pin and the fixing screws for Interface Board because the incorrect location decision may cause the connector to be damaged.

(vii) Fix the Interface Board by tightening the fixing screws ① to ④.
For the RKEXS, and RKEM/RKES/RKEXS8F that does not install the Interface Board in the step (vi), this work is not required.

(viii) Close the cover and fix it by fastening two cover fixing screws (blue) on the top of the cover.

(g) Connect the removed interlocking cable to the new Control Unit when the special UPS is connected.

(h) If the RKAK/RKAKX/RKAKS is connected, connect the removed ENC cable to the new Control Unit.

(i) If the Additional Battery Box was connected, connect the removed special cable to the new Control Unit.

NOTE : • If you insert the Control Unit without connecting the RKAK/RKAKX/RKAKS to the Control Unit, a failure occurs again in the Control Unit.
• If you insert the Control Unit without connecting the Additional Battery Box and/or UPS to the Control Unit, a failure notice of the Additional Battery Box or UPS is displayed.
• In the case of the RKM/RKEM/RKS/RKES/RKEXS/RKEXSA/RKEXSB/RKEXS8F, the installed direction is different in the Control Unit #0 and #1, so that be careful of the connecting position of the cables.

(j) Make sure that 20 seconds or longer has elapsed after the Control Unit was taken out.
Insert it in the set position in the status where the right and left levers on the Control Unit are opened, and close the levers completely until you hear the buttons (blue), which fix the levers, click.
Although the ALM LED (red) lights up(‡1) when you insert the Control Unit, it goes out after the Control Unit recovers.
If the Control Unit is inserted without waiting for 20 seconds, it is possible that the Control Unit is not recovered from the failure normally.
When it is not recovered even if 30 minutes or more elapsed, perform the dummy replacement(‡2) of the Control Unit which was inserted.
When the Control Unit is not recovered (30 minutes or more elapsed) even if "I1G300 CTL recovery start" is displayed in the Information Message of WEB after the dummy replacement, perform the dummy replacement of the Control Unit which was inserted, again.
When it is not recovered after another 30 minutes, service personnel connects it to the WEB and takes recovery actions according to "Information Message" on WEB. (There may be a problem on the Control Unit or the cache memories installed.)
But, when any messages are displayed on WEB about the Control Unit or the cache memories installed, then service personnel connects the other Control Unit to the WEB and takes recovery actions according to "Information Message" in the other Control Unit.
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.

NOTE : • Do not catch a ENC cable, when the Control Unit for the inserted.
- In the case of the RKM/RKS, the installation direction is different in the Control Unit # 0 and # 1. Install the Control Unit #0 with the cover up and #1 with the cover down.
- When pushing the levers at the same time in the direction shown by the arrows (←——), perform this operation within one minute. If it has taken more than one minute 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 Control Unit replacement since the failure may be caused in the Control Unit.

‡1 : If the Control Unit is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the ALM LED (red) may not be turned off ("I1G300 CTL recovery start" is not displayed in "Information Message" on WEB).
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted Control Unit from the chassis, and insert it again after 20 seconds or more passed.

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

(k) Make sure that the WARNING LED (orange) on the front of the Basic Chassis goes out(‡1). (The Control Unit 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.)

(l) Connect the removed all cables to the Control Unit.

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 Control Unit continues to detect the Fibre Channel failures, and the I/O processing of the Control Unit may be deteriorated.
• In the case of the RKM/RKEM/RKS/RKES/RKEXS/RKEXSA/RKEXSB/RKEXS8F, the installed direction is different in the Control Unit #0 and #1, so that be careful of the connecting position of the cables.

(m) Check that the READY LED (green) on the front of the Basic Chassis is on. The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH) before it lights up.

(n) Refer to "Information Message" on WEB, and check to see that [I0010x CTL recovered (CTL-x)] is indicated. (Refer to WEB "2.5 Information Message"(WEB 02-0110).)
When this is indicated, the replacement of Control Unit has completed.

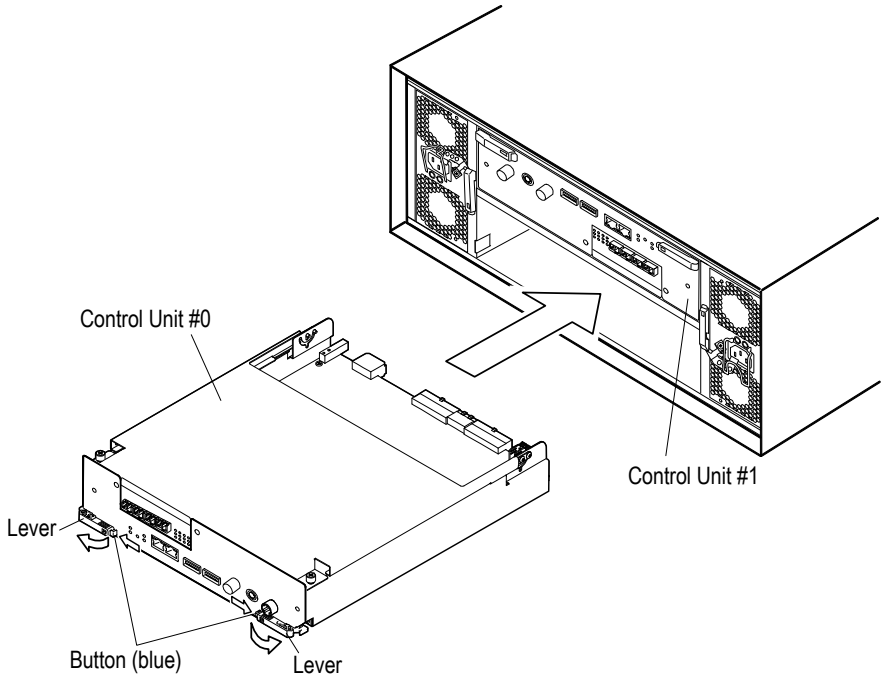
(o) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Disk Drive is new, the start message and completion message of the drive firmware automatic download are not displayed.
When the message indicating the abnormal 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 01-0890)".)

(p) Check that the LED of the remote adaptor connected to the Control Unit is installed lights on when the remote adaptor is connected.

(q) Check that the maintenance port IP address is set correctly.
When the maintenance port IP address is displayed as "0.0.0.0", set it. (Refer to System Parameter "4.2 (4) Setting of Maintenance LAN" (SYSPR 04-0160).)

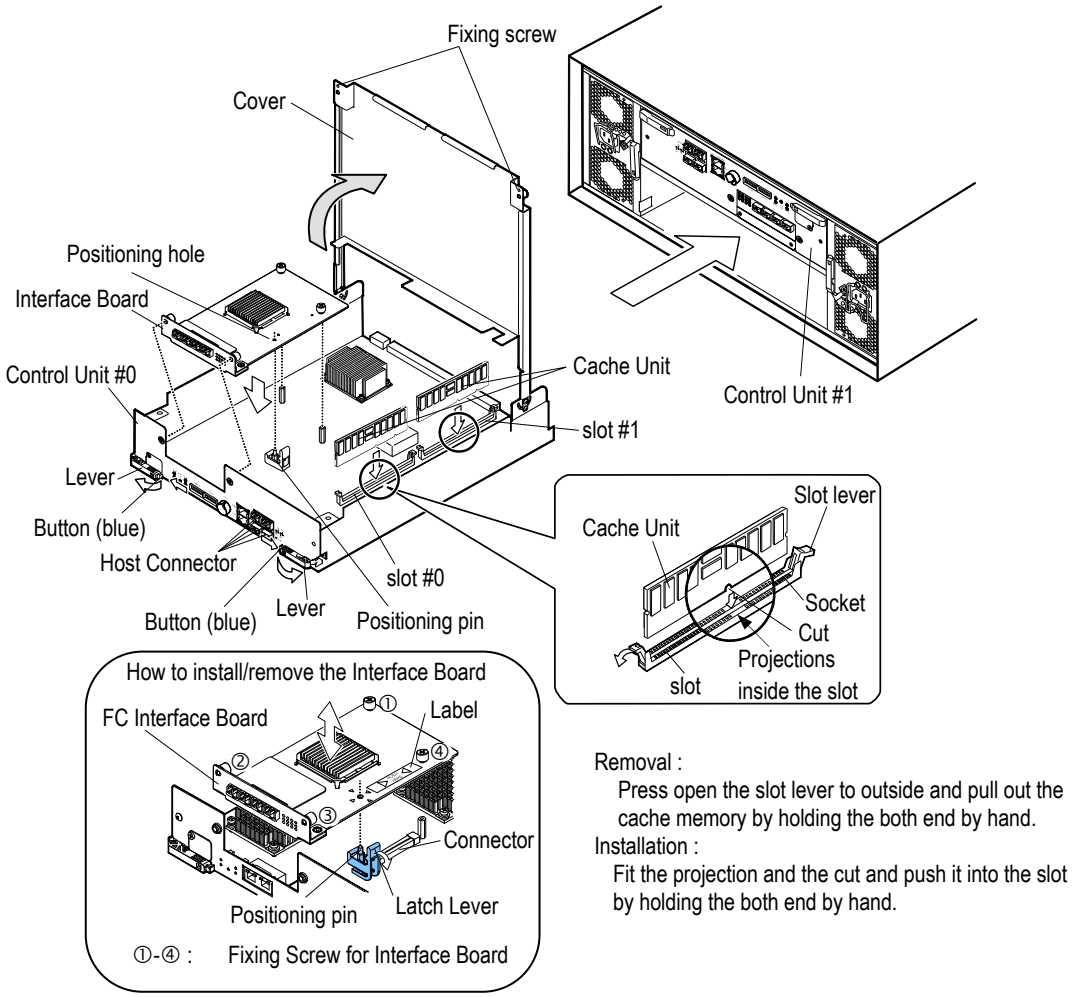
(r) Check the date and time of the subsystem. If they are not correct, set them.
(Refer to Troubleshooting "2.2 Confirming and Setting RTC (Real Time Clock)" (TRBL 02-0010).)

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.



*1 : The figure shows the case where the FC Interface Board is not installed in the Control Unit of the RKM.

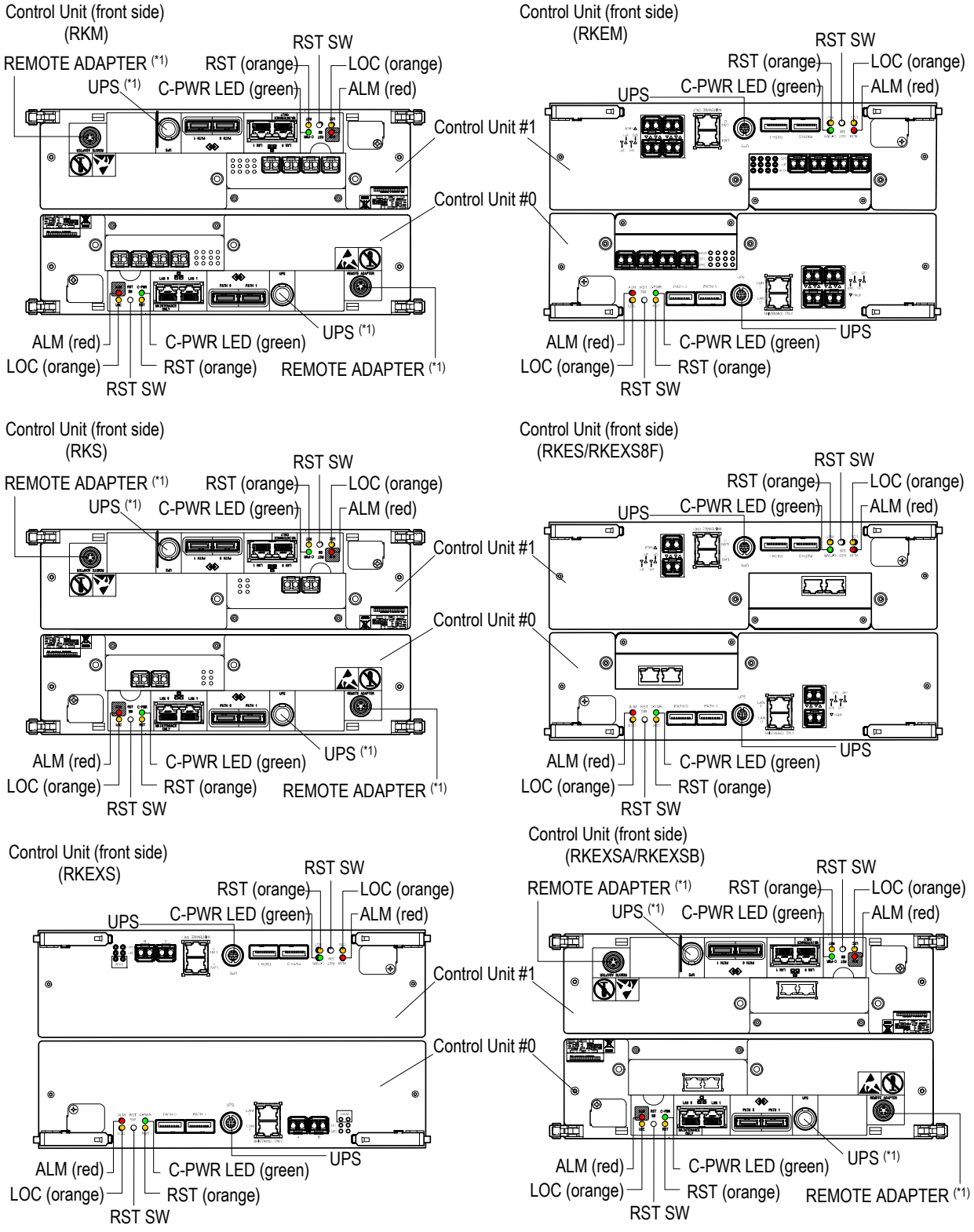
Figure 2.2.8 Control Unit Replacement (RKM/RKS/RKEXSA/RKEXSB)



*1 : The figure shows RKEM.

*2 : The Cache Unit of the RKES/RKEXS/RKEXS8F is implemented in the Slot #0 only, and Slot #1 does not exist in the RKES/RKEXS/RKEXS8F. The Slot #0 of RKES/RKEXS/RKEXS8F is in the same position as the Slot#0 of RKEM.

Figure 2.2.8.1 Control Unit Replacement (RKEM/RKES/RKEXS/RKEXS8F)



*1 : The position of the connector is different depending on the Control Unit.
Confirm the connector.

Figure 2.2.9 Position of the LED on the Control Unit
(RKM/RKEM/RKS/RKES/RKEXS/RKEXSA/RKEXSB/RKEXS8F)

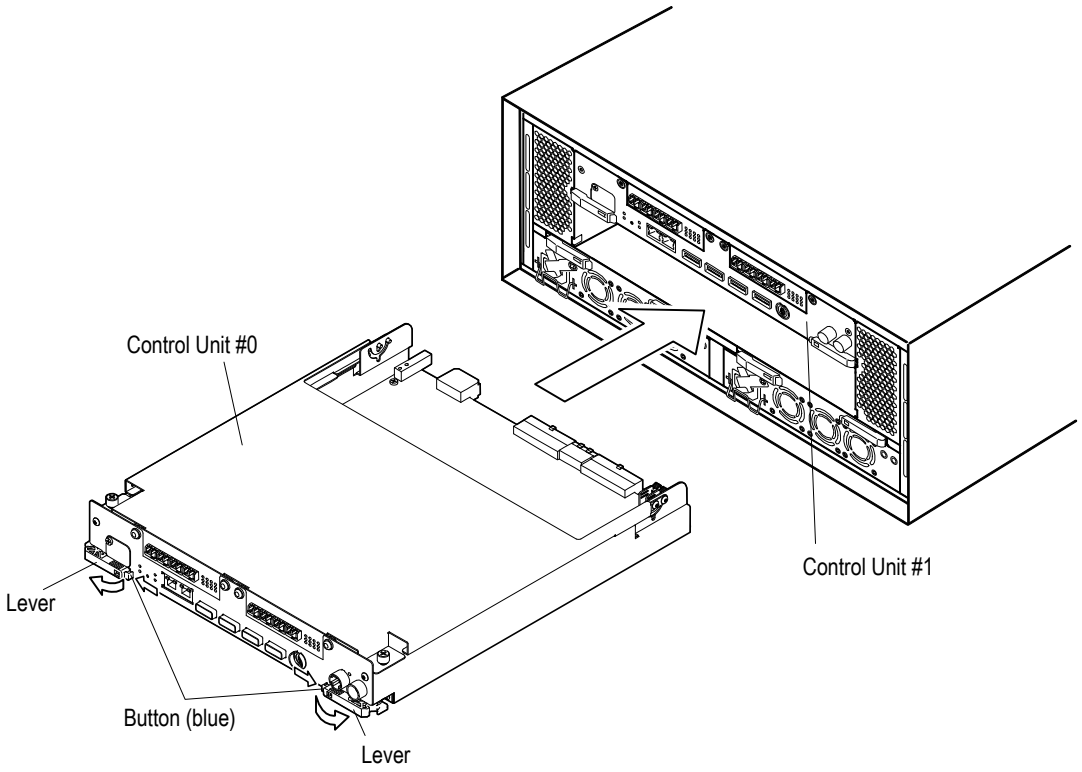
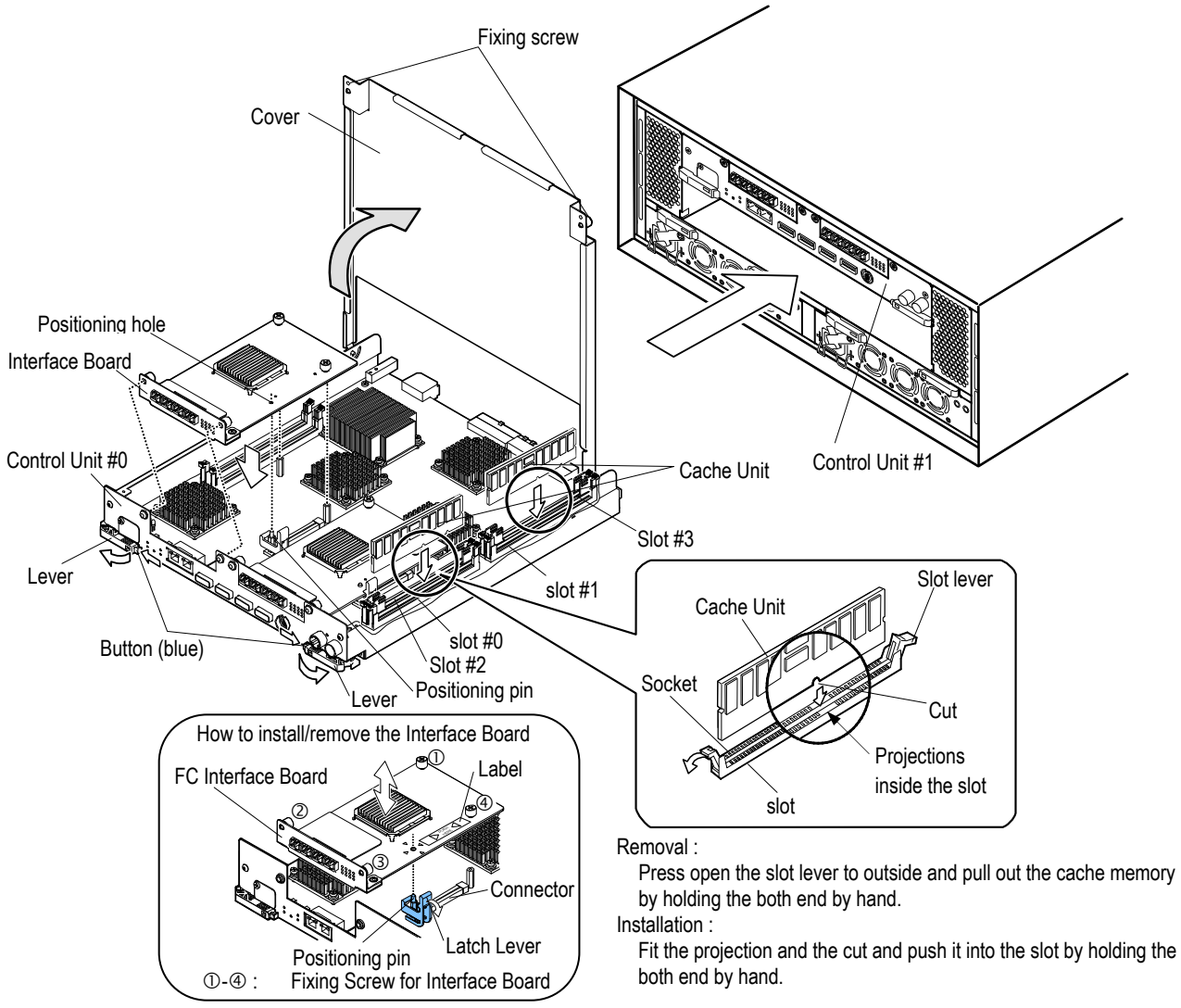


Figure 2.2.10 Control Unit Replacement (RKH)



Removal :
Press open the slot lever to outside and pull out the cache memory by holding the both end by hand.

Installation :
Fit the projection and the cut and push it into the slot by holding the both end by hand.

Figure 2.2.10.1 Control Unit Replacement (RKEH)

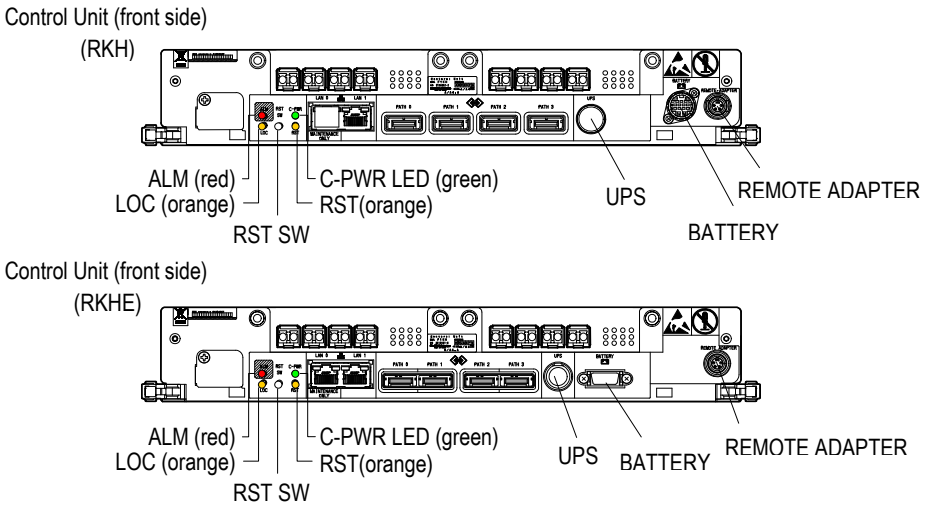


Figure 2.2.11 Position of the LED on the Control Unit (RKH/RKHE)

(1-2) When the ALM LED or RST LED of the RKM/RKS is off
(Refer to "Figure 2.2.8 Control Unit Replacement (RKM/RKS/RKEXSA/RKEXSB)" (REP 02-0510), "Figure 2.2.8.1 Control Unit Replacement (RKEM/RKES/RKEXS/RKEXS8F)" (REP 02-0511), "Figure 2.2.9 Position of the LED on the Control Unit (RKM/RKEM/RKS/RKES/RKEXS/RKEXSA/RKEXSB/RKEXS8F)" (REP 02-0512), "Figure 2.2.10 Control Unit Replacement (RKH)" (REP 02-0520), "Figure 2.2.10.1 Control Unit Replacement (RKEH)" (REP 02-0530) and "Figure 2.2.11 Position of the LED on the Control Unit (RKH)" (REP 02-0530).)

NOTE :
- When replacing the Control Unit while the subsystem power is turned on, be sure to replace them one by one. When replacing the Control Unit of the both systems (Control Unit #0 and Control Unit #1) at the same time, follow the procedure explained in "(2) Procedure for replacement with the power turned off" (REP 02-0580).
- System parameters are automatically loaded to the new Control Unit from the built in Disk Drive. Accordingly no setting, such as operating manually, is required.
- When the Control Unit is replaced while the LU of the subsystem is being formatted, restoration of the Control Unit which is inserted may be delayed until the LU 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.
- Replace the Control Unit after recovering the UPS when the special UPS is connected and a failure occurs in the UPS.

(a) For preventive detaching of the Control Unit, press RST SW.
Use a tool with a thin tip (a precise screwdriver, etc.) because the hole of RST SW is small (3 mm in diameter). Make sure that the ALM LED (red) or RST LED (orange) turns on within one second and the WARNING LED (orange) on the Front Bezel blinks.

(b) Connect OUT (J100-J10x) of the remote adaptor in the final steps and the connector (REMOTE ADAPTER) of the Control Unit are connected with the remote cable (VRCx) when the remote adaptor is connected. Check that the LED of the connected remote adaptor lights on when the remote cable has already been connected. Next, remove the remote cable connected to the Control Unit to be replaced is installed.

(c) 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 Control Unit.
When the levers are completely opened, the Control Unit comes out forward.

(d) Remove the all cables connected to the Control Unit that was blocked for prevention against a failure. (When the Additional Chassis of Rack Mount Style is connected, disconnect the ENC cable also.)

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 Control Unit continues to detect the Fibre Channel failures, and the I/O processing of the Control Unit may be deteriorated.
• Remove the cable for the Additional Battery Box by inserting the connector into the Control Unit side completely and pressing the latch of the connector.

⚠ CAUTION

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

(e) Remove the Control Unit by pulling it out toward you.

(f) For the RKEH/RKEHD/RKEM/RKES/RKEXS/RKEXS8F, remove the Cache Unit and Interface Board from the Control Unit to be replaced.
For the subsystem excluding RKEH/RKEHD/RKEM/RKES/RKEXS/RKEXS8F, proceed to the step (g).

(i) Loosen two cover fixing screws (blue) on the top of the cover, and open the cover to the arrow (⟶) direction.
You can fix the cover at a perpendicular position and, furthermore, you can lift the cover a little from this position and fall it to the opposite side.

(ii) Remove the Cache Unit on the Control Unit.
Push the slot levers which fix the Cache Unit, and pull up the Cache Unit by holding both the end of the Cache Unit, and then the cache memory can be removed.

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

(iii) Remove the Interface Board mounted on the Control Unit.
Loosen the fixing screws ① to ④(four places) of the Interface Board installed in the Control Unit, operate the latch lever slowly to the arrow direction (⟶), remove the connector while lifting up the Interface Board, and remove it from the Control Unit.
For the RKEXS, and RKEM/RKES/RKEXS8F that does not install the Interface Board, this work is not required.

NOTE : Place the removed Interface Board in the place where anti-static measures are taken.

(iv) Loosen two cover fixing screws (blue) on the top of the cover of the new Control Unit, and open the cover to the arrow (⟶) direction.

(v) Be sure to Install the removed Cache Unit in the position with the same slot number as before in the new Control Unit.

(vi) Place the removed Interface Board according to the positioning pin of the new Control Unit, and fix the fixing screw ① temporarily. Press the label (PUSH HERE) part, and insert it in the connector. At this time, verify that the connector is inserted surely. Install the Interface Board making its sheet metal part face inside of the Control Unit.
For the RKEXS, and RKEM/RKES/RKEXS8F that does not install the Interface Board in the step (iii), this work is not required.

NOTE : When installing the Interface Board, insert the connector after checking the locations of the positioning pin and the fixing screws for Interface Board because the incorrect location decision may cause the connector to be damaged.

(vii) Fix the Interface Board by tightening the fixing screws ① to ④.
For the RKEXS, and RKEM/RKES/RKEXS8F that does not install the Interface Board in the step (vi), this work is not required.

(viii) Close the cover and fix it by fastening two cover fixing screws (blue) on the top of the cover.

(g) Connect the removed interlocking cable to the new Control Unit when the special UPS is connected.

(h) If the RKAK/RKAKX/RKAKS is connected, connect the removed ENC cable to the new Control Unit.

(i) If the Additional Battery Box was connected, connect the removed special cable to the new Control Unit.

NOTE :
- If you insert the Control Unit without connecting the RKAK/RKAKX/RKAKS to the Control Unit, a failure occurs again in the Control Unit.
- If you insert the Control Unit without connecting the Additional Battery Box and/or UPS to the Control Unit, a failure notice of the Additional Battery Box or UPS is displayed.
- In the case of the RKM/RKEM/RKS/RKES/RKEXS/RKEXSA/RKEXSB/RKEXS8F, the installed direction is different in the Control Unit #0 and #1, so that be careful of the connecting position of the cables.

(j) After making sure that 20 seconds or longer has elapsed after the Control Unit was taken out, insert it in the set position in the status where the right and left levers on the Control Unit are opened, and close the levers completely until you hear the buttons (blue), which fix the levers, click.
Although the ALM LED (red) lights up(‡1) when you insert the Control Unit, it goes out after the Control Unit recovers.
If the Control Unit is inserted without waiting for 20 seconds, it is possible that the Control Unit is not recovered from the failure normally.
When it is not recovered even if 30 minutes or more elapsed, perform the dummy replacement(‡2) of the Control Unit which was inserted.
When the Control Unit is not recovered (30 minutes or more elapsed) even if "I1G300 CTL recovery start" is displayed in the Information Message of WEB after the dummy replacement, perform the dummy replacement of the Control Unit which was inserted, again.
When it is not recovered after another 30 minutes, service personnel connects it to the WEB and takes recovery actions according to "Information Message" on WEB. (There may be a problem on the Control Unit or the cache memories installed.)
But, when any messages are displayed on WEB about the Control Unit or the cache memories installed, then service personnel connects the other Control Unit to the WEB and takes recovery actions according to "Information Message" in the other Control Unit.
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.

NOTE : • Do not catch a ENC cable, when the Control Unit for the inserted.
- In the case of the RKM/RKS, the installation direction is different in the Control Unit # 0 and # 1. Install the Control Unit #0 with the cover up and #1 with the cover down.
- When pushing the levers at the same time in the direction shown by the arrows (←——), perform this operation within one minute. If it has taken more than one minute 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 Control Unit replacement since the failure may be caused in the Control Unit.

‡1 : If the Control Unit is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the ALM LED (red) may not be turned off ("I1G300 CTL recovery start" is not displayed in "Information Message" on WEB).
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted Control Unit from the chassis, and insert it again after 20 seconds or more passed.

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

(k) Make sure that the WARNING LED (orange) on the Front Bezel is off(‡1).
(The Control Unit 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 WARNING LED (orange) is on, replace the Control Unit again.
If WARNING LED (orange) is blinking, make sure WARNING LED (orange) goes off by referring to WEB.

(l) Connect the removed all cables to the Control Unit.

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 Control Unit continues to detect the Fibre Channel failures, and the I/O processing of the Control Unit may be deteriorated.
• In the case of the RKM/RKS, the installed direction is different in the Control Unit #0 and #1, so that be careful of the connecting position of the cables.

(m) Make sure that the READY LED (green) on the front of the Basic Chassis lights up.
The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH) before it lights up.

(n) Refer to “Information Message” on WEB, and check to see that [I0010x CTL recovered (CTL-x)] is indicated. (Refer to WEB “2.5 Information Message”(WEB 02-0110).)
When this is indicated, the replacement of Control Unit has completed.

(o) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the Disk 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 01-0890)”.)

(p) Check that the LED of the remote adaptor connected to the Control Unit is installed lights on when the remote adaptor is connected.

(q) Check the date and time of the subsystem. If they are not correct, set them.
(Refer to Troubleshooting “2.2 Confirming and Setting RTC (Real Time Clock)” (TRBL 02-0010).)

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

This page is for editorial purpose only.

(2) Procedure for replacement with the power turned off
(Refer to "Figure 2.2.8 Control Unit Replacement (RKM/RKS/RKEXSA/RKEXSB)" (REP 02-0510), "Figure 2.2.8.1 Control Unit Replacement (RKEM/RKES/RKEXS/RKEXS8F)" (REP 02-0511), "Figure 2.2.9 Position of the LED on the Control Unit (RKM/RKEM/RKS/RKES/RKEXS/RKEXSA/RKEXSB/RKEXS8F)" (REP 02-0512), "Figure 2.2.10 Control Unit Replacement (RKH)" (REP 02-0520), "Figure 2.2.10.1 Control Unit Replacement (RKEH)" (REP 02-0530) and "Figure 2.2.11 Position of the LED on the Control Unit (RKH)" (REP 02-0530).)
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.
When replacing both Control Units with the power turned off using SAS(SED) Disk Drives with the priced optional Data At Rest Encryption unlocked and enabled, get the backup file of the master authentication key and its password from the customer or SE, inform the Technical Support Center of the backup file name and the information on the collected simple trace, and then request to check that it is the latest backup file.
When the customer or SE never has made a backup of master authentication key, use the backup file stored on the License key CD (label name: Hitachi Adaptable modular storage PP License key Data At Rest Encryption, password : abcdef).
After checking that it is the latest backup file, perform the following work.

(a) Confirm the installation location of the Control Unit whose ALM LED (red) or RST LED (orange) is on.

(b) Turn off the main switch.
Make sure that the POWER LED (green) on the Front Bezel go off. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the power has already been turned off, check that Cache memory is not in the back-up state. (To check for the back-up state, refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
If the memory is still being backed up, first release it from the back-up state, and then replace the Control Unit.

In this case, check that the C-PWR LED (green) on Control Unit is extinguished.

NOTE : If the C-PWR LED (green) is lit, it may be that some of the Cache memory data has not been written into the disk. In this case, removing the Control Unit may cause a loss of user data.

(c) Remove the power cables (two) from the Basic Chassis in which the Control Unit to be replaced is installed.

(d) 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 Control Unit.
When the levers are completely opened, the Control Unit comes out forward.

(e) Remove the all cables connected to the Control Unit.

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 Control Unit continues to detect the Fibre Channel failures, and the I/O processing of the Control Unit may be deteriorated.
• Remove the cable for the Additional Battery Box by inserting the connector into the Control Unit side completely and pressing the latch of the connector.

⚠ CAUTION

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

(f) Remove the Control Unit by pulling it out toward you.

(g) For the RKEH/RKEHD/RKEM/RKES/RKEXS/RKEXS8F, remove the Cache Unit and Interface Board from the Control Unit to be replaced.
For the subsystem excluding RKEH/RKEHD/RKEM/RKES/RKEXS/RKEXS8F, proceed to the step (h).

(i) Loosen two cover fixing screws (blue) on the top of the cover, and open the cover to the arrow (⟶) direction.
You can fix the cover at a perpendicular position and, furthermore, you can lift the cover a little from this position and fall it to the opposite side.

(ii) Remove the Cache Unit on the Control Unit.
Push the slot levers which fix the Cache Unit, and pull up the Cache Unit by holding both the end of the Cache Unit, and then the cache memory can be removed.

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

(iii) Remove the Interface Board mounted on the Control Unit.
Loosen the fixing screws ① to ④(four places) of the Interface Board installed in the Control Unit, operate the latch lever slowly to the arrow direction (⟶), remove the connector while lifting up the Interface Board, and remove it from the Control Unit.
For the RKEXS, and RKEM/RKES/RKEXS8F that does not install the Interface Board, this work is not required.

NOTE : Place the removed Interface Board in the place where anti-static measures are taken.

(iv) Loosen two cover fixing screws (blue) on the top of the cover of the new Control Unit, and open the cover to the arrow (⟶) direction.

(v) Be sure to Install the removed Cache Unit in the position with the same slot number as before in the new Control Unit.

(vi) Place the removed Interface Board according to the positioning pin of the new Control Unit, and fix the fixing screw ① temporarily. Press the label (PUSH HERE) part, and insert it in the connector. At this time, verify that the connector is inserted surely. Install the Interface Board making its sheet metal part face inside of the Control Unit.
For the RKEXS, and RKEM/RKES/RKEXS8F that does not install the Interface Board in the step (iii), this work is not required.

NOTE : When installing the Interface Board, insert the connector after checking the locations of the positioning pin and the fixing screws for Interface Board because the incorrect location decision may cause the connector to be damaged.

(vii) Fix the Interface Board by tightening the fixing screws ① to ④.
For the RKEXS, and RKEM/RKES/RKEXS8F that does not install the Interface Board in the step (vi), this work is not required.

(viii) Close the cover and fix it by fastening two cover fixing screws (blue) on the top of the cover.

(h) Insert it in the set position in the status where the right and left levers on the Control Unit are opened, and close the levers completely until you hear the buttons (blue), which fix the levers, click.
If the Control Unit is caught by something when it is inserted, do not push it in forcibly. Retry the insertion from the beginning. If forced, pins might be broken.

NOTE : • Do not catch a ENC cable, when the Control Unit for the inserted.
• In the case of the RKM/RKS, the installation direction is different in the Control Unit # 0 and # 1. Install the Control Unit #0 with the cover up and #1 with the cover down.

When replacing the other Control Unit, return to the step (d), and perform the work for the other Control Unit.

(i) Connect the removed all cables to the Control Unit.

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 Control Unit continues to detect the Fibre Channel failures, and the I/O processing of the Control Unit may be deteriorated.
• In the case of the RKM/RKEM/RKS/RKES/RKEXS/RKEXSA/RKEXSB/RKEXS8F, the installed direction is different in the Control Unit #0 and #1, so that be careful of the connecting position of the cables.

(j) Connect the power cables (two) to the Basic Chassis whose Control Unit was replaced.

(k) When replacing both Control Units with the power turned off using SAS(SED) Disk Drives with the priced optional Data At Rest Encryption unlocked and enabled, perform the following work.
In the case other than described above, turn on the main switch and proceed to the step (l) (the subsystem usually recovers in about five minutes.)
  (i) Turn on the main switch, and then transfer to the Maintenance Mode.
  Refer to WEB "Chapter 3 The Maintenance Mode Operation Procedure" (WEB 03-0000)."
  (ii) Using the backup file and its password obtained from the customer or SE, perform the restoration on Web. (Refer to WEB "3.3.2 Master Authentication Key for SED (WEB 03-0381)".).
  (iii) Click the [Go to Normal Mode] button of the menu frame in the maintenance mode window on Web to transfer to the Normal Mode.
  (iv) In the information message on Web, check that "I6JB00 SED authentication has started" is displayed, and after ten seconds, "I6JC00 SED authentication has completed" is displayed.
  (v) After all the works are completed, request the customer or SE to update the master authentication
(l) Check that the READY LED (green) on the front of the Basic Chassis 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 RKH) 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 Basic Chassis lights up.
(m) Check that "I10000 Subsystem is ready" is displayed referring to the Information Message on WEB.
(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 Disk 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 01-0890)".)
(o) Check the date and time of the subsystem. If they are not correct, set them.
(Refer to Troubleshooting "2.2 Confirming and Setting RTC (Real Time Clock)" (TRBL 02-0010).)

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

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(3) Procedure for replacement with the power turned off (with the cache memory data volatilized forcibly)

(Refer to "Figure 2.2.8 Control Unit Replacement (RKM/RKS/RKEXSA/RKEXSB)" (REP 02-0510), "Figure 2.2.8.1 Control Unit Replacement (RKEM/RKES/RKEXS/RKEXS8F)" (REP 02-0511), "Figure 2.2.9 Position of the LED on the Control Unit (RKM/RKEM/RKS/RKES/RKEXS/RKEXSA/RKEXSB/RKEXS8F)" (REP 02-0512), "Figure 2.2.10 Control Unit Replacement (RKH)" (REP 02-0520), "Figure 2.2.10.1 Control Unit Replacement (RKEH)" (REP 02-0530) and "Figure 2.2.11 Position of the LED on the Control Unit (RKH)" (REP 02-0530).)

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.

When replacing both Control Units with the power turned off using SAS(SED) Disk Drives with the priced optional Data At Rest Encryption unlocked and enabled, get the backup file of the master authentication key and its password from the customer or SE, inform the Technical Support Center of the backup file name and the information on the collected simple trace, and then request to check that it is the latest backup file.

When the customer or SE never has made a backup of master authentication key, use the backup file stored on the License key CD (label name: Hitachi Adaptable modular storage PP License key Data At Rest Encryption, password : abcdef).

After checking that it is the latest backup file, perform the following work.

NOTE : When doing the following works, get a permission of the Technical Support Center. When replacing the controller with the power turned on (with the cache memory data not volatilized) in a maintenance work, refer to procedure "(2) Procedure for replacement with the power turned off" (REP 02-0580).

(a) Confirm the installation location of the Control Unit whose ALM LED (red) or RST LED (orange) is on.

(b) Turn off the main switch.
Make sure that the POWER LED (green) on the Front Bezel go off.
In this case, check that the C-PWR LED (green) on Control Unit is extinguished.

NOTE : If the C-PWR LED (green) is lit, it may be that some of the Cache memory data has not been written into the disk. In this case, removing the Control Unit may cause a loss of user data.

(c) Remove the power cables (two) from the Basic Chassis in which the Control Unit to be replaced is installed.

(d) 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 Control Unit.
When the levers are completely opened, the Control Unit comes out forward.

(e) Remove the all cables connected to the Control Unit.

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 Control Unit continues to detect the Fibre Channel failures, and the I/O processing of the Control Unit may be deteriorated.
• Remove the cable for the Additional Battery Box by inserting the connector into the Control Unit side completely and pressing the latch of the connector.

⚠ CAUTION

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

(f) Remove the Control Unit by pulling it out toward you.

(g) For the RKEH/RKEHD/RKEM/RKES/RKEXS/RKEXS8F, remove the Cache Unit and Interface Board from the Control Unit to be replaced.
For the subsystem excluding RKEH/RKEHD/RKEM/RKES/RKEXS/RKEXS8F, proceed to the step (h).

(i) Loosen two cover fixing screws (blue) on the top of the cover, and open the cover to the arrow (⟶) direction.
You can fix the cover at a perpendicular position and, furthermore, you can lift the cover a little from this position and fall it to the opposite side.

(ii) Remove the Cache Unit on the Control Unit.
Push the slot levers which fix the Cache Unit, and pull up the Cache Unit by holding both the end of the Cache Unit, and then the cache memory can be removed.

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

(iii) Remove the Interface Board mounted on the Control Unit.
Loosen the fixing screws ① to ④(four places) of the Interface Board installed in the Control Unit, operate the latch lever slowly to the arrow direction (⟶), remove the connector while lifting up the Interface Board, and remove it from the Control Unit.
For the RKEXS, and RKEM/RKES/RKEXS8F that does not install the Interface Board, this work is not required.

NOTE : Place the removed Interface Board in the place where anti-static measures are taken.

(iv) Loosen two cover fixing screws (blue) on the top of the cover of the new Control Unit, and open the cover to the arrow (⟶) direction.

(v) Be sure to Install the removed Cache Unit in the position with the same slot number as before in the new Control Unit.

(vi) Place the removed Interface Board according to the positioning pin of the new Control Unit, and fix the fixing screw ① temporarily. Press the label (PUSH HERE) part, and insert it in the connector. At this time, verify that the connector is inserted surely. Install the Interface Board making its sheet metal part face inside of the Control Unit.
For the RKEXS, and RKEM/RKES/RKEXS8F that does not install the Interface Board in the step (iii), this work is not required.

NOTE : When installing the Interface Board, insert the connector after checking the locations of the positioning pin and the fixing screws for Interface Board because the incorrect location decision may cause the connector to be damaged.

(vii) Fix the Interface Board by tightening the fixing screws ① to ④.
For the RKEXS, and RKEM/RKES/RKEXS8F that does not install the Interface Board in the step (vi), this work is not required.

(viii) Close the cover and fix it by fastening two cover fixing screws (blue) on the top of the cover.

(h) Insert it in the set position in the status where the right and left levers on the Control Unit are opened, and close the levers completely until you hear the buttons (blue), which fix the levers, click.
If the Control Unit is caught by something when it is inserted, do not push it in forcibly. Retry the insertion from the beginning. If forced, pins might be broken.

NOTE : • Do not catch a ENC cable, when the Control Unit for the inserted.
• In the case of the RKM/RKS, the installation direction is different in the Control Unit # 0 and # 1. Install the Control Unit #0 with the cover up and #1 with the cover down.

When replacing the other Control Unit, return to the step (d), and perform the work for the other Control Unit.

(i) Connect the removed all cables to the Control Unit.

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 Control Unit continues to detect the Fibre Channel failures, and the I/O processing of the Control Unit may be deteriorated.
• In the case of the RKM/RKEM/RKS/RKES/RKEXS/RKEXSA/RKEXSB/RKEXS8F, the installed direction is different in the Control Unit #0 and #1, so that be careful of the connecting position of the cables.

(j) Connect the power cables (two) to the Basic Chassis whose Control Unit was replaced.

(k) When replacing both Control Units with the power turned off using SAS(SED) Disk Drives with the priced optional Data At Rest Encryption unlocked and enabled, perform the following work.
In the case other than described above, turn on the main switch and proceed to the step (l) (the subsystem usually recovers in about five minutes.)

(i) Turn on the main switch, and then transfer to the Maintenance Mode.
Refer to WEB "Chapter 3 The Maintenance Mode Operation Procedure" (WEB 03-0000)".

(ii) Using the backup file and its password obtained from the customer or SE, perform the restoration on Web. (Refer to WEB "3.3.2 Master Authentication Key for SED (WEB 03-0381)".)

(iii) Click the [Go to Normal Mode] button of the menu frame in the maintenance mode window on Web to transfer to the Normal Mode.

(iv) In the information message on Web, check that "I6JB00 SED authentication has started" is displayed, and after ten seconds, "I6JC00 SED authentication has completed" is displayed.

(v) After all the works are completed, request the customer or SE to update the master authentication

(l) Check that the READY LED (green) on the front of the Basic Chassis 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 RKH) 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 Basic Chassis lights up.

(m) Check that "I10000 Subsystem is ready" is displayed referring to the Information Message on WEB.

(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 Disk 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 01-0890)".)

(o) Check the date and time of the subsystem. If they are not correct, set them.
(Refer to Troubleshooting "2.2 Confirming and Setting RTC (Real Time Clock)" (TRBL 02-0010).)

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

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2.2.6 Replacing Cache Unit

For the RKEH/RKEHD/RKEM/RKES/RKEXS/RKEXS8F, replace the Cache Unit.
For the Basic Chassis excluding the RKEH/RKEHD/RKEM/RKES/RKEXS/RKEXS8F, replace the Control Unit without replacing the Cache Unit (Refer to "2.2.5 Replacing Control Unit" (REP-02-0450).).

⚠ CAUTION

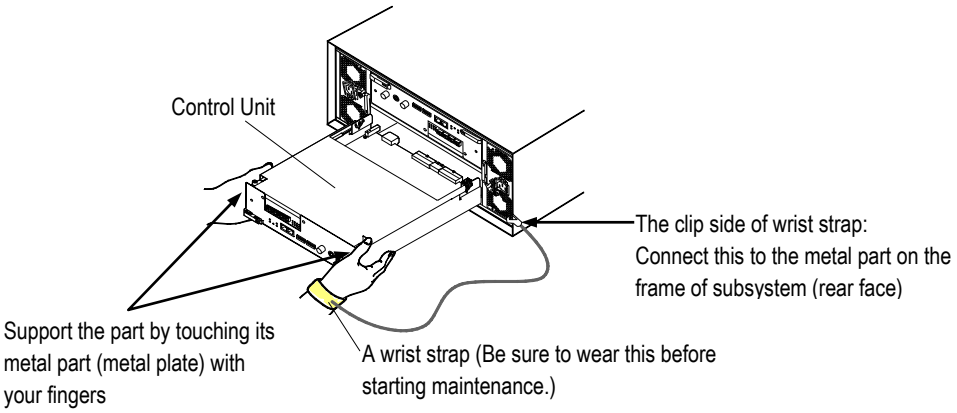
Touching heat sinks or ICs may cause getting burned. Be sure to handle with care.

CAUTION

- **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 is Control Unit, 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 Control Unit is precision instrument. Be sure to put on the wrist strap before starting work in order to protect Control Unit 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 Control Unit into the subsystem, support the Control Unit as touching its metal part with fingers of your hand that wears a wrist strap.



[Notes for the case where NAS Unit (DKN-200-NGW1) is connected to this device]

Prior to this operation, if all of the following three cases apply to this device, execute [Correspondence when connecting the NAS Unit].

[Points to be checked in advance]

- NAS Unit is connected to this device.
  Confirm with the disk array device administrator.
- NAS Unit is in operation.
  Confirm with the NAS Unit administrator.
- A failure has not occurred on the NAS Unit.
  Ask the NAS Unit administrator to check whether failure has occurred or not by checking with the NAS administration software, NAS Manager GUI, List of RAS Information, etc.
  In case of failure, execute the maintenance operation together with the NAS maintenance personnel.

[Correspondence when connecting the NAS Unit]

Confirm with the NAS Unit administrator whether it is possible to terminate the NAS service.
Determine how to react according to the confirmation result.

- When the NAS service can be terminated
  Before starting this operation, ask the NAS Unit administrator for the planned shutdown of the NAS Unit.
  After completing this operation, ask the NAS Unit administrator to reboot the NAS Unit.
- When the NAS service cannot be terminated
  When this operation executed for the Cache Unit installed in the Control Unit connected by the NAS Unit is completed, the FC path (Fibre Channel path) of the NAS Unit might go into the Failure status.
  Contact the NAS Unit administrator, refer to "Recovering from FC path errors" of "Hitachi NAS Manager User's Guide", confirm the FC path status and, if the status is Failure, ask for the recovery of the FC path.
  In addition, if there are any personnel for the NAS Unit maintenance, ask the NAS Unit maintenance personnel to refer to "NAS IMS 2.9.8 Displaying LU Path Setting Screen " (NAS IMS 02-0490) in "DKN-200-NGW1 NAS Unit Maintenance Manual", and ask to check the status of the FC path and to recover the FC path if it is in a failure status after completing this operation for one of the Cache Unit installed in the Control Unit connected by the NAS Unit.

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Replace the specified slot number only for the Cache memory 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. 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 Control Unit after blocking the Control Unit to be replaced. 4. When replacing Control Unit of both systems (CTL 0 and CTL 1), power off the subsystem 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 Basic Chassis is blinking at high speed because the automatic download of the ENC firmware is 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 Basic Chassis 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 Basic Chassis 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 • In the case of the RKM/RKS : See "(1-1) When the ALM LED of the RKEM/RKES/RKEH on the Control Unit is on" (REP 02-0660). When the ALM LED is off (Preventive replacement) • In the case of the RKM/RKS : See "(1-2) When the ALM LED of the RKEM/RKES/RKEH on the Control Unit is off" (REP 02-0730).
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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis is blinking at high speed because the update of the flash program or the automatic download of the ENC 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 Basic Chassis 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.	• In the case of the RKM/RKS : See "(2) Procedure for replacement with the power turned off" (REP 02-0770).

(1) Procedure for replacement with the power turned on

(1-1) When the ALM LED of the RKEM/RKES/RKH on the Control Unit is on

(Refer to "Figure 2.2.12 Cache Memory Replacement (RKEM/RKES/RKEXS/RKEXS8F)" (REP 02-0700), "Figure 2.2.13 Position of the LED on the Control Unit (RKM/RKEM/RKS/RKES/RKEXS/RKEXS8F)" (REP 02-0710), "Figure 2.2.14 Cache Memory Replacement (RKEH)" (REP 02-0720) and "Figure 2.2.15 Position of the LED on the Control Unit (RKH/RKHE)" (REP 02-0720).)

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.

NOTE : • Do not replace the Control Unit which operates normally.
Before replacing the Control Unit, confirm that it is blocked (the ALM LED (red) in on).
- System parameters are automatically loaded to the new Control Unit from the built in Disk Drive. Accordingly no setting, such as operating manually, is required.
- When the Control Unit is replaced while the LU of the subsystem is being formatted, restoration of the Control Unit which is inserted may be delayed until the LU formatting is completed.
- Replace the Cache Unit after recovering the UPS when the special UPS is connected and a failure occurs in the UPS.

(a) Make sure that ALM LED (red) on the Control Unit mounting the Cache Unit to be replaced lights up. If it does not light up, replace the Cache memory following "(1-2) When the ALM LED of the RKM/RKS/RKH on the Control Unit is off" (REP 02-0730).

(b) Connect OUT (J100-J10x) of the remote adaptor in the final steps and the connector (REMOTE ADAPTER) of the Control Unit installing the Cache memory that is not replaced in DF800 are connected with the remote cable (VRCx) when the remote adaptor is connected. Check that the LED of the connected remote adaptor lights on when the remote cable has already been connected. Next, remove the remote cable connected to the Control Unit in which the Cache memory to be replaced is installed.

(c) 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 Control Unit.
When the levers are completely opened, the Control Unit comes out forward.

(d) Remove all the power cables connected to the Control Unit mounting the Cache Unit 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 Control Unit continues to detect the Fibre Channel failures, and the I/O processing of the Control Unit may be deteriorated.
• Remove the cable for the Additional Battery Box by inserting the connector into the Control Unit side completely and pressing the latch of the connector.

⚠ CAUTION

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

(e) Remove the Control Unit by pulling it out toward you.
(f) Loosen two cover fixing screws (blue) on the top of the cover, and open the cover to the arrow (⟶) direction.
You can fix the cover at a perpendicular position and, furthermore, you can lift the cover a little from this position and fall it to the opposite side.
(g) Remove the Cache Unit, in which the failure occurred, after recording its installation location, capacity, and model name.
Push the slot levers which fix the Cache Unit, and pull up the Cache Unit by holding both the end of the Cache Unit, and then the cache memory can be removed. Install the Interface Board making its sheet steel part face inside of the Control Unit.

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

(h) Install the new Cache Unit to the Control Unit.

NOTE : • Install the new Cache Unit in the removed slot #.
• Install a new Cache Unit with the same capacity as that of the former one in the same slot
• For the RKH, install the Cache Unit 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 Control Unit #0 and the Control Unit #1 the same.

(i) Close the cover and fix it by fastening two cover fixing screws (blue) on the top of the cover.
(j) Connect the removed interlocking cable to the Control Unit when the special UPS is connected.
(k) If the RKAK/RKAKX/RKAKS is connected, connect the removed ENC cable to the Control Unit.

(l) If the Additional Battery Box was connected, connect the removed special cable to the Control Unit.

NOTE : • If you insert the Control Unit without connecting the RKAK/RKAKX to the Control Unit, a failure occurs again in the Control Unit.
• If you insert the Control Unit without connecting the Additional Battery Box and/or UPS to the Control Unit, a failure notice of the Additional Battery Box or UPS is displayed.
• In the case of the RKM/RKS, the installed direction is different in the Control Unit #0 and #1, so that be careful of the connecting position of the cables.

(m) Make sure that 20 seconds or longer has elapsed after the Control Unit was taken out.
Insert it in the set position in the status where the right and left levers on the Control Unit are opened, and close the levers completely until you hear the buttons (blue), which fix the levers, click.
Although the ALM LED (red) lights up(‡1) when you insert the Control Unit, it goes out after the Control Unit recovers.
If the Control Unit is inserted without waiting for 20 seconds, it is possible that the Control Unit is not recovered from the failure normally.
When it is not recovered even if 30 minutes or more elapsed, perform the dummy replacement(‡2) of the Control Unit which was inserted.
When the Control Unit is not recovered (30 minutes or more elapsed) even if "I1G300 CTL recovery start" is displayed in the Information Message of WEB after the dummy replacement, perform the dummy replacement of the Control Unit which was inserted, again.
When it is not recovered after another 30 minutes, service personnel connects it to the WEB and takes recovery actions according to "Information Message" on WEB. (There may be a problem on the Control Unit or the cache memories installed.)
But, when any messages are displayed on WEB about the Control Unit or the cache memories installed, then service personnel connects the other Control Unit to the WEB and takes recovery actions according to "Information Message" in the other Control Unit.

NOTE : • Do not catch a ENC cable, when the Control Unit for the inserted.
• In the case of the RKEM/RKES/RKEXS/RKEXS8F, the installation direction is different in the Control Unit # 0 and # 1. Install the Control Unit #0 with the cover up and #1 with the cover down.
• When returning the levers in the arrow directions (⟶) at the same time, operate them within one second. If the operation takes longer than one second, the Control Unit may not be recovered. If it occurs, execute the recovery procedure once again. If the Control Unit is not recovered in spite of the re-execution, replace the Control Unit because it may be faulty.

‡1 : If the Control Unit is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the ALM LED (red) may not be turned off ("I1G300 CTL recovery start" is not displayed in "Information Message" on WEB).
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted Control Unit from the chassis, and insert it again after 20 seconds or more passed.

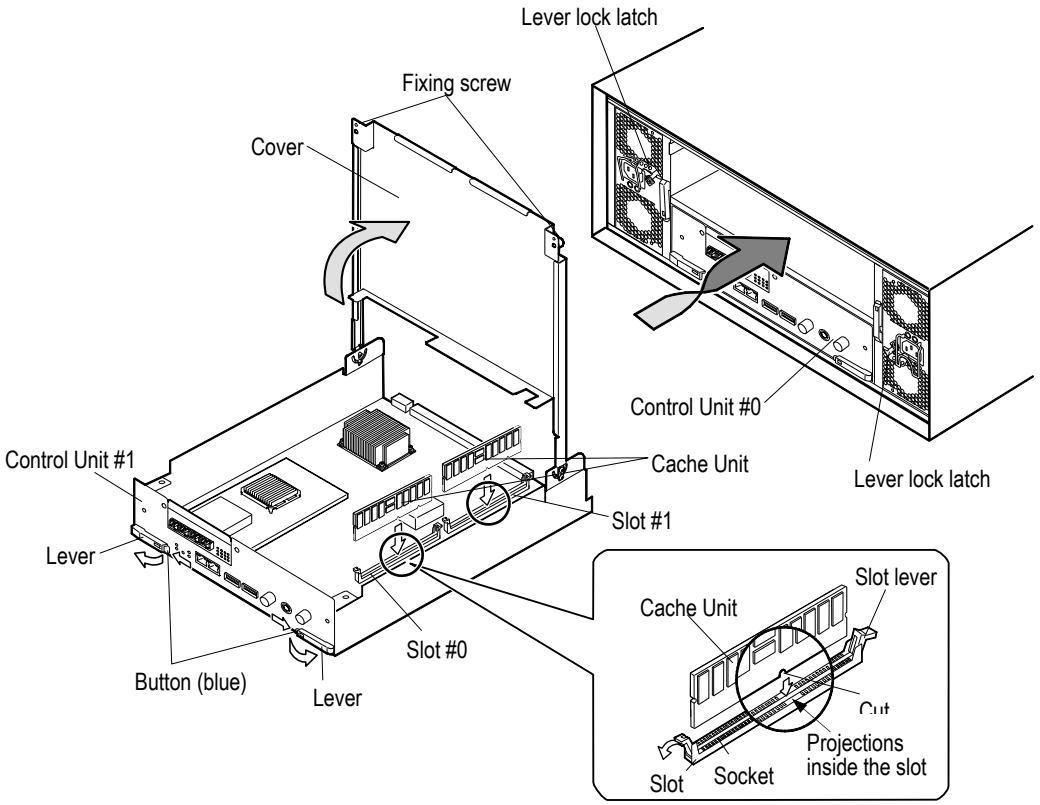
‡2 : This means that the part concerned is removed, and it is reinstalled after 20 seconds or more passed.

(n) Check that the ALM LED (red) on the Control Unit is off.
(o) Check that the WARNING LED (orange) on the front of the Basic Chassis goes out(‡1).
(The Control Unit 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.)
(p) Connect the removed all cables to the Control Unit.

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 Control Unit continues to detect the Fibre Channel failures, and the I/O processing of the Control Unit may be deteriorated.
• In the case of the RKEM/RKES/RKEXS/RKEXS8F, the installed direction is different in the Control Unit #0 and #1, so that be careful of the connecting position of the cables.

(q) Check that the READY LED (green) on the front of the Basic Chassis lights up.
The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH) before it lights up.
(r) 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 02-0110).)
When this is indicated, the replacement of Cache Unit has completed.
(s) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the disk 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 01-0890)").
(t) Check that the LED of the remote adaptor connected to the Control Unit in which the replaced Cache memory is installed lights on when the remote adaptor is connected.

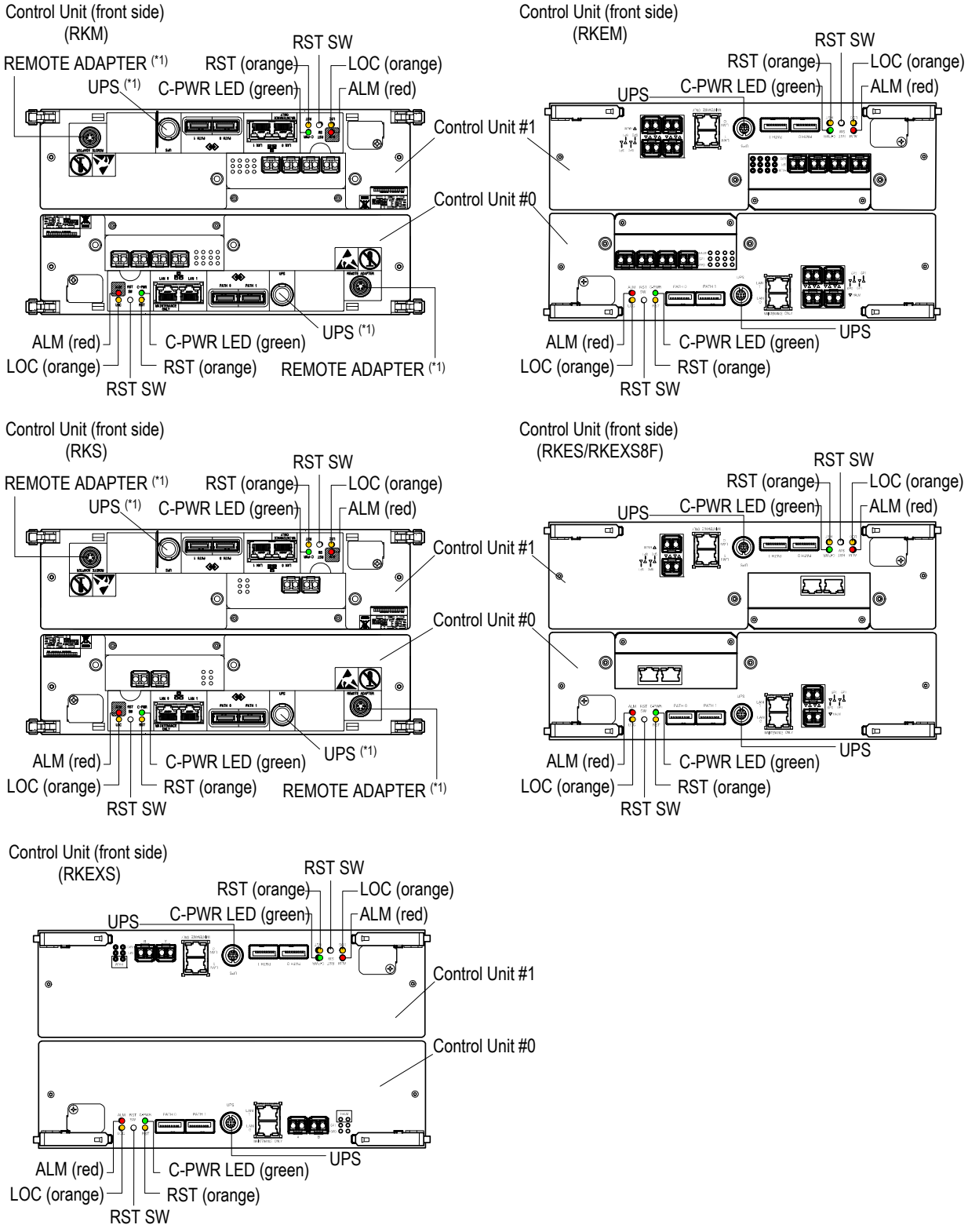
‡1 : When it is blinking at low speed, perform the maintenance according to the recovery method of the message referring to the Information Message on WEB. If the subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic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



*1 : The figure shows RKEM.

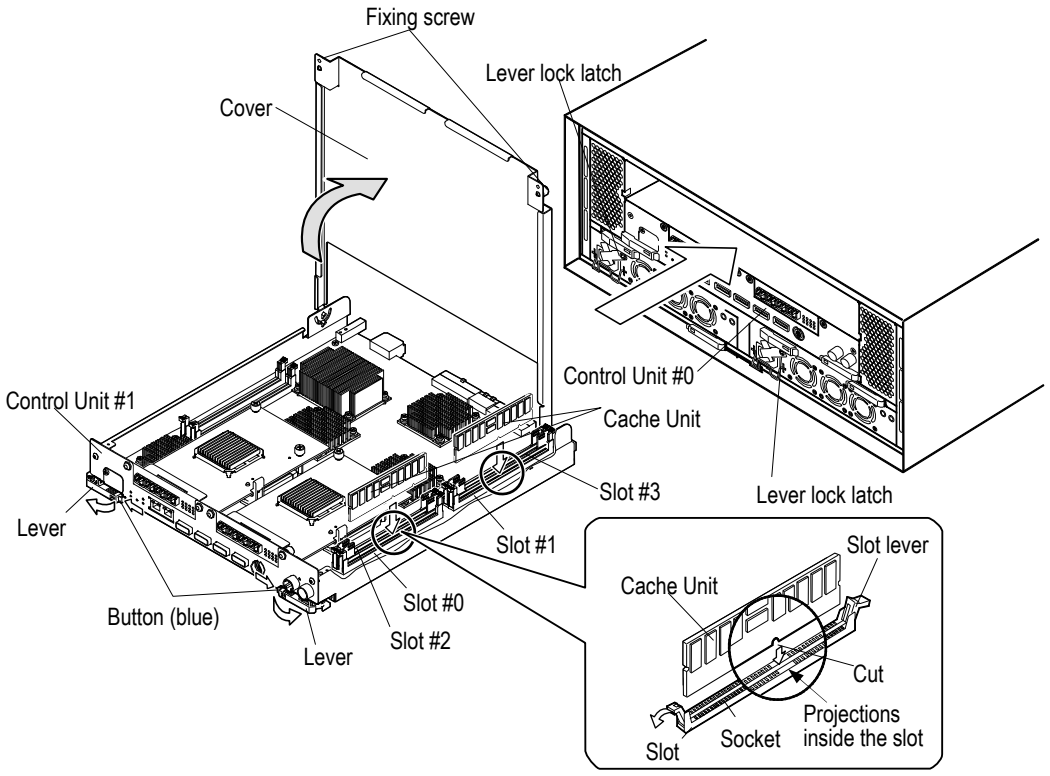
*2: The Cache Unit of the RKES/RKEXS/RKEXS8F is implemented in the Slot #0 only, and Slot #1 does not exist. The Slot #0 of RKES/RKEXS/RKEXS8F is in the same position as the Slot#0 of RKEM.

Figure 2.2.12 Cache Memory Replacement (RKEM/RKES/RKEXS/RKEXS8F)



*1 : The position of the connector is different depending on the Control Unit.
Confirm the connector.

Figure 2.2.13 Position of the LED on the Control Unit (RKM/RKEM/RKS/RKES/RKEXS/RKEXS8F)



Removal :
Press open the slot lever to outside and pull out the cache memory by holding the both end by hand.
Installation :
Fit the projection and the cut and push it into the slot by holding the both end by hand.

Figure 2.2.14 Cache Memory Replacement (RKEH)

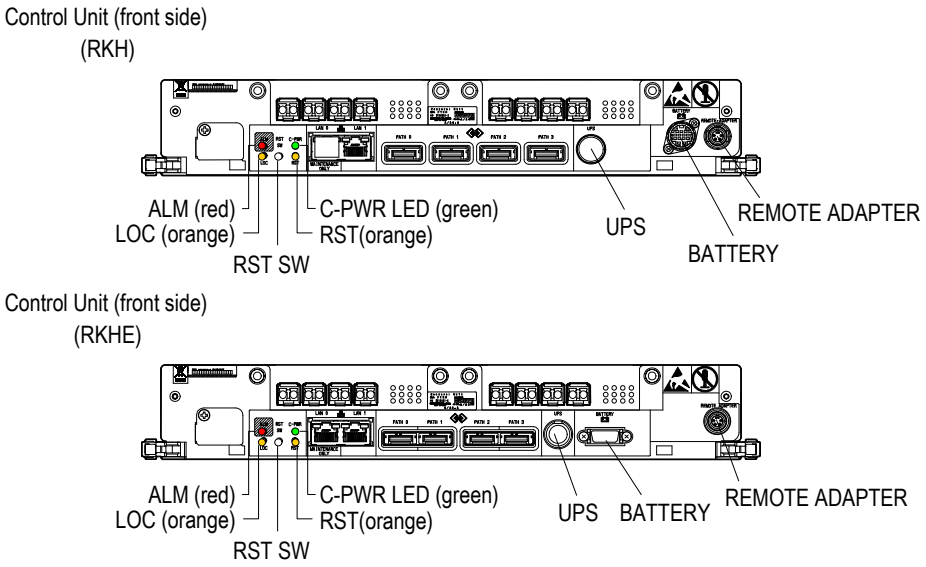


Figure 2.2.15 Position of the LED on the Control Unit (RKH/RKHE)

(1-2) When the ALM LED of the RKEM/RKES/RKH on the Control Unit is off
(Refer to "Figure 2.2.12 Cache Memory Replacement (RKEM/RKES/RKEXS/RKEXS8F)" (REP 02-0700), "Figure 2.2.13 Position of the LED on the Control Unit (RKM/RKEM/RKS/RKES/RKEXS/RKEXS8F)" (REP 02-0710), "Figure 2.2.14 Cache Memory Replacement (RKEH)" (REP 02-0720) and "Figure 2.2.15 Position of the LED on the Control Unit (RKH)" (REP 02-0720).)

NOTE : • System parameters are automatically loaded to the new Control Unit from the built in Disk Drive. Accordingly no setting, such as operating manually, is required.
• When the Control Unit is replaced while the LU of the subsystem is being formatted, restoration of the Control Unit which is inserted may be delayed until the LU 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.
• Replace the Cache Unit after recovering the UPS when the special UPS is connected and a failure occurs in the UPS.

(a) Press the RST SW on the Control Unit, in which the Cache Unit to be replaced is installed, and make sure that the ALM LED (red) comes on. Use a tool with a thin tip (a precise screwdriver, etc.) because the hole of RST SW is small (3 mm in diameter). If not, remove the Cache Unit following the "(2) Procedure for replacement with the power turned off" (REP 02-0770).
(b) Connect OUT (J100-J10x) of the remote adaptor in the final steps and the connector (REMOTE ADAPTER) of the Control Unit installing the Cache memory that is not replaced in DF800 are connected with the remote cable (VRCx) when the remote adaptor is connected. Check that the LED of the connected remote adaptor lights on when the remote cable has already been connected. Next, remove the remote cable connected to the Control Unit in which the Cache memory to be replaced is installed.
(c) 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 Control Unit.
When the levers are completely opened, the Control Unit comes out forward.
(d) Remove the all cables connected to the Control Unit on which the Cache Unit to be replaced is mounted.

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 Control Unit continues to detect the Fibre Channel failures, and the I/O processing of the Control Unit may be deteriorated.
• Remove the cable for the Additional Battery Box by inserting the connector into the Control Unit side completely and pressing the latch of the connector.

⚠ CAUTION

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

(e) Remove the Control Unit by pulling it out toward you.

(f) Loosen two cover fixing screws (blue) on the top of the cover, and open the cover to the arrow (⟶) direction.
You can fix the cover at a perpendicular position and, furthermore, you can lift the cover a little from this position and fall it to the opposite side.

(g) Remove the Cache Unit to be replaced for the purpose of preventive maintenance after recording its installation location, capacity, and model name. Install the Interface Board making its sheet steel part face inside of the Control Unit.

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

(h) Install the Cache Unit in the Control Unit.

NOTE :
- Install the new Cache Unit in the removed slot #.
- Install a new Cache Unit with the same capacity as that of the former one in the same slot
- For the RKH, install the Cache Unit 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 Control Unit #0 and the Control Unit #1 the same.

(i) Close the cover and fix it by fastening two cover fixing screws (blue) on the top of the cover.

(j) Connect the removed interlocking cable to the Control Unit when the special UPS is connected.

(k) If the RKAK/RKAKX/RKAKS is connected, connect the removed ENC cable to the Control Unit.

(l) If the Additional Battery Box was connected, connect the removed special cable to the Control Unit.

NOTE :
- If you insert the Control Unit without connecting the RKAK/RKAKX/RKAKS to the Control Unit, a failure occurs again in the Control Unit.
- If you insert the Control Unit without connecting the Additional Battery Box and/or UPS to the Control Unit, a failure notice of the Additional Battery Box or UPS is displayed.
- In the case of the RKEM/RKES/RKEXS/RKEXS8F, the installed direction is different in the Control Unit #0 and #1, so that be careful of the connecting position of the cables.

(m) Make sure that 20 seconds or longer has elapsed after the Control Unit was taken out.
Insert it in the set position in the status where the right and left levers on the Control Unit are opened, and close the levers completely until you hear the buttons (blue), which fix the levers, click.
Although the ALM LED (red) lights up(‡1) when you insert the Control Unit, it goes out after the Control Unit recovers.
If the Control Unit is inserted without waiting for 20 seconds, it is possible that the Control Unit is not recovered from the failure normally.
When it is not recovered even if 30 minutes or more elapsed, perform the dummy replacement(‡2) of the Control Unit which was inserted.
When the Control Unit is not recovered (30 minutes or more elapsed) even if "I1G300 CTL recovery start" is displayed in the Information Message of WEB after the dummy replacement, perform the dummy replacement of the Control Unit which was inserted, again.
When it is not recovered after another 30 minutes, service personnel connects it to the WEB and takes recovery actions according to "Information Message" on WEB. (There may be a problem on the Control Unit or the cache memories installed.)
But, when any messages are displayed on WEB about the Control Unit or the cache memories installed, then service personnel connects the other Control Unit to the WEB and takes recovery actions according to "Information Message" in the other Control Unit.

NOTE : • Do not catch a ENC cable, when the Control Unit for the inserted.
- In the case of the RKEM/RKES/RKEXS/RKEXS8F, the installation direction is different in the Control Unit # 0 and # 1. Install the Control Unit #0 with the cover up and #1 with the cover down.
- When returning the levers in the arrow directions (⟶) at the same time, operate them within one second. If the operation takes longer than one second, the Control Unit may not be recovered. If it occurs, execute the recovery procedure once again. If the Control Unit is not recovered in spite of the re-execution, replace the Control Unit because it may be faulty.

(n) Check that the ALM LED (red) on the Control Unit is off.
(o) Check that the WARNING LED (orange) on the front of the Basic Chassis goes out(‡3).
(The Control Unit 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.)

‡1 : If the Control Unit is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the ALM LED (red) may not be turned off ("I1G300 CTL recovery start" is not displayed in "Information Message" on WEB).
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted Control Unit from the chassis, and insert it again after 20 seconds or more passed.
‡2 : This means that the part concerned is removed, and it is reinstalled after 20 seconds or more passed.
‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

(p) Connect the removed all cables to the Control Unit.

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 Control Unit continues to detect the Fibre Channel failures, and the I/O processing of the Control Unit may be deteriorated.
• In the case of the RKEM/RKES/RKEXS/RKEXS8F, the installed direction is different in the Control Unit #0 and #1, so that be careful of the connecting position of the cables.

(q) Check that the READY LED (green) on the front of the Basic Chassis lights up.
The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH) before it lights up.

(r) 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 02-0110).)
When this is indicated, the replacement of Cache Unit has completed.

(s) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the disk 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 01-0890)"))..

(t) Check that the LED of the remote adaptor connected to the Control Unit in which the replaced Cache memory is installed lights on when the remote adaptor is connected.

(2) Procedure for replacement with the power turned off

(Refer to "Figure 2.2.12 Cache Memory Replacement (RKEM/RKES/RKEXS/RKEXS8F)" (REP 02-0700), "Figure 2.2.13 Position of the LED on the Control Unit (RKM/RKEM/RKS/RKES/RKEXS/RKEXS8F)" (REP 02-0710), "Figure 2.2.14 Cache Memory Replacement (RKEH)" (REP 02-0720) and "Figure 2.2.15 Position of the LED on the Control Unit (RKH)" (REP 02-0720).)

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.

(a) Turn off the main switch.

Make sure that the POWER LED (green) on the Front Bezel go off. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the power has already been turned off, check that Cache memory is not in the back-up state. (To check for the back-up state, refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
If the memory is still being backed up, first release it from the back-up state, and then replace the Control Unit.

In this case, check that the C-PWR LED (green) on Control Unit is extinguished.

NOTE : If the C-PWR LED (green) is lit, it may be that some of the Cache Unit data has not been written into the disk. In this case, removing the Control Unit may cause a loss of user data.

(b) Remove the power cables (two) from the Basic Chassis in which the Cache Unit to be replaced is installed.

(c) 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 Control Unit.
When the levers are completely opened, the Control Unit comes out forward.

(d) Remove the all cables connected to the Control Unit.

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 Control Unit continues to detect the Fibre Channel failures, and the I/O processing of the Control Unit may be deteriorated.
• Remove the cable for the Additional Battery Box by inserting the connector into the Control Unit side completely and pressing the latch of the connector.

⚠ CAUTION

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

(e) Remove the Control Unit by pulling it out toward you.

(f) Loosen two cover fixing screws (blue) on the top of the cover, and open the cover to the arrow (⟶) direction.
You can fix the cover at a perpendicular position and, furthermore, you can lift the cover a little from this position and fall it to the opposite side.

(g) Remove the Cache Unit, in which the failure occurred, after recording its installation location, capacity, and model name. Install the Interface Board making its sheet steel part face inside of the Control Unit.

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

(h) Install the Cache Unit in the Control Unit.

NOTE :
- Install the new Cache Unit in the removed slot #.
- Install a new Cache Unit with the same capacity as that of the former one in the same slot
- For the RKH, install the Cache Unit 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 Control Unit #0 and the Control Unit #1 the same.

(i) Close the cover and fix it by fastening two cover fixing screws (blue) on the top of the cover.

(j) Insert it in the set position in the status where the right and left levers on the Control Unit are opened, and close the levers completely until you hear the buttons (blue), which fix the levers, click.
If the Control Unit is caught by something when it is inserted, do not push it in forcibly. Retry the insertion from the beginning. If forced, pins might be broken.

NOTE :
- Do not catch a ENC cable, when the Control Unit for the inserted.
- In the case of the RKEM/RKES/RKEXS/RKEXS8F, the installation direction is different in the Control Unit # 0 and # 1. Install the Control Unit #0 with the cover up and #1 with the cover down.

(k) Connect the removed all cables to the Control Unit.

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 Control Unit continues to detect the Fibre Channel failures, and the I/O processing of the Control Unit may be deteriorated.
- In the case of the RKEM/RKES/RKEXS/RKEXS8F, the installed direction is different in the Control Unit #0 and #1, so that be careful of the connecting position of the cables.

(l) Connect the power cables (two) to the Basic Chassis whose Cache Unit was replaced.
(m) Turn on the main switch (the subsystem usually recovers in about five minutes).
(n) Check that the READY LED (green) on the front of the Basic Chassis 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 RKH) 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 Basic Chassis lights up.
(o) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the disk 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 01-0890)").

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

2.2.7 Replacing Interface Board

For RKEH/RKEHD, or the RKEM/RKES/RKEXS8F that installs the Interface Board, replace the Interface Board.
For the Basic Chassis other than those above, replace the Control Unit without replacing the Interface Board (Refer to "2.2.5 Replacing Control Unit" (REP-02-0450).)

⚠ CAUTION

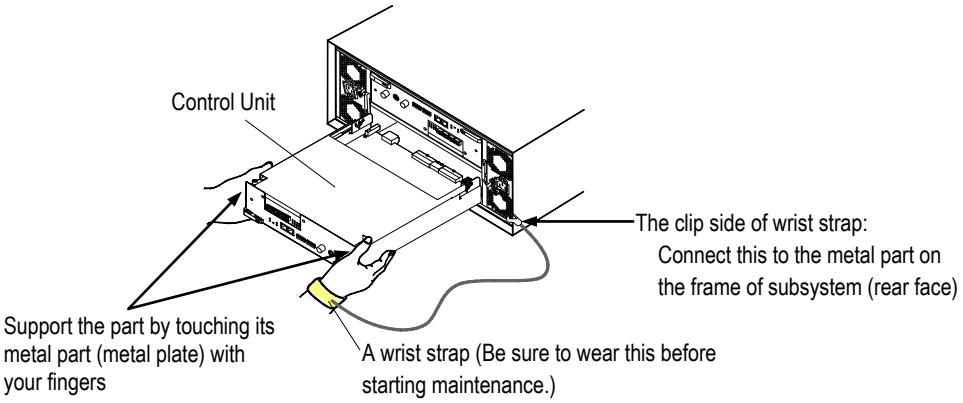
Touching heat sinks or ICs may cause getting burned. Be sure to handle with care.

CAUTION

- **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 is Control Unit, 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 Control Unit is precision instrument. Be sure to put on the wrist strap before starting work in order to protect Control Unit 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 Control Unit into the subsystem, support the Control Unit as touching its metal part with fingers of your hand that wears a wrist strap.



[Notes for the case where NAS Unit (DKN-200-NGW1) is connected to this device]

Prior to this operation, if all of the following three cases apply to this device, execute [Correspondence when connecting the NAS Unit].

[Points to be checked in advance]

- NAS Unit is connected to this device.
  Confirm with the disk array device administrator.
- NAS Unit is in operation.
  Confirm with the NAS Unit administrator.
- A failure has not occurred on the NAS Unit.
  Ask the NAS Unit administrator to check whether failure has occurred or not by checking with the NAS administration software, NAS Manager GUI, List of RAS Information, etc.
  In case of failure, execute the maintenance operation together with the NAS maintenance personnel.

[Correspondence when connecting the NAS Unit]

Confirm with the NAS Unit administrator whether it is possible to terminate the NAS service.
Determine how to react according to the confirmation result.

- When the NAS service can be terminated
  Before starting this operation, ask the NAS Unit administrator for the planned shutdown of the NAS Unit.
  After completing this operation, ask the NAS Unit administrator to reboot the NAS Unit.
- When the NAS service cannot be terminated
  When this operation executed for the Interface Board installed in the Control Unit connected by the NAS Unit is completed, the FC path (Fibre Channel path) of the NAS Unit might go into the Failure status.
  Contact the NAS Unit administrator, refer to "Recovering from FC path errors" of "Hitachi NAS Manager User's Guide", confirm the FC path status and, if the status is Failure, ask for the recovery of the FC path.
  In addition, if there are any personnel for the NAS Unit maintenance, ask the NAS Unit maintenance personnel to refer to "NAS IMS 2.9.8 Displaying LU Path Setting Screen" (NAS IMS 02-0490) in "DKN-200-NGW1 NAS Unit Maintenance Manual", and ask to check the status of the FC path and to recover the FC path if it is in a failure status after completing this operation for the Interface Board installed in the Control Unit connected by the NAS Unit.

This page is for editorial purpose only.

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 Control Unit after blocking the Control Unit to be replaced. 4. When replacing Control Unit of both systems (CTL 0 and CTL 1), power off the subsystem before the replacement. 5. 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. 6. At the time of the preventive replacement, do not perform the preventive replacement work while the READY LED (green) on the front of the Basic Chassis is blinking at high speed because the automatic download of the ENC firmware is being executed. Make the replacement after the LED lights on. 7. At the time of the preventive replacement, do not perform the preventive replacement work while the WARNING LED (orange) on the front of the Basic Chassis 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 Basic Chassis usually goes out about 30 seconds later. 8. 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 on the Control Unit is on" (REP 02-0820). When the ALM LED is off (Preventive replacement) • See "(1-2) When the ALM LED on the Control Unit is off" (REP 02-0880).
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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis is blinking at high speed because the update of the flash program or the automatic download of the ENC 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 Basic Chassis 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 02-0920).

(1) Procedure for replacement with the power turned on

(1-1) When the ALM LED on the Control Unit is on

(Refer to "Figure 2.2.16 Replacing Interface Board (RKEM/RKES/RKEXS8F)" (REP 02-0860), "Figure 2.2.17 Position of the LED on the Control Unit (RKM/RKEM/RKS/RKES/RKEXS8F)" (REP 02-0870), "Figure 2.2.18 Replacing Interface Board (RKEH)" (REP 02-0871) and "Figure 2.2.19 Position of the LED on the Control Unit (RKH/RKHE)" (REP 02-0871).)

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).).

NOTE : • Do not replace the Control Unit which operates normally. Before replacing the Control Unit, confirm that it is blocked (the ALM LED (red) in on).
• System parameters are automatically loaded to the new Control Unit from the built in Disk Drive. Accordingly no setting, such as operating manually, is required.
• When the Control Unit is replaced while the LU of the subsystem is being formatted, restoration of the Control Unit which is inserted may be delayed until the LU formatting is completed.
• Replace the Interface Board after recovering the UPS when the special UPS is connected and a failure occurs in the UPS.

(a) Collect Simple Trace and Constitution Information (Port Information). (Refer to Troubleshooting "7.3 Collecting Simple Trace" (TRBL 07-0040) and System Parameter "4.2 (8) Setting of Constitute" (SYSPR 04-0280).)

NOTE : If you change the interface board different type, all the following information is cleared. So please collect simple trace and constitute information to keep constitution 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 ALM LED (red) on the Control Unit mounting the Interface Board to be replaced lights up. If it does not light up, remove the Interface Board following "(1-2) When the ALM LED on the Control Unit is off" (REP 02-0880).

(c) Connect OUT (J100-J10x) of the remote adaptor in the final steps and the connector (REMOTE ADAPTER) of the Control Unit installing the Interface Board that is not replaced in DF800 are connected with the remote cable (VRCx) when the remote adaptor is connected. Check that the LED of the connected remote adaptor lights on when the remote cable has already been connected. Next, remove the remote cable connected to the Control Unit in which the Interface Board to be replaced is installed.

(d) 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 Control Unit.
When the levers are completely opened, the Control Unit comes out forward.

(e) Remove all the power cables connected to the Control Unit mounting the Interface Board 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 Control Unit continues to detect the Fibre Channel failures, and the I/O processing of the Control Unit may be deteriorated.
• Remove the cable for the Additional Battery Box by inserting the connector into the Control Unit side completely and pressing the latch of the connector.

⚠ CAUTION

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

(f) Remove the Control Unit by pulling it out toward you.

(g) Loosen two cover fixing screws (blue) on the top of the cover, and open the cover to the arrow (⟶) direction.
You can fix the cover at a perpendicular position and, furthermore, you can lift the cover a little from this position and fall it to the opposite side.

(h) Remove the Interface Board mounted on the Control Unit.
Loosen the fixing screws ① (four places) of the Interface Board (or the dummy Interface Board) installed in the Control Unit, operate the latch lever slowly to the arrow direction (⟶), remove the connector while lifting up the Interface Board, and remove it from the Control Unit.

NOTE : Place the removed Interface Board in the place where anti-static measures are taken.

(i) Place the new Interface Board according to the positioning pin of the Control Unit, press the label (PUSH HERE) part, and insert it in the connector.
At this time, check that the connector is inserted surely. Insert the Interface Board making its sheet metal part face inside of the Control Unit.

NOTE : • Install the new Interface Board in the removed position.
• When installing the Interface Board, insert the connector after checking the locations of the positioning pin and the fixing screws for Interface Board because the incorrect location decision may cause the connector to be damaged.

(j) Fix the Interface Board by tightening four fixing screws (blue).

(k) Close the cover and fix it by fastening two cover fixing screws (blue) on the top of the cover.

(l) Connect the removed interlocking cable to the Control Unit when the special UPS is connected.

(m) If the RKAK/RKAKX/RKAKS is connected, connect the removed ENC cable to the Control Unit.

(n) If the Additional Battery Box was connected, connect the removed special cable to the Control Unit.

NOTE : • If you insert the Control Unit without connecting the RKAK/RKAKX/RKAKS to the Control Unit, a failure occurs again in the Control Unit.
• If you insert the Control Unit without connecting the Additional Battery Box and/or UPS to the Control Unit, a failure notice of the Additional Battery Box or UPS is displayed.
• In the case of the RKM/RKS, the installed direction is different in the Control Unit #0 and #1, so that be careful of the connecting position of the cables.

(o) Make sure that 20 seconds or longer has elapsed after the Control Unit was taken out. Insert it in the set position in the status where the right and left levers on the Control Unit are opened, and close the levers completely until you hear the buttons (blue), which fix the levers, click.
Although the ALM LED (red) lights up(‡1) when you insert the Control Unit, it goes out after the Control Unit recovers.
If the Control Unit is inserted without waiting for 20 seconds, it is possible that the Control Unit is not recovered from the failure normally.
When it is not recovered even if 30 minutes or more elapsed, perform the dummy replacement(‡2) of the Control Unit which was inserted.
When the Control Unit is not recovered (30 minutes or more elapsed) even if "I1G300 CTL recovery start" is displayed in the Information Message of WEB after the dummy replacement, perform the dummy replacement of the Control Unit which was inserted, again.
When it is not recovered after another 30 minutes, service personnel connects it to the WEB and takes recovery actions according to "Information Message" on WEB. (There may be a problem on the Control Unit or the cache memories installed.)
But, when any messages are displayed on WEB about the Control Unit or the cache memories installed, then service personnel connects the other Control Unit to the WEB and takes recovery actions according to "Information Message" in the other Control Unit.

NOTE : • Do not catch a ENC cable, when the Control Unit for the inserted.
• In the case of the RKM/RKS, the installation direction is different in the Control Unit # 0 and # 1. Install the Control Unit #0 with the cover up and #1 with the cover down.
• When returning the levers in the arrow directions (⟶) at the same time, operate them within one second. If the operation takes longer than one second, the Control Unit may not be recovered. If it occurs, execute the recovery procedure once again. If the Control Unit is not recovered in spite of the re-execution, replace the Control Unit because it may be faulty.

‡1 : If the Control Unit is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the ALM LED (red) may not be turned off ("I1G300 CTL recovery start" is not displayed in "Information Message" on WEB).
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted Control Unit from the chassis, and insert it again after 20 seconds or more passed.

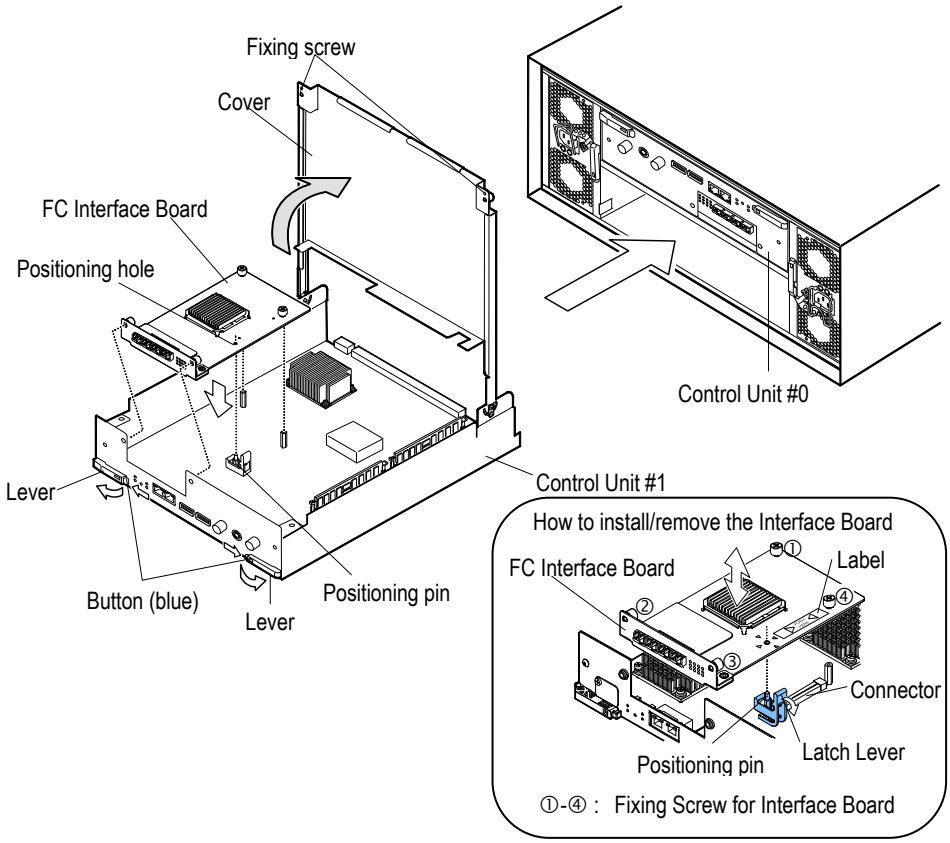
‡2 : This means that the part concerned is removed, and it is reinstalled after 20 seconds or more passed.

(p) Check that the ALM LED (red) on the Control Unit is off.
(q) Check that the WARNING LED (orange) on the front of the Basic Chassis goes out(‡1).
(The Control Unit 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.)
(r) Reconnect all cables that were disconnected.

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 Control Unit continues to detect the Fibre Channel failures, and the I/O processing of the Control Unit may be deteriorated.
• In the case of the RKM/RKS, the installed direction is different in the Control Unit #0 and #1, so that be careful of the connecting position of the cables.

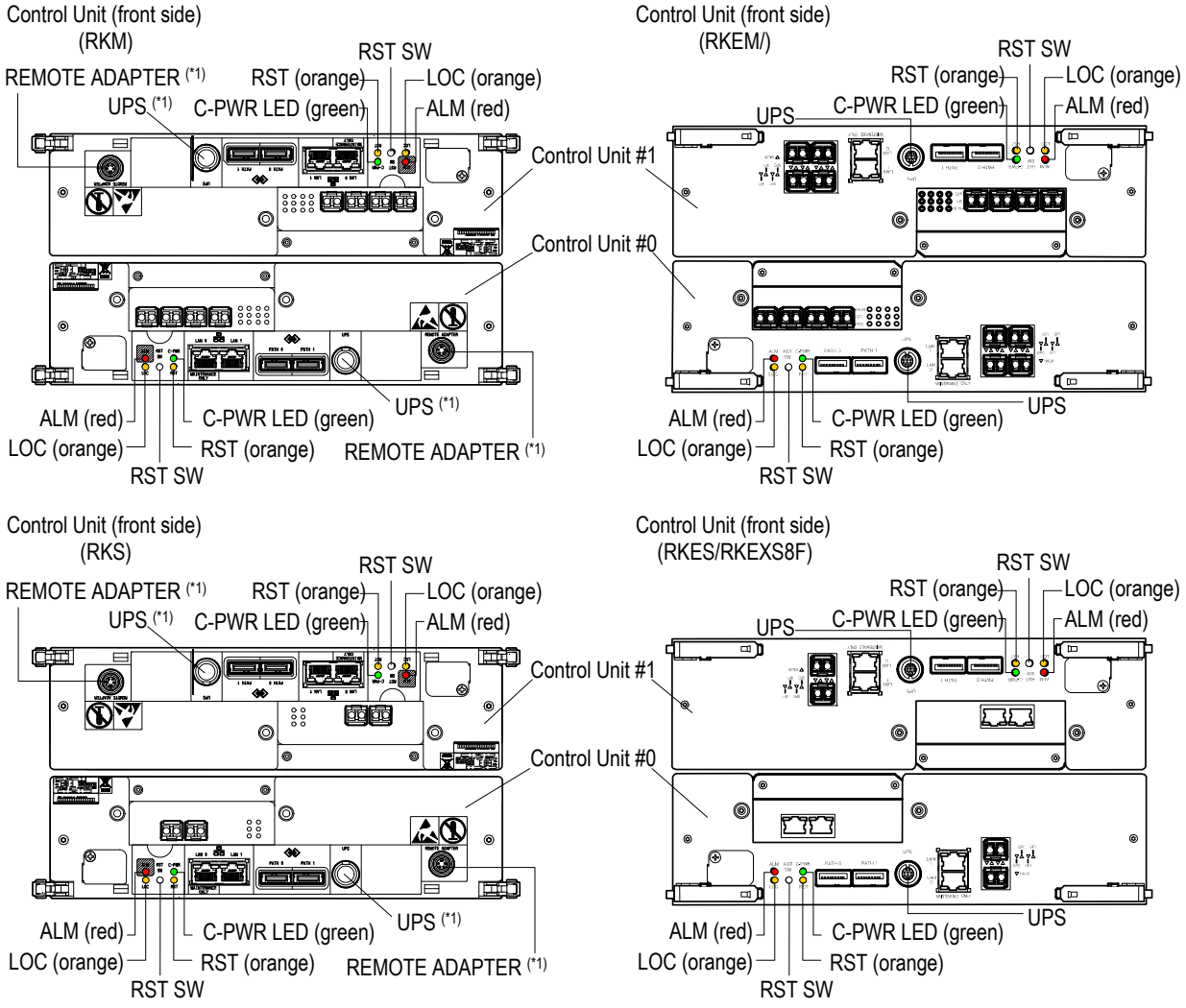
(s) Check that the READY LED (green) on the front of the Basic Chassis lights up.
The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH) before it lights up.
(t) Refer to "Information Message" on WEB, and check to see that [I0010x CTL recovered (CTL-x)] is indicated. (Refer to WEB "2.5 Information Message" (WEB 02-0110).)
When this is indicated, the replacement of Interface Board has completed.
(u) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the disk 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 01-0890)").
(v) Check that the LED of the remote adaptor connected to the Control Unit in which the replaced Interface Board is installed lights on when the remote adaptor is connected.

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.



*1 : The figure shows the case where the FC Interface Board is installed in the Control Unit .

Figure 2.2.16 Replacing Interface Board (RKEM/RKES/RKEXS8F)



*1 : The position of the connector is different depending on the Control Unit.
Confirm the connector.

Figure 2.2.17 Position of the LED on the Control Unit (RKM/RKEM/RKS/RKES/RKEXS8F)

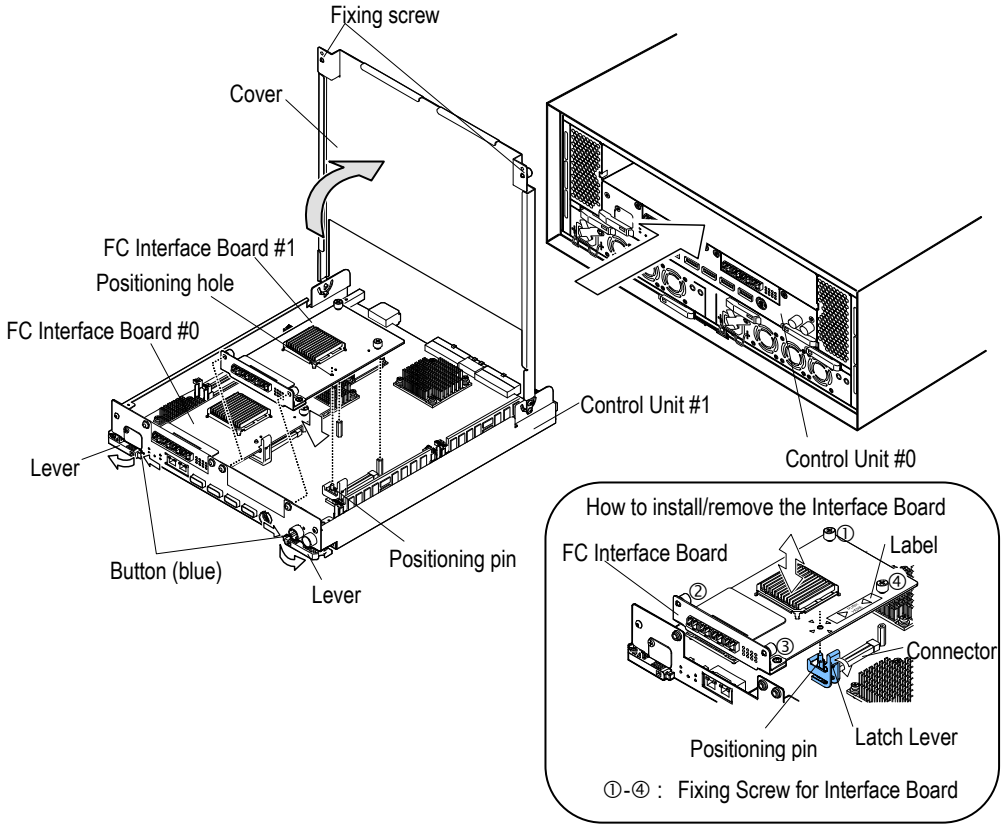


Figure 2.2.18 Replacing Interface Board (RKEH)

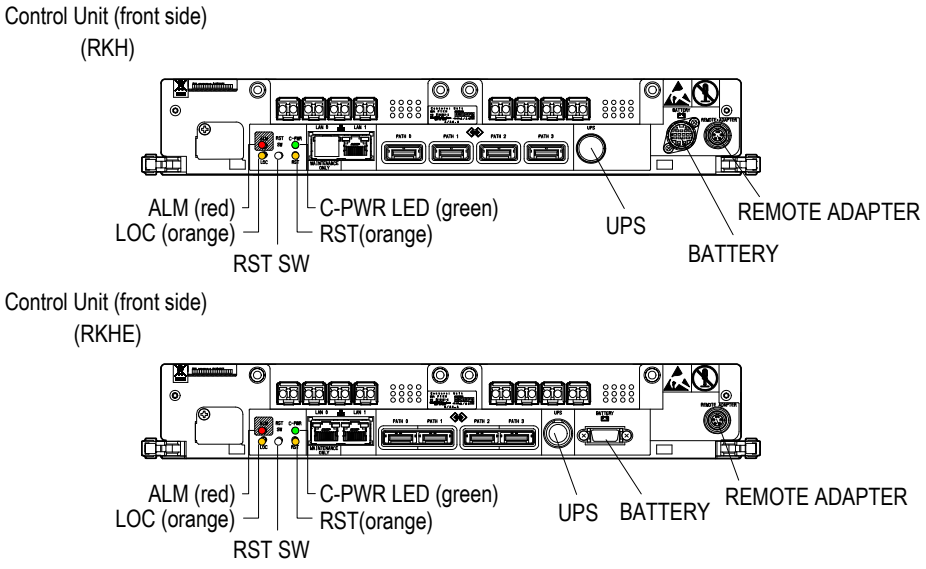


Figure 2.2.19 Position of the LED on the Control Unit (RKH/RKHE)

This page is for editorial purpose only.

(1-2) When the ALM LED on the Control Unit is off
(Refer to "Figure 2.2.16 Replacing Interface Board (RKEM/RKES/RKEXS8F)" (REP 02-0860), "Figure 2.2.17 Position of the LED on the Control Unit (RKM/RKEM/RKS/RKES/RKEXS8F)" (REP 02-0870), "Figure 2.2.18 Replacing Interface Board (RKEH)" (REP 02-0871) and "Figure 2.2.19 Position of the LED on the Control Unit (RKH/RKHE)" (REP 02-0871).)

NOTE : • System parameters are automatically loaded to the new Control Unit from the built in Disk Drive. Accordingly no setting, such as operating manually, is required.
• When the Control Unit is replaced while the LU of the subsystem is being formatted, restoration of the Control Unit which is inserted may be delayed until the LU 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.
• Replace the Interface Board after recovering the UPS when the special UPS is connected and a failure occurs in the UPS.

(a) Collect Simple Trace and Constitution Information (Port Information). (Refer to Troubleshooting "7.3 Collecting Simple Trace" (TRBL 07-0040) and System Parameter "4.2 (8) Setting of Constitute" (SYSPR 04-0280).)

NOTE : If you change the interface board different type, all the following information is cleared. So please collect simple trace and constitute information to keep constitution 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) Press the RST SW on the Control Unit, in which the Interface Board to be replaced is installed, and make sure that the ALM LED (red) comes on. Use a tool with a thin tip (a precise screwdriver, etc.) because the hole of RST SW is small (3 mm in diameter). If not, remove the Interface Board following the "(2) Procedure for replacement with the power turned off" (REP 02-0920).

(c) Connect OUT (J100-J10x) of the remote adaptor in the final steps and the connector (REMOTE ADAPTER) of the Control Unit installing the Interface Board that is not replaced in DF800 are connected with the remote cable (VRCx) when the remote adaptor is connected. Check that the LED of the connected remote adaptor lights on when the remote cable has already been connected. Next, remove the remote cable connected to the Control Unit in which the Interface Board to be replaced is installed.

(d) 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 Control Unit.
When the levers are completely opened, the Control Unit comes out forward.
(e) Remove the all cables connected to the Control Unit on which the Interface Board to be replaced is mounted.

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 Control Unit continues to detect the Fibre Channel failures, and the I/O processing of the Control Unit may be deteriorated.
• Remove the cable for the Additional Battery Box by inserting the connector into the Control Unit side completely and pressing the latch of the connector.

⚠ CAUTION

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

(f) Remove the Control Unit by pulling it out toward you.
(g) Loosen two cover fixing screws (blue) on the top of the cover, and open the cover to the arrow (⟶) direction.
You can fix the cover at a perpendicular position and, furthermore, you can lift the cover a little from this position and fall it to the opposite side.
(h) Remove the Interface Board mounted on the Control Unit.
Loosen the fixing screws ① to ④ of the Interface Board (or the dummy Interface Board) installed in the Control Unit, operate the latch lever slowly to the arrow direction (⟶), remove the connector while lifting up the Interface Board, and remove it from the Control Unit.

NOTE : Place the removed Interface Board in the place where anti-static measures are taken.

(i) Place the new Interface Board according to the positioning pin of the Control Unit, temporarily fix the fixing screw ①. Press the label (PUSH HERE) part, and insert it in the connector.
At this time, check that the connector is inserted surely. Insert the Interface Board making its sheet metal part face inside of the Control Unit.

NOTE : • Install the new Interface Board in the removed position.
• When installing the Interface Board, insert the connector after checking the locations of the positioning pin and the fixing screws for Interface Board because the incorrect location decision may cause the connector to be damaged.

(j) Fix the Interface Board by tightening the fixing screws ① to ④.
(k) Close the cover and fix it by fastening two cover fixing screws (blue) on the top of the cover.
(l) Connect the removed interlocking cable to the Control Unit when the special UPS is connected.
(m) If the RKAK/RKAKX/RKAKS is connected, connect the removed ENC cable to the Control Unit.

(n) If the Additional Battery Box was connected, connect the removed special cable to the Control Unit.

NOTE : • If you insert the Control Unit without connecting the RKAK/RKAKX/RKAKS to the Control Unit, a failure occurs again in the Control Unit.
• If you insert the Control Unit without connecting the Additional Battery Box and/or UPS to the Control Unit, a failure notice of the Additional Battery Box or UPS is displayed.
• In the case of the RKM/RKS, the installed direction is different in the Control Unit #0 and #1, so that be careful of the connecting position of the cables.

(o) Make sure that 20 seconds or longer has elapsed after the Control Unit was taken out.
Insert it in the set position in the status where the right and left levers on the Control Unit are opened, and close the levers completely until you hear the buttons (blue), which fix the levers, click.
Although the ALM LED (red) lights up(‡1) when you insert the Control Unit, it goes out after the Control Unit recovers.
If the Control Unit is inserted without waiting for 20 seconds, it is possible that the Control Unit is not recovered from the failure normally.
When it is not recovered even if 30 minutes or more elapsed, perform the dummy replacement(‡2) of the Control Unit which was inserted.
When the Control Unit is not recovered (30 minutes or more elapsed) even if "I1G300 CTL recovery start" is displayed in the Information Message of WEB after the dummy replacement, perform the dummy replacement of the Control Unit which was inserted, again.
When it is not recovered after another 30 minutes, service personnel connects it to the WEB and takes recovery actions according to "Information Message" on WEB. (There may be a problem on the Control Unit or the cache memories installed.)
But, when any messages are displayed on WEB about the Control Unit or the cache memories installed, then service personnel connects the other Control Unit to the WEB and takes recovery actions according to "Information Message" in the other Control Unit.

NOTE : • Do not catch a ENC cable, when the Control Unit for the inserted.
• In the case of the RKM/RKS, the installation direction is different in the Control Unit # 0 and # 1. Install the Control Unit #0 with the cover up and #1 with the cover down.
• When returning the levers in the arrow directions (⟶) at the same time, operate them within one second. If the operation takes longer than one second, the Control Unit may not be recovered. If it occurs, execute the recovery procedure once again. If the Control Unit is not recovered in spite of the re-execution, replace the Control Unit because it may be faulty.

‡1 : If the Control Unit is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the ALM LED (red) may not be turned off ("I1G300 CTL recovery start" is not displayed in "Information Message" on WEB).
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted Control Unit from the chassis, and insert it again after 20 seconds or more passed.

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

(p) Check that the ALM LED (red) on the Control Unit is off.
(q) Check that the WARNING LED (orange) on the front of the Basic Chassis goes out(‡1).
(The Control Unit 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.)
(r) Reconnect all cables that were disconnected.

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 Control Unit continues to detect the Fibre Channel failures, and the I/O processing of the Control Unit may be deteriorated.
• In the case of the RKM/RKS, the installed direction is different in the Control Unit #0 and #1, so that be careful of the connecting position of the cables.

(s) Make sure that the READY LED (green) on the Front Bezel is on. The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH) before it lights up.
(t) Refer to "Information Message" on WEB, and check to see that [I0010x CTL recovered (CTL-x)] is indicated. (Refer to WEB "2.5 Information Message" (WEB 02-0110).)
When this is indicated, the replacement of Interface Board has completed.
(u) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the disk 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 01-0890)").
(v) Check that the LED of the remote adaptor connected to the Control Unit in which the replaced Interface Board is installed lights on when the remote adaptor is connected.

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

(2) Procedure for replacement with the power turned off
(Refer to "Figure 2.2.16 Replacing Interface Board (RKEM/RKES/RKEXS8F)" (REP 02-0860), "Figure 2.2.17 Position of the LED on the Control Unit (RKM/RKEM/RKS/RKES/RKEXS8F)" (REP 02-0870), "Figure 2.2.18 Replacing Interface Board (RKEH)" (REP 02-0871) and "Figure 2.2.19 Position of the LED on the Control Unit (RKH/RKHE)" (REP 02-0871).)
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).).

(a) Collect Simple Trace and Constitution Information (Port Information). (Refer to Troubleshooting "7.3 Collecting Simple Trace" (TRBL 07-0040) and System Parameter "4.2 (8) Setting of Constitute" (SYSPR 04-0280).)

NOTE : If you change the interface board different type, all the following information is cleared. So please collect simple trace and constitute information to keep constitution 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.
Make sure that the POWER LED (green) on the Front Bezel go off. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the power has already been turned off, check that Interface Board is not in the back-up state. (To check for the back-up state, refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
If the memory is still being backed up, first release it from the back-up state, and then replace the Control Unit.

In this case, check that the C-PWR LED (green) on Control Unit is extinguished.

NOTE : If the C-PWR LED (green) is lit, it may be that some of the Cache Unit data has not been written into the disk. In this case, removing the Control Unit may cause a loss of user data.

(c) Remove the power cables (two) from the Basic Chassis in which the Interface Board to be replaced is installed.

(d) 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 Control Unit.
When the levers are completely opened, the Control Unit comes out forward.

(e) Remove the all cables connected to the Control Unit.

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 Control Unit continues to detect the Fibre Channel failures, and the I/O processing of the Control Unit may be deteriorated.
• Remove the cable for the Additional Battery Box by inserting the connector into the Control Unit side completely and pressing the latch of the connector.

⚠ CAUTION

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

(f) Remove the Control Unit by pulling it out toward you.
(g) Loosen two cover fixing screws (blue) on the top of the cover, and open the cover to the arrow (⟶) direction.
You can fix the cover at a perpendicular position and, furthermore, you can lift the cover a little from this position and fall it to the opposite side.
(h) Remove the Interface Board mounted on the Control Unit.
Loosen the fixing screws ① to ④ of the Interface Board (or the dummy Interface Board) installed in the Control Unit, operate the latch lever slowly to the arrow direction (⟶), remove the connector while lifting up the Interface Board, and remove it from the Control Unit.

NOTE : Place the removed Interface Board in the place where anti-static measures are taken.

(i) Place the new Interface Board according to the positioning pin of the Control Unit, temporarily fix the fixing screw ①. Press the label (PUSH HERE) part, and insert it in the connector.
At this time, check that the connector is inserted surely. Insert the Interface Board making its sheet metal part face inside of the Control Unit.

NOTE : • Install the new Interface Board in the removed position.
• When installing the Interface Board, insert the connector after checking the locations of the positioning pin and the fixing screws for Interface Board because the incorrect location decision may cause the connector to be damaged.

(j) Fix the Interface Board by tightening the fixing screws ① to ④.
(k) Close the cover and fix it by fastening two cover fixing screws (blue) on the top of the cover.

(l) Insert it in the set position in the status where the right and left levers on the Control Unit are opened, and close the levers completely until you hear the buttons (blue), which fix the levers, click.
If the Control Unit is caught by something when it is inserted, do not push it in forcibly. Retry the insertion from the beginning. If forced, pins might be broken.

NOTE : • Do not catch a ENC cable, when the Control Unit for the inserted.
• In the case of the RKM/RKS, the installation direction is different in the Control Unit #0 and #1. Install the Control Unit #0 with the cover up and #1 with the cover down.

(m) Reconnect all cables that were disconnected.

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 Control Unit continues to detect the Fibre Channel failures, and the I/O processing of the Control Unit may be deteriorated.
• In the case of the RKM/RKS, the installed direction is different in the Control Unit #0 and #1, so that be careful of the connecting position of the cables.

(n) Connect the power cables (two) to the Basic Chassis whose Interface Board was replaced.
(o) Turn on the main switch (the subsystem usually recovers in about five minutes).
(p) Check that the READY LED (green) on the front of the Basic Chassis 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 RKH) 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 Basic Chassis 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 disk 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 01-0890)”).

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

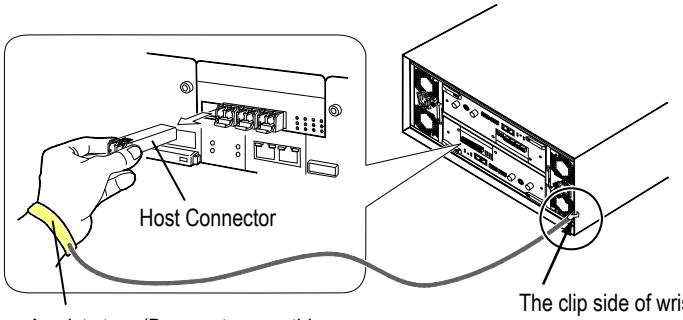
2.2.8 Replacing Host Connector

CAUTION

- **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 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).



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 subsystem (rear face)

[Notes for the case where NAS Unit (DKN-200-NGW1) is connected to this device]

Prior to this operation, if all of the following three cases apply to this device, execute [Correspondence when connecting the NAS Unit].

[Points to be checked in advance]

- NAS Unit is connected to this device.
  Confirm with the disk array device administrator.
- NAS Unit is in operation.
  Confirm with the NAS Unit administrator.
- A failure has not occurred on the NAS Unit.
  Ask the NAS Unit administrator to check whether failure has occurred or not by checking with the NAS administration software, NAS Manager GUI, List of RAS Information, etc.
  In case of failure, execute the maintenance operation together with the NAS maintenance personnel.

[Correspondence when connecting the NAS Unit]

Confirm with the NAS Unit administrator whether it is possible to terminate the NAS service.
Determine how to react according to the confirmation result.

- When the NAS service can be terminated
  Before starting this operation, ask the NAS Unit administrator for the planned shutdown of the NAS Unit.
  After completing this operation, ask the NAS Unit administrator to reboot the NAS Unit.
- When the NAS service cannot be terminated
  When this operation executed for the Host Connector installed in the Control Unit connected by the NAS Unit is completed, the FC path (Fibre Channel path) of the NAS Unit might go into the Failure status.
  Contact the NAS Unit administrator, refer to "Recovering from FC path errors" of "Hitachi NAS Manager User's Guide", confirm the FC path status and, if the status is Failure, ask for the recovery of the FC path.
  In addition, if there are any personnel for the NAS Unit maintenance, ask the NAS Unit maintenance personnel to refer to "NAS IMS 2.9.8 Displaying LU Path Setting Screen" (NAS IMS 02-0490) in "DKN-200-NGW1 NAS Unit Maintenance Manual", and ask to check the status of the FC path and to recover the FC path if it is in a failure status after completing this operation for the Host Connector installed in the Control Unit connected by the NAS Unit.

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Refer to the figure below for the Host Connector replacement work. 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.

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 ALARM 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. The Host Connectors different from each other are installed in the RKM/RKH and RKS respectively. When replacing each of them, be careful not to use a wrong one. ① RKM/RKH There are two kinds of Host Connectors for 8 G bps and 4 G bps. ② RKS 4G bps Host connector 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 ALM LED is on • See "(1-1) When the HALM LED on the Host Connector is on" (REP 02-0970) When the ALM LED is off (Preventive replacement) • See "(1-2) When the HALM LED on the Host Connector is off" (REP 02-0990).
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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis is blinking at high speed because the update of the flash program or the automatic download of the ENC 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 Basic Chassis 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 02-1000).

(1) Procedure for replacement with the power turned on

(1-1) When the HALM LED on the Host Connector is on

(Refer to "Figure 2.2.20 Replacing Host Connector" (REP 02-0980).)

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).).

NOTE : • Do not replace the Host Connector which operates normally.
• Before replacing the Host Connector on the Interface Board, confirm that the HALM LED (RED) on the Interface Board is on.
• Before replacing the Host Connector on the Control Unit of the RKEM/RKES, confirm that the GP 0 LED and GP 1 LED are on (RED) at the same time.

(a) When replacing the Host Connector on the Interface Board, confirm that the HALM LED (RED) on the Host Connector to be replaced is on.

When replacing the Host Connector on the Control Unit of the RKEM/RKES, confirm that the GP 0 LED and GP 1 LED on the Control Unit are on (RED) at the same time.

If it does not light up, remove the Host Connector following "(1-2) When the HALM LED on the Host Connector is off" (REP 02-0990).

(b) Remove the Fibre Channel cables connected to the Control Unit 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 : When the host connector cannot be removed, remove it pushing the lever down.

(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 insert the Host Connector in the port until it clicks.

NOTE : • Install the 8 G bps of Host Connector in the 8 G bps of Interface Board (DF-F800-DKF84/ DF-F800-DKF82) and the FC interface in the Control Unit of the RKEM/RKES.
• Install the 10 G bps of Host Connector in the 10 G bps of iSCSI Interface Board (DF-F800-DKSA2).

(f) Connect the Fibre Channel Interface cables.

(g) If the GP 0 LED and GP 1 LED do not comet on, the other failure may be considered, so that restore it following Troubleshooting "Chapter 1. Flowchart for Troubleshooting" (TRBL 01-0000).

(h) Refer to “Information Message” on WEB, and check to see that [I53A0a Host Connector recovered (Port xy-z)] is indicated. (Refer to WEB “2.5 Information Message” (WEB 02-0110).)
When this is indicated, the replacement of Host Connector has completed.

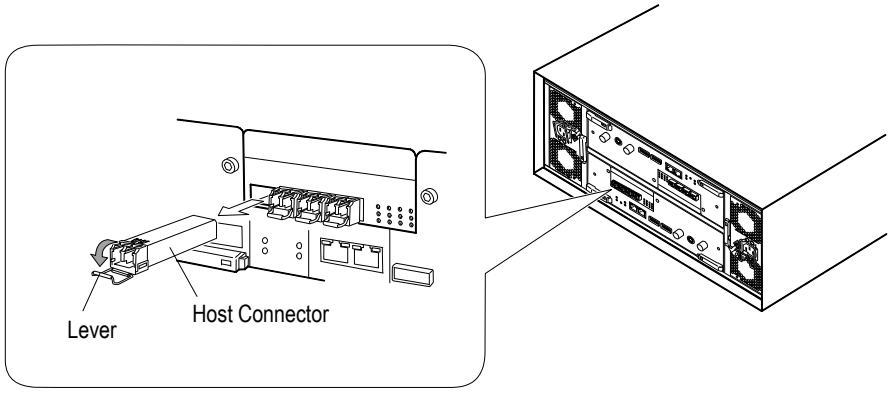


Figure 2.2.20 Replacing Host Connector

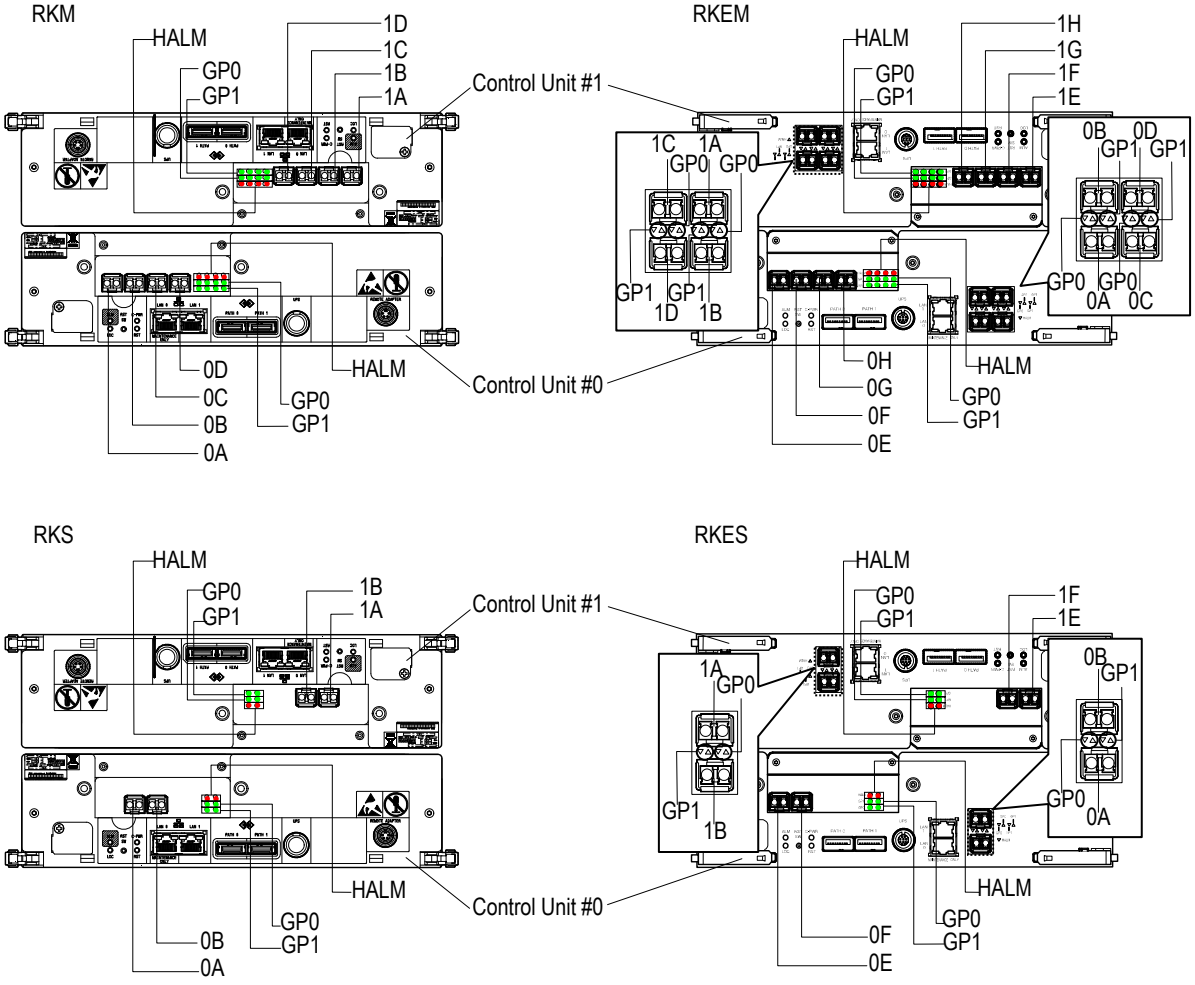


Figure 2.2.20.1 FC Interface Port and HALM LED (RKM/RKEM/RKS/RKES)

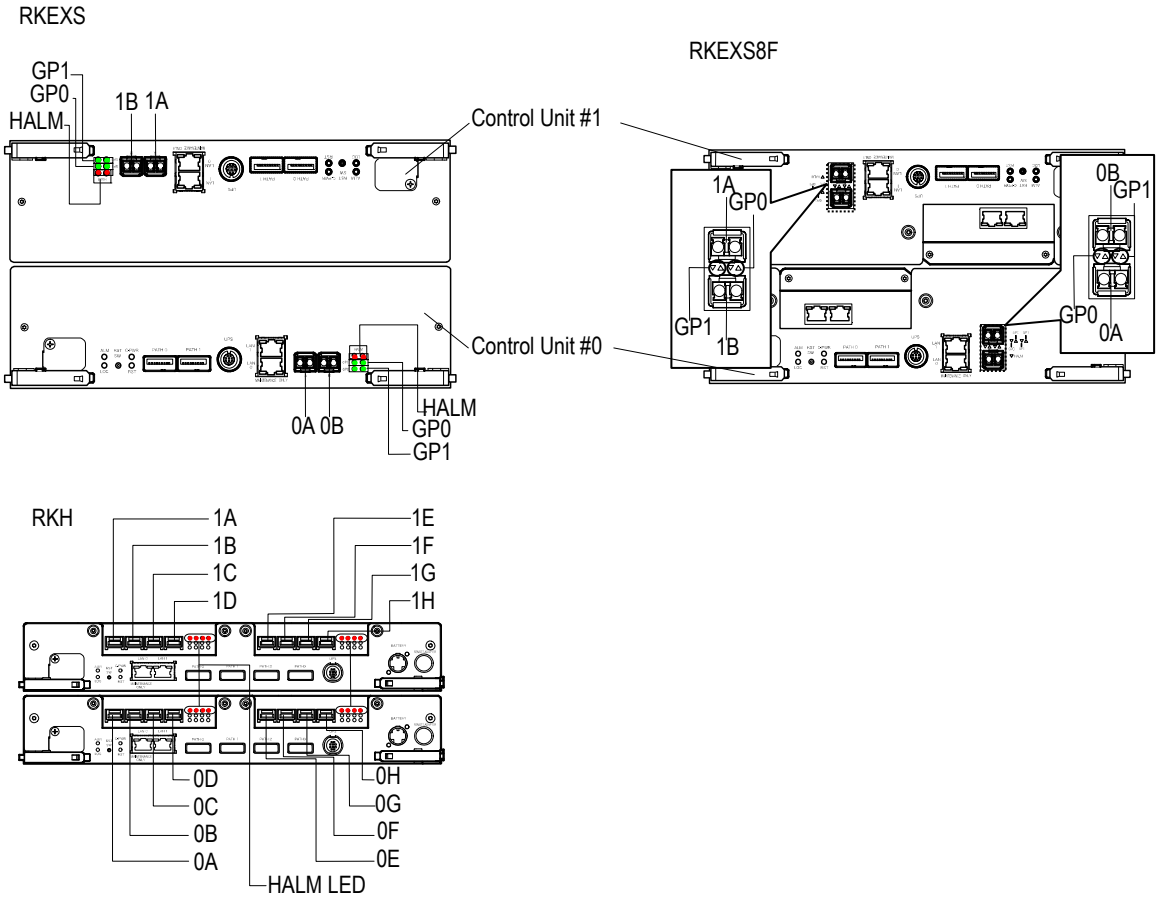


Figure 2.2.20.2 FC Interface Port and HALM LED (RKEXS/RKEXS8F/RKH)

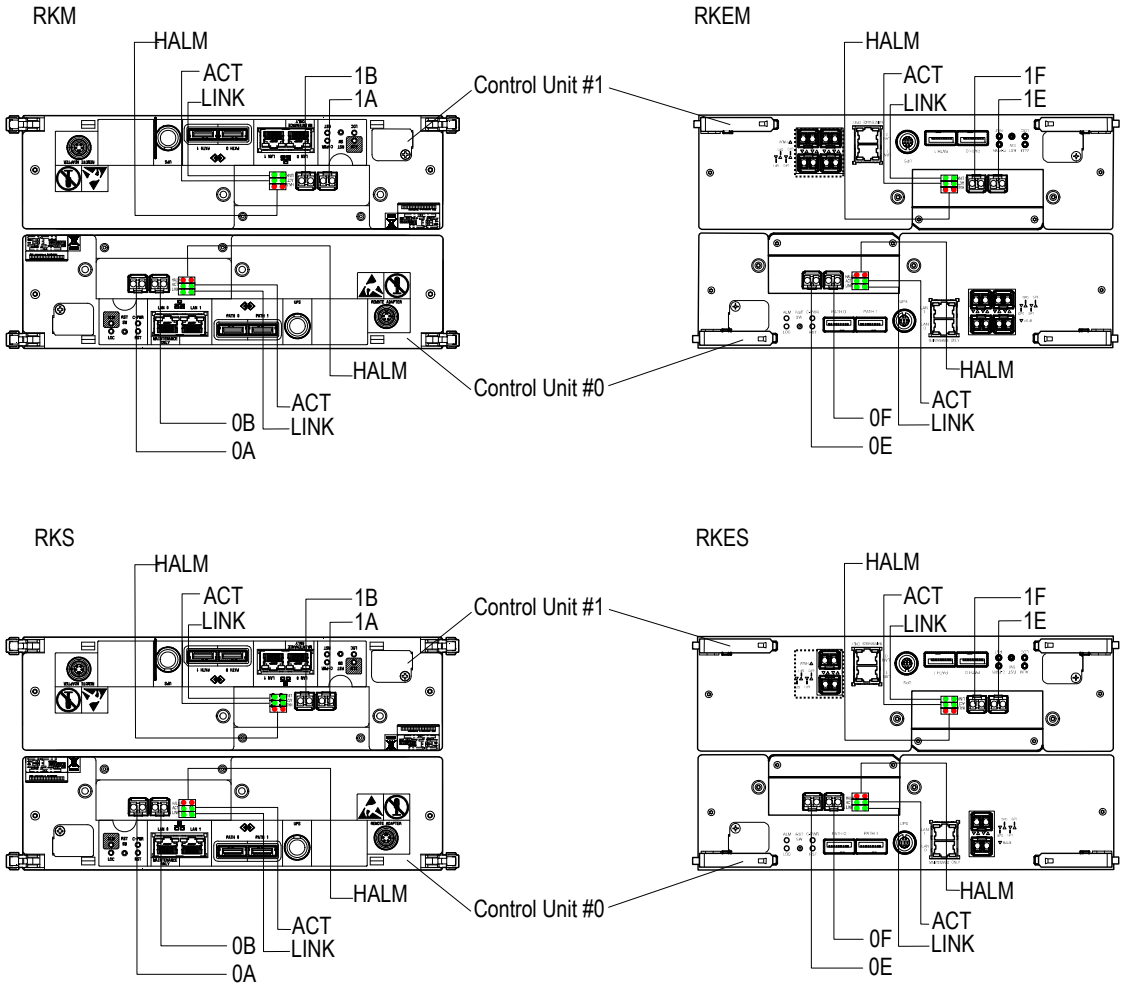


Figure 2.2.20.2 10G bps iSCSI Interface Port and HALM LED (RKM/RKEM/RKS/RKES)

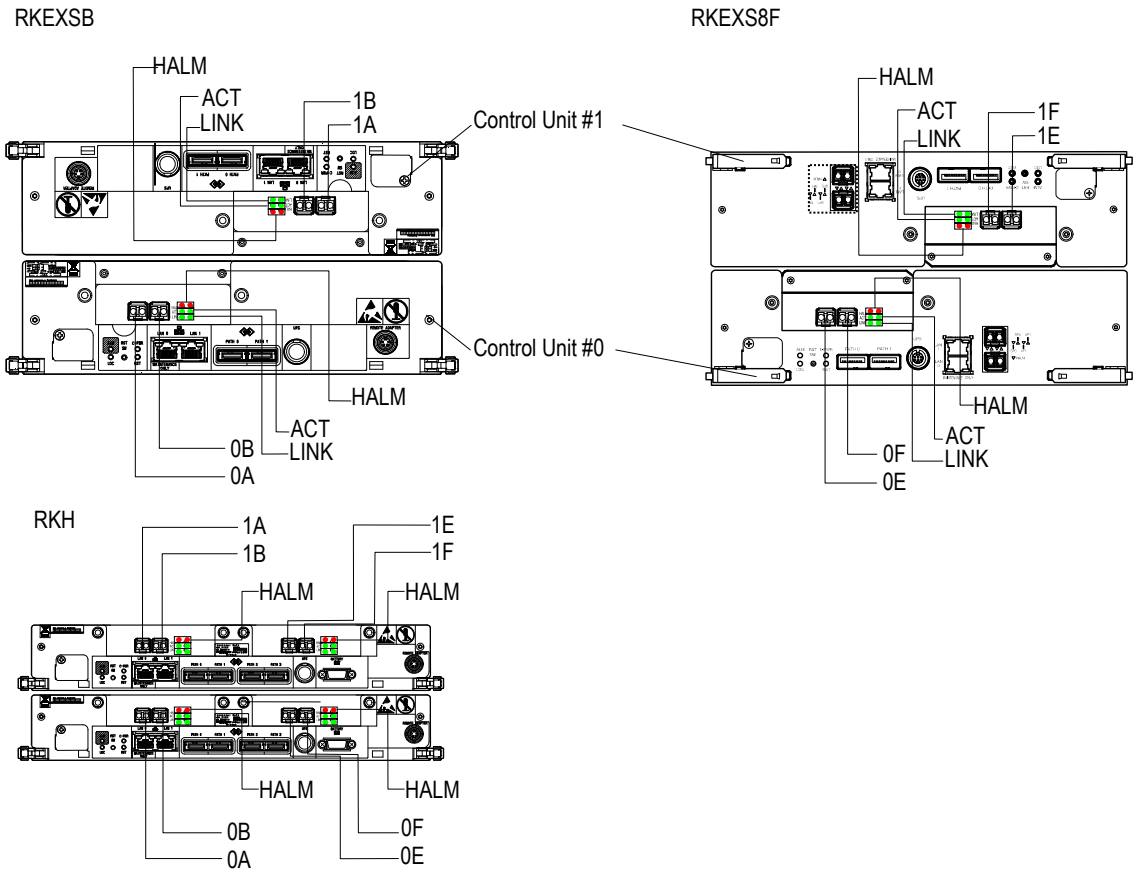


Figure 2.2.20.3 10G bps iSCSI Interface Port and HALM LED (RKEXS/RKEXS8F/RKH)

This page is for editorial purpose only.

(1-2) When the HALM LED on the Host Connector is off

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 Fibre Channel cables connected to the Control Unit 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.

NOTE : When the host connector cannot be removed, remove it pushing the lever down.

(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 : • Install the 8 G bps of Host Connector in the 8 G bps of Interface Board (DF-F800-DKF84/ DF-F800-DKF82) and the FC interface in the Control Unit of the RKEM/RKES.
• Install the 10 G bps of Host Connector in the 10 G bps of iSCSI Interface Board (DF-F800-DKSA2).

(e) Connect the Fibre Channel Interface cables.

(f) If the GP 0 LED and GP 1 LED do not come on, the other failure may be considered, so that restore it following Troubleshooting “Chapter 1. Flowchart for Troubleshooting” (TRBL 01-0000).

(g) Refer to “Information Message” on WEB, and check to see that [I53A0a Host Connector recovered (Port xy-z)] is indicated. (Refer to WEB “2.5 Information Message” (WEB 02-0110).)
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 ④ Collection of errors" (MSG 01-0000).).

(a) Turn off the main switch.

Make sure that the POWER LED (green) on the Front Bezel go off. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the power has already been turned off, check that Cache memory is not in the back-up state. (To check for the back-up state, refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
If the memory is still being backed up, first release it from the back-up state, and then replace the Control Unit.

In this case, check that the C-PWR LED (green) on Control Unit is extinguished.

NOTE : If the C-PWR LED (green) is lit, it may be that some of the Cache Unit data has not been written into the disk. In this case, removing the Control Unit may cause a loss of user data.

(b) Remove the Fibre Channel cables connected to the Control Unit 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 : When the host connector cannot be removed, remove it pushing the lever down.

(d) Check the insertion direction of the Host Connector and inset the Host Connector in the port until it clicks.

NOTE :
- Install the 8 G bps of Host Connector in the 8 G bps of Interface Board (DF-F800-DKF84/ DF-F800-DKF82) and the FC interface in the Control Unit of the RKEM/RKES.
- Install the 10 G bps of Host Connector in the 10 G bps of iSCSI Interface Board (DF-F800-DKSA2).

(e) Connect the Fibre Channel Interface cables.

(f) Turn on the main switch (the subsystem usually recovers in about five minutes).

(g) Check that the READY LED (green) on the front of the Basic Chassis 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 RKH) 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 Basic Chassis 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 disk 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 01-0890)").

(i) If the GP 0 LED and GP 1 LED do not light on, the other failure may be considered, so that restore it following Troubleshooting "Chapter 1. Flowchart for Troubleshooting" (TRBL 01-0000).

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

2.2.9 Replacing ENC Unit

Working procedures are different in the RKAK, the RKAKX, and the RKAKS.

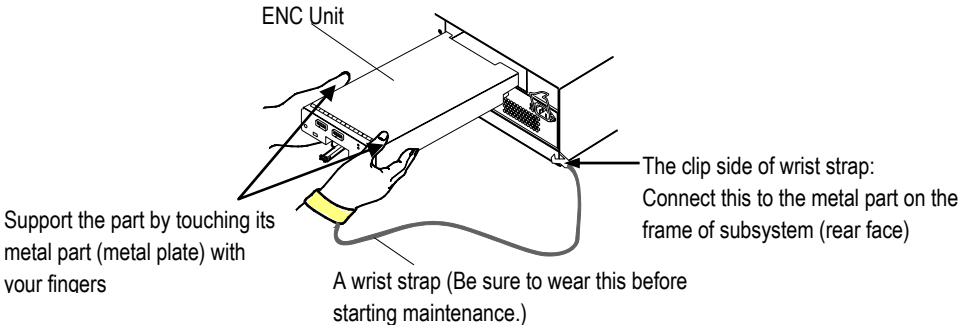
(1) Replacing the ENC Unit of the RKAK

CAUTION

- **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 ENC Unit, 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 ENC Unit is precision instrument. Be sure to put on the wrist strap before starting work in order to protect ENC Unit 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 ENC Unit into the subsystem, support the ENC Unit as touching its metal part with fingers of your hand that wears a wrist strap.



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 ENC Unit, the subsystem must be in the status shown below. • The firmware is not being performed. • The Control Unit 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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis 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 Basic Chassis usually goes out about 30 seconds later.	When the ALM LED (red) of the ENC Unit to be replaced is on Refer to "(a-1) When the ALM LED of the ENC Unit to be replaced is on" (REP 02-1050) When the ALM LED (red) of the ENC Unit to be replaced is off (Preventive replacement) Refer to "(a-2) When the ALM LED of the ENC Unit to be replaced is off" (REP 02-1052)
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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis is blinking at high speed because the update of the flash program or the automatic download of the ENC 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 Basic Chassis 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 02-1061)

NOTE : • When bending the 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 ENC Units need to be replaced on the same PATH, replace the Control Unit of the RKH/RKM/RKS first, and then replace the ENC Unit of the Additional Chassis. Also, when replacing the ENC Units of two or more Additional Chassis, replace the Additional Chassis that the subsystem Unit # is smaller.
- When a failure of the battery system (whose message code is W03z0x, W0400x or W3Tzxy) has occurred, recover the subsystem from the battery system failure before replacing the ENC Unit.
- When UPS interlock is used, if you turn off the subsystem power other than the regular procedure in case of an ENC Unit failure, the power may not be turned on later. Turn off/on the output of the UPS, and then turn on the subsystem power. If you cannot turn off/on the UPS, remove the interlock cable between the UPS and the subsystem (it becomes the Waning status), and then turn off the subsystem power.

(a) Procedure for replacement with the power turned on
(Refer to "Figure 2.2.21 Replacing of ENC Unit" (REP 02-1051).)

(a-1) When the ALM LED of the ENC Unit 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 ④ Collection of errors" (MSG 01-0000).).
Store the collected simple trace information on the CD-R.

(i) Make sure that the ALM LED (red) of the ENC Unit to be replaced is lit.
When ALM LED (red) on the ENC Unit is off, remove the ENC Unit following "(a-2) When the ALM LED of the ENC Unit to be replaced is off" (REP 02-1052).

(ii) 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 ENC Unit.
When the lever is completely opened, the ENC Unit comes out forward.

(iii) Remove the ENC cable connected to the ENC Unit 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 ENC Unit by pulling it out toward you.

(v) After waiting for 20 seconds or more, insert a new ENC Unit until its lever is slightly opened.
When doing this, do not insert the ENC Unit completely.
If the ENC Unit is inserted without waiting for 20 seconds or longer, it is possible that the ENC Unit is not recovered from the failure normally(‡1).

NOTE : Do not catch a ENC cable, when the ENC Unit is inserted.

(vi) Connect the ENC cable to new ENC Unit.

(vii) Close it completely until you hear the button (blue), which fixes the lever, click.

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 subsystem is not recovered from the failure nevertheless, replace the ENC Unit because the ENC Unit is considered to have failed.

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

(viii) Make sure that the ALM LED (red) on the ENC Unit is off(‡1).

(ix) Check that the READY LED (green) on the front of the Basic Chassis is on and the ALARM LED (red) and WARNING LED (orange) goes out(‡2). The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH) before it lights up.
When the Power Saving 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) Refer to "Information Message" on WEB, and check to see that [I00Be0 ENC recovered (Unit-x, ENC-y)] is indicated. (Refer to WEB "2.5 Information Message" (WEB 02-0110).)
When this is indicated, the replacement of ENC Unit has completed.

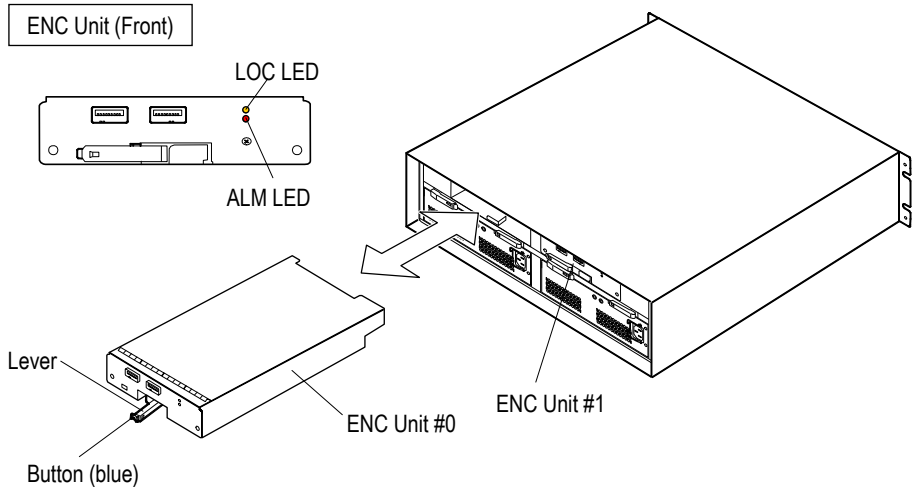


Figure 2.2.21 Replacing of ENC Unit (RKAK)

‡1: If the ENC Unit is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the Red (ALARM) LED of the replaced ENC Unit may not be turned off.
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted ENC Unit from the chassis, 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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

(a-2) When the ALM LED of the ENC Unit to be replaced is off

(i) 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 ENC Unit.
When the lever is completely opened, the ENC Unit comes out forward.

NOTE : When opening the lever, perform the operation of the lever within one second.

(ii) Remove the ENC cable connected to the ENC Unit to be replaced.

(iii) Remove the ENC Unit by pulling it out toward you.

(iv) After waiting for 20 seconds or more, insert a new ENC Unit until its lever is slightly opened.
When doing this, do not insert the ENC Unit completely.
If the ENC Unit is inserted without waiting for 20 seconds or longer, it is possible that the ENC Unit is not recovered from the failure normally(‡1).

NOTE : Do not catch a ENC cable, when the ENC Unit is inserted.

(v) Connect the ENC cable to new ENC Unit.

(vi) Close it completely until you hear the button (blue), which fixes the lever, click.

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 subsystem is not recovered from the failure nevertheless, replace the ENC Unit because the ENC Unit is considered to have failed.

(vii) Make sure that the ALM LED (red) on the ENC Unit is off(‡2).

(viii) When an ENC Unit other than that to be replaced is detached in the replacement of the ENC Unit installed in the RKH/RKM/RKS or removal of the ENC cable connected to it, remove the ENC cable connected to the detached ENC Unit. (You may replace the ENC cables in any order because the ENC Unit to be replaced is detached. An ENC Unit other than that to be replaced cannot be detached no matter which cable connected to the front or rear ENC Unit is removed first.)
Perform a restoration of the detached ENC Unit following the procedure starting from step (ii).
When the ENC Unit 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.

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

‡2 : If the ENC Unit is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the Red (ALARM) LED of the replaced ENC Unit may not be turned off.
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted ENC Unit from the chassis, and insert it again after 20 seconds or more passed.

(ix) Check that the READY LED (green) on the front of the Basic Chassis is on and the ALARM LED (red) and WARNING LED (orange) goes out(‡1). The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH) before it lights up.
When the Power Saving 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) Refer to "Information Message" on WEB, and check to see that [I00Be0 ENC recovered (Unit-x, ENC-y)] is indicated. (Refer to WEB "2.5 Information Message" (WEB 02-0110).)
When this is indicated, the replacement of ENC Unit has completed.

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

(b) Procedure for replacement with the power turned off

(Refer to "Figure 2.2.21 Replacing of ENC Unit" (REP 02-1051).)

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.

(i) Turn off the main switch.

Make sure that the POWER LED (green) on the Front Bezel go off. If you cannot turn off the power, troubleshoot the failure by connecting to the WEB.

NOTE : If the power has already been turned off, check that Cache memory is not in the back-up state. (To check for the back-up state, refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
If the memory is still being backed up, first release it from the back-up state, and then replace the Control Unit.

In this case, check that the C-PWR LED (green) on Control Unit is extinguished.

NOTE : If the C-PWR LED (green) is lit, it may be that some of the Cache memory data has not been written into the disk. In this case, removing the Control Unit may cause a loss of user data.

(ii) Remove the power cables (two) from the RKAK in which the ENC Unit to be replaced is installed.

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

(iv) Remove the cables connected to the ENC Unit.

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 ENC Unit by pulling it out toward you.

(vi) Insert a new ENC Unit until its lever is slightly opened.
When doing this, do not insert the ENC Unit completely.

NOTE : Do not catch a ENC cable, when the ENC Unit is inserted.

(vii) Connect the ENC cable to new ENC Unit.

(viii) Close it completely until you hear the button (blue), which fixes the lever, click.

(ix) Connect the power cables (two) to the RKAK whose ENC Unit was replaced.

(x) Turn on the main switch (the subsystem usually recovers in about five minutes).
Make sure that the ALM LED (red) has not gone out.

(xi) Check that the READY LED (green) on the front of the Basic Chassis 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 RKH) 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 Basic Chassis lights up. When the Power Saving 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.

(xii) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the disk 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 01-0890)").

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

(2) Replacing ENC Unit of the RKAKX

CAUTION

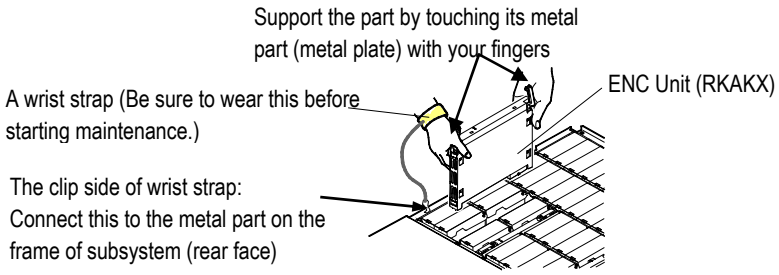
- **Do not pull out multiple RKAKXs at a time because the rack can fall over.**
- **Do not put objects on the RKAKX which has been pulled out of the rack or use it as working space because the rack can fall over.**

CAUTION

- **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 ENC Unit, 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 ENC Unit is precision instrument. Be sure to put on the wrist strap before starting work in order to protect ENC Unit 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 ENC Unit into the subsystem, support the ENC Unit as touching its metal part with fingers of your hand that wears a wrist strap.



NOTE : • When removing the Disk Drive to the RKAKX, 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 (7) Installing the stabilizer" (INST 02-0090).)
• When pulling out or storing the RKAKX, perform it for only one RKAKX at a time slowly and surely. (Refer to Installation "1.4.1 (1) How to pull the RKAKX out of the rack frame" (INST 01-0111) or "1.4.1 (2) How to store the RKAKX in the rack frame." (INST 01-0112).)

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 ENC Unit, the subsystem must be in the status shown below. • The firmware is not being performed. • The Control Unit 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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis 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 Basic Chassis usually goes out about 30 seconds later.	When the ALM LED (red) of the ENC Unit to be replaced is on Refer to "(a-1) When the ALM LED of the ENC Unit to be replaced is on" (REP 02-1073) When the ALM LED (red) of the ENC Unit to be replaced is off (Preventive replacement) Refer to "(a-2) When the ALM LED of the ENC Unit to be replaced is off" (REP 02-1080)
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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis is blinking at high speed because the update of the flash program or the automatic download of the ENC 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 Basic Chassis 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 02-1082)

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

NOTE : • When bending the ENC cable to connect it, give it a bend with a long radius (more than 20 mm) so as not to apply the cable and the connector excessive stresses.

- When two or more ENC Units need to be replaced on the same PATH, replace the Control Unit of the RKH/RKM/RKS first, and then replace the ENC Unit of the Additional Chassis. Also, when replacing the ENC Units of two or more Additional Chassis, replace the Additional Chassis that the subsystem Unit # is smaller.
- When a failure of the battery system (whose message code is W03z0x, W0400x or W3Tzxy) has occurred, recover the subsystem from the battery system failure before replacing the ENC Unit.
- When UPS interlock is used, if you turn off the subsystem power other than the regular procedure in case of an ENC Unit failure, the power may not be turned on later. Turn off/on the output of the UPS, and then turn on the subsystem power. If you cannot turn off/on the UPS, remove the interlock cable between the UPS and the subsystem (it becomes the Waning status), and then turn off the subsystem power.

(a) Procedure for replacement with the power turned on

(a-1) When the ALM LED of the ENC Unit 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 ④ Collection of errors" (MSG 01-0000).).

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

(i) Pull the RKAKX out of the rack, and remove the top cover. (Refer to Installation "1.4.1 How to Attach/Remove Front Bezel of the Rackmount Model" (INST 01-0100).)

(ii) Make sure that the ALM LED (red) of the ENC Unit to be replaced is lit.

When ALM LED (red) on the ENC Unit is off, remove the ENC Unit following "(a-2) When the ALM LED of the ENC Unit to be replaced is off" (REP 02-1070).

(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 ENC Unit, and remove the ENC Unit by pulling it out.

(iv) After waiting for 20 seconds or more, insert a new ENC Unit until its lever is slightly opened.

When doing this, do not insert the ENC Unit completely.

If the ENC Unit is inserted without waiting for 20 seconds or longer, it is possible that the ENC Unit 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 subsystem is not recovered from the failure nevertheless, replace the ENC Unit because the ENC Unit is considered to have failed.

• Check that there is no foreign substance near the connector and in the subsystem before inserting the new ENC Unit.

(v) Make sure that the ALM LED (red) on the ENC Unit is off(‡2).

(vi) Check that the READY LED (green) on the front of the Basic Chassis is on and the ALARM LED (red) and WARNING LED (orange) goes out(‡3). The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH) before it lights up.

When the Power Saving 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 ENC Unit, and insert it again after 20 seconds or more passed.

‡2: If the ENC Unit is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the Red (ALARM) LED of the replaced ENC Unit may not be turned off.

After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted ENC Unit from the chassis, and insert it again after 20 seconds or more passed.

(vii) Refer to “Information Message” on WEB, and check to see that [I00Be0 ENC recovered (Unit-x, ENC-y)] is indicated. (Refer to WEB “2.5 Information Message” (WEB 02-0110).) When this is indicated, the replacement of ENC Unit has completed.

(viii) Return the RKAKX into the rack after attaching its cover. (Refer to Installation "1.4.1 How to Attach/Remove Front Bezel of the Rackmount Model" (INST 01-0100).)

NOTE : Do not drop a screw and such in the subsystem.
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.

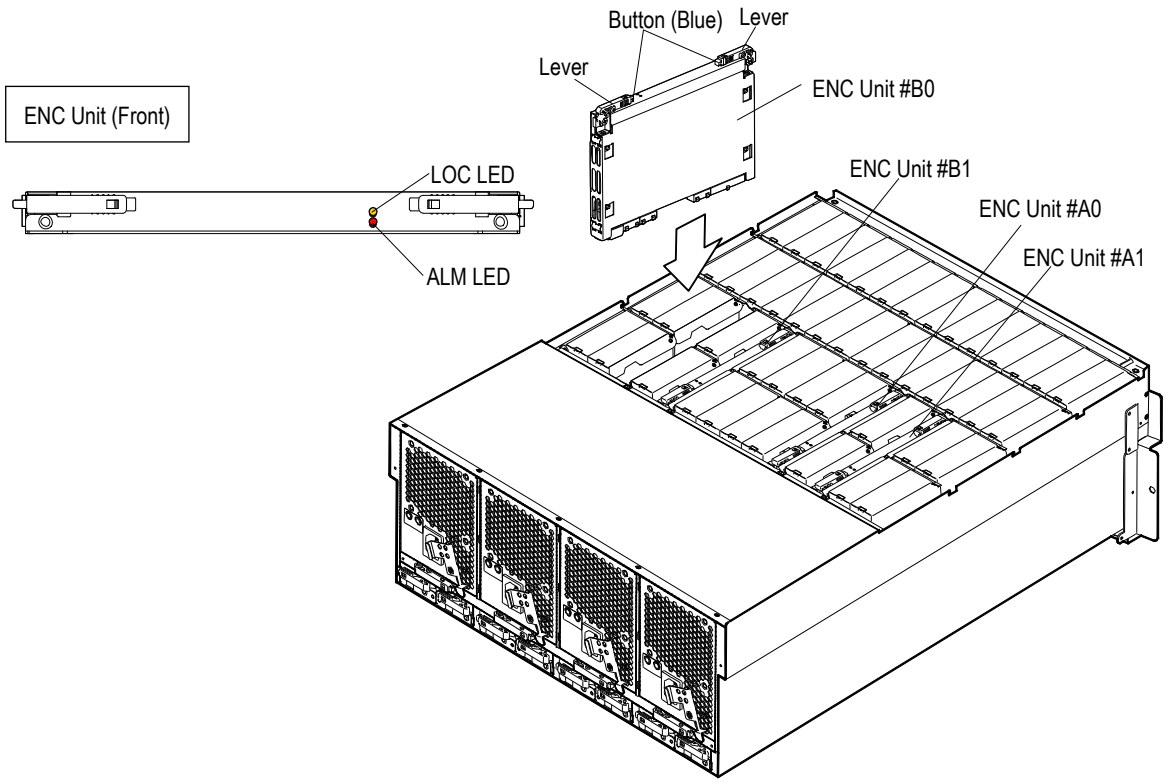


Figure 2.2.21.1 Replacing of ENC Unit (RKAKX)

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

(a-2) When the ALM LED of the ENC Unit to be replaced is off

(i) Pull the RKAKX out of the rack, and remove the top cover. (Refer to Installation "1.4.1 How to Attach/Remove Front Bezel of the Rackmount Model" (INST 01-0100).)

(ii) 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 ENC Unit, and remove the ENC Unit by pulling it out.

(iii) After waiting for 20 seconds or more, insert a new ENC Unit until its lever is slightly opened.
When doing this, do not insert the ENC Unit completely.
If the ENC Unit is inserted without waiting for 20 seconds or longer, it is possible that the ENC Unit 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 subsystem is not recovered from the failure nevertheless, replace the ENC Unit because the ENC Unit is considered to have failed.
• Check that there is no foreign substance near the connector and in the subsystem before inserting the new ENC Unit.

(vi) Make sure that the ALM LED (red) on the ENC Unit is off(‡2).

(v) When an ENC Unit other than that to be replaced is detached in the replacement of the ENC Unit installed in the RKH/RKM/RKS or removal of the ENC cable connected to it, remove the ENC cable connected to the detached ENC Unit. (You may replace the ENC cables in any order because the ENC Unit to be replaced is detached. An ENC Unit other than that to be replaced cannot be detached no matter which cable connected to the front or rear ENC Unit is removed first.)
Perform a restoration of the detached ENC Unit following the procedure starting from step (ii).
When the ENC Unit 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.

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

‡2 : If the ENC Unit is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the Red (ALARM) LED of the replaced ENC Unit may not be turned off.
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted ENC Unit from the chassis, and insert it again after 20 seconds or more passed.

(vi) Check that the READY LED (green) on the front of the Basic Chassis is on and the ALARM LED (red) and WARNING LED (orange) goes out(‡1). The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH) before it lights up.
When the Power Saving 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 [I00Be0 ENC recovered (Unit-x, ENC-y)] is indicated. (Refer to WEB "2.5 Information Message" (WEB 02-0110).)
When this is indicated, the replacement of ENC Unit has completed.

(viii) Return the RKAKX into the rack after attaching its cover. (Refer to Installation "1.4.1 How to Attach/Remove Front Bezel of the Rackmount Model" (INST 01-0100).)

NOTE : Do not drop a screw and such in the subsystem.
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.

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem 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 ④ Collection of errors" (MSG 01-0000).).

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

(i) Turn off the main switch.

Make sure that the POWER LED (green) on the Front Bezel go off. If you cannot turn off the power, troubleshoot the failure by connecting to the WEB.

NOTE : If the power has already been turned off, check that Cache memory is not in the back-up state. (To check for the back-up state, refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
If the memory is still being backed up, first release it from the back-up state, and then replace the Control Unit.

In this case, check that the C-PWR LED (green) on Control Unit is extinguished.

NOTE : If the C-PWR LED (green) is lit, it may be that some of the Cache memory data has not been written into the disk. In this case, removing the Control Unit may cause a loss of user data.

(ii) Remove the power cables (four) from the RKAKX in which the ENC Unit to be replaced is installed.

(iii) Pull the RKAKX out of the rack, and remove the top cover. (Refer to Installation "1.4.1 How to Attach/Remove Front Bezel of the Rackmount Model" (INST 01-0100).)

(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 ENC Unit, and remove the ENC Unit by pulling it out.

(v) Insert the new ENC Unit until its lever is slightly closed, and then close it completely until you hear the right and left buttons (blue), which fix the lever, click.

NOTE : Check that there is no foreign substance near the connector and in the subsystem before inserting the new ENC Unit.

(vi) Connect the power cables (four) to the RKAKX whose ENC Unit was replaced.

(vii) Return the RKAKX into the rack after attaching its cover. (Refer to Installation "1.4.1 How to Attach/Remove Front Bezel of the Rackmount Model" (INST 01-0100).)

NOTE : Do not drop a screw and such in the subsystem.
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 subsystem usually recovers in about five minutes).

Make sure that the ALM LED (red) has not gone out.

(ix) Check that the READY LED (green) on the front of the Basic Chassis 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 RKH) 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 Basic Chassis lights up.
When the Power Saving 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 disk 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 01-0890)").

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

This page is for editorial purpose only.

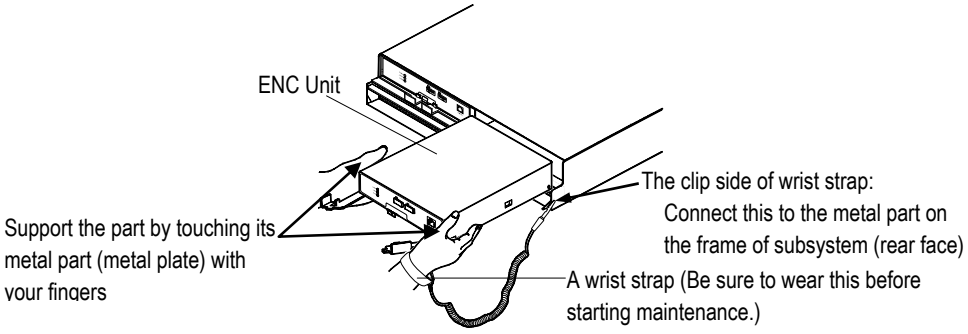
(3) Replacing the ENC Unit of RKAKS

CAUTION

- **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 ENC Unit, 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 ENC Unit is precision instrument. Be sure to put on the wrist strap before starting work in order to protect ENC Unit 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 ENC Unit into the subsystem, support the ENC Unit as touching its metal part with fingers of your hand that wears a wrist strap.



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 ENC Unit, the subsystem must be in the status shown below. • The firmware is not being performed. • The Control Unit 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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis 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 Basic Chassis usually goes out about 30 seconds later.	When the ALM LED (red) of the ENC Unit to be replaced is on Refer to "(a-1) When the ALM LED of the ENC Unit to be replaced is on" (REP 02-1093) When the ALM LED (red) of the ENC Unit to be replaced is off (Preventive replacement) Refer to "(a-2) When the ALM LED of the ENC Unit to be replaced is off" (REP 02-1100)
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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis is blinking at high speed because the update of the flash program or the automatic download of the ENC 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 Basic Chassis 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 02-1102)

NOTE : • When bending the 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 ENC Units need to be replaced on the same PATH, replace the Control Unit of the RKH/RKM/RKS first, and then replace the ENC Unit of the Additional Chassis. Also, when replacing the ENC Units of two or more Additional Chassis, replace the Additional Chassis that the subsystem Unit # is smaller.
- When a failure of the battery system (whose message code is W03z0x, W0400x or W3Tzxy) has occurred, recover the subsystem from the battery system failure before replacing the ENC Unit.
- When UPS interlock is used, if you turn off the subsystem power other than the regular procedure in case of an ENC Unit failure, the power may not be turned on later. Turn off/on the output of the UPS, and then turn on the subsystem power. If you cannot turn off/on the UPS, remove the interlock cable between the UPS and the subsystem (it becomes the Waning status), and then turn off the subsystem power.

(a) Procedure for replacement with the power turned on

(a-1) When the ALM LED of the ENC Unit 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 ④ Collection of errors" (MSG 01-0000).).

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

(i) Make sure that the ALM LED (red) of the ENC Unit to be replaced is lit.
When ALM LED (red) on the ENC Unit is off, remove the ENC Unit following "(a-2) When the ALM LED of the ENC Unit to be replaced is off" (REP 02-1100).

(ii) Open the right and left levers completely which fix the ENC Unit.
When the lever is completely opened, the ENC Unit comes out forward.

(iii) Remove the ENC cable connected to the ENC Unit 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) Pull out and remove the ENC Unit while holding the ENC unit with your both hands.

(v) After waiting for 20 seconds or more, insert a new ENC Unit until its levers are slightly titled with its levers opened.
When doing this, do not insert the ENC Unit completely.
If the ENC Unit is inserted without waiting for 20 seconds or longer, it is possible that the ENC Unit is not recovered from the failure normally(‡1).

NOTE : Do not catch a ENC cable when the ENC Unit is inserted.

(vi) Connect the ENC cable to new ENC Unit.

(vii) Push the right and left levers in toward the ENC Unit.

NOTE : 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 subsystem is not recovered from the failure nevertheless, replace the ENC Unit because the ENC Unit is considered to have failed.

(viii) Make sure that the ALM LED (red) on the ENC Unit is off(‡2).

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

‡2: If the ENC Unit is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the Red (ALARM) LED of the replaced ENC Unit may not be turned off.
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted ENC Unit from the chassis, and insert it again after 20 seconds or more passed.

(ix) Check that the READY LED (green) on the front of the Basic Chassis is on and the ALARM LED (red) and WARNING LED (orange) goes out(‡2). The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH) before it lights up.
When the Power Saving 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) Refer to "Information Message" on WEB, and check to see that [I00Be0 ENC recovered (Unit-x, ENC-y)] is indicated. (Refer to WEB "2.5 Information Message" (WEB 02-0110).)
When this is indicated, the replacement of ENC Unit has completed.

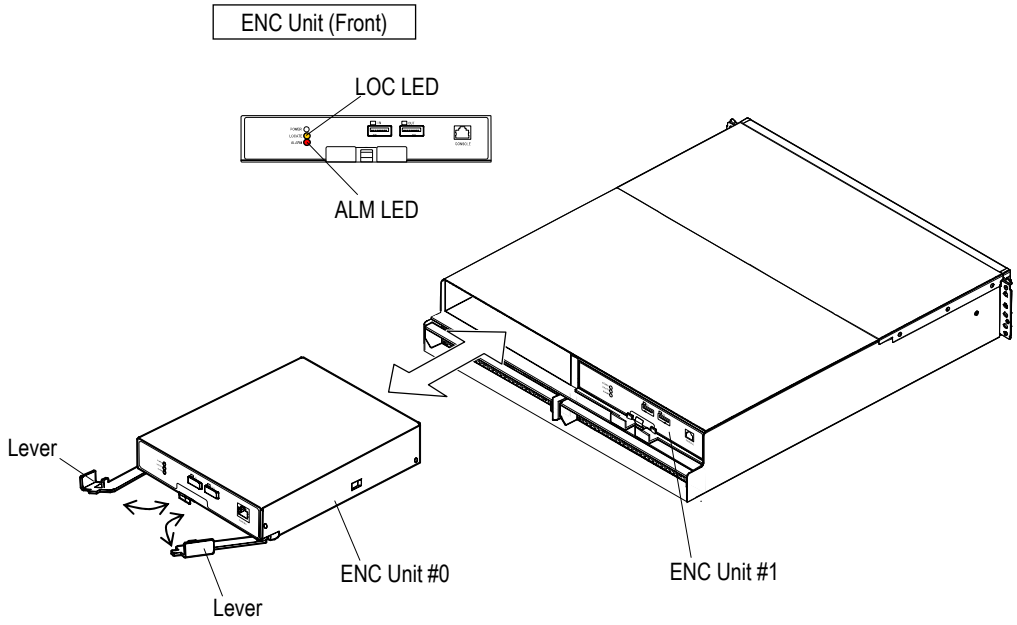


Figure 2.2.21.2 Replacing of ENC Unit (RKAKS)

‡1: If the ENC Unit is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the Red (ALARM) LED of the replaced ENC Unit may not be turned off.
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted ENC Unit from the chassis, 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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

(a-2) When the ALM LED of the ENC Unit to be replaced is off

(i) Open the right and left levers completely which fix the ENC Unit.
When the lever is completely opened, the ENC Unit comes out forward.

NOTE : When opening the lever, perform the operation of the lever within one second.

(ii) Remove the ENC cable connected to the ENC Unit to be replaced.

(iii) Pull out and remove the ENC Unit while holding the ENC unit with your both hands.

(iv) After waiting for 20 seconds or more, insert a new ENC Unit until its lever is slightly opened.
When doing this, do not insert the ENC Unit completely.
If the ENC Unit is inserted without waiting for 20 seconds or longer, it is possible that the ENC Unit is not recovered from the failure normally(‡1).

NOTE : Do not catch a ENC cable, when the ENC Unit is inserted.

(v) Connect the ENC cable to new ENC Unit.

(vi) Push the right and left levers in toward the ENC unit.

NOTE : 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 subsystem is not recovered from the failure nevertheless, replace the ENC Unit because the ENC Unit is considered to have failed.

(vii) Make sure that the ALM LED (red) on the ENC Unit is off(‡2).

(viii) When an ENC Unit other than that to be replaced is detached in the replacement of the ENC Unit installed in the RKH/RKM/RKS or removal of the ENC cable connected to it, remove the ENC cable connected to the detached ENC Unit. (You may replace the ENC cables in any order because the ENC Unit to be replaced is detached. An ENC Unit other than that to be replaced cannot be detached no matter which cable connected to the front or rear ENC Unit is removed first.)
Perform a restoration of the detached ENC Unit following the procedure starting from step (ii).
When the ENC Unit 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.

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

‡2 : If the ENC Unit is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the Red (ALARM) LED of the replaced ENC Unit may not be turned off.
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted ENC Unit from the chassis, and insert it again after 20 seconds or more passed.

(ix) Check that the READY LED (green) on the front of the Basic Chassis is on and the ALARM LED (red) and WARNING LED (orange) goes out(‡1). The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH) before it lights up.
When the Power Saving 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) Refer to "Information Message" on WEB, and check to see that [I00Be0 ENC recovered (Unit-x, ENC-y)] is indicated. (Refer to WEB "2.5 Information Message" (WEB 02-0110).)
When this is indicated, the replacement of ENC Unit has completed.

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

(b) Procedure for replacement with the power turned off

(Refer to "Figure 2.2.21.2 Replacing of ENC Unit(RKAKS)" (REP 02-1094).)

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.

(i) Turn off the main switch.

Make sure that the POWER LED (green) on the Front Bezel go off. If you cannot turn off the power, troubleshoot the failure by connecting to the WEB.

NOTE : If the power has already been turned off, check that Cache memory is not in the back-up state. (To check for the back-up state, refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
If the memory is still being backed up, first release it from the back-up state, and then replace the Control Unit.

In this case, check that the C-PWR LED (green) on Control Unit is extinguished.

NOTE : If the C-PWR LED (green) is lit, it may be that some of the Cache memory data has not been written into the disk. In this case, removing the Control Unit may cause a loss of user data.

(ii) Open the right and left levers completely which fix the ENC Unit.
When the lever is completely opened, the ENC Unit comes out forward.

(iii) Remove the ENC cables connected to the ENC Unit.

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) Pull out and remove the ENC Unit while holding the ENC unit with your both hands.

(v) Insert a new ENC Unit until its levers are slightly titled with its levers opened.
When doing this, do not insert the ENC Unit completely.

NOTE : Do not catch a ENC cable, when the ENC Unit is inserted.

(vi) Connect the ENC cable to new ENC Unit.

(vii) Push the right and left levers in toward the ENC Unit.

(viii) Turn on the main switch (the subsystem usually recovers in about five minutes).
Make sure that the ALM LED (red) has not gone out.

(iX) Check that the READY LED (green) on the front of the Basic Chassis 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 RKH) 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 Basic Chassis lights up. When the Power Saving 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 disk 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 01-0890)").

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

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2.2.10 Replacing ENC Cable

Working procedures are different in the RKAK, the RKAKX, and the RKAKS.
In the case of the RKAKX, replace the ENC cable and the cable holder together.

(1) Replacing the ENC cable of the RKAK

CAUTION

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 ENC Unit, the subsystem must be in the status shown below. • The firmware is not being performed. • The Control Unit 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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis 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 Basic Chassis usually goes out about 30 seconds later.	Refer to "(1-1) Procedure for replacement with the power turned on" (REP 02-1111)
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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis is blinking at high speed because the update of the flash program or the automatic download of the ENC 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 Basic Chassis 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 02-1114)

NOTE : • When bending the 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, W0400x or W3Tzxy) has occurred, recover the subsystem from the battery system failure before replacing the ENC cable.
• When UPS interlock is used, if you turn off the subsystem power other than the regular procedure in case of an ENC Unit failure, the power may not be turned on later. Turn off/on the output of the UPS, and then turn on the subsystem power. If you cannot turn off/on the UPS, remove the interlock cable between the UPS and the subsystem (it becomes the Waning status), and then turn off the subsystem power.

(1-1) Procedure for replacement with the power turned on
Replace the ENC cable referring to Figure 2.2.22.
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).).

(a) Among the ENC Units which are connected to the 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 ENC Unit of the one whose the subsystem Unit# is large.
When the lever is completely opened, the ENC Unit comes out forward.

NOTE : When opening the lever, perform the operation of the lever within one second.

(b) Remove the ENC cable to be replaced.
Remove the ENC cable while pulling the tab of the 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 ENC cable. (Refer to Installation "2.4.10 Connecting the ENC Cables" (INST 02-0700).)

(d) After waiting for 20 seconds or more, insert the ENC Units until its lever is slightly closed, and then close it completely until you hear the button (blue), which fixes the lever, click.
If the ENC Unit is inserted without waiting for 20 seconds or longer, it is possible that the ENC Unit 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 subsystem is not recovered from the failure nevertheless, replace the ENC Unit because the ENC Unit is considered to have failed.
• Do not catch an ENC cable, when the ENC Unit is inserted.

(e) Check that the ALM LED (red) on the ENC Unit is off(‡2).

(f) Check that the READY LED (green) on the front of the Basic Chassis is on and the ALARM LED (red) and WARNING LED (orange) goes out(‡3). The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH) before it lights up.

(g) Refer to "Information Message" on WEB, and check to see that [I00Be0 ENC recovered (Unit-x, ENC-y)] is indicated. (Refer to WEB "2.5 Information Message" (WEB 02-0110).)
When this is indicated, the replacement of ENC cable has completed.

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

‡2 : If the ENC Unit is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the Red (ALARM) LED of the replaced ENC Unit may not be turned off.
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted ENC Unit from the chassis, and insert it again after 20 seconds or more passed.

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

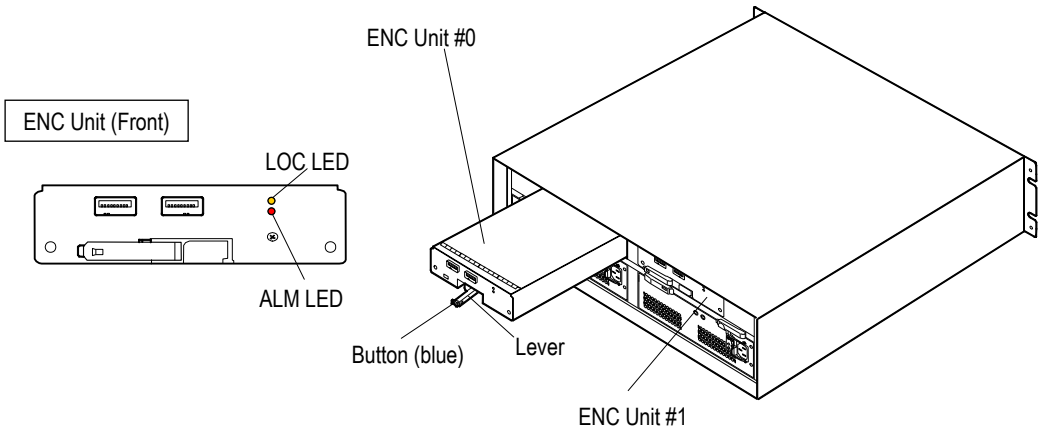

Figure 2.2.22 Locations of LEDs on the ENC Unit (RKAK)

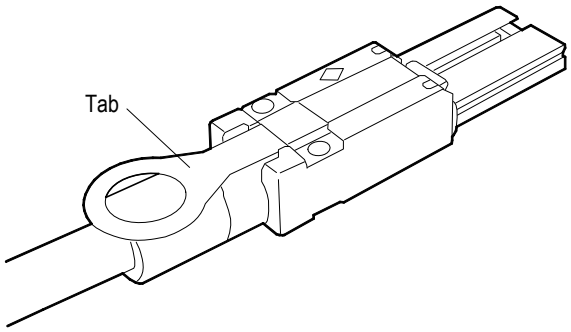

Figure 2.2.22.1 Locations of tab on the ENC cable

(1-2) Procedure for replacement with the power turned off
Replace the ENC cable referring to Figure 2.2.22.
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).).

(a) Turn off the main switch.
Make sure that the POWER LED (green) on the Front Bezel go off. If you cannot turn off the power, troubleshoot the failure by connecting to the WEB.

NOTE : If the power has already been turned off, check that Cache memory is not in the back-up state. (To check for the back-up state, refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
If the memory is still being backed up, first release it from the back-up state, and then replace the Control Unit.

In this case, check that the C-PWR LED (green) on Control Unit is extinguished.

NOTE : If the C-PWR LED (green) is lit, it may be that some of the Cache memory data has not been written into the disk. In this case, removing the Control Unit may cause a loss of user data.

(b) Remove the power cables (two) from the RKAK to which the ENC cable to be replaced is connected.

(c) Among the ENC Units which are connected to the 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 ENC Unit of the one whose the subsystem Unit# is large.
When the lever is completely opened, the ENC Unit comes out forward.

(d) Remove the ENC cable to be replaced.
Remove the ENC cable while pulling the tab of the 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.

(e) Connect a new ENC cable. (Refer to Installation "2.4.10 Connecting the ENC Cables" (INST 02-0700))

(f) Close it completely until you hear the button (blue), which fixes the lever, click.

NOTE : Do not catch a ENC cable, when the ENC Unit is inserted.

(g) Connect the power cables (two) to the RKAK whose ENC cable was replaced.

(h) Turn on the main switch (the subsystem usually recovers in about five minutes).
After doing this, make sure that the ALM LED (red) on the ENC Unit is not on.

(i) Check that the READY LED (green) on the front of the Basic Chassis 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 RKH) 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 Basic Chassis 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 disk 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 01-0890)").

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

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(2) Replacing the ENC cable of the RKAKX

CAUTION

- **Do not pull out multiple RKAKXs at a time because the rack can fall over.**
- **Do not put objects on the RKAKX which has been pulled out of the rack or use it as working space because the rack can fall over.**

CAUTION

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 ENC Unit, the subsystem must be in the status shown below. • The firmware is not being performed. • The Control Unit 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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis 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 Basic Chassis usually goes out about 30 seconds later.	Refer to "(2-1) Procedure for replacement with the power turned on" (REP 02-1121)
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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis is blinking at high speed because the update of the flash program or the automatic download of the ENC 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 Basic Chassis 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 02-1132)

NOTE : • When bending the ENC cable to connect it, give it a bend with a long radius (more than 20 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, W0400x or W3Tzxy) has occurred, recover the subsystem from the battery system failure before replacing the ENC cable.
• When UPS interlock is used, if you turn off the subsystem power other than the regular procedure in case of an ENC Unit failure, the power may not be turned on later. Turn off/on the output of the UPS, and then turn on the subsystem power. If you cannot turn off/on the UPS, remove the interlock cable between the UPS and the subsystem (it becomes the Waning status), and then turn off the subsystem power.
• When removing the Disk Drive to the RKAKX, 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 (7) Installing the stabilizer" (INST 02-0090).)

(2-1) Procedure for replacement with the power turned on
Replace the ENC cable referring to Figure 2.2.22.2 to Figure 2.2.22.8.
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).).

(a) Remove the stopper on the rear side of the subsystem (Refer to Installation "2.5.8 (6) Attaching the stopper" (INST 02-1290)).
(b) Open the cable routing bar toward you.
(c) If the cable tray is attached, remove it (Refer to Installation "2.5.8 (5) Attaching the cable tray" (INST 02-1280)).
(d) Make sure that the ALM LED (red) of the cable holder to which the ENC cable to be replaced is connected is lit. (Refer to Figure 2.2.22.2.)
(e) Remove the repeat binder which fixes the power cables and ENC cables in the middle (Refer to Installation "2.5.8 (4) Fixing the cables in the middle" (INST 02-1270)).
(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 "2.5.4 (2) Fixing the cable routing bars" (INST 02-1020)).
• 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 ENC cables and power cables.
When replacing the cable holder #A0/#A1, release the routing referring to Installation "2.5.8 (2) Routing of the cable routing bar#0" (INST 02-1240).
When replacing the cable holder #B0/#B1, release the routing referring to Installation "2.5.8 (3) Routing of the cable routing bar#1" (INST 02-1252).

(h) Open the lever toward you pressing the button (blue) which fixes the cable holder to which the ENC cable to be replaced is connected, and remove the cable holder.

(i) Loosen the screw (blue) which fixes the holder cover for the new cable holder, and remove it.

(j) Connect a new ENC cable to a new cable holder

NOTE : Pull the 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 RKAKX.
Insert the cable holder until its lever is slightly closed, and then close the lever completely until you hear the button (blue), which fixes the lever, click.

NOTE : Connect the cable holder to the correct connector (IN/OUT).

(m) Affix the cable label to the cable. (Refer to Installation "2.5.6 (3) Attaching cable labels" (INST 02-1210).)

(n) Pull the RKAKX out of the rack, and remove the top cover. (Refer to Installation "1.4.1 How to Attach/Remove Front Bezel of the Rackmount Model" (INST 01-0100).)

(o) 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 ENC Unit whose the ALM LED (red) is on.
When the lever is completely opened, the ENC Unit 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 ENC Units until its lever is slightly closed, and then close it completely until you hear the button (blue), which fixes the lever, click.
If the ENC Unit is inserted without waiting for 20 seconds or longer, it is possible that the ENC Unit 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 subsystem is not recovered from the failure nevertheless, replace the ENC Unit because the ENC Unit is considered to have failed.

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

(q) Check that the ALM LED (red) on the ENC Unit is off(‡1).

(r) Check that the READY LED (green) on the front of the Basic Chassis is on and the ALARM LED (red) and WARNING LED (orange) goes out(‡2). The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH) before it lights up.

(s) Refer to "Information Message" on WEB, and check to see that [I00Be0 ENC recovered (Unit-x, ENC-y)] is indicated. (Refer to WEB "2.5 Information Message" (WEB 02-0110).)
When this is indicated, the replacement of ENC cable has completed.

(t) Return the RKAKX into the rack after attaching its cover. (Refer to Installation "1.4.1 How to Attach/Remove Front Bezel of the Rackmount Model" (INST 01-0100).)

NOTE : Do not drop a screw and such in the subsystem.
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 ENC cable, and fix it with the repeat binder.
When replacing the cable holder #A0/#A1, release the routing referring to Installation "2.5.8 (2) Routing of the cable routing bar#0" (INST 02-1240).
When replacing the cable holder #B0/#B1, release the routing referring to Installation "2.5.8 (3) Routing of the cable routing bar#1" (INST 02-1252).

(v) Return the power cables and ENC cables to the original state, and fix them with the repeat binder in the middle. (Refer to Installation "2.5.8 (4) Fixing the cables in the middle" (INST 02-1270)).

(w) If the cable tray is removed, attach it (Refer to Installation "2.5.8 (5) Attaching the cable tray" (INST 02-1280)).

(x) Close the cable routing bar.

(y) Attach the stopper on the rear side of the subsystem (Refer to Installation "2.5.8 (6) Attaching the stopper" (INST 02-1290)).

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

(z) Pull out the subsystem and check that the routing is performed correctly (refer to Installation "2.5.8 (7) Checking Routing" (INST 02-1290)).

‡1 : If the ENC Unit is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the Red (ALARM) LED of the replaced ENC Unit may not be turned off.
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted ENC Unit from the chassis, 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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

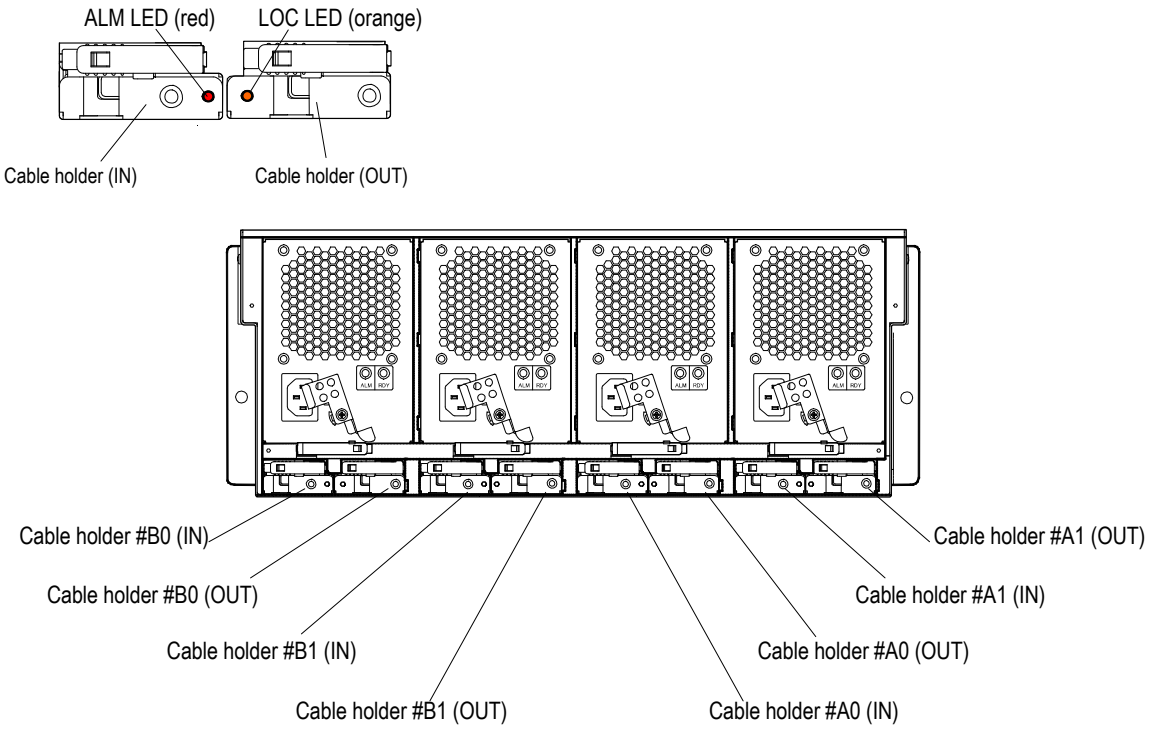
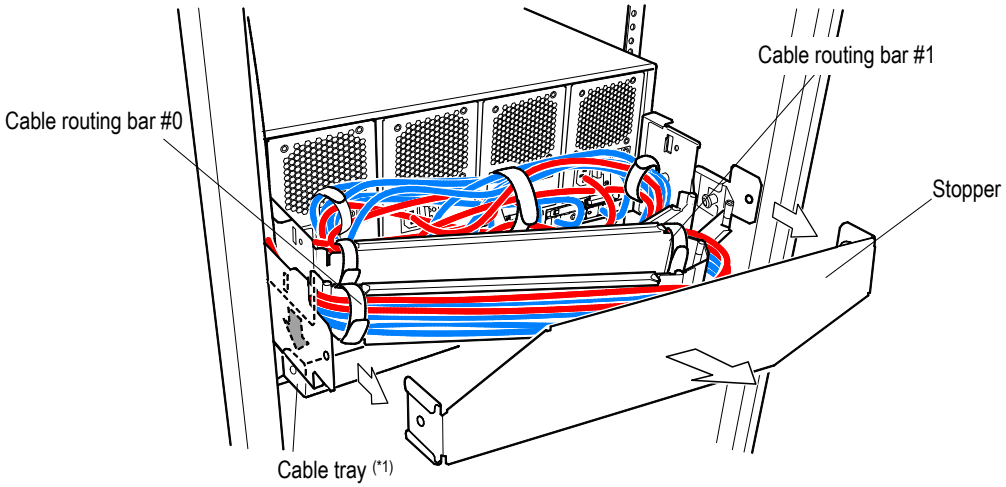


Figure 2.2.22.2 Locations of the LEDs on the Cable Holder



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

Figure 2.2.22.3 Locations of the Cable Routing Bar, the Stopper, and the Cable Tray

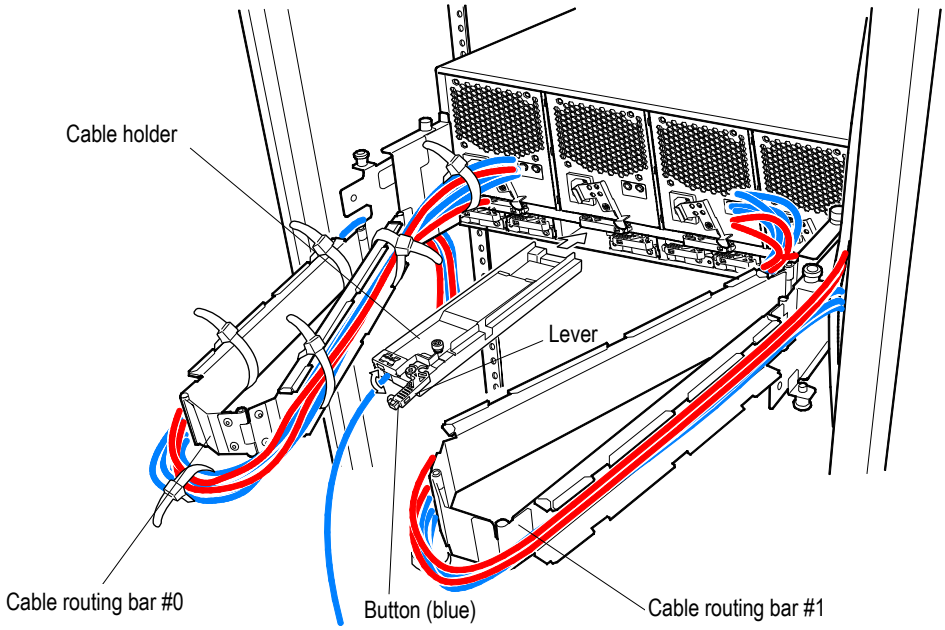


Figure 2.2.22.4 Replacing the ENC Cable/Cable Holder

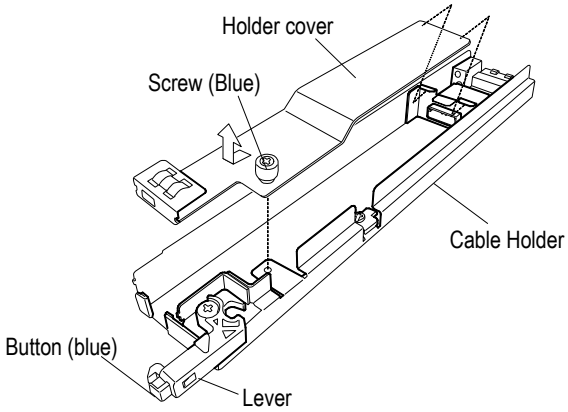


Figure 2.2.22.5 Removing the Cable Holder and the Holder Cover

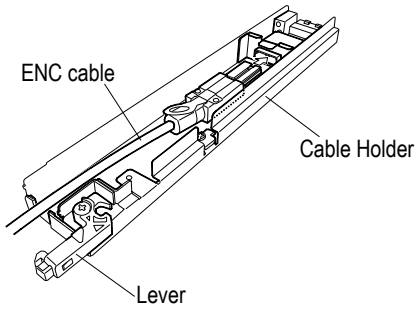


Figure 2.2.22.6 Connecting the ENC Cable

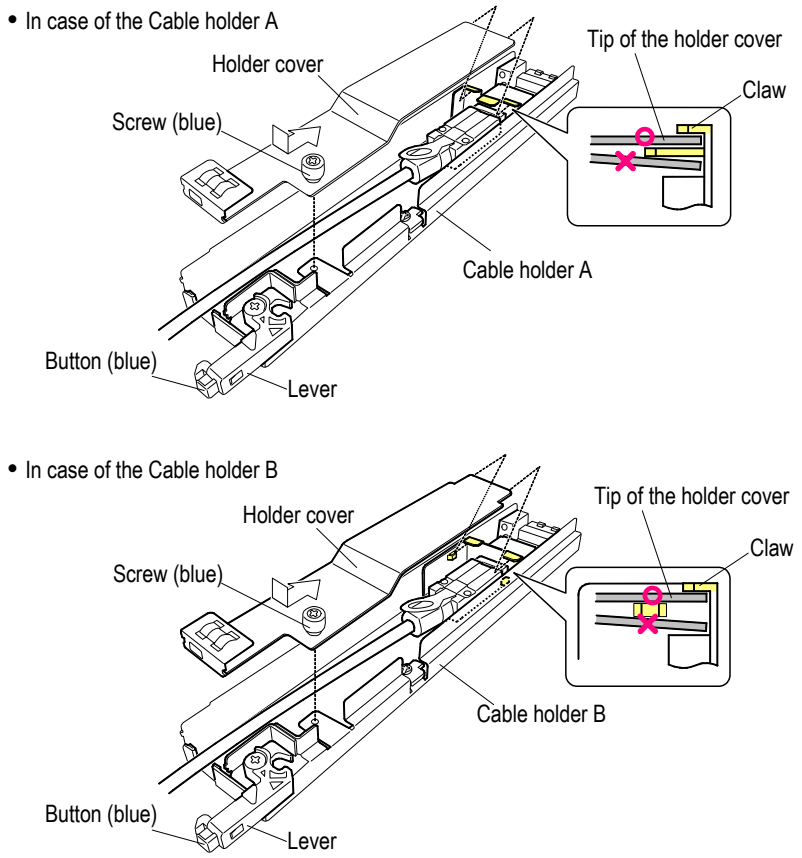


Figure 2.2.22.7 Attaching the Cable Holder and the Holder Cover

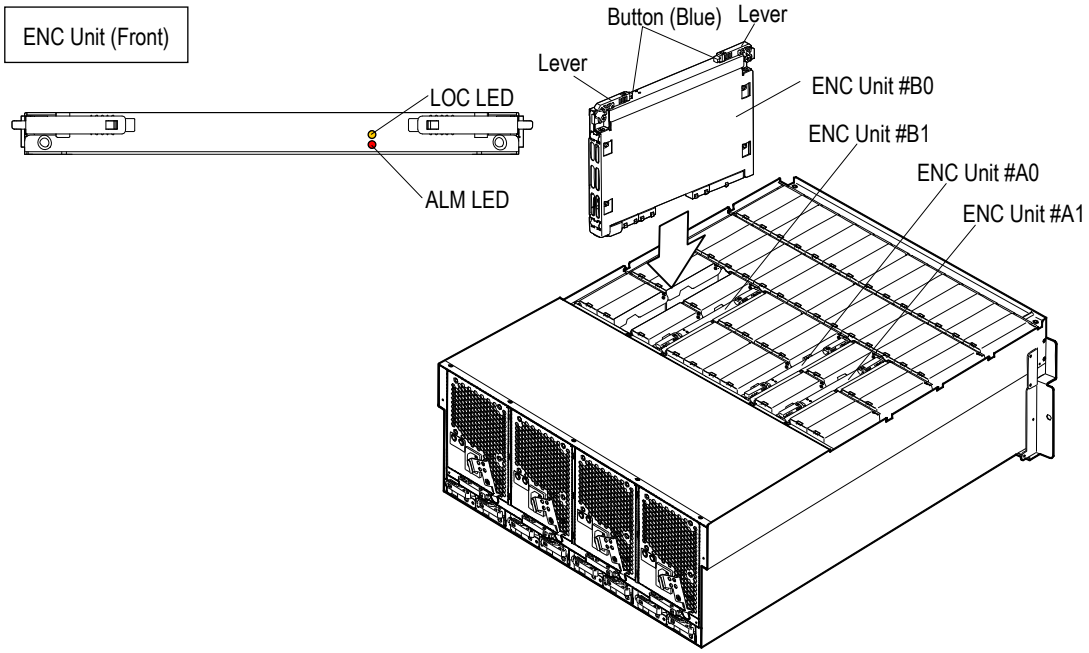


Figure 2.2.22.8 LED Locations of ENC Unit (RKAKX)

(2-2) Procedure for replacement with the power turned off
Replace the ENC cable referring to Figure 2.2.22.
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).).

(a) Turn off the main switch.
Make sure that the POWER LED (green) on the Front Bezel go off. If you cannot turn off the power, troubleshoot the failure by connecting to the WEB.

NOTE : If the power has already been turned off, check that Cache memory is not in the back-up state. (To check for the back-up state, refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
If the memory is still being backed up, first release it from the back-up state, and then replace the Control Unit.

In this case, check that the C-PWR LED (green) on Control Unit is extinguished.

NOTE : If the C-PWR LED (green) is lit, it may be that some of the Cache memory data has not been written into the disk. In this case, removing the Control Unit may cause a loss of user data.

(b) Remove the stopper on the rear side of the subsystem (Refer to Installation "2.5.8 (6) Attaching the stopper" (INST 02-1290)).
(c) Open the cable routing bar toward you.
(d) If the cable tray is attached, remove it (Refer to Installation "2.5.8 (5) Attaching the cable tray" (INST 02-1280)).
(e) Remove the repeat binder which fixes the power cables and ENC cables in the middle (Refer to Installation "2.5.8 (4) Fixing the cables in the middle" (INST 02-1270)).
(f) Remove the power cables (four) from the RKAKX to which the 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 "2.5.4 (2) Fixing the cable routing bars" (INST 02-1020)).
• 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 ENC cables and power cables.
When replacing the cable holder #A0/#A1, release the routing referring to Installation "2.5.8 (2) Routing of the cable routing bar#0" (INST 02-1240).
When replacing the cable holder #B0/#B1, release the routing referring to Installation "2.5.8 (3) Routing of the cable routing bar#1" (INST 02-1252).
(i) Open the lever toward you pressing the button (blue) which fixes the cable holder to which the ENC cable to be replaced is connected, and remove the cable holder.

(j) Loosen the screw (blue) which fixes the holder cover for a new cable holder, and remove it.
(k) Connect a new ENC cable to a new cable holder.

NOTE : Pull the 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 RKAKX.
Insert the cable holder into the RKAKX, and then close the lever completely until you hear the button (blue), which fixes the lever, click.

NOTE : Connect the cable holder to the correct connector (IN/OUT).

(n) Affix the cable label to the cable. (Refer to Installation "2.5.6 (3) Attaching cable labels" (INST 02-1210).)
(o) Connect the power cables (four) to the RKAKX whose ENC cable was replaced.
(p) Turn on the main switch (the subsystem usually recovers in about five minutes).
Make sure that the ALM LED (red) on the ENC unit goes out.
(q) Check that the READY LED (green) on the front of the Basic Chassis 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 RKH) 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 Basic Chassis 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 disk 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 01-0890)").
(s) Route the replaced ENC cable, and fix it with the repeat binder.
When replacing the cable holder #A0/#A1, release the routing referring to Installation "2.5.8 (2) Routing of the cable routing bar#0" (INST 02-1240).
When replacing the cable holder #B0/#B1, release the routing referring to Installation "2.5.8 (3) Routing of the cable routing bar#1" (INST 02-1252).
(t) Return the power cables and ENC cables to the original state, and fix them with the repeat binder in the middle. (Refer to Installation "2.5.8 (4) Fixing the cables in the middle" (INST 02-1270)).

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

(u) If the cable tray is removed, attach it (Refer to Installation "2.5.8 (5) Attaching the cable tray" (INST 02-1280)).

(v) Close the cable routing bar.

(w) Attach the stopper on the rear side of the subsystem (Refer to Installation "2.5.8 (6) Attaching the stopper" (INST 02-1290)).

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

(x) Pull out the subsystem and check that the routing is performed correctly (refer to Installation "2.5.8 (7) Checking Routing'" (INST 02-1290)).

(3) Replacing the ENC cable of the RKAKS

CAUTION

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 ENC Unit, the subsystem must be in the status shown below. • The firmware is not being performed. • The Control Unit 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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis 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 Basic Chassis usually goes out about 30 seconds later.	Refer to "(3-1) Procedure for replacement with the power turned on" (REP 02-1150)
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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis is blinking at high speed because the update of the flash program or the automatic download of the ENC 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 Basic Chassis 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 02-1153)

NOTE : • When bending the 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, W0400x or W3Tzxy) has occurred, recover the subsystem from the battery system failure before replacing the ENC cable.
• When UPS interlock is used, if you turn off the subsystem power other than the regular procedure in case of an ENC Unit failure, the power may not be turned on later. Turn off/on the output of the UPS, and then turn on the subsystem power. If you cannot turn off/on the UPS, remove the interlock cable between the UPS and the subsystem (it becomes the Waning status), and then turn off the subsystem power.

(3-1) Procedure for replacement with the power turned on
Replace the ENC cable referring to Figure 2.2.23.
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).).

(a) Among the ENC Units which are connected to the 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 ENC Unit of the one whose the subsystem Unit# is large.
When the lever is completely opened, the ENC Unit comes out forward.

NOTE : When opening the lever, perform the operation of the lever within one second.

(b) Remove the ENC cable to be replaced.
Remove the ENC cable while pulling the tab of the 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 ENC cable. (Refer to Installation "2.4.10 Connecting the ENC Cables" (INST 02-0700).)

(d) After waiting for 20 seconds or more, insert the ENC Units until its lever is slightly closed, and then close it completely until you hear the button (blue), which fixes the lever, click.
If the ENC Unit is inserted without waiting for 20 seconds or longer, it is possible that the ENC Unit 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 subsystem is not recovered from the failure nevertheless, replace the ENC Unit because the ENC Unit is considered to have failed.
• Do not catch an ENC cable, when the ENC Unit is inserted.

(e) Check that the ALM LED (red) on the ENC Unit is off(‡2).

(f) Check that the READY LED (green) on the front of the Basic Chassis is on and the ALARM LED (red) and WARNING LED (orange) goes out(‡3). The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH) before it lights up.

(g) Refer to "Information Message" on WEB, and check to see that [I00Be0 ENC recovered (Unit-x, ENC-y)] is indicated. (Refer to WEB "2.5 Information Message" (WEB 02-0110).)
When this is indicated, the replacement of ENC cable has completed.

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

‡2 : If the ENC Unit is removed and then inserted at the time between the execution and the completion of the spin-up of the priced option, Power Saving (until "I1GZ00 The spin up of disk drives completed" is displayed for the RAID Group that "I1GY00 The request of spin up of disk drives is accepted" is displayed in "Information Message" on WEB), the Red (ALARM) LED of the replaced ENC Unit may not be turned off.
After checking that the Disk Drives in which the spin-up command was executed were all spun up, remove the inserted ENC Unit from the chassis, and insert it again after 20 seconds or more passed.

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

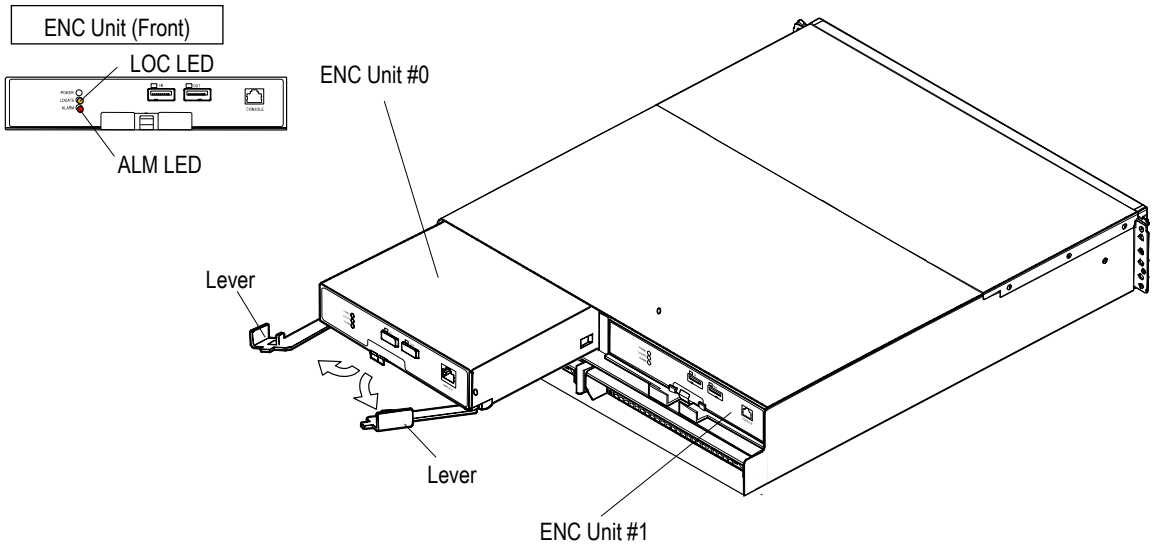


Figure 2.2.23 Locations of LEDs on the ENC Unit (RKAKS)

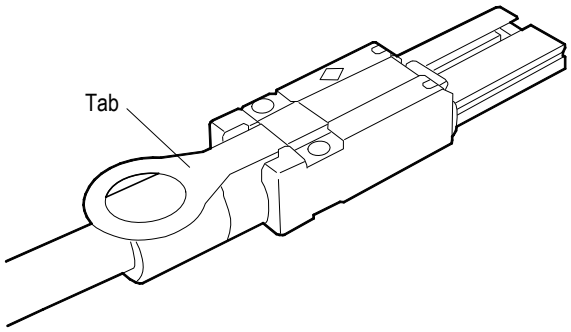


Figure 2.2.23.1 Locations of tab on the ENC cable

(3-2) Procedure for replacement with the power turned off
Replace the ENC cable referring to Figure 2.2.23.
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).).

(a) Turn off the main switch.
Make sure that the POWER LED (green) on the Front Bezel go off. If you cannot turn off the power, troubleshoot the failure by connecting to the WEB.

NOTE : If the power has already been turned off, check that Cache memory is not in the back-up state. (To check for the back-up state, refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
If the memory is still being backed up, first release it from the back-up state, and then replace the Control Unit.

In this case, check that the C-PWR LED (green) on Control Unit is extinguished.

NOTE : If the C-PWR LED (green) is lit, it may be that some of the Cache memory data has not been written into the disk. In this case, removing the Control Unit may cause a loss of user data.

(b) Among the ENC Units which are connected to the 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 ENC Unit of the one whose the subsystem Unit# is large.
When the lever is completely opened, the ENC Unit comes out forward.

(c) Remove the ENC cable to be replaced.
Remove the ENC cable while pulling the tab of the 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 ENC cable. (Refer to Installation "2.4.10 Connecting the ENC Cables" (INST 02-0700))

(e) Close it completely until you hear the button (blue), which fixes the lever, click.

NOTE : Do not catch a ENC cable, when the ENC Unit is inserted.

(f) Connect the power cables (two) to the RKAK whose ENC cable was replaced.

(g) Turn on the main switch (the subsystem usually recovers in about five minutes).
After doing this, make sure that the ALM LED (red) on the ENC Unit is not on.

(h) Check that the READY LED (green) on the front of the Basic Chassis 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 RKH) 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 Basic Chassis lights up.

(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 disk 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 01-0890)").

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

2.2.11 Replacing Basic Chassis of Rack Mount Style

Perform this work only when an instructed to do so is given by the Technical Support Center for coping with troubles.

⚠ CAUTION

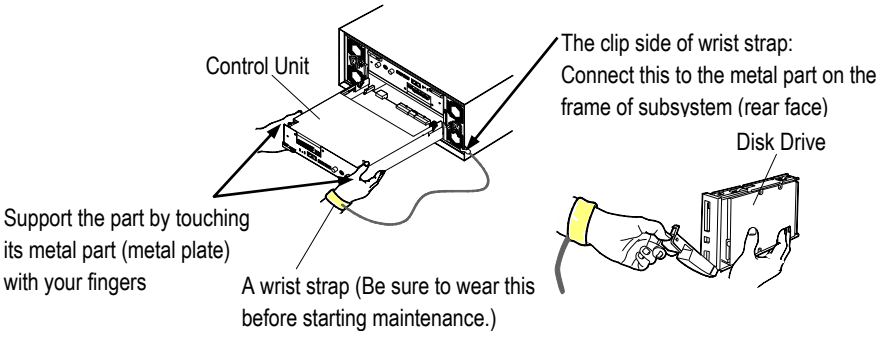
Be sure to perform the operation with two or more workers.

CAUTION

- **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.**
- **When you install a Disk Drive or Control Unit, 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 Disk Drive and Control Unit is precision instrument. Be sure to put on the wrist strap before starting work in order to protect Disk Drive and Control Unit 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 Disk Drive or Control Unit into the subsystem, support the Disk Drive or Control Unit as touching its metal part with fingers of your hand that wears a wrist strap.



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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis is blinking at high speed because the update of the flash program or the automatic download of the ENC 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 Basic Chassis 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 02-1180)

(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 ④ Collection of errors" (MSG 01-0000).).

NOTE : • When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
When the cache is in the cache backup mode, make the replacement after canceling the mode.
• Write down the serial number of the subsystem before the replacement.
Write down the same serial number as the removed subsystem in the new subsystem.

(a) Turn off the main switch. (The POWER LED goes out.)
Make sure that the POWER LED (green) on the Front Bezel goes out. If the power cannot be turned off, have the Web be connected and find out a cause of the trouble

NOTE : If the power has already been turned off, check that Cache memory is not in the back-up state. (To check for the back-up state, refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
If the memory is still being backed up, first release it from the back-up state, and then replace the Control Unit.

In this case, check that the C-PWR LED (green) on Control Unit is extinguished.

NOTE : If the C-PWR LED (green) is lit, it may be that some of the Cache memory data has not been written into the disk. In this case, removing the Control Unit may cause a loss of user data.

(b) Remove the Front Bezel. (Refer to Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door of the Subsystem" (INST 01-0100).)
(c) Remove all the cables connected to the components (Control Unit, and Power Unit).

NOTE : When the cable cannot be removed easily, do not pull it by force.
Pull out the Control Unit 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 (Disk Drives, Cache Backup Battery, FAN Unit, Control Unit, Power Unit, and ENC Unit) referring to each removal procedure of them.
Affix labels bearing HDD numbers on the removed Disk Drives and put the drives in the box for temporary storage arranging them in the same order as they were installed in the subsystem.
The Disk Drive is not installed in RKH.

(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 02-0400) in the for Installation.

(f) Reinstall the parts. (Refer to "2.2 Replacement of Components" (REP 02-0030).)
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 subsystem usually recovers in about five minutes).

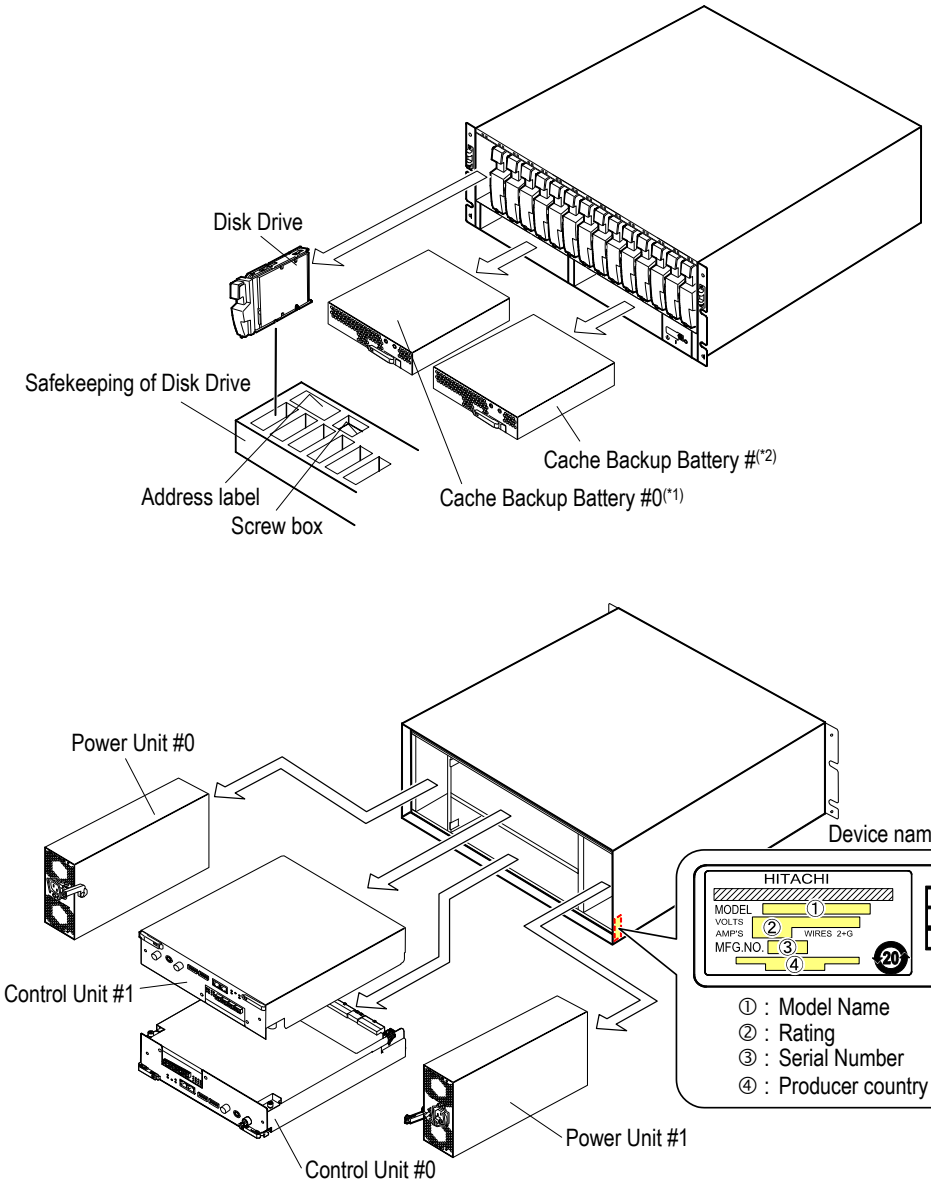
(i) Check that the READY LED (green) on the front of the Basic Chassis lights up, and the ALARM LED (red) and the WARNING LED (orange) go out(‡1). The READY LED (green) may blink at high speed (for the maximum of 30 to 50 minutes, or 40 to 60 minutes in case of the RKH) or the WARNING LED (orange) may blink at high speed (for the maximum of 30 to 85 minutes) before the READY LED (green) on the front of the Basic Chassis 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 disk 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 01-0890)").

(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.

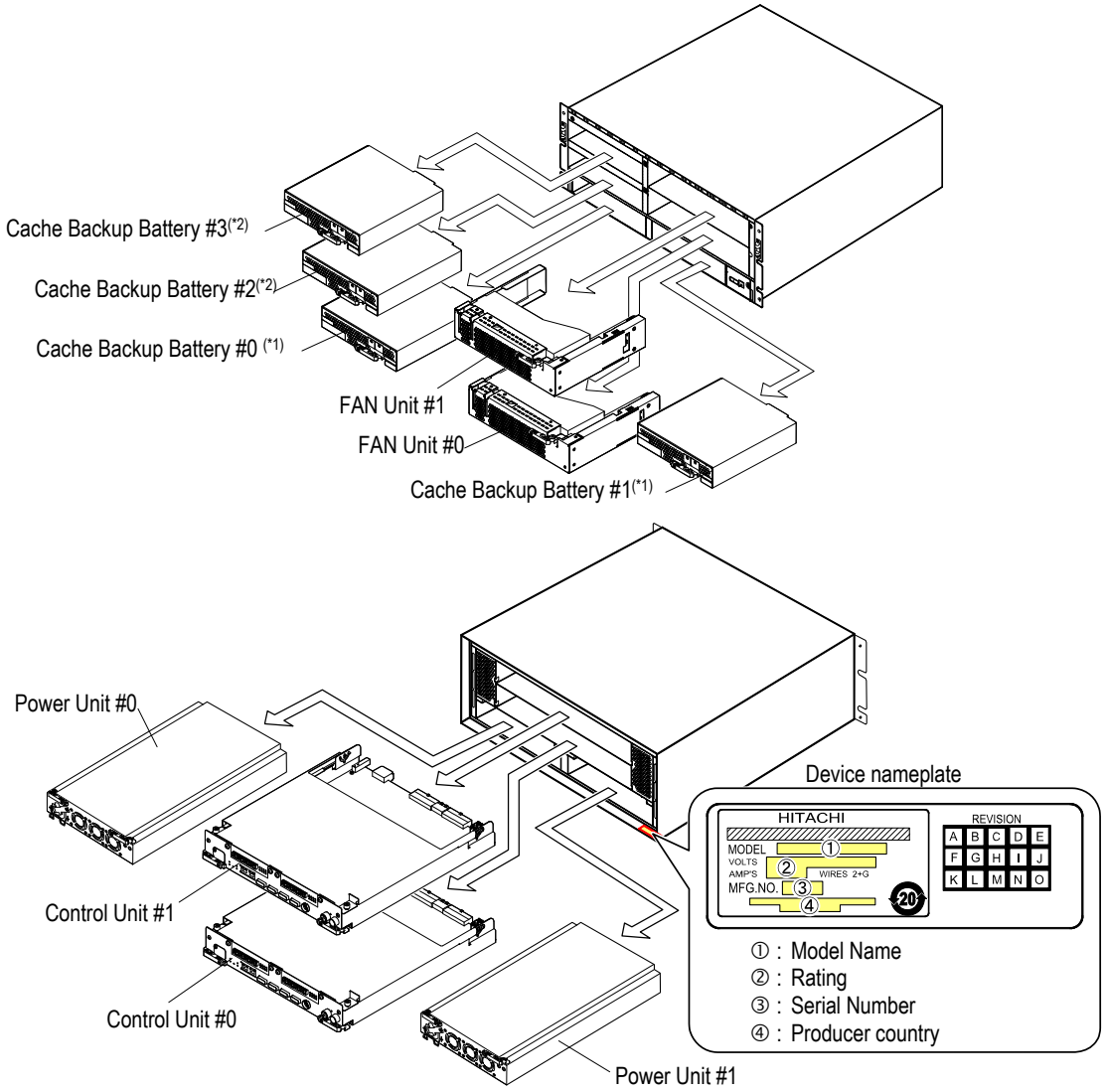
(l) Attach the Front Bezel.

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.



*1 : Only one Cache Backup Battery is installed in the RKM/RKS in standard.
*2 : This Cache Backup Battery is option.
*3 : The figure shows RKM.

Figure 2.2.24 Replacing Basic Chassis of Rack Mount Style (RKM/RKS)



*1 : The battery unit installed in RKH is installed in # 0 and # 1 by the standard.

*2 : This Cache Backup Battery is option.

Figure 2.2.25 Replacing Basic Chassis of Rack Mount Style (RKH)

2.2.12 Replacing Additional Chassis of Rack Mount Style

Perform this work only when an instructed to do so is given by the Technical Support Center for coping with troubles.

⚠ CAUTION

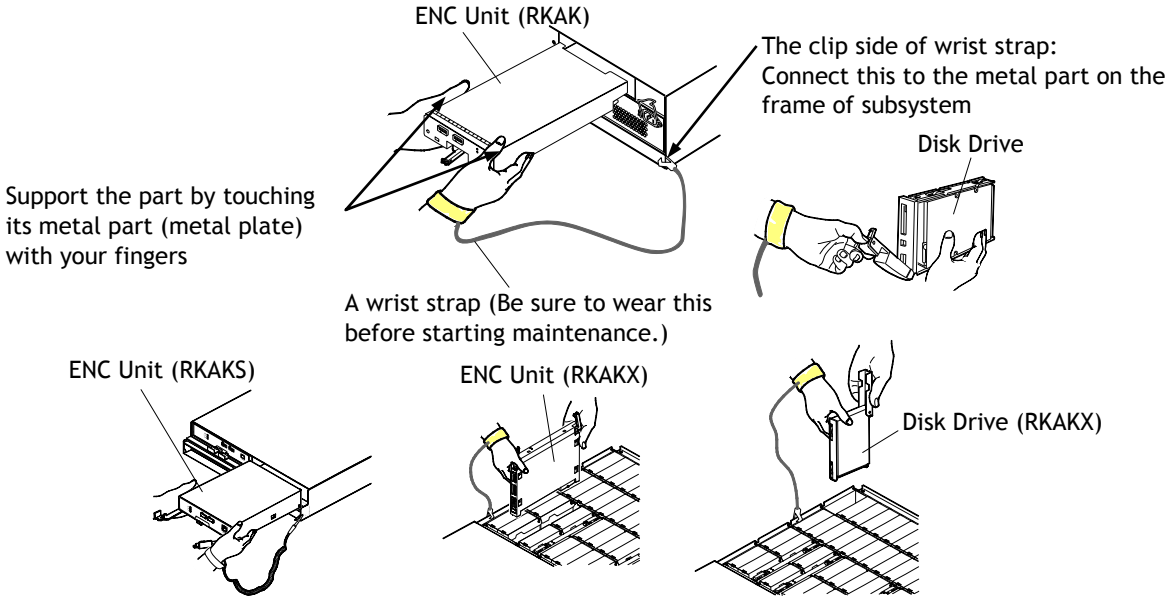
- **Be sure to perform the operation with two or more workers.**
- **Do not pull out multiple RKAKXs at a time because the rack can fall over.**
- **Do not put objects on the RKAKX which has been pulled out of the rack or use it as working space because the rack can fall over.**

CAUTION

- **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.**
- **When you install a Disk Drive or ENC Unit, 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 Disk Drive and ENC Unit is precision instrument. Be sure to put on the wrist strap before starting work in order to protect Disk Drive and ENC Unit 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 Disk Drive and ENC Unit into the subsystem, support the Disk Drive and ENC Unit as touching its metal part with fingers of your hand that wears a wrist strap.



NOTE : • When removing the Disk Drive to the RKAKX, 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 (7) Installing the stabilizer" (INST 02-0090).)
• Do not pull out multiple RKAKXs at a time because the rack can fall over.

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 Basic Chassis is blinking at high speed because the automatic download of the ENC 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 Basic Chassis is blinking at high speed because the update of the flash program or the automatic download of the ENC 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 Basic Chassis 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 02-1230)

(1) Procedure for replacement with the power turned off

(1-1) Replacing the RKAK

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).).

NOTE : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
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.)
Make sure that the POWER LED (green) on the Front Bezel go off. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the power has already been turned off, check that Cache memory is not in the back-up state. (To check for the back-up state, refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
If the memory is still being backed up, first release it from the back-up state, and then replace the Control Unit.

In this case, check that the C-PWR LED (green) on Control Unit is extinguished.

NOTE : If the C-PWR LED (green) is lit, it may be that some of the Cache memory data has not been written into the disk. In this case, removing the Control Unit may cause a loss of user data.

(b) Remove the Front Bezel. (Refer to Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door of the Subsystem" (INST 01-0100).)
(c) Remove all the cables connected to the components (Control Unit, Power Unit, and ENC Unit).

NOTE : When the cable cannot be removed easily, do not pull it by force.
Pull out the Control Unit, Power Unit, and ENC 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 (Disk Drives, Power Unit, and ENC Unit) referring to each removal procedure of them.
Affix labels bearing HDD numbers on the removed Disk Drives and put the drives in the box for temporary storage arranging them in the same order as they were installed in the subsystem.
(e) Remove the frame and replace it with a new one. (The weight of the frame whose each part has been removed is 13 kg.)
Refer to Installation "2.4.3 Mounting on Rack Frame" (INST 02-0400) in the Maintenance Manual for Installation.
(f) Install all the removed parts in the same positions as before in the new chassis. (Refer to "2.2 Replacement of Components" (REP 02-0030).)
(g) Return all the removed cables as they were before.
(h) Turn on the main switch (the subsystem usually recovers in about five minutes).
(i) Check that the READY LED (green) on the front of the Basic Chassis 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 RKH) 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 Basic Chassis 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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem 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 disk 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 01-0890)").

(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.

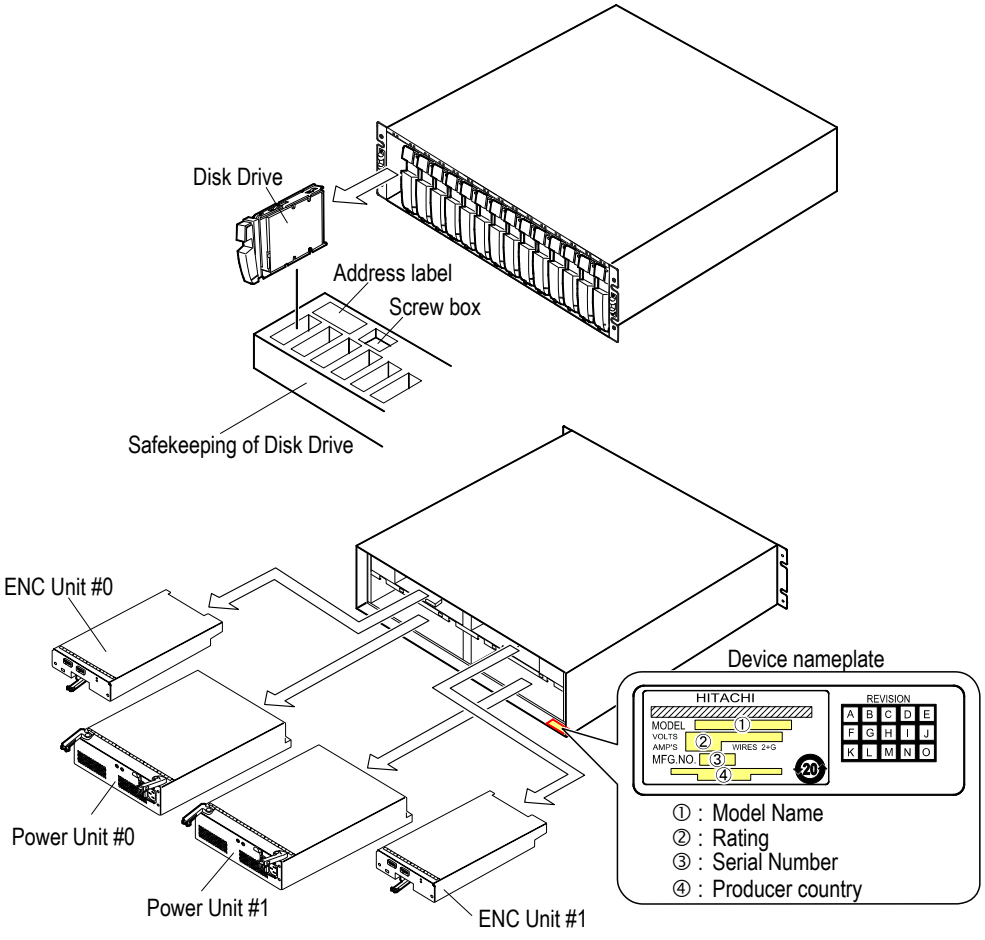


Figure 2.2.26 Replacing Additional Chassis of Rack Mount Style (RKAK)

(1-2) Replacing the RKAKX

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).).

NOTE : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
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.)

Make sure that the POWER LED (green) on the Front Bezel go off. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the power has already been turned off, check that Cache memory is not in the back-up state. (To check for the back-up state, refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
If the memory is still being backed up, first release it from the back-up state, and then replace the Control Unit.

In this case, check that the C-PWR LED (green) on Control Unit is extinguished.

NOTE : If the C-PWR LED (green) is lit, it may be that some of the Cache memory data has not been written into the disk. In this case, removing the Control Unit may cause a loss of user data.

(b) Remove the cables and other parts on the rear side of the subsystem.

(i) Remove the stopper on the rear side of the subsystem (Refer to Installation "2.5.8 (6) Attaching the stopper" (INST 02-1290)).

(ii) Open the cable routing bar toward you.

(iii) If the cable tray is attached, remove it (Refer to Installation "2.5.8 (5) Attaching the cable tray" (INST 02-1280)).

(iv) Release the routing of the ENC cables and power cables. (Refer to Installation "2.5.8 Routing the Cables" (INST 02-1240))

(v) Remove all the power cables connected to the RKAKX.

NOTE : When the cable cannot be removed easily, do not pull it by force.

(vi) Remove all the cable holders connected to the RKAKX to be replaced referring to the procedures for replacing the ENC cable.

(vii) Remove the cable routing bar. (Refer to Installation "2.5.4 Installing the Cables Routing Bars" (INST 02-1020))

(c) Remove all the Power Units connected to the RKAKX to be replaced referring to the procedures for replacing the Power Unit.

(d) Pull the RKAKX out of the rack, and remove the top cover. (Refer to Installation "1.4.1 How to Attach/Remove Front Bezel of the Rackmount Model" (INST 01-0100).)

(e) Remove all the Disk Drives and ENC units installed in the RKAKX to be replaced referring to each removal procedure of them.
Put the removed Disk Drives in the box for temporary storage arranging them in the same Disk Drive numbering order as they were installed in the subsystem.

(f) Remove the frame from the rack. (Refer to Installation "2.5.2 (2) Installing the RKAKX" (INST 02-0940).)

(g) Install the inners in a new frame. (Refer to Installation "2.5.2 (1) (a) Installing the Inners" (INST 02-0920).)

(h) Remove the rack rails from the rack and install new ones in the rack. (Refer to Installation "2.5.2 (1) (b) Installing the rails" (INST 02-0930).)

(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 "2.5.2 (2) Installing the RKAKX" (INST 02-0940) in the Maintenance Manual for Installation.

(j) Install all the removed Disk Drives and ENC Units in the same positions as before in the new chassis. (Refer to "2.2 Replacement of Components" (REP 02-0030).)

(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 RKAKX, and return the RKAKX into the rack. (Refer to Installation "1.4.1 How to Attach/Remove Front Bezel of the Rackmount Model" (INST 01-0100).)

NOTE : Do not drop a screw and such in the subsystem.
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 Replacement of Components" (REP 02-0030).)

(n) Connect the cables on the rear side of the subsystem, 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 Replacement of Components" (REP 02-0030).)

(ii) Connect all the removed power cables in the same positions as before in the new chassis. (Refer to "2.2 Replacement of Components" (REP 02-0030).)

(iii) Install the cable routing bar. (Refer to "2.5.4 Installing the Cables Routing Bars" (REP 02-1020).)

(iv) If the cable tray is removed, attach it (Refer to Installation "2.5.8 (5) Attaching the cable tray" (INST 02-1280)).

(v) Route the power cables and the ENC cables, and attach the stopper. (Refer to "2.5.8 Routing the Cables" (REP 02-1240).)

(o) Turn on the main switch (the subsystem usually recovers in about five minutes).

(p) Check that the READY LED (green) on the front of the Basic Chassis 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 RKH) 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 Basic Chassis 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 disk 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 01-0890)").

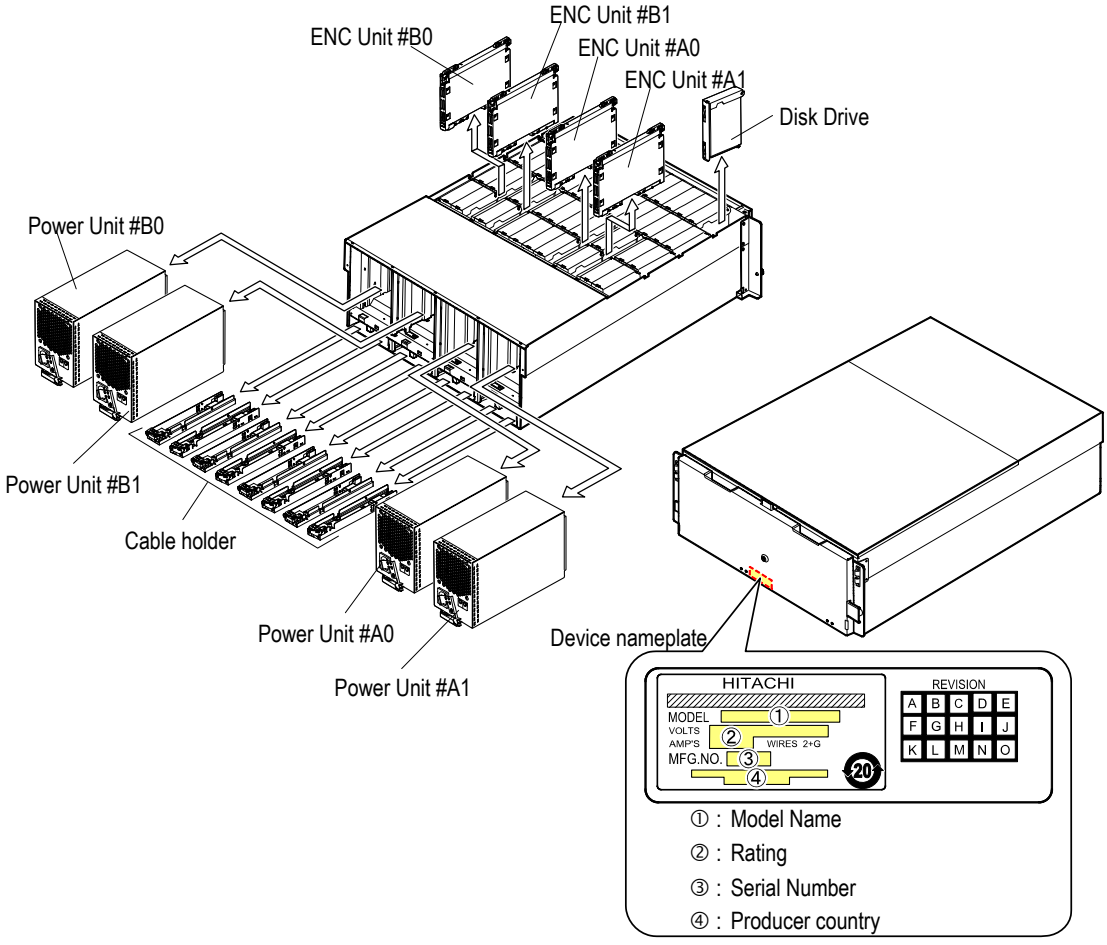


Figure 2.2.26.1 Replacing Additional Chassis of Rack Mount Style (RKAKX)

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

(1-3) Replacing the RKAKS

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).).

NOTE : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
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.)
Make sure that the POWER LED (green) on the Front Bezel go off. If you cannot turn off the power, troubleshoot the failure by connecting to the Web.

NOTE : If the power has already been turned off, check that Cache memory is not in the back-up state. (To check for the back-up state, refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)
If the memory is still being backed up, first release it from the back-up state, and then replace the Control Unit.

In this case, check that the C-PWR LED (green) on Control Unit is extinguished.

NOTE : If the C-PWR LED (green) is lit, it may be that some of the Cache memory data has not been written into the disk. In this case, removing the Control Unit may cause a loss of user data.

(b) Remove the Front Bezel. (Refer to Installation "1.4 How to Open/Close Door or Attach/Remove Front Bezel/Rear Door of the Subsystem" (INST 01-0100).)

(c) Remove all the cables connected to the components (Control Unit, Power Unit, and ENC Unit).

NOTE : When the cable cannot be removed easily, do not pull it by force.
Pull out the Control Unit, Power Unit, and ENC 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 (Disk Drives, Power Unit, and ENC Unit) referring to each removal procedure of them.
Affix the HDD number labels the on the removed Disk Drives and put the drives in the box for temporary storage arranging them in the same order as they were installed in the subsystem.

(e) Remove the frame and replace it with a new one. (The weight of the frame whose each part has been removed is 13 kg.)
Refer to Installation "2.4.3 Mounting on Rack Frame" (INST 02-0400) in the Maintenance Manual for Installation.

(f) Install all the removed parts in the same positions as before in the new chassis. (Refer to "2.2 Replacement of Components" (REP 02-0030).)

(g) Return all the removed cables as they were before.
(h) Turn on the main switch (the subsystem usually recovers in about five minutes).
(i) Check that the READY LED (green) on the front of the Basic Chassis 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 RKH) 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 Basic Chassis 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 disk 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 01-0890)").
(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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

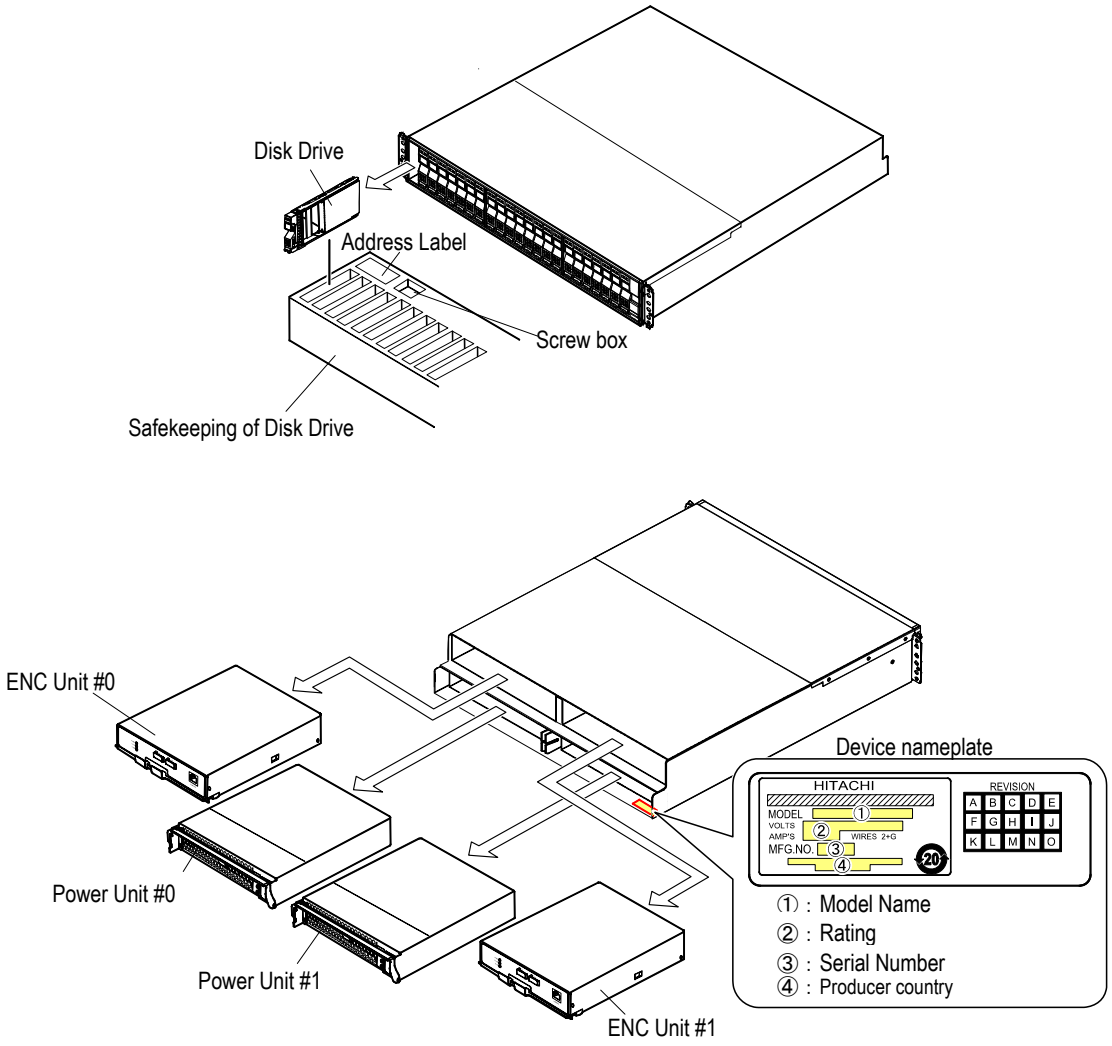


Figure 2.2.26.2 Replacing Additional Chassis of Rack Mount Style (RKAKS)

2.2.13 Replacing Remote Adapter

Select a procedure from the following and execute it.

No.	Power status during the replacement	Restriction	Reference section
1	One Remote Adapter	The replacement cannot be done in the state in which the subsystem power is on.	See "(1) Replacement procedure with the one Remote Adapter" (REP 02-1260).
2	When the Remote Adapter is duplicated.	If both of the two Remote Adapters are required to be replaced, be sure to replace them one by one, or replace them in the state in which the subsystem power is turned off.	See "(2) Replacement procedure to be used when the Remote Adapter is duplicated" (REP 02-1270).

(1) Replacement procedure with the one Remote Adapter

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).).

(a) Turn off the main switch of the subsystem connected to the Remote Adapter to be replaced.

NOTE : Make sure that the subsystem is not in the Cache Backup mode. (Refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).) When the subsystem is in the Cache Backup mode, perform the replacement after canceling the mode.

(b) Remove all the remote and power cables from the Remote adapter.

(c) Replacing the new Remote Adapter

(d) Connect the removed remote cable and power cable.

(e) Turn on the main switch.

(f) Make sure that the following LEDs on the Remote Adapter are on.

- POWER LED
- LEDs for the connectors among the J100 to J105 to which the remote cables are connected.

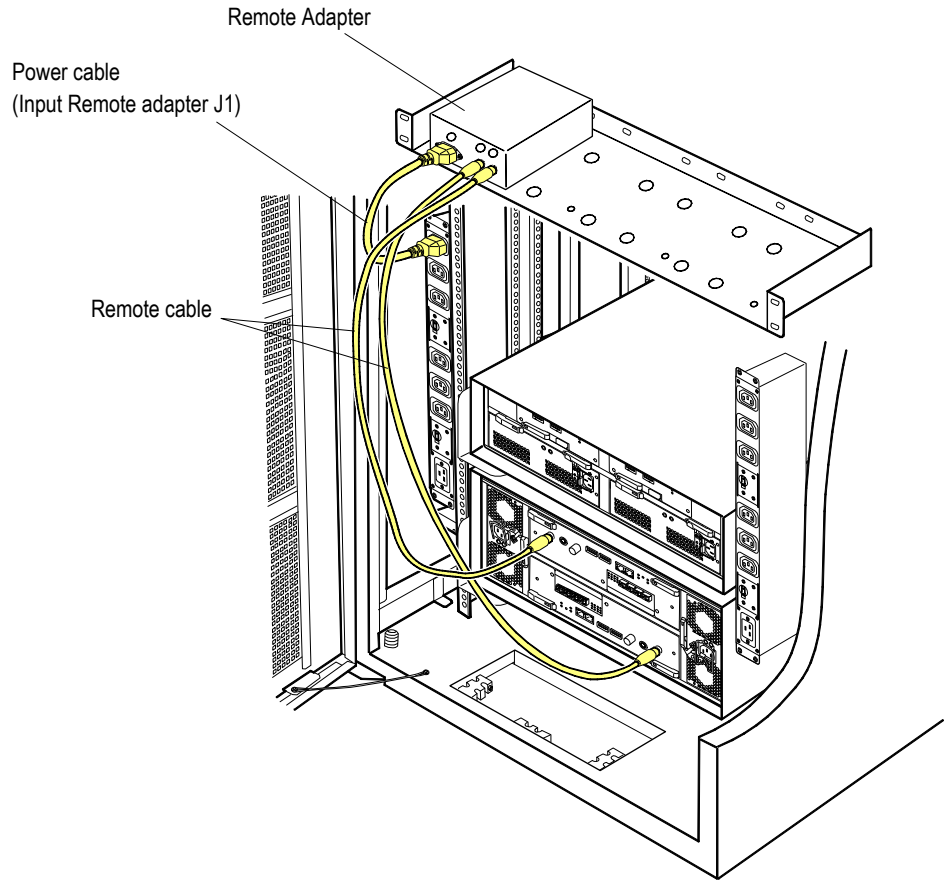


Figure 2.2.27 Replacing Remote Adapter

(2) Replacement procedure to be used when the Remote Adapter is duplicated

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).).

(a) Make sure that all the LEDs of the Remote Adapter not to be replaced are on.

(b) Remove the remote and power cables from the Remote Adapter to be replaced.

(c) Replacing the new Remote Adapter

(d) Connect the removed remote cable and power cable.

(e) Make sure that the following LEDs on the Remote Adapter are on.

- POWER LED
- LEDs for the connectors among the J100 to J105 to which the remote cables are connected.

2.2.14 Replacing an Additional Battery Box

Additional Battery Box has AC power supply model (DF-F800-N1RK) and DC power supply model (DF-F800-N1RKD). The replacement procedure varies on each model.
Take care not to mistake the type name of components.

(1) Replacing the AC power supply model (DF-F800-N1RK)

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 disk is not backed up because the power is not supplied from the battery.	Refer to "(1-1) Procedure for replacement with the power turned on " (REP 02-1281).
2	Replacement with the power turned off	—	Refer to "(1-2) Procedure for replacement with the power turned off " (REP 02-1283).

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 subsystem 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

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).).

(a) Remove the special cables and power cables from the Additional Battery Box that ALM LED is on.

NOTE : Remove the cable for the Additional Battery Box by inserting the connector into the Additional Battery Box side completely and pressing the latch of the connector.

(b) Remove the Front Bezel from the replacing the Additional Battery Box.

(c) Remove two Binding screws (one each at left and right) on the front side fixing the Additional Battery Box.

(d) Loosen the Binding screws or Bind screw with washer (two each at left and right) on the rear side fixing the Additional Battery Box.

(e) Pull out and remove the Additional Battery Box from the front side.

(f) Install the Additional Battery Box from the front side so that the outlet opening aims at the rear side of the subsystem.

(g) Fix the front part of the Additional Battery Box with two Binding screws (one place each at left and right).

(h) Fix the rear part of the Additional Battery Box with two Stoppers (one place each at left and right) and four Binding screws or Bind screw with washer (two places each at left and right).

NOTE : Shift each of the two Stoppers in the direction shown by the arrow and make it contact the frame.

(i) Attach the Front Bezel to the front frame.

(j) Connect the removed special cables and power cables.

(k) Charge the battery after the RDY LED (green) on the Additional Battery Box blinks until it changes to lighting. (Although the RDY LED (green) on the Additional Battery Box blinks during the charge, it changes to lighting when the charge is completed. It is about 24 hours at the maximum.)

(l) Check that the RDY LED (green) on the Additional Battery Box is on.

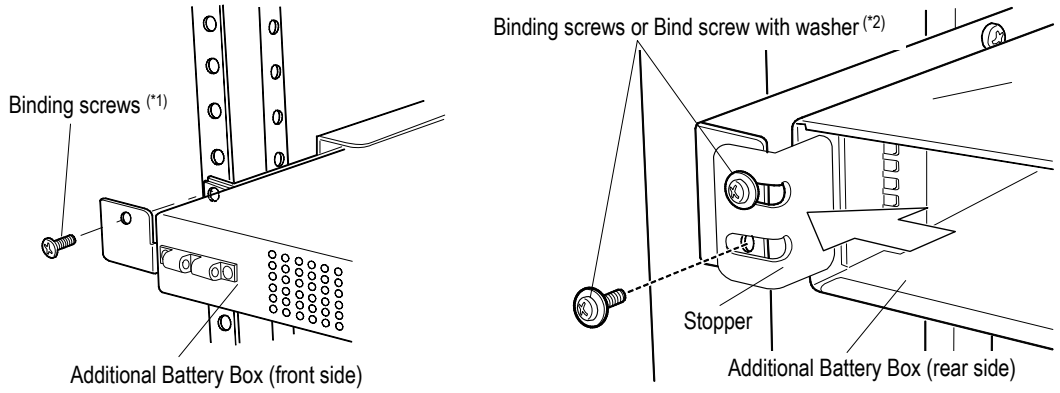
Check that the READY LED (green) on the front of the Basic Chassis is on and the ALARM LED (red) and WARNING LED (orange) are off(‡1).

The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 40 to 60 minutes).

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

(m) Refer to "Information Message" on WEB, and check to see that [I041xy Battery recovered (Additional Battery-y)] is indicated. (Refer to WEB "2.5 Information Message" (WEB 02-0110).) When this is indicated, the replacement of Additional Battery Box has completed.

(n) Dispose of recycling the Additional Battery Box in the removed Additional Battery Box. For recycling, refer to "Chapter 5. Recycling" (REP 05-0000).



*1 When securing the RK40 rack frame, use the Bind screw (M5×10).
When securing the HP Rack Frame or the Sun StorEdge Rack Frame or the RS6000 rack frame, use the Bind screw (M5×8).

*2 When securing the RK40 rack frame, use the Bind screw with washer (M3×10).
When securing the HP Rack Frame or the Sun StorEdge Rack Frame or the RS6000 rack frame, use the Bind screw (M3×6).

Figure 2.2.28 Fixing the Front/Rear Part of the Additional Battery Box

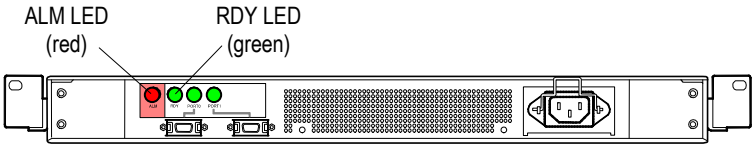


Figure 2.2.29 Position of the LED on the Additional Battery Box (DF-F800-N1RK)

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

Check the state of Device main switch at first.

- When main switch is on, work from procedure (a).
- When main switch is off, work from procedure (e).

(a) 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).).

(b) Turn off the main switch

(c) Check to see that PWR LED (green) on the Front Bezel of the Basic Chassis turns off (POWER OFF). If it does not go POWER OFF, connect the Maintenance PC to WEB (Refer to Troubleshooting "Chapter 3. Before Starting WEB Connection" (TRBL 03-0000).), and analyze the cause of failure.

(d) After turning off the main switch, check to see that C-PWR LED (green) on the Controller is off.

NOTE : If the C-PWR LED (green) is lit, it may be that some of the Cache memory data has not been written into the disk. In this case, removing the Control Unit may cause a loss of user data.
If the power has already been turned off, check that Cache memory is not in the back-up state. (To check for the back-up state, refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)

(e) Remove the special cables and power cables from the Additional Battery Box that ALM LED is on.

NOTE : Remove the cable for the Additional Battery Box by inserting the connector into the Additional Battery Box side completely and pressing the latch of the connector.

(f) Remove the Front Bezel from the replacing the Additional Battery Box.

(g) Remove two Binding screws (one each at left and right) on the front side fixing the Additional Battery Box.

(h) Loosen the Binding screws or Bind screw with washer (two each at left and right) on the rear side fixing the Additional Battery Box.

(i) Pull out and remove the Additional Battery Box from the front side.

(j) Install the Additional Battery Box from the front side so that the outlet opening aims at the rear side of the subsystem.

(k) Fix the front part of the Additional Battery Box with two Binding screws (one place each at left and right).

(l) Fix the rear part of the Additional Battery Box with two Stoppers (one place each at left and right) and four Binding screws or Bind screw with washer (two places each at left and right).

NOTE : Shift each of the two Stoppers in the direction shown by the arrow and make it contact the frame.

(m) Attach the Front Bezel to the front frame.
(n) Connect the removed special cables and power cables.
(o) Turn on the main switch (the subsystem usually recovers in about five minutes).
(p) Charge the battery after the RDY LED (green) on the Additional Battery Box blinks until it changes to lighting. (Although the RDY LED (green) on the Additional Battery Box blinks during the charge, it changes to lighting when the charge is completed. It is about 24 hours at the maximum.)
(q) Check that the RDY LED (green) on Additional Battery Box is on.
(r) Check that the READY LED (green) on the front of the Basic Chassis 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) 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 Basic Chassis lights up.
(s) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the disk 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 01-0890)").
(t) Recycle the removed Additional Battery Box. For the recycling procedure, refer to "Chapter 5. Recycling" (REP 05-0000).

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

(2) Replacing the DC power supply model (DF-F800-N1RKD)

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 disk is not backed up because the power is not supplied from the battery.	Refer to "(2-1) Procedure for replacement with the power turned on " (REP 02-1300).
2	Replacement with the power turned off	—	Refer to "(2-2) Procedure for replacement with the power turned off " (REP 02-1330).

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 subsystem 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

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).).

(a) Remove the special cables and power cables from the Additional Battery Box that ALM LED is on.

NOTE : Remove the cable for the Additional Battery Box by inserting the connector into the Additional Battery Box side completely and pressing the latch of the connector.

(b) Remove the power cables.

(i) Turn off the Power Unit Switch on the Additional Battery Box to be replaced.

(ii) Ask the customer to turn off the input power connected to the Power Unit to be replaced.

(iii) Measure the terminal with a tester, and verify that the power is not supplied (0 V).

(iv) Record the relation of terminals and cable connection (The location of FG and positive and negative terminals, and the color of cables).

(v) After waiting for one minute or longer, remove the terminal block cover of the Power Unit to be replaced.

(vi) Remove the cable connected to the plus and minus power input terminals on the terminal block.

(vii) Remove the FG cable from the frame ground (FG).

(c) Remove the Front Bezel of the slot which installs the Additional Battery Box.

(d) Remove two Binding screws (one each at left and right) on the front side fixing the Additional Battery Box.

(e) Loosen the Binding screws or Bind screw with washer (two each at left and right) on the rear side fixing the Additional Battery Box.

(f) Pull out and remove the Additional Battery Box from the front side.

(g) Install the Additional Battery Box from the front side so that the outlet opening aims at the rear side of the subsystem.

(h) Fix the front part of the Additional Battery Box with two Binding screws (one place each at left and right).

(i) Fix the rear part of the Additional Battery Box with two Stoppers (one place each at left and right) and four Binding screws or Bind screw with washer (two places each at left and right).

NOTE : Shift each of the two Stoppers in the direction shown by the arrow and make it contact the frame.

(j) Attach the Front Bezel to the front frame.

(k) Connect the removed special cables.

(l) Connect the power cables.

⚠ CAUTION

- **This subsystem shall be connected directly to the d.c. supply system earthing electrode conductor or to a bonding jumper from an earthing terminal bar or bus to which the d.c. supply system earthing electrode conductor is connected.**
- **This subsystem shall be located in the same immediate area (such as, adjacent cabinets) as any other subsystem that has a connection between the earthed conductor of the same d.c. supply circuit and the earthing conductor, and also the point of earthing of the d.c. system. The d.c. system shall not be earthed elsewhere.**
- **The d.c. supply source is to be located within the same premises as this subsystem.**
- **Switching or disconnecting devices shall not be in the earthed circuit conductor between the d.c. source and the point of the connection of the earthing electrode conductor.**

(i) Connect the FG cable to the frame ground (FG).
(ii) Connect the cable to the plus and minus power input terminals on the terminal block. When doing this, take care not to confuse the plus and minus terminals.
(iii) Reinstall the cover of the terminal block.
(iv) Ask the customer to turn on the input power.
(v) Turn on the Power Unit Switches (breaker) of the installed Additional Battery Box. Check that the READY LED (green) of the Additional Battery Box blinks.

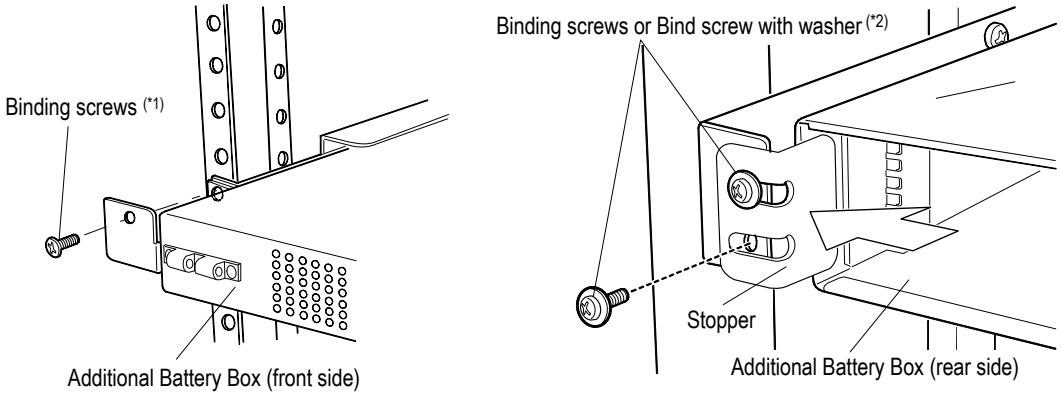
(m) Charge the battery after the RDY LED (green) on the Additional Battery Box blinks until it changes to lighting. (Although the RDY LED (green) on the Additional Battery Box blinks during the charge, it changes to lighting when the charge is completed. It is about 24 hours at the maximum.)

(n) Check that the RDY LED (green) on the Additional Battery Box is on.
Check that the READY LED (green) on the front of the Basic Chassis is on and the ALARM LED (red) and WARNING LED (orange) are off(‡1).
The READY LED (green) on the front of the Basic Chassis may blink at high speed (for the maximum of 40 to 60 minutes).

(o) Refer to "Information Message" on WEB, and check to see that [I041xy Battery recovered (Additional Battery-y)] is indicated. (Refer to WEB "2.5 Information Message" (WEB 02-0110).) When this is indicated, the replacement of Cache Backup Battery has completed.

(p) Dispose of recycling the battery in the removed Cache Backup Battery. For recycling, refer to "Chapter 5. Recycling" (REP 05-0000).

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.



*1 When securing the RK40 rack frame, use the Bind screw (M5×10).
When securing the HP Rack Frame or the Sun StorEdge Rack Frame or the RS6000 rack frame, use the Bind screw (M5×8).

*2 When securing the RK40 rack frame, use the Bind screw with washer (M3×10).
When securing the HP Rack Frame or the Sun StorEdge Rack Frame or the RS6000 rack frame, use the Bind screw (M3×6).

Figure 2.2.29.1 Fixing the Front/Rear Part of the Additional Battery Box (Rack Mount Model)

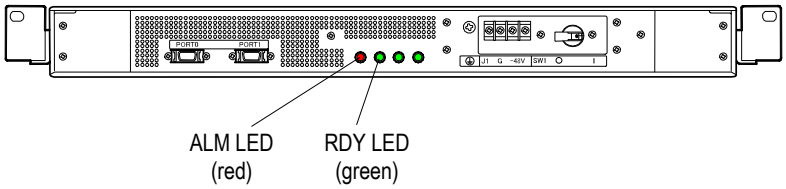


Figure 2.2.29.2 Position of the LED on the Additional Battery Box (DF-F800-N1RKD)

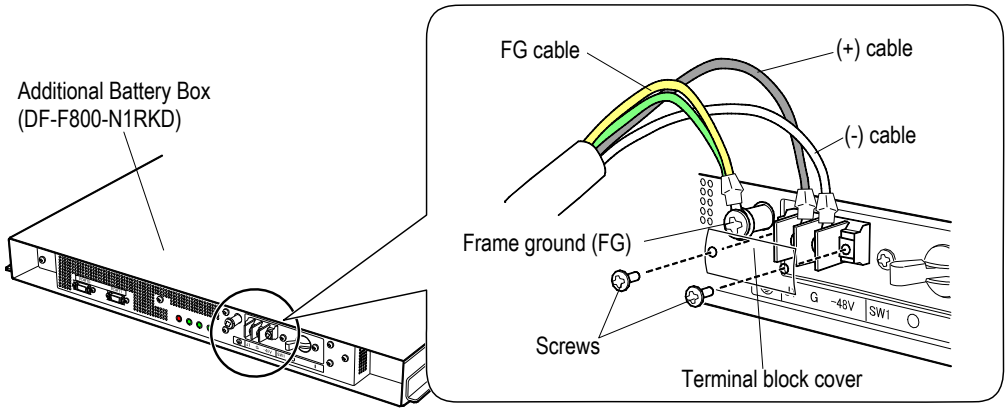


Figure 2.2.29.3 Power Cable Connection

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

Check the state of Device main switch at first.

- When main switch is on, work from procedure (a).
- When main switch is off, work from procedure (e).

(a) 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).).

(b) Turn off the main switch

(c) Check to see that PWR LED (green) on the Front Bezel of the Basic Chassis turns off (POWER OFF).
If it does not go POWER OFF, connect the Maintenance PC to WEB (Refer to Troubleshooting "Chapter 3. Before Starting WEB Connection" (TRBL 03-0000).), and analyze the cause of failure.

(d) After turning off the main switch, check to see that C-PWR LED (green) on the Controller is off.

NOTE : If the C-PWR LED (green) is lit, it may be that some of the Cache memory data has not been written into the disk. In this case, removing the Control Unit may cause a loss of user data.
If the power has already been turned off, check that Cache memory is not in the back-up state. (To check for the back-up state, refer to "1.1.2 Checking Cache Memory in the Back-up State" (REP 01-0040).)

(e) Remove the special cables from the Additional Battery Box that ALM LED is on.

NOTE : Remove the cable for the Additional Battery Box by inserting the connector into the Additional Battery Box side completely and pressing the latch of the connector.

(f) Remove the power cables.
(i) Ask to turn off the input power connected to the Power Unit to be replaced.
(ii) Measure the terminal with a tester, and verify that the power is not supplied (0 V).
(iii) Record the relation of terminals and cable connection (The location of FG and positive and negative terminals, and the color of cables).
(iv) After waiting for one minute or longer, remove the terminal block cover of the Power Unit to be replaced.
(v) Remove the cable connected to the plus and minus power input terminals on the terminal block.
(vi) Remove the FG cable from the frame ground (FG).

(g) Remove the Front Bezel of the slot which installs the Additional Battery Box.

(h) Remove two Binding screws (one each at left and right) on the front side fixing the Additional Battery Box.

(i) Loosen the Binding screws or Bind screw with washer (two each at left and right) on the rear side fixing the Additional Battery Box.

(j) Pull out and remove the Additional Battery Box from the front side.

(k) Install the Additional Battery Box from the front side so that the outlet opening aims at the rear side of the subsystem.
(l) Fix the front part of the Additional Battery Box with two Binding screws (one place each at left and right).
(m) Fix the rear part of the Additional Battery Box with two Stoppers (one place each at left and right) and four Binding screws or Bind screw with washer (two places each at left and right).

NOTE : Shift each of the two Stoppers in the direction shown by the arrow and make it contact the frame.

(n) Attach the Front Bezel to the front frame.
(o) Connect the removed special cables.
(p) Connect the power cables.

⚠ CAUTION

- **This subsystem shall be connected directly to the d.c. supply system earthing electrode conductor or to a bonding jumper from an earthing terminal bar or bus to which the d.c. supply system earthing electrode conductor is connected.**
- **This subsystem shall be located in the same immediate area (such as, adjacent cabinets) as any other subsystem that has a connection between the earthed conductor of the same d.c. supply circuit and the earthing conductor, and also the point of earthing of the d.c. system. The d.c. system shall not be earthed elsewhere.**
- **The d.c. supply source is to be located within the same premises as this subsystem.**
- **Switching or disconnecting devices shall not be in the earthed circuit conductor between the d.c. source and the point of the connection of the earthing electrode conductor.**

(i) Connect the FG cable to the frame ground (FG).
(ii) Connect the cable to the plus and minus power input terminals on the terminal block. When doing this, take care not to confuse the plus and minus terminals.
(iii) Reinstall the cover of the terminal block.
(iv) Ask the customer to turn on the input power.
(v) Turn on the Power Unit Switches (breaker) of the installed Additional Battery Box. Check that the READY LED (green) on the Additional Battery Box blinks.
(q) Turn on the main switch (the subsystem usually recovers in about five minutes).
(r) Charge the battery after the RDY LED (green) on the Additional Battery Box blinks until it changes to lighting. (Although the RDY LED (green) on the Additional Battery Box blinks during the charge, it changes to lighting when the charge is completed. It is about 24 hours at the maximum.)
(s) Check that the RDY LED (green) on Additional Battery Box is on.

(t) Check that the READY LED (green) on the front of the Basic Chassis 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) 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 Basic Chassis lights up.

(u) Check that the start message and the end message of the drive firmware automatic download are displayed. When the drive firmware version of the disk 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 01-0890)").

(v) Recycle the removed battery. For the recycling procedure, refer to "Chapter 5. Recycling" (REP 05-0000).

‡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 subsystem is in the Warning status when the Information Message on WEB was referred to, the WARNING LED (orange) on the front of the Basic Chassis lights up, and if the subsystem is not in the Warning status, the WARNING LED (orange) goes out.

2.2.15 Replacing Front Bezel

⚠ CAUTION

Attach or remove the Front Bezel carefully following the procedure. Otherwise, you may hurt your fingers by pinching them.

CAUTION

- **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.**
- **Since front bezels of the RKH/RKM/RKS and the RKAK are different with each other in their 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.**

A key is necessary to attach or remove the Front Bezel.

(1) Insert the key into the keyhole on the replacing Front Bezel and release the Lock of the Front Bezel.
(2) Pull the replacing Front Bezel toward you holding its sides to disengage it from the ball catches.
(3) Disengage the two hooks of the replacing Front Bezel from the slots on the subsystem main body by shifting the bezel to the right and remove the bezel.
(4) Hold the side of new Front Bezel with your both hands.
(5) Hang the hook of the new Front Bezel (left side) on the hole in the bottom left part of the subsystem.
(6) Hang the hook of the new Front Bezel (right side) on the hole in the bottom right part of the subsystem.
(7) After making the hooks of the new Front Bezel engaged, press the bezel against the main body until it is stopped.
(8) Fix the attached Front Bezel by turning the key.

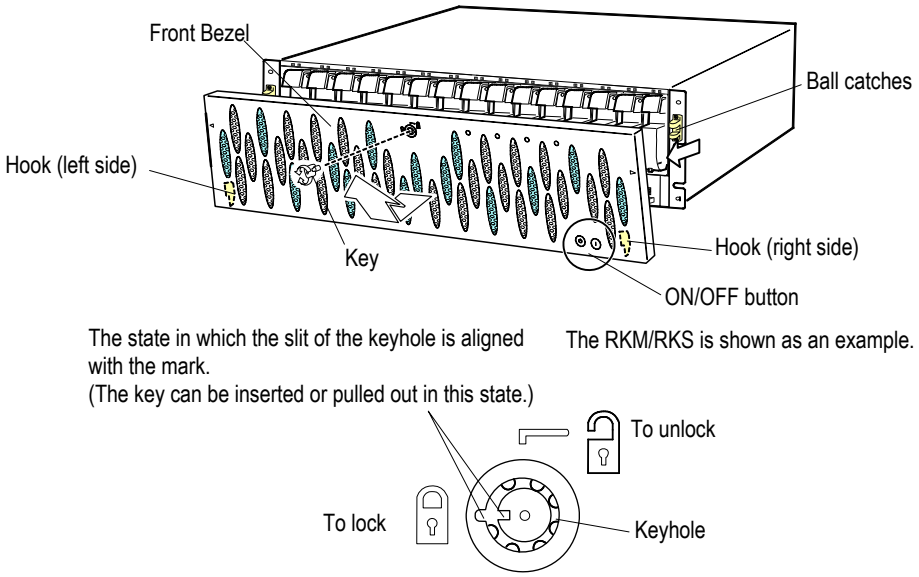
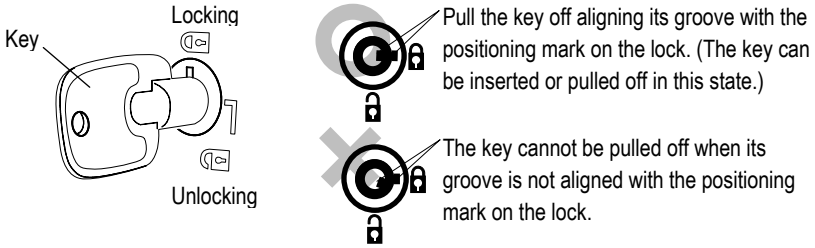


Figure 2.2.30 Procedure for Replacing Front Bezel

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.



• 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.

Chapter 3. Periodic Maintenance

This chapter contains information on items of periodical maintenance which is performed to prevent failures of the subsystem from occurring and to maintain operation performance.

3.1 Periodic Maintenance Items

Table 3.1.1 shows periodical maintenance items of the subsystem. Inspect and clean the subsystem regularly according to the operation environment.

Table 3.1.1 Periodic Maintenance Items

No.	Item			Interval (*1)	Inspection item for each model Rackmount Model Rackmount Model (RK40)	Standard time required (*2)
1	Inspection	Inspecting Fans	Fan Unit Power Unit	Y1	"3.2.1 Inspecting Fans" (REP 03-0010)	5 min
2	Cleaning	Cleaning the subsystem	Front bezel	Y1	"3.2.2 Cleaning the Subsystem" (REP 03-0020)	5 min
			Rear door	Y1	"3.2.2 Cleaning the Subsystem" (REP 03-0020)	5 min
3	Replacement of periodical replacement part		Battery	Y5	"3.3.1 Replacing Battery" (REP 03-0040)	10 min
			Additional Battery Box (AC)	Y5	"3.3.1 Replacing Battery" (REP 03-0040)	15 min
			Additional Battery Box (DC)	Y5	"3.3.1 Replacing Battery" (REP 03-0040)	20 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 subsystem 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. (See Table 3.1.2.)

*2 : Working hours change by the case where one RKH/RKM/RKS is checked, and the number of RKAK/RKAKX/RKAKS

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 of the subsystem	• 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 subsystem failure occurrence and items common to the subsystem and a connected system.

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 Unit.
A Fan Unit is only installed in the RKH.
Inspect the fans in the status where the subsystem 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. (See 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 RKH, make sure that the fans of the Fan Unit 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 the Subsystem

To clear the subsystem, 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 subsystem may rise causing a failure or even a fire.
- **Be careful not to move the subsystem 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 of the Subsystem" (INST 01-0100).)
(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).

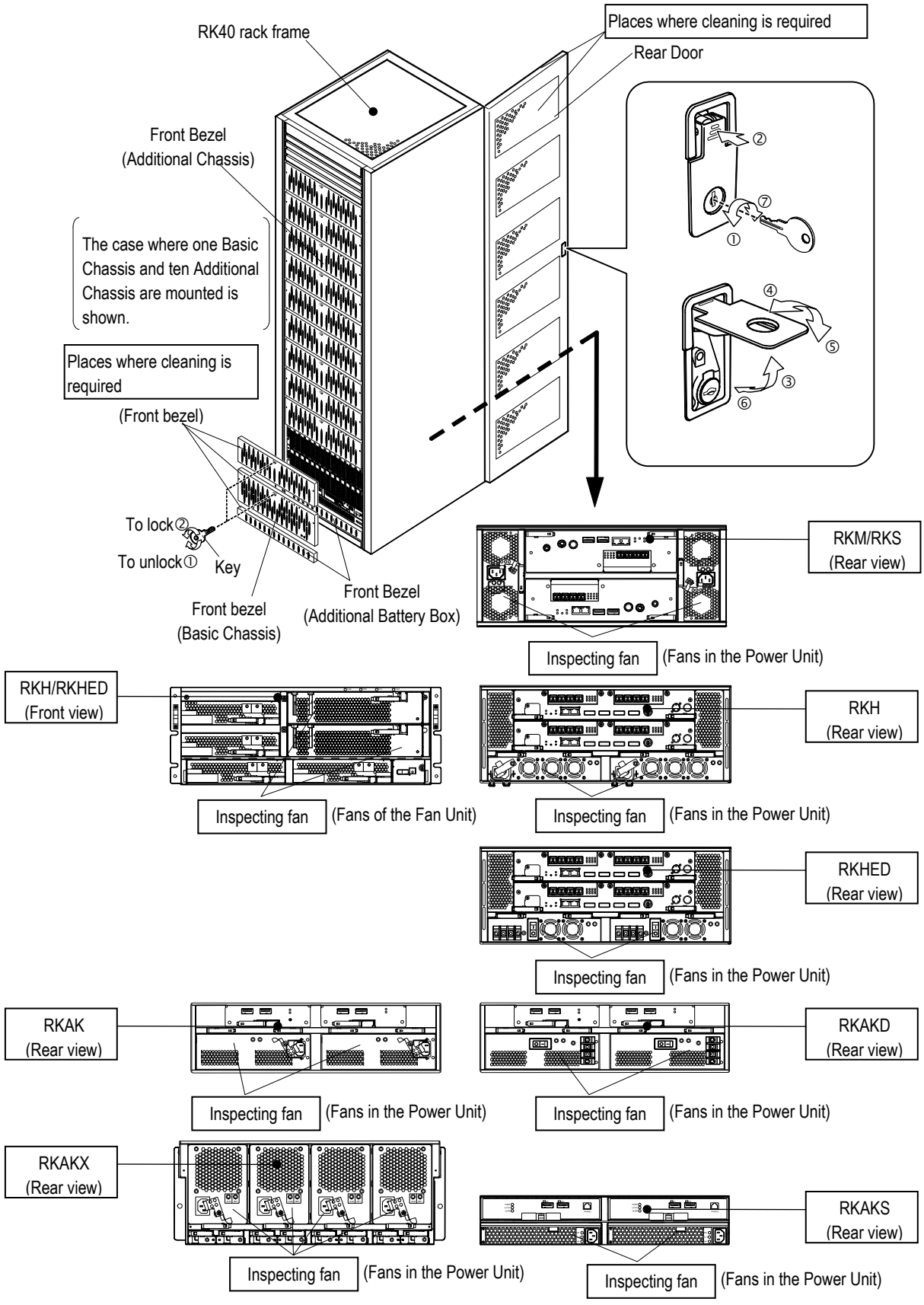


Figure 3.2.1 Inspecting and Cleaning Rackmount Model with RK40 Rack Frame

3.3 Replacing Periodical Replacement Parts

- In the subsystem, a battery, which is a part with limited life, is used and it must be replaced periodically. To replace the battery, replace the Cache Backup Battery containing the battery.
  The battery has a usable period. Confirm the time limit and do not use the battery which passed the time limit.
  When replacing two Cache Backup Battery at the same time (RKM/RKS) or replacing four at the same time (RKH), 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.
- The DC power supply model array has Front Bezel with the Air Filter installed.
  Replace this Air Filter each year.

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.**

CAUTION

- **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 24 hours.

(1) For the procedure for replacing a Cache Backup Battery, refer to "2.2.2 Replacing Cache Backup Battery" (REP 02-0280).
For the procedure for replacing an Additional Battery Box, refer to "2.2.14 Replacing an Additional Battery Box" (REP 02-01280).

(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 RKHED whose the Front Bezel type name is DF-F800-UBKD and for the RKAKD whose the Front Bezel type name is DF-F800-UBKAD.

(1) Remove the Front Bezel. (Refer to Installation "1.4.1 How to Attach/Remove Front Bezel of the Rackmount Model" (INST 01-0100).)
(2) Loosen two screws on the back of the Front Bezel.
(3) Tilt the upper part of the metal plate toward you, and disengage the metal plate from the hooks.
(4) Replace the Air Filter.

NOTE : Attach the Air Filter so that the cutout of the Air Filter is located in the Lens part on the Front Bezel.

(5) Hang the metal plate on the hook to attach it.
(6) Tighten two screws on the back of the Front Bezel to fix the metal plate.
(7) Attach the Front Bezel. (Refer to Installation "1.4.1 How to Attach/Remove Front Bezel of the Rackmount Model" (INST 01-0100).)
(8) Using the Hitachi Storage Navigator Modular 2, set the Air Filter information. (Refer to System Parameter "Chapter 10. Setting Air Filter Information" (SYSPR 10-0000).)

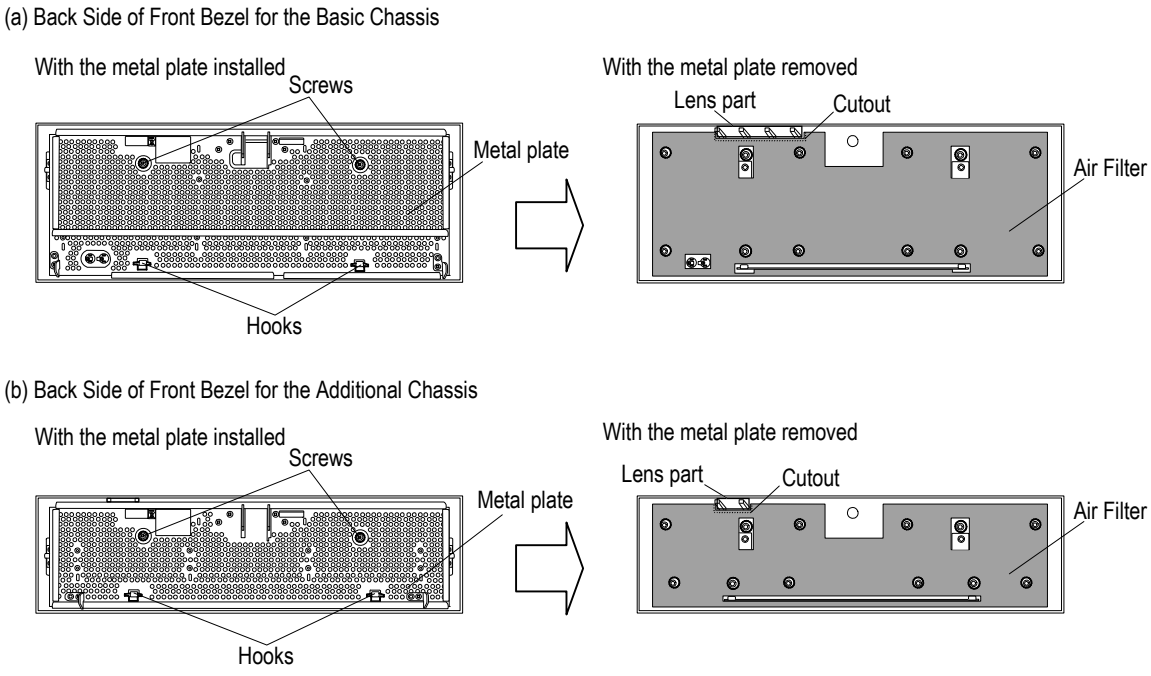


Figure 3.3.1 Parts Locations on the Front Bezel Back Side

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	Slotted screwdriver	No.1	For Local/Remote Mode Setting and Web special window display setting (rotary switch)
2	Phillips screwdriver	No.2	General use
3	Allen wrench	No.4	For fastening of power cable.
4	Spanner	No.22	For adjusting leveling bolt (of RK40 rack frame)
5	Wrist strap	–	For discharge static electricity
6	RoHS-compliant marker pen	–	To write in the cable label/device nameplate

4.2 Maintenance Tools for Software

Maintenance tool consists of Hitachi Storage Navigator Modular 2 or Subsystem'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) Subsystem'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. Subsystem's built-in WEB enables you to perform the maintenance operations such as confirming a failure status of the subsystem, referencing a 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.

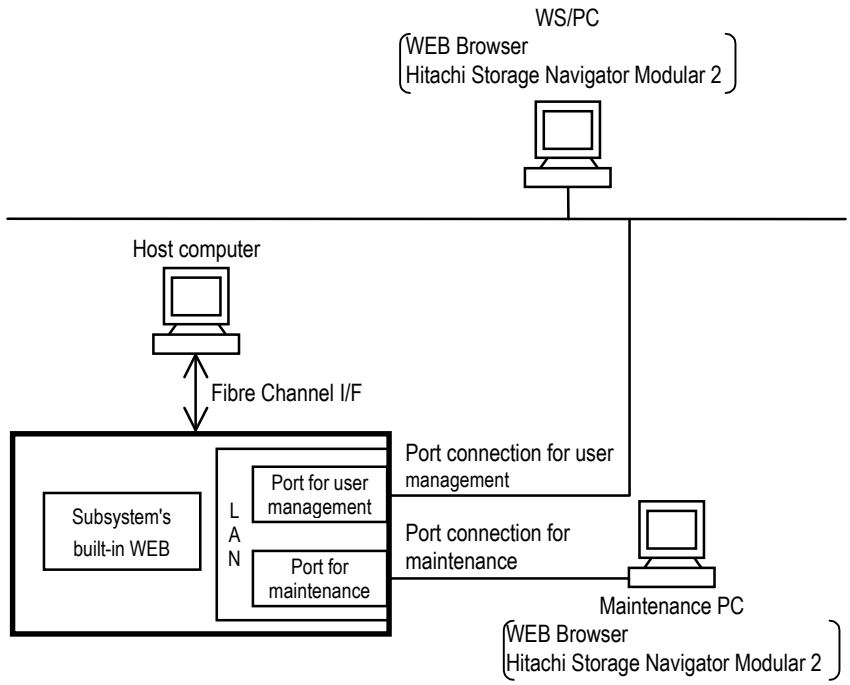


Figure 4.2.1 Connection of Maintenance Tool for Software

Chapter 5. Recycling

(1) Parts to be recycled

The battery used in the subsystem is a sealed Nickel-hydride rechargeable battery. The lead battery is a valuable resource which can be recycled.

When you replace it or dispose of a used subsystem, 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.**

- **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 is a part to be recycled. A label bearing the mark is affixed on the battery.

(3) Specifications of lead battery

Table 5.1 Specifications of Sealed Nickel-hydride Rechargeable Battery

No.	Specification	Cache Backup Battery (DF-F800-N1K)	Additional Battery Box (DF-F800-N1RK/ DF-F800-N1RK/D)
1	Manufacturer	Matsushita Battery Industrial Co., Ltd.	
2	Model	HHR-33AH15W3	
3	Voltage (V)	6	
4	Capacity (mAh)	9600	57600

(4) Disposal and safety in storage

Before storing a sealed Nickel-hydride rechargeable battery, cover its terminals with electric tape, etc. to prevent a short circuit. Store it separately from batteries of other type such as dry battery.

(5) Method of storage

Table 5.2 Storage Method

No.	Item	Requirement
1	Storage method	Store a Cache Backup Battery and an Additional Battery Box 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 within a range of 0 to 35 °C (25 °C or less in average). • In the case of the Additional Battery Box, keep it in a place where the temperature is within a range of 0 to 35 °C (25 °C or less in average).
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, check the usable time limit of it following "(6) Checking usable term of maintenance part" (REP 05-0030).

(6) Checking usable term of maintenance part

If the battery is left uncharged for longer than six months, it will discharge excessively and becomes unable to be fully recharged. Therefore, when the battery is stored as a maintenance part, it must be stored on charge under the following condition.

In the case of the Cache Backup Battery, it is necessary to use it within one year. (Concerning the batteries mounted on the subsystem, since they are charged while the subsystem power is on, no problem will occur.)

In the case of the Additional Battery Box, it is necessary to use it within one year.

Table 5.3 Term of Maintenance Part

No.	Items	Conditions	
		Cache Backup Battery	Additional Battery Box
1	Period of Long-term storage	One year	One year
2	Storage temperature	0 ºC ~35 ºC (25 ºC or less in average)	0 ºC ~35 ºC (25 ºC or less in average)
3	Supplemental charge interval	Once per six months	Once per six months

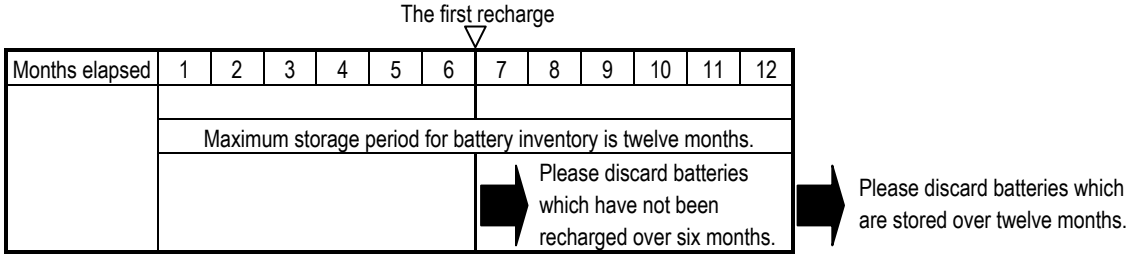


Figure 5.1 The chart for recharging