

DF500

Disk Array Subsystem

Maintenance Manual

~for Maintenance~

REV.6

Read this manual carefully and keep it.

- Before starting operation, read the safety instructions carefully and fully understand them.
- After reading this manual, keep it at hand for your reference.

HITACHI

Preface

This manual explains procedures for part replacements and inspections, which are to be performed as actions against failures, for service personnel who maintain the DF500 disk array subsystem.

Cautionary Notes

On this manual

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- Hitachi, Ltd. is not liable for any troubles or accidents which caused by operations not written in this manual.
- This manual may be revised without prior notice.
- The disk array is a “class 1 laser system” which emits no hazardous laser beam. Be sure to operate it according to this manual. Do not perform any operations other than those written in this manual. Otherwise, unexpected failures or accidents may be caused.

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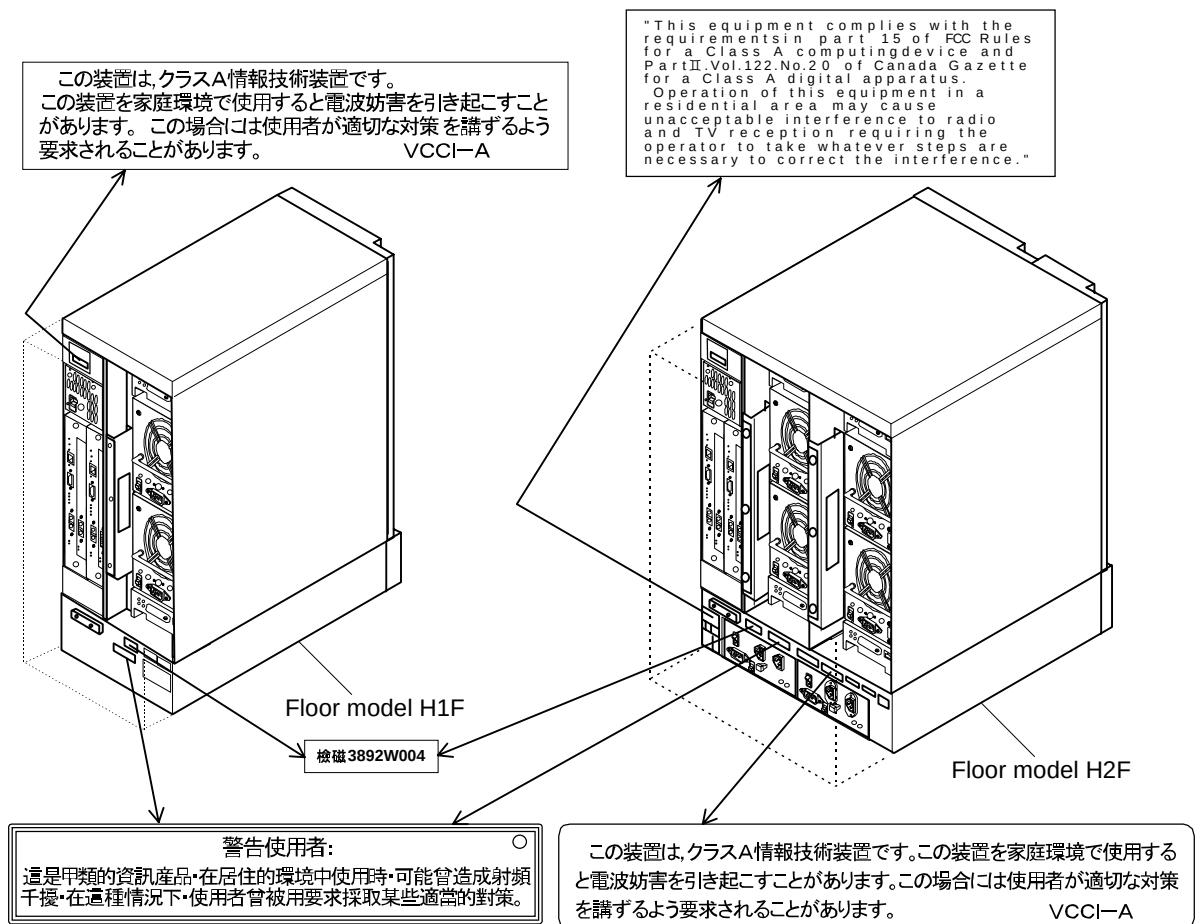
Note

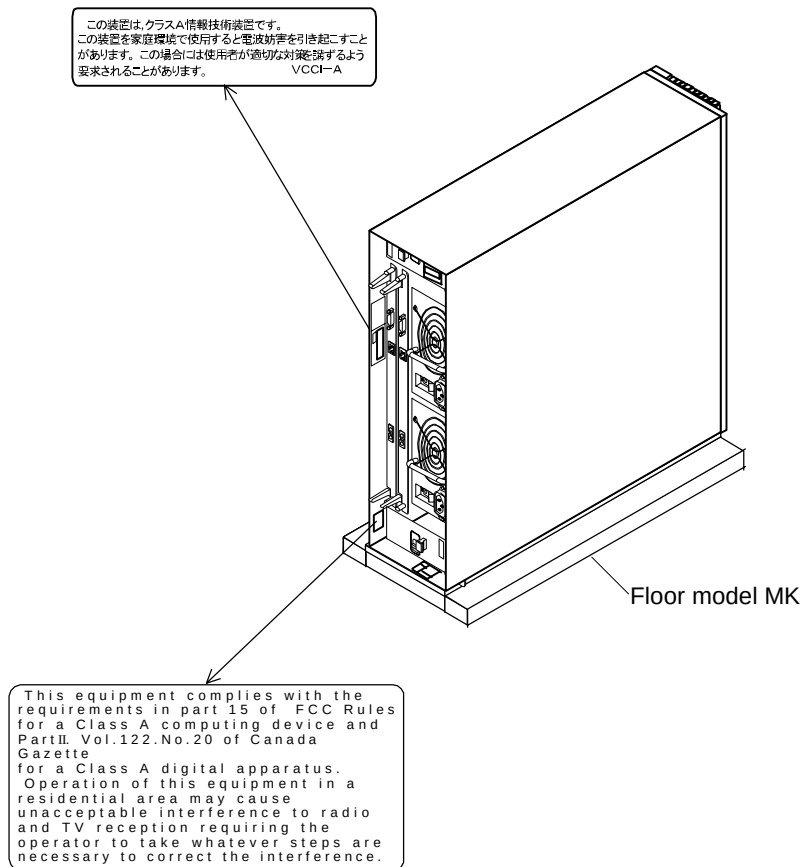
EMI Regulation

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference in which case the user will be required to correct the interference at his own expense. Testing was done with shielded cables. Therefore, in order to comply with the FCC regulations, you must use shielded cables with you installation.

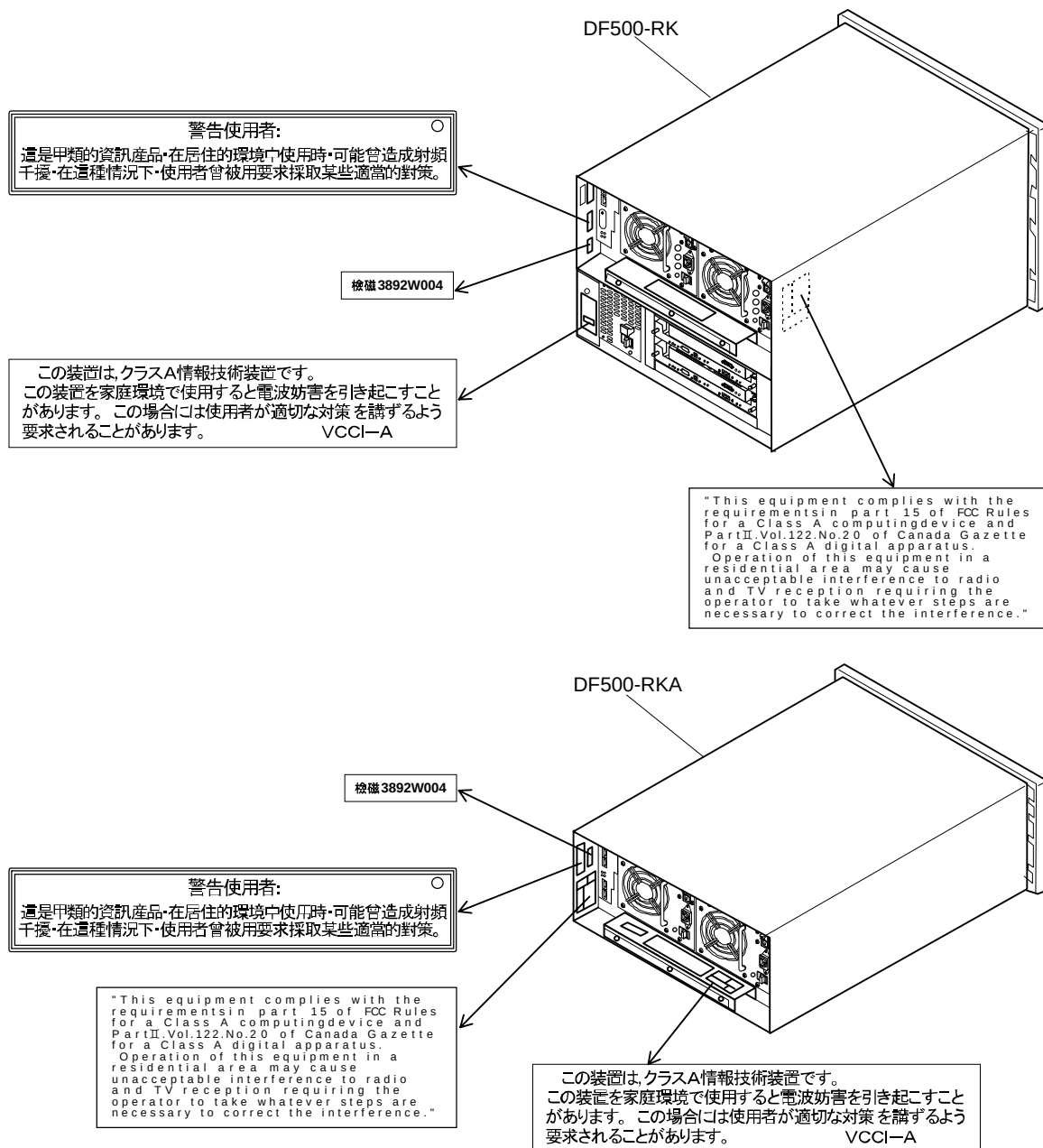
EMI Regulation Labels Affixed on the Subsystem

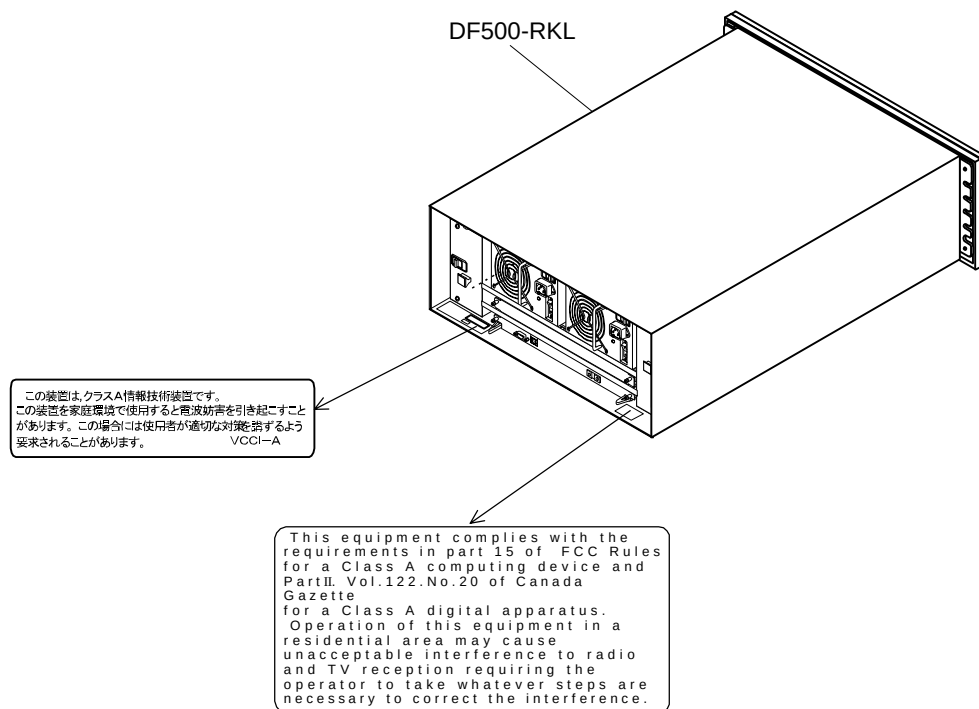
Floor model H1F/H2F



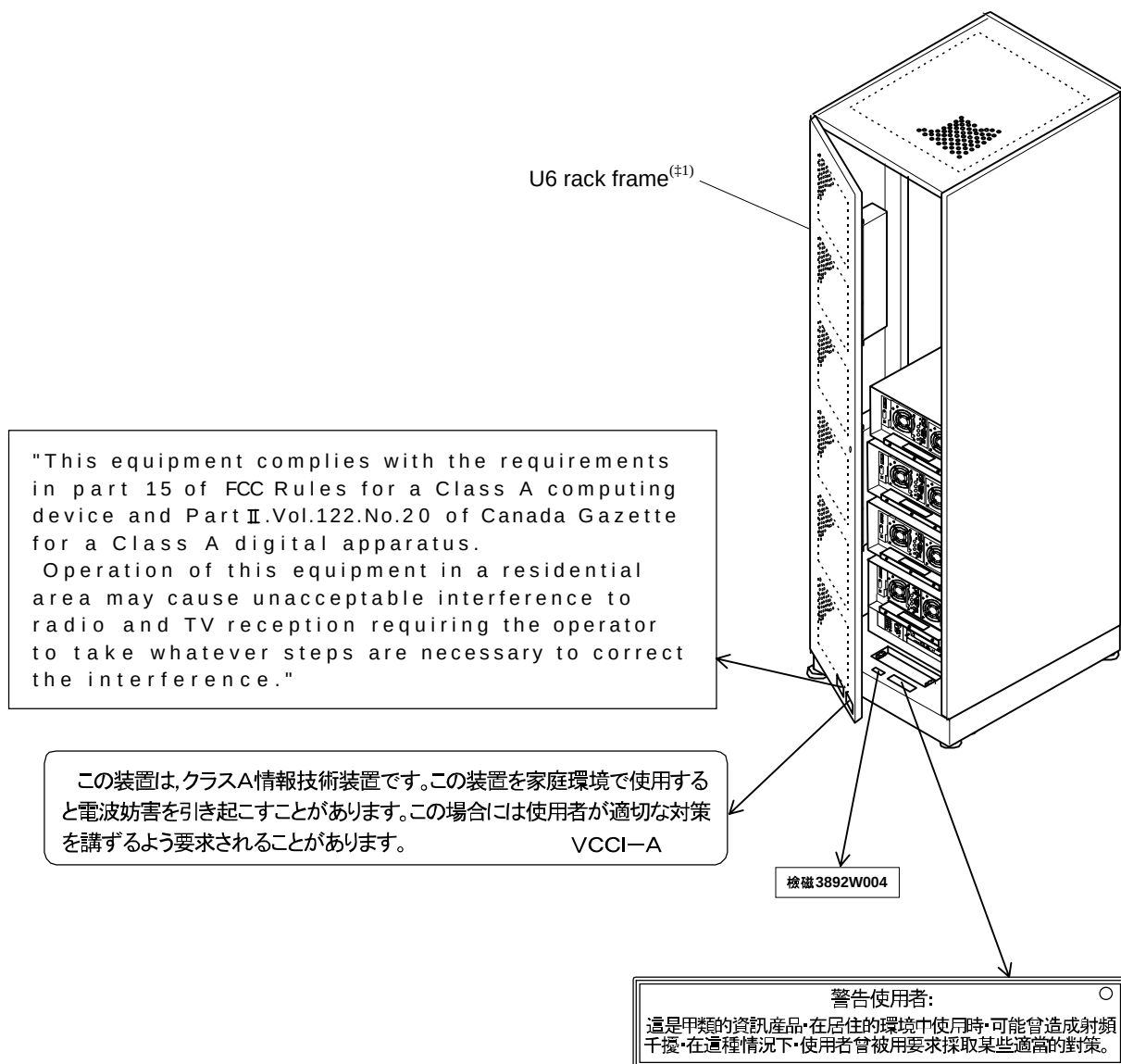
Floor model MK

Rackmount model RK/RKA



Rackmount model RKL

Rackmount model with U6 rack frame



†1 : The illustration shows an example of the disk array subsystem in which the DF500-RK/RKA is installed.

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SAFETY SUMMARY

1. General Safety Guidelines

Read the following safety guidelines carefully and follow them when you conduct maintenance of the machine.

Before starting maintenance

- Maintenance of the machine must be done only by trained and qualified engineers.
- Read and follow the safety guidelines and procedures in this manuals.
- In this manual and on the machine, hazard warnings are provided to aid you in preventing or reducing the risk of death, personal injury, or product damage. Understand and follow these hazard warnings fully.
- The hazard warning which appear on the warning labels on the machine or in the manual have one of the following alert signal words WARNING, or CAUTION.

	DANGER :	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
	WARNING :	Indicates a potentially hazardous situation which, if not avoided, can result in death or serious injury.
	CAUTION :	Indicates a potentially hazardous situation which, if not avoided, will or can result in minor or moderate injury, or serious damage of product.
		The alert symbol shown left precedes every signal word for hazard warnings, and appears in safety related descriptions in the manual.

The signal word 'NOTICE' is used to present warnings which are not directly related to personal injury hazards.

- When warning labels become dirty or start peeling off, replace them.
- Keep in mind that the hazard warnings in this manual or on the machine cannot cover every possible case, as it is impossible to predict and evaluate all circumstances beforehand.
Be alert and use your common sense.
- This disk array is a "class 1 laser system" which emits no hazardous laser beam. Be sure to operate it according to this manual. Do not perform any operations other than those written in this manual. Otherwise, unexpected failures or accidents may be caused.

⚠ SAFETY SUMMARY (Continued)

During work

- For each procedure, follow the given method and sequence of steps.
- Use the spare, consumables, and materials for maintenance which are specified in the manual; otherwise, personal injury or damage of the machine, as well as deterioration of the product's quality, may result.
- Use the special tools and instruments specified for the work in the manual or commercially available tools and instruments which fit the purpose.
- Use measurement instruments and powered tools which are properly calibrated or periodically inspected.
- Keep the maintenance area neat and tidy.
- Always put away parts, materials, or tool when not in use.
- Wear an eye protector where liquid may splash or anything may fly about.
- When lifting anything heavy, lift it using your legs with your back kept erect, to prevent injury to your back or spine.
When lifting anything, for the weight of which CAUTION is indicated, use a proper lifting tool or have somebody help you.
- Keep a soldering iron and its stand away from you to prevent accidental contact and burns.
- When using sharp objects or cutting tools, make sure that no part of your body lies in the path of the blade, or point.
- Before finishing your work, check if the subsystem is returned to its original state.
(Make sure that all parts removed during maintenance have been installed back in their original positions in the machine. Make sure that no tool or foreign material left in the machine.)

⚠ SAFETY SUMMARY (Continued)

Prevention of electric shocks

- Before starting work, make sure that, unless otherwise specifically instructed, there is no potential electric hazard in the maintenance area such as insufficient grounding or a wet floor.
- Before starting work, note where the emergency power-off switches are located and make sure you know how to operate them.
- Unless otherwise specifically instructed, cut off all power sources to the machine before starting maintenance. Just switching off the machine power supplies is usually not enough.

When power is fed from a wall or floor outlet, unplug the power supply cord, or turn off the switch on the power distribution panel or board. Attach a notice on the panel or board prohibiting the use of the switch.

If the machine power has been already turned off, make sure yourself that these conditions are satisfied.

- Do not touch any uninsured conductor or surface, where so instructed, which remains charged for a limited time after the external power supply to the machine is disconnected.
- When working on a machine which has a grounding terminal, make sure that the terminals properly connected to the facility's ground.
- When working close to a hazardously energized part, do not work alone; work with another person who can immediately turn off the power in an emergency.
- Do not wear any metallic item such as a wrist watch with a metallic surface, or metallic accessories.

If you wear eyeglasses with a metallic frame, take care not to let the frame touch an uninsured surface.

- Make sure that your hands and arms are dry.
- Unless otherwise specifically instructed, use only one hand when it is necessary to work near an exposed live electric circuit.

This prevents the completion of the circuit through both hands even if you accidentally touch the circuit.

- Do not use a dental mirror near an exposed live electric circuit.

The mirror surface is conductive and can become hazardous even if it is made of plastic.

- Unless otherwise specifically instructed, do not supply power to any subassembly such as a power supply unit or a motor while it is removed from the machine.

SAFETY SUMMARY (Continued)

Preventing being caught by rotating or moving parts

- Tuck in your tie, scarf, shirt, or any other loose clothing so that it will not be caught by a rotating or moving part.
- Tie up long hair.
- Unless otherwise specifically instructed, do not supply power to any device with rotating or moving parts which are not properly covered.
- When instructed to supply power to any device with rotating or moving parts whose covers have been removed, work with another person who can immediately turn off the power in an emergency.

Procedure in an emergency

For electric shock

- Do not panic. Do not become another victim through contact with the injured person.
- First, shut off the electric current passing through the victim.
Use the emergency power-off switch, if there is one, or otherwise, a normal power-off switch. If this cannot be done, push the victim away from the source of the electric current by using a nonconductor object such as a dry wooden stick.
- Then, call an ambulance.
- If the victim is unconscious, artificial respiration may be necessary.
A proper method for performing artificial respiration or resuscitation should be learned beforehand.
- If the victim's heart is not beating, cardiac resuscitation should be performed by a trained and qualified person.

For outbreak of fire

- First shut off all the power from the machine using the emergency power-off switch.
- If the fire continues burning after the power is shut off, take suitable actions including the use of a fire extinguisher or a call for the fire department.

SAFETY SUMMARY (Continued)

2. Hazard Warning Statements

The following are the hazard warning statements contained in this manual.

2.1 DANGER statements

No DANGER statement is contained.

2.2 WARNING statements

No WARNING statement is contained.

2.3 CAUTION statements

- Do not remove the pin cover of the ENC(RKL) board. Otherwise, an electric shock may be caused.

(01-0010, 04-1300, 04-1700)

- Attach or remove the front bezel carefully following the procedure. Otherwise, you may hurt your fingers by pinching them.

(01-0070, 01-0090, 01-0100)

- Open or close the door carefully following the procedure. Otherwise, you may hurt you fingers by pinching them.

(01-0120, 01-0130)

- 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.

- 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.

(04-0020)

⚠ SAFETY SUMMARY (Continued)

- The lead battery contains poisonous substances. Besides, if it is handled improperly, an electric shock or explosion may be caused. Please follow the safety instructions below.
 - ① Do not disassemble or remake the battery.
 - ② Do not deform the battery.
 - ③ Do not connect plus and minus poles with a metallic article such as a wire.
 - ④ Do not reverse the connections of plus and minus poles.
 - ⑤ Do not peel off the covering tube.
 - ⑥ Do not connect the battery directly to the outlet.
 - ⑦ Do not connect the battery to anything other than this subsystem for charging/discharging.
 - ⑧ Do not leave the battery in a hot place. Store it in a dark and cool place.
 - ⑨ Do not discard a used battery at the site where it was removed for replacement.

(04-0200, 04-0690, 04-1140, 04-1550)
- Since each fan is rotating with high-speed, be careful not to be caught by it.

(04-0490, 04-0950, 04-1380, 04-1780)
(06-0030, 06-0050, 06-0090)
- Be sure to check if the supplied power is turned off to prevent an electric shock..
- Pay enough attention to connect cables correctly.

(04-0510, 04-0970)
- If you touch a live part, it is feared that you receive an electric shock.
- Be sure to keep the front bezel and rear panel clean. Or else, the ventilation is deteriorated so that the temperature inside the disk array may rise causing a failure or even a fire.
- Be careful not to move the subsystem violently during cleaning.

(06-0040)
- Be careful not to touch any of live parts.
- 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.

(06-0070, 06-0100)
- Install or remove the front bezel carefully following the procedure. Otherwise, you may hurt your fingers by pinching them.

(06-0070, 06-0100)

⚠ SAFETY SUMMARY (Continued)

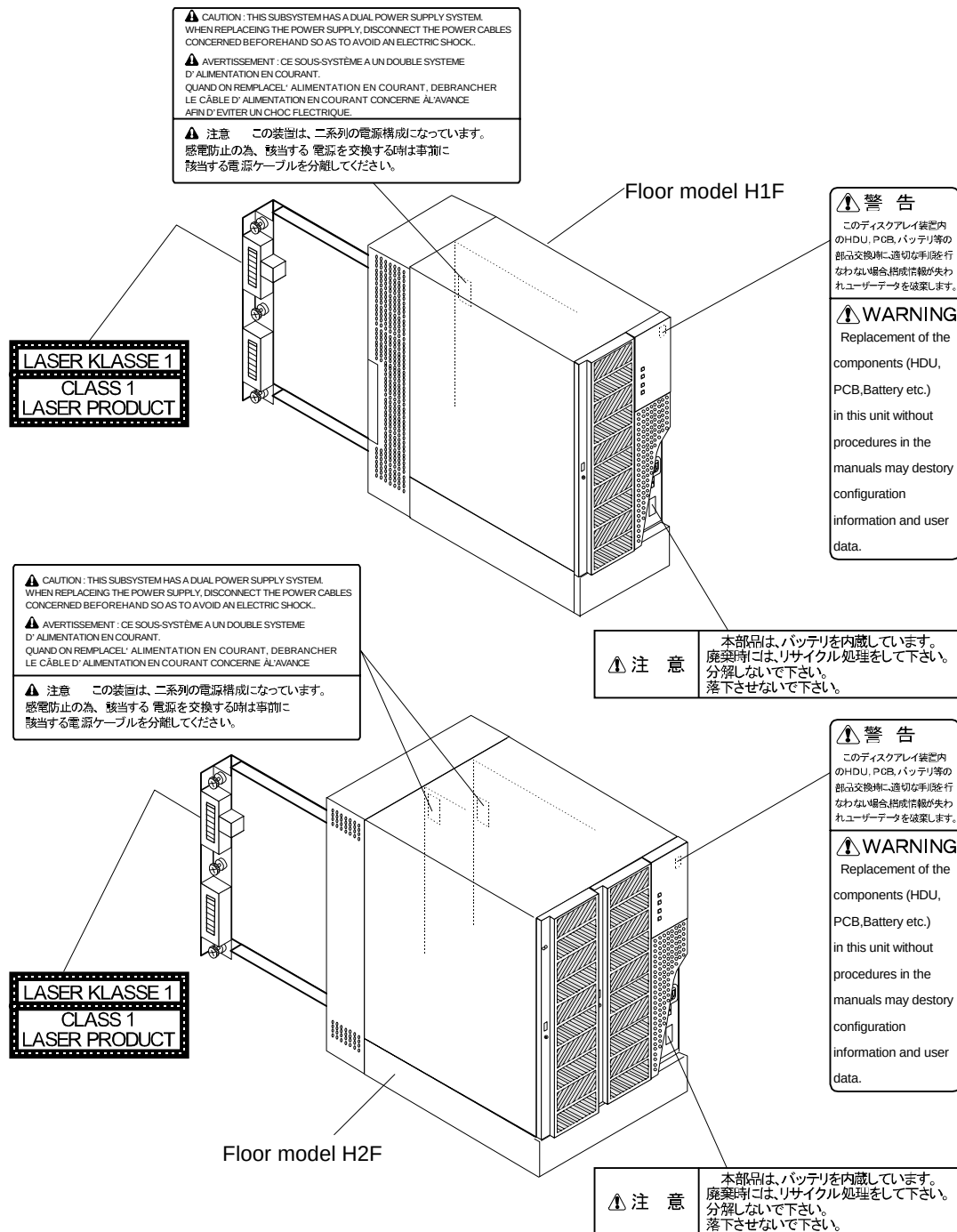
- Do not disassemble the battery, or a burn or electric shock may be caused.
- If a battery is handled wrongly, it is feared that an explosion is caused.

(06-0110)

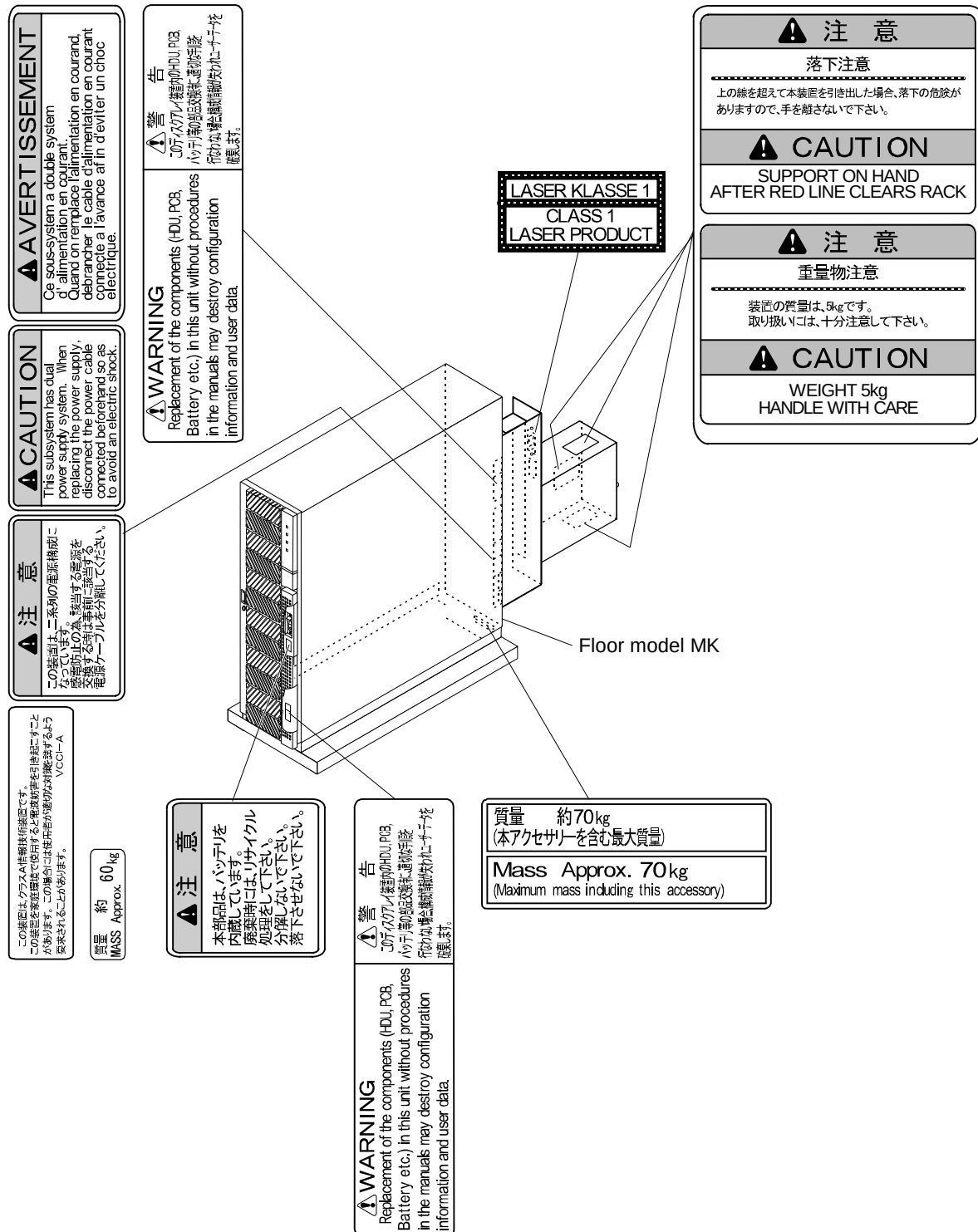
⚠ SAFETY SUMMARY (Continued)

3. ⚠ Warning Labels Affixed on the Subsystem

3.1 Floor model (H1F/H2F/MK)

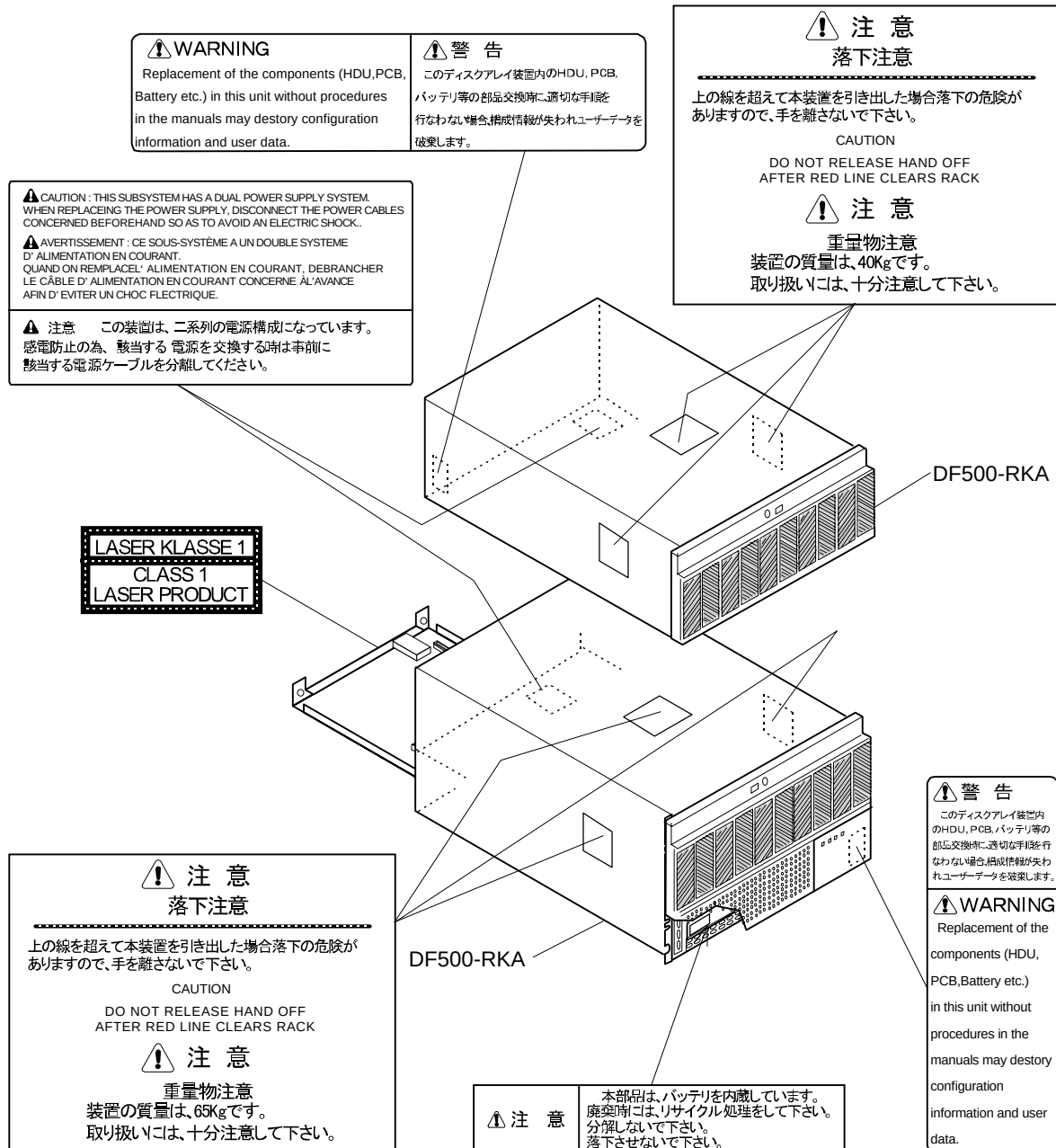


⚠ SAFETY SUMMARY (Continued)



⚠ SAFETY SUMMARY (Continued)

3.2 Rackmount model (RK/RKA/RKL)



⚠ SAFETY SUMMARY (Continued)

⚠ 注意

落下注意

上の線を超えて本装置を引き出した場合、落下の危険がありますので、手を離さないで下さい。

⚠ CAUTION

SUPPORT ON HAND
AFTER RED LINE CLEARS RACK

⚠ 注意

重量物注意

装置の質量は、5kgです。
取り扱いの際は、十分注意して下さい。

⚠ CAUTION

WEIGHT 5kg
HANDLE WITH CARE

⚠ CAUTION

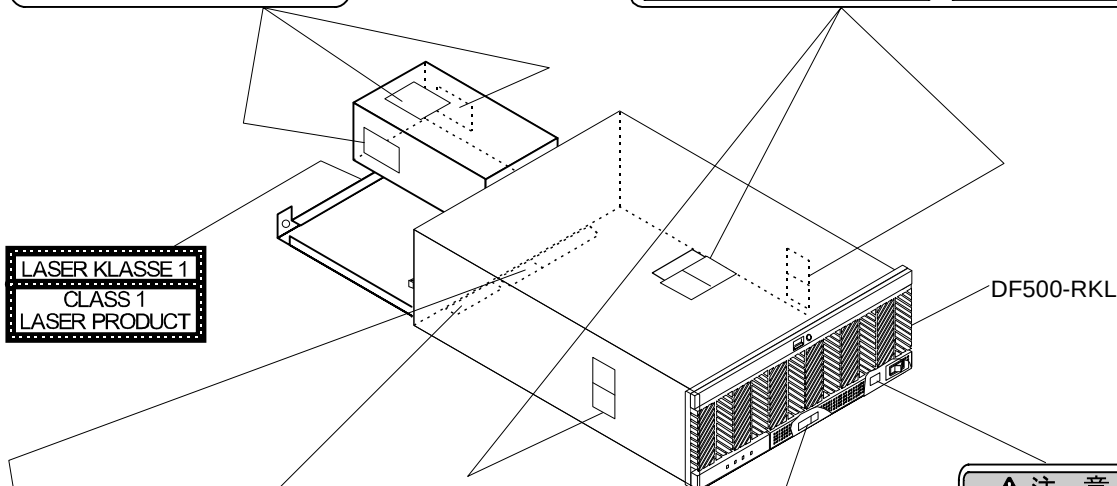
Careful of the drop.
It is heavy.

Do not release hand
off after red line
clears rack.
The subsystem mass
approximately 60kg.

⚠ 注意

落下注意
重量物注意

上の線を超えて本装置を
引き出した場合、落下の
危険がありますので、
手を離さないで下さい。
装置質量は約60kgです。



⚠ WARNING

Replacement of the components (HDU, PCB, Battery etc.) in this unit without procedures in the manuals may destroy configuration information and user data.

⚠ 警告

このディスプレイ装置内のHDI, PCB, バッテリ等の部品交換時に適切な判断を行わない場合構成情報が失われユーザデータを破壊します。

⚠ 注意

本部品は、バッテリーを内蔵しています。廃棄時にはリサイクル処理をして下さい。分解しないで下さい。落下させないで下さい。

⚠ WARNING

Replacement of the components (HDI, PCB, Battery etc.) in this unit without procedures in the manuals may destroy configuration information and user data.

⚠ 警告

このディスプレイ装置内のHDI, PCB, バッテリ等の部品交換時に適切な判断を行わない場合構成情報が失われユーザデータを破壊します。

この装置は、クラスA情報技術装置です。
この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。 VCCI-A

質量 約 60kg
MASS Approx.

⚠ 注意

この装置は、二系列の電源構成になっています。感電防止の為、該当する電源を交換する時は事前に該当する電源ケーブルを分離してください。

⚠ CAUTION

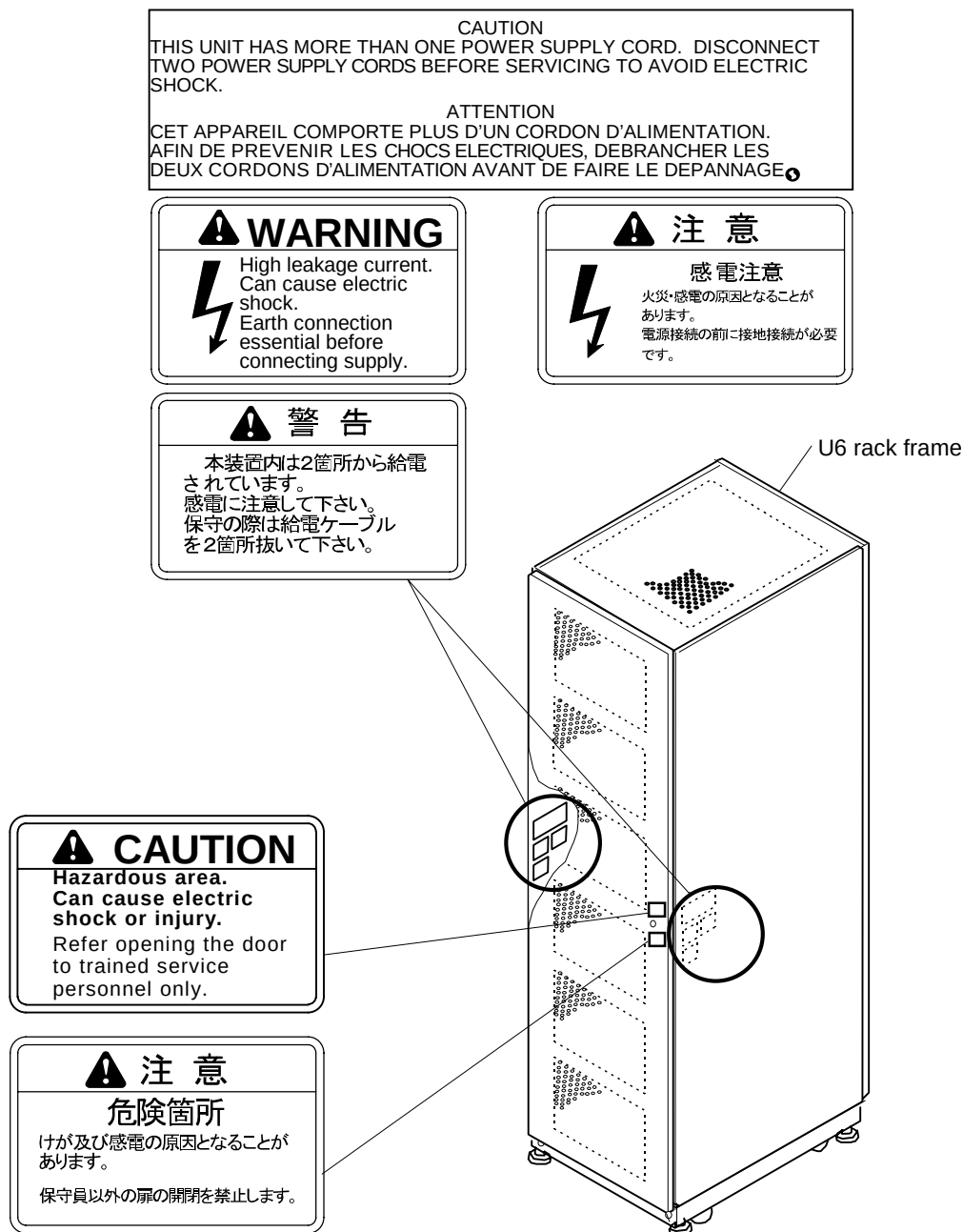
This subsystem has dual power supply system. When replacing the power supply, disconnect the power cable connected beforehand so as to avoid an electric shock.

⚠ AVERTISSEMENT

Ce sous-système a double system d'alimentation en courant. Quand on remplace l'alimentation en courant, débrancher le cable d'alimentation en courant connecté à l'avance afin d'éviter un choc électrique.

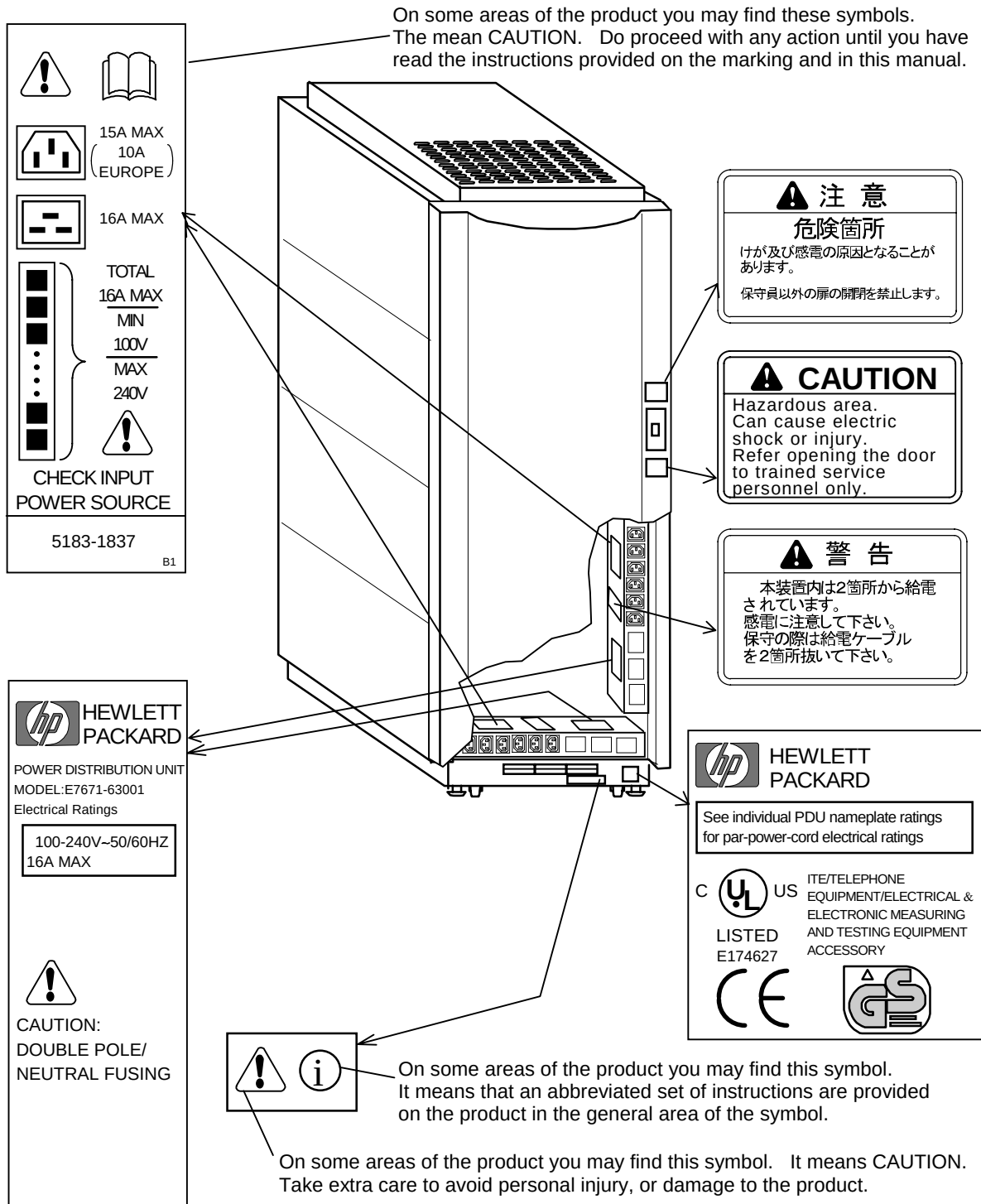
⚠ SAFETY SUMMARY (Continued)

3.3 Rackmount model with U6 rack frame



⚠ SAFETY SUMMARY (Continued)

3.4 Rackmount model with U4 rack frame



Chapter 1. Before Maintenance Work

- 1.1 Before Starting Maintenance Work.....01-0010
- 1.2 How to Open/Close Door or Attach/Remove
 - Front Bezel of the Subsystem 01-0070
- 1.3 Connecting a Service PC and the Subsystem 01-0131
- 1.4 Backing Up and Restoring System Parameters 01-0149
 - 1.4.1 Backing Up System Parameters 01-0149
 - 1.4.2 Restoring System Parameters 01-0200

1.1 Before Starting Maintenance Work

Take notice of the following when performing a maintenance work for the subsystem. Illustrations in this section show cases of the rackmount model. They are the same for the floor model.

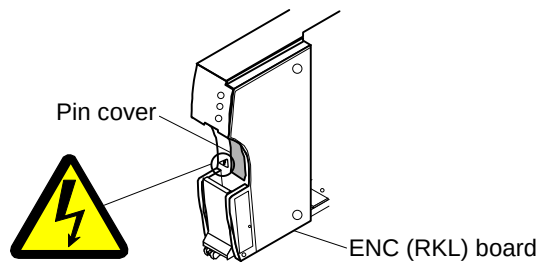
(1) Note on installing and removing parts

Generally, each part is equipped with high-precision components. Remove and install the part gently so as not to give it any shock.

Be sure to follow the cautionary note on the ENC (RKL) board shown below



Do not remove the pin cover of ENC (RKL) board, or an electric shock may be caused.



(2) Note on cable routing

(a) Handling of cables laid on the floor

- Protect cables which cannot be accommodated by the subsystem and thus laid on the floor or cables which cross a passage with cable protecting, etc.
- Do not make inter-device cables apart from the floor but lay them on the floor.

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

- Give excess lengths to cables routed under the floor so that they can easily be laid on the slab.

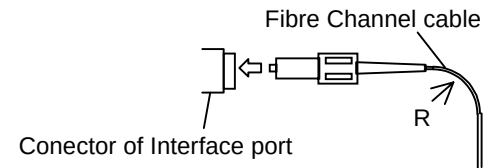
Do not make them to be hung dangling.

(c) How to route cables

- Give excess lengths to cables taking earthquakes, etc. in consideration.
- Route cables giving them excess lengths lest they should disturb replacement of part to be done for maintenance.
- Make AC and DC cables apart each other. When they have to be positioned close each other, do not make them run in parallel but make them cross each other.
- When using cable protecting duct, be careful not to damage or break cables by catching them.

(d) Be sure to insert or pull out a cable connector holding it with your hand. If you pull a cable, a trouble may be caused.

- (e) When bending the Fibre Channel 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.



(3) Note on restarting

When restarting the subsystem, turn on the breaker after waiting more than one minute after the breaker is turned off (after the POWER LED goes out).

(4) Note on completing a maintenance work

Close all the external covers when a maintenance work is completed.

It is required to make all the external covers closed to operate the subsystem properly.

(Be sure to close all the external covers during operation because it is indispensable to maintain the performance of the subsystem including prevention of adverse effects caused by radio frequency energy.)

(5) Confirming cancellation of the cache backup 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 the subsystem is controlled with a write-after method. When the power is turned off, the subsystem automatically writes data in the Cache memory left unwritten onto the Disk drive. This operation is called a destaging. When process is completed, the POWER LED goes out and the power supplied to each section installed is turned off.

However, when the destaging cannot be completed when the power is turned off owing to the unexpected power failure or by the operation of the circuit breaker, the Cache memory enters the cache backup mode in which the power is supplied by the battery to secure the data.

If the backup is not done normally, configuration information may be lost and user data may be destroyed.

- Confirming state of the cache memory backup

You can confirm whether the subsystem is in the cache backup state by viewing the indication of the BACK UP LED (green) on the Controller.

The state of the cache backup can be confirmed in the following procedure.

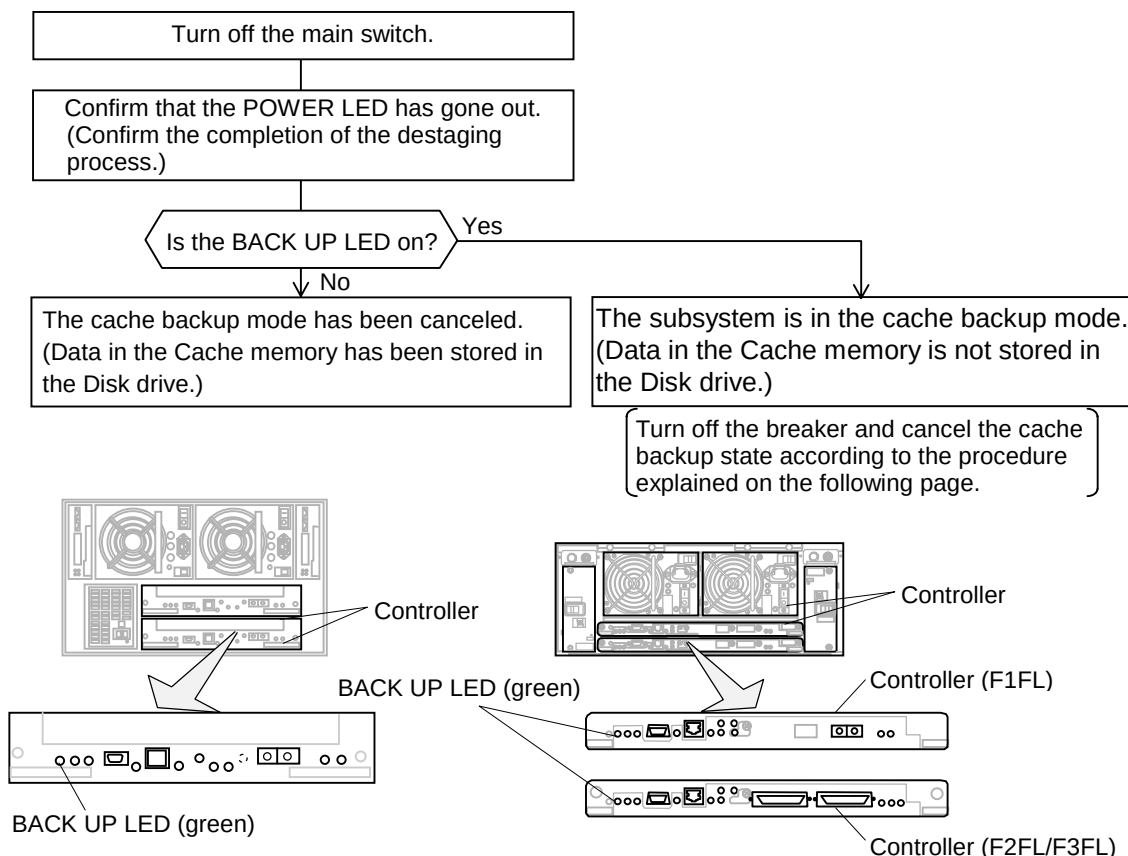
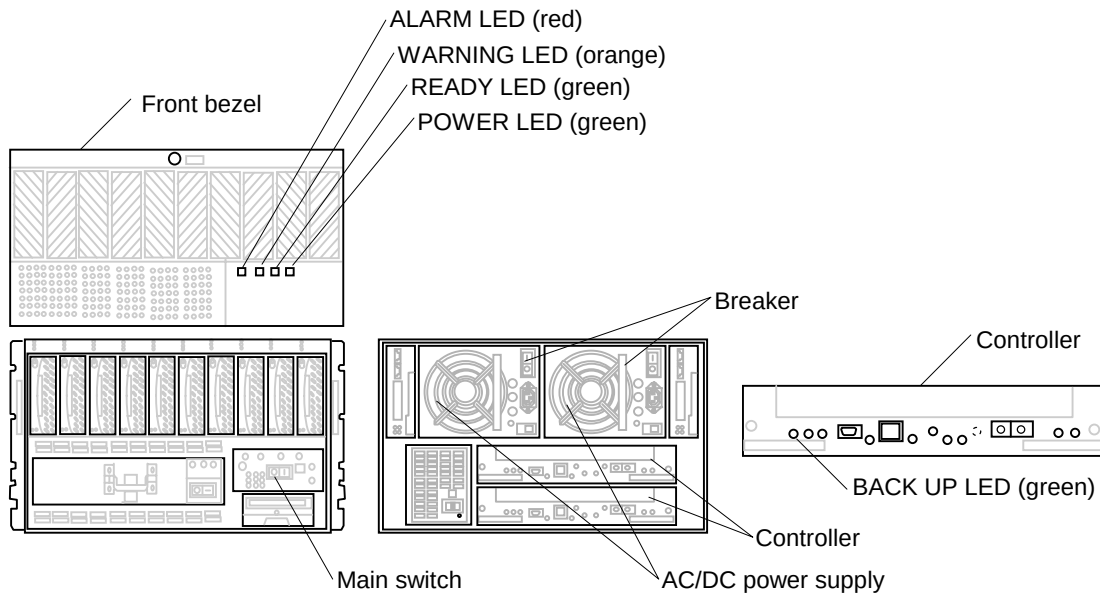
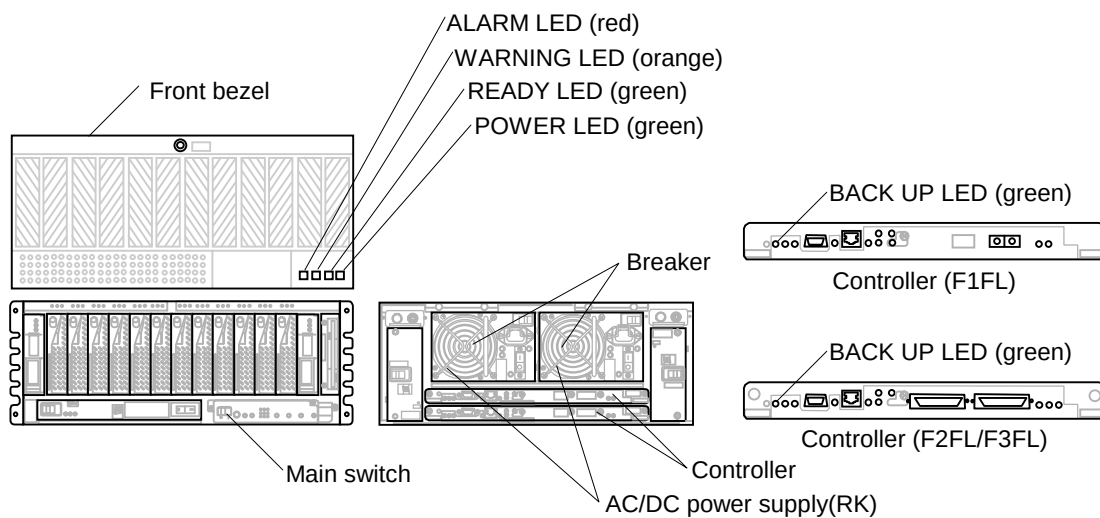


Figure 1.1.1 Procedure for Confirming State of Cache Backup

- 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.



(a) RK/RKA



(b) RKL

Figure 1.1.1.1 Indication Name

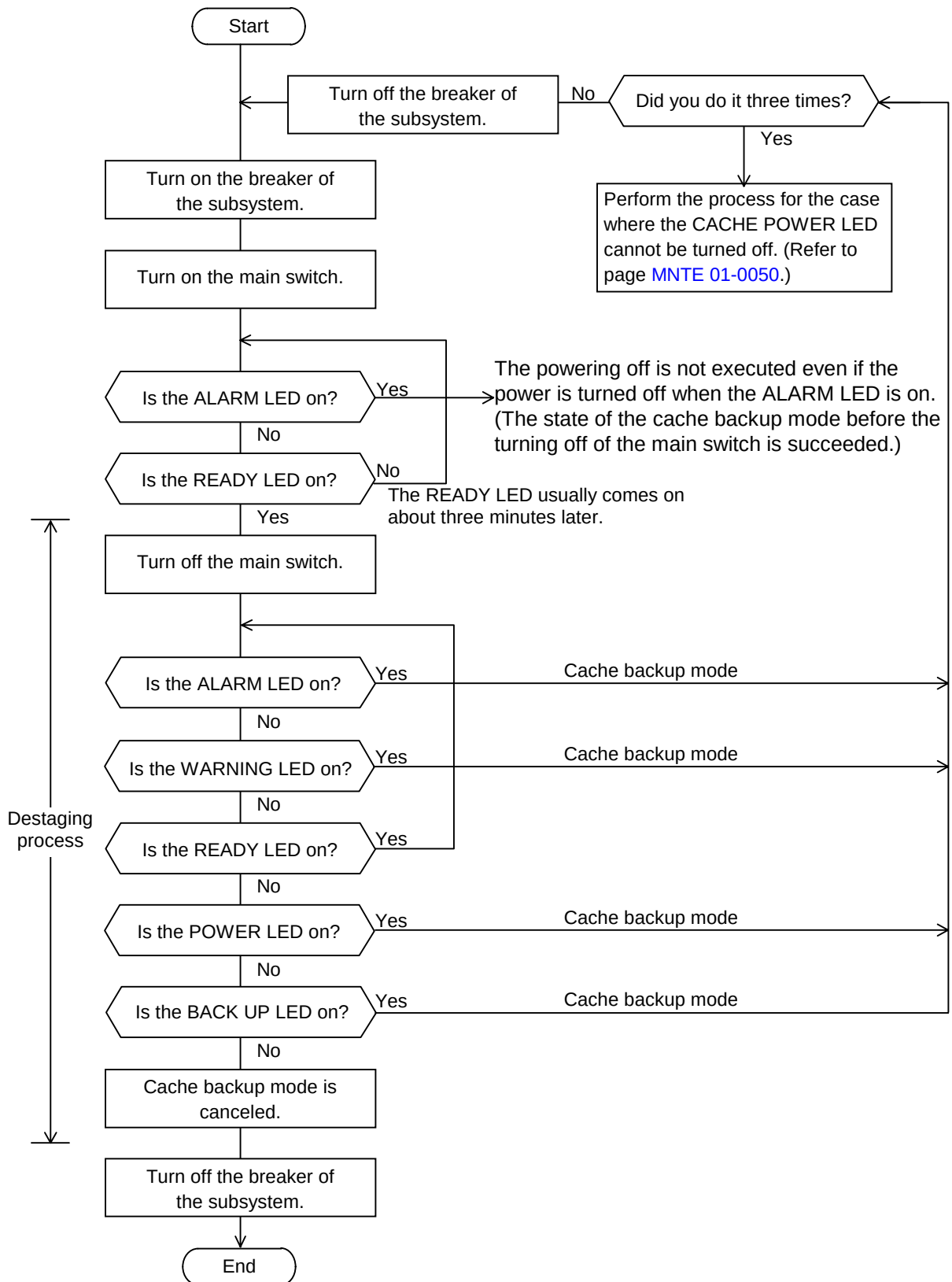


Figure 1.1.2 Procedure for Canceling the Cache Backup Mode of the Cache Memory

- Procedure for the process to be performed when the BACK UP LED 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 forcible parity recovery^(‡1) or that in which the data is entirely erased once, and then recovered.

(1) Procedure using the forcible parity recovery
It takes long times at the longest from start to completion of the process to execute the forcible parity recovery.
(The time required for the recovery process varies depending on the Disk drive capacity and number of rows.)

(2) Procedure not using the forcible parity recovery
When the forcible parity recovery 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 Item (1).

**Table 1.1.1 Standard Time Required for
the Forcible Parity Recovery or an LU Formatting**

Unit : min

Type of Disk drive		17.8 G byte (xxx18)	35.6 G byte (xxx36)	71.6 G byte (xxx72)
Item				
Forcible parity recovery ^(‡1)	5 Disk drives (4D+1P)	25	50	100
	10 Disk drives (4D+1P) ×2	50	100	200
	20 Disk drives (4D+1P) ×4	100	200	400
LU formatting ^(‡2)	5 Disk drives (4D+1P)	25	50	100
	10 Disk drives (4D+1P) ×2	50	100	200
	30 Disk drives (4D+1P) ×6	150	300	600
*1 : The time described above is a general guideline of recovery time in a configuration of 4D+1P. If N in ND+1P is larger than 4, recovery time in a configuration with the same number of drives is shorten. *2 : The time described above is a general guideline of formatting time when LUs are formatted LU by LU in a configuration of 4D+1P. If formatted in a multiplexed manner, formatting terminates in shorter time than the time described above. When 30 drives (six LUs) each with a capacity of 18 GB are formatted in a multiplexed manner, formatting time is about 110 minutes.				

‡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.

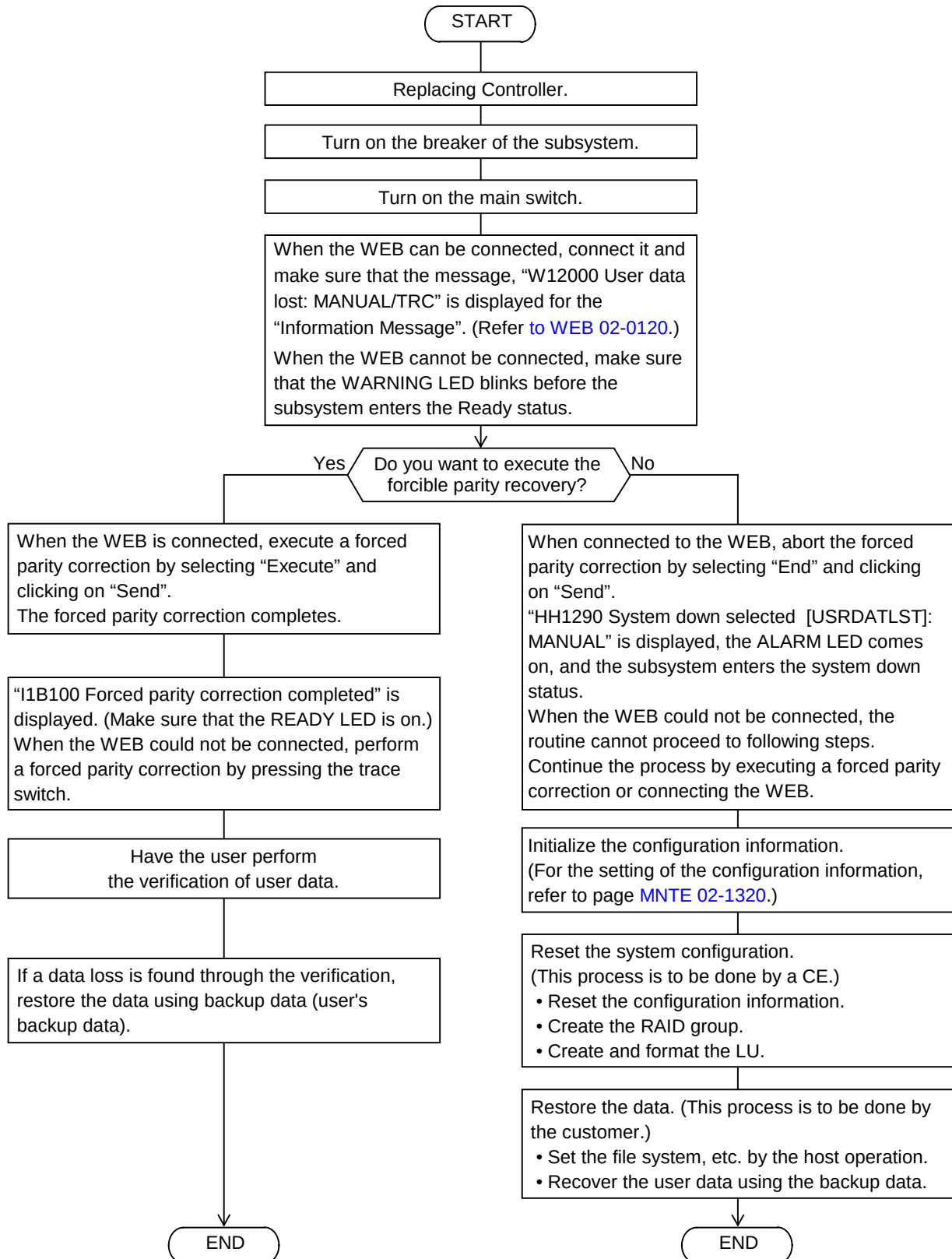


**Figure 1.1.3 Procedure for the Process to be Performed
when the BACK UP LED cannot be turned off**

1.2 How to Open/Close Door or Attach/Remove Front Bezel of the Subsystem

1.2.1 How to attach/remove front bezel of floor model



Attach or remove the front bezel carefully following the procedure. Otherwise, you may hurt your fingers by pinching them.

A key is necessary to attach or remove the front bezel.

The key for the Floor model H1F or Floor model H2F are kept in the place accessible when the window of the front bezel is opened. (See Figure 1.2.1.)

The key of the model MK subsystem is kept being hung on the hook screw above the upper fan unit on the rear side of the subsystem. If not, borrow it from a system administrator.

(1) Procedure for removal

- (a) Insert the key into the keyhole of the front bezel, and turn it in the direction shown by the arrow① (→).
- (b) Holding the front bezel, slide the locking button in the direction shown by the arrow② (→).
- (c) Remove the front bezel by pulling left side of it toward you and moving to the left ③ (→) to disengage the two hooks.

(2) Procedure for attachment

- (a) Make sure that the keyhole is in the unlocking position (the slit of the keyhole is at the unlocking position.). If not, insert the key into the keyhole, and turn it in the direction shown by the arrow①(→) to put the keyhole in the unlocking state.
- (b) After making the hooks of the front bezel engaged, press the bezel against the main body until it is stopped.
- (c) Fix the front bezel by turning the key in the direction shown by the arrow④ (<.....).

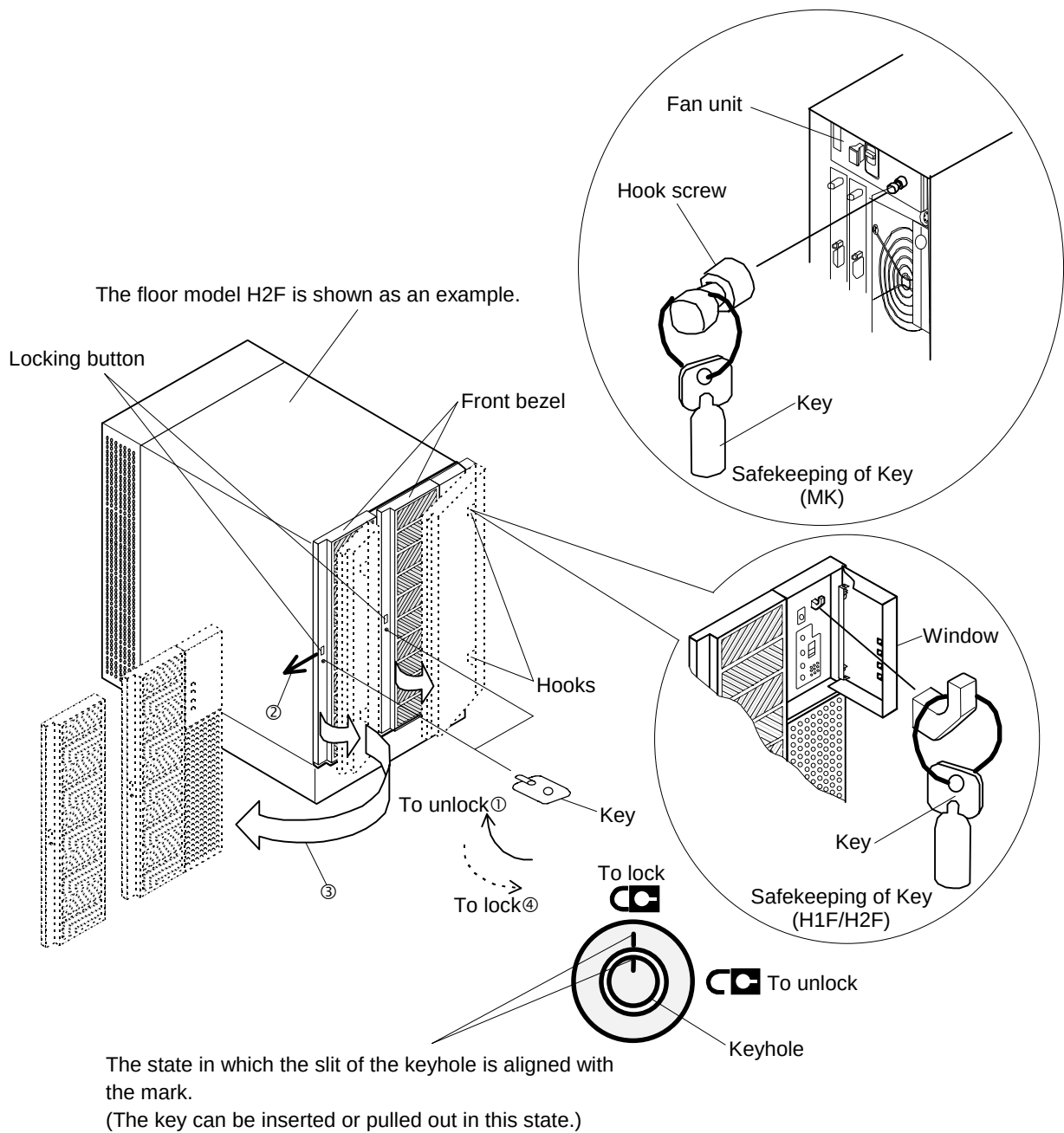
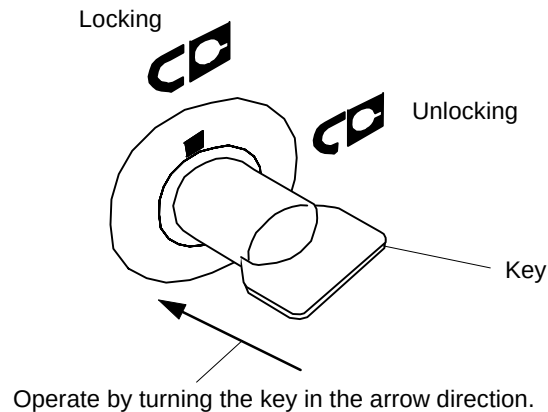
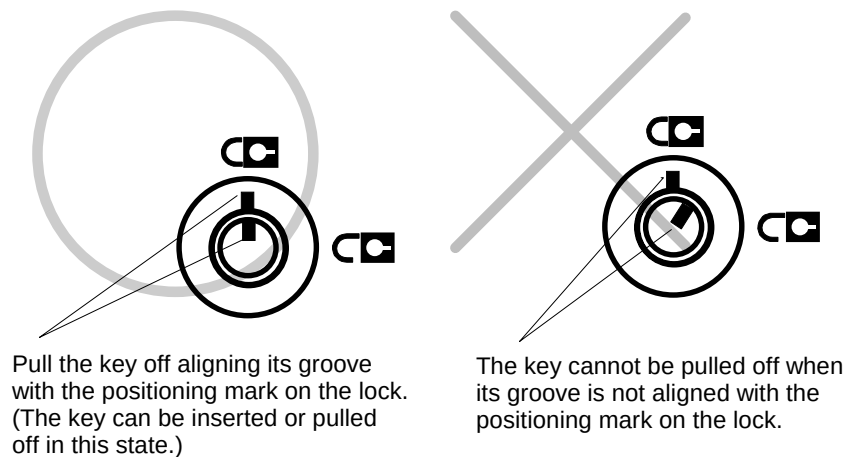


Figure 1.2.1 Procedure for Attaching/Removing Front Bezel

Notice : (1) 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.



(2) 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.

1.2.2 How to attach/remove rear cover of floor model



Attach or remove the rear cover carefully following the procedure. Otherwise, you may hurt your fingers by pinching them.

Each of the Floor model H1F and Floor model H2F has the rear cover. Procedures for installing and removing the cover are shown below.

(1) Procedure for removal

- (a) Hold the rear cover with your both hands.
- (b) Pull the bottom of the rear cover toward you (in the direction shown by the arrow ①) to disengage the ball catches.
- (c) Move the rear cover which is in the above-mentioned status upward (in the direction shown by the arrow ②), then the rear cover is detached from the upper hanger and can be removed.

(2) Procedure for attachment

- (a) Hold the rear cover with your both hands.
- (b) Make the rear cover be detached from the upper hanger.
- (c) Then, fix the rear cover which is in the status above by making the ball catches engaged and pushing the rear cover against the main body.

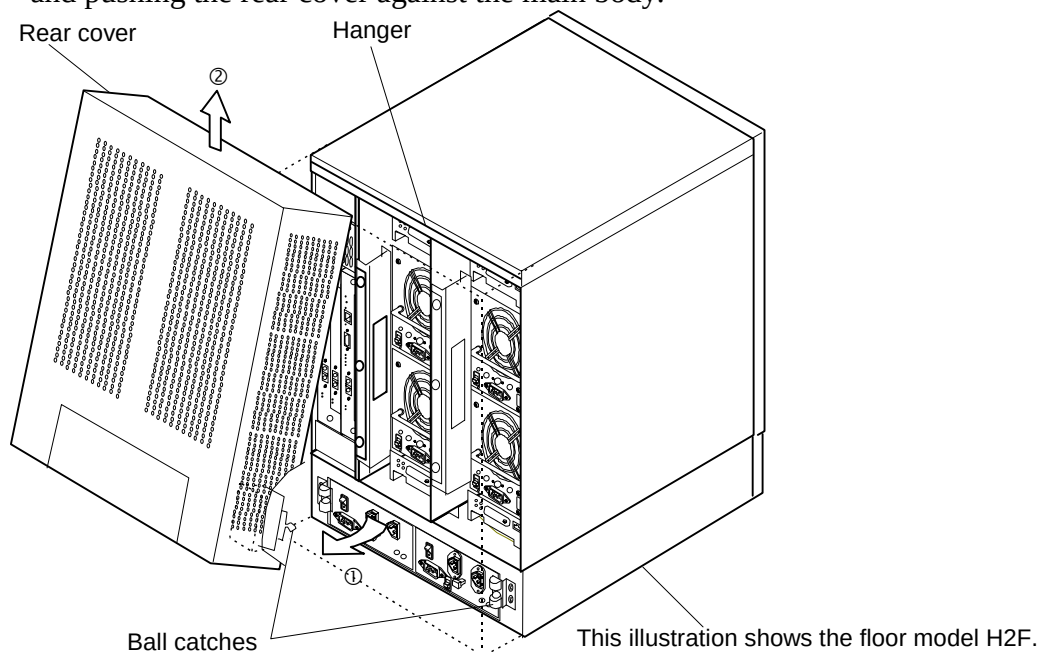


Figure 1.2.2 Procedure for Attaching/Removing Rear Cover

1.2.3 How to attach/remove front bezel of the RK/RKA/RKL



Attach or remove the front bezel carefully following the procedure. Otherwise, you may hurt your fingers by pinching them.

A key is necessary to attach or remove the front bezel.

Each of the rackmount model RK and rackmount model RKA has the rear cover.

Procedures for installing and removing the cover are shown below. (See Figure 1.2.3.)

The key of the model MK subsystem is kept being hung on the hook screw above the left fan unit on the rear side of the subsystem. If not, borrow it from a system administrator.

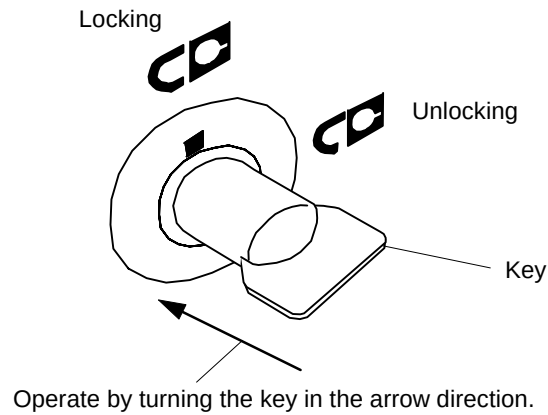
(1) Procedure for removal

- (a) Insert the key into the keyhole of the front bezel, and turn it in the direction shown by the arrow① (→).
- (b) Holding the front bezel, slide the locking button in the direction shown by the arrow② (→).
- (c) Remove the front bezel by moving it upward in the direction shown by the arrow③ to disengage the two hooks.

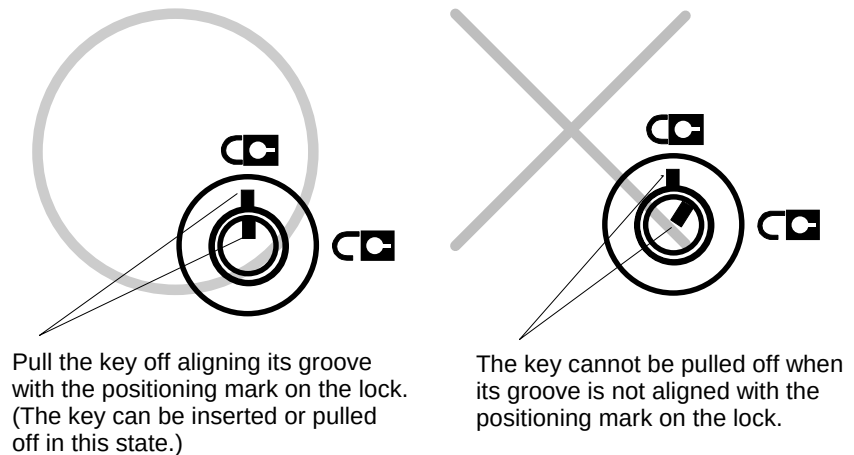
(2) Procedure for attachment

- (a) Make sure that the keyhole is in the unlocking position (the slit of the keyhole is in the unlocking position). If not, insert the key into the keyhole, and turn it in the direction shown by the arrow① (→) to put the keyhole in the unlocking state.
- (b) Attach the front bezel making the hooks of it engaged, and pressing it against the main body.
- (c) Fix the front bezel by turning the key in the direction shown by the arrow④ (<.....).

Notice : (1) 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.



(2) 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.

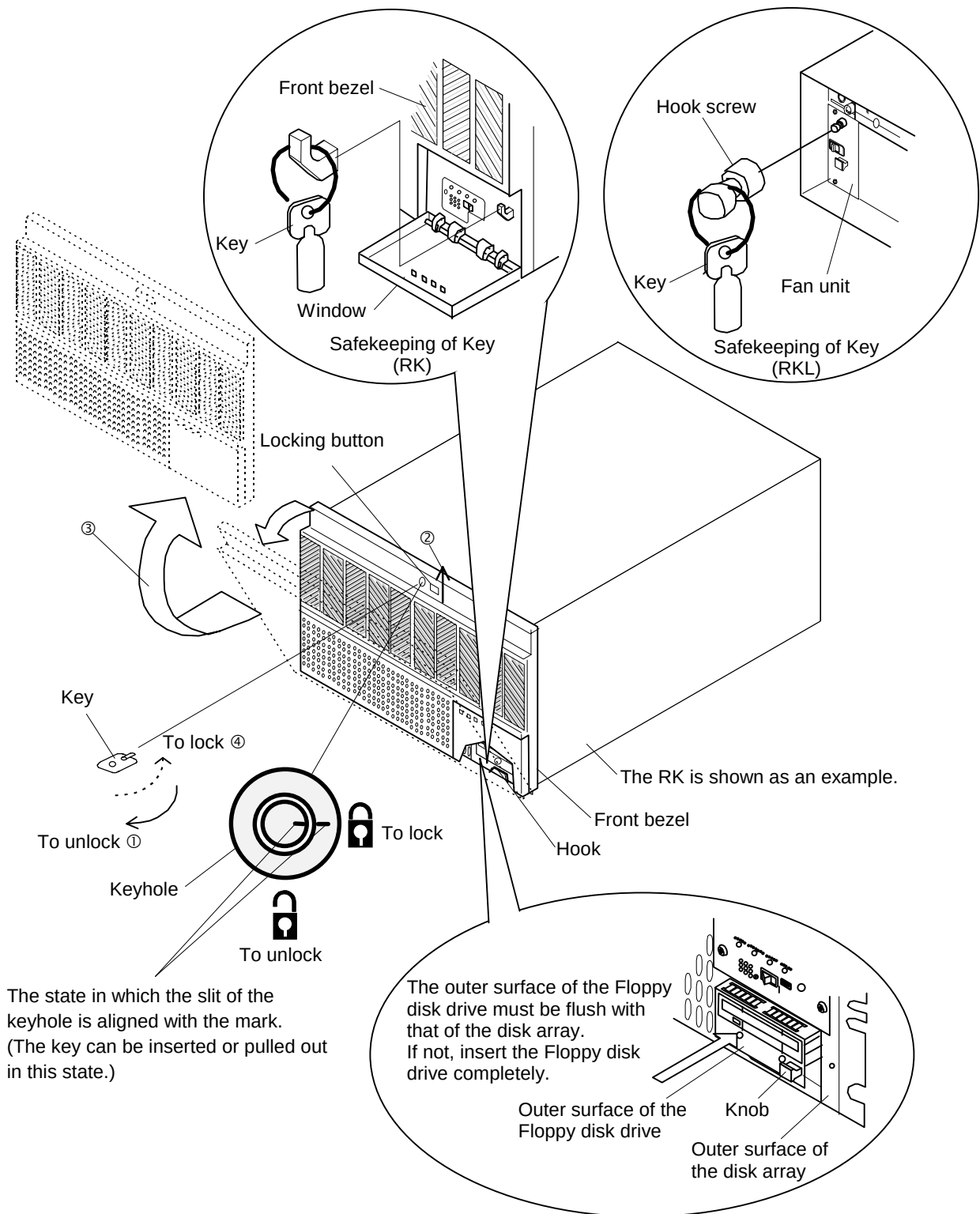
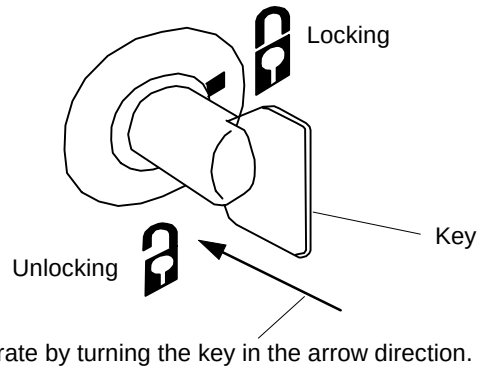
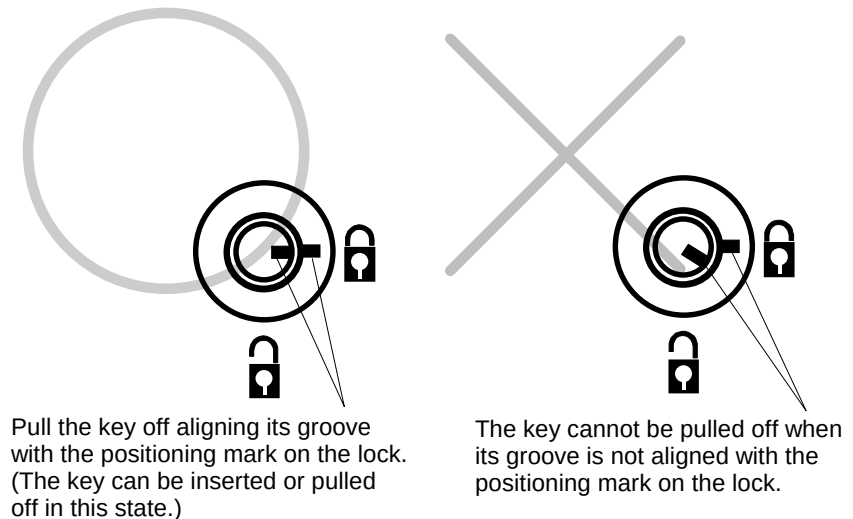


Figure 1.2.3 Procedure for Attaching/Removing Front Bezel

Notice : (1) 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.



(2) 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.

1.2.4 How to open/close the door of U6 rack frame



Open or close the door carefully following the procedure.

Otherwise, you may hurt you fingers by pinching them.

(1) Procedure for opening the rear door

- (a) Fit an allen wrench in the key socket on the rear door, turn the allen wrench in the direction shown by the arrow (—→), and open the rear door slowly leaving the wrench as it is.

(2) Procedure for closing the rear door

- (a) To close the rear door, fit the allen wrench in the key socket on the door, turn the wrench in the direction shown by the arrow (—→), press the door against the main body leaving the wrench as it is, and then turn the wrench in the direction shown by the arrow (·····>) to return it to its original state.
- (b) Make sure that the rear door is latched and cannot be opened.

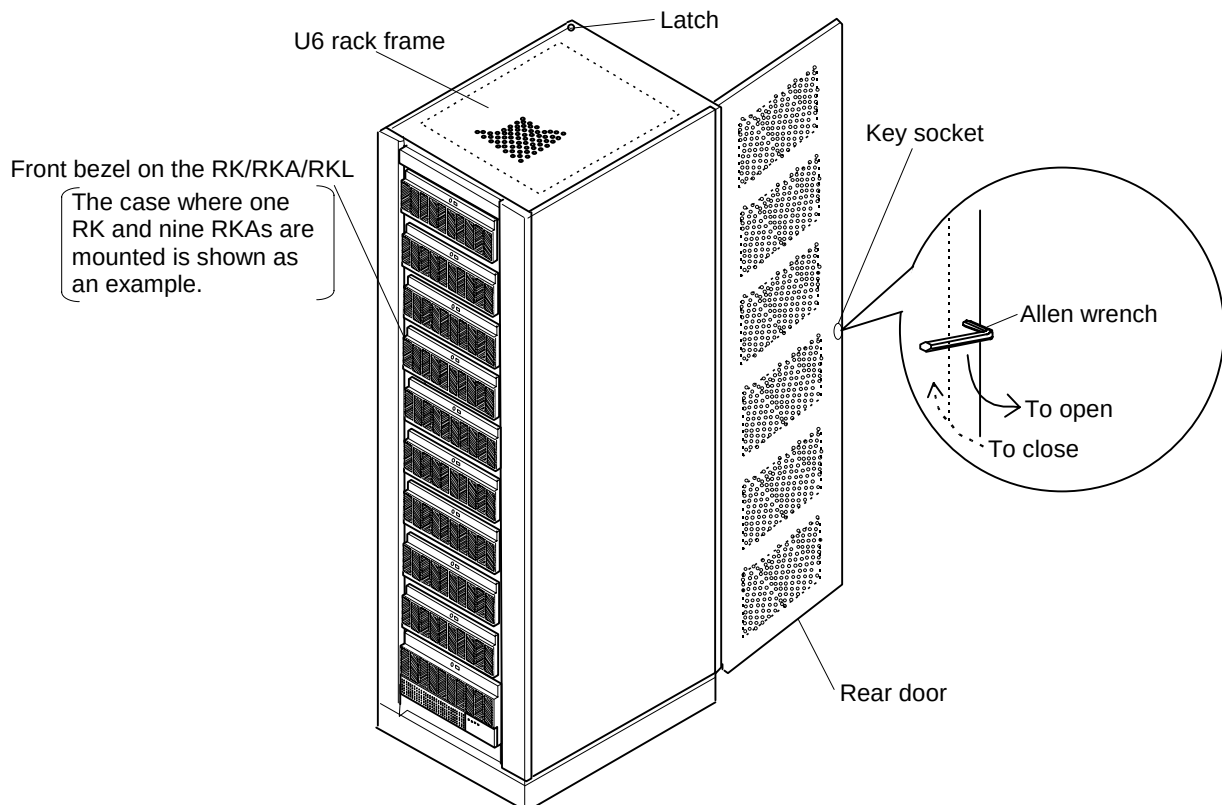


Figure 1.2.4 Procedure for Opening/Closing Rear Door

1.2.5 How to open/close the door of U4 rack frame



Open or close the door carefully following the procedure.

Otherwise, you may hurt you fingers by pinching them.

(1) Procedure for opening the rear door

- (a) Fit the key in the keyhole on the rear door and turn the key in the direction of the arrow (→) to unlock the door.
- (b) Press the upper part of the latch and open to the arrow (↶) the rear door.

(2) Procedure for closing the rear door

- (a) To close the door, close each door slowly in the direction of the arrow (↷) and press the door until the latched.
- (b) Fit the key in the keyhole on the rear door and turn the key in the direction of the arrow (←) to lock the door.

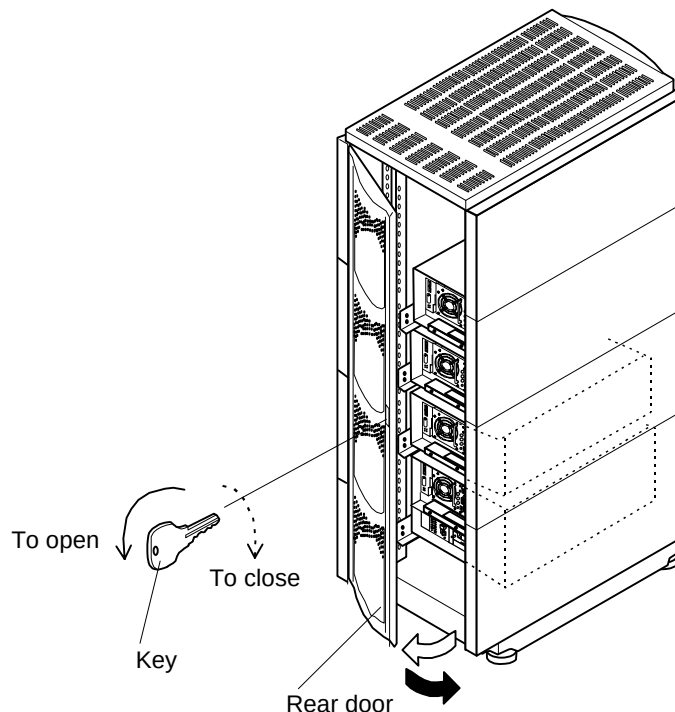
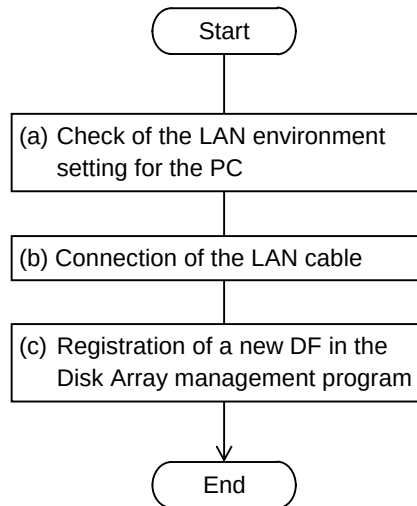


Figure 1.2.5 Procedure for Opening/Closing Rear Door

1.3 Connecting a Service PC and the Subsystem

When connecting a subsystem , follow the flowchart below.



(1) Checking the LAN environment setting

- (a) Make sure that the Disk Array management program has been installed. (Make sure that the activation file startmgr. bat exists.)
- (b) Checking the LAN environment setting for the PC
 - Make sure that the following settings have been made or change the settings to the following.

No.	Network parameter	Setting of the PC environment	Setting of the LAN environment of the subsystem
1	IP Address	192.168.0.■ ^(*)	192.168.0.16
2	Subnet Mask	255.255.255.0	255.255.255.0
3	Default MASK	No setting is needed.	0.0.0.0
*1 : For the "■", set any value (1 to 254) which is not duplicate with that of the subsystem.			

- The default setting values for the subsystem when shipped from the factory are:
IP address = 193.168.0.16 and Subnet mask = 255.255.255.0.

(2) Connecting the LAN cable

Notice : In the case of a new introduction, connect the LAN cross cable to the LAN connector of the Controller, and make a field-adjustment. (If the field-adjustment is made via the Hub using the LAN cross cable, it may not be made normally because IP addresses of the Controllers#1 and #2 are the same.

Connect LAN connectors of the Controller#0 of the subsystem and a PC.

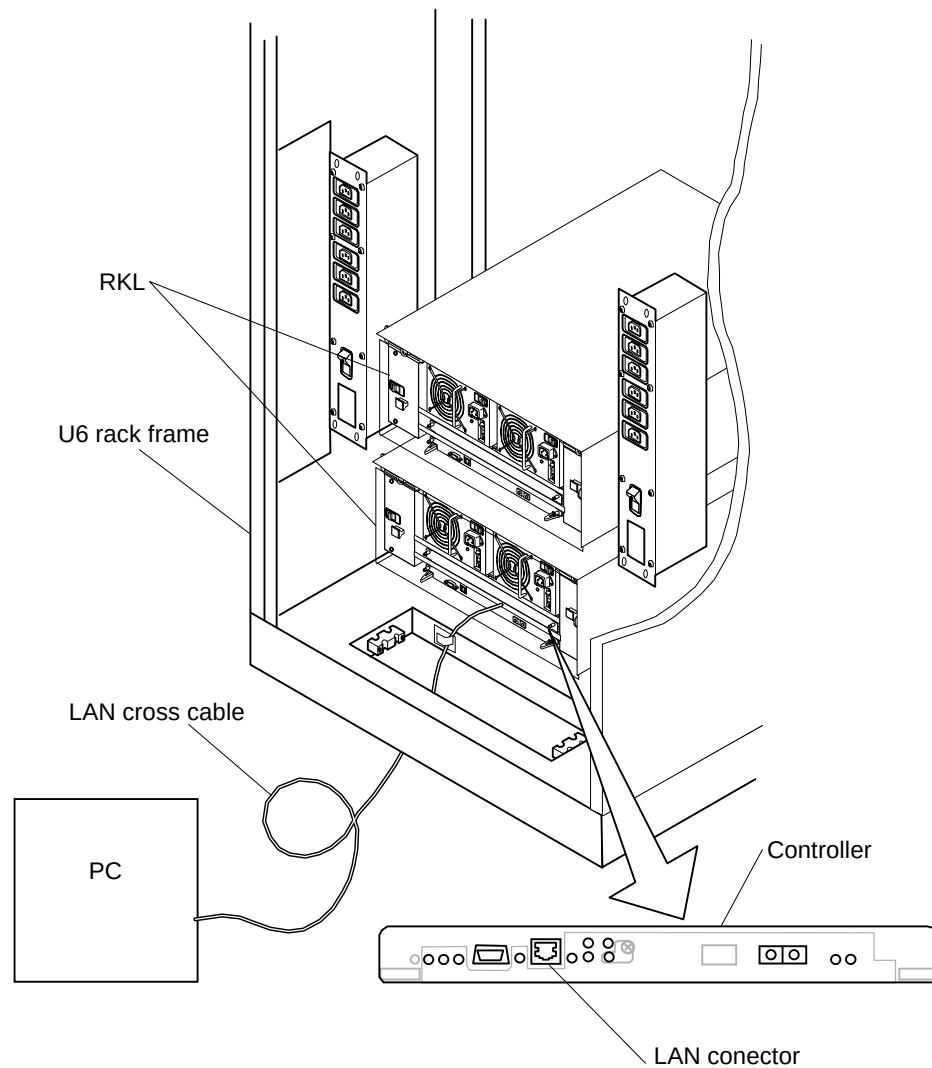


Figure 3.10.1 Connecting the LAN Cable

(3) Registering DF newly introduced

(3-1) When the Disk Array management program 2 is used

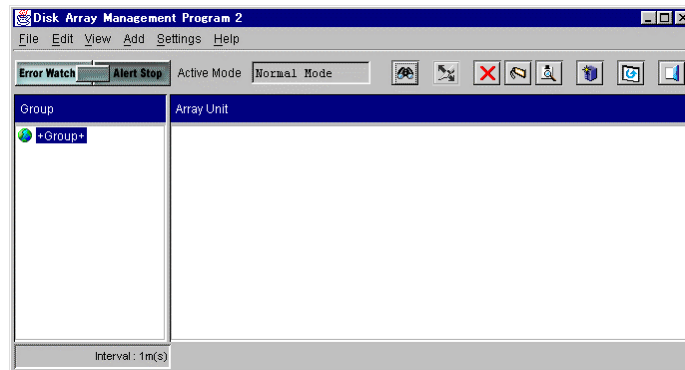
(a) Activating the Disk Array management program 2

- (i) Execute the batch file or shell script for activating the Disk Array management program 2.

In the case of Windows, activate the batch file, startmgr2.bat.

In the case of Solaris or IRIX, activate the shell script, startmgr^(‡1).

- (ii) The Disk Array management program 2 is activated in the Monitor mode and the main window is displayed^(‡2).



In the case of Windows, the prompt window is also displayed.

Close the prompt window because it has nothing to do with the operation of the Disk Array management program 2.

You can do the “Icon Minimization” or “Program Quitting” automatically by specifying the “Icon Minimization” or “Program Quitting” for the property of the batch file.

You can execute the display of the Disk Array management program 2 operation mode and state of the failure monitoring and the following functions in the main window.

For the operation of each function, refer to the page explaining each function.

- Registration of the disk array subsystem (registration, deletion, change, and properties display)
- Execution of the failure monitoring and setting of the failure monitoring option
- Change of the Active mode
- Setting and change of the login password for the “Management” mode
- Display of the version

When changing the operation mode, execute the “Change Mode”.

‡1 : When activating the batch file or shell script, execute the batch file or shell script under the same directory as that of the program of the Disk Array management program.

‡2 : The mode change cannot be done at the time of the initial activation of the Disk Array management program 2. A registration of a password validates the mode change.

(b) Changing the management mode

The Disk Array management program 2 has two modes, the Normal mode and the Management mode.

In the Normal mode, the configuration and status of the disk array subsystem are displayed.

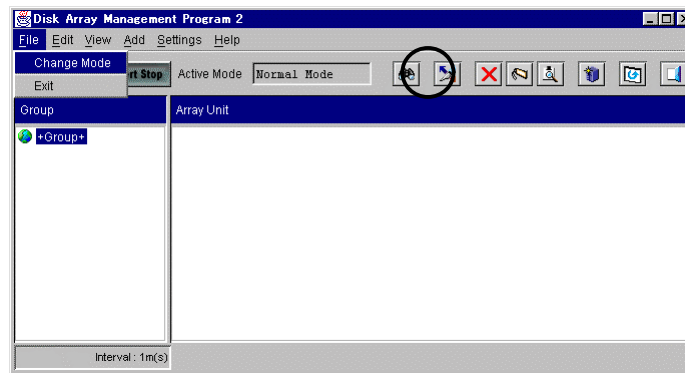
In the Management mode, the configuration of the disk array subsystem can be set in addition to the functions of the Monitor mode.

(i) Changing the Normal mode to the Management mode

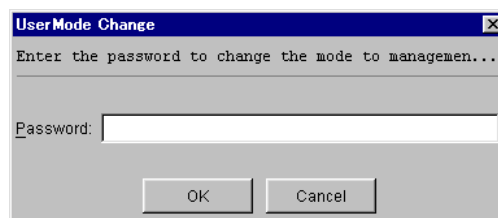
Change the Management mode from the Normal mode to the Maintenance mode.

When the log-in has been made in the Normal mode, [Normal mode] is displayed as a detailed information of the [Active mode] in the upper part of the main window.

- ① Select [File] – [Change Mode] in the main window or click  : Change Mode].



- ② The window for the password entry is displayed. Enter a password and click [OK] button.



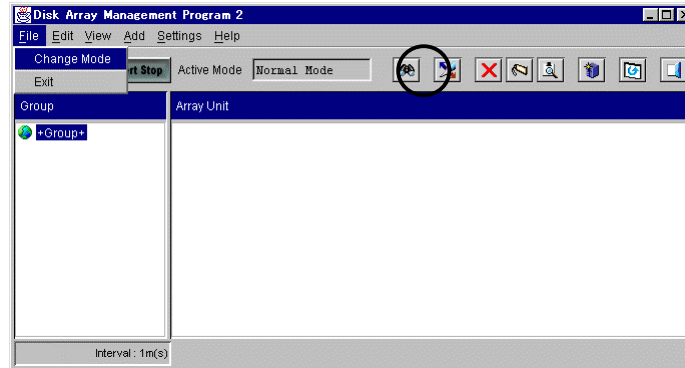
- ③ [Maintenance mode] is displayed for the [Active mode] in the upper part of the main window. When the unit window is displayed, the Disk Array management program 2 operates in the Maintenance mode.

(ii) Changing the Management mode to the Normal mode

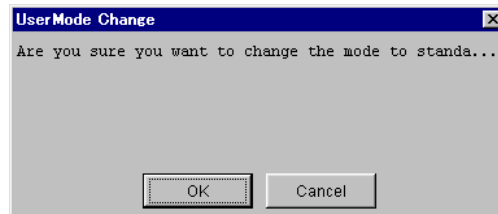
Change the Management mode from the Normal mode to the Active mode.

When the log-in has been made in the Management mode, [Management mode] is displayed as a detailed information of the [Active mode] in the upper part of the main window.

- ① Select [File] – [Change Mode] in the main window or click : Change Mode].



- ② The message asking for the confirmation is displayed. Click [OK] button.

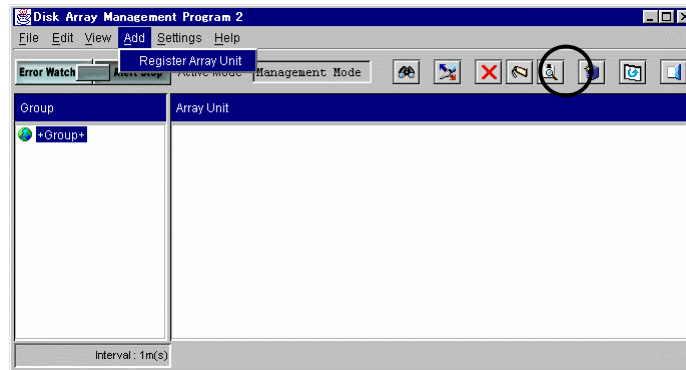


- ③ [Normal mode] is displayed for the [Active mode] in the upper part of the main window. When the unit window is displayed, the Disk Array management program 2 operates in the [Normal Mode].

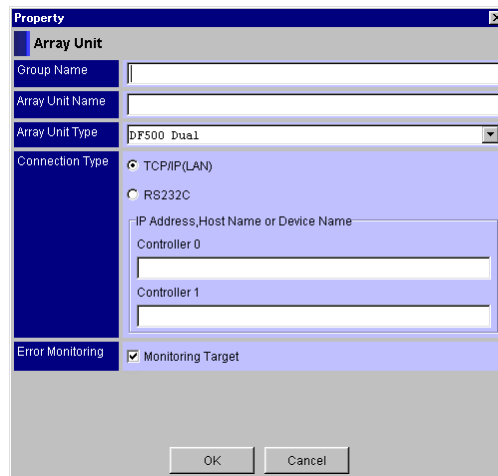
(c) Registering the disk array subsystem

Register the disk array subsystem to be operated in order to operate it from the Disk Array management program 2. A temporary registration of the disk array subsystem which does not exist cannot be done.

- (i) Select [Registering Array Unit] in the main window or click  : Array Unit Registering].



- (ii) Enter the information for the registration and click the [OK] button^(†1).



Notice : The disk array subsystem with the dual system can also be used with a single Controller only. [Array Unit Type] is used to select a type of the subsystem to be connected. For [IP Address, Host Name, or Device Name], enter information of the connected Controller only.

[Group Name] : Specify group names when applying group control to the disk array subsystems. Specify each of them with 16 or less half size alphabetic characters, numerals, and/or symbols (- and/or _). The maximum number of the groups allowed to be registered is 200. The entrance of the group names is not necessary when the group control is not applied to the disk array subsystems.

[Array Unit Name] : Specify a disk array subsystem name to be registered. Specify it with 16 or less half size alphabetic characters, numerals, and/or symbols (- and/or _).

[Array Unit Type] : Select a type of the disk array subsystem.

[Connection Type] : Select a type of the connection to be used for the disk array subsystem. Select [TCP/IP (LAN)].

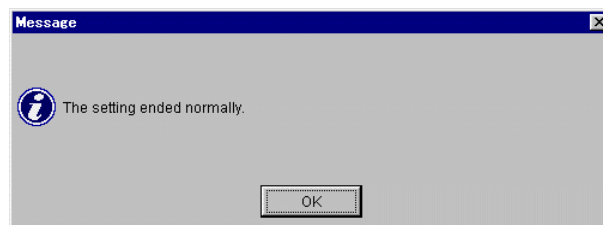
[IP Address, Host Name, or Device Name]

Specify connection information on each of the Controllers 0 and 1.

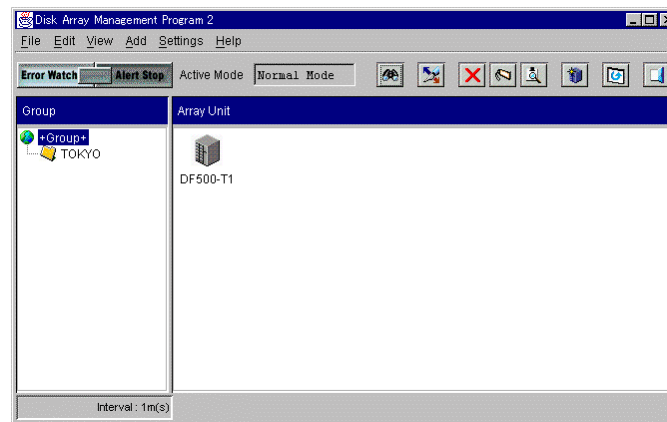
Specify an [IP Address] or [Host Name] when [TCP/IP (LAN)] has been selected for the [Network]

[Error Monitoring] : Set whether to apply the failure monitoring or not. Checking off the box: The failure monitoring is applied. Not checking off the box: The failure monitoring is not applied.

(iii) Since a message informing of a completion of the registration is displayed, click the [OK] button.



(iv) The updated main window is displayed.



When an entry has been made in [Group Name], the group name is displayed in the tree diagram on the right side of the window. A clicking on the group name displays an icon(s) of the disk array subsystem(s) registered in the group. There are two types of icon of the disk array subsystem as shown below: an icon for the dual system and that for the single system.

• Icon for the dual system :



• Icon for the single system :



The icons of the disk array subsystem are displayed in the order of the registration of the disk array subsystems.

- (3-2) Registering the newly introduced DF in the Disk Array management program
- (a) Activating the Disk Array management program
- (i) Execute the batch file or shell script for activating the Disk Array management program.
- In the case of Windows, activate the batch file, startmgr.bat.
In the case of Solaris or IRIX, activate the shell script, startmgr^(‡1).
- (ii) The Disk Array management program is activated in the Monitor mode and the main window is displayed^(‡2).



In the case of Windows, the prompt window is also displayed.

Close the prompt window because it has nothing to do with the operation of the Disk Array management program.

You can do the “Icon Minimization” or “Program Quitting” automatically by specifying the “Icon Minimization” or “Program Quitting” for the property of the batch file.

You can execute the display of the Disk Array management program operation mode and state of the failure monitoring and the following functions in the main window.

For the operation of each function, refer to the page explaining each function.

- Registration of the disk array subsystem (registration, deletion, change, and display)
- Execution of the failure monitoring and setting of the failure monitoring option
- Change of the operation mode
- Setting and change of the login password for the “Management” mode
- Display of the version

When changing the operation mode, execute the “Change Mode”.

‡1 : When activating the batch file or shell script, execute the batch file or shell script under the same directory as that of the program of the Disk Array management program.

‡2: When the manager is activated for the first time, the [Change Mode] button is displayed in half tone. You can make the [Change Mode] button effective by clicking the [Password Change] button and registering the password.

(b) Changing the management mode

The Disk Array management program has two modes, the Monitor mode and the Management mode.

In the Monitor mode, the configuration and status of the disk array subsystem are displayed.

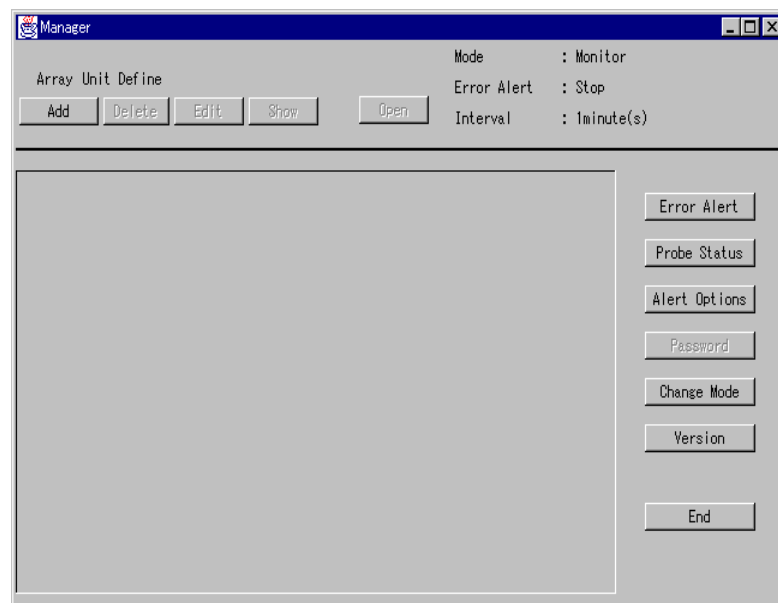
In the Management mode, the configuration of the disk array subsystem can be set in addition to the functions of the Monitor mode.

(i) Changing the Monitor mode to the Management mode

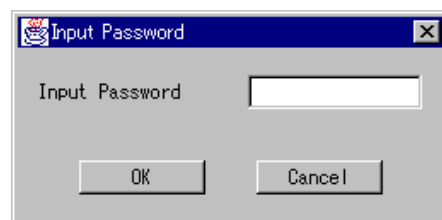
Change the operation mode from the Monitor mode to the “Management” mode.

When the login has been made in the Monitor mode, “Monitor Mode” is displayed on the right of the “Mode” on the upper right in the main window.

- ① Click the [Change Mode] button in the main window.



- ② The window for the password entry is displayed. Enter a password and click [OK] button.



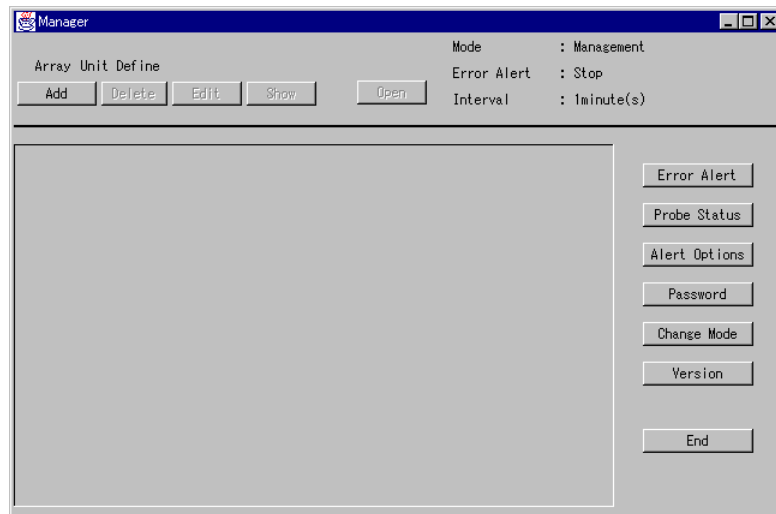
- ③ [Management Mode] is displayed on the right of the [Mode], and the Disk Array management program operates in the Management mode.

(ii) Changing the Management mode to the Monitor mode

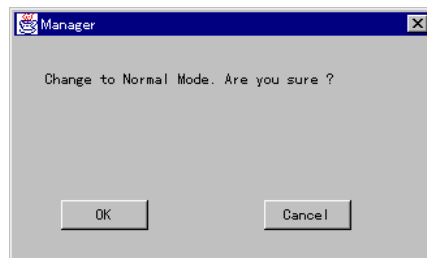
Change the operation mode from the Management mode to the Monitor mode.

When the login has been made in the Management mode, “Management” mode is displayed on the right of the “Mode” on the upper right in the main window.

- ① Click the [Change Mode] button in the main window.



- ② The message asking for the confirmation is displayed. Click [OK] button.

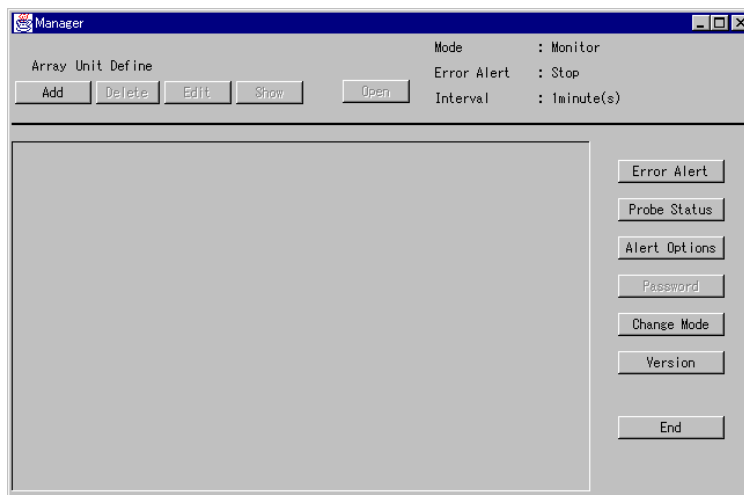


- ③ [Monitor Mode] is displayed on the right of the [Mode], and the Disk Array management program operates in the Monitor mode.

(c) Registering the disk array subsystem

Register the disk array subsystem to be operated in order to operate it from the Disk Array management program. A temporary registration of the disk array subsystem which does not exist cannot be done.

- (i) Click the [Add] button in the main window.



- (ii) Enter the information for the registration and click the [OK] button^(‡1).

No.	Item		Setting
1	Unit name		DF500
2	Group name		Not needed
3	Array unit type		DF500 Dual
4	Connection mode		LAN
5	Controller 0	IP address	192.168.0.16 ^(*)
6	Controller 1	IP address	Not needed
7	Failure monitoring		OFF
*1 : The default setting values for the subsystem when shipped from the factory are: IP address = 193.168.0.16 and Subnet mask = 255.255.255.0.			

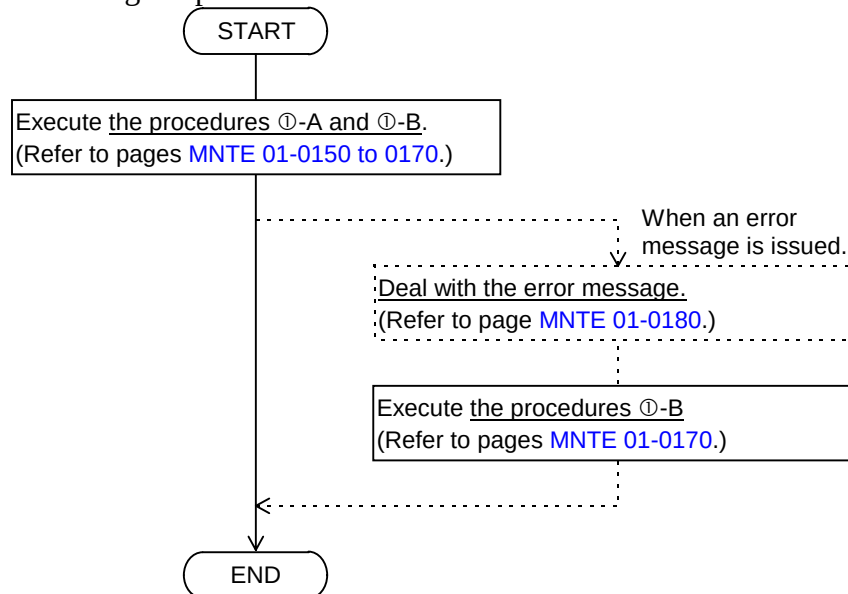
‡1: In the disk array subsystem with the dual system, only one Controller can be used. For the “Disk Array Subsystem Model”, select a model of the disk array subsystem to be connected. For the “Controller 0 IP address/Host name/Device name” and “Controller 1 IP address/Host name/Device name”, make the entry for the connected Controller only.

1.4 Backing Up and Restoring System Parameters

When replacing a part, there may be a case where system parameters (target ID, buzzer setting, disk drive recovery mode, etc.) must be backed up or restored. In this case, perform “system parameter backup to FD” or “system parameter restoration from FD”. (The RAID group setting and LU setting are not included in the backup or restoration of the system parameters.)

1.4.1 System parameters backup

Operate following the procedure below.



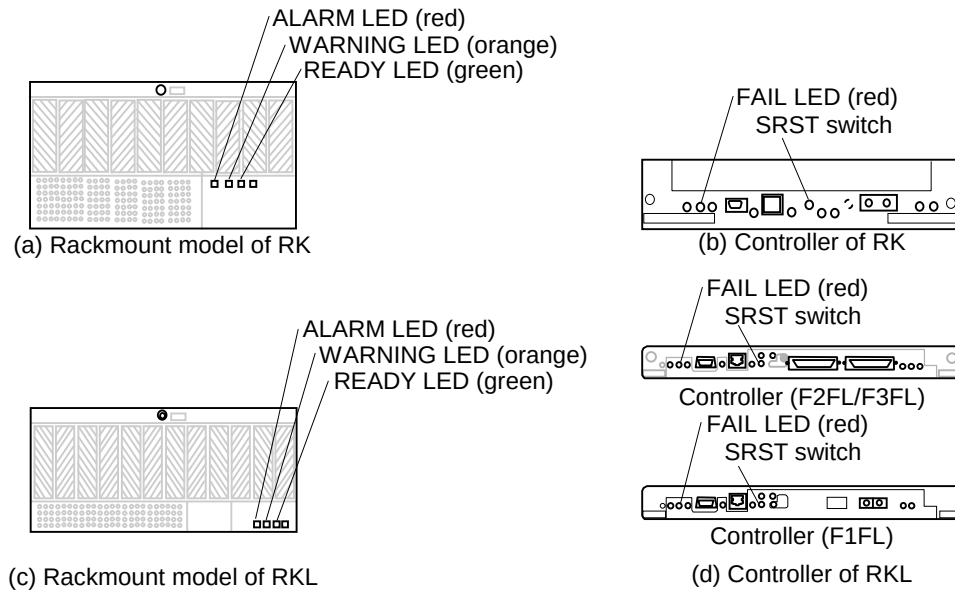
- Notice :
- Use an MS-DOS formatted 3.5-inch FD (1.44 Mbytes) when backing up the system parameters to an FD. Note that backup data on the FD is overwritten.
 - Even if the FD, which was used for the backed up of the system parameters, is left inserted in the Floppy disk drive in the subsystem after the backed up has been completed, no malfunction of the subsystem occurs.
 - The system parameters are stored in the backup FD with a file name “SYSP500. DAT” or “SYSP501.DAT”.

Operate following the procedure below.

[Procedure ①-A] Preparation for the setting

- (a) Turn off the main switch and make sure that the POWER LED goes off.
- (b) Turn on the subsystem power.
- (c) Proceed to the procedure starting from the step (d) after making sure that the READY LED (green) or ALARM LED (red) on the subsystem are on. (Also proceed to the procedure starting from the step (d) in the case where the READY LED (green) and ALARM LED (red) do not come on after waiting for ten minutes when the power is turned on.) (Refer to Figure 1.3.1.)
- (d) Please confirm that WARNING LED (bitter orange) of RK front bezel is not flickering with the high speed (125 ms the intervals).
Please wait for a while (longest about 80 seconds), if it is flickering at high speed. The high speed flickering disappears. As for the low speed (1 second the interval) flickering, there is not a problem.
- (e) Changing the maintenance mode.
 - Single Controller
Press the SRST switch of the single Controller.
 - Dual controller
 - (i) Press the SRST switch of the Controller#0.
 - (ii) Wait for a while (about ten seconds) and press the SRST switch of the Controller#1 immediately (within ten seconds) after the FAIL LED (red) of the Controller#0 comes on.
(Sometimes the buzzer may beeps when the SRST switch is pressed, however, you do not have to stop it until these operations are completed.)
When the FAIL LED of the Controller #0 does not go out in spite of the above operation, power off the subsystem, return to step (b) without pulling out nor insert the Controller, and execute the procedure over again.

Notice : Because the Controller is shutdown status for the Maintenance Mode, the command from the host is impossible execution.
Please change it to the Maintenance Mode after the confirmation of separation of the device from the host or shutdown of the host.

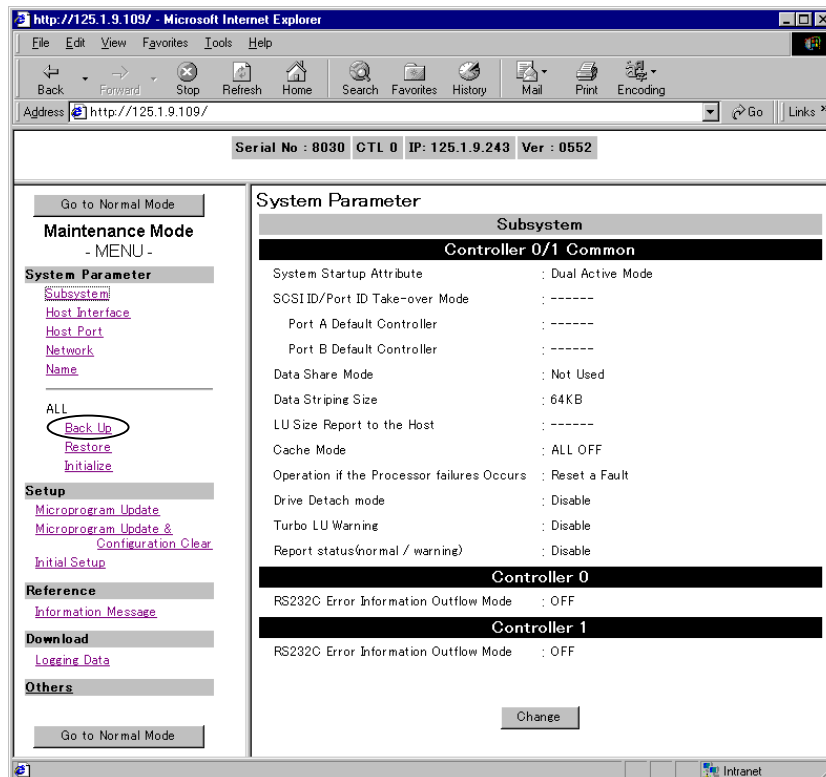
**Figure 1.3.1 Indication Locations of LED**

- (f) Enter the IP address of the controller which performs the backing up of the system parameters.



When the IP address has already been entered, update the display of the browser.

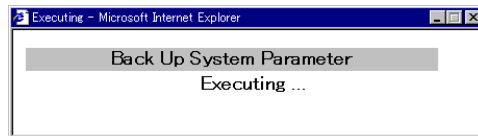
- (g) The maintenance window of the WEB is displayed.



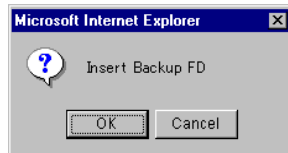
- Go to the [Procedure ①-B] on page [MNTE 01-0170](#).

[Procedure ①-B] Procedure for backing up

- (a) Click on “Back Up” under “System Parameter” in the menu frame in the maintenance window of the WEB.



- (b) Further, the following window is additionally displayed to request to insert an FD for backing up the configuration information.



- (c) Insert the FD for backing up the system parameters into the Floppy disk drive of the subsystem, and click the [OK] button. Then, only the window shown in step (a) remains on the screen showing that the backing up of the system parameters to the FD is being executed.
- (d) When the backing up completes normally, the following window is displayed. Click the [OK] button.



- When an error message is displayed during the execution of the backing up, go to [Dealing with an error message] on page [MNTE 01-0180](#).

[Dealing with an error message]

When an error message is displayed during an execution of a system parameter backing up to an FD, operate following the procedure below.

- (a) When an error occurs during an execution of a system parameter backing up to an FD, the following message is displayed. Click the [OK] button.

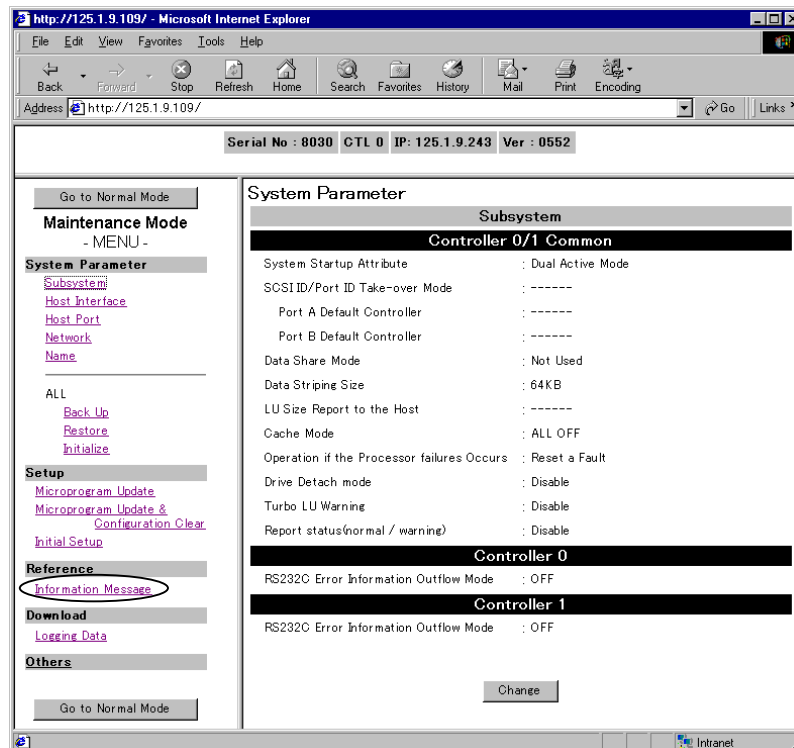


One of the following message may be displayed instead.

“Abnormal End File Write Error”
“Abnormal End FD Device Error”

One of the following message may be displayed instead.

- (b) Click on “Information Message” under “Reference” in the menu frame in the maintenance window of the WEB. Details of the error will be displayed.



A meaning of each error message and an action to be taken against it is shown below.

Error message	Meaning	Required action
"FD device install error"	An installation of an FD device failed.	Retry.
"FD device error"	A trouble occurred in the device.	Retry.
"FD not inserted"	The FD is not inserted.	Insert the FD.
"FD unformatted"	The FD is not formatted.	Format the FD.
"FD write protected"	The FD is write protected.	Remove the write protection.
"FD control error"	A trouble other than the above occurred.	Retry.
"File write error"	An error occurred during a writing onto the file.	Retry.

When one of the above message is displayed, the backing up of the system parameters to an FD is not executed. The backing up must be retried.

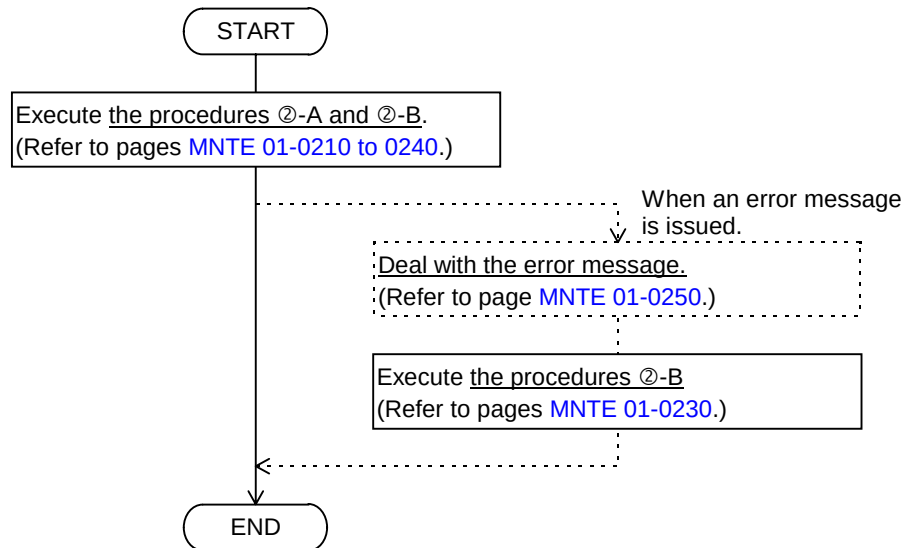
- Execute the [Procedure ①-B] on page [MNTE 01-0170](#).

1.4.2 Restoration system parameters.

The restoration of the system parameter is to be done by an operation from the WEB. However, in the case of the single Controller configuration, operation from the WEB is not necessary because contents on the FD are reflected on the system parameters on the Controller automatically at the time of the subsystem powering on when the FD used for backing up the system parameters is being inserted in the Floppy disk drive.

When the WEB cannot be connected because IP address of any one of the controllers is unknown in the case where it is necessary to replace the both Controllers, make the subsystem configuration the single Controller configuration by removing one of the Controllers, the Controller #1. Then, restore system parameters of the Controller #0. After that, make the subsystem have the both Controllers after powering off the subsystem, connect the WEB using the restored IP address, and restore the system parameters of the both Controllers.

Operate following the procedure below.



- Notice:
- Even if the FD, which was used for the restoration of the system parameters, is left inserted in the Floppy disk drive in the subsystem after the restoration has been completed, no malfunction of the subsystem occurs.
 - When the restoration of the system parameters fails, the system parameter information returns to the default one. Therefore, when the restoration fails, system parameters corresponding to the operation environment must be set following the procedure for setting the system parameters. (Refer to [Chapter 6, “Parameters Setting” in the Maintenance Manual for Installation.](#))

[Procedure ②-A] Preparation for the setting

- (a) Turn on the main switch of the subsystem.
- (b) Proceed to the procedure starting from the step (c) after making sure that the READY LED (green) or ALARM LED (red) on the subsystem are on. (Also proceed to the procedure starting from the step (c) in the case where the READY LED (green) and ALARM LED (red) do not come on after waiting for ten minutes when the power is turned on.) (Refer to Figure 1.3.2.)
- (c) Make sure that the WARNING LED (orange) is not blinking fast (at intervals of 125 ms). If it is blinking fast, wait for a while (80 seconds at the longest). It will cease to blink fast. There is no problem if it blinks slowly (at intervals of one second).
- (d) Changing the maintenance mode.
 - Single Controller
Press the SRST switch of the single Controller.
 - Dual controller
 - (i) Press the SRST switch of the Controller#0.
 - (ii) Wait for a while (about ten seconds) and press the SRST switch of the Controller#1 immediately (within ten seconds) after the FAIL LED (red) of the Controller#0 comes on.
(Sometimes the buzzer may beeps when the SRST switch is pressed, however, you do not have to stop it until these operations are completed.)
When the FAIL LED of the Controller #0 does not go out in spite of the above operation, power off the subsystem, return to step (a) without pulling out nor insert the Controller, and execute the procedure over again.

Notice : Because the Controller is shutdown status for the Maintenance Mode, the command from the host is impossible execution.
Please change it to the Maintenance Mode after the confirmation of separation of the device from the host or shutdown of the host.

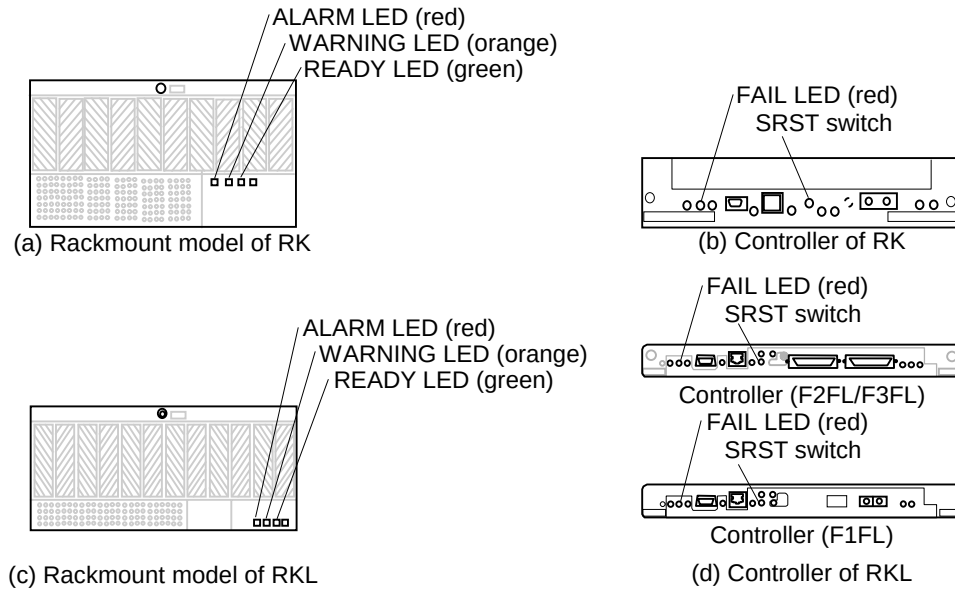


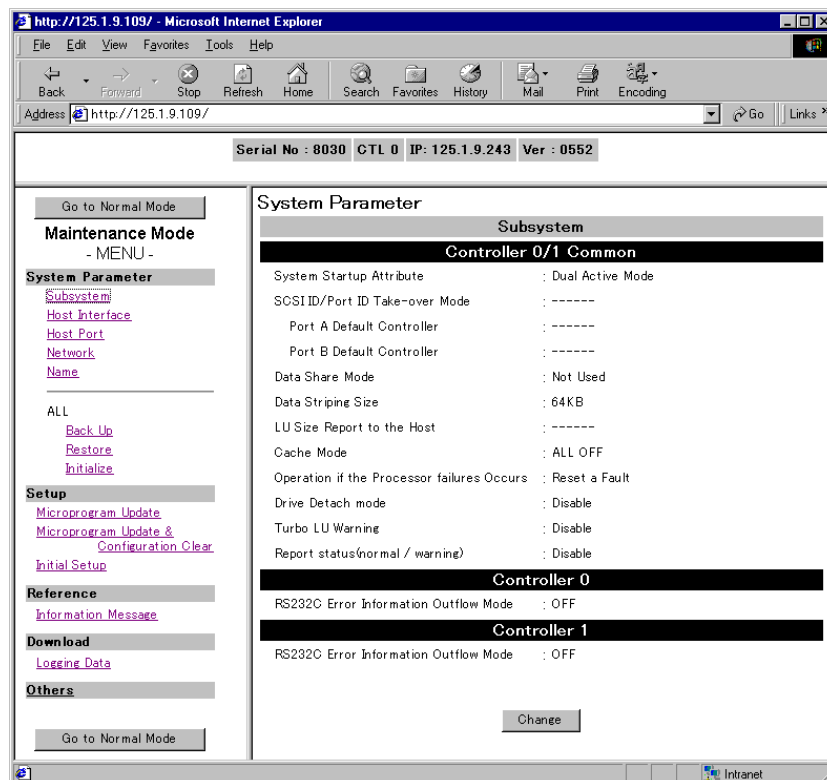
Figure 1.3.2 Indication Locations of LED

- (e) Enter the IP address of the controller which performs the restore of the system parameters.



When the IP address has already been entered, update the display of the browser.

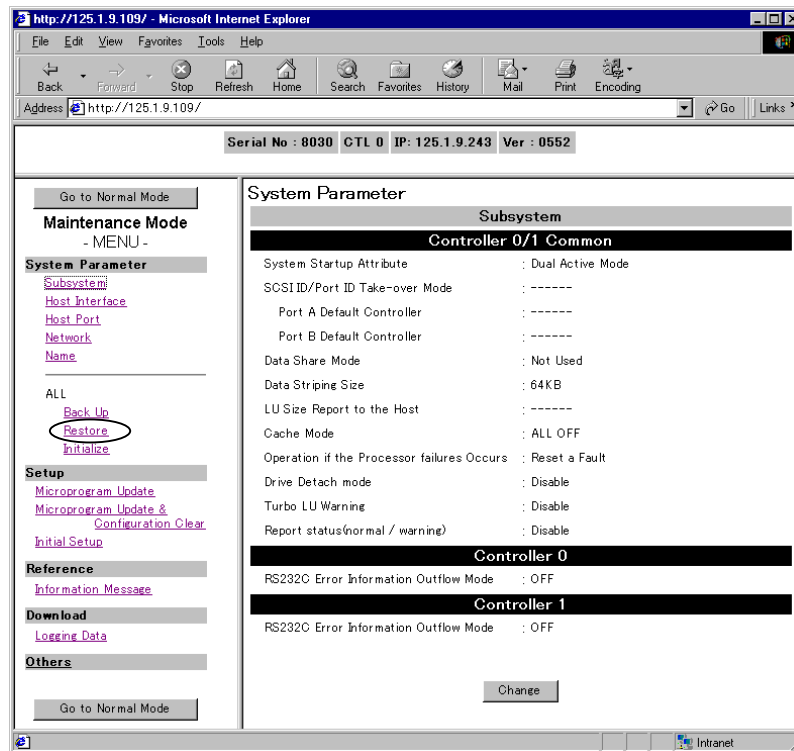
- (f) The maintenance window of the WEB is displayed.



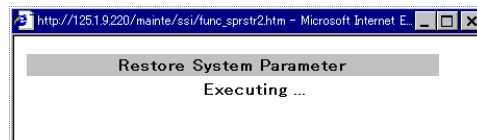
- Go to the [Procedure ②-B] on page [MNTE 01-0230](#).

[Procedure ②-B] Procedure for restore

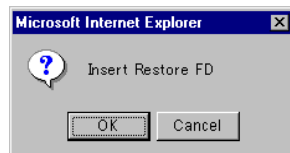
- (a) Click on “Restore” under “System Parameter” in the menu frame in the maintenance window of the WEB. Details of the error will be displayed.



The following window is displayed.



- (b) Further, the following window is additionally displayed to request to insert an FD for restoration.



(c) Insert the FD for restore the system parameters into the Floppy disk drive of the subsystem, and click the [OK] button. Then, only the window shown in step (a) remains on the screen showing that the restore of the system parameters to the FD is being executed.

(d) When the restore completes normally, the following window is displayed.

Click the [OK] button.



- When an error message is displayed during the execution of the restore, go to [Dealing with an error message] on page [MNTE 01-0250](#).

[Dealing with an error message]

When an error message is displayed during an execution of a system parameter backing up to an FD, operate following the procedure below.

- (a) When an error occurs during an execution of a system parameter backing up to an FD, the following message is displayed. Click the [OK] button.



One of the following message may be displayed instead.

“Abnormal End Bad FD Inserted”
 “Abnormal End Restore File Error”
 “Abnormal End Another File Error”
 “Abnormal End FD Device Error”

One of the following message may be displayed instead.

- (b) Click on “Information Message” under “Reference” in the menu frame in the maintenance window of the WEB. Details of the error will be displayed.

Error message	Meaning	Required action
“FD device install error”	The installation of the FD device terminated abnormally.	Retry.
“Bad FD inserted”	The restoration file cannot be found.	Insert the correct FD.
“FD not inserted”	The file was attempted to be opened, but the FD was not inserted.	Insert the FD.
“FD not inserted” “System parameter restore failed”	The file was attempted to be read, but the FD was not inserted.	Insert the FD.
“File read error” “System parameter restore failed”	A read error occurred in the inserted FD.	Retry.
“FD not inserted” “Another system parameter restore failed”	The file on the other Controller side was attempted to be read, but the FD was not inserted.	Insert the FD.
“File read error” “Another system parameter restore failed”	An error occurred in a reading from the file on the other Controller side of the inserted FD.	Retry.

When any of the above message is displayed, the restoration of the system parameters from an FD is not executed but the routine returns to the default step.

Reset the system parameters referring to [Chapter 6, “Parameters Setting” in the Maintenance Manual for Installation](#).

Chapter 2. Troubleshooting

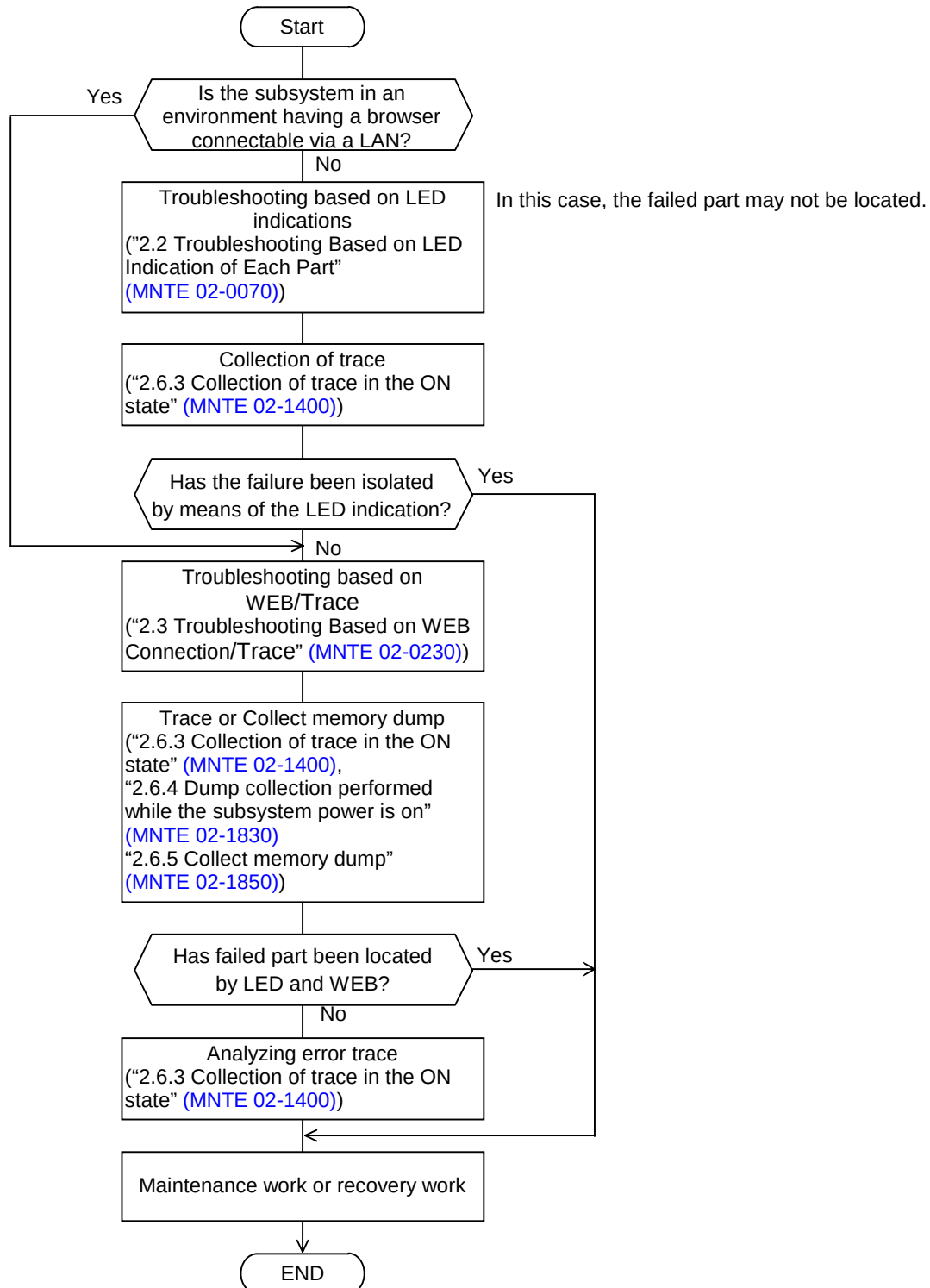
This chapter contains information on troubleshooting and recovery measures to be used when failures occur in the unit.

Illustrations in this section show cases of the rackmount model. They are the same for the floor model.

- 2.1 Troubleshooting Based on LED Indication of Front Bezel.....02-0040
- 2.2 Troubleshooting Based on LED Indication of Each Part 02-0070
- 2.3 Troubleshooting Based on WEB Connection/Trace 02-0230
- 2.4 Troubleshooting Based on Messages 02-0420
- 2.5 Details of Recovery Procedures 02-1060
- 2.6 Collecting Error Information.....02-1360
- 2.7 Procedure for Recovery from the Suspension Status (PSUE)
with MRCF-Lite Function.....02-1920

When a failure occurs, check to see if it is in the unit, in the power supply system of RK or RKA, or in the WEB browser.

The following is the flow of troubleshooting to be used when a failure occurs in the unit.

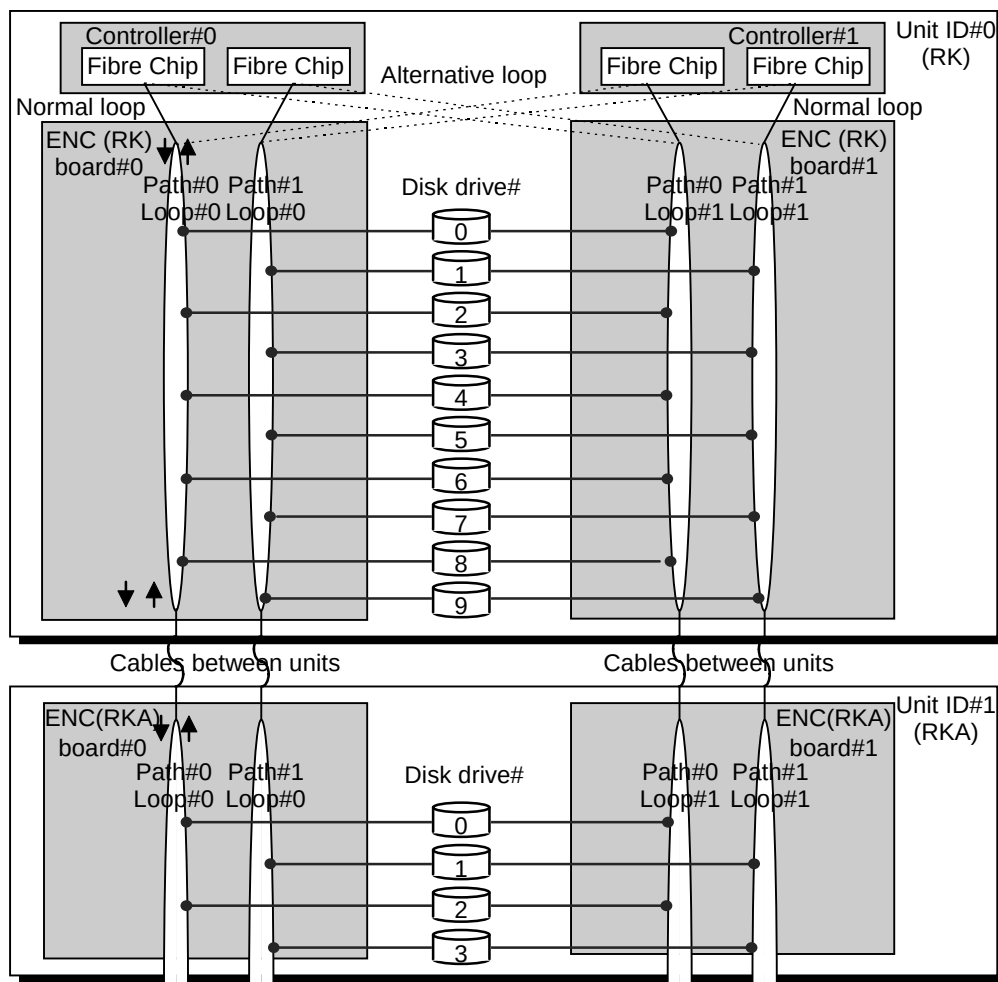


Names of failed parts

The failed parts of the internal Fibre Channel of DF500 are classified into the path and loop.

The respective configurations of these items are shown below.

- In the case of RK/RKA



RK, RKA has four loops at the back end, which have the following names.

- Path#0, Loop#0
- Path#1, Loop#0
- Path#0, Loop#1
- Path#1, Loop#1

The paths and loops have the following meanings.

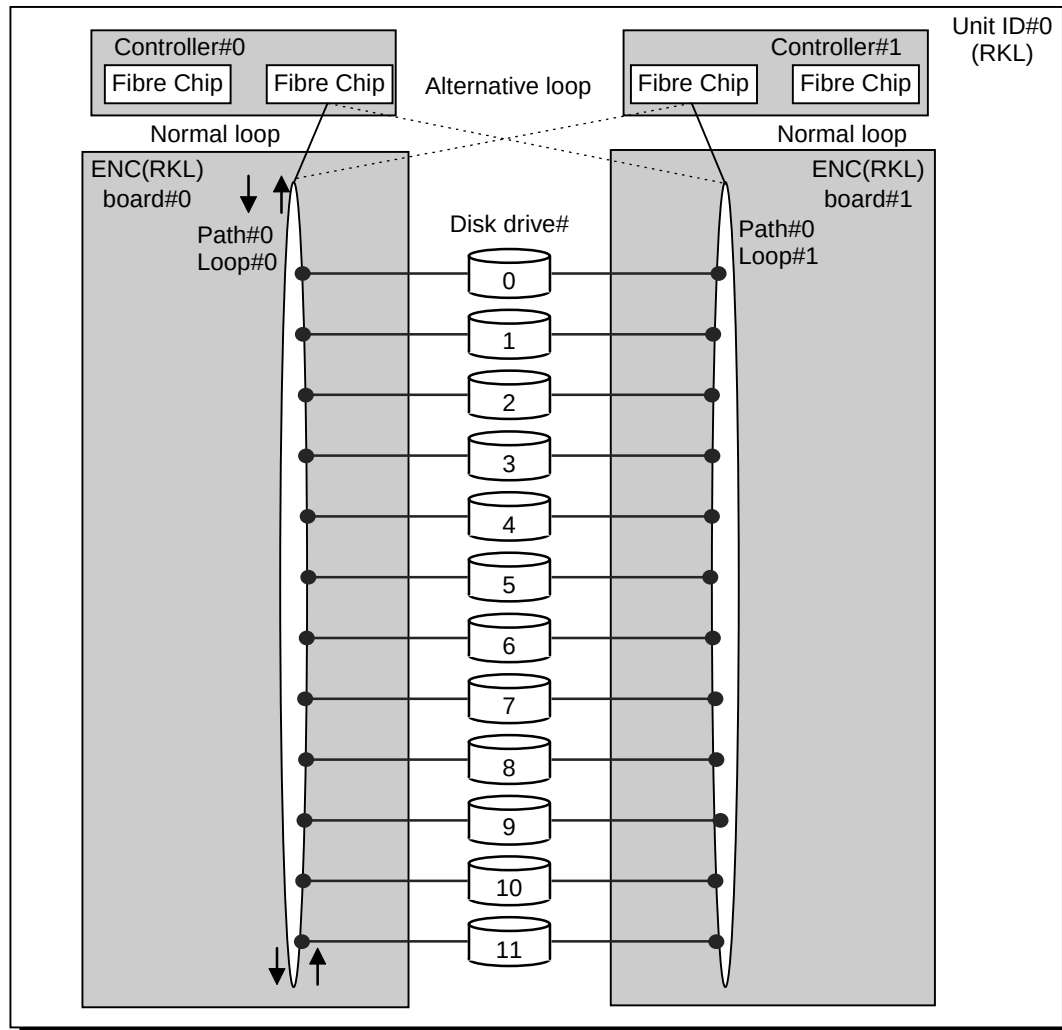
Path

Path	Meaning	Connection
Path#0	2 fibre lines connected to Disk drive of even number	Disk drives 0, 2, and 4 are connected to GO line and Disk drives 6 and 8 are connected to RETURN line.
Path#1	2 fibre lines connected to Disk drive of odd number	Disk drives 1, 3, and 5 are connected to GO line and Disk drives 7 and 9 are connected to RETURN line.

Loop

Loop	Meaning	Connection
Loop#0	2 Fibre lines on ENC board#0	Used as normal loop of Controller#0 and alternative loop of Controller#1.
Loop#1	2 Fibre lines on ENC board#1	Used as normal loop of Controller #1 and alternative loop of Controller#0.

- In the case of RKL



RKL has two loops at the back end, which have the following names.

- Path#0, Loop#0
- Path#0, Loop#1

The paths and loops have the following meanings.

Path

Path	Meaning	Connection
Path#0	1 fibre lines connected to Disk drive of even number	Disk drives 0 to 11 are connected to GO line and Disk drives 6 to 11 are connected to RETURN line.

Loop

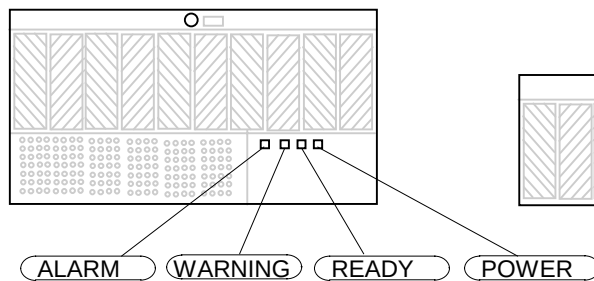
Loop	Meaning	Connection
Loop#0	1 Fibre lines on ENC board#0	Used as normal loop of Controller#0 and alternative loop of Controller#1.
Loop#1	1 Fibre lines on ENC board#1	Used as normal loop of Controller #1 and alternative loop of Controller#0.

2.1 Troubleshooting Based on LED Indication of Front Bezel

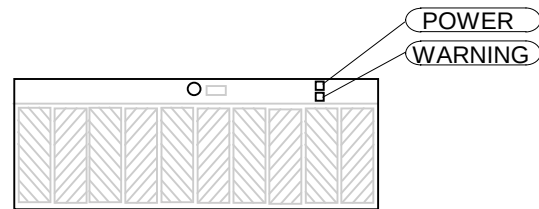
(1) LED positions of front bezel

The positions of LED's are shown below.

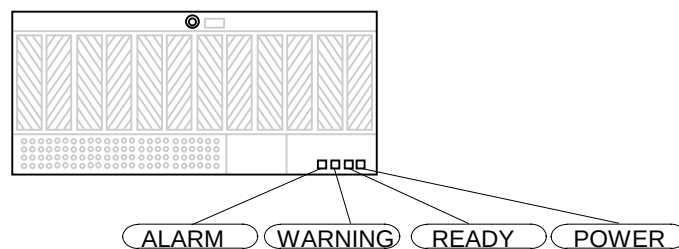
(a) RK



(a) RK



(b) RKA



(c) RKL

Figure 2.1.1 Locations and Name of LED

(2) Troubleshooting procedure

The states of the units indicated by the LED indication patterns of the front bezel and the actions to take against them are shown below.

Table 2.1.1 LED Indication Patterns on Front Bezel

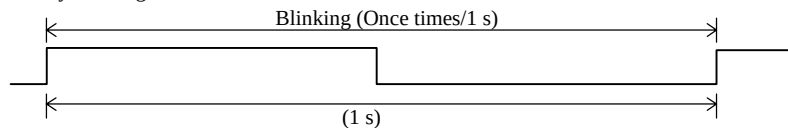
(○ : On ◇ : Blinking × : Off — : Not depend)

No (*1)	LEDs						State of unit	Actions to take	Failure
	RK/RKL				RKA				
	ALARM (Red)	WARNING (Orange)	READY (Green)	POWER (Green)	POWER (Green)	WARNING (Orange)			
1	×	×	○	○	○	×	Normal.	Recovery operation is not necessary.	—
2	×	×	×	×	×	×	Power is not turned on or power supply has failed.	Find out failure according to “2.2.1 Troubleshooting based on LED indications” (MNTE 02-0180).	Power supply error. (RK/RKA, and RKL)
3	○	×	×	×	×	×	AC/DC power supply failed.	1. Check that power cable is connected correctly. 2. Check LED indication of AC/DC power supply. (see Table 2.2.3, Table 2.2.3.1.) 3. Check LED indication of ENC (RK, RKA) board. (see Table 2.2.6, Table 2.2.7, Table 2.2.7.1.)	Power supply error. (RK, RKA, and RKL)
4	×	×	×	○	—	—	A failure occurred during power-on process.	1. Check LED indication of Controller. (see Table 2.2.4.) 2. If FAIL LED of one Controller or more does not light up, wait READY LED to light up (for at least 10 min).	Parts failure. (RK/RKL)
								3. If state does not change for more than 10 min, analysis with WEB is effective. Find out failure according to troubleshooting based on READY LED.	Failure must be detected with WEB.
*1 :  : This is not a failure status									

(○ : On ◇ : Blinking × : Off — : Not depend)

No	LEDs						State of unit	Actions to take	Failure
	RK/RKL				RKA				
	ALARM (Red)	WARNING (Orange)	READY (Green)	POWER (Green)	POWER (Green)	WARNING (Orange)			
5	×	✧ ^(*1) (slowly blinking)	×	○	—	—	It was detected that the cache data volatilized (user data was lost) while the subsystem power was on.	See “2.5 Details of Recovery procedures”. (MNTE 02-1060)	User’s data lost.
6	○	×	×	○	—	—	A failure occurred during self-test at time when power is turned on.	Check LED indication of Controller. (see Table 2.2.4.)	Parts failure. (RK/RKL)
7	×	○	○	○	○	×	A failure which does not stop operation occurred in RK.	Check LED indication of each RK part. (See “2.2 Troubleshooting Based on LED Indication of Each Part” (MNTE 02-0070)).	Parts error. (RK/RKL)
					○	○	A failure which does not stop operation occurred in RKA. ^(*2)	Check LED indication of each RKA part. (See “2.2 Troubleshooting Based on LED Indication of Each Part” (MNTE 02-0070)).	Parts error. (RKA)
8	×	✧ ^(*1) (slowly blinking)	○	○	—	—	A failure which does not stop operation occurred in unit (It must be detected with WEB).	Analysis with WEB is effective. “2.3 Troubleshooting based on WEB Connection/Trace” (MNTE 02-0230) or “2.6.3 Collection of trace in the ON state” (MNTE 02-1400) are not necessary.	Failure must be detected with WEB.

*1 : Slowly blinking



*2 : In the following cases, the WARNING LED of the RKA may not come on. However, the FAIL LED of each component comes on. (excluding the case of (2) below.)

(1) When the ENC board failed before the subsystem became ready during start-up.

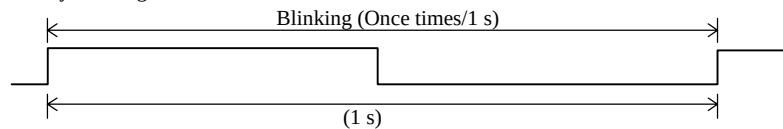
(2) When the ENC board failed and the failed ENC board was pulled off.

(3) When the failed ENC board was replaced with a new one and the new ENC board was found to be faulty. (However, the FAIL LED is on immediately after the ENC board is inserted. Judge the new ENC board faulty when the FAIL LED does not go out after one minute has passed.)

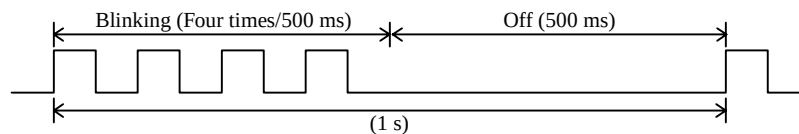
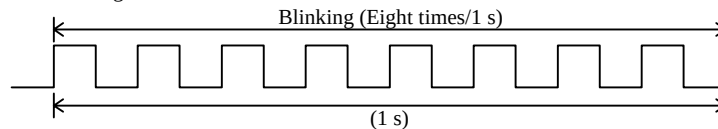
(○ : On ◇ : Blinking × : Off — : Not depend)

No	LEDs						State of unit	Actions to take	Failure
	RK/RKL				RKA				
	ALARM (Red)	WARNING (Orange)	READY (Green)	POWER (Green)	POWER (Green)	WARNING (Orange)			
9	○	◇ ^(*1) (slowly blinking)	×	○	—	—	A failure which does not stop operation occurred in unit.	Analysis with WEB is effective. Find out failure according to troubleshooting based on READY LED.	Failure must be detected with WEB.
10	—	◇ ^(*2) (fast blinking)	—	—	—	—	Latest revision maintenance function of flash program is executed.	Wait until fast blinking stops.	No error.

*1 : Slowly blinking



*2 : Fast blinking



2.2 Troubleshooting Based on LED Indication of Each Part

When a failure occurs, check to see if it is in the parts.

- How to read Reference page : No. of page in which the recovery measures are described.

It refers to the page No. of the volume of maintenance.

H1F : Floor model (H1F/H2F)

RK : Rackmount model (RK/RKA)

MK : Floor model (MK)

RKL : Rackmount model (RKL)

(1) Troubleshooting based on LED indication of battery unit

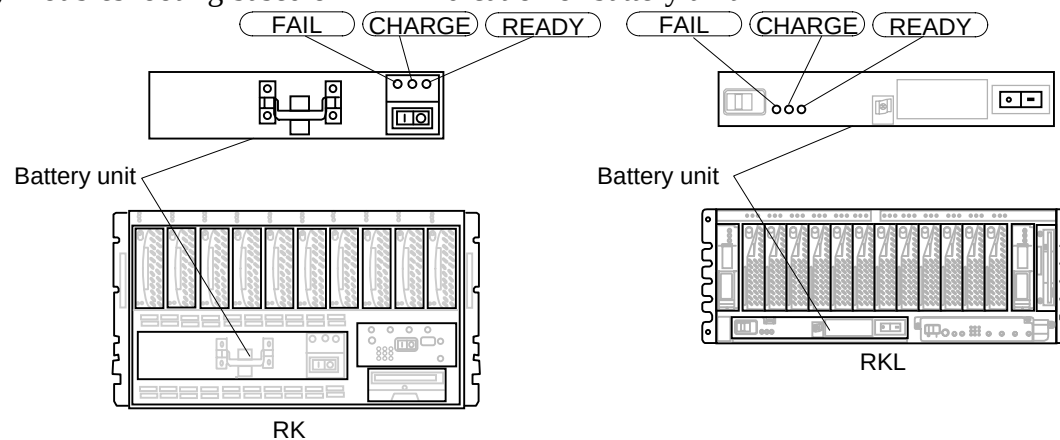


Table 2.2.1 LED Indication Patterns on Battery Unit

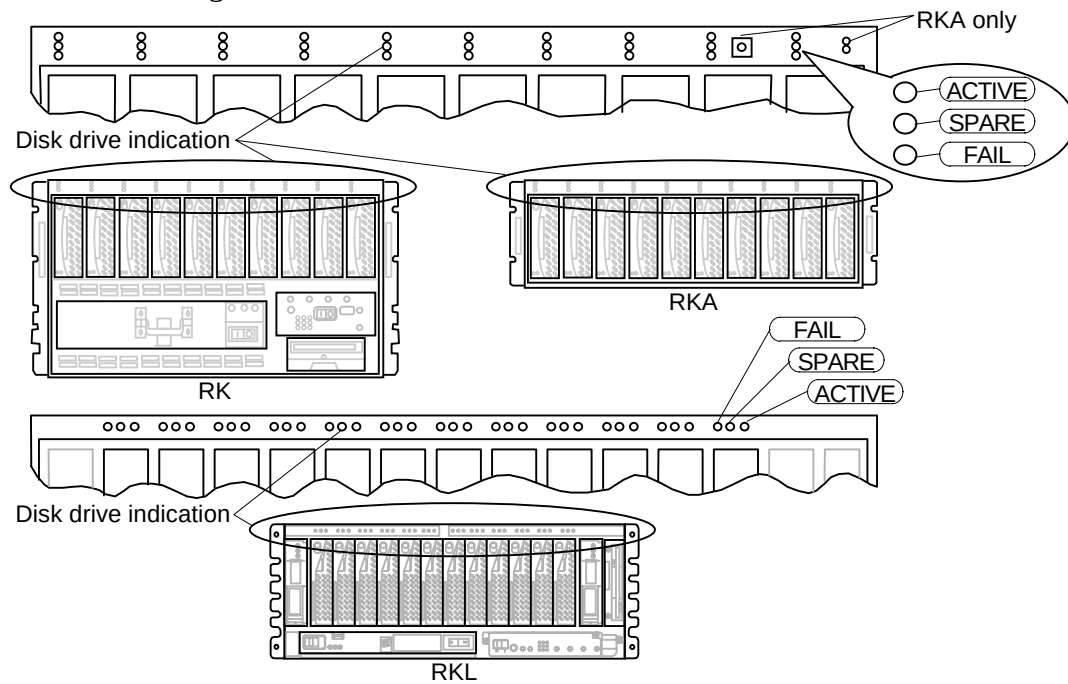
(○ : On ◇ : Blinking × : Off — : Not depend)

No (*1)	LEDs			Cause or status	Action(s) to be taken	Reference page
	FAIL (Red)	CHARGE (Orange)	READY (Green)			
1	×	×	○	Normal.	Recovery operation is unnecessary.	—
2	×	○	○	The battery is being charged.		
3	×	◇	×	Voltage level after charging is monitored.		
4	○	×	×	A trouble occurred in setting of the battery unit. 1. The battery is not installed. 2. The battery switch is turned off.	Check the presence/absence of the battery unit and setting of the battery switch.	—
5	○	×	×	1. Battery voltage is abnormal. (Battery voltage is lower than 5.7 V or higher than 7.0 V.) 2. Battery charging voltage is abnormal. 3. The usable term of the battery is expired.	Replace the Battery unit (battery).	H1F:04-0200 RK :04-0690 MK :04-1140 RKL:04-1550
*1 : : This is not a failure status.						

(○ : On ◇ : Blinking × : Off — : Not depend)

No (*1)	LEDs			Cause or status	Action(s) to be taken	Reference page
	FAIL (Red)	CHARGE (Orange)	READY (Green)			
6	○	○	◇	This is warning of charging condition of the battery. 1. Battery voltage drop. (Voltage: 5.7 V to 7.0 V)	Charge the battery ^(*1) . If the battery voltage is not recovered after it has been charged for 24 hours, replace the Battery unit (battery).	H1F:04-0200 RK :04-0690 MK :04-1140 RKL:04-1550
7	○	○	×	The battery is being charged. 1. Battery voltage drop. (Battery voltage is lower than 5.7 V.)	Charge the battery. If the battery voltage is not recovered after it has been charged for 24 hours, replace the battery unit (battery).	H1F:04-0200 RK :04-0690 MK :04-1140 RKL:04-1550
*1 : The charging operation is started when the AC power cable is connected and the breaker of the AC/DC power supply is turned on. (It is not necessary to place the subsystem into the Ready status.)						

(2) Troubleshooting based on LED indication of Disk drive

**Table 2.2.2 LED Indication Patterns on Disk Drive**

(○ : On ◇ : Blinking × : Off — : Not depend)

No. (*)1	LEDs			Cause or status	Action(s) to be taken	Reference page
	ACTIVE (Green) ^{(*)2}	SPARE (Orange)	FAIL (Red)			
1	◇	—	—	The Disk drive is being accessed.	This is not a problem.	—
2	○	—	—	Spun up.	This is not a problem.	—
3	×	—	—	Seeking.	This is not a problem.	—
4	—	○	—	It is shown that the Disk drive is set to a Spare disk.	This is not a problem.	—
5	—	—	○	A failure that makes the Disk drive of lighting LED unable to operate occurred in it. When the WARNING LED is blinking, ascertain the state of the saving onto the Spare disk by referring to a log message by means of connection to the WEB or a trace collection performed while the subsystem power is on ^{(*)2} .	Replace the Disk drive.	H1F:04-0050 RK :04-0550 MK :04-1010 RKL:04-1420
*1 :  : This is not a failure status. *2 : The WARNING LED blinks when a data recovery on a Spare disk fails, a data recovery on a replaced Disk drive fails, or a writing of recovery data is not completed. The blinking LED will go out by means of a trace collection performed while the subsystem power is on or a reference to a log message by the WEB.						

(3) Troubleshooting based on LED indication of AC/DC power supply

Notice : When the PS RDY LED is off, it shows that a failure has occurred even if the fan rotating.

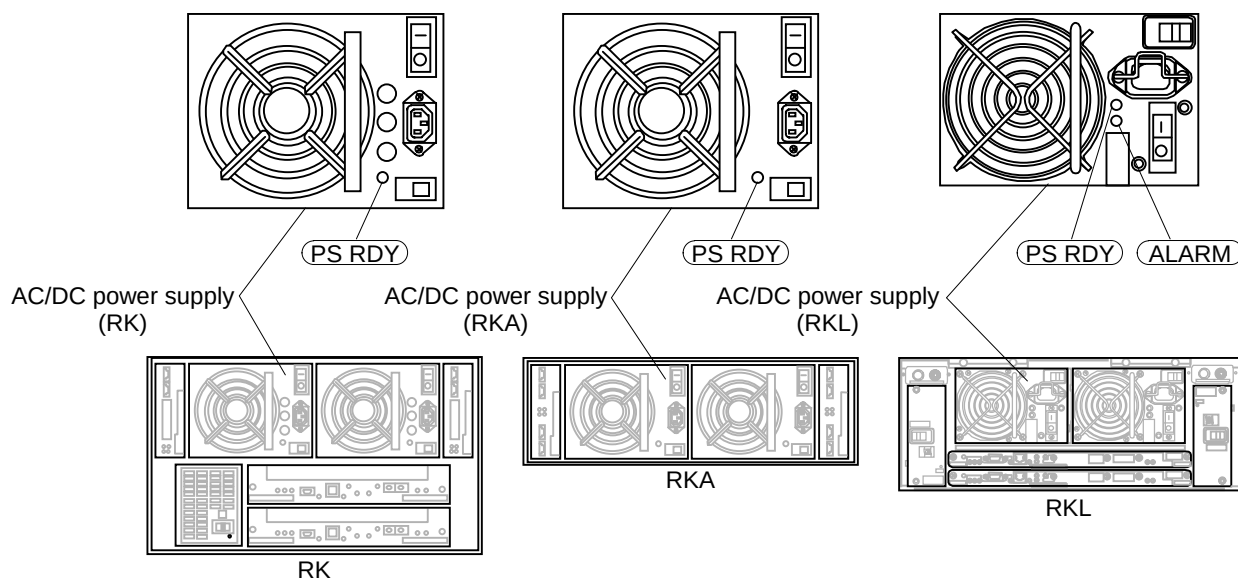


Table 2.2.3 LED Indication Patterns on AC/DC Power Supply (RK/RKA)

(○ : On ◇ : Blinking × : Off — : Not depend)

No. (*1)	LEDs	Cause or status	Action(s) to be taken	Reference page
	PS RDY (Green)			
1	○	This shows the normal operation of the AC/DC power supply.	This is not a problem.	—
2	×	In trouble or resting.	Make sure that the breaker is turned on. 1. If the PS RDY LED is kept off when the breaker is turned on, replace the AC/DC power supply.	H1F:04-0450 RK :04-0830
*1 :  : This is not a failure status.				

Table 2.2.3.1 LED Indication Patterns on AC/DC Power Supply (RKL)

(○ : On ◇ : Blinking × : Off — : Not depend)

No. (*1)	LEDs		Cause or status	Action(s) to be taken	Reference page
	PS RDY (Green)	ALARM (Red)			
1	○	×	This shows the normal operation of the AC/DC power supply.	This is not a problem.	—
2	×	×	In resting.	Make sure that the breaker is turned on. 1. If the PS RDY LED is kept off when the breaker is turned on, replace the AC/DC power supply.	MK :04-1350 RKL:04-1750
3	×	○	In trouble.	Replace the AC/DC power supply.	MK :04-1350 RKL:04-1750
4	○	○			
*1 :  : This is not a failure status.					

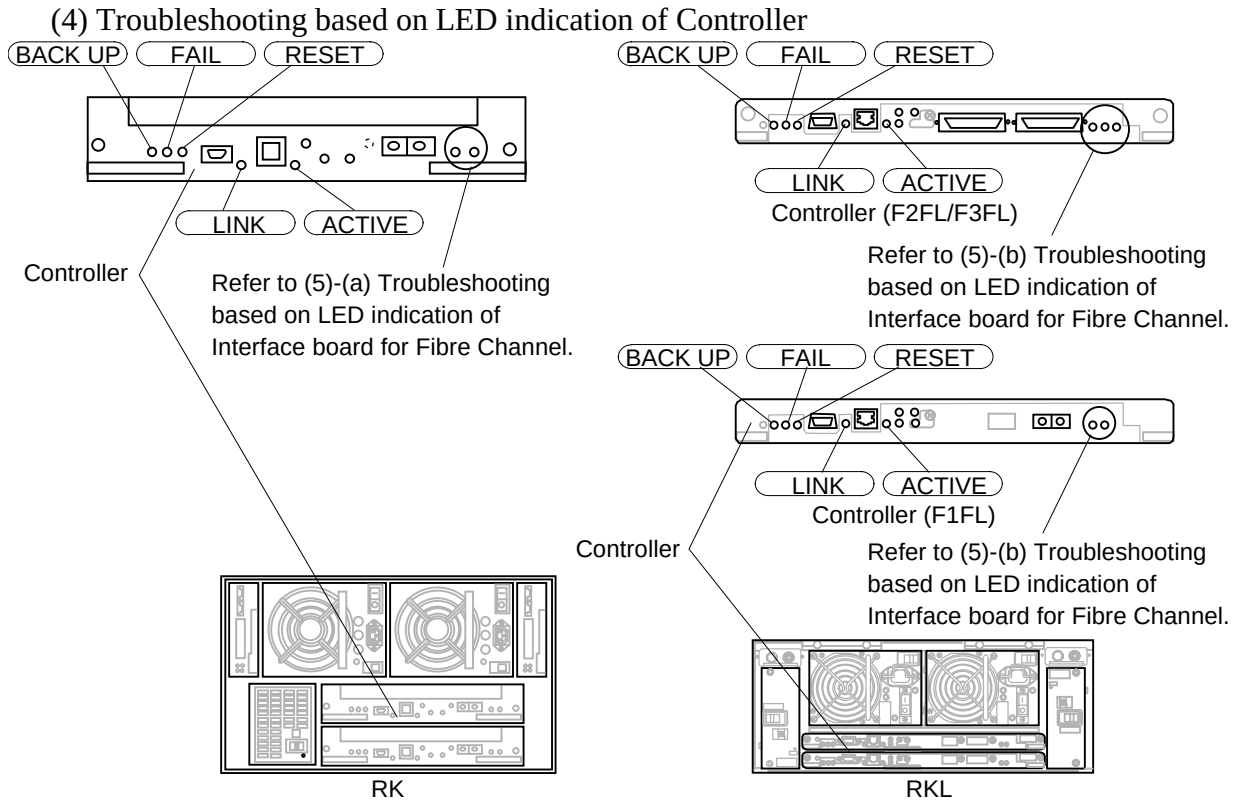


Table 2.2.4 LED Indication Patterns on Controller

(○ : On ✧ : Blinking × : Off — : Not depend)

No. (*1)	LEDs					Cause or status	Action(s) to be taken	Reference page
	BACK UP (Green)	FAIL (Red)	RESET (Orange)	LINK (Green)	ACTIVE (Green)			
1	○	—	—	—	—	It is shown that the Cache memory is being backed up because a sequential shutdown was not executed normally.	Cancel the cache backing up. (Refer to the procedure for canceling the backing up of the Cache memory on page.)	01-0030
2	×	—	—	—	—	This shows that the Cache memory is not being backed up.	This is not a problem.	—
3	—	—	○	—	—	The LED comes on when the controller is being reset in the following cases. • During power-on reset • During reset for WEB maintenance mode • During reboot process	This is not a problem.	—
4	—	—	—	○	—	This shows that the linkage of LAN is normal.	This is not a problem.	—

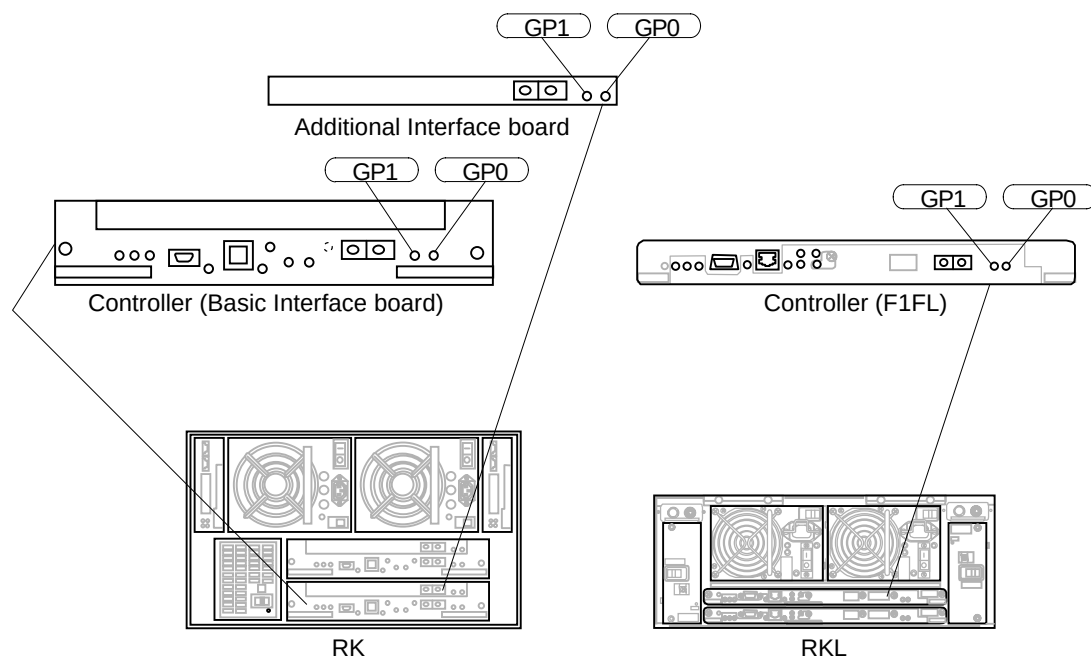
*1 : : This is not a failure status.

(○ : On ✧ : Blinking × : Off — : Not depend)

No. (*1)	LEDs					Cause or status	Action(s) to be taken	Reference page
	BACK UP (Green)	FAIL (Red)	RESET (Orange)	LINK (Green)	ACTIVE (Green)			
5	—	—	—	—	○	This shows that data is being transferred via LAN.	This is not a problem.	—
6	—	—	—	×	—	While an active LAN cable is connected, LINK LED does not on.	Check the LAN cable. If it is normal, replace the Controller.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
7	—	○	—	—	—	A failure that makes the controller unable to operate occurred in it.	Connect PC to WEB and check the message, then follow the instruction. (Refer to “2.4 Troubleshooting Based on Messages” on page.) 1. Replace the Controller. If the operation is not recovered, replace the following items in order. 2. Replace the Cache memory. 3. Replace the Interface board (Fibre Channel or SCSI).	02-0420 H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580 H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650 H1F:04-0300 RK :04-0780

(5) Troubleshooting based on LED indication of Interface board

(a) Interface board for Fibre Channel

**Table 2.2.5 LED Indication Patterns on Interface Board for Fibre Channel**

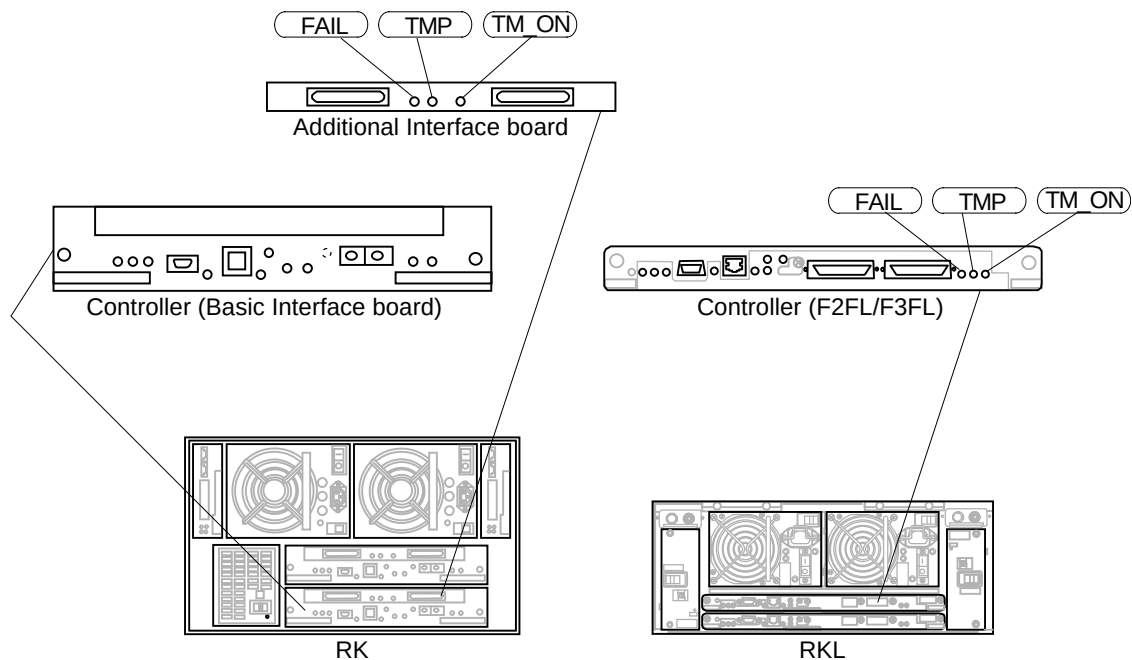
(○ : On ✧ : Blinking × : Off — : Not depend)

No. (*1)	LEDs		Cause or status	Action(s) to be taken	Reference page
	GP1 (Green)	GP0 (Green)			
1	○	○	Link-up state.	This is not a problem.	—
2	×	×	Interface is in initial state. Interface is in reset state. Waiting for ID to be taken over. Loop port is bypassed.	This is not a problem.	—
3	○	×	Loop (Link) is being initialized.	This is not a problem.	—
*1 : : This is not a failure status.					

(○ : On ✧ : Blinking × : Off — : Not depend)

No. (*1)	LEDs		Cause or status	Action(s) to be taken	Reference page
	GP1 (Green)	GP0 (Green)			
4	×	○	Link failed.	1. If the Fibre Channel cable is not connected, no troubles occur in this state. If this port is not used, it should not be mounted on the unit, however. 2. Check the connections of the following Fibre Channel interfaces. • Fibre Channel Cable • Fibre Channel HUB • Fibre Channel Switch • Host Adapter • GBIC (When Fibre Channel HUB or Fibre Channel switch is connected) 3. Replace the following devices in order from the nearest one to this unit and see if the interface is linked up. • Controller or Additional board • Fibre Channel Cable • Fibre Channel HUB • Fibre Channel Switch • Host Adapter • GBIC (When Fibre Channel HUB or Fibre Channel switch is connected)	—
5	✧	○	Link failure often occurs.	1. Check the connections of the following Fibre Channel interfaces. • Fibre Channel Cable • Fibre Channel HUB • Fibre Channel Switch • Host Adapter • GBIC (When Fibre Channel HUB or Fibre Channel switch is connected)	—
6	○	✧	Loop (Link) is often initialized.	2. Replace the following devices in order from the nearest one to this unit and see if the interface is linked up. • Controller or Additional board • Fibre Channel Cable • Fibre Channel HUB • Fibre Channel Switch • Host Adapter • GBIC (When Fibre Channel HUB or Fibre Channel switch is connected)	
7	✧	✧	Link failure often occurs. Loop (Link) is often initialized.	2. Replace the following devices in order from the nearest one to this unit and see if the interface is linked up. • Controller or Additional board • Fibre Channel Cable • Fibre Channel HUB • Fibre Channel Switch • Host Adapter • GBIC (When Fibre Channel HUB or Fibre Channel switch is connected)	

(b) Interface board for SCSI

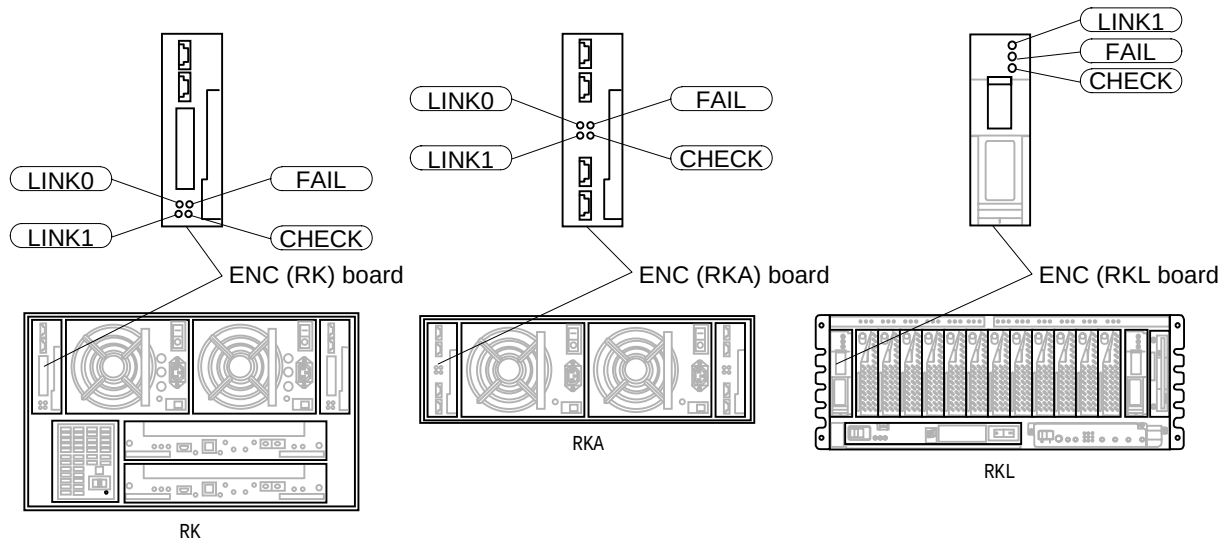
**Table 2.2.5.1 LED Indication Patterns on Interface Board for Fibre Channel**

(○ : On ✧ : Blinking × : Off — : Not depend)

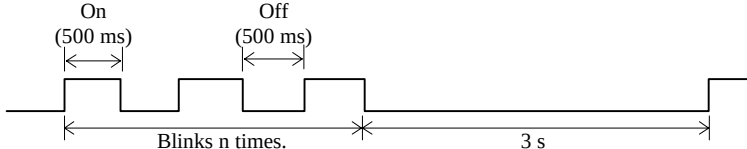
No. (*1)	LEDs			Cause or status	Action(s) to be taken	Reference page
	FAIL (Red)	TMP (Green)	TM_ON (Green)			
1	—	○	—	Normal.	Recovery operation is unnecessary.	—
2	○	—	—	A failure has occurred in the SCSI Interface board.	Make the interface type consistent with that of a host computer.	—
3	×	×	—	If it is off when the power is internally supplied, it means that a failure has occurred. When the power is supplied from outside, it shows a normal state even if the LED is off.	Replace the SCSI Interface board. For the MK or RKL, replace the Interface board(s) in units of Controller.	H1F:04-0300 RK :04-0780 MK :04-1170 RKL:04-1580

*1 :  : This is not a failure status.

(6) Troubleshooting based on LED indication of ENC board

**Table 2.2.6 LED Indication Patterns on ENC (RK) Board**

(○ : On ◇ : Blinking × : Off — : Not depend)

No. (*)	LEDs				Cause or status	Action(s) to be taken	Reference page
	FAIL (Red)	CHECK (Red)	LINK 0 (Green)	LINK 1 (Green)			
1 (*)	×	×	○	○	Normal.	Recovery operation is unnecessary.	—
2	—	◇ ^(*) (Once times)	—	—	This shows a trouble in the AC/DC power supply. 1. Logic +5 V voltage error	Replace the AC/DC power supply (RK) on which the same PS RDY as that of ENC (RK) board is turned off.	H1F:04-0450 RK :04-0920
3	—	◇ ^(*) (Twice times)	—	—	This shows a trouble in the AC/DC power supply. 1. Drive +12 V voltage error		
4	—	◇ ^(*) (Three times)	—	—	This shows a trouble in the AC/DC power supply. 1. Logic +3.3 V voltage error		
5	—	◇ ^(*) (Five times)	—	—	This shows a battery voltage error.	Confirm the LED indication on the Battery unit (see Table 2.2.1).	—
*1 :  : This is not a failure status. *2 : If a single system is used, LINK 0 and LINK 1 of ENC #1 do not light up even in the normal state. Use the subsystem leaving it as it is. *3 : Indication of status with LED. 							

(○ : On ◇ : Blinking × : Off — : Not depend)

No. (*1)	LEDs				Cause or status	Action(s) to be taken	Reference page
	FAIL (Red)	CHECK (Red)	LINK 0 (Green)	LINK 1 (Green)			
6	—	✧(*1) (Six times)	×	—	This shows a voltage error in the Controller.	Replace the Controller on which the same FAIL LED as that of ENC (RK) board is turned on.	H1F:04-0230 RK :04-0720
7	○	—	—	—	A failure that makes the ENC (RK) board unable to operate occurred in it.	Replace the ENC board.	H1F:04-0420 RK :04-0890
8	—	—	×	—	The input on loop HSSDC-0 side is abnormal.	Replace the Controller on which the same FAIL LED as that of ENC (RK) board is turned on.	H1F:04-0230 RK :04-0720
9	—	—	—	×	The input on loop HSSDC-1 side is abnormal.		

*1 : Indication of status with LED.

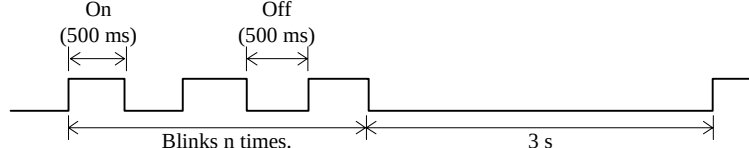


Table 2.2.7 LED Indication Patterns on ENC (RKA) Board

(○ : On ◇ : Blinking × : Off — : Not depend)

No. (*1)	LEDs				Cause or status	Action(s) to be taken	Reference page
	FAIL (Red)	CHECK (Red)	LINK 0 (Green)	LINK 1 (Green)			
1	×	×	○	○	Normal.	Recovery operation is unnecessary.	—
2	—	✧ ^(*2) (Once times)	—	—	This shows a trouble in the AC/DC power supply. 1. Logic +5 V voltage error.	Replace the AC/DC power supply (RKA) on which the same PS RDY as that of ENC (RKA) board is turned off.	H1F:04-0450 RK :04-0910
3	—	✧ ^(*2) (Twice times)	—	—	This shows a trouble in the AC/DC power supply. 1. Drive +12 V voltage error.		
4	—	✧ ^(*2) (Three times)	—	—	This shows a trouble in the AC/DC power supply. 1. Logic +3.3 V voltage error.		
5	—	✧ ^(*2) (Four times)	—	—	This shows a trouble in the AC/DC power supply. 1. Logic +2.5 V voltage error. This shows a battery voltage error.		
6	○	—	—	—	A failure that makes the ENC board unable to operate occurred in it.	Replace the ENC board.	H1F:04-0420 RK :04-0890
7	—	—	×	—	The input on loop HSSDC-0 side is abnormal.	Replace the Controller on which the same FAIL LED as that of ENC (RK) board is turned on.	H1F:04-0230 RK :04-0720
8	—	—	—	×	The input on loop HSSDC-1 side is abnormal.		

*1 :  : This is not a failure status.

*2 : Indication of status with LED.

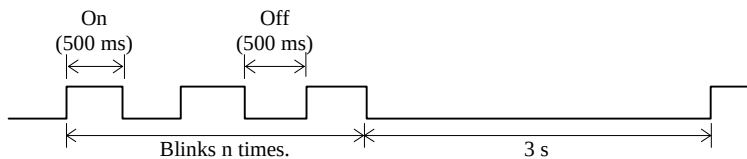
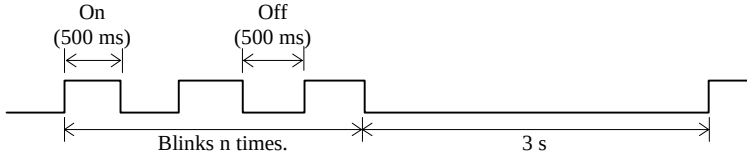
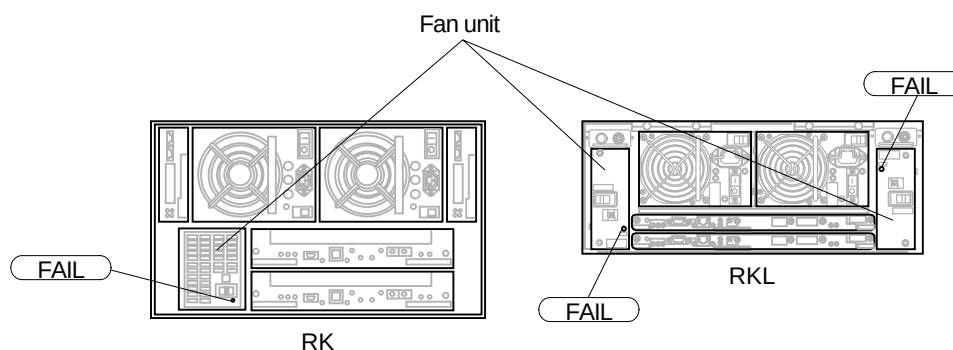


Table 2.2.7.1 LED Indication Patterns on ENC (RKL) Board

(○ : On ◇ : Blinking × : Off — : Not depend)

No. (*1)	LEDs			Cause or status	Action(s) to be taken	Reference page
	FAIL (Red)	CHECK (Red)	LINK (Green)			
1 (*2)	×	×	○	Normal.	Recovery operation is unnecessary.	—
2	—	◇ ^(*3) (Once times)	—	This shows a trouble in the AC/DC power supply. 1. Logic +5 V voltage error.	Replace the AC/DC power supply (RKL) on which the same PS RDY as that of ENC (RKL) board is turned off.	MK :04-1350 RKL:04-1750
3	—	◇ ^(*3) (Twice times)	—	This shows a trouble in the AC/DC power supply. 1. Drive +12 V voltage error.		
4	—	◇ ^(*3) (Three times)	—	This shows a trouble in the AC/DC power supply. 1. Logic +3.3 V voltage error.		
5	—	◇ ^(*3) (Five times)	—	This shows a battery voltage error.	Confirm the LED indication on the Battery unit (see Table 2.2.1).	—
6	—	◇ ^(*3) (Six times)	×	This shows a voltage error in the Controller.	Replace the Controller on which the same FAIL LED as that of ENC (RKL) board is turned on.	MK :04-1170 RKL:04-1580
7	○	—	—	A failure that makes the ENC (RKL) board unable to operate occurred in it.	Replace the ENC (RKL) board.	MK :04-1300 RKL:04-1700
8	—	—	×	The input on loop is abnormal.	Replace the Controller on which the same FAIL LED as that of ENC (RKL) board is turned on.	MK :04-1170 RKL:04-1580
*1 :  : This is not a failure status. *2 : If a single system is used, LINK of ENC #1 do not light up even in the normal state. Use the subsystem leaving it as it is. *3 : Indication of status with LED. 						

(7) Troubleshooting based on LED indication of Fan unit



Notice : While the FAIL LED of a Fan unit is on, when a Controller has been blocked (the FAIL LED is on), be sure to correct the Controller blockade failure first.

Table 2.2.8 LED Indication Patterns on Fan Unit

(○ : On ◇ : Blinking × : Off — : Not depend)

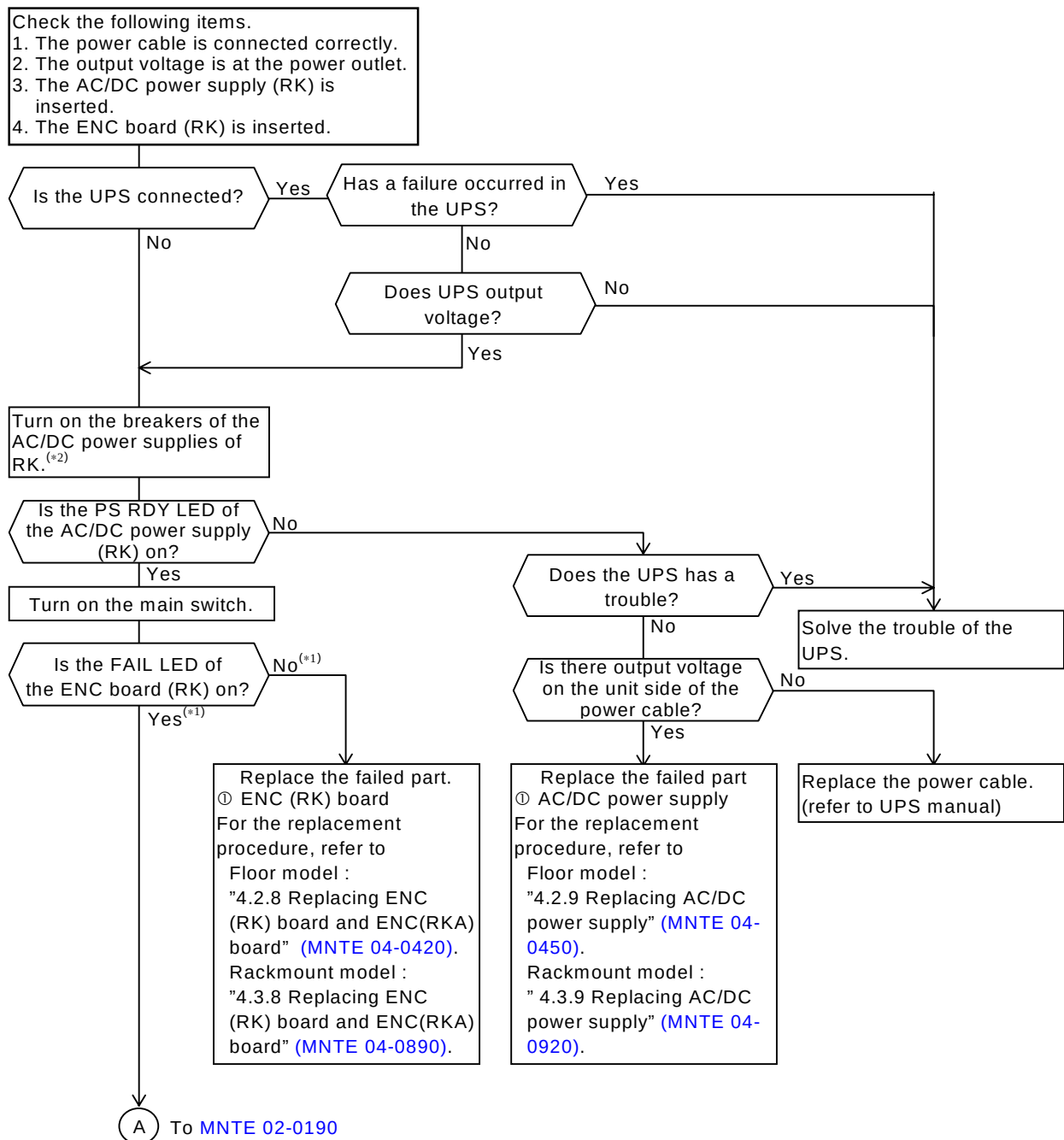
No. (*1)	LEDs	Cause or status	Action(s) to be taken	Reference page
	FAIL (Red)			
1	×	When the FAIL LED of the fan unit is lighting up, if the Controller is blocked (if the FAIL LED is lighting up), be sure to repair the Controller first.	This shows that the fans are normal.	—
2	○	This shows that there is a trouble in the fans.	Replace the Fan unit.	H1F:04-0490 RK :04-0950 MK :04-1380 RKL:04-1780
*1 :  : This is not a failure status.				

2.2.1 Troubleshooting based on LED indications

(1) Troubleshooting based on the indication of the POWER LED

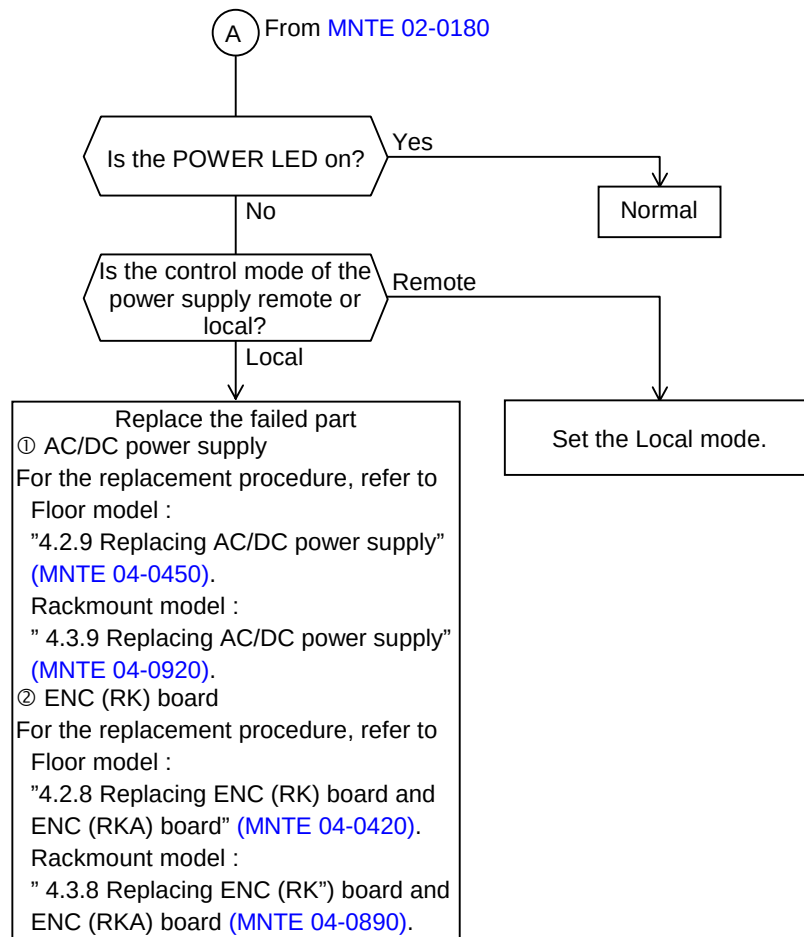
Perform troubleshooting based on the indication of the POWER LED following the flowchart shown below.

(a) Troubleshooting on the indication on the POWER LED of RK. (When the POWER LED is not on)

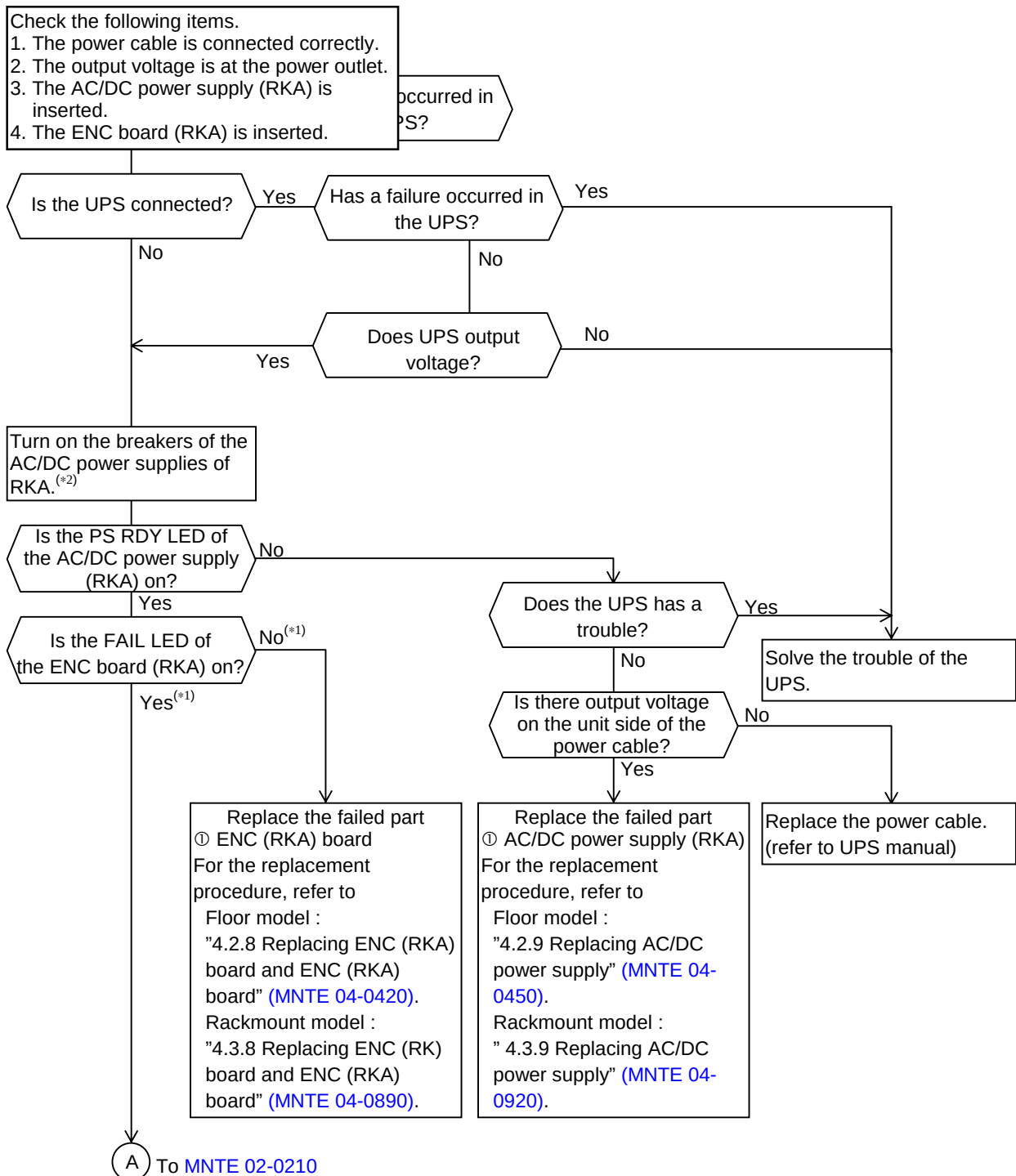


*1 : The FAIL LED of the ENC board is on until the subsystem becomes ready, however, this does not mean that the ENC board is faulty. If the FAIL LED does not go out after the subsystem has become ready, replace the ENC board.

*2 : This operation is not needed when the breaker and the main switch have already been turned on.

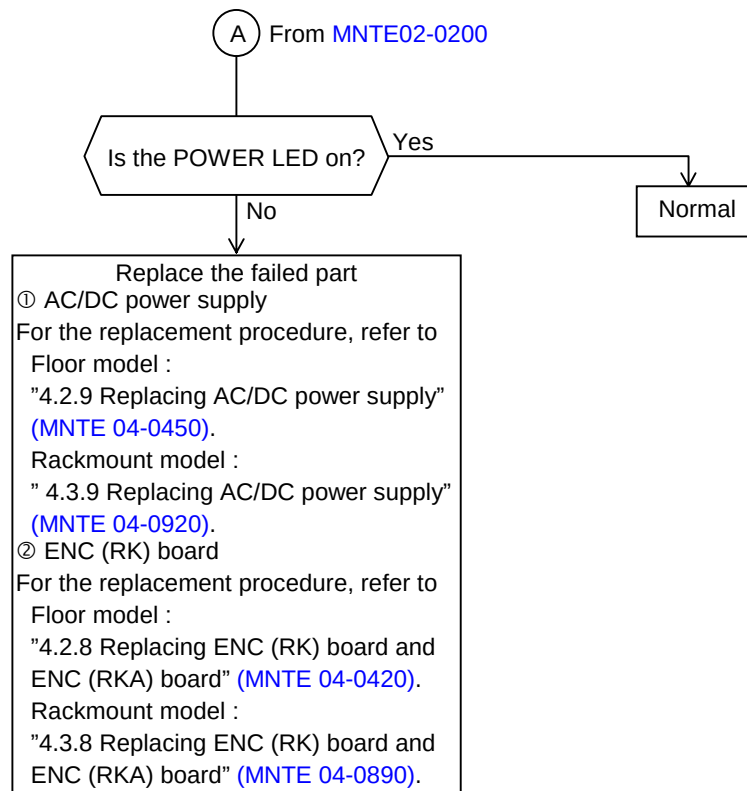


(b) Troubleshooting on the indication on the POWER LED of RKA. (Not POWER LED on)

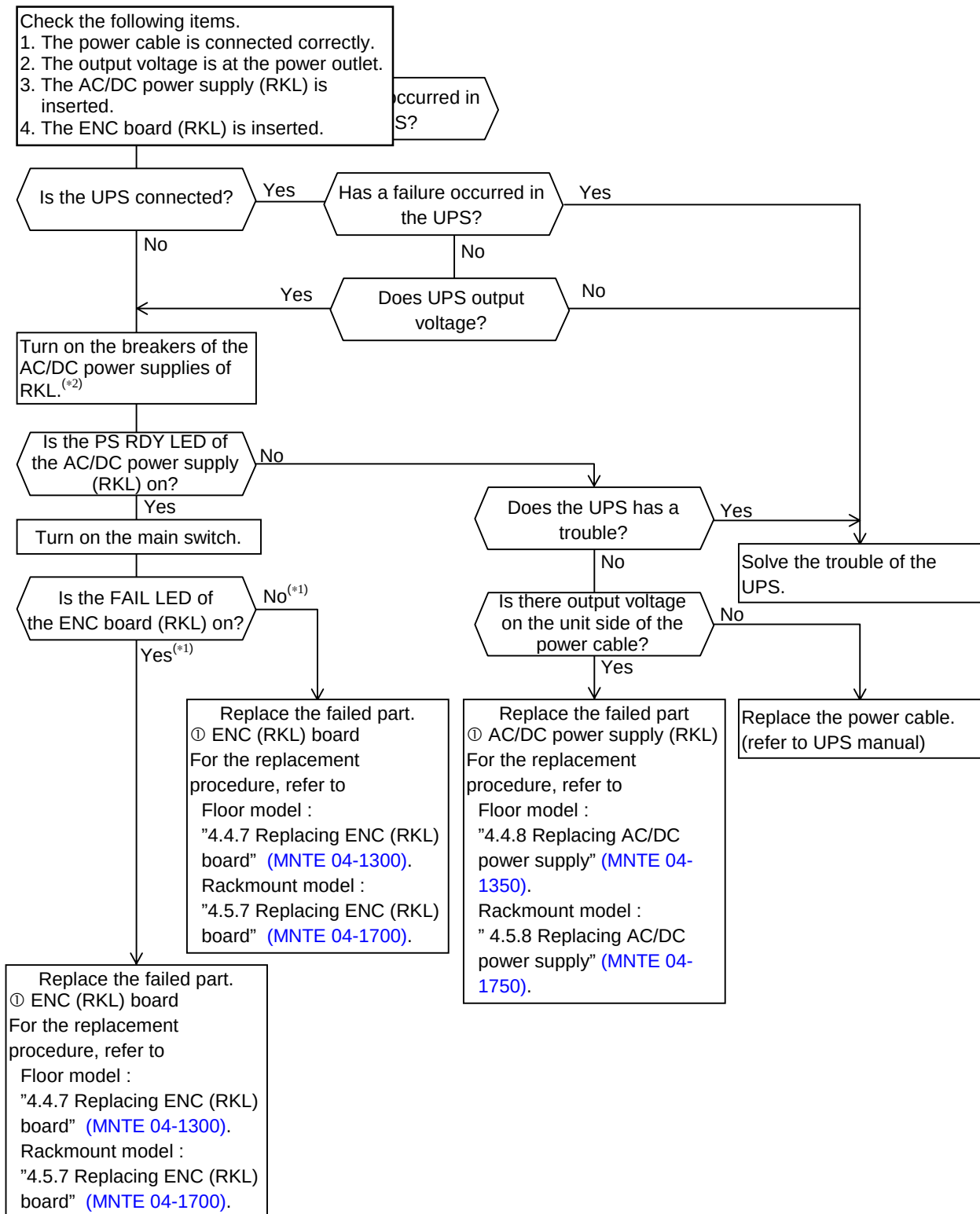


*1 : The FAIL LED of the ENC board is on until the subsystem becomes ready, however, this does not mean that the ENC board is faulty. If the FAIL LED of the subsystem which has become ready does not go out, replace the ENC board.

*2 : This operation is not needed when the breaker and the main switch have already been turned on.



(c) Troubleshooting on the indication on the POWER LED of RKL. (POWER LED is not turned on)

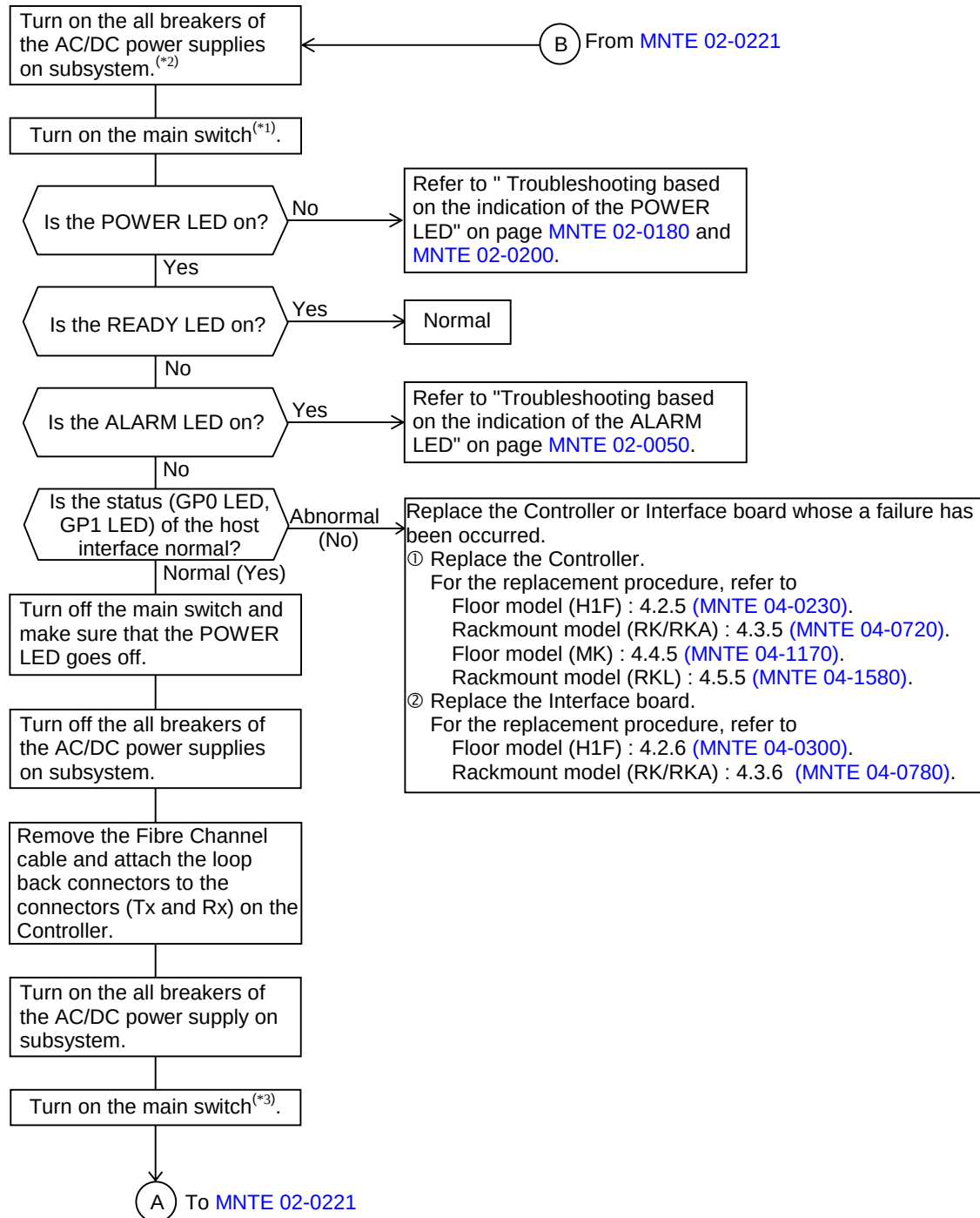


*1 : The FAIL LED of the ENC board is on until the subsystem becomes ready, however, this does not mean that the ENC board is faulty. If the FAIL LED of the subsystem which has become ready does not go out, replace the ENC board.

*2 : This operation is not needed when the breaker and the main switch have already been turned on.

(2) Troubleshooting based on the indication of READY LED (When in the Fibre Channel interface)

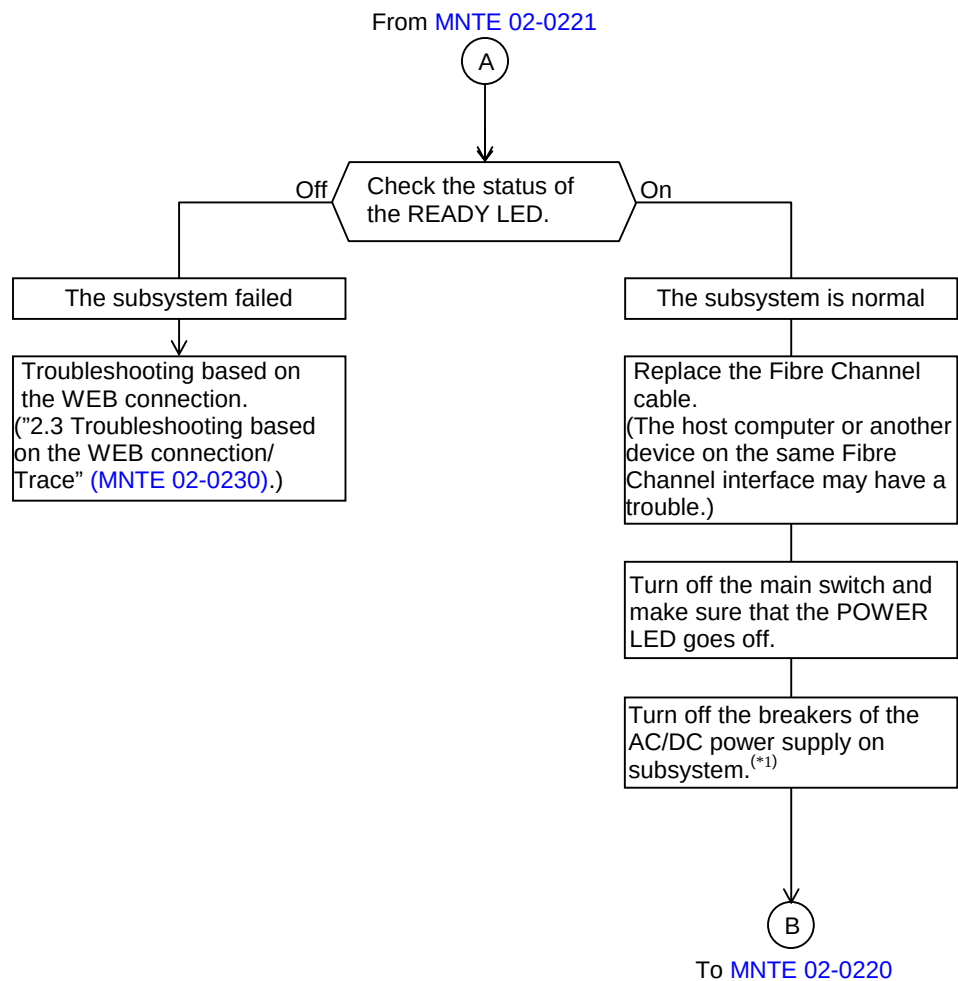
Perform a troubleshooting based on the indication of the READY LED following the flowchart shown below.



*1 : When in the remote mode, the host computer must be turned on.

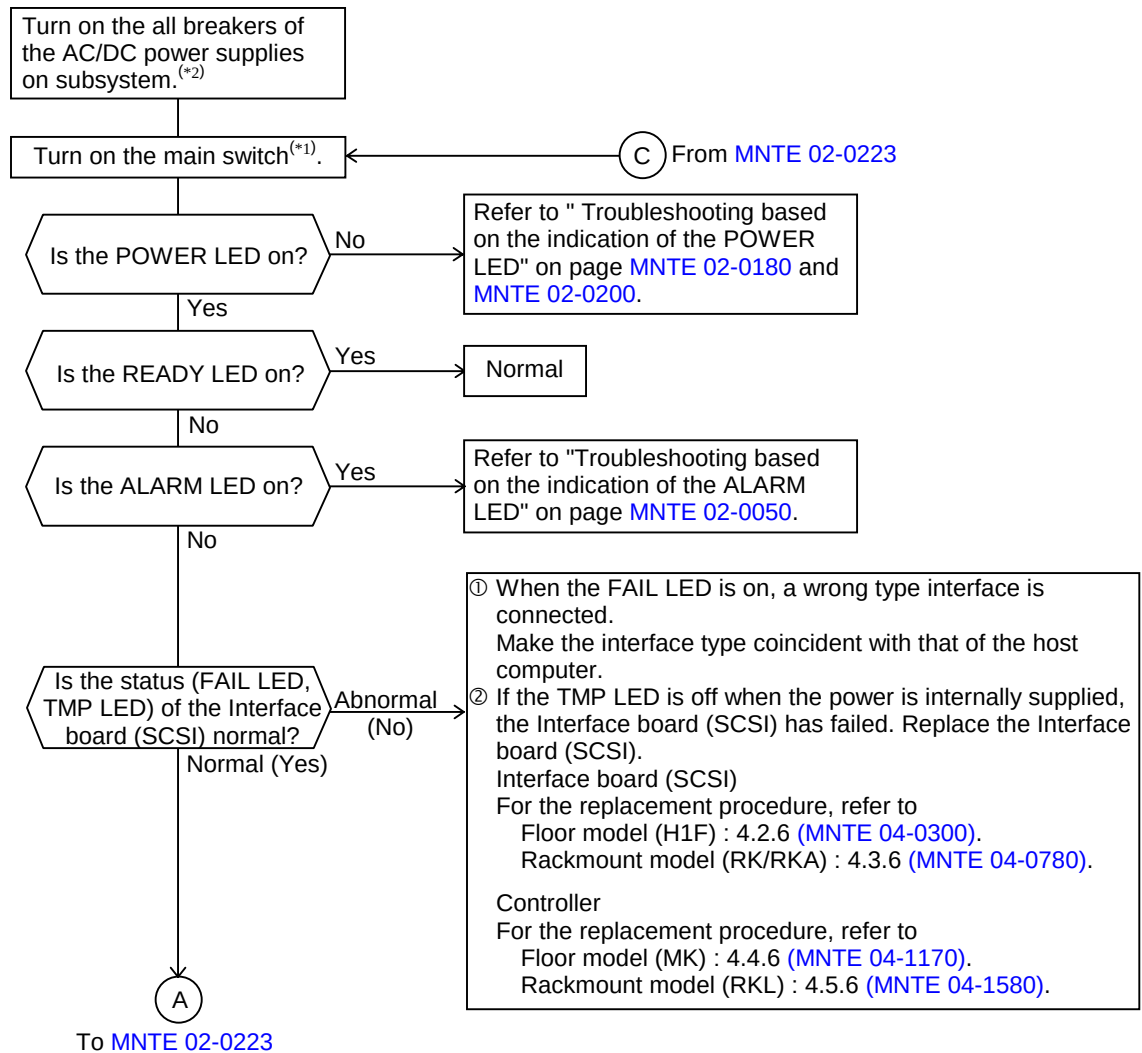
*2 : This operation is not needed when the breaker and the main switch have already been turned on.

*3 : When the mode is Remote, change it to Local.



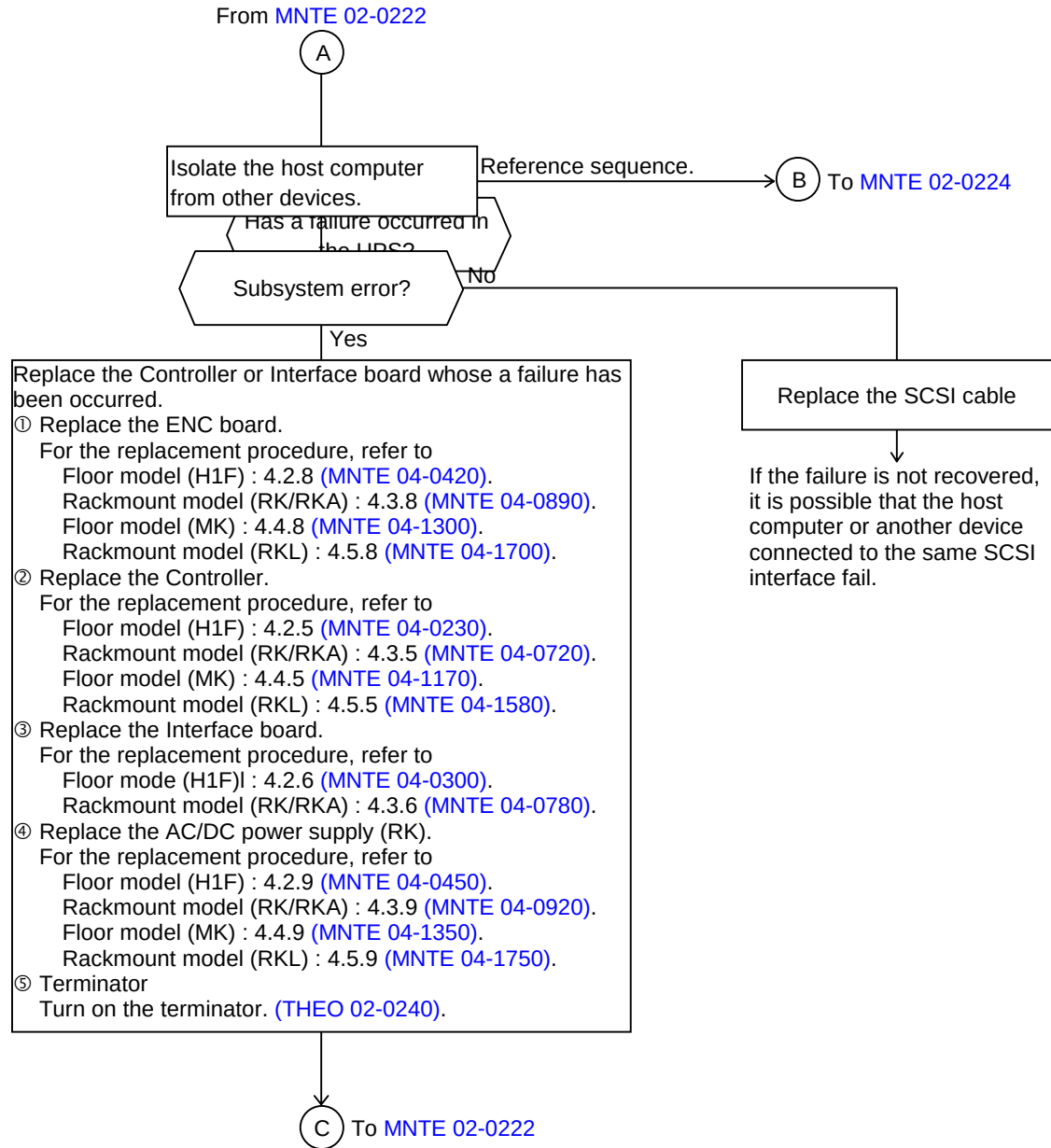
*1 : Return the Remote/Local setting as it was. It may take three minutes at the longest until the READY LED comes on after the main switch is turned on. For the setting of the Remote/Local mode, refer to [“for Installation Setting the Power Control Mode \(Local/Remote Mode\)”](#).

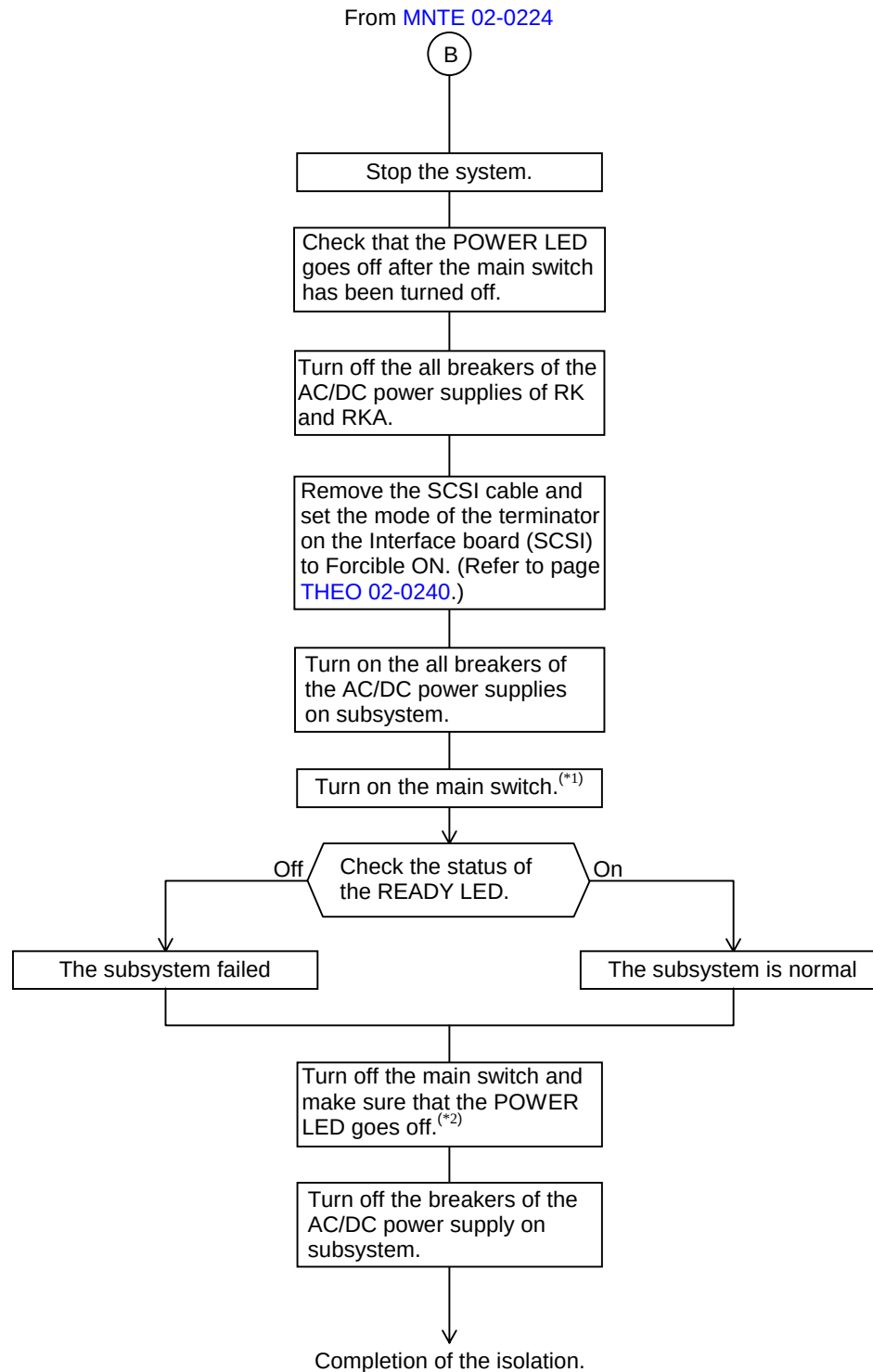
- (3) Troubleshooting based on the indication of READY LED (When in the SCSI interface)
Perform a troubleshooting based on the indication of the READY LED following the flowchart shown below.



*1 : When in the remote mode, the host computer must be turned on.

*2 : This operation is not needed when the breaker and the main switch have already been turned on.





*1 : When the mode is Remote, change it to Local.

*2 : Return the Remote/Local setting as it was. It may take three minutes at the longest until the READY LED comes on after the main switch is turned on. For the setting of the Remote/Local mode, refer to “[for Installation Setting the Power Control Mode \(Local/Remote Mode\)](#)”.

2.3 Troubleshooting Based on WEB Connection/Trace

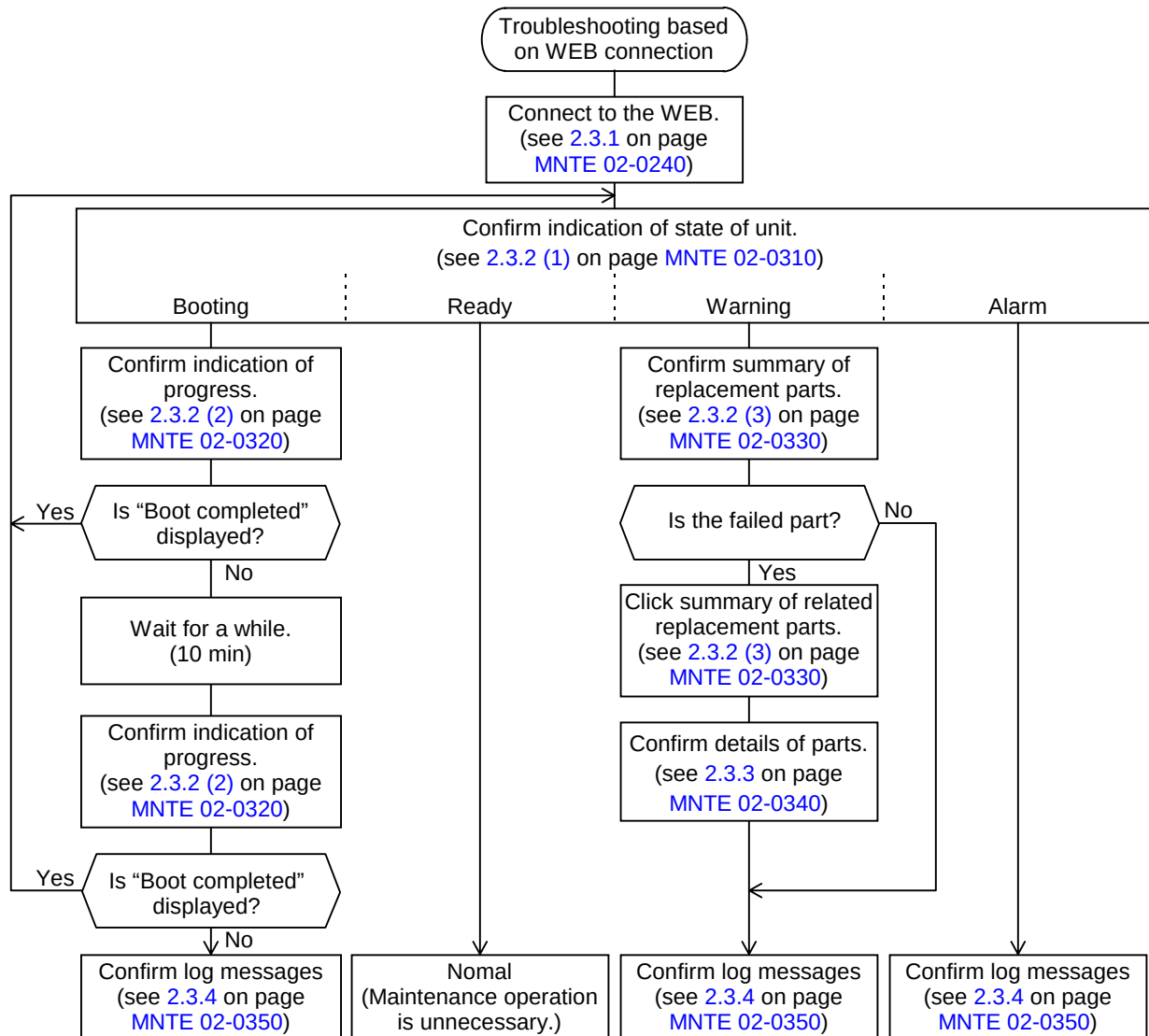
Troubleshooting based on the WEB connection to locate a failed part in the unit and how to repair that trouble are shown below.

The flow of the troubleshooting based on the WEB connection is as follows.

Identify the failed part following the procedure below.

However, the log message of the WEB to be used for the troubleshooting can be collected through a trace collection performed while the subsystem power is on.

When the WEB cannot be connected, perform a troubleshooting after collecting a trace while the subsystem power is on.



Notice : In the case where the log message is checked while the WARNING LED is blinking, the WARNING LED goes out when the warning is cancelled or stays on when the warning is not cancelled.

2.3.1 WEB connection procedure

(1) Before starting connecting work to the WEB

Before starting connection work to the WEB, check the following items to customers or system engineers.

(a) Investigation on the status of use of customer's LAN functions

Table 2.3.1 LAN Function Status of Use Investigation Method

Item	LAN function		Contents to be checked	Investigation method
1	LAN status of use		Being used or unused	Check that cable is connected to the LAN connector.
2	Maintenance terminal (WEB/Disk Array management program)		Provided or none	Inquire of customers or system engineers.
3	Network parameter setting value	DCHP	Enable or disabled ^(*1)	Inquire of customers or system engineers or refer to setting values from trace or RS232C. ^(*2)
		IP Address	Setting value ^(*1)	
		Subnet Mask	Setting value ^(*1)	
		Default Gateway	Setting value ^(*1)	

*1 : If a customer uses the network function without setting it, device network parameters use the following shipment setting values as they are.

Network parameter	Factory setting value
DCHP	Disable
IP Address	192.168.0.16
Subnet Mask	255.255.255.0
Default Gateway	Disable

*2 : When the IP address is unknown, collect a trace while the subsystem power is on and refer to the LAN control information in the configuration information.

For details of it, refer to “Procedure for analyzing a trace collected while the subsystem power is on (automatic edition of LAN control information of an WEB log message)” on page [MNTE 02-1370](#).

(b) Determination and preparation of maintenance terminal to be used

If the network is used for another purpose, consult the customer.

Table 2.3.2 Decision and Preparation of Maintenance Terminal

Item	Customer's environment	Maintenance terminal used	Preparation	Connection procedure reference destination
1	The customer has a service terminal.	Borrow a customer's service terminal.	None	2.3.1 (3) Procedure to connect customer's maintenance terminal to WEB. (see MNTE 02-0270)
2	The customer has no service terminal. The LAN connector of the Controller can be used.	Connect the portable service PC via a LAN.	PC for maintenance LAN cross cable	2.3.1 (4) Procedure to connect portable maintenance PC to WEB. (see MNTE 02-0280)
3	The customer has no service terminal. The LAN connector of the Hub can be used (the DF and Hub have been connected to each other).	Connect the portable service PC.	PC for maintenance RS232C cross cable	

- (c) If a system has a dual Controller, connect to either Controller to connect to the WEB.
First, connect to Controller#0.
If Controller#0 is blocked, however, information after the blockage of Controller#0 is referenced on only Controller#1 side. Accordingly, if Controller#0 is blocked, connect to Controller#1.

Notice : The procedure for connecting to another subsystem having the same IP address via a LAN.

In the case of connecting and maintaining two or more controllers, whose IP addresses are the same, using a service PC and cross cable of a LAN, when one of the Controllers is connected to the PC, the PC memorizes the IP address and physical address of the Controller making a pair of them. Therefore, if another Controller is connected to the PC via a LAN, the IP address is not accepted because the physical address is different. To make the above connection via a LAN, execute the following command from the MS-DOS prompt of Windows PC in order to delete the information on the IP address stored in the arp table in the PC.

```
arp -d IP address
```

IP address : IP address stored in the arp table

Example : When deleting an IP address 192.168. 0.16 (default) from the table

```
arp -d 192.168. 0.16
```

To make sure that the IP address stored in the arp table has been deleted, execute the following command from the MS-DOS prompt of Windows PC.

```
arp -a
```

The IP address has been deleted when a message, “No ARP Entries Found” or the one informing that the specified IP address could not be found is returned from the subsystem.

(2) Note on WEB using

- (a) The LAN function may become temporarily unable to be connected when the update of the WEB display is repeated frequently. In this case, wait for a short time (at least one minute), then update again.
- (b) When connecting the WEB of DF500, use the following browsers.

Table2.3.3 Recommended WEB hardware

No.	Item	Description	Remark
1	OS	Microsoft Windows 95, 98, 2000/NT 4.0, ME Solaris2.6, AIRIX6.4	
2	PC	Pentium (Pentium II (233 MHz or more) is recommended), Memory 40 Mbytes or more (64 Mbytes or more is recommended or more)	
3	WS	Turbo Sparc 170 M Hz, Memory 256 Mbytes or more R10000 195 M Hz, Memory 128 Mbytes or more	
4	Disk requirement	When a memory dump of 5 Mbytes or more is to be done, a capacity of more than 180 Mbytes/controller is required.	

Table2.3.3.1 Support Browser List

(○ : support × : not support)

No.	platform	OS	browser	Ver ^(*1)	the microprogram revision ^(*1)				
					0552 0552/A	05x3	05x4/B	05x5/C 05x6 05x7	05x8 and later
1	WS	IRIX	Netscape Navigator	4.7	×	○	○	○	○
				4.76	×	×	×	○	○
		Solaris 2.6	Netscape Navigator	4.7	○	○	○	○	○
				4.76	×	×	×	○	○
2	PC	windows	Internet Exploror	5.0	○	○	○	○	○
				5.5 ^(*2)	×	×	○	○	○
			Netscape Navigator	4.7	○	○	○	○	○
				4.75	×	×	×	×	○
				4.76	×	×	×	×	○
*1 : Versions that are not contained in the table are not supported yet.									
*2 : Service Pack 1 is included.									

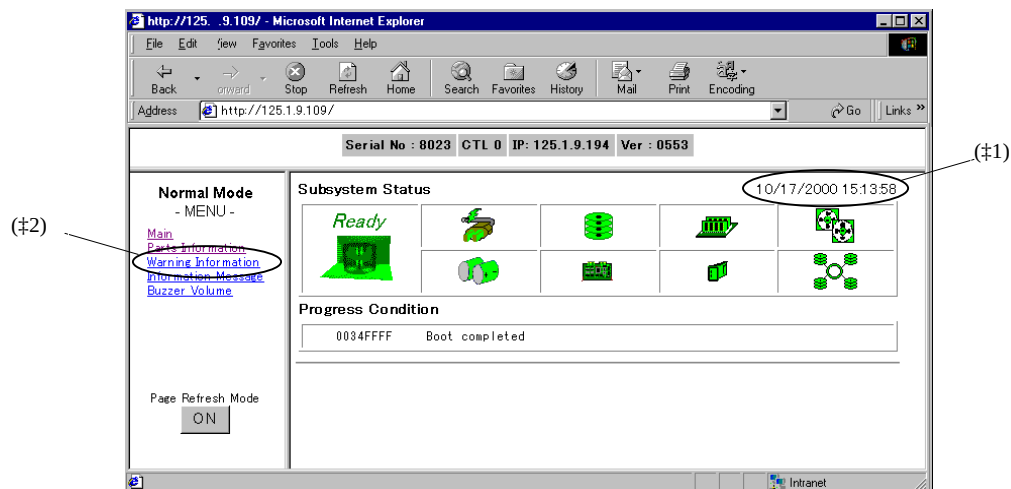
Notes on (restriction of) use of the support browser are shown on the next page.

Notices on (restriction of) the support browser

- There may be a case where a new line is started in a window depending on a setting of the browser. In such a case, make the character size smaller.
< Method of character size change >
In the case of IE
Select “Middle” or smaller size for the “Character Size” in the “Display”.
In the case of Netscape
Select the “Reduction of Font Size” in the “Display” and keep it being selected until paragraphs become easy to be read.
- There may be a case where an empty dialogue box is displayed during operation in the Maintenance mode. In such a case, close the window by clicking on the mark of “X” in the upper left corner of the dialogue box, restart the browser, and then make a retry from the entry of the URL.
- When a window size is changed while a page is displayed by Netscape, the succeeding operation in the Refresh mode may not be done normally. In such a case, display the page over again by clicking the Re-Display button.
- In the case of using Netscape
Memory cache: 1024 kbytes (default) or larger
Disk cache: 7680 kbytes (default) or larger
< Method of cache size setting >
Select the “Edition”, “Setting”, “Details”, and “Cache” in this order.
Specify sizes of the memory cache and disk cache.

(c) If the WEB has been connected, information displayed before may be still displayed. Before starting troubleshooting based on the WEB connection, [Refresh] the WEB window.

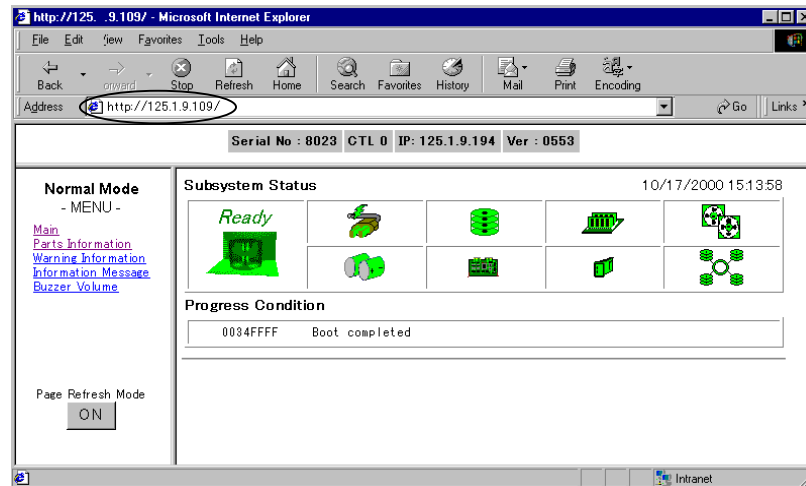
The time when the WEB window is displayed is referenced as shown below.



‡1 : This is the time set in the RTC (real time clock) of the subsystem controller. (This is different from the time of the main body PC.)

‡2 The “Warning Information” in the menu frame is displayed by the microprogram revisions 05x3 and later. It is displayed in the same way in the succeeding windows.

- (3) Procedure to connect customer's maintenance terminal to WEB
- (a) Start up the maintenance terminal.
 - (b) Start the browser and set the IP address of the unit to the URL and connect it.
- If the WEB window is displayed, connection is made successfully.



(4) Procedure to connect portable maintenance PC to WEB

- (a) Connect the LAN connector on the Controller of the unit to that of the maintenance PC directly by the LAN cross cable.

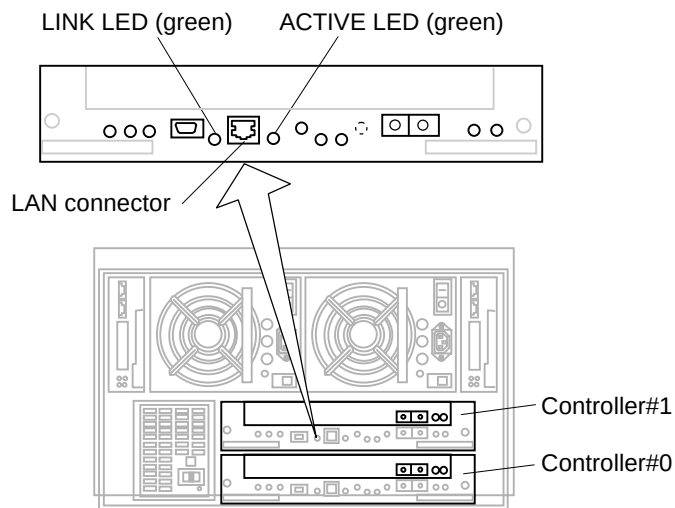


Figure 2.3.1 LAN Connector Position of (RK/RKA)

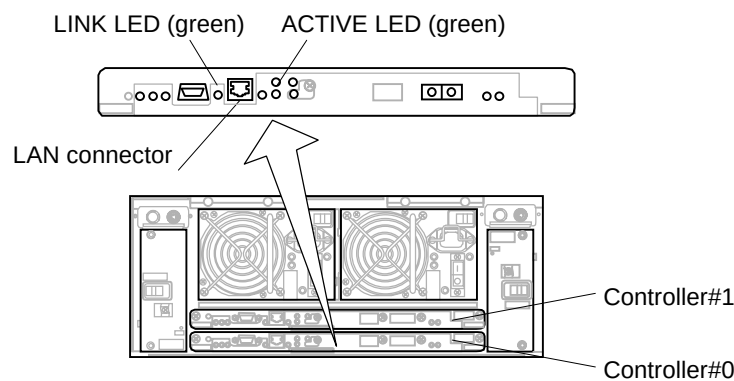


Figure 2.3.2 LAN Connector Position of RKL

- (b) Start up the maintenance PC.
 (c) Change the IP address of the “network parameter” of the maintenance PC.
 Select the IP address to be set to the PC according to the following table.

Table 2.3.4 Operational Environment

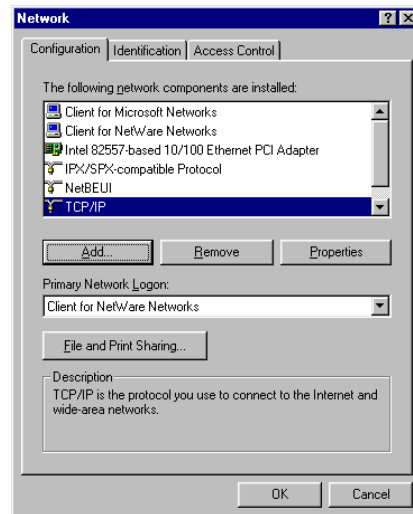
No.	Subsystem IP address	Subsystem subnet mask	IP address to be set for the service PC	Subnet mask to be set for the service PC
1	192.168.0.16 (At the time of shipment)	255.255.255.0 (At the time of shipment)	192.168.0. xxx ("xxx" is any value from 1 to 254 except 16.)	255.255.255.0 (The value same as that of the subsystem subnet mask is set.)
2	Value set by a user Example : When a user has set "158.214.136.25" for the subsystem.	Value set by a user Example : When a user has set "255.255.255.0" for the subsystem.	158.214.136.xxx ("xxx" is any value from 1 to 254 except 25.)	255.255.255.0 (The value same as that of the subsystem subnet mask is set.)

(5) Setting method of IP address on Windows 95

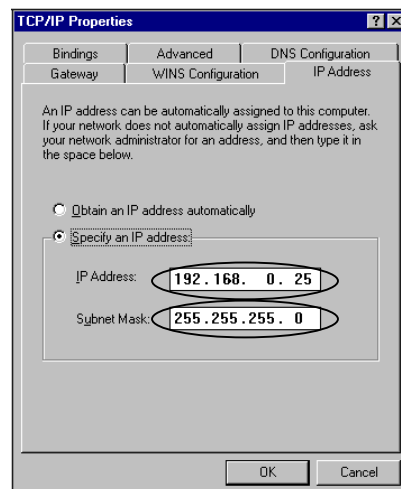
The procedure for setting an IP address of the PC in Windows 95 is shown below.

Also in Windows 98, the IP Address of the PC can be set by the similar operation.

- (a) Select [Start]-[Set]-[Control Panel]-[Network].
- (b) Select [Configuration]-[The following network components are installed]-[TCP/IP] and click the [Properties] button to open [TCP/IP Properties].

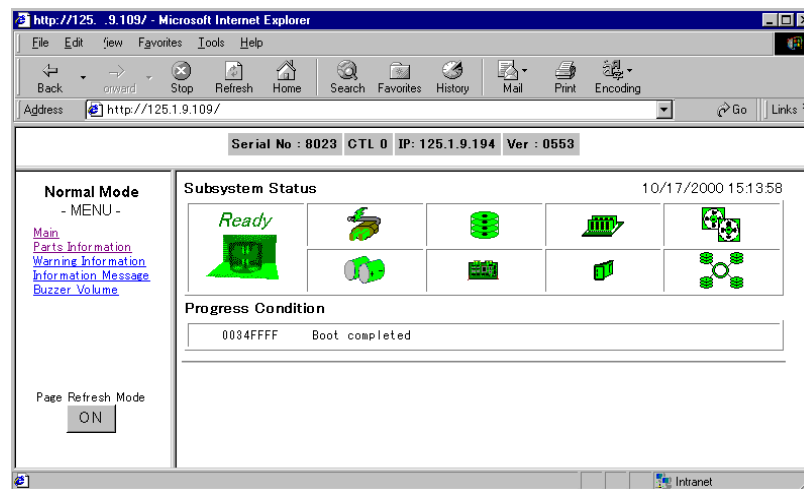


- (c) Select [TCP/IP Properties]-[IP Address]-[Specify an IP address] and set the [IP Address] and press the [OK] button.
 - (d) Set the TCP/IP to “Disable DNS” because the connection takes a long time when the TCP/IP of the network is set to the condition in which the DNS is used.
- For the setting procedure, refer to the instruction manual of the PC to be used.



- (e) The system asks if you want to reboot. Press the [OK] button.

- (f) The maintenance PC is rebooted and the changed IP Address and Subnet Mask becomes effective.
- (g) Start up the browser and set the IP Address of to the URL to connect to the WEB.
If the PC is connected normally, the WEB window appears.
- (h) Make sure that the browser is set to the condition in which the proxy server is not used because the connection cannot be done if the proxy server is set to be used.
To make sure the setting, refer to the instruction manual of the browser to be used.



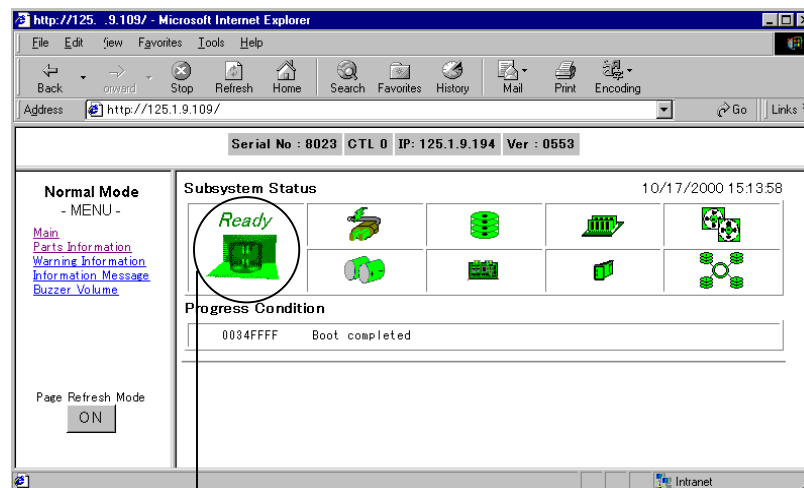
2.3.2 Confirm state of unit

Check the position of the failed part of the unit on the main window in the normal mode of the WEB.

For the replacement of the parts and recovery measures, see the log messages (“2.3.4 Confirm log messages” (MNTTE 02-0350)).

(1) Confirm indication of state of unit

The state of the unit can be confirmed in the following window.

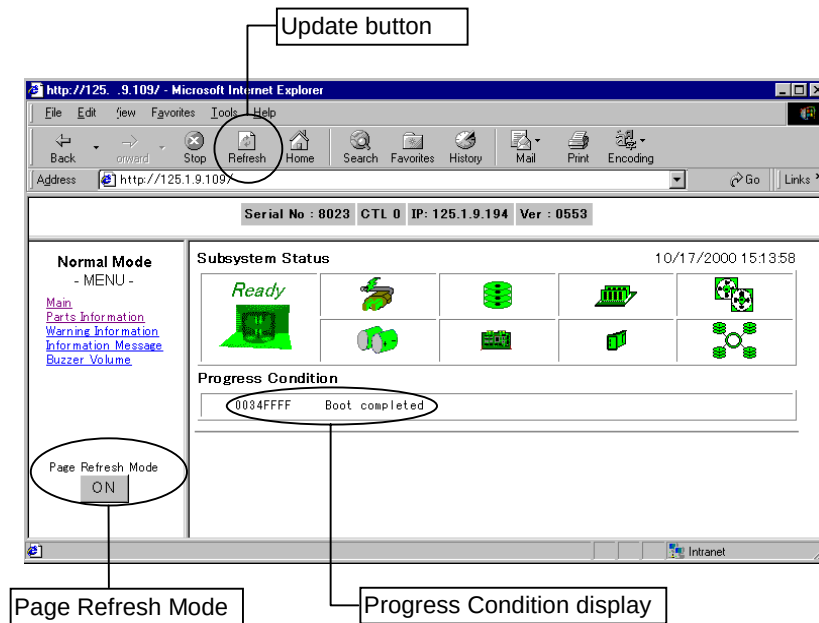


Confirm state of unit

Booting ...	Ready	Warning	Alarm
			
	Green	Yellow	Red

(2) Confirm indication of progress

If “Booting…” is indicated in the window of (1) (the Controller is being started up), the progress of start-up operation can be confirmed according to the following procedure.



(a) Turn on the page refresh mode (Click the [ON] button).

The window is updated automatically at the interval of 5 seconds.

(If the [OFF] button of the page refresh mode is indicated, the above operation is not necessary.)

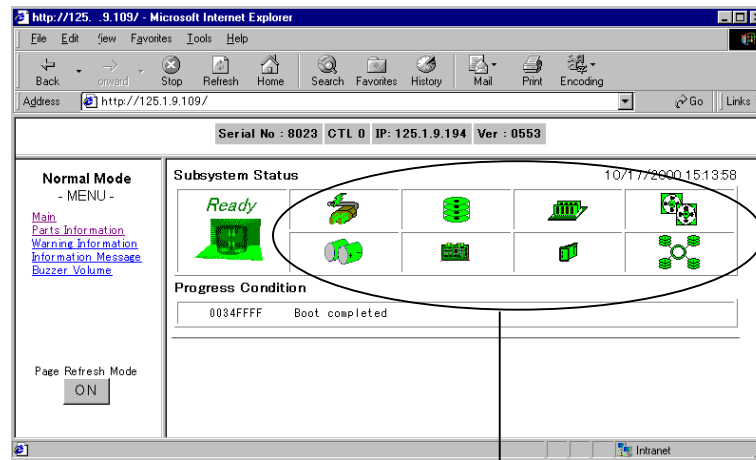
If the page refresh mode is not indicated in the main window, press the update button of the browser to update the window.

(b) See the indication of progress of the window.

If the start-up operation is completed, “Boot completed” is indicated in this part.

(3) Confirm replacement part summary

The state of each replacement parts can be confirmed with the replacement part summary.



Summary of exchange parts status

AC/DC power supply	Disk drive	Cache memory	Fan unit
			
Battery unit	Controller	ENC board	Loop
			

If any part fails, its summary becomes red. If the red part summary is clicked, the state confirmation window of the part (“2.3.3 Confirm state of each part” (MNTTE 02-0340)) appears and the position of the failed part is confirmed more in detail.

Also, when the menu frame “Warning Information” is clicked, status of each component is displayed (see Subsection 2.3.3, “Confirm state of each part” on page MNTTE 02-0340) and the status of each component can be checked.

The “Warning Information” can be selected when the microprogram revision 05x3 or later is used.

2.3.3 Confirm state of each part

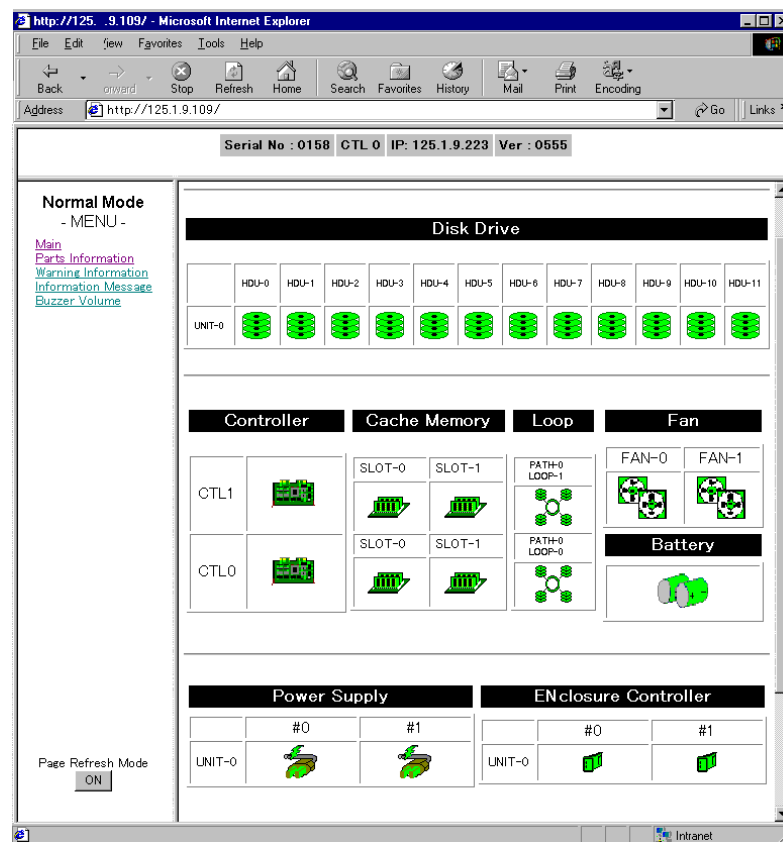
When checking the status of a component through an image, a clicking on each component of the “Summary of replacement component statuses” in the main window changes the window to that shown in Item (1) below and a detailed component status is displayed.

In this case, the window is changed in the state in which the selected (clicked) component is positioned at the top of the window. Also, a clicking on the “Parts Information” menu in the main window changes the window.

When checking the status of a component through a message (the check can be done when the microprogram revision 05x3 or later is used), a clicking on the “Warning Information” of the menu frame in the main window changes the window to that shown in Item (2) below and displays a detailed component status as a message. In this case, detailed status of each component can be checked. For the replacement for maintenance or recovery procedure, refer to a log message (see “Subsection 2.3.4, Confirm log messages” (MNTE 02-0350).) and perform a recovery action following the procedure given by the each log message.

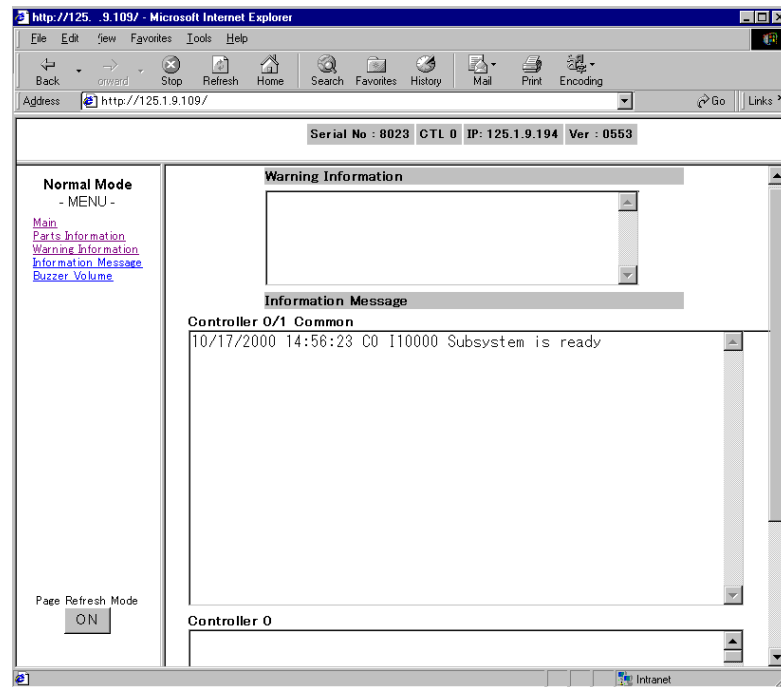
(1) Procedure for checking the status through an image

When there is a component in which a failure has occurred, the image of the component is displayed in red.



(2) Procedure for checking the status through a message

A part in which a failure has occurred is displayed by means of a message.

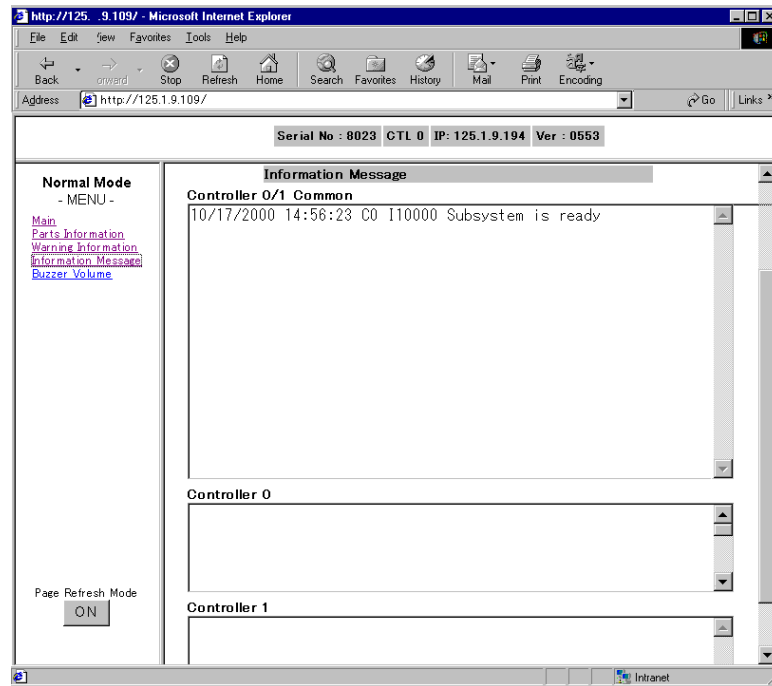


2.3.4 Confirm log messages

(1) Procedure for confirming log messages

Click the [Information Message] menu in the main window, and the “Information Message window” appears.

In the “Information Message window”, you can identify the cause of the failure and confirm the recovery measures.



The information on the failures which were detected during operation of the unit and state of the unit s indicated in the above window.

The information on the failures and state after the unit starts up is indicated in the [Controller 0/1 Common] box.

The information on the failures and state at the time of start-up of the unit is indicated for each Controller in the [Controller 0] and [Controller 1] boxes.

The contents of each message are shown below.

(a) CUDG (Self-test at power-on) detection message

(i) Indicated message

The CUDG detection message is indicated in the [Controller 0] or [Controller 1] box as shown below.

MM/DD/YYYY HH:MM:SS Cx	54	◆◆◆◆◆◆◆◆
MM/DD/YYYY HH:MM:SS Cx	50	◆◆◆◆◆◆◆◆
MM/DD/YYYY HH:MM:SS Cx	4C	◆◆◆◆◆◆◆◆
MM/DD/YYYY HH:MM:SS Cx	48	◆◆◆◆◆◆◆◆
MM/DD/YYYY HH:MM:SS Cx	44	◆◆◆◆◆◆◆◆
MM/DD/YYYY HH:MM:SS Cx	40	△△△△△△△△
MM/DD/YYYY HH:MM:SS Cx	3C	△△△△△△△△
MM/DD/YYYY HH:MM:SS Cx	38	△△△△△△△△
MM/DD/YYYY HH:MM:SS Cx	34	△△△△△△△△
MM/DD/YYYY HH:MM:SS Cx	30	△△△△△△△△
MM/DD/YYYY HH:MM:SS Cx	2C	△△△△△△△△
MM/DD/YYYY HH:MM:SS Cx	28	△△△△△△△△
MM/DD/YYYY HH:MM:SS Cx	24	△△△△△△△△
MM/DD/YYYY HH:MM:SS Cx	20	□□□□□□□□
MM/DD/YYYY HH:MM:SS Cx		○○○○○○○○○○○○
MM/DD/YYYY HH:MM:SS Cx	CTLx	

MM/DD/YYYY : Date of occurrence

HH:MM:SS : Time of occurrence

Cx : # of Controller in which failure is detected

◆◆◆◆◆◆◆◆ : PCI Config information

△△△△△△△△ : Detailed information

□□□□□□□□ : Message code

○○○○○○○○○○○○ : Message text (Any number of letters)

CTLx : CUDG executing controller #

(ii) Recovery measures

Recover from the failure according to the recovery measures for each message code.

(For the recovery measures for each message, see “2.4 Troubleshooting Based on Messages” (2) Errors detected by CUDG ([MNTE 02-0430](#)).)

(b) Flash/RAM micro detection message

(i) Indicated message

The Flash/RAM micro detection message is indicated in the [Controller 0/1 Common], [Controller 0], or [Controller 1] box as shown below.

The latest one is indicated at the top line.

Notice : As the date and time of occurrence indicated by the message, the RTC set in the detection controller is used.
If the RTC is different from one control to another, the indicated time of occurrence may be different from one message to another (the message on the upper line is indicated earlier than the one on the lower line).
In this case, the actually latest message is indicated at the top, too.

MM/DD/YYYY HH:MM:SS Cx	□□□□□□	○○○○○○○○○○○○	:	△△△△△△/◆◆◆◆
MM/DD/YYYY HH:MM:SS Cx	□□□□□□	○○○○○○○○○○○○	:	△△△△△△/◆◆◆◆
		:		

MM/DD/YYYY : Confirmed date

HH:MM:SS : Confirmed times

Cx : Error detected Controller#

□□□□□□ : Message Code^(‡1)

Rxxxxx : Flash detected messages ([MNTE 02-0580](#))

Ixxxxx : Progress messages ([MNTE 02-0710](#))

Wxxxxx : Warning messages ([MNTE 02-0800](#))

Hxxxxx : Failure messages ([MNTE 02-0850](#))

○○○○○○○○○○○○ : Message text (Optional font number)

△△△△△△△△ : Recovery measures code (see (ii))

◆◆◆◆ : Collecting failure information code (see (ii))

‡1 : For the message in which no recovery method is written, follow the recovery method shown in another message issued at the same time.

(ii) Recovery measures

- ① Collect the failure information according to “(◆◆◆)”.

Table 2.3.5 Collecting Failure Information List

Display code	Collecting failure information
TRC	Collect trace.
DMP	Collect trace and dump.
No display	Collection of information is not necessary.

For the details of the message, see “2.6 Collecting failure information” ([MNTE 02-1360](#)).

- ② Recover from the failure according to “Recovery measure code (△△△△△△△)”.
For the details of the message, see “2.4 Troubleshooting Based on Messages” ([MNTE 02-0420](#)).

Table 2.3.6 Recovery Measure Code List

Display code	Recovery measures	Reference page
2CTL	① Replace the Controller, the FAIL LED of which is on. ② If the system is still abnormal, replace the other Controller.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
BAT	Replace the Battery unit.	H1F:04-0200 RK :04-0690 MK :04-1140 RKL:04-1550
CACHE	Replace the Cache memory indicated in the message text.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
CTL	Replace the Controller, the FAIL LED of which is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
ENC	Replace the ENC board indicated in the message text.	H1F:04-0420 RK :04-0890 MK :04-1300 RKL:04-1750
FAN	Replace the Fan unit.	H1F:04-0490 RK :04-0950 MK :04-1380 RKL:04-1780
FD	Replace the Floppy disk.	—

Display code	Recovery measures	Reference page
FDD	Replace the Floppy disk drive.	H1F:04-0180 RK :04-0680 MK :04-1130 RKL:04-1540
HDU	Replace the Disk drive indicated in the message text.	H1F:04-0050 RK :04-0550 MK :04-1010 RKL:04-1420
MANUAL	Referring to the manual ("2.4 Troubleshooting Based on Messages" (MNTE 02-0420)), recover from the failure according to the recovery measures for each message code. Rxxxx : Flash detected messages (MNTE 02-0580) Ixxxx : Progress messages (MNTE 02-0710) Wxxxx : Warning messages (MNTE 02-0800) Hxxxx : Failure messages (MNTE 02-0850)	—
PON	Turn on the power again.	—
PS	Replace the AC/DC power supply indicated in the message text.	H1F:04-0450 RK :04-0920 MK :04-1350 RKL:04-1750
RETRY	① Retry the operation. ② If the same failure occurs again, see the messages list in the manual "2.4 Troubleshooting based on messages" (MNTE 02-0420) and recover from the failure according to the recovery measures for each message code.	—
SYSPM	Set the system parameter in the WEB maintenance mode correctly.	For WEB 03-0250
UPS	Execute a recovery process referring to the UPS manual. (For the replacement procedure, see related manual " Disk Subsystem UPS MANUAL ".)	—
No display	This is not a problem. Recovery operation is not necessary.	—

(iii) How to read failure information

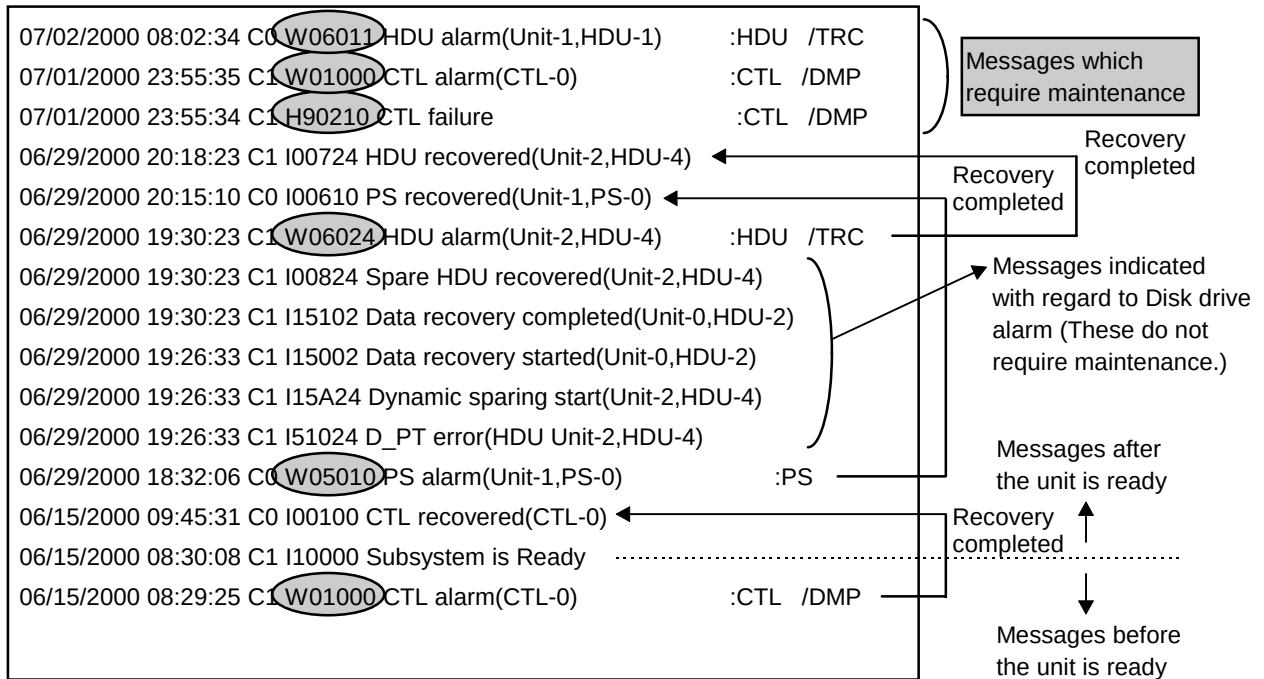
- The history of the unit after it is turned on is indicated in the Information Message.
- The message of Subsystem is Ready indicates the time when the unit is ready.
The messages made after the power is turned on until the unit is ready are indicated before this message. The messages made after the unit is ready are indicated after this message.
- Particularly pay attention to Wxxxxx (Warning message), Hxxxxx (Failure messages), and Rxxxxx (Flash detection message).
- The following messages are indicated when failures occur and when they are solved. (See Table 2.3.7.)

If the recovery message is indicated after a failure occurrence message, the failure has been solved and you do not need to solve it.

Table 2.3.7 Failure Message List

No.	Description	Failure detected messages		Failure recovery messages	
1	Controller error/recovery	W0010x	CTL alarm (CTL-x)	I0010x	CTL recovered (CTL-x)
2	Cache memory error/recovery	W0D0xy	CACHE alarm (CTL-x, CACHE-y)	I002xy	CACHE recovered (CACHE-x/y)
3	Battery error/recovery	W03000	Battery alarm	I00300	Battery recovered
		W03100	Battery removed		
		W03200	Battery SW off		
		W03300	Battery charge alarm		
4	Battery backup circuit error/recovery	W0340x	Battery backup circuit alarm (CTL-x)	I0040x	Battery backup circuit recovered (CTL-x)
5	Fan error/recovery	W04000	FAN alarm	I00500	FAN recovered
6	Power supply error/recovery	W050xy	PS alarm (Unit-x, PS-y)	I006xy	PS recovered (Unit-x, PS-y)
7	Disk drive error/recovery	W060xy	HDU alarm (Unit-x, HDU-y)	I007xy	HDU recovered (Unit-x, HDU-y)
8	Spare disk error/recovery	W061xy	Spare HDU alarm (Unit-x, HDU-y)	I009xy	Spare HDU recovered (Unit-x, HDU-y)
9	Loop error/recovery	W080xy	Loop alarm (Path-x, Loop-y)	I00Axy	Loop recovered (Path-x, Loop-y)
10	ENC board error/recovery	W090xy	ENC alarm (Unit-x, ENC-y)	I00Bxy	ENC recovered (Unit-x, ENC-y)
11	UPS error/recovery	W0C000	UPS alarm (UPS-x)	I00D00	UPS recovered (UPS-x)

Example of message analysis :



2.4 Troubleshooting Based on Messages

The contents of each failure detected during operation are reported by a message.

The failures detected during operation after the main switch of this unit is turned on and the state of the unit are reported.

(1) How to read table

Message code	Message text	Description	Collect the error		Recovery message	Reference page
			Trace	Dump		
*****	*****	The ENC board was inserted but recovery failed.	Gather		① Replace the Disk drive.	H1F:04-0470 RK :04-0960 MK :04-1010 RKL:04-1410

- The following messages are indicated.

CUDG detected message : 018xxxxx (MNTN 02-0430)

MM/DD/YYYY HH:MM:SS Cx	54	◆◆◆◆◆◆◆◆
MM/DD/YYYY HH:MM:SS Cx	50	◆◆◆◆◆◆◆◆
MM/DD/YYYY HH:MM:SS Cx	4C	◆◆◆◆◆◆◆◆
MM/DD/YYYY HH:MM:SS Cx	48	◆◆◆◆◆◆◆◆
MM/DD/YYYY HH:MM:SS Cx	44	◆◆◆◆◆◆◆◆
MM/DD/YYYY HH:MM:SS Cx	40	△△△△△△△△
MM/DD/YYYY HH:MM:SS Cx	3C	△△△△△△△△
MM/DD/YYYY HH:MM:SS Cx	38	△△△△△△△△
MM/DD/YYYY HH:MM:SS Cx	34	△△△△△△△△
MM/DD/YYYY HH:MM:SS Cx	30	△△△△△△△△
MM/DD/YYYY HH:MM:SS Cx	2C	△△△△△△△△
MM/DD/YYYY HH:MM:SS Cx	28	△△△△△△△△
MM/DD/YYYY HH:MM:SS Cx	24	△△△△△△△△
MM/DD/YYYY HH:MM:SS Cx	20	□□□□□□□□
MM/DD/YYYY HH:MM:SS Cx		○○○○○○○○○○
MM/DD/YYYY HH:MM:SS Cx	CTLx	

Information on "Offset 24".
Information is required to specify the slot # of the Cache memory to be replaced for recovery measures.
00000000 : Slot#0
00000001 : Slot#1
00000002 : Slot#2
00000003 : Slot#3

MM/DD/YYYY : Date of occurrence

HH:MM:SS : Time of occurrence

Cx : # of Controller in which failure is detected

◆◆◆◆◆◆◆◆ : PCI Config information

△△△△△△△△ : Detailed information

□□□□□□□□ : Message code

○○○○○○○○○○ : Message text (Any number of letters)

CTLx : CUDG executing controller #

Flash detected messages

Flash detected messages : Rxxxxx (MNTN 02-0580)

Progress messages : Ixxxxx (MNTN 02-0710)

Warning messages : Wxxxxx (MNTN 02-0800)

Failure messages : Hxxxxx (MNTN 02-0850)

- Message text : Message text is indicated.
- Description : Contents of failure are described concretely.
- Collection of errors

Trace : Collect trace of failure during ON time

Dump : Dump collection performed while the subsystem power is on (When a Controller blockade)/Collect memory dump.

Gather : Must be collected.

Space : Does not need to be collected.

- Recovery measures: How to recover from failure is indicated.

Recovery measure No.

- Reference page : No. of page in which the recovery measures are described.

It refers to the page No. of the volume of maintenance.

H1F : Floor model

RK : Rackmount model

MK : Floor model

RKL : Rackmount model

(2) CUDG detected messages

Table 2.4.1 CUDG detected messages

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
01814101	BOOT ROM0 ERR	The starting address of sum check is incorrect. (FM0)			① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
01814102	BOOT ROM0 ERR	The length to execute sum check is incorrect. (FM0)				
01814103	BOOT ROM0 ERR	The sum values obtained by sum check are mismatched. (FM0)				
01814201	BOOT ROM1 ERR	The starting address of sum check is incorrect. (FM1)				
01814202	BOOT ROM1 ERR	The length to execute sum check is incorrect. (FM1)				
01814203	BOOT ROM1 ERR	The sum values obtained by sum check are mismatched. (FM1)				
01815801	BOOT ROM0 ERR	The sum values obtained by sum check are mismatched. (FM0)				
01824301	CSDS RW ERR	As a result of 4-byte the R/W test of CS/DS, the written value and read value were different from each other.				
01824302	CSDS RW ERR	As a result of 2-byte the R/W test of CS/DS, the written value and read value were different from each other.				
01824303	CSDS RW ERR	As a result of 1-byte the R/W test of CS/DS, the written value and read value were different from each other.				
01834401	L2 RW ERR	As a result of the R/W test of L2 cache, the written value and read value were different from each other.				
01834402	L2 RW ERR	As a result of the R/W test of L2 cache, an illegal status was detected.				

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
01844501	MCTL RW ERR	As a result of the R/W test of M-CTL register, the written value and read value were different from each other.			① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
01844502	MCTL RW ERR	As a result of the R/W test of M-CTL register, an illegal status was detected.				
01844503	MCTL DMA ERR	DMA transfer by M-CTL was not completed.				
01844504	MCTL DMA ERR	As a result of DMA transfer by M-CTL, an illegal status was detected.				
01834505	MCTL DMA ERR	Abnormality was detected in the data sent from M-CTL by DMA transfer.				
01844601	MCTL FORCE ERR	A data was written in the read-only register of M-CTL, but any error was not detected.				
01844602	MCTL FORCE ERR	As a result of the error detection test on the internal bus of M-CTL, any normal error was not detected.				
01844603	MCTL FORCE ERR	As a result of the error detection test on the PCI bus of M-CTL, any normal error was not detected.				
01844701	LAN CTL RW ERR	As a result of the R/W test on the LAN control register, the written value and read value were different from each other.				
01844702	LAN CTL LB ERR	As a result of the loop-back test on the LAN controller, an illegal status was detected.				
01844703	LAN CTL LB ERR	Abnormality was detected in the data sent to the LAN controller by loop-back.				
01844D01	CTC CH0 ERR	Counting of CH0 by CTC was not finished within the specified time.				
01844D02	CTC CH0 ERR	A parity error occurred in the CH0 counter of CTC.				
01844D03	CTC CH0 ERR	Counting of CH0 by CTC is not finished.				
01844D04	CTC CH1 ERR	Counting of CH1 by CTC was not finished within the specified time.				

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
01844D05	CTC CH1 ERR	A parity error occurred in the CH1 counter of CTC.			① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
01844D06	CTC CH1 ERR	Counting of CH1 by CTC is not finished.				
01845101	FDC BUFF ERR	As a result of the R/W test on the DMA buffer of FDC, the written value and read value were different from each other.				
01845102	FDC BUFF ERR	As a result of the R/W test on the DMA buffer of FDC, an illegal status was detected.				
01864801	S10 CTL RW ERR	As a result of the R/W test on the SIO controller register, the written value and read value were different from each other.				
01864802	S10 CTL RW ERR	As a result of the R/W test on the SIO controller register, an illegal status was detected.				
01864803	S10 CTL LB ERR	As a result of the loop-back test on the SIO controller, an illegal status was detected.				
01864804	S10 CTL LB ERR	Abnormality was detected in the data sent to the SIO controller by loop-back.				
01874901	DCTL1 RW ERR	As a result of the R/W test on the D-CTL register, the written value and read value were different from each other.			① Replace the Controller whose FAIL LED is on. ② If the system is still abnormal, replace the other Controller.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
01874902	DCTL1 RW ERR	As a result of the R/W test on the D-CTL register, an illegal status was detected.				
01874A01	DUAL RW ERR	As a result of the R/W test on the D-CTL dual register, the written value and read value were different from each other.				
01874A02	DUAL RW ERR	As a result of the R/W test on the D-CTL dual register, an illegal status was detected.				

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
01874C01	DCTL FR1 ERR	As a result of the test to make error forcibly in access to MPU by D-CTL, an illegal status was detected.			① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
01874C02	DCTL FR1 ERR	As a result of the test to make an error forcibly in access to M-CTL DMA by D-CTL, an illegal status was detected.				
01874C03	DCTL FR1 ERR	As a result of the test on the buffer for M-CTL DMA in D-CTL, an error was detected.				
01874E0E	H_PT0 XFER ERR	When D-CTL was initialized for DMA transfer of host port #0, an illegal status was detected.				
01874E0F	H_PT0 XFER ERR	An error occurred during transfer for DMA transfer test #1 of host port #0.				
01874E10	H_PT0 XFER ERR	An illegal status was detected after transfer for DMA transfer test #1 of host port #0 was finished.				
01874E11	H_PT0 XFER ERR	Abnormality was detected in the data transferred for DMA transfer test #1 of host port #0.				
01874E12	H_PT0 XFER ERR	An illegal status was detected when the D-CTL was initialized for the DMA transfer from the host port #0.				
01874E13	H_PT0 XFER ERR	In the DMA transfer test #2 against the host port #0, an error occurred during the transfer.				
01874E14	H_PT0 XFER ERR	In the DMA transfer test #2 against the host port #0, an illegal status was detected after the transfer.				

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
01874E15	H_PT1 XFER ERR	In the DMA transfer test #2 against the host port #0, an error was found in transferred data.			① Check the mounting condition of the Interface board of the Controller, the FAIL LED of which is on. If the board is mounted normally, replace the Interface board. ② If the system is still abnormal, replace the above Controller.	H1F:04-0300 RK :04-0780 MK :04-1170 RKL:04-1580
01874E16	H_PT1 XFER ERR	An illegal status was detected when the D-CTL was initialized for the DMA transfer from the host port #1.				
01874E17	H_PT1 XFER ERR	An error occurred during transfer for DMA transfer test #1 of host port #1.				
01874E18	H_PT1 XFER ERR	An illegal status was detected after transfer for DMA transfer test #1 of host port #1 was finished.				
01874E19	H_PT1 XFER ERR	Abnormality was detected in the data transferred for DMA transfer test #1 of host port #1.				
01874E1A	H_PT1 XFER ERR	An illegal status was detected when the D-CTL was initialized for the DMA transfer from the host port #1.				

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
01874E1B	H_PT1 XFER ERR	An error occurred during transfer for DMA transfer test #2 of host port #1.			① Check the mounting condition of the Interface board of the Controller, the FAIL LED of which is on. If the board is mounted normally, replace the Interface board.	H1F:04-0300 RK :04-0780 MK :04-1170 RKL:04-1580
01874E1C	H_PT1 XFER ERR	An illegal status was detected after transfer for DMA transfer test #2 of host port #1 was finished.				
01874E1D	H_PT1 XFER ERR	Abnormality was detected in the data transferred for DMA transfer test #2 of host port #1.				
01874E1E	H_PT0 FR ERR	When D-CTL was initialized to make an error in DMA of host port #0 forcibly, an illegal status was detected.			① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
01874E1F	H_PT0 FR ERR	When an error was made in DMA of host port #0 forcibly, an error was detected during DMA transfer of host port #0.				
01874E20	H_PT0 FR ERR	When an error was made in DMA of host port #0 forcibly, an illegal status was detected.				
01874E21	H_PT1 FR ERR	When an error was made in DMA of host port #1 forcibly, an error was detected during DMA transfer of host port #1.			① Check the mounting condition of the Interface board of the Controller, the FAIL LED of which is on. If the board is mounted normally, replace the Interface board.	H1F:04-0300 RK :04-0780 MK :04-1170 RKL:04-1580
01874E22	H_PT1 FR ERR	When an error was made in DMA of host port #1 forcibly, an illegal status was detected.				
01875301	DCTL2 RW ERR	As a result of the R/W test on the D-CTL register, the written value and read value were different from each other.			① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
01875302	DCTL2 RW ERR	As a result of the R/W test on the D-CTL register, an illegal status was detected.				

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
01875501	DMA0 XFER ERR	Transfer of data from D-CTL by DMA0 was not finished.			① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
01875502	DMA0 XFER ERR	As a result of transfer from D-CTL by DMA0, an illegal status was detected.				
01875503	DMA0 XFER ERR	Abnormality was detected in the data transferred from D-CTL by DMA0.				
01875504	D_PT0 XFER ERR	When D-CTL was initialized for DMA transfer of drive port #0, an illegal status was detected.				
01875505	D_PT0 XFER ERR	When the drive FPC loop was initialized for DMA transfer of drive port #0, an error occurred.				
01875506	D_PT0 XFER ERR	As a result of DMA transfer test #1 of drive port #0, an error occurred.				
01875507	D_PT0 XFER ERR	After transfer is finished for DMA transfer test #1 of drive port #0, an illegal status was detected.				
01875508	D_PT0 XFER ERR	Abnormality was detected in the data transferred for DMA transfer test #1 of drive port #0.				
01875509	D_PT0 XFER ERR	As a result of DMA transfer test #2 of drive port #0, an error occurred.				
0187550A	D_PT0 XFER ERR	After transfer is finished for DMA transfer test #2 of drive port #0, an illegal status was detected.				
0187550B	D_PT0 XFER ERR	Abnormality was detected in the data transferred for DMA transfer test #2 of drive port #0.				
0187550C	D_PT1 XFER ERR	When D-CTL was initialized for DMA transfer of drive port #1, an illegal status was detected.				
0187550D	D_PT1 XFER ERR	When the drive FPC loop was initialized for DMA transfer of drive port #1, an error occurred.				
0187550E	D_PT1 XFER ERR	As a result of DMA transfer test #1 of drive port #1, an error occurred.				

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
0187550F	D_PT1 XFER ERR	After transfer is finished for DMA transfer test #1 of drive port #1, an illegal status was detected.			① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
01875510	D_PT1 XFER ERR	Abnormality was detected in the data transferred for DMA transfer test #1 of drive port #1.				
01875511	D_PT1 XFER ERR	As a result of DMA transfer test #2 of drive port #1, an error occurred.				
01875512	D_PT1 XFER ERR	After transfer is finished for DMA transfer test #2 of drive port #1, an illegal status was detected.				
01875513	D_PT1 XFER ERR	Abnormality was detected in the data transferred for DMA transfer test #2 of drive port #1.				
01875601	DMA0 FR ERR	When an error was made forcibly in DMA#0 of D-CTL, an illegal status was detected.				
01875602	D_PT0 FR ERR	When D-CTL was initialized for DMA transfer of drive port #0, an illegal status was detected.				
01875603	D_PT0 FR ERR	When the drive FPC loop was initialized for DMA transfer of drive port #0, an error occurred.				
01875604	D_PT0 FR ERR	When an error was made forcibly in DMA at drive port #0 of D-CTL, an error was detected during DMA transfer of drive port #0.				
01875605	D_PT0 FR ERR	When an error was made forcibly in DMA at drive port #0 of D-CTL, an illegal status was detected.				
01875606	D_PT1 FR ERR	When an error was made forcibly in DMA at drive port #1 of D-CTL, an error was detected during DMA transfer of drive port #1.				
01875607	D_PT1 FR ERR	When an error was made forcibly in DMA at drive port #1 of D-CTL, an illegal status was detected.				

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
01875710	H_PT0 XFER ERR	When D-CTL was initialized for DMA transfer of host port #0, an illegal status was detected.			① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
01875711	H_PT0 XFER ERR	When the drive FPC loop was initialized for DMA transfer of host port #0, an error occurred.				
01875712	H_PT0 XFER ERR	As a result of DMA transfer test #1 of host port #0, an error occurred.				
01875713	H_PT0 XFER ERR	After transfer is finished for DMA transfer test #1 of host port #0, an illegal status was detected.				
01875714	H_PT0 XFER ERR	Abnormality was detected in the data transferred for DMA transfer test #1 of host port #0.				
01875715	H_PT0 XFER ERR	As a result of DMA transfer test #2 of host port #0, an error occurred.				
01875716	H_PT0 XFER ERR	After transfer is finished for DMA transfer test #2 of host port #0, an illegal status was detected.				
01875717	H_PT0 XFER ERR	Abnormality was detected in the data transferred for DMA transfer test #2 of host port #0.			① Check the mounting condition of the Interface board of the Controller, the FAIL LED of which is lighting up. If the board is mounted normally, replace the Interface board. ② If the system is still abnormal, replace the above Controller.	H1F:04-0300 RK :04-0780 MK :04-1170 RKL:04-1580 H1F:04-0230 RK :04-0720
01875718	H_PT1 XFER ERR	When D-CTL was initialized for DMA transfer of host port #1, an illegal status was detected.				
01875719	H_PT1 XFER ERR	When the drive FPC loop was initialized for DMA transfer of host port #1, an error occurred.				
0187571A	H_PT1 XFER ERR	As a result of DMA transfer test #1 of host port #1, an error occurred.				
0187571B	H_PT1 XFER ERR	After transfer is finished for DMA transfer test #1 of host port #1, an illegal status was detected.				
0187571C	H_PT1 XFER ERR	Abnormality was detected in the data transferred for DMA transfer test #1 of host port #1.				

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
0187571D	H_PT1 XFER ERR	As a result of DMA transfer test #2 of host port #1, an error occurred.			① Check the mounting condition of the Interface board of the Controller, the FAIL LED of which is lighting up. If the board is mounted normally, replace the Interface board. ② If the system is still abnormal, replace the above Controller.	H1F:04-0300 RK :04-0780 MK :04-1170 RKL:04-1580
0187571E	H_PT1 XFER ERR	After transfer is finished for DMA transfer test #2 of host port #1, an illegal status was detected.				
0187571F	H_PT1 XFER ERR	Abnormality was detected in the data transferred for DMA transfer test #2 of host port #1.				
01875720	H_PT0 FR ERR	When an error was made forcibly in DMA at drive port #0 of D-CTL, an illegal status was detected in initialization of D-CTL.			① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
01875721	H_PT0 FR ERR	When an error was made forcibly in DMA at drive port #0 of D-CTL, an error occurred in initialization of the loop of host FP #0 for DMA transfer of the drive port.				
01875722	H_PT0 FR ERR	When an error was made forcibly in DMA at host port #0, an error was detected during DMA transfer of host port #0.				
01875723	H_PT0 FR ERR	When an error was made forcibly in DMA at host port #0, an illegal status was detected.				
01875724	H_PT1 FR ERR	When an error was made forcibly in DMA at host port #1, an error was detected during DMA transfer of host port #1.			① Check the mounting condition of the Interface board of the Controller, the FAIL LED of which is lighting up. If the board is mounted normally, replace the Interface board. ② If the problem is not recovered, replace the Controller.	H1F:04-0300 RK :04-0780 MK :04-1170 RKL:04-1580
01875725	H_PT1 FR ERR	When an error was made forcibly in DMA at host port #1, an illegal status was detected.				

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
01884B01	CACHE1 INF ERR	When information on mounting of the Cache memory was obtained three times, all three obtained values were different.			① Check the mounting condition of the Cache memory of the Controller, the FAIL LED which is on. If it is normal, replace the all Cache memories. ② If the system is still abnormal, replace the above Controller.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650 H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
01884B02 (*1)	CACHE1 INF ERR	When information on mounting of the Cache memory was obtained, a nonexistent value was obtained.			① Check the mounting condition of the Cache memory of the Controller, the FAIL LED of which is on. If it is normal, replace the Cache memory of the slot # indicated in Offset 24 of the indicated message. (See (MNTE 02-420)) ② If the system is still abnormal, replace the above Controller.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650 H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
01884B03	CACHE1 IMP ERR	Cache memories are not mounted in cache slots #0 and #1.			① Check the mounting condition of the Cache memory of the Controller, the FAIL LED of which is on. If it is normal, replace the Cache memories of slots #0 and #1. ② If the system is still abnormal, replace the above Controller.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650 H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
*1 : Cache slot # (0 - 3) is reported to Offset 24 of error code 01884B02.						

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
01884B04	CACHE1 IMP ERR	Cache memories of different capacities are mounted on a pair of cache slot (#0 and #1, or #2 and #3).			① Check the mounting condition of the Cache memory of the Controller, the FAIL LED of which is on (See if the capacities of each pair of Cache memory are the same). If it is normal, replace the all Cache memories. ② If the system is still abnormal, replace the above Controller.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
01884B05 (*1)	CACHE1 SIZE ERR	When image map of the Cache memory was obtained three times, all three obtained values were different.			① Check the mounting condition of the Cache memory of the Controller, the FAIL LED of which is on.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
01884B06 (*1)	CACHE1 SIZE ERR	An image map of a nonexistent Cache memory was obtained			If it is normal, replace the Cache memory of the slot # indicated in	
01884B07 (*1)	CACHE1 SIZE ERR	The Cache memory size indicated by the M-CTL register was different from the size inspected by CUDG.			Offset 24 of the indicated message.(See (MNTE 02-420))	
01884B08 (*1)	CACHE1 R/W ERR	As a result of the R/W test on the Cache memory, the written value and read value were different from each other.			② If the system is still abnormal, replace the above Controller.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
01884B09 (*1)	CACHE1 RW ERR	As a result of the R/W test on the Cache memory, an ECC error occurred.				
01884B0A (*1)	CACHE1 ADR ERR	As a result of the test on the address line of the Cache memory, the written value and read value were different from each other.				
01884B0B (*1)	CACHE1 ADR ERR	As a result of the test on the address line of the Cache memory, an ECC error occurred.				
*1 : Cache slot # (0 - 3) is reported to Offset 24 of error code 01884B05 to 0184B0B.						

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
01884B0C	CACHE1 ECC ERR	When an ECC check was executed on the Cache memory, the expected ECC error did not occur.			① Check the mounting condition of the Cache memory of the Controller, the FAIL LED of which is on.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
01884B0D	CACHE1 ECC ERR	When an ECC check was executed on the Cache memory, the data on the Cache memory were different from the expected ones.			If it is normal, replace the Cache memories of slots #0 and #1. ② If the system is still abnormal, replace the above Controller.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
01885401	CACHE2 INF ERR	When information on mounting of the Cache memory was obtained three times, all three obtained values were different.			① Check the mounting condition of the Cache memory of the Controller of the # indicated by "Cx" (x: Controller #) in the log message. If it is normal, replace the Cache memories of slots #0 and #1. ② If the system is still abnormal, replace the above Controller.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650 H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
01885402 (*1)	CACHE2 INF ERR	When information on mounting of the Cache memory was obtained, a nonexistent value was obtained.			① Check the mounting condition of the Cache memory of the Controller of the # indicated by "Cx" (x: Controller #) in the log message.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
01885403 (*1)	CACHE2 RW ERR	As a result of the R/W test on the Cache memory, the written value and read value were different from each other.			If it is normal, replace the Cache memory of the slot # indicated in Offset 24 of the indicated message (See (MNTE 02-420)).	
01885404 (*1)	CACHE2 RW ERR	As a result of the R/W test on the Cache memory, an ECC error occurred.				
01885405 (*1)	CACHE2 ADR ERR	As a result of the test on the address line of the Cache memory, the written value and read value were different from each other.			② If the system is still abnormal, replace the above Controller.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
01885406 (*1)	CACHE2 ADR ERR	As a result of the test on the address line of the Cache memory, an ECC error occurred.				

*1 : Cache slot # (0 - 3) is reported to Offset 24 of error code 01885402 to 01885406.

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
01894E01	HSPC IMP ERR	The host SPC mounting information of M-CTL was different from the mounting information inspected by CUDG.			① Check the mounting condition of the Interface board of the Controller, the FAIL LED of which is lighting up. If the board is mounted normally, replace the Interface board. ② If the system is still abnormal, replace the above Controller.	H1F:04-0300 RK :04-0780 MK :04-1170 RKL:04-1580 H1F:04-0230 RK :04-0720
01894E02	HSPC0 RW ERR	As a result of the R/W test on the host SPC, the written value and read value were different from each other.				
01894E03	HSPC0 SCR RW ERR	As a result of the R/W test on the SCRIPT RAM of the host SPC, the written value and read value were different from each other.				
01894E04	HSPC0 LPBK ERR	As a result of the loop-back test on the host SPC, an illegal status was detected.				
01894E05	HSPC0 LPBK ERR	As a result of the loop-back test on the host SPC, abnormality was detected in the transferred data.				
01894E06	HSPC0 LPBK ERR	In the loop back test against the host SPC #0, an illegal status was detected.				
01894E07	HSPC0 LPBK ERR	In the loop back test against the host SPC #0, an error was found in transferred data.				
01894E08	HSPC1 RW ERR	In the R/W test against the host SPC #1, read and written data were not the same.				
01894E09	HSPC1 SCR RW ERR	In the R/W test against the script RAM of the host SPC #1, read and written data were not the same.				
01894E0A	HSPC1 LPBK ERR	In the loop back test against the host SPC #1, an illegal status was detected.				
01894E0B	HSPC1 LPBK ERR	In the loop back test against the host SPC #1, an error was found in transferred data.				
01894E0C	HSPC1 LPBK ERR	In the loop back test against the host SPC #1, an illegal status was detected.				
01894E0D	HSPC1 LPBK ERR	In the loop back test against the host SPC #1, an error was found in transferred data.				

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
018A4F01	DFPC0 LPBK ERR	As a result of the R/W test on drive FPC #0, the written value and read value were different from each other.			① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
018A4F02	DFPC0 LPBK ERR	As a result of the R/W test on drive FPC #0, an illegal status was detected.				
018A4F03	DFPC0 LPINI ERR	As a result of the loop-back test on drive FPC #0, an error occurred during initialization of the loop.				
018A4F04	DFPC0 LPBK ERR	An error occurred during the write loop-back transfer of drive FPC #0.				
018A4F05	DFPC0 LPBK ERR	Abnormality was detected in the data sent from drive FPC #0 by write loop-back transfer.				
018A4F06	DFPC0 RW ERR	An error occurred during read loop-back transfer of drive FPC #0.				
018A4F07	DFPC0 LPINI ERR	Abnormality was detected in the data sent from drive FPC #0 by read loop-back transfer.				
018A4F08	DFPC1 RW ERR	As a result of the R/W test on drive FPC #1, the written value and read value were different from each other.				
018A4F09	DFPC1 RW ERR	As a result of the R/W test on drive FPC #1, an illegal status was detected.				

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
018A4F0A	DFPC1 LPINI ERR	As a result of the loop-back test on drive FPC #1, an error occurred during initialization of the loop.			① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
018A4F0B	DFPC1 LPBK ERR	An error occurred during the write loop-back transfer of drive FPC #1.				
018A4F0C	DFPC1 LPBK ERR	Abnormality was detected in the data sent from drive FPC #1 by write loop-back transfer.				
018A4F0D	DFPC1 LPBK ERR	An error occurred during read loop-back transfer of drive FPC #1.				
018A4F0E	DFPC1 LPBK ERR	Abnormality was detected in the data sent from drive FPC #1 by read loop-back transfer.				
018B5001 (*1, *2)	FDC ERR	As a result of the test on FD controller, an illegal status was detected.			① Make sure that the Floppy disk drive is installed correctly.	H1F:04-0180 RK :04-0680 MK :04-1130 RKL:04-1540
					② Replace the Floppy disk drive.	H1F:04-0180 RK :04-0680 MK :04-1130 RKL:04-1540
					③ If the subsystem fails to recover in spite of the replacement, get the number of the Controller (CTLx) on which the CUDG was made from the message notifying the detection of the error, power off the subsystem, and then replace the Controller.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
018C5201	PTC ERR	As a result of the R/W test on RTC, the written value and read value were different from each other.			① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
018C5202	PTC ERR	As a result of the R/W test on RTC, an illegal status was detected.				
*1 : A different message notifying a detection of an error may be displayed. When it is displayed, take a recovery action following it.						
*2 : This message and another one may be displayed doubly.						

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
018D5701	HFPC IMP ERR	Mounting condition indicated in the M-CTL register during the mounting check of the host FPC is different from mounting condition inspected by CUDG.			① When the 2-Gbps board (DF2G2) is installed, check if the revision of the original controller (F1F) is B or later. If it is A, the 2-Gbps board cannot be installed. ② Check the mounting condition of the Interface board of the Controller, the FAIL LED of which is on. If the board is mounted normally, replace the Interface board. ③ If the system is still abnormal, replace the above Controller.	H1F:04-0300 RK :04-0780 MK :04-1170 RKL:04-1580
018D5702	HFPC0 RW ERR	As a result of the R/W test on host FPC #0, the written value and read value were different from each other.			① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
018D5703	HFPC0 RW ERR	As a result of the R/W test on host FPC #0, an illegal status was detected.				
018D5704	HFPC0 LPINI ERR	An error occurred during initialization of the loop for the loop-back test of host FPC #0.				
018D5705	HFPC0 LPBK ERR	An error occurred during the write loop-back transfer of host FPC #0.				
018D5706	HFPC0 LPBK ERR	Abnormality was detected in the write loop-back data of host FPC #0.				
018D5707	HFPC0 LPBK ERR	An error occurred during read loop-back transfer of host FPC #0.				
018D5708	HFPC0 LPBK ERR	Abnormality was detected in the data sent from host FPC #0 by read loop-back transfer.				

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
018D5709	HFPC1 RW ERR	As a result of the R/W test on host FPC #1, the written value and read value were different from each other.			① Check the mounting condition of the Interface board of the Controller, the FAIL LED of which is on. If the board is mounted normally, replace the Interface board. ② If the system is still abnormal, replace the above Controller.	H1F:04-0300 RK :04-0780 MK :04-1170 RKL:04-1580
018D570A	HFPC1 RW ERR	As a result of the R/W test on host FPC #1, an illegal status was detected.				
018D570B	HFPC1 LPINI ERR	As a result of the loop-back test on host FPC #1, an error occurred during initialization of the loop.				
018D570C	HFPC1 LPBK ERR	An error occurred during the write loop-back transfer of host FPC #1.				
018D570D	HFPC1 LPBK ERR	Abnormality was detected in the data sent from host FPC #1 by write loop-back transfer.				
018D570E	HFPC1 LPBK ERR	An error occurred during read loop-back transfer of host FPC #1.				
018D570F	HFPC1 LPBK ERR	Abnormality was detected in the data sent from host FPC #1 by read loop-back transfer.				
018xxxD0 (*1)	CACHE ACCESS ERR	As a result of the R/W test to confirm the access to the Cache memory in the CUDG items which use the Cache memory, the written value and read value were different from each other.			① Check the mounting condition of the Cache memory of the Controller, the FAIL LED of which is on. If it is normal, replace the Cache memory of the slot # indicated in Offset 24 of the indicated message. (See (MNTE 02-420)) ② If the system is still abnormal, replace the above Controller.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
018xxxD1 (*1)	CACHE ACCESS ERR	As a result of the R/W test to confirm the access to the Cache memory in the CUDG items which use the Cache memory, an illegal status was detected.				
018xxxE0	HARD ERR	A hardware error was detected in the M-CTL register (MPINT) when each CUDG was finished.				
018xxxF0	PCI STS ERR	An error was detected in the PCI status register when each CUDG was finished.			① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
*1 : Cache slot # (0 - 3) is reported to Offset 24 of error code 0188xxxD0 to 0188xxxD1.						

(3) Flash detected messages

Table 2.4.2 Flash detected messages

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
R00100	PS off time over/PS alarm	A COMPELOFF interruption occurred because of overtime P-OFF or abnormal voltage.			① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
R00110	INTSTACK threshold over	A HARDERR interruption occurred because of STACK MEN S OVR.		Gather		
R00120	INTSTACK back over	A HARDERR interruption occurred because of STACK BACK OVER.		Gather		
R00140	MCTL data parity error [DP3]	A HARDERR interruption occurred because of DP3ERR.		Gather		
R00141	MCTL data parity error [DP2]	A HARDERR interruption occurred because of DP2ERR.		Gather		
R00142	MCTL data parity error [DP1]	A HARDERR interruption occurred because of DP1ERR.		Gather		
R00143	MCTL data parity error [DP0]	A HARDERR interruption occurred because of DP0ERR.		Gather		
R00150	MCTL REG access error [RDRGWR]	A HARDERR interruption occurred because of RDRGWRERR.		Gather		
R00170	MCTL ready time-out	A HARDERR interruption occurred because of RDYTMOUT.		Gather		
R00180	CTC Parity error (CH-0)	A HARDERR interruption occurred because of CTCCH0PERR.		Gather		
R00181	CTC Parity error (CH-1)	A HARDERR interruption occurred because of CTCCH1PERR.		Gather		
R00190	Watchdog timer counter parity error	A HARDERR interruption occurred because of WCDGCNTPERR.		Gather		
R00191	FDC-DMA ADR counter count over	A HARDERR interruption occurred because of FDC ADR CNT OVR.		Gather		
R00192	FDC-DMA ADR counter parity error	A HARDERR interruption occurred because of FDC ADR CNT PER.		Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
R10100	C/P-BRG parity error	A parity error was detected in the PCI status of CPU/PCI Bridge.		Gather	① Check the mounting condition of the Interface board of the Controller, the FAIL LED of which is on. If the board is mounted normally, replace the above Controller. ② If the system is still abnormal, replace the interface board.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
R10101	C/P-BRG system error	A system error was detected in the PCI status of CPU/PCI Bridge.		Gather		
R10102	C/P-BRG master abort	A master abortion was received in the PCI status of CPU/PCI Bridge.		Gather		
R10103	C/P-BRG target abort	A target abortion was received in the PCI status of CPU/PCI Bridge.		Gather		
R10104	C/P-BRG data parity error	A data parity error was received in the PCI status of CPU/PCI Bridge.		Gather		
R10105	C/P-BRG PCI SERR	A PCI SERR was notified in the error detection register of CPU/PCI Bridge.		Gather		
R10106	C/P-BRG PCI SERR	A PCI target parity error was detected in the error detection register of CPU/PCI Bridge.		Gather		
R10107	C/P-BRG memory read parity error	A memory read parity error was detected in the error detection register of CPU/PCI Bridge.		Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
R10110	MCTL parity error	A parity error was detected in the status register of M-CTL PCI Config.		Gather		
R10111	MCTL system error	A system error was notified in the status register of M-CTL PCI Config.		Gather		
R10120	LAN parity error	A parity error was detected in the status register LAN PCI Config.		Gather		
R10121	LAN system error	A system error was notified in the status register of LAN PCI Config.		Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
R10130	P/P-BRG0 parity error	A parity error was detected in the PCI status of PCI/PCI Bridge.		Gather	① Check the mounting condition of the Interface board of the Controller, the FAIL LED of which is on. If the board is mounted normally, replace the above Controller. ② If the system is still abnormal, replace the interface board.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
R10131	P/P-BRG0 system error	A system error was notified in the PCI status of PCI/PCI Bridge.		Gather		
R10132	P/P-BRG1 parity error	A parity error was detected In the PCI status of PCI/PCI Bridge.		Gather		
R10133	P/P-BRG1 system error	A system error was notified in the PCI status of PCI/PCI Bridge.		Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
R10140	DMA#0 parity error	A parity error was detected in the status register of M-PT PCI Config.		Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
R10141	DMA#0 system error	A system error was notified in the status register of M-PT PCI Config.		Gather		
R10150	D_PORT parity error	A parity error was detected in the status register of D-PT PCI Config.		Gather		
R10151	D_PORT system error	A system error was notified in the status register of D-PT PCI Config.		Gather		
R10152	H_PORT parity error	A parity error was detected in the status register of H-PT PCI Config.		Gather		
R10153	H_PORT system error	A system error was notified in the status register of H-PT PCI Config.		Gather		
R10160	HFPC-A parity error	A parity error was detected in the status register of HFPC A PCI Config.		Gather		
R10161	HFPC-A system error	A system error was notified in the status register of HFPC A PCI Config.		Gather		
R10162	HFPC-B parity error	A parity error was detected in the status register of HFPC B PCI Config.		Gather		
R10163	HFPC-B system error	A system error was notified in the status register of HFPC B PCI Config.		Gather		
R10164	HSPC-A parity error	A parity error was detected in the status register of HSPC A PCI Config.		Gather		
R10165	HSPC-A system error	A system error was notified in the status register of HSPC A PCI Config.		Gather		
R10166	HSPC-B parity error	A parity error was detected in the status register of HSPC B PCI Config.		Gather		
R10167	HSPC-B system error	A system error was notified in the status register of HSPC B PCI Config.		Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
R10170	DFPC0 parity error	A parity error was detected in the status register of DFPC0 PCI Config.		Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
R10171	DFPC0 system error	A system error was notified in the status register of DFPC0 PCI Config.		Gather		
R10172	DFPC1 parity error	A parity error was detected in the status register of DFPC1 PCI Config.		Gather		
R10173	DFPC1 system error	A system error was notified in the status register of DFPC1 PCI Config.		Gather		
R10180	MCTL SERR	A HARDERR interruption occurred because of a SERR assertion.		Gather		
R10190	MCTL PCI-ABT-CNT parity error	A HARDERR interruption occurred because of a PCI arbitration counter parity error.		Gather		
R10191	MCTL M-ABT-CNT parity error	A HARDERR interruption occurred because of a master port counter parity error.		Gather		
R20220	DCTL access error [2BWR]	A HARDERR interruption occurred because of a MPDBFBWR assertion.		Gather		
R20230	CTL lock aborted	A HARDERR interruption occurred because of a ACKIN OFF assertion.		Gather		
R20240	Other CTL lock time-out	A HARDERR interruption occurred because of TIME_OUT (LOCK) assertion.		Gather		
R20250	PCI BUFF parity error [RPDPTY]	A HARDERR interruption occurred because of a RDPTYERR assertion.		Gather		
R20260	DCTL access error [WR PROTECT]	A HARDERR interruption occurred because of a WR_PROTECT assertion.		Gather		
R20270	CACHE address over [MPU]	A HARDERR interruption occurred because of a CADROVM assertion.		Gather		
R20271	CACHE address over [DMA0]	A HARDERR interruption occurred because of a CADROVD0 assertion.		Gather		
R20272	CACHE address over [D_PORT0]	A HARDERR interruption occurred because of a CADROVDPO assertion.		Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
R20273	CACHE address over [D-PORT1]	A HARDERR interruption occurred because of a CADROVDP1 assertion.		Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
R20274	CACHE address over [HPORT0]	A HARDERR interruption occurred because of a CADROVHD0 assertion.		Gather		
R20275	CACHE address over [HPORY1]	A HARDERR interruption occurred because of a CADROVHD1 assertion.		Gather		
R20276	CACHE address over [M_MPU]	A HARDERR interruption occurred because of a CADROVM0 assertion.		Gather		
R20280	CACHE write error	A HARDERR interruption occurred because of a C_WRERR assertion.		Gather		
R20281	CACHE REF counter parity error	A HARDERR interruption occurred because of a REFCNT_PTYERR assertion.		Gather		
R20290	Other CTL lock response time-out	A HARDERR interruption occurred because of a TIME_OUT (ACK) assertion.		Gather		
R303xy	ECC uncorrectable error (CACHE-x/y)	A HARDERR interruption occurred because of a ECCUNCORRE assertion. x, y : Cache memory slot# (RK/RKA=0-3) (MK/RKL=0-1)		Gather	① Replace the Cache memory.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
R304xy	ECC correction failed (CACHE-x/y)	A HARDERR interruption occurred because of a ECCCORERR assertion. x, y : Cache memory slot# (RK/RKA=0-3) (MK/RKL=0-1)		Gather		
R31000	ECC write parity error [MPU]	A HARDERR interruption occurred because of a ECCWTPERR assertion.		Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
R31100	ECC generate error [MPU]	A HARDERR interruption occurred because of a ECCGENERR assertion.		Gather		
R3120x	ECC uncorrectable error (CTL-x)	The ECCUNCORRE occurred when the hardware error interruption was suppressed. x : Controller# (0-1)		Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
R40100	DUAL I/F data error [DMPERR]	A HARDERR interruption occurred because of a DMP_DTERR assertion.		Gather	① Replace the Controller whose FAIL LED is on. ② If the system is still abnormal, replace the above Controller.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
R40106	DUAL I/F parity error [EMRPTY]	A HARDERR interruption occurred because of a EMP_RDPTYERR assertion.		Gather		
R40107	DUAL I/F parity error [IMRPTY]	A HARDERR interruption occurred because of a IM_RDPTYERR assertion.		Gather		
R40108	DUAL I/F parity error [EMPWPTY]	A HARDERR interruption occurred because of a EMP_WRPTYERR assertion.		Gather		
R4010E	DUAL I/F parity error [IMWPTY]	A HARDERR interruption occurred because of a IM_WTPTYERR assertion.		Gather		
R4010F	DUAL I/F parity error [ID0 WPTYE]	A HARDERR interruption occurred because of a ID0_WTPTYERR assertion.		Gather		
R40110	DUAL I/F parity error [IDP0WPTYE]	A HARDERR interruption occurred because of a IDP0_WTPTYERR assertion.		Gather		
R40111	DUAL I/F parity error [IDP1WpTYE]	A HARDERR interruption occurred because of a IDP1_WTPTYERR assertion.		Gather		
R40120	DUAL I/F CACHE address over [EMPCADROV]	A HARDERR interruption occurred because of a EMP_CADROV assertion.		Gather		
R40121	DUAL I/F CACHE address over [EMMPUCADR]	A HARDERR interruption occurred because of a M-MPU_CADROV assertion.		Gather		
R40122	DUAL I/F CACHE address over [ED0CADR]	A HARDERR interruption occurred because of a ED0_CARDROV assertion.		Gather		
R40123	DUAL I/F CACHE address over [EDP0CADR]	A HARDERR interruption occurred because of a CDP0_CADROV assertion.		Gather		
R40124	DUAL I/F CACHE address over [EDP1CADR]	A HARDERR interruption occurred because of a EDP1_CADROV assertion.		Gather		
R40125	DUAL I/F CACHE address over [EHP0DCADR]	A HARDERR interruption occurred because of a EHP0D_CADROV assertion.		Gather		
R40126	DUAL I/F CACHE address over [EHP1DCADR]	A HARDERR interruption occurred because of a EHP1D_CADROV assertion.		Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
R40130	DUAL I/F ready time-out [IMRDYT]	A HARDERR interruption occurred because of a IM RDYTMOUT assertion.		Gather	① Replace the Controller whose FAIL LED is on. ② If the system is still abnormal, replace the above Controller.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
R40131	DUAL I/F ready time-out [ID0RDYT]	A HARDERR interruption occurred because of a ID0 RDYTMOUT assertion.		Gather		
R40132	DUAL I/F ready time-out [IDP0RDYT]	A HARDERR interruption occurred because of a IDP0 RDYTMOUT assertion.		Gather		
R40133	DUAL I/F ready time-out [IDP1RDYT]	A HARDERR interruption occurred because of a IDP1 RDYTMOUT assertion.		Gather		
R40140	DUAL I/F clock error [ICKERR]	A HARDERR interruption occurred because of a ICKERR assertion.		Gather		
R40150	DUAL I/F error [MDTDCHK]	A HARDERR interruption occurred because of a MDTDCHK assertion.		Gather		
R40160	DUAL I/F access error [EMPWPROT]	A HARDERR interruption occurred because of a MPU_W_PROTECT assertion.		Gather		
R40161	DUAL I/F address parity error [EADRPERR]	A HARDERR interruption occurred because of a EADRPERR assertion.		Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
R40200	DUAL I/F error [DMPERR]	A HARDERR interruption occurred because of a M_MPU_DTE_END assertion.		Gather		
R40201	DUAL I/F access error [EMMPWPROT]	A HARDERR interruption occurred because of a M-MPU_WR_PROTECT assertion.		Gather		
R40202	DUAL I/F ready time-out [IMMPUWPTYE]	A HARDERR interruption occurred because of a M-MPU_WTPTYER assertion. (MMPU_HDE_END)		Gather		
R40210	DUAL I/F ready time-out [MMPURDYT]	A HARDERR interruption occurred because of a M-MPU RDYTMOUT assertion.		Gather		
R40211	DUAL I/F parity error [EMMPUWPTYE]	A HARDERR interruption occurred because of a M-MPU WTPTYERR assertion. (MMPU_DUALHDERR)		Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
RA00xx	Microprogram error [FLS]	A system shutdown occurred because of a logical contradiction. xx : Any code		Gather	① Turn on the power again.	—
RA0410	Host name delete error	The network download function failed to delete the host name.		Gather	① Check the directory, in which the main system is stored, entered in the WEB window. ② Replace the Controller if the error recurs.	— H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
RA0411	NFS unmount error	An NFS unmounting resulted in an error during operation of the network download function.		Gather	① Check the directory, in which the main system is stored, entered in the WEB window. ② Replace the Controller if the error recurs.	— H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
RA0412	NFS mount error	An NFS mounting resulted in an error during operation of the network download function.		Gather	① Check the directory, in which the main system is stored, entered in the WEB window. ② Replace the Controller if the error recurs.	— H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
RA0413	Host name add error	The network download function failed to add the host name.		Gather	① Check the directory, in which the main system is stored, entered in the WEB window. ② Replace the Controller if the error recurs.	— H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
RA0414	NFS file open error	A file opening resulted in an error during operation of the network download function.		Gather	① Check the directory, in which the main system is stored, entered in the WEB window. ② Replace the Controller if the error recurs.	— H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
RA0415	System file error	An error was detected in a file in the directory storing the system during operation of the network download function.		Gather	① Check if the directory, in which the main system is stored, entered in the Web window and the files stored in it are correct. ② Replace the Controller if the error recurs.	— H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
RA1000	Loop error	A system shutdown occurred because of a loop failure.		Gather	① Collect and analyze memory dump and specify the failed part.	02-1850
RA2000	DIPSW read error	The DIP switch register was read three times and all the results were different from each other.		Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
RA30xy	CACHE size mismatch b/w. CTL (CACHE-x/y)	A cache mounting error occurred. x, y : Cache memory slot# (RK/RKA=0-3) (MK/RKL=0-1)			① Replace the Cache memory.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
RA4000	CTL synchronized error	Synchronization failed.		Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
RA4100	CTL initial synchronized error	Time-out occurred in another system because of an initial synchronization.		Gather		
RA4200	Maintenance mode synchronized error	A synchronization error occurred in maintenance mode.		Gather		
RA5000	I/F fatal error	① No Interface boards are mounted.			① Mount at least one Interface board on the Controller.	—
		② Both SCSI and Fibre Channel are mounted as the host interface.			① Use interfaces of only one type.	—
					② Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
		③ An Interface board was reset by mounting check.			① Replace the Interface board and restart the unit.	H1F:04-0300 RK :04-0780 MK :04-1170 RKL:04-1580
					② Replace the Controller whose FAIL LED is on and turn the power on again.	H1F:04-0230 RK :04-0720

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
RA5100	ID succession failed [config]	The Interface boards of the Controllers were mismatched in the ID take-over mode.			① Set the system parameter correctly in the WEB maintenance mode.	For WEB Chapter 3
RA5200	ID succession failed [system parameter]	The individual information of the system parameter is not set in the other system in the ID take-over mode.				
RA6000	CTL number mismatch	The single mode is set in the system parameter but dual mode is selected actually.				
RA6100	System parameter undefined	System parameter information (common) is not set.				
RA6200	System parameter SUM check error	A sum check error occurred in the system parameter area.		Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
RA7000	Microprogram revision mismatch	The systems drive-loaded between Controllers are mismatched.			① Turn the power off, then turn it on again.	—
RA7100	System program error [NO SCSI]	A SCSI system does not exist in the drive of a SCSI configuration.			① Install a microprogram for SCSI.	—
RA7200	System program error [NO FIBRE]	A Fibre system does not exist in the drive of a Fibre configuration.			① Install a microprogram for Fibre Channel.	—
RA7300	System program error [NO SCREENING]	The screening system does not exist in the system drive in the Screening System Start-Up mode.		Gather	① Reinstall the microprogram.	For Maintenance Chapter 5
RA7400	System program error [SCREENING]	The ordinary system does not exist (only the screening system exists) in the system drive in the Ordinary System Start-Up mode.		Gather		
RA7500	System program error [Unsupport]	A reading of the microprogram by the floor model H1FL and RKL subsystem failed because the subsystem does not support the microprogram.		Gather	① Retry the installation using the FDs containing the main microprogram which is supported by the floor model H1FL and RKL	For Maintenance Chapter 5
RA9000	Task make error	Generation of a task or a semaphore failed.		Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
RAA000	CUDG skip	CUDG skip was made.			—	—
RAA100	Remote reboot execute	A remote rebooting was done.			—	—
RAA200	Option data initialized	The unlocking information was initialized owing to an occurrence of a sumcheck error in the take-over information area (FM) in which the unlocking information is stored.			—	—
RAB0xy	Secondary clock not out (CTL-x, CTL-y)	PCI/PCI Bridge chip x : controller # (0-1) y : error code # (1-3) 1 : PCI/PCI Bridge0 failure 2 : PCI/PCI Bridge1 failure 3 : PCI/PCI Bridge0/1 failure	Gather		① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
RB1000	FD device error	FD device error occurred.			① Replace the failed FD.	—
RB1100	FD device install error	Installation of a FD device finished abnormally.			② If this error still occurs, replace the floppy disk drive.	H1F:04-0180 RK :04-0680 MK :04-1130 RKL:04-1540
RB1200	FD read error	A file opening/reading error occurred.				
RB1300	FD number error	FD number is illegal.			① Check the FD number.	—
RB1400	Open/read error [END.DAT]	An END. DAT opening/reading error occurred.			① Replace the failed FD. ② If this error still occurs, replace the floppy disk drive.	H1F:04-0180 RK :04-0680 MK :04-1130 RKL:04-1540
RB1500	No END. DAT found in FD	END. DAT is not in FD.				
RB1600	FD control error	A FD access error occurred.				
RB1700	File seek error	The inserted FD is faulty.				
RB2000	FD unformatted	FD is not formatted.			① Formatting the FD.	—
RB2100	FD not inserted	FD is not inserted.			① Inserting the FD.	—
RB2200	FD write protected	FD cannot be written since it is write-protected.			① Canceling the FD.	—
RB2300	Bad FD inserted	An error was detected in FD.			① Replace the failed FD. ② If this error still occurs, replace the floppy disk drive.	H1F:04-0180 RK :04-0680 MK :04-1130 RKL:04-1540
RB3000	File size error	An error was detected in file size.				
RB3100	File open error	Opening of file failed.				
RB3200	File read error	Reading of file failed.				
RB3300	File write error	Writing of file failed.				
RB3400	Bad FD file	An error was detected in file.				
RB3500	Bad block ID	An illegal block ID was detected.				

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
RB3600	Bad LBA in FD	An illegal writing LBA was caused by illegal contents of FD.			① Replace the failed FD. ② If this error still occurs, replace the floppy disk drive.	—
RB4000	File open error [MAINPRG. DAT]	A MAINPRG DAT opening error occurred.				
RB4100	File read error [MAINPRG. DAT]	A MAINPRG DAT reading error occurred.				
RB5000	FD read error [USTR500. DAT]	A USTR500. DAT file reading error occurred.				
RB5100	Status error [USTR500. DAT]	A USTR500. DAT file status error occurred.				
RB7000	Program size too large	The program is too large in size.			① Replace the installation FD with correct one.	—
RB8000	Old microprogram exists	There was another system when installation was started.			① If installation may be continued (In this case, all the data in the Disk drive are deleted (The RAID group and LU deformation are initialized)), insert the next FD and continue installation.	For Installation Chapter 5
					② When the data in the Disk drive need to be saved, stop the work and perform update installation.	For Maintenance Chapter 5
RB8100	Install failed	Installation failed.		Gather	① The cause of the failure is indicated under the message. Solve the failure according to the procedure indicated under the message.	—
RB8200	Install partially complete	Installation failed in a part of the drive.		Gather	① See [Procedure of locating failed part when the message of "Install partially complete" is output].	For Installation Chapter 5
RB8300	Empty system retry full install	Update installation cannot be executed since a system does not exist in the Disk drive.			① Execute new installation.	—
RB8400	Download failed	Drive-loading failed.			① See "2.5 Details of Recovery Procedures".	02-1060

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
RB8500	Microprogram extract error	Depression of main microprogram failed.			① Execute update installation.	For Maintenance Chapter 5
					② If the system is still abnormal, replace the Controller, the FAIL LED of which is lighting up.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
RB9000	System parameter restore failed	Restoration of the system failed.		Gather	① Replace inserted FD with a correct backup FD.	—
					② If there is not a backup FD, set the system parameter correctly in the WEB maintenance mode.	For Installation Chapter 6
RB9100	Another system parameter restore failed	Restoration of another system failed.		Gather	① Replace inserted FD with a correct backup FD.	—
					② If there is not a backup FD, set the system parameter correctly in the WEB maintenance mode.	For Installation Chapter 6
RBA000	Down grade check NG	Down-grade check result was NG.			① The present microprogram version cannot be updated to a specified microprogram version. Check the work procedure.	For Maintenance Chapter 5
RBA100	Unsupported microprogram error	The microprogram, which does not support the floor model H1FL and RKL, was attempted to be installed in the DF500-MK/RKL.			① When retrying the installation, replace the FDs with those containing the main microprogram supported by the floor model H1FL and RKL and perform the installation over again.	For Maintenance Chapter 5
RBA200	Unsupported FM0 program error	The FM0 microprogram, which does not support the floor model H1FL and RKL, was attempted to be installed in the DF500-MK/RKL.			① When retrying the installation, replace the FDs with those containing the main microprogram supported by the floor model H1FL and RKL and perform the installation over again.	For Maintenance Chapter 5

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
RBA300	Unsupported FM1 program error	The FM1 microprogram, which does not support the floor model H1FL and RKL, was attempted to be installed in the DF500-MK/RKL.			① When retrying the installation, replace the FDs with those containing the main microprogram supported by the floor model H1FL and RKL and perform the installation over again.	For Maintenance Chapter 5
RBB0xy	Bad sequence number (Unit-x, HDU-y)	The update sequence number is illegal. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)			① Replace the Disk drive.	H1F:04-0050 RK :04-0550 MK :04-1010 RKL:04-1420
RBC000	No drive available	There is not a Disk drive to install.			① Replace Disk drive #0 - 4 of the RK and RKL unit.	H1F:04-0050 RK :04-0550 MK :04-1010 RKL:04-1420
RBC1xy	Drive block size error (Unit-x, HDU-y)	Illegal drive block size was detected during read capacity check. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)			① Replace the Disk drive.	H1F:04-0050 RK :04-0550 MK :04-1010 RKL:04-1420
RBC2xy	Unknown drive (Unit-x, HDU-y)	Writing a program in FM0 failed. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)				
RBD000	FM0 program write error	Writing a program in FM0 failed.		Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720
RBD100	FM1 program write error	Writing a program in FM1 failed.		Gather		MK :04-1170 RKL:04-1580

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
RBE000	Flash memory write error	Writing in the flash memory failed.		Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
RBE100	Flash memory SUM check error	A sum check error is detected in the flash memory.		Gather		
RBE200	Flash program update error	When the FM microprogram which failed in maintenance of the flash version is updated, its version is not matched to the version of the main microprogram.			① Perform the installation upgrade.	For Maintenance Chapter 5
					② If the system is still abnormal, replace the above Controller.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
RBE300	Flash program update start	Updating of the FM1 flash program was started by the latest REV maintenance function of the flash program.			—	—
RBE301	Flash program update end	Updating of the FM1 flash program was started by the latest REV maintenance function of the flash program.			—	—
RBF000	Backup FD error	A malfunction was detected in the backup FD.			① Replace the FD in which the failure occurred. ② If this error still occurs, replace the floppy disk drive.	H1F:04-0180 RK :04-0680 MK :04-1130 RKL:04-1540
RC0000	System parameter restore complete	The automatic restoration of the system parameters completed normally.			—	—

(4) Progress message

Table 2.4.3 Progress message

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
I0010x	CTL recovered (CTL-x)	The Controller recovered by replacing the board in the ON state. x : Controller# (0-1)			—	—
I002xy	CACHE recovered (CACHE-x/y)	The cache package recovered from blockage by replacing the board in the ON state. x, y : Cache memory slot# (RK/RKA=0-3) (MK/RKL=0-1)			—	—
I00300	Battery recovered	The battery voltage became normal.			—	—
I0040x	Battery backup circuit recovered (CTL-x)	The battery charging circuit recovered. x : Controller# (0-1)				—
I00500	FAN recovered	The fan failure was recovered.			—	—
I006xy	PS recovered (Unit-x, PS-y)	The DC power (CTL/DRV PS) voltage became normal. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : AC/DC power supply# (0-1)			—	—
I007xy	HDU recovered (Unit-x, HDU-y)	The Disk drive was recovered. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)			—	—
I008xy	Spare HDU recovered (Unit-x, HDU-y)	Data was recovered to the Spare disk. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)			—	—

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
I009xy	Spare HDU recovered (Unit-x, HDU-y)	The Spare disk was recovered. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)			—	—
I00Axy	Loop recovered (PATH-x, LOOP-y)	The loop recovered. x = Path # (RK/RKA=0-1) (MK=0, RKL=0-6) y = Loop # (0-1)			—	—
I00Bxy	ENC recovered (Unit-x, ENC-y)	A SW P/K failure was solved. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y = ENC board # (0-1)			—	—
I00D0x	UPS recovered (UPS-x)	The UPS was recovered. x = UPS # (0-1)			—	—
I00E00	Battery removed	The Battery unit was removed from the subsystem when a battery failure had occurred.			—	—
I00F00	Battery SW off	The switch of the Battery unit was turned off when a battery failure had occurred.			—	—
I01000	Battery charge alarm	The battery voltage dropped causing the battery to be charged when a battery failure has occurred.			—	—
I02000	Battery alarm	A battery voltage error or a battery charging circuit error occurred when a battery failure had occurred.			—	—
I03100	Battery removed	The battery was removed from the unit.			—	—
I03200	Battery SW off	The switch of the battery was turned off.			—	—
I10000	Subsystem is ready	The unit is ready.			—	—
I11000	All raid group initialized	All RAID groups were deleted.			—	—
I111xx	RAID group deleted (RG-xx)	All LUs were deleted. xx : RAID group#			—	—

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
I12000	ALL LU initialized	All LUs were deleted. (This is also displayed when the LU#0 is created.)			—	—
I121xx	LU deleted (LU-xx)	LUs were deleted. xx : LUN number (0-63)			—	—
I122xx	LU format completed (LU-xx)	LU formatting was completed. xx : LUN number (0-63)			—	—
I123xx	LU format failed (LU-xx)	LU formatting stopped abnormally. xx : LUN number (0-63)	Gather		① If "W060xy HDU alarm (Unit-x, HDU-y) is indicated at this time, follow the instruction of W060xy.	—
					② A Confirm that a Disk drive to which the objective LU is allotted is mounted.	—
					③ If it is confirmed in the step ② that all the disk drives are installed and no failure has occurred in them, format the object LU again.	—
I130xy	Spare HDU defined (Unit-x, HDU-y)	A Spare disk is registered. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)			—	—
I131xy	Spare HDU deleted (Unit-x, HDU-y)	Registration of a disk is called off. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)			—	—
I140xy	System copy started (Unit-x, HDU-y)	System copy was started. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)			—	—

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
I141xy	System copy completed (Unit-x, HDU-y)	System copy terminated normally. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)			—	—
I142xy	System copy failed (Unit-x, HDU-y)	System copy failed. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)	Gather		① Replace the Disk drive.	H1F:04-0050 RK :04-0550 MK :04-1010 RKL:04-1420

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
I150xy	Data recovery started (Unit-x, HDU-y)	Data recovery was started. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)			—	—
I151xy	Data recovery completed (Unit-x, HDU-y)	Data recovery terminated normally. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)			—	—
I152xy	Data recovery failed (Unit-x, HDU-y)	Data recovery failed. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)	Gather		① See "2.5 Details of Recovery Procedures".	02-1060
I153xy	Data recovery partial (Unit-x, HDU-y)	Recovery of data is finished normally. (Incomplete writing is registered.) x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)	Gather		① See "2.5 Details of Recovery Procedures".	02-1060
I15Axy	Dynamic sparing start (Unit-x, HDU-y)	Dynamic sparing started. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)			—	—
I160xx	FALSH other revision edit (REV-xx)	Version-up of flash was detected when Controller in the ON state is inserted. xx : Micro (Rev.)			—	—

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
I17001	Default LU-CTL change failed [PIN]	The charge LU is not changed. (Pin exists)	Gather		① If any Disk drive failed, replace it, then restart the unit.	H1F:04-0050 RK :04-0550 MK :04-1010 RKL:04-1420
I17002	Default LU-CTL change failed [PS OFF]	The charge LU is not changed. (Plan is not stopped)			① Set the unit in the ready state and turn off the power, then turn on the power again.	—
I17003	Default LU-CTL change failed [HOT]	The charge LU is not changed. (System hot standby)			① Use the system as it is. (A change of the charge LU is ignored in the hot standby mode.)	—
I17004	Default LU-CTL change failed [LU]	The charge LU is not changed. (LU is not defined)			① Use the system as it is. (A change of the charge LU is ignored since LU is not defined.)	—
I18000	PIN-over recovered	The PIN threshold value lowered.			—	—
I19000	Online micro-update completed	Micro-replacement is completed in the ON state.			—	—
I1A00x	Turbo-LU disable (Default CTL-x)	LU residence is not changed. x : Default Controller# (0-1)			① Set the unit in the ready state and turn off the power, then turn on the power again.	—
I1A10x	Turbo-LU deleted (Default CTL-x)	LU residence is deleted. (When RAID group/LU is deleted) x : Default Controller# (0-1)			—	—
I1A2xy	Turbo-LU warning recovered (CTL-x, ERR-y)	LU residence OFF warning was called off. x : Default controller # y : Factor code 0: Too large LU 1: Cache access error 2: Regression of controller 3: Abnormal battery voltage 4: Abnormal battery charging circuit 5: Larger than PIN threshold value			—	—
I1A30x	Turbo-LU enable (Default CTL-x)	The Turbo LU residence function was turned on. x : Default Controller# (0-1)			—	—

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
I1B000	Forced parity correction started	Forced parity recovery processing was started.			—	—
I1B100	Forced parity correction completed	Forced parity recovery processing was finished.			—	—
I1C0xy	Loop diagnostic start (Path-x, Loop-y)	Loop diagnosis was started. x : Path# (RK/RKA=0-1) (MK/RKL=0) y : Loop# (0-1)			—	—
I1C1xy	Loop diagnostic end (Path-x, Loop-y)	Loop diagnosis was finished. x : Path# (RK/RKA=0-1) (MK/RKL=0) y : Loop# (0-1)			—	—
I20100	FD system error	A system error occurred during collection of trace in the ON state.			① Replace the FD and retry. When the subsystem is not recovered from the error, replace the FDD and execute once again. ② If the subsystem is not recovered from the error nevertheless, replace the Controller whose number is displayed in the "Cx" (x: Controller number) in the log message.	H1F:04-0180 RK :04-0680 MK :04-1130 RKL:04-1540 H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
I20200	FD data over	Trace information to be collected in the ON state exceeds 1 Mbyte and cannot be collected.			① Controller of the No. indicated by "Cx" (x: Controller #) in the log message.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
I20300	FD write protected	Collection of trace in the ON state failed because of the write protection of FD.			① Unprotected FD.	—
I20400	FD unformatted	Collection of trace in the ON state failed since FD is not formatted.			① Format FD.	—

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
I20500	FD device error	A device is not generated when data are compressed and written in FD during collection of trace in the ON state.			① Replace the FD and retry. When the subsystem is not recovered from the error, replace the FDD and execute once again. ② If the subsystem is not recovered from the error nevertheless, replace the Controller whose number is displayed in the "Cx" (x: Controller number) in the log message.	H1F:04-0180 RK :04-0680 MK :04-1130 RKL:04-1540 H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
I20600	FD file open error	A file opening error occurred during collection of trace in the ON state.			① Replace the FD in which the failure occurred. ② If this error still occurs, replace the floppy disk drive.	H1F:04-0180 RK :04-0680 MK :04-1130 RKL:04-1540
I20700	FD access interrupt	Collection of trace in the ON state was interrupted.			① Collect trace in the ON state again.	—
I301xy	HDU error (Unit-x, HDU-y)	PDEV should be blocked because of an error, but it is not blocked since redundancy is insufficient. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)	Gather		① See "2.5 Details of Recovery Procedures".	02-1060
I30200	System HDU error	There is a drive which cannot handle the system before the system is ready.	Gather		① Solve the failure according to "I142xy System copy failed (Unit-x, HDU-y)" indicated before the message.	—

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
I303xy	HDU read capacity failed (Unit-x, HDU-y)	The capacity of the current Disk drive is not matched to the capacity of the Disk drive used when RG was set. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)			① Replace the Disk drive with one having proper capacity.	H1F:04-0050 RK :04-0550 MK :04-1010 RKL:04-1420
I304xy	HDU spin up failed (Unit-x, HDU-y)	An insertion of a Disk drive failed because of a Disk drive failure. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)			① Pull out the Disk drive and insert it again. ⁽¹¹⁾	H1F:04-0050 RK :04-0550 MK :04-1010 RKL:04-1420
					② If the trouble is not solved in spite of the above operation, replace the Disk drive.	H1F:04-0050 RK :04-0550 MK :04-1010 RKL:04-1420
I305xy	HDU read capacity failed (Unit-x, HDU-y)	An insertion of a Disk drive failed because of an illegal read capacity. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)			① Replace the Disk drive with one having proper capacity.	H1F:04-0050 RK :04-0550 MK :04-1010 RKL:04-1420
					② If the trouble is not solved in spite of the above operation, replace the Disk drive.	H1F:04-0050 RK :04-0550 MK :04-1010 RKL:04-1420

¹¹ : If this message is issued frequently, it is suspected that one of the following cases have occurred.

- Symptom : In the case where the MRCF-Lite function is used, a spin up operation repeats an interruption and restart because of a collision between the commands of MRCF-Lite and RAID Manager.
Corrective action : Contact the system administrator. If the MRCF-Lite command is issued because of a pollings at a short intervals, have the administrator discontinue a script.
- Symptom : A spin up operation repeats an interruption and restart because LU switchings occur frequently.
Corrective action : Check the setting of the owner right to the LU and change it so that the LU switching does not occur owing to an I/O command issued by a host. (However, the setting of the owner right cannot be changed while the subsystem power is on.)

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
I410xy	HDU error over (Unit-x, HDU-y) [HDRVC]	The disk at the position indicated with x and y exceeds the threshold value because of an error in the recovered mechanism system. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)			① Replace the Disk drive.	H1F:04-0050 RK :04-0550 MK :04-1010 RKL:04-1420
I411xy	HDU error over (Unit-x, HDU-y) [HDUNR]	The disk at the position indicated with x and y exceeds the threshold value because of an error in the un-recovered mechanism system. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)				
I412xy	HDU error over (Unit-x, HDU-y) [MDRCV]	The disk at the position indicated with x and y exceeds the threshold value because of an error in the recovered medium system. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)				
I413xy	HDU error over (Unit-x, HDU-y) [MDUNR]	The disk at the position indicated with x and y exceeds the threshold value because of an error in the un-recovered medium system. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)				

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
I414xy	HDU error over (Unit-x, HDU-y) [RWRCV]	The disk at the position indicated with x and y exceeds the threshold value because of an error in the recovered R/W system. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)			① Replace the Disk drive.	H1F:04-0050 RK :04-0550 MK :04-1010 RKL:04-1420
I415xy	HDU error over (Unit-x, HDU-y) [RWUNR]	The disk at the position indicated with x and y exceeds the threshold value because of an error in the un-recovered R/W system. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)				
I416xy	HDU error over (Unit-x, HDU-y) [IFRCV]	The disk at the position indicated with x and y exceeds the threshold value because of an error in the recovered disk I/F. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)				
I417xy	HDU error over (Unit-x, HDU-y) [IFUNR]	The disk at the position indicated with x and y exceeds the threshold value because of an error in the un-recovered disk I/F. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)				

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
I418xy	HDU error over (Unit-x, HDU-y) [CHRCV]	The disk at the position indicated with x and y exceeds the threshold value because of an error in the recovered hardware. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)			① Replace the Disk drive.	H1F:04-0050 RK :04-0550 MK :04-1010 RKL:04-1420
I419xy	HDU error over (Unit-x, HDU-y) [CHUNR]	The disk at the position indicated with x and y exceeds the threshold value because of an error in the un-recovered hardware. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)				
I41Axy	HDU error over (Unit-x, HDU-y) [SCRCV]	The disk at the position indicated with x and y exceeds the threshold value because of an error in the recovered SCSI I/F. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)				
I41Bxy	HDU error over (Unit-x, HDU-y) [SCUNR]	The disk at the position indicated with x and y exceeds the threshold value because of an error in the un-recovered SCSI I/F. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)				

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
I41Cxy	HDU error over (Unit-x, HDU-y) [ONVRCV]	The disk at the position indicated with x and y exceeds the threshold value because of a correctable error in the on-line verification. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)			① Replace the Disk drive.	H1F:04-0050 RK :04-0550 MK :04-1010 RKL:04-1420
I41Dxy	HDU error over (Unit-x, HDU-y) [ONVUNR]	The disk at the position indicated with x and y exceeds the threshold value because of an uncorrectable error in the on-line verification. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)				
I4200x	Online micro-update (CTL-x)	The controller was micro-replaced in the ON state. x : Controller # (0-1)			—	—
I502xy	HDU change Info (Unit-x, HDU-y)	Report on a drive to be replaced. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)			① Replace the Disk drive.	H1F:04-0050 RK :04-0550 MK :04-1010 RKL:04-1420
I510xy	D_PT error (Unit-x, HDU-y)	A drive port failure. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)				

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
I6010x	LAN failure (CTL-x)	The LAN state is invalid. x : Controller# (0-1)			① Confirm the LAN cable.	—
					② A Replace the Controller of the No. indicated with x.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
I60200	Link failure [LIMIT OVER]	Link failures were detected more than the threshold value.	Gather		① Specify the failed part with the automatic loop diagnostic function. Follow the other message indicated at this time.	—
I603xy	Obstacle part unknown (Path-x, Loop-y)	Failed part cannot be specified by the loop diagnosis. x = Path # (RK/RKA=0-1) (MK/RKL=0) y = Loop# (0-1)	Gather		① When any of the following messages is displayed before this message, perform maintenance following it. • W060xy HDU alarm • W090xy ENC alarm • 1301xy HDU error	—
					② When a part to be replaced is not displayed before this message, refer to Section 2.5, "Details of Recovery Procedures".	02-1060
I604xy	ENC recovery NG HDU-NG (Unit-x, HDU-y or z)	Since a Disk drive (y or z) connected to an ENC to be recovered had a failure, this ENC was not recovered. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y or z : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)	Gather		① Replace the Disk drive (y or z) to recover it, then insert the ENC board again.	H1F:04-0050 RK :04-0550 MK :04-1010 RKL:04-1420
I605xy	ENC recovery NG ENC-NG (Unit-x, ENC-y)	Since an ENC to be recovered had a failure, it was not recovered. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : ENC board# (0-1)	Gather		① Replace the ENC board with new one.	H1F:04-0420 RK :04-0890 MK :04-1300 RKL:04-1700
I606xy	ENC Thermal alarm (Unit-x, ENC-y)	Because a temperature error was detected in the ENC of the extended subsystem, the ENC concerned was blocked.			—	—

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
I607xy	CACHE error over (CACHE-x/y) [CRECT]	The number of cache correctable error occurrences exceeded its threshold value in the DMA transfer. (during the single system operation.) x, y : Cache memory slot# (RK/RKA=0-3) (MK/RKL=0-1)			① Remove the Cache memory in which the failure occurred after the sequential shutdown.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
I60800	LU change over	The LU switchings occurred frequently.			① Check the access paths from the host computer to each LU again and make accesses to the each LU done by the controller having the owner right.	—
I609xy	ENC cable error (Unit-x, ENC-y)	The cable disconnection caused a blockade of the corresponding ENC. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : ENC board# (0-1)			—	—
I61000	ENC error inf. [parity error]	Because a parity error occurred in the ENC, the ENC concerned was blocked.			—	—
I61100	ENC error inf. [H8 bus parity error]	Because an H8 BUS parity error occurred in the ENC, the ENC concerned was blocked.			—	—
I61200	ENC error inf. [SFF-0 error]	Because an SFF-0 error occurred in the ENC, the ENC concerned was blocked.			—	—
I61300	ENC error inf. [SFF-1 error]	Because an SFF-1 error occurred in the ENC, the ENC concerned was blocked.			—	—
I61400	ENC error inf. [SFF-2 error]	Because an SFF-2 error occurred in the ENC, the ENC concerned was blocked.			—	—
I61500	ENC error inf. [SFF-3 error]	Because an SFF-3 error occurred in the ENC, the ENC concerned was blocked.			—	—

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
I61600	ENC error inf. [SFF-4 error]	Because an SFF-4 error occurred in the ENC, the ENC concerned was blocked.			—	—
I61700	ENC error inf. [CUDG ECTLREGERR]	Because a CUDG ECTL register error occurred in the ENC, the ENC concerned was blocked.			—	—
I61800	ENC error inf. [CUDG SRAMERR]	Because a CUDG SRAM parity error occurred in the ENC, the ENC concerned was blocked.			—	—
I61900	ENC error inf. [CUDG H8SIOERR]	Because a CUDG H8 S10 error occurred in the ENC, the ENC concerned was blocked.			—	—
I61A00	ENC error inf. [H8SIOERR]	Because a H8 S10 error occurred in the ENC, the ENC concerned was blocked.				—
I61B00	ENC error inf. [ECTL force test]	Because a parity error occurred in the ENC, the ENC concerned was blocked.				—
I61C00	SES error inf. [SES-HDU error]	The ENC was blocked because both of the two SES drives became unable to access the ENC.			—	—
I61D00	Warning	The cache volatilized because the previous sequential shutdown had not been executed.			① From the next time on, turn off the power using the main switch.	—
I61E00	PIN-over [Forced parity correction]	A parity recovery was terminated because an amount of pinned data exceeded its threshold value.			—	—

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
I8000x	Unit ADD start (Loop-x)	A process of an RKA addition performed with the subsystem power on was started x: Device ID number (RKA: 1 to 9)				—
I8010x	Unit ADD start (Loop-x)	An addition to a loop was started. x: Loop number (0 or 1)				—
I8020x	Unit ADD complete (Loop-x)	An RKA addition performed with the subsystem power on completed normally. x: Device ID number (RKA: 1 to 9)				—
I8030x	Unit ADD complete (Loop-x)	An addition to a loop completed normally. x: Loop number (0 or 1)				—
I8040x	Unit ADD FAIL (Loop-x)	An RKA addition performed with the subsystem power on terminated abnormally. x: Device ID number (RKA: 1 to 9)				—
I8050x	Unit ADD FAIL (Loop-x)	An addition to a loop terminated abnormally. x: Loop number (0 or 1)				—
I806xy	Unit ADD ENC INIT FAIL (Unit-x, ENC-y)	An ENC failure was detected in an initialization of an added ENC board or when the FAIL LED was turned off. x: Device ID number (RKA: 1 to 9) y: ENC board number (0 or 1)	Gather		① Power off the added RKA and replace the ENC board. ② If the same message is displayed although the ENC board has been replaced, replace the existing ENC boards that were installed finally.	H1F:04-0420 RK :04-0890
I807xy	Unit ADD ENC INIT FAIL (Unit-x, HDU-y/z)	An SES HDU failure was detected in an initialization of an added ENC board or when the FAIL LED was turned off. x: Device ID number (RKA: 1 to 9) y: Disk drive number (RKA: 0 or 2, 1 or 3)	Gather		① replace the disk drive.	H1F:04-0050 RK :04-0550

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
I8080x	Unit ADD start FAIL (Unit-x)	An RKA addition performed with the subsystem power on could not be done. x: Device ID number (RKA: 1 to 9)			A cause of the addition failure is displayed in another message. Take a recovery action following the message.	—
I80900	Unit ADD start FAIL (Command)	An RKA addition performed with the subsystem power on could not be done because the Format/SyncCache command was being executed.			① Wait until execution of the Format/SyncCache command completes. ② Or, abort the execution of the Format/SyncCache command.	—
I80A0x	Unit ADD start FAIL [Loop] (Loop-x)	Though an RKA addition was attempted while the subsystem power was on, it could not be started because a loop failure had occurred. x: Loop number (0 or 1)			① Retry the addition after completing the recovery from the loop failure.	—
I80Bxy	Unit ADD FAIL no SES (Unit-x, HDU-y/z)	No SES drive was found. x: Device ID number (RKA: 1 to 9) y: Disk drive number (RKA: 0 or 2, 1 or 3)	Gather		① Power off the added RKA and replace the disk drive. ② If the same message is displayed in spite of the replacement, replace the ENC board after powering off the added RKA. ③ If the same message is displayed although the ENC board has been replaced, replace the existing ENC boards that were installed finally.	H1F:04-0050 RK :04-0550 H1F:04-0420 RK :04-0890
I80C0x	Unit ADD FAIL [Loop alarm](Loop-x)	A loop was blocked during the addition. x: Loop number (0 or 1)	Gather		① Power off the added RKA and replace the ENC board. ② If the same message is displayed although the ENC board has been replaced, replace the existing ENC boards that were installed finally.	H1F:04-0420 RK :04-0890

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
I80D0x	Unit ADD FAIL [cable off](Loop-x)	A disconnection from a loop was detected. x: Loop number (0 or 1)	Gather		① Power off the added RKA and replace the ENC cable and retry. ② If the same message is displayed in spite of the replacement, replace the ENC board of the existing RK/RKA, that was mounted finally, after powering off the added RKA, and then make a retry.	H1F:04-0420 RK :04-0890
I80E00	Unit ADD warning [HDU number over]	Drives other than the SES drive are installed.			—	
I80F00	Unit ADD FAIL [Command]	The Format/SyncCache command was executed during an addition of the RKA performed with the subsystem power on.			① Wait until execution of the Format/SyncCache command completes. ② Or, abort the execution of the Format/SyncCache command.	—
I81000	Unit ADD ENC INIT data error [SFF-0ERR]	During an addition of the RKA performed with the subsystem power on, an SFF No. 0 error was detected when the ENC was initialized.	Gather		① Power off the added RKA and replace the ENC board..	H1F:04-0420 RK :04-0890
I81100	Unit ADD ENC INIT data error [SFF-1ERR]	During an addition of the RKA performed with the subsystem power on, an SFF No. 1 error was detected when the ENC was initialized.	Gather			
I81200	Unit ADD ENC INIT data error [SFF-2ERR]	During an addition of the RKA performed with the subsystem power on, an SFF No. 2 error was detected when the ENC was initialized.	Gather			
I81300	Unit ADD ENC INIT data error [SFF-3ERR]	During an addition of the RKA performed with the subsystem power on, an SFF No. 3 error was detected when the ENC was initialized.	Gather			

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
I81400	Unit ADD ENC INIT data error [SFF-4ERR]	During an addition of the RKA performed with the subsystem power on, an SFF No. 4 error was detected when the ENC was initialized.	Gather		① Power off the added RKA and replace the ENC board..	H1F:04-0420 RK :04-0890
I81500	Unit ADD ENC INIT data error [RAMPERR]	During an addition of the RKA performed with the subsystem power on, an RAMPERR was detected when the ENC was initialized.	Gather			
I81600	Unit ADD ENC INIT data error [H8BUSPERR]	During an addition of the RKA performed with the subsystem power on, an H8 Bus Parity Error was detected when the ENC was initialized.	Gather			
I81700	Unit ADD ENC INIT data error [CUDGECTLR]	During an addition of the RKA performed with the subsystem power on, an SWCUDG (E-CTL Register error) was detected when the ENC was initialized.	Gather			
I81800	Unit ADD ENC INIT data error [CUDGECTLF]	During an addition of the RKA performed with the subsystem power on, an SWCUDG (E-CTL Force Test error) was detected when the ENC was initialized.	Gather			
I81900	Unit ADD ENC INIT data error [CUDGSRAM]	During an addition of the RKA performed with the subsystem power on, an SWCUDG (SRAM Test error) was detected when the ENC was initialized.	Gather			
I81A00	Unit ADD ENC INIT data error [CUDGH8SIO]	During an addition of the RKA performed with the subsystem power on, an SWCUDG (H8 RS232C Test error) was detected when the ENC was initialized.	Gather			
I81B00	Unit ADD ENC INIT data error [H8IOSERR]	During an addition of the RKA performed with the subsystem power on, an H8SIOSERR was detected when the ENC was initialized.	Gather			

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
I82000	Unit ADD Unit number over	A number of the RKAs to be connected are too large.			① Connection disabled. Confirm how many RKAs are connected	
I8210x	Unit ADD Loop error (Loop-x)	A failure was detected in the added loop (loop-x). x: Loop number (0 or 1)	Gather		① Make a retry after recovering the subsystem from the loop failure.	
I8220x	Unit ADD Cable error (Loop-x)	A cable connection error was detected in the loop-x during an addition to the loop. x: Loop number (0 or 1)			① Confirm the order of cables that are connected to the device (check whether the color of connectors and cables matches together)	
I8230x	Unit ADD HDU nothing (Unit-x)	No HDU exists in the added loop-x. x: Loop number (0 or 1)			① Check if the device ID is correct. ② Power off the added RKA and replace the disk drive. If the same message is ③ displayed in spite of the replacement, replace the ENC board after powering off the added RKA. If the same message is ④ displayed although the ENC board has been replaced, replace the existing ENC boards that were installed finally.	H1F:04-0050 RK :04-0550 H1F:04-0420 RK :04-0890
I824xy	Unit ADD ENC DIAG FAIL (Unit-x, ENC-y)	An ENC failure was detected in a diagnosis of the added ENC. x: Device ID number (RKA: 1 to 9) y: ENC board number (0 or 1)			① Power off the added RKA and replace the ENC board. ② If the same message is displayed although the ENC board has been replaced, replace the existing ENC boards that were installed finally.	H1F:04-0420 RK :04-0890

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
I825xy	Unit ADD ENC DIAG FAIL (Unit-x, HDU-y/z)	An disk drive failure was detected in a diagnosis of the added ENC. x: Device ID number (RKA: 1 to 9) y: disk drive number (RKA 0 to 9)			① Power off the added RKA and replace the disk drive.	H1F:04-0050 RK :04-0550
I82600	Unit ADD ENC DIAG data error [H8SIOERR]	An H8SIOERR was detected in a diagnosis of the added ENC.			① Power off the added RKA and replace the ENC board.	H1F:04-0420 RK :04-0890
I82700	Unit ADD ENC DIAG data error [SFF-0ERR]	An SFF No. 0ERER was detected in a diagnosis of the added ENC.				
I82800	Unit ADD DIAG data error [SFF-1ERR]	An SFF No. 1ERER was detected in a diagnosis of the added ENC.				
I82900	Unit ADD DIAG data error [SFF-2ERR]	An SFF No. 2ERER was detected in a diagnosis of the added ENC.				
I82A00	Unit ADD DIAG data error [SFF-3ERR]	An SFF No. 3ERER was detected in a diagnosis of the added ENC.			① Power off the added RKA and replace the ENC board.	H1F:04-0420 RK :04-0890
I82B00	Unit ADD DIAG data error [SFF-4ERR]	An SFF No. 4ERER was detected in a diagnosis of the added ENC.				
I82C00	Unit ADD DIAG data error [RAMPERR]	An RAMPERR was detected in a diagnosis of the added ENC.				
I82D00	Unit ADD DIAG data error [H8BUSPERR]	An H8BUSPERR was detected in a diagnosis of the added ENC.				
I82E00	Unit ADD DIAG data error [CUDGECTLR]	An CUDGECTLR was detected in a diagnosis of the added ENC.				
I82F00	Unit ADD DIAG data error [CUDGCTLF]	An CUDGCTLF was detected in a diagnosis of the added ENC.				
I83000	Unit ADD DIAG data error [CUDGSRAM]	An CUDGSRAM was detected in a diagnosis of the added ENC.				
I83100	Unit ADD DIAG data error [CUDGH8SIO]	An CUDGH8SIO was detected in a diagnosis of the added ENC.				

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
i840xy	Unit ADD no SES HDU (Unit-x, HDU-y)	A drive non-installation error of the added RKA x: Device ID number (RKA: 1 to 9) y: Disk drive number (RKA: 0 to 9)			① Apply the recovery measures only when the following is displayed next to this message. *I8Bxy Unit ADD FAIL no SES ② Power off the added RKA and replace the disk drive. ③ If the same message is displayed in spite of the replacement, replace the ENC board after powering off the added RKA.	H1F:04-0050 RK :04-0550 H1F:04-0420 RK :04-0890
I841xy	Unit ADD SES spinup error (Unit-x, HDU-y)	A spin up error of a drive in the added RKA x: Device ID number (RKA: 1 to 9) y: Disk drive number (RKA: 0 to 9)			① Apply the recovery measures only when the following is displayed next to this message. *I8Bxy Unit ADD FAIL no SES ② Power off the added RKA and replace the disk drive. If the same message is ③ displayed in spite of the replacement, replace the ENC board after powering off the added RKA.	H1F:04-0050 RK :04-0550 H1F:04-0420 RK :04-0890
IAxxyy	Coupling started (LU-xx/yy)	An initial copy was started. xx: Copy source LU number (0 to 63) yy: Copy destination LU number (0 to 63)			—	—
IBxxyy	Coupling completed (LU-xx/yy)	An initial copy completed normally. xx: Copy source LU number (0 to 63) yy: Copy destination LU number (0 to 63)			—	—

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
ICxxyy	Coupling failed (LU-xx/yy)	An initial copy terminated abnormally. xx: Copy source LU number (0 to 63) yy: Copy destination LU number (0 to 63)			① Define the pair of the MRCF-Lite again.	—
IDxxyy	Resync started (LU-xx/yy)	A resynchronization was started. xx: Copy source LU number (0 to 63) yy: Copy destination LU number (0 to 63)			—	—
IExxyy	Resync completed (LU-xx/yy)	A resynchronization completed normally. xx: Copy source LU number (0 to 63) yy: Copy destination LU number (0 to 63)			—	—
IFxxyy	Resync failed (LU-xx/yy)	A resynchronization terminated abnormally. xx: Copy source LU number (0 to 63) yy: Copy destination LU number (0 to 63)			—	—
IGxxyy	PSUE occurred (LU-xx/yy)	the pair status was changed to PSUE when the MRCF-Lite function was being used. xx : Primary LU number (0 to 63) yy : Secondary LU number (0 to 63)	Gather		① Make a recovery from the failure already occurred.	

(5) Warning messages

Table 2.4.5 Warning messages

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
W0100x	CTL alarm (CTL-x)	The Controller was regressed (It had a failure or was not connected), or a failure was detected in the Controller of another system during the initial setting operation. x : Controller# (0-1)	Gather	Gather	① When HB07xx is displayed also, follow the recovery procedure against it. ② Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
W02000	Other CTL removed	A shutdown occurred in MPU on the Controller of another system.	Gather			
W03000	Battery alarm	Abnormal battery voltage or a failure in the battery charging circuit was detected.			① Replace the Battery unit.	H1F:04-0200 RK :04-0690 MK :04-1140 RKL:04-1550
W03100	Battery alarm	A Battery unit has been removed from an array unit.			① Attach a Battery unit to an array unit.	
W03200	Battery removed	The switch of a Battery unit has been set to OFF.			① Set the switch of a Battery unit to ON.	
W03300	Battery charge alarm	The battery voltage has lowered and the battery is being charged.			① Replace the Battery unit.	
W0340x	Battery back up circuit alarm (CTL-x)	The battery backup circuit failed. x : Controller# (0-1)			① If W03000, W03100, W03200, or W03300 is also indicated, follow the recovery measures for it. If only W0340x is indicated, replace the Controller of the No. indicated with x.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
W04000	FAN alarm	The Fan unit failed.			① Replace the Fan unit.	H1F:04-0490 RK :04-0950 MK :04-1380 RKL:04-1780
W050xy	PS alarm (Unit-x, PS-y)	The AC/DC power supply failed. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : AC/DC power supply # (0-1)			① Replace the AC/DC power supply.	H1F:04-0450 RK :04-0960 MK :04-1350 RKL:04-1750

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
W060xy	HDU alarm (Unit-x, HDU-y)	The Disk drive is blocked. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)	Gather		① Replace the Disk drive.	H1F:04-0050 RK :04-0550 MK :04-1010 RKL:04-1420
W061xy	Spare HDU alarm (Unit-x, HDU-y)	The Spare disk failed.	Gather			
W070xy	HDU spin up failed (Unit-x, HDU-y)	Spin-up of a Disk drive inserted with the power turned on failed. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)	Gather		① Insert again.	—
					② A If the same message is still indicated, replace the Disk drive.	H1F:04-0050 RK :04-0550 MK :04-1010 RKL:04-1420
W071xy	HDU inquiry error (Unit-x, HDU-y)	An inquiry error occurred in a Disk drive inserted with the power turned on. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)	Gather		① Replace the Disk drive.	H1F:04-0050 RK :04-0550 MK :04-1010 RKL:04-1420
W072xy	HDU read capacity failed (Unit-x, HDU-y)	The capacity read from the Disk drive with the power turned on was illegal. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)	Gather			
W073xy	HDU replace failed (Unit-x, HDU-y)	Insertion of a Disk drive failed when it was inserted with the power turned on. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)	Gather			

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
W080xy	Loop alarm (Path-x, Loop-y)	Since the Fibre Channel loop failed, the operation is continued with the alternative loop. x : Path# (0-1) y : Loop# (0-1)	Gather		① Specify the failed part with the automatic loop diagnostic function. Follow the other message indicated at this time.	—
W090xy	ENC alarm (Unit-x, ENC-y)	The ENC board failed. x : Unit ID# (0-9) y : ENC board# (0-1)	Gather		① Replace the ENC board.	H1F:04-0420 RK :04-0890 MK :04-1300 RKL:04-1700
W0B0xy	ENC recovery failed (Unit-x, ENC-y)	The ENC board was inserted but recovery failed. x : Unit ID# (0-9) y : ENC board# (0-1)	Gather		① The cause of failure in recovery is indicated by another message. Maintain according to that message.	—
W0C00x	UPS alarm (UPS-x)	A trouble of the UPS was detected. x : UPS# (0-1)			① Execute a recovery process referring to the "UPS manual".	—
W0D0xy	CACHE alarm (CTL-x, CACHE-y)	A cache access error occurred. (unrecoverable) X : Controller# x=0 : Controller#0 x=1 : Controller#1 x=2 : Controller#0 and #1 y : Cache memory# y=0 : Cache slot# (RK/RKA=0-1) (MK/RKL=1) y=2 : Cache slot# (RK/RKA=2-3)	Gather		① Replace the Cache memory.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
W0E0xx	LU alarm (LU-xx)	LU was blocked. xx : LU# (0-63)	Gather		① See "2.5 Details of Recovery Procedures".	02-10160
W120xx	User data lost (LU-xx)	The user data were lost since the Cache memory was volatilized. xx : LU# (0-63)	Gather		① See "2.5 Details of Recovery Procedures".	02-1060
W22000	PS OFF failed [NO HDU]	The plan was not stopped since there was not a Disk drive to save the information to be taken over.	Gather		① See "2.5 Details of Recovery Procedures".	02-1060
W23000	PS OFF failed [CACHE ERR]	The plan was not stopped since a cache failure occurred and the PIN data could not be saved.	Gather		① See "2.5 Details of Recovery Procedures".	02-1060

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
W310xx	DMA error (DMA-xx)	DMA failed. xx : DMA#	Gather		① Controller of the No. indicated by "Cx" (x: Controller #) in the log message.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
W320xy	LA error (D_PT-0, CTL-x, TRNS-y)	An LA error (including an LUN error) occurred in drive port #0. x : Controller# (0-1) y : Transfer direction R: Read direction W : Write direction	Gather	Gather	① See "2.5 Details of Recovery Procedures".	02-1060
W321xy	LA error (D_PT-1, CTL-x, TRNS-y)	An LA error (including an LUN error) occurred in drive port #1. x : Controller# (0-1) y : Transfer direction R: Read direction W: Write direction	Gather	Gather	① See "2.5 Details of Recovery Procedures".	02-1060
W322xy	LA error (H_PT-0, CTL-x, TRNS-y)	An LA error (including an LUN error) occurred in host port#0. x : Controller# (0-1) y : Transfer direction R: Read direction W : Write direction	Gather	Gather	① See "2.5 Details of Recovery Procedures".	02-1060
W323xy	LA error (H_PT-1, CTL-x, TRNS-y)	An LA error (including an LUN error) occurred in host port#1. x : Controller# (0-1) y : Transfer direction R: Read direction W : Write direction	Gather	Gather	① See "2.5 Details of Recovery Procedures".	02-1060
W330xy	LRC error (D_PT-0, CTL-x, TRNS-y)	An LRC error occurred in drive port # 0. x : Controller# (0-1) y : Transfer direction R: Read direction W : Write direction	Gather	Gather	① See "2.5 Details of Recovery Procedures".	02-1060
W331xy	LRC error (D_PT-1, CTL-x, TRNS-y)	An LRC error occurred in drive port#1. x : Controller# (0-1) y : Transfer direction R: Read direction W : Write direction	Gather	Gather	① See "2.5 Details of Recovery Procedures".	02-1060

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
W340xy	LRC error (D_PT-0, CTL-x, TRNS-y)	An LRC error occurred in host port#0. x : Controller# (0-1) y : Transfer direction R: Read direction W : Write direction	Gather	Gather	① See "2.5 Details of Recovery Procedures".	02-1060
W341xy	LRC error (D_PT-1, CTL-x, TRNS-y)	An LRC error occurred in host port#1. x : Controller# (0-1) y : Transfer direction R: Read direction W : Write direction	Gather	Gather	① See "2.5 Details of Recovery Procedures".	02-1060
W41000	PIN write error	PIN data were not saved in the Disk drive since a hardware error occurred.	Gather		① See "2.5 Details of Recovery Procedures".	02-1060
W41100	PIN over [PNLEVLOV]	The number of the PIN segments exceeded the threshold value PIN.	Gather		① See "2.5 Details of Recovery Procedures".	02-1060
W4200x	SNMP invalid (CTL-x) [Config]	There is not SNMP information or the microprogram for SNMP is inserted but SNMP information has not been introduced. The SNMP function has not started up. x : Controller# (0-1)			① Install the information for SNMP.	—
W43000	SNMP invalid [RAM Device MAKE ERR]	When SNMP was initialized, making of a RAM device failed.	Gather		① Controller of the No. indicated by "Cx" (x: Controller #) in the log message.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
W43100	SNMP invalid [RAM Device INIT ERR]	When SNMP was initialized, initialization of a RAM device failed.	Gather			
W43200	SNMP invalid [RAM Device CREATE ERR]	When SNMP was initialized, generation of a RAM device failed.	Gather			
W43300	SNMP invalid [RAM Device WRITE ERR]	When SNMP was initialized, writing in a RAM device failed.	Gather			
W43400	SNMP failure [APL ERR]	An application error of SNMP was detected.	Gather			

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
W440xy	Turbo-LU warning (CTL-x, ERR-y)	Residence OFF warning occurred in the LU residence mode. x : Default controller # (0-1) y : Factor code 0 : Too large LU 1 : Cache access error 2 : Regression of controller 3 : Abnormal battery voltage 4 : Abnormal battery charging circuit 5 : Larger than PIN threshold value	Gather		y=0 : Return the configuration of Cache memory. (Add cache memory.) y=1 : Perform maintenance described in message code "W0D0x0". To resume the LU cache resident function after recovering from a cache failure, turn off and then on an array unit. y=2 : Perform maintenance described in message code "W0100x". y=3 : Perform maintenance described in message code "W03000", "W03100", "W03200", and "W03300". y=4 : Perform maintenance described in message code "W0340x". y=5 : Perform maintenance described in message code "W41100".	—
W4500x	Online micro-update executing (CTL-x)	The microprogram of a Controller has not been replaced with the power turned on. x : Controller# (0-1) This message is indicated to warn that microprogram of a Controller is being replaced with the power turned on. If replacement of the microprogram is finished, this warning disappears.			—	—

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
W4600x	Online micro-update started (CTL-x)	The Controller was blocked falsely to replace the microprogram with the power turned on, or the Controller of another system was blocked falsely. x : Controller# (0-1)			—	—
W4700x	Serial number error [WWN] (CTL-x)	The serial number of the subsystem is not set yet. x : Controller# (0-1)			① Set the serial number with the Disk Array management program.	For WEB 03-0280

(6) Failure messages

Table 2.4.5 Failure messages

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
H00100	PCI data parity error [DMA0PERR]	A data parity error occurred in the PCI bus while M-DMA #0 is transferred.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
H00110	INTSTACK threshold over	The number of the piled INTSTACKs exceeded the set threshold value.	Gather	Gather		
H00120	INSTACK back over	Stacking-back operation was performed while there were no stacks in INTSTACK.	Gather	Gather		
H00121	INSTACK memory over	The 250 layers of INTSTACKs in the memory became insufficient.	Gather	Gather		
H00130	M-DMA0 ADR counter count over	The DMA#0 ADR counter counted over.	Gather	Gather		
H00131	M-DMA0 ADR counter parity error	A parity error occurred in the DMA#0 ADR counter.	Gather	Gather		
H00140	MCTL data parity error [DP3]	A parity error occurred in data bit 31-24 when data were read from M-CTL Reg.	Gather	Gather		
H00141	MCTL data parity error [DP2]	A parity error occurred in data bit 23-16 when data were read from M-CTL Reg.	Gather	Gather		
H00142	MCTL data parity error [DP1]	A parity error occurred in data bit 15-08 when data were read from M-CTL Reg.	Gather	Gather		
H00143	MCTL data parity error [DP0]	A parity error occurred in data bit 07-00 when data were read from M-CTL Reg.	Gather	Gather		
H00150	MCTL REG access error [RDRGWR]	Data were written in the read-only register of M-CTL.	Gather	Gather		
H00160	MPU FAN alarm	The MPU cooling fan failed. (No MPU cooling fans are used at present. Accordingly, if this message is indicated, MCTL is abnormal.)	Gather	Gather		
H00170	MCTL Ready time-out	A ready signal was not received from MCTL in 1 ms.	Gather	Gather		
H00180	CTC parity error (CH-0)	A parity error was detected by timer CH0 of M-CTL.	Gather	Gather		
H00181	CTC parity error (CH-1)	A parity error was detected by timer CH1 of M-CTL.	Gather	Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
H00190	Watchdog-timer counter parity error	A parity error occurred in the watchdog timer counter.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
H00191	FDC-DMA ADR counter count over	The FDC DMA ADR counter counted over.	Gather	Gather		
H00192	FDC-DMA ADR counter parity error	A parity error occurred in the FDC DMA ADR counter.	Gather	Gather		
H10100	C/P-BRG parity error	A parity error was detected in CPU-PCI bridge.	Gather	Gather		
H10101	C/P-BRG system error	A system error was detected in CPU-PCI bridge.	Gather	Gather		
H10102	C/P-BRG master abort	A master abortion was received in CPU-PCI bridge.	Gather	Gather		
H10103	C/P-BRG target abort	A target abort was received in CPU-PCI bridge.	Gather	Gather		
H10104	C/P-BRG data parity error	A data parity error was detected in CPU-PCI bridge.	Gather	Gather		
H10105	C/P-BRG PCI SERR	A SERR was detected in CPU-PCI bridge.	Gather	Gather		
H10106	C/P-BRG PCI PERR	A PERR was detected in CPU-PCI bridge.	Gather	Gather		
H10107	C/P-BRG memory read parity error	Memory read parity error was detected in CPU-PCI bridge.	Gather	Gather		
H10110	MCTL parity error	Parity error was detected in MCTL.	Gather	Gather		
H10111	MCTL system error	System error was detected in MCTL.	Gather	Gather		
H10120	LAN parity error	Parity error was detected in LANCTL.	Gather	Gather		
H10121	LAN system error	System error was detected in LANCTL.	Gather	Gather		
H10130	P/P-BRG0 parity error	A parity error was detected in PCI / PCI bridge0.	Gather	Gather		
H10131	P/P-BRG0 system error	A system error was detected in PCI / PCI bridge0.	Gather	Gather		
H10132	P/P-BRG1 parity error	A parity error was detected in PCI / PCI bridge1.	Gather	Gather		
H10133	P/P-BRG1 system error	A system error was detected in PCI / PCI bridge1.	Gather	Gather		
H10140	DMA#0 parity error	Parity error was detected in DCTL-0.	Gather	Gather		
H10141	DMA#0 system error	System error was detected in DCTL-0.	Gather	Gather		
H10150	D_PORT parity error	Parity error was detected in DCTL-1.	Gather	Gather		
H10151	D_PORT system error	System error was detected in DCTL-1.	Gather	Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
H10152	H_PORT parity error	Parity error was detected in DCTL-2.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
H10153	H_PORT system error	System error was detected in DCTL-2.	Gather	Gather		
H10160	HFPC-A parity error	Parity error was detected in HFPC-A.	Gather	Gather		
H10161	HFPC-A system error	System error was detected in HFPC-A.	Gather	Gather		
H10162	HFPC-B parity error	Parity error was detected in HFPC-B.	Gather	Gather		
H10163	HFPC-B system error	System error was detected in HFPC-B.	Gather	Gather		
H10164	HSPC-A parity error	Parity error was detected in HSPC-A.	Gather	Gather		
H10165	HSPC-A system error	System error was detected in HSPC-A.	Gather	Gather		
H10166	HSPC-B parity error	Parity error was detected in HSPC-B.	Gather	Gather		
H10167	HSPC-B system error	System error was detected in HSPC-B.	Gather	Gather		
H10170	DFPC0 parity error	Parity error was detected in DFPC-0.	Gather	Gather		
H10171	DFPC0 system error	System error was detected in DFPC-0.	Gather	Gather		
H10172	DFPC1 parity error	Parity error was detected in DFPC-1.	Gather	Gather		
H10173	DFPC1 system error	System error was detected in DFPC-1.	Gather	Gather		
H10180	MCTL PCI SERR	A SERR was detected in MCTL.	Gather	Gather		
H10190	MCTL PCI-ARBT-CNT parity error	A PCI arbitration counter parity error was detected in MCTL.	Gather	Gather		
H10191	MCTL M-ARBT-CNT parity error	A PCI master arbitration counter parity error was detected in MCTL.	Gather	Gather		
H1090x	CACHE read PCI ERR [OTH_CTL] (CTL-x)	A PCI error occurred in another controller during a cache reading. x : Controller# (0-1)	Gather	Gather		
H1093x	CACHE write PCI ERR [OTH_CTL] (CTL-x)	A PCI error occurred in another Controller during a cache writing. x : Controller# (0-1)	Gather	Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
H20100	Parity generation LA error [DRR]	Illegal LA was detected when the (DRR Failure) parity was generated.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
					② A If the system is still abnormal, replace the all Cache memories.	
H20220	DCTL access error [2BWR]	2-byte writing was made in DBUF of the 4-byte boundary.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
H20230	CTL lock aborted	Locking condition of the system was interrupted.	Gather	Gather		
H20240	Other CTL lock time-out	Access time-out was detected while the other system is locked.	Gather	Gather		
H20250	PCI BUFF parity error [RPDPTY]	A parity error occurred in PCI BUFF during cache reading operation.	Gather	Gather		
H20260	DCTL access error [WRPROTECT]	A write access was made in a write-protected area.	Gather	Gather		
H20270	CACHE address over [MPU]	Cache address over was detected during access to MPU.	Gather	Gather		
H20271	CACHE address over [DMA0]	Cache address over was detected during access to DMA0.	Gather	Gather		
H20272	CACHE address over [D_PORT0]	Cache address over was detected during access to D_PORT#0.	Gather	Gather		
H20273	CACHE address over [D_PORT1]	Cache address over was detected during access to D_PORT#1.	Gather	Gather		
H20274	CACHE address over [H_PORT0]	Cache address over was detected during access to H_PORT#0.	Gather	Gather		
H20275	CACHE address over [H_PORT1]	Cache address over was detected during access to H_PORT#1.	Gather	Gather		
H20276	CACHE address over [M_MPU]	Cache address over was detected during access to M-DMA.	Gather	Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
H20280	CACHE write error	PCI_PERR, BYTEWRERR, or BUFPTYERR was detected during the cache write operation of MPU, then cache writing was masked, or cache write operation of MPU was made and masked after PCI_SERR was detected.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
H20281	CACHE REF counter parity error	A parity error was detected in the Cache memory refreshing counter.	Gather	Gather		
H20290	Other CTL lock response time-out	Lock response time-out of the other system was detected.	Gather	Gather		
H203A0	DCTL time-out [H_PORT]	D-CTL finish time-out was detected.	Gather	Gather		
H204A1	DCTL time-out [D_PORT]	D-CTL finish time-out was detected.	Gather	Gather		
H205B0	DMA forced stop failed	Forced stopping of DMA failed.	Gather	Gather		
H206B1	DMA#0 hard error end reset failed	Resetting of factors after hardware error end of DDR failed.	Gather	Gather	① Replace all cache memories of a controller whose FAIL LED is on.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
H2091x	CACHE address over [OTH_CTL] (CTL-x)	A cache address over error occurred in another Controller. x : Controller# (0-1)	Gather	Gather		
H2092x	CACHE uncorrectable error [OTH_CTL] (CTL-x)	The processing cannot be continued because of an error unrecoverable with the ECC. x: Denotes a number of a controller that became unable to continue the processing.	Gather	Gather		
H2094x	DCTL address over [OTH_CTL] (CTL-x)	A DCTL access error occurred in another Controller. x : Controller# (0-1)	Gather	Gather		
H2095x	DCTL hard error [OTH_CTL] (CTL-x)	A DCTL hardware error occurred during cache access by the controller of another system. x : Controller# (0-1)	Gather	Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
H301xx	ECC write parity error (DMA-xx)	A parity error was detected when the Cache memory was written. xx : DMA#	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
H302xx	ECC generate error (DMA-xx)	A failure was detected in generation of ECC when the Cache memory was written. xx : DMA#	Gather	Gather		
H303xy	ECC uncorrectable error (CACHE-x/y)	An uncorrectable ECC failure was detected when the Cache memory was read. x, y : Cache memory slot# (RK/RKA=0-3) (MK/RKL=0-1)	Gather	Gather	① Replace the Cache memory.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
H304xy	ECC correction failed (CACHE -x/y)	A failure was detected while the Cache memory was read and ECC was corrected. x, y : Cache memory slot# (RK/RKA=0-3) (MK/RKL=0-1)	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
H3050x	ECC uncorrectable error (CTL-x)	Processing cannot be continued because of uncorrectable ECC error. x : No. of the Controller which cannot continue processing.	Gather	Gather	② A If the system is still abnormal, replace the all Cache memories.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
H3091x	CACHE address over [OTH_CTL] (CTL-x)	A cache address over was detected. x: Controller number (0 or1)	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
H3092x	CACHE uncorrectable ERR [OTH_CTL] (CTL-x)	An error which cannot be corrected by the ECC occurred during an access to the cache by another Controller. x : Controller# (0-1)	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
H40100	DUAL I/F data error [DMPERR]	A data error was detected when the other system of MPU was access. (Detection of the other system)	Gather	Gather	① Replace the Controller whose FAIL LED is on. ② If the system is still abnormal, replace the other Controller.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
H40101	DUAL I/F data error [DDMODTE]	A data error was detected when the other system of DMA#0 was access. (Detection of the other system)	Gather	Gather		
H40102	DUAL I/F data error [EDP0DTE]	A data error was detected when the other system of D_PORT#0 was access. (Detection of the other system)	Gather	Gather		
H40103	DUAL I/F data error [EDP1DTE]	A data error was detected when the other system of D_PORT#1 was access. (Detection of the other system)	Gather	Gather	① Replace the Controller whose FAIL LED is on. ② If the system is still abnormal, replace the other Controller.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
H40104	DUAL I/F data error [EHP0DTE]	A data error was detected when the other system of H_PORT#0 was access. (Detection of the other system)	Gather	Gather		
H40105	DUAL I/F data error [EHP1DTE]	A data error was detected when the other system of H_PORT#1 was access. (Detection of the other system)	Gather	Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
H40106	DUAL I/F parity error [EMPRPTY]	A parity error was detected in the other system when the other system of MPU was read. (Detection of the other system)	Gather	Gather		
H40107	DUAL I/F parity error [IMRPTY]	A parity error was detected in the system when the other system of MPU was read. (Detection of the system)	Gather	Gather		
H40108	DUAL I/F parity error [EMPWPTY]	A parity error was detected in the system when the other system of MPU was written. (Detection of the other system)	Gather	Gather		
H40109	DUAL I/F clock error [ED0WPTYE]	A parity error was detected in the system when the other system of DMA#0 was written. (Detection of the other system)	Gather	Gather		
H4010A	DUAL I/F parity error [EDP0WPTYE]	A parity error was detected in the system when the other system of D_PORT#0 was written. (Detection of the other system)	Gather	Gather		
H4010B	DUAL I/F parity error [EDP1WPTYE]	A parity error was detected in the system when the other system of D_PORT#1 was written. (Detection of the other system)	Gather	Gather		
H4010C	DUAL I/F parity error [EHP0WPTYE]	A parity error was detected in the system when the other system of H_PORT#0 was written. (Detection of the other system)	Gather	Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
H4010D	DUAL I/F parity error [EHP1WPTYE]	A parity error was detected in the system when the other system of H_PORT#1 was written. (Detection of the other system)	Gather	Gather	① Replace the Controller whose FAIL LED is on. ② If the system is still abnormal, replace the other Controller.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
H4010E	DUAL I/F parity error [IMWPTY]	A parity error was detected in the system when the other system of MPU was written. (Detection of the system)	Gather	Gather		
H4010F	DUAL I/F parity error [ID0WPTYE]	A parity error was detected in the system when the other system of DMA#0 was written. (Detection of the system)	Gather	Gather		
H40110	DUAL I/F parity error [IDP0WPTYE]	A parity error was detected in the system when the other system of D_PORT#0 was written. (Detection of the system)	Gather	Gather		
H40111	DUAL I/F parity error [IDP1WPTYE]	A parity error was detected in the system when the other system of D_PORT#1 was written. (Detection of the system)	Gather	Gather		
H40112	DUAL I/F parity error [IHP0WPTYE]	A parity error was detected in the system when the other system of H_PORT#0 was written. (Detection of the system)	Gather	Gather		
H40113	DUAL I/F parity error [IHP1WPTYE]	A parity error was detected in the system when the other system of H_PORT#0 was written. (Detection of the system)	Gather	Gather		
H40120	DUAL I/F CACHE address over [EMPCADROV]	Cache address over was detected when access to the other system of MPU was made. (Detection of the other system)	Gather	Gather		
H40121	DUAL I/F CACHE address over [EMMPUCADR]	Cache address over was detected when access to the other system of M-DMA was made. (Detection of the other system)	Gather	Gather		
H40122	DUAL I/F CACHE address over [ED0CADR]	Cache address over was detected when access to the other system of DMA#0 was made. (Detection of the other system)	Gather	Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
H40123	DUAL I/F CACHE address over [EDP0CADR]	Cache address over was detected when access to the other system of D_PORT#0 was made. (Detection of the other system)	Gather	Gather	① Replace the Controller whose FAIL LED is on. ② If the system is still abnormal, replace the other Controller.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
H40124	DUAL I/F CACHE address over [EDP1CADR]	Cache address over was detected when access to the other system of D_PORT#1 was made. (Detection of the other system)	Gather	Gather		
H40125	DUAL I/F CACHE address over [EHP0DCADR]	Cache address over was detected when access to the other system of H_PORT#0 was made. (Detection of the other system)	Gather	Gather		
H40126	DUAL I/F CACHE address over [EHP1DCADR]	Cache address over was detected when access to the other system of H_PORT#0 was made. (Detection of the other system)	Gather	Gather		
H40130	DUAL I/F ready time-out [IMRDYT]	A RDYTMOUT error was detected in the other system when the other system of MPU was accessed. (Detection of the system)	Gather	Gather		
H40131	DUAL I/F ready time-out [ID0RDYT]	A RDYTMOUT error was detected in the other system when the other system of DMA#0 was accessed. (Detection of the system)	Gather	Gather		
H40132	DUAL I/F ready time-out [IDP0RDYT]	A RDYTMOUT error was detected in the other system when the other system of D_PORT#0 was accessed. (Detection of the system)	Gather	Gather		
H40133	DUAL I/F ready time-out [IDP1RDYT]	A RDYTMOUT error was detected in the other system when the other system of D_PORT#1 was accessed. (Detection of the system)	Gather	Gather		
H40134	DUAL I/F ready time-out [IHP0RDYT]	A RDYTMOUT error was detected in the other system when the other system of H_PORT#0 was accessed. (Detection of the system)	Gather	Gather		
H40135	DUAL I/F ready time-out [IHP1RDYT]	A RDYTMOUT error was detected in the other system when the other system of H_PORT#1 was accessed. (Detection of the system)	Gather	Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
H40140	DUAL I/F clock error [ICLKERR]	A clock abnormal was detected in the other system when the other system of MPU was accessed. (Detection of the system)	Gather	Gather	① Replace the Controller whose FAIL LED is on. ② If the system is still abnormal, replace the other Controller.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
H40141	DUAL I/F clock error [DOICLKER]	A clock abnormal was detected in the other system when the other system of DMA#0 was accessed. (Detection of the system)	Gather	Gather		
H40142	DUAL I/F clock error [IDP0ICLKER]	A clock abnormal was detected in the other system when the other system of D_PORT#0 was accessed. (Detection of the system)	Gather	Gather		
H40143	DUAL I/F clock error [IDP1ICLKER]	A clock abnormal was detected in the other system when the other system of D_PORT#1 was accessed. (Detection of the system)	Gather	Gather		
H40144	DUAL I/F clock error [IHP0ICLKER]	A clock abnormal was detected in the other system when the other system of H_PORT#0 was accessed. (Detection of the system)	Gather	Gather		
H40145	DUAL I/F clock error [IHP1ICLKER]	A clock abnormal was detected in the other system when the other system of H_PORT#1 was accessed. (Detection of the system)	Gather	Gather		
H40150	DUAL I/F error [MDTDCHK]	A MDTDCHK error was detected when access to the other system of MPU was made. (Detection of the other system)	Gather	Gather		
H40151	DUAL I/F error [ID0DDTDCHK]	A MDTDCHK error was detected when access to the other system of DMA#0 was made. (Detection of the system)	Gather	Gather		
H40152	DUAL I/F error [D10DDTDK]	A MDTDCHK error was detected when access to the other system of D_PORT#0 was made. (Detection of the system)	Gather	Gather		
H40153	DUAL I/F error [D11 DDTDK]	A MDTDCHK error was detected when access to the other system of D_PORT#1 was made. (Detection of the system)	Gather	Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
H40160	DUAL I/F access error [EMPWPROT]	A WR access to the WR PROTECT area was detected when the other system of MPU was written. (Detection of the other system)	Gather	Gather	① Replace the Controller whose FAIL LED is on. ② If the system is still abnormal, replace the other Controller.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
H40161	DUAL I/F address parity error [EADRPERR]	An address parity error was detected when access to the other system of MPU was made. (Detection of the other system)	Gather	Gather		
H40170	DUAL I/F clock error [ECLKERR]	A clock error of the other system was detected. (Detection of the other system)	Gather	Gather		
H90100	PS DC Voltage alarm	The voltage of the DC power supply was abnormal.	Gather		① Replace AC/DC power supply of the both RK.	H1F:04-0450 RK :04-0920 MK :04-1350 RKL:04-1750
H90210	CTL failure	The Controller was blocked.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
H90320	Watch-dog time-out	A watchdog time-out occurred.	Gather	Gather		
H90330	Connection unit excess (Max.5)	The number of connected units exceeded limit.		Gather	① Check that five or more units are not connected.	—
HA0100	CUDG error	A CUDG error was detected during the start-up operation. (RAM CUDG)	Gather	Gather	① Solve the failure according to the CUDG detection message indicated before the message.	—
HA020x	RTC alarm (CTL-x)	A RTC failure occurred or the RTC battery was used up. x : Controller# (0-1)	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HA0310	M-DMA transfer time-out	M-DMA transfer time-out occurred. (5 msec)	Gather	Gather		
HA0311	M-DMA retry error	M-DMA failed in retry.	Gather	Gather		
HA0312	M-DMA multiple run	The system was running when M-DMA was started.	Gather	Gather		
HA0313	M-DMA stop time-out	M-DMA forced stop time-out occurred. (5 msec)	Gather	Gather		
HA0420	FLASH write error	Writing in flash memory failed.	Gather	Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
HA0530	SERIAL open error	An OPEN error was caused by RS232C.	Gather	Gather	① Replace the RS232C cable.	—
					② Replace the Controller whose FAIL LED is on.	
HA0531	SOCKET open error	An OPEN error was caused by the socket.	Gather	Gather	① Replace the LAN cable.	—
					② Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HA0532	ACCEPT open error	An OPEN error was caused by the accept.	Gather	Gather	① Replace the LAN cable.	—
					② Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HB0210	Target abort INT status error	The target abortion INT status is illegal.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
					② If the system is still abnormal, replace the Interface board.	H1F:04-0300 RK :04-0780
HB0320	H-FPC PCI INT STS REG error [CRS]	The Tachyon made a master access to the PCI violating the address boundary of the PCI.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
					② If the system is still abnormal, replace the Interface board.	H1F:04-0300 RK :04-0780
HB0421	H-FPC PCI STS REG error [RMA]	A master abortion occurred when Tachyon made a master access to the PCI.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
					② If the system is still abnormal, replace the Interface board.	H1F:04-0300 RK :04-0780
HB0522	H-FPC PCI STS REG error [DPE]	Tachyon PCI Status Reg error. (DPE)	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
HB0623	H-FPC PCI INT STS REG err [UBE]	An access was attempted in units of other than four bytes to the Tachyon Chip resistor disregarding that accesses to which must be done in units of four bytes.	Gather	Gather	① Replace the Interface board.	H1F:04-0300 RK :04-0780
HB07xy	H-FPC I/F board type error	The exclusive interface board for a transfer rate of 1 Gbps is used although the fibre channel transfer rate is 2 Gbps. x: Transfer rate of the Port A (0 or 1) y: Transfer rate of the Port B (0 or 1)			① Replace the interface board with that for the 2-Gbps fibre channel.	H1F:04-0300 RK :04-0780
HC0100	HSPC PCI bus parity error	A PCI bus parity error was detected in HSPC.	Gather	Gather		MK :04-1170 RKL:04-1580
HC0101	HSPC PCI bus fault	A PCI bus fault was detected in HSPC.	Gather	Gather		
HC0200	HSPC initialize time-out	Time-out was detected while the HSPC register was initialized.	Gather	Gather		
HC0300	HSPC FIFO error	A FIFO error occurred in H-SPC.	Gather	Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
HD0100	DFPC error over [DFPCINM]	The Controller was blocked since the failure of D-FPC exceeded the threshold value.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HD1100	HDU CDB check code error [RETRY]	The Controller was blocked since the retry NG occurred in the drive check code.	Gather	Gather		
HD1200	HDU CDB check code error [OVER]	The Controller was blocked since the drive check code exceeded the threshold value.	Gather	Gather		
HD21xx	Host transfer DMA error over (DMA-xx)	The number of DMA hardware failure occurrences exceeded its threshold value in the host transfer. xx : DMA# (0-3)		Gather		
HD22xx	CACHE error over (CACHE-x/y) [CRECT]	The number of cache correctable error occurrences exceeded its threshold value in the DMA transfer. (during the dual system operation) x, y : Cache memory slot# (RK/RKA=0-3) (MK/RKL=0-1)		Gather		
HD2400	DRR time-out	A time-out of the waiting for DRR completion occurred.		Gather		
HE0100	Backend down [All Loop NG]	The back end was blocked : Since both loops (Normal loop/Alternate loop) have failures, access to the drive is impossible.	Gather	Gather	① Identify the failed part with the automatic loop diagnostic function. Repair according to the other message indicated at this time.	—
HE020x	Backend down [NO SES-HDU BKW] (Unit-x)	The back end was blocked : Since there are no usable SES disk drives in the unit, the unit cannot be controlled or monitored. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6)	Gather	Gather	① Identify the failed part with the automatic loop diagnostic function. Repair according to the other message indicated at this time.	—
HE030x	Backend down [NO SES-HDU BKD] (Unit-x)	The back end was blocked : Since there are no usable SES disk drives in the unit, the unit cannot be controlled or monitored. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6)	Gather	Gather	① Identify the failed part with the automatic loop diagnostic function. Repair according to the other message indicated at this time.	—

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
HE040x	Backend down [NO ENC] (Unit-x)	The back end was blocked : There are no usable ENC. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6)	Gather	Gather	① Identify the failed part with the automatic loop diagnostic function. Repair according to the other message indicated at this time.	—
HE050x	Backend down [Unit# ERR] (Unit-x)	The back end was blocked : Abnormality in the connection order of the units or a wrong ID of a unit was detected. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6)	Gather	Gather	① Check that the connection order of the units is correct.	—
					② Check that the ID of each unit is correct.	—
HE06xy	Backend down [AL_PA] (Path-x, Loop-y)	The back end was blocked: Abnormality was detected in AL-PA of the drive connected to the loop. x : Path# (RK/RKA=0-1) (MK/RKL-0 y : Loop# (0-1)	Gather	Gather	① Notify the technical support.	—
HE0710	Backend loop change error [OWN]	The loop switch was changed and the newly selected loop had a failure, too.	Gather	Gather	① Identify the failed part with the automatic loop diagnostic function. Repair according to the other message indicated at this time.	—
HE0711	Backend loop change error [OTH]	The loop switch was changed and the newly selected loop had a failure, too.	Gather	Gather	① Identify the failed part with the automatic loop diagnostic function. Repair according to the other message indicated at this time.	—
HE082x	CTL loop failure (CTL-x)	A loop failure occurred in the Controller of the system. x : Controller# (0-1)	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HE082x	CTL loop failure (CTL-x)	A loop failure occurred in the Controller of the other system. x : Controller# (0-1)	Gather	Gather		
HE0930	BKD job time-out	Back end diagnosis job time-out occurred.	Gather	Gather		
HE0A31	BKW job time-out	Back end monitoring job finish waiting time-out occurred.	Gather	Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
HE0Bxy	ENC thermal alarm [PSOFF] (Unit-x, ENC-y)	The sequential shutdown was executed because a temperature error was detected in the ENC. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : ENC board# (0- 1)	Gather		① Check if the environment is set in accordance with the specifications. ② Turn the power on and check if the fan of the AC/DC power supply is not in the state in which it has been given an alarm. ③ Replace the ENC board.	H1F:04-0420 RK :04-0890 MK :04-1300 RKL:04-1700
HE0C00	Controller thermal alarm [OWN]	The Controller of own system was blocked because a temperature error was detected in the Controller.	Gather		① Check if the environment is set in accordance with the specifications. ② Check if the fan of the AC/DC power supply is not in the state in which it has been given an alarm.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HE0D00	Controller thermal alarm [OTH]	The Controller of another system was blocked because a temperature error was detected in the Controller.	Gather		③ Replace the Controller whose FAIL LED is on.	
HE0E00	Controller thermal alarm [PSOFF]	The sequential shutdown was executed because a temperature error was detected in the Controller.	Gather		① Check if the environment is set in accordance with the specifications. ② Turn the power on and check if the fan of the AC/DC power supply is not in the state in which it has been given an alarm. ③ Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HE0Fxy	Backend down [Cable ERR] (Unit-x, ENC-y)	The back end was blocked : Abnormality in the connection order of the cables was detected. x : Unit ID# (0-9) y : ENC board# (0-1)	Gather	Gather	① Check that the connection order of the unit cables is correct. (Check that a connector and a cable of the same color are connected together.)	—

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
HF0100	Data transfer check error [SEGP0SERR]	(Data assurance check) An illegal cache writing segment position was detected.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HF0101	Data transfer check error [WRN0DTYBK]	(Data assurance check) A block which was not dirty was written in the Disk drive.	Gather	Gather		
HF0102	Data transfer check error [RDDTYBLK]	(Data assurance check) Data were read into a dirty block.	Gather	Gather		
HF0103	Data transfer check error [RDSEGERR]	(Input/Output data assurance check) An illegal segment to be read was detected.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
					② If the system is still abnormal, replace the all Cache memory.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
HF0104	Data transfer check error [WSGQATERR]	(Data assurance check) Contradiction occurred in the queue attribute of the write segment.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
					② If the system is still abnormal, replace the all Cache memory.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
HF0105	Data transfer check error [WSEGPDEV]	(Input/Output data assurance check) An illegal Disk drive to be written was detected.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
					② If the system is still abnormal, replace the all Cache memory.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
HF0106	Data transfer check error [WSEGLOCK]	(Input/Output data assurance check) An illegal Disk drive to be written was detected.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
					② If the system is still abnormal, replace the all Cache memory.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
HF0107	Data transfer check error [CCPLUNERR]	(Data assurance check) An illegal LUN was detected when data were copied between Cache memories.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
					② If the system is still abnormal, replace the all Cache memory.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
HF0108	Data transfer check error [CCPLBAERR]	(Data assurance check) An illegal LBA was detected when data were copied between Cache memories.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
					② If the system is still abnormal, replace the all Cache memory.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
HF0109	Data transfer check error [PARLUNERR]	(Data assurance check) An illegal LUN was detected when parity was generated.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
					② If the system is still abnormal, replace the all Cache memory.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
HF010A	Data transfer check error [PARLBAERR]	(Data assurance check) An illegal LBA was detected when parity was generated.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
					② If the system is still abnormal, replace the all Cache memory.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
HF010B	Data transfer check error [QUEUEERR]	(Data assurance check) Contradiction occurred in transfer of the queue.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
					② If the system is still abnormal, replace the all Cache memory.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
HF010C	Data transfer check error [COWDRVERR]	(Data assurance check) Data to be written together are dispersed in multiple Disk drives.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
					② If the system is still abnormal, replace the all Cache memory.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
HF010D	Data transfer check error [LACHEKMOD]	(Data assurance check) Contradiction occurred in specification of LA check.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
					② If the system is still abnormal, replace the all Cache memory.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
HF010E	Data transfer check error [DSTPOSERR]	(Data assurance check) An illegal writing position was detected during destaging.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
					② If the system is still abnormal, replace the all Cache memory.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
HF010F	Data transfer check error [SEGP0SOTH]	(Data assurance check) An illegal cache writing segment position was detected.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
					② If the system is still abnormal, replace the all Cache memory.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
HF0110	Data transfer check error [CMPNGHE]	(Data assurance check) A duplex compare of SGCB was detected. (Non-specialized writing)	Gather	Gather	① Replace the Controller whose FAIL LED is on. ② If the system is still abnormal, replace the other Controller.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HF0111	Data transfer check error [CMPNGSP]	Data assurance check) A duplex compare of SGCB was detected. (Specialized writing)	Gather	Gather		
HF0112	Data transfer check error [CMPNGSP]	Data assurance check) A duplex compare of SGCB was detected. (Generation of parity)	Gather	Gather	① Replace the Controller whose FAIL LED is on. ② If the system is still abnormal, replace the other Controller.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HF0113	Data transfer check error [CMPNGCP]	Data assurance check) A duplex compare of SGCB was detected. (Copying between Cache memories)	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
					② If the system is still abnormal, replace the all Cache memory.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
HF0114	Data transfer check error [CMPNGDC]	Data assurance check) A duplex compare of SGCB was detected. (Transfer from disk to Cache memory)	Gather	Gather	① Replace the Controller whose FAIL LED is on. ② If the system is still abnormal, replace the other Controller.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HF0115	Data transfer check error [CMPNGCD]	Data assurance check) A duplex compare of SGCB was detected. (Transfer from Cache memory to disk)	Gather	Gather		
HF0116	Data transfer check error [SSGQATERR]	(Data assurance check) An illegal segment queue attribute was detected in the intermediate skip mode.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HG0100	CTL communication send time-out	Communication receiving waiting time-out occurred.	Gather	Gather		
HG0210	OTH CTL Response time-out [CMDFMWR]	Time-out occurred in communication of request for updating the flash memory of the other system. (CMD)	Gather	Gather		
HG0311	OTH CTL Response time-out [OFW]	Communication waiting time-out occurred in the other system during off-line monitoring.	Gather	Gather		
HG0312	Resource release time-out	General resource release waiting time-out occurred.	Gather	Gather		
HG0413	Data share job time-out	Job time-out occurred for request for share.	Gather	Gather		
HG0514	LU-CTL change time-out	Time-out occurred while LU was changed.	Gather	Gather		
HH010x	System parameter undefined (CTL-x)	A system parameter is not set. x : Controller# (0-1)	Gather	Gather	① Set the system parameter correctly in the WEB maintenance mode.	For Installation Chapter 6
HH020x	Flash revision mismatch (CTL-x)	A controller which the currently installed microprogram could not operate was detected. x : Controller# (0-1)	Gather	Gather	① Check setting of the system parameter in the WEB maintenance mode to see if a function which the currently installed microprogram cannot operate is set.	For Installation Chapter 6
					② If setting is correct, replace the Controller, the FAIL LED of which is lighting up.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
HH030x	FLASH-RAM program I/F error (CTL-x)	Illegal interface between the flash boot program and RAM program was detected. x : Controller# (0-1)	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HH0400	Unsupported function enabled	A function which the system did not support was set.	Gather	Gather	① Set the system parameter correctly in the WEB maintenance mode.	For Installation Chapter 6
HH0510	Task make error [INMTSKERR]	Generation of the initial setting task failed.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HH0620	JOB make error	Generation of a job at start up failed.	Gather	Gather		
HH0930	No system HDU	The system area of the all Disk drives became unavailable.	Gather	Gather	① Notify the technical support.	—
HH0A40	System HDU access error	Since access could not be made to the system area of the all Disk drives because of a system area access error, the Controller was blocked.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HH0Bxy	HDU capacity shortage (Unit-x, HDU-y)	A Disk drive having capacity smaller than the specified value was connected when P/S was turned on. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6) y : Disk drive# (RK/RKA=0-9) (MK/RKL=0-11)	Gather	Gather	① Replace the Disk drive.	H1F:04-0050 RK :04-0550 MK :04-1010 RKL:04-1420
HH0C50	HDU changed before PS ON	The Disk drive used until previous operation is not mounted when P/S is turned on.	Gather	Gather	① Check the mounting position of the disk.	—
HH0D60	Stripe size changed	The stripe size was changed after installation.	Gather	Gather	① Set the system parameter correctly in the WEB maintenance mode.	For Installation Chapter 6
HH0Exy	CACHE access error (CACHE0x/y) [PON]	A cache access error (unrecoverable) occurred when P/S was turned on. x, y : Cache memory slot# (RK/RKA=0-3) (MK/RKL=0-1)	Gather	Gather	① Replace the Cache memory.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
HH0F0x	CACHE SLOT REG error (CTL-x)	Abnormality was detected in REG which indicated the mounting condition of the Cache memory. x : Controller# (0-1)	Gather	Gather	① Insert the Cache memory in the slot again.	—
					② If the system is still abnormal, replace the all Cache memory.	H1F:04-0360 RK :04-0830 MK :04-1240 RKL:04-1650
					③ If the system is still abnormal, replace the Controller, the FAIL LED of which is lighting up.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HH1070	PIN segment error [PINSEGOV]	Cache segments are insufficient for recovery of the PIN data of the information taken over.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HH1180	DCTL hard error [PS ON]	A DMA hardware failure occurred while PS is turned on.	Gather	Gather		
HH1290	System down selected [USRDLST]	When data were lost, system shutdown was selected by the user.			① See "2.5 Details of Recovery procedures".	02-1060
HH12A0	Forced parity correction time-out	Time-out occurred during forced parity recovery operation while P/S is turned on.	Gather	Gather	① Replace the Disk drive.	H1F:04-0050 RK :04-0550 MK :04-1010 RKL:04-1420
					② Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HH13B0	System change failed [PIN]	Since a PIN segment exists, the system cannot be changed.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HH13B1	System change failed [PSOFF]	Since the plan was not stopped, the system cannot be changed.	Gather	Gather		
HH14C0	CACHE mode change failed [POFF]	Since the plan has not been stopped correctly, the cache mode cannot be changed.	Gather	Gather	① Return the cache mode in the WEB maintenance mode and start up, then change the cache mode again and turn off and on the power again.	For Installation Chapter 6
HH16D0	CTL recovery failed [DRR ERR]	When the Controller was recovered in the ON state, a DRR failure was detected during recovery operation of the Cache memory.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
HH17xx	Unit which cannot be managed (Unit-x)	A subsystem which could not be controlled because of absence of installed drive was detected by the back end diagnosis executed at the time of the powering on. x : Unit ID# (RK/RKA=0-9) (MK=0, RKL=0-6)		Gather	① Make sure that at least two Disk drives are installed in the subsystem closely to the left.	—
HH180x	Cache size over (CTL-x)	The capacity of the whole cache memory is larger than the prescribed value. (1200 M bytes) x : Controller# (0-1)			① Replace the controller with that supports the prescribed capacity (larger than 1200 M bytes).	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HI0100	PS OFF failed [DSTG HUNG]	Hang-up of destaging processing of the other system was detected when the plan was stopped.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HI0201	PS OFF failed [POFNONCLD]	When PS is turned off, the information taken over is not set in the COLD state.	Gather	Gather	① Turn on PS, then off again.	—
HI0202	PS OFF failed [POFNOJOB]	When PS is turned off, the plan stopping job has not been executed.	Gather	Gather	① Turn on PS, then off again.	—
HI0310	OTHPs OFF time-out	Time-out in waiting for communication of the other system occurred while the plan was being stopped.	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HI0420	System down selected [PS OFF]	When the plan could not be stopped, system shutdown was selected by the user.			① See "2.5 Details of Recovery procedures".	02-1060
HI05xy	CACHE access error (CACHE-x/y) [POFF]	When the plan was stopped, system shutdown was caused by a cache access error. (unrecoverable) x, y : Cache memory slot# (RK/RKA=0-3) (MK/RKL=0-1)	Gather	Gather	① See "2.5 Details of Recovery procedures".	02-1060
HI0600	PS OFF failed [PIN]	The sequential shutdown could not be done because of the too much pinned data.	Gather	Gather	① See "2.5 Details of Recovery procedures".	02-1060

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
HJ01xx	Microprogram error [INM]	Logical illegality was detected in the microprogram. (Initial setting) xx : Optional code	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HJ02xx	Microprogram error [POF]	Logical illegality was detected in the microprogram. (Stop of plan) xx : Optional code	Gather	Gather		
HJ03xx	Microprogram error [RST]	Logical illegality was detected in the microprogram. (Reset) xx : Optional code	Gather	Gather		
HJ04xx	Microprogram error [SCK]	Logical illegality was detected in the microprogram. (Kernel) xx : Optional code	Gather	Gather		
HJ05xx	Microprogram error [CIT]	Logical illegality was detected in the microprogram. (Interruption) xx : Optional code	Gather	Gather		
HJ06xx	Microprogram error [RSM]	Logical illegality was detected in the microprogram. (Resource control) xx : Optional code	Gather	Gather		
HJ07xx	Microprogram error [FTD]	Logical illegality was detected in the microprogram. (Tachyon driver control) xx : Optional code	Gather	Gather		
HJ08xx	Microprogram error [FSM]	Logical illegality was detected in the microprogram. (Sequence Manager) xx : Optional code	Gather	Gather		
HJ09xx	Microprogram error [LSM]	Logical illegality was detected in the microprogram. (Link service control) xx : Optional code	Gather	Gather		
HJ0Axx	Microprogram error [HSC]	Logical illegality was detected in the microprogram. (H-SCSI control) xx : Optional code	Gather	Gather		
HJ0Bxx	Microprogram error [NCR]	Logical illegality was detected in the microprogram. (NCR) xx : Optional code	Gather	Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
HJ0Cxx	Microprogram error [HSW]	Logical illegality was detected in the microprogram. (H-SPC interruption) xx : Optional code	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HJ0Dxx	Microprogram error [SCP]	Logical illegality was detected in the microprogram. (SCP control) xx : Optional code	Gather	Gather		
HJ0Exx	Microprogram error [CMD]	Logical illegality was detected in the microprogram. (Command) xx : Optional code	Gather	Gather		
HJ0Fxx	Microprogram error [PRS]	Logical illegality was detected in the microprogram. (Reading first) xx : Optional code	Gather	Gather		
HJ10xx	Microprogram error [COW]	Logical illegality was detected in the microprogram. (Writing together) xx : Optional code	Gather	Gather		
HJ11xx	Microprogram error [RCH]	Logical illegality was detected in the microprogram. (Cache control) xx : Optional code	Gather	Gather		
HJ12xx	Microprogram error [RAD]	Logical illegality was detected in the microprogram. (RAID control) xx : Optional code	Gather	Gather		
HJ13xx	Microprogram error [DSC]	Logical illegality was detected in the microprogram. (Execution of input/output) xx : Optional code	Gather	Gather		
HJ14xx	Microprogram error [DMA]	Logical illegality was detected in the microprogram. (Data transfer control) xx : Optional code	Gather	Gather		
HJ15xx	Microprogram error [ERR]	Logical illegality was detected in the microprogram. (Assistance in failure processing) xx : Optional code	Gather	Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
HJ16xx	Microprogram error [RCF]	Logical illegality was detected in the microprogram. (Configuration control) xx : Optional code	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HJ17xx	Microprogram error [DRC]	Logical illegality was detected in the microprogram. (Recovery of Disk drive) xx : Optional code	Gather	Gather		
HJ18xx	Microprogram error [OFW]	Logical illegality was detected in the microprogram. (Off-line monitoring) xx : Optional code	Gather	Gather		
HJ19xx	Microprogram error [ONW]	Logical illegality was detected in the microprogram. (On-line monitoring) xx : Optional code	Gather	Gather		
HJ1Axx	Microprogram error [DST]	Logical illegality was detected in the microprogram. (Emergency destaging) xx : Optional code	Gather	Gather		
HJ1Bxx	Microprogram error [CPR]	Logical illegality was detected in the microprogram. (Forced recovery of parity) xx : Optional code	Gather	Gather		
HJ1Cxx	Microprogram error [COM]	Logical illegality was detected in the microprogram. (Common function) xx : Optional code	Gather	Gather		
HJ1Dxx	Microprogram error [SV1]	Logical illegality was detected in the microprogram. (SVP I/F) xx : Optional code	Gather	Gather		
HJ1Exx	Microprogram error [LUC]	Logical illegality was detected in the microprogram. (Common function) xx : Optional code	Gather	Gather		
HJ1Fxx	Microprogram error [PR0]	Logical illegality was detected in the microprogram. (Communication between Controllers) xx : Optional code	Gather	Gather		

Message code	Message text	Description	Collect the error		Recovery measures	Reference page
			Trace	Dump		
HJ20xx	Microprogram error [BKW]	Logical illegality was detected in the microprogram. (Back end control) xx : Optional code	Gather	Gather	① Replace the Controller whose FAIL LED is on.	H1F:04-0230 RK :04-0720 MK :04-1170 RKL:04-1580
HJ21xx	Microprogram error [BKD]	Logical illegality was detected in the microprogram. (Back end diagnosis) xx : Optional code	Gather	Gather		
HJ22xx	Microprogram error [DST]	Logical illegality was detected in the microprogram. (Coupling copy job) xx : Optional code	Gather	Gather		

2.5 Details of Recovery Procedures

2.5.1 Recovery measures

Table 2.5.1 shows error recovery methods^(‡1). Errors are classified into power-on errors, operation errors, data recovery errors, and power-off errors.

Table 2.5.1 Error Recovery Methods for Each Error

No.	Classification	Description	Reference page
1	The subsystem does not become ready.	A loading of information from a Disk drive failed.	MNTE 02-1070
2		User data was lost because Cache memory was volatile. (Forced parity recovery.) When the WARNING LED blinks before the subsystem enters the Ready status in the case where the subsystem is not in the environment with the connectable WEB, the forced parity recovery is done when the trace switch is pressed.	MNTE 02-1080
3	The power cannot be turned off.	Planned shutdown cannot be performed because the number of PIN data is too large. (due to Disk drive and Controller error.)	MNTE 02-1110
4		An attempt was made to save PIN data to the Disk drive during planned shutdown but failed because a hardware error occurred.	MNTE 02-1140
5		Planned shutdown cannot be performed because all the Disk drives to which inheritance information is to be saved disappeared due to a DMA double error or a Disk drive quintuple error.	MNTE 02-1160
6		Planned shutdown cannot be performed because PIN data cannot be saved due to a Cache memory error, etc.	MNTE 02-1180
7	Data recovery does not terminate normally.	Forced recovery was performed because a RD error occurred in the copy source during a correction copy.	MNTE 02-1200
8		Data recovery terminated abnormally because a Disk drive error occurred in the copy source during a correction copy.	MNTE 02-1210
9		Data recovery terminated abnormally because a Spare disk error occurred during a copyback.	MNTE 02-1220
10	An error occurred during operation.	The number of PIN segments exceeded its threshold value.	MNTE 02-1230
11		Data containing a LA/LRC error was detected.	MNTE 02-1250
12		A system down occurred.	MNTE 02-1270
13		Actions to be taken when a LU blockade occurs.	MNTE 02-1290
14		A loop failure occurred, however, the failed part cannot be located.	MNTE 02-1300

‡1 : • Since the latest state of the unit is always referenced in this recovery operation, turn on the Page Refresh Mode of the WEB.
(Click the [ON] button to indicate [OFF].)

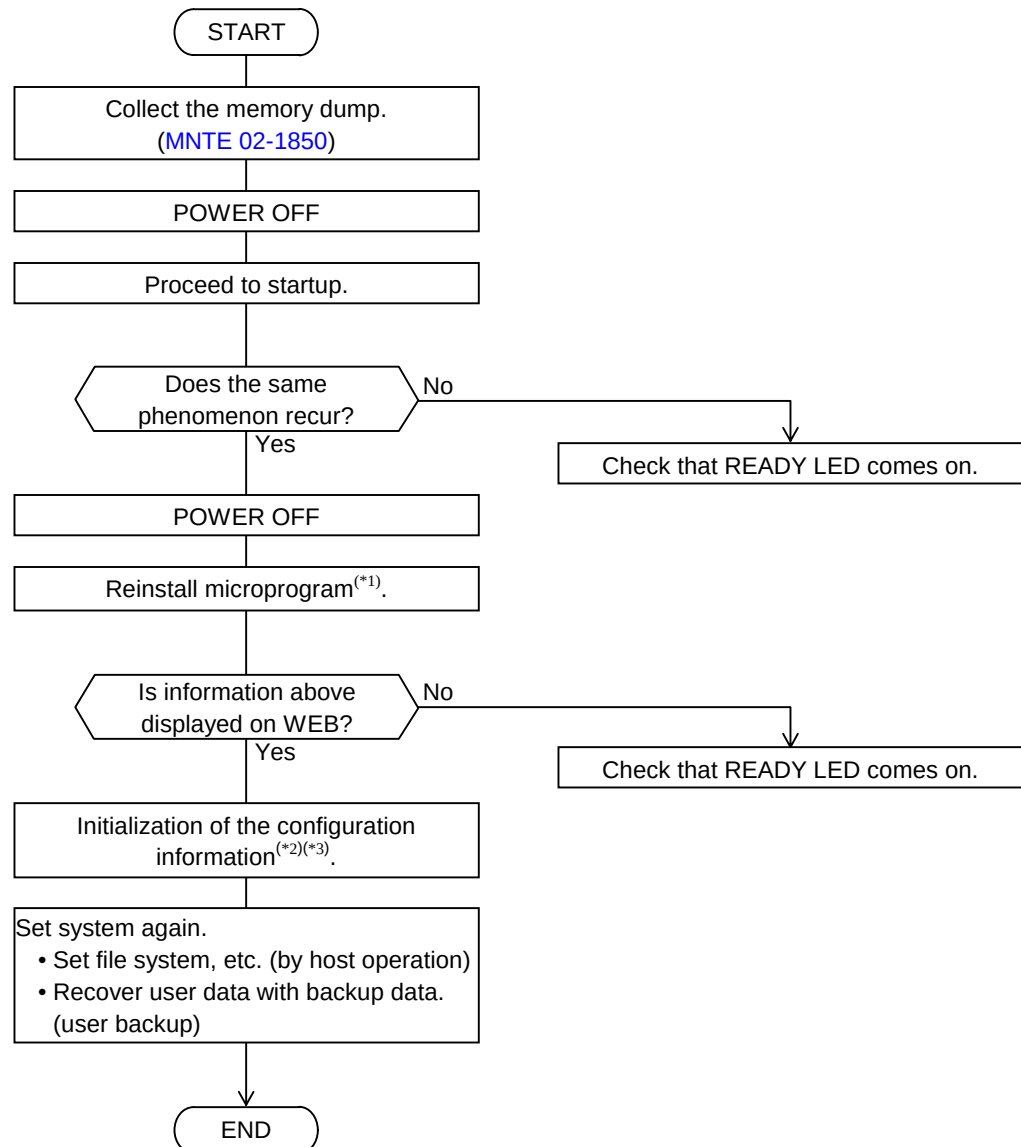
• If the power is turned on again in the recovery operation, the WEB connection between the unit and browser is cut out, make it again. (Press the update button of the browser.)

- (1) The PS cannot be turned on : Case 1
(Information could not be loaded from the Disk drive.)

[WEB Information Message display]

MM/DD/YYYY	HH:MM:SS	Cx	RB8400	Download fail	:MANUAL
Date	Time	Detect	Controller#		

[Recovery measures]



*1 : For the installation procedure of the microprogram, see “Chapter 5 Update Installation Microprogram” (MNTTE 05-0000).

*2 : If this operation is executed, all the data in the Disk drive are deleted (the RAID group and LU definition are initialized).

*3 : For initialization of the information on configuration, see “2.5.2 Initialization procedure of information on configuration” (MNTTE 02-1320).

- (2) The PS cannot be turned on : Case 2 (forced parity recovery)
(User data was lost because Cache memory was volatile.)

[WEB Information Message display]

MM/DD/YYYY	HH:MM:SS	Cx W12000	User data lost	:MANUAL/TRC
Date	Time	Detect Controller#		

[Display of the WEB main window]

The following questions are displayed on the main window.

These questions are displayed on only the master controller in the dual system mode.

The master Controller is Controller#0 usually. If Controller#0 is blocked and the Controller in the hot replacement mode is replaced, the master Controller may be Controller#1, however.

If the Controller#0 (or Controller#1 when Controller#0 is blocked) is connected to the WEB first and above "WEB Information Message" window is displayed but the following questions are not displayed on the main window, the master Controller has been changed. In this case, connect Controller#1 to the WEB.

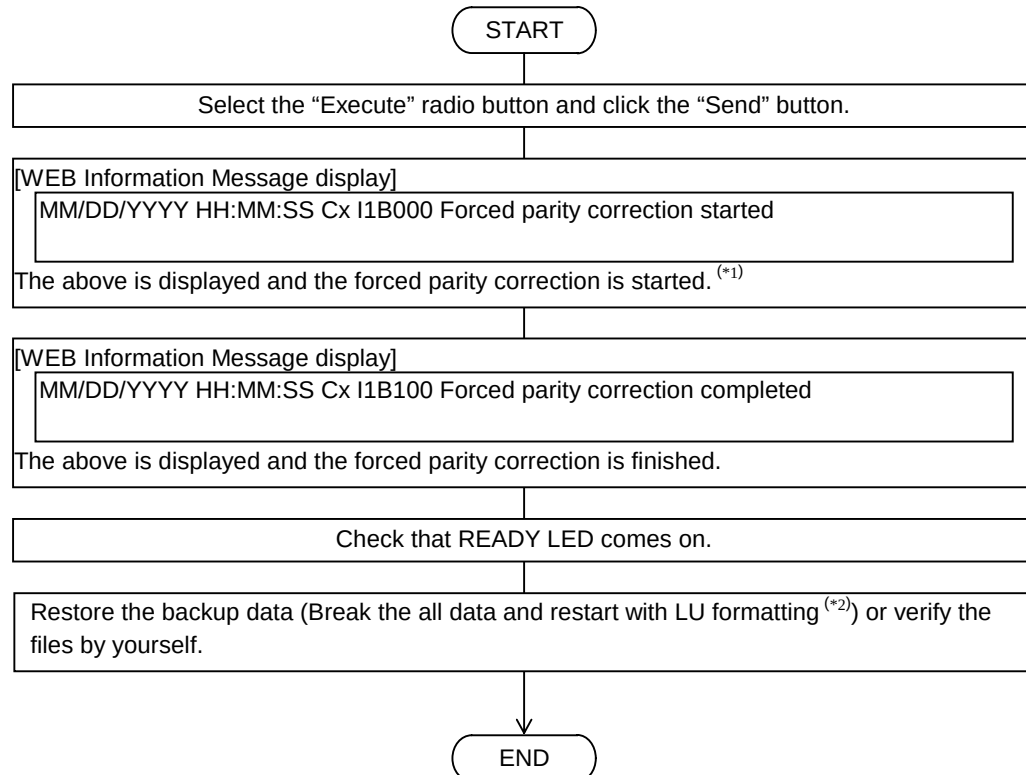
? Confirmation	
Execute Force Parity Adjust?	
☒	Execute
☐	End
☐	Skip
Send	

[Recovery measures]

1. Execute the forced parity correction.

To execute the forced parity correction means to match the data in the Disk drive to each other and the data cannot be recovered completely by executing it.

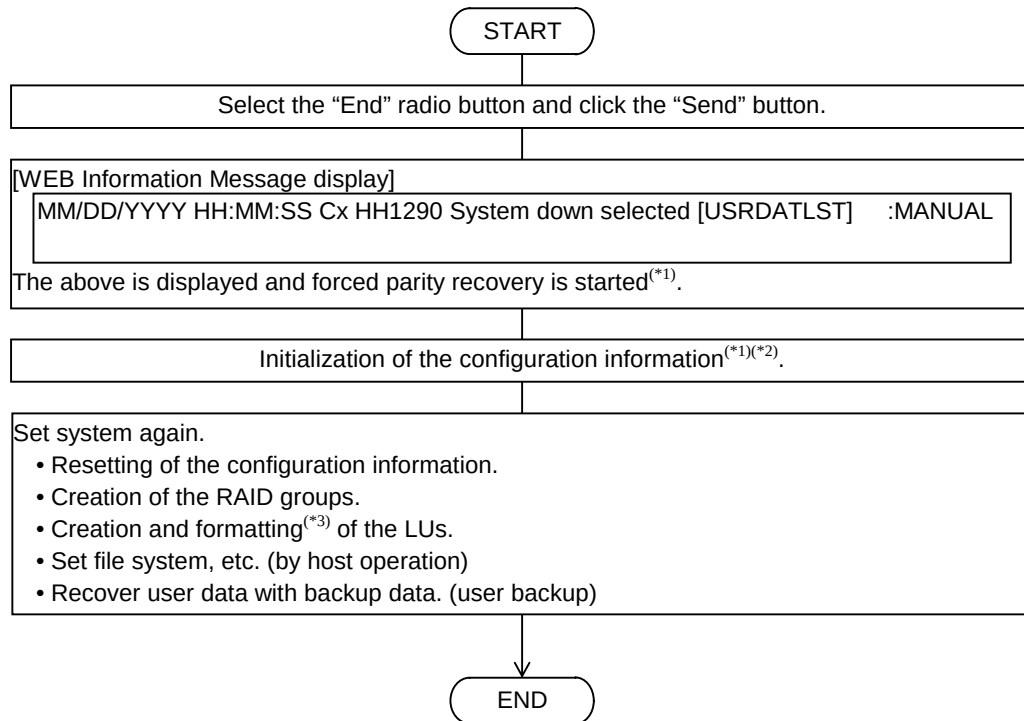
After the following operation, restore the backup data.



*1 : The forced parity correction takes about 40 minutes for 1 line. (when an 18-Gbyte Disk drive is divided into 4D + 1P.)

*2 : Even if the LU formatting is done, it may fail. That is because the LU concerned is an object of the MRCF-Lite function when the output sense key code is "05-9552." Request the user to delete the pair. After the pair is deleted, perform the LU formatting again.

2. Executing no forced parity recovery. (System down)

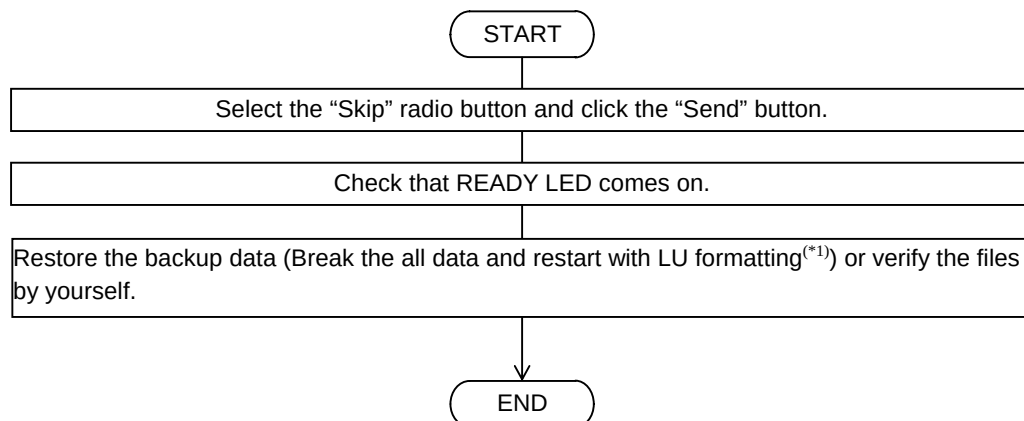


*1 : When this operation is performed, data on the Disk drive is all erased (the RAID group and LU definition are initialized).

*2 : For the initialization of the configuration information, refer to Subsection 2.5.2, "Initialization procedure of information on configuration" on page [MNTE 02-1320](#).

*3 : Even if the LU formatting is done, it may fail. That is because the LU concerned is an object of the MRCF-Lite function when the output sense key code is "05-9552." Request the user to delete the pair. After the pair is deleted, perform the LU formatting again.

3. Do not execute the forced parity correction (Skip the forced parity correction).



*1 : Even if the LU formatting is done, it may fail. That is because the LU concerned is an object of the MRCF-Lite function when the output sense key code is "05-9552." Request the user to delete the pair. After the pair is deleted, perform the LU formatting again.

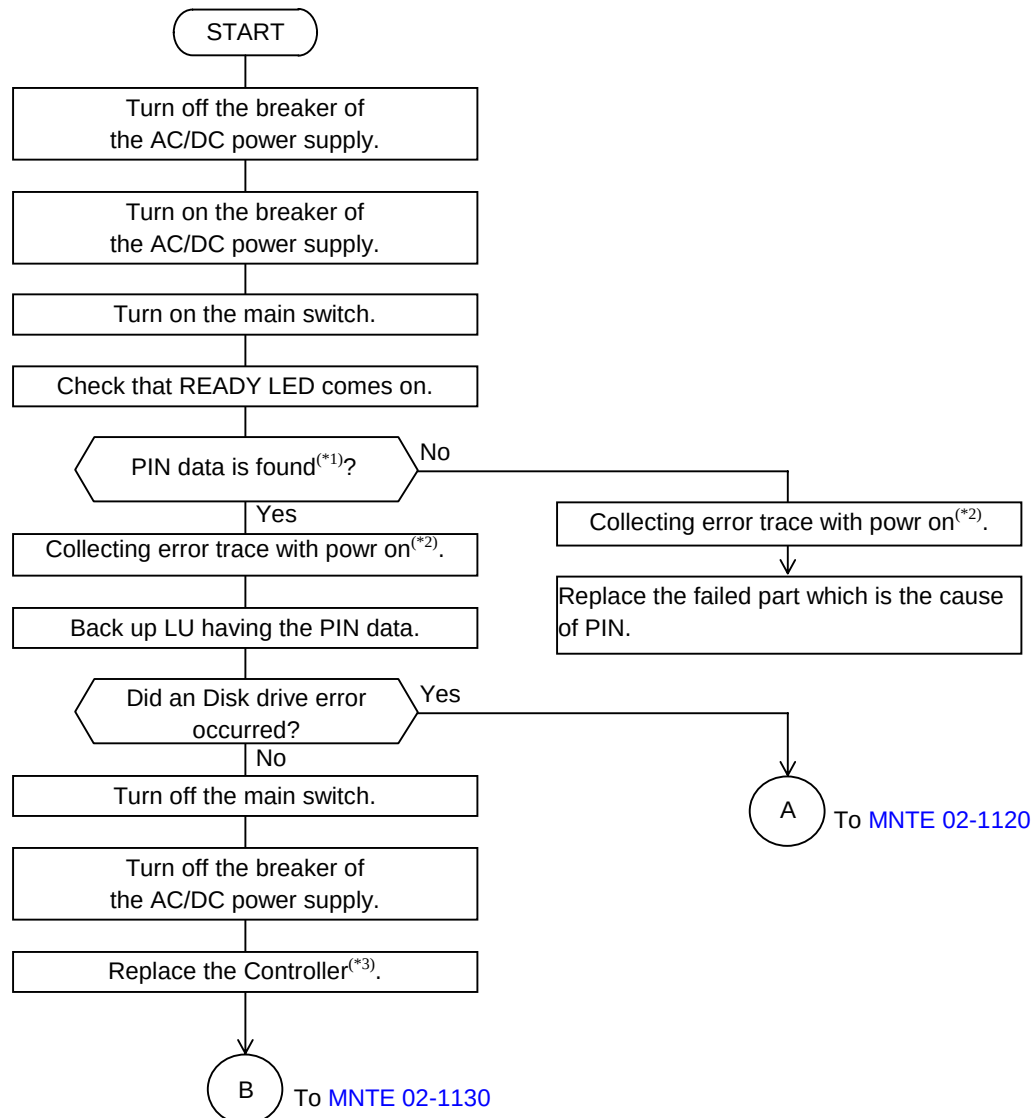
(3) An error occurred during operation: Case 1

(Planned shutdown cannot be performed because the number of PIN data is too large.
(due to Disk drive/Controller error))

[WEB Information Message display]

MM/DD/YYYY	HH:MM:SS	Cx	HI0600 PS OFF failed [PIN]	:MANUAL/TRC
Date	Time	Detect Controller#		

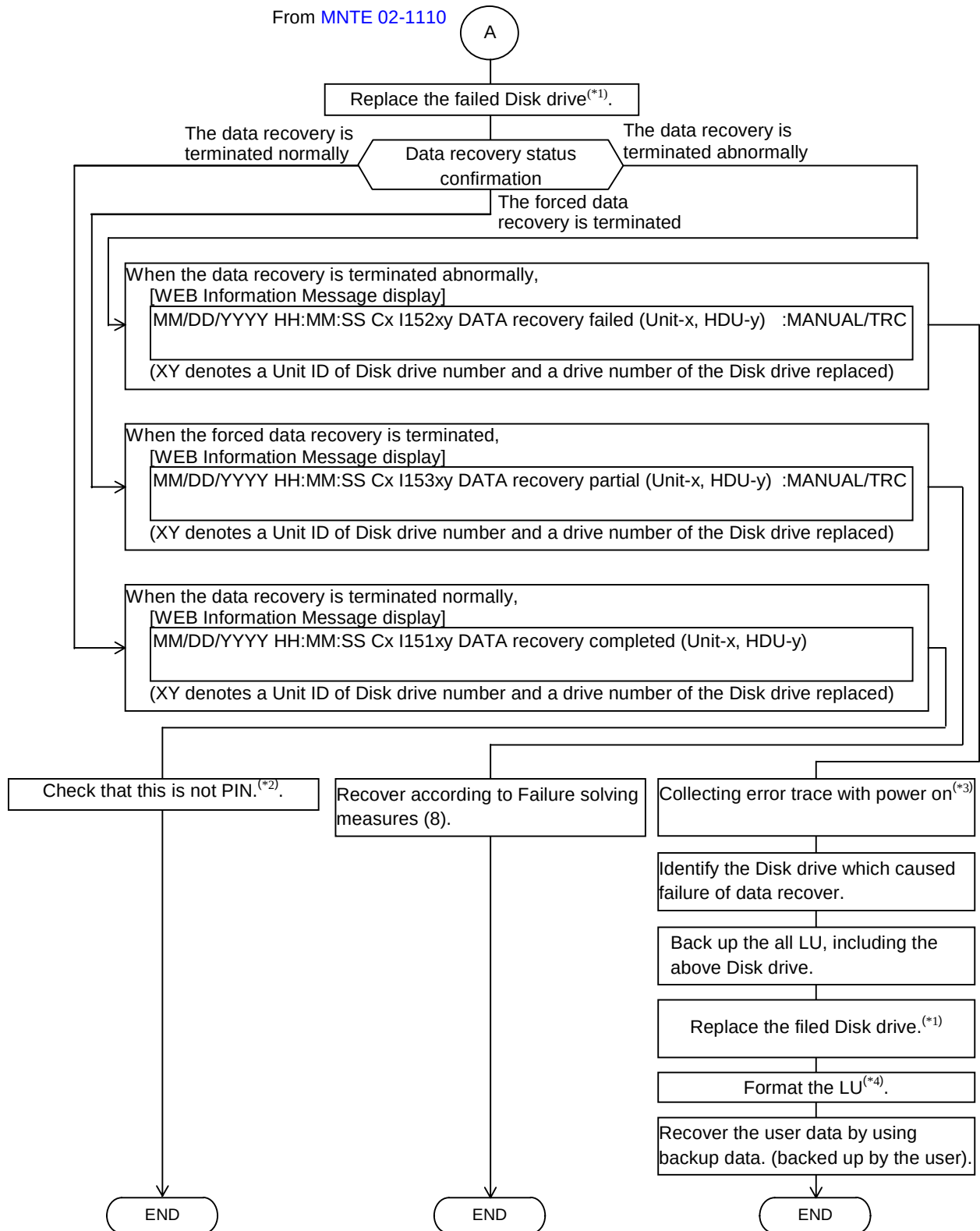
[Recovery measures]



*1 : See page “Disk Array management program (for GUI) User’s Guide” to refer to the information on presence/absence of Pinned data.

*2 : For the Error trace with power on, see “2.6.3 Collection of trace in the ON state” (MNT E 02-1400).

*3 : For the replacement of the Controller, see “Chapter 4 Parts Replacement”.

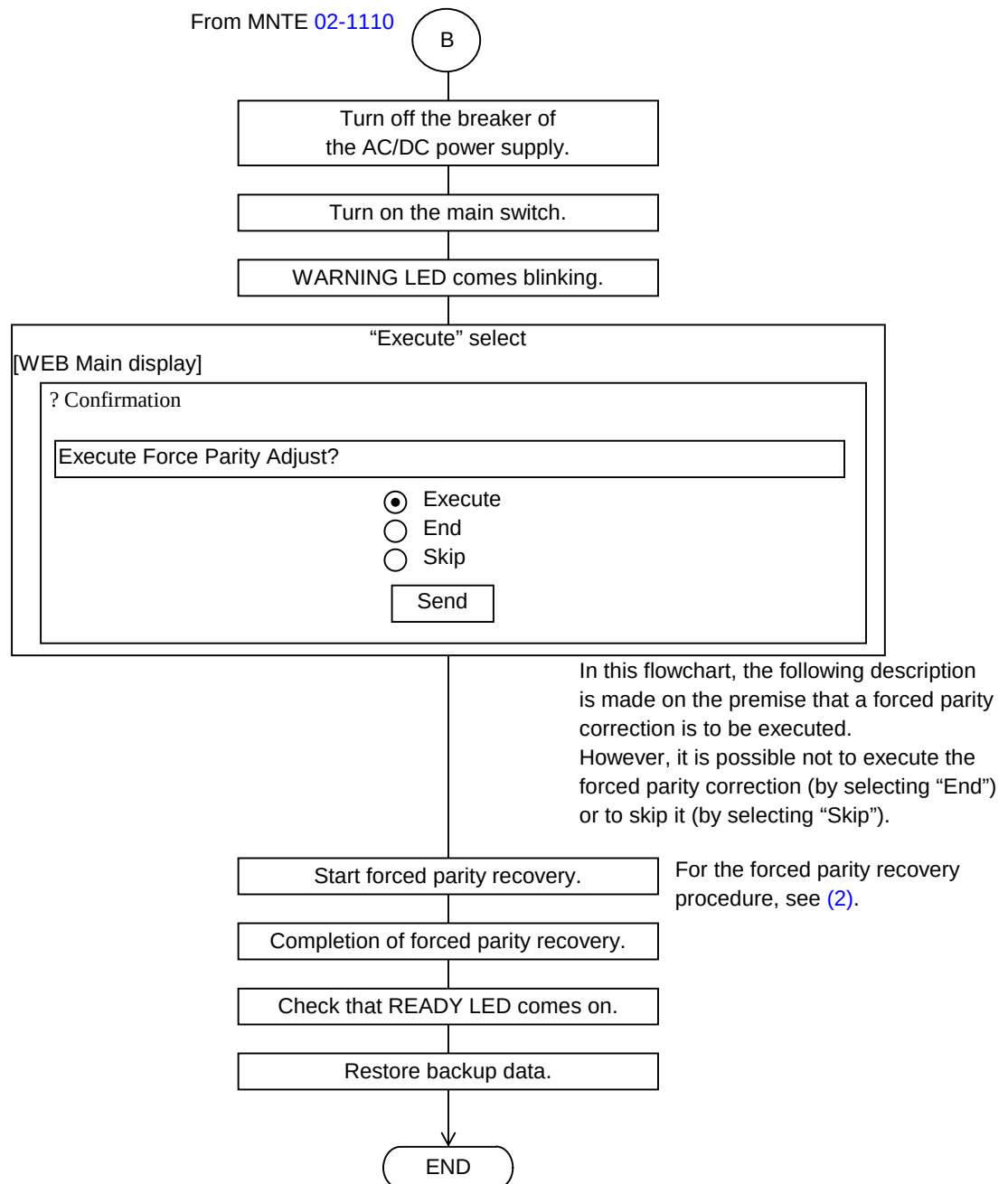


*1 : For the replacement of the Controller, see “Chapter 4 Parts Replacement”.

*2 : See page “Disk Array management program (for GUI) User’s Guide” to refer to the information on presence/absence of Pinned data.

*3 : For the Error trace with power on, see “2.6.3 Collection of trace in the ON state” ([MNTE 02-1400](#)).

*4 : Even if the LU formatting is done, it may fail. That is because the LU concerned is an object of the MRCF-Lite function when the output sense key code is “05-9552.” Request the user to delete the pair. After the pair is deleted, perform the LU formatting again.



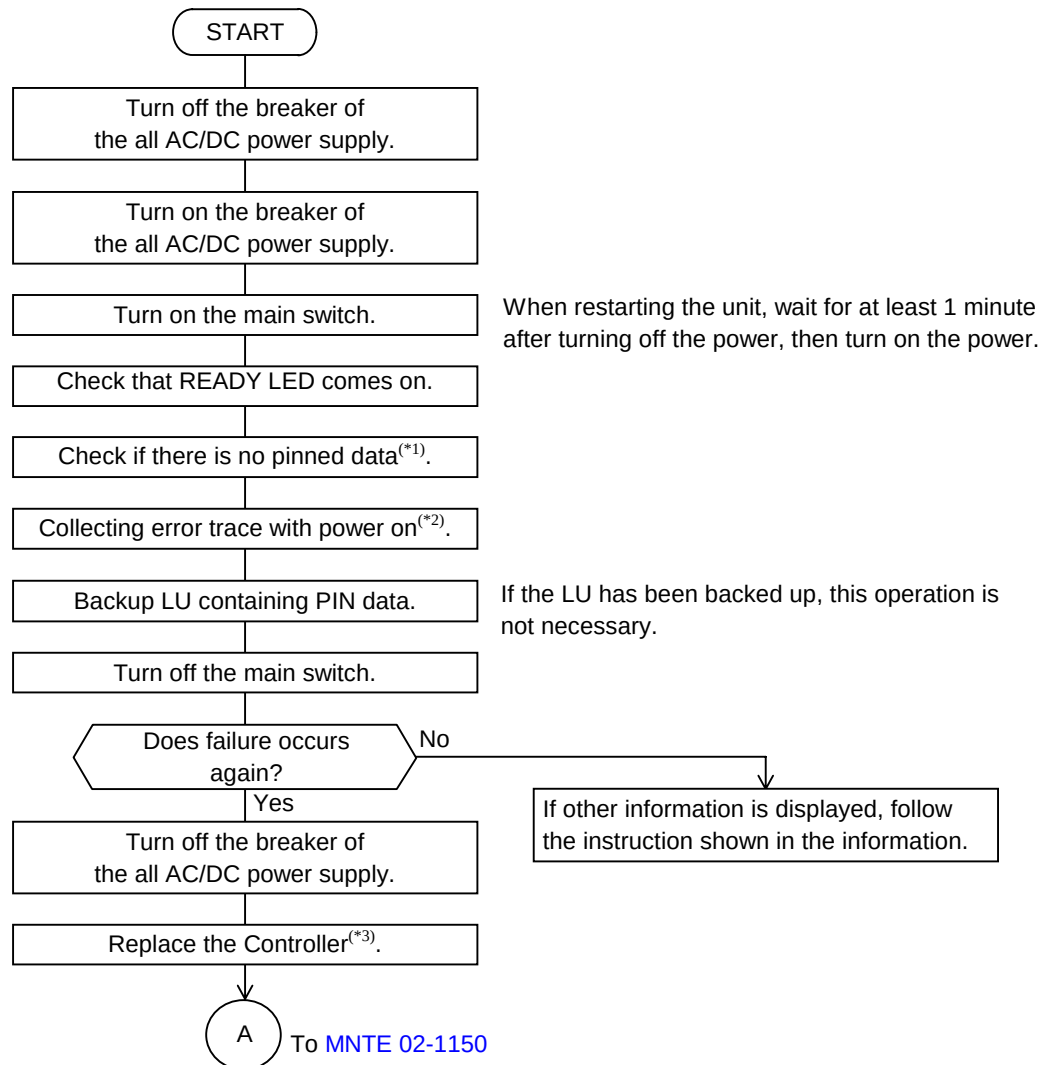
(4) When the PS cannot be turned off : Case 2

(An attempt was made to save PIN data to the Disk drive during planned shutdown but failed because a hardware error occurred.)

[WEB Information Message display]

MM/DD/YYYY	HH:MM:SS	Cx	W41000 PIN write error	:MANUAL/TRC
Date	Time	Detect Controller#		

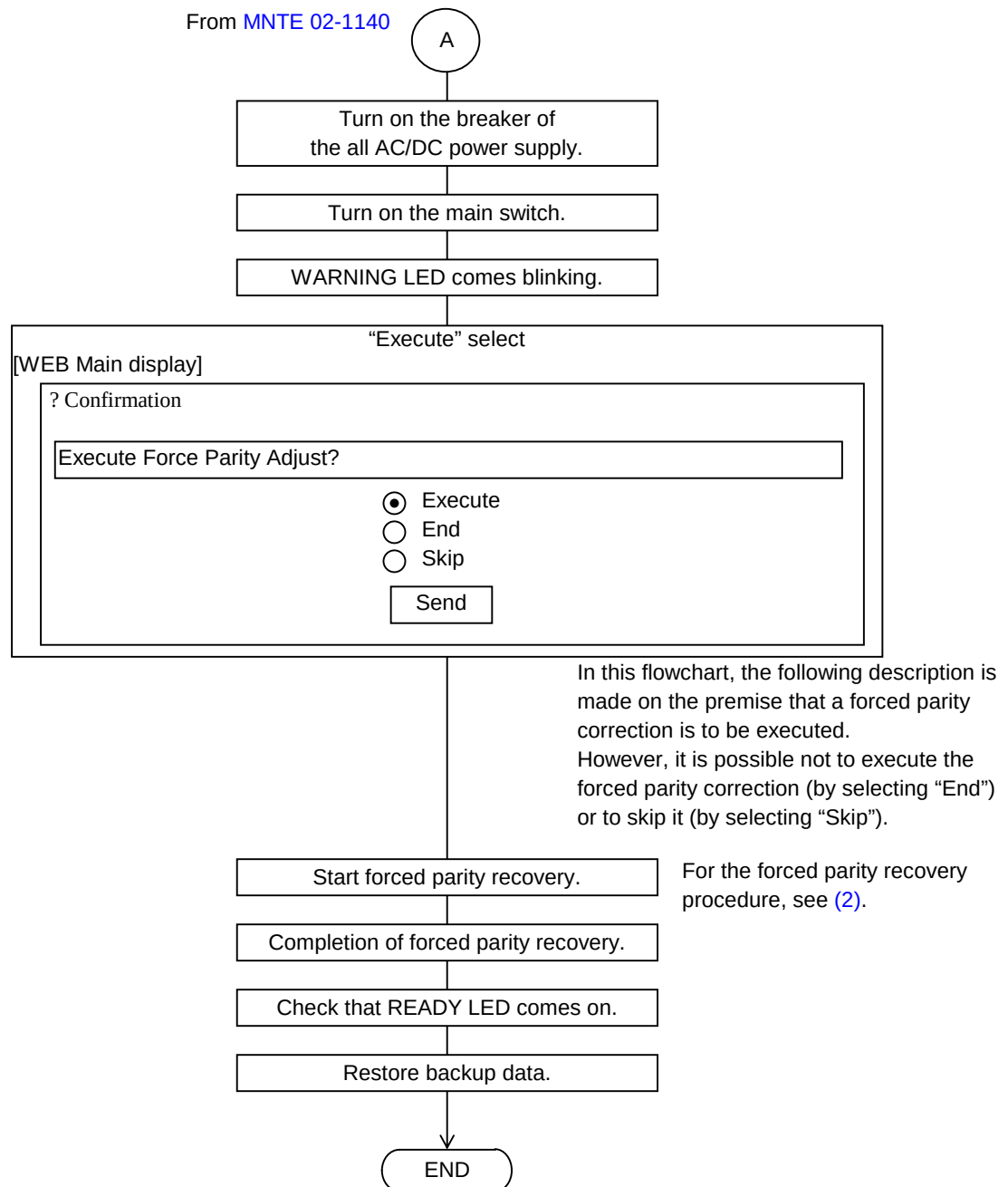
[Recovery measures]



*1 : See page “Disk Array management program (for GUI) User’s Guide” to refer to the information on presence/absence of Pinned data.

*2 : For the Error trace with power on, see “2.6.3 Collection of trace in the ON state” (MNTTE 02-1400).

*3 : For the replacement of the Controller, see “Chapter 4 Parts Replacement”.



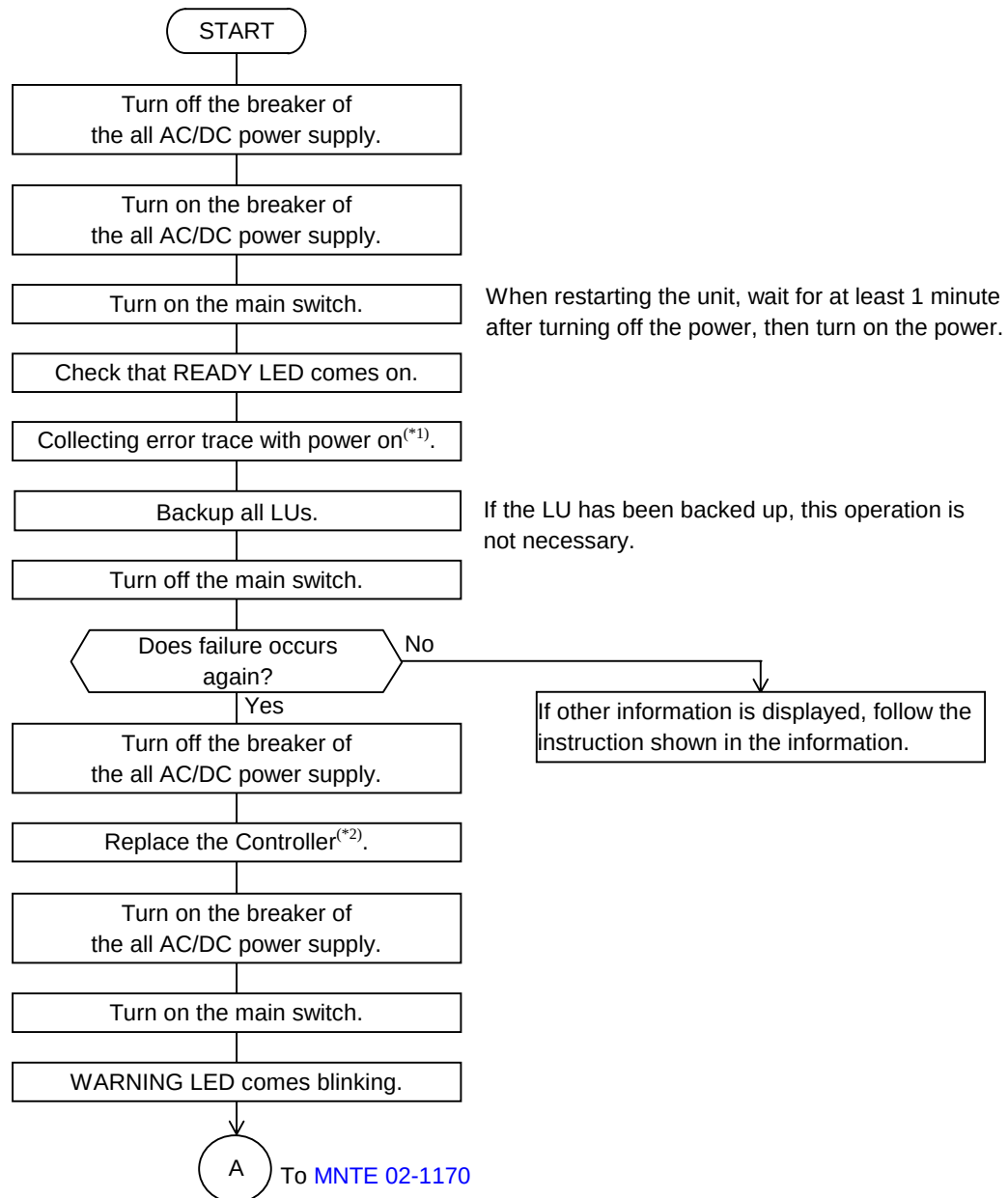
(5) When the PS cannot be turned off : Case 3

(Planned shutdown cannot be performed because all the Disk drives to which inheritance information is to be saved disappeared due to a DMA double error or a disk quintuple error.)

[WEB Information Message display]

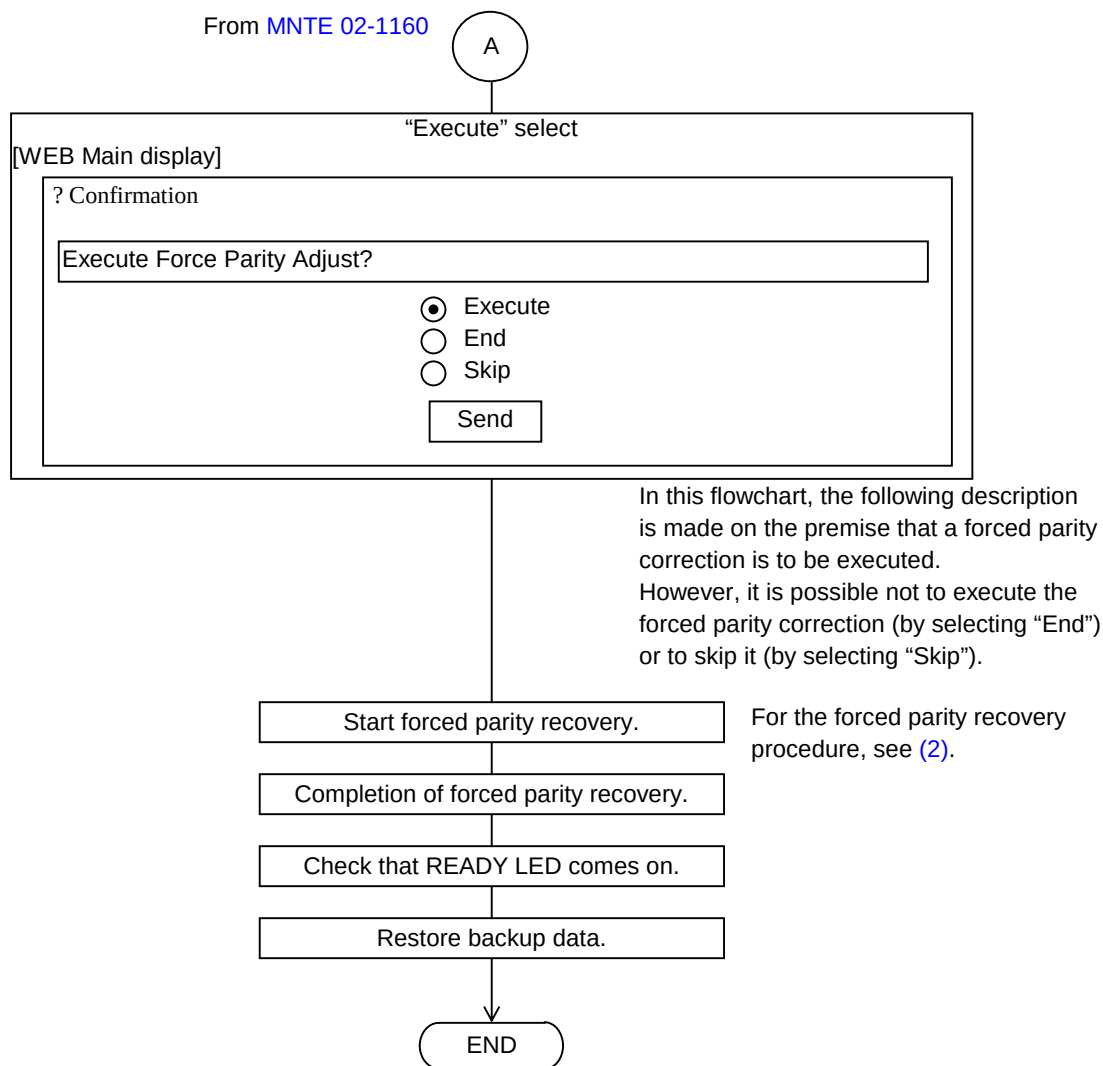
MM/DD/YYYY HH:MM:SS			Cx W22000 PS OFF failed [NO HDU]	:MANUAL/TRC
Date	Time		Detect Controller#	

[Recovery measures]



*1 : For the Error trace with power on, "2.6.3 Collection of trace in the ON state" (MNTE 02-1400).

*2 : For the replacement of the Controller, see "Chapter 4 Parts Replacement".



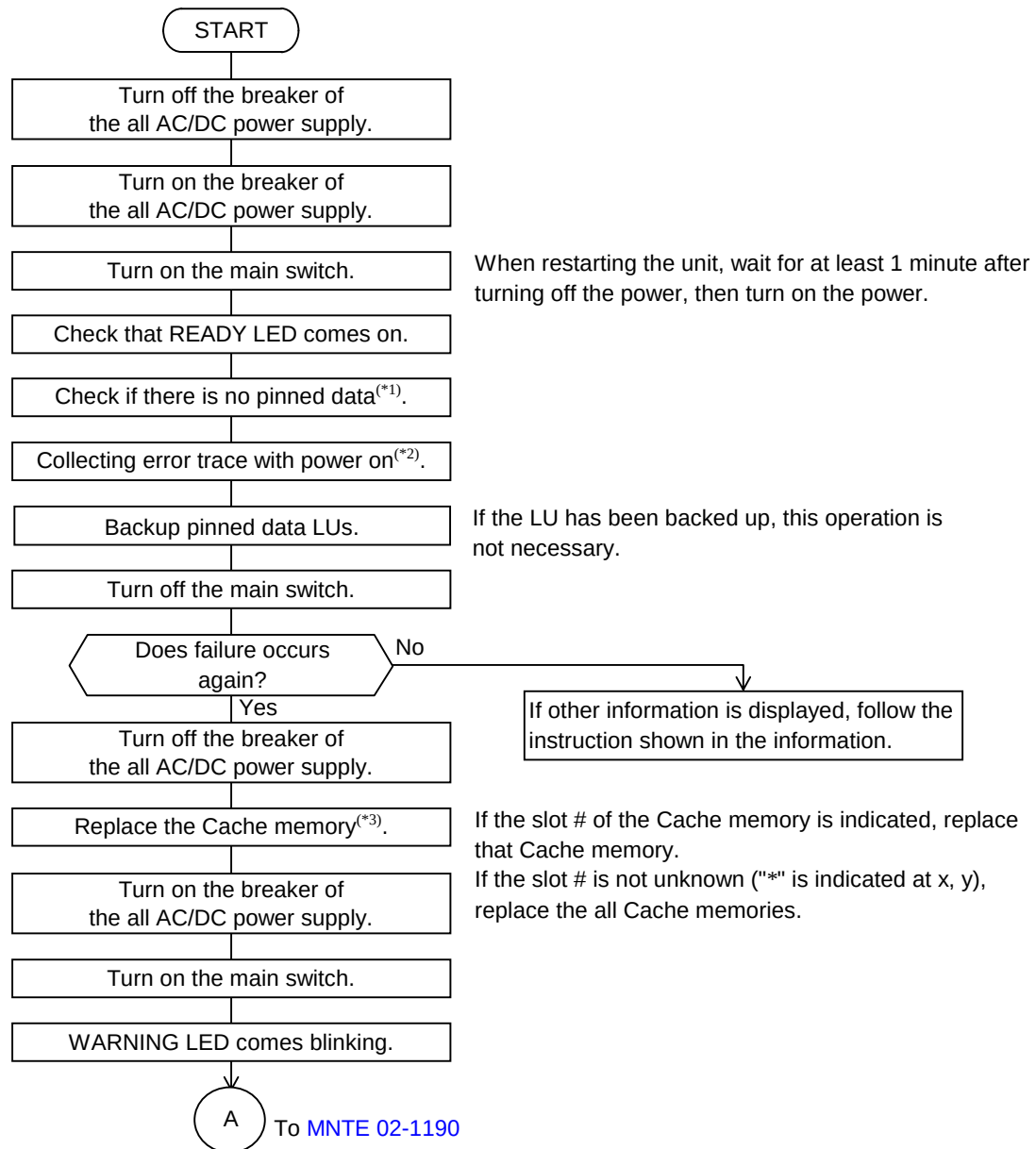
(6) When the PS cannot be turned off : Case 4

(Planned shutdown cannot be performed because PIN data cannot be saved due to a Cache memory error, etc.)

[WEB Information Message display]

MM/DD/YYYY	HH:MM:SS	Cx	W23000 PS OFF failed [CACHE ERR]	:MANUAL/TRC
Date	Time	Detect Controller#		

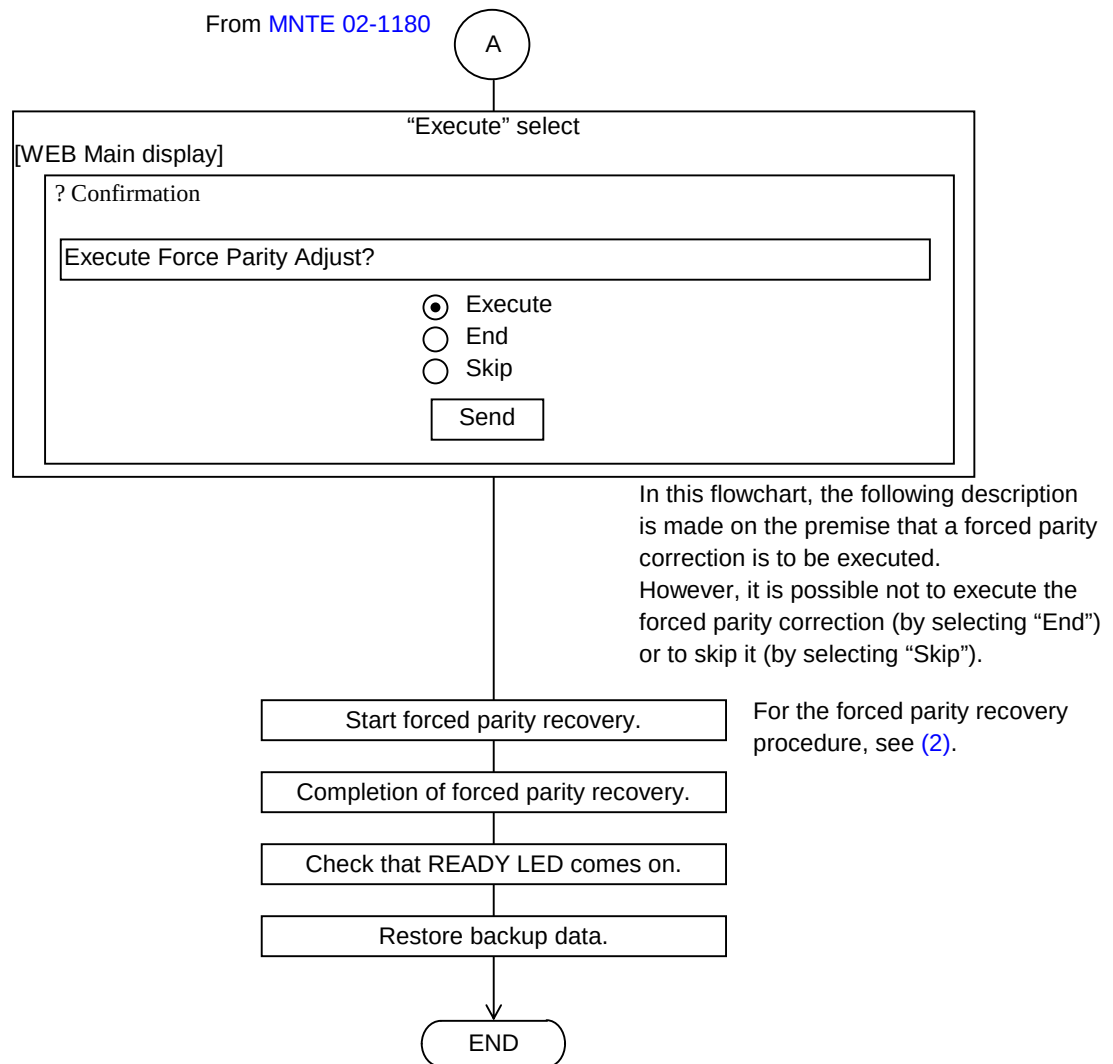
[Recovery measures]



*1 : See page "Disk Array management program (for GUI) User's Guide" to refer to the information on presence/absence of Pinned data.

*2 : For the Error trace with power on, see "2.6.3 Collection of trace in the ON state" (MNTE 02-1400).

*3 : For the replacement of the Cache memory, see "Chapter 4 Parts Replacement".



(7) Data restoration and copy back do not terminate normally : Case 1

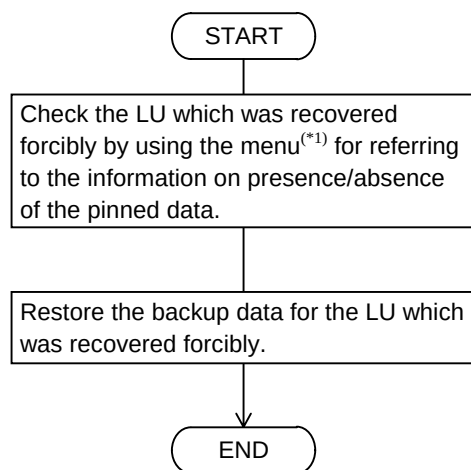
(Forced recovery was performed because an read error occurred in the copy source during a correction copy)

Forced recovery----- When attempting to read the data which was recovered forcibly, it is reported as a read error.

[WEB Information Message display]

MM/DD/YYYY	HH:MM:SS	Cx I153xy	Data recovery partial	:MANUAL/TRC
Date	Time	Detect Controller#		

[Recovery measures]

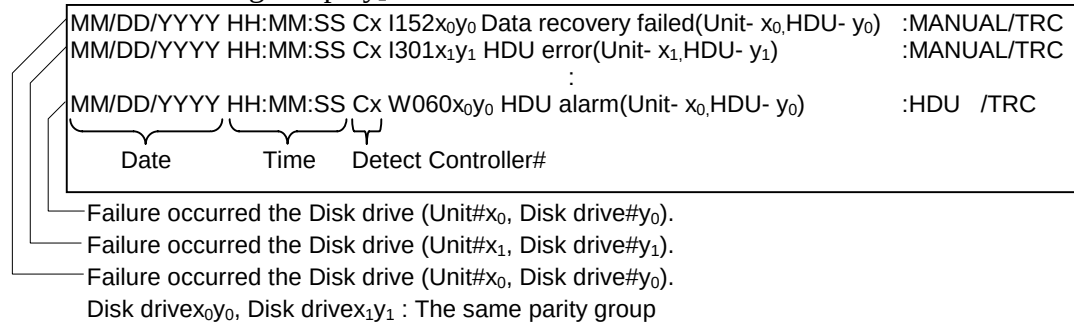


*1 :See page “Disk Array management program (for GUI) User’s Guide” for presence/absence of pinned data.

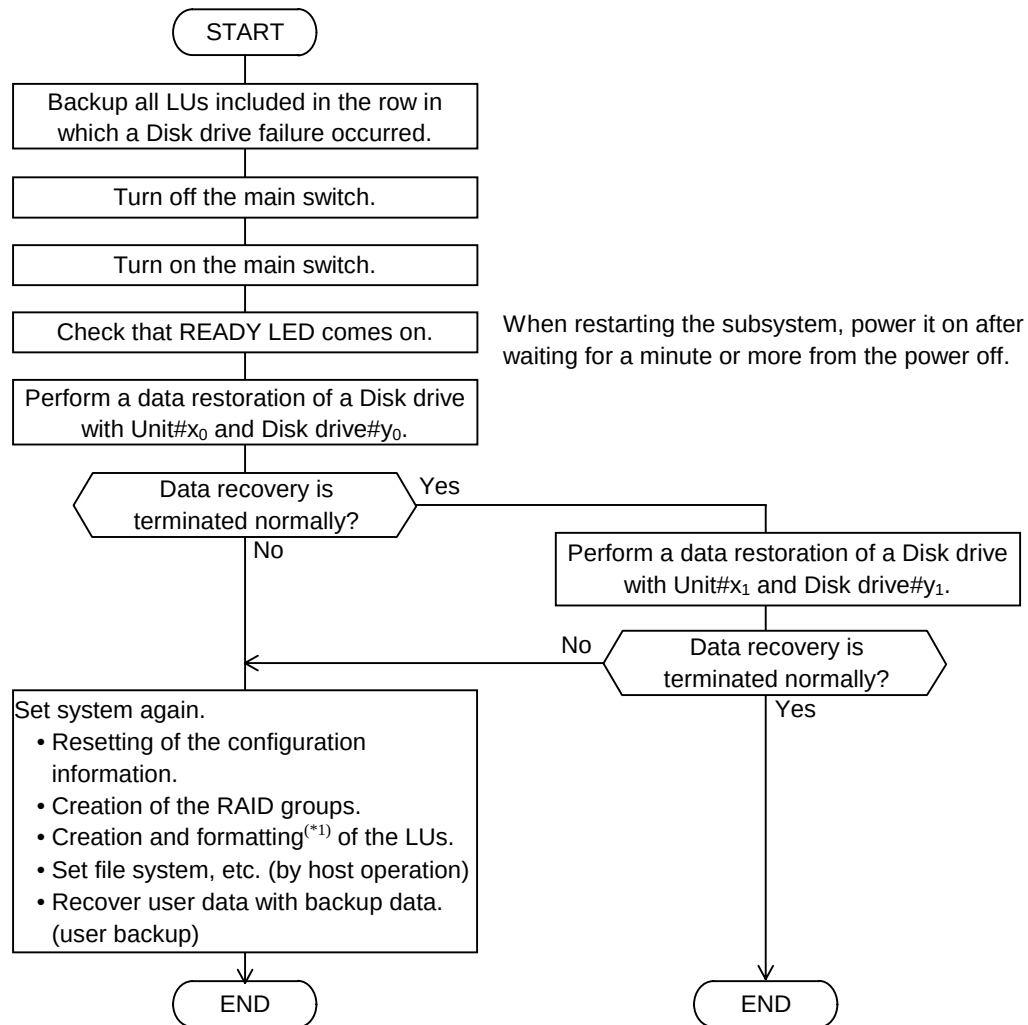
(8) Data restoration and copy back do not terminate normally : Case 2

(Recovery was terminated abnormally because a Disk drive error occurred in the copy source during a correction copy)

[WEB Information Message display]



[Recovery measures]



*1 : Even if the LU formatting is done, it may fail. That is because the LU concerned is an object of the MRCF-Lite function when the output sense key code is "05-9552." Request the user to delete the pair. After the pair is deleted, perform the LU formatting again.

(9) Data restoration and copy back do not terminate normally : Case 3

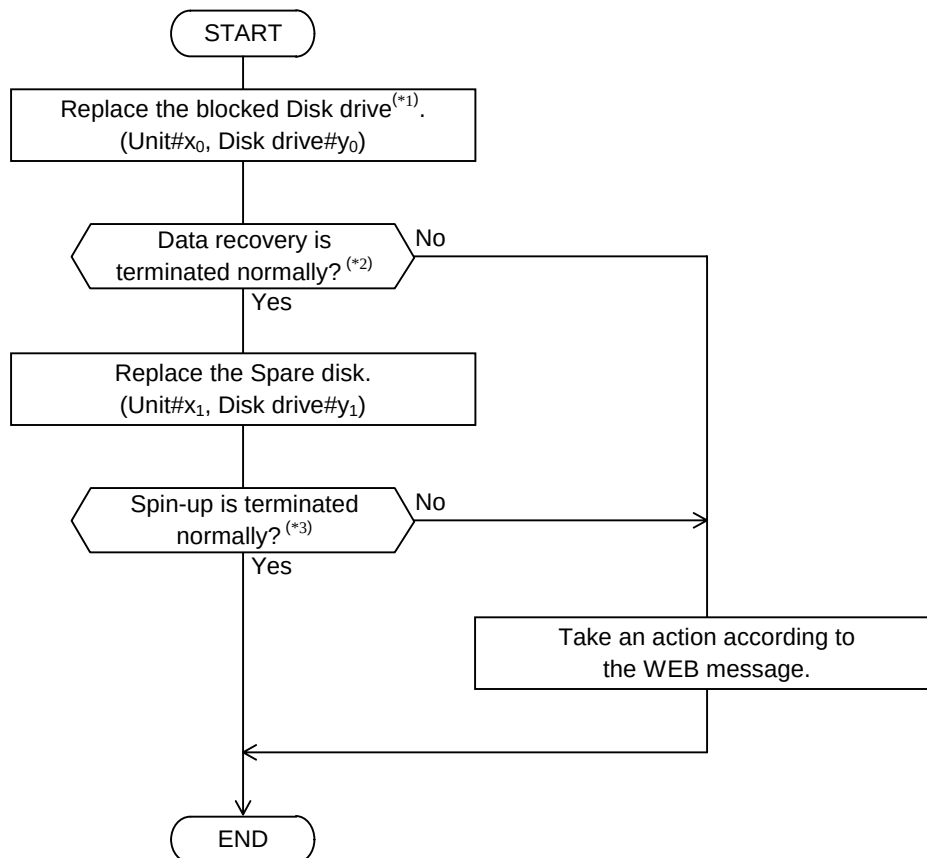
(A Spare disk failure occurred while the correction is copied and the recovery failed.)

[WEB Information Message display]

MM/DD/YYYY HH:MM:SS	Cx I152x ₁ y ₁	Data recovery failed(Unit-x ₁ ,HDU-y ₁)	:MANUAL/TRC
MM/DD/YYYY HH:MM:SS	Cx W061x ₁ y ₁	Spare HDU alarm(Unit-x ₁ ,HDU-y ₁)	:HDU /TRC
MM/DD/YYYY HH:MM:SS	Cx I150x ₁ y ₁	Data recovery started(Unit-x ₁ ,HDU-y ₁)	
MM/DD/YYYY HH:MM:SS	Cx W060x ₀ y ₀	HDU alarm(Unit-x ₀ ,HDU-y ₀)	:HDU /TRC
Date	Time	Detect Controller#	

Failure occurred the Disk drive (Unit#x₀, Disk drive#y₀).
 Recovery start the Spare disk(Unit#x₁, Disk drive#y₁).
 Failure occurred the Spare disk (Unit#x₁, Disk drive#y₁).
 Failure occurred the Spare disk (Unit#x₁, Disk drive#y₁).

[Recovery measures]



*1 : For the replacement of the Disk drive,, see “Chapter 4 Parts Replacement”.

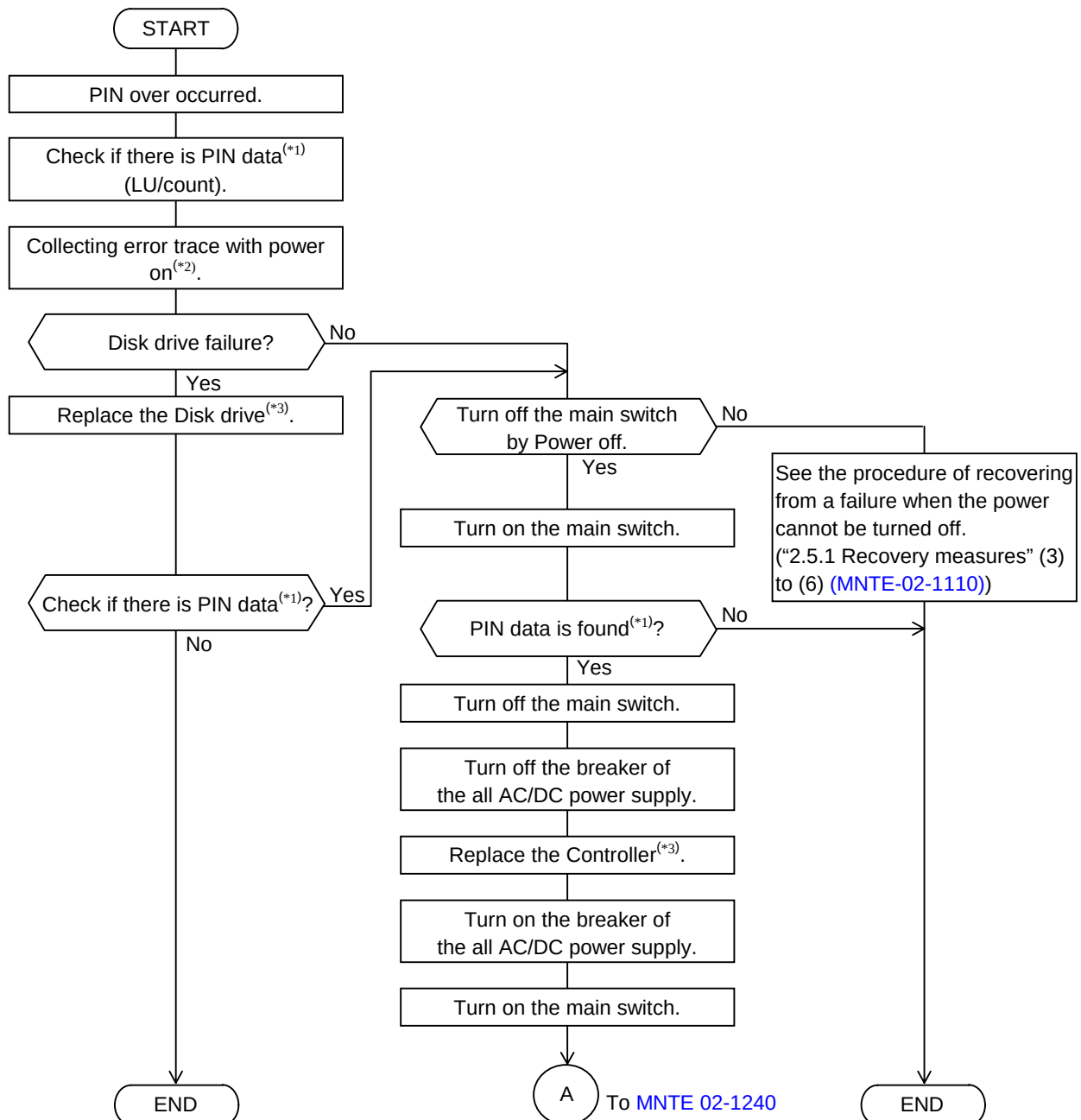
*2 : Check that the message of “I151x₀y₀ Data recovery completed (Unit-x₀, HDU-y₀)” is displayed.*3 : Check that the message of “I009x₁y₁ HDU recovery (Unit-x₁, HDU-y₁)” is displayed.

(10) Recovery procedure for PIN OVER.

[WEB Information Message display]

MM/DD/YYYY HH:MM:SS Cx W41100 PIN over[PNLEVLOV]			:MANUAL/TRC
Date	Time	Detect Controller#	

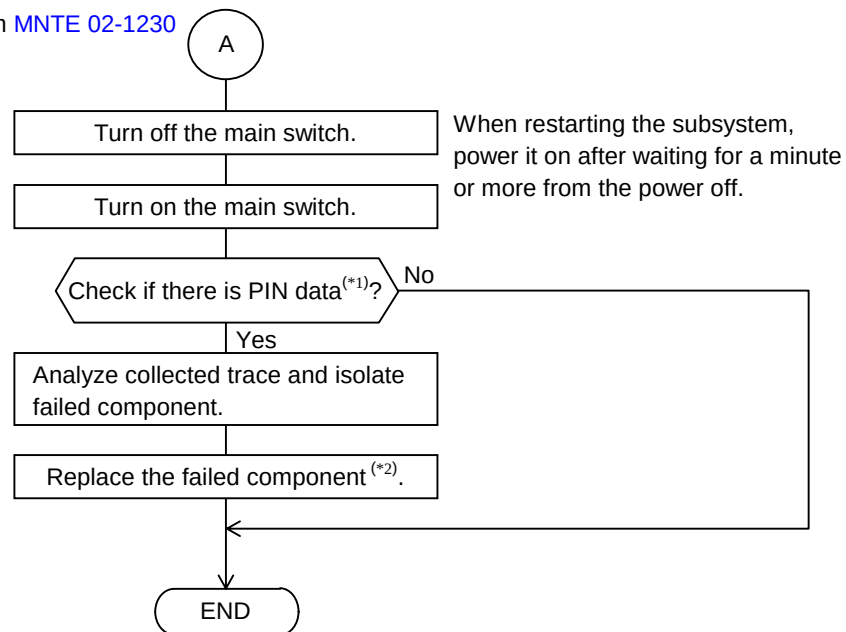
[Recovery measures]



*1 : See page "Disk Array management program (for GUI) User's Guide" to refer to the information on presence/absence of Pinned data.

*2 : For the Error trace with power on, see "2.6.3 Collection of trace in the ON state" (MNTE 02-1400).

*3 : For the replacement of the Controller, see "Chapter 4 Parts Replacement".

From [MNTE 02-1230](#)

*1 : See page [“Disk Array management program \(for GUI\) User’s Guide”](#) to refer to the information on presence/absence of Pinned data.

*2 : For the replacement of the Controller, see [“Chapter 4 Parts Replacement”](#).

- (11) An error occurred during operation : Case 1
(Data containing an LA/LRC error was detected)

[WEB Information Message display]

Any one of the following is displayed.

MM/DD/YYYY HH:MM:SS Cx W320xy LA error(D-PT-0,CTL=x,TRNS-y) :MANUAL/DMP

MM/DD/YYYY HH:MM:SS Cx W321xy LA error(D-PT-1,CTL=x,TRNS-y) :MANUAL/DMP

MM/DD/YYYY HH:MM:SS Cx W322xy LA error(H-PT-0,CTL=x,TRNS-y) :MANUAL/DMP

MM/DD/YYYY HH:MM:SS Cx W323xy LA error(H-PT-0,CTL=x,TRNS-y) :MANUAL/DMP

MM/DD/YYYY HH:MM:SS Cx W330xy LRC error(D-PT-0,CTL=x,TRNS-y) :MANUAL/DMP

MM/DD/YYYY HH:MM:SS Cx W331xy LRC error(D-PT-1,CTL=x,TRNS-y) :MANUAL/DMP

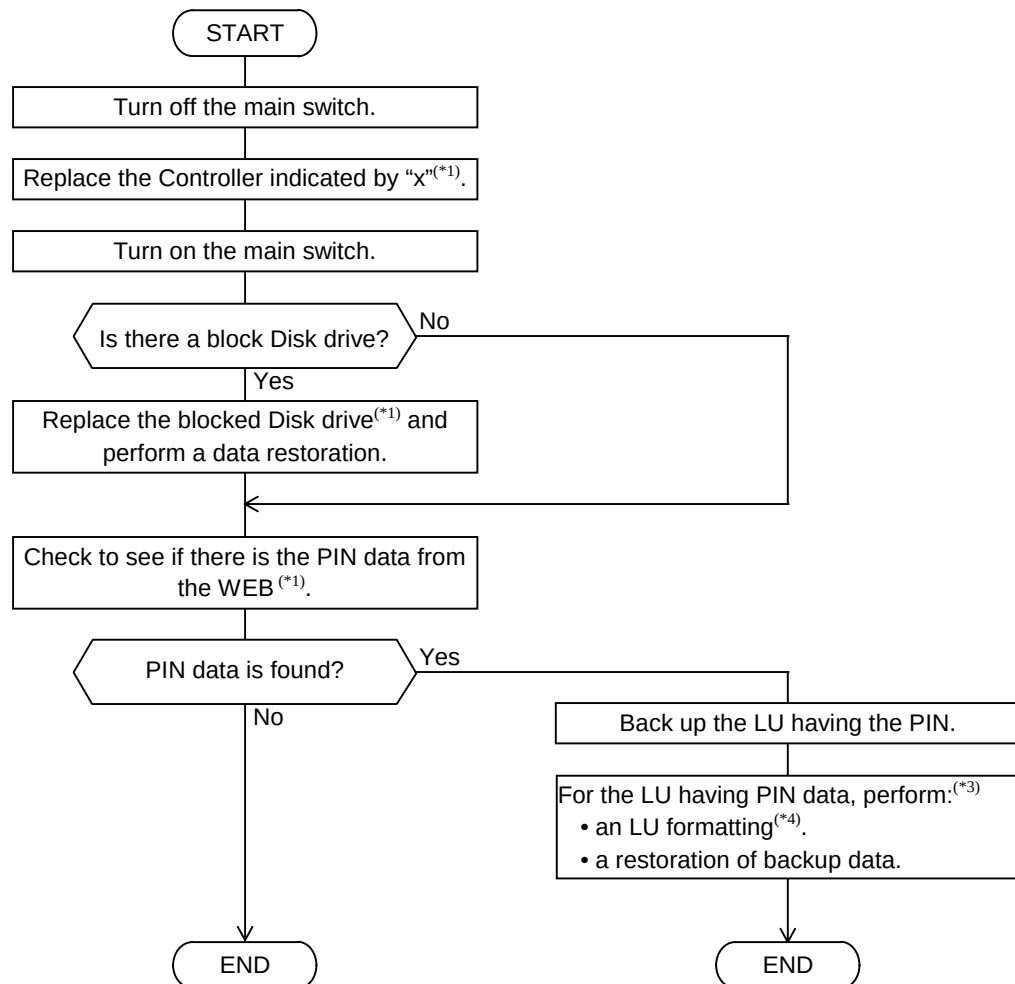
MM/DD/YYYY HH:MM:SS Cx W340xy LRC error(H-PT-0,CTL=x,TRNS-y) :MANUAL/DMP

MM/DD/YYYY HH:MM:SS Cx W341xy LRC error(H-PT-0,CTL=x,TRNS-y) :MANUAL/DMP
{ Date { Time { Detect Controller#

x : Controller# (0-1)

y : Transfer direction (R : Read, W : Write)

[Recovery measures]



*1 : For the replacement of the Controller and Disk drive,, see ["Chapter 4 Parts Replacement"](#).

*2 : See page ["Disk Array management program \(for GUI\) User's Guide"](#) to refer to the information on presence/absence of Pinned data.

*3 : This operation is required because an LA/LRC error occurs even after the controller has been replaced if the LA/LRC data remains in the cache as PIN data.

*4 : Even if the LU formatting is done, it may fail. That is because the LU concerned is an object of the MRCF-Lite function when the output sense key code is "05-9552." Request the user to delete the pair. After the pair is deleted, perform the LU formatting again.

(12) System down.

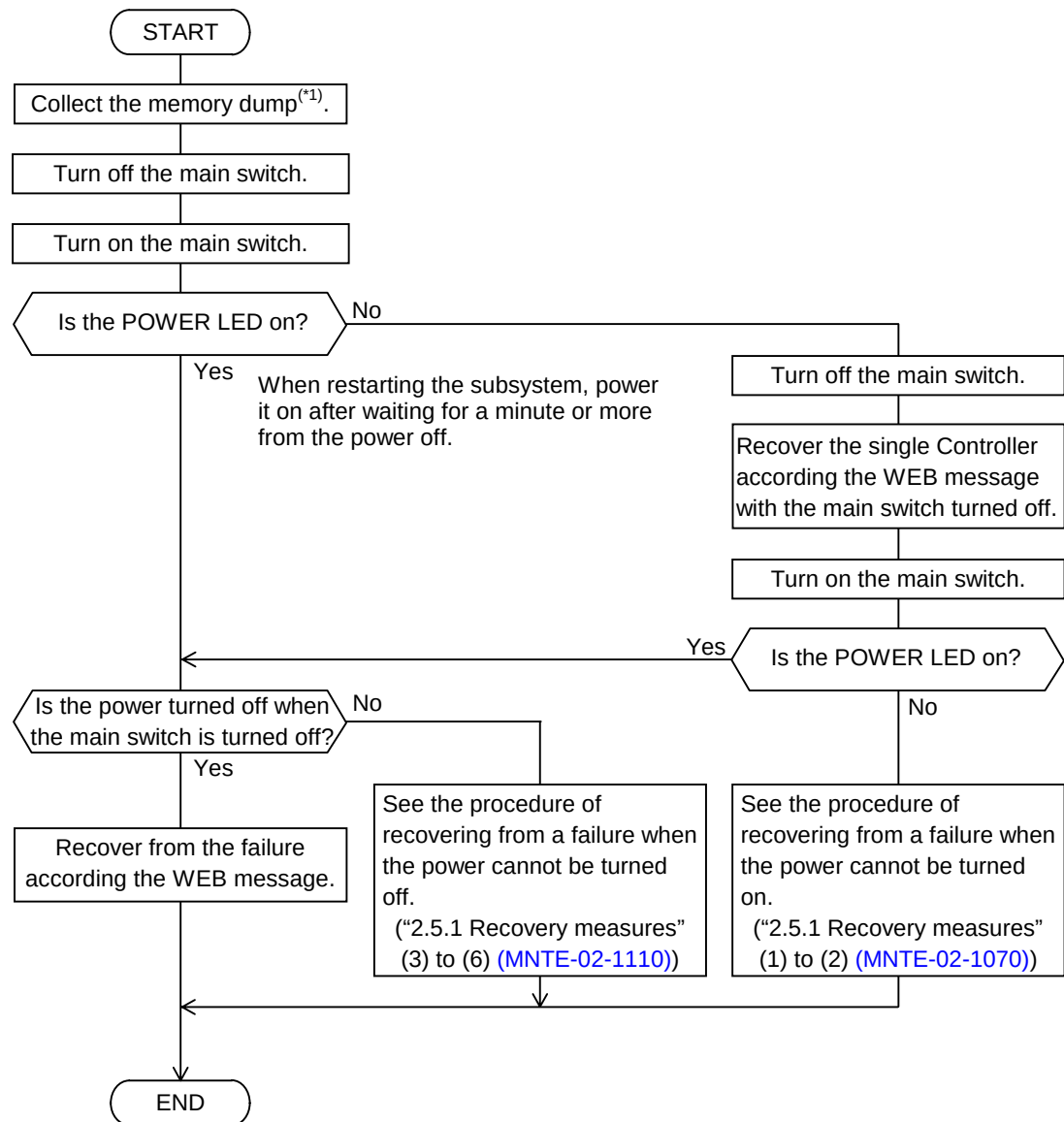
[WEB Information Message display]

MM/DD/YYYY	HH:MM:SS	Cx Hxxxxxx	○○○○○○○	:	△△△△△△/□□□
Date	Time	Detect Controller#			

xxxxx, ○○○○○○○○ : △△△△△△/□□□ Optional

- Notice :
- When the ALARM LED is off, recover the failure following the panel display.
 - The recovery procedure shown below is for the case where blockades of both Controllers in a dual Controller configuration occur.
 - In the case of a single Controller configuration or when one of the Controllers in a dual Controller configuration fails, recover the failure following the panel display.

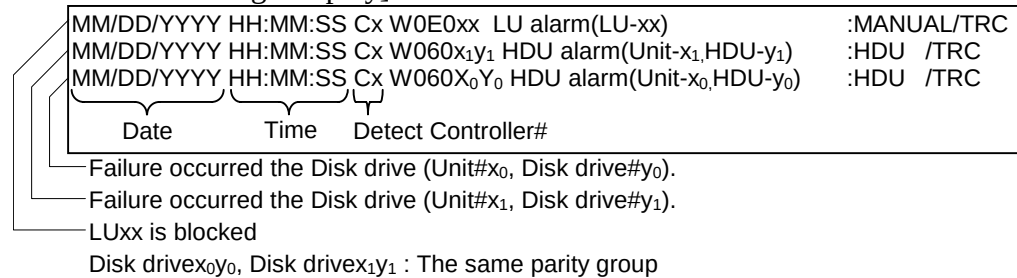
[Recovery measures]



*1 : For the Error trace with power on, see "2.6.4 Collect memory dump" (MNTTE 02-1830).

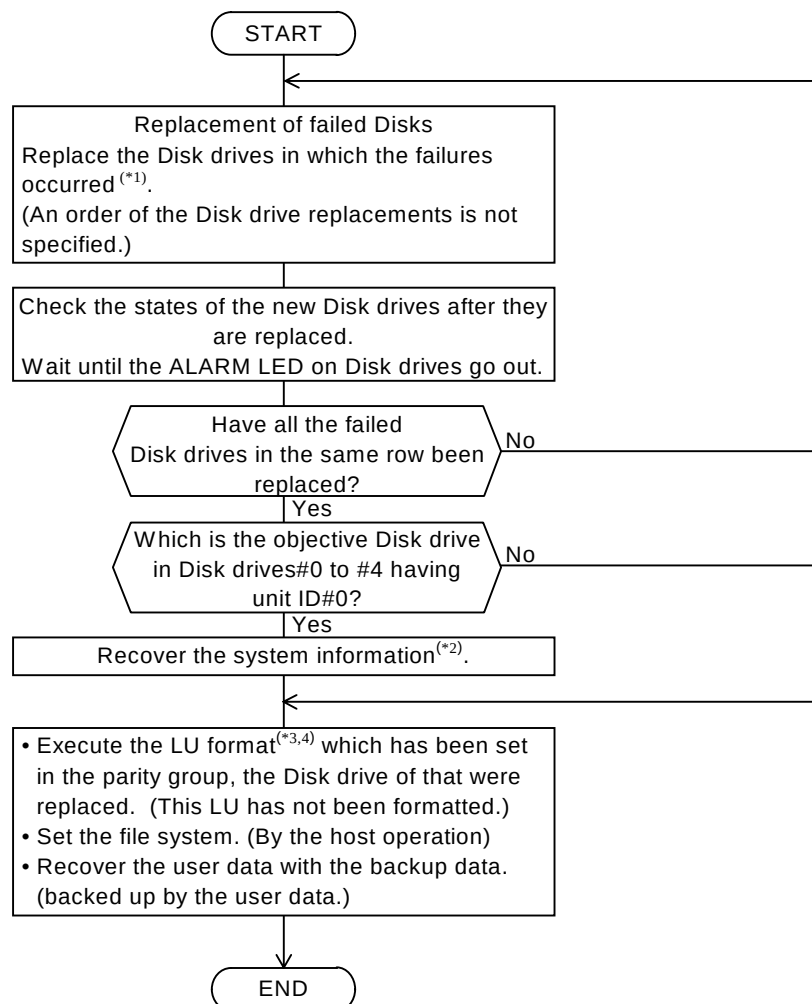
(13) Actions to be taken when an LU blockade occurs.

[WEB Information Message display]



[Recovery measures]

- The recovery operation must be reformed with the subsystem power turned on.



*1 : For the replacement of the Disk drive, see "Chapter 4 Parts Replacement".

*2 : Recover the system information with the maintenance function of the Disk Array management program. For the operating procedure, see "Operation Manual for Disk Array management program (Volume of maintenance)".

*3 : For the operating procedure, see "Disk Array management program (for GUI) User's Guide".

*4 : Even if the LU formatting is done, it may fail. That is because the LU concerned is an object of the MRCF-Lite function when the output sense key code is "05-9552." Request the user to delete the pair. After the pair is deleted, perform the LU formatting again.

- (14) A loop failure occurred, however, the failed part cannot be located

[WEB Information Message display]

MM/DD/YYYY HH:MM:SS	Cx I1C1xy	Loop diagnostic end (Path-x,Loop-y)	
MM/DD/YYYY HH:MM:SS	Cx I603xy	Obstacle part unknown (Path-x,Loop-y)	:MANUAL/TRC
MM/DD/YYYY HH:MM:SS	Cx I1C0xy	Loop diagnostic start (Path-x,Loop-y)	
MM/DD/YYYY HH:MM:SS	Cx W0801y	Loop alarm (Path-1,Loop-y)	: /TRC
MM/DD/YYYY HH:MM:SS	Cx W0800y	Loop alarm (Path-0,Loop-y)	: /TRC
MM/DD/YYYY HH:MM:SS	Cx I60200	Link Failure [LIMIT OVER]	:MANUAL/TRC
Date	Time	Detect Controller#	

Loop failures occurred exceeding its threshold number of occurrences.
 Loop-y was blocked and the loop was switched to the alternating one.
 Loop-y was blocked and the loop was switched to the alternating one.
 Automatic diagnosis of the failed part in the failed loop (Path-x, Loop-y) started.
 The failed part could not be located although an automatic diagnosis of the failed loop (Path-x, Loop-y) was done.
 Automatic diagnosis of the failed part in the failed loop (Path-x, Loop-y) completed.

If one of the phrases described below is indicated in a string of the messages above, do maintenance work following the messages.

W060xy HDU alarm
 W090xy ENC alarm
 I301xy HDU error

[Recovery measures]

Operate following the recovery measures below.

(a) Collect a trace

Insert an already-formatted FD for trace collection into the Floppy disk drive of an array unit, and then press the trace switch on the front panel.

(b) Locating a faulty section by the trace analysis tool

- (i) Inserts a trace FD into a PC in which the trace analysis tool has been installed, and then starts the trace analysis tool. (the directory TRACE.BAT in which TDCONV has been installed.)
- (ii) Selects “6. Cause of Backend-Fibre failure (BK-FAIL.TXT)” from the menu, and then analyzes traces. (Refer to [MNTE 02-1510](#))
- (iii) The tool automatically displays the result of analyzing in the form of the memo note. By referring to analyzed information, locates a faulty section, and checks a situation in which a failure occurred.
 BK-FAIL.txt : Displays a faulty section that caused a loop blockade due to the condition over an intermittent failure threshold value at the last time.
 → Used to locate a unit to be replaced when a loop blockade occurs due to the condition over a backend failure threshold value.

Next page show the example of BK-FAIL.txt.

Example of displaying BK-FAIL.txt

```

<<<<< Obstacle part special ization result : CTL#0/Path#0/Loop#0 >>>>>
There is no error.
-----
<<<<< Obstacle part special ization result : CTL#0/Path#0/Loop#1 >>>>>
There is no error.
-----
:
:
:

```

(c) Locating a faulty section

Replace a replaceable unit (Disk drive or ENC board) indicated in BK-FAIL.txt. (Refer to “for Maintenance, Chapter 4)

(d) Restarting applications.

Restart user’s applications, and keep an array unit operating for about one hour.

(e) Collecting traces again to check recovery

- (i) Collect traces again to check recovery from the failure.
- (ii) Inserts a trace FD into a PC in which the trace analysis tool has been installed, and then starts the trace analysis tool. (the directory TRACE.BAT in which TDCONV has been installed.)
- (iii) Selects “7. Backend-Fibre failure count (BK-CUR.TXT)” from the menu, and then analyzes traces. (Refer to [MNTE 02-1510](#))
- (iv) The tool automatically displays the result of analyzing in the form of the memo note. By referring to analyzed information, locates a faulty section, and checks a situation in which a failure occurred. By seeing the BK-CUR.txt described below, check that failure is not counted up.

BK-CUR.txt : Current count of the threshold value

→ Used to when the a backend failure checking does not occur.

Example of displaying BK-CUR.txt

```

<<<<< Error current information[CTL0/Path0/Loop0] >>>>>
Clear time      : 00/08/21 09:22:29
Last update    : 00/00/00 00:00:00

```

	Write data N.G	Read data N.G	Fibre Loop N.G	Others N.G
HDU(0,0)	0	0	0	0
HDU(0,2)	0	0	0	0
HDU(0,4)	0	0	0	0
HDU(0,6)	0	0	0	0
HDU(0,8)	0	0	0	0
HDU(1,0)	0	0	0	0
HDU(1,2)	0	0	0	0
HDU(1,4)	0	0	0	0
:				
:				

(f) Checking that a failure does not occur

Check with the contents of the displayed BK-CUR.txt that failure is not counted up.

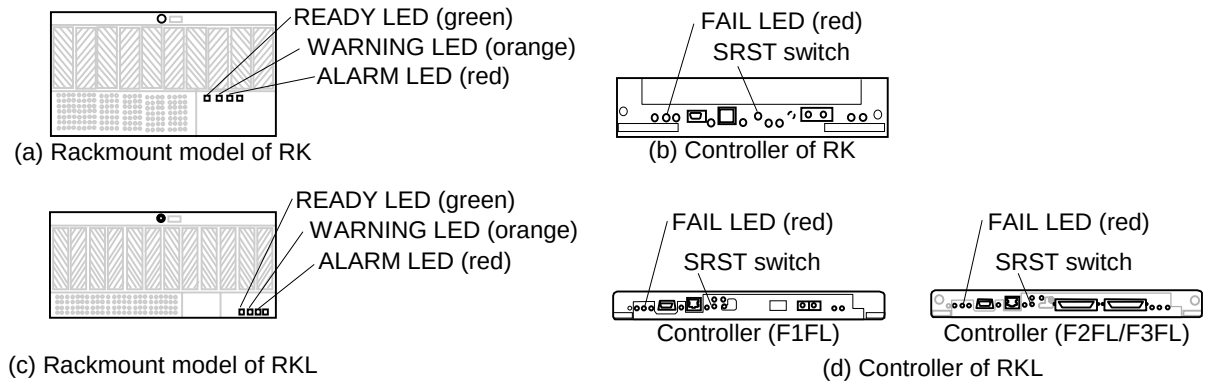
2.5.2 Initialization procedure of information on configuration

Notice : Be careful that the whole data on the disk will be erased (RAID groups and LU definitions will be initialized.) when this operation is performed.

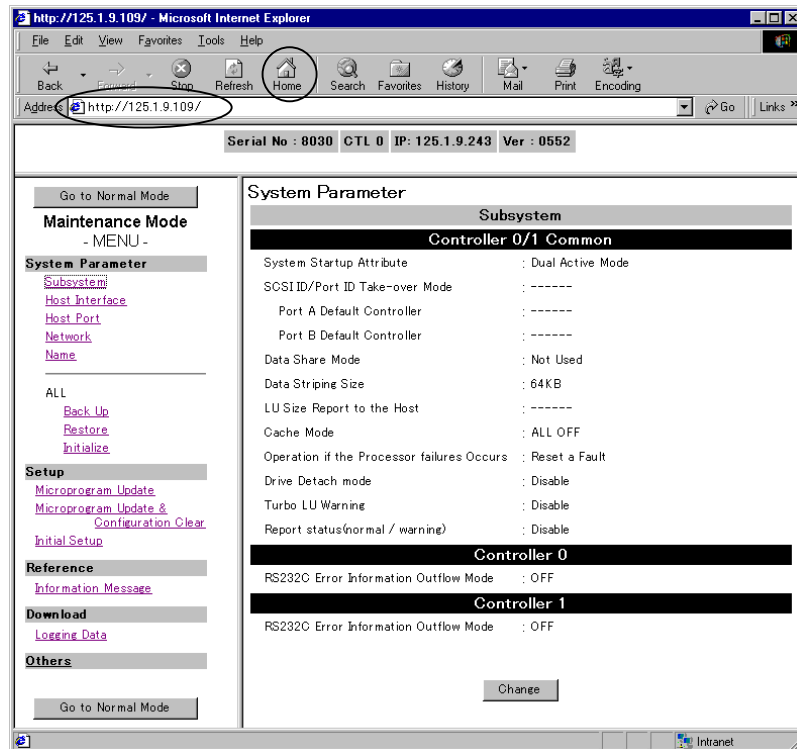
- (1) Turn on the main switch of the subsystem.
- (2) Proceed to the procedure starting from the step (3) after making sure that the READY LED (green) or ALARM LED (red) on the subsystem are on. (Also proceed to the procedure starting from the step (3) in the case where the READY LED (green) and ALARM LED (red) do not come on after waiting for ten minutes when the power is turned on.) (Refer to Figure 2.5.1.)
- (3) Make sure that the WARNING LED (orange) is not blinking fast (at intervals of 125 ms). If it is blinking fast, wait for a while (80 seconds at the longest). It will cease to blink fast. There is no problem if it blinks slowly (at intervals of one second).
- (4) Changing the maintenance mode.
 - Single Controller
Press the SRST switch of the single Controller.
 - Dual controller
 - (a) Press the SRST switch of the Controller#0.
 - (b) Wait for a while (about ten seconds) and press the SRST switch of the Controller#1 immediately (within ten seconds) after the FAIL LED (red) of the Controller#0 comes on.
(Sometimes the buzzer may beeps when the SRST switch is pressed, however, you do not have to stop it until these operations are completed.)
When the FAIL LED of the Controller#0 does not go out in spite of the above operation, power off the subsystem, return to step (1) without pulling out nor insert the Controller, and execute the procedure over again.

Notice : Because the Controller is shutdown status for the Maintenance Mode, the command from the host is impossible execution. Please change it to the Maintenance Mode after the confirmation of separation of the device from the host or shutdown of the host.

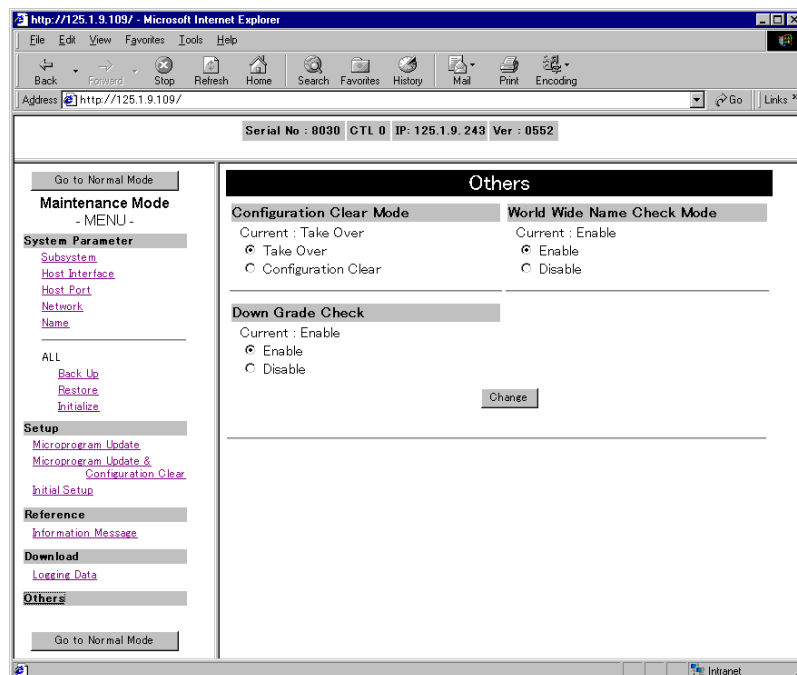
- (c) Make sure that the subsystem is READY, and do maintenance work.

**Figure 2.5.1 Indication Locations of LED**

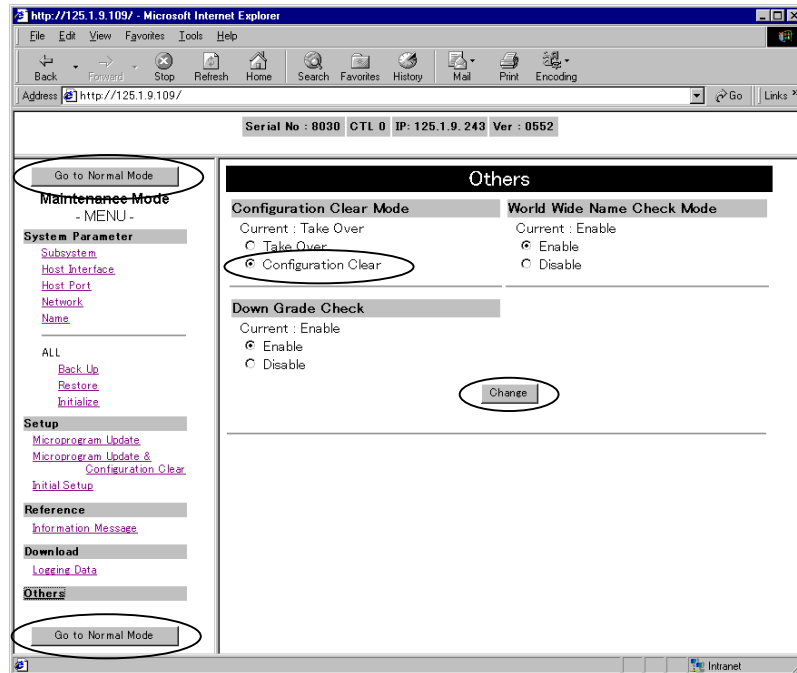
- (5) Input the IP address of Controller#0 from the browser. If the WEB has been connected, press the “Refresh” button to update the page.



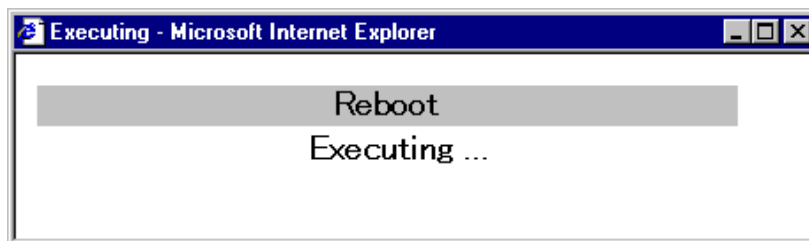
- (6) Click “Others” in the menu frame.
The following window appears.



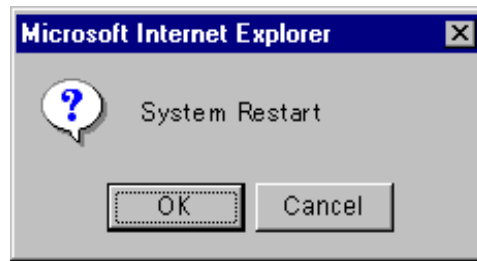
- (7) Select the “Configuration Clear” radio button of [Configuration Clear Mode], then click the “Change” button.
- (8) Click “Go To Normal Mode”. There are two “Go To Normal Mode” buttons, one at the top of the menu frame and the other at the bottom. Select either of them.



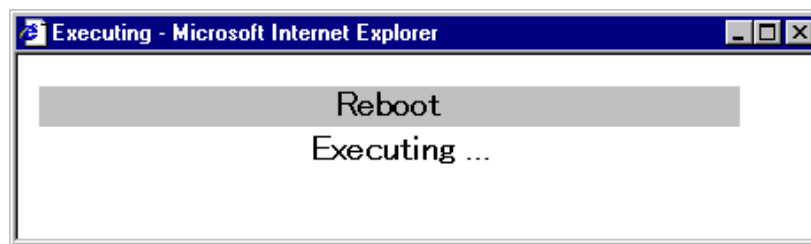
The following window is displayed while the above operation is executed.



- (9) The following confirmation message is displayed at the later time for a while. Please click [OK] for the continuation.



The following window is displayed while the above operation is executed.



- (10) If rebooting is finished, the array unit is ready.
Make sure that the READY LED on the front side of the subsystem comes on.

2.6 Collecting Error Information

When any failure occurs, the information on it saved in the Controller can be collected. The purpose of this function is to facilitate pursuit of factors of failures and shorten the time consumed for analysis of them.

The failure information is collected by the following two methods.

(1) Collect trace in the ON state

The information on trace and configuration saved in the Controller is collected.

This information can be collected with the unit and a 3.5-inch FD (1.44 Mbyte) or with the Disk Array management program.

The collected information cannot be analyzed in the field, however.

The trace of a failure in the ON state is collected while the unit is operating. The trace in the ON state cannot be collected while the ALARM LED of the unit is lighting up.

(However, in the case where the system goes down at the time of the sequential shutdown, the log message can be collected.)

For details of the procedure for the collection, refer to Subsection 2.6.3 “Collection of trace in the ON state” on page [MNTE 02-1400](#).

(2) Collecting a dump while the subsystem power is on

Information, which is stored in the Controller, on the Controller blockade is collected using the Disk Array management program. However, the written information cannot be analyzed at the site.

The above-mentioned dump collection is performed when the subsystem is operating.

The dump can also be collected after the failed Controller is recovered from the failure.

For details of the procedure for the collection, refer to Subsection 2.6.4, “Collecting dump while the subsystem power is on” on page [MNTE 02-1830](#).

(3) Collect memory dump

The information saved in the Controller is downloaded to the browser terminal by using the WEB. The written information cannot be analyzed in the field, however.

Basically, the memory dump cannot be collected while the user is working. When the redundancy Controller is blocked and the WEB log message “W0100X CTL alarm (CTL-X)” |

(X: Controller No.) is displayed, the memory dump can be collected while the user is working, however.

For details of the procedure for the collection, refer to Subsection 2.6.5, “Collecting dump while the subsystem power is on” on page [MNTE 02-1850](#).

The failure information is collected by different methods, depending on the configuration and condition of the unit.

Collect the failure information securely according to “2.6.2 Judge collection of failure information” ([MNTE 02-1380](#)).

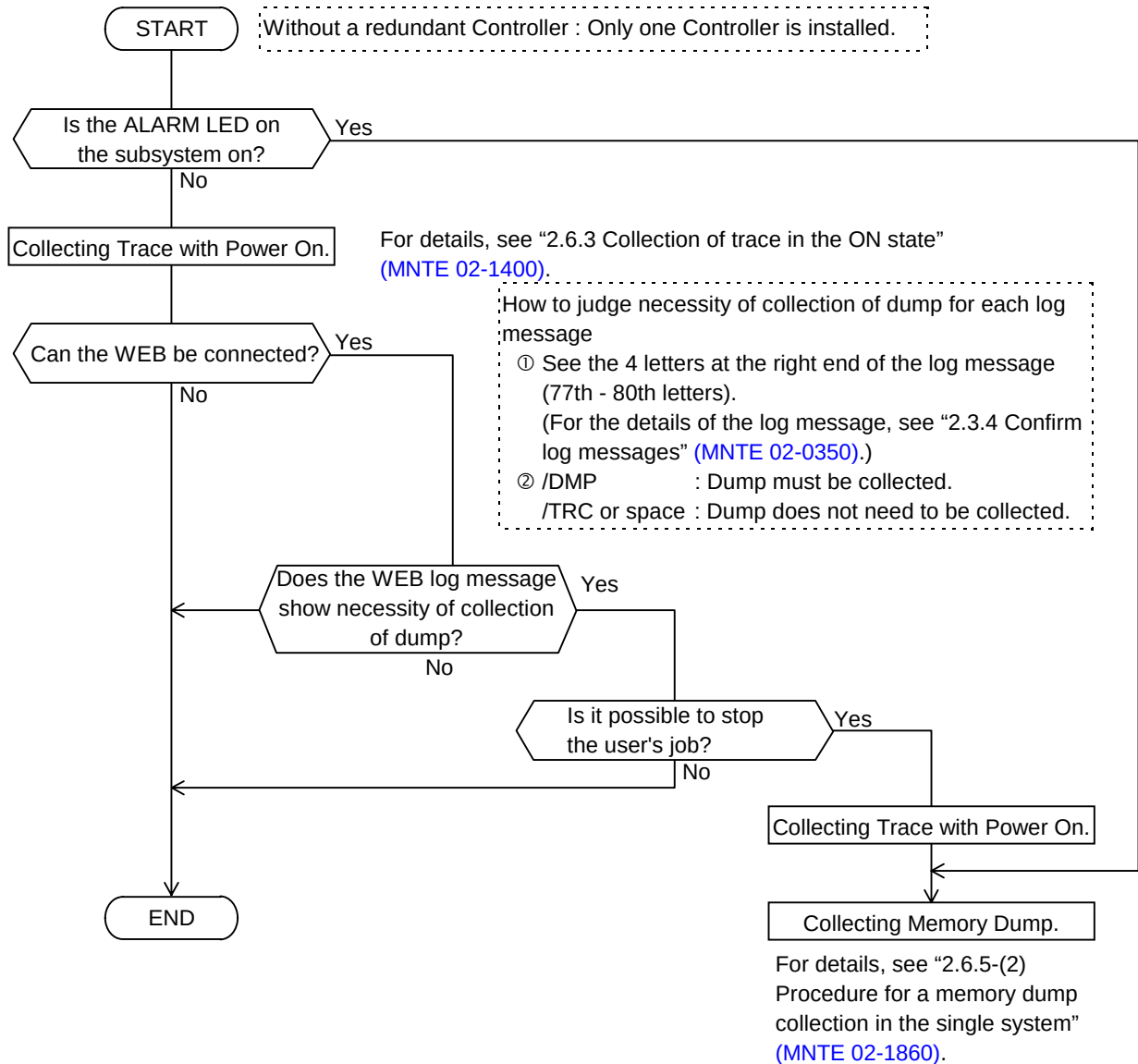
2.6.1 Time to collect failure information

Collect the failure information in the following cases.

- (1) A failure was reported to the work-station server, client for maintenance, WEB browser, or Disk Array management program.
- (2) The WARNING LED (Orange) of the unit blinked or lighted up.
- (3) The ALARM LED (Red) of the unit lighted up.

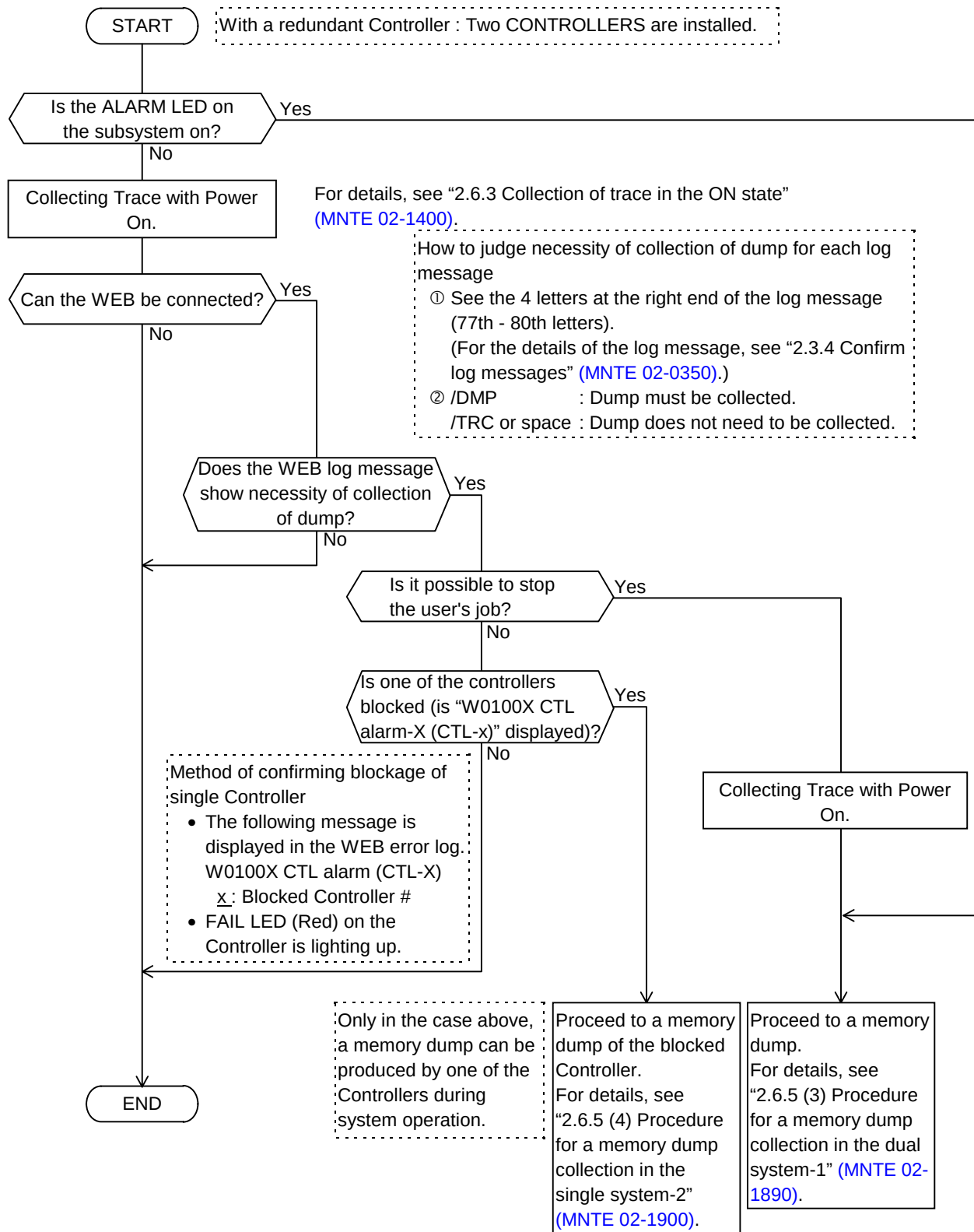
2.6.2 Judge collection of failure information

(1) Flow of judgment of collection of failure information for system having single Controller (without a redundancy Controller)



*1 : When the power supply is controlled in the remote mode, if the power of the host computer is turned off, the power of the unit is turned off, too. If the unit is turned off, the memory dump cannot be collected. In the remote mode, collect the memory dump while the host computer is not making access (I/O).

(2) Flowchart for determining to produce a memory dump in the case of the dual configuration. (with the redundant Controller.)



2.6.3 Collection of trace in the ON state

The information on trace and configuration saved in the Controller is collected in the ON state.

The procedure of collecting and analyzing the trace in the ON state is as follows.

The trace in the ON state is collected by the following two methods.

- Collection of trace in the ON state with the unit

The information on trace and configuration is written in a 3.5-inch FD with the Floppy disk drive mounted on the unit.

The trace can be collected by using only the unit.

For the collection procedure, see “(1) Procedure of collecting trace in the ON state with unit” ([MNTE 02-1410](#)).

- Collection of trace in the ON state with Disk Array manager program

The information on trace and configuration is output to a file of the starting terminal device with the Disk Array management program through LAN.

For the collection procedure, see “(2) Procedure of collecting trace in the ON state with Disk Array manager administrative program” ([MNTE 02-1430](#)).

The trace in the ON state is collected while the unit is in operation (in the ready state).

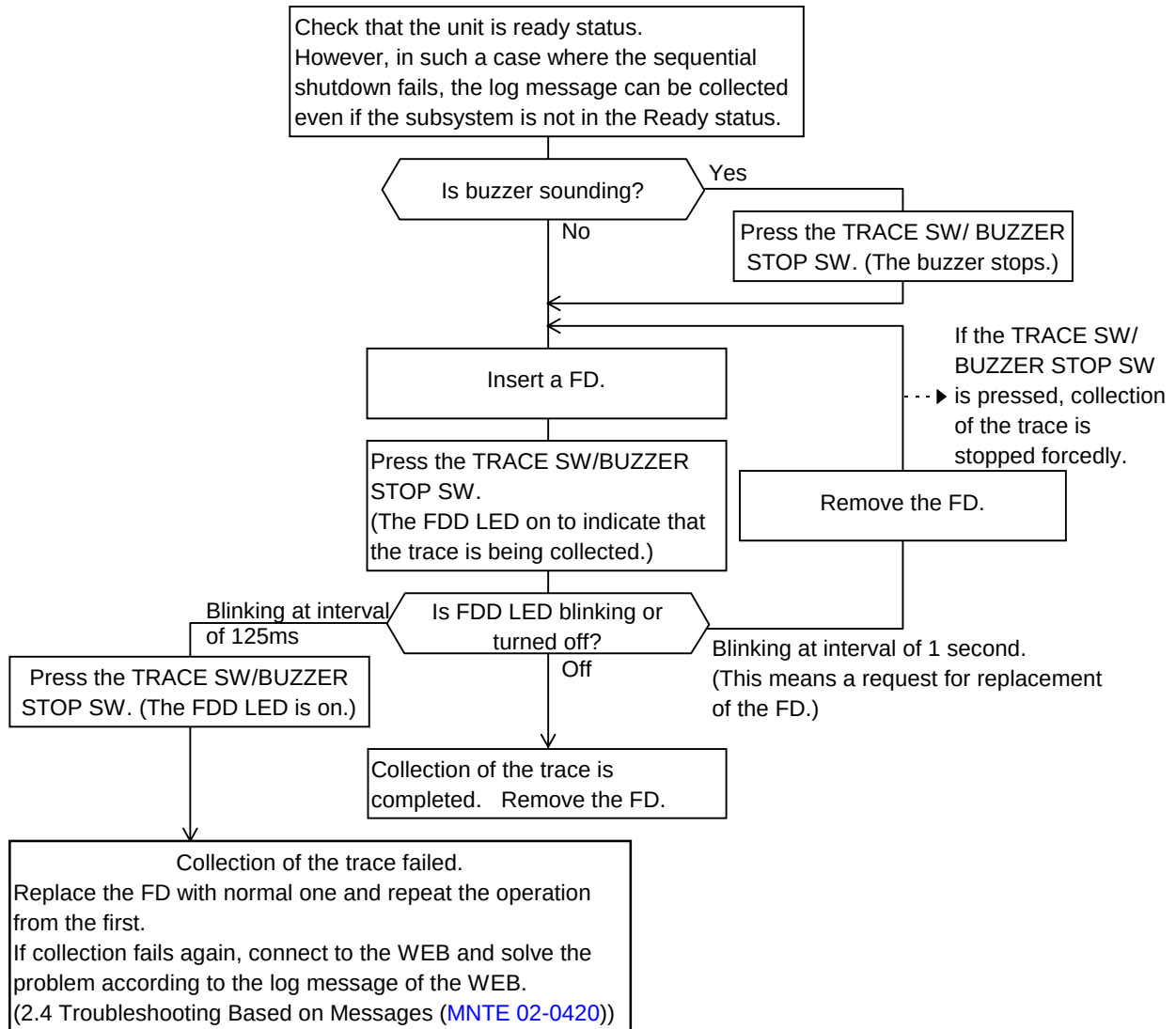
Accordingly, it cannot be collected while the unit is being started up or stopped or its ALARM LED (Red) is lighting up.

However, in a trace collection from an independent subsystem performed while its power is on, part of the trace information (log message) can be collected in such a case where a sequential shutdown fails.

(1) Procedure of collecting trace in the ON state with unit

3.5-inch FDs (1.44 Mbyte) of MS-DOS format are necessary for collection of the trace in the ON state with unit. Prepare one FD and one spare for each unit (The necessary number of the FDs depends on the compression ratio of the data written in them, however.)

The trace information and configuration information are collected together in the following procedure. Before collecting the information, delete the all files from each FD to be used. If there is any file in the FD, the trace may not be collected.



Notice : In the case where a failure has occurred and a trace is collected while the WARNING LED is blinking with the subsystem power turned on, the WARNING LED goes out when the warning is cancelled or stays on when the warning is not cancelled.

The binary information files shown in Table 2.6.1 are output.

Table 2.6.1 Output information list

No.	Collect item ^{(*)1}	File name ^{(*)1}
1	FLASH system information (Controller#0)	FLS0cxx.lzh
2	FLASH system information (Controller#1)	FLS1cxx.lzh
3	Information on controller for FLASH	CTLSEcxx.lzh
4	Disk drive inquiry information	DRVTYcxx.lzh
5	Trace information (Controller#0)	TRC0cxx.lzh
6	Trace information (Controller#1)	TRC1cxx.lzh
7	FLASH trace information (Controller#0)	GIJI0cxx.lzh
8	FLASH trace information (Controller#1)	GIJI1cxx.lzh
9	Take-over information	VRScxx.lzh
10	Trace information in powering on process (Controller#0)	MBTR0cxx.lzh
11	Trace information in powering on process (Controller#1)	MBTR1cxx.lzh
12	Link service log-in information	LOGINcxx.lzh
13	Information on check code error temporary saving (Controller#0)	SHEL0cxx.lzh
14	Information on check code error temporary saving (Controller#1)	SHEL1cxx.lzh
15	SES drive management information	SESDRcxx.lzh
16	Back end diagnostic information	BKDCxx.lzh
17	FLASH use area information	CHKcxx.lzh
18	Information on WEB message common to Controllers	LCDcxx.lzh
19	Individual information on WEB message for each Controller (Controller#0)	MSG0cxx.lzh
20	Individual information on WEB message for each Controller (Controller#1)	MSG1cxx.lzh
21	Current LAN information (Controller#c)	LANc00.lzh
22	LA- error in information (Controller#0)	LAJB0000.lzh
23	LA- error in information (Controller#1)	LAJB1000.lzh
24	Cache memory information at LA error occurrence (Controller#0)	LARH0000.lzh
25	Cache memory information at LA error occurrence (Controller#1)	LARH1000.lzh
26	Watchdog time-out information (Controller#0)	WTDG0000.lzh
27	Watchdog time-out information (Controller#1)	WTDG1000.lzh
28	Watchdog time-out information ^{(*)2} (Controller#0)	WTD20000.lzh
29	Watchdog time-out information ^{(*)2} (Controller#1)	WTD21000.lzh
*1 : Extension of collection file c : Master Controller No. (Controller from which trace was collected) (0 or 1) xx : An incremental No. from 00 to 99. *2 : This is output by the microprograms Rev. ×5×5 and later.		

(2) Procedure of collecting trace in the ON state with Disk Array management program

Notice: In the case of the connection via RS232C, a trace collection with the subsystem power on cannot be done in the host online mode.

< Disk Array management program 2>

- ① Check that the unit is ready.
- ② The trace in the ON state is collected by using the maintenance function (Maintenance mode) of the Disk Array management program.

For the starting method of the disk array management program and setting method of the maintenance mode, see “Disk Array management program (for GUI) User’s Guide”.

- ③ In the case of a dual-Controller system, if either Controller is blocked, connect the Disk Array management program to only the normal Controller.
- ④ The trace information and configuration information are collected separately with the Disk Array management program.

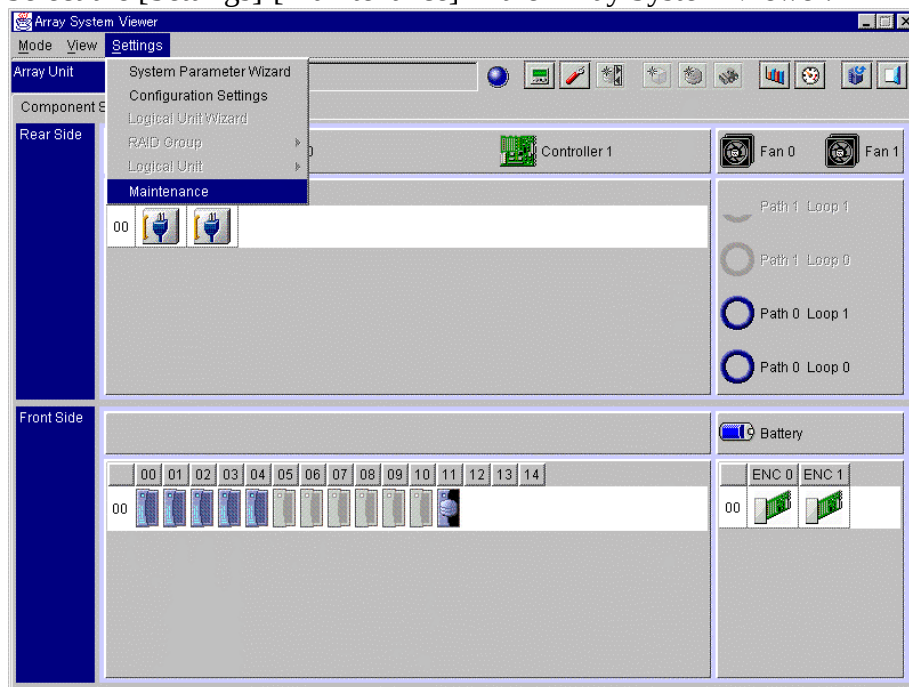
For collection of the trace information, see “(a) Procedure of collecting trace information”.

For collection of the configuration information, see “(b) Procedure of collecting configuration information”.

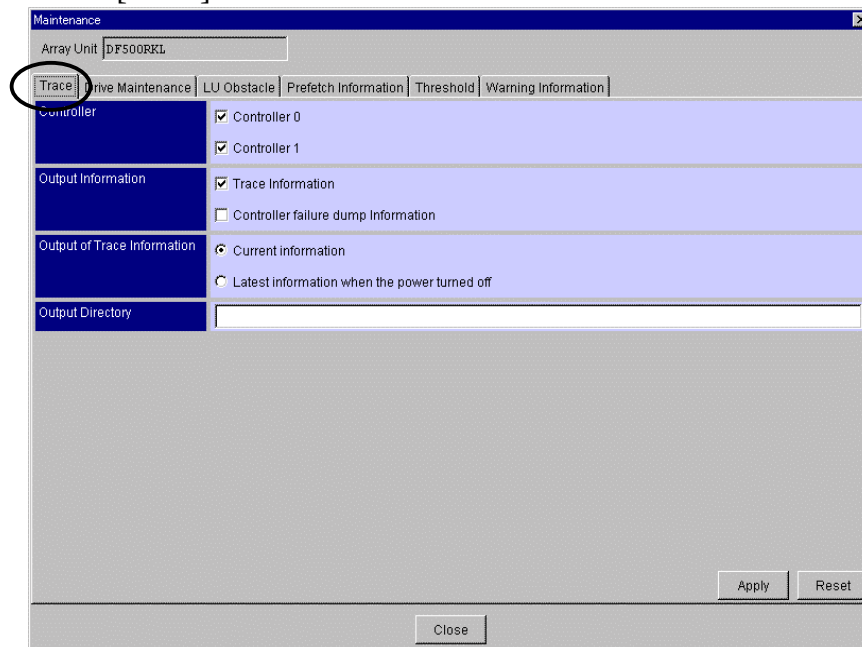
(a) Procedure of collecting trace information

The trace information of the unit is output into a file.

- ① Select the [Settings]-[Maintenance] in the Array System Viewer.



② Click the [Trace] button.



③ [Controller] : <When system has single Controller> Check the check box of Controller 0.

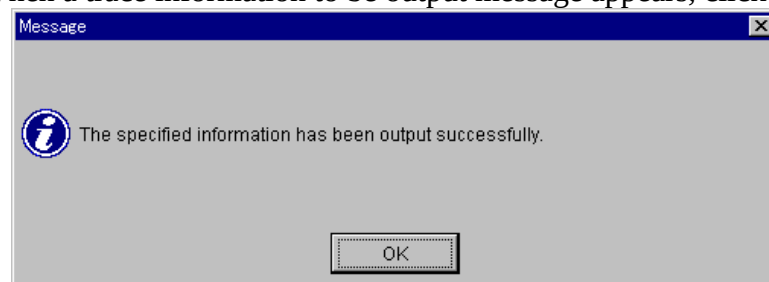
<When system has double Controller> Check the check boxes of Controller 0 and 1

. [Output of Trace Information] : Select the Current Information.

④ Specify the output directory of trace. Select the directory to output the trace information. If it is not selected, the information is output to the directory where the Disk Array management program is installed. After that, when analyzing the trace using the trace analysis tool, specify the path of the FD for the directory to which the trace is to be output. c:\tdconv\trace

⑤ Click the [Apply] button.

⑥ When a trace information to be output message appears, click [OK].



The trace information files shown in Table 2.6.2 are output.
They are binary files.

Table 2.6.2 Output Trace Information List

No.	Trace type	Output file name ^(*)
1	Interruption	s1inter.xx
2	Host command	s1host.xx
3	Drive command	s1drv.xx
4	Module	s1module.xx
5	Job	s1job.xx
6	SSB	s1ssb.xx
7	Error	s1err.xx
8	Failure	s1fail.xx
9	Down	s1down.xx
10	Drive blockade	s1detach.xx
11	LU switching	s1luc.xx
12	Link service command	s1link.xx
13	Operation with subsystem power on	s1onope.xx
14	Hardware failure factor	s1hard.xx
15	Front end fibre	s1fend.xx
16	Back end failure	s1bobs.xx
17	Back end link	s1blink.xx
18	Back end module	s1bmodu.xx
19	Back end simple input/output	s1beasyf.xx
20	Module start-up	s1premf.xx
21	Operation start-up	s1preof.xx
22	Dummy response	s1gijif.xx
23	Simple input/output	s1easyf.xx
24	FC drive interruption	s1fcint.xx
25	FD drive module	s1fcmodu.xx
26	SES	s1ses.xx ^{(*)2}
27	Data share	s1share.xx ^{(*)4}
28	WEB message (Controller common)	s1msgcom.xx ^{(*)4}
29	WEB message (Controller each)	s1msgfls.xx ^{(*)4}
30	System parameter configuration information	sysprm.txt ^{(*)3}
31	RAID/LU configuration information	raidlu.txt ^{(*)3}
32	Taake-over information	VRS ^{(*)5}
*1 : Trace file name. xx : Controller of output. 00 : Trace information of Controller#0 01 : Trace information of Controller#1 *2 : This information is output by the Disk Array management programs Rev. 3.20 and later and the microprograms Rev. x5x3 and later. *3 : This information is output by the Disk Array management programs Rev. 3.20 and later. *4 : This information is output by the Disk Array management programs Rev. 3.30 and later and the microprograms Rev. x5x4 and later. *5 : This information is output by the Disk Array management programs 2 and later.		

(b) Procedure of collecting configuration information.

The configuration information of the unit is output into text files.

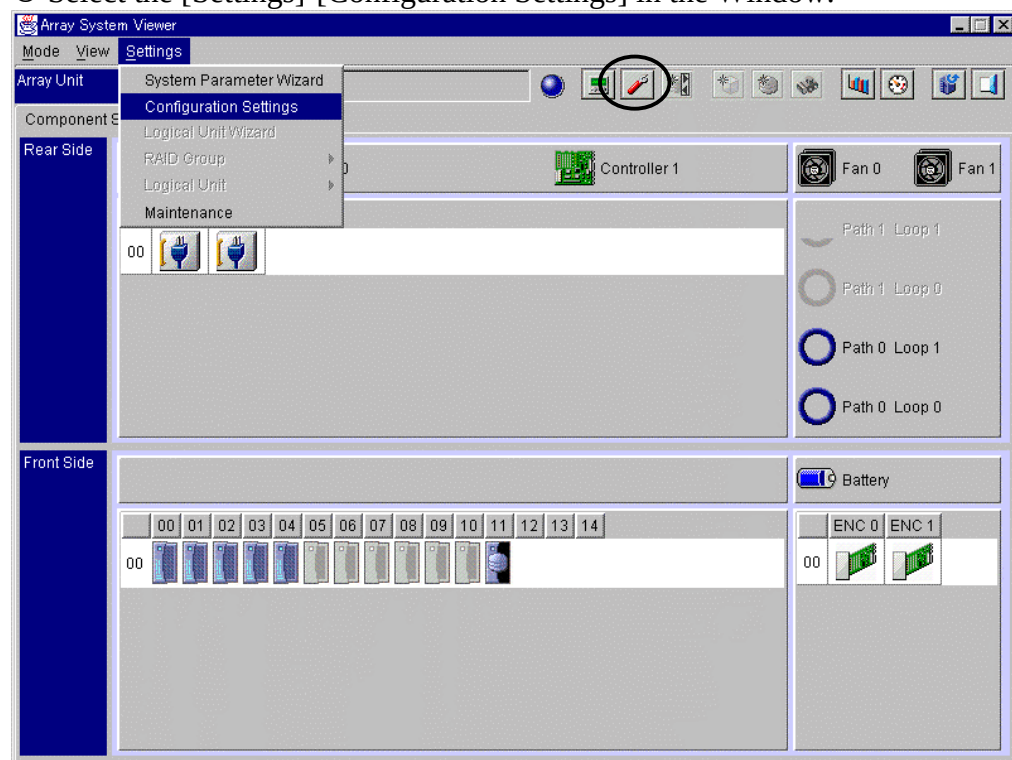
This information contains the system parameter, RAID/LU, and condition of the component parts of the unit.

The “system parameter” and “RAID/LU and condition of component parts” are output into separate files.

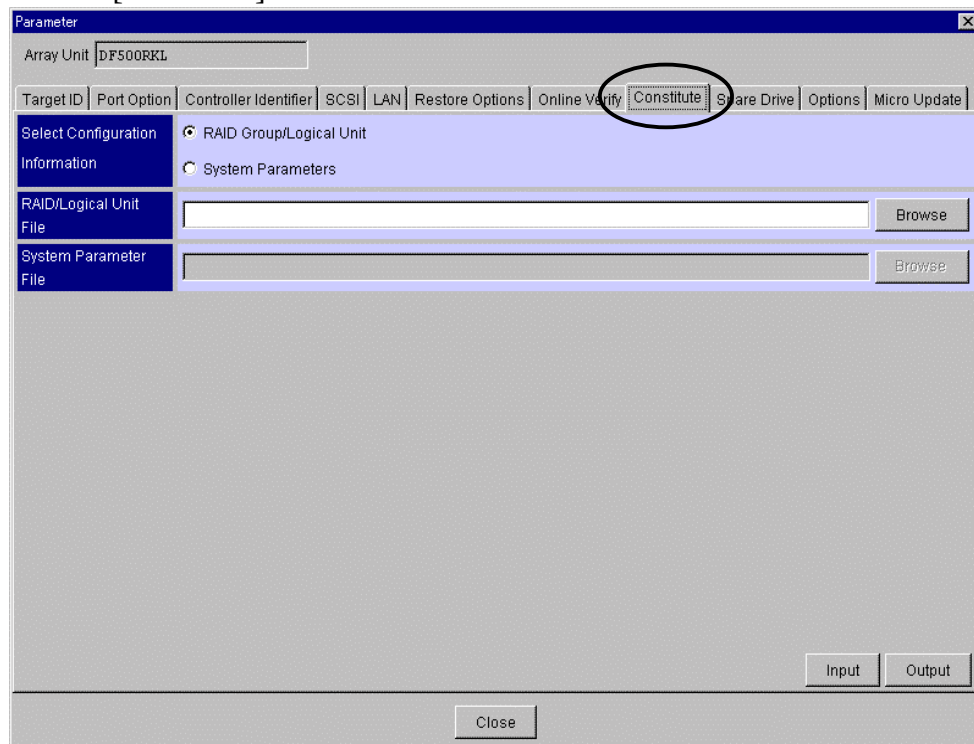
(i) Configuration output: System parameter

The contents of the system parameter set in the unit are output into a selected text file.

① Select the [Settings]-[Configuration Settings] in the Window.



② Click the [Constitute] tab.

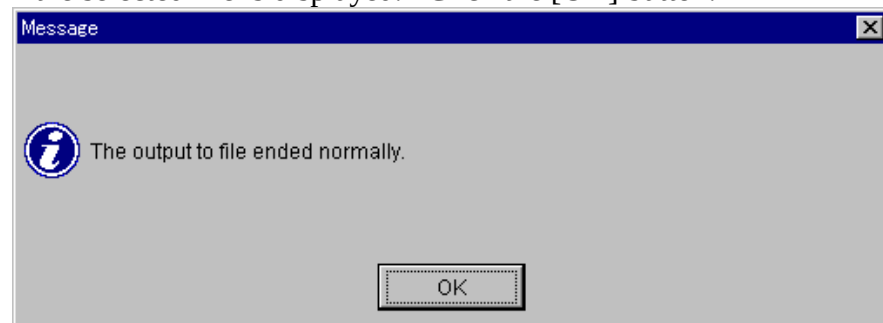


③ Click the [System Parameter] radio button.

④ Click the "Browse" button and select the directory and file name to output the configuration information. The selected file name is displayed in the text box.

⑤ Click the [Export] button.

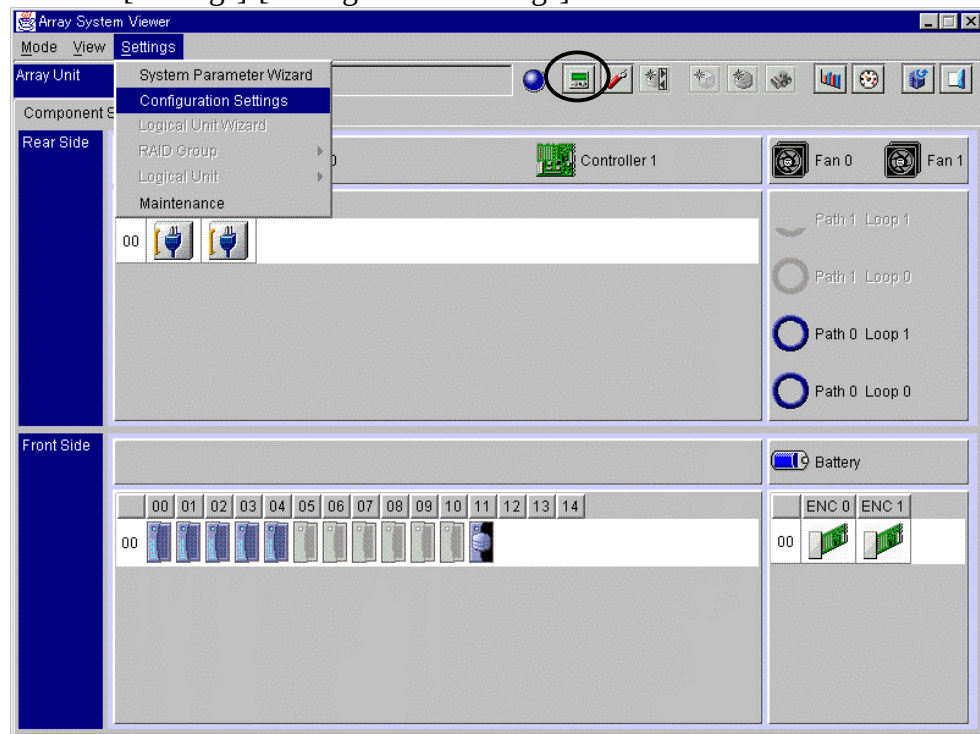
⑥ The confirmation message that the system parameter information was output into the selected file is displayed. Click the [OK] button.



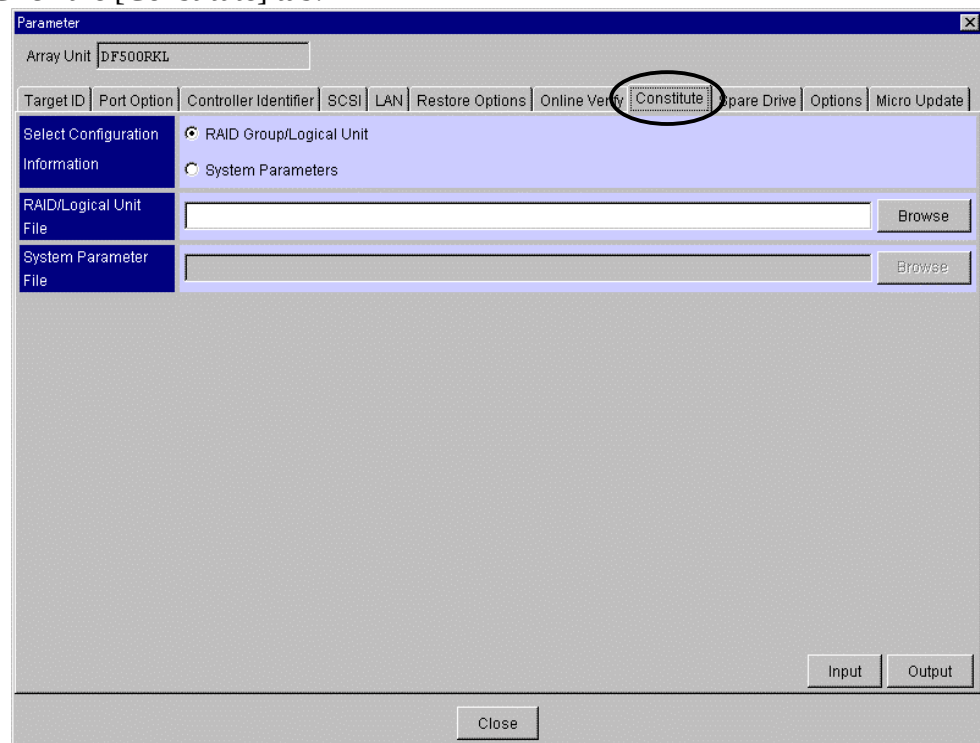
The system parameter information is saved in the text file of the selected name.

(ii) File output of configuration: RAID/LU and condition of component parts

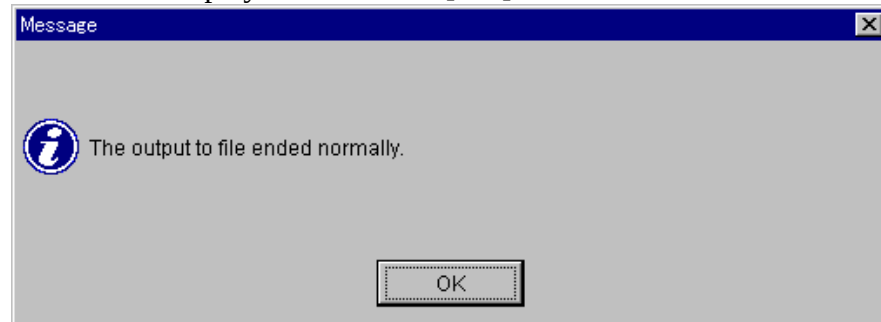
① Select the [Settings]-[Configuration Settings] in the Window.



② Click the [Constitute] tab.



- ③ Click the [RAID/logical Unit File] radio button.
- ④ Click the “Browse” button and select the directory and file name to output the configuration information. The selected file name is displayed in the text box.
- ⑤ Click the [Export] button.
- ⑥ The confirmation message that the system parameter information was output into the selected file is displayed. Click the [OK] button.



The system parameter information is saved in the text file of the selected name.

< Disk Array management program >

- ① Check that the unit is ready.
- ② The trace in the ON state is collected by using the maintenance function (Maintenance mode) of the Disk Array management program.
For the starting method of the disk array management program and setting method of the maintenance mode, see “Disk Array management program (for GUI) User’s Guide”.
- ③ In the case of a dual-Controller system, if either Controller is blocked, connect the Disk Array management program to only the normal Controller.
- ④ The trace information and configuration information are collected separately with the Disk Array management program.

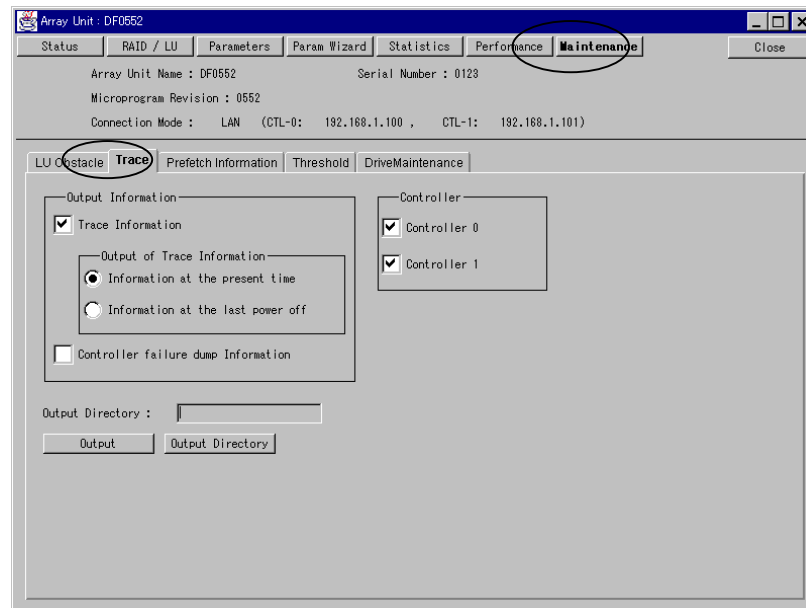
For collection of the trace information, see [“\(a\) Procedure of collecting trace information”](#).

For collection of the configuration information, see [“\(b\) Procedure of collecting configuration information”](#).

(a) Procedure of collecting trace information

The trace information of the unit is output into a file.

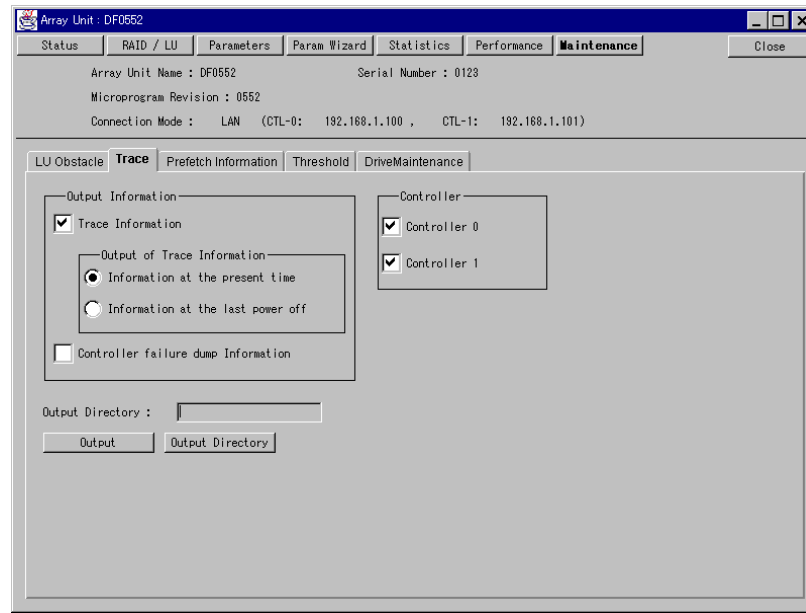
- ① Click [Maintenance] button in the window, then click the [Trace] tab.



- ② [Output of Trace Information]: Click the radio button of “Information at the present time”.

[Controller] : <When system has single Controller> Check the check box of Controller 0.

<When system has double Controller> Check the check boxes of Controller 0 and 1.

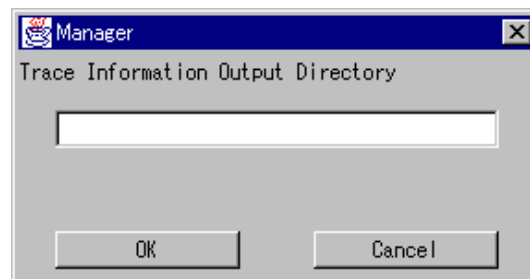


- ③ Click the “Output Directory” button, and the window to select a directory to output the trace information appears.

Select the directory to output the trace information. If it is not selected, the information is output to the directory where the Disk Array management program is installed.

After that, when analyzing the trace using the trace analysis tool, specify the path of the FD for the directory to which the trace is to be output.

c:\tdconv\trace



Select the directory and click the [OK] button, and that directory is displayed in the text box.

- ④ Click the [Output] button.

- ⑤ When a trace information to be output message appears, click [OK].



The trace information files shown in Table 2.6.2 ([MNTE 02-1432](#)) are output. They are binary files.

(b) Procedure of collecting configuration information.

The configuration information of the unit is output into text files.

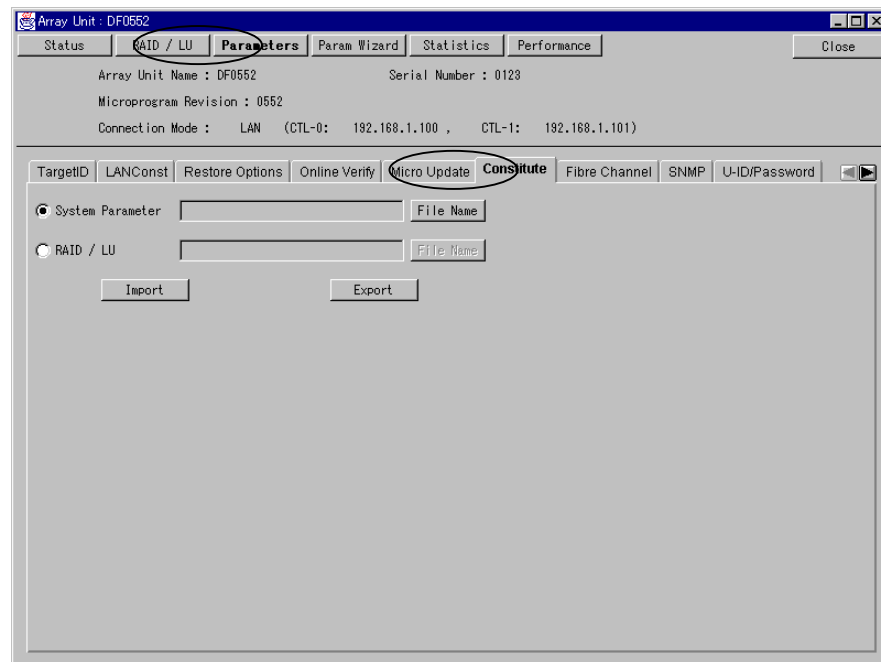
This information contains the system parameter, RAID/LU, and condition of the component parts of the unit.

The “system parameter” and “RAID/LU and condition of component parts” are output into separate files.

(i) Configuration output: System parameter

The contents of the system parameter set in the unit are output into a selected text file.

① Click the [Parameter], the click the [Constitute] tab.

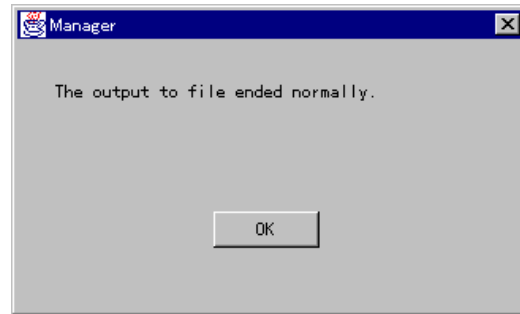


② Click the [System Parameter] radio button.

③ Click the “File Name” button and select the directory and file name to output the configuration information. The selected file name is displayed in the text box.

④ Click the [Export] button.

- ⑤ The confirmation message that the system parameter information was output into the selected file is displayed. Click the [OK] button.

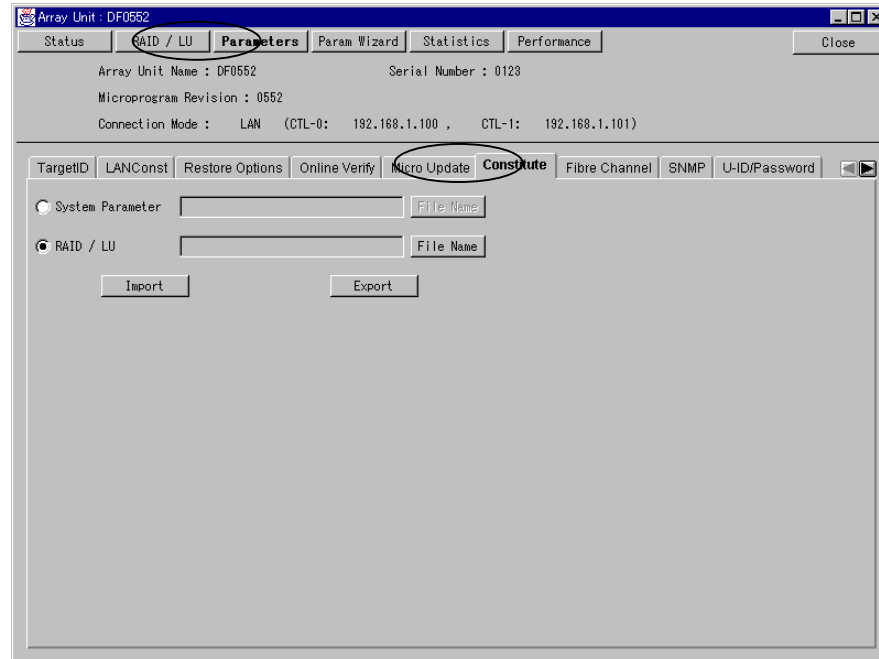


The system parameter information is saved in the text file of the selected name.

(ii) Configuration output : RAID/LU and condition of component parts

The information on the RAID/LU definition and condition of the component parts is output into a selected text file.

① Click the [Parameter], the click the [Constitute] tab.

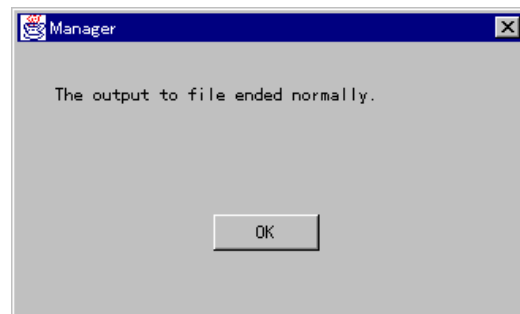


② Click the [RAID/LU] radio button.

③ Click the “File Name” button and select the directory and file name to output the configuration information. The selected file name is displayed in the text box.

④ Click the [Export] button.

⑤ The confirmation message that the information on the RAID/LU definition and condition of the component parts was output into the selected file is displayed. Click the [OK] button.



The information on the RAID/LU definition and condition of the component parts is saved in the text file of the selected name.

(3) Procedure for installing the trace analysis tool

(3-1) Articles required to be prepared

To analyze the trace, prepare a personal computer, an FD which contains the trace analysis tool, and an FD which contains a trace collected according to Item (1), “Procedure of collecting trace in the ON state with unit” on page [MNTE 02-1410](#) or trace information collected according to Item (2), “Procedure of collecting trace in the ON state using disk array management program” on page [MNTE 02-1430](#).

(a) Usable personal computer

- Personal computer compatible with IBM PC
- MS-DOS Ver. 5.0 or later
(which can run on the DOS prompt of Windows 95/98/NT)
- A Disk drive having a free capacity of larger than 15 Mbytes is required.
- A 3.5-inch FD is required.

(b) Trace analysis tool installation FD

The following files are contained in the trace analysis tool installation FD.

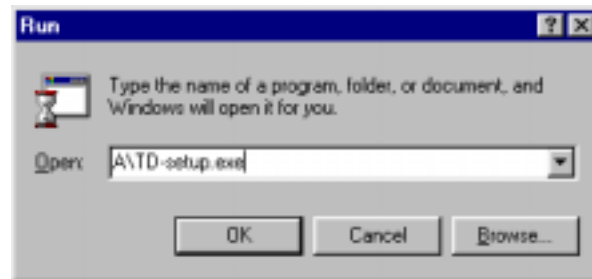
TD-setup.exe ----- A program for setting up the trace analysis tool
(Self-decompression type compressed file)

(3-2) Procedure for installation

(a) Activating the setting up program

Insert the trace analysis tool installation FD into the FDD of the PC.

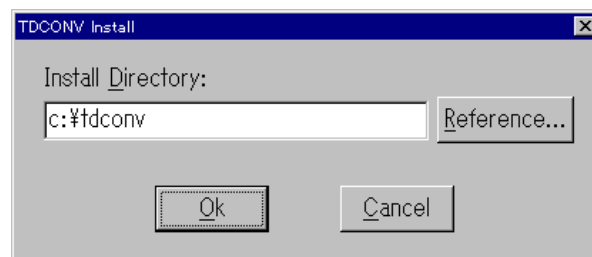
Activate the setting up program by specifying "A:\TD-setup.exe" from "Execute by specifying a file name" in the "Start" and click the [OK] button.



(b) Specifying a directory in which the tool is to be installed

The above setting up program asks you in what directory the tool is to be installed.

Enter an appropriate directory name and click the [OK] button.



(c) Completion of the installation

The installation program copies the necessary file to the specified directory and completes the installation. (It is not required to reboot the PC.)

(4) Procedure for analyzing trace

Since the procedure for analyzing a trace varies depending on the revision of the analysis tool, perform the analysis which suits the revision concerned. This procedure can be applied to trace analysis tools Rev. 0503 and later. Here, the procedure is shown using the trace analysis tool Rev. 0504 as an example.

The procedure for analyzing the trace, which is collected according to Item (1), “Procedure of collecting trace in the ON state with unit” on page [MNTE 02-1410](#) or Item (2), “Procedure of collecting trace in the ON state with Disk Array management program” on page [MNTE 02-1430](#), is shown below.

(4-1) Moving the trace information

In the both cases where the trace is collected while the subsystem power is on from an independent subsystem and where it is collected while the subsystem power is on using the Disk Array management program, move the file to which the trace information is output to the following.

c:/tdconv/trace

(4-2) Activating the trace analysis tool

Execute the activation by specifying “C:\TDCONV\TRACE.bat” from “Execute by specifying a file name” in the “Start”. (Specify the directory in which the TDCONV is to be installed.)

Click the [OK] button.



(4-3) Selecting items to be analyzed

When the following menu is displayed, select items to be “Japanese or English”^(‡1).

```
=====
Trace Analysis Tool                               Ver. 0507

Select Language

1. English
2. Japanese
=====

Please choose a language to use for output file :
2
```

When the following menu is displayed, select items to be analyzed.

```
=====
Trace Analysis Tool                               Ver. 0507

Menu
=====
1. Information Message (MSGCOM.TXT,Cx-MSG.TXT)
2. Configuration (CONFIG.TXT)
3. Failure Trace (Cx-FAIL.TXT)
4. SSB Trace (Cx-SSB.TXT)
5. Drive detach status (Cx-DRVDT.TXT)
6. Cause of Backend-Fibre failure (BK-FAIL.TXT)
7. Backend-Fibre failure count (BK-CUR.TXT)
8. Drive Positin-Map check (Cx-PMAP.TXT)
9. FC Driver Interrupt Trace (Cx-FCINT.TXT)
Q. QUIT
=====

Please choose number :
```

‡1 : The menu for selecting Japanese or English is displayed by Trace Analysis Tool Ver. 0506 or later.

Function of each menu is shown below.

No.	Menu	Description and occasion to be used	Example
1	Information Message (MSGCOM.txt, Cx-MSG.txt ^{(*)1})	Enables a log message displayed in the "Information Message" window of the WEB to be referred to. Refer to it when you want to view the history of failures occurred in the subsystem. • MSGCOM.TXT: Message common to the Controllers • Cx-MSG.TXT: Message particular to each Controller	MNTE 02-1530
2	Configuration (CONFIG.txt)	Enables a configuration of the subsystem (such as an IP Address and RG/LU setting) to be referred to. Refer to it when you want to know the subsystem configuration or when the setting of the IP Address of the subsystem is unknown at the time when connecting the WEB or Disk Array management program.	MNTE 02-1530 to MNTE 1590
3	Failure Trace (Cx-SSB.txt ^{(*)1})	Enables failure information detected by the subsystem to be referred to. Up to 1000 pieces of information are displayed ^{(*)2} .	MNTE 02-1600
4	SSB Trace (Cx-SSB.txt ^{(*)1})	Enables the SSB information reported to a host computer and the powering on information to be referred to. Up to 1000 pieces of information are displayed ^{(*)2} .	MNTE 02-1610
5	Drive detach status (Cx-DRVDT.txt ^{(*)1})	Enables the failure information on a Disk drive blockade to be referred to. Refer to it when the Disk drive blockade has occurred. Collect the information before replacing the blocked Disk drive in order to acquire the failure information of the Disk drive surely. That is because the failure information may be overwritten when the Disk drive is replaced since the cache memory area for storing the disk failure information can store information on only one failure per Disk drive. There may be a case where the information contains a failure of a Disk drive which is not blocked, however, it is not necessary to perform maintenance (replacement) of the Disk drive as long as the drive is not actually blocked.	MNTE 02-1620
6	Cause of Backend-Fibre failure (BK-FAIL.txt)	Identifies the part which has caused a back end fibre loop failure and displays it. Refer to it when the subsystem is placed in the state of the loop blockade of the back end fibre but the subsystem cannot identify the failed part.	MNTE 02-1620
7	Backend-Fibre failure count (BK-CUR.txt)	Displays the state of failure occurrence (counted value in the statistical information) in the back end fibre loop. Refer to it when checking if the subsystem has been recovered from the back end fibre loop failure.	MNTE 02-1620
*1 : x denotes a Controller number. *2 : When the overflow of the displayed information occurs, the oldest information is deleted and the latest one is left.			

No.	Menu	Description and occasion to be used	Example
8	Drive Position-Map check (Cx-PMAP.txt ^(*)1) ^{(*)3})	Displays the position map (arrangement order of the Fibre addresses (AL-PA) of the Disk drives on the back end fibre loop. This is used to identify a failed part when a back end loop blockade occurs owing to an incorrect position map caused by an incorrect connection order of the subsystems or a Disk drive failure. This information is displayed by the trace analysis tool Rev. 0504 or later.	MNTE 02-1630
9	FC Driver Interrupt Trace (Cx-FCINT.txt ^(*)1) ^{(*)3})	This can display failure information (Lip (f6), etc.) detected by the subsystem on the Fibre Channel on the host computer side. When a host computer cannot recognize the subsystem or a host computer has detected a data transfer error, it is considered that the failure on the Fibre Channel is one of the causes. Refer to this file when checking up on a failure on the Fibre Channel ^{(*)2} . This information is displayed by the trace analysis tool Rev. 0504 and the microprogram revision 0553 or later.	MNTE 02-1630
10	MRCF-Lite Failure Trace	Enables the failure information to be referred to when the subsystem enters the suspension status (PSUE) because of an occurrence of a failure in the case where MRCF-Lite function is used.	MNTE 02-1631
11	QUIT	Quits the trace analysis tool. (It leaves the TXT file of the analysis result in the .\RESULT directory and deletes the trace file, etc. from the disk drive.)	—
*1 : x denotes a Controller number. *2 : When the overflow of the displayed information occurs, the oldest information is deleted and the latest one is left. *3 : For the microprogram revision 0552, use the trace analysis tool Rev. 0504 or later. When the trace analysis tool Rev. 0503 is used, the Drive Position-Map check cannot be referred to. Besides, the microprogram revision 0552 cannot refer to the FC Driver Interrupt Trace. For the microprogram revision 0553, use the trace analysis tool Rev. 0504 or later. When the trace analysis tool Rev. 0503 is used, the Drive Position-Map check and Driver Interrupt Trace cannot be referred to.			

(4-4) Example of analysis result display

(a) Example WEB log message

Example of Controller log each message (Cx-MSG.TXT)

07/12/2000 10:04:20 C0 RBE301 Flash program update end
07/12/2000 10:03:54 C0 RBE300 Flash program update start

Date
Time
Detect Controller#

Example of Controller log common message (MSGCOM.TXT)

07/11/2000 09:06:13 C0 I00702 HDU recovered(Unit-0,HDU-2)	
07/11/2000 09:06:13 C0 I15102 Data recovery completed(Unit-0,HDU-2)	
07/11/2000 09:06:00 C0 I15002 Data recovery started(Unit-0,HDU-2)	
07/11/2000 09:06:00 C0 I14102 System copy completed(Unit-0,HDU-2)	
07/11/2000 09:05:57 C0 I14002 System copy started (Unit-0,HDU-2)	
07/11/2000 09:04:51 C0 W06002 HDU alarm(Unit-0,HDU-2)	:HDU /TRC
07/11/2000 09:02:47 C0 I12200 LU format completed(LU-00)	
07/11/2000 09:02:31 C0 I11200 All LU initialized	
07/11/2000 09:01:50 C0 I11000 All RAID group initialized	
07/11/2000 09:00:41 C0 I00300 Battery recovered	
07/11/2000 09:00:37 C0 W03200 Battery SW off	:BAT
07/11/2000 08:59:52 C0 I10000 Subsystem is Ready	

(b) Example of configuration information

The following items are displayed.

No.	Display item	Detail
1	DF500 Type	—
2	Microprogram revision	—
3	RAID configuration information	Display of RAID configuration information
4	LU configuration information	Display of LU configuration information
5	Drive unit satate	Display of drive unit state
6	Controller configuration	Display of information on the system parameter, "system start attribute"
7	Pair status of the MRCF-Lite function	Display of apir status of the MRCF-Lite function
8	Subsystem option information 1	Display of information on the system parameter, "option 1"
9	Subsystem option information 2	Display of information on the system parameter, "option 2"
10	Host connection information 1	Display of information on the system parameter, "host connection mode"
11	Host connection information 2	Display of information on the system parameter, "host connection mode"
12	PORT option information	Display of information on the system parameter, "port type"
13	TARGET ID information	Display of information on the system parameter, "TARGET ID"
14	Transfer rate control information	Display of information on the system parameter, "SYNC CONTROL"
15	LAN control information	Display of information on the system parameter, "LAN CONST"
16	Other control information	Display of information on the systemparameter, "controls other than the above"

(b-1) DF500 Type

DF Type : DF500

(b-2) Microprogram revision

System Version : 0551/E (20000710.02)

(b-3) RAID configuration information

Information of all the defined RAID groups is displayed.

However, in the case of a RAID level other than those shown below, the digit of the group No. is left blank.

---- RAID Configuration ----					
Group No.	Level	Unit No.	HDU No.	Width	Depth
0	5	0	0	5	1
1	5	1	0	5	1
2	5	0	5	5	1
3	5	1	5	5	1

RAID Group RAID group number (0 to 19)

RAID Level RAID level

0 (RAID 0), 1 (RAID 1), 5 (RAID 5)

01 (RAID 0+1)

Unit No. Number of the starting array unit of a RAID group

HDU No. Number of the starting disk drive of a RAID group

Width Width of a RAID group

Depth Depth of a RAID group

(b-4) LU configuration information

Information of all the defined LU is displayed.

In the case of an illegal value, “-” is displayed.

---- LU Configuration ----						
LU No.	D-CTL	C-CTL	RG	Status	Capacity	Staging Size
0	0	0	0	Normal	16777216	512
1	1	1	1	Normal	16777216	512
2	0	0	2	Normal	16777216	512
3	1	1	3	Normal	16777216	512

LU LU number (0 to 63)

D-CTL Default number of Controller controlling the LU (0 or 1)

C-CTL The number of the Controller currently in use (0 or 1)

RG RAID group number of an LU concerned (0 to 19)

Status LU status

Normal (RAID and LUs are already defined)

Unformat (Not-yet-formatted status)

Regressed (LU regression status)

Detached (LU blockade status)

Capacity LU capacity (Displaying the LU capacity with the number of blocks in decimal)

Staging Size..... Block size (Displaying the number of bytes per block in decimal)

(b-5) Disk drive information

Information of Disk drive is displayed.

---- Drive Configuration ----	
Location(Unit#,HDU#)	Status
Drive(0,0)	Normal
Drive(0,1)	Normal
Drive(0,2)	Undefine
⋮	
Drive(9,8)	Not Installed
Drive(9,9)	Not Installed

Location Mounting position of a Disk drive

Status The status of the Disk drive

[Data drive]

(Normal (Normal status (RAID and LUs are already defined))
 Undefine (RAID not yet defined)
 Standby (LU not yet defined)
 Detached (Blockade)
 Not Installed (Not yet mounted)
 Recon. (Under data restoration)

[Spare drive]

(Not Used (Not used)
 Not Installed (Not yet mounted)
 Used by Unit#x, HDU#y (In use as a Spare disk of
 Disk drive Unit No. x and HDU No. y)

(b-6) Pair Status of the MRCF-Lite function

Pair Status of the MRCF-Lite function is displayed.

---- MRCF-Lite Configuration ----		
P-VOL.	S-PVOL	PairStatus
1	2	COPY [Initial Copy]
3	4	COPY [Initial Copy + Split]
5	6	COPY [Initial Copy(P-VOL → S-VOL)]
7	8	COPY [Initial Copy(S-VOL → P-VOL)]
1	10	COPY [Initial Copy Skip]
11	12	COPY [Initial Copy Skip + Split]
13	14	PAIR
15	16	PSUS
17	18	PSUE

P-VOL Primary volume

S-VOL Secondary volume

Pair Status Pair Status of MRCR-Lite

PAIR

..... PSUS

PSUE

..... COPY [Initial Copy]

..... COPY [Initial Copy + Split]

..... COPY [Resync Copy (P-VOL S-VOL)]

..... COPY [Resync Copy (S-VOL P-VOL)]

..... COPY [Initial Copy Skip]

..... COPY [Initial Copy Skip + Split]

(b-7) Controller configuration information

The start-up system attribute of the system parameter is displayed being divided into three items, the system start-up attribute, Data Sharing mode, and the SCSI ID Take-Over mode as shown below.

System Startup Attribute(DUAL CONFIG) = Dual Active Mode (or)	Hot Standby Mode (or)
	Single Mode
Data Share Mode(DATA SHARE MODE) = Not Used (or)	Used
ID Taking-Over mode enable = OFF	
Link Separation = DISABLE	

(b-8) Subsystem option information 1

Information on the system parameter “option 1” is displayed with two bytes as shown below. In addition, displays with an ON or OFF indication whether connection mode assigned to each bit is enabled or not

(Sample)
Option 1 (OPTION) = 0000
Drive Detach mode enable (Bit=11) = OFF

(b-9) Subsystem option information 2

Information on the system parameter “option 2” is displayed with four bytes as shown below.

In addition, displays with an ON or OFF indication whether connection mode assigned to each bit is enabled or not

(Sample)
 Option 2 (ENHANCE OPTION) = 00000000
 Multipath (Connection) (Bit=30) = ON
 PROCOM mode enable (Bit=28) = OFF
 Report Status (normal / warning) (Bit=27) = OFF
 Multipath (Array Unit) (Bit=26) = OFF
 Turbo LU warning (Bit=25) = OFF

(b-10) Host connection information 1

Information on the system parameter “Host connection information 1” is displayed with four bytes as shown below.

If no mode has been set for this parameter, the mode is set to Standard Mode.

(Sample)
 Host Connection Mode1
 (SPECIAL CONNECT) = Standard Mode (or)
 Open VMS Mode (or)
 TRESPASS Mode (or)
 Wolfpack Mode (or)
 IBM 7135 I/O Path switch Mode (or)
 NCR I/o Path switch Mode (or)

(b-11) Host connection information 2

Information on the system parameter “Host connection information 2” is displayed with four bytes as shown below. In addition, displays with an ON or OFF indication whether connection mode assigned to each bit is enabled or not

(Sample)
 Host Connection Mode2 (OPTION) = 00000000
 VxVM mode enable (Bit=15) = OFF
 ODE Mapper mode enable (Bit=13) = OFF
 HP Connection mode enable (Bit=12) = OFF
 Report Inquiry page 83H (Bit=11) = OFF
 UA(06/2A00) Suppress mode = OFF
 HISUP mode enable = OFF

(b-12) PORT option information

Information on the system parameter “PORT option information is displayed with four bytes as shown below. In addition, displays with an ON or OFF indication whether connection mode assigned to each bit is enabled or not

(Sample)

PORT OPTION = 00000000

LIP Port ALL Reset Mode (Bit=31) = Target Authentication (or)
Port Reset

LIP(SCSI Reset) Processing Transmission Mode (Bit=30) = DISABLE

LIP(SCSI Reset) Signal Transmission Mode (Bit=29) = DISABLE

TRS(BDR) Transmission Mode (Bit=28) = DISABLE

Reserve Influence Range Designation (Bit=27) = Controller (or)
Subsystem

Logical Unit Reset Transmission Mode (Bit=26) = DISABLE

Third Party Process Logout Mode (Bit=25) = DISABLE

(b-13) TARGET ID information

In the case of SCSI system, “TARGET ID information” of system parameter is displayed.

However, the transferred information is displayed as PORT 0 and PORT 1 irrespective of whether the I/F board is installed or not.

(Sample)	Target ID (TARGET ID)
	PORT 0 = Single Target Mode (or) Multi Target Mode
	PORT 1 = Single Target Mode (or) Multi Target Mode

(b-14) Transfer rate control information

In the case of SCSI, "SYNC CONTROL" of system parameter is displayed. However, the transferred information is displayed as PORT 0 and PORT 1 irrespective of whether the I/F board is installed or not.

(Sample-1)
 SYNC Control (SYNC CONTROL)
 PORT 0 = STANDARD
 PORT 1 = STANDARD

(Sample-2)
 SYNC Control (SYNC CONTROL)
 PORT A = MANUAL
 SINGLE END = 20 (40) Mbyte/s
 DIFFERENTIAL = 2 Mbyte/s
 ULTRA2 = 40 (80) Mbytes
 :
 :

ROPT n = ... "STANDARD" or "MANUAL" is displayed as information of Port n (n = 0 to 1). In the case of "MANUAL," the following information is displayed.

SINGLE END = ... Single end transfer rate information

DIFFERENTIAL = ... Differential transfer rate information

ULTRA2 = ... ULTRA2 transfer rate information

<transfer rate> = ASYNC (or)

..... 5 (10) Mbyte/s (or)

..... 10 (20) Mbyte/s (or)

..... 13 (26) Mbyte/s (or)

..... 20 (40) Mbyte/s (or)

..... 33 (66) Mbyte/s (or)

..... 40 (80) Mbyte/s (or)

(b-15) LAN control information

“LAN CONST” of system parameter is displayed.

```

---- CTL0 LAN Const(LAN CONST) ----
CONNECT LAN (CONNECT LAN) = ON
DHCP Mode = OFF
DEFAULT
  IP ADDRESS(MANUAL) = 125. 1. 9.247
  SUB NET MASK(SUB NET MASK) = 255. 0. 0. 0
  GATEWAY ADDRESS(DEFAULT GATEWAY) = 125. 10. 10. 10
CURRENT
  IP ADDRESS = 125. 1. 9.247
  SUB NET MASK = 255. 0. 0. 0
  GATEWAY ADDRESS = 125. 10. 10

---- CTL1 LAN Const(LAN CONST) ----
CONNECT LAN(CONNECT LAN) = ON
DHCP Mode = OFF
DEFAULT
  IP ADDRESS(MANUAL) = 125. 1. 9.248
  SUB NET MASK(SUB NET MASK) = 255. 0. 0. 0
  GATEWAY ADDRESS(DEFAULT GATEWAY) = 125. 10. 10. 10
CURRENT
  IP ADDRESS = 125. 1. 9.248
  SUB NET MASK = 255. 0. 0. 0
  GATEWAY ADDRESS = 125. 10. 10

```

In the CURRENT section, values currently used are displayed.

(b-16) Other control information

Control information other than system parameters (b-6) to (b-14) is displayed.

```

(Sample)
Cache Random mode = DISABLE
LU Size Report to the Host = Auto Adjust (or)
                               Non Adjus
Data Striping Size = 64KB (or)
                    32KB (or)
                    16KB
Operation if the Processor failures Occurs = Reset a Fault (or)
                                              Shutdown the system
Command Queuing = ON
Controller Identifier = DISABLE
RS232C Error Information Outflow Mode = ON(NORMAL) (or)
                                         ON(HITRACK) (or)
                                         OFF
ROM Pseudo-response command Processing = Busy (or)
                                         Not Ready=

```

(c) Examples of displaying failure trace

Examples of displaying failure trace

```

[No.DE04] ( 27/1000)
TIME      : 0:51:40'182' [ 2F4E16]
P/S Cnt   : 52
RTClock   : 00-05-29 16:29:40
Sense     : [0B/C000]
Type      : [ABORTED CMD] Time Out Detected in Controller
           : [40110352] (Drv#:00) MPU detected error
           : [Micro (Command Job)] Time Out Waiting for Event
           : (Waiting for Transfer Completion of Hst Data)
Notes     : 1. Check/Replace I/F Adapter ASSY, I/F Cable, Terminator
           : 2. Replace CTL-ASSY
           : 3. Check HOST or Other DEVICE on the SCSI I/F
Dump      :
000 : DE 04 6D 50 00 2F 4E 16 -16 88 00 34 01 BF 39 70
016 : 70 00 0B 00 00 00 00 00 -38 00 00 00 00 00 00
032 : C0 00 00 00 00 00 40 00 -00 00 00 00 00 00 00
048 : 11 52 00 00 00 00 00 00 -00 00 00 00 00 00 00
064 : 00 00 00 00 00 00 00 00 -00 00 00 00 00 00 00
080 : 00 00 00 00 40 11 03 52 -00 00 00 00 00 00 00
096 : 00 05 29 16 29 40 00 00 -00 00 00 00 00 00 00

```

(d) SSB trace example

Example of SSB trace (Report to a host)

```

[No.3EBD] (723/1000)
TIME      : 1:17:04'498' [ 469072]
P/S Cnt   : 22
RTClock   : 00-05-23 15:55:40
Sense      : [0B/C000]
Type       : [ABORTED CMD] Time Out Detected in Controller
           : [4011xx52] (Drv#:00) MPU detected error
           : [Micro (Command Job)] Time Out Waiting for Event
           : (Waiting for Transfer Completion of Hst Data)
Notes      : 1. Check/Replace I/F Adapter ASSY, I/F Cable, Terminator
           : 2. Replace CTL-ASSY
           : 3. Check HOST or Other DEVICE on the SCSI I/F
Dump       :
000 : 3E BD 1A 40 00 46 90 72 - 83 97 00 16 3B 4D 31 80
016 : 70 00 0B 00 00 00 00 38 - 00 00 00 00 C0 00 00 00
032 : 00 00 40 00 00 00 00 00 - 00 00 00 00 11 52 00 00
048 : 00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
064 : 00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
080 : 0A 61 C2 00 10 00 00 00 - 00 00 00 00 00 00 00 00
096 : 00 05 23 15 55 40 00 00 - 00 00 00 00 00 00 00 00

```

Example of SSB trace (Information at the time of powering on)

```

[No.3D42] (344/1000)
TIME      : 0:04:57'246' [ 4891E]
P/S Cnt   : 16
RTClock   : 00-05-22 11:30:04
SYSTEM    :
DISK#0    : WARM / WARM Available
DISK#1    : WARM / WARM Available
DISK#2    : WARM / WARM Available
DISK#3    : WARM / WARM Available
DISK#4    : WARM / WARM Available
CACHE     : Volatiled
P/K#0     : Volatiled
P/K#1     : Volatiled
P/K#2     : Volatiled
P/K#3     : Volatiled
Dump      :
000 : 3D 42 29 F0 00 04 89 1E - 6A 9B 00 10 00 00 00 00
016 : 70 00 00 00 00 00 00 38 - 00 00 00 00 00 00 00 00
032 : 00 00 40 00 00 00 00 FF - 00 05 22 11 30 04 00 00
048 : 10 02 01 01 80 00 00 02 - 00 00 30 35 35 31 2F 44
064 : 22 22 22 22 22 00 00 00 - 00 00 00 00 50 53 4F 4E
080 : 00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00
096 : 00 05 22 11 30 04 00 00 - 00 00 00 00 00 00 00 00

```

(e) Disk failure information (Cx- DRVDT.TXT)

Example of disk failed (when failure occurred)

```

HDU#1 Unit#0
TIM      : 00.05.26 09:09:20
P/S Cnt  : 5
Sense    : [04/4400]
          : [HARDWARE] Internal Target Failure
OP Code  : [00]
Type     : [4013FF84] MPU Detected Error
          : [Micro (1Board Micro2) ] Drive blocked while PS/ON to reqady
Notes    : Replece HDU Assy
Dump     :
          000 : 30 02 05 FF 00 05 26 FF - 09 09 20 FF 00 01 6F F0
          016 : 00 04 44 00 40 13 84 FF - 2A FF FF FF FF FF FF FF
          032 : 37 65 0A 4B 00 00 00 00 - 00 00 00 00 00 2F 52 C0
          048 : 40 13 62 30 01 C3 A1 F0 - 00 00 00 00 00 00 00 00

```

Example of disk failed (when no failure occurred)

```

HDU#0 Unit#0
[No Error]

```

(f) Back end fibre loop failure —— Example of failed part identification display

Example of failed part identification display (when no failure occurred)

```

<<<<< Obstacle part specialization result : CTL#0/PATH#0/LOOP#0 >>>>>
There is no error.
-----

```

(g) Back end fibre loop failure —— Example of failure occurrence state display

Example of failure occurrence state display (counted value in the statistical information)

```

<<<<< Error current information[CTL0/Path0/Loop0] >>>>>
Clear time   : 00/08/21 09:22:29
Last update  : 00/00/00 00:00:00

```

	Write data N.G	Read data N.G	Fibre Loop N.G	Others N.G
HDU(0,0)	0	0	0	0
HDU(0,2)	0	0	0	0
HDU(0,4)	0	0	0	0
HDU(0,6)	0	0	0	0
HDU(0,8)	0	0	0	0
HDU(1,0)	0	0	0	0
HDU(1,2)	0	0	0	0
HDU(1,4)	0	0	0	0

(h) Example of back end fibre position map display

```

#155 2156800[ms]:[C0.P1](0,1)(0,3)(0,5)(1,1)(1,3)(1,5)(1,7)(1,9)(0,9)
#155 2156805[ms]:[C0.P0](0,0)(0,2)(0,4)(3,1)**(1,2)*(1,4)(1,6)(1,8)(0,6) ①
***** This Position Map is error!![3]
#155 2156835[ms]:[C0.P1](0,1)(0,3)(0,5)(1,1)(1,3)(1,5)(1,7)(1,9)(0,9)
#155 2156875[ms]:[C0.P0][C1.P0](0,0)(0,2)(0,4)(3,1)**(1,2)*(1,4)(1,6)(1,8)(0,6)
***** This Position Map is error!![3] ②
#155 2156881[ms]:[C0.P1][C1.P1](0,1)(0,3)(0,5)(1,1)(1,3)(1,5)(1,7)(1,9)(0,9)

```

Position map
 "[Cx, Py]" means that the CTL#/Path# is connected to the fibre loop.
 "(x, y)" means that the drive of Unit-x and HDU-y is connected.

Time when the position map was acquired

Number of powering on execution

Second line of ① : "The position map displayed with this message has an error in its arrangement order."
 Asterisk of ② : "The fibre address (AL-PA) of the drive displayed with an asterisk has an error."

(i) Example of FC driver interrupt trace display

Example of a link down (when Lip (f8) was detected in the loop topology) display

```

[No.23E7] (360/400)
TIME      : 0:04:05'929' [ 3C0A9]
P/S Cnt   : 46
RTClock   : 00-10-03 19:31:33
Type      : [SFC Link Attention] PortA : Link Down
           : The port received LIP(F8) from Port_ID 01
           : if Port_ID is "F7", Port_ID is uncertain.
Dump      :
000 : 23 E7 30 C0 00 03 C0 A9 -05 D4 53 2E 00 00 00 00
016 : 06 01 03 24 00 10 03 19 -31 33 02 01 80 02 01 90

```


(j) Example of MRCF-Lite failure trace display

Information on all the MRCF-Lite failures which have occurred till the time of a trace collection and which remain on the trace is displayed. Information on the failure occurs later is displayed previously.

```

*****
---- Error Information ----
Error Code   : [0102]
Time        : 01-03-15 08:39:46

---- Current LU Information ----
[P-VOL]
  LUN       : 51
  STATUS    : BAD
[S-VOL]
  LUN       : 52
  STATUS    : GOOD

---- Pair Status of Pre-PSUE ----
Pair Status  : COPY
Copy Mode    : Resync Copy(S-VOL → P-VOL)
*****
      .
      .
      .
*****

---- Error Information ----
Error Code   : [0103]
Time        : 01-03-15 08:39:46

---- Current LU Information ----
[P-VOL]
  LUN       : 47
  STATUS    : GOOD
[S-VOL]
  LUN       : 48
  STATUS    : BAD

---- Pair Status of Pre-PSUE ----
Pair Status  : COPY
Copy Mode    : Resync Copy(P-VOL → S-VOL)
*****

```

Error Code	Error code (For the details, refer to Table 2.7.1, "Displayed Codes and Actions to Be Taken when Status Is Changed to MRCF PSUE" on page MNTE 02-1770.)
Time	Time and date when the failure occurred
P-VOL	Primary volume
S-VOL	Secondary volume
LUN	LU number
STATUS	Data assurance
	GOOD (Data is assured.)
	 BAD (Data is not assured.)
	 GRAY (Data may be assured.)

Pair Status	Pair information
	SMPL
	 COPYPAIR
	 PSUS
	 PSUE
Copy Mode	Copy details
	Initial copy (P-VOL → S-VOL)
	Initial copy (P-VOL → S-VOL) and split
	Resync Copy (P-VOL → S-VOL)
	Resync Copy (S-VOL → P-VOL)
	Initial copy skip
	Initial copy skip and split

(5) Configuration information analysis

(a) System parameter

Open the file output in (2)-(6)-(i) with an appropriate editor. The format of the file consists of the following items. Outline of the file structure is shown in Figure 2.6.1.

- File header
- Subsystem name registered in the Disk Array management program.
- Output time (Time of the machine in which the Disk Array management program is installed)
- Microprogram revision
- Array unit type
- Common Controller parameters
- Controller 0 parameters
- Controller 1 parameters
- Direction for FD backup

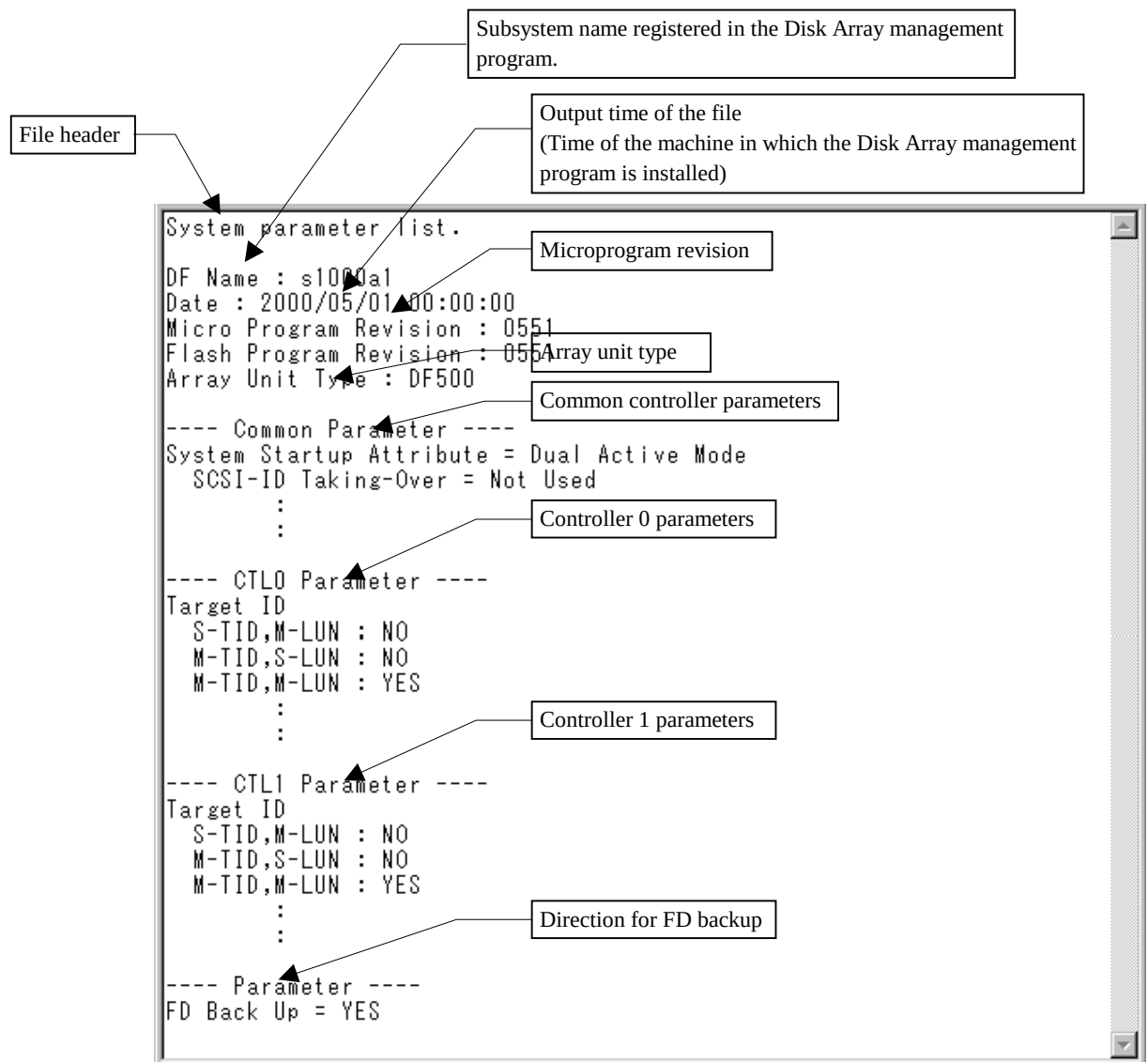


Figure 2.6.1 Outline of the Format of the System Parameter Output File

[Common Controller Parameters]

Common setting items of the system parameters of the subsystem are displayed.
An example of the output is shown in Figure 2.6.2.

```

System parameter list.

DF Name : df500a1
Date : 2000/06/01 15:00:00
Micro Program Revision : 0551
Flash Program Revision : 0551
Array Unit Type : DF500

---- Common Parameter ----
System Startup Attribute = Dual Active Mode
SCSI ID/Port ID Take-over Mode = ---
Default Controller
  Port A = ---
  Port B = ---
Data Share Mode = Used
Host Connection Mode 1
  Port 0A = Standard Mode
  Port 0B = Standard Mode
  Port 1A = Standard Mode
  Port 1B = Standard Mode
Host Connection Mode 2
  Port 0A
    VxVM DMP mode enable = OFF
    ODE Mapper mode enable = ---
    HP Connection mode enable = OFF
    Report inquiry page 83H = OFF
  Port 0B
    VxVM DMP mode enable = OFF
    ODE Mapper mode enable = ---
    HP Connection mode enable = OFF
    Report inquiry page 83H = OFF
  Port 1A
    VxVM DMP mode enable = OFF
    ODE Mapper mode enable = ---
    HP Connection mode enable = OFF
    Report inquiry page 83H = OFF
  Port 1B
    VxVM DMP mode enable = OFF
    ODE Mapper mode enable = ---
    HP Connection mode enable = OFF
    Report inquiry page 83H = OFF
Serial Number =
Option 1
  Drive Detach mode enable = OFF
Option 2
  Multipath(Controller) = OFF
  PROCOM mode enable = OFF
  Report status (normal / warning) = OFF
  Multipath (Array Unit) = OFF
  Turbo LU Warning = OFF
  UA(06/2A00) suppress mode enable = OFF
Data Striping Size = 64KB
Operation if the Processor failures Occurs = Reset a Fault
INQUIRY Information
  Command Queuing = ON
  ANSI Version = ---
  Vendor ID = HITACHI
  Product ID = DF500F
  ROM Microprogram Version =
  RAM Microprogram Version =
Cache Mode = All OFF

```

Figure 2.6.2 System parameters: Output Example of Common Parameters

The following items are displayed.

Table 2.6.3 List of Common Setting Items

No.	Displayed item	Description
1	System start attribute	Configuration of the subsystem
2	Host connection modes 1 and 2	Host connection mode for each port
3	Serial number	Serial number of the subsystem
4	Options 1 and 2	Optional functions of the subsystem which have been set
5	Data striping size	Striping size of data
6	LU size	Mode for automatically adjusting the LU size to be reported to a host computer
7	Operation to be done when a processor failure occurs	Operation mode to be applied when a processor failure occurs
8	Information responded to INQUIRY	Response to the INQUIRY command
9	Cache mode	Mode for assigning the Cache memory

Some items are not set depending on the connected subsystem. They are not output to the file. Setting items whose set values are shown as “---” are those which are not supported in the subsystem configuration.

[Controller 0 Parameters]

Common setting items of the system parameters of the subsystem are displayed.
An example of the output is shown in Figure 2.6.3

```

---- CTL0 Parameter ----
Target ID
  S-TID,M-LUN : NO
  M-TID,S-LUN : NO
  M-TID,M-LUN : YES

Data
Port  Target ID  H-LUN  LUN
0A      0        0      0
0B      0        1      1
Port Type
Port Option
  Reset/LIP Mode(Signal)
    Port A = OFF
    Port B = OFF
  Reset/LIP Mode(Process)
    Port A = OFF
    Port B = OFF
  LIP Port All Reset Mode
    Port A = OFF
    Port B = OFF
  Target Reset (Bus Device Reset) Mode
    Port A = OFF
    Port B = OFF
  Reserve Mode
    Port A = OFF
    Port B = OFF
  Logical Unit Reset Mode
    Port A = OFF
    Port B = OFF
  Third Party Process Logout Mode
    Port A = OFF
    Port B = OFF
ROM Pseudo-response command processing = ---
Save Data pointer response
  Port A = ---
  Port B = ---
Controller Identifier = Disable
RS232C Error Information Outflow Mode = OFF
Write & Verify Execution Mode = ON
LAN Const
  DHCP = OFF
  IP Address = 0.0.0.0
  Subnet Mask = 0.0.0.0
  Default Gateway = 0.0.0.0
  Ether Address = 00:00:00:00:00:00
SCSI transfer rate
  Port A = ---
  Port A = ---

```

Figure 2.6.3 System Parameters: Output Example of Controller 0 Parameters

The following items are displayed.

Table 2.6.4 List of Controller#0 Setting Items

No.	Displayed item	Description
1	Target ID	Target ID which has been set for each port
2	Port type	Optional function which has been set for each port
3	ROM dummy response	Mode for responding to a host computer during the period from powering on to the time when the Controller becomes ready.
4	Save Data pointer response	Mode for reporting the Save Data pointer to a host computer
5	Controller identifier	Identifier of the controller
6	RS232C Error Information Sending mode	Mode for sending error information via RS232C
7	Write and verify execution mode	Mode for executing the write & verify
8	LAN configuration	LAN configuration information
9	SCSI transfer rate	SCSI transfer rate set for each port

Some items are not set depending on the connected subsystem. They are not output to the file. Setting items whose set values are shown as “---” are those which are not supported in the subsystem configuration.

[Controller 1 Parameters]

Common setting items of the system parameters of the subsystem are displayed.
An example of the output is shown in Figure 2.6.4

```

---- CTL1 Parameter ----
Target ID
  S-TID,M-LUN : NO
  M-TID,S-LUN : NO
  M-TID,M-LUN : YES

Data
Port  Target ID  H-LUN  LUN
0A      0        0      0
0B      0        1      1
Port Type
Port Option
  Reset/LIP Mode(Signal)
    Port A = OFF
    Port B = OFF
  Reset/LIP Mode(Process)
    Port A = OFF
    Port B = OFF
  LIP Port All Reset Mode
    Port A = OFF
    Port B = OFF
  Target Reset (Bus Device Reset) Mode
    Port A = OFF
    Port B = OFF
  Reserve Mode
    Port A = OFF
    Port B = OFF
  Logical Unit Reset Mode
    Port A = OFF
    Port B = OFF
  Third Party Process Logout Mode
    Port A = OFF
    Port B = OFF
ROM Pseudo-response command processing = ---
Save Data pointer response
  Port A = ---
  Port B = ---
Controller Identifier = Disable
RS232C Error Information Outflow Mode = OFF
Write & Verify Execution Mode = ON
LAN Const
  DHCP = OFF
  IP Address = 0.0.0.0
  Subnet Mask = 0.0.0.0
  Default Gateway = 0.0.0.0
  Ether Address = 00:00:00:00:00:00
SCSI transfer rate
  Port A = ---
  Port A = ---

```

Figure 2.6.4 System Parameters: Output Example of Controller 1 Parameters

The following items are displayed.

Table 2.6.5 List of Controller#1 Setting Items

No.	Displayed item	Description
1	Target ID	Target ID which has been set for each port
2	Port type	Optional function which has been set for each port
3	ROM dummy response	Mode for responding to a host computer during the period from powering on to the time when the Controller becomes ready.
4	Save Data pointer response	Mode for reporting the Save Data pointer to a host computer
5	Controller identifier	Identifier of the controller
6	RS232C Error Information Sending mode	Mode for sending error information via RS232C
7	Write and verify execution mode	Mode for executing the write & verify
8	LAN configuration	LAN configuration information
9	SCSI transfer rate	SCSI transfer rate set for each port

Some items are not set depending on the connected subsystem. They are not output to the file. Setting items whose set values are shown as “---” are those which are not supported in the subsystem configuration.

[Parameters for Backup Use in the System Parameter Information]

An instruction whether or not to back up the system parameter information from the Floppy disk drive of the subsystem to the FD. “YES” is always displayed.

A screenshot of a graphical user interface window. The window has a title bar and a scrollable text area. The text area contains two lines: "---- Parameter ----" and "FD Back Up = YES". On the right side of the window, there are three small, vertically stacked buttons: a top button with an upward-pointing arrow, a middle button with a horizontal line, and a bottom button with a downward-pointing arrow.

```
---- Parameter ----  
FD Back Up = YES
```

Figure 2.6.5 Output Example for FD Backup Specification

(b) Statuses of RAID, LU and components

Open the file output in (2)-(6)-(ii) with an appropriate editor. The format of the file consists of the following items. Outline of the file structure is shown in Figure 2.6.6 and Figure 2.6.7.

- File header
- Subsystem name registered in the Disk Array management program.
- Output time (Time of the machine in which the Disk Array management program is installed)
- Microprogram revision
- Array unit type
- RAID, LU configuration
- Components status

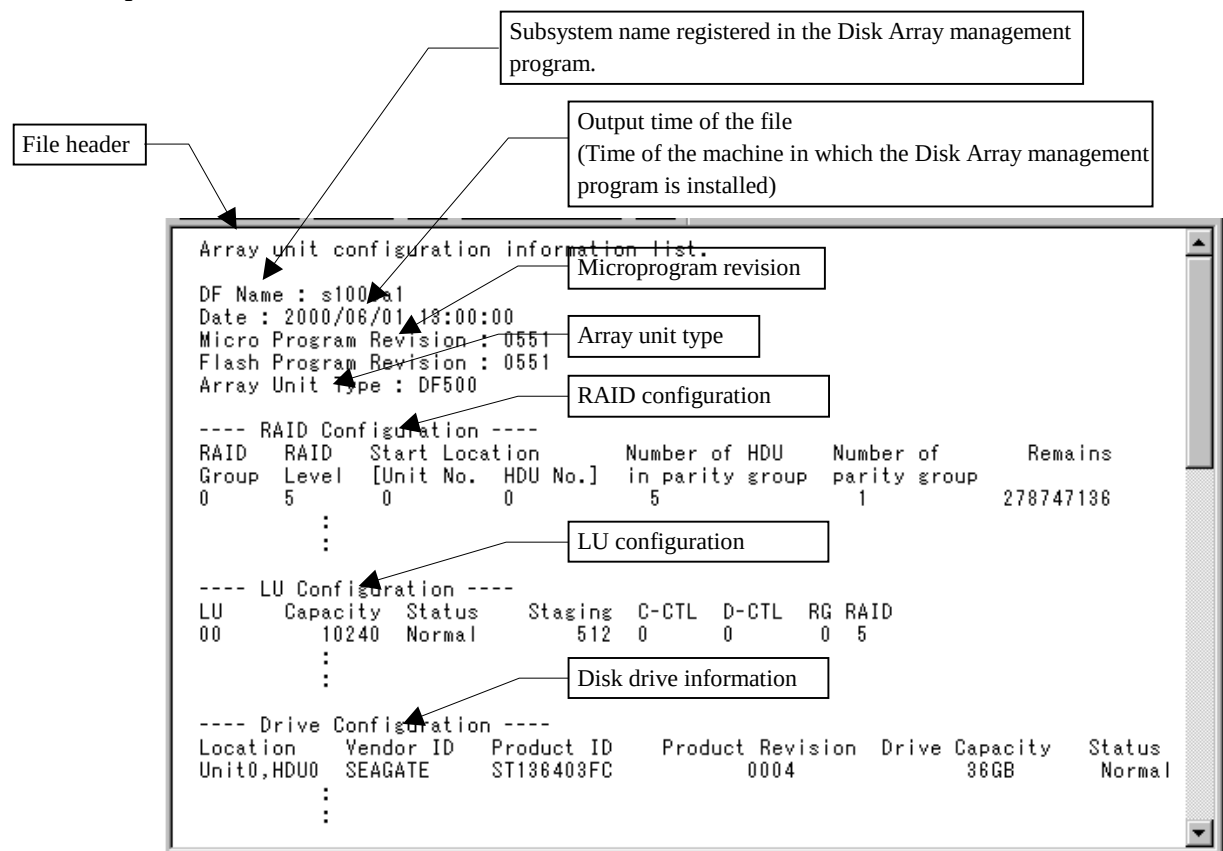


**Figure 2.6.6 Outline of the Format of
RAID/LU Configuration Information Output File**

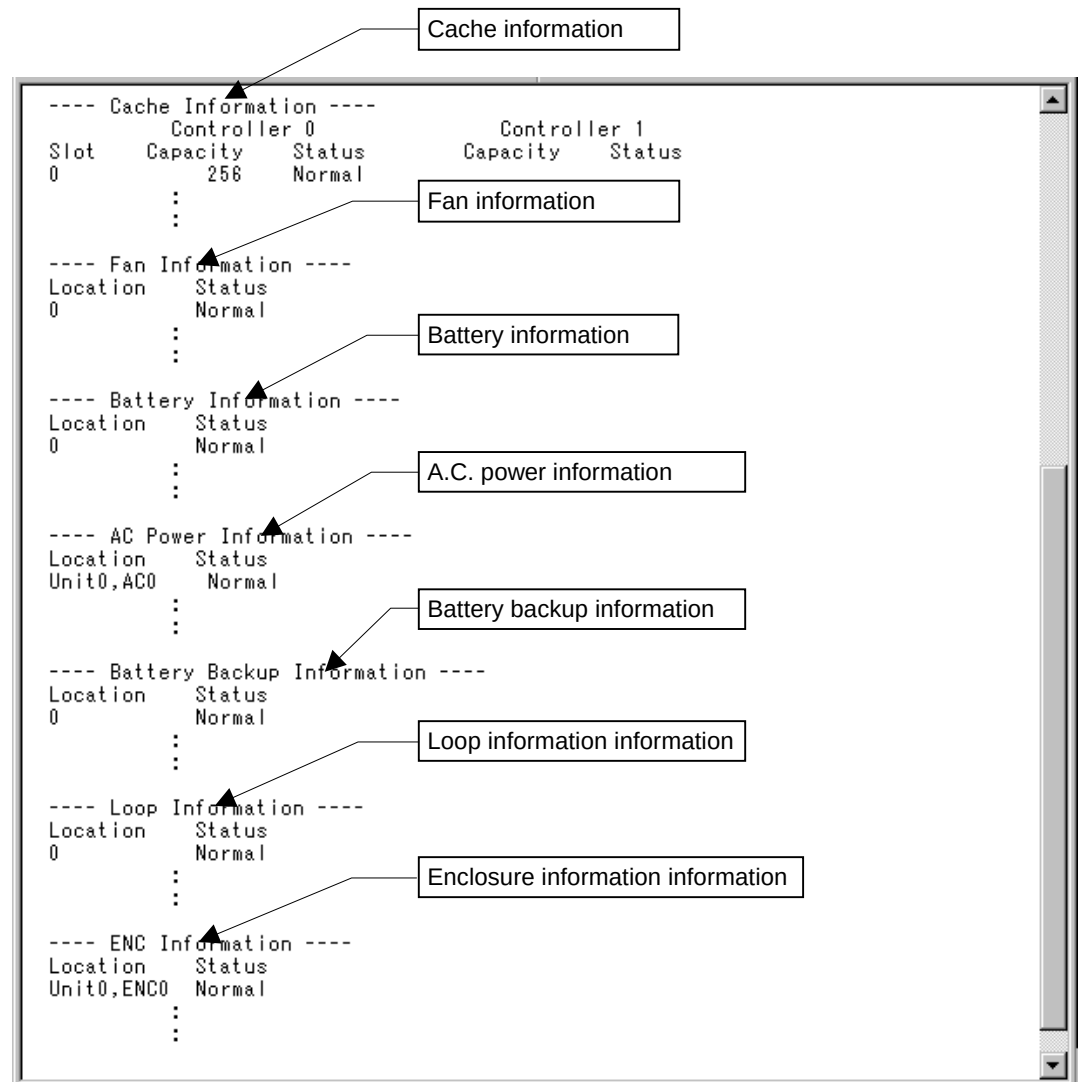


**Figure 2.6.7 Outline of the Format of
RAID/LU Configuration Information Output File**

[Format of RAID Configuration Information]

The RAID configuration of the subsystem is displayed. For the RAID group which has not been created, the “Level” is displayed as “-”.

---- RAID Configuration ----						
RAID Group	RAID Level	Start Location [Unit No. HDU No.]		Number of HDU in parity group	Number of parity group	Remains
0	5	0	0	5	1	278747136
1	5	0	5	5	1	278747136
	:					
	:					
18	-					
19	-					

[RAID Group] : RAID group number

[RAID Level] : RAID level

When no RAID is set, “-” is displayed. No other information is displayed.

[Start Location]

[Unit No.] : Starting unit number of RAID group

[HDU No.] : Starting Disk drive number of RAID group

[Number of HDU in parity group]

: The number of Disk drive in the parity group of the RAID group

[Number of parity group]

: The number of parity groups in the RAID group

[Remains] : The capacity (in units of block) that can be defined by LU of the RAID group

[Formatting LU Configuration Information]

The LU configuration of the subsystem is displayed. Information on the created LUs having LUNs is displayed.

---- LU Configuration ----							
LU	Capacity	Status	Staging	C-CTL	D-CTL	RG	RAID
00	10240	Normal	512	0	0	0	5
01	10240	Normal	512	1	1	1	5
After 02, not define.							

[LU]	:	LU number
[Capacity]	:	LU capacity (in units of block)
[Status]	:	The status of the LU
		Normal Normal status in which the LU is defined and formatted
		Unformat Status in which the LU is defined but not formatted
		Detached Status in which the LU is blocked
		Regressed Status in which the LU is regressed
[Staging]	:	Preread data amount (in units of block)
[C-CTL]	:	The number of the controller currently in use
[D-CTL]	:	Default number of controller controlling the LU
[RG]	:	The number of the RAID group that creates the LU
[RAID]	:	The RAID level of the RAID group that creates the LU

[Format for Drive Information]

Information on and status of the Disk drive of the subsystem are displayed.

---- Drive Configuration ----						
Location	Vendor ID	Product ID	Product Revision	Drive Capacity	Status	
Unit0, HDU0	SEAGATE	ST136403FC	0004	36GB	Normal	
Unit0, HDU1	SEAGATE	ST136403FC	0004	36GB	Normal	
Unit0, HDU2	SEAGATE	ST136403FC	0004	36GB	Normal	
:						
Unit9, HDU7	Nothing					
Unit9, HDU8	Nothing					
Unit9, HDU9	Nothing					

[Location] : The installation location of the drive

[Vendor ID] : The vendor ID of the drive

[Product ID] : The product ID of the drive

[Product Revision] : Firmware revision of the drive

[Drive Capacity] : The capacity of the drive

[Status] : The status of the drive

Normal Normal (RAID, LU defined)

Detached Detached

Standby Normal (LU undefined)

Undefine Normal (RAID undefined)

Recon. Reconfiguring (copying from collection or backup)

“Nothing” is shown after Location for the location of a Disk drive not installed.

[Format for Cache Information]

Configuration information and status of the cache memory in the subsystem are displayed.

---- Cache Information ----					
Controller 0			Controller 1		
Slot	Capacity	Status	Capacity	Status	
0	256	Normal	256	Normal	
1	256	Normal	256	Normal	
2	None	Nothing	None	Nothing	
3	None	Nothing	None	Nothing	

[Slot] : The installation location of the cache

[Controller 0]

[Capacity] : The capacity (in units of Mbyte) of the cache of controller 0

[Status] : The status of the cache of controller 0

Normal Normal
 Detached Detached
 Nothing Not installed
 --- Slot not supported

[Controller 1]

[Capacity]: The capacity (in units of Mbyte) of the cache of controller 1

[Status]: The status of the cache of controller 1

Normal Normal
 Detached Detached
 Nothing Not installed
 --- Slot not supported

[Format for Fan Information]

Status of the fan unit of the subsystem is displayed.

---- Fan Information ----	
Location	Status
0	Normal

[Location] : The installation location of the fan

[Status] : The status of the fan

Normal Normal
 Alarm Abnormal
 Nothing Not installed

[Format for Battery Backup Status Information]

Status of the battery unit of the subsystem is displayed.

---- Battery Backup Information ----	
Location	Status
0	Normal
1	Normal

[Location] : The installation location of the battery backup circuit

[Status] : The status of the battery backup circuit

Normal Normal

Alarm Abnormal

[Format for A.C. Power Information]

Status of the A.C. power of the subsystem is displayed.

---- AC Power Information ----	
Location	Status
Unit0,AC0	Normal
Unit0,AC1	Normal
:	:
Unit9,AC0	Nothing
Unit9,AC1	Nothing

[Location] : The installation location of the A. C. power supply

[Status] : The status of the A. C. power supply

Normal Normal

Alarm Abnormal

Nothing Not installed

[Format for Battery Backup Circuit Status Information]

Status of the battery backup circuit of the subsystem is displayed.

---- Battery Backup Information ----	
Location	Status
0	Normal
1	Normal

[Location] : The installation location of the battery backup circuit

[Status] : The status of the battery backup circuit

Normal Normal

Alarm Abnormal

[Format for Loop Information]

Status of the loop of the subsystem is displayed

Location	Status
0	Normal
1	Normal
2	Normal
3	Normal

[Location] : The installation location of the loop

[Status] : The status of the loop

Normal Normal

Alarm Abnormal

Nothing Not installed

[Format for Enclosure Information]

Status of the enclosure of the subsystem is displayed

--- ENC Information ---	
Location	Status
Unit0, ENC0	Normal
Unit0, ENC1	Normal
:	:
Unit9, ENC0	Nothing
Unit9, ENC1	Nothing

[Location] : The installation location of the enclosure

[Status] : The status of the enclosure

Normal Normal

Alarm Abnormal

Nothing Not installed

2.6.4 Dump collection performed while the subsystem power is on

Through the dump collection performed while the subsystem power is on, detailed information (dump information on Controller failure) on the immediately previous Controller blockade stored in the Controller is collected.

Since the above-mentioned dump information is taken over from the blocked Controller to the replaced Controller, it can be collected after the Controller is recovered from the failure.

Procedure for collecting a dump while the subsystem power is on is shown below.

Notice : In the case of the connection via RS232C, a trace collection with the subsystem power on cannot be done in the host online mode.

< Disk Array management program 2 >

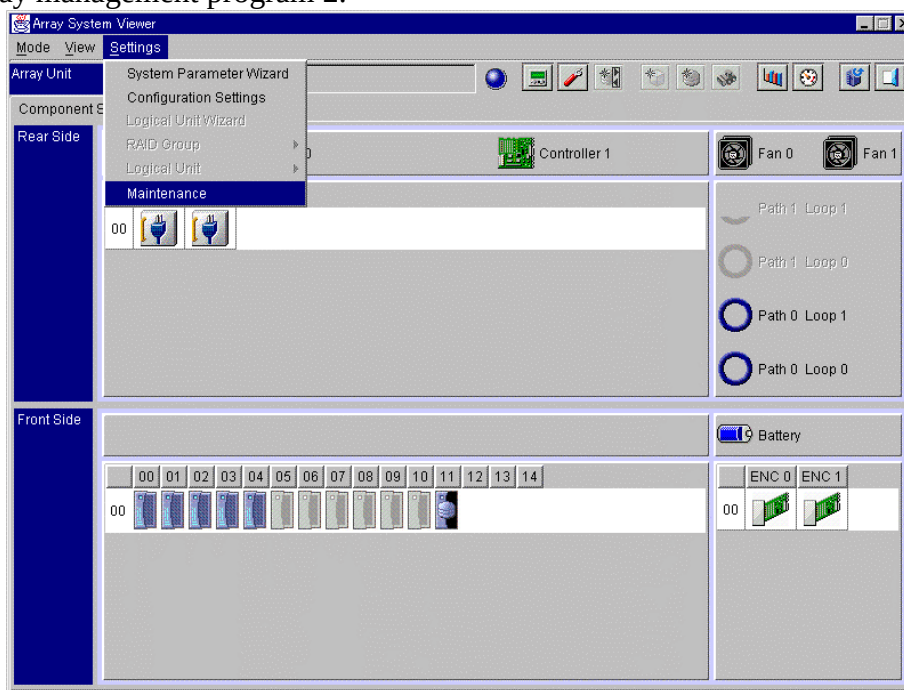
(1) Check that the unit is ready.

(2) The Dump is collected by using the maintenance function (Maintenance mode) of the Disk Array management program 2.

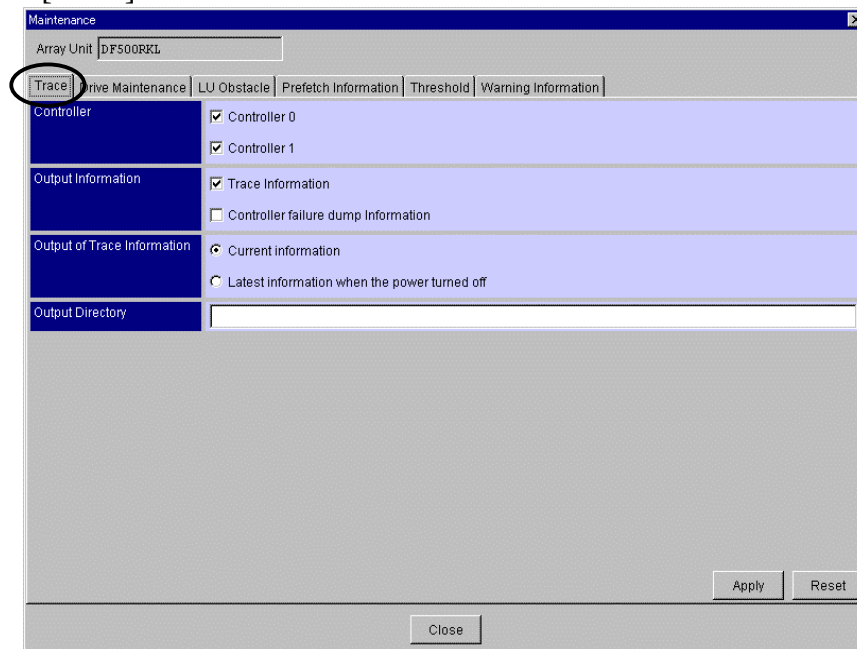
For the starting method of the disk array management program and setting method of the maintenance mode, see “Disk Array management program (for GUI) User’s Guide”.

(3) In the case of a dual-Controller system, if either Controller is blocked, connect the Disk Array management program 2 to only the normal Controller.

(4) The trace information and configuration information are collected separately with the Disk Array management program 2.



(5) Click the [Trace] button



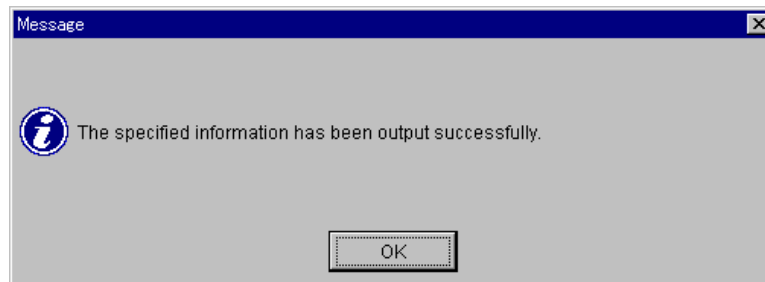
(6) [Output information] : Check off the [Controller Failure Dump Information] check box with the check button, and select the Controller (by checking off the [Controller 0] or [Controller 1] check box) from which the dump is to be collected.

When you want to make the output from the both Controllers at the same time, select the both of them.

(7) Specify the directory to which the Controller failure dump information is to be output.
When no directory is specified, the information is output to the directory in which the Disk Array management program is installed.

(8) Click the [Apply] button.

(9) When the message notifying that the specified information has been output is displayed, click the [OK] button.



The output Controller dump information is 10 Mbytes long per Controller and output with the following file name.

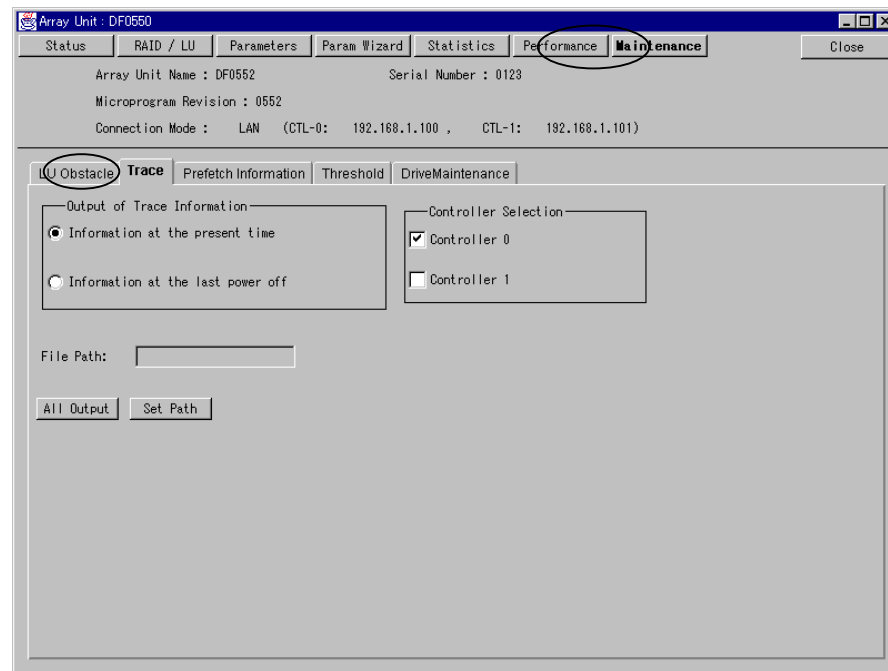
- Controller failure dump information on the Controller 0: ctdump.00
- Controller failure dump information on the Controller 1: ctdump.01

< Disk Array management program >

- (1) Make sure that the subsystem is in the Ready status.
- (2) The above-mentioned dump is collected by the Disk Array management program (in the Maintenance mode).

For the procedures for activating the Disk Array management program and setting the Maintenance mode, refer to the Disk Array management program Operator Manual - Maintenance Volume.

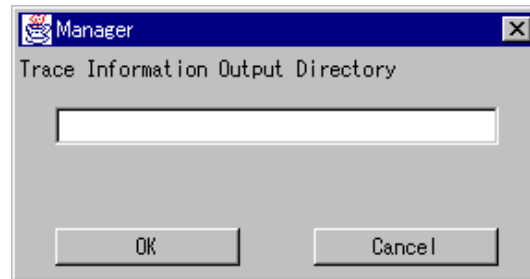
- (3) When a blocked controller exists in the case of the dual Controller configuration, connect the Disk Array management program to the normal Controller only.
- (4) In the unit window, click the [Maintenance] button and click the [Trace] tab.



- (5) [Output information] : Check off the [Controller Failure Dump Information] check box with the check button, and select the Controller (by checking off the [Controller 0] or [Controller 1] check box) from which the dump is to be collected.

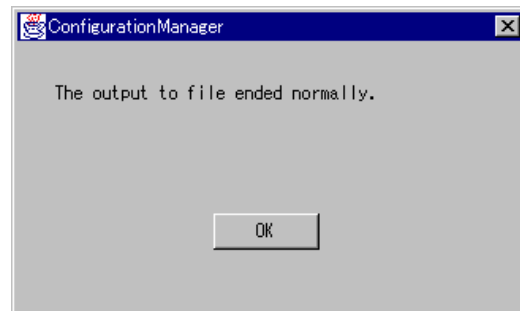
When you want to make the output from the both Controllers at the same time, select the both of them.

- (6) When the [Output Directory] button is clicked, the window for specifying the directory, to which the Controller failure dump information is to be output, is displayed.
Specify the directory to which the Controller failure dump information is to be output.
When no directory is specified, the information is output to the directory in which the Disk Array management program is installed.



Specify the directory and click the [OK] button. The specified directory is displayed in the text box.

- (7) Click the [All Output] button.
(8) When the message notifying that the specified information has been output is displayed, click the [OK] button.



The output Controller dump information is 10 Mbytes long per Controller and output with the following file name.

- Controller failure dump information on the Controller 0: ctldump.00
- Controller failure dump information on the Controller 1: ctldump.01

2.6.5 Collect memory dump

The method of collecting the memory dump is shown below.

(1) Before collecting the memory dump

(a) Items to be prepared

The memory dump is collected in the maintenance mode of the WEB.

To connect to the WEB, prepare a terminal device to be used as a browser (Microsoft (R) Internet Explorer Ver. 5.0, or Netscape Communicator Ver. 4.7).

A Disk drive having available area of at least 360 Mbyte is necessary for collection of the memory dump.

(b) Collect the memory dump information from each Controller.

Save the files collected from different controllers into different directories or put different names to them so that you will see from which controller they were collected.

(c) Check that the WARNING LED (Orange) of the front bezel of RK is not blinking fast (at the interval of 125ms). If it is, wait for a while (up to 80 seconds), and it stops blinking fast.

(If this LED is blinking slow (at the interval of 1 second), there are no problems.)

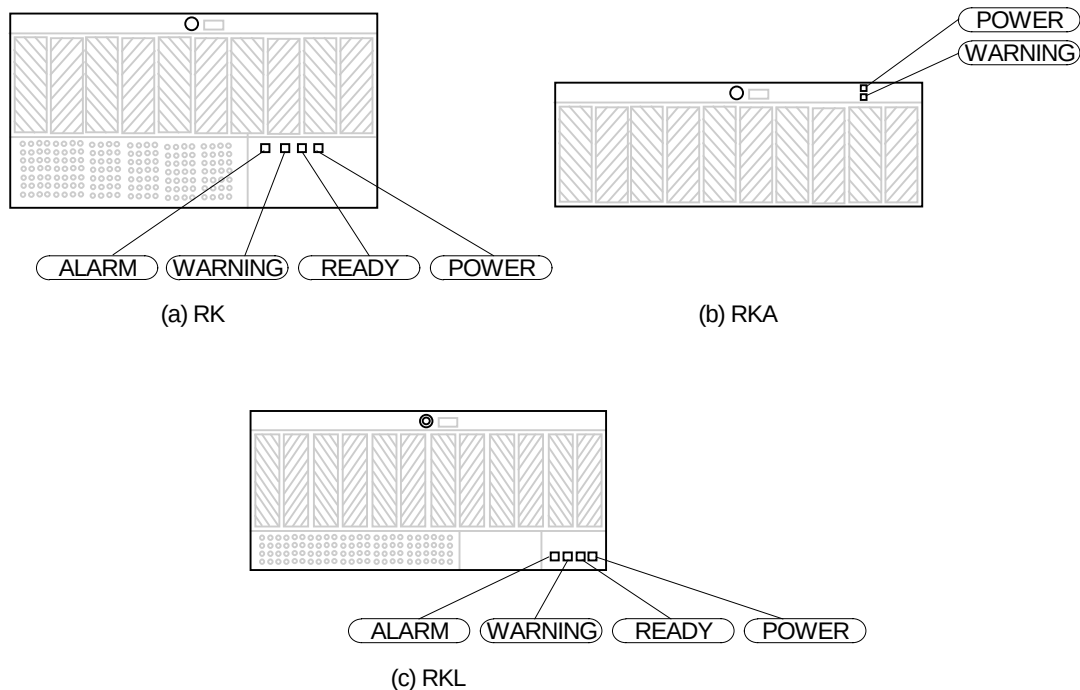


Figure 2.6.8 Indication Locations and Names of LED (Front Bezel)

- (2) Procedure for a memory dump collection in the single system
- (a) Please push the SRST switch of Controller.
- (The Controller enter the WEB maintenance mode.)

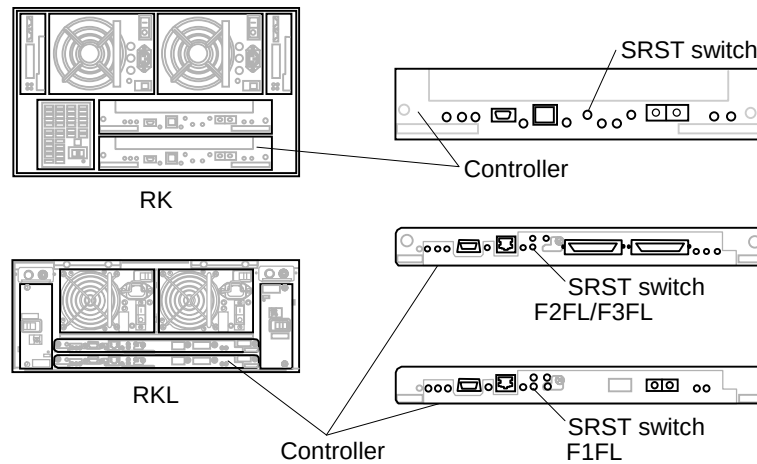
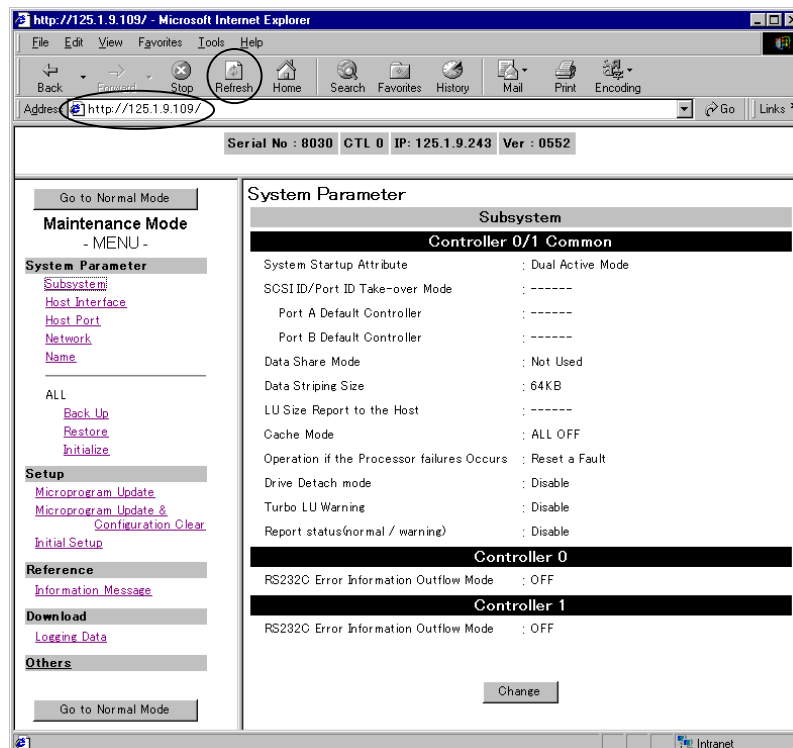
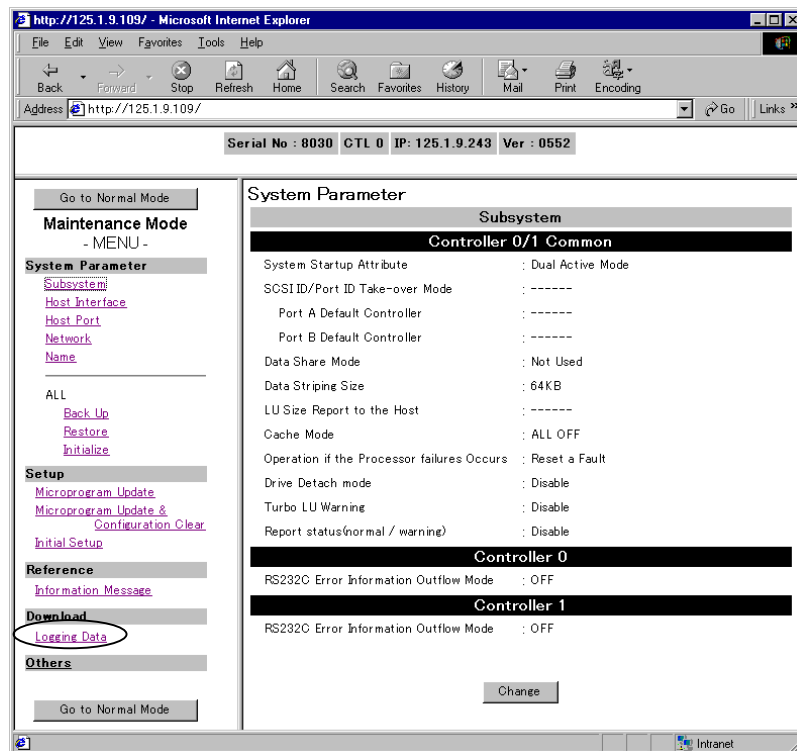


Figure 2.6.9 Indication Locations of Controller

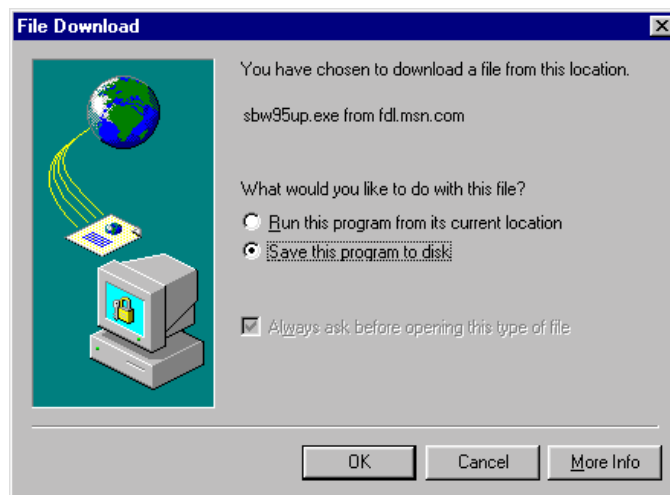
- (b) Please input the IP Address of the Controller where it was connected with the network to the browser. Please input the page by the “Refresh” button of the browser if it has already been connected with WEB.



- (c) Collect the memory dump according to the WEB and the following procedure.
Click “Logging Data” in the menu frame of “Download”.



The following dialog is displayed.
Select [Save this program to disk] and click [OK].



Select the place to save the file and file name (Default file name: logging.dat) and click [Save]^{‡1}.



The down-loading is started and the progress indicating message window is displayed. When the down-loading completes, the progress indicating message window is closed.

(d) Turn the power off.

‡1 : There may be a case where the default file name is given as “logging.dat” depending on the setting of the PC. In this case, reset the file name to “logging.dat” or any other name.

- (3) Method of collecting memory dump from dual-Controller system-1
(When the user's work is stopped and the memory dumps are collected from both Controllers.)

Notice : If either Controller is blocked, collect the memory dump from that Controller first.

- (a) Press the SRST switch of the blocked Controller. (If both Controllers are normal or blocked, press the SRST switch of either one.)
Wait for a while (about ten seconds) and check that the FAILED LED of the Controller lights up.
Within ten seconds after the FAILED LED lights up, press the SRST switch of the other Controller.
(Sometimes the buzzer may beeps when the SRST switch is pressed, however, you do not have to stop it until these operations are completed.)
When ten seconds or longer pass after the FAIL LED of the Controller concerned comes on, return to the beginning of the step (a) and execute the procedure over again.
(When the above procedure is executed, the both Controllers enter the Maintenance mode of the WEB.)

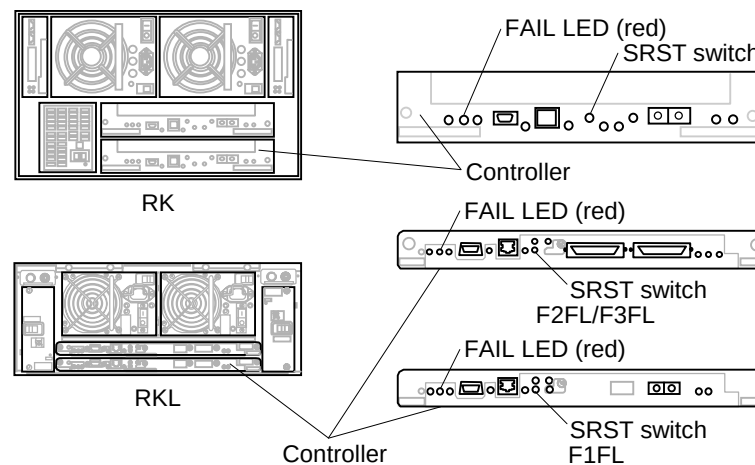


Figure 2.6.10 Indication Locations of Controller

- (b) Input the IP address of the controller from which the memory dump will be collected, through the browser.
If the system has been connected to the WEB, press the “Refresh” button to update the page.
- (c) Collect the memory dump according to the WEB similarly to the memory dump of the single-Controller system.
Perform the operation in (2) (c).

- (d) Return to (b) and collect the memory dump from the other Controller.
(Save the memory dump files collected from different Controllers into different directories or put different names to them so that you will see from which controller they were collected.)
- (e) Turn off the power of the unit.

- (4) Method of collecting memory dump from dual-Controller system-2
(When the memory dump is collected from a blocked Controller.)

Notice : Precaution: Collect the memory dump from only the blocked Controller.
(The FAIL LED (red) of the blocked controller is lighting up.)

- (a) Press the SRST switch of the blocked Controller.
(The Controller will be set in the maintenance mode of the WEB.)

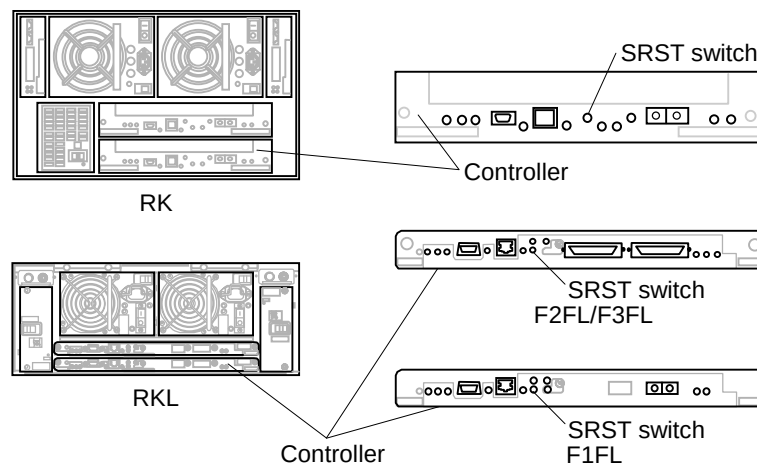


Figure 2.6.10 Indication Locations of Controller

- (b) Input the IP address of the Controller from which the blocked Controller, through the browser.
If the system has been connected to the WEB, press the update button to update the page.
- (c) Collect the memory dump according to the WEB similarly to the memory dump of the single-Controller system.
Perform the operation in (2) (c).

(5) Compression of collected information

Compress the collected information with a personal computer, etc. according to the following procedure.

- (a) Move to the directory where the dump data is saved (Set this directory as the current directory).

lha a : Output file name^(‡1) Dump file name^(‡2)

‡1 : When the dumps of both controllers were collected, put different names to the files so that the origin of the data can be distinguished.

‡2 : Use the dump file name collected in (2), (3), and (4).
(Default file name: logging.dat)

2.7 Procedure for Recovery from the Suspension Status (PSUE) with MRCF-Lite Function

This is a procedure for acquiring a pair status of an LU that is an object of the MRCF-Lite function or detailed information on a cause of a failure that has put the subsystem in the PSUE status and whether data of the primary/secondary volume is assured or not.

Use this procedure when detailed information on a cause of a failure that has put the subsystem in the PSUE status is necessary or a user asks a procedure for a pair recovery to be done by the user.

[Step 1] Trace collection performed with the subsystem power on

Collect a trace while the subsystem power is on. (Refer to Subsection 2.6.3, "Collection of trace in the ON state" on page MNTE 02-1280.)

[Step 2] Trace analysis

Analyze the trace collected in step 1 with the trace analysis tool.

For how to select it, refer to the following.

- Item (3) in Subsection 2.6.3, "Procedure for installing the trace analysis tool" on page MNTE 02-1360.
- Item (4) in Subsection 2.6.3, "Procedure for analyzing a trace" on page MNTE 02-1370.

When selecting items to be analyzed with the trace analysis tool (see page MNTE 02-1380), select "2. Configuration (CONFIG. TXT)" and "A. MRDF-Lite Failure Trace (Cx-MRCF. TXT).

[Step 3] Grasping status of PSUE pair

(a) Acquiring a subsystem serial number from the configuration information

Select the analysis item of the trace analysis tool, "2. Configuration (CONFIG. TXT)."

Get the subsystem serial number by referring to the " subsystem serial number" in the information displayed. The following example shows that the subsystem serial number is "0011."

```
SERIAL Number (SERIAL NO) = 0011
```

(b) Acquiring PSUE pair from the configuration information

Select the analysis item of the trace analysis tool, "2. Configuration (CONFIG. TXT)."

Get the PSUE pair by referring to the " Information of MRCF-Lite pair" in the information displayed. The following example shows that a pair of LUs with LU numbers 17 and 18 is in the PSUE status.

```
---- MRCF-Lite Configuration ----
P-VOL.  S-PVOL  PairStatus
  1      2      COPY [Initial Copy]
  3      4      COPY [Initial Copy + Split]
  5      6      COPY [Initial Copy(P-VOL → S-VOL)]
  7      8      COPY [Initial Copy(S-VOL → P-VOL)]
  1     10      COPY [Initial Copy Skip]
 11     12      COPY [Initial Copy Skip + Split]
 13     14      PAIR
 15     16      PSUS
 17     18      PSUE
```


- (c) Grasping statuses of primary and secondary volumes using the MRCF-Lite failure information

Select “A. MRDF-Lite Failure Trace (Cx-MRCF. TXT)” from items to be analyzed with the trace analysis tool.

```

*****
---- Error Information ----
Error Code   : [0105]
Time        : 01-03-15 08:39:42

---- Current LU Information ----
[P-VOL]
LUN         : 35
STATUS      : BAD
[S-VOL]
LUN         : 56
STATUS      : BAD

---- Pair Status of Pre-PSUE ----
Pair Status  : COPY
Copy Mode    : Resync copy(P-VOL → S-VOL)
*****
      .
      .
      .
*****

---- Error Information ----
Error Code   : [0106]
Time        : 01-03-15 08:39:41

---- Current LU Information ----
[P-VOL]
LUN         : 29
STATUS      : GOOD
[S-VOL]
LUN         : 30
STATUS      : BAD

---- Pair Status of Pre-PSUE ----
Pair Status  : COPY
Copy Mode    : Resync copy(P-VOL → S-VOL)
*****

```

Check if the displayed pairs are those found in the step (a) in order to judge each of the displayed information is on a failure, which has currently occurred. You can judge it by comparing an LUN of the each pair.

(i) Configuration Information

```

---- MRCF-Lite Configuration ----
P-VOL.  S-PVOL  PairStatus
  1       2     COPY [Initial Copy]
  3       4     COPY [Initial Copy + Split]
  5       6     COPY [Initial Copy(P-VOL → S-VOL)]
  7       8     COPY [Initial Copy(S-VOL → P-VOL)]
  1      10     COPY [Initial Copy Skip]
 11      12     COPY [Initial Copy Skip + Split]
 13      14     PAIR
 15      16     PSUS
 17      18     PSUE

```

(ii) Error Information

```

*****
---- Error Information ----
Error Code   : [0201]
Time        : 01-03-15 08:39:37

---- Current LU Information ----
[P-VOL]
LUN         : 17
STATUS      : GOOD
[S-VOL]
LUN         : 18
STATUS      : BAD

---- Pair Status of Pre-PSUE ----
Pair Status  : COPY
Copy Mode    : Initial Copy
*****

```

The data status of P-VOL/S-VOL depend on the error information.

```

STATUS ..... Data Guarantee
              ..... GOOD ( with Data Guarantee)
              ..... BAD (without Data Guarantee)
              ..... GRAY (GOOD or BAD)

```

(d) Error factors

Identify a cause of a failure through an error code in the failure information. A list of recovery actions corresponding to error codes is shown below. When no failure information is displayed, the error code cannot be known. However, the necessary recovery action will be done when a recovery action against a failure that has already occurred is taken because a failure has surely occurred.

Table 2.7.1 Recovery actions corresponding to error codes

No.	Error code	Error factor	Recovery procedure	Remarks
				CK:Floer Model(CK) RK:Ruck mount model (RKRKA) MK:Floer Model (MK) RKL:Floer Model (RKL)
1	0101	A correction read from the copy source cannot be done. (A second drive error occurred.)	A failure of the subsystem has occurred. Recover the subsystem from the failure.	MENTE 02
2	0102	A Data copying from the copy source to the copy destination cannot be done. (An error caused by a factor of the controller occurred in the DRR when the copying was done.)	Perform a sequential shutdown after consulting a user ^{*1} , and then replace the controller (when the error occurred in the single controller or one of the dual controller.)	H1F:04-0200 RK:04-0650 MK:04-1090 RKL:04-1430
3	0103	A correction date creation of the copy source failed. (An error caused by a factor of the controller occurred in a DRR when the parity was created.)		
4	0104	There is a part (data or parity portion) where a writing was not completed in the the copy source LU.	A failure of the subsystem has occurred. Recover the subsystem from the failure.	MENTE 02
5	0105	A staging of the copy source cannot be done. (Errors occurred in the two or more drives at a time during a copying.)		
6	0106	A time-out occurred during a copying when waiting for an RDEV.		
7	0107	A time-out occurred during a copying when waiting for a DRR.	Replace the controller whose FAIL LED is on.	H1F:04-0200 RK:04-0650 MK:04-1090 RKL:04-1430
8	0108	There is inconsistency in a parity portion on the write side of the copy source LU	A failure of the subsystem has occurred. Recover the subsystem from the failure.	MENTE 02
9	0109	A Data copying from the copy source to the copy destination cannot be done. (An error caused by a factor of the cache occurred in the DRR when the copying was done.)	Replace the cache memory in the slot with the number designated in the cache failure occurred immediately before.	H1F:04-0360 RK:04-0830 MK:04-1240 RKL:04-1650
10	010A	A correction date creation of the copy source failed. (An error caused by a factor of the cache occurred in a DRR when the parity was created.)		
*1: Replace the controller in which the failure occurred. However, do it after consulting with the user because the controller is not blocked.				

No.	Error code	Error factor	Recovery procedure	Remarks
				CK:Floer Model(CK) RK:Ruck mount model (RKRKA) MK:Floer Model (MK) RKL:Floer Model (RKL)
11	0201	A power failure and cache volatilization occurred during a copying to the secondary volume.	Notify that a power failure has occurred.	—
12	0202	The controller was blocked during a copying to the secondary volume.	Replace a controller whose FAIL LED is on.	H1F:04-0200 RK:04-0650 MK:04-1090 RKL:04-1430
13	0203	A CHK1 reset occurred during a copying to the secondary volume.		
14	0204	A DRR time-out occurred during a copying to the secondary volume.		
15	0205	An abnormal POST was received from the DRR during a copying to the secondary volume (when the subsystem is operating with a single controller because a CHK1 reset occurs with the dual controller). (The error was caused by the controller.)	A failure of the subsystem has occurred. Recover the subsystem from the failure.	MENTE 02
16	0206	An abnormal POST was received from the DRR during a copying to the secondary volume (when the subsystem is operating with a single controller because a CHK1 reset occurs with the dual controller). (The error was caused by the cache.)	Replace the cache memory in the slot with the number designated in the cache failure occurred immediately before.	H1F:04-0360 RK:04-0830 MK:04-1240 RKL:04-1650
17	0301	A data trouble occurred in addition to a PIN OVER in the PAIR or COPY status	Recover the subsystem from the PIN OVER.	MNTE 02-1140
18	0401	A power failure and cache volatilization	Notify that a power failure has occurred and take a recovery action against the cache volatilization.	MNTE 02-1000
19	0402	An LU blockade occurred.	Take a recovery action against the LU blockade.	MNTE 02-1180
20	0501	The status was changed to PSUE according to an instruction by the user.	—	—

(e) Pare recovery information

Restore the data according to the "Statuses" of the P-VOL and S-VOL in the failure information.

This operation is to be done by the user because it requires an issue of the RAID Manager command.

Correspondences between recovery actions and volume statuses are shown in the table below.

Table 2.7.2 Data recovery procedure

Volume (Status)		P-VOL	
		GOOD	BAD
S-VOL	GOOD	Adopt the P-VOL data and resynchronize (pairresync) the S-VOL with the P-VOL.	—
	BAD	Data of the P-VOL is correct. Resynchronize (pairresync) the S-VOL with the P-VOL. Care should be taken because the data will be destroyed if the resynchronization is done in the reverse direction. However, the pair may have been deleted by the recovery action against the double failure of the drive. In this case, form the pair.	Neither the P-VOL nor S-VOL data are assured. Delete the pair, restore the backup to the P-VOL, and then form the pair again. However, the pair may have been deleted by the recovery action against the double failure of the drive

Chapter 3. Troubleshooting by Means of Error Notification Program

3.1 Troubleshooting by Means of SNMP Agent Support Function.....	03-0010
3.2 Troubleshooting by Means of Disk Array management program.....	03-0090

3.1 Troubleshooting by Means of SNMP Agent Support Function

The SNMP agent support function notifies a network monitoring personal computer or workstation, in which the SNMP manager program is installed, of failures of the disk array subsystem via the SNMP (Simple Network Management Protocol). This section explains the troubleshooting operation to be performed when the SNMP agent support function is used.

3.1.1 Maintenance with TRAP Codes

(1) Ascertaining failure information

An example of an output bay the TRAP issued by the disk array subsystem. (a) is an example of output by HP OpenView/NetM*COMET. (b) is an example of output by SunNet Manager.

(a) Example of trapped output by HP OpenView/NetM*COMET

If an error occurs, the following screen is popped up.

fan Failure event		Trap name	
May 12 (Friday), 2000 4p.m. 21 minutes 15 seconds			
fan	OK		

“Error event” in the “Event Category” box changes to “■”. Double-clicking this box displays an Error Event browser. For detailed information refer to the browser.

Event Category	
☒ Error event ☐ Threshold event ☐ Status event ☐ Setting event ☐ Application warning event ☐ All events	
[Read only]	

Error Event Browser		IP address or registered host model name		Generic Trap Code		Specific Trap Code	
File	Action	View					Help
Significance	Date	Source	Message				
Important warning area	2000/05/12 16:21:15	DF500	Trap:generic 6 specific:3 args (0):				
1 Event - Dangerous:0 Serious warning:1 Warning:0 Caution:0 Normal:0							

(b) Example of trapped output by SunNet Manager

The diagram shows a window titled "Event/Trap Report-DF500". Inside the window, there is a "Save" button and a "Device name:" label followed by a text input field. Below this is a "Remarks" label followed by a text input field containing "6". To the right of the "Remarks" field is a horizontal slider with "1" and "6" at its ends. Below the slider is a large text area containing the following text:

Fri Apr 12 13:29:06 2000 [DF500] : Trap :

sequence=1
receive- time=Fri Apr 12 13:29:06 2000
version=0
community=public
enterprise=Hitach,Ltd..system. storage. dfraid. dfraid
Lan
source-time=00:00:00.00
trap- type=Fan_Failure

Annotations with arrows point to specific parts of the form:

- An arrow points from the text "IP address or registered host model name" to the "Device name:" input field.
- An arrow points from the text "Trap name" to the "trap- type=Fan_Failure" line in the text area.

(2) Troubleshooting method

Perform maintenance referring to the output examples in (1) and according to Table 3.1.1, "Recovery Procedure for Each Trap Code".

Table 3.1.1 Recovery Procedure for Each Trap Code

No.	Generic Trap Code	Specific Trap Code	Trap name	Description	Recovery procedure	Remarks
1	0	0	coldStart	Power-on	This is not an error. Recovery operation is not necessary.	
2	4	0	authentication-Failure	Invalid SNMP access (The community name set for the subsystem differs from the community name accessed by the SNMP manager)	Change the community name set for the subsystem or the community name accessed by the SNMP manager so that they match. When changing the community name set for the subsystem, refer to "SNMP Agent Support Function User's Guide". When changing the community name accessed by the SNMP manager, refer to the manual of each manager.	
3	6	1	systemDown	Controller down	It is shown that a failure indicated by a message code with "H" at the top. For the detailed failure information, refer to the display of the WEB log message of the subsystem. Perform the maintenance instructed for message code H#####. "#####" is optional.	Refer to "2.4 Message Troubleshooting" (MNTTE 02-0420).
4	6	2	driveFailure	Disk shutdown	Perform the maintenance instructed. Message code : W060xy Message text : HDU alarm (Unit-x, HDU-y) The information corresponding to xy in the manual is not notified regarding the trap. Refer to the display of the WEB log message of the subsystem.	
5	6	3	fanFailure	Fan failure	Perform the maintenance instructed. Message code : W04000 Message text : FAN alarm	

No.	Generic Trap Code	Specific Trap Code	Trap name	Description	Recovery procedure	Remarks
6	6	4	powerSupply-Failure	Power supply failure	Perform the maintenance instructed. Message code : W050xy Message text : PS alarm (Unit-x, PS-y) The information corresponding to xy in the manual is not notified regarding the trap. Refer to the display of the WEB log message of the subsystem.	Refer to "2.4 Message Troubleshooting" (MNTE 02-0420).
7	6	5	batteryFailure	Battery voltage error	Perform the maintenance instructed. Message code : W03000 Message text : Battery alarm The information corresponding to xy in the manual is not notified regarding the trap. Refer to the display of the WEB log message of the subsystem.	
8	6	6	cacheFailure	Cache access error occurred	Perform the maintenance written. Message code : W0D0x0 Message text : CACHE alarm (CTL-y, CACHE-z) The information corresponding to x, y, and z, in the manual is not notified regarding the trap. Refer to the display of the WEB log message of the subsystem.	
9	6	7	upsFailure	UPS error	Perform the maintenance instructed. Message code : W0C000 Message text : UPS alarm	
10	6	9	backupCircuit-Failure	Battery circuit failure	Perform the maintenance instructed. Message code : W0340x Message text : Battery back up circuit alarm (CTL-x) The information corresponding to x in the manual is not notified regarding the trap. Refer to the display of the WEB log message of the subsystem.	

No.	Generic Trap Code	Specific Trap Code	Trap name	Description	Recovery procedure	Remarks
11	6	10	other-controller-Failure	Another side controller blockade (For dual configuration only)	Perform the maintenance instructed. Message code : W0100x Message text : CTL alarm (CTL-x) The information corresponding to <u>x</u> in the manual is not notified regarding the trap. Refer to the display of the WEB log message of the subsystem. When this trap is displayed following the No.14 "microprogram Replacement executed", it does not mean a failure because it is reported owing to the microprogram replacement.	Refer to "2.4 Message Troubleshooting" (MNTTE 02-0420).
12	6	11	warning	A warning was issued in the disk array subsystem.	It is shown that a failure indicated by a message code with "W" at the top. For the detailed failure information, refer to the display of the WEB log message of the subsystem. Perform the maintenance instructed for message code W#####. "#####" is optional.	
13	6	12	spareDrive-Failure	Spare disk blockade	Perform the maintenance instructed. Message code : W061xy Message text : Spare HDU alarm (Unit-x, HDU-y) The information corresponding to <u>xy</u> in the manual is not notified regarding the trap. Refer to the display of the WEB log message of the subsystem.	
14	6	13	microprogram-Replacement-executed	A micro program replacement executed (For dual configuration only)	Perform the maintenance instructed. Message code : W4600x Message text : Online Micro-update started (CTL-x) The message is the one informing that the microprogram replacement has been started as shown below, therefore, no maintenance work is necessary.	

3.1.2 Maintenance with MIB (df Regression) Values

(1) Confirming error information

Examples of output caused by a trap issued by the subsystem are shown below. (a) is an example of output by HP OpenView/NetM*COMET. (b) is an example of output by SunNet Manager.

For MIB values, see Table 3.1.3 “dfRegressionStatus Values and Failed Components”.

(a) Example of MIB value output by HP OpenView/NetM*COMET

MIB Browse

Node name or IP address: hsp1FSswb Community name:

MIB object ID: terprises.hitachi.systemExMib.storageExMib.dfraidExMib.dfraidLanExMib.dfWarningCondition

dfRegressionStatus (selected)

dfPreventiveMaintenanceInformation

dfWarningReserve1

dfWarningReserve2

Move tree upward

Move tree downward

Details

Inquiry start

Inquiry quit

Graph

MIB interface: SNMP set value: Setting (Set)

MIB value: **0:1048576**

Message: Note : Community "public" is used for node DF500.

Close Reselect Save... Help

dfRegressionStatus value

IP address or registered host model name

(b) Example of MIB value output by SunNet Manager

Event/Trap Report-DF500

Save Device name: _____

Remarks 19 1 19

Tue Jul 12 16:42:07 2000 [DF500] : Event : Hitachi-DF-RAID-LAN-MIB

dfRegressionStatus=**1048576** (Greater Than 0 Priority Low)
dfPreventiveMaintenanceInformationn=0
dfWarningReserve1=0
dfWarningReserve2=0

IP address or registered host model name

dfRegressionStatus value

Table 3.1.2 Format of dfRegressionStatus

Byte \ Bit	7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	0	Cache
1	0	0	0	Fan	BK	0	D.C.PS	Battery
2	0	0	0	0	0	0	Loop	UPS
3	CTL	Warning	0	0	ENC	D-Drive	S-Drive	Drive

When a regression is applied to the part concerned, turn on the corresponding bit.
Value of the object corresponding to each failure status is shown in Table 3.1.3.

Table 3.1.3 dfRegressionStatus Value Corresponding to Each Failure

No.	Bit location		Object value (in decimal)	Description
	Byte	Bit		
1	—	—	0	The disk array is normal.
2	3	0	1	Disk drive (data disk or Spare disk) blockade.
3	3	1	2	Disk drive (Spare disk) blockade.
4	3	2	4	Disk drive (data disk) blockade.
5	3	3	8	ENC error.
6	3	6	64	Warning is arised in the disk array.
7	3	7	128	Mate controller blockade.
8	2	0	256	UPS error.
9	2	1	512	Loop error.
10	1	0	65536	Battery error.
11	1	1	131072	AC/DC power supply error.
12	1	3	524288	Battery circuit error.
13	1	4	1048576	Fan error.
14	0	0	16777216	Cache access error.

When two or more failed parts exist, the object value is the sum of each object value.

Example : When failures occur in the battery and the fan, the object value is
“1114112 (65536+1048576)”.

The object value converted into binary form corresponds to the format shown in Table 3.1.2.

(2) Troubleshooting procedure

Perform a maintenance by associating the item in the description column in Table 3.1.3 with the contents of Table 3.1.1.

3.2 Troubleshooting by Means of Disk Array management program

The Disk Array management program notifies of failures of the disk array subsystem by the failure monitoring function.

This section explains the troubleshooting operation to be performed when the Disk Array management program is used.

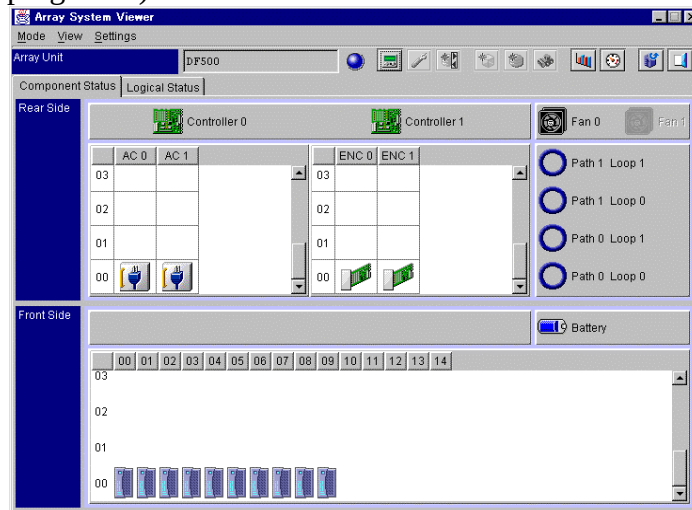
3.2.1 Maintenance with the Disk Array management program (GUI version)

(1) Display of subsystem status

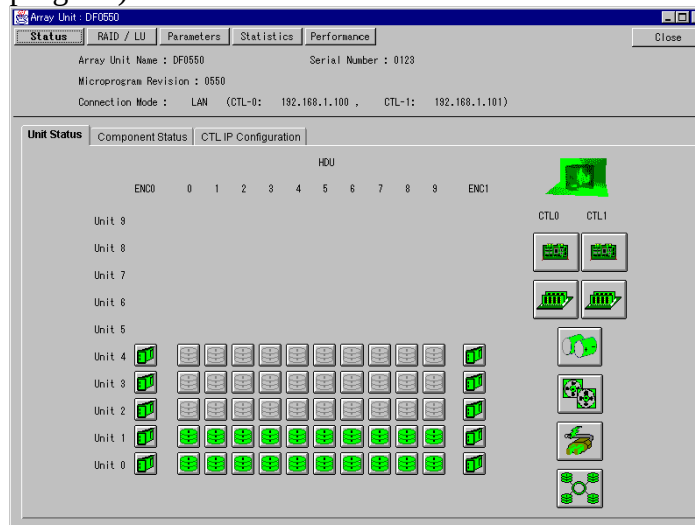
The layout of the window, which displays statuses of the components in the disk array subsystem, of the Disk Array management program is shown below.

- RK/RKA

(Disk Array management program 2)

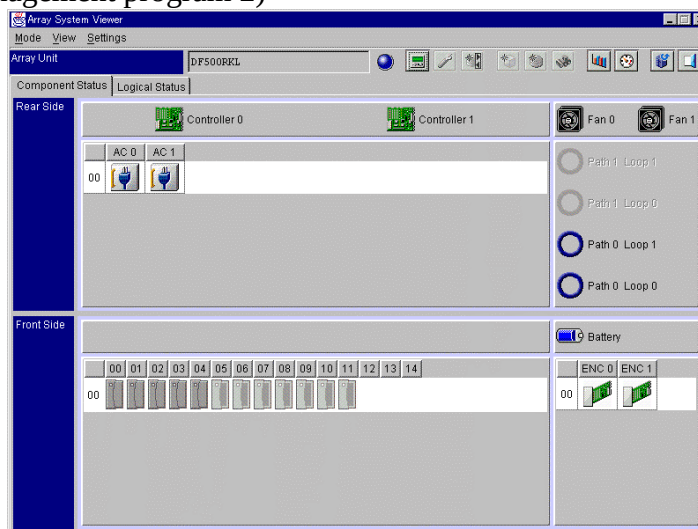


(Disk Array management program)

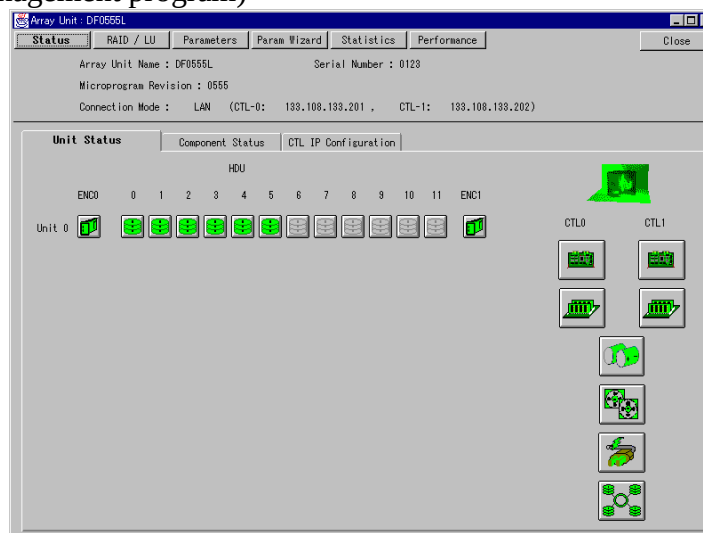


- RKL

(Disk Array management program 2)



(Disk Array management program)



When a failure occurs in a component such as the Disk drive, Controller, Battery, Fan, and Cache memory in the disk array subsystem, the component concerned is displayed with an icon colored in red.

(2) Troubleshooting method

Perform maintenance referring to the display examples in (1) and according to Table 3.2.1, “Recovery Procedure for Each Error Display”.

Table 3.2.1 Recovery Procedure for Each Error Display

No.	Error Display	Description	Recovery procedure	Remarks
1	 : Red	• Busy or Disk drive detached for Restoring/Waiting for Restore • Inserted Disk drive did not spin-up (RAID group defined)	Perform the maintenance instructed. Message code : W060xy Message text : HDU alarm (Unit-x, HDU-y)	Refer to “2.4 Message Troubleshooting” (MNTE 02-0420)
2	 : Red line	• The Disk drive is blocked and uninstalled		
3	 : Red	• Busy or Spare disk detached for Restoring/Waiting for Restore	Perform the maintenance instructed. Message code : W061xy Message text : Spare HDU alarm (Unit-x, HDU-y)	
4	 : Red line	• Though the disk array subsystem is set to use a Spare disk, but the Spare disk is not installed		
5	 : Yellow	• A cache backup circuit error occurred	Perform the maintenance instructed. Message code : W0340x Message text : Battery back up circuit alarm (CTL-x)	
6	 : Red	• Controller down	Issuance of this trap indicates that an error beginning with message code “H” occurred. For detailed error information, see the WEB log message display of the subsystem. Perform the maintenance instructed. Message code H#####. “#####” is optional.	
7	 : Red	• Fan error	Perform the maintenance instructed. Message code : W04000 Message text : FAN alarm	
8	 : Red	• AC/DC power supply error	Perform the maintenance instructed. Message code : W050xy Message text : PS alarm (Unit-x, PS-y)	
9	 : Red	• Battery voltage error	Perform the maintenance instructed. Message code : W03000 Message text : Battery alarm The information corresponding to xy in the manual is not notified regarding the trap. See the WEB log message display of the subsystem.	
10	 : Red	• Cache access error	Perform the maintenance instructed. Message code : W0D0x0 Message text : CACHE alarm (CTL-y, CACHE-z)	

No.	Error Display	Description	Recovery procedure	Remarks
11	 : Red	• ENC error	Perform the maintenance instructed. Message code : W090 <u>xy</u> Message text : ENC alarm (Unit- <u>x</u> , ENC- <u>y</u>)	Refer to "2.4 Message Troubleshooting"
12	 : Red	• Loop error	Perform the maintenance instructed. Message code : W080 <u>xy</u> Message text : Loop alarm (Path- <u>x</u> , Loop- <u>y</u>)	(MNTE 02-0420).

Chapter 4. Parts Replacement

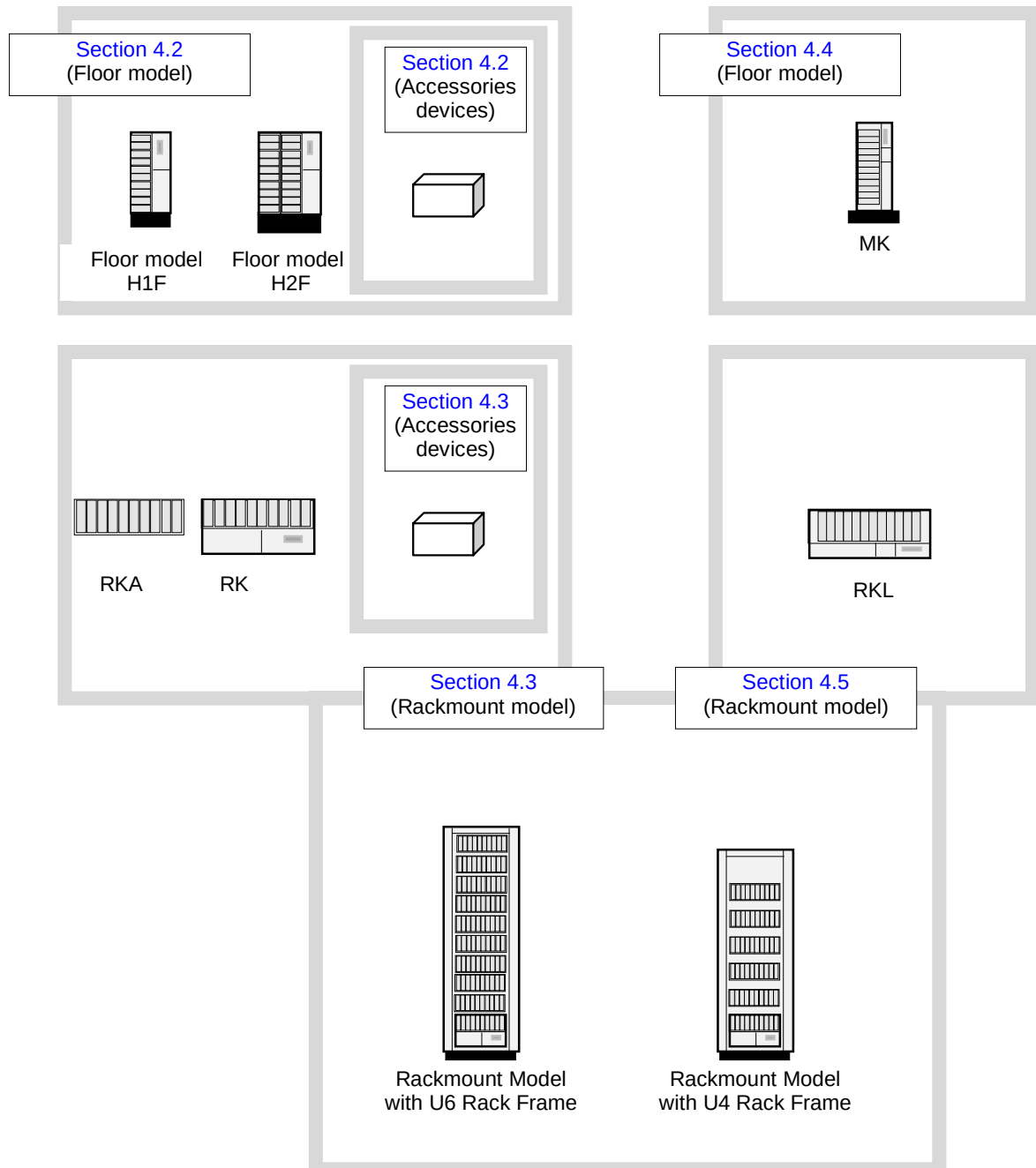
This chapter explains procedures for replacing parts which is specified as maintenance parts and identified as failed parts through troubleshooting, etc..

- 4.1 Before Starting Maintenance Work 04-0010
- 4.2 Replacing Parts of Floor Model (H1F/H2F) 04-0030
- 4.3 Replacing Parts of Rackmount Model (RK/RKA).....04-0530
- 4.4 Replacing Parts of Floor Model (MK) 04-0990
- 4.5 Replacing Parts of Rackmount Model (RKL).....04-1400

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4.1 Before Starting Maintenance Work

- (1) The DF500 is used as one of three types of floor model or rackmount model produced through a combination of the RK, RK+RKA, or RKL with the kit exclusive to the combination.

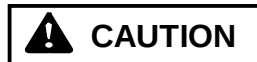


(2) Perform the powering on/off operation correctly.

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.

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.

Since the power supplying system is duplicated, operate breakers of the both systems when turning on/off the AC/DC power supplies.



- **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.**
- **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.**

(3) Backup user data.

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

- (4) When replacing a Disk drive, a Controller, a Battery unit, an ENC board, a Fan unit, and an AC/DC power supply unit while an array unit is powered on, replace those units 20 seconds or more after their respective failed units are removed.
- (5) When the WEB can be connected, backup the system parameters. (Refer to [MNTE 01-0140](#).)
- (6) 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.

4.2 Replacing Parts of Floor Model (H1F/H2F)

The floor model is produced by combining the RK or RKA with the kit for exclusive use.

4.2.1 Locations of replaceable parts

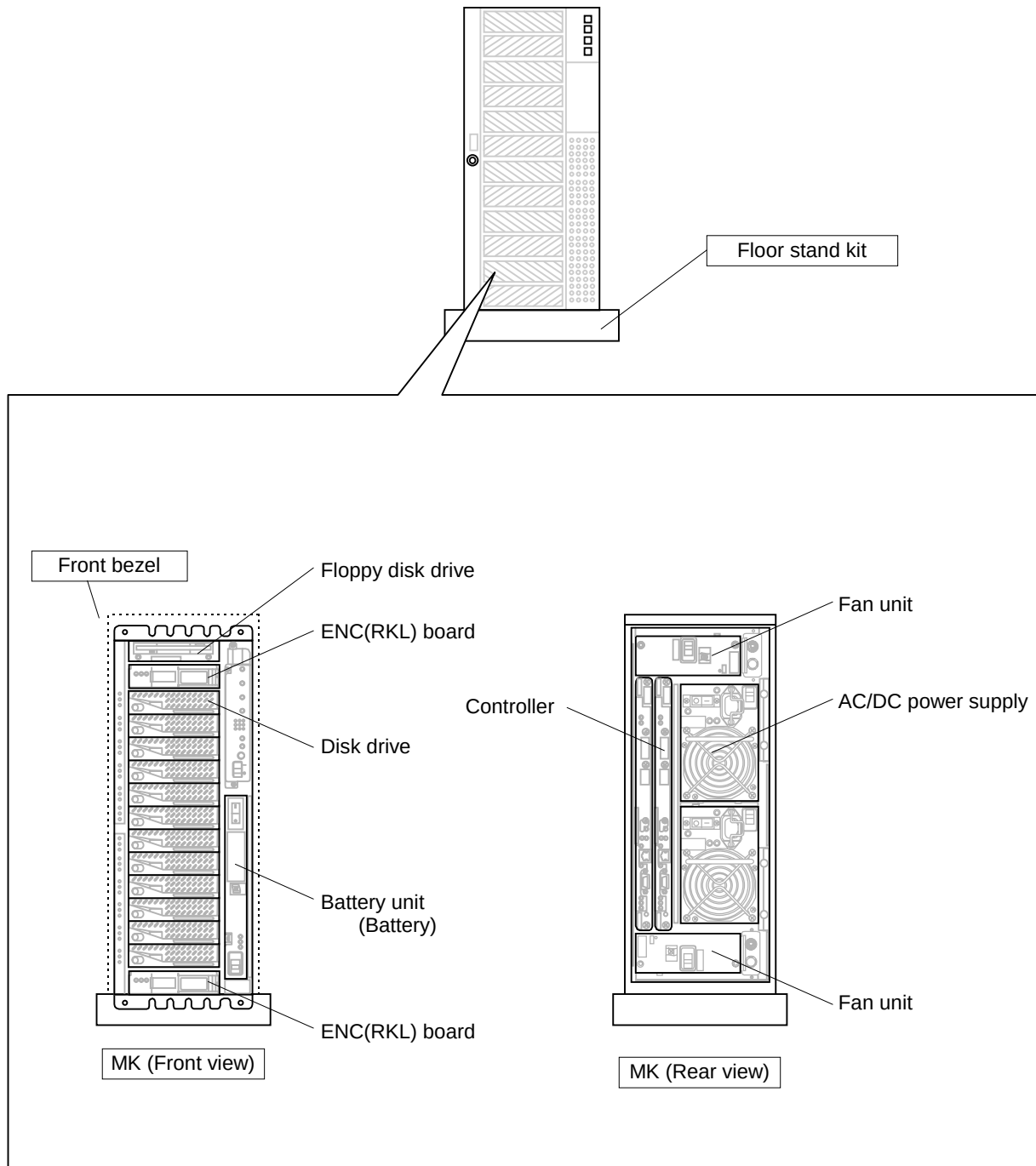


Figure 4.2.1 Replaceable Part Locations of Floor Model

**Table 4.2.1 Replaceable Parts and Condition of Power Supplying
when Replacing Each of Them**

	No.	Part name	Part No.	Model	Power supplying condition for replacement ^(*1)	
					ON	OFF
RK and RKA	1	Disk drive (8 G bytes)	5507067-1	DF-F500-AAF8	○ ^(*2)	Not applicable
		Disk drive (18 G bytes)	5507067-2	DF-F500-AAF18	○ ^(*2)	Not applicable
		Disk drive (18 G bytes)	5507067-44	DF-F500-AAH18	○ ^(*2)	Not applicable
		Disk drive (36 G bytes)	5507067-3	DF-F500-AAF36	○ ^(*2)	Not applicable
		Disk drive (72 G bytes)	5507067-4	DF-F500-AAF72	○ ^(*2)	Not applicable
	2	AC/DC power supply (RK)	5507067-5	—	●	○
	3	AC/DC power supply (RKA)	5507067-6	—	●	○
	4	Floppy disk drive	5507067-17	—	Not applicable	○
	5	Battery unit	5507067-16	—	○	○
	6	ENC (RK) board	5507067-13	—	●	○
	7	ENC (RKA) board	5507067-14	—	●	○
	8	Controller	5507067-12	DF-F500-F1F	●	○ ^(*3)
	9	Interface board (1 G bps Fibre Channel)	5507067-11	DF-F500-DFFM5	(●)	○
		Interface board (2 G bps Fibre Channel)	5507067-61	DF-F500-DF2G2	(●)	○
		Interface board (SCSI)	5507067-9	DF-F500-DFUDS	(●)	○
		Interface board (SCSI)	5507067-10	DF-F500-DFU2S	(●)	○
	10	Cache memory (256 M bytes)	5507067-7	DF-F500-C256	(●)	○
		Cache memory (512 M bytes)	5507067-22	DF-F500-C512	(●)	○
		Cache memory (1024 M bytes)	5507067-8	DF-F500-C1G	(●)	○
	11	Fan unit	5507067-18	—	○	○
Floor Stand Kit	1	PDB	5507067-24	—	●	○
*1 : Descriptions of the symbol. ○ : Replacement can be done on this condition. ● : Replacement can be done on this condition only when the part concerned has redundancy. (●) : Replacement can be done on this condition only when the Controller is duplicated. *2 : Power must be on. *3 : When the WEB cannot be connected, the Controller cannot be replaced while the subsystem power is off in the case of the dual controller configuration.						

4.2.2 Replacing Disk drive

Procedure for replacing the Disk drive varies depending on the RAID configuration and the set mode for data restoration. Confirm the RAID configuration and the set mode for data restoration of the subsystem, and then perform the replacement following the procedure shown below.

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	RAID level		Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	Indispensable	With the Spare disk (s)	RAID 0	See 4.2.2 (1-1)
				RAID 1, RAID 5, and RAID 0+1	See 4.2.2 (1-2)
			Without the Spare disk	RAID 0 ^(*1) RAID 1, RAID 5, and RAID 0+1	See 4.2.2 (2)
2	Replacement with the power turned off	Not applicable			—
*1 : The setting of spare disk for RAID 0 can be done by means of the dynamic sparing only.					

Notice : • Be sure to back up user data before starting the replacement.
When the set RAID group and LU are deleted or formatted, related user data will be lost.

- When the loop failure (W080xv Loop alarm) has occurred, recover the subsystem from the loop failure before replacing the Disk drive.
If the subsystem is not recovered from the loop failure, there may be a case where the replaced Disk drive is not recovered from the failure normally.

Mounting location number of Disk drive.

Mounting location number of Disk drive is a combination of a device number (Unit ID) and a Disk drive number which is assigned within the each RK/RKA individually. As the device IDs, #0 is assigned to the RK and numbers #1 to #9 are assigned to each RKA connected. As the Disk drive numbers, #0 to #9 are assigned to Disk drives mounted on the RK or RKA in the order from left to right when the RK/RKA is placed laterally.

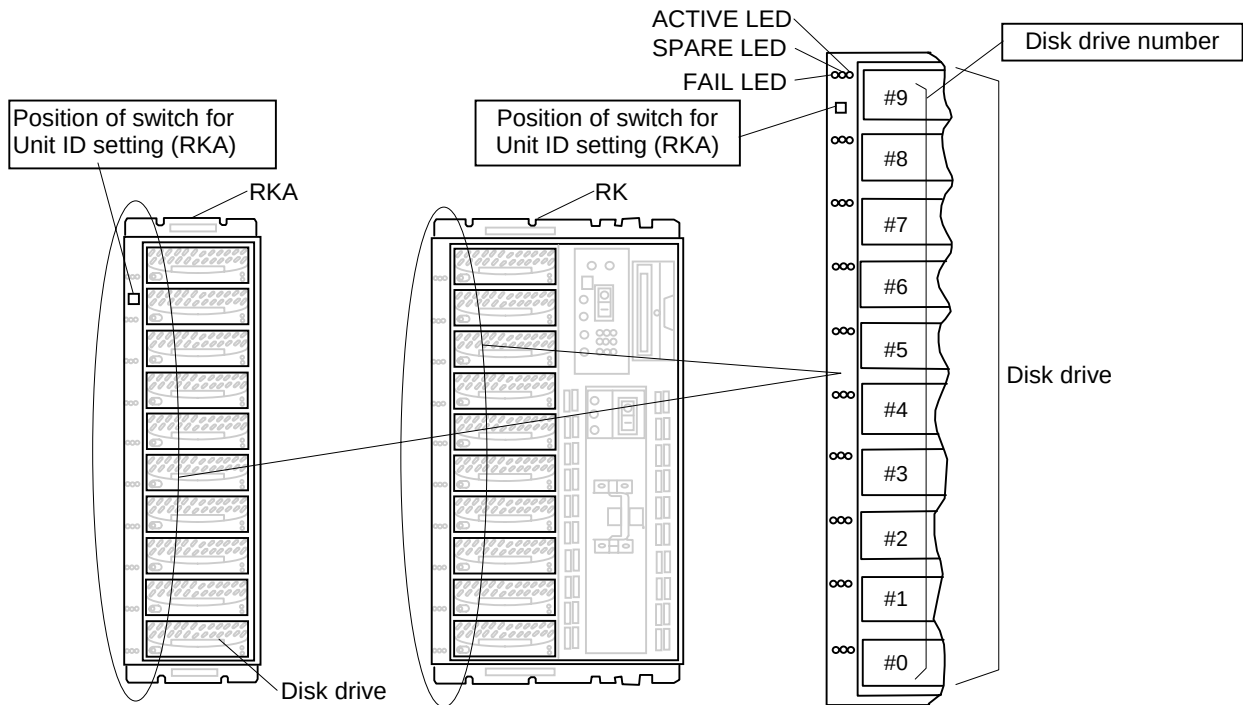


Figure 4.2.2 Mounting Locations of Disk Drives

(1) Procedure for replacing the Disk drive when the Spare disk is not set

(1-1) Replacing Disk drive in RAID 0 configuration

- (a) Make a backup of user data.
- (b) Remove the front bezel of the RK. (Refer to [MNTE 01- 0090.](#))
- (c) Make sure whether the Disk drive to be replaced is blocked or not by viewing the message of the WEB.
- (d) Remove the Disk drive to be replaced.

Operate the lock release button of the Disk drive and remove the Disk drive taking care not to apply any shock to it.

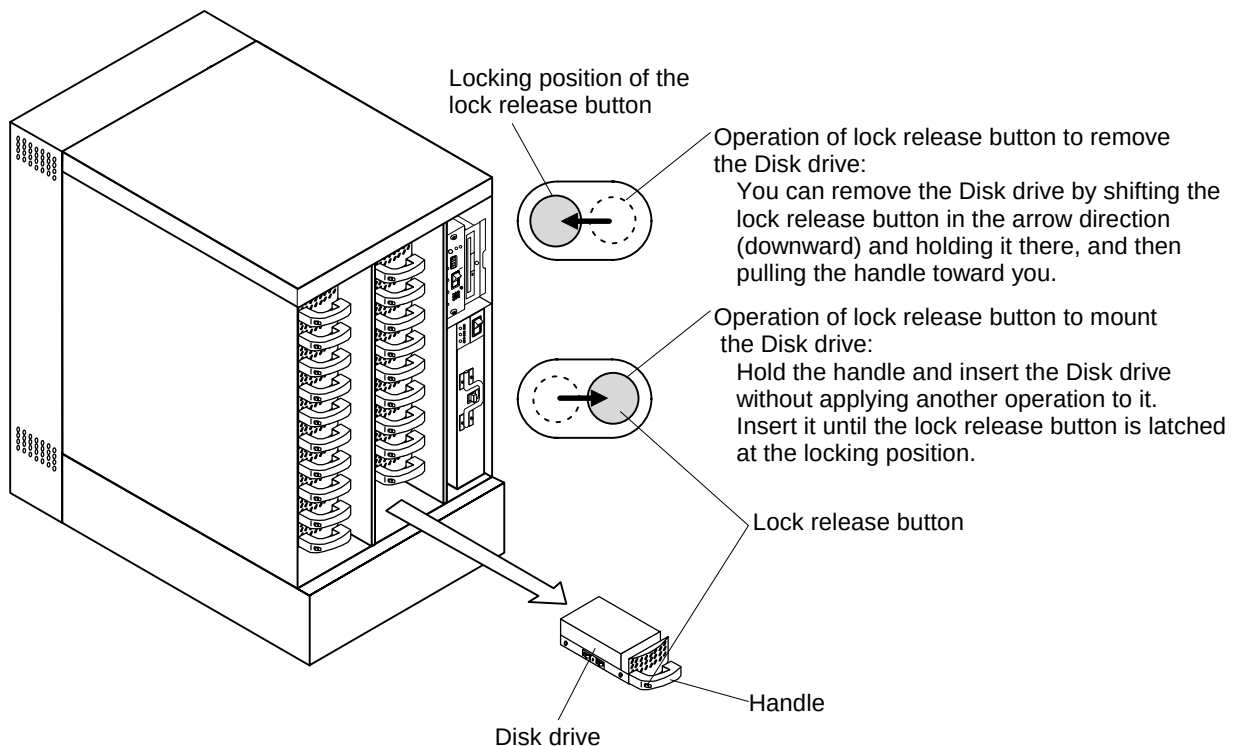


Figure 4.2.3 Operation of Lock Release Button of Disk Drive

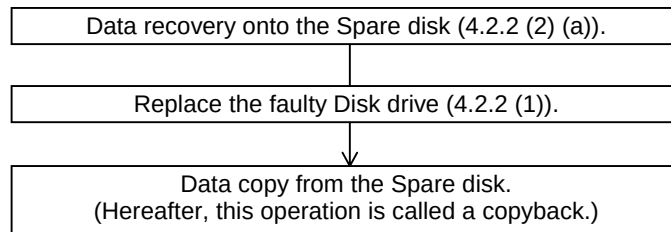
- (e) Wait for more than 20 seconds, and then insert a new Disk drive taking care not to apply any shock to it. (See Figure 4.2.3.)
If the Disk drive is inserted without waiting for 20 seconds, it is possible that the Disk drive is not recovered from the failure normally.
- (f) If the FAIL LED (red) of the Disk drive concerned is still on after the replacement, and replace the Disk drive again.
- (g) Format the LU. (Refer to [INST 06- 0410.](#))
- (h) Restore the data using the backup previously prepared.
- (i) Install the front bezel. (Refer to [INST 01- 0070.](#))

(1-2) Replacing Disk drive in RAID 1, 5, or 0+1 configuration

- (a) Remove the front bezel. (Refer to [INST 01- 0070](#).)
- (b) Check if the Disk drive to be replaced is blocked. When the Disk drive is blocked, the FAIL LED (red) at the location corresponding to the Disk drive concerned is on.
- (c) Operate the lock release button of the Disk drive to be replaced and remove the Disk drive taking care not to apply any shock to it.
- (d) Wait for than 20 seconds, and then insert the replacement Disk drive.
Operate the lock release button on the Disk drive and mount the Disk drive slowly taking care not to apply any shock to it.
If the Disk drive is inserted without waiting for 20 seconds, it is possible that the Disk drive is not recovered from the failure normally.
- (e) Make sure that the FAIL LED (red) of the replaced Disk drive goes out.
- (f) The data is restored automatically on the replaced Disk drive.
If the FAIL LED (red) of the Disk drive concerned is still on after the replacement, and replace the Disk drive again.
- (g) Select “Information Message” from the WEB and make sure that the data recovery is completed normally (I151xy Data recovery completed). (Refer to [WEB 02- 0120](#).)
- (h) Make sure that the WARNING LED (orange) on the panel is off.
- (i) Attach the front bezel. (Refer to [INST 01- 0070](#).)

‡1 : The copy back is done in the case where the automatic recover mode is set.

- (2) Procedure for replacing the Disk drive when the Spare disk is set
 The data recovery is executed as shown below.
 To replace Disk drive, refer to [Figure 4.2.3](#).



(a) Data recovery onto the Spare disk

There are two types of data recovery onto the Spare disk depending on the incentive.

- Data recovery onto the Spare disk when a failure in the disk is detected.
- Data copy onto the Spare disk when a disk is detected in which the error count has exceeded its threshold value. (This operation will be called “dynamic sparing” hereafter)

After the data recovery onto the Spare disk is completed, the recovered disk location can be found using the panel. (Refer to [WEB 03-0360](#), “[Information Message](#)”.)

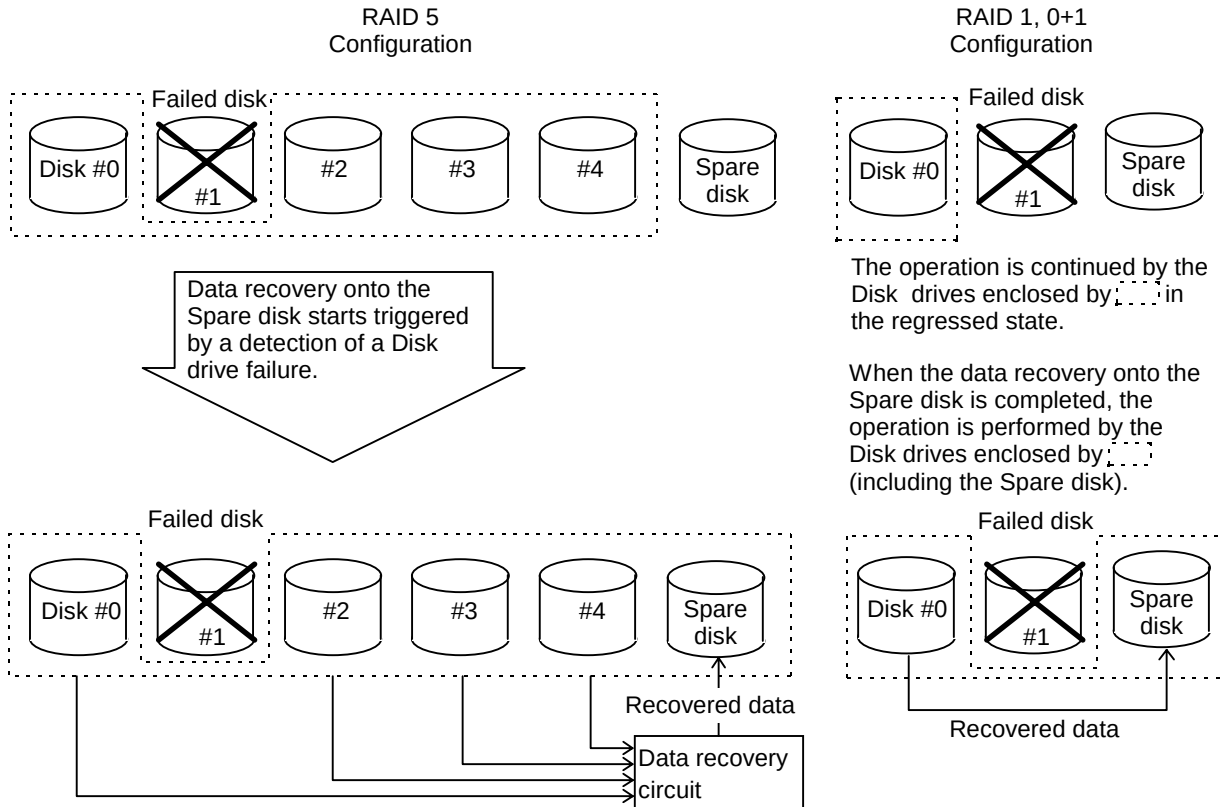
When the WEB cannot be connected, collect a trace while the subsystem power is on and refer to the WEB log message.

(b) Data recovery onto the Spare disk when a disk failure is detected

As to data recovery onto the Spare disk, as shown in the drawing on the following page, when a disk failure occurs, the data of the failed disk is recovered automatically onto the Spare disk.

Automatic recovery onto the Spare disk is executed only under the following condition.

Condition : “When a disk failure is detected, the Spare disk is an unused disk.”



In the following cases, the data recovery onto the Spare disk will not start automatically.

An action to start the data recovery is required.

- When the drive recovery option in the Disk Array management program^(‡1) the disk recovery mode is specified to is set to “not automatic mode”, the data recovery will not start automatically when the disk is replaced.

In this case, it is necessary to instruct recovery onto the Spare disk using the Disk Array management program.

- If a further disk failure occurs while the Spare disk is used already (data of a Disk drive has been already recovered onto the Spare disk), the data of the nearly failed Disk drive will not be recovered onto the Spare disk.

Data of the second failed Disk drive is also not restored on the Spare disk automatically even if the copyback is completed in the above status and the Spare disk goes out of use.

- If a Disk drive with no failure (a Disk drive which is not blocked) is removed, no data recovery onto the Spare disk will be executed. In this case, to recover data onto the Spare disk, it is necessary to instruct a recovery using the Disk Array management program^(‡1).

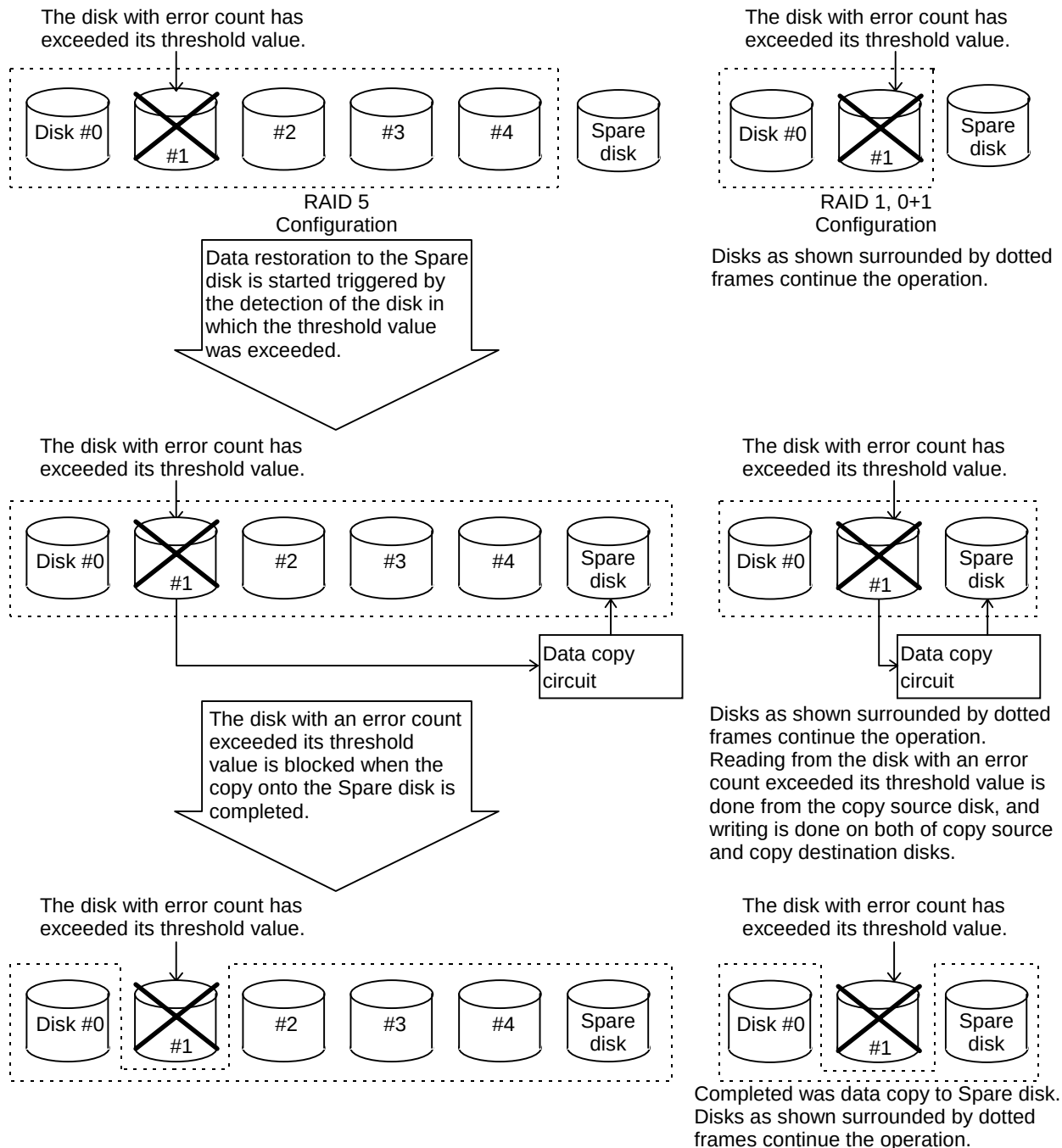
‡1 : For the details of the Disk Array management program, refer to the “Disk Array management program (for GUI) User’s Guide”.

(c) Data recovery onto the Spare disk by means of the dynamic sparing

Data recovery onto the Spare disk is performed as shown below. When a Disk drive is detected in which the error count has exceeded its threshold value, data stored in the Disk drive is copied automatically onto the Spare disk.

The automatic data recovery onto the Spare disk is performed only when the following condition is met.

Condition : The Spare disk is not in use when a disk is detected in which the error count has exceeded its threshold value.



The subsystem displays the following message on the panel when detecting a disk in which the error count has exceeded its threshold value.

MM/DD/YYYY	HH:MM:SS	Cx I41	■XY	HDU error over (Unit-X, HDU-Y)	: MANUAL / TRC
Date	Time	Detect Controller#	■: 0 to 9 or A to D		

At the time when an excess of the error occurrence count over threshold value is detected, only the display of the above message is done in the “Information Message” window of the WEB ([WEB 02-0120](#)), no regression of the Disk drive occurs, and the dynamic sparing is started.

The disk with an error count exceeded its threshold value is blocked after the dynamic sparing is completed.

Refer to page [MNTE 04-0160](#) for “Information Message” transition when the dynamic sparing is performed.

In the following cases in which a disk with an error count exceeded its threshold value is detected, the Disk drive is blocked without an execution of the dynamic sparing.

- When the dynamic sparing mode is set not to execute the dynamic sparing.
- When a disk with an error count exceeded its threshold value is detected after the data has been recovered or while the Spare disk is being used for the data recovery.
- Another Disk drive with an error count exceeded its threshold value is detected during the dynamic sparing operation.

In each case above, the disk with an error count exceeded its threshold value is blocked. Procedures for data recovery and Disk drive replacement are the same as those for the installation of the Spare disk.

Errors counted in the subsystem and default threshold values for them are listed below.

Item No.	Kind of error	Threshold (Default)
1	Disk mechanical error. (Recovered)	50
2	Disk mechanical error. (Un-recovered)	2
3	Disk medium error. (Recovered)	100
4	Disk medium error. (Un-recovered)	50
5	Disk R/W error. (Recovered)	10
6	Disk R/W error. (Un-recovered)	2
7	Disk I/F error. (Recovered)	50
8	Disk I/F error. (Un-recovered)	2
9	Disk hardware error. (Recovered)	50
10	Disk hardware error. (Un-recovered)	2
11	Disk SCSI I/F error. (Recovered)	50
12	Disk SCSI I/F error. (Un-recovered)	2
13	Collectable errors in online verify.	100
14	Un-correctable errors in online verify.	50

There threshold values above can be referred to and updated from the Disk Array management program^(‡1).

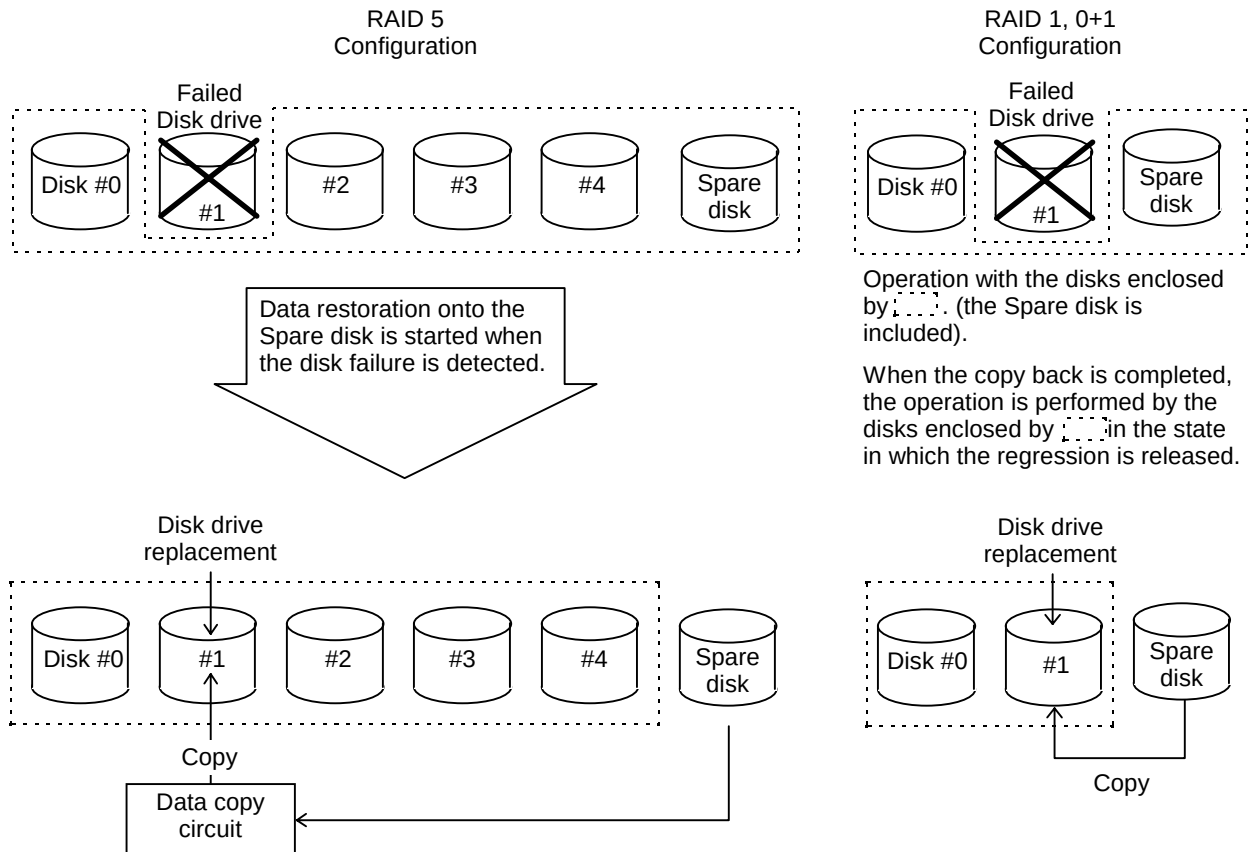
Besides, the then error count can be referred to concerning the recovered or un-recovered disk media errors, correctable errors in online verify operations, correctable errors, and un-correctable errors.

‡1 : For details of the Disk Array management program, refer to the “Disk Array management program (for GUI) User’s Guide”.

(d) Copy back

When a new Disk drive is inserted to where a failure occurred as shown in the drawing below, the copy back will be executed automatically.

When the failed Disk drive is replaced during the data recovery onto the Spare disk, after the data recovery is completed, the copy back will be executed automatically.



In the following cases, the copy back will not start automatically. Operation to start the copy back is required.

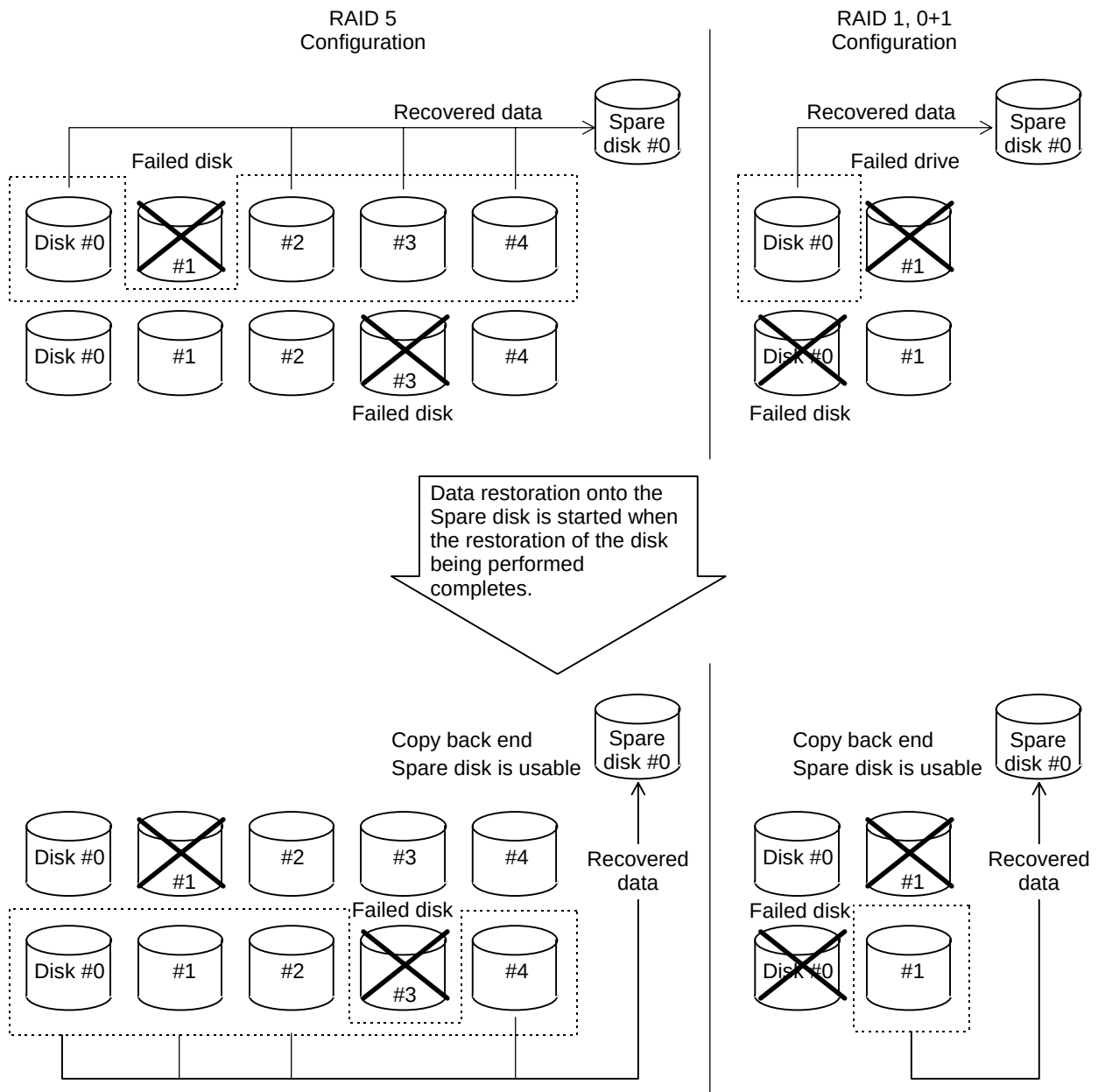
- When the drive recovery opportunity of the drive recovery option in the Disk Array management program is not set to "automatic start" (automatic), the continuous start is not done. To make the continuous start be done, the drive recovery opportunity of the drive recovery option in the Disk Array management program must be set to "automatic start" (automatic).

(e) The continuous data recovery

When failures occurred in plural disks, after the data recovery of the first disk is completed, the data recovery of the second disk will start automatically by the continuous data recovery.

The continuous start is performed (the specified mode is activated) only when the disk recovery mode is specified as “automatic start”.

Continuous starting is initiated not only when restoring using Spare disk, but also when making a collection copy to the original Disk drive, and when recovering with no Spare disk mounted.



In the following cases, the continuous data recovery will not start.

- When the drive recovery opportunity of the drive recovery option in the Disk Array management program is not set to “automatic start” (automatic), the continuous start is not done. To make the continuous start be done, the drive recovery opportunity of the drive recovery option in the Disk Array management program must be set to “automatic start” (automatic).
- When all Spare disks are used, if the blocked Disk drive is not replaced, the continuous data recovery will not start. If the Spare disk can be used or the blocked Disk drive is replaced, the continuous data recovery will start.
- The continuous data recovery will not start for detached Disk drive and uninstalled Disk drive.

(f) Transition of “Information Message”

When the recovery completes normally, the “Information Message” from the WEB ([WEB 02-0120](#)) change successively as shown below.

(i) Data recover (Data recovery onto the Spare disk when a disk failure is detected)

W060xy	HDU alarm	: Disk blocked
I150xy	Data recovery started	: Start of data area recovery
I151xy	Data recovery completed	: Completion of data area recovery
I008xy	Spare HDU recovered	: Completion of recovery onto Spare disk

(ii) Data recover (Dynamic sparing from data disk to Spare disk)

I15Axy	Dynamic sparing start	: Start of Dynamic sparing
I150xy	Data recovery started	: Start of disk recover
I151xy	Data recovery completed	: Completion of data recovery
I008xy	Spare HDU recovered	: Completion of recovery onto Spare disk
W060xy	HDU alarm	: Disk x, y were blocked

(iii) Copy back

I140xy	System copy started	: Start of system area recovery ^(‡1)
I141xy	System copy completed	: Completion of system area recovery ^(‡1)
I150xy	Data recovery started	: Start of data area recovery
I151xy	Data recovery completed	: Completion of data area recovery

When the recovery terminates abnormally, either ‘I142xy System cop failed’ or ‘I152xy Data recover failed’ is displayed. Take a recovery action following the messages.

‡1 : This message is displayed only when replacing Disk drive (#0 to #3) on the RK.

(g) Confirming completion of data recovery or copy back

Select “Information Message” from the WEB ([WEB 02-0120](#)) and make sure that the data recovery is completed normally.

**Table 4.2.2 (Example) Standard Times Required for Drive Recovery
in RAID 5(4D+1P) Configuration (Unit : Minute)**

Disk drive capacity	Revolution speed ^(*)
	10,000 min ⁻¹ (Type:AxFx)
8.7 G bytes	38
17.8 G bytes	75
35.7 G bytes	150
71.6 G bytes	300
*1 : Times shown in the above table are strictly standard ones. In some cases, the longer times may be required depending on the accesses from the host computer.	

4.2.3 Replacing Floppy disk drive

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	The Floppy disk drive cannot be used during the replacement.	See 4.2.3 (1).
2	Replacement with the power turned off	—	See 4.2.3 (2).

(1) Procedure for replacement with the power turned on

- (a) When a Controller blockade has occurred, replace the blocked Controller before replacing the Floppy disk drive.
- (b) Remove the front bezel of the RK side. (Refer to [INST 01- 0070](#).)
- (c) Take out the Floppy disk drive by pulling it toward you holding its knob.
- (d) Hold the Floppy disk drive by its knob and insert it along the guide rails of the subsystem (align the face of the Floppy disk drive with that of the subsystem).
When doing this, be careful not to insert the Floppy disk drive upside down.
- (e) Collect a trace from the independent subsystem while the subsystem power is on (refer to page [MNTE 02-1400](#) for “2.6.3 Collection of trace in the ON state”) to make sure that the trace collection terminates normally.

Notice : When the trace collection does not terminate normally,
the Controller may be faulty. Replace the Controller #0
(see page MNTE 04-0230).

(2) Procedure for replacement with the power turned off

- (a) Remove the front bezel of the RK side. (Refer to [INST 01- 0070](#).)
- (b) Turn off the main switch. (The POWER LED goes out.)
- (c) Remove the rear cover. (Refer to [INST 01- 0090](#).)
- (d) Make sure that the BACK UP LED (green) on the Controller is off. (This is to make sure that the disk array is not in the Cache Backup mode.)
- (e) Take out the Floppy disk drive by pulling it toward you holding its knob.
- (f) Hold the Floppy disk drive by its knob and insert it along the guide rails of the subsystem (align the face of the Floppy disk drive with that of the subsystem).
When doing this, be careful not to insert the Floppy disk drive upside down.
- (g) Turn on the main switch.
Make sure that the READY LED (green) has come on.
- (h) Attach the rear cover.
- (i) Attach the front bezel.

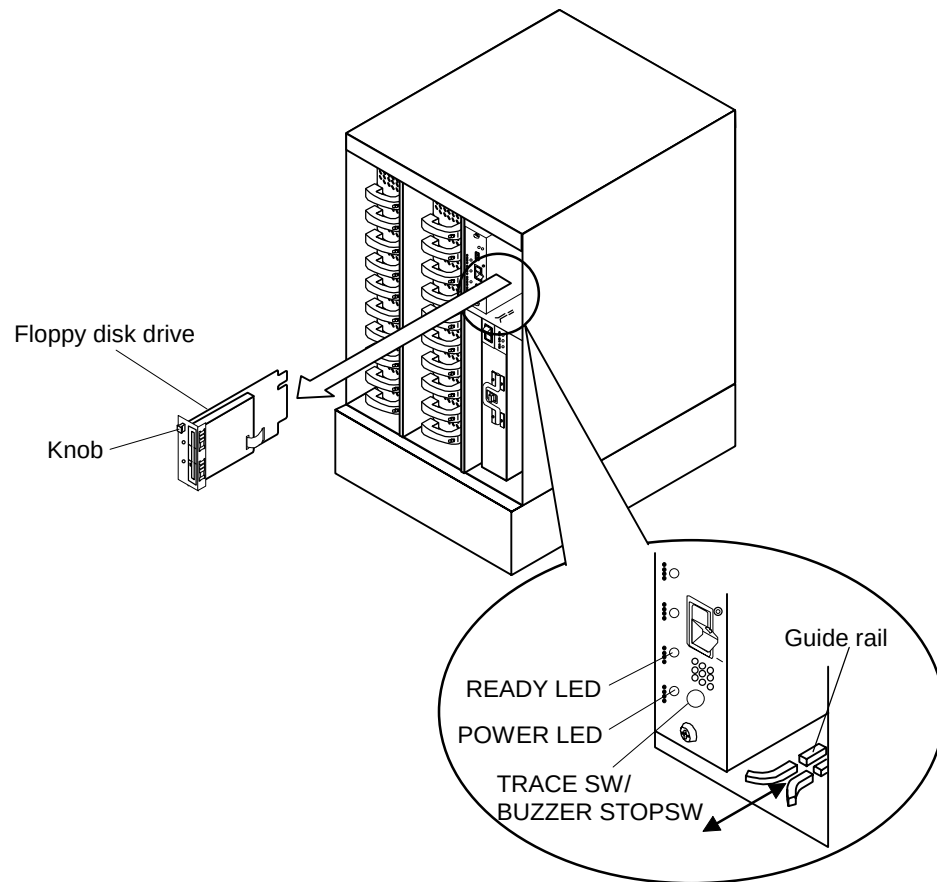


Figure 4.2.4 Replacing Floppy Disk Drive

4.2.4 Replacing Battery unit

Select a procedure from the following and execute it.

When replacing the Battery unit, remove or install it with its battery switch turned off.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	If the power is turned off during the replacement, data is not backed up because the power is not supplied from the battery.	See 4.2.4 (1)
2	Replacement with the power turned off	Apply this in the case where you do not want the preventive replacement against a self-recovered failure from being reported when the failure monitoring service is activated.	See 4.2.4 (2)



- **The lead battery contains poisonous substances. Besides, if it is handled improperly, an electric shock or explosion may be caused. Please follow the safety instructions below.**
 - ① **Do not disassemble or remake the battery.**
 - ② **Do not deform the battery.**
 - ③ **Do not connect plus and minus poles with a metallic article such as a wire.**
 - ④ **Do not reverse the connections of plus and minus poles.**
 - ⑤ **Do not peel off the covering tube.**
 - ⑥ **Do not connect the battery directly to the outlet.**
 - ⑦ **Do not connect the battery to anything other than this subsystem for charging/discharging.**
 - ⑧ **Do not leave the battery in a hot place. Store it in a dark and cool place.**
 - ⑨ **Do not discard a used battery at the site where it was removed for replacement.**

- (1) Procedure for replacement with the power turned on
 - (a) Remove the front bezel of the RK side. (Refer to [MNTE 01-0070](#).)
 - (b) Turn off the battery switch of the Battery unit to be replaced.
 - (c) Release the latch in the front and pull out the Battery unit toward you. (Since two latches are provided in the front and on the right-hand side of the Battery unit, the Battery unit is stopped once at the position of the latch on the right-hand side.
 - (d) Release the latch on the right-hand side holding the Battery unit main body with your hand and pull it out toward you.
 - (e) Make sure that the battery switch on the Battery unit has been turned off.
 - (f) Wait for more than 20 seconds, and then insert the Battery unit into the specified location in the RK.

If the Battery unit is inserted without waiting for 20 seconds, it is possible that the Battery unit is not recovered from the failure normally.
 - (g) Turn on the battery switch of the Battery unit.

Make sure that the WARNING LED (orange) is off.
 - (h) Keep the power on for two hours or longer to charge the battery.
 - (i) Make sure that the READY LED (green) on the Battery unit is on.
 - (j) Attach the front bezel.

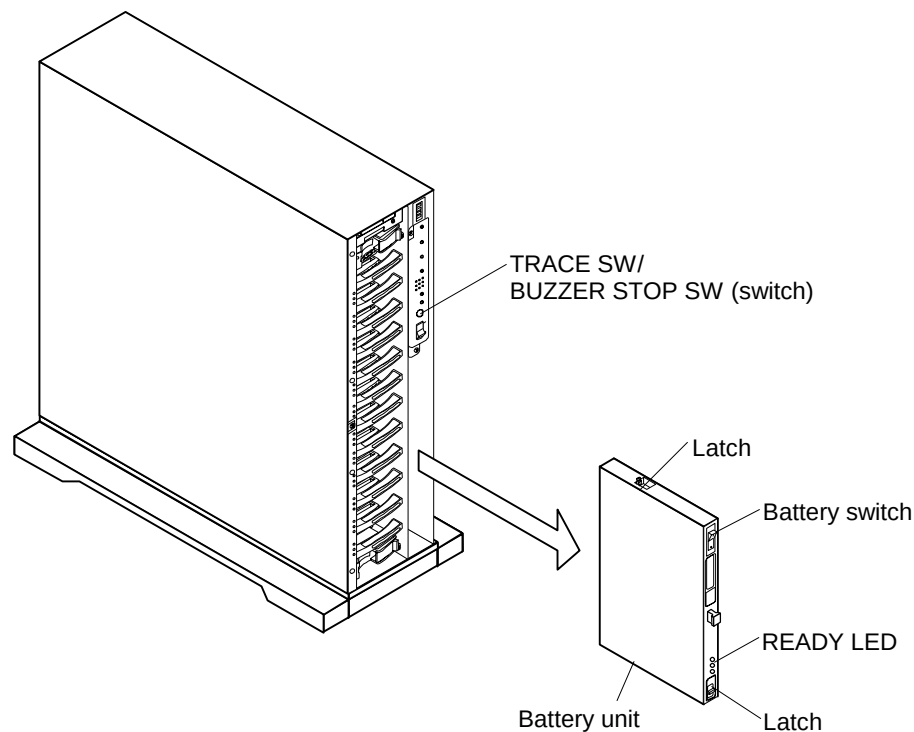


Figure 4.2.5 Replacing Battery Unit

(2) Procedure for replacement with the power turned off

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)
When the cache is in the cache backup mode, make the replacement after canceling the mode.

- (a) Remove the front bezel of the RK side. (Refer to [MNTE 01-0070](#).)
- (b) Turn off the main switch. Make sure that the POWER LED(green) on the panel has gone out.)
- (c) Remove the rear cover. (Refer to [MNTE 01-0090](#).)
- (d) Make sure that the BACK UP LED on the Controller is off. (This is to make sure that the subsystem is not in the Cache Backup mode.)
- (e) Turn off the battery switch of the Battery unit.
- (f) Release the latch in the front and pull out the Battery unit toward you. (Since two latches are provided in the front and on the right-hand side of the Battery unit, the Battery unit is stopped once at the position of the latch on the right-hand side.
- (g) Release the latch on the right-hand side holding the Battery unit main body with your hand and pull it out toward you.
- (h) Make sure that the battery switch on the Battery unit has been turned off.
- (i) Insert the Battery unit into the specified location in the disk array.
- (j) Turn on the battery switch of the Battery unit.
- (k) Turn on the main switch.
- (l) Make sure that the READY LED (green) is on. (Make sure that the READY LED on the panel is on and the ALARM and WARNING LEDs are off.)
- (m) Keep the power on for two hours or longer to charge the battery.
- (n) Attach the front bezel.
- (o) Attach the rear cover.

4.2.5 Replacing Controller

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	1. The procedure varies depending on whether the FAIL LED ^(*) is on or off. 2. Make the replacement in units of Controller. 3. When replacing the both Controllers at the same time, do it with the power turned off. 4. In the case of the single Controller configuration, perform the replacement after turning off the power.	When the FAIL LED is on See 4.2.5 (1-1) .
			When the FAIL LED is off See 4.2.5 (1-2) . (Preventive replacement)
2	Replacement with the power turned off	When the WEB cannot be connected, this cannot be applied in the case of the dual Controller configuration.	See 4.2.5 (2) .
*1 : For the installation location of the FAIL LED, see Figure 4.2.6..			

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

(1-1) When the FAIL LED is on

(a) Remove the rear cover. (Refer to [MNTE 01-0090](#).)

(b) Make sure that the FAIL LED (red) on the Controller to be replaced is on. (Refer to Figure 4.2.6.)

Notice : • Do not replace the Controller which operates normally.
Before replacing the Controller, confirm that it is blocked (the FAIL LED (red) in on).

- When replacing the two Controller with the power turned on, the Controller must be replaced one after another.
When the two Controllers are replaced at the same time, turned off the subsystem power before replacement.
- Since the system parameters are automatically loaded on the new Controller by copying them from that of another system, setting using a FD or by manual operation is not needed.
However, if the two Controllers failed at the same time, a system parameter restoration using the FD is required.

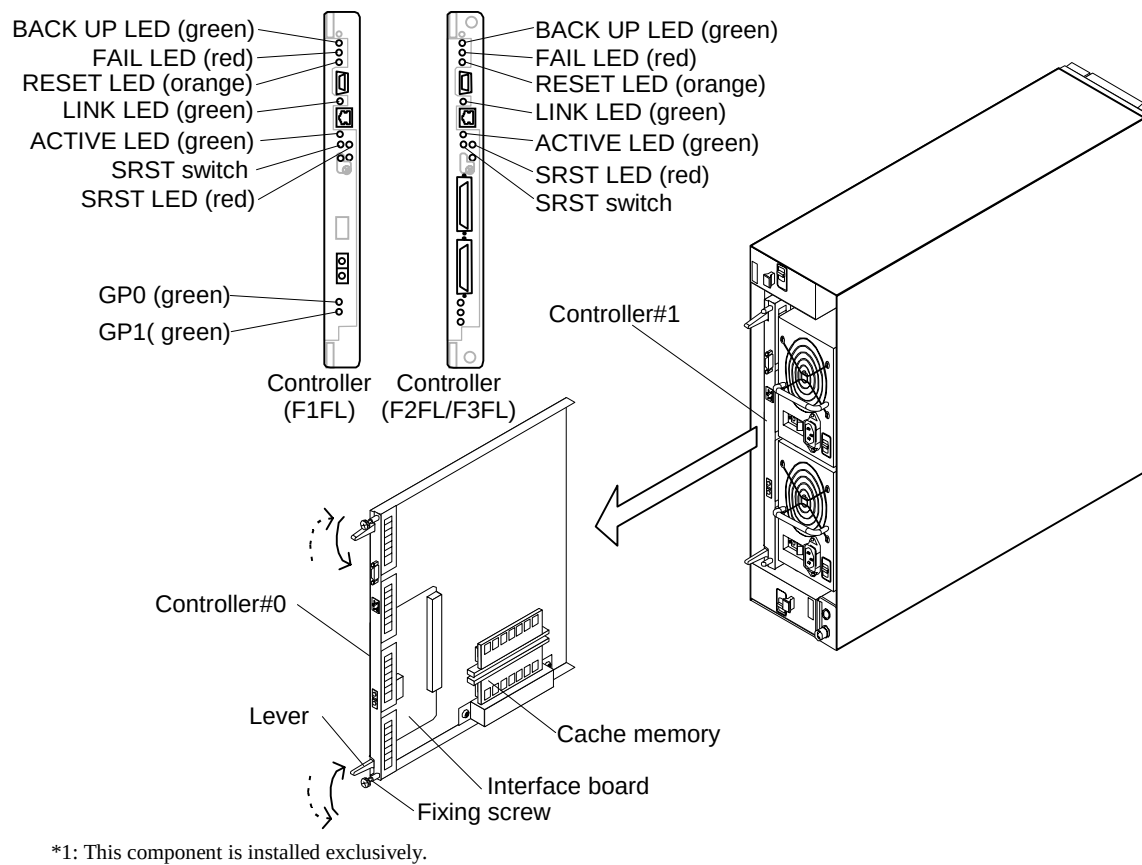


Figure 4.2.6 Controller Replacement and LED Locations

- (c) Remove the interface cable (Fibre Channel), LAN, and RS232C cables connected to the Controller.

Notice : Do not remove the SCSI interface cable connected to the Interface board. Because, in the case of the SCSI connection, lower devices connected in the daisy chain become unable to be recognized by the host.

- (d) Loosen the upper and lower fixing screws of the Controller.
Raise the both upper and lower levers at the same time in the direction shown by the arrows (.....>) and take out the Controller.
- (e) Remove the Interface board (or Dummy (Interface)).

Notice : Because the Interface board to which the cable is left connected is live, do not let any of its live parts contact the other articles.

- (f) Remove the Cache memory mounted on the Controller.
You can remove the Cache memory by pulling it up while gripping it at its both ends and pressing the slot levers which secure it.

Notice : Place the removed Interface board and Cache memory temporarily in the place where the anti-static measures are taken.

- (g) Reinstall the removed Cache memory in Controller. Be sure to install it in the same position as before.
- (h) Remount the removed Interface board (or Dummy (Interface)) on the new Controller.

- (i) Wait for more than 20 seconds, and then insert the Controller into the specified position with its upper and lower levers being raised, then return the both levers to the direction shown by the arrows (—→) at the same time.

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

Notice : When returning the both levers in the directions shown by the arrows (—→) at the same time, 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 Controller because the Controller is considered to have failed.

- (j) Tighten the upper and lower fixing screws of the Controller.
(k) Make sure that the WARNING LED (orange) on the panel is off.
(l) Connect the removed interface cable (Fibre Channel or SCSI), LAN, and RS232C cables to the Controller.

(1-2) When the FAIL LED is off

- (a) Remove the rear cover. (Refer to [MNTE 01-0090](#).)
- (b) Remove the interface cable (Fibre Channel), LAN, and RS232C cables connected to the Controller to be blocked for prevention against a failure.

Notice : • When replacing the two Controller with the power turned on, the Controller must be replaced one after another.

When the two Controllers are replaced at the same time, turned off the subsystem power before replacement.

- Since the system parameters are automatically loaded on the new Controller by copying them from that of another system, setting using a FD or by manual operation is not needed. However, if the two Controllers failed at the same time, a system parameter restoration using the FD is required.
 - Do not remove the SCSI interface cable connected to the Interface board. Because, in the case of the SCSI connection, lower devices connected in the daisy chain become unable to be recognized by the host.
- (c) To block the controller by way of prevention against a failure, press the SRST switch and make sure that the FAIL LED (red) comes on (see Figure 4.2.6).
 - (d) Loosen the upper and lower fixing screws of the Controller.
Raise the both upper and lower levers at the same time in the direction shown by the arrows (·····>) and take out the Controller.
 - (e) Remove the Interface board (or Dummy (Interface)).

Notice : Because the Interface board to which the cable is left connected is live, do not let any of its live parts contact the other articles.

- (f) Remove the Cache memory mounted on the Controller.

You can remove the Cache memory by pulling it up while gripping it at its both ends and pressing the slot levers which secure it.

Notice : Place the removed Interface board and Cache memory temporarily in the place where the anti-static measures are taken.

- (g) Reinstall the removed Cache memory in Controller. Be sure to install it in the same position as before.
- (h) Remount the removed Interface board (or Dummy (Interface)) on the new Controller.
- (i) Wait for more than 20 seconds, and then insert the Controller into the specified position with its upper and lower levers being raised, then return the both levers to the direction shown by the arrows (—→) at the same time.

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

Notice : When returning the both levers in the directions shown by the arrows (—→) at the same time, 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 Controller because the Controller is considered to have failed.

- (j) Tighten the upper and lower fixing screws of the Controller.
- (k) Make sure that the WARNING LED (orange) on the panel is off.
- (l) Connect the removed interface cable (Fibre Channel), LAN, and RS232C cables to the Controller.

- (2) Procedure for replacement with the power turned off (See Figure 4.2.6.)
- (a) Remove the rear cover. (Refer to [MNTE 01-0090](#).)
 - (b) Confirm the installation location of the Controller whose FAIL LED is on. (Refer to [MNTE 04-0240](#).)
 - (c) Remove the front bezel of the RK. (Refer to [MNTE 01-0070](#).)
 - (d) When the WEB can be connected, make sure that the system parameter backup FD is inserted, and back up the system parameters. (Refer to [MNTE 01-0140](#).)
 - (e) Turn off the main switch.
Make sure that the POWER LED (green) on the panel has gone out.
When an array unit cannot be turned off, connect to the WEB to isolate its faults.

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)
When the cache is in the cache backup mode, make the replacement after canceling the mode.

Make sure that the BACK UP LED (green) on the Controller is off.

Notice : When the BACK UP LED (green) is on, user data not written on the disk exists in the cache memory.
If the Controller is removed from the subsystem in this state, it is feared that user data may be lost.

- (f) Remove the interface cable (Fibre Channel), LAN, and RS232C cables connected to the Controller.

Notice : Do not remove the SCSI interface cable connected to the Interface board. Because, in the case of the SCSI connection, lower devices connected in the daisy chain become unable to be recognized by the host.

- (g) Loosen the upper and lower fixing screws of the Controller.
Raise the both upper and lower levers at the same time in the direction shown by the arrows (····>) and take out the Controller.

- (h) Remove the Interface board (or Dummy (Interface)).

Notice : Because the Interface board to which the cable is left connected is live, do not let any of its live parts contact the other articles.

- (i) Remove the Cache memory

Notice: Place the removed Cache memory in the place where anti-static measures are taken.

- (j) Reinstall the removed Interface board (or Dummy (Interface)) on the new Controller.
- (k) Insert the removed Cache memory. Be sure to install it in the position with the same slot number as before.
- (l) Insert the Controller in the specified position with its upper and lower levers being raised, then return the levers at the same time in the direction shown by the arrows (→).
- If the Controller 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.
- (m) Tighten the upper and lower fixing screws of the Controller.
- (n) Connect the removed interface cable (Fibre Channel), LAN, and RS232C cables to the Controller.
- (o) Turn on the main switch.
- Make sure that the WARNING LED (orange) on the panel has gone out.
- (p) Attach the rear cover. (Refer to [MNTE 01-0090](#).)
- (q) Prepare the FD for system parameter restoration to which the system parameters were backed up in step (d). If the FD for system parameter restoration is not available, prepare the list of set system parameters instead.
- (r) Check if the FD to which the system parameters were backed up is inserted in the Floppy disk drive.
- (s) Restore the system parameters. (Refer to [MNTE 01-0200](#).)
- (t) Turn off the main switch.
- Turn off the breakers of the AC/DC power supply.
- (u) Turn on the breakers of the AC/DC power supply.
- Turn on the main switch.
- (v) Make sure that the POWER LED (green) on the panel is off.
- (w) Attach the front bezel.

4.2.6 Replacing Interface board for Fibre Channel

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	When the FAIL LED of the controller, in which the interface board to be replaced is installed, is on in the case of the dual system configuration.	See 4.2.6 (1-1)
		When the FAIL LED of the controller, in which the interface board to be replaced is installed, is off in the case of the dual system configuration.	See 4.2.6 (1-2) (Preventive replacement)
2	Replacement with the power turned off	—	See 4.2.6 (2)

(1) Procedure for replacement with the power turned on

(1-1) When the FAIL LED of the controller is on

- (a) Remove the rear cover. (Refer to [MNTE 01-0090](#).)
- (b) Remove the interface cable (Fibre Channel or SCSI), LAN, and RS232C cables connected to the Controller on which the Interface board to be replaced is mounted.

Notice : • Do not replace the Controller which operates normally.

Before replacing the Controller, confirm that it is blocked (the FAIL LED (red) in on).

- Since the system parameters are automatically loaded on the new Controller by copying them from that of another system, setting using a FD or by manual operation is not needed.

- (c) Make sure that the FAIL LED on the Controller on which the Interface board to be replaced is on. If not, remove the Interface board following the “When the FAIL LED goes out” in Item (1-2) on page [MNTE 04-0330](#).
- (d) Loosen the upper and lower fixing screws of the Controller.
Raise the both upper and lower levers at the same time in the direction shown by the arrows (····>) and take out the Controller.
- (e) Loosen the three screws of the Interface board.
Pull the Interface board upward and disconnect the connector.

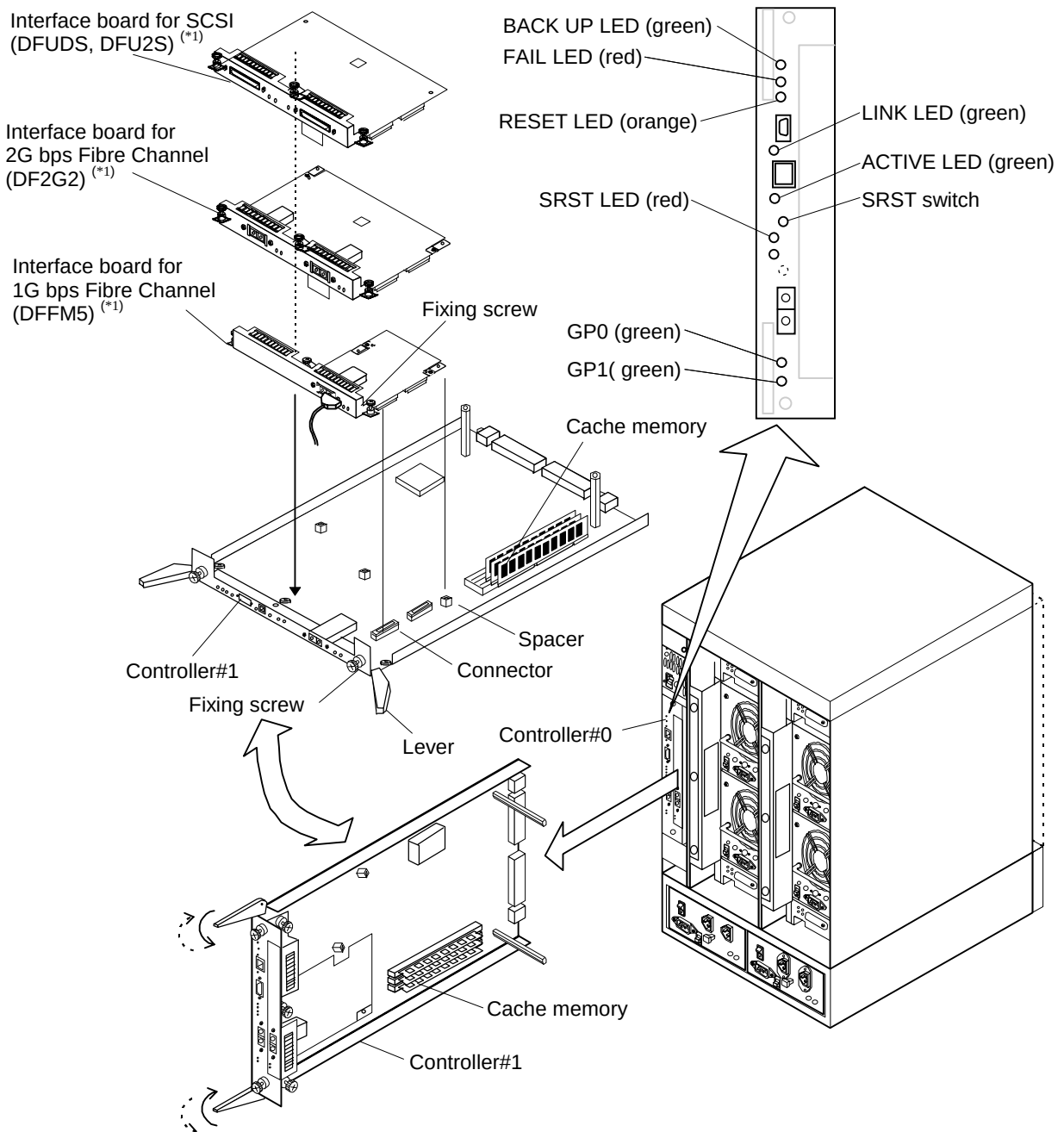


Figure 4.2.7 Replacing Interface Board

- (f) Install the interface board on the spacer of the controller and tighten the three fixing screws.

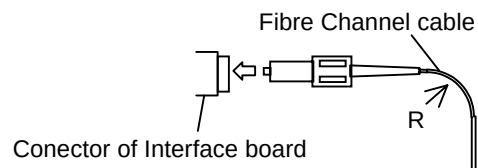
When doing this, make sure that the connectors have been inserted completely.

- (g) Wait for more than 20 seconds, and then insert the Controller in the specified position with its upper and lower levers being raised, then return the levers at the same time in the direction shown by the arrows (—→).

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

- (h) Tighten the upper and lower fixing screws of the Controller.
(i) The WARNING LED (orange) on the panel goes out.
(j) Connect the removed interface cable (Fibre Channel or SCSI), LAN, and RS232C cables to the Controller.

Notice : When bending the Fibre Channel 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 an excessive stress.



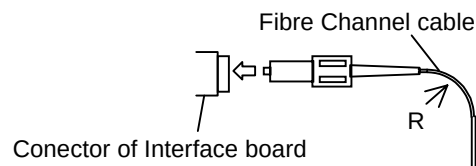
(1-2) When the FAIL LED goes out

- (a) Remove the rear cover. (Refer to [MNTE 01-0090](#).)
- (b) Remove the interface cable (Fibre Channel or SCSI), LAN, and RS232C cables connected to the Controller to be blocked for prevention against a failure.

Notice : • Since the system parameters are automatically loaded on the new Controller by copying them from that of another system, setting using a FD or by manual operation is not needed.

- (c) Press the SRST switch on the Controller, in which the Interface board to be replaced is installed, and make sure that the FAIL LED comes on.
 - (d) Loosen the upper and lower fixing screws of the Controller.
Raise the both upper and lower levers at the same time in the direction shown by the arrows (····>) and take out the Controller.
 - (e) Loosen the three screws of the Interface board.
Pull the Interface board upward and disconnect the connector.
 - (f) Install the interface board on the spacer of the controller and tighten the three fixing screws.
When doing this, make sure that the connectors have been inserted completely.
 - (g) Wait for more than 20 seconds, and then insert the Controller in the specified position with its upper and lower levers being raised, then return the levers at the same time in the direction shown by the arrows (—→).
- If the Controller is inserted without waiting for 20 seconds, it is possible that the Controller is not recovered from the failure normally.
- (h) Tighten the upper and lower fixing screws of the Controller.
 - (i) The WARNING LED (orange) on the panel goes out.
 - (j) Connect the removed interface cable (Fibre Channel or SCSI), LAN, and RS232C cables to the Controller.

Notice : When bending the Fibre Channel 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 an excessive stress.



- (2) Procedure for replacement with the power turned off (See Figure 4.2.7.)
- (a) Remove the rear cover. (Refer to [MNTE 01-0090](#).)
 - (b) Confirm the installation location of the Controller whose FAIL LED (red) is on.
Make sure that the system parameter backup FD is inserted, then backup the system parameters.
 - (c) Remove the front bezel of the RK side. (Refer to [MNTE 01-0090](#).)
 - (d) Turn off the main switch.
Make sure that the POWER LED (green) on the panel has gone out.
When an array unit cannot be turned off, connect to the WEB to isolate its faults.

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)
When the cache is in the cache backup mode, make the replacement after canceling the mode.

Make sure that the BACK UP LED (green) on the Controller is off.

Notice : When the BACK UP LED is on, user data not written on the disk may exist in the cache memory.
If the Controller is removed from the subsystem in this state, it is feared that user data may be lost.

- (e) Remove the interface cable (Fibre Channel or SCSI), LAN, and RS232C cables connected to the Controller on which the Interface board to be replaced is mounted.
- (f) Loosen the upper and lower fixing screws of the Controller.
Pull both upper and lower levers at the same time in the direction shown by the arrows (····>) and Raise the out the Controller.
- (g) Loosen the three screws of the Interface board.
Pull the Interface board upward and disconnect the connector.

- (h) Install the Interface board in the specified position on the Controller and tighten the three fixing screws.
- (i) Insert the Controller in the specified position with its upper and lower levers being raised, then return in the levers at the same time in the direction shown by the arrows (→).
If the Controller 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.
- (j) Tighten the upper and lower fixing screws of the Controller.
- (k) Connect the removed interface cable (Fibre Channel or SCSI), LAN, and RS232C cables to the Controller.
- (l) Turn on the main switch.
- (m) Make sure that the WARNING LED (orange) on the panel has gone out.
- (n) Attach the rear cover.
- (o) Attach the front bezel.

4.2.7 Replacing Cache memory

Replacement of the Cache memory must be done by the set of two memory boards (set of boards in slots #0 and #1 and that in slots #2 and #3).

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	When the FAIL LED of the controller, in which the cache memory to be replaced is installed, is on in the case of the dual system configuration.	See 4.2.7 (1-1)
		When the FAIL LED of the controller, in which the cache memory to be replaced is installed, is off in the case of the dual system configuration.	See 4.2.7 (1-2) (Preventive replacement)
2	Replacement with the power turned off	—	See 4.2.7 (2)
*1: In the case of the single Controller configuration, the Cache memory cannot be replaced unless the subsystem power is turned off.			

(1) Procedure for replacement with the power turned on

(1-1) When the FAIL LED of the controller is on

- (a) Remove the rear cover. (Refer to [MNTE 01-0090](#).)
- (b) Make sure that the FAIL LED (red) on the Controller on which the Cache memory to be replaced is on. If not, remove the Cache memory following the “When the FAIL LED goes out” in Item (2-1) on page [MNTE 04-0390](#).

Notice : • Do not replace the Controller which operates normally.
Before replacing the Controller, confirm that it is blocked (the FAIL LED (red) in on).

- Since the system parameters are automatically loaded on the new Controller by copying them from that of another system, setting using a FD or by manual operation is not needed.

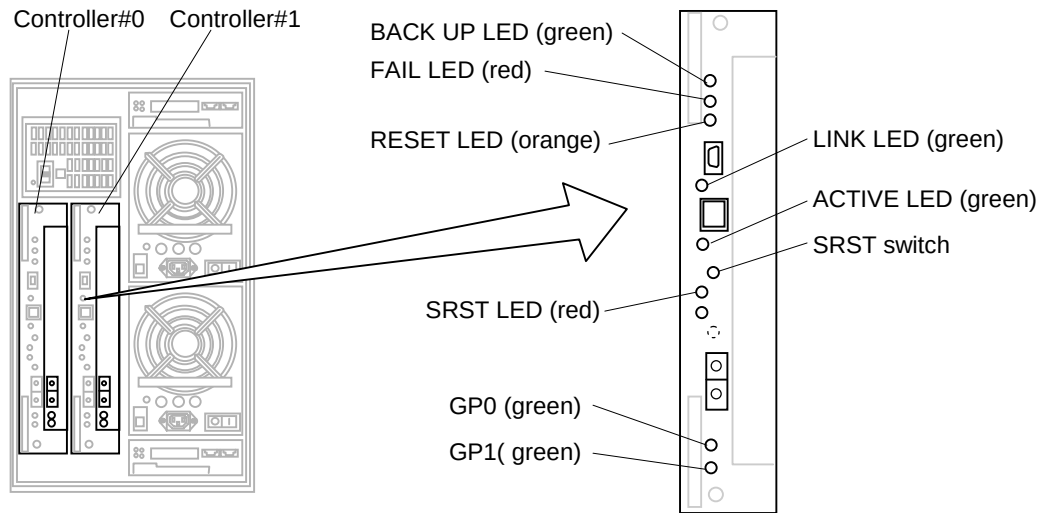


Figure 4.2.8 LEDs of Controller

- (c) Remove the interface cable (Fibre Channel), LAN, and RS232C cables connected to the Controller on which the Cache memory to be replaced is mounted.

Notice : Do not remove the SCSI interface cable connected to the Interface board. Because, in the case of the SCSI connection, lower devices connected in the daisy chain become unable to be recognized by the host.

- (d) Loosen the upper and lower fixing screws of the Controller.
Raise the both upper and lower levers at the same time in the direction shown by the arrows (····>) and take out the Controller.
- (e) Remove the Cache memory.
- (f) Install the Cache memory in the Controller.
- Install a new Cache memory with the same capacity as that of the former one in the same slot.
- (g) Wait for more than 20 seconds, and then insert the Controller in the specified position with its upper and lower levers being raised, then return in the levers at the same time in the direction shown by the arrows (—>).
If the Controller is inserted without waiting for 20 seconds, it is possible that the Controller is not recovered from the failure normally.
- (h) Tighten the upper and lower fixing screws of the Controller.
- (i) Make sure that the FAIL LED (red) on the Controller is off.
- (j) Make sure that the WARNING LED (orange) on the panel is off.
- (k) Connect the removed interface cable (Fibre Channel), LAN, and RS232C cables to the Controller.
- (l) Attach the rear cover.

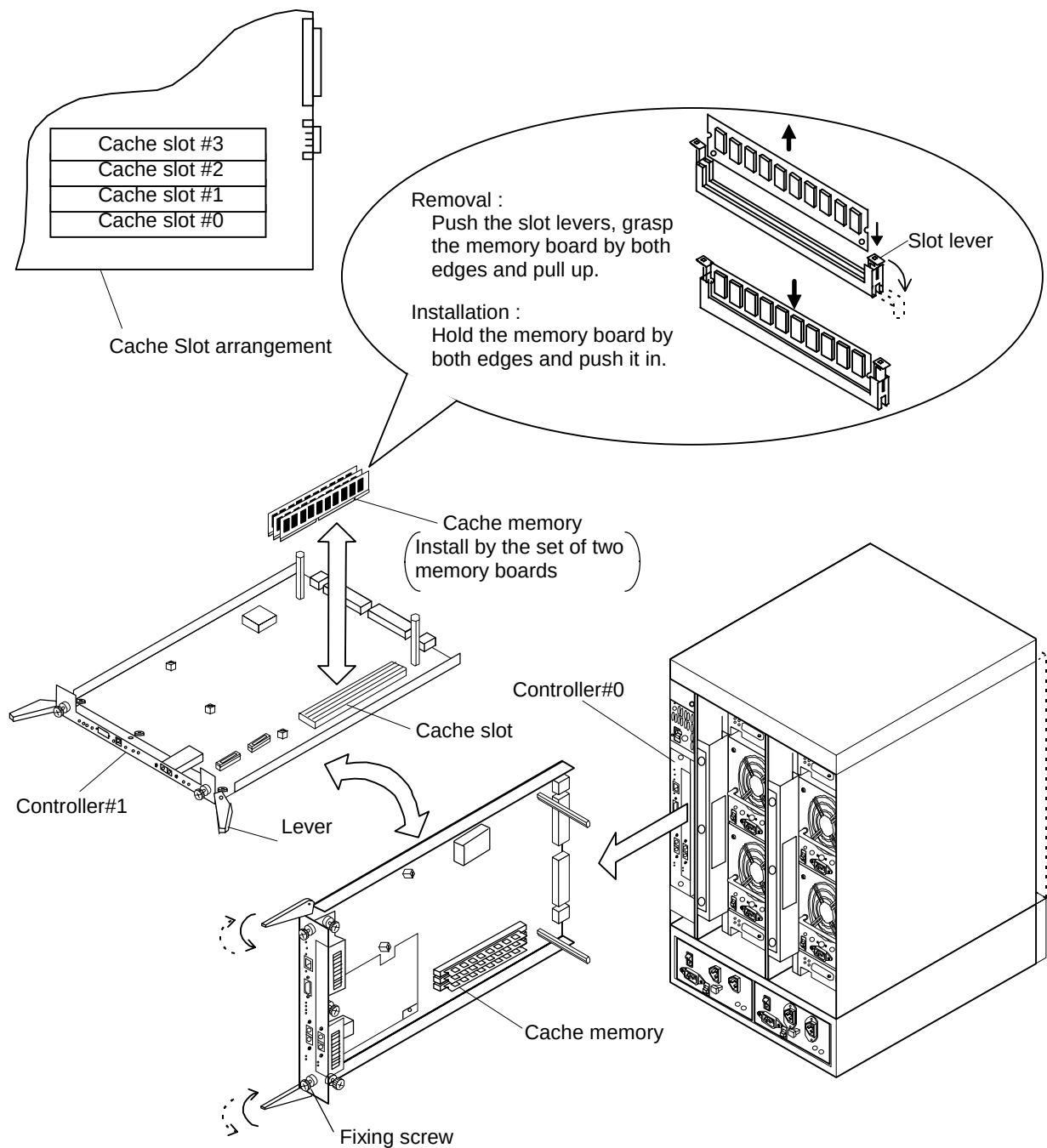


Figure 4.2.9 Replacing of Cache Memory

(1-2) When the FAIL LED goes out

- (a) Remove the rear cover. (Refer to [MNTE 01-0090](#).)
- (b) Remove the interface cable (Fibre Channel), LAN, and RS232C cables connected to the Controller on which the Cache memory to be replaced is mounted.

Notice : • Since the system parameters are automatically loaded on the new Controller by copying them from that of another system, setting using a FD or by manual operation is not needed.

- Do not remove the SCSI interface cable connected to the Interface board. Because, in the case of the SCSI connection, lower devices connected in the daisy chain become unable to be recognized by the host.

- (c) Press the SRST switch on the Controller, in which the Cache memory to be replaced is installed, and make sure that the FAIL LED comes on.
- (d) Loosen the upper and lower screws of the Controller.
Raise the both upper and lower levers at the same time in the direction shown by the arrows (····>) and take out the Controller.
- (e) Remove the Cache memory.
- (f) Install the Cache memory in the Controller.
 - Install a new Cache memory with the same capacity as that of the former one in the same slot.
- (g) Wait for more than 20 seconds, and then insert the Controller in the specified position with its upper and lower levers being raised, then return in the levers at the same time in the direction shown by the arrows (——>).
If the Controller is inserted without waiting for 20 seconds, it is possible that the Controller is not recovered from the failure normally.
- (h) Tighten the upper and lower fixing screws of the Controller.
- (i) Make sure that the FAIL LED (red) on the Controller is off.
- (j) Make sure that the WARNING LED (orange) on the panel is off.
- (k) Connect the removed interface cable (Fibre Channel), LAN, and RS232C cables to the Controller.
- (l) Attach the rear cover.

- (2) Procedure for replacement with the power turned off
- (a) Remove the rear cover. (Refer to [MNTE 01-0090](#).)
 - (b) Confirm the installation location of the Controller whose FAIL LED (red) is on.
Make sure that the system parameter backup FD is inserted, then backup the system parameters.
 - (c) Remove the front bezel of the RK side. (Refer to [MNTE 01-0070](#).)
 - (d) Turn off the main switch.
Make sure that the POWER LED (green) on the panel has gone out.
When the power cannot be turn off, perform a troubleshooting after connecting to WEB.

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)
When the cache is in the cache backup mode, make the replacement after canceling the mode.

Make sure that the BACK UP LED (green) on the Controller is off.

Notice : When the BACK UP LED is on, user data not written on the disk may exists in the Cache memory.
If the Controller is removed from the subsystem in this state, it is feared that user data may be lost.

- (e) Remove the interface cable (Fibre Channel), LAN, and RS232C cables connected to the Controller.

Notice : Do not remove the SCSI interface cable connected to the Interface board. Because, in the case of the SCSI connection, lower devices connected in the daisy chain become unable to be recognized by the host.

- (f) Loosen the upper and lower fixing screws of the Controller.
Raise the both upper and lower levers at the same time in the direction shown by the arrows (····>) and take out the Controller.
- (g) Remove the Cache memory.

- (h) Install the Cache memory in the Controller.
 - Install a Cache memory with the same capacity as that of the former one in the same slot.
- (i) Insert the Controller in the specified position with its right and left levers being raised, then return the levers at the same time in the direction shown by the arrow (→).
If the Controller 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.
- (j) Tighten the left and right fixing screws of the Controller.
- (k) Turn on the main switch.
- (l) Make sure that the WARNING LED (orange) on the panel is off.
- (m) Connect the removed interface cable (Fibre Channel), LAN, and RS232C cables to the Controller.
- (n) Attach the rear cover.
- (o) Attach the front bezel.

4.2.8 Replacing ENC (RK) board and ENC (RKA) board

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	When replacing the ENC, the subsystem must be in the status shown below. • Hot replacement of the microprogram is not being performed. • Hot replacement of the Controller is not being performed. • Any part other than the above is not being replaced.	See 4.2.8 (1-1) When the FAIL LED (red) of the ENC board to be replaced is on
			See 4.2.8 (1-2) When the FAIL LED (red) of the ENC board to be replaced is off (Preventive replacement)
2	Replacement with the power turned off	—	See 4.2.8 (2)

Notice : When more than one ENC board on the same loop must be replaced, replace the ENC board on the RK side first, and the ENC board on the RKA side next.

When a failure of the battery system (whose message code is W03000, W03100, W03200, W03300, or W03400) has occurred, recover the subsystem from the battery system failure before replacing the ENC board.

(1) Procedure for replacement with the power turned on (See Figure 4.2.10.)

(1-1) When the FAIL LED of the ENC board to be replaced is on

- Remove the rear cover. (Refer to [MNTE 01-0090](#).)
 - Make sure that the FAIL LED (red) is on.
 - Disconnect the ENC cable connected to the ENC board to be replaced.
 - Raise the lever on the ENC board in the direction shown by the arrow (····>).
 - Pull the ENC board toward you to remove it.
 - Insert a new ENC board into the specified location with its levers being raised after waiting for 20 seconds, and connect a new ENC cable as the old one was before.
- If the ENC board is inserted without waiting for 20 seconds, it is possible that the ENC board is not recovered from the failure normally.

(g) Return the levers in the direction shown by the arrows ② (<.....).

Notice : When returning the both levers in the directions shown by the arrows ② (<.....) at the same time, 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 board because the ENC board is considered to have failed.

(h) Make sure that the FAIL LED (red) on the ENC board is off.

(i) Attach the rear cover.

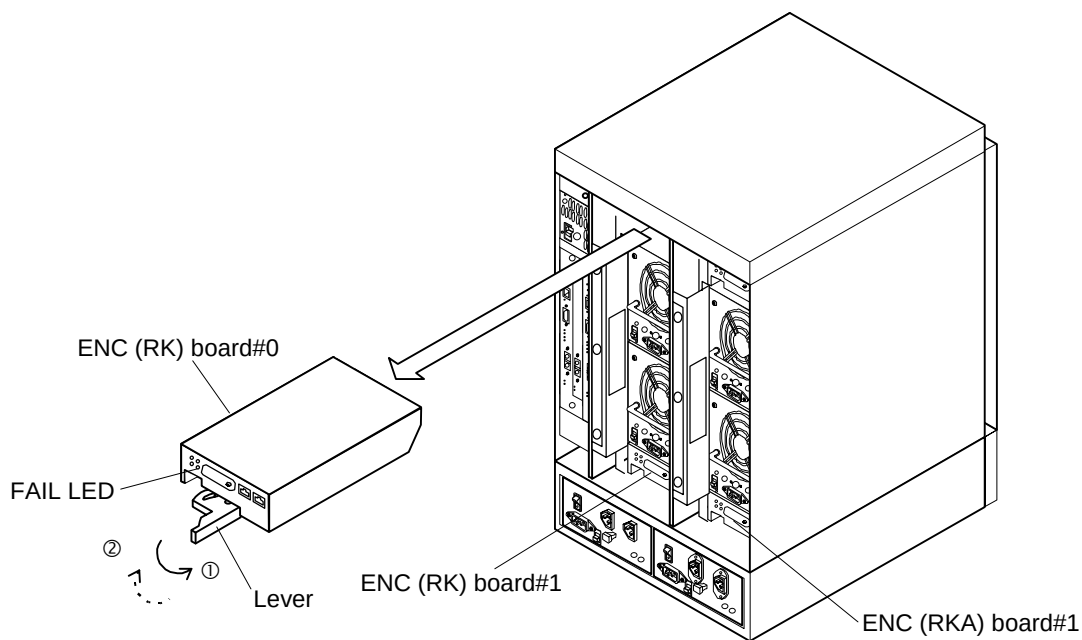


Figure 4.2.10 Replacing of ENC Board

- (1-2) When the FAIL LED of the ENC board to be replaced is off
- (a) Remove the rear cover. (Refer to [MNTE 01-0090](#).)
 - (b) Remove the ENC cable connected to the ENC board to be replaced.
 - (c) Raise the lever on the ENC board in the direction shown by the arrow ① (→).
 - (d) Pull the ENC board toward you to remove it.
 - (e) Insert a new ENC board into the specified location with its levers being raised after waiting for 20 seconds, and connect a new ENC cable as the old one was before.
If the ENC board is inserted without waiting for 20 seconds, it is possible that the ENC board is not recovered from the failure normally.
 - (f) Return the levers in the direction shown by the arrows ② (<.....).

Notice : When returning the both levers in the directions shown by the arrows ② (<.....) at the same time, 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 board because the ENC board is considered to have failed.

- (g) Make sure that the FAIL LED (red) on the ENC board is off.
- (h) Attach the rear cover.

(2) Procedure for replacement with the power turned off

(a) Turn off the main switch.

Make sure that the POWER LED (green) on the panel has gone out.

When the power cannot be turned off, perform a troubleshooting after connecting to WEB.

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)
When the cache is in the cache backup mode, make the replacement after canceling the mode.

Make sure that the BACK UP LED (green) on the Controller is off.

Notice : When the BACK UP LED is on, user data not written on the disk may exist in the Cache memory.
If the Controller is removed from the subsystem in this state, it is feared that user data may be lost.

(b) Remove the rear cover.

(c) Turn off the breaker of the AC/DC power supply.

Make sure that the BACK UP LED (green) of the Controller has gone out.

Notice : It is possible that the recovery is not made normally if the replacement is done without turning off the breaker.

(d) Remove the cables connected to the ENC board.

(e) Open the lever which is on the ENC board in the direction shown by the arrow ① (→).

(f) Pull the ENC board toward you to remove it.

(g) Insert a new ENC board into the specified location with its levers being raised and connect a new ENC cable as the old one was before.

(h) Return the levers in the direction shown by the arrows ② (<……).

(i) Turn on the breaker of the AC/DC power supply on the rear side of the subsystem.

- (j) Turn on the main switch.

Make sure that the FAIL LED (red) has not gone out.

After doing this, make sure that the FAIL LED (red) on the ENC board is not on.

When the ENC board is replaced without turning off the breaker of the AC/DC power supply (Item (c)) by mistake, an unexpected error message may be displayed.

Examples of error message:

W03100 Buttery removed

W08000 Loop alarm (Path-0, Loop-0)

If the above occurs, execution of the following procedure will make the recovery.

(a) → (c) → (i) → (j)

- (k) Attach the rear cover.

4.2.9 Replacing AC/DC power supply

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	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.	See 4.2.9 (1)
2	Replacement with the power turned off	—	See 4.2.9 (2)

(1) Procedure for replacement with the power turned on (See Figure 4.2.11)

- (a) Remove the rear cover. (Refer to [MNTE 01-0090](#).)
- (b) Make sure that the PS RDY LED (green) of the power supply to be replaced is off.
- (c) Make sure that the PS RDY LED (green) of the power supply not to be replaced is on.

Notice : If the PS READY LEDs of the both power supplies are displayed is off, it is presumed that one of the following failures has occurred.

- The WARNING LED came on because an error was detected in one of the AC/DC power supply.
 - A failure occurred in the other one of the AC/DC power supply.
Replace the AC/DC power supply whose PS RDY LED is off first. After that, replace the AC/DC power supply which was to be replaced. (The WARNING LED does not go out until the AC/DC power supply is replaced or the subsystem is powered off.)
- (d) Turn on the breaker of the AC/DC power supply to be replaced.

Notice : Even when the breaker of the AC/DC power supply to be replaced is turned off while the subsystem is powered on, the fan of the AC/DC power supply keeps its operation.

- (e) Disconnect the power cable connected to the AC/DC power supply to be replaced.
- (f) Shift the power cable, which is coming out from the rectangular hole on the cable duct, to the position where it does not disturb the removal of the AC/DC power supply.
- (g) Slide the latch upward and take out the AC/DC power supply while it is unlatched.
- (h) Make sure that the breaker of the new AC/DC power supply is turned off.
- (i) Wait for more than 20 seconds, and then insert the AC/DC power supply the main body until it is latched with a click.

If the AC/DC power supply is inserted without waiting for 20 seconds, it is possible that the AC/DC power supply is not recovered from the failure normally.

- (j) Connect the removed cable as they were before.
- (k) Turn on the breaker of the AC/DC newly mounted power supply.
Make sure that the PS RDY LED (green) of the AC/DC power supply is on.
- (l) Make sure that the WARNING LED (orange) has gone out.
- (m) Attach the rear cover.

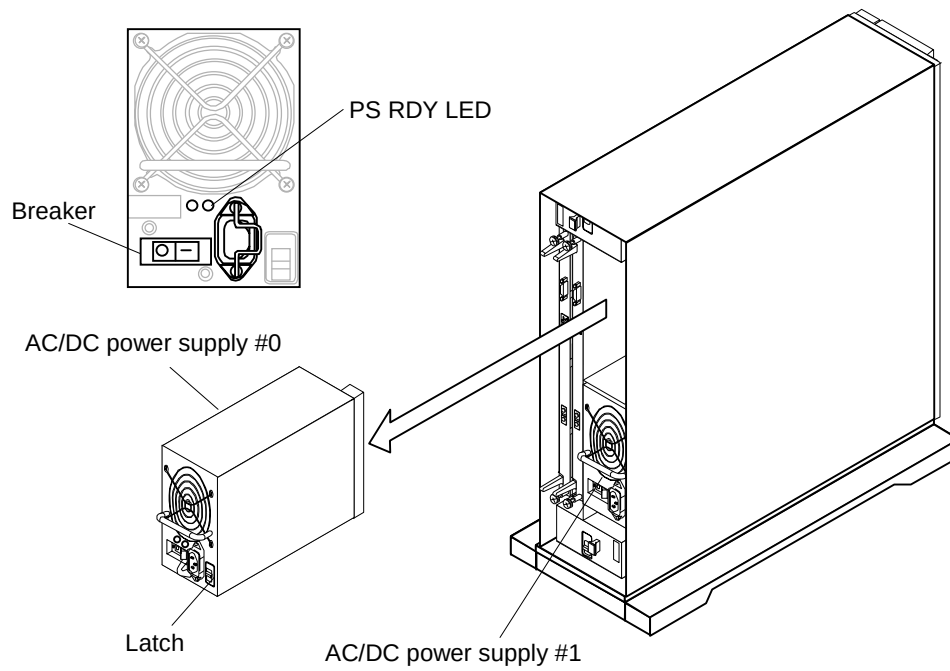


Figure 4.2.11 Replacing AC/DC Power Supply

(2) Procedure for replacement with the power turned off

- (a) Remove the rear cover.
- (b) Turn off the main switch.

Make sure that the POWER LED (green) on the panel has gone out.

When the power cannot be turn off, perform a troubleshooting after connecting to WEB.

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)

When the cache is in the cache backup mode, make the replacement after canceling the mode.

Make sure that the BACK UP LED (green) has gone out.

Notice : When the BACK UP LED is on, user data not written on the disk may exists in the Cache memory.

If the controller is removed from the subsystem in this state, it is feared that user data may be lost.

- (c) Turn off the breakers of the both AC/DC power supplies.
- (d) Remove the remote cable connected to the AC/DC power supply to be replaced.
- (e) Remove the power cable connected to the AC/DC power supply to be replaced.
- (f) Slide the latch upward and take out the AC/DC power supply while it is latched.
- (g) Make sure that the breaker of the new AC/DC power supply is turned off.
- (h) Push in the new AC/DC power supply until it is latched with a click.
- (i) Connect the removed power cable.
- (j) Connect the removed remote cable.
- (k) Turn on the breakers of the both AC/DC power supplies.

Make sure that the PS RDY LEDs (green) of the both AC/DC power supplies are on.

- (l) Make sure that the WARNING LED (orange) has gone out.
- (m) Make sure that the three LEDs of the connected Remote adapter are on.
- (n) Attach the rear cover.

4.2.10 Replacing Fan unit

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	Complete the replacement within 10 minutes, and restart the fans of the Fan unit.	See 4.2.10 (1)
2	Replacement with the power turned off	—	See 4.2.10 (2)



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

- (1) Procedure for replacement with the power turned on
 (a) Remove the rear cover. (Refer to [MNTE 01-0090](#).)

Notice : While the FAIL LED of a Fan unit is on, when a Controller has been blocked (the FAIL LED is on), be sure to correct the Controller blockade failure first.

- (b) Make sure that the FAIL LED (red) is on.
 (c) Release the lock by shifting the latch to the left.
 (d) Take out the Fan unit by holding its knob and pulling it toward you.

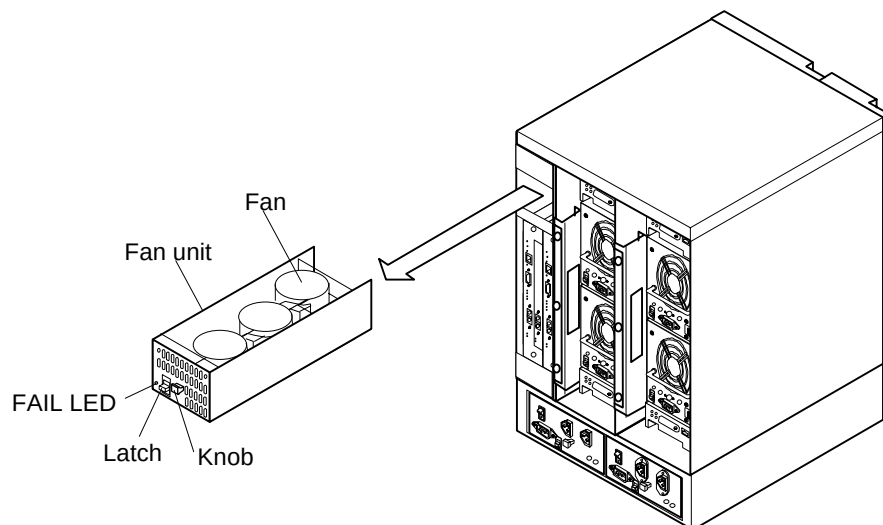


Figure 4.2.12 Replacing Fan Unit

- (e) Wait for more than 20 seconds, and then press the Fan unit into the main body until it is latched with a click.
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.
- (f) Make sure that the status of the FAIL LED (red) changes from on to off.
- (g) Check if the fans of the mounted Fan unit are rotating.
- (h) Attach the rear cover.

- (2) Procedure for replacement with the power turned off
- (a) Remove the rear cover. (Refer to [MNTE 01-0090](#).)

Notice : While the FAIL LED of a Fan unit is on, when a Controller has been blocked (the FAIL LED is on), be sure to correct the Controller blockade failure first.

- (b) Turn off the main switch.
- Make sure that the POWER LED (green) on the panel has gone out.
- When the power cannot be turn off, perform a troubleshooting after connecting to WEB.

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)

When the cache is in the cache backup mode, make the replacement after canceling the mode.

Make sure that the BACK UP LED (green) has gone out.

Notice : When the BACK UP LED is on, user data not written on the disk may exists in the Cache memory.

If the controller is removed from the subsystem in this state, it is feared that user data may be lost.

- (c) Release the lock by shifting the latch to the left.
- (d) Take out the Fan unit by holding its knob and pulling it toward you.
- (e) Push in the new AC/DC power supply until it is latched with a click.
- (f) Turn on the main switch.
- Make sure that the status of the FAIL LED (red) changes from on to off.
- (g) Check if the fans of the mounted Fan unit are rotating.
- (h) Attach the rear cover.

4.2.11 Replacing PDB

Select a procedure from the following and execute it.(in the case of floor model H2F)

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	—	See 4.2.11 (1).
2	Replacement with the power turned off	Not applicable	—

(1) Replacement procedure with the power turned on



- **Be sure to check if the supplied power is turned off to prevent an electric shock.**
- **Pay enough attention to connect cables correctly.**

- (a) Remove the rear cover. (Refer to [MNTE 01-0090](#).)
- (b) Turn on the circuit breaker (CB1) of the PDB to be replaced.
- (c) Turn off the breakers of all the AC/DC power supplies connected to the PDB to be replaced.
- (d) Disconnect all the cables connected to the PDB to be replaced.
 - (i) Unplug the power cable (white) or power cable (yellow) from the outlet of the PDB.
 - (ii) Disconnect the power cable (J1F) from the connector on the PDB.
 - (iii) Disconnect the power cable (J1F) from the connector of the power source.
 - (iv) Unplug the PDB interlock cable (white) or PDB interlock (yellow) from the outlet of the PDB.
- (e) Take out the PDB disengaging the latch by sliding it upward.
- (f) Make sure that the circuit breaker (CB1) of the new PDB is turned off.
- (g) Insert the PDB the main body until it is latched with a click.
- (h) Reconnect the cables removed from the PDB.
 - (i) Connect the power cable (J1F) to the connector of the power source.
 - (ii) Connect the power cable (J1F) to the connector on the PDB.
 - (iii) Plug the power cable (white) or power cable (yellow) in the outlet of the PDB.
 - (iv) Plug the PDB interlock cable (white) or PDB interlock cable (yellow) in the outlet of the PDB.
- (i) Power on the PDB.
- (j) Turn on the AC/DC power supply connected to the PDB.
- (k) Attach the rear cover.

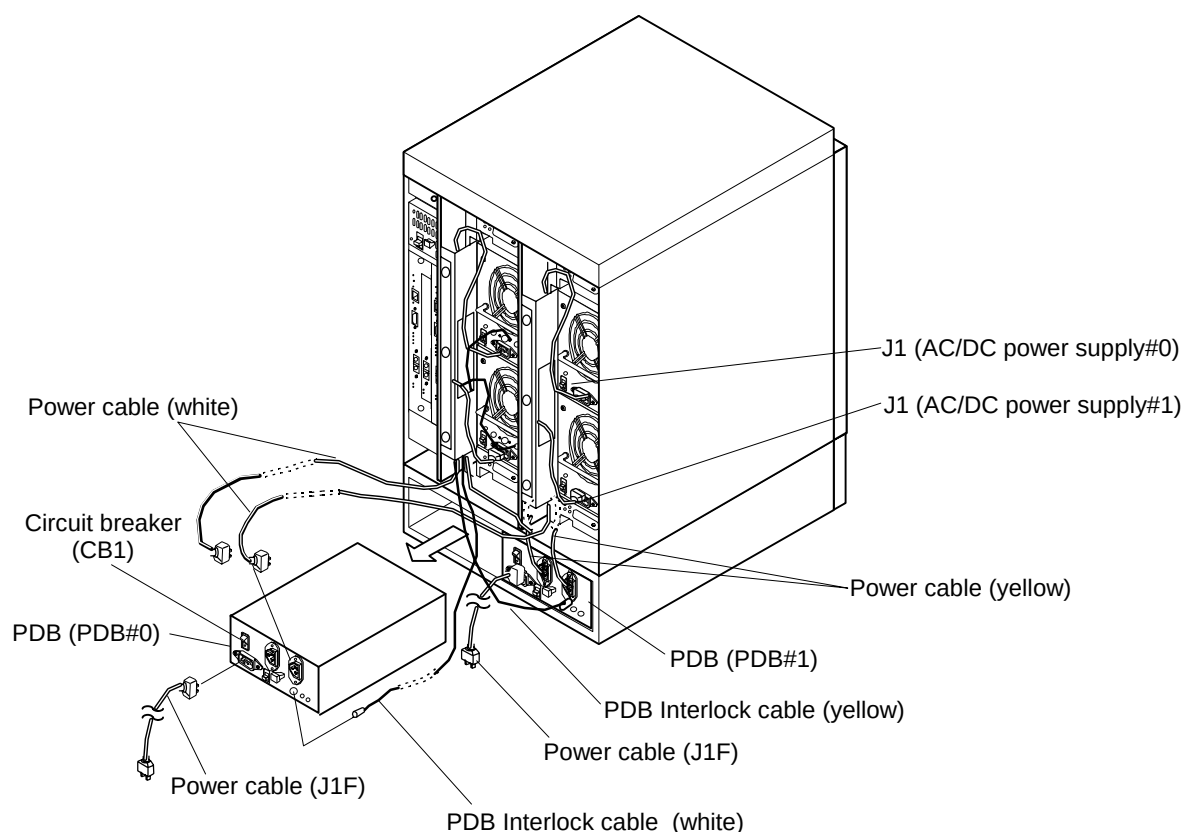


Figure 4.2.13 Replacing PDB

Table 4.2.3 Connect the Cable Plug

No.	PDB	Cable Plug (for PDB)	Cable type	Receptacle to which the plug on the other side of the cable is to be connected
1	PDB#0	PDB#0 (Output side connector)	Power cable (white)	AC/DC power supply#0 of the RK (J1)
		PDB#0 (Output side connector)	Power cable (white)	AC/DC power supply#0 of the RKA (J1)
		PDB#0 (Input side connector)	PDB interlock cable (white)	AC/DC power supply#0 of the RK (J4)
		PDB#0 (Input side connector)	Power cable (J1F)	Connector on the power supplying side
2	PDB#1	PDB#1 (Output side connector)	Power cable (yellow)	AC/DC power supply#1 of the RK (J1)
		PDB#1 (Output side connector)	Power cable (yellow)	AC/DC power supply#1 of the RKA (J1)
		PDB#1 (Input side connector)	PDB interlock cable (yellow)	AC/DC power supply#1 of the RK (J4)
		PDB#1 (Input side connector)	Power cable (J1F)	Connector on the power supplying side

4.3 Replacing Parts of Rackmount Model (RK/RKA)

The following are procedures for replacing parts specified as maintenance parts of the rackmount models.

4.3.1 Locations of replaceable parts

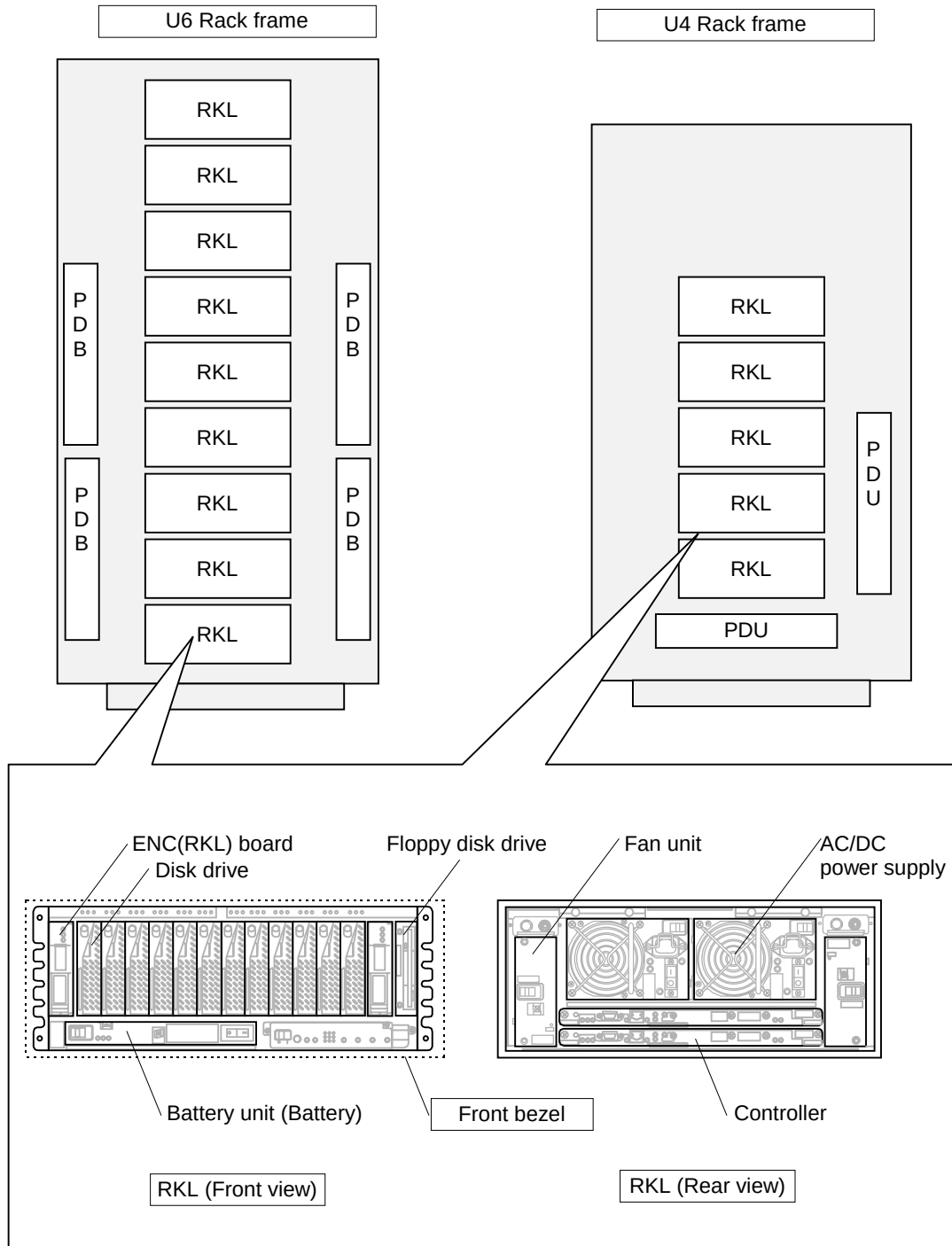


Figure 4.3.1 Replaceable Part Locations of Rackmount Model

**Table 4.3.1 Replaceable Parts and Condition of Power Supplying
when Replacing Each of Them**

	No.	Part name	Part No.	Model	Power supplying condition for replacement ^(*1)	
					ON	OFF
RK and RKA	1	Disk drive (8 G bytes)	5507067-1	DF-F500-AAF8	○ ^(*2)	Not applicable
		Disk drive (18 G bytes)	5507067-2	DF-F500-AAF18	○ ^(*2)	Not applicable
		Disk drive (18 G bytes)	5507067-44	DF-F500-AAH18	○ ^(*2)	Not applicable
		Disk drive (36 G bytes)	5507067-3	DF-F500-AAF36	○ ^(*2)	Not applicable
		Disk drive (72 G bytes)	5507067-4	DF-F500-AAF72	○ ^(*2)	Not applicable
	2	AC/DC power supply (RK)	5507067-5	—	●	○
	3	AC/DC power supply (RKA)	5507067-6	—	●	○
	4	Floppy disk drive	5507067-17	—	Not applicable	○
	5	Battery unit	5507067-16	—	○	○
	6	ENC (RK) board	5507067-13	—	●	○
	7	ENC (RKA) board	5507067-14	—	●	○
	8	Controller	5507067-12	DF-F500-F1F	●	○ ^(*3)
	9	Interface board (1 G bps Fibre Channel)	5507067-11	DF-F500-DFFM5	(●)	○
		Interface board (2 G bps Fibre Channel)	5507067-61	DF-F500-DF2G2	(●)	○
		Interface board (SCSI)	5507067-9	DF-F500-DFUDS	(●)	○
		Interface board (SCSI)	5507067-10	DF-F500-DFU2S	(●)	○
		10	Cache memory (256 M bytes)	5507067-7	DF-F500-C256	(●)
	Cache memory (512 M bytes)		5507067-22	DF-F500-C512	(●)	○
	Cache memory (1024 M bytes)		5507067-8	DF-F500-C1G	(●)	○
	11	Fan unit	5507067-18	—	○	○
U6 Rack frame	1	PDB	5507067-15	—	●	○
U4 Rack frame	—					
*1 : Descriptions of the symbol. ○ : Replacement can be done on this condition. ● : Replacement can be done on this condition only when the part concerned has redundancy. (●) : Replacement can be done on this condition only when the Controller is duplicated. *2 : Power must be on. *3 : When the WEB cannot be connected, the Controller cannot be replaced while the subsystem power is off in the case of the dual controller configuration.						

4.3.2 Replacing Disk drive

Procedure for replacing the Disk drive varies depending on the RAID configuration and the set mode for data restoration. Confirm the RAID configuration and the set mode for data restoration of the subsystem, and then perform the replacement following the procedure shown below.

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	RAID level		Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	Indispensable	With the Spare disk (s)	RAID 0	See 4.3.2 (1-1) .
				RAID 1, RAID 5, and RAID 0+1	See 4.3.2 (1-2) .
			Without the Spare disk	RAID 0 ^(*1) RAID 1, RAID 5, and RAID 0+1	See 4.3.2 (2) .
2	Replacement with the power turned off	Not applicable			—
*1 : The setting of spare disk for RAID 0 can be done by means of the dynamic sparing only.					

Notice : • Be sure to back up user data before starting the replacement.
When the set RAID group and LU are deleted or formatted, related user data will be lost.

- When the loop failure (W080xy Loop alarm) has occurred, recover the subsystem from the loop failure before replacing the Disk drive.
If the subsystem is not recovered from the loop failure, there may be a case where the replaced Disk drive is not recovered from the failure normally.

Mounting location number of Disk drive

Mounting location number of Disk drive is a combination of a device number (device ID) and a Disk drive number which is assigned within the each RK/RKA individually. As the device IDs, #0 is assigned to the RK and numbers #1 to #9 are assigned to each RKA connected. As the Disk drive numbers, #0 to #9 are assigned to Disk drives mounted on the RK or RKA in the order from left to right when the RK/RKA is placed laterally.

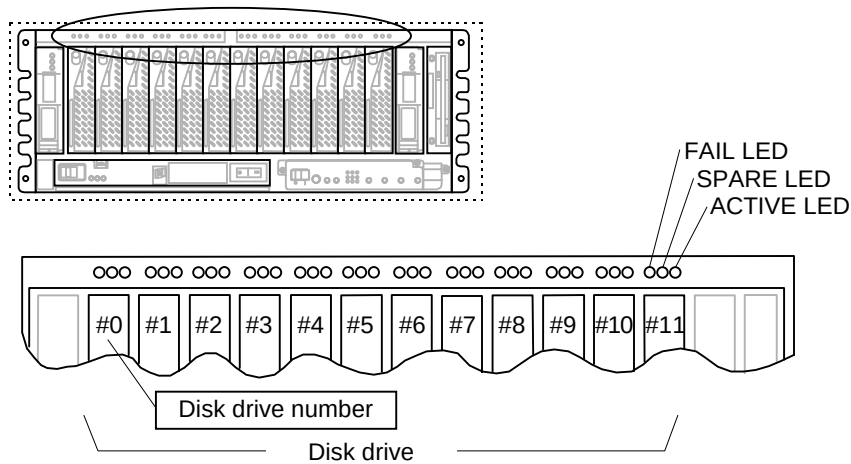


Figure 4.3.2 Mounting Locations of Disk Drives

(1) Procedure for replacing the Disk drive when the spare disk is not set

(1-1) Replacing Disk drive in RAID 0 configuration

- (a) Make a backup of user data.
- (b) Remove the front bezel of the RK. (Refer to [MNTE 01-0090](#).)
- (c) Make sure whether the disk drive to be replaced is blocked or not by viewing the message of the WEB.
- (d) Remove the Disk drive to be replaced.

Operate the lock release button of the Disk drive and remove the Disk drive taking care not to apply any shock to it.

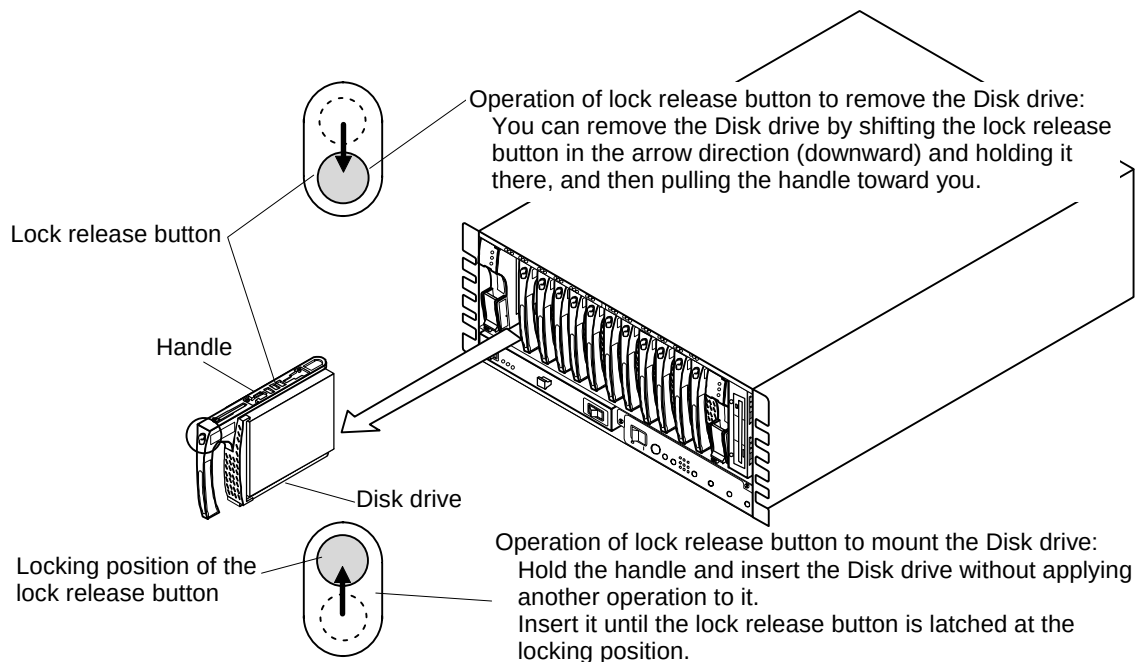


Figure 4.3.3 Operation of Lock Release Button of Disk Drive

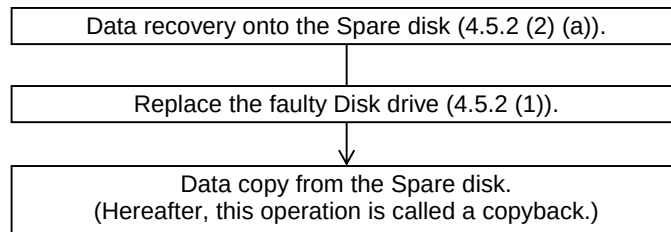
- (e) Wait for more than 20 seconds, and then insert a new Disk drive taking care not to apply any shock to it. (See Figure 4.3.3.)
If the Disk drive is inserted without waiting for 20 seconds, it is possible that the Disk drive is not recovered from the failure normally.
- (f) The FAIL LED (red) of the replaced Disk drive goes out.
 - If the FAIL LED (red) of the Disk drive concerned is still on after the replacement, execute the powering off procedure and replace the Disk drive again.
- (g) Format the LU. (Refer to Subsection 6.4.3, "Setting LU" on page [INST 06-0410](#).)
- (h) Restore the data using the backup previously prepared.
- (i) Attach the front bezel.

(1-2) Replacing Disk drive in RAID 1, 5, or 0+1 configuration

- (a) Remove the front bezel.
- (b) Check if the Disk drive to be replaced is blocked. When the Disk drive is blocked, the FAIL LED (red) at the location corresponding to the Disk drive concerned is on.
- (c) Operate the lock release button of the Disk drive to be replaced and remove the Disk drive taking care not to apply any shock to it.
- (d) Wait for more than 20 seconds, and then insert the replacement Disk drive.
Operate the lock release button on the Disk drive and mount the Disk drive slowly taking care not to apply any shock to it. (See Figure 4.3.3.)
If the Disk drive is inserted without waiting for 20 seconds, it is possible that the Disk drive is not recovered from the failure normally.
- (e) The FAIL LED (red) of the replaced Disk drive goes out.
- (f) The data is restored automatically on the replaced Disk drive.
If the FAIL LED (red) of the Disk drive concerned is still on after the replacement, execute the powering off procedure and replace the Disk drive again.
- (g) Select "Information Message" from the WEB (WEB 02-0120) and make sure that the data recovery is completed normally (I151xy Data recovery completed).
- (h) Make sure that the WARNING LED (orange) on the panel is off.
- (i) Attach the front bezel.

‡1 : The copy back is done in the case where the automatic recover mode is set.

- (2) Procedure for replacing the Disk drive when the Spare disk is set
 The data recovery is executed as shown below.
 To replace Disk drive, refer to [Figure 4.3.3](#).



(a) Data recovery onto the Spare disk

There are two types of data recovery onto the Spare disk depending on the incentive.

- Data recovery onto the Spare disk when a failure in the Disk drive is detected.
- Data copy onto the Spare disk when a disk is detected in which the error count has exceeded its threshold value. (This operation will be called “dynamic sparing” hereafter. Note that some microprograms of certain version do not support the operation.)

After the data recovery onto the Spare disk is completed, the recovered disk location can be found using the panel. (Refer to [WEB 03-0360](#), “[Information Message](#)”.)

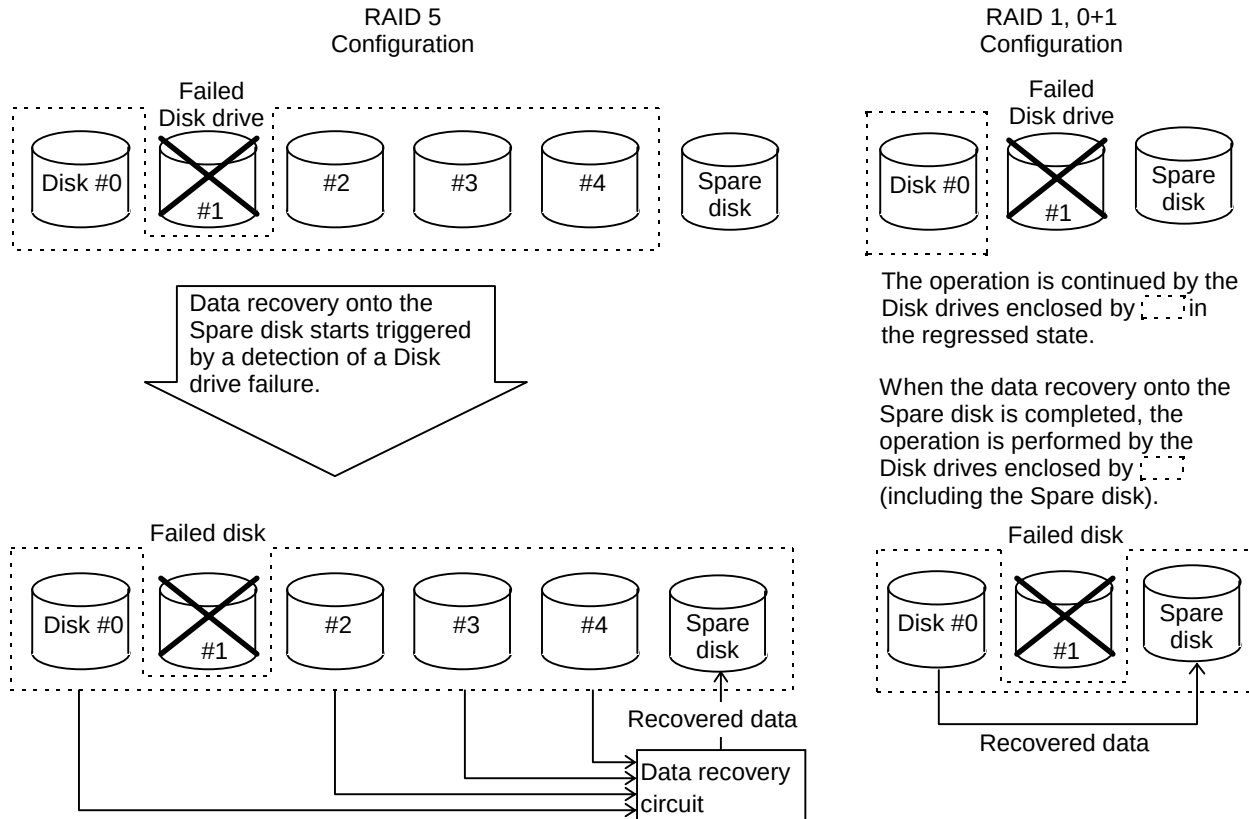
When the WEB cannot be connected, collect a trace while the subsystem power is on and refer to the WEB log message.

(b) Data recovery onto the Spare disk when a Disk drive failure is detected

As to data recovery onto the Spare disk, as shown in the drawing on the following page, when a Disk drive failure occurs, the data of the failed disk is recovered automatically onto the Spare disk.

Automatic recovery onto the Spare disk is executed only under the following condition.

Condition : “When a Disk drive failure is detected, the Spare disk is an unused disk.”



In the following cases, the data recovery onto the Spare disk will not start automatically.

An action to start the data recovery is required.

- When the drive recovery option in the Disk Array management program^(‡1) the disk recovery mode is specified to is set to “not automatic mode”, the data recovery will not start automatically when the disk is replaced.

In this case, it is necessary to instruct recovery onto the Spare disk using the Disk Array management program.

- If a further disk failure occurs while the Spare disk is used already (data of a Disk drive has been already recovered onto the Spare disk), the data of the nearly failed Disk drive will not be recovered onto the Spare disk.

Data of the second failed Disk drive is also not restored on the Spare disk automatically even if the copyback is completed in the above status and the Spare disk goes out of use.

- If a Disk drive with no failure (a Disk drive which is not blocked) is removed, no data recovery onto the Spare disk will be executed. In this case, to recover data onto the Spare disk, it is necessary to instruct a recovery using the Disk Array management program^(‡1).

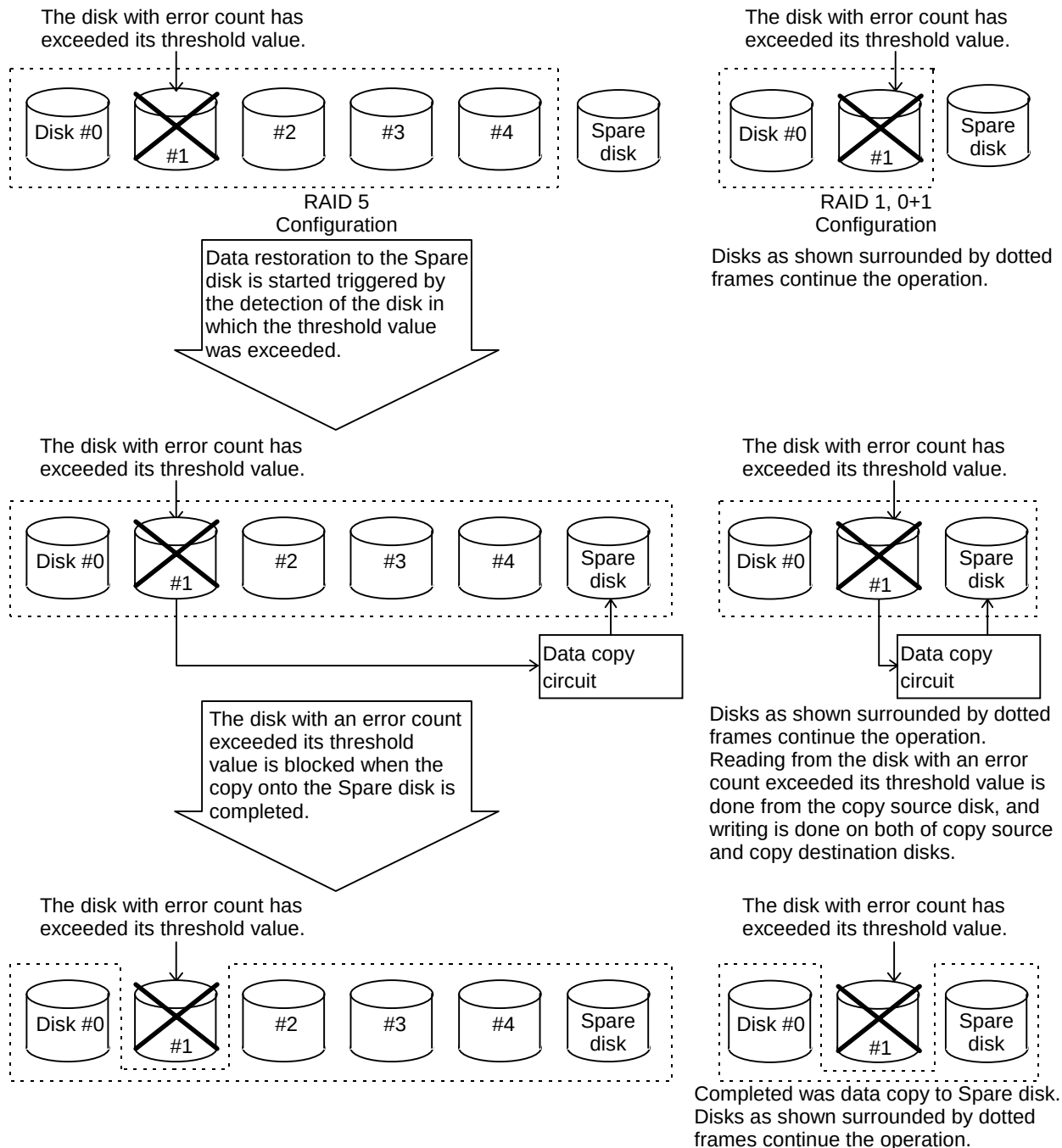
‡1 : For the details of the Disk Array management program, refer to the “Disk Array management program (for GUI) User’s Guide”.

(c) Data recovery onto the Spare disk by means of the dynamic sparing

Data recovery onto the Spare disk is performed as shown below. When a Disk drive is detected in which the error count has exceeded its threshold value, data stored in the Disk drive is copied automatically onto the Spare disk.

The automatic data recovery onto the Spare disk is performed only when the following condition is met.

Condition : The Spare disk is not in use when a disk is detected in which the error count has exceeded its threshold value.



The subsystem displays the following message on the panel when detecting a disk in which the error count has exceeded its threshold value.

MM/DD/YYYY	HH:MM:SS	Cx I41■XY	HDU error over (Unit-X, HDU-Y)	: MANUAL / TRC
Date	Time	Detect Controller#	■: 0 to 9 or A to D	

At the time when an excess of the error occurrence count over threshold value is detected, only the display of the above message is done in the “Information Message” window of the WEB ([WEB 02-0120](#)), no regression of the Disk drive occurs, and the dynamic sparing is started.

The disk with an error count exceeded its threshold value is blocked after the dynamic sparing is completed.

Refer to page [MNTE 04-0640](#) for “Information Message” transition when the dynamic sparing is performed.

In the following cases in which a disk with an error count exceeded its threshold value is detected, the Disk drive is blocked without an execution of the dynamic sparing.

- When the dynamic sparing mode is set not to execute the dynamic sparing.
- When a disk with an error count exceeded its threshold value is detected after the data has been recovered or while the Spare disk is being used for the data recovery.
- Another Disk drive with an error count exceeded its threshold value is detected during the dynamic sparing operation.

In each case above, the disk with an error count exceeded its threshold value is blocked. Procedures for data recovery and disk replacement are the same as those for the installation of the Spare disk.

Errors counted in the subsystem and default threshold values for them are listed below.

Item No.	Kind of error	Threshold (Default)
1	Disk mechanical error. (Recovered)	50
2	Disk mechanical error. (Un-recovered)	2
3	Disk medium error. (Recovered)	100
4	Disk medium error. (Un-recovered)	50
5	Disk R/W error. (Recovered)	10
6	Disk R/W error. (Un-recovered)	2
7	Disk I/F error. (Recovered)	50
8	Disk I/F error. (Un-recovered)	2
9	Disk hardware error. (Recovered)	50
10	Disk hardware error. (Un-recovered)	2
11	Disk SCSI I/F error. (Recovered)	50
12	Disk SCSI I/F error. (Un-recovered)	2
13	Collectable errors in online verify.	100
14	Un-correctable errors in online verify.	50

There threshold values above can be referred to and updated from the Disk Array management program^(‡1).

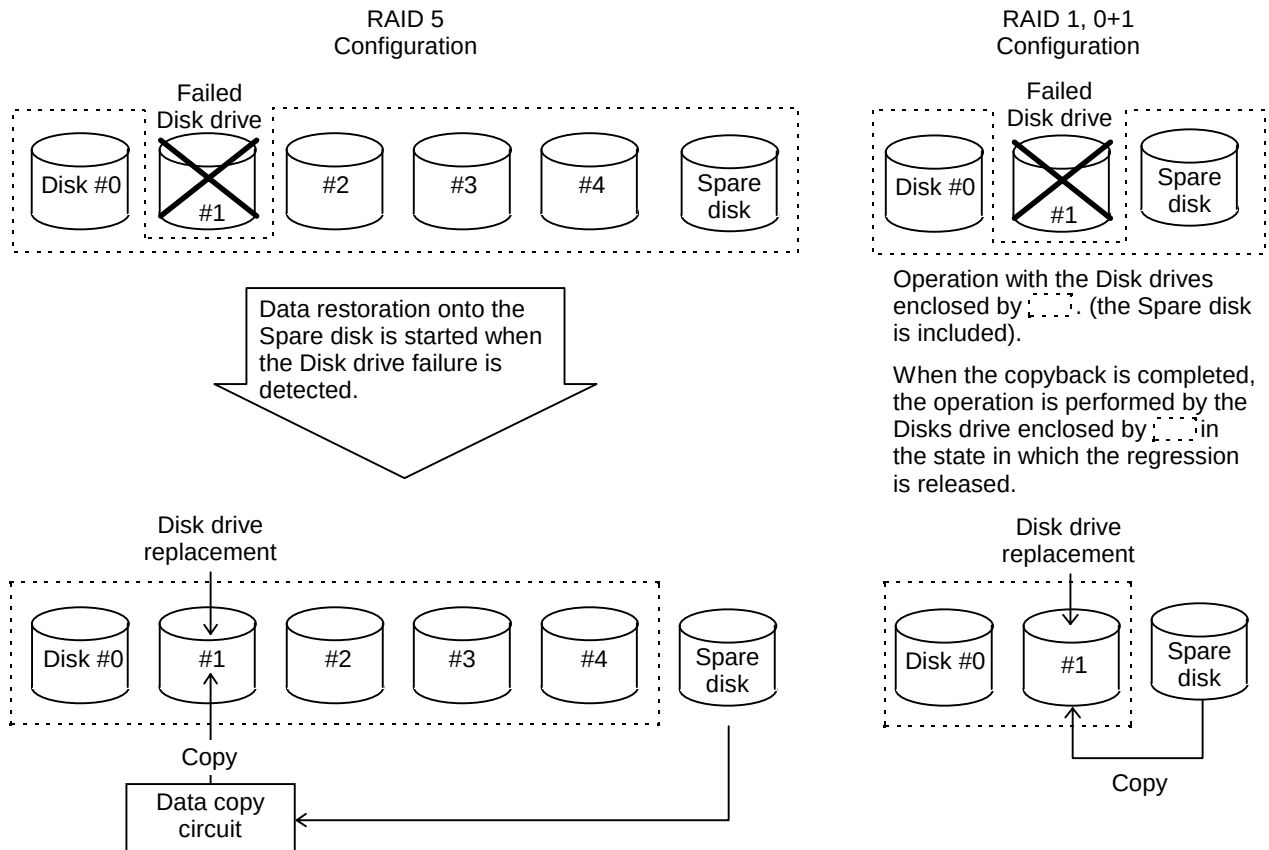
Besides, the then error count can be referred to concerning the recovered or un-recovered disk media errors, correctable errors in online verify operations, correctable errors, and un-correctable errors.

‡1 : For details of the Disk Array management program, refer to the “Disk Array management program (for GUI) User’s Guide”.

(d) Copy back

When a new Disk drive is inserted to where a failure occurred as shown in the drawing below, the copy back will be executed automatically.

When the failed Disk drive is replaced during the data recovery onto the Spare disk, after the data recovery is completed, the copy back will be executed automatically.



In the following cases, the copy back will not start automatically. Operation to start the copy back is required.

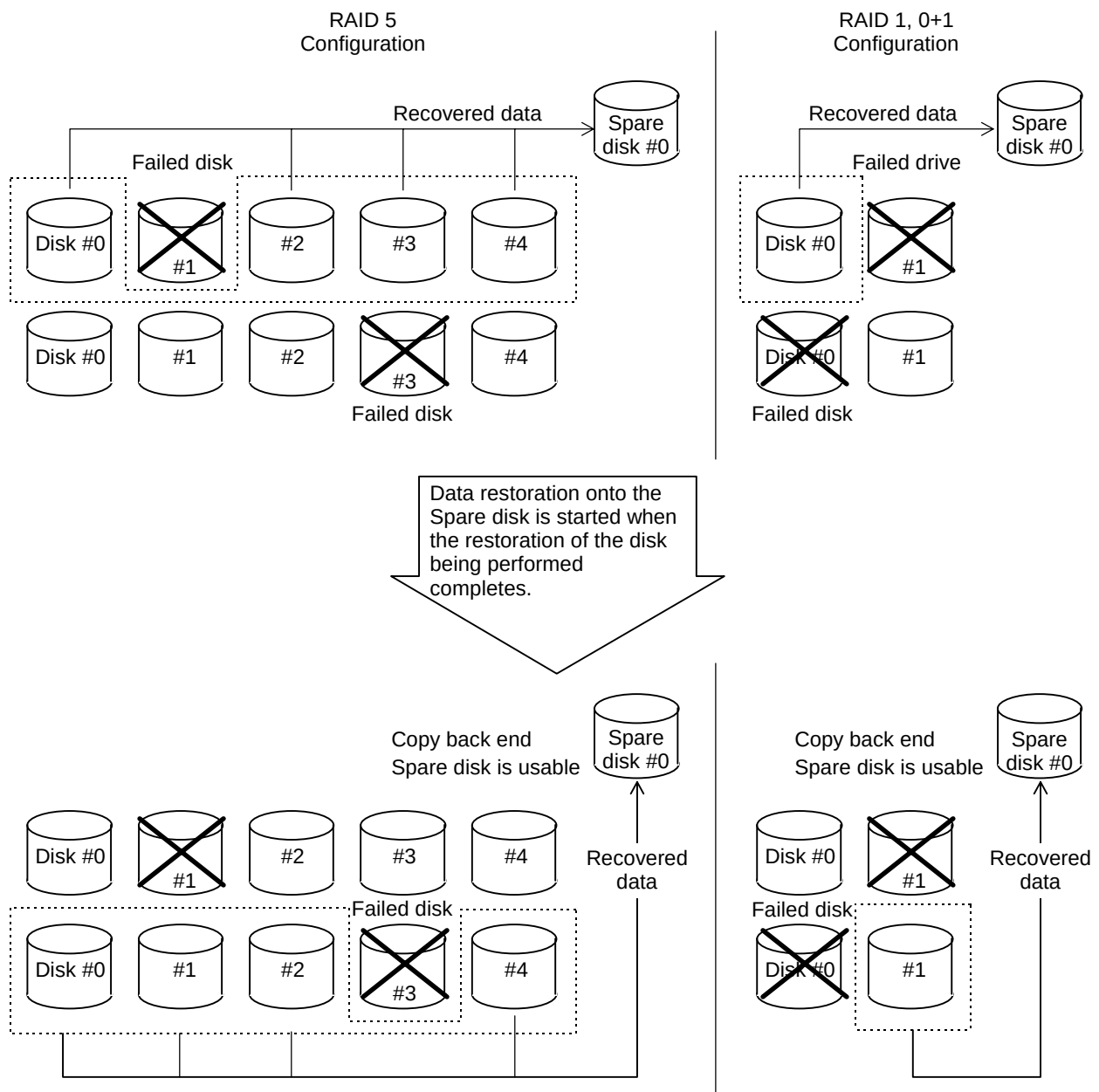
- When the drive recovery opportunity of the drive recovery option in the Disk Array management program is not set to "automatic start" (automatic), the continuous start is not done. To make the continuous start be done, the drive recovery opportunity of the drive recovery option in the Disk Array management program must be set to "automatic start" (automatic).

(e) The continuous data recovery

When failures occurred in plural disks, after the data recovery of the first disk is completed, the data recovery of the second disk will start automatically by the continuous data recovery.

The continuous start is performed (the specified mode is activated) only when the drive recovery option in the Disk Array management program the disk recovery mode is specified as “automatic start”.

Continuous starting is initiated not only when restoring using Spare disk, but also when making a collection copy to the original Disk drive, and when recovering with no Spare disk mounted.



In the following cases, the continuous data recovery will not start.

- When the drive recovery opportunity of the drive recovery option in the Disk Array management program is not set to “automatic start” (automatic), the continuous start is not done. To make the continuous start be done, the drive recovery opportunity of the drive recovery option in the Disk Array management program must be set to “automatic start” (automatic).
- When all Spare disks are used, if the blocked Disk drive is not replaced, the continuous data recovery will not start. If the Spare disk can be used or the blocked Disk drive is replaced, the continuous data recovery will start.
- The continuous data recovery will not start for detached Disk drive and uninstalled Disk drive.

(f) Transition of “Information Message”

When the recovery completes normally, the “Information Message” from the WEB ([WEB 02-0120](#)) change successively as shown below.

(i) Data recover (Data recovery onto the Spare disk when a disk failure is detected)

W060xy	HDU alarm	: Disk blocked
I150xy	Data recovery started	: Start of data area recovery
I151xy	Data recovery completed	: Completion of data area recovery
I008xy	Spare HDU recovered	: Completion of recovery onto Spare disk

(ii) Data recover (Dynamic sparing from data disk to Spare disk)

I15Axy	Dynamic sparing start	: Start of Dynamic sparing
I150xy	Data recovery started	: Start of disk recover
I151xy	Data recovery completed	: Completion of data recovery
I008xy	Spare HDU recovered	: Completion of recovery onto Spare disk
W060xy	HDU alarm	: Disk x, y were blocked

(iii) Copy back

I140xy	System copy started	: Start of system area recovery ^(‡1)
I141xy	System copy completed	: Completion of system area recovery ^(‡1)
I150xy	Data recovery started	: Start of data area recovery
I151xy	Data recovery completed	: Completion of data area recovery

When the recovery terminates abnormally, either ‘I142xy System cop failed’ or ‘I152xy Data recover failed’ is displayed. Take a recovery action following the messages.

‡1 : This message is displayed only when replacing Disk drive (#0 to #3) on the RK.

(g) Confirming completion of data recovery or copy back

Select “Information Message” from the WEB ([WEB 02-0120](#)) and make sure that the data recovery is completed normally.

**Table 4.3.2 (Example)Standard Times Required for Drive Recovery
in RAID 5(4D+1P) Configuration (Unit : Minute)**

Disk drive capacity	Revolution speed ^(*)
	10,000 min ⁻¹ (Type:AxFx)
8.7 G bytes	38
17.8 G bytes	75
35.7 G bytes	150
71.6 G bytes	300
*1 : Times shown in the above table are strictly standard ones. In some cases, the longer times may be required depending on the accesses from the host computer.	

4.3.3 Replacing Floppy disk drive

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	The Floppy disk drive cannot be used during the replacement.	See 4.3.3 (1).
2	Replacement with the power turned off	—	See 4.3.3 (2).

(1) Procedure for replacement with the power turned on

- (a) When a Controller blockade has occurred, replace the blocked Controller before replacing the Floppy disk drive.
- (b) Remove the front bezel of the RK. (Refer to [MNTE 01-0100](#).)
- (c) Take out the Floppy disk drive by pulling it toward you holding its knob.
- (d) Hold the Floppy disk drive by its knob and insert it along the guide rails of the subsystem (align the face of the Floppy disk drive with that of the subsystem).
When doing this, be careful not to insert the Floppy disk drive upside down.
- (e) Collect a trace from the independent subsystem while the subsystem power is on (refer to page [MNTE 02-1400](#) for “2.6.3 Collection of trace in the ON state”) to make sure that the trace collection terminates normally.

Notice : When the trace collection does not terminate normally,
the Controller may be faulty. Replace the Controller #0
(see page [MNTE 04-0720](#)).

(2) Procedure for replacement with the power turned off

- (a) Remove the front bezel of the RK. (Refer to [MNTE 01-0100](#).)
- (b) Turn off the main switch. (The POWER LED goes out.)
- (c) Make sure that the BACK UP LED on the Controller is off. (This is to make sure that the disk array is not in the Cache Backup mode.)
- (d) Take out the Floppy disk drive by pulling it toward you holding its knob.
- (e) Hold the Floppy disk drive by its knob and insert it along the guide rails of the subsystem. (align the face of the Floppy disk drive with that of the subsystem)
When doing this, be careful not to insert the Floppy disk drive upside down.
- (f) Turn on the main switch.
Make sure that the READY LED has come on.
- (g) Attach the front bezel.

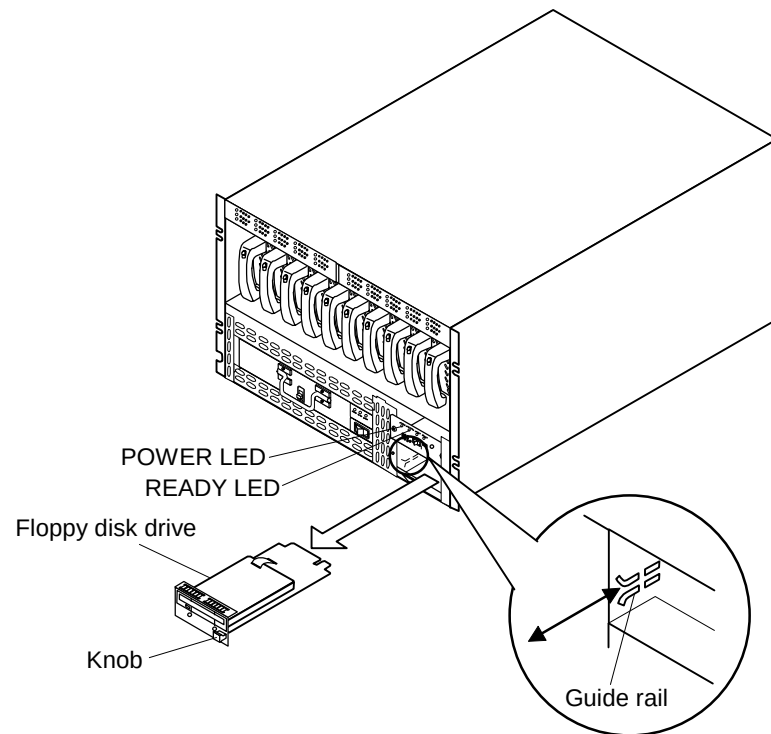


Figure 4.3.4 Replacing Floppy Disk Drive

4.3.4 Replacing Battery unit

Select a procedure from the following and execute it.

When replacing the Battery unit, remove or install it with its battery switch turned off.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	If the power is turned off during the replacement, data is not backed up because the power is not supplied from the battery.	See 4.3.4 (1) (04-0700) .
2	Replacement with the power turned off	Apply this in the case where you do not want the preventive replacement against a self-recovered failure from being reported when the failure monitoring service is activated.	See 4.3.4 (2) (04-0710) .



- **The lead battery contains poisonous substances. Besides, if it is handled improperly, an electric shock or explosion may be caused. Please follow the safety instructions below.**
 - ① **Do not disassemble or remake the battery.**
 - ② **Do not deform the battery.**
 - ③ **Do not connect plus and minus poles with a metallic article such as a wire.**
 - ④ **Do not reverse the connections of plus and minus poles.**
 - ⑤ **Do not peel off the covering tube.**
 - ⑥ **Do not connect the battery directly to the outlet.**
 - ⑦ **Do not connect the battery to anything other than this subsystem for charging/discharging.**
 - ⑧ **Do not leave the battery in a hot place. Store it in a dark and cool place.**
 - ⑨ **Do not discard a used battery at the site where it was removed for replacement.**

- (1) Procedure for replacement with the power turned on
 - (a) Remove the front bezel of the RK. (Refer [MNTE 01-0100](#).)
 - (b) Turn off the battery switch of the Battery unit to be replaced. (Then, the WARNING LED (orange) comes on and a buzzer sounds.)
 - (c) Release the latch in the front and pull out the Battery unit toward you. (Since two latches are provided in the front and on the right-hand side of the Battery unit, the Battery unit is stopped once at the position of the latch on the right-hand side.)
 - (d) Release the latch on the right-hand side holding the Battery unit main body with your hand and pull it out toward you.
 - (e) Make sure that the battery switch on the Battery unit has been turned off.
 - (f) Wait for more than 20 seconds, and then insert the Battery unit into the specified location in the RK.

If the Battery unit is inserted without waiting for 20 seconds, it is possible that the Battery unit is not recovered from the failure normally.
 - (g) Turn on the battery switch of the Battery unit.

Make sure that the WARNING LED (orange) is off.
 - (h) Keep the power on for two hours or longer to charge the battery.
 - (i) Make sure that the READY LED (green) on the Battery unit is on.
 - (j) Attach the front bezel.

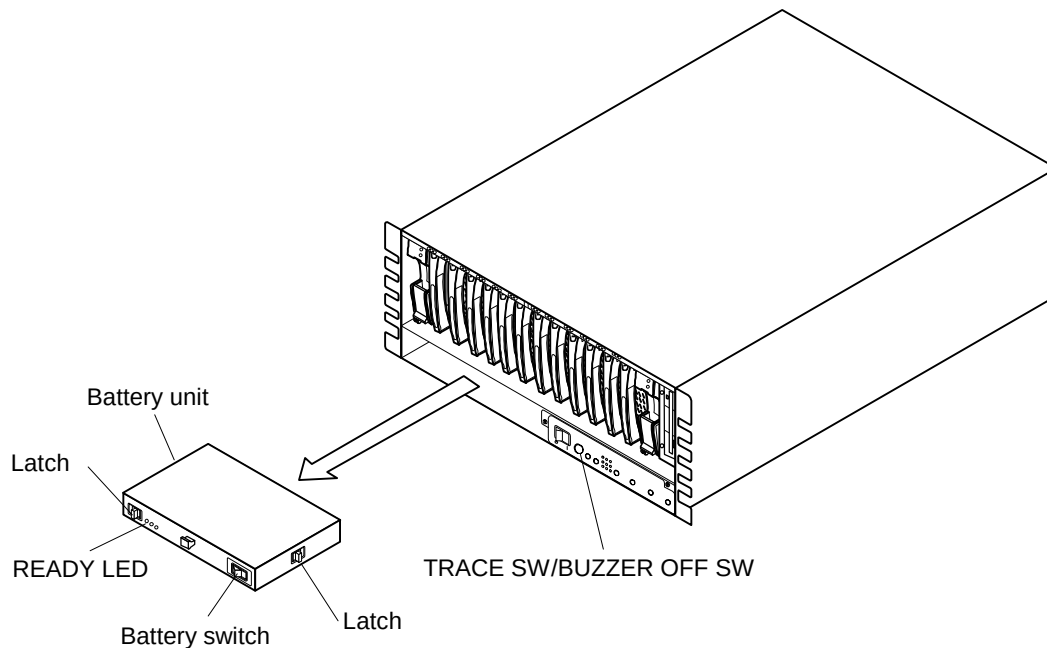


Figure 4.3.5 Replacing Battery Unit

(2) Procedure for replacement with the power turned off

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)
When the cache is in the cache backup mode, make the replacement after canceling the mode.

- (a) Remove the front bezel of the RK. (Refer to [MNTE 01-0100](#).)
- (b) Turn off the main switch. (The POWER LED goes out.)
- (c) Make sure that the BACK UP LED on the Controller is off. (This is to make sure that the subsystem is not in the cache backup mode.)
- (d) Turn off the battery switch of the Battery unit.
- (e) Release the latch in the front and pull out the Battery unit toward you. (Since two latches are provided in the front and on the right-hand side of the Battery unit, the Battery unit is stopped once at the position of the latch on the right-hand side.)
- (f) Release the latch on the right-hand side holding the Battery unit main body with your hand and pull it out toward you.
- (g) Make sure that the battery switch on the Battery unit has been turned off.
- (h) Insert the Battery unit into the specified location in the disk array.
- (i) Turn on the battery switch of the Battery unit.
- (j) Turn on the main switch.
- (k) Make sure that the READY LED is on. (Make sure that the READY LED on the panel is on and the ALARM and WARNING LEDs are off.)
- (l) Keep the power on for two hours or longer to charge the battery.
- (m) Attach the front bezel.

4.3.5 Replacing Controller

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	1. The procedure varies depending on whether the FAIL LED ^(*) is on or off.	When the FAIL LED is on See 4.3.5 (1-1).
		2. Make the replacement in units of Controller. 3. When replacing the both Controllers at the same time, do it with the power turned off. 4. In the case of the single Controller configuration, perform the replacement after turning off the power.	When the FAIL LED is off See 4.3.5 (1-2). (Preventive replacement)
2	Replacement with the power turned off	—	See 4.3.5 (2).

*1 : For the installation location of the FAIL LED, see Figure 4.3.6.

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

(1-1) When the FAIL LED is on

(a) Make sure that the FAIL LED (red) on the controller to be replaced is on. (Refer to Figure 4.3.6.)

Notice : • Do not replace the Controller which operates normally.
Before replacing the Controller, confirm that it is blocked (the FAIL LED (red) in on).

- When replacing the two Controller with the power turned on, the Controller must be replaced one after another. When the two Controllers are replaced at the same time, turned off the subsystem power before replacement.
- Since the system parameters are automatically loaded on the new Controller by copying them from that of another system, setting using a FD or by manual operation is not needed. However, if the two Controllers failed at the same time, a system parameter restoration using the FD is required.

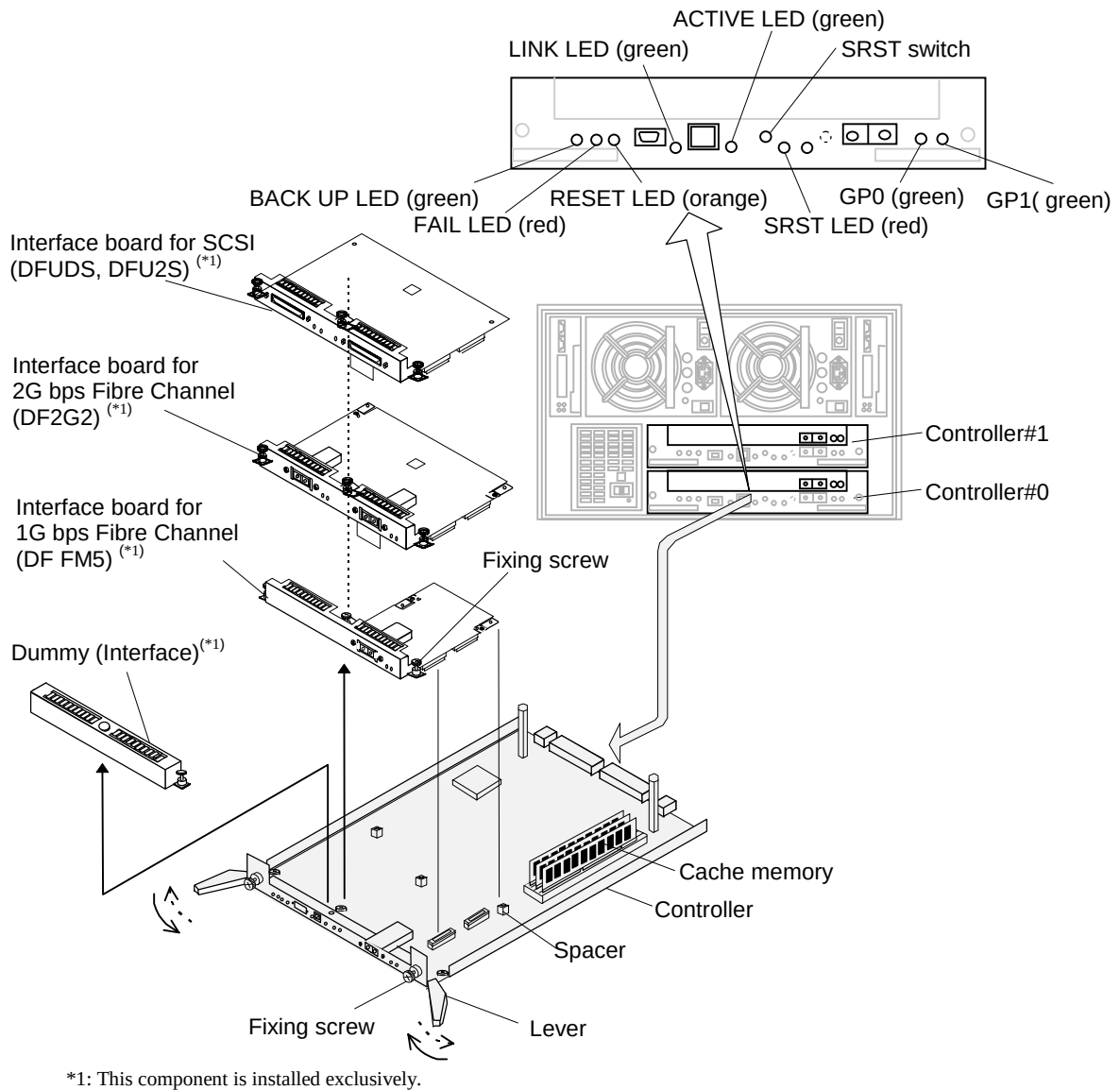


Figure 4.3.6 Controller Replacement and LED Locations

- (b) Remove the interface cable (Fibre Channel), LAN, and RS232C cables connected to the Controller.

Notice : Do not remove the SCSI interface cable connected to the Interface board. Because, in the case of the SCSI connection, lower devices connected in the daisy chain become unable to be recognized by the host.

- (c) Loosen the left and right fixing screws of the Controller.
Raise the both right and left levers at the same time in the direction shown by the arrows (·····>) and take out the Controller.
- (d) Remove the Interface board (or Dummy (Interface)).

Notice : Because the Interface board to which the cable is left connected is live, do not let any of its live parts contact the other articles.

- (e) Remove the Cache memory mounted on the Controller.
You can remove the Cache memory by pulling it up while gripping it at its both ends and pressing the slot levers which secure it.

Notice : Place the removed Interface board and Cache memory temporarily in the place where the anti-static measures are taken.

- (f) Reinstall the removed Cache memory in Controller. Be sure to install it in the same position as before.
- (g) Remount the removed Interface board (or Dummy (Interface)) on the new Controller.
- (h) Wait for more than 20 seconds, and then insert the Controller into the specified position with its right and left levers being raised, then return the both levers to the direction shown by the arrows (—>) at the same time.
- If the Controller is inserted without waiting for 20 seconds, it is possible that the Controller is not recovered from the failure normally.

Notice : When returning the both levers in the directions shown by the arrows (→) at the same time, 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 Controller because the Controller is considered to have failed.

- (i) Tighten the left and right fixing screws of the Controller.
- (j) Make sure that the WARNING LED (orange) on the panel is off.
- (k) Connect the removed interface cable (Fibre Channel), LAN, and RS232C cables to the Controller.

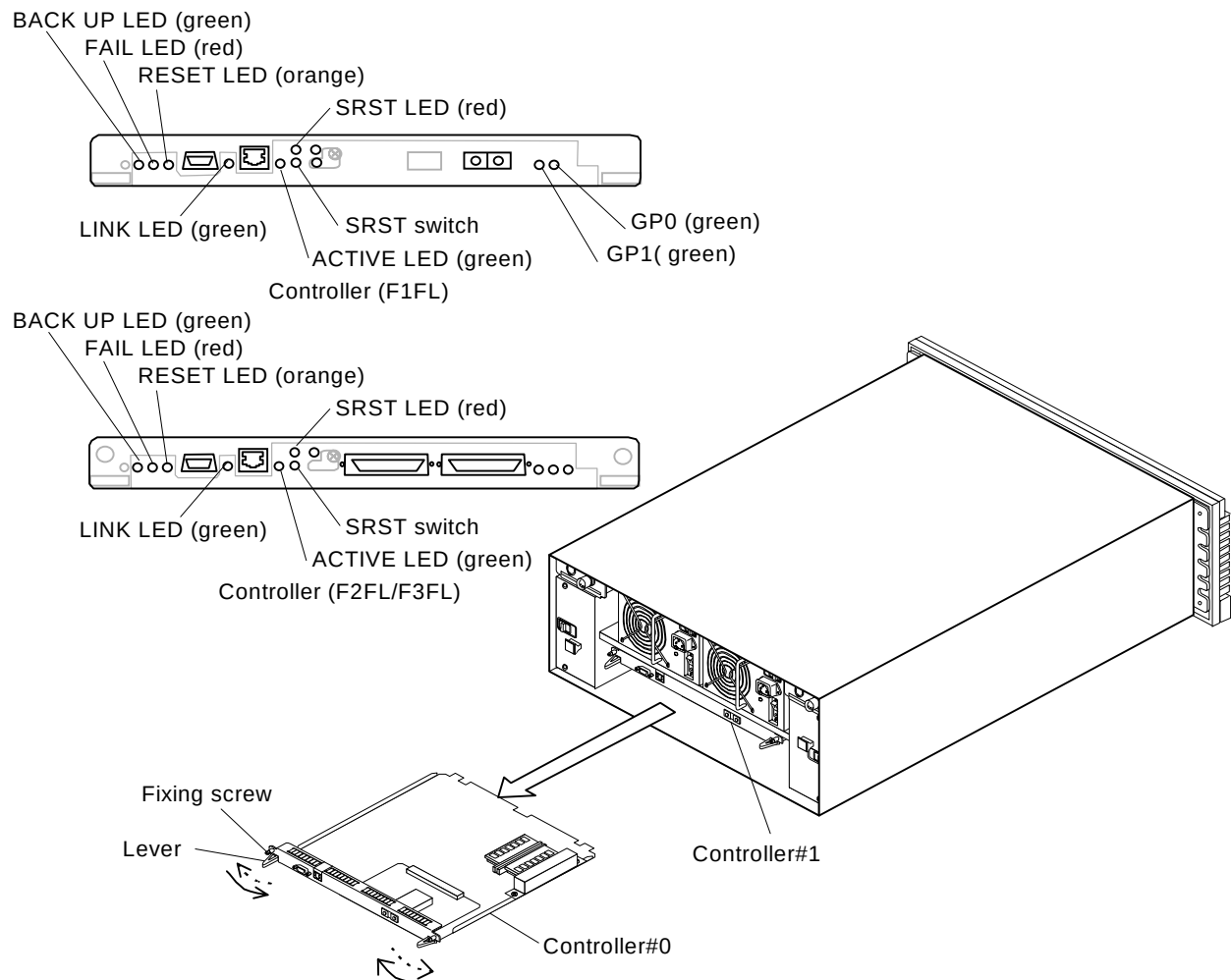


Figure 4.3.7 Replacing Controller

(1-2) When the FAIL LED is off

- (a) Remove the interface cable (Fibre Channel or SCSI), LAN, and RS232C cables connected to the Controller to be blocked for prevention against a failure.

Notice : • When replacing the two Controller with the power turned on, the Controller must be replaced one after another. When the two Controllers are replaced at the same time, turned off the subsystem power before replacement.

- Since the system parameters are automatically loaded on the new Controller by copying them from that of another system, setting using a FD or by manual operation is not needed. However, if the two Controllers failed at the same time, a system parameter restoration using the FD is required.
 - Do not remove the SCSI interface cable connected to the Interface board. Because, in the case of the SCSI connection, lower devices connected in the daisy chain become unable to be recognized by the host.
- (b) To block the Controller by way of prevention against a failure, press the SRST switch and make sure that the FAIL LED (red) comes on (see Figure 4.3.6).
 - (c) Loosen the left and right fixing screws of the Controller.
Raise the both right and left levers at the same time in the direction shown by the arrows (·····>) and take out the Controller.
 - (d) Remove the Interface board (or Dummy (Interface)).

Notice : Because the Interface board to which the cable is left connected is live, do not let any of its live parts contact the other articles.

- (e) Remove the Cache memory mounted on the Controller.

You can remove the Cache memory by pulling it up while gripping it at its both ends and pressing the slot levers which secure it.

Notice : Place the removed Interface board and Cache memory temporarily in the place where the anti-static measures are taken.

- (f) Reinstall the removed Cache memory in Controller. Be sure to install it in the same position as before.
- (g) Remount the removed Interface board (or Dummy (Interface)) on the new Controller.
- (h) Wait for more than 20 seconds, and then insert the Controller into the specified position with its right and left levers being raised, then return the both levers to the direction shown by the arrows (—→) at the same time.

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

Notice : When returning the both levers in the directions shown by the arrows (—→) at the same time, 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 Controller because the Controller is considered to have failed.

- (i) Tighten the left and right fixing screws of the Controller.
- (j) Make sure that the WARNING LED (orange) on the panel is off.
- (k) Connect the removed interface cable (Fibre Channel), LAN, and RS232C cables to the Controller.

- (2) Procedure for replacement with the power turned off (See Figure 4.3.6.)
- (a) Confirm the installation location of the Controller whose FAIL LED is on (See Figure 4.3.6.).
 - (b) Remove the front bezel of the RK. (Refer to [MNTE 01-0100.](#))
 - (c) Make sure that the system parameter backup FD is inserted, then backup the system parameters.
 - (d) Turn off the main switch.
Make sure that the POWER LED (green) on the panel has gone out.
When an array unit cannot be turned off, connect to the WEB to isolate its faults.

Notice : When the power has already been turned off, make sure that the subsystem is not in the cache backup mode.
(Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020.](#))
When the subsystem is in the cache backup mode, cancel the mode before starting the replacement.

Make sure that the BACK UP LED (green) on the Controller is off.

Notice : When the BACK UP LED (green) is on, user data not written on the disk exists in the Cache memory.
If the Controller is removed from the subsystem in this state, it is feared that user data may be lost.

- (e) Remove the interface cable (Fibre Channel), LAN, and RS232C cables connected to the Controller.

Notice : Do not remove the SCSI interface cable connected to the Interface board. Because, in the case of the SCSI connection, lower devices connected in the daisy chain become unable to be recognized by the host.

- (f) Loosen the right and left fixing screws of the Controller.
Raise the both right and left levers at the same time in the direction shown by the arrows (····>) and take out the Controller.

- (g) Remove the Interface board (or Dummy (Interface)).

Notice : Because the Interface board to which the cable is left connected is live, do not let any of its live parts contact the other articles.

- (h) Remove the Cache memory.

Notice: Place the removed Cache memory in the place where anti-static measures are taken.

- (i) Reinstall the removed Interface board (or Dummy (Interface)) on the new Controller.
- (j) Insert the removed Cache memory. Be sure to install it in the position with the same slot number as before.
- (k) Insert the Controller in the specified position with its right and left levers being raised, then return the levers at the same time in the direction shown by the arrows (→).
If the Controller 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.
- (l) Tighten the left and right fixing screws of the Controller.
- (m) Connect the removed interface cable (Fibre Channel), LAN, and RS232C cables to the Controller.
- (n) Turn on the main switch.
Make sure that the WARNING LED (orange) on the panel has gone out.
- (o) Prepare the FD for system parameter restoration to which the system parameters were backed up in step (c). If the FD for system parameter restoration is not available, prepare the list of set system parameters instead.
- (p) Check if the FD to which the system parameters were backed up is inserted in the Floppy disk drive.
- (q) Restore the system parameters. (Refer to [MNTE 01-0200](#).)
- (r) Turn off the main switch.
Turn off the breakers of the AC/DC power supply.
- (s) Turn on the breakers of the AC/DC power supply.
Turn on the main switch.
- (t) Make sure that the POWER LED (green) on the panel is off.
- (u) Attach the front bezel.

4.3.6 Replacing Interface board

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	When the FAIL LED of the controller, in which the interface board to be replaced is installed, is on in the case of the dual system configuration.	See 4.3.6 (1-1)
		When the FAIL LED of the controller, in which the interface board to be replaced is installed, is off in the case of the dual system configuration.	See 4.3.6 (1-2) (Preventive replacement)
2	Replacement with the power turned off	—	See 4.3.6 (2)

(1) Procedure for replacement with the power turned on

(1-1) When the FAIL LED of the controller is on

- (a) Remove the interface cable (Fibre Channel or SCSI), LAN, and RS232C cables connected to the Controller on which the Interface board to be replaced is mounted.

Notice : • Do not replace the Controller which operates normally.

Before replacing the Controller, confirm that it is blocked (the FAIL LED (red) in on).

- Since the system parameters are automatically loaded on the new Controller by copying them from that of another system, setting using a FD or by manual operation is not needed.

- (b) Make sure that the FAIL LED on the Controller on which the Interface board to be replaced is on. If not, remove the Interface board following the “When the FAIL LED goes out” in Item (1-2) on page [MNTE 04-0800](#).
- (c) Loosen the left and right fixing screws of the Controller.
Raise the both right and left levers at the same time in the direction shown by the arrows (····>) and take out the Controller.
- (d) Loosen the three screws of the Interface board.
Pull the Interface board upward and disconnect the connector.

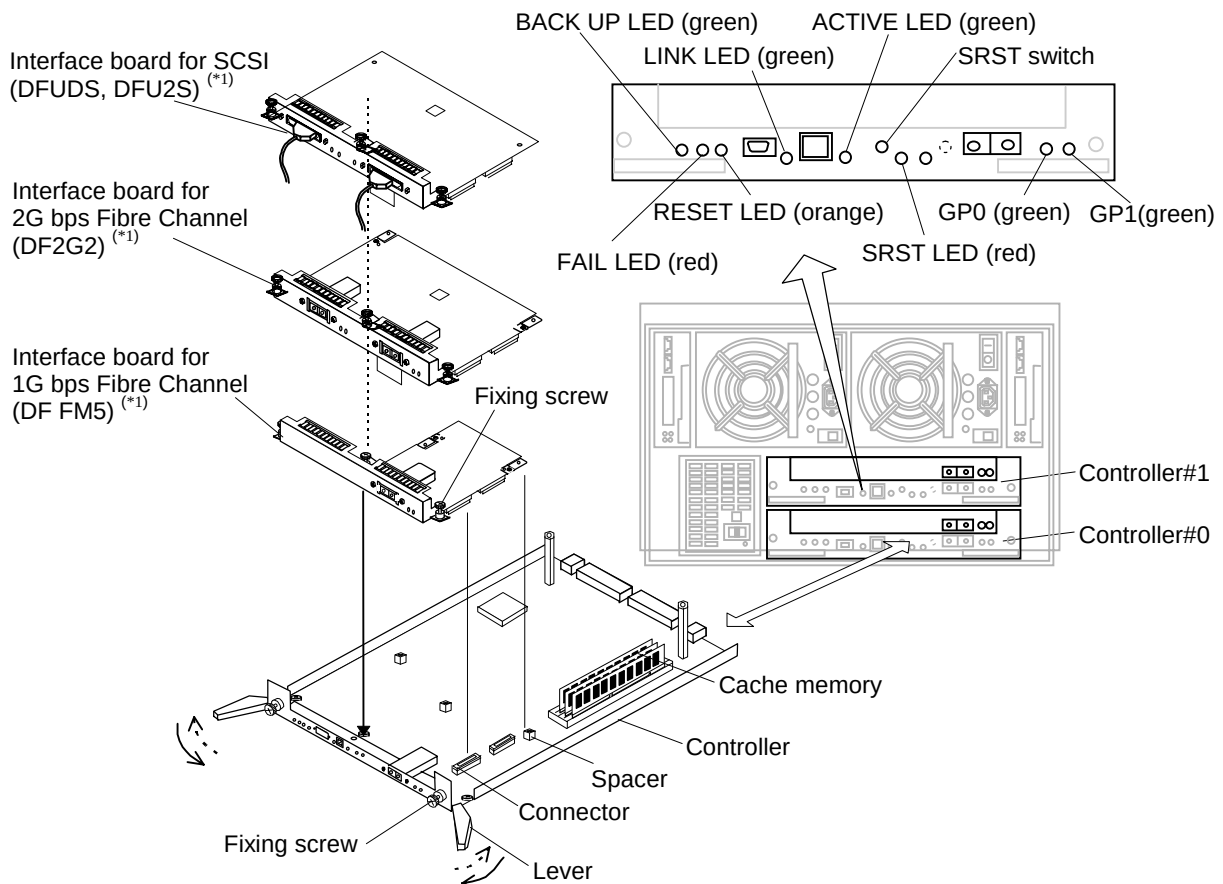
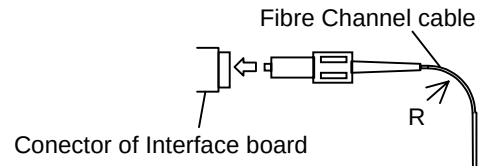


Figure 4.3.8 Replacing Interface Board

- (e) Install the Interface board on the spacer of the Controller and tighten the three fixing screws.
When doing this, make sure that the connectors have been inserted completely.
- (f) Wait for more than 20 seconds, and then insert the Controller in the specified position with its right and left levers being raised, then return the levers at the same time in the direction shown by the arrows (—→).
- If the Controller is inserted without waiting for 20 seconds, it is possible that the Controller is not recovered from the failure normally.
- (g) Tighten the left and right fixing screws of the Controller.
- (h) The WARNING LED (orange) on the panel goes out.

- (i) Connect the removed interface cable (Fibre Channel or SCSI), LAN, and RS232C cables to the Controller.

Notice : When bending the Fibre Channel 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 an excessive stress.



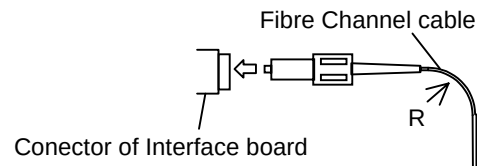
(1-2) When the FAIL LED goes out

- (a) Remove the interface cable (Fibre Channel or SCSI), LAN, and RS232C cables connected to the Controller to be blocked for prevention against a failure.

Notice : • Since the system parameters are automatically loaded on the new Controller by copying them from that of another system, setting using a FD or by manual operation is not needed.

- (b) Press the SRST switch on the Controller, in which the Interface board to be replaced is installed, and make sure that the FAIL LED comes on.
- (c) Loosen the left and right fixing screws of the Controller.
Raise the both right and left levers at the same time in the direction shown by the arrows (····>) and take out the Controller.
- (d) Loosen the three screws of the Interface board.
Pull the Interface board upward and disconnect the connector.
- (e) Install the interface board on the spacer of the controller and tighten the three fixing screws.
When doing this, make sure that the connectors have been inserted completely.
- (f) Wait for more than 20 seconds, and then insert the Controller in the specified position with its right and left levers being raised, then return the levers at the same time in the direction shown by the arrows (—>).
If the Controller is inserted without waiting for 20 seconds, it is possible that the Controller is not recovered from the failure normally.
- (g) Tighten the left and right fixing screws of the Controller.
- (h) The WARNING LED (orange) on the panel goes out.
- (i) Connect the removed interface cable (Fibre Channel or SCSI), LAN, and RS232C cables to the Controller.

Notice : When bending the Fibre Channel 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 an excessive stress.



- (2) Procedure for replacement with the power turned off (See Figure 4.3.8.)
- (a) Confirm the installation location of the Controller whose FAIL LED is on.
 - (b) Remove the front bezel of the RK. (Refer to [MNTE 01-0100](#).)
 - (c) Turn off the main switch.
Make sure that the POWER LED (green) on the panel has gone out.
When an array unit cannot be turned off, connect to the WEB to isolate its faults.

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)
When the cache is in the cache backup mode, make the replacement after canceling the mode.

Make sure that the BACK UP LED (green) on the Controller is off.

Notice : When the BACK UP LED is on, user data not written on the disk may exist in the cache memory.
If the Controller is removed from the subsystem in this state, it is feared that user data may be lost.

- (d) Remove the interface cable (Fibre Channel or SCSI), LAN, and RS232C cables connected to the Controller.
- (e) Loosen the right and left fixing screws of the Controller.
- (f) Pull both right and left levers at the same time in the direction shown by the arrows (····>) and Raise the out the Controller.
- (g) Loosen the three screws of the Interface board.
Pull the Interface board upward and disconnect the connector.
- (h) Install the Interface board in the specified position on the Controller and tighten the three fixing screws.
- (i) Insert the Controller in the specified position with its right and left levers being raised, then return in the levers at the same time in the direction shown by the arrows (——>).
If the Controller 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.
- (j) Tighten the left and right fixing screws of the Controller.
- (k) Connect the removed interface cable (Fibre Channel or SCSI), LAN, and RS232C cables to the Controller.

- (l) Turn on the main switch.
- (m) Make sure that the WARNING LED (orange) on the panel has gone out.
- (n) Attach the front bezel.

4.3.7 Replacing Cache memory

Replacement of the Cache memory must be done by the set of two memory boards (set of boards in slots #0 and #1 and that in slots #2 and #3).

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	When the FAIL LED of the controller, in which the cache memory to be replaced is installed, is on in the case of the dual system configuration.	See 4.3.7 (1-1)
		When the FAIL LED of the controller, in which the cache memory to be replaced is installed, is off in the case of the dual system configuration.	See 4.3.7 (1-2) (Preventive replacement)
2	Replacement with the power turned off	—	See 4.3.7 (2)
*1: In the case of the single Controller configuration, the Cache memory cannot be replaced unless the subsystem power is turned off.			

(1) Procedure for replacement with the power turned on

(1-1) When the FAIL LED of the controller is on

- (a) Make sure that the FAIL LED (red) on the Controller on which the Cache memory to be replaced is on. If not, remove the Cache memory following the “When the FAIL LED goes out” in Item (1-2) on page [MNTE 04-0860](#).

- Notice :
- Do not replace the Controller which operates normally.
Before replacing the Controller, confirm that it is blocked (the FAIL LED (red) in on).
 - Since the system parameters are automatically loaded on the new Controller by copying them from that of another system, setting using a FD or by manual operation is not needed.

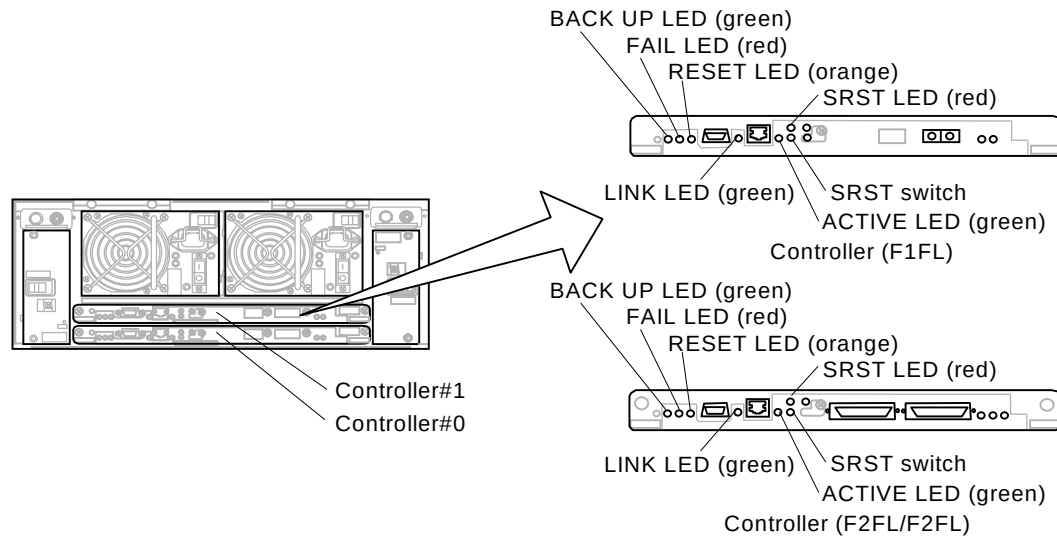


Figure 4.3.9 LEDs of Controller

- (b) Remove the interface cable (Fibre Channel), LAN, and RS232C cables connected to the Controller on which the Cache memory to be replaced is mounted.

Notice : Do not remove the SCSI interface cable connected to the Interface board. Because, in the case of the SCSI connection, lower devices connected in the daisy chain become unable to be recognized by the host.

- (c) Loosen the left and right fixing screws of the Controller.
Raise the both right and left levers at the same time in the direction shown by the arrows (····>) and take out the Controller.
- (d) Remove the Cache memory.
- (e) Install the Cache memory in the Controller.
- Install a new Cache memory with the same capacity as that of the former one in the same slot.
- (f) Wait for more than 20 seconds, and then insert the Controller in the specified position with its right and left levers being raised, then return in the levers at the same time in the direction shown by the arrows (—>).
If the Controller is inserted without waiting for 20 seconds, it is possible that the Controller is not recovered from the failure normally.
- (g) Tighten the left and right fixing screws of the Controller.
- (h) Make sure that the FAIL LED (red) on the Controller is off.
- (i) Make sure that the WARNING LED (orange) on the panel is off.
- (j) Connect the removed interface cable (Fibre Channel), LAN, and RS232C cables to the Controller.

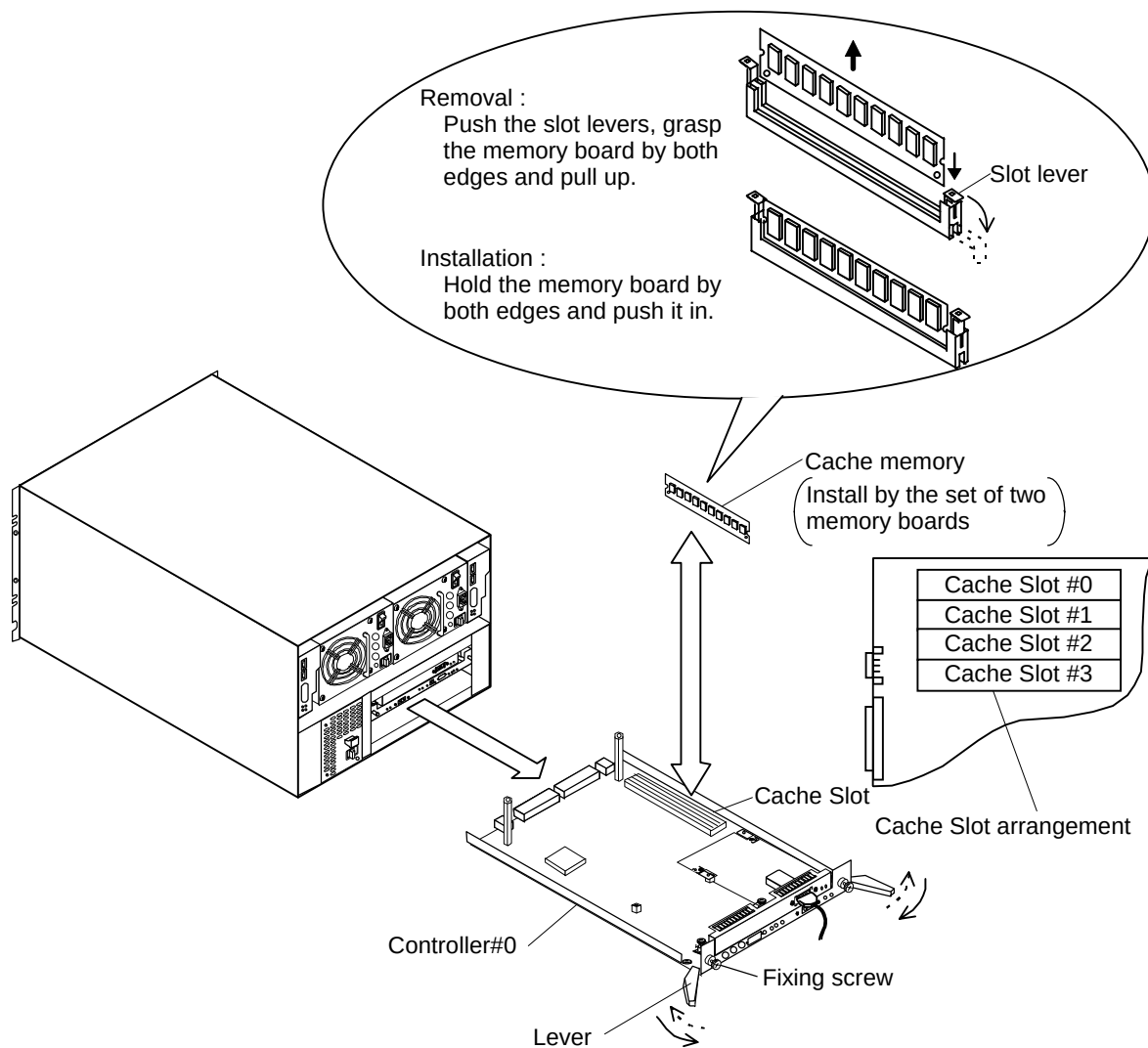


Figure 4.3.10 Replacing of Cache Memory

(1-2) When the FAIL LED goes out

- (a) Remove the interface cable (Fibre Channel), LAN, and RS232C cables connected to the Controller on which the Cache memory to be replaced is mounted.

Notice : • Since the system parameters are automatically loaded on the new Controller by copying them from that of another system, setting using a FD or by manual operation is not needed.

- Do not remove the SCSI interface cable connected to the Interface board. Because, in the case of the SCSI connection, lower devices connected in the daisy chain become unable to be recognized by the host.

- (b) Press the SRST switch on the Controller, in which the Cache memory to be replaced is installed, and make sure that the FAIL LED comes on.
- (c) Loosen the left and right fixing screws of the Controller.
Raise the both right and left levers at the same time in the direction shown by the arrows (····>) and take out the Controller.
- (d) Remove the Cache memory.
- (e) Install the Cache memory in the Controller.
• Install a new Cache memory with the same capacity as that of the former one in the same slot.
- (f) Wait for more than 20 seconds, and then insert the Controller in the specified position with its right and left levers being raised, then return in the levers at the same time in the direction shown by the arrows (—>).
If the Controller is inserted without waiting for 20 seconds, it is possible that the Controller is not recovered from the failure normally.
- (g) Tighten the left and right fixing screws of the Controller.
- (h) Make sure that the FAIL LED (red) on the Controller is off.
- (i) Make sure that the WARNING LED (orange) on the panel is off.
- (j) Connect the removed interface cable (Fibre Channel), LAN, and RS232C cables to the Controller.

(2) Procedure for replacement with the power turned off

(a) Remove the front bezel of the RK. (Refer to [MNTE 01-0100](#).)

(b) Turn off the main switch.

Make sure that the POWER LED (green) on the panel has gone out.

When the power cannot be turn off, perform a troubleshooting after connecting to WEB.

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)

When the cache is in the cache backup mode, make the replacement after canceling the mode.

Make sure that the BACK UP LED (green) on the Controller is off.

Notice : When the BACK UP LED is on, user data not written on the disk may exist in the cache memory.

If the Controller is removed from the subsystem in this state, it is feared that user data may be lost.

(c) Remove the interface cable (Fibre Channel), LAN, and RS232C cables connected to the Controller.

Notice : Do not remove the SCSI interface cable connected to the Interface board. Because, in the case of the SCSI connection, lower devices connected in the daisy chain become unable to be recognized by the host.

(d) Loosen the right and left fixing screws of the Controller.

Pull both right and left levers at the same time in the direction shown by the arrows (····>) and Raise the out the Controller.

(e) Remove the Cache memory.

(f) Install the Cache memory in the Controller.

- Install a Cache memory with the same capacity as that of the former one in the same slot.

- (g) Insert the Controller in the specified position with its right and left levers being raised, then return the levers at the same time in the direction shown by the arrow (—→).
If the Controller 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.
- (h) Tighten the left and right fixing screws of the Controller.
- (i) Turn on the main switch.
- (j) Make sure that the WARNING LED (orange) on the panel is off.
- (k) Connect the removed interface cable (Fibre Channel), LAN, and RS232C cables to the Controller.
- (l) Attach the front bezel.

4.3.8 Replacing ENC (RK) board and ENC (RKA) board

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	When replacing the ENC, the subsystem must be in the status shown below. • Hot replacement of the microprogram is not being performed.	See 4.3.8 (1-1) When the FAIL LED (red) of the ENC board to be replaced is on
		• Hot replacement of the Controller is not being performed. • Any part other than the above is not being replaced.	See 4.3.8 (1-2) When the FAIL LED (red) of the ENC board to be replaced is off (Preventive replacement)
2	Replacement with the power turned off	—	See 4.3.8 (2)

Notice : When more than one ENC board on the same loop must be replaced, replace the ENC board on the RK side first, and the ENC board on the RKA side next.

When a failure of the battery system (whose message code is W03000, W03100, W03200, W03300, or W03400) has occurred, recover the subsystem from the battery system failure before replacing the ENC board.

(1) Procedure for replacement with the power turned on (See Figure 4.3.11.)

(1-1) When the FAIL LED of the ENC board to be replaced is on

- (a) Make sure that the FAIL LED (red) is on. If it is off, remove the ENC board following Item (1-2) “When the FAIL LED of the ENC board to be replaced is off” on page [MNTE 04-0901](#).
- (b) Disconnect the ENC cable connected to the ENC board to be replaced.
- (c) Raise the lever on the ENC board in the direction shown by the arrow ① (→).
- (d) Pull the ENC board toward you to remove it.
- (e) Insert a new ENC board into the specified location with its levers being raised after waiting for 20 seconds, and connect a new ENC cable as the old one was before.
If the ENC board is inserted without waiting for 20 seconds, it is possible that the ENC board is not recovered from the failure normally.

(f) Return the levers in the direction shown by the arrows ② (<.....).

Notice : When returning the both levers in the directions shown by the arrows ② (<.....) at the same time, 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 board because the ENC board is considered to have failed.

(g) Make sure that the FAIL LED (red) on the ENC board is off.

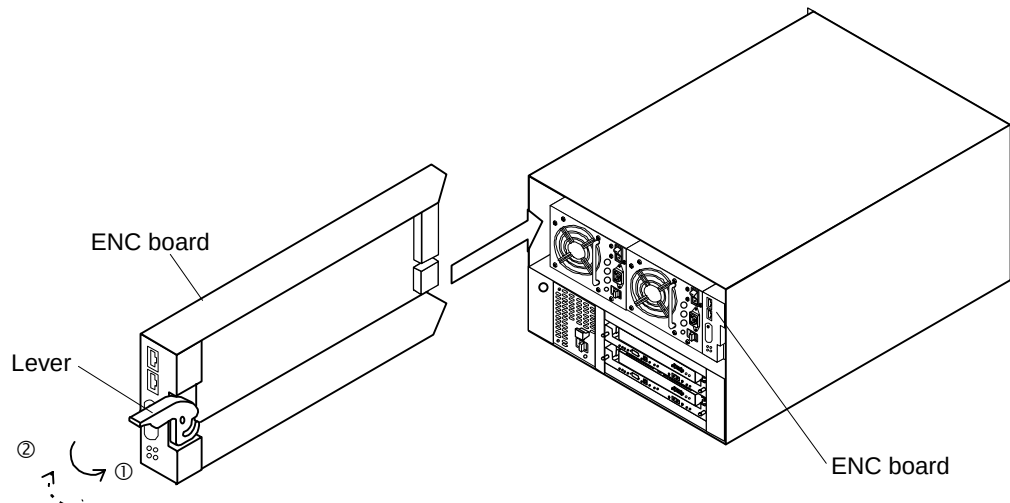


Figure 4.3.11 Replacing of ENC Board

- (1-2) When the FAIL LED of the ENC board to be replaced is off
- (a) Remove the ENC cable connected to the ENC board to be replaced.
 - (b) Raise the lever on the ENC board in the direction shown by the arrow ① (→).
 - (c) Pull the ENC board toward you to remove it.
 - (d) Insert a new ENC board into the specified location with its levers being raised after waiting for 20 seconds, and connect a new ENC cable as the old one was before.
If the ENC board is inserted without waiting for 20 seconds, it is possible that the ENC board is not recovered from the failure normally.
 - (e) Return the levers in the direction shown by the arrows ② (<.....).

Notice : When returning the both levers in the directions shown by the arrows ② (<.....) at the same time, 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 board because the ENC board is considered to have failed.

- (f) Make sure that the FAIL LED (red) on the ENC board is off.

(2) Procedure for replacement with the power turned off

(a) Turn off the main switch.

Make sure that the POWER LED (green) on the panel has gone out.

When the power cannot be turned off, perform a troubleshooting after connecting to WEB.

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)
When the cache is in the cache backup mode, make the replacement after canceling the mode.

Make sure that the BACK UP LED (green) on the Controller is off.

Notice : When the BACK UP LED is on, user data not written on the disk may exist in the Cache memory.
If the Controller is removed from the subsystem in this state, it is feared that user data may be lost.

(b) Turn off the breaker of the AC/DC power supply.

Make sure that the BACK UP LED (green) of the Controller has gone out.

Notice : It is possible that the recovery is not made normally if the replacement is done without turning off the breaker.

(c) Remove the cables connected to the ENC board.

(d) Open the lever which is on the ENC board in the direction shown by the arrow ① (→).

(e) Pull the ENC board toward you to remove it.

(f) Insert a new ENC board into the specified location with its levers being raised and connect a new ENC cable as the old one was before.

(g) Return the levers in the direction shown by the arrows ② (<.....).

(h) Turn on the breaker of the AC/DC power supply on the rear side of the subsystem.

- (i) Turn on the main switch.

Make sure that the FAIL LED (red) has not gone out.

After doing this, make sure that the FAIL LED (red) on the ENC board is not on.

When the ENC board is replaced without turning off the breaker of the AC/DC power supply (Item (c)) by mistake, an unexpected error message may be displayed.

Examples of error message:

W03100 Buttery removed

W08000 Loop alarm (Path-0, Loop-0)

If the above occurs, execution of the following procedure will make the recovery.

(a) → (c) → (i) → (j)

4.3.9 Replacing AC/DC power supply

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	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.	See 4.3.9 (1)
2	Replacement with the power turned off	—	See 4.3.9 (2)

(1) Procedure for replacement with the power turned on (See Figure 4.3.12)

- (a) Make sure that the PS RDY LED (green) of the power supply to be replaced is off.
- (b) Make sure that the PS RDY LED (green) of the power supply not to be replaced is on.

Notice : If the PS READY LEDs of the both power supplies are displayed is off, it is presumed that one of the following failures has occurred.

- The WARNING LED came on because an error was detected in one of the AC/DC power supply.
- A failure occurred in the other one of the AC/DC power supply.

Replace the AC/DC power supply whose PS RDY LED is off first. After that, replace the AC/DC power supply which was to be replaced. (The WARNING LED does not go out until the AC/DC power supply is replaced or the subsystem is powered off.)

- (c) Turn on the breaker of the AC/DC power supply to be replaced.

Notice : Even when the breaker of the AC/DC power supply to be replaced is turned off while the subsystem is powered on, the fan of the AC/DC power supply keeps its operation.

- (d) Disconnect the power cable connected to the AC/DC power supply to be replaced.
- (e) Shift the power cable, which is coming out from the rectangular hole on the cable duct, to the position where it does not disturb the removal of the AC/DC power supply.

- (f) Slide the latch upward and take out the AC/DC power supply while it is unlatched.
- (g) Make sure that the breaker of the new AC/DC power supply is turned off.
- (h) Wait for more than 20 seconds, and then insert the AC/DC power supply the main body until it is latched with a click.

If the AC/DC power supply is inserted without waiting for 20 seconds, it is possible that the AC/DC power supply is not recovered from the failure normally.

- (i) Connect the removed cable as they were before.
- (j) Turn on the breaker of the AC/DC newly mounted power supply.

Make sure that the PS RDY LED (green) of the AC/DC power supply is on.

- (k) Make sure that the WARNING LED (orange) has gone out.

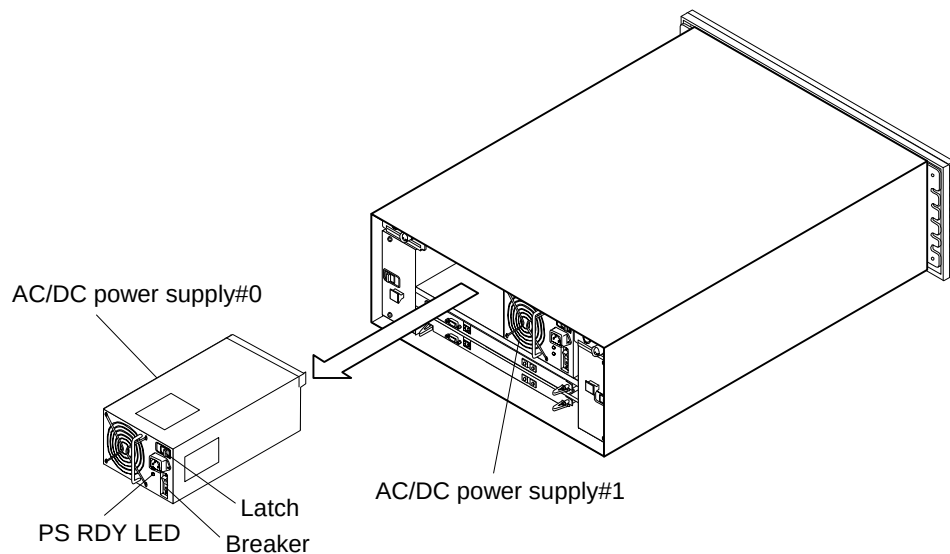


Figure 4.3.12 Replacing AC/DC Power Supply

(2) Procedure for replacement with the power turned off

(a) Turn off the main switch.

Make sure that the POWER LED (green) on the panel has gone out.

When the power cannot be turn off, perform a troubleshooting after connecting to WEB.

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)
When the cache is in the cache backup mode, make the replacement after canceling the mode.

Make sure that the BACK UP LED (green) has gone out.

Notice : When the BACK UP LED is on, user data not written on the disk may exists in the Cache memory.
If the Controller is removed from the subsystem in this state, it is feared that user data may be lost.

(b) Turn off the breakers of the both AC/DC power supply.

(c) Remove the remote cable connected to the AC/DC power supply to be replaced.

(d) Remove the power cable connected to the AC/DC power supply to be replaced.

(e) Slide the latch upward and take out the AC/DC power supply while it is latched.

(f) Make sure that the breaker of the new AC/DC power supply is turned off.

(g) Push in the new AC/DC power supply until it is latched with a click.

(h) Connect the removed power cable.

(i) Connect the removed remote cable.

(j) Turn on the breakers of the both AC/DC power supply.

Make sure that the PS RDY LEDs (green) of the both AC/DC power supply are on.

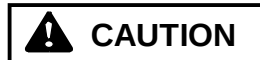
(k) Make sure that the WARNING LED (orange) has gone out.

(l) Make sure that the three LEDs of the connected Remote adapter are on.

4.3.10 Replacing Fan unit

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	Complete the replacement within 10 minutes, and restart the fans of the Fan unit.	See 4.3.10 (1)
2	Replacement with the power turned off	—	See 4.3.10 (2)



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

(1) Procedure for replacement with the power turned on

Notice : While the FAIL LED of a Fan unit is on, when a Controller has been blocked (the FAIL LED is on), be sure to correct the Controller blockade failure first.

- (a) Make sure that the FAIL LED (red) is on.
- (b) Release the lock by shifting the latch to the left.
- (c) Take out the Fan unit by holding its knob and pulling it toward you.

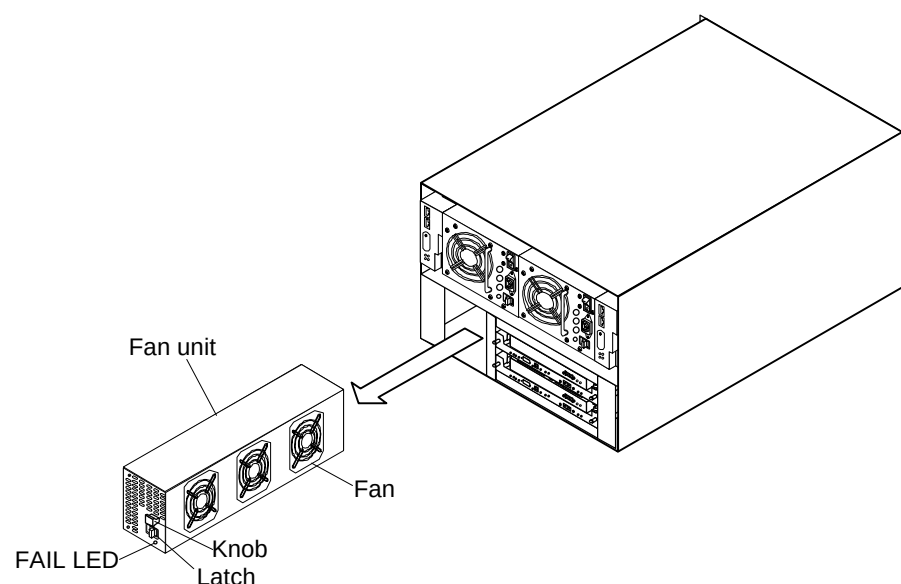


Figure 4.3.14 Replacing Fan Unit

(d) Wait for more than 20 seconds, and then press the Fan unit into the main body until it is latched with a click.

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.

(e) Make sure that the status of the FAIL LED (red) changes from on to off.

(f) Check if the fans of the mounted Fan unit are rotating.

- (2) Procedure for replacement with the power turned off
- (a) Remove the rear cover. (Refer to [MNTE 01-0090](#).)

Notice : While the FAIL LED of a Fan unit is on, when a Controller has been blocked (the FAIL LED is on), be sure to correct the Controller blockade failure first.

- (b) Turn off the main switch.
- Make sure that the POWER LED (green) on the panel has gone out.
- When the power cannot be turn off, perform a troubleshooting after connecting to WEB.

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)

When the cache is in the cache backup mode, make the replacement after canceling the mode.

Make sure that the BACK UP LED (green) has gone out.

Notice : When the BACK UP LED is on, user data not written on the disk may exists in the Cache memory.

If the controller is removed from the subsystem in this state, it is feared that user data may be lost.

- (c) Release the lock by shifting the latch to the left.
- (d) Take out the Fan unit by holding its knob and pulling it toward you.
- (e) Push in the new AC/DC power supply until it is latched with a click.
- (f) Turn on the main switch.
- Make sure that the status of the FAIL LED (red) changes from on to off.
- (g) Check if the fans of the mounted Fan unit are rotating.
- (h) Attach the rear cover.

4.3.11 Replacing PDB

Select a procedure from the following and execute it.

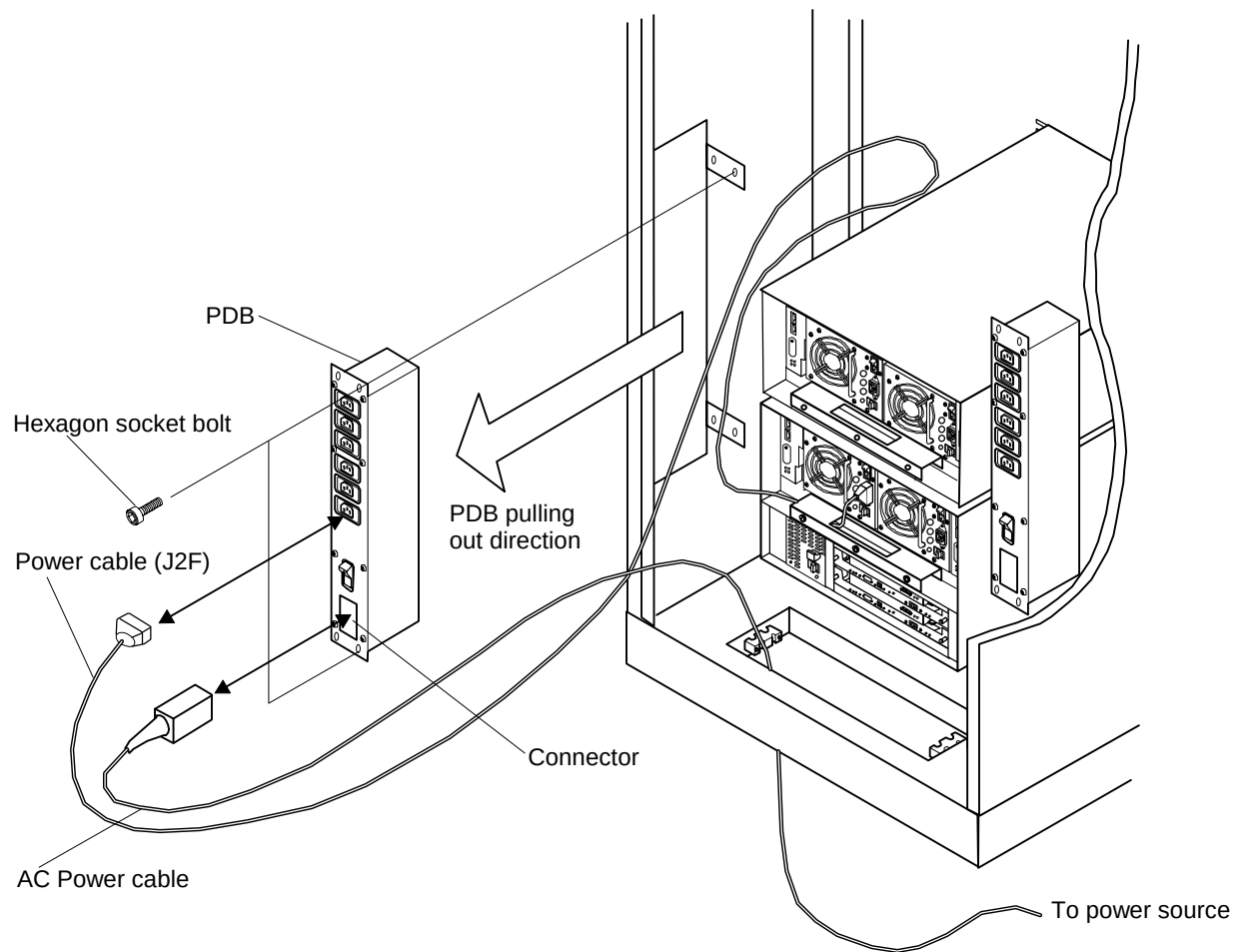
No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	—	See 4.3.11 (1) .

(1) Replacement procedure with the power turned on



- **Be sure to check if the supplied power is turned off to prevent an electric shock.**
- **Pay enough attention to connect cables correctly.**

- (a) Open the rear door.
- (b) Make sure that the PS RDY LED (green) on the AC/DC power supply connected to the PDB which is not to be replaced is on.
- (c) Turn off the breakers of all the AC/DC power supplies connected to the PDB to be replaced.
- (d) Disconnect all the cables connected to the PDB to be replaced.
 - (i) Unplug the power cable from the outlet of the PDB.
 - (ii) Disconnect the power cable from the connector on the PDB.
 - (iii) Disconnect the power cable from the connector of the power source.
- (e) Remove the four hexagon socket bolt while supporting the PDB with your hand.
- (f) Remove the PDB by pulling it out.
- (g) Fasten the new PDB to the U6 rack frame with hexagon socket bolt.
- (h) Reconnect the cables removed from the PDB.
 - (i) Connect the power cable to the connector of the power source.
 - (ii) Connect the power cable to the connector on the PDB.
 - (iii) Plug the power cable in the outlet of the PDB.
- (i) Power on the PDB.
- (j) Turn on the AC/DC power supply connected to the PDB.
- (k) Close the rear door.

**Figure 4.3.15 Replacing PDB**

4.4 Replacing Parts of Floor Model (MK)

The floor model is produced by combining the RKL with the kit for exclusive use.

4.4.1 Locations of replaceable parts

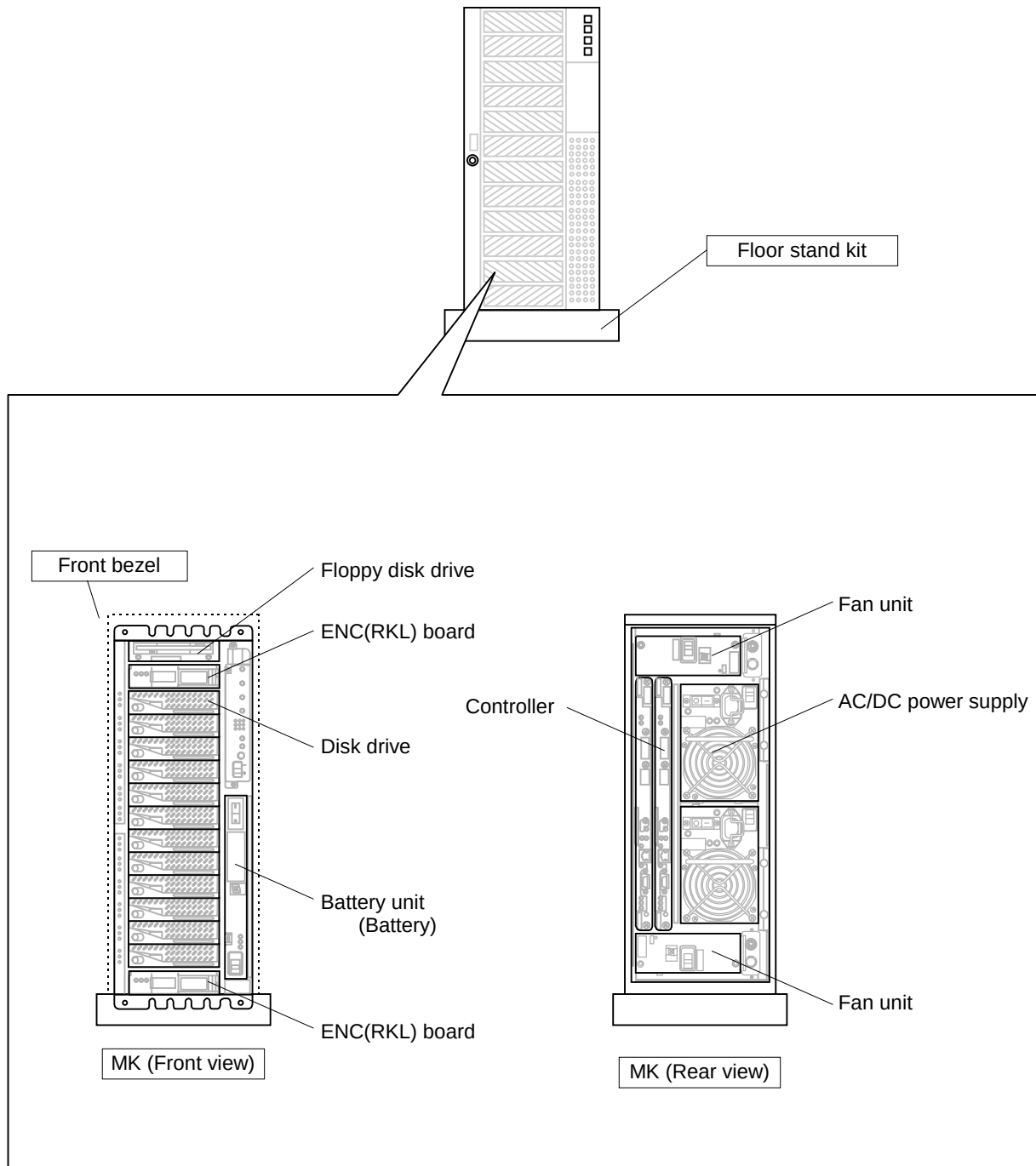


Figure 4.3.1 Replaceable Part Locations of Floor Model

**Table 4.3.1 Replaceable Parts and Condition of Power Supplying
when Replacing Each of Them**

	No.	Part name	Part No.	Model	Power supplying condition for replacement ^(*1)	
					ON	OFF
MK	1	Disk drive (18 G bytes)	5507067-81	DF-F500-ACF18	○ ^(*2)	Not applicable
		Disk drive (18 G bytes)	5507067-93	DF-F500-ACH18	○ ^(*2)	Not applicable
		Disk drive (36 G bytes)	5507067-82	DF-F500-ACF36	○ ^(*2)	Not applicable
		Disk drive (72 G bytes)	5507067-83	DF-F500-ACF72	○ ^(*2)	Not applicable
	2	AC/DC power supply (RKL)	5507067-84	—	●	○
	3	Floppy disk drive	5507067-89	—	Not applicable	○
	4	Battery unit	5507067-88	—	○	○
	5	ENC (RKL) board	5507067-87	—	●	○
	6	Controller	5507067-85	DF-F500-F1FL	●	○ ^(*3)
			5507067-86	DF-F500-F2FL	●	○ ^(*3)
			5507067-92	DF-F500-F3FL	●	○ ^(*3)
	7	Cache memory (256 M bytes)	5507067-91	—	(●)	○
	8	Fan unit	5507067-90	—	○	○
*1 : Descriptions of the symbol. ○ : Replacement can be done on this condition. ● : Replacement can be done on this condition only when the part concerned has redundancy. (●) : Replacement can be done on this condition only when the Controller is duplicated. *2 : Power must be on. *3 : When the WEB cannot be connected, the Controller cannot be replaced while the subsystem power is off in the case of the dual Controller configuration.						

4.4.2 Replacing Disk drive

Procedure for replacing the Disk drive varies depending on the RAID configuration and the set mode for data restoration. Confirm the RAID configuration and the set mode for data restoration of the subsystem, and then perform the replacement following the procedure shown below.

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	RAID level		Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	Indispensable	With the Spare disk (s)	RAID 0	See 4.4.2 (1-1)
				RAID 1, RAID 5, and RAID 0+1	See 4.4.2 (1-2)
			Without the Spare disk	RAID 0 ^(*) RAID 1, RAID 5, and RAID 0+1	See 4.4.2 (2)
2	Replacement with the power turned off	Not applicable			—
*1 : The setting of spare disk for RAID 0 can be done by means of the dynamic sparing only.					

Notice : • Be sure to back up user data before starting the replacement.
When the set RAID group and LU are deleted or formatted, related user data will be lost.

- When the loop failure (W080xv Loop alarm) has occurred, recover the subsystem from the loop failure before replacing the Disk drive.
If the subsystem is not recovered from the loop failure, there may be a case where the replaced Disk drive is not recovered from the failure normally.

Mounting location number of Disk drive.

Mounting location number of a Disk drive is represented by a combination of a device number (device ID) and a Disk drive number given in a subsystem.

The device number has been set to #0.

The Disk drive numbers #0 to #11 are given to the Disk drives in the order from bottom top.

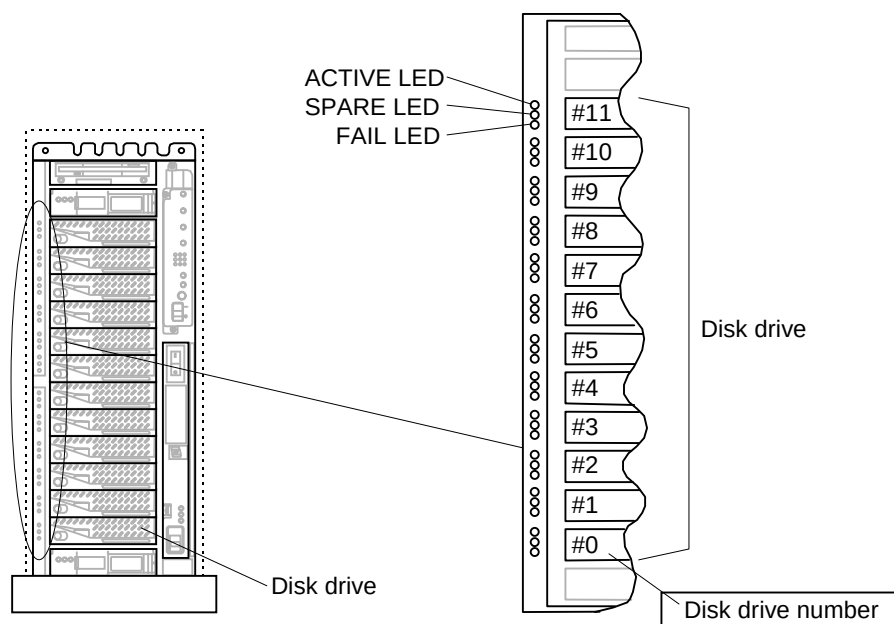


Figure 4.4.2 Mounting Locations of Disk Drives

(1) Procedure for replacing the Disk drive when the Spare disk is not set

(1-1) Replacing Disk drive in RAID 0 configuration

- (a) Make a backup of user data.
- (b) Remove the front bezel. (Refer to [MNTE 01- 0070](#).)
- (c) Make sure whether the Disk drive to be replaced is blocked or not by viewing the message of the WEB.
- (d) Remove the Disk drive to be replaced.

Operate the lock release button of the Disk drive and remove the Disk drive taking care not to apply any shock to it.

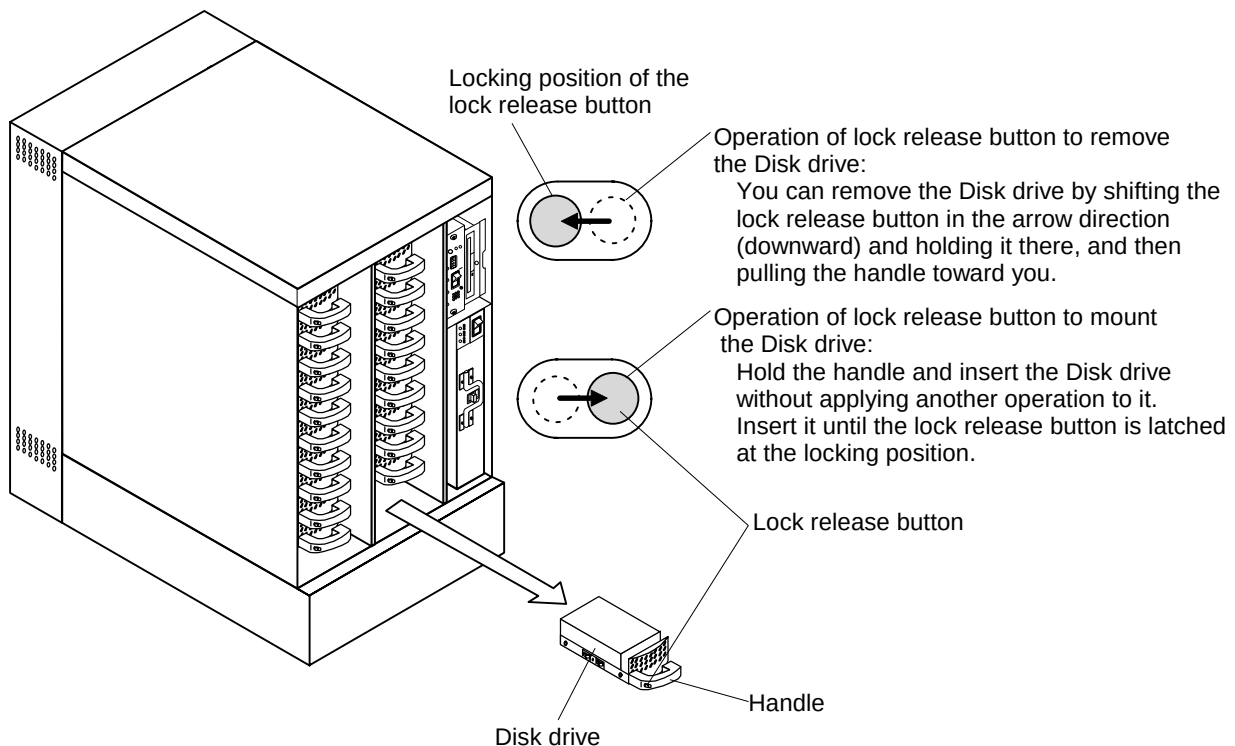


Figure 4.4.3 Operation of Lock Release Button of Disk Drive

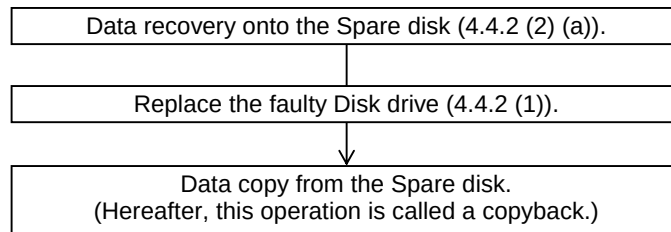
- (e) Wait for more than 20 seconds, and then insert a new Disk drive taking care not to apply any shock to it. (See Figure 4.4.3.)
If the Disk drive is inserted without waiting for 20 seconds, it is possible that the Disk drive is not recovered from the failure normally.
- (f) If the FAIL LED (red) of the Disk drive concerned is still on after the replacement, and replace the Disk drive again.
- (g) Format the LU. (Refer to [INST-L 06- 0590](#).)
- (h) Restore the data using the backup previously prepared.
- (i) Install the front bezel.

(1-2) Replacing Disk drive in RAID 1, 5, or 0+1 configuration

- (a) Remove the front bezel. (Refer to [MNTE 01- 0070](#).)
- (b) Check if the Disk drive to be replaced is blocked. When the Disk drive is blocked, the FAIL LED (red) at the location corresponding to the Disk drive concerned is on.
- (c) Operate the lock release button of the Disk drive to be replaced and remove the Disk drive taking care not to apply any shock to it.
- (d) Wait for than 20 seconds, and then insert the replacement Disk drive.
Operate the lock release button on the Disk drive and mount the Disk drive slowly taking care not to apply any shock to it.
If the Disk drive is inserted without waiting for 20 seconds, it is possible that the Disk drive is not recovered from the failure normally.
- (e) Make sure that the FAIL LED (red) of the replaced Disk drive goes out.
- (f) The data is restored automatically on the replaced Disk drive.
If the FAIL LED (red) of the Disk drive concerned is still on after the replacement, and replace the Disk drive again.
- (g) Select “Information Message” from the WEB and make sure that the data recovery is completed normally (I151xy Data recovery completed). (Refer to [WEB 02- 0120](#).)
- (h) Make sure that the WARNING LED (orange) on the panel is off.
- (i) Attach the front bezel.

‡1 : The copy back is done in the case where the automatic recover mode is set.

- (2) Procedure for replacing the Disk drive when the Spare disk is set
 The data recovery is executed as shown below.
 To replace Disk drive, refer to [Figure 4.4.3](#).



(a) Data recovery onto the Spare disk

There are two types of data recovery onto the Spare disk depending on the incentive.

- Data recovery onto the Spare disk when a failure in the disk is detected.
- Data copy onto the Spare disk when a disk is detected in which the error count has exceeded its threshold value. (This operation will be called “dynamic sparing” hereafter. Note that some microprograms of certain version do not support the operation.)

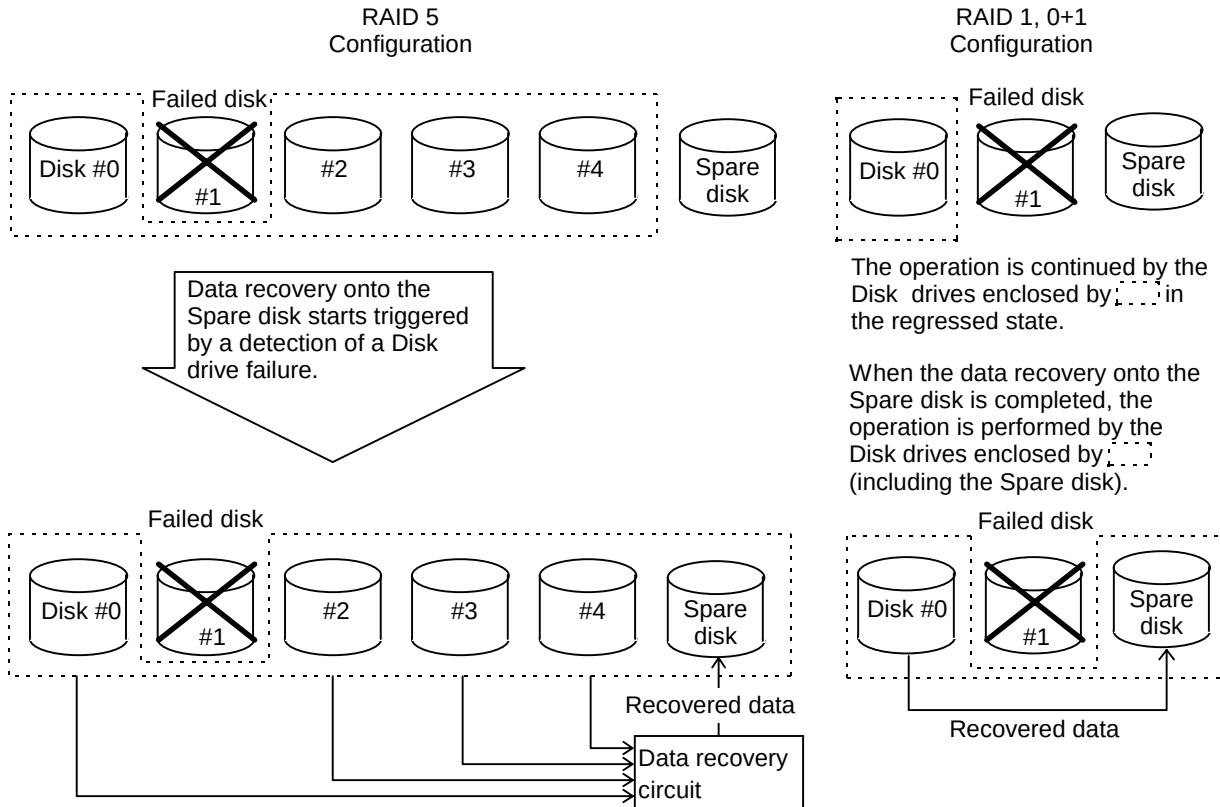
After the data recovery onto the Spare disk is completed, the recovered disk location can be found using the panel. (Refer to [WEB 03-0360](#), “[Information Message](#)”.)

When the WEB cannot be connected, collect a trace while the subsystem power is on and refer to the WEB log message.

(b) Data recovery onto the Spare disk when a disk failure is detected

As to data recovery onto the Spare disk, as shown in the drawing on the following page, when a disk failure occurs, the data of the failed disk is recovered automatically onto the Spare disk.

Automatic recovery onto the Spare disk is executed only under the following condition.
 Condition : “When a disk failure is detected, the Spare disk is an unused disk.”



In the following cases, the data recovery onto the Spare disk will not start automatically.

An action to start the data recovery is required.

- When the drive recovery option in the Disk Array management program^(‡1) the disk recovery mode is specified to is set to “not automatic mode”, the data recovery will not start automatically when the disk is replaced.

In this case, it is necessary to instruct recovery onto the Spare disk using the Disk Array management program.

- If a further disk failure occurs while the Spare disk is used already (data of a Disk drive has been already recovered onto the Spare disk), the data of the nearly failed Disk drive will not be recovered onto the Spare disk.

Data of the second failed Disk drive is also not restored on the Spare disk automatically even if the copyback is completed in the above status and the Spare disk goes out of use.

- If a Disk drive with no failure (a Disk drive which is not blocked) is removed, no data recovery onto the Spare disk will be executed. In this case, to recover data onto the Spare disk, it is necessary to instruct a recovery using the Disk Array management program^(‡1).

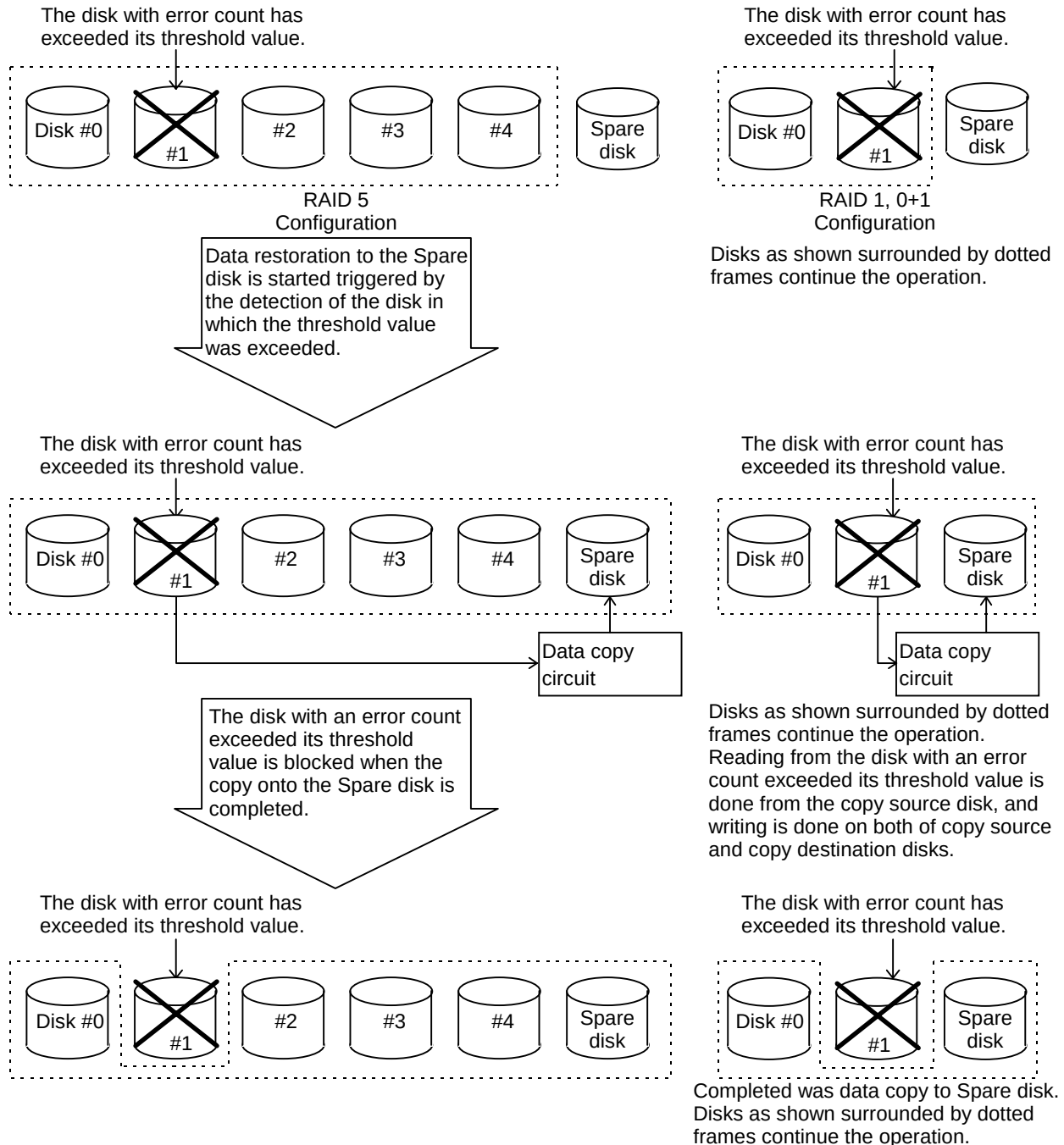
‡1 : For the details of the Disk Array management program, refer to the “Disk Array management program (for GUI) User’s Guide”.

(c) Data recovery onto the Spare disk by means of the dynamic sparing

Data recovery onto the Spare disk is performed as shown below. When a Disk drive is detected in which the error count has exceeded its threshold value, data stored in the Disk drive is copied automatically onto the Spare disk.

The automatic data recovery onto the Spare disk is performed only when the following condition is met.

Condition : The Spare disk is not in use when a disk is detected in which the error count has exceeded its threshold value.



The subsystem displays the following message on the panel when detecting a disk in which the error count has exceeded its threshold value.

MM/DD/YYYY	HH:MM:SS	Cx I41■XY	HDU error over (Unit-X, HDU-Y)	: MANUAL / TRC
Date	Time	Detect Controller#	■: 0 to 9 or A to D	

At the time when an excess of the error occurrence count over threshold value is detected, only the display of the above message is done in the “Information Message” window of the WEB ([WEB 02-0120](#)), no regression of the Disk drive occurs, and the dynamic sparing is started.

The disk with an error count exceeded its threshold value is blocked after the dynamic sparing is completed.

Refer to page [MNTE 04-1120](#) for “Information Message” transition when the dynamic sparing is performed.

In the following cases in which a disk with an error count exceeded its threshold value is detected, the Disk drive is blocked without an execution of the dynamic sparing.

- When the dynamic sparing mode is set not to execute the dynamic sparing.
- When a disk with an error count exceeded its threshold value is detected after the data has been recovered or while the Spare disk is being used for the data recovery.
- Another Disk drive with an error count exceeded its threshold value is detected during the dynamic sparing operation.

In each case above, the disk with an error count exceeded its threshold value is blocked. Procedures for data recovery and Disk drive replacement are the same as those for the installation of the Spare disk.

Errors counted in the subsystem and default threshold values for them are listed below.

Item No.	Kind of error	Threshold (Default)
1	Disk mechanical error. (Recovered)	50
2	Disk mechanical error. (Un-recovered)	2
3	Disk medium error. (Recovered)	100
4	Disk medium error. (Un-recovered)	50
5	Disk R/W error. (Recovered)	10
6	Disk R/W error. (Un-recovered)	2
7	Disk I/F error. (Recovered)	50
8	Disk I/F error. (Un-recovered)	2
9	Disk hardware error. (Recovered)	50
10	Disk hardware error. (Un-recovered)	2
11	Disk SCSI I/F error. (Recovered)	50
12	Disk SCSI I/F error. (Un-recovered)	2
13	Collectable errors in online verify.	100
14	Un-correctable errors in online verify.	50

There threshold values above can be referred to and updated from the Disk Array management program^(‡1).

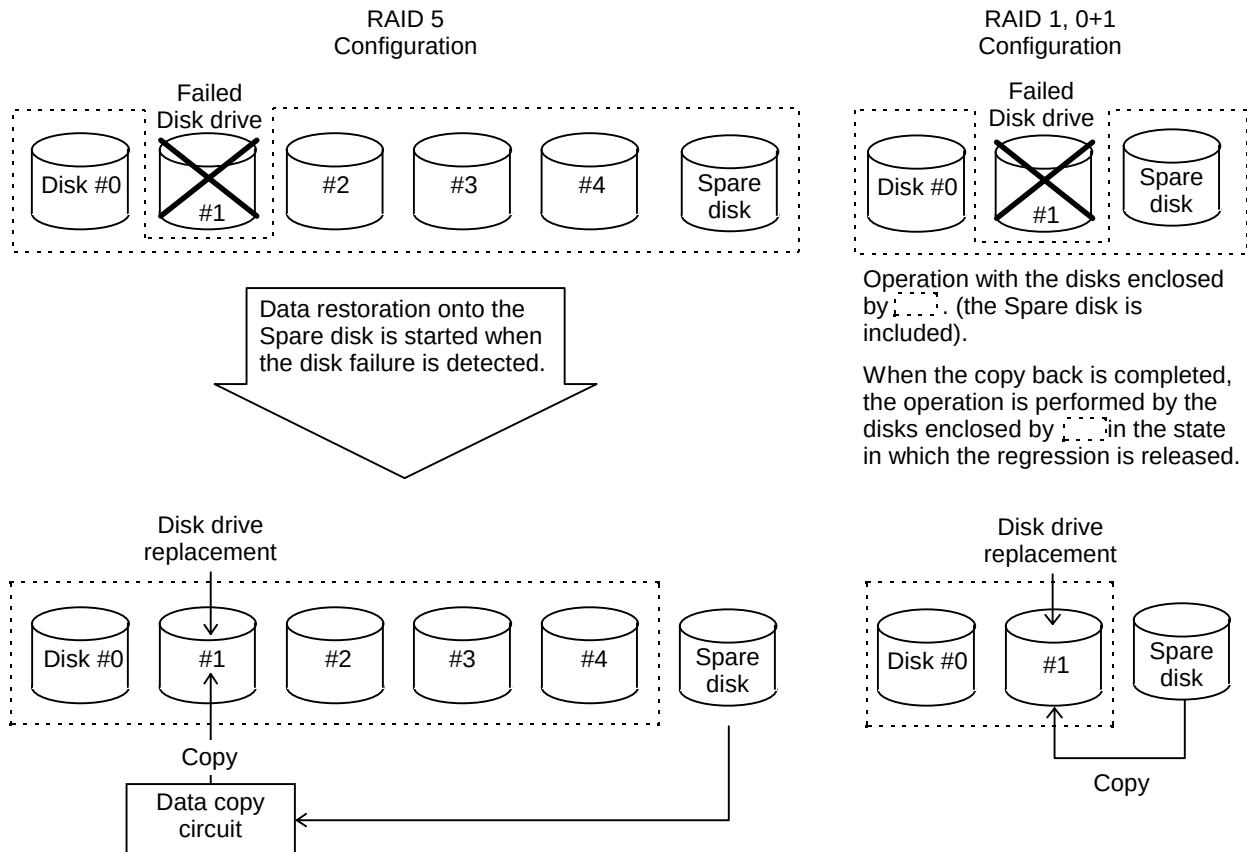
Besides, the then error count can be referred to concerning the recovered or un-recovered disk media errors, correctable errors in online verify operations, correctable errors, and un-correctable errors.

‡1 : For details of the Disk Array management program, refer to the “Disk Array management program (for GUI) User’s Guide”.

(d) Copy back

When a new Disk drive is inserted to where a failure occurred as shown in the drawing below, the copy back will be executed automatically.

When the failed Disk drive is replaced during the data recovery onto the Spare disk, after the data recovery is completed, the copy back will be executed automatically.



In the following cases, the copy back will not start automatically. Operation to start the copy back is required.

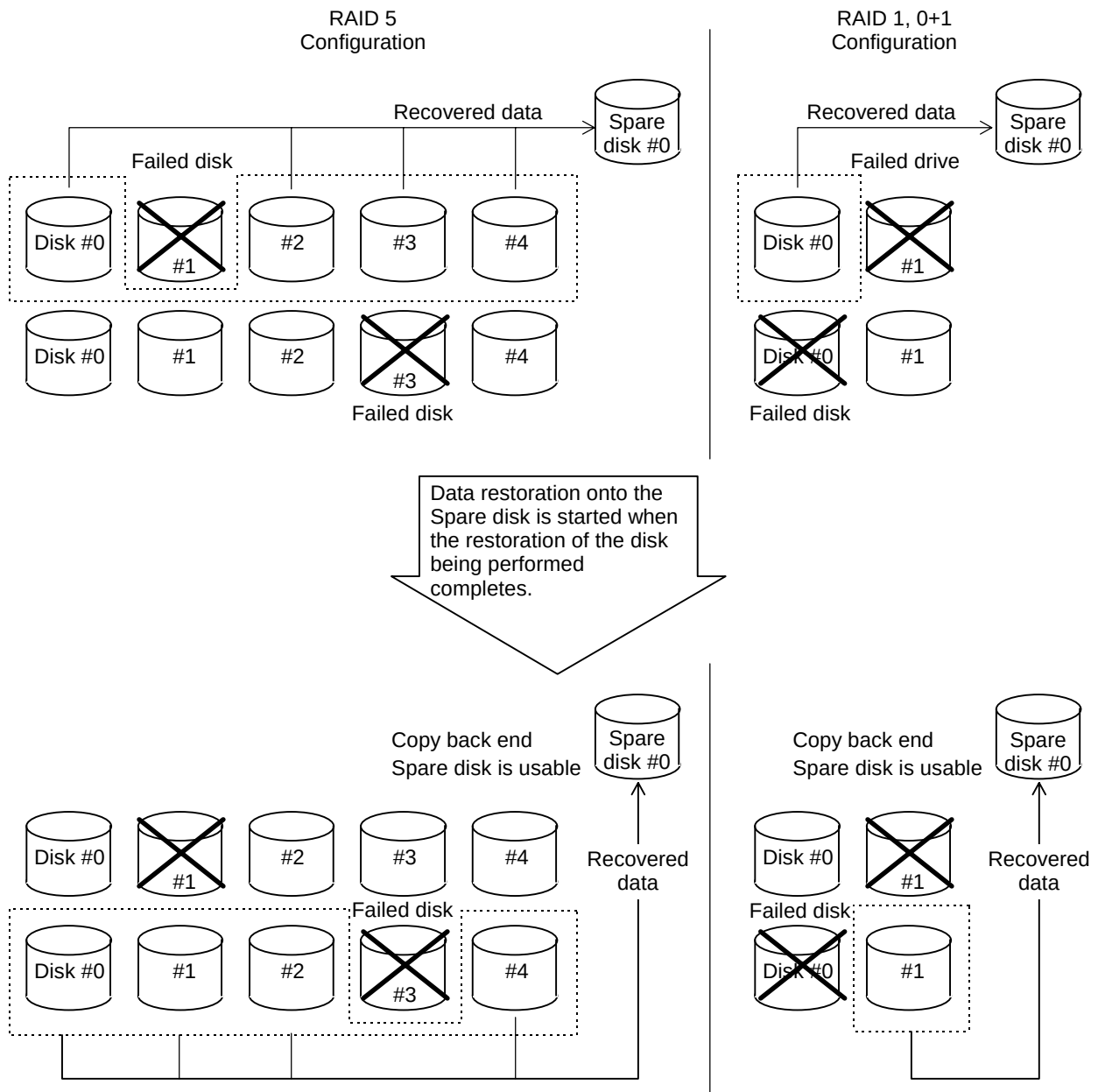
- When the drive recovery opportunity of the drive recovery option in the Disk Array management program is not set to "automatic start" (automatic), the continuous start is not done. To make the continuous start be done, the drive recovery opportunity of the drive recovery option in the Disk Array management program must be set to "automatic start" (automatic).

(e) The continuous data recovery

When failures occurred in plural disks, after the data recovery of the first disk is completed, the data recovery of the second disk will start automatically by the continuous data recovery.

The continuous start is performed (the specified mode is activated) only when the disk recovery mode is specified as “automatic start”.

Continuous starting is initiated not only when restoring using Spare disk, but also when making a collection copy to the original Disk drive, and when recovering with no Spare disk mounted.



In the following cases, the continuous data recovery will not start.

- When the drive recovery opportunity of the drive recovery option in the Disk Array management program is not set to “automatic start” (automatic), the continuous start is not done. To make the continuous start be done, the drive recovery opportunity of the drive recovery option in the Disk Array management program must be set to “automatic start” (automatic).
- When all Spare disks are used, if the blocked Disk drive is not replaced, the continuous data recovery will not start. If the Spare disk can be used or the blocked Disk drive is replaced, the continuous data recovery will start.
- The continuous data recovery will not start for detached Disk drive and uninstalled Disk drive.

(f) Transition of “Information Message”

When the recovery completes normally, the “Information Message” from the WEB ([WEB 02-0120](#)) change successively as shown below.

(i) Data recover (Data recovery onto the Spare disk when a disk failure is detected)

W060xy HDU alarm : Disk blocked
 I150xy Data recovery started : Start of data area recovery
 I151xy Data recovery completed : Completion of data area recovery
 I008xy Spare HDU recovered : Completion of recovery onto Spare disk

(ii) Data recover (Dynamic sparing from data disk to Spare disk)

I15Axy Dynamic sparing start : Start of Dynamic sparing
 I150xy Data recovery started : Start of disk recover
 I151xy Data recovery completed : Completion of data recovery
 I008xy Spare HDU recovered : Completion of recovery onto Spare disk
 W060xy HDU alarm : Disk x, y were blocked

(iii) Copy back

I140xy System copy started : Start of system area recovery ^(‡1)
 I141xy System copy completed : Completion of system area recovery ^(‡1)
 I150xy Data recovery started : Start of data area recovery
 I151xy Data recovery completed : Completion of data area recovery

When the recovery terminates abnormally, either ‘I142xy System cop failed’ or ‘I152xy Data recover failed’ is displayed. Take a recovery action following the messages.

(g) Confirming completion of data recovery or copy back

Select “Information Message” from the WEB ([WEB 02-0120](#)) and make sure that the data recovery is completed normally.

**Table 4.4.2 (Example)Standard Times Required for Drive Recovery
in RAID 5(4D+1P) Configuration (Unit : Minute)**

Disk drive capacity	Revolution speed ^(‡1)
	10,000 min ⁻¹ (Type:AxFx)
17.8 G bytes	75
35.7 G bytes	150
71.6 G bytes	300
^{*1} : Times shown in the above table are strictly standard ones. In some cases, the longer times may be required depending on the accesses from the host computer.	

‡1 : This message is displayed only when replacing Disk drive (#0 to #3) on the RK.

4.4.3 Replacing Floppy disk drive

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	The Floppy disk drive cannot be used during the replacement.	See 4.4.3 (1) .
2	Replacement with the power turned off	—	See 4.4.3 (2) .

(1) Procedure for replacement with the power turned off

- (a) When a Controller blockade has occurred, replace the blocked Controller before replacing the Floppy disk drive.
- (b) Remove the front bezel. (Refer to [MNTE 01- 0070](#).)
- (c) Take out the Floppy disk drive by pulling it toward you holding its knob.
- (d) Hold the Floppy disk drive by its knob and insert it along the guide rails of the subsystem (align the face of the Floppy disk drive with that of the subsystem). When doing this, be careful not to insert the Floppy disk drive upside down.
- (e) Collect a trace from the independent subsystem while the subsystem power is on (refer to page [MNTE 02-1400](#) for “2.6.3 Collection of trace in the ON state”) to make sure that the trace collection terminates normally.

Notice : When the trace collection does not terminate normally, the Controller may be faulty. Replace the Controller #0 (see page [MNTE 04-1170](#)).

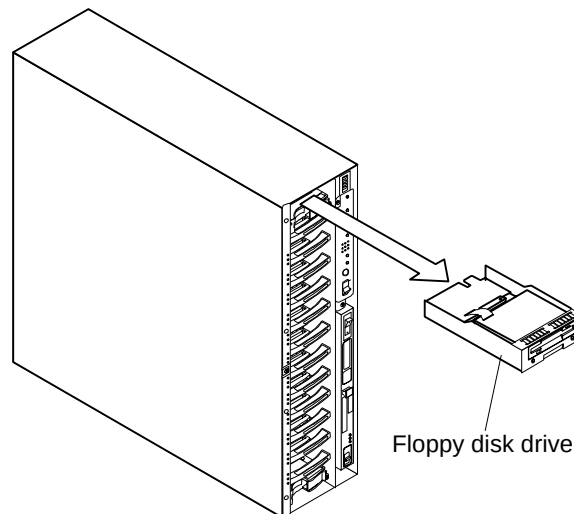


Figure 4.4.4 Replacing Floppy Disk Drive

- (2) Procedure for replacement with the power turned off
- (a) Remove the front bezel. (Refer to [MNTE 01- 0070](#).)
 - (b) Turn off the main switch. (The POWER LED goes out.)
 - (c) Make sure that the BACK UP LED (green) on the Controller is off. (This is to make sure that the disk array is not in the Cache Backup mode.)
 - (d) Take out the Floppy disk drive.
 - (e) Insert the Floppy disk drive.
 - (f) Turn on the main switch.
Make sure that the FAIL LED (green) has not gone out.
 - (g) Install the front bezel.

4.4.4 Replacing Battery unit

Select a procedure from the following and execute it.

When replacing the Battery unit, remove or install it with its battery switch turned off.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	If the power is turned off during the replacement, data is not backed up because the power is not supplied from the battery.	See 4.4.4 (1)
2	Replacement with the power turned off	Apply this in the case where you do not want the preventive replacement against a self-recovered failure from being reported when the failure monitoring service is activated.	See 4.4.4 (2)



- **The lead battery contains poisonous substances. Besides, if it is handled improperly, an electric shock or explosion may be caused. Please follow the safety instructions below.**
 - ① **Do not disassemble or remake the battery.**
 - ② **Do not deform the battery.**
 - ③ **Do not connect plus and minus poles with a metallic article such as a wire.**
 - ④ **Do not reverse the connections of plus and minus poles.**
 - ⑤ **Do not peel off the covering tube.**
 - ⑥ **Do not connect the battery directly to the outlet.**
 - ⑦ **Do not connect the battery to anything other than this subsystem for charging/discharging.**
 - ⑧ **Do not leave the battery in a hot place. Store it in a dark and cool place.**
 - ⑨ **Do not discard a used battery at the site where it was removed for replacement.**

- (1) Procedure for replacement with the power turned on
 - (a) Remove the front bezel. (Refer to [MNTE 01-0070](#).)
 - (b) Turn off the battery switch of the Battery unit to be replaced.
 - (c) Release the latch in the front and pull out the Battery unit toward you. (Since two latches are provided in the front and on the right-hand side of the Battery unit, the Battery unit is stopped once at the position of the latch on the right-hand side.
 - (d) Release the latch on the right-hand side holding the Battery unit main body with your hand and pull it out toward you.
 - (e) Make sure that the battery switch on the Battery unit has been turned off.
 - (f) Wait for more than 20 seconds, and then insert the Battery unit into the specified location.

If the Battery unit is inserted without waiting for 20 seconds, it is possible that the Battery unit is not recovered from the failure normally.
 - (g) Turn on the battery switch of the Battery unit.

Make sure that the WARNING LED (orange) is off.
 - (h) Keep the power on for two hours or longer to charge the battery.
 - (i) Make sure that the READY LED (green) on the Battery unit is on.
 - (j) Attach the front bezel.

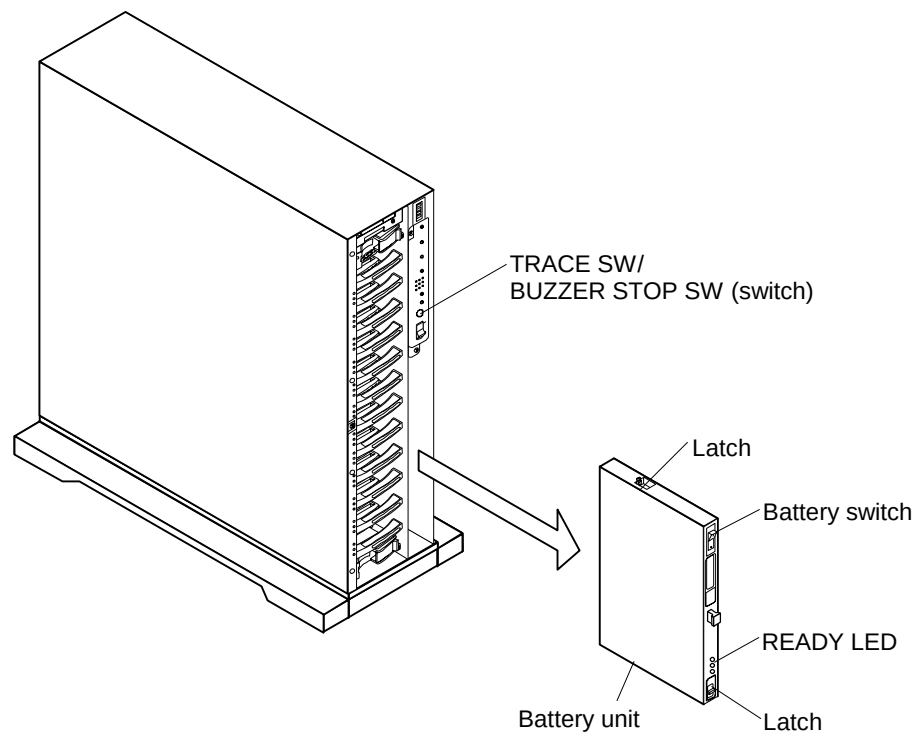


Figure 4.4.5 Replacing Battery Unit

(2) Procedure for replacement with the power turned off

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)
When the cache is in the cache backup mode, make the replacement after canceling the mode.

- (a) Remove the front bezel. (Refer to [MNTE 01-0070](#).)
- (b) Turn off the main switch.
Make sure that the POWER LED(green) on the panel has gone out.)
- (c) Make sure that the BACK UP LED on the Controller is off. (This is to make sure that the subsystem is not in the Cache Backup mode.)
- (d) Turn off the battery switch of the Battery unit.
- (e) Release the latch in the front and pull out the Battery unit toward you. (Since two latches are provided in the front and on the right-hand side of the Battery unit, the Battery unit is stopped once at the position of the latch on the right-hand side.
- (f) Release the latch on the right-hand side holding the Battery unit main body with your hand and pull it out toward you.
- (g) Make sure that the battery switch on the Battery unit has been turned off.
- (h) Insert the Battery unit into the specified location in the disk array.
- (i) Turn on the battery switch of the Battery unit.
- (j) Turn on the main switch.
- (k) Make sure that the READY LED (green) is on. (Make sure that the READY LED on the panel is on and the ALARM and WARNING LEDs are off.)
- (l) Keep the power on for two hours or longer to charge the battery.
- (m) Attach the front bezel.

4.4.5 Replacing Controller

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	1. The procedure varies depending on whether the FAIL LED ^(*) is on or off. 2. Make the replacement in units of Controller. 3. When replacing the both Controllers at the same time, do it with the power turned off. 4. In the case of the single Controller configuration, perform the replacement after turning off the power.	When the FAIL LED is on See 4.4.5 (1-1).
			When the FAIL LED is off See 4.4.5 (1-2). (Preventive replacement)
2	Replacement with the power turned off	When the WEB cannot be connected, this cannot be applied in the case of the dual Controller configuration.	See 4.4.5 (2).

*1 : For the installation location of the FAIL LED, see Figure 4.4.6..

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

(1-1) When the FAIL LED is on

(a) Make sure that the FAIL LED (red) on the Controller to be replaced is on. (Refer to Figure 4.4.6.)

Notice : • Do not replace the Controller which operates normally.
Before replacing the Controller, confirm that it is blocked (the FAIL LED (red) in on).

- When replacing the two Controller with the power turned on, the Controller must be replaced one after another.
When the two Controllers are replaced at the same time, turned off the subsystem power before replacement.
- Since the system parameters are automatically loaded on the new Controller by copying them from that of another system, setting using a FD or by manual operation is not needed.
However, if the two Controllers failed at the same time, a system parameter restoration using the FD is required.

- (b) Remove the interface cable (Fibre Channel or SCSI), LAN, and RS232C cables connected to the Controller.
- (c) Loosen the upper and lower fixing screws of the Controller.
Raise the both upper and lower levers at the same time in the direction shown by the arrows (·····>) and take out the Controller.
- (d) Wait for more than 20 seconds, and then insert the Controller into the specified position with its upper and lower levers being raised, then return the both levers to the direction shown by the arrows (—>) at the same time.
If the Controller is inserted without waiting for 20 seconds, it is possible that the Controller is not recovered from the failure normally.

Notice : When returning the both levers in the directions shown by the arrows (—>) at the same time, 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 Controller because the Controller is considered to have failed.

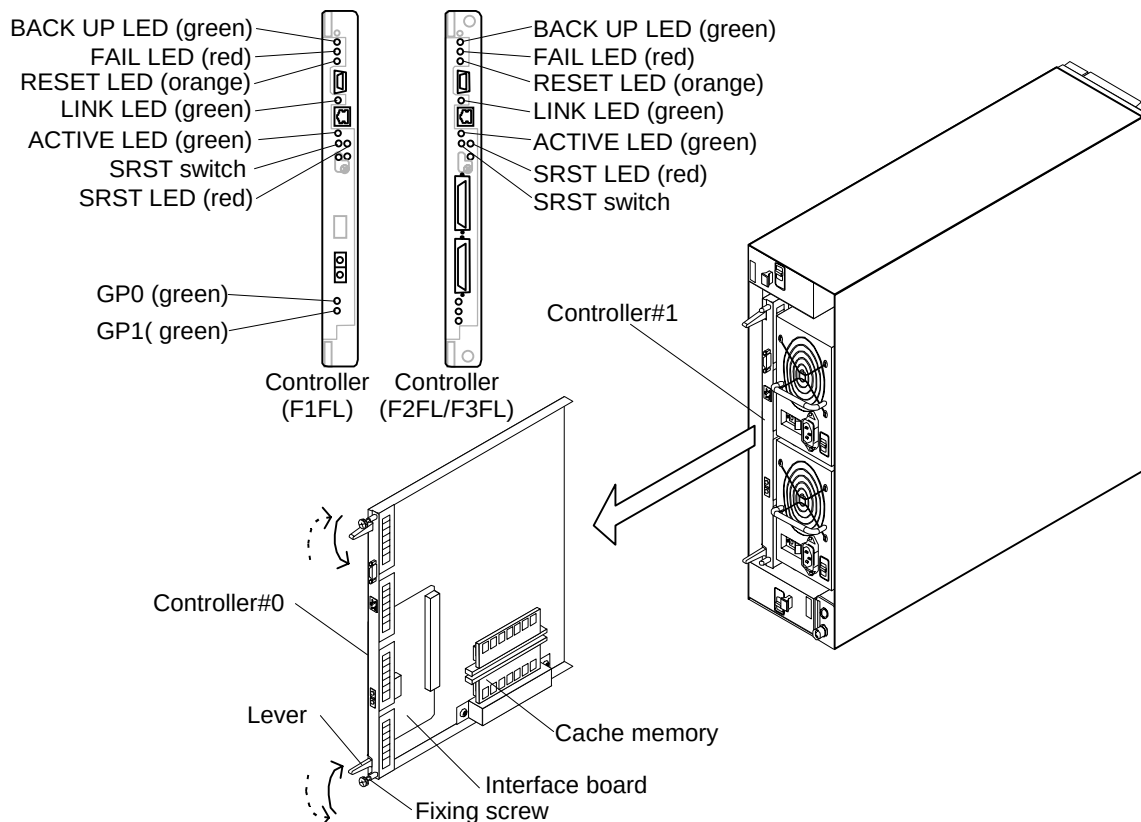


Figure 4.4.6 Controller Replacement and LED Locations

- (e) Tighten the upper and lower fixing screws of the Controller.
- (f) Make sure that the WARNING LED (orange) on the panel is off.
- (g) Connect the removed interface cable (Fibre Channel or SCSI), LAN, and RS232C cables to the Controller.

(1-2) When the FAIL LED is off

- (a) Remove the interface cable (Fibre Channel or SCSI), LAN, and RS232C cables connected to the Controller to be blocked for prevention against a failure.

Notice : • When replacing the two Controller with the power turned on, the Controller must be replaced one after another. When the two Controllers are replaced at the same time, turned off the subsystem power before replacement.

- Since the system parameters are automatically loaded on the new Controller by copying them from that of another system, setting using a FD or by manual operation is not needed. However, if the two Controllers failed at the same time, a system parameter restoration using the FD is required.
 - Do not remove the SCSI interface cable connected to the Interface board. Because, in the case of the SCSI connection, lower devices connected in the daisy chain become unable to be recognized by the host.
- (b) To block the controller by way of prevention against a failure, press the SRST switch and make sure that the FAIL LED (red) comes on (see Figure 4.4.6).
- (c) Loosen the upper and lower fixing screws of the Controller.
Raise the both upper and lower levers at the same time in the direction shown by the arrows (·····>) and take out the Controller.

- (d) Wait for more than 20 seconds, and then insert the Controller into the specified position with its upper and lower levers being raised, then return the both levers to the direction shown by the arrows (—→) at the same time.

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

Notice : When returning the both levers in the directions shown by the arrows (—→) at the same time, 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 Controller because the Controller is considered to have failed.

- (e) Tighten the upper and lower fixing screws of the Controller.
(f) Make sure that the WARNING LED (orange) on the panel is off.
(g) Connect the removed interface cable (Fibre Channel or SCSI), LAN, and RS232C cables to the Controller.

- (2) Procedure for replacement with the power turned off (See Figure 4.4.6.)
- (a) Confirm the installation location of the Controller whose FAIL LED is on. (Refer to [MNTE 04-1180](#).)
 - (b) Remove the front bezel. (Refer to [MNTE 01-0070](#).)
 - (c) When the WEB can be connected, make sure that the system parameter backup FD is inserted, and back up the system parameters. (Refer to [MNTE 01-0140](#).)
 - (d) Turn off the main switch.
Make sure that the POWER LED (green) on the panel has gone out.
When an array unit cannot be turned off, connect to the WEB to isolate its faults.

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)
When the cache is in the cache backup mode, make the replacement after canceling the mode.

Make sure that the BACK UP LED (green) on the Controller is off.

Notice : When the BACK UP LED (green) is on, user data not written on the disk exists in the Cache memory.
If the Controller is removed from the subsystem in this state, it is feared that user data may be lost.

- (e) Remove the interface cable (Fibre Channel or SCSI), LAN, and RS232C cables connected to the Controller.
- (f) Loosen the upper and lower fixing screws of the Controller.
Raise the both upper and lower levers at the same time in the direction shown by the arrows (····>) and take out the Controller.
- (g) Insert the Controller in the specified position with its upper and lower levers being raised, then return the levers at the same time in the direction shown by the arrows (—>).
If the Controller 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.
- (h) Tighten the upper and lower fixing screws of the Controller.
- (i) Connect the removed interface cable (Fibre Channel or SCSI), LAN, and RS232C cables to the Controller.
- (j) Turn on the main switch.
Make sure that the WARNING LED (orange) on the panel has gone out.

- (k) Prepare the FD for system parameter restoration to which the system parameters were backed up in step (c). If the FD for system parameter restoration is not available, prepare the list of set system parameters instead.
- (l) Check if the FD to which the system parameters were backed up is inserted in the Floppy disk drive.
- (m) Restore the system parameters. (Refer to [MNTE 01-0200](#).)
- (n) Turn off the main switch.
Turn off the breakers of the AC/DC power supply.
- (o) Turn on the breakers of the AC/DC power supply.
Turn on the main switch.
- (p) Make sure that the POWER LED (green) on the panel is off.
- (q) Attach the front bezel.

4.4.6 Replacing Cache memory

Replacement of the Cache memory must be done by the set of two memory boards (set of boards in slots #0 and #1).

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	When the FAIL LED of the controller, in which the cache memory to be replaced is installed, is on in the case of the dual system configuration.	See 4.4.6 (1-1)
		When the FAIL LED of the controller, in which the cache memory to be replaced is installed, is off in the case of the dual system configuration.	See 4.4.6 (1-2) (Preventive replacement)
2	Replacement with the power turned off	—	See 4.4.6 (2)
*1 : In the case of the single Controller configuration, the Cache memory cannot be replaced unless the subsystem power is turned off.			

(1) Procedure for replacement with the power turned on

(1-1) When the FAIL LED of the controller is on

- (a) Make sure that the FAIL LED (red) on the Controller on which the Cache memory to be replaced is on. If not, remove the Cache memory following the “When the FAIL LED goes out” in Item (1-2) on page [MNTE 04-1270](#).

Notice : • Do not replace the Controller which operates normally.

Before replacing the Controller, confirm that it is blocked (the FAIL LED (red) in on).

- Since the system parameters are automatically loaded on the new Controller by copying them from that of another system, setting using a FD or by manual operation is not needed.

- (b) Remove the interface cable (Fibre Channel or SCSI), LAN, and RS232C cables connected to the Controller on which the Cache memory to be replaced is mounted.
- (c) Loosen the upper and lower fixing screws of the Controller.
Raise the both upper and lower levers at the same time in the direction shown by the arrows (……>) and take out the Controller.
- (d) Remove the cache cover to attach on the Controller.
- (e) Remove the Cache memory.

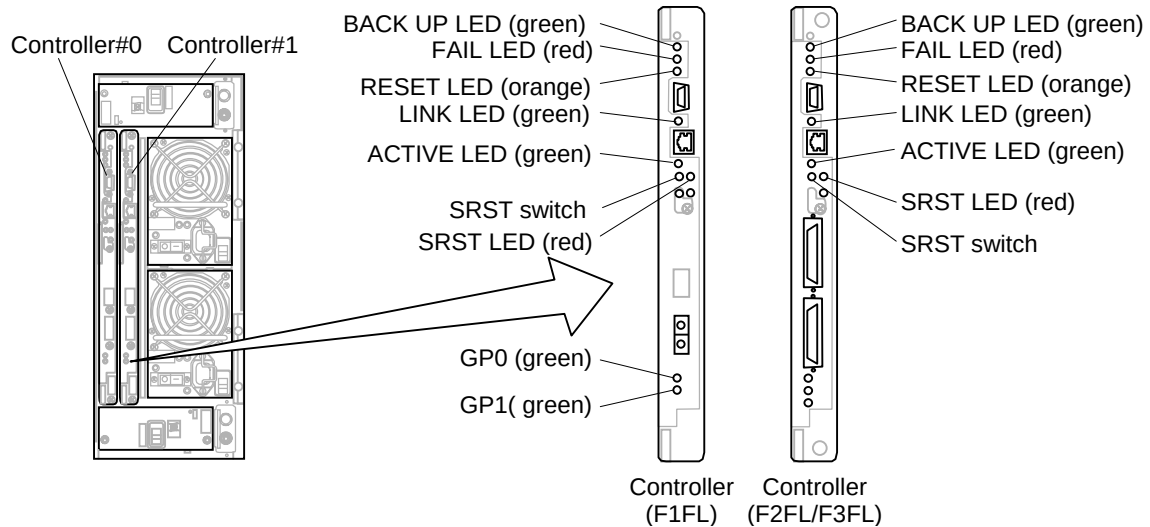


Figure 4.4.7 LEDs of Controller

- (f) Install the Cache memory in the Controller.
 - (g) Attach the cache cover.
 - (h) Wait for more than 20 seconds, and then insert the Controller in the specified position with its upper and lower levers being raised, then return in the levers at the same time in the direction shown by the arrows (→).
- If the Controller is inserted without waiting for 20 seconds, it is possible that the Controller is not recovered from the failure normally.
- (i) Tighten the upper and lower fixing screws of the Controller.
 - (j) Make sure that the FAIL LED (red) on the Controller is off.
 - (k) Make sure that the WARNING LED (orange) on the panel is off.
 - (l) Connect the removed interface cable (Fibre Channel or SCSI), LAN, and RS232C cables to the Controller.

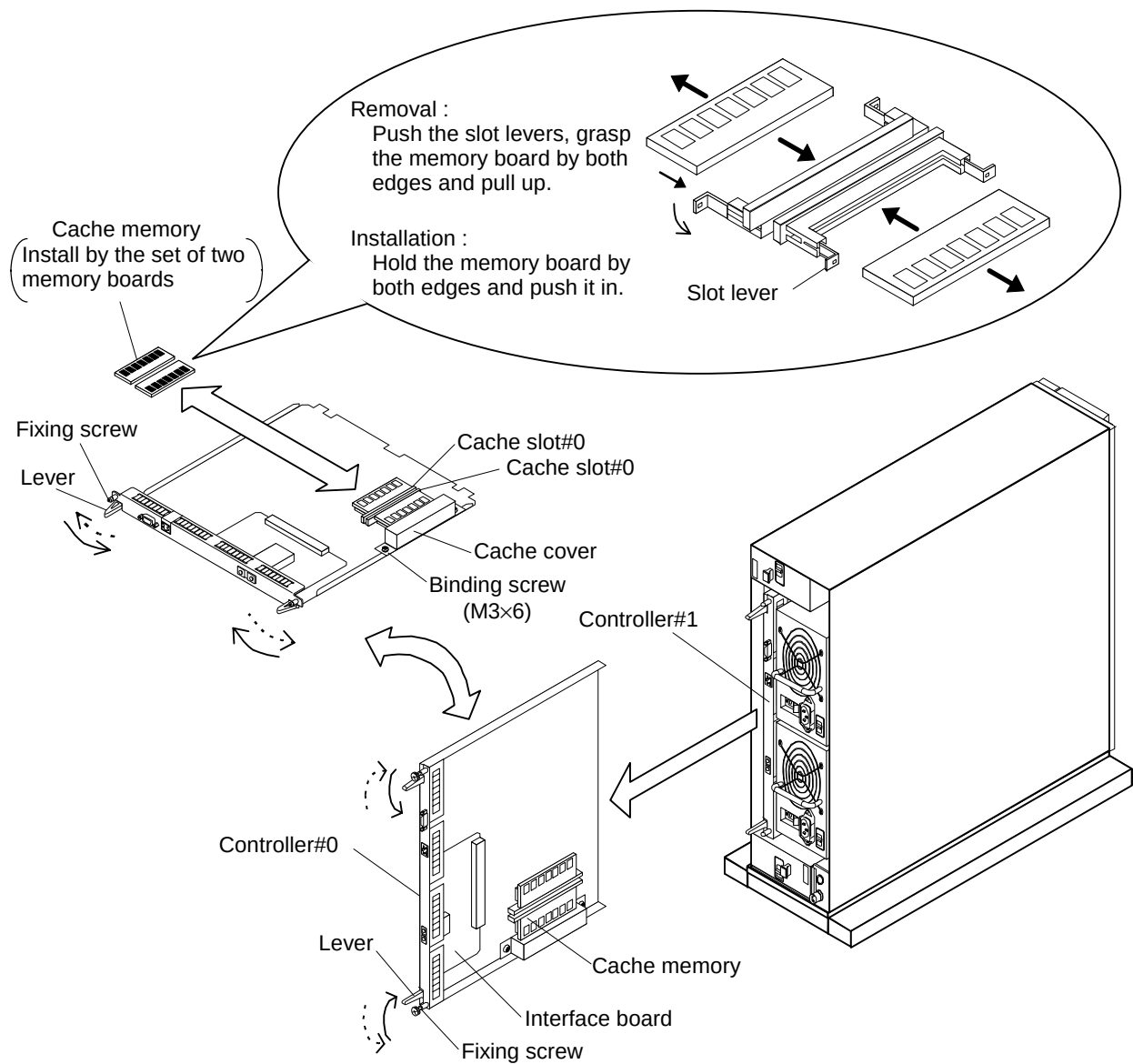


Figure 4.4.8 Replacing of Cache Memory

(1-2) When the FAIL LED goes out

- (a) Remove the interface cable (Fibre Channel or SCSI), LAN, and RS232C cables connected to the Controller on which the Cache memory to be replaced is mounted.

Notice : • Since the system parameters are automatically loaded on the new Controller by copying them from that of another system, setting using a FD or by manual operation is not needed.

- (b) Press the SRST switch on the Controller, in which the Cache memory to be replaced is installed, and make sure that the FAIL LED (red) comes on.
- (c) Loosen the upper and lower screws of the Controller.
Raise the both upper and lower levers at the same time in the direction shown by the arrows (····>) and take out the Controller.
- (d) Remove the cache cover to attach on the Controller.
- (e) Remove the Cache memory.
- (f) Install the Cache memory in the Controller.
- (g) Attach the cache cover.
- (h) Wait for more than 20 seconds, and then insert the Controller in the specified position with its upper and lower levers being raised, then return in the levers at the same time in the direction shown by the arrows (——>).
If the Controller is inserted without waiting for 20 seconds, it is possible that the Controller is not recovered from the failure normally.
- (i) Tighten the upper and lower fixing screws of the Controller.
- (j) Make sure that the FAIL LED (red) on the Controller is off.
- (h) Make sure that the WARNING LED (orange) on the panel is off.
- (l) Connect the removed interface cable (Fibre Channel or SCSI), LAN, and RS232C cables to the Controller.

- (2) Procedure for replacement with the power turned off
- (a) Confirm the installation location of the Controller whose FAIL LED (red) is on.
Make sure that the system parameter backup FD is inserted, then backup the system parameters.
 - (b) Remove the front bezel. (Refer to [MNTE 01-0070](#).)
 - (c) Turn off the main switch.
Make sure that the POWER LED (green) on the panel has gone out.
When the power cannot be turn off, perform a troubleshooting after connecting to WEB.

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)
When the cache is in the cache backup mode, make the replacement after canceling the mode.

Make sure that the BACK UP LED (green) on the Controller is off.

Notice : When the BACK UP LED is on, user data not written on the disk may exists in the Cache memory.
If the Controller is removed from the subsystem in this state, it is feared that user data may be lost.

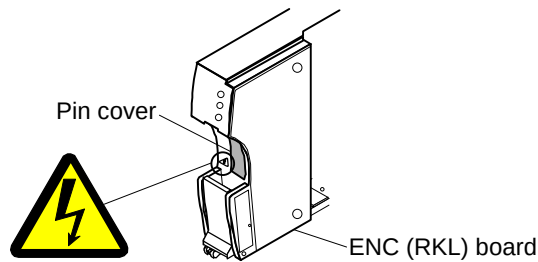
- (d) Remove the interface cable (Fibre Channel or SCSI), LAN, and RS232C cables connected to the Controller.
- (e) Loosen the upper and lower fixing screws of the Controller.
Raise the both upper and lower levers at the same time in the direction shown by the arrows (····>) and take out the Controller.
- (f) Remove the cache cover to attach on the Controller.
- (g) Remove the Cache memory.
- (h) Install the Cache memory in the Controller.
- (i) Attach the cache cover.
- (j) Insert the Controller in the specified position with its right and left levers being raised, then return the levers at the same time in the direction shown by the arrow (—→).
If the Controller 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.

- (k) Tighten the left and right fixing screws of the Controller.
- (l) Turn on the main switch.
- (m) Make sure that the WARNING LED (orange) on the panel is off.
- (n) Connect the removed interface cable (Fibre Channel or SCSI), LAN, and RS232C cables to the Controller.
- (o) Attach the front bezel.

4.4.7 Replacing ENC (RKL) board



**Do not remove the pin cover of the ENC(RKL) board.
Otherwise, an electric shock may be caused.**



Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	When replacing the ENC, the subsystem must be in the status shown below. • Hot replacement of the microprogram is not being performed. • Hot replacement of the Controller is not being performed. • Any part other than the above is not being replaced.	See 4.4.7 (1-1) When the FAIL LED (red) of the ENC board to be replaced is on
			See 4.4.7 (1-2) When the FAIL LED (red) of the ENC board to be replaced is off (Preventive replacement)
2	Replacement with the power turned off	—	See 4.4.7 (2)

Notice : When a failure of the battery system (whose message code is W03000, W03100, W03200, W03300, or W03400) has occurred, recover the subsystem from the battery system failure before replacing the ENC board.

(1) Procedure for replacement with the power turned on (See Figure 4.4.9.)

(1-1) When the FAIL LED of the ENC board to be replaced is on

(a) Remove the front bezel. (Refer to [MNTE 01-0090](#).)

(b) Make sure that the FAIL LED (red) is on.

Notice : Make sure that the pin cover of the ENC(RKL) board is not removed. If the board is removed while the subsystem power is on when the pin cover removed, an electric shock may be caused. Therefore, care should be taken.

(c) Raise the lever on the ENC board in the direction shown by the arrow (→).

(d) Pull the ENC board toward you to remove it.

(e) Insert a new ENC board into the specified location with its levers being raised after waiting for 20 seconds, and connect a new ENC cable as the old one was before.

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

(f) Return the levers in the direction shown by the arrows ② (<……).

Notice : When returning the both levers in the directions shown by the arrows ② (<……) at the same time, 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 board because the ENC board is considered to have failed.

(g) Make sure that the FAIL LED (red) on the ENC board is off.

- (1-2) When the FAIL LED of the ENC board to be replaced is off
- (a) Remove the front bezel. (Refer to [MNTE 01-0090](#).)
 - (b) Raise the lever on the ENC board in the direction shown by the arrow ① (→).
 - (c) Pull the ENC board toward you to remove it.
 - (d) Insert a new ENC board into the specified location with its levers being raised after waiting for 20 seconds, and connect a new ENC cable as the old one was before.
If the ENC board is inserted without waiting for 20 seconds, it is possible that the ENC board is not recovered from the failure normally.
 - (e) Return the levers in the direction shown by the arrows ② (<.....).

Notice : When returning the both levers in the directions shown by the arrows ② (<.....) at the same time, 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 board because the ENC board is considered to have failed.

- (f) Make sure that the FAIL LED (red) on the ENC board is off.

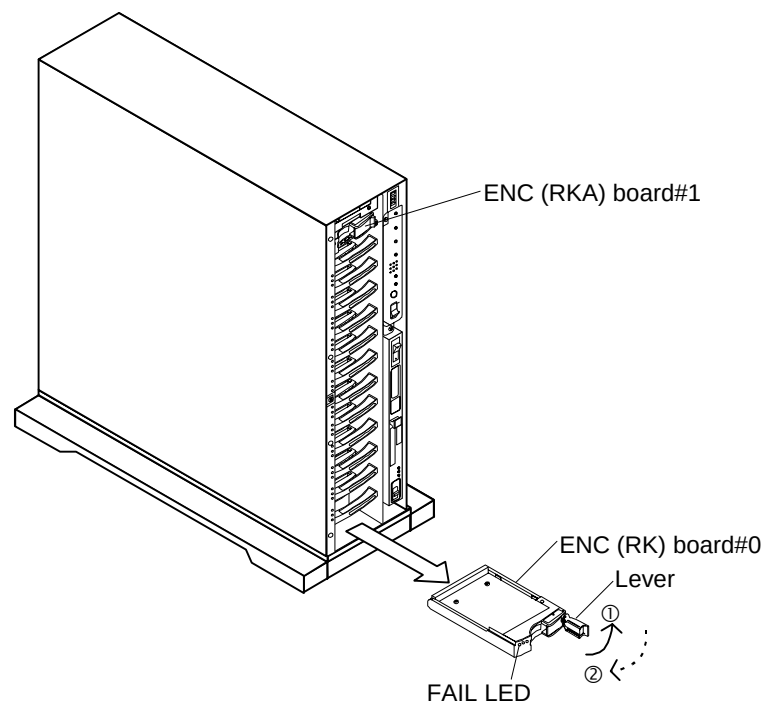


Figure 4.4.9 Replacing of ENC Board

(2) Procedure for replacement with the power turned off

(a) Turn off the main switch.

Make sure that the POWER LED (green) on the panel has gone out.

When the power cannot be turned off, perform a troubleshooting after connecting to WEB.

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)
When the cache is in the cache backup mode, make the replacement after canceling the mode.

Make sure that the BACK UP LED (green) on the Controller is off.

Notice : When the BACK UP LED is on, user data not written on the disk may exist in the Cache memory.
If the Controller is removed from the subsystem in this state, it is feared that user data may be lost.

(b) Remove the front bezel. (Refer to [MNTE 01-0090](#).)

(c) Turn off the breaker of the AC/DC power supply.

Make sure that the BACK UP LED (green) of the Controller has gone out.

Notice : It is possible that the recovery is not made normally if the replacement is done without turning off the breaker.

(d) Open the lever which is on the ENC board in the direction shown by the arrow ① (→).

(e) Pull the ENC board toward you to remove it.

(f) Insert a new ENC board into the specified location with its levers being raised and connect a new ENC cable as the old one was before.

(g) Return the levers in the direction shown by the arrows ② (<.....).

(h) Turn on the breaker of the AC/DC power supply on the rear side of the subsystem.

- (i) Turn on the main switch.

Make sure that the FAIL LED (red) has not gone out.

After doing this, make sure that the FAIL LED (red) on the ENC board is not on.

When the ENC board is replaced without turning off the breaker of the AC/DC power supply (Item (c)) by mistake, an unexpected error message may be displayed.

Examples of error message:

W03100 Buttery removed

W08000 Loop alarm (Path-0, Loop-0)

If the above occurs, execution of the following procedure will make the recovery.

(a) → (c) → (i) → (j)

4.4.8 Replacing AC/DC power supply

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	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.	See 4.4.8 (1)
2	Replacement with the power turned off	—	See 4.4.8 (2)

(1) Procedure for replacement with the power turned on (See Figure 4.4.10)

- (a) Make sure that the PS RDY LED (green) of the power supply to be replaced is off.
- (b) Check if the PS RDY LED (green) is on and the PS ALARM LED (red) is off on the AC/DC power supply.
- (c) Turn on the breaker of the AC/DC power supply to be replaced.

Notice : Even when the breaker of the AC/DC power supply to be replaced is turned off while the subsystem is powered on, the fan of the AC/DC power supply keeps its operation.

- (d) Disconnect the power cable as they connected to the AC/DC power supply to be replaced.
- (e) Slide the latch upward and take out the AC/DC power supply while it is unlatched.
- (f) Make sure that the breaker of the new AC/DC power supply is turned off.
- (g) Wait for more than 20 seconds, and then insert the AC/DC power supply the main body until it is latched with a click.
If the AC/DC power supply is inserted without waiting for 20 seconds, it is possible that the AC/DC power supply is not recovered from the failure normally.
- (h) Connect the removed cable as they were before.
- (i) Turn on the breaker of the AC/DC newly mounted power supply.
At this time, check if the PS RDY LED (green) is on and the PS ALARM LED (red) is off on the power supply not to be replaced at this time.

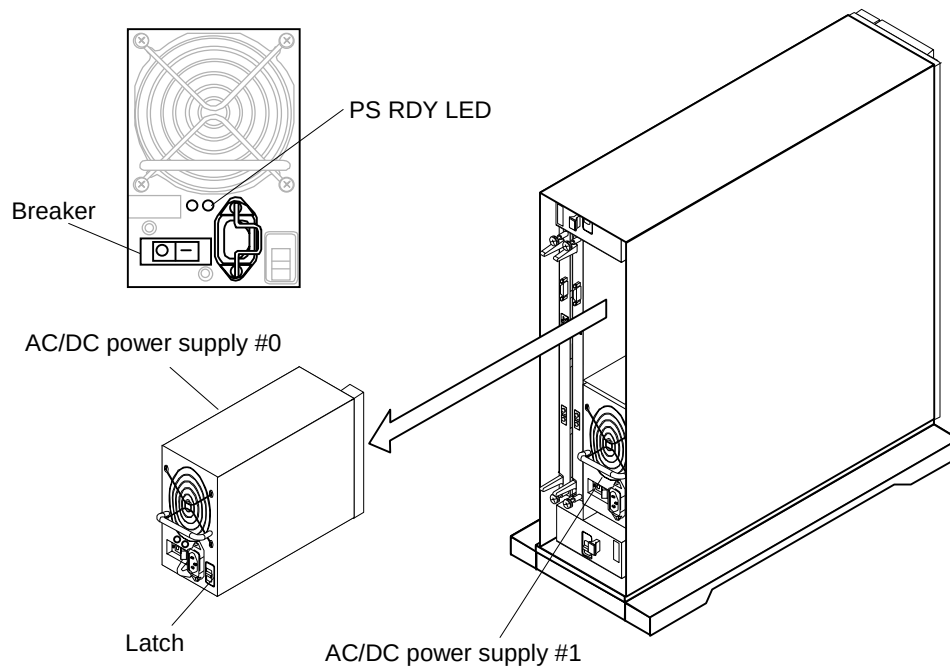


Figure 4.4.10 Replacing AC/DC Power Supply

(2) Procedure for replacement with the power turned off

(a) Turn off the main switch.

Make sure that the POWER LED (green) on the panel has gone out.

When the power cannot be turned off, perform a troubleshooting after connecting to WEB.

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)
When the cache is in the cache backup mode, make the replacement after canceling the mode.

(b) Make sure that the BACK UP LED (green) has gone out.

Notice : When the BACK UP LED is on, user data not written on the disk may exist in the Cache memory.
If the controller is removed from the subsystem in this state, it is feared that user data may be lost.

(c) Turn off the breakers of the both AC/DC power supplies.

(d) Disconnect the power cable as they connected to the AC/DC power supply to be replaced.

(e) Slide the latch upward and take out the AC/DC power supply while it is latched.

(f) Make sure that the breaker of the new AC/DC power supply is turned off.

(g) Push in the new AC/DC power supply until it is latched with a click.

(h) Connect the removed cable as they were before.

(i) Turn on the breakers of the both AC/DC power supplies.

Make sure that the PS RDY LEDs (green) of the both AC/DC power supplies are on.

(j) Make sure that the WARNING LED (orange) has gone out.

4.4.9 Replacing Fan unit

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	Complete the replacement within 10 minutes, and restart the fans of the Fan unit.	See 4.4.9 (1)
2	Replacement with the power turned off	—	See 4.4.9 (2)



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

(1) Procedure for replacement with the power turned on

The two same fan units are installed facing each other in the state in which one of them is turned upside down.

When installing them, make them turned up or down correctly.

Notice : While the FAIL LED of a Fan unit is on, when a Controller has been blocked (the FAIL LED is on), be sure to correct the Controller blockade failure first.

- (a) Make sure that the FAIL LED (red) is on.
- (b) Unlock the fan units by shifting latches of upper and lower fan units downward and upward respectively.
- (c) Take out the Fan unit by holding its knob and pulling it toward you.
- (d) Wait for more than 20 seconds, and then press the Fan unit into the main body until it is latched with a click.
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.
- (e) Make sure that the status of the FAIL LED (red) changes from on to off.
- (f) Check if the fans of the mounted Fan unit are rotating.

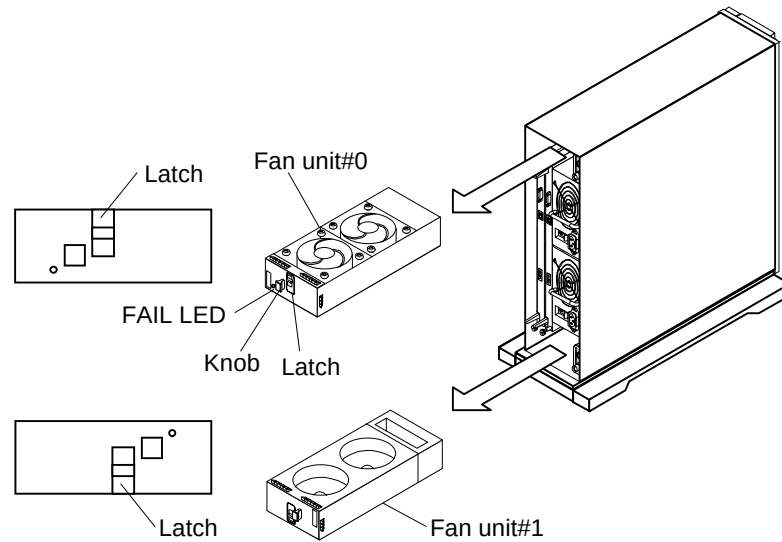


Figure 4.4.11 Replacing Fan Unit

(2) Procedure for replacement with the power turned off

Notice : While the FAIL LED of a Fan unit is on, when a Controller has been blocked (the FAIL LED is on), be sure to correct the Controller blockade failure first.

(a) Turn off the main switch.

Make sure that the POWER LED (green) on the panel has gone out.

When the power cannot be turn off, perform a troubleshooting after connecting to WEB.

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)

When the cache is in the cache backup mode, make the replacement after canceling the mode.

Make sure that the BACK UP LED (green) has gone out.

Notice : When the BACK UP LED is on, user data not written on the disk may exist in the Cache memory.

If the controller is removed from the subsystem in this state, it is feared that user data may be lost.

- (b) Release the lock by shifting the latch to the left.
- (c) Take out the Fan unit by holding its knob and pulling it toward you.
- (d) Push in the new AC/DC power supply until it is latched with a click.
- (e) Turn on the main switch.

Make sure that the status of the FAIL LED (red) changes from on to off.

- (f) Check if the fans of the mounted Fan unit are rotating.

4.5 Replacing Parts of Rackmount Model (RKL)

The following are procedures for replacing parts specified as maintenance parts of the rackmount models.

4.5.1 Locations of replaceable parts

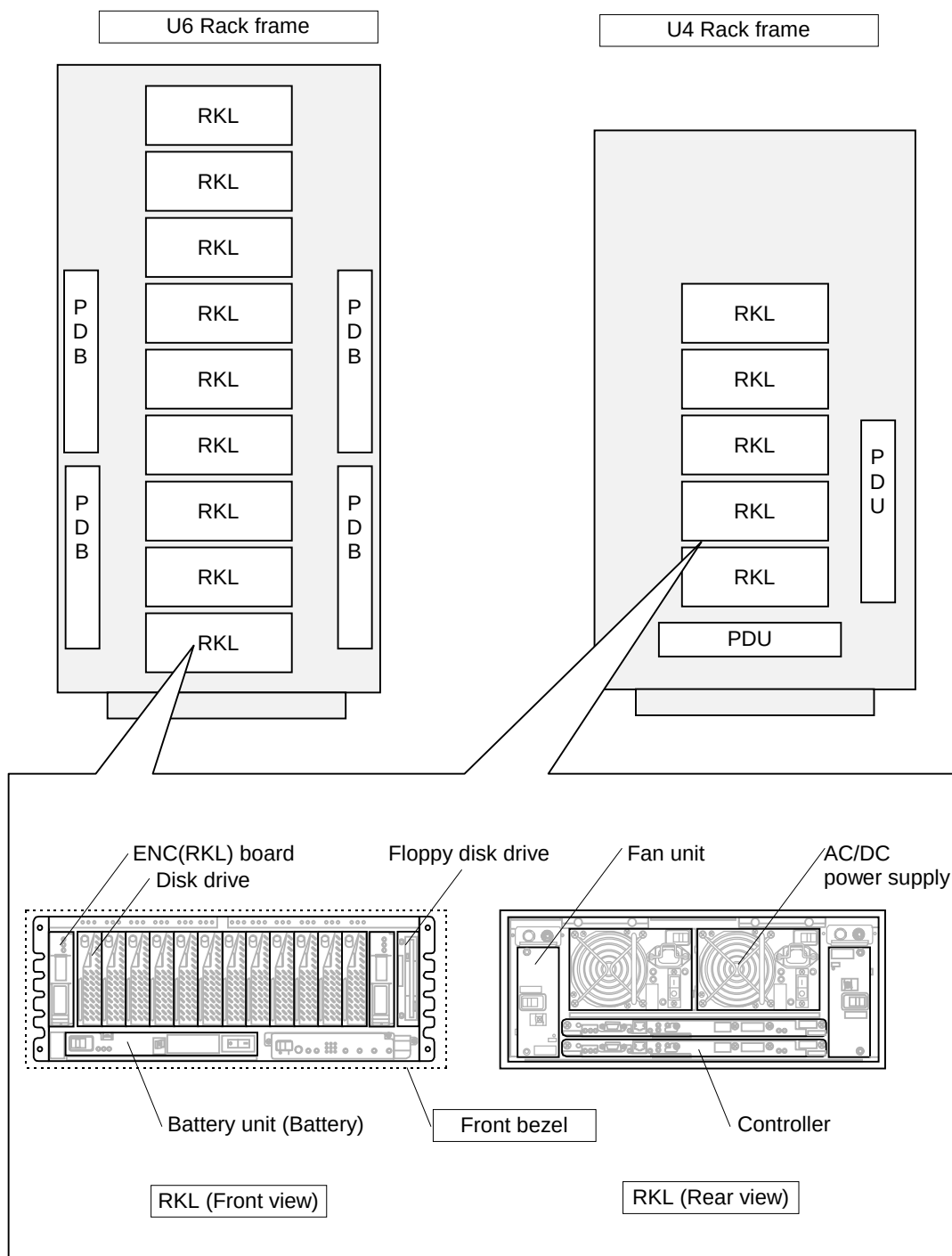


Figure 4.5.1 Replaceable Part Locations of Rackmount Model

**Table 4.5.1 Replaceable Parts and Condition of Power Supplying
when Replacing Each of Them**

	No.	Part name	Part No.	Model	Power supplying condition for replacement ^(*1)	
					ON	OFF
RK and RKA	1	Disk drive (18 G bytes)	5507067-81	DF-F500-ACF18	○ ^(*2)	Not applicable
		Disk drive (18 G bytes)	5507067-93	DF-F500-ACH18	○ ^(*2)	Not applicable
		Disk drive (36 G bytes)	5507067-82	DF-F500-ACF36	○ ^(*2)	Not applicable
		Disk drive (72 G bytes)	5507067-83	DF-F500-ACF72	○ ^(*2)	Not applicable
	2	AC/DC power supply (RKL)	5507067-84	—	●	○
	3	Floppy disk drive	5507067-89	—	Not applicable	○
	4	Battery unit	5507067-88	—	○	○
	5	ENC (RKL) board	5507067-87	—	●	○
	6	Controller	5507067-85	DF-F500-F1FL	●	○ ^(*3)
			5507067-86	DF-F500-F2FL	●	○ ^(*3)
			5507067-92	DF-F500-F3FL	●	○ ^(*3)
	7	Cache memory (256 M bytes)	—	—	(●)	○
	8	Fan unit	5507067-90	—	○	○
*1 : Descriptions of the symbol. ○ : Replacement can be done on this condition. ● : Replacement can be done on this condition only when the part concerned has redundancy. (●) : Replacement can be done on this condition only when the Controller is duplicated. *2 : Power must be on. *3 : When the WEB cannot be connected, the Controller cannot be replaced while the subsystem power is off in the case of the dual Controller configuration.						

4.5.2 Replacing Disk drive

Procedure for replacing the Disk drive varies depending on the RAID configuration and the set mode for data restoration. Confirm the RAID configuration and the set mode for data restoration of the subsystem, and then perform the replacement following the procedure shown below.

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	RAID level		Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	Indispensable	With the Spare disk (s)	RAID 0	See 4.5.2 (1-1) .
				RAID 1, RAID 5, and RAID 0+1	See 4.5.2 (1-2) .
			Without the Spare disk	RAID 0 ^(*1) RAID 1, RAID 5, and RAID 0+1	See 4.5.2 (2) .
2	Replacement with the power turned off	Not applicable			—
*1 : The setting of spare disk for RAID 0 can be done by means of the dynamic sparing only.					

Notice : • Be sure to back up user data before starting the replacement.
When the set RAID group and LU are deleted or formatted, related user data will be lost.

- When the loop failure (W080xy Loop alarm) has occurred, recover the subsystem from the loop failure before replacing the Disk drive.
If the subsystem is not recovered from the loop failure, there may be a case where the replaced Disk drive is not recovered from the failure normally.

Mounting location number of Disk drive

Mounting location number of a Disk drive is represented by a combination of a device number (device ID) and a Disk drive number given in a subsystem.

The device number has been set to #0.

The Disk drive numbers #0 to #11 are given to the Disk drives in the left from bottom right.

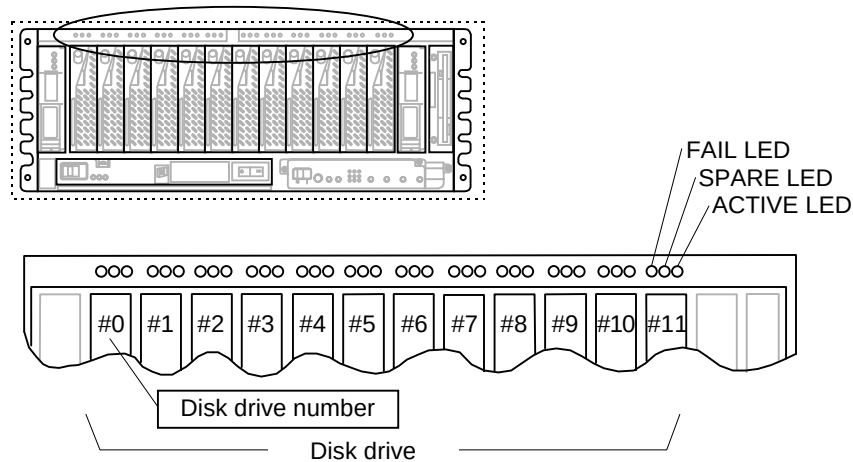


Figure 4.5.2 Mounting Locations of Disk Drives

(1) Procedure for replacing the Disk drive when the spare disk is not set

(1-1) Replacing Disk drive in RAID 0 configuration

- (a) Make a backup of user data.
- (b) Remove the front bezel. (Refer to [MNTE 01-0090](#).)
- (c) Make sure whether the Disk drive to be replaced is blocked or not by viewing the message of the WEB.
- (d) Remove the Disk drive to be replaced.

Operate the lock release button of the Disk drive and remove the Disk drive taking care not to apply any shock to it.

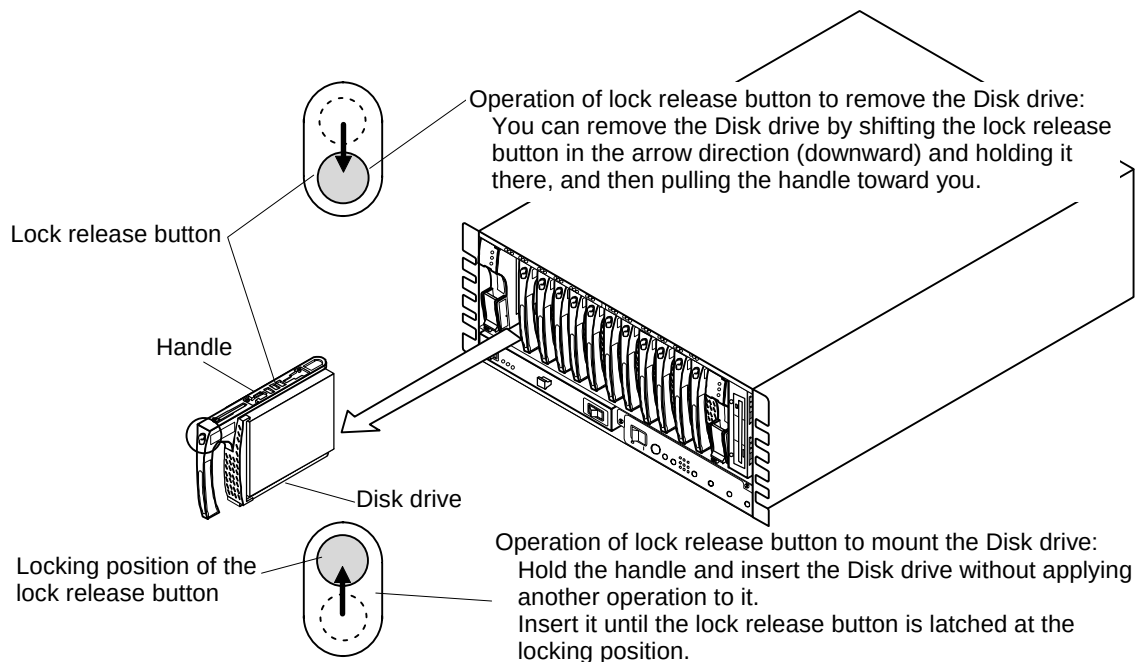


Figure 4.5.3 Operation of Lock Release Button of Disk Drive

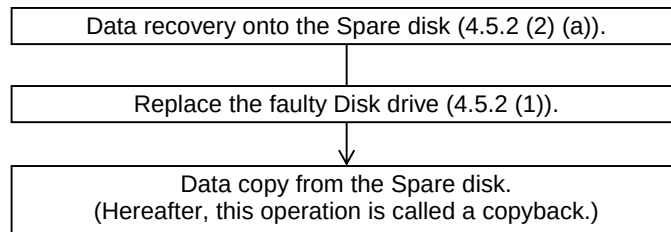
- (e) Wait for more than 20 seconds, and then insert a new Disk drive taking care not to apply any shock to it. (See Figure 4.5.3.)
If the Disk drive is inserted without waiting for 20 seconds, it is possible that the Disk drive is not recovered from the failure normally.
- (f) The FAIL LED (red) of the replaced Disk drive goes out.
 - If the FAIL LED (red) of the Disk drive concerned is still on after the replacement, execute the powering off procedure and replace the Disk drive again.
- (g) Format the LU. (Refer to [INST-L 06-0590](#).)
- (h) Restore the data using the backup previously prepared.
- (i) Attach the front bezel.

(1-2) Replacing Disk drive in RAID 1, 5, or 0+1 configuration

- (a) Remove the front bezel. (Refer to [MNTE 01-0090](#).)
- (b) Check if the Disk drive to be replaced is blocked. When the Disk drive is blocked, the FAIL LED (red) at the location corresponding to the Disk drive concerned is on.
- (c) Operate the lock release button of the Disk drive to be replaced and remove the Disk drive taking care not to apply any shock to it.
- (d) Wait for more than 20 seconds, and then insert the replacement Disk drive.
Operate the lock release button on the Disk drive and mount the Disk drive slowly taking care not to apply any shock to it. (See Figure 4.5.3.)
If the Disk drive is inserted without waiting for 20 seconds, it is possible that the Disk drive is not recovered from the failure normally.
- (e) The FAIL LED (red) of the replaced Disk drive goes out.
- (f) The data is restored automatically on the replaced Disk drive.
If the FAIL LED (red) of the Disk drive concerned is still on after the replacement, execute the powering off procedure and replace the Disk drive again.
- (g) Select "Information Message" from the WEB ([WEB 02-0120](#)) and make sure that the data recovery is completed normally (I151xy Data recovery completed).
- (h) Make sure that the WARNING LED (orange) on the panel is off.
- (i) Attach the front bezel.

‡1 : The copy back is done in the case where the automatic recover mode is set.

- (2) Procedure for replacing the Disk drive when the Spare disk is set
 The data recovery is executed as shown below.
 To replace Disk drive, refer to [Figure 4.5.3](#).



(a) Data recovery onto the Spare disk

There are two types of data recovery onto the Spare disk depending on the incentive.

- Data recovery onto the Spare disk when a failure in the Disk drive is detected.
- Data copy onto the Spare disk when a disk is detected in which the error count has exceeded its threshold value. (This operation will be called “dynamic sparing” hereafter. Note that some microprograms of certain version do not support the operation.)

After the data recovery onto the Spare disk is completed, the recovered disk location can be found using the panel. (Refer to [WEB 03-0360](#), “[Information Message](#)”.)

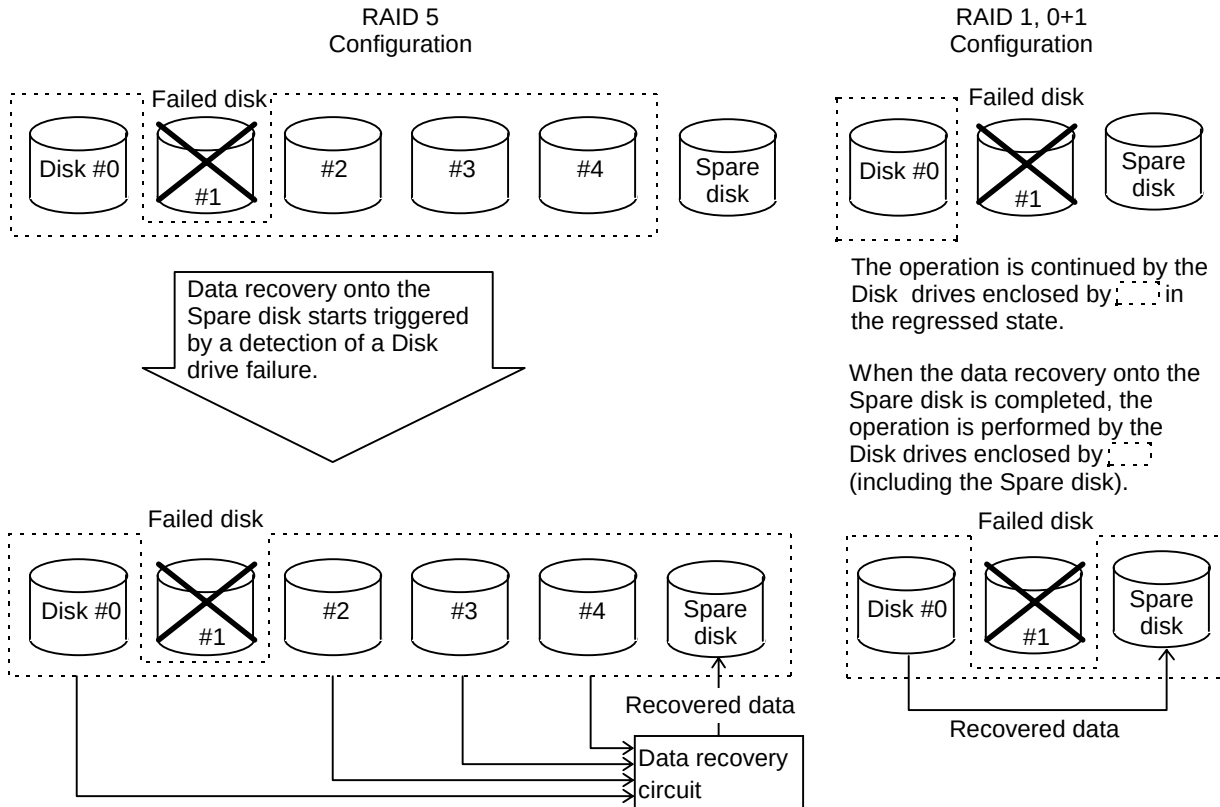
When the WEB cannot be connected, collect a trace while the subsystem power is on and refer to the WEB log message.

(b) Data recovery onto the Spare disk when a Disk drive failure is detected

As to data recovery onto the Spare disk, as shown in the drawing on the following page, when a Disk drive failure occurs, the data of the failed disk is recovered automatically onto the Spare disk.

Automatic recovery onto the Spare disk is executed only under the following condition.

Condition : “When a Disk drive failure is detected, the Spare disk is an unused disk.”



In the following cases, the data recovery onto the Spare disk will not start automatically.

An action to start the data recovery is required.

- When the drive recovery option in the Disk Array management program^(‡1) the disk recovery mode is specified to is set to “not automatic mode”, the data recovery will not start automatically when the disk is replaced.

In this case, it is necessary to instruct recovery onto the Spare disk using the Disk Array management program.

- If a further disk failure occurs while the Spare disk is used already (data of a Disk drive has been already recovered onto the Spare disk), the data of the nearly failed Disk drive will not be recovered onto the Spare disk.

Data of the second failed Disk drive is also not restored on the Spare disk automatically even if the copyback is completed in the above status and the Spare disk goes out of use.

- If a Disk drive with no failure (a Disk drive which is not blocked) is removed, no data recovery onto the Spare disk will be executed. In this case, to recover data onto the Spare disk, it is necessary to instruct a recovery using the Disk Array management program^(‡1).

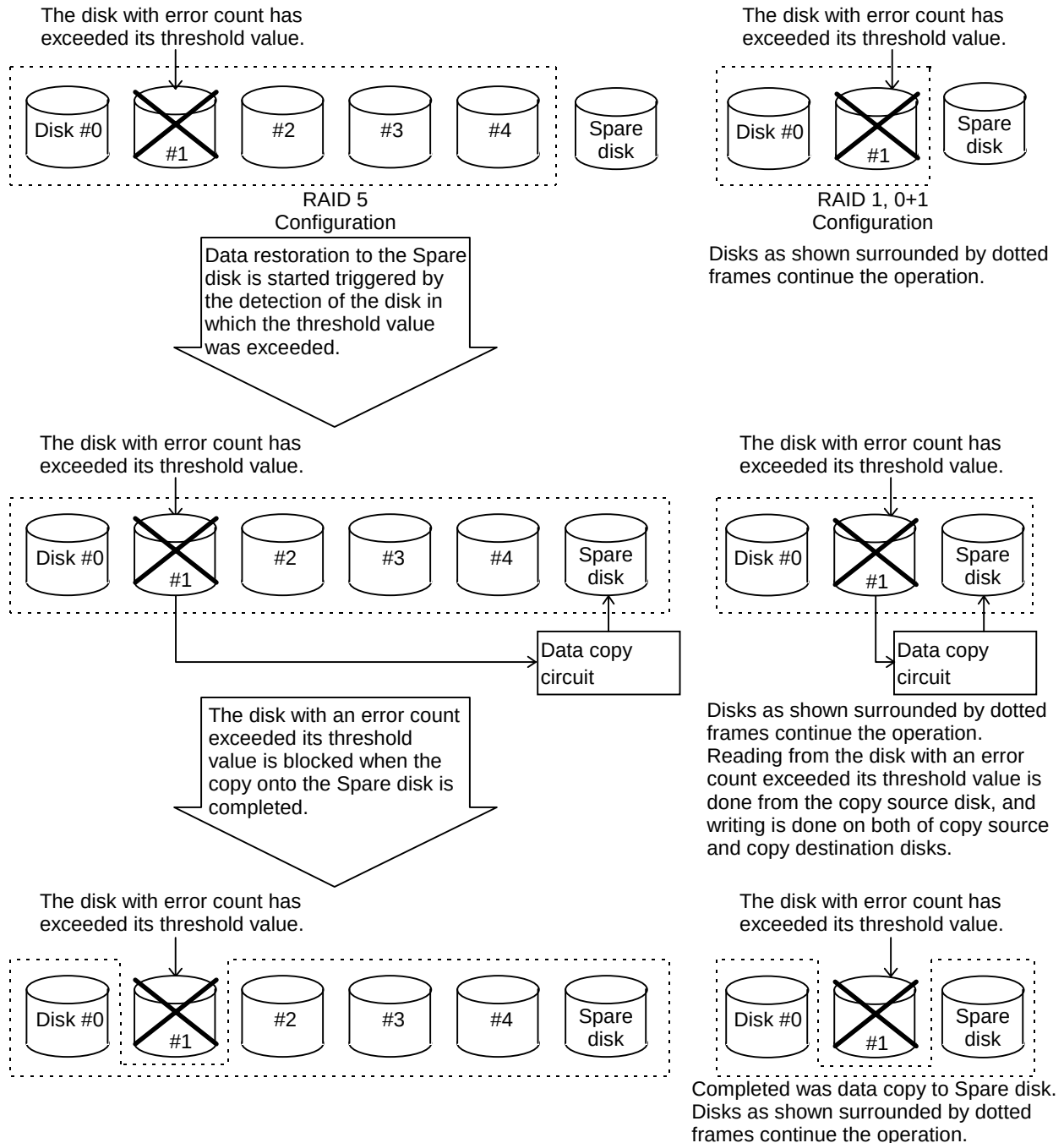
‡1 : For the details of the Disk Array management program, refer to the “Disk Array management program (for GUI) User’s Guide”.

(c) Data recovery onto the Spare disk by means of the dynamic sparing

Data recovery onto the Spare disk is performed as shown below. When a Disk drive is detected in which the error count has exceeded its threshold value, data stored in the Disk drive is copied automatically onto the Spare disk.

The automatic data recovery onto the Spare disk is performed only when the following condition is met.

Condition : The Spare disk is not in use when a disk is detected in which the error count has exceeded its threshold value.



The subsystem displays the following message on the panel when detecting a disk in which the error count has exceeded its threshold value.

MM/DD/YYYY	HH:MM:SS	Cx I41	■XY	HDU error over (Unit-X, HDU-Y)	: MANUAL / TRC
Date	Time	Detect Controller#	■: 0 to 9 or A to D		

At the time when an excess of the error occurrence count over threshold value is detected, only the display of the above message is done in the “Information Message” window of the WEB ([WEB 02-0120](#)), no regression of the Disk drive occurs, and the dynamic sparing is started.

The disk with an error count exceeded its threshold value is blocked after the dynamic sparing is completed.

Refer to page [MNTE 04-1520](#) for “Information Message” transition when the dynamic sparing is performed.

In the following cases in which a disk with an error count exceeded its threshold value is detected, the Disk drive is blocked without an execution of the dynamic sparing.

- When the dynamic sparing mode is set not to execute the dynamic sparing.
- When a disk with an error count exceeded its threshold value is detected after the data has been recovered or while the Spare disk is being used for the data recovery.
- Another Disk drive with an error count exceeded its threshold value is detected during the dynamic sparing operation.

In each case above, the disk with an error count exceeded its threshold value is blocked. Procedures for data recovery and disk replacement are the same as those for the installation of the Spare disk.

Errors counted in the subsystem and default threshold values for them are listed below.

Item No.	Kind of error	Threshold (Default)
1	Disk mechanical error. (Recovered)	50
2	Disk mechanical error. (Un-recovered)	2
3	Disk medium error. (Recovered)	100
4	Disk medium error. (Un-recovered)	50
5	Disk R/W error. (Recovered)	10
6	Disk R/W error. (Un-recovered)	2
7	Disk I/F error. (Recovered)	50
8	Disk I/F error. (Un-recovered)	2
9	Disk hardware error. (Recovered)	50
10	Disk hardware error. (Un-recovered)	2
11	Disk SCSI I/F error. (Recovered)	50
12	Disk SCSI I/F error. (Un-recovered)	2
13	Collectable errors in online verify.	100
14	Un-correctable errors in online verify.	50

There threshold values above can be referred to and updated from the Disk Array management program^(‡1).

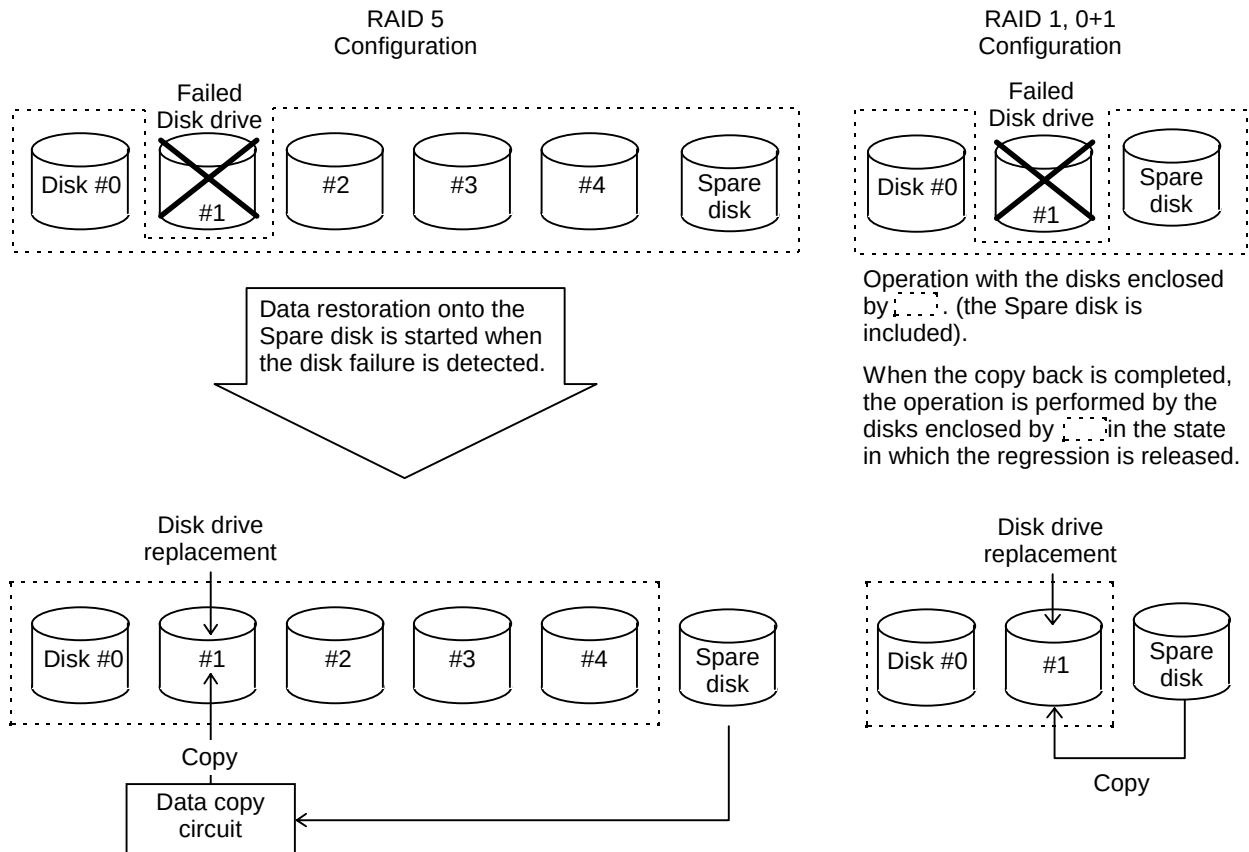
Besides, the then error count can be referred to concerning the recovered or un-recovered disk media errors, correctable errors in online verify operations, correctable errors, and un-correctable errors.

‡1 : For details of the Disk Array management program, refer to the “Disk Array management program (for GUI) User’s Guide”.

(d) Copy back

When a new Disk drive is inserted to where a failure occurred as shown in the drawing below, the copy back will be executed automatically.

When the failed Disk drive is replaced during the data recovery onto the Spare disk, after the data recovery is completed, the copy back will be executed automatically.



In the following cases, the copy back will not start automatically. Operation to start the copy back is required.

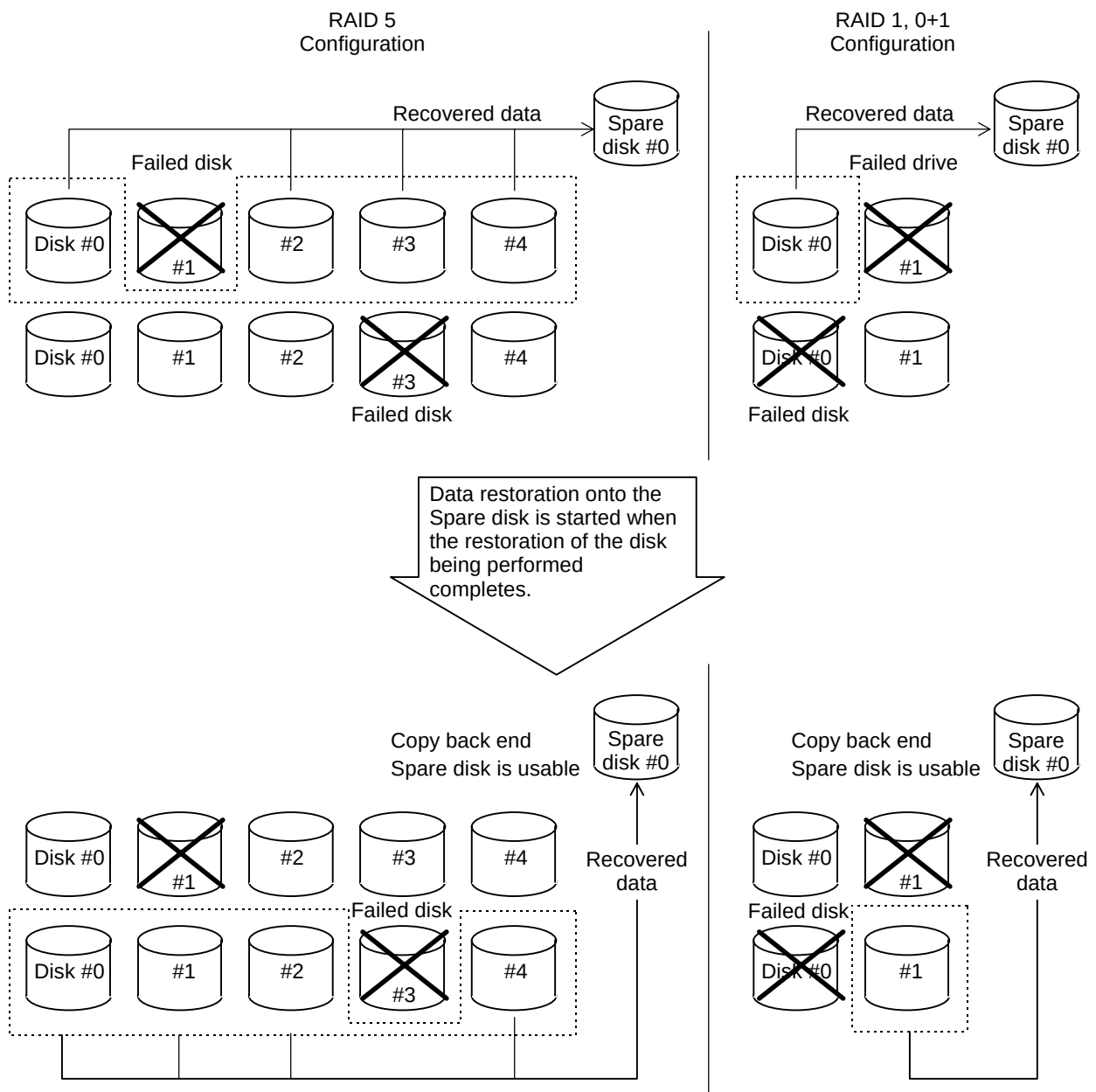
- When the drive recovery opportunity of the drive recovery option in the Disk Array management program is not set to "automatic start" (automatic), the continuous start is not done. To make the continuous start be done, the drive recovery opportunity of the drive recovery option in the Disk Array management program must be set to "automatic start" (automatic).

(e) The continuous data recovery

When failures occurred in plural disks, after the data recovery of the first disk is completed, the data recovery of the second disk will start automatically by the continuous data recovery.

The continuous start is performed (the specified mode is activated) only when the drive recovery option in the Disk Array management program the disk recovery mode is specified as “automatic start”.

Continuous starting is initiated not only when restoring using Spare disk, but also when making a collection copy to the original Disk drive, and when recovering with no Spare disk mounted.



In the following cases, the continuous data recovery will not start.

- When the drive recovery opportunity of the drive recovery option in the Disk Array management program is not set to “automatic start” (automatic), the continuous start is not done. To make the continuous start be done, the drive recovery opportunity of the drive recovery option in the Disk Array management program must be set to “automatic start” (automatic).
- When all Spare disks are used, if the blocked Disk drive is not replaced, the continuous data recovery will not start. If the Spare disk can be used or the blocked Disk drive is replaced, the continuous data recovery will start.
- The continuous data recovery will not start for detached Disk drive and uninstalled Disk drive.

(f) Transition of “Information Message”

When the recovery completes normally, the “Information Message” from the WEB ([WEB 02-0120](#)) change successively as shown below.

(i) Data recover (Data recovery onto the Spare disk when a disk failure is detected)

W060xy HDU alarm : Disk blocked
 I150xy Data recovery started : Start of data area recovery
 I151xy Data recovery completed : Completion of data area recovery
 I008xy Spare HDU recovered : Completion of recovery onto Spare disk

(ii) Data recover (Dynamic sparing from data disk to Spare disk)

I15Axy Dynamic sparing start : Start of Dynamic sparing
 I150xy Data recovery started : Start of disk recover
 I151xy Data recovery completed : Completion of data recovery
 I008xy Spare HDU recovered : Completion of recovery onto Spare disk
 W060xy HDU alarm : Disk x, y were blocked

(iii) Copy back

I140xy System copy started : Start of system area recovery^(‡1)
 I141xy System copy completed : Completion of system area recovery^(‡1)
 I150xy Data recovery started : Start of data area recovery
 I151xy Data recovery completed : Completion of data area recovery

When the recovery terminates abnormally, either ‘I142xy System cop failed’ or ‘I152xy Data recover failed’ is displayed. Take a recovery action following the messages.

(g) Confirming completion of data recovery or copy back

Select “Information Message” from the WEB ([WEB 02-0120](#)) and make sure that the data recovery is completed normally.

**Table 4.5.2 (Example)Standard Times Required for Drive Recovery
in RAID 5(4D+1P) Configuration (Unit : Minute)**

Disk drive capacity	Revolution speed ^(*)
	10,000 min ⁻¹ (Type:AxFx)
17.8 G bytes	75
35.7 G bytes	150
71.6 G bytes	300
*1 : Times shown in the above table are strictly standard ones. In some cases, the longer times may be required depending on the accesses from the host computer.	

‡1 : This message is displayed only when replacing Disk drive (#0 to #3) on the RK.

4.5.3 Replacing Floppy disk drive

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	The Floppy disk drive cannot be used during the replacement.	See 4.5.3 (1).
2	Replacement with the power turned off	—	See 4.5.3 (2).

(1) Procedure for replacement with the power turned off

- (a) When a Controller blockade has occurred, replace the blocked Controller before replacing the Floppy disk drive.
- (b) Remove the front bezel. (Refer to [MNTE 01-0100](#).)
- (c) Take out the Floppy disk drive by pulling it toward you holding its knob.
- (d) Hold the Floppy disk drive by its knob and insert it along the guide rails of the subsystem (align the face of the Floppy disk drive with that of the subsystem). When doing this, be careful not to insert the Floppy disk drive upside down.
- (e) Collect a trace from the independent subsystem while the subsystem power is on (refer to page [MNTE 02-1400](#) for “2.6.3 Collection of trace in the ON state”) to make sure that the trace collection terminates normally.

Notice : When the trace collection does not terminate normally, the Controller may be faulty. Replace the Controller #0 (see page [MNTE 04-1580](#)).

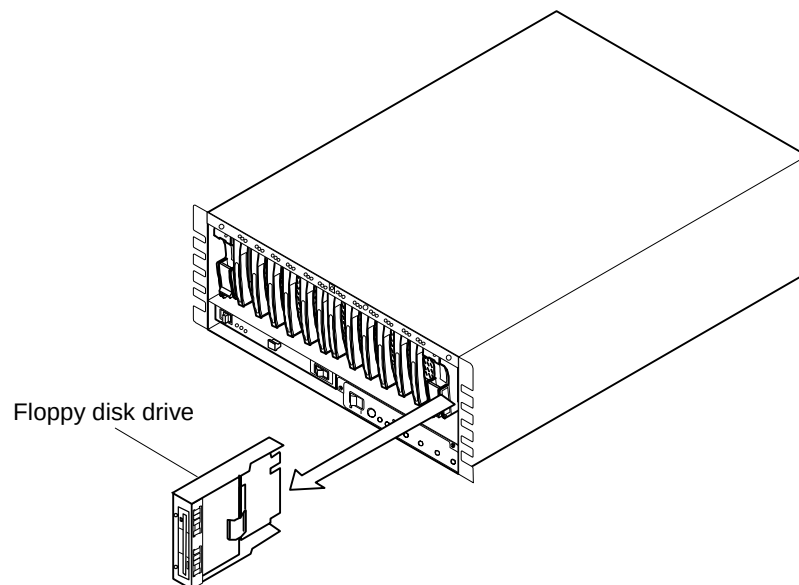


Figure 4.5.4 Replacing Floppy Disk Drive

- (2) Procedure for replacement with the power turned off
- (a) Remove the front bezel. (Refer to [MNTE 01-0100](#).)
 - (b) Turn off the main switch. (The POWER LED goes out.)
 - (c) Make sure that the BACK UP LED on the Controller is off. (This is to make sure that the disk array is not in the Cache Backup mode.)
 - (d) Take out the Floppy disk drive.
 - (e) Insert the Floppy disk drive.
 - (f) Turn on the main switch.
Make sure that the READY LED has come on.
 - (g) Attach the front bezel.

4.5.4 Replacing Battery unit

Select a procedure from the following and execute it.

When replacing the Battery unit, remove or install it with its battery switch turned off.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	If the power is turned off during the replacement, data is not backed up because the power is not supplied from the battery.	See 4.5.4 (1).
2	Replacement with the power turned off	Apply this in the case where you do not want the preventive replacement against a self-recovered failure from being reported when the failure monitoring service is activated.	See 4.5.4 (2).



- **The lead battery contains poisonous substances. Besides, if it is handled improperly, an electric shock or explosion may be caused. Please follow the safety instructions below.**
 - ① **Do not disassemble or remake the battery.**
 - ② **Do not deform the battery.**
 - ③ **Do not connect plus and minus poles with a metallic article such as a wire.**
 - ④ **Do not reverse the connections of plus and minus poles.**
 - ⑤ **Do not peel off the covering tube.**
 - ⑥ **Do not connect the battery directly to the outlet.**
 - ⑦ **Do not connect the battery to anything other than this subsystem for charging/discharging.**
 - ⑧ **Do not leave the battery in a hot place. Store it in a dark and cool place.**
 - ⑨ **Do not discard a used battery at the site where it was removed for replacement.**

- (1) Procedure for replacement with the power turned on
 - (a) Remove the front bezel. (Refer to [MNTE 01-0100](#).)
 - (b) Turn off the battery switch of the Battery unit to be replaced.
 - (c) Release the latch in the front and pull out the Battery unit toward you. (Since two latches are provided in the front and on the right-hand side of the Battery unit, the Battery unit is stopped once at the position of the latch on the right-hand side.)
 - (d) Release the latch on the right-hand side holding the Battery unit main body with your hand and pull it out toward you.
 - (e) Make sure that the battery switch on the Battery unit has been turned off.
 - (f) Wait for more than 20 seconds, and then insert the Battery unit into the specified location.

If the Battery unit is inserted without waiting for 20 seconds, it is possible that the Battery unit is not recovered from the failure normally.
 - (g) Turn on the battery switch of the Battery unit.

Make sure that the WARNING LED (orange) is off.
 - (h) Keep the power on for two hours or longer to charge the battery.
 - (i) Make sure that the READY LED (green) on the Battery unit is on.
 - (j) Attach the front bezel.

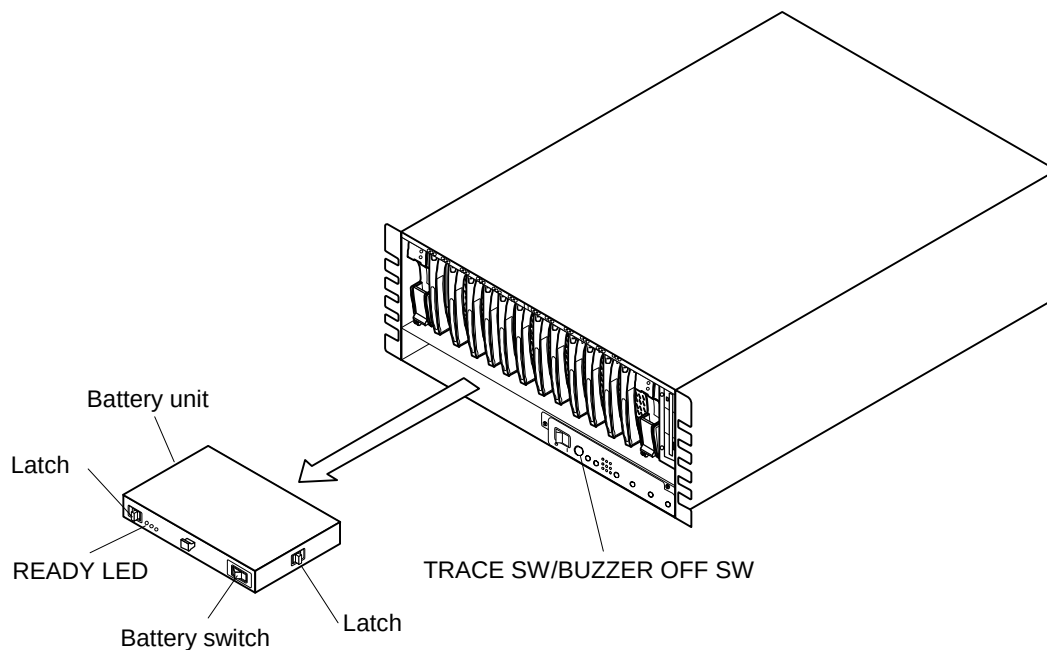


Figure 4.5.5 Replacing Battery Unit

(2) Procedure for replacement with the power turned off

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)
When the cache is in the cache backup mode, make the replacement after canceling the mode.

- (a) Remove the front bezel. (Refer to [MNTE 01-0100](#).)
- (b) Turn off the main switch. (The POWER LED goes out.)
- (c) Make sure that the BACK UP LED on the Controller is off. (This is to make sure that the subsystem is not in the cache backup mode.)
- (d) Turn off the battery switch of the Battery unit.
- (e) Release the latch in the front and pull out the Battery unit toward you. (Since two latches are provided in the front and on the right-hand side of the Battery unit, the Battery unit is stopped once at the position of the latch on the right-hand side.)
- (f) Release the latch on the right-hand side holding the Battery unit main body with your hand and pull it out toward you.
- (g) Make sure that the battery switch on the Battery unit has been turned off.
- (h) Insert the Battery unit into the specified location in the disk array.
- (i) Turn on the battery switch of the Battery unit.
- (j) Turn on the main switch.
- (k) Make sure that the READY LED is on. (Make sure that the READY LED on the panel is on and the ALARM and WARNING LEDs are off.)
- (l) Keep the power on for two hours or longer to charge the battery.
- (m) Attach the front bezel.

4.5.5 Replacing Controller

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	1. The procedure varies depending on whether the FAIL LED ^(*) is on or off.	When the FAIL LED is on See 4.5.5 (1-1).
		2. Make the replacement in units of Controller. 3. When replacing the both Controllers at the same time, do it with the power turned off. 4. In the case of the single Controller configuration, perform the replacement after turning off the power.	When the FAIL LED is off See 4.5.5 (1-2). (Preventive replacement)
2	Replacement with the power turned off	—	See 4.5.5 (2).

*1 : For the installation location of the FAIL LED, see Figure 4.5.6..

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

(1-1) When the FAIL LED is on

(a) Make sure that the FAIL LED (red) on the controller to be replaced is on. (Refer to Figure 4.5.6.)

Notice : • Do not replace the Controller which operates normally.
Before replacing the Controller, confirm that it is blocked (the FAIL LED (red) in on).

- When replacing the two Controller with the power turned on, the Controller must be replaced one after another. When the two Controllers are replaced at the same time, turned off the subsystem power before replacement.
- Since the system parameters are automatically loaded on the new Controller by copying them from that of another system, setting using a FD or by manual operation is not needed. However, if the two Controllers failed at the same time, a system parameter restoration using the FD is required.

- (b) Remove the interface cable (Fibre Channel or SCSI), LAN, and RS232C cables connected to the Controller.
- (c) Loosen the left and right fixing screws of the Controller.
Raise the both right and left levers at the same time in the direction shown by the arrows (.....>) and take out the Controller.

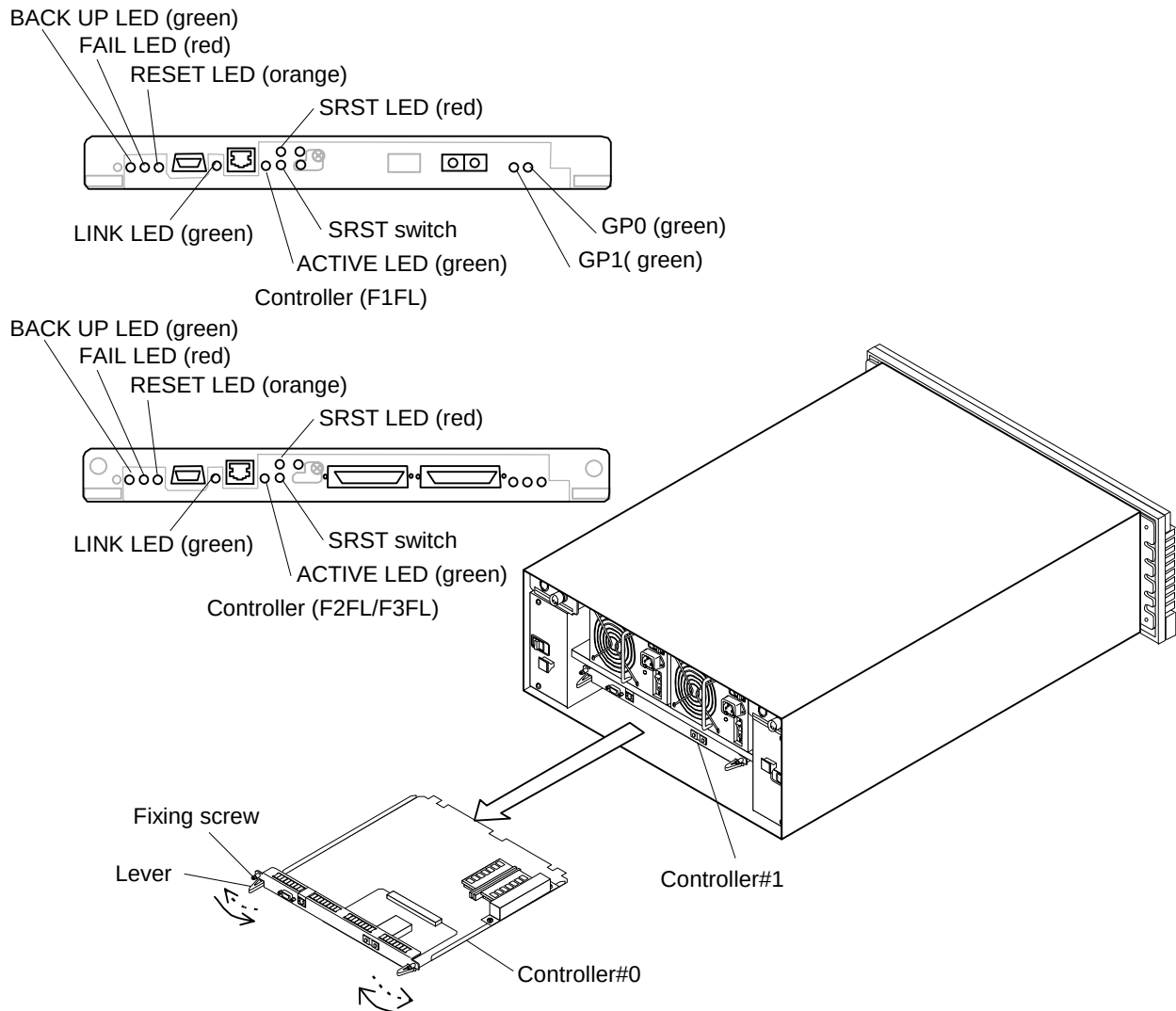


Figure 4.5.6 Replacing Controller

- (d) Wait for more than 20 seconds, and then insert the Controller into the specified position with its right and left levers being raised, then return the both levers to the direction shown by the arrows (—→) at the same time.

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

Notice : When returning the both levers in the directions shown by the arrows (—→) at the same time, 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 Controller because the Controller is considered to have failed.

- (e) Tighten the left and right fixing screws of the Controller.
(f) Make sure that the WARNING LED (orange) on the panel is off.
(g) Connect the removed interface cable (Fibre Channel or SCSI), LAN, and RS232C cables to the Controller.

(1-2) When the FAIL LED is off

- (a) Remove the interface cable (Fibre Channel or SCSI), LAN, and RS232C cables connected to the Controller to be blocked for prevention against a failure.

Notice : • When replacing the two Controller with the power turned on, the Controller must be replaced one after another. When the two Controllers are replaced at the same time, turned off the subsystem power before replacement.

- Since the system parameters are automatically loaded on the new Controller by copying them from that of another system, setting using a FD or by manual operation is not needed. However, if the two Controllers failed at the same time, a system parameter restoration using the FD is required.

- (b) To block the Controller by way of prevention against a failure, press the SRST switch and make sure that the FAIL LED (red) comes on (see Figure 4.5.6).

- (c) Loosen the left and right fixing screws of the Controller.

Raise the both right and left levers at the same time in the direction shown by the arrows (·····>) and take out the Controller.

- (d) Wait for more than 20 seconds, and then insert the Controller into the specified position with its right and left levers being raised, then return the both levers to the direction shown by the arrows (—>) at the same time.

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

Notice : When returning the both levers in the directions shown by the arrows (—>) at the same time, 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 Controller because the Controller is considered to have failed.

- (e) Tighten the left and right fixing screws of the Controller.
- (f) Make sure that the WARNING LED (orange) on the panel is off.
- (g) Connect the removed interface cable (Fibre Channel or SCSI), LAN, and RS232C cables to the Controller.

- (2) Procedure for replacement with the power turned off (See Figure 4.5.6.)
- (a) Confirm the installation location of the Controller whose FAIL LED is on.
 - (b) Remove the front bezel. (Refer to [MNTE 01-0100](#).)
 - (c) Make sure that the system parameter backup FD is inserted, then backup the system parameters.
 - (d) Turn off the main switch.
Make sure that the POWER LED (green) on the panel has gone out.
When an array unit cannot be turned off, connect to the WEB to isolate its faults.

Notice : When the power has already been turned off, make sure that the subsystem is not in the cache backup mode.
(Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)
When the subsystem is in the cache backup mode, cancel the mode before starting the replacement.

Make sure that the BACK UP LED (green) on the Controller is off.

Notice : When the BACK UP LED (green) is on, user data not written on the disk exists in the Cache memory.
If the Controller is removed from the subsystem in this state, it is feared that user data may be lost.

- (e) Remove the interface cable (Fibre Channel or SCSI), LAN, and RS232C cables connected to the Controller.
- (f) Loosen the right and left fixing screws of the Controller.
Raise the both right and left levers at the same time in the direction shown by the arrows (····>) and take out the Controller.
- (g) Insert the Controller in the specified position with its right and left levers being raised, then return the levers at the same time in the direction shown by the arrows (——>).
If the Controller 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.
- (h) Tighten the left and right fixing screws of the Controller.
- (i) Connect the removed interface cable (Fibre Channel), LAN, and RS232C cables to the Controller.
- (j) Turn on the main switch.
Make sure that the WARNING LED (orange) on the panel has gone out.

- (k) Prepare the FD for system parameter restoration to which the system parameters were backed up in step (c). If the FD for system parameter restoration is not available, prepare the list of set system parameters instead.
- (l) Check if the FD to which the system parameters were backed up is inserted in the Floppy disk drive.
- (m) Restore the system parameters. (Refer to [MNTE 01-0200](#).)
- (n) Turn off the main switch.
Turn off the breakers of the AC/DC power supply.
- (o) Turn on the breakers of the AC/DC power supply.
Turn on the main switch.
- (p) Make sure that the POWER LED (green) on the panel is off.
- (q) Attach the front bezel.

4.5.6 Replacing Cache memory

Replacement of the Cache memory must be done by the set of two memory boards (set of boards in slots #0 and #1.).

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	When the FAIL LED of the controller, in which the cache memory to be replaced is installed, is on in the case of the dual system configuration.	See 4.5.6 (1-1)
		When the FAIL LED of the controller, in which the cache memory to be replaced is installed, is off in the case of the dual system configuration.	See 4.5.6 (1-2) (Preventive replacement)
2	Replacement with the power turned off	—	See 4.5.6 (2)
*1: In the case of the single Controller configuration, the Cache memory cannot be replaced unless the subsystem power is turned off.			

(1) Procedure for replacement with the power turned on

(1-1) When the FAIL LED of the controller is on

- (a) Make sure that the FAIL LED (red) on the Controller on which the Cache memory to be replaced is on. If not, remove the Cache memory following the “When the FAIL LED goes out” in Item (1-2) on page [MNTE 04-1680](#).

- Notice :
- Do not replace the Controller which operates normally.
Before replacing the Controller, confirm that it is blocked (the FAIL LED (red) in on).
 - Since the system parameters are automatically loaded on the new Controller by copying them from that of another system, setting using a FD or by manual operation is not needed.

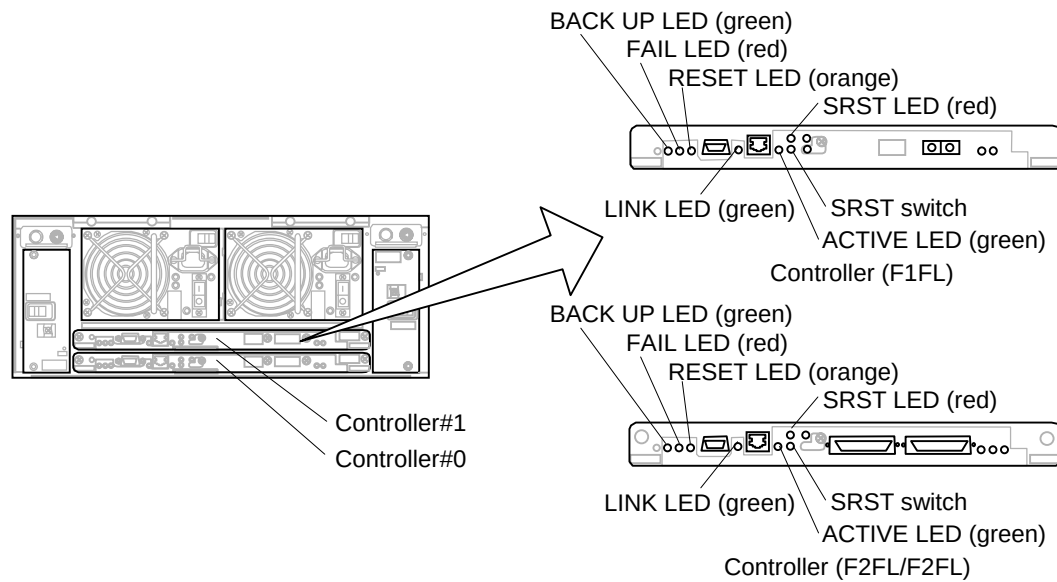


Figure 4.5.7 LEDs of Controller

- (b) Remove the interface cable (Fibre Channel or SCSI), LAN, and RS232C cables connected to the Controller on which the Cache memory to be replaced is mounted.
- (c) Loosen the left and right fixing screws of the Controller.
Raise the both right and left levers at the same time in the direction shown by the arrows (····>) and take out the Controller.
- (d) Remove the cache cover to attach on the Controller.
- (e) Remove the Cache memory.
- (f) Install the Cache memory in the Controller.
- (g) Attach the cache cover.
- (h) Wait for more than 20 seconds, and then insert the Controller in the specified position with its right and left levers being raised, then return in the levers at the same time in the direction shown by the arrows (—>).
If the Controller is inserted without waiting for 20 seconds, it is possible that the Controller is not recovered from the failure normally.
- (i) Tighten the left and right fixing screws of the Controller.
- (j) Make sure that the FAIL LED (red) on the Controller is off.
- (k) Make sure that the WARNING LED (orange) on the panel is off.
- (l) Connect the removed interface cable (Fibre Channel or SCSI), LAN, and RS232C cables to the Controller.

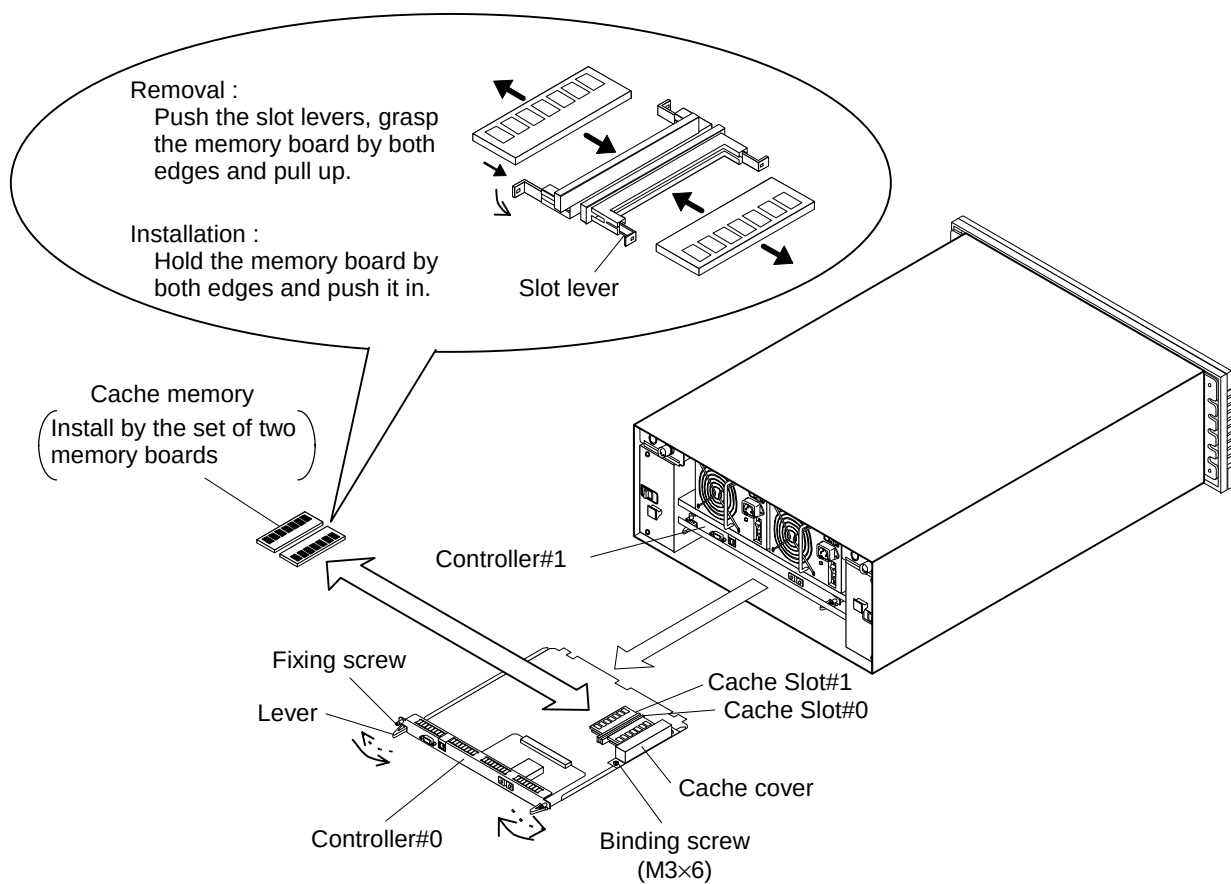


Figure 4.5.8 Replacing of Cache Memory

(1-2) When the FAIL LED goes out

- (a) Remove the interface cable (Fibre Channel or SCSI), LAN, and RS232C cables connected to the Controller on which the Cache memory to be replaced is mounted.

Notice : • Since the system parameters are automatically loaded on the new Controller by copying them from that of another system, setting using a FD or by manual operation is not needed.

- (b) Press the SRST switch on the Controller, in which the Cache memory to be replaced is installed, and make sure that the FAIL LED (red) comes on. If not, remove the Cache memory following the “Procedure for replacement with the power turned off” in Item (2) on page [MNTE 04-1690](#).
- (c) Loosen the left and right fixing screws of the Controller.
Raise the both right and left levers at the same time in the direction shown by the arrows (····>) and take out the Controller.
- (d) Remove the cache cover to attach on the Controller.
- (e) Remove the Cache memory.
- (f) Install the Cache memory in the Controller.
- (g) Attach the cache cover.
- (h) Wait for more than 20 seconds, and then insert the Controller in the specified position with its right and left levers being raised, then return in the levers at the same time in the direction shown by the arrows (—>).
If the Controller is inserted without waiting for 20 seconds, it is possible that the Controller is not recovered from the failure normally.
- (i) Tighten the left and right fixing screws of the Controller.
- (j) Make sure that the FAIL LED (red) on the Controller is off.
- (k) Make sure that the WARNING LED (orange) on the panel is off.
- (l) Connect the removed interface cable (Fibre Channel or SCSI), LAN, and RS232C cables to the Controller.

(2) Procedure for replacement with the power turned off

(a) Remove the front bezel. (Refer to [MNTE 01-0100](#).)

(b) Turn off the main switch.

Make sure that the POWER LED (green) on the panel has gone out.

When the power cannot be turn off, perform a troubleshooting after connecting to WEB.

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)

When the cache is in the cache backup mode, make the replacement after canceling the mode.

Make sure that the BACK UP LED (green) on the Controller is off.

Notice : When the BACK UP LED is on, user data not written on the disk may exist in the cache memory.

If the Controller is removed from the subsystem in this state, it is feared that user data may be lost.

(c) Remove the interface cable (Fibre Channel or SCSI), LAN, and RS232C cables connected to the Controller.

(d) Loosen the right and left fixing screws of the Controller.

Pull both right and left levers at the same time in the direction shown by the arrows (····>) and Raise the out the Controller.

(e) Remove the cache cover to attach on the Controller.

(f) Remove the Cache memory.

(g) Install the Cache memory in the Controller.

(h) Attach the cache cover.

(i) Insert the Controller in the specified position with its right and left levers being raised, then return the levers at the same time in the direction shown by the arrow (——>).

If the Controller 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.

(j) Tighten the left and right fixing screws of the Controller.

(k) Turn on the main switch.

Make sure that the WARNING LED (orange) on the panel is off.

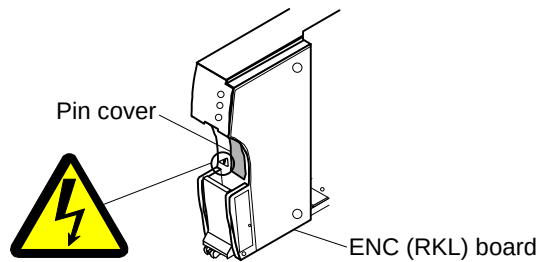
(l) Connect the removed interface cable (Fibre Channel or SCSI), LAN, and RS232C cables to the Controller.

(m) Attach the front bezel.

4.5.7 Replacing ENC (RKL) board



**Do not remove the pin cover of the ENC(RKL) board.
Otherwise, an electric shock may be caused.**



Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	When replacing the ENC, the subsystem must be in the status shown below. • Hot replacement of the microprogram is not being performed.	See 4.5.7 (1-1) When the FAIL LED (red) of the ENC board to be replaced is on
		• Hot replacement of the Controller is not being performed. • Any part other than the above is not being replaced.	See 4.5.7 (1-2) When the FAIL LED (red) of the ENC board to be replaced is off (Preventive replacement)
2	Replacement with the power turned off	—	See 4.5.7 (2)

Notice : When a failure of the battery system (whose message code is W03000, W03100, W03200, W03300, or W03400) has occurred, recover the subsystem from the battery system failure before replacing the ENC board.

(1) Procedure for replacement with the power turned on (See Figure 4.5.9.)

(1-1) When the FAIL LED of the ENC board to be replaced is on

(a) Remove the front bezel. (Refer to [MNTE 01-0090](#).)

(b) Make sure that the FAIL LED (red) is on.

Notice : Make sure that the pin cover of the ENC(RKL) board is not removed. If the board is removed while the subsystem power is on when the pin cover removed, an electric shock may be caused. Therefore, care should be taken.

(c) Raise the lever on the ENC board in the direction shown by the arrow ① (→).

(d) Pull the ENC board toward you to remove it.

(e) Insert a new ENC board into the specified location with its levers being raised after waiting for 20 seconds, and connect a new ENC cable as the old one was before.

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

(f) Return the levers in the direction shown by the arrows ② (<.....).

Notice : When returning the both levers in the directions shown by the arrows ② (<.....) at the same time, 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 board because the ENC board is considered to have failed.

(g) Make sure that the FAIL LED (red) on the ENC board is off.

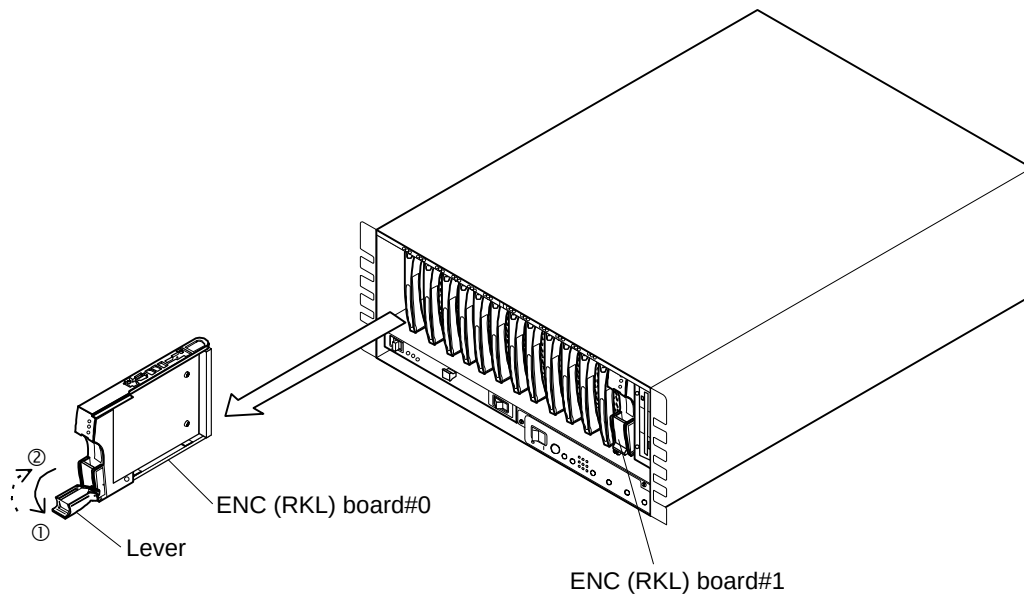


Figure 4.5.9 Replacing of ENC Board

- (1-2) When the FAIL LED of the ENC board to be replaced is off
- Raise the lever on the ENC board in the direction shown by the arrow ① (→).
 - Pull the ENC board toward you to remove it.
 - Insert a new ENC board into the specified location with its levers being raised after waiting for 20 seconds, and connect a new ENC cable as the old one was before.
If the ENC board is inserted without waiting for 20 seconds, it is possible that the ENC board is not recovered from the failure normally.
 - Return the levers in the direction shown by the arrows ② (<.....).

Notice : When returning the both levers in the directions shown by the arrows ② (<.....) at the same time, 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 board because the ENC board is considered to have failed.

- Make sure that the FAIL LED (red) on the ENC board is off.

(2) Procedure for replacement with the power turned off

(a) Turn off the main switch.

Make sure that the POWER LED (green) on the panel has gone out.

When the power cannot be turned off, perform a troubleshooting after connecting to WEB.

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)
When the cache is in the cache backup mode, make the replacement after canceling the mode.

Make sure that the BACK UP LED (green) on the Controller is off.

Notice : When the BACK UP LED is on, user data not written on the disk may exist in the Cache memory.
If the Controller is removed from the subsystem in this state, it is feared that user data may be lost.

(b) Turn off the breaker of the AC/DC power supply.

Make sure that the BACK UP LED (green) of the Controller has gone out.

Notice : It is possible that the recovery is not made normally if the replacement is done without turning off the breaker.

(c) Open the lever which is on the ENC board in the direction shown by the arrow ① (→).

(d) Pull the ENC board toward you to remove it.

(e) Insert a new ENC board into the specified location with its levers being raised and connect a new ENC cable as the old one was before.

(f) Return the levers in the direction shown by the arrows ② (<……).

(g) Turn on the breaker of the AC/DC power supply on the rear side of the subsystem.

(h) Turn on the main switch.

Make sure that the FAIL LED (red) has not gone out.

After doing this, make sure that the FAIL LED (red) on the ENC board is not on.

When the ENC board is replaced without turning off the breaker of the AC/DC power supply (Item (c)) by mistake, an unexpected error message may be displayed.

Examples of error message:

W03100 Buttery removed

W08000 Loop alarm (Path-0, Loop-0)

If the above occurs, execution of the following procedure will make the recovery.

(a) → (c) → (i) → (j)

4.5.8 Replacing AC/DC power supply

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	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.	See 4.5.8 (1)
2	Replacement with the power turned off	—	See 4.5.8 (2)

(1) Procedure for replacement with the power turned on (See Figure 4.5.10)

- (a) Make sure that the PS RDY LED (green) of the power supply to be replaced is off.
- (b) Check if the PS RDY LED (green) is on and the PS ALARM LED (red) is off on the AC/DC power supply.
- (c) Turn on the breaker of the AC/DC power supply to be replaced.

Notice : Even when the breaker of the AC/DC power supply to be replaced is turned off while the subsystem is powered on, the fan of the AC/DC power supply keeps its operation.

- (d) Disconnect the power cable as they connected to the AC/DC power supply to be replaced.
- (e) Slide the latch upward and take out the AC/DC power supply while it is unlatched.
- (f) Make sure that the breaker of the new AC/DC power supply is turned off.
- (g) Wait for more than 20 seconds, and then insert the AC/DC power supply the main body until it is latched with a click.
If the AC/DC power supply is inserted without waiting for 20 seconds, it is possible that the AC/DC power supply is not recovered from the failure normally.
- (h) Connect the removed cable as they were before.
- (i) Turn on the breaker of the AC/DC newly mounted power supply.
At this time, check if the PS RDY LED (green) is on and the PS ALARM LED (red) is off on the power supply not to be replaced at this time.
- (j) Make sure that the WARNING LED (orange) has gone out.

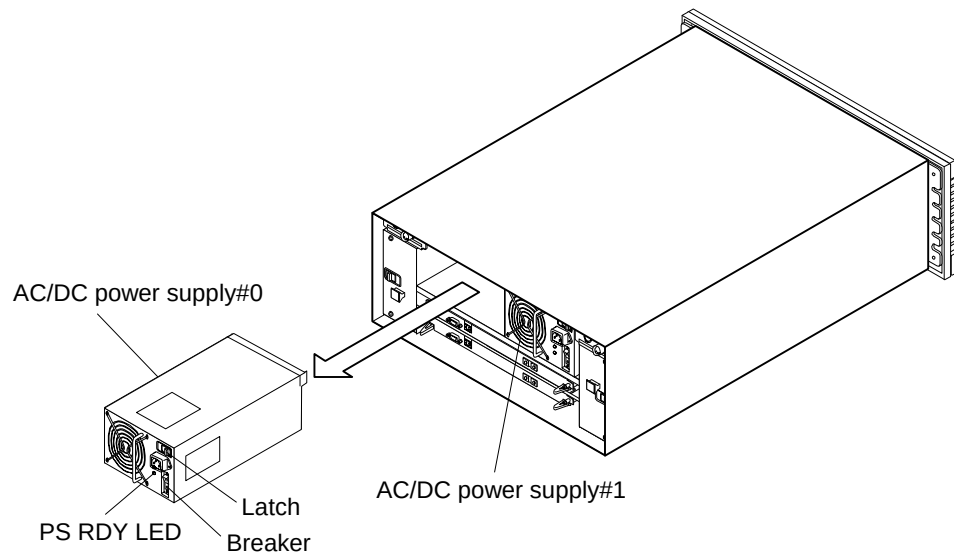


Figure 4.5.10 Replacing AC/DC Power Supply

(2) Procedure for replacement with the power turned off

(a) Turn off the main switch.

Make sure that the POWER LED (green) on the panel has gone out.

When the power cannot be turned off, perform a troubleshooting after connecting to WEB.

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)
When the cache is in the cache backup mode, make the replacement after canceling the mode.

Make sure that the BACK UP LED (green) has gone out.

Notice : When the BACK UP LED is on, user data not written on the disk may exist in the Cache memory.
If the Controller is removed from the subsystem in this state, it is feared that user data may be lost.

(b) Turn off the breakers of the both AC/DC power supply.

(c) Disconnect the power cable as they connected to the AC/DC power supply to be replaced.

(d) Slide the latch upward and take out the AC/DC power supply while it is latched.

(e) Make sure that the breaker of the new AC/DC power supply is turned off.

(f) Push in the new AC/DC power supply until it is latched with a click.

(g) Connect the removed cable as they were before.

(h) Turn on the breakers of the both AC/DC power supply.

Make sure that the PS RDY LEDs (green) of the both AC/DC power supply are on.

(i) Make sure that the WARNING LED (orange) has gone out.

4.5.9 Replacing Fan unit

Select a procedure from the following and execute it.

No.	Power supplying condition at the time of replacement	Restriction	Reference for replacement procedure
1	Replacement with the power turned on (hot replacement)	Complete the replacement within 10 minutes, and restart the fans of the Fan unit.	See 4.5.9 (1)
2	Replacement with the power turned off	—	See 4.5.9 (2)



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

(1) Procedure for replacement with the power turned on

The two same fan units are installed facing each other in the state in which each of them faces right or left. When installing them, make each of them face reverse direction correctly.

Notice : While the FAIL LED of a Fan unit is on, when a Controller has been blocked (the FAIL LED is on), be sure to correct the Controller blockade failure first.

- (a) Make sure that the FAIL LED (red) is on. left.
- (b) Unlock the fan units by shifting latches of left and right fan units downward and upward respectively.
- (c) Take out the Fan unit by holding its knob and pulling it toward you.
- (d) Wait for more than 20 seconds, and then press the Fan unit into the main body until it is latched with a click.
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.
- (e) Make sure that the status of the FAIL LED (red) changes from on to off.
- (f) Check if the fans of the mounted Fan unit are rotating.

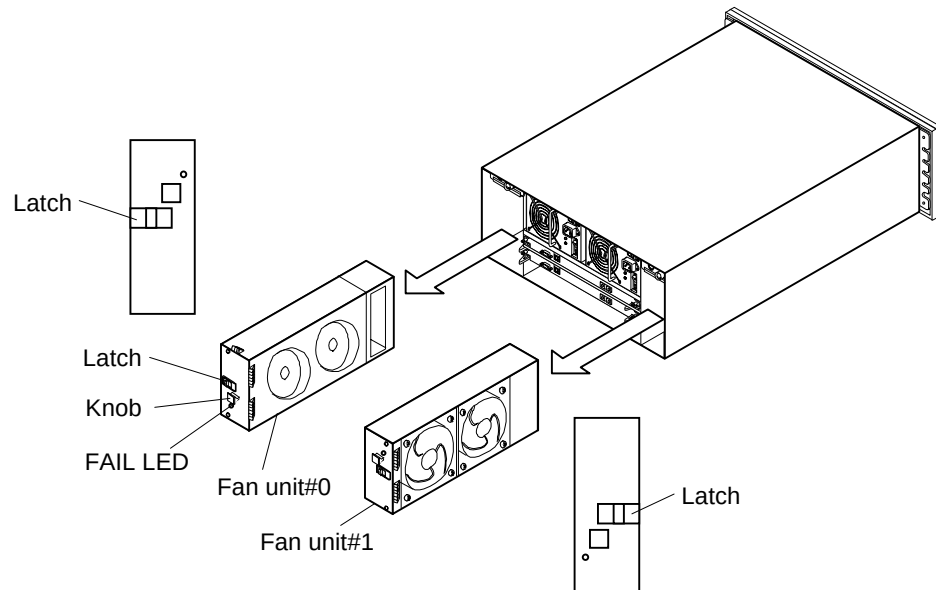


Figure 4.5.11 Replacing Fan Unit

(2) Procedure for replacement with the power turned off

Notice : While the FAIL LED of a Fan unit is on, when a Controller has been blocked (the FAIL LED is on), be sure to correct the Controller blockade failure first.

(a) Turn off the main switch.

Make sure that the POWER LED (green) on the panel has gone out.

When the power cannot be turn off, perform a troubleshooting after connecting to WEB.

Notice : When the power has already been turned off, make sure that the cache is not in the cache backup mode. (Refer to Item (5) in Section 1.1, “Before Starting Maintenance Work” on page [MNTE 01-0020](#).)

When the cache is in the cache backup mode, make the replacement after canceling the mode.

Make sure that the BACK UP LED (green) has gone out.

Notice : When the BACK UP LED is on, user data not written on the disk may exist in the Cache memory.
If the controller is removed from the subsystem in this state, it is feared that user data may be lost.

- (b) Release the lock by shifting the latch to the left.
- (c) Take out the Fan unit by holding its knob and pulling it toward you.
- (d) Push in the new AC/DC power supply until it is latched with a click.
- (e) Turn on the main switch.
Make sure that the status of the FAIL LED (red) changes from on to off.
- (f) Check if the fans of the mounted Fan unit are rotating.

Chapter 5. Update Microprogram

5.1 Update Install of Microprogram.....	05-0010
5.2 Procedure for Recovery from a Failure	05-0020
5.3 Procedure for Isolating Cause of Disk Drive Failure when “Install partially complete” Message Is Output	05-0040

5.1 Update Install of Microprogram

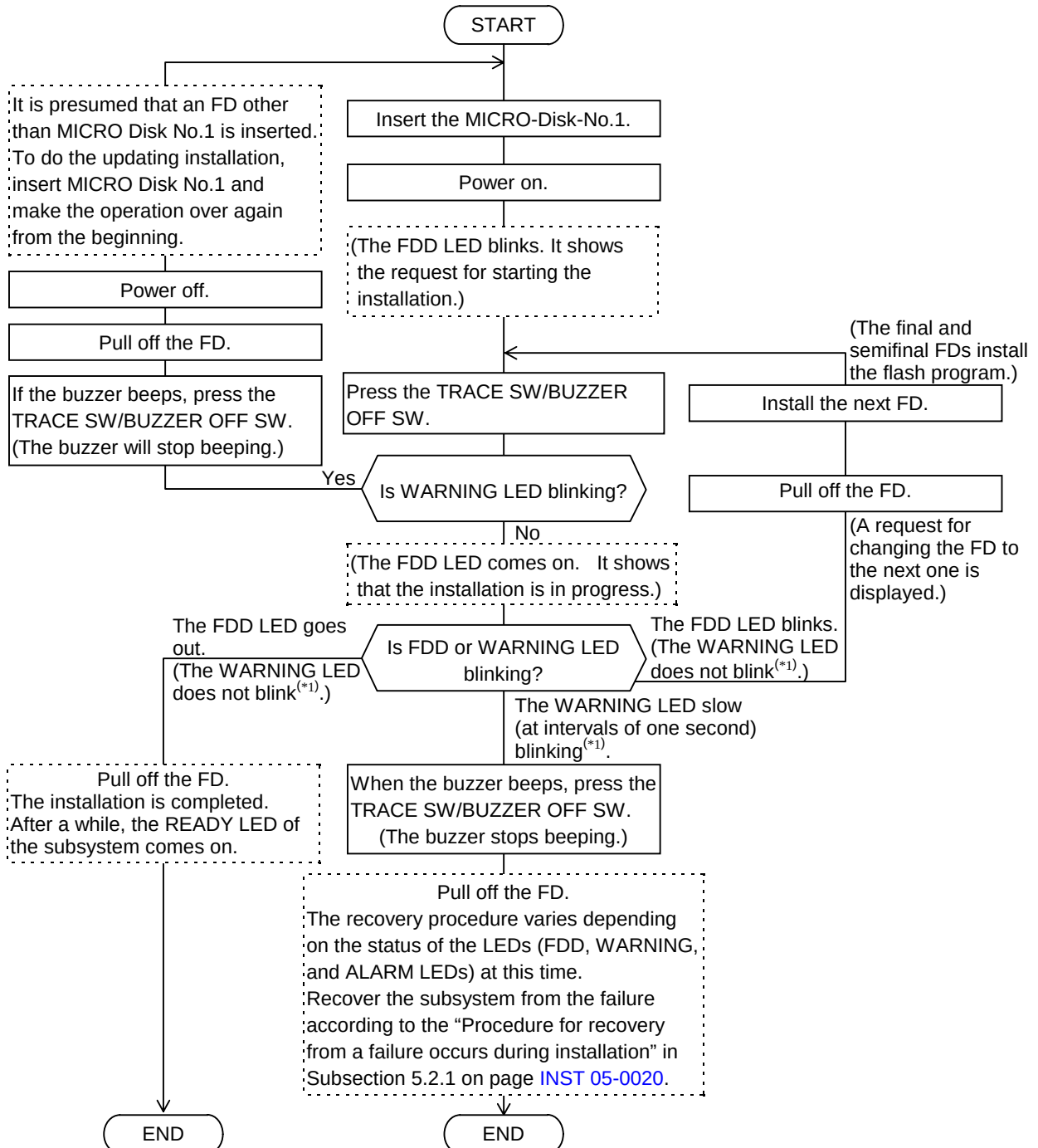
Microprogram is used to update the microprogram stored in the Disk drive. FDs are used for downloading.

5.1.1 Install to subsystem

(1) Operation as described below.

(a) Turn off the power supply.

(b) Operation as described below.



*1 : When the first(at intervals of 125 ms) blinking of WARNING LED, stop the blinking for a while waiting.

5.2 Procedure for Recovery from a Failure

5.2.1 Procedure for recovery from a failure occurs during installation

<Failure which causes an FD change request>

- LED status

FDD LED	WARNING LED	ALARM LED	Recovery procedure
Blinking	Blinking	Off	Replace the FD with a correct one and continue the installation following messages output to the Web.

- Details of WEB error logs

Message code	Message text	Recovery procedure	Remake
RB2000	FD unformatted	An unformatted FD is inserted.	
RB2100	FD not inserted	No FD is inserted.	
RB2300	Bad FD inserted	An incorrect FD is inserted.	

<Failure which causes system down>

- LED status

FDD LED	WARNING LED	ALARM LED	Recovery procedure
Off	Blinking	On	Insert a correct FD, turn on the power again, and perform the operation over again from the beginning. If a recovery from the failure is not successful nevertheless, connect the WEB and recover from the failure following the recovery procedure against each WEB message. For the details, refer to Section 2.3, "Troubleshooting by Means of WEB" on page MNTE 02-0190 in the Maintenance Manual for Maintenance.

- Details of WEB error logs

Message code	Message text	Recovery procedure	Remake
RB1500	No END.DAT found in FD	The END.DAT is not stored in the FD.	
RB3100	File open error	The opening of the file failed.	
RB3200	File read error	The reading of the file failed.	
RB3400	Bad FD file	An error was detected in the file.	
RB3500	Bad block FD	An illegality was detected in the block ID.	
RB3600	Bad LBA in FD	The LBA specified by the FDD is not stored in the system area.	
RB7000	Program size too large	The program size is too large.	
RB8300	Empty system retry full install	The updating installation cannot be done because there is no existing system.	
RBA000	Down grade check NG	A downgrade of the program was detected.	
RBA100	Unsupported microprogram error	The microprogram (Rev. 05x4 or earlier) cannot be installed because the floor model MK and RKL does not support it.	
RBA200	Unsupported FM0 program error	The FM0 microprogram (Rev. 05x4 or earlier) cannot be installed because the floor model MK and RKL does not support it.	

Message code	Message text	Recovery procedure	Remake
RBA300	Unsupported FM1 program error	The FM1 microprogram (Rev. 05x4 or earlier) cannot be installed because the floor model MK and RKL does not support it.	
RBA0xy	Bad sequence number (Unit-x, HDU-y)	Information of new and old programs in Disk drives do not agree with each other.	
RBC000	No drive available	No installable Disk drive exists.	
RBC10x	Drive block size error (Unit-0, HDU-y)	An illegal block size of the Disk drive was detected.	
RBC2xy	Unknown drive (Unit-X, HDU-Y)	The Disk drive capacity is smaller than half the system area.	

<Install partially complete (The installation of some of the Disk drives failed.)>

• LED status

FDD LED	WARNING LED	ALARM LED	Recovery procedure
Off	Off ^(*1)	Off	It may be a Disk drive failure. For the details, refer to Section 5.3, "Procedure for Isolating Cause of Disk Drive Failure when" Install partially complete " Message Is Output" on page MNTE 05-0040 .
*1 : When a beep of the buzzer is stopped by a pressing of the TRACE SW/BUZZER OFF SW, the process is continued automatically and the blinking of the WARNING LED is stopped. The subsystem is placed in the Ready status.			

• Details of WEB error logs

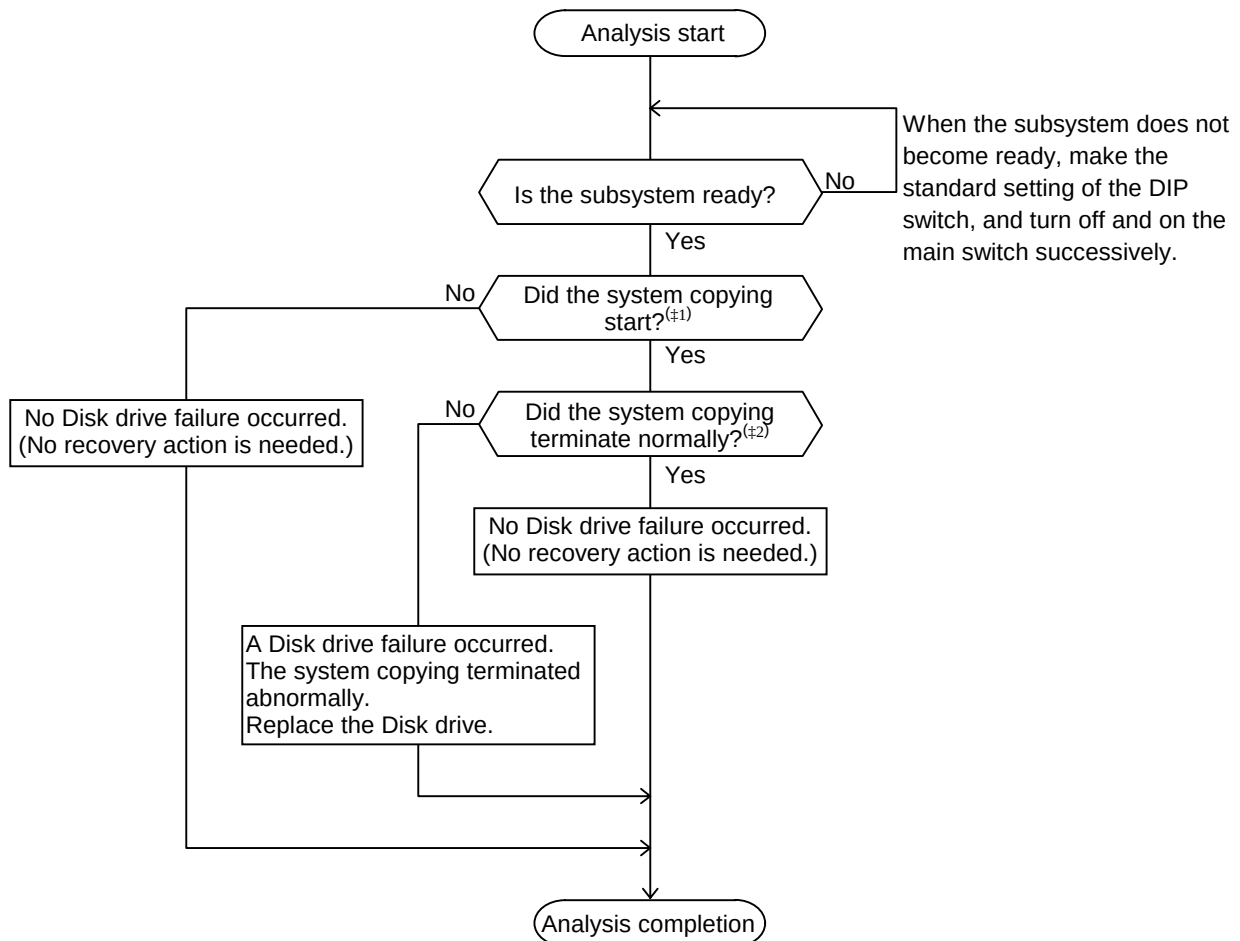
Message code	Message text	Recovery procedure	Remake
RB8200	Install partially complete	The installation of some of the Disk drives failed.	

5.3 Procedure for Isolating Cause of Disk Drive Failure when “Install partially complete” Message Is Output

The message “Install partially complete” is displayed on the WEB window when the subsystem detects either of the following statuses. The “Install partially complete” status can be known through the status of the LED.

- (1) If into the Disk drive#0 to #4 of RK and RKL, mounted does not have one more Disk drives.
- (2) One or more Disk drive(s) failed to install a program.
This may be a Disk drive failure. Analyze the phenomena following the procedure below and take necessary action.

Since the case (1) is not a failure, no repairing work is required. The state (2) may be a Disk drive failure. Analyze the state following the procedure below and take necessary measures.

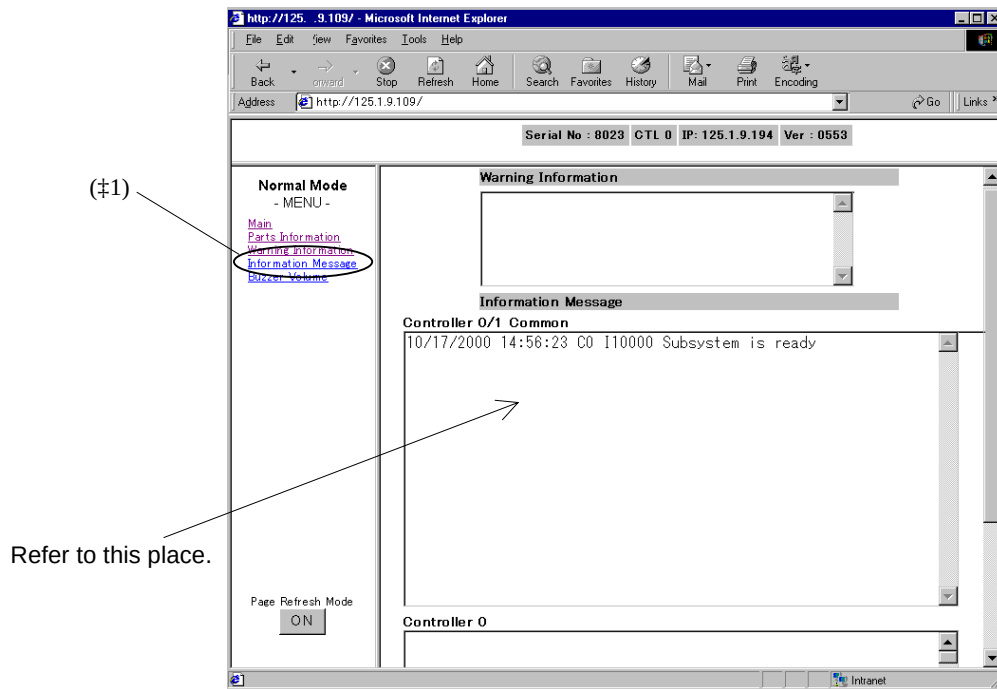


‡1 : Refer to “5.3.1 System copy operation occurred confirming procedure” (MNTE 05-0050).

‡2 : Refer to “5.3.2 System copy complete operation confirming procedure” (MNTE 05-0060).

5.3.1 System copy operation occurred confirming procedure

You can verify whether the system copy operation has occurred by viewing the “Information Message” window in the WEB window.



- When the occurred of system copy

MM/DD/YYYY HH:MM:SS Cx I140xy System copy started (Unit-x, HDU-y)			
MM/DD/YYYY	HH:MM:SS	Cx I140xy	System copy started (Unit-x, HDU-y)
Date	Time	Detect Controller#	x : Unit ID# y : Disk drive#

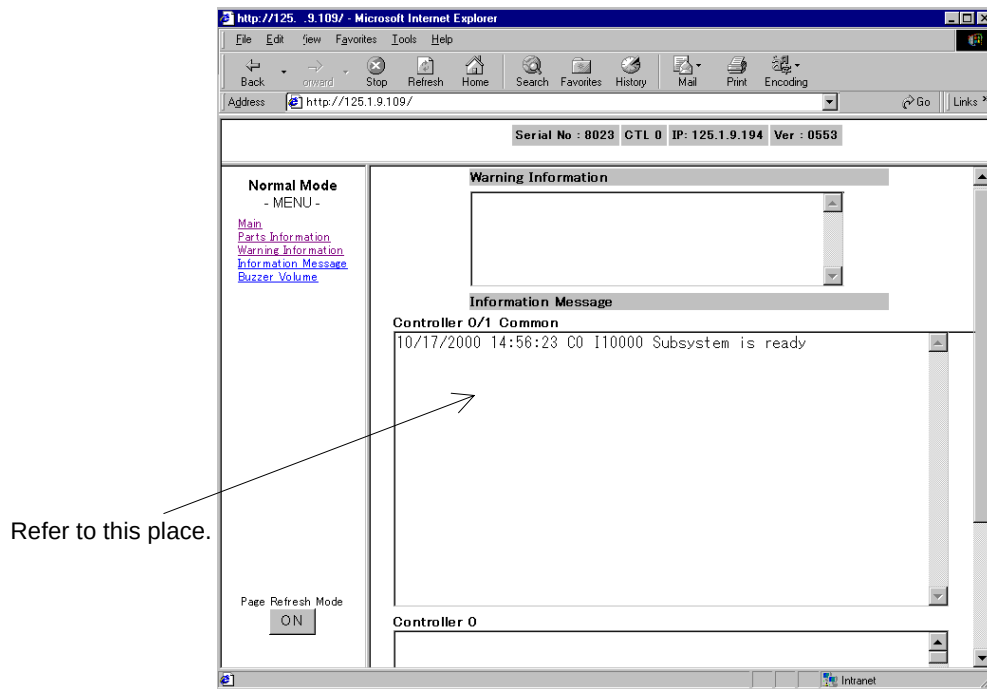
- When the not occurred of system copy

The message above is not displayed but a message “I10000 Subsystem is Ready” is displayed.

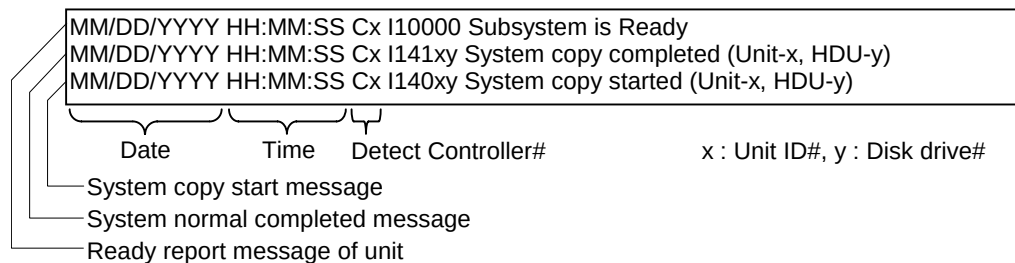
‡1 : The “Warning Information” in the menu frame is displayed by the microprogram revisions 05x3 and later. It is displayed in the same way in the succeeding windows.

5.3.2 System copy complete operation confirming procedure

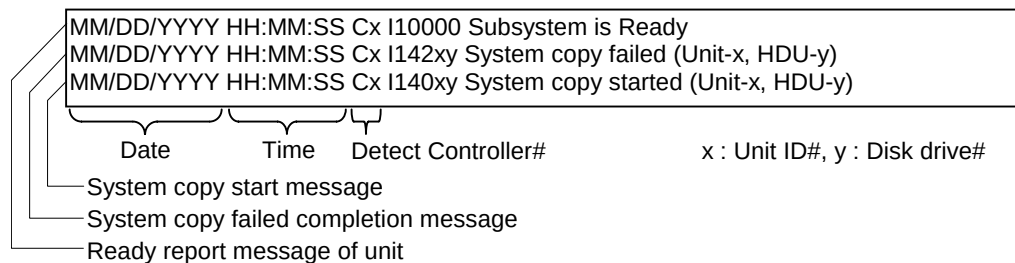
You can verify whether the system copy operation has occurred by viewing the “Information Message” window in the WEB window.



- When the normal completed of system copy



- When the not occurred of system copy



Chapter 6. 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.

- 6.1 Periodic Maintenance Items 06-0010
- 6.2 Inspecting and Cleaning Floor Model 06-0020
- 6.3 Inspecting and Cleaning Rackmount Model
 - with U6 Rack Frame 06-0050
- 6.4 Inspecting and Cleaning Rackmount Model
 - with U4 Rack Frame 06-0080
- 6.5 Replacing Periodical Replacement Parts.....06-0110

6.1 Periodic Maintenance Items

Table 6.1.1 shows periodical maintenance items of the subsystem. Inspect and clean the subsystem regularly according to the operation environment.

Table 6.1.1 Periodic Maintenance Items

No.	Item			Interval (*1)	Inspection item for each model					Standard time required (*2)
					Floor Model			Rackmount Model		
					H1F	H2F	MK	Rackmount Model (U6)	Rackmount Model (U4)	
1	Inspection	Inspecting FANs	AC/DC power supply	Y1	Section 6.2.1	Section 6.2.1	Section 6.2.1	Section 6.3.1	Section 6.4.1	5 min
			Fan unit	Y1	Section 6.2.1	Section 6.2.1	Section 6.2.1	Section 6.3.1	Section 6.4.1	5 min
2	Cleaning	Cleaning the subsystem	Front bezel	Y1	Section 6.2.2	Section 6.2.2	Section 6.2.2	Section 6.3.2	Section 6.4.2	5 min
			Rear cover	Y1	Section 6.2.2	Section 6.2.2	—	—	—	5 min
			Rear door	Y1	—	—	—	Section 6.3.2	Section 6.4.2	5 min
3	Replacement of periodical replacement part		Battery unit	Y2	Section 6.5.1	Section 6.5.1	Section 6.5.1	Section 6.5.1	Section 6.5.1	10 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 6.1.2.) *2 : Each time shown below is required for the one RK and RKL. It varies depending on the number of the RKAs and RKLs.										

Table 6.1.2 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.

6.2 Inspecting and Cleaning Floor Model

Perform the inspection and cleaning periodically. Parts of the floor models to be inspected and cleaned are shown in Figure 6.2.1 (for the H1F and H2F) and Figure 6.2.2 (for the MK).

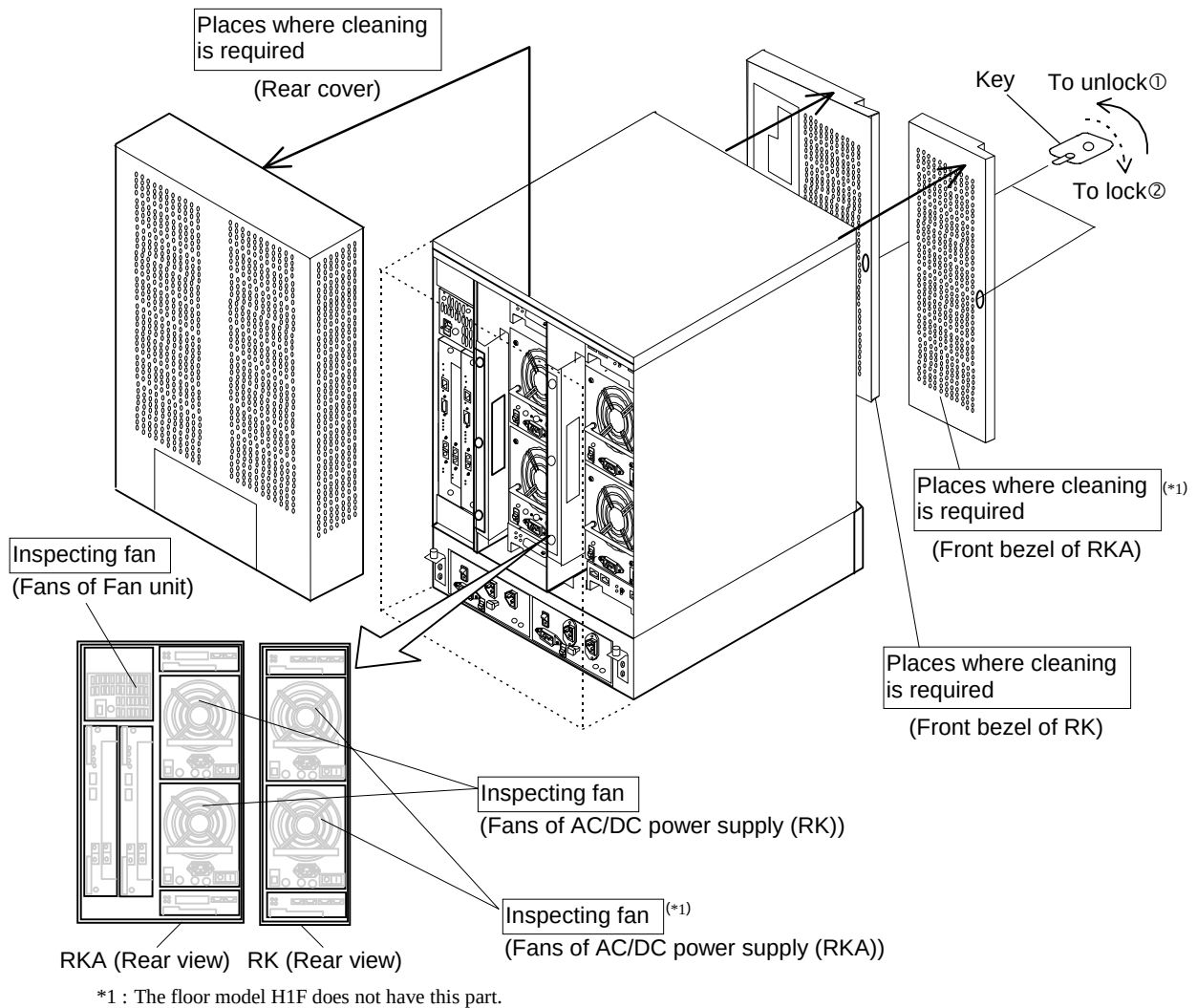


Figure 6.2.1 Inspecting and Cleaning of Floor Model (H1F/H2F)

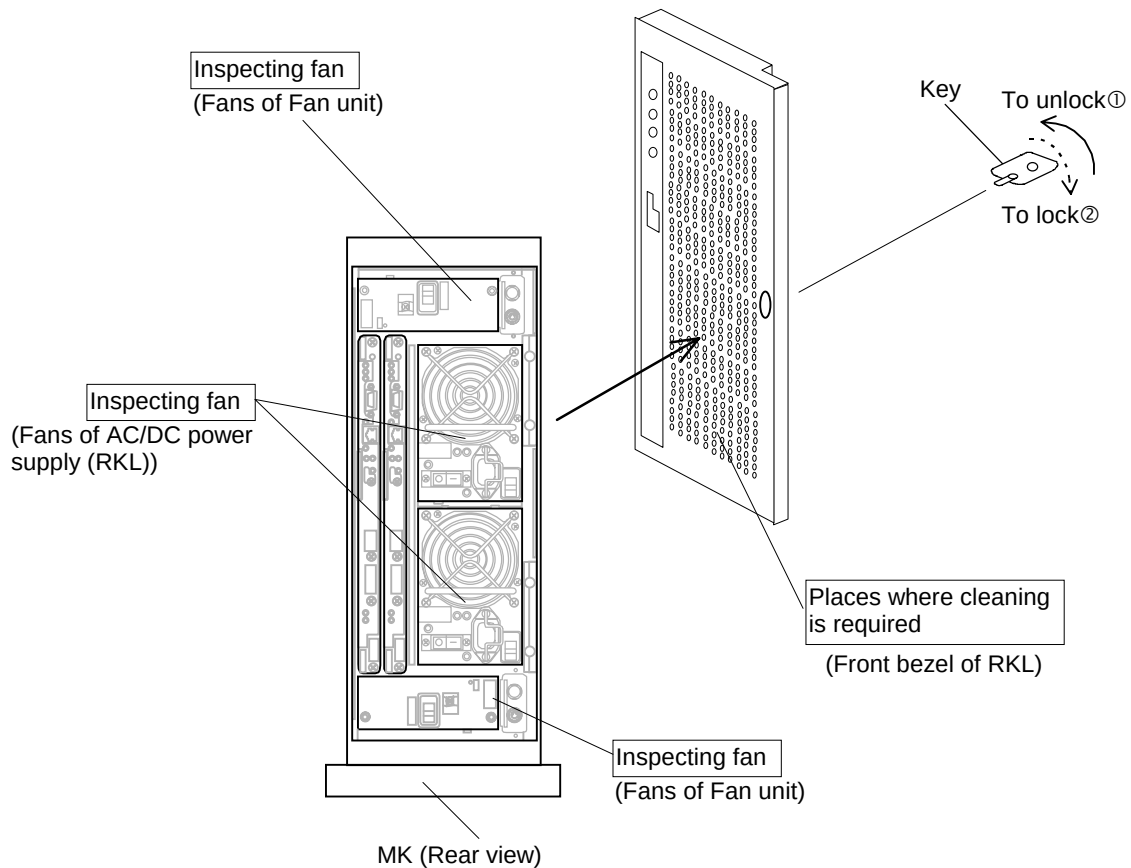


Figure 6.2.2 Inspecting and Cleaning of Floor Model (MK)

6.2.1 Inspecting fans

Inspect the fans while the subsystem powered on.



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

- (1) In the case of the floor model H1F and H2F, remove the rear cover.
- (2) Make sure that fans of the AD/DC power supply on the rear side of the subsystem are rotating.
- (3) Make sure that fans of the Fan unit on the rear side of the subsystem are rotating.
- (4) In the case of the floor model H1F and H2F, reinstall the rear cover after the inspection and cleaning are completed.

6.2.2 Cleaning the subsystem

When cleaning the subsystem, check if no clogging exists in the route of the cooling air and remove it when it is found.



- If you touch a live part, it is feared that you receive an electric shock.
- 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.

- (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.
- (3) Remove the front bezel. (See page [MNTE 01-0070](#))
- (4) Clean the internal surfaces of the front bezel.
- (5) Attach the front bezel.
- (6) Turn the key in the direction shown by the arrow ② (<·····) to latch the front bezel.
- (7) In the case of the floor model H1F and H2F, remove the rear cover.
- (8) Clean the outer and inner sides of the rear cover.
- (9) In the case of the floor model H1F and H2F, reinstall the rear cover after the inspection and cleaning are completed.

6.3 Inspecting and Cleaning Rackmount Model with U6 Rack Frame

6.3.1 Inspecting fans

Perform the inspection of the fans with the power turned on.



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

- (1) Open the rear door. To open it, insert an Allen wrench into the keyhole on the door, turn it in the direction shown by the arrow ① (→), and open the door leaving the wrench as it is. (See Figure 6.3.1.)
- (2) Make sure that the fan of the AC/DC power supply in the rear of the mounted unit are rotating.
- (3) Make sure that the fans of the Fan unit in the rear of the mounted unit are rotating.
- (4) Fit the Allen wrench in the key socket on the door turn it in the direction shown by the arrow ① (→), and close the door leaving the wrench as it is.

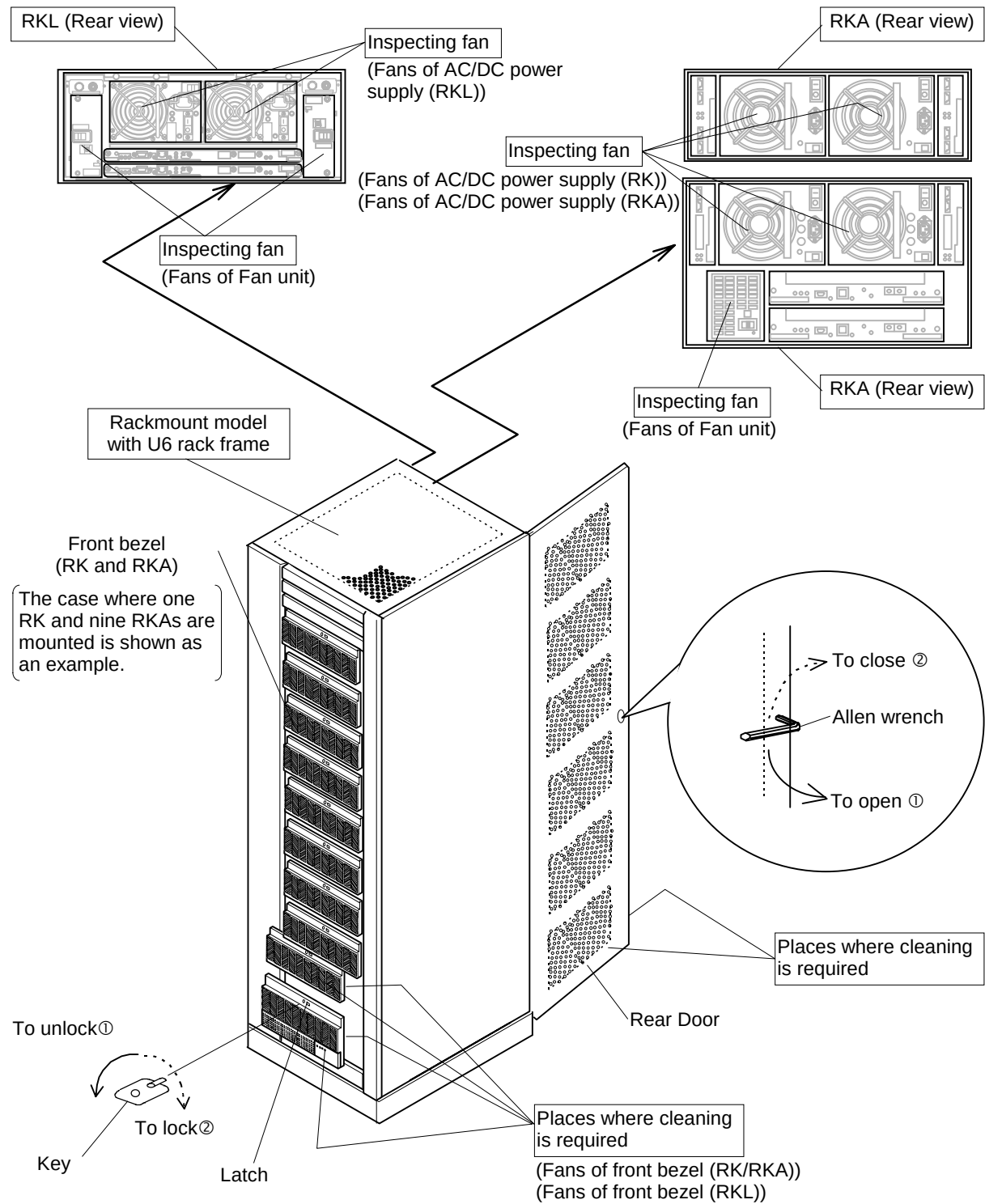


Figure 6.3.1 Inspecting and Cleaning Rackmount Mode with U6 Rack Frame

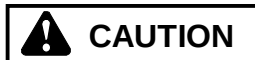
6.3.2 Cleaning the subsystem

When cleaning the subsystem, check if no clogging exists in the route of the cooling air and remove it when it is found.



- Be careful not to touch any of live parts.
- 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.

(1) Clean the outside of the front bezel.



Install or remove the front bezel carefully following the procedure. Otherwise, you may hurt your fingers by pinching them.

- (2) Slide the latch and remove the front bezel. (See page [MNTE 01-0070](#))
- (3) Clean the internal surfaces of the front bezel.
- (4) Attach the front bezel.
- (5) Clean the external surfaces of the rear door.
- (6) Open the rear doors. (See page [MNTE 01-0120](#))
- (7) Clean the internal surfaces of the rear door.
- (8) Close the rear door. To close it, insert the Allen socket wrench into the keyhole on the door, turn it in the direction shown by the arrow ① (←), and close the door leaving the wrench as it is.

6.4 Cleaning Rackmount Model with U4 Rack Frame

Perform inspection and cleaning periodically. Parts to be inspected and cleaned are shown in Figure 6.4.1.

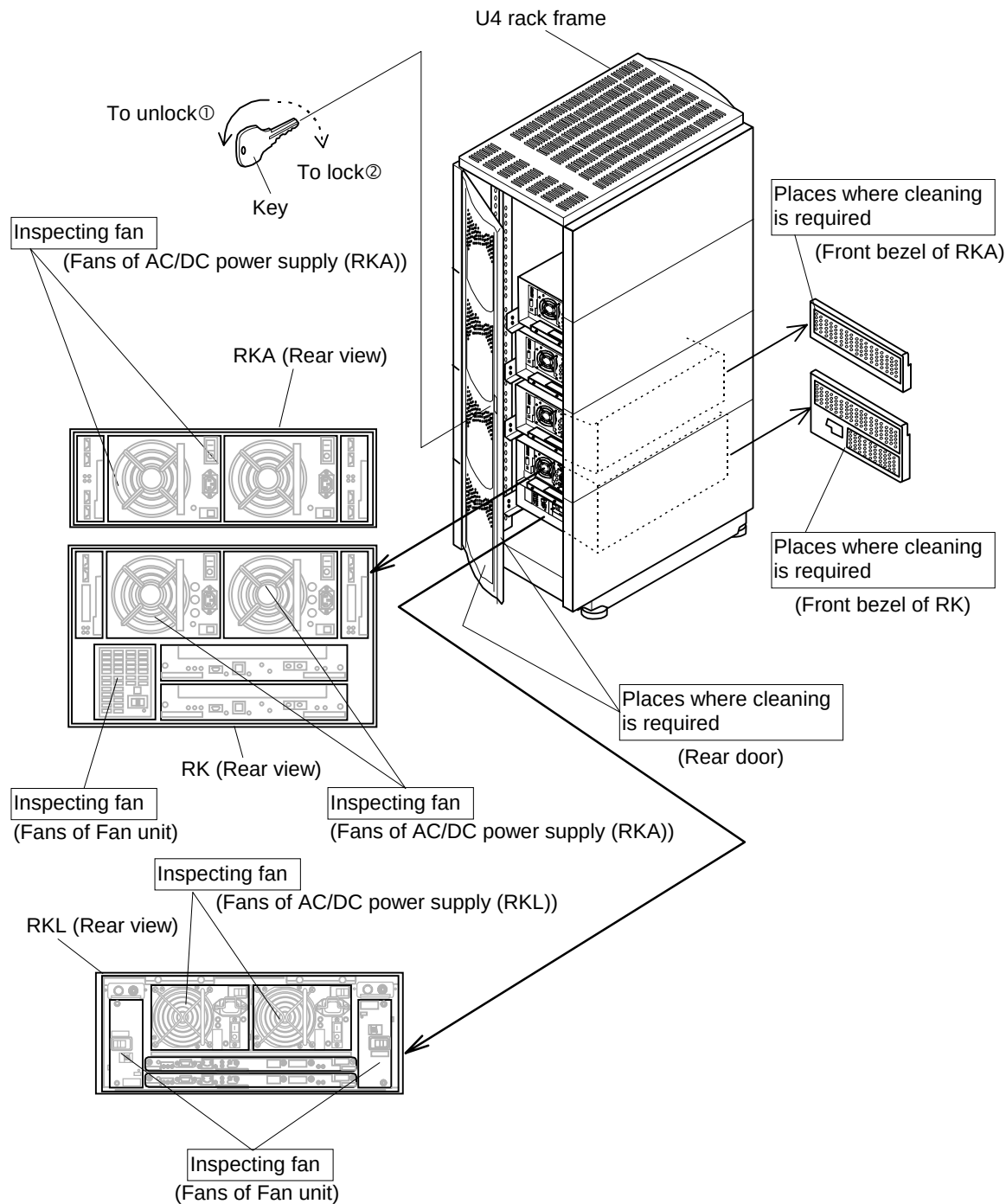


Figure 6.4.1 Inspecting and Cleaning Rackmount Mode with U4 Rack Frame

6.4.1 Inspecting fans

Perform the inspection of the fans with the power turned on.



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

- (1) Open the rear door. To open it, insert an Allen wrench into the keyhole on the door, turn it in the direction shown by the arrow ① (→), and open the door leaving the wrench as it is. (See Figure 6.4.1.)
- (2) Make sure that the fan of the AC/DC power supply in the rear of the mounted unit are rotating.
- (3) Make sure that the fans of the Fan unit in the rear of the mounted unit are rotating.
- (4) Fit the Allen wrench in the key socket on the door turn it in the direction shown by the arrow ① (→), and close the door leaving the wrench as it is.

6.4.2 Cleaning the subsystem

When cleaning the subsystem, check if no clogging exists in the route of the cooling air and remove it when it is found.



- Be careful not to touch any of live parts.
- 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.

- (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.



Install or remove the front bezel carefully following the procedure. Otherwise, you may hurt your fingers by pinching them.

- (3) Slide the latch and remove the front bezel. (See page [MNTE 01-0070](#))
- (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 doors. (See page [MNTE 01-0130](#))
- (9) Clean the internal surfaces of the rear door.
- (10) Close the rear door. To close it, insert the key into the keyhole on the door, turn it in the direction shown by the arrow ① (←), and close the door leaving the wrench as it is.

6.5 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 battery unit containing the battery.

The battery has a usable period. Confirm the time limit and do not use the battery which passed the time limit.

6.5.1 Replacing Battery unit



- **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.**

For the procedure to replace the battery unit, refer to one of the following related items in sections explaining replacement of parts.

Floor model H1F/H2F : Subsection 4.2.4, “Replacing Battery unit” on page
[MNTE 04-0200](#)

Rackmount model RK : Subsection 4.3.4, “Replacing Battery unit” on page
[MNTE 04-0690](#)

Floor model MK : Subsection 4.4.4, “Replacing Battery unit” on page
[MNTE 04-1140](#)

Rackmount model RKL: Subsection 4.5.4, “Replacing Battery unit” on page
[MNTE 04-1550](#)

Appendix

Appendix A Sense Data 70-0010

Appendix B Glossary 70-0170

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Appendix A Sense Data

In the case of the Fibre Channel, sense data is transferred to the host computer as data of the Request Sense command or being stored in the payload of the FCP_RSP when an error occurs.

Appendix A.1 Details of sense codes

Details of the sense codes are shown in Table A.1.

Table A.1 Sense Codes

Sense key	Sense code	Error name	Description
0/5	00 00	NO ADDITIONAL SENSE INFORMATION	• There is no valid additional sense information.
-	00 06	I/O PROCESS TERMINATED	(Does not occur.)
4	01 00	NO INDEX/SECTOR SIGNAL	• The INDEX signal cannot be detected. • The SECTOR signal cannot be detected.
1/4	02 00	NO SEEK COMPLETE	• Seek operation in the Disk drive cannot be executed correctly.
4	03 00	PERIPHERAL DEVICE WRITE FAULT	• A Write Fault was detected in the Disk drive.
2	04 00	LOGICAL UNIT NOT READY, CAUSE NOT REPORTABLE	• The LU connected cannot execute a command because LUs are being formatted.
2	04 01	LOGICAL UNIT IS IN PROCESS OF BECOMING READY	• The Disk drive will soon become ready although it is currently not ready.
2	04 02	LOGICAL UNIT NOT READY, INITIALIZING COMMAND REQUIRED	• The Disk drive is currently not ready; it has not been spun-up.
2	04 03	LOGICAL UNIT NOT READY, INITIALIZING COMMAND REQUIRED	(Does not occur.)
2	04 04	LOGICAL UNIT NOT READY, FORMAT IN PROGRESS	• The logical unit is currently not ready. (It is executing the formatting command.)
2	04 80	LOGICAL UNIT NOT READY, PARITY RECOVER IN PROCESS	(Does not occur.)
2	04 81	LOGICAL UNIT NOT READY, PARITY RECOVER IN PROCESS	(Does not occur.) • The logical unit is currently not ready. Data is being reconstructed.
2	04 82	LOGICAL UNIT NOT READY, DATA RECONSTRUCTION IN PROCESS	(Does not occur.)
2	04 83	LOGICAL UNIT NOT READY	(Does not occur.) • The logical unit concerned is blocked. (There is an uninstalled drive.)
2	04 84	POWER OFF IN PROCESS	• A sequential shutdown is in progress.
2	05 00	LOGICAL UNIT DOES NOT RESPOND TO SELECTION	• An error occurred in the drive interface in the logical unit.
1/4	06 00	NO REFERENCE POSITION FOUND	• The positioning to Track 0 failed.
4	07 00	MULTIPLE PERIPHERAL DEVICES SELECTED	• Two or more Disk drives were selected at the same time.

Sense key	Sense code	Error name	Description
4	08 00	LOGICAL UNIT COMMUNICATION FAILURE	• An error occurred in the drive interface in the logical unit.
4	08 01	LOGICAL UNIT COMMUNICATION TIME-OUT	• A time-out error occurred in the drive interface in the logical unit.
1/4	08 02	LOGICAL UNIT COMMUNICATION PARITY ERROR	• A parity error occurred in the drive interface in the logical unit.
1/4	09 00	TRACK FOLLOWING ERROR	• A track positioning failed.
-	0A 00	ERROR LOG OVERFLOW	(Does not occur.)
-	0B 00	(RESERVED)	(Does not occur.)
1	0C 01	WRITE ERROR RECOVERED WITH AUTO REALLOCATION	(Does not occur.) • The write error was recovered by the automatic reallocation.
3	0C 02	WRITE ERROR-AUTO REALLOCATION FAILED	• An automatic allocation was executed against the write error but failed.
-	0D to 0F	(RESERVED)	(Does not occur.)
3	10 00	ID CRC OR ECC ERROR	• A CRC error occurred in the ID field.
3	11 00	UNRECOVERED READ ERROR	• An error occurred in the data field.
3	11 01	READ RETRIES EXHAUSTED	• Reading of the data field was retried but the error was not recovered. (An error correction was not applied.)
3	11 02	ERROR TOO LONG TO CORRECT	• The read error in the data field could not be corrected by means of the ECC.
3	11 03	MULTIPLE READ ERROR	(Does not occur.)
3	11 04	UNRECOVERED READ ERROR : AUTO REALLOCATION FAILED	• An automatic reallocation was executed against the recoverable error but failed
3	11 0A	MISCORRECTED ERROR	(Does not occur.)
3	11 0B	UNRECOVERED READ ERROR: RECOMMEND REASSIGNMENT	(Does not occur.)
3	11 0C	UNRECOVERED READ ERROR: RECOMMEND REWRITE THE DATA	(Does not occur.)
3	12 00	ADDRESS MARK NOT FOUND FOR ID FIELD	• The address mark of the ID field could not be detected.
1/3	13 00	ADDRESS MARK NOT FOUND FOR DATA FIELD	• The address mark of the data field could not be detected.
1/3	14 00	RECORDED ENTITY NOT FOUND	(Does not occur.)
1/3	14 01	RECORD NOT FOUND	• The block with the identical ID field could not be detected.
3	15 00	RANDOM POSITIONING ERROR	(Does not occur.)
1/3	15 01	MECHANICAL POSITIONING ERROR	• A seek error occurred.

Sense key	Sense code	Error name	Description
1/3	15 02	POSITIONING ERROR DETECTED BY READ OF MEDIUM	• The seek operation terminated normally but the head was positioned at an address not intended.
1/3	16 00	DATA SYNCHRONIZATION MARK ERROR	(Does not occur.)
1	17 00	RECOVERED DATA WITH NO ERROR CORRECTION APPLIED	• The error was recovered by a retry.
1	17 01	RECOVERED DATA WITH RETRIES	• The error was recovered by a retry (without a head offset).
1	17 02	RECOVERED DATA WITH POSITIVE HEAD OFFSET	• The error was recovered by a retry with a head offset in the positive direction.
1	17 03	RECOVERED DATA WITH NEGATIVE HEAD OFFSET	• The error was recovered by a retry with a head offset in the negative direction.
1	17 05	RECOVERED DATA USING PREVIOUS SECTOR	(Does not occur.)
1	17 06	RECOVERED DATA WITHOUT EC: DATA AUTO REALLACATD	(Does not occur.)
1	17 07	RECOVERED DATA WITH ECC: RECOMMED REASSIGNMENT	(Does not occur.)
1	18 00	RECOVERED DATA WITH ERROR CORRECTION APPLIED	• The error was recovered by the ECC (without a retry).
1	18 01	RECOVERED DATA WITH ERROR CORRECTION AND RETRIES APPLIED	• The error was recovered by the ECC applied in a retry.
1	18 02	RECOVERED DATA-DATA AUTO-REALLOCATED	• Data was recovered by an automatic reallocation.
1	18 05	RECOVERED DATA: RECOMMED REASSIGNMENT	(Does not occur.)
1/3	19 00	DEFECT LIST ERROR	(Does not occur.)
1/3	19 01	DEFECT LIST NOT AVAILABLE	(Does not occur.)
1/3	19 02	DEFECT LIST ERROR IN PRIMARY LIST	• An error occurred during an access to the Primary (P) list.
1/3	19 03	DEFECT LIST ERROR IN GROWN LIST	• An error occurred during an access to the Grown (G) list.
5	1A 00	PARAMETER LIST LENGTH ERROR	• The parameter list length is illegal.
4	1B 00	SYNCHRONOUS DATA TRANSFER ERROR	• A synchronous data transfer error occurred in a data transfer.
3	1C 00	DEFECT LIST NOT FOUND	(Does not occur.)
3	1C 01	PRIMARY DEFECT LIST NOT FOUND	• The positioning to the Primary (P) list failed.
3	1C 02	GROWN DEFECT LIST NOT FOUND	• The positioning to the Primary (P) list failed.
3	1D 00	MISCOMPARE DURING VERIFY OPERATION	• A data compare error occurred during write or read buffer verify processing.

Sense key	Sense code	Error name	Description
1	1E 00	RECOVERED ID WITH ECC CORRECTION	(Does not occur.)
-	1F	(RESERVED)	(Does not occur.)
5	20 00	INVALID COMMAND OPERATION CODE	• The operation code is invalid..
5	21 00	LOGICAL BLOCK ADDRESS OUT OF RANGE	• An attempt was made to access beyond the logical block address reported with Read Capacity (PMI bit=0).
5	22 00	ILLEGAL FUNCTION	(Does not occur.)
-	23 00	(RESERVED)	(Does not occur.)
5	24 00	INVALID FIELD IN CDB	• There is an invalid field in the CDB. Ex.: RESERVED Bit/VALUE , ZERO
5	25 00	LOGICAL UNIT NOT SUPPORTED	• The LUN shown by the CDB or Identify message is not supported.
5	25 80	LOGICAL UNIT ALLOCATE ERROR	• The logical unit allocation failed.
5	25 81	RAID GROUP NOT DEFINE	• The RAID group (RG) is not defined.
5	25 83	COULD NOT ENABLE P-CACHE	• P The Turbo LU specification was rejected by the specification condition check.
5	25 84	ROW LAST LBA IN RAID GROUP DEFINED RAID0+1 FULL MAPPING IS CHANGED	• The current value of the Row Last LBA in the RAID group is different from that when RAID 0+1 full mapping was defined.
5	25 90	LU ACCESSED THROUGH NON OWNER CONTROLLER	• The controller with no LU owner right received a command to switch the LU (in the case of the Trespass mode).
5	25 A0	MODE SELECT COMMAND DIVISIONAL TRANSFER ERROR	• The divisional transfer failed.
5	26 00	INVALID FIELD IN PARAMETER LIST	• There is an invalid field in the parameter list.
5	26 01	PARAMETER NOT SUPPORTED	• An unsupported parameter was received.
5	26 02	PARAMETER VALUE INVALID	• The parameter value is invalid.
5	26 03	THRESHOLD PARAMETERS NOT SUPPORTED	(Does not occur.)
5	27 00	WRITE PROTECTED	(Does not occur.)
5	28 00	NOT READY TO READY TRANSITION	(Does not occur.)
6	29 00	POWER ON RESET, RESET, BUS DEVICE RESET OR HARD ERROR RESET OCCURRED	• A Power On Reset occurred. • A Bus Device Reset occurred. • A SCSI Bus Reset occurred. • An internal reset occurred owing to a serious hardware error.

Sense key	Sense code	Error name	Description
6	2A 00	PARAMETERS CHANGED	- The Mode Select parameter was changed. - Another system received the SCSI Reset in the dual configuration. Ex.: A parameter was changed by the Mode Select command.
6	2A 01	MODE PARAMETERS CHANGED	(Does not occur.)
6	2A 02	LOG PARAMETERS CHANGED	(Does not occur.)
5	2B 00	COPY CANNOT EXECUTE SINCE HOST CANNOT DISCONNECT	(Does not occur.)
5	2C 00	COMMAND SEQUENCE ERROR	(Does not occur.)
-	2D to 2E	(RESERVED)	(Does not occur.)
6	2F 00	COMMANDS CLEARED BY ANOTHER INITIATOR	The command was cleared according to the Clear Queue message from another initiator or owing to an occurrence of the CA status in the initiator.
3	30 00	INCOMPATIBLE MEDIUM INSTALLED	(Does not occur.)
3	30 01	CANNOT READ MEDIUM: UNKNOWN FORMAT	(Does not occur.)
3	30 02	CANNOT READ MEDIUM: INCOMPATIBLE FORMAT	(Does not occur.)
3	30 03	CLEANING CARTRIDGE INSTALLED	(Does not occur.)
3	31 00	MEDIUM FORMAT CORRUPTED	The medium is not formatted correctly; it must be reformatted by the Format Unit command
3	31 01	FORMAT COMMAND FAILED	The Format command terminated abnormally; it must be reformatted by the Format Unit command.
3	31 80	DATA FORMAT CORRUPTED	The data format for the disk array is not established.
3	31 81	FORMAT COMMAND NOT EXECUTE	- The format command cannot be executed because the Disk drive configuration is incomplete (i.e., the data or parity drive is detached). - An attempt was made to execute the format command beyond the actual disk capacity.
1/4	32 00	NO DEFECT SPARE LOCATION AVAILABLE	The reallocation cannot be done because the alternative area is insufficient.
1/3	32 01	DEFECT LIST UPDATE FAILURE	The update of the Grown (G) list failed.
-	33 to 46	(RESERVED)	(Does not occur.)
1	37 00	ROUNDED PARAMETER	(Does not occur.) The processing was executed with the parameter value rounded because it could not be executed with the original value.

Sense key	Sense code	Error name	Description
-	38 00	(RESERVED)	(Does not occur.)
5	39 00	SAVING PARAMETERS NOT SUPPORTED	(Does not occur.)
-	3A 00	MEDIUM NOT PRESENT	(Does not occur.)
-	3B to 3C	(RESERVED)	(Does not occur.)
B	3D 00	INVALID BITS IN IDENTIFY MESSAGE	• An invalid bit was detected in the Identify message.
2	3E 00	LOGICAL UNIT HAS NOT SELF-CONFIGURED YET	• The self- configuration of the Disk drive is not established yet.
6	3F 00	TARGET OPERATING CONDITIONS HAVE CHANGED	(Does not occur.)
6	3F 01	MICROCODE HAS BEEN CHANGED	• The microprogram was downloaded.
6	3F 02	CHANGED OPERATING DEFINITION	(Does not occur.)
6	3F 03	INQUIRY DATA HAS CHANGED	(Does not occur.)
4	40 00	RAM FAILURE	(Does not occur.)
4	41 00	DATA PATH FAILURE	(Does not occur.)
4	42 00	POWER-ON OR SELF-TEST FAILURE	(Does not occur.)

Sense key	Sense code	Error name	Description
B	43 00	MESSAGE ERROR	The operation cannot be continued because the message was rejected or an error occurred in the Message phase.
4	44 00	INTERNAL TARGET FAILURE	A hardware or firmware error was detected in the Controller during the command execution.
4	44 A0	NO REASSIGN SECTOR	No sector to be reassigned cannot be detected.
B	45 00	SELECT OR RESELECT FAILURE	- A Select/ Reselect time-over was detected. - An invalid selection was detected.
-	46 00	UNSUCCESSFUL SOFT RESET	(Does not occur.).
B	47 00	SCSI : SCSI PARITY ERROR	A SCSI bus on parity error occurred.
		Fibre Channel : CRC ERROR DETECTED	A Fibre Channel bus on CRC error occurred.
B	48 00	INITIATOR DETECTED ERROR MESSAGE RECEIVED	The Initiator Detected Error message was received from the initiator.
B	49 00	INVALID MESSAGE ERROR	An invalid message was detected.
		COMMAND SEQUENCE ERROR	- Multiple commands were issued from a LAN. (Example: Failure Monitoring Program and Disk Array Management Program were used at the same time.) - The communication via a LAN was not done normally because of a LAN failure.
B	4A 00	COMMAND PHASE ERROR	An error occurred in the Command phase.
B	4B 00	DATA PHASE ERROR	An error occurred in the Data phase.

Sense key	Sense code	Error name	Description
4	4C 00	LOGICAL UNIT FAILED SELF-CONFIGURATION	• A loading of a microcode or parameter failed when starting up the controller.
4	4C 80	LOGICAL UNIT FAILED SELF-CONFIGURATION	(Does not occur.)
-	4D 00	(RESERVED)	(Does not occur.)
B	4E 00	OVERLAPPED COMMANDS ATTEMPTED	- Two commands with no tag was issued to the same I-T-L. - Commands with and without tags were issued to the same I-T-L. (When this code is reported, all the commands queueing for the I-T-L concerned are cleared.)
-	4F to 52	(RESERVED)	(Does not occur.)
-	53 00	MEDIA LOAD OR EJECT FAILED	(Does not occur.)
-	53 02	MEDIUM REMOVAL PREVENTED	(Does not occur.)
-	54 to 59	(RESERVED)	(Does not occur.)
-	5A 00	OPERATOR REQUEST OR STATE CHANGE INPUT	(Does not occur.)
-	5A 01	OPERATOR MEDIUM REMOVAL REQUEST	(Does not occur.)
-	5A 02	OPERATOR SELECTED WRITE PROTECT	(Does not occur.)
-	5A 03	OPERATOR SELECTED WRITE PERMIT	(Does not occur.)
1	5B 00	LOG EXCEPTION	• An exceptional log in the Disk drive was detected.
1	5B 01	THRESHOLD CONDITION MET	(Does not occur.)
1	5B 02	LOG COUNTER AT MAXIMUM	• The log counter in the Disk drive reached its maximum value.
1	5B 03	LOG LIST CODES EXHAUSTED	• All log list codes in the Disk drive were used up.
4/6	5C 00	RPL STATUS CHANGE	(Does not occur.)
6	5C 01	SPINDLES SYNCHRONIZED	(Does not occur.)
1/6	5C 02	SPINDLES NOT SYNCHRONIZED	(Does not occur.) • A synchronous withdrawal failure or an off-synchronization after a passing synchronization was detected.
-	5D to 7F	(RESERVED)	(Does not occur.)

Sense key	Sense code	Error name	Description
1	80 00	RECOVERED DATA WITH PARITY DATA WITHOUT AUTO-REALLOCATION	(Does not occur.) • Data was recovered using parity disk data. (Data on the medium is not recovered yet.)
1	80 01	RECOVERED DATA WITH RECOVERED PARITY DISK ERROR	(Does not occur.) • Data was recovered using parity disk data which had been recovered from an error.
1	80 02	DATA WRITE IN DRIVE REGRESSION	(Does not occur.)
1	81 00	AUTO-REALLOCATION COMPLETE WITH DATA CORRECTION	(Does not occur.) • A correctable error was detected in a data restoration was detected although an automatic reallocation terminated normally.
1	81 01	AUTO-REALLOCATION COMPLETE WITH DATA CORRECTION	(Does not occur.) • Data was recovered using parity disk data. (Data on the medium was recovered.)
6	82 00	DRIVE RECOVER COMPLETE	• The disk recovery by means of a drive recovery completed normally ^(*1) .
6	82 01	DRIVE RECOVER ERROR FOR UNCORRECTABLE DATA ERROR	• Unrecoverable data was generated although the disk recovery by means of a drive recovery completed normally.
6	82 02	DRIVE RECOVER COMPLETE (EXIST UNCORRECTABLE DATA ERROR)	• The Disk drive recovery by means of a Disk drive recovery completed normally. But the configuration status was not changed to that in which the recovery had completed because a unrecoverable error occurred ^(*1) .
6	82 03	DRIVE RECOVER ERROR FOR DISK MEDIA ERROR (FROM)	(Does not occur.) • A media error was detected in the recovery source data disk during a Disk drive recovery.
6	82 04	DRIVE RECOVER ERROR FOR DISK MEDIA ERROR (TO)	(Does not occur.) • A media error was detected in the recovery destination data disk during a Disk drive recovery.
6	82 05	DRIVE RECOVER ERROR FOR DISK HARD ERROR (FROM)	(Does not occur.) • A hardware error was detected in the recovery source data disk during a Disk drive recovery
6	82 06	DRIVE RECOVER ERROR FOR DISK HARD ERROR (TO)	(Does not occur.) • A hardware error was detected in the recovery destination data disk during a Disk drive recovery.
6	82 08	DRIVE RECOVER FORCE STOP	(Does not occur.) • The drive recovery was forcibly terminated by an operator instruction.
6	82 0A	DRIVE RECOVER COMPLETES WITH UNRECOVERED DATA	(Does not occur.) • Unrecoverable data was generated although the data disk recovery by means of a Disk drive recovery completed normally.
6	82 0B	DRIVE RECOVER ERROR FOR DATA REGRESSION (FROM)	(Does not occur.) • The recovery source data disk was blocked during a Disk drive recovery.
*1 : The sense code is not reported to the host. (It is reported as the Sense Information on Mode Sense page 34H.)			

Sense key	Sense code	Error name	Description
6	82 0C	DRIVE RECOVER ERROR FOR DATA REGRESSION (TO)	(Does not occur.) • The recovery destination data disk was blocked during a Disk drive recovery.
6	82 0D	DRIVE RECOVER ERROR FOR CACHE HARD ERROR	(Does not occur.) • A hardware error was detected in the inter-cache control during a Disk drive recovery.
6	82 0E	STRUCTURE INFORMATION CHANGE	(Does not occur.) • The state of the configuration information changed.
6	82 0F	DRIVE RECOVER ERROR FOR SPARE DISK USED	(Does not occur.) • The Disk drive recovery cannot be started because data for write-after remains in the recovery destination spare disk.
6	82 10	DRIVE RECOVER FORCIBLY TERMINATE	• The Disk drive recovery was forcibly terminated by an operator instruction ^(*) .
6	82 11	DRIVE RECOVER FORCIBLY TERMINATE (MEDIA ERR DETECT : FROM)	• The Disk drive recovery was forcibly terminated because a media error was detected in the Disk drive recovery source disk during the drive recovery ^(*) .
6	82 12	DRIVE RECOVER FORCIBLY TERMINATE (MEDIA ERR DETECT : TO)	• The Disk drive recovery was forcibly terminated because a media error was detected in the Disk drive recovery destination disk during the drive recovery ^(*) .
6	82 13	DRIVE RECOVER FORCIBLY TERMINATE (HARD ERR DETECT : FROM)	• The Disk drive recovery was forcibly terminated because a hardware error was detected in the Disk drive recovery source disk during the drive recovery ^(*) .
6	82 14	DRIVE RECOVER FORCIBLY TERMINATE (HARD ERR DETECT : TO)	• The Disk drive recovery was forcibly terminated because a hardware error was detected in the Disk drive recovery destination Disk drive during the drive recovery ^(*) .
6	82 15	DRIVE RECOVER FORCIBLY TERMINATE (DISK BLOCKED : FROM)	• The Disk drive recovery was forcibly terminated because the Disk drive recovery source disk was blocked during the Disk drive recovery ^(*) .
6	82 16	DRIVE RECOVER FORCIBLY TERMINATE (DISK BLOCKED : TO)	• The Disk drive recovery was forcibly terminated because the Disk drive recovery destination Disk drive was blocked during the drive recovery ^(*) .
6	82 17	DRIVE RECOVER FORCIBLY TERMINATE (CACHE HARD ERRDETECT)	• The Disk drive recovery was forcibly terminated because a hardware error was detected in an inter-cache control during the Disk drive recovery ^(*) .
6	82 18	DRIVE RECOVER FORCIBLY TERMINATE (CONFIGURATION CHANGE)	• The Disk drive recovery was forcibly terminated because the status of the configuration information changed ^(*) .
6	82 19	DRIVE RECOVER FAIL (WRITE AFTER DATA REMAIN)	• The Disk drive could not be started because data for write-after remains in the recovery destination spare disk ^(*) .
6	82 1A	TIME OUT DETECTED IN CONTROLLER	• The Disk drive recovery was forcibly terminated because an time-out occurred in an internal process ^(*) .
B	83 00	DRIVE DUMP INFORMATION CHANGE	• The dump information was changed because another controller was blocked during a collection of the Send Diag drive dump.
3	88 00	READ ATENPTED TO NOT INITIALIZED AREA IN REGRESSION MODE	(Does not occur.)
*1 : The sense code is not reported to the host. (It is reported as the Sense Information on Mode Sense page 34H.)			

Sense key	Sense code	Error name	Description
3	89 00	WRITE UNABLE IN PARITY INCONSISTENT AREA IN REGRESSION MODE	(Does not occur.)
4	8A 01	PARITY ERROR DETECTED DURING MEDIUM PARITY CERTIFICATION	• A parity error was detected during a medium parity consistency check.
4	8A 02	CHECK CODE ERROR DETECTED DURING MEDIUM LA CERTIFICATION	• A parity error was detected during a medium LA consistency check.
1	8A 03	DIRTY DATA EXIST DURING MEDIUM PARITY CERTIFICATION	• Intermediate pinned data and dirty data were found during a parity consistency check.
1	8A 04	DIRTY DATA EXIST DURING MEDIUM LA CERTIFICATION	• Remaining intermediate or physical dirty data and pinned data were found during an LA consistency check of a medium.
1	8B 01	COMMAND ATTEMPTED TO BLOCKED LOGICAL UNIT	• An inoperable command was issued to the blocked logical unit.
5	8C 01	PARITY CHECK REQUESTED DURING REGRESSION MODE	• Parity check was required in the Regression mode.
5	8D 01	DETACH IS REJECTED BECAUSE THE LOGICAL UNIT WILL BE BLOCKD	(Does not occur.)
3	8E 01	READ ATTEMPTED TO WRITE-UNCOMPLETED BLOCK	• An instruction to read or verify was given to the block on which a writing has not completed.
1	8F 00	SYSTEM AREA WRITE ERROR	(Does not occur.)
4	8F 01	SYSTEM AREA WRITE ERROR OCCURED AT ONE OF SYSTEM DRIVE	(Does not occur.)
4	90 00	UNRECOVERED DATA ERROR WITH PARITY DISK DATA	• An unrecoverable data error occurred during a data recovery with parity disk data.
4	90 01	UNRECOVERED DATA ERROR WITH PARITY DISK DATA IN REGRESSION MODE	• An unrecoverable data error occurred during operation in the Regression mode.
4	91 00	AUTO-REALLOCATION NOT COMPLETE FOR UNCORRECTABLE ERROR	• Data could not be reconstructed because an unrecoverable error was detected during an automatic allocation
4	91 01	AUTO-REALLOCATION NOT COMPLETE FOR UNCORRECTABLE ERROR	• The alternative block could not be reallocated in an automatic reallocation.
4	92 00	UNRECOVERED ERROR IN REGRESSION MODE	(Does not occur.)
3	93 00	PARITY ADJUSTMENT ERROR ON CACHE MEMORY	• A parity adjustment error occurred in the Cache memory.
5	94 01	LU ACCESSED THROUGH NON OWNER CONTROLLER	• The Controller with no LU owner right received a command to switch the LU (in the case of the Alternate Paths 1 and 2).
2	95 00	COMMAND NOT EXECUTED BECAUSE ARRAY UNIT SHUTDOWN IN PROGRESS	• The pseudo sequential shutdown is in prgress.
2	95 01	COMMAND NOT EXECUTED BECAUSE ARRAY UNIT SHUTDOWN HAS BEEN COMPLETED	• The pseudo sequential shutdown terminated normally.
4	95 02	ARRAY UNIT SHUTDOWN ERROR	• The pseudo sequential shutdown terminated abnormally.

Sense key	Sense code	Error name	Description
5	95 10	COMMAND NOT EXECUTED BECAUSE ONLINE MICROPROGRAM REPLACEMENT IN PROGRESS	The command cannot be executed because the microprogram is being replaced.
5	95 11	ONLINE MICROPROGRAM REPLACEMENT COMMAND NOT EXECUTED BECAUSE SVP ASSY REPLACEMENT IN PROGRESS	(Does not occur.) The command for online microprogram replacement cannot be executed because the SVP panel is being replaced.
5	95 20	MODE SELECT / MODE SENSE WAS RECEIVED IN THE COMMAND EXECUTION IMPOSIBLE CONDITION	The Mode Select/Mode Sense 3E_H (extended code 03_H/04_H/05_H/06_H) was received in the state in which no command could be executed.
5	95 40	SPARE DISK FIELD WAS INVALID	A spare disk has been defined within a range of the designated RG (at the time of the RG setting).
5	95 41	DRIVE CAPACITY OF RAID GROUP IS INVALID, OR RAID GROUP CAPACITY IS TOO LARGE	- The Disk drive capacity is illegal (when the RG is set). The cause may be one the following. - The capacity of the data disk exceeds that of the spare disk. - The capacity of the set RG exceeds 2 Tbytes. - When the RG was expanded, the Disk drive capacity of the added portion was smaller than that of the Disk drive that had already been defined.
5	95 42	DESIGNATED DISK DOES NOT DEFINE SPARE DISK	The designated Disk drive is that which cannot be defined as a spare disk (at the time of the spare disk designation).
5	95 43	SPARE DISK IS OVER	The number of the specified spare disks exceeds maximum definable value (at the time of the spare disk designation).
5	95 44	DESIGNATED DISK WAS ALREADY DEFINED	The designated drive has already been defined as a spare disk or an RG (at the time of the spare disk specification).
5	95 45	DESIGNATED DISK CAPACTIY IS SMALL	The value of the designated Last LBA is less than the maximum Last LBA of the RG (at the time of the spare disk designation). (The cases where the drive is blocked or uninstalled are excluded.)
5	95 46	LINVALID ORDER THAT NON-SPARE DISK RECIVER TO RELEASD SPARE DISK ORDER	An instruction to release a drive of a spare disk was issued to the Disk drive which was not designated as a spare drive (at the time of the spare disk release).
5	95 47	SPARE DISK RECIVES TO RELEASD SPARE DISK ORDER, but SPARE DISK IS USED	The spare disk is being used though it was specified to be released of the spare disk.

Sense key	Sense code	Error name	Description
5	95 48	RECIVES KEY-CLOSE ORDER, but KEY WAS ALREADY OPEND	• An unlocking instruction was given to the drive which was not locked.
5	95 49	RECIVES KEY-CLOSE ORDER, but KEY WAS ALREADY CLOSED	• A locking instruction was given to the drive which was already locked.
5	95 4A	INVALID KEY CODE	• The pricing key code is invalid.
7	95 50	COMMAND NOT EXECUTE FOR WRITE PROHIBITION	• Command not execute for write prohibition
5	95 51	COMMAND NOT EXECUTE FOR CONCEALMENT MODE	• Command not execute for concealment mode
5	95 52	COMMAND NOT EXECUT FOR COUPLING	• Command not execute for coupling
5	95 53	AP DISTINCTION NUMBER IS FULL	• Ap distinction number is full
5	95 54	COMMAND RESPONSE CAN NOT BE DONE BECAUSE COMMAND DEVICE IS NOT SET	• Command response can not be done because command device is not set
5	95 55	COMMAND NOT EXECUTE BECAUSE STRIPE SIZE IS NO SET AS 64KB	• Command not execute because stripe size is no set as 64Kbytes
5	95 56	COMMAND NOT EXECUTE BECAUSE FAILRE OCCURRED IN REVERSE RESYNC	• Command not execute because failre occurred in reverse resync
5	98 00	DRIVE DETACHED AND LOST IN PARITY INCONSISTENT AREA	(Does not occur.)
4	99 00	DATA WRITE ERROR ON SYNCHRONIZE CACHE	• Data in the cache cannot be written on the drive in a synchronized cache.

Sense key	Sense code	Error name	Description
4	A0 00	CACHE MEMORY HARDWARE ERROR	A failure occurred in the cache circuit.
4	A1 00	NO INDEX/SECTOR SIGNAL IN WRITEAFTER	(Does not occur.)
4	A2 00	NO SEEK COMPLETE IN WRITEAFTER	(Does not occur.)
4	A3 00	WRITE FAULT IN WRITEAFTE	(Does not occur.)
4	A4 00	DRIVE NOT READY IN WRITEAFTER	(Does not occur.)
4	A6 00	NO TRACK ZERO FOUND IN WRITEAFTER	(Does not occur.)
4	A8 00	LOGICAL UNIT COMMUNICATION ERROR IN WRITEAFTER	(Does not occur.)
4	A8 01	LOGICAL UNIT COMMUNICATION TIME OUT IN WRITEAFTER	(Does not occur.)
4	A8 02	LOGICAL UNIT COMMUNICATION PARITY ERROR IN WRITEAFTER	(Does not occur.)
4	A9 00	TRACK FOLLOWING ERROR IN WRITEAFTER	(Does not occur.)
4	AC 02	WRITE ERROR AUTO-REALLOCATION FAILED IN WRITEAFTE	(Does not occur.)
4	AE 00	PIN DATA MORETHAN THRESHOLD	(Does not occur.)
4	AF 00	WRITE ERROR AUTO-REALLOCATIONFAILED BY NO DEFECT SPARE IN WRITEAFTER	(Does not occur.)
4	B0 00	INTERNAL TARGET ERROR IN WRITEAFTER	(Does not occur.)
4	B2 00	NO ADDRESS MARK FOUND IN ID FIELD AT WRITEAFTER	(Does not occur.)
4	B3 00	NO ADDRESS MARK FOUND IN DATA FIELD AT WRITEAFTER	(Does not occur.)
4	B4 00	NO RECORD FOUND IN WRITEAFTER	(Does not occur.)
4	B5 02	POSITIONING ERROR DETECTED BY READ OF MEDIUM IN WRITEAFTER	(Does not occur.)
4	BF 01	DISK DIRECT WRITE BYBATTERY ALARM	(Does not occur.) Data was written on the disk in the Write-Through mode (without write-after process) because the voltage of the battery for the cache backup became lower than the specified value.
4	BF 02	DISK DIRECT WRITE BY PIN DATA OVER	(Does not occur.) Data was written on the disk in the Write-Through mode (without write-after process) because the number of pinned data exceeded the specified value.

Sense key	Sense code	Error name	Description
4	BF 03	WRITE THROUGH FOR DMA ERROR	(Does not occur.) • Data was written on the disk in the Write-Through mode (without write-after process) because an DMA failure occurred.
4	BF 04	WRITE THROUGH FOR PIN DATA	(Does not occur.) • Data was written on the disk in the Write-Through mode (without write-after process) because pinned data existed in the area where the data was to be written.
B	C0 00	TIME OUT DETECTED IN CONTROLLER	• A time-out occurred during an internal processing.
B	C0 01	TIME OUT DETECTED IN HOST DATA TRANSFER	• A time-out occurred during a data transfer between a host computer.
B	C0 02	TIME OUT DETECTED IN HOST DATA TRANSFER	• A time-out occurred during communication between the Controllers.
B	C1 00	CACHE MEMORY UNASSIGNED FOR FORMAT	• The cache necessary for the formatting cannot be assigned.
B	C2 00	SYSTEM DRIVE CHANGED	• The system current drive was changed
5	DA 00	DRIVE RECOVERY REQUEST IS REJECTED, SINCE ANOTHER DRIVE RECOVERY IN PROCESS	• The new data recovery request cannot be accepted because another Disk drive is being recovered
6	DB 00	ONLINE RECOVERY COMMAND ABORTED	(Does not occur.)
6	E0 00	BATTERY ALARM	(Does not occur.)
6	E2 00	FAN ALARM	(Does not occur.)
4	E4 00	NVS INTERNAL TABLE OVERFLOW, WRITE INCOMPLETE MANAGEMENT AREA	• The system area overflowed ^(※1) . (Pinned data management area)
6	E5 00	POWER SUPPLY FAILURE	(Does not occur.)
6	E5 01	DC VOLTAGE DECREASED	(Does not occur.)
4	E8 00	SYSTEM FLOPPY DISK ERROR	(Does not occur.)
4	E9 00	BACK UP FLOPPY DISK ERROR	(Does not occur.)
1	EA 00	CONTROL INFORMATION WRITE ERROR ON A DISK	(Does not occur.) • There was a Disk drive on which the take-over information could not be written.
4	EA 01	PROGRAM SIZE OUT OF RANGE	• The program size which the write buffer received was larger than that of the program area.
4	EA 02	CONTROL INFORMATION SIZE OUT OF RANGE	• The take-over information size which the write buffer received was larger than that of the take-over information of the system.
*1 : In the case where WAR = 1 in the Mode Select command when reporting the sense code to a host, Sense key: 4/ Code: F804 _H are also reported.			

Sense key	Sense code		Error name	Description
5	EA	03	ONLINE MICROPROGRAM DOWNLOAD ERROR	• A microprogram download error was detected.
5	EA	04	ONLINE MICROPROGRAM REPLACEMENT ERROR	• An error was detected when specifying an online microprogram replacement.
1	EA	05	PARTIALLY COMPLETED ONLINE MICROPROGRAM DOWNLOAD	• A microprogram installation is in the state in which it has been partially completed.
5	EA	10	MICROPROGRAM DOWN GRADE CHECK ERROR	• An error in the microprogram downgrade check
4	EB	00	BACK UP FLOPPY DISK NOT INSERTED	• The online SCSI ID setting failed because the backup FD was not inserted yet.
4	EB	01	BACK UP FLOPPY DISK MOTOR FAILURE	• The online SCSI ID setting failed owing to a trouble of the FD motor.
4	EB	02	BACK UP FLOPPY DISK WRITE ERR	• A write error on the backup FD occurred during an online SCSI ID setting
4	EB	03	ONLINE SCSI ID SET FAILURE (CONTROLLER FAILED)	• The online SCSI ID setting for the subsystem with the dual configuration failed owing to a blockade of the Controller in another system.
3	F0	00	R/W BUFFER ERROR	• A loading of the microprogram or parameter failed when the Controller was started.
3	F1	00	ERROR IN CONTROLLER INITIALIZATION	
4	F2	00	ERROR IN CONTROLLER INITIALIZATION	
4	F3	00	ERROR IN CONTROLLER INITIALIZATION	
4	F4	00	CACHE MEMORY FAILURE	• The cache module was blocked because a Cache memory error occurred.
4	F6	10	DRIVE SEEK RECOVERED ERROR WARNING	• A Disk drive emerged in which the number of recovered mechanical errors exceeded the threshold value ^(*) .
4	F6	11	DRIVE SEEK UNRECOVERED ERROR WARNING	• A Disk drive emerged in which the number of unrecovered mechanical errors exceeded the threshold value ^(*) .
4	F6	20	DRIVE MEDIUM RECOVERED ERROR WARNING	• A Disk drive emerged in which the number of recovered medium errors exceeded the threshold value ^(*) .
4	F6	21	DRIVE MEDIUM UNRECOVERED ERROR WARNING	• A Disk drive emerged in which the number of unrecovered medium errors exceeded the threshold value ^(*) .
4	F6	30	DRIVE R/W RECOVERED ERROR WARNING	• • A Disk drive emerged in which the number of recovered R/W errors exceeded the threshold value ^(*) .
4	F6	31	DRIVE R/W UNRECOVERED ERROR WARNING	• A Disk drive emerged in which the number of unrecovered R/W errors exceeded the threshold value ^(*) .
4	F6	40	DRIVE I/F RECOVERED ERROR WARNING	• A Disk drive emerged in which the number of recovered interface errors exceeded the threshold value ^(*) .
4	F6	41	DRIVE I/F UNRECOVERED ERROR WARNING	• A Disk drive emerged in which the number of unrecovered interface errors exceeded the threshold value ^(*) .
4	F6	50	DRIVE CONTROLLER HARD RECOVERED ERROR WARNING	• A Disk drive emerged in which the number of recovered hardware errors exceeded the threshold value ^(*) .
*1 : The sense code is not reported to a host computer.				

Sense key	Sense code	Error name	Description
4	F6 60	SCSI I/F RECOVERED ERROR WARNING	• A Disk drive emerged in which the number of recovered SCSI interface errors exceeded the threshold value ^(※1) .
4	F6 61	SCSI I/F UNRECOVERED ERROR WARNING	• A Disk drive emerged in which the number of unrecovered SCSI interface errors exceeded the threshold value ^(※1) .
4	F6 70	ONLINE VERIFY CORRECTABLE ERROR WARNING	• A Disk drive emerged in which the number of correctable errors in the online verify exceeded the threshold value ^(※1) .
4	F6 71	ONLINE VERIFY UNCORRECTABLE ERROR WARNING	• A Disk drive emerged in which the number of uncorrectable errors in the online verify exceeded the threshold value ^(※1) .
4	F8 00	BATTERY ALARM	• Battery failure ^(※1)
4	F8 01	FAN ALARM	• Fan failure ^(※1)
4	F8 02	DC POWER SUPPLY FAILURE	• DC failure ^(※1)
4	F8 03	DRIVE FAILURE	• Drive failure (regression) ^(※1)
4	F8 04	PIN DATA OVER	• Pin data over ^(※1)
4	F8 05	CACHE MEMORY FAILURE	• Module blockade ^(※1)
4	F8 07	AC LINE/IN BOX FAILURE	(Does not occur.)
4	F8 08	UPS FAILURE	• UPS failure
4	F8 09	BK FAILURE	• Battery backup circuit failure
4	F8 0A	SW P/K UNIT FAILURE	• ENC blockade
4	F8 0B	LOOP FAILURE	• Loop failure
4	F8 F0	ANOTHER CONTROLLER NOT READY	• The controller of another system was blocked ^(※1) .
4	F9 00	BATTERY RECOVERY	• Battery failure recovery ^(※2)
4	F9 01	FAN RECOVERY	• Fan failure recovery ^(※2)
4	F9 02	DC POWER SUPPLY RECOVERY	• DC failure recovery ^(※2)
4	F9 03	DRIVE RECOVERY	• Drive failure (regression) recovery ^(※2)
4	F9 04	PIN DATA RECOVERY	• Pin data over recovery ^(※2)
4	F9 05	CACHE MEMORY RECOVERY	• Module blockade release ^(※2)
※1 : The sense code is reported to the host only when WAR = 1 in the Mode Select command (page35 _H). ※2 : The sense code is reported to the host only when RCVRV = 1 in the Mode Select command (page35 _H).			

Sense key	Sense code	Error name	Description
4	F9 06	OWN CONTROLLER RECOVERY	• Own Controller recovery ^(*1)
4	F9 07	AC LINE/ IN BOX RECOVERY	(Does not occur.)
4	F9 08	UPS FAILURE RECOVERY	• UPS failure recovery
4	F9 09	BK FAILURE RECOVERY	• Battery backup circuit failure recovery
4	F9 0A	SW P/K UNIT RECOVERY	• ENC failure recovery
4	F9 0B	LOOP RECOVERY	• Loop failure recovery
4	F9 F0	ANOTHER CONTROLLER RECOVERY	• Another system Controller failure recovery
4	FA 00	LOGICAL UNIT INTERNAL ERROR	(Does not occur.)
4	FB 00	LOGICAL UNIT INTERFACE UNMATCH	(Does not occur.)
4	FC 00	LOGICAL UNIT INTERFACE ERROR	(Does not occur.)
B	FD 00	COMMAND NOT EXECUTED BY CHANGING LOGICAL UNIT	• Command execution was disabled because the LU was switched.
B	FD 01	COMMAND PAUSE BY CHANGING LOGICAL UNIT	• The command execution was interrupted owing to an LU switching.
*1 : The sense code is reported to the host only when RCVRV = 1 in the Mode Select command (page35 H).			

Appendix B Glossary

Cache backup :

Because a cache memory uses DRAM, information stored in it is lost when the subsystem power is shut off. To provide against unexpected power failure, the subsystem has an setup to maintain data in the cache memory by batteries.

Cache backup is a state in which the data is protected by the batteries.

Hot replacement :

To replace an installed part with the subsystem power on. Usually, the major part is duplicated so that when one of the parts fails, the subsystem function is maintained by another part.

PDB : Power Distribution Box

PDU : Power Distribution Unit

Rack frame:

A frame on which electronic equipment are mounted like a bookshelf using rails, etc.

Most of them have a width of 19 inches, and called 19-inch rack frame.

Height of the equipment to be mounted is regulated by the EIA standard (1 EIA unit = 44.45 mm).

The rack frame has screw holes to fasten equipment with bolts, etc.

RAID : Redundant Array of Independent (Inexpensive) Disks

The RAID technology, which was proposed by a research group in the University of California at Berkeley in 1987, is to realize high-speed, large capacity, and highly reliable storage device by scattering accesses using several disk drives.

RAID levels proposed by the University of California are classified into six levels, that is, RAID 0 to RAID 5, and they are selected according to user's demand taking their costs and speeds in consideration.

Spare disk :

A Disk drive installed separately from Disk drives used for usual reading and writing.

When one of the latter Disk drives fails, the subsystem keeps in service as before by copying data stored in the failed disk drive to the spare disk drive.

Revision Control

Legend for revision codes : AD : Addition CH : Change CR : Correction DL : Deletion

REV.	Date	DRW	CHKD	APPD	Sheet No.	Description	Code
0	Jul.31.2000	A.Yamanashi	A.Yamanashi	M.Sato	All	Issued	-
1	Aug.25.2000	K.Suzuki	K.Suzuki	Y.Takeuchi	All	Issued	-
2	Sep.12.2000	K.Suzuki	K.Suzuki	Y.Takeuchi	02-0800 02-0840 04-0020	W03100 and W03200 were addition. W440xy was addition the description of recovery measures The time was changed to 20 seconds from ten seconds. (Pages 04-0070, 04-0080, 04-0210, 04-0250, 04-0260, 04-0310, 04-0330, 04-0370, 04-0390, 04-0420, 04-0430, 04-0460, 04-0500, 04-0570, 04-0580, 04-0700, 04-0740, 04-0750, 04-0790, 04-0800, 04-0840, 04-0860, 04-0890, 04-0900, 04-0930 and 04-0960 were changed by the same reason.)	AD AD CH
3	Oct.10.2000	K.Suzuki	K.Suzuki	Y.Takeuchi	00-0000 00-0050 00-0060 00-0070 00-0090 01-0130 01-0150 01-0190 01-0200 01-0210 01-0220 01-0250 02-0050 02-0060 02-0061 02-0070 02-0110 02-0120 02-0130	Rev.2 → Rev.3 “Infomation” in the Section 2.6 was corrected to “Information”. “Patr” in the Chapter 4. was corrected to “Part”. Title neme of 4.2.6 and 4.3.6 were changed. “complet” in the Subsection 5.3.2 was corrected to “complete”. Appendix A was deleted. (B → A, C → B) “subsytem” was corrected to “subsystem”. Arrow of (2) were changed. Text of (c) and (ii) were modified. “controll” was corrected to “control”. Description of (2) was added. Text of (b) and (ii) were modified. (e) was moved to page 01-0220. (e) was moved to this page from page 01-00210. “inseted” was corrected to “inserted”. “Nomal” was corrected to “Normal”. *2 was added. Item 10 and *2 were moved to page 02-0061. This page was newly added. (Item 10 and *2 were moved to this page from page 02-0060.) “Nomal” was corrected to “Normal”. “Inteface” was corrected to “Interface”. (a) was added. “Cause or status” of Item 3 was moved to Item 2. “Contrller” was corrected to “Controller”.	CH CR CR CH CR DL/CH CR CH CH CR AD CH DL AD CR CR DL DL AD CR CR AD CH CR

Legend for revision codes : AD : Addition CH : Change CR : Correction DL :
Deletion

REV.	Date	DRW	CHKD	APPD	Sheet No.	Description	Code
					02-0131	This page was newly added. ((b) Interface board for SCSI)	AD
					02-0170	Notice was added.	AD
					02-0180	Frow was changed and *1 was added.	CH/AD
					02-0190	Frow was changed.	CH
					02-0200	Frow was changed and *1 was added.	CH/AD
					02-0220	Fibre Channel was added to (2). Flow was changed. ("A", "B" and * number were added.)	AD CH/AD
					02-0221	This page was newly added. (A part of the flow was move to this page from page 02-0220.)	AD
					02-0222	This page was newly added. ((3) When in the SCSI interface)	AD
					02-0223	This page was newly added.	AD
					02-0224	This page was newly added.	AD
					02-0240	"magement" in the Table 2.3.1 was corrected to "management".	CR
						Description of "Maintenace terminal used" in the Table 2.3.2 was changed.	CH
					02-0260	Description of (2)-(a) was added. Window design was modified. ‡2 was added.	AD CH AD
					02-0270	Window design was modified.	CH
					02-0280	Figure number of rackmount model side was to "Figure 2.3.2". Table 2.3.4 was changed.	CH
					02-0290	A Notice was added.	AD
					02-0300	A Notice was added. Wed window design was modified.	AD CH
					02-0310	Wed window design was modified.	CH
					02-0320	Wed window design was modified.	CH
					02-0330	Wed window design was modified. Text of Item (3) was added..	CH AD
					02-0340	Text of 2.3.3 was modified. (1) was moved to page 02-0341.	CH DL
					02-0341	This page was newly added. ((1) was moved to this page from page 02-0340, and WED window was changed.)	AD
					02-0342	This page was newly added. ((2) was added.)	AD
					02-0350	Wed window design was modified.	CH
					02-0590	"eror" in the "R10110" was corrected to "error".	CR
					02-0630	"iF" in the "R40107" and "IF" in the "R4010E" were corrected to "I/F".	CR
					02-0730	Description of "I1A00x" and "I1A10x" were added to "(0-1)".	AD
					02-0740	Description of "I1A30x" was added to "(0-1)". Recovery measures of "I20100" was changed. "I20500" to I20700" were moved to page 02-0750.	AD CH DL

Legend for revision codes : AD : Addition CH : Change CR : Correction DL :
Deletion

REV.	Date	DRW	CHKD	APPD	Sheet No.	Description	Code
					02-0750	"I20500", "I20600" and "I20700" were moved to this page from page 02-0740. Recovery measures of "I20500" was changed.	AD
						"I412xy" to "I414xy" were moved to page 02-0760.	CH
						"I412xy" to "I414xy" were moved to page 02-0760.	DL
					02-0760	"I412xy", "I413xy" and "I414xy" were moved to this page from page 02-0750.	AD
						"I419xy" to "I41Bxy" were moved to page 02-0770.	DL
					02-0770	"I419xy", "I41Axy" and "I41Bxy" were moved to this page from page 02-0760.	AD
						"I6010x" to "I604xy" were moved to page 02-0780.	DL
					02-0780	"I6010x", "I60200", "I603xy" and "I604xy" were moved to this page from page 02-0770.	AD
						"I609xy" to "I61700" were moved to page 02-0790.	DL
					02-0790	"I609xy", "I61000", "I61100", "I61200", "I61300", "I61400", "I61500", "I61600", and "I61700" were moved to this page from page 02-0780.	AD
						"shoutdown" in the "I61D00" was corrected to "shutdown".	CR
					02-0810	"(PATH-x, LOOP-y)" in the "W080xy" was corrected to "(Path-x, Loop-y)".	CR
					02-0840	"CTL-x" to Message text of "W4700" was added.	AD
					02-0960	"(PATH-x, LOOP-y)" in the "HE06xy" was corrected to "(Path-x, Loop-y)".	CR
					02-1290	"managerment" in *2 was corrected to "management".	CR
					02-1320	Text of (2) and (b) were modified.	CH
					02-1360	"Infomation" in the Section 2.6 was corrected to "Information".	CR
					02-1420	"Contoroller" in the Table 2.6.1 was corrected to "Controller".	CR
						Item 23 to 27 were added.	AD
					02-1430	Window design was modified.	CH
					02-1440	Window design was modified.	CH
						"mangement" in ③ was corrected to "management".	CR
						Description of ③ was added.	AD
					02-1450	Item 26, 27, 28, *2 and *3 were added.	AD
					02-1500	Title of (4) was changed, and description was added.	CH/AD
						(4-1) was added.	AD/CH
						The succeeding step numbers were changed. (4-1 → 4-2, 4-2 → 4-3)	
					02-1510	Item number was changed. (4-3 → 4-4)	CH
						No.8 and 9 were added.	AD
					02-1520	Description of Item 5 was added.	AD
						"Quit" was moved to page 02-1521.	DL

Legend for revision codes : AD : Addition CH : Change CR : Correction DL :
Deletion

REV.	Date	DRW	CHKD	APPD	Sheet No.	Description	Code
					02-1521	This page was newly added. (No.8 and 9 was added, and Item 10 was moved to this page from page 02-1520.	AD
					02-1530	Item number was changed. (4-4 → 4-5) “comon” in (a) was corrected to “common”, and “configuration” in (b) was “configuration”.	CH CR
					02-1560	Display of (b-6) and (b-9) were added.	AD
					02-0570	Display of (b-10) was added.	AD
					02-1590	“SYNC CONTROL” in (b-14) was corrected to “LAN CONST”.	CR
					02-1620	(f) and (g) were added.	AD
					02-1630	(h) and (i) were added. Item (5) was deleted.	AD DL
					02-1640	This page was deleted. (together with page 02-1650, and 02-1660.)	DL
					02-1670	Number was changed. ((b) → (5), (i) → (a))	CH
					02-1750	(ii) was changed to (b).	CH
					02-1850	Description of (a) was changed.	CH
					02-1890	Text of (a) was modified.	CH
					04-0020	(6) was added.	AD
					04-0040	AAH18 and SCSI Interface board were added.	AD
						“redundansy” in *1 was corrected to “redundancy”.	CR
					04-0070	“20 minutes” in the (e) was corrected to “20 seconds”.	CR
					04-0080	“20 minutes” in the (d) was corrected to “20 seconds”.	CR
						“recovery” in the (g) was corrected to “recovery”.	CR
					04-0090	“Fibure” in the (2) and “incentve” in (a) were corrected to “Figure” and “insentive”.	CR
					04-0100	“manegement” in ‡1 was corrected to “management”.	CR
					04-0110	“shwon” in the figure was corrected to “shown”.	CR
					04-0160	“recovery” in the figure was corrected to “recovery”.	CR
					04-0210	“20 minutes” in the (f) was corrected to “20 seconds”.	CR
					04-0230	“sme” in the table was corrected to “same”. “powe” in the notice was corrected to “power”. (c) and (d) were moved to page 04-0240.	CR AD
					04-0231	This page was newly added. (Figure 4.2.6 was moved to this page from page 04-0240. SCSI and *1 were added)	AD

Legend for revision codes : AD : Addition CH : Change CR : Correction DL :
Deletion

REV.	Date	DRW	CHKD	APPD	Sheet No.	Description	Code
					04-0240	(c) and (d) were moved to this page from page 04-0230. Notice was added. "pluuing" in the (f) was corrected to "pulling".	AD CR
						Figure was moved to page 04-0231.	DL
						(g) and (h) was moved to this page from page 04-0250.	AD
					04-0250	(g) and (h) was moved to page 04-0240. Notice was added to (i).	AD AD
					04-0260	Notice were added to (b) and (e). "pove" in the Notice was corrected to "power", and "pluuing" in the (f) was corrected to "pulling".	AD CR
						(g), (h) and (i) were moved to page 04-0270.	DL
					04-0270	(g), (h) and (i) were moved to this page from page 04-0260. Notice was added to (i).	AD AD
					04-0280	"subsystem" in the Notice was corrected to "subsystem", and "fizing" in the (g) was corrected to "fixing".	CR
						Notice was added to (f).	AD
						(h) was moved to page 04-0290.	DL
					04-0290	(h) was moved to this page from page 04-0280.	AD
						"parametera" in the (r) was corrected to "parameters".	CR
					04-0300	SCSI cable was added to (b).	AD
						"two" in the (e) was changed to "three".	CH
					04-0310	SCSI interface was added to figure.	AD
						"two" in the (f) was changed to "three".	CH
					04-0320	SCSI cablewas added to (j).	AD
					04-0330	SCSI cablewere added to (b) and (j).	AD
						"two" in the (e) was changed to "three".	CH
					04-0340	SCSI cablewas added to (e).	AD
						"two" in the (g) was changed to "three".	CH
					04-0350	SCSI cablewas added to (k).	AD
					04-0370	Notice was added to (c).	AD
					04-0380	Slot lever was changed of figure.	CH
					04-0390	Description was added to Notice.	AD
					04-0400	Notice was added to (i).	AD
					04-0410	Description was changed to (m).	CH
					04-0420	Description was added to Notice.	AD
						(g), (h) and (i) were moved to page 04-0430.	DL
						"Disonnnect" in the (c) was corrected to "Discomment".	CR
					04-0430	(g), (h) and (i) were moved to this page from page 04-0420. Notice wad added to (g).	AD AD
						(1-2) was moved to page 04-0431.	DL
					04-0431	This page was newly added. ((1-2) was moved to this page from page 04-0430.)	AD
					04-0440	Description was changed to (e). (arrow)	CH

Legend for revision codes : AD : Addition CH : Change CR : Correction DL :
Deletion

REV.	Date	DRW	CHKD	APPD	Sheet No.	Description	Code
					04-0450	"supplys" and "powe" in the Notice were corrected to "supply" and "power".	CR
					04-0460	"20 minutes" in the (i) was corrected to "20 seconds".	CR
					04-0470	Cable routing of power cable (#0 side) was changed, and description was added.	CH/AD
					04-0490	"20 minutes" in the Table was corrected to "10 minutes".	CR
					04-0500	"20 minutes" in the (e) was corrected to "20 seconds".	CR
					04-0510	"ot" in the (b) was corrected to "to".	CR
					04-0520	Cable routing of power cable (#0 side) was changed.	CH
						"PBD" in the table was corrected to "PDB".	CR
					04-0530	Wrong title in the figure was corrected.	CR
					04-0540	AAH18 and SCSI Interface board were added.	AD
						"redundansy" in *1 was corrected to "redundancy".	CR
					04-0570	"20 minutes" in the (e) was corrected to "20 seconds".	CR
					04-0580	"recovery" in the (g) was corrected to "recovery".	CR
					04-0590	"Fibure" in the (2) and "incentve" in (a) were corrected to "Figure" and "insentive".	CR
					04-0610	"shwon" in the figure was corrected to "shown".	CR
					04-0660	"recovery" in the figure was corrected to "recovery".	CR
					04-0700	"20 minutes" in the (f) was corrected to "20 seconds".	CR
					04-0720	"sme" in the table was corrected to "same". "powe" in the notice was corrected to "power".	CR
						(b) and (c) were moved to page 04-0730.	AD
					04-0721	This page was newly added. (Figure 4.2.6 was moved to this page from page 04-0240. SCSI and *1 were added.)	AD
					04-0730	(b) and (c) were moved to this page from page 04-0720.	AD
						Notice were added to (b) and (d).	AD
						(f) and (g) was moved to this page from page 04-0740.	AD
					04-0740	(g) and (h) was moved to page 04-0730.	AD
						Notice and SCSI were added to (i) and figure.	AD
					04-0750	Description were added to Notice of (a) and Notice to (d).	AD
						(f) to (k) were moved to page 04-0751.	DL

Legend for revision codes : AD : Addition CH : Change CR : Correction DL : Deletion

REV.	Date	DRW	CHKD	APPD	Sheet No.	Description	Code
					04-0751	This page was newly added. ((f) to (k) were moved to this page from page 04-0750.	AD
					04-0760	Notice was added to (h). “subsystem” in the Notice was corrected to “subsystem”.	AD CR
					04-0770	Notice was added to (e) and Notice was changed to (g). Description was changed to (m). “parametera” in the Notice was corrected to “parameters”.	AD/CH CH CR
					04-0780	Title was changed. SCSI cable was added to (a). “two” in the (d) was changed to “three”.	CH AD CH
					04-0790	SCSI interface was added to figure. “two” in the (e) was changed to “three”.	AD CH
					04-0800	SCSI cable was added to (i). SCSI interface was added to figure. “two” in the (e) was changed to “three”.	AD AD CH
					04-0810	SCSI cable was added to (i). SCSI cable was added to (d). “two” in the (g) was changed to “three”.	AD AD CH
					04-0820	SCSI cable was added to (k).	AD
					04-0840	Notice was added to (b).	AD
					04-0850	Slot lever was changed to figure.	CH
					04-0860	Description was added to Notice.	AD
					04-0870	Notice was added to (c).	AD
					04-0880	Description was changed to (k).	CH
					04-0890	Description was added to Notice. “Disonnnect” in the (b) was corrected to “Discomment”.	AD CR
						(f) and (g) were moved to page 04-0900.	DL
					04-0900	(g), (h) and (i) were moved to this page from page 04-0890. Notice wad added to (f). (1-2) was moved to page 04-0901.	AD AD DL
					04-0901	This page was newly added. ((1-2) was moved to this page from page 04-0900.) Notice was added to (e).	AD
					04-0910	Description was changed to (d). (arrow)	CH
					04-0920	“supplys” in the Notice was corrected to “supply” and “ot” in (c) was corrected to “to”.	CR
					04-0930	“20 minutes” in the (h) was corrected to “20 seconds”.	CR
						“powe” in the (j)e was corrected to “power”.	CR
					04-0940	“supplys” in (b) and (j) were corrected to “supply”.	CR
					04-0960	“20 minutes” in the (d) was corrected to “20 seconds”.	CR
					05-0010	“subsystem” in the Title of Subsection 5.1.1 was corrected to “subsystem”. “watting” in the *1 was corrected to “waiting”.	CR CR

Legend for revision codes : AD : Addition CH : Change CR : Correction DL :
Deletion

REV.	Date	DRW	CHKD	APPD	Sheet No.	Description	Code
					05-0040	"complet" in the *2 was corrected to "complete".	CR
					05-0050	WEB window design was modified.	CH
						‡1 was added.	AD
					05-0060	WEB window design was modified.	CH
					70-0000	Appendix A was deleted. (B → A, C → B) Contents of the chapter (on 19 pages from 70-0000 to 70-0170) were reedited and eight pages (70-0180 to 70-0250) were deleted because of the deletion of Appendix A.	DL/CH CH/DL
					70-0110	Error names and descriptions of the codes 95 41 was changed.	CH
4	Dec.10.2000	K.Suzuki	K.Suzuki	Y.Takeuchi	00-0000	Rev.3 → Rev.4	CH
					01-0150	Text of (e)-(ii) was changed.	CH
					01-0210	Text of (d)-(ii) was changed.	CH
					02-0250	Notice was added to (c).	AD
					02-0650	"RA0410", "RA0411", "RA0412", "RA0413" and "RA0414" were added.	AD
						"RA1000" to "RA4200" were moved to page 02-0651.	DL
					02-0651	This page was newly added. ("RA1000", "RA2000", "RA30xy", "RA4000", "RA4100" and "RA4200" were moved to this page from page 02-0650.	AD
					02-0700	"RBF001" and "RC0000" were added.	AD
					02-0710	Description of "I00D0x" was added to text.	AD
					02-0750	"I304xy" and "I305xy" were added.	AD
						"I411xy" was moved to page 02-0760.	DL
					02-0760	"I411xy" was moved to this page from page 02-0750.	AD
						"I418xy" was moved to page 02-0770.	DL
					02-0770	"I418xy" was moved to this page from page 02-0760.	AD
					02-0791	This page was newly added. ("I61E00" was added.)	AD
					02-0810	Description of "W0C00x" was added to text.	AD
					02-0840	Description of "W47000" was added to text.	AD
					02-0870	"H1090x" and "H1093x" were added.	AD
						"H20240" and "H20250" were moved to page 02-0880.	DL
					02-0880	"H20240" and "H20250" were moved to this page from page 08-0870.	AD
					02-0890	"H2091x", "H2094x", "H2095x" and "H3092x" were added.	AD
						"H40102", "H40103" and "H40104" were moved to page 02-0900.	DL

Legend for revision codes : AD : Addition CH : Change CR : Correction DL :
Deletion

REV.	Date	DRW	CHKD	APPD	Sheet No.	Description	Code
					02-0900	"H40102", "H40103" and "H40104" were moved to this page from page 02-0890.	AD
						"H4010C", "H4010D", "H4010E" and "H4010F" were moved to page 02-0910.	DL
					02-0910	"H4010C", "H4010D", "H4010E" and "H4010F" were moved to this page from page 02-0900.	AD
						"H40122" and "H40123" were moved to page 02-0920.	DL
					02-0920	"H40122" and "H40123" were moved to this page from page 02-0910.	AD
						"H40135", "H40140", "H40141", and "H40142" were moved to page 02-0930.	DL
					02-0930	"H40135", "H40140", "H40141" and "H40142" were moved to this page from page 02-0920.	AD
						"H40153", "H40160", "H40161" and "H40170" were moved to page 02-0931.	DL
					02-0931	This page was newly added. (Message code were moved to this page from page 04-0930 and 02-0940.)	AD
					02-0940	"H90100", "H90210", "H90320" and "H90330" were moved to page 02-0931.	DL
					02-0950	Description of "HD21xx" and "HD22xx" were added to text.	AD
					02-1010	"HH13B0" and "HH13B1" were moved to this page from page 02-1020.	AD
					02-1020	"HH180x" was added.	AD
						"HH13B0" and "HH13B1" were moved to page 02-1010.	DL
					02-1320	Text of (4)-(b) was changed.	CH
					02-1450	Item Nos 27, 28 and 29 was added. The succeeding step numbers were changed.	AD/CH
					02-1570	"Third Party Process Logout Mode...." was added to (b-11)	AD
					02-1700	Figure design was modified. (Pages 02-1720 was changed by the same reason.)	CH
5	Jan.10.2001	K.Suzuki	K.Suzuki	Y.Takeuchi	All	A revision owing to a change of the page format. (Revision numbers of all pages were advanced to 5.)	CH

Legend for revision codes : AD : Addition CH : Change CR : Correction DL :
Deletion

REV.	Date	DRW	CHKD	APPD	Sheet No.	Description	Code
6	Mar.20.2001	K.Suzuki			00-0000	Rev.5 → Rev.6	CH
					00-0040	‡1 was added.	AD
					00-0050	Connecting a Service PC and the Subsystem added.(1.3)	AD
					00-0051	This page was newly added.	AD
					00-0060	Procedure for Recovery from the Suspension Status (PSUE) with MRCF-Lite Function added.(2.7)	AD
					01-0000	Connecting a Service PC and the Subsystem added.	AD
					01-0010	(2)(d) added.	AD
					01-0011	(d)→(e)	CH
					01-0020	“If the backup…” was added.	AD
					01-0030	Title of Figure was added. (Figure 1.1.1.1)	AD
					01-0081	This page was newly added. (Notice was added.)	AD
					01-0101	This page was newly added.	AD
					01-0110	Figure 1.2.3 was changed.	CH
					01-0111	This page was newly added. (Notice was added.)	AD
					01-0131 to 01-0151	Connecting a Service PC and the Subsystem added.(1.3)	AD/CH
					02-0000	2.7 was added.	AD
					02-0170	“ALARM” in the figure were corrected to “FAIL”.	CR
					02-0180	Follow was changed.	CH
					02-0223	Refer page number was changed. (02-0262 → 02-0240)	CH
					02-0224	Refer page number was changed. (02-0232 → 02-0240)	CH
					02-0260	“Support browser “was deleted. Support browser table was added.	DL AD
					02-0460	01874E06-01874E18 were corrected. 01874E12-01874E15 were changed.	CR CH
					02-0461	01874E19, 01874E1A were added.	AD
					02-0540	Message text was corrected. (CACHE→ CACHE1)	CR
					02-0550	Message text was corrected. (HSPC→ HSPC0)	CR
					02-0570	01894E06-01894E0D were added. Recovery measures of “018D5701” was changed.	AD CH
					02-0571	“018D5709” , “018D570A”and “018D570B” were moved to page 02-0571.	DL
					02-0571	“018D5709” , “018D570A”and “018D570B” were moved to this page from page 02-0570.	AD
					02-0590	Reference page of “018D570C-018D570F“ were added.	AD
					02-0590	Reference page of “018xxxD0-018xxxE0“ were corrected.	CR
					02-0590	Recovery measures of “R10100-R10121” were changed.	CH

Legend for revision codes : AD : Addition CH : Change CR : Correction DL : Deletion

REV.	Date	DRW	CHKD	APPD	Sheet No.	Description	Code
					02-0591	Recovery measures of "R10130-R10132" were added.	AD
						Recovery measures of "R10133" was changed.	CH
					02-0620	Recovery measures of "R303xy", "R304xy" were changed.	CH
						Massge code of "R312xx->R3120x" were changed.	
					02-0670	RAB0xy was added.	AD
						Recovery measures of "RB1000-RB1200", "RB1400-RB1700", and "RB2300-RB3500" were added.	
					02-0680	Recovery measures of "RB3600-RB5100" was added.	AD
					02-0701	Recovery measures of "RBF000" was added.	AD
					02-0730	Recovery measures of "I123xx" was added.	AD
					02-0760	Recovery measures of "I20100", "I20500" were changed.	CH
					02-0761	Recovery measures of "I20600" was changed.	CH
					02-0770	Notes were added.	AD
					02-0785	Message code of "I607xx-> I607xy" was corrected.	CR
					02-0787 to 02-0794	Message code of "I8000x-IGxxyy" were added .	AD
					02-0800	Recovery measures of "W0100x" was changed.	CH
					02-0842	Message code of "W47000->W4700x" was corrected.	CR
					02-0890	H2092x was added.	AD
					02-0900	Recovery measures of "H303xy" was changed. H3091x was added.	CH/AD
					02-0950	Description of "HA0532" was changed. Description of "HB0320"- "HB0522" were changed.	CH/AD
						HB0623-HB07xy were added.	
					02-0960	HD2400 was added.	AD
					02-1054	HJ21xx was added.	AD
					02-1090	*2 was added.	AD
					02-1120	*4 was added.	AD
					02-1210	*1 was added.	AD
					02-1260	*4 was added.	AD
					02-1290	*4 was added.	AD
					02-1400	RS-232C was deleted.	DL
					02-1430	Notice was added.	AD
					02-1450	Table 2.6.2 was moved.	CH
					02-1510	VER.0506 -> VER.0507 were corrected.	CR
					02-1521	"MRCF-Lite Failure Trace" was added.	AD
					02-1530	"Pair status of the MRCF-Lite function" was added.	AD
					02-1560	(b-6) was added.	AD
						(b-6)- (b-7) were changed.	CH
					02-1570	(b-8)- (b-10) were changed.	CH

Legend for revision codes : AD : Addition CH : Change CR : Correction DL : Deletion

REV.	Date	DRW	CHKD	APPD	Sheet No.	Description	Code
					02-1580	(b-13) was changed.	CH
					02-1590	(b-14)- (b-15) were changed.	CH
					02-1631	(j) was added.	AD
					02-1632	(j) was added.	AD
					02-1830	Notice was added.	AD
						<Disk array management program2> were added.	
					02-1831	<Disk array management program2> were added.	AD
					02-1920 to 02-1980	2.7 were added.	AD
					03-0090	Disk Array management program2 window was added.	AD
					03-0091	Disk Array management program2 window was added.	AD
					04-0010	Accessories device added.	AD
					04-0040	DF-F500-DF2G2 was added.	AD
					04-0180	Restriction of Item No.1 was changed. Procedure of (1) was changed. (2) was added. Figure 4.2.4 was moved to page 04-0190.	CH CH AD DL
					04-0190	(f) to (i) were deleted. Figure 4.2.4 was moved to this page from page 04-0180.	DL AD
					04-0231	DF-F500-DF2G2 was added.	AD
					04-0260	Notice was changed.	CH
					04-0300	Discription of (c) was changed.	CH
					04-0310	DF-F500-DF2G2 was added.	AD
					04-0330	Notice was changed.	CH
					04-0360	Discription of (b) was changed.	CH
					04-0390	Notice was changed.	CH
					04-0480	(b) was corrected to (a).	CR
					04-0490	Item 2 to table was added.	AD
					04-0501	This page was newly added.	AD
					04-0540	Item 8 was to *3. DF-F500-DF2G2 was added.	AD
					04-0680	Restriction of Item No.1 was changed. Procedure of (1) was changed. (2) was added. Figure 4.3.4 was moved to page 04-0681.	CH CH AD DL
					04-0681	This page was newly added. (Figure was moved from the provious page.)	AD
					04-0721	DF-F500-DF2G2 was added.	AD
					04-0740	DF-F500-DF2G2 was added.	AD
					04-0750	Notice was changed.	CH
					04-0780	Discription of (b) was changed.	CH
					04-0790	DF-F500-DF2G2 was added.	AD
					04-0800	Notice was changed.	CH
					04-0830	Discription of (a) was changed.	CH
					04-0860	Discription of (a) was changed.	CH
					04-0890	Discription of (a) was changed.	CH
					04-0950	Item 2 to table was added.	AD
					04-0961	This page was newly added.	AD

