

HDS REVISION NOTICE

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DOCUMENT REVISION LEVEL

Instructions: Add revised sheets and dispose of superseded sheets as indicated by the most current revision level. (Please see Notes.)

DATE	HITACHI REVISION LEVEL	HDS REVISION LEVEL	DESCRIPTION OF REVISION
4/98	0	0	Original HDS Edition.
11/98	1	0U1	See the Hitachi, Ltd. Revision Control sheet for details of this revision. This revision may be ordered as a separate package to be used as a base manual supplement. HDS Document Order #FE-98DF350-0U1
1/99	2	0U2	See the Hitachi, Ltd. Revision Control sheet for details of this revision. This revision may be ordered as a separate package to be used as a base manual supplement. HDS Document Order #FE-98DF350-0U2

NOTES:

1. Prior to disposal of superseded documents or sheets, please review applicable HDS policies and procedures on the disposal of proprietary or classified information.
2. To provide a historical revision record, please file this HDS Revision Notice sheet in the back of the revised manual.

DF350F Disk Subsystem MAINTENANCE MANUAL

Rev.2.1

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 describes specifications and interface of the DF350F disk array subsystem.
- For the procedure for installing the subsystem, refer to the user's operation manual.
- For maintenance works such as replacement of maintenance parts and troubleshooting, refer to the maintenance manual.
- Keep this manual at hand so that you can use it at any time.
- Copyrights of this manual are reserved by Hitachi, Ltd.
Contents of this manual cannot be reproduced or copied, in whole or in part, without permission of Hitachi, Ltd.
- Contents of this manual are subject to change without prior notice.
- It must be noted that Hitachi, Ltd. shall not be liable for the result of operation which is not described in this manual.
- This subsystem is a "class 1 laser system" which emits no hazardous laser beam. Be sure to operate it according to this manual. Do not perform an operations other than those written in this manual. Otherwise, unexpected failures or accidents may be caused.

REV.	Date	DRW.	CHKD	APPD	Sheet No.	Description	Code
0	Jan.20.'98	A.Yamanashi	K.Aruga	H.Iwasaki	All	Issued	
1	Jul.31.'98	A.Yamanashi	K.Aruga	H.Iwasaki	SAFETY	Rev.0 → Rev.1	CH
					ENTRY	Rev.0 → Rev.1	CH
					THEORY	Rev.0 → Rev.1	CH
					TRBL	Rev.0 → Rev.1	CH
					PERIOD	Rev.0 → Rev.1	CH
					M-FC	Rev.0 → Rev.1	CH
					PANEL	Rev.0 → Rev.1	CH
					MK-REP	Rev.0 → Rev.1	CH
					MK-INST	Rev.0 → Rev.1	CH
					MK-OPT	Rev.0 → Rev.1	CH
					MK-PART	Rev.0 → Rev.1	CH
					CK-REP	Rev.0 → Rev.1	CH
					CK-INST	Rev.0 → Rev.1	CH
					CK-OPT	Rev.0 → Rev.1	CH
					CK-PART	Rev.0 → Rev.1	CH
					RH-REP	Rev.0 → Rev.1	CH
					RH-INST	Rev.0 → Rev.1	CH
					RH-OPT	Rev.0 → Rev.1	CH
					RH-PART	Rev.0 → Rev.1	CH
					RH-FRAME	Rev.0 → Rev.1	CH
					RW-REP	Rev.0 → Rev.1	CH
					RW-INST	Rev.0 → Rev.1	CH
					RW-OPT	Rev.0 → Rev.1	CH
					RW-PART	Rev.0 → Rev.1	CH
					RW-FRAME	Rev.0 → Rev.1	CH
2	Oct.16.'98	A.Yamanashi			TRBL	Rev.1 → Rev.2	CH
					M-FC	Rev.1 → Rev.2	CH
					PANEL	Rev.1 → Rev.2	CH
					MK-REP	Rev.1 → Rev.2	CH
					MK-INST	Rev.1 → Rev.2	CH
					MK-OPT	Rev.1 → Rev.2	CH
					MK-PARTS	Rev.1 → Rev.2	CH
					CK-REP	Rev.1 → Rev.2	CH
					CK-INST	Rev.1 → Rev.2	CH
					CK-OPT	Rev.1 → Rev.2	CH
					CK-PARTS	Rev.1 → Rev.2	CH
					RH-REP	Rev.1 → Rev.2	CH
					RH-INST	Rev.1 → Rev.2	CH
					RH-OPT	Rev.1 → Rev.2	CH
					RH-PARTS	Rev.1 → Rev.2	CH
					RH-FRAME	Rev.1 → Rev.2	CH
					RW-REP	Rev.1 → Rev.2	CH
					RW-INST	Rev.1 → Rev.2	CH
					RW-OPT	Rev.1 → Rev.2	CH
					RW-PARTS	Rev.1 → Rev.2	CH
					RW-FRAME	Rev.1 → Rev.2	CH

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[Common to all types]

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2. THEORY OF OPERATION	THEORY0000
3. TROUBLESHOOTING	TRBL0000
4. PERIODIC	PERIOD0000
5. MICROPROGRAM-FC	M-FC0000
6. PANEL	PANEL0000

[MK type]

7. PARTS REPLACEMENT	MK-REP0000
8. INSTALLATION	MK-INST0000
9. OPTIONAL INSTALLATION	MK-OPTION0000
10. PARTS CATALOG	MK-PARTS0000

[CK type]

7. PARTS REPLACEMENT	CK-REP0000
8. INSTALLATION	CK-INST0000
9. OPTIONAL INSTALLATION	CK-OPTION0000
10. PARTS CATALOG	CK-PARTS0000

[RKH type]

7. PARTS REPLACEMENT	RH-REP0000
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[RKWH type]

7. PARTS REPLACEMENT	RW-REP0000
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11. PROCEDURES FOR INSTALLING	RW-FRAME0000

Search Flowchart

Find the item you want to refer to in this DF350F Maintenance Manual.

To troubleshoot

→ See Chapter 3 "TROUBLESHOOTING" (TRBL0000).

To replace parts

→ See Chapter 7 "PARTS REPLACEMENT" for the type used (XX-REP0000).

To update the microprogram

→ See Chapter 5 "MICROPROGRAM-FC" (M-FC0000).

To perform periodic inspection

→ See Chapter 4 "PERIODIC" (PERIOD0000).

To install

→ See Chapter 8 "INSTALLATION" for the type used (XX-INST0000).

To add options

→ See Chapter 9 "OPTIONAL INSTALLATION" for the type used (XX-OPTION0000).

To mount in the rack frame of the rackmount type

→ See Chapter 11 "PROCEDURES FOR INSTALLING" for the type used (XX-FRAME0000).

• See SAFETY0000 for the precautions for safe handling.

• See ENTRY0000 for how to use this manual.

• See THEORY0000 for the description of this unit.

• See PANEL0000 for how to operate the panel.

• See XX-PARTS0000 for the list of parts for the type used.

DF350F Disk Subsystem

0. SAFETY SUMMARY

Rev.1

REVISION CONTROL

Legend for revision codes : AD : Addition CH : Change CR : Correction DL : Deletion

REV.	Date	DRW.	CHKD	APPD	Sheet No.	Description	Code
0	Jan.20.'98	A.Yamanashi	K.Aruga	H.Iwasaki	All	Issued	
1	Jul.25.'98	A.Yamanashi			0030	Added 'This subsystem is a "class 1 laser system"...'.	AD

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1.  General Safety Guidelines SAFETY0030
2. WARNING statement..... SAFETY0070
3.  Locations where WARNING and CAUTION labels are Affixed SAFETY0100

△ 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 headings Danger, 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 subsystem is a "class 1 laser system" which emits no hazardous laser beam. Be sure to operate it according to this manual. Do not perform an 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 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, hold it close to yourself and keep your back 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 bit, or point.
- Before finishing your work, make sure that all parts removed during maintenance have been in stalled 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.

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.

 SAFETY SUMMARY (Continued)

Procedure in an emergencyFor 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, cardio-pulmonary 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.

(1) ⚠ Danger statement

No Danger statement

(2) ⚠ Warning statement

- **Power supply is turned on. Be careful not to touch the live parts to avoid an electric shock.**

(PERIOD0040, 0050, 0060)

- **The fan is rotating fast. Do not touch the fan.**

(PERIOD0070)

- **Only the maintenance personal should operate this maintenance.**

The operation by the user is prohibited absolutely.

(CK-REP0500, MK-REP0500, RH-REP0530, RW-REP0520)

- **Don't touch indise of In Box ASSY. Electricity remains even if main switch is off.**

(CK-REP0520, MK-REP0520, RH-REP0550, RW-REP0540)

- **A large leak current flows when plural subsystems of DF350F-RKH are installed.**

Be sure to ground them for preventing an electric shock accident.

(RH-FRAME0310)

- **A large leak current flows when plural subsystems of DF350F-RKWH are installed.**

Be sure to ground them for preventing an electric shock accident.

(RW-FRAME0350)

(3) ⚠ Caution statement

- **Use of controls, adjustments, or performance of procedures other than those specified herein may result in hazardous radiation exposure.**

(ENTRY0070)

- **The battery contains a poisonous substance. An electric shock may be caused by inappropriate handling. Be sure to follow the instructions below.**

(1) **Do not disassemble or remake the battery.**

(2) **Do not deform the battery.**

(3) **Do not connect (+) pole to (–) pole with metallic article such as a steel wire.**

(4) **Do not reverse (+) and (–) 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 at a hot place. Store the battery in a dark, cool place.**

(ENTRY0130)

⚠ SAFETY SUMMARY (Continued)

- **If an LED which indicates the voltage error comes on, internal power supply may fail.**
When the internal power supply fails, an electric shock or fire may be caused. If you find the error, turn off the power, then call the service personnel.
 (TRBL0130)
- **Do not place it on the unstable place, on the shaky table, or the inclined place, etc.**
Dropping or a fall of it may cause an injury.
 (THEORY0140)
- **Power supply is turned on. Be careful not to touch the live parts to avoid an electric shock.**
 (PERIOD0040, PERIOD0050, PERIOD0060)
- **The fan is rotating fast. Do not touch the fan.**
 (PERIOD0070)
- **Do not disintegrate removed Battery. It may cause burn or electric shock.**
 (PERIOD0100, CK-REP0330, MK-REP0330, RH-REP0350, RW-REP0350)
- **Make sure that AC cable is not damaged. It may cause electric shock or fire.**
 (PERIOD0110, CK-REP0190, MK-REP0170, RH-REP0180, RW-REP0180)
- **When replacing parts without turning off the power, do not put on metallic accessories or watches so that to avoid electric shock.**
Be careful not to touch the electrified parts with a screwdriver etc.
 (CK-REP0040, MK-REP0040, RH-REP0040, RW-REP0040)
- **Do not subject HDU ASSY to any impact or vibration since it is a precision component.**
 (CK-REP0280, 0290, CK-INST0140, CK-OPTION0220,)
 (MK-REP0280, 0290, MK-INST0120, MK-OPTION0220,)
 (RH-REP0300, 0310, RH-INST0130, RH-OPTION0250,)
 (RW-REP0300, 0310, RW-INST0140, RW-OPTION0240)
- **FAN is rotating with right speed, be careful not to be caught by the FAN.**
 (CK-REP0320, MK-REP0320, RH-REP0340, RW-REP0340)
- **The unpacking and installation should be carried out by 2 or more personnel to prevent turning over of the device or being caught under the device.**
 (CK-INST0050, MK-INST0050, RH-INST0050, RW-INST0050)
- **Do not block the ventilation. With the temperature rise, it may cause failure or fire.**
 (CK-INST0130, MK-INST0110, RH-INST0100, RW-INST0110)
- **The leveling bolts of the frame should have been lowered to touch the floor before installing the subsystem in the rack.**
Do not attempt to start installation before lower the leveling bolts (to prevent the equipment from falling).
- **Do not draw out two or more subsystems installed at a time (to prevent the equipment from falling).**
Install subsystems to the rack starting from the bottom position, in order to prevent turning over.
 (RH-FRAME0050, 0130, 0230,)
 (RW-FRAME0050, 0150, 0260)

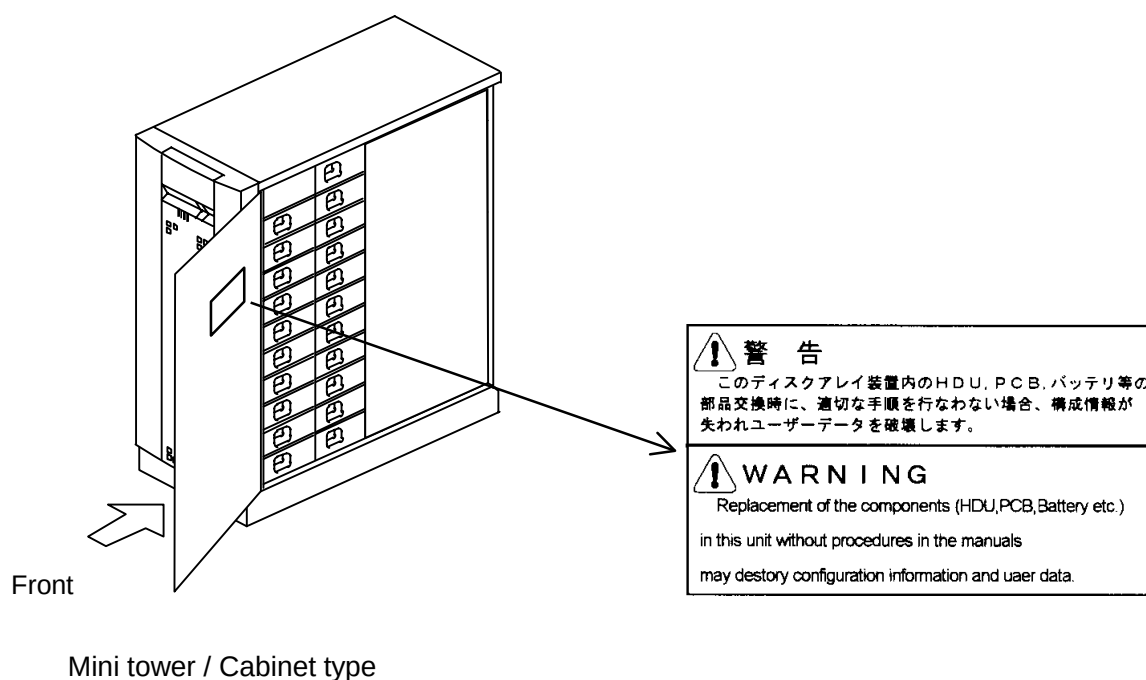
⚠ SAFETY SUMMARY (Continued)

- **Be sure to perform the work with two or more persons. The mass of the DF350F-RKH disk subsystem is approximately 60kg.**
(RH-FRAME0050, RH-FRAME0130, RH-FRAME0230)
- **The mass of the DF350F-RKH is approximately 60kg. Be sure to hold it by its handles with two or more persons when installing it in the rack frame.**
Make sure that the front panel of the DF350F-RKH is secured tightly before installing the DF350F-RKH in the rack frame. If not, the front panel may come off during the installation causing a personal injury.
(RH-FRAME0100, RH-FRAME0190, RH-FRAME0280)
- **Be sure to perform the work with two or more persons. The mass of the DF350F-RKWH disk subsystem is approximately 105kg.**
- **Install subsystems to the rack starting from the bottom position, in order to prevent turning over.**
(RW-FRAME0050, RW-FRAME0150, RW-FRAME0260)
- **The mass of the DF350F-RKWH is approximately 105kg. Be sure to hold it by its handles with two or more persons when installing it in the rack frame.**
Make sure that the front panel of the DF350F-RKWH is secured tightly before installing the DF350F-RKWH in the rack frame. If not, the front panel may come off during the installation causing a personal injury.
(RW-FRAME0110, RW-FRAME0220, RW-FRAME0310)
- **The carrier is not fixed to the rack frame. Therefore take care when lifting/mounting the unit from/on carrier.**
(RW-FRAME0050, RW-FRAME0150, RW-FRAME0260)
- **Do the work following the safety instructions concerning HP rack frame.**
(RH-FRAME0050, RW-FRAME0050)
- **Do the work following other safety instructions concerning IBM AS/400 (9309) rack frame.**
(RH-FRAME0130, RW-FRAME0150)

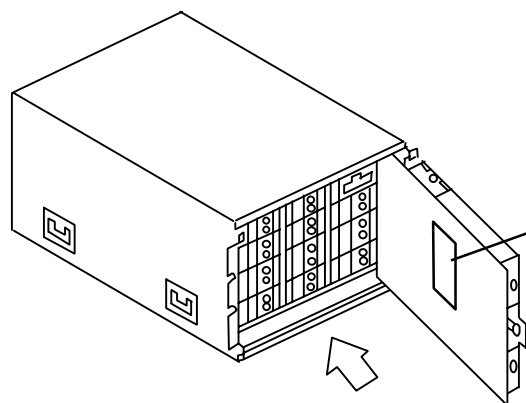
⚠ SAFETY SUMMARY (Continued)

03. ⚠ Locations where **WARNING** and **CAUTION** labels are Affixed.

Locations where WARNING and CAUTION labels are affixed are shown below.



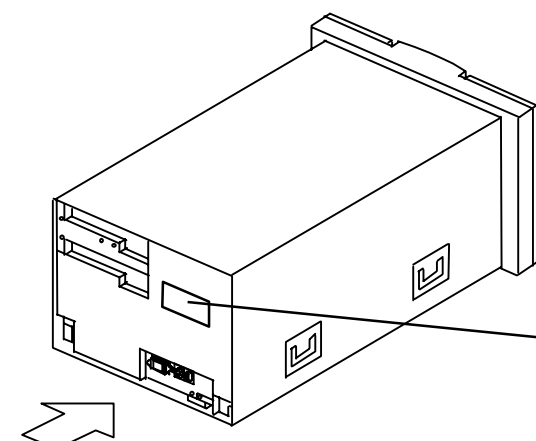
⚠ SAFETY SUMMARY (Continued)



Front

⚠ 警告
このディスプレイ装置内の
のHDI, PCB, バッテリ等の
部品交換時に、適切な手順を行
なわない場合、構成情報が失わ
れユーザーデータを破壊します。

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



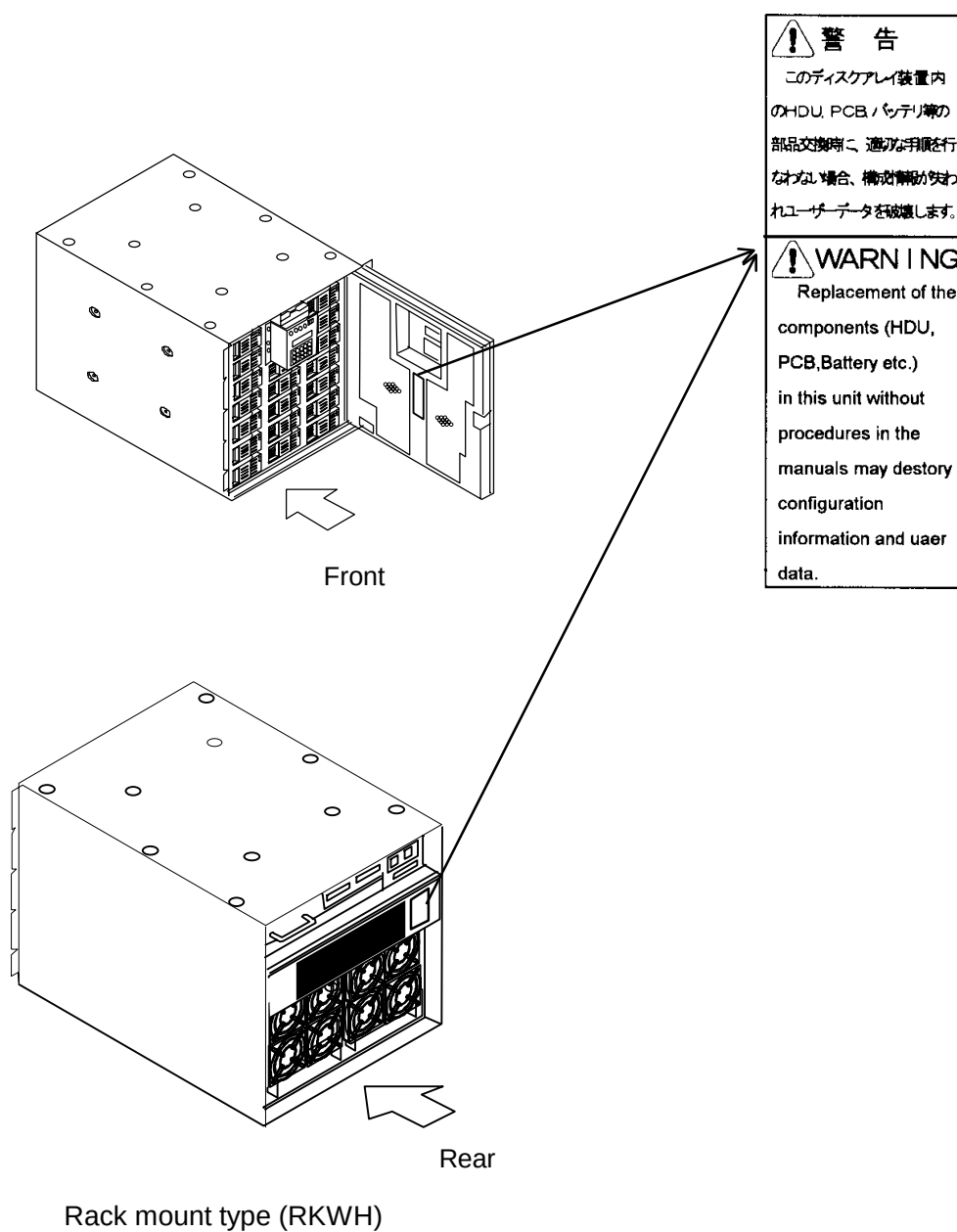
Rear

Rack mount type (RKH)

⚠ 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、適切な手順を行わない場合、構成情報が
失われユーザーデータを破壊します。

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

⚠ SAFETY SUMMARY (Continued)



⚠ SAFETY SUMMARY (Continued)

⚠ Must not pick up the equipment to use handle(Fan) and handle(Battery). Follow the procedure described in the installation manual to move.

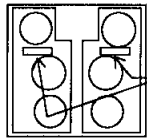
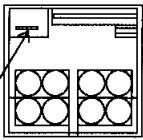



FIG.1 Front View **FIG.2 Rear View**

Notice

(1) Handle (Fan) are used removing fan or opening front cover.
 (2) Handle (Battery) is used removing battery only.

⚠ ファン及びバッテリーのハンドルを持って装置を移動もしくは持ち上げることを禁止します。装置の取扱いは、インストールマニュアルの手順に従って下さい。

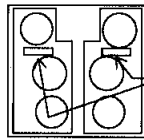
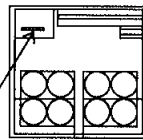
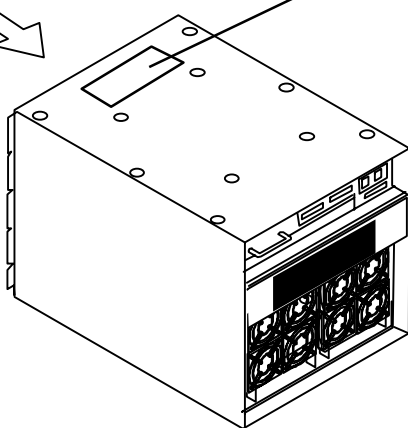



図 1. 装置前面 **図 2. 装置後面**

注意

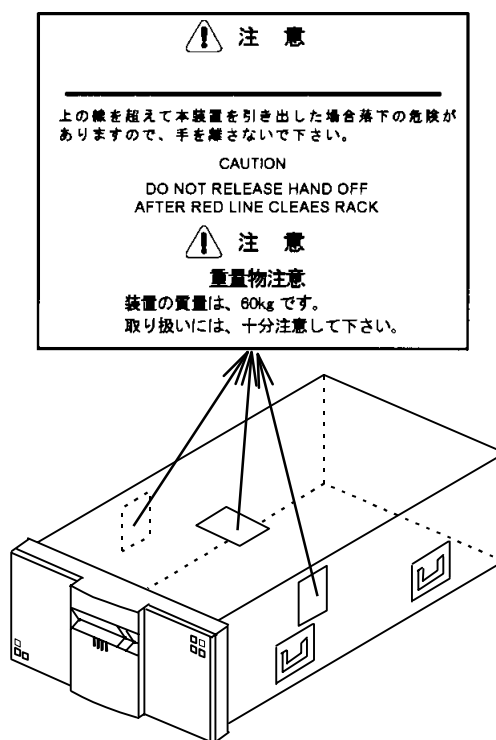
(1) ハンドル(ファン)はファンの取り外し及びフロントカバーの開閉にのみ使用します。
 (2) ハンドル(バッテリー)はバッテリーの交換にのみ使用します。

Front

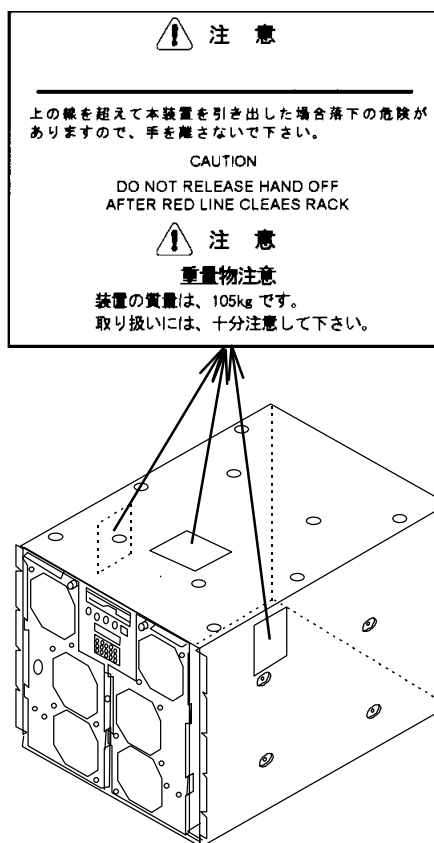


Rack mount type (RKWH)

⚠ SAFETY SUMMARY (Continued)



Rack mount type (RKH)



Rack mount type (RKWH)

DF350F Disk Subsystem

1. ENTRY

Rev.1

REVISION CONTROL

Legend for revision codes : AD : Addition CH : Change CR : Correction DL : Deletion

REV.	Date	DRW.	CHKD	APPD	Sheet No.	Description	Code
0	Jan.20.'98	A.Yamanashi	K.Aruga	H.Iwasaki	All	Issued	
1	Jul.25.'98	A.Yamanashi			0020 0030 0040 0050 0095	Added 1.7. Added 1.7. Added Notice. Changed flowchart. This page was newly added.	AD AD AD CH AD

Start all maintenance work from this section.

1. Before Maintenance Work

Always confirm the contents of the following sections 1.1 to 1.7 before starting maintenance of this unit.

- 1.1 Precautions for Replacing the Parts
- 1.2 Prohibited Actions during Maintenance of the Unit to Prevent Customer Data from Being Erased
- 1.3 LASER SAFETY COMPLIANCE
- 1.4 Precautions for the Recovery Method
- 1.5 Precautions for Replacing the HDU ASSY
- 1.6 Note on Completing Maintenance Work
- 1.7 Notes on Microprogram Revision

1.1 Precautions for Replacing the Parts

- (1) Do not subject the unit to any vibration or shock.

Notice : The hard disk drive mounted in this unit is a precision component. Be careful not to subject this unit to any vibration or shock during maintenance. Take care especially when you handle the HDU ASSY.

- (2) Check the back-up state of the CACHE memory.

The CACHE memory of this unit provides write-after control. If data is not yet written, before the power is turned off, the unit automatically writes the data on the CACHE memory to the hard disk. This is called destaging. After this processing is completed, the power is turned off.

If the power is turned off in a state in which destaging cannot be completed due to an unexpected power interruption or a tripped circuit breaker, the CACHE memory switches to the back-up mode using the battery for data integrity. If any equipment of the unit is removed or inserted in this back-up mode, the battery may stop supplying power, resulting in the user data being lost. When you handle any equipment of the unit with the unit power off, be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

Notice : If installation/de-installation of the mounted component (HDU ASSY, AC/DC power supply, CTL ASSY, Battery ASSY, or I/F ADAPTER ASSY (DK/DKH type only)) is executed while keeping the subsystem in the backup mode, the battery may be powered off causing user's data to be lost.

When handling the component with the subsystem power off, be sure to check if data in the cache memory has been backed up, and execute the maintenance in the state that the subsystem is released from the backup mode.

- Checking the back-up state of the cache memory

You can determine whether the unit is in the back-up mode by checking the indication of the CACHE PWR (green LED) on the CTL ASSY, as described below.

Set the circuit breaker on the rear of the unit to “|” (ON) with the power switch (POWER SW) set to “○” (OFF).

Determine the state of the memory from the indication of the CACHE PWR.

CACHE PWR LED on ----- Indicates the back-up mode.

CACHE PWR LED off ----- Indicates that the back-up mode is canceled.

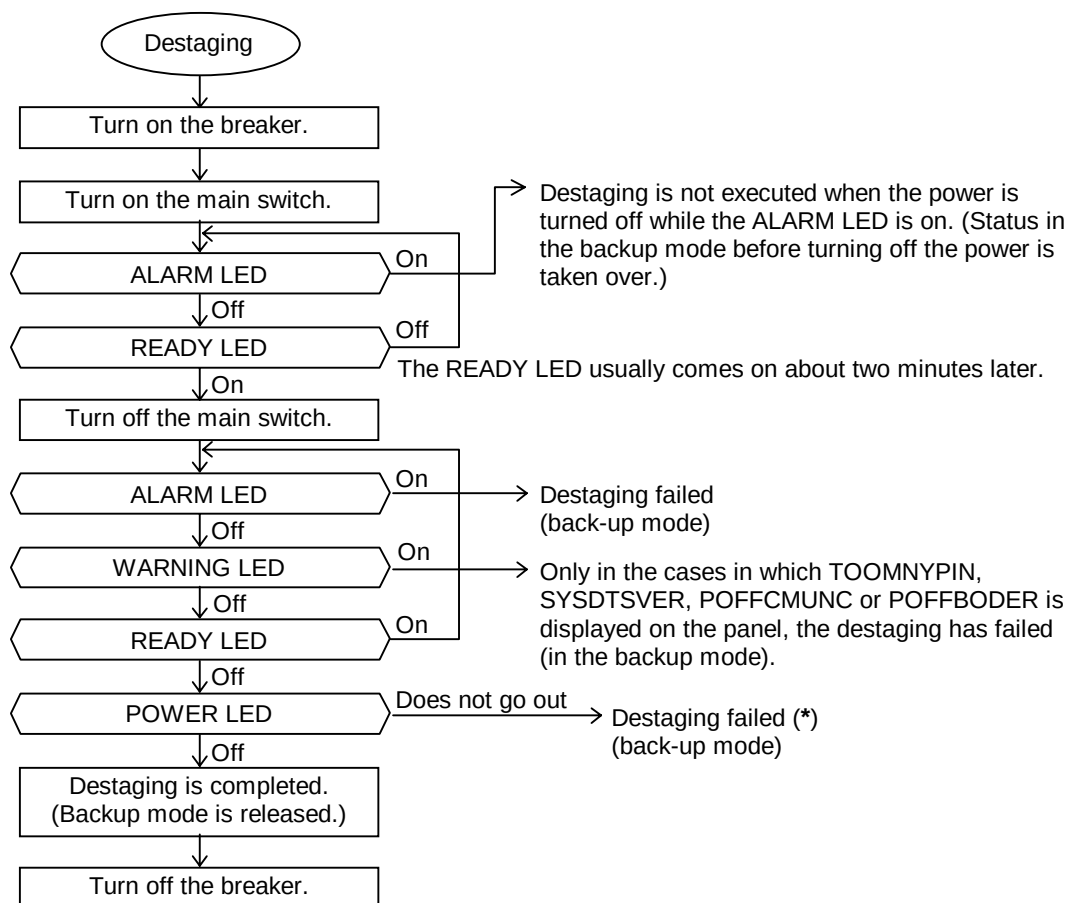
- Canceling the back-up mode of the CACHE memory

Perform the following procedure (ENTRY0050) to cancel the back-up state of the CACHE memory. After canceling the back-up state according to this procedure, make sure that the back-up state is canceled before starting maintenance work.

- (3) When you are replacing parts such as the CTL ASSY or SVP ASSY, insert them straight along the rails of the unit. If you fail in insertion, check the connectors of the parts and the pins of the unit for deformation, and then reinsert the parts.

1.1.1 Precautions for updating the microprogram

Make sure that no drive failure is present when you update the microprogram.



* : If destaging failed, retry the above processing several times. If all retrials fail, see Chapter 3, "Troubleshooting," to complete destaging before starting maintenance work.

Note : All LEDs mentioned in the flowchart above are those on the front of the subsystem.



1.2 Prohibited Actions during Maintenance of the Unit to Prevent Customer Data from Being Erased

- Do not start up delete the RAID group.
- Do not start up delete LU.
- Do not start up format LU.
- Do not start up with the DIP switches 5 and 7 on.

• **Do not delete the RAID group. It would result in all user data being lost.**

Pressing the key when the panel display is

R	A	I	D		C	O	N	F	I	G							
D	E	L	E	T	E												

displays the following RAID group deletion confirmation message :

D	E	L	E	T	E												
A	L	L		R	A	I	D										

Press the key, and 'QUIT' is displayed. Then press the key to cancel deleting the RAID group.

Pressing the key with the RAID group deletion confirmation message displayed would delete the RAID group, resulting in the user data being lost.

• **Do not delete LU. It would result in all user data being lost.**

Pressing the key when the panel display is

L	U		C	O	N	F	I	G									
D	E	L	E	T	E												

displays the following LU deletion confirmation message :

D	E	L	E	T	E												
A	L	L		L	U												

Press the key, and 'QUIT' is displayed. Then press the key to cancel deleting LU.

Pressing the key with the LU deletion confirmation message displayed would LU, resulting in the user data being lost.

• **Do not format LU.**

Formatting LU would result in the data on the disk being lost.

• **Do not start up with the DIP switches 5 and 7 on.**

Doing so would initialize the configuration information.

1.3 LASER SAFETY COMPLIANCE

DF350F use a laser product (MIM1063G). When you use DF350F then keep below.

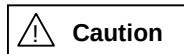
The MIM1063G module is an international Class 1 laser product under IEC825 and the US Department of Health and Human Services (DHHS) Radiation Performance Standard. The Center for Device and Radiological Health (CDRH) of the US Food and Drug Administration implemented regulation for laser products on August 2, 1996. Compliance is mandatory for products marketed in the United States. The information shown below indicates compliance with the CDRH regulations.

This product conforms to the applicable requirements of 21 CFR Chapter 1, Sub Chapter J, Parts 1040.10 and CENELEC HD 482 SI using IEC825 standard.

This product is a Class 1 product, Laserklasse 1, and complies with Par. 3 of the "Equipment Safety Law" of June 24, 1968.

The module has been approved by the following safety certification agencies:

- Underwriters Laboratories (UL) Recognized Product, File Number E157779. Applicable requirements: UL 1950.
- Canadian Standards Association (CSA), File Number LR 1018538. Applicable requirements: CAN/CSA C22.2 No.950.
- Center for Device and Radiological Health (CDRH), Accession Number 9622099.
- TÜV Essen of North America, License Number B 97 05 28026 003. Applicable requirements: EN60950 A3: 1995, EN60825-1: 1994 and All: 1996, EN60825-2: 1994.



Use of controls, adjustments, or performance of procedures other than those specified herein may result in hazardous radiation exposure

1.4 Precautions for the Recovery Method

- (1) If any of the following errors is displayed on the panel screen, perform recovery surely according to the procedure described in Subsection 2.2.3, "Details of the Recovery Method" (TRBL0810) in Chapter 3, "Troubleshooting".

- * RZ0800 DLOADFAIL ----- Drive load error
- * W01300 USRDATLST ----- User data lost because of volatile cache
- * W00F00 TOOMNPIN----- Scheduled shutdown impossible because of an excessive amount of PIN data
- * W01000 POFFBODER ----- PIN data could not be stored on the disk during scheduled shutdown because a hardware failure occurred
- * W01100 SYSDTSVER----- Scheduled shutdown impossible because there is no drive to save inherited information
- * W01200 POFFCMUNC----- Scheduled shutdown impossible because PIN data cannot be saved due to a cache failure
- * W01400 PINOVER----- PIN segment number was over PIN threshold
- * W202XY LUALM-XY----- LU blocked, or drive blocked in blocked LU
- * I016XY DRVERR-XY ----- An error that would cause the drive to be blocked occurred but the drive was not blocked because there was no redundancy.
- * I017XY RCVWNG-XY----- Data recovery ended on the condition with write-unfinished registration
- * I012XY PCVRT-XY ----- Data recovery failed
- * W60AXY DMAALM-XY ----- DMA error occurred at DMA#0, DMA#1, DMA#2, or DMA#3
- * W622XY LAERR1-XY ----- LA (LUN) error occurred at DMA#1
- * W623XY LRCERR1-XY ----- LRC (LUN) error occurred at DMA#1
- * W624XY LAERR2-XY ----- LA (LUN) error occurred at DMA#2
- * W625XY LRCERR2-XY ----- LRC (LUN) error occurred at DMA#2
- * W626XY LAERR3-XY ----- LA (LUN) error occurred at DMA#3
- * W627XY LRCERR3-XY ----- LRC (LUN) error occurred at DMA#3
- * H***** ----- SYSTEM Error occurred
- * H60419 LANPERR----- Parity error of data bus on LSI for LANCTL

etc...

1.5 Precautions for Replacing the HDU ASSY

- (1) If the unit uses the RAID5 level, an error on one of the five built-in disks in one row would not result in data being lost.

If a disk failure occurs, determine the port number and row number of the faulty disk from the error code displayed on the SVP panel and then replace the disk with the unit power on. (Data recovery is also possible for RAID1/A.)

Notice : If a normal HDU ASSY is replaced by mistake, the customer data is erased.

(HDU swapping to determine the HDU at the RAID5 level erases the customer data.) Follow Section 4.3 in Chapter 7 to determine the port number and row number of the HDU ASSY to be replaced.

1.6 Note on Completing Maintenance Work

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

It is required to keep 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.)

1.7 Notes on Microprogram Revision

In some cases maintenance works vary depending on the microprogram revision. After confirming the revision, perform the maintenance works corresponding to it.

The microprograms are roughly classified into 2 types as shown below.

No.	Microprogram type	Microprogram contents	Revision No. determination rule
1	NON-SNMP	Microprogram not supporting SNMP function.	03xx/xx ("x" is optional)
2	SNMP	Microprogram supporting SNMP function.	43xx/xx ("x" is optional)

This manual explains the maintenance operation in the case of the NON-SNMP microprogram as an representative. Therefore, when the SNMP microprograms is used, change its revision No. to that of the NON-SNMP microprogram to determine the maintenanceworks.

2. How to Use this Manual

This maintenance manual consists of this and ten other chapters listed below. Each chapter has a table of contents to allow quick reference to the desired page.

① ENTRY -----	ENTRY	Common to all types
② THEORY OF OPERATION -----	THEORY	
③ TROUBLESHOOTING -----	TRBL	
④ PERIODIC -----	PERIOD	
⑤ MICROPROGRAM-FC -----	M-FC	
⑥ PANEL -----	PANEL	Specific to each type
⑦ PARTS REPLACEMENT -----	REP	
⑧ INSTALLATION -----	INST	
⑨ OPTIONAL INSTALLATION -----	OPTION	
⑩ PARTS CATALOG -----	PARTS	
⑪ PROCEDURES FOR INSTALLING - FRAME		

Chapters ① to ⑥ are common to all types (mini tower, cabinet and rackmount types).

Chapters ⑦ to ⑩ are specific to each type. Chapter ⑪ is for the rackmount type only.

① ENTRY

This Chapter describes the precautions for maintenance of the DF350F, and the use of the maintenance manual. The chapter name is described as ENTRYxxxx at the bottom of each page.

② THEORY OF OPERATION

This chapter describes the specifications for the DF350F and shows its appearance. The chapter name is described as THEORYxxxx at the bottom of each page.

③ TROUBLESHOOTING

This chapter covers troubleshooting the DF350F. The chapter name is described as TRBLxxxx at the bottom of each page.

④ PERIODIC

This chapter covers the periodic inspection of the DF350F. The chapter name is described as PERIODxxxx at the bottom of each page.

⑤ MICROPROGRAM-FC

This chapter covers field changes of the microprogram of the DF350F. The chapter name is described as M-FCxxxx at the bottom of each page.

⑥ PANEL

This chapter describes the functions of the panel of the DF350F and how to operate the panel. The chapter name is described as PANELxxxx at the bottom of each page.

⑦ PARTS REPLACEMENT

This chapter covers replacing the parts of the DF350F. The chapter name is described as shown below at the bottom of each page, where REP, the abbreviation for the chapter name, is preceded by the symbol indicating the type of the DF350F.

Mini tower type ----- MK-REPxxxx

Cabinet type----- CK-REPxxxx

Rackmount (RKH) type----- RH-REPxxxx

Rackmount (RKWH) type----- RW-REPxxxx

⑧ INSTALLATION

This chapter describes how to install the DF350F. The chapter name is described as shown below at the bottom of each page, where INST, the abbreviation for the chapter name, is preceded by the symbol indicating the type of the DF350F.

Mini tower type ----- MK-INSTxxxx

Cabinet type----- CK-INSTxxxx

Rackmount (RKH) type----- RH-INSTxxxx

Rackmount (RKWH) type----- RW-INSTxxxx

⑨ OPTIONAL INSTALLATION

This chapter covers adding options to the DF350F. The chapter name is described as shown below at the bottom of each page, where OPTION, the abbreviation for the chapter name, is preceded by the symbol indicating the type of the DF350F.

Mini tower type ----- MK-OPTIONxxxx

Cabinet type----- CK-OPTIONxxxx

Rackmount (RKH) type----- RH-OPTIONxxxx

Rackmount (RKWH) type----- RW-OPTIONxxxx

⑩ PARTS CATALOG

This chapter covers the parts catalog of the DF350F. The chapter name is described as shown below at the bottom of each page, where PARTS, the abbreviation for the chapter name, is preceded by the symbol indicating the type of the DF350F.

Mini tower type ----- MK-PARTSxxxx

Cabinet type----- CK-PARTSxxxx

Rackmount (RKH) type----- RH-PARTSxxxx

Rackmount (RKWH) type----- RW-PARTSxxxx

⑪ PROCEDURES FOR INSTALLING

This chapter covers rack mounting of the DF350F. The chapter name is described as shown below at the bottom of each page, where FRAME, the abbreviation for the chapter name, is preceded by the symbol indicating the type of the DF350F.

Rackmount (RKH) type----- RH-FRAMExxxx

Rackmount (RKWH) type----- RW-FRAMExxxx

3. GLOSSARY

ALM-----	Alarm
CDB -----	Command Descriptor Block
CTL-----	Control
CTLWD-----	Control-Word
DBUF -----	Data Buffer
D-CTL-----	Data Control
DMA -----	Direct Memory Access
DRR -----	Data Recovery and Reconstruction
ECC-----	Error Checking and Correcting
ECLKERR-----	External Clock Error
FDD -----	Floppy Disk Drive
HDU -----	Hard Disk Unit
I/F -----	Interface
ID -----	Identifier
LCD -----	Liquid Crystal Display
ICLKERR -----	Internal Clock Error
LED-----	Light Emitting Diode
MPU-----	Micro Processor Unit
NVS -----	Non-Volatile Storage
PCI-----	Power Control Interface
PIC-----	Peripheral Interface Controller
PS -----	Power Supply
PSALM -----	Power Supply Alarm
PTYERR-----	Parity Error
PWR-----	Power
RDY -----	Ready
REM-----	Remote
RST-----	Reset
R/W-----	Read/Write
SCSI -----	Small Computer System Interface
SPC -----	Sub-Processor
SW-----	Switch
TERMPWR -----	Terminator Power
THALM-----	Thermal Alarm

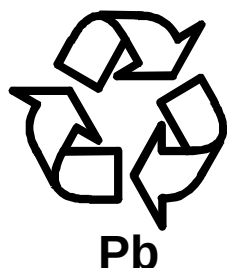
4. Recycling

(1) Parts to be recycled

This unit uses a lead battery, which is a valuable and recyclable resource. When you replace parts or dispose of used products, remove the lead battery for recycling.

(2) Recycle mark

The following three-arrow recycle mark indicates that the lead battery can be recycled. this mark is pasted on the rear of the unit.



(3) Position of the lead battery and how to remove it

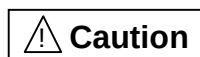
For the position of the lead battery and how to remove it, see “Replacing the battery” in Chapter 7 (for the type used).

(4) Specifications for the lead battery

No.	Specifications	Mini tower (MK), Cabinet (CK) and Rackmount (RKWH) type	Rackmount (RKH) type
1	Manufacturer	Hitachi, Ltd.	
2	Model	HP10-6 (6M10.0)	HP6-6 (6M6.0)
3	Voltage [V]	6	
4	Capacity [Ahr]	10	6

(5) Disposing of the battery and its safe keeping

To prevent the removed lead battery from short-circuiting, place insulation tape on its terminals or take other proper countermeasures. Do not store the battery with dry batteries or other batteries.



The battery contains a poisonous substance. An electric shock may be caused by inappropriate handling. Be sure to follow the instructions below.

- (1) Do not disassemble or remake the battery.**
- (2) Do not deform the battery.**
- (3) Do not connect (+) pole to (-) pole with metallic article such as a steel wire.**
- (4) Do not reverse (+) and (-) 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 at a hot place. Store the battery in a dark, cool place.**

DF350F Disk Subsystem

2. THEORY

Rev.1

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

REV.	Date	DRW.	CHKD	APPD	Sheet No.	Description	Code
0	Jan.20.'98	A.Yamanashi	K.Aruga	H.Iwasaki	All	Issued	
1	Jul.25.'98	A.Yamanashi			0030 0050 0070 0080 0090 0100 0260	Added (4D+1P, 3D+1P, 2D+1P). Added (4D+1P, 3D+1P, 2D+1P). Changed maximum capacity. Added 17.8GB. 4D, 3D, 2D. Changed 'Energy saving'. Added *9. Added ㊦.	AD AD CH AD CH AD AD

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1. Outline of RAID Architecture

The purposes of the RAID technology are to reduce the cost of disk subsystem, improve the reliability, and increase the I/O performance. DF350F supports RAID0, RAID1, RAID5 (4D+1P) and RAID 0+1 (called RAIDA later) to meet these purposes. The characteristics of each RAID level are explained briefly hereunder.

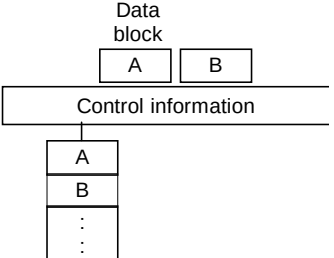
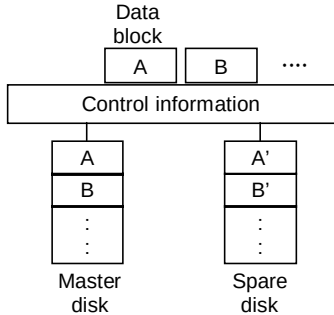
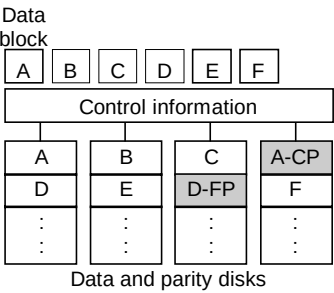
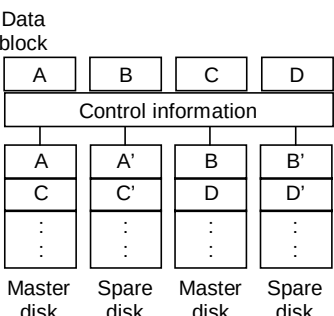
1.1 Outline of the Disk Array

The concept on the disk array was announced by the research group of the University of California, Berkeley in 1987. The group called the disk array a RAID (Redundant Array of Inexpensive Disks : a disk subsystem consisting of multiple inexpensive compact disks to provide redundancy) and classified its family into 5 levels ; RAID1 to RAID5. RAID1 to RAID5 are generally used as classification terms of the disk array systems at present.

1.2 Outline of RAID Systems

Table 1.2.1 shows advantages and disadvantages of the RAID1, RAID5 and RAID0 systems and the conventional disk system (called RAID0).

Table 1.2.1 Outline of RAID System

Level	Configuration	Characteristics	
RAID 0		Outline	Each data block is written on one disk.
		Advantages	Redundant disks are unnecessary. Parity processing is unnecessary.
		Disadvantage	Since there is no data redundancy, the usability is low.
RAID 1		Outline	Mirror disks are used (double writing is performed). The same data is written on both master and spare disks.
		Advantages	Since data is duplicated, the usability and reliability are high.
		Disadvantage	A disk capacity which is double the user data capacity is necessary.
RAID 5		Outline	Data is written on multiple disks one by one in units of a block (or blocks). Parity data is generated from data in multiple of blocks and written on an optional disk.
		Advantages	Since each disk can receive input and output instructions independently, this level is suited to transaction processings consisting of mainly small-capacity random accessed. Parity data provides high reliability and high usability at a comparatively lower cost.
		Disadvantage	Since parity data is updated when data is updated, an internal reading operation of the data before updating and the parity data before updating is necessary so that another input and output operations are adversely affected.
RAID 0+1 (RAIDA) *1		Outline	Decentralizes data to two disks and write the identical data on the master and spare disks.
		Advantages	Since data is duplicated, the usability and reliability are high. It is fitter than the RAID1 for transaction processings mainly consist of small sized random accesses since each disk in it can accept I/Os independently by virtue of the data decentralization.
		Disadvantage	A disk capacity which is double the user data capacity is necessary.

*1 : Striped RAID0.

1.3 Application of RAID Technology

When one I/O processing spans multiple disk drives (when the stripe size is too small) during transaction processing in RAID5, the performance cannot be fulfilled sufficiently.

Therefore, thorough examination is required on the stripe size.

In DF350/DF350F, three stripe sizes of 16k, 32k and 64k can be selected and the default value is set at 64k by making good use of the experience obtained through uses of the DF300s.

Lump writing of data to the drive and prereading of old data are performed by using the cache memory so as to prevent occurrence of write penalty as far as possible.

- **Write penalty**

In the DF350/DF350F (RAID5), 5 disk drives constitute one parity group (4D + 1P). Since parity data is generated from 4 data disks in the group, when partial writing of one stripe in the group occurs in the transaction processing, it is necessary to generate the corresponding parity data in the group once again. Since parity data is calculated by the following calculation formula, to create “data before updating”, “parity before updating” and “data after updating” are necessary the parity. Extra processing of reading “data before updating” at this time is called write penalty.

[New parity] = ([Data before updating] EOR [Data after updating]) EOR [Parity before updating]

2. Differences between DF350/DF350F and DF300

Differences between the DF350/DF350F and former DF300 are explained below. They are at the same time characteristics of the DF350 and DF350F.

- **Use of high-speed RISC processor**

The DF300 used the RISC processor I960 CA (20 MHz) as the microprocessor. Whereas concerning the DF350 and DF350F, it was changed to I960 CF (33 MHz) with higher speed.

- **Increase in cache capacity**

Capacity of the cache was increased from 256 MB (maximum for the DF300) to 1 GB (for the DF350 and DF350F) so that high-speed read/write processings were realized.

- **Use of flash memories**

The DF300 used EEPROMs for storing the configuration information, whereas concerning the DF350 and DF350F, they are changed to flash memories (with fixed parts and changeable parts).

- **Remarkable enhanced performance of internal bus**

Performance of the bus between the cache and the DMA was enhanced from 71 MB (for the DF300) to 106 MB (for the DF350 and DF350F).

- **Use of ultra SCSI and fibre channel for host interface**

The DF300 used the SCSI-2 for the host interface, whereas the DF350 uses the SCSI-3 (Ultra SCSI).

DF350F is a product modifying the DF350 by changing its host interface from Ultra SCSI to Fibre Channel.

- **Use of ultra SCSI for drive interface**

The DF300 used the SCSI-2 for the drive interface, whereas concerning the DF350 and DF350F, it was changed to the SCSI-3 (Ultra SCSI).

3. Overview

The DF350F series disk array subsystem connects small hard disk drives to provide a large storage capacity. This subsystem uses an Fibre Channel as a host interface and it features a large storage capacity, high-speed data transfer and high reliability. There are four types disk array subsystems: a mini tower (MK), cabinet (CK) and two types of rackmount types. The rackmount type can be mounted on a dedicated rack chassis; up to six RKH types can be mounted on a dedicated U1 rack, and up to four RKWH types can be mounted on a dedicated U2 rack.

(1) High performance

- The subsystem uses a non-volatile and large storage cache memory that ranges from 16M bytes (MB) to 1G bytes (GB) per controller to perform high-speed command processing when hitting the read/write data.

(2) Large capacity

- This subsystem can connect and control up to 21 small disk drives to support up to 357.7GB of disk capacity using RAID0 technology.
- The rackmount type using a dedicated chassis supports up to 1.43TB of disk capacity using RAID0 technology.

(3) Reduction of data loss due to a disk failure

- Disk data where a failure has occurred is recoverable with parity data.
- Data on a disk where a failure has occurred is restored to an optional spare disk and the spare disk then can be used as an original data disk.

(4) Multi-RAID configuration

- The subsystem supports the RAID0/1/5(4D+1P)/A configuration according to the usage.

(5) Reliability

- Non-volatile caching prevents data from being lost if the power is turned off or interrupted momentarily.

(6) Maintainability

- Maintenance is possible without turning off the subsystem.

4. Basic Specifications

Item			Type	Mini tower type (MK)	Cabinet type (CK)	Rack mount type (*6)			
						Standard type (RKH)		Large-capacity type (RKWH)	
						Single unit	Mounted on U1 rack	Single unit	Mounted on U2 rack
Host interface	Interface type		Fibre channel Optical (Non-OFC, 100-M5-SN-I) ANSI FC-PH X3T11 / Project 755D / Rev 4.3 ANSI FC-PH-2 X3T11 / Project 901D / Rev 7.2 ANSI FC-PH-3 X3T11 / Project 119D / Rev 8.4						
	Data transfer speed (i.e. maximum speed for transfer to the host)		100MB/s (Fibre Channel)						
	Transferred block size		512Bytes						
Disk drive used	Drive name		1”H/1.6”H 3.5”HDD						
	Data capacity		2.0/4.1/8.7/17.8GB						
	Data transfer speed		9.37 - 15MB/s						
	Revolution speed		7,200rpm						
RAID specifications	RAID level (*1)		0/1/5(4D+1P, 3D+1P, 2D+1P)/A						
	RAID configuration	RAID0 (nD)	n=2-5	n=2-20	n=2-10	n=(2-10)×6	n=5-20	n=(5-20)×4	
		RAID1 (nD+nD)	n=1-2	n=1-8	n=1-4	n=(1-4)×6	n=2-8	n=(2-8)×4	
		RAID5 (4nD+nP)	n=1	n=1-4	n=1-2	n=(1-2)×6	n=1-4	n=(1-4)×4	
		RAIDA (2nD+2nP)	n=1	n=1-4	n=1-2	n=(1-2)×6	n=1-4	n=(1-4)×4	
	Row configuration		1 row	1-4 rows	1-2 rows		1-4 rows		
Sub-system data capacity (*2)	Minimum (GB)	RAID0	4.1				10.3		
		RAID1	2.0				4.1		
		RAID5 (4D)	8.2				8.2		
		RAIDA	4.1				4.1		
	Maximum (GB)	RAID0	89.4	357.7	178.8	1073.2	357.7	1430.9	
		RAID1	35.7	143.0	71.5	429.2	143.0	572.3	
		RAID5 (4D)	71.5	286.1	143.0	858.6	286.1	1144.7	
		RAIDA	35.7	143.0	71.5	429.2 (@17.8GB DRV)	143.0	572.3 (@17.8GB DRV)	
	Unit of expansion (GB)	RAID0	—	2.0/ 4.1/ 8.7/17.8					
		RAID1		2.0/ 4.1/ 8.7/17.8					
		RAID5 (4D)		8.2/16.6/34.8/71.5					
		RAIDA		4.1/ 8.3/17.4/35.7					
Cache specifications	Capacity		16-1,024MB/controller			Up to 12,288MB/ dual controller×6	16-1,024MB/ controller	Up to 8,192MB/ dual controller×4	
	Control system		Read LRU/Write After						
	Battery back-up		Provided						
	Back-up time (*3)		48h (@256MB/single unit/subsystem)						
Internal logic specifications	Control CPU		intel 80960CF (@33MHz)						
	Control OS		VxWorks						
	Control memory		Flash 1MB/SRAM 512MB/DRAM 4MB						
	Data bus performance		Cache : 106MB/s						
	Data assurance method		Data bus : Through-parity Cache : ECC (1 bit for correction, 2 bits for detection) Drive : Data assurance code						
Redundancy	Hot-replaceable part (*9)		Controller/Drive/Fan/Power supply				Controller/Drive/Fan/ In Box/Power supply (Dual AC power supply is used)		
Maintenance specifications	Micro-loading system		Flash memory/Disk drive (resident)						
	SVP (built-in dedicated tool)panel		● Failure information logging/Power control ● Drive controlling micro-program D/L ● Configuration information change ● Drive recovery initiating process						
	FDD		● Failure information logging						
	Operator panel		● Power ON/OFF switch and LEDs ● Failure message indication						

Item \ Type			Mini tower type (MK)	Cabinet type (CK)	Rack mount type (*6)			
					Standard type (RKH)		Large-capacity type (RKWH)	
					Single unit	Mounted on U1 rack	Single unit	Mounted on U2 rack
Physical specifications	Startup time		Standard 40sec. (Max 2.5 min) *8					
	Cabinet size (mm) (Width×Depth×Height)		230×465×409	300×600×700	484×656×263	800×850×1,790	480×632×442	700×800×1,980
	Weight (kg) (*4)		Approximately 33/ Approximately 37	Approximately 50/ Approximately 85	Approximately 45/ Approximately 60	~/ Approximately 580	Approximately 84/ Approximately 105	~/ Approximately 590
	Acoustic noise (dB)		55	60	55	65	60	65
Input power supply specifications	Input voltage (*5)		89 - 127V AC or 178- 254V AC			178 - 254V AC		
	Frequency		50 / 60 ± 1Hz					
	Number of phases/ Connection		Single phase, protection grounding provided					
	Nominal current		4.0A (100V) 2.0A (200V)	9.0A (100V) 4.5A (200V)	5.0A (100V) 2.5A (200V)	— 15.0A(200V)	— 5.5A (200V)	— 22.0A(200V)
	Required power (*7)	(Steady)	300VA	800VA	500VA	3,100VA	900VA	3,600VA
		(Starting)	450VA	1,100VA	620VA	3,820VA	1,200VA	4,800VA
Operational and environmental specific	Temperature		10 to 40°C (When the A1E18 is installed, it is recommended to use it within a range from 10°C to 35°C.)					
	Humidity		8 to 80%					
	Maximum wet bulb temperature		29°C (non-condensing)					
	Vibration		Operating : Less than 0.25G Non-operating : Less than 0.5G Transporting : Less than 0.5G					
Insulation-perform	Insulation withstand voltage		1500V (1min)					
	Insulation resistance		DC500V, 10MΩ or more					
Energy saving	Capacity		89.4GB	357.7GB	178.8GB	1073.2GB	357.7GB	1430.9GB
	Energy consumption		300W	800W	500W	3,100W	900W	3,600W
	Energy consumption efficiency		0.0034W/MB	0.0022W/MB	0.0028W/MB	0.0029W/MB	0.0025W/MB	0.0025W/MB

- *1 • RAID0 is the unit that connects single disk drives and it has no redundancy. Also, it does not support the data striping function.

Notice : RAID5, RAID1 and RAID10 have redundancy to increase data reliability, but data may be erased by an accidental hardware or software failure occurring in the array subsystem. To prevent data from being erased, the customer should make complete backups for restoring the erased data.

- *2 • The RAID levels are not intermixed.
- The management area on each disk is excluded.
 - The calculation is performed with 1 kbytes = 1,000 bytes.
- *3 • The back-up time indicates the data back-up duration of the cache memory.
- The batteries are fully charged.
 - If a sudden power failure occurs, non-volatile data on the cache memory is assured. When the power is turned off normally, the battery power is not wasted since the data is reflected from the cache to the disk.
 - There may be the case that, when the subsystem enters the cash backup mode, an alarm warning a low battery voltage (indicated by a yellow LED) at the startup of the subsystem. This shows that the remaining battery capacity is insufficient, and the subsystem automatically disables the write cache and runs. When the battery is recharged up, this yellow indicator goes out. The subsystem automatically enables the write cache and continues the operation. This alarm indication disappears within 24 hours (at most). While the alarm indicator is on, the performance of the subsystem may be reduced a little but the functional operations will not be affected.
 - If the unit is not energized for more than a month, the over discharging of the battery occurs and it may be cause an unrecoverable damage. In this case, the battery must be energized more than 24 hours at least once a month, or store the unit with the switch of the battery off. Even when the switch is off, the battery discharges naturally. Therefore, turn on the switch of the battery and energize it for 24 hours every three months to charge it.
- *4 • The basic minimum configuration consists of five disks (one row), a spare disk, and a redundant controller not including a redundant power supply. The rackmount type(RKWH) is provided with a redundant power supply as a standard.
- The maximum configuration consists of mountable disks, a redundant controller and a redundant power supply.
- *5 • Use of an Uninterruptible Power System (UPS) is recommended for mitigating the affects of a sudden power interruption.

- *6** • The standard type (RKH) and (RKWH) are mountable on a 19" rack that is being sold in the market. In this case, dedicated rack rails corresponding to the number of rack mount type units to be mounted are required.

Notice : Also, there is a limitation on the weight. Contact us before mounting the rack mount type (RKH) and (RKWH) on racks other than the U1 rack and U2 rack made by Hitachi.

- For any rack mount type mounted on the rack, LED indication on the central panel is used.
- Since the centralized power distributor (for 200V) and centralized power switch are provided on the rack, power can be turned on/off by using them.
- A cable with single-phase 200V plug is attached to the rack as the standard component. If you want to connect to the centralized power distributor directly, installation of the power cable is required.
- The plug shape and receptacle for each rack is as follows :

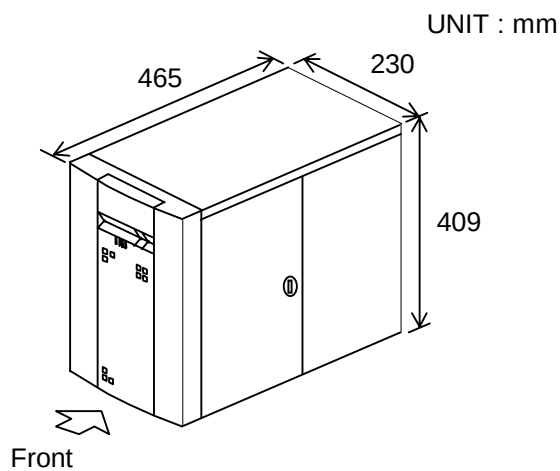
	For U1 rack	For U2 rack
Plug shape	NEMA standard L6-20P 	NEMA standard L6-30P 
Receptacle	L6-20R	L6-30R

- Since the U2 rack uses the dual AC line, prepare two outlets. The dual system is allowed if each power is led from a different AC line.
- *7** • Powers required for the maximum configurations are shown.
When planning a facility such as an uninterruptible power supply (UPS), assume the power factor to be 100% (300W=300VA for example). The values shown are those for 100/200 volts. In case the tolerance is included, the values may be exceeded.
- *8** • It may take 2 minutes 30 seconds or more for starting up the subsystem when it is powered on within 30 seconds after it is powered off. It is because the starting up immediately after powering off is restricted in order to protect the drive system.
It may also take 2 minutes 30 seconds or more for starting up the subsystem if a failure occurs in it.
- *9** • Hot replacement must be done by trained service personnel only (except the drive).

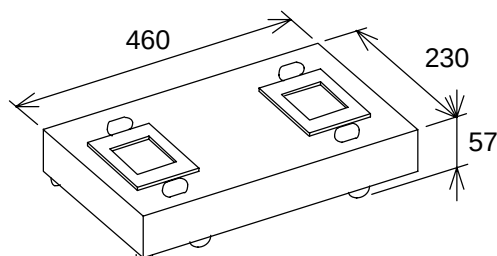
5. Appearance

5.1 Dimensions

Figure 5.1.1 to 5.1.3 show the dimensions for the DF350F subsystem.



Mini tower type (MK)



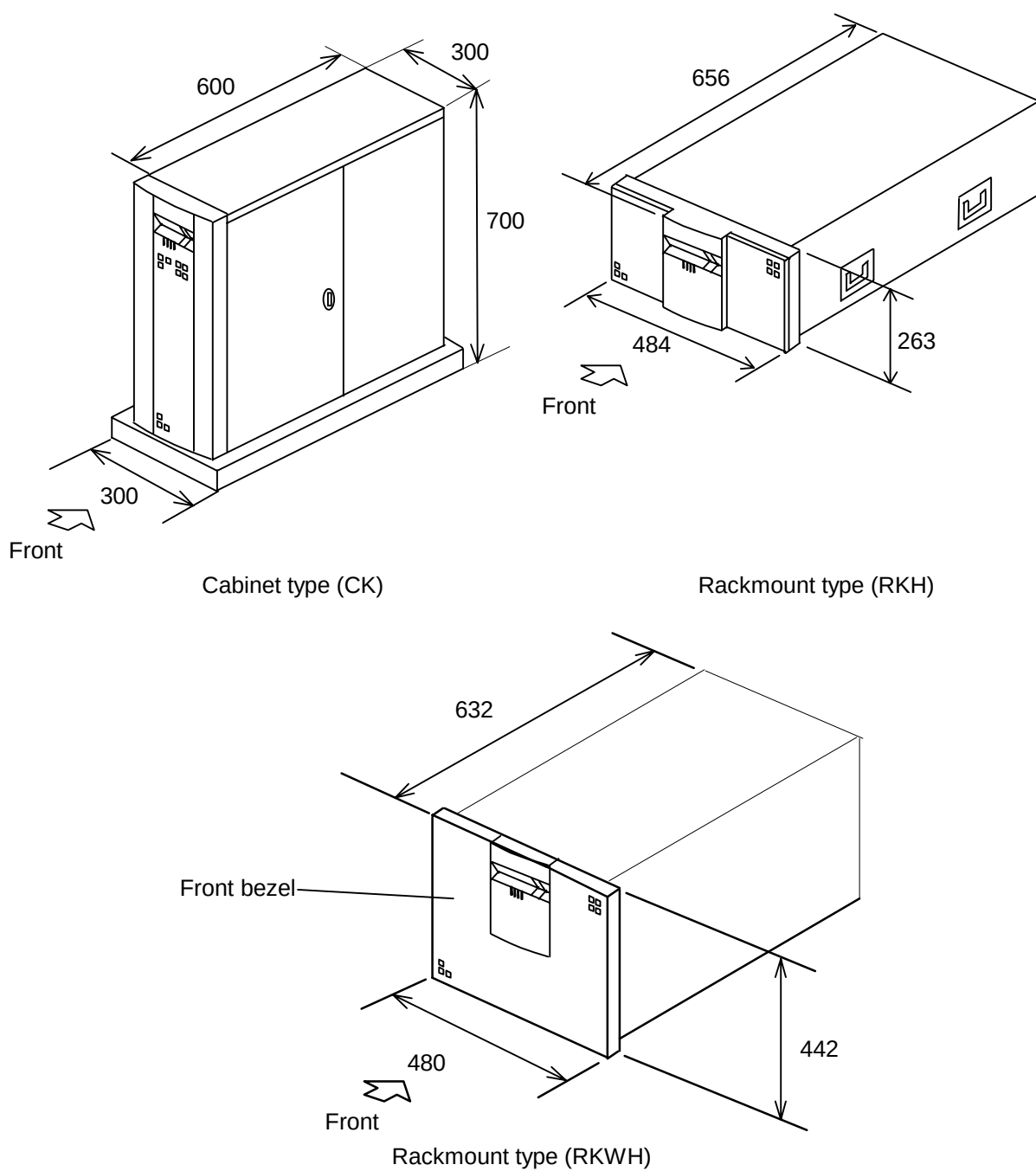
Weight : 4kg approx.

Pedestal for the mini tower type (optional)

Name	Paint color
Front cover	Light sandstone (10Y 7.3/0.4)
Side cover	
Main body	
Pedestal for the Mini tower	Sandstone dark (10Y 5.3/0.4)

Figure 5.1.1 Appearance of DF350F Subsystem (Mini tower type)

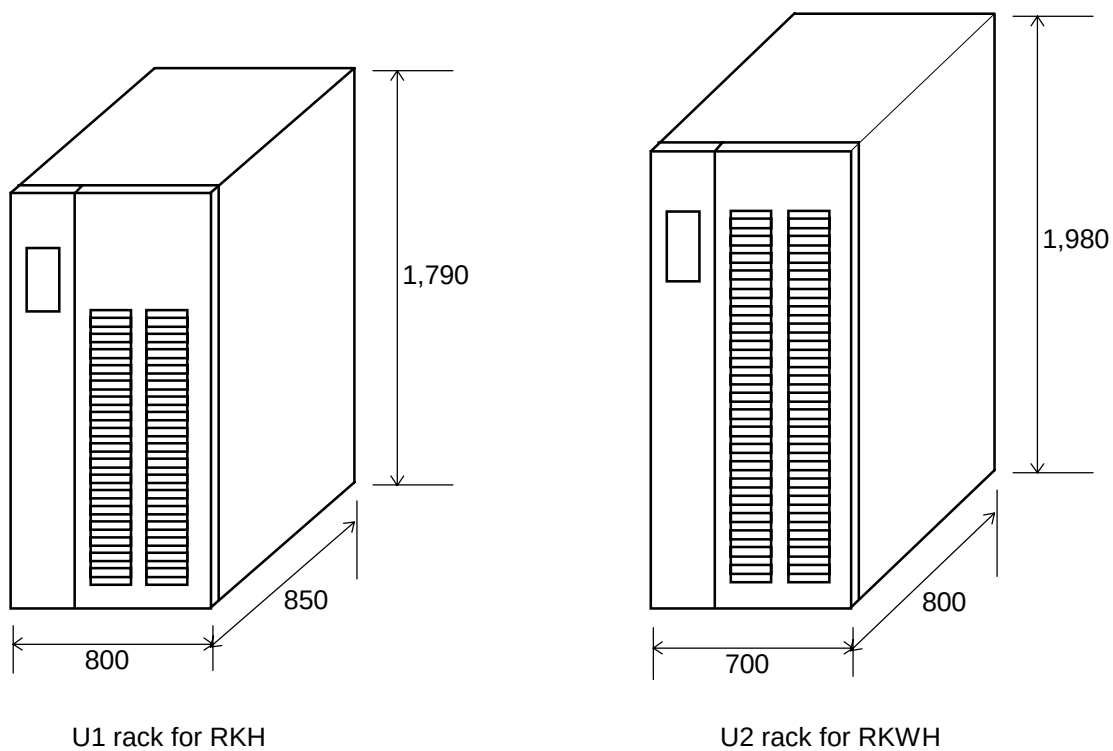
UNIT : mm



Name	Paint color		
	Cabinet	Rackmount (RKH)	Rackmount (RKWH)
Front cover	Light sandstone (10Y 7.3/0.4)	Light sandstone (10Y 7.3/0.4)	Light sandstone (10Y 7.3/0.4)
Side cover		Silver	Gray
Main body			
Kickplate (Anti-turnover skirt)	Dark sandstone (10Y 5.3/0.4)	—	—

Figure 5.1.2 Appearance of DF350F Subsystem (Cabinet and rackmount types)

UNIT : mm

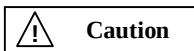


External color : Light limestone (10Y 7.3/0.4)

Figure 5.1.3 Appearance of DF350F Subsystem (U1 and U2 racks)

5.2 Maintenance Area

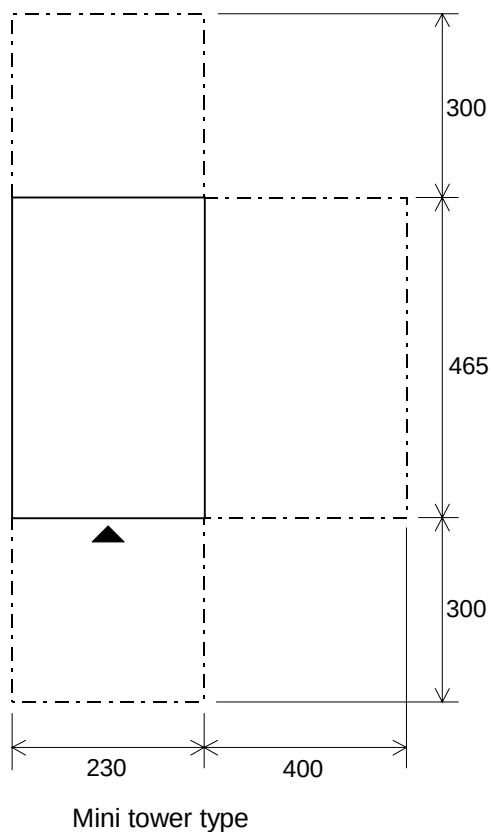
Figure 5.2.1 to 5.2.3 show the maintenance areas of the DF350F subsystem. For the installation of the DF350F subsystem, secure the maintenance area.



Do not place it on the unstable place, on the shaky table, or the inclined place, etc.

Dropping or a fall of it may cause an injury.

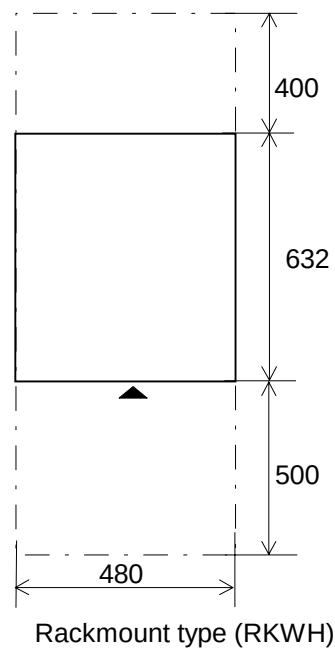
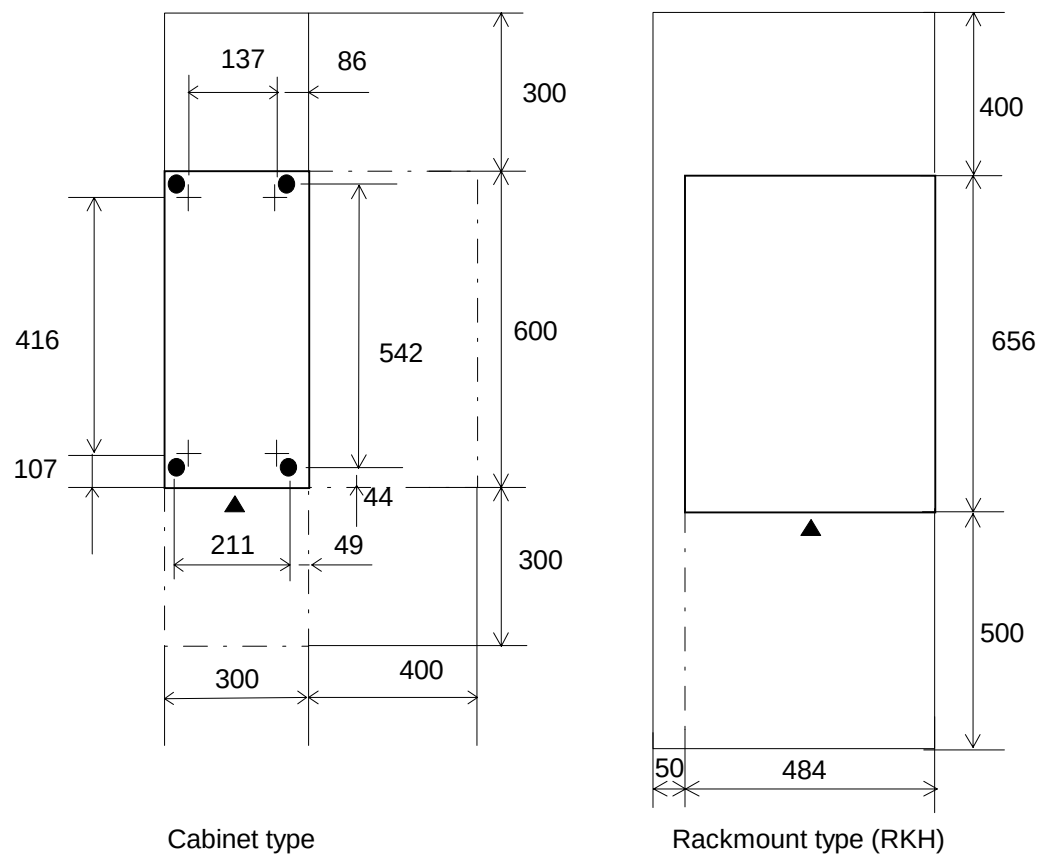
UNIT : mm



————— : External dimensions of the subsystem ▲ : Front
 - - - - - : Maintenance areas

Figure 5.2.1 Maintenance Areas of the DF350F Subsystem (Mini tower type)

UNIT :mm



————— : External dimensions of the subsystem

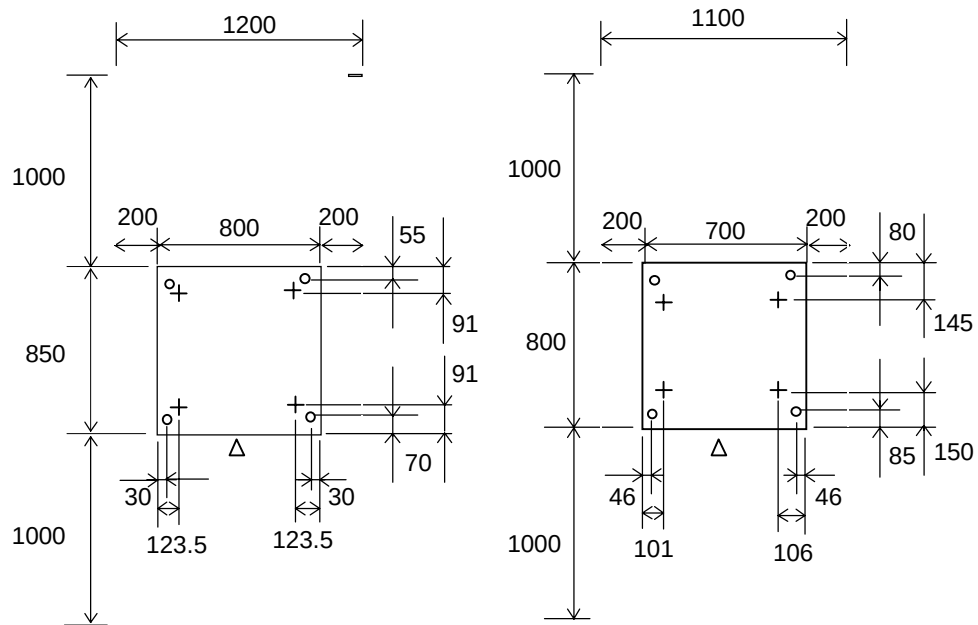
_____ : Maintenance areas

▲ : Front

● : Leveling bolts

+ : Casters

Figure 5.2.2 Maintenance Areas of the DF350F Subsystem (Cabinet and Rackmount types)



U1 rack for RKH

U2 rack for RKWH

————— : External dimensions of the subsystem

————— : Maintenance areas

▲ : Front

● : Leveling bolts

⊕ : Casters

Figure 5.2.3 Maintenance Areas of the DF350F Subsystem (U1 and U2 racks)

6. Location of Components

Figure 6.1 to 6.4 show the location of components for each type.

(1) Mini tower type

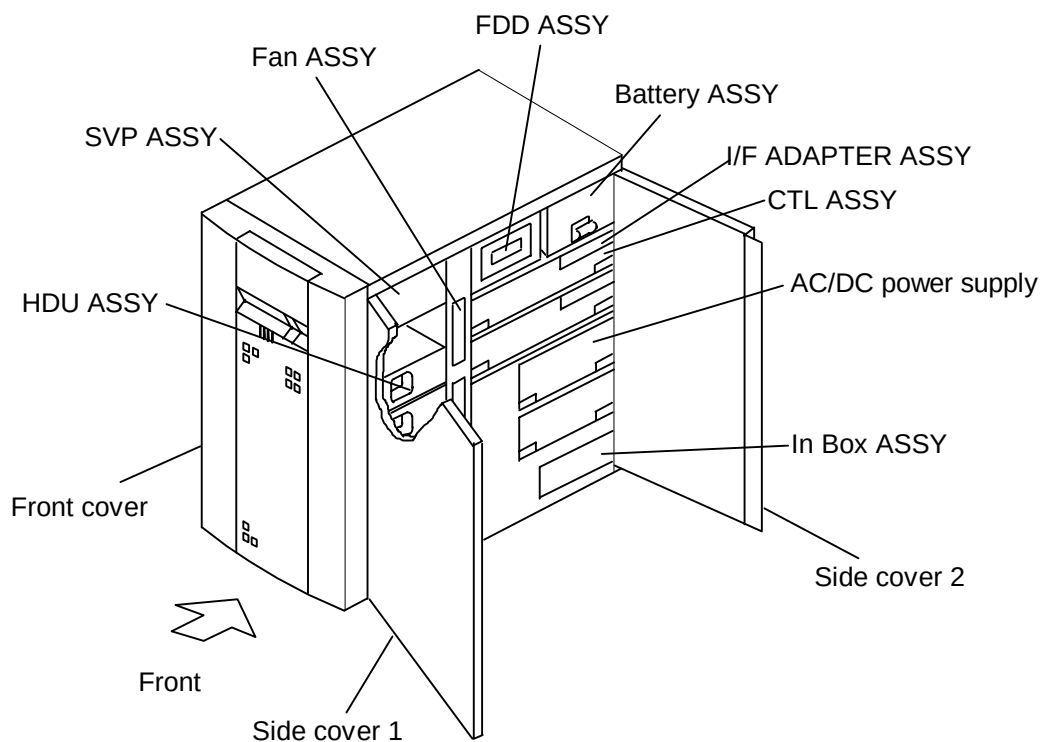
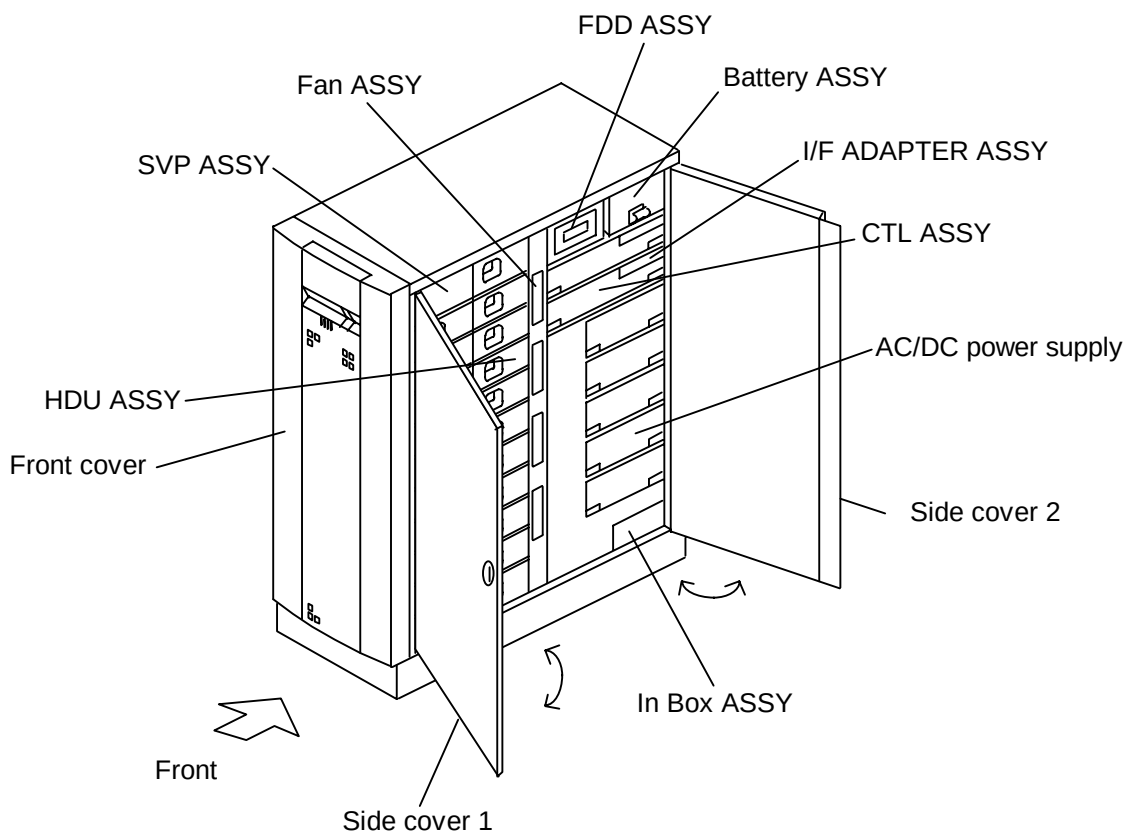
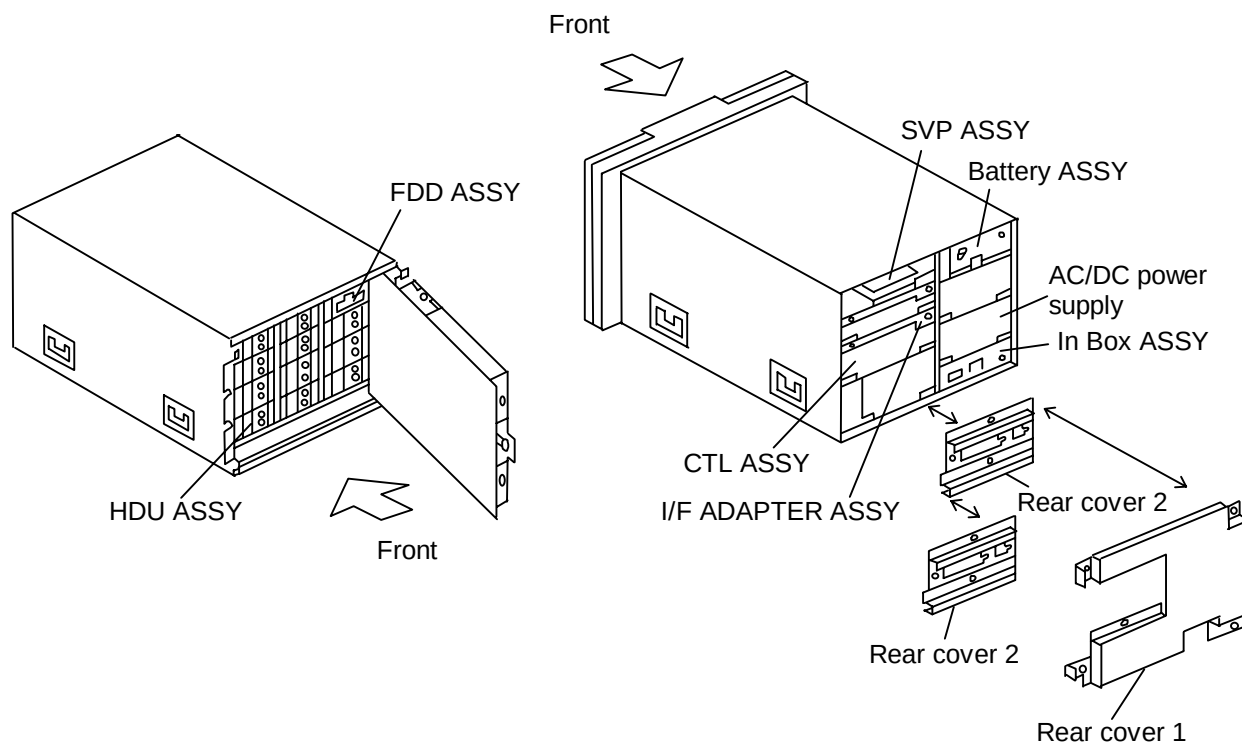


Figure 6.1 Location of Components (Mini tower type)

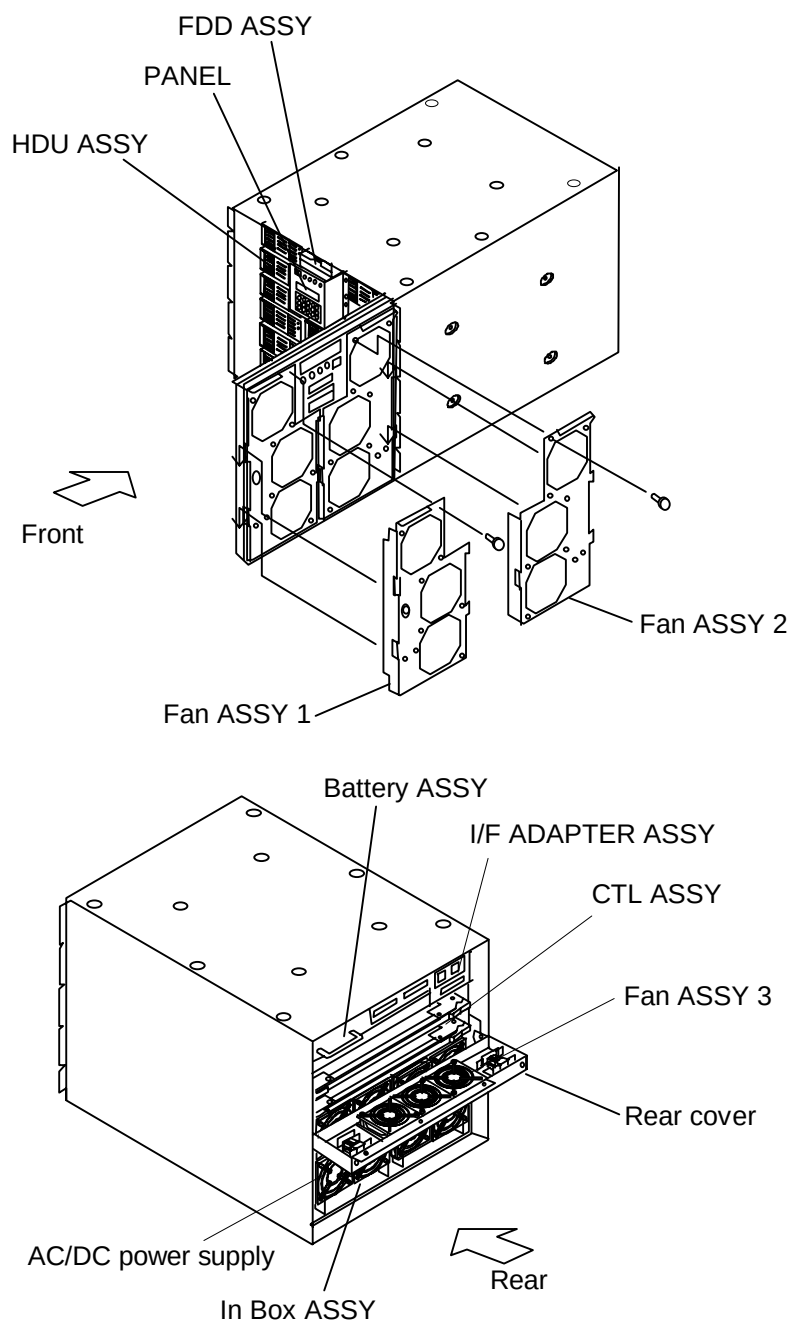
(2) Cabinet type

**Figure 6.2 Location of Components (Cabinet type)**

(3) Rackmount (RKH) type

**Figure 6.3 Location of Components (Rackmount (RKH) type)**

(4) Rackmount (RKWH) type

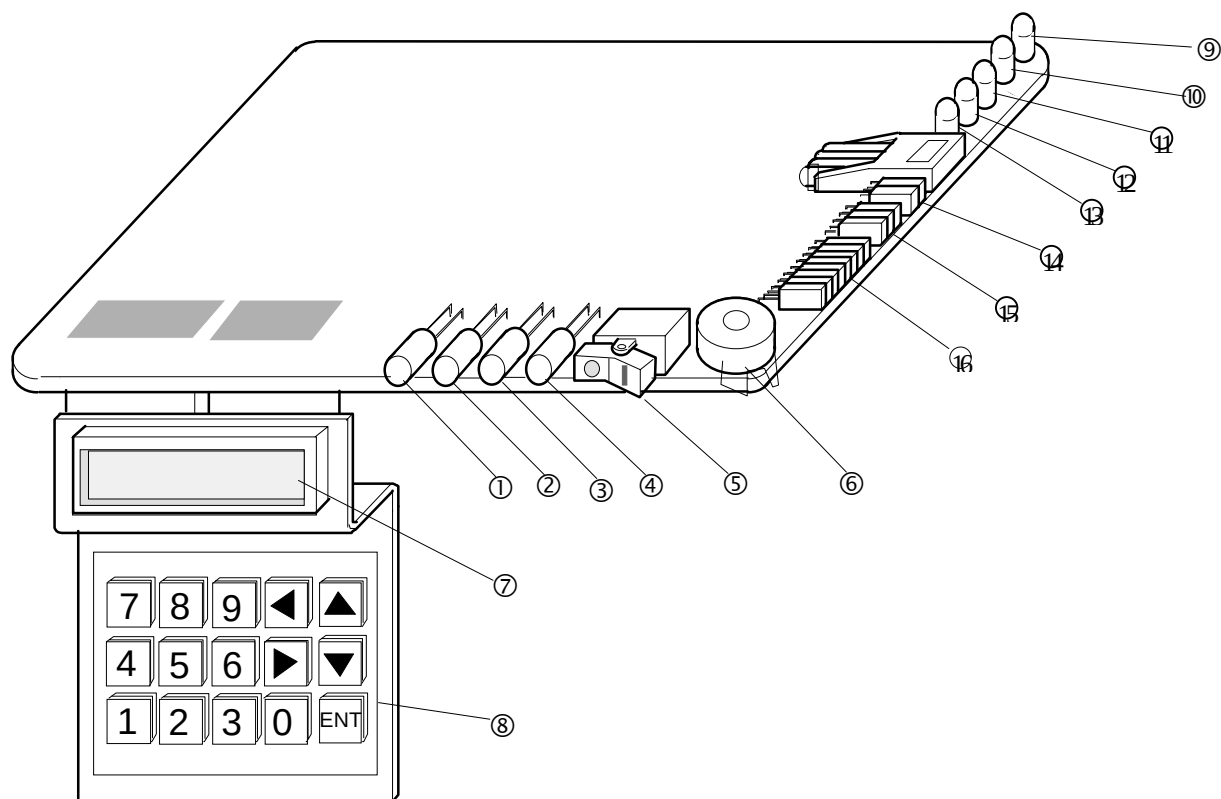
**Figure 6.4 Location of Components (Rackmount (RKWH) type)**

7. Location and Functions of Switches and LEDs

7.1 Mini Tower and Cabinet Types

(1) SVP ASSY

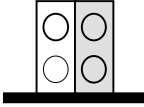
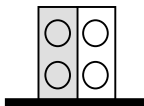
Figure 7.1.1 shows the SVP ASSY.



For the sections (numbers) and functions, see Table 7.1.1.

Figure 7.1.1 SVP ASSY of Mini Tower and Cabinet Types

Table 7.1.1 Functions for the PANEL ASSY of Mini Tower and Cabinet Types

No.	Name	Classification	Color	Function
1	READY	LED	Green	The power is turned on and the unit (DF350F subsystem) is operable.
2	WARNING	LED	Yellow	A failure has occurred inside although the unit remains operable.
3	ALARM	LED	Red	An inoperable failure has occurred in the unit.
4	POWER	LED	Green	The power is supplied to the drives and packages.
5	Main switch	Switch	—	This switch turns on or off the unit. “I” indicates the power is on; “O” indicates the power is off.
6	Buzzer	Buzzer	—	If a failure occurs, an alarm sound is emitted.
7	Display	LCD	—	This displays the unit status and the error codes.
8	Numerical key pad	Switch	—	This switch makes the settings on the unit.
9	SVP CHECK1	LED	Red	This LED indicates whether the cause of the abnormal voltage is being displayed (lit) or not (extinguished).
10	SVP ALARM	LED	Red	The LED indicates that the cause of abnormal voltage is displayed by the flashing count.
11	CHARGE	LED	Yellow	The LED indicates that the battery is being charged (lit) or the voltage level is being checked (flashing for 30 min.)
12	BATTERY OK	LED	Green	The LED indicates that the battery has been charged.
13	SVP READY	LED	Green	The LED indicates that the SVP ASSY is operable.
14	SW2 *	Jumper socket	Green	The jumper socket sets LOCAL mode or REMOTE mode.  Local mode  Remote mode

(Continued)

* REMOTE MODE is not supported. Be sure to use LOCAL MODE.

No.	Name	Classification	Color	Function																		
15	SW3 *	Jumper socket	Black	3 2 1 <table><tr><th>#</th><th>Meaning</th></tr><tr><td> 1 </td><td>Provided : RESET</td></tr><tr><td> 2 </td><td>DC FAILE detection level Provided : 4.2V Not provided : 4.6V</td></tr><tr><td> 3 </td><td>BUZZER Provided : Keeps sounding. Not provided : The host controls.</td></tr></table>	#	Meaning	1	Provided : RESET	2	DC FAILE detection level Provided : 4.2V Not provided : 4.6V	3	BUZZER Provided : Keeps sounding. Not provided : The host controls.										
#	Meaning																					
1	Provided : RESET																					
2	DC FAILE detection level Provided : 4.2V Not provided : 4.6V																					
3	BUZZER Provided : Keeps sounding. Not provided : The host controls.																					
16	SW4 *	Jumper socket	Black	8 7 6 5 4 3 2 1 <table><tr><th>#</th><th>Meaning</th></tr><tr><td>1</td><td>Not provided : LED TEST</td></tr><tr><td>2</td><td>Not provided : LCD TEST</td></tr><tr><td>3</td><td>Not provided : BUZZER TEST</td></tr><tr><td>4</td><td>Not provided : BATTERY CHARGE</td></tr><tr><td>5</td><td>Not provided : BATTERY DISCHARGE</td></tr><tr><td>6</td><td>Not used</td></tr><tr><td>7</td><td>Not used</td></tr><tr><td>8</td><td>Not used</td></tr></table>	#	Meaning	1	Not provided : LED TEST	2	Not provided : LCD TEST	3	Not provided : BUZZER TEST	4	Not provided : BATTERY CHARGE	5	Not provided : BATTERY DISCHARGE	6	Not used	7	Not used	8	Not used
#	Meaning																					
1	Not provided : LED TEST																					
2	Not provided : LCD TEST																					
3	Not provided : BUZZER TEST																					
4	Not provided : BATTERY CHARGE																					
5	Not provided : BATTERY DISCHARGE																					
6	Not used																					
7	Not used																					
8	Not used																					
17	Connector	Connector	—	Not used.																		

* Do not change the SW3, SW4 settings that have been set at the factory.

LED TEST

Lights all the LEDs installed on the panel.

LCD TEST

Tests the LCD module display and displays the characters to be tested. When a key is pressed in this mode, the pressed key is displayed on the LCD.

BUZZER TEST

Sounds the buzzer by setting buzzer (bit 6) of CTL Reg. (0X02).

BATTERY CHARGE

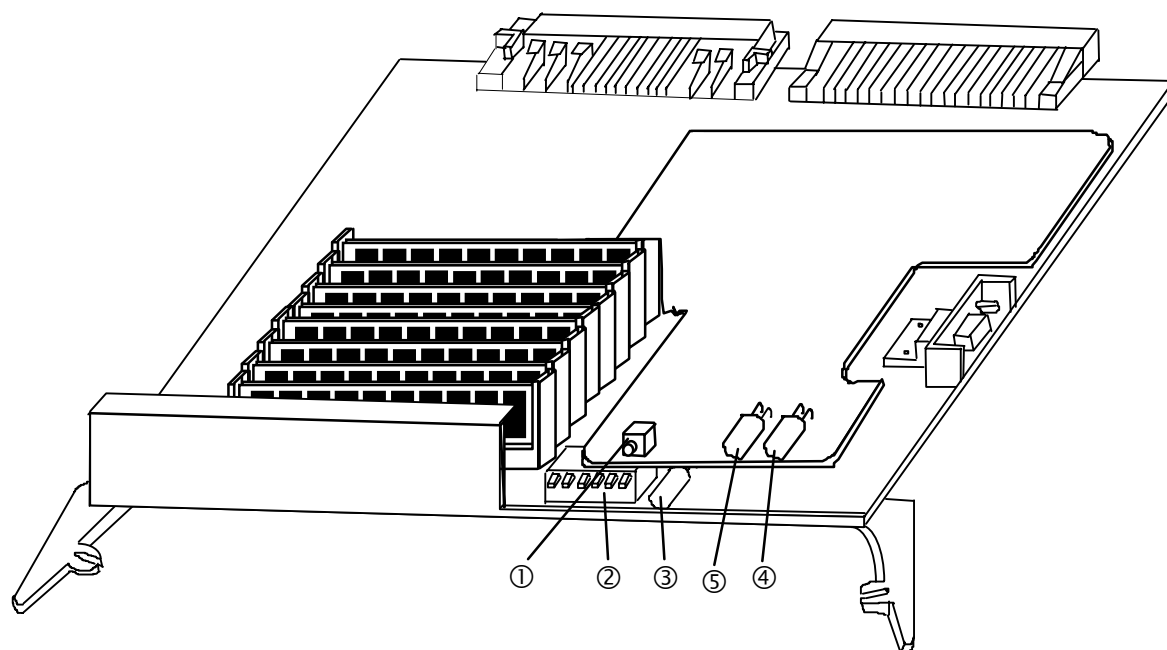
Charges the battery regardless of the battery voltage.

BATTERY DISCHARGE

Discharges the battery regardless of the battery voltage.

(2) CTL ASSY

Figure 7.1.2 shows the CTL ASSY.



For the sections (numbers) and functions, see Table 7.1.2.

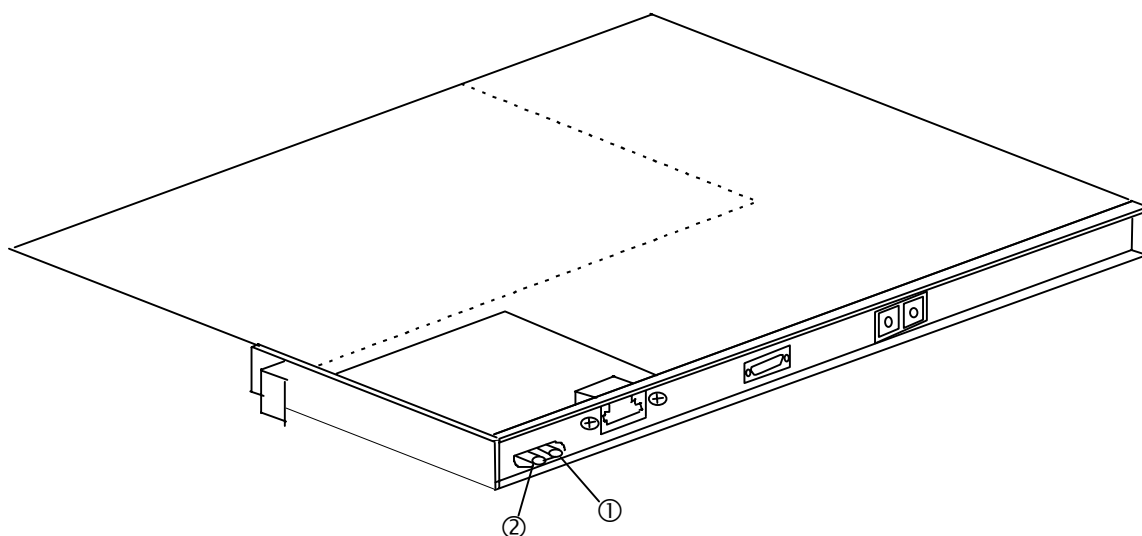
Figure 7.1.2 CTL ASSY of Mini Tower and Cabinet Types

Table 7.1.2 Functions for the Type PANEL ASSY of Mini Tower and Cabinet Types

Table 1-12 Functions for the Type 1-1021-1022-1023-1024-1025-1026-1027-1028-1029-1030-1031-1032-1033-1034-1035-1036-1037-1038-1039-1040-1041-1042-1043-1044-1045-1046-1047-1048-1049-1050-1051-1052-1053-1054-1055-1056-1057-1058-1059-1060-1061-1062-1063-1064-1065-1066-1067-1068-1069-1070-1071-1072-1073-1074-1075-1076-1077-1078-1079-1080-1081-1082-1083-1084-1085-1086-1087-1088-1089-1090-1091-1092-1093-1094-1095-1096-1097-1098-1099-1100-1101-1102-1103-1104-1105-1106-1107-1108-1109-1110-1111-1112-1113-1114-1115-1116-1117-1118-1119-1120-1121-1122-1123-1124-1125-1126-1127-1128-1129-1130-1131-1132-1133-1134-1135-1136-1137-1138-1139-1140-1141-1142-1143-1144-1145-1146-1147-1148-1149-1150-1151-1152-1153-1154-1155-1156-1157-1158-1159-1160-1161-1162-1163-1164-1165-1166-1167-1168-1169-1170-1171-1172-1173-1174-1175-1176-1177-1178-1179-1180-1181-1182-1183-1184-1185-1186-1187-1188-1189-1190-1191-1192-1193-1194-1195-1196-1197-1198-1199-1200-1201-1202-1203-1204-1205-1206-1207-1208-1209-1210-1211-1212-1213-1214-1215-1216-1217-1218-1219-1220-1221-1222-1223-1224-1225-1226-1227-1228-1229-1230-1231-1232-1233-1234-1235-1236-1237-1238-1239-1240-1241-1242-1243-1244-1245-1246-1247-1248-1249-1250-1251-1252-1253-1254-1255-1256-1257-1258-1259-1260-1261-1262-1263-1264-1265-1266-1267-1268-1269-1270-1271-1272-1273-1274-1275-1276-1277-1278-1279-1280-1281-1282-1283-1284-1285-1286-1287-1288-1289-1290-1291-1292-1293-1294-1295-1296-1297-1298-1299-1300-1301-1302-1303-1304-1305-1306-1307-1308-1309-1310-1311-1312-1313-1314-1315-1316-1317-1318-1319-1320-1321-1322-1323-1324-1325-1326-1327-1328-1329-1330-1331-1332-1333-1334-1335-1336-1337-1338-1339-1340-1341-1342-1343-1344-1345-1346-1347-1348-1349-1350-1351-1352-1353-1354-1355-1356-1357-1358-1359-1360-1361-1362-1363-1364-1365-1366-1367-1368-1369-1370-1371-1372-1373-1374-1375-1376-1377-1378-1379-1380-1381-1382-1383-1384-1385-1386-1387-1388-1389-1390-1391-1392-1393-1394-1395-1396-1397-1398-1399-1400-1401-1402-1403-1404-1405-1406-1407-1408-1409-1410-1411-1412-1413-1414-1415-1416-1417-1418-1419-1420-1421-1422-1423-1424-1425-1426-1427-1428-1429-1430-1431-1432-1433-1434-1435-1436-1437-1438-1439-1440-1441-1442-1443-1444-1445-1446-1447-1448-1449-1450-1451-1452-1453-1454-1455-1456-1457-1458-1459-1460-1461-1462-1463-1464-1465-1466-1467-1468-1469-1470-1471-1472-1473-1474-1475-1476-1477-1478-1479-1480-1481-1482-1483-1484-1485-1486-1487-1488-1489-1490-1491-1492-1493-1494-1495-1496-1497-1498-1499-1500-1501-1502-1503-1504-1505-1506-1507-1508-1509-1510-1511-1512-1513-1514-1515-1516-1517-1518-1519-1520-1521-1522-1523-1524-1525-1526-1527-1528-1529-1530-1531-1532-1533-1534-1535-1536-1537-1538-1539-1540-1541-1542-1543-1544-1545-1546-1547-1548-1549-1550-1551-1552-1553-1554-1555-1556-1557-1558-1559-1560-1561-1562-1563-1564-1565-1566-1567-1568-1569-1570-1571-1572-1573-1574-1575-1576-1577-1578-1579-1580-1581-1582-1583-1584-1585-1586-1587-1588-1589-1590-1591-1592-1593-1594-1595-1596-1597-1598-1599-1600-1601-1602-1603-1604-1605-1606-1607-1608-1609-1610-1611-1612-1613-1614-1615-1616-1617-1618-1619-1620-1621-1622-1623-1624-1625-1626-1627-1628-1629-1630-1631-1632-1633-1634-1635-1636-1637-1638-1639-1640-1641-1642-1643-1644-1645-1646-1647-1648-1649-1650-1651-1652-1653-1654-1655-1656-1657-1658-1659-1660-1661-1662-1663-1664-1665-1666-1667-1668-1669-1670-1671-1672-1673-1674-1675-1676-1677-1678-1679-1680-1681-1682-1683-1684-1685-1686-1687-1688-1689-1690-1691-1692-1693-1694-1695-1696-1697-1698-1699-1700-1701-1702-1703-1704-1705-1706-1707-1708-1709-1710-1711-1712-1713-1714-1715-1716-1717-1718-1719-1720-1721-1722-1723-1724-1725-1726-1727-1728-1729-1730-1731-1732-1733-1734-1735-1736-1737-1738-1739-1740-1741-1742-1743-1744-1745-1746-1747-1748-1749-1750-1751-1752-1753-1754-1755-1756-1757-1758-1759-1760-1761-1762-1763-1764-1765-1766-1767-1768-1769-1770-1771-1772-1773-1774-1775-1776-1777-1778-1779-1780-1781-1782-1783-1784-1785-1786-1787-1788-1789-1790-1791-1792-1793-1794-1795-1796-1797-1798-1799-1800-1801-1802-1803-1804-1805-1806-1807-1808-1809-1810-1811-1812-1813-1814-1815-1816-1817-1818-1819-1820-1821-1822-1823-1824-1825-1826-1827-1828-1829-1830-1831-1832-1833-1834-1835-1836-1837-1838-1839-1840-1841-1842-1843-1844-1845-1846-1847-1848-1849-1850-1851-1852-1853-1854-1855-1856-1857-1858-1859-1860-1861-1862-1863-1864-1865-1866-1867-1868-1869-1870-1871-1872-1873-1874-1875-1876-1877-1878-1879-1880-1881-1882-1883-1884-1885-1886-1887-1888-1889-1890-1891-1892-1893-1894-1895-1896-1897-1898-1899-1900-1901-1902-1903-1904-1905-1906-1907-1908-1909-1910-1911-1912-1913-1914-1915-1916-1917-1918-1919-1920-1921-1922-1923-1924-1925-1926-1927-1928-1929-1930-1931-1932-1933-1934-1935-1936-1937-1938-1939-1940-1941-1942-1943-1944-1945-1946-1947-1948-1949-1950-1951-1952-1953-1954-1955-1956-1957-1958-1959-1960-1961-1962-1963-1964-1965-1966-1967-1968-1969-1970-1971-1972-1973-1974-1975-1976-1977-1978-1979-1980-1981-1982-1983-1984-1985-1986-1987-1988-1989-1990-1991-1992-1993-1994-1995-1996-1997-1998-1999-2000-2001-2002-2003-2004-2005-2006-2007-2008-2009-2010-2011-2012-2013-2014-2015-2016-2017-2018-2019-2020-2021-2022-2023-2024-2025-2026-2027-2028-2029-2030-2031-2032-2033-2034-2035-2036-2037-2038-2039-2040-2041-2042-2043-2044-2045-2046-2047-2048-2049-2050-2051-2052-2053-2054-2055-2056-2057-2058-2059-2060-2061-2062-2063-2064-2065-2066-2067-2068-2069-2070-2071-2072-2073-2074-2075-2076-2077-2078-2079-2080-2081-2082-2083-2084-2085-2086-2087-2088-2089-2090-2091-2092-2093-2094-2095-2096-2097-2098-2099-2100-2101-2102-2103-2104-2105-2106-2107-2108-2109-2110-2111-2112-2113-2114-2115-2116-2117-2118-2119-2120-2121-2122-2123-2124-2125-2126-2127-2128-2129-2130-2131-2132-2133-2134-2135-2136-2137-2138-2139-2140-2141-2142-2143-2144-2145-2146-2147-2148-2149-2150-2151-2152-2153-2154-2155-2156-2157-2158-2159-2160-2161-2162-2163-2164-2165-2166-2167-2168-2169-2170-2171-2172-2173-2174-2175-2176-2177-2178-2179-2180-2181-2182-2183-2184-2185-2186-2187-2188-2189-2190-2191-2192-2193-2194-2195-2196-2197-2198-2199-2200-2201-2202-2203-2204-2205-2206-2207-2208-2209-2210-2211-2212-2213-2214-2215-2216-2217-2218-2219-2220-2221-2222-2223-2224-2225-2226-2227-2228-2229-2230-2231-2232-2233-2234-2235-2236-2237-2238-2239-2240-2241-2242-2243-2244-2245-2246-2247-2248-2249-2250-2251-2252-2253-2254-2255-2256-2257-2258-2259-2260-2261-2262-2263-2264-2265-2266-2267-2268-2269-2270-2271-2272-2273-2274-2275-2276-2277-2278-2279-2280-2281-2282-2283-2284-2285-2286-2287-2288-2289-2290-2291-2292-2293-2294-2295-2296-2297-2298-2299-2300-2301-2302-2303-2304-2305-2306-2307-2308-2309-2310-2311-2312-2313-2314-2315-2316-2317-2318-2319-2320-2321-2322-2323-2324-2325-2326-2327-2328-2329-2330-2331-2332-2333-2334-2335-2336-2337-2338-2339-2340-2341-2342-2343-2344-2345-2346-2347-2348-2349-2350-2351-2352-2353-2354-2355-2356-2357-2358-2359-2360-2361-2362-2363-2364-2365-2366-2367-2368-2369-2370-2371-2372-2373-2374-2375-2376-2377-2378-2379-2380-2381-2382-2383-2384-2385-2386-2387-2388-2389-2390-2391-2392-2393-2394-2395-2396-2397-2398-2399-2400-2401-2402-2403-2404-2405-2406-2407-2408-2409-2410-2411-2412-2413-2414-2415-2416-2417-2418-2419-2420-2421-2422-2423-2424-2425-2426-2427-2428-2429-2430-2431-2432-2433-2434-2435-2436-2437-2438-2439-2440-2441-2442-2443-2444-2445-2446-2447-2448-2449-2450-2451-2452-2453-2454-2455-2456-2457-2458-2459-2460-2461-2462-2463-2464-2465-2466-2467-2468-2469-2470-2471-2472-2473-2474-2475-2476-2477-2478-2479-2480-2481-2482-2483-2484-2485-2486-2487-2488-2489-2490-2491-2492-2493-2494-2495-2496-2497-2498-2499-2500-2501-2502-2503-2504-2505-2506-2507-2508-2509-2510-2511-2512-2513-2514-2515-2516-2517-2518-2519-2520-2521-2522-2523-2524-2525-2526-2527-2528-2529-2530-2531-2532-2533-2534-2535-2536-2537-2538-2539-2540-2541-2542-2543-2544-2545-2546-2547-2548-2549-2550-2551-2552-2553-2554-2555-2556-2557-2558-2559-2560-2561-2562-2563-2564-2565-2566-2567-2568-2569-2570-2571-2572-2573-2574-2575-2576-2577-2578-2579-2580-2581-2582-2583-2584-2585-2586-2587-2588-2589-2590-2591-2592-2593-2594-2595-2596-2597-2598-2599-2600-2601-2602-2603-2604-2605-2606-2607-2608-2609-2610-2611-2612-2613-2614-2615-2616-2617-2618-2619-2620-2621-2622-2623-2624-2625-2626-2627-2628-2629-2630-2631-2632-2633-2634-2635-2636-2637-2638-2639-2640-2641-2642-2643-2644-2645-2646-2647-2648-2649-2650-2651-2652-2653-2654-2655-2656-2657-2658-2659-2660-2661-2662-2663-2664-2665-2666-2667-2668-2669-2670-2671-2672-2673-2674-2675-2676-2677-2678-2679-2680-2681-2682-2683-2684-2685-2686-2687-2688-2689-2690-2691-2692-2693-2694-2695-2696-2697-2698-2699-2700-2701-2702-2703-2704-2705-2706-2707-2708-2709-2710-2711-2712-2713-2714-2715-2716-2717-2718-2719-2720-2721-2722-2723-2724-2725-2726-2727-2728-2729-2730-2731-2732-2733-2734-2735-2736-2737-2738-2739-2740-2741-2742-2743-2744-2745-2746-2747-2748-2749-2750-2751-2752-2753-2754-2755-2756-2757-2758-2759-2760-2761-2762-2763-2764-2765-2766-2767-2768-2769-2770-2771-2772-2773-2774-2775-2776-2777-2778-2779-2780-2781-2782-2783-2784-2785-2786-2787-2788-2789-2790-2791-2792-2793-2794-2795-2796-2797-2798-2799-2800-2801-2802-2803-2804-2805-2806-2807-2808-2809-2810-2811-2812-2813-2814-2815-2816-2817-2818-2819-2820-2821-2822-2823-2824-2825-2826-2827-2828-2829-2830-2831-2832-2833-2834-2835-2836-2837-2838-2839-2840-2841-2842-2843-2844-2845-2846-2847-2848-2849-2850-2851-2852-2853-2854-2855-2856-2857-2858-2859-2860-2861-2862-2863-2864-2865-2866-2867-2868-2869-2870-2871-2872-2873-2874-2875-2876-2877-2878-2879-2880-2881-2882-2883-2884-2885-2886-2887-2888-2889-2890-2891-2892-2893-2894-2895-2896-2897-2898-2899-2900-2901-2902-2903-2904-2905-2906-2907-2908-2909-2910-2911-2912-2913-2914-2915-2916-2917-2918-2919-2920-2921-2922-2923-2924-2925-2926-2927-2928-2929-2930-2931-2932-2933-2934-2935-2936-2937-2938-2939-2940-2941-2942-2943-2944-2945-2946-2947-2948-2949-2950-2951-2952-2953-2954-2955-2956-2957-2958-2959-2960-2961-2962-2963-2964-2965-2966-2967-2968-2969-2970-2971-2972-2973-2974-2975-2976-2977-2978-2979-2980-2981-2982-2983-2984-2985-2986-2987-2988-2989-2990-2991-2992-2993-2994-2995-2996-2997-2998-2999-3000-3001-3002-3003-3004-3005-3006-3007-3008-3009-3010-3011-3012-3013-3014-3015-3016-3017-3018-3019-302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(3) I/F ADAPTER ASSY

Figure 7.1.3 shows the I/F ADAPTER ASSY.



DF-F350F-DMON
(Optical (Non OFC) I/F SC type)

For the sections (numbers) and functions, see Table 7.1.3.

Figure 7.1.3 I/F ADAPTER ASSY of Mini Tower and Cabinet Types

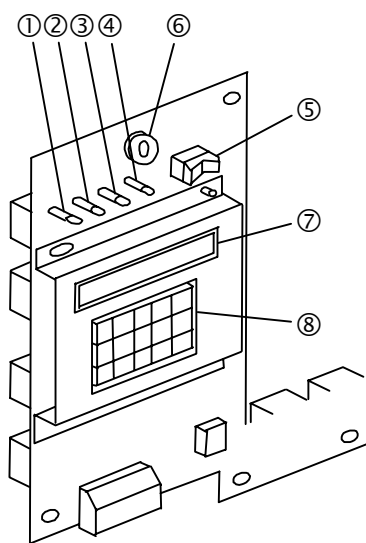
Table 7.1.3 Functions for I/F ADAPTER ASSY of the Mini Tower and Cabinet Types

No.	Name	Classification	Color	Function
1	STATUS-1	LED	Green	The LED indicates the status of I/F ADAPTER ASSY.
2	STATUS-2	LED	Yellow	

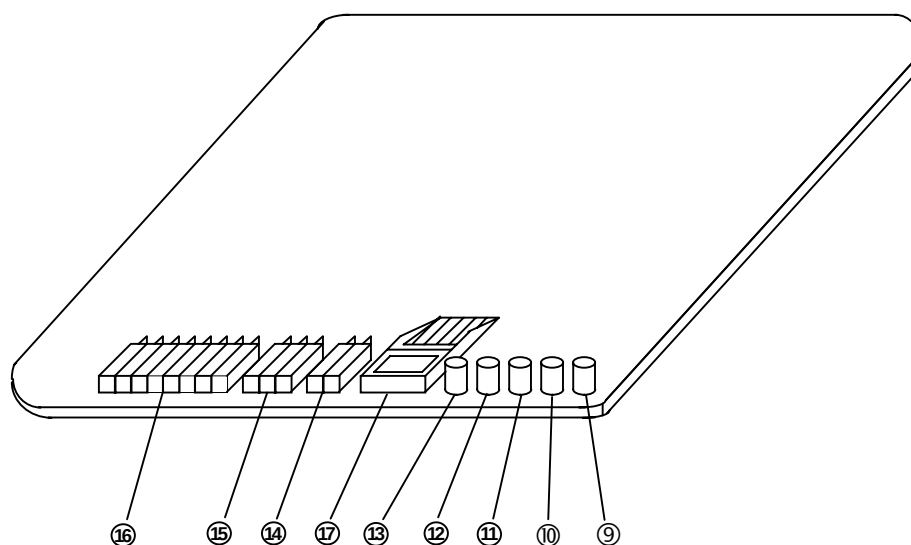
7.2 Rackmount Type

(1) SVP ASSY

Figure 7.2.1 shows the SVP ASSY of the rackmount (RKH) type and Figure 7.2.2 shows the SVP ASSY of the rackmount (RKWH) type.



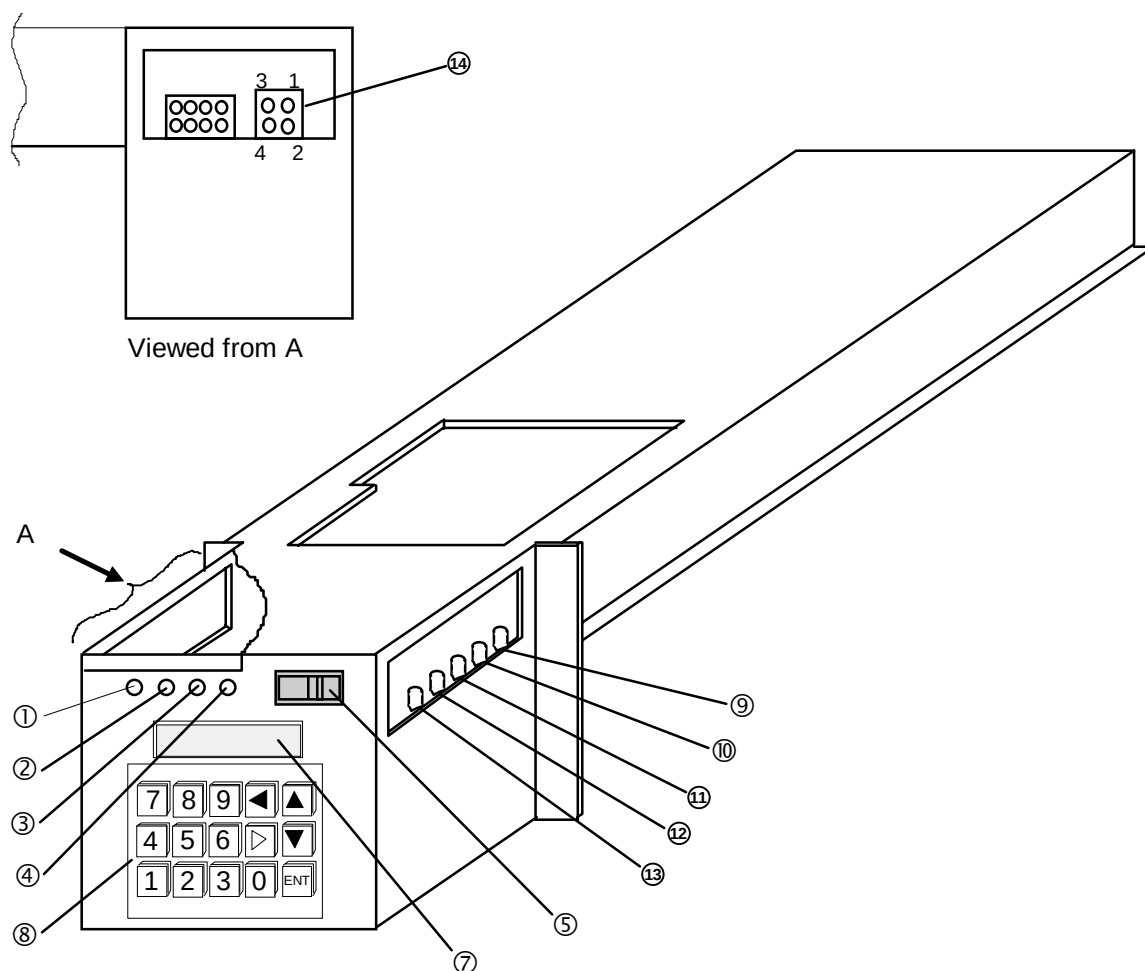
(a) RKH PANEL



(b) RKH SVP

For the sections (numbers) and functions, see Table 7.2.1.

Figure 7.2.1 SVP ASSY of Rackmount (RKH) Type



For the sections (numbers) and functions, see Table 7.2.1.

Figure 7.2.2 SVP ASSY of Rackmount (RKWH) Type

Table 7.2.1 Functions for the SVP ASSY of the Rackmount Type

No.	Name	Classification	Color	Function					
1	READY	LED	Green	The power is turned on and the unit (DF350F subsystem) is operable.					
2	WARNING	LED	Yellow	A failure occurs inside although the unit is operable.					
3	ALARM	LED	Red	An inoperable failure occurs in the unit.					
4	POWER	LED	Green	The power is supplied to the drives and packages.					
5	Main switch	Switch	—	This switch turns on or off the unit. “I” indicates the power is on; “O” indicates the power is off.					
6 (*1)	Buzzer	Buzzer	—	If a failure occurs, an alarm sound is emitted.					
7	Display	LCD	—	This displays the unit status and the error codes.					
8	Numerical key pad	Switch	—	This switch makes the settings on the unit.					
9	SVP CHECK1	LED	Red	This LED indicates whether the cause of the abnormal voltage is being displayed (lit) or not (extinguished).					
10	SVP ALARM	LED	Red	The LED indicates that the cause of abnormal voltage is displayed by the flashing count.					
11	CHARGE	LED	Yellow	The LED indicates that the battery is being charged (lit) or the voltage level is being checked (flashing for 30 min.)					
12	BATTERY OK	LED	Green	The LED indicates that the battery has been charged.					
13	SVP READY	LED	Green	The LED indicates that the SVP ASSY is operable.					
14	SW2(*3)	Jumper socket	Green	The jumper socket sets LOCAL mode or REMOTE mode. (*2) Local mode Remotemode					
15 (*1)	SW3 (*3)	Jumper socket	Black	321 <table><tr><th>#</th><th>Meaning</th></tr><tr><td> 1 Provided : RESET </td><td> 2 DC FAILE detection level Provided : 4.2V Not provided : 4.6V </td></tr><tr><td> 3 BUZZER Provided : Keeps sounding. Not provided : The host controls. </td></tr></table>	#	Meaning	1 Provided : RESET	2 DC FAILE detection level Provided : 4.2V Not provided : 4.6V	3 BUZZER Provided : Keeps sounding. Not provided : The host controls.
#	Meaning								
1 Provided : RESET	2 DC FAILE detection level Provided : 4.2V Not provided : 4.6V								
3 BUZZER Provided : Keeps sounding. Not provided : The host controls.									

(Continued)

No.	Name	Classification	Color	Function																		
16 (*1)	SW4 (*3)	Jumper socket	Black	8 7 6 5 4 3 2 1 <table><tr><th>#</th><th>Meaning</th></tr><tr><td>1</td><td>Not provided : LED TEST</td></tr><tr><td>2</td><td>Not provided : LCD TEST</td></tr><tr><td>3</td><td>Not provided : BUZZER TEST</td></tr><tr><td>4</td><td>Not provided : BATTERY CHARGE</td></tr><tr><td>5</td><td>Not provided : BATTERY DISCHARGE</td></tr><tr><td>6</td><td>Not used</td></tr><tr><td>7</td><td>Not used</td></tr><tr><td>8</td><td>Not used</td></tr></table>	#	Meaning	1	Not provided : LED TEST	2	Not provided : LCD TEST	3	Not provided : BUZZER TEST	4	Not provided : BATTERY CHARGE	5	Not provided : BATTERY DISCHARGE	6	Not used	7	Not used	8	Not used
#	Meaning																					
1	Not provided : LED TEST																					
2	Not provided : LCD TEST																					
3	Not provided : BUZZER TEST																					
4	Not provided : BATTERY CHARGE																					
5	Not provided : BATTERY DISCHARGE																					
6	Not used																					
7	Not used																					
8	Not used																					
17 (*1)	Connector	Connector	—	Not used.																		

*1 : Not used in RKWH type.

*2 : REMOTE MODE is not supported. Be sure to use LOCAL MODE.

*3 : Do not change the SW2, SW3 and SW4 settings that have been set at the factory.

LED TEST

Lights all the LEDs installed on the panel.

LCD TEST

Tests the LCD module display and displays the characters to be tested. When a key is pressed in this mode, the pressed key is displayed on the LCD.

BUZZER TEST

Sounds the buzzer by setting buzzer (bit 6) of CTL Reg. (0X02).

BATTERY CHARGE

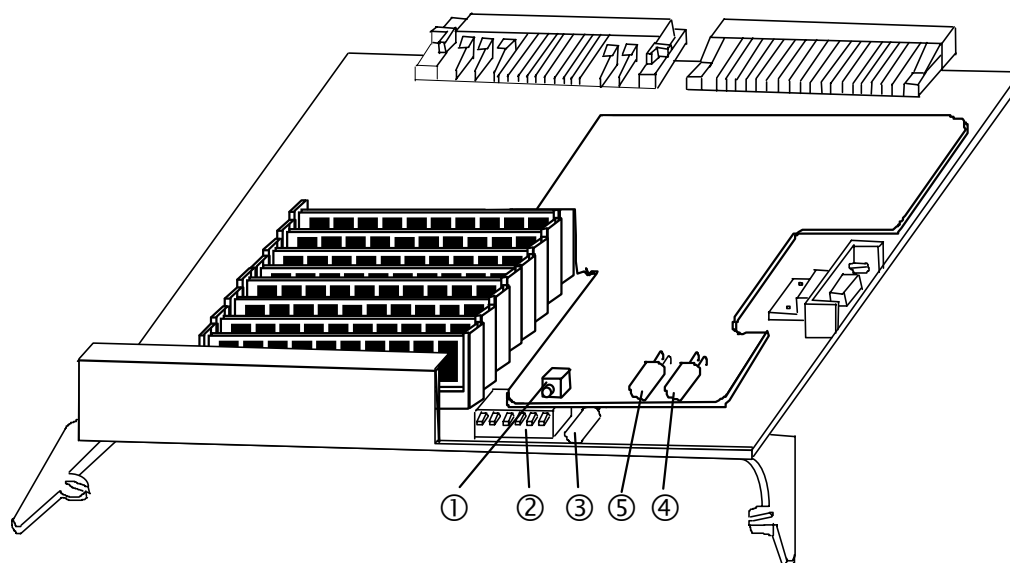
Charges the battery regardless of the battery voltage.

BATTERY DISCHARGE

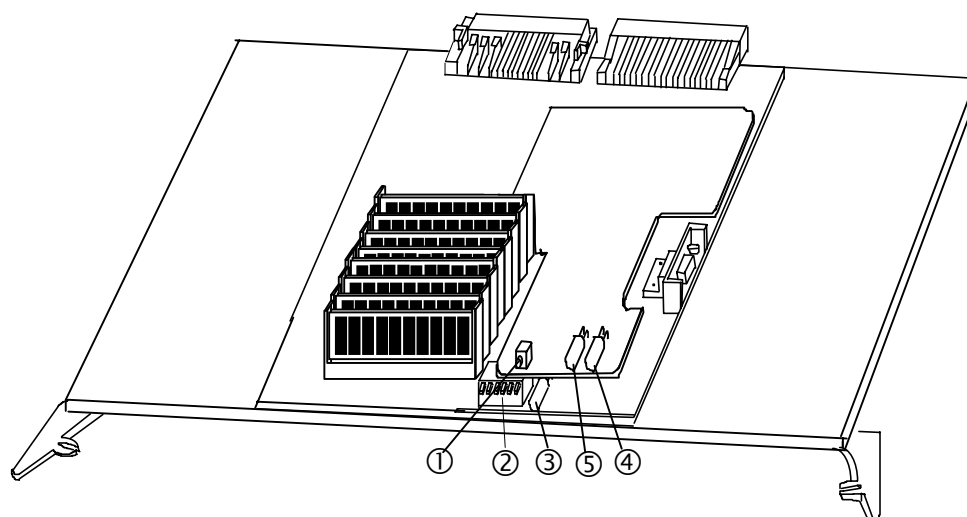
Discharges the battery regardless of the battery voltage.

(2) CTL ASSY

Figure 7.2.3 shows the CTL ASSY.



(a) Rackmount (RKH) Type



(b) Rackmount (RKWH) Type

For the sections (numbers) and functions, see Table 7.2.2.

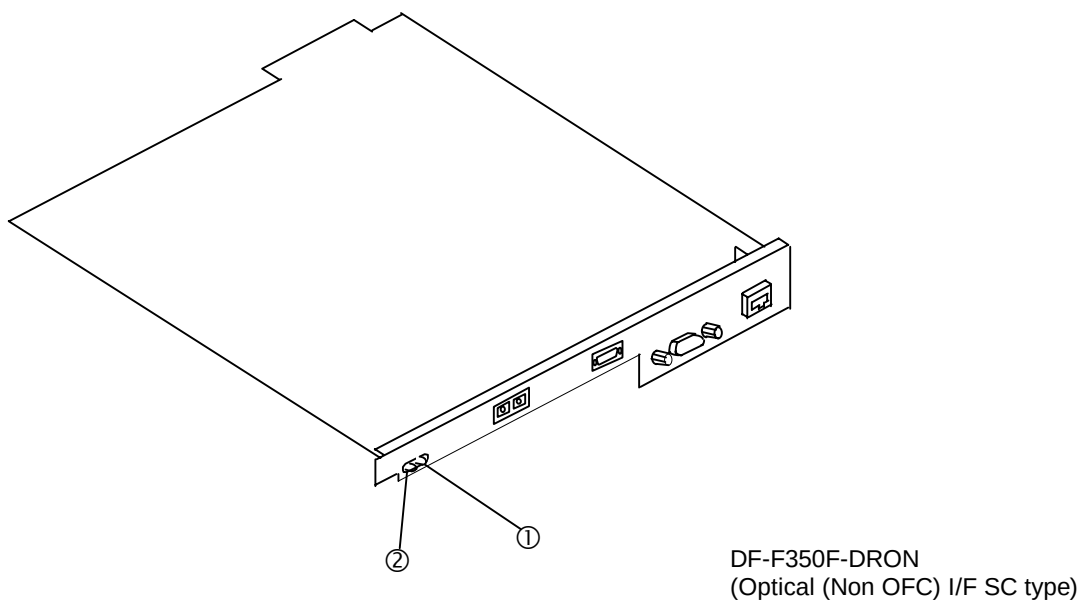
Figure 7.2.3 CTL ASSY of the Rackmount Type

Table 7.2.2 Functions of the Rackmount Type

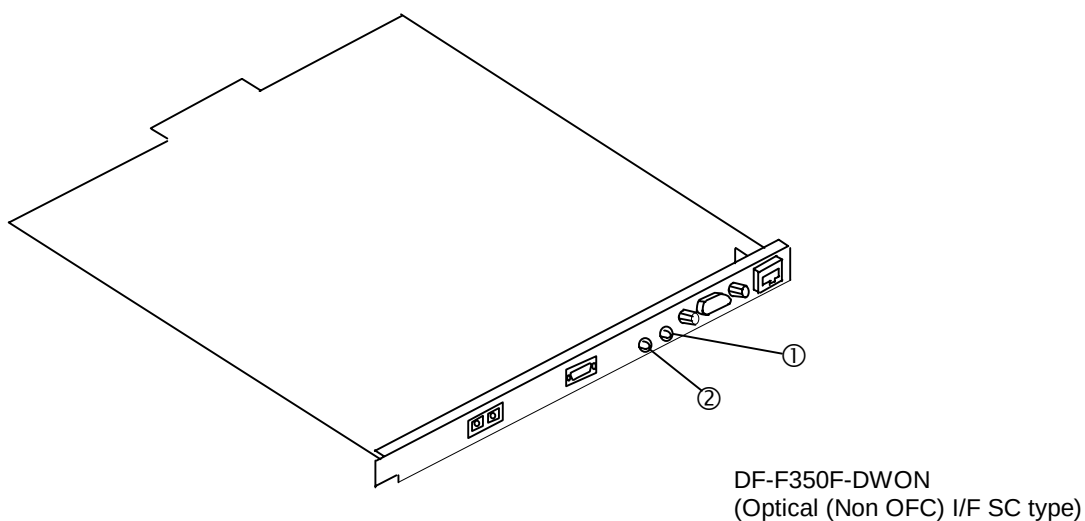
No.	Name	Classification	Color	Function																		
1	READY switch	Switch	—	This switch collects a memory dump.																		
2	DIP switch	Switch	—	ON 1 2 3 4 5 6 7 8 ↓ Setting <table><tr><th>#</th><th>Meaning</th></tr><tr><td>1</td><td>Installs a micro-program.</td></tr><tr><td>2</td><td>Dumps the contents of memory.</td></tr><tr><td>3</td><td>Clears a system parameter.</td></tr><tr><td>4</td><td>Sets a system parameter.</td></tr><tr><td>5</td><td>Initializes a unit parameter.*</td></tr><tr><td>6</td><td>Skips CUDG.</td></tr><tr><td>7</td><td>Initializes a unit parameter.*</td></tr><tr><td>8</td><td>Blocks the controller.</td></tr></table> * The initialization of the unit parameters in Nos. 5 and 7 is valid only when both switches are set to ON.	#	Meaning	1	Installs a micro-program.	2	Dumps the contents of memory.	3	Clears a system parameter.	4	Sets a system parameter.	5	Initializes a unit parameter.*	6	Skips CUDG.	7	Initializes a unit parameter.*	8	Blocks the controller.
#	Meaning																					
1	Installs a micro-program.																					
2	Dumps the contents of memory.																					
3	Clears a system parameter.																					
4	Sets a system parameter.																					
5	Initializes a unit parameter.*																					
6	Skips CUDG.																					
7	Initializes a unit parameter.*																					
8	Blocks the controller.																					
3	CACHE PWR	LED	Green	Confirmation of this LED display status checks whether or not the cache memory is in the back-up mode. ① Set the circuit breaker on the back of the unit to “I” with the main switch set to “O”. ② You can check the following status with this LED display status. Lit : Indicates that the cache is in the back-up mode. (The power is supplied from the battery to the cache.) Extinguished : The cache does not perform a back-up. For canceling the back-up mode of the cache memory, see “1. Before Maintenance Work” in the Entry Chapter.																		
4	FAIL	LED	Red	The LED indicates that an inoperable failure occurs in the CTL ASSY.																		
5	RESET	LED	Yellow	The CTL ASSY is being reset.																		

(3) I/F ADAPTER ASSY

Figure 7.2.4 shows the I/F ADAPTER ASSY.



(a) Rackmount (RKH) type



(b) Rackmount (RKWH) type

For the sections (numbers) and functions, see Table 7.2.3.

Figure 7.2.4 I/F ADAPTER ASSY

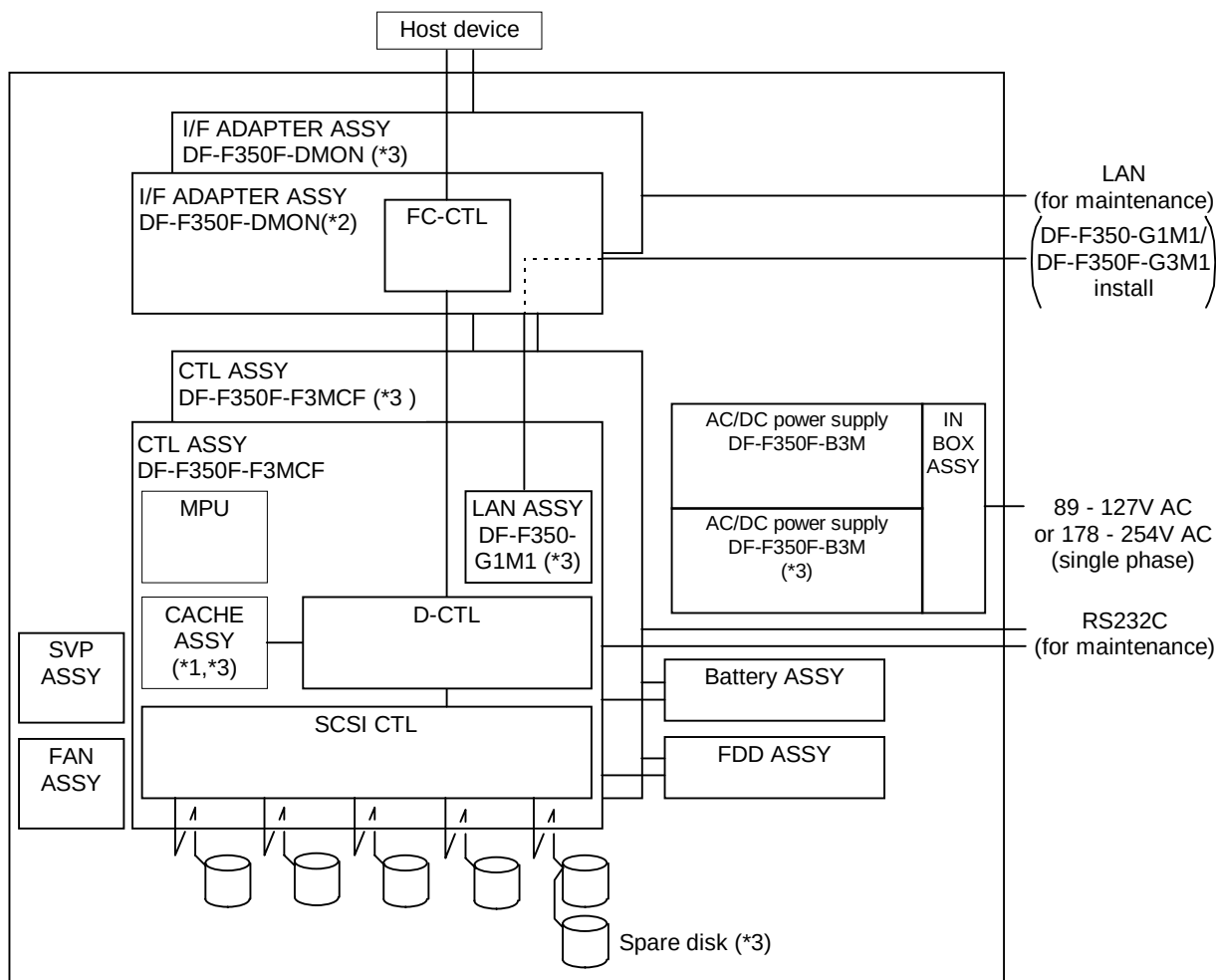
Table 7.2.3 Functions for I/F ADAPTER ASSY of the Mini Tower and Cabinet Types

No.	Name	Classification	Color	Function
1	STATUS-1	LED	Green	The LED indicates the status of I/F ADAPTER ASSY.
2	STATUS-2	LED	Yellow	

8. Subsystem Configuration

8.1 Configuration of Mini Tower Type

The DF350F mini tower type disk array subsystem consists of up to 6 disks, that is, one ROW of five disks (four data disks and one parity data disk), and one optional spare disk, and a controller for controlling these disks. (See Figure 8.1.1)



***1 CACHE ASSY**

DF-F350-C8E : 8 MB

DF-F350-C32E : 32 MB

DF-F350-C128E : 128 MB

Caches must be installed in identical pairs and up to four pairs can be installed. (Intermixed identical pairs are possible.)

***2 I/F ADAPTER ASSY**

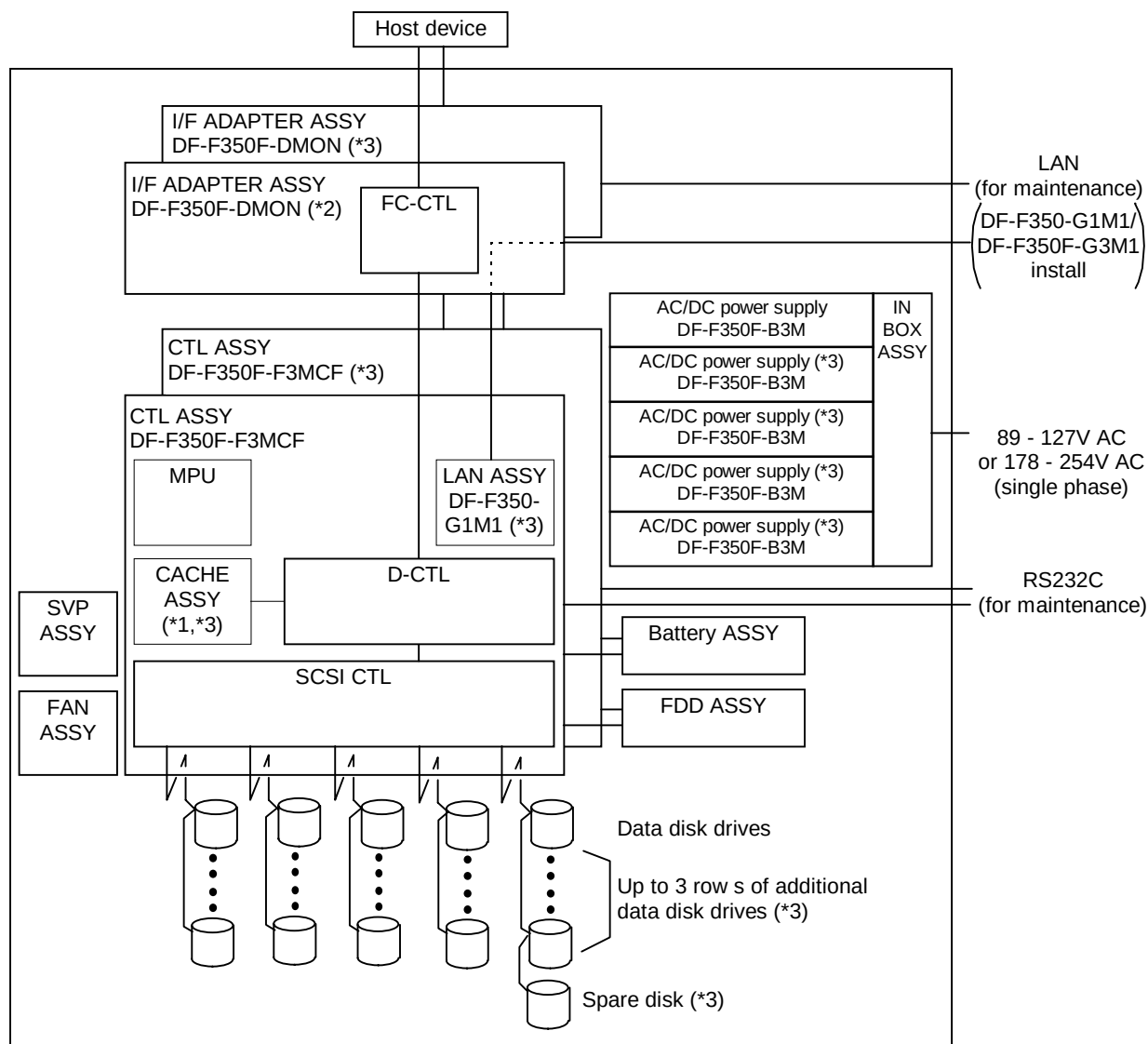
DF-F350F-DMON : Optical (Non OFC) I/F, 100-M5-SN-I, SC connector

***3** A redundant AC/DC power supply, a spare disk drive, a redundant CTL ASSY, CACHE ASSY, and an I/F ADAPTER ASSY for the redundant CTL ASSY and a LAN ASSY are optional.

Figure 8.1.1 Configuration of Mini Tower Type

8.2 Configuration of Cabinet Type

The DF350F cabinet type disk array subsystem consists of up to 21 disks, that is, up to 4 ROWs (3 ROWs are optional) of disks (each row contains five disks (four data disks and one parity data disk)), and one optional spare disk, and a controller for controlling these disks. (See Figure 8.2)



***1 CACHE ASSY**

DF-F350-C8E : 8 MB

DF-F350-C32E : 32 MB

DF-F350-C128E : 128 MB

Cache must be installed in identical pairs and up to four pairs can be installed. (Intermixed identical pairs are possible.)

***2 I/F ADAPTER ASSY**

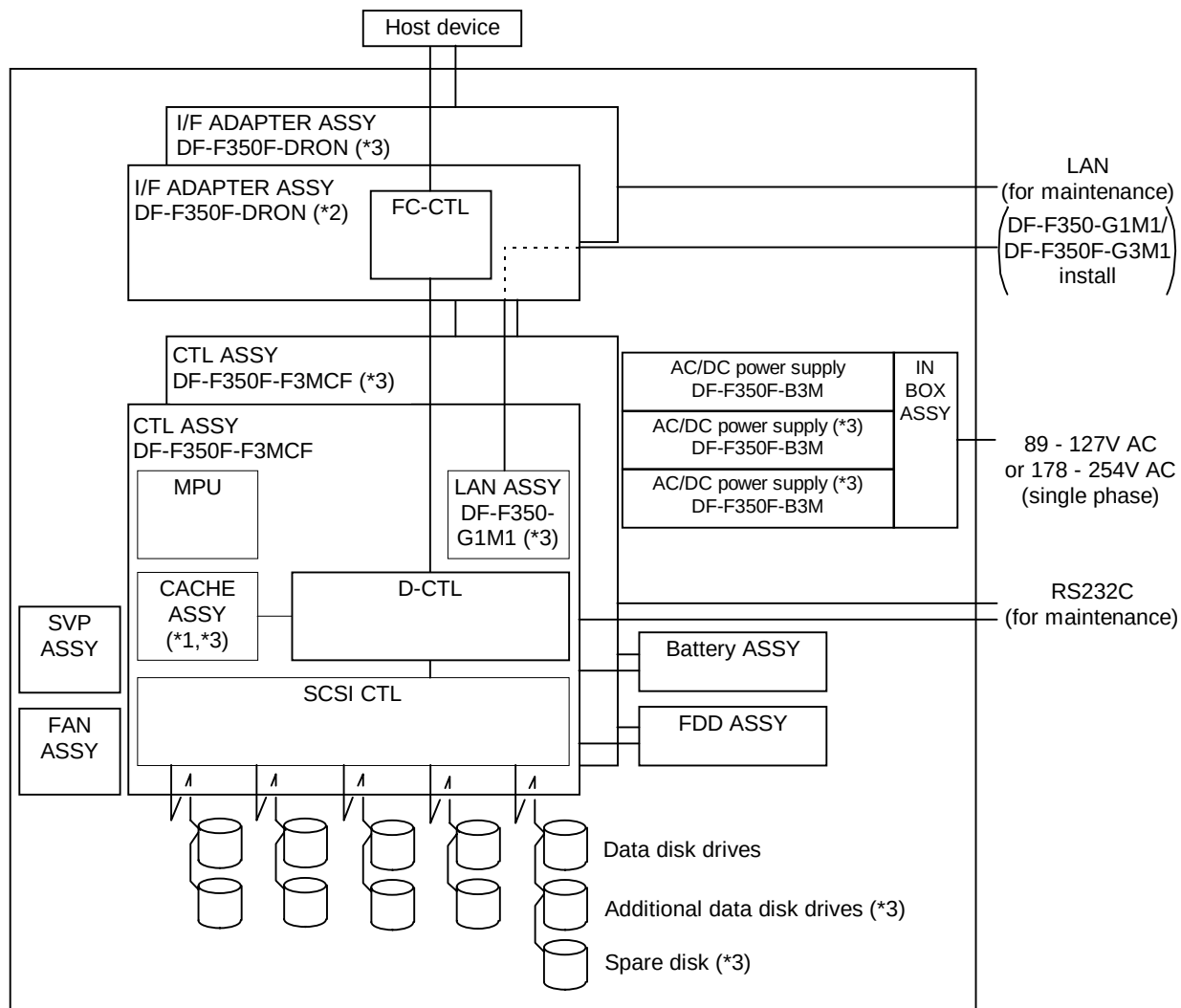
DF-F350F-DMON : Optical (Non OFC) I/F, 100-M5-SN-I, SC connector

***3** A redundant AC/DC power supply, a spare disk drive, a CTL ASSY, CACHE ASSY, and an I/F ADAPTER ASSY for the redundant CTL ASSY and a LAN ASSY are optional.

Figure 8.2 Configuration of Cabinet Type

8.3 Configuration of Rackmount (RKH) Type

The DF350F disk array subsystem of the rackmount (RKH) type consists of up to two rows (the basic row, plus optional one row). One row contains five disk drives (four data disk drives plus one parity data disk drive) and one optional spare disk drive. Up to 11 disk drives can be installed including a controller that controls these disk drives. (See Figure 8.3)



***1 CACHE ASSY**

DF-F350-C8E : 8 MB

DF-F350-C32E : 32 MB

DF-F350-C128E : 128 MB

Cache must be installed in identical pairs and up to four pairs can be installed. (Intermixed identical pairs are possible.)

***2 I/F ADAPTER ASSY**

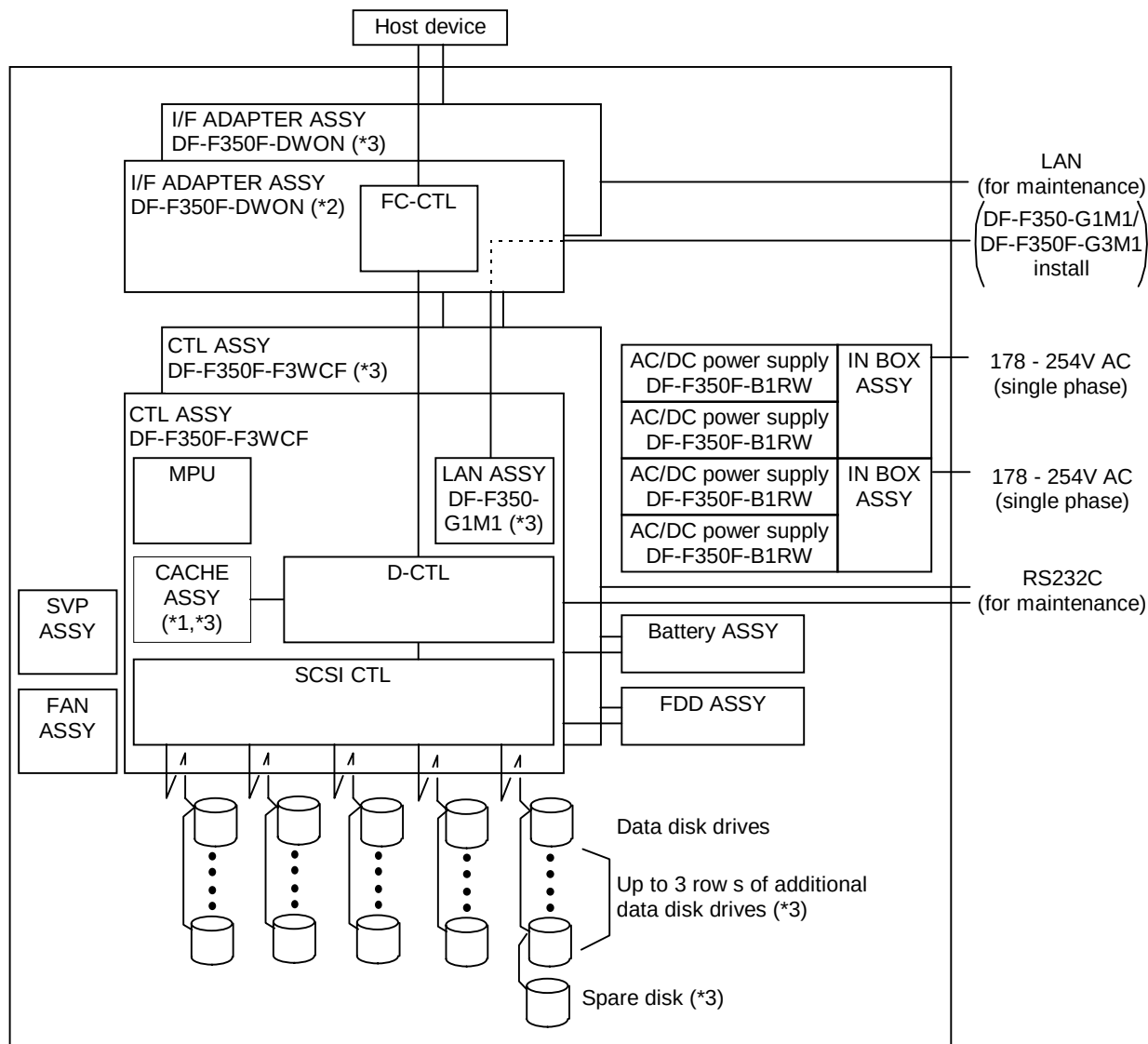
DF-F350F-DRON : Optical (Non OFC) I/F, 100-M5-SN-I, SC connector

***3** A redundant AC/DC power supply, a spare disk drive, a additional data disk drives, a CTL ASSY, CACHE ASSY, and an I/F ADAPTER ASSY for the redundant CTL ASSY and a LAN ASSY are optional.

Figure 8.3 Configuration of Rackmount (RKH) Type

8.4 Configuration of Rackmount (RKWH) Type

The DF350F disk array subsystem of the rackmount (RKWH) type consists of up to four rows (the basic row, plus additional three rows). One row contains five disk drives (four data disk drives plus one parity data disk drive) and one optional spare disk drive. Up to 21 disk drives can be installed including a controller that controls these disk drives. (See Figure 8.4)



***1 CACHE ASSY**

DF-F350-C8E : 8 MB

DF-F350-C32E : 32 MB

DF-F350-C128E : 128 MB

Cache must be installed in identical pairs and up to four pairs can be installed. (Intermixed identical pairs are possible.)

***2 I/F ADAPTER ASSY**

DF-F350F-DWON : Optical (Non OFC) I/F, 100-M5-SN-I, SC connector

***3** A spare disk drive, a additional data disk drives, a CTL ASSY, CACHE ASSY, and an I/F ADAPTER ASSY for the redundant CTL ASSY and a LAN ASSY are optional.

Figure 8.4 Configuration of Rackmount (RKWH) Type

8.5 Configuration of Rack Frame

8.5.1 U1 Rack frame

The DF-F350-U1 is a rack frame where up to six DF350F rackmounts (type RKH) can be installed. This frame consists of a Power Distribution Box (PDB) that supplies the AC power and a panel that combines and controls the operation display and start/stop of RKH and a cooling fan. (See Figure 8.5.1.)

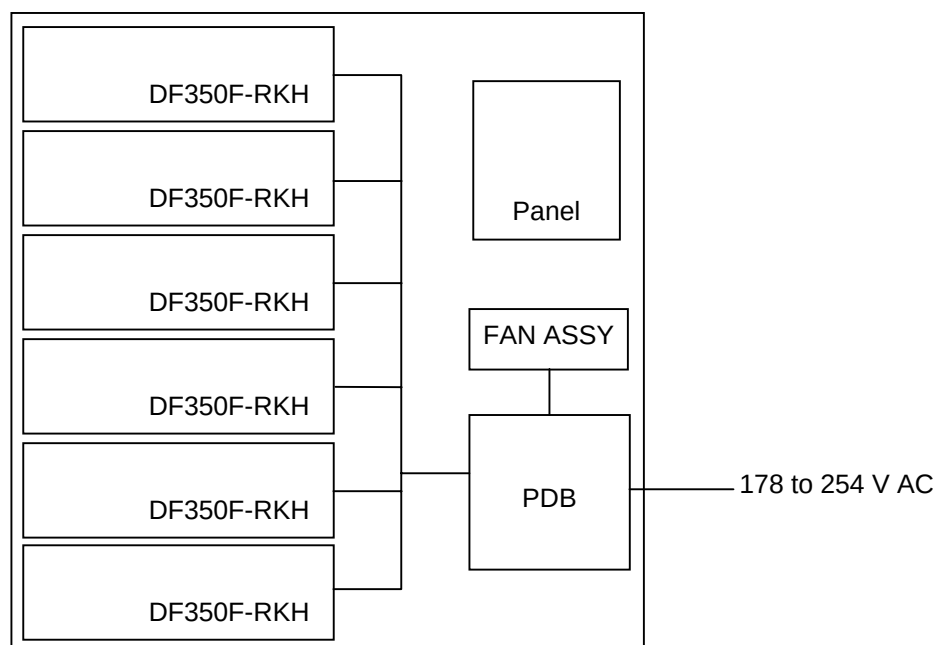
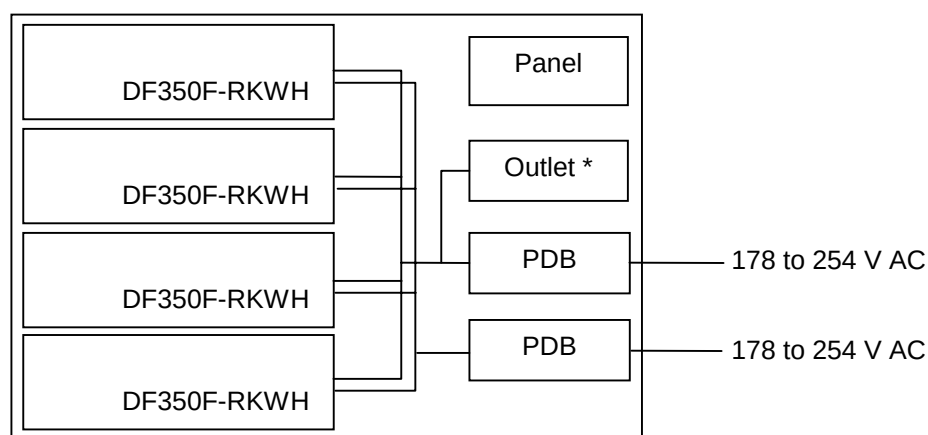


Figure 8.5.1 System Configuration of U1 Rack Frame

8.5.2 U2 Rack frame

The DF-F350-U2 is a rack frame where up to four DF350F rackmounts (type RKWH). This frame consists of two PDBs that duplicate the power system and a panel that combines and controls the operation display and start/stop of type RKWH. (See Figure 8.5.2.)



* This outlet is optional.

Figure 8.5.2 System Configuration of U2 Rack Frame

9. Software Configuration

The software configuration of the DF350F is shown in Figure 9.1.

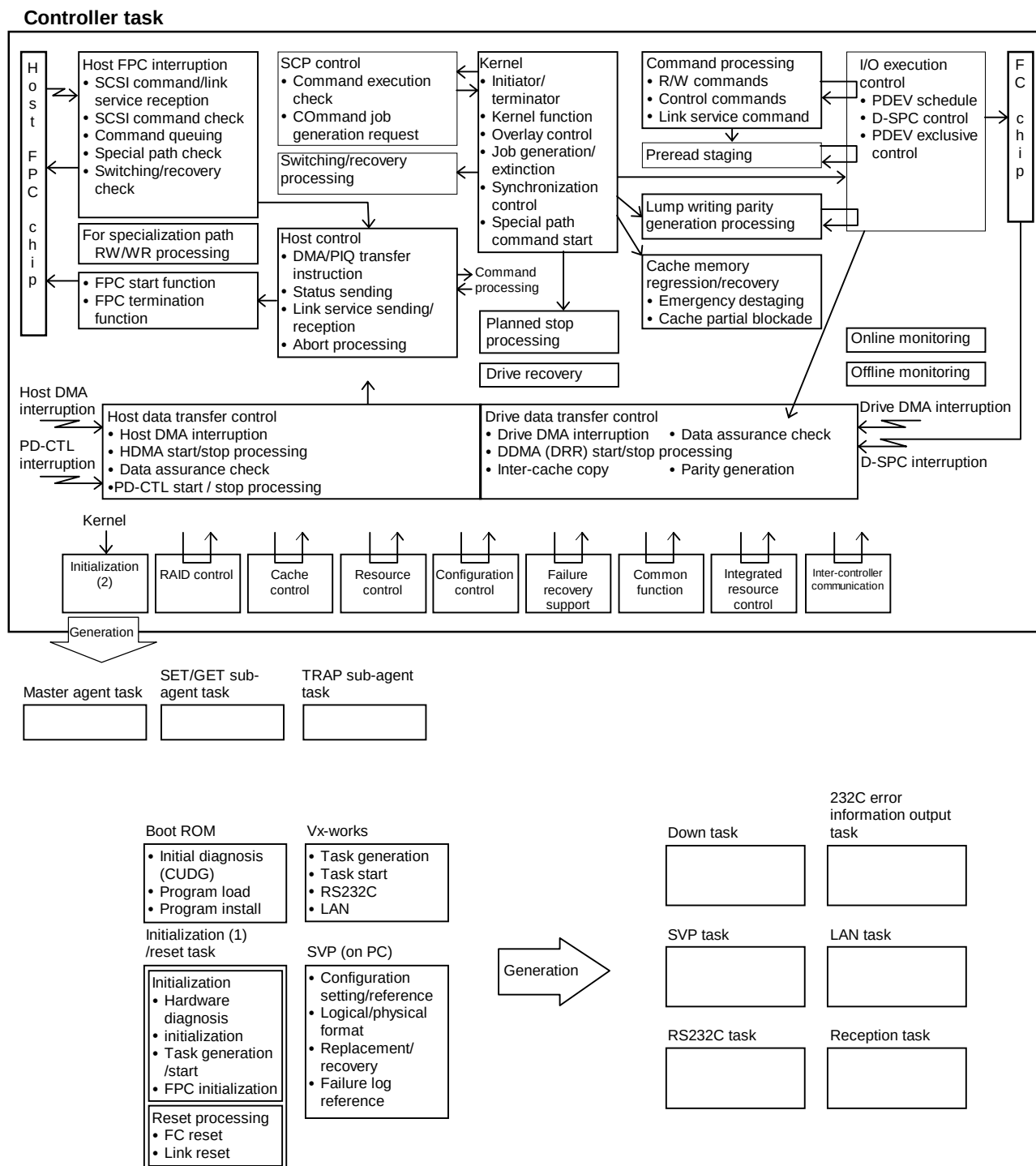


Figure 9.1 Software Configuration

10. Power On/Off Sequence

10.1 IMPL Flow

An IMPL processing procedure when power is turned on is explained below. The IMPL sequence is broadly divided into four processes and they are executed sequentially.

(1) Boot loader

After the flash memory is booted, minimum hardware initialization is executed. Thereafter, the local memory loader is expanded to the local memory from the flash memory and control is transferred to it.

(2) Local memory loader

The physical drives in the first row are spun up.

The Vx-works load module is loaded onto the local memory. Thereafter, control is transferred to Vx-works.

(3) Vx-works

The table in the local memory for communication between the tasks is initialized by the root task of Vx-works and the hardware resource (LAN, RS232C) is tested.

(4) DF task

The DF table and hardware are initialized and then a DF task is generated. CUDG taking-over information is loaded by the DF task and when disks are installed in the second and subsequent rows, they are spun up.

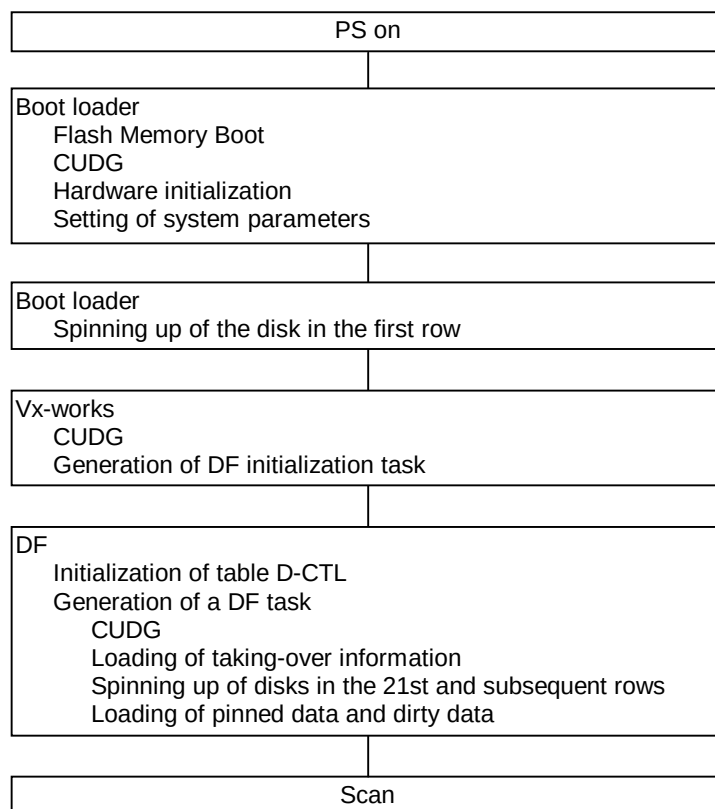


Figure 10.1.1 Planned Stop of IMPL Sequence

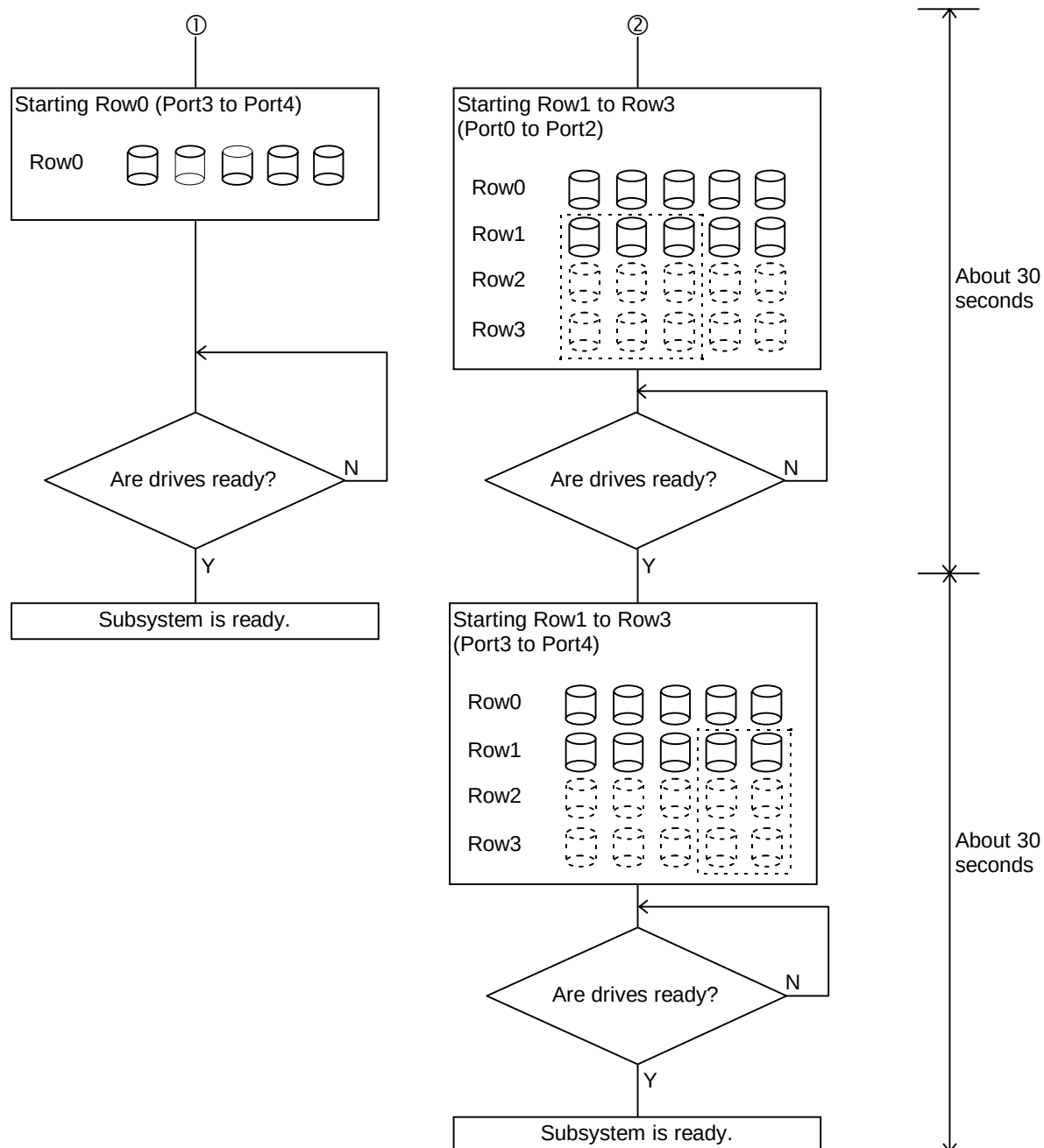


Figure 10.2.1 Starting the Drives

10.3 Planned Stop

When the PS is turned off because of the host computer power off or PS off is instructed by a service person, the subsystem monitors the ending status of the processings being executed or not executed for all the logical devices and when everything ends, the destaging is executed.

When a track (pinned data) fails to be destaged occurs in this case, the Pin information is stored in the system area of the system disk.

Thereafter, the taking-over information is stored in the system area of the system disk, and the power of the drive is turned off, and the power of the cache battery is turned off, and then permission of power off is notified to the hardware.

The hardware turns the power off after receiving the permission.

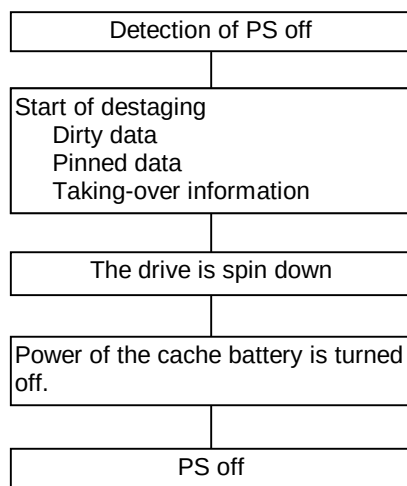


Figure 10.3.1 Planned Stop

11. Explanation on Operations

11.1 Data Format

Figure 11.1 shows the data format.

In the sub-block, the address assurance code (LA) and data assurance code (LRC) are added. The physical format of the physical drive is recorded in the data field in units of 516bytes.

Cache data

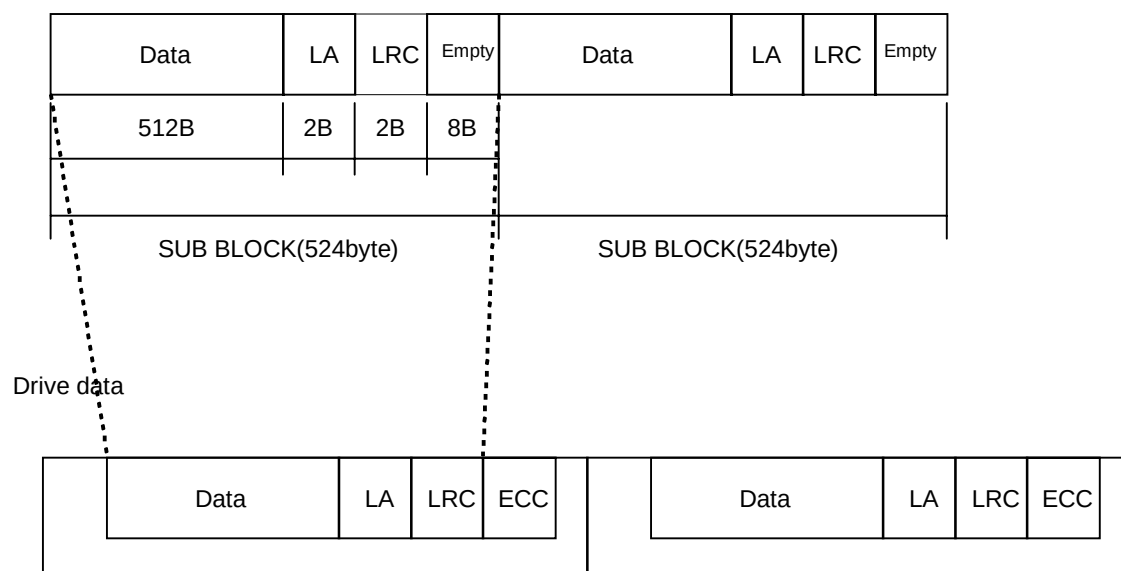


Figure 11.1 Data Format

11.2 R/W processing

Every Read/Write processing is performed via the cache. Figure 11.2.1 shows the flow of data.

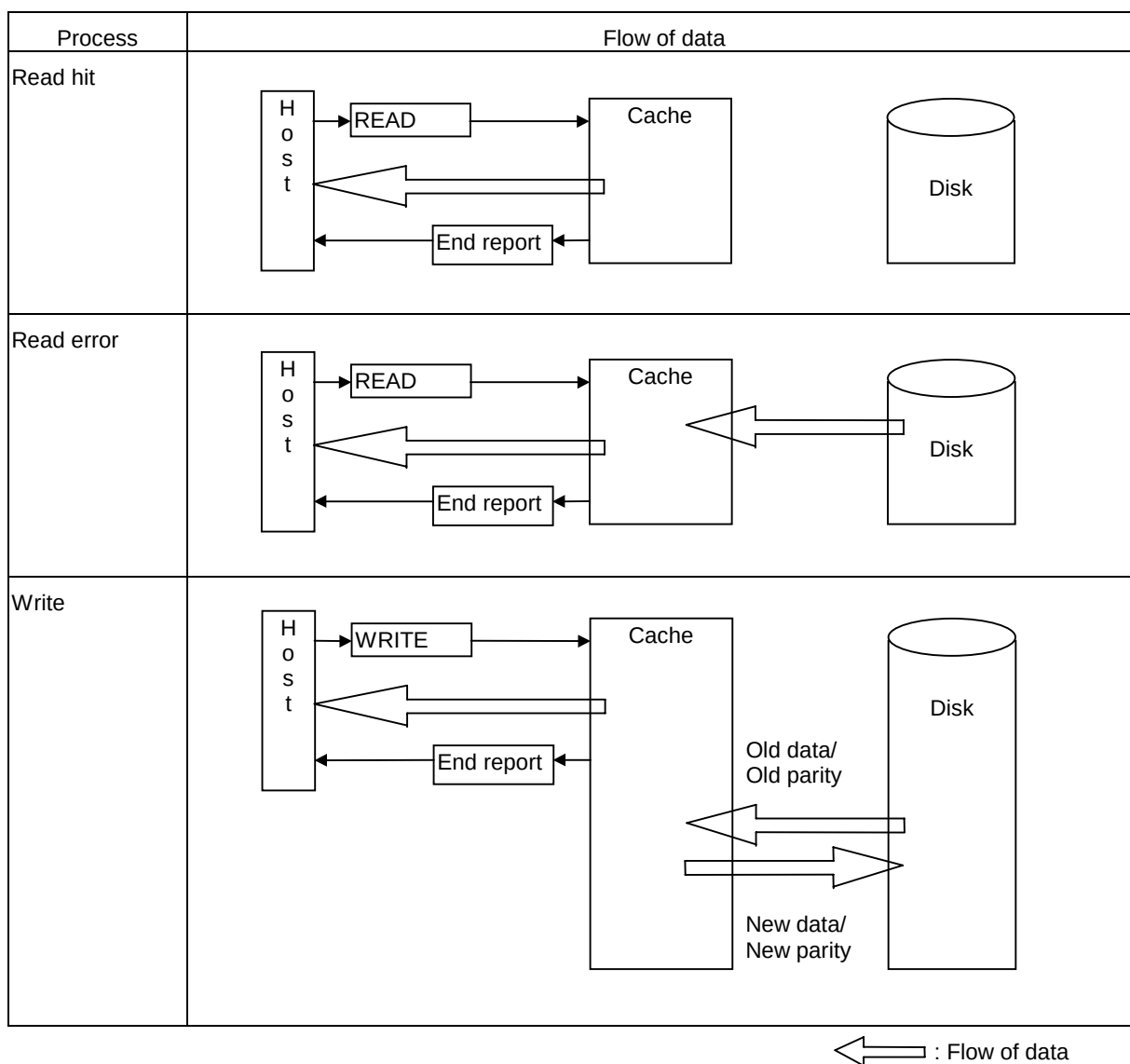


Figure 11.2.1 Flow of Data

To improve the responding performance of the writing process the write-after process of returning an end report to the host is executed at the time when writing of data into the cache ends. Thereafter, the controller generates parity asynchronously and writes data on the disk.

Figure 11.2.2 shows the flow of access to a disk in the dual system configuration.

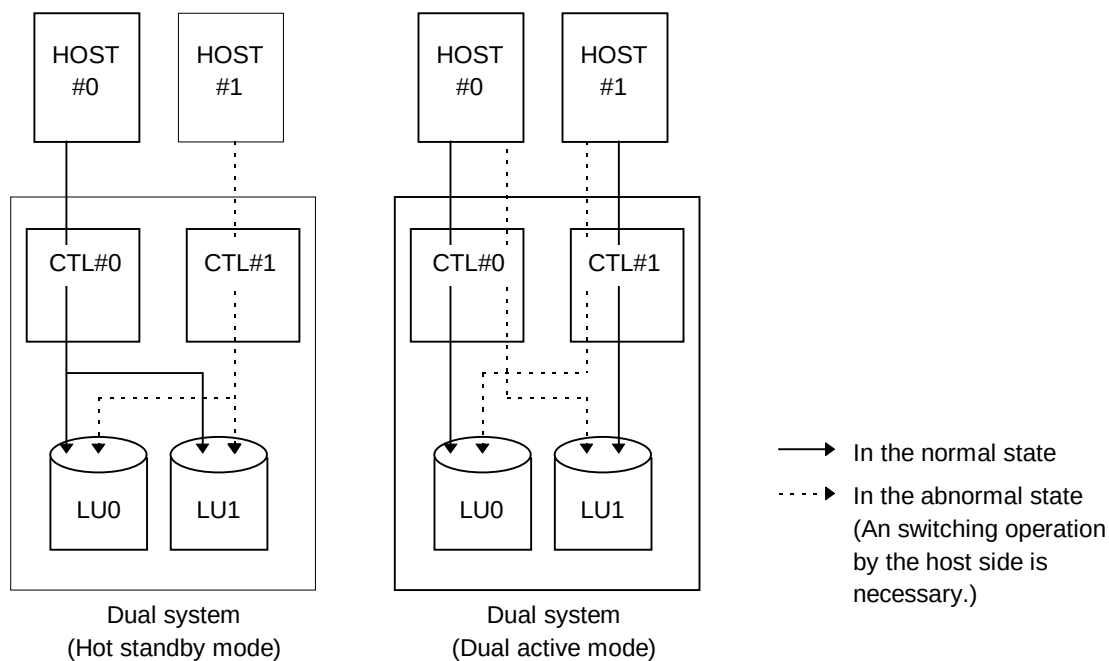


Figure 11.2.2 Flow of Access to Disks

In the dual active mode, the LU to be under the charge of by each controller is determined as shown in Figure 11.2.2. In the normal state, access by the controller on the other side is possible, However, the switching operation takes a short period and when access from other than the controller in charge is executed, the performance will be lowered.

11.3 Cache Control

(1) Cache structure

The cache consists of a directory section for controlling data and a data section for storing user data.

(2) Data

With respect to data in the cache, a 16kB segments are controlled by the SGCB. The minimum unit of data is a sub-block (LBA) and one segment is equal to 32 sub-blocks (LBA). Data in the cache consists of staging data from the drive and dirty data which is not reflected to the drive. There are two types of dirty data ; data without parity generated and data with parity generated. Data has surface attributes of the R and W surfaces so that the write penalty occurs at the time of the parity updating which is peculiar to the RAID can be reduced. To prevent data loss occurs when the power fails, it is made non-volatile by means of the battery.

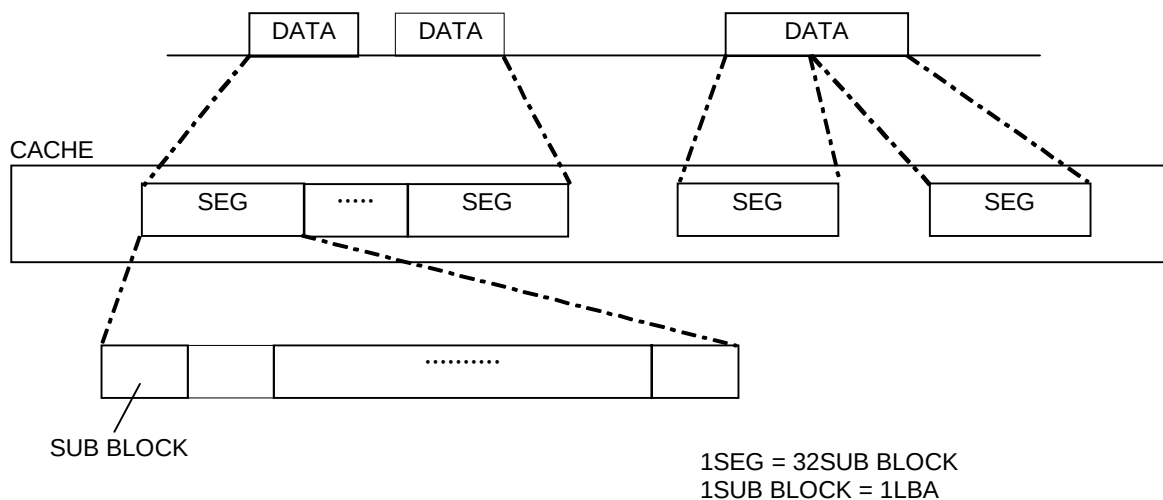


Figure 11.3.1 Data Structure in Cache

(3) Hit/miss determination

A hash table is used to increase the speed of data retrieval in the cache. SGCB is entered in the hash table and hit or miss is determined by using VDEV# and VSEG# as entry positions.

(4) Queue control

Data in the cache is controlled by queues classified according to attributes. An SGCB is queued for each queue. The queues are controlled so as to perform processings according to the attributes such as segment assignment and sweeping out of dirty data.

(5) Dual configuration

When the subsystem operates in the dual configuration, write data in the directory is double-written into the caches in both CTL boards, so that even if one CTL board is blocked, no user data will be lost.

11.4 Destaging

Write data from the host is stored in the cache once and swept out to the disk asynchronously.

There are two types of destaging methods available such as destaging of random data and destaging of sequential data.

(1) Destaging of random data

Data is processed in units of LBAs. The old data and old parity of data to be destaged are staged from the disk. New parity is generated from the new data, old data and old parity and the new data and new parity are destaged in units of LBAs.

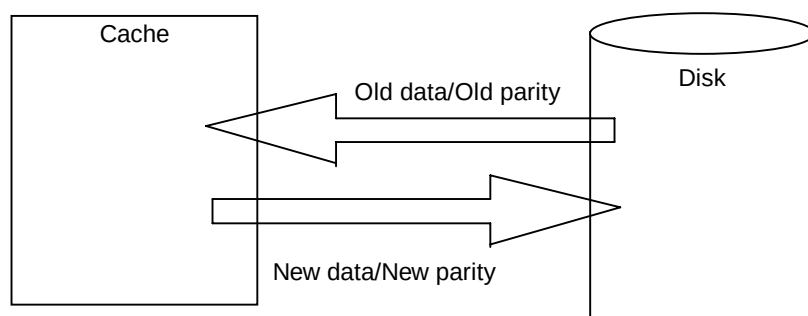


Figure 11.4.1 Destaging of Random Data

(2) Destaging of sequential data

Data is processed in units of stripes. New parity is generated from the write data and the new data and new parity are destaged in units of stripes.

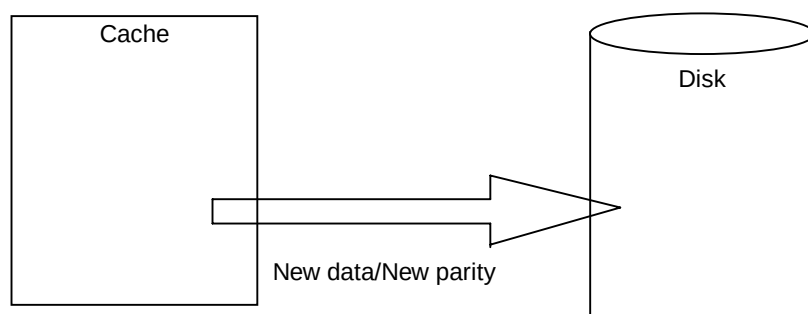


Figure 11.4.2 Destaging of Sequential Data

11.5 Operation when a Drive Failure Occurs

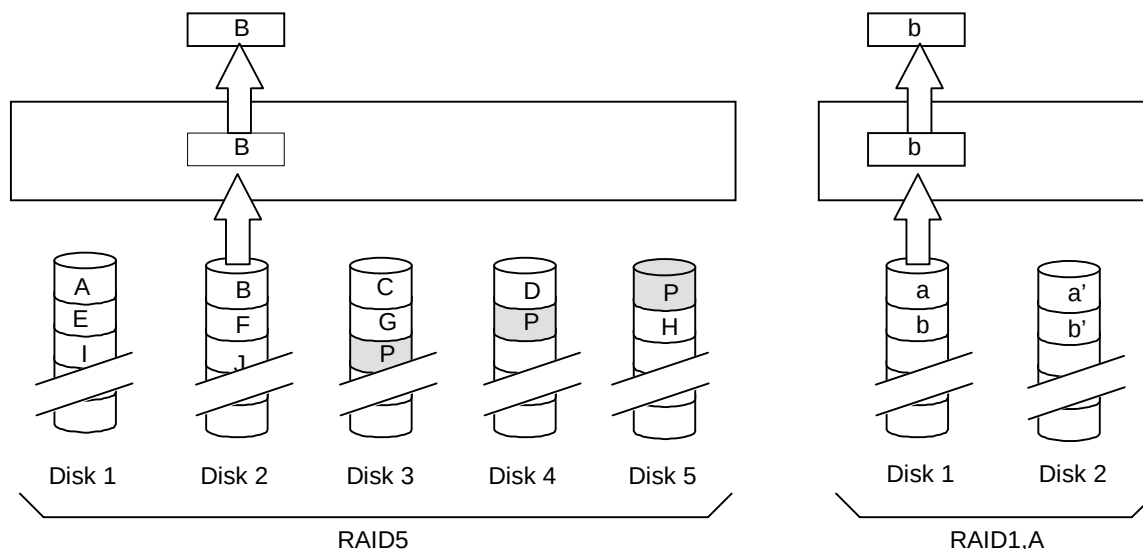
(1) I/O operation against drive failures

Even if the physical drive of this subsystem (RAID1, 5, A) fails and data cannot be read, the target data can be recovered by using data on normal disks. In RAID1 or A another disk is used and in RAID5, data on the other disks on the same stripe is used. By doing this, even when a failure occurs in the drive, the work can be continued as it is. Even in the case of write request, the processing can be continued in the same way.

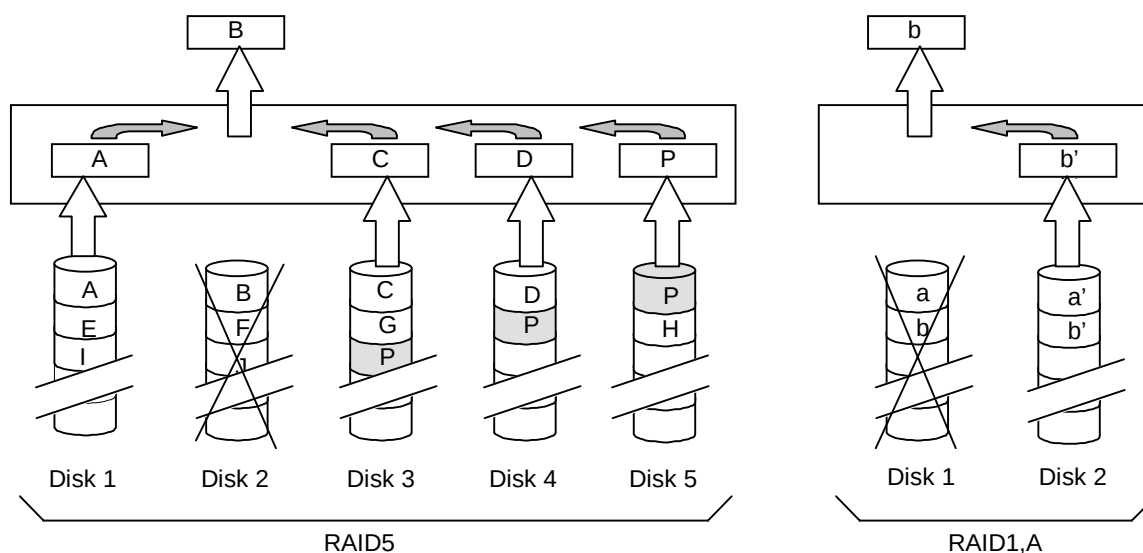
Figure 11.5.1 shows the outline of the data reading operation when a failure occurs in the drive.

Data B reading request

(a) In the normal state



(b) In the case of disk failure



A, B, C, a', b'... ; data

P ; parity

Figure 11.5.1 Operation when a Disk Failure Occurs

(2) Data assurance when a drive failure occurs

This subsystem has an optional spare disk and data of a drive which fails and is blocked or whose failure occurrence count exceeds a specified value is automatically reconstructed on the spare disk.

This processing is performed on the background of the host side, so that an I/O request can be received continuously. Data saved on the spare disk is copied into the original position again after the faulty drive is replaced.

(a) Dynamic sparing

Errors which occur during normal read/write processings are controlled for each drive. When the error count of a drive exceeds a specified value, it is judged that there exists a risk that a failure (an unrecoverable error) occurs in the drive and the data is automatically copied onto the spare disk. This function is called a dynamic sparing function.

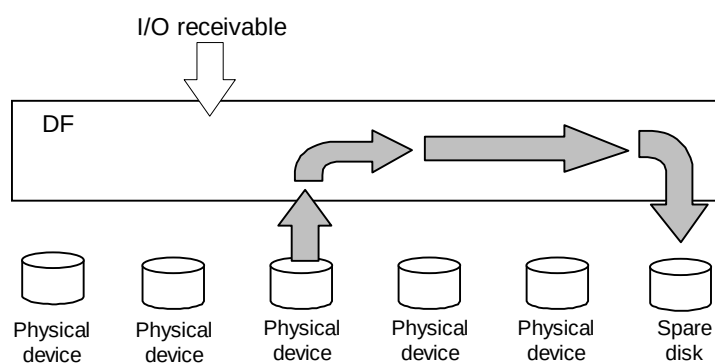


Figure 11.5.2 Outline of Dynamic Sparing

(b) Correction copy

If an failure occurs in a drive and data cannot be read and written when RAID5 is used, the data of the faulty drive is reconstructed by using data of the other drives and parity data, then copied onto the spare disk.

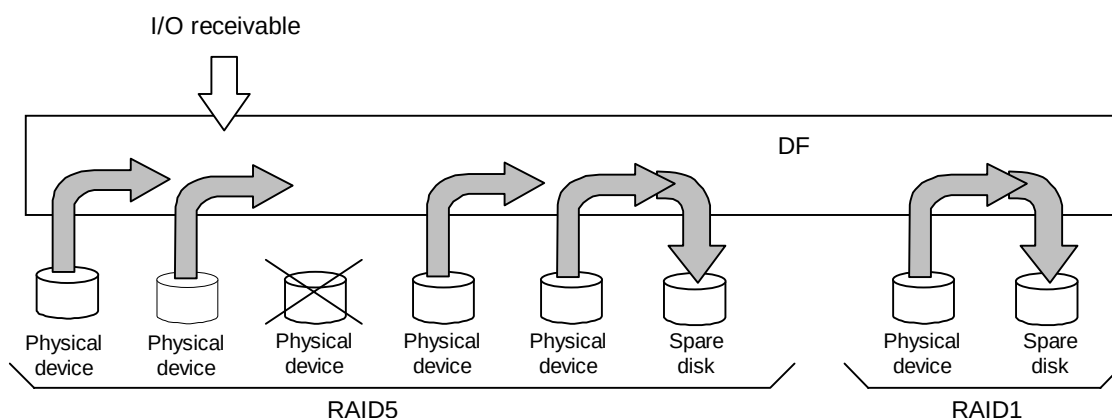


Figure 11.5.3 Outline of Correction Copy

12. Maintenance

12.1 Maintenance Tools

There are three maintenance tools available ; Disk array utility, Failure notification program, and SNMP. Table 12.1.1 lists functions of the maintenance tools.

Table 12.1.1 Maintenance Tool Function List

	Failure Alert						Configuration reference and setting	Statistical information reference
	Disk	Fan	Battery	Power supply	Cache	Contro-ller		
Disk Array Utility	○	○	○	○	○	○	• Definition of RAID • Definition of LU • Setting of system option	• Operating state of controller • Number of host command receptions • Operating state of commands • State of cache load
Failure notification program	○	○	○	○	×	○	None	None
SNMP	△	○	○	○	○	×	None	None

○ : Supported

× : Not supported

△ : Supported without drive position display

Figure 12.1.1 shows the connecting configuration of maintenance tools.

DF350F User

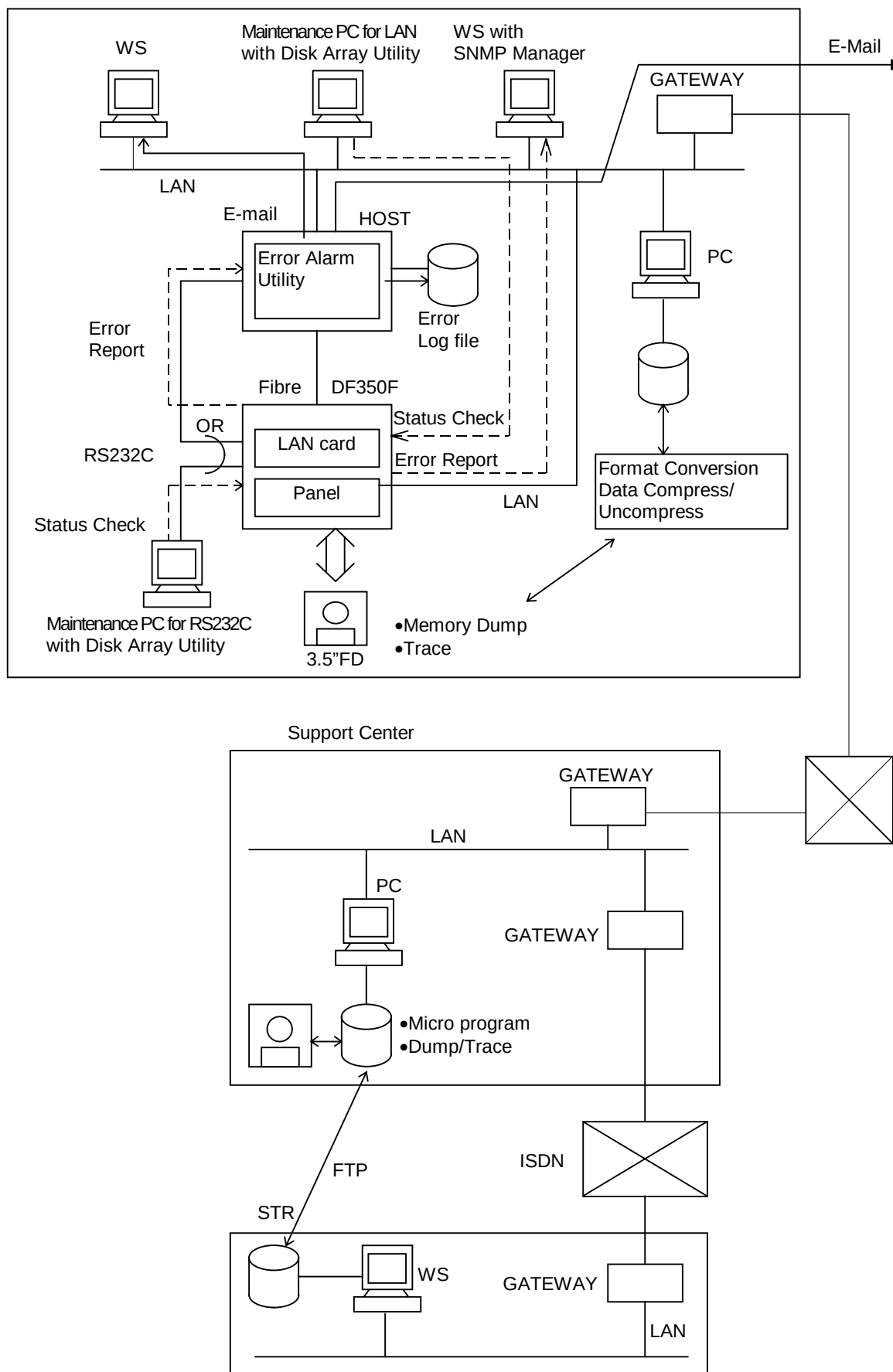


Figure 12.1.1 Maintenance Tools Connecting Configuration

DF350F Disk Subsystem

3. TROUBLE SHOOTING

Rev.2

REVISION CONTROL

Legend for revision codes : AD : Addition CH : Change CR : Correction DL : Deletion

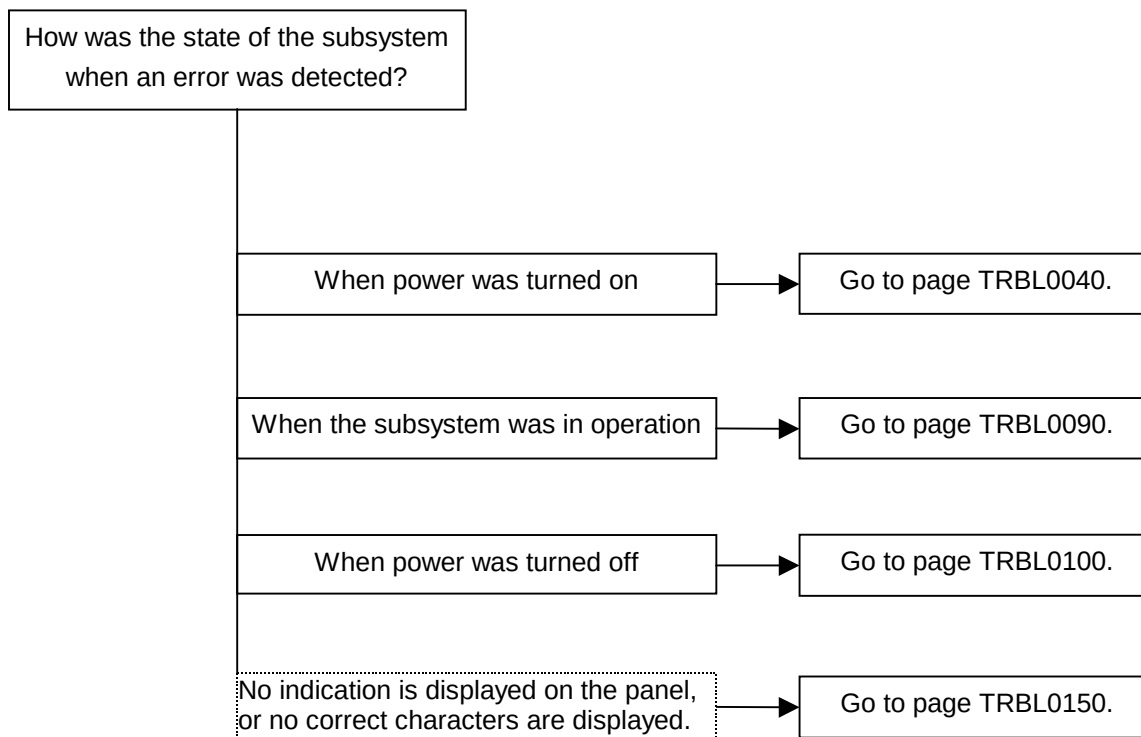
REV.	Date	DRW.	CHKD	APPD	Sheet No.	Description	Code
0	Jan.20.'98	A.Yamanashi	K.Aruga	H.Iwasaki	All	Issued	
1	Jul.31.'98	A.Yamanashi	K.Aruga	H.Iwasaki	0120	Added Fig.2.1.1.	AD/
						Change 'Method' in the table.	CH
					0200	Added '018CCDE0'.	AD
					0240	Added 'PERTIALLY COMPLT'.	AD
					0260	Added 'HZF021'.	AD
					0340	Change Recovery measures in 'W015XX'.	CH
					0470	Delete 'HZ0601', 'HZ0602'.	DL
					0475	This page was newly added.	AD
					0950	Delete 'Down the DIP switch...'.	DL
					0980	Changed flow chart.	CH
					1110	Added ㊦-(c).	AD
					1130	Added 'Example of displaying...'.	AD
					1290	Changed Note.	CH
					1300	Changed Table 8.1.1.	CH
					1310	Changed 'Recovery procedure' on Table 8.1.1.	CH
2	Oct.16.'98	A.Yamanashi			0030	Added "No indication is displayed on the panel..." (Pages 0150 added by the same reason.)	AD
					0230	Deleted R60201-R70102.	DL
					0231-	These page were newly added.	AD
					0235		
					0490	Added HZ14XY.	AD
					0491-	These page were newly added.	AD
					0493		
					0500	Deleted HZ14XY.	DL
					0840	Added No.16, 17.	AD
					0940	copy back→correction copy. (Pages 0950, 0960 were changed by the same reason.)	CH
					1012	This page was newly added.	AD
					1014	This page was newly added.	AD
					1080	Added 4.2.	AD
					1090	Added 4.3.	AD
					1091-	These page were newly added.	AD
					1094		
					1100	4.3→4.4/Changed (1)-㊦/Deleted (3).	CH/ DL
					1105	This page was newly added./4.3.1→4.4.1.	AD/ CH
					1110	Changed ㊦→㊧, ㊧→㊨, ㊨→㊩.	CH
					1120	Changed "Example of displaying power on information".	CH

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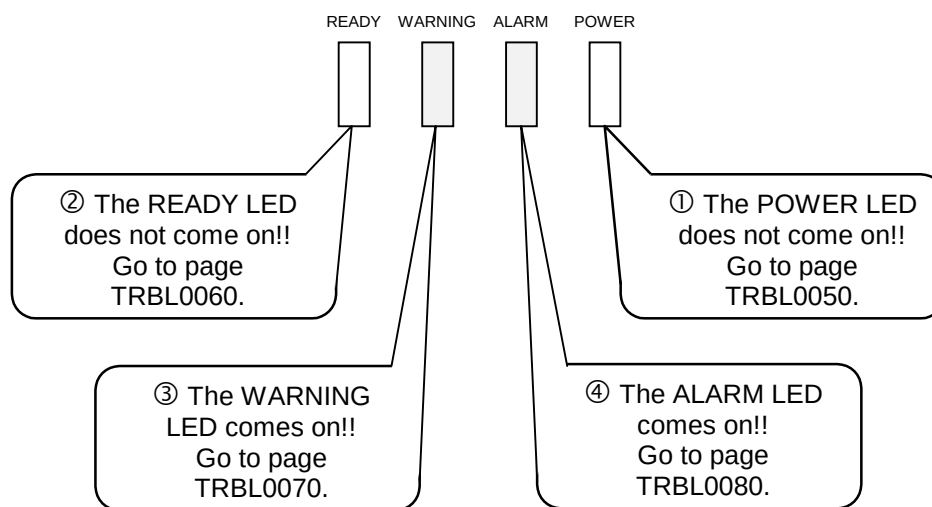
1. Errors and Recovery Measures

If an error occurs during a power-on sequence, troubleshoot it according to Section 1.1 “Errors Occur during Power-On Sequence and Recovery Measures”. If an error occurs after the power-on, troubleshoot it according to Section 1.2 “Errors Occur during Subsystem Operation and Recovery Measures”. If an error occurs during a power-off sequence, troubleshoot it according to Section 1.3 “Errors Occur during Power-Off Sequence and Recovery Measures”.



1.1 Errors Occur during Power-On Sequence and Recovery Measures

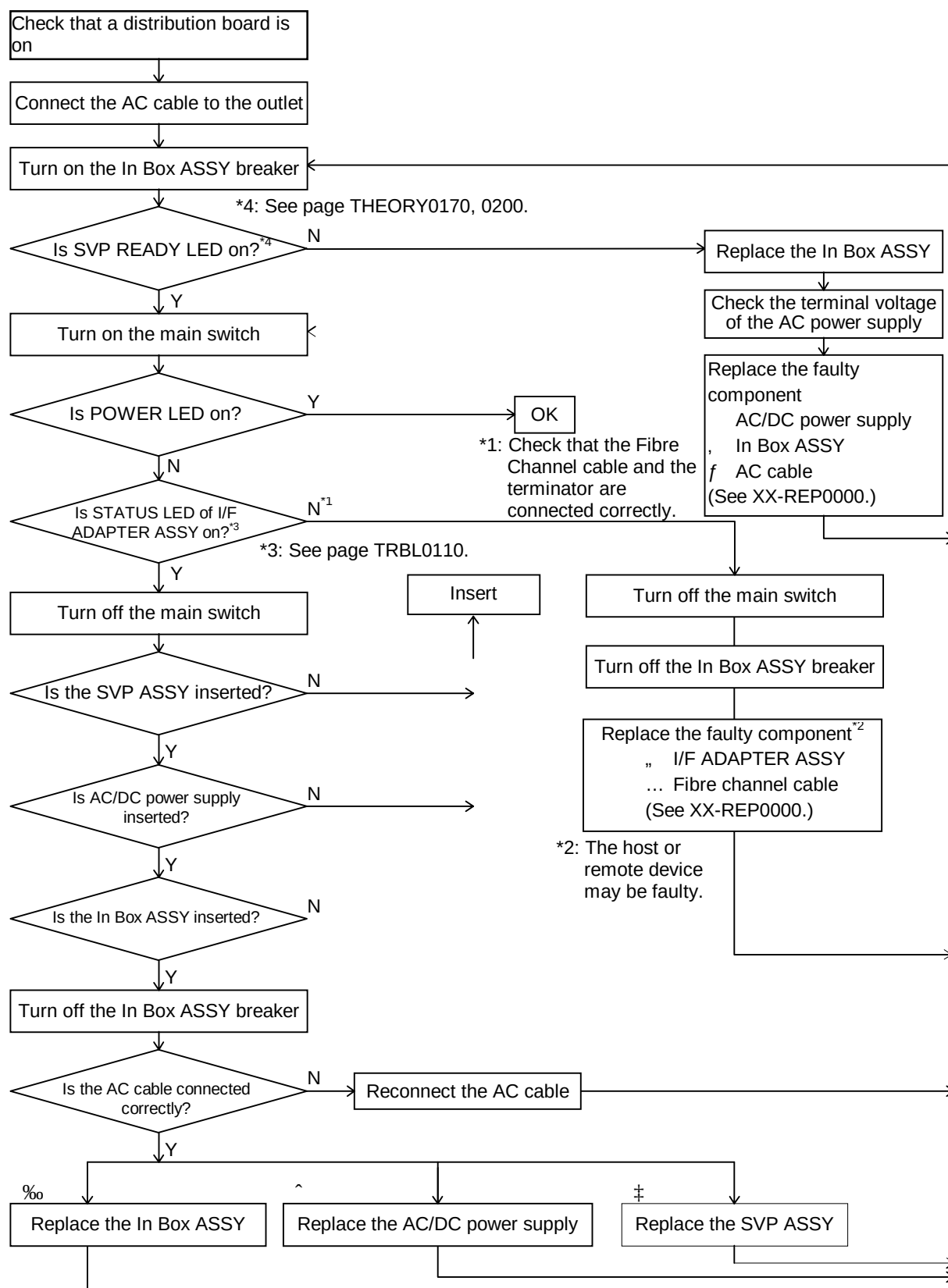
This section describes the errors that may occur when subsystem power is turned on and actions to be taken against them.



	Error	Action to be taken
①	The POWER LED on the front of the subsystem does not come on.	The SVP ASSY ①, AC/DC power supply ②, or IN BOX ASSY ③ may be faulty. Troubleshoot the error according to “POWER LED error troubleshooting” on page TRBL0050, then replace the faulty component.
②	The READY LED on the front of the subsystem does not come on.	The SVP ASSY ① may be faulty, or a failure causing an alarm or warning ② may have occurred. Troubleshoot the error according to “READY LED error troubleshooting” on page TRBL0060, then replace the faulty component.
③	The WARNING LED on the front of the subsystem came on.	The AC/DC power supply ①, Fan ASSY ②, SVP ASSY ③, or drive ④ may be faulty. Troubleshoot the error according to “WARNING LED error troubleshooting” on page TRBL0070, then replace the faulty component.
④	The ALARM LED on the front of the subsystem came on.	The AC/DC power supply ①, FAN ASSY ②, SVP ASSY ③, or CUDG ④ may be faulty. Troubleshoot the error according to “ALARM LED error troubleshooting” on page TRBL0080, then replace the faulty component.

(1) POWER LED error troubleshooting

Troubleshoot the POWER LED error according to the flowchart shown below.

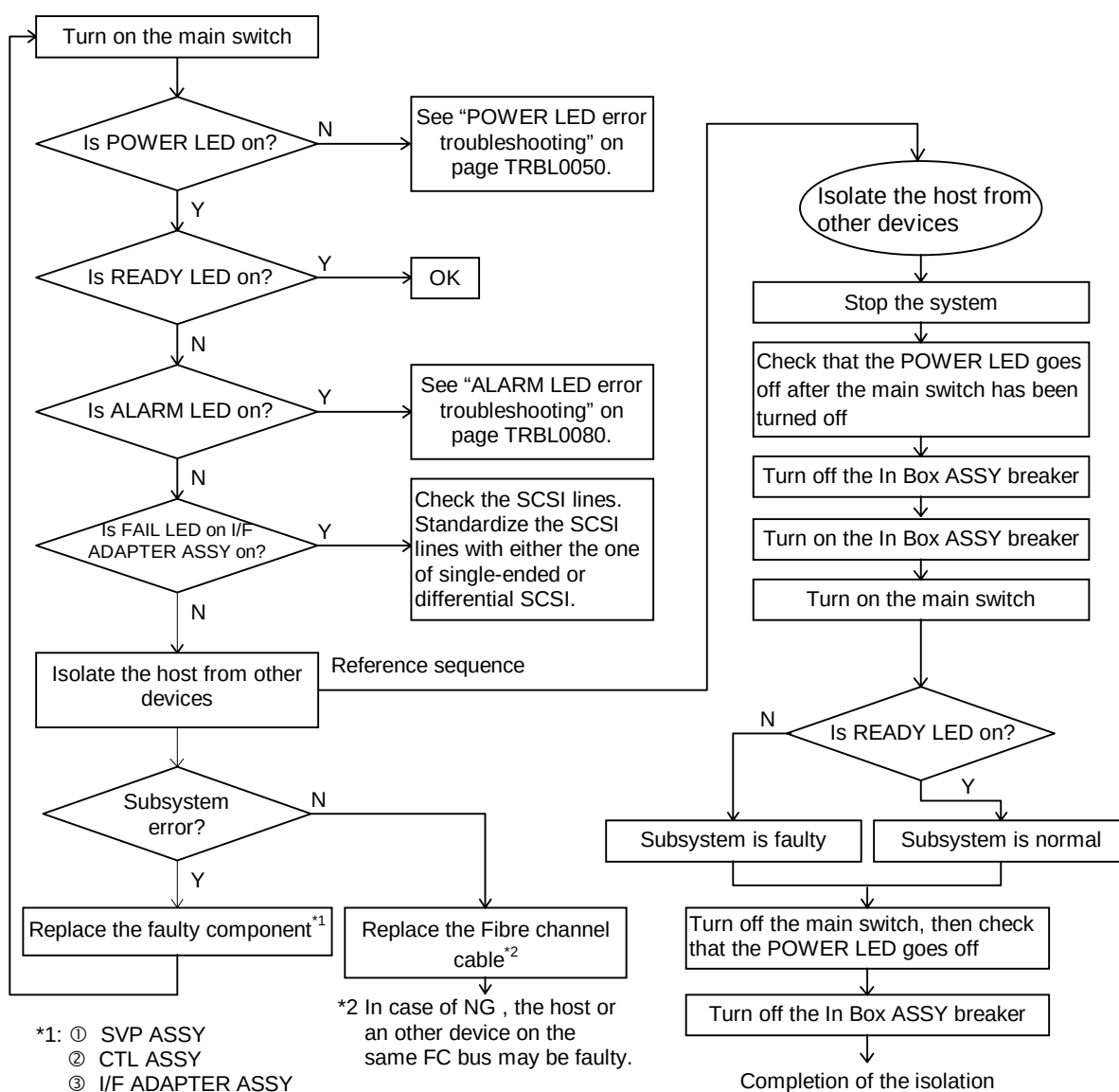


Replace the components ①②④⑥⑦ and ⑧ according to the replacement procedures in "Parts Replacement Chapter" (XX-REP0000).

Replace the components ③ and ⑤ according to the replacement procedures in "Installation Chapter" (INST0000).

(2) READY LED error troubleshooting

Troubleshoot the READY LED error according to the flowchart shown below.

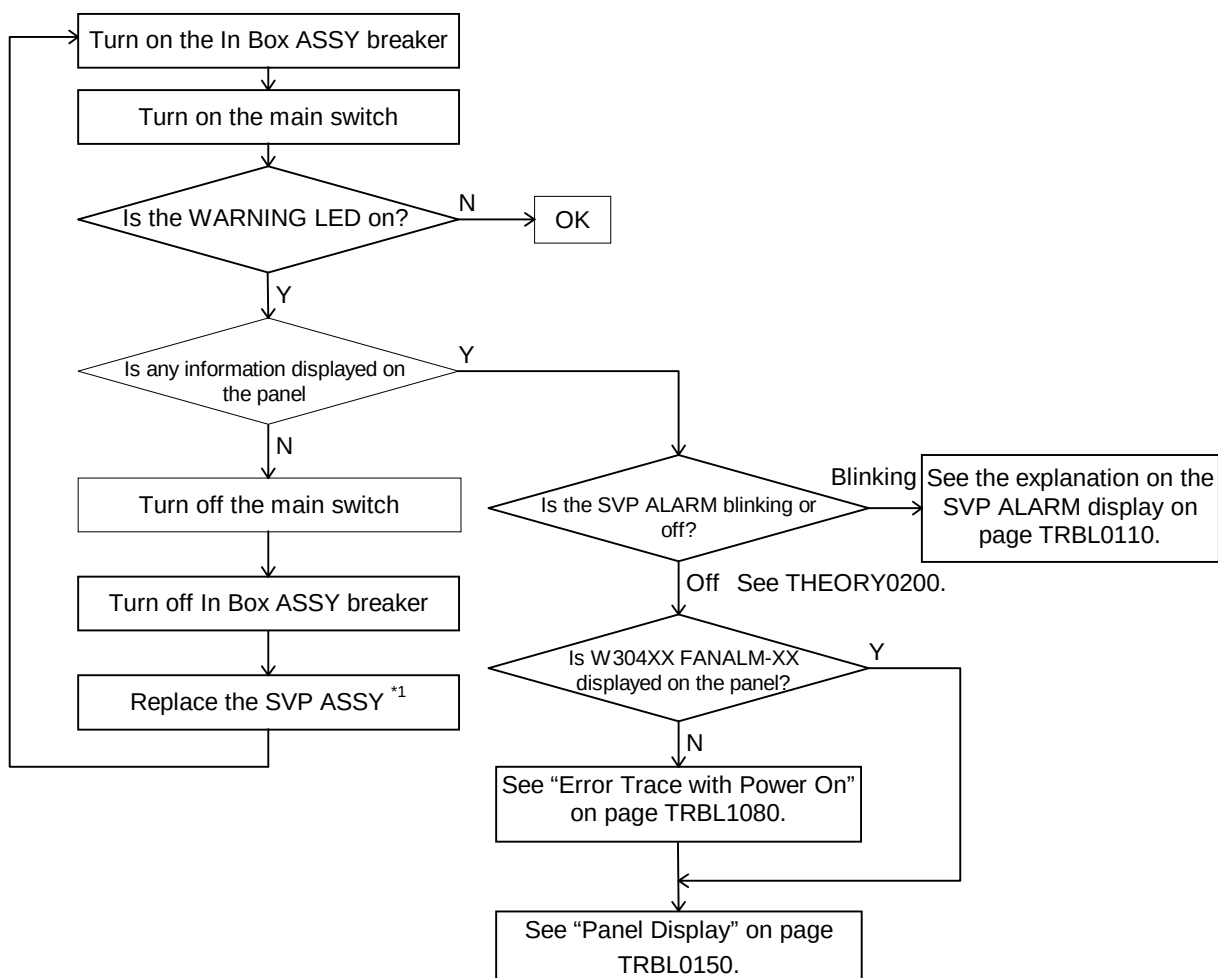


Note: It may take two minutes (max.) till the READY LED comes on after the main switch has been turned on.

Replace the components ① to ③ according to the replacement procedures in "Parts Replacement Chapter" (XX-REP0000).

(3) WARNING LED error troubleshooting

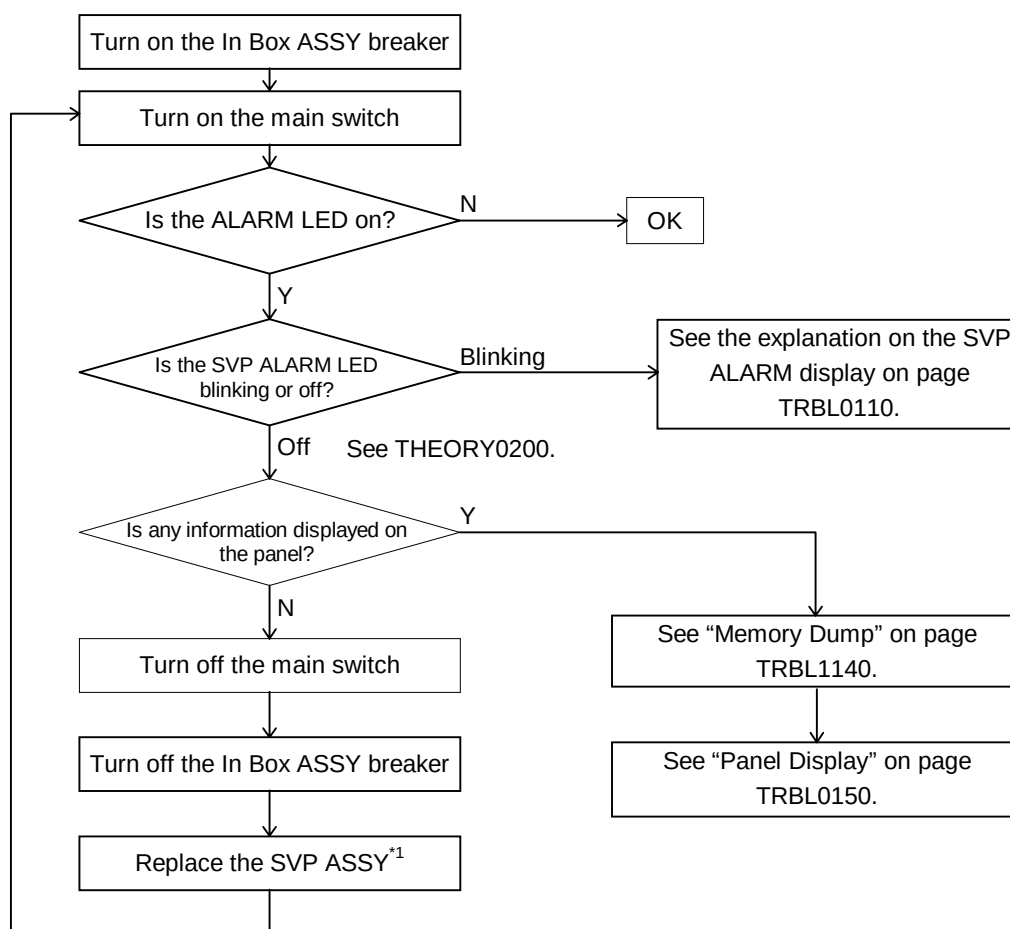
Troubleshoot the WARNING LED error according to the flowchart shown below.



*1: Replace the faulty component according to the replacement procedure in "Parts Replacement Chapter" (XX-REP0000).

(4) ALARM LED error troubleshooting

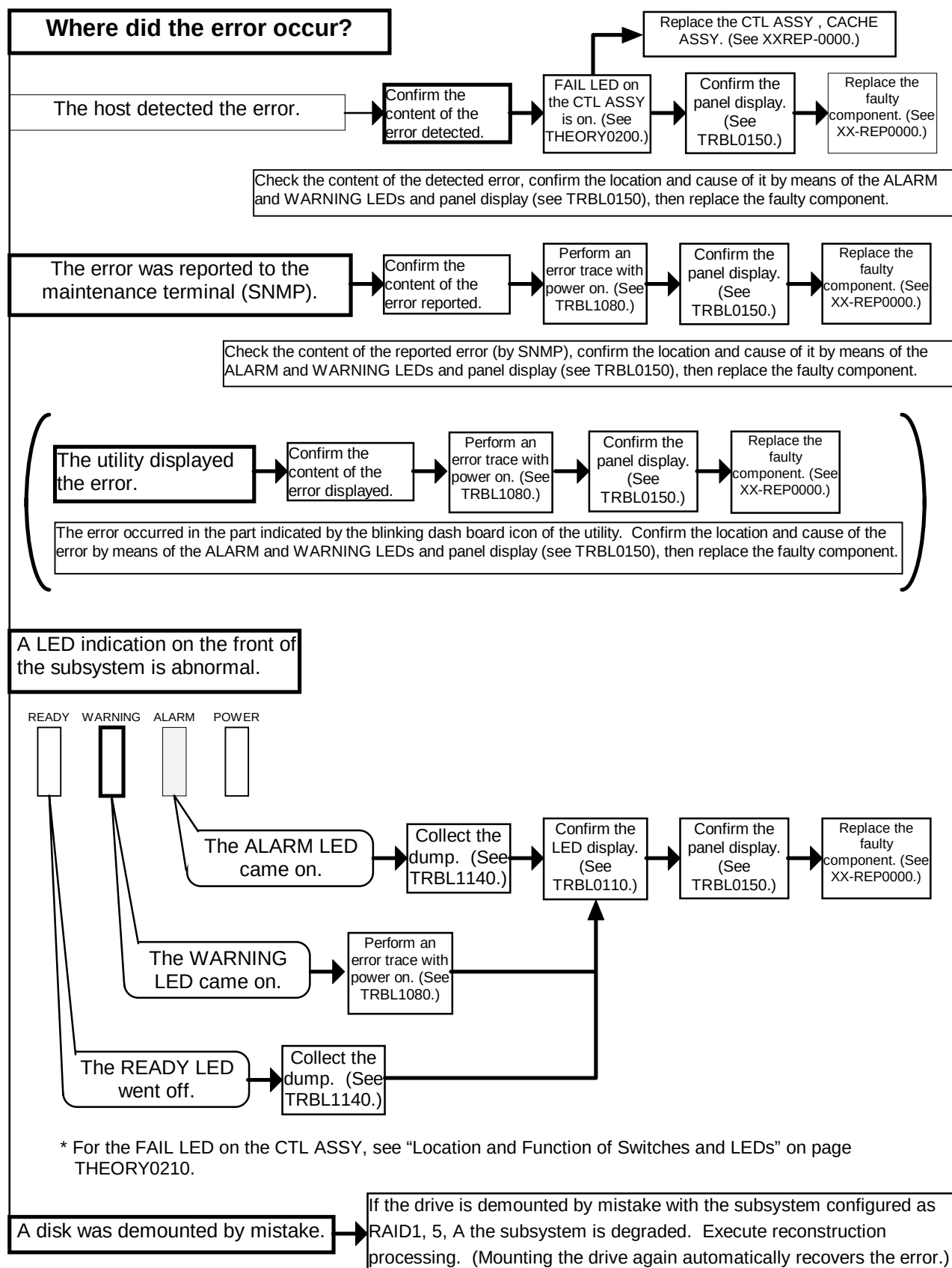
Troubleshoot the ALARM LED error according to the flowchart shown below.



*1: Replace the faulty component according to the replacement procedure in "Parts Replacement Chapter" (XX-REP0000).

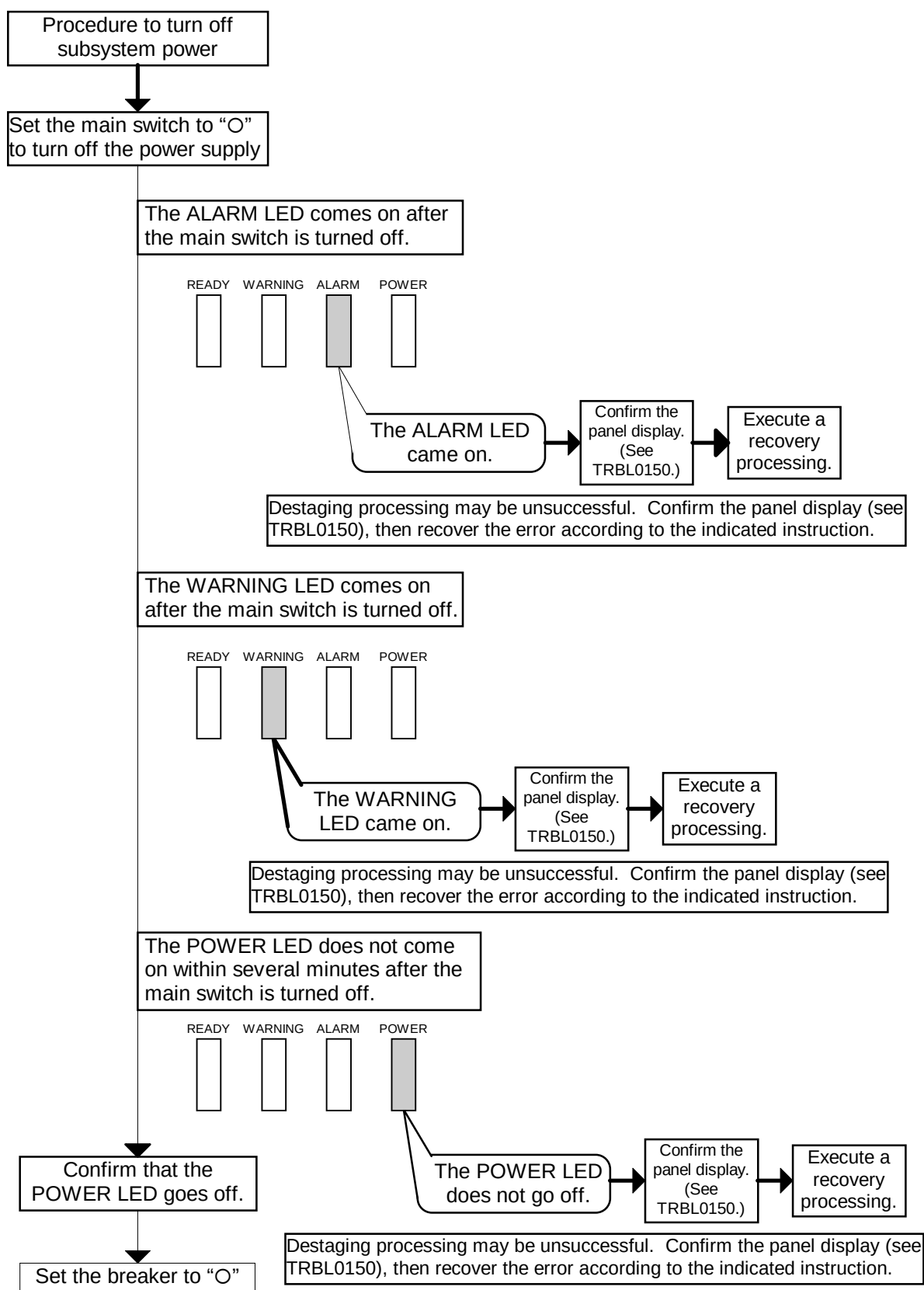
1.2 Errors Occur during Subsystem Operation and Recovery Measures

If an error occurs during use of the disk array subsystem, locate the faulty component and replace it according to the following procedure:



1.3 Errors Occur during Power-Off Sequence and Recovery Measures

This section describes the errors that may occur when the subsystem power is turned off and actions to be taken against them.



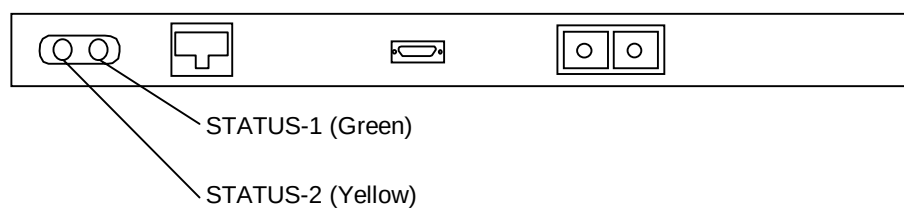
2. Error Displays

When the subsystem detects an error, it reports the error using the LEDs or the display panel.

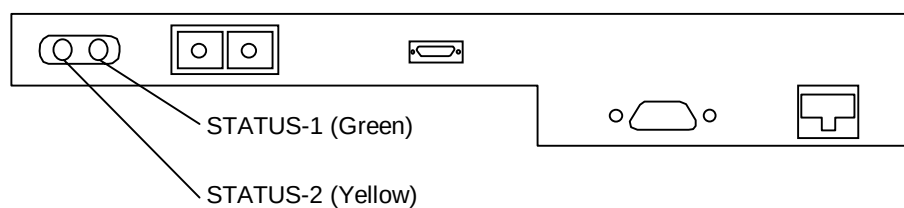
LEDs indicate the subsystem status, etc. The panel displays the contents of the errors detected when the subsystem is in operation.

2.1 Displays by Means of LEDs

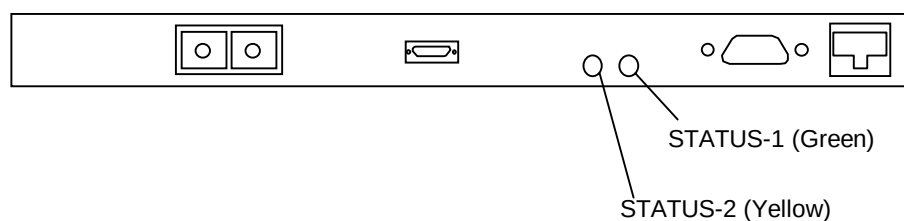
- (1) LEDs on the I/F ADAPTER ASSY of the mini tower type, cabinet type, or rackmount (RKH/RKWH) type are located as follows:



For Mini Tower/Cabinet Type



For Rack Mount Type (RKH)



For Rack Mount Type (RKWH)

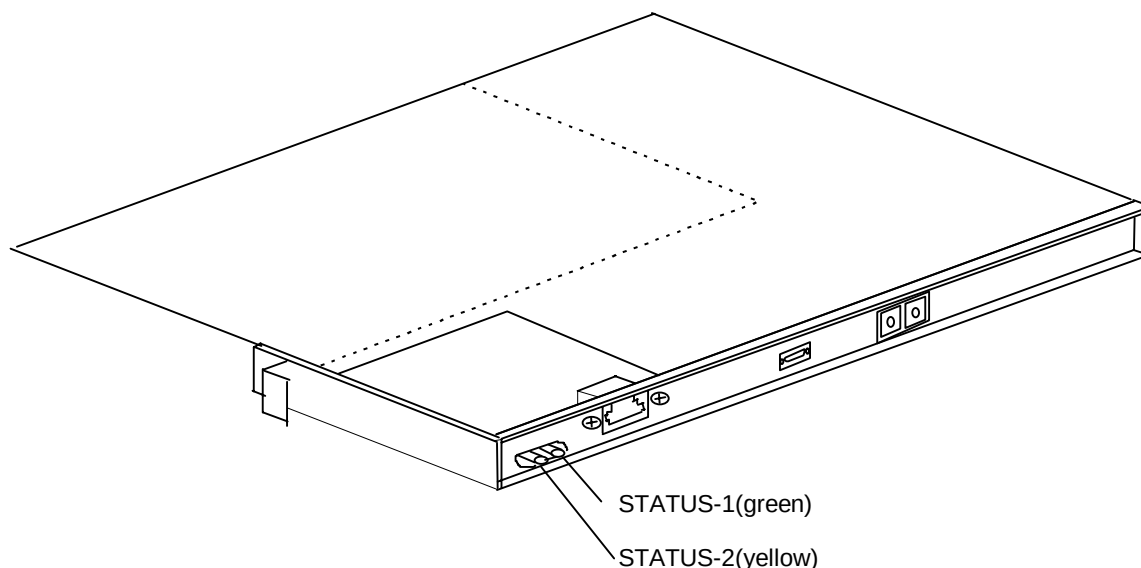


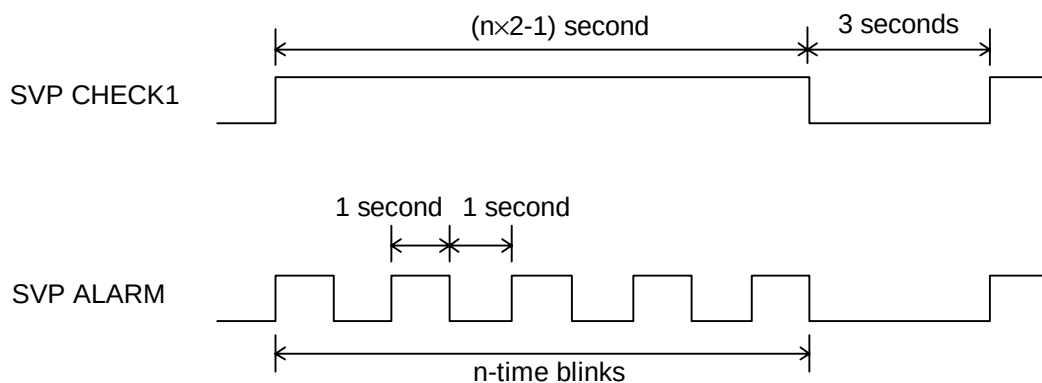
Figure 2.1.1 Location of I/F ADAPTER ASSY (Fibre)

No.	Name	Classification	Color	Function
1	STATUS-1	LED	Green	Shows status of the I/F ADAPTER.
2	STATUS-2	LED	Yellow	

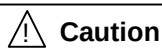
LED status		Status	Method
STATUS-1 (Green)	STATUS-2 (Yellow)		
OFF	OFF	Abnormal	An error occurred during execution of the power-on selftest of the I/F ADAPTER ASSY. Check the panel and replace the I/F ADAPTER ASSY. For the replacement of the I/F ADAPTER ASSY, see the following pages. Mini tower type : MK-REP0470 Cabinet type : CK-REP0470 Rackmount (RKH) type : RH-REP0490 Rackmount (RKWH) type : RW-REP0490
OFF	ON	Abnormal	
OFF	BLINK	Abnormal	
OFF	FLASH	Power on selftest	If the status is held for twenty seconds after powering on, it shows that an error has occurred. Take an according to the panel display.
ON	OFF	Abnormal (failure during operation)	An error occurred after the normal termination f the power-on selftest of the I/F ADAPTER ASSY. Take an according to the panel display.
ON	ON	Abnormal (failure during operation)	
ON	BLINK	Normal (link up)	—
BLINK	OFF	Normal (link down)	Confirm that the host has started up normally. Make sure that there is no problem in the fibre channel cable connections of the subsystem, the hub, and the host. After checking the above, power off the subsystem and then power it on again.

(2) Status indication by means of LEDs

If a voltage error occurs, the subsystem turns on the SVP ALARM and CHECK1 LEDs in the SVP ASSY to indicate the cause (status). The cause (status) is indicated by the number of times SVP ALARM LED blinks while the CHECK1 LED is on.



For the mounting locations of the SVP CHECK1 and SVP ALARM LEDs, see "Location and Function of Switches and LEDs" on page THEORY0200.



Caution

If an LED which indicates the voltage error comes on, a failure may have occurred inside the power supply. If so, an electric shock or fire may be caused. If you find the error, turn off the power, then call the service personnel.

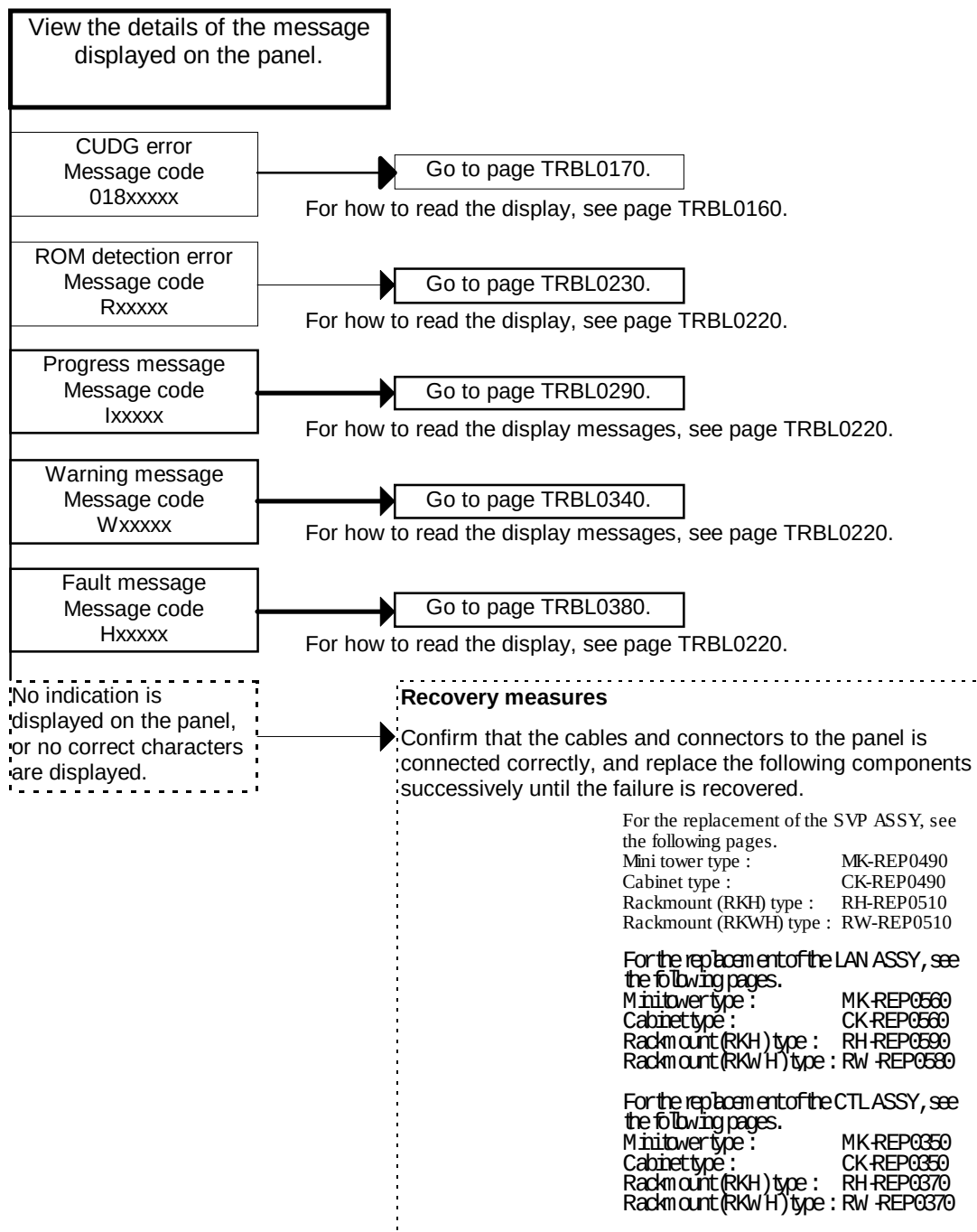
No.	LED status	Description	Component to be replaced	Remarks
1	SVP ALARM LED blinks once. ALARM LED is on.	Logic + 5V voltage error	AC/DC power supply	
2	SVP ALARM LED blinks twice. ALARM LED is on.	Logic + 12V voltage error	AC/DC power supply	
3	SVP ALARM LED blinks three times. ALARM LED is on.	BS + 12V voltage error	AC/DC power supply	
4	SVP ALARM LED blinks four times. WARNING LED is on.	Charged voltage error	SVP ASSY *1	
5	SVP ALARM LED blinks five times. WARNING LED is on.	The battery is not inserted. The battery switch is off. Battery voltage error ($V > 4.333$)	Battery or SVP ASSY *1 CTL ASSY	} Note
6	SVP ALARM LED blinks six times. ALARM LED is on.	CACHE voltage error When PS is turned on: $V > 4.40$, $V < 3.52$	SVP ASSY *1 CTL ASSY *1 CACHE	
7	SVP ALARM LED blinks seven times. WARNING LED is on.	CACHE voltage error When PS is turned on: $3.52 \leq V \leq 4.40$ After PS is turned off: $V < 3.52$	SVP ASSY *1	
8	SVP ALARM LED blinks seven times. ALARM LED is on.	Cache voltage error When PS is turned on: $3.52 \leq V \leq 4.40$ After PS is turned off: $V > 4.40$	SVP ASSY *1	
9	SVP ALARM LED blinks eight times. ALARM LED is on.	SVP thermal error alarm	Fan ASSY	
10	BATTERY OK LED is on. CHARGE LED is on.	Battery voltage error $3.714 \leq V < 3.962$	—	The battery is being charged.
11	BATTERY OK LED is blink. CHARGE LED is on. WARNING LED is on.	Battery voltage error $3.529 \leq V < 3.714$	—	The battery is being charged.
12	CHARGE LED is on. SVP ALARM LED blinks five times. WARNING LED is on.	Battery voltage error $V < 3.529$	—	The battery is being charged.

*1 Mini-tower type, cabinet type, and rackmount (RKH/RKWH) type

Note: Replace the battery or SVP ASSY after confirming that the battery is inserted and the battery switch is on.

2.2 Panel Display

On panel display, the subsystem reports the errors detected during operation after the main switch is turned on and status information.



For the mounting location, operation procedure, and functions of the panel, see Panel Chapter on page PANEL0000.

(1) Errors detected by CUDG

Table 2.2.1 Errors Detected by CUDG

Message code	Message text	Description	Recovery measures
01824100	BOOT ROM ERR	Checksum calculation error	Replace the CTL ASSY. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
01824110	BOOT ROM ERR	Checksum	
01824120	HARD ERR	Boot ROM error (hardware error)	
01834400	PANEL R/W ERR	Register R/W	Replace the SVP ASSY. For the replacement of the SVP ASSY, see the following pages. Mini tower type : MK-REP0490 Cabinet type : CK-REP0490 Rackmount (RKH) type : RH-REP0510 Rackmount (RKWH) type : RW-REP0510
01834410	HARD ERR	Hardware error	
01844300	SPC R/W ERR	Register R/W	
01844310	SPC COMMAND ERR	SPC command error	Check if the I/F ADAPTER ASSY is installed, replace it, or replace the CTL ASSY. For the check and replacement of the I/F ADAPTER ASSY, see the following pages. Mini tower type : MK-REP0470 Cabinet type : CK-REP0470 Rackmount (RKH) type : RH-REP0490 Rackmount (RKWH) type : RW-REP0490 For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
01844320	SPC I/F ERR	Uninstalled interface component, etc.	
0184C800	—	SPC command error	
0184C600	—	SPC command error	Replace the CTL ASSY. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
0184C610	—	SPC REQ/ACK error	
0184C620	—	SPC abnormal termination	
0184C810	—	SPC REQ/ACK error	
0184C820	—	SPC abnormal termination	
01854200	CS/DS ERR	Register R/W	
01854210	HARD ERR	Hardware error	

Message code	Message text	Description	Recovery measures
01858000	—	Register R/W	Replace the CTL ASSY. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
01858010	—	No parity generation	
01858020	—	Hardware error	
01858400		Register R/W	
01868200	M-CTL R/W ERR	Register R/W	
01868210	HARD ERR	Hardware error	
01868300	M-CTL FORCE	No parity generation (upper)	
01868310	ERR	No parity generation (lower)	
01868320		Watchdog timer	
01868330		Write-only register R/W	
01868340		Read-only register R/W	
01868350		EPROM write	
01868360	HARD ERR	Hardware error	
0187C900	PC_CTL	Register R/W	
0187C910	PD_CTL	An illegal error occurred	
0187C920	PD_CTL	Hardware error	
0187CBC0	PD_CTL force	CACHE→PDRAM transfer error	
0187CBC1	PD_CTL force	PDRAM→CACHE transfer error	
0187CBF0	PD_CTL force	Hardware error	
0187CB00	PD_CTL force	Error check when accessing the register in the PD_CTL	
0187CB04	PD_CTL force	Error check when accessing the PD_RAM (MPU access)	
0187CB08	PD_CTL force	Error check when accessing the PCI bus (MPU access)	
0187CB09	PD_CTL force	Error check when accessing the DMA bus	
0187CB0B	PD_CTL force	Error check when accessing the AD bus	
0187CB0D	PD_CTL force	RAS signal error check when accessing the MP	
0187CB20	PD_CTL force	RAS signal error check when refreshing	
0187CB23	PD_CTL force	Error check when accessing the PD_RAM (data transfer)	
0187CB27	PD_CTL force	RAS signal error check when transferring data	
01888100	TIMER ERR	Timer operation	
01888110	TIMER ERR	Hardware error	
0189CA00	PD_RAM	Register R/W	
0189CA10	PD_RAM	An illegal error occurred	
0189CA20	PD_RAM	Hardware error	
018AC200	D-CTL R/W ERR	Register R/W	
018AC210	HARD ERR	Hardware error	
018AC530	D-CTL FORCE ERR	DMA transfer termination	

Message code	Message text	Description	Recovery measures
018AC540	ECC ERR	ECC error	Replace the CTL ASSY. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
018AC570	HARD ERR	Hardware error	
018AC630	—	Abnormal termination of DMA transfer	
018AC640	—	D-CTL INT clear	
018AC650	—	Write data comparison	
018AC660	—	Write data DRR comparison	
018AC670	—	Read data comparison	
018AC680	—	Read data DRR comparison	
018AC6B0	—	Hardware error	
018AC700	—	Register R/W (D-CTL)	
018AC710	—	Hardware error (D-CTL)	
018AC830	—	Error code error (D-CTL)	
018AC840	—	ECC error (D-CTL)	
018AC870	—	Hardware error (D-CTL)	
018B4500	CACHE INF ERR	Undefined value check	Check if the CACHE ASSY is installed, replace it, or replace the CTL ASSY. For the installation check and replacement of the CACHE ASSY, see the following pages. Mini tower type : MK-REP0530 Cabinet type : CK-REP0530 Rackmount (RKH) type : RH-REP0560 Rackmount (RKWH) type : RW-REP0550 For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
018B4510	CACHE INF ERR	CACHE information check	
018B4520	CACHE SIZE ERR1	Size check 1	Change the cache size or mounting information. For the installation check and replacement of the CACHE ASSY, see the following pages. Mini tower type : MK-REP0530 Cabinet type : CK-REP0530 Rackmount (RKH) type : RH-REP0560 Rackmount (RKWH) type : RW-REP0550
018B4530	CACHE SIZE ERR2	Size check 2	
018B4540	CACHE SIZE ERR3	Size check 3	
018B4550	CACHEACCESS ERR	Access check	Replace the CACHE or CTL ASSY. For the installation check and replacement of the CACHE ASSY, see the following pages. Mini tower type : MK-REP0530 Cabinet type : CK-REP0530 Rackmount (RKH) type : RH-REP0560 Rackmount (RKWH) type : RW-REP0550 For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370

Message code	Message text	Description	Recovery measures
018B4560	CACHE ECC ERR	ECC circuit check 1	Replace the CACHE or CTL ASSY. For the installation check and replacement of the CACHE ASSY, see the following pages. Mini tower type : MK-REP0530 Cabinet type : CK-REP0530 Rackmount (RKH) type : RH-REP0560 Rackmount (RKWH) type : RW-REP0550 For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
018B4570	CACHE ECC ERR	ECC circuit check 2	
018B4580	HARD ERR	Hardware error	
018B4590	REG READ ERR	Register read error	
018BC300	—	Undefined value check	
018BC310	—	Access check	
018BC320	—	Hardware error	
018BC330	—	Register read error	
018BC550	Cache R/W ERR	Cache R/W test	Replace the CTL ASSY. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
018BC560	CACHE ECC ERR	ECC error occurrence	
018BC690	—	CACHE R/W test	Replace the CACHE or CTL ASSY. For the installation check and replacement of the CACHE ASSY, see the following pages. Mini tower type : MK-REP0530 Cabinet type : CK-REP0530 Rackmount (RKH) type : RH-REP0560 Rackmount (RKWH) type : RW-REP0550 For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
018BC6A0	—	ECC error occurrence	
018BC850	—	CACHE R/W test	
018BC860	—	ECC error occurrence	
018BCBD0	PD_CTL force	ECC error occurrence	
018BCBE0	PD_CTL force	ECC error occurrence	Check if the I/F ADAPTER ASSY is installed, replace it. For the check and replacement of the I/F ADAPTER ASSY, see the following pages. Mini tower type : MK-REP0470 Cabinet type : CK-REP0470 Rackmount (RKH) type : RH-REP0490 Rackmount (RKWH) type : RW-REP0490
018CCC00	BIU test	Register R/W (CTL reg)	
018CCC01	BIU test	An illegal error occurred	
018CCC10	BIU test	Register R/W (CFG reg)	
018CCC11	BIU test	An illegal error occurred	
018CCC20	BIU test	Register R/W (SLIM)	
018CCC21	BIU test	An illegal error occurred	
018CCC30	BIU test	Hardware error	
018CCD00	FF LOOPBACK	MAIL BOX BUSY ERR	
018CCD10	FF LOOPBACK	END STATUS ERR	
018CCD20	FF LOOPBACK	MAIL BOX CMD ERR	
018CCD30	FF LOOPBACK	TRNS CNT ERR	
018CCD40	FF LOOPBACK	TRANS DATA COMPARE ERR	
018CCDE0	FF LOOPBACK	FF START ERR	
018CCDF0	FF LOOPBACK	Hardware error	

Message code	Message text	Description	Recovery measures
018D8410	—	Self test	Replace the LAN or CTL ASSY. For the replacement of the LAN ASSY, see the following pages. Mini tower type : MK-REP0560 Cabinet type : CK-REP0560 Rackmount (RKH) type : RH-REP0590 Rackmount (RKWH) type : RW-REP0580 For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
018D8420	—	Initial setting error	
018D8430	—	82596 termination INT	
018D8440	—	Command error	
018D8450	—	Parity error	
018D8460	—	Send data comparison	
018D8470	—	Hardware error	

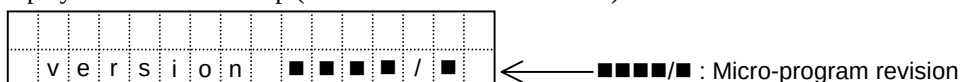
2.2.2 ROM messages

The ROM messages displayed on the panel are classified into the four types shown in Table 2.2.2.

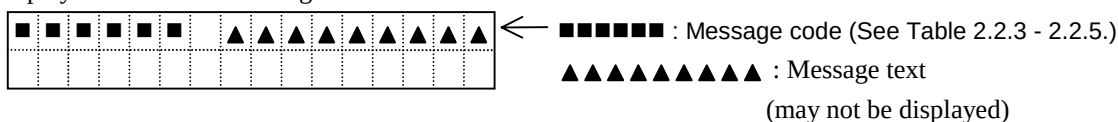
Table 2.2.2 Message Code Classification

No.	Message code	ROM message and description
1	Rxxxxx	Information detected till the subsystem is made ready when power is turned on.
2	Ixxxxx	Progress message:
3	Wxxxxx	Warning message:
4	Hxxxxx	Failure message:

① Display after normal startup (No error has occurred so far.)



② Display when the status changes or an error occurs



The latest information is displayed. Pressing the  key enables old information to be referenced.

Single controller: ----- 10 pieces of information

Dual controller: ----- 30 pieces of information

The above information is stored in advance. If ① is displayed by pressing the  key, it indicates that there is no more information. When ① is not displayed, it indicates that more than maximum pieces of information has been already collected.

Note: The dual controller consists of two controllers but is equipped with only one SVP panel. For this reason, judge which controller displays the message from the following:

First character of message text — Uppercase letter: Controller 0
Lowercase letter: Controller 1

Example: Controller #0 ROM RESP MODE
Controller #1 rOM RESP MODE

Note: For the origin of the errors detected by the CUDG, determine it by means of the ALARM LED on the CTL ASSY that detected the failures.

Both controllers may report errors concerning shared units such as fans, power supplies, and batteries.

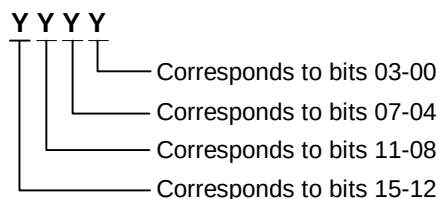
(1) ROM detection messages

Message code	Message text	Description	Recovery measures
R20801	DGDRVERR	The microprogram of version 0354 or later has been installed in the system area of the disk, however, it cannot be loaded because the system parameter (SYS REV) on the CTL ASSY is specified as 0353.	Change the SYS REV of the system parameter to 0354 or later. For the setting of the system parameters, see the following pages. Mini tower type : MK-INST0240 Cabinet type : CK-INST0270 Rackmount (RKH) type : RH-INST0260 Rackmount (RKWH) type : RW-INST0260
R40201	ACFAIL	An abnormality of AC power supply was detected.	Turn the power off, then turn it on again. For the turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
R40202	DCVALARM	DC power supply failure	Replace the AC/DC power supply. For the replacement of the AC/DC power supply, see the following pages. Mini tower type : MK-REP0500 Cabinet type : CK-REP0500 Rackmount (RKH) type : RH-REP0530 Rackmount (RKWH) type : RW-REP0520
R501XX	SIMM UMCH	The cache memory capacities of slot XX does not match between two controllers in dual configuration.	Replace the CACHE ASSY. For the replacement of the CACHE ASSY, see the following page. Mini tower type : MK-REP0530 Cabinet type : CK-REP0530 Rackmount (RKH) type : RH-REP0560 Rackmount (RKWH) type : RW-REP0550
R60101	BOARD ERR	The number of Cache ASSYs installed in the CTL ASSY cannot be recognized.	Check if the CACHE ASSYs are installed correctly. When they are installed correctly, replace them or the CTL ASSY.
R60102	SIZE ERR	The cache memory capacity in the CTL ASSY cannot be recognized.	For the installation check and replacement of the CACHE ASSY, see the following pages. Mini tower type : MK-REP0530 Cabinet type : CK-REP0530 Rackmount (RKH) type : RH-REP0560 Rackmount (RKWH) type : RW-REP0550 For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370

Message code	Message text	Description	Recovery measures
R60201	YYYYZZZZ	A hardware error occurred. YYYY : Content of MPINT1 register ZZZZ : Content of MPUERR register	When the message shown on the left is displayed, it is suspected that a failure has occurred in one (or more) of the CTL ASSY, LAN ASSY, I/F ADAPTER ASSY, CACHE ASSY, HDU ASSY, and back board. Identify the failed part by means of the error code (YYYYZZZZ) and replace it. Replace parts one by one until the failure is recovered. If the failure cannot be recovered after all the following parts are replaced, the failure is considered to have occurred in the back board. In this case, replace the entire subsystem. For details of the error codes, see the next page. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370 For the replacement of the LAN ASSY, see the following pages. Mini tower type : MK-REP0560 Cabinet type : CK-REP0560 Rackmount (RKH) type : RH-REP0590 Rackmount (RKWH) type : RW-REP0580 For the check and replacement of the I/F ADAPTER ASSY, see the following pages. Mini tower type : MK-REP0470 Cabinet type : CK-REP0470 Rackmount (RKH) type : RH-REP0490 Rackmount (RKWH) type : RW-REP0490 For the installation check and replacement of the CACHE ASSY, see the following pages. Mini tower type : MK-REP0530 Cabinet type : CK-REP0530 Rackmount (RKH) type : RH-REP0560 Rackmount (RKWH) type : RW-REP0550 For the replacement of the HDU ASSY, see the following pages. Mini tower type : MK-REP0170 Cabinet type : CK-REP0170 Rackmount (RKH) type : RH-REP0190 Rackmount (RKWH) type : RW-REP0190

Details of error codes

Details of the upper 2 bytes of the 4 bytes error codes (YYYYZZZZ) are shown below. The upper 2 bytes show contents of the register MPINT1 for detecting hardware internal failures. (They are given in hexadecimal.)



Example : When the error code is “80000000”

The following error occurred :

YYYY=8000, ZZZZ=0000 MPINT1 bit 15 DP1ERR

The failed part is one of the CTL ASSY, LAN ASSY, and HDU ASSY. Replace the parts concerned one by one until the error ceases to occur.

YYYY=MPINT1

bit	Register	Description	Failure part
15	DP1ERR	This bit shows that a parity error has occurred in data bits 08-15 in the register inside the M-CTL. The bit is interlocked with the interrupting INT4. When the bit is “1”, it shows that the error has occurred. • CS/DS memory • R/W register in the M-CTL • R/W register in the D-CTL • LAN local SRAM • SPC	• CTL ASSY • LAN ASSY • HDU ASSY
14	DP0ERR	This bit shows that a parity error has occurred in data bits 00-07 in the register inside the M-CTL. The bit is interlocked with the interrupting INT4. When the bit is “1”, it shows that the error has occurred.	• CTL ASSY • LAN ASSY • HDU ASSY
13	SQCNTERR	This bit shows that an error has occurred in the sequence counter. The bit is interlocked with the INT4. When the bit is “1”, it shows that the error has occurred.	• CTL ASSY
12	DP3ERR	This bit shows that a parity error has occurred in data bits 24-31 in the register inside the M-CTL. The bit is interlocked with the interrupting INT4. When the bit is “1”, it shows that the error has occurred.	• CTL ASSY • LAN ASSY
11	DP2ERR	This bit shows that a parity error has occurred in data bit 16-23 in the register inside the M-CTL. The bit is interlocked with the interrupting INT4. When the bit is “1”, it shows that the error has occurred.	• CTL ASSY • LAN ASSY
10	FC ERR	This bit shows that a hardware error has occurred in the FC-CTL (FC controller). The bit is interlocked with the interrupting INT4.	• CTL ASSY • I/F ADAPTER ASSY
09	CAC_2BWRERR	This bit shows that a 2 byte writing has been performed in an access to the cache. The bit is interlocked with the interrupting INT4. When the bit is “1”, it shows that the error has occurred.	• CTL ASSY
08	WCDGCNT1PERR	This bit shows that a parity error has occurred in bits 00-07 in the counter for the watchdog timer. The bit is interlocked with the interrupting INT4. When the bit is “1”, it shows that the error has occurred.	• CTL ASSY

bit	Register	Description	Failure part
07	RDRGWRERR	This bit shows that a writing has been performed in the read-only register contained in the external register of the MP. The bit is interlocked with the interrupting INT4. When the bit is "1", it shows that the error has occurred.	• CTL ASSY
06	WRRGRDERR	This bit shows that a writing has been performed in the write-only register contained in the external register of the MP. The bit is interlocked with the interrupting INT4. When the bit is "1", it shows that the error has occurred.	• CTL ASSY
05	FLASH WR ERR	This bit shows that a writing has been performed in the Boot ROM area. The bit is interrupted with the interrupting INT4. When the bit is "1", it shows that the error has occurred.	• CTL ASSY
04	RDYTMOUT	This bit shows that the "READY" signal has not been received within the specified time (1ms). The bit is interlocked with the interrupting INT4. When the bit is "1", it shows that the error has occurred.	• CTL ASSY
03	DCTLERR	This bit shows that a hardware error has occurred in the C-CTL (DMA controller). The bit is interlocked with the interrupting INT4. The bit shows the hardware error in the D-CTL transparently. The bit is cleared when all the error causes are cleared in the D-CTL.	• CTL ASSY • HDU ASSY • Back board failure
02	CTCCH0PERR	This bit shows that a parity error has been detected in the timer CH0 in the M-CTL LSI. The bit is interlocked with the interrupting INT4. When the bit is "1", it shows that the error has occurred.	• CTL ASSY
01	CTCCH1PERR	This bit shows that a parity error has been detected in the timer CH1 in the M-CTL LSI. The bit is interlocked with the interrupting INT4. When the bit is "1", it shows that the error has occurred.	• CTL ASSY
00	LANCTLPERR	This bit shows that a parity error of the data path has occurred in the LSI (82596) for the LANCTL. The bit is interlocked with the interrupting INT4. When the bit is "1", it shows that the error has occurred.	• CTL ASSY • LAN ASSY

Details of the lower 2 bytes of the 4 bytes error codes (YYYYZZZZ) are shown below. The lower 2 bytes show contents of the register MPUERR for detecting hardware internal failures. (They are given in hexadecimal.)

ZZZZ=MPU ERR

bit	Register	Description	Failure part
15	PTYERR0	This bit shows a parity error in one of the upper bytes on the MPU bus.	• CTL ASSY
14	PTYERR1	This bit shows a parity error in one of the lower bytes on the MPU bus.	• CTL ASSY
13	ECCWRITEPTYERR	This bit shows a parity error occurs when writing data in the DRAM after adding the ECC.	• CTL ASSY • CACHE ASSY
12	ECCGENERATIONERR	This bit shows that a failure has occurred in the ECC generation.	• CTL ASSY
11	ECCUNCORRECTERR	When this bit is "1", it shows that an error has occurred in 2 or more bits and the error correction by means of the ECC is impossible.	• CTL ASSY • CACHE ASSY
10	ECCCORRECTERR	This bit shows that the result of an error correction by means of the ECC is incorrect.	• CTL ASSY
09	MPDBF2ByteWRITE	When this bit is "1", it shows that only 2 bytes has been written in the DBF of 4 bytes boundary.	• CTL ASSY
08	ECCCORRECTION	This bit shows that an error correction by means of the ECC has been performed.	• CTL ASSY • CACHE ASSY
07	SELFLOCKOVTM	When this bit is "1", it shows that a time out of a memory locking from the own MPU has occurred. (BUSABTERR)	• CTL ASSY

bit	Register	Description	Failure part
06	EXOVTM	When this bit is "1", it shows that a time out of a memory locking from another controller has occurred. (BUSABTERR)	• CTL ASSY • Back board failure
05	ACKOFF	When this bit is "1", it shows that the DBFACK signal from another controller has been turned off during an assertion.	• CTL ASSY • Back board failure
04	reserved	This bit is always "0" at the time of reading and writing.	—
03	reserved		—
02	reserved		—
01	reserved		—
00	reserved		—

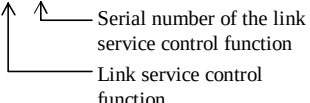
Message code	Message text	Description	Recovery measures
R60401	FMWT ERR	A write operation onto the flash memory failed.	Replace the CTL ASSY. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
R70501	S-ID UMCH	The SCSI IDs set for controllers differ each other in the SCSI ID inherit mode.	
R70101	SUMCHKERR	A checksum error occurred in the updating counter of the flash memory upper section.	
R70102	SUMCHKERR	A checksum error occurred in the program area of the flash memory valuable section.	

Message code	Message text	Description	Recovery measures
R70103	SUMCHKERR	A checksum error occurred in the updating counter of flash memory lower section.	Replace the CTL ASSY. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
RF0701	DGCHKERR	Downgrade of the microprogram was detected.	The revision No. of the microprogram cannot be changed from the current one to the specified one. Use the microprogram with the current revision No. (To operate the subsystem using the microprogram with the specified revision No., the initializing installation is needed.)
RZ0800	DLOADFAIL	Loading of data or a program from the drive failed.	For detailed recovery procedure, see page TRBL0840.
RZ0801	B-NUM ERR	Two CTL ASSYs are installed although "single" is specified for the system parameter.	For single configuration, use one CTL ASSY. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370 For dual configuration, change the system parameter. For the setting of the system parameters, see the following pages. Mini tower type : MK-INST0240 Cabinet type : CK-INST0270 Rackmount (RKH) type : RH-INST0260 Rackmount (RKWH) type : RW-INST0260
RZ0802	B-REV ERR	"Dual" is specified for the system parameter but the controller of this revision does not support the dual configuration.	Replace the CTL ASSY with the one which can support the dual configuration. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
RZ0803	S-VER ERR	An attempt was made to load the micro-program for the dual system although "single" was specified for the system parameter.	Download the single system. For downloading the system, see M-FC0030.
RZ0804	S-VER ERR	An attempt was made to load the micro-program for the single system although "dual" was specified for the system parameter.	Download the dual system. For downloading the system, see M-FC0030.
RZ0805	SYS U-MCH	The micro-program revision loaded by the controller 0 differs from that loaded by the controller 1.	Download the system again. For downloading the system, see M-FC0030.
—	CHECKSUM ERR OR INIT? (HIT ENTER)	An error occurred in system information in the flash memory.	Download the system data. For downloading the system, see M-FC0070.
—	PERTIAL COMPLT CONT(0), RETRY(1)	The microprogram could not be installed in all (five) drives of Row 0.	Press the  key on the panel and continue the processing. Because a drive failure may have occurred, isolate the problem and take actions against in referring to page M-FC0110 when the subsystem enters the Ready status.

Message code	Message text	Description	Recovery measures
H6F001	FFCHERR	A Error Attention occurred.	Replace the cable or the I/F ADAPTER ASSY. For the replacement of the I/F ADAPTER ASSY, see the following pages. Mini tower type : MK-REP0470 Cabinet type : CK-REP0470 Rackmount (RKH) type : RH-REP0490 Rackmount (RKWH) type : RW-REP0490
HZF002	R0ATTCHK1	CHK1 error occurred when sending/receiving the link service.	
H6F003	R0REGCHK1	CHK1 error occurred due to the STATUS register check when sending/receiving the link service.	
HZF004	R1ATTCHK1	CHK1 error occurred when receiving the FCP_CMND.	
H6F005	R1REGCHK1	CHK1 error occurred due to the STATUS register check when receiving the FCP_CMND.	
HZF006	R2ATTCHK1	CHK1 error occurred when sending/receiving FCP_DATA or sending FCP_RSP.	
H6F007	R2REGCHK1	CHK1 error occurred due to the STATUS register check in the cases of FCP_DATA or FCP_RSP.	
HZF008	LAMBERR	Mail box command terminated abnormally.	
HZF00B	LSERR	FFC error occurred during LS issue or reception response.	
HZF00C	LSRTRY	The error was not recovered though a retry was made according to the request for retry of the LS issue or the reception response.	
HZF00D	SPG0NG	FFC driver cannot be activated. (specialized path)	
HZF00E	SPRETRY2	Retry 2 was reported from FFC driver. (specialized path)	
HZF00F	HCG0NG	FFC driver cannot be activated. (non-specialized path)	
HZF010	HCRETRY2	Retry 2 was reported from the FFC driver. (non-specialized path)	
HZF011	PI0G0NG	The FFC driver cannot be activated. (P10)	
HZF012	PI0RETRY2	Retry 2 was reported from the FFC driver. (P10)	
HZF013	STSG0NG	The FFC driver cannot be activated. (FCP_RSP)	
HZF014	STSRETRY2	Retry 2 was reported from the FFC driver. (FCP_RSP)	
HZF017	BUFQINGNG	Buffer queuing for receiving the command failed.	
HZF018	BMBERR	An error occurred in MB command issuing process after FFC initialization.	

Message code	Message text	Description	Recovery measures
HZF019	RABUFQNG	Buffer queuing cannot be done during FFC interruption.	Replace the cable or the I/F ADAPTER ASSY. For the replacement of the I/F ADAPTER ASSY, see the following pages. Mini tower type : MK-REP0470 Cabinet type : CK-REP0470 Rackmount (RKH) type : RH-REP0490 Rackmount (RKWH) type : RW-REP0490
HZF01A	SPSTTOUT	Specialized path interrupt time out.	
HZF01B	HCSTTOUT	Non-specialized path interrupt time out.	
H6F01C	MBERR	An error occurred in issuing process of the mail box command.	
H6F01D	BIUERR	A failure occurred in the BIU during FFC diagnostic process.	
H6F01E	FFCN0TRDY	The FFC does not become ready.	
H6F01F	BUFQUENG	Buffer queuing cannot be done.	
HZF020	STSTOUT	FCP_RSP response completion waiting time out.	
HZF021	FFCREVERR	Fire Fly Rev. not corresponding.	
HZF101	FIF0OVER	FIFO overrun	
HZF102	FIF0UNDER	FIFO underrun	
HZF103	PCIDSCONT	PCI address is not continuous.	
HZF104	PCIDIRERR	Transfer direction conflict (PCI)	
HZF105	PCIINVACC	Illegal FIFO access	
HZF106	DCTLDIRER	Transfer direction conflict (D_CTL)	
HZF107	INVAREAAC	Independent transfer area over	
HZF108	XFWERR	PDRAM WE signal check error	
HZF109	XFCASERR	PDRAM CAS signal check error	
HZF10A	XFRASERR	PDRAM RAS signal check error	
HZF10B	PDRAMPE0	PDRAM PCI parity error (in bits 0 through 7)	
HZF10C	PDRAMPE1	PDRAM PCI parity error (in bits 8 through 15)	
HZF10D	PDRAMPE2	PDRAM PCI parity error (in bits 16 through 23)	
HZF10E	PDRAMPE3	PDRAM PCI parity error (in bits 24 through 31)	
HZF10F	COREUNR	FIFO (READ) in the CORE overrun	
HZF110	COREOVR	FIFO (WRITE) in the CORE underrun	
HZF111	PDFFPE0	PDRAM_FF parity error (in bits 0 through 7)	
HZF112	PDFFPE1	PDRAM_FF parity error (in bits 8 through 15)	
HZF113	PDFFPE2	PDRAM_FF parity error (in bits 16 through 23)	
HZF114	PDFFPE3	PDRAM_FF parity error (in bits 24 through 31)	

Message code	Message text	Description	Recovery measures
HZF201	TSKMKERR2	Generation of a link service task failed when turning on the power supply.	Replace the cable or the I/F ADAPTER ASSY. For the replacement of the I/F ADAPTER ASSY, see the following pages. Mini tower type : MK-REP0470 Cabinet type : CK-REP0470 Rackmount (RKH) type : RH-REP0490 Rackmount (RKWH) type : RW-REP0490
HZF202	TSKMKERR2	Generation of a link service task failed when resetting.	
HZF301	ADBS1PERR	Parity error was detected in bits 8 through 15 of the AD bus between the M_CTL and the PC_CTL.	
HZF302	ADBS0PERR	Parity error was detected in bits 0 through 7 of the AD bus between the M_CTL and the PD_CTL.	
HZF303	PDRG3PERR	Parity error was detected in bits 24 through 31 when reading the register in the PD_CTL.	
HZF304	PDRG2PERR	Parity error was detected in bits 16 through 23 when reading the register in the PD_CTL.	
HZF305	PDRG1PERR	Parity error was detected in bits 8 through 15 when reading the register in the PD_CTL.	
HZF306	PDRG0PERR	Parity error was detected in bits 0 through 7 when reading the register in the PD_CTL.	
HZF307	PCIPERR	Parity error was detected in the PCI bus when reading the Fire Fly register or SLIM.	
HZF308	PDRM3PERR	Parity error was detected in bits 24 through 31 when reading the PD_RAM.	
HZF309	PDRM2PERR	Parity error was detected in bits 16 through 23 when reading the PD_RAM.	
HZF30A	PDRM1PERR	Parity error was detected in bits 8 through 15 when reading the PC_RAM.	
HZF30B	PDRM0PERR	Parity error was detected in bits 0 through 7 when reading the PD_RAM.	
HZF30C	COREWTERR	CORE REGISTER WRITE ERROR	
HZF30D	COREPCSER	CORE PCI SERR RECEIVE	
HZF30E	COREPCRER	CORE PCI RETRY ERROR	
HZF30F	PARITYERR	PARITY ERROR	
HZF310	SYSTEMERR	SYSTEM ERROR NOTIFY	
HZF311	MABTRCV	MASTER ABORT RECEIVE	
HZF312	TABTRCV	TARGET ABORT RECEIVE	
HZF313	TABTNTFY	TARGET ABORT NOTIFY	
HZF314	DATAPERR	DATA PARITY ERROR	

Message code	Message text	Description	Recovery measures
HZF315	RFRASERR	RF RAS ERROR	Replace the cable or the I/F ADAPTER ASSY. For the replacement of the I/F ADAPTER ASSY, see the following pages. Mini tower type : MK-REP0470 Cabinet type : CK-REP0470 Rackmount (RKH) type : RH-REP0490 Rackmount (RKWH) type : RW-REP0490
HZF316	RFCASERR	RF CAS ERROR	
HZF317	RFWERR	RF WE ERROR	
HZF318	MPRASERR	MP RAS ERROR	
HZF319	MPCASERR	MP CAS ERROR	
HZF31A	MPWEERR	MP WE ERROR	
HZF31B	MPPCPERR3	MP PCI PARITY ERROR (Bit 0 - 7)	
HZF31C	MPPCPERR2	MP PCI PARITY ERROR (Bit 8 - 15)	
HZF31D	MPPCPERR1	MP PCI PARITY ERROR (Bit 16 - 23)	
HZF31E	MPPCPERR0	MP PCI PARITY ERROR (Bit 24 - 31)	
HZFZXX	MICROFFC	FC logical conflict (FFC control) %C%C 00 : MB issue cannot be done. 01 : MB completion waiting time out.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZFYXY	MICROLSC	FC logical conflict (link service control) %C%C 	

(2) Progress message

Table 2.2.4 Progress Messages

Message code	Message text	Description	Recovery measures
I00100	BATRCV	The battery voltage became normal.	—
I002XX	FANRCV-XX	The fan failure was recovered. XX: Fan number	—
I003XX	PSRCV-XX	The DC power voltage became normal. XX: Power supply number	—
I005XY	DRVRCV-XY	The drive was recovered. X: Port number Y: Row number	—
I006XY	SPDRCN-XY	Data was recovered to the spare disk. X: Port number Y: Row number	—
I007XY	LUFMT-XY	LU formatting was completed. X: Target ID Y: LUN	—
I00800	RGINIT	All RAID groups and LUs were deleted.	—
I00900	LUINIT	All LUs were deleted.	—
I00A00	PRTYRCSTR	Forced parity recovery was started.	—
I00B00	PRTYRCEND	Forced parity recovery was terminated.	—
I00CXY	LURCV-XY	The degraded LU was recovered normally. X: Target ID Y: LUN	—
I00DXY	SYS-CP-XY	System copy was started. X: Port number Y: Row number	—
I00EXY	SYSRCV-XY	System copy terminated normally. X: Port number Y: Row number	—
I00FXY	SYSFLT-XY	System copy failed. X: Port number Y: Row number	Replace the HDU ASSY in the location indicated by the port and row numbers. However, if there is a shutdown HDU ASSY in the same row, replace it first. For the replacement of the HDU ASSY, see the following pages. Mini tower type : MK-REP0170 Cabinet type : CK-REP0170 Rackmount (RKH) type : RH-REP0190 Rackmount (RKWH) type : RW-REP0190

Message code	Message text	Description	Recovery measures
I010 <u>XY</u>	RCV-ST- <u>XY</u>	Data recovery was started. X: Port number Y: Row number	—
I011 <u>XY</u>	RCVEND- <u>XY</u>	Data recovery terminated normally. X: Port number Y: Row number	—
I012 <u>XY</u>	RCVFLT- <u>XY</u>	Data recovery failed. X: Port number Y: Row number	For detailed recovery procedures, see pages TRBL0840.
I01300	PINUNDER	The number of PIN segments was recovered to its threshold or lower.	—
I01400	SYSDRVNG	When the system was started, an unusable drive was found in the system area.	—
I01500	PINSEGOV	The drive for the parity unmatching area was shut down because there are too many PIN data segments.	Follow the instruction of “W202XY DRVALM-XY” displayed at the same time.
I016 <u>XY</u>	DRVERR- <u>XY</u>	An error eligible to cause a drive shutdown occurred but the drive was not shut down due to shortage of redundancy. X: Port number Y: Row number	For detailed recovery procedures, see pages TRBL0840.
I017 <u>XY</u>	RCVWNG- <u>XY</u>	Data recovery was terminated with the condition “incomplete write registration”. X: Port number Y: Row number	For detailed recovery procedure, see page TRBL0840.
I01B <u>XX</u>	RGDEL- <u>XX</u>	The RAID group was deleted. XX: RAID group	—
I01C <u>XY</u>	LUDEL- <u>XY</u>	The LU was deleted. X: Target ID Y: LUN number	—
I01D <u>XY</u>	DYNMSP- <u>XY</u>	The Dynamic Sparing was started. X: PORT No. Y: ROW No.	—

Message code	Message text	Description	Recovery measures
I01EYY	CHNG PE-YY	Version up of the flash changeable part program occurred. YY: Version of the flash changeable part after the version up.	When the message shown below is displayed on the panel following this message, execute the recovery according to the procedure below. (If no message is displayed, continue the use leaving it as it is.) HZ62XY FLSREVXY HZ60422 CTLFAIL W015XX CTLALM-XX Recovery procedure • When the CTL ASSY is not redundant : Power off the subsystem once, then power it on again. • When the CTL ASSY is redundant (to recover with power on) : Perform the insertion of the CTL ASSY in the regressed. • When the CTL ASSY is redundant (to recover with power off) : Power off the subsystem once, then power it on again.
I01F00	FDCHNG	The flash changeable part program was saved to the backup FD.	—
I02000	FDDEVICE	The flash changeable part program was saved to FD or read from FD, hardware error was occurred.	—
I02100	FDFILE	When the flash changeable part program was read from the FD, fail is abnormal.	—
I030XY	HDRCV-XY	The number of recovered mechanical system errors in the drive whose position is indicated as “XY” exceeded the threshold value. X: Port number Y: Row number	Replace with the HDU ASSY to be supported. For the replacement of the HDU ASSY, see the following pages. Mini tower type : MK-REP0170 Cabinet type : CK-REP0170 Rackmount (RKH) type : RH-REP0190 Rackmount (RKWH) type : RW-REP0190
I031XY	HDUNR-XY	The number of unrecovered mechanical system errors in the drive whose position is indicated as “XY” exceeded the threshold value. X: Port number Y: Row number	
I032XY	MDRCV-XY	The number of recovered media errors in the drive whose position is indicated as “XY” exceeded the threshold value. X: Port number Y: Row number	
I033XY	MDUNR-XY	The number of unrecovered media errors in the drive whose position is indicated as “XY” exceeded the threshold value. X: Port number Y: Row number	

Message code	Message text	Description	Recovery measures
I034 <u>XY</u>	RWRCV- <u>XY</u>	The number of recovered R/W errors in the drive whose position is indicated as “XY” exceeded the threshold value. X: Port number Y: Row number	Replace with the HDU ASSY to be supported. For the replacement of the HDU ASSY, see the following pages. Mini tower type : MK-REP0170 Cabinet type : CK-REP0170 Rackmount (RKH) type : RH-REP0190 Rackmount (RKWH) type : RW-REP0190
I035 <u>XY</u>	RWUNR- <u>XY</u>	The number of unrecovered R/W errors in the drive whose position is indicated as “XY” exceeded the threshold value. X: Port number Y: Row number	
I036 <u>XY</u>	IFRCV- <u>XY</u>	The number of recovered I/F errors in the drive whose position is indicated as “XY” exceeded the threshold value. X: Port number Y: Row number	
I037 <u>XY</u>	IFUNR- <u>XY</u>	The number of unrecovered I/F errors in the drive whose position is indicated as “XY” exceeded the threshold value. X: Port number Y: Row number	
I038 <u>XY</u>	CHRCV- <u>XY</u>	The number of recovered hardware errors in the drive whose position is indicated as “XY” exceeded the threshold value. X: Port number Y: Row number	
I039 <u>XY</u>	CHUNR- <u>XY</u>	The number of unrecovered hardware errors in the drive whose position is indicated as “XY” exceeded the threshold value. X: Port number Y: Row number	
I03A <u>XY</u>	SCRCV- <u>XY</u>	The number of recovered SCSI I/F errors in the drive whose position is indicated as “XY” exceeded the threshold value. X: Port number Y: Row number	
I03B <u>XY</u>	SCUNR- <u>XY</u>	The number of unrecovered SCSI I/F errors in the drive whose position is indicated as “XY” exceeded the threshold value. X: Port number Y: Row number	
I03C <u>XY</u>	ONVCOR- <u>XY</u>	The drive occurred in which the number of collectable errors in online verify exceeded whose position is indicated as “XY” exceeded the threshold value. X: Port number Y: Row number	

Message code	Message text	Description	Recovery measures
I03D <u>XY</u>	ONVUCR- <u>XY</u>	The drive occurred in which the number of uncorrectable errors in online verify exceeded whose position is indicated as “XY” exceeded the threshold value. X: Port number Y: Row number	Replace with the HDU ASSY to be supported. For the replacement of the HDU ASSY, see the following pages. Mini tower type : MK-REP0170 Cabinet type : CK-REP0170 Rackmount (RKH) type : RH-REP0190 Rackmount (RKWH) type : RW-REP0190
I619 <u>XX</u>	CTLRCV- <u>XX</u>	The controller degradation status was dissolved because the CTL ASSY was replaced. XX (00 or 01): Number of recovered controller	—
161A <u>XX</u>	CMRCV- <u>XX</u>	The partial cache shutdown status was dissolved because the CTL ASSY was replaced. XX (00, 01, 02, or 03) : Number of recovered cache slot XX = 00 : Cache slots 0 and 4 were recovered. XX = 01 : Cache slots 1 and 5 were recovered. XX = 02 : Cache slots 2 and 6 were recovered. XX = 03 : Cache slots 3 and 7 were recovered.	—
IZ1801	NOLUCHGPN	The system was started without the change of LU in charge because the PIN segment exists.	Turn the power off, then turn it on again. If the error is not recovered nevertheless, replace the CTL ASSY. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
IZ1802	NOLUCHGCS	The system was started without the change of LU in charge because the planned shutdown was not performed last time.	
IZ1803	NOLUCHGHS	The system was started without the change of LU in charge because the system type was “hot standby.”	
IZ1804	NOLUCHGLU	The system was started without the change of LU in charge because the LU is not defined.	

(3) Warning messages

Table 2.2.5 Warning Messages

Message code	Message text	Description	Recovery measures
W00F00	TOOMNYPIN	Planned shutdown could not be performed because the amount of PIN data was too large.	For detailed recovery procedure, see page TRBL0840.
W01000	POFFBODER	An attempt was made to store PIN data in the disk but failed because a hardware error occurred.	For detailed recovery procedure, see page TRBL0840.
W01100	SYSDTSVER	Planned shutdown could not be performed because there was no drive to which inherited information can be saved.	For detailed recovery procedure, see page TRBL0840.
W01200	POFFCMUNC	Planned shutdown could not be performed because PIN data could not be saved due to a cache error.	For detailed recovery procedure, see page TRBL0840.
W01300	USRDATLST	User data was lost because cache memory was volatile.	For detailed recovery procedure, see page TRBL0840.
W01400	PINOVER	The number of PIN segments exceeded its threshold.	For detailed recovery procedure, see page TRBL0840.
W015XX	CTLALM-XX	A controller degradation (due to a failure or unconnection) occurred. XX : Controller number (00 or 01)	Check the STATUS LED of the I/F ADAPTER ASSY, see page TRBL0120. When the STATUS LED shows the normal status, replace the blocked CTL ASSY. (*1) For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
W01600	SNMP INVL	The SNMP function is not started because SNMP information is not set.	Set SNMP information. For the setting of SNMP, see page TRBL1230.
W01601	FD ERR	The FD for setting SNMP information cannot be mounted.	Insert a correct FD for SNMP. For the setting of SNMP, see page TRBL1230.
W01602	FOPN ERR	No setting file exists in the FD for setting SNMP information.	Insert a correct FD for setting SNMP information. For the setting of SNMP, see page TRBL1230.
W01603	FDR ERR	A read error occurred with the FD for setting SNMP information.	Insert a correct FD for setting SNMP information. For the setting of SNMP, see page TRBL1230.
W01604	FSIZE OV	The capacity of the file for setting SNMP information exceeded the specified size.	Insert a correct FD for setting SNMP information. For the setting of SNMP, see page TRBL1230.

*1 : If the same error message is issued after the replacement, replace another CTL ASSY.

Message code	Message text	Description	Recovery measures
W01605	RDEV MKER	A creation of a RAM device failed.	Retry. If the error is not recovered, replace the CTL ASSY. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
W01606	RDEV IER	An initialization of a RAM device failed.	
W01607	RDEV CER	A creation of a RAM device file failed.	
W01608	RDEV WER	A write operation to a RAM device file failed.	
W01609	SNMP ERR	The SNMP function was lost because OPTIMA detected an error	
W01700	GWAD ERR	The set gateway address is incorrect.	Set a correct gateway address.
W01800	SHTDWNWAR	Planned shutdown was not performed when the power was turned off the last time.	When the ENTER key is pressed, WARNING LED goes off and READY LED comes on. * If planned shutdown is not performed correctly when the power is turned off, data may be lost.
W10100	BATALM	A battery voltage error occurred.	Charge the battery for 24 hours or more and turn the breaker off, then turn it on again. If the message code disappears, use the battery as it is. If the error is not recovered, perform the replacements in the following order. ①Battery ASSY ②SVP ASSY For the replacement of the Battery ASSY, see the following pages. Mini tower type : MK-REP0330 Cabinet type : CK-REP0330 Rackmount (RKH) type : RH-REP0350 Rackmount (RKWH) type : RW-REP0350 For the replacement of the SVP ASSY, see the following pages. Mini tower type : MK-REP0490 Cabinet type : CK-REP0490 Rackmount (RKH) type : RH-REP0510 Rackmount (RKWH) type : RW-REP0510
W202XY	DRVALM-XY	A drive shutdown occurred. X: Port number Y: Row number	For detailed recovery procedures, see pages TRBL0840.
W20CXY	SPINUP-XY	A spin up of the HDU ASSY inserted when the power supply was on failed. X: Port number Y: Row number	Insert the HDU ASSY again. If the same message is still displayed, replace the HDU ASSY. For the replacement of the HDU ASSY, see the following pages. Mini tower type : MK-REP0170 Cabinet type : CK-REP0170 Rackmount (RKH) type : RH-REP0190 Rackmount (RKWH) type : RW-REP0190

Message code	Message text	Description	Recovery measures						
W20E <u>XY</u>	RDCAPA- <u>XY</u>	Read capacity data (sector length or last LBA) in the HDU ASSY inserted while the power was on is incorrect. X: Port number Y: Row number	Replace this HDU ASSY with the one supported. For the replacement of the HDU ASSY, see the following pages. Mini tower type : MK-REP0170 Cabinet type : CK-REP0170 Rackmount (RKH) type : RH-REP0190 Rackmount (RKWH) type : RW-REP0190						
W304 <u>XX</u>	FANALM- <u>XX</u>	A fan error occurred. XX: Fan number	Replace the Fan ASSY For the replacement of the Fan ASSY, see the following pages. Mini tower type : MK-REP0320 Cabinet type : CK-REP0320 Rackmount (RKH) type : RH-REP0340 Rackmount (RKWH) type : RW-REP0340						
W405 <u>XX</u>	PSALM- <u>XX</u>	A DC power error occurred. XX: Power supply number If a double failure of the power supplies occurs in the case of the rack mount type, it is assumed to be caused by a failure in the IN BOX ASSY. example <table><tr><td>AC/DC#1</td><td>AC/DC#3</td></tr><tr><td>AC/DC#0</td><td>AC/DC#2</td></tr><tr><td>IN BOX#0</td><td>IN BOX#1</td></tr></table> When the AC/DC #1 and the AC/DC #0 fail, the IN BOX #0 is assumed to have failed. When the AC/DC #3 and the AC/DC #2 fail, the IN BOX #1 is assumed to have failed.	AC/DC#1	AC/DC#3	AC/DC#0	AC/DC#2	IN BOX#0	IN BOX#1	Replace the AC/DC power supply. For the replacement of the AC/DC power supply, see the following pages. Mini tower type : MK-REP0410 Cabinet type : CK-REP0410 Rackmount (RKH) type : RH-REP0440 Rackmount (RKWH) type : RW-REP0520 Replace the IN BOX ASSY For the replacement of the IN BOX ASSY, see the following pages. Rackmount (RKWH) type : RW-REP0540
AC/DC#1	AC/DC#3								
AC/DC#0	AC/DC#2								
IN BOX#0	IN BOX#1								
W508 <u>XY</u>	CMALM <u>X-YY</u>	An unrecoverable cache access error occurred in P/K 0, P/K 1, P/K 2, or P/K 3. X: X indicates a controller number. X = 0: Controller number 0 X = 1: Controller number 1 X = 2: Controller numbers 0 and 1 Y: Y indicates a cache package number. Y = 0: Cache package numbers 0 and 4 Y = 1: Cache package numbers 1 and 5 Y = 2: Cache package numbers 2 and 6 Y = 3: Cache package numbers 3 and 7 YY: Cache package number YY=00: Cache package numbers 0 and 4 YY=01: Cache package number 1 and 5 YY=02: Cache package numbers 2 and 6 YY=03: Cache package numbers 3 and 7	Replace CACHE ASSY 0, 1, 2, or 3. For the replacment of the CACHE ASSY, see the following pages. Mini tower type : MK-REP0530 Cabinet type : CK-REP0530 Rackmount (RKH) type : RH-REP0560 Rackmount (RKWH) type : RW-REP0550						

Message code	Message text	Description	Recovery measures
W60A <u>XX</u>	DMAALM- <u>XX</u>	An error occurred in DMA#0 or DMA#1. XX: DMA number	For detailed recovery procedure, see page TRBL0840.
W619 <u>XX</u>	FLSWAR- <u>XX</u>	The flash memory updating count exceeded the specified value.	Replace the CTL ASSY displayed. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
W622 <u>XY</u>	LAERR1- <u>XY</u>	An LA error occurred in DMA#1 (including LUN errors). X: Controller number Y: Transfer direction R: Read direction W: Write direction	For detailed recovery procedure, see page TRBL0840.
W623 <u>XY</u>	LRCER1- <u>XY</u>	An LRC error occurred in DMA#1 (including LUN errors). X: Controller number Y: Transfer direction R: Read direction W: Write direction	For detailed recovery procedure, see page TRBL0840.
W624 <u>XY</u>	LAERR2- <u>XY</u>	An LA error occurred in DMA#2 (including LUN errors). X: Controller number Y: Transfer direction R: Read direction W: Write direction	For detailed recovery procedure, see page TRBL0840.
W625 <u>XY</u>	LRCER2- <u>XY</u>	An LRC error occurred in DMA#2 (including LUN errors). X: Controller number Y: Transfer direction R: Read direction W: Write direction	For detailed recovery procedure, see page TRBL0840.
W626 <u>XY</u>	LAERR3- <u>XY</u>	An LA error occurred in DMA#3 (including LUN errors). X: Controller number Y: Transfer direction R: Read direction W: Write direction	For detailed recovery procedure, see page TRBL0840.
W627 <u>XY</u>	LRCER3- <u>XY</u>	An LRC error occurred in DMA#3 (including LUN errors). X: Controller number Y: Transfer direction R: Read direction W: Write direction	For detailed recovery procedure, see page TRBL0840.

(4) Failure messages

Table 2.2.5 Failure Messages

Message code	Message text	Description	Recovery measures
H00D00	DTLSTDWN	The user-specified system down was directed when data was lost.	Turn the power off, then turn it on again. For how to turn off/on the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
H00E00	POFSYSDWN	The user-specified system down was directed when planned shutdown was impermissible.	
H00FXX	POFCMER-XX	The system went down because an unrecoverable cache access error occurred during planned shutdown. This made PIN data inheritance impossible. XX = 00: Cache package number 0 or 4 XX = 01: Cache package number 1 or 5 XX = 02: Cache package number 2 or 6 XX = 03: Cache package number 3 or 7 XX = **: Cache package numbers cannot be identified.	Replace CACHE ASSY 0, 1, 2, or 3. For the replacement of the CACHE ASSY, see the following pages. Mini tower type : MK-REP0530 Cabinet type : CK-REP0530 Rackmount (RKH) type : RH-REP0560 Rackmount (RKWH) type : RW-REP0550
H40200	DCVALM	A DC power voltage error occurred.	Replace the AC/DC power supply. For the replacement of the AC/DC power supply, see the following pages. Mini tower type : MK-REP0500 Cabinet type : CK-REP0500 Rackmount (RKH) type : RH-REP0530 Rackmount (RKWH) type : RW-REP0520
H50BXX	PONCMERXX	An unrecoverable cache access error occurred when the P/S is on. XX = 00: Cache package number 0 or 4 XX = 01: Cache package number 1 or 5 XX = 02: Cache package number 2 or 6 XX = 03: Cache package number 3 or 7 XX = **: Cache package numbers cannot be identified.	Replace CACHE ASSY 0, 1, 2, or 3. For the replacement of the CACHE ASSY, see the following pages. Mini tower type : MK-REP0530 Cabinet type : CK-REP0530 Rackmount (RKH) type : RH-REP0560 Rackmount (RKWH) type : RW-REP0550

Message code	Message text	Description	Recovery measures
H540XX	ECCW-XX	A parity error was detected when data was being written to cache memory. XX = 00: Cache package number 0 or 4 XX = 01: Cache package number 1 or 5 XX = 02: Cache package number 2 or 6 XX = 03: Cache package number 3 or 7 XX = **: Cache package numbers cannot be identified.	Replace CACHE ASSY 0, 1, 2, or 3. For the replacement of the CACHE ASSY, see the following pages. Mini tower type : MK-REP0530 Cabinet type : CK-REP0530 Rackmount (RKH) type : RH-REP0560 Rackmount (RKWH) type : RW-REP0550
H541XX	ECCG-XX	An ECC generation error was detected when data was being written to cache memory. XX = 00: Cache package number 0 or 4 XX = 01: Cache package number 1 or 5 XX = 02: Cache package number 2 or 6 XX = 03: Cache package number 3 or 7 XX = **: Cache package numbers cannot be identified.	
H542XX	ECCU-XX	An uncorrectable error was detected when data was being read into cache memory. XX = 00: Cache package number 0 or 4 XX = 01: Cache package number 1 or 5 XX = 02: Cache package number 2 or 6 XX = 03: Cache package number 3 or 7 XX = **: Cache package numbers cannot be identified.	
H543XX	ECCC-XX	An ECC correction error occurred when data was being written to cache memory. XX = 00: Cache package number 0 or 4 XX = 01: Cache package number 1 or 5 XX = 02: Cache package number 2 or 6 XX = 03: Cache package number 3 or 7 XX = **: Cache package numbers cannot be identified.	

Message code	Message text	Description	Recovery measures
H544YY	ECCULP-YY	Processing cannot be continued because an unrecoverable ECC error occurred. YY = 00: Controller 0 cannot continue the processing. YY = 01: Controller 1 cannot continue the processing.	Replaced the CTL ASSY indicated by YY. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
H60401	RGDP1ERR	A parity error occurred in one of data bits 08 to 15.	Replace the CTL ASSY in which the error was detected. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
H60402	RGDP0ERR	A parity error occurred in one of data bits 00 to 07.	Replace the CTL ASSY whose FAIL LED is on. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
H60403	SQCNTERR	A sequence counter error occurred.	
H60404	WCDG1PERR	A parity error occurred in one of counter bits 00 to 07 for watchdog timers.	
H60405	RDRGWRERR	A write operation was instructed to the read-only register.	
H60419	LANPERR	A data bus parity error occurred in an LSI for LANCTL.	For detailed recovery procedure, see page TRBL0840.
H60420	RGDP3ERR	A parity error occurred in one of data bits 24 to 31.	Replace the CTL ASSY whose FAIL LED is on. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
H60421	RGDP2ERR	A parity error occurred in one of data bits 16 to 23.	
H60422 (*1)	CTLFAIL	A CTL FAIL failure of other system was detected.	
H60428	CTCCHOPER	A parity error occurred in timer CH0.	
H60429	CTCPH1PER	A parity error occurred in timer CH1.	
H6042A	REG2BWR	2-byte data was written to the 4-byte register.	
H61101	PROTOUT	A reception waiting timeout occurred. (Communication)	
H61102	RSMTOUT	A release waiting timeout occurred. (Integrated resource management)	
H61104	LUCTOUT	A timeout occurred during LU switching.	
H61105	OFWTOUT	A timeout of waiting communication with another system occurred during offline monitoring.	
H61200	PONDMAERR	A DMA hardware error occurred when the P/S is on.	

*1 : If the same error message is issued after the replacement, replace another CTL ASSY.

Message code	Message text	Description	Recovery measures
H61501 (*1)	IMPTY1	A parity error occurred in another system during MPU processing. (The controller of own system detected it.)	Replace the CTL ASSY whose FAIL LED is on. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
H61502 (*1)	IMRDTY	A ready timeout (RDYTIMEOUT) was detected in another system during MPU processing. (The controller of own system detected it.)	
H61503 (*1)	IMPTY0	A parity error occurred in own system during MPU processing. (The controller of own system detected it.)	
H61504 (*1)	IMSEQ	A sequencer error was detected in own system during MPU processing. (The controller of own system detected it.)	
H61505 (*1)	ICLKERR	A clock error of another system was detected on the dual I/F.	
H61506 (*1)	DMPERR	A bus failure occurred when the MPU was accessing the controller of another system.	
H61507 (*1)	DMPCOR	An ECC error occurred when the MPU was accessing the controller of another system.	
H61508 (*1)	DMPARB	An arbitration error occurred when the MPU was accessing the controller of another system.	
H61509 (*1)	EADRP2	An address parity error occurred in another system when DMA2 was in use.	
H6150A (*1)	EADRP1	An address parity error occurred in another system when DMA0 was in use.	
H6150B (*1)	EADRP0	An address parity error occurred in another system when the MPU was in use.	
H6150C (*1)	EMPTY1	A parity error occurred in another system during MPU processing. (The controller of another system detected it.)	
H6150D (*1)	EMRDTY	A ready timeout (RDYTIMEOUT) occurred in another system during MPU processing. (The controller of another system detected it.)	
H6150E (*1)	EMPTY0	A parity error occurred in own system during MPU processing. (The controller of another system detected it.)	

*1 : If the same error message is issued after the replacement, replace another CTL ASSY.

Message code	Message text	Description	Recovery measures
H6150F (*1)	EMSEQ	A sequencer error occurred in own system during MPU processing. (The controller of another system detected it.)	Replace the CTL ASSY whose FAIL LED is on. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
H61510 (*1)	ECLKERR	A clock error occurred in the controller of another system.	
H61511 (*1)	ID2PTY1	A parity error occurred in another system when DMA#2 was in used.	
H61512 (*1)	ID2RDYT	A ready timeout (RDYTIMEOUT) was detected in another system when DMA#2 was in use. (The controller of own system detected it.)	
H61513 (*1)	ID2PTY0	A parity error was detected in own system when DMA#2 was in use. (The controller of own system detected it.)	
H61514 (*1)	ID2SEQ	A sequencer error was detected in own system when DMA#2 was in use. (The controller of own system detected it.)	
H61515 (*1)	ED2PTY1	A parity error of another system was detected when DMA#2 was in use.	
H61516 (*1)	ED2RDYT	A ready timeout (RDYTIMEOUT) was detected in another system when DMA#2 was in use. (The controller of own system detected it.)	
H61517 (*1)	ED2PTY0	A parity error was detected in own system when DMA#2 was in use. (The controller of own system detected it.)	
H61518 (*1)	ED2SEQ	A sequence error was detected in own system when DMA#2 was in use. (The controller of own system detected it.)	
H61519 (*1)	ID0PTY1	A parity error was detected in another system when DMA#0 was in used. (The controller of another system detected it.)	
H6151A (*1)	ID0RDYT	A ready timeout (RDYTIMEOUT) was detected in another system when DMA#0 was in use. (The controller of another system detected it.)	
H6151B (*1)	IDPTY0	A parity error was detected in own system when DMA#0 was in use. (The controller of another system detected it.)	

*1 : If the same error message is issued after the replacement, replace another CTL ASSY.

Message code	Message text	Description	Recovery measures
H6151C (*1)	ID0SEQ	A sequencer error was detected in own system when DMA#0 was in use. (The controller of another system detected it.)	Replace the CTL ASSY whose FAIL LED is on. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
H6151D (*1)	ED0PTY1	A parity error was detected in another system when DMA#0 was in use. (The controller of own system detected it.)	
H6151E (*1)	ED0RDYT	A ready timeout (RDYTIMEOUT) was detected in another system when DMA#0 was in use. (The controller of own system detected it.)	
H6151F (*1)	ED0PTY0	A parity error was detected in own system when DMA#0 was in use. (The controller of own system detected it.)	
H61520 (*1)	ED0SEQ	A sequence error was detected in own system when DMA#0 was in use. (The controller of own system detected it.)	
H61521 (*1)	ID1BPTY1	A parity error (PTYERR) of own system was detected in DUAL when DMA1B was in use. (The controller of own system detected it.)	
H61522 (*1)	ID1BRDYT	A ready timeout (RDYTIMEOUT) of another system was detected in DUAL when DMA1B was in use. (The controller of own system detected it.)	
H61523 (*1)	ID1BPTY0	A parity error (PTYERR) of another system was detected in DUAL when DMA1B was in use. (The controller of own system detected it.)	
H61524 (*1)	ID1BSEQ	A sequencer error (SEQERR) of own system was detected in DUAL when DMA1B was in use. (The controller of own system detected it.)	
H61525 (*1)	ED1BPTY1	A parity error (PTYERR) of own system was detected in DUAL when DMA1B was in use. (The controller of another system detected it.)	
H61526 (*1)	ED1BRDYT	A ready timeout (RDYTIMEOUT) of another system was detected in DUAL when DMA1B was in use. (The controller of another system detected it.)	

*1 : If the same error message is issued after the replacement, replace another CTL ASSY.

Message code	Message text	Description	Recovery measures
H61527 (*1)	ED1BPTY0	A parity error (PTYERR) of another system was detected in DUAL when DMA1B was in use. (The controller of another system detected it.)	Replace the CTL ASSY whose FAIL LED is on. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
H61528 (*1)	ED1BSEQ	A sequencer error (SEQERR) of own system was detected in DUAL when DMA1B was in use. (The controller of another system detected it.)	
H61529 (*1)	D1BICKERR	An ICLHERR was detected in DUAL when DMA1B was in use. (The controller of own system detected it.)	
H6152A (*1)	D1BECLKERR	An ECLHERR was detected in DUAL when DMA1B was in use. (The controller of another system detected it.)	
H6152B (*1)	DDM1BDTE	A data transfer error was detected during access to DMA1B.	
H61531 (*1)	ID1PTY1	A parity error (PTYERR) of own system was detected in DUAL when DMA1 was in use. (The controller of own system detected it.)	
H61532 (*1)	ID1RDYT	A read timeout (RDYTIMEOUT) of another system was detected in DUAL when DMA1 was in use. (The controller of own system detected it.)	
H61533 (*1)	ID1PTY0	A parity error (PTYERR) of own system was detected in DUAL when DMA1 was in use. (The controller of own system detected it.)	
H61534 (*1)	ID1SEQ	A sequencer error (SEQERR) of own system was detected in DUAL when DMA1 was in use. (The controller of own system detected it.)	
H61535 (*1)	ED1PTY1	A parity error (PTYERR) of own system was detected in DUAL when DMA1 was in use. (The controller of another system detected it.)	
H61536 (*1)	ED1RDYT	A ready timeout (RDYTIMEOUT) of another system was detected in DUAL when DMA1 was in use. (The controller of another system detected it.)	

*1 : If the same error message is issued after the replacement, replace another CTL ASSY.

Message code	Message text	Description	Recovery measures
H61537 (*1)	ED1PTY0	A parity error (PTYERR) of another system was detected in DUAL when DMA1 was in use. (The controller of another system detected it.)	Replace the CTL ASSY whose FAIL LED is on. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
H61538 (*1)	ED1SEQ	A sequencer error (SEQERR) of own system was detected in DUAL when DMA1 was in use. (The controller of another system detected it.)	
H61539 (*1)	D1ICLKERR	An ICLHERR was detected in DUAL when DMA1 was in use. (The controller of own system detected it.)	
H6153A (*1)	D1ECLKERR	An ECLKERR was detected in DUAL when DMA1 was in use. (The controller of another system detected it.)	
H6153B (*1)	DDM1DTE	A data transfer failure was detected during access to DMA1.	
H61900	CMCPYERR	A failure was detected during a cache recovery in an online recovery.	
H61B00 (*1)	DDM2DTE	A data failure was detected during DMA#2 access.	
H61C00 (*1)	DDM0DTE	A data failure was detected during DMA#0 access.	
H61D00	DMAFRSTNG	DMA forcible shutdown failed.	
H61E00	POFMTEWAR	A destaging hangup of another system was detected during planned shutdown.	
H61F00	DRRRSTNG	DRR hardware error end reset failed.	
H61F01	DMA3RSTNG	DMA1B hardware error end reset failed.	
H66000	LRCGENERR	An LRC generation error occurred.	
H66100	SHRTOUT	A shared communication time out occurred.	

*1 : If the same error message is issued after the replacement, replace another CTL ASSY.

Message code	Message text	Description	Recovery measures
HZ0100	ACFAIL	An AC power error occurred.	Turn the power off, then turn it on again. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ0406	WRRGRDERR	A read operation was instructed to the write-only register.	Replace the CTL ASSY whose FAIL LED is on. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
HZ0407	ROMWRERR	A write operation occurred in the BOOT ROM area.	
HZ0408	RDYTMOUT	The ready signal could not be received within 1 millisecond.	
HZ0409	PTYERR0	A parity error occurred in one of data bits 8 to 15.	
HZ0410	PTYERR1	1 A parity error occurred in one of data bits 0 to 7.	
HZ0415	DBF2BWR	A 2-byte write operation occurred in the 4-byte boundary DBF.	
HZ0501	SEGPOSERR	An incorrect cache write segment location was detected.	
HZ0502	WRNODTYBK	An attempt was made to write a block that is not dirty to the drive.	
HZ0503	WRNODTYSG	An attempt was made to write a segment that is not dirty to the drive.	
HZ0504	RDDTYBLK	An attempt was made to read data into a dirty block.	
HZ0505	RDSEGERR	Check of the segment to be read	Retry. If the error is not recovered, replace the CTL ASSY whose FAIL LED is on. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
HZ0506	WSGQATERR	A conflict of the write segment queue attribute occurred.	
HZ0507	WSEGPDEV	A conflict occurred between the write segment and corresponding PDEV.	
HZ0508	WSEGLOCK	A segment lock conflict occurred when data was being written.	
HZ0509	CCPLUNERR	An invalid LUN was detected when data was being copied between caches.	
HZ0510	CCPLBAERR	An invalid LBA was detected when data was being copied between caches.	

*1 : If the same error message is issued after the replacement, replace another CTL ASSY.

Message code	Message text	Description	Recovery measures
HZ0511	PARLAERR	An invalid LA was detected during parity generation.	Retry. If the error is not recovered, replace the CTL ASSY whose FAIL LED is on. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
HZ0512	PARLUNERR	An invalid LUN was detected during parity generation.	
HZ0513	PARLBAERR	An invalid LBA was detected during parity generation.	
HZ0514	QUEUEERR	A queue transition conflict occurred.	
HZ0515	COWDRVERR	Data to be written collectively is dispersed to several PDEVs.	
HZ0516	LACHEKMOD	A conflict occurred in a LA check.	
HZ0517	DSTPOSERR	An invalid write location was detected during destaging.	
HZ0518	DSTLAERR	An invalid LA was detected during destaging.	
HZ0519	SEGDOSOTH	An invalid cache write segment location was detected.	
HZ051A	PARLAOTH	An invalid LA was detected during parity generation.	
HZ051B (*1)	CMPNGHC	A compare error occurred in the double-written SGCB. (Unspecialized cache write)	Replace the CTL ASSY whose FAIL LED is on. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
HZ051C (*1)	CMPNGSP	A compare error occurred in the double-written SGCB. (Specialized cache write)	
HZ051D (*1)	CMPNGPA	A compare error occurred in the double-written SGCB. (Parity generation)	
HZ051E (*1)	CMPNGCP	A compare error occurred in the double-written SGCB. (Copy between caches)	
HZ051F (*1)	CMPNGCTL	A compare error occurred in the double-written SGCB. (Copy between CTLs)	
HZ0520 (*1)	CMPNGDC	A compare error occurred in the double-written SGCB. (Data transfer from drive to cache)	
HZ0521 (*1)	CMPNGCD	A compare error occurred in the double-written SGCB. (Data transfer from cache to drive)	
HZ0522 (*1)	CCPLAERR	An invalid LA was detected when data was being copied between caches.	

*1 : If the same error message is issued after the replacement, replace another CTL ASSY.

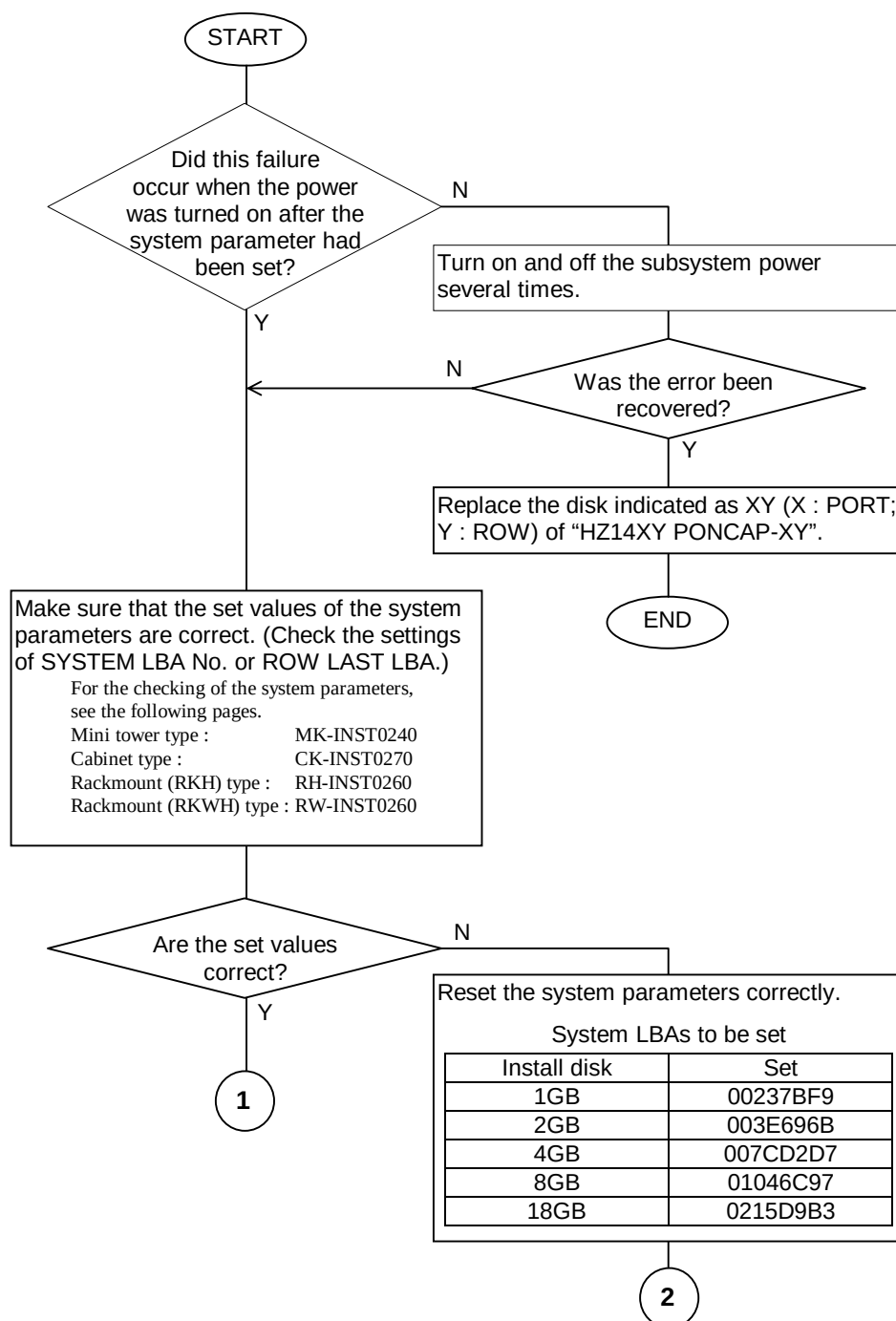
Message code	Message text	Description	Recovery measures
HZ0601	STRSIZECHG	The message shown on the left is issued for the following two causes. • The stripe size was changed after installation. • In a microprogram replacement, installation to update the Ver.0355/B or later to the Ver.0355 or earlier was executed.	The message is issued when the “STRIPE SIZE” on the system parameter is changed after the LU definition. Reset the “STRIPE SIZE” of the system parameter to the value same as that at the time of the LU definition. For the procedure for setting the system parameter, see page PANEL0080. The installation to update the microprogram to the Ver.0355 or earlier cannot be executed in the state Micro-Disk Ver.0355/B or later is used. Reexecute the updating installation of Micro-Disk Ver.0355/B or later.
HZ0602	LBASIZECHG	The host LBA size of the LU was changed after installation.	The message is issued when the “HOST BLK SIZE” on the system parameter is changed after the LU definition. Reset the “HOST BLK SIZE” of the system parameter to the value same as that at the time of the LU definition. For the procedure for setting the system parameter, see page PANEL0080.

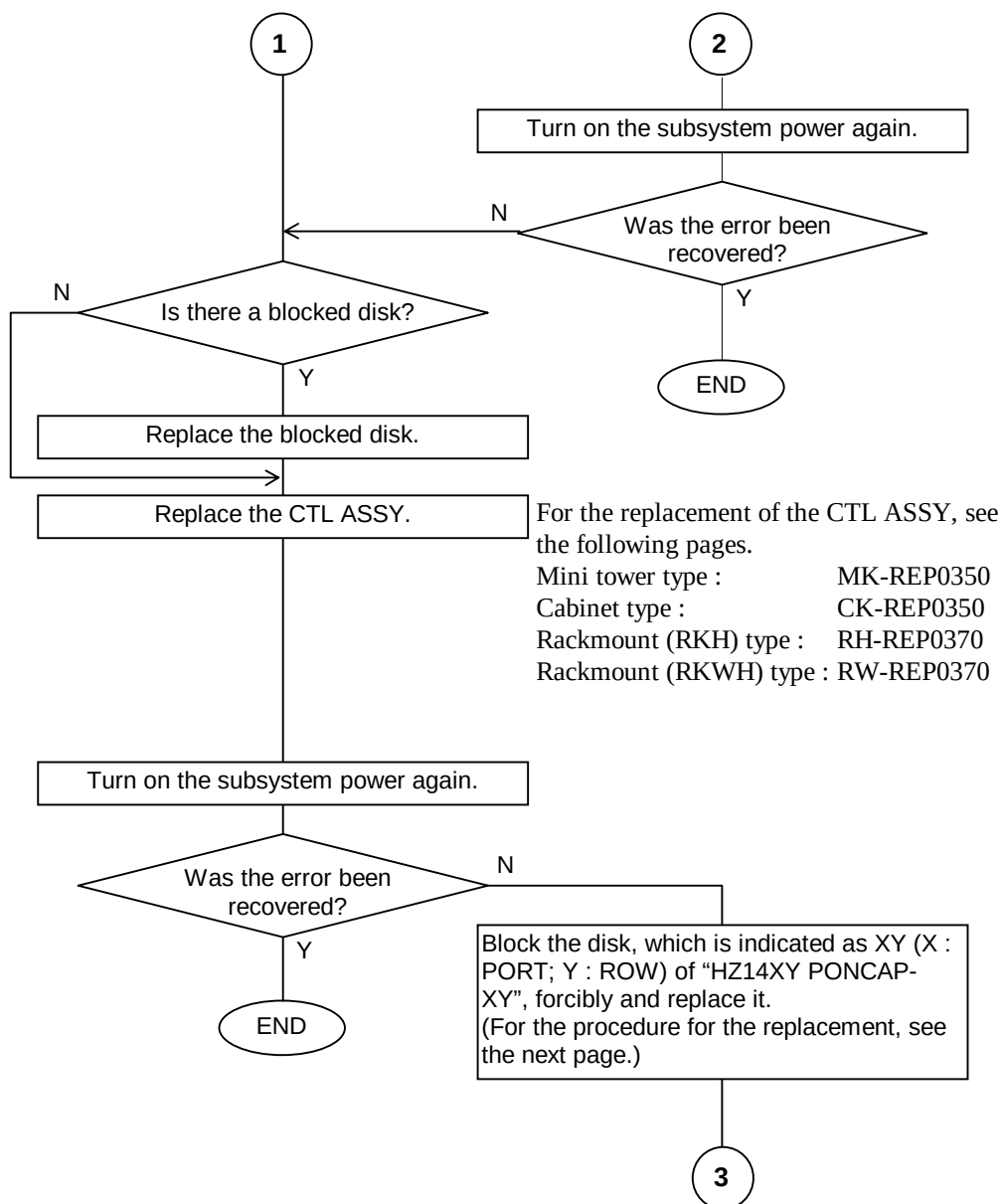
Message code	Message text	Description	Recovery measures
HZ0603	SPDUSED	"No spare disk" was set while a spare disk was in use.	Re-specify the system parameter correctly. For the setting of the system parameters, see the following pages. Mini tower type : MK-INST0240 Cabinet type : CK-INST0270 Rackmount (RKH) type : RH-INST0260 Rackmount (RKWH) type : RW-INST0260
HZ0701	NOSYSTDRV	The system areas of all drives became unusable.	Retry. If the error is not recovered, replace the CTL ASSY whose FAIL LED is on. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
HZ0702	NOSYSTDAT	Inheritance information in the system area is determined for none of the drives.	
HZ0801	CACHE4MB	No directory can be created because the cache capacity is 4Mbytes.	Check the installed CACHE ASSY.
HZ0803	NOPINSEG	Segments on a cache are not enough to recover PIN data of inheritance information.	Replace the CTL ASSY whose FAIL LED is on. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
HZ0902	UNSPTRV	An unsupported drive was mounted when the P/S was turned on.	Replace the HDU ASSY with a supported one. For the replacement of the HDU ASSY, see the following pages. Mini tower type : MK-REP0170 Cabinet type : CK-REP0170 Rackmount (RKH) type : RH-REP0190 Rackmount (RKWH) type : RW-REP0190
HZ0A00	JOBMKERR	Job generation when the system was started failed. (A kind of logical error)	Replace the CTL ASSY whose FAIL LED is on. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
HZ0A01	TASKMKERR	Task generation when the system was started failed. (A kind of logical error)	Check if the CACHE ASSY #0 is installed. If it is installed, replace the CTL ASSY. For the check of the CACHE ASSY installation, see the following pages. Mini tower type : MK-REP0530 Cabinet type : CK-REP0530 Rackmount (RKH) type : RH-REP0560 Rackmount (RKWH) type : RW-REP0550 For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370

Message code	Message text	Description	Recovery measures
HZ0C00	WCDGTOUT	A watchdog timeout occurred.	Replace the CTL ASSY whose FAIL LED is on. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
HZ1001	RSOPENERR	An RS232 open error occurred.	Replace the RS232C cable or the I/F ADAPTER ASSY. For the replacement of the I/F ADAPTER ASSY, see the following pages. Mini tower type : MK-REP0470 Cabinet type : CK-REP0470 Rackmount (RKH) type : RH-REP0490 Rackmount (RKWH) type : RW-REP0490
HZ1002	SOOPENERR	A socket open error occurred.	Replace the cable or the I/F ADAPTER ASSY. For the replacement of the I/F ADAPTER ASSY, see the following pages. Mini tower type : MK-REP0470 Cabinet type : CK-REP0470 Rackmount (RKH) type : RH-REP0490 Rackmount (RKWH) type : RW-REP0490
HZ1003	ACOPENERR	An accept open error occurred.	
HZ1100	PSONTOUT	A timeout occurred during forcible parity recovery when the P/S was on.	Replace the HDU or CTL ASSY. For the replacement of the HDU ASSY, see the following pages. Mini tower type : MK-REP0170 Cabinet type : CK-REP0170 Rackmount (RKH) type : RH-REP0190 Rackmount (RKWH) type : RW-REP0190 For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
HZ1103	POFTOUT	A waiting timeout of the communication with another system occurred during planned shutdown.	Replace the CTL ASSY whose FAIL LED is on. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
HZ1301	POFNONCLD	An attempt was made to turn off the PS when inheritance information is not COLD.	Press the PS OFF switch, turn the PS on, then turn it off again.
HZ1302	POFSEQERR	A sequencer error was detected during PS-off processing.	For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ14XY	PONCAP-XY	A disk whose capacity is less than the specified value was connected when the P/S was on. X: Port number Y: Row number	Perform the recovery operation following the PONCAP recovery procedure shown on the next page.

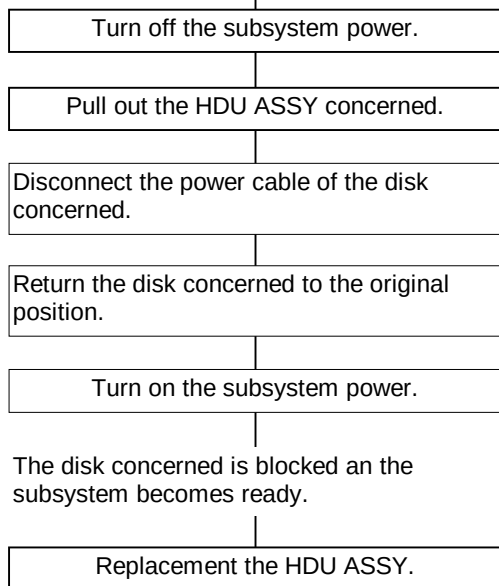
PONCAP recovery procedure

Note : Perform the recovery in the state that a host I/O is not instructed.

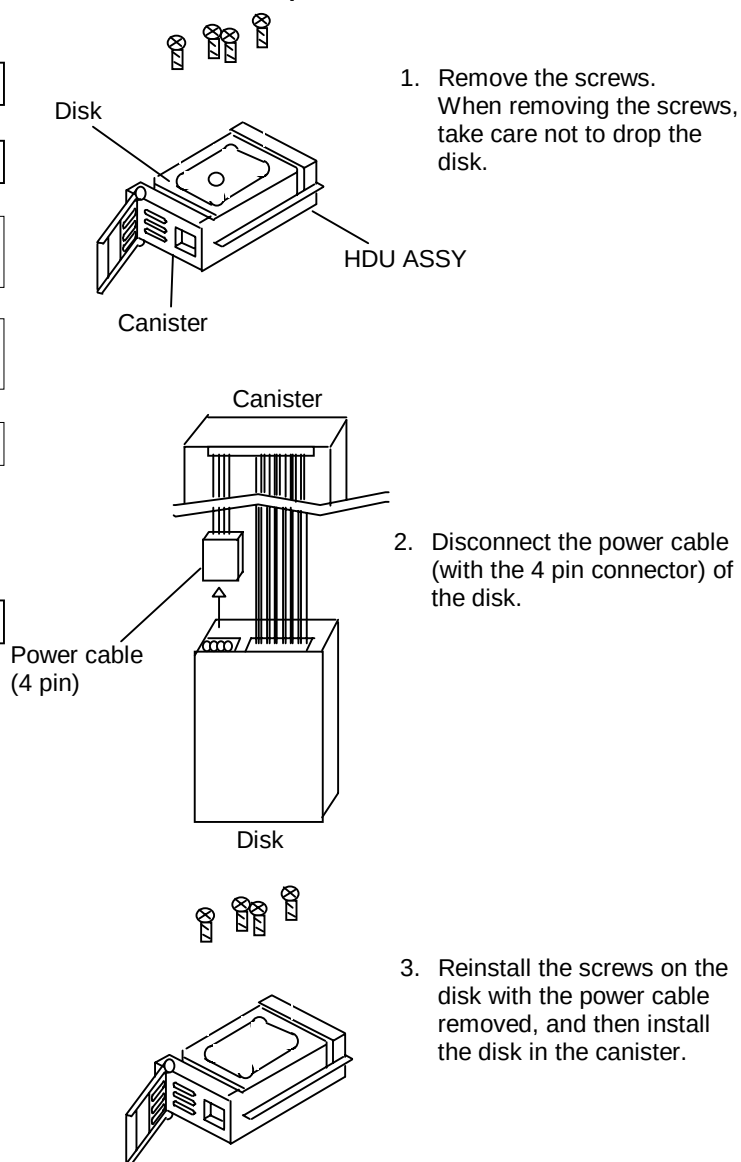




3



How to disconnect the power cable



Message code	Message text	Description	Recovery measures
HZ1500	DRVSTERR	The disk used the last time was not mounted when the P/S was on.	Check the disk mounting location.
HZ1601	SYSCHGPIN	The system transition cannot be performed because a PIN segment exists.	Retry. If the error is not recovered, replace the CTL ASSY whose FAIL LED is on. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
HZ1602	SYSCHGPOF	The system transition cannot be performed because the last planned shutdown was not executed.	
HZ1603	SYSCHGCTL	The system transition cannot be performed because the controller is degraded.	
HZ1604	SYSCHGNG	The system transition cannot be performed because the system from which the transition is to be performed is not supported.	
HZ1701	CMPKGCNS	A system down occurred because the cache package configuration differs between controllers.	
HZ21YY	EEPROM-YY	The system parameter is not set. XX: Number of the controller for which the system parameter is not set	Make the CACHE ASSY configurations of the CTL ASSYs same. For the configuration of the CACHE ASSY, see the following pages. Mini tower type : MK-REP0530 Cabinet type : CK-REP0530 Rackmount (RKH) type : RH-REP0560 Rackmount (RKWH) type : RW-REP0550
HZ2200	ROWLBACHG	ROW LAST LBA for the LU-defined disk was changed.	
HZ2400	M-CADROV	A cache address over occurred during access to the MPU.	Set the system parameter. For the setting of the system parameters, see the following pages. Mini tower type : MK-INST0240 Cabinet type : CK-INST0270 Rackmount (RKH) type : RH-INST0260 Rackmount (RKWH) type : RW-INST0260
HZ2401	D0-CADROV	A cache address over occurred during access to the DMA0.	
HZ2402	D1-CADROV	A cache address over occurred during access to the DMA1.	
HZ2403	D2-CADROV	A cache address over occurred during access to the DMA2.	
HZ2404	D1B-CADROV	A cache address over occurred during access to the DMA1B.	

Message code	Message text	Description	Recovery measures
HZ51YY	ROMINF-YY	An invalid interface between the boot program and RAM program occurred. YY = 00: Controller number 0 YY = 01: Controller number 1	Turn the power off, then turn it on again. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ5500	SYSACCERR	When NOSYS DRV error occurs by a current system area access error, the last system DRV is not blocked and only the CTL is blocked.	Replace blocked CTL ASSY. For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
HZ62XY	FLSHREVXY	The CTL ASSY which currently installed micro-program could not operate was detected. X : CTL# which output this message Y : Inoperable CTL# (When "Y" is "*", it indicates both CTLs.)	If "I01EYY CHNG PBY" is displayed immediately preceding this message, follow the recovery procedure for the message "I01EYY CHNG PB-YY" shown on page TRBL0310. If the above message is not displayed immediately preceding this message, execute the recovery following the procedure below. Replace the CTL ASSY with the one having the following revision number. Microprogram Ver.0354xx (xx is optional) → PE.26 and later For the replacement of the CTL ASSY, see the following pages. Mini tower type : MK-REP0350 Cabinet type : CK-REP0350 Rackmount (RKH) type : RH-REP0370 Rackmount (RKWH) type : RW-REP0370
HZ6300	SYSPRMREV	A function which the system does not support is set.	A function which the system does not support in system parameters is set to valid. Verify the system parameter setting.
HZ9100	MICROINM	An internal error (invalid setting of the system operation status flag) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9200	MICROPOF	An internal error (invalid internal processing code) occurred in the subsystem.	
HZ9201		An internal error (invalid start factor from kernel) occurred in the subsystem.	
HZ9202		An internal error (invalid POST code) occurred in the subsystem.	
HZ9203		An internal error (block size over of the trace area) occurred in the subsystem.	
HZ9300	MICRORST	An internal error (invalid startup of communication reception processing) occurred in the subsystem.	
HZ9400	MICROSCK	An internal error (invalid system operation flag) occurred in the subsystem.	
HZ9410		An internal error (parameter error occurs "when a job is generated") occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9411	MICROSCK	An internal error (parameter error occurs “when a job is canceled”) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9412		An internal error (parameter error occurs “when the overlay load status is checked”) in the subsystem.	
HZ9413		An internal error (parameter error occurs “during overlay load waiting”) occurred in the subsystem.	
HZ9414		An internal error (parameter error occurs “when a region is deallocated”) occurred in the subsystem.	
HZ9420		An internal error (an error occurs “when the job is started with an invalid job address”) occurred in the subsystem.	
HZ9430		An internal error (occurrence of “event waiting” when a job timeout error without a factor is detected) occurred in the subsystem.	
HZ9431		An internal error (occurrence of “resource waiting” when a job timeout error without a factor is detected) occurred in the subsystem.	
HZ9432		An internal error (occurrence of “unclear wait factor” when a job timeout error without a factor is detected) occurred in the subsystem.	
HZ94Z0		An internal error (invalid interrupt disabled status occurs “before the monitoring job is started”) occurred in the subsystem.	
HZ94Z1		An internal error (invalid interrupt disabled status occurs “after the monitoring job is started”) occurred in the subsystem.	
HZ9600	MICRORMS	An internal error (invalid startup of communication reception processing) occurred in the subsystem.	
HZ9610		An internal error (parameter error “extent resource allocation”) occurred in the subsystem.	
HZ9611		An internal error (parameter error “extent resource deallocation”) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9612	MICRORSM	An internal error (parameter error "registration of an extent resource queue") occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9613		An internal error (parameter error "forcible deallocation of extent resource waiting") occurred in the subsystem.	
HZ9620		An internal error (parameter error "job resource deallocation") occurred in the subsystem.	
HZ9621		An internal error (segment resource deallocation omission "allocated SEG or free area waiting") occurred in the subsystem.	
HZ9622		An internal error (segment resource deallocation omission "allocation of a physically dirty section") occurred in the subsystem.	
HZ9623		An internal error (segment resource deallocation omission "specific SGCB") occurred in the subsystem.	
HZ9624		An internal error (extent resource deallocation omission) occurred in the subsystem.	
HZ9630		An internal error (invalid value of integrated resource management lock counter) occurred in the subsystem.	
HZ9A00	MICROCMD	An internal error (invalid command main starting factor "NON_REQ") occurred in the subsystem.	
HZ9A01		An internal error (invalid command main starting factor "WAT_TOV") occurred in the subsystem.	
HZ9A02		An internal error (invalid command main starting factor "ABT, OFF_REQ") occurred in the subsystem.	
HZ9A03		An internal error (invalid command main starting factor "0") occurred in the subsystem.	
HZ9A10		An internal error (invalid processing code in JCB work area) occurred in the subsystem.	
HZ9A11		An internal error (posting of "PDEV" with an invalid POST code) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9A12	MICROCMD	An internal error (posting of "HDMA" with an invalid POST code) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9A13		An internal error occurred (start with an unexisting factor when restarted after interruption) occurred in the subsystem.	
HZ9A21		An internal error (invalid start factor "ABORT") occurred in the subsystem.	
HZ9A22		An internal error (invalid starting factor "timeout error") occurred in the subsystem.	
HZ9A23		An internal error (invalid host code "host data transfer") occurred in the subsystem.	
HZ9A24		An internal error (invalid host code "SKIPMASK copy") occurred in the subsystem.	
HZ9A25		An internal error (invalid host code "read error check") occurred in the subsystem.	
HZ9A26		An internal error (invalid host code "parity generation") occurred in the subsystem.	
HZ9A27		An internal error (invalid host code "destaging") occurred in the subsystem.	
HZ9A28		An internal error (invalid host code "copy between caches") occurred in the subsystem.	
HZ9A29		An internal error (invalid host code "data generation") occurred in the subsystem.	
HZ9A40		An internal error (invalid reconnection during ReqSense PIO transfer) occurred in the subsystem.	
HZ9A41		An internal error (invalid reconnection during PIO transfer for ReqSense reconnection restart) occurred in the device.	
HZ9A42		An internal error (invalid ReqSense starting factor) occurred in the subsystem.	
HZ9A43		An internal error (invalid starting factor when ReqSense is restarted after interruption) occurred in the subsystem.	
HZ9A51		An internal error (invalid starting factor "MAIN") occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9A52	MICROCMD	An internal error (invalid starting factor "timeout") occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9A53		An internal error (invalid starting factor "P/S OFF & ABORT") occurred in the subsystem.	
HZ9A54		An internal error (invalid starting factor "timeout & P/S OFF & ABORT") occurred in the subsystem.	
HZ9A55		An internal error (invalid start factor "interruption request") occurred in the subsystem.	
HZ9A56		An internal error (invalid detail code "event restart") occurred in the subsystem.	
HZ9A57		An internal error (invalid waiting factor code "timeout restart") occurred in the subsystem.	
HZ9A58		An internal error (invalid waiting factor code "ABORT restart") occurred in the subsystem.	
HZ9A59		An internal error (invalid waiting factor code "timeout, ABORT restart") occurred in the subsystem.	
HZ9A5A		An internal error (extent lock disabled "format check") occurred in the subsystem.	
HZ9A5B		An internal error (invalid RAID level "PDEV check") occurred in the subsystem.	
HZ9A5C		An internal error (invalid RAID level "PDEV check at expansion") occurred in the subsystem.	
HZ9A5D		An internal error (invalid internal status "DRR termination waiting") occurred in the subsystem.	
HZ9A5E		An internal error (invalid loop counter "PDEV termination waiting") occurred in the subsystem.	
HZ9A5F		An internal error (invalid RAID level "dirty map deletion") occurred in the subsystem.	
HZ9A5G		An internal error (invalid loop counter "I/O list creation") occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9A60	MICROCMD	An internal error ("event" started according to invalid starting factor) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9A61		An internal error ("starting factor 1" started according to invalid starting factor) occurred in the subsystem.	
HZ9A70		An internal error ("starting factor 1" started according to invalid starting factor) occurred in the subsystem.	
HZ9A71		An internal error ("resource" started according to invalid starting factor) occurred in the subsystem.	
HZ9A72		An internal error ("event" started according to invalid starting factor) occurred in the subsystem.	
HZ9A73		An internal error (invalid processing code in JCB work area "at initial startup") occurred in the subsystem.	
HZ9A74		An internal error (invalid processing code in JCB work area "extent resource") occurred in the subsystem.	
HZ9A75		An internal error (invalid processing code in JCB work area "segment resource") occurred in the subsystem.	
HZ9A76		An internal error (invalid processing code in JCB work area "event") occurred in the subsystem.	
HZ9A90		An internal error (invalid Read With Skip Mask starting factor "in normal processing") occurred in the subsystem.	
HZ9A91		An internal error (invalid Read With Skip Mask starting factor "at processing interruption") occurred in the subsystem.	
HZ9AA0		An internal error (invalid Write With Skip Mask starting factor "at normal processing") occurred in the subsystem.	
HZ9AA1		An internal error (invalid Write With Skip Mask starting factor "at processing interruption") occurred in the subsystem.	
HZ9AB0		An internal error (invalid inquiry starting factor) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9AB1	MICROCMD	An internal error (invalid starting factor when inquiry interruption is requested) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9AC0		An internal error (invalid starting factor for ModeSel job elimination waiting) occurred in the subsystem.	
HZ9AC1		An internal error (invalid starting factor for ModeSel PDEV termination waiting) occurred in the subsystem.	
HZ9AC2		An internal error (reception of ModeSel unknown starting factor) occurred in the subsystem.	
HZ9AC3		An internal error (ModeSel conflict recovery, invalid page execution) occurred in the subsystem.	
HZ9AC4		An internal error (ModeSel conflict recovery, invalid updating flag) occurred in the subsystem.	
HZ9AC5		An internal error (ModeSel shutdown processing, invalid page execution) occurred in the subsystem.	
HZ9AC6		An internal error (ModeSel shutdown processing, invalid updating flag) occurred in the subsystem.	
HZ9AD0		An internal error (invalid ModeSense starting factor "NON_REQ") occurred in the subsystem.	
HZ9AD1		An internal error (invalid ModeSense startup factor "ABT, OFF_REQ") occurred in the subsystem.	
HZ9AE0		An internal error (invalid ReadCap starting factor "NON_REQ") occurred in the subsystem.	
HZ9AE1		An internal error (invalid ReadCap starting factor "ABT, OFF_REQ") occurred in the subsystem.	
HZ9AF0		An internal error (invalid Reserve starting factor "NON_REQ") occurred in the subsystem.	
HZ9AF1		An internal error (invalid Reserve starting factor "ABT, OFF_REQ") occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9AG0	MICROCMD	An internal error (invalid Release starting factor “NON_REQ”) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9AG1		An internal error (invalid Release starting factor “ABT, OFF_REQ”) occurred in the subsystem.	
HZ9AH0		An internal error (invalid SendDiag starting factor “NON_REQ”) occurred in the subsystem.	
HZ9AH1		An internal error (invalid SendDiag event waiting status) occurred in the subsystem.	
HZ9AH2		An internal error (invalid POST code for SendDiag pass through) occurred in the subsystem.	
HZ9AI0		An internal error (invalid ReceiveDiag starting factor “NON_REQ”) occurred in the subsystem.	
HZ9AI1		An internal error (invalid ReceiveDiag starting factor “ABT, OFF_REQ”) occurred in the subsystem.	
HZ9AJ0		An internal error (invalid ReadDefectDt starting factor “NON_REQ”) occurred in the subsystem.	
HZ9AJ1		An internal error (invalid ReadDefectDt starting factor “ABT, OFF_REQ”) occurred in the subsystem.	
HZ9AK0		An internal error (invalid WriteBufwrbuf starting factor “NON_REQ”) occurred in the subsystem.	
HZ9AK1		An internal error (invalid WriteBufwrbuf starting factor “ABT, OFF_REQ”) occurred in the subsystem.	
HZ9AL0		An internal error (invalid ReadBuf starting factor “NON_REQ”) occurred in the subsystem.	
HZ9AL1		An internal error (invalid ReadBuf starting factor “ABT, OFF_REQ”) occurred in the subsystem.	
HZ9AQ0		An internal error (“starting factor 1” started according to invalid starting factor) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9AQ1	MICROCMD	An internal error (invalid starting factor for restart after interruption) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9AR0		An internal error (invalid TestUnitReady starting factor "NON_REQ") occurred in the subsystem.	
HZ9AR1		An internal error (invalid TestUnitReady starting factor "ABT, OFF_REQ") occurred in the subsystem.	
HZ9B01	MICROPRS	An internal error (invalid value of starting factor 0) occurred in the subsystem.	
HZ9B02		An internal error (invalid value of starting factor 1 "at initial start") occurred in the subsystem.	
HZ9B03		An internal error (subsystem start according to invalid starting factor) occurred in the subsystem.	
HZ9B04		An internal error (invalid return value of vseg acquisition function) occurred in the subsystem.	
HZ9B05		An internal error (invalid return value of staging range determination function (internal)) occurred in the subsystem.	
HZ9B06		An internal error (invalid return value 1 of hit judgment function (internal)) occurred in the subsystem.	
HZ9B07		An internal error (invalid return value 2 of hit judgment function (internal)) occurred in the subsystem.	
HZ9B08		An internal error (subsystem start according to other starting factor during PDEV waiting) occurred in the subsystem.	
HZ9B09		An internal error (subsystem start according to other starting factor during DRR waiting) occurred in the subsystem.	
HZ9B10		An internal error (invalid pre-read waiting) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9B11	MICROPRS	An internal error (invalid internal factor information “in normal processing”) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9B12		An internal error (invalid internal factor information “at timeout”) occurred in the subsystem.	
HZ9B13		An internal error (invalid internal factor information “at restart after interruption”) occurred in the subsystem.	
HZ9B14		An internal error (invalid internal factor information “at interruption or timeout”) occurred in the subsystem.	
HZ9B15		An internal error (invalid internal code) occurred in the subsystem.	
HZ9B16		An internal error (invalid POST code) occurred in the subsystem.	
HZ9B17		An internal error (invalid return value of vseg acquisition function “correction”) occurred in the subsystem.	
HZ9B18		An internal error (invalid internal processing code “correction”) occurred in the subsystem.	
HZ9B19		An internal error (invalid return value of staging range determination function “correction”) occurred in the subsystem.	
HZ9B20		An internal error (invalid return value of hit judgment function “correction”) occurred in the subsystem.	
HZ9B21		An internal error (invalid return value of hit judgment function “parity correction”) occurred in the subsystem.	
HZ9C00	MICROCOW	An internal error (invalid internal processing code detected during intermediate error recovery) occurred in the subsystem.	
HZ9DQ0	MICRORCH	An internal error (impossible queue transition in map and queue matching recovery) occurred in the subsystem.	
HZ9DQ1		An internal error (impossible queue transition in physically dirty section deallocation) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9DQ2	MICRORCH	An internal error (impossible queue transition in segment deallocation) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9DJ0		An internal error (invalid JCB acquisition list format in segment recovery during reset) occurred in the subsystem.	
HZ9DJ1		An internal error (invalid JCB acquisition list format in JCB recovery during reset) occurred in the subsystem.	
HZ9DM0		An internal error (rado_ptdkdt error in intermediate DTY processing of map and queue matching recovery) occurred in the subsystem.	
HZ9DM1		An internal error (rado_simchg error in intermediate DTY processing of map and queue matching recovery) occurred in the subsystem.	
HZ9DF0		An internal error (rado_simchg error in incomplete writing free processing of dirty discard RG initialization) occurred in the subsystem.	
HZ9DF1		An internal error (rado_simchg error in incomplete write free processing of dirty discard RG initialization 2) occurred in the subsystem.	
HZ9DV0		An internal error (rado_simchg error in incomplete writing free processing of spare VDEV deletion recovery source) occurred in the subsystem.	
HZ9DV1		An internal error (rado_simchg error in clean free processing of spare VDEV deletion) occurred in the subsystem.	
HZ9DV2		An internal error (rado_simchg error in incomplete writing free processing of spare VDEV deletion recovery destination) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9E01	MICRORAD	An internal error (excessive number of registrations in I/O request list) "RAID5") occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9E02		An internal error (excessive number of registrations in I/O request list) "RAID1") occurred in the subsystem.	
HZ9E03		An internal error (excessive number of registrations in I/O request list) "no RAID5 parity") occurred in the subsystem.	
HZ9E04		An internal error (excessive number of registrations in I/O request list) "RAID5 data") occurred in the subsystem.	
HZ9E05		An internal error (excessive number of registrations in I/O request list) "RAID5 parity") occurred in the subsystem.	
HZ9E06		An internal error (invalid RAID level "other than RAID0, RAID1, and RAID5") occurred in the subsystem.	
HZ9E07		An internal error (invalid RAID level "other than RAID0, RAID1, and RAID5") occurred in the subsystem.	
HZ9E08		An internal error (no LUN belongs to PDEV) occurred in the subsystem.	
HZ9E09		An internal error (LU straddle "RAID0") occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9E0A	MICRORAD	An internal error (LU straddle "RAID1") occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9E0B		An internal error (stripe straddle "no RAID5 parity") occurred in the subsystem.	
HZ9E0C		An internal error (stripe straddle "RAID5 data") occurred in the subsystem.	
HZ9E0D		An internal error (stripe straddle "RAID5 parity") occurred in the subsystem.	
HZ9E0E		An internal error (invalid RAID level "other than RAID0, RAID1, and RAID5") occurred in the subsystem.	
HZ9E0F		An internal error (invalid RAID level "other than RAID0, RAID1, and RAID5") occurred in the subsystem.	
HZ9E0G		An internal error (invalid RAID level "other than RAID1, and RAID5 (with a parity)") occurred in the subsystem.	
HZ9E0H		An internal error (PDEV in I/O request list conflicting with PDEV input) occurred in the subsystem.	
HZ9E0I		An internal error (invalid RAID level "other than RAID5") occurred in the subsystem.	
HZ9E0J		An internal error (invalid RAID level "RAID5 (with a parity)") occurred in the subsystem.	
HZ9E0K		An internal error (invalid RAID level "other than RAID5") occurred in the subsystem.	
HZ9E0L		An internal error (invalid RAID level "other than RAID0, RAID1, and RAID5") occurred in the subsystem.	
HZ9E0M		An internal error (invalid RAID level "other than RAID0, RAID1, and RAID5") occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9E0N	MICRODSC	An internal error (invalid RAID level "other than RAID0, RAID1, and RAID5") occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9F00		An internal error (invalid input CDB detected during simplified I/O execution) occurred in the subsystem.	
HZ9F10		An internal error (uncreated DMA list detected in the data interface when an I/O error occurred) occurred in the subsystem.	
HZ9F11		An internal error (uncreated DMA list detected in the data interface when an I/O error occurred) occurred in the subsystem.	
HZ9F20		An internal error (DMA READ command DMA was transferred when an SPC response timeout occurred) occurred in the subsystem.	
HZ9F21		An internal error (READ command DMA was not transferred when an SPC response timeout occurred) occurred in the subsystem.	
HZ9F22		An internal error (SPC response timeout with non-READ command) occurred in the subsystem.	
HZ9F30		An internal error (invalid setting of I/O list SPC end interruption detected when a D-SPC interruption occurred) occurred in the subsystem.	
HZ9F40		An internal error (system down when an I/O execution interruption function was started) occurred in the subsystem.	
HZ9F41		An internal error (no I/O list found in the DMA queue during I/O execution interruption processing (DMA transfer end waiting status)) occurred in the subsystem.	
HZ9F50		An internal error (I/O list found in the PDEV queue when the I/O execution function was started) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9F60	MICRODSC	An internal error (I/O list found in the PDEV queue when the PDEV allocation/deallocation function was started) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9F70		An internal error (invalid SCSI status detected in the I/O list during processing of an I/O execution control matrix) occurred in the subsystem.	
HZ9F80		An internal error (I/O list found in the PDEV queue when the leading queue of the I/O list for I/O execution control was being processed) occurred in the subsystem.	
HZ9F90		An internal error (invalid SCSI command flag detected in the I/O list during CDB creation) occurred in the subsystem.	
HZ9F91		An internal error (I/O list internal information already transferred to DMA when the READ command was issued) occurred in the subsystem.	
HZ9F92		An internal error (invalid I/O list command type detected when a command was issued) occurred in the subsystem.	
HZ9FA0		An internal error (invalid SCSI command flag detected in the I/O list during collection of disk command trace acquisition) occurred in the subsystem.	
HZ9FA1		An internal error (invalid I/O command type detected during acquisition of disk command trace) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9G01	MICRODMA	Internal error (DMA transfer length 0 detected during copy between CTLs) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9G02		An internal error (invalid double write mode of DRR list) occurred in the subsystem.	
HZ9G03		An internal error (invalid double write mode of DRR list) occurred in the subsystem.	
HZ9G04		An internal error (invalid double write mode of DRR list) occurred in the subsystem.	
HZ9G05		An internal error (invalid cache WT specification detected during copy between CTLs) occurred in the subsystem.	
HZ9G06		An internal error (invalid dual I/O error factor “failure of own system detected by own CTL” detected during host data transfer) occurred in the subsystem.	
HZ9G07		An internal error (invalid dual I/O error factor “failure of another system detected by own CTL” detected during host data transfer) occurred in the subsystem.	
HZ9G08		An internal error (invalid dual I/O error factor “failure detected by own CTL” detected during host data transfer) occurred in the subsystem.	
HZ9G09		An internal error (invalid dual I/O error factor “failure of another system detected by another CTL” detected during host data transfer) occurred in the subsystem.	
HZ9G0A		An internal error (invalid dual I/O error factor “failure of own system detected by another CTL” detected during host data transfer) occurred in the subsystem.	
HZ9G0C		An internal error (invalid dual I/O error factor “failure detected by another CTL” detected during host data transfer) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9G0D	MICRODMA	An internal error (system down caused by a dual I/F error detected during host data transfer) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9G0E		An internal error (invalid dual I/F error factor “failure of own system detected by own CTL” detected during format data generation) occurred in the subsystem.	
HZ9G0F		An internal error (invalid dual I/F error factor “failure of another system detected by own CTL” detected during format data generation) occurred in the subsystem.	
HZ9G0G		An internal error (invalid dual I/F error factor “failure detected by own CTL” detected during format data generation) occurred in the subsystem.	
HZ9G0H		An internal error (invalid dual I/F error factor “failure of another system detected by another CTL” detected during format data generation) occurred in the subsystem.	
HZ9G0I		An internal error (invalid dual I/F error factor “failure of own system detected by another CTL” detected during format data generation) occurred in the subsystem.	
HZ9G0J		An internal error (invalid dual I/F error factor “failure detected by another CTL” detected during format data generation) occurred in the subsystem.	
HZ9G0K		An internal error (system down caused by a dual I/F error detected during format data generation) occurred in the subsystem.	
HZ9G0L		An internal error (invalid dual I/F error factor “failure of own system detected by own CTL” detected during DRR execution) occurred in the subsystem.	
HZ9G0M		An internal error (invalid dual I/F error factor “failure of another system detected by own CTL” detected during DRR execution) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HG9G0N	MICRODMA	An internal error (invalid dual I/F error factor “failure detected by own CTL” detected during DRR execution) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9G0O		An internal error (invalid dual I/F error factor detected during DRR execution “failure of another system detected by another CTL”) occurred in the subsystem.	
HZ9G0P		An internal error (invalid dual I/F error factor “failure of own system detected by another CTL” detected during DRR execution) occurred in the subsystem.	
HZ9G0Q		An internal error (invalid dual I/F error factor “failure detected by another CTL” detected during DRR execution) occurred in the subsystem.	
HZ9G0R		An internal error (system down caused by a dual I/F error detected during DRR execution) occurred in the subsystem.	
HZ9G0S		An internal error (system down caused by a collectable error detected during DRR execution) occurred in the subsystem.	
HZ9G0T		An internal error (invalid map updating detected during DRR execution) occurred in the subsystem.	
HZ9G0U		An internal error (system down caused by a dual I/F error detected during DRR execution) occurred in the subsystem.	
HZ9G0V		An internal error (invalid retry flag caused by a dual I/F error detected during DRR execution) occurred in the subsystem.	
HZ9G0W		An internal error (system down caused by HDER or DTER detected during DRR execution) occurred in the subsystem.	
HZ9G0X		An internal error (system down caused by a collectable error detected during DRR execution) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9G0Y	MICRODMA	An internal error (system down caused by a collectable error detected during DMA1B execution) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9G0Z		An internal error (invalid DMA start type detected during DRR queue updating) occurred in the subsystem.	
HZ9G10		An internal error (system down caused by a collectable error detected during DMA1 execution) occurred in the subsystem.	
HZ9G11		An internal error (system down caused by a collectable error detected during DMA1 execution) occurred in the subsystem.	
HZ9G12		An internal error (invalid number of started DMA detected during D-DMA interrupt termination) occurred in the subsystem.	
HZ9G13		An internal error (invalid number of started DMA detected during D-DMA forced stop) occurred in the subsystem.	
HZ9G14		An internal error (DMA transfer length 0 detected during copy between caches) occurred in the subsystem.	
HZ9G15		An internal error (DMA transfer length 0 detected during parity generation) occurred in the subsystem.	
HZ9G16		An internal error (DMA transfer length 0 detected during verification start) occurred in the subsystem.	
HZ9G17		An internal error (DMA transfer length 0 detected during DMA1 start) occurred in the subsystem.	
HZ9G18		An internal error (DMA transfer length 0 detected during DMA1B start) occurred in the subsystem.	
HZ9G19		An internal error (no HDER or DTER error factor detected during unspecialized path execution) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9G1A	MICRODMA	An internal error (system failure caused by HDER or DTER detected during unspecialized path execution) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9G1B		An internal error (no HDER or DTER error factor detected during specialized path execution) occurred in the subsystem.	
HZ9G1C		An internal error (system down caused by HDER or DTER detected during specialized path execution) occurred in the subsystem.	
HG9G1D		An internal error (no HDER or DTER error factor detected during DMA1 execution) occurred in the subsystem.	
HZ9G1E		An internal error (system down caused by HDER or DTER detected during DMA1 execution) occurred in the subsystem.	
HZ9G1F		An internal error (no HDER or DTER error factor detected during DMA1B execution) occurred in the subsystem.	
HZ9G1G		An internal error (system down caused by HDER or DTER detected during DMA1B execution) occurred in the subsystem.	
HZ9G1H		An internal error (no HDER or DTER error factor detected during DRR execution) occurred in the subsystem.	
HZ9G1I		An internal error (system down caused by HDER or DTER detected during DRR execution) occurred in the subsystem.	
HZ9G1J		An internal error (DMA transfer length 0 detected during format data generation) occurred in the subsystem.	
HZ9G1K		An internal error (system down caused by a collectable error detected during format data generation) occurred in the subsystem.	
HZ9G1L		An internal error (system down caused by a dual I/F error detected during format data generation) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9G1M	MICRODMA	Internal error (invalid map updating detected during format data generation) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9G1N		An internal error (invalid retry flag caused by a dual I/F error detected during format data generation) occurred in the subsystem.	
HZ9G1O		An internal error (no HDER or DTER error factor detected during format data generation) occurred in the subsystem.	
HZ9G1P		An internal error (system down caused by HDER or DTER detected during format data generation) occurred in the subsystem.	
HZ9G1Q		An internal error (system down caused by collectable error detected during unspecialized path execution) occurred in the subsystem.	
HZ9G1R		An internal error (system down caused by collectable error detected during specialized path execution) occurred in the subsystem.	
HZ9G1S		An internal error (system down caused by collectable error detected during unspecialized path execution) occurred in the subsystem.	
HZ9G1T		An internal error (system down caused by collectable error detected during specialized path execution) occurred in the subsystem.	
HZ9G1U		An internal error (invalid DMA start type detected during H-DMA queue updating) occurred in the subsystem.	
HZ9G1V		An internal error (DMA length 0 detected during unspecialized path start) occurred in the subsystem.	
HZ9G1W		An internal error (system down detected during unspecialized path interruption processing) occurred in the subsystem.	
HZ9G1X		An internal error (system down detected during specialized path interruption processing) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9G1Y	MICRODMA	Internal error (system down detected during DRR interruption processing start) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9G1Z		An internal error (system down detected during start of format data generation interruption processing) occurred in the subsystem.	
HZ9G20		An internal error (DMA length 0 “read” detected during specialized path start) occurred in the subsystem.	
HZ9G21		An internal error (DMA length 0 “write” detected during specialized path start) occurred in the subsystem.	
HZ9G22		An internal error (invalid transfer port detected during DMA1 staging (data section)) occurred in the subsystem.	
HZ9G23		An internal error (invalid transfer port “RAID5” detected during DMA1 staging (parity section)) occurred in the subsystem.	
HZ9G25		An internal error (invalid transfer port detected during DMA1 staging (no LA check)) occurred in the subsystem.	
HZ9G26		An internal error (invalid transfer port detected during DMA1 destaging (data section)) occurred in the subsystem.	
HZ9G27		An internal error (invalid transfer port “RAID5” detected during DMA1 destaging (parity section)) occurred in the subsystem.	
HZ9G29		An internal error (invalid transfer port detected during DMA1 destaging (no LA check)) occurred in the subsystem.	
HZ9G2A		An internal error (invalid transfer port detected during DMA1B staging (data section)) occurred in the subsystem.	
HZ9G2B		An internal error (invalid transfer port “RAID5” detected during DMA1B staging (parity section)) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9G2D	MICRODMA	An internal error (invalid transfer port detected during DMA1B staging (no LA check)) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9G2E		An internal error (invalid transfer port detected during DMA1B destaging (data section)) occurred in the subsystem.	
HZ9G2F		An internal error (invalid transfer port "RAID5" detected during DMA1B destaging (parity section)) occurred in the subsystem.	
HZ9G2H		An internal error (invalid transfer port detected during DMA1B destaging (no LA check)) occurred in the subsystem.	
HZ9G2I		An internal error (invalid dual I/F error factor "failure of own system detected by own CTL" detected during DMA1 data transfer) occurred in the subsystem.	
HZ9G2J		An internal error (invalid dual I/F error factor "failure of another system detected by own CTL" detected during DMA1 data transfer) occurred in the subsystem.	
HZ9G2K		An internal error (invalid dual I/F error factor "failure detected by own CTL" detected during DMA1 data transfer) occurred in the subsystem.	
HZ9G2L		An internal error (invalid dual I/F error factor "failure of another system detected by another CTL" detected during DMA1 data transfer) occurred in the subsystem.	
HZ9G2M		An internal error (invalid dual I/F error factor "failure of own system detected by another CTL" detected during DMA1 data transfer) occurred in the subsystem.	
HZ9G2N		An internal error (invalid dual I/F error factor "failure detected by another CTL" detected during DMA1 data transfer) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9G2O	MICRODMA	An internal error (system down caused by dual I/O error during DMA1 data transfer) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9G2P		An internal error (invalid dual I/F error factor “failure of own system detected by own CTL” detected during DMA1B data transfer) occurred in the subsystem.	
HZ9G2Q		An internal error (invalid dual I/F error factor “failure of another system detected by own CTL” detected during DMA1B data transfer) occurred in the subsystem.	
HZ9G2R		An internal error (invalid dual I/F error factor “failure detected by own CTL” detected during DMA1B data transfer) occurred in the subsystem.	
HZ9G2S		An internal error (invalid dual I/F error factor “failure of another system detected by another CTL” detected during DMA1B data transfer) occurred in the subsystem.	
HZ9G2T		An internal error (invalid dual I/F error factor “failure of own system detected by another CTL” detected during DMA1B data transfer) occurred in the subsystem.	
HZ9G2U		An internal error (invalid dual I/F error factor “failure detected by another CTL” detected during DMA1B data transfer) occurred in the subsystem.	
HZ9G2V		An internal error (system down caused by dual I/O error during DMA1B data transfer) occurred in the subsystem.	
HZ9G2W		An internal error (invalid DMA start type detected during H-DMA interrupt assignment) occurred in the subsystem.	
HZ9G2X		An internal error (invalid staging map updating information “invalid transfer synchronization” output in data share mode) occurred in the subsystem.	
HZ9G2Y		An internal error (invalid transfer direction at unspecialized path LA/LRC error) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9G2Z	MICRODMA	Internal error (invalid transfer direction at specialized path LA/LRC error) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9G30		An internal error (invalid transfer direction at DMA1LA/LRC error) occurred in the subsystem.	
HZ9G31		An internal error (invalid transfer direction at DMA1B LA/LRC error) occurred in the subsystem.	
HZ9H00	MICROERR	An internal error (fault table retrieval error "index section") occurred in the subsystem.	
HZ9H01		An internal error (fault table retrieval error "data section") occurred in the subsystem.	
HZ9J00	MICRODRC	An internal error (invalid start factor code 1 "when reconnection waiting is restarted") occurred in the subsystem.	
HZ9J01		An internal error (invalid starting factor code 0 "when event completion is restarted") occurred in the subsystem.	
HZ9J02		An internal error (invalid start detail code "when event completion is restarted") occurred in the subsystem.	
HZ9J03		An internal error (invalid start detail code "when resource wait is restarted") occurred in the subsystem.	
HZ9J04		An internal error (invalid startup factor code 1 "unused code") occurred in the subsystem.	
HZ9J10		An internal error (invalid processing mode "internal information") occurred in the subsystem.	
HZ9J20		An internal error (invalid execution function ID "internal information") occurred in the subsystem.	
HZ9J21		An internal error (invalid function return value "unused return value") occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9J22	MICRODRC	Internal error (invalid POST code “when PDEV is completed”) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9J23		An internal error (invalid start detail code “other than PDEV completion/timeout”) occurred in the subsystem.	
HZ9J24		An internal error (invalid start detail code 1 “other than remote job elimination waiting”) occurred in the subsystem.	
HZ9J30	MICRODRC	An internal error (invalid execution function ID “internal information”) occurred in the subsystem.	
HZ9J31		An internal error (invalid function return value “unused return value”) occurred in the subsystem.	
HZ9J32		An internal error (invalid POST code “when PDEV is completed”) occurred in the subsystem.	
HZ9J33		An internal error (invalid start detail code 1 “other than PDEV completion/timeout”) occurred in the subsystem.	
HZ9J34		An internal error (invalid starting factor code 1 “other than resource waiting restart”) occurred in the subsystem.	
HZ9J35		An internal error (invalid start detail code 1 “other than remote job elimination waiting”) occurred in the subsystem.	
HZ9J40		An internal error (invalid execution function ID “internal information”) occurred in the subsystem.	
HZ9J41		An internal error (invalid function return value “unused return value”) occurred in the subsystem.	
HZ9J42		An internal error (invalid LU status) occurred in the subsystem.	
HZ9J50		An internal error (invalid execution function ID “internal information”) occurred in the subsystem.	
HZ9J51		An internal error (invalid function return value “unused return value”) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9J52	MICRODRC	Internal error (invalid LU status) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9J60		An internal error (invalid execution function ID “internal information”) occurred in the subsystem.	
HZ9J61		An internal error (invalid function return value “unused return value”) occurred in the subsystem.	
HZ9J62		An internal error (invalid LU status) occurred in the subsystem.	
HZ9J70		An internal error (invalid execution function ID “internal information”) occurred in the subsystem.	
HZ9J71		An internal error (invalid function return value “unused return value”) occurred in the subsystem.	
HZ9J72		An internal error (invalid LU status) occurred in the subsystem.	
HZ9J80		An internal error (invalid POST code “when PDEV is completed”) occurred in the subsystem.	
HZ9J81		An internal error (invalid start detail code “other than PDEV completion/timeout”) occurred in the subsystem.	
HZ9J82		An internal error (invalid POST code “when PDEV is completed”) occurred in the subsystem.	
HZ9J83		An internal error (invalid start detail code “other than PDEV completion/timeout”) occurred in the subsystem.	
HZ9J84		An internal error (invalid POST code “when DRR is completed”) occurred in the subsystem.	
HZ9J85		An internal error (invalid start detail code “other than DRR completion/timeout”) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9J90	MICRODRC	Internal error (invalid execution function ID “internal information”) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9J91		An internal error (invalid function return value “unused return value”) occurred in the subsystem.	
HZ9J92		An internal error (invalid start detail code 1 “other than remote job elimination waiting”) occurred in the subsystem.	
HZ9J93		An internal error (invalid abnormal termination information “internal information”) occurred in the subsystem.	
HZ9JA0		An internal error (invalid execution function ID “internal information”) occurred in the subsystem.	
HZ9JA1		An internal error (invalid function return value “unused return value”) occurred in the subsystem.	
HZ9JA2		An internal error (invalid start detail code “other than PDEV completion/timeout”) occurred in the subsystem.	
HZ9K00	MICROOFW	An internal error (invalid job start parameter) occurred in the subsystem.	
HZ9K10		An internal error (invalid starting factor code 1) occurred in the subsystem.	
HZ9K11		An internal error (invalid starting factor code 0 “at initial startup”) occurred in the subsystem.	
HZ9K12		An internal error (invalid starting factor code 0 “when event completion is restarted”) occurred in the subsystem.	
HZ9K13		An internal error (invalid starting factor code 0 “when the sleep timer is restarted”) occurred in the subsystem.	
HZ9K14		An internal error (invalid execution function ID “internal information”) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9K15	MICROOFW	An internal error (invalid starting factor code 0 “when other job elimination is restarted”) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9K16		An internal error (invalid execution function ID “internal information”) occurred in the subsystem.	
HZ9K20		An internal error (invalid starting factor code 1) occurred in the subsystem.	
HZ9K21		An internal error (invalid starting factor code 0 “at initial startup”) occurred in the subsystem.	
HZ9K22		An internal error (invalid starting factor code 0 “when event completion is restarted”) occurred in the subsystem.	
HZ9K30		An internal error (invalid starting factor code 1) occurred in the subsystem.	
HZ9K40		An internal error (invalid POST code “loading of PIN data header section”) occurred in the subsystem.	
HZ9K50		An internal error (invalid POST code “loading with SGCB and segment”) occurred in the subsystem.	
HZ9K60		An internal error (invalid POST code “segment loading”) occurred in the subsystem.	
HZ9K70		An internal error (invalid POST code “loading without SGCB and segment”) occurred in the subsystem.	
HZ9K80		An internal error (invalid POST code “device WARM writing”) occurred in the subsystem.	
HZ9K90		An internal error (invalid starting factor code 0 “when event completion is restarted”) occurred in the subsystem.	
HZ9K91		An internal error (invalid start detail code “other than other communication reception”) occurred in the subsystem.	
HZ9KA0		An internal error (invalid starting factor code 0 “when event completion is restarted”) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9KA1	MICROOFW	Internal error (invalid start detail code “other than DRR completion”) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9KA2		An internal error (invalid POST code “cache copy between CTLs”) occurred in the subsystem.	
HZ9KB0		An internal error (invalid parameter “at initial start synchronization”) occurred in the subsystem.	
HZ9L00	MICROONW	An internal error (invalid start parameter) occurred in the subsystem.	
HZ9L01		An internal error (invalid start parameter) occurred in the subsystem.	
HZ9L02		An internal error (invalid start parameter) occurred in the subsystem.	
HZ9L10		An internal error (invalid start of communication reception processing) occurred in the subsystem.	
HZ9M00	MICRODST	An internal error (invalid start factor from kernel) occurred in the subsystem.	
HZ9M01		An internal error (unsuccessful physical dirty sweepout) occurred in the subsystem.	
HZ9N00	MICROCPR	An internal error (logical micro-program conflict “forced parity recovery”) occurred in the subsystem.	
HZ9NA0		An internal error (invalid start parameter) occurred in the subsystem.	
HZ9NB0		An internal error (unassignable segment “parity”) occurred in the subsystem.	
HZ9NB1		An internal error (unassignable segment “data”) occurred in the subsystem.	
HZ9NB2		An internal error (unassignable segment “spare disk”) occurred in the subsystem.	
HZ9NC0		An internal error (invalid hit error judgment “invalid internal processing in RAID0”) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9NC1	MICROCPR	Internal error (invalid hit error judgment “invalid RAID0 judgment”) occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9NC2		An internal error (invalid hit error judgment “invalid RAID1 judgment”) occurred in the subsystem.	
HZ9NC3		An internal error (invalid hit error judgment “invalid RAID5 judgment”) occurred in the subsystem.	
HZ9ND0		An internal error (invalid POST code “staging”) occurred in the subsystem.	
HZ9ND1		An internal error (invalid POST code “parity generation”) occurred in the subsystem.	
HZ9ND2		An internal error (invalid POST code “format data generation”) occurred in the subsystem.	
HZ9ND3		An internal error (invalid POST code “format write”) occurred in the subsystem.	
HZ9ND4		An internal error (invalid POST code “copy between caches”) occurred in the subsystem.	
HZ9ND5		An internal error (invalid POST code “PIN data writing”) occurred in the subsystem.	
HZ9ND6		An internal error (invalid POST code “destaging”) occurred in the subsystem.	
HZ9ND7		An internal error (invalid POST code “reassignment”) occurred in the subsystem.	
HZ9ND8		An internal error (invalid POST code “RAID1 copy”) occurred in the subsystem.	
HZ9NE0		An internal error (invalid POST code “verification”) occurred in the subsystem.	
HZ9NE1		An internal error (invalid POST code “collection”) occurred in the subsystem.	

Message code	Message text	Description	Recovery measures
HZ9NE2	MICROCPR	Internal error (invalid POST code "collection destaging") occurred in the subsystem.	Acquire memory dump and turn the power off, then turn it on again. For how to acquire the memory dump, see page TRBL1140. For turning off/on of the power, see the following pages. Mini tower type : MK-REP0050 Cabinet type : CK-REP0050 Rackmount (RKH) type : RH-REP0050 Rackmount (RKWH) type : RW-REP0050
HZ9O00	MICROCOM	An internal error (logical micro-program conflict "common function") occurred in the subsystem.	
HZ9Q00	MICROLUC	An internal error (logical micro-program conflict "LU switching") occurred in the subsystem.	
HZ9Q01		An internal error (invalid starting factor) occurred in the subsystem.	
HZ9Q02		An internal error (invalid starting factor) occurred in the subsystem.	
HZ9Q03		An internal error (invalid starting factor) occurred in the subsystem.	
HZ9Q04		An internal error (invalid starting factor) occurred in the subsystem.	
HZ9R00	MICROPRO	An internal error (logical micro-program conflict "communication between controllers") occurred in the subsystem.	
HZ9R01		An internal error (current pointer overflow "reception processing") occurred in the subsystem.	
HZ9R02		An internal error (invalid message issuance section) occurred in the subsystem.	
HZ9R03		An internal error (invalid return value from reception processing function) occurred in the subsystem.	
HZ9R10		An internal error (current pointer overflow "reception processing") occurred in the subsystem.	
HZ9R20		An internal error (current pointer overflow "on insertion processing") occurred in the subsystem.	
HZ9ND8		An internal error (invalid POST code "RAID1 copy") occurred in the subsystem.	

The port and row numbers displayed in messages when a disk drive error occurs differ for each type. The correspondence between the disk drive mounting locations, port numbers, and row numbers for each type is shown below.

Mini Tower Type

PORT = 4	ROW = 4
PORT = 4	ROW = 0
PORT = 3	ROW = 0
PORT = 2	ROW = 0
PORT = 1	ROW = 0
PORT = 0	ROW = 0

Cabinet Type

PORT = 4	ROW = 4	ROW = 4
PORT = 4	ROW = 2	ROW = 3
	ROW = 0	ROW = 1
PORT = 3	ROW = 2	ROW = 3
	ROW = 0	ROW = 1
PORT = 2	ROW = 2	ROW = 3
	ROW = 0	ROW = 1
PORT = 1	ROW = 2	ROW = 3
	ROW = 0	ROW = 1
PORT = 0	ROW = 2	ROW = 3
	ROW = 0	ROW = 1

Rack Mount (RKH) Type

PORT = 1	PORT = 3	PORT = 4
ROW = 1	ROW = 1	ROW = 4
ROW = 0	ROW = 0	Not used
ROW = 1	ROW = 1	ROW = 1
ROW = 0	ROW = 0	ROW = 0
PORT = 0	PORT = 2	PORT = 4

Rack Mount (RKWH) Type

PORT = 1		PORT = 4
ROW = 3	Not used	ROW = 3
ROW = 2	Not used	ROW = 2
ROW = 1	Not used	ROW = 1
ROW = 0	ROW = 4	ROW = 0
ROW = 3	ROW = 3	ROW = 3
ROW = 2	ROW = 2	ROW = 2
ROW = 1	ROW = 1	ROW = 1
ROW = 0	ROW = 0	ROW = 0
PORT = 0	PORT = 2	PORT = 3

2.2.3 Details of recovery procedures

Table 2.2.3 shows error recovery methods. Errors are classified into power-on errors, operation errors, data recovery errors, and power-off errors.

Table 2.2.3 Error Recovery Methods for Each Error

No.	Classification	Description	Item No. for reference
1	The power cannot be turned on.	A loading of information from a disk failed.	(1)
2		User data was lost because cache memory was volatile. (Forced parity recovery)	(2)
3	The power cannot be turned off.	Planned shutdown cannot be performed because the number of PIN data is too large (due to disk controller error).	(3)
4		An attempt was made to save PIN data to the disk during planned shutdown but failed because a hardware error occurred.	(4)
5		Planned shutdown cannot be performed because all the disks to which inheritance information is to be saved disappeared due to a DMA double error or a disk quintuple error.	(5)
6		Planned shutdown cannot be performed because PIN data cannot be saved due to a cache error, etc.	(6)
7		The number of PIN segments exceeded its threshold value.	(7)
8			
8	Data recovery or copyback does not terminate normally.	A drive shutdown occurred. Isolation of the error location.	(8)
9		Forced recovery was performed because an RD error occurred in the copy source during a collection copy.	(9)
10		Data recovery terminated abnormally because a disk error occurred in the copy source during a collection copy.	(10)
11		Data recovery terminated abnormally because a spare disk error occurred during a copyback.	(11)
12	An error occurred during operation.	A DMA parity error occurred.	(12)
13		Data containing an LA/LRC error was detected.	(13)
14		A system down occurred.	(14)
15		A LAN error occurred.	(15)
16		Failures occur in the two or more disks in the same ROW. (When user backup data exists)	(16)
17		Failures occur in the tow or more disks in the same ROW. (When no user backup data exists)	(17)

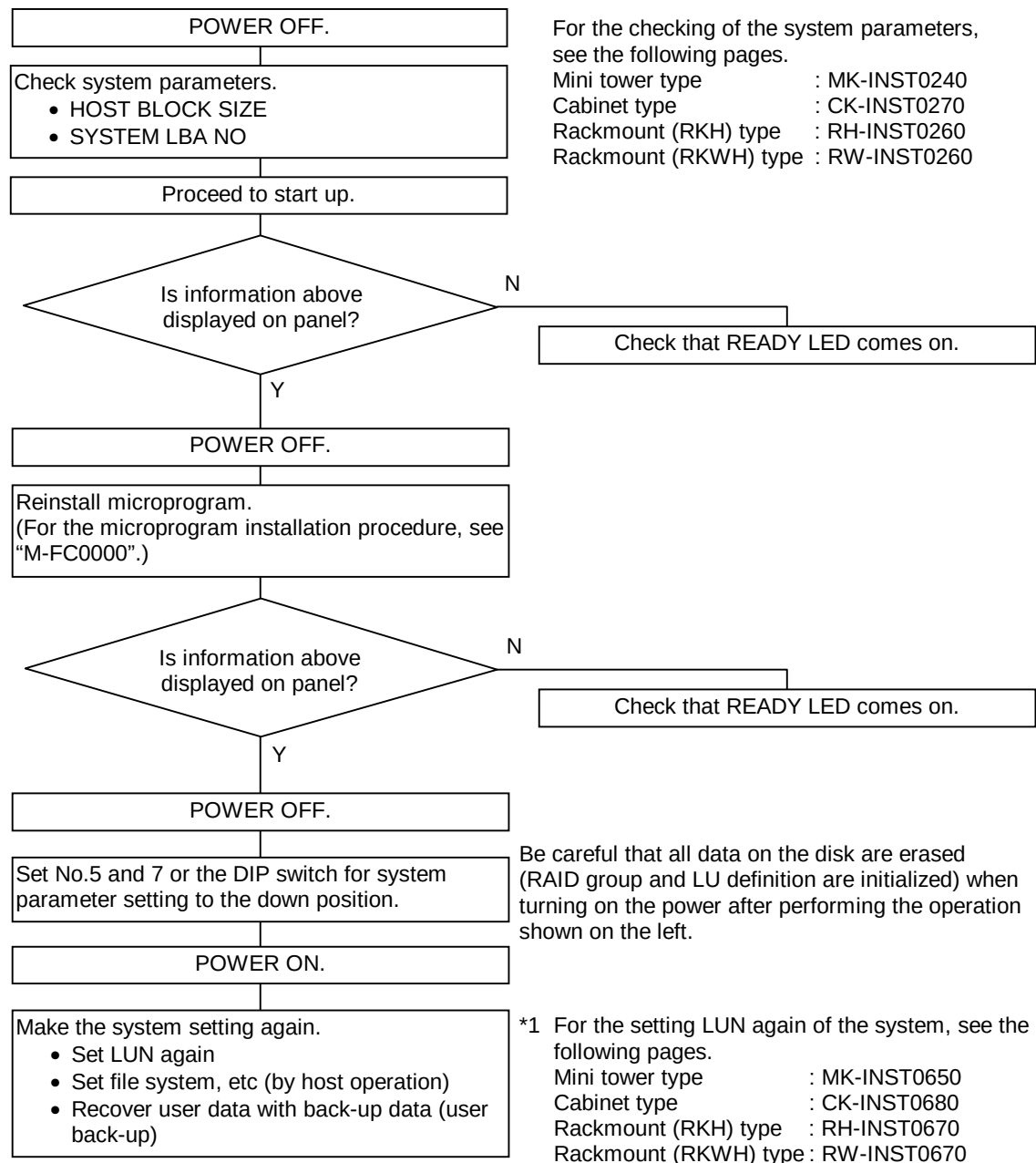
(1) The PS cannot be turned on : Case 1

(Information could not be loaded from the disk.)

- Incorrect program·none·loading failed
- No passing information·load failed
- Pinned data loading failed

[Panel display for factor determination]

R	O	M	F	A	T	A	L	E	R	R	O	R		
R	Z	0	8	0	0	D	L	O	A	D	F	A	I	L

[Recovery procedure]

(2) The PS cannot be turned on : Case 2 (forced parity recovery)

(User data was lost because cache memory was volatile.)

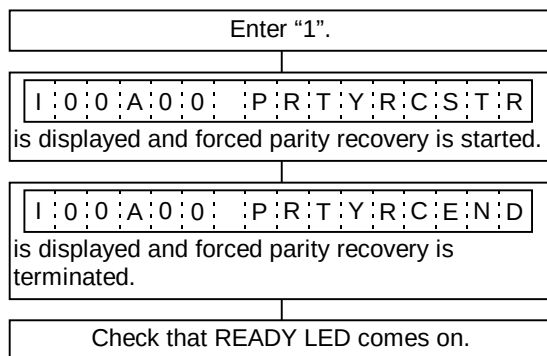
[Panel display for factor determination]

After the PS is turned on, the panel is displayed as follows : The WARNING LED also comes on.

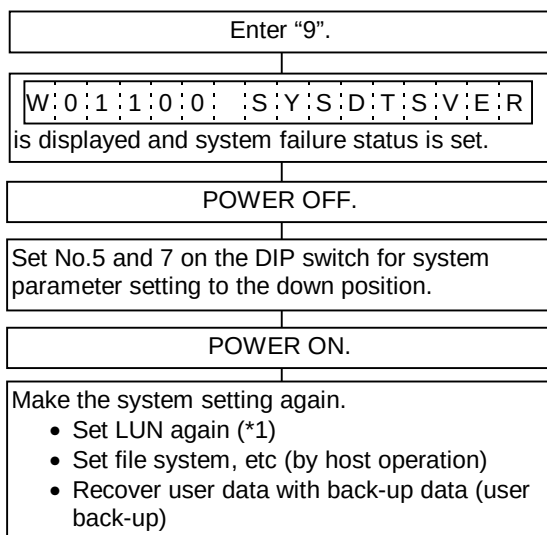
W	0	1	3	0	0	U	S	R	D	A	T	L	S	T	
C	O	N	T	(	1	)	S	T	O	P	(	9	)		

[Recovery procedure]

Executing forced parity recovery.



Executing no forced parity recovery.



Be careful that all data on the disk are erased (RAID group and LU definition are initialized) when turning on the power after performing the operation shown on the left.

*1 For the setting LUN again of the system, see the following pages.

Mini tower type	: MK-INST0650
Cabinet type	: CK-INST0680
Rackmount (RKH) type	: RH-INST0670
Rackmount (RKWH) type	: RW-INST0670

[Remark]

The purpose of forced parity recovery is to match user data, not to restore data.

Depending on the factor, user data may be able to be used as it is. When there is back-up data, however, user data should be restored after execution of forced parity recovery.

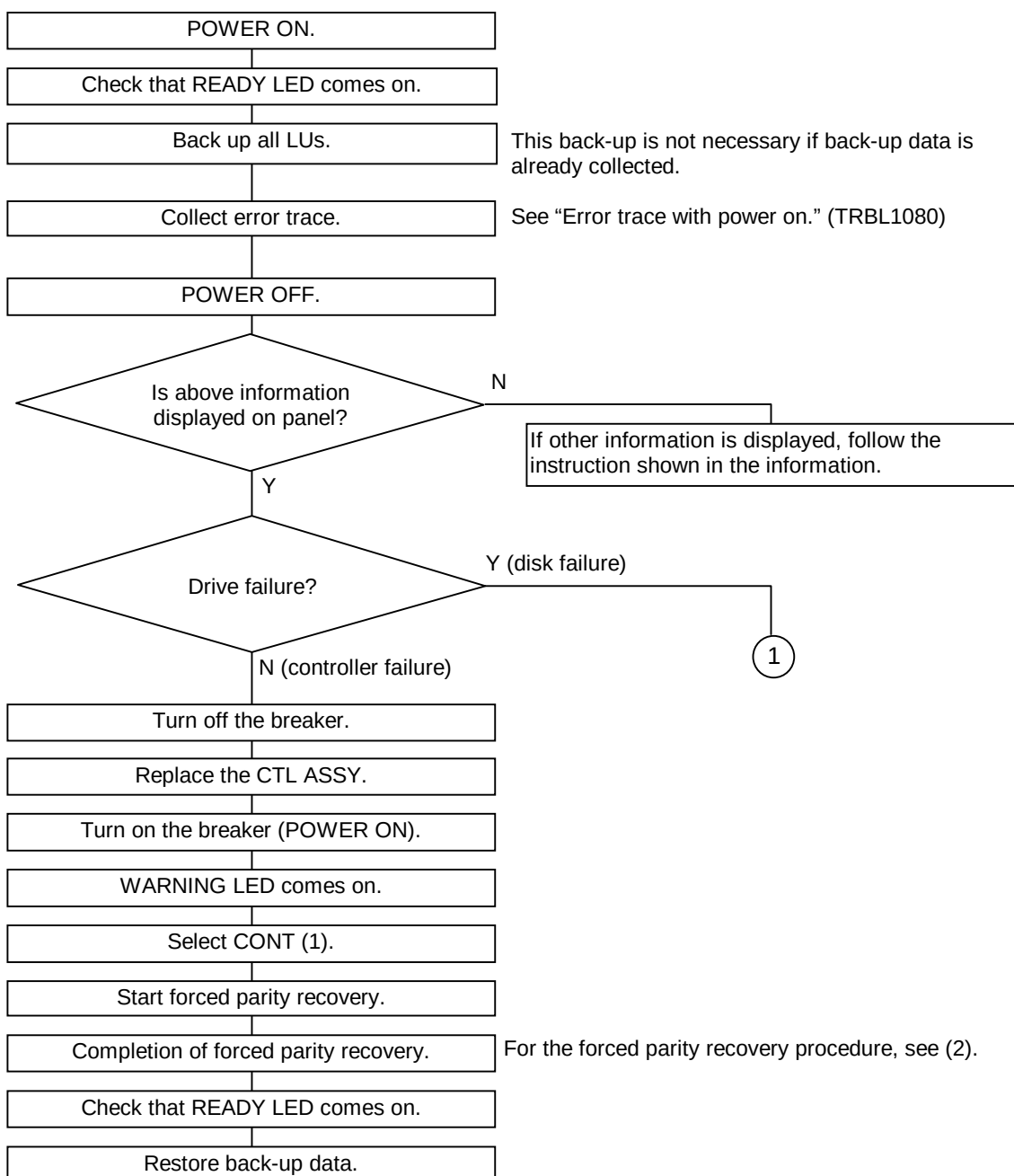
(3) When the PS cannot be turned off : Case 1

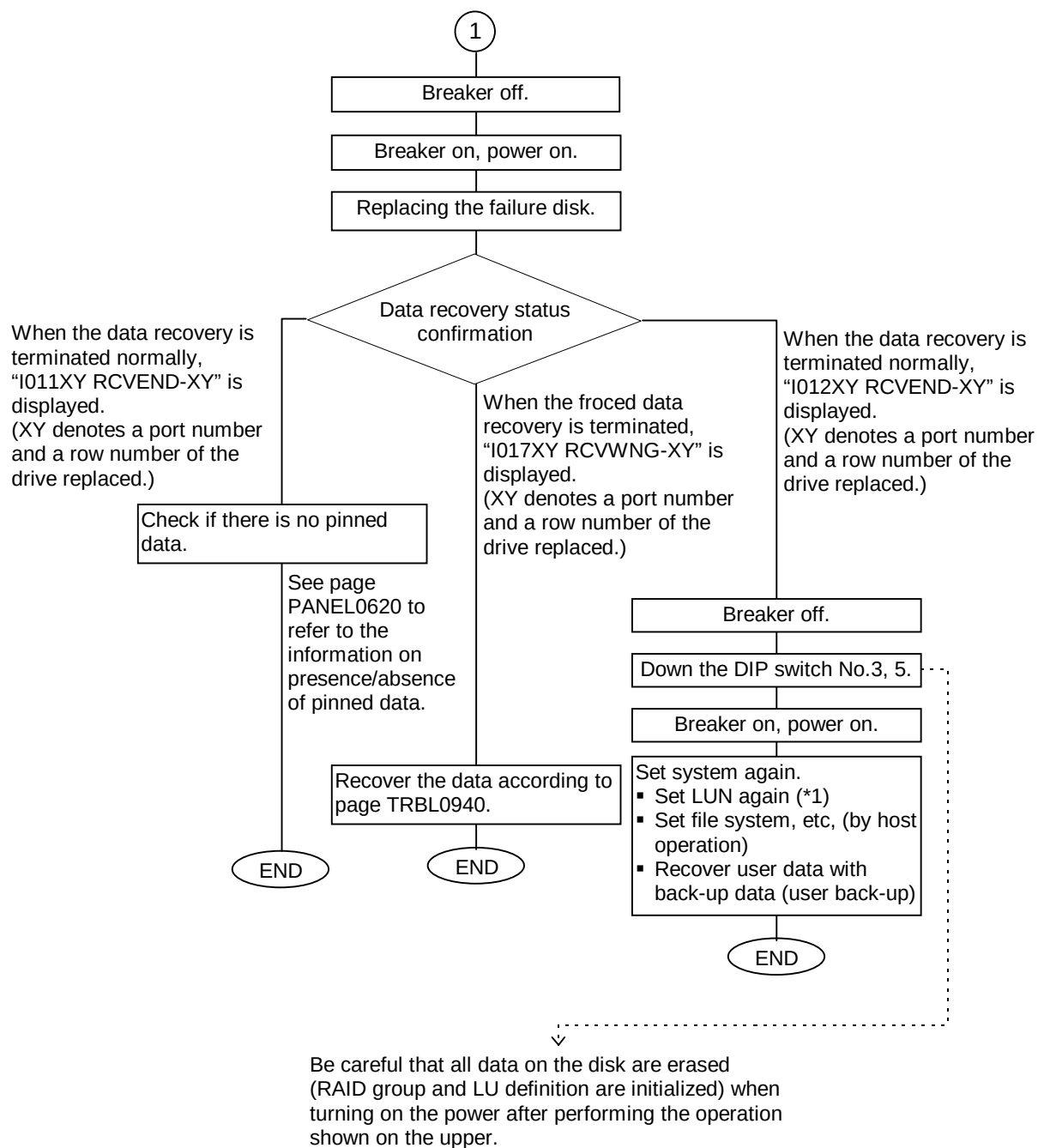
(Planned shutdown cannot be performed because the number of PIN data is too large (due to disk controller error).)

[Panel display for factor determination]

W	0	0	F	0	0	T	0	0	M	N	Y	P	I	N
P	U	S	H	A	N	Y	K	E	Y					

↓ (Press any key to turn off the PS.)

[Recovery procedure]



*1 For the setting LUN again of the system, see the following pages.

Mini tower type	: MK-INST0650
Cabinet type	: CK-INST0680
Rackmount (RKH) type	: RH-INST0670
Rackmount (RKWH) type	: RW-INST0670

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

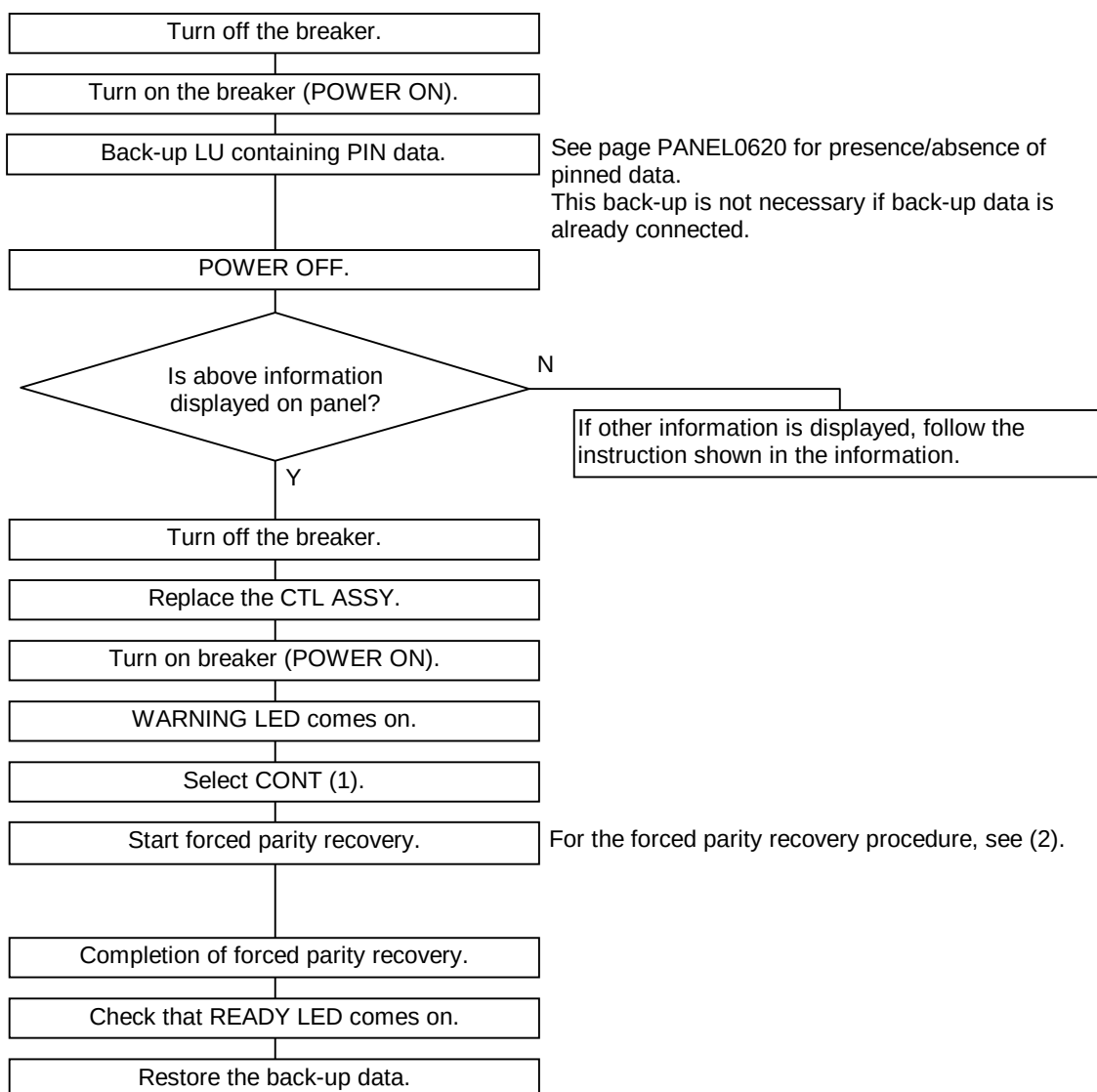
(An attempt was made to save PIN data to the disk during planned shutdown but failed because a hardware error occurred.)

[Panel display for factor determination]

W	0	1	0	0	0	P	O	F	F	B	O	D	E	R
P	U	S	H	A	N	Y	K	E	Y					

↓ (Press any key to turn off the PS.)

W	0	1	0	0	0	P	O	F	F	B	O	D	E	R
H	0	0	E	0	0	P	O	F	S	Y	S	D	W	N

[Recovery procedure]

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

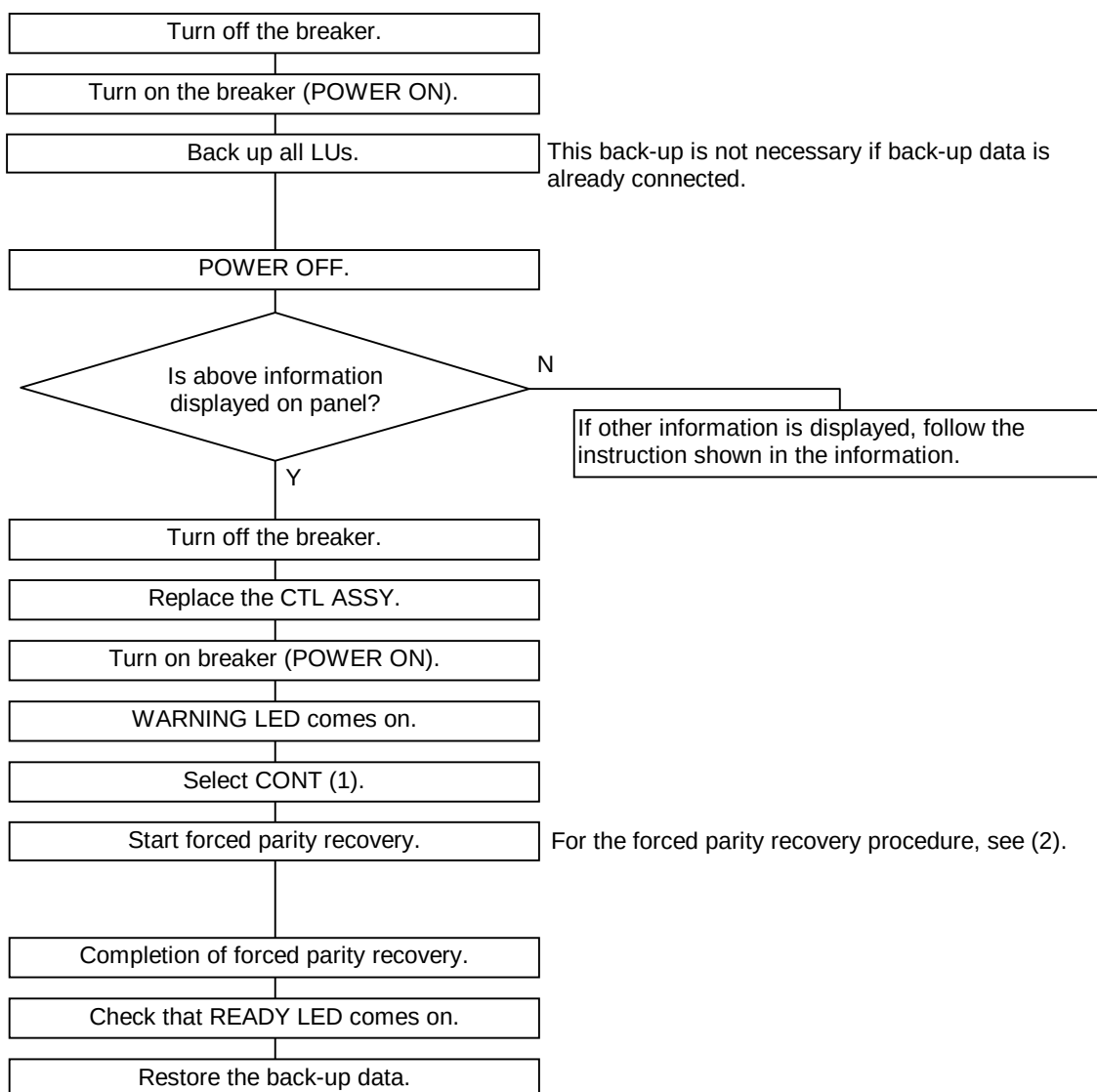
(Planned shutdown cannot be performed because all the disks to which inheritance information is to be saved disappeared due to a DMA double error or a disk quintuple error.)

[Panel display for factor determination]

W	0	1	1	0	0	S	Y	S	D	T	S	V	E	R
P	U	S	H	A	N	Y	K	E	Y					

↓ (Press any key to turn off the PS.)

W	0	1	1	0	0	S	Y	S	D	T	S	V	E	R
H	0	0	E	0	0	P	O	F	S	Y	S	D	W	N

[Recovery procedure]

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

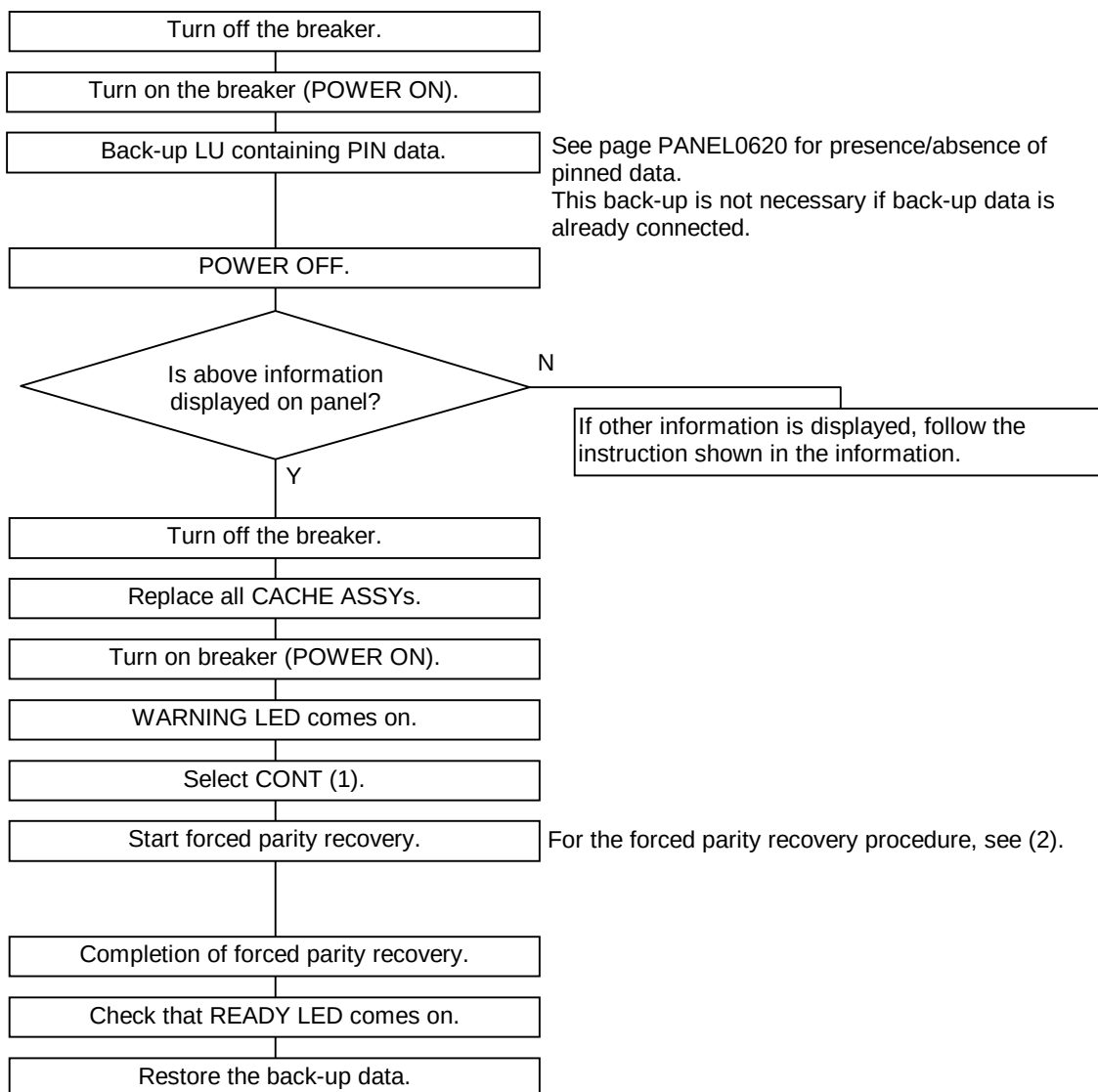
(Planned shutdown cannot be performed because PIN data cannot be saved due to a cache error, etc.)

[Panel display for factor determination]

W	0	1	2	0	0	P	O	F	F	C	M	U	N	C
P	U	S	H	A	N	Y	K	E	Y					

↓ (Press any key to turn off the PS.)

W	0	1	2	0	0	P	O	F	F	C	M	U	N	C
H	0	0	F	0	X	P	O	F	C	M	E	R	-	X

[Recovery procedure]

[Panel display for factor determination]

W	0	1	4	0	0
P	I	N	O	V	E
R					

```
graph TD
    Start([Start]) --> Step1[PIN over occurred.]
    Step1 --> Step2[Check if there is PIN data (LU/count).]
    Step2 --> Step3[Trace with power on.]
    Step3 --> Decision1{Planned shutdown?}
    Decision1 -- Y --> Step4[Replace the drive.]
    Decision1 -- N --> Step5{Power off}
    Step4 --> Decision2{Check if there is pinned data.}
    Decision2 -- Y --> Step5
    Decision2 -- N --> End([End])
    Step5 -- OK --> Step6[Breaker off.]
    Step6 --> Step7[Replace the CTL ASSY.]
    Step7 --> Step8[Breaker on.]
    Step8 --> Step9[Power on.]
    Step9 --> Step10[Power off.]
    Step10 --> Step11[Power on.]
    Step11 --> Decision3{Check if there is pinned data.}
    Decision3 -- Y --> Step12[Analyze collected trace and isolate failed component.]
    Decision3 -- N --> End
    Step12 --> Step13[Replace the failed component.]
    Step13 --> End
```

See page PANEL0620 for presence/absence of pinned data.
See page TRBL1080 for collecting the trace with power on.

See "P/S OFF error recovery procedure".

See page PANEL0620 for presence/absence of pinned data.

- (8) Isolating a cause when a SCSI bus error due to a faulty drive occurs.

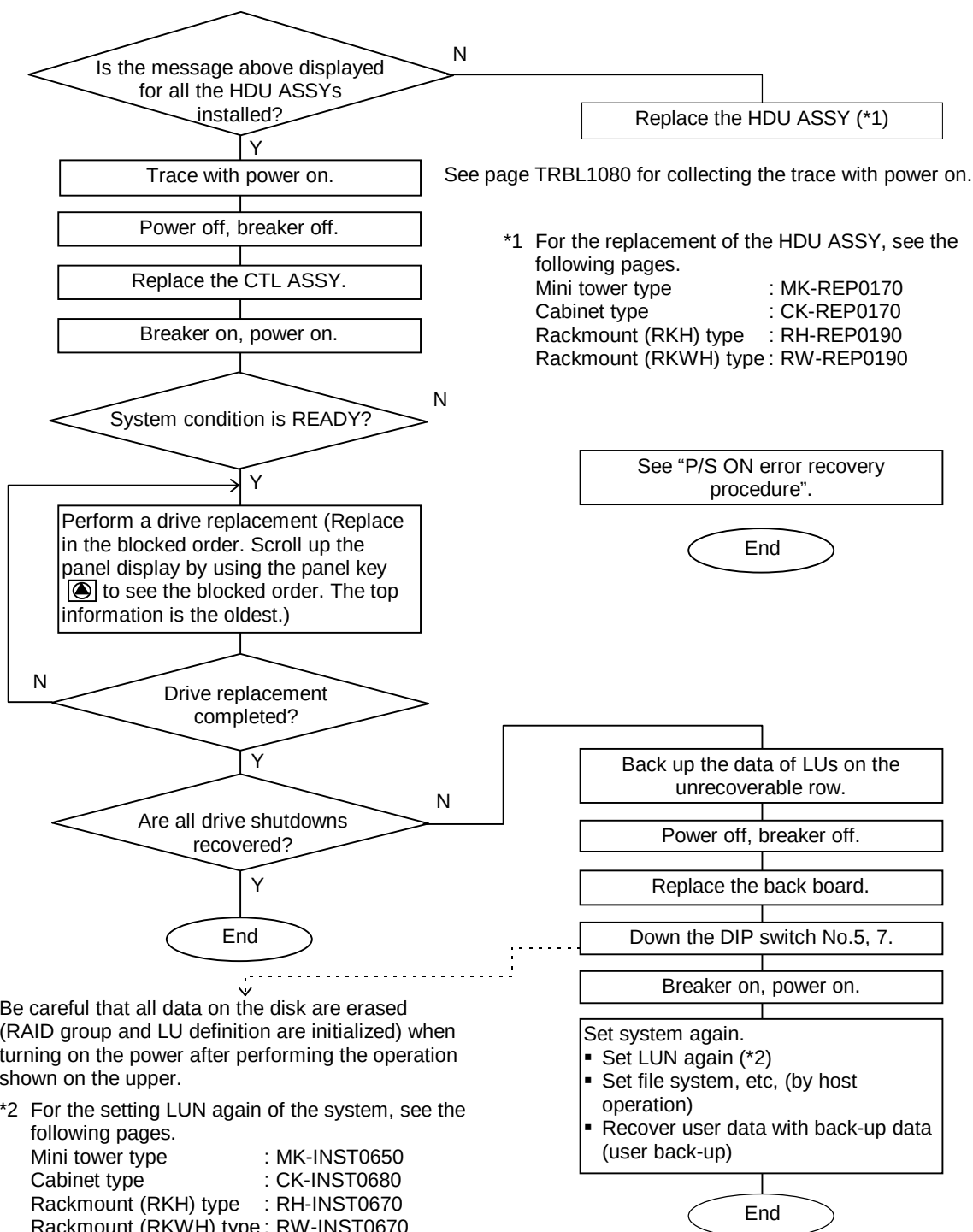
[Panel display for factor determination]

- WARNING LED is on
- Panel display

W	2	0	2	X	0		D	R	V	A	L	M	-	X	0
W	2	0	2	X	1		D	R	V	A	L	M	-	X	1
W	2	0	2	X	2		D	R	V	A	L	M	-	X	2
W	2	0	2	X	3		D	R	V	A	L	M	-	X	3

X denotes a port number. An example of the CK model with four-row configuration (maximum) is shown above.

[Recovery procedure]



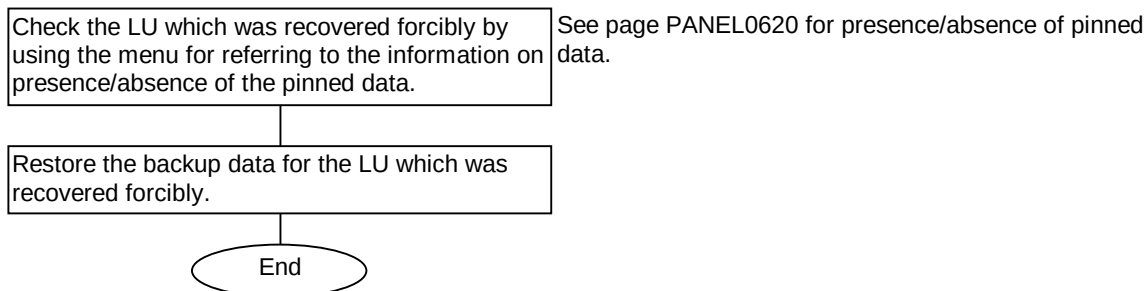
(9) Data restoration and correction copy do not terminate normally : Case 1

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

Forced recovery ----- Execute the correction copy skipping the part in which the RD error occurred. When attempting to read the data which was recovered forcibly, it is reported as a read error.

[Panel display for factor determination]

X : Port number Y : Row number

[Recovery procedure]

(10) Data restoration and correction copy do not terminate normally : Case 2

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

[Panel display for factor determination]

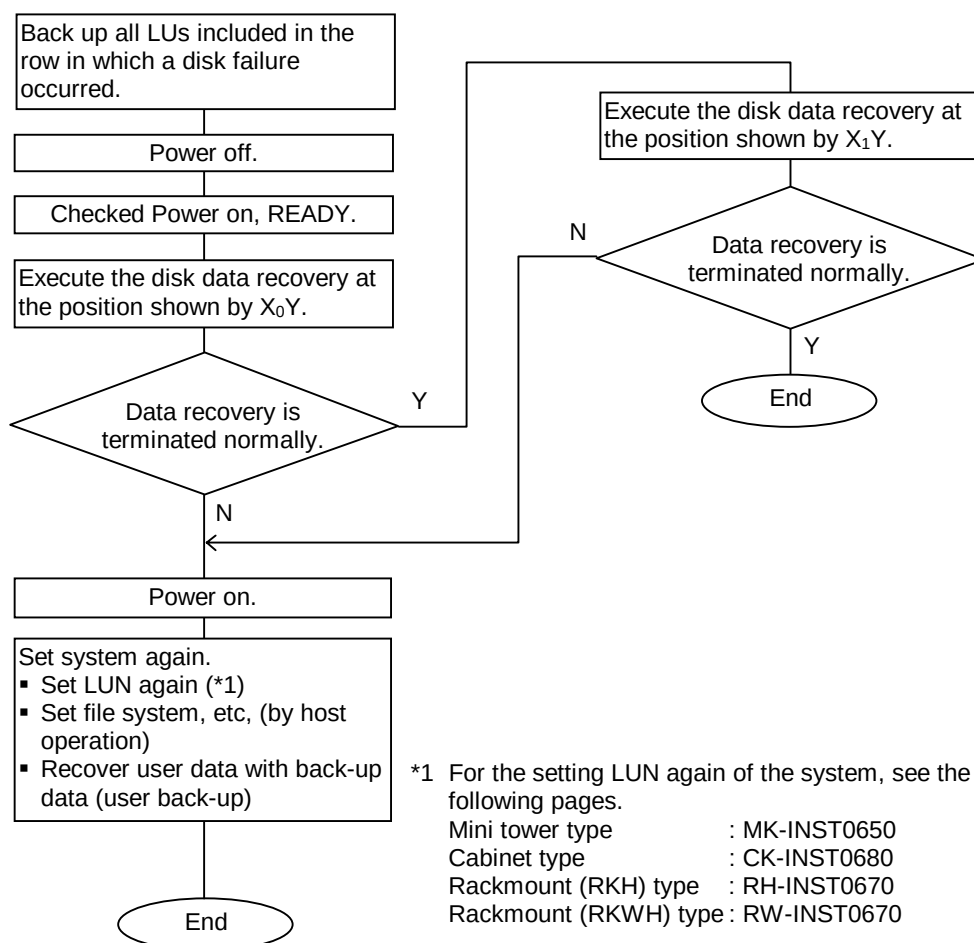
W	2	0	2	X ₀	Y	D	R	V	A	L	M	-	X ₀	Y
I	0	1	6	X ₁	Y	R	C	V	F	L	T	-	X ₁	Y

Occurrence of a disk failure is displayed.

Indicate that a failure occurs in the drive in the same row containing the failed disk above, and the processing for the copy disk is terminated abnormally.

X₀Y : Denotes a port number and a row number of the failed disk.

X₁Y : Denotes a port number and a row number of the disk to be recovered.

[Recovery procedure]

(11) Data restoration and correction copy do not terminate normally : Case 3

(Data recovery terminated abnormally because a spare disk error occurred during correction copy.)

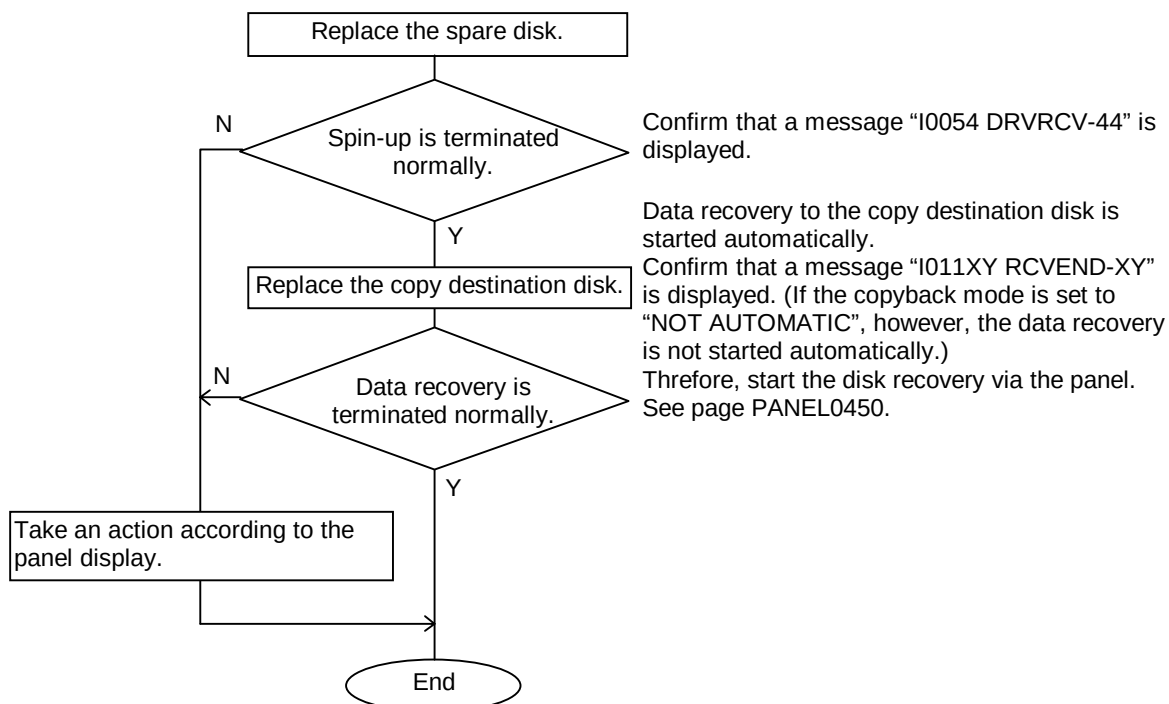
[Panel display for factor determination]

W	2	0	2	4	4	D	R	V	A	L	M	-	4	4
I	0	1	2	X	Y	R	C	V	F	L	T	-	X	Y

X : Port number Y : Row number

← When a spare disk error occurs.

← Occurrence of the copy destination disk failure is displayed.

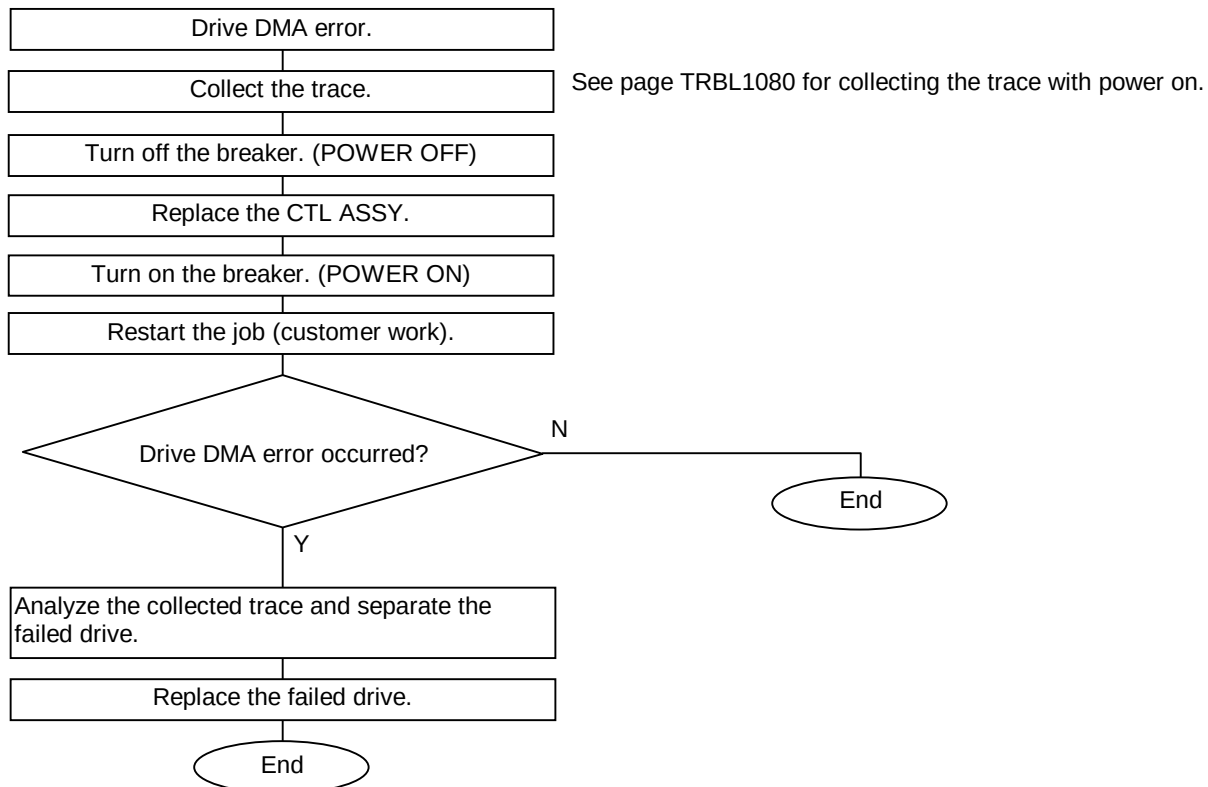
[Recovery procedure]

(12) Isolating a cause when a D-DMA parity error occurs.

[Panel display for factor determination]

W	:	6	:	0	:	A	:	X	:	X	:	D	:	M	:	A	:	A	:	L	:	M	:	-	:	X	:	X

[Recovery procedure]



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

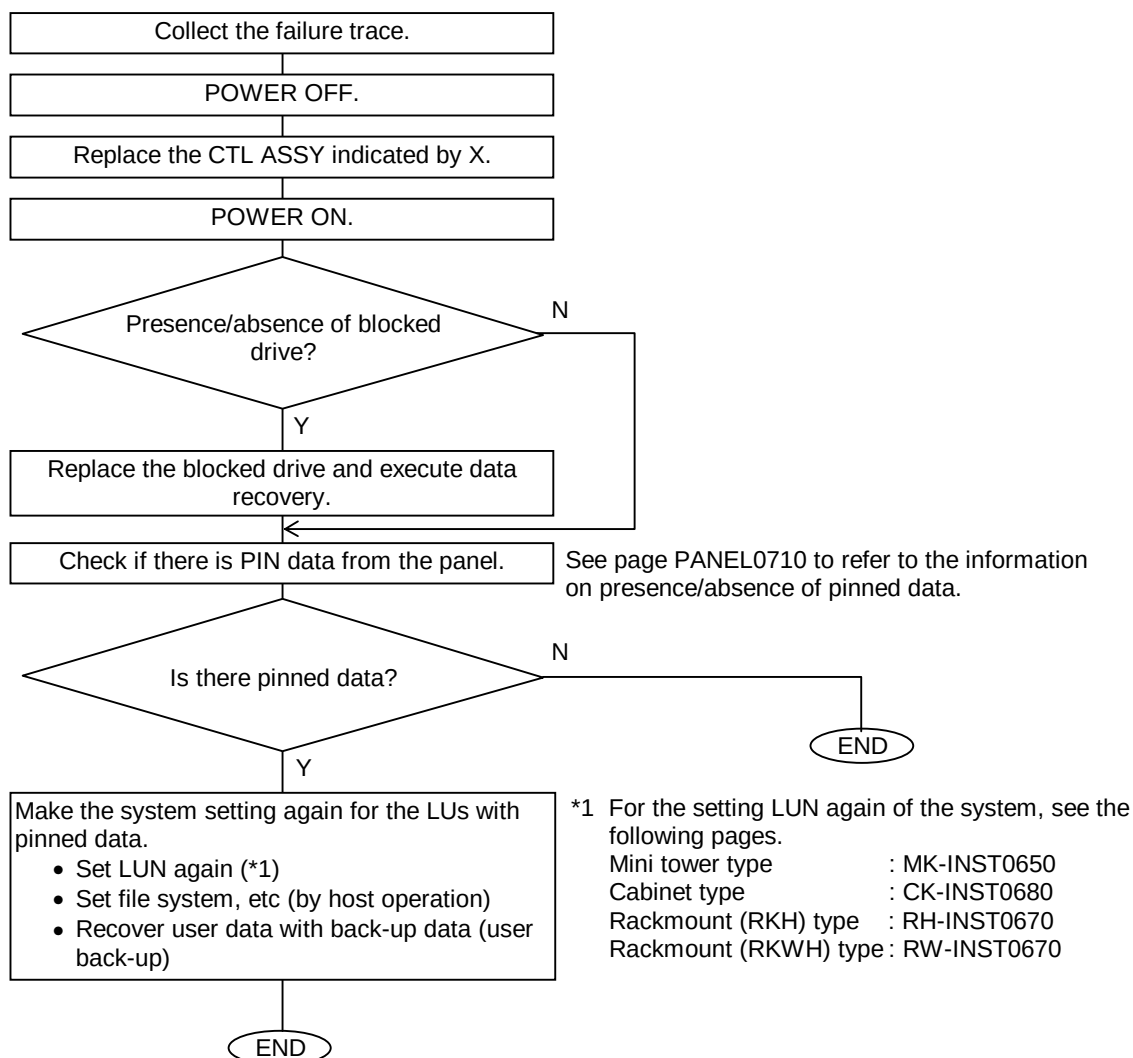
[Panel display for factor determination]

W	6	2	7	X	Y	L	R	C	E	R	3	-	X	Y
W	6	2	6	X	Y	L	A	E	R	R	3	-	X	Y
W	6	2	5	X	Y	L	R	C	E	R	2	-	X	Y
W	6	2	4	X	Y	L	A	E	R	R	2	-	X	Y
W	6	2	3	X	Y	L	R	C	E	R	1	-	X	Y
W	6	2	2	X	Y	L	A	E	R	R	1	-	X	Y

One of the indications shown on the left is displayed according to the failed component.

X : Controller number
Y : Transfer direction
(R : Read, W : Write)

[Recovery procedure]



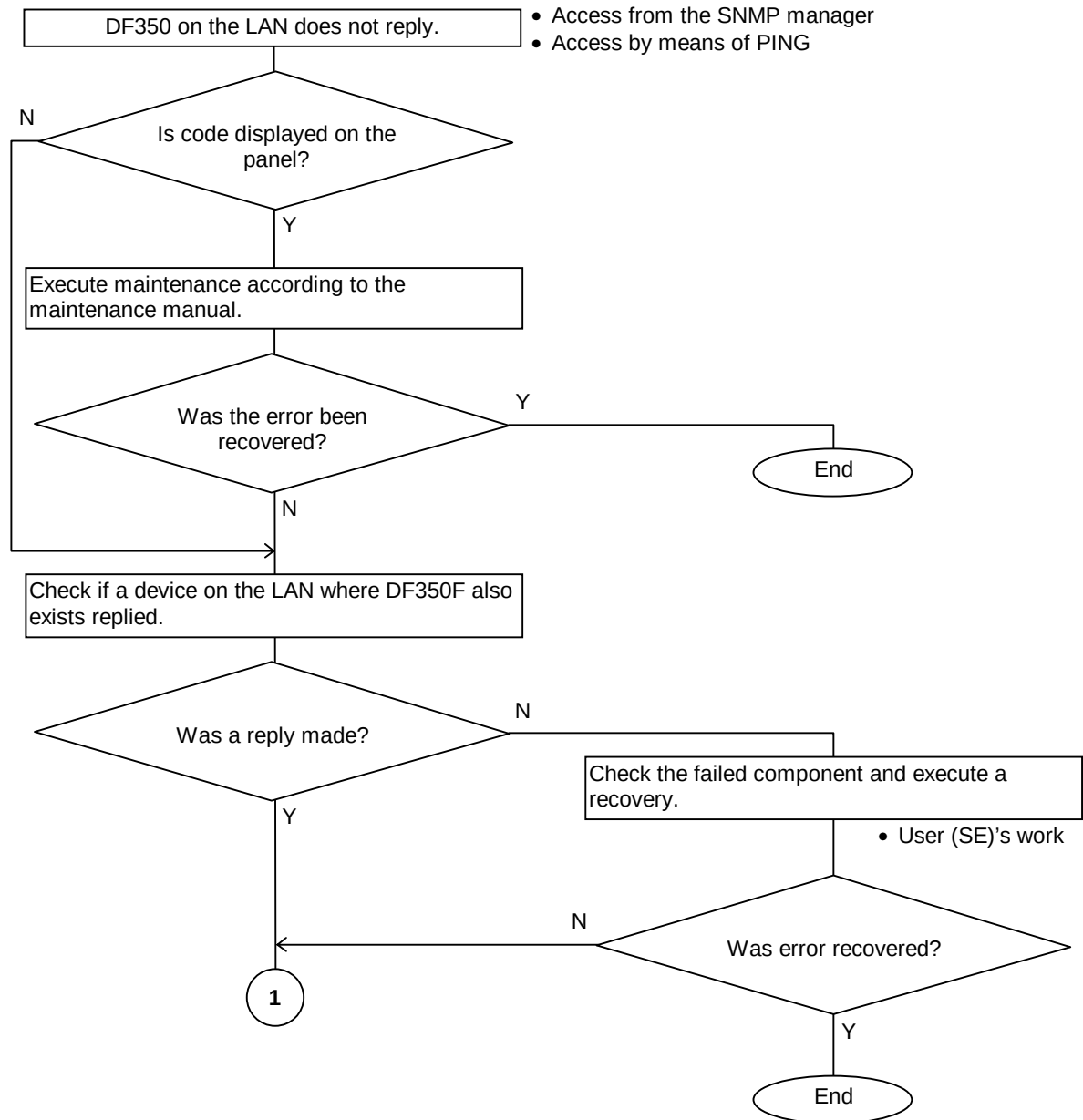
(15) Isolating a cause when a LAN error occurs.

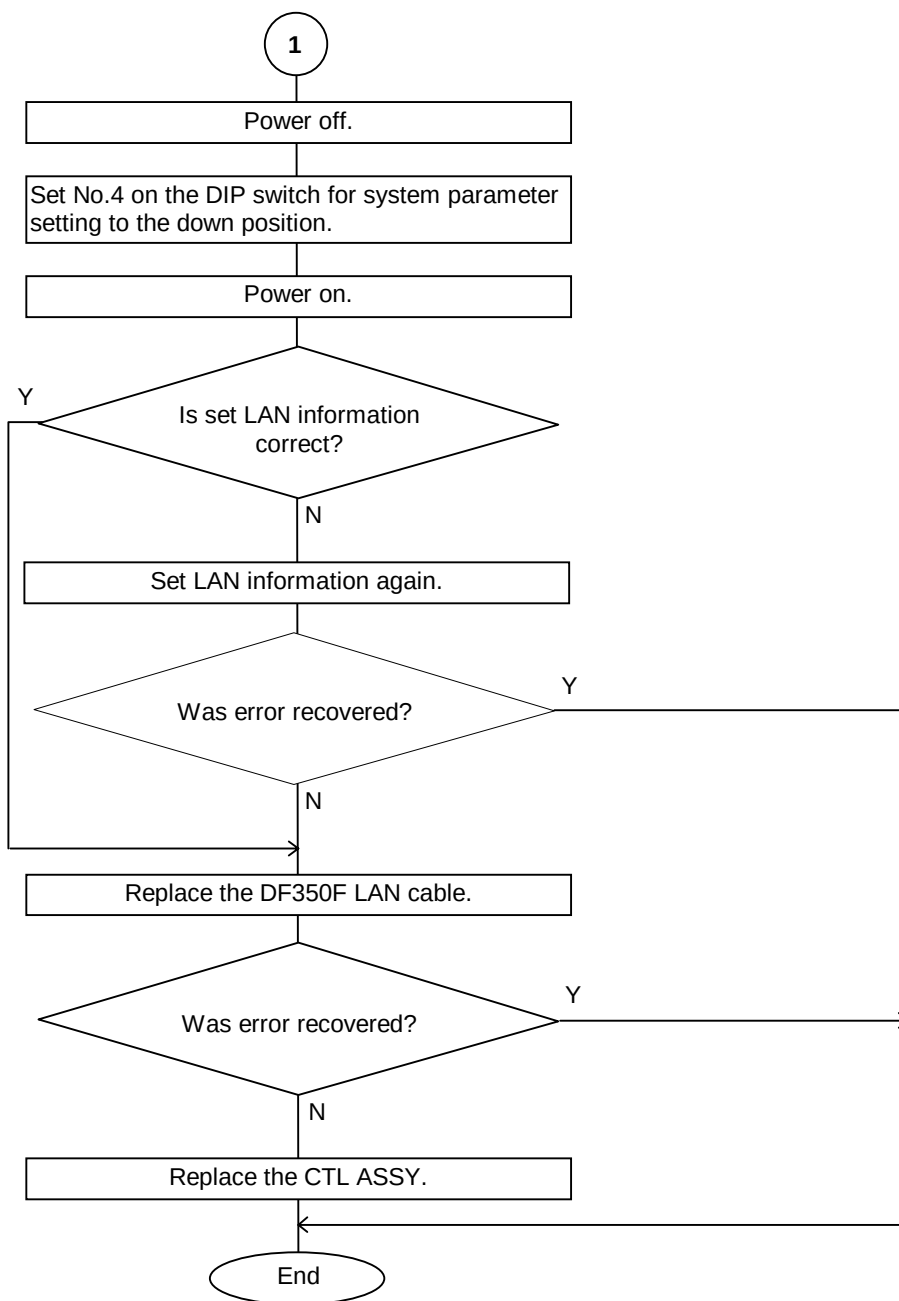
[Panel display for factor determination]

- ALARM or WARNING LED is on
- Panel display

[illegible]

[Recovery procedure]





- (16) Action to be taken when failures occur in the tow or more disks in the same ROW : Case 1
(when user backup data exists)

[Panel display for factor determination]

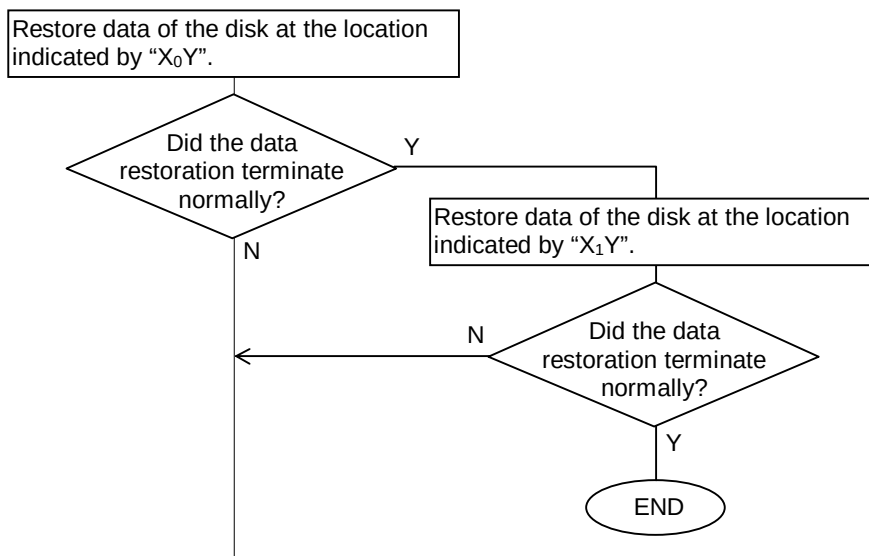
- WARNING LED is on
- Panel display

W	2	0	2	X ₀	Y	D	R	V	A	L	M	-	X ₀	Y
I	0	1	6	X ₁	Y	D	R	V	E	R	R	-	X ₁	Y

X₀Y and X₁Y indicate the PORT number and the ROW number of the failed disk respectively. (The above is an example when two disks in the same ROW rail.)

[Recovery procedure]

Be sure to perform the recovery operation in the state that the subsystem power is on.



LU reconstruction

- Execute the LU formatting for the ROW the disks in which were replaced. The LU set for the ROW the disks in which were replaced can be confirmed as shown below. (For details see page PANEL0330.)

Select "REFER" from "LU CONFIG" menu in the SVP function.

START P=■, R=■

↑
ROW number

Notice : Do not execute the LU formatting for the ROW in which the disk was not replaced. If format the LU in the ROW in which the disk was not replaced by mistake, user data will be lost.

- Execute the settings of the file system, etc. (by the host operation).
- Execute a restoration of the user data using the backup data (user backup data).

END

- (17) Action to be taken when failures occur in the tow or more disks in the same ROW : Case 2
(when no user backup data exists)

[Panel display for factor determination]

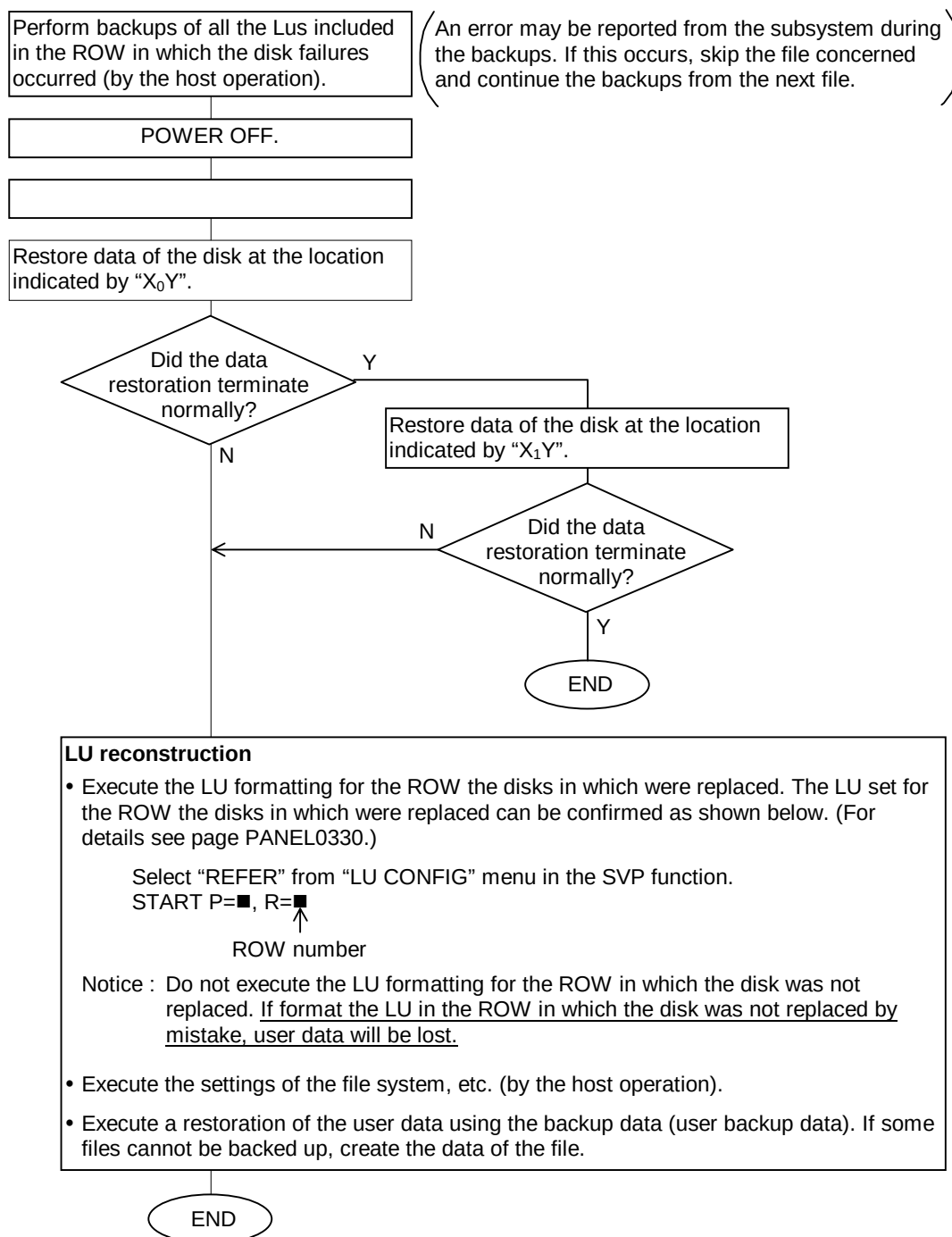
- WARNING LED is on
- Panel display

W	2	0	2	X ₀	Y	D	R	V	A	L	M	-	X ₀	Y
I	0	1	6	X ₁	Y	D	R	V	E	R	R	-	X ₁	Y

X₀Y and X₁Y indicate the PORT number and the ROW number of the failed disk respectively. (The above is an example when two disks in the same ROW rail.)

[Recovery procedure]

Be sure to perform the recovery operation in the state that the subsystem power is on.



3. Sense Data

Sense data is transferred to the host by the REQUEST SENSE command.

3.1 Details of Sense Codes

Table 3.1.1 list the sense codes.

Table 3.1.1 Sense Codes (1/6)

Sense key	Sense code	Error name	Description
0/5	00 00	NO ADDITIONAL SENSE INFORMATION	There is no valid additional sense information.
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 cannot be executed correctly in the drive.
4	03 00	PERIPHERAL DEVICE WRITE FAULT	A write fault was detected in the drive.
2	04 00	LOGICAL UNIT NOT READY, CAUSE NOT REPORTABLE	- The READY signal of the drive cannot be detected. - The drive cannot be accessed.
2	04 01	LOGICAL UNIT IS IN PROCESS OF BECOMING READY	The drive is made ready soon although it is currently not ready.
2	04 02	LOGICAL UNIT NOT READY, INITIALIZING COMMAND REQUIRED	The drive is currently not ready ; it is not started by spinup.
2	04 04	LOGICAL UNIT NOT READY, FORMAT IN PROGRESS	The logical unit is currently not ready. (The format command is being executed.)
2	04 84	POWER OFF IN PROCESS	Planned shutdown is in progress.
2	05 00	LOGICAL UNIT DOES NOT RESPOND TO SELECTION	The logical unit has not responded to the drive interface.
1/4	06 00	NO REFERENCE POSITION FOUND	The head cannot be positioned at track 0.
4	07 00	MULTIPLE PERIPHERAL DEVICES SELECTED	Two or more drives were simultaneously selected.
4	08 00	LOGICAL UNIT COMMUNICATION FAILURE	A drive interface error occurred in the logical unit.
4	08 01	LOGICAL UNIT COMMUNICATION TIME-OUT	A drive interface timeout error occurred in the logical unit.
1/4	08 02	LOGICAL UNIT COMMUNICATION PARITY ERROR	A drive interface parity error occurred in the logical unit.
1/4	09 00	TRACK FOLLOWING ERROR	The track position has come off.
3	0C 02	WRITE ERROR-AUTO REALLOCATION FAILED	Automatic reallocation was executed against a write error but failed.
3	10 00	ID CRC OR ECC ERROR	A CRC error occurred in the ID field.
3	11 02	ERROR TOO LONG TO CORRECT	The read error in the DATA field cannot be corrected by means of ECC.
3	11 04	UNRECOVERED READ ERROR : AUTO REALLOCATION FAILED	Automatic reallocation was executed against an uncorrectable error but failed.
3	12 00	ADDRESS MARK NOT FOUND FOR ID FIELD	The address mark of the ID field cannot be detected.
1/3	13 00	ADDRESS MARK NOT FOUND FOR DATA FIELD	The address mark of the DATA field cannot be detected.
1/3	14 01	RECORD NOT FOUND	A block that matches cannot be detected in the ID field.
1/3	15 01	MECHANICAL POSITIONING ERROR	A seek error occurred.
1/3	15 02	POSITIONING ERROR DETECTED BY READ OF MEDIUM	Seek operation terminated normally but the head was positioned at an invalid address.

Table 3.1.1 Sense Codes (2/6)

Sense key	Sense code	Error name	Description
1	17 00	RECOVERED DATA WITH NO ERROR CORRECTION APPLIED	• The error was recovered by means of a retry.
1	17 01	RECOVERED DATA WITH RETRIES	• The error was recovered by means of a retry. (Without head offset)
1	17 02	RECOVERED DATA WITH POSITIVE HEAD OFFSET	• The error was recovered by means of a retry with a positive head offset.
1	17 03	RECOVERED DATA WITH NEGATIVE HEAD OFFSET	• The error was recovered by means of a retry with a negative head offset.
1	18 00	RECOVERED DATA WITH ERROR CORRECTION APPLIED	• The error was recovered by means of ECC without retry.
1	18 01	RECOVERED DATA WITH ERROR CORRECTION AND RETRIES APPLIED	• The error was recovered by means of ECC with retry.
1	18 02	RECOVERED DATA-DATA AUTO-REALLOCATED	• Data was recovered by means of an automatic reallocation.
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 length of the parameter list is incorrect.
4	1B 00	SYNCHRONOUS DATA TRANSFER ERROR	• An synchronous transfer error occurred in a data transfer.
3	1C 01	PRIMARY DEFECT LIST NOT FOUND	• A positioning to the PRIMARY (P) list failed.
3	1C 02	GROWN DEFECT LIST NOT FOUND	• A positioning to the GROWN (G) list failed.
E	1D 00	MISCOMPARE DURING VERIFY OPERATION	• A data compare error occurred during write or read buffer verify processing.
5	20 00	INVALID COMMAND OPERATION CODE	• The operation code is incorrect.
5	21 00	LOGICAL BLOCK ADDRESS OUT OF RANGE	• An attempt was made to access beyond the logical block address reported by means of READ CAPACITY (PMI bit = 0).
5	24 00	INVALID FIELD IN CDB	• The CDB contains an invalid field. ex. RESERVED Bit/VALUE ≠ ZERO
5	25 00	LOGICAL UNIT NOT SUPPORTED	• The LUN indicated 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	26 00	INVALID FIELD IN PARAMETER LIST	• The parameter list contains a invalid field.
5	26 01	PARAMETER NOT SUPPORTED	• An unsupported parameter was received.
5	26 02	PARAMETER VALUE INVALID	• The parameter value is invalid.
6	29 00	POWER ON RESET, RESET OR BUS DEVICE RESET OCCURRED	• A POWER ON RESET occurred. • A BUS DEVICE RESET occurred. • A SCSI BUS RESET occurred.
6	2A 00	PARAMETERS CHANGED	• A MODE SELECT parameter was changed. ex. A parameter was changed by the MODE SELECT command.
6	2F 00	COMMANDS CLEARED BY ANOTHER INITIATOR	• The command was cleared according to the CLEAR QUEUE message from another initiator or because the CA status occurred in the initiator.

Table 3.1.1 Sense Codes (3/6)

Sense key	Sense code	Error name	Description
3	31 00	MEDIUM FORMAT CORRUPTED	The data 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 arrays is not established.
3	31 81	FORMAT COMMAND NOT EXECUTE	- The format command cannot be executed because the disk configuration is incomplete (i.e., the data or parity drive is detached). - An attempt was made to execute the format command beyond the actual mounting capacity.
1/4	32 00	NO DEFECT SPARE LOCATION AVAILABLE	Reallocation cannot be applied because the alternate area is insufficient.
1/3	32 01	DEFECT LIST UPDATE FAILURE	The GROWN (G) list could not be updated.
B	3D 00	INVALID BITS IN IDENTIFY MESSAGE	An invalid bit was found in the IDENTIFY message.
2	3E 00	LOGICAL UNIT HAS NOT SELF-CONFIGURED YET	The drive self-configuration is not yet established.
6	3F 01	MICROCODE HAS BEEN CHANGED	The microprogram was downloaded.
B	43 00	MESSAGE ERROR	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 command execution.
4	44 A0	NO REASSIGN SECTOR	No sector to be reassigned cannot be detected.
B	45 00	SELECT OR RESELECT FAILURE	- SELECT TIME OVER or RESELECT TIME OVER was detected. - An invalid SELECTION was detected.
B	47 00	SCSI PARITY ERROR	A SCSI bus parity 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 received.
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.
4	4C 00	LOGICAL UNIT FAILED SELF-CONFIGURATION	A loading of a microcode or parameter failed during controller startup.
B	4E 00	OVERLAPPED COMMANDS ATTEMPTED	- Two commands without tags were issued to the same I-T-L. - A command with a tag and a command without it were issued to the same I-T-L. (When this code is reported, all the commands queued at the I-T-L are cleared.)
1	5B 00	LOG EXCEPTION	A log exception was detected in the drive.
1	5B 02	LOG COUNTER AT MAXIMUM	The log counter in the drive reached the maximum value.
1	5B 03	LOG LIST CODES EXHAUSTED	All log list codes in the drive were used up.
6	82 00	DRIVE RECOVER COMPLETE	Disk recovery by means of drive recovery terminated normally. (Note)
6	82 01	DRIVE RECOVER ERROR FOR UNCORRECTABLE DATA ERROR	Disk recovery by means of drive recovery terminated normally but unrecoverable data occurred. (Note)

Note : This sense code is not reported to the host. (This code is reported in sense information on MODE SENSE page 34H.)

Table 3.1.1 Sense Codes (4/6)

Sense key	Sense code	Error name	Description
6	82 02	DRIVE RECOVER COMPLETE (EXIST UNCORRECTABLE DATA ERROR)	• Disk recovery by means of drive recovery terminated normally but the configuration status did not change to the recovery completion status because unrecoverable data occurred. (Note)
6	82 10	DRIVE RECOVER FORCIBLY TERMINATE	• Drive restoration was forcibly terminated by an operator instruction. (Note)
6	82 11	DRIVE RECOVER FORCIBLY TERMINATE (MEDIA ERR DETECT : FROM)	• Drive restoration was forcibly terminated because a media error was detected in the drive restoration source disk. (Note)
6	82 12	DRIVE RECOVER FORCIBLY TERMINATE (MEDIA ERR DETECT : TO)	• Drive recovery was forcibly terminated because a media error was detected in the drive restoration destination disk. (Note)
6	82 13	DRIVE RECOVER FORCIBLY TERMINATE (HARD ERR DETECT : FROM)	• Drive restoration was forcibly terminated because a hardware error was detected in the drive restoration source disk. (Note)
6	82 14	DRIVE RECOVER FORCIBLY TERMINATE (HARD ERR DETECT : TO)	• Drive restoration was forcibly terminated because a hardware error was detected in the drive restoration destination disk. (Note)
6	82 15	DRIVE RECOVER FORCIBLY TERMINATE (DISK BLOCKED : FROM)	• Drive restoration was forcibly terminated because the drive restoration source disk was shut down. (Note)
6	82 16	DRIVE RECOVER FORCIBLY TERMINATE (DISK BLOCKED : TO)	• Drive restoration was forcibly terminated because the drive restoration destination disk was shut down. (Note)
6	82 17	DRIVE RECOVER FORCIBLY TERMINATE (CACHE HARD ERRDETECT)	• Drive restoration was forcibly terminated because a hardware error was detected in cache control for drive restoration. (Note)
6	82 18	DRIVE RECOVER FORCIBLY TERMINATE (CONFIGURATION CHANGE)	• Drive restoration was forcibly terminated because the configuration information status was changed. (Note)
6	82 19	DRIVE RECOVER FAIL (WRITE AFTER DATA REMAIN)	• The drive could not be started because write-after data remains in the restoration destination spare disk. (Note)
6	82 1A	TIME OUT DETECTED IN CONTROLLER	• Drive restoration was forcibly terminated because a timeout error occurred during internal processing. (Note)
B	83 00	DRIVE DUMP INFORMATION CHANGE	• The dump was changed because another controller was shut down during collection of SEND DIAG drive dump.
4	8A 01	PARITY ERROR DETECTED DURING MEDIUM PARITY CERTIFICATION	• A parity error was detected during medium parity matching check.
4	8A 02	CHECK CODE ERROR DETECTED DURING MEDIUM LA CERTIFICATION	• A check code error was detected during medium LA matching check.
1	8A 03	DIRTY DATA EXIST DURING MEDIUM PARITY CERTIFICATION	• Intermediate pinned dirty data was found during parity matching check.
1	8A 04	DIRTY DATA EXIST DURING MEDIUM LA CERTIFICATION	• Intermediate or physical pinned dirty data was found during medium LA matching check.
1	8B 01	COMMAND ATTEMPTED TO BLOCKED LOGICAL UNIT	• An inoperable command was issued to the shut down logical unit.
5	8C 01	PARITY CHECK REQUESTED DURING REGRESSION MODE	• Parity check was requested in the degraded (regression) mode.
3	8E 01	READ ATTEMPTED TO WRITE-UNCOMPLETED BLOCK	• READ or VERIFY was directed for the block for which WRITE is not completed.

Note : This sense code is not reported to the host. (This code is reported in sense information on MODE SENSE page 34H.)

Table 3.1.1 Sense Codes (5/6)

Sense key	Sense code	Error name	Description
4	90 00	UNRECOVERED DATA ERROR WITH PARITY DISK DATA	• An unrecoverable data error occurred during 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 degradation (regression).
4	91 00	AUTO-REALLOCATION NOT COMPLETE FOR UNCORRECTABLE ERROR	• Data cannot be reconstructed because an unrecoverable error was detected during automatic reallocation.
4	91 01	AUTO-REALLOCATION NOT COMPLETE FOR UNCORRECTABLE ERROR	• An alternate block could not be reallocated during automatic reallocation.
3	93 00	PARITY ADJUSTMENT ERROR ON CACHE MEMORY	• A parity adjustment error occurred in the cache.
4	99 00	DATA WRITE ERROR ON SYNCHRONIZE CACHE	• Data on synchronized cache cannot be written to the drive.
4	A0 00	CACHE MEMORY HARDWARE ERROR	• An error occurred in the cache circuit.
B	C0 00	TIME OUT DETECTED IN CONTROLLER	• A timeout occurred during internal processing.
B	C0 01	TIME OUT DETECTED IN HOST DATA TRANSFER	• A timeout occurred during host data transfer.
B	C1 00	CACHE MEMORY UNASSIGNED FOR FORMAT	Cache necessary for 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	• A new data recovery request cannot be accepted because another drive is being recovered.
4	E4 00	NVS INTERNAL TABLE OVERFLOW, WRITE INCOMPLETE MANAGEMENT AREA	• The system area overflowed. (PIN data management area) (Note 1)
4	EA 01	PROGRAM SIZE OUT OF RANGE	• The program size received in the write buffer exceeds the program area size of the system.
4	EA 02	CONTROL INFORMATION SIZE OUT OF RANGE	• The inheritance information size received in the write buffer exceeds the inheritance information size of the system.
3	F0 00	R/W BUFFER ERROR	• A loading of a microcode 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 shut down because a cache memory error occurred.
4	F6 10	DRIVE SEEK RECOVERED ERROR WARNING	• A drive occurred in which the number of recovered mechanical system errors exceeded the threshold value. (Note 2)
4	F6 11	DRIVE SEEK UNRECOVERED ERROR WARNING	• A drive occurred in which the number of unrecovered mechanical system errors exceeded the threshold value. (Note 2)
4	F6 20	DRIVE MEDIUM RECOVERED ERROR WARNING	• A drive occurred in which the number of recovered medium errors exceeded the threshold value.

Note 1 : If WAR is 1 in the MODE SELECT command (page 35H) when this sense code is reported to the host, "sense key : 4/code : F804" is also reported.

Note 2 : This sense code is reported to the host only when WAR is 1 in the MODE SELECT command (page 35H).

Table 3.1.1 Sense Codes (5/6)

Sense key	Sense code	Error name	Description
4	F6 21	DRIVE MEDIUM UNRECOVERED ERROR WARNING	• A drive occurred in which the number of unrecovered medium errors exceeded the threshold value.
4	F6 30	DRIVE R/W RECOVERED ERROR WARNING	• A drive occurred in which the number of recovered R/W errors exceeded the threshold value.
4	F6 31	DRIVE R/W UNRECOVERED ERROR WARNING	• A drive occurred in which the number of unrecovered R/W errors exceeded the threshold value.
4	F6 40	DRIVE I/F RECOVERED ERROR WARNING	• A drive occurred in which the number of recovered I/F errors exceeded the threshold value.
4	F6 41	DRIVE I/F UNRECOVERED ERROR WARNING	• A drive occurred in which the number of unrecovered I/F errors exceeded the threshold value.
4	F6 50	DRIVE CONTROLLER HARD RECOVERED ERROR WARNING	• A drive occurred in which the number of recovered Hardware errors exceeded the threshold value.
4	F6 51	DRIVE CONTROLLER HARD UNRECOVERED ERROR WARNING	• A drive occurred in which the number of unrecovered Hardware errors exceeded the threshold value.
4	F6 60	SCSI I/F RECOVERED ERROR WARNING	• A drive occurred in which the number of recovered SCSI I/F errors exceeded the threshold value.
4	F6 61	SCSI I/F UNRECOVERED ERROR WARNING	• A drive occurred in which the number of unrecovered SCSI I/F errors exceeded the threshold value.
4	F6 70	ONLINE VERIFY CORRECTABLE ERROR WARNING	• A drive occurred in which the number of collectable errors in online verify exceeded the threshold value.
4	F6 71	ONLINE VERIFY UNCORRECTABLE ERROR WARNING	• A drive occurred in which the number of uncollectable errors in online verify exceeded the threshold value.
4	F8 00	BATTERY ALARM	• A battery failure occurred. (Note 1)
4	F8 01	FAN ALARM	• A fan failure occurred. (Note 1)
4	F8 02	DC POWER SUPPLY FAILURE	• A DC failure occurred. (Note 1)
4	F8 03	DRIVE FAILURE	• A drive failure (degradation) occurred. (Note 1)
4	F8 04	PIN DATA OVER	• A PIN data over occurred. (Note 1)
4	F8 05	CACHE MEMORY FAILURE	• The module was shut down. (Note 1)
4	F8 F0	ANOTHER CONTROLLER NOT READY	• Another controller was shut down. (Note 1)
4	F9 00	BATTERY RECOVERY	• The battery failure was recovered. (Note 2)
4	F9 01	FAN RECOVERY	• The fan failure was recovered. (Note 2)
4	F9 02	DC POWER SUPPLY RECOVERY	• The DC failure was recovered. (Note 2)
4	F9 03	DRIVE RECOVERY	• The drive failure (degradation) was recovered. (Note 2)
4	F9 04	PIN DATA RECOVERY	• The PIN data over was recovered. (Note 2)
4	F9 05	CACHE MEMORY RECOVERY	• Module shut down was released. (Note 2)
4	F9 06	OWN CONTROLLER RECOVERY	• The own controller was recovered. (Note 2)
4	F9 F0	ANOTHER CONTROLLER RECOVERY	• Another controller was recovered. (Note 2)
B	FD 00	COMMAND NOT EXECUTED BY CHANGING LOGICAL UNIT	• Command execution was disabled because the LU was switched. (This code is reported only to the SVP panel.)
B	FD 01	DOMMAND PAUSE BY CHANGING LOCICAOL UNIT	• LU switch command was stopped. (This code is reported only to the SVP panel.)

Note 1 : This sense code is reported to the host only when WAR is 1 in the MODE SELECT command (page 35H).

Note 2 : This sense code is reported to the host only when RCVRY is 1 in the MODE SELECT command (page 35H).

4. Error Trace with Power On

Error trace with power on is used when an error occurs. Of information stored in the controller, error trace and SSB trace are written onto a 3.5" floppy disk (1.44M bytes). Error trace with power on is collected during operation. The collected information is used for error trace analyses (Section 4.3).

4.1 When to Collect Error Trace with Power On

Collect the error trace with power on in the following cases :

- (1) An error is reported in the workstation server, maintenance client, and utility.
- (2) The ALARM and WARNING LEDs come on.

4.2 Notes on the Online Failure Trace Collection Before it is Executed

Concerning some versions of the DF300/DF350, a waiting hang-up of the host or a controller blockade (in the case of the dual controller configuration) may occur when the online trace is executed after specifying the default condition to collect all items automatically. Execute the operation following the procedure for the online trace correction.

Be sure to check the microprogram version of the subsystem before the operation referring to the table below. (To know the microprogram version, open the front panel (bezel) of the subsystem and see the SVP display panel. Since the SVP display screen is scrolled upward when a failure occurs, search for it using the direction keys ( and ).)

Table 4.2.1 DF350(SCSI) Microprogram Version that Allows Online Trace that Corrects All Items

No.	Subsystem	Controller	Microprogram Ver.
1	DF350-DK/DKH/MK/CK/RKH/RKWH	Single controller/ Dual controller	0304/D or later

Table 4.2.2 DF300 Microprogram Version that Allows Online Trace that Corrects All Items

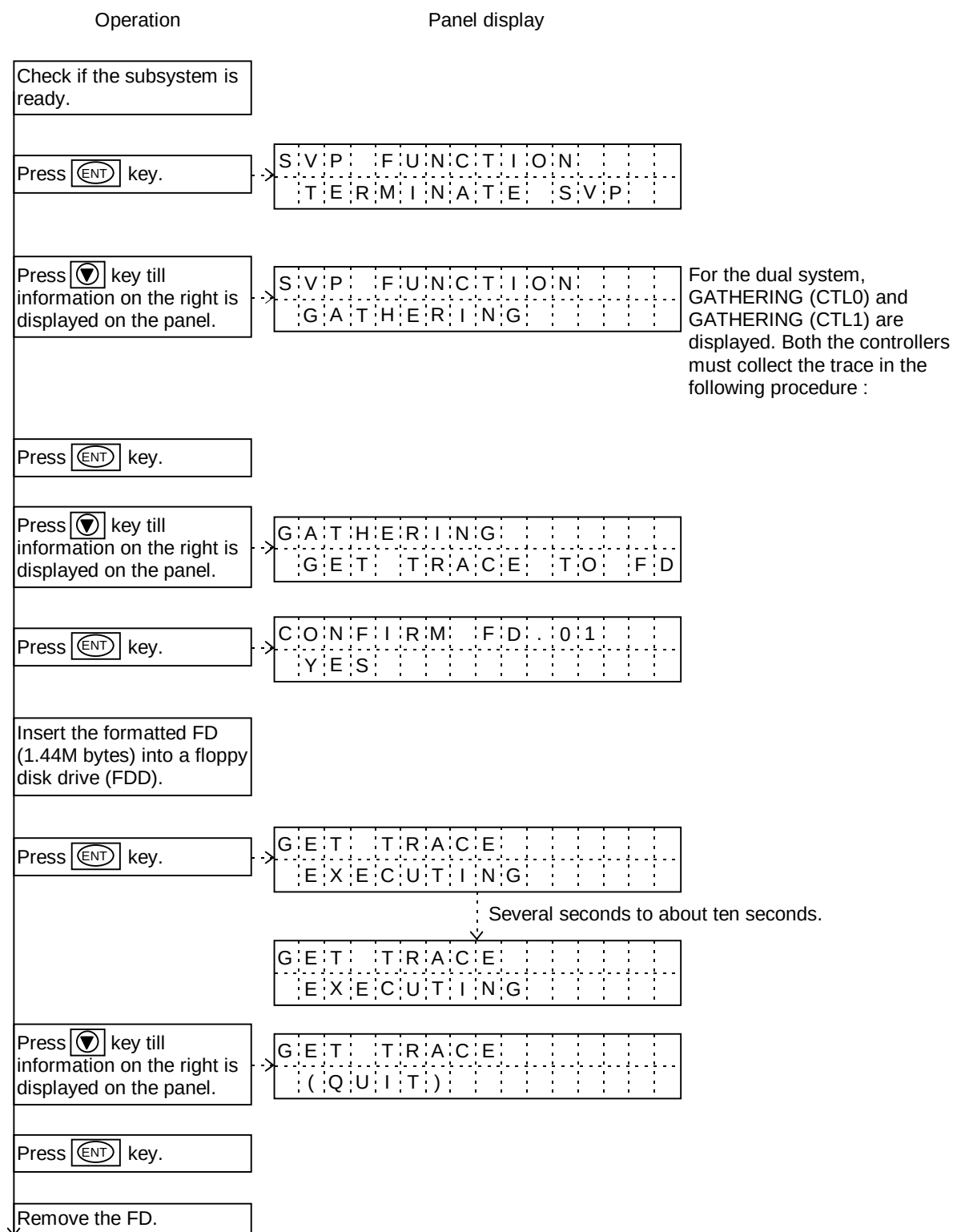
No.	Subsystem	Controller	Microprogram Ver.
1	DF300-DK	Single controller	8103/A or later
2	DF300-MK/CK/RK/RKH	Single controller	0103/C or later
3	DF300-MK/CK/RK/RKH	Dual controller	All version

Note : Concerning the DF350F disk array subsystem (Using the Fibre Channel connection), all the microprogram Versions allow to specify the automatic collection of all items (default) for the online trace collection.

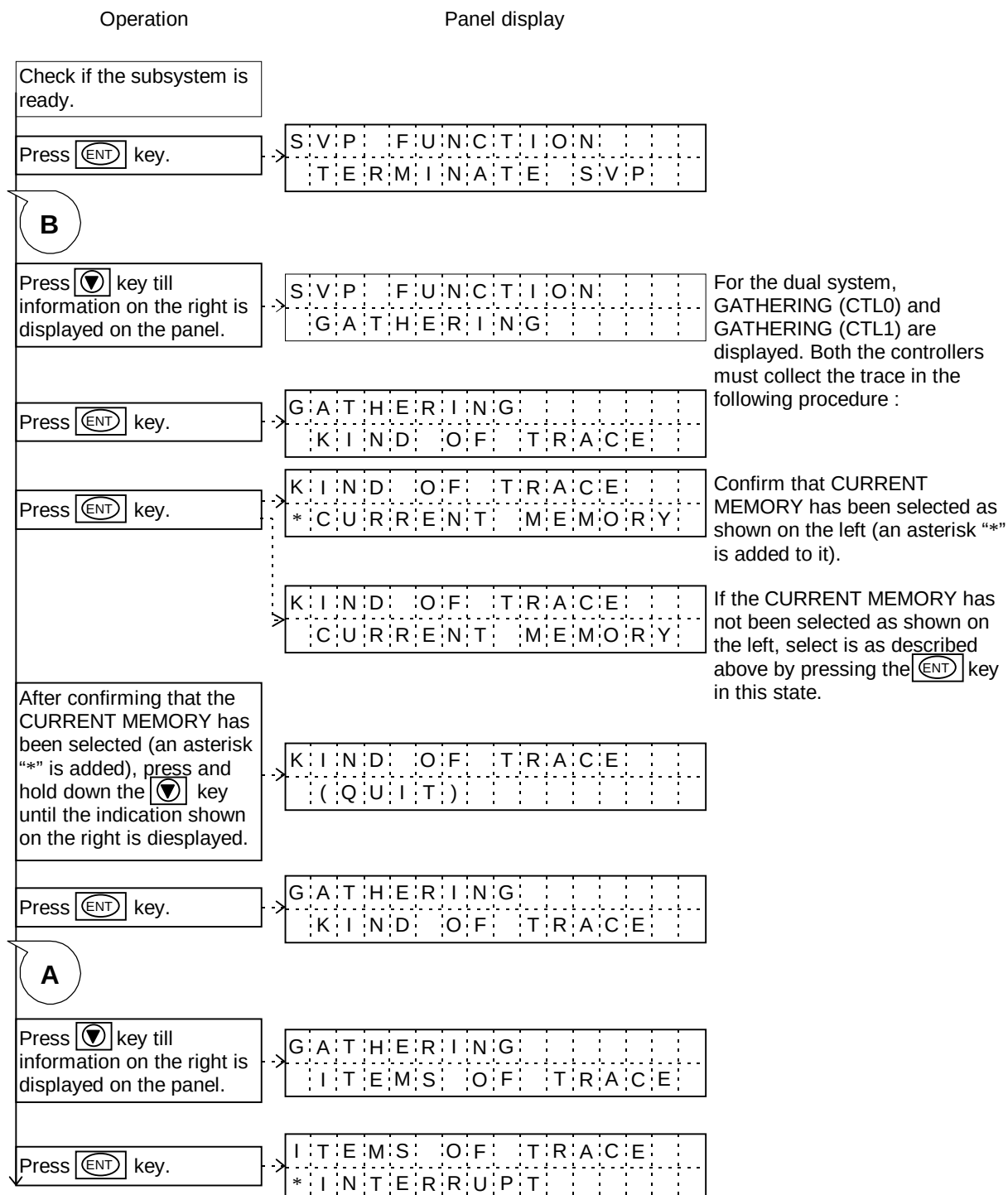
4.3 Collecting Error Trace with Power On

Use the 1.44M byte 3.5" floppy disk (FD) formatted in MS-DOS to collect error trace with power on. Prepare one 3.5" FD per controller.

(1) In case of microprogram Ver.0355** (** is optional) or later.



(2) In case of microprogram Ver.0355** (** is optional) or earlier.



(3) Selecting items to be traced.

Concerning some versions of the DF300/DF350, a failure may occur when the trace is collected on the default condition (automatic collection of all items). Therefore, collect trace information of each item separately.

The procedure for collecting the trace of each item is shown below.

Select the items to be traced from the default items as shown in the following settings 1 to 10 using the  and  keys. (The item with an asterisk "*" is not an object to be traced.) Each time the  key is pressed, presence an absence of the asterisk "*" are alternated. (A multiple selection is allowed.)

Collect the trace information ten times (on item at a time) using the following settings of ten types (settings 1 to 10).

(Default)

ITEM OF TRACE
* INTERRUPT
* HOST COMMAND
* DRIVE COMMAND
* MODULE
* JOB
* SSB
* ERROR
* FAILURE
* DOWN
* DRIVE DETACH

(Setting 1)

ITEM OF TRACE
* INTERRUPT
HOST COMMAND
DRIVE COMMAND
MODULE
JOB
SSB
ERROR
FAILURE
DOWN
DRIVE DETACH

(Setting 2)

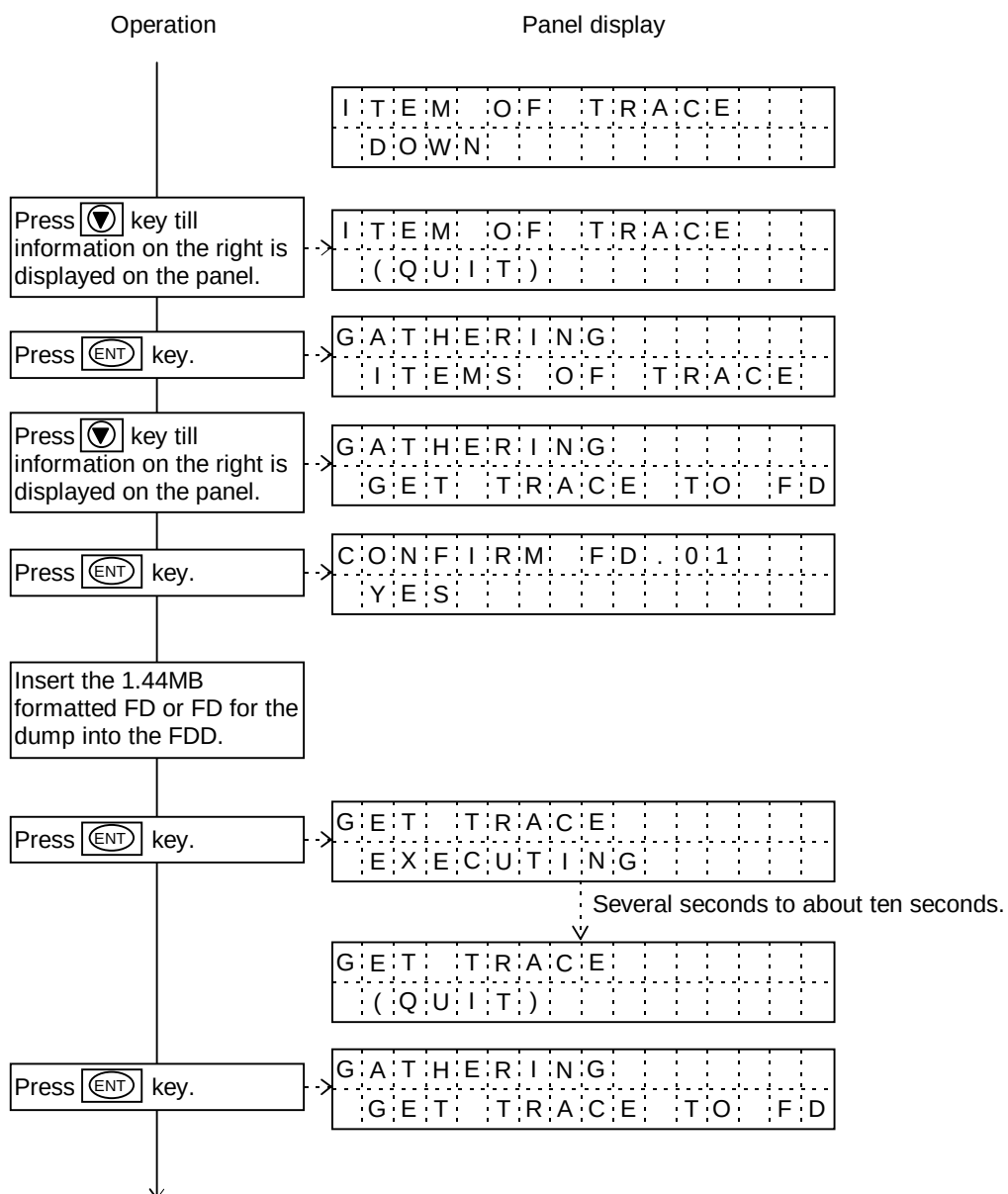
ITEM OF TRACE
INTERRUPT
* HOST COMMAND
DRIVE COMMAND
MODULE
JOB
SSB
ERROR
FAILURE
DOWN
DRIVE DETACH

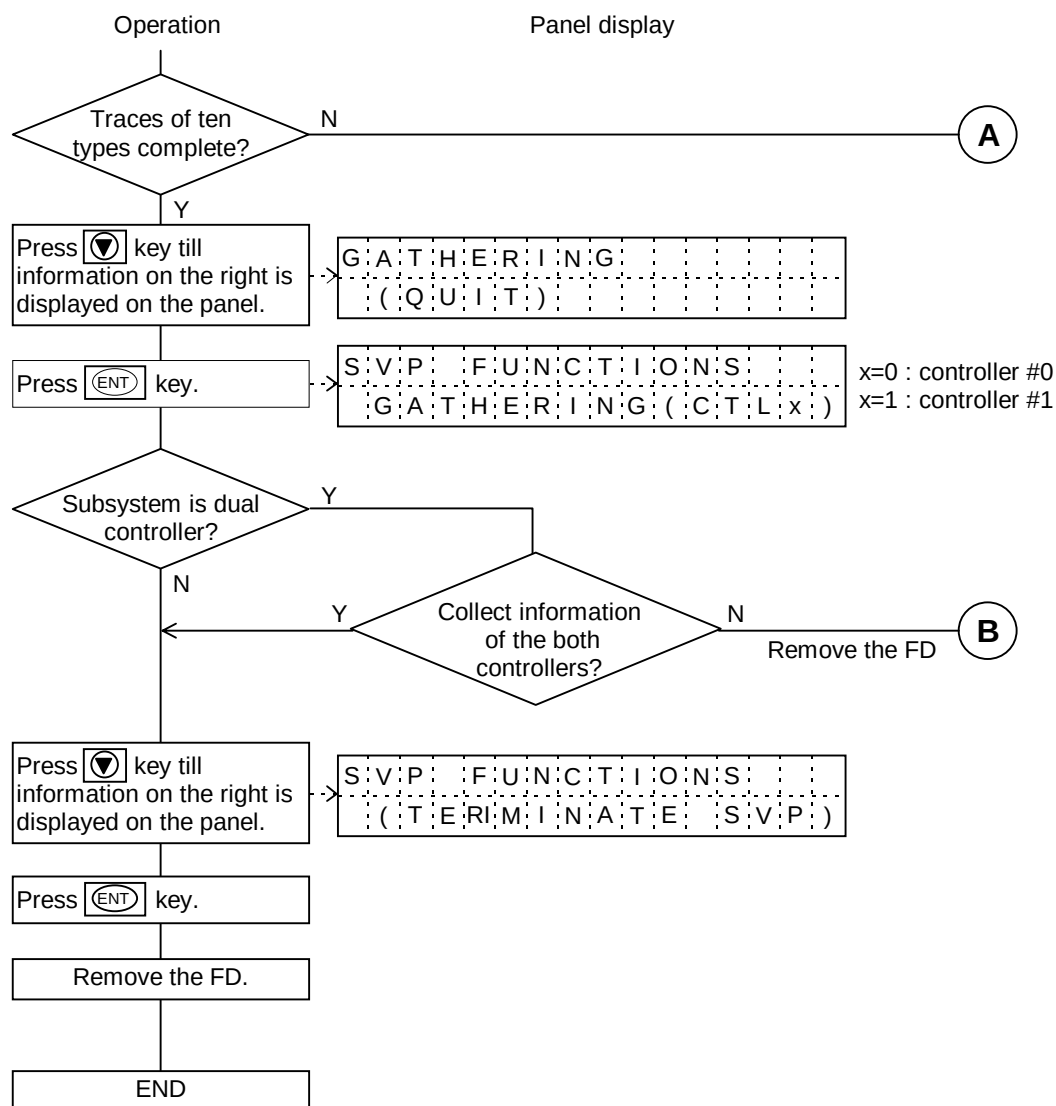
• • • •

(Setting 10)

ITEM OF TRACE
INTERRUPT
HOST COMMAND
DRIVE COMMAND
MODULE
JOB
SSB
ERROR
FAILURE
DOWN
* DRIVE DETACH

Perform the following operations after completion of the settings on the previous page.





4.4 Analyzing Error Trace with Power On

Use a trace analysis tool to locate the failed component according to the error trace with power on information collected in Section 4.3.

(1) Preparation

Analyzing error trace with power on requires ① personal computer, ② FD containing the trace analysis tool, and ③ FD containing the trace information collected in Section 4.3.

① Personal computer that can be used

- IBM compatible machine.
- MS-DOS Ver.5.0 or later.
- Programs can run on the Windows 3.1 or Windows 95/98 DOS prompt.
- A hard disk drive (HDD) with a free capacity or at least 3M bytes is required.
- A 3.5" FDD is required.

② FD containing the trace analysis tool

The following four files (six files for the tool of revision 0403 or later) are contained in the FD. Files required for the trace analysis of the DF300/DF350/DF350F are the following a) to d). (Files e) and f) are not required because they are used for the DF400 only.)

a) TDCONV.EXE -----	Analysis execution file	}	Tools of revisions 0301 and earlier.
b) TDCONV.REV -----	REV file		
c) TDCONFJ.*(four files)-----	Data file in Japanese	}	For the DF300/DF350/ DF350F trace analyses.
d) TDCONVE.*(four files) -----	Data file in English		
e) TDCV400J.*(four files) -----	Data file in Japanese	}	For the DF400 trace analyses.
f) TDCV400E.*(four files)-----	Data file in English		

(2) Installation method

① Creating a directry

Create an suitable directry on the HDD of the personal computer prepared according to (1)-①.

```
C:\>MKDIR TDCONV
```

↑
(Directory name)

Copy the files.

```
C:\>CD TDCONV
```

```
C:\TDCONV>COPY A:*. * -----
```

Copy all files from the FD containing the trace analysis tool to the directory created in the HDD.

Note : If tow or more TDCONV files exist in the directory, the trace analysis tool may not operate.

```
C:\TDCONV>dir
```

Enter the above command to check the files under the directory. If there are two or more files under the directory, enter the following command to delete the analysis execution file, then recopy the files

```
C:\TDCONV>del TDCONV*. *
```

- ② Confirm the revision number of the trace analyzing tool.

To confirm the number, type the following.

C:\TDCONV>TDCONV

TDCONV REVs and corresponding support functions are shown in Table 4.4.1.

Table 4.4.1 TDCONV REVs and Corresponding Support Functions

No.	TDCONV REV	Support function
1	0101 (*1)	Supports functions for analyzing the failure trace, SSB trace of the DF300/DF350.
2	0201	Supports functions for analyzing the failure trace, SSB trace of the DF350F.
3	0301	Supports functions for drive failure information (C-DRVDTC.TRC) of the DF350/DF350F. (*2)
4	0403	Supports functions for analyzing the failure trace, SSB trace, and drive failure information of the DF400.

*1 : The trace analyzing function for the DF350F is not supported by the tool of revision earlier than 0101. Copy the tool of revision later than 0201 again.

*2 : The trace of the drive failure information (C-DRVDTC.TRC) cannot be collected from the DF350F with the microprogram of version 0355 or earlier.

This function is available with the DF350F microprogram of version 0355 or earlier.

- (3) Procedure for analysis of error trace with power on

Execute the analysis execution file (TDCONV.EXE) to create a text file. Refer to the text file to find the failed component.

- ① Insert the FD containing the trace collected online into the FDD.
② Change to the directory where you installed the analysis execution file.

C:\>CD TDCONV

- Editing the SSB trace

C:\TDCONV>TDCONV A:\C-SSB.TRC /T

- Editing the failure trace

C:\TDCONV>TDCONV A:\C-FAIL.TRC /T

- Editing the drive failure information trace

C:\TDCONV>TDCONV A:\C-DRVDTC.TRC /T

Note : The drive failure information trace (C-DRVDTC.TRC) is a piece of trace information supported by the DF350F microprogram of version 0355 or later.

This command edits only the FD containing the trace collected with the microprogram of version 0355 or later.

When the /T option is specified, logs are edited in descending order of time (that is, the latest log is edited first). When this option is not specified, logs are edited in ascending order of time (that is, the oldest log is edited first).

- ③ Change to the directory where you installed the analysis execution file.

If an error occurs, repeat the following operation.

- (a) Insert another formatted 1.44M byte FD into the FDD, not the FD containing collected trace information. (File is not required.)
- (b) C:\>DIR A:
- (c) Remove the FD from the FDD.

Then, return to ①.

If the same error reoccurs, trace information may be unable to be collected because the FD is faulty. Prepare another FD, then collect error trace with power on again.

- ④ Executing conversion in ② creates text files (C-SSB.TXT, C-FAIL.TXT and C-DRVDTC.TXT) in the directory.

C-SSB.TXT, C-FAIL.TXT, and C-DRVDTC.TXT can refer to information of the SSB trace, the failure trace, and the drive blockade factor respectively.

If a file having the same name exists, the old text file name is changed to C-SSB.B_1 and the file is saved.

(Up to nine back-up files (from B_2 to B_9) are subsequently created. Files with larger numbers are old files.)

- ⑤ Open the above text file with an appropriate editor.

The following information is displayed in the text file.

- Time (time relative to power-on)
- Error information
- Failed component
- Error information

- (a) SSB trace (C-SSB.TXT)

SSB trace can be referred to for the SSB information reported to the host (see page TRBL1120 for an example of displaying SSB information) and power-on information. (See page TRBL1120 for an example of displaying power-on information.) Up to 150 information is stored. (If information is stored beyond 150 information, the oldest information is discarded and the latest information is stored.)

- (b) Error trace (C-FAIL.TXT)

Error trace can be referred to for the error information detected in the controller. Up to 300 information is stored. (If information is stored beyond 300 information, the oldest information is discarded and the latest information is stored.) An example of displaying error information is shown on page TRBL1130.

- (c) Drive failure information (C-DRVDTC.TXT)

Drive failure information can be referred to. Since the latest failure information of each drive is stored, the drive blockingfactor information which has been overwritten by failure trace (C-FAIL.TXT) can be referred to.

An example of displayed drive failure information is shown on page TRBL1130.

Note : To surely collect the drive blocking factor information, collect this information before replacing the blocked drive.

Example of displaying SSB information

```

[No.00B8]    (136/150)
TIME       :    38:40:20'892"621"' [ 84CD49C-026D] ----- Time relative to power-on
P/S Cnt    : 16                               38 hours and 40 minutes have elapsed.
Sense      : [0B/4700]
            : [ABORTED CMD] A SCSI bus parity error was detected.
Type       : [1010xx17] An error detected by the host I/F controller
            : [The host is faulty] A parity error occurred during DMA transfer write.
Notes      : 1. Check the I/F ADAPTER ASSY, I/F cable, and terminator, then replace the faulty component (s).
            : 2. Replace the control ASSY.
            : 3. Check the host on the SCSI bus and other devices.
Dump       :
000 : B8  00  50  0A  9C  D4  4C  08  -  6D  02  00  10  3B  6D  C0  1D
016 : 70  00  0B  00  00  00  00  38  -  00  00  00  00  47  00  00  00
032 : 00  00  10  00  00  00  00  00  -  00  00  00  00  10  17  00  00
048 : 11  00  00  00  01  00  00  00  -  01  02  02  00  00  00  00  00
064 : 00  00  00  00  01  46  01  25  -  08  6E  00  00  12  F4  12  00

```

Example of displaying power-on information

(By obtaining the power-on time, the error occurrence time (power-on time + relative time) can be calculated.)

```

[No.00AE]    (126/150)
TIME       :    0:01: 41'374"824"' [ 18BFE-0338]
P/S Cnt    : 16
RTClock    : 96-04-14 19:18:01-----power-on time
SYSTEM     : COLD                               CACHE : Nonvolatile
DISK#0     : COLD / COLD Usable                 P/K#0  : Nonvolatile
DISK#1     : COLD / COLD Usable                 P/K#1  : Nonvolatile
DISK#2     : COLD / COLD Usable                 P/K#2  : Nonvolatile
DISK#3     : COLD / COLD Usable                 P/K#3  : Nonvolatile
DISK#4     : COLD / COLD Usable
Dump       :
000 : AE  00  30  07  FE  8B  01  00  -  38  03  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  00  -  96  04  17  19  18  01  00  00
048 : 10  01  01  01  01  80  00  02  -  03  00  30  33  30  35  2F  41
064 : 11  11  11  11  11  00  00  00  -  00  00  FF  C8  50  53  4F  4E

```

Example of displaying SSB information

[No.03FC] (42/300)

TIME : 0:37:28'991"134" [22511F-0086] ----- Time relative to power-on

P/S Cnt : 16 0 hours and 37 minutes have elapsed.

Sense : [04/4400]
: [HARDWARE] A hardware or firmware error was detected in the controller during command execution.

Type : [100F0105] An error detected by the host I/F controller
: [H-SPC error] Invalid interrupt of TERMINATE command

Notes : Replacement of the control ASSY.

Dump :

000	:	FC	03	A0	2C	1F	51	22	00	-	86	00	00	10	00	00	00	00
016	:	70	00	04	00	00	00	00	00	-	38	00	00	00	00	00	00	00
032	:	44	00	00	00	00	00	10	00	-	00	00	00	00	00	00	00	00
048	:	0F	05	00	00	00	00	00	00	-	00	00	00	00	01	01	80	02
064	:	FF	A8	71	D8	FA	7E	FF	FF	-	41	00	02	60	00	00	20	20
080	:	00	00	00	00	10	0F	01	05	-	00	00	00	00	00	00	00	00

Example of displaying drive failure information

(Display when a failure occurs)

Port#0 Row#0 Position of the drive in which the failure occurred

TIME : 97.12.25 14:24:46 Time when the error occurred

P/S Cnt : 1 Number of P/S ONs

Sense : [FF/FFFF] Sense key/Sense code received from the drive
Unregistered code (FF/FFFF shows invalidity.)

OP Code [FF] Command code sent to the drive when a failure occurred

Type : [40111003] Error detected by MPU (FF shows invalidity.)
: [D-SPC failure] [Microprogram failure (I/O execution control)] invalid phase error

Notes : HDU ASSY replacement

Dump :

000	:	30	02	01	FF	97	12	25	FF	-	14	24	46	FF	84	2C	03	00
016	:	FF	FF	FF	FF	40	11	10	03	-	FF	FF	FF	FF	FF	FF	FF	FF

(Display when a no failure occurs)

Port#0 Row#0

[No failure]

5. Memory Dump

Memory dump sweeps out the information stored in the controller to a 3.5" FD (1.44M bytes); it is used when an error occurs. The purpose of memory dump is to facilitate tracing the cause of the error and shorten the analysis time. The swept out information cannot be analyzed in the job site.

The following explain when to collect memory dump and how to collect and transfer it.

5.1 When to Collect Memory Dump

Collect a memory dump in the following cases. During the system operation, collect the memory dump when the system can be stopped.

- (1) An error is reported to the workstation server, maintenance client, or utility.
- (2) The ALARM and WARNING LEDs come on.

5.2 Collecting Memory Dump

Memory dump is used to collect information of the controller with power turned on.

Use the 1.44M byte 3.5" floppy disk (FD) formatted in MS-DOS to collect the memory dump. Up to seven FDs can be used. (The number of FDs to be used depends on a compression rate because memory dump data is compressed and written to 3.5" FDs.)

Affix labels to the prepared FDs to make the order in which memory dump data was collected clear.

Note : Delete a file from the FD to be used in advance. If the FD contains a file, memory dump may be unable to be collected.

- (1) Collecting memory dump (for single system)
 - ① Set DIP switch No.2, as shown in Figure 5.2.1.

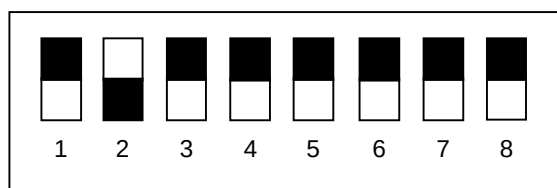
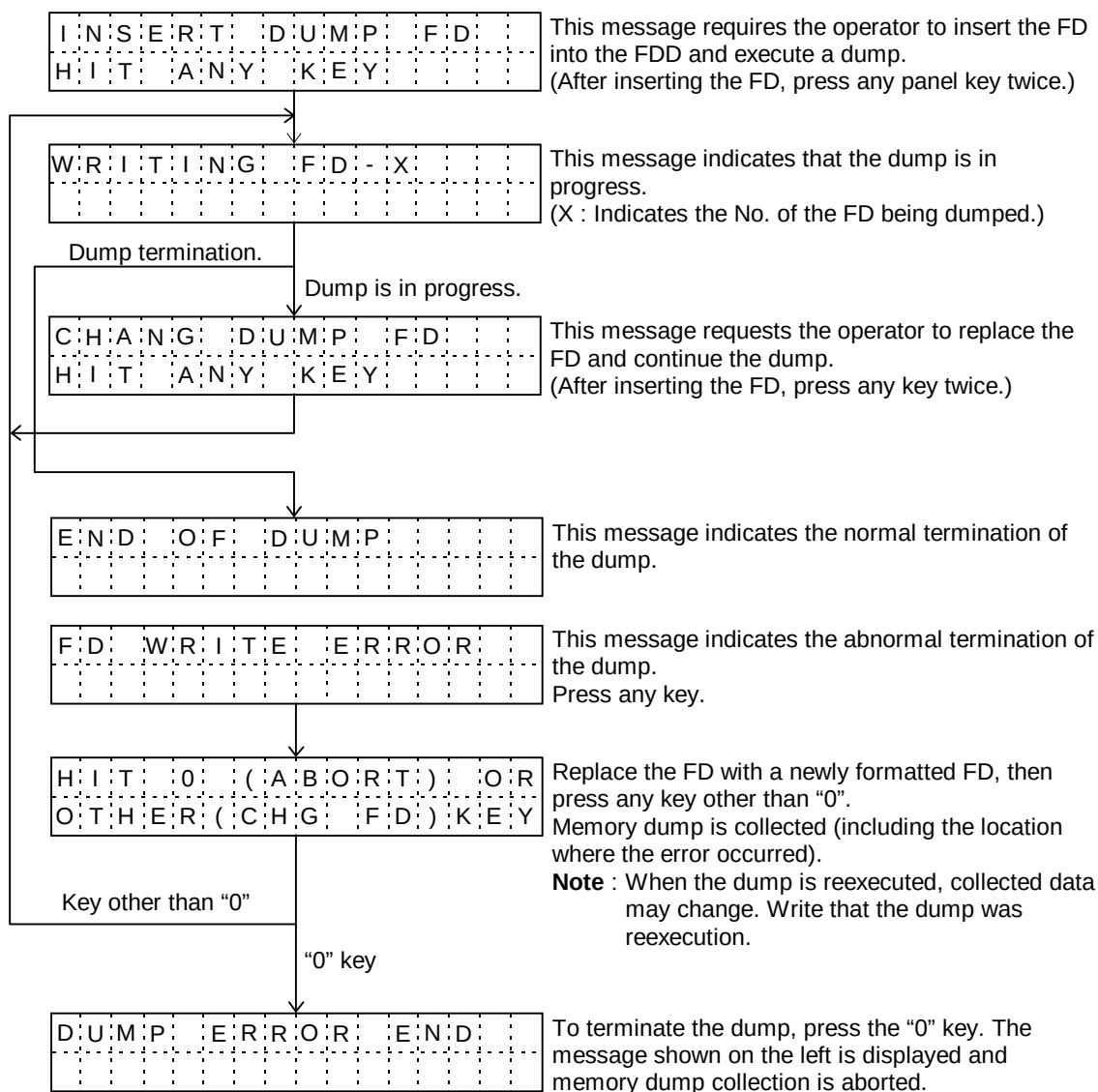


Figure 5.2.1 DIP Switch Setting for Memory Dump

- ② Press the reset switch on the main board.

- ③ Perform operation according to the panel display.

Panel display



- ④ Set DIP switch No.2, as shown in Figure 5.2.2.

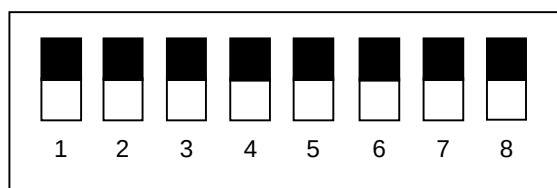


Figure 5.2.2 Standard DIP Switch Setting

- ⑤ Turn off the power of the subsystem.

(2) Collecting memory dump (for dual system)

To collect memory dump when both the CTL ASSYs are normal, shut down one of the CTL ASSYs, then execute memory dump. This prevents incorrect panel display.

- ① Set DIP switch No.8 of the CTL ASSY whose board is to be shut down, as shown in Figure 5.2.3.



Figure 5.2.3 DIP Switch Setting for Shutting Down CTL ASSY

- ② Press the reset switch of the CTL ASSY to be shut down.

Ten seconds later, the red LED on the CTL ASSY comes on, indicating that the CTL ASSY was shut down.

In this case, the following message is displayed on the panel :

H	6	0	4	2	2	C	T	L	F	A	I	L	XX indicates a controller number. (00 : CTL0, 01 : CTL1)
W	0	1	5	0	0	C	T	L	A	L	M	- X X	

As a result of the operations ① and ②, one of the CTL ASSYs is shut down. (If one of them has been already shut down before memory dump collection, the operations ① and ② are not necessary.) After checking that the ASSY has been shut down, set the DIP switch No.8 as shown in Figure 5.2.6.

Turning off the power of the subsystem releases controller shutdown.

- ③ Set DIP switch No.2 of the CTL ASSY for which memory dump is to be executed, as shown in Figure 5.2.4. The DIP switches of the CTL ASSYs for which memory dump is not to be executed need not be set.

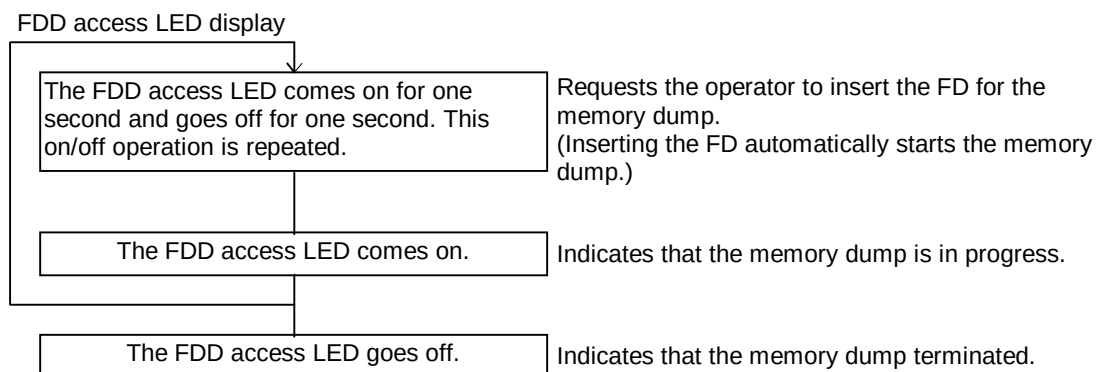


Figure 5.2.4 DIP Switch Setting for Memory Dump

- ④ Press the reset switch of the CTL ASSY for which memory dump is to be executed.

Perform the following operations depending on the status of the controller (being shut down or not) for which memory dump is to be collected :

- When the controller is not shut down
Perform operations according to panel display (in the same manner as memory dump for single system).
- When the controller is shut down
Perform operations according to the FDD access LED because no information is displayed on the panel.



Note 1 : If writing on the FD failed because an error was detected during memory dump execution, the FDD access LED comes on for 0.5 second and goes off for 0.5 second.

This on/off operation is repeated. The FD may be faulty. Replace it with another FD. The FDD access LED comes on and memory dump is reexecuted for the new FD.

Note 2 : To abort the memory dump, set the DIP switch No.2, as shown in Figure 5.2.5, then press the reset switch on the CTL ASSY.

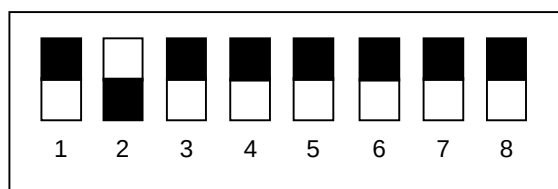


Figure 5.2.5 DIP Switch Setting for Canceling Memory Dump

Note 3 : To collect memory dump of another controller after collecting memory dump of one controller, execute ④, then execute ③ and ④ for another controller.

Prepare a new FD. Alternatively, the FDs used for memory dump conversion explained in Section 5.2 may be used after the memory dump data is copied for storage.

⑤ Set the DIP switch No.2, as shown in Figure 5.2.6.

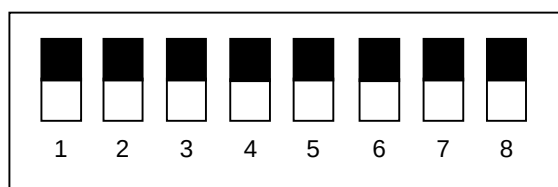


Figure 5.2.6 Standard DIP Switch Setting

⑥ Turn off the power of the subsystem.

Collected information is compressed in the DOS format.

(3) Compression of collected information

Collected information is stored in files shown in Table 5.2.1 on any FD. When compressible, information is stored in the ○○○_X.lzh format. When not compressible, information is stored in the ○○○_X.cmp format. When files are split, “X” of ○○○_X.lzh indicates a sequence number (i.e., 1, 2...). When they are not split, “X” is set to “1”.

Table 5.2.1 Files in Which Collected Information is Stored

No.	File name	Description	Size
1	MPU-R_1.lzh	M-CTL control register	98 [B]
2	DBUF-R_1.lzh	D-CTL control register	404 [B]
3	CACHE_1.lzh	DBUF/CACHE	(*1)
4	DRAM_1.lzh	CS/DS (DRAM)	4 [MB]
5	FLASH_1.lzh	Flash memory	1 [MB]
6	SRAM_1.lzh	DS (SRAM)	512 [KB]
7	LAN-SR_1.lzh	LAN LocalSRAM	256 [KB]
8	LANEEP_1.lzh	LAN EEPROM section	1 [KB]
9	OP-PNL_1.lzh	OP PANEL	128 [B]
10	RTC_1.lzh	RTC	128 [B]
11	HSCSI_1.lzh	HOST SCSI	32 [B]
12	DSCSI0_1.lzh	DRV SCSI PORT0	32 [B]
13	DSCSI1_1.lzh	DRV SCSI PORT1	32 [B]
14	DSCSI2_1.lzh	DRV SCSI PORT2	32 [B]
15	DSCSI3_1.lzh	DRV SCSI PORT3	32 [B]
16	DSCSI4_1.lzh	DRV SCSI PORT4	32 [B]
17	DSCSI5_1.lzh	DRV SCSI PORT5	32 [B]
18	SERIAL_1.lzh	Serial I/O Controller	16 [B]
19	DIPCAS_1.lzh	DIP switch port/cache slot port	16 [B]

*1 The DBUF/CACHE size depends on the size of a cache installed :

When cache is installed-----512K bytes

When a 128M byte cache is installed-----About 1.5M bytes

Use a PC that can handle text files to store collected information in one file in the following procedure.

- ① Create a new directory.
- ② Copy all the collected files to the directory (○○○_X.lzh and ○○○_X.cmp are not distinguished).
- ③ Move the files to the directory created (current directory “r”) and enter the following :

lha a : output file name

The file specified by the output file name is created.

6. Troubleshooting by Means of Error Notification Program

Error Notification Utility is a utility program uses the log file output function or E-mail information function to notify the error when an error occurs. This program runs on a workstation or server. Users select the log file output function or E-mail information function. This chapter explains the correspondence between the information output by these functions and maintenance method.

6.1 Maintenance by Means of Log File Output Function

(1) Confirming error information

Log file output information is output in the format shown in Figure 6.1.1. Use the error information in the format to confirm the contents of the error. Figure 6.1.2 is an example of log file output information output when a power error occurs. Figure 6.1.3 is an example of log file output information output when the failed disk is shut down.

Day Mon dd hh:mm:ss yyyy/device ID/error information

Figure 6.1.1 Format of Information Output to Log File Output Information

Mon Mar 25 15:35:22 1996/UNIT001/DF350SET Power Supply failure

Figure 6.1.2 Example of Log File Output Information Output when Power Error Occurs

Tue Mar 26 19:10:12 1996/UNIT002/DF350SNT Drive Detached
Tue Mar 26 19:10:12 1996/UNIT002/DF350NER Detached Drive Position Port No.3 Row No.0

Figure 6.1.3 Example of Log File Output Information Output when a Failed Disk is Shut Down

The meanings of the log file output information shown in Figure 6.1.1 are explained in Table 6.1.1.

Table 6.1.1 Meanings of Log File Output Information

No.	Item	Meaning
1	Day Mon dd hh:mm:ss yyyy	Date when the error occurred
2	Device ID	ID of the device in which the error occurred
3	Error information	Type of the error occurred

(2) Troubleshooting method

Refer to the error information shown in Figure 6.1.1, confirm the message code according to Table 6.3.1, then recover the error following the instructions displayed on the panel. (See Section 2.2.)

6.2 Maintenance by Means of E-Mail Information Function

(1) Confirming error information

E-Mail information is output in the format shown in Figure 6.2.1. Use the error information in the format to confirm the contents of the error.

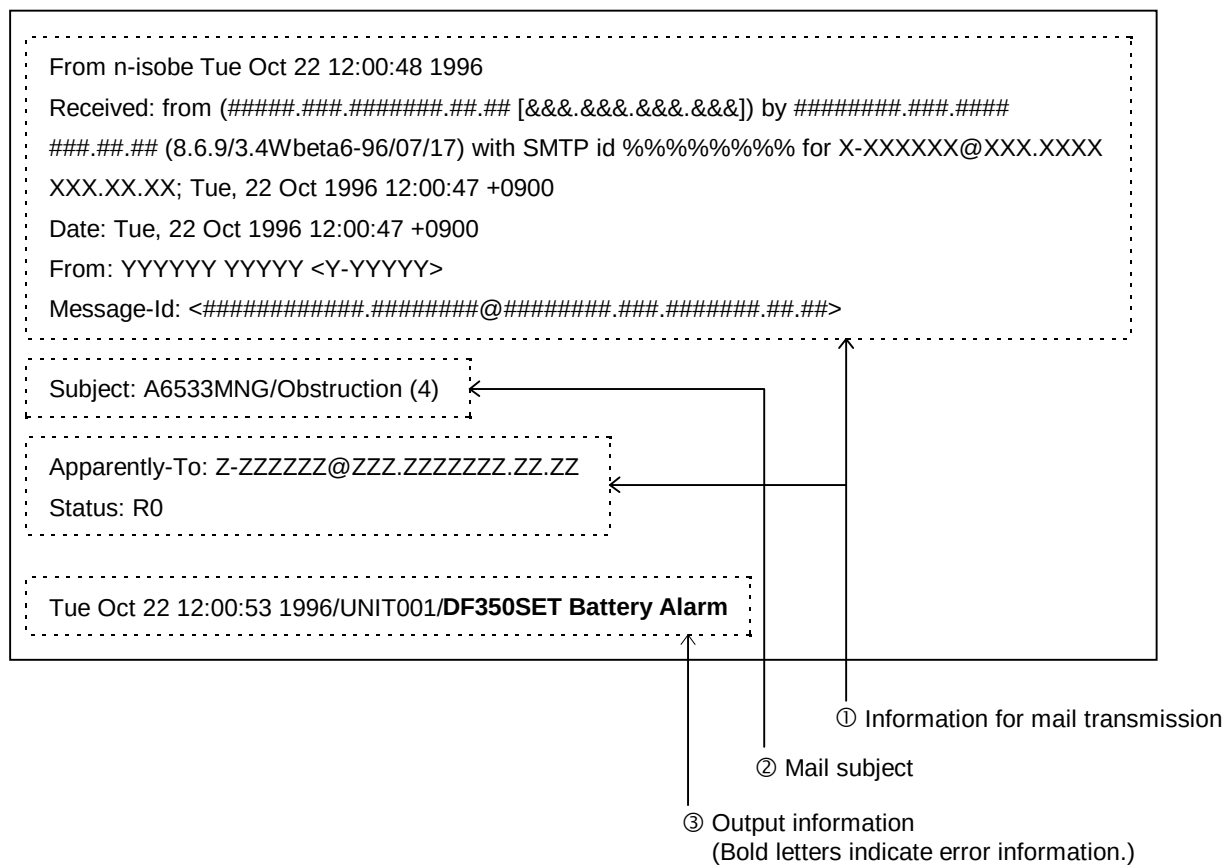


Figure 6.2.1 Example of Output E-Mail Information (Battery Error)

The meaning of the output information shown in Figure 6.2.1 are explained below.

① Information for mail transmission

Information for mail transmission (in Figure 6.2.1, transmission source address and transmission destination address, etc., indicated by #, &, %, X, Y, and Z) is not required for maintenance. This information varies depends on the mail environment, etc.

② Mail subject

The mail subject indicates the type of mail. The meanings of mail subjects are explained in Table 6.2.1.

Table 6.2.1 Meanings of Mail Subjects

No.	Subject	Meaning
1	Subject: DF350MNG/Obstruction (xx)	When the E-Mail of this subject is issued, maintenance is required. Numbers enclosed in parentheses do not have any special meaning.
2	Subject: DF350MNG/Buffer full !!	Indicates that communication with the disk array subsystem is abnormal. Use the panel of the main body at the site to check whether an error occurred, then perform maintenance according to the information displayed on the main body panel.

③ Output information

E-Mail information is output in the format shown in Figure 6.2.2. Use the error information in the format to confirm the contents of the error.

Day Mon dd hh:mm:ss yyyy/device ID/error information

Figure 6.2.2 Format of E-Mail Information

E-Mail information shown in Figure 6.2.2 may not be transmitted when the mail subject is not the one listed as No.1 in Figure 6.2.1 (Subject : A6533MNG/Obstruction (xx)). If E-Mail information is not transmitted, use the main body panel of the disk array subsystem at the site to check whether an error occurred, then perform maintenance according to the information displayed on the main body panel.

The meanings of the E-Mail information shown in Figure 6.2.2 are explained in Table 6.2.2.

Table 6.2.2 Meanings of E-Mail Information

No.	Item	Meaning
1	Day Mon dd hh:mm:ss yyyy	Date when the error occurred
2	Device ID	ID of the device in which the error occurred
3	Error information	Type of the error occurred

(2) Troubleshooting method

Refer to the error information shown in Figure 6.1.1, confirm the message code according to Table 6.3.1, then recover the error following the instructions displayed on the panel. (See Section 2.2.)

6.3 List of Error Information

Table 6.3.1 shows the messages corresponding to error information and maintenance.

Table 6.3.1 Message Corresponding to Error Information and Maintenance

No.	Error information	Meaning of message	Reference section
		Standard maintenance	
1	DF350SNT Drive Detached DF350NER Detached Drive Position Port No.X Row No.Y	The drive was shut down.	Section 2.2 "Panel Displays."
		Perform the maintenance instructed for message code W202XY and message text DRVALM-XY.	
2	DF350SET Power Supply Failure	An AC/DC power supply failure occurred.	
		Perform the maintenance instructed for message code W405XY and message text PSALM-XY. Data corresponding to XX in the manual is not notified included in RS232C error information output. Refer to the panel display at the site.	
3	DF350SET Battery Alarm	A Battery ASSY voltage error occurred.	
		Perform the maintenance instructed for message code W10100 and message text BATALM.	
4	DF350SET Fan Alarm	A FAN ASSY failure occurred.	
		Perform the maintenance instructed for message code W304XX and message text FANALM-XX. Data corresponding to XX in the manual is not notified included in RS232C error information output. Refer to the panel display at the site.	
5	DF350SET Controller Detached	A Controller failure occurred.	
		Perform the maintenance instructed for message code W015XX and message text CTLALM-XX. Data corresponding to XX in the manual is not notified included in RS232C error information output. Refer to the panel display at the site.	

7. Troubleshooting by Means of SNMP Agent Support Function

The SNMP agent support function notifies subsystem error to the workstation for network monitoring, in which the SNMP manager is installed, via simple network management protocol (SNMP). This chapter explains how to troubleshoot subsystem errors by means of the SNMP agent support function.

7.1 Maintenance with Trap Codes

(1) Confirming error information

Examples of output caused by a trap issued by the subsystem are shown below. ① is an example of output by HP Open View/NetM*COMET. ② is an example of output by SunNet Manager.

① Example of trapped output by HP Open View/NetM*COMET

If an error occurs, the following screen is popped up.

fan Failure event		Trap name	
May 10 (Friday), 1996 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 Brouser. For detailed information refer to the brouser.

Event Category	
☒ Error event ☐ Threshold event ☐ Status event ☐ Setting event ☐ Application warning event ☐ All events	
[Read only]	

Error Event Brouser				IP address or registered host model name		Generic Trap Code		Specific Trap Code	
File	Action	View						Help	
Significance	Date	Source	Message						
Important warning area	1996/05/10 16:21:15	DF350	Trap:generic 6 specific:3 args (0):						
1 Event - Dangerous:0 Serious warning:1 Warning:0 Caution:0 Normal:0									

② Example of trapped output by SunNet Manager

IP address or registered host model name

Event/Trap Report-DF350

Save Device name: _____

Remarks 6 1 6

Fri Apr 12 13:29:06 1996 [DF350] : Trap :

sequence=1

receive-time=Fri Apr 12 13:29:06 1996

version=0

community=public

enterprise=Hitach,Ltd..system. storage. dfraid. dfraid

Lan

source-time=00:00:00.00

trap-type=Fan_Failure

Trap name

(2) Troubleshooting method

Perform maintenance referring to the output examples in (1) and according to Table 7.1.1, “Recovery Procedure for Each Trap Code”.

Table 7.1.1 Recovery Procedure for Each Trap Code (1/2)

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 “A-6534/DF350F Hitachi Disk Array Subsystem SNMP Support Function Operation Manual.” When changing the community name accessed by the SNMP manager, refer to the manual of each manager.	
3	6	1	systemDown	Controller down	Issuance of this trap indicates that an error beginning with message code H occurred. For detailed error information, see the panel display of the subsystem. Perform the maintenance instructed for message code H#####. “#####” is optional.	Refer to Section 2.2 “Panel Displays”.
4	6	2	driveFailure	Driver shutdown	Perform the maintenance instructed for message code W202XY and message text DRVALM-XY. The information corresponding to XY in the manual is not notified regarding the trap. See the panel display of the subsystem.	

Table 7.1.1 Recovery Procedure for Each Trap Code (2/2)

No.	Generic Trap Code	Specific Trap Code	Trap name	Description	Recovery procedure	Remarks
5	6	3	fanFailure	Fan failure	Perform the maintenance instructed for message code W304XX and message text FANALM-XX. The information corresponding to XX in the manual is not notified regarding the trap. See the panel display of the subsystem.	Refer to Section 2.2 "Panel Displays".
6	6	4	powerSupply-Failure	Power supply failure	Perform the maintenance instructed for message code W405XX and message text PSALM-XX. The information corresponding to XX in the manual is not notified regarding the trap. See the panel display of the subsystem.	
7	6	5	batteryFailure	Battery voltage error	Perform the maintenance instructed for message code W10100 and message text BATALM.	
8	6	6	cacheFailure	Cache access error occurred	Perform the maintenance written in message code W508XX and message text CACHE-XX or message code W508XY and message text CMALMX-NP. The information corresponding to XX, XY, X, and NP in the manual is not notified regarding the trap. See the panel display of the subsystem.	

7.2 Maintenance with MIB (df Regression) Values

(1) Confirming error information

Examples of output caused by a trap issued by the subsystem are shown below. ① is an example of output by HP OpenView/NetN*COMET. ② is an example of output by SunNet Manager. For MIB values, see Table 7.2.1 “dfRegressionStatus Values and Failed COmponents”.

① Example of MIB value output by HP OpenView/NetN*COMET

MIB Browse

Node name or IP address: hsp1FSsw

Community name:

MIB object ID: terprises.hitachi.systemExMib.storageExMib.dfraidExMib.dfraidLanExMib.dfWarningCondition

dfRegressionStatus

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 DF350.

Close Reselect Save... Help

dfRegressionstatus value

IP address or registered host model name

② Example of MIB value output by SunNet Manager

Event/Trap Report-DF350

Save Device name:

Remarks 19 1

Tue Jul 12 16:42:07 1996 [DF350] : Event : Hitachi-DF-RAID-LAN-MTB

dfRegressionStatus=1048576 (Grater Than 0 Priority Low)

dfPreventiveMaintenanceInformationn=0

dfWarningReserve1=0

dfWarningReserve2=0

dfRegressionStatus value

IP address or registered host model name

Table 7.2.1 dfRegressionStatus Values and Failed Components

No.	dfRegressionStatus value (decimal)	Failed component				
		Cache ASSY	FAN ASSY	AC/DC power supply	Battery ASSY	HDU ASSY
1	0					
2	1					×
3	65536				×	
4	65537				×	×
5	131072			×		
6	131073			×		×
7	196608			×	×	
8	196609			×	×	×
9	104856		×			
10	104857		×			×
11	1114112		×		×	
12	1114113		×		×	×
13	1179648		×	×		
14	1179649		×	×		×
15	1245184		×	×	×	
16	1245185		×	×	×	×
17	16777216	×				
18	16777217	×				×
19	16842752	×			×	
20	16842753	×			×	×
21	16908288	×		×		
22	16908289	×		×		×
23	16973824	×		×	×	
24	16983825	×		×	×	×
25	17825792	×	×			
26	17825793	×	×			×
27	17891328	×	×		×	
28	17891329	×	×		×	×
29	17956864	×	×	×		
30	17956865	×	×	×		×
31	18022400	×	×	×	×	
32	18022401	×	×	×	×	×

(2) Troubleshooting procedure

Perform maintenance referring to the output examples in (1) and according to Table 7.2.2, “Maintenance Procedure for Each Failed Component”.

Table 7.2.2 Maintenance Procedure for Each Failed Component

No.	Failed component	Maintenance procedure	Remarks
1	HDU ASSY	Perform the maintenance instructed for message code W202 <u>XY</u> and message text DRV <u>ALM-XY</u> . The information corresponding to <u>XY</u> in the manual is not found in the MIB. See the panel display of the subsystem.	Refer to Section 2.2 “Panel Displays”.
2	Fan ASSY	Perform the maintenance instructed for message code W304 <u>XX</u> and message text FAN <u>ALM-XX</u> . The information corresponding to <u>XX</u> in the manual is not found in the MIB. See the panel display of the subsystem.	
3	AC/DC power supply	Perform the maintenance instructed for message code W405 <u>XX</u> and message text PS <u>ALM-XX</u> . The information corresponding to <u>XX</u> in the manual is not found in the MIB. See the panel display of the subsystem.	
4	Battery ASSY	Perform the maintenance instructed for message code W10100 and message text BATA <u>LM</u> .	
5	CACHE ASSY	Perform the maintenance instructed for message code W508 <u>XX</u> and message text CACH <u>E-XX</u> or message code W508 <u>XY</u> and message text CMALMX- <u>NP</u> . The information corresponding to <u>XX</u> , <u>XY</u> , <u>X</u> , and <u>NP</u> in the manual is not found in the MIB. See the panel display of the subsystem.	

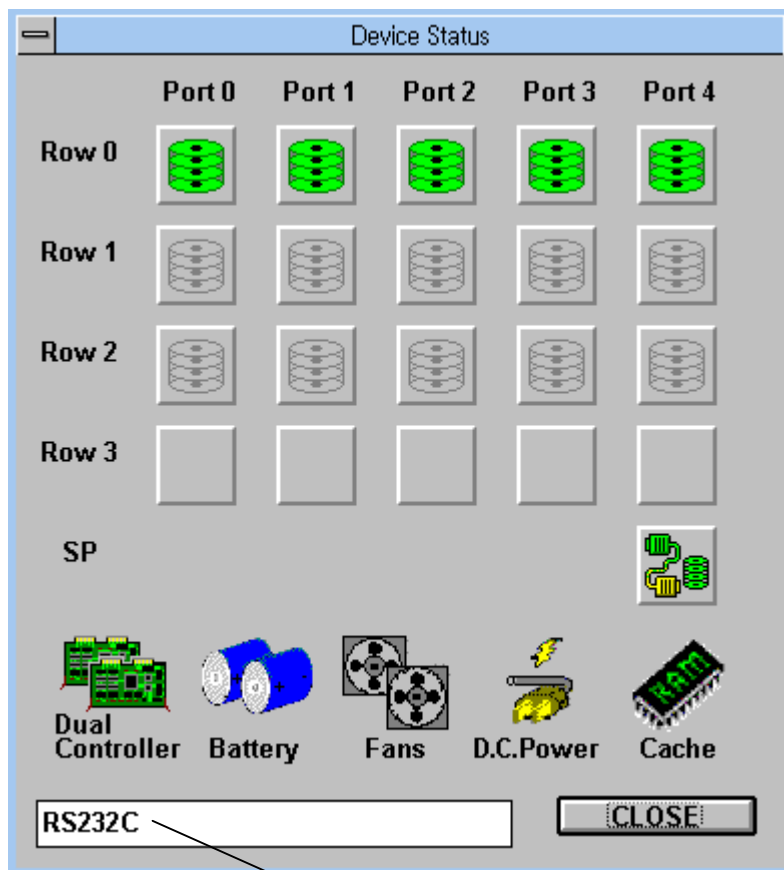
8. Troubleshooting by Means of Disk Array Utility Program

Error Alert function in Disk Array Utility notifies subsystem error. This chapter explains how to troubleshoot subsystem error by means of the Disk Array Utility.

8.1 Maintenance with Device Status Display

(1) Device Status Display

“Device Status” window of Disk Array Utility shows below.



→ The connection indication of RAID device.

“RS232C”: This window shows the status of RAID device that is connected with an RS232C.

“LAN : host name”: This window shows the status of RAID device that is connected with a LAN. (host_name --- A name of RAID device described in HOSTS file.)

When a failure occurs at the disk drives, the controller, the battery, the fans, the power supply and the cache in the disk array, the window is blinking red.

Note : When connected to the disk array subsystem of the dual system, both the CTL0 and the CTL1 are connected. Therefore, when a failure occurs in the common parts (disk, battery, fan, or power supply) of the disk array subsystem, two “A”s (Abnormals) are displayed in the “Error Alert” window in the case of LAN connection or two “Device Status” windows are displayed in the case of RS232C connection.

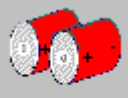
(2) Troubleshooting method

Perform maintenance referring to the display examples in (1) and according to Table 8.1.1, "Recovery Procedure for Each Error Display."

Table 8.1.1 Recovery Procedure for Each Error Display (1/2)

No.	Error Display	Description	Recovery procedure
1	 ↔  Red Yellow	• The disk drive that is busy, being restored, or waiting for restore was blocked. • The inserted disk drive did not spin-up. (The RAID group has been defined or the spare disk has been defined.)	Perform the maintenance instructed for message code W202 <u>XY</u> and message text DRVALM- <u>XY</u>
	 ↔  Red Gray	• The inserted disk drive did not spin-up. (The RAID group has not been defined.)	
	 ↔  Red No indication	• The disk drive was removed. (The RAID group has been defined or the spare disk has been defined.)	

Table 8.1.1 Recovery Procedure for Each Error Display (2/2)

No.	Error Display	Description	Recovery procedure
2	 Dual Controller	Blinking red	Controller down
3	 Fans	Blinking red	Fan error
4	 D.C.Power	Blinking red	DC power error
5	 Battery	Blinking red	Battery voltage error
6	 Cache	Blinking red	Cache access error

DF350F Disk Subsystem

4. PERIODIC

Rev.1

REV.	Date	DRW.	CHKD	APPD	Sheet No.	Description	Code
0	Jan.20.'98	A.Yamanashi	K.Aruga	H.Iwasaki	All	Issued	
1	Jul.25.'98	A.Yamanashi			0100	Changed Note.	CH

CONTENTS

1. Periodic Maintenance.....	PERIOD0030
2. Checking the Fans	PERIOD0030
2.1 Checking the Fans of the Mini tower/Cabinet Type	PERIOD0040
2.2 Checking the Fans of the Rackmount Type (RKH)	PERIOD0050
2.3 Checking the Fans of the Rackmount Type (RKWH)	PERIOD0060
2.4 Checking the Fans of the U1 Rack Frame	PERIOD0070
3. Cleaning the Front Cover and Rear Panel	PERIOD0080
4. Replacing the Battery	PERIOD0100
5. Checking the Operation of the Unit Alone.....	PERIOD0110

1. Periodic Maintenance

Table 1.1 lists the periodic maintenance items of the unit.

Table 1.1 Periodic Maintenance Items

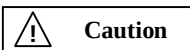
No.	Item	Period	Standard time required	See
1	Checking the fans	Y1	5 min 10 min (*2)	Section 2
2	Cleaning the front cover and rear panel	Y1 (*1)	5 min	Section 3
3	Replacing the battery	Y2	10 min	Section 4
4	Checking the operation of the unit alone	Y1	5 min	Section 5

*1 Periodically clean according to the customer's environment conditions

*2 U1 frame

2. Checking the Fans

2.1 Checking the Fans of the Mini tower/Cabinet Type



Power supply is turned on. Be careful not to touch the live parts to avoid an electric shock.

(Checking the Fan ASSY)

- (1) Open the side covers 1 and 2.
- (2) Loosen the thumbscrew of the Fan ASSY and then pull out the Fan ASSY towards you holding the handle.
After being pulled out, the fan will rotate by inertia for a while before stopping. Check the rotation of the fan. Also the warning lamp (yellow) turns on and the buzzer sounds. Open the front cover and then confirm that FANALM-XX (XX : mounting position) is displayed on the panel.
- (3) Press the **ENT** key on the panel to stop the buzzer.
- (4) Insert the Fan ASSY and then tighten the thumbscrew.
The fan starts rotating and FANRCV-XX (XX : mounting position) is displayed on the panel, while the WARNING LED (yellow) turns off.
- (5) Perform (2) to (4) above for all the Fan ASSYs.
- (6) Close the side covers 1 and 2.

(Checking the Power Fan)

- (1) Check that the Power Fan on the rear of the unit is rotating.

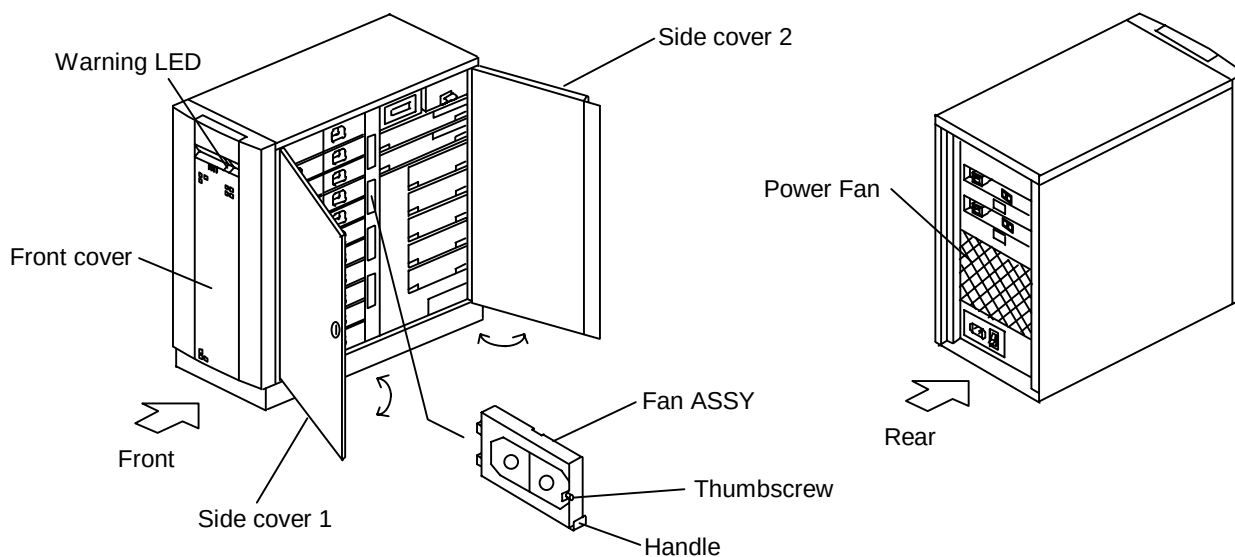
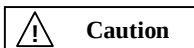


Figure 2.1.1 Checking the Fans of the Mini tower/Cabinet Type

2.2 Checking the Fans of the Rackmount Type (RKH)



Power supply is turned on. Be careful not to touch the live parts to avoid an electric shock.

(Checking the Fan ASSY)

- (1) Remove the front cover and then open the front panel.
- (2) Loosen the thumbscrew of the Fan ASSY and then pull out the Fan ASSY towards you holding the handle.
After being pulled out, the fan will rotate by inertia for a while before stopping. Check the rotation of the fan. Also the WARNING LED (yellow) turns on and the buzzer sounds. Open the front cover and then confirm that FANALM-XX (XX : mounting position) is displayed on the panel.
- (3) Press the **ENT** key on the panel to stop the buzzer.
- (4) Insert the Fan ASSY and then tighten the thumbscrew.
The fan starts rotating and FANRCV-XX (XX : mounting position) is displayed on the panel, while the warning lamp (yellow) turns off.
- (5) Perform (2) to (4) above for all the Fan ASSYs.
- (6) Close the front panel and then attach the front cover.

(Checking the Power Fan)

- (1) Check that the Power Fan on the rear of the unit is rotating.

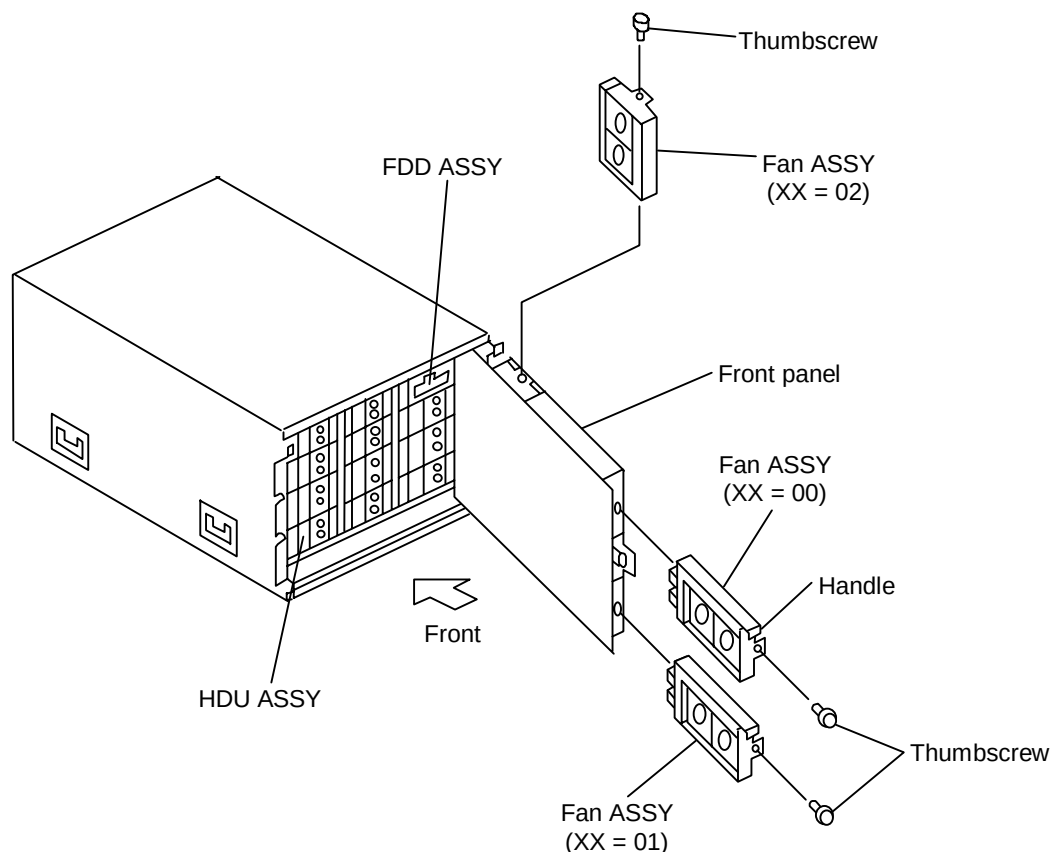
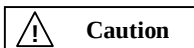


Figure 2.2.1 Checking the Fans of the Rackmount Type (RKH)

2.3 Checking the Fans of the Rackmount Type (RKWH)



Power supply is turned on. Be careful not to touch the live parts to avoid an electric shock.

(Checking the Fan ASSY)

- (1) Check that the Fan ASSYs on the front and rear of the unit are rotating.

If the front bezel is attached on the front of the unit, remove it to check the ASSY.

Open the rear cover for checking the Fan ASSY on the rear of the unit.

(Checking the Power Fan)

- (1) Check that the Power Fan on the rear of the unit is rotating.

(Checking the In Box Fan)

- (1) Check that the In Box Fan on the rear of the unit is rotating.

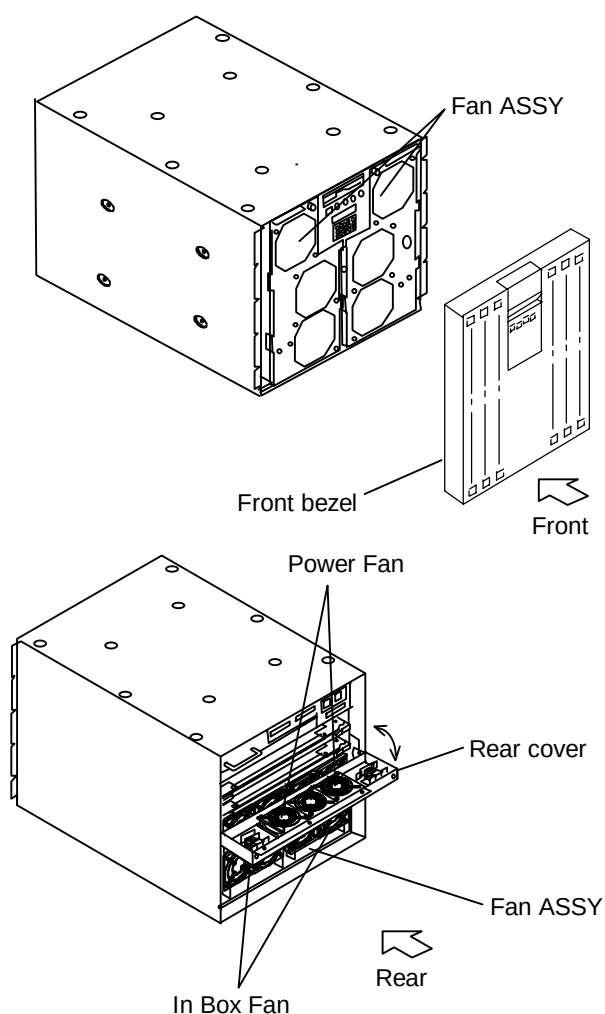
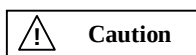


Figure 2.3.1 Checking the Fans of the Rackmount Type (RKWH)

2.4 Checking the Fans of the U1 Rack Frame

(Checking the Fan ASSY)

- (1) Confirm that air blows from each fan in the direction of the arrow shown in Figure 2.4.1. Also check each fan for any abnormal sounds.
- (2) If there is no air blowing, or an abnormal sound is heard, replace the fan with the spare.
For replacement, see RH-REP.



The fan is rotating fast. Do not touch the fan.

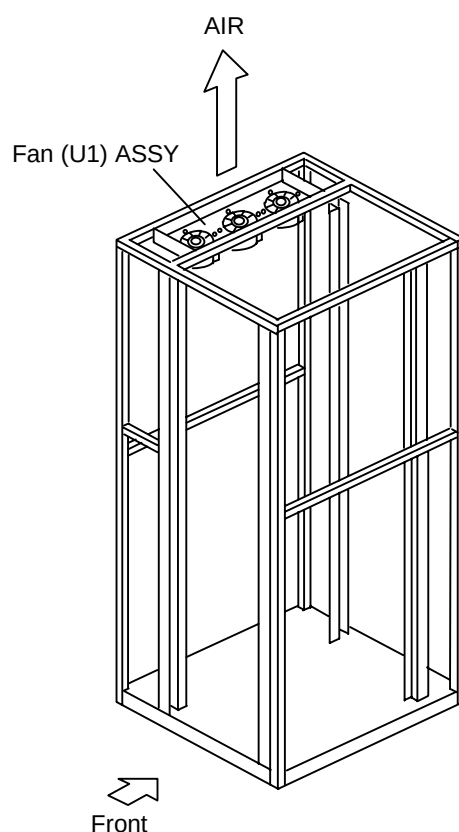


Figure 2.4.1 Checking the Fans of the U1 Frame

3. Cleaning the Front Cover and Rear Panel

Cleaning is a work to confirm if no clogging exists in the route of the cooling air and to remove it when it is found.

Notice : Be sure to keep front cover and rear covers clean. Or else, the ventilation is deteriorated and the temperature inside the unit may rise or even catch fire.

Be careful not to move the subsystem violently not to touch the live parts during cleaning.

- (1) Clean the outside of the front cover.
- (2) For the mini tower or cabinet type, pull the front cover from the right side towards you to open it. For the rackmount type, remove the front cover/bezel.
- (3) Clean the inside of the front cover/bezel.
- (4) For the mini tower or cabinet type, slowly push the front cover to close it. For the rackmount type, attach the front cover/bezel.
- (5) Clean the rear of the unit.

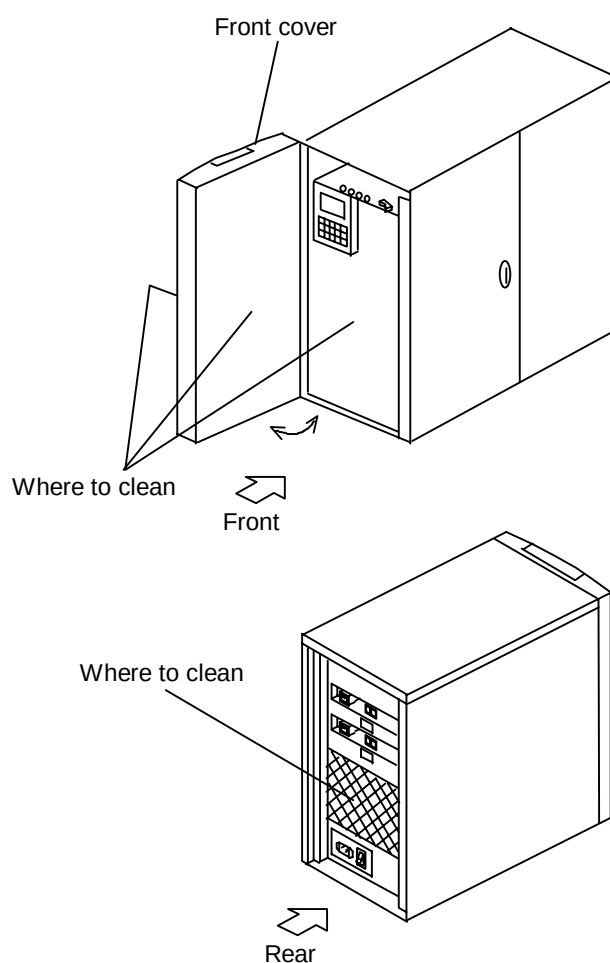
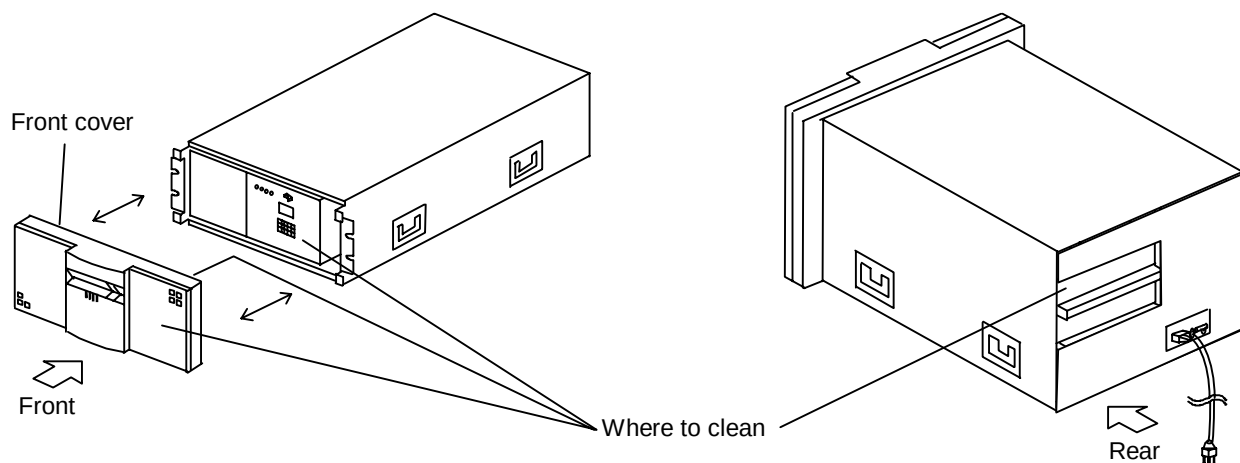
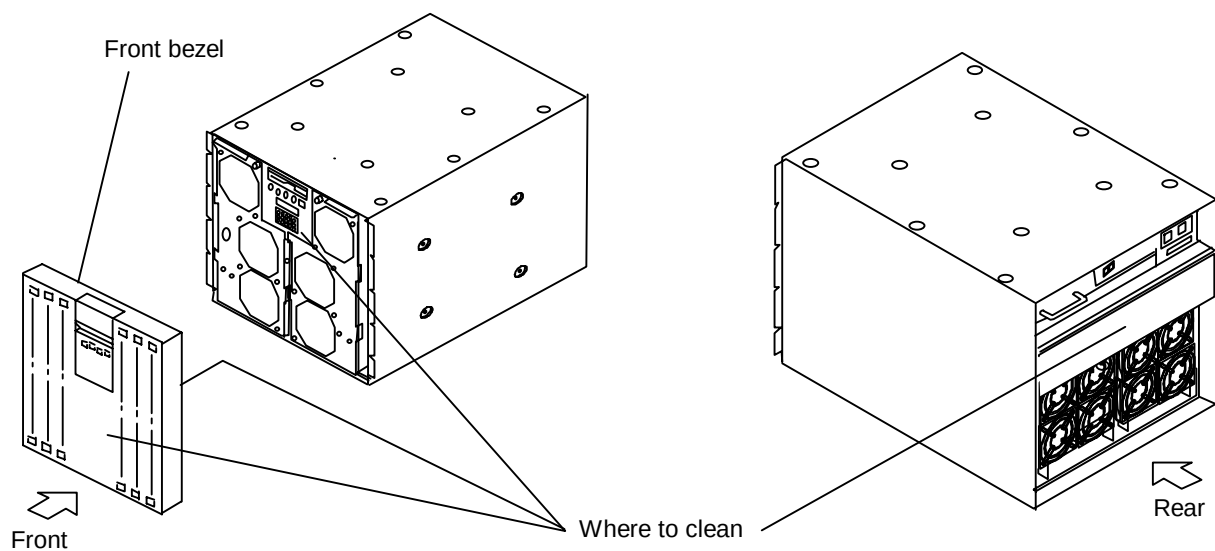


Figure 3.1 For the Mini tower or Cabinet Type



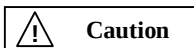
Rackmount Type (RKH)



Rackmount Type (RKWH)

Figure 3.2 For the Rackmount Type

4. Replacing the Battery



Do not disintegrate removed Battery. It may cause burn or electric shock.

For how to replace the battery, see “Replacing the Battery” in Chapter 7 for each type.

The battery can be replaced with the power on. This battery replacement must be performed swiftly. If power trouble such as a momentary interruption occurs while replacing the battery, the user data will be lost.

Alternatively, you can turn off the power to replace the battery. In this case, turn off the power according to the power off procedure and then replace the battery.

Note : The lead-acid battery is a precious resource which can be recycled.

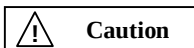
The battery uses lead which is a heavy metal and sulfuric acid which is a deleterious substance. Therefore, never case it off at the place where the replacement of it is done.

When a part is to be replaced or a used product is to be discarded, take out the lead-acid battery to get it recycled.

See page “ENTRY0120” for the safety of depositing and storing the battery.

When the battery ASSY is replaced, power on the subsystem and charge the battery for more than two hours before returning the subsystem to the customer.

5. Checking the Operation of the Unit Alone



Make sure than AC cable is not damaged. It may cause electrck shock or fire.

- (1) Confirm that the circuit breaker (switch on the rear) is off and then connect the AC cable.
- (2) Connect the AC cable to the outlet.

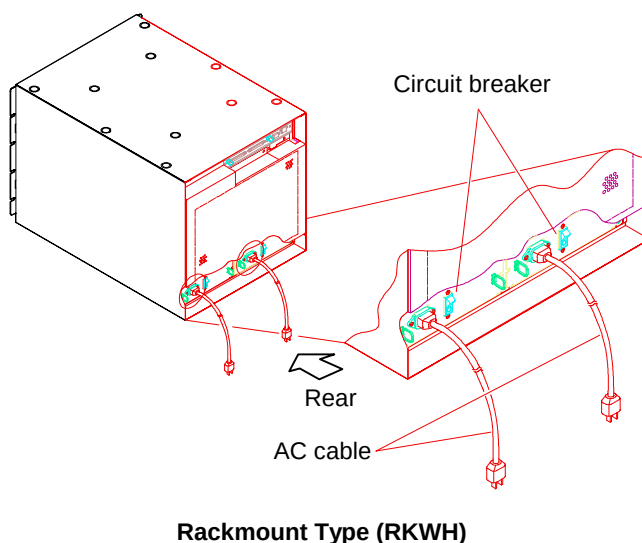
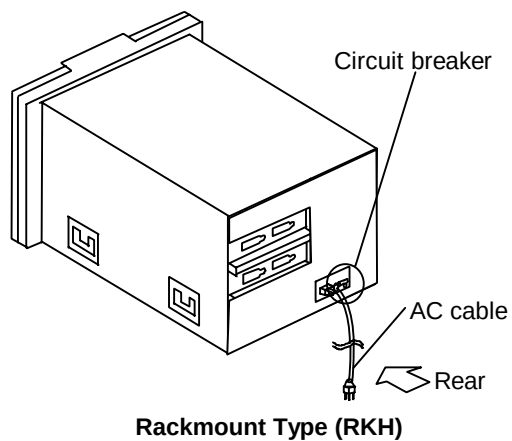
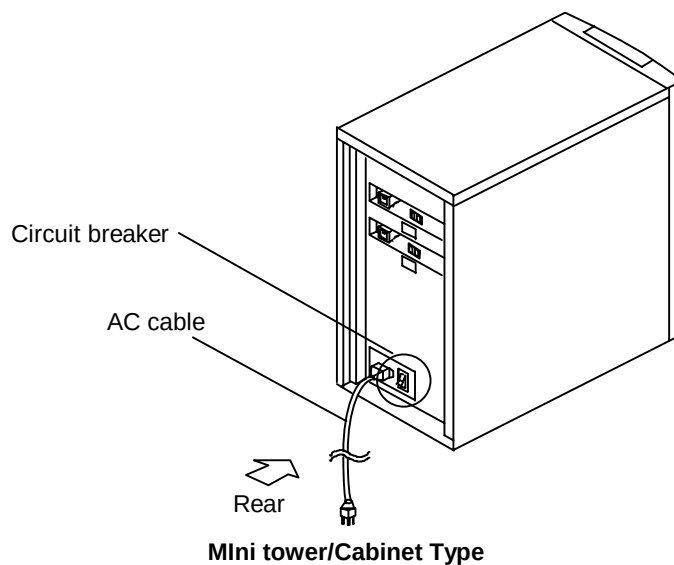
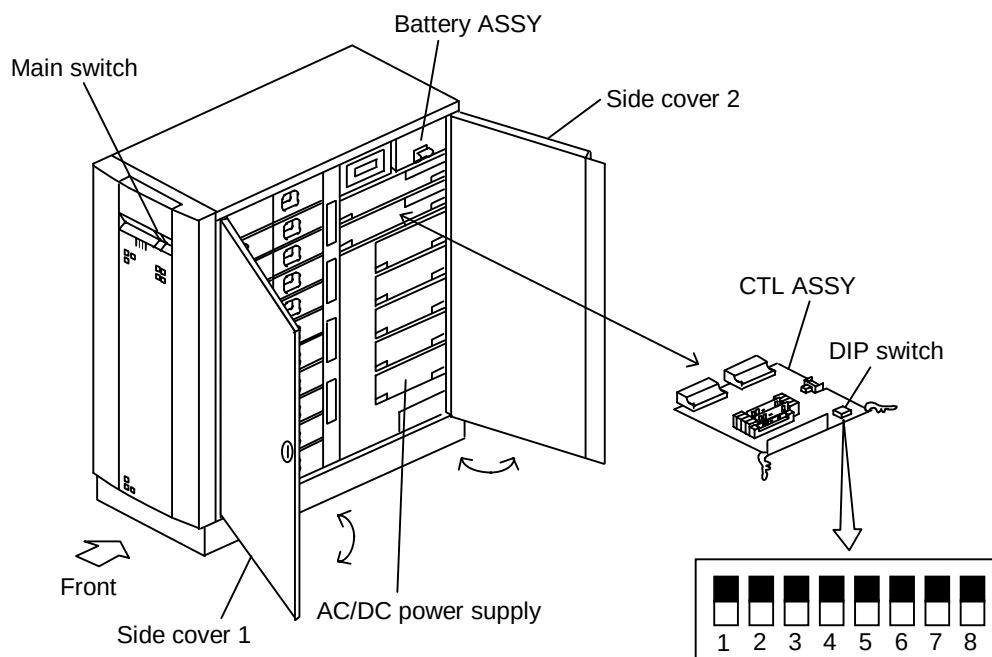


Figure 5.1 Connecting the AC cable(s)

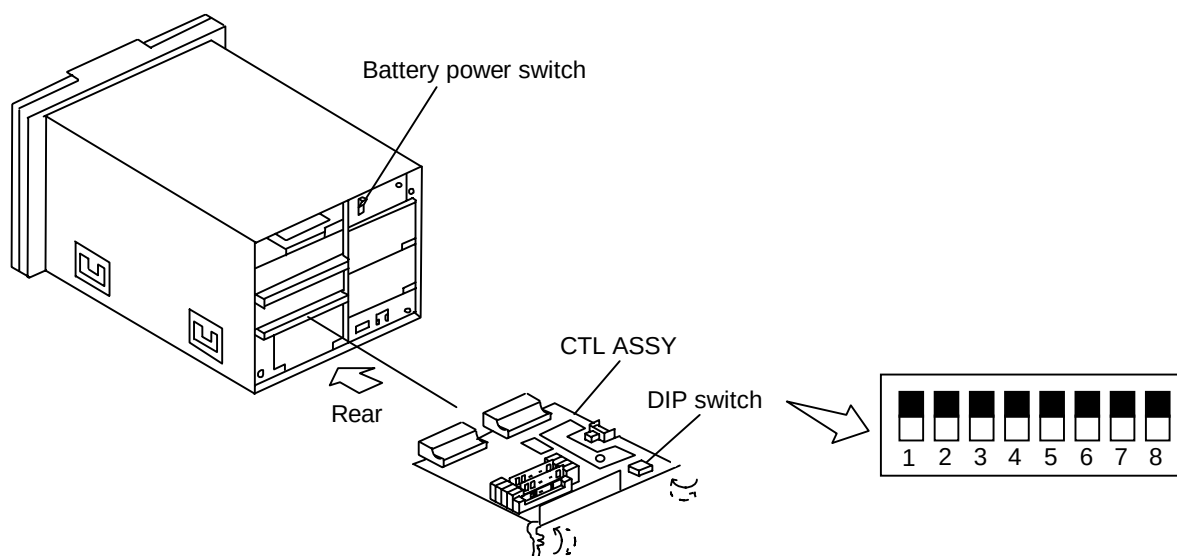
- (3) For the mini tower or cabinet type, open the side covers 1 and 2, confirm that the battery power switch is on and that the main switch is off, and then turn on the circuit breaker.

Open the rear covers 1 and 2 for the rack mount type (RKH), or open the rear cover for the rack mount type (RKWH). Make sure that the battery power switch is on and the main switch is off, then turn on the breaker.

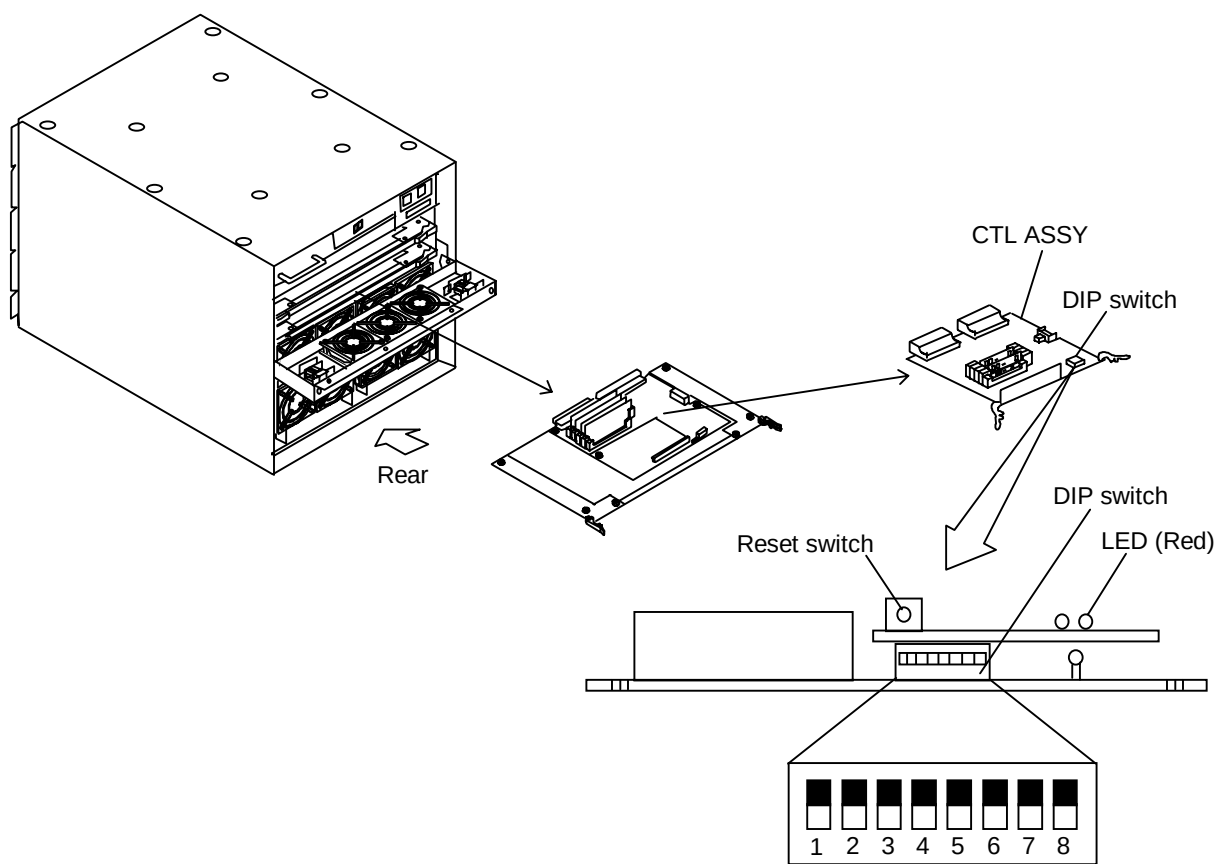
- (4) Check that all DIP switch settings are off (i.e., in the upper positions).



Mini tower/Cabinet Type



Rackmount Type (RKH)



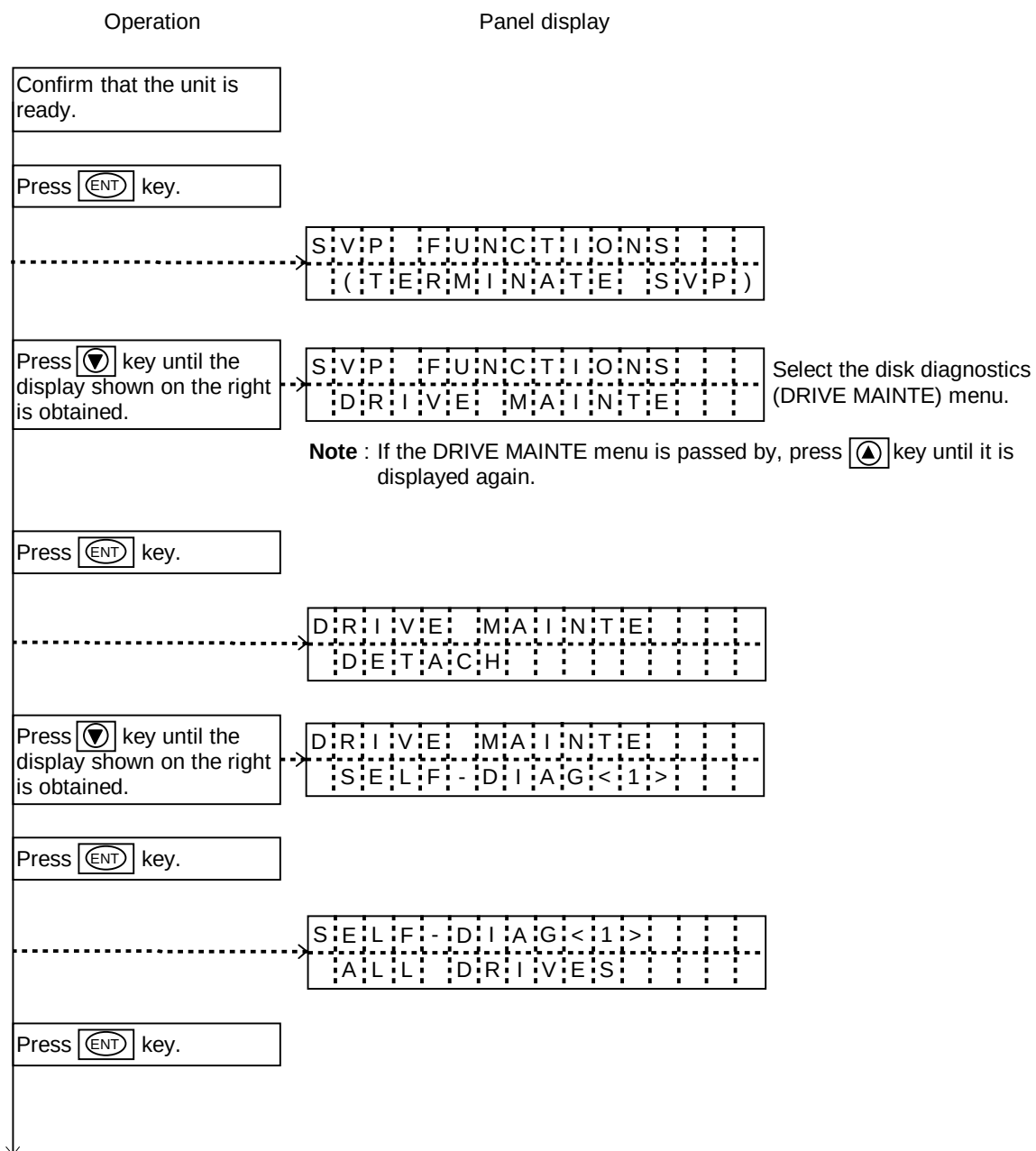
Rackmount Type (RKWH)

Figure 5.2 DIP Switch Settings

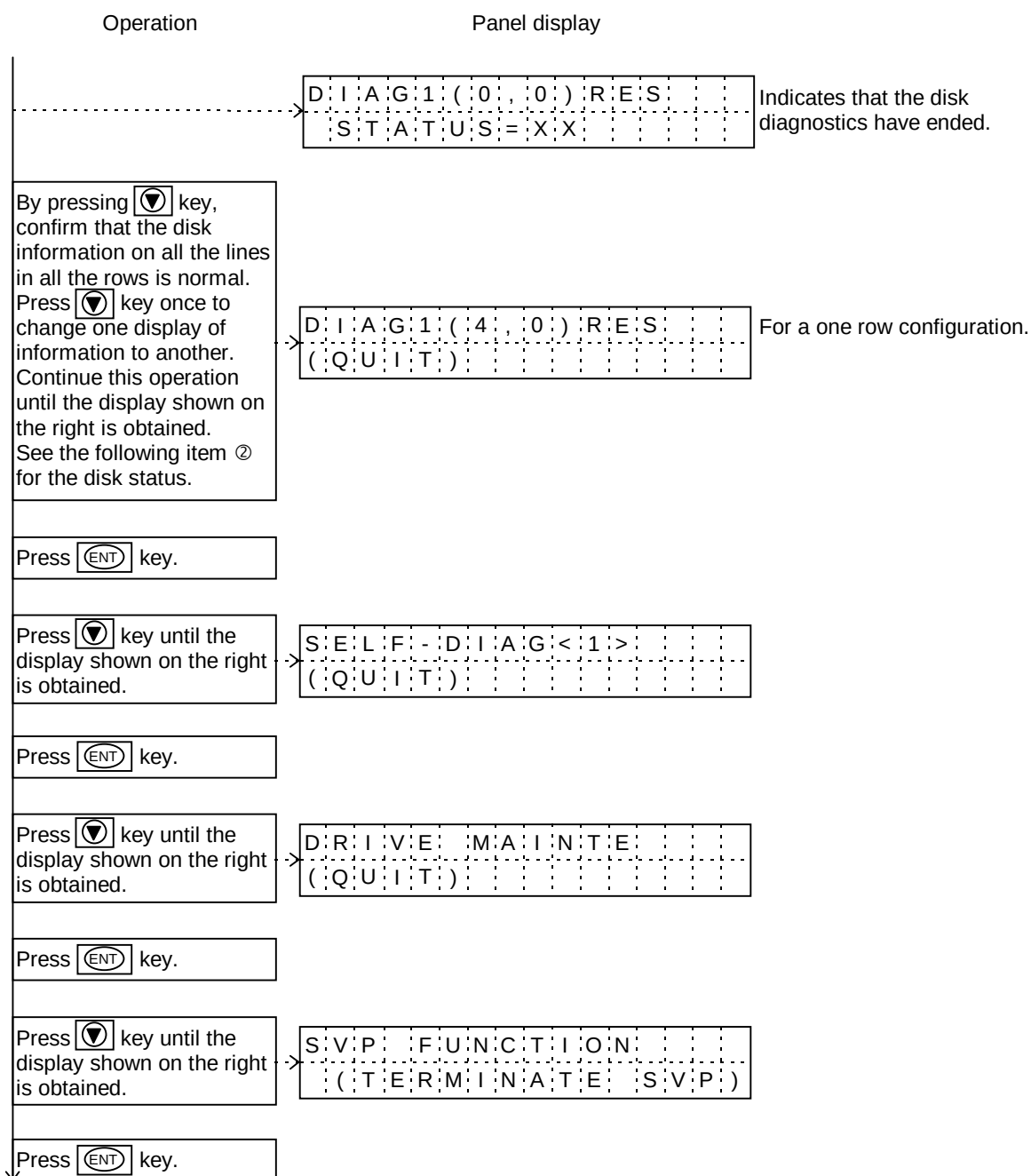
- (5) Turn on the main switch.
- (6) Confirm that the unit becomes ready within one or two minutes. If alarm or warning is lit, see the error display.

- (7) Perform diagnostics on the disks according to the following procedure and confirm that the diagnostics end normally for all the disks.

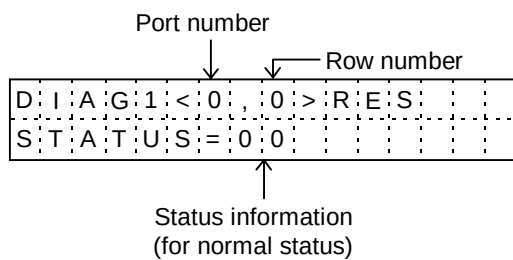
① Perform the following procedure.



[Disk diagnostics on the run]



② Disk status information.



	Status display	Description
Normal	STATUS = 00	
Abnormal	STATUS = 02	Drive check condition : Reinsert the HDU ASSY. If the same status is displayed, replace the HDU ASSY.
	STATUS = 22	Drive I/F time out : Reinsert the HDU ASSY. If the same status is displayed, replace the HDU ASSY.
	STATUS = 80	Hardware error : Reinsert the HDU ASSY. If the same status is displayed, replace the HDU ASSY>

(8) Turn off the main switch and confirm that the power is turned off normally.

DF350F Disk Subsystem

5. MICROPROGRAM-FC

Rev.2

REVISION CONTROL

Legend for revision codes : AD : Addition CH : Change CR : Correction DL : Deletion

REV.	Date	DRW.	CHKD	APPD	Sheet No.	Description	Code
0	Jan.20.'98	A.Yamanashi	K.Aruga	H.Iwasaki	All	Issued	
1	Jul.25.'98	A.Yamanashi	K.Aruga	H.Iwasaki	0020 0030 0050 0110	Added 5. Added case1. Changed flowchart. This page was newly added.	AD AD CH AD
2	Oct.16.'98	A.Yamanashi			0020 0030 0040 0070	Changed title. Changed title and flow chart. Changed title. Changed title.	CH CH CH CH

CONTENTS

1. Flow of Microprogram Update Operations	M-FC0030
2. Update of Microprogram	M-FC0040
3. Update of Flash Program	M-FC0070
4. Confirmation of Flash Program Revision	M-FC0090
5. Disk Failures Isolation Procedure when "PARTIAL COMPLT" Message Is Output.....	M-FC0110

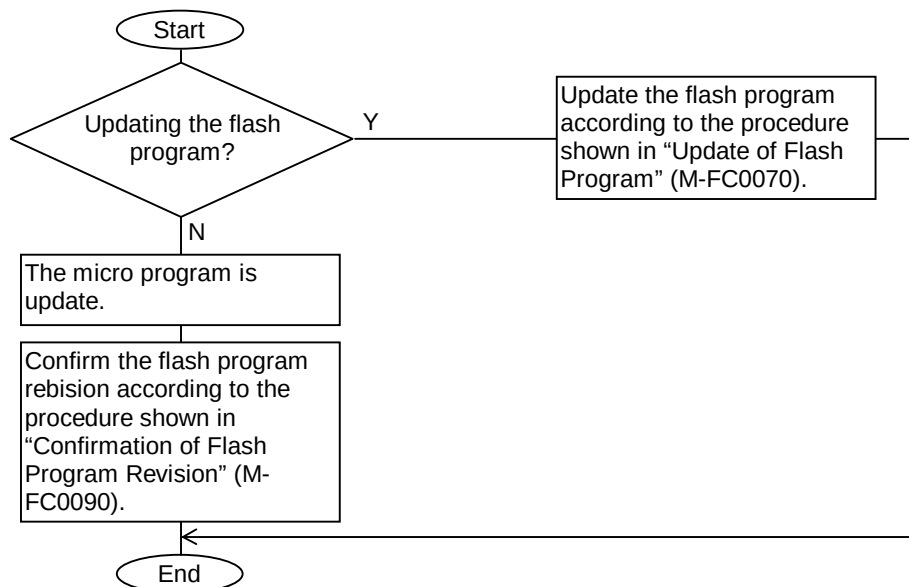
1. Flow of Microprogram Update Operations

When updating either the microprogram or the flash program, it is required to update both of them at the same time depending on their revision numbers. Determine the updating procedure according to the following flowchart, then execute the download.

However, the download shown below cannot be performed.

Case 1 : Downgrade to Ver.0355/B and later and Ver.0354xx and earlier (xx is optional)

(If this downgrade is performed, "HZ0601 STRSIZECHG" is displayed.)



2. Update of Microprogram

Update of Microprogram is used to update the microprogram stored in the disk (ROW0). Four floppy disks are used for downloading.

Note : Be sure that no disk failure is present before updating the microprogram.

- (1) Turn off the power for the unit.
- (2) Set DIP switch No.1 of the CTL ASSY as shown in Figure 2.1. For the location of the DIP switch, see Chapter 2 (THEORY).

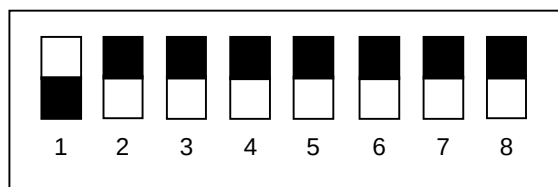
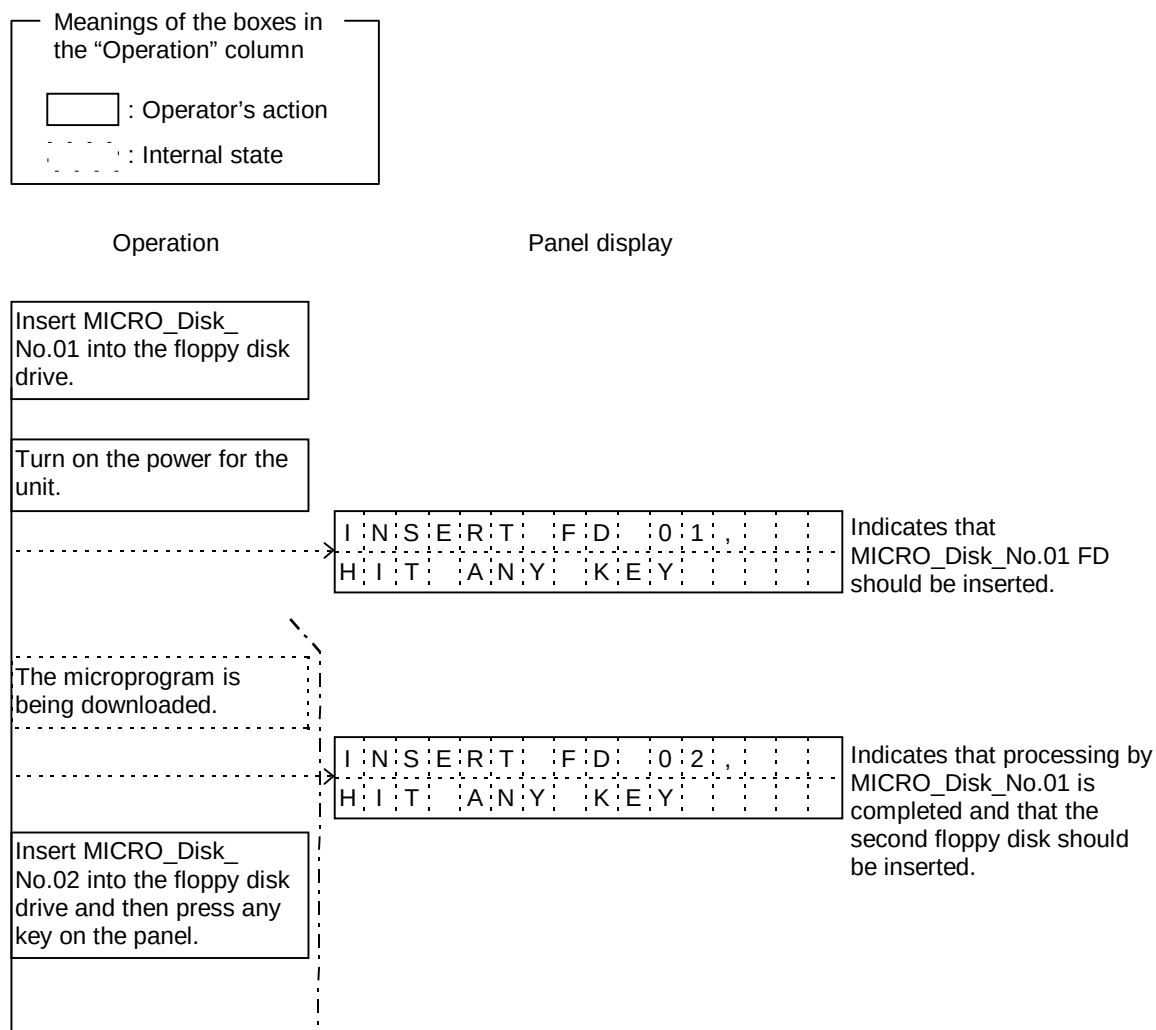
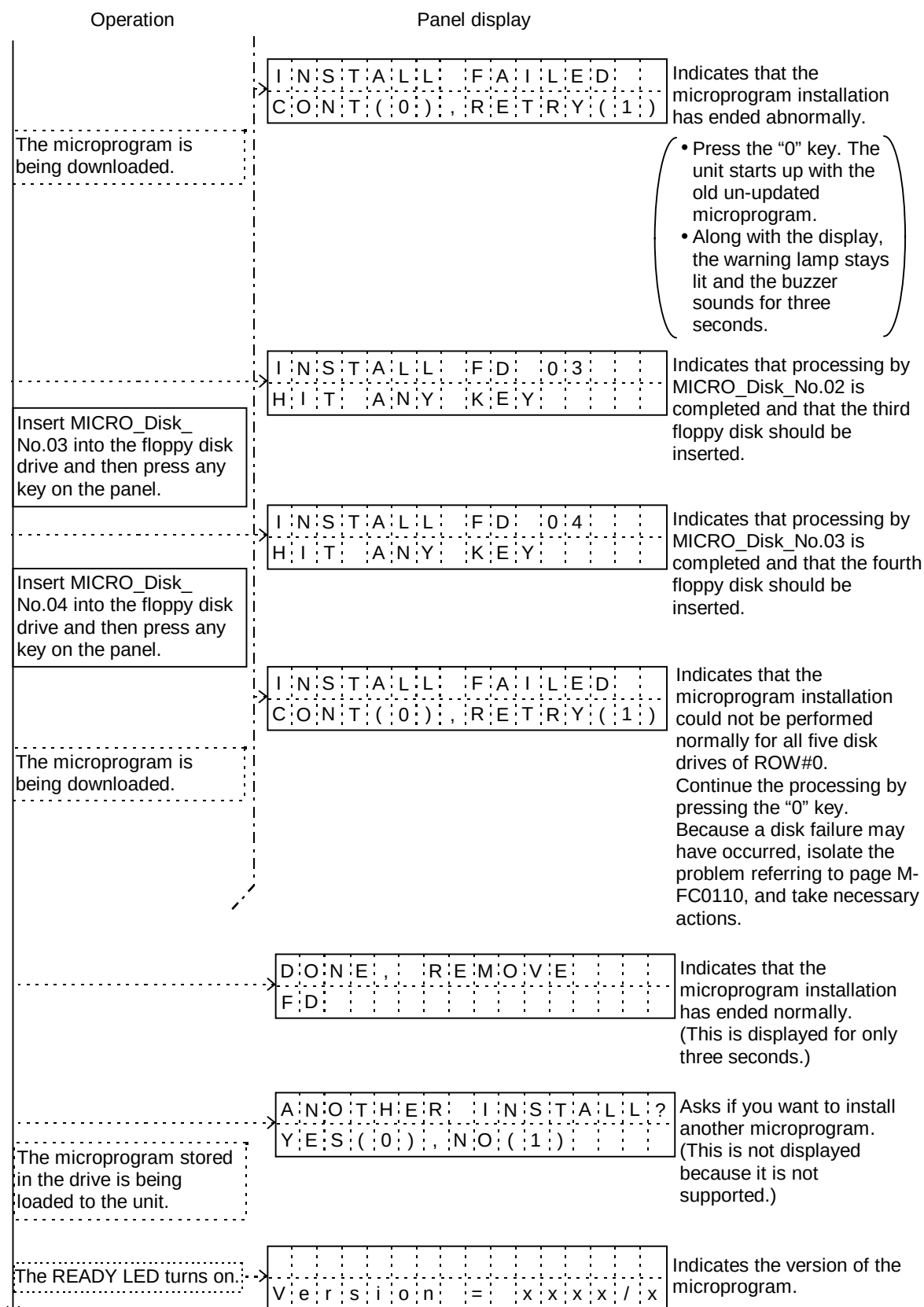


Figure 2.1 DIP Switch Setting

Note : If the dual controller option (DF-F350F-F3MCF/DF-F350F-F3WCF) is installed, use the same settings for both controllers.

- (3) Perform the following procedure.





(4) Set DIP switch No.1 as shown in Figure 2.2.



Figure 2.2 Standard DIP Switch Settings

Note : If the dual controller option (DF-F350F-F3MCF/DF-F350F-F3WCF) is installed, use the same settings for both controllers.

3. Update of Flash Program

Update of flash program is used to update the firmwear stored in the FLASH Memory. One floppy disk is used for downloading.

- (1) Turn off the power for the unit.
- (2) For the dual system, one procedure takes effect for only one system. Remove the CTL ASSY in the other system. (CTL does not need to be blocked.)
- (3) Set DIP switch No.1 of the CTL ASSY as shown in Figure 3.1. For the location of the DIP switch, see Chapter 2 (THEORY).

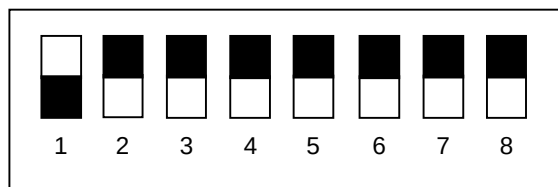
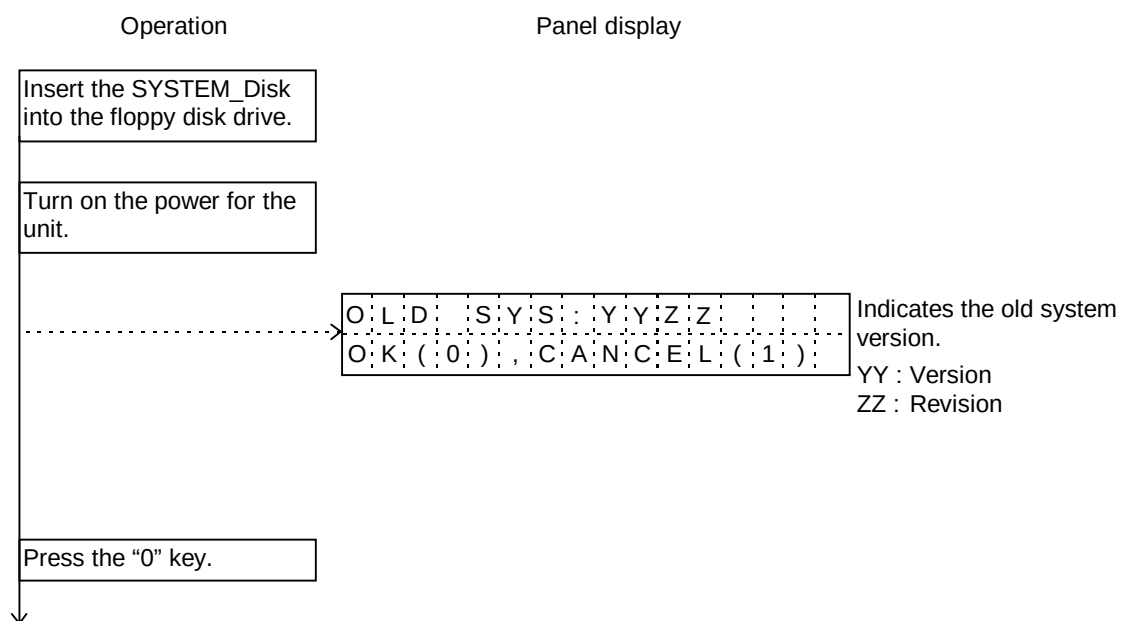
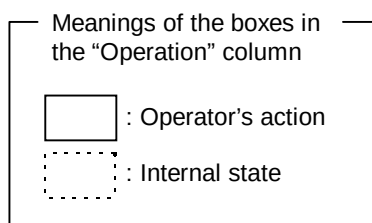
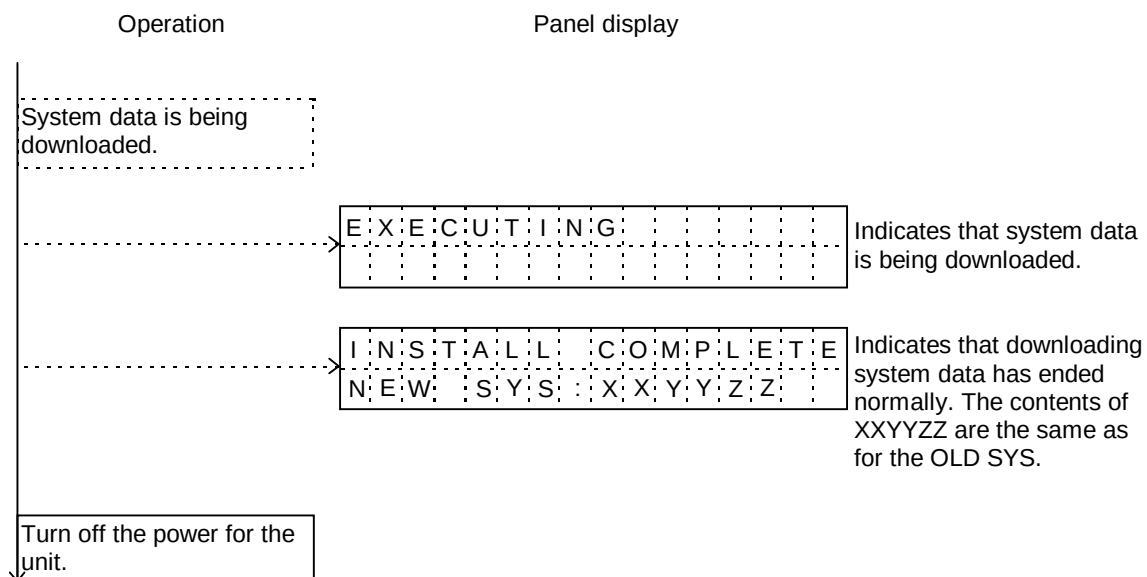


Figure 3.1 DIP Switch Setting

- (4) Perform the following procedure.





Note : To cancel downloading system data, press "1" (QUIT) with the screen displaying OLD SYS.
The following is displayed.

C	A	N	C	E	L	E	D								
R	E	M	O	V	E	D	F	D							

Remove the SYSTEM_Disk from the floppy disk drive and then turn off the power for the unit.

- (5) Set DIP switch No.1 as shown in Figure 3.2.

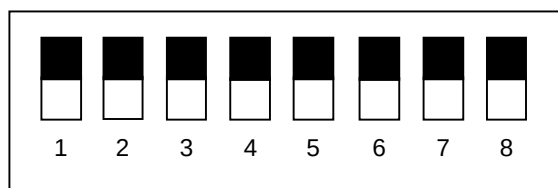


Figure 3.2 Standard DIP Switch Settings

- (6) Mount the removed CTL ASSY in the original location.
 (7) For the dual system, mount the removed CTL ASSY, remove the CTL ASSY that has the system data already downloaded, and then repeat steps (3), (4), (5) and (6) in order.

4. Conformation of Flash Program Revision

Perform the following procedure.

- (1) Turn off the power for the unit.
- (2) Set DIP switch No.4 of the CTL ASSY as shown in Figure 4.1. For the location of the DIP switch, see Chapter 2 (THEORY).

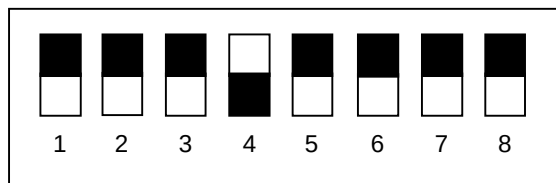
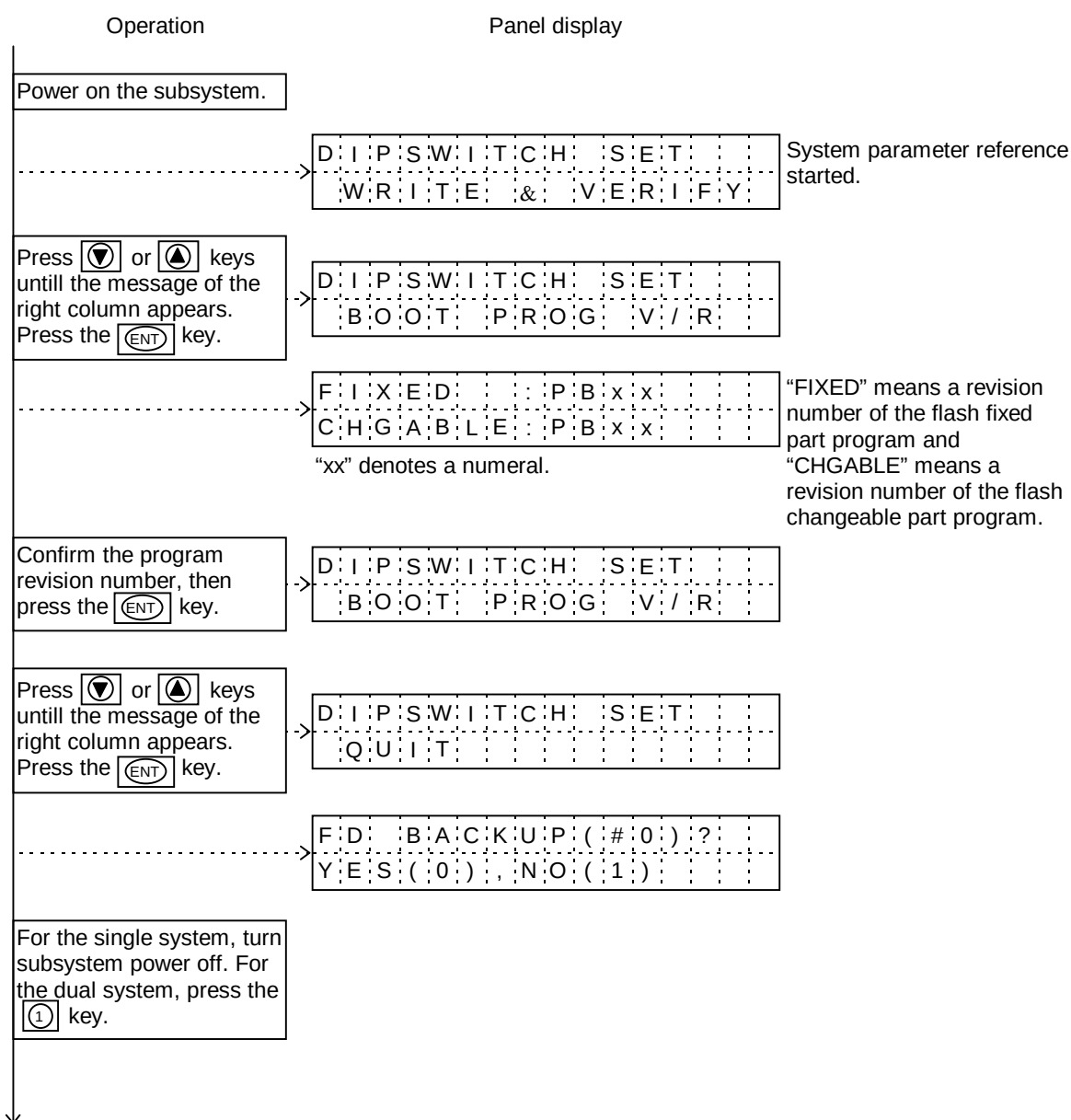
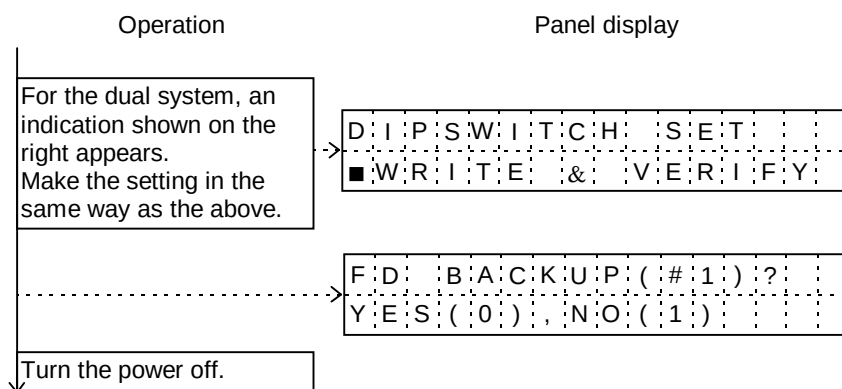


Figure 4.1 DIP Switch Settings for Download Program

Note : If the dual controller option (DF-F350F-F3MCF/DF-F350F-F3WCF) is installed, use the same settings for both controllers.

- (3) Perform the following procedure.





(4) Set DIP switch No.4 as shown in Figure 4.2.

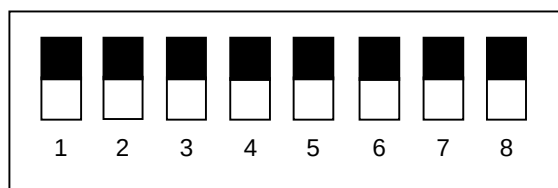


Figure 4.2 Standard DIP Switch Settings

Note : If the dual controller option (DF-F350F-F3MCF/DF-F350F-F3WCF) is installed, use the same settings for both controllers.

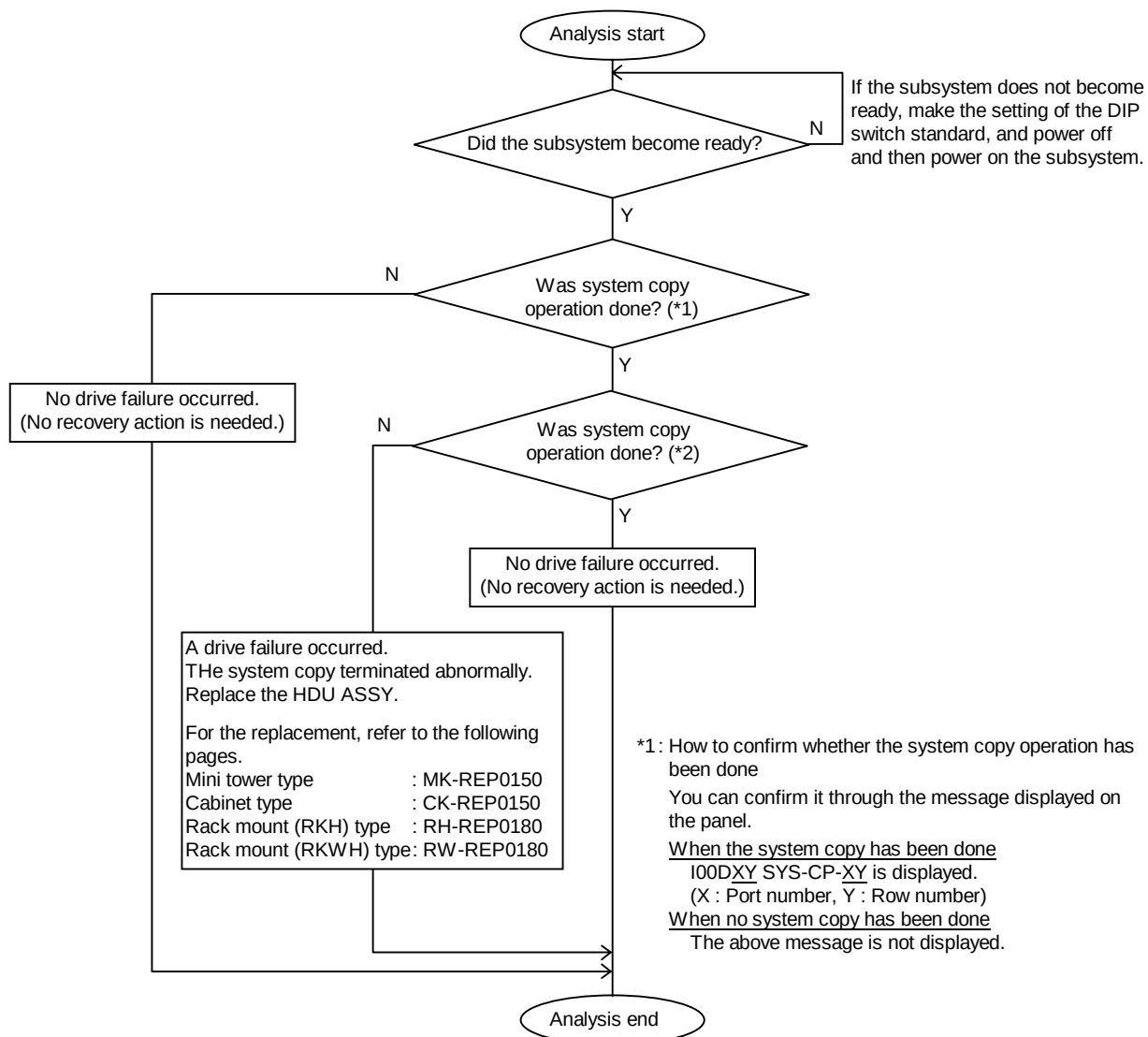
5. Disk Failures Isolation Procedure when “PARTIAL COMPLT” Message Is Output

The subsystem outputs “PARTIAL COMPLT” message on the panel when one of the following states are detected.

① 5 disks are not installed in the Row 0.

② There in one or more disk which failed the program installation.

Since the case ① is not a failure, no recovery action is needed. In the case ②, a drive failure may have occurred. Therefore, analyze the problem in the following procedure and take necessary actions.



*1: How to confirm whether the system copy operation has been done

You can confirm it through the message displayed on the panel.

When the system copy has been done

I00DXY SYS-CP-XY is displayed.

(X : Port number, Y : Row number)

When no system copy has been done

The above message is not displayed.

*2: How to confirm the status of system copy termination

You can confirm it through the message displayed on the panel. (Be careful because the ALARM LED on the HDU ASSY does not come on when the system copy terminates abnormally.)

When the system copy terminates normally

I00DXY SYS-CP-XY

I00EXY SYSRCV-XY

(X : Port number, Y : Row number)

When the system copy terminates abnormally

I00DXY SYS-CP-XY

I00FXY SYSFLT-XY

(X : Port number, Y : Row number)

System copy may have been done in two or more drives. Make the confirmation using the  or  key.

DF350F Disk Subsystem

6. PANEL

Rev.2

REVISION CONTROL

Legend for revision codes : AD : Addition CH : Change CR : Correction DL : Deletion

REV.	Date	DRW.	CHKD	APPD	Sheet No.	Description	Code
0	Jan.20.'98	A.Yamanashi	K.Aruga	H.Iwasaki	All	Issued	
1	Jul.31.'98	A.Yamanashi	K.Aruga	H.Iwasaki	0080	Changed sentence 'This item No.s... '.	CH
2	Oct.16.'98	A.Yamanashi			0080 0090 0190 0200 0240	Added No.9, 10. Added *4./Deleted No.9, 10. Deleted (15). Added (15). Changed Note.	AD AD/ DL DL AD CH

CONTENTS

1. Panel Configuration.....	PANEL0030
2. Panel Feature.....	PANEL0060
3. Panel Operation	PANEL0070
3.1 Message Display.....	PANEL0070
3.2 System Parameter Setting	PANEL0080
3.2.1 System parameter setting procedure (basic).....	PANEL0100
3.2.2 System parameter setting.....	PANEL0120
3.3 Configuration Information (SVP) Setting.....	PANEL0260
3.3.1 SVP operation procedure	PANEL0280
3.3.2 Configuration information (SVP) setting	PANEL0290
3.4 Panel Tree Structure.....	PANEL0800

1. Panel Configuration

Figure 1.1 shows the panel configuration.

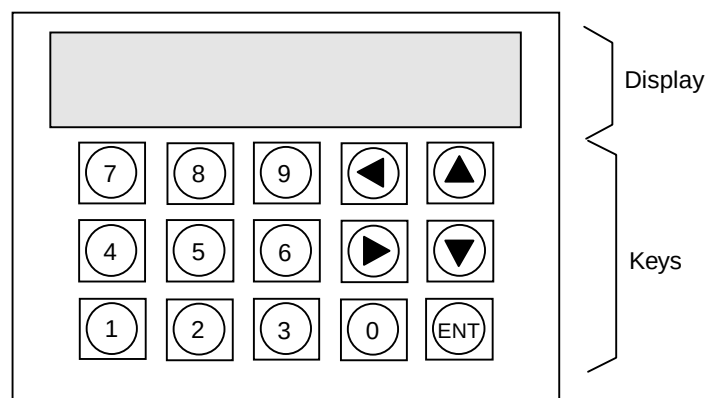
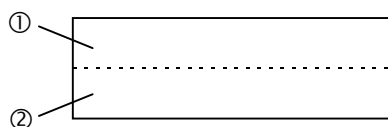


Figure 1.1 Panel Configuration

(1) Display

There are two types of display format: display formats 1 and 2. The display format 1 is used for progress, warning, or fault messages. The other messages use the display format 2.

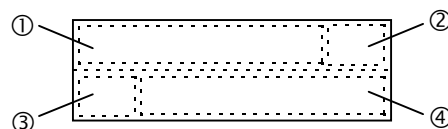
Display format 1



A variety of messages may be displayed with this format. One message may use one or two lines.

- For the message displayed with one line
“①” the message just before the latest message
“②” latest message

Display format 2



① Menu title

There are two kinds of menu title described below.

[DIPSWITCH SET]

For setting the target ID, buzzer, etc.

[SVP FUNCTION]

For the operations other than described above.

② Warning

A hatch mark “#” indicates that a message has occurred in the host command processing during panel operation.

③ Current setting

An asterisk “*” indicates the item currently set.

④ Menu item/parameter value

This indicates the menu item or the parameter value entered from the panel.

(2) Keys

Use the following keys for panel operation.

-  -  : Used for entering the parameter values.
 : Used for determining the menu or the input parameter.
  : Used for determining the parameter input position.
  : Used for selecting the menu.

There are three methods of entering parameters using the ten keys from  to . The first method is entering the decimal numbers; the second is entering the hexadecimal numbers; and the third is entering the characters. The following are examples of these methods.

① Entering the decimal numbers

For entering the IP address : 012.345.678.901.

I	P	A	D	D	R	E	S	S											
a	a	a	.	b	b	b	.	c	c	c	.	d	d	d	.				

Enter "012" into "aaa", "345" into "bbb", "678" into "ccc", and "901" into "ddd".

② Entering the hexadecimal numbers

For setting the last LBA information : (3E696B)16

R	O	L	A	S	T	L	B	A	a	a	.								
						0	0	3	E	6	9	6	B	.					

↑ Cursor position

"aa" represents the decimal value for the hexadecimal number on the cursor position. When "00" is entered into "aa", the two digits of the input decimal number on the second line is converted into the hexadecimal value, then "0" is displayed.

For entering (003E696B)16, enter "00", "00", "03", "14", "06", "09", "06", and "11" in decimal numbers into "aa". Then "003E696B" is displayed on the second line to confirm the hexadecimal value.

③ Entering the characters

For VENDOR : HITACHI

V	E	N	D	O	R				a	a	b	b	.						
						H	I	T	A	C	H	I	.						

↑ Cursor position

"aa" represents the decimal value for the higher order hexadecimal digit of the character code on the cursor position. "bb" represents the decimal value for the lower order hexadecimal digit of the character code on the cursor position. When entering "04" into "aa" and "08" into "bb", these values are converted into "48" in hexadecimal numbers. Further, "48" is converted into the ASCII code to display "H" on the second line.

When entering HITACHI, enter "0408", "0409", "0504", "0401", "0403", "0408", and finally "0409" into "aabb". These decimal numbers are converted into a hexadecimal value, and then converted into the ASCII codes, so that "HITACHI" is displayed on the second line for confirming the input characters.

Table 1.1 ASCII Codes

		Higher order							
Lower order		0	1	2	3	4	5	6	7
	0	NUL	DLE	SP	0	@	P	\	p
	1	SOH	DC1	!	1	A	Q	a	q
	2	STX	DC2	"	2	B	R	b	r
	3	ETX	DC3	#	3	C	S	c	s
	4	EOT	DC4	\$	4	D	T	d	t
	5	ENQ	NAK	%	5	E	U	e	u
	6	ACK	SYN	&	6	F	V	f	v
	7	BEL	ETB	'	7	G	W	g	w
	8	BS	CAN	(	8	H	X	h	x
	9	HT	EM	)	9	I	Y	i	y
	A	NL	SUB	*	:	J	Z	j	z
	B	VT	ESC	+	;	K	[	k	{
	C	FF	FS	,	<	L	\	l	
	D	CR	GS	-	=	M	]	m	}
	E	SO	RS	.	>	N	^	n	~
	F	SI	US	/	?	O	_	o	DEL

(3) Message display

One display is provided for the two controllers. You can determine which of the two controllers displayed the message as follows.

Example 1)

Message from the controller No.0 : The first (left most) character is in uppercase.

Message from the controller No.1 : The first (left most) character is in lowercase.

Controller No.0 : DIPSWITCH SET

Controller No.1 : dIPSWITCH SET

For the dual controllers, the menu title with the display format 2 is displayed as indicated above. (For the panel operation messages, the first (left most) character is always in uppercase regardless of the controller No.)

For the single controller, the first (left most) character is always in uppercase.

Example 2)

“■” appears on the panel when the CTL1 system parameter is to be set.

“■” not displayed : CTL0 system parameter is set.

“■” displayed : CTL1 system parameter is set.

D	I	P	S	W	I	T	C	H	S	E	T		
R	O	M		R	E	S	P		M	O	D	E	



This indicates CTL0 system parameter setting.

D	I	P	S	W	I	T	C	H	S	E	T		
■	R	O	M		R	E	S	P		M	O	D	E



This indicates CTL1 system parameter setting.

2. Panel Feature

The panel feature has the following three broad functions.

- (1) Message display
- (2) System parameter (DIP SWITCH) setting
- (3) Configuration information (SVP) setting

The following describes an overview of each of these three functions.

No.	Name	Function	Remarks
1	Message display	(1) Unit status message There are following four kinds of messages which are automatically displayed by the unit. ① Progress message : Reports the completion of recovery operation. ② Warning message : Reports a hardware failure which does not cause the unit to be inoperable. ③ Fault message : Reports a fatal failure which causes the unit to be inoperable. ④ CUDG message : Reports a failure detected by the diagnostic processing of the unit. (2) Panel operation message The operation and error messages are displayed on the panel during panel operation.	
2	System parameter (DIP SWITCH) setting	Sets the system parameters including the IP address, target (this unit) ID, and other system parameters, etc. Upon installation and sets to make back-up of the system parameters on a floppy disk or restore them.	See Section 3.2.
3	Configuration information (SVP) setting	Sets the RAID group, LU, LU format, and disk recovery, etc.	See Section 3.3.

3. Panel Operation

3.1 Message Display

(1) Unit status message

Upon detection, the progress, warning, fault, or CUDG message is automatically displayed on the panel by the unit.

The unit stores up to 10 messages to allow viewing of earlier messages. To view these messages, press  key on the panel.

Each time  key is pressed, a previous message is displayed. (To return to the latest message, press  key.)

(2) Panel operation message

The operation and error messages during panel operation are displayed on the panel.

See the “Installation” or “Extended Option” section for details about the operation messages.

Table 3.1 shows error messages displayed when using the panel feature. These messages are displayed on the menu title column. To recover an error, see the “Troubleshooting” section.

Table 3.1 Error Message

No.	Message	Description												
1	#REENTER	Reenter the value because the entered value has an invalid specification.												
2	#NO EFFECT	The processing has been executed but no data specified can be found. Example) An attempt was made to display the defined logical unit but no logical unit has been defined.												
3	#RESERV. CONF.	The logical unit #0 is reserved for the other host so that the processing has been suspended.												
4	#CHK (@@ - YYYY)	An error has occurred during processing so that the processing has been suspended. @@ : Sense key (error classification) YYYY : Sense code (error in detail) The values indicated with @@ and their contents are as follows. <table><tr><td>Value</td><td>Contents</td></tr><tr><td>NR</td><td>NOT READY</td></tr><tr><td>ME</td><td>MEDIUM ERROR</td></tr><tr><td>HE</td><td>HARDWARE ERROR</td></tr><tr><td>IR</td><td>ILLEGAL REQUEST</td></tr><tr><td>AC</td><td>ABORTED COMMAND</td></tr></table>	Value	Contents	NR	NOT READY	ME	MEDIUM ERROR	HE	HARDWARE ERROR	IR	ILLEGAL REQUEST	AC	ABORTED COMMAND
Value	Contents													
NR	NOT READY													
ME	MEDIUM ERROR													
HE	HARDWARE ERROR													
IR	ILLEGAL REQUEST													
AC	ABORTED COMMAND													
5	#FD : NOT READY	The floppy disk is incorrectly inserted.												
6	#FD : FORMAT ERR	The floppy disk inserted is incorrectly formatted.												
7	#FD : WRITE-PTD	The floppy disk inserted is write protected.												
8	#FD : □□□□□□□□□□	An error has occurred during input/output to the floppy disk so that the processing has been suspended. “□□□□□□□□□□” indicates details about the error.												
9	#FD : DESCRI.ERR	The file in the floppy disk contains a wrong description, or no file exists on the floppy disk.												
10	#INTERRUPT	The slave CTL processing has been suspended. (The CTL has been reset or blocked.)												

3.2 System Parameter Setting

Set the parameter for the controller configuration and controller processing mode. Execute this function by setting the DIP switch No.4 on the CTL ASSY to "ON" to turn on the controller.

For the dual controller configuration, use of the system parameter setup menu selects the same setup for the both controllers or the setup for each controller. (When the "same setup for both controller" menu is selected, setup for one controller is reflected to the other controller.)

The menu items and their usage are as follows.

(The item No.s 1, 3, 7, 10, 13, and 17 in the following table must be set for each controller.)

No.	Menu item	Usage	Contents		Factory setting
			Parameter	How to set	
1	WRITE & VERIFY	Specifies the write and verify execution mode.	ON : Does not inhibit the write and verify execution mode. OFF : Inhibits the write and verify execution mode.	Select	ON
2	STRIPE SIZE	Specifies the data striping size.	16KB : Stripes the data in 16kbytes. 32KB : Stripes the data in 32kbytes. 64KB : Stripes the data in 64kbytes.	Select	64KB
3	LAN CONST	Specifies the LAN configuration information. ① CONNECT LAN Specifies whether or not the LAN board is mounted.	CONNECT : LAN board is mounted. NOT CONNECT : LAN board is not mounted.	Select	Depending on the configuration from the factory
		② IP ADDRESS Sets the IP address.	Enters the numerical value using the panel keypad.	Enter	000.000.000.000
		③ SUB NET MASK	Enters the numerical value using the panel keypad.	Enter	000.000.000.000
		④ DEFAULT GATEWAY	Enters the numerical value using the panel keypad.	Enter	000.000.000.000
		⑤ ETHER ADDRESS (*1)	Enters the numerical value using the panel keypad.	Only for reference	???????????
4	CONNECT VMS	Specifies whether or not the VMS is connected.	CONNECT : Connects the VMS. NOT CONNECT : Does not connect the VMS.	Select	NOT CONNECT
5	SPECIAL CONNECT (*2)	Specifies the emulation mode.	OPEN SYSTEM : Open system emulation mode ALTERNATE PATH3 : TRESPASS mode	Select	OPEN SYSTEM
6	HOST BLK SIZE	Specifies the drive format size.	512B : The drive format size is 512bytes per block.	fixed	512B
7	ERROR INF	Specifies the error information send mode for the RS232C.	OFF : Inhibit outflow of information. ON (NORMAL) : Does not inhibit outflow of information. ON (HITRACK) : Does not inhibit outflow of information for the HITRACK.	Select	Depending on the unit's factory setting (OFF for Japan)
8	CONTROLLER	Specifies the controller type.	MINI TOWER : Mini tower (MK) HIGH RACK MOUNT : Rackmount (RKH) CABINET, RACK : Cabinet type (CK), Rackmount (RKWH)	Select	Depending on the configuration from the factory
9	SPARE DISK	Specifies whether or not the spare disk is mounted.	EXISTENCE : Spare disk mounted NOTHING : Spare disk not mounted	Select	Depending on the configuration from the factory
10	SERIAL NO	Specifies the serial No. of the controller.	Enters the numerical value using the panel keypad.	Enter	

*1 Changing the ETHER ADDRESS with this menu is impossible after shipment.

*2 This menu can be used in the Flash Program Ver.PE24 and later.

No.	Menu item	Usage	Contents		Factory setting
			Parameter	How to set	
11	ROM V/R	Specifies the ROM microprogram revision.	Enters the numerical value using the panel keypad.	Enter	Revision from the factory
12	RAM V/R	Specifies the RAM microprogram revision.	Enters the numerical value using the panel keypad.	Enter	Revision from the factory
13	CONTROLLER NAME	Sets the controller identifier.	DISABLE : Setting of the controller identifier is invalid. ENABLE : Setting of the controller identifier is valid. CTL NAME : Controller identifier.	Select	DISABLE
14	ROW LAST LBA (*3)	Specifies the capacity that a single drive uses (for each ROW).	Enters the numerical value using the panel keypad.	Enter	Depending on the configuration from the factory
15	BUZZER	Specifies whether or not the buzzer sounds when displaying the warning or fault message.	ENABLE : Buzzer sounds. DISABLE : Buzzer does not sound.	Select	ENABLE
16	SYSTEM ERROR	Specifies the operation if the processor failure occurs.	AUTO RESET : Resets a fault. SYSTEM DOWN : Shutdown the system.	Select	AUTO RESET
17	INQUIRY INF	Specifies the vendor name, model name, and command queuing.	VENDOR TYPE : Vendor name PRODUCT TYPE : Model name COMMAND QUEUING : Command queuing ON : Executes the command queuing. OFF : Inhibits the command queuing.	Enter Enter Select	VENDOR TYPE = HITACHI PRODUCT TYPE = DF350F COMMAND QUEUING = ON
18	DUAL CONFIG	Specifies the system startup attribute.	SINGLE MODE : Single system attribute DUAL MODE : Dual system attribute DUAL ACTIVE : Dual stand-by configuration setting HOT STAND-BY : Hot stand-by configuration setting DATA SHARE MODE : Data share mode attribute OFF : Not used in the Data share mode (DISABLE) ON : Used in the Data share mode (ENABLE)	Select	Depending on the configuration from the factory
19	SYS REV	Limit the revision Nos. of installing system.	Displays the startup program revision.	—	“0354”
20	OPTION (*4)	Specifies the optional function when using it.	Enters the option code using the panel keypad.	Enter	“0000”
21	BOOT PROG V/R	Displays the startup program revision.	Displays the startup program revision.	—	
22	RTC SET	Sets the internal clock.	Enters the time using the panel keypad.	Enter	Year, month, day, day of the week, hour, minute, second
23	QUIT	Terminates the parameter input.	Enters using the panel keypad.	Enter	

*3 The ROW LAST LBA is displayed for setting the capacity that a single drive uses. Sets the capacity according to the menu displayed.

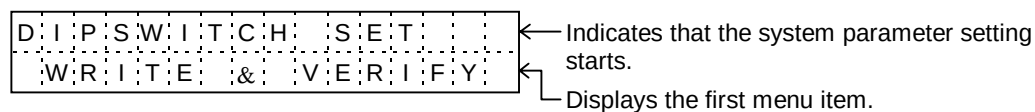
*4 When the HP is connected, set the both CTL ASSYs option code to “0008”.
When the SUN is connected, set the both CTL ASSYs option code to “1000”.

3.2.1 System parameter setting procedure (basic)

Procedure 1 : Starts the system parameter setting

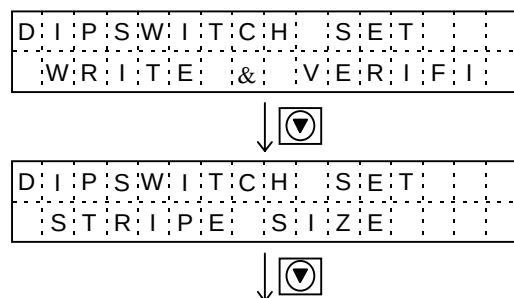
Setting the DIP switch No.s 4 and 6 to "ON" turns on the controller.

The following message is displayed on the panel.



Procedure 2 : Selects the menu item

Press  key once to display the next menu item. Continue pressing this key until you get to the menu item desired.

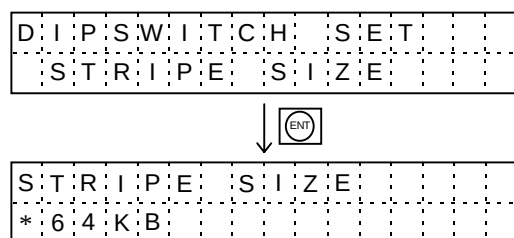


The menu items are displayed in the order described in Section 3.2.

Procedure 3 : Determines the menu item

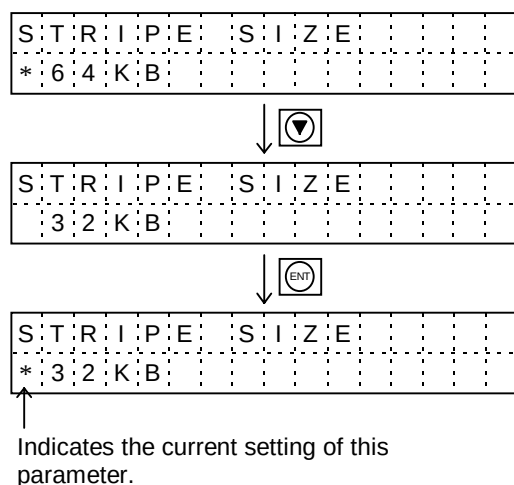
When the desired menu item is displayed, press the  key.

Now, you can set the parameter for this menu item.



Procedure 4 : Sets the parameter

Press  key to display the next parameter. When the desired parameter is displayed, press the  key. Now, the parameter is selected.



Procedure 5 : Terminates the system parameter setting

The following message is displayed by repeatedly pressing the  key. Now, press the  key to display the “FD BACKUP”. Make a back-up copy of system parameter, and terminate the EEPROM setting.

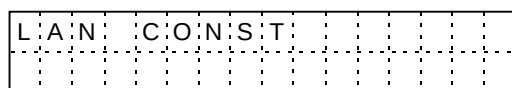
D	I	P	S	W	I	T	C	H	S	E	T				
Q	U	I	T												



F	D		B	A	C	K	U	P							

(3) Sets the LAN configuration.

① Panel display



← Pressing the  and  keys scrolls the items.

↑
Display start position (The message shown in the table below ② is displayed on this position. The current setting of the parameter is preceded by an asterisk "*".)

② Contents of display

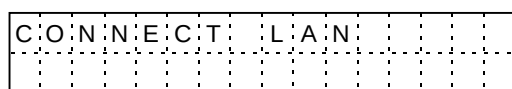
No.	Message displayed	Description
1	CONNECT LAN	Sets whether or not the LAN is connected.
2	IP ADDRESS	Sets the IP address.
3	SUB NET MASK	Sets the sub-net mask value.
4	DEFAULT GATEWAY	Sets the default gateway address.
5	ETHER ADDRESS	Sets the Ethernet address.
6	QUIT	Returns to the initial menu.

③ Key and other operations

(a) The "ETHER ADDRESS" is displayed only when the LAN board is mounted.

(3-1) Sets whether or not the LAN is connected.

① Panel display



← Pressing the  and  keys scrolls the items.

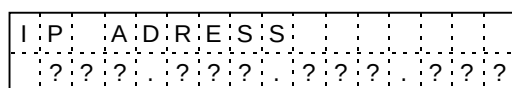
↑
Display start position (The message shown in the table below ② is displayed on this position. The current setting of the parameter is preceded by an asterisk "*".)

② Contents of display

No.	Message displayed	Description
1	CONNECT	LAN connected
2	NOT CONNECT (default)	LAN not connected

(3-2) Sets the IP address.

① Panel display



← "???" indicates the current value (000 - 255).

② Key and other operations

- Using the  and  keys changes the cursor position.
- Skip the period "." when moving the cursor or entering the value.
- Left justify the input value next to each period ".".
- Press the  key to define the entered value.
- If the entered value is invalid, the previous value is displayed again.
- Setting the value entered returns to the LAN configuration setup menu.

(3-3) Sets the sub-net mask value.

① Panel display

S	U	B	.	N	E	T	.	M	A	S	K	.	.	.
?	?	?	.	?	?	?	.	?	?	?	.	?	?	?

← "???" indicates the current value (000 - 255).

② Key and other operations

- (a) Using the  and  keys changes the cursor position.
- (b) Skip the period "." when moving the cursor or entering the value.
- (c) Left justify the input value next to each period ".".
- (d) Press the  key to define the entered value.
- (e) If the entered value is invalid, the previous value is displayed again.
- (f) Setting the value entered returns to the LAN configuration setup menu.

(3-4) Sets the default gateway address.

① Panel display

D	E	F	U	L	T	.	G	A	T	W	A	Y	.	.	.
?	?	?	.	?	?	?	.	?	?	?	.	?	?	?	

← "???" indicates the current value (000 - 255).

② Key and other operations

- (a) Using the  and  keys changes the cursor position.
- (b) Skip the period "." when moving the cursor or entering the value.
- (c) Left justify the input value next to each period ".".
- (d) Press the  key to define the entered value.
- (e) If the entered value is invalid, the previous value is displayed again.
- (f) Setting the value entered returns to the LAN configuration setup menu.

(3-5) Ethernet address.

① Panel display

E	T	.	A	D	D	R	E	S	S	.	▲	▲	.	.	.
?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?

← "?????????????" indicates the current value (000000000000 - FFFFFFFF).

(4) Sets the VMS connection.

① Panel display

C	O	N	N	E	C	T	V	M	S										



Display start position (The message shown in the table below ② is displayed on this position. The current setting of the parameter is preceded by an asterisk "*".)

② Contents of display

No.	Message displayed	Description
1	CONNECT	VMS connected
2	NOT CONNECT (default)	VMS not connected

(5) Sets the emulation mode.

① Panel display

S	P	E	C	I	A	L	C	O	N	N	C	T							



Display start position (The message shown in the table below ② is displayed on this position. The current setting of the parameter is preceded by an asterisk "*".)

② Contents of display

No.	Message displayed	Description
1	OPEN SYSTEM (default)	Operate in the Open System Mode.
2	ALTERNATE PATH3	Operate in the TRESPASS Mode.

(6) Sets the host block size.

① Panel display

H	O	S	T	B	L	K	S	I	Z	E									



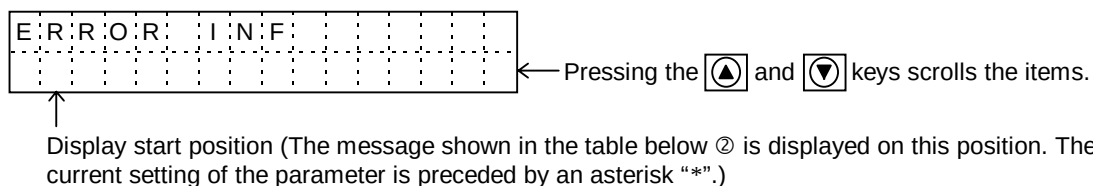
Display start position (The message shown in the table below ② is displayed on this position. The current setting of the parameter is preceded by an asterisk "*".)

② Contents of display

No.	Message displayed	Description
1	512BYTES (default)	512 bytes per block

(7) Sets the RS232C error information outflow mode.

① Panel display

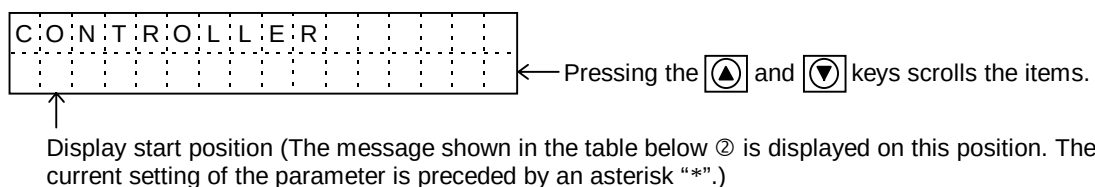


② Contents of display

No.	Message displayed	Description
1	ON (NORMAL)	Does not inhibit outflow of information. Outputs only the fault messages.
2	ON (HITRACK)	Does not inhibit outflow of information. Displays the fault messages and the normal status of the unit.
3	OFF (default)	Inhibits outflow of information.

(8) Sets the controller type.

① Panel display

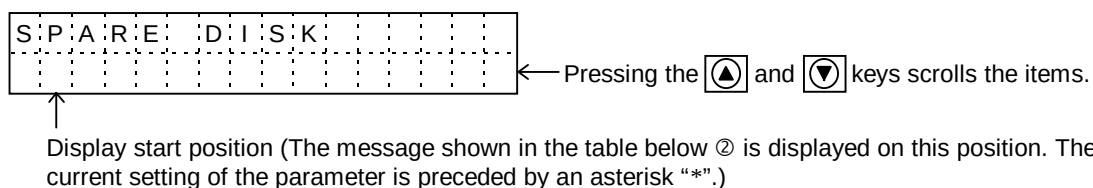


② Contents of display

No.	Message displayed	Description
1	MINI TOWER	Mini tower
2	HIGH RACK MOUNT	Rackmount (standard)
3	CABINET, WRACK	Cabinet type Rackmount (large capacity)

(9) Sets whether or not the spare disk is mounted.

① Panel display

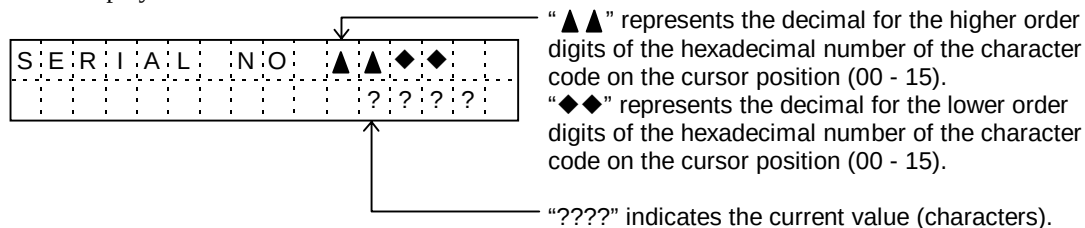


② Contents of display

No.	Message displayed	Description
1	EXISTENCE (default)	Spare disk is mounted.
2	NOTHING	Spare disk is not mounted.

(10) Sets the controller serial No.

① Panel display

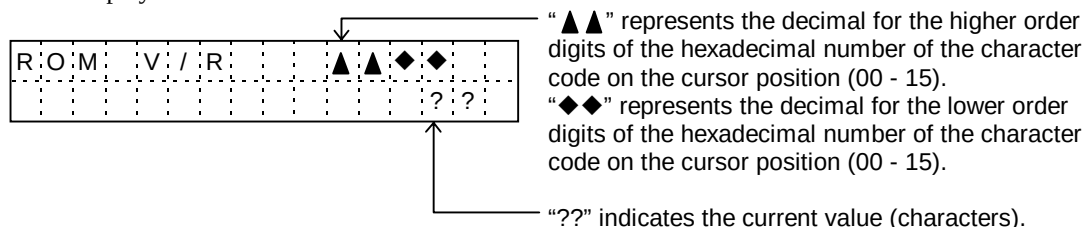


② Key and other operations

- Using the and keys changes the cursor position.
- Enter the two decimal digits representing the two-digit hexadecimal number into “▲▲◆◆”. The input result is immediately reflected on the cursor position in characters.
- Press the key to defines the entire input value.
- If the entered value is invalid, the previous value is displayed again.
- Setting the input value returns to the initial menu.

(11) Sets the version of the ROM microprogram.

① Panel display

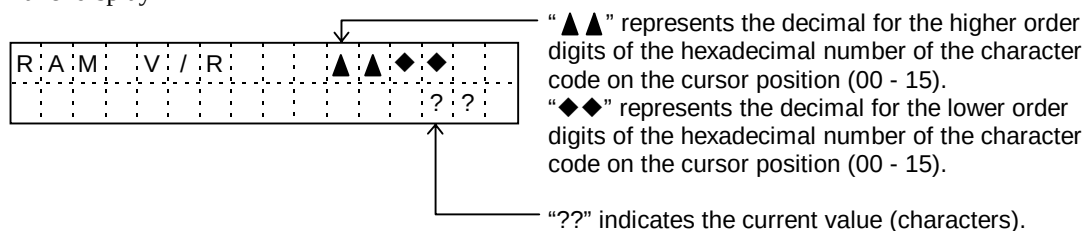


② Key and other operations

- Using the and keys changes the cursor position.
- Enter the two decimal digits representing the two-digit hexadecimal number into “▲▲◆◆”. The input result is immediately reflected on the cursor position in characters.
- Press the key to defines the entire input value.
- If the entered value is invalid, the previous value is displayed again.
- Setting the input value returns to the initial menu.

(12) Sets the version of the RAM microprogram.

① Panel display

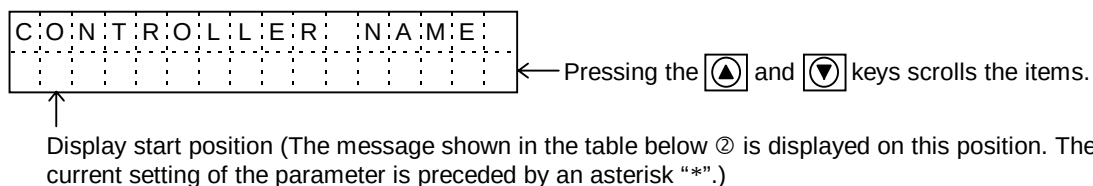


② Key and other operations

- Using the and keys changes the cursor position.
- Enter the two decimal digits representing the two-digit hexadecimal number into “▲▲◆◆”. The input result is immediately reflected on the cursor position in characters.
- Press the key to defines the entire input value.
- If the entered value is invalid, the previous value is displayed again.
- Setting the input value returns to the initial menu.

(13) Sets the last LBA information.

① Panel display

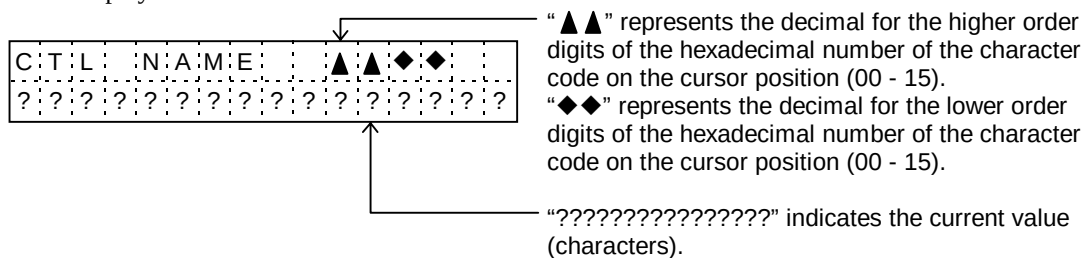


② Contents of display

No.	Message displayed	Description
1	DISABLE	Does not set the controller identifier.
2	ENABLE	Sets the controller identifier.

When selecting "ENABLE", the panel display changes to the one shown below and the controller identifier setting operation starts.

③ Panel display

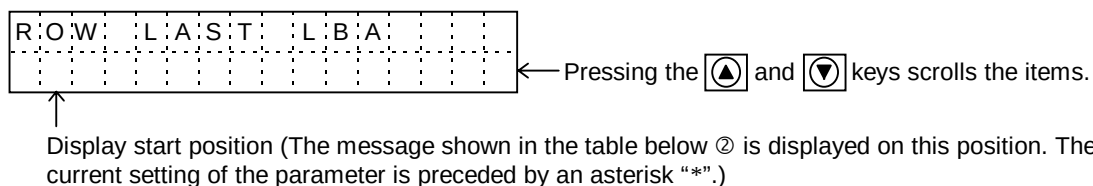


④ Key and other operations

- Using the [Left] and [Right] keys changes the cursor position.
- Enter the two decimal digits representing the two-digit hexadecimal number into "▲▲◆◆". The input result is immediately reflected on the cursor position in characters.
- Press the [ENT] key to defines the entire input value.
- If the entered value is invalid, the previous value is displayed again.
- Setting the input value returns to the initial menu.

(14) Sets the last LBA information.

① Panel display



② Contents of display

No.	Message displayed	Description
1	ROW#0	Sets the last LBA of the ROW0.
2	ROW#1	Sets the last LBA of the ROW1.
3	ROW#2	Sets the last LBA of the ROW2.
4	ROW#3	Sets the last LBA of the ROW3.
5	QUIT	Returns to the initial menu.

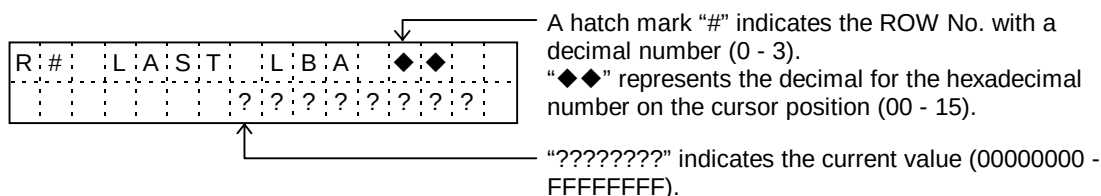
③ The range that can be set depends on the controller type setting.

Mini tower : Only the ROW0
 Rackmount (standard) : ROW0 - 1
 Cabinet : ROW0 - 3
 Rackmount (large capacity) : ROW0 - 3

No.	Drive Capacity	Model	Final LBA No. (Hex)
1	2GB	DF-F350-A2E2	(3E696B)16
2	4GB	DF-F350-A2E4 DF-F350-A3E4	(7CD2D7)16
3	8GB	DF-F350-A1E8 DF-F350-A2E8	(1046C97)16
4	18GB	DF-F350-A1E18	(215D9B3)16

(14-1) Sets the last LBA for each ROW.

① Panel display

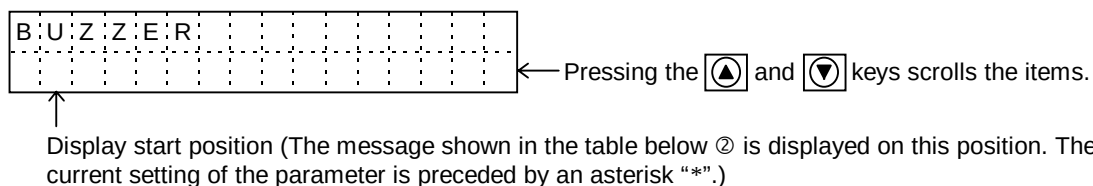


② Key and other operations

- Using the [Left] and [Right] keys changes the cursor position.
- Enter the two decimal digits into "◆◆". The input result is immediately reflected on the cursor position as a hexadecimal number.
- Press the [ENT] key to defines the entire input value.
- If the entered value is invalid, the previous value is displayed again.
- Setting the input value returns to the last LBA information setup menu.

(15) Sets whether or not the buzzer sounds.

① Panel display

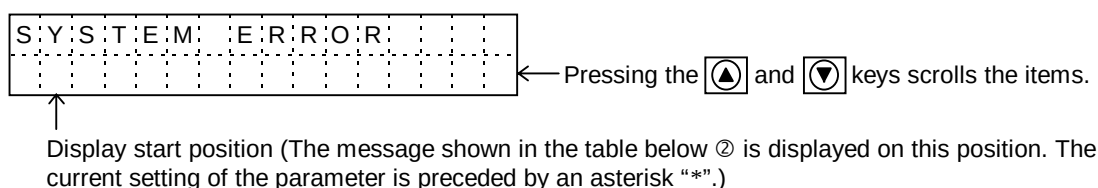


② Contents of display

No.	Message displayed	Description
1	ENABLE (default)	The buzzer sounds if a failure occurs.
2	DISABLE	The buzzer does not sound even if a failure occurs.

(16) Shutdown the system if a system error (CHK1) occurs.

① Panel display

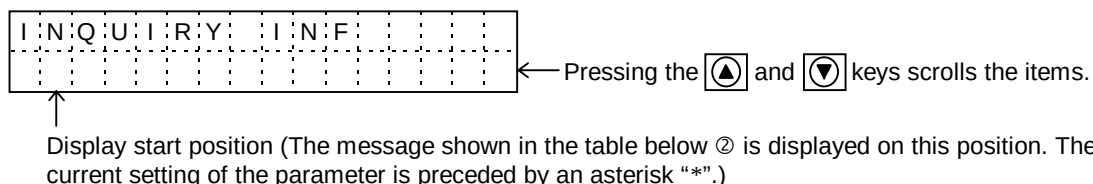


② Contents of display

No.	Message displayed	Description
1	SYSTEM DOWN	Shutdown the system.
2	AUTO RESET (default)	Automatically resets the system.

(17) Sets the INQUIRY response information.

① Panel display

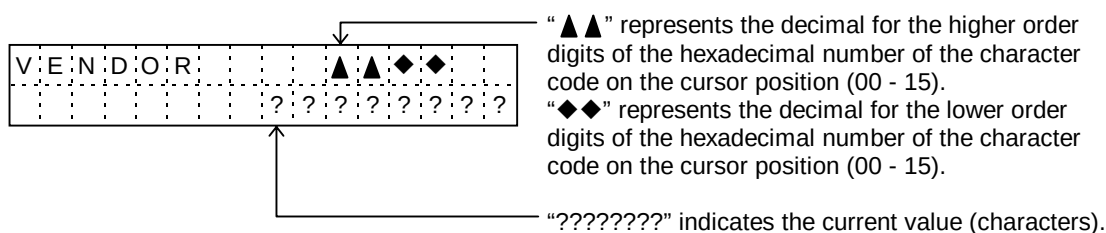


② Contents of display

No.	Message displayed	Description
1	VENDOR TYPE	Sets the vendor type information.
2	PRODUCT TYPE	Sets the product type information.
3	COMMAND QUEUING	Sets the command queuing mode.
4	QUIT	Returns to the initial menu.

(17-1) Sets the vendor type information.

① Panel display

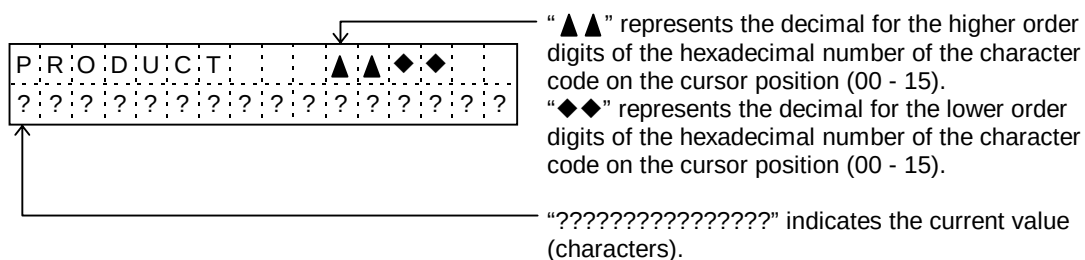


② Key and other operations

- Using the  and  keys changes the cursor position.
- Enter the two decimal digits representing the two-digit hexadecimal number into “▲▲◆◆”. The input result is immediately reflected on the cursor position in characters.
- Press the  key to defines the entire input value.
- If the entered value is invalid, the previous value is displayed again.
- Setting the input value returns to the INQUIRY response information setup.
- Setting the “0x00” (NULL) or “0x20” (space) for the first character returns to the default.

(17-2) Sets the product type information.

① Panel display

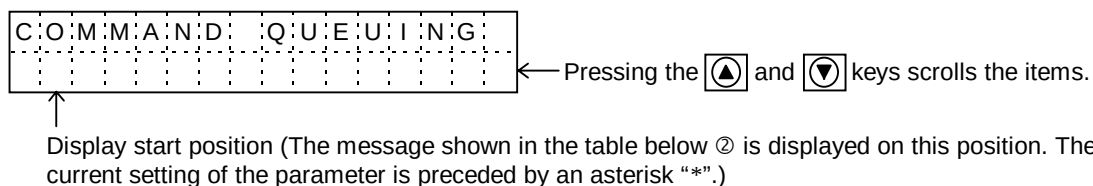


② Key and other operations

- Using the  and  keys changes the cursor position.
- Enter the two decimal digits representing the two-digit hexadecimal number into “▲▲◆◆”. The input result is immediately reflected on the cursor position in characters.
- Press the  key to defines the entire input value.
- If the entered value is invalid, the previous value is displayed again.
- Setting the input value returns to the INQUIRY response information setup.
- Setting the “0x00” (NULL) or “0x20” (space) for the first character returns to the default.

(17-3) Sets the command queuing mode.

① Panel display



② Contents of display

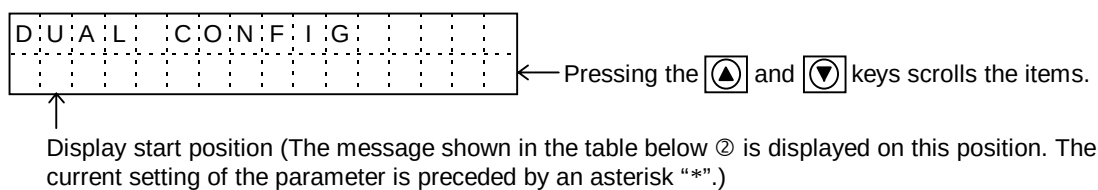
No.	Message displayed	Description
1	ON (default)	Standard INQUIRY data CmdQue = 1
2	OFF	Standard INQUIRY data CmeQue = 0

③ Key and other operations

(a) Setting the input value returns to the INQUIRY response information setup.

(18) Sets the dual operation attribute.

① Panel display

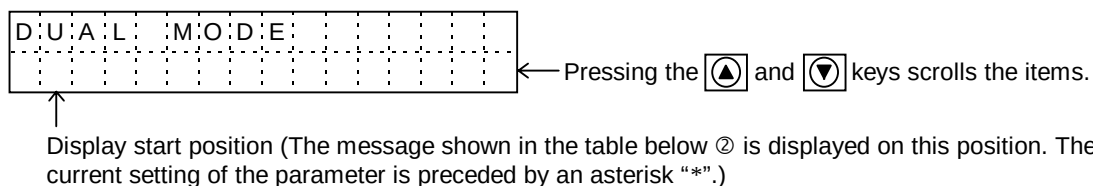


② Contents of display

No.	Message displayed	Description
1	SINGLE MODE (default)	Operates in the single mode.
2	DUAL MODE	Sets the dual type individual attribute.

(18-1) Sets the dual type individual attribute.

① Panel display

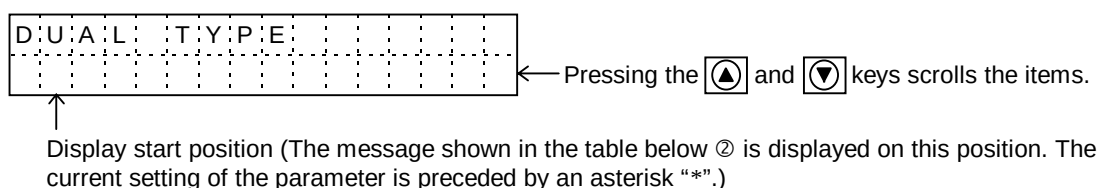


② Contents of display

No.	Message displayed	Description
1	DUAL TYPE (default)	Sets the dual type attribute.
2	DATA SHARE MODE	Sets the data share operation attribute.

(18-2) Sets the dual type attribute.

① Panel display

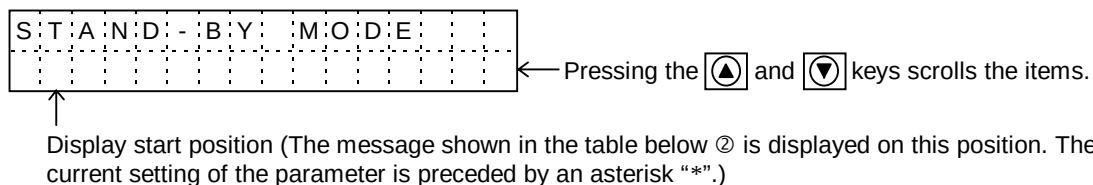


② Contents of display

No.	Message displayed	Description
1	DUAL ACTIVE (default)	Operates in the dual active mode.
2	HOT STAND-BY	Operates in the hot standby mode. Sets the standby mode.

(18-3) Sets the standby mode.

① Panel display

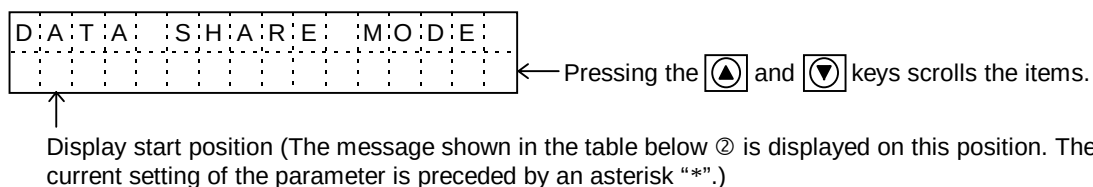


② Contents of display

No.	Message displayed	Description
1	CONNECT HOST (default)	The standby controller responds to the standby selection.

(18-4) Sets the data share operation attribute.

① Panel display

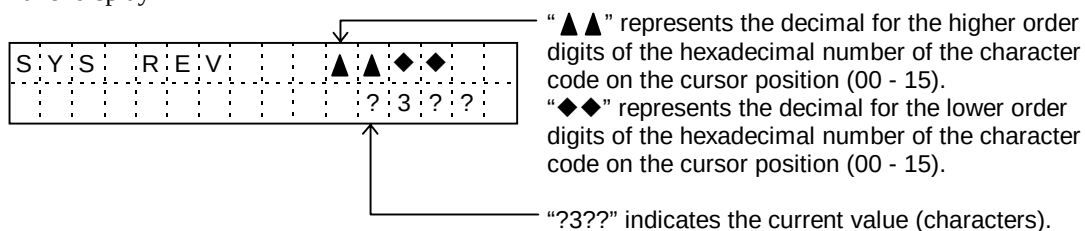


② Contents of display

No.	Message displayed	Description
1	OFF (default)	Data share feature is disabled.
2	ON	Data share feature is enabled.

(19) Sets the system revision.

① Panel display

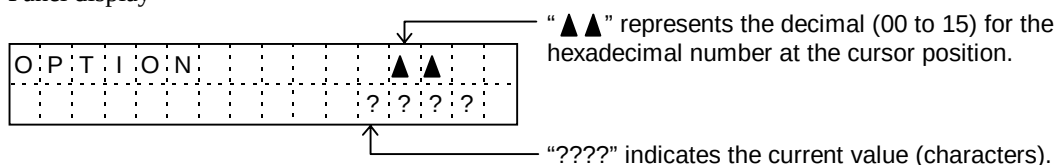


② Key and other operations

- Using the and keys changes the cursor position.
- Enter the two decimal digits representing the two-digit hexadecimal number into “▲▲◆◆”. The input result is immediately reflected on the cursor position in characters.
- Press the key to defines the entire input value.
- If the entered value is invalid, the previous value is displayed again.
- Setting the input value returns to the initial menu.
- The second character from the head, that is, “3” is unchangeable.

(20) Sets the option code.

① Panel display



Note : When connecting this subsystem to the HP host, set the both CTL ASSYs option code to “0008”.

When connecting this subsystem to the SUN host, set the both CTL ASSYs option code to “1000”.

② Key and other operations

- Using the and keys changes the cursor position.
- Enter a number of two decimal digits in place of “▲▲”. The input result is immediately reflected at the cursor position as a hexadecimal number.
- Press the key to define the entire input value.
- If the entered value is invalid, the previous value is displayed again.

(21) Displays the boot program version.

① Panel display

F	I	X	E	D					▲	▲	▲	▲	▲	▲
C	H	G	A	B	L	E			◆	◆	◆	◆	◆	◆

② Key and other operations

▲▲▲▲▲▲ : Indicates the fixed program version.

◆◆◆◆◆◆ : Indicates the variable program version.

(a) Pressing the  key returns to the initial menu.

(22) Sets the internal clock.

① Panel display

D	A	T	A		Y	Y	-	M	M	-	D	D	(	W	)
T	I	M	E		H	H	:	m	m	:	S	S			

← Pressing the  and  keys scrolls the items.

② Contents of display

No.	Message displayed	Description
1	DATA YY-MM-DD (W)	YY : Year (No limitation), MM : Month (01 - 12), DD : Date (01 - 31), W : Day of the week (1 - 7) ^{*1}
2	TIME HH:mm-SS	HH : Hour (00 - 23), mm ; Minute (00 - 59), SS : Second (00 - 59)
3	SET	Defines the input value
4	QUIT	Cancel the input value.

(a) Using the  and  keys changes the cursor position.

(b) “SET” defines the input value. “QUIT” cancel the input value.

*1 The setting of the day of the week is as follows:

1 : Sunday 2 : Monday 3 : Tuesday 4 : Wednesday 5 : Thursday
6 : Friday 7 : Saturday

3.3 Configuration Information (SVP) Setting

The configuration information (SVP) function can be executed from the panel when the controller is in the ready status.

The menu items and their usage are as follows.

No.	Menu item	Use	Description	Setting before shipment
1	RAID CONFIG	RAID configuration information reference/setting menu	① Reference to RAID configuration information ② Definition of RAID group ③ Deletion of RAID group	
2	LU CONFIG	LU configuration information reference/setting menu	① Reference to LU configuration information ② Definition of LU ③ Deletion of LU ④ Formatting of LU ⑤ Switching LU service controller	
3	SYSTEM OPT (CUR)	System option setting (Only a current value)	① Drive recovery execution mode ② Copyback recovery mode ③ Correction copy recovery mode ④ Setting of the dynamic sparing starting mode. ⑤ Setting of the interval time in the recovery ⑥ Setting of the unit of recovery processing ⑦ Setting of the Online Verify function ⑧ Setting of the idling time	
	SYSTEM OPT (SVD)	System option setting (A saved value and current value)	① Drive recovery execution mode ② Copyback recovery mode ③ Correction copy recovery mode ④ Setting of the dynamic sparing starting mode. ⑤ Setting of the interval time in the recovery ⑥ Setting of the unit of recovery processing ⑦ Setting of the Online Verify function ⑧ Setting of the idling time ⑨ Setting of the job time-out limit ⑩ Setting of the number of detections in the execution of the reselection time-out ⑪ Setting of the TRESPASS mode (*1)	
4	DRIVE MAINTENANCE	Drive maintenance menu	① Instruction of drive detaching ② Instruction of drive recovery ③ Reference to drive data recovery status ④ Drive self diagnosis ⑤ Parity matching check ⑥ ECC check ⑦ LA check ⑧ Drive format ⑨ Recovery of system information ⑩ Reference of the disk failure statistical information.	

*1 : This menu is displayed only when ALTERNATE PATH3 has been set by SPECIAL CONNECT of the system parameter.

No.	Menu item	Use	Description	Setting before shipment
5	MICRO VER/REV	Microprogram version/revision numbers reference menu	① Reference to microprogram version/revision	
6	GATHERING (CTL0)	Gathers information of the controller #0 in FD in case of dual system configuration	① Output of dump information being stored in the drive to floppy disk ② Output of trace information being stored in the drive to floppy disk ③ Output of trace information being stored in the memory to floppy disk	
7	GATHERING (CTL1)	Gathers information of the controller #1 in FD in case of dual system configuration	① Output of dump information being stored in the drive to floppy disk ② Output of trace information being stored in the drive to floppy disk ③ Output of trace information being stored in the memory to floppy disk	
8	MEMORY MAINT	Memory content reference/update menu	① Reference/update of memory content	
9	RECV ERR INFO	Error display of recovery when the power is on	① Displays the errors occur during recovery operation performed while power is on	
10	PIN INFO	Display of PIN existence of every LU	① Display of PIN data existence	
11	WARNING INFO	Display of unrecovered warning information	The current warning information is indicated	
12	CLEAR LOG(CT0)	Clearing log information of controller #0	Log information related controller and host I/F is cleared	
13	CLEAR LOG(CT1)	Clearing log information of controller #1	Log information related controller and host I/F is cleared	
14	THRESHOLD	Reference/set threshold value.	Reference/set threshold value.	
15	TOPOLOGY (CTL0)	Reference/set the topological information for controller 0.	Reference/set the topological information (FC_AL, Fabric).	
16	TOPOLOGY (CTL1)	Reference/set the topological information for controller 1.	Reference/set the topological information (FC_AL, Fabric).	
17	SELFPORT (CTL0)	Reference/set port information for controller 0.	Reference/set own port information.	
18	SELFPORT (CTL1)	Reference/set port information for controller 1.	Reference/set own port information.	
19	SECURITY (CTL0)	Reference/set security information for controller 0.	① Enable/disable the access check. ② Reference/set host identification information.	
20	SECURITY (CTL1)	Reference/set security information for controller 1.	① Enable/disable the access check. ② Reference/set host identification information.	
21	FFC REV (CTL0)	Refers to the revision number of the FFC firmware of the controller 0.	Display of the revision number of each type of firmware in FFC.	
22	FFC REV (CTL1)	Refers to the revision number of the FFC firmware of the controller 1.	Display of the revision number of each type of firmware in FFC.	

3.3.1 SVP operation procedure

Procedure 1 : Starts the SVP operation

Press  key when the controller is in the ready status.

The following message is displayed on the panel.

S	V	P		F	U	N	C	T	I	O	N	S		
(	T	E	R	M	I	N	A	T	E		S	V	P	)

← Indicates that the SVP operation is started.
← The first menu item is displayed.

Procedure 2 : Selects the menu item

Press  key once to display the next menu item. Continue pressing this key until you get to the menu item desired.

S	V	P		F	U	N	C	T	I	O	N	S		
S	Y	S	T	E	M		O	P	T	(	C	U	R	)

↓ 

S	V	P		F	U	N	C	T	I	O	N	S		
S	Y	S	T	E	M		O	P	T	(	S	V	D	)

↓ 

The menu items is displayed in the order described in Section 2.2.

Procedure 3 : Determines the menu item

When the desired menu item is displayed, press the  key.

Now, you can set the parameter for this menu item.

S	V	P		F	U	N	C	T	I	O	N	S		
S	Y	S	T	E	M		O	P	T	(	S	V	D	)

↓ 

Procedure 4 : Operation for the menu item

Perform the operation described in Subsection 3.3.2 and after.

Procedure 5 : Terminates the SVP operation

The following message is displayed by repeatedly pressing the  key on the menu item selection. Now, press the  key to terminate the SVP operation.

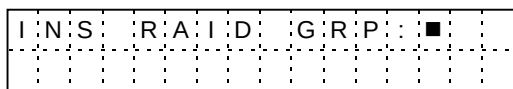
S	V	P		F	U	N	C	T	I	O	N	S		
(	T	E	R	M	I	N	A	T	E		S	V	P	)

↓ 

V	E	R	/	R	E	V		X	X	X	X	X	X	
(	Q	U	I	T	)									

(1-2) Adds the RAID group.

① Panel display

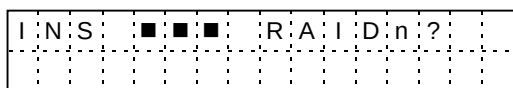

 ← "■" : RAID group No.
 ← Pressing the  and  keys scrolls the items.

② Contents of display on the second line

No.	Message displayed	Description
1	ALL RAID5	Defines the maximum configuration range (ports and rows) for the units being used as the RAID5, RAID1, RAID0 or RAID A group.
2	ALL RAID1	
3	ALL RAID0	
4	ALL RAID A	
5	ROW = ■ RAID5	Defines the row "■" as the RAID5, RAID1, RAID0 or RAID A group.
6	ROW = ■ RAID1	
7	ROW = ■ RAID0	
8	ROW = ■ RAID A	
9	(QUIT)	Returns to the previous menu (RAID function selection menu).

③ Key and other operations

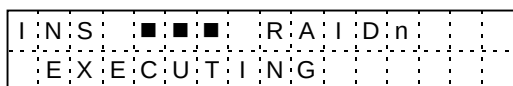
Selecting the pattern to be added (by displaying the desired pattern on the second line and pressing the  key) switches to the following display for confirming the contents before actually adding the RAID group.


 ← "■■■" = "ALL" or "R = m" (m : Row No.)
 ← Pressing the  and  keys scrolls the items.

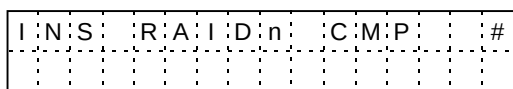
Contents of display on the second line

No.	Message displayed	Description
1	YES	Adds the RAID group.
2	(QUIT)	Returns to the previous menu (pattern selection menu) without adding the RAID group.

Accepting the acknowledgment switches to the following display to notify that the RAID group is being added.


 ← "■■■" = "ALL" or "R = m" (m : Row No.)
 E X E C U T I N G

Completion of adding the RAID switches to the following display.


 ← Pressing the  and  keys scrolls the items.

Contents of display on the second line

No.	Message displayed	Description
1	(QUIT)	Returns to the RAID function selection menu.

① Panel display

← Pressing the and keys scrolls the items.

No.	Message displayed	Description
1	ALL RAID	Deletes all the RAID groups.
	RG■ (RAID■)	Deletes the specified RAID group. RAID group No. (RG■) and RAID level (RAID■).
	#NO EFFECT	The RAID group that can be deleted does not exist.
2	(QUIT)	Returns to the previous menu (RAID function selection menu).

① Panel display

← Pressing the  and  keys scrolls the items.

No.	Message displayed	Description
1	(QUIT)	Returns to the previous menu (RAID function selection menu).
2	YES	Deletes all the RAID groups.

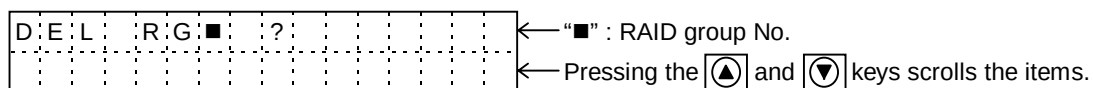
D	E	L	A	L	L	R	A	I	D					
E	X	E	C	U	T	I	N	G						

D E L	R A I D	C M P	#

No.	Message displayed	Description
1	(QUIT)	Returns to the previous menu (RAID function selection menu).

(1-3.2) Deletes the specified RAID group.

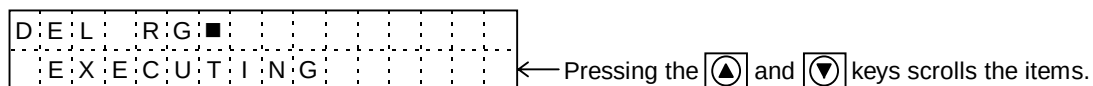
① Panel display



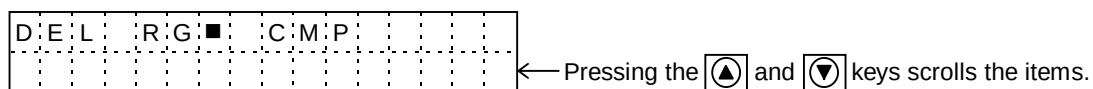
Contents of display on the second line

No.	Message displayed	Description
1	(QUIT)	Returns to the previous menu (RAID function selection menu).
2	YES	Deletes the specified RAID group.

Accepting the deleting all the RAID groups switches to the following display to notify that all the RAID groups are being deleted.



Completion of deletion switches to the following display.

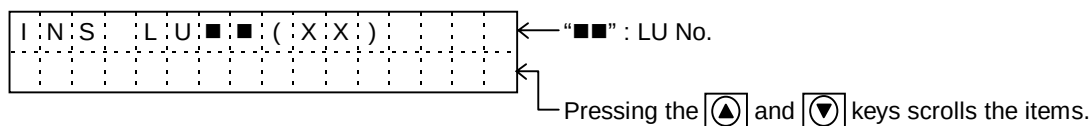


Contents of display on the second line

No.	Message displayed	Description
1	(QUIT)	Returns to the previous menu (RAID function selection menu).

(2-2) Adds the LU.

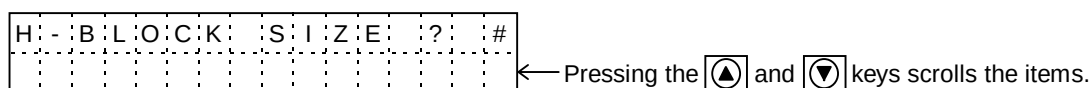
① Panel display



② Contents of display on the second line

No.	Message displayed	Description
1	G = 0 ALL CAPA.	Defines all the free capacities in the RAID group as the target LU (displayed on the first line). Or, defines the LU having the specified capacity in the RAID group. Specifies the capacity in a decimal.
	G = 0 C = □□□□□□□□	
	G = 1 ALL CAPA.	
	G = 1 C = □□□□□□□□	
	G = 2 ALL CAPA.	
	G = 2 C = □□□□□□□□	
	G = 3 ALL CAPA.	
2	G = 3 C = □□□□□□□□	Returns to the previous menu (LU function selection menu).
	(QUIT)	

③ Panel display (Specifies the host block length.)

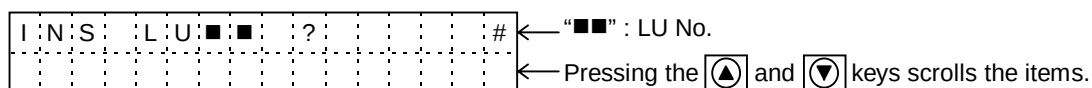


④ Contents of display on the second line

No.	Message displayed	Description
1	512B	Selects the host block length.
2	(QUIT)	Returns to the previous menu (LU function selection menu).

⑤ Key and other operations

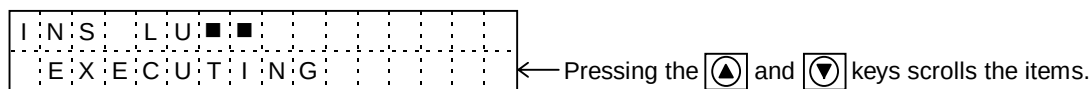
Selecting the host block length switches to the following display for confirming the contents before actually adding the LU.



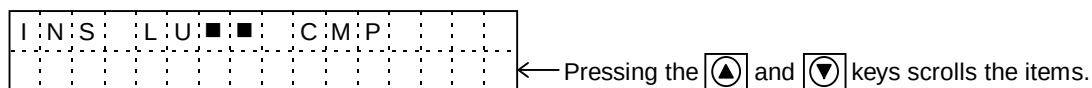
Contents of display on the second line

No.	Message displayed	Description
1	YES	Adds the LU.
2	(QUIT)	Returns to the pattern selection menu.

Accepting the acknowledgment switches to the following display to notify that the LU is being added.



Completion of adding the LU switches to the following display.



Contents of display on the second line

No.	Message displayed	Description
1	(QUIT)	Returns to the LU function selection menu.

(2-3) Deletes the LU.

① Panel display

D	E	L	E	T	E										

← Pressing the  and  keys scrolls the items.

② Contents of display on the second line

No.	Message displayed	Description
1	ALL LU	Deletes all the LUs.
	LAST LU■■ (XX)	Deletes the last LU. ■■ = LU No.
	#NO EFFECT	The LU to be deleted does not exist.
2	(QUIT)	Returns to the previous menu (LU function selection menu).

(2-3.1) Deletes all the LUs.

① Panel display

D	E	L		A	L	L		L	U		?				

← Pressing the  and  keys scrolls the items.

② Contents of display on the second line

No.	Message displayed	Description
1	(QUIT)	Returns to the previous menu (LU function selection menu).
2	YES	Deletes all the LUs.

③ Key and other operations

Accepting the acknowledgment switches to the following display to notify that all the LUs are being deleted.

D	E	L		A	L	L		L	U						
				E	X	E	C	U	T	I	N	G			

Completion of deletion switches to the following display.

D	E	L		L	U		C	M	P						

← Pressing the  and  keys scrolls the items.

Contents of display on the second line

No.	Message displayed	Description
1	(QUIT)	Returns to the previous menu (LU function selection menu).

(2-3.2) Deletes the last LU.

① Panel display

D	E	L		L	U		■	■		?					

← "■■" : LU No.

← Pressing the  and  keys scrolls the items.

② Contents of display on the second line

No.	Message displayed	Description
1	(QUIT)	Returns to the previous menu (LU function selection menu).
2	YES	Deletes the last LU.

(2-5) Changes the default controller for the LU.

① Panel display

C	T	L	C	H	G	L	U												

← Pressing the  and  keys scrolls the items.

② Contents of display on the second line

No.	Message displayed	Description
1	LU■■ (XX) C#	Changes the default controller for the LU. Controller #0 ----Controller #1 Controller #1 ----Controller #0 C# : Default controller “■■” : LU No.
2	(QUIT)	Returns to the previous menu (LU function selection menu).

③ Key and other operations

Selecting the LU and its controller (by displaying them on the second line) switches to the following display for confirming the contents before changing.

C	H	G	L	U	■	■	?												

← Pressing the  and  keys scrolls the items.

Contents of display on the second line

No.	Message displayed	Description
1	YES	Changes the default controller for the LU.
2	(QUIT)	Returns to the previous menu (LU function selection menu) without changing the default controller for the LU.

Accepting the changing the default controller for the LU switches to the following display to notify that the controller is being changed.

C	H	G	L	U	■	■													

Completion of changing the default controller for the LU switches to the following display.

C	H	G	L	U	■	■	C	M	P										

← Pressing the  and  keys scrolls the items.

Note : Power on/off operation is needed to validate the change of the controller for the LU.

Contents of display

No.	Message displayed	Description
1	(QUIT)	Returns to the previous menu (LU function selection menu).

(3) System option setup menu.

① Panel display

①-1 Setting only the current value

S	Y	S	T	E	M	O	P	T	(	C	U	)

← Pressing the  and  keys scrolls the items.

①-2 Setting the saved value and the current value

S	Y	S	T	E	M	O	P	T	(	S	V	)

← Pressing the  and  keys scrolls the items.

② Contents of display on the second line

No.	Message displayed	Description
1	RECOVERY MODE	Sets the disk recovery execution mode.
2	COPYBACK MODE	Sets whether or not the copy-back is automatically started.
3	CORRECTION MODE	Sets whether or not the correction copy is automatically started.
4	DYNAMIC SPARE	Sets the dynamic spare
5	INTERVAL TIME	Sets the interval time.
6	RECOVERY UNIT	Sets the amount of data per disk recovery processing.
7	ONLINE VERIFY	Sets whether or not to perform the online verify.
8	IDLING TIME	Sets the idling time.
9	JOB TIMEOUT (*1)	Sets the job timeout.
10	RESEL TIMEOUT (*1)	Sets the number of detection during reselection timeout execution.
11	TRESPASS MODE (*1) (*2)	Sets the TRESPASS MODE.
12	(QUIT)	Returns to the previous menu (SVP function selection menu).

*1 : For the item No.9 "JOB TIMEOUT", the item No.10 "RESEL TIMEOUT" and item No.11 "TRESPASS MODE", only the "SYSTEM OPT (SV)" is displayed.

*2 : This menu is displayed only when ALTERNATE PATH3 has been set by SPECIAL CONNECT of the system parameter.

(3-1) Sets the disk recovery execution mode.

① Panel display

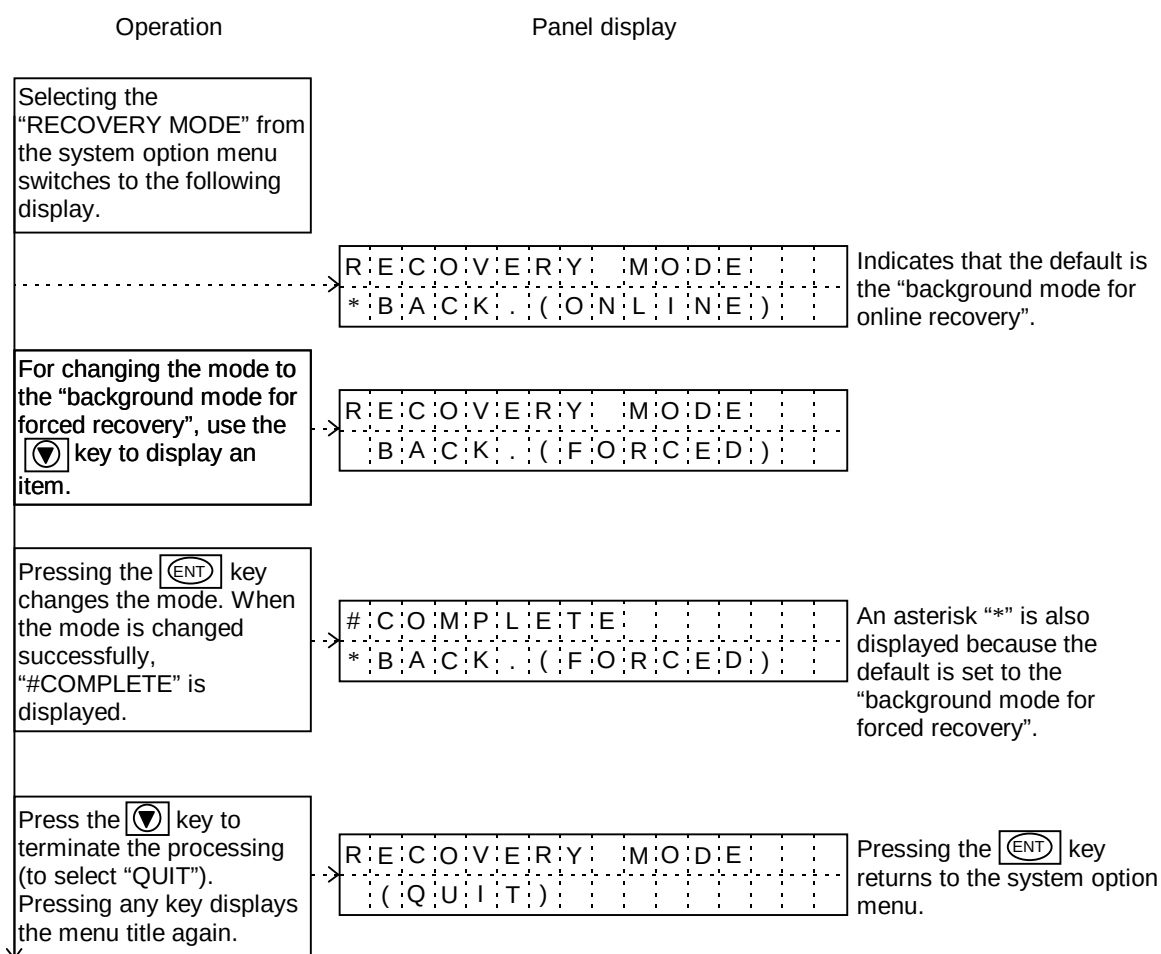
R	E	C	O	V	E	R	Y		M	O	D	E

← Pressing the  and  keys scrolls the items.

② Contents of display on the second line

No.	Message displayed	Description
1	BACK. (ONLINE)	Sets the background mode for online recovery.
2	BACK. (FORCED)	Sets the background mode for forced recovery.
3	INTER. (ONLINE)	Sets the interleave mode for online recovery.
4	INTER. (FORCED)	Sets the interleave mode for forced recovery.
5	(QUIT)	Returns to the previous menu (system option setup menu).

③ Key and other operations



① Panel display

← Pressing the  and  keys scrolls the items.

No.	Message displayed	Description
1	AUTOMATICALLY	Copy-back is automatically started.
2	NOT AUTOMATIC.	Copy-back is not automatically started.
3	(QUIT)	Returns to the previous menu (system option setup menu).

Same as the item (3-1).

① Panel display

← Pressing the  and  keys scrolls the items.

No.	Message displayed	Description
1	AUTOMATICALLY	Correction copy is automatically started.
2	NOT AUTOMATIC.	Correction copy is not automatically started.
3	(QUIT)	Returns to the previous menu (system option setup menu).

Same as the item (3-1).

① Panel display

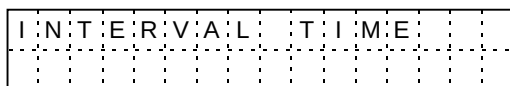
← Pressing the  and  keys scrolls the items.

No.	Message displayed	Description
1	R/W ONV EXECUTE	Ordinarily starts the dynamic sparing by Read/Write and the online verify.
2	R/W EXECUTE	Ordinarily starts the dynamic sparing by Read/Write only.
3	NOT EXECUTE	Does not start the dynamic sparing.

Same as the item (3-1).

(3-5) Sets the interval time.

① Panel display



← Pressing the and keys scrolls the items.

② Contents of display on the second line

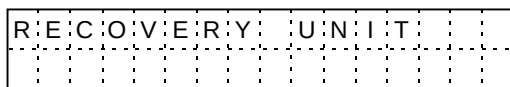
No.	Message displayed	Description
1	□□□ × 10ms	Specifies the interval time in the interleave mode or the startup determination time in the background mode using a number between 0 and 255. "□□□" indicates the current value.
2	(QUIT)	Returns to the previous menu (system option setup menu).

③ Key and other operations

Use the , , and number keys to specify the numerical value while the data in the item No.1 is being displayed. (The cursor wraps around within the range of "□□□".) Then, press the key to define the input value. (If the input value is invalid, prompts to reenter a value.)

(3-6) Sets the amount of data per disk recovery processing.

① Panel display



← Pressing the and keys scrolls the items.

② Contents of display on the second line

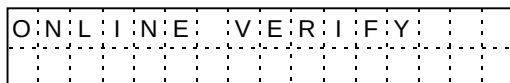
No.	Message displayed	Description
1	□□□□ Blocks	Specifies the value regarding 512bytes as 1 for the amount of data per disk recovery processing. The value shall be a multiple of 32 within the range from 32 to 65504. "□□□□" indicates the current value.
2	(QUIT)	Returns to the previous menu (system option setup menu).

③ Key and other operations

Same as the item (3-5) ③.

(3-7) Sets whether or not to perform the online verify.

① Panel display



← Pressing the and keys scrolls the items.

② Contents of display on the second line

No.	Message displayed	Description
1	EXECUTE	The online verify is done.
2	NOT EXECUTE	The online verify is not done.
3	(QUIT)	Returns to the previous menu (system option setup menu).

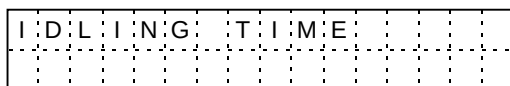
③ Key and other operations

Press the or key to select an item. Then, press the key.

The current selection is preceded by an asterisk "※".

(3-8) Sets the idling time.

① Panel display



← Pressing the  and  keys scrolls the items.

② Contents of display on the second line

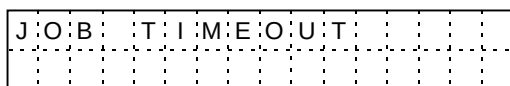
No.	Message displayed	Description
1	DEFAULT (10sec)	Sets the default time (10 seconds).
2	seconds	Specifies a time other than the default within the range from 1 (01) to 30. " " indicates the current value. "00" is indicated in " " for the default.
3	(QUIT)	Returns to the previous menu (system option setup menu).

③ Key and other operations

Same as the item (3-5) ③.

(3-9) Sets the job timeout.

① Panel display



← Pressing the  and  keys scrolls the items.

② Contents of display on the second line

No.	Message displayed	Description
1	STANDARD (9s)	Sets 9 seconds for the job timeout.
2	EXTENSION (28s)	Sets 28 seconds for the job timeout.
3	SPECIAL (60s)	Sets 60 seconds for the job timeout.
4	(QUIT)	Returns to the previous menu (system option setup menu).

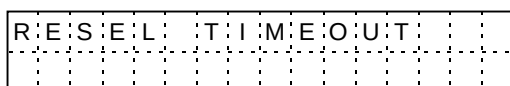
③ Key and other operations

Press the  or  key to select an item. Then, press the  key.

The current selection is preceded by an asterisk "*".

(3-10) Sets the number of detection during reselection timeout execution.

① Panel display



← Pressing the  and  keys scrolls the items.

② Contents of display on the second line

No.	Message displayed	Description
1	TWICE	Detaches the disk if reselection timeout is detected twice consecutively.
2	ONCE	Detaches the disk if reselection timeout is detected once.
3	(QUIT)	Returns to the previous menu (system option setup menu).

③ Key and other operations

Press the  or  key to select an item. Then, press the  key.

The current selection is preceded by an asterisk "*".

(3-11) Sets the TRESPASS MODE.

① Panel display

T	R	E	S	P	A	S	S		M	O	D	E

← Pressing the  and  keys scrolls the items.

② Contents of display on the second line

No.	Message displayed	Description
1	AUTO TRSPAS	Executes the command ignoring the ownership field.
2	NON AUTO TRSPAS	Determines whether or not to execute the command according to the ownership field.
3	(QUIT)	Returns to the previous menu (debug support menu) screen.

③ Key and other operations

Operation

Panel display

Selecting the "TRESPASS MODE" from the trespass mode setting menu switches the display to the following.

T	R	E	S	P	A	S	S		M	O	D	E
*	A	U	T	O		T	R	S	P	A	S	

Indicates that the default mode is the "Executes the command ignoring the ownership field".

To change the mode to "Determines whether or not to execute the command according to the ownership field", use the  or  key to display the item.

T	R	E	S	P	A	S	S		M	O	D	E
	N	O	N		A	U	T	O		T	R	S

Pressing the  key changes the item to be selected.

#	C	O	M	P	L	E	T	E				
*	N	O	N		A	U	T	O		T	R	S

An asterisk "*" is displayed because the mode "Determine whether or not to execute the command according to the ownership field" was selected.

Press the  key to terminate the processing. This operation displays "(QUIT)".

T	R	E	S	P	A	S	S		M	O	D	E
	(	Q	U	I	T	)						

Press the  key.

(4) Disk maintenance menu.

① Panel display

D	R	I	V	E		M	A	I	N	T	E								

← Pressing the  and  keys scrolls the items.

② Contents of display on the second line

No.	Message displayed	Description
1	DETACH	Specifies to detach the disk.
2	DATA RECOVER	Specifies to start disk recovery.
3	RECOVER STATUS	References the disk recovery condition.
4	SELF-DIAG<0>	Runs self-diagnostics on the disk (mainly, for the controller).
5	SELF-DIAG<1>	Runs self-diagnostics on the disk (for the controller and the disk).
6	PARITY CHECK	Executes the parity check.
7	ECC CHECK	Executes the ECC check.
8	LA CHECK	Executes the LA check.
9	FORMAT (516B)	Formats the 516 bytes of the sector length.
10	FORMAT (524B)	Formats the 524 bytes of the sector length.
11	SYSTEM RECOVER	Recovers the system information.
12	STATISTICS CNT	Reference of the disk failure statistical information.
13	(QUIT)	Returns to the previous menu (SVP function selection menu).

(4-1) Specifies to detach the disk.

① Panel display

D	E	T	A	C	H		D	R	I	V	E								

← Pressing the  and  keys scrolls the items.

② Contents of display on the second line

No.	Message displayed	Description
1	P = ① R = ② : BUSY	The disk that is able to be detached (① : port, ② : row) and its status (BUSY : In use, STDBY : Not used).
	P = ① R = ② : STDBY	
2	(QUIT)	Returns to the previous menu (disk maintenance selection menu).

③ Key and other operations

Selecting the disk you want to detach (by displaying the desired disk on the second line and pressing the  key) switches to the following display for confirming the contents before actually detaching the disk.

D	E	T	A	C	H	(	①	,	②	)		?							

← Pressing the  and  keys scrolls the items.

Contents of display on the second line

No.	Message displayed	Description
1	YES	Detaches the disk.
2	(QUIT)	Returns to the previous menu (disk maintenance selection menu) without detaching the disk.

Accepting the acknowledgment switches to the following display to notify that the disk is being detached.

D	E	T	A	C	H	(	①	,	②	)									

Completion of detaching the disk switches to the following display.

D T C H (① , ②) C M P

← Pressing the  and  keys scrolls the items.

Contents of display on the second line

No.	Message displayed	Description
1	(QUIT)	Returns to the disk maintenance selection menu.

(4-2) Specifies to start disk recovery.

① Panel display

D A T A R E C O V E R

← Pressing the  and  keys scrolls the items.

② Contents of display on the second line

No.	Message displayed	Description
1	P = ① R = ② : CORREC	The disk to be recovered (① : port, ② : row) and its recovery method (CORREC : Recovery by correction copy, COPY : Recovery by copy-back).
	P = ① R = ② : COPY	
2	(QUIT)	Returns to the previous menu (disk maintenance selection menu).

③ Key and other operations

Selecting the disk you want to detach (by displaying the desired disk on the second line and pressing the  key) switches to the following display for confirming the contents before actually detaching the disk.

R C V R (① , ②) ?

← Pressing the  and  keys scrolls the items.

Contents of display on the second line

No.	Message displayed	Description
1	YES	Starts recovering the disk.
2	(QUIT)	Returns to the previous menu (disk maintenance selection menu) without starting to recover the disk.

Accepting the starting disk recovery switches to the following display.

R C V R (① , ②) A P T

← Pressing the  and  keys scrolls the items.

Contents of display on the second line

No.	Message displayed	Description
1	(QUIT)	Returns to the disk maintenance selection menu.

(4-3) References the disk recovery condition.

① Panel display

R	E	C	O	V	E	R		S	T	A	T	U	S	

← Pressing the  and  keys scrolls the items.

② Contents of display on the second line

No.	Message displayed	Description
1	DRIVE (①, ②) #####	① : Port No., ② : Row No., ##### : Recovery condition COMP : Recovery completed (Normal) nnn% : Percentage of recovery ABORT : Recovery completed (Abnormal) FORCE : Forced termination of recovery
2	(QUIT)	Returns to the previous menu (disk maintenance selection menu).

(4-4) Runs self-diagnostics on the disk (inhibiting to change the media positioning).

① Panel display

S	E	L	F	-	D	I	A	G	<	0	>			

← Pressing the  and  keys scrolls the items.

② Contents of display on the second line

No.	Message displayed	Description
1	ALL DRIVES	Runs diagnostics on all the disks mounted.
2	P = ① R = ②	Runs diagnostics on the specified disk (① : Port, ② : Row).
3	(QUIT)	Returns to the previous menu (disk maintenance selection menu).

③ Key and other operations

Selecting the disk (menu item) to be diagnosed switches to the following display to notify that the disk is being diagnosed.

D	I	A	G	O	(	①	,	②	)					
E	X	E	C	U	T	I	N	G						

Completion of diagnostics switches to the following display to indicate the result.

D	I	A	G	O	(	①	,	②	)	R	E	S		

← Pressing the  and  keys scrolls the items.

Contents of display on the second line

No.	Message displayed	Description
1	STATUS = 00	The diagnostic result is good.
2	STATUS = rr xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx	If the diagnostic result is "Drive Check Condition", displays the code (rr = 02) and the Extended Sense Byte (xx...x) which is sent from the disk. If the diagnostic result is other than "Drive Check Condition", displays the code (rr) and the internal error information (xx...x).
3	(QUIT)	Returns to the previous menu (disk maintenance selection menu).

- Same as the item (4-4) for the operation and display format.

- To execute this operation, LU formatting must be completed. If LU formatting is not completed, this operation cannot be done.

- ① Panel display

← Pressing the  and  keys scrolls the items.

No.	Message displayed	Description
1	ALL LU	Performs a parity check on all the LUs.
2	LU ■■ (XX)	Performs a parity check on the specified LU. (Displays only the LUN defined.) “■■” indicates the LU No.
3	(QUIT)	Returns to the previous menu (disk maintenance selection menu).

- Selecting the LU to be checked switches to the following display to notify that the LU is being checked.

Completion of check switches to the following display.

← Pressing the  and  keys scrolls the items.

No.	Message displayed	Description
1	STATUS = NORMAL	All the check results are normal.
2	ERR = ■■■■■■■■	The number of errors indicated by “■■■■■■■■” has been detected. The details about the errors have been output to the floppy disk. If the number of errors exceeds “99999999”, “ERR = *****” is displayed.
3	(QUIT)	Returns to the previous menu (LU selection menu).

(4-6.2) For the dual system.

① Panel display

P	A	R	I	T	Y	C	H	E	C	K										

← Pressing the  and  keys scrolls the items.

② Contents of display on the second line

No.	Message displayed	Description
1	ALL LU	Performs a parity check on all the LUs.
2	LU ■■ (XX)	Performs a parity check on the specified LU. (Displays only the LUN defined.) “■■” indicates the LU No.
3	(QUIT)	Returns to the previous menu (disk maintenance selection menu).

③ Key and other operations

Selecting the LU to be checked switches to the following display to notify that the LU is being checked.

P	R	T	Y	(	L	U	■	■	)											
E	X	E	C	U	T	I	N	G												

Completion of check switches to the following display.

P	R	T	Y	(	L	U	■	■	)	R	E	S								

← Pressing the  and  keys scrolls the items.

Contents of display on the second line

No.	Message displayed	Description
1	STATUS = NORMAL	All the check results are normal.
2	ERR = ■■■■■■■■	The number of errors indicated by “■■■■■■■■” has been detected. The details about the errors have been output to the floppy disk. If the number of errors exceeds “99999999”, “ERR = *****” is displayed.
3	(QUIT)	Returns to the previous menu (LU selection menu).

(4-7) ECC check.

Same as the item (4-6) for the operation and display format.

(4-8) LA check.

Same as the item (4-6) for the operation and display format.

(4-9) Formats the disk.

① Panel display

F	O	R	M	A	T	(	■	■	■	B	)

■■■ = "516" or "524"

← Pressing the  and  keys scrolls the items.

② Contents of display on the second line

No.	Message displayed	Description
1	ALL DRIVES	Formats all the disks mounted except the current disk.
2	P = ① R = ② : UNDEF	The disk mounted (① : Port, ② : Row) and its status (UNDEF : Not defined in the RAID configuration, BUSY : In use, STDBY : Not used, DETCH : Detached).
	P = ① R = ② : BUSY	
	P = ① R = ② : STDBY	
	P = ① R = ② : DETCH	
3	(QUIT)	Returns to the previous menu (disk maintenance selection menu).

③ Key and other operations

Selecting the disk (menu item) to be formatted switches to the following display for confirming the disk before actually formatting the disk.

[For all the disks mounted]

F	O	R	M	A	T	(	A	L	L	)	?

← Pressing the  and  keys scrolls the items.**[For the disk specified]**

F	O	R	M	A	T	(	①	,	②	)	?

← Pressing the  and  keys scrolls the items.

Contents of display on the second line

No.	Message displayed	Description
1	YES	Starts formatting the disk.
2	(QUIT)	Returns to the previous menu (disk maintenance selection menu) without formatting the disk.

(4-10) Recovers the system information.

① Panel display

S	Y	S	T	E	M		R	E	C	O	V	E	R							

← Pressing the  and  keys scrolls the items.

② Contents of display on the second line

No.	Message displayed	Description
1		Status of the disk with Row = 0 (① : Port No.)
	P = ① : NOT USABLE	Unusable status Note : Recovery of system information can be done only for the disk in the unusable status.
	P = ① : USABLE (CUR)	Used as the current disk.
	P = ① : USABLE	Usable status.
	P = ① : IN PROGRESS	Recovery of the system information is in progress.
2	(QUIT)	Returns to the previous menu (disk maintenance selection menu).

③ Key and other operations

Selecting the disk you want to recover (by displaying the desired disk on the second line and pressing the  key) switches to the following display for confirming the contents before actually recovering the system information.

R	C	V	R	(	①	,	0	)		?										

← Pressing the  and  keys scrolls the items.

Contents of display on the second line

No.	Message displayed	Description
1	YES	Starts recovering the system information.
2	(QUIT)	Returns to the previous menu (disk maintenance selection menu) without starting to recover the system information.

R	C	V	R	(	①	,	0	)		?										

← Pressing the  and  keys scrolls the items.

Contents of display on the second line

No.	Message displayed	Description
1	(QUIT)	Returns to the disk maintenance selection menu.

(4-11) Reference of the disk failure statistical information.

① Panel display

S	T	A	T	I	S	T	I	C	S	C	N	T

← Pressing the  and  keys scrolls the items.

② Contents of display on the second line

No.	Message displayed	Description
1	TOTAL COUNT	Displays the number of occurrences of the disk failures (accumulated value).
2	CURRENT COUNT	Displays the number of occurrences of the disk failures (current value).
3	(QUIT)	Returns to the previous menu (disk maintenance selecting menu) screen.

③ Key and other operations

Selecting the item to which you want to refer (for example, "TOTAL COUNT") switches the display to the following.

T	O	T	A	L	C	O	U	N	T

← Pressing the  and  keys scrolls the items.

Contents of display on the second line

No.	Message displayed	Description
1	MEDIUM ERR (REC)	Refers to the number of occurrences of the media errors (recovered).
2	MEDIUM ERR (UNR)	Refers to the number of occurrences of the media errors (unrecovered).
3	ON VERIFY (REC)	Refers to the number of errors (recovered) detected by the online verify.
4	ON VERIFY (UNR)	Refers to the number of errors (unrecovered) detected by the online verify.
5	(QUIT)	Returns to the previous menu.

Selecting the item (types) to which you want to refer switches the display to the following.

R	O	W	#	n					

n : Row number (0 - 4)

ll : Number of errors occurred in the disk of port number 0.

mm : Number of errors occurred in the disk of port number 1.

nn : Number of errors occurred in the disk of port number 2.

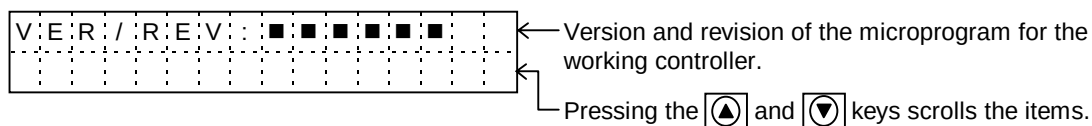
oo : Number of errors occurred in the disk of port number 3.

pp : Number of errors occurred in the disk of port number 4.

Number of errors is represented with a decimal number of two digits. If it exceeds 99, it is represented as "99".

(5) Microprogram version/revision reference menu.

① Panel display

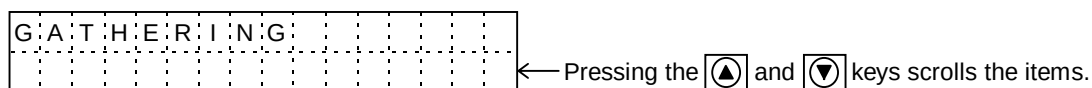


② Contents of display

No.	Message displayed	Description
1	(QUIT)	Returns to the previous menu (SVP function selection menu).

(6) Debug support menu.

① Panel display



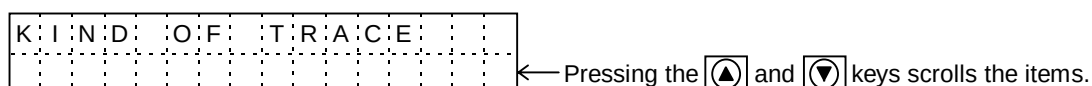
Perform the same operation for “GATHERING (CTL0)” and “GATHERING (CTL1)”.

② Contents of display on the second line

No.	Message displayed	Description
1	KIND OF TRACE	To output the trace information to the floppy disk, selects the data in the memory or the data saved in the system disk.
2	ITEMS OF TRACE	Selects the item of the trace information to be output to the floppy disk. This function must be executed to set the information before activating the floppy disk output function.
3	GET TRACE TO FD	Outputs the trace information to the floppy disk.
4	KIND OF STATi	To output the statistics to the floppy disk, selects the data in the memory or the data saved in the system disk.
5	GET STATI TO FD	Outputs the statistics to the floppy disk.
6	(QUIT)	Returns to the previous menu (SVP function selection menu).

(6-1) Sets the location of the trace information.

① Panel display



② Contents of display on the second line

No.	Message displayed	Description
1	CURRENT MEMORY	Acquires the trace information in the memory.
2	SAVED ON DRIVE	Acquires the trace information saved in the system disk.
3	(QUIT)	Returns to the previous menu (debug support menu).

③ Key and other operations

Operation	Panel display
Selecting the "KIND OF TRACE" from the debug support menu switches to the following display.	K I N D O F T R A C E * C U R R E N T M E M O R Y Indicates that the default is to "acquire the trace information in the current memory".
To change to "acquire the trace information saved in the system disk", use the  key to display the item.	K I N D O F T R A C E S A V E D O N D R I V E
Pressing the  key changes the item to be selected.	K I N D O F T R A C E * S A V E D O N D R I V E An asterisk "*" is displayed to indicate that the default is to "acquire the trace information saved in the system disk".
Press the  key to terminate the processing (to select "QUIT").	K I N D O F T R A C E (Q U I T) Pressing the  key returns to the debug support menu.

(6-2) Selects the trace information to be acquired.

① Panel display

I T E M S O F T R A C E	← Pressing the  and  keys scrolls the items.

② Contents of display on the second line

No.	Message displayed	Description
1	INTERRUPT	Acquires the interrupt trace information.
2	HOST COMMAND	Acquires the host command trace information.
3	DRIVE COMMAND	Acquires the disk command trace information.
4	MODULE	Acquires the module trace information.
5	JOB	Acquires the job trace information.
6	SSB	Acquires the SSB trace information.
7	ERROR	Acquires the error trace information.
8	FAILURE	Acquires the failure trace information.
9	DOWN	Acquires the down trace information.
10	(QUIT)	Returns to the previous menu (debug support menu).

③ Key and other operations

Operation	Panel display
Selecting the "ITEMS OF TRACE" from the debug support menu switches to the following display.	ITEMS OF TRACE * INTERRUPT Indicates that the item with an asterisk "*" is to be output. (In this case, "Interrupt trace" is the item to be output.)
Each time the  key is pressed while the item is displayed, the item with an asterisk "*" is switched between "display" and "non-display" ("for output" and "not for output"). Thus, press the  key if you do not want to output the "interrupt trace".	ITEMS OF TRACE INTERRUPT An asterisk is disappeared so that the item is not to be output.
Press the  or  key to display other items, then use the  key to set the items to be output or not to be output. After the setting is completed, press  key and display "QUIT" to terminate the processing.	ITEMS OF TRACE (QUIT) Pressing the  key returns to the debug support menu.

(6-3) Outputs the trace information to the floppy disk.

① Panel display

CONFIRM F.D. ■■	← "■■" : Floppy disk No.
	← Pressing the  and  keys scrolls the items.

Contents of display on the second line

No.	Message displayed	Description
1	YES	Starts to output the trace information to the floppy disk mounted.
2	(QUIT)	Returns to the previous menu (debug support menu) without outputting the trace information.

Accepting the confirmation that the floppy disk is mounted switches to the following display to notify that the trace information is being output.

G	E	T		T	R	A	C	E							
	E	X	E	C	U	T	I	N	G						

If all the data cannot be output to the floppy disk mounted, returns to the previous status ("CONFIRM FD.##?") to mount another floppy disk.

Completion of output of all the data switches to the following display.

G	E	T		T	R	A	C	E		C	M	P			

← Pressing the  and  keys scrolls the items.

Contents of display on the second line

No.	Message displayed	Description
1	(QUIT)	Returns to the previous menu (debug support menu).

(6-4) Sets the location of the statistics.

① Panel display

K	I	N	D		O	F		S	T	A	T	I			

← Pressing the  and  keys scrolls the items.

② Contents of display on the second line

No.	Message displayed	Description
1	CURRENT MEMORY	Acquires the statistics in the memory.
2	SAVED ON DRIVE	Acquires the statistics saved in the system disk (statistics saved immediately before power-off).
3	(QUIT)	Returns to the previous menu (debug support menu).

③ Key and other operations

Operation	Panel display
Selecting the "KIND OF STATI." from the debug support menu switches to the following display.	K I N D O F S T A T I . * C U R R E N T M E M O R Y Indicates that the default is to "acquire the statistics in the current memory".
To change to "acquire the statistics saved in the system disk", use the  key to display the item.	K I N D O F S T A T I . S A V E D O N D R I V E
Pressing the  key changes the item to be selected.	K I N D O F S T A T I . * S A V E D O N D R I V E An asterisk "*" is displayed to indicate that the default is to "acquire the statistics saved in the system disk".
Press the  key to terminate the processing (to select "QUIT").	K I N D O F S T A T I . (Q U I T) Pressing the  key returns to the debug support menu.

(6-5) Outputs the statistics to the floppy disk.

① Key and other operations

Selecting the floppy disk output function for the statistics switches to the following display for confirming that the floppy disk is mounted.

C	O	N	F	I	R	M	F	D	.	■	■				

← “■ ■” : Floppy disk No.
 ← Pressing the  and  keys scrolls the items.

Contents of display on the second line

No.	Message displayed	Description
1	YES	Starts to output the statistics to the floppy disk mounted.
2	(QUIT)	Returns to the previous menu (debug support menu) without outputting the statistics.

Accepting the confirmation that the floppy disk is mounted switches to the following display to notify that the statistics is being output.

G	E	T		S	T	A	T	I	C	S					#
E	X	E	C	U	T	I	N	G							

If all the data cannot be output to the floppy disk mounted, returns to the previous status (“CONFIRM FD.##?”) to mount another floppy disk.

G	E	T		S	T	A	T	I	.	C	M	P			#

← Pressing the  and  keys scrolls the items.

Contents of display on the second line

No.	Message displayed	Description
1	(QUIT)	Returns to the previous menu (debug support menu).

(7) Memory contents reference/update menu.

① Function

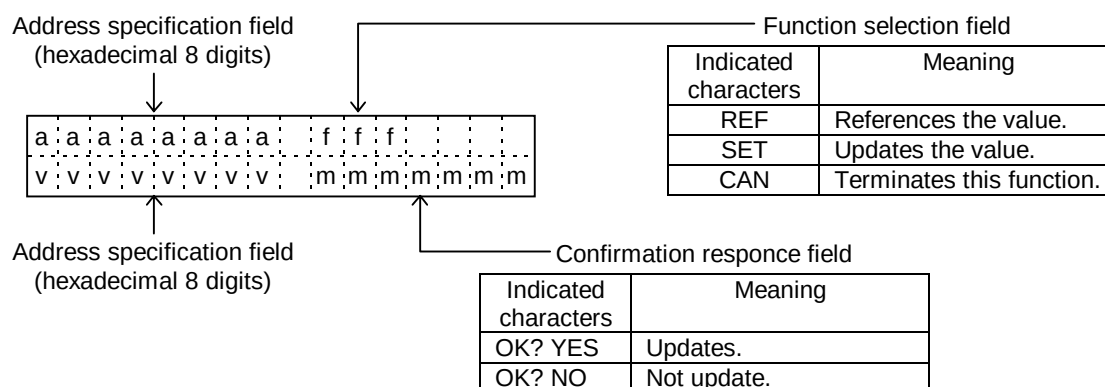
References/updates the contents of an arbitrary address (4 bytes) under the control of MPU. The contents can only be updated after referencing them.

If you attempt to reference an invalid address, an error message is reported.

② User interface

The user interface is dedicated for this function differing from the one for the other SVP functions. (The details about this user interface is described in the following item ④.)

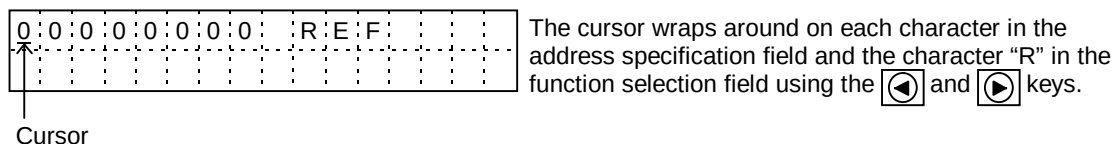
③ Configuration of the window (LCD)

**Configuration of the Window (LCD) for Referencing/Updating the Memory Contents**

④ Operations

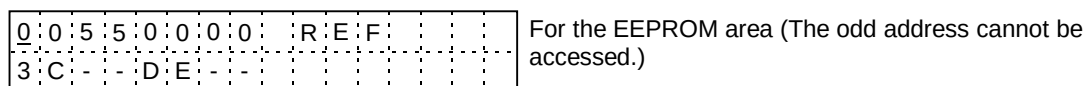
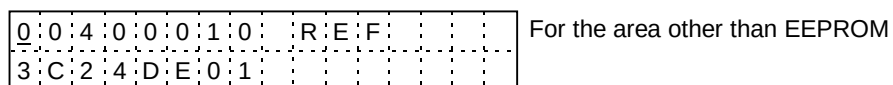
④-1 How to activate this function

Selecting the "MEMORY MAINT" from the SVP function selection menu switches to the following display and the reference function can be used.



④-2 How to reference the contents of the specified address (4 bytes)

Specifies the desired address in hexadecimal number in the address specification field and press the key. Now, the contents of 4 bytes following the specified address are displayed on the value reference/specification field. (See the figure below.)



[How to specify the address]

Positions the cursor on the desired column in the address specification field. Then, specify the address using one of the following ways; direct specification or wraparound specification.

(a) Direct specification

Pressing one of the number keys between 0 and 9 displays the value of that key on the current cursor position. The cursor position remains as before.

(b) Wraparound specification

Each time the  or  key is pressed, a hexadecimal number is wrapped around one by one on the current cursor position. The  key is used for forward wraparound (0 → 1 → ... → 9 → A → B → ... → F → 0 → 1 → ...), and the  key is used for backward wraparound (F → E → ... → A → 9 → 8 → ... → 0 → F → E).

The cursor position remains as before.

Specifying an invalid address (access inhibited area) displays the following error message to notify it.

0	0	0	0	0	0	0	0	R	E	F				
I	N	V	A	L	I	D		A	D	D	R	E	S	S

Pressing any key deletes the error message displayed. Then, the value reference/specification field becomes blank. (See the figure below.)

0	0	0	0	0	0	0	0	R	E	F				

Indicates the cursor position after the error message displayed disappears by pressing the  key.

Note : To specify the address in the cache area, the 4 byte boundary value needs to be specified.

To specify the address in the EEPROM area, the 2 byte boundary value needs to be specified.

④-3 How to change the contents of the specified address (4 bytes)

The contents can only be changed after referencing the value. Move the cursor to the function selection field using the  or  key. Then, press  or  key to display "SET".

Pressing the  key now enables the contents in the value reference/specification field to be changed. The address specification field enters into the protection (address change inhibited) status.

0	0	4	0	0	0	1	0	S	E	T				
3	C	2	4	D	E	0	1							

The cursor wraps around on each character in the value reference/specification field and the character "S" in the function selection field using the  and  keys.

Cursor

Change the contents in the value reference/specification field to the desired value using the same way described in the previous item "(a) Direct specification" and "(b) Wraparound specification". The changes being made here is only affected to the display. The contents in the actual memory has not yet been changed.

Press the  key after completion of changing the contents in the value reference/specification field. Now, the value reference/specification field enters into the protection (specification change inhibited) status and the message confirming to change the contents in the actual memory is displayed. (See the figure below.)

0	0	4	0	0	0	1	0	S	E	T				
3	C	2	4	F	F	0	0	O	K	?	Y	E	S	

The cursor is fixed on this position in the confirmation message displayed.

If you may change the contents, press the  key. Now, the contents in the actual memory is updated to the specified value. Then, returns to the previous reference status.

To cancel the changes, press the  or  key to switch the display to “NO”, then press the  key. The confirmation messages disappears and returns to the status where the contents in the value reference/specification field can be changed.

To return to the previous address contents reference function, use the  or  key to move the cursor to the function selection field, press the  or  key to display “REF”, and press the  key.

[Update inhibited area]

This function handles the three areas; the read/write area, read-only area, and access inhibited area.

The read-only area is the area which can only be referenced and cannot be updated. If you attempt to update (by displaying “SET” in the function selection field and pressing the  key) after referencing the value of this area, the error message is displayed to notify that this area is inhibited to update. (See the figure below.)

1	0	1	0	0	0	0	0	S	E	T				
3	C	2	4	D	E	0	1	N	O	T	U	P	D	

Pressing any key deletes the error message displayed. (See the figure below.)

1	0	1	0	0	0	0	0	R	E	F				
3	C	2	4	D	E	0	1							

The display is switched to “REF” using the  key to reference the contents of the other address.

④-4 How to terminate the reference/update function

To return to the SVP function selection menu after terminating the memory contents reference/update function, use the  or  key to move the cursor to the function selection field, and press the  or  key to display “CAN”. Then, press the  key.

⑤ Reference/update range

Table 3.6.1 shows the memory range which can be accessed by this function.

**Table 3.6.1 Memory Range Which can be Accessed by
Memory Contents Reference/Update Function (1/2)**

No.	Item	Accessible Range (Address)	Access Type
1	DEBUG part Reg	0x7000 0000 - 0x7000 008D	Only for reference
		0x7000 0090 - 0x7000 00AD	Only for reference
		0x7000 00B0 - 0x7000 00B5	Only for reference
		0x7000 00B8 - 0x7000 00BD	Only for reference
		0x7000 00C0 - 0x7000 00C5	Only for reference
		0x7000 00C8 - 0x7000 00E3	Only for reference
		0x7000 00F4 - 0x7000 00F7	Only for reference
		0x7000 0100 - 0x7000 011D	Only for reference
		0x7000 0120 - 0x7000 012B	Only for reference
		0x7000 0130 - 0x7000 013F	Only for reference
		0x7000 0164 - 0x7000 0169	Only for reference
		0x7000 0180 - 0x7000 0183	Only for reference
		0x7000 0188 - 0x7000 019B	Only for reference

**Table 3.6.1 Memory Range Which can be Accessed by
Memory Contents Reference/Update Function (2/2)**

No.	Item	Accessible Range (Address)	Access Type
2	CS/DS	0x90000000 - 0x903FFFFF	Reference/update
3	OP PANEL	0xA0000000 - 0xA000007C	Only for reference
4	CACHE	0xB0000400 - 0xB0FFFFFF	Reference/update
		0xB4000400 - 0xB4FFFFFF	Reference/update
		0xB8000400 - 0xB8FFFFFF	Reference/update
		0xBC000400 - 0xBCFFFFFF	Reference/update
5	Flash	0xF0000000 - 0xF0003FFD	Only for reference
		0xF0003FFE - 0xF00FFFFF	Only for reference

(8) PIN data existence reference menu

① Panel display

P I N : L U ■ ■ (X X)	← "■■" : LU No.
	← Pressing the  and  keys scrolls the items.

② Contents of display on the second line

No.	Message displayed	Description
1	NUM = #####	Displays the number of PINs for the LU.
2	(QUIT)	Returns to the previous menu (PIN data existence reference menu).

③ How to display the next LU information

Press the  key after confirming the following display to confirm whether or not the PIN data for the next LU exists.

P I N : I N F O

(9) Online failure recovery display menu.

① Panel display

R	C	V	:	E	R	R	:	B	Y	T	:	n	n	n	:
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

←“nnn” indicates the byte position of the array reconstruct condition parameter.

② Contents of display on the second line

No.	Message displayed	Description
1	34C6XXXXXXXXXXXX	Array reconstruct condition parameter (0 - 7 bytes).
2	.	
3	XXXXXXXXXXXXXXXXXX	Array reconstruct condition parameter (192 - 199 bytes).
4	(QUIT)	Returns to the previous menu (online failure recovery display menu).

③ The failure information consists of 200 bytes per information.

The 200 byte failure  key displays the next failure information.

RCV ERR : BYT xxx	① Reconstruction Status Code
34C6080100000040	00h : Data recovery not executed.
①←	01h : Data recovery normally terminated.
7000060000000038	02h : Data recovery normally terminated.
②←	04h : Data recovery normally terminated.
0000000082030000	08h : Data recovery forcibly terminated.
③←	(*) Other than 00h and 04h. The following is valid.
0000040030300000	② Sense Key : 06
④←	③ Sense Code : 8203
0000000001420000	④ Error detection part
⑥←	01 (81) : Disk detection error
0000000000000000	04 : Disk controller detection error
0000000000000000	10 : Host interface controller detection error
0128000000000000	40 : MPU detection error
2000030082000200	⑤ Disk No.
.	(Port, Row)
0000000000000000	Port and row No.s of the disk where an error is detected.
(QUIT)	⑥ Failure occurrence part code
(TERMINATE SVP)	Error code

① Panel display

← Pressing the  and  keys scrolls the items.

No.	Message displayed	Description
1	Warning message code and message text Example) W20201 DRVALM-01	Displays the warning information during execution.
2	(QUIT)	Returns to the previous menu (warning information display menu).

(11) Statistics clear menu.

① Panel display

C	L	E	A	R	L	O	G	(	C	T	O	)

← Pressing the  and  keys scrolls the items.

“CL0” can be “CT1”.

② Contents of display on the second line

No.	Message displayed	Description
1	ALL DATA	Initializes the statistics counter completely.
2	CONTROLLER	Initializes the statistics counter related to the controller.
3	HOST	Initializes the statistics counter related to the host.
4	(QUIT)	Returns to the previous menu (statistics clear menu).

③ Key and other operations

Selecting the item to be cleared (by displaying the desired item on the second line and pressing the  key) switches to the following display for confirming the contents before actually clearing the statistics.

C	L	R	L	O	G	(	▲	▲	▲	▲	)

← ▲▲▲▲ = ALL : For selecting ALL DATA
 CTRL : For selecting CONTROLLER
 HOST : For selecting HOST

Contents of display on the second line

No.	Message displayed	Description
1	YES	Starts to clear the statistics.
2	(QUIT)	Returns to the previous menu (clear menu selection) without clearing the statistics.

Starting to clear the statistics switches to the following display to notify that the statistics is being cleared.

C	L	E	A	R	L	O	G						
					E	X	E	C	U	T	I	N	G

← Pressing the  and  keys scrolls the items.

Completion of clearing the statistics switches to the following display.

C	L	E	A	R	L	O	G	C	M	P		
					(	Q	U	I	T	)		

← Pressing the  key while “QUIT” is displayed returns to the previous menu (statistics clear menu).
 Displaying “TERMINATE SVP” using the  or  key and pressing the  key terminates the SVP operation using the maintenance panel.

① Panel display

← Pressing the  and  keys scrolls the items.

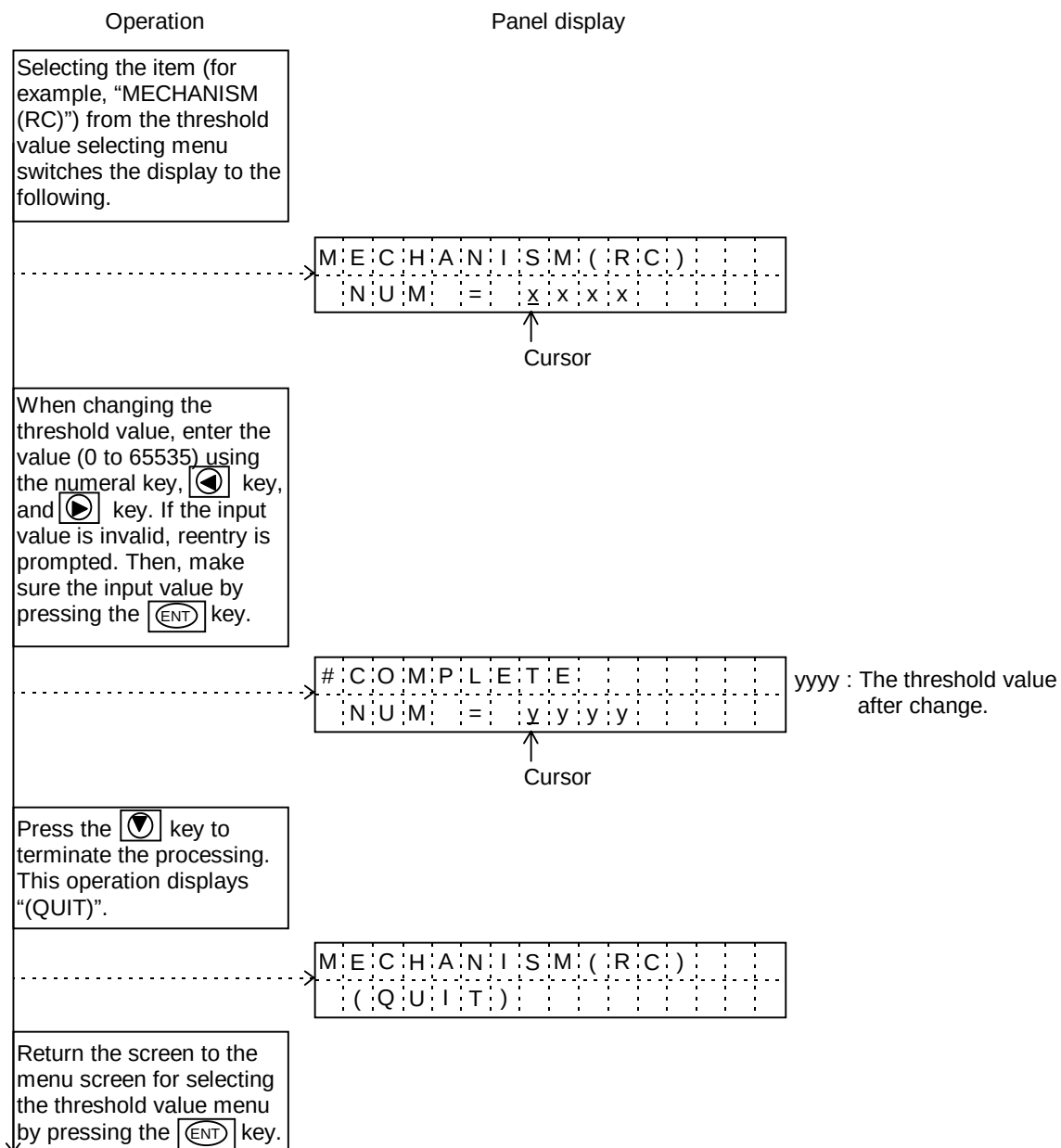
No.	Message displayed	Description
1	DRIVE	Selects the threshold value for the drive.
2	(QUIT)	Returns to the previous menu (SVP function selecting menu) screen.

① Panel display

← Pressing the  and  keys scrolls the items.

No.	Message displayed	Description
1	MECHANISM (RC)	Number of errors (recovered) of the drive mechanical system.
2	MECHANISM (UR)	Number of errors (unrecovered) of the drive mechanical system.
3	MEDIUM (RC)	Number of drive media errors. (recovered)
4	MEDIUM (UR)	Number of drive media errors. (unrecovered)
5	READ/WRITE (RC)	Number of errors (recovered) of the drive reading/writing system.
6	READ/WRITE (UR)	Number of errors (unrecovered) of the drive reading/writing system.
7	DRIVE I/F (RC)	Number of errors (recovered) of the drive I/F system.
8	DRIVE I/F (UR)	Number of errors (unrecovered) of the drive I/F system.
9	HARDWARE (RC)	Number of errors (recovered) of the drive hardware.
10	HARDWARE (UR)	Number of errors (unrecovered) of the drive hardware.
11	SCSI I/F (RC)	Number of errors (recovered) of the drive SCSI I/F system.
12	SCSI I/F (UR)	Number of errors (unrecovered) of the drive SCSI I/F system.
13	ONL VERIFY (CE)	Number of drive online verify collectable errors.
14	ONL VERIFY (UR)	Number of drive online verify uncollectable errors.
15	(QUIT)	Returns to the previous menu.

③ Key and other operations



(13-1) Function.

(13-2) Panel operation.

(a) Panel display

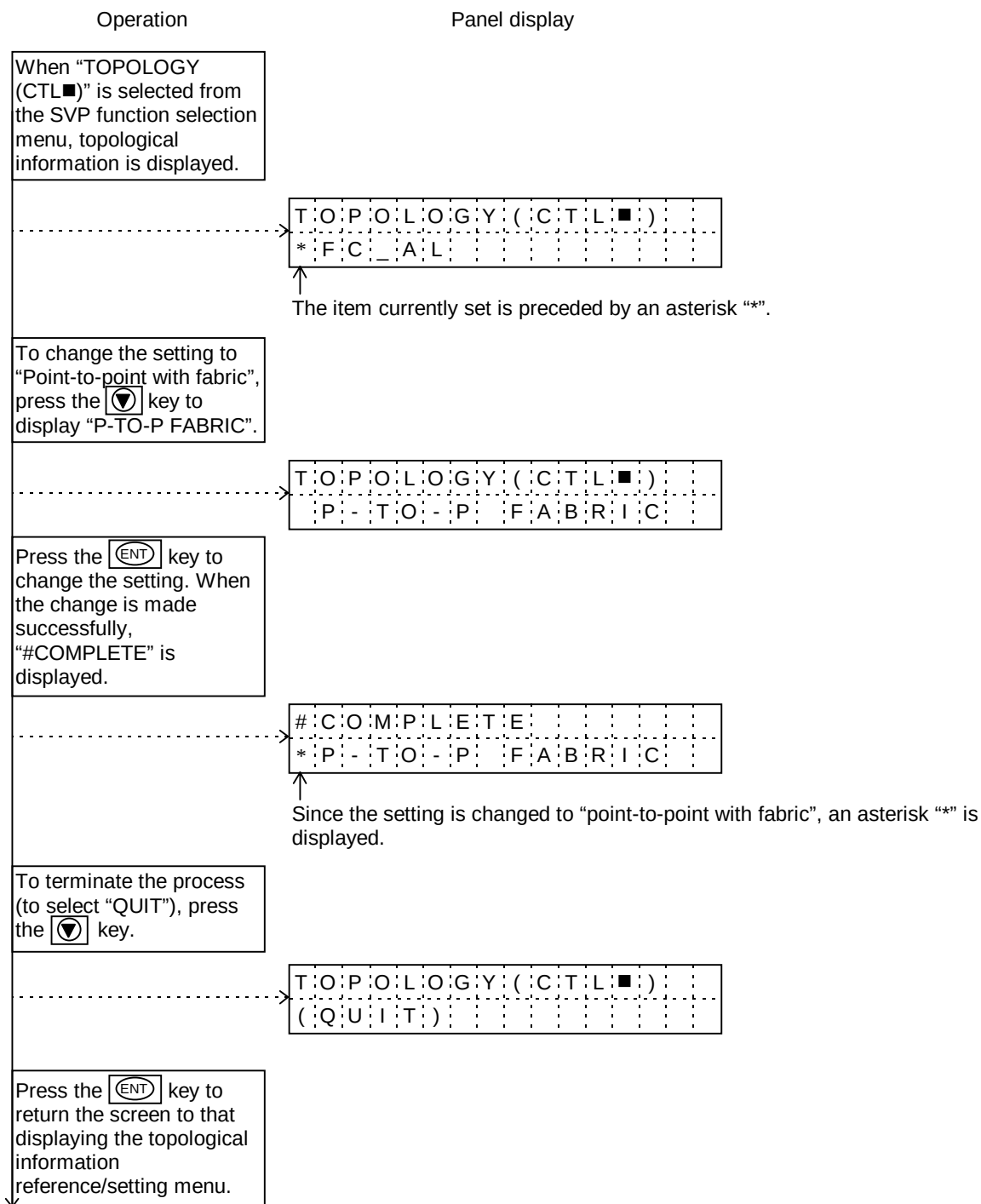
(b) Display on the second line (added message only)

② Topological information reference/setting menu

← “■” denotes a controller number, 0 or 1.

No.	Message displayed	Description
1	FC_AL	FC_AL
2	P-TO-P FABRIC	Point - to - point with fabric.
3	FC AL FABRIC	FC AL with fabric.

(c) Key and other operations



(13-3) Others.

The topological information set by this function becomes valid when the subsystem is powered on after a planned powering off.

(14-1) Function.

① Host identification information

The host identification information contains three items shown below for each host.

Host identification information for up to 32 hosts can be specified.

- 1 Host node name
- 2 Host port name
- 3 Host N Port ID

This information specifies whether to prevent the unintended hosts from accessing.

When “access check enabled” is set, this function rejects logging in of hosts that are not specified in the host identification information. When “access check disabled” is set, this function ignores the host identification information and does not perform the check restricting the access.

The table below shows whether each item of the host identification information can be set or referred to and whether it is used for the access check.

No.	Host identification information	Setting	Reference	Used or not used for access check
1	Host node name	Possible	Possible	Used
2	Host port name	Possible	Possible	Used
3	Host N Port ID	Possible	Possible	Not used

The above security information ① and ② are set for each controller. The host identification information is stored on a floppy disk in advance and read from it with setting operations. (Formatting of the floppy disk will be explained later.)

The access check enabling/disabling information is set by entering data from the panel.

① SVP function selection menu

(a) Panel display

[illegible]

(b) Display on the second line (added message only)

No.	Message displayed	Description
19	SECURITY (CTL0)	Reference/setting of the security information of the controller 0.
20	SECURITY (CTL1)	Reference/setting of the security information of the controller 1.

② Security information reference/setting menu

(a) Panel display

S	E	C	U	R	I	T	Y	(	C	T	L	■	)

←“■” denotes a controller number, 0 or 1.

(b) Display on the second line

No.	Message displayed	Description
1	ACCESS GUARD	Whether to enable or disable the access check is set.
2	HOST PERMISSION	The host identification information reference/setting function is activated.

③ Access check information reference/setting menu

(a) Panel display

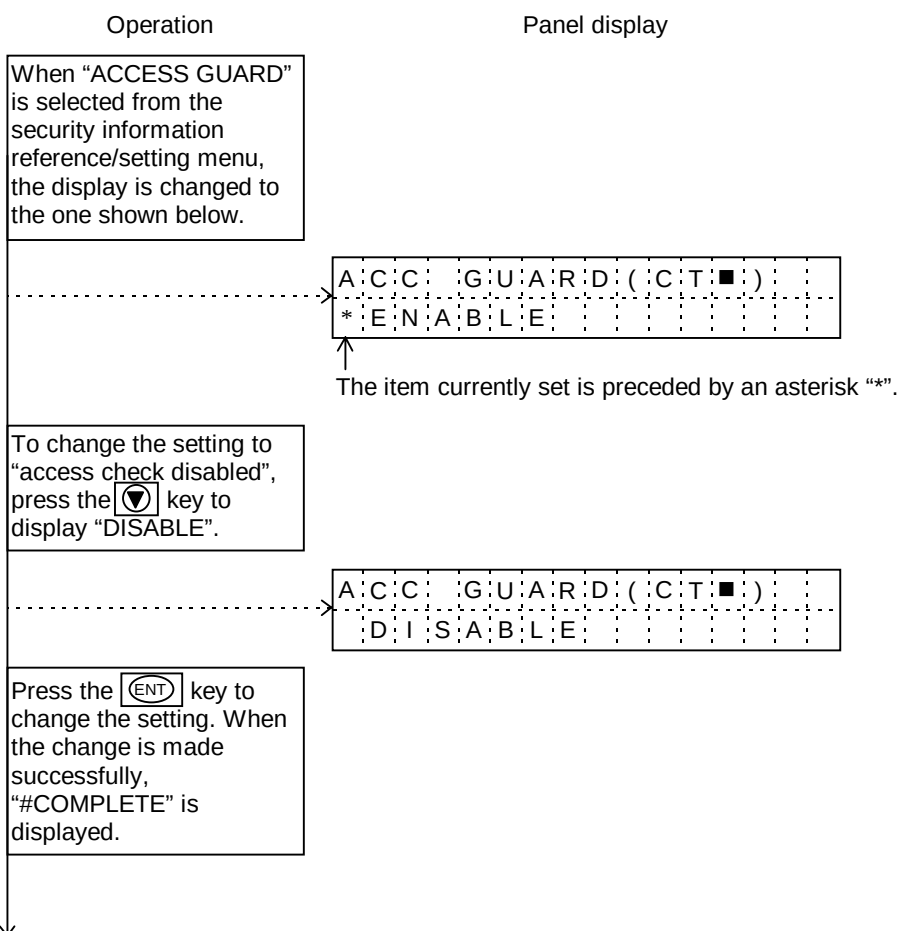
A	C	C		G	U	A	R	D	(	C	T	■	)

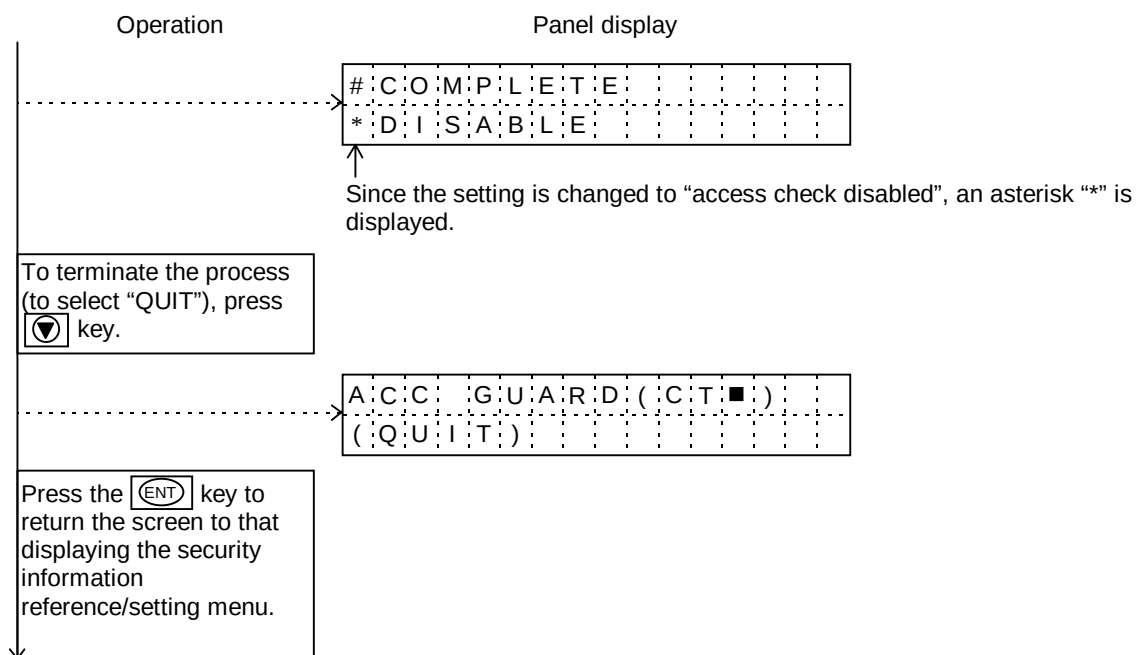
←“■” denotes a controller number, 0 or 1.

(b) Display on the second line

No.	Message displayed	Description
1	ENABLE	Hosts other than those specified by the host identification information setting function are denied access. If no host identification information has been set, this setting is invalidated (in the same way as the case of “disable”).
2	DISABLE	The access check is not performed regardless of whether the host identification information has been set. (default)

(c) Key and other operations





④ Host identification information reference/setting menu

(a) Panel display

H O S T P E R M (C T ■)	← "■" denotes a controller number, 0 or 1.

(b) Display on the second line

No.	Message displayed	Description
1	REFER	Host identification information is referred to.
2	INSTITUTE	Host identification information is set. (This information is loaded from the floppy disk.)

(c) Key and other operations

The host identification information reference/setting menu is displayed by selecting "HOST PERMISSION" from the security information reference/setting menu.

⑤ Referring to host identification information

(a) Panel display (host node name)

N O D E (C T ■ : n n)	← "nn" denotes an entry number (in decimal).
x x x x x x x x x x x x x x x x	← The node name of a host (8 bytes) is displayed in hexadecimal (16 characters).

(b) Panel display (host port name)

P O R T (C T ■ : n n)	← "nn" denotes an entry number (in decimal).
x x x x x x x x x x x x x x x x	← The node name of a host (8 bytes) is displayed in hexadecimal (16 characters).

(c) Panel display (host N_Port_ID)

N _ P O R T (C T ■ : n n)	← "nn" denotes an entry number (in decimal).
x x x x x x	← The N_Port_ID of a host (3 bytes) is displayed in hexadecimal (6 characters). If this information has not been set, "000000" is displayed.

(d) Panel display

When referring to the host identification information, select “REFER” from the host identification information reference/setting menu. The identification information of up to 32 hosts can be displayed when they have been entered. When referring to each information, scroll the display up or down using the “” or “” key. To quickly return the screen to the one displaying the first entry, press the “←” (leftward arrow) key.

If no host identification information has been set, “#NO EFFECT” is displayed.

⑥ Setting host identification information

(a) Key and other operations

When “INSTITUTE” is selected from the host identification information reference/setting menu, the following message appears to prompt you to insert the floppy disk.

C	O	N	F	I	R	M	:	F	D	:	?								

Display on the second line

No.	Message displayed	Description
1	(QUIT)	The screen is returned to the preceding one (displaying the message of the host identification information reference/setting) without a setting operation.
2	YES	The host identification information is set based on the data read from the floppy disk inserted.

When the floppy disk is inserted, the following message appears to notify that the host identification information is being set.

I	N	S	:	P	E	R	M	:	■										
E	X	E	:	C	U	T	I	N	G										

← “■” denotes a controller number, 0 or 1.

When the setting is completed, the following message appears. (In this setting process, the new host identification information is written over the information that has been set.)

I	N	S	:	P	E	R	M	:	■	:	C	M	:	P						

← “■” denotes a controller number, 0 or 1.

Display on the second line

No.	Message displayed	Description
1	(QUIT)	The screen is returned to the preceding one (displaying the host identification information reference/setting menu).

When any of the errors listed below is detected during accessing the floppy disk, the “#FD:DESCRI.ERR” message appears to prompt you to check.

[FD accessing errors]

- The floppy disk does not contain the necessary file or a wrong file name is given.
- The file on the floppy disk has no effective description line.
- The file contains the following description errors :
 - The name field contains invalid characters (other than hexadecimal ones).
 - The file name length is incorrect.

(14-3) Others.

The security information set by this function becomes valid when the subsystem is powered on after a planned powering off.

(15-1) Function.

- 1 Node name
- 2 Port name
- 3 N Port ID

No.	Identification information	Setting	Reference	Used or not used for access check
1	Node name	Possible	Impossible	Setting is made using the WWN updating tool.
2	Port name	Possible	Impossible	Setting is made using the WWN updating tool.
3	N_Port_ID	Possible	Possible	

(15-2) Panel operation.

(a) Panel display

[illegible]

No.	Message displayed	Description
17	SELFPORT (CTL0)	Reference or setting of the own port information for controller 0.
18	SELFPORT (CTL1)	Reference or setting of the own port information for controller 1.

② Own port information reference/setting menu

(a) Panel display

[illegible]

← “■” denotes a controller number, 0 or 1.

(b) Display on the second line

No.	Message displayed	Description
1	REFER	The own port information (own node name, own port name, and own port ID) is referred to.
2	INSTITUTE	The own port information (own port ID) is set.

③ Referring to the own port information

(a) Panel display (node name)

[illegible]

← “■” denotes a controller number, 0 or 1.

← The node name of the own port (8 bytes) is displayed in hexadecimal (16 characters).

(b) Panel display (port name)

P	O	R	T				(	C	T	L	■	)				
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

← “■” denotes a controller number, 0 or 1.

← The port name of the own port (8 bytes) is displayed in hexadecimal (16 characters).

(c) Panel display (N_Port_ID)

[illegible]

← “■” denotes a controller number, 0 or 1.

← The N_Port_ID of a host (3 bytes) is displayed in hexadecimal (6 characters). If this information has not been set, "000000" is displayed.

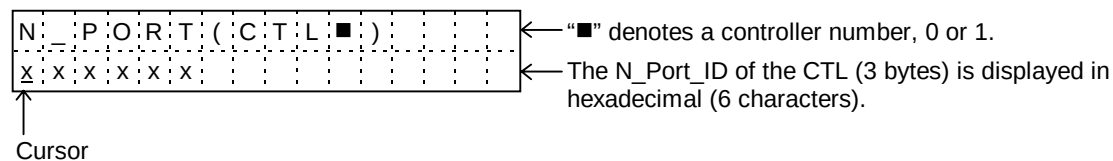
(d) Key operation

When referring to the own port information, select “REFER” from the own port information reference/setting menu. When referring to each information, scroll the display up or down using the “” or “” key.

④ Setting own port ID.

(a) Key and other operations

When setting to the own port information, select “UPDATE PORT-ID” from the own port information reference/setting menu.



<Operation procedure>

- ① To move the cursor, press the key.
- ② To input value of the cursor position, perform the following operation. Actual cursor position is not changed by the operation, but only the indication on the LED is changed. N_Port_ID is actually changed when the key is pressed as explained later.

<Operation 1>

When one of the keys to is pressed, cursor position is changed to the one specified by the key pressed.

<Operation 2>

Each time when the or key is pressed, the value in hexadecimal representing the cursor position rotates in the ascending order (0 → 1 → 2 → → 9 → A → B → → F → 0 → 1 →) or in the descending order (0 → E → F → A → 9 → 8 → 1 → 0 → F →) respectively.

<Value of own port ID>

For how to specify the value of the own port ID, see the “Hitachi DF350F Series Disk Array Subsystem User’s Guide for Installation”. (The guide is prepared in separate volumes each corresponding to the host system to be connected.)

When the setting is completed, the following message appears. (In this setting process, the new own port information is written over the information that has been set.)

I	N	S	:	S	E	L	F	:	■	:	C	M	P	:
:	:	:	:	:	:	:	:	:	:	:	:	:	:	:

← "■" denotes a controller number, 0 or 1.

Display on the second line

No.	Message displayed	Description
1	(QUIT)	The screen is returned to the preceding one (displaying the own port information reference/setting menu).

When any of the errors listed below is detected during accessing the floppy disk, the "#FD:DESCRI.ERR" message appears to prompt you to check.

[FD accessing errors]

- The floppy disk does not contain the necessary file or a wrong file name is given.
- The file on the floppy disk has no effective description line.
- The file contains the following description errors :
 - The name field contains invalid characters (other than hexadecimal ones).
 - The file name length is incorrect.

(15-3) Others.

The own port information set by this function becomes valid when the subsystem is powered on after a planned powering off.

(15-4) Format of a floppy disk or file for the host identification information and the own port information.

① Format

A DOS-formatted file is required to store the host identification information and the own port information. The floppy disk to be used is IBM-formatted (512 bytes per sector, 18 sectors per track, and the storage capacity of 1.44 MB) 3.5 inch disk.

② File configuration

The host identification information and the own port ID should be stored together in a single file.

File for Host Identification Information and Own Port ID

No.	File name	Contents
1	HOSTINFO.DAT	File storing the following. • Host identification information of the controller 0. • Host identification information of the controller 1. • Own port ID of the controller 0. • Own port ID of the controller 1.

③ File format

The HOSTINFO.DAT file is a text-formatted file. Its format is shown and described below.

; Comment			
[CTL0 Host Permission]			
Δ_0 Node-name	Δ_1 Port-name	Δ_1 N_Port_ID	----- Host identification information for controller 0.
Δ_0 Node-name	Δ_1 Port-name	Δ_1 N_Port_ID	
	:		
	:		
[CTL1 Host Permission]			----- Host identification information for controller 1.
; Comment			
Δ_0 Node-name	Δ_1 Port-name	Δ_1 N_Port_ID	
Δ_0 Node-name	Δ_1 Port-name		
	:		
	:		
[CTL0 Self Port]			----- N_Port_ID for controller 0.
Δ_0 N_Port_ID			
[CTL1 Self Port]			----- N_Port_ID for controller 1.
Δ_0 N_Port_ID			

[Host identification information]

Describe the node name, port name, and N_Port_ID (omittable) of each host on a single line.
Host identification information of up to 32 hosts can be specified for each controller.

[Own port ID]

Describe the N_Port_ID of the own port on a single line.

Node name ----- Describe the node name of a host (8 bytes) with 6 hexadecimal characters.

Port name ----- Describe the port name of a host (8 bytes) with 6 hexadecimal characters.

N_Port_ID ----- Describe the N_Port_ID of a host (8 bytes) with 6 hexadecimal characters. This data is omittable. When omitted, it is assumed to be "0x000000".

Δ_n ----- "n" or more space characters (20h).

;; ----- A line beginning with a semicolon ";" is assumed to be a comment line (however, this is not valid data). A comment line can be placed anywhere in the file.

HOSTINFO.DAT File Format

(16)FFC firmware revision information reference/setting menu.

(16-1) Function.

① SVP functions selection menu

(a) Panel display

S	V	P	F	U	N	C	T	I	O	N	S

(b) Display on the second line

No.	Message displayed	Description
1	FFC REV (CTL0)	Reference of the FFC firmware revision information of the controller 0.
2	FFC REV (CTL1)	Reference of the FFC firmware revision information of the controller 1.

② Referring to FFC firmware revision information

(a) Panel display (BIU revision)

B	I	U						C	T	■	← “■” denotes a controller number, 0 or 1.
x	x	x	x	x	x	x	x				← Displays the revision of the BIU (4 bytes) in hexadecimal (8 characters).

(b) Panel display (sequence manager revision)

S	E	Q		M	N	G		C	T	■	← “■” denotes a controller number, 0 or 1.
x	x	x	x	x	x	x	x				← Displays the revision of the sequence manager (4 bytes) in hexadecimal (8 characters).

(c) Panel display (sequence manager operation firmware revision)

O	P	E	R		F	I	R	M		C	T	■	← “■” denotes a controller number, 0 or 1.
x	x	x	x	x	x	x	x	x					← Displays the revision of the sequence manager operational firmware (4 bytes) in hexadecimal (8 characters).

(d) Panel display (sequence manager POST firmware revision)

P	O	S	T		F	I	R	M		C	T	■	← "■" denotes a controller number, 0 or 1.
x	x	x	x	x	x	x	x	x					← Displays the revision of the sequence manager POST firmware (4 bytes) in hexadecimal (8 characters).

(e) Panel display (ENDEC+revision)

E	N	D	E	C	+					C	T	■	← “■” denotes a controller number, 0 or 1.
x	x	x	x	x	x	x	x						← Displays the ENDEC+revision (4 bytes) in hexadecimal (8 characters).

(f) Panel display (FC-PH revision)

F	C	-	P	H		H	/	L		C	T	■																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																

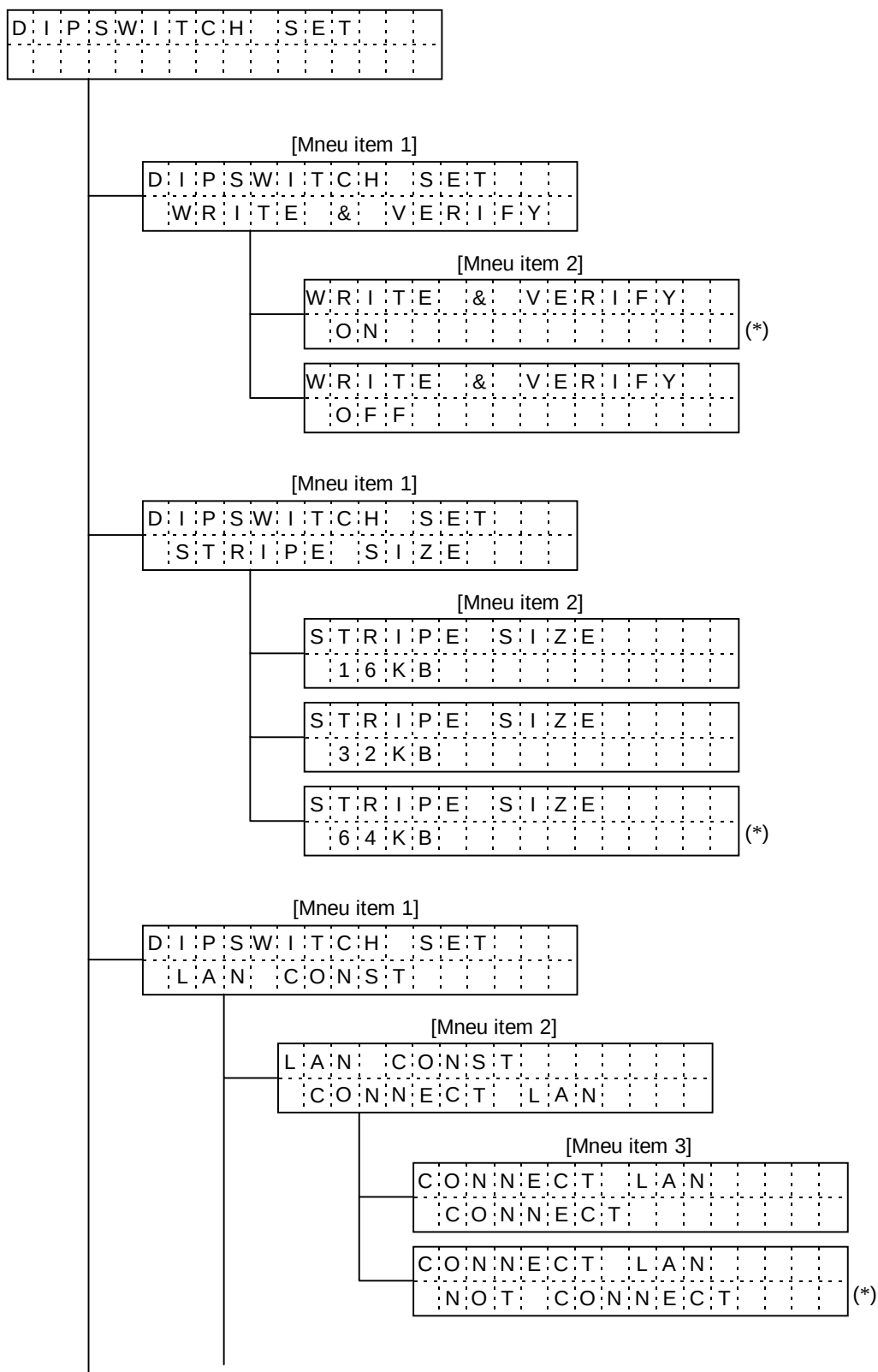
(g) Panel display

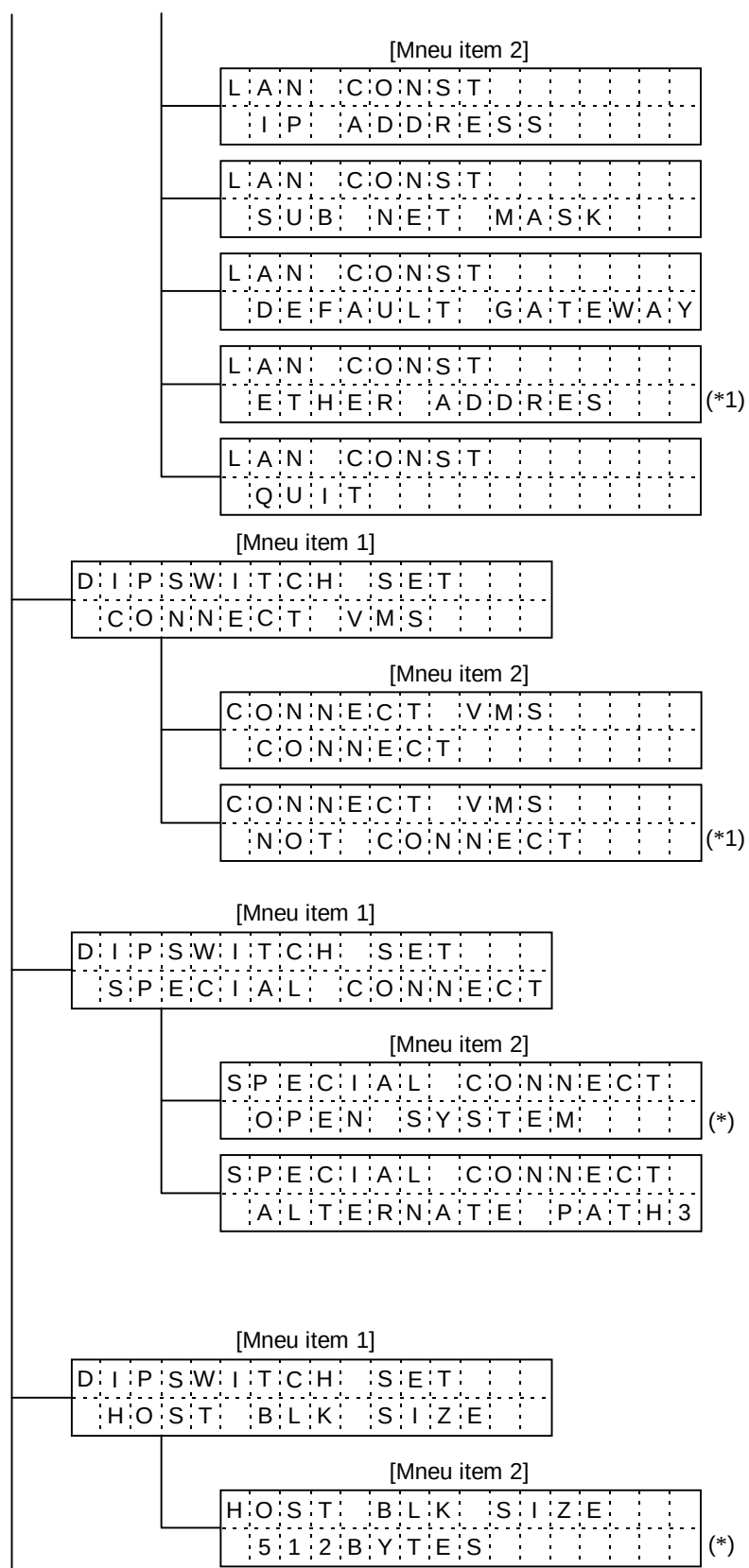
When referring to each information, scroll the display up or down using the “” or “” key.

3.4 Panel Tree Structure

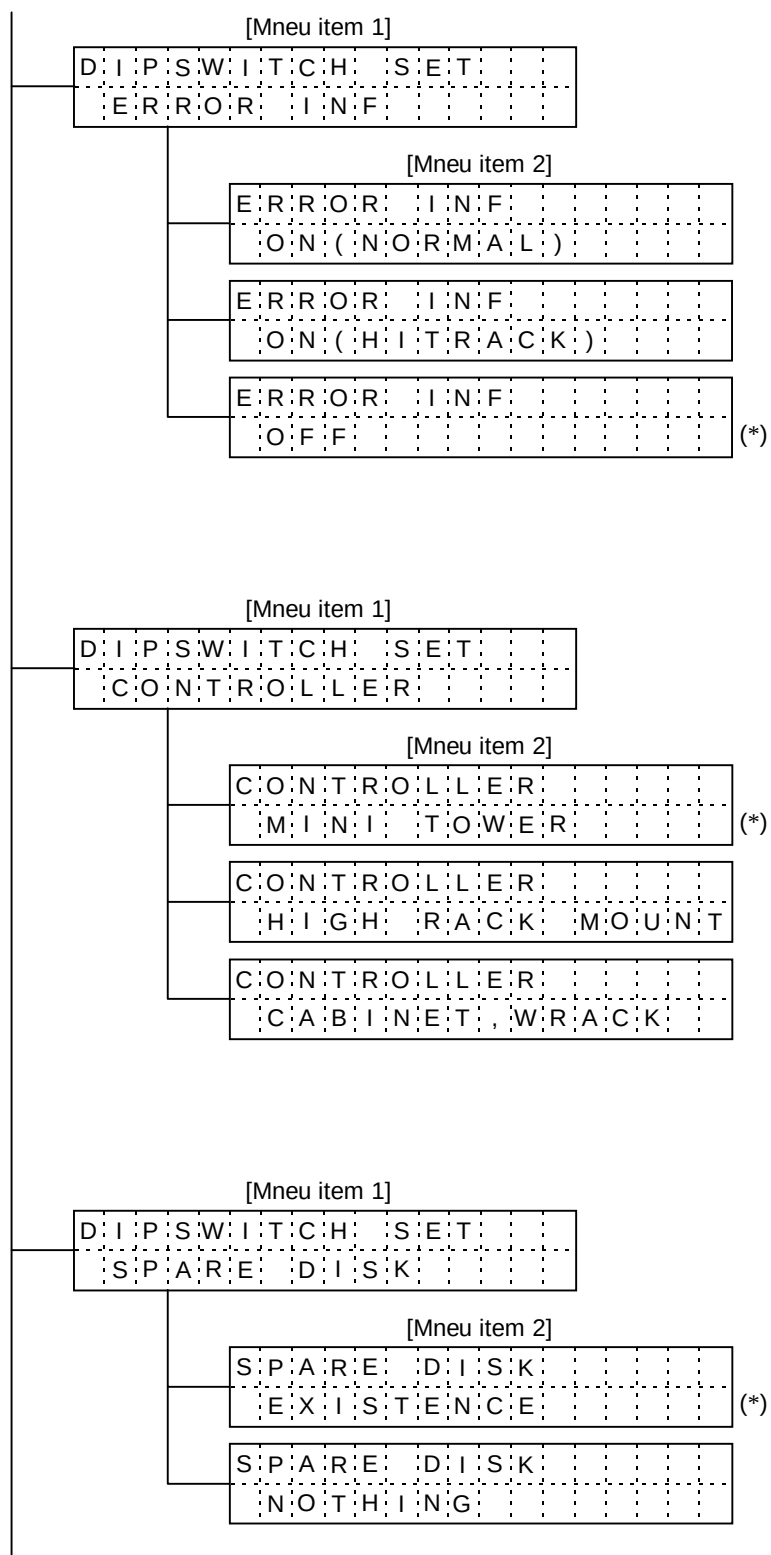
(1) Frame list for system parameter setup function.

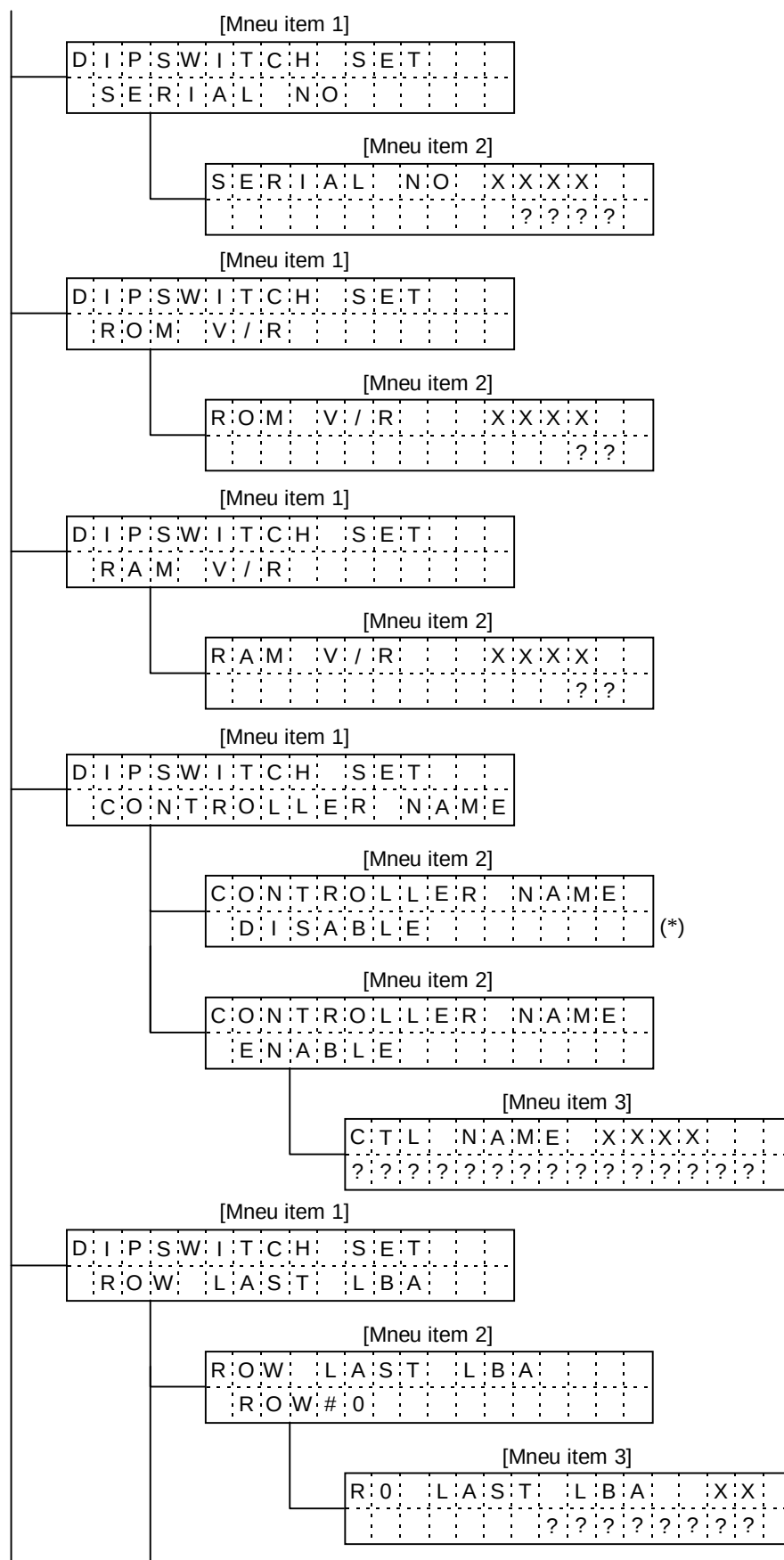
The default value is preceded by an asterisk (*) (on the right side of the frame).

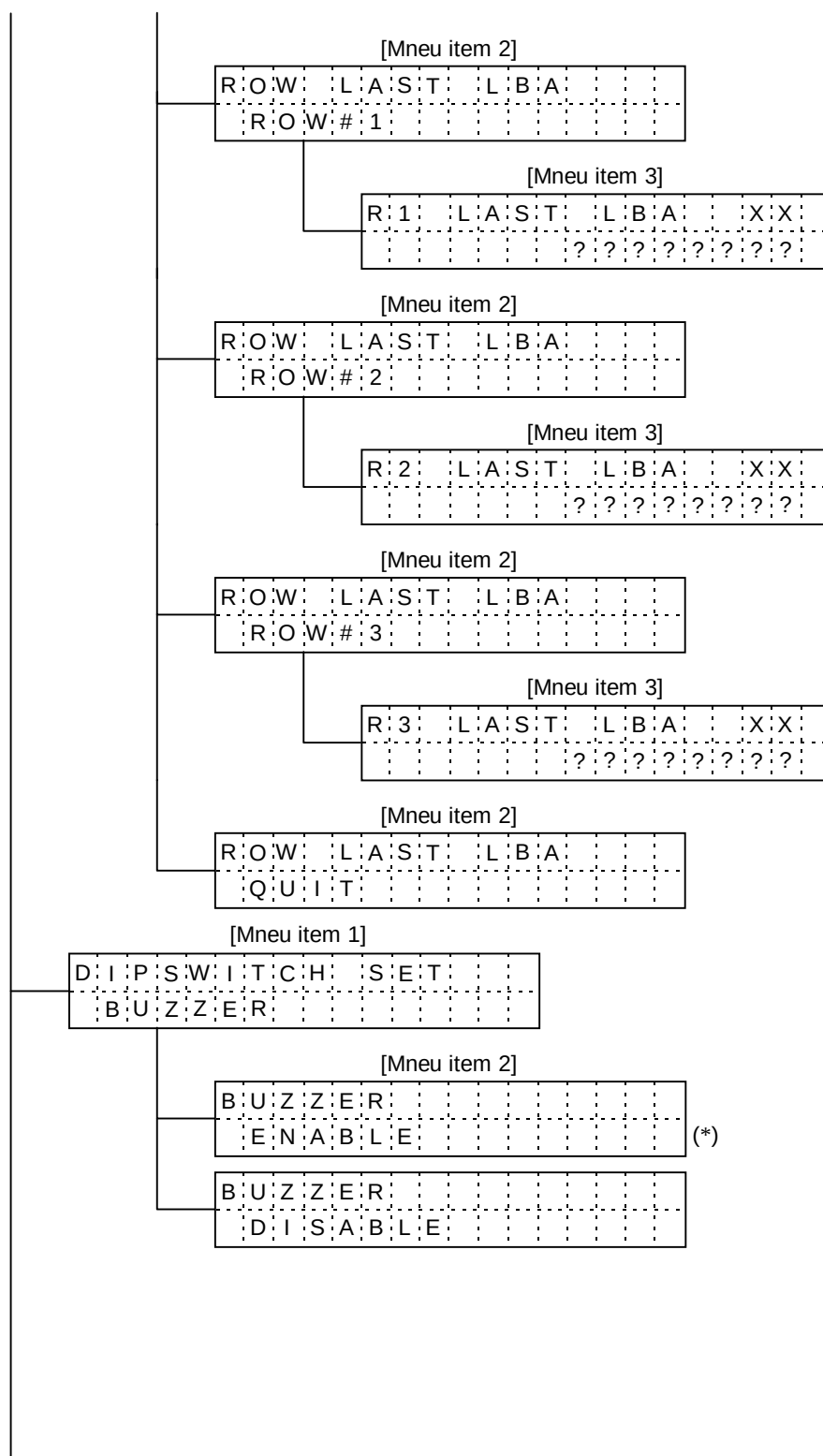


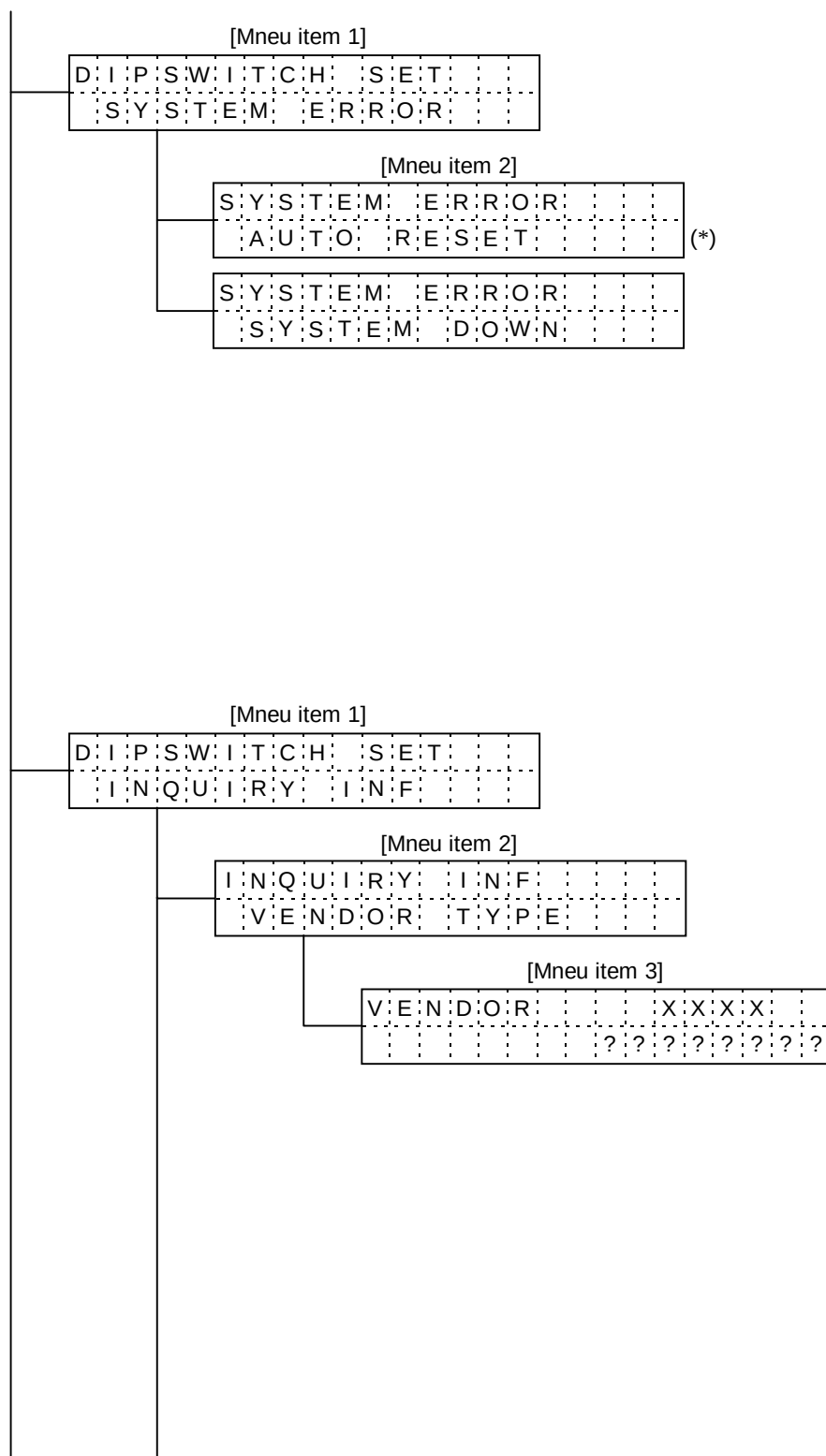


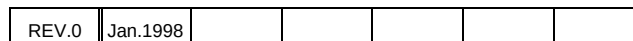
*1 This display is LAN additional feature only.

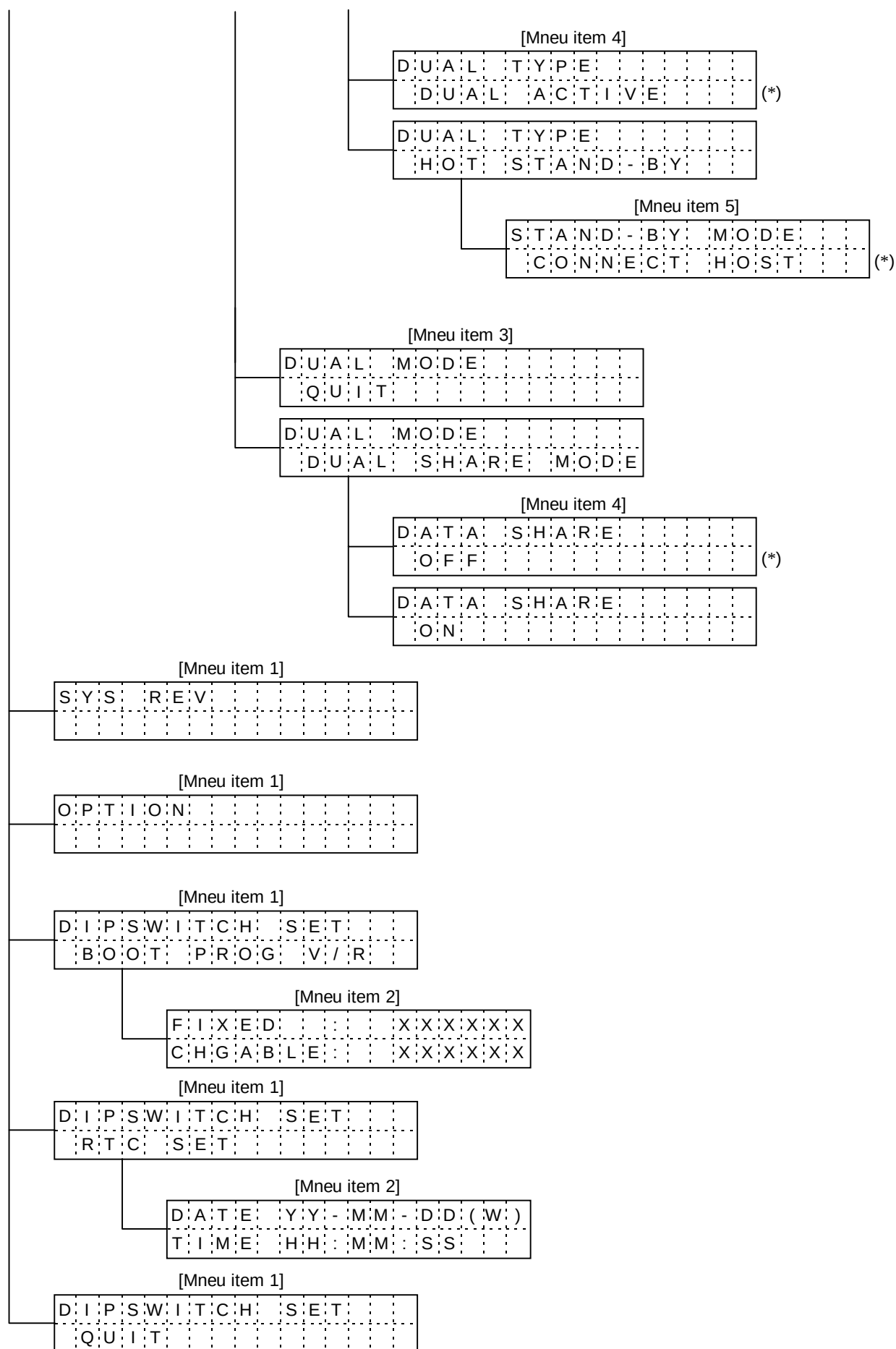




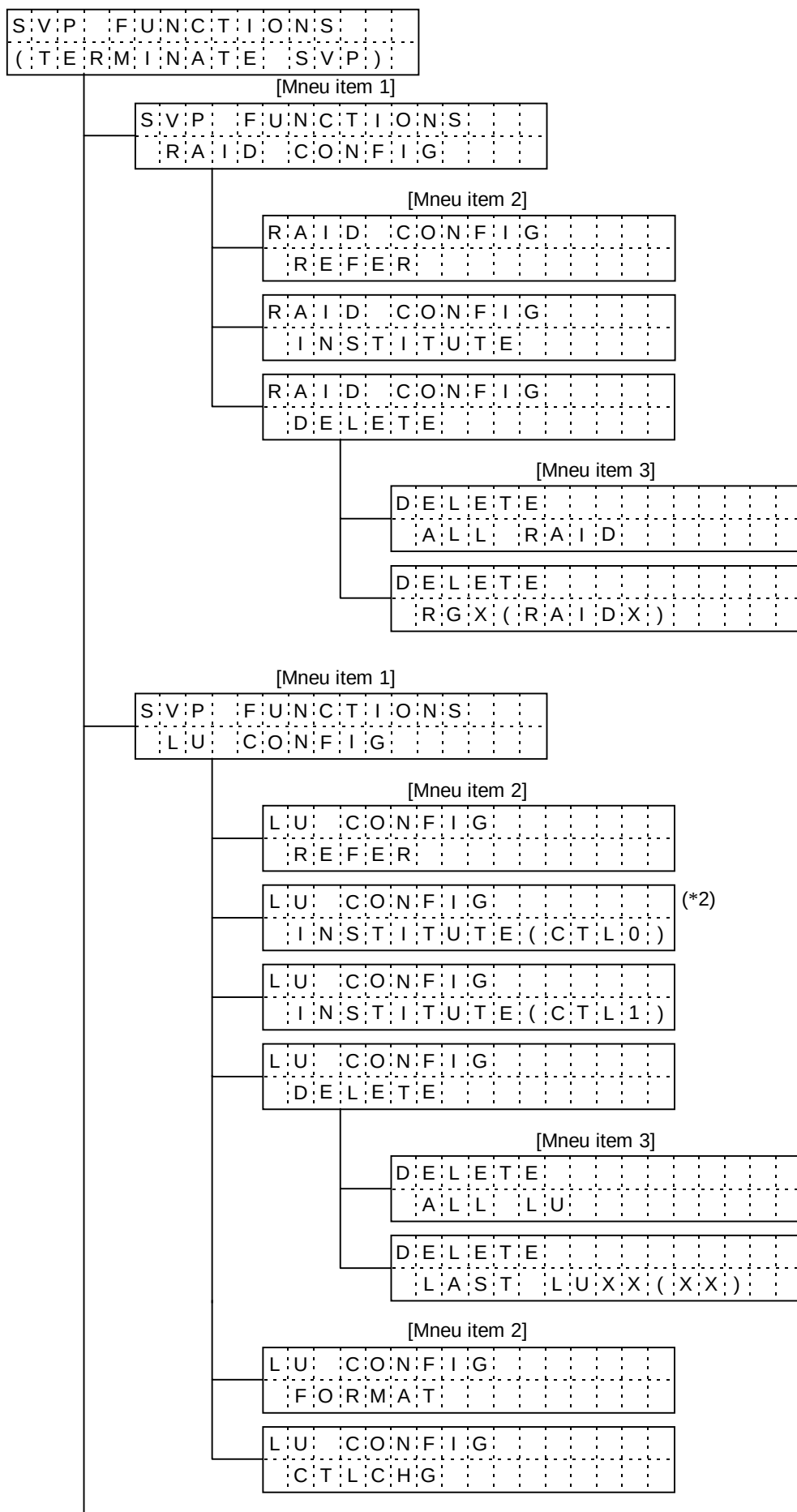


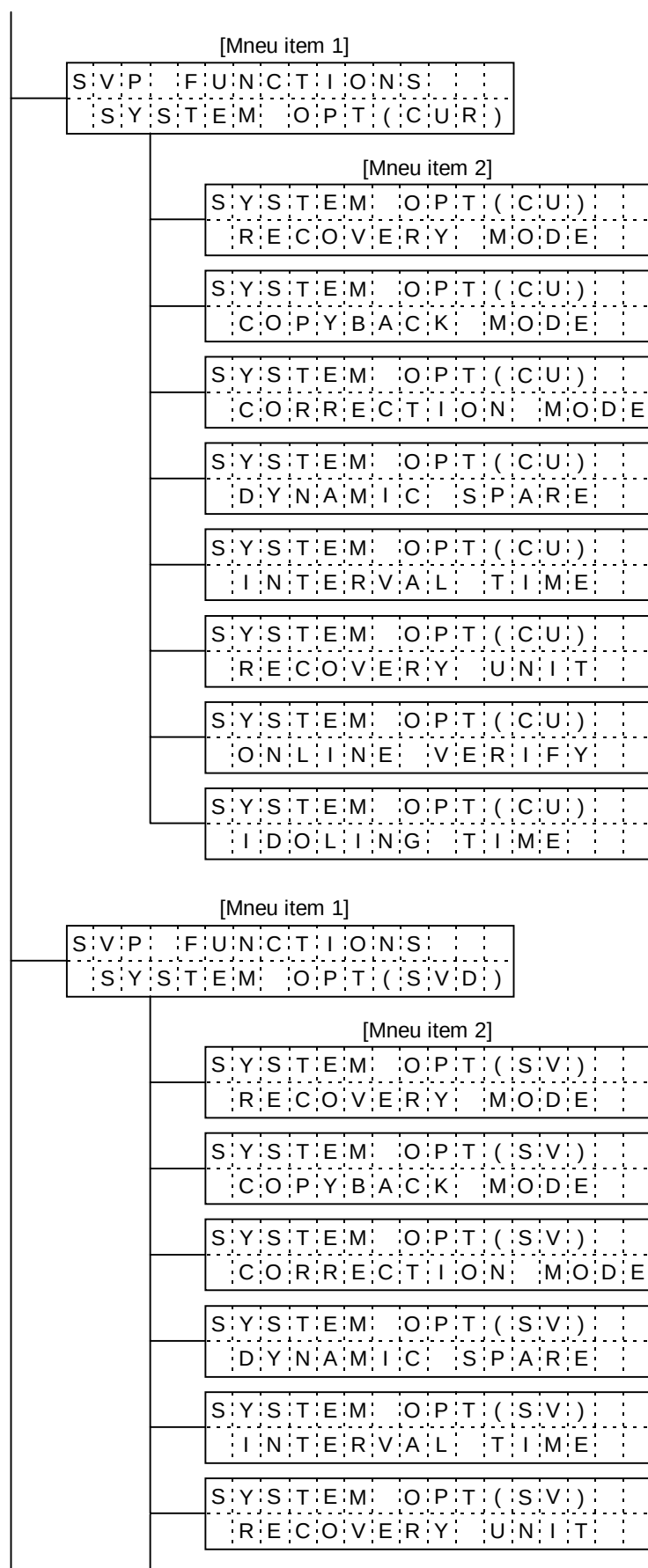


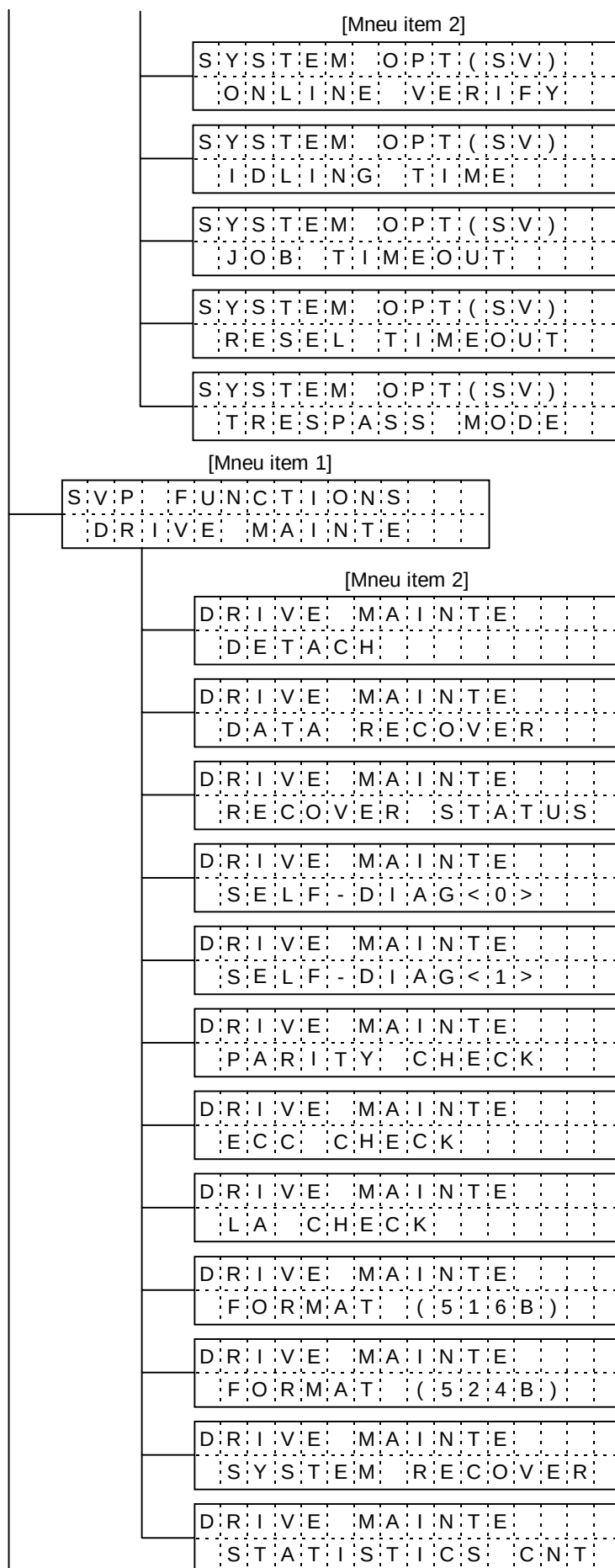


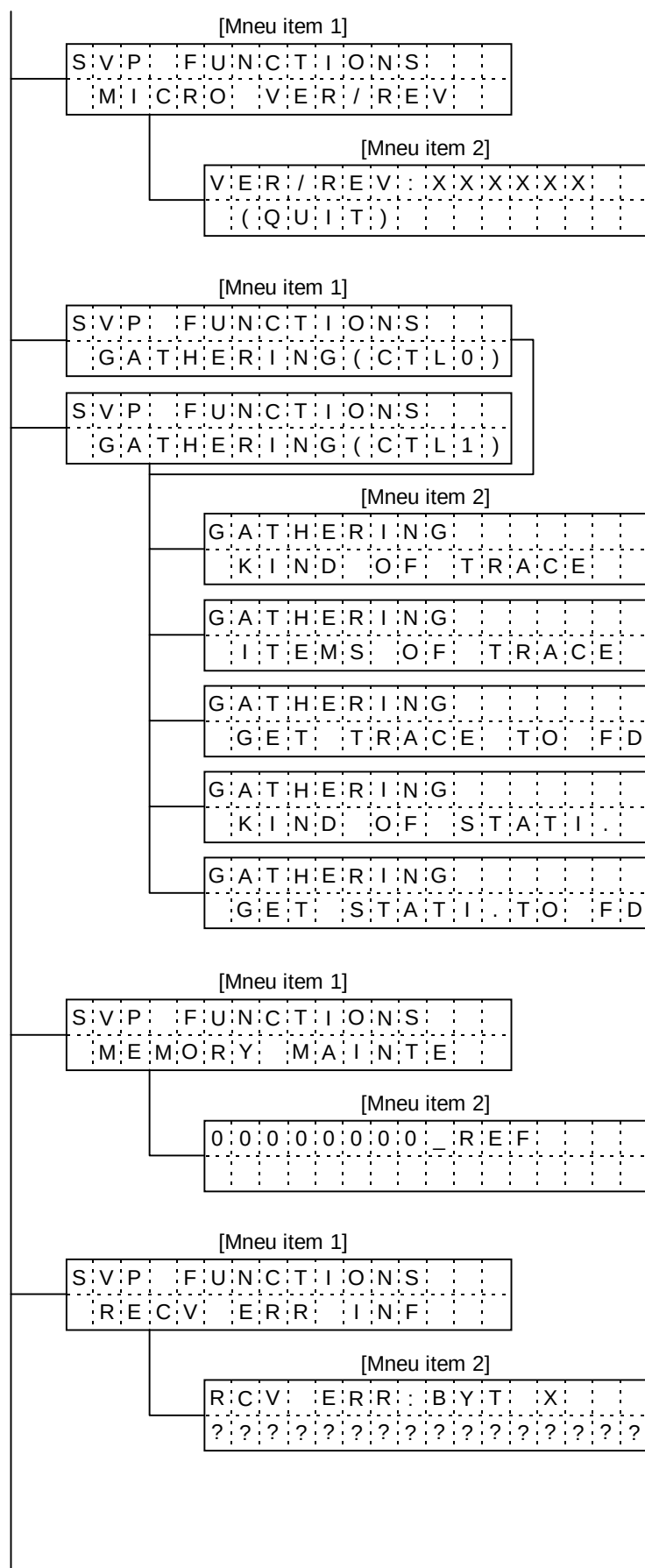


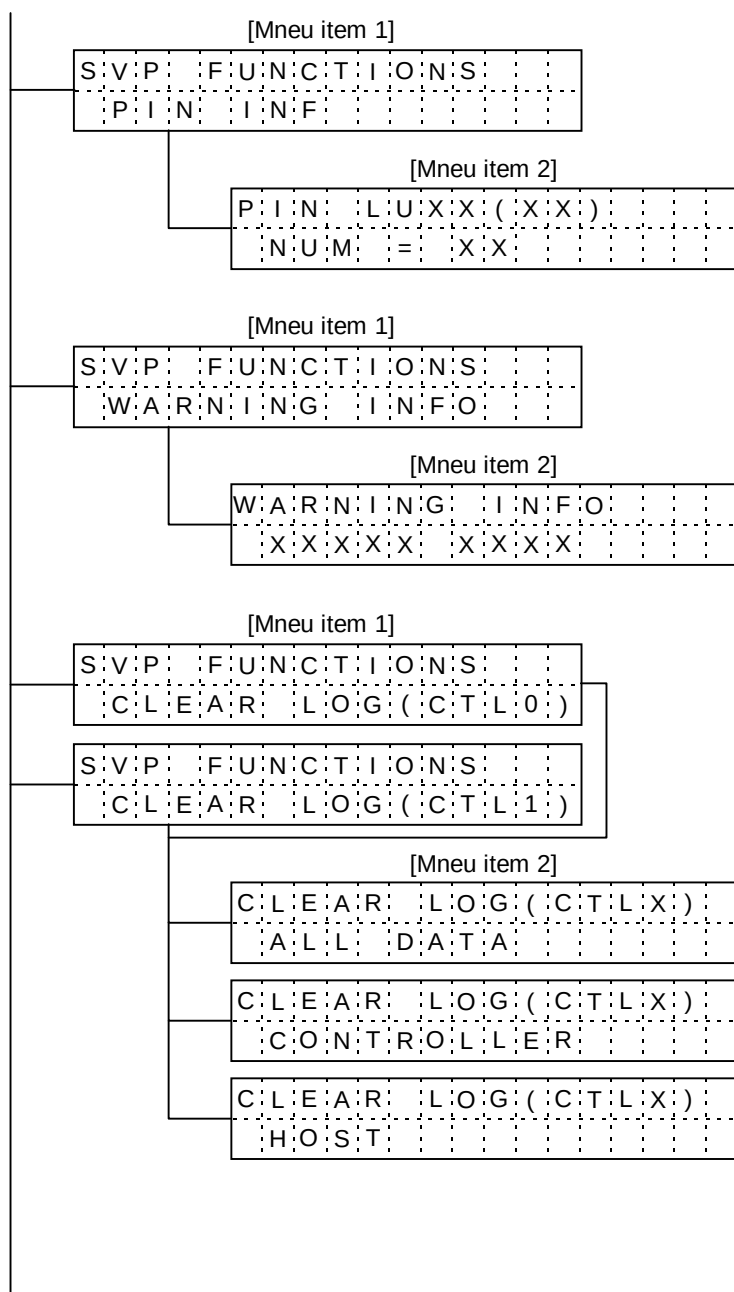
(2) Frame list for SVP function.

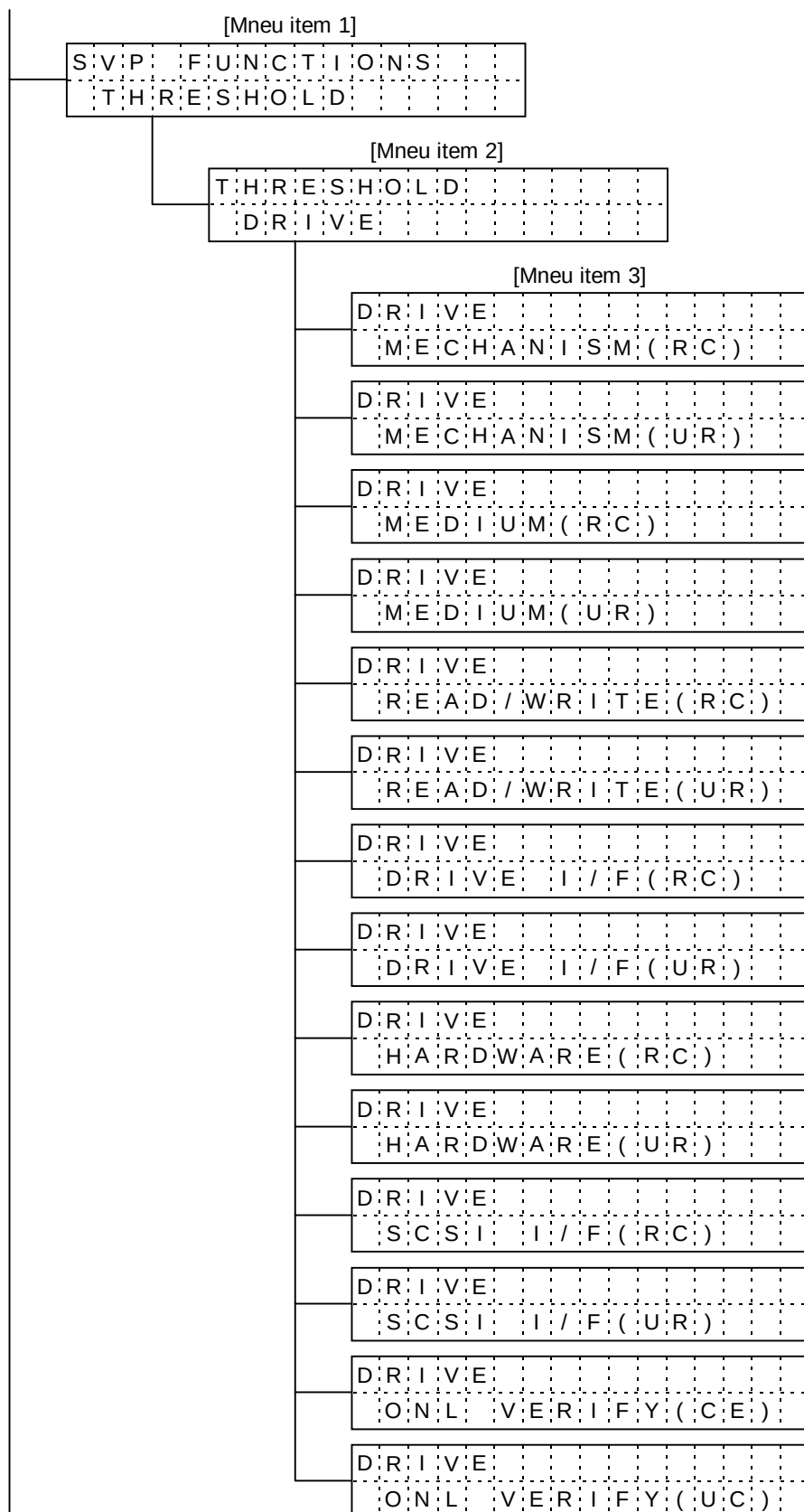


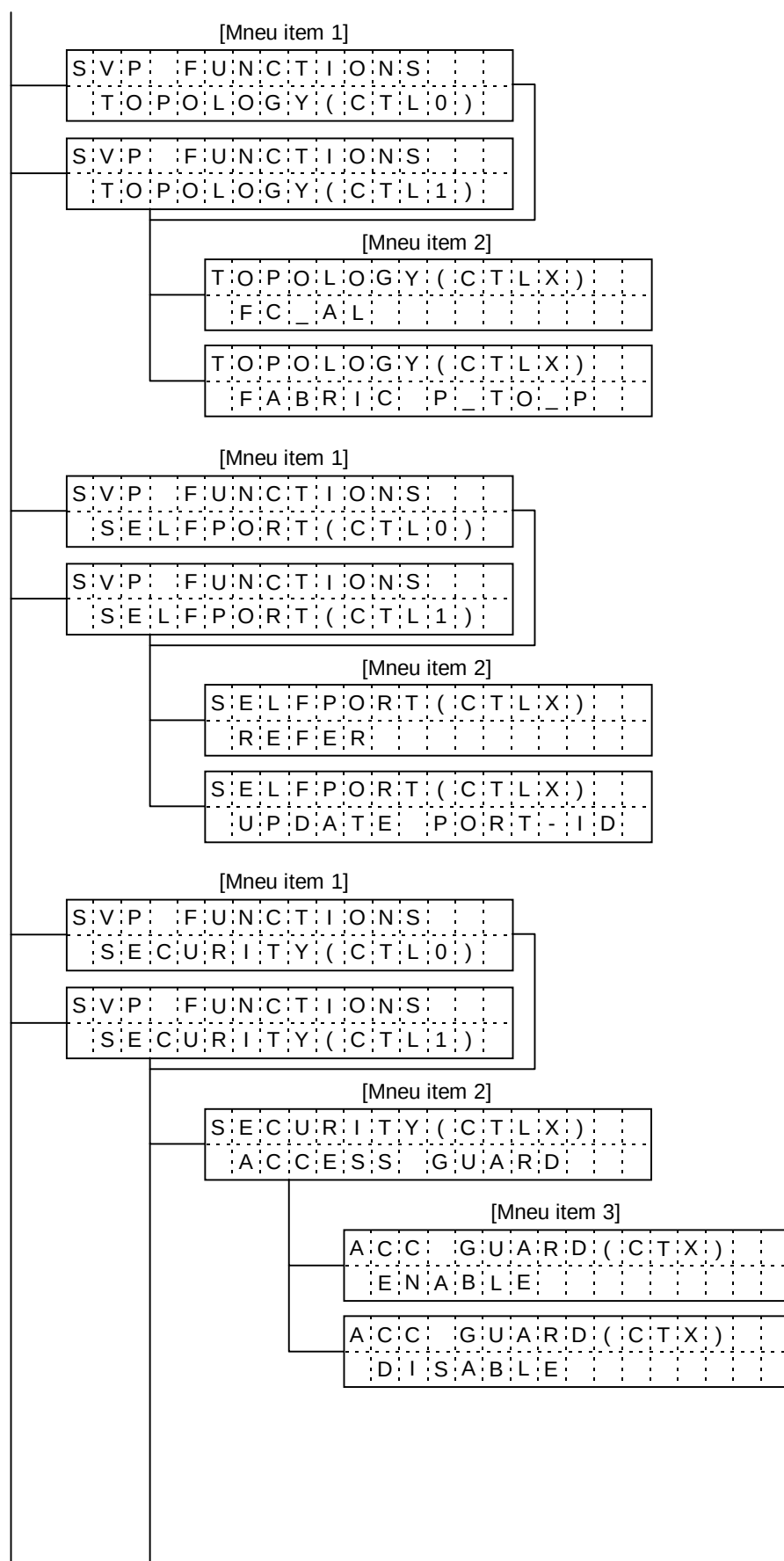


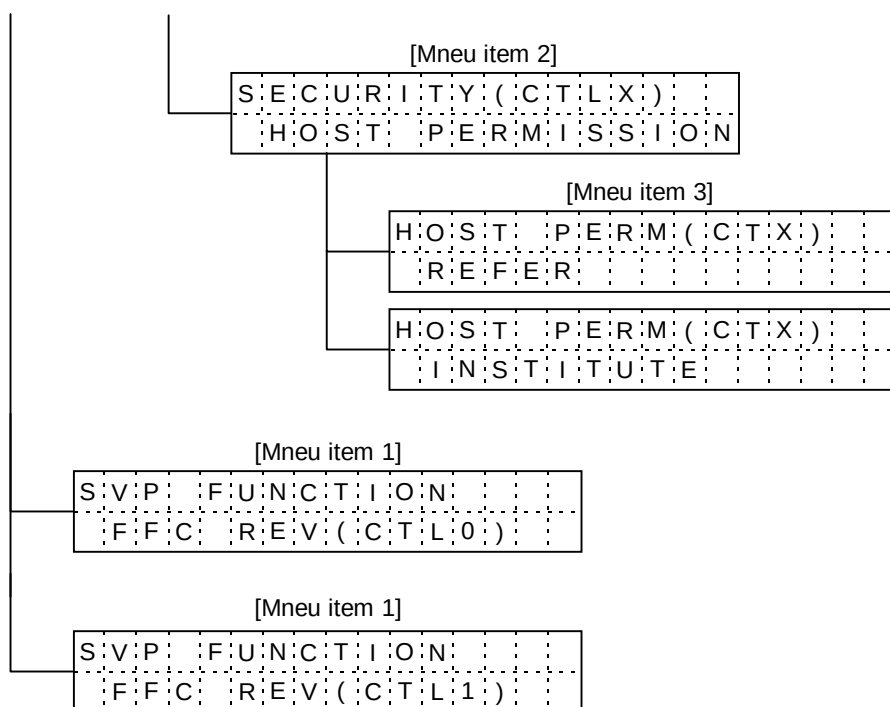












*2 For the single system and dual system (host standby mode), the controller No. is not displayed as shown below.

S	V	P	F	U	N	C	T	I	O	N	S		
I	N	S	T	I	T	U	T	E					

DF350F Disk Subsystem
7. PARTS REPLACEMENT
(Mini Tower Type)

Rev.2

CONTENTS

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1. Mechanical Configuration

Figures 1.1 and 1.2 show mechanical configuration and parts location of this subsystem.

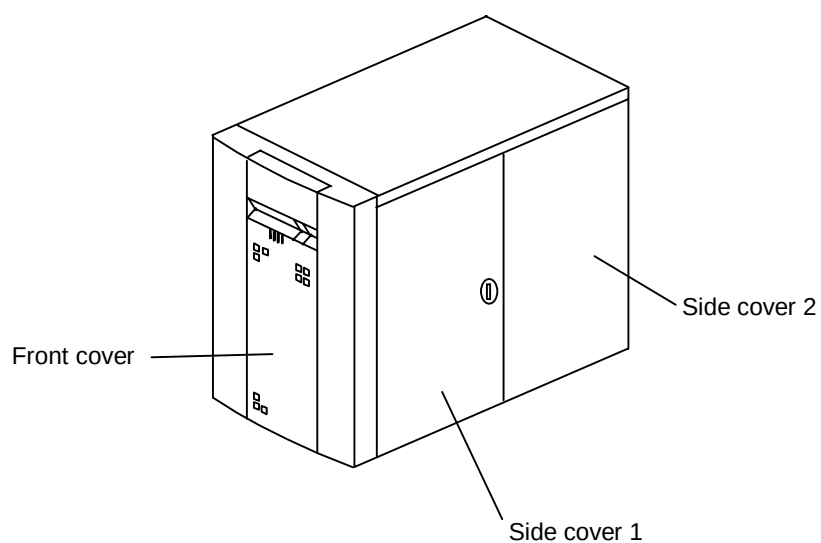


Figure 1.1 Appearance of DF350F Disk Subsystem (Mini Tower Type)

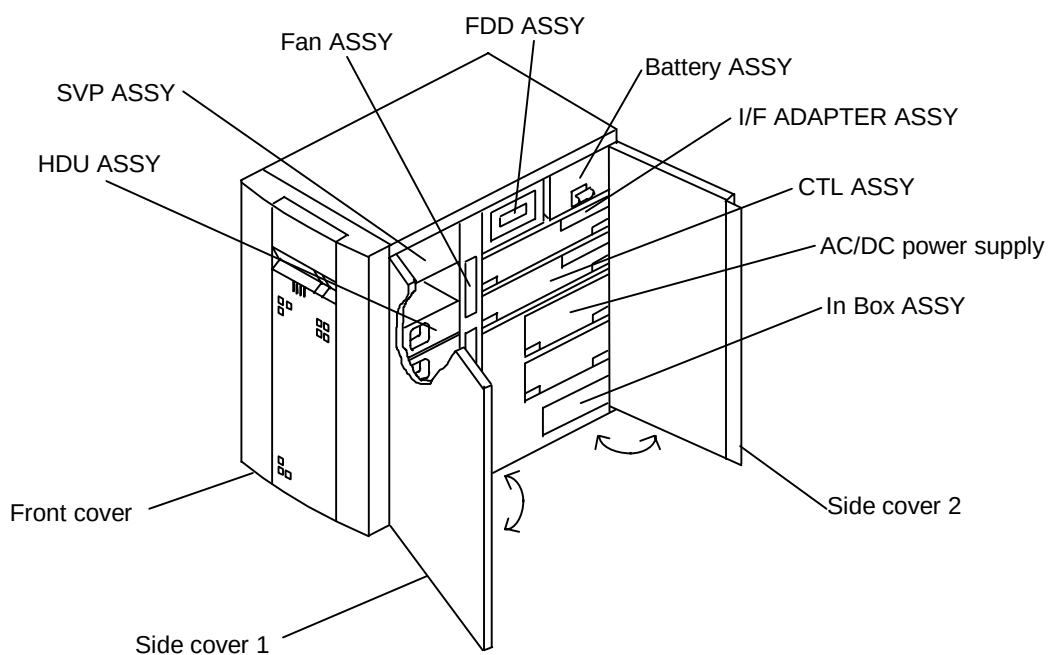


Figure 1.2 Parts Location

2. Maintenance Procedure

(1) Turning power on/off when replacing parts

Turning on/off procedure varies depending on the parts to be replaced.

Follow the procedures described in the table below for replacing each part.

No	Product name	Drawing No.	Model	Turning on/off power	
				Option not provided	Option provided
1	HDU ASSY (2GB1"H)	3243084-E	DF-F350-A2E2	④	④
2	HDU ASSY (4GB1"H)	3243084-F	DF-F350-A2E4	④	④
3	HDU ASSY (4GB1"H)	3252929-E	DF-F350-A3E4	④	④
4	HDU ASSY (8GBH.H)	3243084-G	DF-F350-A1E8	④	④
5	HDU ASSY (8GB1"H)	3252929-B	DF-F350-A2E8	④	④
6	HDU ASSY (18GBH.H)	3252929-A	DF-F350-A1E18	④	④
7	Fan ASSY	3237448-C	DF-F350-P1M	③	—
8	Battery ASSY	3247182-A	DF-F350-N1M10	③	—
9	FDD ASSY	3237444-A	DF-F350-M1M	②	—
10	CTL ASSY	3250738-A	DF-F350F-F3MCF	②	③
11	I/F ADAPTER ASSY (Optical (Non OFC))	3250739-C	DF-F350F-DMON	①	①
12	SVP ASSY	3237450-B	DF-F350-L1ML	②	—
13	AC/DC Power Supply	5479203-1	DF-F350F-B3M	②	③
14	In Box ASSY	5497259-1	DF-F350F-Q2M	②	—
15	CACHE ASSY	3247121-A	DF-F350-C8E	①	—
16	CACHE ASSY	3247121-B	DF-F350-C32E	①	—
17	CACHE ASSY	3247121-C	DF-F350-C128E	①	—
18	LAN ASSY	5493862-A	DF-F350-G1M1	②	③
19	LAN ASSY (SNMP)	5493862-C	DF-F350F-G3M1	②	③

① Turning the power off DF350F Disk Subsystem and Host System.

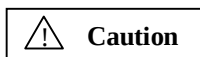
② Turning the power off DF350F Disk Subsystem.

③ Turning the power off is unnecessary.

④ Turning the power on DF350F Disk Subsystem.

Notice : When a part which requires to turn the power off or on for replacement (marked with ① and ②) is to be replaced, turn the power off correctly according to the instruction in MK-REP0050 beforehand.

Otherwise, there is a risk that the user data is destroyed.

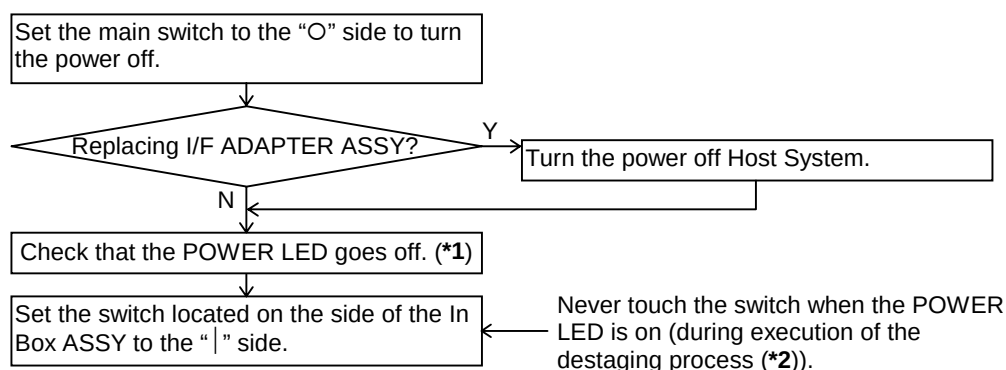


When replacing parts without turning off the power, do not put on metallic accessories or watches so that to avoid electric shock.

Be careful not to touch the electrified parts with a screwdriver etc.

2.1 Turning the Power On/Off for Each String

(1) Turning the power off



*1 Check the back-up state of the CACHE memory.

Be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

The CACHE memory of this unit provides write-after control. If data is not yet written, before the power is turned off, the unit automatically writes the data on the CACHE memory to the hard disk. This is called destaging. After this processing is completed, the power is turned off.

If the power is turned off in a state in which destaging cannot be completed due to an unexpected power interruption or a tripped circuit breaker, the CACHE memory switches to the back-up mode using the battery for data integrity. If any equipment of the unit is removed or inserted in this back-up mode, the battery may stop supplying power, resulting in the user data being lost. When you handle any equipment of the unit with the unit power off, be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

• Checking the back-up state of the cache memory

You can determine whether the unit is in the back-up mode by checking the indication of the CACHE PWR (green LED) on the CTL ASSY, as described below.

Set the circuit breaker on the rear of the unit to "I" (ON) with the power switch (POWER SW) set to "O" (OFF).

Determine the state of the memory from the indication of the CACHE PWR.

CACHE PWR LED on ----- Indicate the back-up mode.

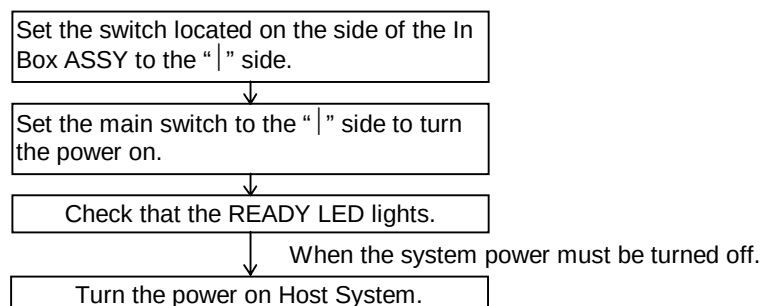
CACHE PWR LED off ----- Indicate that the back-up mode is canceled.

Notice : In case the data is not properly backed up, the user's data will be lost.

*2 The cache memory installed in this subsystem is controlled with a write-after method. When turning off the power, the subsystem automatically writes all the data left on the cache memory unwritten to the hard disk drive. (This operation is called a destaging.) The subsystem turns off the power when this process is completed. When the power is turned off according to the power failure or by the operation of the breaker, the destaging can not be performed. In this case, the subsystem enters the mode of battery back-up. If the system is kept in this state, the battery may be discharged and the user data might be lost. Therefore, be sure to follow the power-off procedure explained above.

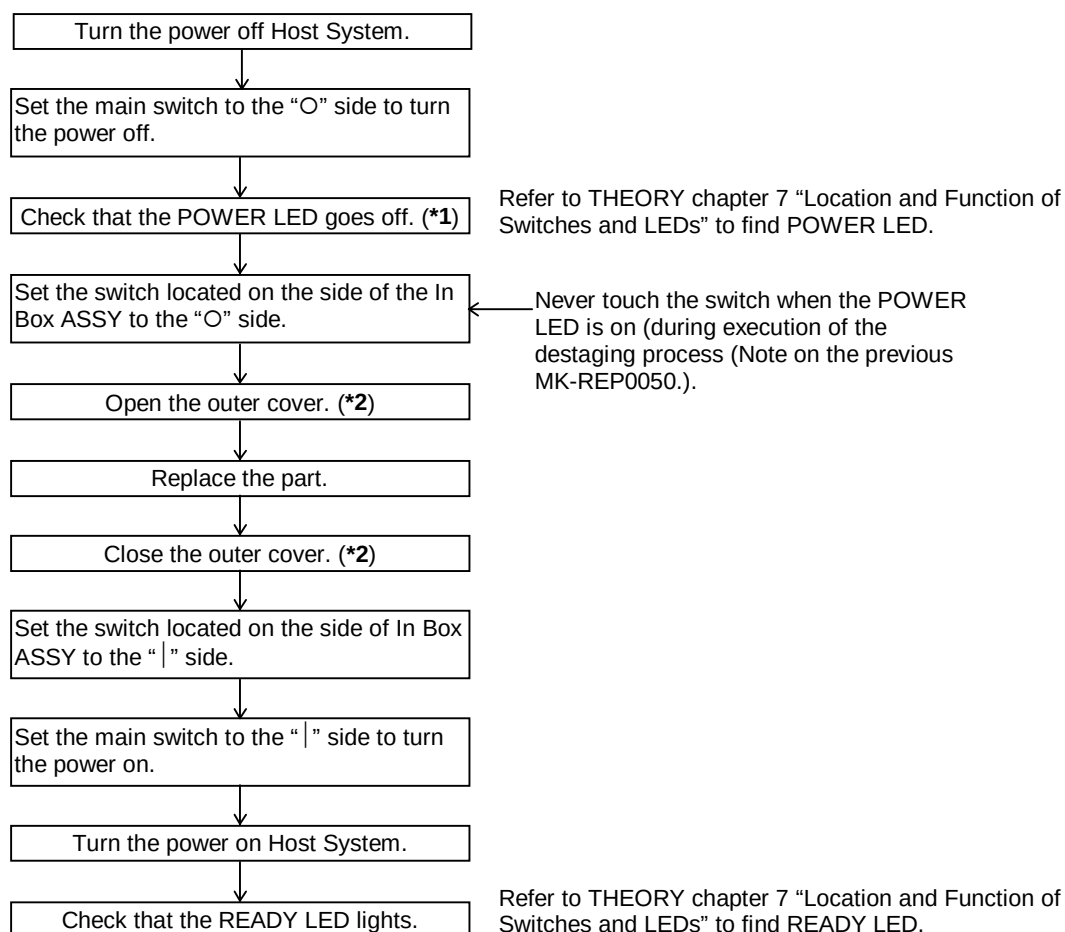
If the breaker is turned off due to power failure or by mistake before the POWER LED goes off, turn the power on again according to Item (2), "Turning the power on" promptly and then execute the power-off procedure explained above.

(2) Turning-ON procedure



2.2 Part Replacement Procedures

- (1) Procedure for the case of turning the power off both DF350F Disk Subsystem and Host System is inevitable.



Notice: In case the power is not normally turned off, the configuration data will be lost and the user's data will be lost.

***1** Check the back-up state of the CACHE memory.

Be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

The CACHE memory of this unit provides write-after control. If data is not yet written, before the power is turned off, the unit automatically writes the data on the CACHE memory to the hard disk. This is called destaging. After this processing is completed, the power is turned off.

If the power is turned off in a state in which destaging cannot be completed due to an unexpected power interruption or a tripped circuit breaker, the CACHE memory switches to the back-up mode using the battery for data integrity. If any equipment of the unit is removed or inserted in this back-up mode, the battery may stop supplying power, resulting in the user data being lost. When you handle any equipment of the unit with the unit power off, be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

- Checking the back-up state of the cache memory

You can determine whether the unit is in the back-up mode by checking the indication of the CACHE PWR (green LED) on the CTL ASSY, as described below.

Set the circuit breaker on the rear of the unit to "I" (ON) with the power switch (POWER SW) set to "O" (OFF).

Determine the state of the memory from the indication of the CACHE PWR.

CACHE PWR LED on ----- Indicate the back-up mode.

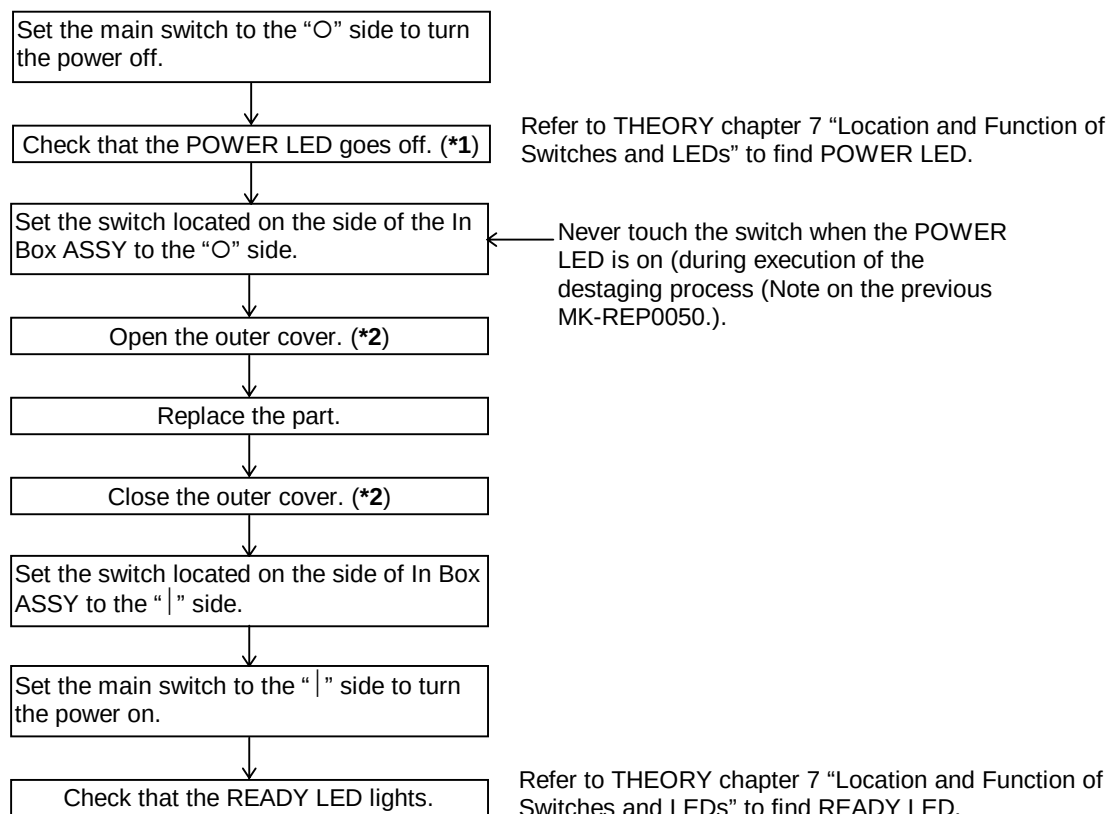
CACHE PWR LED off ----- Indicate that the back-up mode is canceled.

***2** Outer cover : Front cover

Side cover 1

Side cover 2

(2) Procedure for the case of turning the power off DF350F Disk Subsystem is inevitable.



Notice: In case the power is not normally turned off, the user's data might be lost.

***1** Check the back-up state of the CACHE memory.

Be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

The CACHE memory of this unit provides write-after control. If data is not yet written, before the power is turned off, the unit automatically writes the data on the CACHE memory to the hard disk. This is called destaging. After this processing is completed, the power is turned off.

If the power is turned off in a state in which destaging cannot be completed due to an unexpected power interruption or a tripped circuit breaker, the CACHE memory switches to the back-up mode using the battery for data integrity. If any equipment of the unit is removed or inserted in this back-up mode, the battery may stop supplying power, resulting in the user data being lost. When you handle any equipment of the unit with the unit power off, be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

- Checking the back-up state of the cache memory

You can determine whether the unit is in the back-up mode by checking the indication of the CACHE PWR (green LED) on the CTL ASSY, as described below.

Set the circuit breaker on the rear of the unit to "I" (ON) with the power switch (POWER SW) set to "O" (OFF).

Determine the state of the memory from the indication of the CACHE PWR.

CACHE PWR LED on ----- Indicate the back-up mode.

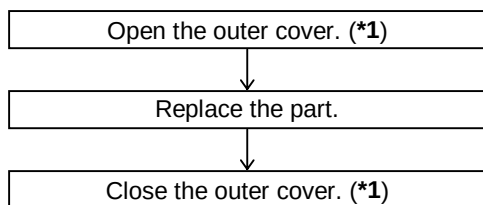
CACHE PWR LED off ----- Indicate that the back-up mode is canceled.

***2** Outer cover : Front cover

Side cover 1

Side cover 2

(3) Procedure for the case of turning the power off DF350F is either not necessary or prohibited.



*1 Outer cover : Front cover
Side cover 1
Side cover 2

2.3 Back-up Procedure of System Parameter

There are cases where system parameters (Buzzer setting, drive recovery mode, etc.) are copied to FD or restored from FD when installing optional parts or replacing parts. In this case, copy or restore system parameters following “2.3.1 Back-up procedure of system parameter” (MK-REP0090) or “2.3.2 Restore procedure of system parameter” (MK-REP0130).

(RAID configuration setting, LU configuration setting, etc. are not contained in system parameter.)

2.3.1 Back-up procedure to FD

- (1) Turn the power off according to MK-REP0050.

Notice: In case the power is not normally turned off, the user's data might be lost.

- (2) Before power on the subsystem, set DIP switch No.4 on CTL ASSY as shown in Figure 2.3.1.

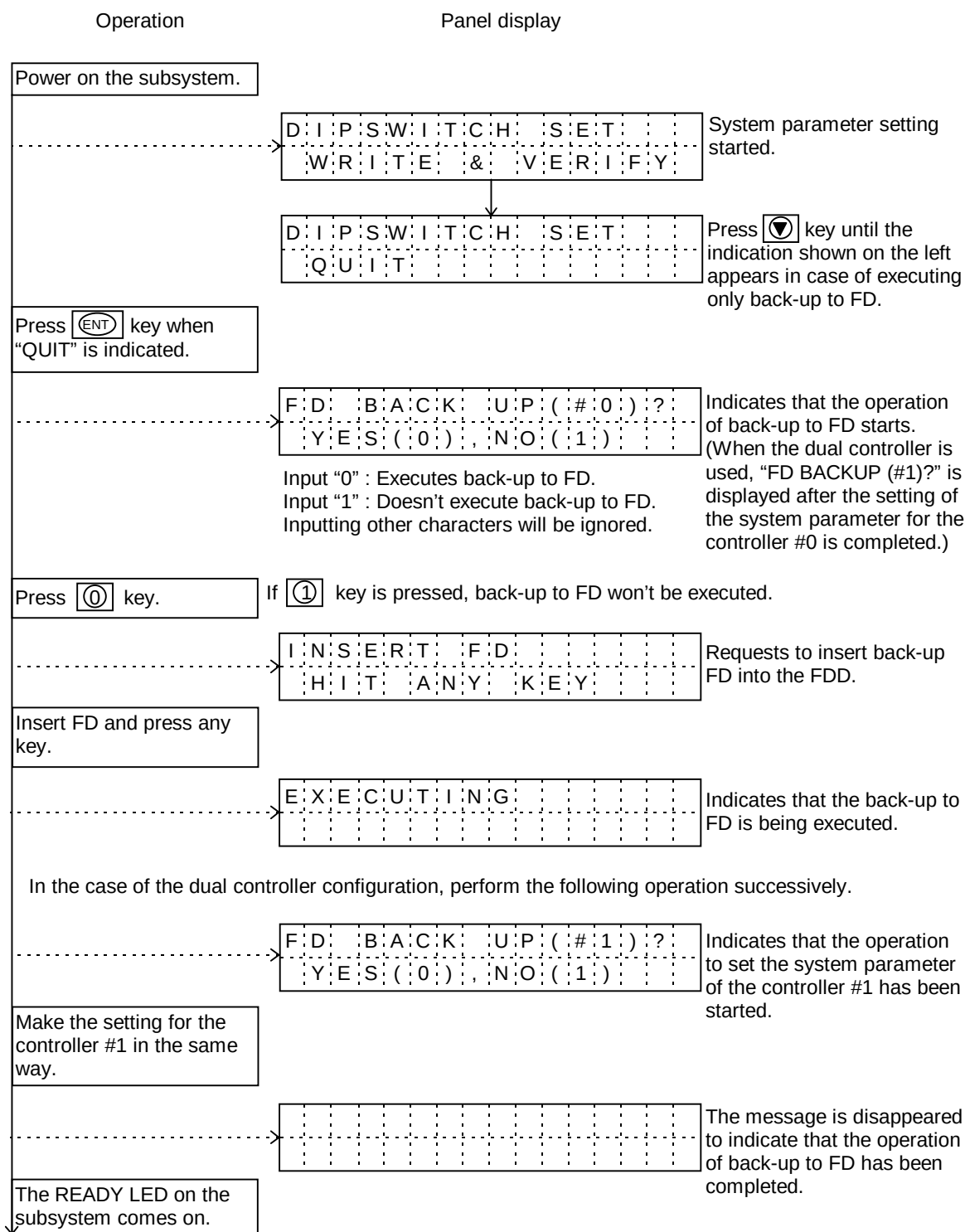
Note : Be sure to set the same data for both controllers if the dual controller option (-F3MCF) has been installed.



Figure 2.3.1 DIP Switches

(Back-up operation to FD is allowed)

(3) Operate as described below.



(4) Set DIP switch No.4 to setting as shown in Figure 2.3.2.

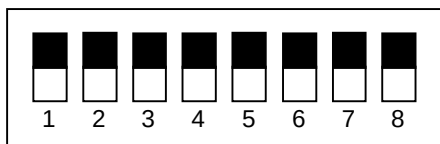
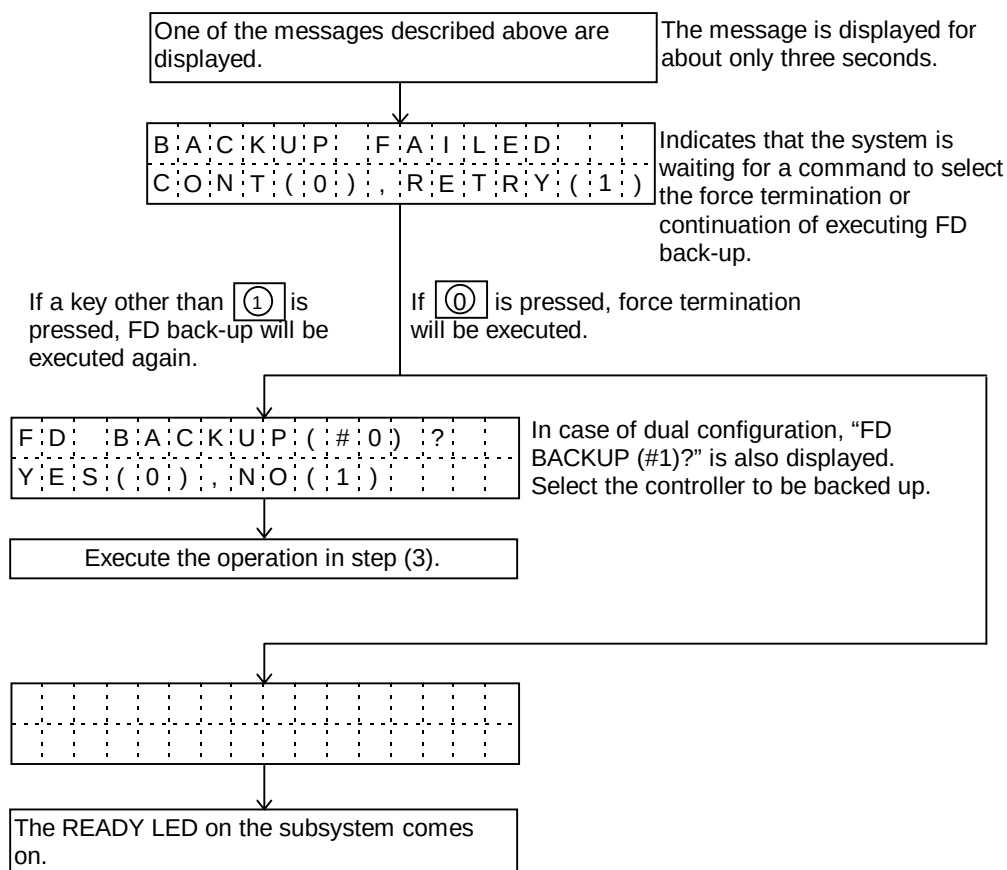


Figure 2.3.2 DIP Switches

Note 1 : While executing the back-up to FD, the messages described below are sometimes displayed.

- **FD NOT INSERTED**
FD isn't inserted. Insert FD into the FDD.
- **FD MOTOR NOT STARTED**
Starting of FD Motor ended in failure. Re-execute..
- **FILE WRITE ERROR**
FD which was inserted is not formatted, or write-protected. Format or release write-protection.
Write error occurred in FD. Insert another FD.

If these messages are displayed, back-up to FD hasn't been executed. So re-execute following the operation described below.



Note 2 : Use 3.5" FD (1.44MB) formatted by MS-DOS for back-up FD. Besides, note that the FD will be overwritten during back-up.

Note 3 : Even if back-up FD is left at FDD after back-up operation, error won't occur on the subsystem.

Note 4 : "EEPROM.DAT" or "EEPROM0.DAT" file is stored in system parameter backed up FD. The case of optional SNMP system, SNMP configuration environment files ("Config.TXT" and "NAME.TXT") are stored with system parameter file.

Note 5 : In case with optional SNMP system and system parameter is restored without SNMP configuration environment files, Subsystem becomes ready without SNMP function. In this case, the warning lamp on the panel comes on and one of messages below is shown on PANEL.

W 0 1 6 0 1 F D E R R
V e r s i o n = X X X X / X

W 0 1 6 0 2 F O P N E R R
V e r s i o n = X X X X / X

W 0 1 6 0 0 S N M P I N V 1
V e r s i o n = X X X X / X

Only Dual controller system.

This case, re-restore the subsystem with a FD in which SNMP configuration environment files is stored.

2.3.2 Restoring procedures from FD

- (1) Before power on the subsystem, set DIP switch No.3 as shown in Figure 2.3.3.

In case of dual controller system, set both the DIP switches as shown in Figure 2.3.3.

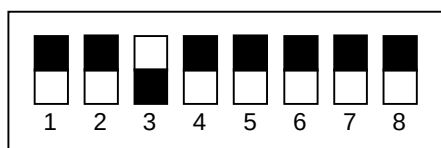
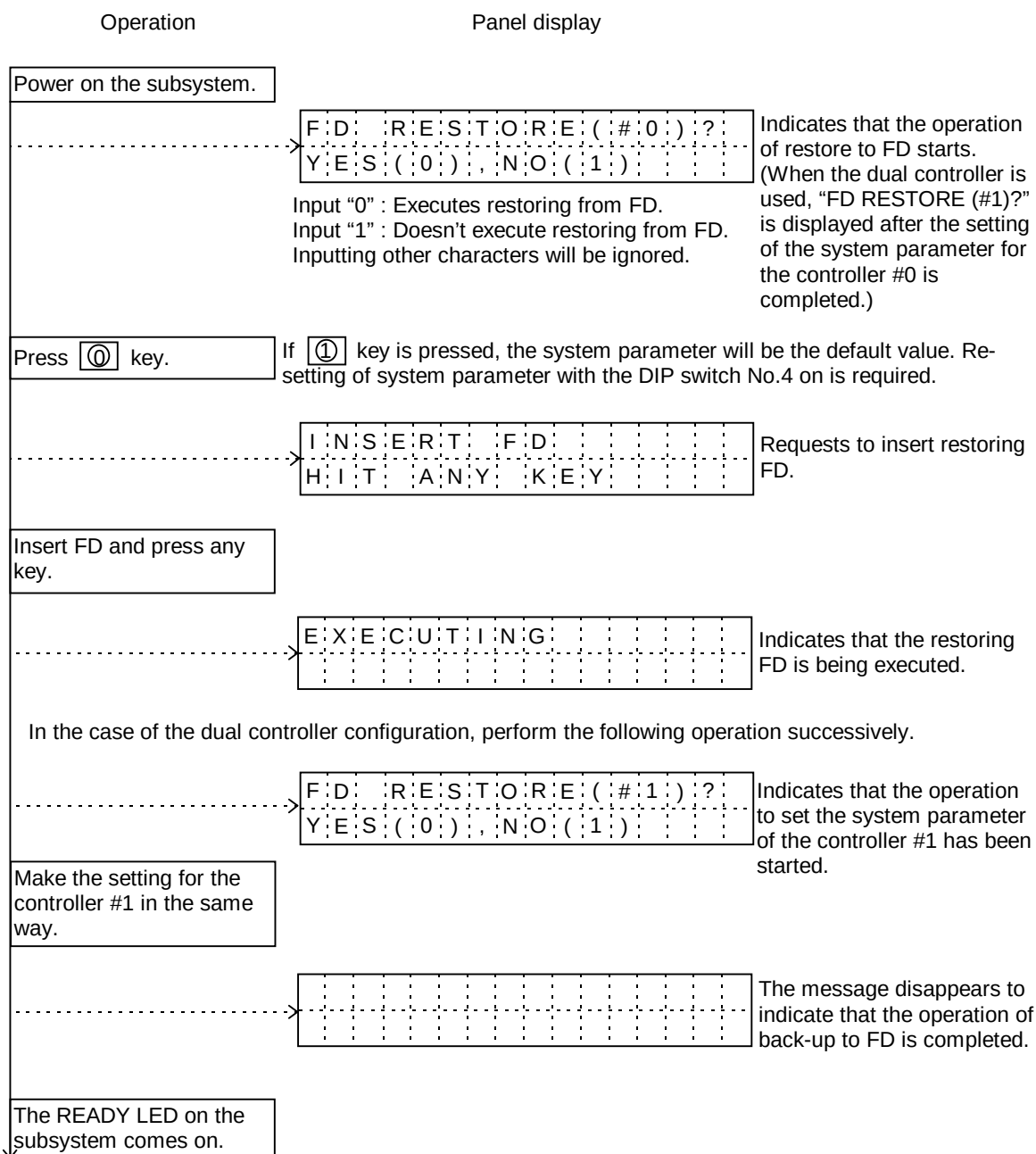


Figure 2.3.3 DIP Switches

(Restoring operation from FD is available)

- (2) Operate as described below.



(3) Set DIP switch No.3 as shown in Figure 2.3.4.

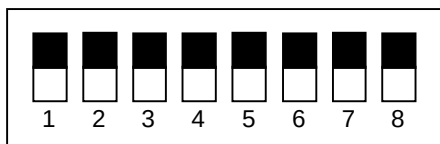
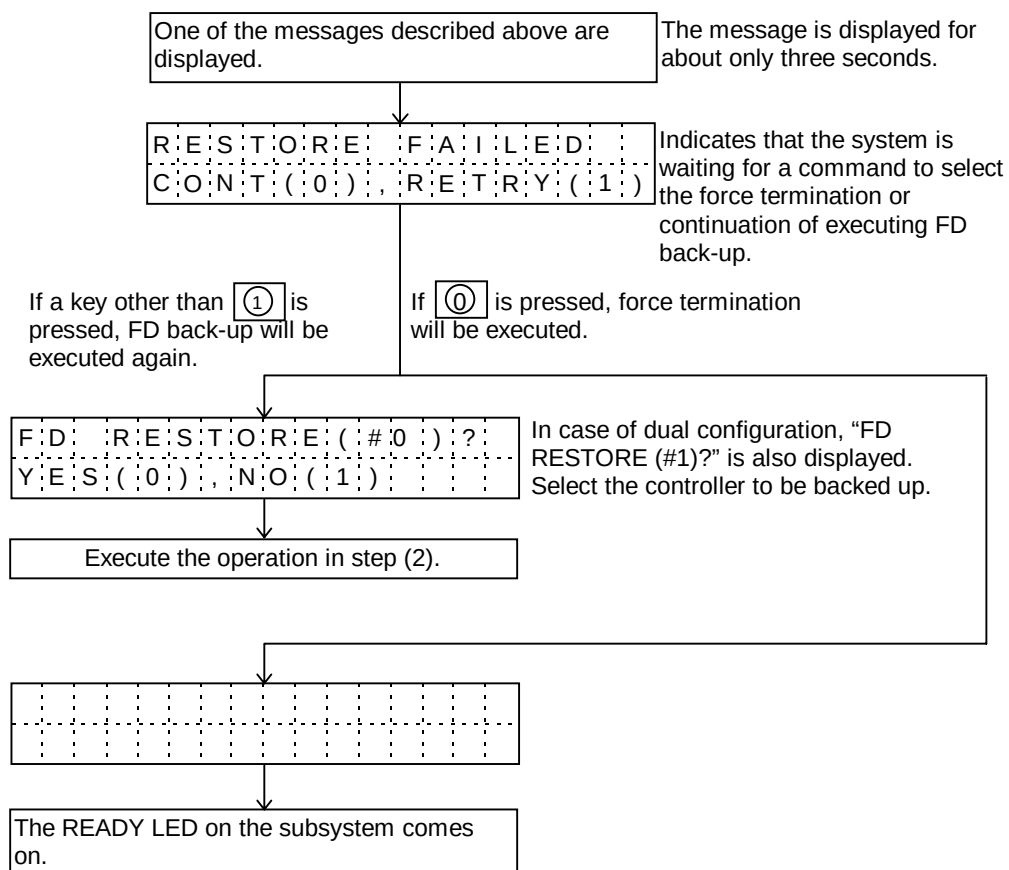


Figure 2.3.4 DIP Switches

Note 1 : While executing the restoring from FD, the messages described below are sometimes displayed.

- **FD NOT INSERTED**
FD isn't inserted. Insert FD into the FDD.
- **FD MOTOR NOT STARTED**
Starting of FD Motor ended in failure. Try again.
- **BAD FD INSERTED**
Inserted FD is not formatted. Format FD.
- **FILE READ ERROR**
Read error occurred in FD. Try again.

If these messages are displayed, restoring from FD hasn't been executed. So re-restore the system following the operation described below.



Note 2 : In case that restoring operation ended in failure and force terminated, setting of system parameter will be with default value.

Accordingly, re-setting with the DIP switch No.4 On is required.

Note 3 : Even if FD which was used to restore is left at FDD after back-up operation, error won't occur on the subsystem.

3. Opening/Closing Front and Side Covers

(1) Opening/Closing the front cover (See Figure 3.1.)

- ① Pull the right side of the front cover to your side to open it.
- ② Push it back slowly to close it.

Notice : Open/Close the front cover carefully to avoid subjecting the subsystem to any impact since it has precision components.

(2) Opening/Closing the side covers (See Figure 3.1.)

- ① Insert the key attached to the subsystem into the keyhole and turn it clockwise. Then, open the side cover 1 gently, and then open the side cover 2.
- ② Gently close the side cover 2 first, and then close the side cover 1. Then, turn the key counterclockwise.

Notice : Open/Close the side covers gently to avoid a shock. Precision components are installed.

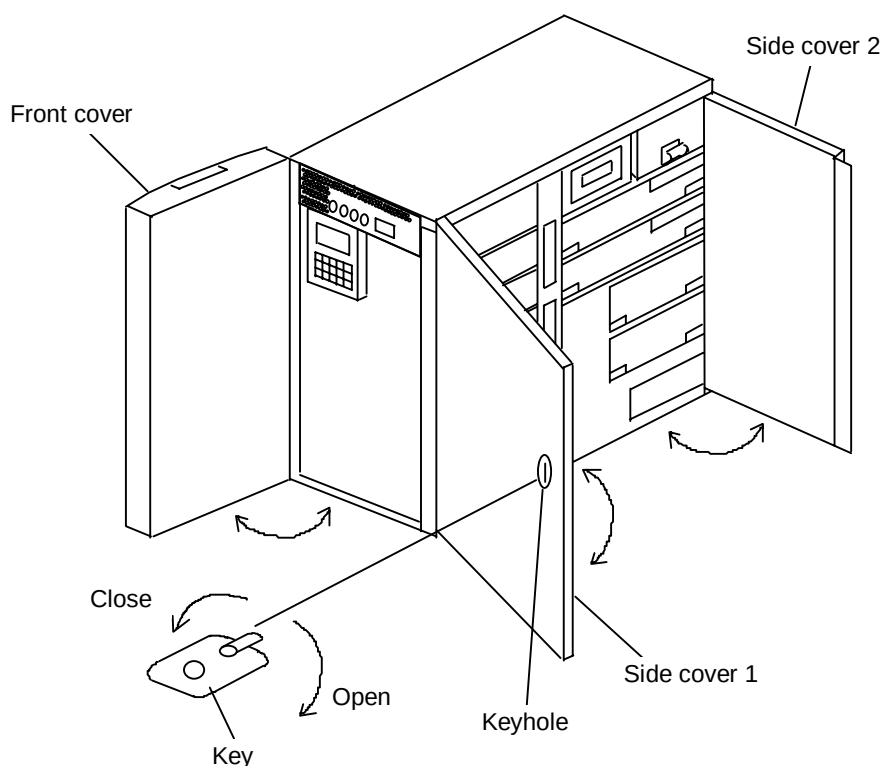


Figure 3.1 Opening/Closing Front and Side Covers

4. Replacing HDU ASSY

The method of replacing HDU varies depending on the RAID configuration.

When replacing the HDU ASSY, confirm the RAID configuration of the subsystem beforehand, and follow the procedure below according to the configuration.

To confirm the RAID configuration, refer to page PANEL0290 ((1) Reference/setting menu of RAID configuration information.)

Notice : Be sure to replace the HDU ASSY with the power kept on. (This procedure is except for when the Micro-Disk version is 0353 or earlier.)**

Proceed the replacement and the data recovery following the procedure below. RAID Specification of replacing HDU can be seen on the panel display. (See PANEL0290.)

Notice : If you delete or re-format the set-up RAID group or LU, user's data in that will be deleted. Be sure to back-up copy the user's data before these operation.

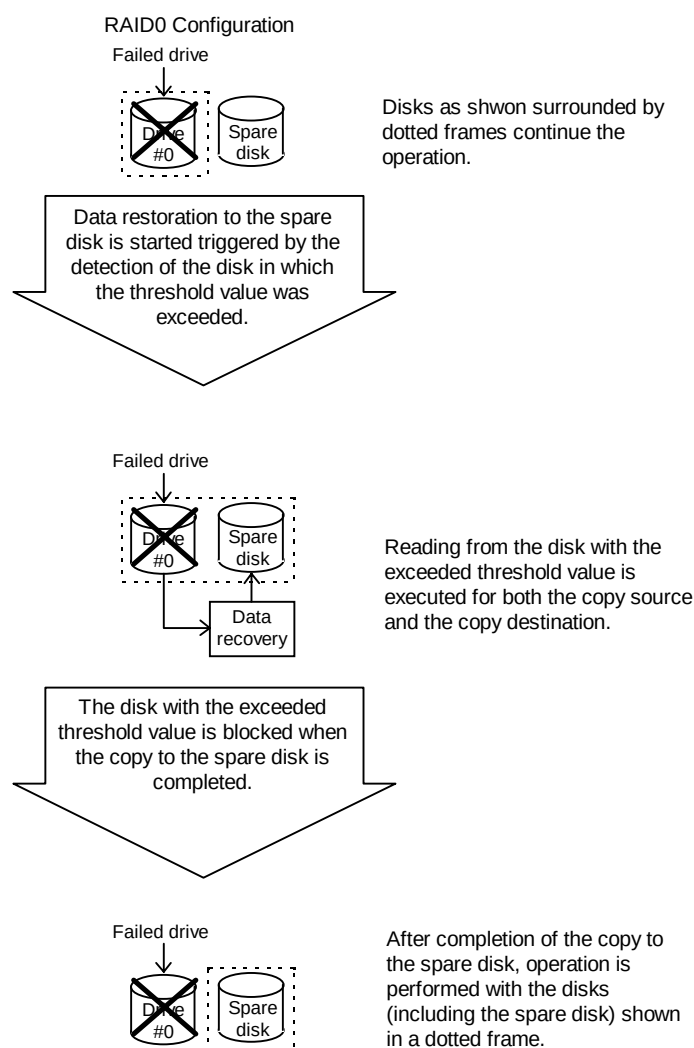
4.1 Procedure of Data Recovery and HDU Replacement Under RAID0 Configuration

4.1.1 Procedure of data recovery and HDU ASSY replacement when no spare disk is installed

- (1) Pull out the disk in which a failure occurred, and insert the replacement disk. For the specific procedures to remove and install the disk, see "HDU ASSY Replacement Procedure" on page MK-REP0280.
- (2) In a short time after the disk is inserted, the ALARM LED on the HDU ASSY goes out and the READY LED comes on. If the inserted disk is that of row 0, following messages will be displayed on the panel.
 I00DXY SYS-CP-XY----- Starting system area recovery
 I00EXY SYSRCV-XY----- Completing system area recovery
 X : Port number, Y : Row number (XY indicates a location of the disk whose system area is being recovered (or has been recovered).)
 If the ALARM LED of the HDU ASSY is on after the replacement, power off the subsystem and reexecute the replacement.
- (3) Execute an LU formatting. For the LU formatting procedure, see page MK-INST0750.
- (4) Restore the data using the backed up data.

4.1.2 When a spare disk is installed

When the Micro_Disk version is 0354** (** is optional) or later, data restoration to the spare disk is executed by the dynamic sparing function. Conditions for restoration to the spare disk and messages, etc. are the same as those to the RAID1, 5 and A. See pages MK-REP0210 through 0240.



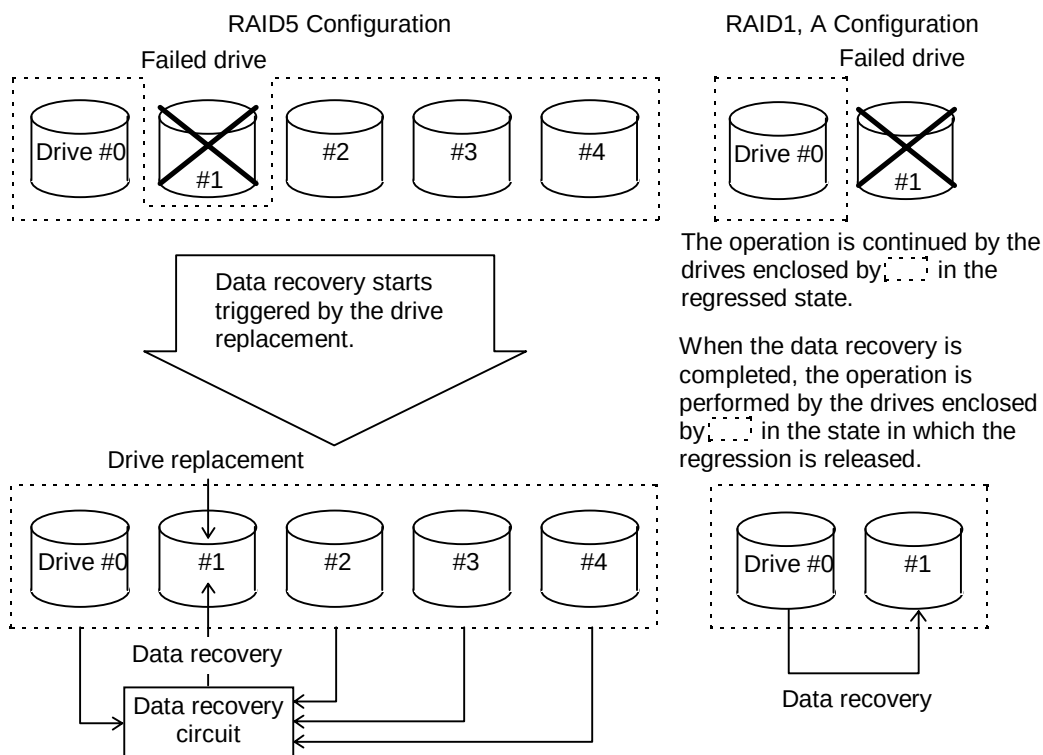
4.2 Procedure of Data Recovery and HDU Replacement Under RAID1, 5, A Configuration

4.2.1 Procedure of data recovery and HDU ASSY replacement when no spare disk is installed

When a failure occurred at a HDU ASSY, replace the failed HDU with a spare HDU.

To replace a HDU, refer to “4.3 HDU ASSY Replacement Procedure”. (See MK-REP0280.) With the replacement, data in the failed HDU will be automatically recovered. The panel display is described at “① Transition of panel display”. (See MK-REP0200.)

Note : When DRIVE MAINTN (RECOVER STATUS) is selected from the panel during data recovery, the progress rate (%) of the data recovery at the moment can be seen (to see the progress rate again, return to the previous screen and then select DRIVE MAINTN again).



In the following cases, the recovery will not start automatically. Operation to start the recovery is required.

- (1) When the drive recovery mode is set to “NOT AUTOMATIC MODE”, the data recovery will not start automatically when the drive is replaced.

In this case, it is necessary to instruct recovery from the panel. (For further details, refer to the Hitachi Disk Array Subsystem Panel Operation Manual.)

- (2) When failures occurred in plural drives, if the second faulty drive is replaced during data recovery of the first drive, the data recovery of the second drive will not start automatically.

In this case, it is necessary to remove and insert the second drive again after the data recovery for the first drive is completed. Or, it is necessary to instruct recovery from the panel. Select “DRIVE MAINTN (RECOVER STATUS)” and make sure that data recovery is completed normally.

① Transition of panel display

I00DXY SYS-CP-XY : Start of system area recovery (*)

I00EXY SYSRCV-XY : Completion of system area recovery (*)

I010XY RCV-ST-XY : Start of data area recovery

I011XY RCVEND-XY : Completion of data area recovery

I005XY DRVRCV-XY : Completion of drive recovery

Note : Symbols X and Y indicated above represent the following.

X indicates port No., Y indicates row No., and XY indicates the location of the drive under recovery.

* : Only with the replacement of HDU in Row = 0.

② Confirming completion of data recovery

Select DRIVE MAINT (RECOVER STATUS) with the panel and check to see that the data recovery is completed normally (COMP).

③ When the data recovery fails (I012XY RCVFLT-XY)

Select RECV ERR INFO from the panel and locate the faulty portion.

(a) Data recovery onto the replacement drive

(i) When the faulty portion is the replaced drive (PORT X, ROW Y)

- Replace the drive again.
- Make sure that the data recovery is completed normally (COMP).

(ii) When the faulty portion is other than the replaced drive

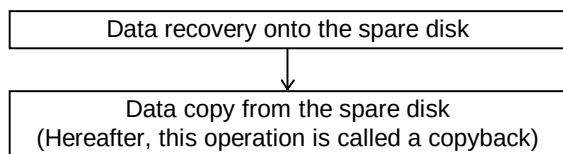
- Remove and insert the replaced drive and start data recovery again.
- Check to see that the data recovery is completed normally (COMP). When the data recovery is completed abnormally, it is a double failure, and cannot be recovered. Ask for an instruction. When the data recovery is completed normally, remove the failed drive (causing the system to be regressed) and replace the drive.

4.2.2 Procedures of data recovery and HDU ASSY replacement when a spare disk is installed

When a failure occurred in a HDU at a system with a spare drive, the data in the failed HDU is automatically recovered to the spare drive. After replacement of the failed HDU, the data in the spare drive will be copied back to the replaced HDU.

To replace HDU, refer to “4.3 HDU ASSY Replacement Procedure”. (See MK-REP0280.) The panel display is described “Transition of Panel Display”. (See MK-REP0260.)

Note : When DRIVE MAINTN (RECOVER STATUS) is selected from the panel during data recovery, the progress rate (%) of the data recovery at the moment can be seen (to see the progress rate again, return to the previous screen and then select DRIVE MAINTN again).



(1) Data recovery onto the spare disk

There are two types of data recovery onto the spare disk depending on the incentive.

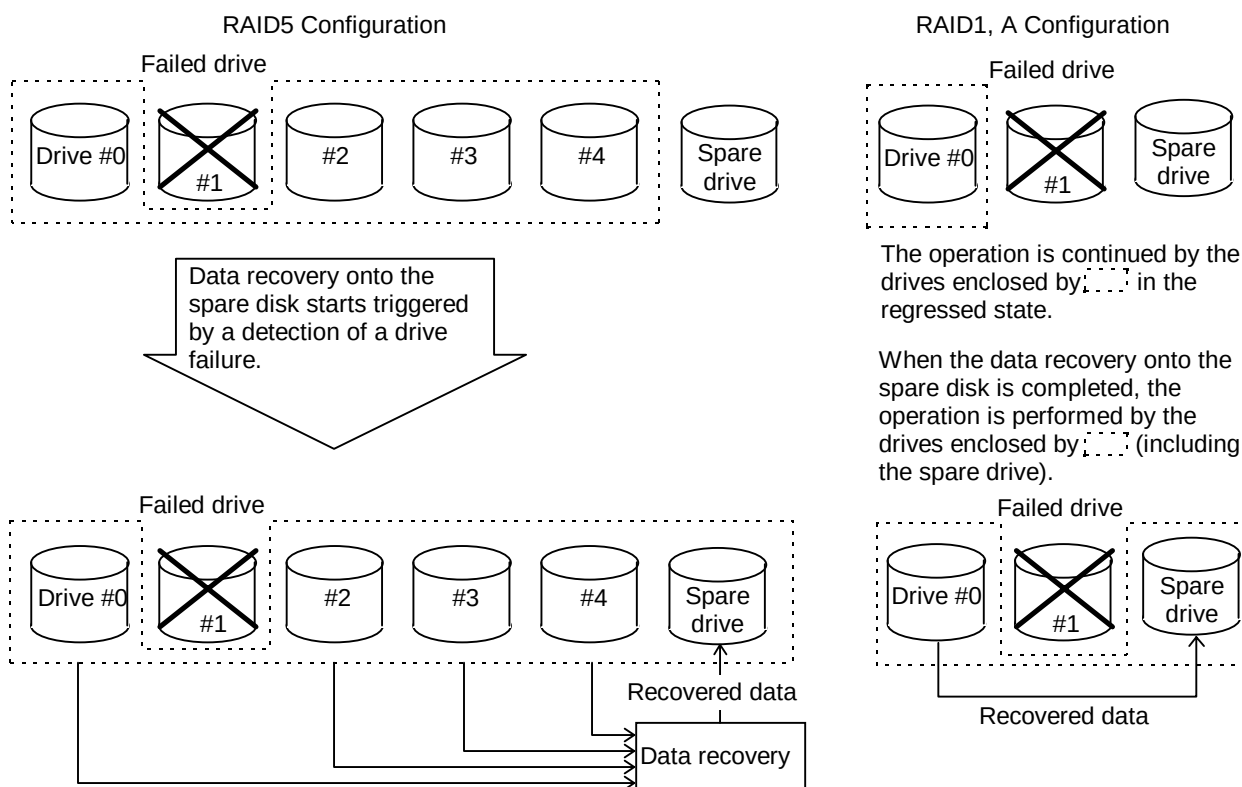
- Data recovery onto the spare disk when a failure in the disk is detected.
- Data copy onto the spare disk when a disk is detected in which the error count has exceeded its threshold value. (This operation will be called “dynamic sparing” hereafter. Note that some microprograms of certain version do not support the operation.)

(1-1) 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 drive failure occurs, the data of the failed drive is recovered automatically onto the spare disk.

Automatic recovery onto the spare disk is executed only under the following condition.

Condition : “When a 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.

- ① When the drive recovery mode is set to "NOT AUTOMATIC MODE", the data recovery onto the spare disk will not start automatically.

In this case, it is necessary to instruct recovery onto the spare disk with the panel. (See MK-REP0300)

- ② If a further drive failure occurs while the spare disk is used already (data of a drive has been already recovered onto the spare disk), the data of the nearly failed drive will not be recovered onto the spare disk.

Even after the copyback is completed in the above state and the spare disk enters the unused state, the data of the second failed drive will not be recovered onto the spare disk.

- ③ If a disk of no failure (a 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 from the panel. (See MK-REP0300)
- ④ When the spare disk is replaced because a spare disk failure occurred during data recovery to the spare disk, the data recovery to the replaced spare disk will not start automatically. In this case, it is necessary to instruct recovery to the spare disk with the panel. (See MK-REP0300)
- ⑤ If a faulty drive is replaced during data recovery to the spare disk, the data copy back the replaced drive will not start automatically even after the data recovery to the spare disk is completed.

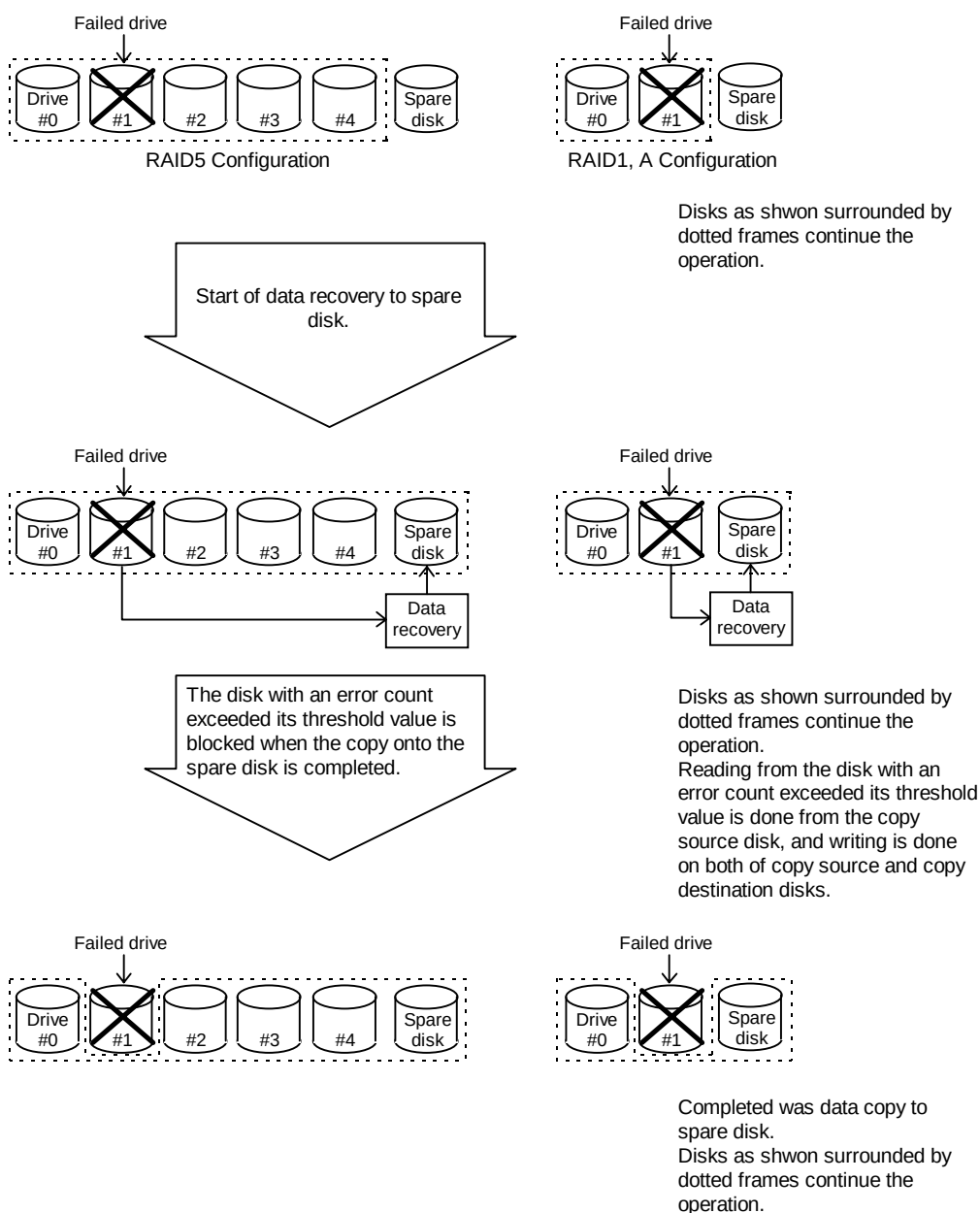
In this case, it is necessary to remove and insert the replaced drive again after the data recovery onto the spare disk is completed.

(1-2) 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 is detected in which the error count has exceeded its threshold value, data stored in the disk 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.

103■XY ■:0 - D
 ▲▲▲▲▲ -XY ▲▲▲▲▲ : Message text } See TRBL0310, 0320, 0330.

At the time when an error count exceeded its threshold value is detected, only a message display on the panel is done without blocking the concerning disk, 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 MK-REP0260 for panel display 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 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 sparing disk is being used for the data recovery.
- Another disk 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 (refer to pages MK-REP0190 through MK-REP0270).

Errors counted in the subsystem and default threshold values for them are listed below.

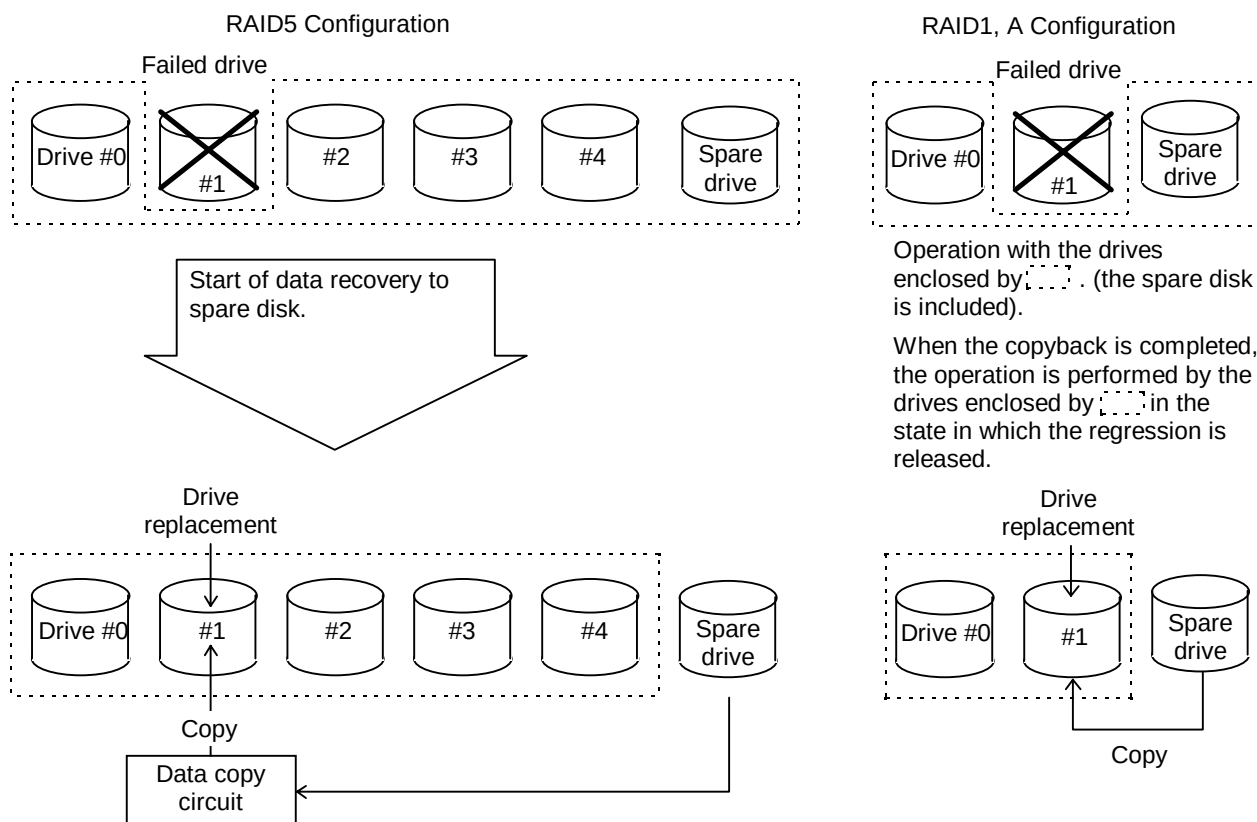
Item No.	Kind of error	Threshold (Default)
1	Drive mechanical error. (Recovered)	50
2	Drive mechanical error. (Unrecovered)	2
3	Drive medium error. (Recovered)	100
4	Drive medium error. (Unrecovered)	50
5	Drive R/W error. (Recovered)	10
6	Drive R/W error. (Unrecovered)	2
7	Drive I/F error. (Recovered)	50
8	Drive I/F error. (Unrecovered)	2
9	Drive hardware error. (Recovered)	50
10	Drive hardware error. (Unrecovered)	2
11	Drive SCSI I/F error. (Recovered)	50
12	Drive SCSI I/F error. (Unrecovered)	2
13	Collectable errors in online verify.	100
14	Uncollectable errors in online verify.	50

The threshold values above can be referred to and updated from the maintenance panel. (See page PANEL0520.)

Besides, the then error count can be referred to concerning the recovered or unrecovered drive media errors, correctable errors in online verify operations, correctable errors, and uncorrectable errors.

(2) Copyback

When a new drive is inserted to where a failure occurred as shown in the drawing below, the copyback will be executed automatically.



In the following cases, the copyback will not start automatically. Operation to start the copyback is required.

- ① When the copyback mode is set to "NOT AUTOMATIC MODE", the copyback will not start automatically after the drive replacement.

In this case, it is necessary to instruct copyback with the panel. (See MK-REP0260)

- ② If a faulty drive is replaced during data recovery to the spare disk, the data copy back to the replaced drive will not start automatically even after the data recovery to the spare disk is completed.

In this case, it is necessary to remove and insert the replacement drive again after the data recovery onto the spare disk is completed.

(a) Transition of panel display.

(i) Data recover (Data recovery onto the spare disk when a disk failure is detected.)

W202XY DRVALM-XY: Drive blocked

I01044 RCV-ST-44 : Start of data area recovery

I01144 RCVEND-44 : Completion of data area recovery

I006XY SPDRCN-XY : Completion of recovery onto spare disk

Note : Symbols X and Y indicated above represent the following.

X indicates port No., Y indicates row No., and XY indicates the location of the recovered drive.

(ii) Data recover (Dynamic sparing)

I01DXY DYNMSP-XY : Start of Dynamic sparing

I01044 RCV-ST-44 : Start of HDU ASSY recover

I01144 RCVEND-44 : Completion of data recovery

I006XY SPDRCN-XY : Completion of recovery onto spare disk

W202XY DRVALM-XY: Drive X, Y were blocked

Note : Symbols X and Y indicated above represent the following.

X indicates port No., Y indicates row No., and XY indicates the location of the recovered drive.

(iii) Copyback

I00DXY SYS-CP-XY : Start of system area recovery (*)

I00EXY SYSRCV-XY : Completion of system area recovery (*)

I010XY RCV-ST-XY : Start of data area recovery

I011XY RCVEND-XY : Completion of data area recovery

I005XY DRVRCV-XY : Completion of recovery onto the drive to which the data has been copied.

Note : Symbols X and Y indicated above represent the following.

X indicates port No., and Y indicates row No., and XY indicates the location of the drive to which the data is copied.

* : This message is displayed only when replacing HDU ASSY.

(b) Confirming completion of data recovery or copyback

Select DRIVE MAINTEN (RECOVER STATUS) from the panel and make sure that the data recovery is completed normally (COMP).

(c) When the data recovery fails (I012XY RCVFLT-XY)

Select RECV ERR INFO from the panel and locate the faulty portion.

(i) Data recovery to the spare disk

- When the faulty portion is the spare disk (PORT 4, ROW 4)

- ➊ Replace the spare disk. In this case, the data recovery to the spare disk will not start.
- ➋ Replace the drive at the regressed location. In this case, the data recovery onto the replacement drive starts.

- When the faulty portion is other than the spare disk

- ➊ Replace the drive at the regressed location. In this case, the data recovery to the replaced drive starts.

- ➋ Make sure that the data recovery ends normally (COMP).

When the data recovery is completed abnormally, it is a double failure, and cannot be recovered. (See 3. Trouble shooting chapter TRBL0840)

When the data recovery is completed normally, remove the failed drive (causing the system to be regressed) and replace the drive. (When the failed drive is removed, the data recovery to the spare disk will not start, where as when the drive is replaced, the data recovery to the replaced drive starts.)

(ii) When the dynamic sparing

- When the faulty portion is the spare disk (PORT 4, ROW 4)

- ➊ Replace the spare disk. In this case, the dynamic sparing will not start.
- ➋ Replace the drive at the regressed location. In this case, the data recovery onto the replacement drive starts.

- When the faulty portion is other than the spare disk

- ➊ Replace the drive at the regressed location. In this case, the data recovery to the replaced drive starts.

- ➋ Make sure that the data recovery ends normally (COMP).

When the data recovery is completed abnormally, it is a double failure, and cannot be recovered. (See 3. Trouble shooting chapter TRBL0840)

(iii) Copyback to the replaced drive from the spare disk

- When the faulty portion is the spare disk (PORT 4, ROW 4)

- ➊ Replace the spare disk. In this case, the data recovery onto the spare disk will not start.
- ➋ Replace the drive in the regressed location. In this case, the data recovery onto the replacement drive starts.

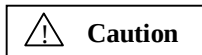
- ➌ Make sure that the data recovery is completed normally (COMP).

- When the faulty portion is other than the spare disk

- ➊ Replace the drive which failed during data recovery and make sure that the data recovery is completed normally (COMP).

- ➋ Replace the drive which is regressed first and make sure that the copyback is completed normally (COMP).

4.3 HDU ASSY Replacement Procedure (See Figure 4.3.1.)



Do not subject the HDU ASSY to any impact or vibration since it is a precision component.

(1) Removing procedure

- ① Open the front cover and the side covers. (See MK-REP0160.)
- ② Check to see the drive installing location of the message text DRVALM-XY (XY indicates the installing location) on the panel is correct and the ALARM LED of the HDU ASSY is on.

W	2	0	2	X	Y	D	R	V	A	L	M	X	Y

X : Port number

Y : Row number

- ③ Open the handle in the direction of the arrow (···➤) and pull it out and remove the HDU ASSY.

Notice : Be sure to replace the HDU ASSY when the subsystem is in the ready state. (If the HDU assembly is replaced when the power of the subsystem is off, the data recovery operation will not start.)

(2) Installing procedure

- ① Open the handle fully, insert the HDU ASSY in place, and rotate the handle in the direction of the arrow (➡).

**Caution**

Do not subject the HDU ASSY to any impact or vibration since it is a precision component.

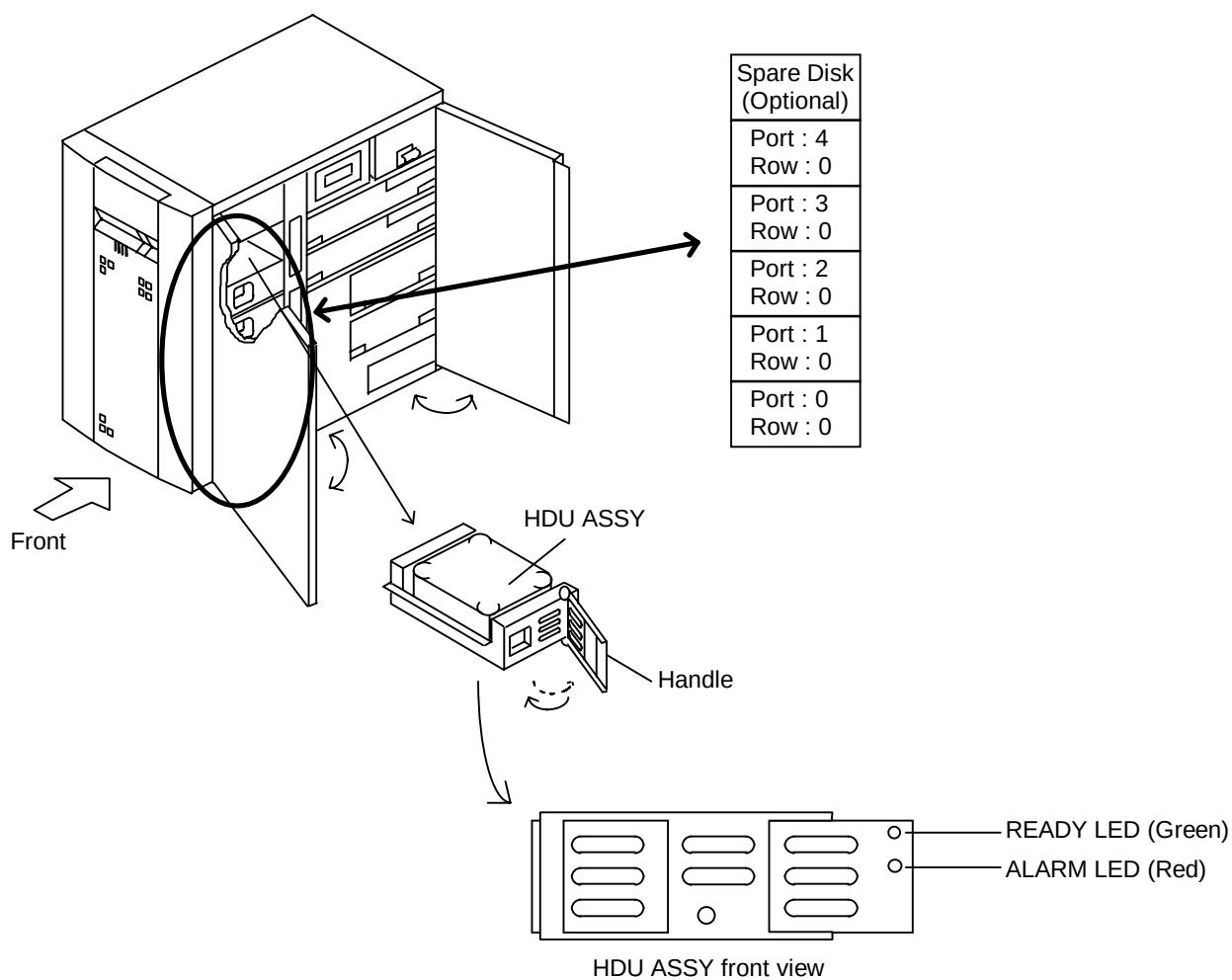
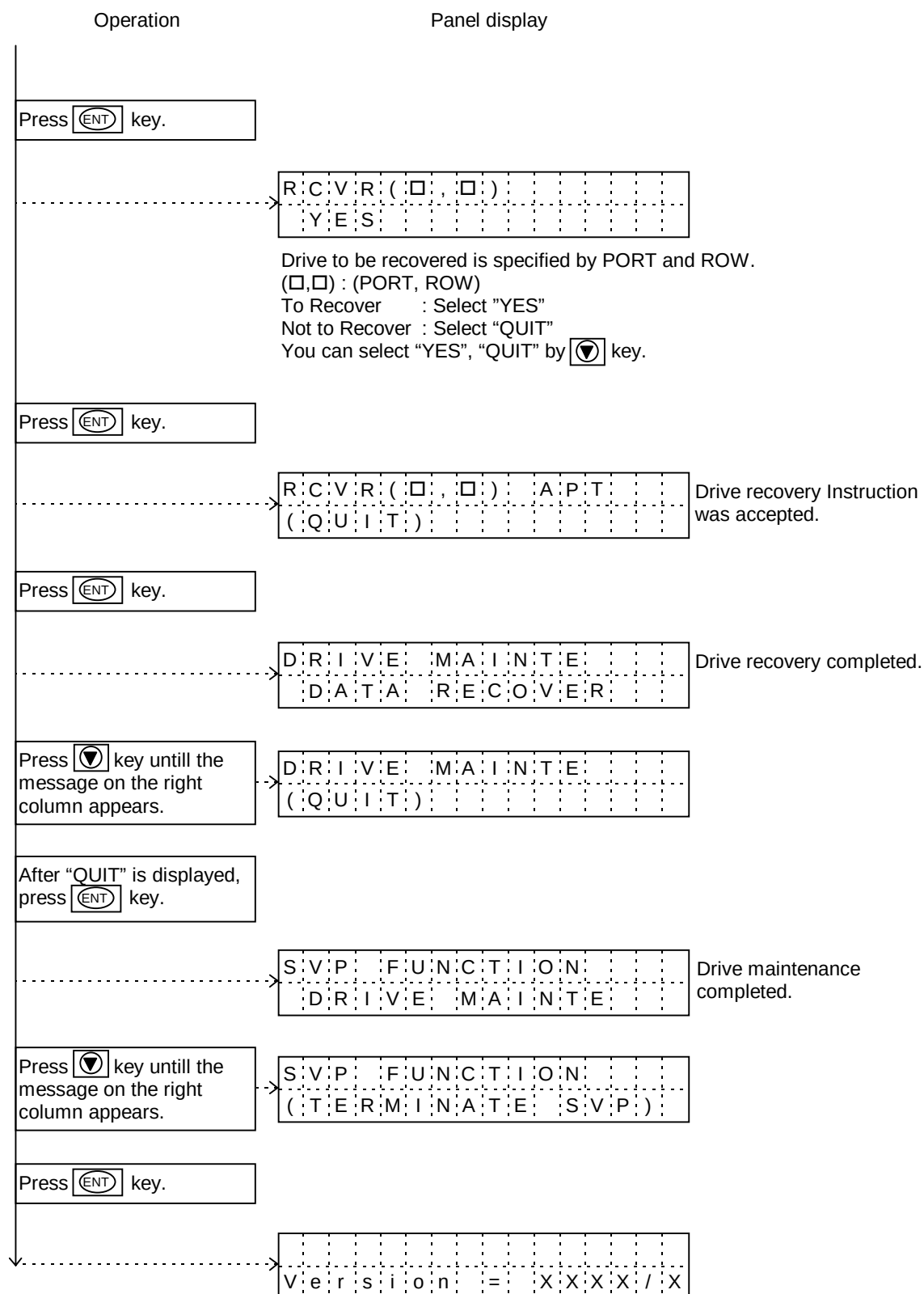
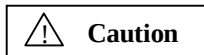


Figure 4.3.1 Replacing HDU ASSY



5. Replacing Fan ASSY (See Figure 5.1.)

When replacing FAN ASSY, turning off the power is not required.



FAN is rotating with high speed, be careful not to be caught by the FAN.

(1) Removing procedure

- ① First open the side cover 1 and then the side cover 2. (See MK-REP0160.)
- ② Remove the thumbscrew and pull the Fan ASSY to your side grasping it by its handle.
(The WARNING LED comes on and a buzzer sounds. Press either key on the panel to stop them.)

(2) Installing procedure

- ① Insert the Fan ASSY into the right place holding it by its handle and tighten the thumbscrew.
- ② Make sure that the WARNING LED goes off and the following panel display appears.

(3) Transition of panel display

I002XX FANRCV-XX-----Termination of fan failure recovery

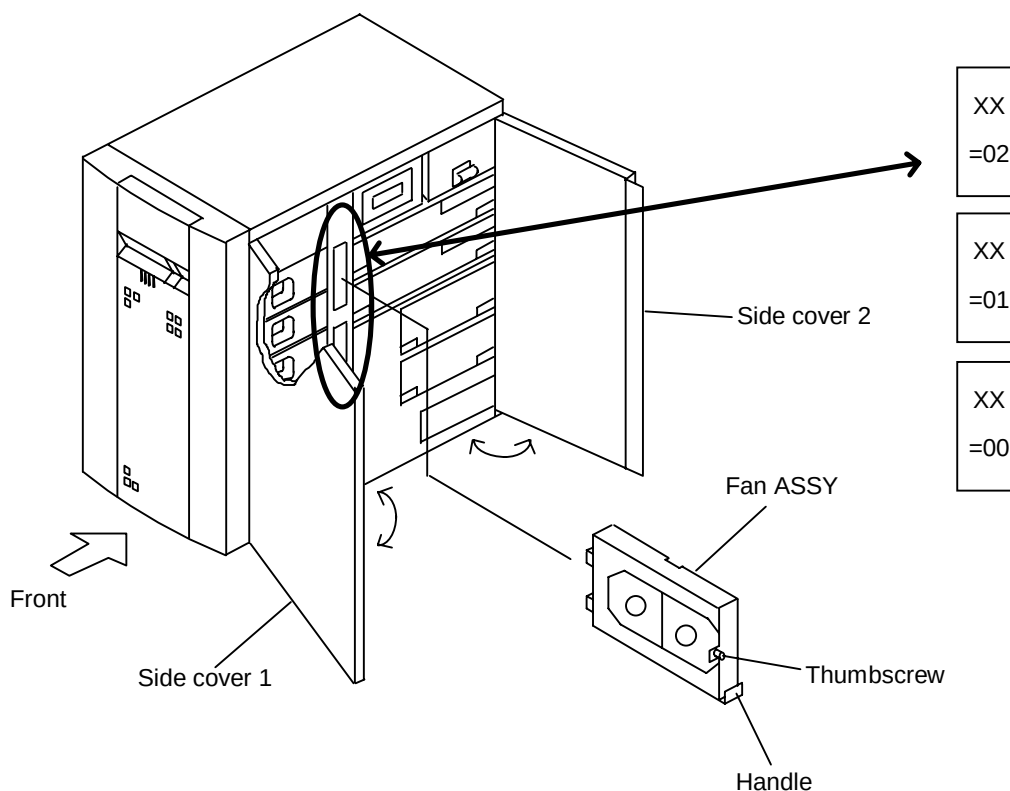


Figure 5.1 Replacing Fan ASSY

6. Replacing Battery ASSY (See Figure 6.1.)

When the battery is to be replaced without power being turned off (during power on), follow the procedure explained below (execute (1)② to (2)② promptly).

Notice 1 : In case the power is not normally turned off, the user's data might be lost.

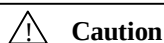
Notice 2 : If the power is already turned off, check the CACHE PWR LED (see page THEORY0200) to confirm that the cache back up is not being executed. In the case the cache back up is being executed, turn on and off the power (see page MK-REP0050).

Make sure that the power is turned off normally, then replace the Battery ASSY.

When the battery is to be replaced with power turned off, read MK-REP0050, "Turning the power off." and "Turning-ON procedure." thoroughly and follow MK-REP0060, "Part Replacement Procedures".

(1) Removing procedure

- ① First open the side cover 1 and then the side cover 2. (See MK-REP0160.)
- ② Turn the switch on the Battery ASSY to "O" side.
(The WARNING LED comes on and a buzzer sounds. Press either key on the panel to stop them.)
- ③ Remove the thumbscrews and pull the Battery ASSY to your side by grasping it by its handle.



Caution

Do not disintegrate removed Battery. It may cause burn or electric shock.

(2) Installing procedure

- ① Insert the Battery ASSY into the right place holding it by its handle and tighten the thumbscrew.
- ② Turn the switch on the Battery ASSY to "I" side.
- ③ Make sure that the WARNING LED goes off and the following panel display appears.

Note : When removing/mounting the Battery ASSY, turn the switch to "O" side.

(3) Transition of panel display

I00100 BATRCV ----- Termination of battery recovery

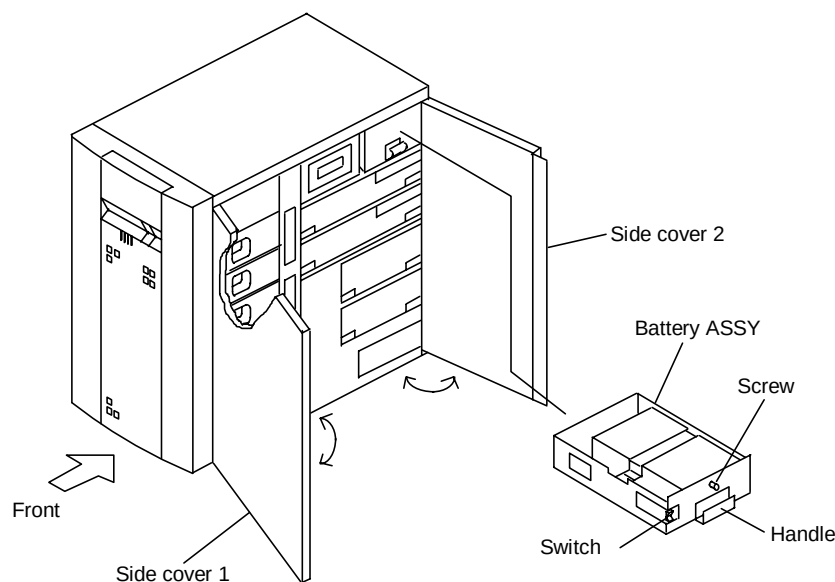


Figure 6.1 Replacing Battery ASSY

Note : The lead-acid battery is a precious resource which can be recycled.

The battery uses lead which is a heavy metal and sulfuric acid which is a deleterious substance. Therefore, never case it off at the place where the replacement of it is done.

When a part is to be replaced or a used product is to be discarded, take out the lead-acid battery to get it recycled.

See page "ENTRY0120" for the safety of depositing and storing the battery.

When the battery ASSY is replaced, power on the subsystem and charge the battery for more than two hours before returning the subsystem to the customer.

7. Replacing FDD ASSY (See Figure 7.1.)

(1) Removing procedure

- ① Turn off the subsystem following the power-off procedure explained in MK-REP0050.

Notice 1 : Be sure to read the above mentioned instruction because user's data may be lost if the power is not turned off normally.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Troubleshooting Section" (See TRBL0030) and turn off the power.

- ② Disconnect the power cable. When the power supply is duplicated, disconnect two cables.
- ③ Open the side cover 1 and then the side cover 2.
- ④ Remove the thumbscrew and pull the FDD ASSY to your side grasping it by its handle.

(2) Installing procedure

- ① Insert the FDD ASSY into the right place holding it by its handle and tighten the thumbscrew.
- ② Connect the power cable.

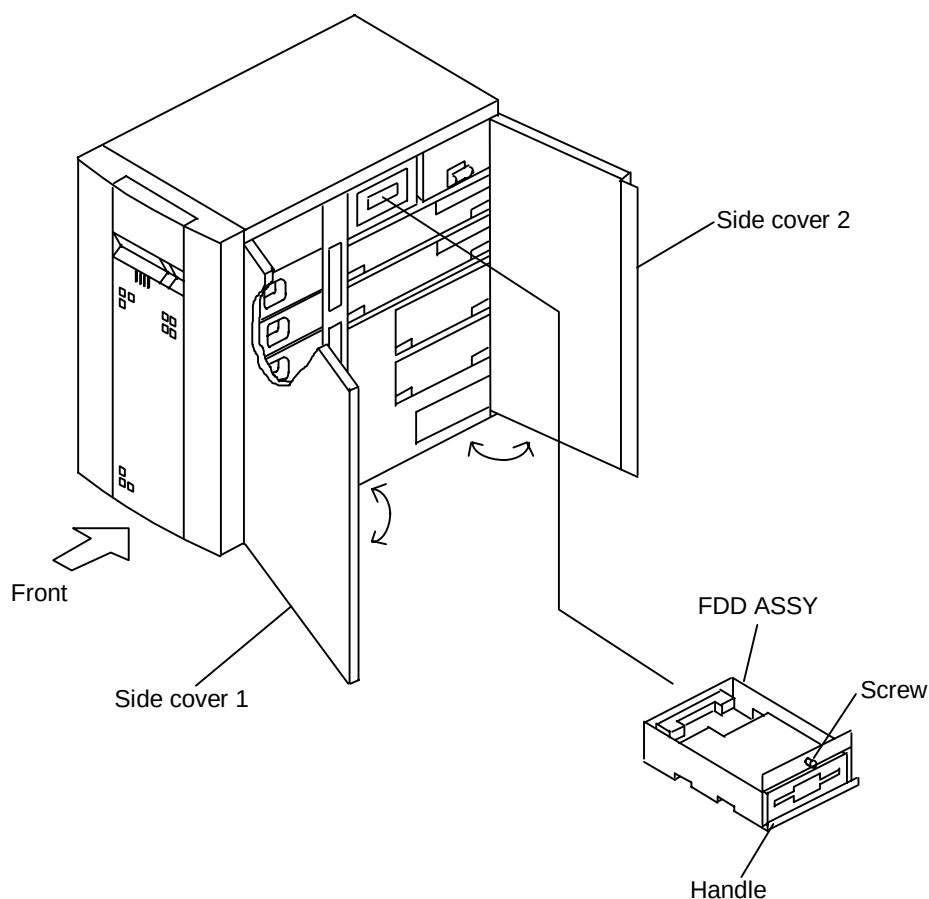


Figure 7.1 Replacing FDD ASSY

8. Replacing CTL ASSY (See Figure 8.1.1.)

The replacement procedure varies depending on whether the backup FD has been inserted or not. Perform the replacement following the procedure corresponding to the case.

- (1) When the backup FD has been inserted

Go to the replacement of the CTL ASSY when the backup FD has been inserted explained on page MK-REP0360.

- (2) When the backup FD has not been inserted

Go to the replacement of the CTL ASSY when the backup FD has not been inserted explained on page MK-REP0440.

8.1 When the backup FD has been inserted

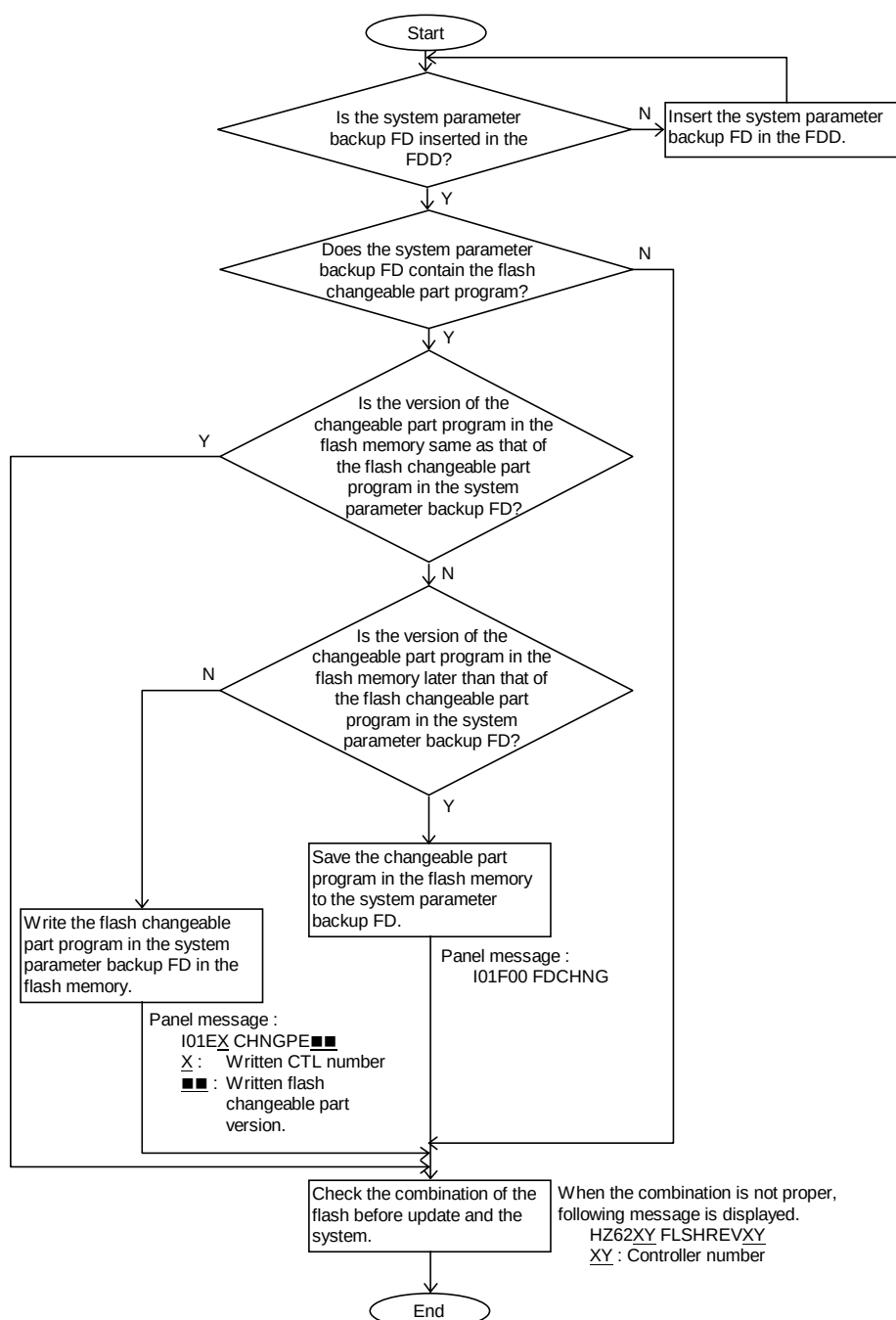
In this subsystem, the flash changeable part is updated automatically. To use the function the system parameter backup FD must be inserted.

By using the function, service person can replace the CTL ASSY without giving care to the combination of the Micro_Disk version and the flash changeable part version of the CTL ASSY.

(If the system parameter backup FD is not inserted when replacing the CTL ASSY, prepare the CTL ASSY whose flash changeable version is the same as that of the CTL ASSY to be replaced, or PE26 or later, and execute the replacement following the procedure explained in Section 8.2 “When the backup FD has not been inserted”).

Outline of flash changeable part automatic updating function

The following is a processing flow of the flash changeable part automatic updating function.



In case no optional redundant CTL installed

(1) Removing procedure

- ① Insert back-up FD into the FDD, copy the system parameter to FD.
(See MK-REP0090.)
- ② Turn off the subsystem following the power-off procedure explained in MK-REP0050.

Notice 1 : Be sure to read the above mentioned instruction because user's data may be lost if the power is not turned off normally.

Notice 2 : When the power has been already turned off, check the CACHE PWR LED (see page THEORY0200) to see if the cache backup is not being performed. If the cache backup is being performed, turn on and off the replacement after the power is turned off normally.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Troubleshooting Section" (See TRBL0030) and turn off the power.

- ③ Disconnect the cable (RS232C).
- ④ First open the side cover 1 and then the side cover 2. (See MK-REP0160.)
- ⑤ Open the right and left levers to the direction of arrows (· · · >) at the same time then remove the CTL ASSY.
- ⑥ Remove the CACHE ASSY and the LAN ASSY if installed.

(2) Installing procedure

- ① Prepare the FD in which the system parameter was copied in (1) ①. If it is not available, prepare the table of system parameter setting.
- ② Reinstall the removed CACHE ASSY and LAN ASSY in CTL ASSY. Be sure to install it in the same position as before.
- ③ Insert the CTL ASSY into the right place with its right and left levers being opened, then close the both levers to the direction of arrows (—→) at the same time.
Note : If the CTL ASSY is caught by something when it is installed, do not push it in forcibly. Retry the installation from the beginning. If forced, pins might be broken.
- ④ Connect the disconnected cables (RS232C).
- ⑤ Set No.3 of the DIP switch of the CTL ASSY to down position.



- ⑥ Turn on the subsystem according to the power-on procedure explained in MK-REP0050.
- ⑦ Set the system parameter of replaced CTL ASSY with the FD prepared at ①. (See MK-REP0130.)

- ⑧ One of the following messages is displayed on the panel. It does not mean a failure. Confirm the message and recover the subsystem state by performing the corresponding operation.

Message on the panel	Subsystem state	Operation
Version = XXXX/X	Subsystem READY LED comes on.	Go to step ⑨
I01EX CHNGPE■■■ HZ62XY FLSHREVXY X : Controller number (0 or 1) ■■■ : Version of flash changeable part is displayed. XY : Controller number (01 or 10) is displayed.	Subsystem ALARM LED comes on. (Version of flash changeable part was updated to PE■■■. Current system cannot operate with the flash changeable part whose version is not updated.)	Operation1 : Return the DIP switch of the CTL ASSY. Operation2 : Turn off the power following the powering off procedure shown on page MK-REP0050. Operation3 : Turn on the power following the powering on procedure shown on page MK-REP0050. Check if the following message is displayed on the panel. Version = XXXX/X Operation4 : Paint the boxes on the CHANGEABLE revision label affixed on the CTL ASSY up to ■■■ (see MK-REP0430), then go to step ⑨.
I01EX CHNGPE■■■ Version = XXXX/X X : Controller number (0 or 1) ■■■ : Version of flash changeable part is displayed.	Subsystem READY LED comes on. (Version of flash changeable part was updated to PE■■■. Current system can operate with the flash changeable part whose version is not updated.)	Paint the boxes on the CHANGEABLE revision label affixed on the CTL ASSY up to ■■■ (see MK-REP0430), then go to step ⑨.

- ⑨ After READY LED come on, set No.3 of DIP switch to as shown.



- ⑩ Turn off the power according to the power off procedure in MK-REP0050.
 ⑪ Turn on the power according to the power on procedure in MK-REP0050. (Soon, the ASSY will enter the ready status.)
 ⑫ Close the side covers 1 and 2. (See MK-REP0160.)

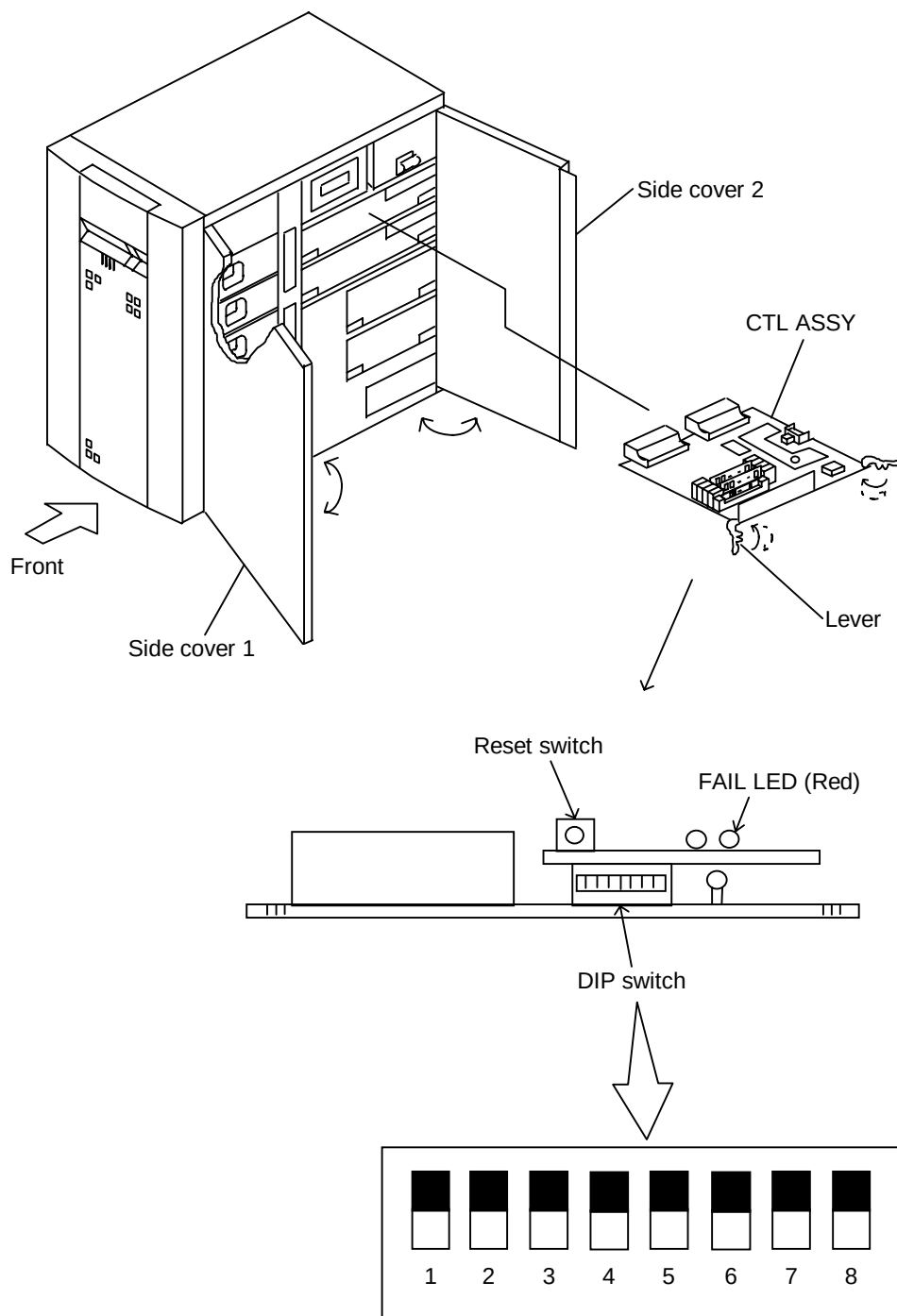


Figure 8.1.1 Replacing CTL ASSY

In case optional redundant CTL is installed

When the subsystem is of dual controllers, a controller can be replaced while the power on.

Notice 1: Do not replace (pull out) the CTL ASSY which operates normally. Before replacing the CTL ASSY, confirm that it is blocked (the FAIL LED in on).

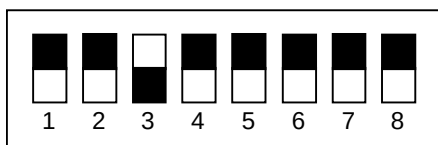
Notice 2: In this case, the controller must be replaced one after another. When Dual controllers are replaced at the same time, the power should be turned off before replacement.

(1) Removing procedure

- ① First open the side cover 1 and then the side cover 2. (See MK-REP0160.)
- ② Disconnect the cables (RS232C).
- ③ Confirm the blocked CTL ASSY (with the FAIL LED turned on). (See Figure 8.1.1.)
- ④ Take out the CTL ASSY by pulling both levers on left and right side at the same time toward the directions shown by allows (···→)
- ⑤ Remove the CACHE ASSY. If the LAN ASSY is installed, also remove it.

(2) Installing procedure

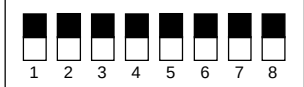
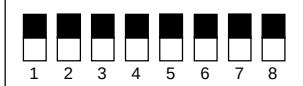
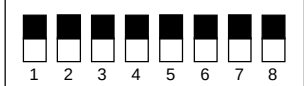
- ① Reinstall the removed CACHE ASSY and the LAN ASSY (option) in the new CTL ASSY. Be sure to install it in the same position as before.
- ② Set No.3 of the DIP switch of the CTL ASSY.



- ③ Insert the CTL ASSY into the right position with the right and left levers being opened, then close the both levers to the direction of arrows (—→) at the same time.

Note : If the CTL ASSY is caught by something when it is installed, do not push it in forcibly. Retry the installation from the beginning. If forced, pins might be broken.

- ④ One of the following messages is displayed on the panel. It does not mean a failure. Confirm the message and recover the subsystem state by performing the corresponding operation.

Message on the panel	Subsystem state	Operation
I619XX CTLRCV-XX XX : Controller number (00 or 01) is displayed.	The WARNING LED goes out and the READY LED of the subsystem comes on.	Return the DIP switch No.3 as shown below, then go to step ⑤ 
I01EX CHNGPE■■ HZ62XY FLSHREVXY H60422 CTLFAIL W015XX CTLALM-XX XX : Controller number (00 or 01) is displayed. X : Controller number (0 or 1) ■■ : Version of flash changeable part is displayed. XY : Controller number (01 or 10) is displayed.	The WARNING LED comes on, and the READY LED of the subsystem comes on in the state that one of the CTL ASSYs is blocked. (The flash changeable part has been updated to the version PE■■. Current system cannot operate with the flash changeable part of earlier version on the CTL ASSY inserted.)	Operation1 : Pull out the inserted CTL ASSY (with the FAIL LED turned on). Operation2 : Insert the CTL ASSY again. (Leave the DIP switch No.3 as set to on.) Operation3 : Return the DIP switch No.3 as shown in the Figure below when the WARNING lamp on the panel goes out and the following message is displayed on the panel.  Operation4 : Paint the boxes on the CHANGEABLE revision label affixed on the CTL ASSY up to ■■ (see MK-REP0430), then go to step ⑤. I619XX CTLRCV-XX
I01EX CHNGPE■■ I619XX CTLRCV-XX	The WARNING LED goes out and the READY LED of the subsystem comes on. (The flash changeable part has been updated to the version PE■■. However, the current system can operate with the flash changeable part of earlier version on the CTL ASSY inserted.)	Operation1 : Return the DIP switch No.3 as shown below.  Operation2 : Paint the boxes on the CHANGEABLE revision label affixed on the CTL ASSY up to ■■ (see MK-REP0430), then go to step ⑤.

- ⑤ Connect the disconnected cables (RS232C).
- ⑥ Close the side covers 1 and 2. (See MK-REP0160.)

When replacing a CTL in a dual controller system (with Redundant CTL option), the system parameter is automatically loaded to the replaced CTL from another CTL. The setting with FD or manual setting is not required.

But, when both CTL ASSY failed at the same time, this automatic operation is not available. In this case, it is necessary to restore from FD. Operate in the same way as single controller.

When replacing a CTL in a dual controller system (with redundant CTL option) , replacement with power off is allowed. The procedure is similar to the replacement in a single controller system. In this case the setting of system parameter from FD or manual operation is also not necessary. (Though installing procedure ⑦ in the single controller system (without redundant CTL option) is not necessary.)

Painting flash revision label

Figure 8.1.2 shows how to paint the flash revision label. (It shows a case to paint the boxes up to PE26.)

Location of the label is shown in Figure 8.1.3.

FIXED	PEXX	01	02	03	04
		05	06	07	08
		10	11	12	13
		15	16	17	18
CHNGABLE	PEXX	21	22	23	24
		25	26	27	28
		30	31	32	33
		35	36	37	38

An example to paint the boxes of the CHANGEABLE label up to 26.

Figure 8.1.2 Revision Label Layout and Numbers to be Painted

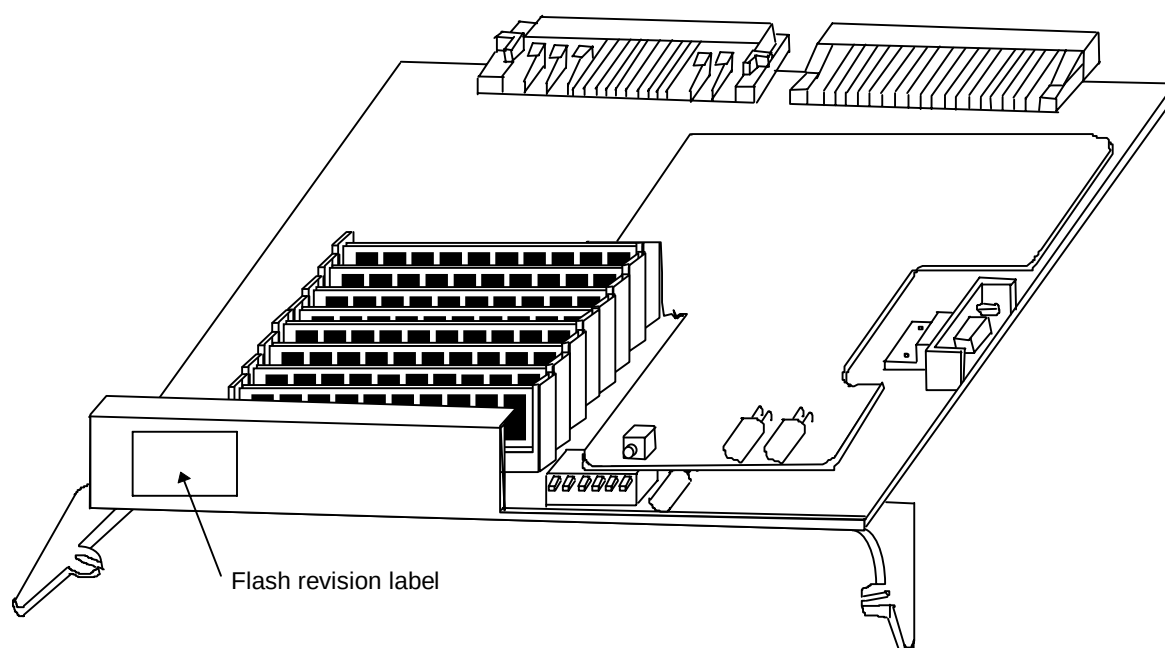


Figure 8.1.3 Location of Revision Label on CTL ASSY

8.2 When the backup FD has not been inserted

In case no optional redundant CTL installed

(1) Removing procedure

- ① Insert back-up FD into the FDD, copy the system parameter to FD.
(See MK-REP0090.)
- ② Turn off the subsystem following the power-off procedure explained in MK-REP0050.

Notice 1 : Be sure to read the above mentioned instruction because user's data may be lost if the power is not turned off normally.

Notice 2 : When the power has been already turned off, check the CACHE PWR LED (see page THEORY0200) to see if the cache backup is not being performed. If the cache backup is being performed, turn on and off the replacement after the power is turned off normally.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Troubleshooting Section" (See TRBL0030) and turn off the power.

- ③ Disconnect the cable (RS232C).
- ④ First open the side cover 1 and then the side cover 2. (See MK-REP0160.)
- ⑤ Open the right and left levers to the direction of arrows (···>) at the same time then remove the CTL ASSY.
- ⑥ Remove the CACHE ASSY and the LAN ASSY if installed.

(2) Installing procedure

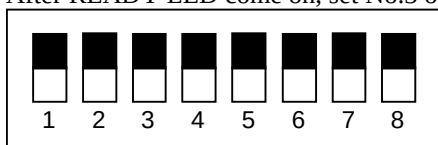
- ① Prepare the FD in which the system parameter was copied in (1) ①. If it is not available, prepare the table of system parameter setting.
- ② Reinstall the removed CACHE ASSY and LAN ASSY in CTL ASSY. Be sure to install it in the same position as before.
- ③ Insert the CTL ASSY into the right place with its right and left levers being opened, then close the both levers to the direction of arrows (—>) at the same time.

Note : If the CTL ASSY is caught by something when it is installed, do not push it in forcibly. Retry the installation from the beginning. If forced, pins might be broken.

- ④ Connect the disconnected cables (RS232C).
- ⑤ Set No.3 of the DIP switch of the CTL ASSY to down position.



- ⑥ Turn on the subsystem according to the power-on procedure explained in MK-REP0050.
- ⑦ Set the system parameter of replaced CTL ASSY with the FD prepared at ①. (See MK-REP0130.) If no system parameter FD, proceed the setting the panel with the table prepared in ①. (Refer to PANEL Chapter.)
- ⑧ After READY LED come on, set No.3 of DIP switch to as shown.



- ⑨ Turn off the power according to the power off procedure in MK-REP0050.
- ⑩ Turn on the power according to the power on procedure in MK-REP0050. (Soon, the ASSY will enter the ready status.)
- ⑪ Close the side covers 1 and 2. (See MK-REP0160.)

In case optional redundant CTL is installed

When the subsystem is of dual controllers, a controller can be replaced while the power on.

Notice 1: Do not replace (pull out) the CTL ASSY which operates normally. Before replacing the CTL ASSY, confirm that it is blocked (the FAIL LED in on).

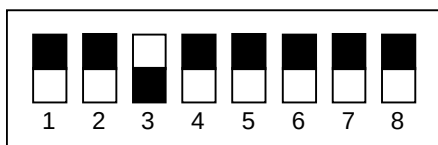
Notice 2: In this case, the controller must be replaced one after another. When Dual controllers are replaced at the same time, the power should be turned off before replacement.

(1) Removing procedure

- ① First open the side cover 1 and then the side cover 2. (See MK-REP0160.)
- ② Disconnect the cables (RS232C).
- ③ Check to see which CTL ASSY is blocked (FAIL LED is lit up).
- ④ Open the right and left levers to the direction of arrows (···>) at the same time then remove the CTL ASSY.
- ⑤ Remove the CACHE ASSY and the LAN ASSY. (option)

(2) Installing procedure

- ① Reinstall the removed CACHE ASSY and the LAN ASSY (option) in the new CTL ASSY. Be sure to install it in the same position as before.
- ② Set No.3 of the DIP switch of the CTL ASSY.



- ③ Insert the CTL ASSY into the right position with the right and left levers being opened, then close the both levers to the direction of arrows (—>) at the same time.

Note : If the CTL ASSY is caught by something when it is installed, do not push it in forcibly. Retry the installation from the beginning. If forced, pins might be broken.

- ④ When the WARNING LED on PANEL goes off and the message below appears on the PANEL, set No.3 DIP switch to as shown.



The message on the PANEL "I619XX CTL RCU-XX". (XX : Indicates the installing location < 00 or 01 >.)

- ⑤ Connect the disconnected cables (RS232C).

⑥ Close the side covers 1 and 2. (See MK-REP0160.)

When replacing a CTL in a dual controller system (with Redundant CTL option), the system parameter is automatically loaded to the replaced CTL from another CTL. The setting with FD or manual setting is not required.

But, when both CTL ASSY failed at the same time, this automatic operation is not available. In this case, it is necessary to restore from FD. Operate in the same way as single controller.

When replacing a CTL in a dual controller system (with redundant CTL option) , replacement with power off is allowed. The procedure is similar to the replacement in a single controller system. In this case the setting of system parameter from FD or manual operation is also not necessary. (Though installing procedure ⑦ in the single controller system (without redundant CTL option) is not necessary.)

9. Replacing I/F ADAPTER ASSY (See Figure 9.1, 9.2, 9.3.)

(1) Removing procedure

- ① Turn off the subsystem following the power-off procedure explained in MK-REP0050 and turn off the host system.

Notice 1 : In case the power is not normally turned off, the user's data might be lost.

Notice 2 : If the power is already turned off, check the CACHE PWR LED (see page THEORY0200) to confirm that the cache back up is not being executed. In the case the cache back up is being executed, turn on and off the power (see page MK-REP0050).

Make sure that the power is turned off normally, then replace the Battery ASSY.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC".

In this case refer to "Trouble shooting chapter" (See TRBL0030) and turn off the power.

- ② Disconnect the Fibre cable, the terminator, and the LAN cable (option).

Notice 3 : When removing or connecting the fibre channel cable, move the connector horizontally, carefully, and slowly.

- ③ First open the side cover 1 and 2 then pull the CTL ASSY. (See MK-REP0350.)
- ④ Remove the bind screw and pull the I/F ADAPTER ASSY toward you to remove it.

(2) Mounting procedure

- ① Insert the I/F ADAPTER ASSY into the right place and tighten the bind screw
- ② Reinstall the CTL ASSY. (See MK-REP0350.)
- ③ Connect the disconnected cables etc. (See Notice 3.)

Note 1 : When the controller is used in a dual configuration, connect the cables to the connectors corresponding to the host to be connected. (See Figure 9.2.)

Controller 01

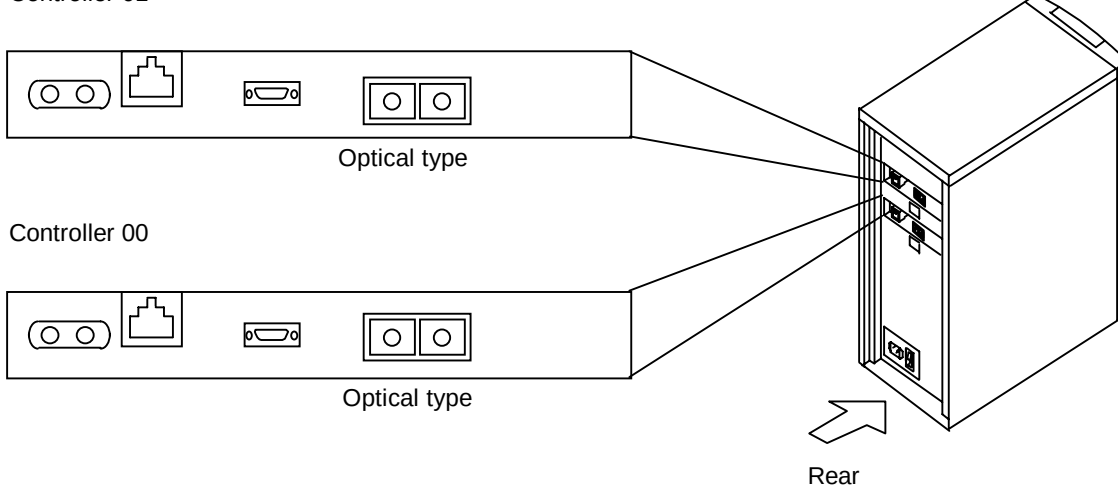


Figure 9.1 Fibre Connector Layout

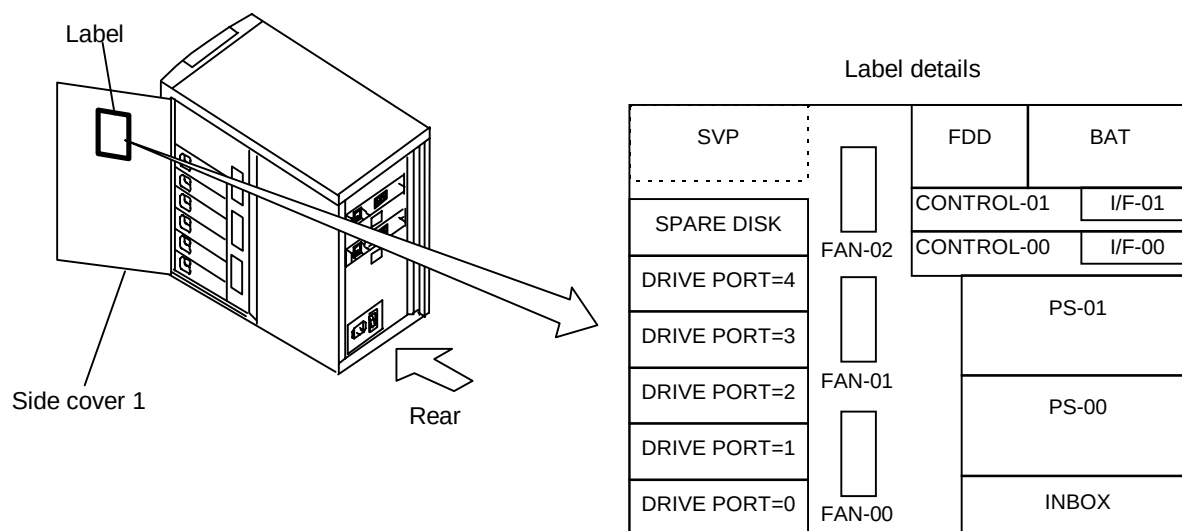


Figure 9.2 Label Layout

④ Close the side covers 1 and 2. (See MK-REP0160.)

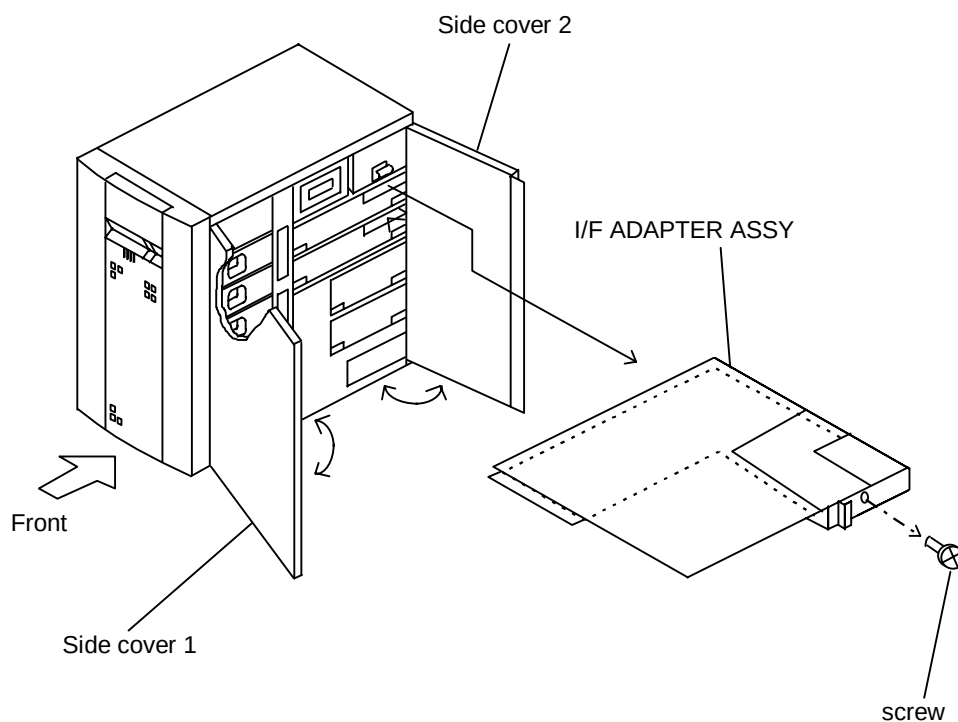


Figure 9.3 Replacing I/F ADAPTER ASSY

10. Replacing SVP ASSY (See Figures 10.1 and 10.2.)

(1) Removing procedure

- ① Turn off the subsystem following the power-off procedure explained in MK-REP0050. (Be sure to read and understand the procedure because if the power is turned off improperly, user data might be destroyed.)

Sometimes the subsystem does not go power off after the main switch turned to “O” side with panel display “TOOMNYPIN” or “SYSDTSVER” or “POFFCMUNC”.

In this case refer to “Trouble shooting chapter” (See TRBL0030) and turn off the power.

- ② Check to see that POWER LED goes off.

Notice : In case the power is not normally turned off, the user’s data might be lost.

- ③ Turn the breaker at the rear to “O” side.
- ④ Open the front cover. (See MK-REP0160.)
- ⑤ Open the side cover 1. (See MK-REP0160.)
- ⑥ Remove 4 screws and remove shield bracket.
- ⑦ Turn the lever to the direction of an arrow (↗) and pull the SVP ASSY toward you. Then, remove the SVP ASSY to the left following arrow A.

(2) Mounting procedure

- ① Insert the SVP ASSY from the right front of the subsystem following the opposite direction of arrow A with its rail engaging with the guide and fix the projection into the cutout. Then, turn the lever to the direction of an arrow (↘) to mount the SVP ASSY.
- ② Fix shield bracket with 4 screws.

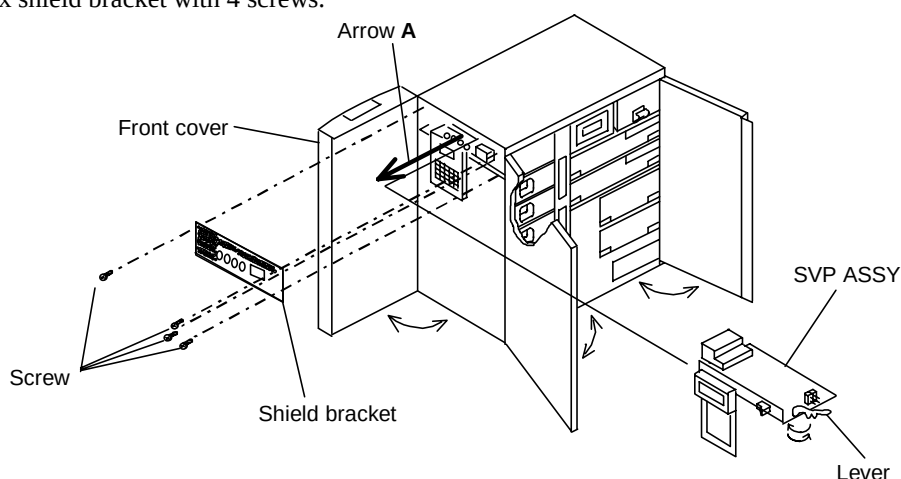


Figure 10.1 Replacing SVP ASSY

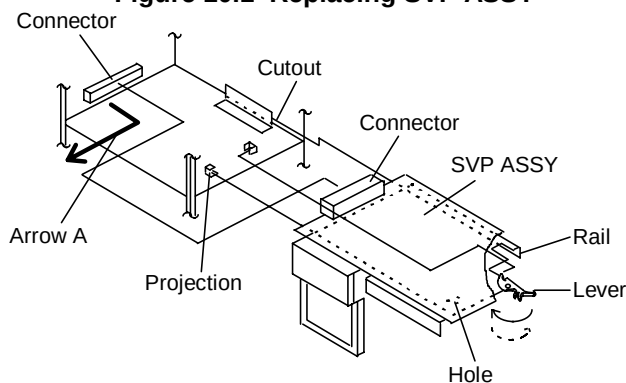
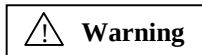


Figure 10.2 Detailed Figure of SVP ASSY Replacement

11. Replacing AC/DC power supply (See Figure 11.1.)



**Only the maintenance personnel can perform this replacement.
The operation by the user is prohibited.**

Tool : Phillips screwdriver (No.2)

Confirm presence/absence of the redundant power supply. If there is a redundant power supply, a hot replacement is possible. Concerning the mini tower type, when installed two AC/DC power supplies, it means that the subsystem has redundant power supply.

When the redundant AC/DC power supply is not installed, follow the procedure from step (4).

(1) Removing procedure

- ① First open the side cover 1 and then the side cover 2. (See MK-REP0160.)
- ② Disconnect the FG cable connected with the AC/DC power supply.
- ③ Open the right and left levers to the direction of arrows (···➤) at the same time, then remove the AC/DC power supply .

(2) Mounting procedure

- ① Insert the AC/DC power supply into the right place with its right and left levers open, then close the both levers to the direction of arrows (➡) at the same time.
- ② Connect the FG cable with the AC/DC power supply.

(3) Transition of panel display

I003XX PSRCV-XX ----- DC power recovery is completed.

(In case with replacement while power on.)

When the subsystem is allowed to be shut off, it is recommended to replace the power supply in the following procedure.

(4) Removing procedure

- ① Turn off the subsystem following the power-off procedure explained in MK-REP0050.

Notice : In case the power is not normally turned off, the user's data might be lost.

Sometimes the subsystem does not go power off after the main switch turned to “O” side with panel display “TOOMNYPIN” or “SYSDTSVER” or “POFFCMUNC”.

In this case refer to “Trouble shooting Chapter” (See TRBL0030) and turn off the power.

- ② First open the side cover 1 and then the side cover 2. (See MK-REP0160.)
- ③ Disconnect the FG cable connected with the AC/DC power supply.
- ④ Open the right and left levers to the direction of arrows (···➤) at the same time, then remove the AC/DC power supply .

(5) Mounting procedure

- ① Insert the AC/DC power supply into the right place with its right and left levers open, then close the both levers to the direction of arrows (➡) at the same time.
- ② Connect the FG cable with the AC/DC power supply.
- ③ Turn the power on following “2.1 Turning the Power on/off for Each String”. (See MK-REP0050.)

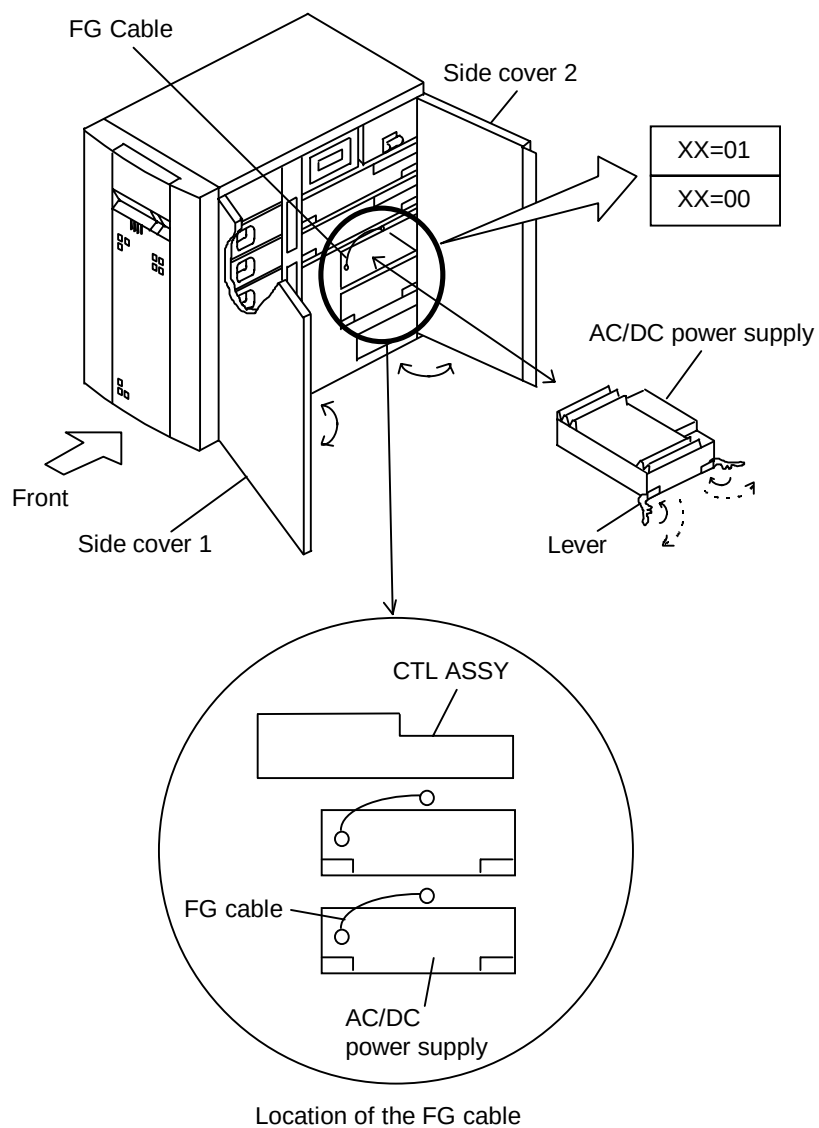
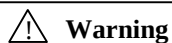


Figure 11.1 Replacing AC/DC power supply

12. Replacing In Box ASSY (See Figure 12.1.)



Warning

Do not touch inside of In Box ASSY. Electricity remains even if main switch is off.

(1) Removing procedure

- ① Turn off the subsystem following the power-off procedure explained in MK-REP0050.

Notice 1 : In case the power is not normally turned off, the user's data might be lost.

Notice 2 : If the power is already turned off, check the CACHE PWR LED (see page THEORY0200) to confirm that the cache back up is not being executed. In the case the cache back up is being executed, turn on and off the power (see page MK-REP0050).

Make sure that the power is turned off normally, then replace the Battery ASSY.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Trouble shooting Chapter" (See TRBL0030) and turn off the power.

- ② Disconnect the power supply cable.
- ③ First open the side cover 1 and then the side cover 2. (See MK-REP0160.)
- ④ Remove the screw and move the In Box ASSY to the left following the arrow A. Then, pull it toward you to remove it.

(2) Installing procedure

- ① Insert the In Box ASSY into the right place and move it to the opposite direction of arrow A (to the right). Then, push it inward and tighten the screw.
- ② Connect the disconnected cables.
- ③ Close side cover 1, then side cover 2. (See MK-REP0160.)
- ④ Turn the power on following the power-on procedure in MK-REP0050.

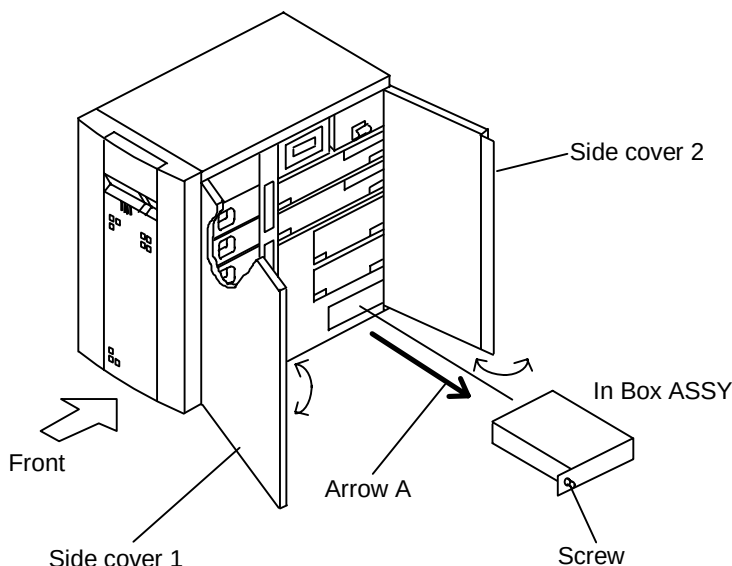


Figure 12.1 Replacing In Box ASSY

13. Replacing CACHE ASSY

In case no optional redundant CTL installed

(1) Procedures

- ① Turn off the subsystem following the power-off procedure explained in MK-REP0050.

Notice 1 : In case the power is not normally turned off, the user's data might be lost.

Notice 2 : If the power is already turned off, check the CACHE PWR LED (see page THEORY0200) to confirm that the cache back up is not being executed. In the case the cache back up is being executed, turn on and off the power (see page MK-REP0050).

Make sure that the power is turned off normally, then replace the Battery ASSY.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Trouble shooting Chapter" (See TRBL0030) and turn off the power.

- ② Open the side cover to remove CTL ASSY. (See MK-REP0350.)

- ③ Replace CACHE ASSY.

Note 1 : Slots #0 and #4, #1 and #5, #2 and #6, #3 and #7 are pairs respectively. Install the cache having the same capacity for these each pair slots.

Note 2 : CACHE ASSY of the largest capacity must be mounted cache slots #0 and #4 in case that CACHE ASSYs of different capacity are used.

- ④ Install the CTL ASSY.

- ⑤ Turn power on following the procedure explained in MK-REP0050.

- ⑥ Close the side covers.

- ⑦ Close the front cover.

Installation example of CACHE ASSY

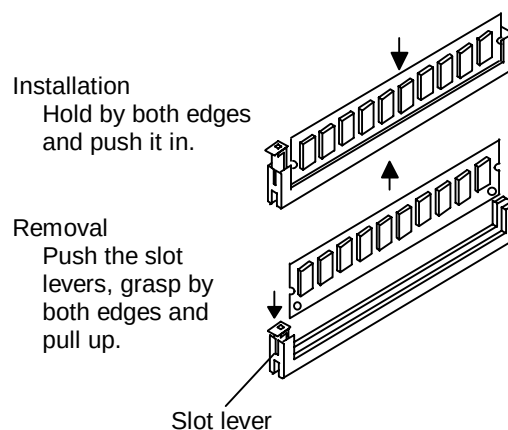
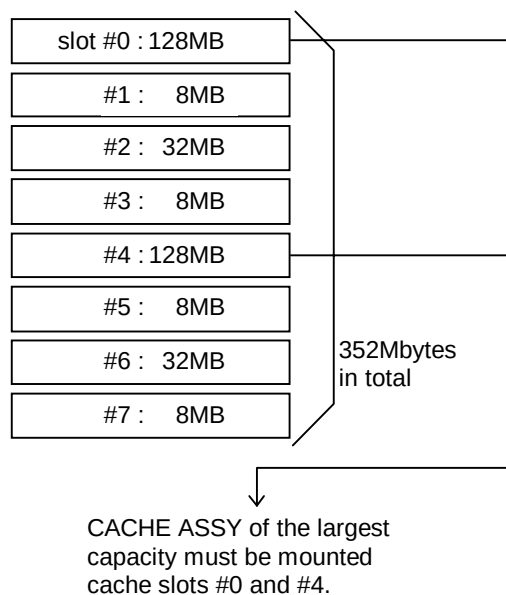


Figure 13.1 Replacing CACHE ASSY

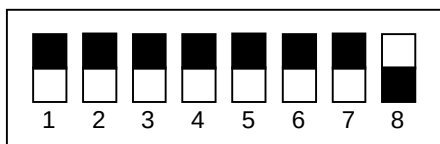
In case optional redundant CTL is installed

When the subsystem are dual controller system, CACHE ASSY can be replaced while the power on.

Notice : In this case, the CACHE ASSY must be replaced one controller at one time. In case CACHE ASSY for both CTL ASSY are replaced at the same time, turn the power off before replacement.

(1) Procedure

- ① First open the side cover 1 and the side cover 2. (See MK-REP0160.)
- ② Disconnect the cable (RS232C).
- ③ Set No.8 DIP switch of the corresponding CTL ASSY.

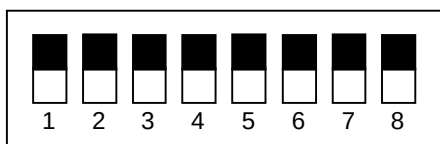


- ④ Push the reset switch of the corresponding CTL ASSY.
- ⑤ Wait ten seconds, check to see that FAIL LED on the CTL comes on and it enters into the blocked state. (See MK-REP0350.)
- ⑥ Open the right and left levers to the direction of arrows (→) at the same time then remove the CTL ASSY.
- ⑦ Replace the CACHE ASSY.

Note 1 : When replacing a cache, install the cache having the same capacity in slots #0 and #4, slots #1 and #5, slots #2 and #6, or slots #3 and #7.

Note 2 : CACHE ASSY for the same slot of both CTL ASSY should have to same capacity.

Note 3 : CACHE ASSY of the largest capacity must be mounted cache slots #0 and #4 in case that CACHE ASSYs of different capacity are used.
- ⑧ Set No.8 of DIP switch to as shown.



- ⑨ Insert the CTL ASSY.
- ⑩ Connect the disconnected cable (RS232C).
- ⑪ Close the side covers 1 and 2. (See MK-REP0160.)

When an optional redundant CTL (for dual configuration) has been installed, the replacement can be performed with machine power off. In this case follow the same procedure as that for single configuration.

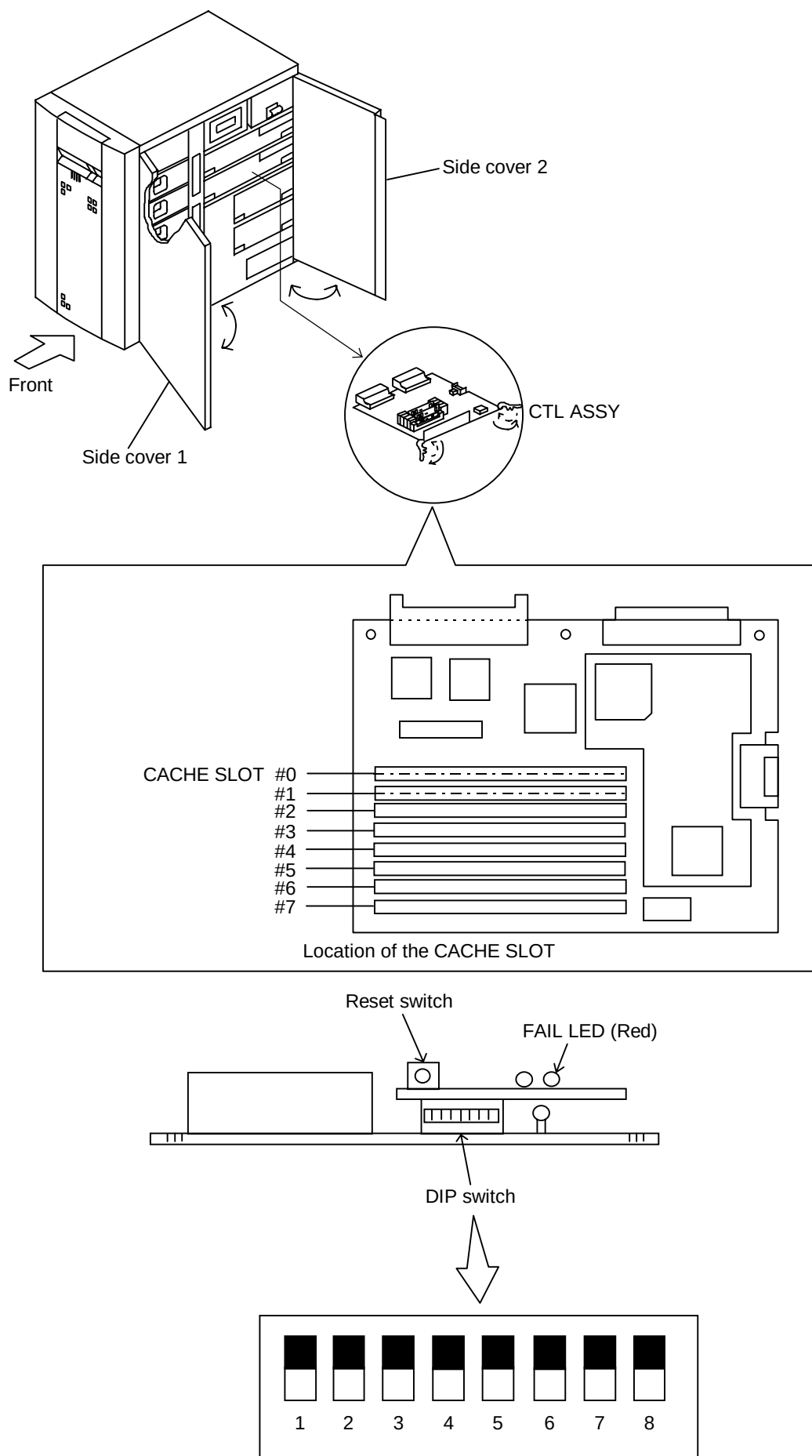


Figure 13.2 CTL ASSY

14. Replacing LAN ASSY

When no optional redundant CTL installed

Notice : Configuration setting change is sometimes required because Mac Address is changed after replacing LAN ASSY.

(1) Procedures

- ① Turn off the subsystem following the power-off procedure explained in MK-REP0050.

Notice 1 : In case the power is not normally turned off, the user's data might be lost.

Notice 2 : If the power is already turned off, check the CACHE PWR LED (see page THEORY0200) to confirm that the cache back up is not being executed. In the case the cache back up is being executed, turn on and off the power (see page MK-REP0050).

Make sure that the power is turned off normally, then replace the Battery ASSY.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYS DTSVER" or "POFFCMUNC". In this case refer to "Trouble shooting Chapter" (See TRBL0030) and turn off the power.

- ② Open the side covers and remove the CTL ASSY. (See MK-REP0160.)
 ③ Pinch the latching heads of card spacers with needle-nose pliers etc. , then pull the LAN ASSY up with care not to touch with surrounding parts. (See Figure 14.1.)

Notice : If your hand or a tool touches with CTL ASSY, touched part may be damaged.

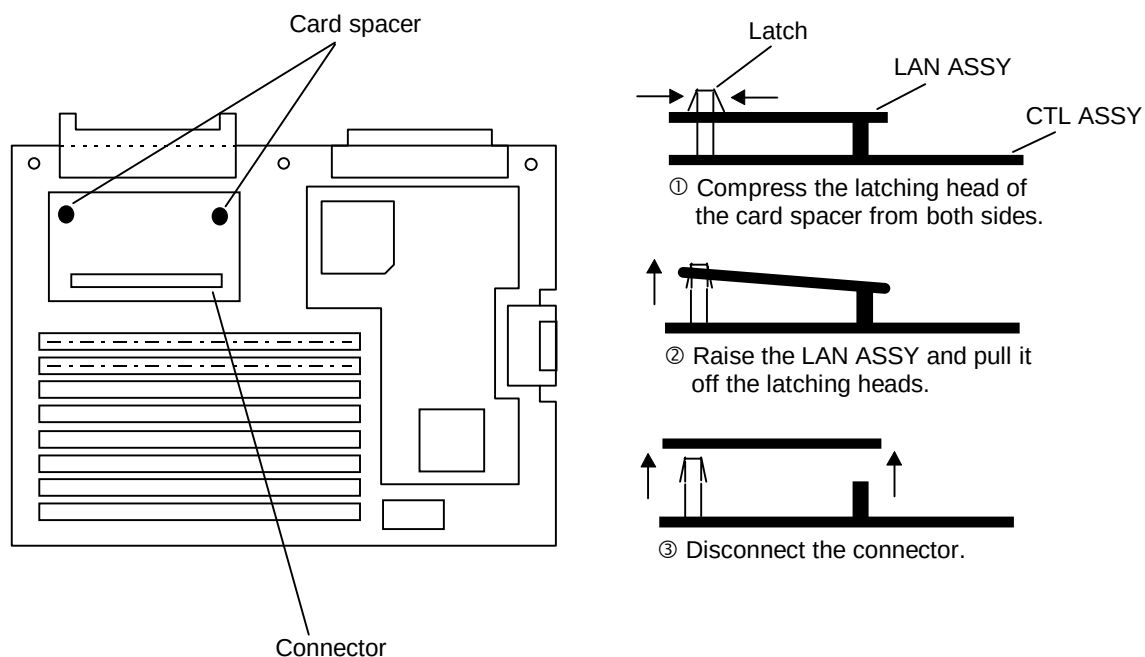


Figure 14.1 Replacing LAN ASSY (1)

- ④ Mount a LAN ASSY for replacement by aligning its mounting holes with the card spacers and pressing the LAN ASSY against the spacers until it is latched with clicks.
- ⑤ Reinstall the CTL ASSY.
- ⑥ Close side covers 1 and 2. (See MK-REP0160.)
- ⑦ Turn on the power. (See MK-REP0050.)

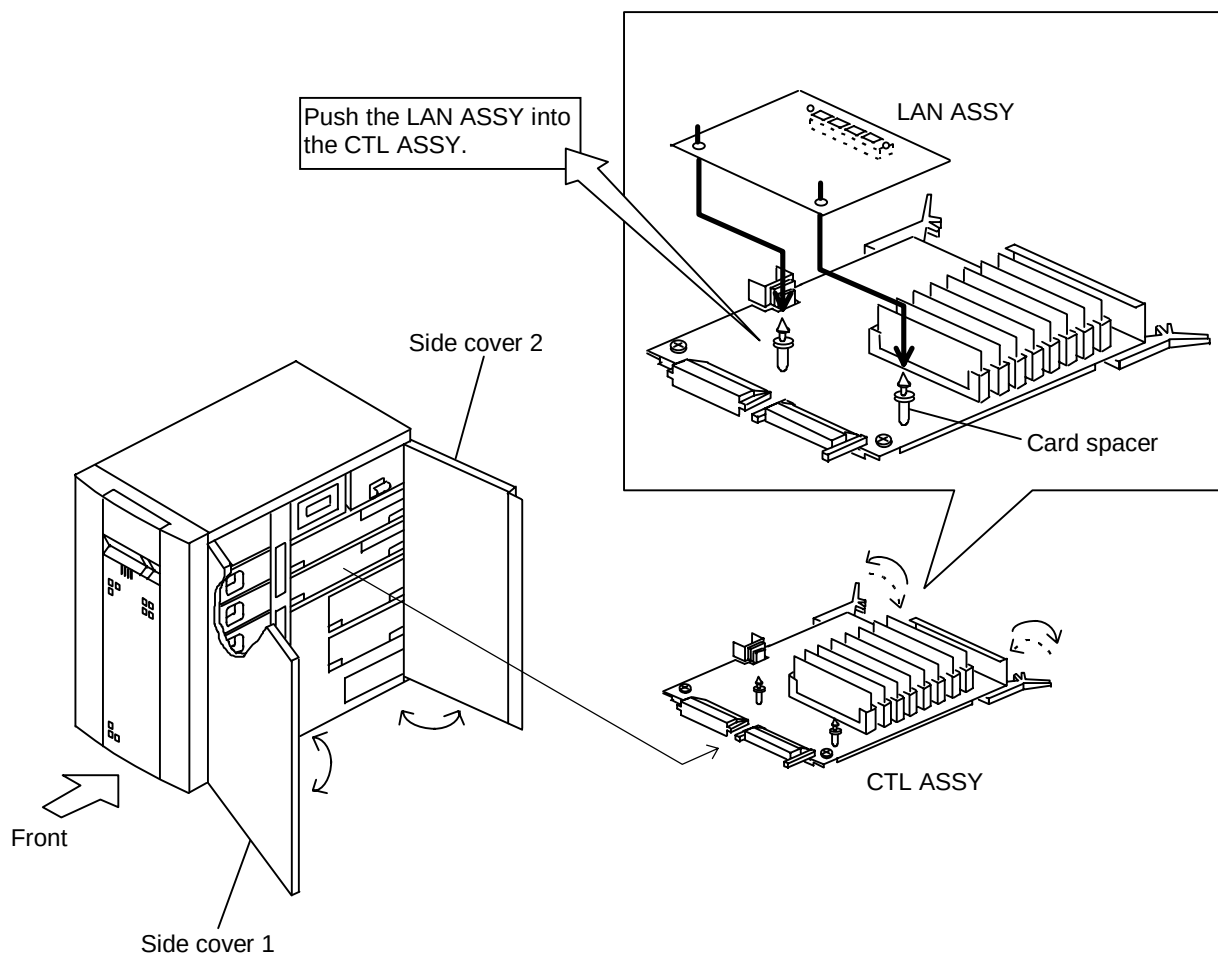


Figure 14.2 Replacing LAN ASSY (2)

When optional redundant CTL installed

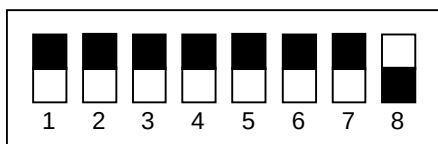
When the subsystem are dual controller system, LAN ASSY can be replaced while the power on.

Notice : When replacing LAN ASSY, perform the replacement for each CTL ASSY one after another.

When replacing both LAN ASSY at a time, turn off the power like the case of single configuration.

(1) Procedure

- ① Open side cover 1 side cover 2. (See MK-REP0160.)
- ② Disconnect the cable (RS232C).
- ③ Set No.8 DIP switch of the corresponding CTL ASSY.



- ④ Push the reset switch of the corresponding CTL ASSY.
- ⑤ Wait ten seconds, check to see that the FAIL LED on the CTL ASSY comes on and it enters the blocked state. (See Figure 14.3.)
- ⑥ Open the right and left levers to the direction of arrows (→) at the same time then remove the CTL ASSY.
- ⑦ Remove the LAN ASSY by pulling it upward. Then mount a new LAN ASSY by aligning its mounting holes with the card spacers and pressing the LAN ASSY against the spacers until it is latched with clicks.
- ⑧ Set No.8 of DIP switch to as shown.



- ⑨ Reinstall the CTL ASSY.
- ⑩ Close the side covers 1 and 2. (See MK-REP0160.)

When an optional redundant CTL (for dual configuration) has been installed, the replacement can be performed with machine power off. In this case follow the same procedure as that for single configuration.

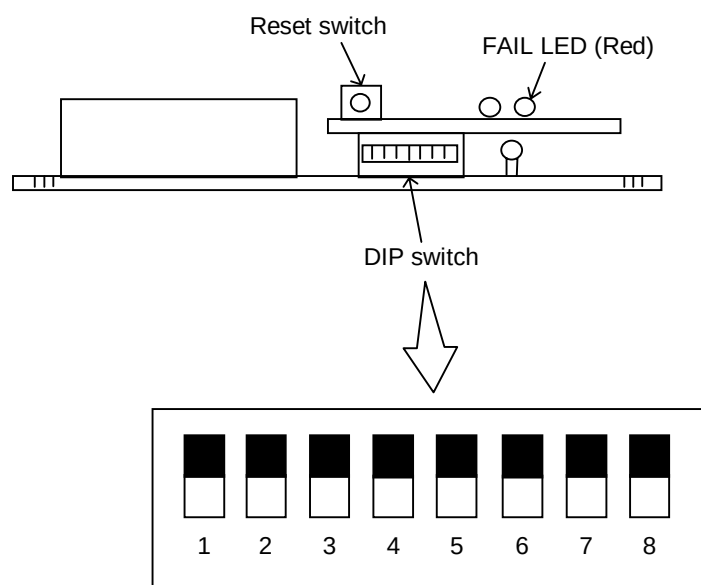


Figure 14.3 Replacing LAN ASSY (3)

DF350F Disk Subsystem

8. INSTALLATION

(Mini Tower Type)

Rev.2

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1. Appearance and Maintenance Area

1.1 Appearance

Figure 1.1.1 shows appearance of the DF350F disk subsystems. (Mini Tower type)

Figure (a) shows an example placed on a desk top. Figure (b) shows an example placed on the floor. Stand is an optional feature.

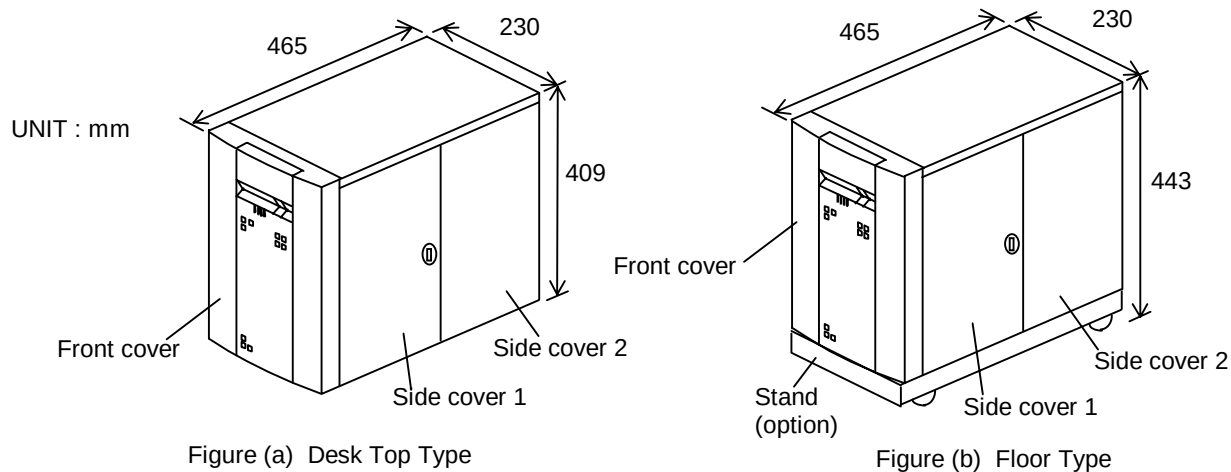


Figure 1.1.1 Appearance

1.2 Maintenance Area

Figure 1.2.1 shows maintenance area for the DF350F disk subsystems. (Mini Tower type)

Figure (a) shows the space required for maintenance of desk top model. Figure (b) shows the space required for maintenance of on the floor model.

UNIT : mm

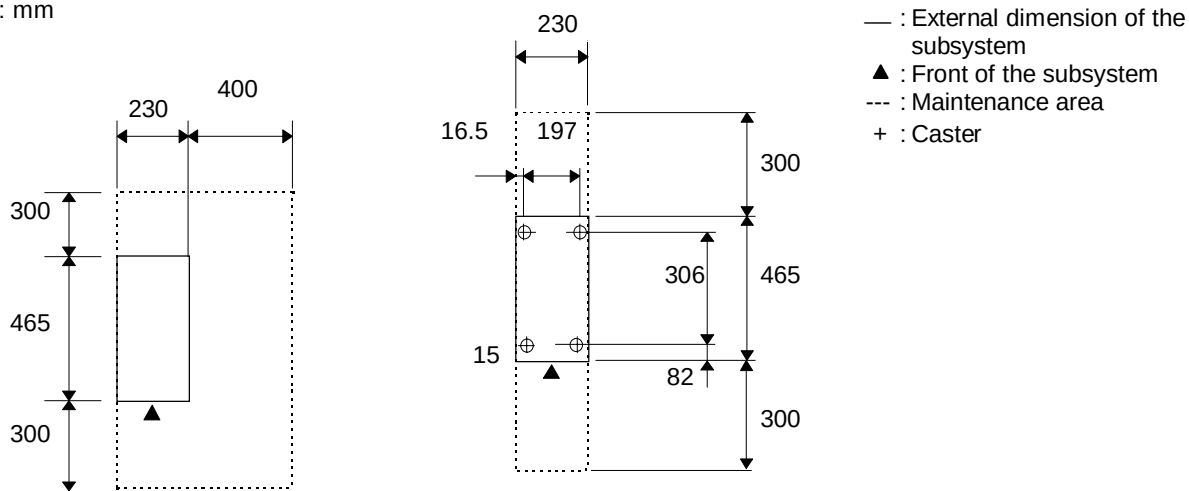


Figure (a) Desk Top Type

Figure (b) Floor Type

Figure 1.2.1 Maintenance Area

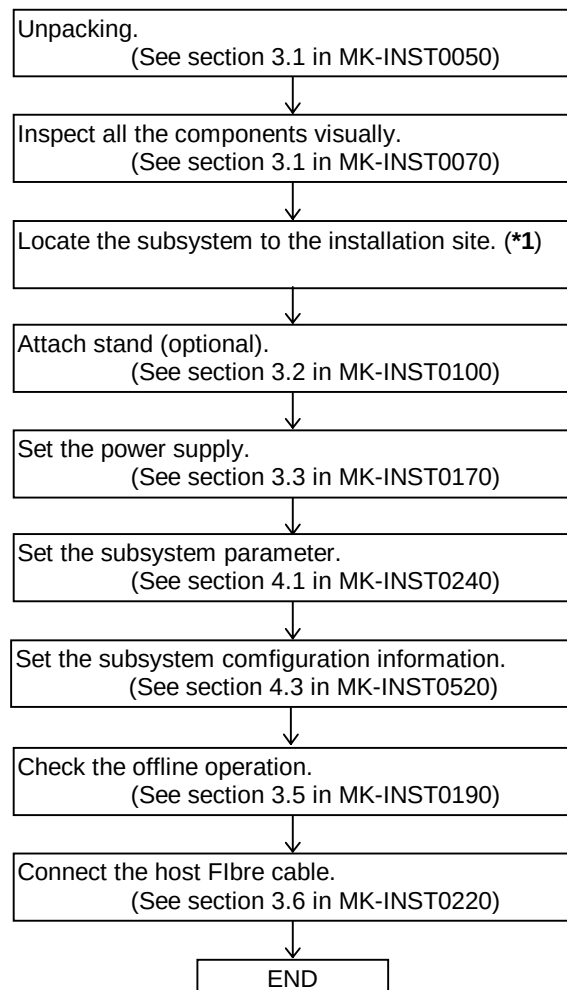
2. Installation

- (1) Tool needed for installation

Phillips screwdriver (No.2).

- (2) How to install

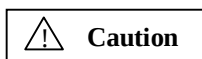
The following flow chart describes how to install the subsystem.



***1 : Place the subsystem with 30cm or more apart from the wall for both the front and the rear because of the ventilation.**

3. Installation Procedure

3.1 Inspecting all the Components



The unpacking and installation should be carried out by 2 or more personnel to prevent turning over of the device or being caught under the device.

3.1.1 Unpacking

- (1) Figure 3.1.1 shows how the subsystem has been packed.
- (2) Figures 3.1.2 to 3.1.4 show the subsystem without external packaging.
- (3) Unpacking
 - ① Loosen the polyester bands.
 - ② Pull out the Tri-wall nails.
 - ③ Remove the external packaging and packing materials.
 - ④ Take the subsystem out of the polyethylene bag.
 - ⑤ Keep two keys in the attached box carefully.
(These keys are used for opening/closing side covers 1 and 2.)
 - ⑥ Remove the cushioning materials, tape, desiccators, etc attached to the subsystem.

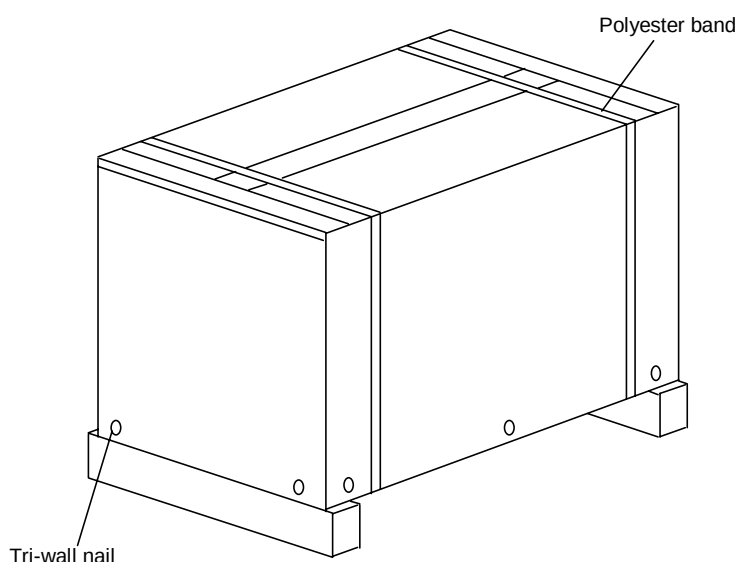


Figure 3.1.1 Subsystem being Packed

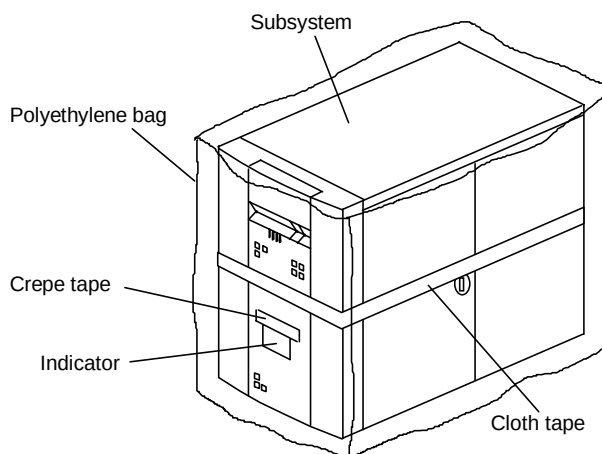


Figure 3.1.2 Subsystem without External Packaging

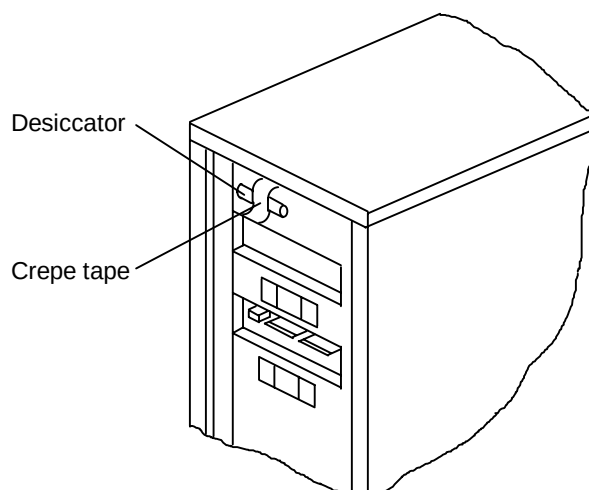


Figure 3.1.3 Location of Desiccantor

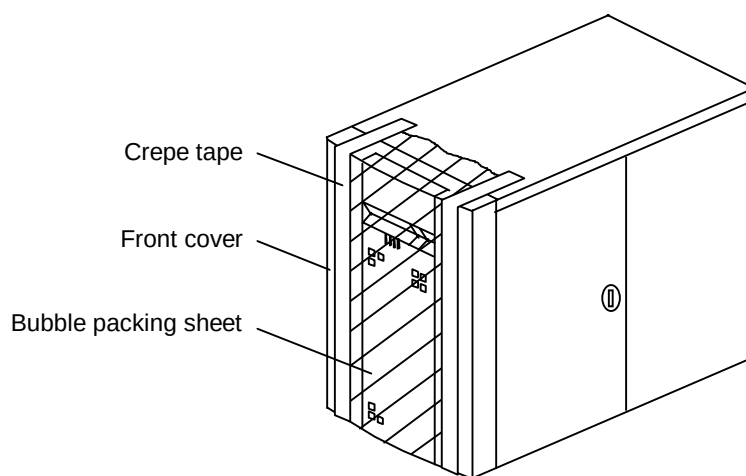


Figure 3.1.4 Front Cover Protection

3.1.2 Inspecting all the components visually

Check the following components before installation according to a customer's configuration.

Table 3.1.1 Mandatory Features

Model Name	Specification	Quantity	Comment
DF350F-MK	Mini Tower (MK)	1	
DF-F350-E2E2 -E2E4 -E3E4 -E2E8 -E1E8 -E1E18	1"H disk drive (516B Format, 2.0GB × 5) (516B Format, 4.1GB × 5) (516B Format, 4.1GB × 5) (516B Format, 8.7GB × 5) Half height disk drive (516B Format, 8.7GB × 5) (516B Format, 17.8GB × 5)	1 (RAID5 :4D+1P)	HDU ASSY
DF-F350-A2E2 -A2E4 -A3E4 -A2E8 -A1E8 -A1E18	1"H disk drive (516B Format, 2.0GB × 1) (516B Format, 4.1GB × 1) (516B Format, 4.1GB × 1) (516B Format, 8.7GB × 1) Half height disk drive (516B Format, 8.7GB × 1) (516B Format, 17.8GB × 1)	1	HDU ASSY
DF-F350F-B3M	Power supply	1	AC/DC power supply
DF-F350-C8E -C32E -C128E	Cache memory (8MB) (32MB) (128MB)	2	CACHE ASSY
DF-F350F-DMON	Fibre Channel Optical (Non OFC) I/F, 100-M5-SN-I, SC connector.	1	I/F ADAPTER ASSY

Table 3.1.2 Optional Features

Model Name	Specification	Quantity	Comment
DF-F350-E2E2 -E2E4 -E3E4 -E2E8 -E1E8 -E1E18	1"H disk drive (516B Format, 2.0GB × 5) (516B Format, 4.1GB × 5) (516B Format, 4.1GB × 5) (516B Format, 8.7GB × 5) Half height disk drive (516B Format, 8.7GB × 5) (516B Format, 17.8GB × 5)	0 - 3	
DF-F350-A2E2 -A2E4 -A3E4 -A2E8 -A1E8 -A1E18	1"H disk drive (516B Format, 2.0GB × 1) (516B Format, 4.1GB × 1) (516B Format, 4.1GB × 1) (516B Format, 8.7GB × 1) Half height disk drive (516B Format, 8.7GB × 1) (516B Format, 17.8GB × 1)	0 - 6	HDU ASSY
DF-F350-C8E -C32E -C128E	Cache memory (8MB) (32MB) (128MB)	0, 2, 4, 6 or 8	CACHE ASSY
DF-F350F-B3M	Spare power supply	0 - 2	AC/DC power supply
DF-F350-G1M1 DF-F350F-G3M1	LAN board LAN board (SNMP)	0 - 2	LAN ASSY
DF-F350F-F3MCF	Controller for dual composition	0 or 1	CTL ASSY
DF-F350F-DMON	Fibre channel Optical (Non OFC) I/F	0 or 1	I/F ADAPTER ASSY

Table 3.1.3 Accessories

Model Name	Specification	Quantity	Comment
DF-F350-J1 -J2 -J3	Power supply cable (Connector attached to two poles with earth) (Inlet type connector, EN60320 STANDARD SHEET C14)	0 or 1	
DF-F350-K050L -K150L -K068S -K268S -K168S -K350L	Interface cable (50PL, 1.5m) (50PL, 3m) (68PS, 1.5m) (68PS, 3m) (68PS, 5m) (50PL, 5m)	0 -	
DF-F350-S1	RS232C cable	0 -	

3.1.3 Inspecting the subsystem components and addendum

This subsection describes how to install the basic components into the subsystem.

Figures 3.1.5 and 3.1.6 show mechanical configuration and parts location of this subsystem.

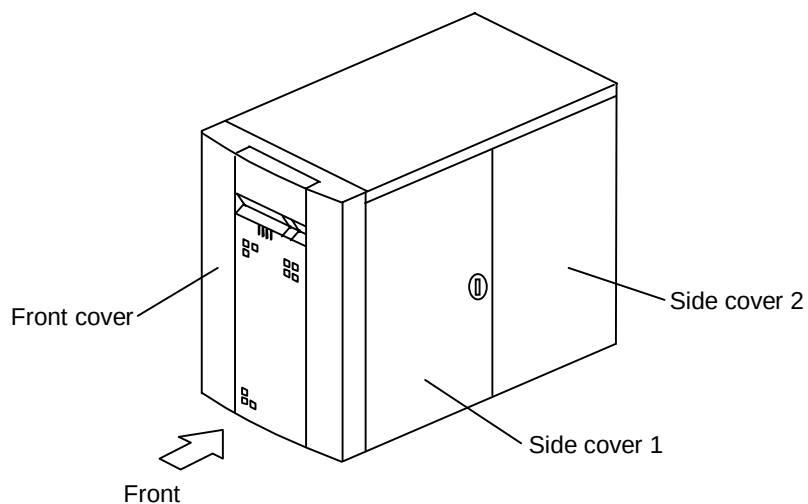


Figure 3.1.5 Appearance of Disk Subsystem (Mini tower type)

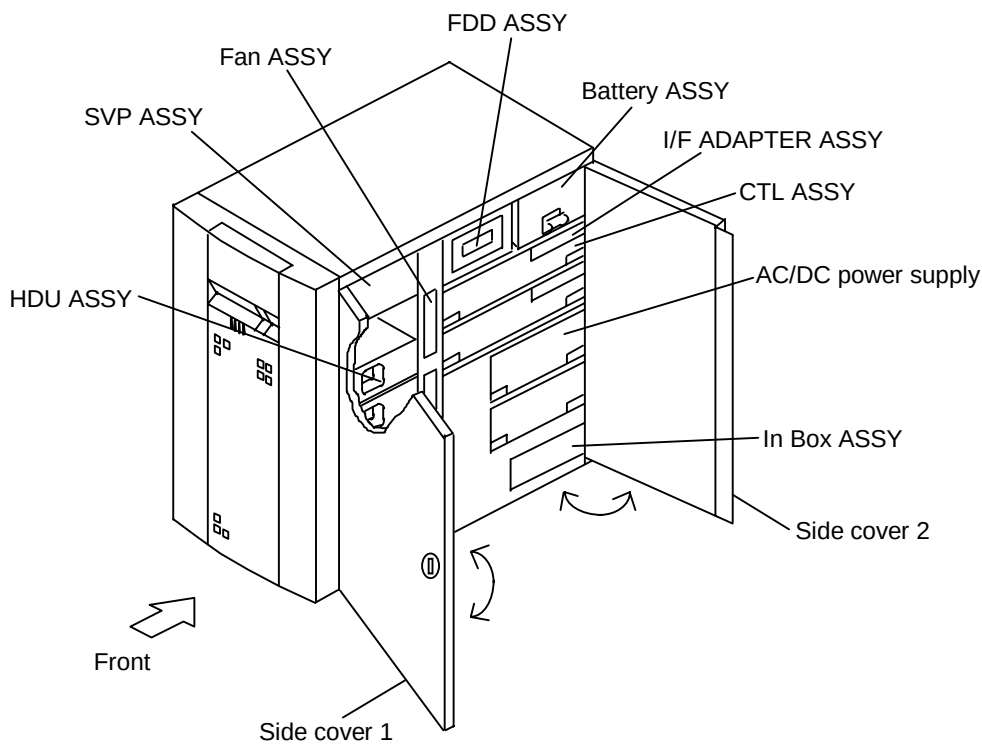


Figure 3.1.6 Parts Location

3.2 Install the Subsystem

3.2.1 Attaching stands (Optional)

(1) Attaching stands

This subsection describes how to attach the stand (optional) to the DF350F disk subsystem, the floor type.

① Tool needed for installation

Hexagon screw key (Nominal 3). (Attached on the back surface of the stand.)

② Mounting screws

Five M4 × 8 hex socket bolts. (Attached on the back surface of the stand.)

③ Attaching the stand

(a) Place the subsystem with its side or rear surface facing down on the rest.

(b) Remove the four screws and take out the four Foot. (See Figure 3.2.1.)

(c) Tighten the four screws. (See Figure 3.2.2.)

(d) Remove the subsystem from the rest and put it on the floor.

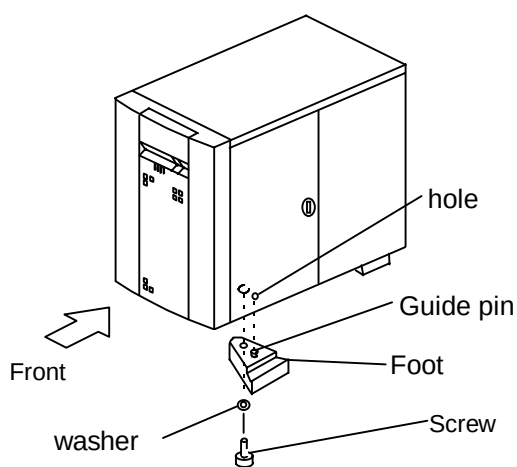


Figure 3.2.1 Remove the Foot

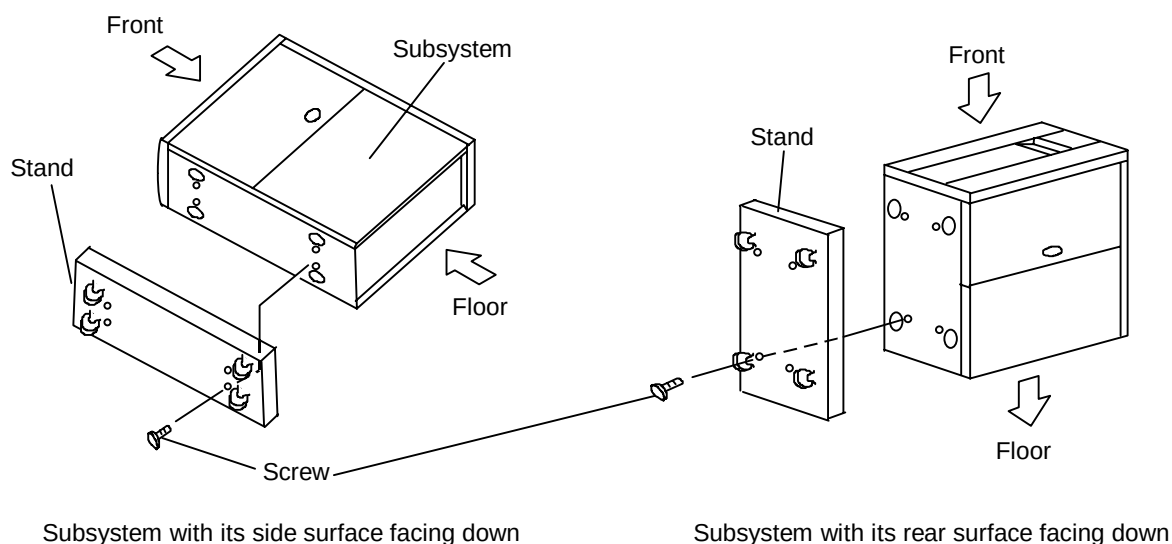
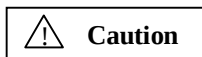


Figure 3.2.2 Attaching the Stand

3.2.2 Install the subsystem

Place the subsystem so that the front and rear is 30cm or more apart from the wall in order not to block the ventilation.



Do not block the ventilation. With the temperature rise, it may cause failure or fire.

(1) Opening/Closing the front cover (See Figure 3.2.3.)

- ① Pull the right side of the front cover toward you to open it.
- ② Push it back slowly to close it.

Notice : Open/Close the front cover gently to avoid subjecting the subsystem to any impact since it has precision components.

(2) Opening/Closing the side covers (See Figure 3.2.3.)

- ① Insert the key attached to the subsystem into the keyhole and turn it to the direction of an arrow (clockwise). Carefully open side cover 1 first, then open side cover 2.
- ② Carefully close side cover 2 first, and then close side cover 1. Finally, turn the key to the direction of an arrow (counterclockwise).

Notice : Open/Close the side covers gently to avoid subjecting the subsystem to any impact since it has precision components.

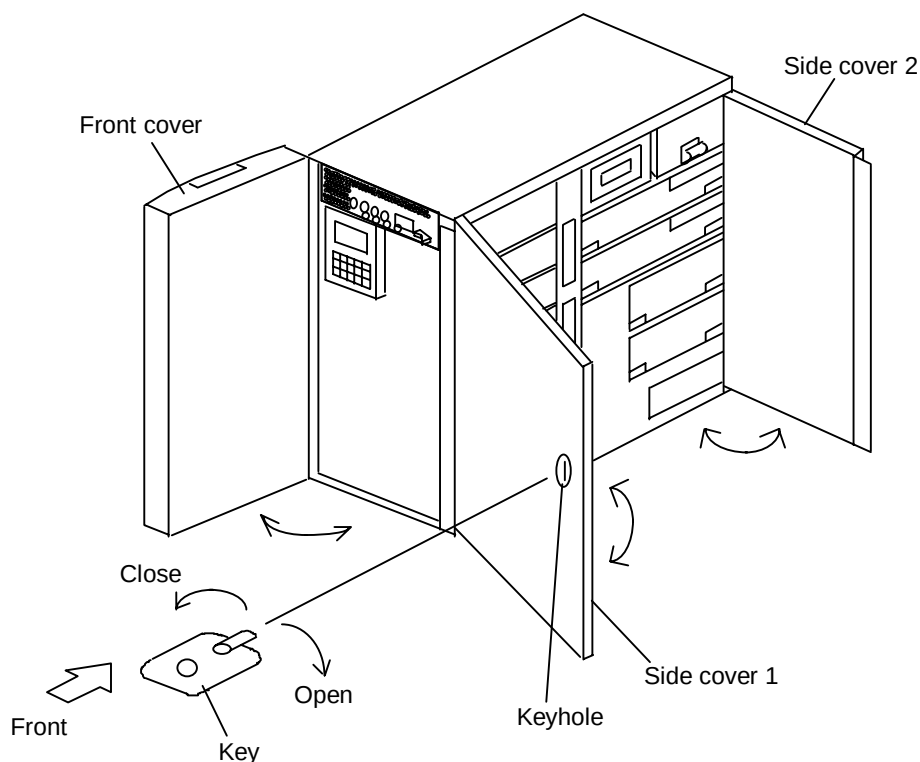


Figure 3.2.3 Opening/Closing Front and Side Covers

(3) Installing HDU ASSY (See Figure 3.2.4.)

- ① Open the handle in the direction of an arrow (···→) completely and insert the HDU ASSY into the right place.
- ② Close the handle in the direction of an arrow (—→).

**Caution**

Do not subject the HDU ASSY to any impact or vibration since it is a precision component.

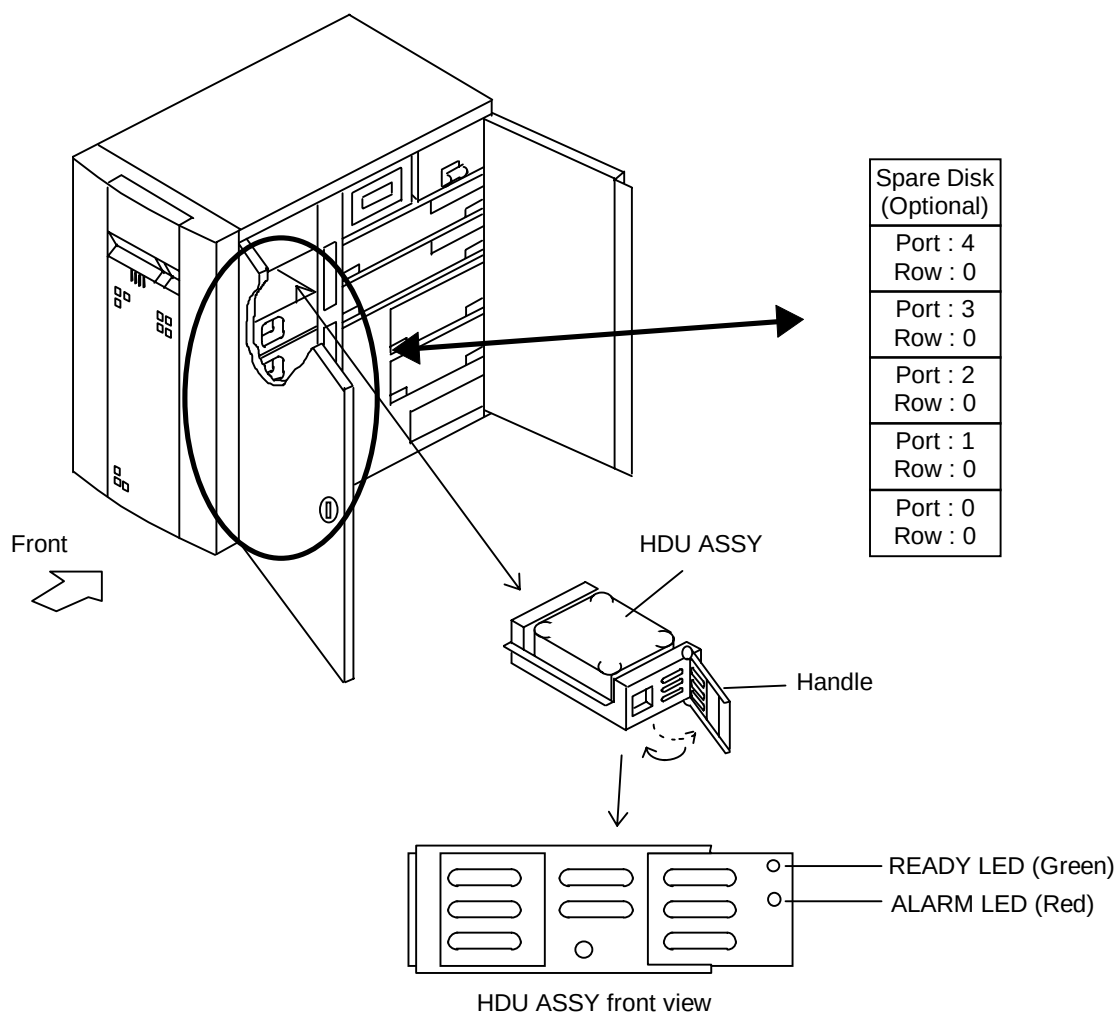
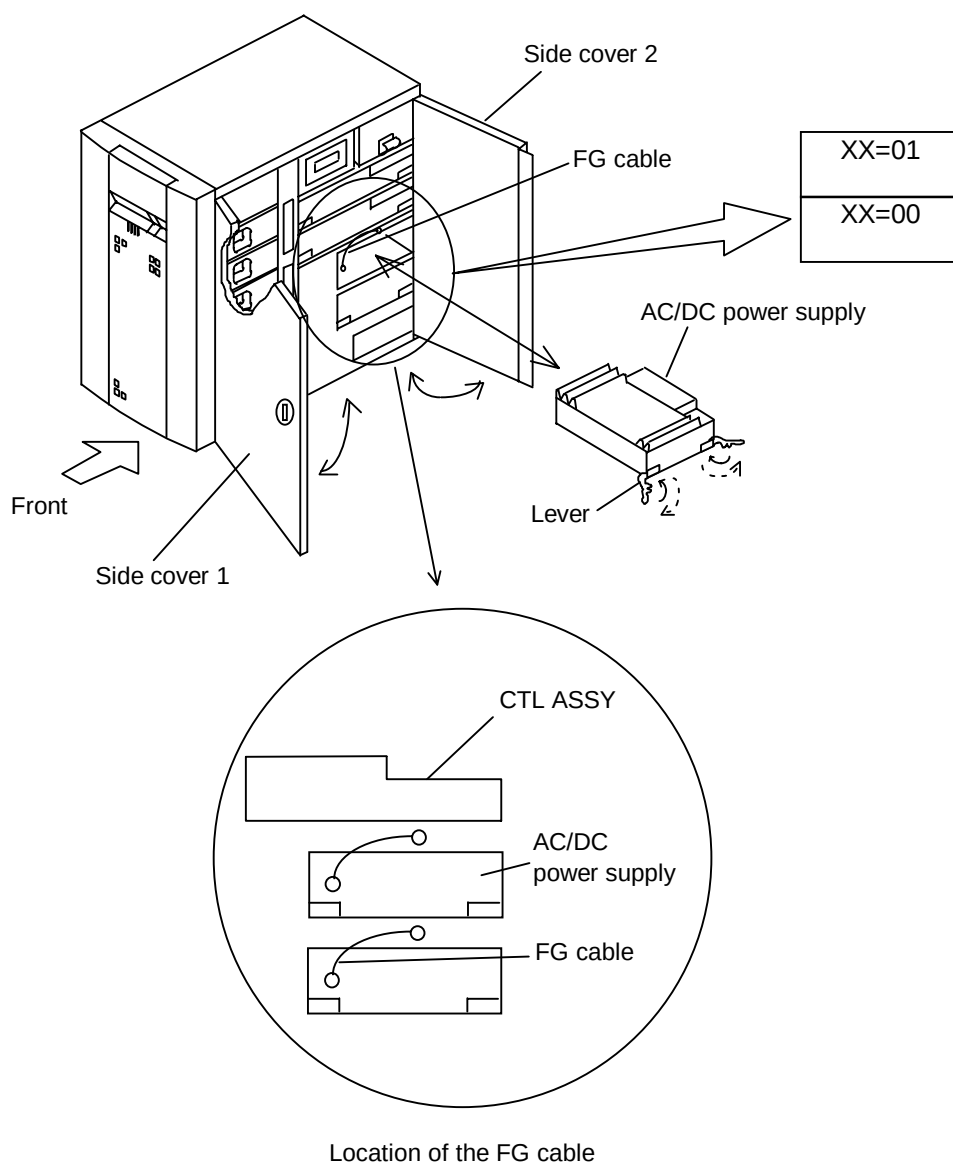


Figure 3.2.4 Installing HDU ASSY

(4) Setting AC/DC power supply (See Figure 3.2.5.)

- ① Insert the AC/DC power supply into the right place with its right and left levers being opened, then close the both levers to the direction of arrows (→) at the same time.
- ② Connect the FG cable with the AC/DC power supply.

**Figure 3.2.5 Setting AC/DC Power Supply**

(5) Setting I/F ADAPTER ASSY (See Figure 3.2.6.)

- ① Insert the I/F ADAPTER ASSY into the right place and tighten the bind screw.

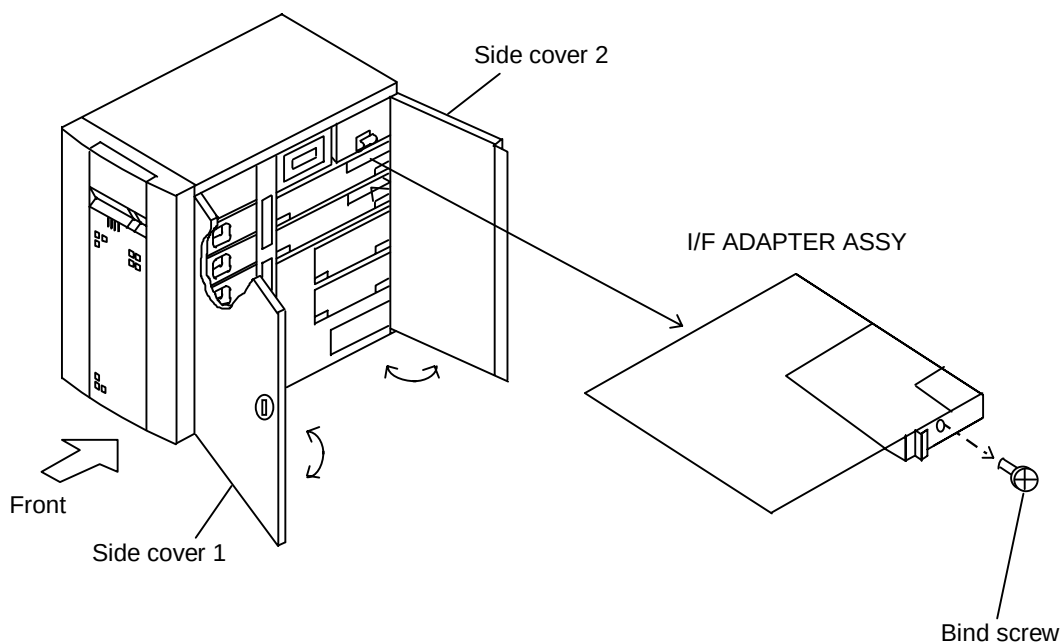


Figure 3.2.6 Setting I/F ADAPTER ASSY

(6) Installing CACHE ASSY (See Figure 3.2.7.)

Note 1 : Be sure to install the cache assemblies having the same capacity in slots #0 and #4, slots #1 and #5, slots #2 and #6, or slots #3 and #7.

Note 2 : Be sure to install the cache assembly having the maximum capacity in slot #0 and #4.

Note 3 : If the redundant CTL ASSY has been installed, install the cache assembly having the same capacity into the same slot.

- ① Open the side covers. (See MK-INST0110.)
- ② Pull out the CTL ASSY. Open the right and left levers to the direction of arrows (···➤) at the same time then remove the CTL ASSY. (See Figure 3.2.8.)
- ③ Install the CACHE ASSY. (See Figure 3.2.7.)
- ④ Insert the CTL ASSY into the former place. Insert the CTL ASSY into the right place with its right and left levers being opened, then close the both levers to the direction of arrows (➡) at the same times. (See Figure 3.2.8.)
- ⑤ Close the side covers. (See MK-INST0110.)

Installation example of CACHE ASSY

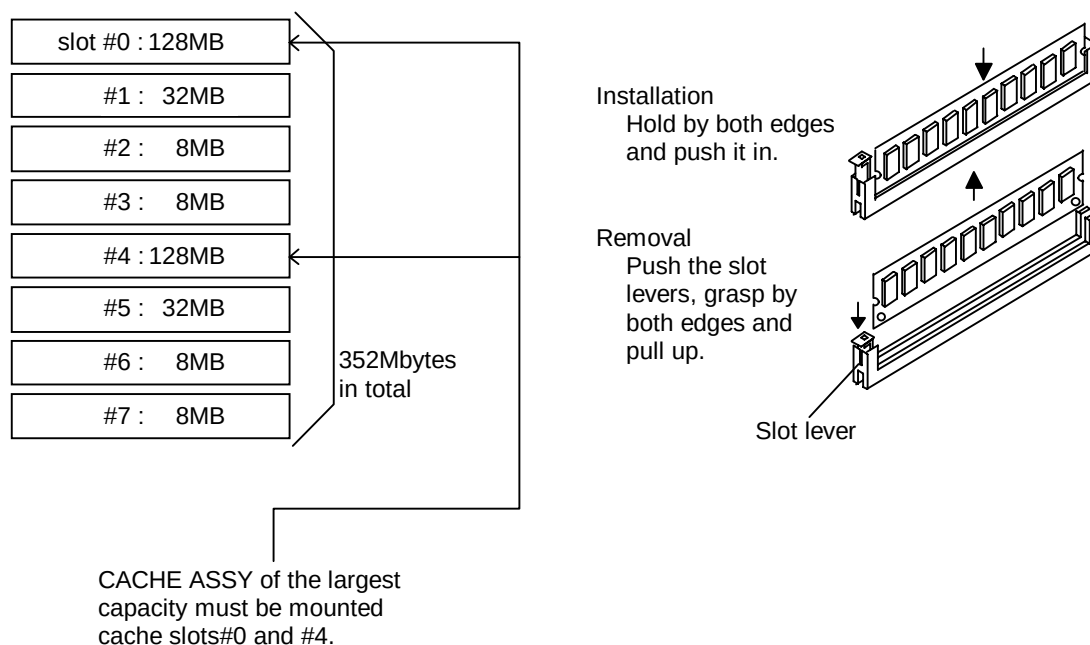
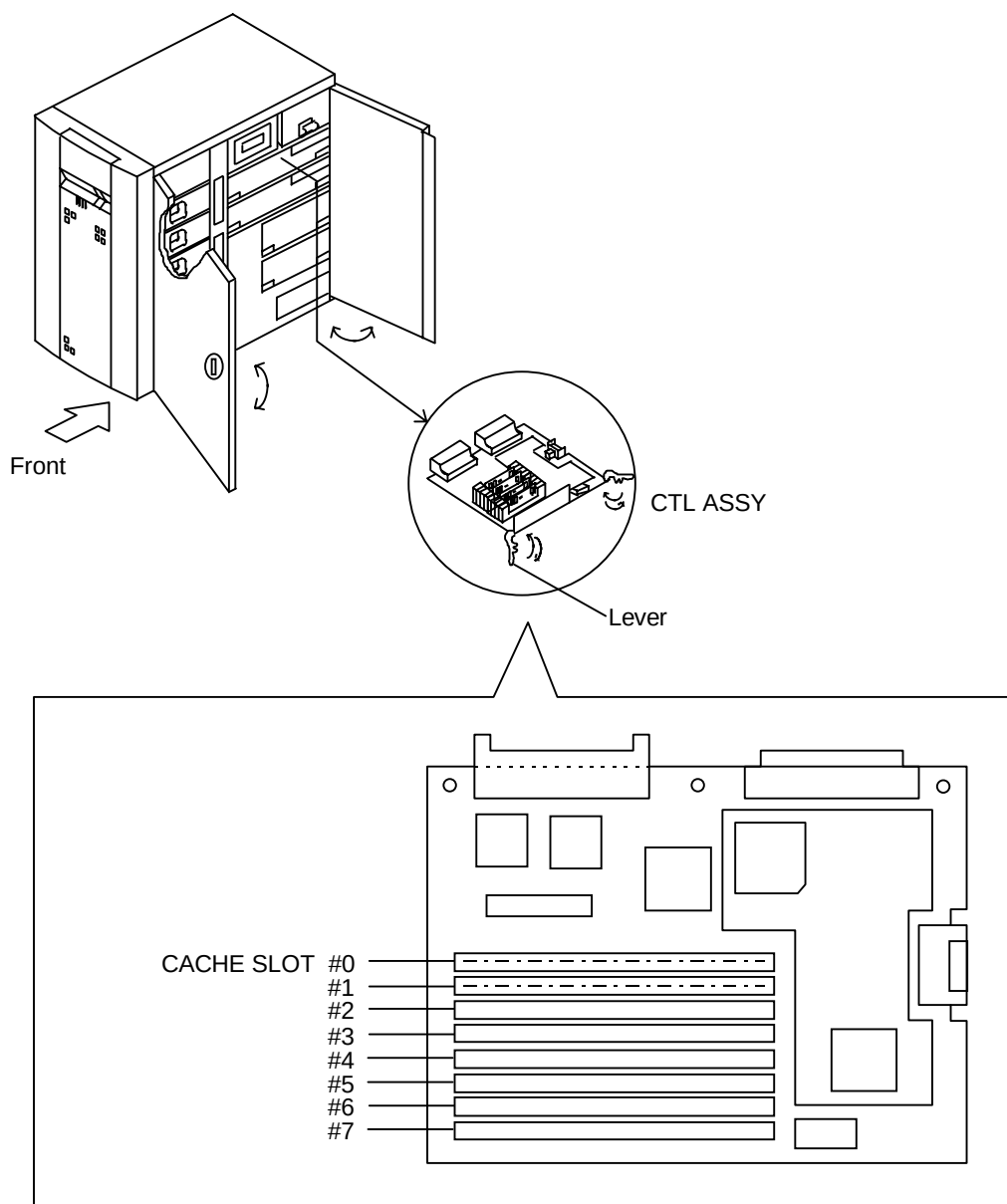


Figure 3.2.7 Installing CACHE ASSY

**Figure 3.2.8 Installing CACHE ASSY**

3.3 Setting the Power Supply

The power for the boards, drives, and fans of the DF350F disk subsystem is supplied by the In Box ASSY and AC/DC power supply converting AC to the DC power.

Turn the power on according to procedures (1) to (6) described below.



Caution

Make sure that AC cable is not damaged. It may cause electric shock or fire.

- (1) Make sure that the circuit breaker (a switch on the rear panel) is "O" (OFF), then connect the AC cable.
(See Figure 3.3.1.)
- (2) Supply AC power.
- (3) Open the side cover and make sure that the battery power switch is turned to "ON". Then turn on the circuit breaker.
- (4) Make sure that all of DIP switches are set to "OFF". (upper positions) Note that no need to remove CTL ASSY.
- (5) Close the side cover and set the circuit breaker to "I" (ON). Then turn the power switch "ON".
- (6) Make sure that the subsystem becomes ready a few minutes later.

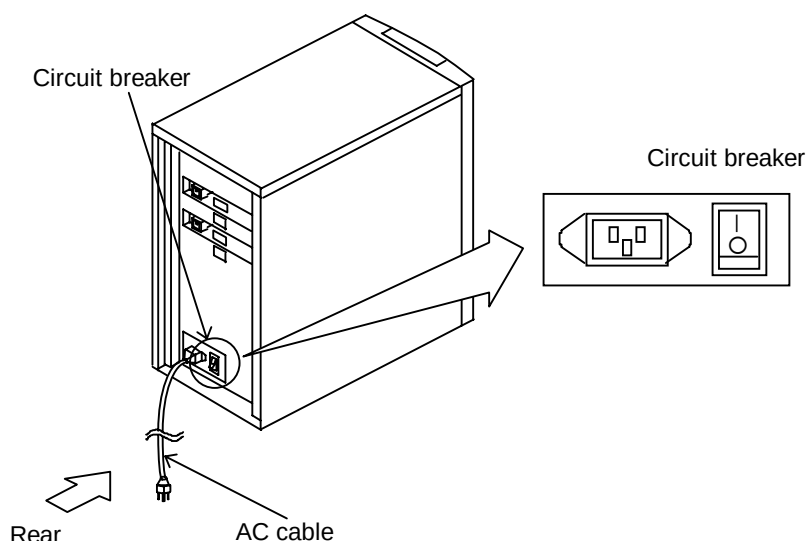


Figure 3.3.1 AC Cable Connection

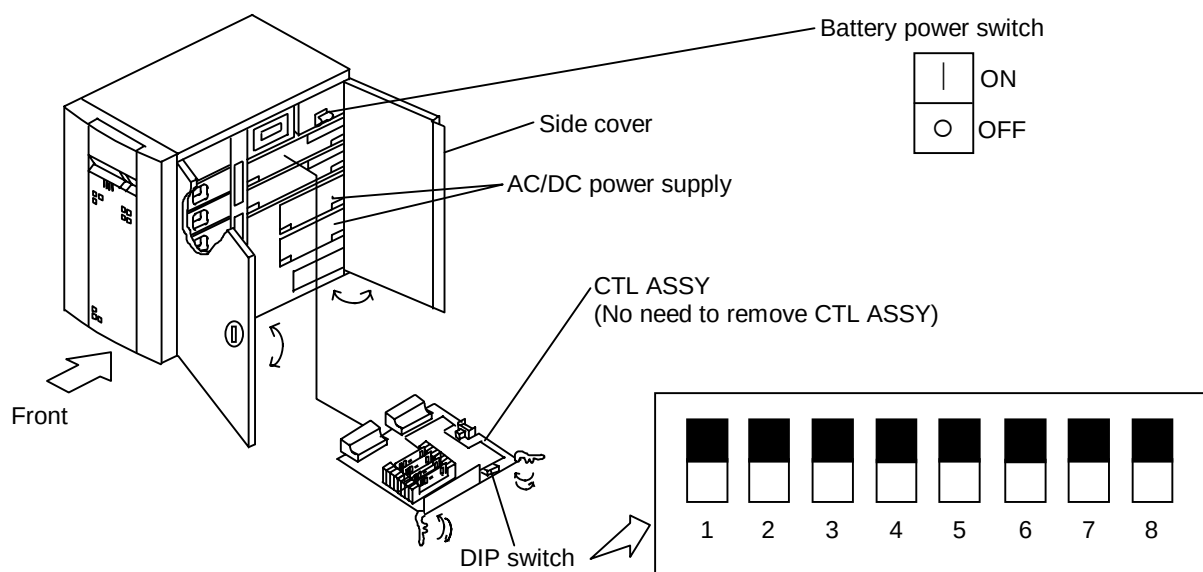


Figure 3.3.2 Inside Construction of the Subsystem

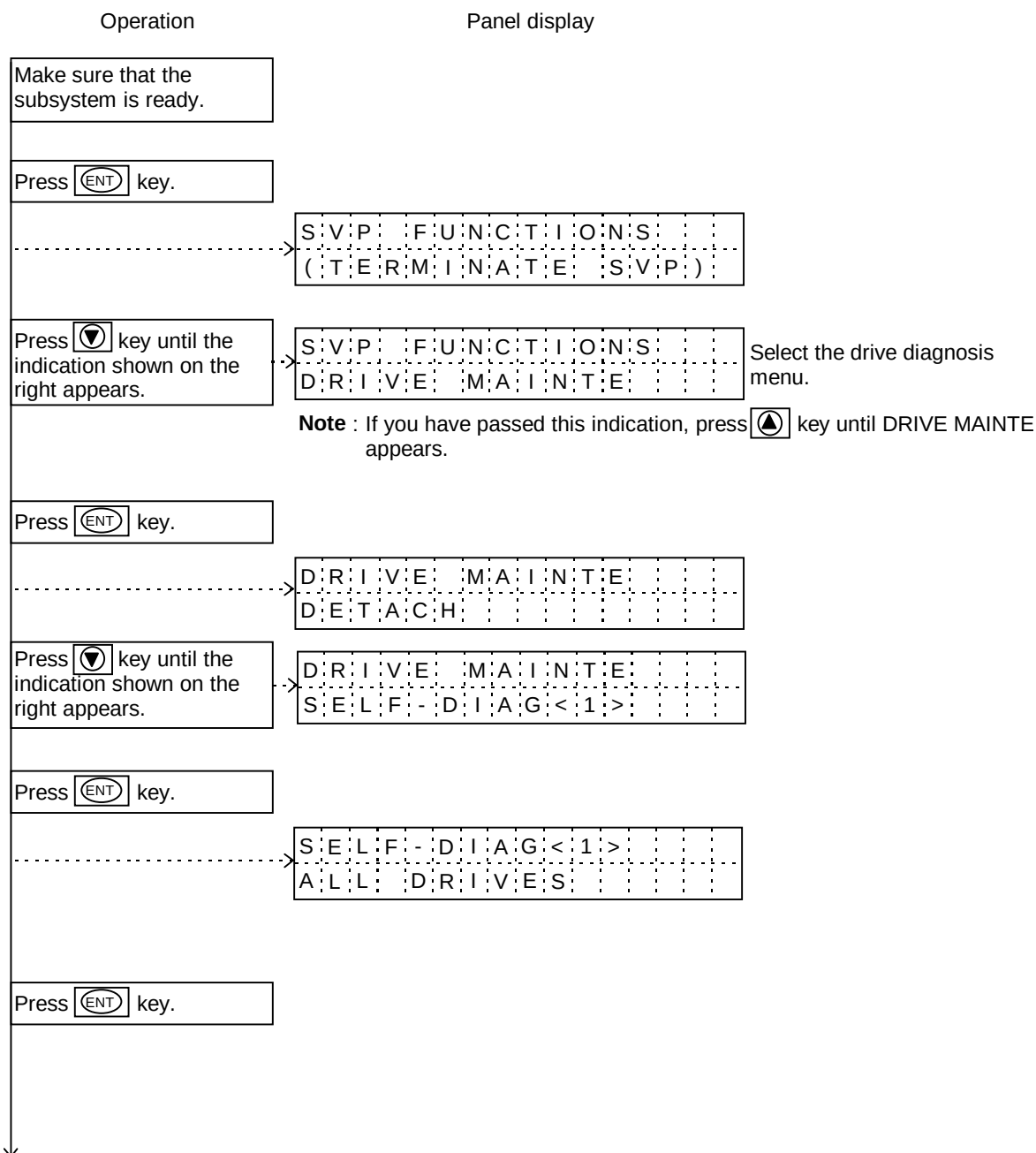
3.4 Setting the Subsystem Parameter

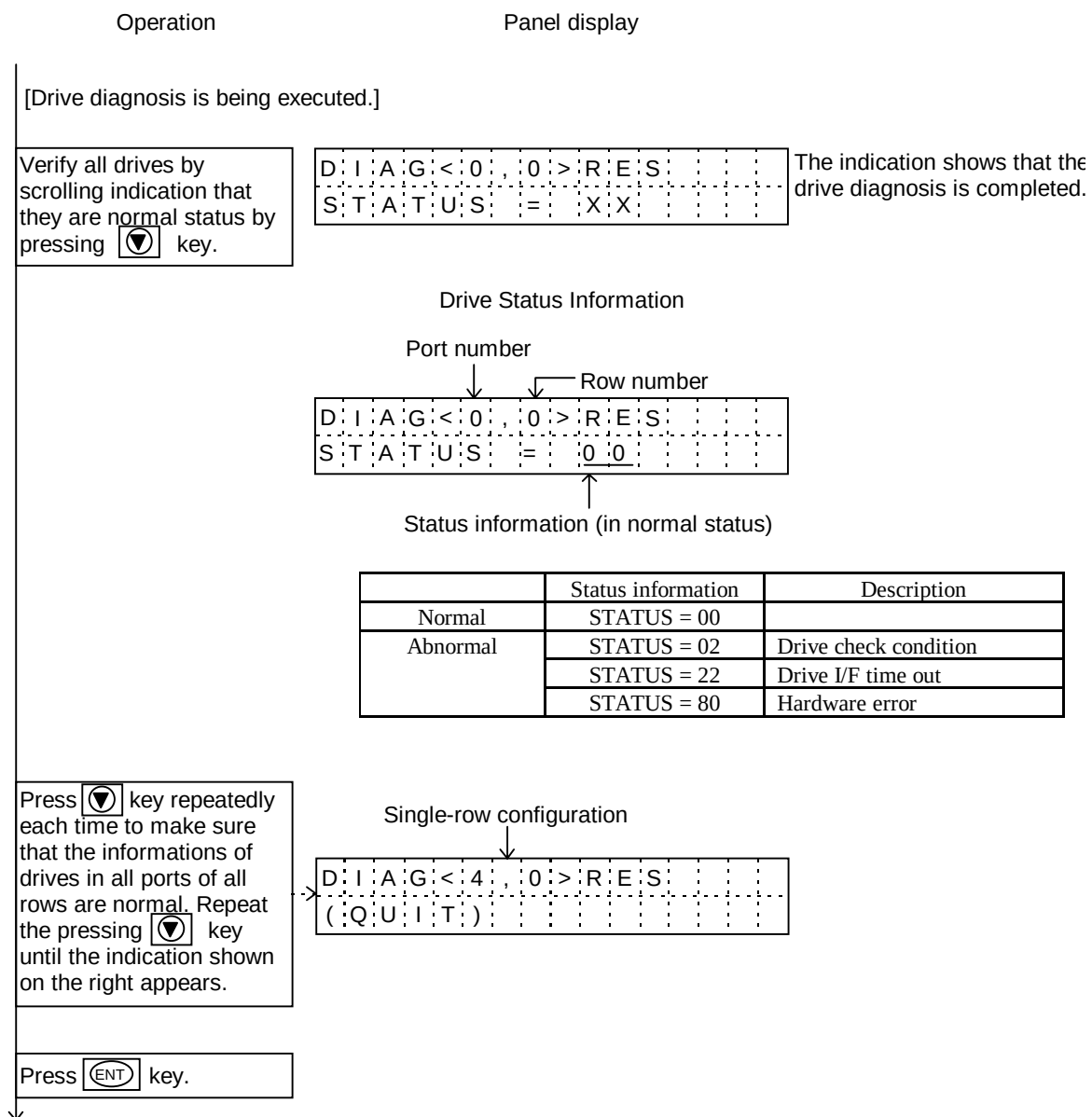
See Chapter “Setting the Subsystem Parameter” in MK-INST0240.

3.5 Checking the Offline Operation

After opening the front cover, execute the drive diagnosis using the Panel display and the ten key as instructed below, and make sure that the diagnosis is completed normally on each of all drives.

① Operate as described below.





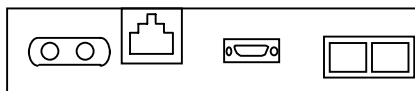
Operation	Panel display
Press  key until the indication shown on the right appears.	→ SELF-DIAG < 1 > (QUIT)
Press  key.	
Press  key until the indication shown on the right appears.	→ DRIVE MAINTEN (QUIT)
Press  key.	
Press  key until the indication shown on the right appears.	→ SVP FUNCTION (TERMINATE SVP)
Press  key.	
Turn off the power switch to make sure that power can be turned off normally.	
Offline operation is finished.	

3.6 Connecting the Fibre Cable

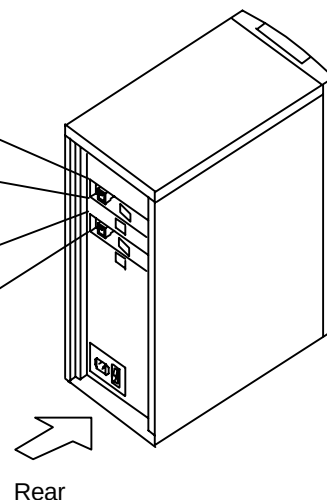
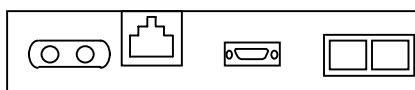
Connect the Fibre cables after confirming the controller number indicated on the label.

Note 1 : When the controller is used in a dual configuration, connect the cables to the connectors corresponding to the host to be connected. (See Figure 3.6.2.)

Controller 01



Controller 00



Rear

Figure 3.6.1 Fibre Connector Layout

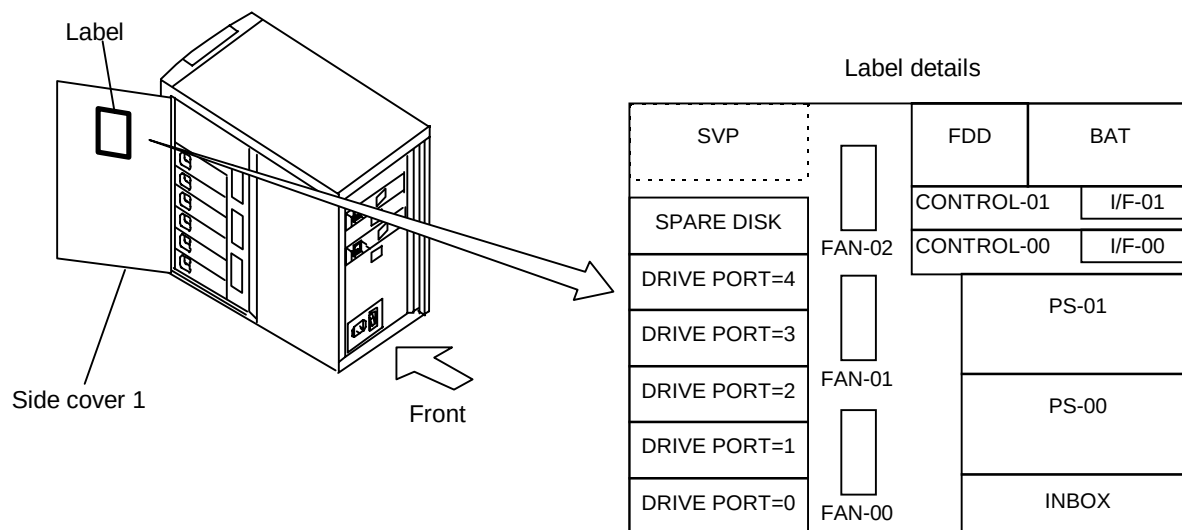
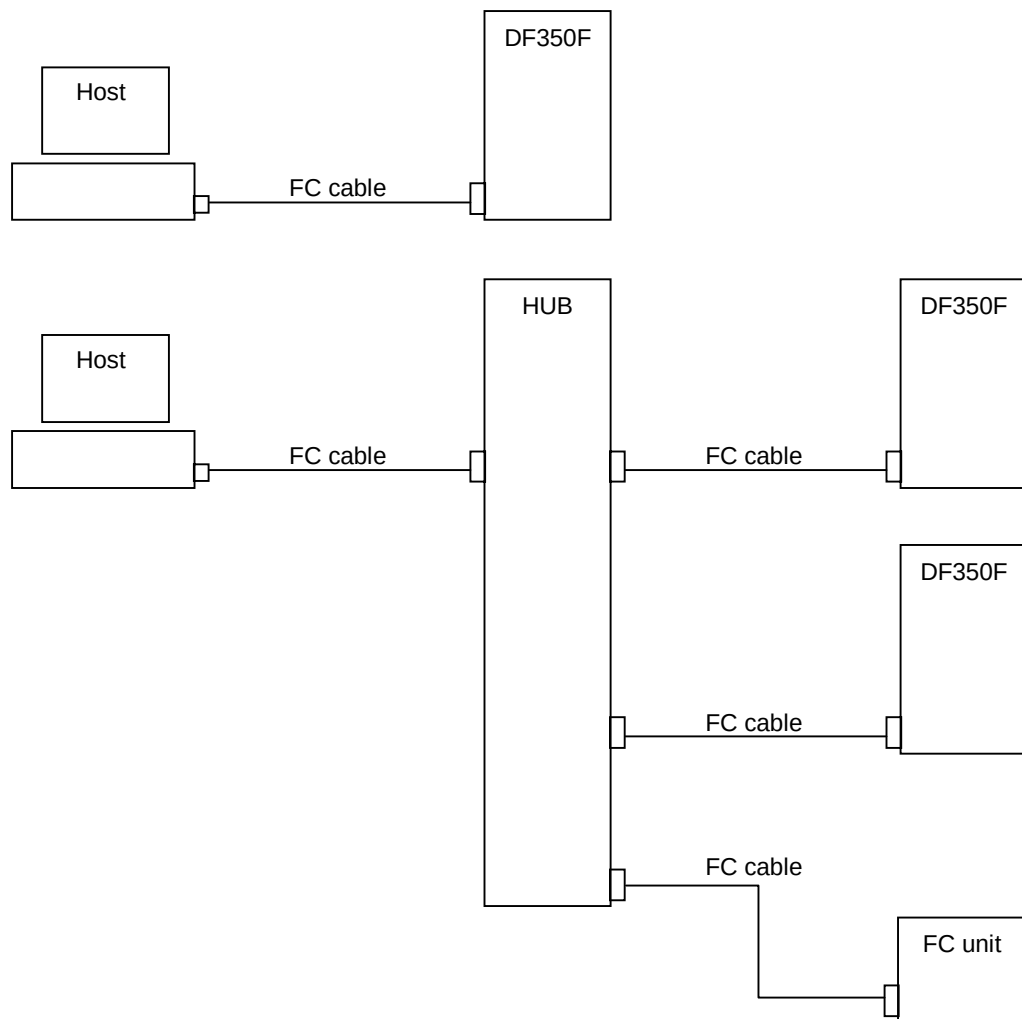


Figure 3.6.2 Label Layout

**Figure 3.7.3 Fibre Channel Connections**

4. Setting the Subsystem Parameter

4.1 Setting the System Parameter

(1) Setting the system parameters and downloading

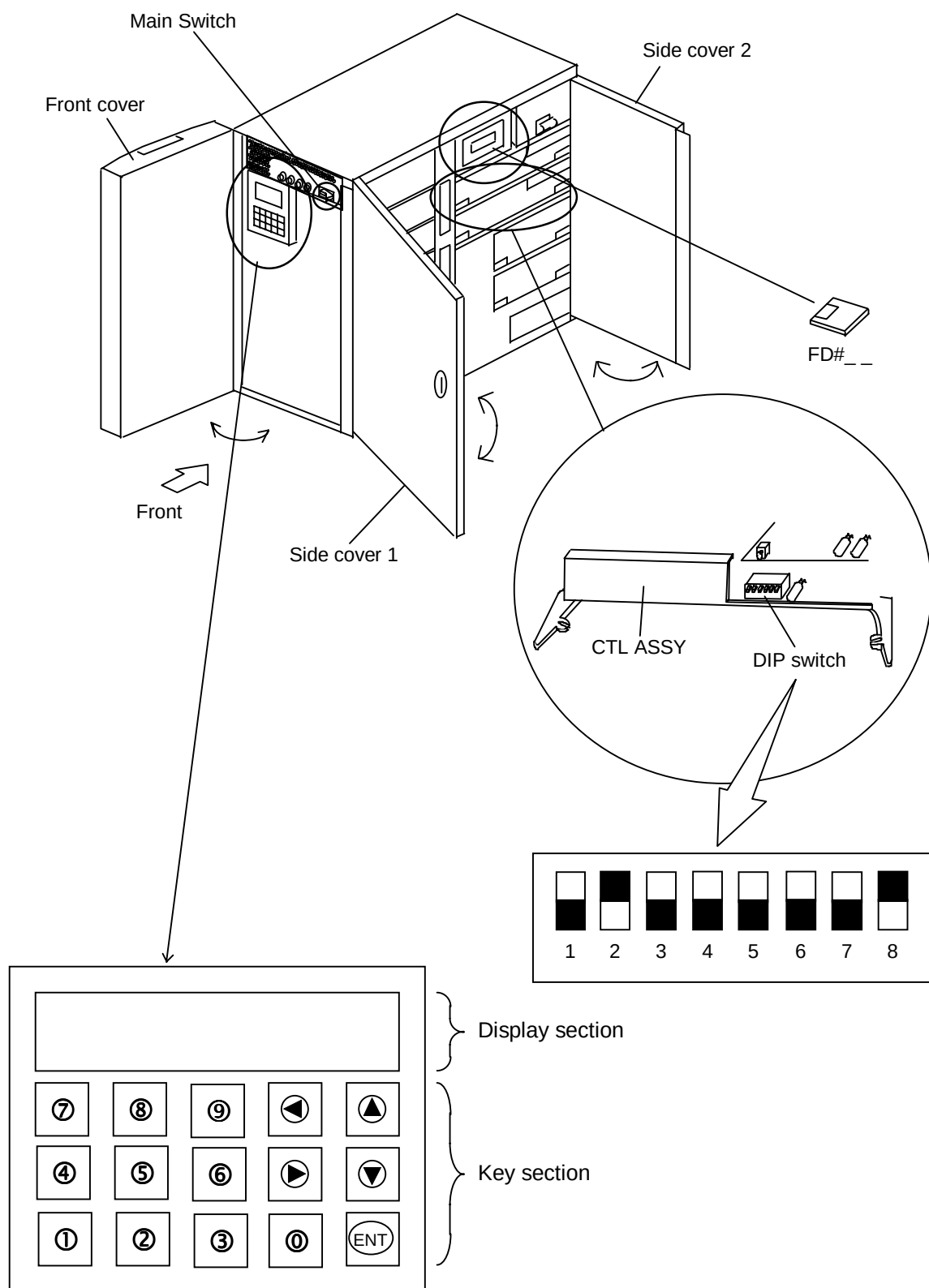
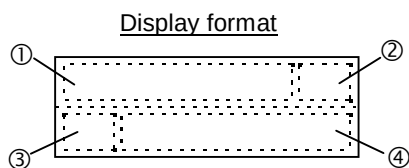


Figure 4.1.1 DIP Switches (System parameter is Set)

(1) Display

While setting up DIPSWITCH or SVP FUNCTION, menu etc. are displayed at panel display in the following display format .



① Menu title

There are two kinds of menu title described below.

DIPSWITCH SET:

For setting the target ID, buzzer, etc.

SVP FUNCTION:

For the operations other than described above.

② Warning

A hatch mark “#” indicates that a message has occurred in the host command processing during panel operation.

③ Current setting

An asterisk “*” indicates the item currently set.

④ Menu item/parameter value

This indicates the menu item or the parameter value entered from the panel.

One display is provided for the two controllers. You can determine which of the two controllers displayed the message as follows.

Message from the controller No. 0: The first (left most) character is in uppercase.

Message from the controller No. 1: The first (left most) character is in lowercase.

Example) Controller No. 0: DIPSWITCH SET

Controller No. 1: dIPSWITCH SET

For the dual controllers, the message with the display format 1 and the menu title with the display format 2 are displayed as indicated above. (For the panel operation messages, the first (left most) character is always in uppercase regardless of the controller No.)

For the single controller, the first (left most) character is always in uppercase.

(2) Keys

Use the - keys for panel operation.



Used for entering the parameter values.



Used for determining the menu or the input parameter.

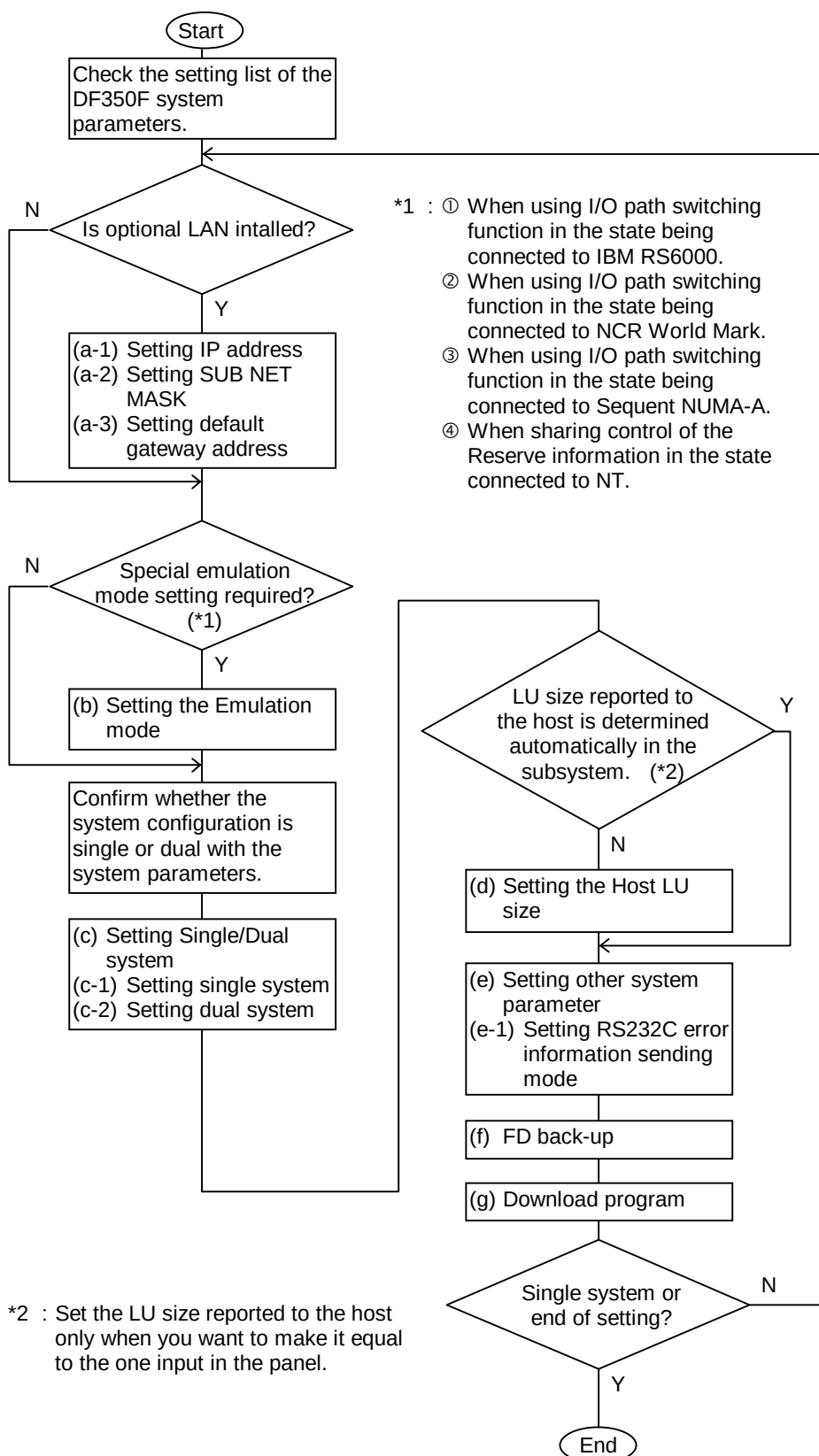


Used for determining the parameter input position.



Used for selecting the menu.

Operate as the flow described below.



Operate as described below.

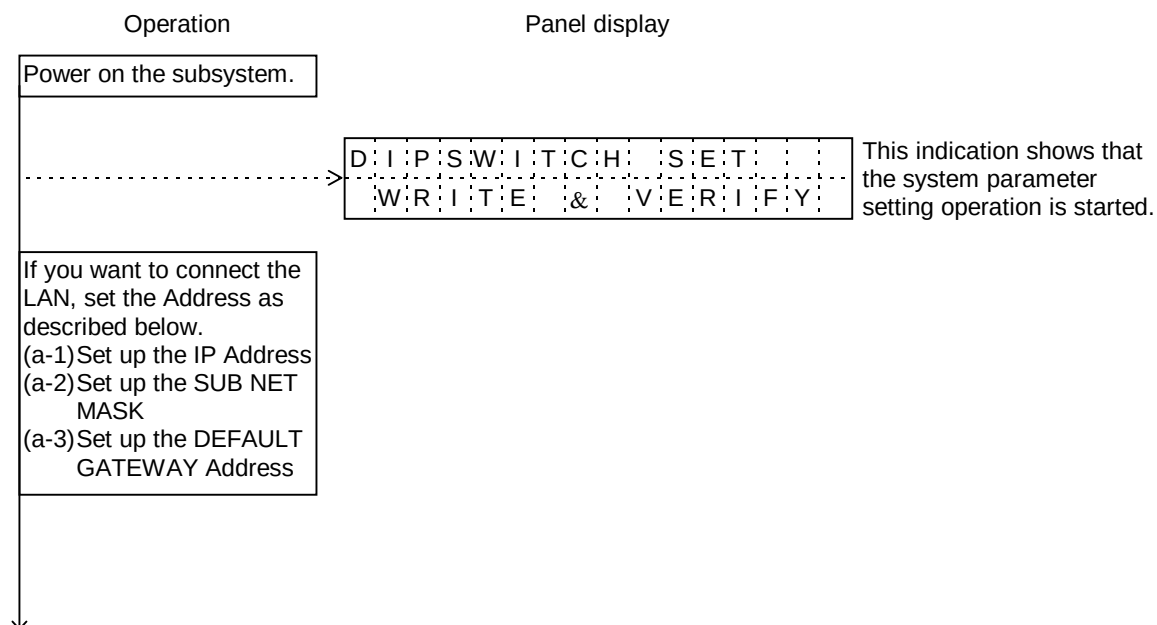
- (1) Before powering on the subsystem, set DIP switches No. 4 and 6 as shown in Figure 4.1.1 .

In case of Dual Controller system (installed DF-F350F-F3MCF) , set DIP switches of both controllers.

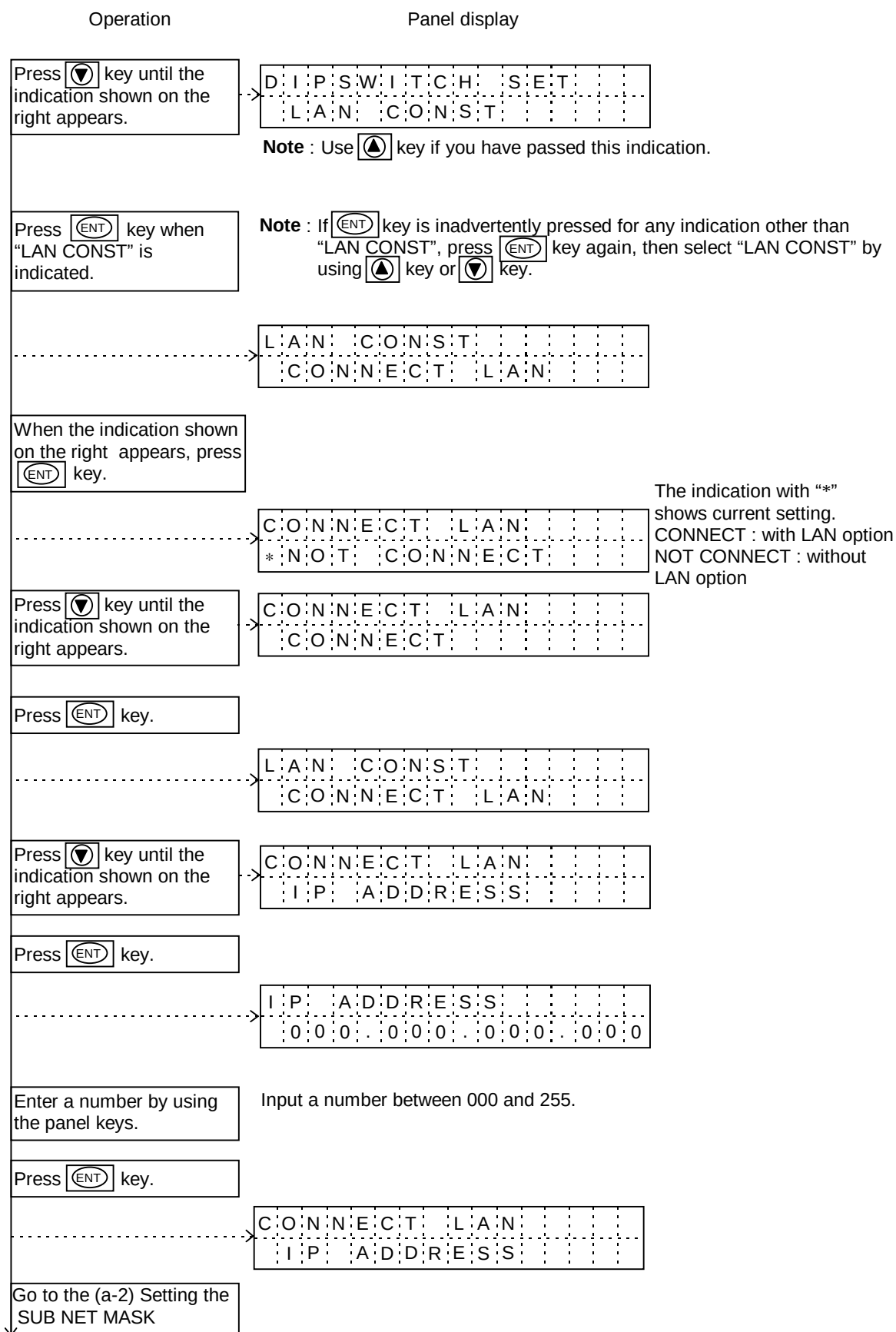


Figure 4.1.1 DIP switches (For setting the system parameter)

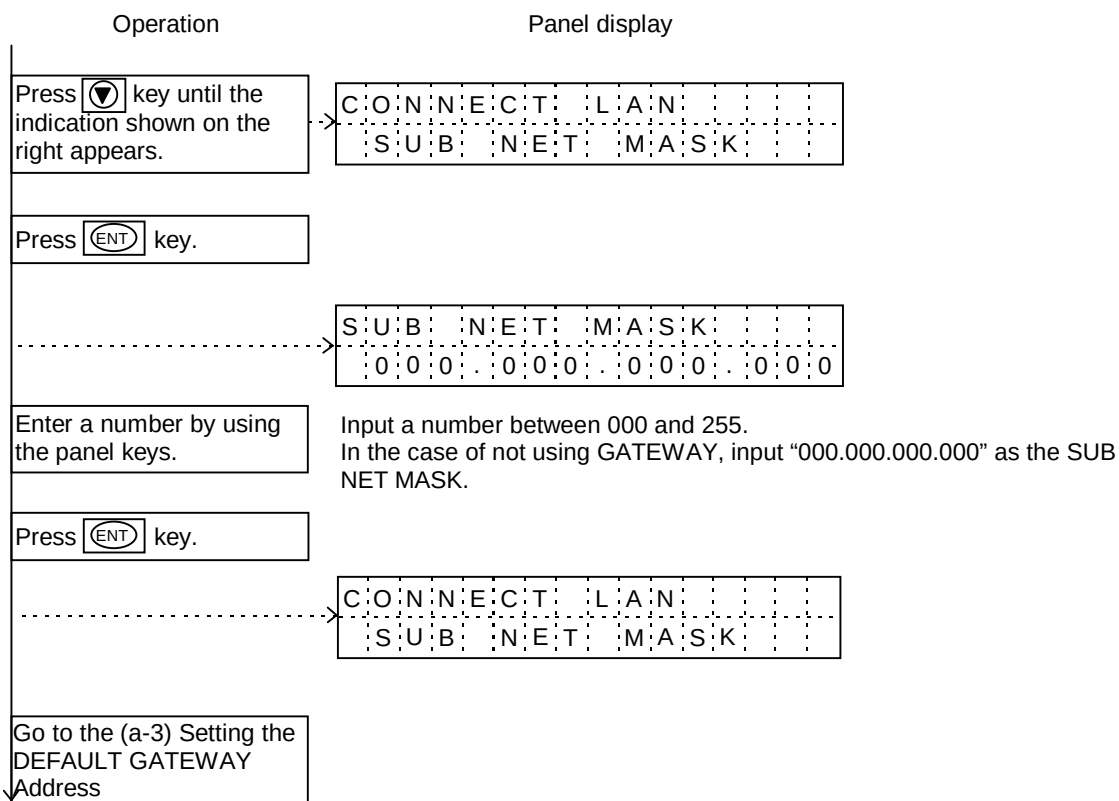
- (2) Operate panel's keys as described below.



(a-1) Setting the IP address.



(a-2) Setting the SUB NET MASK

***Note**

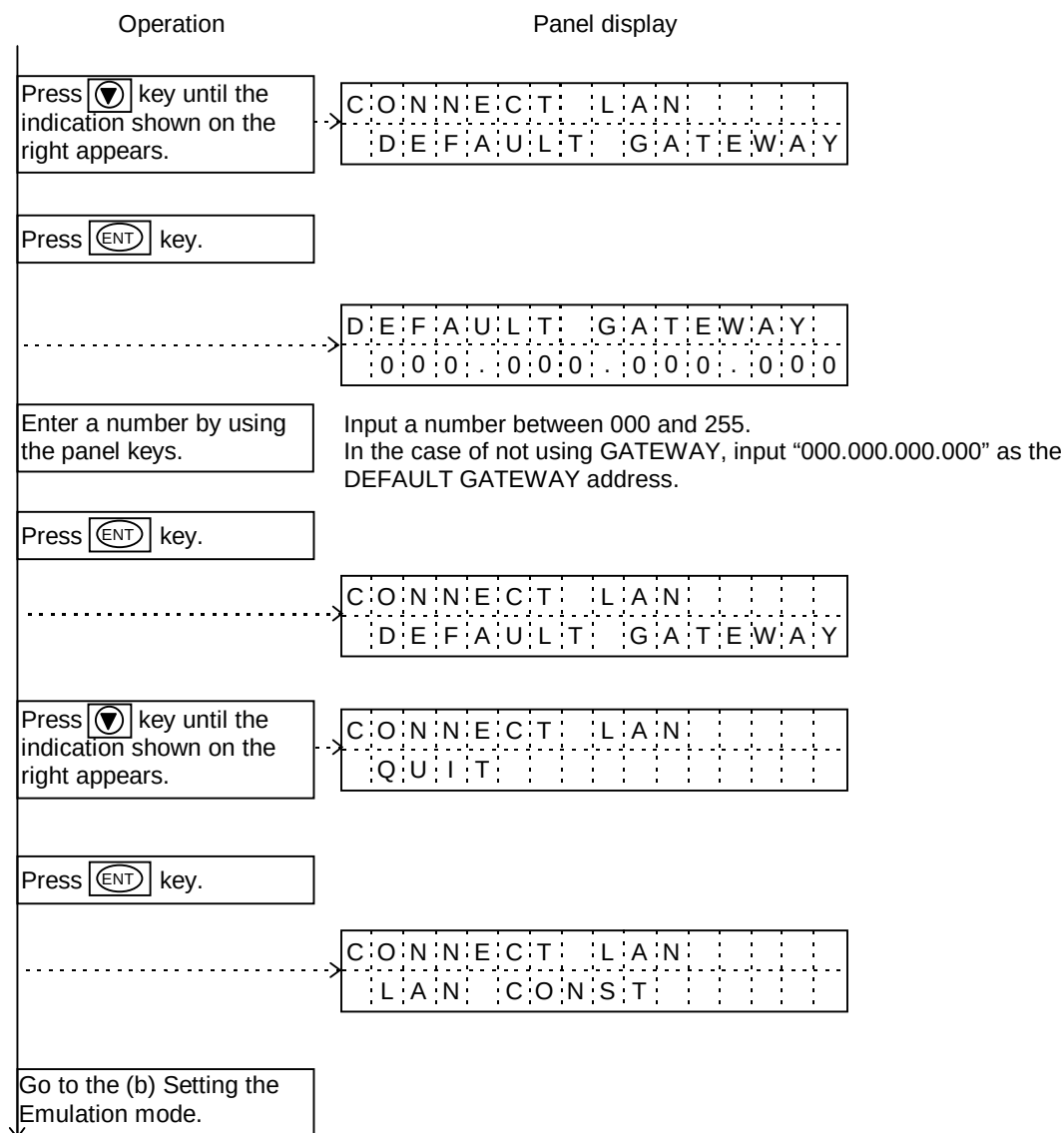
If "000.000.000.000" as the SUB NET MASK is set, this subsystem automatically adopts default SUB NET MASK for each IP address as described in the table 4.1.1.

Table 4.1.1 Default SUB NET MASK related with IP address

No.	IP Address of the subsystem	DEFAULT SUB NET MASK
1	from 000.000.000.000 to 127.255.255.255	255.000.000.000
2	from 128.000.000.000 to 191.255.255.255	255.255.000.000
3	others	255.255.255.000

If a smaller SUB NET MASK than default number is entered, this subsystem adopts default number.

(a-3) Setting the DEFAULT GATEWAY address

***Note**

If an invalid GATEWAY address is set (the IP address of the device is different from network address.), either of warning messages as shown below is displayed until the READY LED of the subsystem lights on.

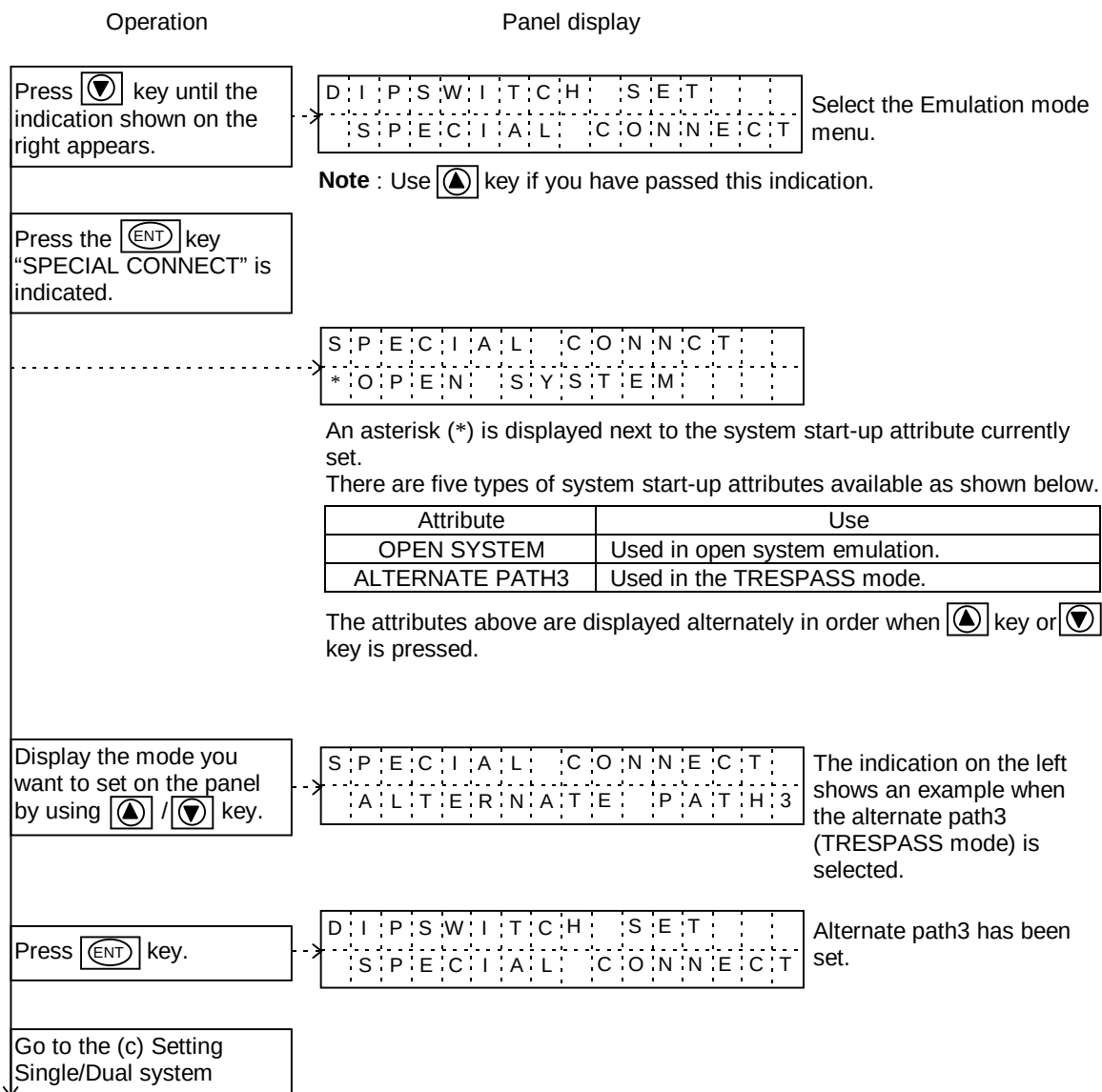
Power off the subsystem and set IP address and default GATEWAY address correctly.

W	0	1	7	0	0	G	A	D	E	R	R		
				.		.		.					

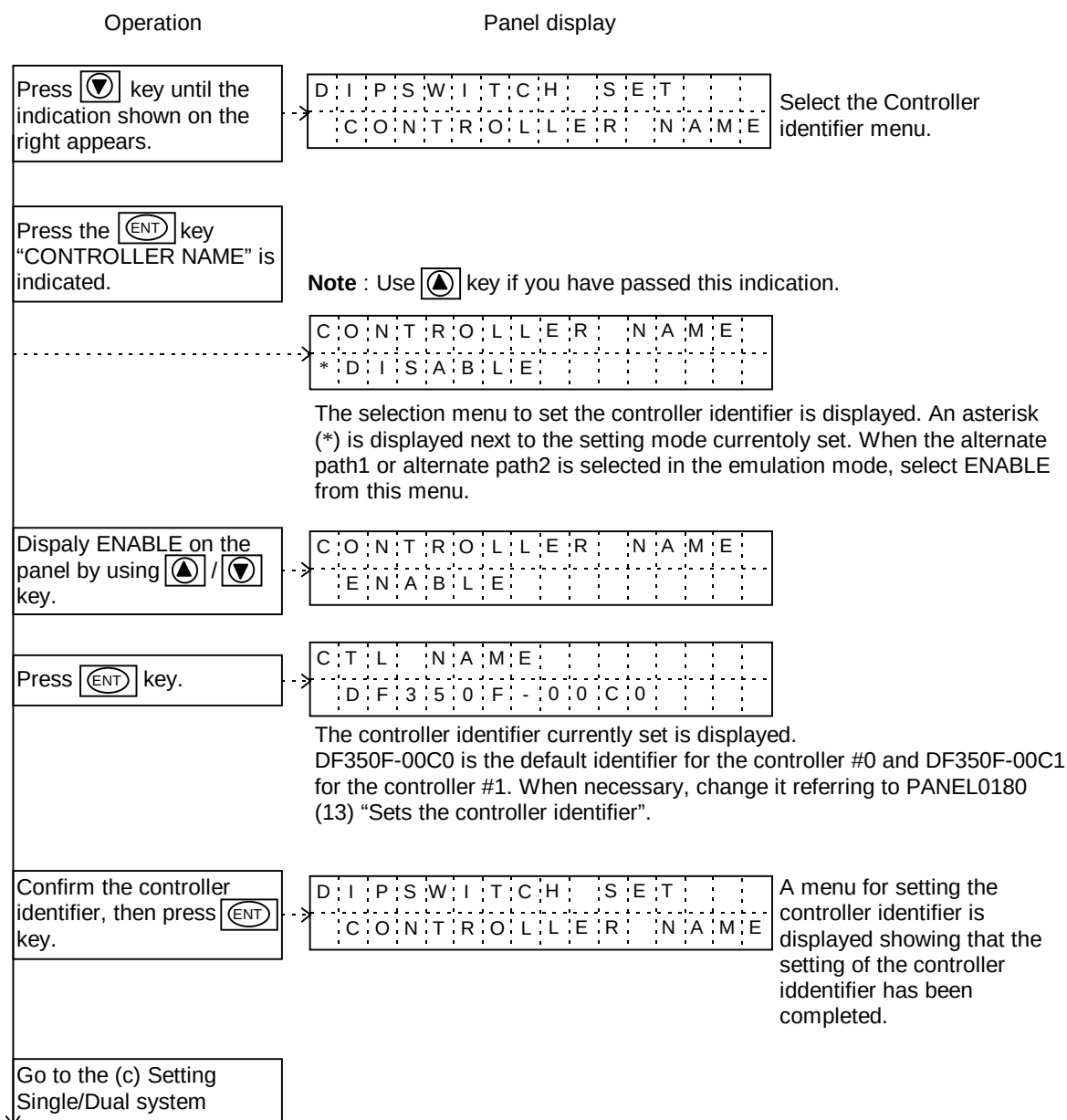
W	0	1	7	0	0	G	A	D	E	R	R	-	X
				.		.		.					

X : controllers No.

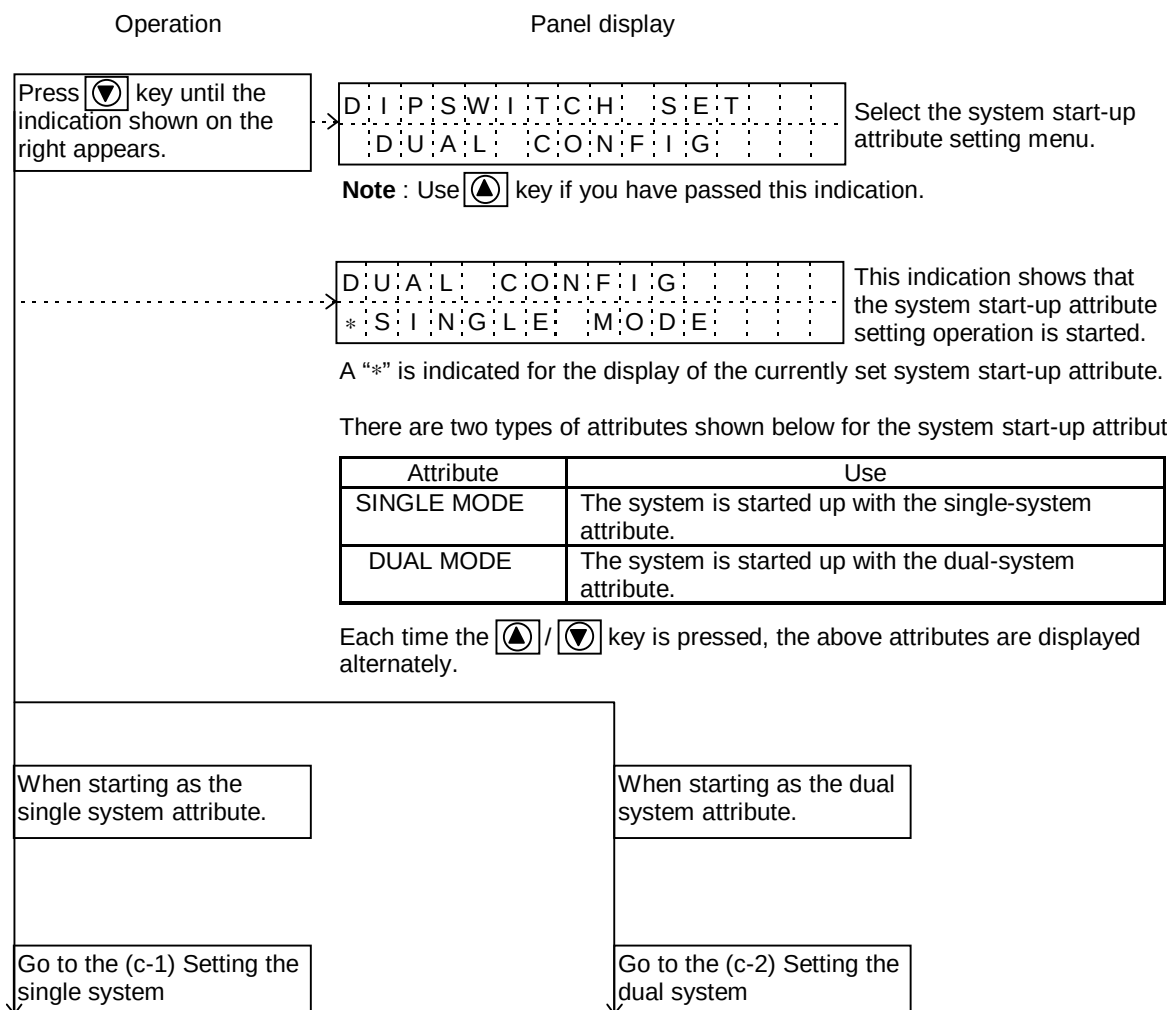
(b) Setting the Emulation mode



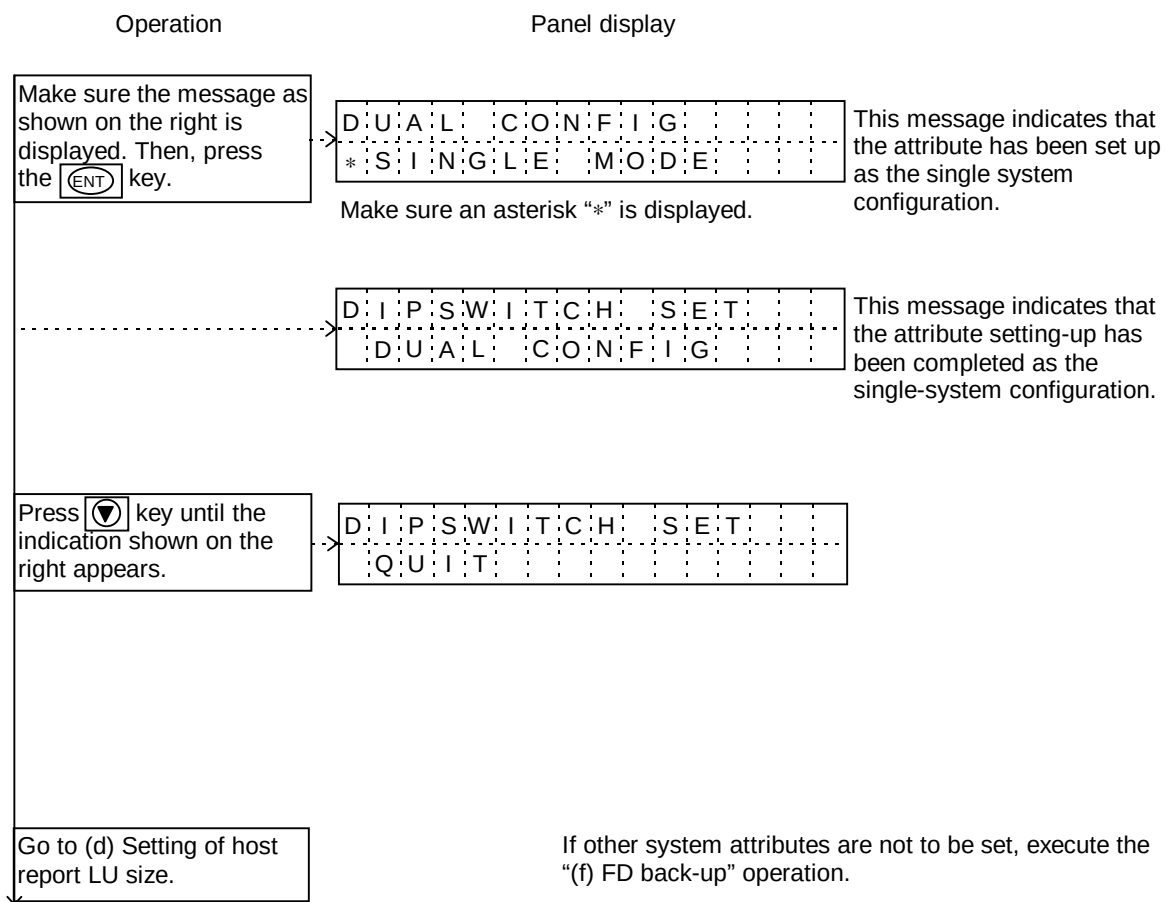
When the alternate path3 is selected, go to the single/dual system setting.



(c) Setting Single/Dual system



(c-1) Setting the single system



(c-2)Setting the dual system

There are five operating modes available as shown in Table 4.1.2.

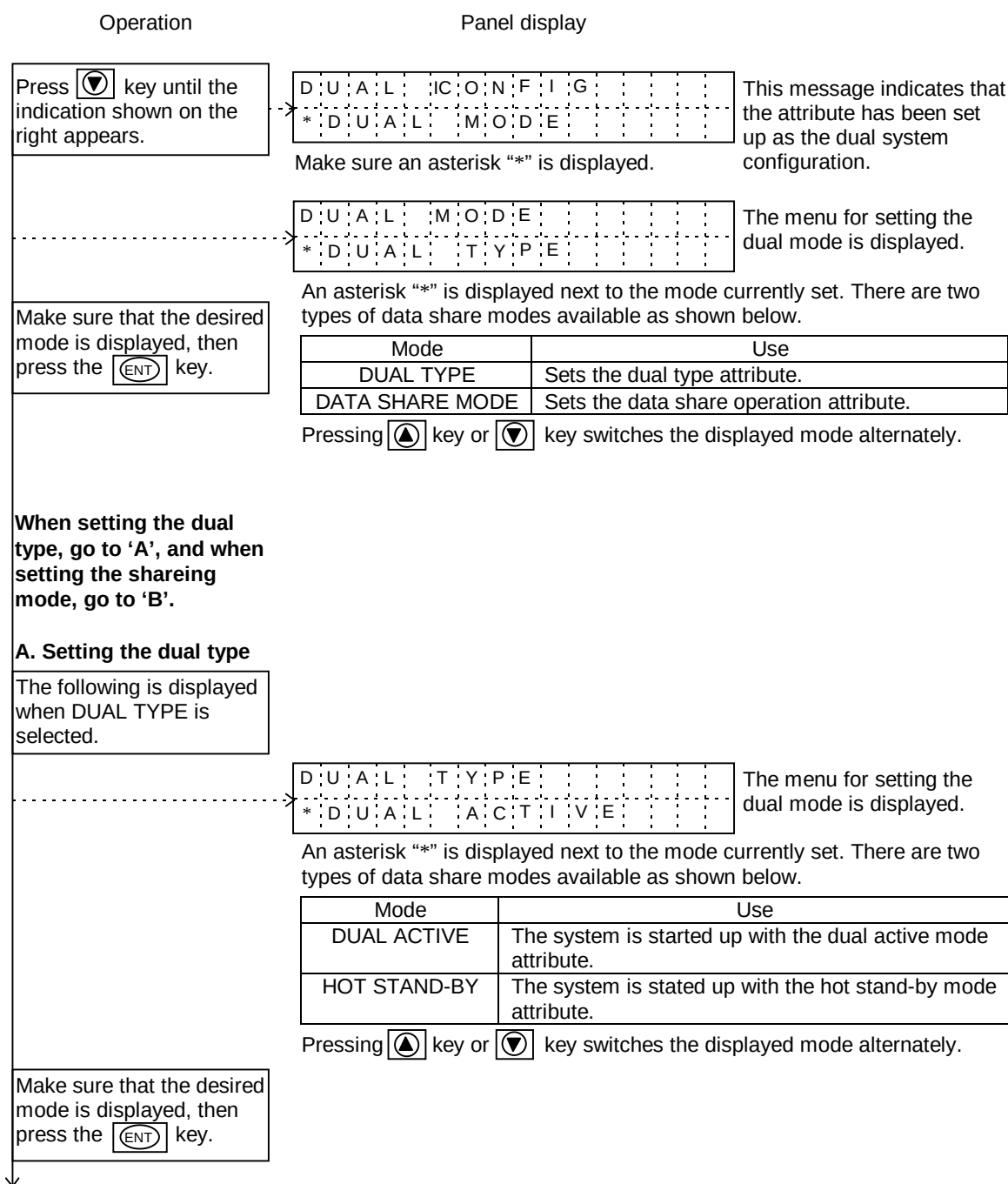
To validate each mode, panel setting shown in the Table 4.1.2 is required.

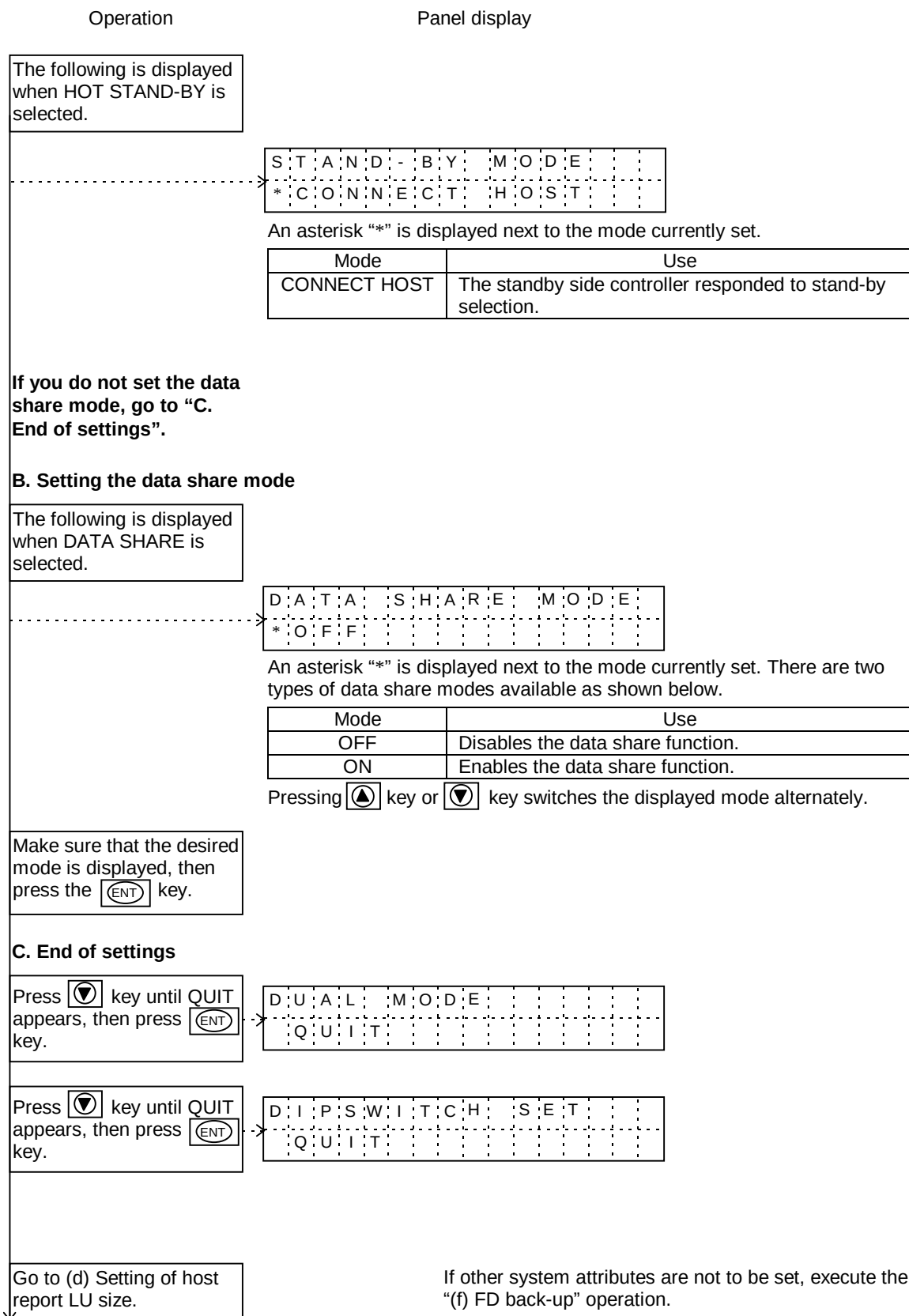
Perform the operations instructed in item (d) and succeeding items referring to the Table 4.1.2.

Table 4.1.2 Active mode and panel setting (Dual system configuration)

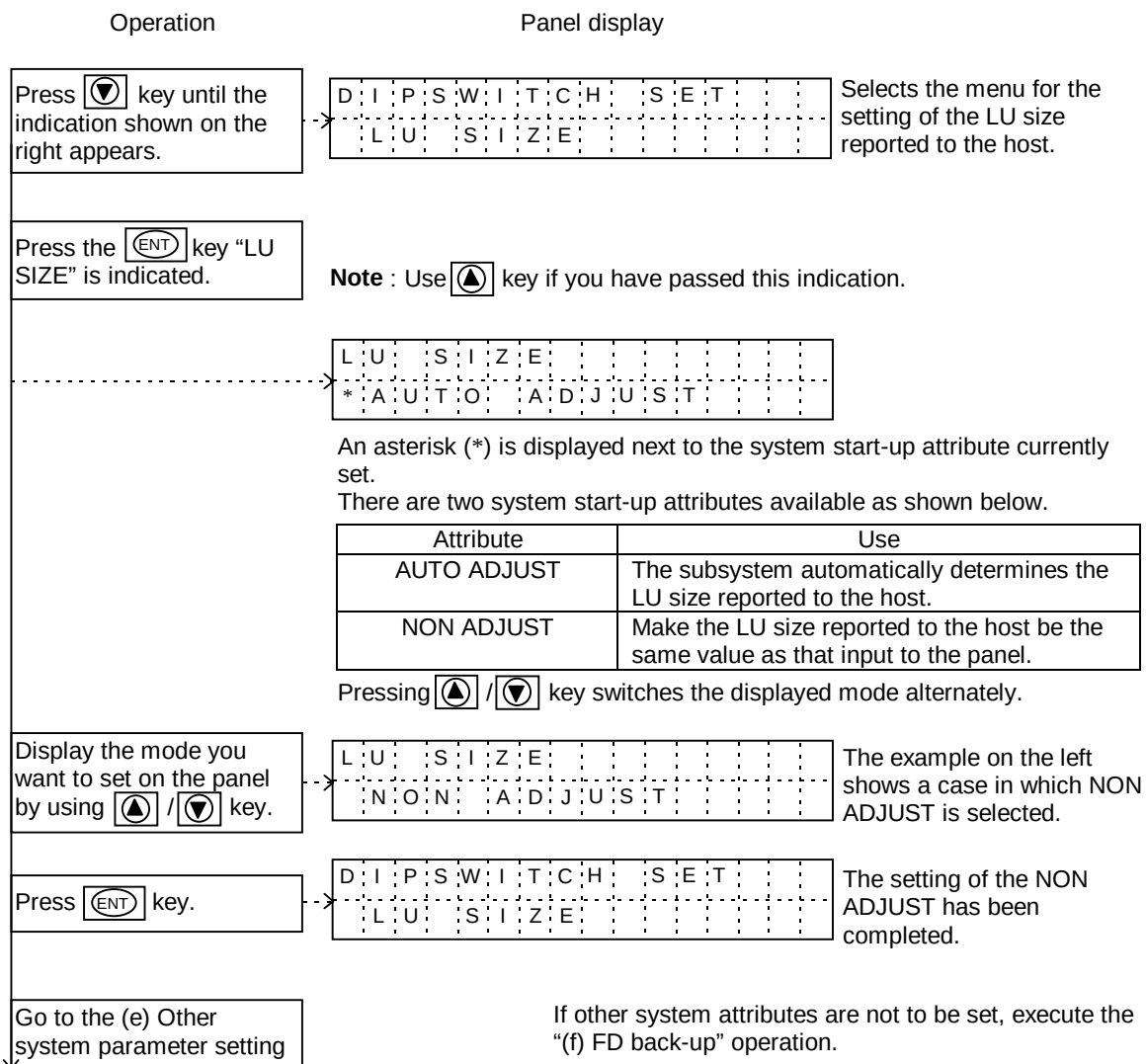
Active mode		Panel set		
		DUAL TYPE	STAND-BY MODE	DATA SHARE MODE
HOT STAND-BY	Normal	HOT STAND-BY	CONNECT HOST	OFF
	Data share (*1)			ON
DUAL ACTIVE	Normal	DUAL ACTIVE	Invalid	OFF
	Data share (*1)			ON

*1 : This function can be used in Micro_disk_Ver.354 or later.





(d) Setting the LU size reported to the host



(e) Other System Parameter Setting

Besides (a) Setting the IP address and (c) Setting SINGLE/DUAL system, there are several setting functions as below. The setting at the factory shipment is shown on the table in the addendum to the device.

To change the setting, see "PANEL0080".

The menu items and their usage are as follows.

(The item Nos. 1, 3, 5, 9, 16, and 17 in the following table must be set for each controller.)

No.	Menu item	Usage	Contents		Factory setting
			Parameter	How to set	
1	WRITE & VERIFY	Specifies the write and verify execution mode.	ON : Does not inhibit the write and verify execution mode. OFF : Inhibits the write and verify execution mode.	Select	ON
2	STRIPE SIZE	Specifies the data striping size.	16KB : Stripes the data in 16kbytes. 32KB : Stripes the data in 32kbytes. 64KB : Stripes the data in 64kbytes.	Select	64KB
3	LAN CONST	Specifies the LAN configuration information. ① CONNECT LAN Specifies whether or not the LAN board is mounted.	CONNECT : LAN board is mounted. NOT CONNECT : LAN board is not mounted.	Select	Depending on the configuration from the factory
		② IP ADDRESS Sets the IP address.	Enters the numerical value using the panel keypad.	Enter	000.000.000.000
		③ SUB NET MASK	Enters the numerical value using the panel keypad.	Enter	000.000.000.000
		④ DEFAULT GATEWAY	Enters the numerical value using the panel keypad.	Enter	000.000.000.000
		⑤ ETHER ADDRESS (*1)	Enters the numerical value using the panel keypad.	Only for reference	???????????
4	CONNECT VMS	Specifies whether or not the VMS is connected.	CONNECT : Connects the VMS. NOT CONNECT : Does not connect the VMS.	Select	NOT CONNECT
5	SPECIAL CONNECT (*2)	Specifies the emulation mode.	OPEN SYSTEM : Open system emulation mode ALTERNATE PATH3 : TRESPASS mode	Select	OPEN SYSTEM

*1 Changing the ETHER ADDRESS with this menu is impossible after shipment.

*2 This menu can be used in the Flash Program Ver.PE24 and later.

No.	Menu item	Usage	Contents		Factory setting
			Parameter	How to set	
6	HOST BLK SIZE	Specifies the drive format size.	512B : The drive format size is 512bytes per block.	Fixed	512B
7	ERROR INF	Specifies the error information send mode for the RS232C.	OFF : Inhibit outflow of information. ON (NORMAL) : Does not inhibit outflow of information. ON (HITRACK) : Does not inhibit outflow of information for the HITRACK.	Select	Depending on the unit's factory setting (OFF for Japan)
8	CONTROLLER	Specifies the controller type.	MINI TOWER : Mini tower (MK) HIGH RACK MOUNT : Rackmount (RKH) CABINET, WRACK : Cabinet type (CK), Rackmount (RKWH)	Select	Depending on the configuration from the factory
9	SPARE DISK	Specifies whether or not the spare disk is mounted.	EXISTENCE : Spare disk mounted NOTHING : Spare disk not mounted	Select	Depending on the configuration from the factory
10	SERIAL NO	Specifies the serial No. of the controller.	Enters the numerical value using the panel keypad.	Enter	
11	ROM V/R	Specifies the ROM microprogram revision.	Enters the numerical value using the panel keypad.	Enter	Revision from the factory
12	RAM V/R	Specifies the RAM microprogram revision.	Enters the numerical value using the panel keypad.	Enter	Revision from the factory
13	CONTROLLER NAME	Sets the controller identifier.	DISABLE : Setting of the controller identifier is invalid. ENABLE : Setting of the controller identifier is valid. CTL NAME : Controller identifier.	Select	DISABLE
14	ROW LAST LBA (*3)	Specifies the capacity that a single drive uses (for each ROW).	Enters the numerical value using the panel keypad.	Enter	Depending on the configuration from the factory
15	BUZZER	Specifies whether or not the buzzer sounds when displaying the warning or fault message.	ENABLE : Buzzer sounds. DISABLE : Buzzer does not sound.	Select	ENABLE
16	SYSTEM ERROR	Specifies the operation if the processor failure occurs.	AUTO RESET : Resets a fault. SYSTEM DOWN : Shutdown the system.	Select	AUTO RESET

*3 The ROW LAST LBA is displayed for setting the capacity that a single drive uses. Sets the capacity according to the menu displayed.

No.	Menu item	Usage	Contents		Factory setting
			Parameter	How to set	
17	INQUIRY INF	Specifies the vendor name, model name, and command queuing.	VENDOR TYPE : Vendor name PRODUCT TYPE : Model name COMMAND QUEUING : Command queuing ON : Executes the command queuing. OFF : Inhibits the command queuing.	Enter Enter Select	VENDOR TYPE = HITACHI PRODUCT TYPE = DF350F COMMAND QUEUING = ON
18	DUAL CONFIG	Specifies the system startup attribute.	SINGLE MODE : Single system attribute DUAL MODE : Dual system attribute DUAL ACTIVE : Dual stand-by configuration setting HOT STAND-BY : Hot stand-by configuration setting DATA SHARE MODE : Data share mode attribute (*5) OFF : Not used in the Data share mode ON : Used in the Data share mode	Select	Depending on the configuration from the factory
19	SYS REV	Limit the revision Nos. of installing system.	Displays the startup program revision.	—	“0354”
20	OPTION	Specifies the optional function when using it.	Enters the option code using the panel keypad.	Enter	“0000”
21	BOOT PROG V/R	Displays the startup program revision.	Displays the startup program revision.	—	
22	RTC SET	Sets the internal clock.	Enters the time using the panel keypad.	Enter	Year, month, day, day of the week, hour, minute, second
23	QUIT	Terminates the parameter input.	Enters using the panel keypad.	Enter	

*4 This menu can be used in the Flash Program Ver.PE24 or later.

*5 This function can be used in Micro_Disk_Ver.0354 or later.

(e-1) Setting RS232C error information sending mode

In order to use the failure notification program, the setting for the “ERROR INF” of the system parameter must be changed to “ON (NORMAL)”.

Operation	Panel display
	D I P S W I T C H S E T W R I T E & V E R I F Y
Press  key until the indication shown on the right appears. Press  key.	D I P S W I T C H S E T E R R O R I N F
	Note : Use  key if you have passed this indication.
Confirm that the indication is changed as shown on the right, which shows that the ERROR INF setting operation is started.	E R R O R I N F * O F F
Press  or  key until the indication shown on the right appears. Press  key.	E R R O R I N F O N (N O R M A L)
Make sure that the message as shown on the right is displayed.	D I P S W I T C H S E T E R R O R I N F
Press  or  key until the indication shown on the right appears. Press  key.	D I P S W I T C H S E T Q U I T
For the dual system, an indication shown on the right appears. Make the setting in the same way as the above.	D I P S W I T C H S E T ■ W R I T E & V E R I F Y

(f) FD back-up.

There are cases where System Parameters (Buzzer setting, drive recovery mode, etc.) needs to be backed up to FD or restored from FD when installing optional parts or replacing parts. This case, perform back-up to FD or restore from FD according to “2.3.1 Back-up procedure to FD (MK-OPTION0050.)” or “2.3.2 Restoring procedures to FD (MK-OPTION0080.)”.

(Raid configuration setting, LU configuration setting, etc are not contained in system parameter.)

Back-up procedure to FD

- (1) Turn the power off according to MK-OPTION0120.

Notice: In case the power is not normally turned off, the user's data might be lost.

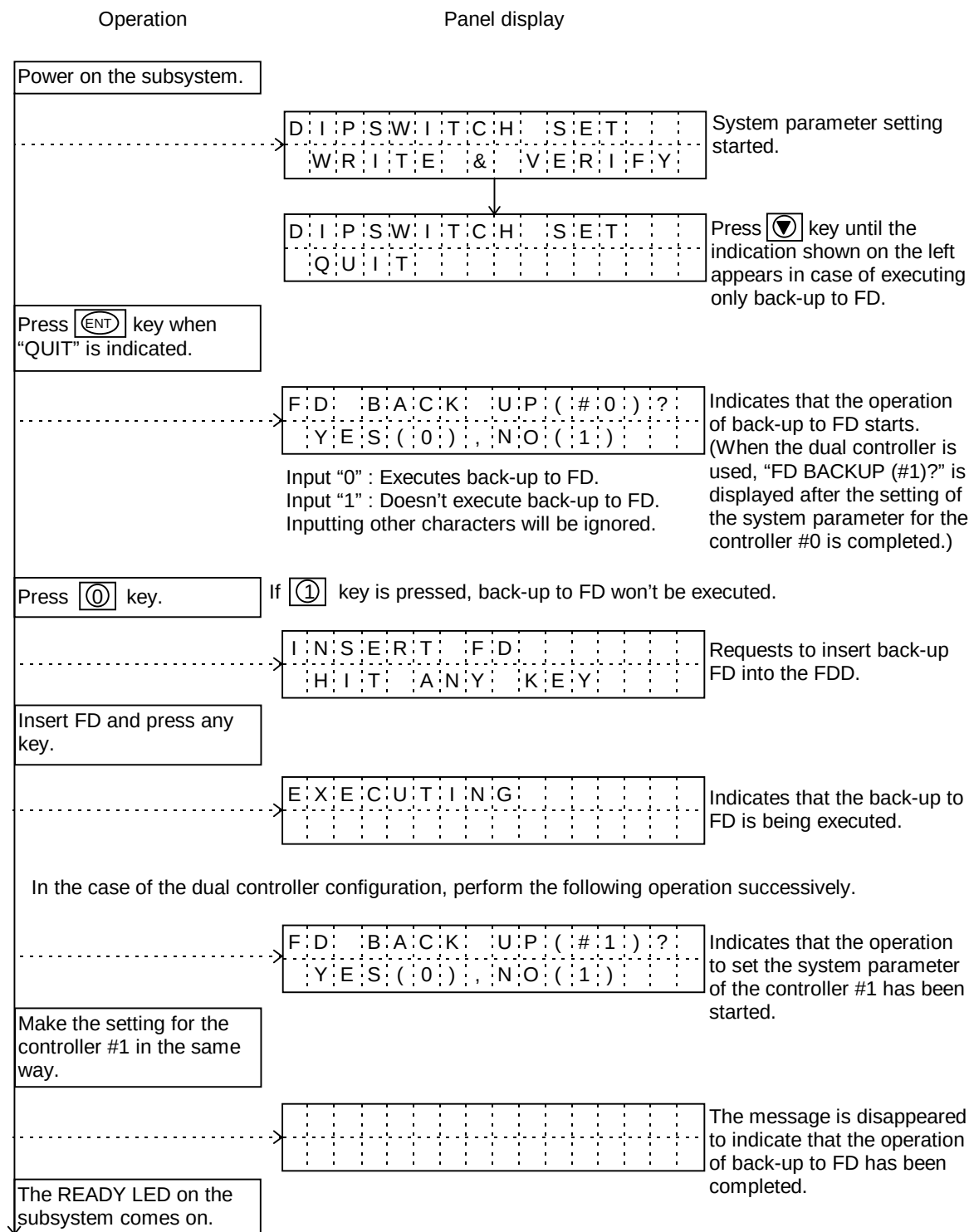
- (2) Before power on the subsystem, set DIP switch No.4 on CTL ASSY as shown in Figure 4.1.2.

Note : Be sure to set the same data for both controllers if the dual controller option (-F3MCF) has been installed.



Figure 4.1.2 DIP Switches

(3) Operate panel's keys as described below.



(4) Set DIP switch No.4 as shown in Figure 4.1.3.

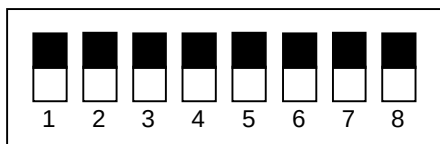
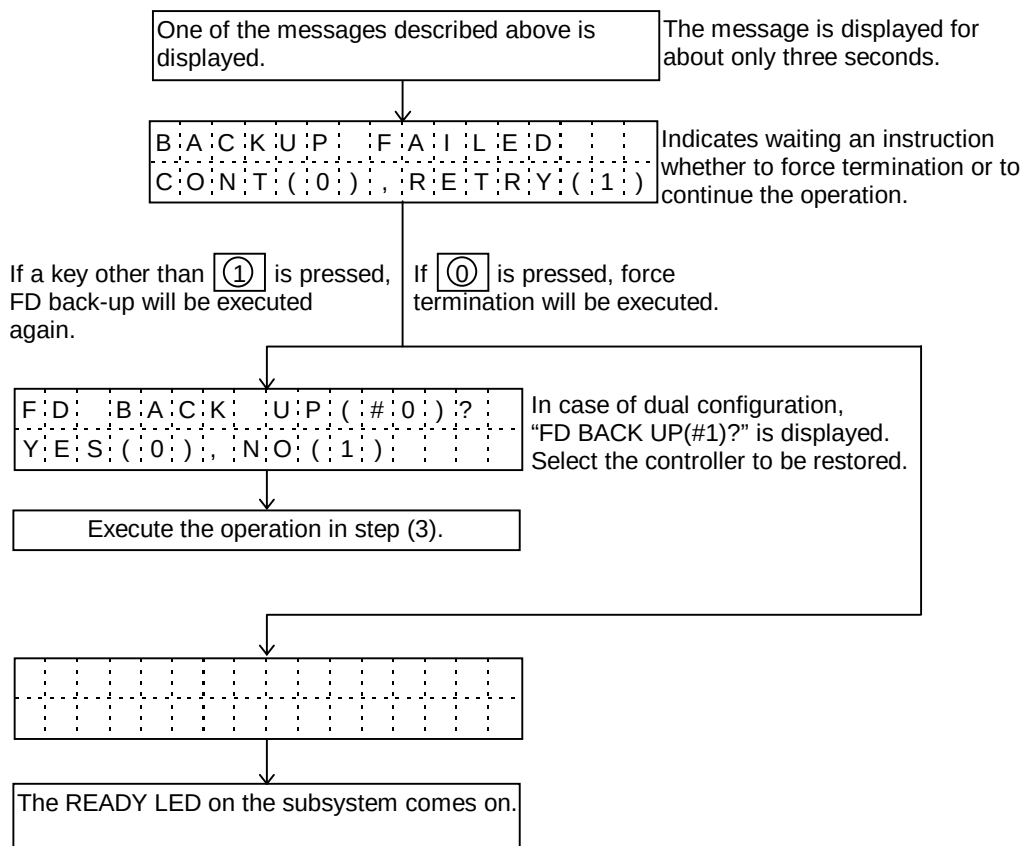


Figure 4.1.3 DIP Switches

Note 1 : While the back-up to FD is being executed, the following messages may be displayed.

- **FD NOT INSERTED**
FD isn't inserted. Insert FD into the FDD.
- **FD MOTOR NOT STARTED**
Starting failure of the FD drive motor occurred. Try again.
- **FILE WRITE ERROR**
FD which was inserted is not formatted, or is the condition of write-protected. Format or release write-protection.
Write error occurred in FD which was inserted. Insert another FD.

If these messages are displayed, back-up to FD hasn't been executed. So try again following the operation described below.



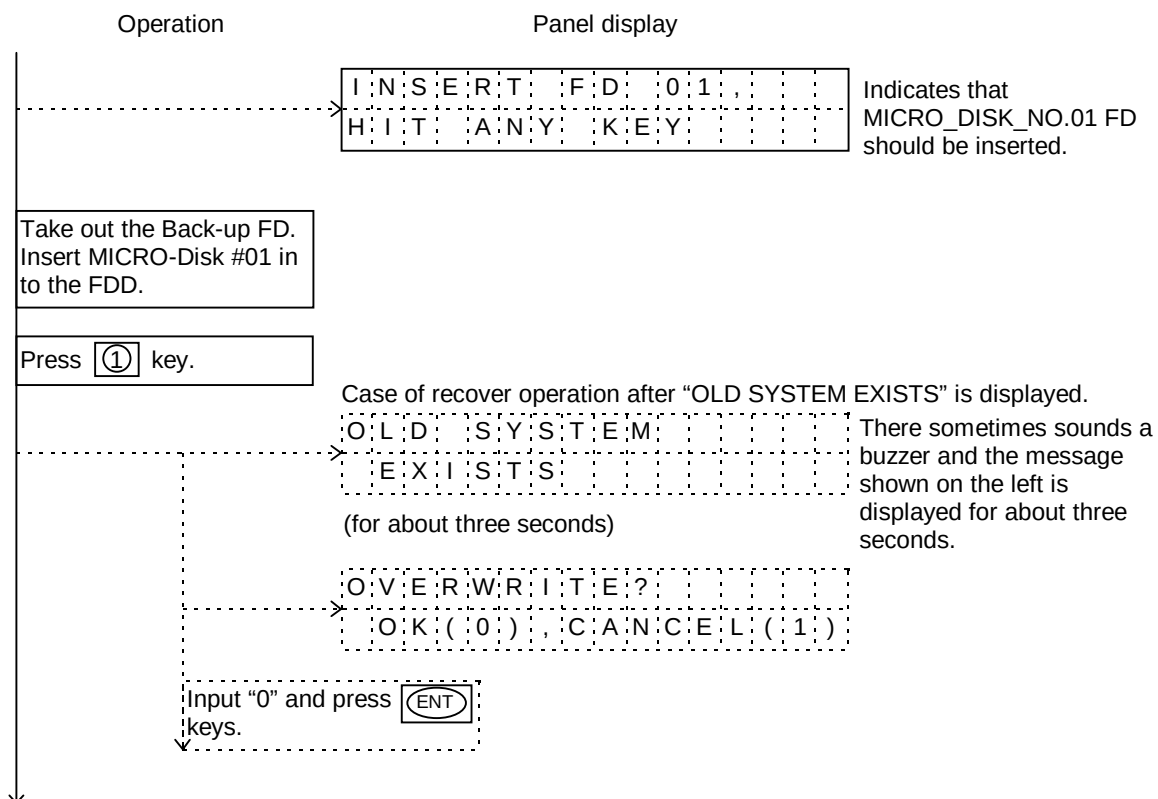
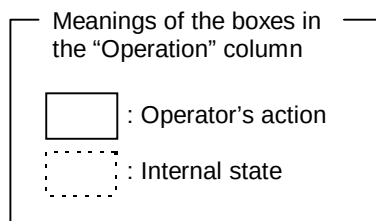
Note 2 : Use 3.5" FD (1.44MB) formatted by MS-DOS for back-up FD. Note that the FD will be overwritten in back-up.

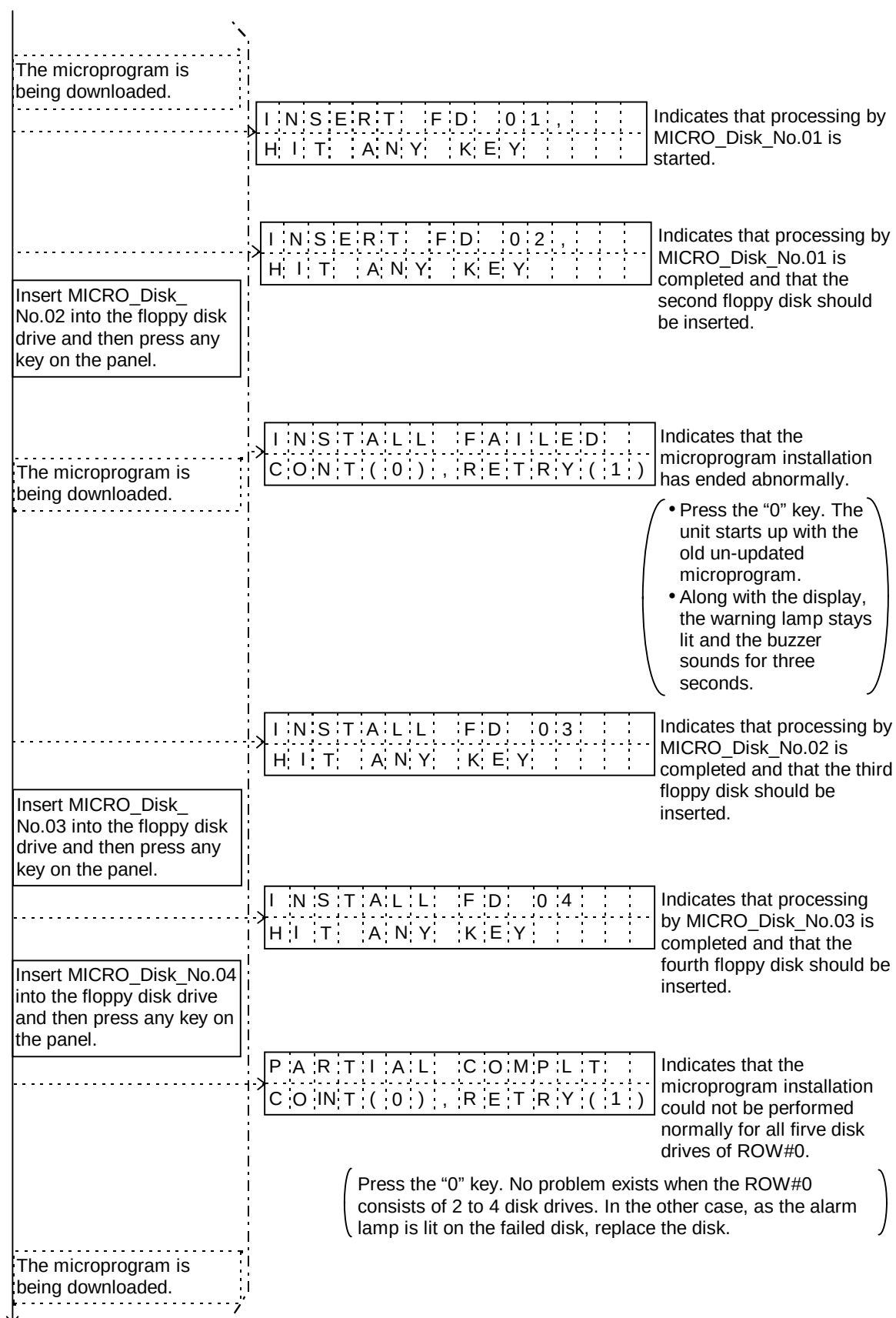
Note 3 : Even if back-up FD is left at FDD after back-up operation, no error will occur on the subsystem.

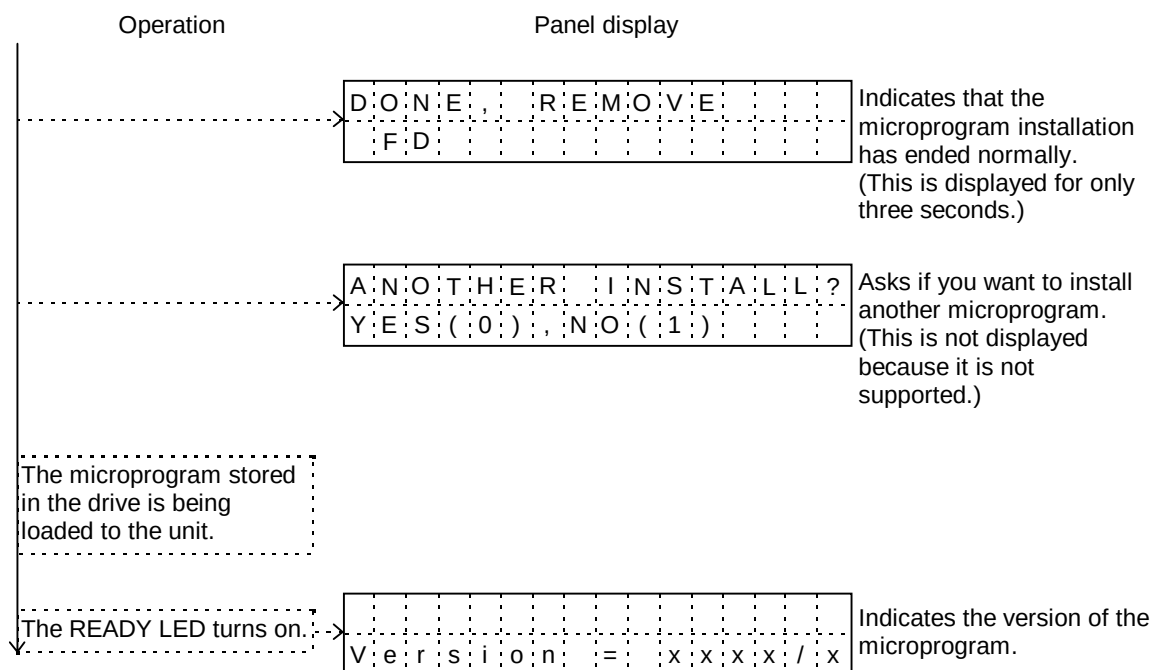
(g) Download Program

Download program is used to update the microprogram stored in the drive. Three floppy disks are used for downloading.

Note : Be sure that no drive failure is present before updating the microprogram.







(1) Set DIP switch No.1 as shown in Figure 4.1.4.

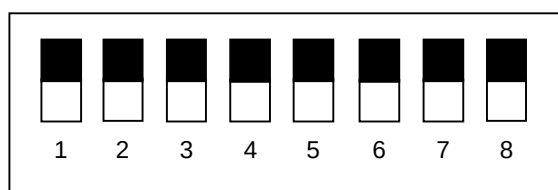


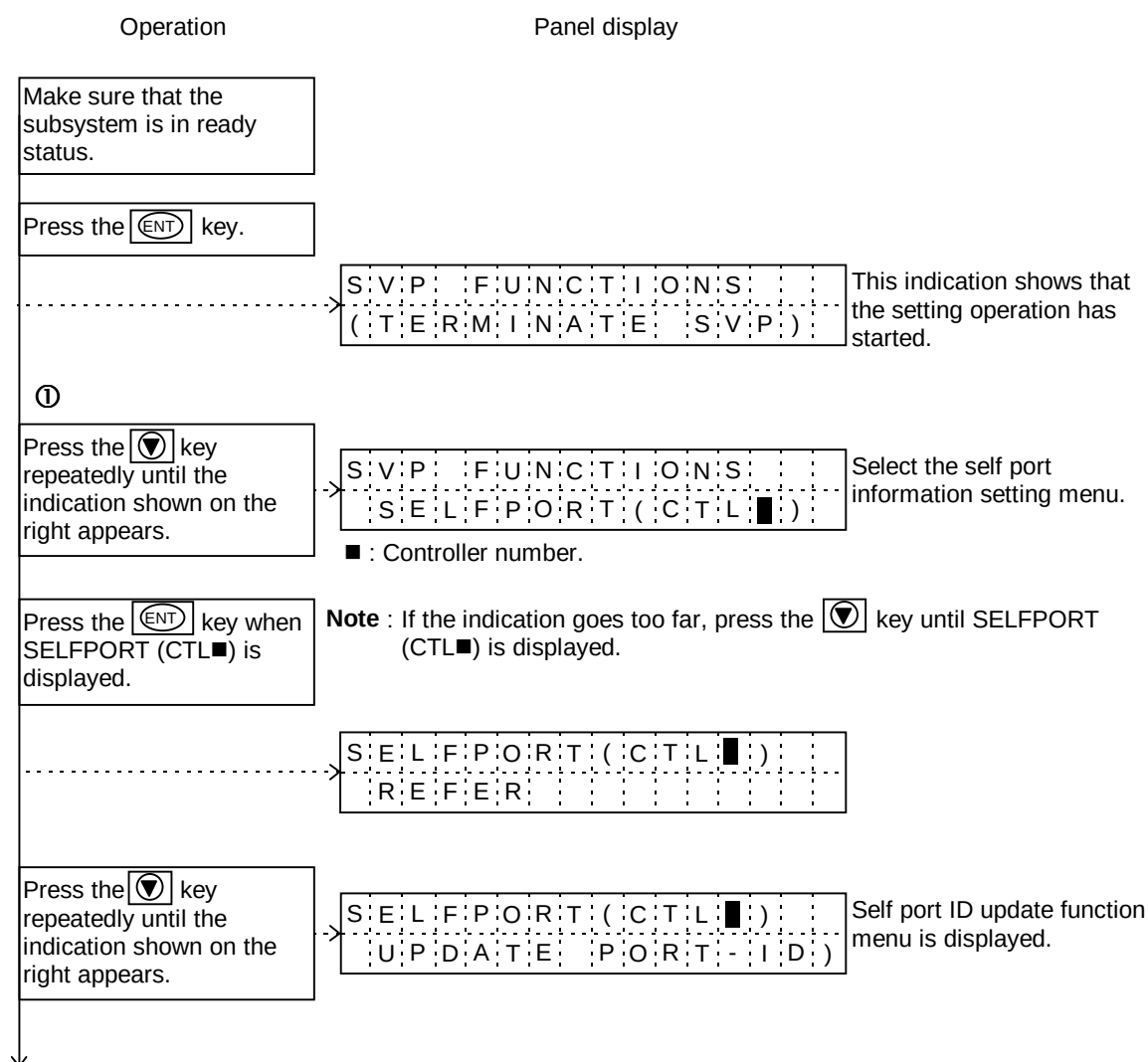
Figure 4.1.4 Standard DIP Switch Settings

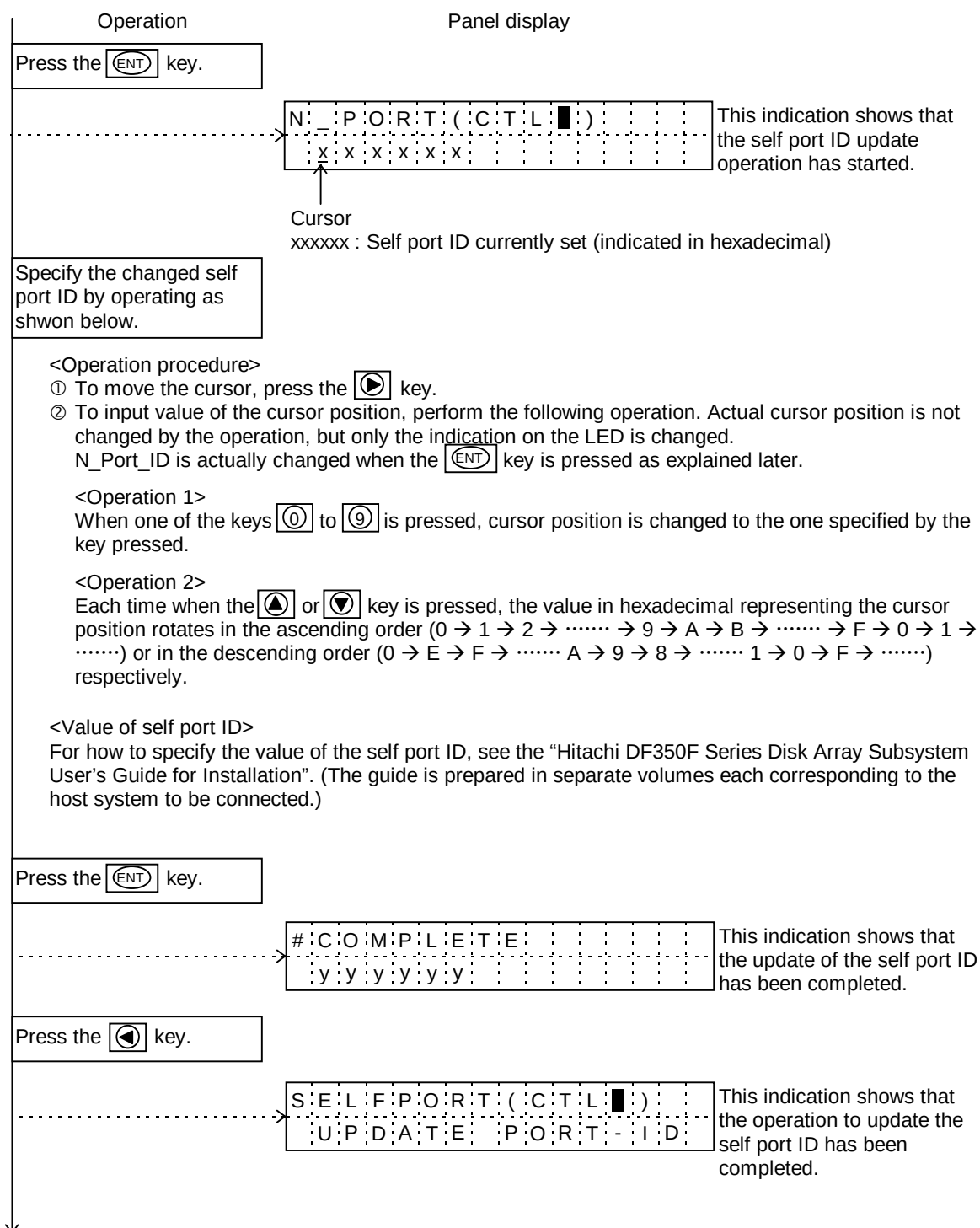
Note : If the dual controller option (DF-F350F-F3MCF) is installed, use the same settings for both controllers.

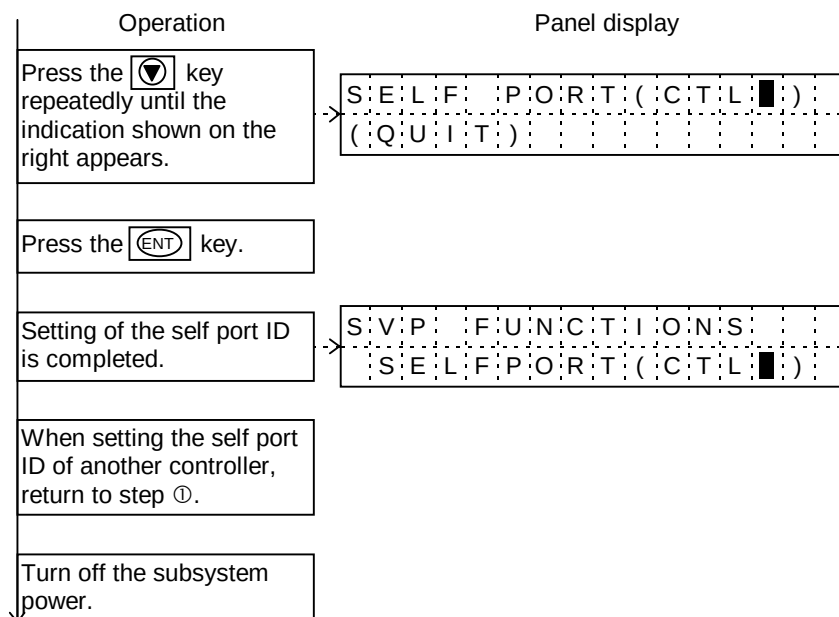
4.2 Setting Self Port ID

The self port IDs have been set to FFFFFFFF for both the controller 0 and controller 1 when the subsystem is shipped from the factory.

Operate following the procedure below.







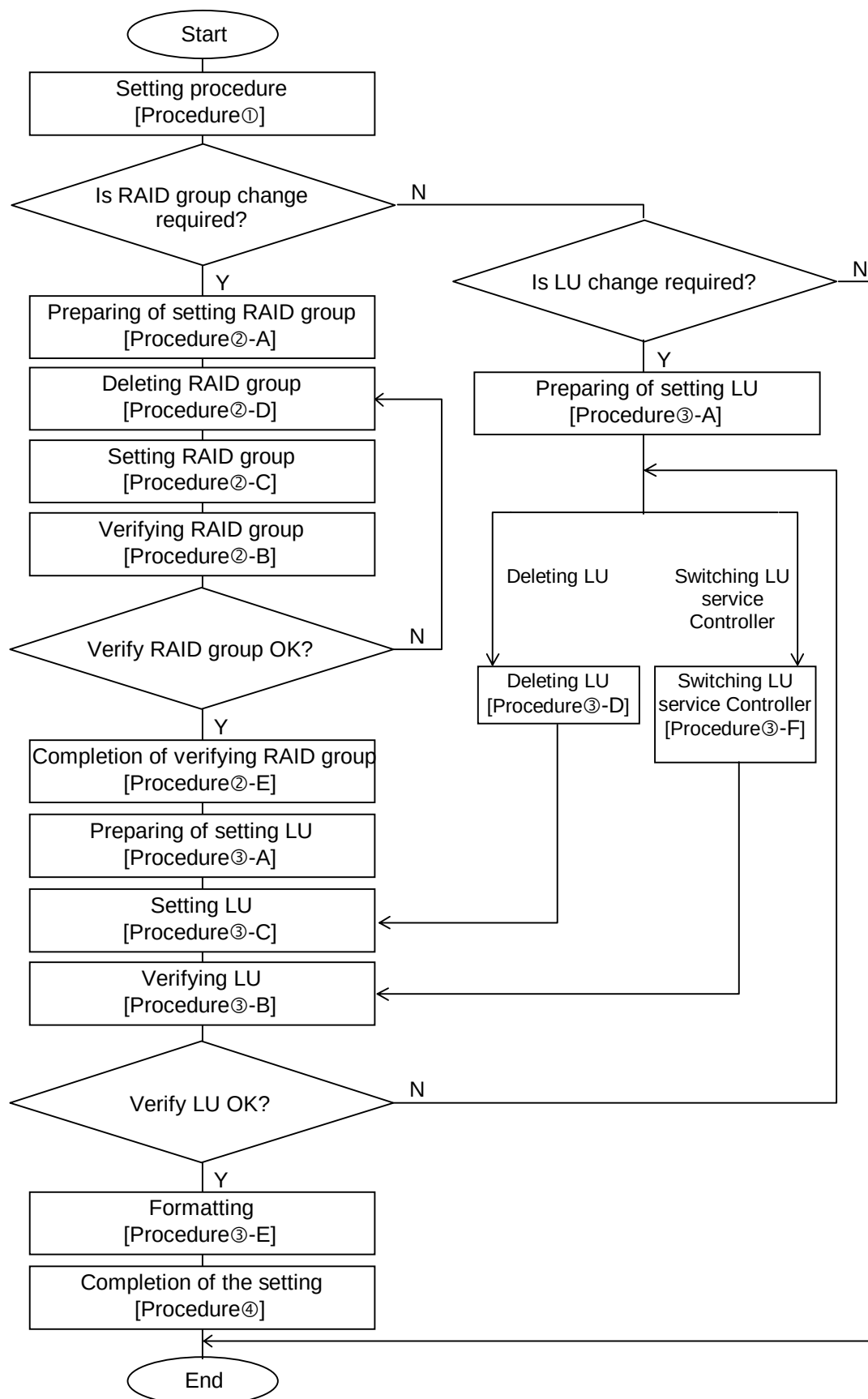
<Note on setting self port ID>

The self port ID which has been set or changed becomes valid after the next powering on. Accordingly, when the self port ID is changed, be sure to power off the subsystem once, then start it up again.

4.3 Setting the Subsystem Configuration Information

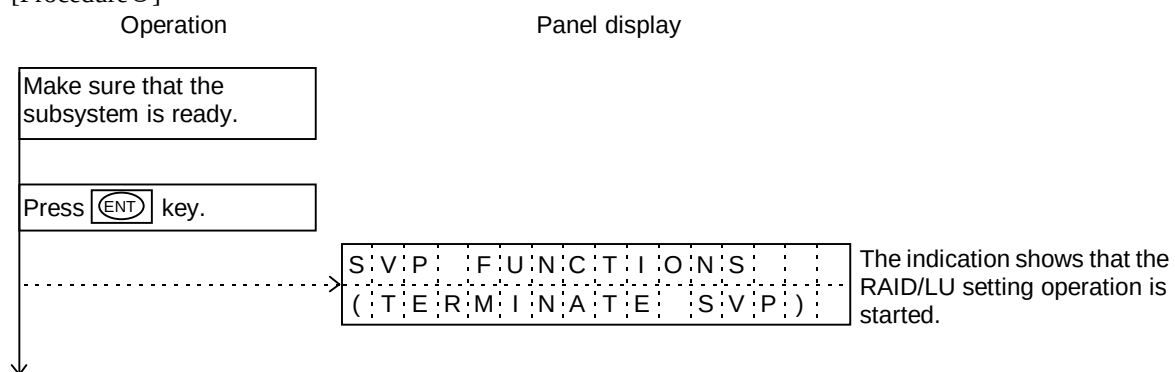
This function can be used when the subsystem is ready.

(During this operation, READ/WRITE command issued from the host cannot be executed. When the host command is received, Not Ready is reported to the host.)



4.3.1 Preparing of setting RAID/LU

[Procedure①]



When changing RAID group, go to procedure ②-A "Preparing of setting RAID group".
 When changing no RAID group but LU, go to procedure ③-A "Preparing of setting LU".
 When changing no RAID group and LU, go to quit.

4.3.2 Setting the RAID group

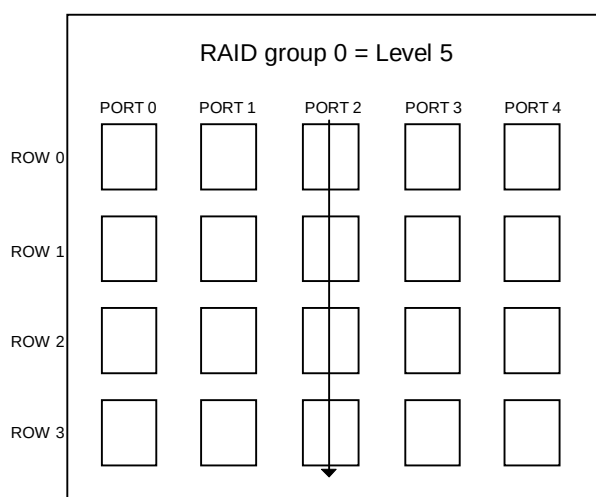
This function is used for setting, deleting and referring the RAID group. This function can be used when the subsystem is ready.

(Setting the DIP switch and turning off/on the subsystem are not required. Read/Write operation from the host can not be executed during this function. When the host command is received, Not Ready is reported to the host.)

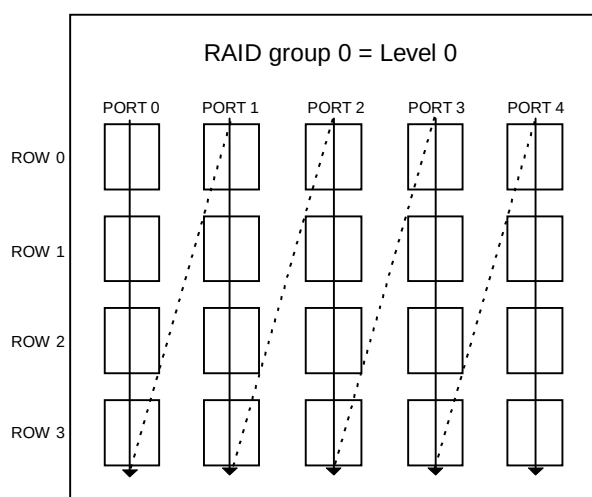
Notice : By deleting the RAID group all user data of the deleted RAID group is lost. Back up user data before deleting the RAID group.

RAID group and RAID level can be set as shown below by using this setting function.

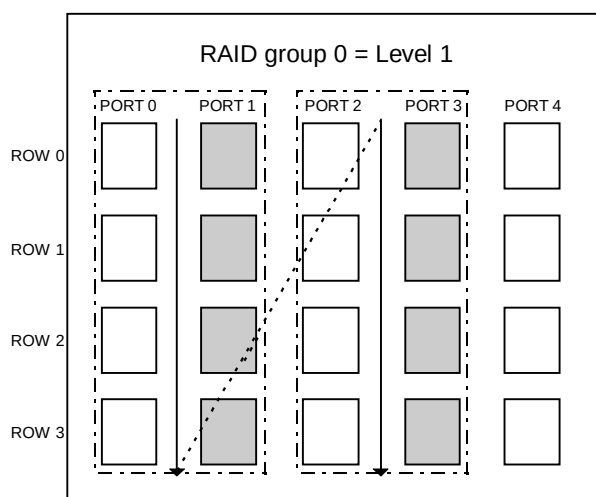
Setting one RAID group with the entire subsystem. (Arrows “↓” indicate the direction of storing data.)



The function stores data in the way executing the data striping over four disks and generating parity data on one disk.

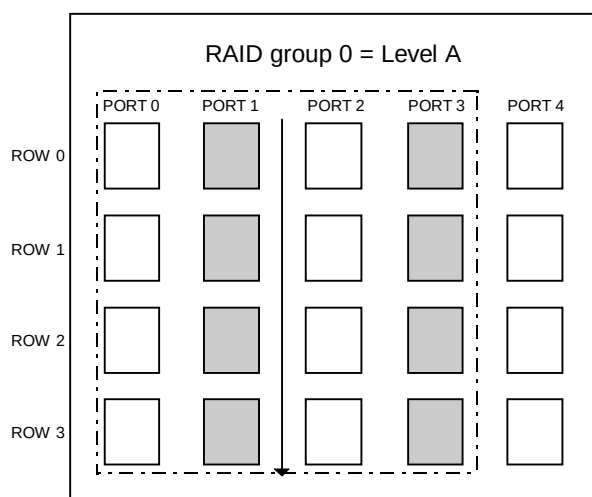


The function stores data without executing neither the data striping nor parity data generation.



The function stores data in the way doubly writing it on the main disk and sub-disk without executing the data striping.

□ : indicates a main disk
 ■ : indicates a sub-disk



The function stores data in the way doubly writing it on the main disk and sub-disk and executing the data striping over two disks of port 0 and port 2.

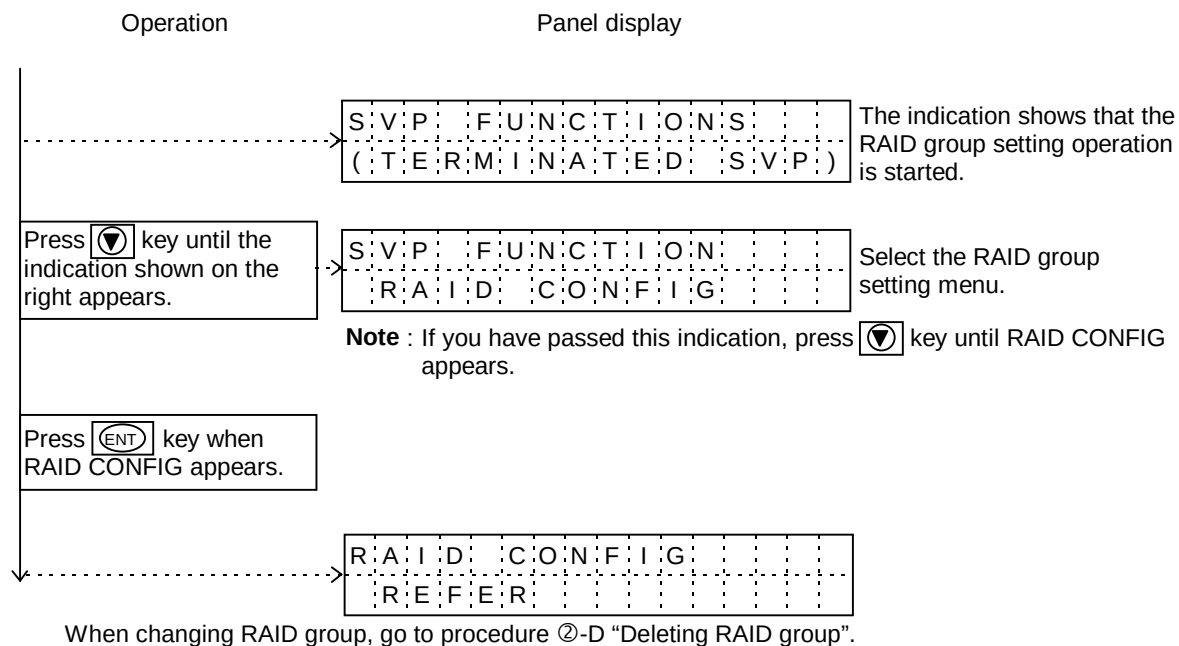
□ : indicates a main disk
 ■ : indicates a sub-disk

Setting one RAID group with each row of disks (Arrows “↓” indicates the direction of storing data.)

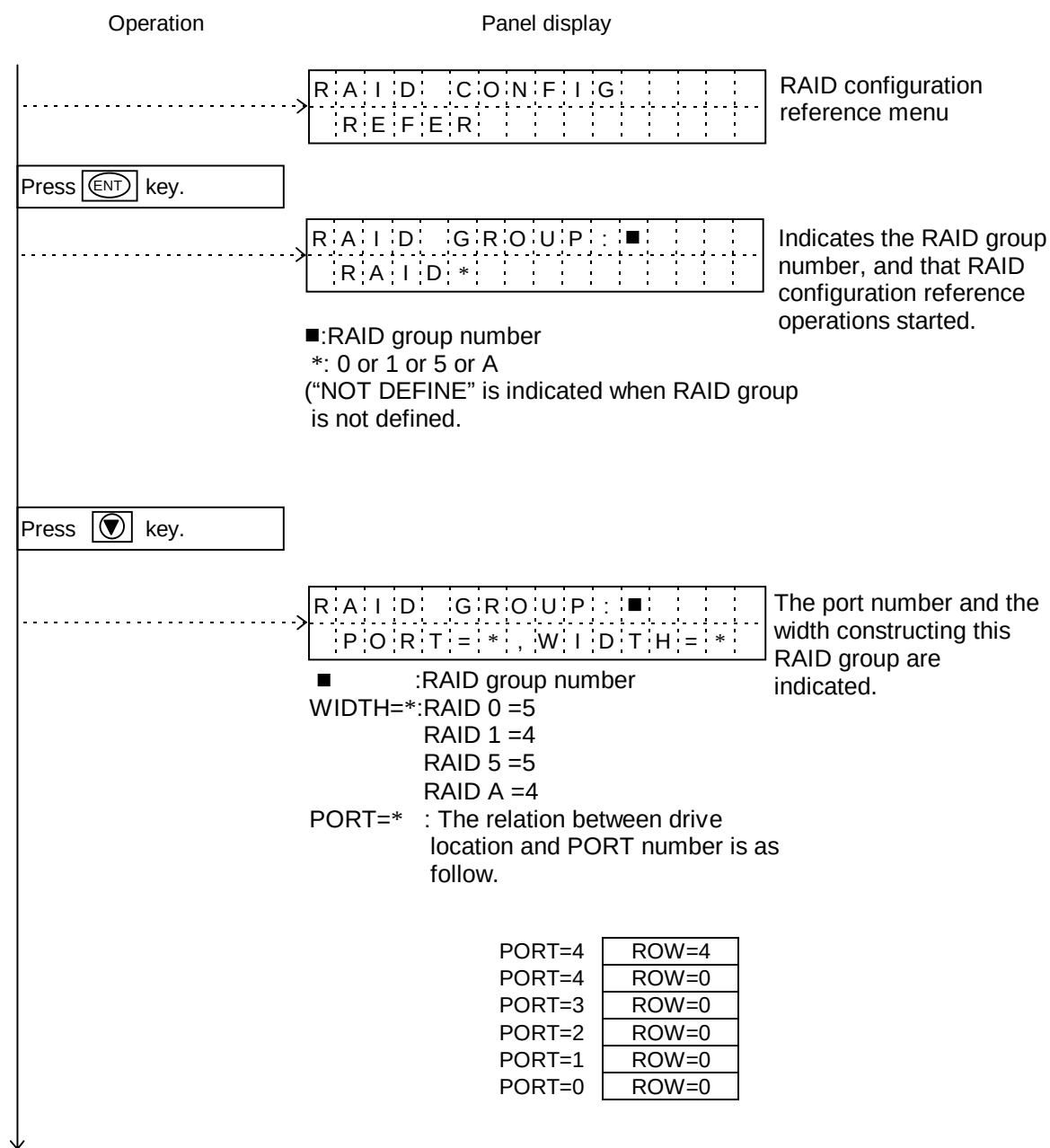
Data cannot be stored extending over two or more RAID groups even if RAID levels of them are the same. The following are examples having set RAID groups of the same RAID level, however, each row has its own RAID level.

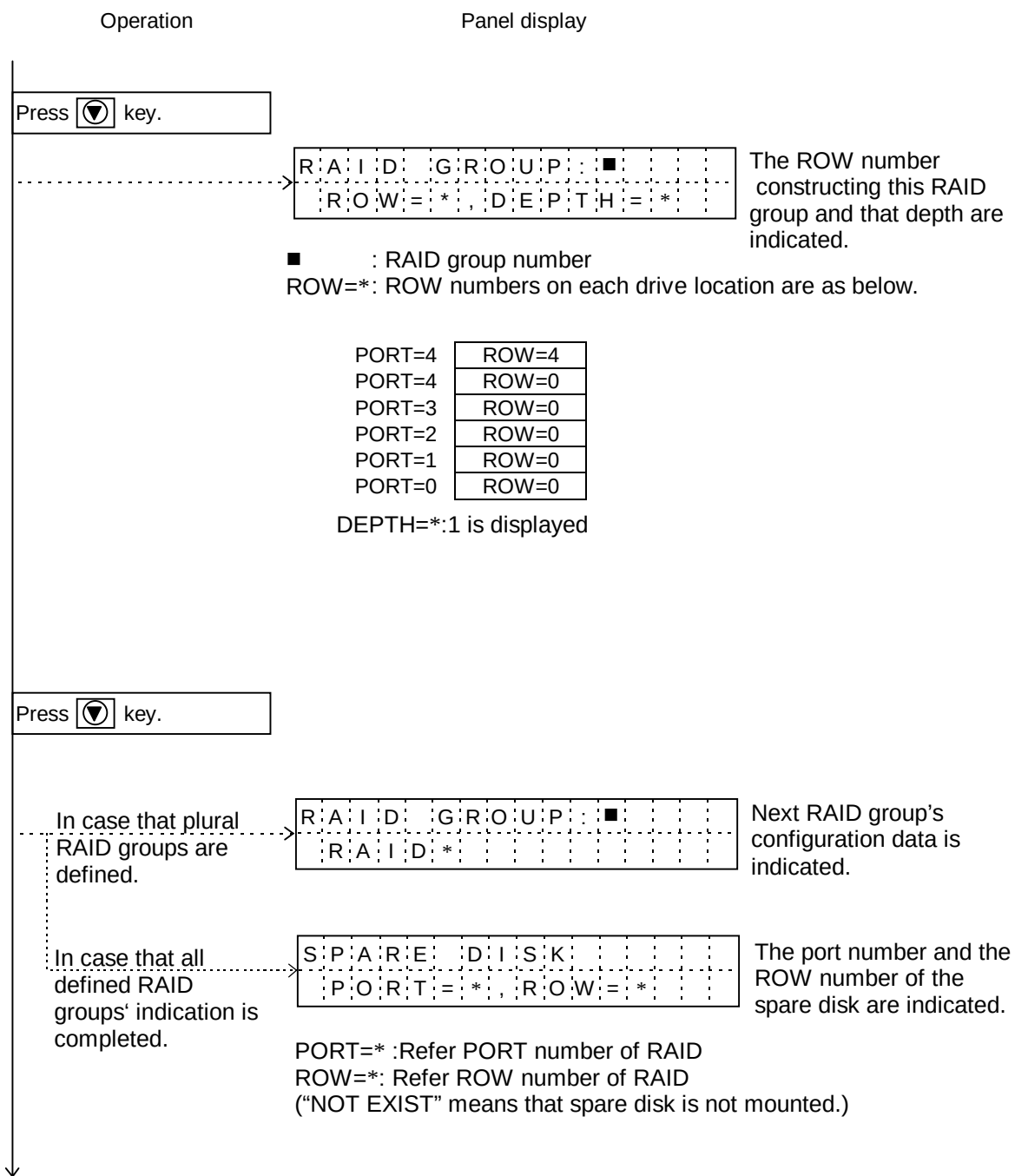


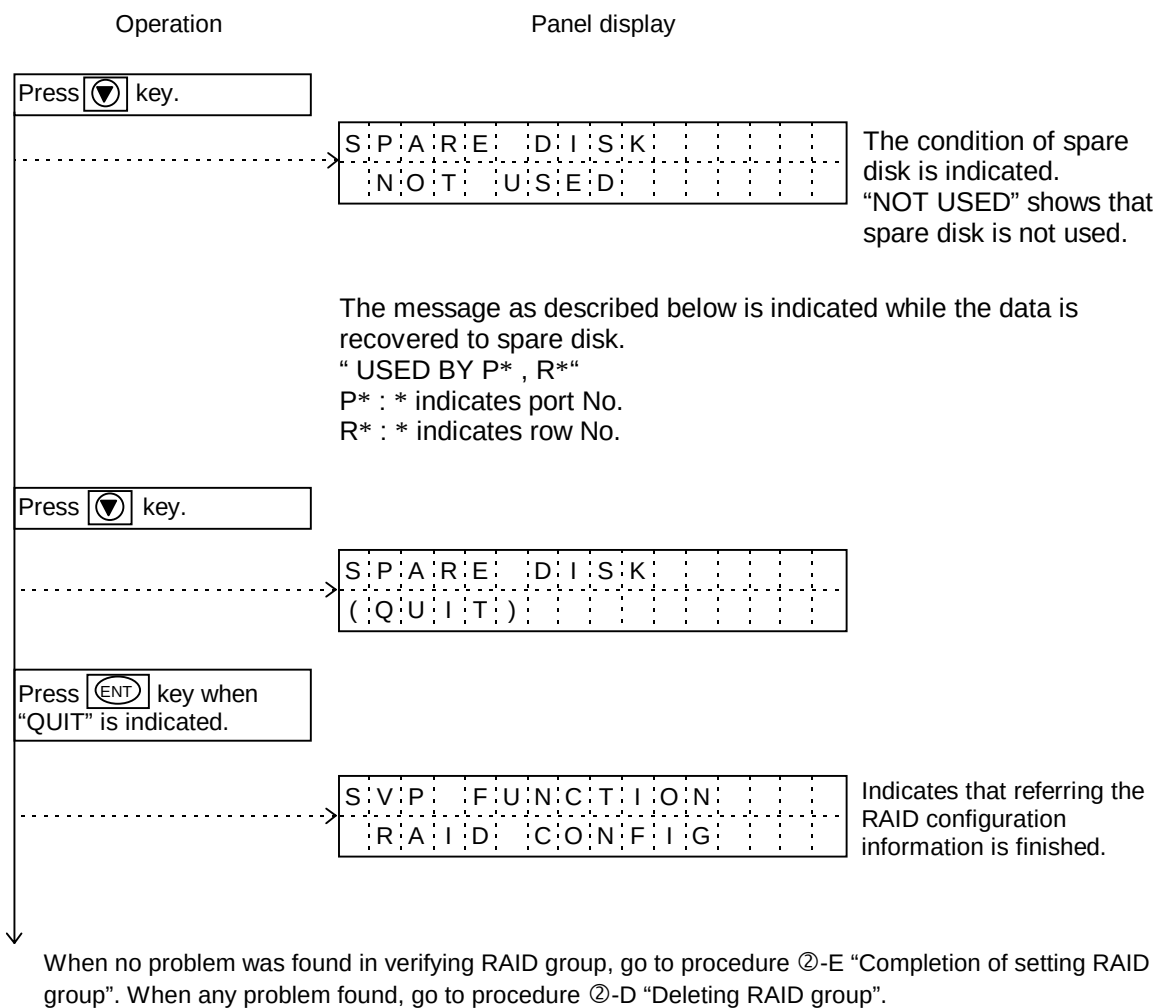
[Procedure②-A] Preparing of setting RAID group



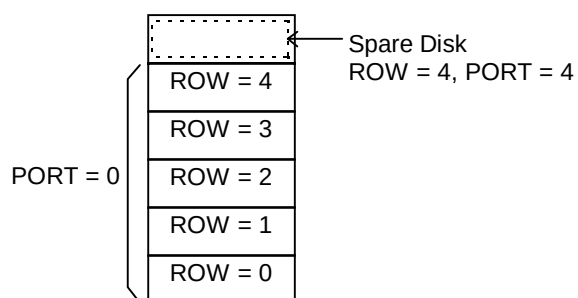
[Procedure②-B] Verifying RAID group







Mini Tower TYPE



[Procedure②-C] Setting RAID group

Operation

Panel display

Pressing  key until the indication shown on the right appears.

R A I D C O N F I G
I N S T I T U T E

Display the menu of adding RAID group.

Press  key.

I N S R A I D G R P ■
A L L R A I D 5

Indicates that adding the RAID group started.

■ : additional RAID group number

(Not used RAID group is indicated in order of small number automatically.)

Additional item as described below is indicated in the second line by pressing  key.

No.	Item indicated	Function	Remark
1	ALL RAID5	The maximum configuration range (ports and rows) of the subsystem in use is defined as the RAID5, RAID1, RAID0 or RAID A group.	
2	ALL RAID1		
3	ALL RAID0		
4	ALL RAID A		

Press  key when Item you want to set appears.

I N S R O W = ■ , R A I D 5 ?
Y E S

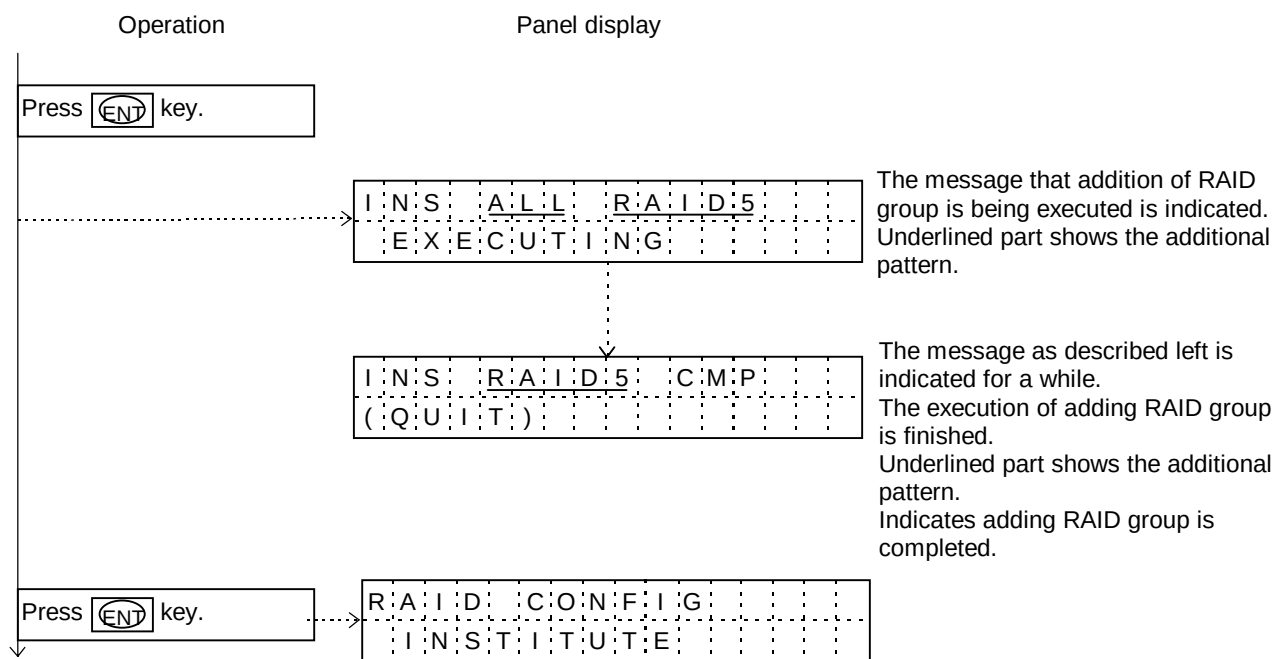
The message to verify additional RAID group is indicated.

Underlined part shows the additional pattern.

(Above is an example in which ROW = ■, RAID5 is selected.)

Pressing , "(QUIT)" is displayed.

In this state, pressing , adding RAID group will be terminated.



Go to procedure ②-B "Verifying RAID group"

Note : Set RAID group for each ROW when you want to set it for each ROW.

[Procedure②-D] Deleting RAID group

Notice : With this operation, Logical Units are deleted, and the user's data will be lost. Be sure to make back up copy before this operation.

Operation

Panel display

Press  key until the indication shown on the right appears.

RAID CONFIG
DELETE

Menu of deleting RAID group is displayed.

Press  key.

DELETE
ALL RAID

Contents of the second-line indication

No.	Item indicated	Function
1	ALL RAID	Deletes all RAID group.
2	RG■ (RAID*)	Deletes appointed RAID group. (■ : RAID group No. * : RAID level)
3	(QUIT)	Returns to the preceding menu.
4	(TERMINATE SVP)	Complete the SVP operation by maintenance panel.

Select item as described right you want to set by  /  key and press  key .

Note : "NO EFFECT" is indicated when no deletable RAID group exists.

Go to ① when you want to delete all RAID groups , Go to ② when you want to delete appointed RAID group.

①Deleting all RAID groups

Operation

Panel display

Select item as described right you want to set by  /  key and press  key .

DEL ALL RAID?
(QUIT)

The message to verify the deletion of RAID group is displayed.

Contents of the second-line indication

No.	Item indicated	Function
1	(QUIT)	Returns to the preceding menu.
2	YES	Deletes all RAID groups.

DEL ALL RAID
EXECUTING

All RAID groups are deleting.

DEL RAID CMP
(QUIT)

When the deletion is completed , the left indication appears.

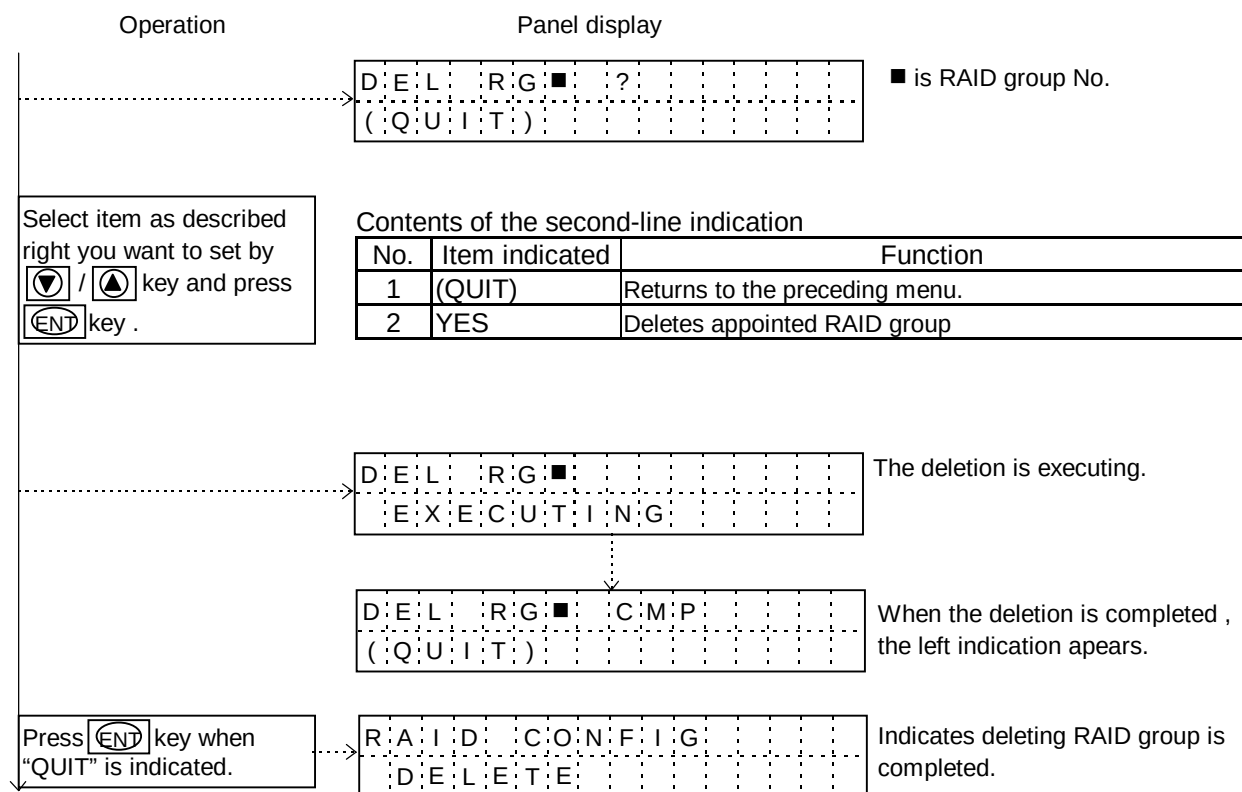
Select "QUIT" by  key and press  key.

RAID CONFIG
DELETE

Indicates deleting RAID group is completed.

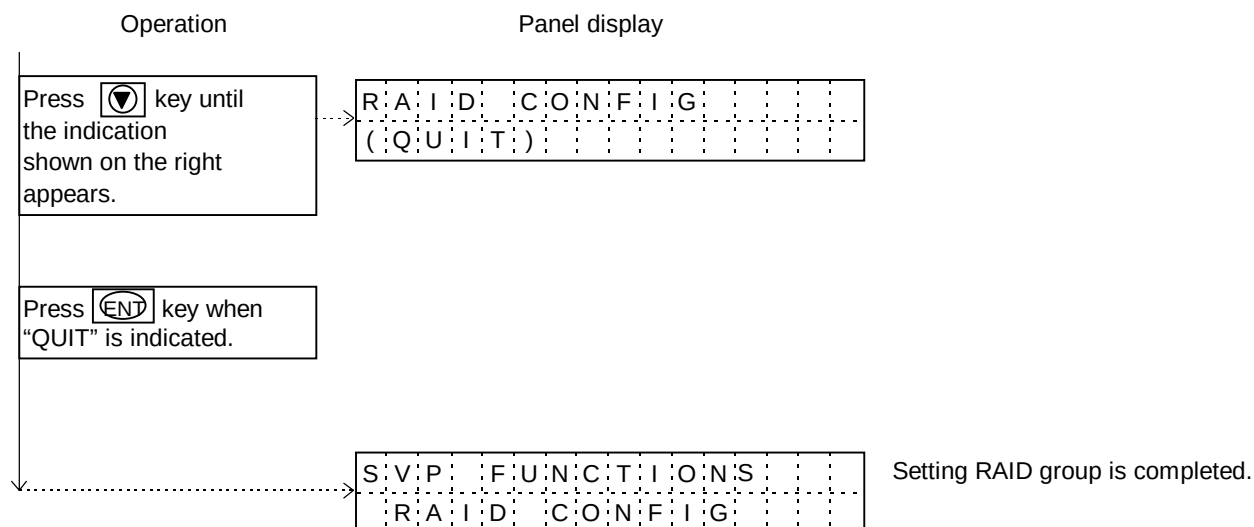
Go to procedure ②-C "Setting RAID group".

②Deleting appointed RAID group



Go to procedure ②-C "Setting RAID group".

[Procedure②-E] Completion of setting RAID group



4.3.3 Setting LU

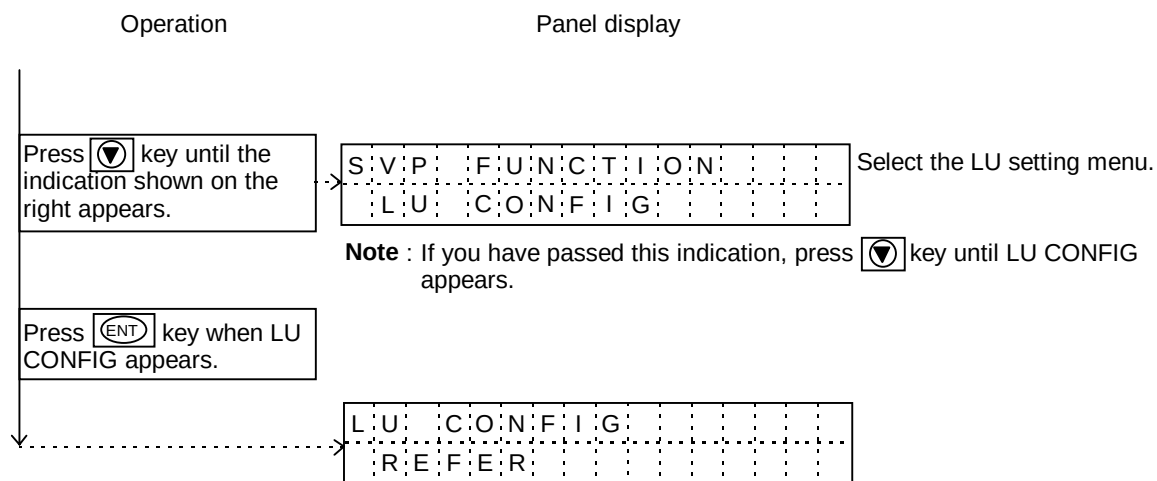
Following procedures are used to set, delete, refer, or format the LU.

This function can be used when the subsystem is ready.

Notice : All user data is lost by deleting the LU.

Be sure to back-up the user data before deleting the LU.

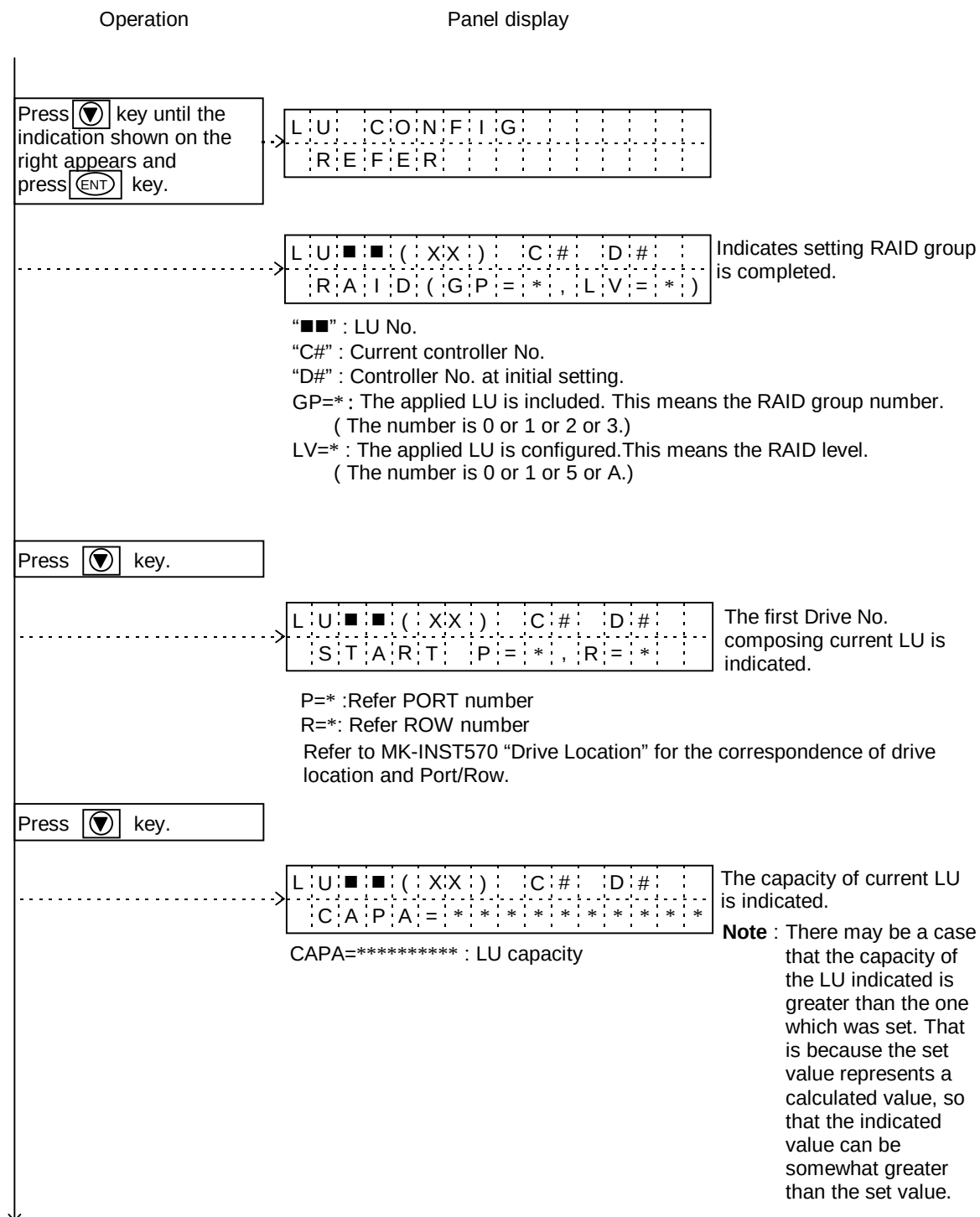
[Procedure③-A] Preparing of setting LU

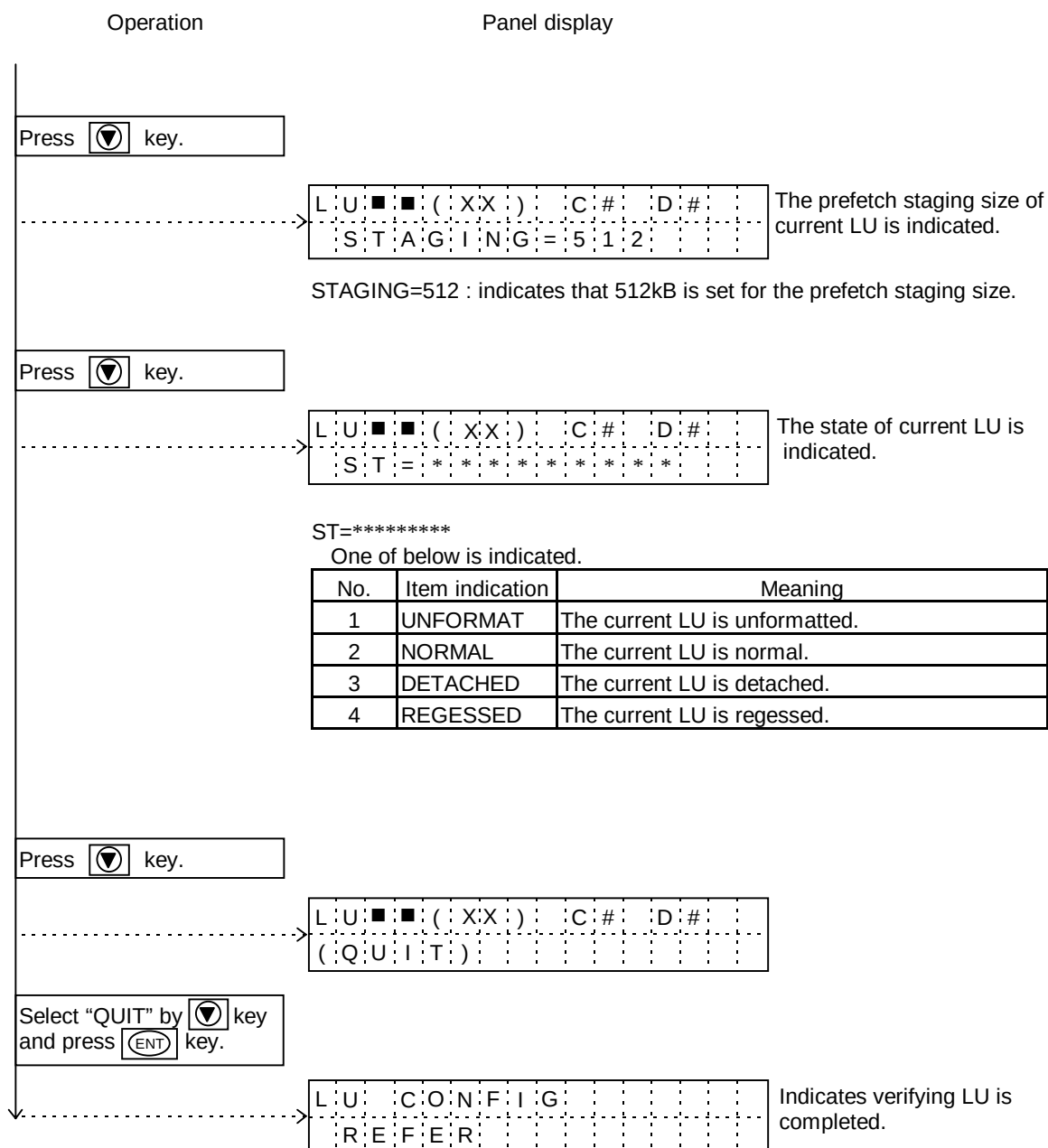


When RAID group is already set, go to procedure ③-C "Setting LU".

When changing no RAID group, go to procedure ③-D "Deleting LU".

[Procedure③-B] Verifying LU





When no problem was found in verifying LU, go to procedure ③-E "Format".

When any problem was found, go to procedure ③-D "Deleting LU".

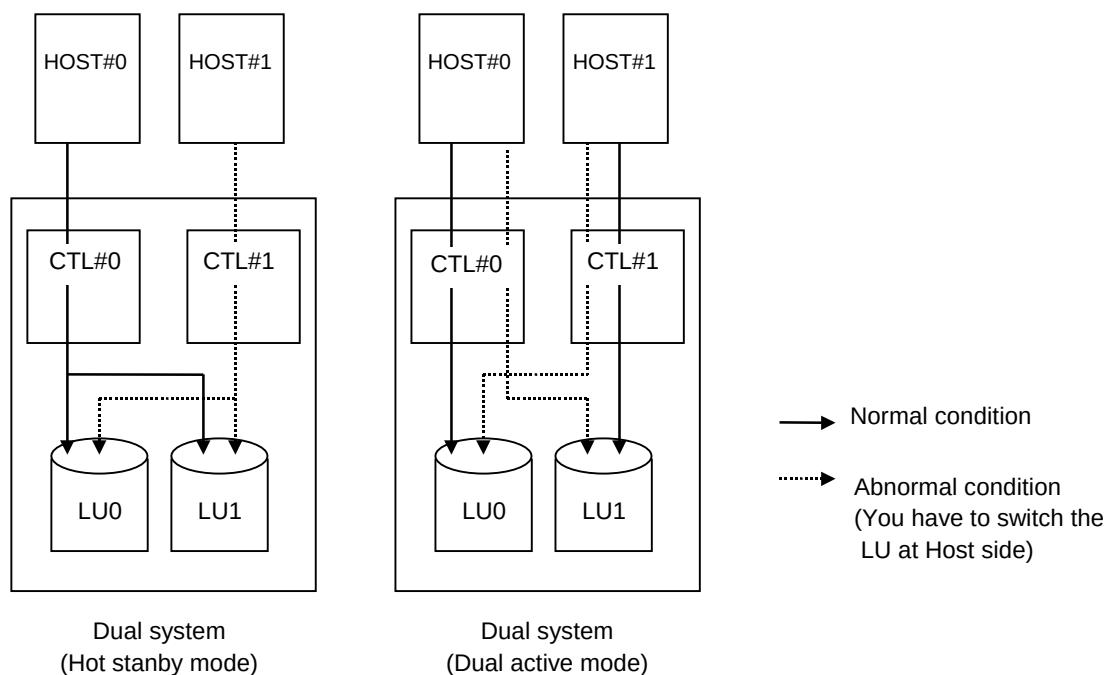
[Procedure③-C] Setting LU

Note) You have to assign service controller to set the LU when dual active mode is selected in the dual system.

Refer to the figure as described below to set the LU assigned service controller.

In the case of example as described above, select “INSTITUTE (CTL0)” when you set LU0 and “INSTITUTE (CTL1)” when set LU1.

In case a service controller is assigned to LU#0 and #1, it is possible to access from HOST#0 and #1, however the data transmitting performance is lowered because of switching LU.

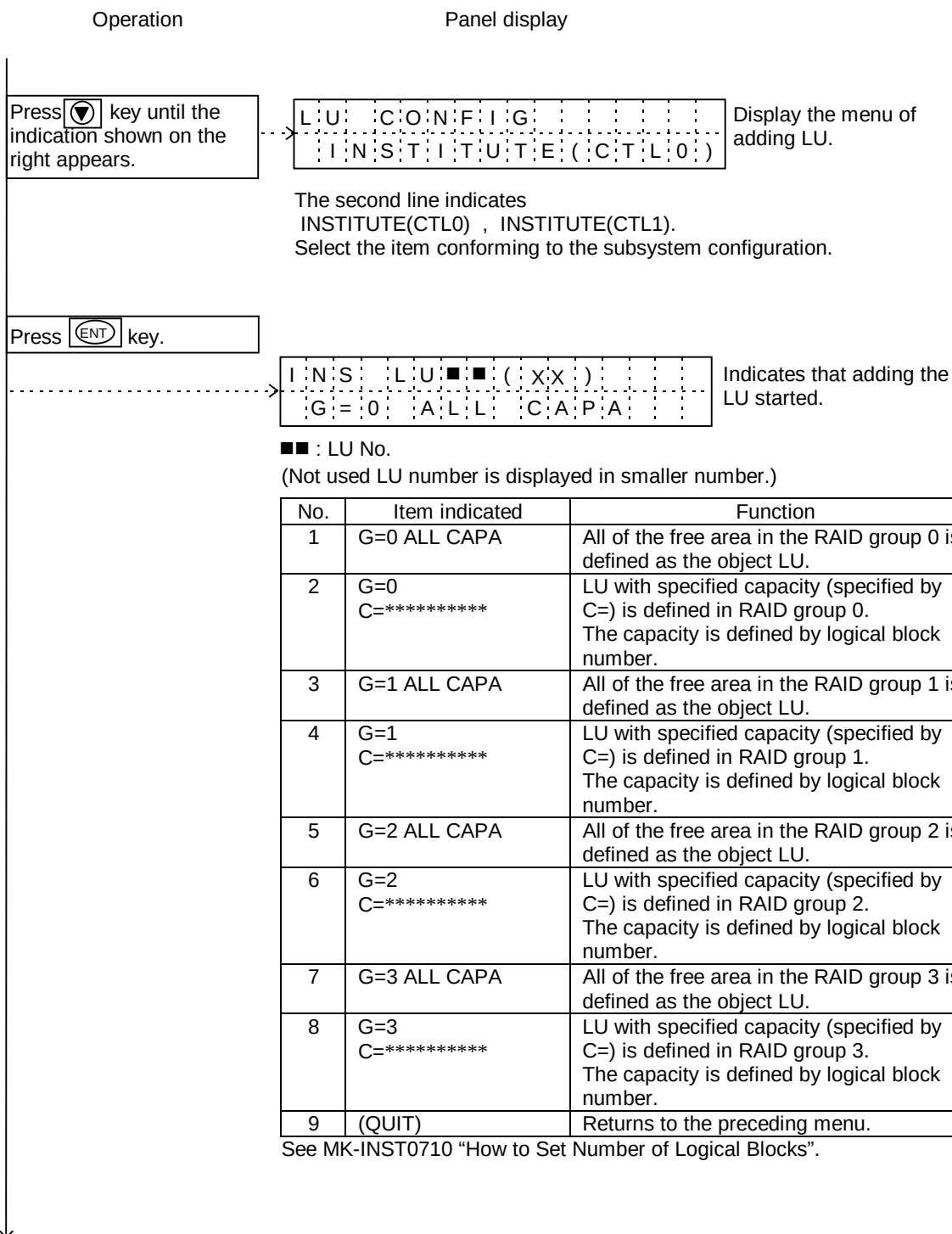


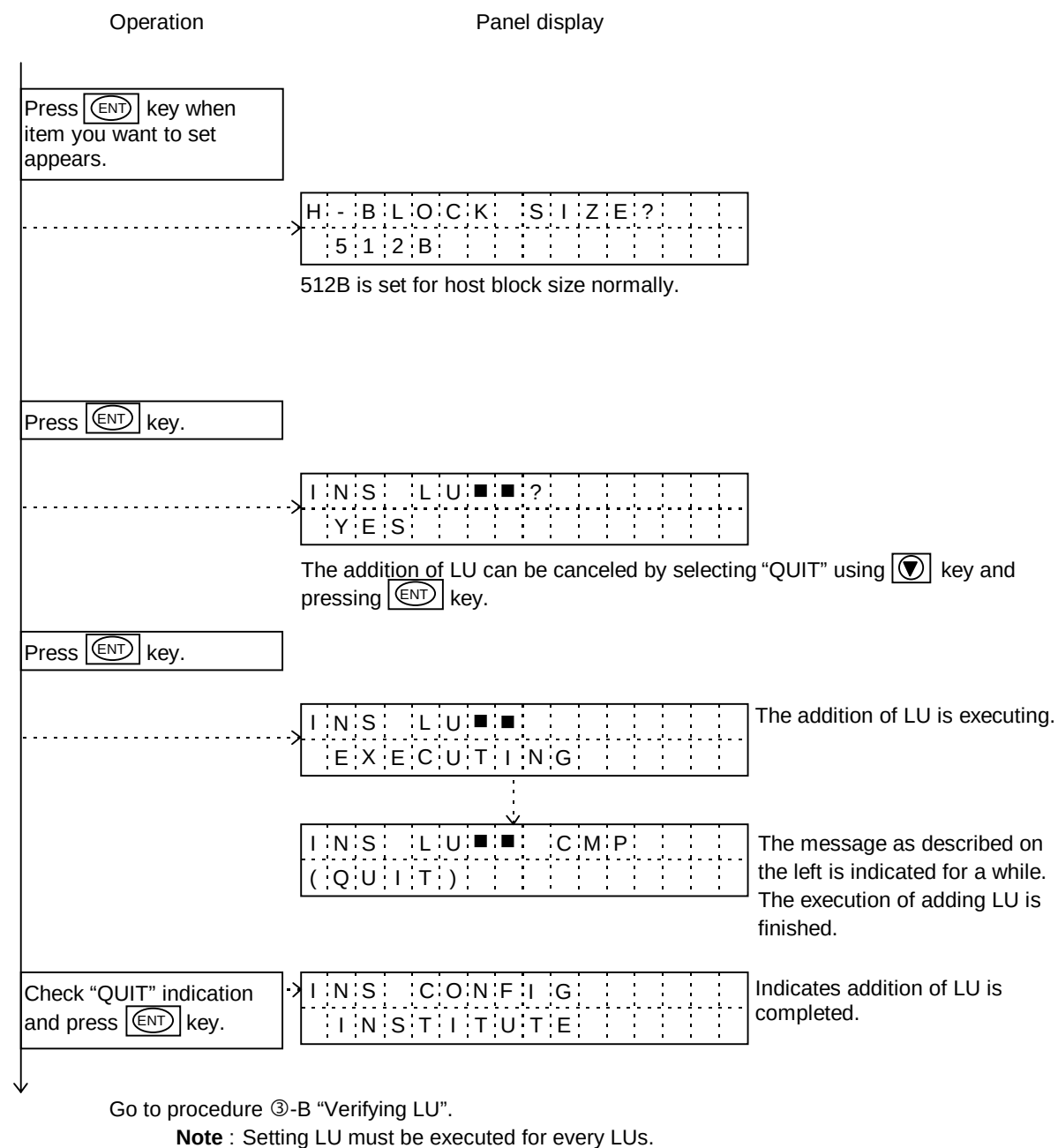
* The function of “Hot standby mode”.

It is possible that the system is continued to execute commands by switching the direction of the commands from Host system to the other controller, if the Host system or the controller failure occurs.

* The function of “Dual active mode”

Controller #0 and #1 are the service controller of LU#0 and #1 respectively.





Supplement / How to Set Number of Logical Blocks

G=*

C=*****



Enter a value (number of logical blocks) here.

- (1) All RAID groups can be divided into up to 8 logical units.
- (2) Set the number of logical blocks to be set for each logical unit to multiples of the following values according to the RAID level.

RAID0	128
RAID1	128
RAIDA	256
RAID5(4D+1P)	512

- (3) When dividing each RAID group into multiple logical units, the total number of blocks in each logical units must be set to the number of logical blocks per row as shown below or less.
- (4) The following lists the number of logical blocks per row.

① When five drives are mounted on a row (four drives for RAID1 and RAIDA);

RAID configuration \ Model (Capacity)	DF-F350-A2E2 (2.0GB)	DF-F350-A2E4 DF-F350-A3E4 (4.1GB)	DF-F350-A1E8 DF-F350-A2E8 (8.7GB)	DF-F350-A1E18 (17.8GB)
RAID0	20,200,960	40,652,160	85,085,440	174,681,600
RAID1/RAIDA	8,080,384	16,260,864	34,034,176	69,872,640
RAID5(4D+1P)	16,160,768	32,521,728	68,068,352	139,745,280

② When n drives are mounted on a row (n < 5);

- RAID0

Number of logical blocks = $m^{(*1)} \times n^{(*2)}$

- RAID1

Number of logical blocks = $m^{(*1)} \times \text{int}(n/2)^{(*3)}$

*1: Refer to the table below for m.

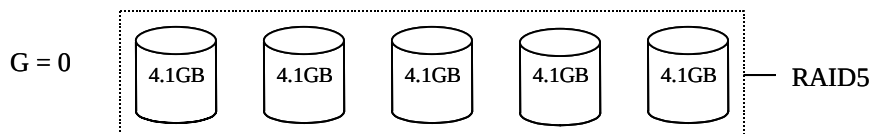
*2: n is 2 or larger in this case.

*3: int means "rounding down".

	DF-F350-A2E2	DF-F350-A2E4 DF-F350-A3E4	DF-F350-A1E8 DF-F350-A2E8	DF-F350-A1E18
Capacity	(2.0GB)	(4.1GB)	(8.7GB)	(17.8GB)
m	4,040,192	8,130,432	17,017,088	34,936,320

(5) Examples of the number of logical blocks set are shown below.

Example ① An example of a logical unit of disks (4.1GB 5units) is divided into 8 LUs.



An example is shown where all G=0 is RAID5 and the LU is divided into 8 LUs of similar capacity. So each group is divided into 2 LUs.

- Group 0

According to (4) ① the logical block number of RAID5 is 32,521,728 ($512 \times 63,519$). An example is shown where LU of G=0 is divided into 2.

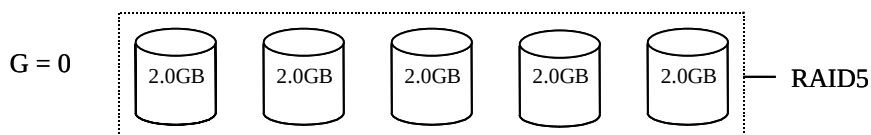
Thus, enter the following.

LU0: G=0

C=16,261,120 ($512 \times 31,760$)

LU1: C=16,260,608 ($512 \times (63,519 - 31,760)$)

Example ② An example of a logical unit of disks (2.0GB 5units) is divided into 8 LUs.



An example is shown where all G=0 is RAID5 and the LU is divided into 8 LUs of similar capacity. So each group is divided into 3 LUs.

- Group 0

According to (4) ① the logical block number of RAID5 is 16,160,768 ($512 \times 31,564$). An example is shown where LU of G=0 is divided into 3.

Thus, enter the following.

LU0: G=0

C=800,768 ($512 \times 1,564$)

LU1: C=5,120,000 ($512 \times 10,000$)

LU2: C=10,240,000 ($512 \times (31,564 - 1,564 - 10,000)$)

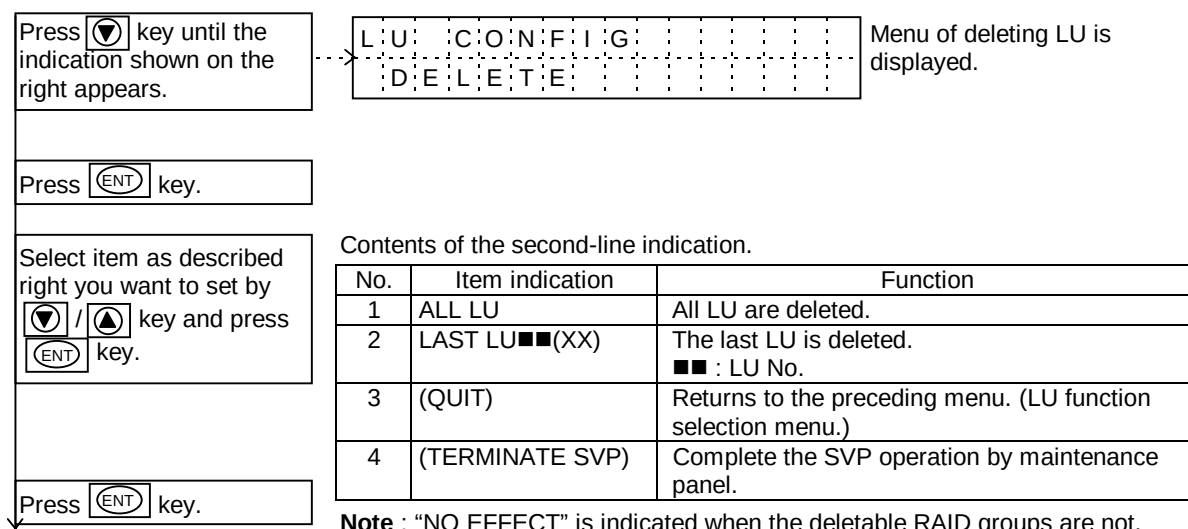
[Procedure③-D] Deleting LU

Note : All user data is lost by deleting the LU.

Be sure to back-up the user data before deleting the LU.

Operation

Panel display



In case of deletion of all LU, go to ①.

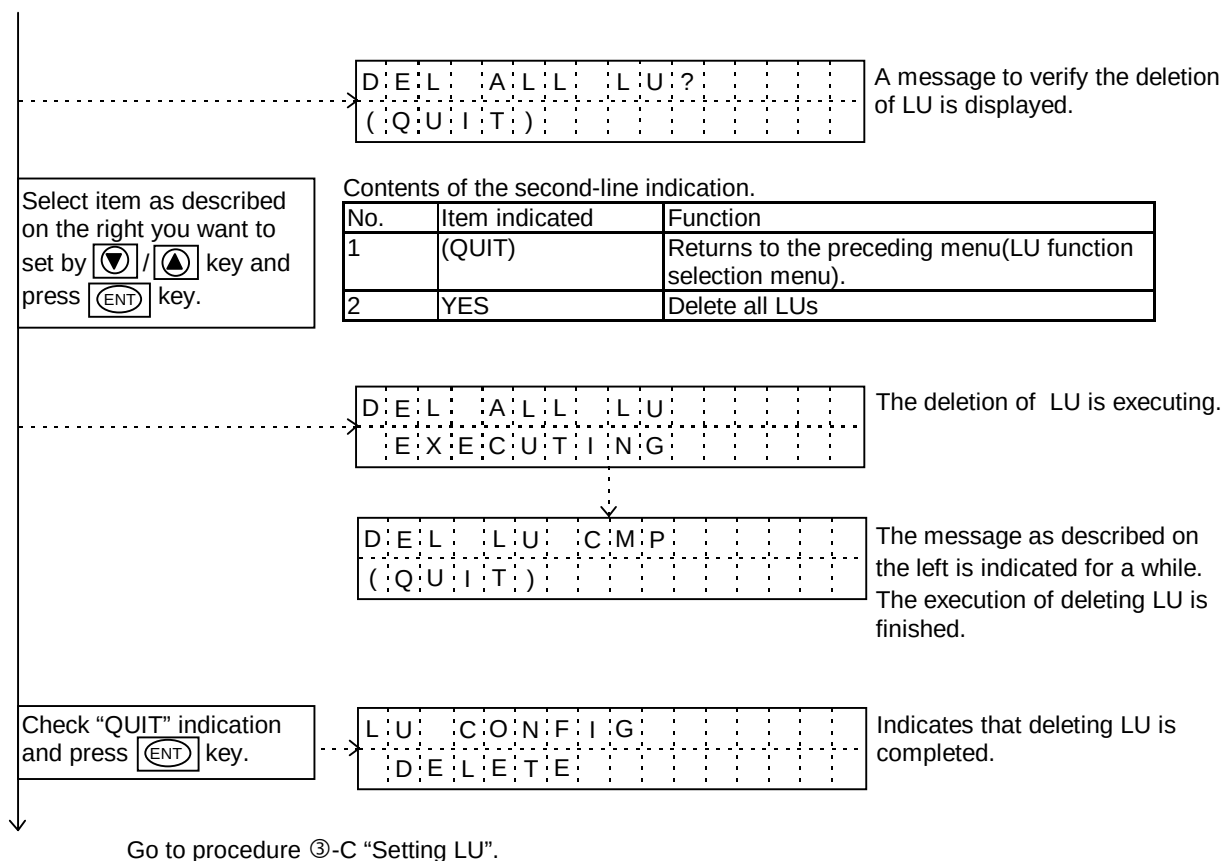
In case of deletion of the last LU, go to ②.

To cancel this operation menu, choose QUIT.

①Deleting all LU

Operation

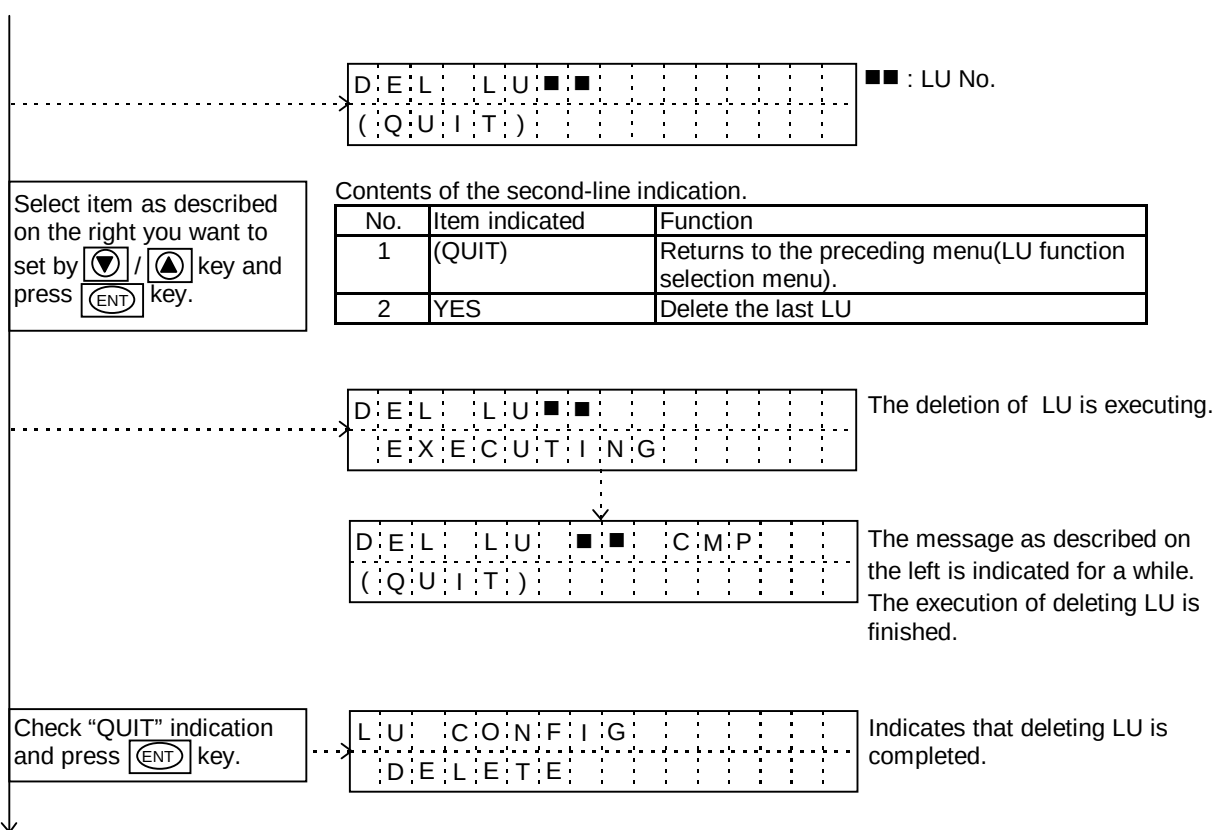
Panel display



②Deleting the last LU

Operation

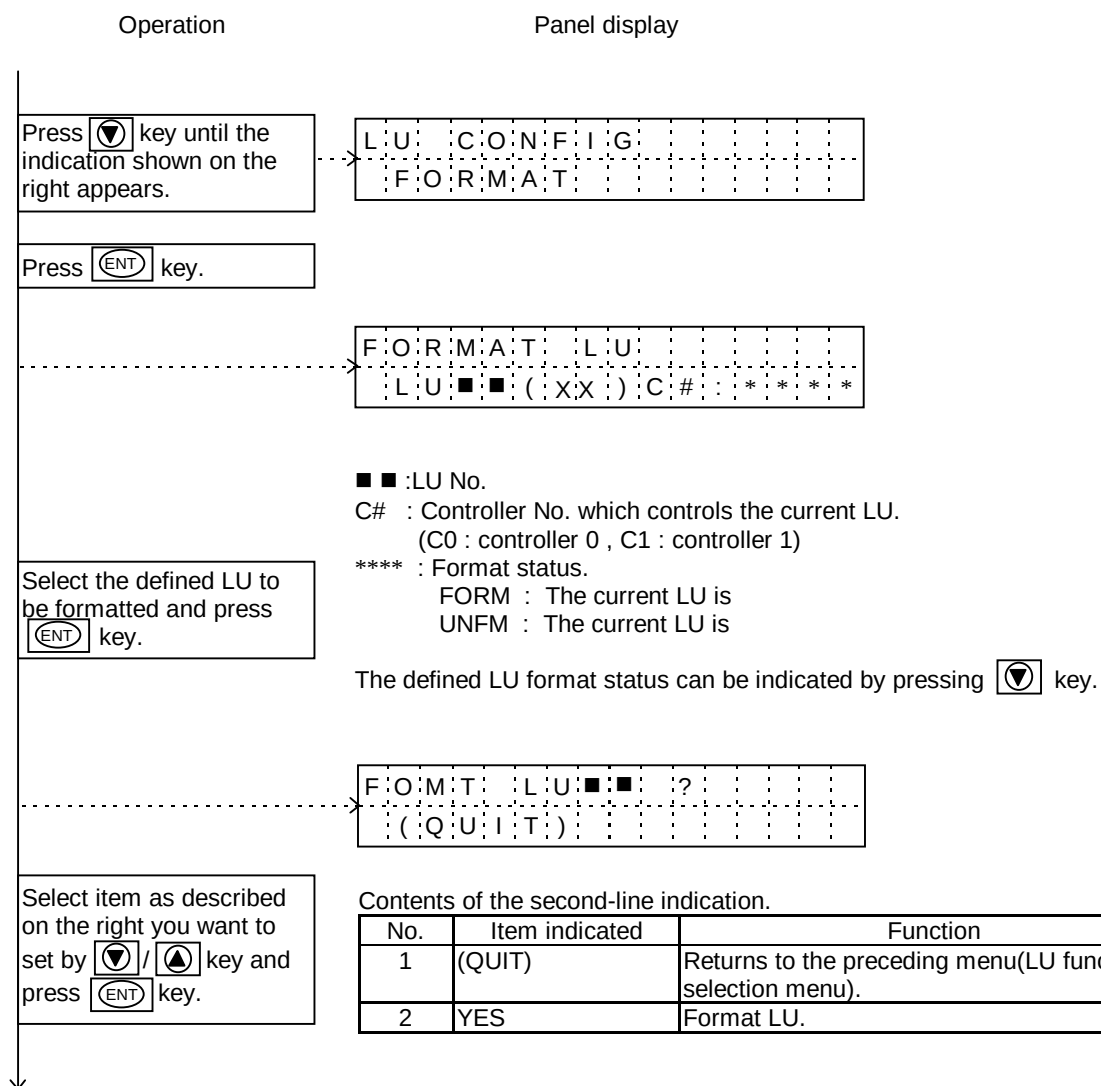
Panel display



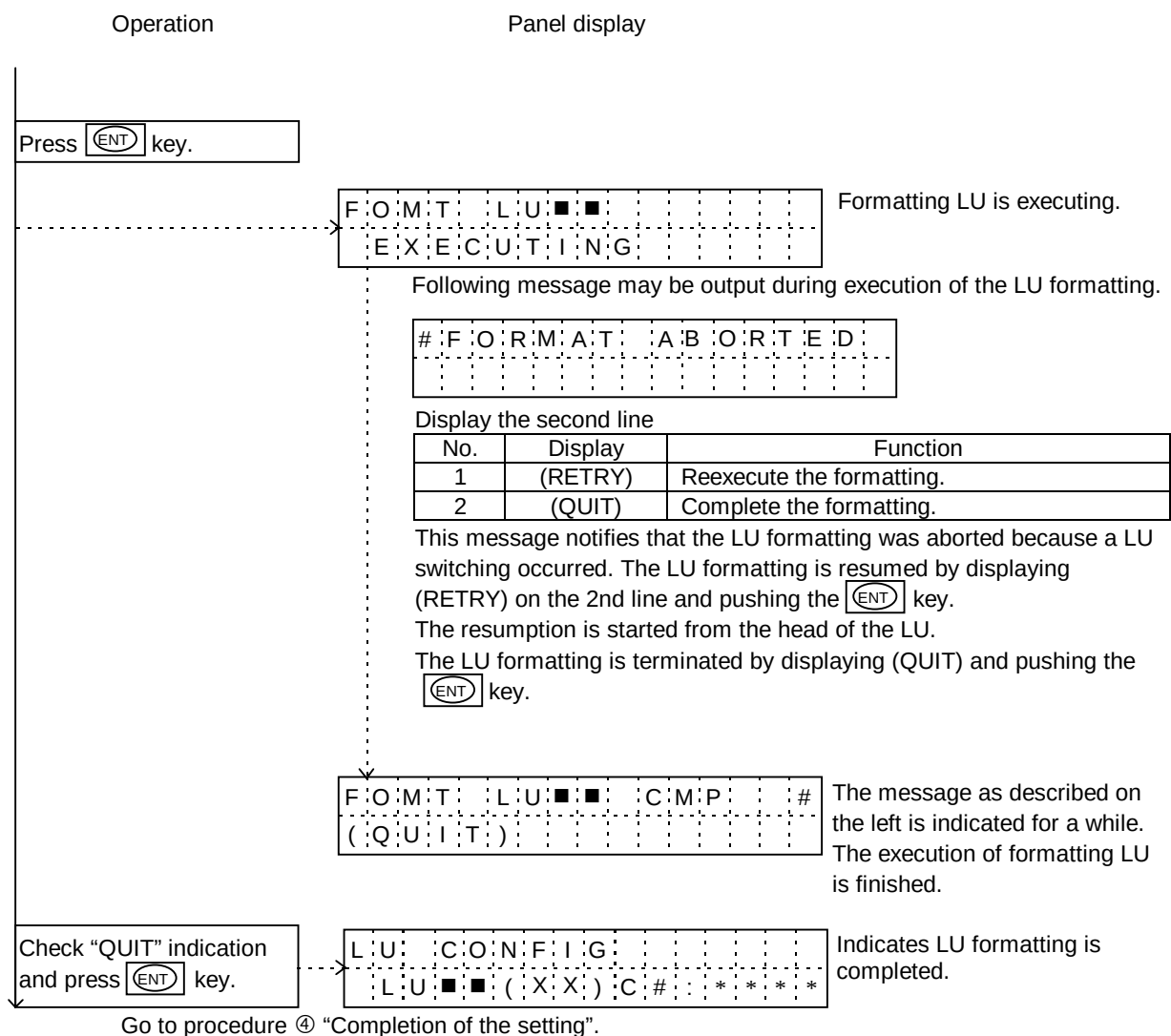
[Procedure③-E] Formatting

Notice : Note that user data will be lost by formatting the formatted LU.

Besides, be sure to execute the LU formatting for each set LU. When the microprogram of version 0354 or later is used, read/write access from the upper device is possible to the LUs other than that being formatted. Accordingly, the formatting for the LU newly added can be executed while executing usual jobs after the addition of the row(s) following the procedures explained on pages MK-OPTION0220 - 0310.

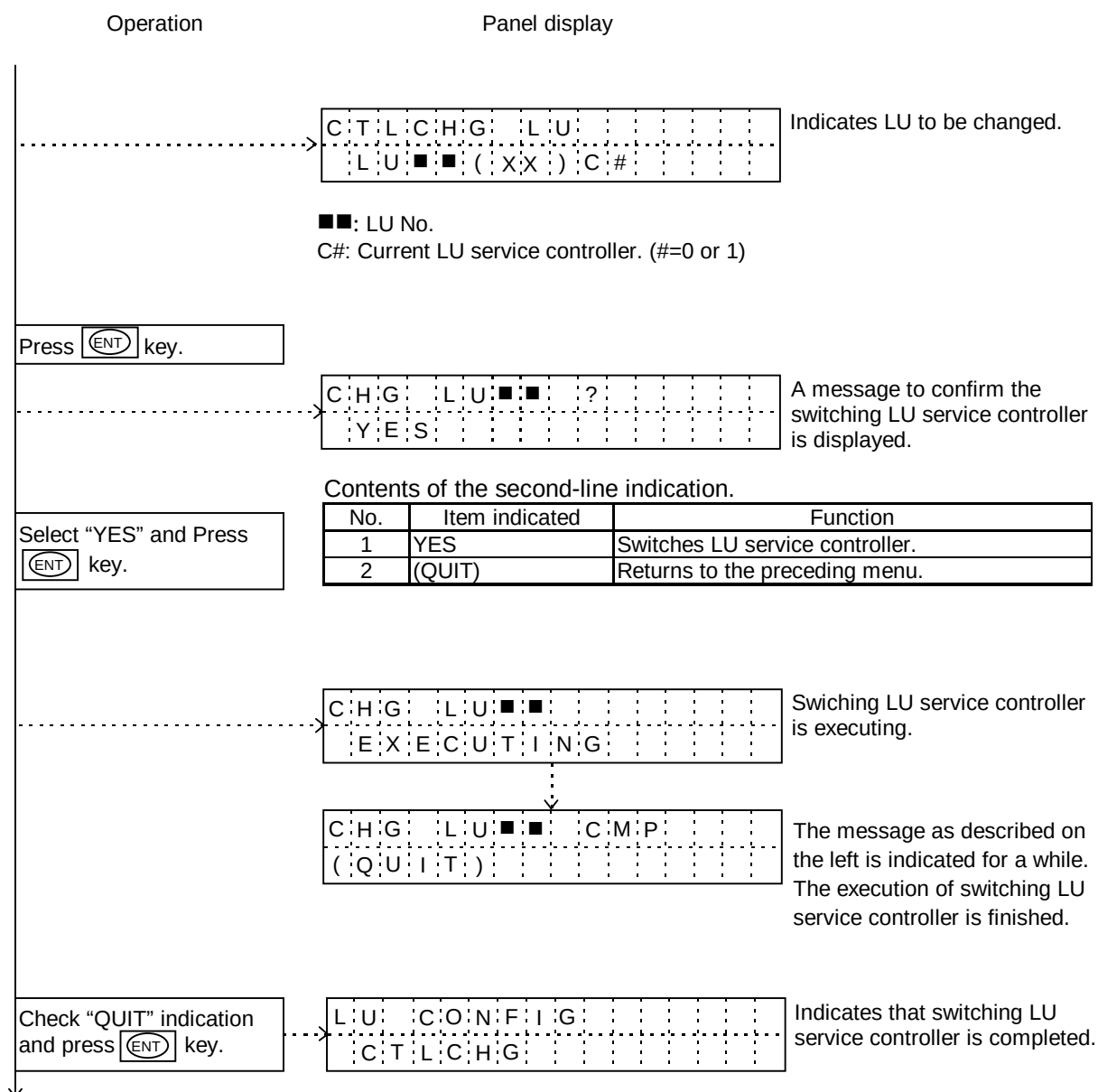


Note : LU format must be executed every set LUs.



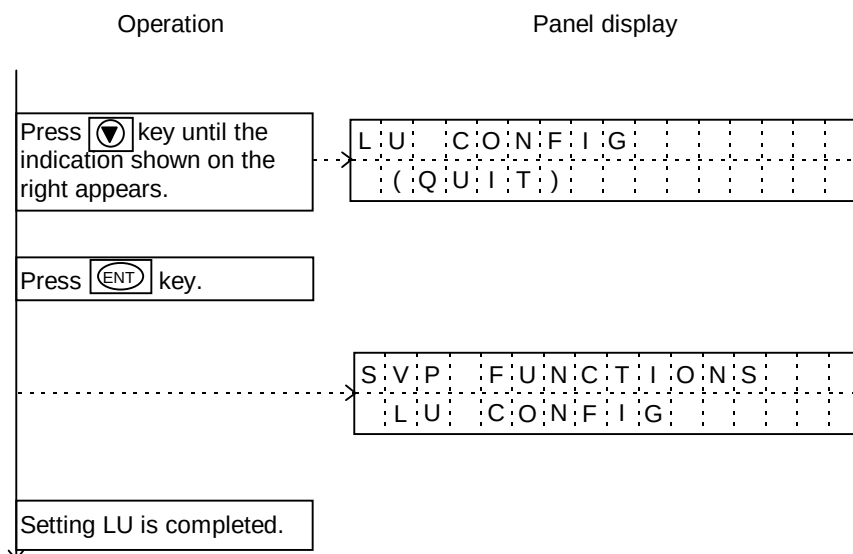
[Procedure③-F] Switching LU service Controller

Note : This function can be used when dual active mode in the dual system is set.



Note : Turn on the power of the subsystem again to make valid switching LU service controller.

[Procedure④] Completion of the setting



LU setting for dual controller configuration

In the case of dual controller configuration(Dual active mode), each LU has to be allocated to a controller which controls that LU in the LU setting operation.

But in the case of dual controller configuration(Hot standby mode), all LU are automatically allocated to the controller #0. (When one of the controllers is blocked, all LU are automatically allocated to the other controller.)

4.2.4 Setting other parameter

The menu items and the use are shown below. Refer to PANEL chapter (PANEL0260) to change the parameter shown below. The function shown below can be used when the subsystem is ready and the LU#0 is already defined.

No.	Menu item	Use	Description	Setting before shipment
1	RAID CONFIG	RAID configuration information reference/setting menu	① Reference to RAID configuration information ② Definition of RAID group ③ Deletion of RAID group	
2	LU CONFIG	LU configuration information reference/setting menu	① Reference to LU configuration information ② Definition of LU ③ Deletion of LU ④ Formatting of LU ⑤ Switching LU service controller	
3	SYSTEM OPT (CUR)	System option setting (Only a current value)	① Drive recovery execution mode ② Copyback recovery mode ③ Correction copy recovery mode ④ Setting of the dynamic sparing starting mode. ⑤ Setting of the interval time in the recovery ⑥ Setting of the unit of recovery processing ⑦ Setting of the Online Verify function ⑧ Setting of the idling time	
	SYSTEM OPT (SVD)	System option setting (A saved value and current value)	① Drive recovery execution mode ② Copyback recovery mode ③ Correction copy recovery mode ④ Setting of the dynamic sparing starting mode. ⑤ Setting of the interval time in the recovery ⑥ Setting of the unit of recovery processing ⑦ Setting of the Online Verify function ⑧ Setting of the idling time ⑨ Setting of the job time-out limit ⑩ Setting of the number of detections in the execution of the reselection time-out ⑪ Setting of the TRESPASS mode (*1)	
4	DRIVE MAINTEN	Drive maintenance menu	① Instruction of drive detaching ② Instruction of drive recovery ③ Reference to drive data recovery status ④ Drive self diagnosis ⑤ Parity matching check ⑥ ECC check ⑦ LA check ⑧ Drive format ⑨ Recovery of system information ⑩ Reference of the disk failure statistical information.	

*1 : This menu is displayed only when ALTERNATE PATH3 has been set by SPECIAL CONNECT of the system parameter.

No.	Menu item	Use	Description	Setting before shipment
5	MICRO VER/REV	Microprogram version/revision numbers reference menu	① Reference to microprogram version/revision	
6	GATHERING (CTL0)	Gathers information of the controller #0 in FD in case of dual system configuration	① Output of dump information being stored in the drive to floppy disk ② Output of trace information being stored in the drive to floppy disk ③ Output of trace information being stored in the memory to floppy disk	
7	GATHERING (CTL1)	Gathers information of the controller #1 in FD in case of dual system configuration	① Output of dump information being stored in the drive to floppy disk ② Output of trace information being stored in the drive to floppy disk ③ Output of trace information being stored in the memory to floppy disk	
8	MEMORY MAINT	Memory content reference/update menu	① Reference/update of memory content	
9	RECV ERR INFO	Error display of recovery when the power is on	① Displays the errors occur during recovery operation performed while power is on	
10	PIN INFO	Display of PIN existence of every LU	① Display of PIN data existence	
11	WARNING INFO	Display of unrecovered warning information	The current warning information is indicated	
12	CLEAR LOG(CTL0)	Clearing log information of controller #0	Log information related controller and host I/F is cleared	
13	CLEAR LOG(CTL1)	Clearing log information of controller #1	Log information related controller and host I/F is cleared	
14	THRESHOLD	Reference/set threshold value.	Reference/set threshold value.	
15	TOPOLOGY (CTL0)	Reference/set the topological information for controller 0.	Reference/set the topological information (FC_AL, Fabric).	
16	TOPOLOGY (CTL1)	Reference/set the topological information for controller 1.	Reference/set the topological information (FC_AL, Fabric).	
17	SELFPORT (CTL0)	Reference/set port information for controller 0.	Reference/set own port information.	
18	SELFPORT (CTL1)	Reference/set port information for controller 1.	Reference/set own port information.	
19	SECURITY (CTL0)	Reference/set security information for controller 0.	① Enable/disable the access check. ② Reference/set host identification information.	
20	SECURITY (CTL1)	Reference/set security information for controller 1.	① Enable/disable the access check. ② Reference/set host identification information.	
21	FFC REV (CTL0)	Refers to the revision number of the FFC firmware of the controller 0.	Display of the revision number of each type of firmware in FFC.	
22	FFC REV (CTL1)	Refers to the revision number of the FFC firmware of the controller 1.	Display of the revision number of each type of firmware in FFC.	

5. Changing the Configuration

5.1 Shifting to Hot Standby from Dual Active

Shifting to Hot Standby from Dual Active while the controller is blocked cannot be performed. Perform the shifting after the blockage is recovered. If PIN segment exists, shifting cannot be performed. Perform the shifting after the PIN segment is recovered.

To see if PIN segment exists, refer to PANEL chapter (PANEL0620 (8)).

- (1) Before turning the power on, set DIP switch No.4 as Figure 5.1.1.

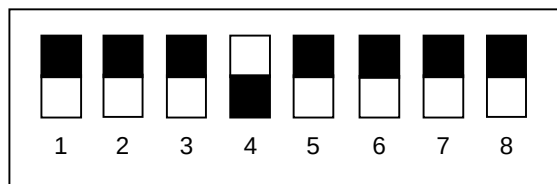
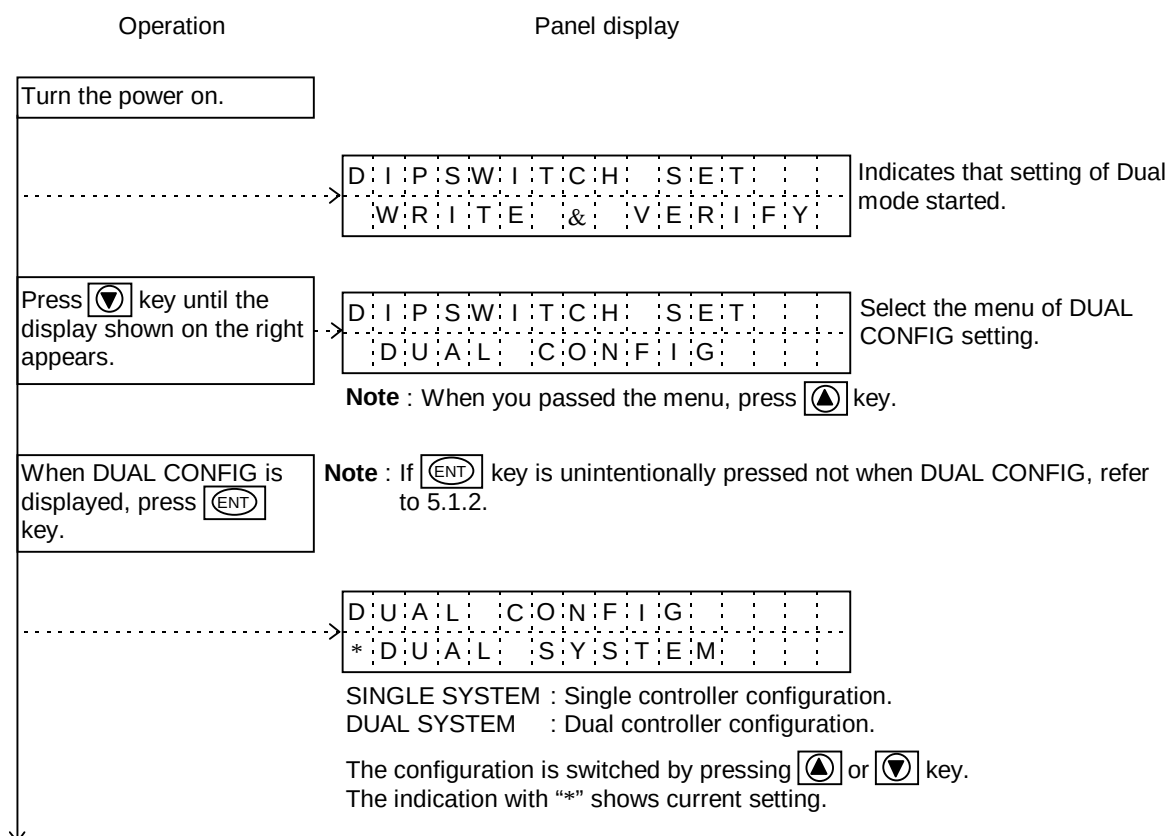
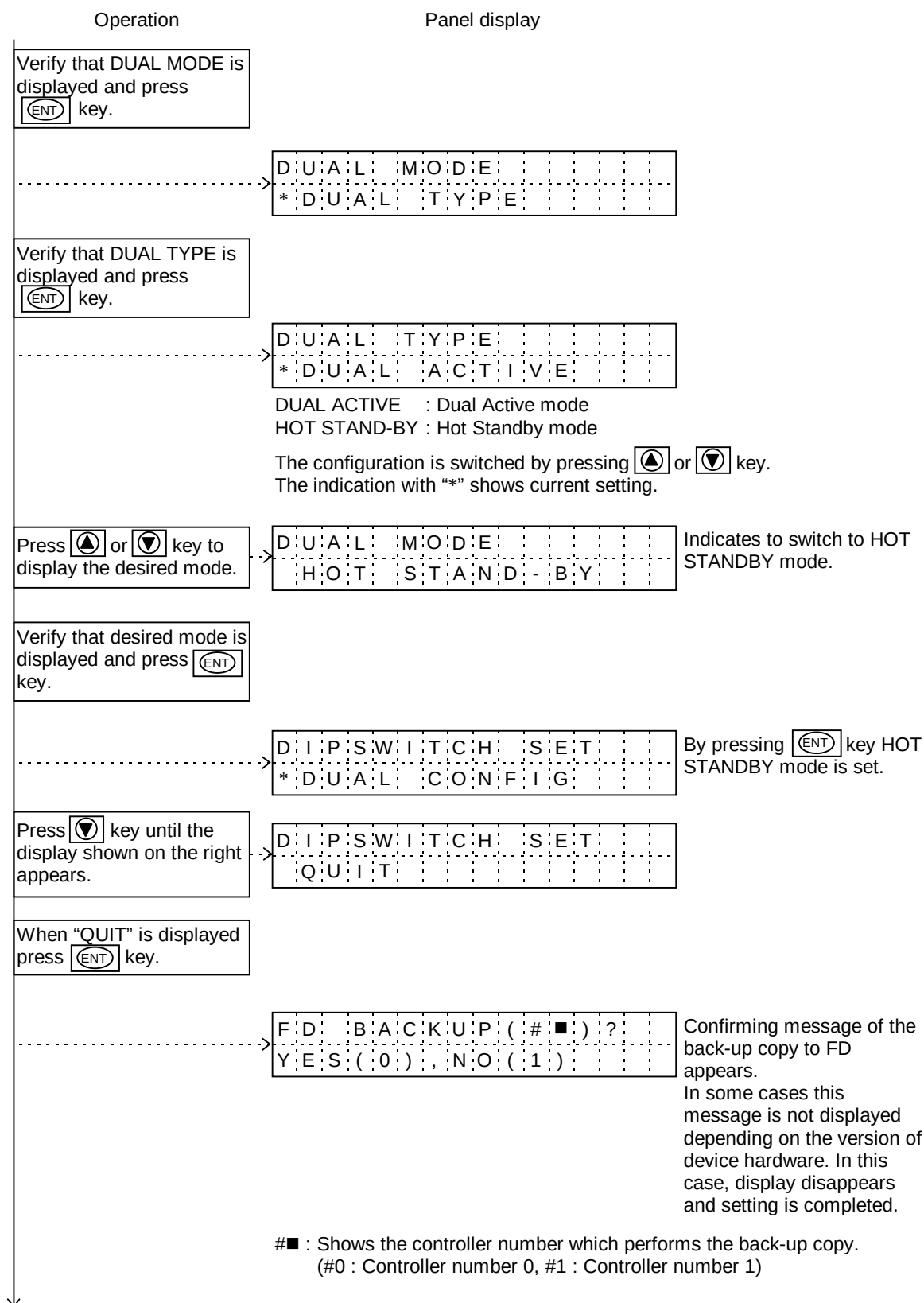
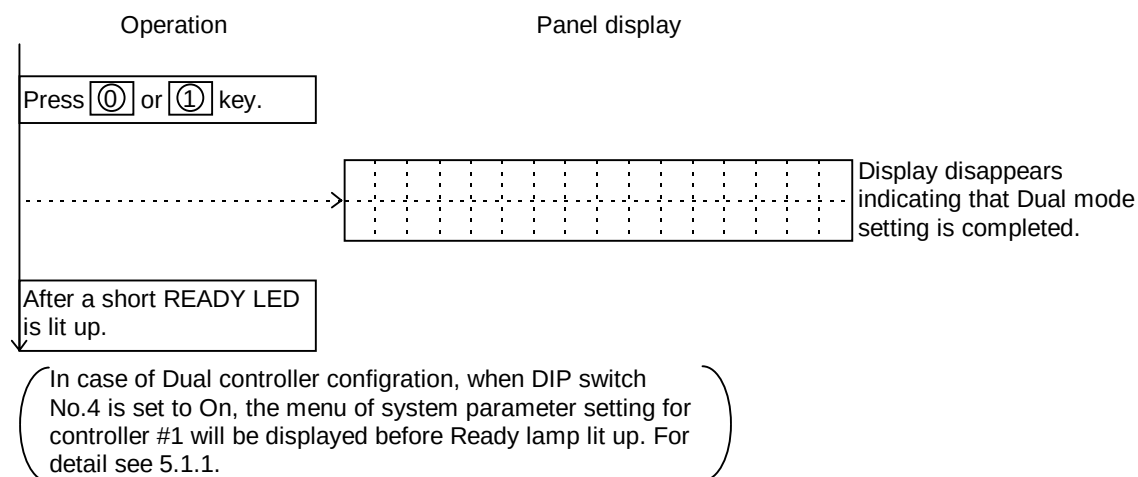


Figure 5.1.1 DIP switch for shifting to Dual system

- (2) Perform as the procedure shown below.







(3) Set DIP switch No.4 as Figure 5.1.2. (Shifting to Dual System has not started yet.)

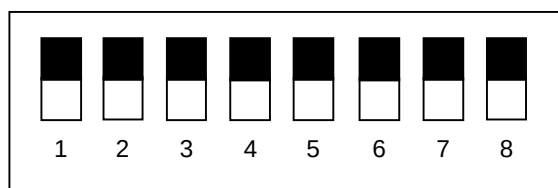


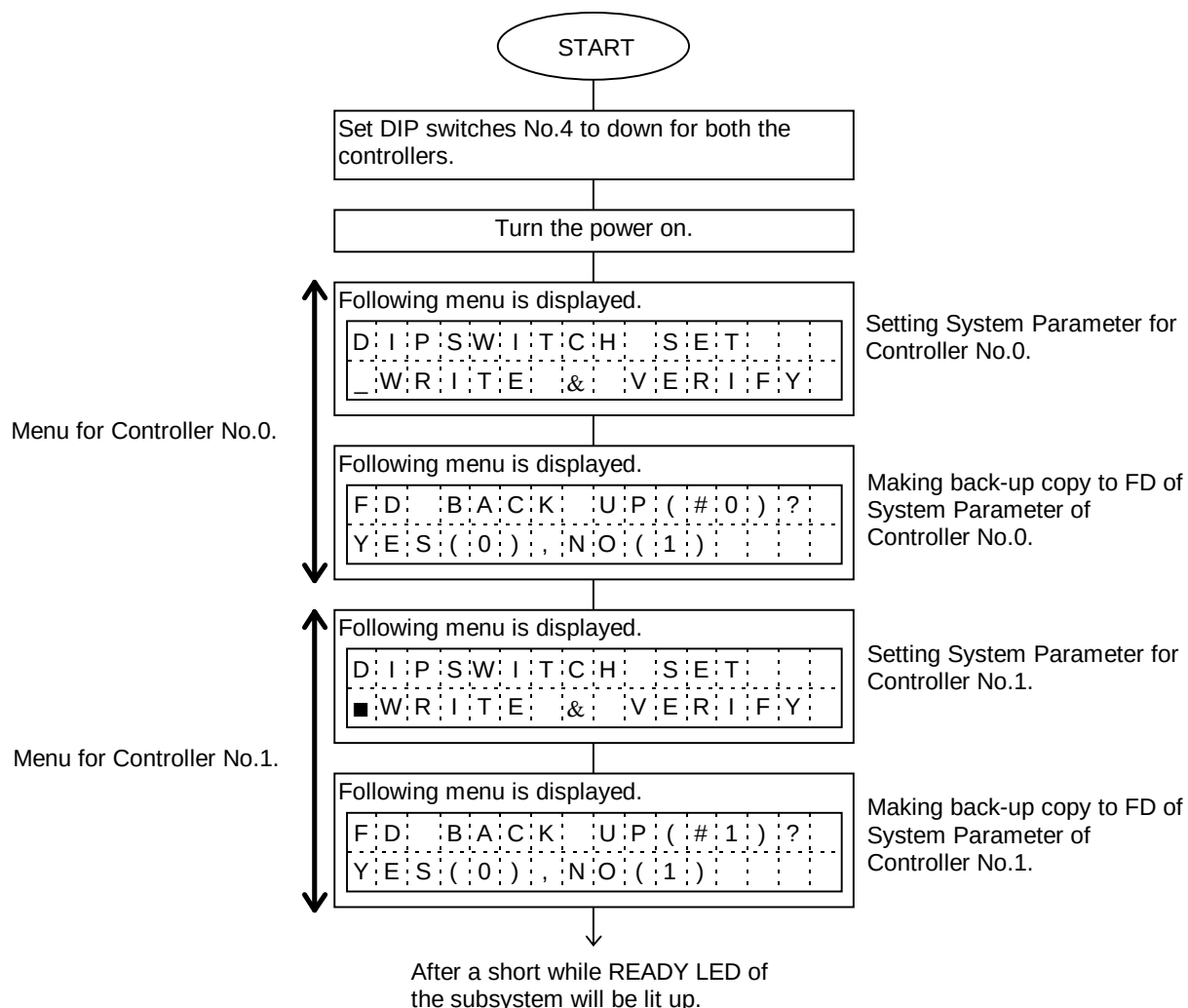
Figure 5.1.2 DIP Switch, shifting to Dual System has not started yet.

Note 1 : When setting Dual mode under dual controller, the setting of controller No.0 will be valid. The setting of controller No.1 will be ignored.

Note 2 : After switching to Dual Active configuration from Hot Standby configuration, Controller No.0 will be the LU Service Controller for previously set LU. To switch LU Service Controller No.1, see “6 PANEL Chapter” (PANEL0370 (2-5)).

5.1.1 Operation of system parameter setting menu under dual controller configuration

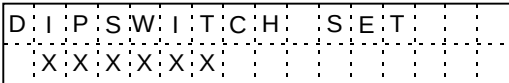
Set DIP switches No.4 to down for both controllers under dual controller configuration, and turn the power off to set the information on EEPROMs of both the controllers.



Note : In case one of DIP switches No.4 is set to down under dual controller configuration, after completion of menu setting for the corresponding controller, READY LED of the subsystem will be lit up.

5.1.2 Returning procedure in system parameter setting menu

During system parameter setting menu when wrong menu is selected ( key is pressed), the method of returning for each menu is shown below.

After the operation below  is displayed.

(XXXXXX : Wrongly selected menu)

Then select desired menu by pressing  or  key.

No.	Menu	Procedure to return
1	WRITE&VERIFY	Press  key.
2	STRIPE SIZE	Press  key.
3	LAN CONST	Press  key to display "QUIT" and press  key.
4	CONNECT VMS	Press  key.
5	ERROR INF	Press  key.
6	CONTROLLER	Press  key.
7	SPARE DISK	Press  key.
8	SERIAL NO	Press  key.
9	ROM V/R	Press  key.
10	RAM V/R	Press  key.
11	ROW LAST LBA	When Menu is ROW LAST LBA : Press  key to display "QUIT", then press  key.
12	BUZZER	Press  key.
13	SYSTEM ERROR	Press  key.
14	INQUIRY INF	Press  key to display "QUIT" and press  key.
15	RTC SET	Press  key to display "QUIT(ENT KEY)" and press  key.

6. Subsystem Settings for Use in Special Modes

6.1 When Connecting to Host Board Adapter Based on HP Tachyon

When connecting the subsystem to the Host Board Adapter based on the HP Tachyon, change the subsystem mode to this mode before using the subsystem.

- (1) Before turning the power on, set DIP switch No.4 as Figure 6.1.1.

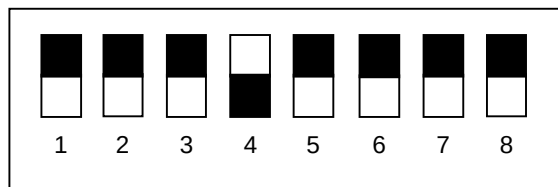
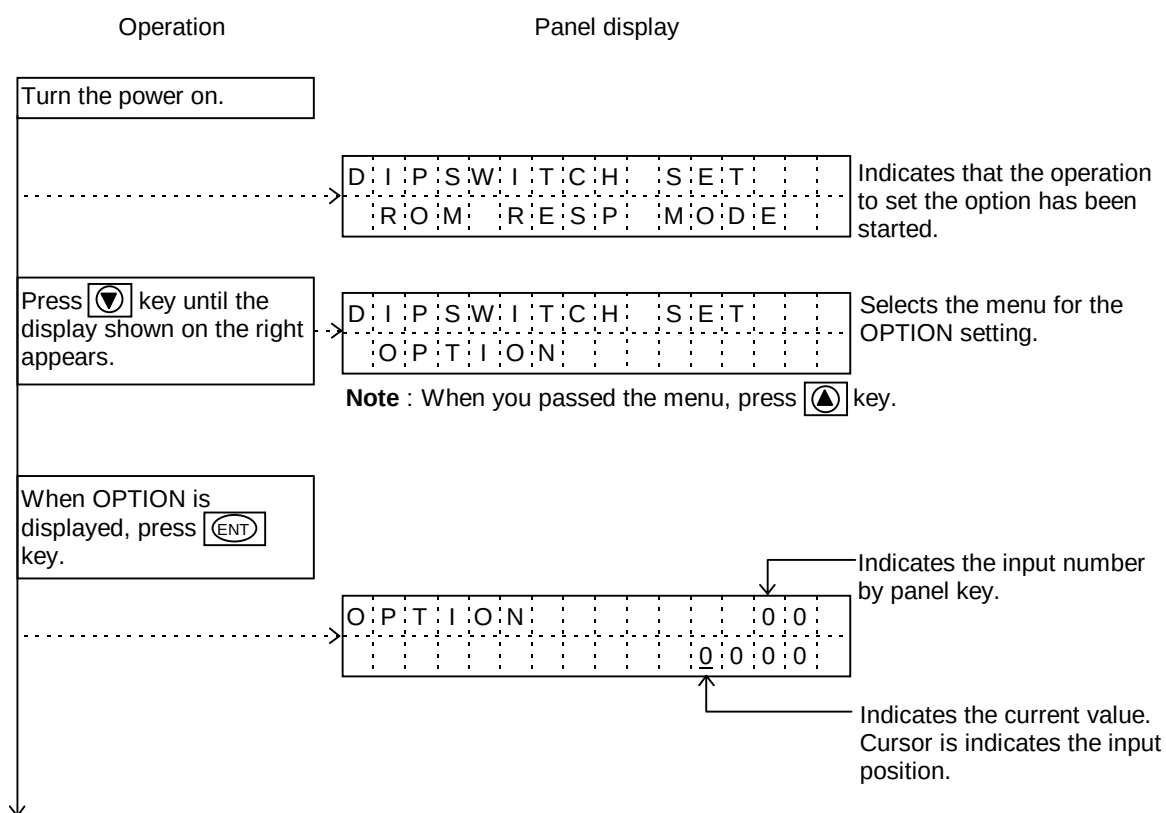
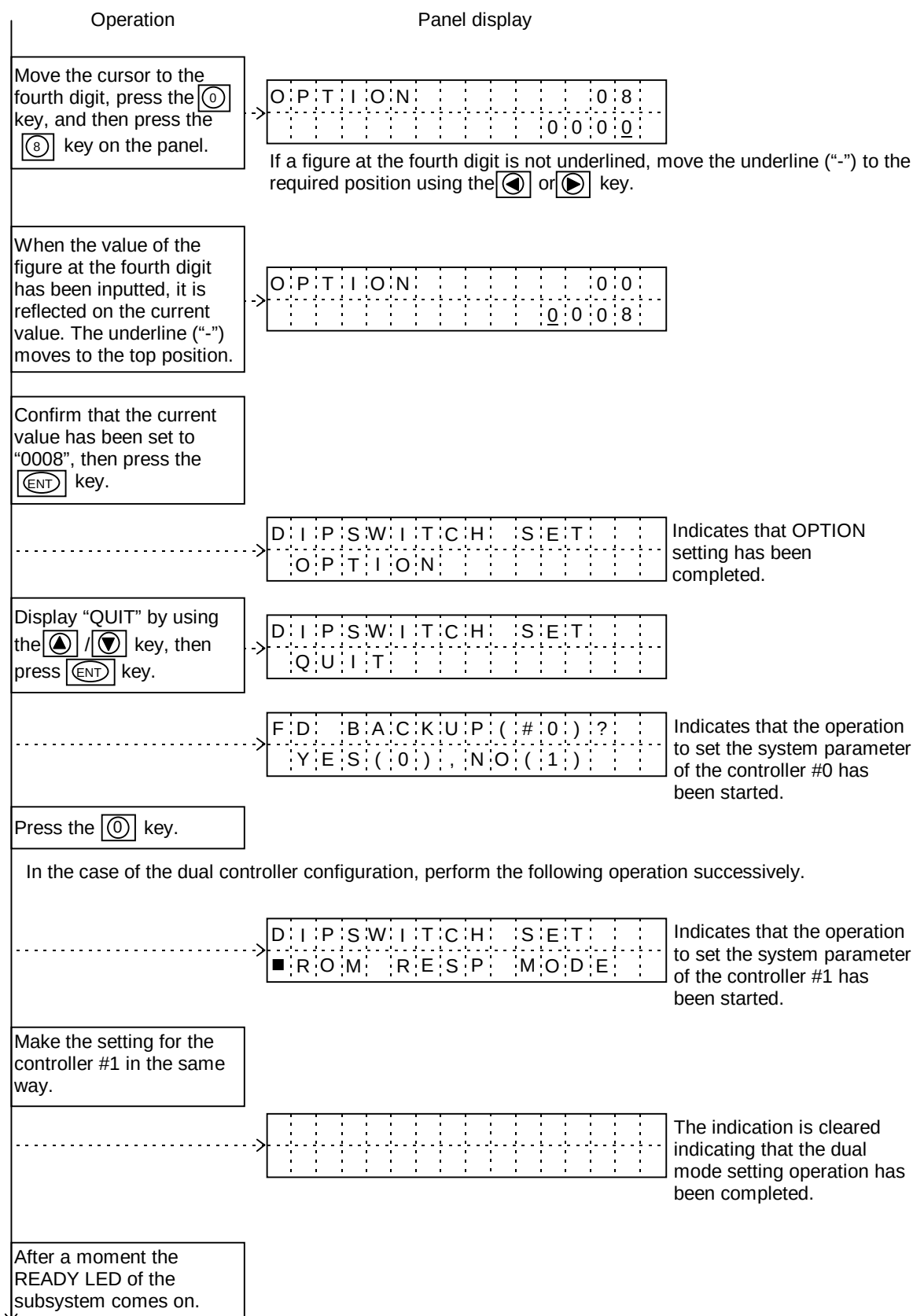


Figure 6.1.1 DIP Switches (Being set for System parameter settings)

- (2) Perform as the procedure shown below.





(3) Set the DIP switch No.4 as shown in Figure 6.1.2.



Figure 6.1.2 DIP switches (Being set for Standard setting)

6.2 When Using I/O Path Switching Function in the State Being Connected to Sequent NUMA-A

When using the I/O path switching function in the state being connected to Sequent NUMA-A, setting of the emulation mode and the setting of the TRESPASS mode from the SVP function is needed.

- (1) Before turning the power on, set DIP switch No.4 as Figure 6.2.1.

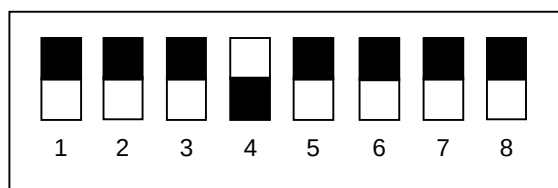
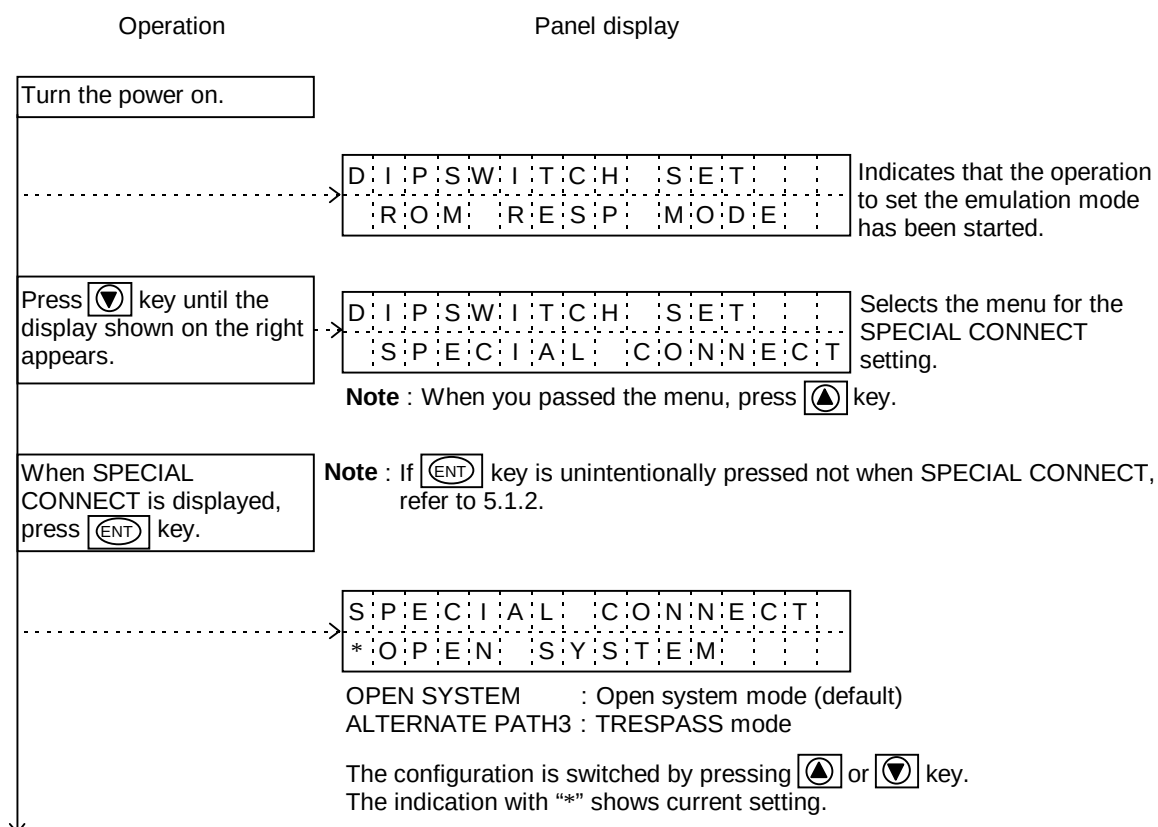
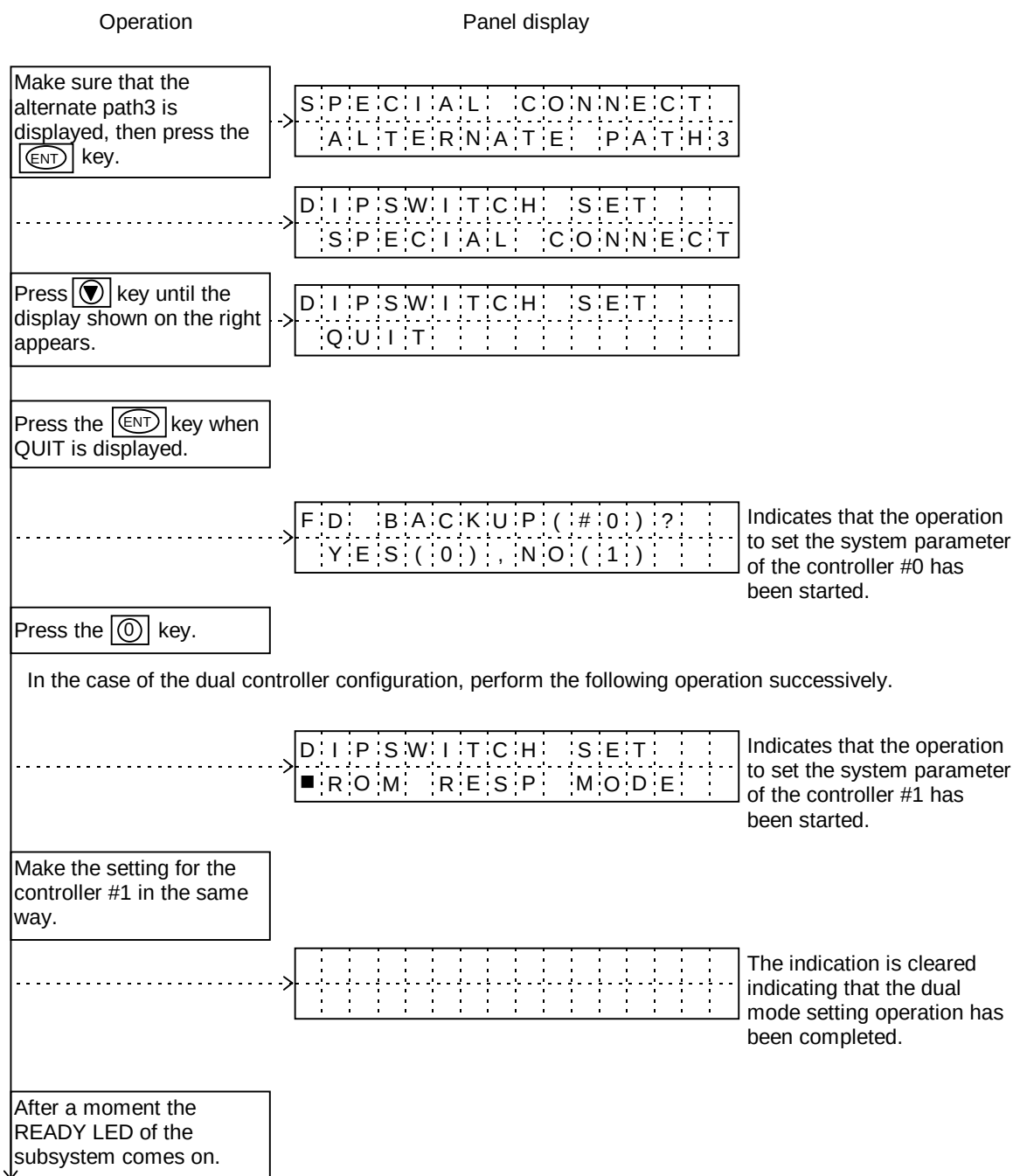


Figure 6.2.1 DIP Switches (Being set for System parameter settings)

- (2) Perform as the procedure shown below.





(3) Set the DIP switch No.4 as shown in Figure 6.2.2.

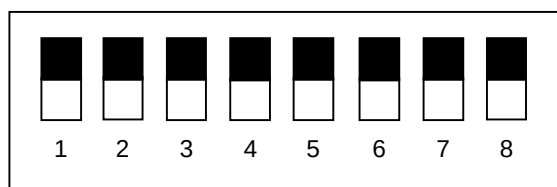
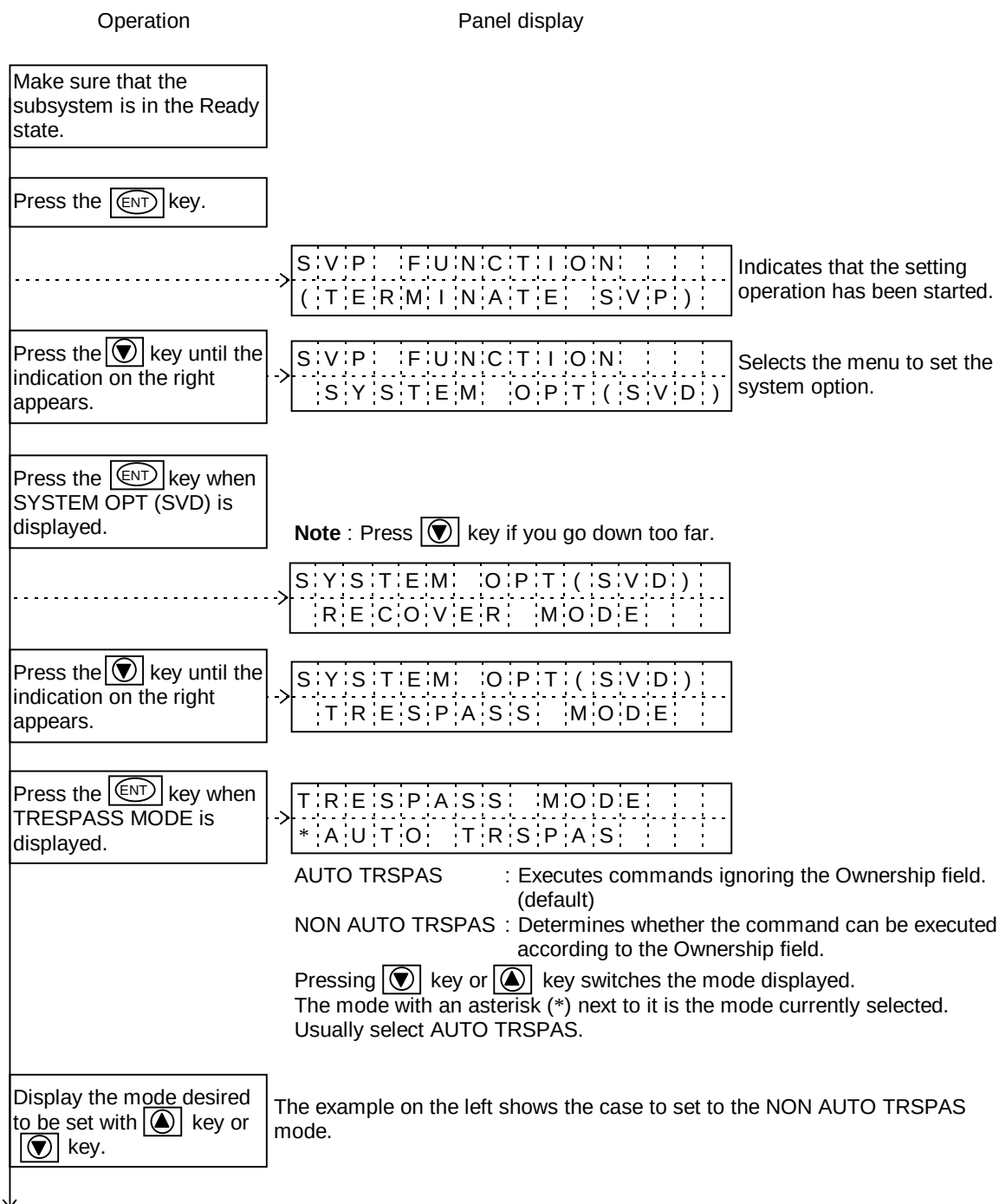
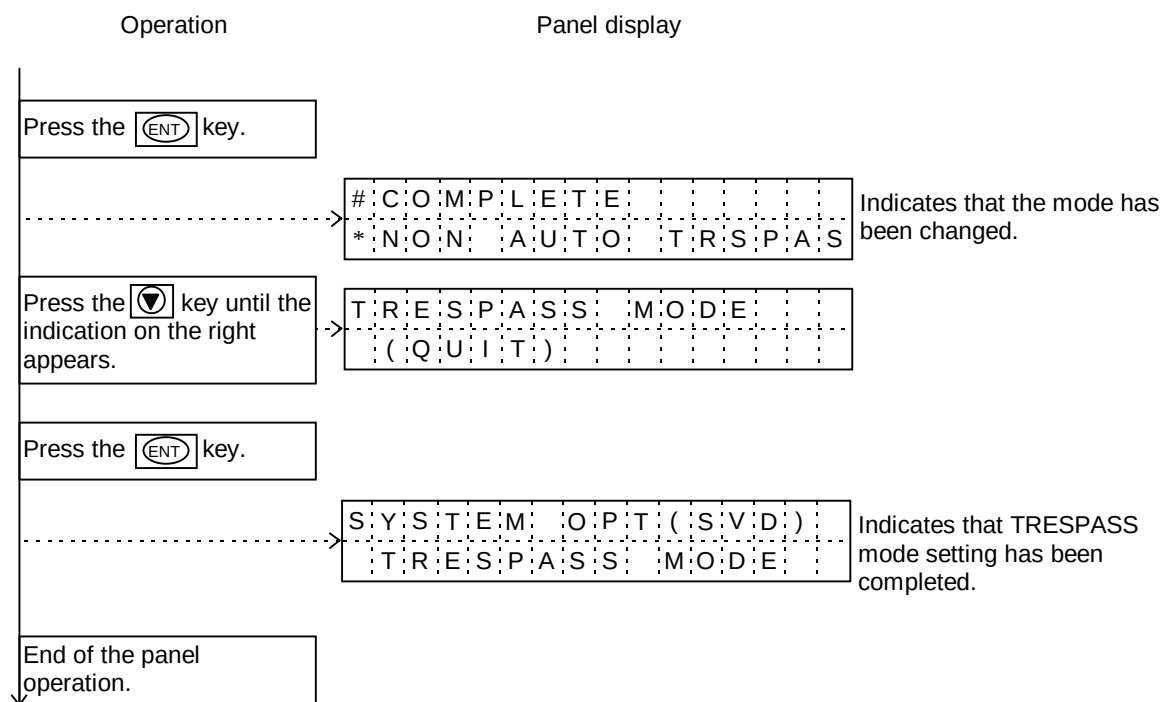


Figure 6.2.2 DIP switches (Being set for Standard setting)

(4) Setting the TRESPASS mode.

This function can be used when the subsystem is in the Ready state. (There is no need to set the DIP switch or reset the power. Ready/write operation cannot be executed from the host while this operation is being performed. When the host command is received, "Not Ready" is returned to the host.)





6.3 Using in the DATA SHARE MODE

- (1) Before turning the power on, set DIP switch No.4 as Figure 6.3.1.

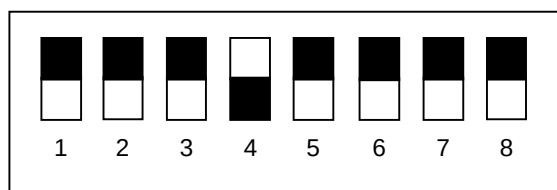
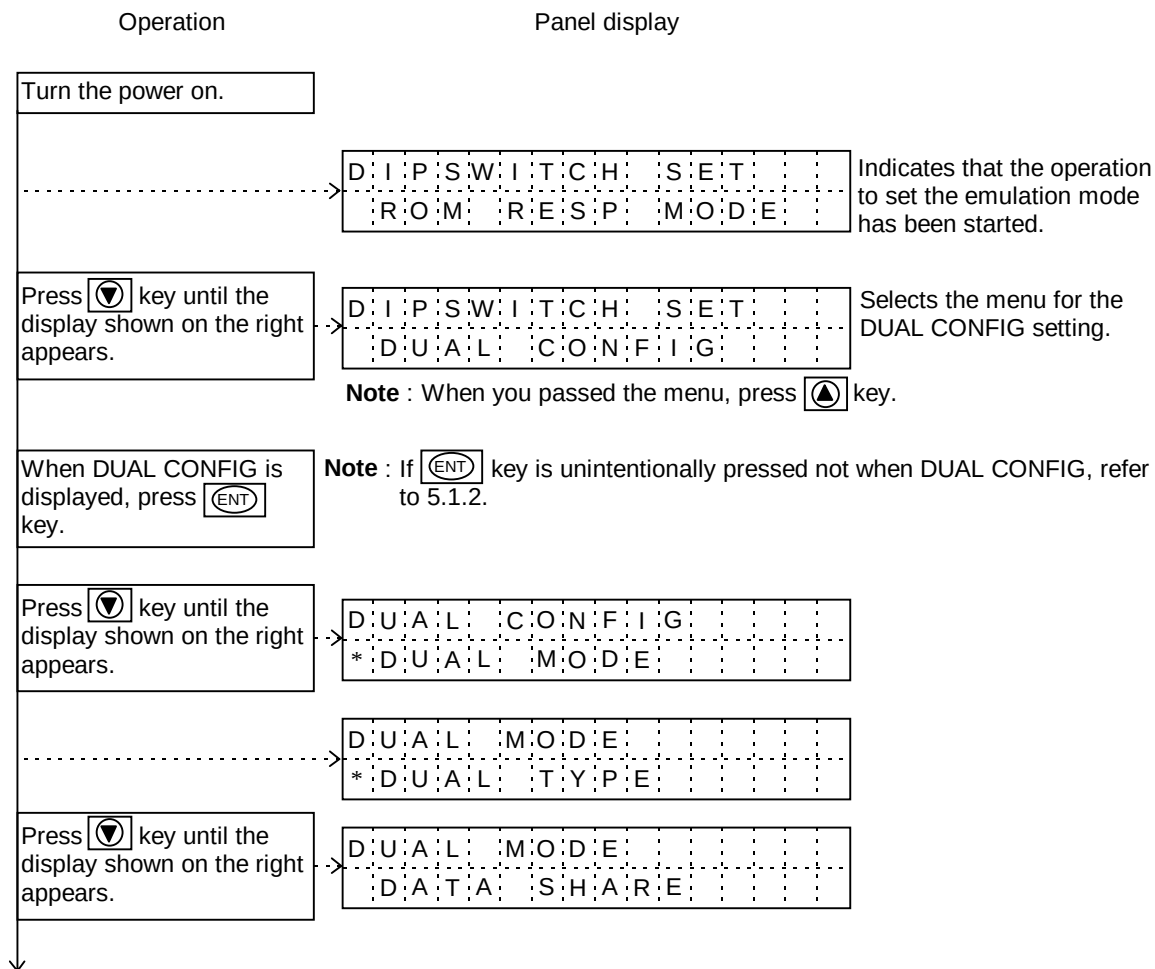
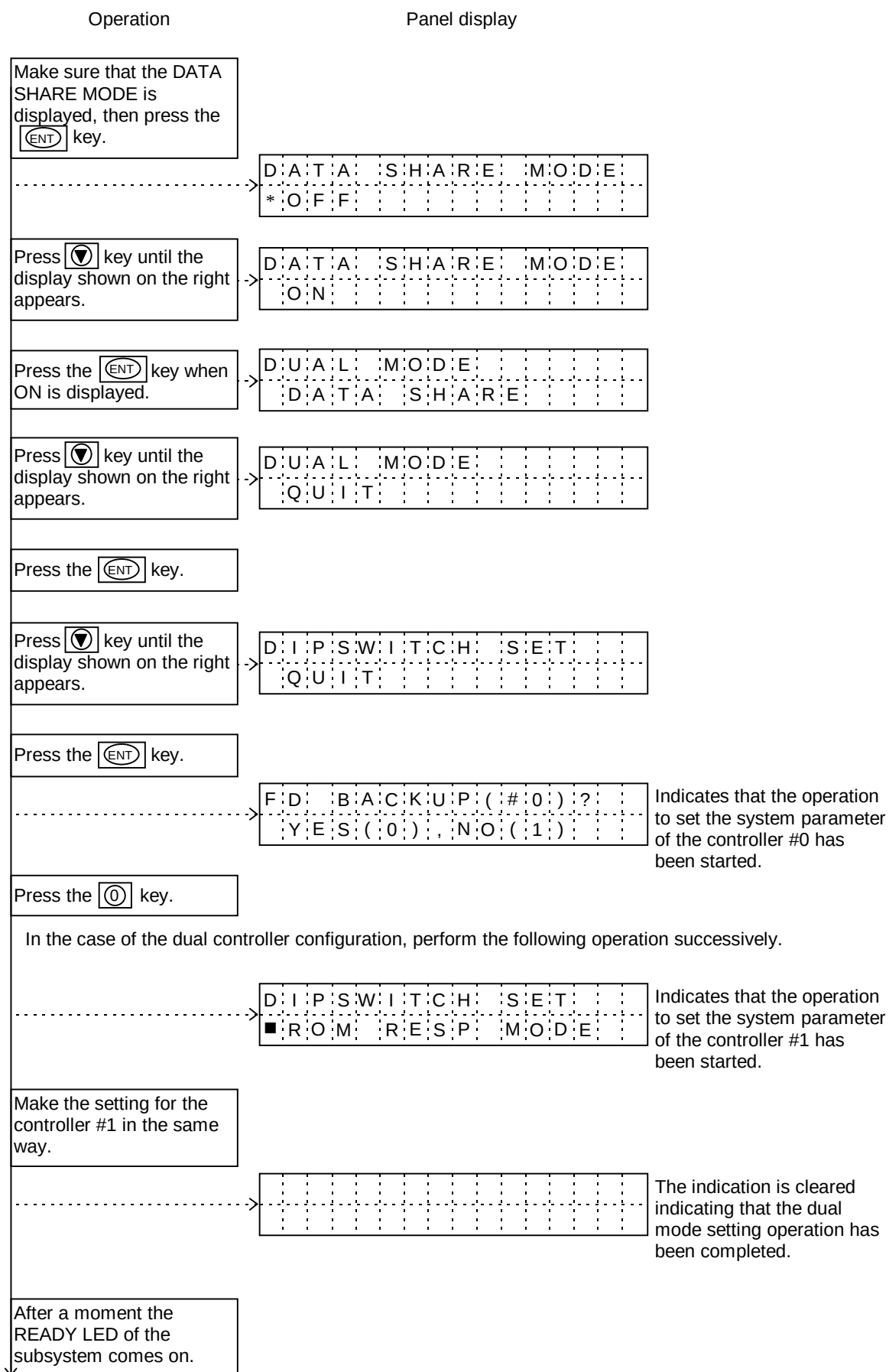


Figure 6.3.1 DIP Switches (Being set for System parameter settings)

- (2) Perform as the procedure shown below.





(3) Set the DIP switch No.4 as shown in Figure 6.3.2.

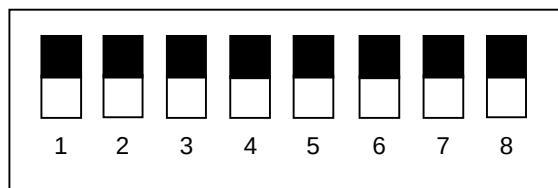


Figure 6.3.2 DIP switches (Being set for Standard setting)

6.4 When Sun OS Solaris 2.5.1 (Aug. '97 version) or Later Is Used by the Host Side

If the following message is displayed on the console screen while executing SUN Format command, use the subsystem with its mode changed to this one.

[Computing capacity exceeds actual disk capacity.]

- (1) Before turning the power on, set DIP switch No.4 as Figure 6.4.1.

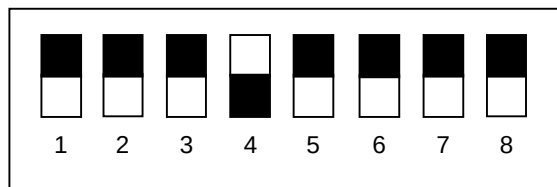
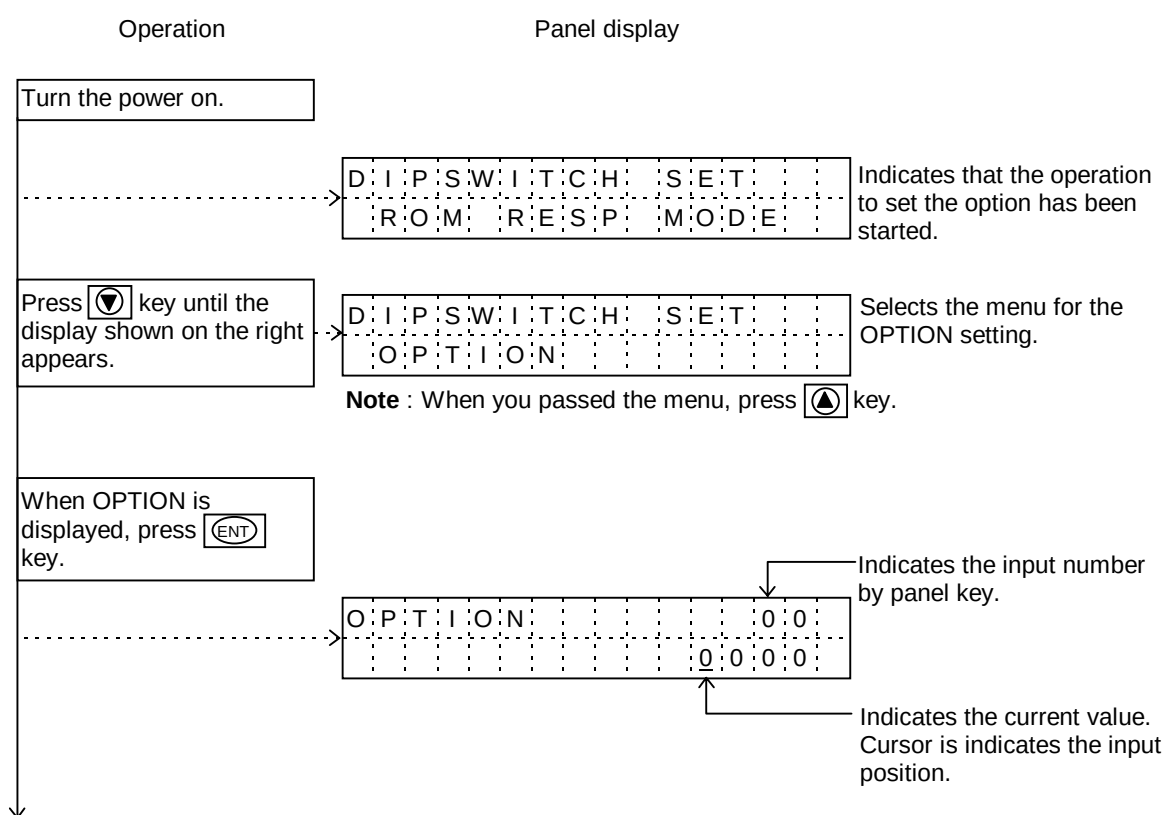
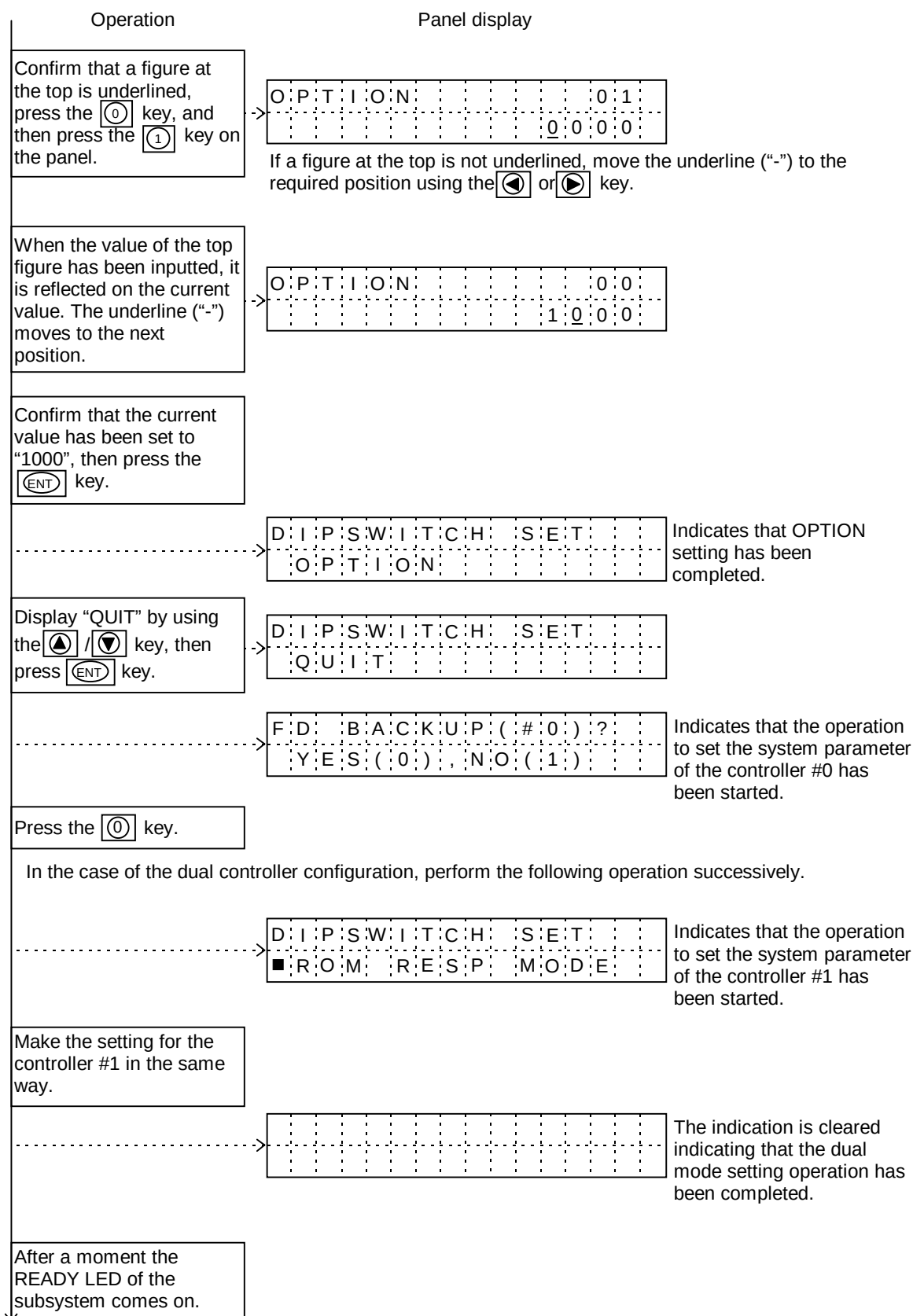


Figure 6.4.1 DIP Switches (Being set for System parameter settings)

- (2) Perform as the procedure shown below.





(3) Set the DIP switch No.4 as shown in Figure 6.4.2.

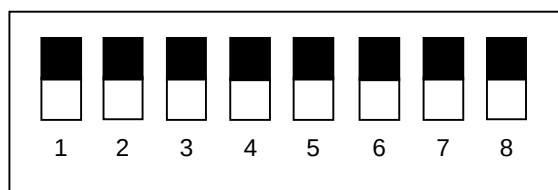


Figure 6.4.2 DIP switches (Being set for Standard setting)

6.5 When Using the Subsystem in LU Blockade Mode

When the subsystem is used in this mode, if a blockade failure occurs on the second disk in the same ROW, the disk concerned is blocked and the LU in which the disk concerned is included is blocked.

When the LU is blocked, data cannot be read from or written onto the LU concerned. If the blocked LU is accessed, a sense key/sense code=0313180 is reported.

To use the subsystem in this mode, the microprogram must be Ver.0355/B or later.

- (1) Before turning the power on, set DIP switch No.4 as Figure 6.5.1.

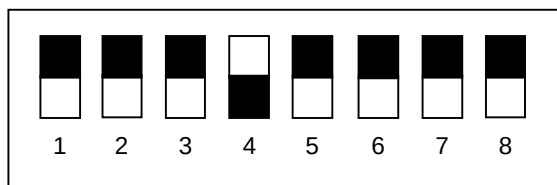
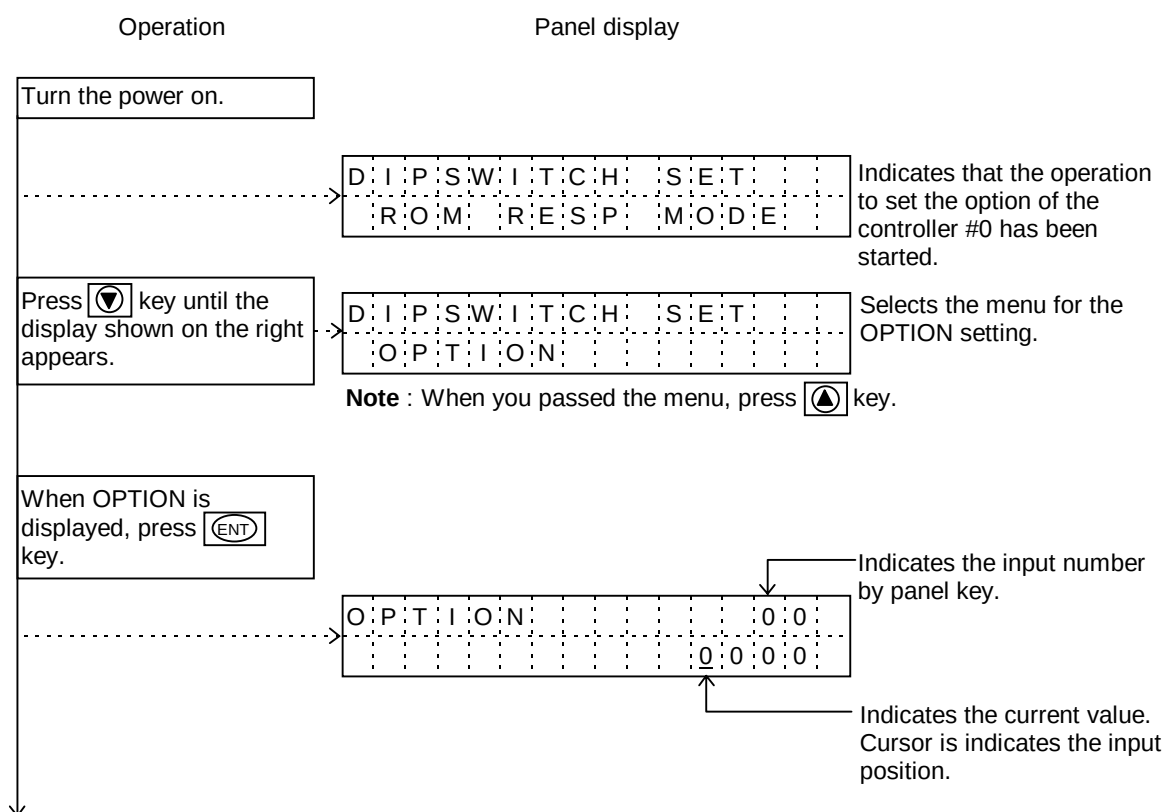
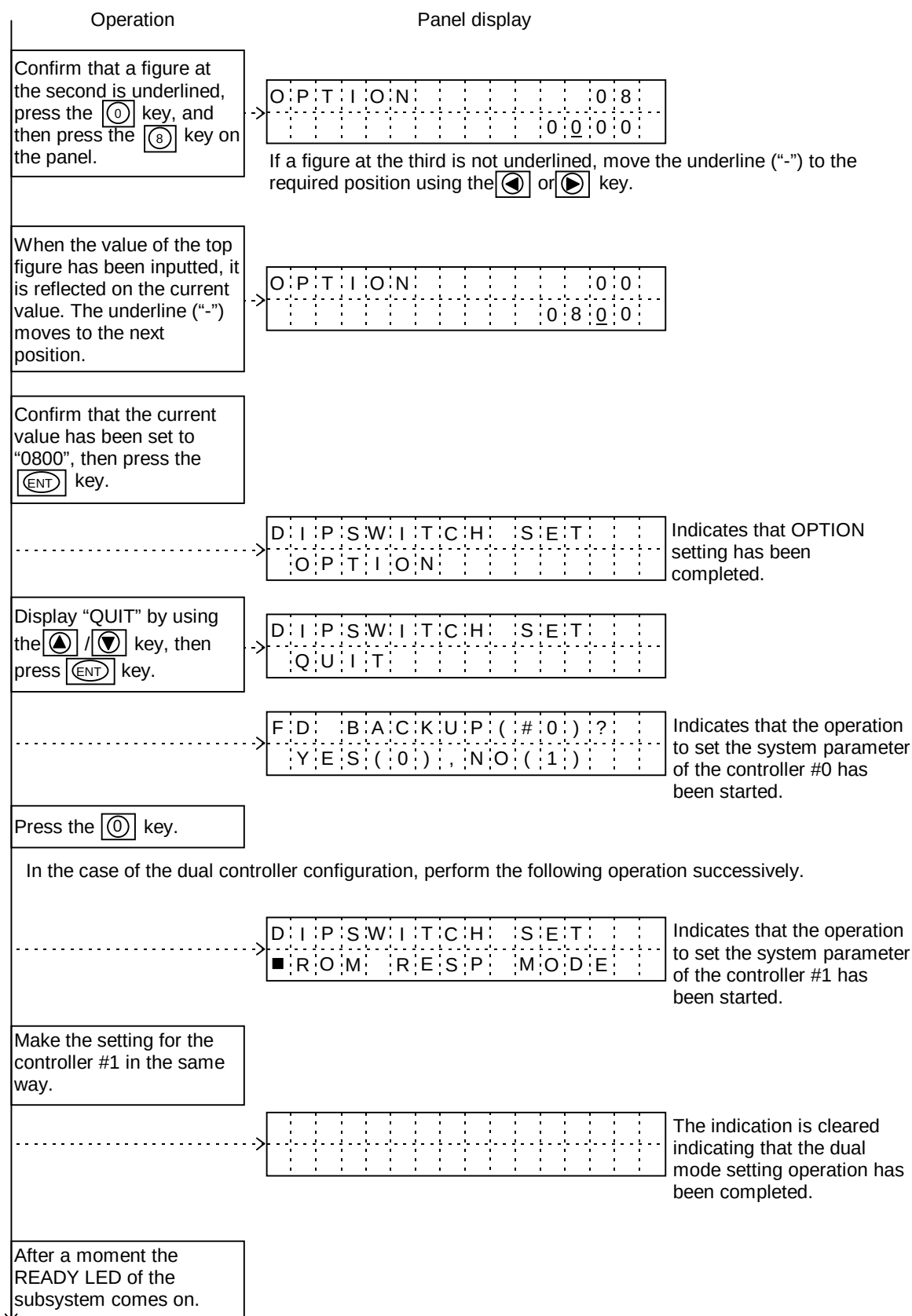


Figure 6.5.1 DIP Switches (Being set for System parameter settings)

- (2) Perform as the procedure shown below.





(3) Set the DIP switch No.4 as shown in Figure 6.5.2.

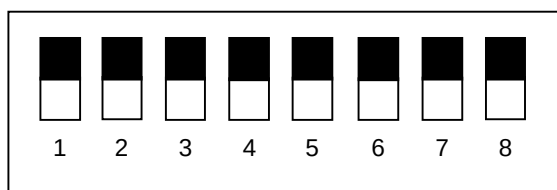


Figure 6.5.2 DIP switches (Being set for Standard setting)

DF350F Disk Subsystem
9. OPTIONAL INSTALLATION
(Mini Tower Type)

Rev.2

REVISION CONTROL

Legend for revision codes : AD : Addition CH : Change CR : Correction DL : Deletion

REV.	Date	DRW.	CHKD	APPD	Sheet No.	Description	Code
0	Jan.20.'98	A.Yamanashi	K.Aruga	H.Iwasaki	All	Issued	
1	Jul.31.'98	A.Yamanashi	K.Aruga	H.Iwasaki	0230	Added A2E8, A1E18.	AD
					0270	Added A2E8, A1E18.	AD
2	Oct.15.'98	A.Yamanashi			0050	Added case of the dual controller.	AD
					0060	Added case of the dual controller.	AD
					0080	Added case of the dual controller.	AD
					0230	Added A3E4.	AD
					0270	Added A3E4.	AD

1. Note when Installing the Optional Features

- (1) Be sure to back-up copy user data before installing the optional features. A miss-operation might cause the loss of user's data.
- (2) Back-up the system parameter according to "Back-up Procedure of System Parameter". (See MK-OPTION0050.)
- (3) Power off the subsystem according to power off procedure before installing the optional features. If not, user's data might be lost.

2. Installing the Optional Features

2.1 Unit Appearance Check

Check visually the unit appearance for distortion or damage during the transportation.

2.2 Checking Items of System Components and the Other Items Shipped with the Unit

Check items and quantities of system components (model, serial number, and quantity) and other items shipped together with the unit. Cross-check with the packing list.

2.3 Back-up Procedure of System Parameter

There are cases where System Parameters (Buzzer setting, drive recovery mode, etc.) are need to be copied to FD or restored from FD when installing optional parts or replacing parts. In this case, copy or restore system parameters following "Back-up procedure to FD" (See MK-OPTION0050) or "Restoring procedures from FD" (See MK-OPTION0080).

(RAID configuration setting, LU configuration setting, etc. are not contained in system parameter.)

2.3.1 Back-up procedure to FD

- (1) Turn the power off according to MK-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

- (2) Before power on the subsystem, set DIP switch No.4 as shown in Figure 2.3.1.

Note : Be sure to set the same data for both controllers if the dual controller option (-F3MCF) has been installed.

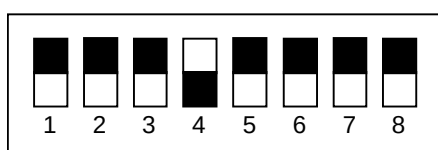
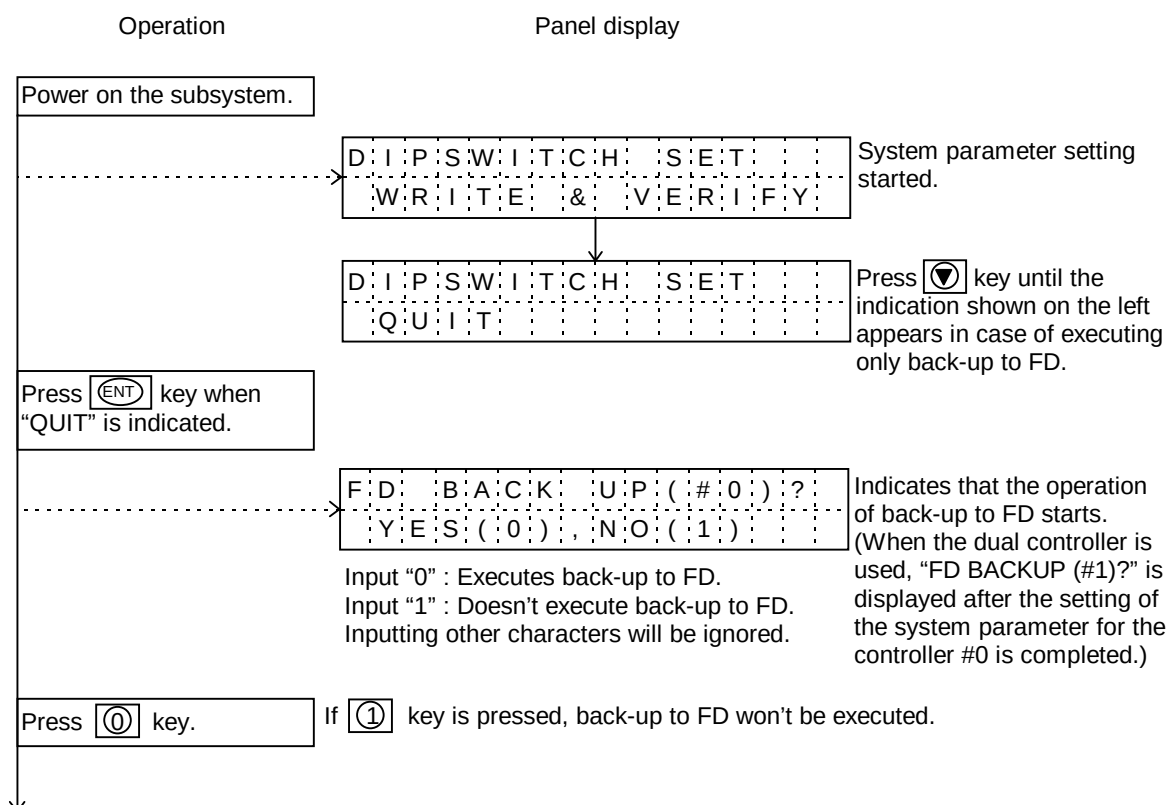
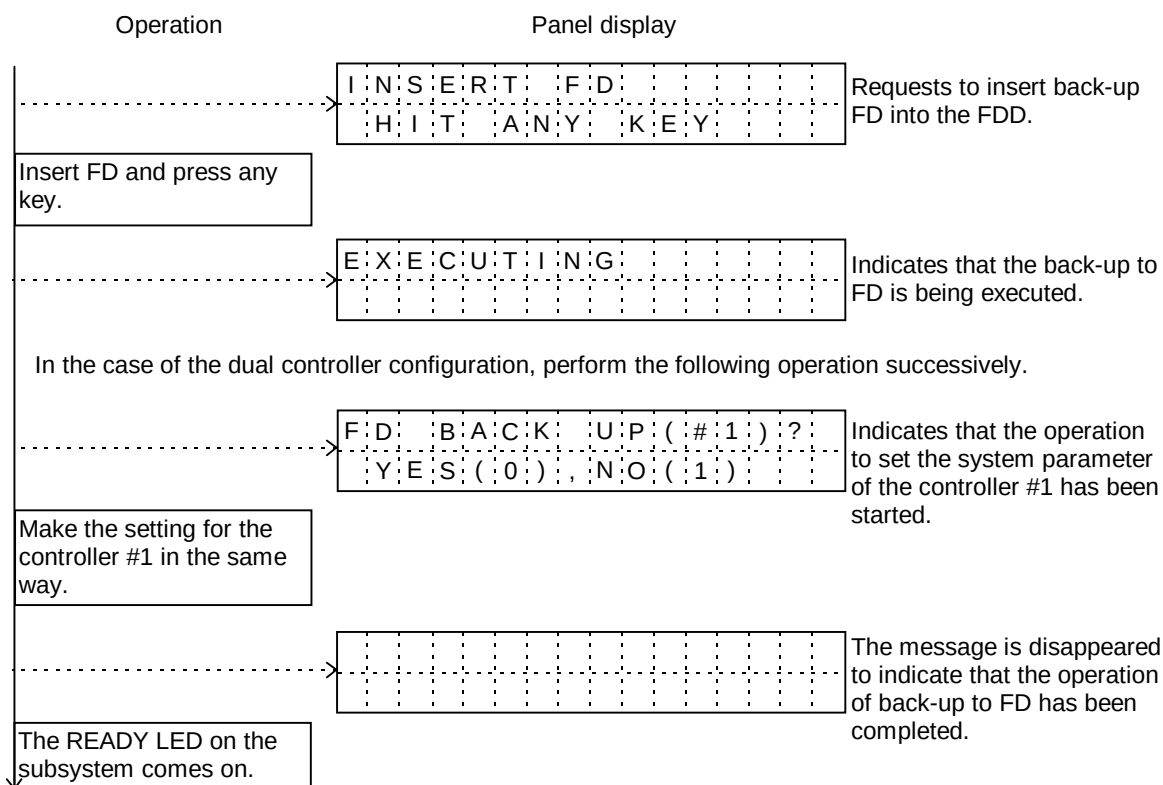


Figure 2.3.1 DIP Switches
(Back-up operation to FD is allowed)

- (3) Operate as described below.





(4) Set DIP switch No.4 as shown in Figure 2.3.2.

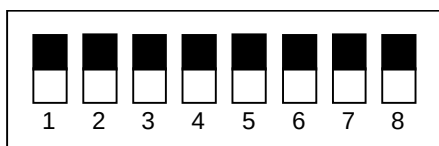
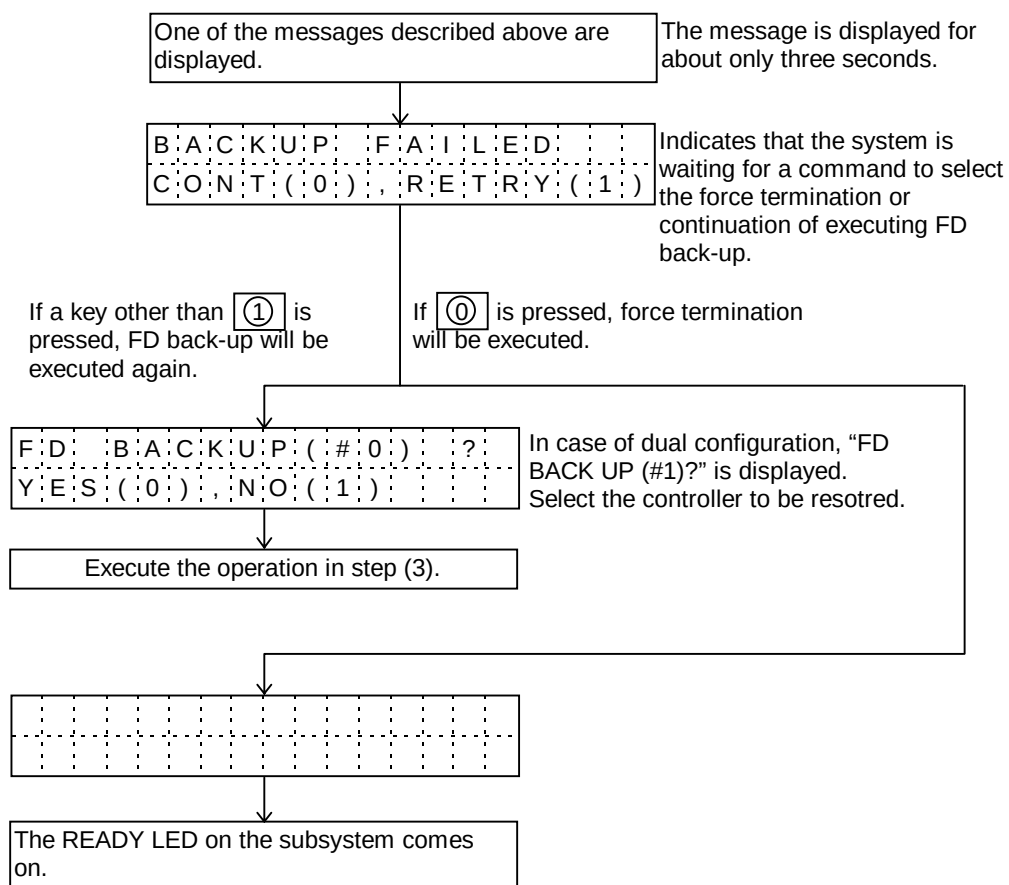


Figure 2.3.2 DIP Switches

Note 1 : While the back-up to FD is being executed, the messages described below are sometimes displayed.

- **FD NOT INSERTED**
FD isn't inserted. Insert FD into the FDD.
- **FD MOTOR NOT STARTED**
Starting of FD Motor ended in failure. Re-execute.
- **FILE WRITE ERROR ("BAD FD INSERTED" (Write-protected))**
FD which was inserted is not formatted, or write-protected. Format or release write-protection.
Write error occurred in FD. Insert another FD.

If these messages are displayed, back-up to FD hasn't been executed. So re-execute following the operation described below.



Note 2 : Use 3.5" FD (1.44MB) formatted by MS-DOS for back-up FD. Besides, note that the FD will be overwritten during back-up.

Note 3 : Even if back-up FD is left at FDD after back-up operation, error won't occur on the subsystem.

2.3.2 Restoring procedures from FD

- (1) Before power on the subsystem, set DIP switch No.3 as shown in Figure 2.3.3.

In case of dual controller system, set both the DIP switches as shown in Figure 2.3.3.

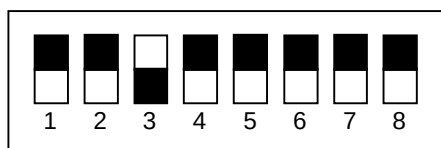
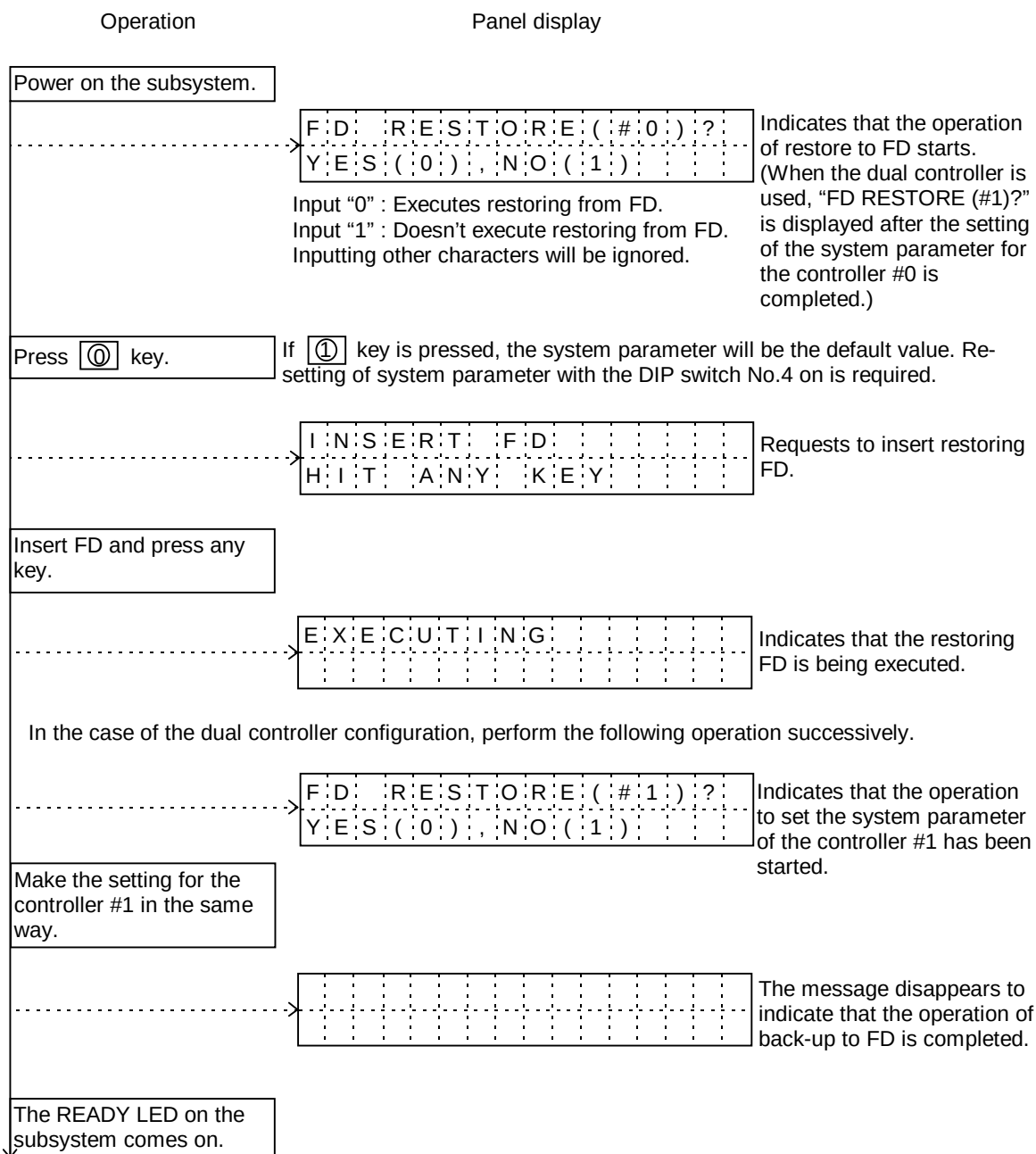


Figure 2.3.3 DIP Switches
(Restoring operation from FD is available)

- (2) Operate as described below.



(3) Set DIP switch No.3 as shown in Figure 2.3.4.

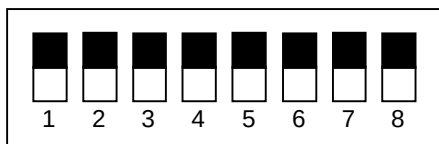
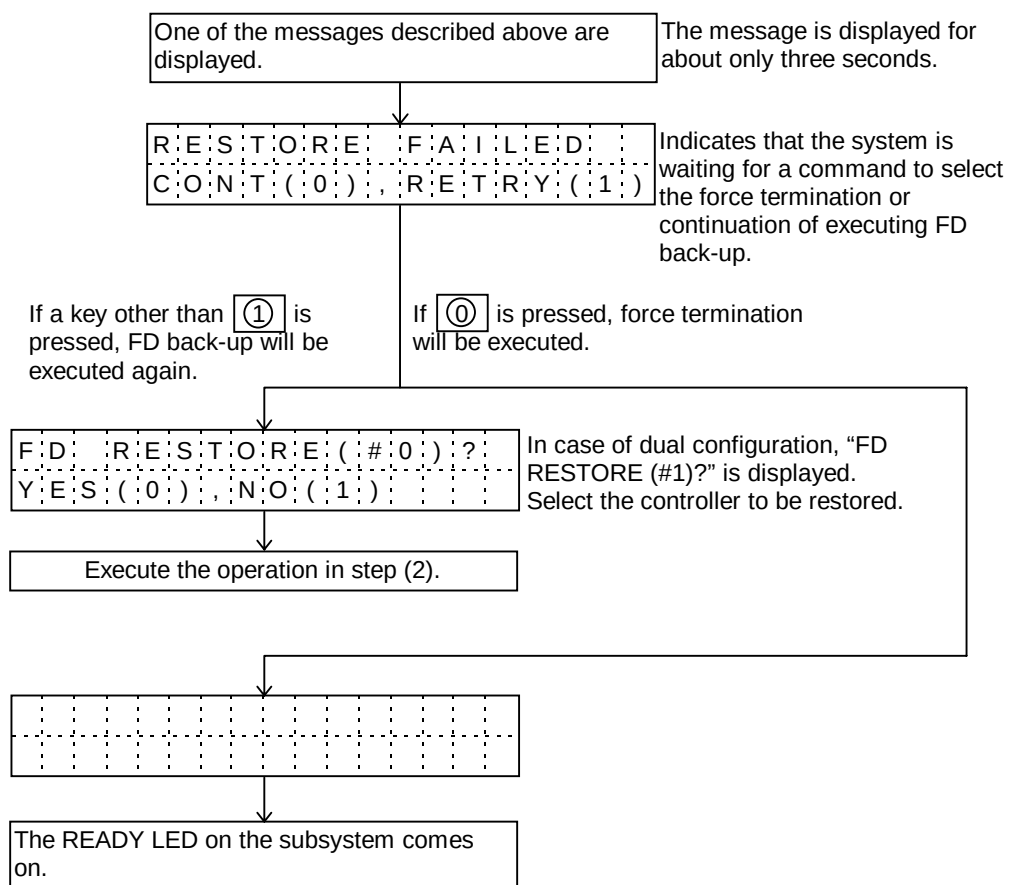


Figure 2.3.4 DIP Switches

Note 1 : While executing the restoring from FD, the messages described below are sometimes displayed.

- **FD NOT INSERTED**
FD isn't inserted. Insert FD into the FDD.
- **FD MOTOR NOT STARTED**
Starting of FD Motor ended in failure. Try again.
- **BAD FD INSERTED**
Inserted FD is not formatted. Format FD.
- **FILE READ ERROR**
Read error occurred in FD. Try again.

If these messages are displayed, restoring from FD hasn't been executed. So re-execute following the operation described below.



Note 2 : In case that restoring operation ended in failure and was force terminated, setting of EEPROM will be default value.

Accordingly, re-setting with the DIP switch No.4 On is required.

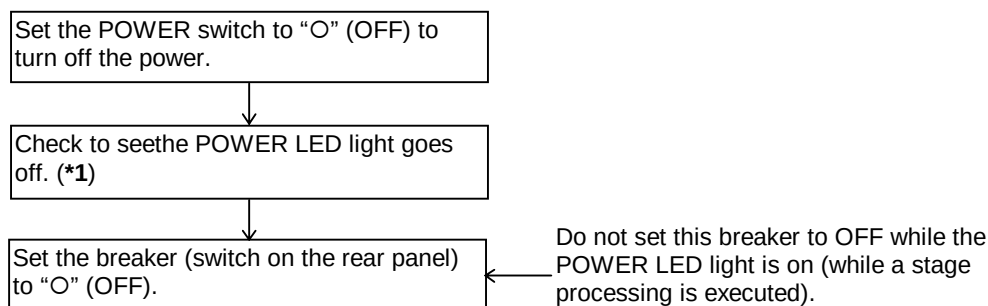
Note 3 : Even if FD which was used to restore is left at FDD after back-up operation, error won't occur on the subsystem.

2.4 Power OFF

Turn off the power correctly according to the Power OFF Procedure (1) shown below.

Notice : If optional features are not installed to the system correctly, user data may be lost.

(1) Power OFF procedure



If a power down occurs or the breaker is set to OFF by mistake before the POWER LED goes off, turn on the power right away according to the "(2) Power ON procedure" below, then execute the power off procedure above.

*1 Check the back-up state of the CACHE memory.

Be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

The CACHE memory of this unit provides write-after control. If data is not yet written, before the power is turned off, the unit automatically writes the data on the CACHE memory to the hard disk. This is called destaging. After this processing is completed, the power is turned off.

If the power is turned off in a state in which destaging cannot be completed due to an unexpected power interruption or a tripped circuit breaker, the CACHE memory switches to the back-up mode using the battery for data integrity. If any equipment of the unit is removed or inserted in this back-up mode, the battery may stop supplying power, resulting in the user data being lost. When you handle any equipment of the unit with the unit power off, be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

• Checking the back-up state of the cache memory

You can determine whether the unit is in the back-up mode by checking the indication of the CACHE PWR (green LED) on the CTL ASSY, as described below.

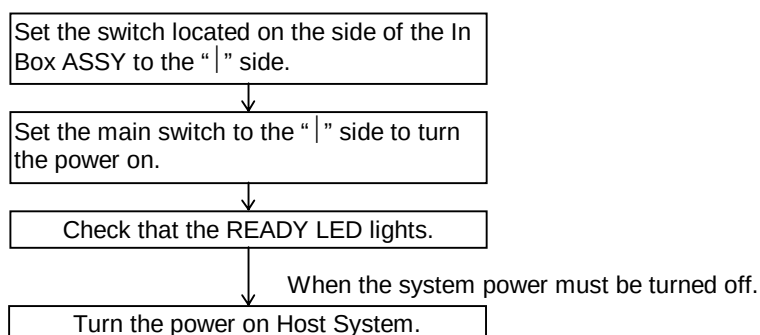
Set the circuit breaker on the rear of the unit to "I" (ON) with the power switch (POWER SW) set to "O" (OFF).

Determine the state of the memory from the indication of the CACHE PWR.

CACHE PWR LED on ----- Indicates the back-up mode.

CACHE PWR LED off ----- Indicates that the back-up mode is canceled.

(2) Power ON procedure



2.5 Installing the CTL ASSY (Upgrading from Single-System to Dual-System) and I/F ADAPTER ASSY

- (1) Insert a back-up floppy disk in a drive and make a back-up copy of the system parameter into the FD.
- (2) Turn off the unit. (See MK-OPTION0110.)

Notice : If the power is not turned off normally, the user's data might be lost.

- (3) Open the side covers.
- (4) Install a CACHE ASSY in the additional CTL ASSY. (Mount a CACHE ASSY of the same capacity in the same corresponding slot of the optional CTL ASSY as those of the already installed CTL ASSY respectively as shown on MK-OPTION0150.)
- (5) Insert the CTL ASSY in a predetermined position with the right and left levers opened. Push the right and left levers in the arrow-marked erection (→) at the same time. (See Figure 2.5.1.)
- (6) Install the additional I/F ADAPTER ASSY. (See Figure 2.5.2.)

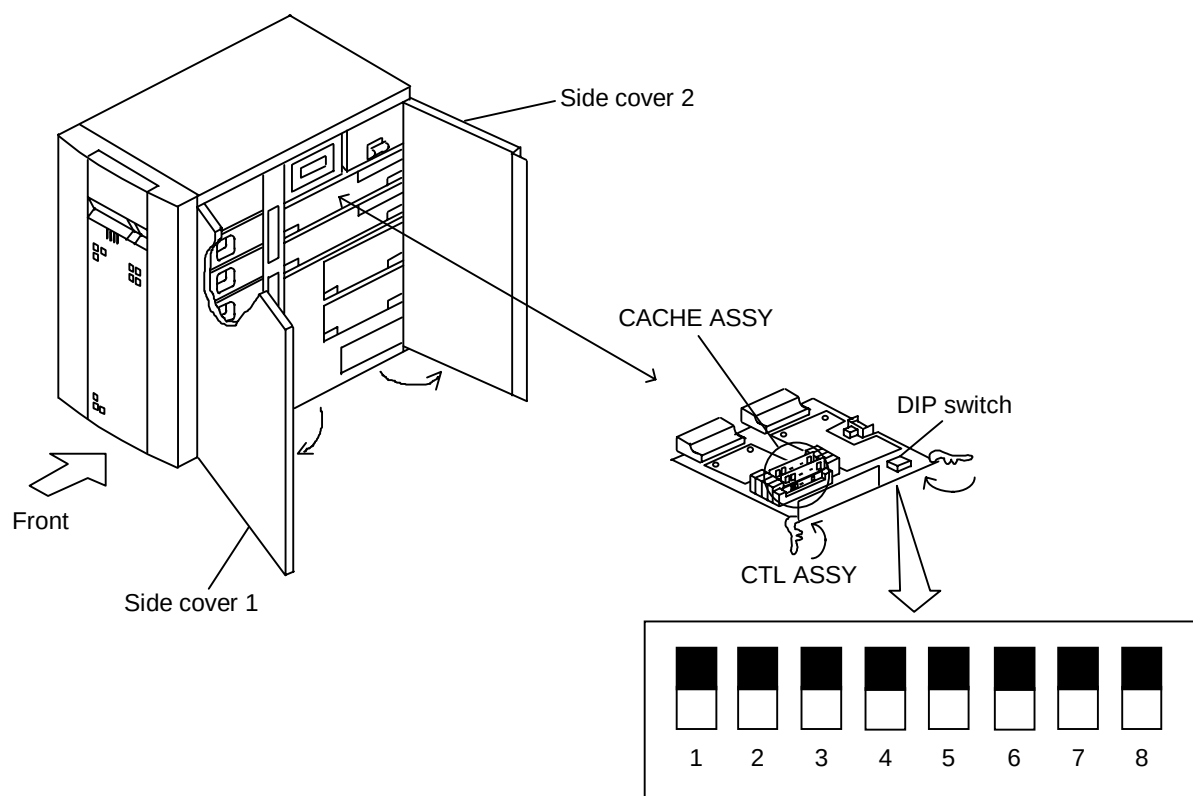


Figure 2.5.1 Installing the CTL ASSY

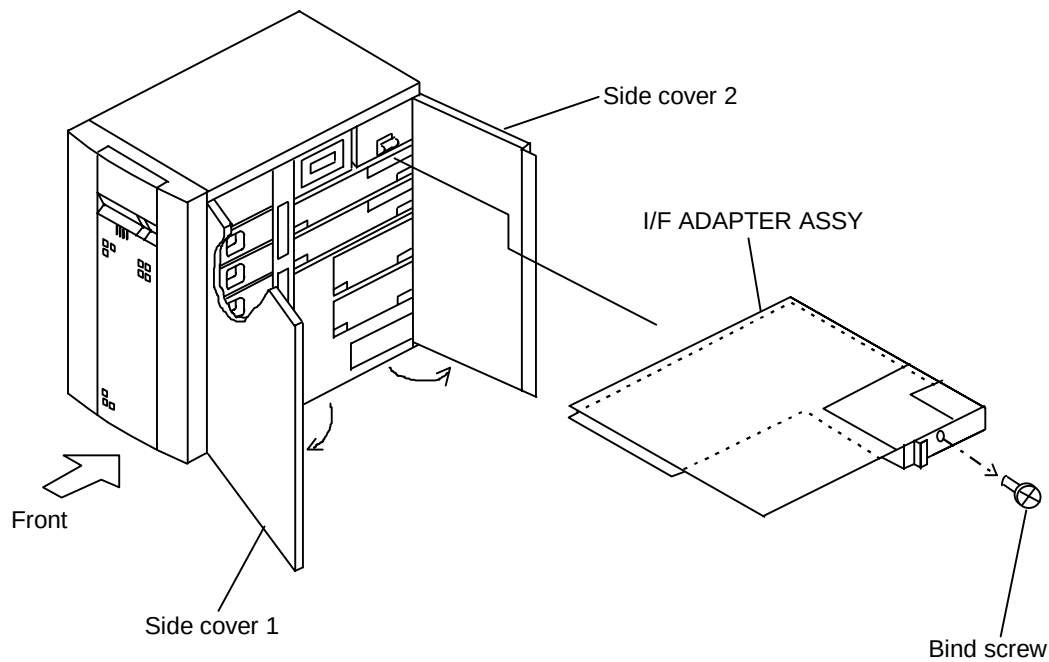
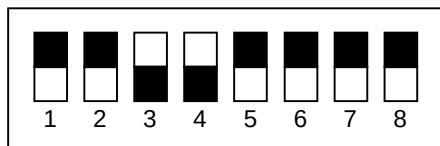


Figure 2.5.2 Installing the I/F ADAPTER ASSY

- (7) Connect Fibre Channel cable, terminator, LAN (option) cable RS232C cable.
- (8) Set the DIP SW of both CTL ASSYs as shown below. (See MK-OPTION0110.)



Note : Be sure to set the DIP SW of both CTL ASSYs.

- (9) Insert the system parameter back-up FD and restore the system parameter data from the FD. (See MK-OPTION0080.)

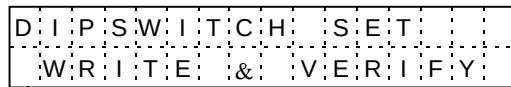
- (10) When system parameter set up menu appears as below, select “DUAL MODE” in “DUAL CONFIG” (setting of Dual operation attribute) menu. (See PANEL0080.)

Set the items #1, 3, 5, 6, 9, 16, 17 in system parameter set up menu (See PANEL0080) for each controller individually. (The other menus are common menus. Same settings are executed for both controllers. Modification by CTL1 is not available.)

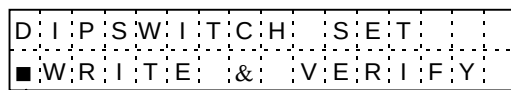
- The system parameter setting menu appears on the panel in the order of CTL0 and CTL1. “■” appears on the panel when the CTL1 system parameter is to be set.

“■” not displayed : CTL0 system parameter is set.

“■” displayed : CTL1 system parameter is set.

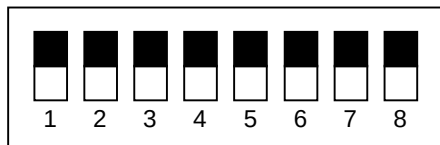


This indicates CTL0 system parameter setting.



This indicates CTL1 system parameter setting.

- (11) After the setting is ended, make a copy of the data into the back-up FD again. (See MK-OPTION0050.)
- (12) Check to see that READY LED is on.
- (13) Turn off the unit (by setting the POWER switch on the front panel to off).
- (14) Set the DIP SW on both boards as shown below.



- (15) Turn on the unit (by setting the POWER switch on the front panel to on). (See MK-OPTION0110.)
- (16) In a short while, the READY LED on the unit comes on.
Check to see “Version = XXXX/X” is displayed on the PANEL, and that corresponds to see system floppy disk version.
- (17) Close the side covers.

2.6 Installing the CACHE ASSY

- (1) Turn off the power according to the power-off procedure in MK-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Trouble shooting Chapter" (See TRBL0030) and turn off the power.

- (2) Open the side covers.
- (3) Remove the CTL ASSY. (See MK-OPTION0120.)
(When a DF-F350F-F3MCF has been installed already, remove both boards, and here after in the same way.)
- (4) Install a CACHE ASSY.

Note 1 : The capacity of the CACHE ASSYs to be mounted in cache slots #0 and #4, slots #1 and #5, slots #2 and #6, and slots #3 and #7 must be the same.

Note 2 : If a DF-F350F-F3MCF has been installed already, mount a CACHE ASSY of the same capacity in the same corresponding slot of the optional CTL ASSY as those of the already installed CTL ASSY respectively.

Note 3 : CACHE ASSY of the largest capacity must be mounted cache slots #0 and #4 in case that CACHE ASSYs of different capacity are used.

- (5) Mount the CTL ASSY.
- (6) Turn on the power according to the power-on procedure in MK-OPTION0110.
- (7) Close the side covers, and turn the power on. (See MK-OPTION0110.)

Installation example of CACHE ASSY

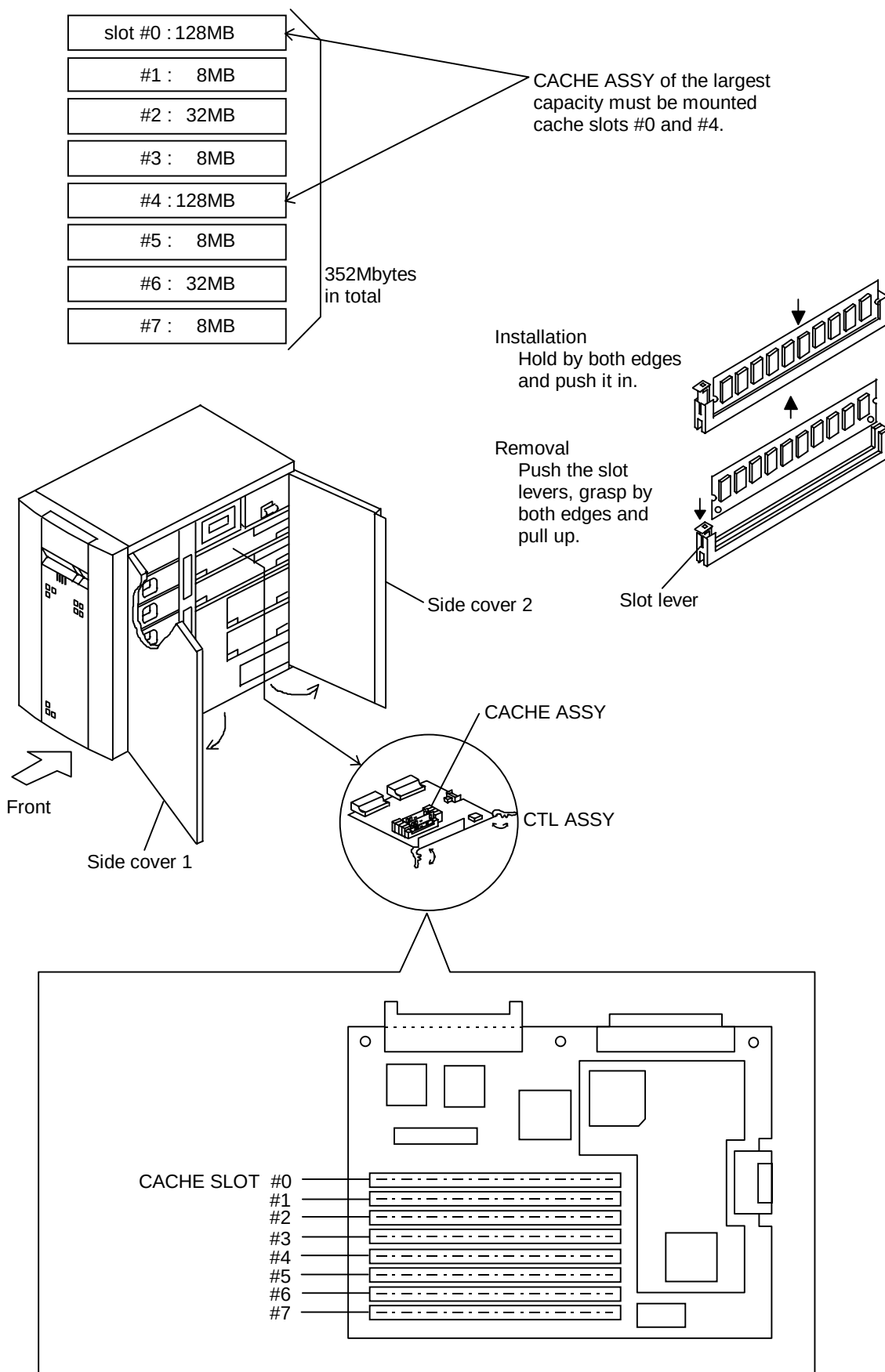


Figure 2.6.1 Installing a CACHE ASSY

2.7 Installing the LAN ASSY

- (1) Turn off the power according to the power-off procedure in MK-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

- (2) Open the side covers.
- (3) Remove the CTL ASSY. (See MK-OPTION0120.)
- (4) Install a LAN ASSY. (See Figure 2.7.1.)

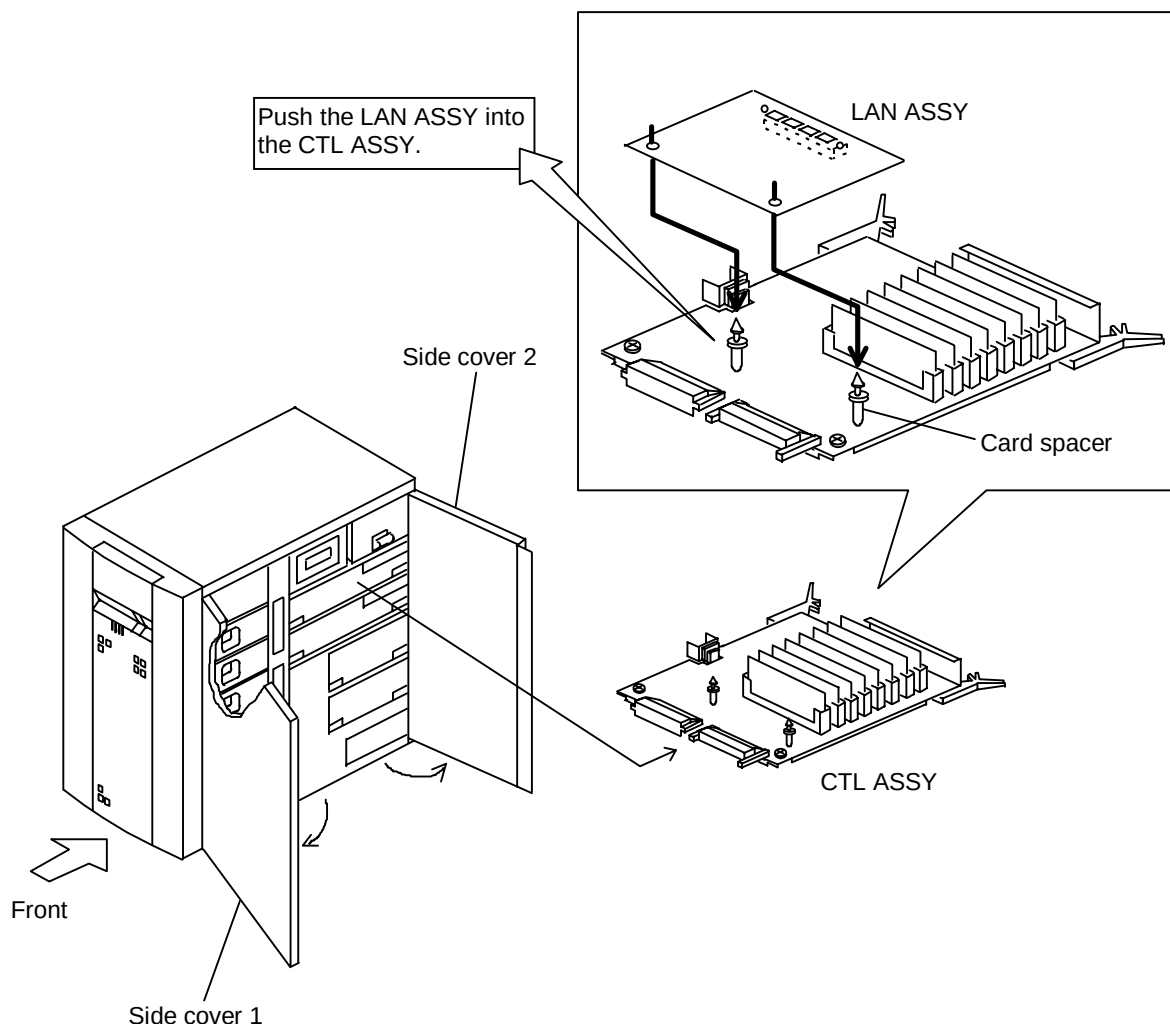


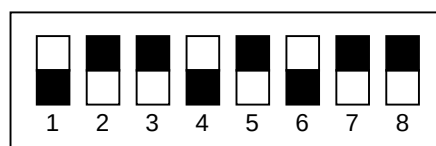
Figure 2.7.1 Installing a LAN ASSY

- (5) Mount the CTL ASSY.
- (6) Set the DIP switches on the CTL ASSY as described below. (See MK-OPTION0120.) depending on the LAN ASSY to be used.
(When a DF-F350F-F3MCF has been installed already, be sure to set the DIP switches on both CTL ASSYs.)

[DF-F350-G1M1]



[DF-F350F-G3M1 (SNMP)]



- (7) Turn on the power according to the power-on procedure in MK-OPTION0110.
- (8) Open the front cover.
- (9) Set LAN connection state on the panel.

① Panel display

C	O	N	N	E	C	T	L	A	N
.	.	.	.	.	.	.	.	.	.

← Pressing ,  key, items are scrolled.

↑
Display start position (The message shown in the table below ② is displayed on this position. The current setting of the parameter is preceded by an asterisk "*".)

② Displayed Item

No.	Message display	Description
1	CONNECT	LAN connected
2	NOT CONNECT	LAN not connected

- (10) Set IP address on the panel. (See MK-INST0280)
- (11) Set SUB NET MASK. (See MK-INST0290)
- (12) Set DEFAULT GATEWAY address. (See MK-INST0300.)
- (13) Set System parameter on the panel. (See MK-INST0240.)
- (14) After setting ② in Chapter 5 and selecting "QUIT" on the panel, when "FD BACK UP" appears on the screen, insert a back-up FD and make a back-up copy of the system parameter. The "FD BACK UP" message may not appear for some unit types, so ignore this step in that case.

D	I	P	S	W	I	T	C	H	S	E	T
Q	U	I	T	.	.	.	.	.	.	.	.

→

F	D	B	A	C	K	U	P	(	#	0	)	?
Y	E	S	(	0	)	,	N	O	(	1	)	.

If this message appears, make a back-up copy of the data in the EEPROM into the BACKUP floppy disk.
In case of dual configuration, "FD BACK UP (#1)?" is displayed. Select the controller to be restored.

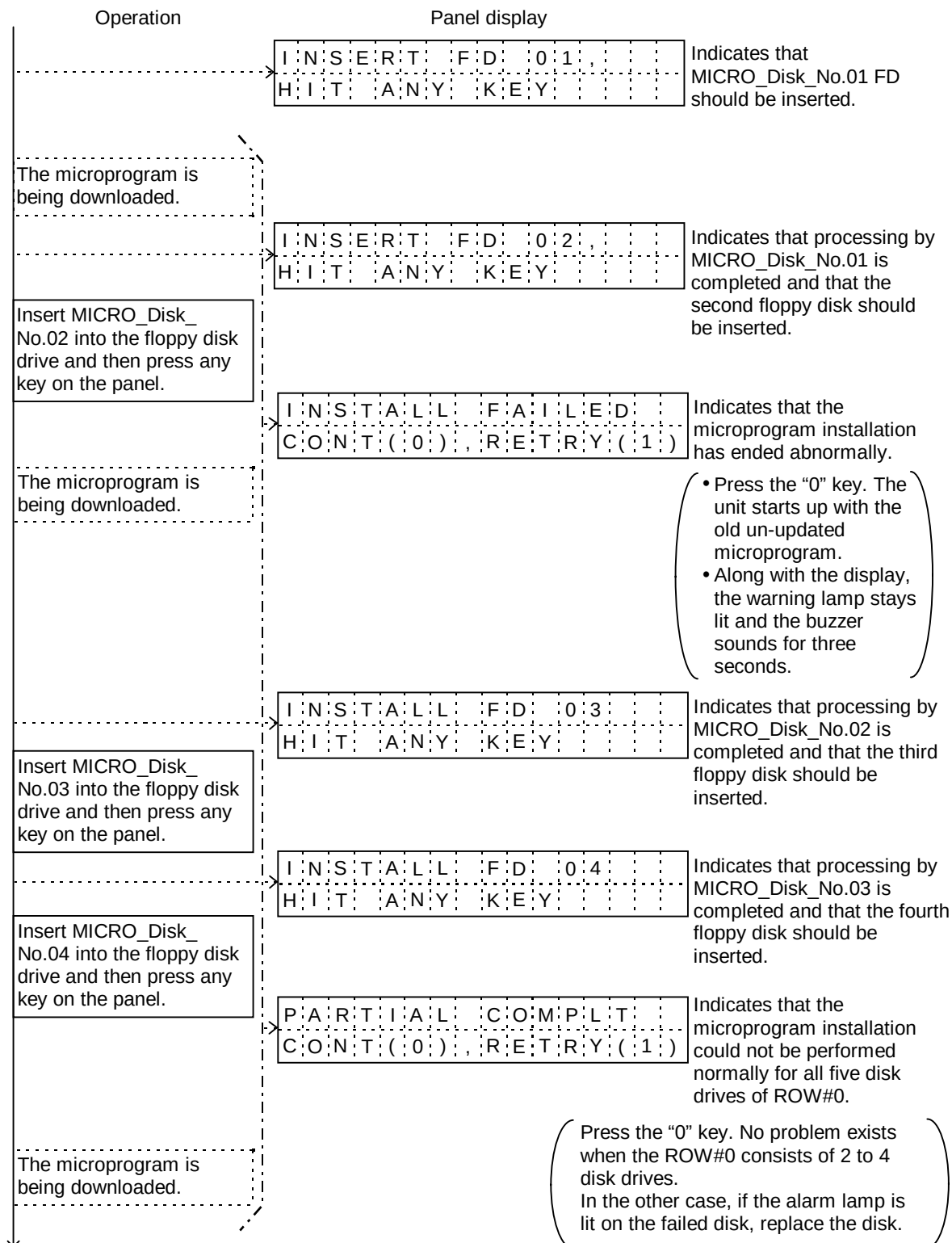
(15) Perform the following procedure.

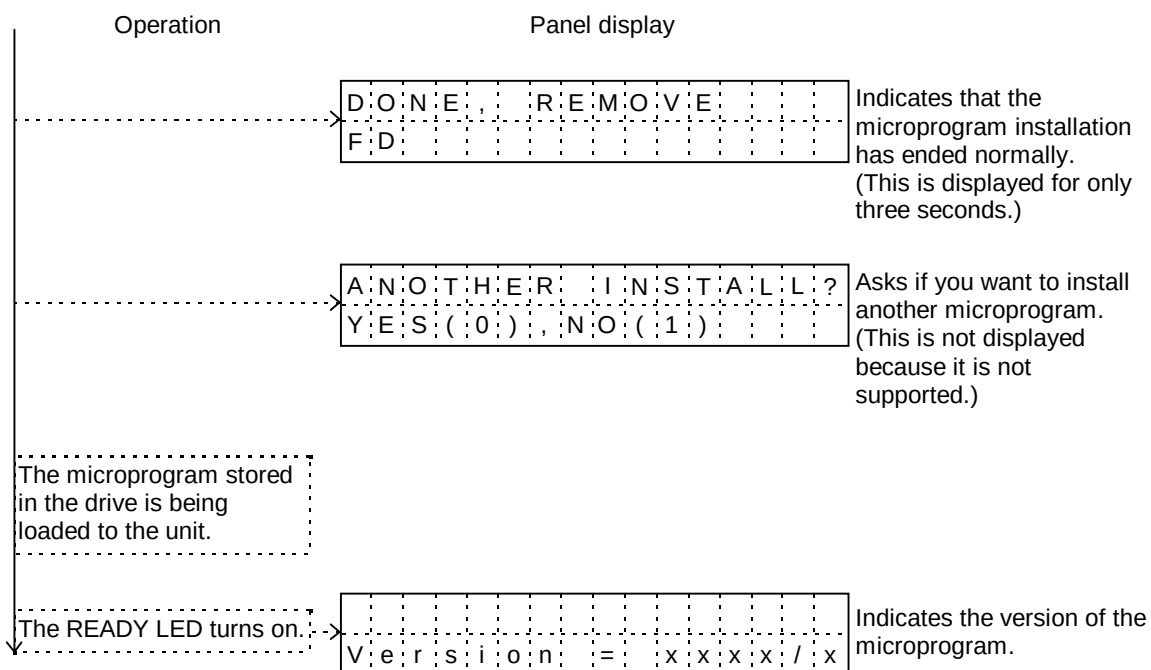
Note : Use a set of four FDs (containing a microprogram corresponding to the SNMP) supplied with the DF-F350F-G3M1 when it is shipped from the factory.

Meanings of the boxes in the "Operation" column

: Operator's action

: Internal state





- (16) Reset the DIP switches (4, 6 or 1, 4, 6) to the original positions after the system is ready.
(When a DF-F350F-F3MCF has been installed already, be sure to set the DIP switches on both CTL ASSYs.)
- (17) Close the front cover.
- (18) Close the side covers.

2.8 Installing the AC/DC Power Supply

(1) Turn off the power according to the power-off procedure in MK-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

(2) Removing procedure

- ① Open the side covers.
- ② Loosen the screw ① on the safety cover and disconnect one end of the FG cable.
- ③ Loosen the screws ② on the safety cover and remove the safety cover with moving the plates in the arrow-marked direction (→).
- ④ Insert the redundant AC/DC power supply in a predetermined position and push the handle in the arrow-marked direction (→).
- ⑤ Fix the FG Cable detached in (2) with screw ①.
- ⑥ Close the side covers.

(3) Turn on the power according to the power-on procedure in MK-OPTION0110.

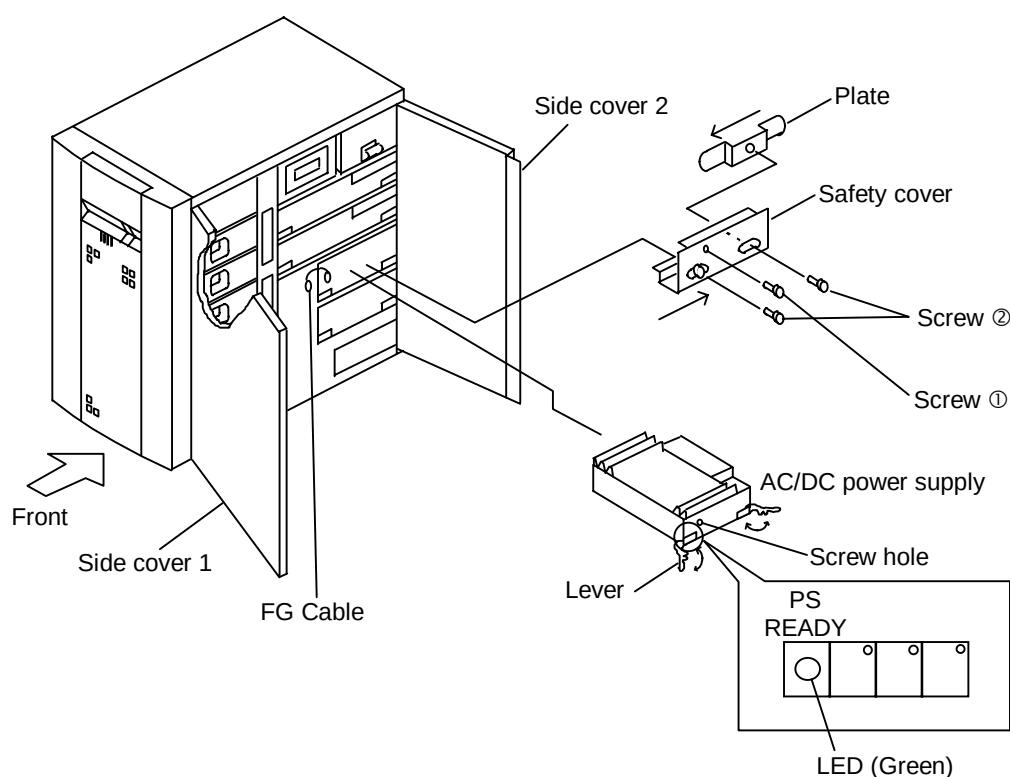
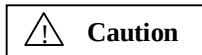


Figure 2.8.1 Installing the AC/DC Power Supply

2.9 Installing the HDU ASSY

Since the procedure differs depending on the cases below, be careful in installing the HDU ASSY.

- [1] Capacity expansion with HDU ASSY exchange
- [2] Capacity expansion with additional HDU ASSY installation
- [3] Installing a spare HDU ASSY



Caution

Do not subject the HDU ASSY to any impact or vibration since it is a precision component.

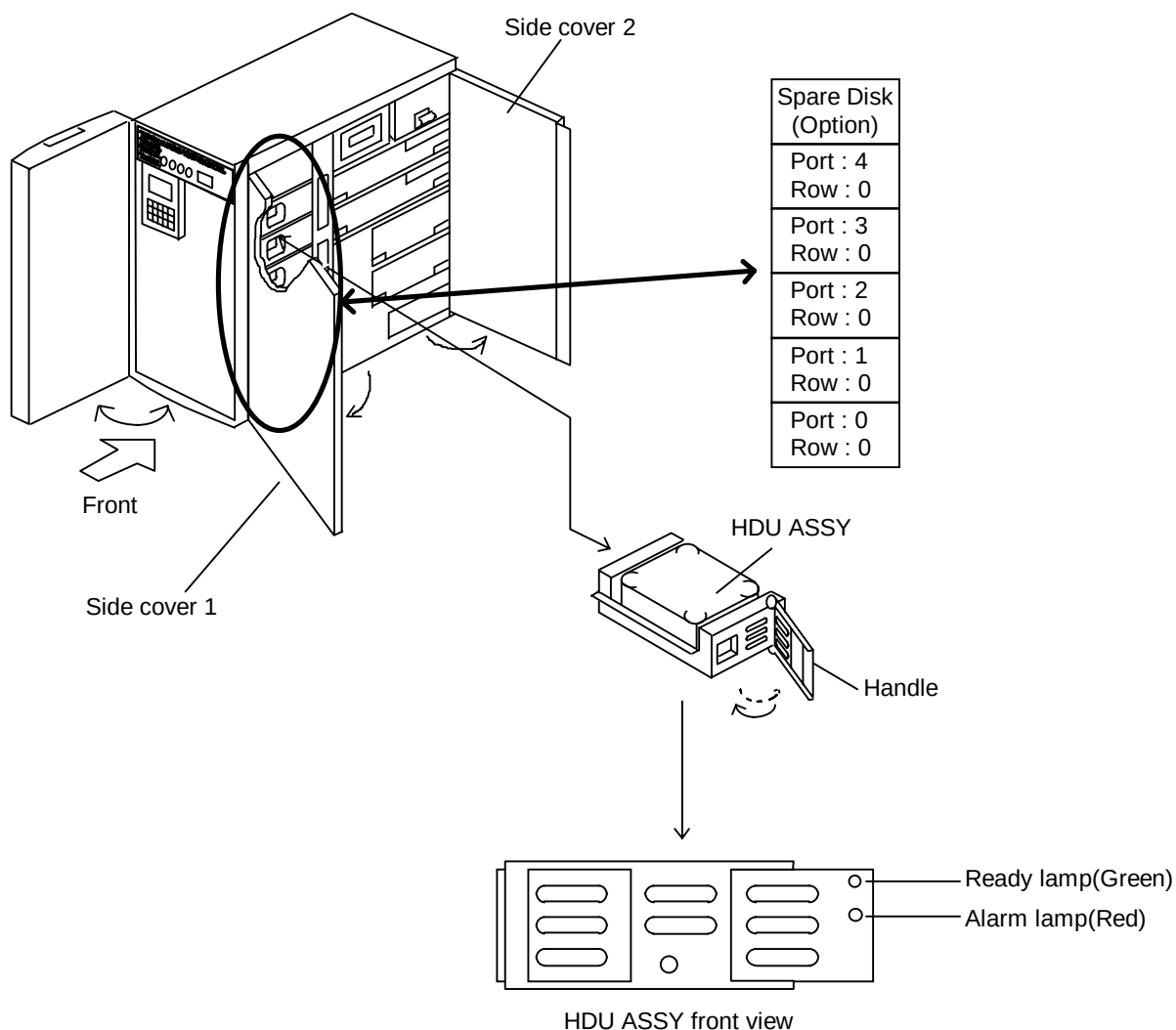


Figure 2.9.1 Installing the HDU ASSY

[1] Capacity expansion with HDU ASSY exchange

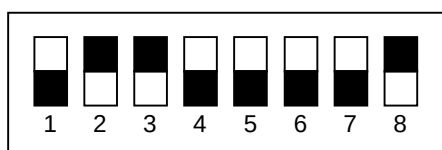
After this operation all the user's data will be lost. Be sure to make a back-up copy of data before beginning this operation. (See MK-OPTION0050.)

- (1) Turn off the power according to the power-off procedure in MK-OPTION0110.

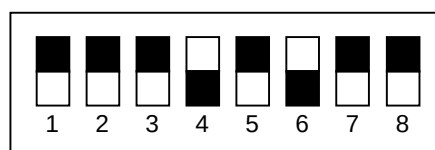
Notice : If the power is not turned off normally, the user's data might be lost.

- (2) Open the front cover and the side covers.
 (3) Remove the old HDU ASSY and set the new HDU ASSY. (See Figure 2.9.1 in MK-OPTION0210.)
 (4) Set the DIP switches on the CTL ASSY as described below.

(When a DF-F350F-F3MCF has been installed already, be sure to set the DIP switches on both CTL ASSYs.)



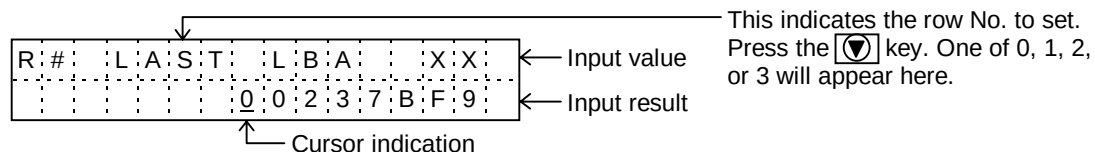
For ROW=0



For ROW≠0

- (5) Turn on the power according to the power-on procedure MK-OPTION0110.
 (6) Set LBA on the panel following the table below. Set the capacity of each drive following the display. (See MK-OPTION0240.)

- When ROW LAST LBA is displayed;



No.	Drive Capacity	Model	Final LBA No. (Hex)
1	2GB	DF-F350-A2E2	(3E696B)16
2	4GB	DF-F350-A2E4 DF-F350-A3E4	(7CD2D7)16
3	8GB	DF-F350-A1E8 DF-F350-A2E8	(1046C97)16
4	18GB	DF-F350-A1E18	(215D9B3)16

- (7) After selecting “QUIT” on the panel, when “FD BACK UP” appears on the screen, insert a back-up FD and make a back-up copy of the system parameter. The “FD BACK UP” message may not appear for some unit types, so ignore this step in that case.



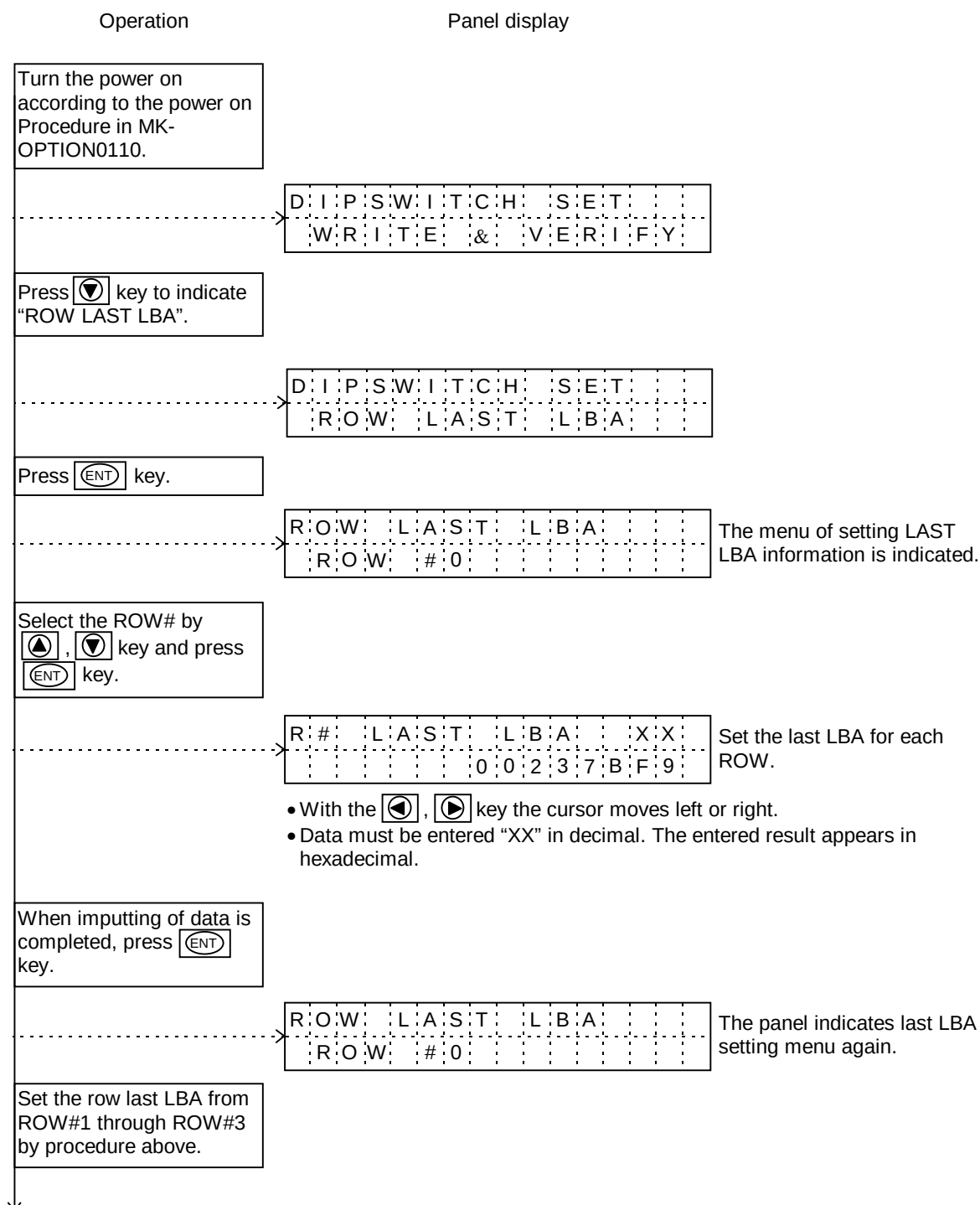
If this message appears, make a back-up copy of the data in the EEPROM into the back-up floppy disk.
In case of dual configuration, “FD BACK UP (#1)?” is displayed.
Select the controller to be restored.

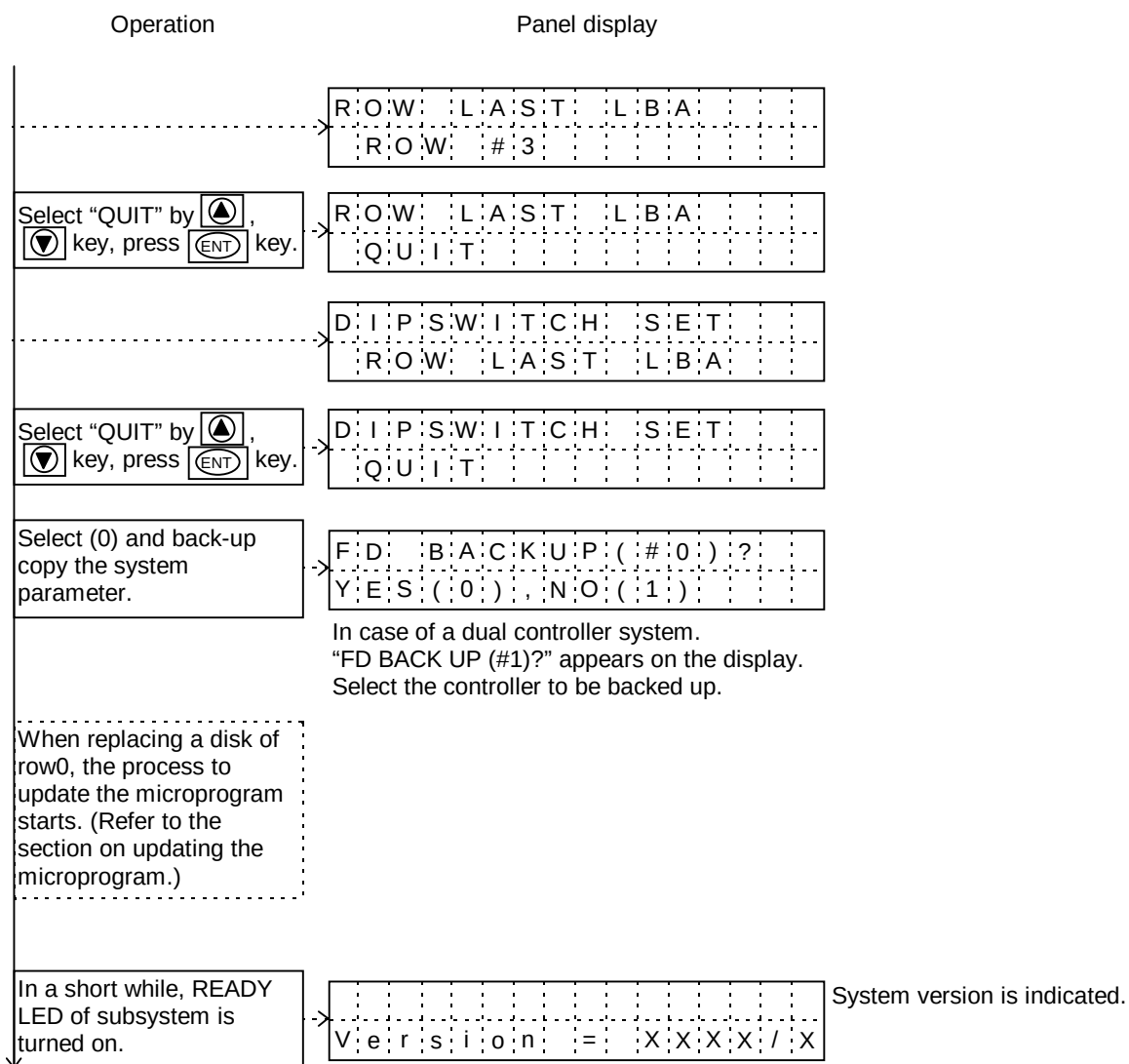
- (8) Set the DIP switches on the CTL ASSY as described below.



- (9) Only in case of exchanging ROW0 disk, revise the microprogram. (See section “MICROPROGRAM-FC”)
- (10) Set up the RAID group and the LU. (See Installation Chapter.)

Set the LAST LBA number on the panel according to the flow below.





[2] Capacity expansion with additional HDU ASSY installation

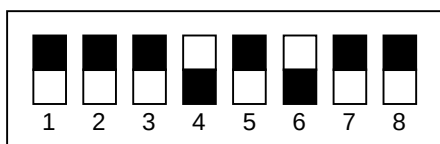
Additional HDU installation to a new ROW.

- (1) Turn off the power according to the power-off procedure in MK-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

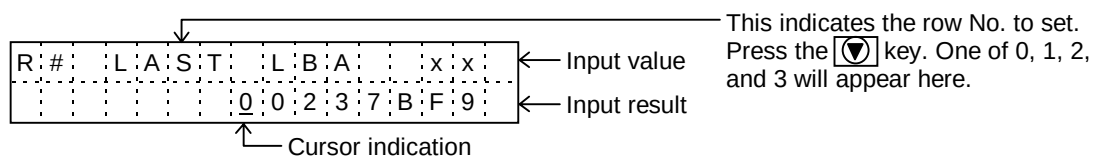
- (2) Open the front cover and the side cover.
 (3) Install an additional HDU ASSY.
 (4) Set the DIP switches 4 and 6 on the CTL ASSY to down.

(When a DF-F350F-F3MCF has been installed already, be sure to set the DIP switches on both CTL ASSYs.)



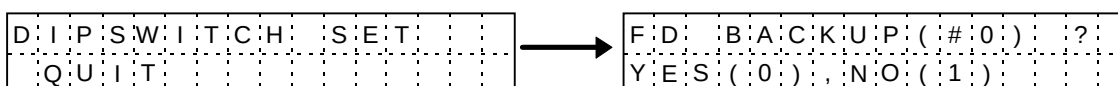
- (5) Turn on the power according to the power-on procedure in MK-OPTION0110.
 (6) Set the system LBA number with the panel according to the table below. In setting the available capacity of each drive follow ROW LAST LBA menu. Set the capacity following the displayed menu. (See MK-OPTION0240.)

- When ROW LAST LBA is displayed;



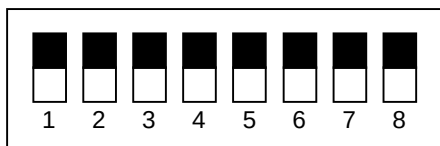
No.	Drive Capacity	Model	Final LBA No. (Hex)
1	2GB	DF-F350-A2E2	(3E696B)16
2	4GB	DF-F350-A2E4 DF-F350-A3E4	(7CD2D7)16
3	8GB	DF-F350-A1E8 DF-F350-A2E8	(1046C97)16
4	18GB	DF-F350-A1E18	(215D9B3)16

- (7) After selecting "QUIT" on the panel screen, when "FD BACK UP" appears on the screen, insert a back-up FD and make a back-up copy of system parameter. The "FD BACK UP" message may not appear for some unit types, so ignore this step in that case.



If this message appears, select (0) and make a back-up copy of the data in the EEPROM into the back-up floppy disk.
 In case of a dual system, it is displayed "FD BACK UP (#1)?". Select the controller to be backed up.

- (8) Reset the DIP switch 4, 6 to the original positions after the system is ready.



- (9) Set up the RAID group and the LU. (See Installation Chapter.)

Notice : Deleting or re-formatting the set up RAID group or LU, the data is also deleted. Be sure to make a back-up copy of user's data before execution.

Additional HDU installation to existing ROW.

- (1) Turn off the power according to the power-off procedure in MK-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

- (2) Open the front cover and the side covers.

- (3) Install additional HDU.

Be sure to install an HDU of capacity no less than pre-installed HDUs. When an HDU of less capacity is installed, after power on (5), warning LED will light up and display shown in Figure 2.9.1 will appear.

Prepare an HDU of appropriate capacity and re-install from (1).

Set the capacity referring to the system parameter setting table.

H	Z	1	4	X	Y	P	O	N	C	A	P	-	X	Y

X : Port number

Y : Row number

Figure 2.9.1 Panel Display when Improper Capacity

- (4) Turn the power on following the power on procedure. (See MK-OPTION0110.)

- (5) Set up the RAID group and the LU. (See Installation Chapter.)

Notice : Deleting or re-formatting the set up RAID group or LU, the data is also deleted. Be sure to make a back-up copy of user's data before execution.

[3] Installing a spare HDU ASSY

- (1) Turn off the power according to the power-off procedure in MK-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

- (2) Open the front cover and the side cover.
- (3) Install a spare HDU ASSY.

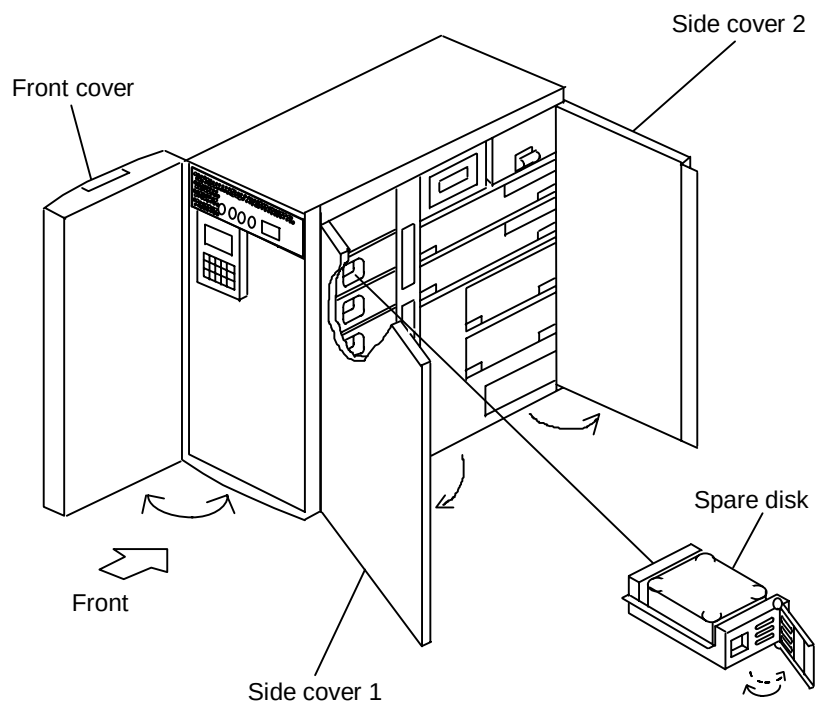
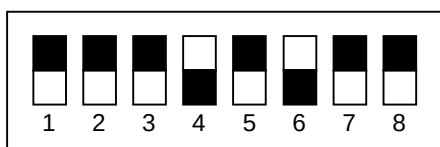


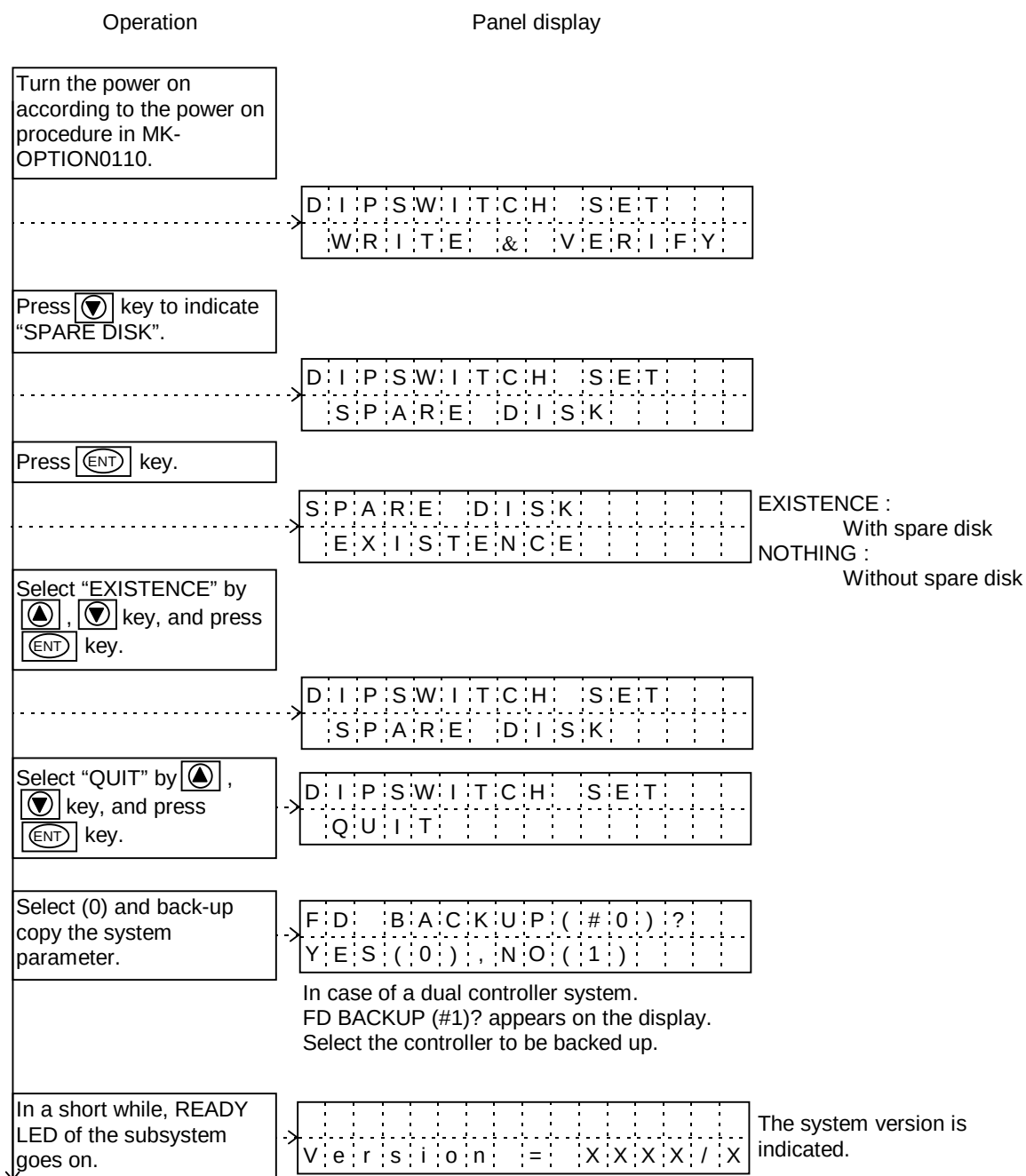
Figure 2.9.2 Installation of Spare Disk

- (4) Set the DIP switches 4 and 6 on the CTL ASSY to down.
(When a DF-F350F-F3MCF has been installed already, be sure to set the DIP switches on both CTL ASSYs.)

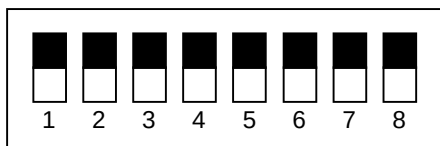


- (5) Turn on the power according to the power-on procedure in MK-OPTION0110.

(6) Set the spare disk from the PANEL according to the flow below.



- (7) Reset the DIP switches 4 and 6 to the original positions, after READY LED lit up.



- (8) Close front cover and side covers.

DF350F Disk Subsystem
10. PARTS CATALOG
(Mini Tower Type)

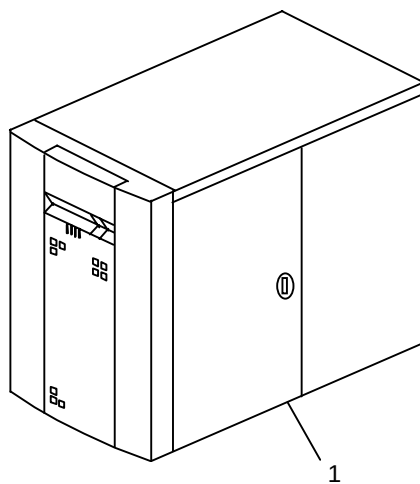
Rev.2

REV.	Date	DRW.	CHKD	APPD	Sheet No.	Description	Code
0	Jan.20.'98	A.Yamanashi	K.Aruga	H.Iwasaki	All	Issued	
1	Jul.31.'98	A.Yamanashi	K.Aruga	H.Iwasaki	0040	Added A2E8, A1E18.	AD
2	Oct.16.'98	A.Yamanashi			0040	Added DF-F350-A3E4.	AD

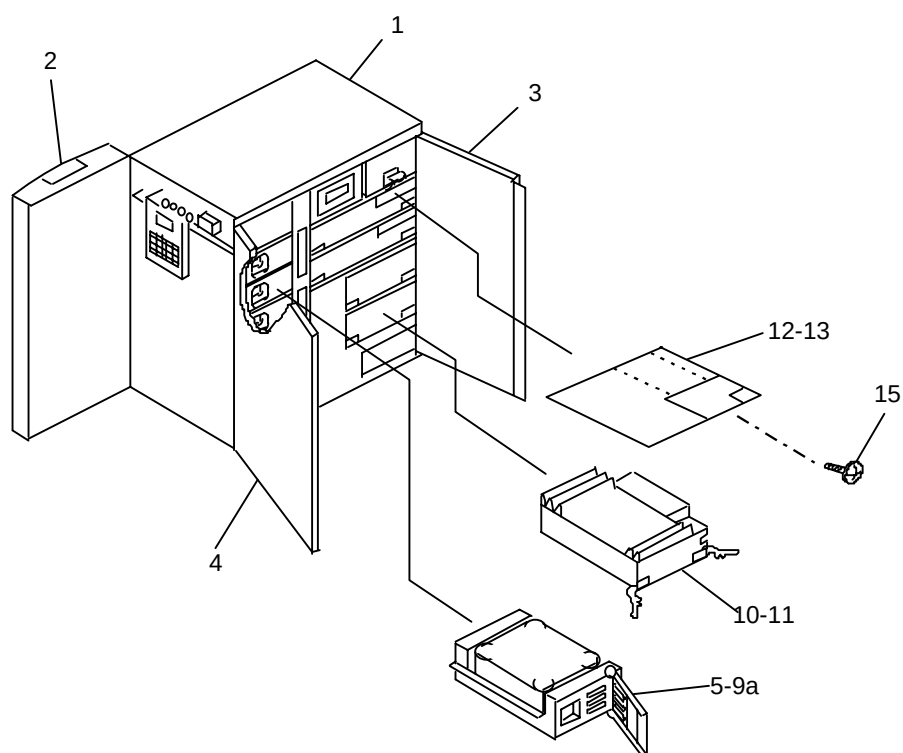
HOW TO USE THIS PARTS CATALOG

LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
1-		FINAL ASSY		
1	2100453-A	FINAL ASSY (SEE LIST 1)	1	
2	2100478-A	• FRONT COVER ASSY	1	
3	3243073-A	• SIDE COVER (R1) ASSY	1	
4	3243074-A	• SIDE COVER (R2) ASSY	1	
5	3243084-E	• HDU ASSY (DF-F350-A2E2)	2-6	S.P.
6	3243084-F	• HDU ASSY (DF-F350-A2E4)	2-6	S.P.
7	3243084-G	• HDU ASSY (DF-F350-A1E8)	2-6	S.P.

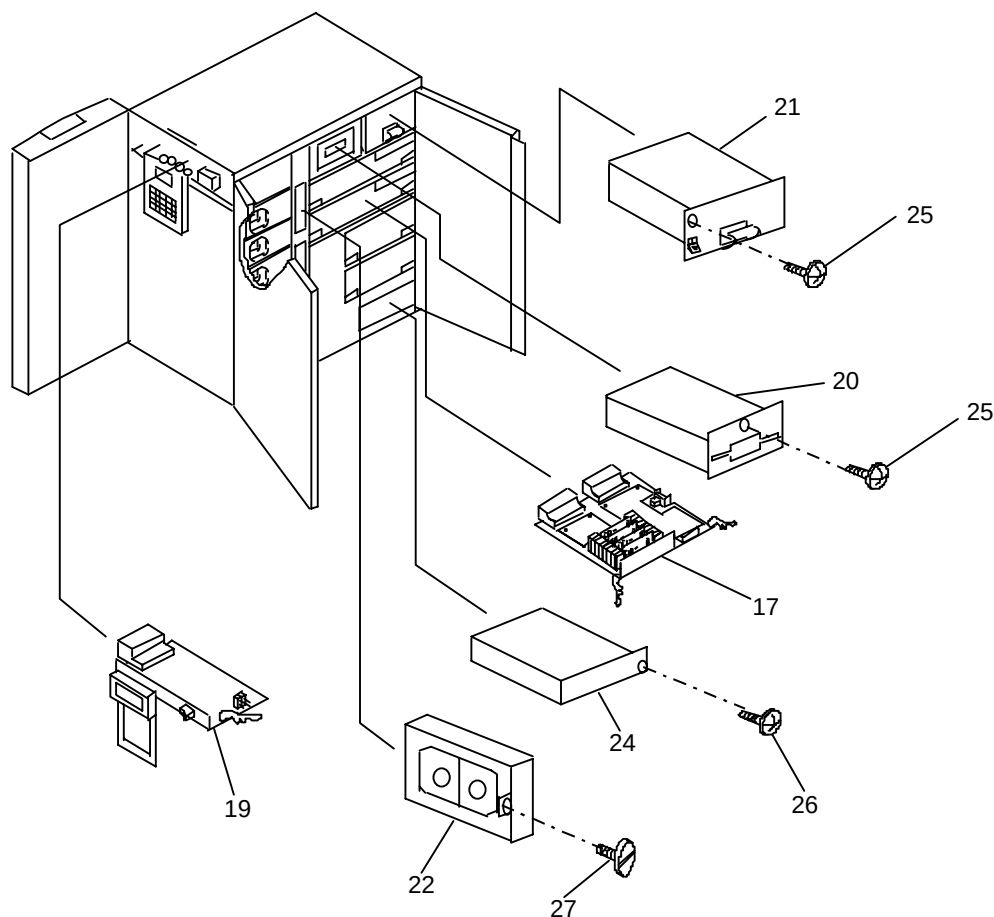
- ① indicates the list number of the assembly given on the visual index.
- ② indicates the item number given on the drawing in the catalog section.
- ③ indicates the part number.
- ④ has the following meaning.
- indicates an assembly or equivalent part.
 - indicates a subassembly or equivalent part included in an assembly indicated by....
- ⑤ indicates the unit type.
- ⑥ indicates the possible number of the subsystem.
- ⑦ indicates S.P.
- If S.P. is written in Remarks, the part or the assembly is spare parts.



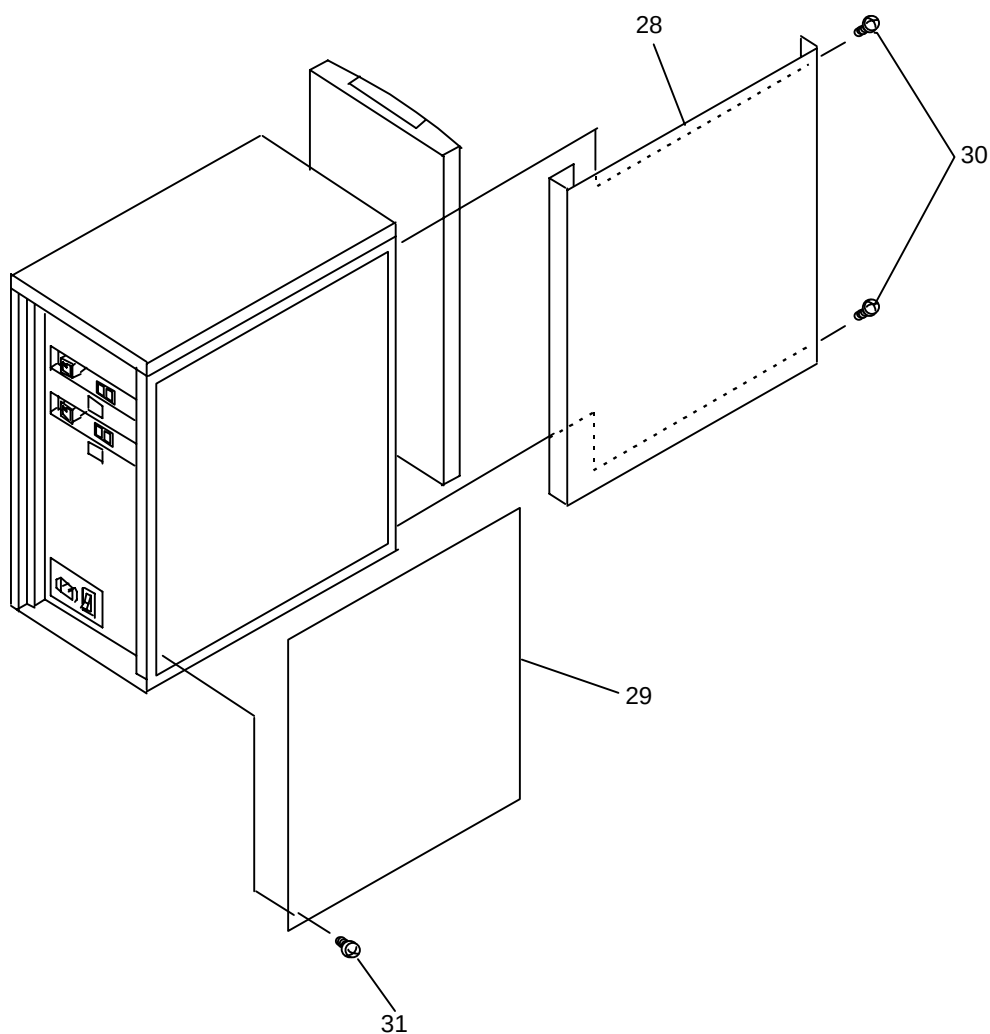
LIST NO.	NAME OF PARTS	SHEET NO.
1	FINAL ASSY	MK-PARTS0040



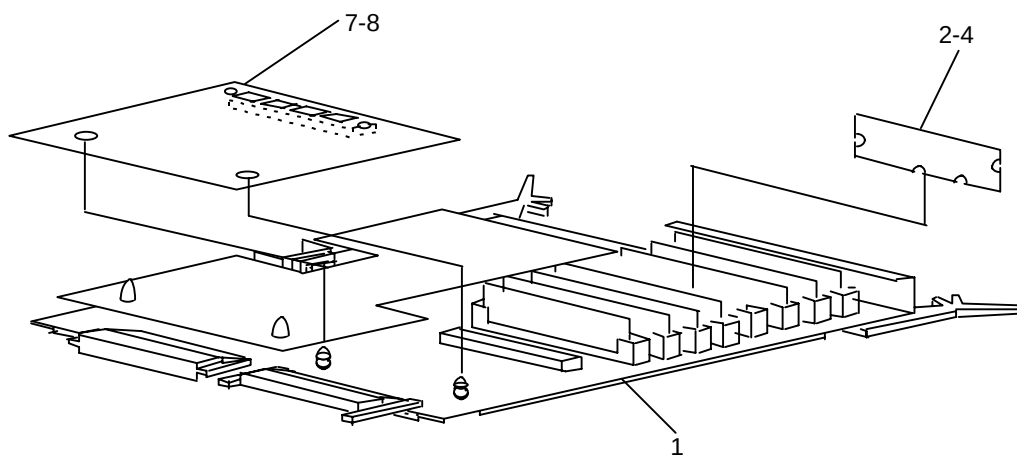
LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
1-		FINAL ASSY		
1	2100453-A	FINAL ASSY (SEE LIST 1)	1	
2	2100478-A	• FRONT COVER ASSY	1	
3	3243073-A	• SIDE COVER (R1) ASSY	1	
4	3243074-A	• SIDE COVER (R2) ASSY	1	
5	3243084-E	• HDU ASSY (DF-F350-A2E2)	2-6	S.P.
6	3243084-F	• HDU ASSY (DF-F350-A2E4)	2-6	S.P.
7	3252929-E	• HDU ASSY (DF-F350-A3E4)	2-6	S.P.
8	3243084-G	• HDU ASSY (DF-F350-A1E8)	2-6	S.P.
9	3252929-B	• HDU ASSY (DF-F350-A2E8)	2-6	S.P.
9a	3252929-X	• HDU ASSY (DF-F350-A1E18)	2-6	S.P.
10	5479203-1	• AC/DC ASSY (DF-F350F-B3M)	1-2	S.P.
11	3243406-A	• AC/DC ASSY (BLIND)	0-1	
12	3250739-C	• I/F ADAPTER ASSY (DF-F350F-DMON)	1-2	S.P.
13	3247183-1	• I/F ADAPTER ASSY (DUMMY)	1	
14				
15	SB706	• BIND SCREW (M2.5 × 6)	2	
16				



LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
1-				
17	3250738-A	• CTL ASSY (DF-F350F-F3MCF)	1	S.P.
18				
19	3237450-B	• SVP ASSY (DF-F350-L1ML)	1	S.P.
20	3237444-A	• FDD ASSY (DF-F350-M1M)	1	S.P.
21	3247182-A	• BATTERY ASSY (DF-F350-N1M10)	1	S.P.
22	3237448-C	• FAN ASSY (DF-F350-P1M)	3	S.P.
23				
24	5497259-1	• IN BOX ASSY (DF-F350F-Q2M)	1	S.P.
25	SB306	• BIND SCREW (M3 × 6)	2	
26	3183101-2	• HWA BIND SCREW	1	
27	5483798-1	• THUMB SCREW	3	



LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
1-				
28	3240338-A	• SIDE COVER L ASSY	1	
29	1503500-C	• SZ611 PK ASSY	1	
30	SB306	• BIND SCREW (M3 × 6.3)	2	
31	SB308	• BIND SCREW (M3 × 8)	16	



LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
1-17-		CTL ASSY		
1	3250738-A	• CTL ASSY (DF-F350F-F3MCF)	1	S.P.
2	3247121-A	•• CACHE MEMORY (DF-F350-C8E)	2, 4, 6, 8	S.P.
3	3247121-B	•• CACHE MEMORY (DF-F350-C32E)	2, 4, 6, 8	S.P.
4	3247121-C	•• CACHE MEMORY (DF-F350-C128E)	2, 4, 6, 8	S.P.
5				
6				
7	5493862-A	•• LAN ASSY (DF-F350-G1M1)	0-1	S.P.
8	5493862-C	•• LAN ASSY (DF-F350F-G3M1)	0-1	S.P.

DF350F Disk Subsystem
7. PARTS REPLACEMENT
(Cabinet Type)

Rev.2

REVISION CONTROL

Legend for revision codes : AD : Addition CH : Change CR : Correction DL : Deletion

REV.	Date	DRW.	CHKD	APPD	Sheet No.	Description	Code
0	Jan.20.'98	A.Yamanashi	K.Aruga	H.Iwasaki	All	Issued	
1	Jul.31.'98	A.Yamanashi	K.Aruga	H.Iwasaki	0040 0330 0340 0500	Added A2E8, A1E18. Changed Note. Changed replacing procedure. Added (4), (5).	AD CH CH AD
2	Oct.16.'98	A.Yamanashi			0040 0100 0130	Added DF-F350-A3E4. Added case of the dual controller. Added case of the dual controller.	AD AD AD

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1. Mechanical Configuration.....	CK-REP0030
2. Maintenance Procedure	CK-REP0040
2.1 Turning the Power On/Off for Each String	CK-REP0050
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2.3.1 Back-up procedure to FD	CK-REP0090
2.3.2 Restoring procedures from FD	CK-REP0130
3. Opening/Closing Front and Side Covers.....	CK-REP0160
4. Replacing HDU ASSY	CK-REP0170
4.1 Procedures of Data Recovery and HDU Replacement	
Under RAID0 Configuration.....	CK-REP0180
4.1.1 Procedure of data recovery and HDU ASSY replacement	
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12. Replacing In Box ASSY	CK-REP0520
13. Replacing CACHE ASSY	CK-REP0530
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1. Mechanical Configuration

Figures 1.1 and 1.2 show mechanical configuration and parts location of this subsystem.

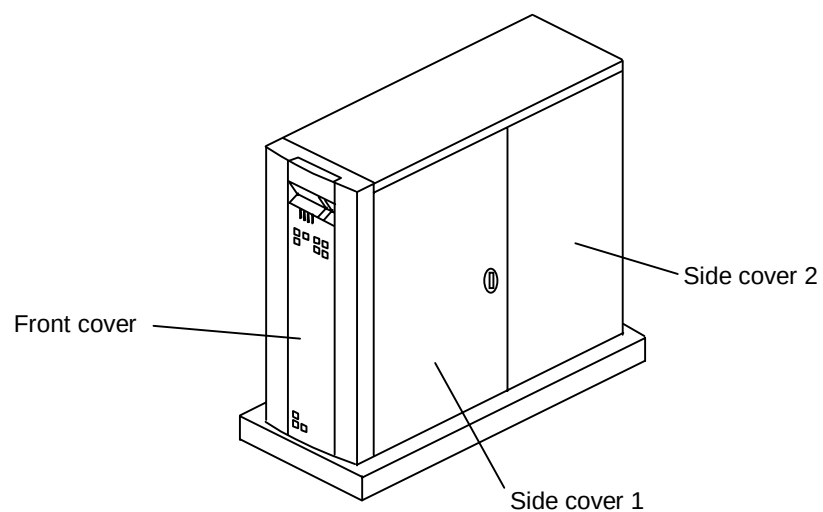


Figure 1.1 Appearance of DF350F Disk Subsystem (Cabinet Type)

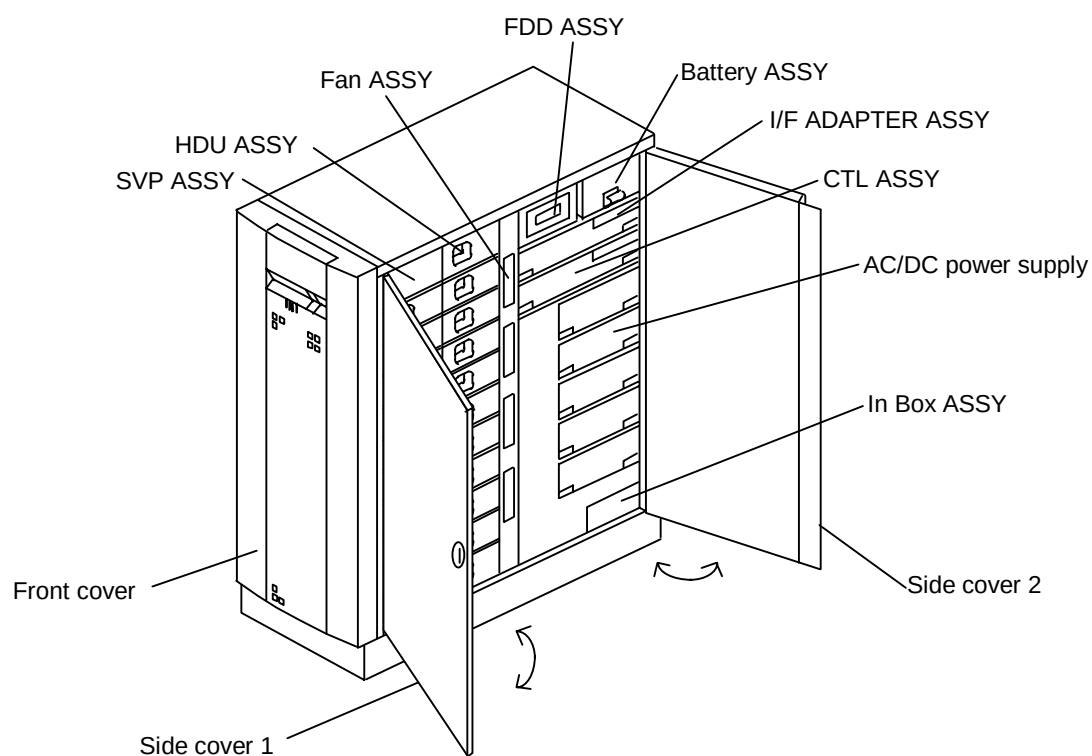


Figure 1.2 Parts Location

2. Maintenance Procedure

(1) Turning power on/off when replacing parts

Turning on/off procedure varies depending on the parts to be replaced.

Follow the procedures described in the table below for replacing each part.

No	Product name	Drawing No.	Model	Turning on/off power	
				Option not provided	Option provided
1	HDU ASSY (2GB1"H)	3243084-E	DF-F350-A2E2	④	④
2	HDU ASSY (4GB1"H)	3243084-F	DF-F350-A2E4	④	④
3	HDU ASSY (4GB1"H)	3252929-E	DF-F350-A3E4	④	④
4	HDU ASSY (8GBH.H)	3243084-G	DF-F350-A1E8	④	④
5	HDU ASSY (8GB1'H)	3252929-B	DF-F350-A2E8	④	④
6	HDU ASSY (18GBH.H)	3252929-A	DF-F350-A1E18	④	④
7	Fan ASSY	3237448-C	DF-F350-P1M	③	—
8	Battery ASSY	3247182-A	DF-F350-N1M10	③	—
9	FDD ASSY	3237444-A	DF-F350-M1M	②	—
10	CTL ASSY	3250738-A	DF-F350F-F3MCF	②	③
11	I/F ADAPTER ASSY (Optical (Non OFC))	3250739-C	DF-F350F-DMON	①	①
12	SVP ASSY	3237450-B	DF-F350-L1ML	②	—
13	AC/DC power supply	5479203-1	DF-F350F-B3M	②	③
14	In Box ASSY	5486142-303	DF-F350-Q1C	②	—
15	CACHE ASSY	3247121-A	DF-F350-C8E	①	—
16	CACHE ASSY	3247121-B	DF-F350-C32E	①	—
17	CACHE ASSY	3247121-C	DF-F350-C128E	①	—
18	LAN ASSY	5493862-A	DF-F350-G1M1	②	③
19	LAN ASSY (SNMP)	5493862-C	DF-F350F-G3M1	②	③

① Turning the power off DF350F Disk Subsystem and Host System.

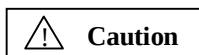
② Turning the power off DF350F Disk Subsystem.

③ Turning the power off is unnecessary.

④ Turning the power on DF350F Disk Subsystem.

Notice : When a part which requires to turn the power off or on for replacement (marked with ① and ②) is to be replaced, turn the power off correctly according to the instruction in CK-REP0050 beforehand.

Otherwise, there is a risk that the user data is destroyed.

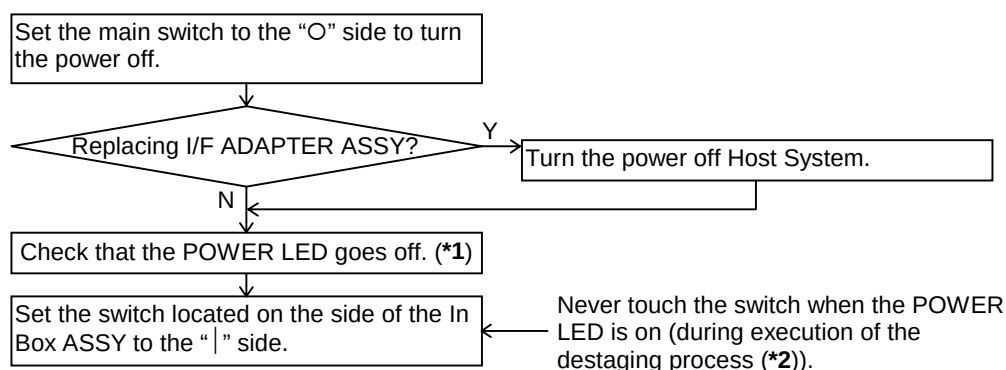


When replacing parts without turning off the power, do not put on metallic accessories or watches so that to avoid electric shock.

Be careful not to touch the electrified parts with a screwdriver etc.

2.1 Turning the Power On/Off for Each String

(1) Turning the power off



*1 Check the back-up state of the CACHE memory.

Be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

The CACHE memory of this unit provides write-after control. If data is not yet written, before the power is turned off, the unit automatically writes the data on the CACHE memory to the hard disk. This is called destaging. After this processing is completed, the power is turned off.

If the power is turned off in a state in which destaging cannot be completed due to an unexpected power interruption or a tripped circuit breaker, the CACHE memory switches to the back-up mode using the battery for data integrity. If any equipment of the unit is removed or inserted in this back-up mode, the battery may stop supplying power, resulting in the user data being lost. When you handle any equipment of the unit with the unit power off, be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

• Checking the back-up state of the cache memory

You can determine whether the unit is in the back-up mode by checking the indication of the CACHE PWR (green LED) on the CTL ASSY, as described below.

Set the circuit breaker on the rear of the unit to "I" (ON) with the power switch (POWER SW) set to "O" (OFF).

Determine the state of the memory from the indication of the CACHE PWR.

CACHE PWR LED on ----- Indicate the back-up mode.

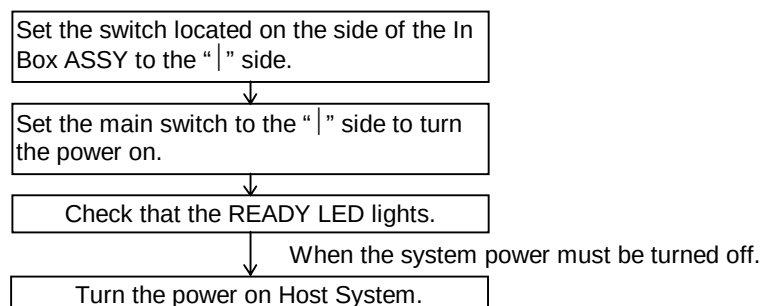
CACHE PWR LED off ----- Indicate that the back-up mode is canceled.

Notice : In case the data is not properly backed up, the user's data will be lost.

***2** The cache memory installed in this subsystem is controlled with a write-after method. When turning off the power, the subsystem automatically writes all the data left on the cache memory unwritten to the hard disk drive. (This operation is called a destaging.) The subsystem turns off the power when this process is completed. When the power is turned off according to the power failure or by the operation of the breaker, the destaging can not be performed. In this case, the subsystem enters the mode of battery back-up. If the system is kept in this state, the battery may be discharged and the user data might be lost. Therefore, be sure to follow the power-off procedure explained above.

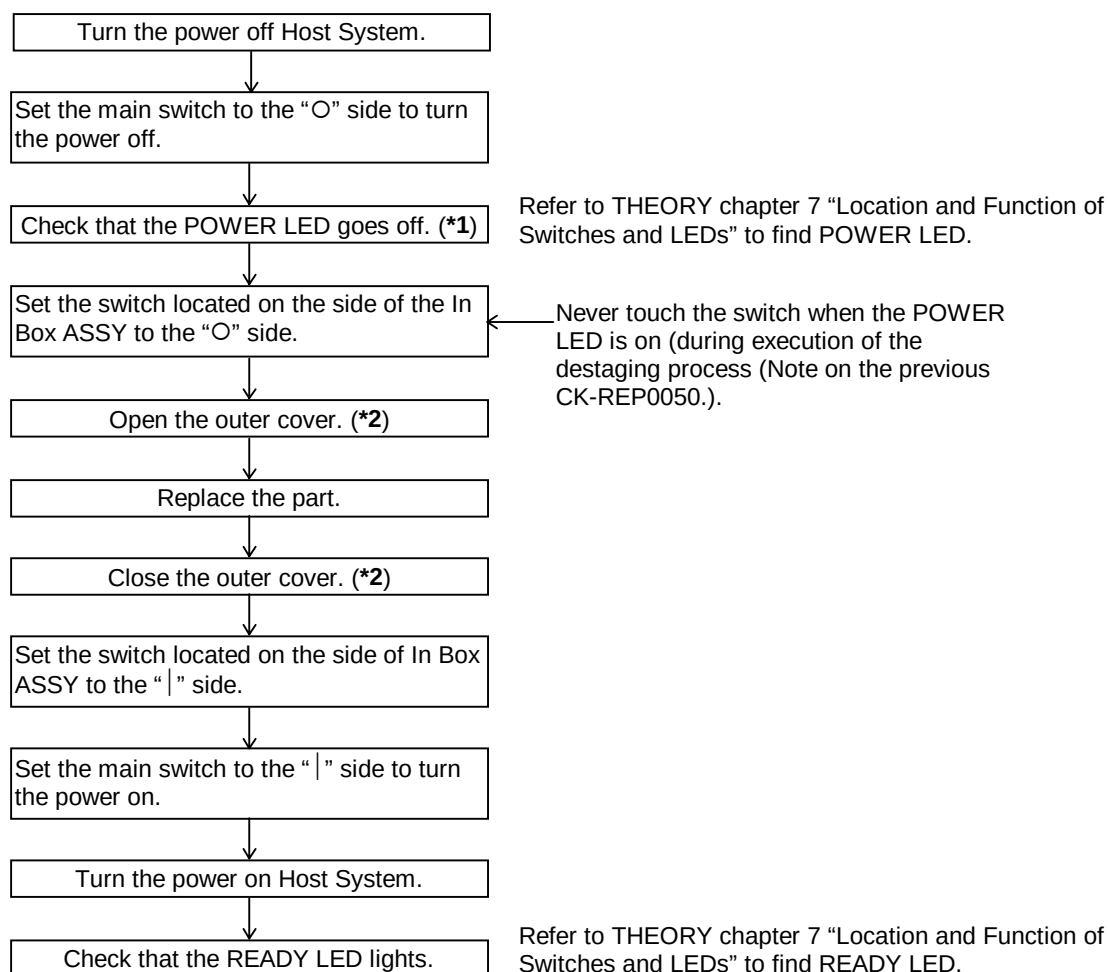
If the breaker is turned off due to power failure or by mistake before the POWER LED goes off, turn the power on again according to Item (2), "Turning the power on" promptly and then execute the power-off procedure explained above.

(2) Turning-ON procedure



2.2 Part Replacement Procedures

- (1) Procedure for the case of turning the power off both DF350F Disk Subsystem and Host System is inevitable.



Notice: In case the power is not normally turned off, the configuration data will be lost and the user's data will be lost.

***1** Check the back-up state of the CACHE memory.

Be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

The CACHE memory of this unit provides write-after control. If data is not yet written, before the power is turned off, the unit automatically writes the data on the CACHE memory to the hard disk. This is called destaging. After this processing is completed, the power is turned off.

If the power is turned off in a state in which destaging cannot be completed due to an unexpected power interruption or a tripped circuit breaker, the CACHE memory switches to the back-up mode using the battery for data integrity. If any equipment of the unit is removed or inserted in this back-up mode, the battery may stop supplying power, resulting in the user data being lost. When you handle any equipment of the unit with the unit power off, be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

- Checking the back-up state of the cache memory

You can determine whether the unit is in the back-up mode by checking the indication of the CACHE PWR (green LED) on the CTL ASSY, as described below.

Set the circuit breaker on the rear of the unit to "I" (ON) with the power switch (POWER SW) set to "O" (OFF).

Determine the state of the memory from the indication of the CACHE PWR.

CACHE PWR LED on ----- Indicate the back-up mode.

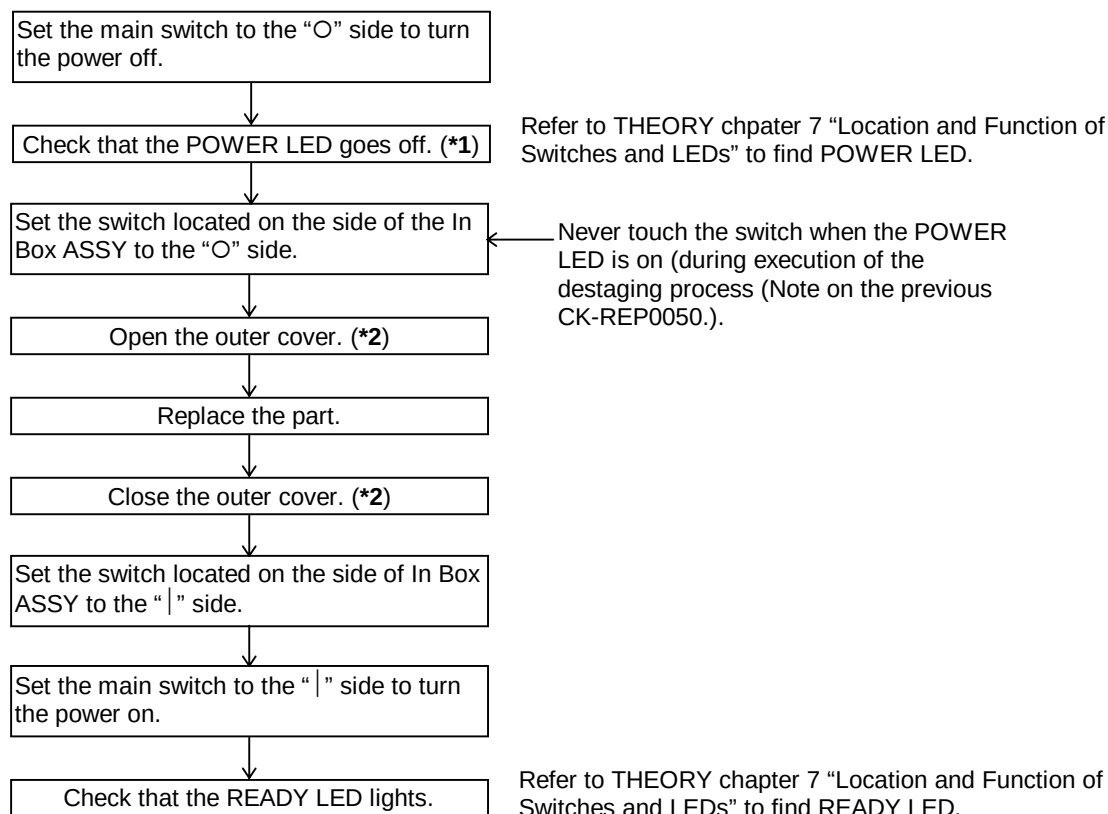
CACHE PWR LED off ----- Indicate that the back-up mode is canceled.

***2** Outer cover : Front cover

Side cover 1

Side cover 2

(2) Procedure for the case of turning the power off DF350F Disk Subsystem is inevitable.



Notice: In case the power is not normally turned off, the user's data might be lost.

***1** Check the back-up state of the CACHE memory.

Be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

The CACHE memory of this unit provides write-after control. If data is not yet written, before the power is turned off, the unit automatically writes the data on the CACHE memory to the hard disk. This is called destaging. After this processing is completed, the power is turned off.

If the power is turned off in a state in which destaging cannot be completed due to an unexpected power interruption or a tripped circuit breaker, the CACHE memory switches to the back-up mode using the battery for data integrity. If any equipment of the unit is removed or inserted in this back-up mode, the battery may stop supplying power, resulting in the user data being lost. When you handle any equipment of the unit with the unit power off, be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

- Checking the back-up state of the cache memory

You can determine whether the unit is in the back-up mode by checking the indication of the CACHE PWR (green LED) on the CTL ASSY, as described below.

Set the circuit breaker on the rear of the unit to "I" (ON) with the power switch (POWER SW) set to "O" (OFF).

Determine the state of the memory from the indication of the CACHE PWR.

CACHE PWR LED on ----- Indicate the back-up mode.

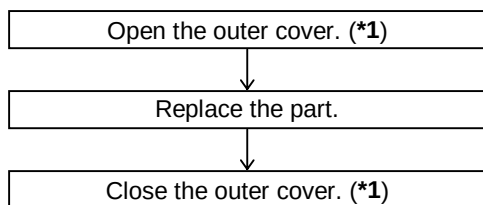
CACHE PWR LED off ----- Indicate that the back-up mode is canceled.

***2** Outer cover : Front cover

Side cover 1

Side cover 2

(3) Procedure for the case of turning the power off DF350F is either not necessary or prohibited.



*1 Outer cover : Front cover
Side cover 1
Side cover 2

2.3 Back-up Procedure of System Parameter

There are cases where system parameters (Buzzer setting, drive recovery mode, etc.) are copied to FD or restored from FD when installing optional parts or replacing parts. In this case, copy or restore system parameters following “2.3.1 Back-up procedure of system parameter” (CK-REP0090) or “2.3.2 Restore procedure of system parameter” (CK-REP0130).

(RAID configuration setting, LU configuration setting, etc. are not contained in system parameter.)

2.3.1 Back-up procedure to FD

- (1) Turn the power off according to CK-REP0050.

Notice: In case the power is not normally turned off, the user's data might be lost.

- (2) Before power on the subsystem, set DIP switch No.4 on CTL ASSY as shown in Figure 2.3.1.

Note : Be sure to set the same data for both controllers if the dual controller option (-F3MCF) has been installed.

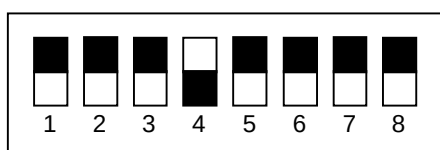
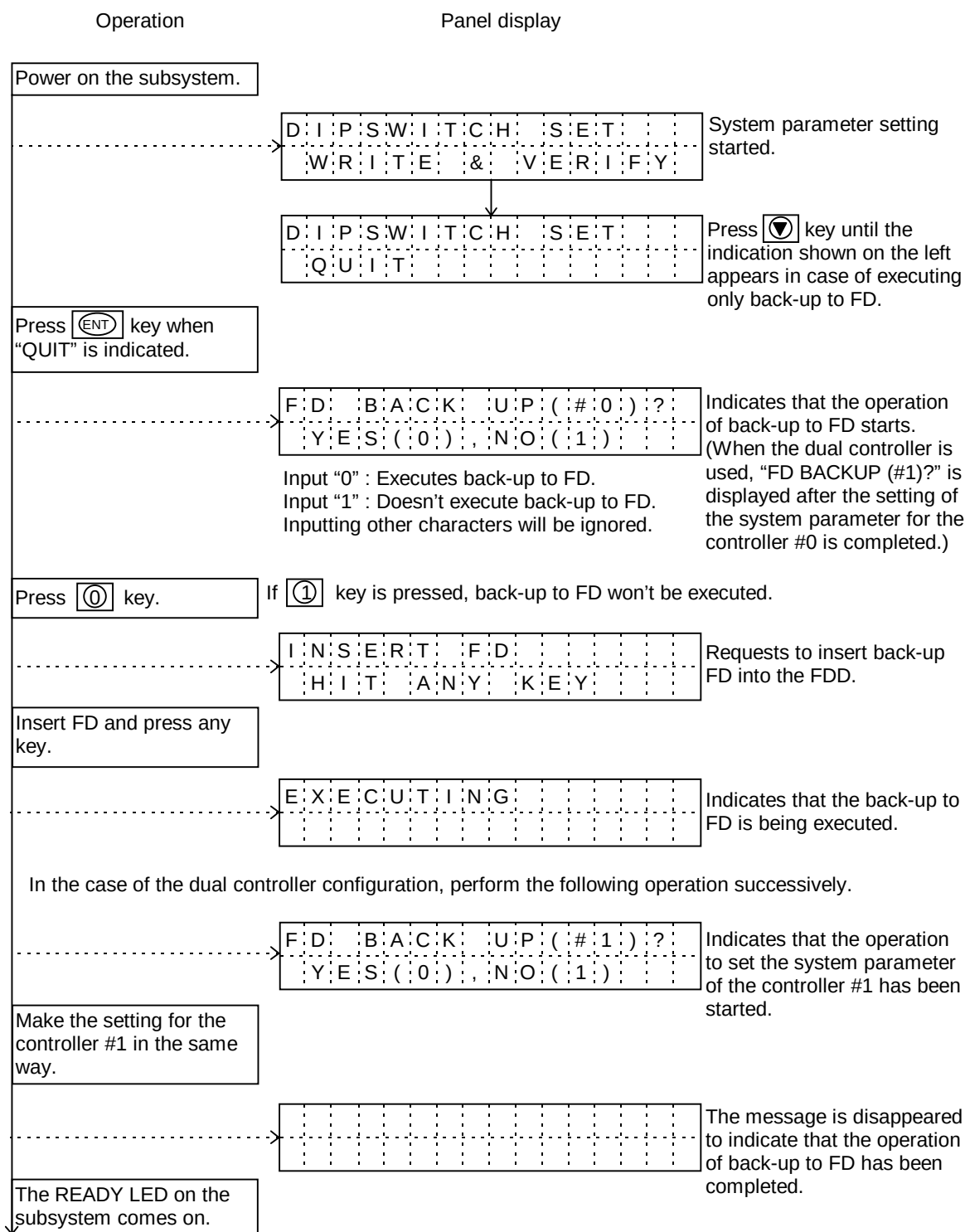


Figure 2.3.1 DIP Switches
(Back-up operation to FD is allowed)

(3) Operate as described below.



(4) Set DIP switch No.4 to setting as shown in Figure 2.3.2.

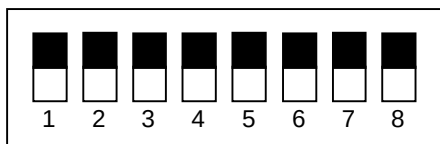
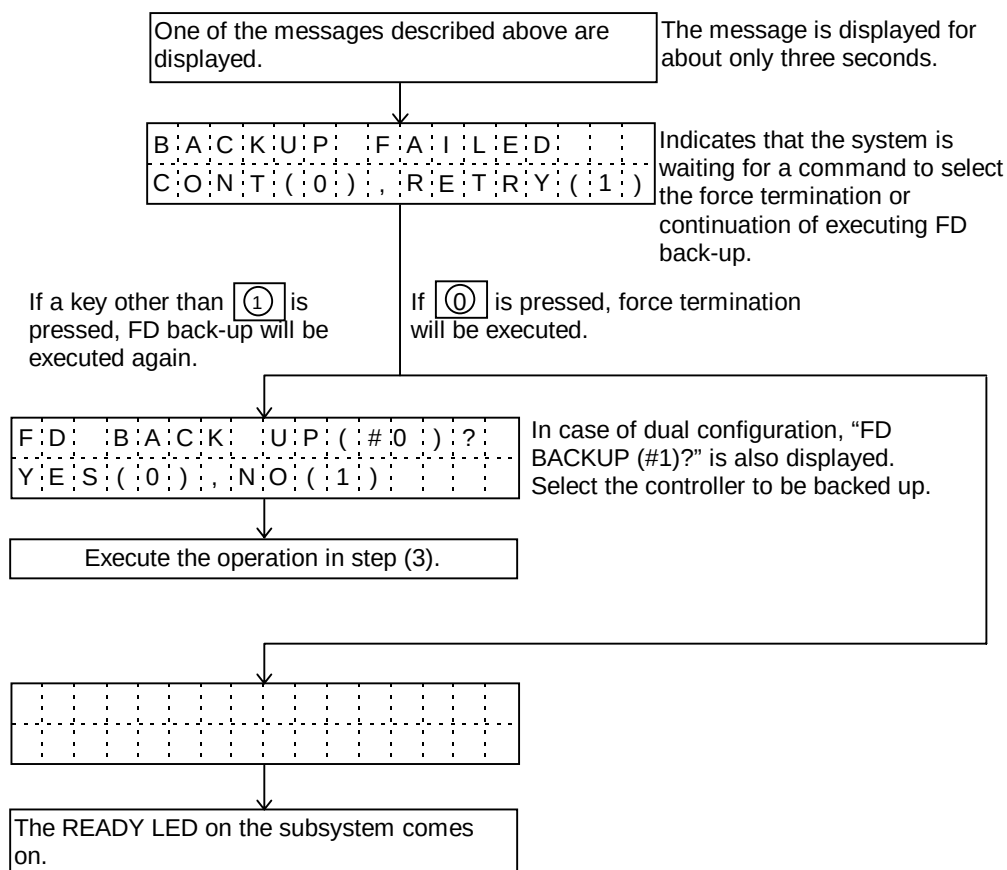


Figure 2.3.2 DIP Switches

Note 1 : While executing the back-up to FD, the messages described below are sometimes displayed.

- **FD NOT INSERTED**
FD isn't inserted. Insert FD into the FDD.
- **FD MOTOR NOT STARTED**
Starting of FD Motor ended in failure. Re-execute..
- **FILE WRITE ERROR**
FD which was inserted is not formatted, or write-protected. Format or release write-protection.
Write error occurred in FD. Insert another FD.

If these messages are displayed, back-up to FD hasn't been executed. So re-execute following the operation described below.



Note 2 : Use 3.5" FD (1.44MB) formatted by MS-DOS for back-up FD. Besides, note that the FD will be overwritten during back-up.

Note 3 : Even if back-up FD is left at FDD after back-up operation, error won't occur on the subsystem.

Note 4 : "EEPROM.DAT" or "EEPROM0.DAT" file is stored in system parameter backed up FD. The case of optional SNMP system, SNMP configuration environment files ("Config.TXT" and "NAME.TXT") are stored with system parameter file.

Note 5 : In case with optional SNMP system and system parameter is restored without SNMP configuration environment files, Subsystem becomes ready without SNMP function. In this case, the warning lamp on the panel comes on and one of messages below is shown on PANEL.

W:01601	F:D	E:R	R:
V:e r s i o n	=	X	X

W:01602	F:O:P:N	E:R	R:
V:e r s i o n	=	X	X

W:01600	S:N:M:P	I:N	V:1
V:e r s i o n	=	X	X

Only Dual controller system.

This case, re-restore the subsystem with a FD in which SNMP configuration environment files is stored.

2.3.2 Restoring procedures from FD

- (1) Before power on the subsystem, set DIP switch No.3 as shown in Figure 2.3.3.

In case of dual controller system, set both the DIP switches as shown in Figure 2.3.3.

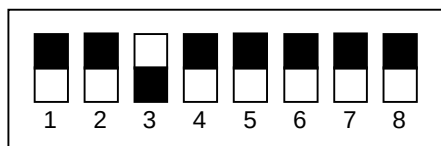
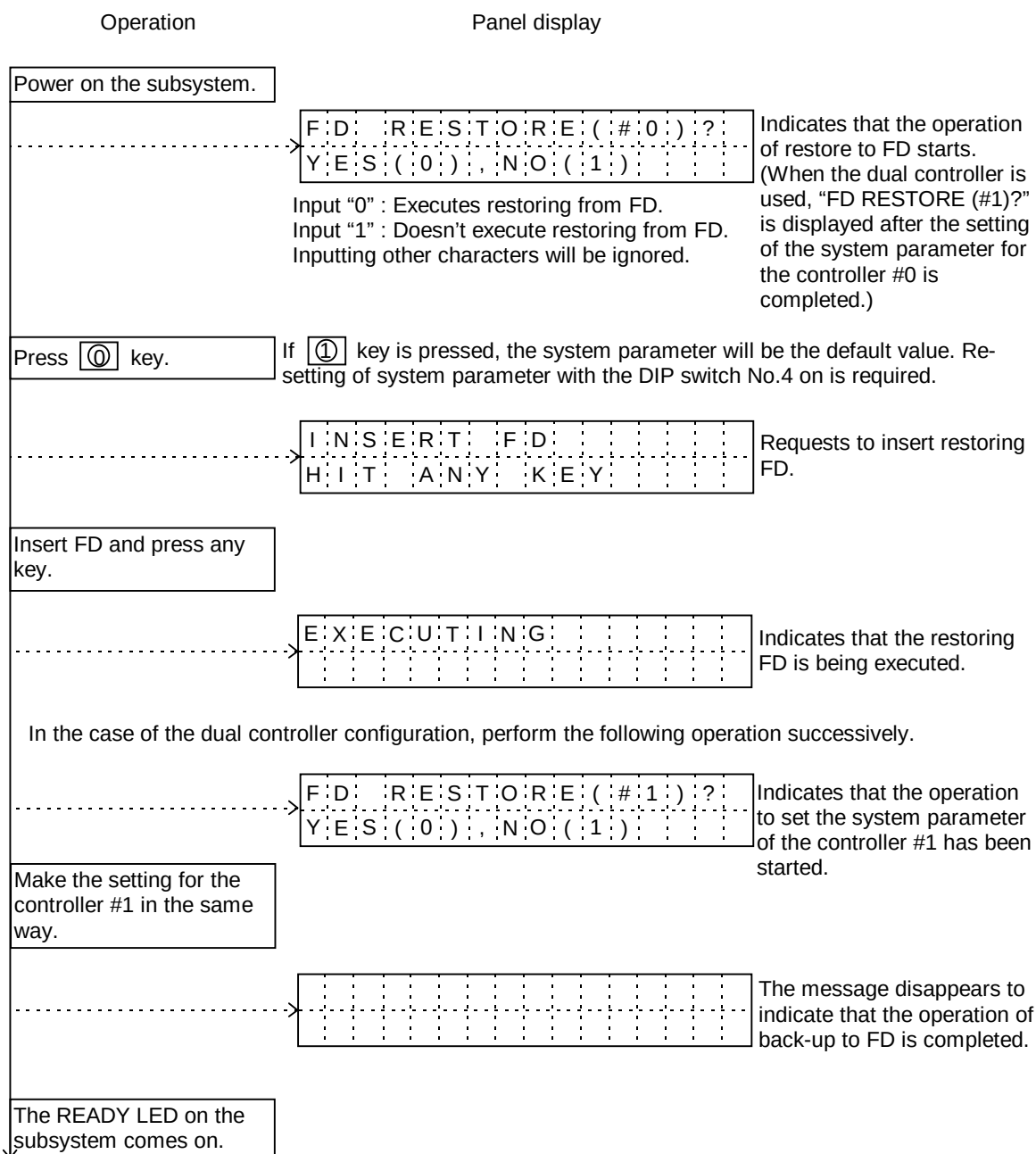


Figure 2.3.3 DIP Switches

(Restoring operation from FD is available)

- (2) Operate as described below.



(3) Set DIP switch No.3 as shown in Figure 2.3.4.

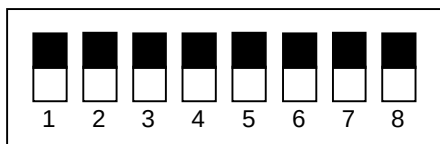
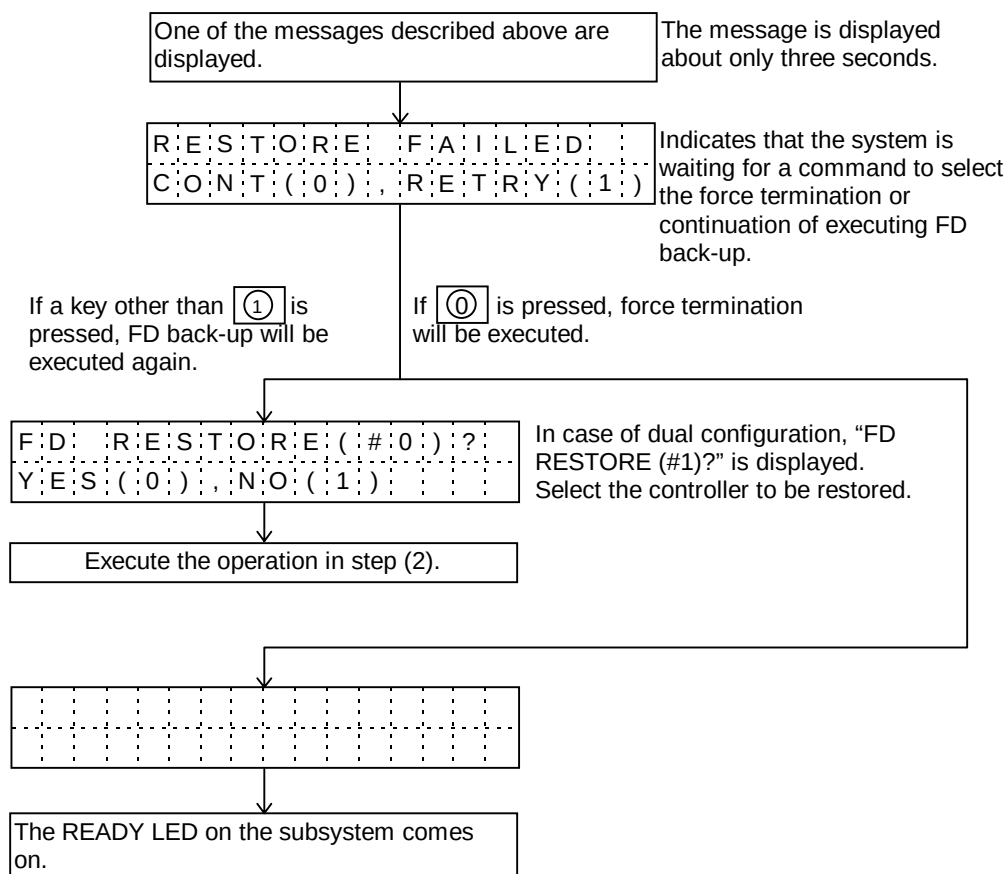


Figure 2.3.4 DIP Switches

Note 1 : While executing the restoring from FD, the messages described below are sometimes displayed.

- **FD NOT INSERTED**
FD isn't inserted. Insert FD into the FDD.
- **FD MOTOR NOT STARTED**
Starting of FD Motor ended in failure. Try again.
- **BAD FD INSERTED**
Inserted FD is not formatted. Format FD.
- **FILE READ ERROR**
Read error occurred in FD. Try again.

If these messages are displayed, restoring from FD hasn't been executed. So re-restore the system following the operation described below.



Note 2 : In case that restoring operation ended in failure and force terminated, setting of system parameter will be with default value.

Accordingly, re-setting with the DIP switch No.4 On is required.

Note 3 : Even if FD which was used to restore is left at FDD after back-up operation, error won't occur on the subsystem.

3. Opening/Closing Front and Side Covers

(1) Opening/Closing the front cover (See Figure 3.1.)

- ① Pull the right side of the front cover to your side to open it.
- ② Push it back slowly to close it.

Notice : Open/Close the front cover carefully to avoid subjecting the subsystem to any impact since it has precision components.

(2) Opening/Closing the side covers (See Figure 3.1.)

- ① Insert the key attached to the subsystem into the keyhole and turn it clockwise. Then, open the side cover 1 gently, and then open the side cover 2.
- ② Gently close the side cover 2 first, and then close the side cover 1. Then, turn the key counterclockwise.

Notice : Open/Close the side covers gently to avoid a shock. Precision components are installed.

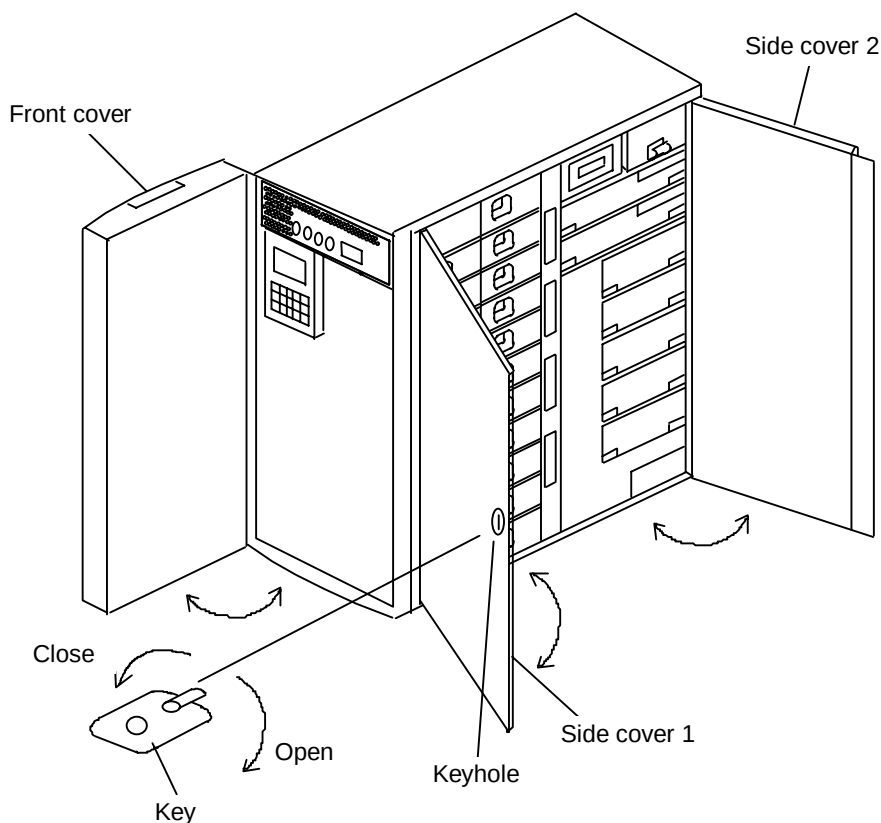


Figure 3.1 Opening/Closing Front and Side Covers

4. Replacing HDU ASSY

The method of replacing HDU varies depending on the RAID configuration.

When replacing the HDU ASSY, confirm the RAID configuration of the subsystem beforehand, and follow the procedure below according to the configuration.

To confirm the RAID configuration, refer to page PANEL0290 ((1) Reference/setting menu of RAID configuration information.)

Notice : Be sure to replace the HDU ASSY with the power kept on. . (This procedure is except for when the Micro-Disk version is 0353 or earlier.)**

Proceed the replacement and the data recovery following the procedure below. RAID Specification of replacing HDU can be seen on the panel display. (See PANEL0290.)

Notice : If you delete or re-format the set-up RAID group or LU, user's data in that will be deleted. Be sure to back-up copy the user's data before these operation.

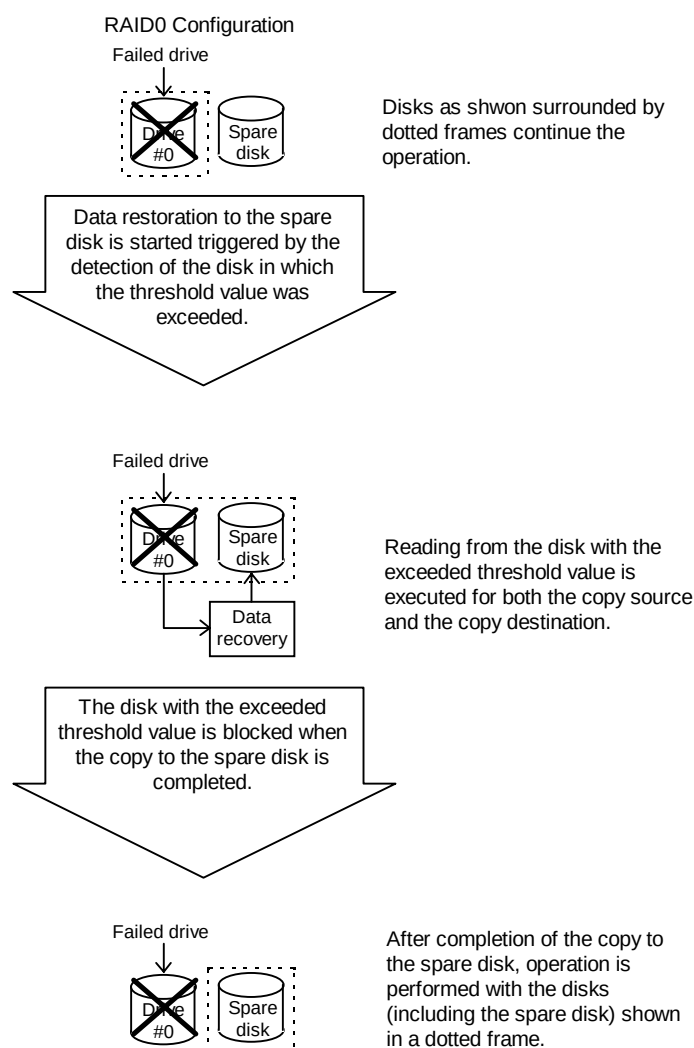
4.1 Procedure of Data Recovery and HDU Replacement Under RAID0 Configuration

4.1.1 Procedure of data recovery and HDU ASSY replacement when no spare disk is installed

- (1) Pull out the disk in which a failure occurred, and insert the replacement disk. For the specific procedures to remove and install the disk, see "HDU ASSY Replacement Procedure" on page CK-REP0280.
- (2) In a short time after the disk is inserted, the ALARM LED on the HDU ASSY goes out and the READY LED comes on. If the inserted disk is that of row 0, following messages will be displayed on the panel.
 I00DXY SYS-CP-XY----- Starting system area recovery
 I00EXY SYSRCV-XY----- Completing system area recovery
 X : Port number, Y : Row number (XY indicates a location of the disk whose system area is being recovered (or has been recovered).)
 If the ALARM LED of the HDU ASSY is on after the replacement, power off the subsystem and reexecute the replacement.
- (3) Execute an LU formatting. For the LU formatting procedure, see page CK-INST0790.
- (4) Restore the data using the backed up data.

4.1.2 When a spare disk is installed

When the Micro_Disk version is 0354** (** is optional) or later, data restoration to the spare disk is executed by the dynamic sparing function. Conditions for restoration to the spare disk and messages, etc. are the same as those to the RAID1, 5 and A. See pages CK-REP0210 through 0240.



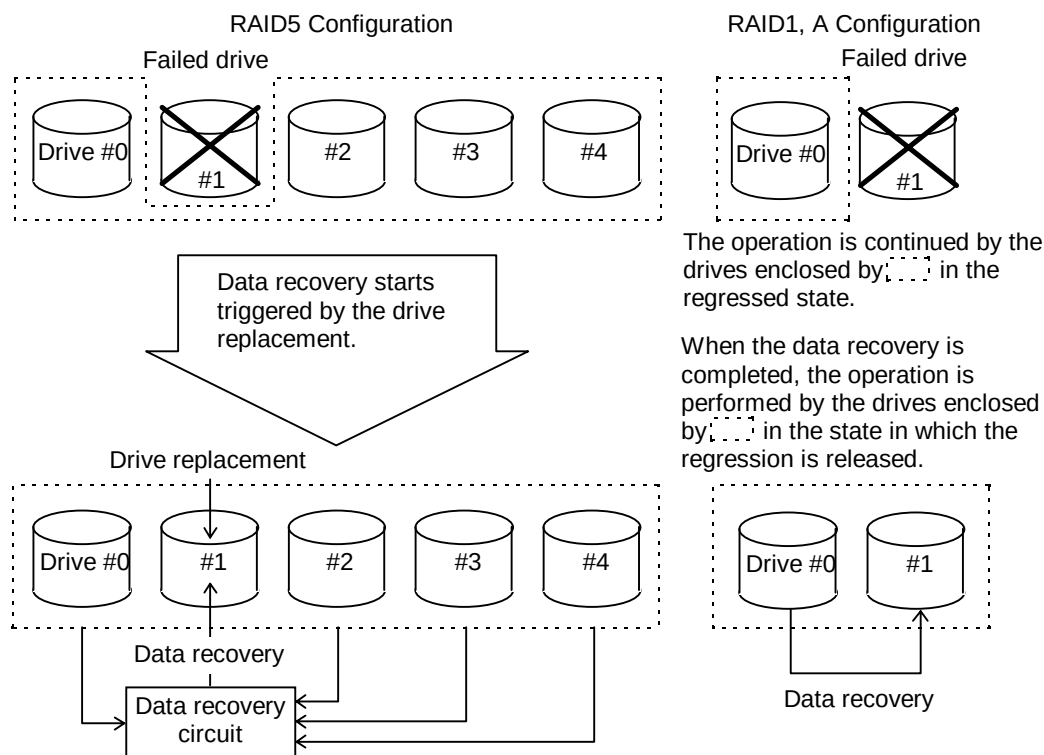
4.2 Procedure of Data Recovery and HDU Replacement Under RAID1, 5, A Configuration

4.2.1 Procedure of data recovery and HDU ASSY replacement when no spare disk is installed

When a failure occurred at a HDU ASSY, replace the failed HDU with a spare HDU.

To replace a HDU, refer to “4.3 HDU ASSY Replacement Procedure”. (See CK-REP0280.) With the replacement, data in the failed HDU will be automatically recovered. The panel display is described at “① Transition of panel display”. (See CK-REP0200.)

Note : When DRIVE MAINTN (RECOVER STATUS) is selected from the panel during data recovery, the progress rate (%) of the data recovery at the moment can be seen (to see the progress rate again, return to the previous screen and then select DRIVE MAINTN again).



In the following cases, the recovery will not start automatically. Operation to start the recovery is required.

- (1) When the drive recovery mode is set to “NOT AUTOMATIC MODE”, the data recovery will not start automatically when the drive is replaced.

In this case, it is necessary to instruct recovery from the panel. (For further details, refer to the Hitachi Disk Array Subsystem Panel Operation Manual.)

- (2) When failures occurred in plural drives, if the second faulty drive is replaced during data recovery of the first drive, the data recovery of the second drive will not start automatically.

In this case, it is necessary to remove and insert the second drive again after the data recovery for the first drive is completed. Or, it is necessary to instruct recovery from the panel. Select “DRIVE MAINTN (RECOVER STATUS)” and make sure that data recovery is completed normally.

① Transition of panel display

I00DXY SYS-CP-XY : Start of system area recovery (*)

I00EXY SYSRCV-XY : Completion of system area recovery (*)

I010XY RCV-ST-XY : Start of data area recovery

I011XY RCVEND-XY : Completion of data area recovery

I005XY DRVRCV-XY : Completion of drive recovery

Note : Symbols X and Y indicated above represent the following.

X indicates port No., Y indicates row No., and XY indicates the location of the drive under recovery.

* : Only with the replacement of HDU in Row = 0.

② Confirming completion of data recovery

Select DRIVE MAINT (RECOVER STATUS) with the panel and check to see that the data recovery is completed normally (COMP).

③ When the data recovery fails (I012XY RCVFLT-XY)

Select RECV ERR INFO from the panel and locate the faulty portion.

(a) Data recovery onto the replacement drive

(i) When the faulty portion is the replaced drive (PORT X, ROW Y)

- Replace the drive again.
- Make sure that the data recovery is completed normally (COMP).

(ii) When the faulty portion is other than the replaced drive

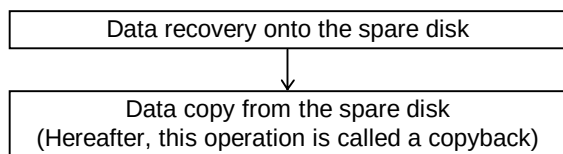
- Remove and insert the replaced drive and start data recovery again.
- Check to see that the data recovery is completed normally (COMP). When the data recovery is completed abnormally, it is a double failure, and cannot be recovered. Ask for an instruction. When the data recovery is completed normally, remove the failed drive (causing the system to be regressed) and replace the drive.

4.2.2 Procedures of data recovery and HDU ASSY replacement when a spare disk is installed

When a failure occurred in a HDU at a system with a spare drive, the data in the failed HDU is automatically recovered to the spare drive. After replacement of the failed HDU, the data in the spare drive will be copied back to the replaced HDU.

To replace HDU, refer to “4.3 HDU ASSY Replacement Procedure”. (See CK-REP0280.) The panel display is described “Transition of Panel Display”. (See CK-REP0260.)

Note : When DRIVE MAINTN (RECOVER STATUS) is selected from the panel during data recovery, the progress rate (%) of the data recovery at the moment can be seen (to see the progress rate again, return to the previous screen and then select DRIVE MAINTN again).



(1) Data recovery onto the spare disk

There are two types of data recovery onto the spare disk depending on the incentive.

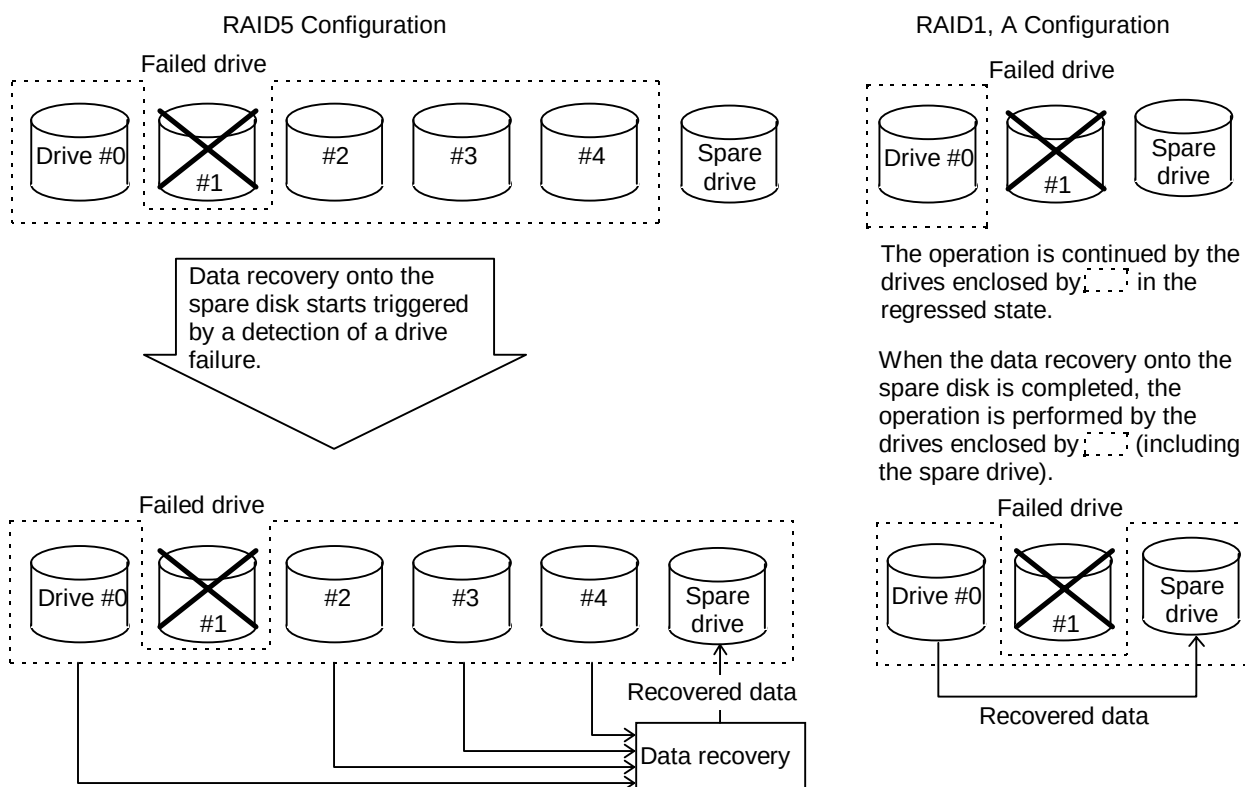
- Data recovery onto the spare disk when a failure in the disk is detected.
- Data copy onto the spare disk when a disk is detected in which the error count has exceeded its threshold value. (This operation will be called “dynamic sparing” hereafter. Note that some microprograms of certain version do not support the operation.)

(1-1) 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 drive failure occurs, the data of the failed drive is recovered automatically onto the spare disk.

Automatic recovery onto the spare disk is executed only under the following condition.

Condition : “When a 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.

- ① When the drive recovery mode is set to "NOT AUTOMATIC MODE", the data recovery onto the spare disk will not start automatically.

In this case, it is necessary to instruct recovery onto the spare disk with the panel. (See CK-REP0300)

- ② If a further drive failure occurs while the spare disk is used already (data of a drive has been already recovered onto the spare disk), the data of the nearly failed drive will not be recovered onto the spare disk.

Even after the copyback is completed in the above state and the spare disk enters the unused state, the data of the second failed drive will not be recovered onto the spare disk.

- ③ If a disk of no failure (a 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 from the panel. (See CK-REP0300)
- ④ When the spare disk is replaced because a spare disk failure occurred during data recovery to the spare disk, the data recovery to the replaced spare disk will not start automatically. In this case, it is necessary to instruct recovery to the spare disk with the panel. (See CK-REP0300)
- ⑤ If a faulty drive is replaced during data recovery to the spare disk, the data copy back the replaced drive will not start automatically even after the data recovery to the spare disk is completed.

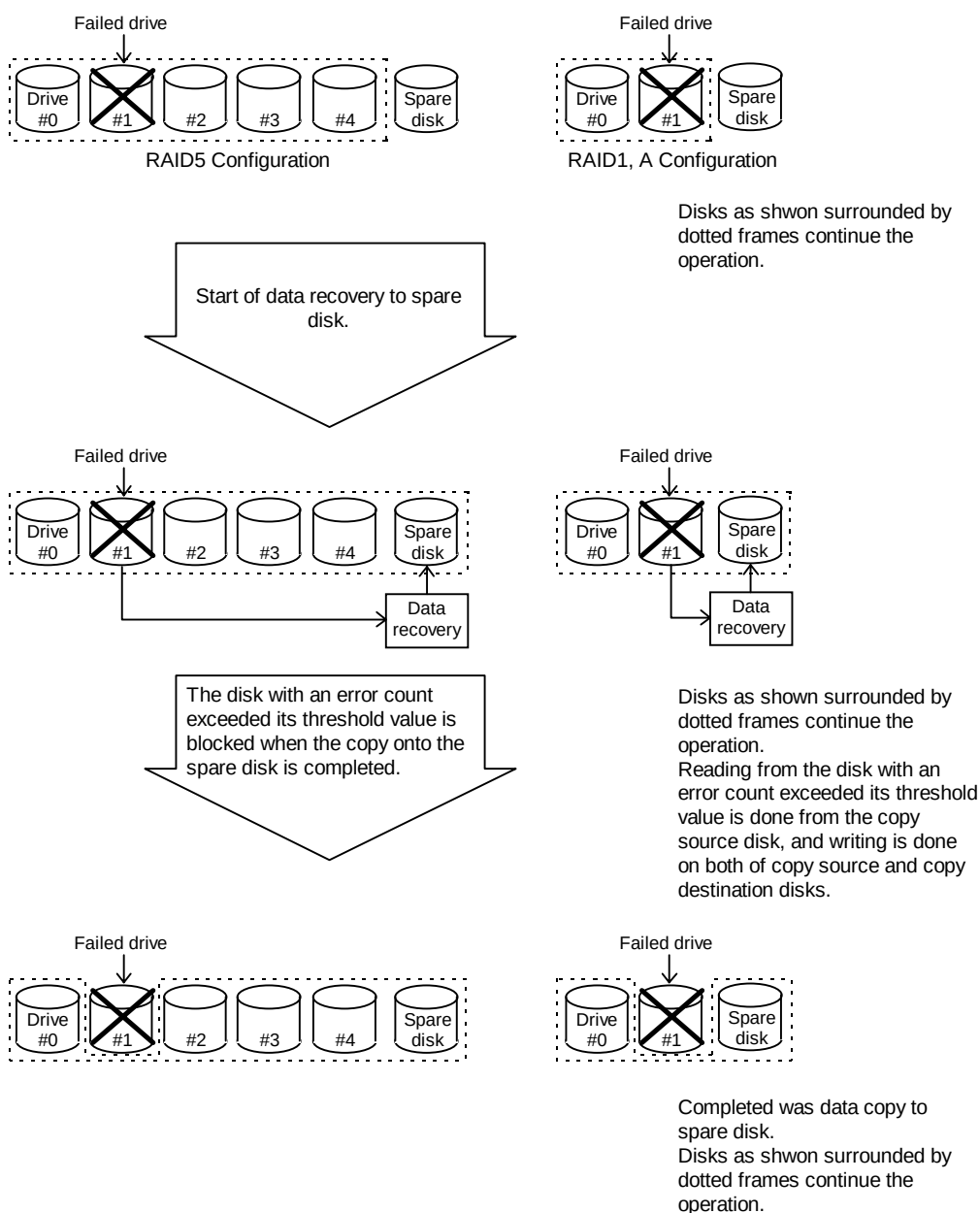
In this case, it is necessary to remove and insert the replaced drive again after the data recovery onto the spare disk is completed.

(1-2) 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 is detected in which the error count has exceeded its threshold value, data stored in the disk 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.

103■XY ■:0 - D
 ▲▲▲▲▲ -XY ▲▲▲▲▲ : Message text } See TRBL0310, 0320, 0330.

At the time when an error count exceeded its threshold value is detected, only a message display on the panel is done without blocking the concerning disk, 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 CK-REP0260 for panel display 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 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 sparing disk is being used for the data recovery.
- Another disk 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 (refer to pages CK-REP0190 through CK-REP0270).

Errors counted in the subsystem and default threshold values for them are listed below.

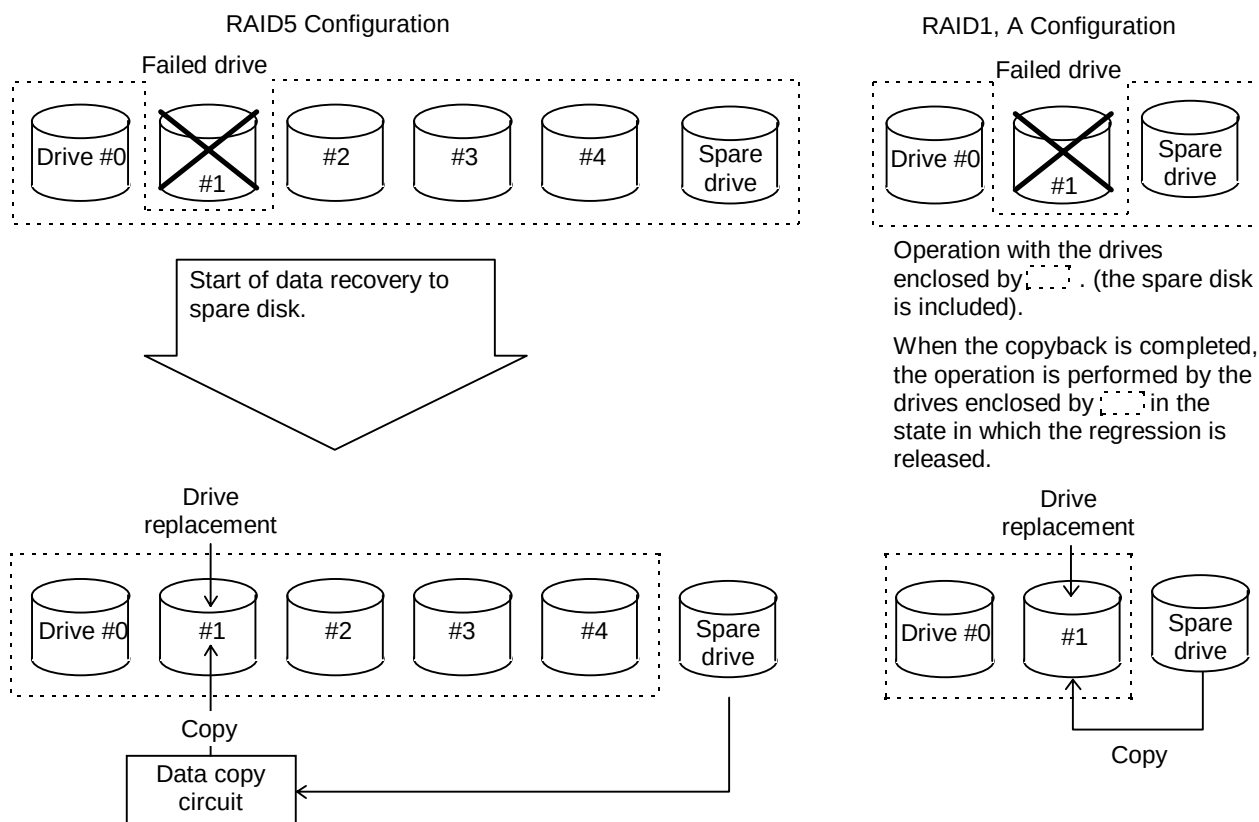
Item No.	Kind of error	Threshold (Default)
1	Drive mechanical error. (Recovered)	50
2	Drive mechanical error. (Unrecovered)	2
3	Drive medium error. (Recovered)	100
4	Drive medium error. (Unrecovered)	50
5	Drive R/W error. (Recovered)	10
6	Drive R/W error. (Unrecovered)	2
7	Drive I/F error. (Recovered)	50
8	Drive I/F error. (Unrecovered)	2
9	Drive hardware error. (Recovered)	50
10	Drive hardware error. (Unrecovered)	2
11	Drive SCSI I/F error. (Recovered)	50
12	Drive SCSI I/F error. (Unrecovered)	2
13	Collectable errors in online verify.	100
14	Uncollectable errors in online verify.	50

The threshold values above can be referred to and updated from the maintenance panel. (See page PANEL0520.)

Besides, the then error count can be referred to concerning the recovered or unrecovered drive media errors, correctable errors in online verify operations, correctable errors, and uncorrectable errors.

(2) Copyback

When a new drive is inserted to where a failure occurred as shown in the drawing below, the copyback will be executed automatically.



In the following cases, the copyback will not start automatically. Operation to start the copyback is required.

- ① When the copyback mode is set to "NOT AUTOMATIC MODE", the copyback will not start automatically after the drive replacement.

In this case, it is necessary to instruct copyback with the panel. (See CK-REP0260)

- ② If a faulty drive is replaced during data recovery to the spare disk, the data copy back to the replaced drive will not start automatically even after the data recovery to the spare disk is completed.

In this case, it is necessary to remove and insert the replacement drive again after the data recovery onto the spare disk is completed.

(a) Transition of panel display.

(i) Data recover (Data recovery onto the spare disk when a disk failure is detected.)

W202XY DRVALM-XY: Drive blocked

I01044 RCV-ST-44 : Start of data area recovery

I01144 RCVEND-44 : Completion of data area recovery

I006XY SPDRCN-XY : Completion of recovery onto spare disk

Note : Symbols X and Y indicated above represent the following.

X indicates port No., Y indicates row No., and XY indicates the location of the recovered drive.

(ii) Data recover (Dynamic sparing)

I01DXY DYNMSP-XY : Start of Dynamic sparing

I01044 RCV-ST-44 : Start of HDU ASSY recover

I01144 RCVEND-44 : Completion of data recovery

I006XY SPDRCN-XY : Completion of recovery onto spare disk

W202XY DRVALM-XY: Drive X, Y were blocked

Note : Symbols X and Y indicated above represent the following.

X indicates port No., Y indicates row No., and XY indicates the location of the recovered drive.

(iii) Copyback

I00DXY SYS-CP-XY : Start of system area recovery (*)

I00EXY SYSRCV-XY : Completion of system area recovery (*)

I010XY RCV-ST-XY : Start of data area recovery

I011XY RCVEND-XY : Completion of data area recovery

I005XY DRVRCV-XY : Completion of recovery onto the drive to which the data has been copied.

Note : Symbols X and Y indicated above represent the following.

X indicates port No., and Y indicates row No., and XY indicates the location of the drive to which the data is copied.

* : This message is displayed only when replacing HDU ASSY.

(b) Confirming completion of data recovery or copyback

Select DRIVE MAINT (RECOVER STATUS) from the panel and make sure that the data recovery is completed normally (COMP).

(c) When the data recovery fails (I012XY RCVFLT-XY)

Select RECV ERR INFO from the panel and locate the faulty portion.

(i) Data recovery to the spare disk

- When the faulty portion is the spare disk (PORT 4, ROW 4)

- ➊ Replace the spare disk. In this case, the data recovery to the spare disk will not start.
- ➋ Replace the drive at the regressed location. In this case, the data recovery onto the replacement drive starts.

- When the faulty portion is other than the spare disk

- ➊ Replace the drive at the regressed location. In this case, the data recovery to the replaced drive starts.

- ➋ Make sure that the data recovery ends normally (COMP).

When the data recovery is completed abnormally, it is a double failure, and cannot be recovered. (See 3. Trouble shooting chapter TRBL0840)

When the data recovery is completed normally, remove the failed drive (causing the system to be regressed) and replace the drive. (When the failed drive is removed, the data recovery to the spare disk will not start, where as when the drive is replaced, the data recovery to the replaced drive starts.)

(ii) When the dynamic sparing

- When the faulty portion is the spare disk (PORT 4, ROW 4)

- ➊ Replace the spare disk. In this case, the dynamic sparing will not start.
- ➋ Replace the drive at the regressed location. In this case, the data recovery onto the replacement drive starts.

- When the faulty portion is other than the spare disk

- ➊ Replace the drive at the regressed location. In this case, the data recovery to the replaced drive starts.

- ➋ Make sure that the data recovery ends normally (COMP).

When the data recovery is completed abnormally, it is a double failure, and cannot be recovered. (See 3. Trouble shooting chapter TRBL0840)

(iii) Copyback to the replaced drive from the spare disk

- When the faulty portion is the spare disk (PORT 4, ROW 4)

- ➊ Replace the spare disk. In this case, the data recovery onto the spare disk will not start.
- ➋ Replace the drive in the regressed location. In this case, the data recovery onto the replacement drive starts.

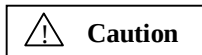
- ➌ Make sure that the data recovery is completed normally (COMP).

- When the faulty portion is other than the spare disk

- ➊ Replace the drive which failed during data recovery and make sure that the data recovery is completed normally (COMP).

- ➋ Replace the drive which is regressed first and make sure that the copyback is completed normally (COMP).

4.3 HDU ASSY Replacement Procedure (See Figure 4.3.1.)



Do not subject the HDU ASSY to any impact or vibration since it is a precision component.

(1) Removing procedure

- ① Open the front cover and the side covers. (See CK-REP0160.)
- ② Check to see the drive installing location of the message text DRVALM-XY (XY indicates the installing location) on the panel is correct and the ALARM LED of the HDU ASSY is on.

W	2	0	2	X	Y	D	R	V	A	L	M	-	X	Y

X : Port number

Y : Row number

- ③ Open the handle in the direction of the arrow (···➤) and pull it out and remove the HDU ASSY.

Notice : Be sure to replace the HDU ASSY when the subsystem is in the ready state. (If the HDU assembly is replaced when the power of the subsystem is off, the data recovery operation will not start.)

(2) Installing procedure

- ① Open the handle fully, insert the HDU ASSY in place, and rotate the handle in the direction of the arrow (➡).

**Caution**

Do not subject the HDU ASSY to any impact or vibration since it is a precision component.

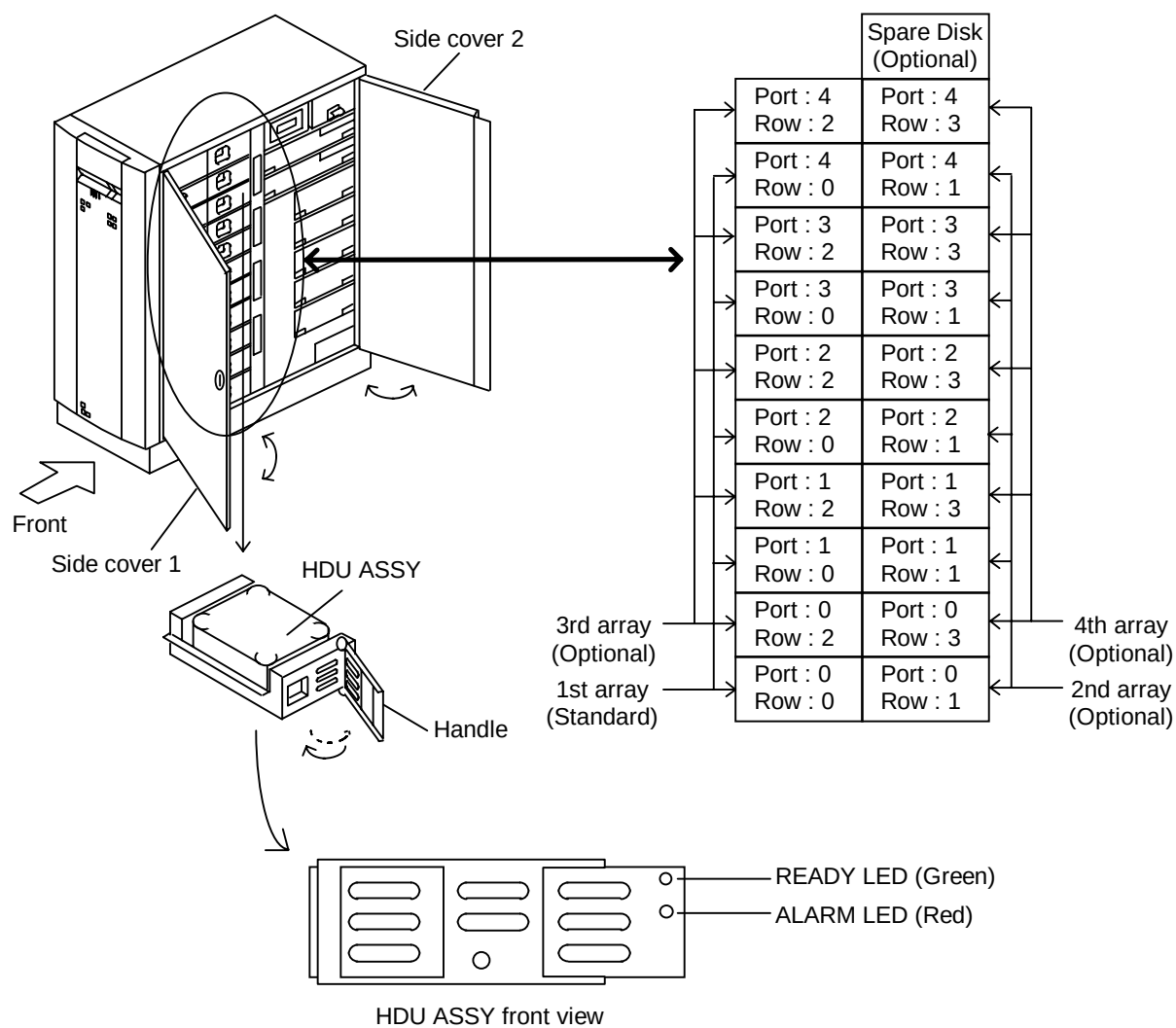
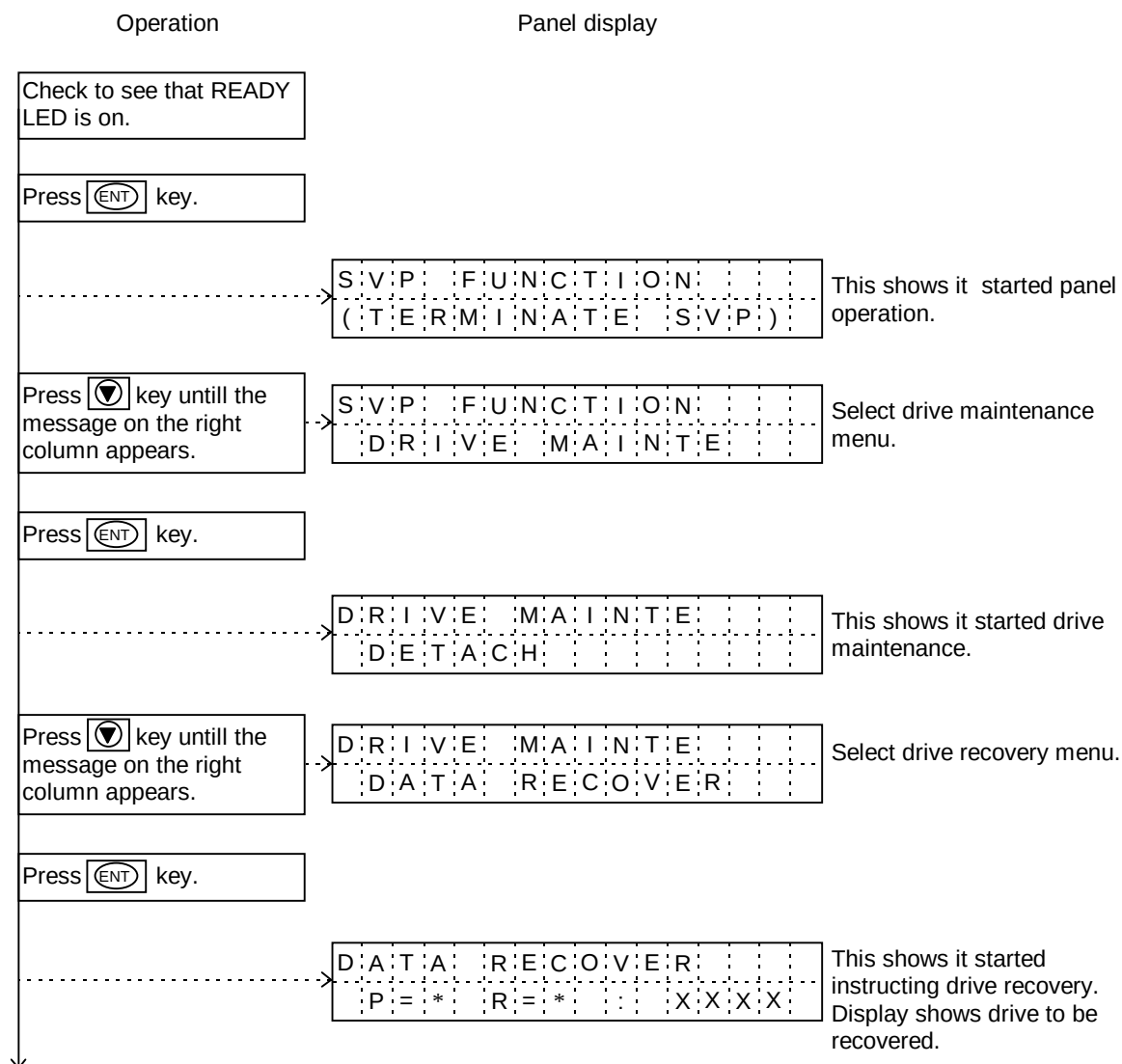


Figure 4.3.1 Replacing HDU ASSY

4.4 Manual Instruction of Data Recovery

This is for manually instructing data recovery. (In a case of dual controller system, which controller to process is automatically specified. No instruction of controller is required.) You can operate this function under device ready and LU#0 instituted (LU can be not formatted yet).

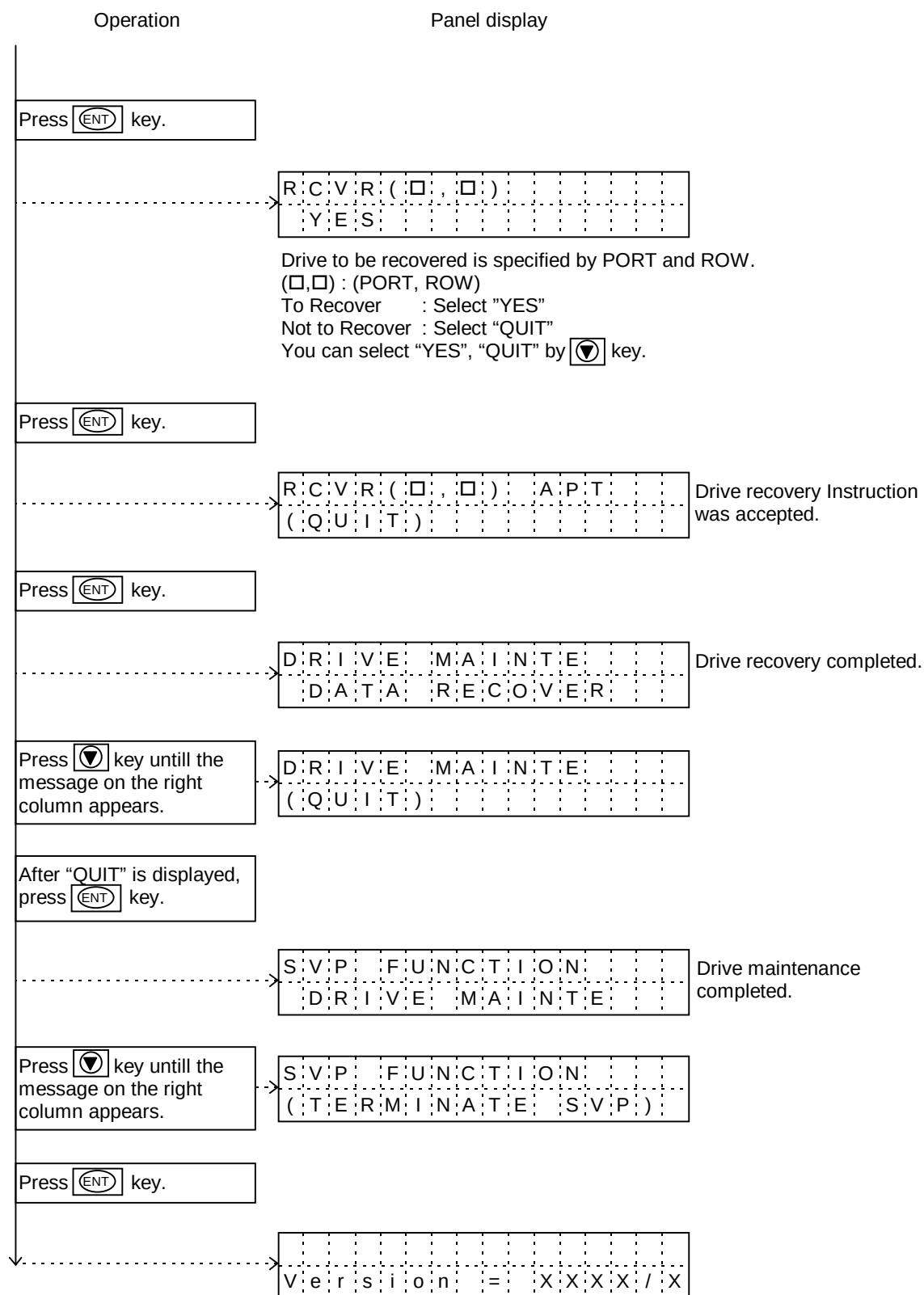


P=* : Port# of Drive to be recovered.

R=* : Row# of Drive to be recovered.

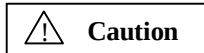
XXXX : Status of Drive to be recovered. Status is one of below.

- STDBY (not used)
- DETACH (blocked)
- NO : (RAID, LU not set yet)



5. Replacing Fan ASSY (See Figure 5.1.)

When replacing FAN ASSY, turning off the power is not required.



FAN is rotating with high speed, be careful not to be caught by the FAN.

(1) Removing procedure

- ① First open the side cover 1 and then the side cover 2. (See CK-REP0160.)
- ② Remove the thumbscrew and pull the Fan ASSY to your side grasping it by its handle.
(The WARNING LED comes on and a buzzer sounds. Press either key on the panel to stop them.)

(2) Installing procedure

- ① Insert the Fan ASSY into the right place holding it by its handle and tighten the thumbscrew.
- ② Make sure that the WARNING LED goes off and the following panel display appears.

(3) Transition of panel display

I002XX FANRCV-XX-----Termination of fan failure recovery

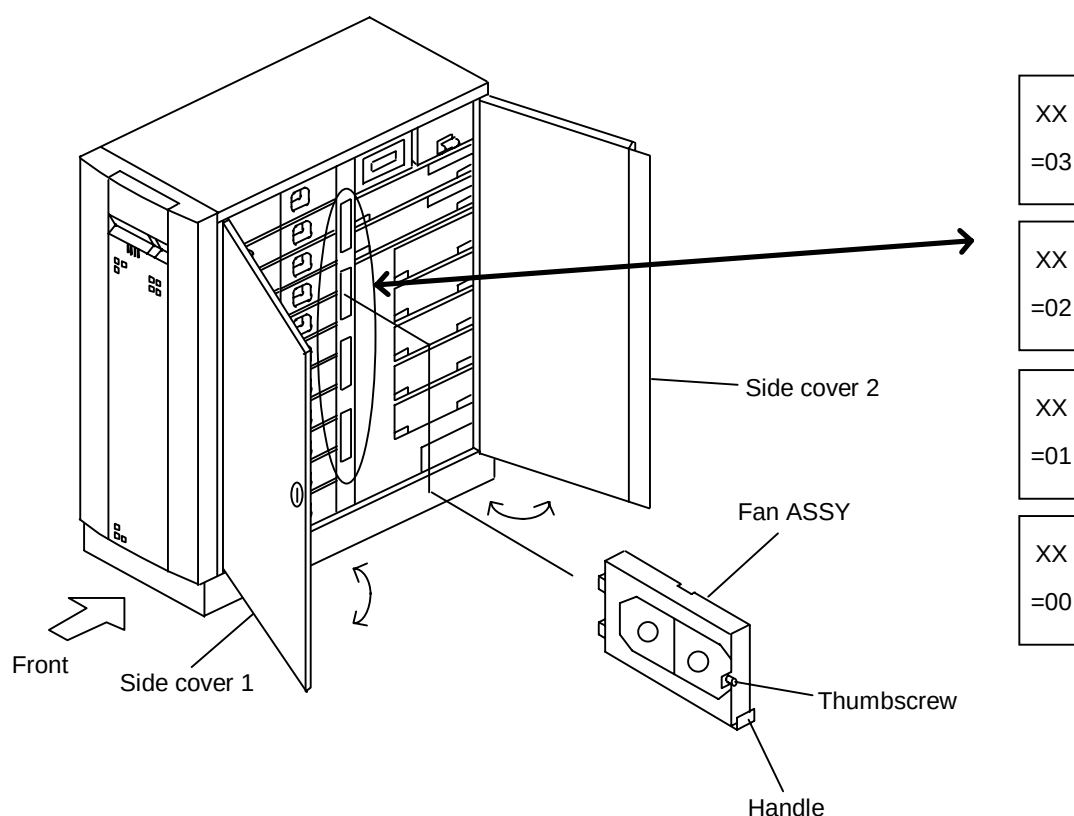


Figure 5.1 Replacing Fan ASSY

6. Replacing Battery ASSY (See Figure 6.1.)

When the battery is to be replaced without power being turned off (during power on), follow the procedure explained below (execute (1)② to (2)② promptly).

Notice 1 : In case the power is not normally turned off, the user's data might be lost.

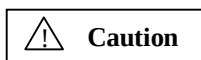
Notice 2 : If the power is already turned off, check the CACHE PWR LED (see page THEORY0200) to confirm that the cache back up is not being execute. In the case the cache back up is being executed, turn on and off the power (see page CK-REP0050).

Make sure that the power is turned off normally, then replace the Battery ASSY.

When the battery is to be replaced with power turned off, read CK-REP0050, "Turning the power off." and "Turning-ON procedure." thoroughly and follow CK-REP0060, "Part Replacement Procedures".

(1) Removing procedure

- ① Check if the subsystem is not in the battery backup mode following the part replacement procedure on page CK-REP0070.
- ② First open the side cover 1 and then the side cover 2. (See CK-REP0160.)
- ③ Turn the switch on the Battery ASSY to "O" side.
(The WARNING LED comes on and a buzzer sounds. Press either key on the panel to stop them.)
- ④ Remove the thumbscrews and pull the Battery ASSY to your side by grasping it by its handle.



Caution

Do not disintegrate removed Battery. It may cause burn or electric shock.

(2) Installing procedure

- ① Insert the Battery ASSY into the right place holding it by its handle and tighten the thumbscrew.
- ② Turn the switch on the Battery ASSY to "I" side.
- ③ Make sure that the WARNING LED goes off and the following panel display appears.

Note : When removing/mounting the Battery ASSY, turn the switch to "O" side.

(3) Transition of panel display

I00100 BATRCV ----- Termination of battery recovery

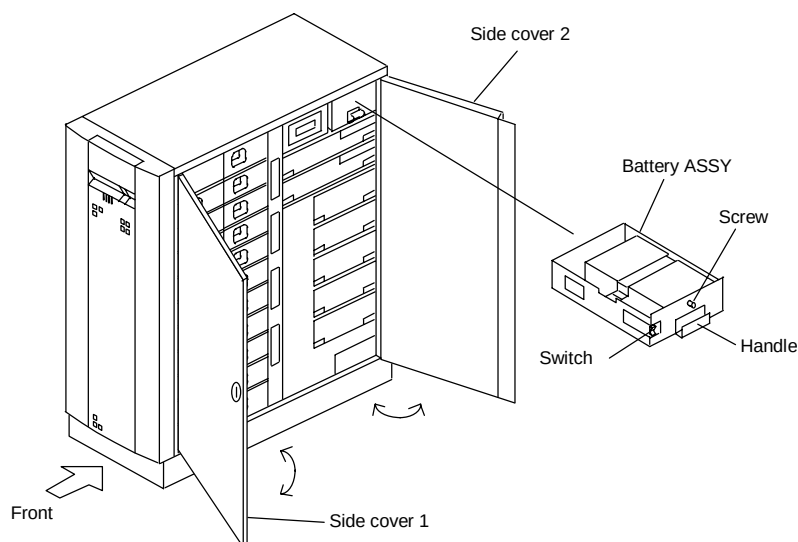


Figure 6.1 Replacing Battery ASSY

Note : The lead-acid battery is a precious resource which can be recycled.

The battery uses lead which is a heavy metal and sulfuric acid which is a deleterious substance. Therefore, never case it off at the place where the replacement of it is done.

When a part is to be replaced or a used product is to be discarded, take out the lead-acid battery to get it recycled.

See page "ENTRY0120" for the safety of depositing and storing the battery.

When the battery ASSY is replaced, power on the subsystem and charge the battery for more than two hours before returning the subsystem to the customer.

7. Replacing FDD ASSY (See Figure 7.1.)

(1) Removing procedure

- ① Turn off the subsystem following the power-off procedure explained in CK-REP0050.

Notice 1 : Be sure to read the above mentioned instruction because user's data may be lost if the power is not turned off normally.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Troubleshooting Section" (See TRBL0030) and turn off the power.

- ② Disconnect the power cable. When the power supply is duplicated, disconnect two cables.
- ③ Open the side cover 1 and then the side cover 2.
- ④ Remove the thumbscrew and pull the FDD ASSY to your side grasping it by its handle.

(2) Installing procedure

- ① Insert the FDD ASSY into the right place holding it by its handle and tighten the thumbscrew.
- ② Connect the power cable.

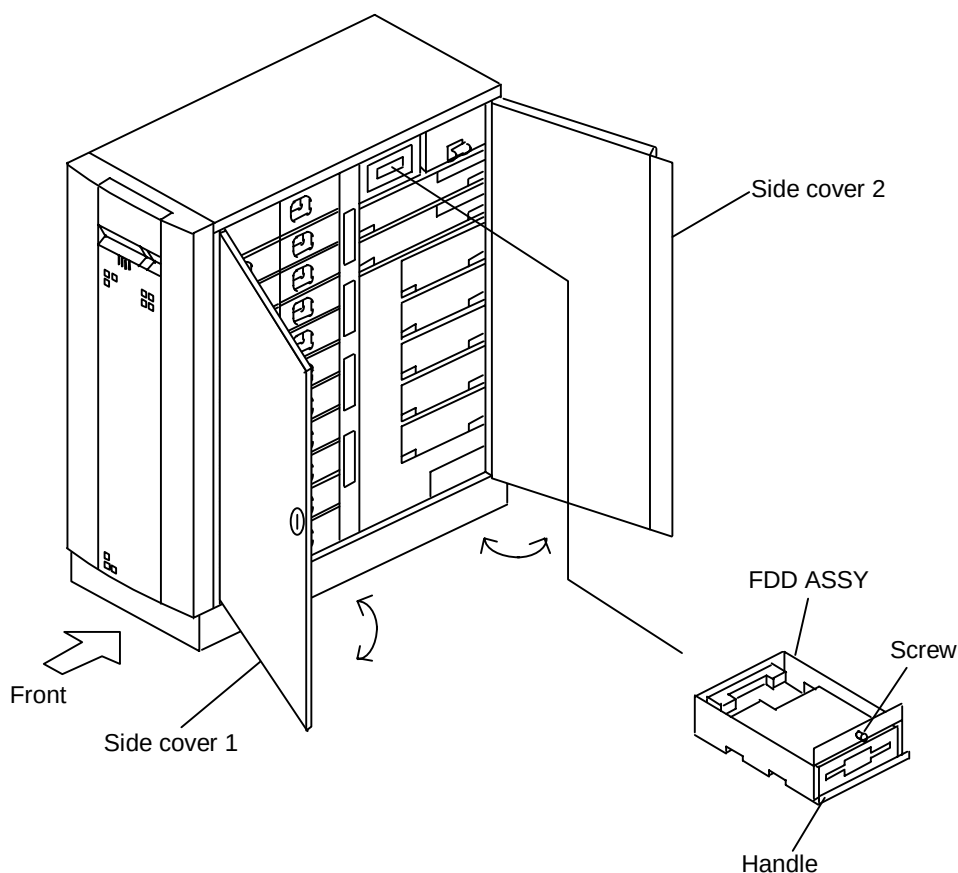


Figure 7.1 Replacing FDD ASSY

8. Replacing CTL ASSY (See Figure 8.1.1.)

The replacement procedure varies depending on whether the backup FD has been inserted or not. Perform the replacement following the procedure corresponding to the case.

- (1) When the backup FD has been inserted

Go to the replacement of the CTL ASSY when the backup FD has been inserted explained on page CK-REP0360.

- (2) When the backup FD has not been inserted

Go to the replacement of the CTL ASSY when the backup FD has not been inserted explained on page CK-REP0440.

8.1 When the backup FD has been inserted

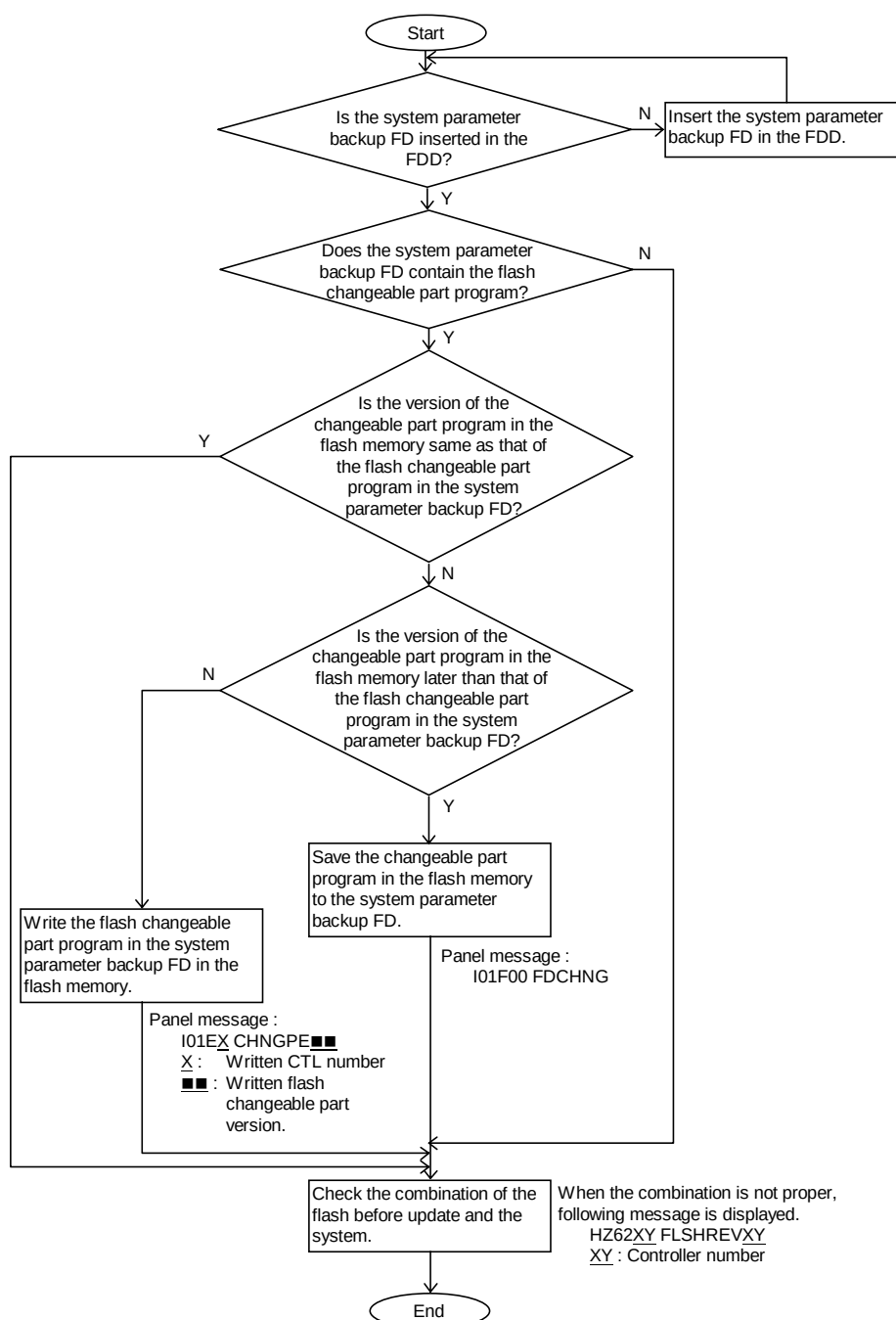
In this subsystem, the flash changeable part is updated automatically. To use the function the system parameter backup FD must be inserted.

By using the function, service person can replace the CTL ASSY without giving care to the combination of the Micro_Disk version and the flash changeable part version of the CTL ASSY.

(If the system parameter backup FD is not inserted when replacing the CTL ASSY, prepare the CTL ASSY whose flash changeable version is the same as that of the CTL ASSY to be replaced, or PE26 or later, and execute the replacement following the procedure explained in Section 8.2 “When the backup FD has not been inserted”).

Outline of flash changeable part automatic updating function

The following is a processing flow of the flash changeable part automatic updating function.



In case no optional redundant CTL installed

(1) Removing procedure

- ① Insert back-up FD into the FDD, copy the system parameter to FD.
(See CK-REP0090.)
- ② Turn off the subsystem following the power-off procedure explained in CK-REP0050.

Notice 1 : Be sure to read the above mentioned instruction because user's data may be lost if the power is not turned off normally.

Notice 2 : When the power has been already turned off, check the CACHE PWR LED (see page THEORY0200) to see if the cache backup is not being performed. If the cache backup is being performed, turn on and off the replacement after the power is turned off normally.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Troubleshooting Section" (See TRBL0030) and turn off the power.

- ③ Disconnect the cable (RS232C).
- ④ First open the side cover 1 and then the side cover 2. (See CK-REP0160.)
- ⑤ Open the right and left levers to the direction of arrows (···>) at the same time then remove the CTL ASSY.
- ⑥ Remove the CACHE ASSY and the LAN ASSY if installed.

(2) Installing procedure

- ① Prepare the FD in which the system parameter was copied in (1) ①. If it is not available, prepare the table of system parameter setting.
- ② Reinstall the removed CACHE ASSY and LAN ASSY in CTL ASSY. Be sure to install it in the same position as before.
- ③ Insert the CTL ASSY into the right place with its right and left levers being opened, then close the both levers to the direction of arrows (—>) at the same time.
Note : If the CTL ASSY is caught by something when it is installed, do not push it in forcibly. Retry the installation from the beginning. If forced, pins might be broken.
- ④ Connect the disconnected cables (RS232C).
- ⑤ Set No.3 of the DIP switch of the CTL ASSY to down position.



- ⑥ Turn on the subsystem according to the power-on procedure explained in CK-REP0050.
- ⑦ Set the system parameter of replaced CTL ASSY with the FD prepared at ①. (See CK-REP0130.)

- ⑧ One of the following messages is displayed on the panel. It does not mean a failure. Confirm the message and recover the subsystem state by performing the corresponding operation.

Message on the panel	Subsystem state	Operation
Version = XXXX/X	Subsystem READY lamp comes on.	Go to step ⑨
I01EX CHNGPE■■■ HZ62XY FLSHREVXY X : Controller number (0 or 1) ■■■ : Version of flash changeable part is displayed. XY : Controller number (01 or 10) is displayed.	Subsystem ALARM lamp comes on. (Version of flash changeable part was updated to PE■■■. Current system cannot operate with the flash changeable part whose version is not updated.)	Operation1 : Return the DIP switch of the CTL ASSY. Operation2 : Turn off the power following the powering off procedure shown on page CK-REP0050. Operation3 : Turn on the power following the powering on procedure shown on page CK-REP0050. Check if the following message is displayed on the panel. Version = XXXX/X Operation4 : Paint the boxes on the CHANGEABLE revision label affixed on the CTL ASSY up to ■■■ (see CK-REP0430), then go to step ⑨.
I01EX CHNGPE■■■ Version = XXXX/X X : Controller number (0 or 1) ■■■ : Version of flash changeable part is displayed.	Subsystem READY lamp comes on. (Version of flash changeable part was updated to PE■■■. Current system can operate with the flash changeable part whose version is not updated.)	Paint the boxes on the CHANGEABLE revision label affixed on the CTL ASSY up to ■■■ (see CK-REP0430), then go to step ⑨.

- ⑨ After READY LED come on, set No.3 of DIP switch to as shown.



- ⑩ Turn off the power according to the power off procedure in CK-REP0050.
 ⑪ Turn on the power according to the power on procedure in CK-REP0050. (Soon, the ASSY will enter the ready status.)
 ⑫ Close the side covers 1 and 2. (See CK-REP0160.)

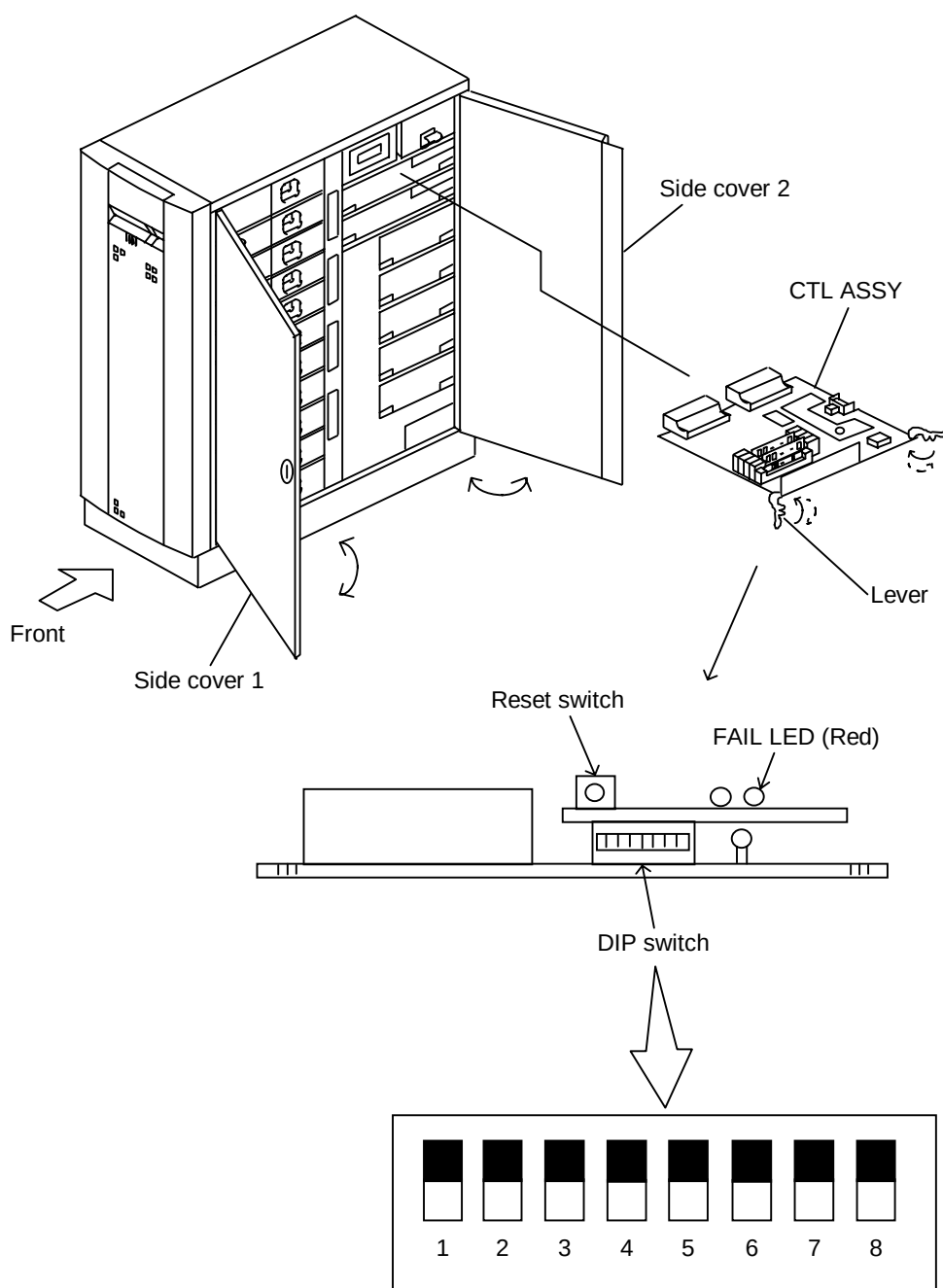


Figure 8.1.1 Replacing CTL ASSY

In case optional redundant CTL is installed

When the subsystem is of dual controllers, a controller can be replaced while the power on.

Notice 1: Do not replace (pull out) the CTL ASSY which operates normally. Before replacing the CTL ASSY, confirm that it is blocked (the FAIL LED in on).

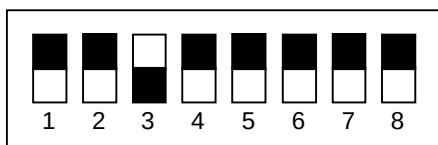
Notice 2: In this case, the controller must be replaced one after another. When Dual controllers are replaced at the same time, the power should be turned off before replacement.

(1) Removing procedure

- ① First open the side cover 1 and then the side cover 2. (See CK-REP0160.)
- ② Disconnect the cables (RS232C).
- ③ Confirm the blocked CTL ASSY (with the FAIL LED turned on). (See Figure 8.1.1.)
- ④ Take out the CTL ASSY by pulling both levers on left and right side at the same time toward the directions shown by allows (···→)
- ⑤ Remove the CACHE ASSY. If the LAN ASSY is installed, also remove it.

(2) Installing procedure

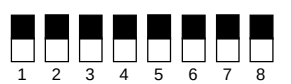
- ① Reinstall the removed CACHE ASSY and the LAN ASSY (option) in the new CTL ASSY. Be sure to install it in the same position as before.
- ② Set No.3 of the DIP switch of the CTL ASSY.



- ③ Insert the CTL ASSY into the right position with the right and left levers being opened, then close the both levers to the direction of arrows (—→) at the same time.

Note : If the CTL ASSY is caught by something when it is installed, do not push it in forcibly. Retry the installation from the beginning. If forced, pins might be broken.

- ④ One of the following messages is displayed on the panel. It does not mean a failure. Confirm the message and recover the subsystem state by performing the corresponding operation.

Message on the panel	Subsystem state	Operation
I619XX CTLRCV-XX XX : Controller number (00 or 01) is displayed.	The WARNING LED goes out and the READY LED of the subsystem comes on.	Return the DIP switch No.3 as shown below, then go to step ⑤ 
I01EX CHNGPE■■ HZ62XY FLSHREVXY H60422 CTLFAIL W015XX CTLALM-XX XX : Controller number (00 or 01) is displayed. X : Controller number (0 or 1) ■■ : Version of flash changeable part is displayed. XY : Controller number (01 or 10) is displayed.	The WARNING LED comes on, and the READY LED of the subsystem comes on in the state that one of the CTL ASSYs is blocked. (The flash changeable part has been updated to the version PE■■. Current system cannot operate with the flash changeable part of earlier version on the CTL ASSY inserted.)	Operation1 : Pull out the inserted CTL ASSY (with the FAIL LED turned on). Operation2 : Insert the CTL ASSY again. (Leave the DIP switch No.3 as set to on.) Operation3 : Return the DIP switch No.3 as shown in the Figure below when the WARNING lamp on the panel goes out and the following message is displayed on the panel.  Operation4 : Paint the boxes on the CHANGEABLE revision label affixed on the CTL ASSY up to ■■ (see CK-REP0430), then go to step ⑤. I619XX CTLRCV-XX
I01EX CHNGPE■■ I619XX CTLRCV-XX	The WARNING LED goes out and the READY LED of the subsystem comes on. (The flash changeable part has been updated to the version PE■■. However, the current system can operate with the flash changeable part of earlier version on the CTL ASSY inserted.)	Operation1 : Return the DIP switch No.3 as shown below.  Operation2 : Paint the boxes on the CHANGEABLE revision label affixed on the CTL ASSY up to ■■ (see CK-REP0430), then go to step ⑤.

- ⑤ Connect the disconnected cables (RS232C).
- ⑥ Close the side covers 1 and 2. (See CK-REP0160.)

When replacing a CTL in a dual controller system (with Redundant CTL option), the system parameter is automatically loaded to the replaced CTL from another CTL. The setting with FD or manual setting is not required.

But, when both CTL ASSY failed at the same time, this automatic operation is not available. In this case, it is necessary to restore from FD. Operate in the same way as single controller.

When replacing a CTL in a dual controller system (with redundant CTL option) , replacement with power off is allowed. The procedure is similar to the replacement in a single controller system. In this case the setting of system parameter from FD or manual operation is also not necessary. (Though installing procedure ⑦ in the single controller system (without redundant CTL option) is not necessary.)

Painting flash revision label

Figure 8.1.2 shows how to paint the flash revision label. (It shows a case to paint the boxes up to PE26.)

Location of the label is shown in Figure 8.1.3.

FIXED	PEXX	01	02	03	04
		05	06	07	08
		10	11	12	13
		15	16	17	18
CHNGABLE	PEXX	21	22	23	24
		25	26	27	28
		30	31	32	33
		35	36	37	38

An example to paint the boxes of the CHANGEABLE label up to 26.

Figure 8.1.2 Revision Label Layout and Numbers to be Painted

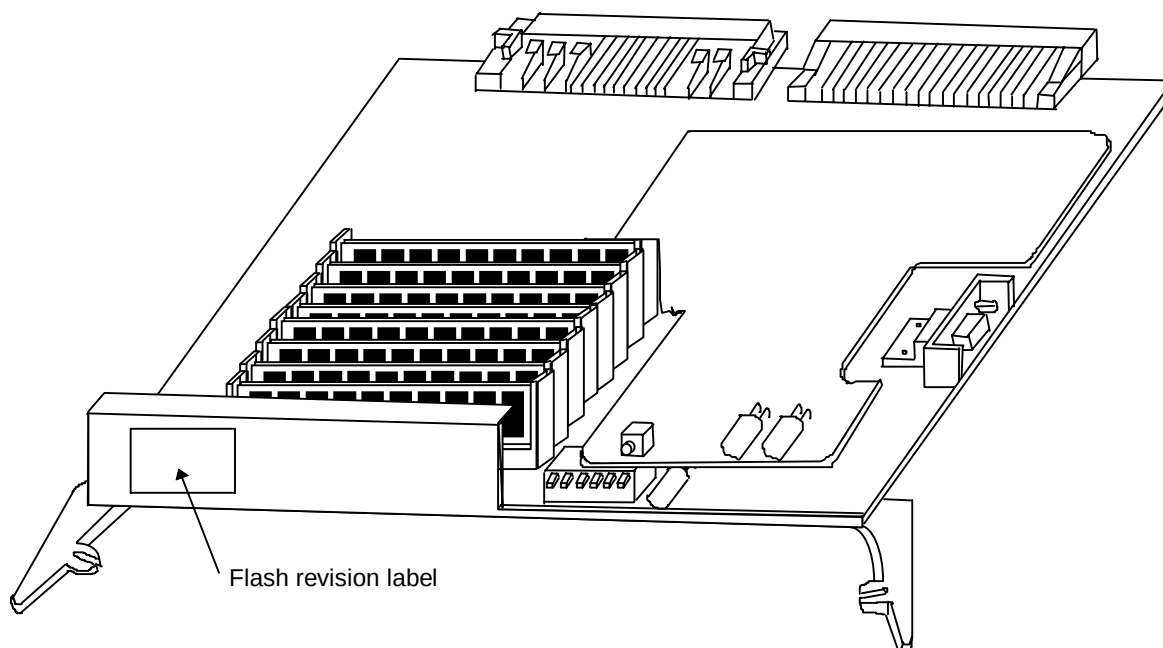


Figure 8.1.3 Location of Revision Label on CTL ASSY

8.2 When the backup FD has not been inserted

In case no optional redundant CTL installed

(1) Removing procedure

- ① Insert back-up FD into the FDD, copy the system parameter to FD.
(See CK-REP0090.)
- ② Turn off the subsystem following the power-off procedure explained in CK-REP0050.

Notice 1 : Be sure to read the above mentioned instruction because user's data may be lost if the power is not turned off normally.

Notice 2 : When the power has been already turned off, check the CACHE PWR LED (see page THEORY0200) to see if the cache backup is not being performed. If the cache backup is being performed, turn on and off the replacement after the power is turned off normally.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Troubleshooting Section" (See TRBL0030) and turn off the power.

- ③ Disconnect the cable (RS232C).
- ④ First open the side cover 1 and then the side cover 2. (See CK-REP0160.)
- ⑤ Open the right and left levers to the direction of arrows (···>) at the same time then remove the CTL ASSY.
- ⑥ Remove the CACHE ASSY and the LAN ASSY if installed.

(2) Installing procedure

- ① Prepare the FD in which the system parameter was copied in (1) ①. If it is not available, prepare the table of system parameter setting.
 - ② Reinstall the removed CACHE ASSY and LAN ASSY in CTL ASSY. Be sure to install it in the same position as before.
 - ③ Insert the CTL ASSY into the right place with its right and left levers being opened, then close the both levers to the direction of arrows (—>) at the same time.
- Note :** If the CTL ASSY is caught by something when it is installed, do not push it in forcibly. Retry the installation from the beginning. If forced, pins might be broken.
- ④ Connect the disconnected cables (RS232C).
 - ⑤ Set No.3 of the DIP switch of the CTL ASSY to down position.



- ⑥ Turn on the subsystem according to the power-on procedure explained in CK-REP0050.
- ⑦ Set the system parameter of replaced CTL ASSY with the FD prepared at ①. (See CK-REP0130.) If no system parameter FD, proceed the setting the panel with the table prepared in ①. (Refer to PANEL Chapter.)
- ⑧ After READY LED come on, set No.3 of DIP switch to as shown.



- ⑨ Turn off the power according to the power off procedure in CK-REP0050.
- ⑩ Turn on the power according to the power on procedure in CK-REP0050. (Soon, the ASSY will enter the ready status.)
- ⑪ Close the side covers 1 and 2. (See CK-REP0160.)

In case optional redundant CTL is installed

When the subsystem is of dual controllers, a controller can be replaced while the power on.

Notice 1: Do not replace (pull out) the CTL ASSY which operates normally. Before replacing the CTL ASSY, confirm that it is blocked (the FAIL LED in on).

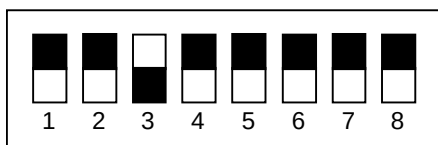
Notice 2: In this case, the controller must be replaced one after another. When Dual controllers are replaced at the same time, the power should be turned off before replacement.

(1) Removing procedure

- ① First open the side cover 1 and then the side cover 2. (See CK-REP0160.)
- ② Disconnect the cables (RS232C).
- ③ Check to see which CTL ASSY is blocked (FAIL LED is lit up).
- ④ Open the right and left levers to the direction of arrows (···>) at the same time then remove the CTL ASSY.
- ⑤ Remove the CACHE ASSY and the LAN ASSY. (option)

(2) Installing procedure

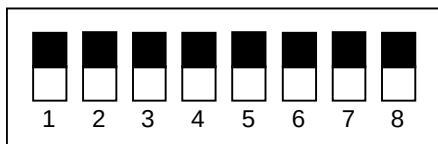
- ① Reinstall the removed CACHE ASSY and the LAN ASSY (option) in the new CTL ASSY. Be sure to install it in the same position as before.
- ② Set No.3 of the DIP switch of the CTL ASSY.



- ③ Insert the CTL ASSY into the right position with the right and left levers being opened, then close the both levers to the direction of arrows (—>) at the same time.

Note : If the CTL ASSY is caught by something when it is installed, do not push it in forcibly. Retry the installation from the beginning. If forced, pins might be broken.

- ④ When the WARNING LED on PANEL goes off and the message below appears on the PANEL, set No.3 of DIP switch to as shown.



The message on the PANEL "I619XX CTL RCU-XX". (XX : Indicates the installing location < 00 or 01 >.)

- ⑤ Connect the disconnected cables (RS232C).

⑥ Close the side covers 1 and 2. (See CK-REP0160.)

When replacing a CTL in a dual controller system (with Redundant CTL option), the system parameter is automatically loaded to the replaced CTL from another CTL. The setting with FD or manual setting is not required.

But, when both CTL ASSY failed at the same time, this automatic operation is not available. In this case, it is necessary to restore from FD. Operate in the same way as single controller.

When replacing a CTL in a dual controller system (with redundant CTL option) , replacement with power off is allowed. The procedure is similar to the replacement in a single controller system. In this case the setting of system parameter from FD or manual operation is also not necessary. (Though installing procedure ⑦ in the single controller system (without redundant CTL option) is not necessary.)

9. Replacing I/F ADAPTER ASSY (See Figure 9.1, 9.2, 9.3.)

(1) Removing procedure

- ① Turn off the subsystem following the power-off procedure explained in CK-REP0050 and turn off the host system.

Notice 1 : In case the power is not normally turned off, the user's data might be lost.

Notice 2 : If the power is already turned off, check the CACHE PWR LED (see page THEORY0200) to confirm that the cache back up is not being execute. In the case the cache back up is being executed, turn on and off the power (see page CK-REP0050).

Make sure that the power is turned off normally, then replace the Battery ASSY.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC".

In this case refer to "Trouble shooting chapter" (See TRBL0030) and turn off the power.

- ② Disconnect the Fibre channel cable, and the LAN cable (option).

Notice 3 : When removing or connecting the fibre channel cable, move the connector horizontally, carefully, and slowly.

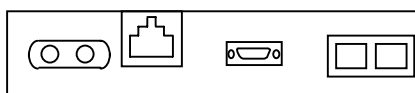
- ③ First open the side cover 1 and 2 then pull the CTL ASSY. (See CK-REP0160, CK-REP0350.)
- ④ Remove the CTL ASSY.
- ⑤ Remove the bind screw and pull the I/F ADAPTER ASSY toward you to remove it.

(2) Mounting procedure

- ① Insert the I/F ADAPTER ASSY into the right place and tighten the bind screw
- ② Reinstall the CTL ASSY.
- ③ Connect the disconnected cables etc. (See Notice 3.)

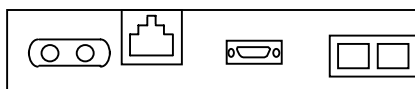
Note 1 : When the controller is used in a dual configuration, connect the cables to the connectors corresponding to the host to be connected. (See Figure 9.2.)

Controller 01



Optical type

Controller 00



Optical type

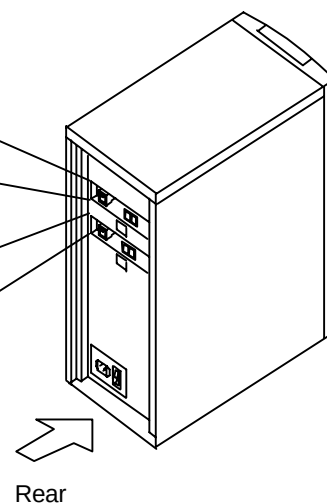


Figure 9.1 Fibre Connector Layout

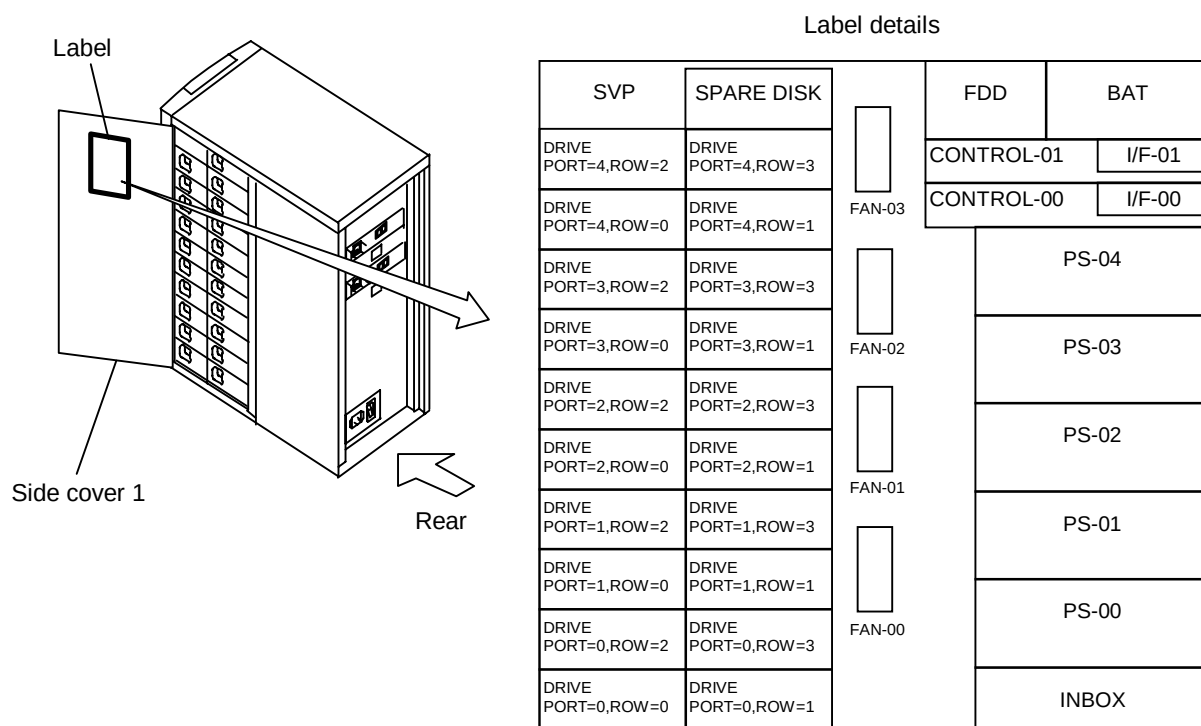


Figure 9.2 Label Layout

- ④ Close the side covers 1 and 2. (See CK-REP0160.)

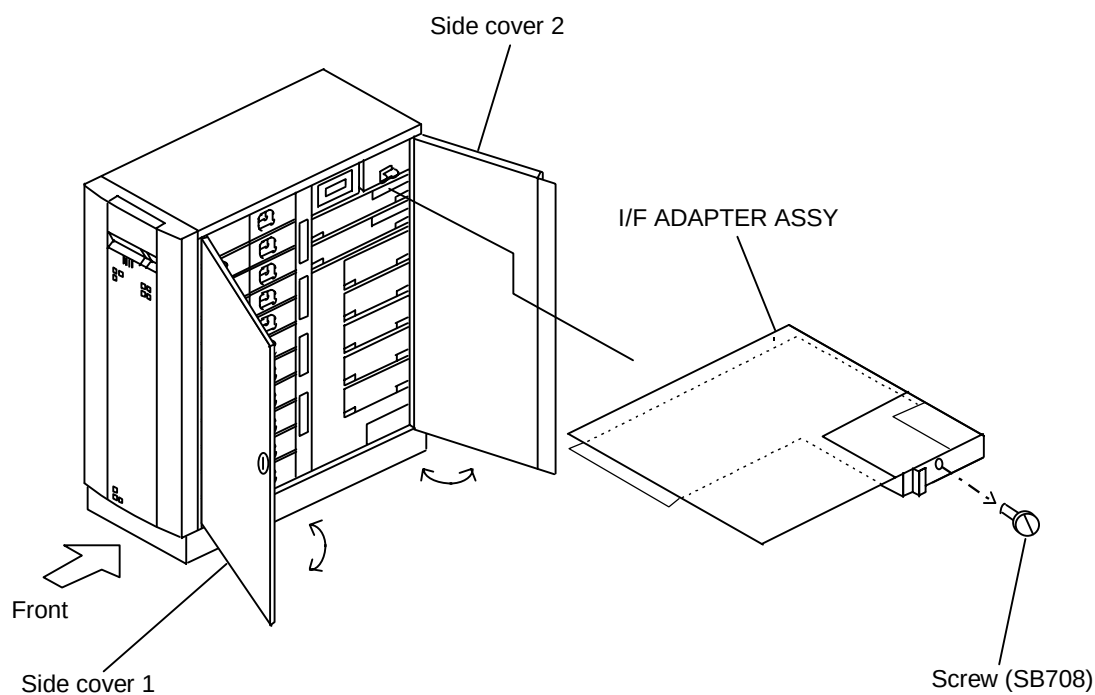


Figure 9.3 Replacing I/F ADAPTER ASSY

10. Replacing SVP ASSY (See Figures 10.1 and 10.2.)

(1) Removing procedure

- ① Turn off the subsystem following the power-off procedure explained in CK-REP0050.

Sometimes the subsystem does not go power off after the main switch turned to “O” side with panel display “TOOMNYPIN” or “SYSDTSVER” or “POFFCMUNC”.

In this case refer to “Trouble shooting chapter” (See TRBL0030) and turn off the power.

- ② Check to see that POWER LED goes off.

Notice : In case the power is not normally turned off, the user’s data might be lost.

- ③ Turn the breaker at the rear to “O” side.
- ④ Open the front cover. (See CK-REP0160.)
- ⑤ Open the side cover 1. (See CK-REP0160.)
- ⑥ Remove 4 screws and remove shield bracket.
- ⑦ Turn the lever to the direction of an arrow (↗) and pull the SVP ASSY toward you. Then, remove the SVP ASSY to the left following arrow A.

(2) Mounting procedure

- ① Insert the SVP ASSY from the right front of the subsystem following the opposite direction of arrow A with its rail engaging with the guide and fix the projection into the cutout.

Then, turn the lever to the direction of an arrow (→) to mount the SVP ASSY.

- ② Fix shield bracket with 4 screws.

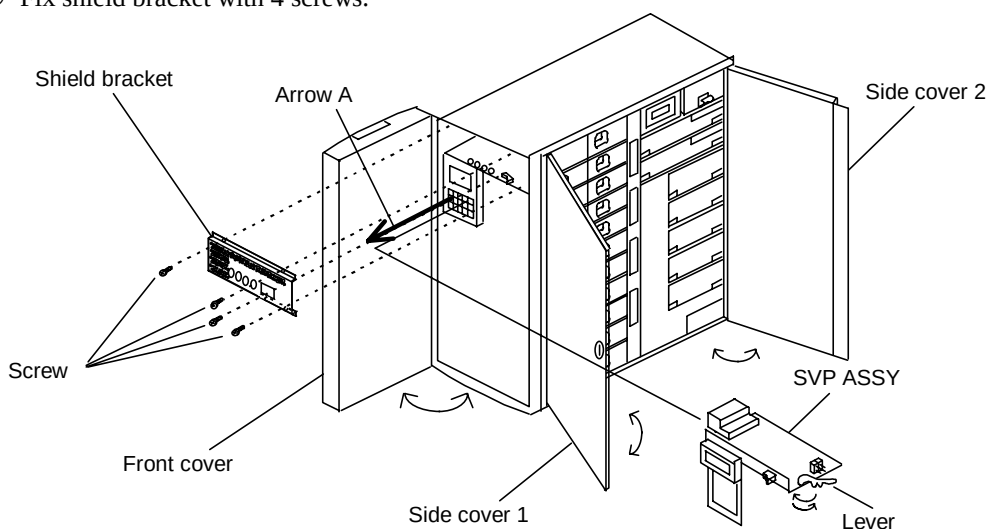


Figure 10.1 Replacing SVP ASSY

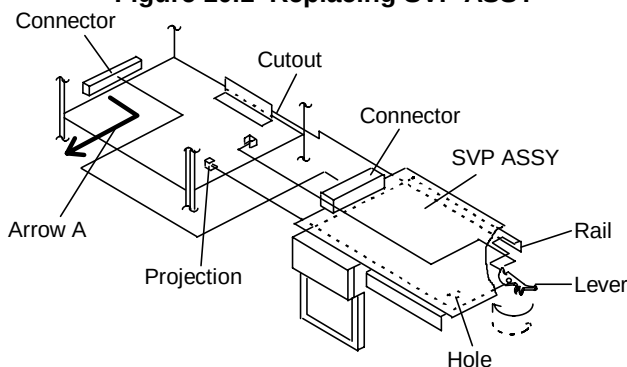
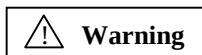


Figure 10.2 Detailed Figure of SVP ASSY Replacement

11. Replacing AC/DC power supply (See Figure 11.1.)



Warning

Only the maintenance personnel can perform this replacement.

The operation by the user is prohibited.

Tool : Phillips screwdriver (No.2)

Confirm presence/absence of the redundant power supply. If there is a redundant power supply, a hot replacement is possible. Concerning the cabinet type, when the number of the installed AC/DC power supplies is more than that of ROWs of the disk drives, it means that the subsystem has redundant power supply.

When the redundant AC/DC power supply is not installed, follow the procedure from step (4).

Cases of redundant power supply installation

Number of ROWs of installed disk drive	Number of installed AC/DC power supplies
1(1 to 5 drives)	2 or more
2(6 to 10 drives)	3 or more
3(11 to 15 drives)	4 or more
4(16 to 20 drives)	5

(1) Removing procedure

- ① First open the side cover 1 and then the side cover 2. (See CK-REP0160.)
- ② Disconnect the FG cable connected with the AC/DC power supply.
- ③ Open the right and left levers to the direction of arrows (···➤) at the same time, then remove the AC/DC power supply .

(2) Mounting procedure

- ① Insert the AC/DC power supply into the right place with its right and left levers open, then close the both levers to the direction of arrows (➡) at the same time.
- ② Connect the FG cable with the AC/DC power supply.

(3) Transition of panel display

I003XX PSRCV-XX ----- DC power recovery is completed.

(In case with replacement while power on.)

When the subsystem is allowed to be shut off, it is recommended to replace the power supply in the following procedure.

(4) Removing procedure

- ① Turn off the subsystem following the power-off procedure explained in CK-REP0050.

Notice : In case the power is not normally turned off, the user's data might be lost.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC".

In this case refer to "Trouble shooting Chapter" (See TRBL0030) and turn off the power.

- ② First open the side cover 1 and then the side cover 2. (See CK-REP0160.)
- ③ Disconnect the FG cable connected with the AC/DC power supply.
- ④ Open the right and left levers to the direction of arrows (···➤) at the same time, then remove the AC/DC power supply .

(5) Mounting procedure

- ① Insert the AC/DC power supply into the right place with its right and left levers open, then close the both levers to the direction of arrows (➡) at the same time.
- ② Connect the FG cable with the AC/DC power supply.
- ③ Turn the power on following "2.1 Turning the Power on/off for Each String". (See CK-REP0050.)

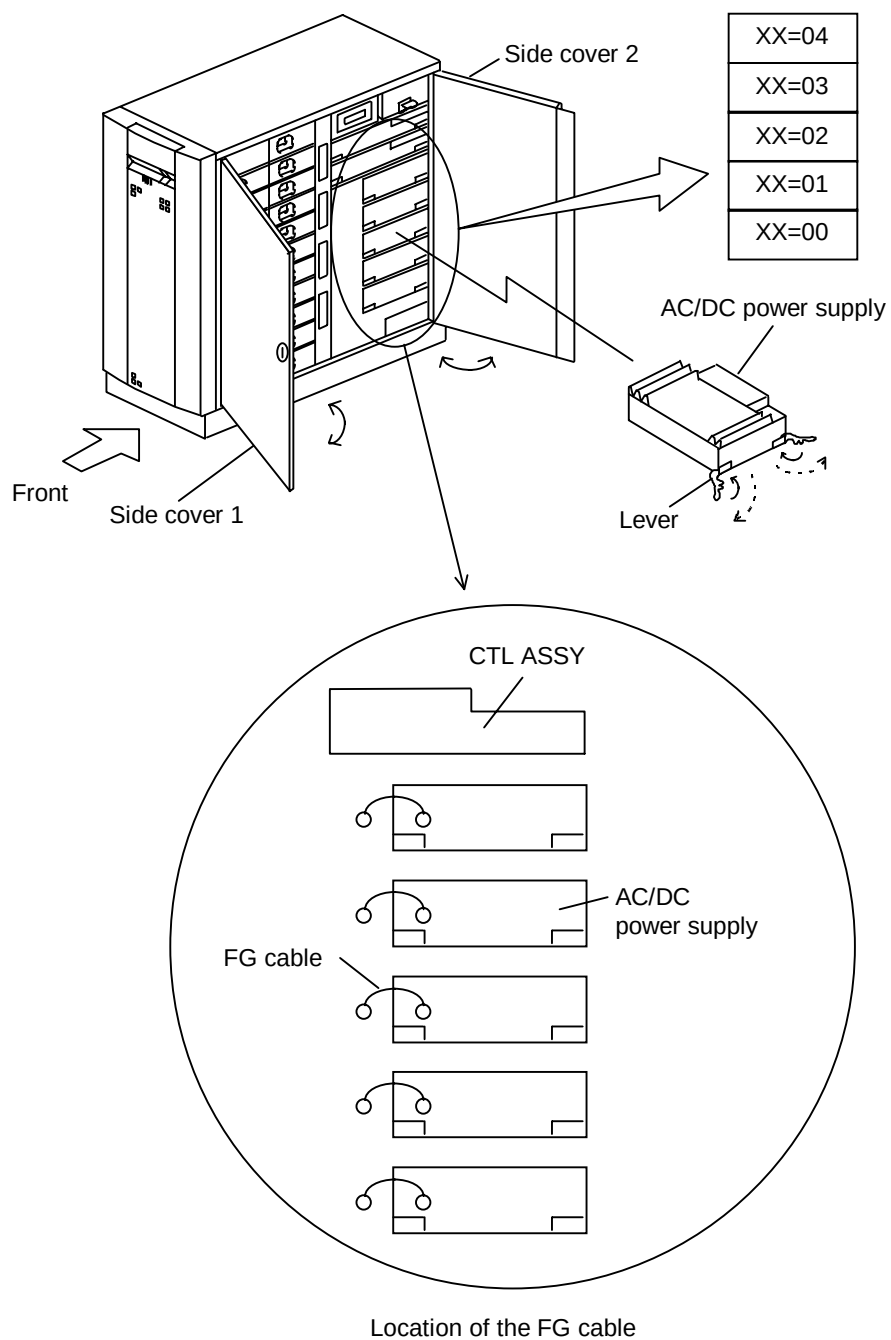
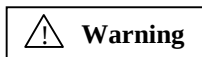


Figure 11.1 Replacing AC/DC power supply

12. Replacing In Box ASSY (See Figure 12.1.)



Do not touch inside of In Box ASSY. Electricity remains even if main switch is off.

(1) Removing procedure

- ① Turn off the subsystem following the power-off procedure explained in CK-REP0050.

Notice 1 : In case the power is not normally turned off, the user's data might be lost.

Notice 2 : If the power is already turned off, check the CACHE PWR LED (see page THEORY0200) to confirm that the cache back up is not being executed. In the case the cache back up is being executed, turn on and off the power (see page CK-REP0050).

Make sure that the power is turned off normally, then replace the Battery ASSY.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC".

In this case refer to "Trouble shooting chapter" (See TRBL0030) and turn off the power.

- ② Disconnect the power supply cable.
- ③ First open the side cover 1 and then the side cover 2. (See CK-REP0160.)
- ④ Remove the screw and move the In Box ASSY to the left following the arrow A. Then, pull it toward you to remove it.

(2) Installing procedure

- ① Insert the In Box ASSY into the right place and move it to the opposite direction of arrow A (to the right). Then, push it inward and tighten the screw.
- ② Connect the disconnected cables.
- ③ Close side cover 1, then side cover 2. (See CK-REP0160.)
- ④ Turn the power on following the power-on procedure in CK-REP0050.

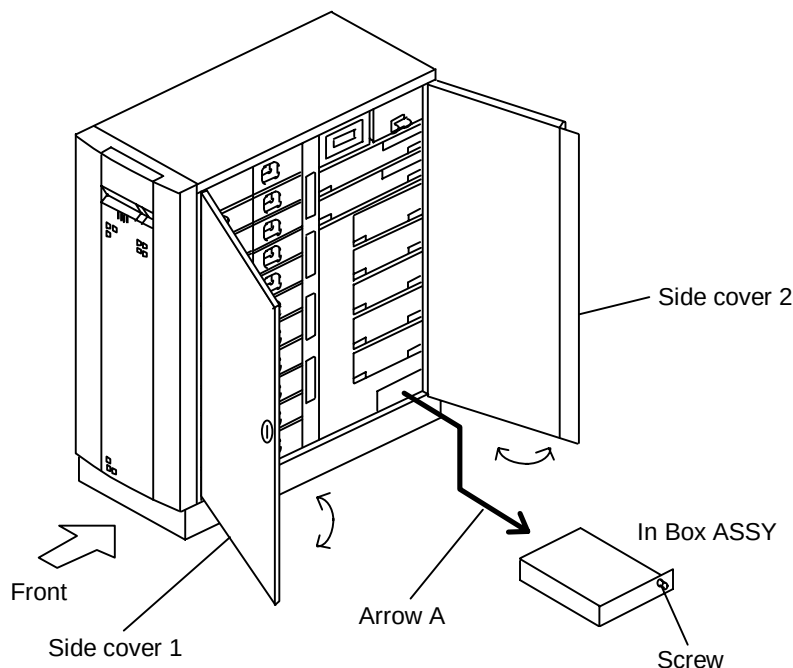


Figure 12.1 Replacing In Box ASSY

13. Replacing CACHE ASSY

In case no optional redundant CTL installed

(1) Procedures

- ① Turn off the subsystem following the power-off procedure explained in CK-REP0050.

Notice 1 : In case the power is not normally turned off, the user's data might be lost.

Notice 2 : If the power is already turned off, check the CACHE PWR LED (see page THEORY0200) to confirm that the cache back up is not being execute. In the case the cache back up is being executed, turn on and off the power (see page CK-REP0050).

Make sure that the power is turned off normally, then replace the Battery ASSY.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Trouble shooting Chapter" (See TRBL0030) and turn off the power.

- ② Open the side cover to remove CTL ASSY. (See CK-REP0350.)

- ③ Replace CACHE ASSY.

Note 1 : Slots #0 and #4, #1 and #5, #2 and #6, #3 and #7 are pairs respectively. Install the cache having the same capacity for these each pair slots..

Note 2 : CACHE ASSY of the largest capacity must be mounted cache slots #0 and #4 in case that CACHE ASSYs of different capacity are used.

- ④ Install the CTL ASSY.

- ⑤ Turn power on following the procedure explained in CK-REP0050.

- ⑥ Close the side covers.

- ⑦ Close the front cover.

Installation example of CACHE ASSY

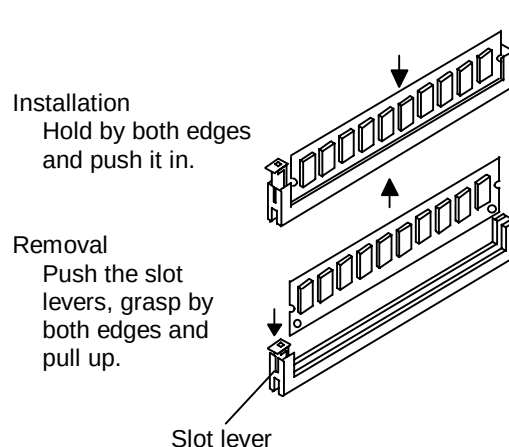
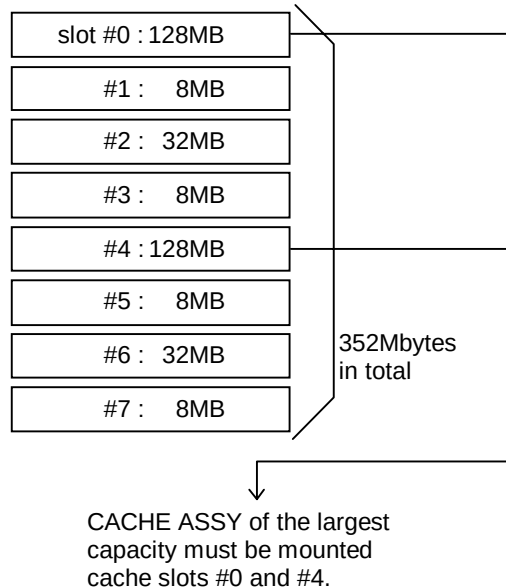


Figure 13.1 Replacing CACHE ASSY

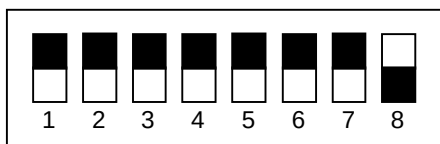
In case optional redundant CTL is installed

When the subsystem are dual controller system, CACHE ASSY can be replaced while the power on.

Notice : In this case, the CACHE ASSY must be replaced one controller at one time. In case CACHE ASSY for both CTL ASSY are replaced at the same time, turn the power off before replacement.

(1) Procedure

- ① First open the side cover 1 and the side cover 2. (See CK-REP0160.)
- ② Disconnect the cable (RS232C).
- ③ Set No.8 DIP switch of the corresponding CTL ASSY.

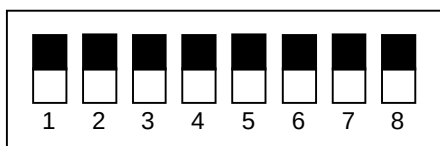


- ④ Push the reset switch of the corresponding CTL ASSY.
- ⑤ Wait ten seconds, check to see that FAIL LED on the CTL comes on and it enters into the blocked state. (See CK-REP0350.)
- ⑥ Open the right and left levers to the direction of arrows (→) at the same time then remove the CTL ASSY.
- ⑦ Replace the CACHE ASSY.

Note 1 : When replacing a cache, install the cache having the same capacity in slots #0 and #4, slots #1 and #5, slots #2 and #6, or slots #3 and #7.

Note 2 : CACHE ASSY for the same slot of both CTL ASSY should have to same capacity.

Note 3 : CACHE ASSY of the largest capacity must be mounted cache slots #0 and #4 in case that CACHE ASSYs of different capacity are used.
- ⑧ Set No.8 of DIP switch to as shown.



- ⑨ Insert the CTL ASSY.
- ⑩ Connect the disconnected cable (RS232C).
- ⑪ Close the side covers 1 and 2. (See CK-REP0160.)

When an optional redundant CTL (for dual configuration) has been installed, the replacement can be performed with machine power off. In this case follow the same procedure as that for single configuration.

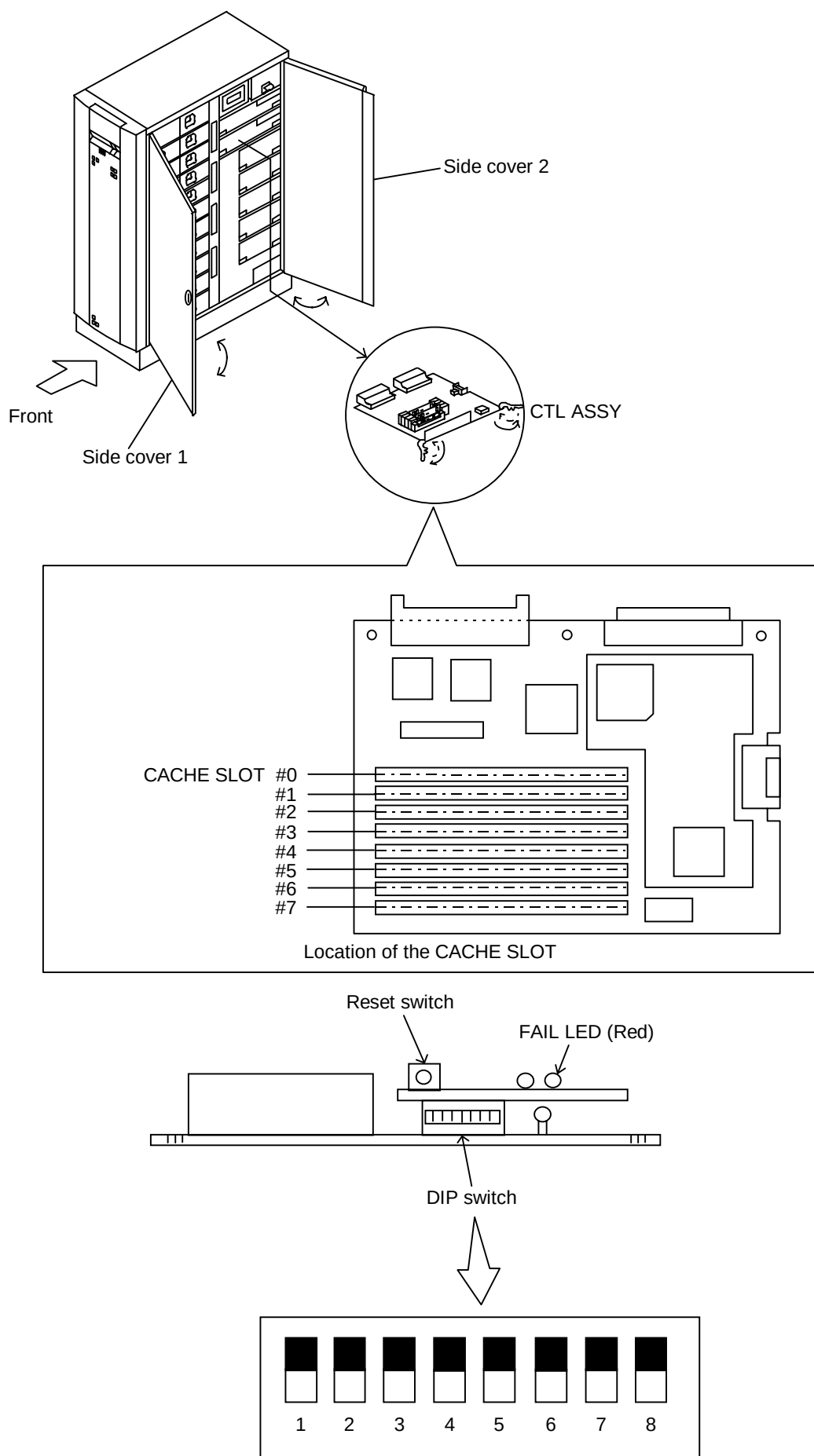


Figure 13.2 CTL ASSY

14. Replacing LAN ASSY

When no optional redundant CTL installed

Notice : Configuration setting change is sometimes required because Mac Address is changed after replacing LAN ASSY.

(1) Procedures

- ① Turn off the subsystem following the power-off procedure explained in CK-REP0050.

Notice 1 : In case the power is not normally turned off, the user's data might be lost.

Notice 2 : If the power is already turned off, check the CACHE PWR LED (see page THEORY0200) to confirm that the cache back up is not being execute. In the case the cache back up is being executed, turn on and off the power (see page CK-REP0050).

Make sure that the power is turned off normally, then replace the Battery ASSY.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Trouble shooting Chapter" (See TRBL0030) and turn off the power.

- ② Open the side covers and remove the CTL ASSY. (See CK-REP0160.)
 ③ Pinch the latching heads of card spacers with needle-nose pliers etc. , then pull the LAN ASSY up with care not to touch with surrounding parts. (See Figure 14.1.)

Notice : If your hand or a tool touches with CTL ASSY, touched part may be damaged.

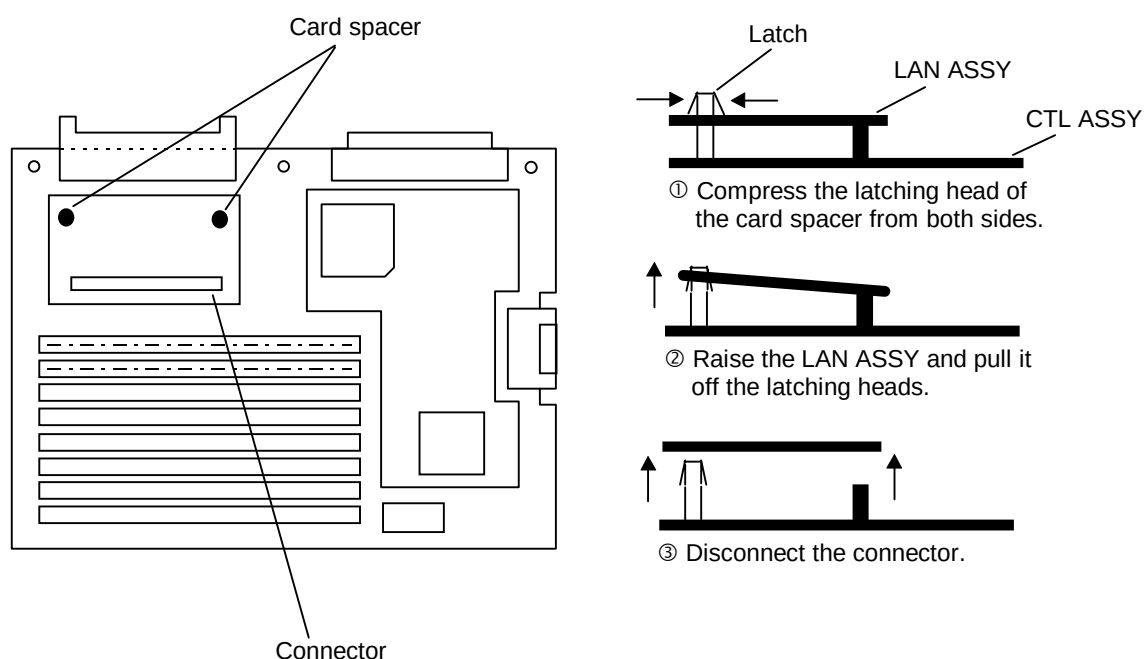


Figure 14.1 Replacing LAN ASSY (1)

- ④ Mount a LAN ASSY for replacement by aligning its mounting holes with the card spacers and pressing the LAN ASSY against the spacers until it is latched with clicks.
- ⑤ Reinstall the CTL ASSY.
- ⑥ Close side covers 1 and 2. (See CK-REP0160.)
- ⑦ Turn on the power. (See CK-REP0050.)

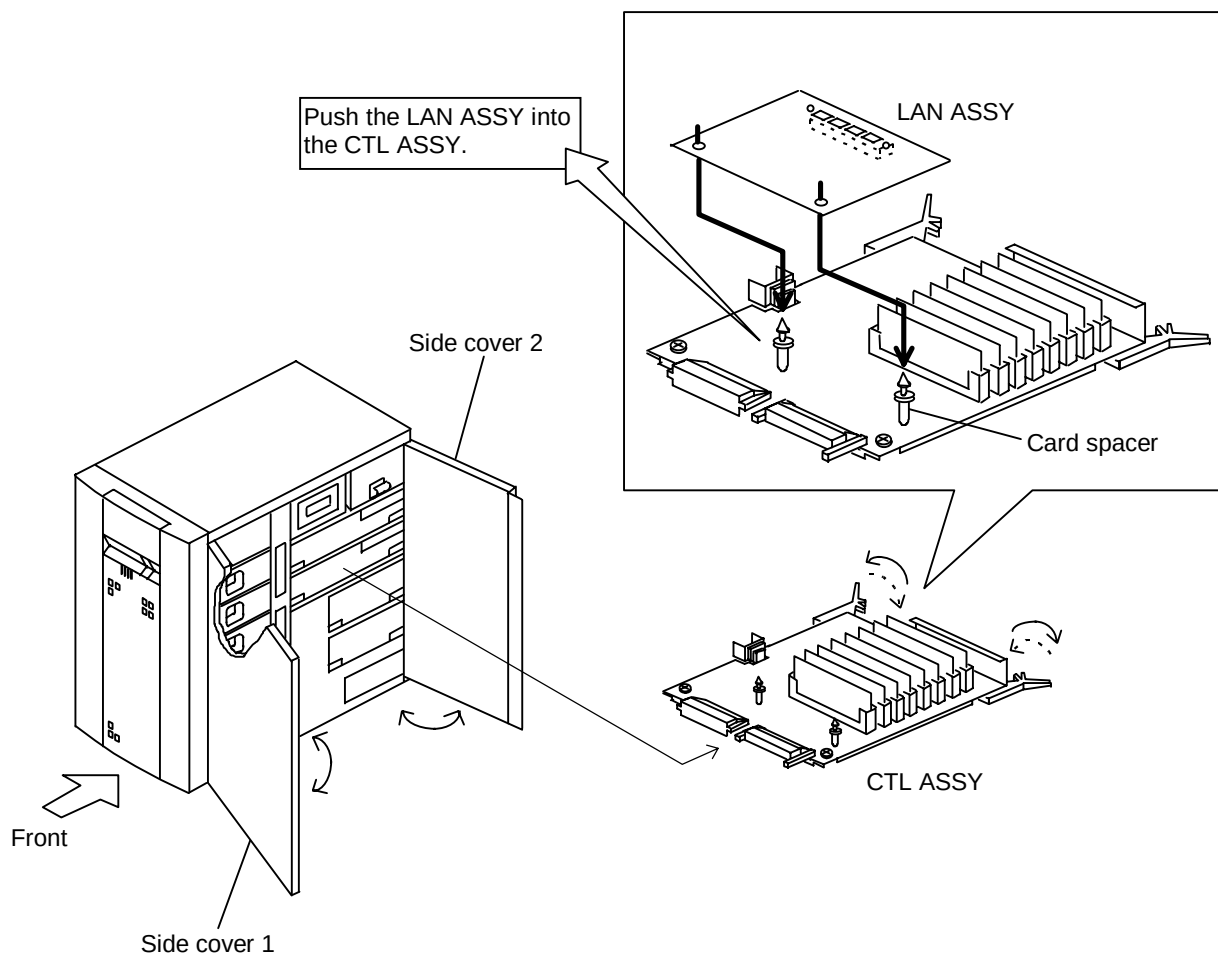


Figure 14.2 Replacing LAN ASSY (2)

When optional redundant CTL installed

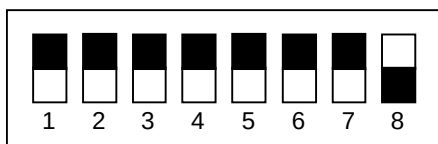
When the subsystem are dual controller system, LAN ASSY can be replaced while the power on.

Notice : When replacing LAN ASSY, perform the replacement for each CTL ASSY one after another.

When replacing both LAN ASSY at a time, turn off the power like the case of single configuration.

(1) Procedure

- ① Open side cover 1 side cover 2. (See CK-REP0160.)
- ② Disconnect the cable (RS232C).
- ③ Set No.8 DIP switch of the corresponding CTL ASSY.



- ④ Push the reset switch of the corresponding CTL ASSY.
- ⑤ Wait ten seconds, check to see that the FAIL LED on the CTL ASSY comes on and it enters the blocked state. (See Figure 14.3.)
- ⑥ Open the right and left levers to the direction of arrows (→) at the same time then remove the CTL ASSY.
- ⑦ Remove the LAN ASSY by pulling it upward. Then mount a new LAN ASSY by aligning its mounting holes with the card spacers and pressing the LAN ASSY against the spacers until it is latched with clicks.
- ⑧ Set No.8 of DIP switch to as shown.



- ⑨ Reinstall the CTL ASSY.
- ⑩ Close the side covers 1 and 2. (See CK-REP0160.)

When an optional redundant CTL (for dual configuration) has been installed, the replacement can be performed with machine power off. In this case follow the same procedure as that for single configuration.

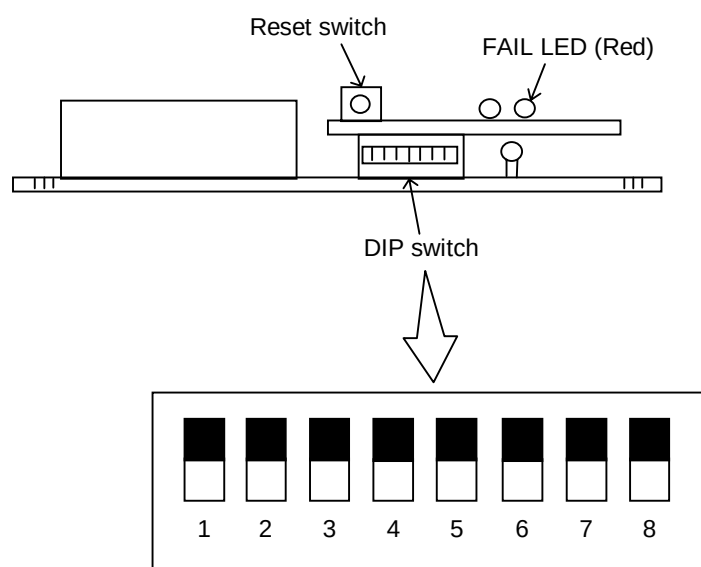


Figure 14.3 Replacing LAN ASSY (3)

DF350F Disk Subsystem

8. INSTALLATION

(Cabinet Type)

Rev.2

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1. Appearance and Maintenance Area

1.1 Appearance

Figure 1.1.1 shows appearance of the DF350F disk subsystems. (Cabinet type)

UNIT : mm

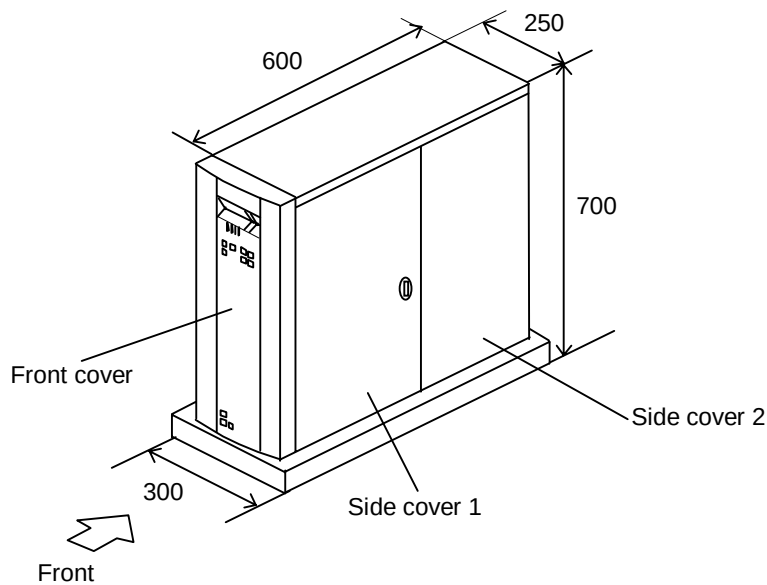


Figure 1.1.1 Appearance

1.2 Maintenance Area

Figure 1.2.1 shows maintenance area for the DF350F disk subsystems. (Cabinet type)

UNIT : mm

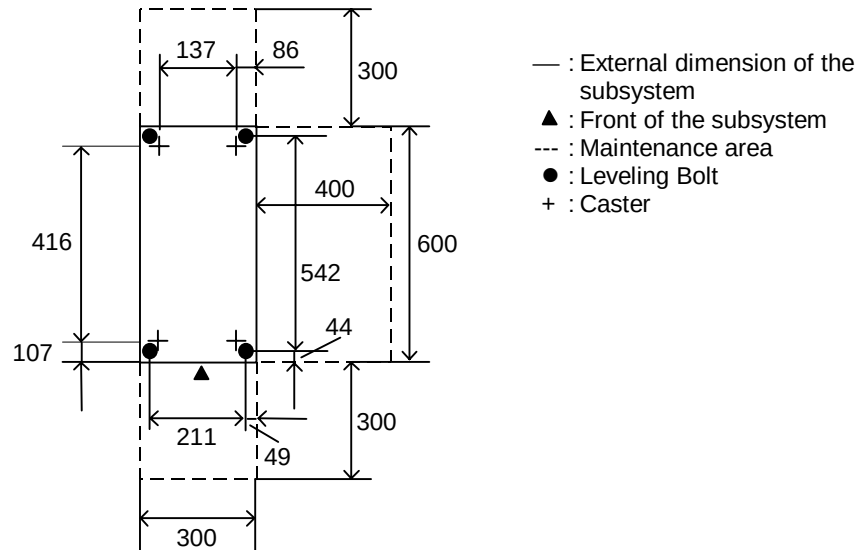


Figure 1.2.1 Maintenance Area

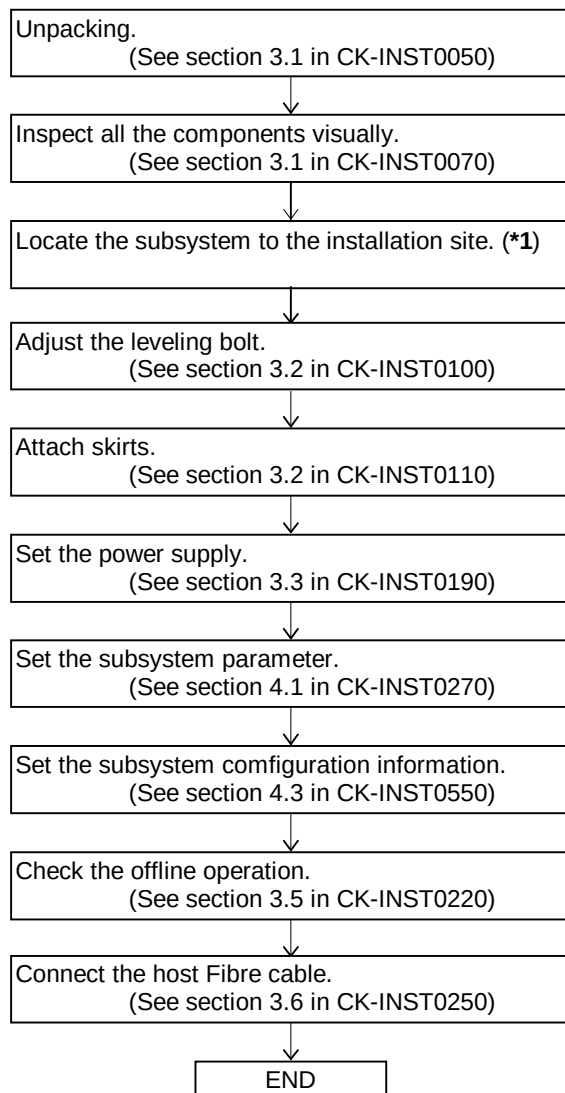
2. Installation

(1) Tool needed for installation

Phillips screwdriver (No.2).

(2) How to install

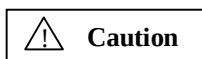
The following flow chart describes how to install the subsystem.



***1 : Place the subsystem with 30cm or more apart from the wall for both the front and the rear because of the ventilation.**

3. Installation Procedure

3.1 Inspecting all the Components



The unpacking and installation should be carried out by 2 or more personnel to prevent turning over of the device or being caught under the device.

3.1.1 Unpacking

- (1) Figure 3.1.1 shows how the subsystem has been packed.
- (2) Figures 3.1.2 to 3.1.4 show the subsystem without external packaging.
- (3) Unpacking
 - ① Loosen the polyester bands.
 - ② Pull out the Tri-wall nails.
 - ③ Remove the external packaging and packing materials.
 - ④ Take the subsystem out of the polyethylene bag.
 - ⑤ Keep two keys in the attached box carefully.
(These keys are used for opening/closing side covers 1 and 2.)
 - ⑥ Remove the cushioning materials, tape, desiccators, etc attached to the subsystem.

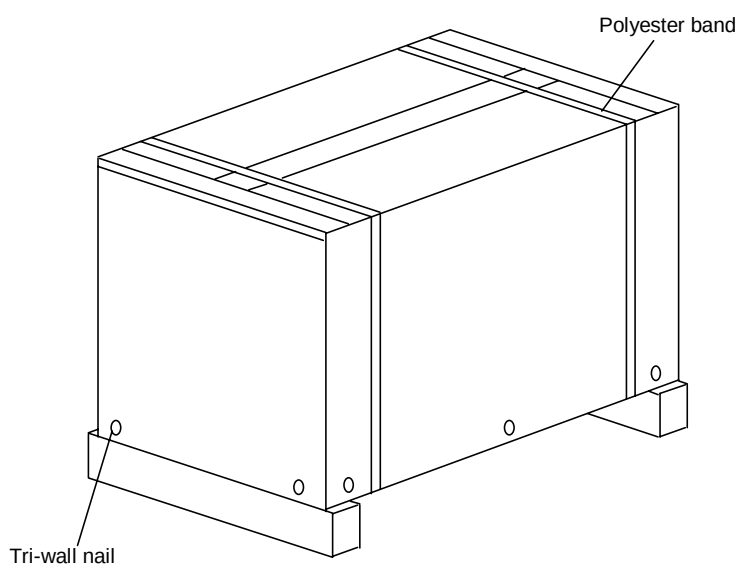


Figure 3.1.1 Subsystem being Packed

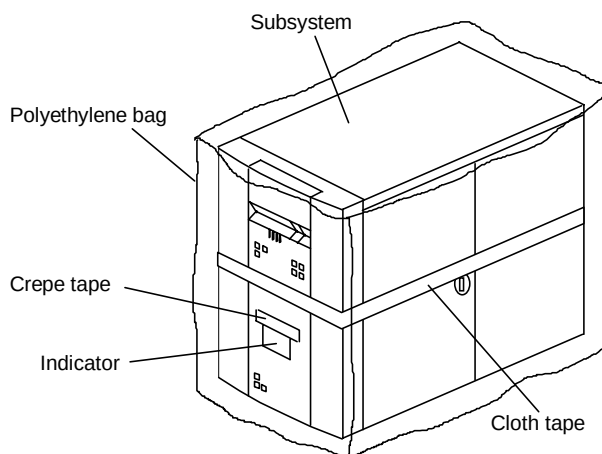


Figure 3.1.2 Subsystem without External Packaging

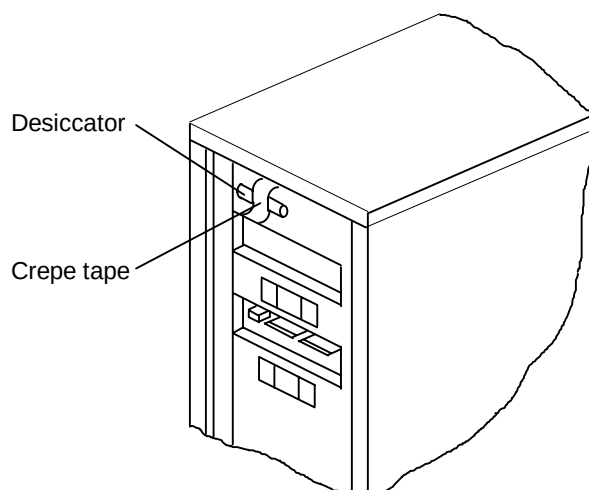


Figure 3.1.3 Location of Desiccator

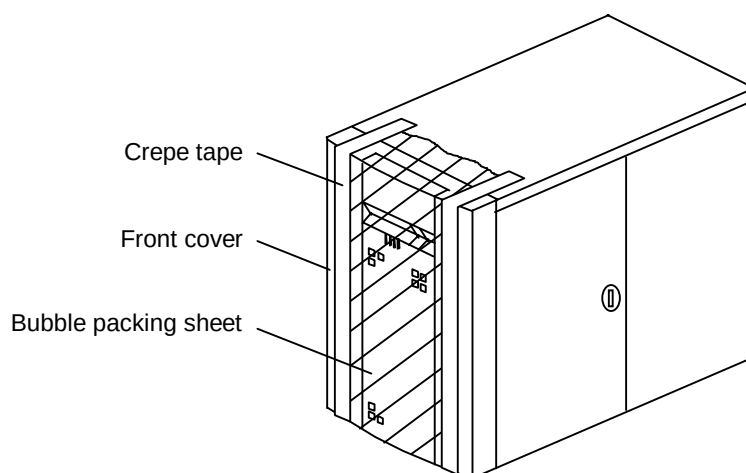


Figure 3.1.4 Front Cover Protection

3.1.2 Inspecting all the components visually

Check the following components before installation according to a customer's configuration.

Table 3.1.1 Mandatory Features

Model Name	Specification	Quantity	Comment
DF350F-CK	Cabinet (CK)	1	
DF-F350-E2E2 -E2E4 -E3E4 -E2E8 -E1E8 -E1E18	1"H disk drive (516B Format, 2.0GB × 5) (516B Format, 4.1GB × 5) (516B Format, 4.1GB × 5) (516B Format, 8.7GB × 5) Half height disk drive (516B Format, 8.7GB × 5) (516B Format, 17.8GB × 5)	1 (RAID5 :4D+1P)	HDU ASSY
DF-F350-A2E2 -A2E4 -A3E4 -A2E8 -A1E8 -A1E18	1"H disk drive (516B Format, 2.0GB × 1) (516B Format, 4.1GB × 1) (516B Format, 4.1GB × 1) (516B Format, 8.7GB × 1) Half height disk drive (516B Format, 8.7GB × 1) (516B Format, 17.8GB × 1)	1	HDU ASSY
DF-F350F-B3M	Power supply	1	AC/DC power supply
DF-F350-C8E -C32E -C128E	Cache memory (8MB) (32MB) (128MB)	2	CACHE ASSY
DF-F350F-DMON	Fibre Channel Optical (Non OFC) I/F, 100-M5-SN-I, SC connector.	1	I/F ADAPTER ASSY

Table 3.1.2 Optional Features

Model Name	Specification	Quantity	Comment
DF-F350-E2E2 -E2E4 -E3E4 -E2E8 -E1E8 -E1E18	1"H disk drive (516B Format, 2.0GB × 5) (516B Format, 4.1GB × 5) (516B Format, 4.1GB × 5) (516B Format, 8.7GB × 5) Half height disk drive (516B Format, 8.7GB × 5) (516B Format, 17.8GB × 5)	0 - 3	HDU ASSY
DF-F350-A2E2 -A2E4 -A3E4 -A2E8 -A1E8 -A1E18	1"H disk drive (516B Format, 2.0GB × 1) (516B Format, 4.1GB × 1) (516B Format, 4.1GB × 1) (516B Format, 8.7GB × 1) Half height disk drive (516B Format, 8.7GB × 1) (516B Format, 17.8GB × 1)	0 - 21	HDU ASSY
DF-F350-C8E -C32E -C128E	Cache memory (8MB) (32MB) (128MB)	0, 2, 4, 6 or 8	CACHE ASSY
DF-F350F-B3M	Spare power supply	0 - 4	AC/DC power supply
DF-F350-G1M1 DF-F350F-G3M1	LAN board LAN board (SNMP)	0 - 2	LAN ASSY
DF-F350F-F3MCF	Controller for dual composition	0 or 1	CTL ASSY
DF-F350F-DMON	Fibre channel Optical (Non OFC) I/F	0 or 1	I/F ADAPTER ASSY

Table 3.1.3 Accessories

Model Name	Specification	Quantity	Comment
DF-F350-J1 -J2 -J3	Power supply cable (Connector attached to two poles with earth) (Inlet type connector, EN60320 STANDARD SHEET C14)	0 or 1	
DF-F350-K050L -K150L -K068S -K268S -K168S -K350L	Interface cable (50PL, 1.5m) (50PL, 3m) (68PS, 1.5m) (68PS, 3m) (68PS, 5m) (50PL, 5m)	0 -	
DF-F350-S1	RS232C cable	0 -	

3.1.3 Inspecting the subsystem components and addendum

This subsection describes how to install the basic components into the subsystem.

Figures 3.1.5 and 3.1.6 show mechanical configuration and parts location of this subsystem.

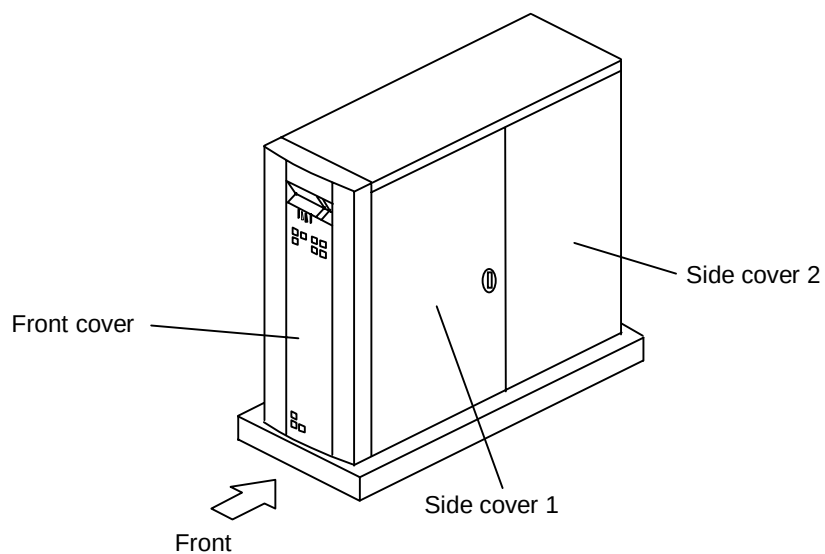


Figure 3.1.5 Appearance of DF350F Disk Subsystem (Cabinet type)

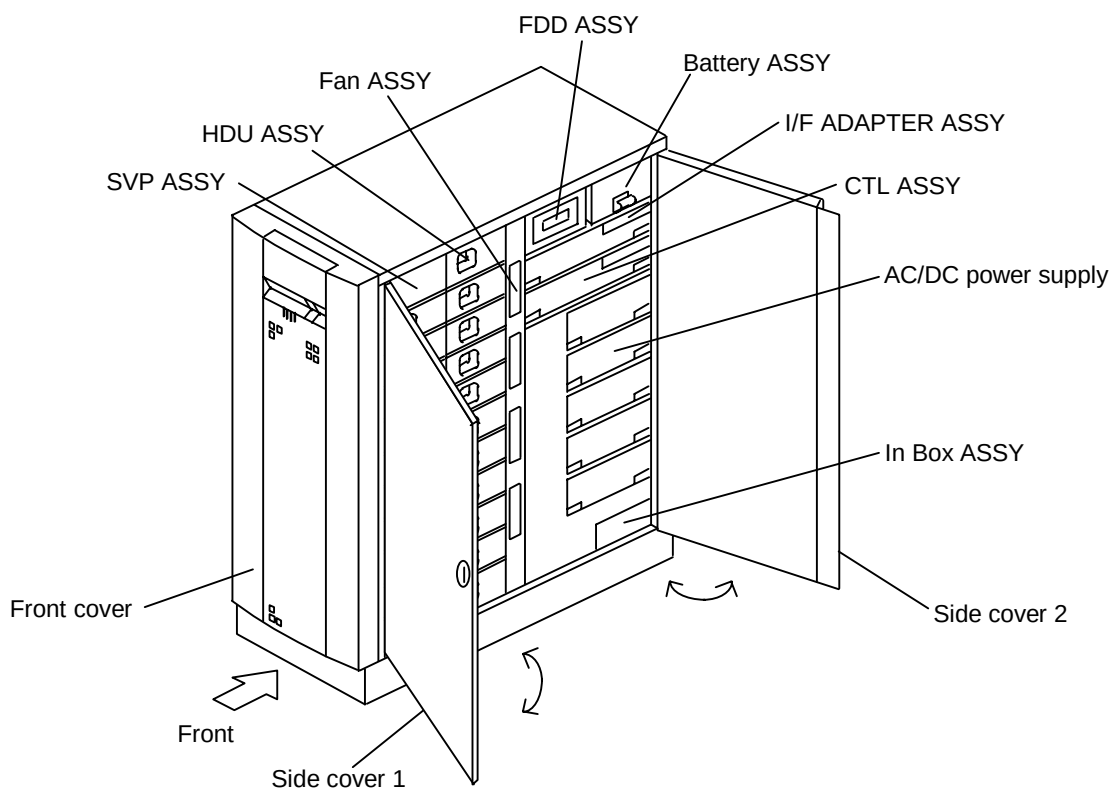


Figure 3.1.6 Parts Location

3.2 Install the Subsystem

3.2.1 Adjusting the leveling bolt

This subsection describes how to adjust the leveling bolt of the stand for the DF350F disk subsystem.

- (1) Remove the tape securing the leveling bolts.
- (2) Rotate the leveling bolt (as shown by an arrow) so that the space between the caster and the floor comes to be approximately 2.5mm.
- (3) Perform fine adjustment of the leveling bolt so that the subsystem is leveled as shown in Figure 3.2.2 .

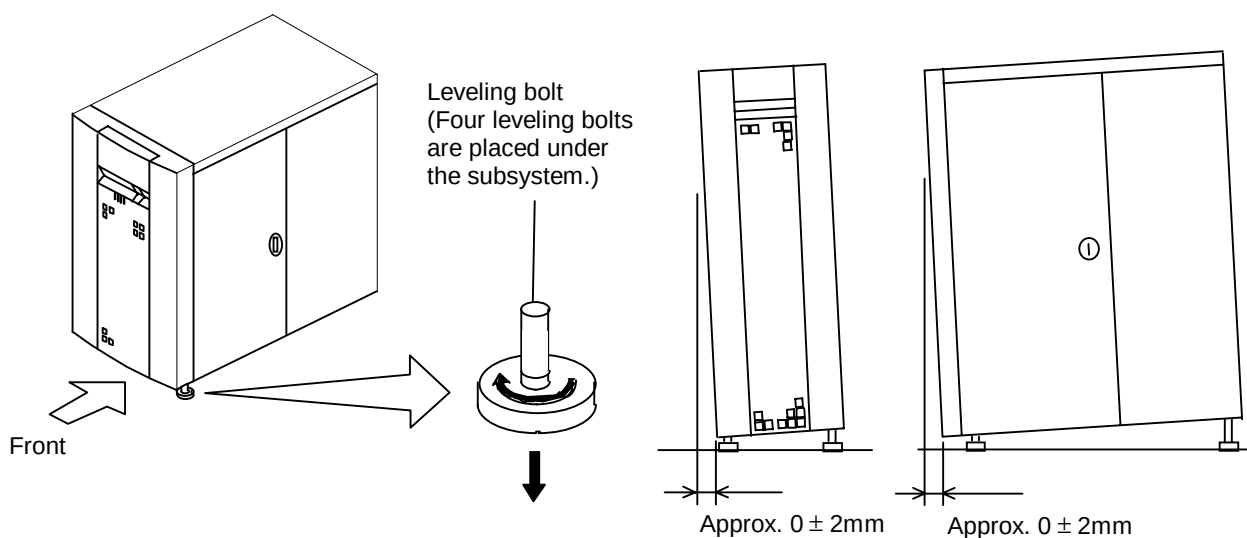


Figure 3.2.1 Turning Direction of Leveling Bolt

Figure 3.2.2 Inclination of Subsystem

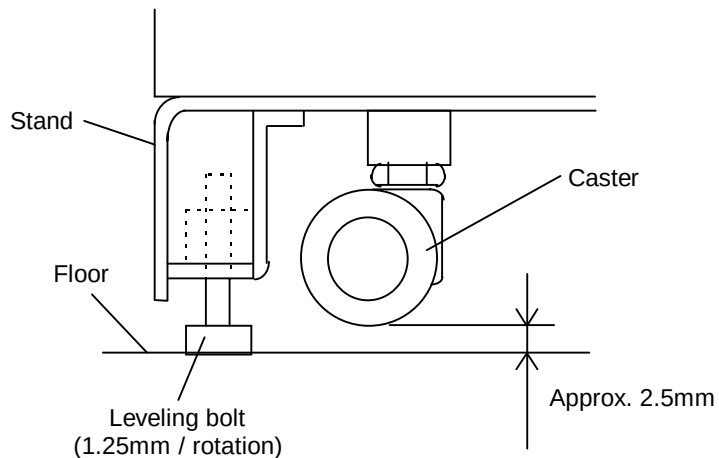


Figure 3.2.3 Space Between Caster and Floor

3.2.2 Attaching skirts

(1) Attachment procedure

- ① Move the leveling bolts downward and make the subsystem be supported by them if not done already.
(See CK-INST0100.)
- ② Remove the Bind screws ❷, remove the four L Metal Fittings* by loosening the Bind screws ❶.
(See Figure 3.2.4 , 3.2.5.)
- *: Keep L Metal Fittings to use moving the subsystem.
- ③ Turn the Stabilizers downward and secure it with the Bind screws ❶ and ❷.
(See Figure 3.2.4 , 3.2.5.)

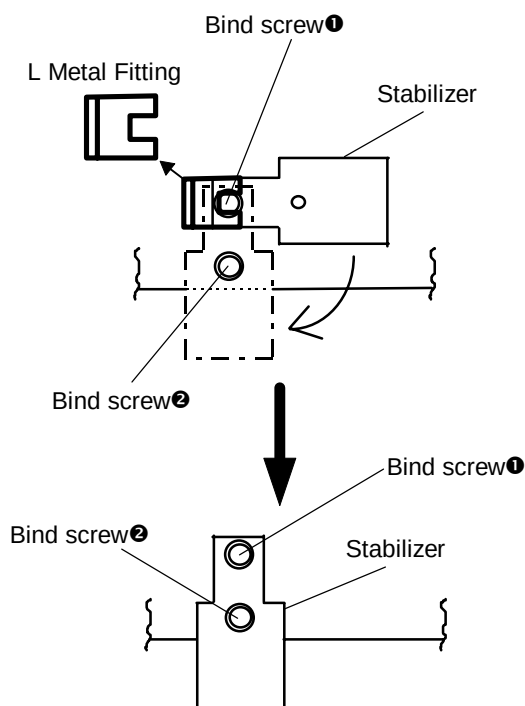


Figure 3.2.4 Securing procedure of Stabilizer

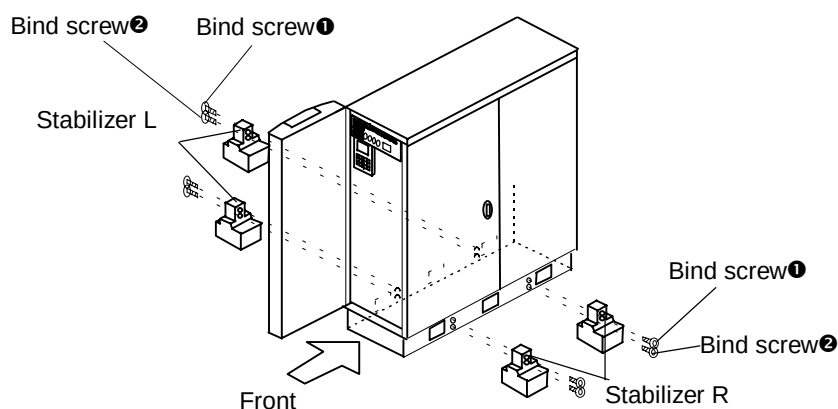


Figure 3.2.5 Securing position of Stabilizer

- ④ Insert latches ❶ of skirts (R) and (L) into the slots ❶ of skirt (F). (See Figure 3.2.6.)
- ⑤ Attach the combined skirts (F), (R) and (L) to the bottom of the unit by fitting them from the front of the unit (as shown by an arrow A) with the skirts (R) and (L) being spread out a little. Then make the latches ❷ of the skirts (R) and (L) be engaged with the slots ❷ of the unit frame. (See Figure 3.2.7.)
- ⑥ Press the both ends of the skirt (F) in the direction shown by arrow B, and make a plastic catch be engaged with that on the unit frame. (See Figure 3.2.8.)

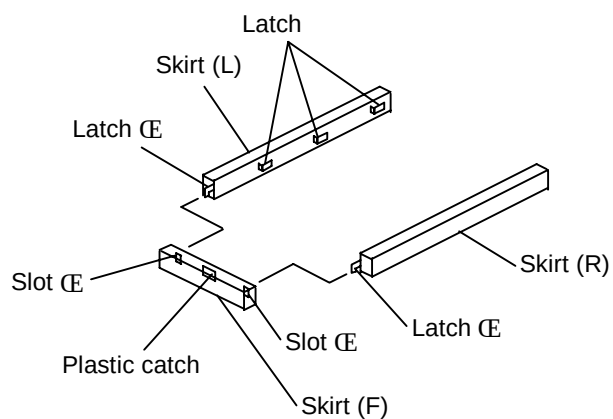


Figure 3.2.6 Assembly of Skirts

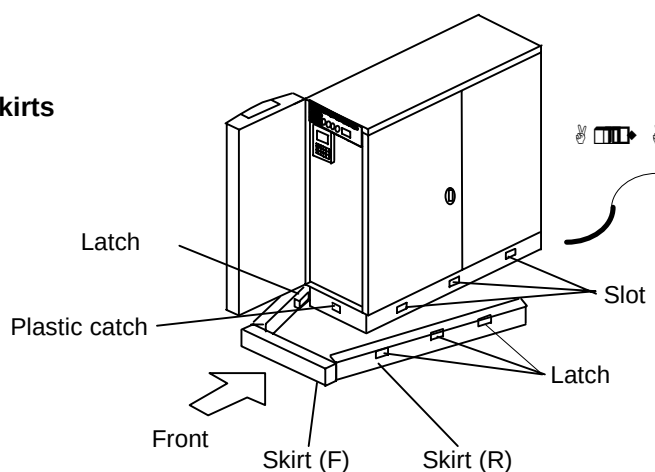


Figure 3.2.7 Fitting the Combined Skirts

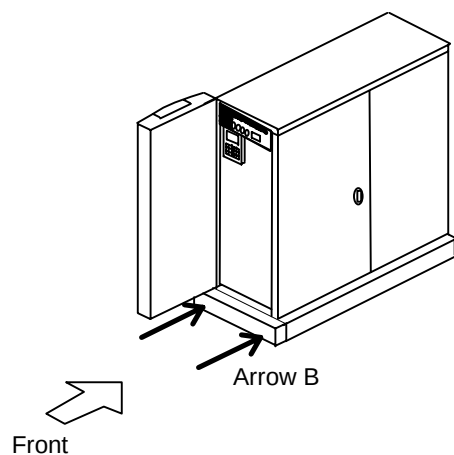
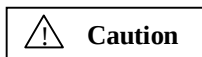


Figure 3.2.8 Securing the Skirts

3.2.3 Install the subsystem

Place the subsystem so that the front and rear is 30cm or more apart from the wall in order not to block the ventilation.



Do not block the ventilation. With the temperature rise, it may cause failure or fire.

(1) Opening/Closing the front cover (See Figure 3.2.9.)

- ① Pull the right side of the front cover toward you to open it.
- ② Push it back slowly to close it.

Notice : Open/Close the front cover gently to avoid subjecting the subsystem to any impact since it has precision components.

(2) Opening/Closing the side covers (See Figure 3.2.9.)

- ① Insert the key attached to the subsystem into the keyhole and turn it to the direction of an arrow (clockwise). Carefully open side cover 1 first, then open side cover 2.
- ② Carefully close side cover 2 first, and then close side cover 1. Finally, turn the key to the direction of an arrow (counterclockwise).

Notice : Open/Close the side covers gently to avoid subjecting the subsystem to any impact since it has precision components.

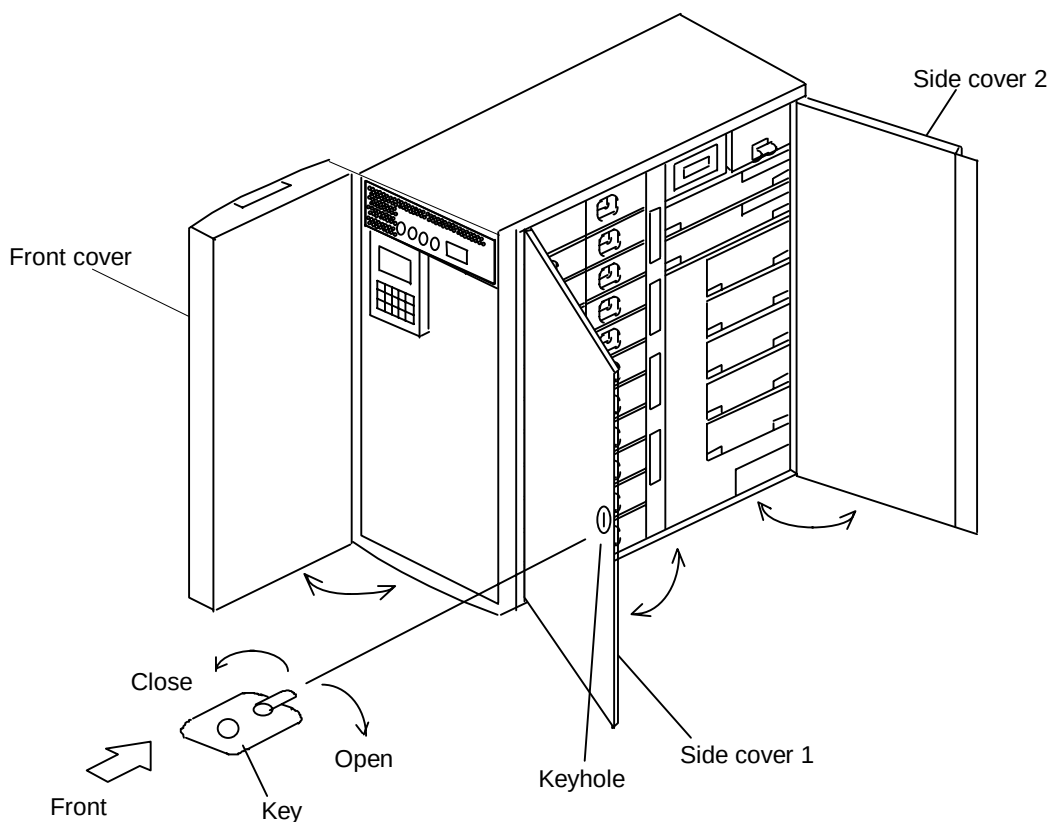


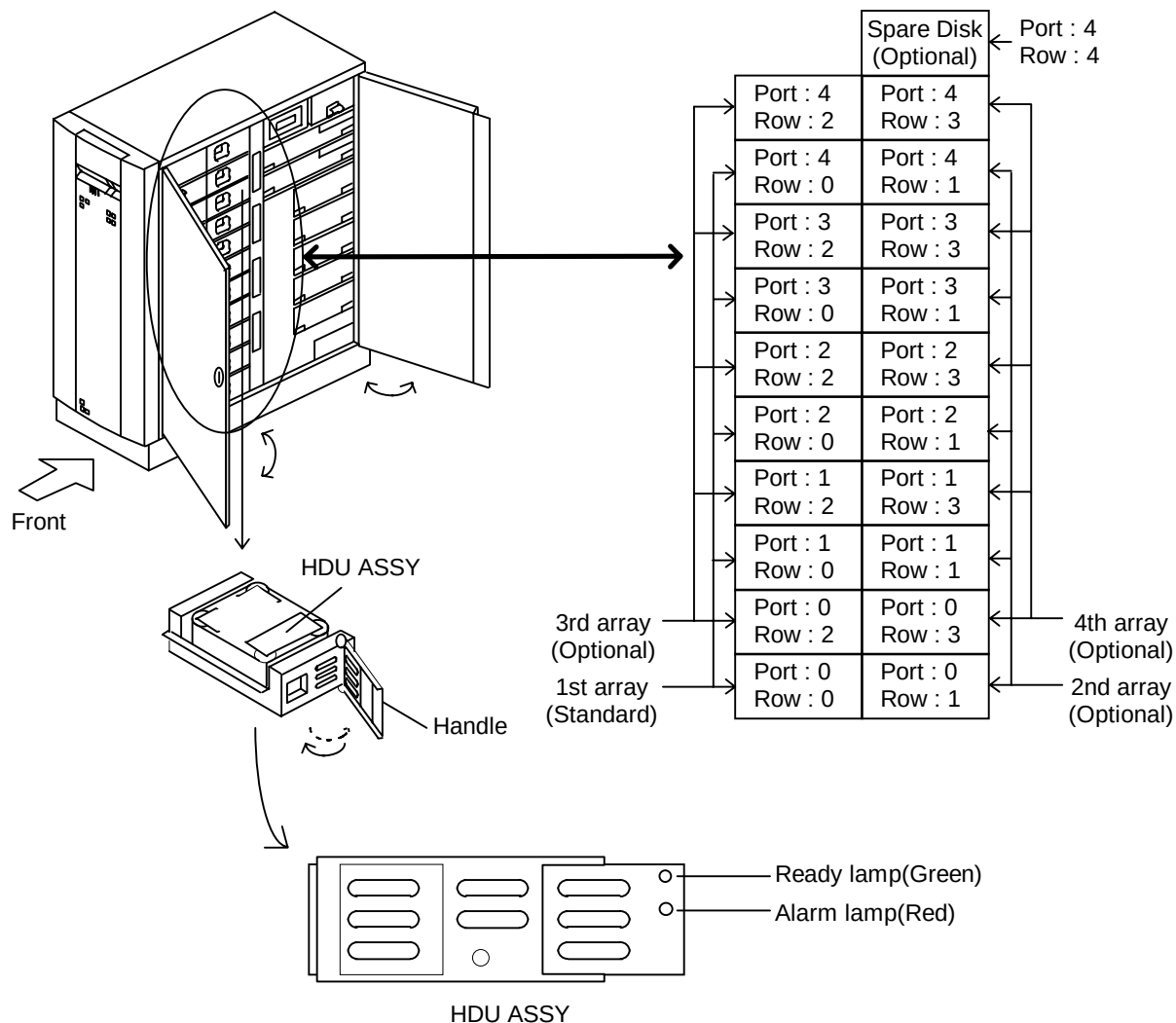
Figure 3.2.9 Opening/Closing Front and Side Covers

(3) Installing HDU ASSY (See Figure 3.2.10.)

- ① Open the handle in the direction of an arrow (···➤) completely and insert the HDU ASSY into the right place.
- ② Close the handle in the direction of an arrow (➡).

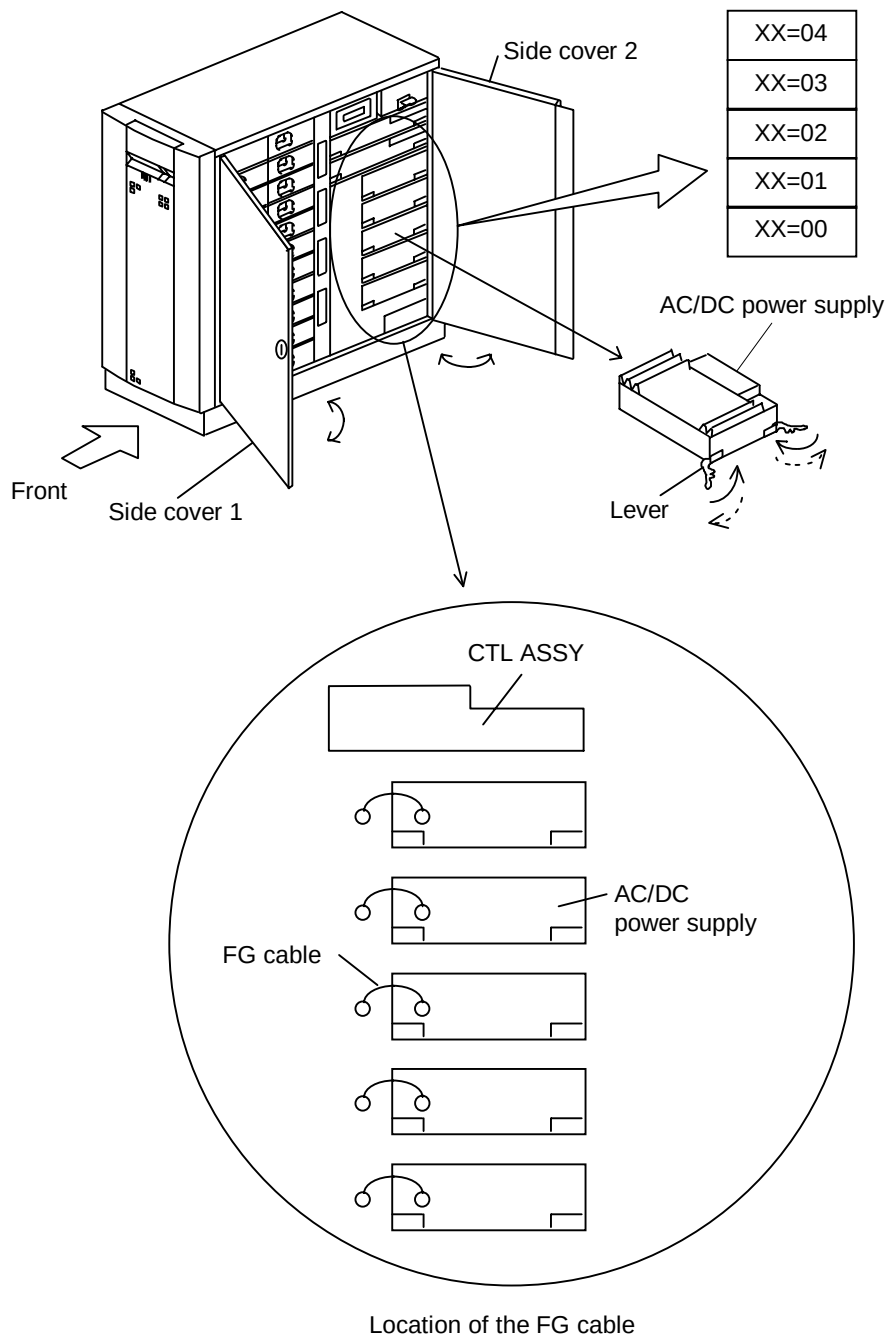
**Caution**

Do not subject the HDU ASSY to any impact or vibration since it is a precision component.

**Figure 3.2.10 Installing HDU ASSY**

(4) Setting AC/DC power supply (See Figure 3.2.11.)

- ① Insert the AC/DC power supply into the right place with its right and left levers being opened, then close the both levers to the direction of arrows (→) at the same time.
- ② Connect the FG cable with the AC/DC power supply.

**Figure 3.2.11 Setting AC/DC Power Supply**

(5) Setting I/F ADAPTER ASSY (See Figure 3.2.12.)

- ① Insert the I/F ADAPTER ASSY into the right place and tighten the bind screw.

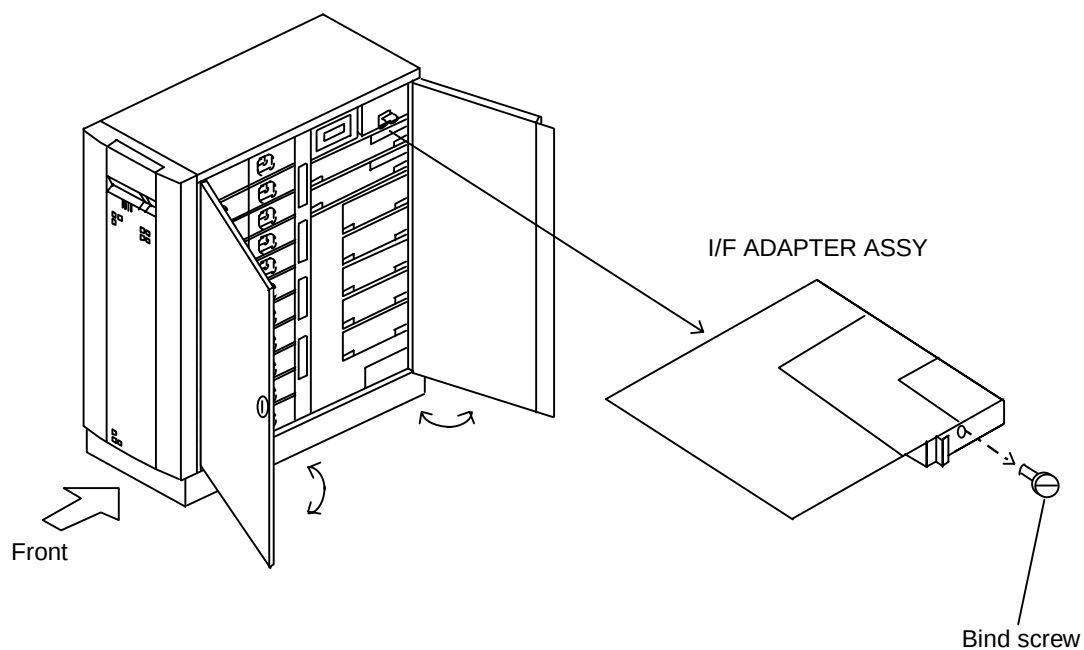


Figure 3.2.12 Setting I/F ADAPTER ASSY

(6) Installing CACHE ASSY (See Figure 3.2.13.)

Note 1 : Be sure to install the cache assemblies having the same capacity in slots #0 and #4, slots #1 and #5, slots #2 and #6, or slots #3 and #7.

Note 2 : When the cache assemblies are to be inserted into the cache slots, insert them in the order of cache slots #0 and #4, cache slots #1 and #5, cache slots #2 and #6 and then cache slots #3 and #7.

Note 3 : Be sure to install the cache assembly having the maximum capacity in slot #0 and #4.

Note 4 : If the redundant CTL ASSY has been installed, install the cache assembly having the same capacity into the same slot.

- ① Open the side covers. (See CK-INST0130.)
- ② Pull out the CTL ASSY. Open the right and left levers to the direction of arrows (···➤) at the same time then remove the CTL ASSY. (See Figure 3.2.14.)
- ③ Install the CACHE ASSY. (See Figure 3.2.13.)
- ④ Insert the CTL ASSY into the former place. Insert the CTL ASSY into the right place with its right and left levers being opened, then close the both levers to the direction of arrows (➡) at the same times. (See Figure 3.2.14.)
- ⑤ Close the side covers. (See CK-INST0130.)

Installation example of CACHE ASSY

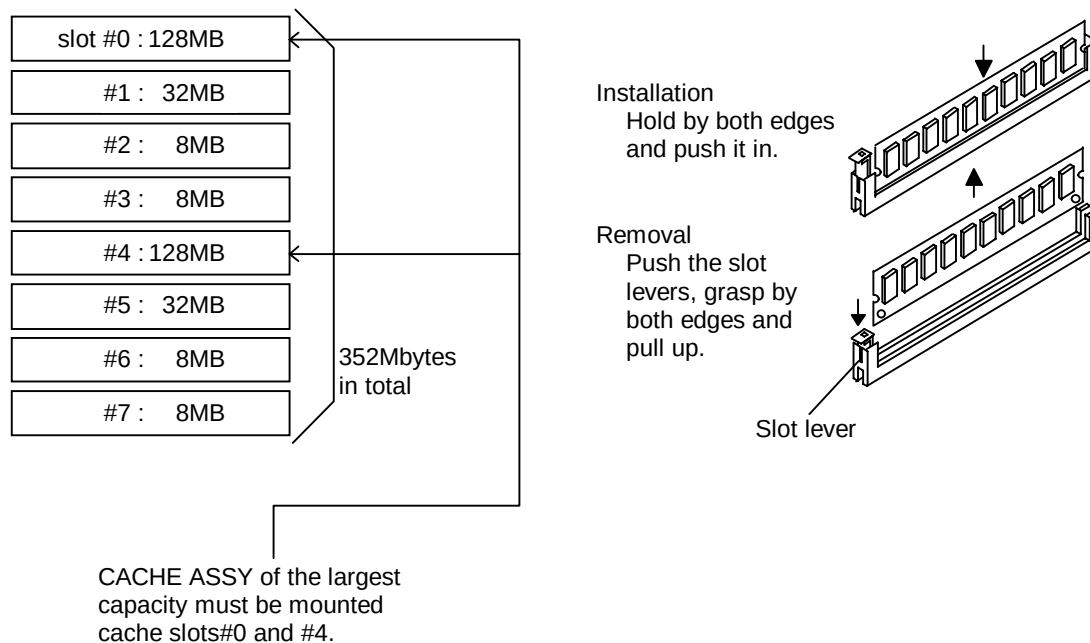
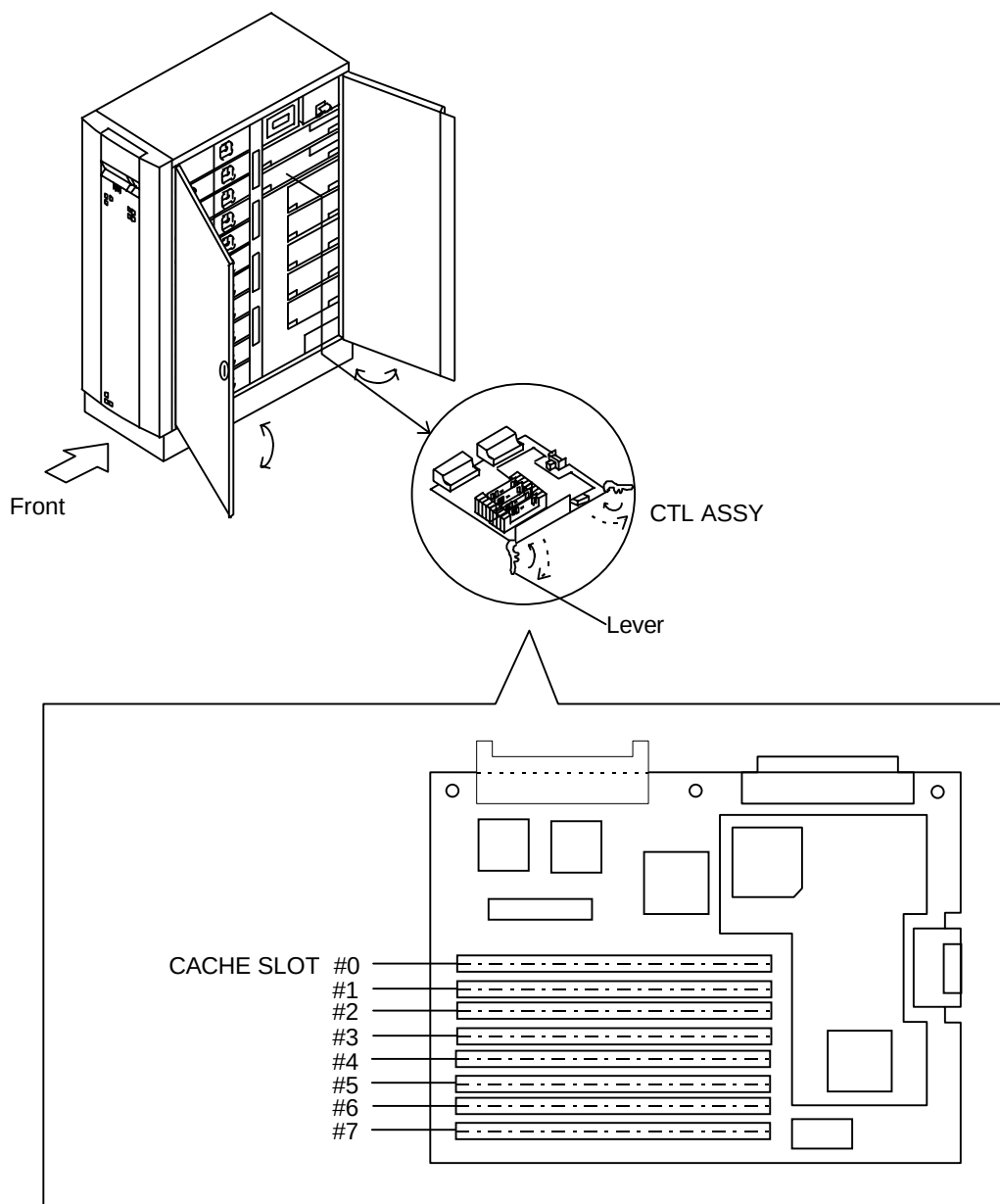


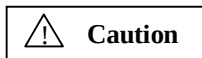
Figure 3.2.13 Installing CACHE ASSY

**Figure 3.2.14 Installing CACHE ASSY**

3.3 Setting the Power Supply

The power for the boards, drives, and fans of the DF350F disk subsystem is supplied by the In Box ASSY and AC/DC power supply converting AC to the DC power.

Turn the power on according to procedures (1) to (6) described below.



Make sure that AC cable is not damaged. It may cause electric shock or fire.

- (1) Make sure that the circuit breaker (a switch on the rear panel) is "O" (OFF), then connect the AC cable.
(See Figure 3.3.1.)
- (2) Supply AC power.
- (3) Open the side cover and make sure that the battery power switch is turned to "ON". Then turn on the circuit breaker.
- (4) Make sure that all of DIP switches are set to "OFF". (upper positions) Note that no need to remove CTL ASSY.
- (5) Close the side cover and set the circuit breaker to "I" (ON). Then turn the power switch "ON".
- (6) Make sure that the subsystem becomes ready a few minutes later.

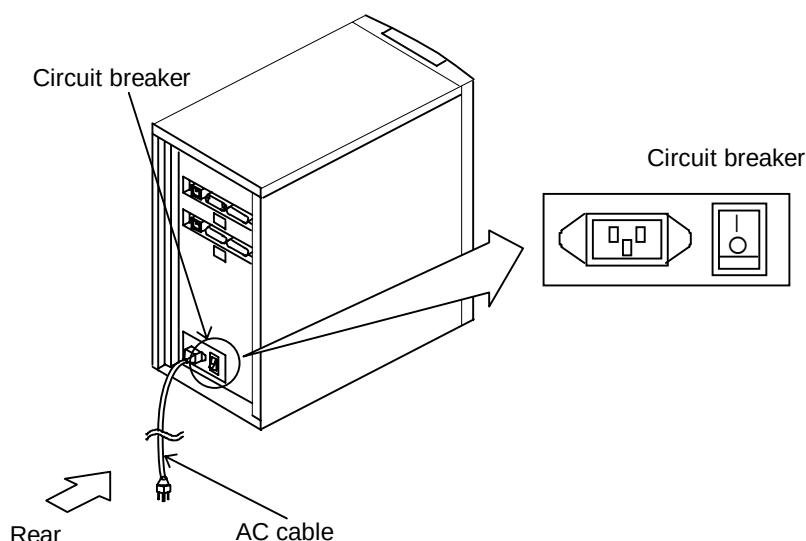


Figure 3.3.1 AC Cable Connection

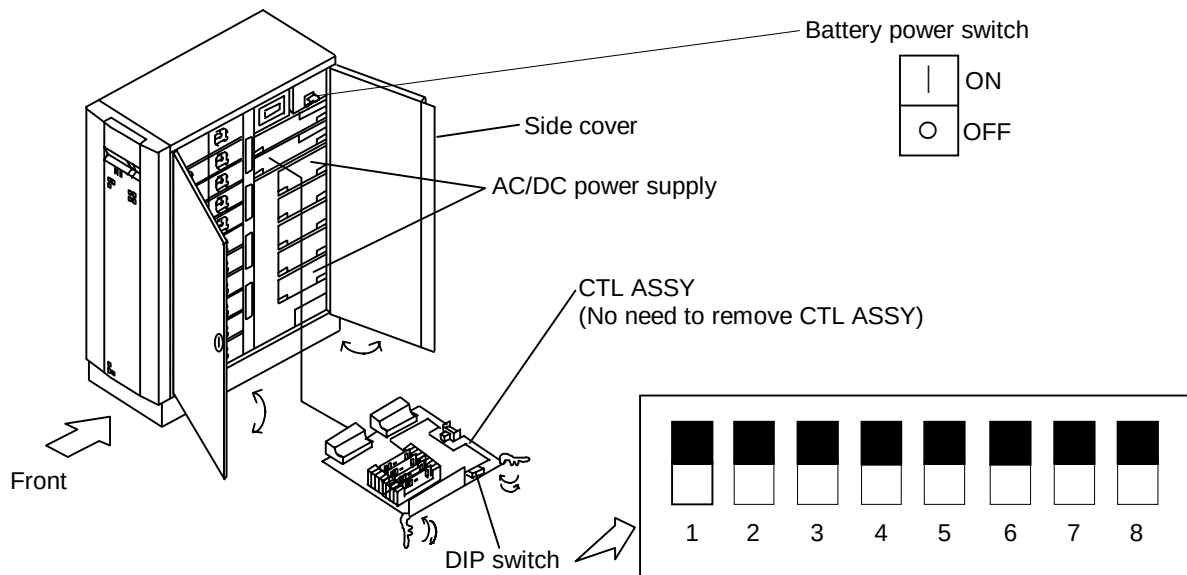


Figure 3.3.2 Inside Construction of the Subsystem

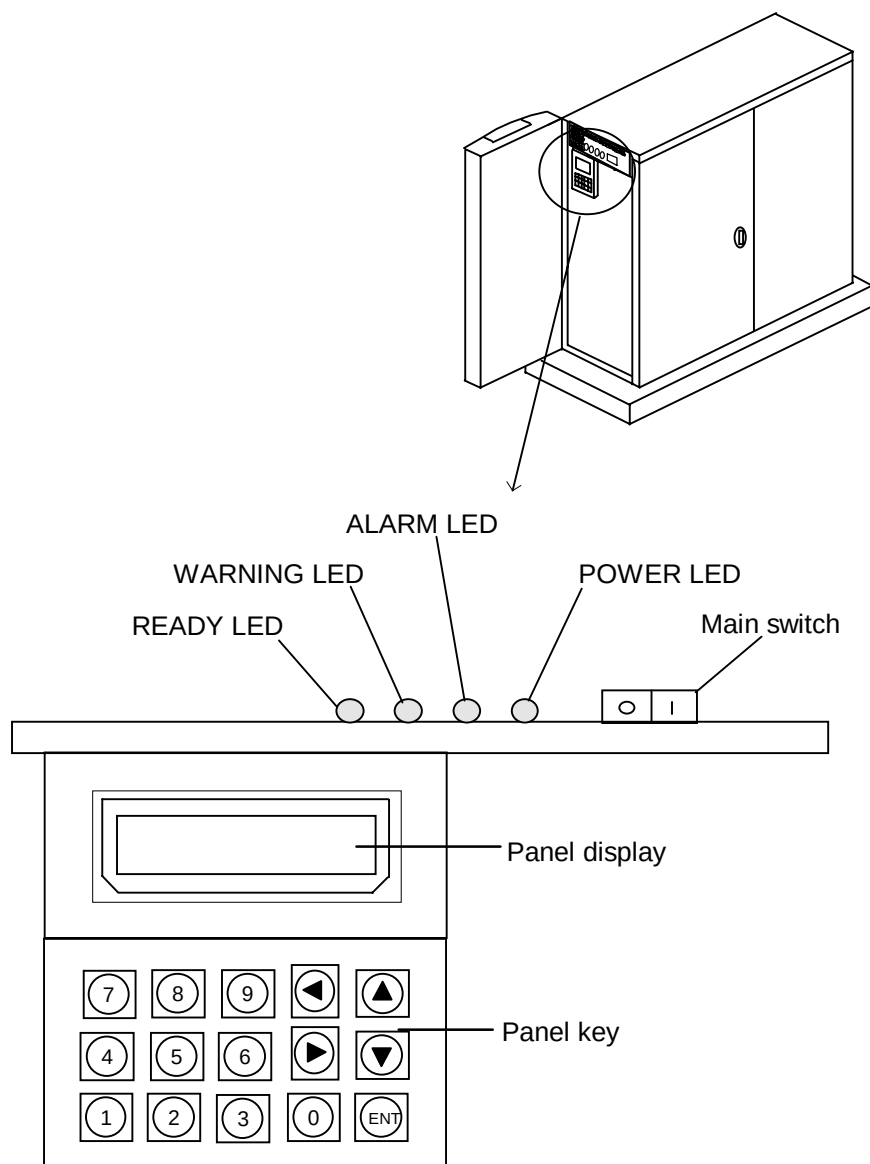


Figure 3.3.3 Panel Configuration

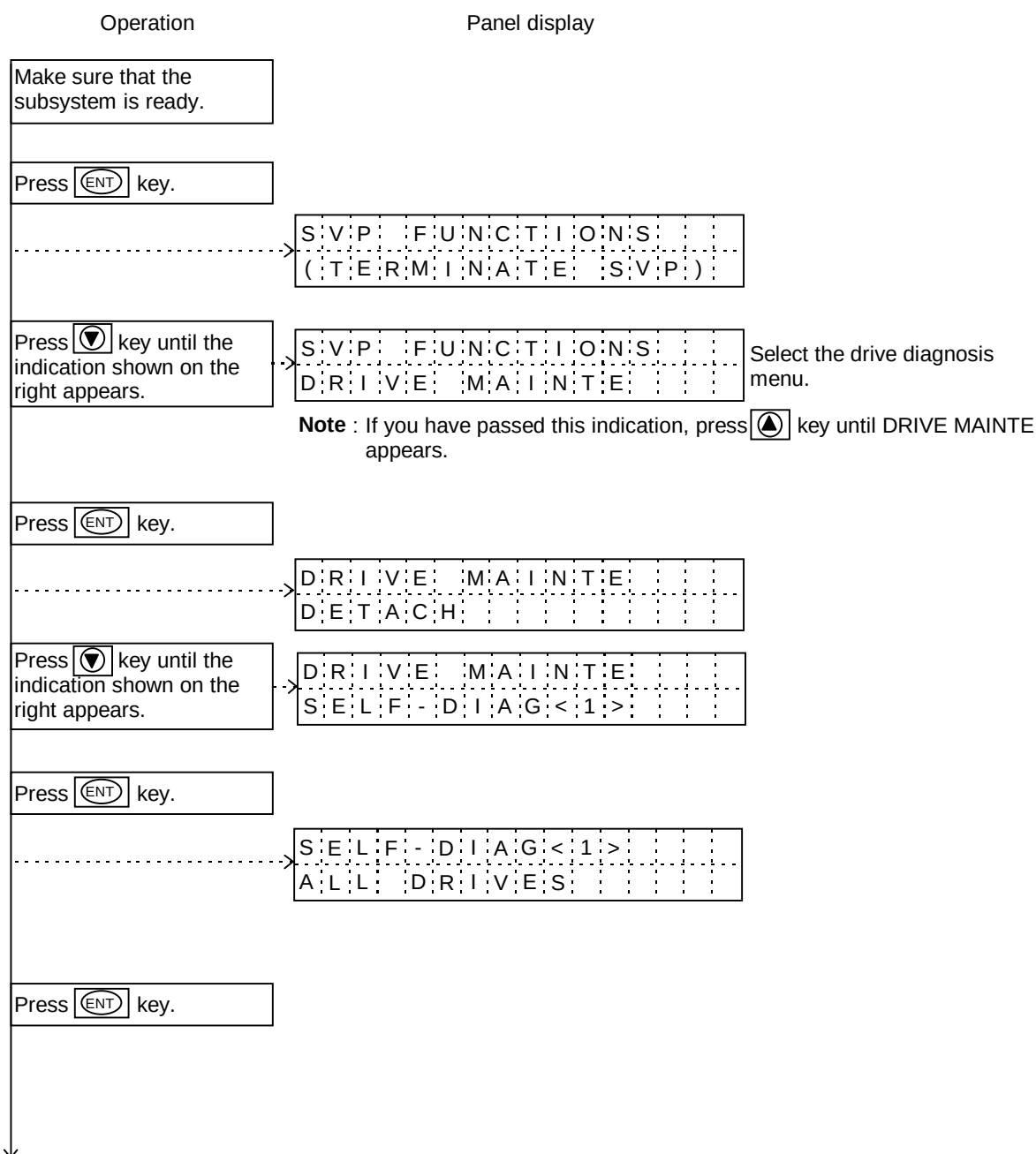
3.4 Setting the Subsystem Parameter

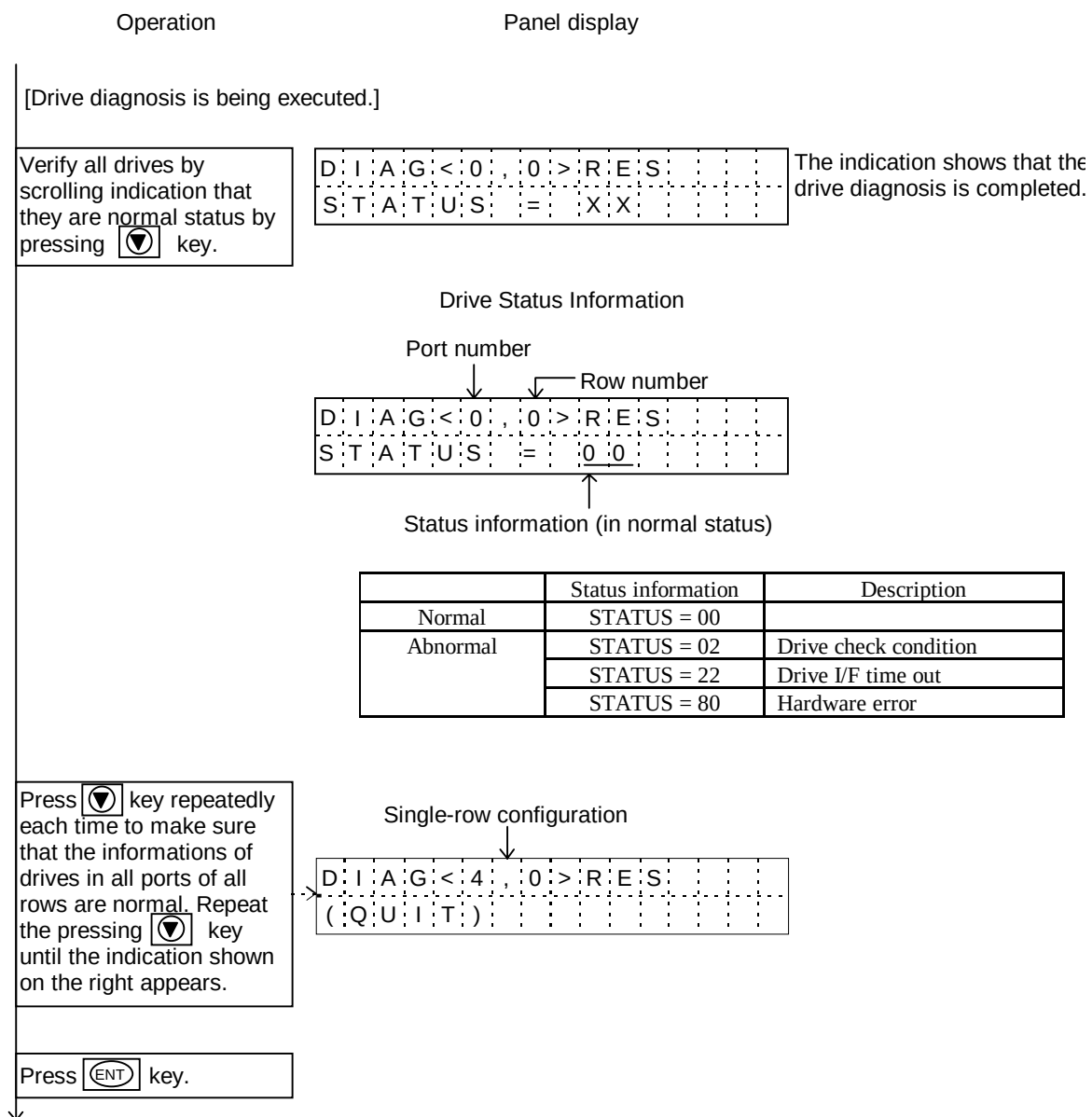
See Chapter “Setting the Subsystem Parameter” in CK-INST0270.

3.5 Checking the Offline Operation

After opening the front cover, execute the drive diagnosis using the Panel display and the ten key as instructed below, and make sure that the diagnosis is completed normally on each of all drives.

① Operate as described below.





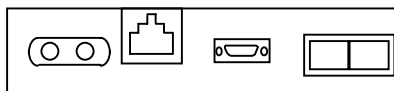
Operation	Panel display
Press  key until the indication shown on the right appears.	→ S E L F - D I A G < 1 > (Q U I T)
Press  key.	
Press  key until the indication shown on the right appears.	→ D R I V E M A I N T E (Q U I T)
Press  key.	
Press  key until the indication shown on the right appears.	→ S V P F U N C T I O N (T E R M I N A T E S V P)
Press  key.	
Turn off the power switch to make sure that power can be turned off normally.	
Offline operation is finished.	

3.6 Connecting the Fibre Channel Cable

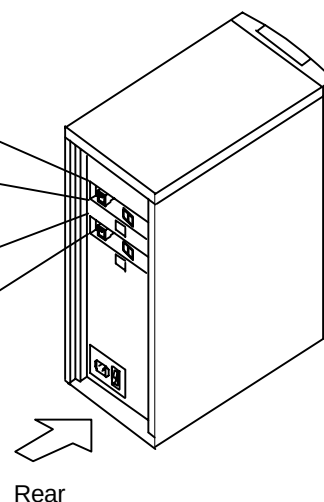
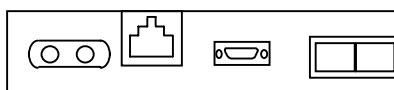
Connect the Fibre cables after confirming the controller number indicated on the label.

Note 1 : When the controller is used in a dual configuration, connect the cables to the connectors corresponding to the host to be connected. (See Figure 3.6.2.)

Controller 01

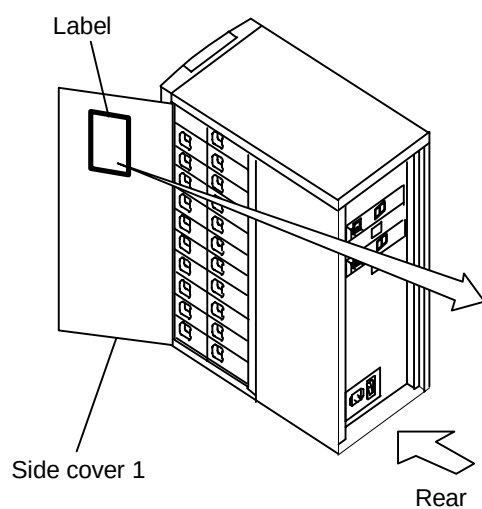


Controller 00



Rear

Figure 3.6.1 Fibre Channel Connector Layout



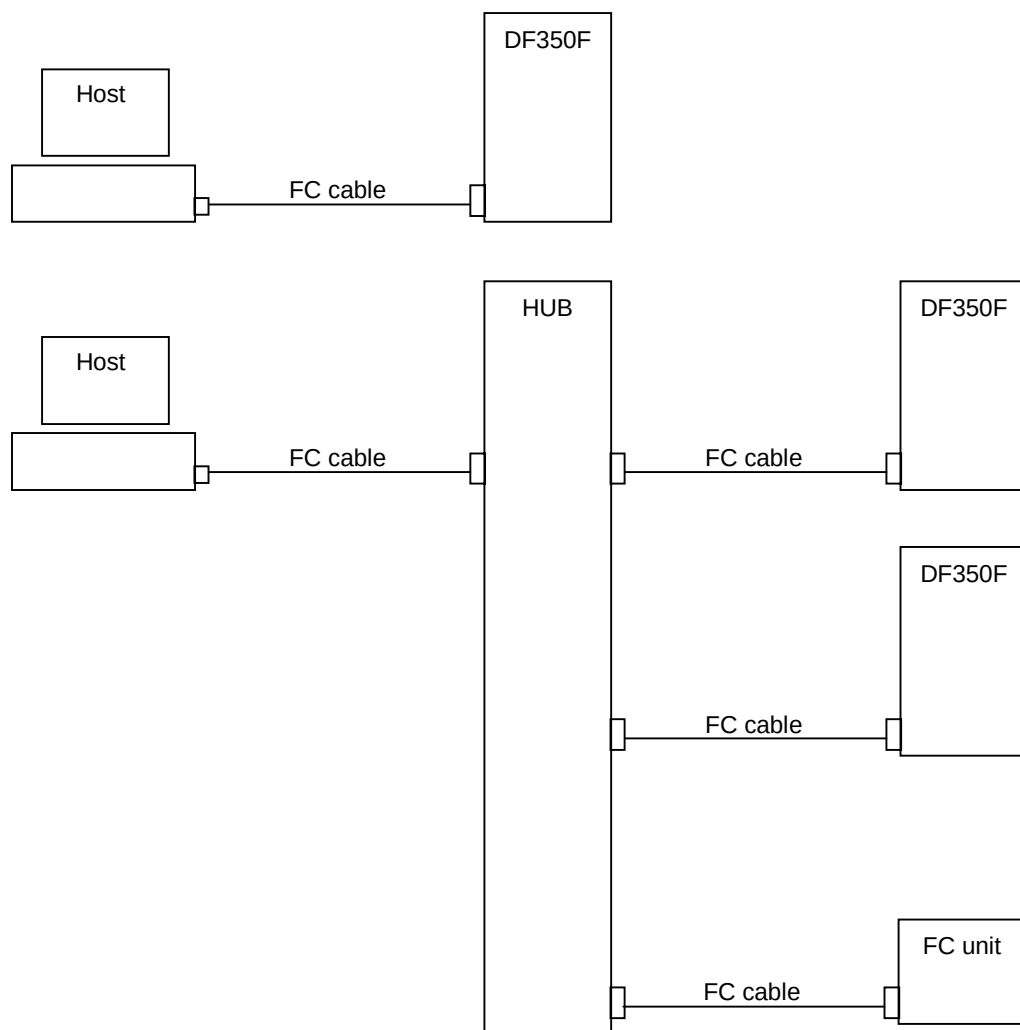
Side cover 1

Rear

Label details

SVP	SPARE DISK		FDD	BAT
DRIVE PORT=4,ROW=2	DRIVE PORT=4,ROW=3		CONTROL-01	I/F-01
DRIVE PORT=4,ROW=0	DRIVE PORT=4,ROW=1	FAN-03	CONTROL-00	I/F-00
DRIVE PORT=3,ROW=2	DRIVE PORT=3,ROW=3		PS-04	
DRIVE PORT=3,ROW=0	DRIVE PORT=3,ROW=1	FAN-02	PS-03	
DRIVE PORT=2,ROW=2	DRIVE PORT=2,ROW=3		PS-02	
DRIVE PORT=2,ROW=0	DRIVE PORT=2,ROW=1	FAN-01	PS-01	
DRIVE PORT=1,ROW=2	DRIVE PORT=1,ROW=3		PS-00	
DRIVE PORT=1,ROW=0	DRIVE PORT=1,ROW=1	FAN-00	INBOX	
DRIVE PORT=0,ROW=2	DRIVE PORT=0,ROW=3			
DRIVE PORT=0,ROW=0	DRIVE PORT=0,ROW=1			

Figure 3.6.2 Label Layout

**Figure 3.6.3 Fibre Channel Connections**

4. Setting the Subsystem Parameter

4.1 Setting the System Parameter

(1) Setting the system parameters and downloading

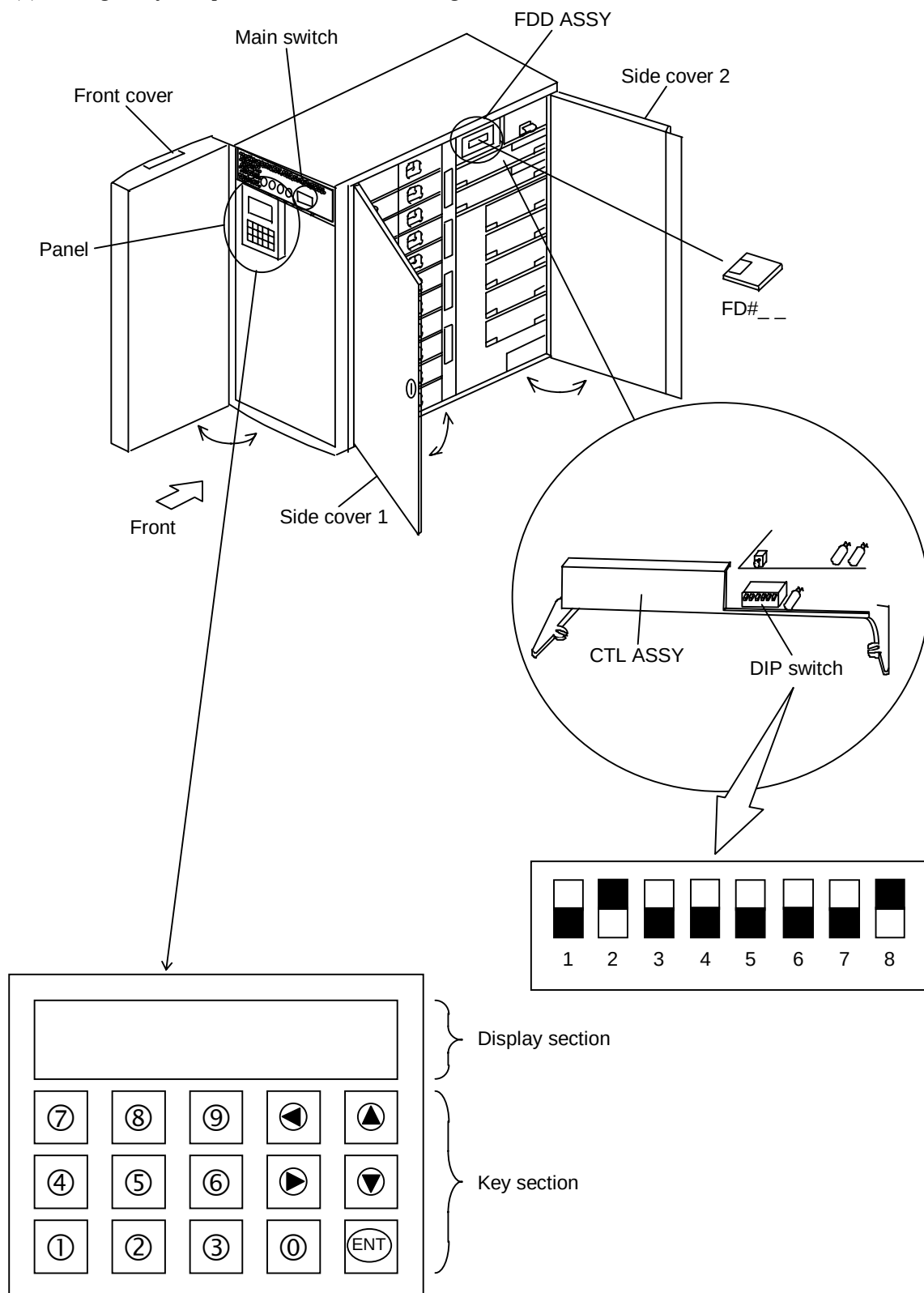
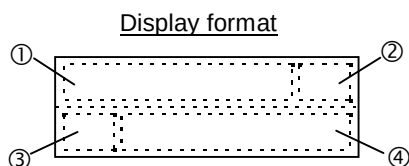


Figure 4.1.1 DIP Switches (System parameter is Set)

(1) Display

While setting up DIPSWITCH or SVP FUNCTION, menu etc. are displayed at panel display in the following display format .



① Menu title

There are two kinds of menu title described below.

DIPSWITCH SET:

For setting the target ID, buzzer, etc.

SVP FUNCTION:

For the operations other than described above.

② Warning

A hatch mark “#” indicates that a message has occurred in the host command processing during panel operation.

③ Current setting

An asterisk “*” indicates the item currently set.

④ Menu item/parameter value

This indicates the menu item or the parameter value entered from the panel.

One display is provided for the two controllers. You can determine which of the two controllers displayed the message as follows.

Message from the controller No. 0: The first (left most) character is in uppercase.

Message from the controller No. 1: The first (left most) character is in lowercase.

Example) Controller No. 0: DIPSWITCH SET

Controller No. 1: dIPSWITCH SET

For the dual controllers, the message with the display format 1 and the menu title with the display format 2 are displayed as indicated above. (For the panel operation messages, the first (left most) character is always in uppercase regardless of the controller No.)

For the single controller, the first (left most) character is always in uppercase.

(2) Keys

Use the - keys for panel operation.



Used for entering the parameter values.



Used for determining the menu or the input parameter.

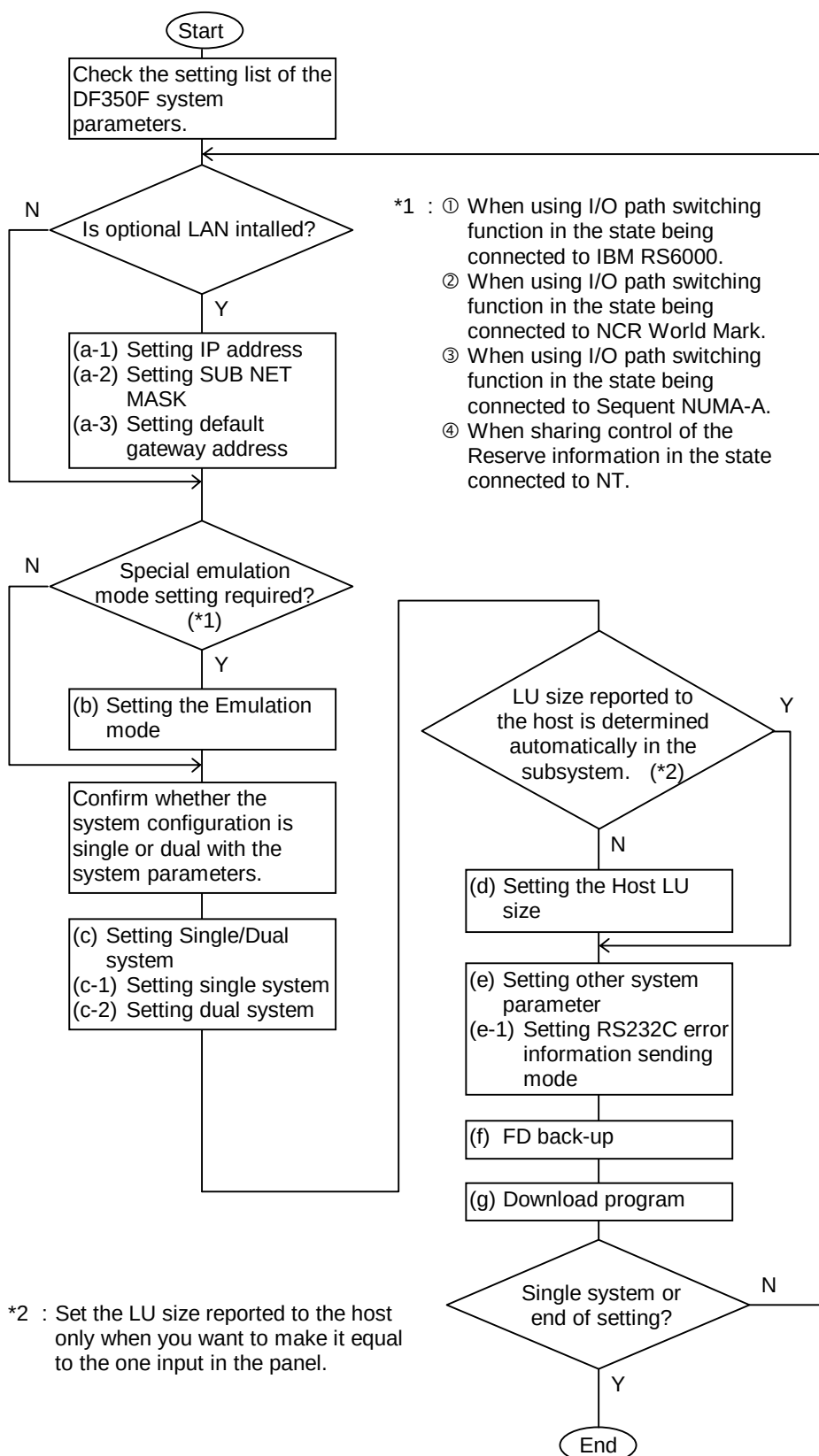


Used for determining the parameter input position.



Used for selecting the menu.

Operate as the flow described below.



Operate as described below.

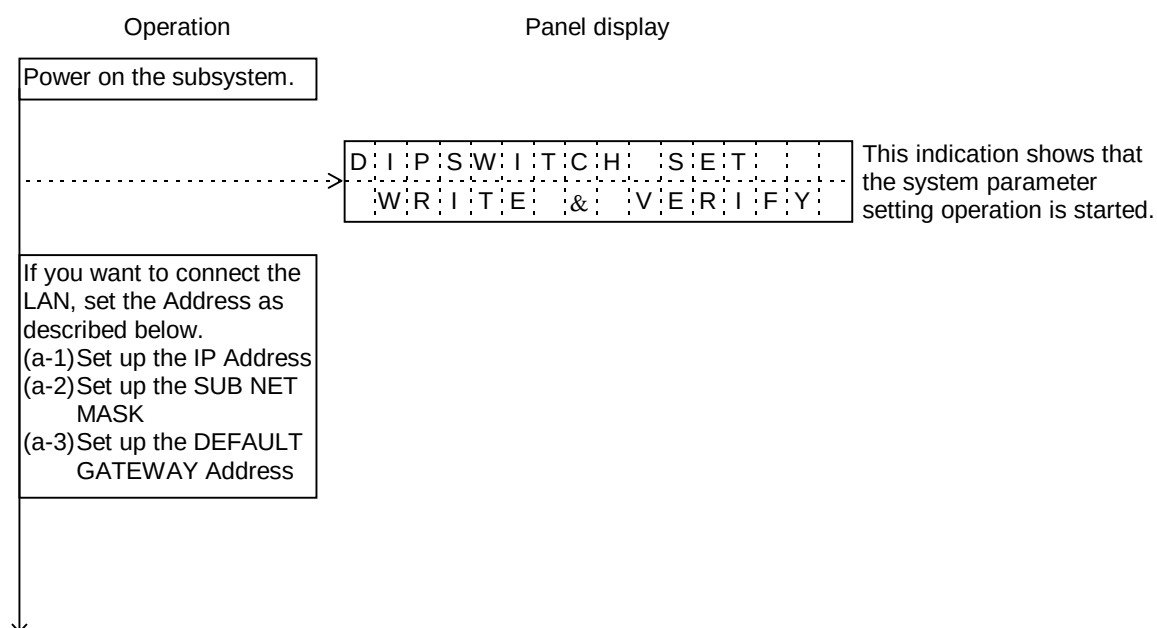
- (1) Before powering on the subsystem, set DIP switches No. 4 and 6 as shown in Figure 4.1.1 .

In case of Dual Controller system (installed DF-F350F-F3MCF) , set DIP switches of both controllers.

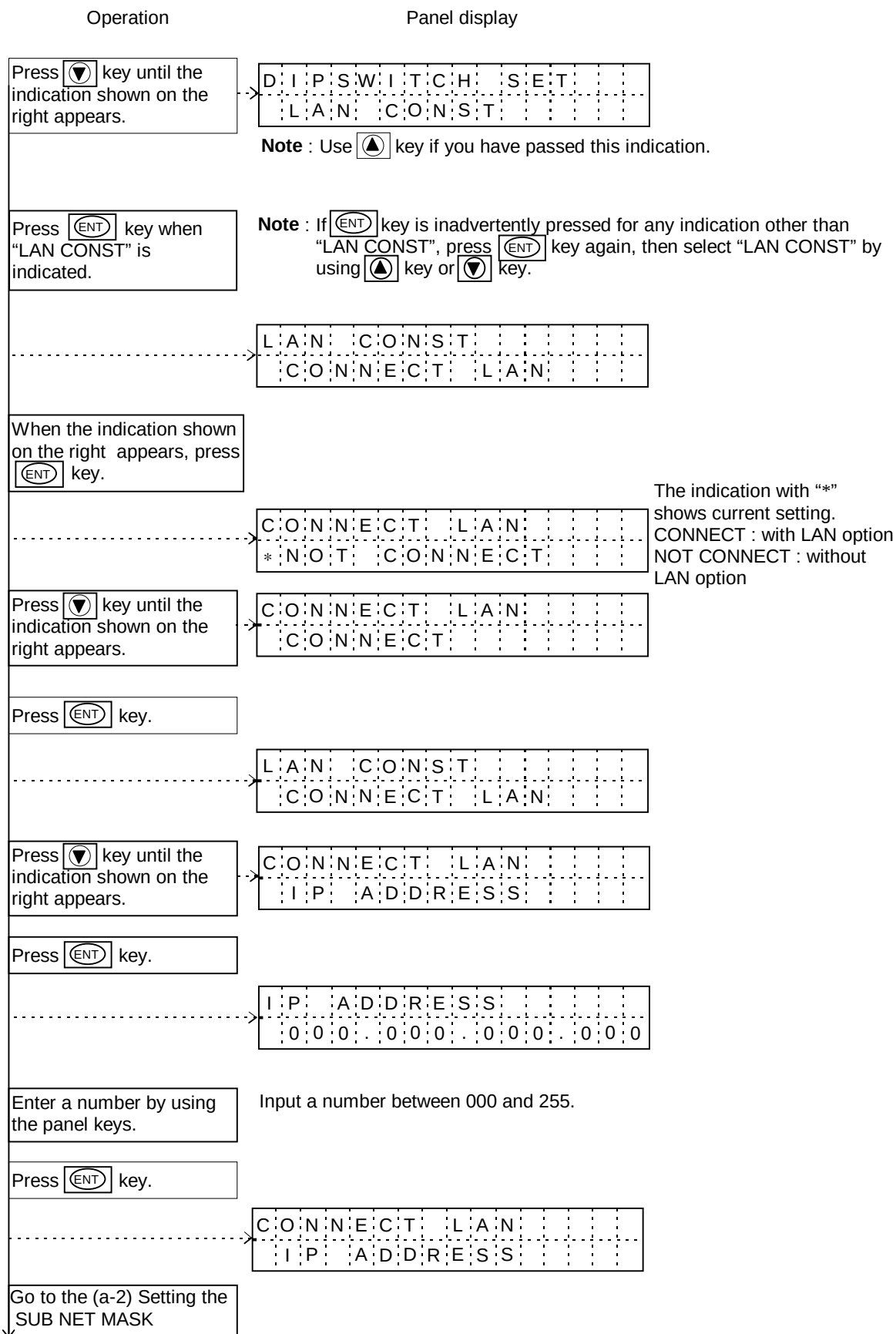


Figure 4.1.1 DIP switches (For setting the system parameter)

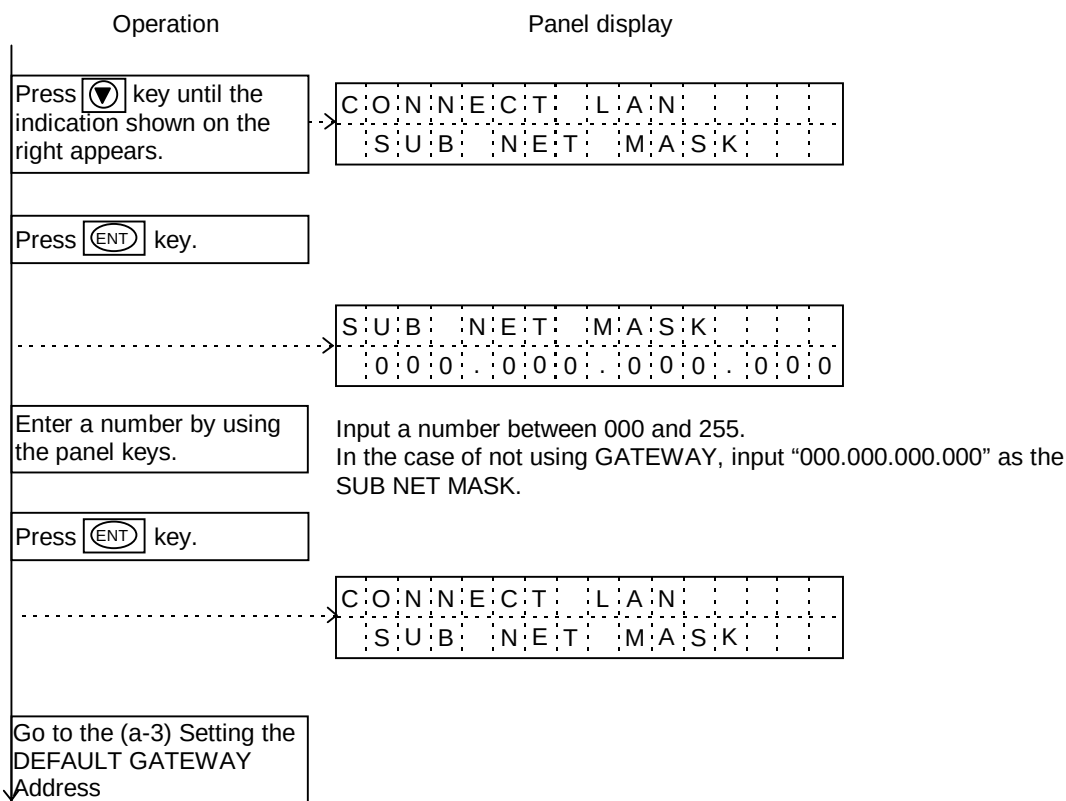
- (2) Operate panel's keys as described below.



(a-1) Setting the IP address.



(a-2) Setting the SUB NET MASK

***Note**

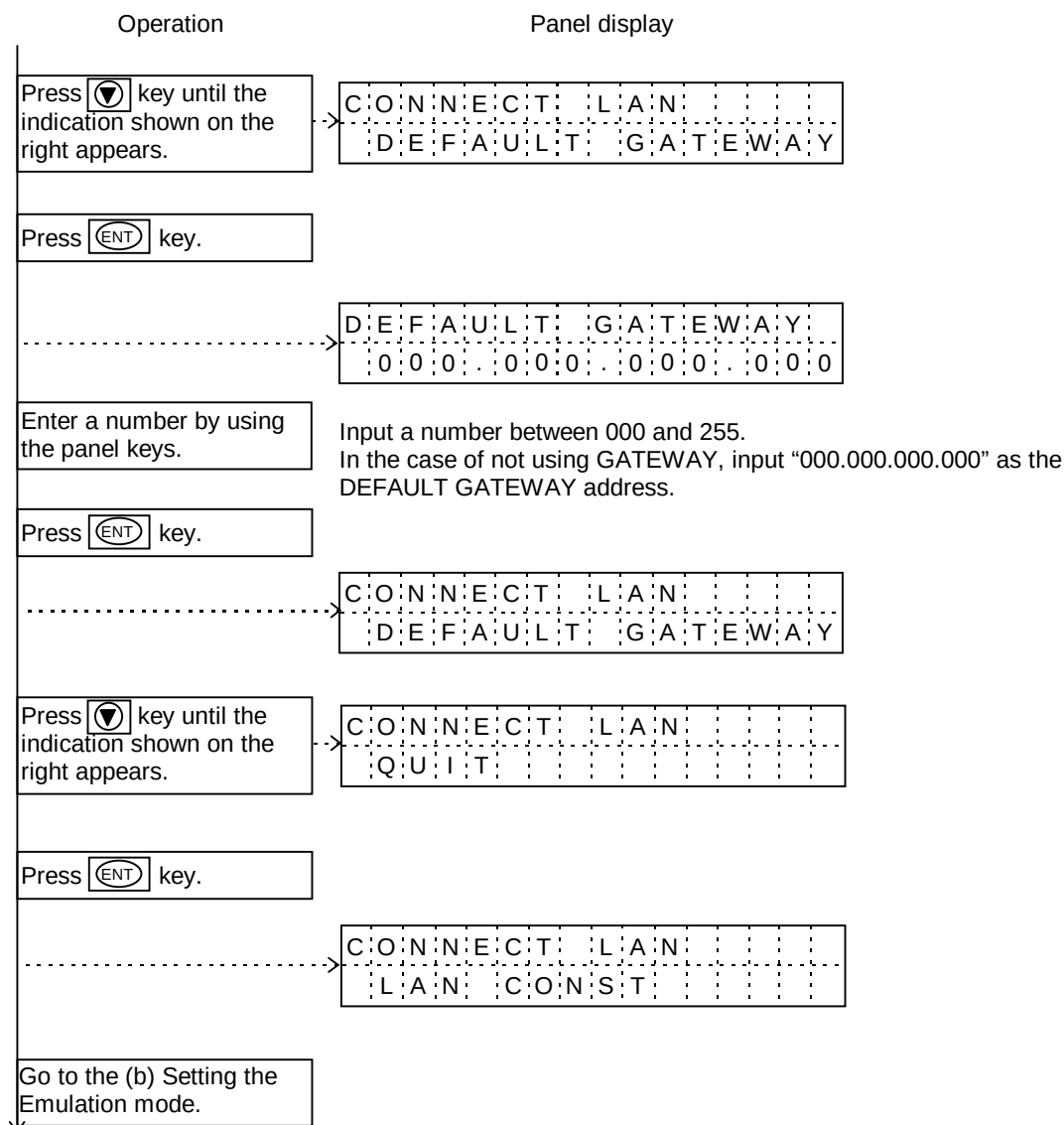
If "000.000.000.000" as the SUB NET MASK is set, this subsystem automatically adopts default SUB NET MASK for each IP address as described in the table 4.1.1.

Table 4.1.1 Default SUB NET MASK related with IP address

No.	IP Address of the subsystem	DEFAULT SUB NET MASK
1	from 000.000.000.000 to 127.255.255.255	255.000.000.000
2	from 128.000.000.000 to 191.255.255.255	255.255.000.000
3	others	255.255.255.000

If a smaller SUB NET MASK than default number is entered, this subsystem adopts default number.

(a-3) Setting the DEFAULT GATEWAY address

***Note**

If an invalid GATEWAY address is set (the IP address of the device is different from network address.), either of warning messages as shown below is displayed until the READY LED of the subsystem lights on.

Power off the subsystem and set IP address and default GATEWAY address correctly.

W	0	1	7	0	0	G	A	D	E	R	R		

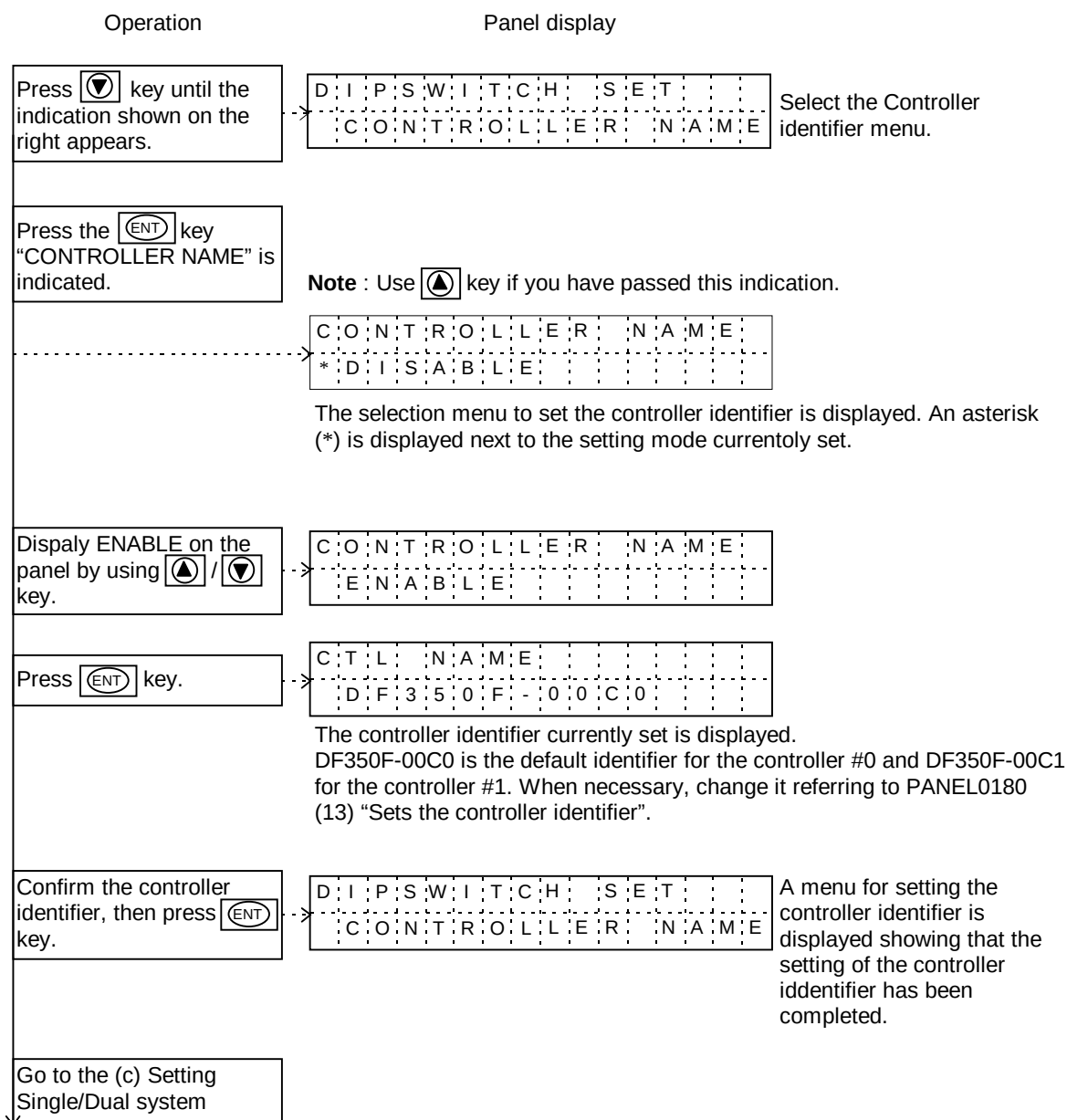
W	0	1	7	0	0	G	A	D	E	R	R	-	X

X : controllers No.

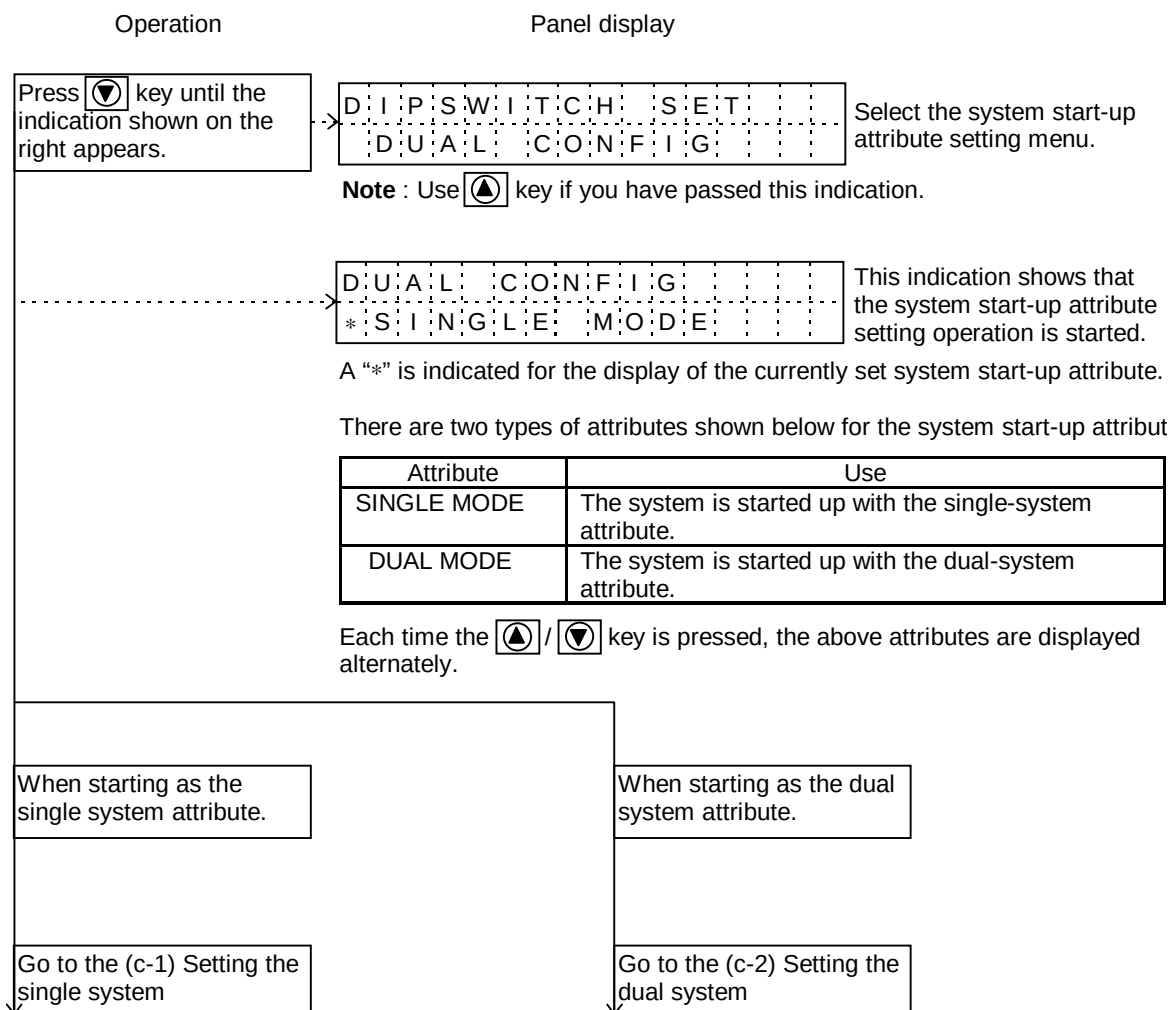
(b) Setting the Emulation mode

Operation	Panel display						
Press  key until the indication shown on the right appears.	D I P S W I T C H S E T S P E C I A L C O N N E C T Select the Emulation mode menu. Note : Use  key if you have passed this indication.						
Press the  key "SPECIAL CONNECT" is indicated.	S P E C I A L C O N N E C T * O P E N S Y S T E M An asterisk (*) is displayed next to the system start-up attribute currently set. There are five types of system start-up attributes available as shown below. <table> <tr> <th>Attribute</th><th>Use</th></tr> <tr> <td>OPEN SYSTEM</td><td>Used in open system emulation.</td></tr> <tr> <td>ALTERNATE PATH3</td><td>Used in the TRESPASS mode.</td></tr> </table> The attributes above are displayed alternately in order when  key or  key is pressed.	Attribute	Use	OPEN SYSTEM	Used in open system emulation.	ALTERNATE PATH3	Used in the TRESPASS mode.
Attribute	Use						
OPEN SYSTEM	Used in open system emulation.						
ALTERNATE PATH3	Used in the TRESPASS mode.						
Display the mode you want to set on the panel by using  /  key.	S P E C I A L C O N N E C T A L T E R N A T E P A T H 3 The indication on the left shows an example when the alternate path3 (TRESPASS mode) is selected.						
Press  key.	D I P S W I T C H S E T S P E C I A L C O N N E C T Alternate path3 has been set.						
Go to the (c) Setting Single/Dual system							

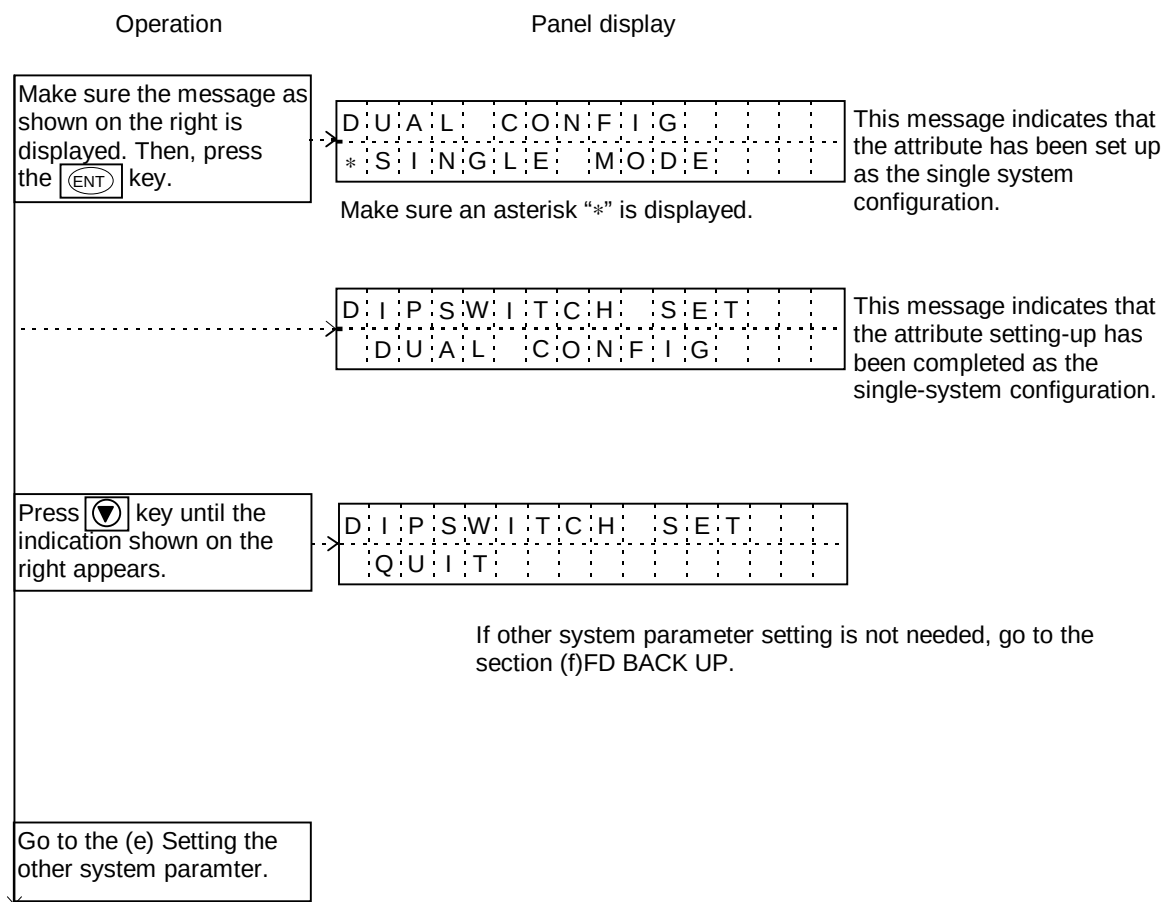
When the alternate path3 is selected, go to the single/dual system setting.



(c) Setting Single/Dual system



(c-1) Setting the single system



(c-2)Setting the dual system

There are five operating modes available as shown in Table 4.1.2.

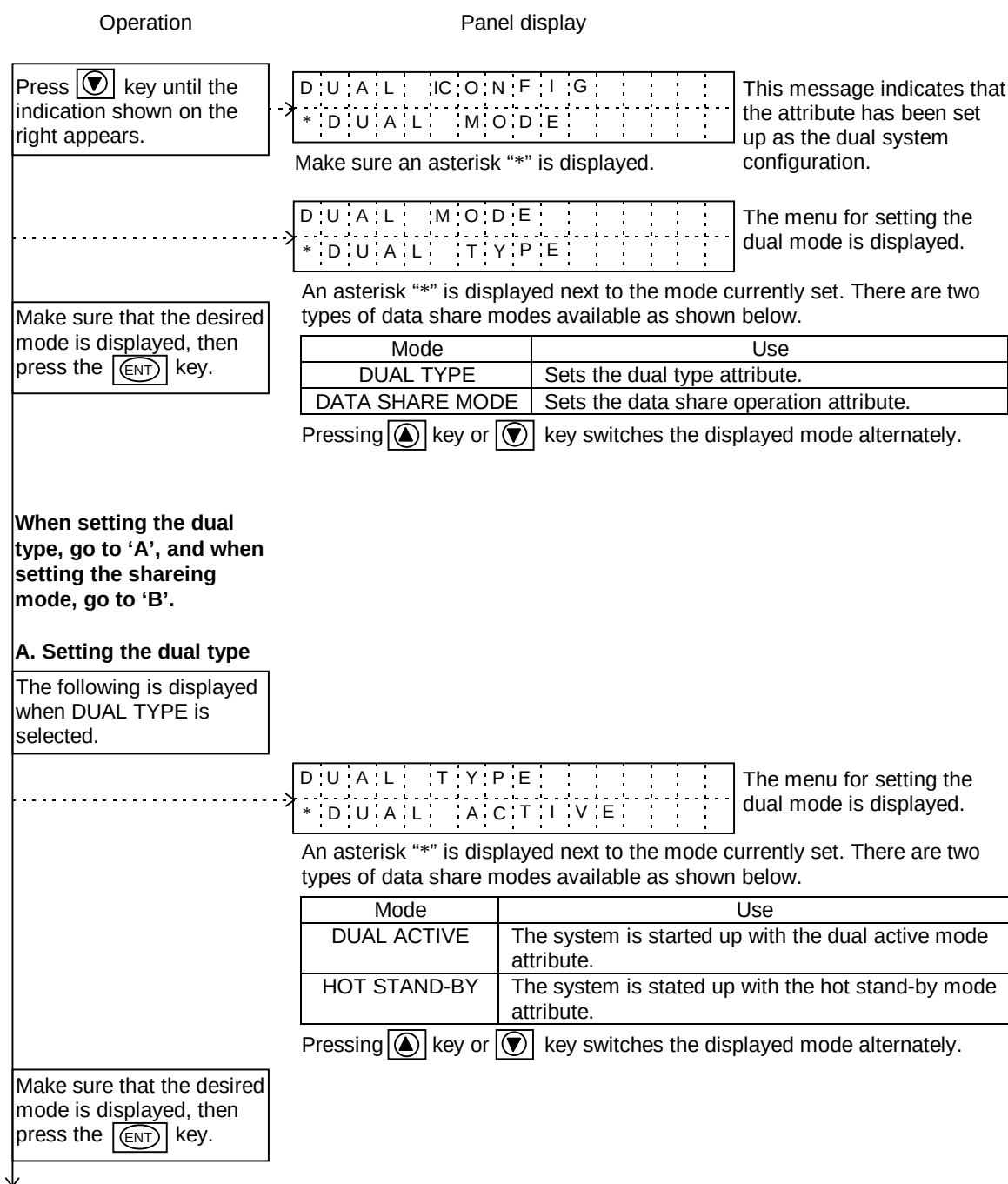
To validate each mode, panel setting shown in the Table 4.1.2 is required.

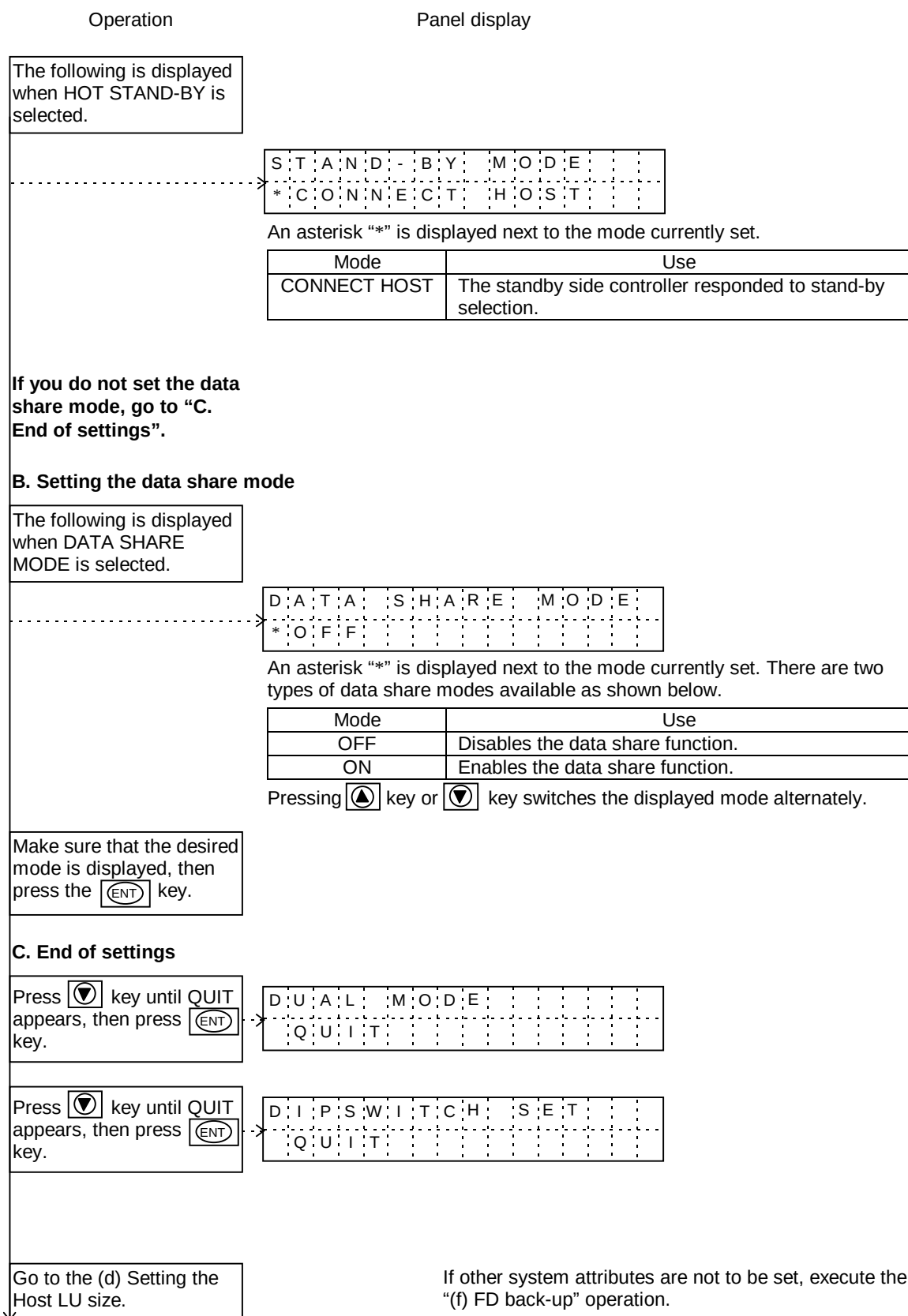
Perform the operations instructed in item (d) and succeeding items referring to the Table 4.1.2.

Table 4.1.2 Active mode and panel setting (Dual system configuration)

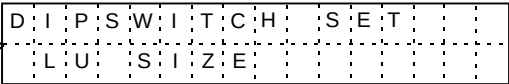
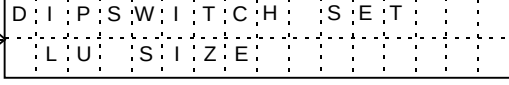
Active mode		Panel set		
		DUAL TYPE	STAND-BY MODE	DATA SHARE MODE
HOT STAND-BY	Normal	HOT STAND-BY	CONNECT HOST	OFF
	Data share (*1)			ON
DUAL ACTIVE	Normal	DUAL ACTIVE	Invalid	OFF
	Data share (*1)			ON

*1 : This function can be used in Micro_disk_Ver.354 or later.





(d) Setting the LU size reported to the host

Operation	Panel display							
Press  key until the indication shown on the right appears.		Selects the menu for the setting of the LU size reported to the host.						
Press the  key "LU SIZE" is indicated.	Note : Use  key if you have passed this indication.  An asterisk (*) is displayed next to the system start-up attribute currently set. There are two system start-up attributes available as shown below. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Attribute</th> <th style="text-align: center;">Use</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">AUTO ADJUST</td> <td>The subsystem automatically determines the LU size reported to the host.</td> </tr> <tr> <td style="text-align: center;">NON ADJUST</td> <td>Make the LU size reported to the host be the same value as that input to the panel.</td> </tr> </tbody> </table> Pressing  /  key switches the displayed mode alternately.	Attribute	Use	AUTO ADJUST	The subsystem automatically determines the LU size reported to the host.	NON ADJUST	Make the LU size reported to the host be the same value as that input to the panel.	
Attribute	Use							
AUTO ADJUST	The subsystem automatically determines the LU size reported to the host.							
NON ADJUST	Make the LU size reported to the host be the same value as that input to the panel.							
Display the mode you want to set on the panel by using  /  key.		The example on the left shows a case in which NON ADJUST is selected.						
Press  key.		The setting of the NON ADJUST has been completed.						
Go to the (e) Other system parameter setting		If other system attributes are not to be set, execute the "(f) FD back-up" operation.						

(e) Other System Parameter Setting

Besides (a) Setting the IP address and (c) Setting SINGLE/DUAL system, there are several setting functions as below. The setting at the factory shipment is shown on the table in the addendum to the device.

To change the setting, see "PANEL0080".

The menu items and their usage are as follows.

(The item Nos. 1, 3, 5, 9, 16 and 17 in the following table must be set for each controller.)

No.	Menu item	Usage	Contents		Factory setting
			Parameter	How to set	
1	WRITE & VERIFY	Specifies the write and verify execution mode.	ON : Does not inhibit the write and verify execution mode. OFF : Inhibits the write and verify execution mode.	Select	ON
2	STRIPE SIZE	Specifies the data striping size.	16KB : Stripes the data in 16kbytes. 32KB : Stripes the data in 32kbytes. 64KB : Stripes the data in 64kbytes.	Select	64KB
3	LAN CONST	Specifies the LAN configuration information. ① CONNECT LAN Specifies whether or not the LAN board is mounted.	CONNECT : LAN board is mounted. NOT CONNECT : LAN board is not mounted.	Select	Depending on the configuration from the factory
		② IP ADDRESS Sets the IP address.	Enters the numerical value using the panel keypad.	Enter	000.000.000.000
		③ SUB NET MASK	Enters the numerical value using the panel keypad.	Enter	000.000.000.000
		④ DEFAULT GATEWAY	Enters the numerical value using the panel keypad.	Enter	000.000.000.000
		⑤ ETHER ADDRESS (*1)	Enters the numerical value using the panel keypad.	Only for reference	???????????
4	CONNECT VMS	Specifies whether or not the VMS is connected.	CONNECT : Connects the VMS. NOT CONNECT : Does not connect the VMS.	Select	NOT CONNECT
5	SPECIAL CONNECT (*2)	Specifies the emulation mode.	OPEN SYSTEM : Open system emulation mode ALTERNATE PATH3 : TRESPASS mode	Select	OPEN SYSTEM

*1 Changing the ETHER ADDRESS with this menu is impossible after shipment.

*2 This menu can be used in the Flash Program Ver.PE24 and later.

No.	Menu item	Usage	Contents		Factory setting
			Parameter	How to set	
6	HOST BLK SIZE	Specifies the drive format size.	512B : The drive format size is 512bytes per block.	Fixed	512B
7	ERROR INF	Specifies the error information send mode for the RS232C.	OFF : Inhibit outflow of information. ON (NORMAL) : Does not inhibit outflow of information. ON (HITRACK) : Does not inhibit outflow of information for the HITRACK.	Select	Depending on the unit's factory setting (OFF for Japan)
8	CONTROLLER	Specifies the controller type.	MINI TOWER : Mini tower (MK) HIGH RACK MOUNT : Rackmount (RKH) CABINET, WRACK : Cabinet type (CK), Rackmount (RKWH)	Select	Depending on the configuration from the factory
9	SPARE DISK	Specifies whether or not the spare disk is mounted.	EXISTENCE : Spare disk mounted NOTHING : Spare disk not mounted	Select	Depending on the configuration from the factory
10	SERIAL NO	Specifies the serial No. of the controller.	Enters the numerical value using the panel keypad.	Enter	
11	ROM V/R	Specifies the ROM microprogram revision.	Enters the numerical value using the panel keypad.	Enter	Revision from the factory
12	RAM V/R	Specifies the RAM microprogram revision.	Enters the numerical value using the panel keypad.	Enter	Revision from the factory
13	CONTROLLER NAME	Sets the controller identifier.	DISABLE : Setting of the controller identifier is invalid. ENABLE : Setting of the controller identifier is valid. CTL NAME : Controller identifier.	Select	DISABLE
14	ROW LAST LBA (*3)	Specifies the capacity that a single drive uses (for each ROW).	Enters the numerical value using the panel keypad.	Enter	Depending on the configuration from the factory
15	BUZZER	Specifies whether or not the buzzer sounds when displaying the warning or fault message.	ENABLE : Buzzer sounds. DISABLE : Buzzer does not sound.	Select	ENABLE
16	SYSTEM ERROR	Specifies the operation if the processor failure occurs.	AUTO RESET : Resets a fault. SYSTEM DOWN : Shutdown the system.	Select	AUTO RESET

*3 The ROW LAST LBA is displayed for setting the capacity that a single drive uses. Sets the capacity according to the menu displayed.

No.	Menu item	Usage	Contents		Factory setting
			Parameter	How to set	
17	INQUIRY INF	Specifies the vendor name, model name, and command queuing.	VENDOR TYPE : Vendor name PRODUCT TYPE : Model name COMMAND QUEUING : Command queuing ON : Executes the command queuing. OFF : Inhibits the command queuing.	Enter Enter Select	VENDOR TYPE = HITACHI PRODUCT TYPE = DF350F COMMAND QUEUING = ON
18	DUAL CONFIG	Specifies the system startup attribute.	SINGLE MODE : Single system attribute DUAL MODE : Dual system attribute DUAL ACTIVE : Dual stand-by configuration setting HOT STAND-BY : Hot stand-by configuration setting DATA SHARE MODE : Data share mode attribute (*5) OFF : Not used in the Data share mode ON : Used in the Data share mode	Select	Depending on the configuration from the factory
19	SYS REV	Limit the revision Nos. of installing system.	Displays the startup program revision.	—	“0354”
20	OPTION	Specifies the optional function when using it.	Enters the option code using the panel keypad.	Enter	“0000”
21	BOOT PROG V/R	Displays the startup program revision.	Displays the startup program revision.	—	
22	RTC SET	Sets the internal clock.	Enters the time using the panel keypad.	Enter	Year, month, day, day of the week, hour, minute, second
23	QUIT	Terminates the parameter input.	Enters using the panel keypad.	Enter	

*4 This menu can be used in the Flash Program Ver.PE24 or later.

*5 This function can be used in Micro_Disk_Ver.0354 or later.

(e-1) Setting RS232C error information sending mode

In order to use the failure notification program, the setting for the “ERROR INF” of the system parameter must be changed to “ON (NORMAL)”.

Operation	Panel display
	D I P S W I T C H S E T W R I T E & V E R I F Y
Press  key until the indication shown on the right appears. Press  key.	D I P S W I T C H S E T E R R O R I N F
	Note : Use  key if you have passed this indication.
Confirm that the indication is changed as shown on the right, which shows that the ERROR INF setting operation is started.	E R R O R I N F * O F F
Press  or  key until the indication shown on the right appears. Press  key.	E R R O R I N F O N (N O R M A L)
Make sure that the message as shown on the right is displayed.	D I P S W I T C H S E T E R R O R I N F
Press  or  key until the indication shown on the right appears. Press  key.	D I P S W I T C H S E T Q U I T
For the dual system, an indication shown on the right appears. Make the setting in the same way as the above.	D I P S W I T C H S E T ■ W R I T E & V E R I F Y

(f) FD back-up.

There are cases where System Parameters (Buzzer setting, drive recovery mode, etc.) needs to be backed up to FD or restored from FD when installing optional parts or replacing parts. This case, perform back-up to FD or restore from FD according to “2.3.1 Back-up procedure to FD (CK-OPTION0050.)” or “2.3.2 Restoring procedures to FD (CK-OPTION0080.)”.

(Raid configuration setting, LU configuration setting, etc are not contained in system parameter.)

Back-up procedure to FD

- (1) Turn the power off according to CK-OPTION0120.

Notice: In case the power is not normally turned off, the user's data might be lost.

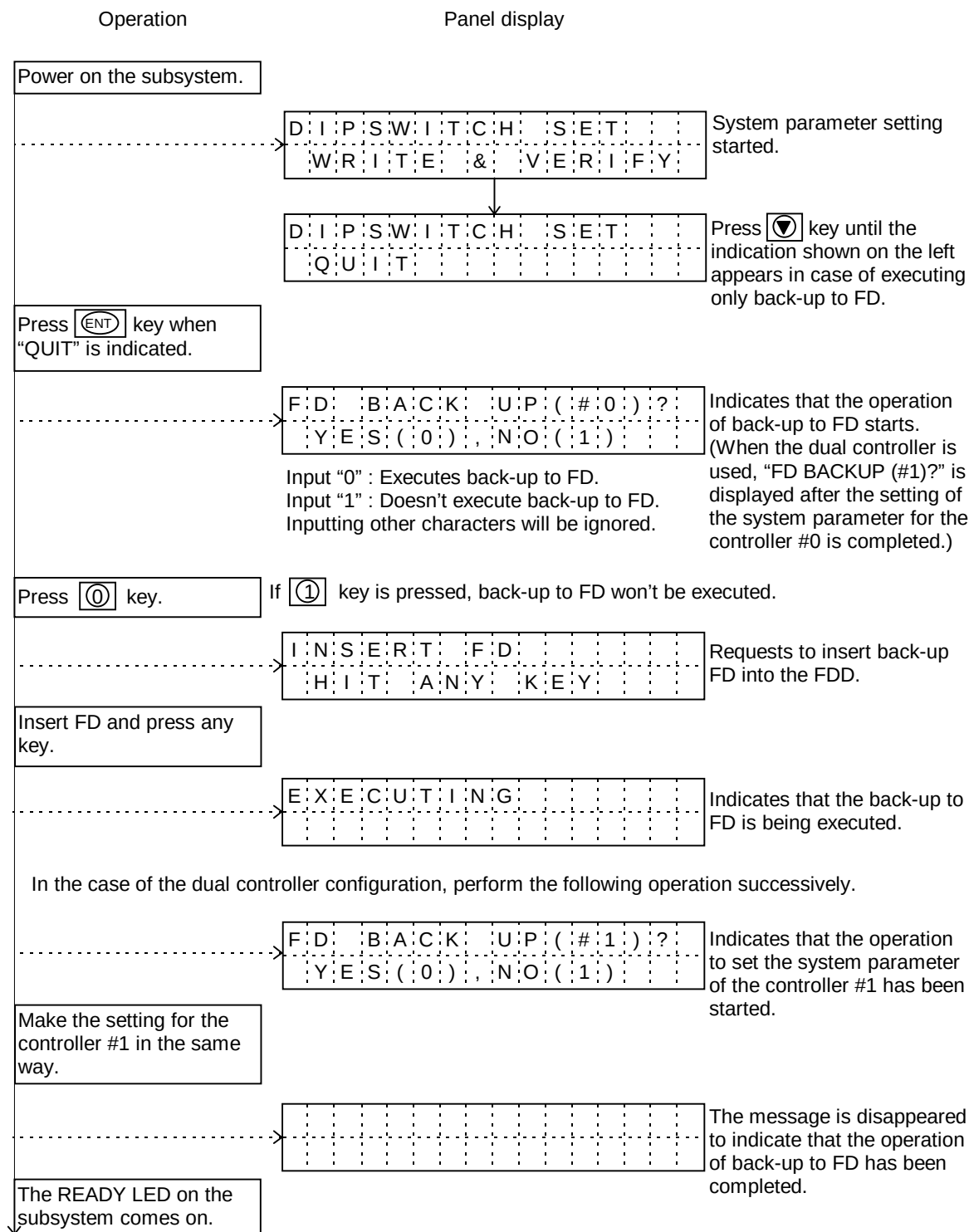
- (2) Before power on the subsystem, set DIP switch No.4 on CTL ASSY as shown in Figure 4.1.2.

Note : Be sure to set the same data for both controllers if the dual controller option (-F3MCF) has been installed.



Figure 4.1.2 DIP Switches

(3) Operate panel's keys as described below.



(4) Set DIP switch No.4 as shown in Figure 4.1.3.

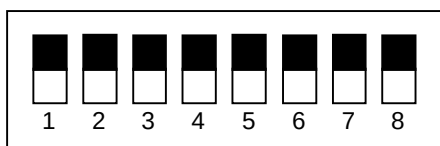
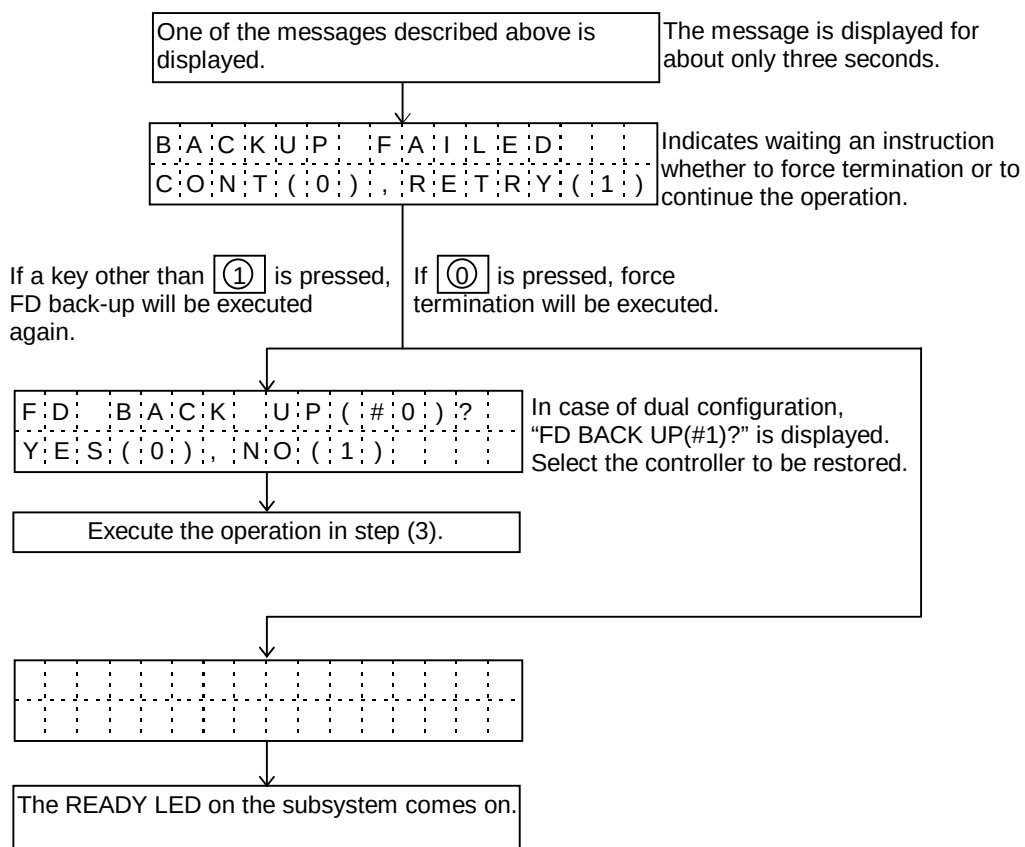


Figure 4.1.3 DIP Switches

Note 1 : While the back-up to FD is being executed, the following messages may be displayed.

- **FD NOT INSERTED**
FD isn't inserted. Insert FD into the FDD.
- **FD MOTOR NOT STARTED**
Starting failure of the FD drive motor occurred. Try again.
- **FILE WRITE ERROR**
FD which was inserted is not formatted, or is the condition of write-protected. Format or release write-protection.
Write error occurred in FD which was inserted. Insert another FD.

If these messages are displayed, back-up to FD hasn't been executed. So try again following the operation described below.



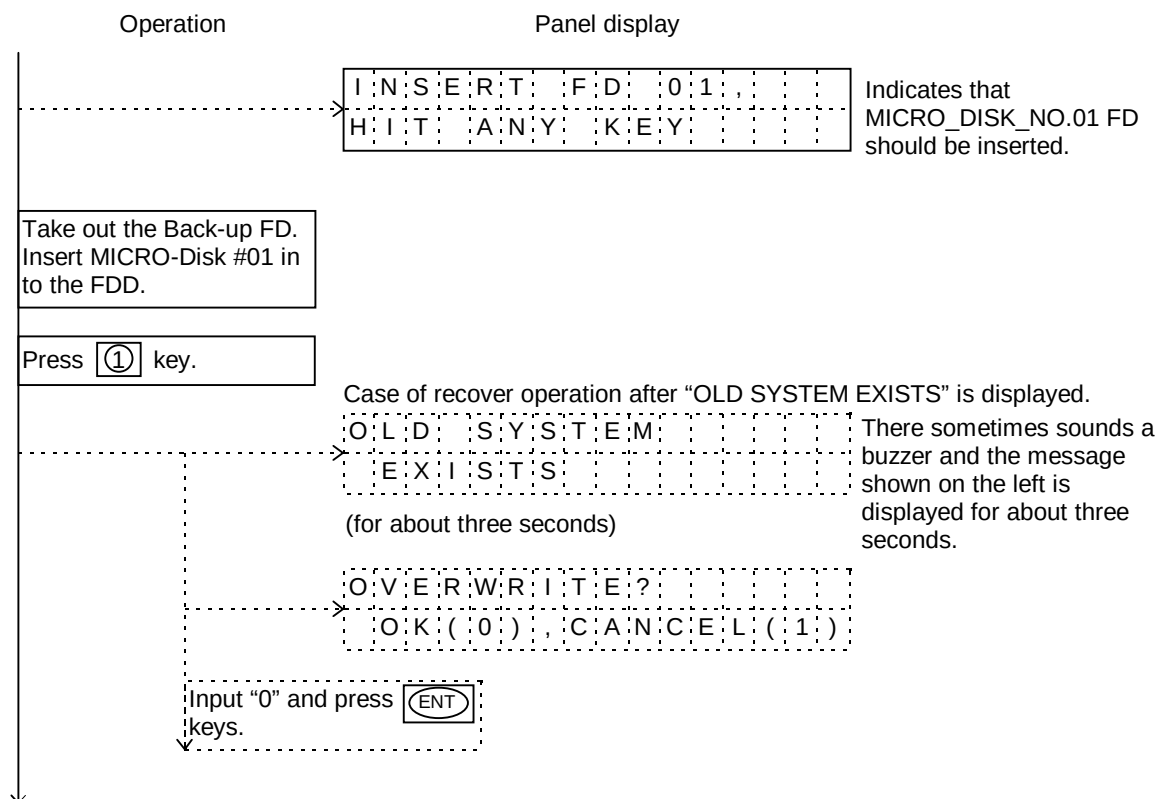
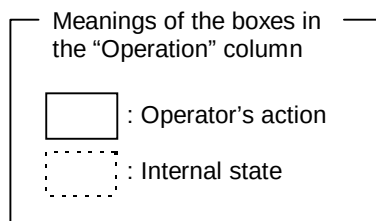
Note 2 : Use 3.5" FD (1.44MB) formatted by MS-DOS for back-up FD. Note that the FD will be overwritten in back-up.

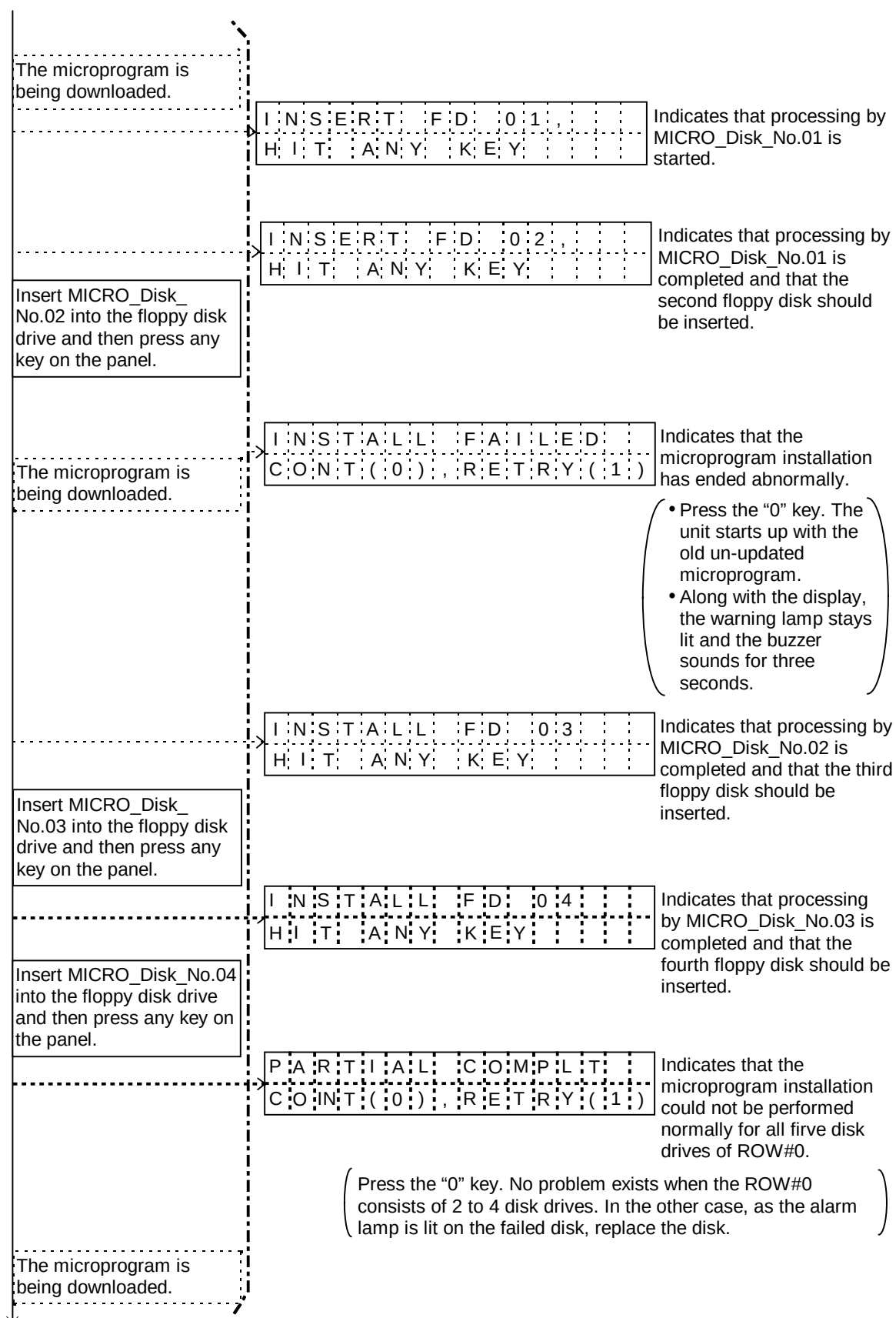
Note 3 : Even if back-up FD is left at FDD after back-up operation, no error will occur on the subsystem.

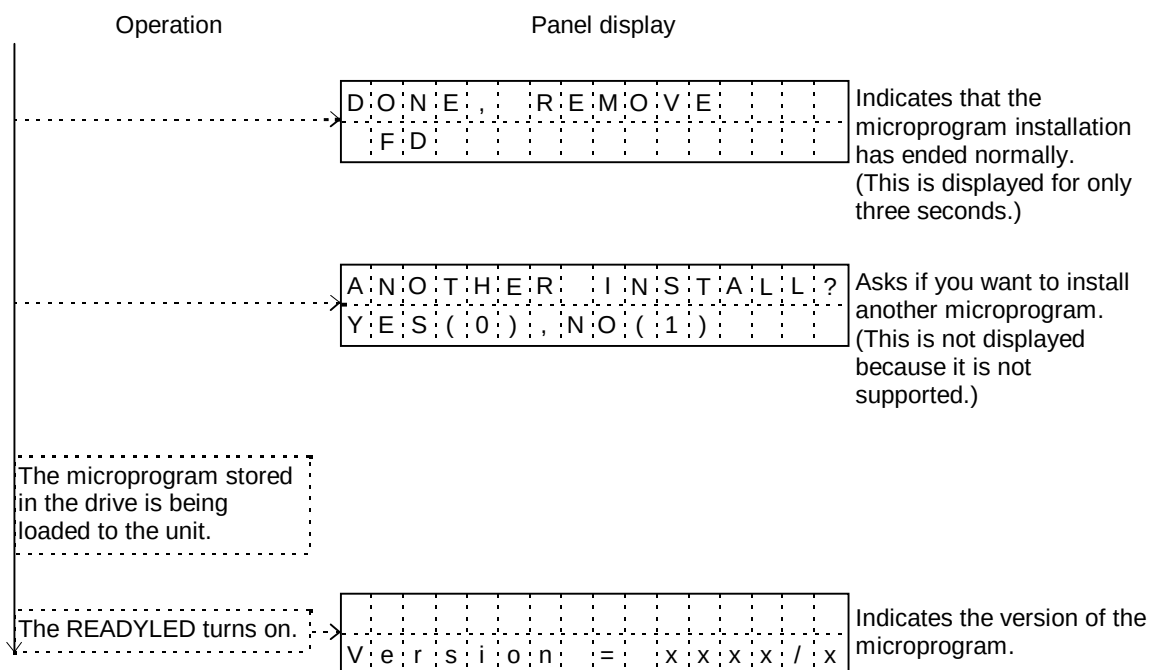
(g) Download Program

Download program is used to update the microprogram stored in the drive. Three floppy disks are used for downloading.

Note : Be sure that no drive failure is present before updating the microprogram.







(1) Set DIP switch No.1 as shown in Figure 4.1.4.

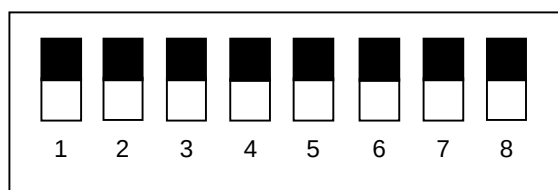


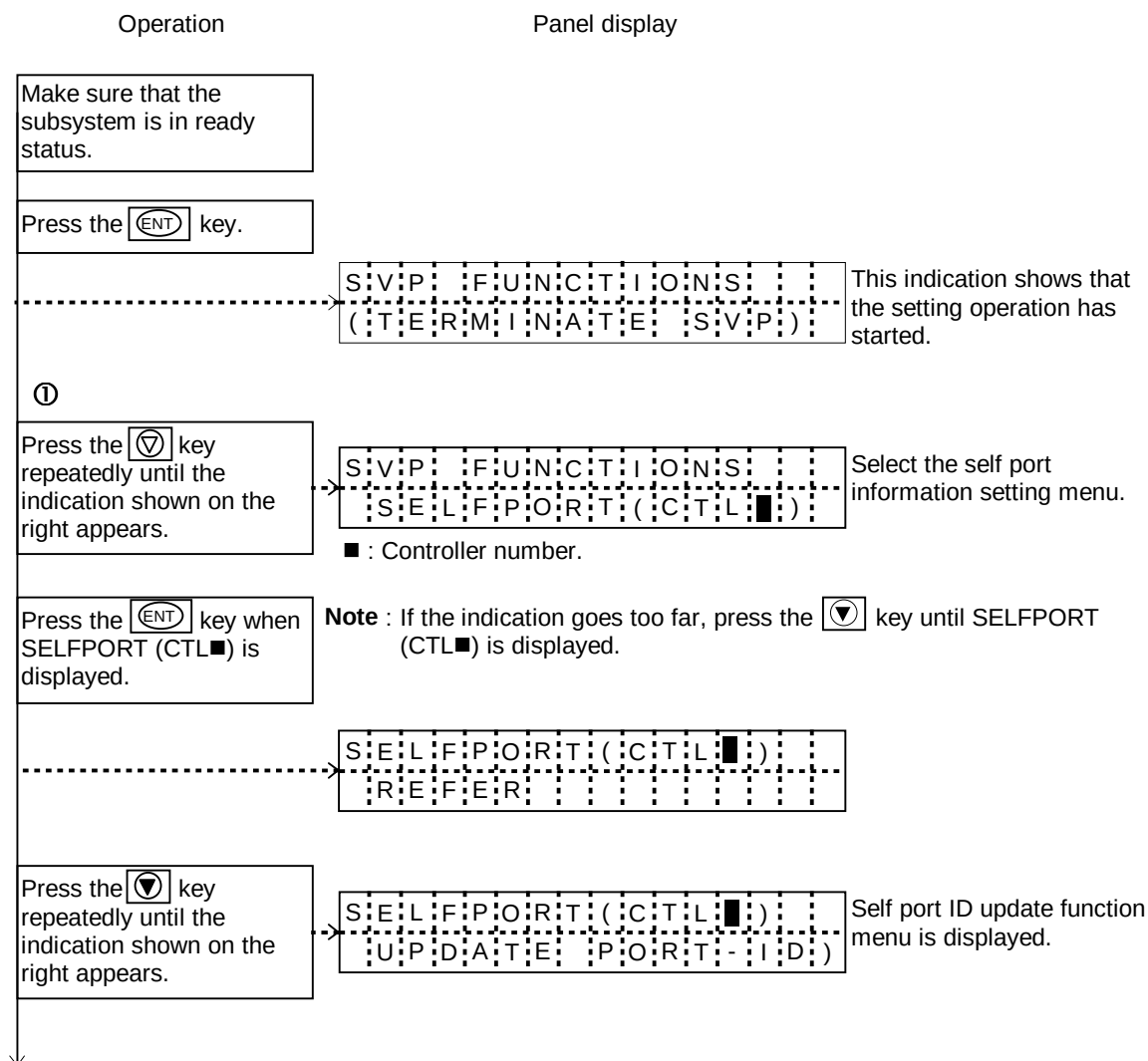
Figure 4.1.4 Standard DIP Switch Settings

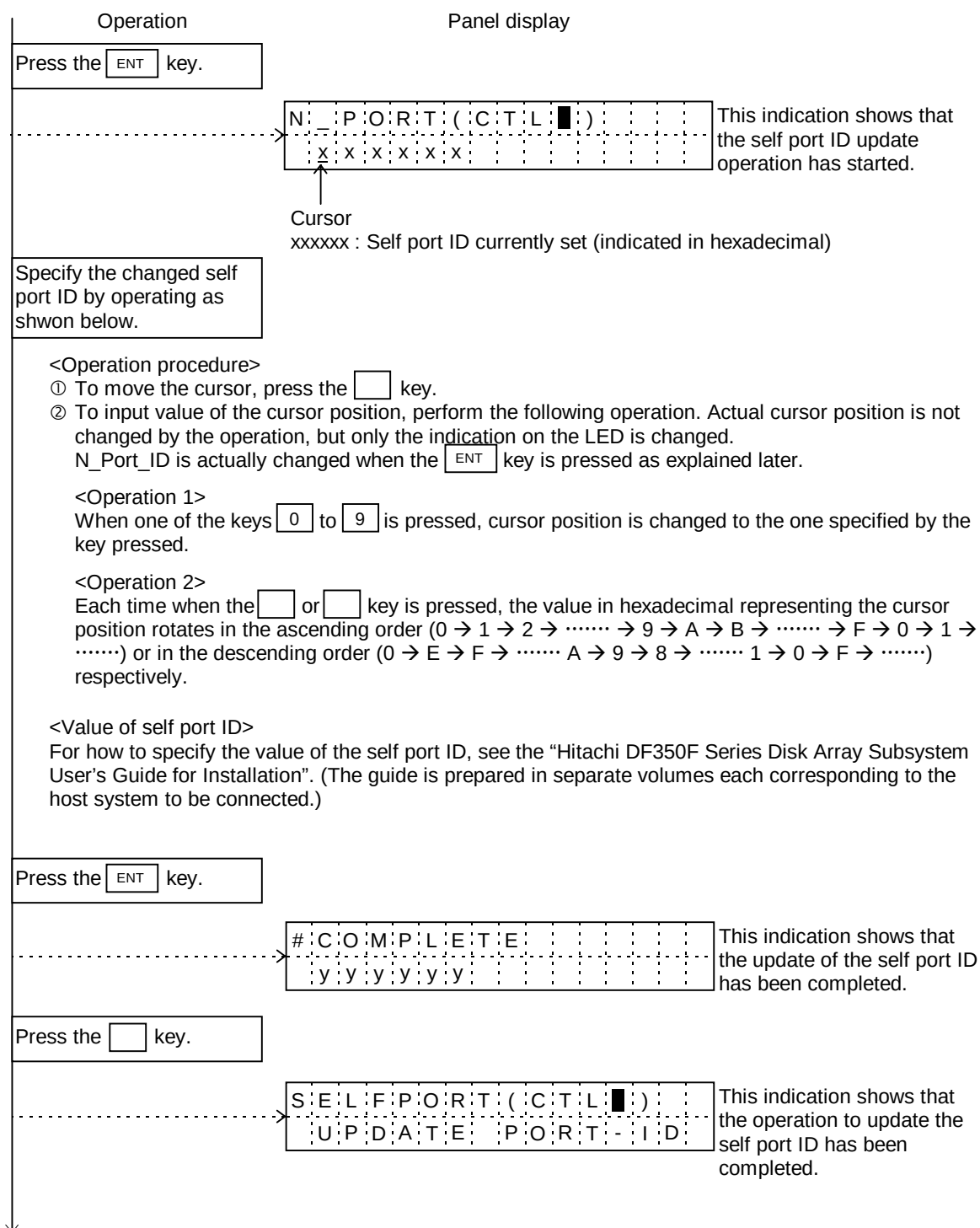
Note : If the dual controller option (DF-F350F-F3MCF) is installed, use the same settings for both controllers.

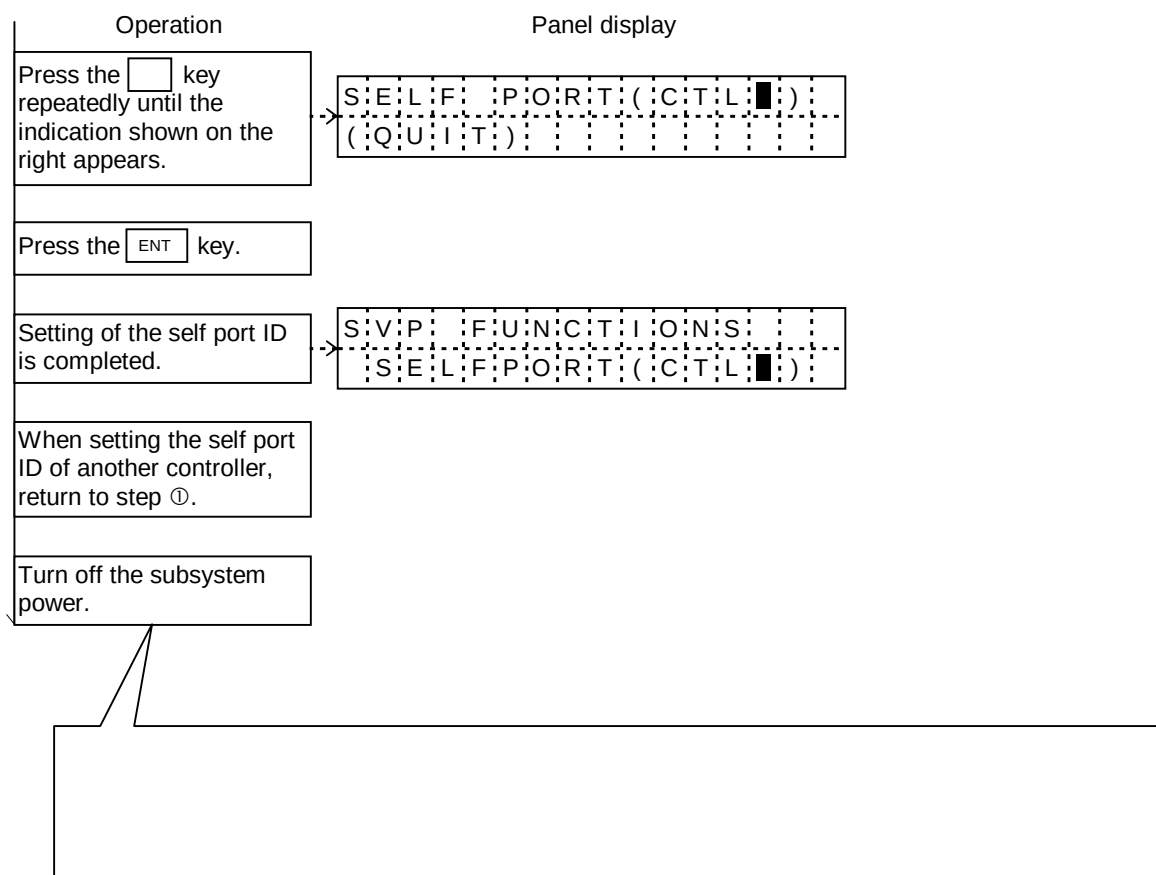
4.2 Setting Self Port ID

The self port IDs have been set to FFFFFFF for both the controller 0 and controller 1 when the subsystem is shipped from the factory.

Operate following the procedure below.



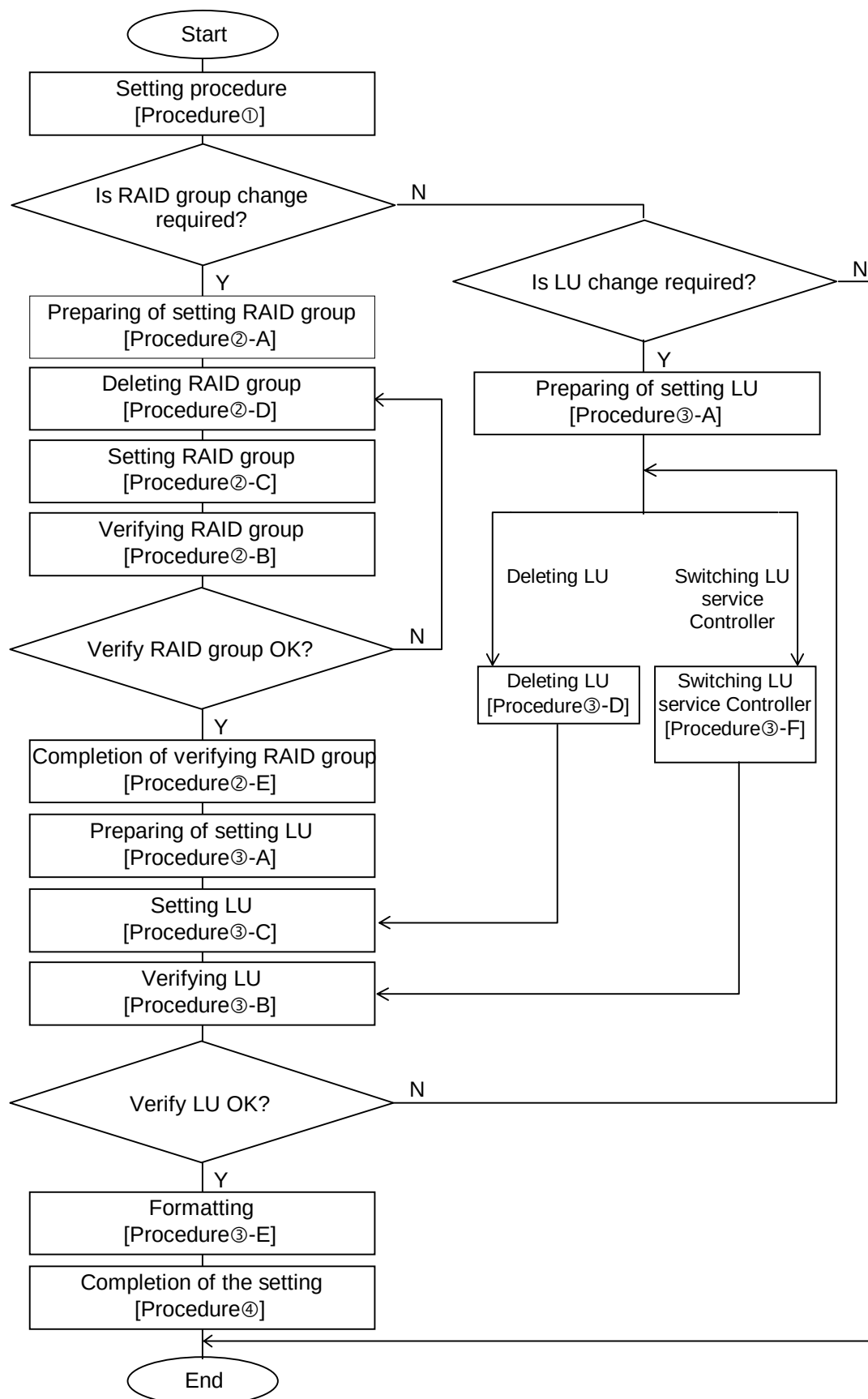




4.3 Setting the Subsystem Configuration Information

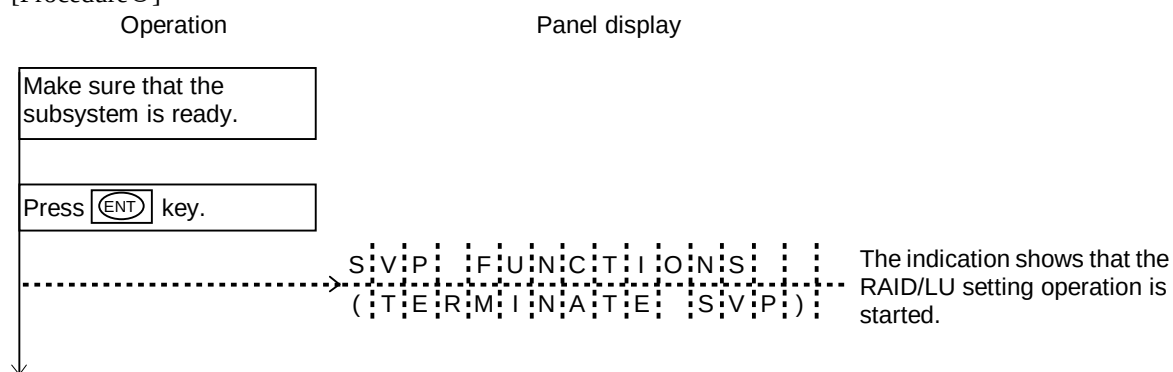
This function can be used when the subsystem is ready.

(During this operation, READ/WRITE command issued from the host cannot be executed. When the host command is received, Not Ready is reported to the host.)



4.3.1 Preparing of setting RAID/LU

[Procedure①]



When changing RAID group, go to procedure ②-A "Preparing of setting RAID group".
 When changing no RAID group but LU, go to procedure ③-A "Preparing of setting LU".
 When changing no RAID group and LU, go to quit.

4.3.2 Setting the RAID group

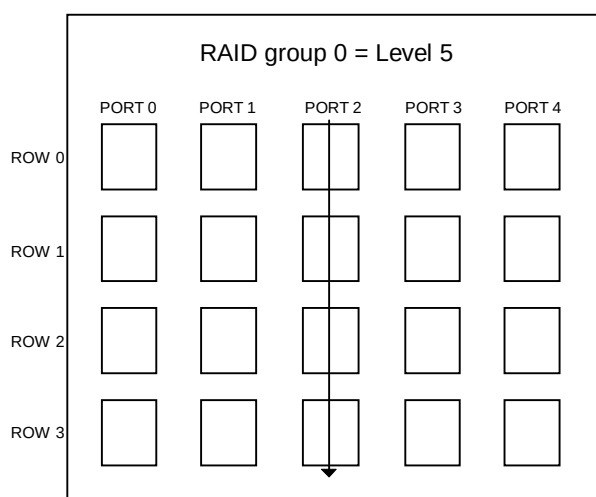
This function is used for setting, deleting and referring the RAID group. This function can be used when the subsystem is ready.

(Setting the DIP switch and turning off/on the subsystem are not required. Read/Write operation from the host can not be executed during this function. When the host command is received, Not Ready is reported to the host.)

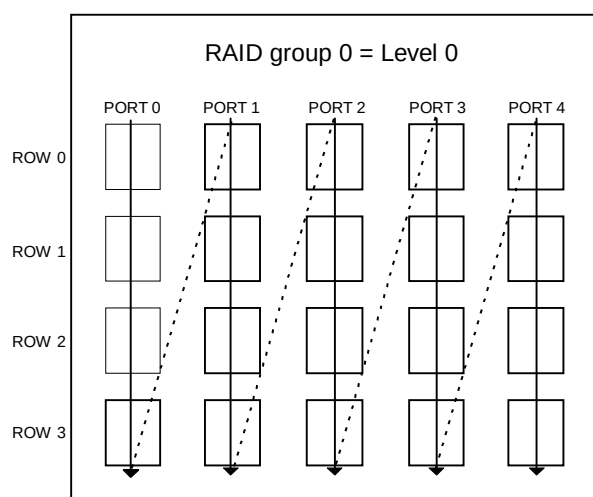
Notice : By deleting the RAID group all user data of the deleted RAID group is lost. Back up user data before deleting the RAID group.

RAID group and RAID level can be set as shown below by using this setting function.

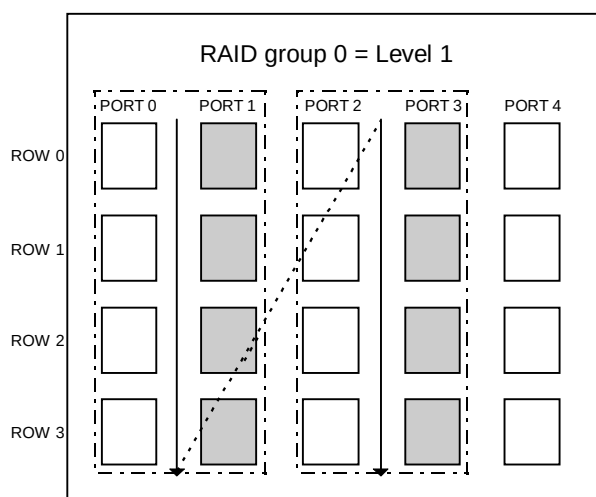
Setting one RAID group with the entire subsystem. (Arrows “↓” indicate the direction of storing data.)



The function stores data in the way executing the data striping over four disks and generating parity data on one disk.

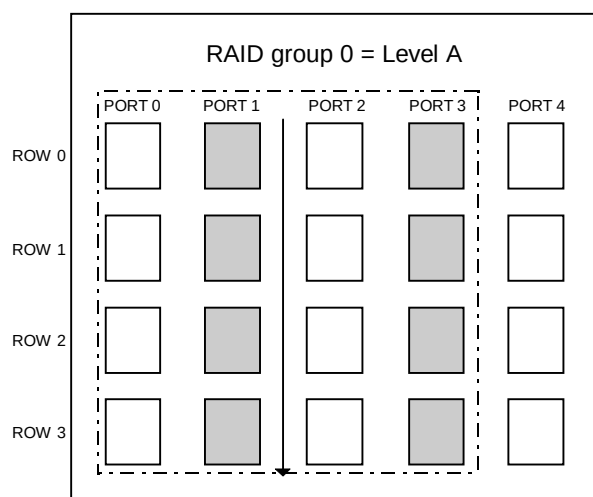


The function stores data without executing neither the data striping nor parity data generation.



The function stores data in the way doubly writing it on the main disk and sub-disk without executing the data striping.

□ : indicates a main disk
 ■ : indicates a sub-disk



The function stores data in the way doubly writing it on the main disk and sub-disk and executing the data striping over two disks of port 0 and port 2.

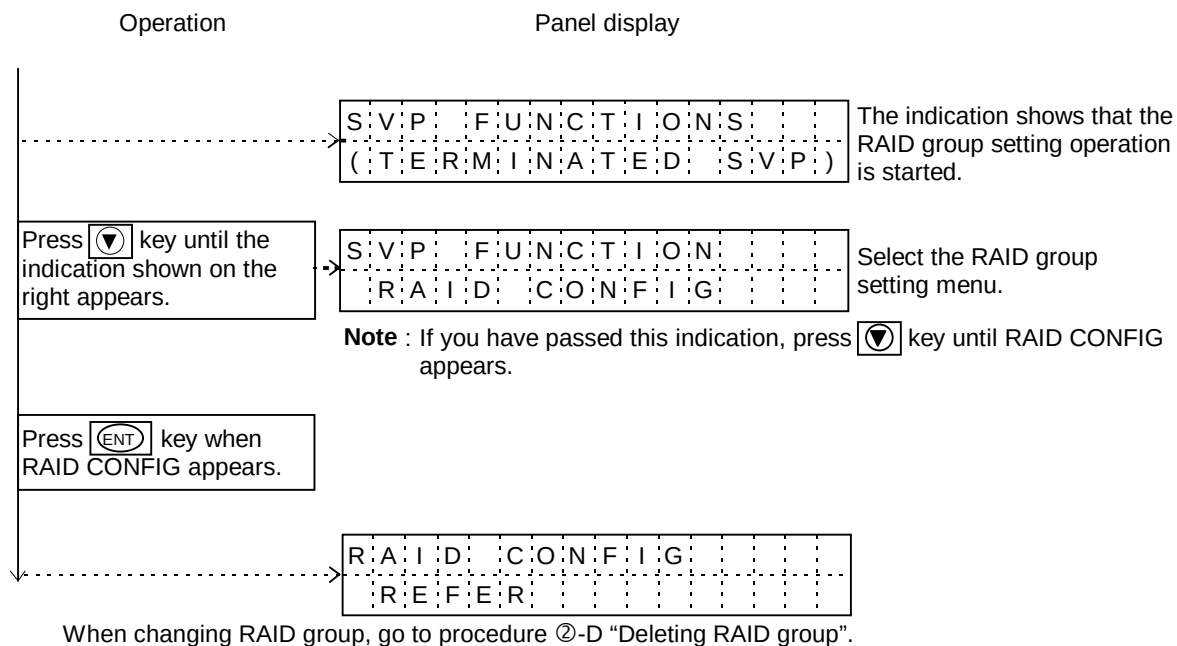
□ : indicates a main disk
 ■ : indicates a sub-disk

Setting one RAID group with each row of disks (Arrows “↓” indicates the direction of storing data.)

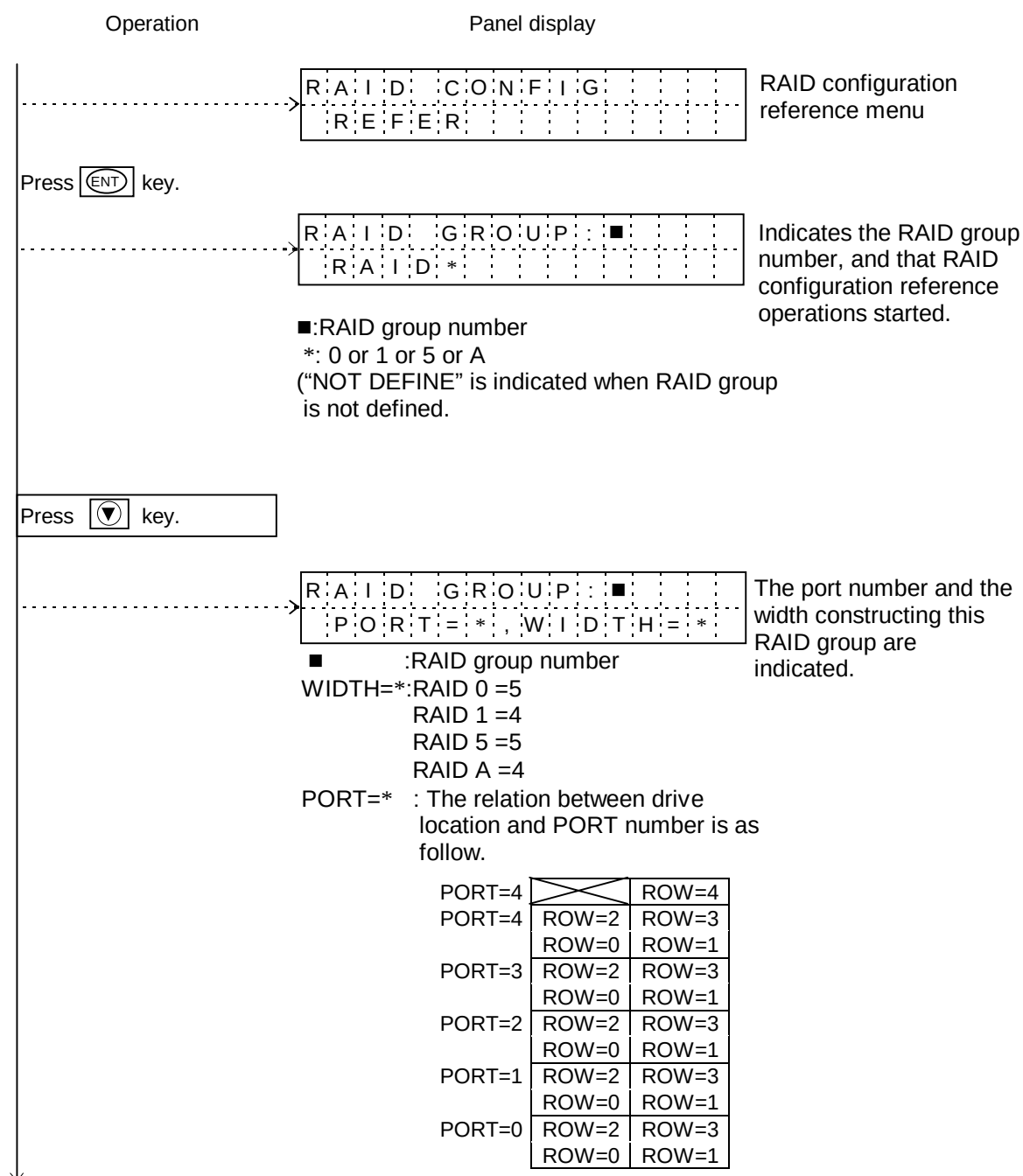
Data cannot be stored extending over two or more RAID groups even if RAID levels of them are the same. The following are examples having set RAID groups of the same RAID level, however, each row has its own RAID level.

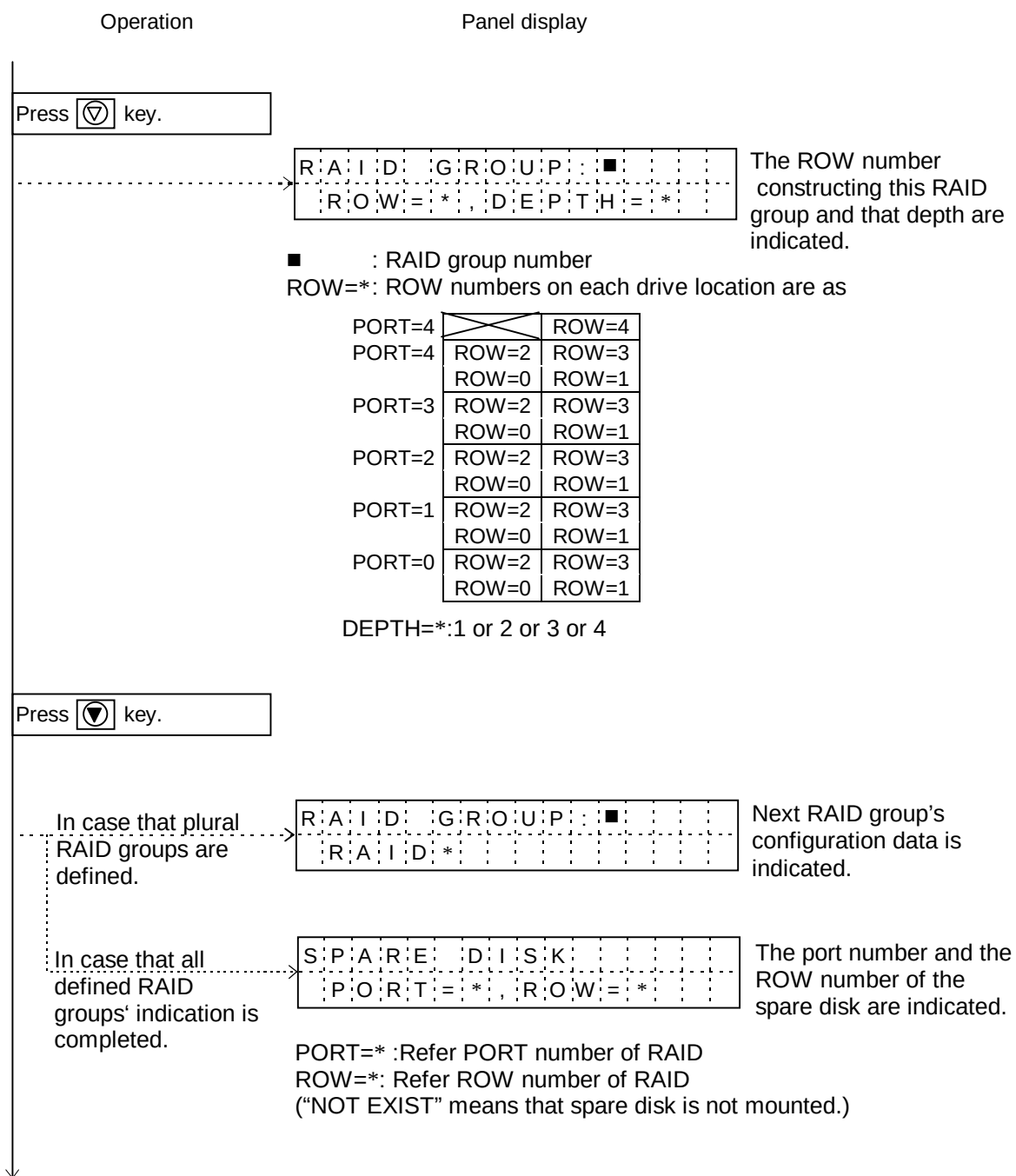


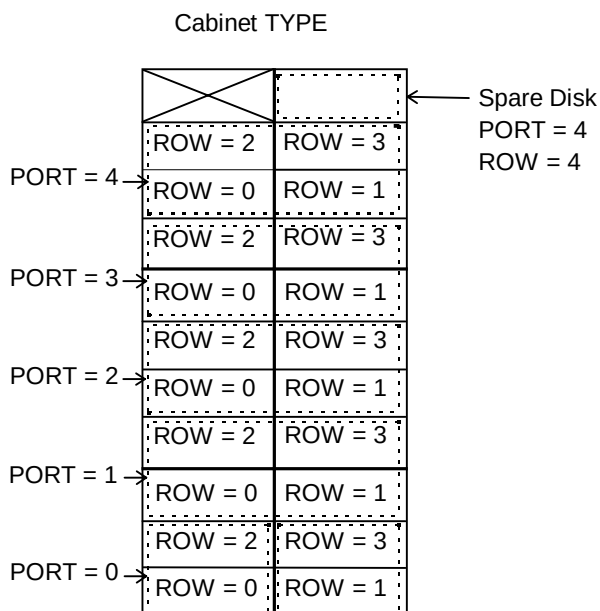
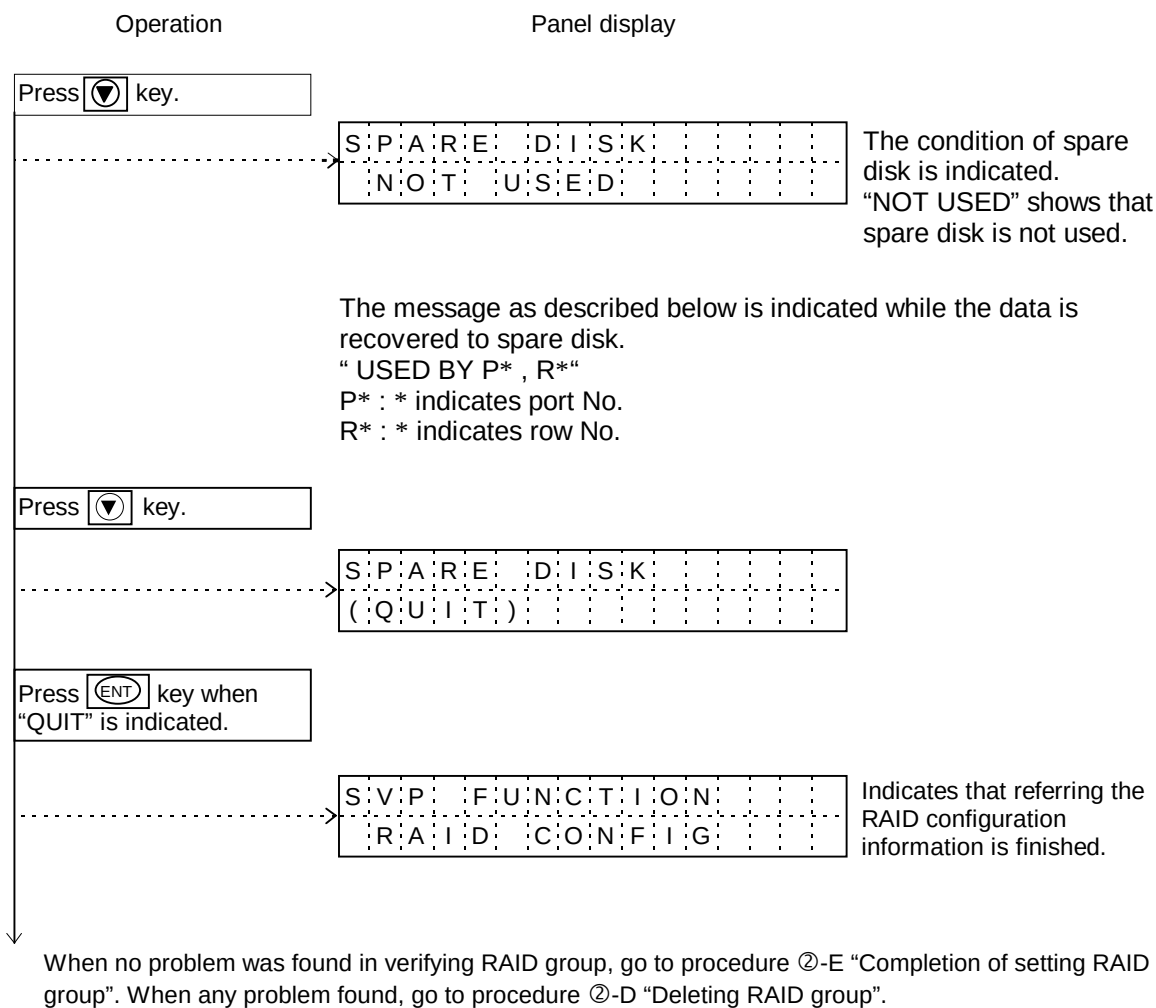
[Procedure②-A] Preparing of setting RAID group



[Procedure②-B] Verifying RAID group







[Procedure②-C] Setting RAID group

Operation

Panel display

Pressing  key until the indication shown on the right appears.

R A I D C O N F I G
I N S T I T U T E

Display the menu of adding RAID group.

Press  key.

I N S R A I D G R P ■
A L L R A I D 5

Indicates that adding the RAID group started.

■ : additional RAID group number

(Not used RAID group is indicated in order of small number automatically.)

Additional item as described below is indicated in the second line by pressing  key.

No.	Item indicated	Function	Remark
1	ALL RAID5	The maximum configuration range (ports and rows) of the subsystem in use is defined as the RAID5, RAID1, RAID0 or RAID A group.	
2	ALL RAID1		
3	ALL RAID0		
4	ALL RAID A		
5	ROW = ■, RAID5	The ■ row is defined as the RAID5, RAID1, RAID0 or RAID A group.	
6	ROW = ■, RAID1		
7	ROW = ■, RAID0		
8	ROW = ■, RAID A		

Press  key when Item you want to set appears.

I N S R O W = ■ , R A I D 5 ?
Y E S

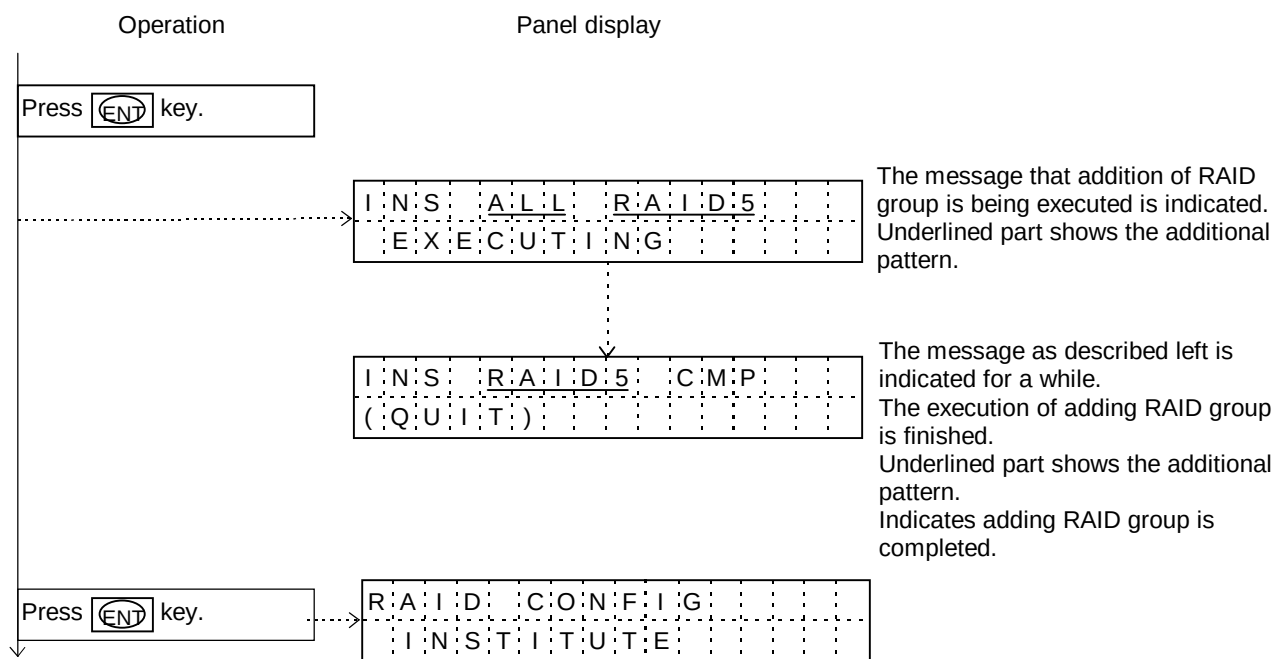
The message to verify additional RAID group is indicated.

Underlined part shows the additional pattern.

(Above is an example in which ROW = ■, RAID5 is selected.)

Pressing , "(QUIT)" is displayed.

In this state, pressing , adding RAID group will be terminated.



Go to procedure ②-B "Verifying RAID group"

Note : Set RAID group for each ROW when you want to set it for each ROW.

[Procedure②-D] Deleting RAID group

Notice : With this operation, Logical Units are deleted, and the user's data will be lost. Be sure to make back up copy before this operation.

Operation

Panel display

Press  key until the indication shown on the right appears.

RAID CONFIG
DELETE

Menu of deleting RAID group is displayed.

Press  key.

DELETE
ALL RAID

Contents of the second-line indication

No.	Item indicated	Function
1	ALL RAID	Deletes all RAID group.
2	RG■ (RAID*)	Deletes appointed RAID group. (■ : RAID group No. * : RAID level)
3	(QUIT)	Returns to the preceding menu.
4	(TERMINATE SVP)	Complete the SVP operation by maintenance panel.

Select item as described right you want to set by  /  key and press  key .

Note : "NO EFFECT" is indicated when no deletable RAID group exists.

Go to ① when you want to delete all RAID groups , Go to ② when you want to delete appointed RAID group.

①Deleting all RAID groups

Operation

Panel display

Select item as described right you want to set by  /  key and press  key .

DEL ALL RAID?
(QUIT)

The message to verify the deletion of RAID group is displayed.

Contents of the second-line indication

No.	Item indicated	Function
1	(QUIT)	Returns to the preceding menu.
2	YES	Deletes all RAID groups.

DEL ALL RAID
EXECUTING

All RAID groups are deleting.

DEL RAID CMP
(QUIT)

When the deletion is completed , the left indication appears.

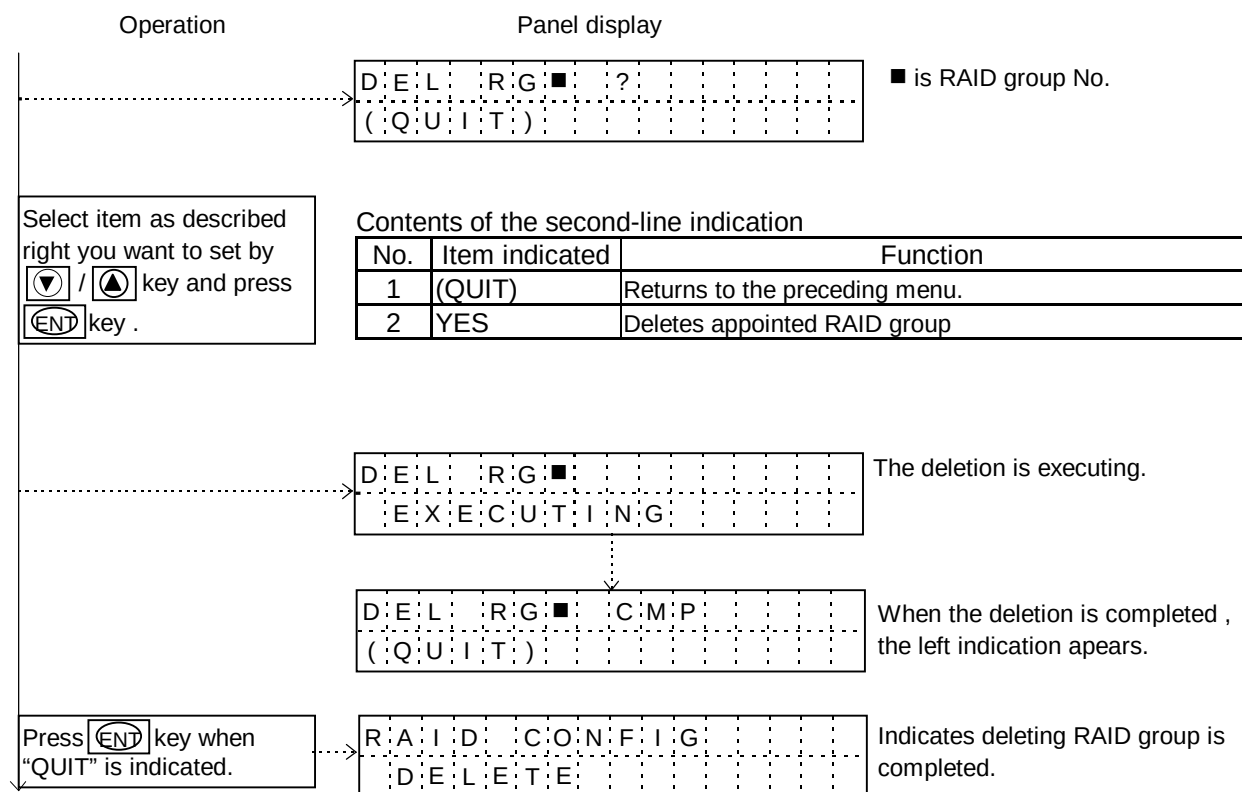
Select "QUIT" by  key and press  key.

RAID CONFIG
DELETE

Indicates deleting RAID group is completed.

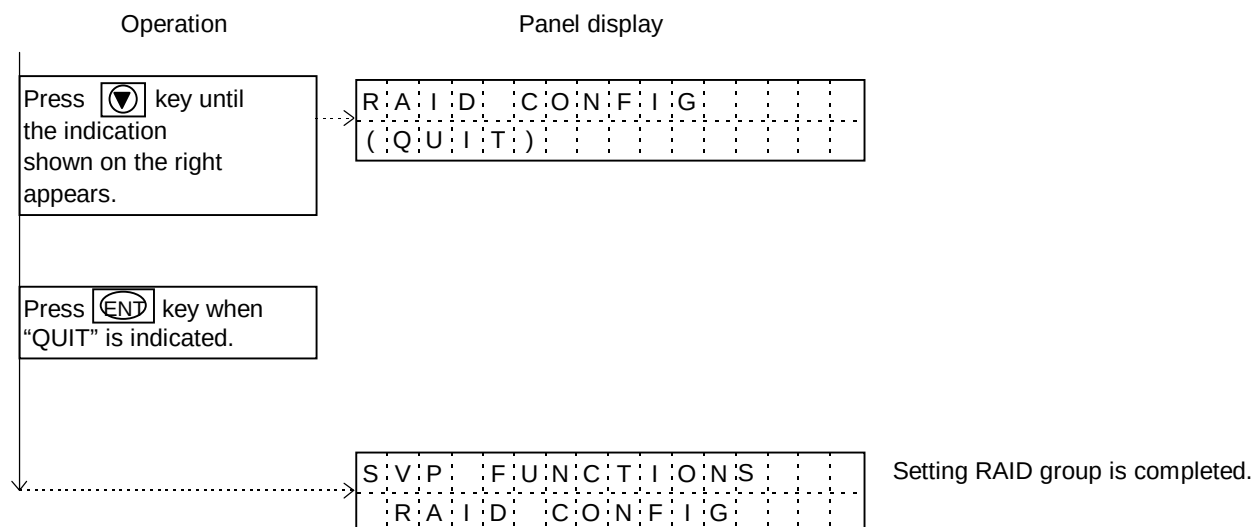
Go to procedure ②-C "Setting RAID group".

②Deleting appointed RAID group



Go to procedure ②-C "Setting RAID group".

[Procedure②-E] Completion of setting RAID group



4.3.3 Setting LU

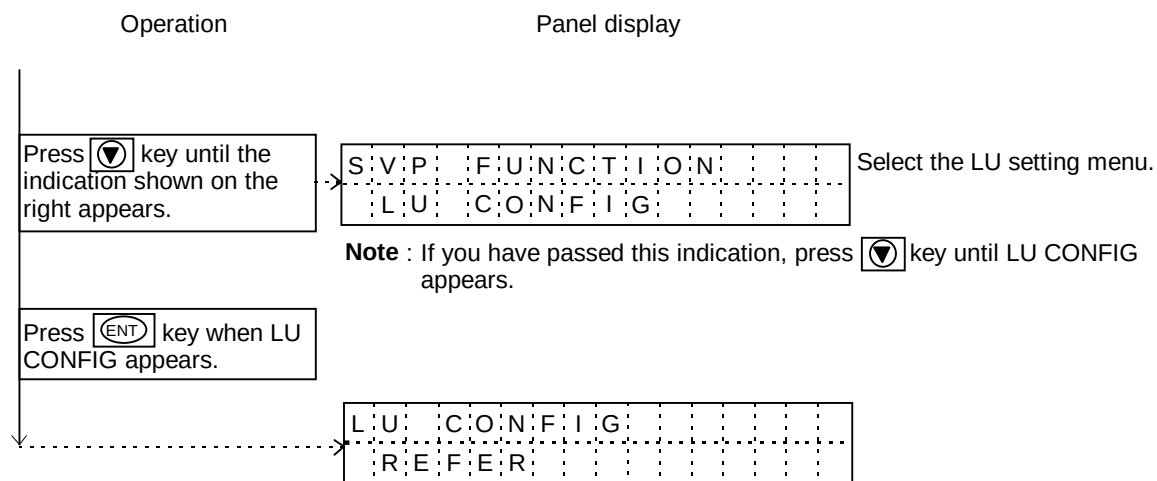
Following procedures are used to set, delete, refer, or format the LU.

This function can be used when the subsystem is ready.

Notice : All user data is lost by deleting the LU.

Be sure to back-up the user data before deleting the LU.

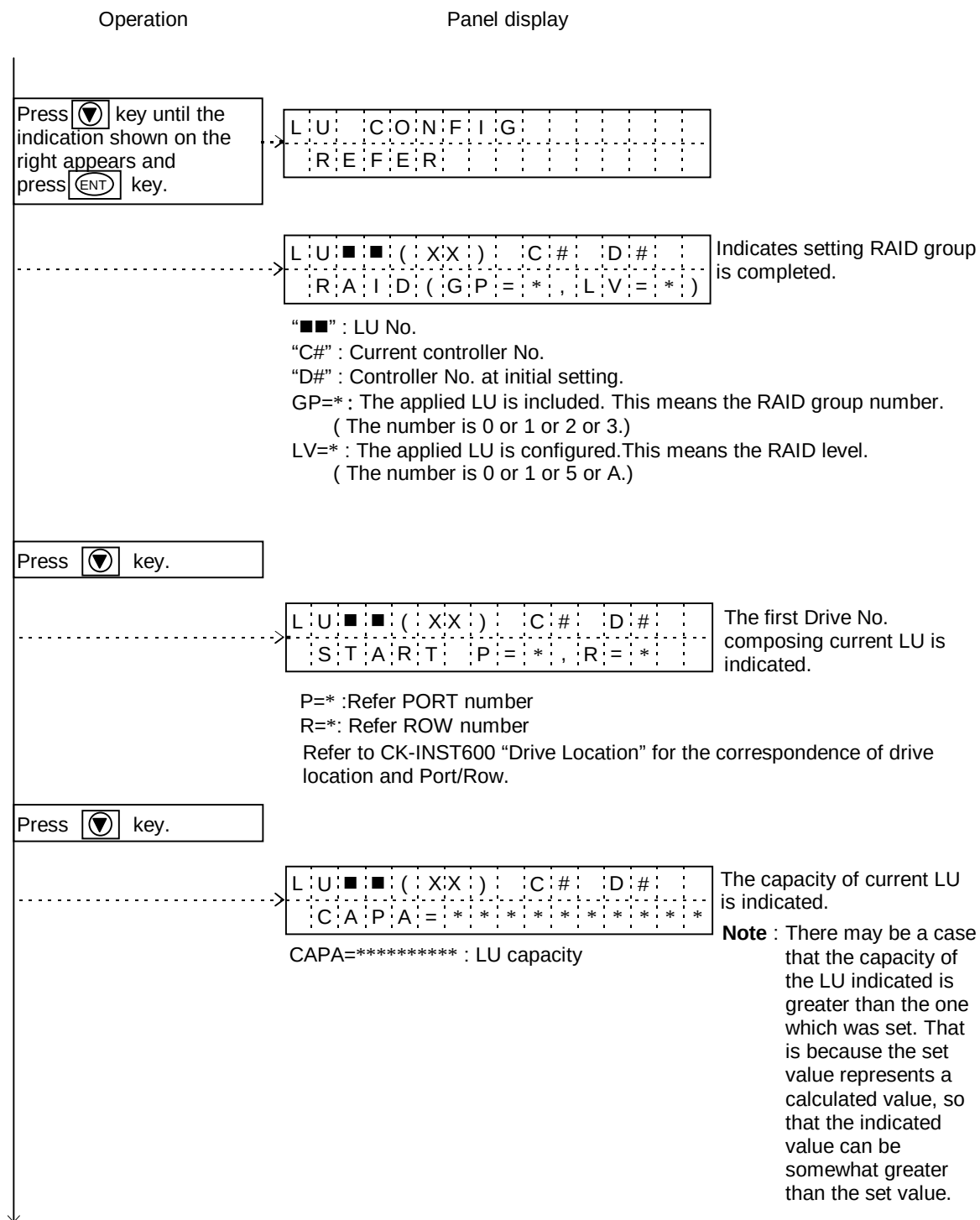
[Procedure③-A] Preparing of setting LU

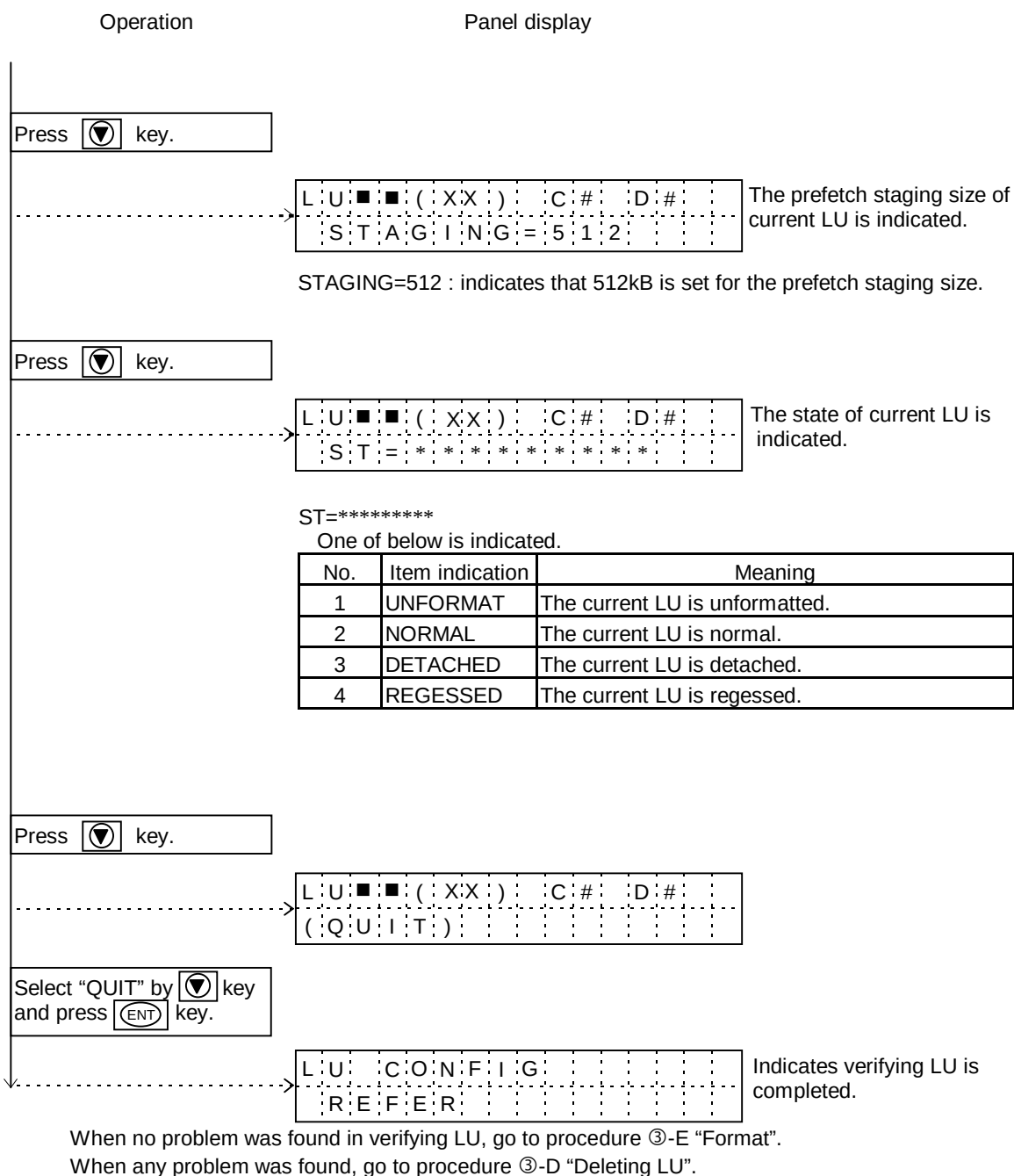


When RAID group is already set, go to procedure ③-C "Setting LU".

When changing no RAID group, go to procedure ③-D "Deleting LU".

[Procedure③-B] Verifying LU





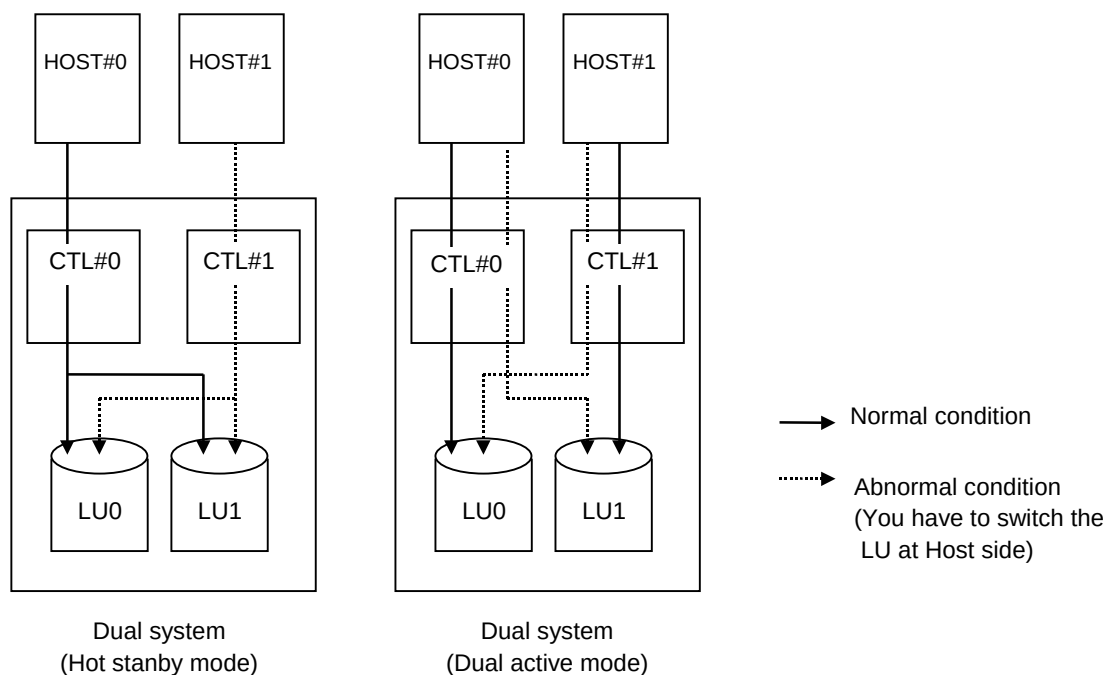
[Procedure③-C] Setting LU

Note) You have to assign service controller to set the LU when dual active mode is selected in the dual system.

Refer to the figure as described below to set the LU assigned service controller.

In the case of example as described above, select “INSTITUTE (CTL0)” when you set LU0 and “INSTITUTE (CTL1)” when set LU1.

In case a service controller is assigned to LU#0 and #1, it is possible to access from HOST#0 and #1, however the data transmitting performance is lowered because of switching LU.

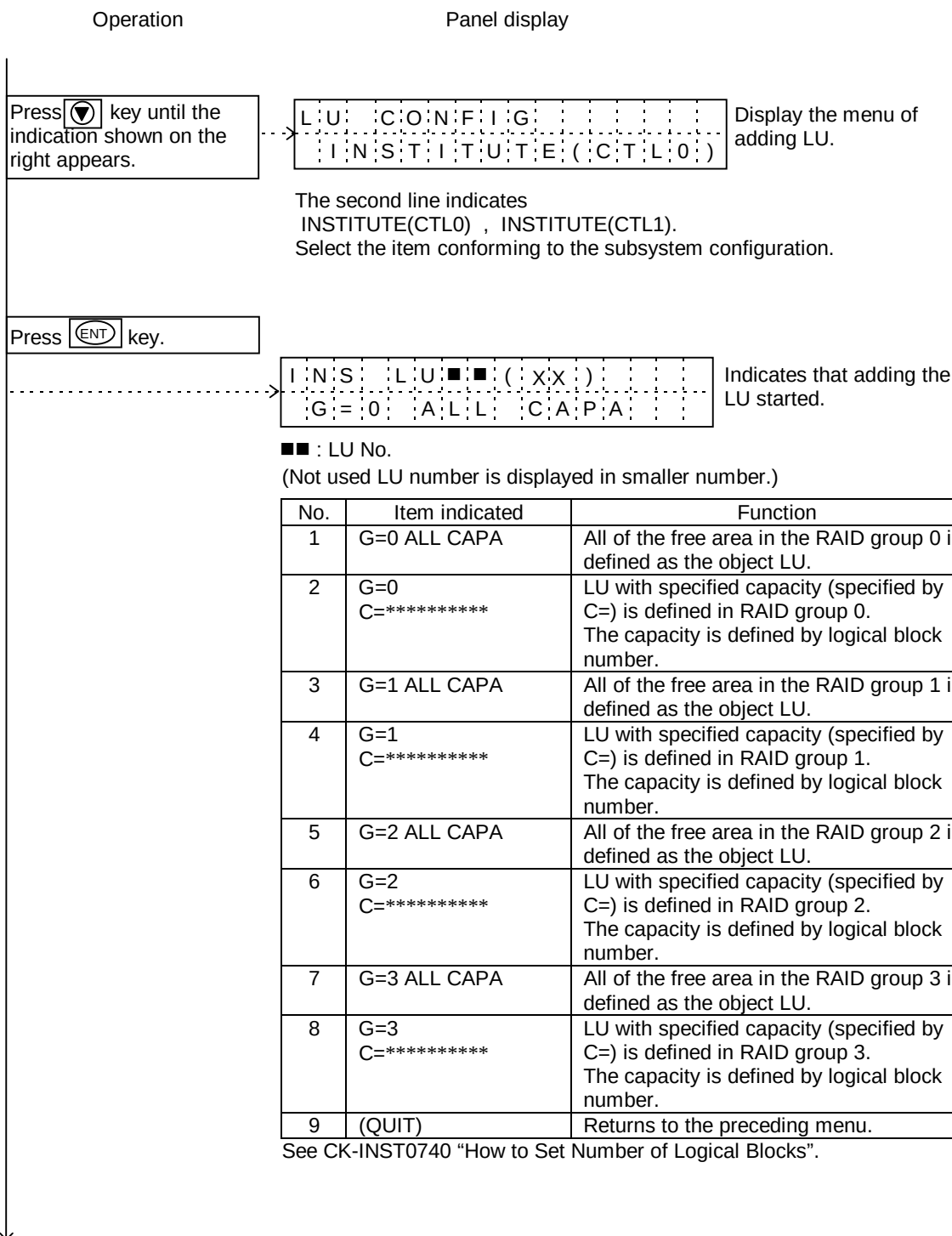


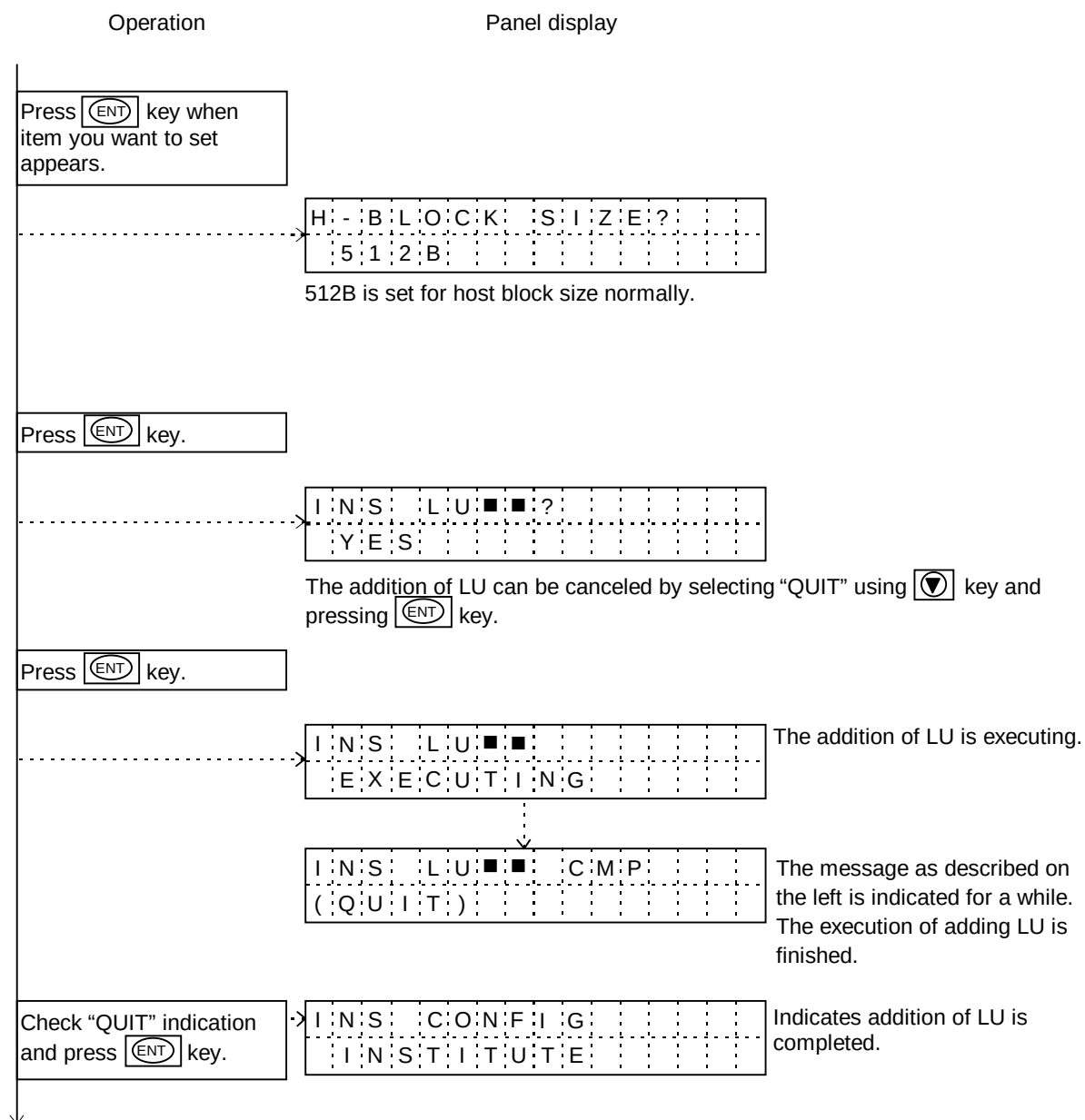
* The function of “Hot standby mode”.

It is possible that the system is continued to execute commands by switching the direction of the commands from Host system to the other controller, if the Host system or the controller failure occurs.

* The function of “Dual active mode”

Controller #0 and #1 are the service controller of LU#0 and #1 respectively.





Go to procedure ③-B "Verifying LU".

Note : Setting LU must be executed for every LUs.

Supplement / How to Set Number of Logical Blocks

G=*

C=*****



Enter a value (number of logical blocks) here.

- (1) All RAID groups can be divided into up to 8 logical units.
- (2) Set the number of logical blocks to be set for each logical unit to multiples of the following values according to the RAID level.

RAID0	128
RAID1	128
RAIDA	256
RAID5(4D+1P)	512

- (3) When dividing each RAID group into multiple logical units, the total number of blocks in each logical units must be set to the number of logical blocks per row as shown below or less.
- (4) The following lists the number of logical blocks per row.

① When five drives are mounted on a row (four drives for RAID1 and RAID5);

RAID configuration \ Model (Capacity)	DF-F350-A2E2 (2.0GB)	DF-F350-A2E4 DF-F350-A3E4 (4.1GB)	DF-F350-A1E8 DF-F350-A2E8 (8.7GB)	DF-F350-A1E18 (17.8GB)
RAID0	20,200,960	40,652,160	85,085,440	174,681,600
RAID1/RAIDA	8,080,384	16,260,864	34,034,176	69,872,600
RAID5(4D+1P)	16,160,768	32,521,728	68,068,352	139,745,280

② When n drives are mounted on a row (n < 5);

- RAID0

Number of logical blocks = $m^{(*1)} \times n^{(*2)}$

- RAID1

Number of logical blocks = $m^{(*1)} \times \text{int}(n/2)^{(*3)}$

*1: Refer to the table below for m.

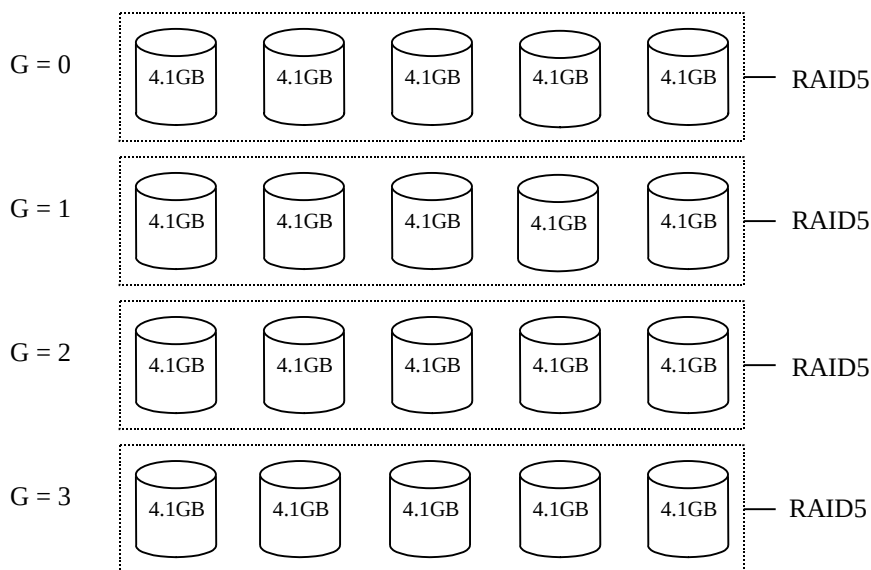
*2: n is 2 or larger in this case.

*3: int means "rounding down".

	DF-F350-A2E2	DF-F350-A2E4 DF-F350-A3E4	DF-F350-A1E8 DF-F350-A2E8	DF-F350-A1E18
Capacity	(2.0GB)	(4.1GB)	(8.7GB)	(17.8GB)
m	4,040,192	8,130,432	17,017,088	34,936,320

(5) Examples of the number of logical blocks set are shown below.

Example ① To divide a system of drives (4.1 GB × 20 units) into eight logical units;



Groups 0 to 3 are all defined as RAID5 and all the groups are divided into eight logical units each with almost the same capacity. Each group is thus divided into two logical units.

- Group 0

Since the number of logical blocks for RAID5 is taken as 32,521,728 ($512 \times 63,519$) from subsection ① of (4), the result becomes $63,519 \div 2 \approx 31,760$.

Thus, enter the following.

LU0: G=0

C=16,261,120 ($512 \times 31,760$)

LU1: C=16,260,608 ($512 \times (63,519 - 31,760)$)

- Groups 1 to 3

Enter LU2 to LU7 in the same way as for Group 0.

LU2 : G=1

C=16,261,120

LU3 : C=16,260,608

LU4 : G=2

C=16,261,120

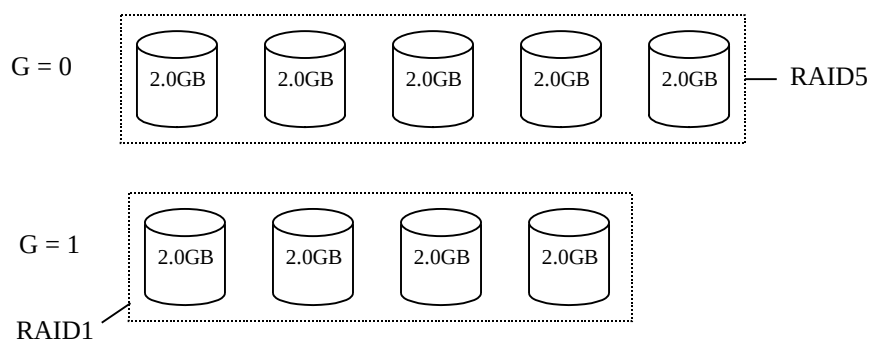
LU5 : C=16,260,608

LU6 : G=3

C=16,261,120

LU7 : C=16,260,608

Example ② To divide a system of drives ($2.0\text{ GB} \times 9\text{ units}$) into five logical units;



The following shows an example in which a mixture of different RAID levels is used between Group 0 and 1, and each group is divided into logical units with a capacity different from each other.

- Group 0

Since the number of logical blocks for RAID5 is taken as 16,160,768 ($512 \times 31,564$) from subsection ① of (4), Group 0 is divided into three LUs as shown below.

Enter the following.

LU0 : G=0

C=800,768($512 \times 1,564$)

LU1 : C=5,120,000($512 \times 10,000$)

LU2 : C=10,240,000($512 \times (31,564 - 1,564 - 10,000)$)

- Group 1

Since the number of logical blocks for RAID1 is calculated as $4,040,192 \times \text{int}(4/2) = 8,080,384$ ($128 \times 63,128$) from subsection ② of (4), Group 1 can be divided into two LUs as shown below.

Enter the following.

LU3 : G=1

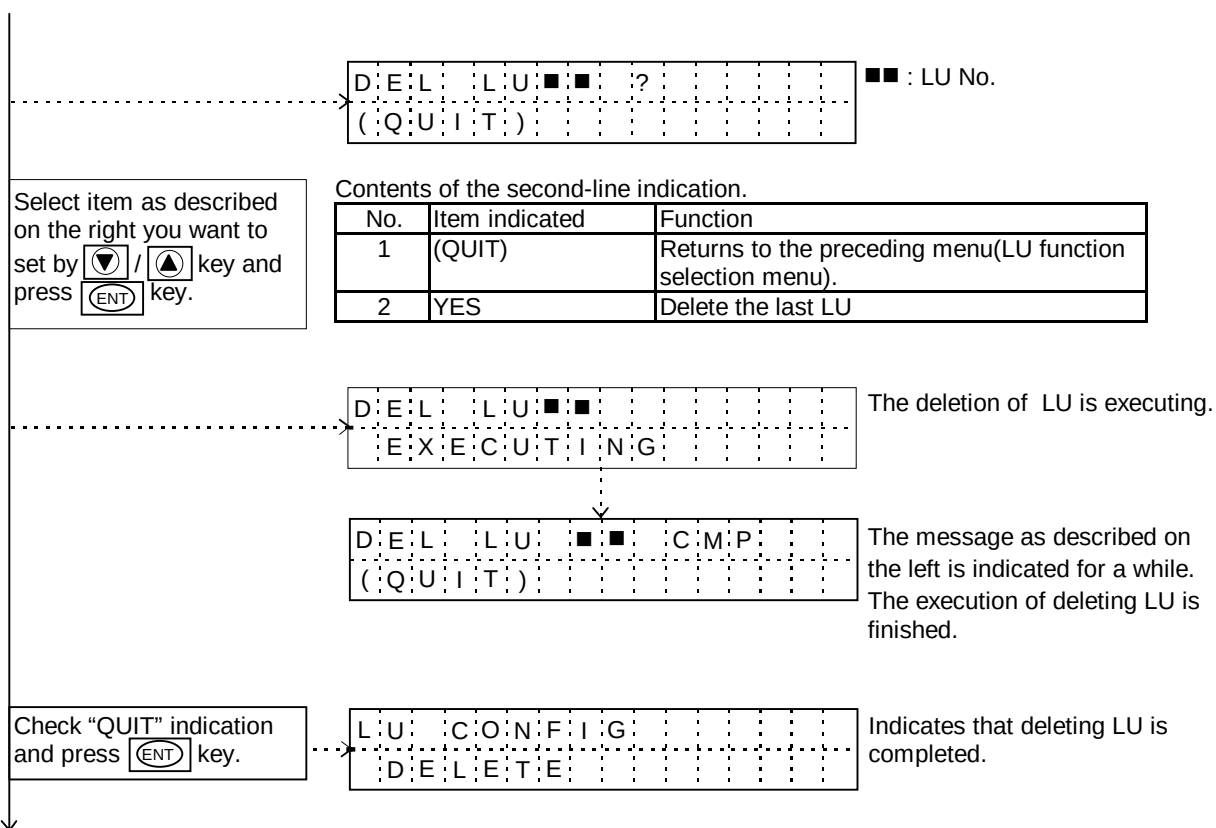
C=2,960,384($128 \times 23,128$)

LU4 : C=5,120,000($128 \times (63,128 - 23,128)$)

②Deleting the last LU

Operation

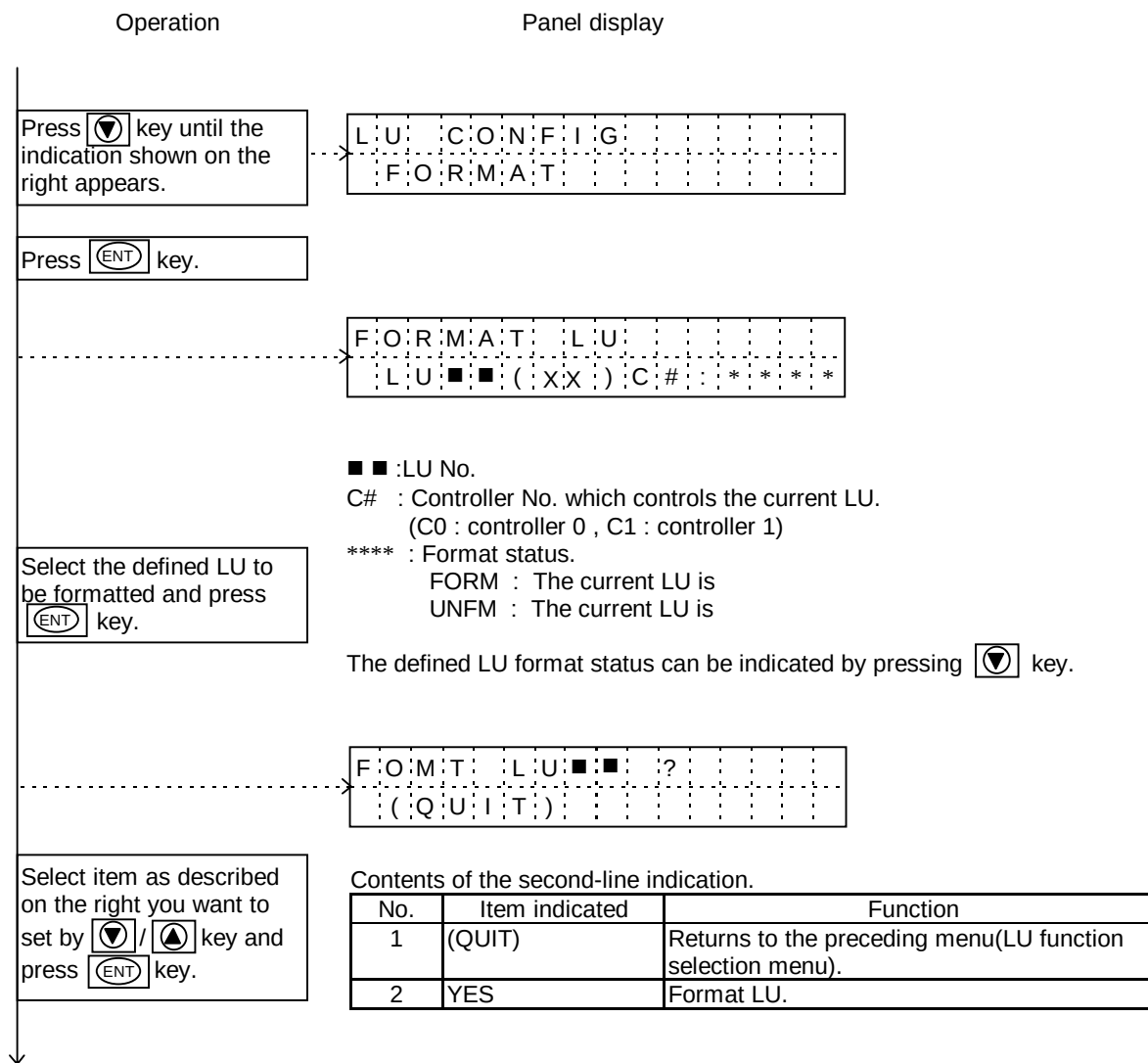
Panel display



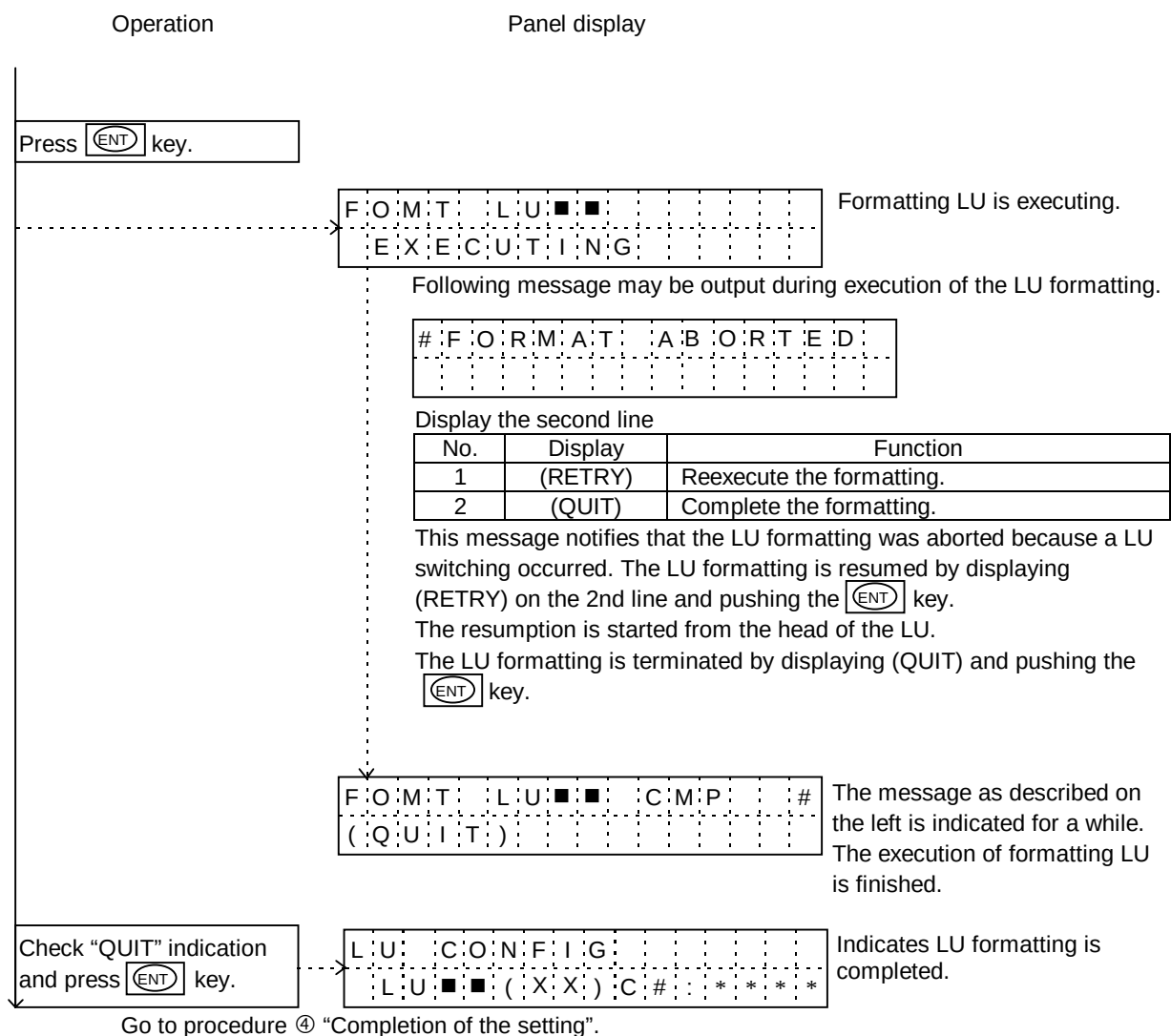
[Procedure③-E] Formatting

Notice : Note that user data will be lost by formatting the formatted LU.

Besides, be sure to execute the LU formatting for each set LU. When the microprogram of version 0354 or later is used, read/write access from the upper device is possible to the LUs other than that being formatted. Accordingly, the formatting for the LU newly added can be executed while executing usual jobs after the addition of the row(s) following the procedures explained on pages CK-OPTION0220 - 0310.

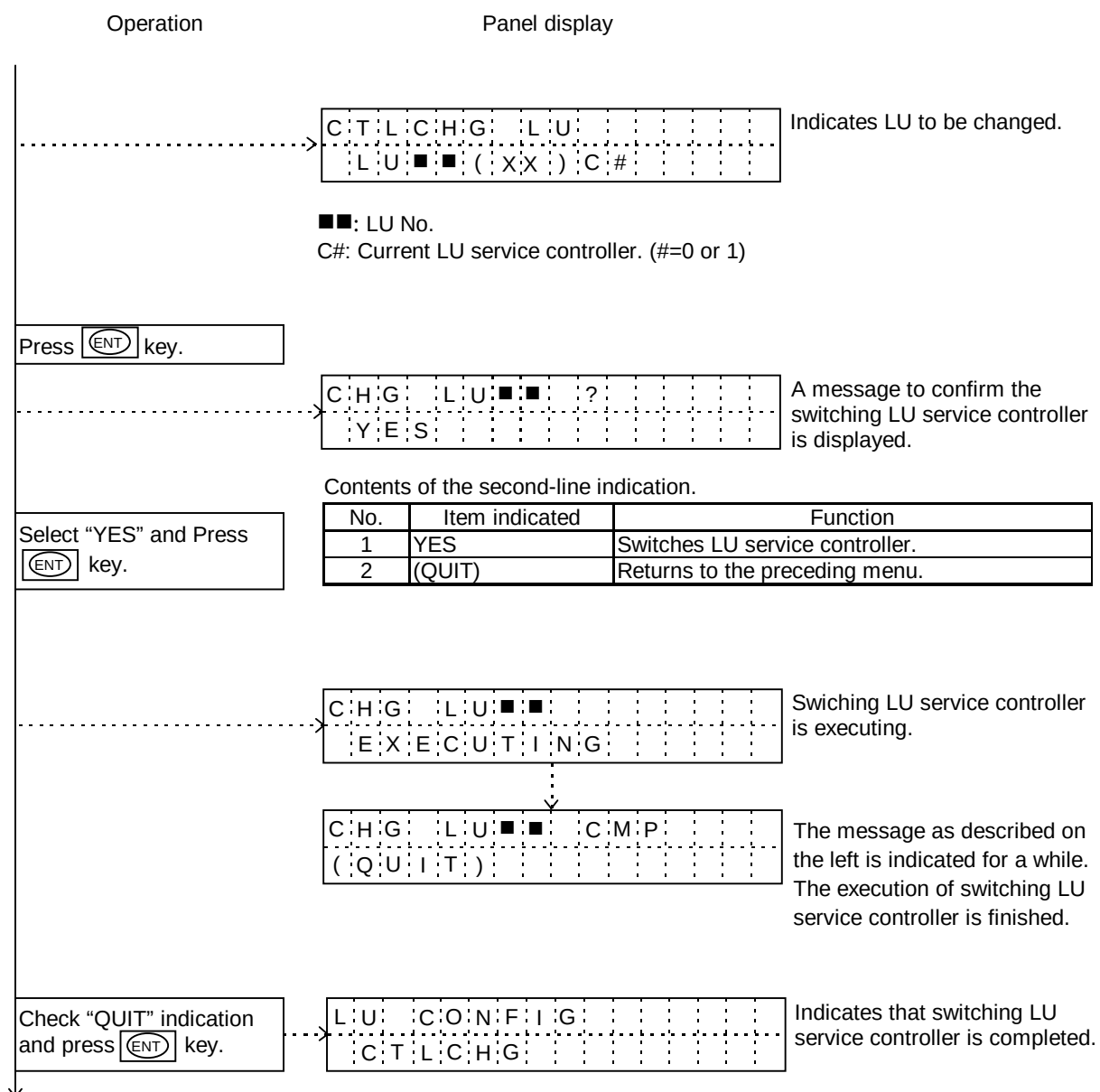


Note : LU format must be executed every set LUs.



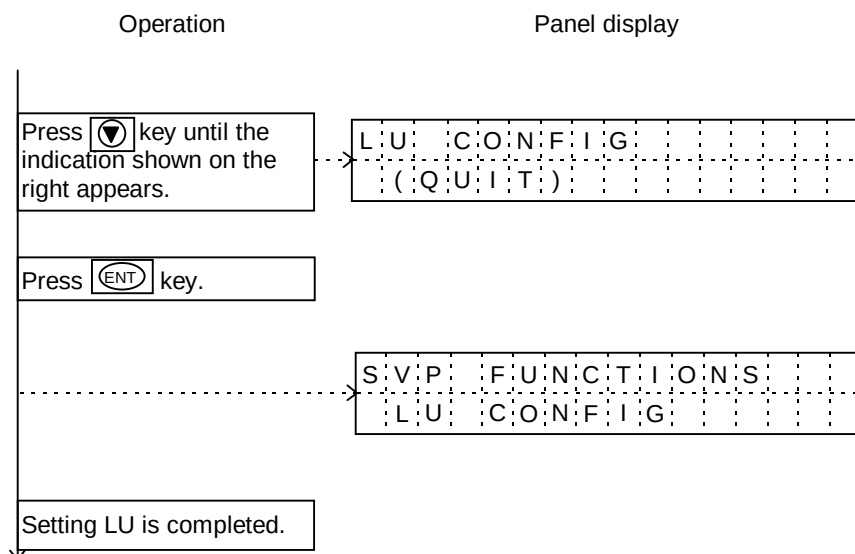
[Procedure③-F] Switching LU service Controller

Note : This function can be used when dual active mode in the dual system is set.



Note : Turn on the power of the subsystem again to make valid switching LU service controller.

[Procedure④] Completion of the setting



LU setting for dual controller configuration

In the case of dual controller configuration(Dual active mode), each LU has to be allocated to a controller which controls that LU in the LU setting operation.

But in the case of dual controller configuration(Hot standby mode), all LU are automatically allocated to the controller #0. (When one of the controllers is blocked, all LU are automatically allocated to the other controller.)

4.3.4 Setting other parameter

The menu items and the use are shown below. Refer to PANEL chapter (PANEL0260) to change the parameter shown below. The function shown below can be used when the subsystem is ready and the LU#0 is already defined.

No.	Menu item	Use	Description	Setting before shipment
1	RAID CONFIG	RAID configuration information reference/setting menu	① Reference to RAID configuration information ② Definition of RAID group ③ Deletion of RAID group	
2	LU CONFIG	LU configuration information reference/setting menu	① Reference to LU configuration information ② Definition of LU ③ Deletion of LU ④ Formatting of LU ⑤ Switching LU service controller	
3	SYSTEM OPT (CUR)	System option setting (Only a current value)	① Drive recovery execution mode ② Copyback recovery mode ③ Correction copy recovery mode ④ Setting of the dynamic sparing starting mode. ⑤ Setting of the interval time in the recovery ⑥ Setting of the unit of recovery processing ⑦ Setting of the Online Verify function ⑧ Setting of the idling time	
	SYSTEM OPT (SVD)	System option setting (A saved value and current value)	① Drive recovery execution mode ② Copyback recovery mode ③ Correction copy recovery mode ④ Setting of the dynamic sparing starting mode. ⑤ Setting of the interval time in the recovery ⑥ Setting of the unit of recovery processing ⑦ Setting of the Online Verify function ⑧ Setting of the idling time ⑨ Setting of the job time-out limit ⑩ Setting of the number of detections in the execution of the reselection time-out ⑪ Setting of the TRESPASS mode (*1)	
4	DRIVE MAINTEN	Drive maintenance menu	① Instruction of drive detaching ② Instruction of drive recovery ③ Reference to drive data recovery status ④ Drive self diagnosis ⑤ Parity matching check ⑥ ECC check ⑦ LA check ⑧ Drive format ⑨ Recovery of system information ⑩ Reference of the disk failure statistical information.	

*1 : This menu is displayed only when ALTERNATE PATH3 has been set by SPECIAL CONNECT of the system parameter.

No.	Menu item	Use	Description	Setting before shipment
5	MICRO VER/REV	Microprogram version/revision numbers reference menu	① Reference to microprogram version/revision	
6	GATHERING (CTL0)	Gathers information of the controller #0 in FD in case of dual system configuration	① Output of dump information being stored in the drive to floppy disk ② Output of trace information being stored in the drive to floppy disk ③ Output of trace information being stored in the memory to floppy disk	
7	GATHERING (CTL1)	Gathers information of the controller #1 in FD in case of dual system configuration	① Output of dump information being stored in the drive to floppy disk ② Output of trace information being stored in the drive to floppy disk ③ Output of trace information being stored in the memory to floppy disk	
8	MEMORY MAINTEN	Memory content reference/update menu	① Reference/update of memory content	
9	RECV ERR INFO	Error display of recovery when the power is on	① Displays the errors occur during recovery operation performed while power is on	
10	PIN INFO	Display of PIN existence of every LU	① Display of PIN data existence	
11	WARNING INFO	Display of unrecovered warning information	The current warning information is indicated	
12	CLEAR LOG(CTL0)	Clearing log information of controller #0	Log information related controller and host I/F is cleared	
13	CLEAR LOG(CTL1)	Clearing log information of controller #1	Log information related controller and host I/F is cleared	
14	THRESHOLD	Reference/set threshold value.	Reference/set threshold value.	
15	TOPOLOGY (CTL0)	Reference/set the topological information for controller 0.	Reference/set the topological information (FC_AL, Fabric).	
16	TOPOLOGY (CTL1)	Reference/set the topological information for controller 1.	Reference/set the topological information (FC_AL, Fabric).	
17	SELFPORT (CTL0)	Reference/set port information for controller 0.	Reference/set own port information.	
18	SELFPORT (CTL1)	Reference/set port information for controller 1.	Reference/set own port information.	
19	SECURITY (CTL0)	Reference/set security information for controller 0.	① Enable/disable the access check. ② Reference/set host identification information.	
20	SECURITY (CTL1)	Reference/set security information for controller 1.	① Enable/disable the access check. ② Reference/set host identification information.	
21	FFC REV (CTL0)	Refers to the revision number of the FFC firmware of the controller 0.	Display of the revision number of each type of firmware in FFC.	
22	FFC REV (CTL1)	Refers to the revision number of the FFC firmware of the controller 1.	Display of the revision number of each type of firmware in FFC.	

5. Changing the Configuration

5.1 Shifting to Hot Standby from Dual Active

Shifting to Hot Standby from Dual Active while the controller is blocked cannot be performed. Perform the shifting after the blockage is recovered. If PIN segment exists, shifting cannot be performed. Perform the shifting after the PIN segment is recovered.

To see if PIN segment exists, refer to PANEL chapter (PANEL0620 (8)).

- (1) Before turning the power on, set DIP switch No.4 as Figure 5.1.1.

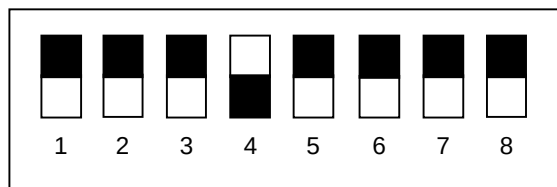
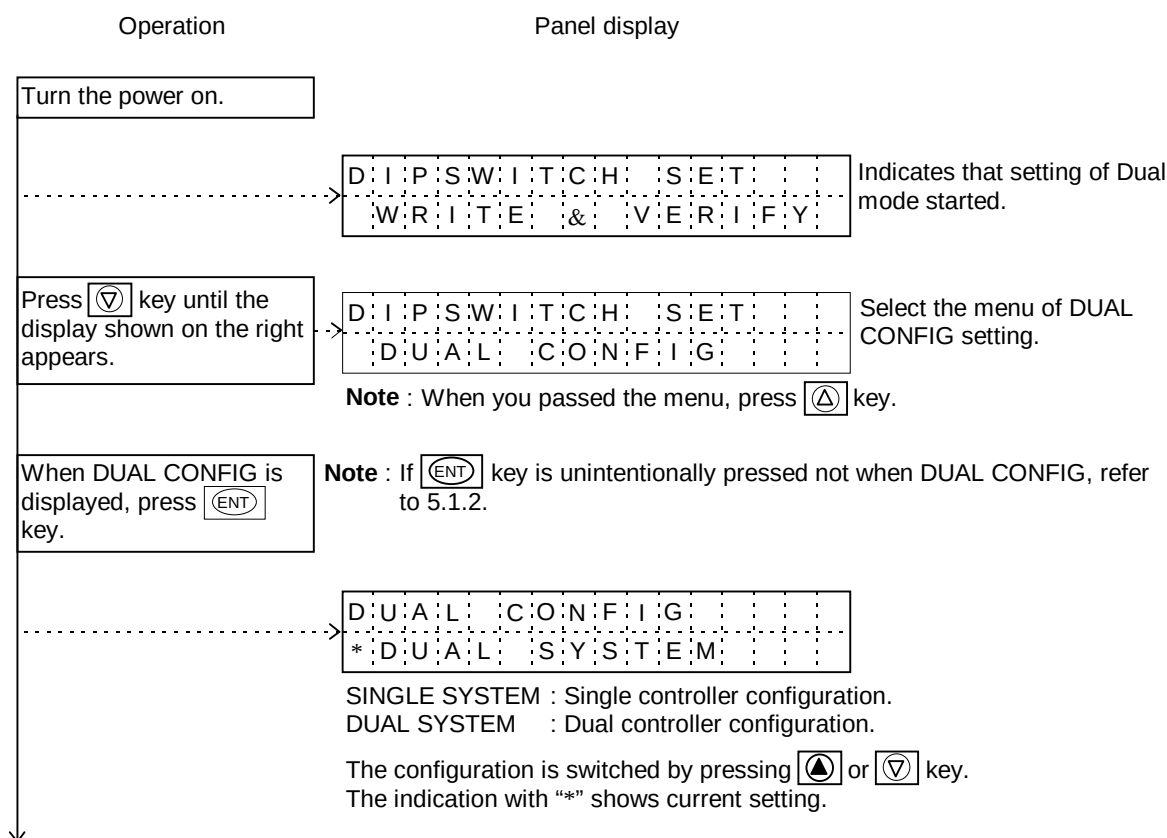
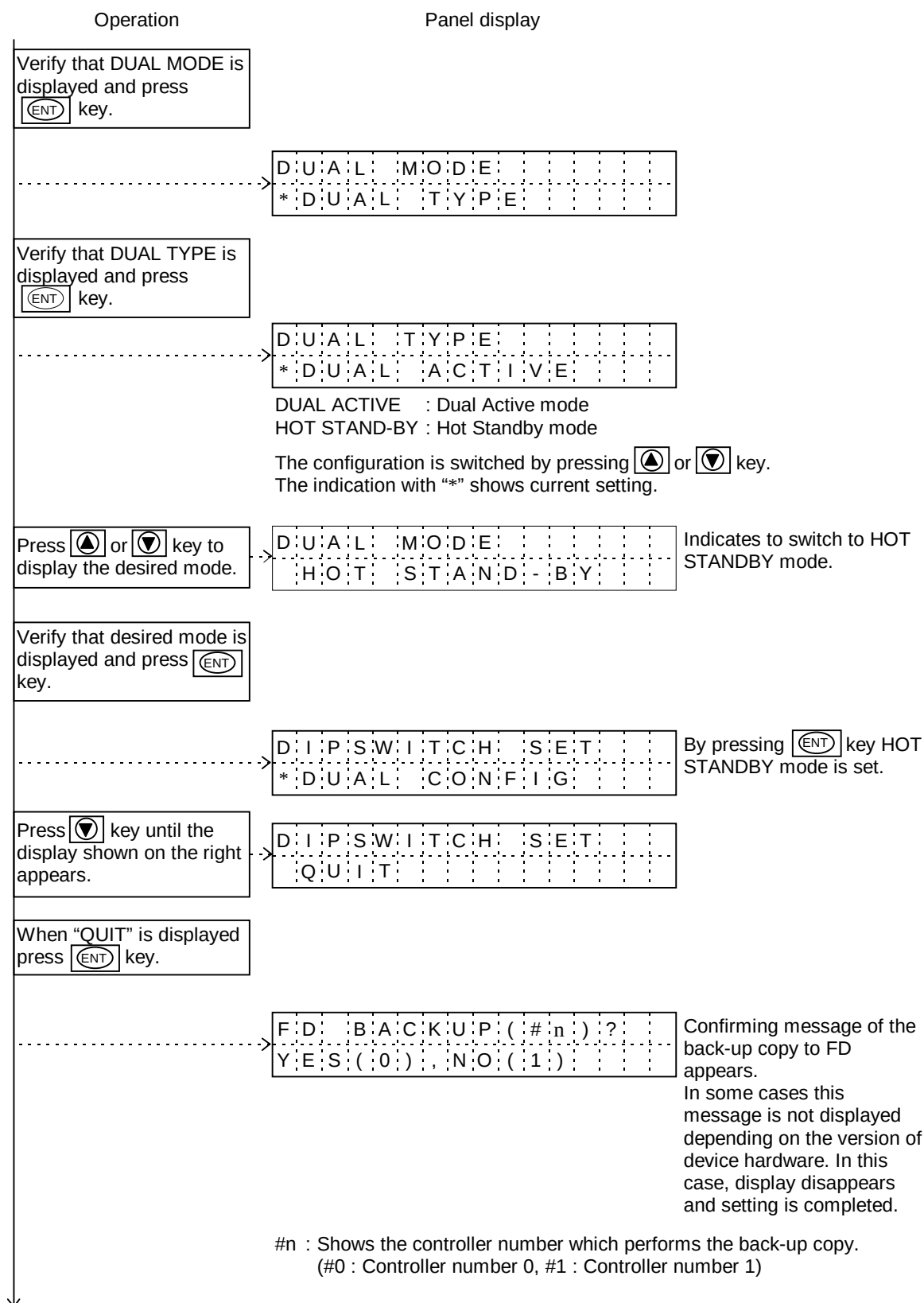
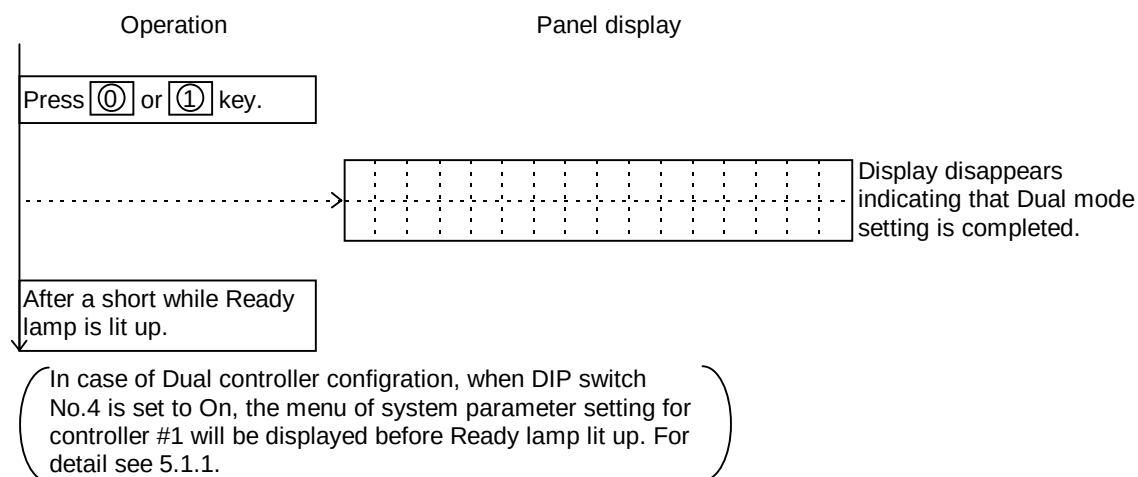


Figure 5.1.1 DIP switch for shifting to Dual system

- (2) Perform as the procedure shown below.







(3) Set DIP switch No.4 as Figure 5.1.2. (Shifting to Dual System has not started yet.)

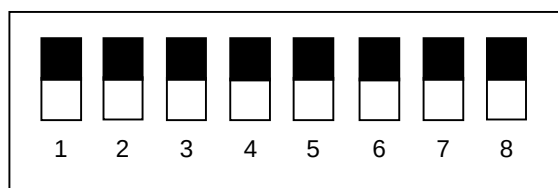


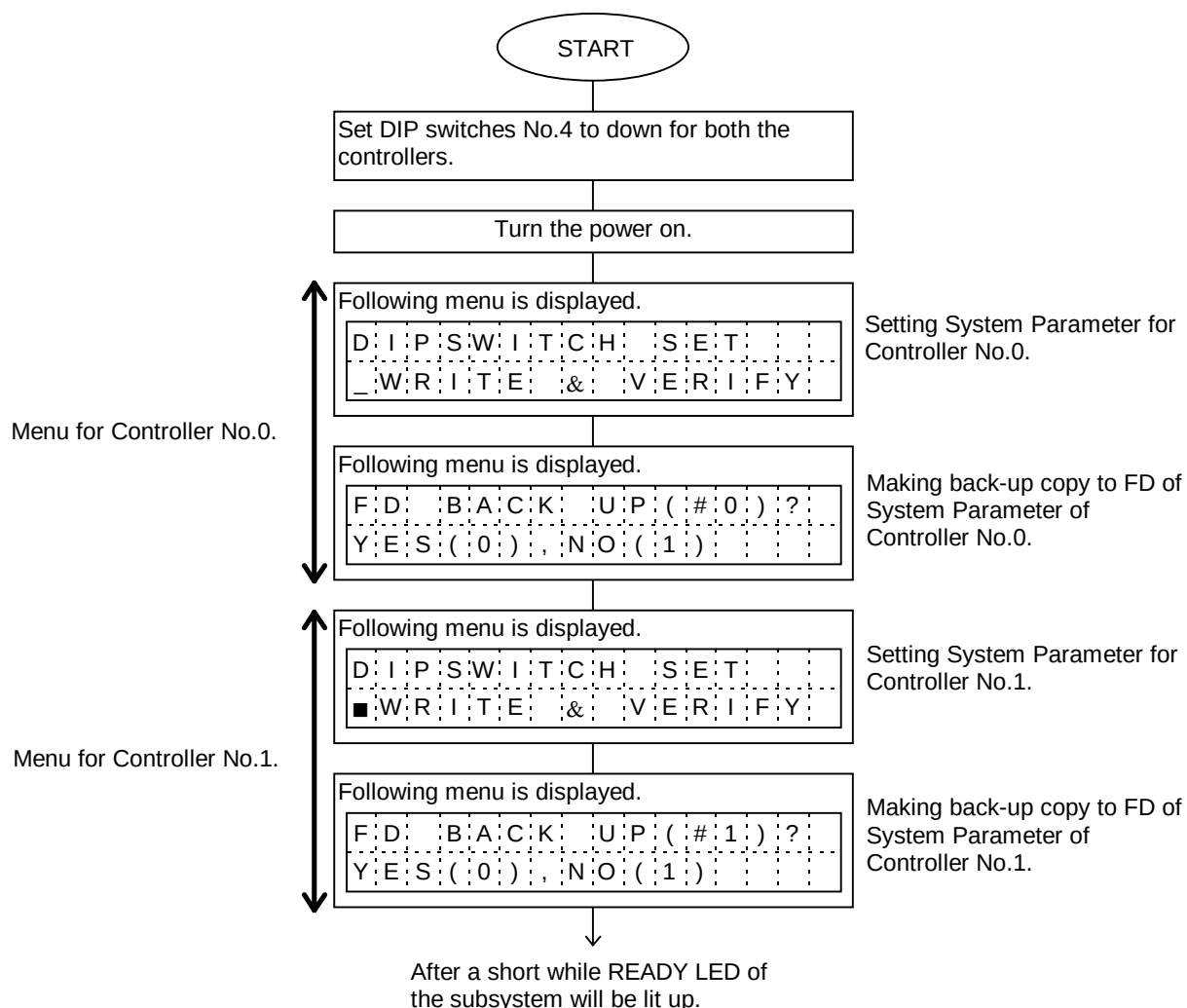
Figure 5.1.2 DIP Switch, shifting to Dual System has not started yet.

Note 1 : When setting Dual mode under dual controller, the setting of controller No.0 will be valid. The setting of controller No.1 will be ignored.

Note 2 : After switching to Dual Active configuration from Hot Standby configuration, Controller No.0 will be the LU Service Controller for previously set LU. To switch LU Service Controller No.1, see “6 PANEL Chapter” (PANEL0370 (2-5)).

5.1.1 Operation of system parameter setting menu under dual controller configuration

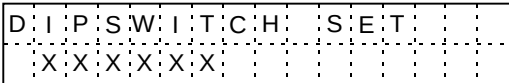
Set DIP switches No.4 to down for both controllers under dual controller configuration, and turn the power off to set the information on EEPROMs of both the controllers.



Note : In case one of DIP switches No.4 is set to down under dual controller configuration, after completion of menu setting for the corresponding controller, READY LED of the subsystem will be lit up.

5.1.2 Returning procedure in system parameter setting menu

During system parameter setting menu when wrong menu is selected ( key is pressed), the method of returning for each menu is shown below.

After the operation below  is displayed.

(XXXXXX : Wrongly selected menu)

Then select desired menu by pressing  or  key.

No.	Menu	Procedure to return
1	WRITE&VERIFY	Press  key.
2	STRIPE SIZE	Press  key.
3	LAN CONST	Press  key to display "QUIT" and press  key.
4	CONNECT VMS	Press  key.
5	ERROR INF	Press  key.
6	CONTROLLER	Press  key.
7	SPARE DISK	Press  key.
8	SERIAL NO	Press  key.
9	ROM V/R	Press  key.
10	RAM V/R	Press  key.
11	ROW LAST LBA	When Menu is ROW LAST LBA : Press  key to display "QUIT", then press  key.
12	BUZZER	Press  key.
13	SYSTEM ERROR	Press  key.
14	INQUIRY INF	Press  key to display "QUIT" and press  key.
15	RTC SET	Press  key to display "QUIT(ENT KEY)" and press  key.

6. Subsystem Settings for Use in Special Modes

6.1 When Connecting to Host Board Adapter Based on HP Tachyon

When connecting the subsystem to the Host Board Adapter based on the HP Tachyon, change the subsystem mode to this mode before using the subsystem.

- (1) Before turning the power on, set DIP switch No.4 as Figure 6.1.1.

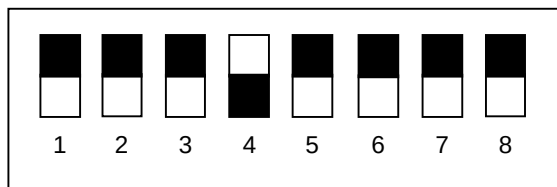
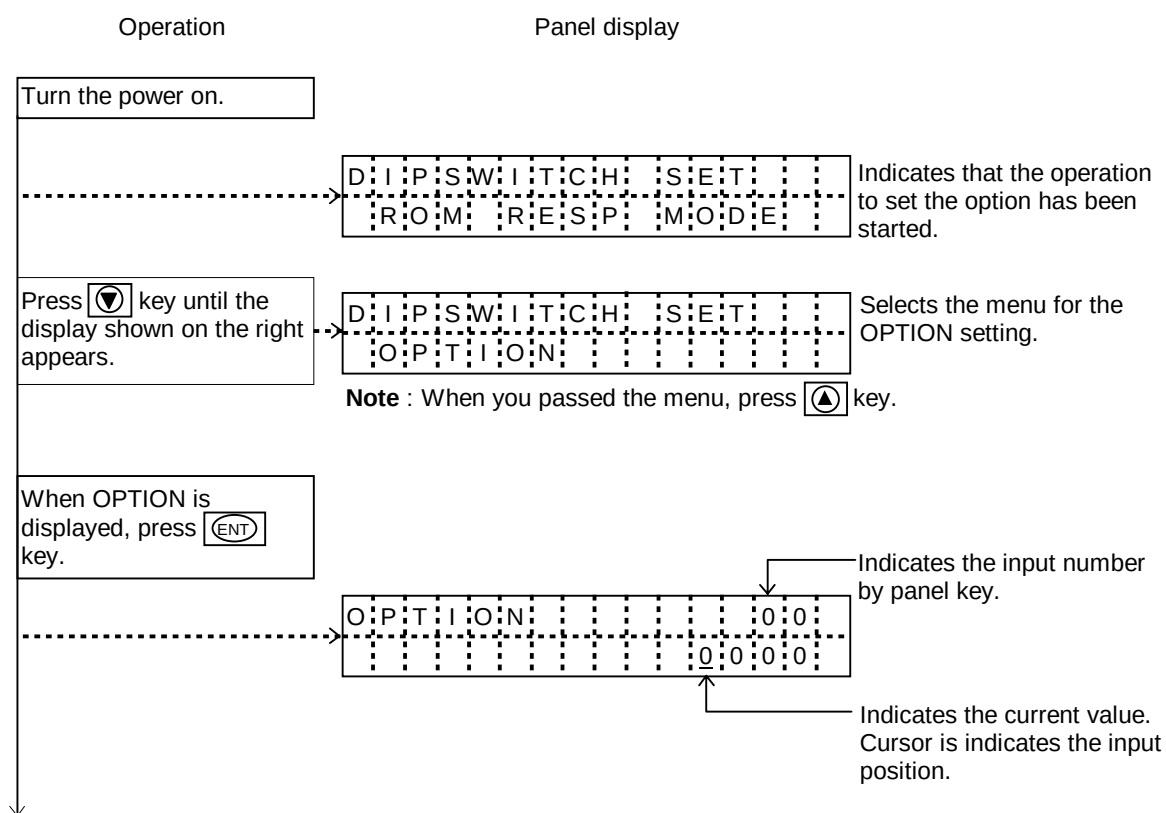
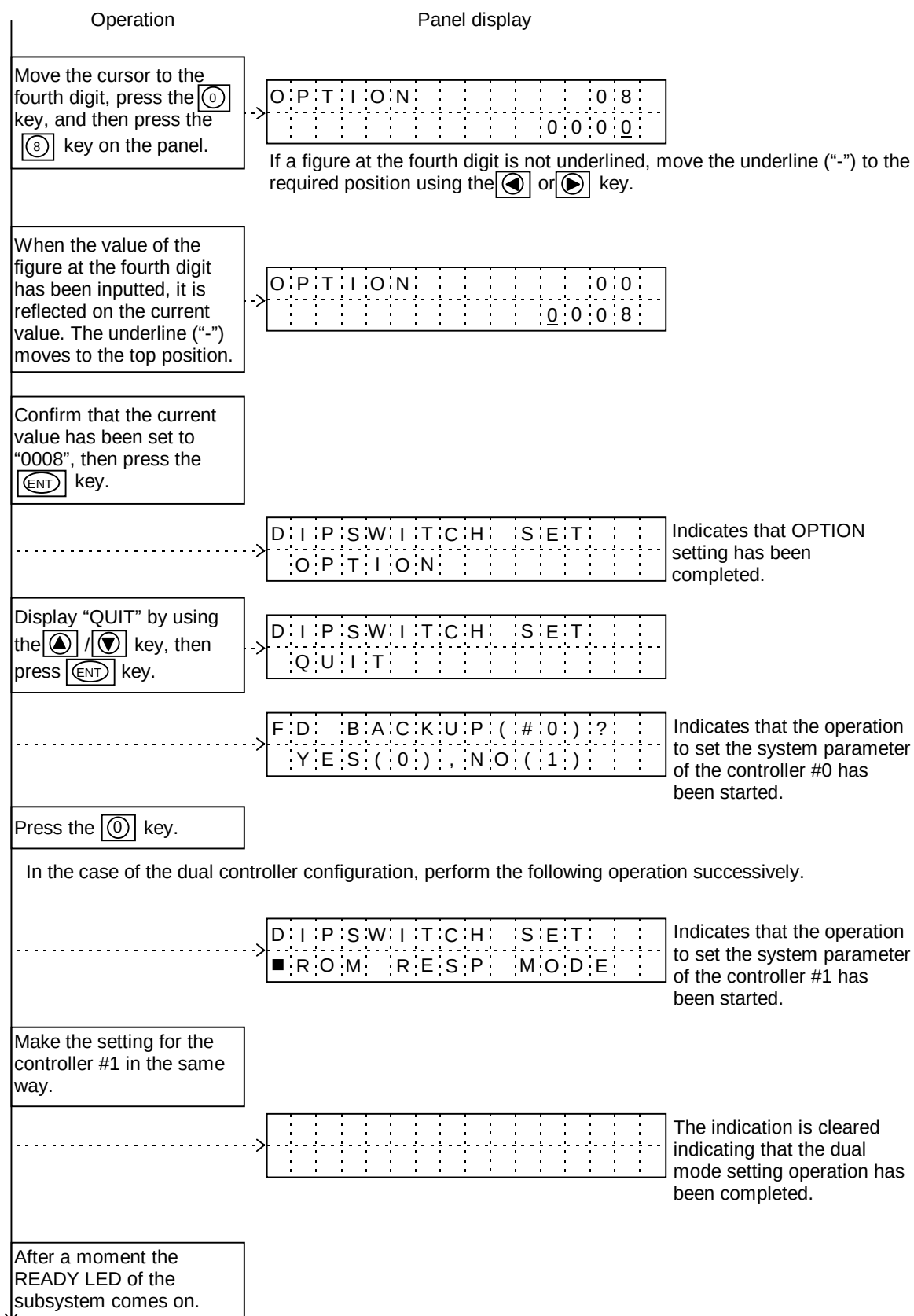


Figure 6.1.1 DIP Switches (Being set for System parameter settings)

- (2) Perform as the procedure shown below.





(3) Set the DIP switch No.4 as shown in Figure 6.1.2.

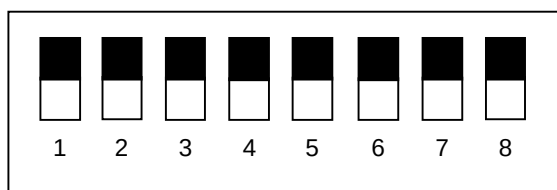


Figure 6.1.2 DIP switches (Being set for Standard setting)

6.2 When Using I/O Path Switching Function in the State Being Connected to Sequent NUMA-A

When using the I/O path switching function in the state being connected to Sequent NUMA-A, setting of the emulation mode and the setting of the TRESPASS mode from the SVP function is needed.

- (1) Before turning the power on, set DIP switch No.4 as Figure 6.2.1.

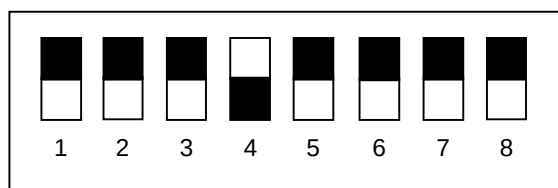
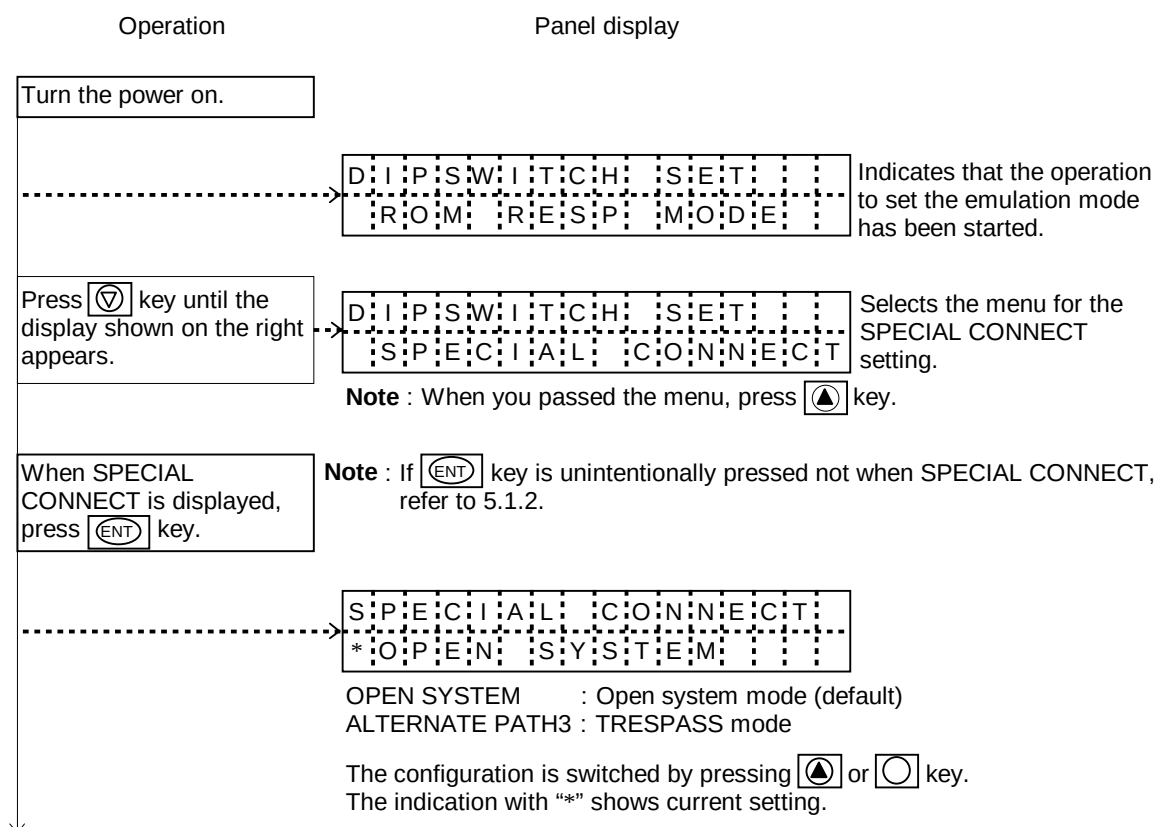
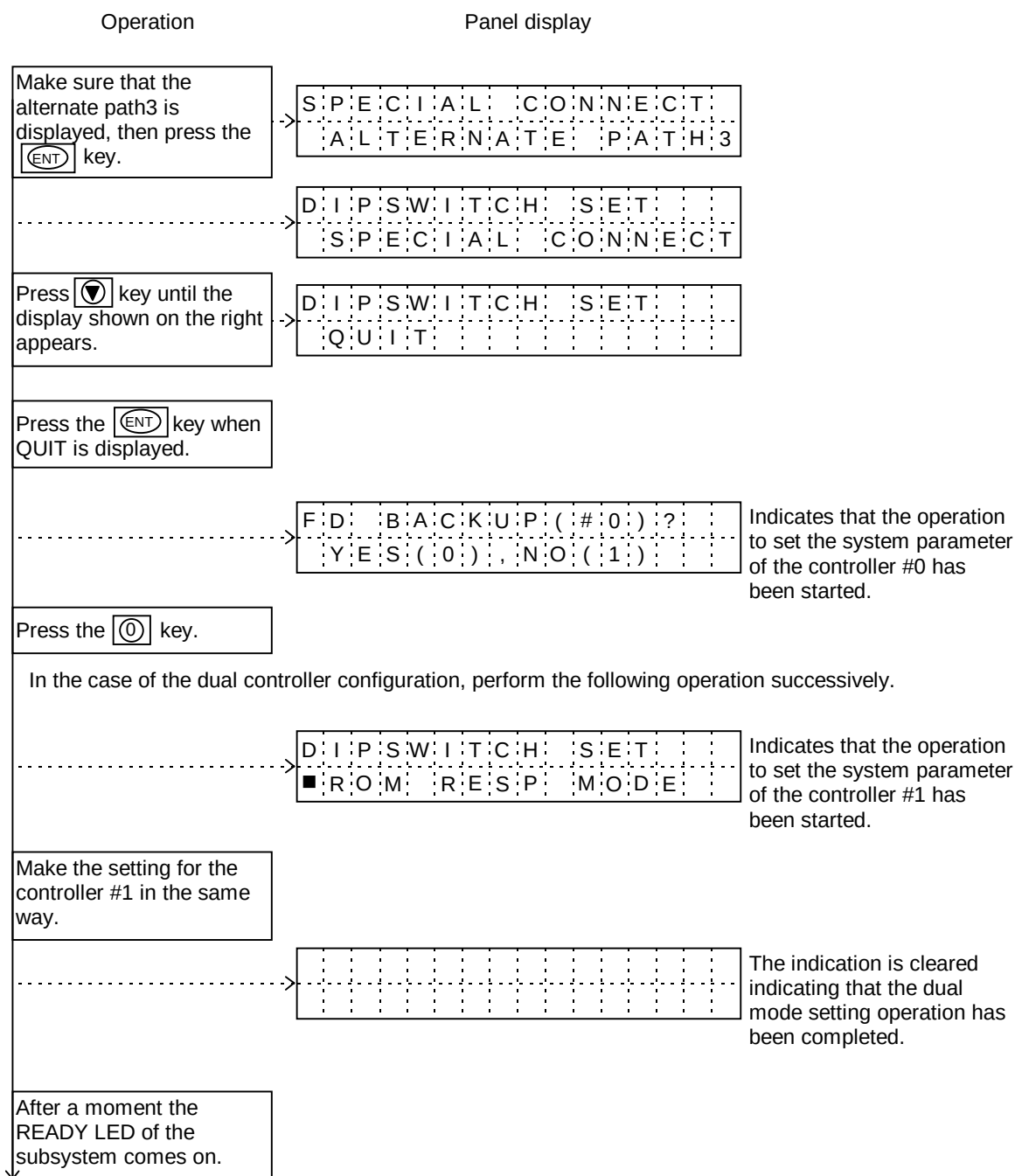


Figure 6.2.1 DIP Switches (Being set for System parameter settings)

- (2) Perform as the procedure shown below.





(3) Set the DIP switch No.4 as shown in Figure 6.2.2.

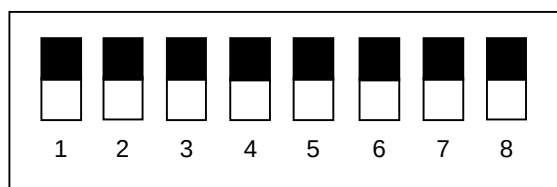
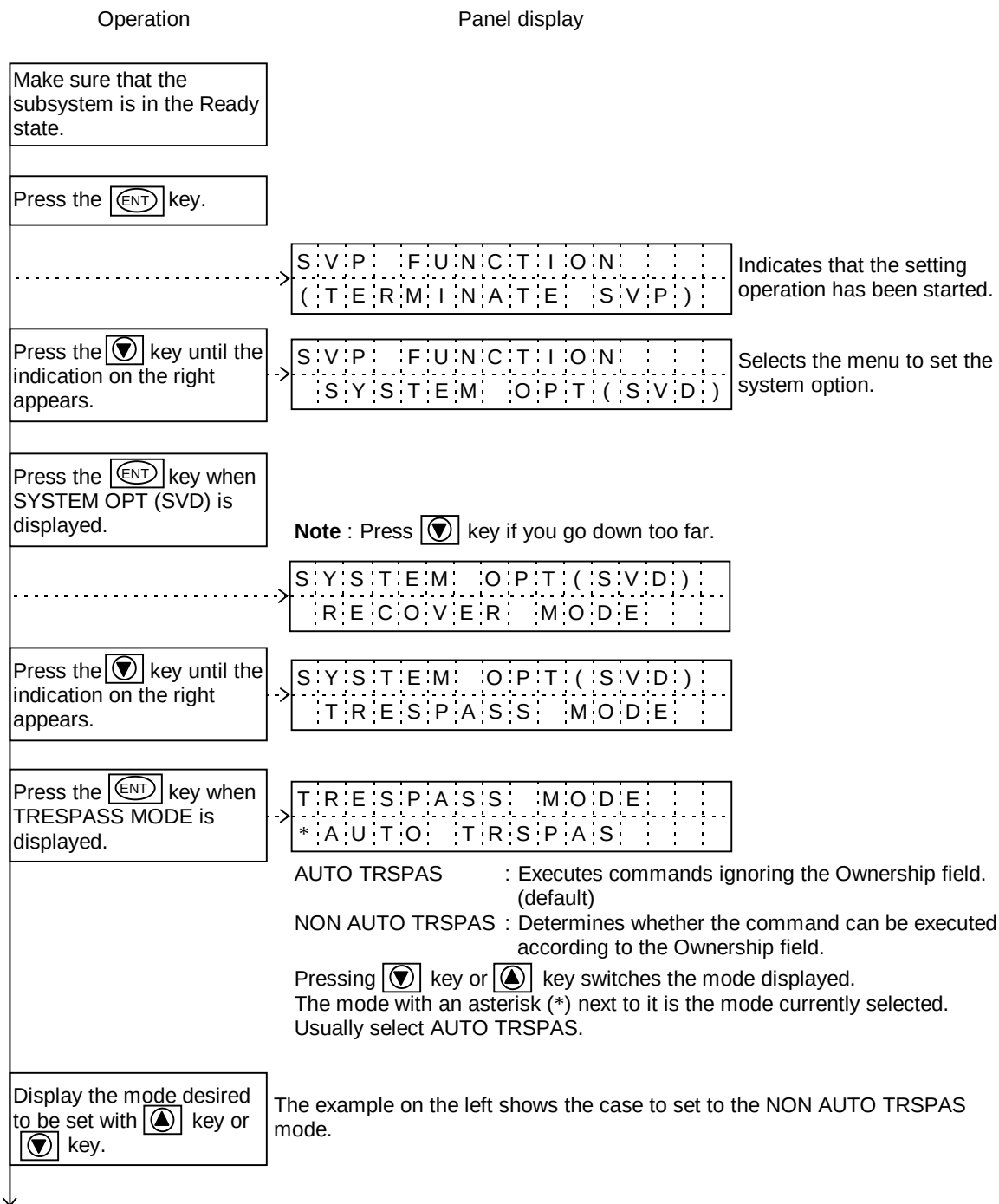
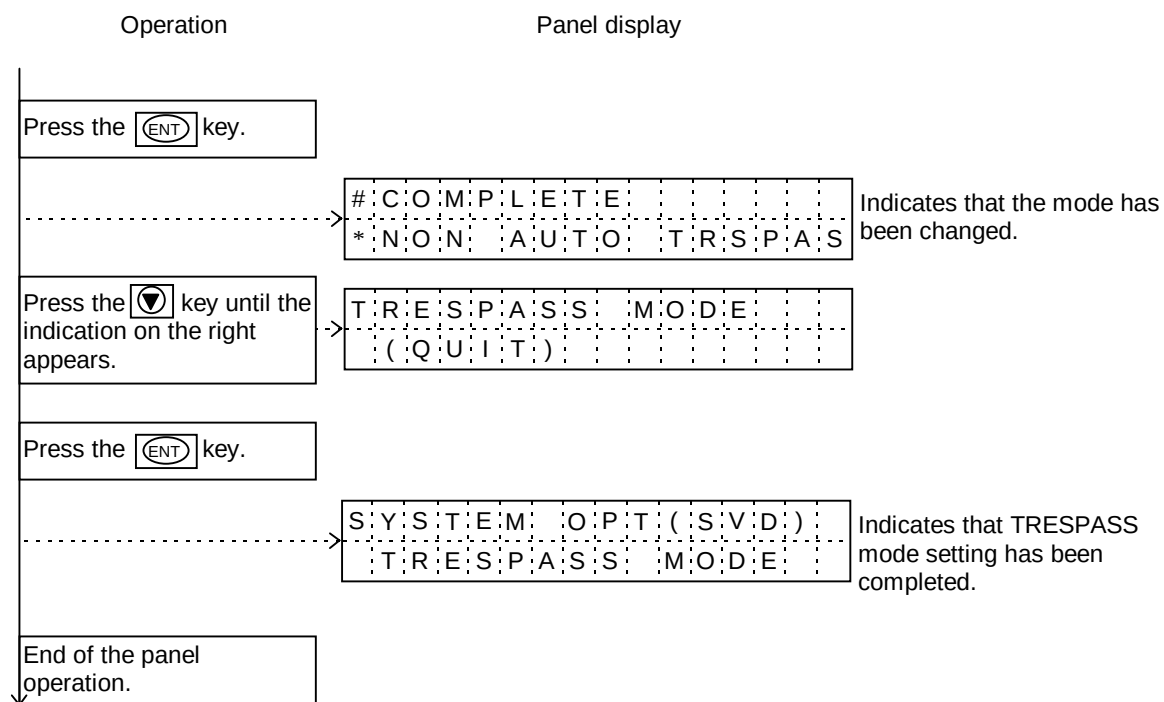


Figure 6.2.2 DIP switches (Being set for Standard setting)

(4) Setting the TRESPASS mode.

This function can be used when the subsystem is in the Ready state. (There is no need to set the DIP switch or reset the power. Ready/write operation cannot be executed from the host while this operation is being performed. When the host command is received, "Not Ready" is returned to the host.)





6.3 Using in the DATA SHARE MODE

- (1) Before turning the power on, set DIP switch No.4 as Figure 6.3.1.

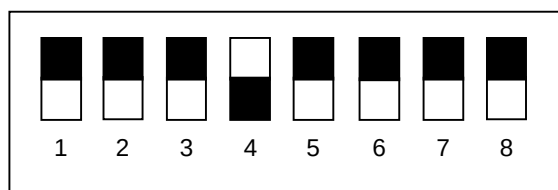
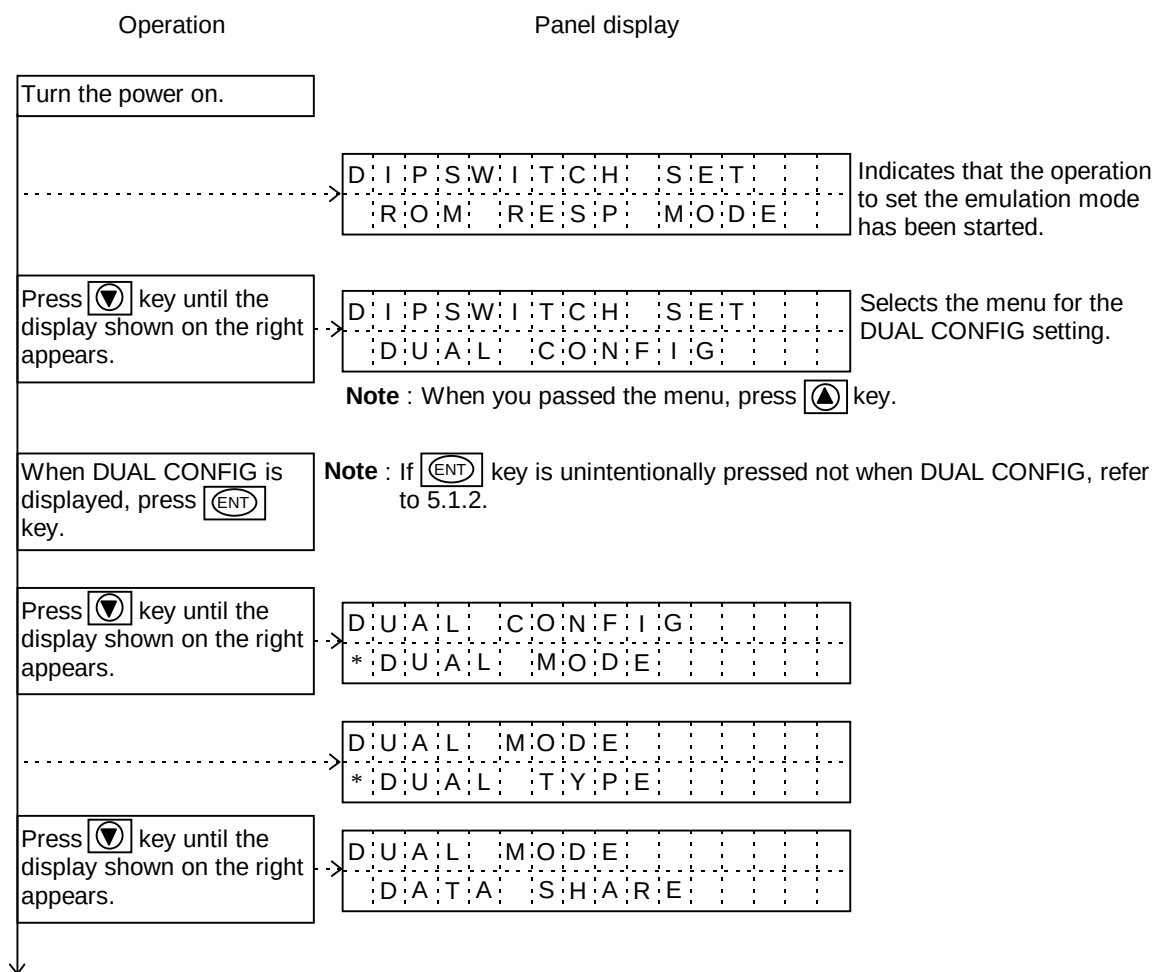
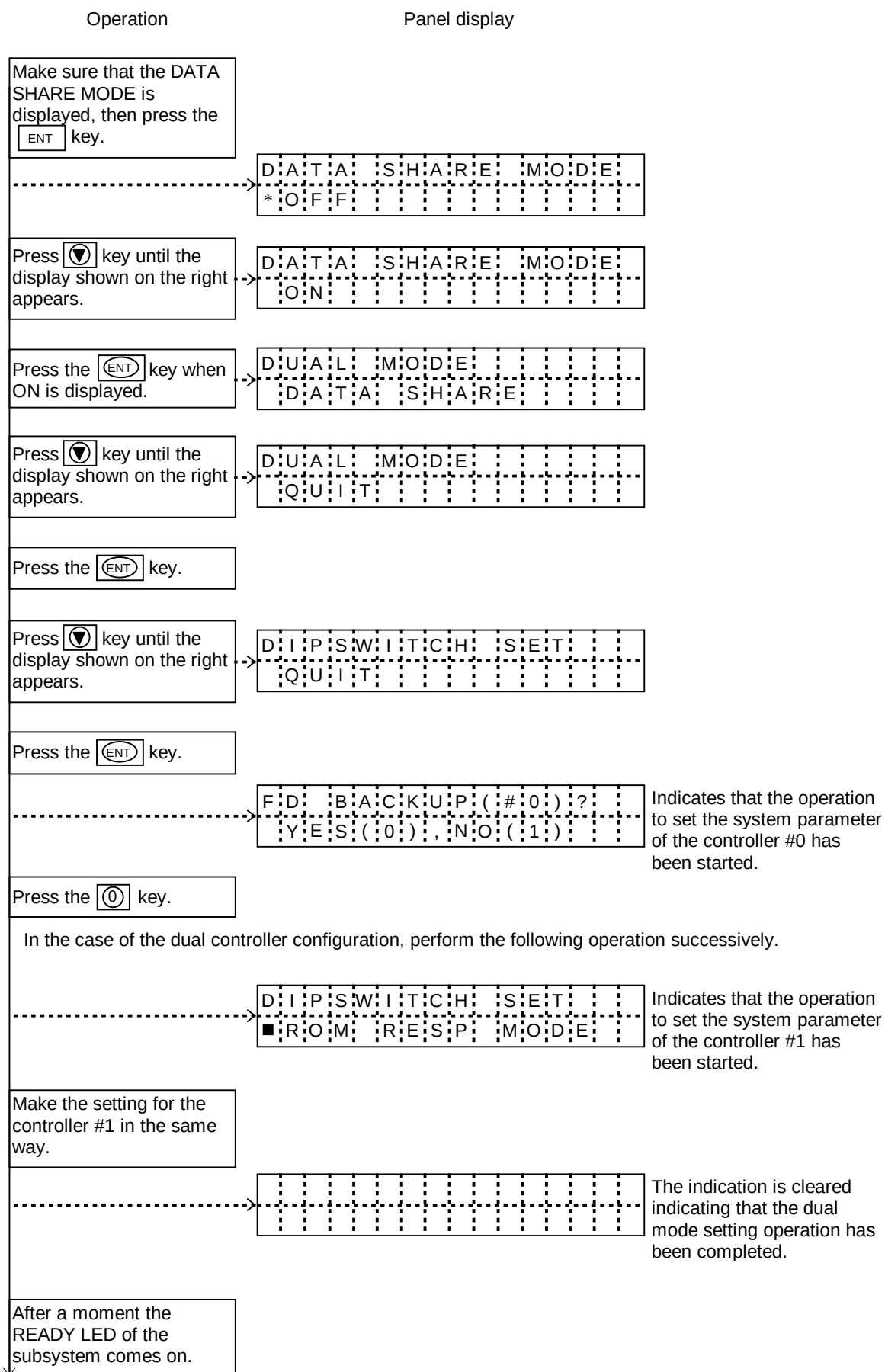


Figure 6.3.1 DIP Switches (Being set for System parameter settings)

- (2) Perform as the procedure shown below.





(3) Set the DIP switch No.4 as shown in Figure 6.3.2.

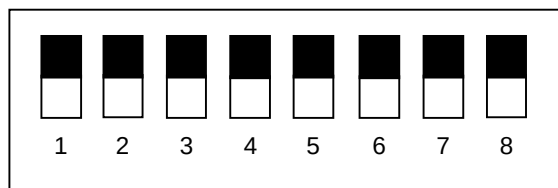


Figure 6.3.2 DIP switches (Being set for Standard setting)

6.4 When Sun OS Solaris 2.5.1 (Aug. '97 version) or Later Is Used by the Host Side

If the following message is displayed on the console screen while executing SUN Format command, use the subsystem with its mode changed to this one.

[Computing capacity exceeds actual disk capacity.]

- (1) Before turning the power on, set DIP switch No.4 as Figure 6.4.1.

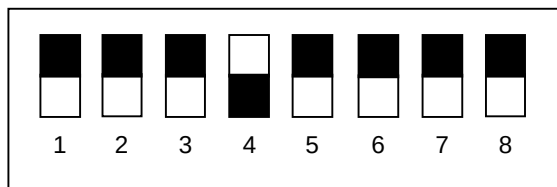
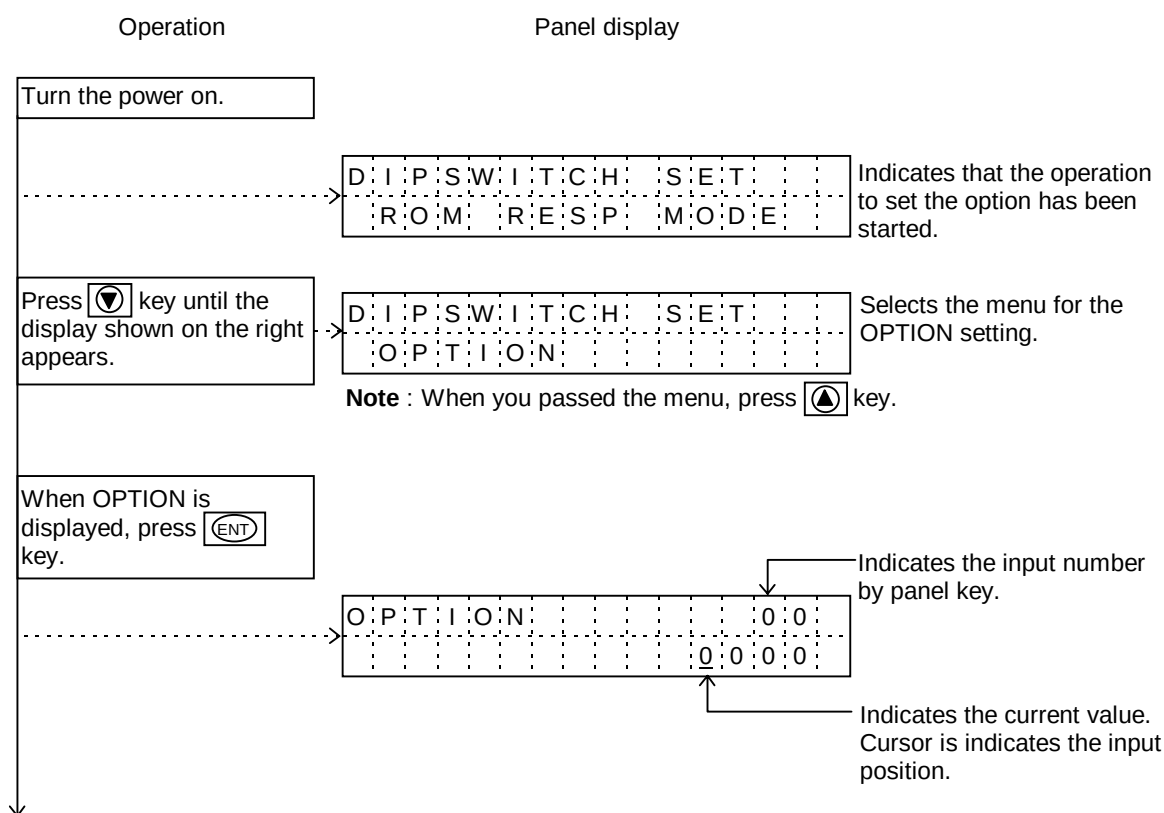
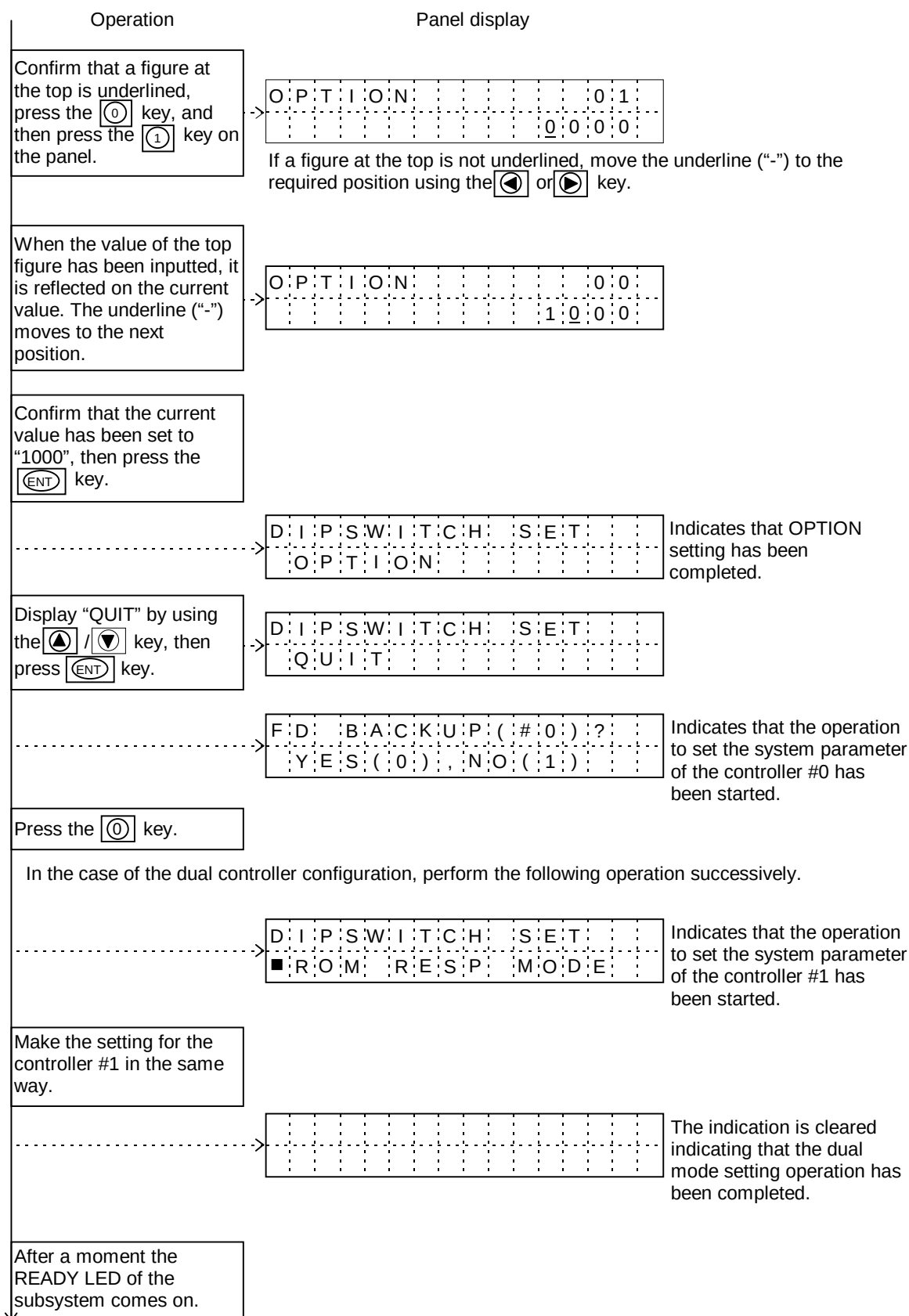


Figure 6.4.1 DIP Switches (Being set for System parameter settings)

- (2) Perform as the procedure shown below.





(3) Set the DIP switch No.4 as shown in Figure 6.4.2.

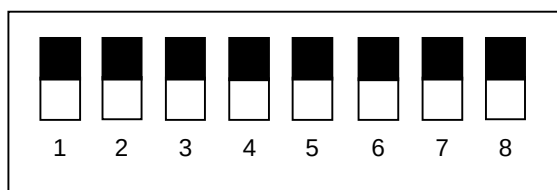


Figure 6.4.2 DIP switches (Being set for Standard setting)

6.5 When Using the Subsystem in LU Blockade Mode

When the subsystem is used in this mode, if a blockade failure occurs on the second disk in the same ROW, the disk concerned is blocked and the LU in which the disk concerned is included is blocked.

When the LU is blocked, data cannot be read from or written onto the LU concerned. If the blocked LU is accessed, a sense key/sense code=0313180 is reported.

To use the subsystem in this mode, the microprogram must be Ver.0355/B or later.

- (1) Before turning the power on, set DIP switch No.4 as Figure 6.5.1.

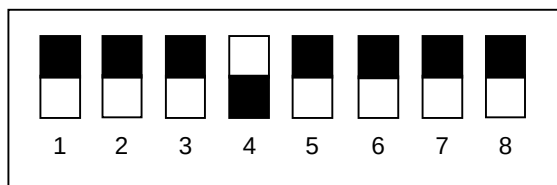
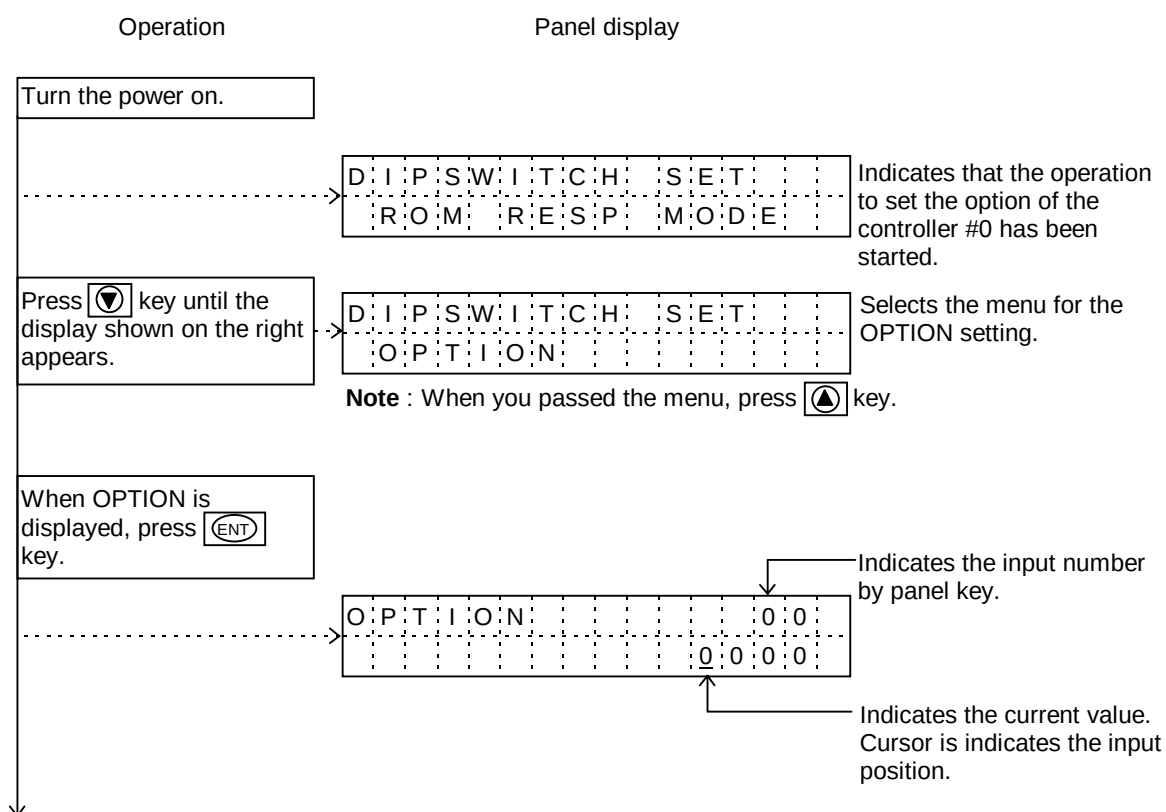
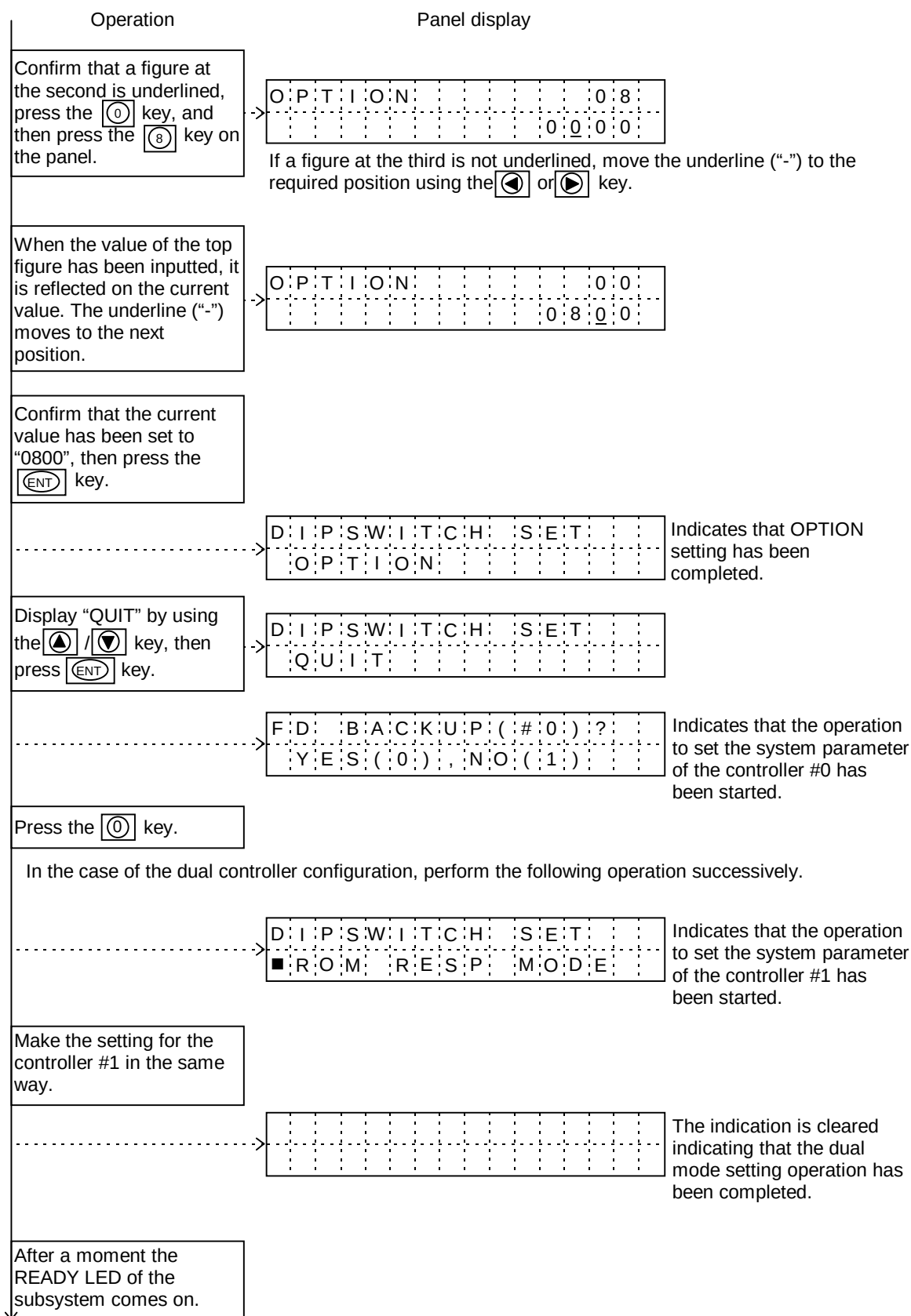


Figure 6.5.1 DIP Switches (Being set for System parameter settings)

- (2) Perform as the procedure shown below.





(3) Set the DIP switch No.4 as shown in Figure 6.5.2.

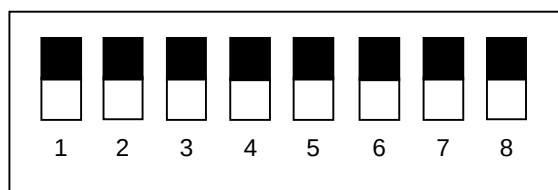


Figure 6.5.2 DIP switches (Being set for Standard setting)

DF350F Disk Subsystem
9. OPTIONAL INSTALLATION
(Cabinet Type)

Rev.2

REVISION CONTROL

Legend for revision codes : AD : Addition CH : Change CR : Correction DL : Deletion

[illegible]

1. Note when Installing the Optional Features

- (1) Be sure to back-up copy user data before installing the optional features. A miss-operation might cause the loss of user's data.
- (2) Back-up the system parameter according to "Back-up Procedure of System Parameter". (See CK-OPTION0050.)
- (3) Power off the subsystem according to power off procedure before installing the optional features. If not, user's data might be lost.

2. Installing the Optional Features

2.1 Unit Appearance Check

Check visually the unit appearance for distortion or damage during the transportation.

2.2 Checking Items of System Components and the Other Items Shipped with the Unit

Check items and quantities of system components (model, serial number, and quantity) and other items shipped together with the unit. Cross-check with the packing list.

2.3 Back-up Procedure of System Parameter

There are cases where System Parameters (Buzzer setting, drive recovery mode, etc.) are need to be copied to FD or restored from FD when installing optional parts or replacing parts. In this case, copy or restore system parameters following “Back-up procedure to FD” (See CK-OPTION0050) or “Restoring procedures from FD” (See CK-OPTION0080).

(RAID configuration setting, LU configuration setting, etc. are not contained in system parameter.)

2.3.1 Back-up procedure to FD

- (1) Turn the power off according to CK-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

- (2) Before power on the subsystem, set DIP switch No.4 as shown in Figure 2.3.1.

Note : Be sure to set the same data for both controllers if the dual controller option (-F3MCF) has been installed.

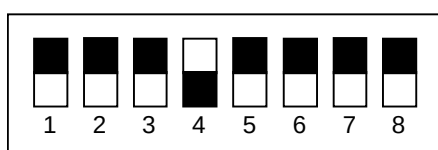
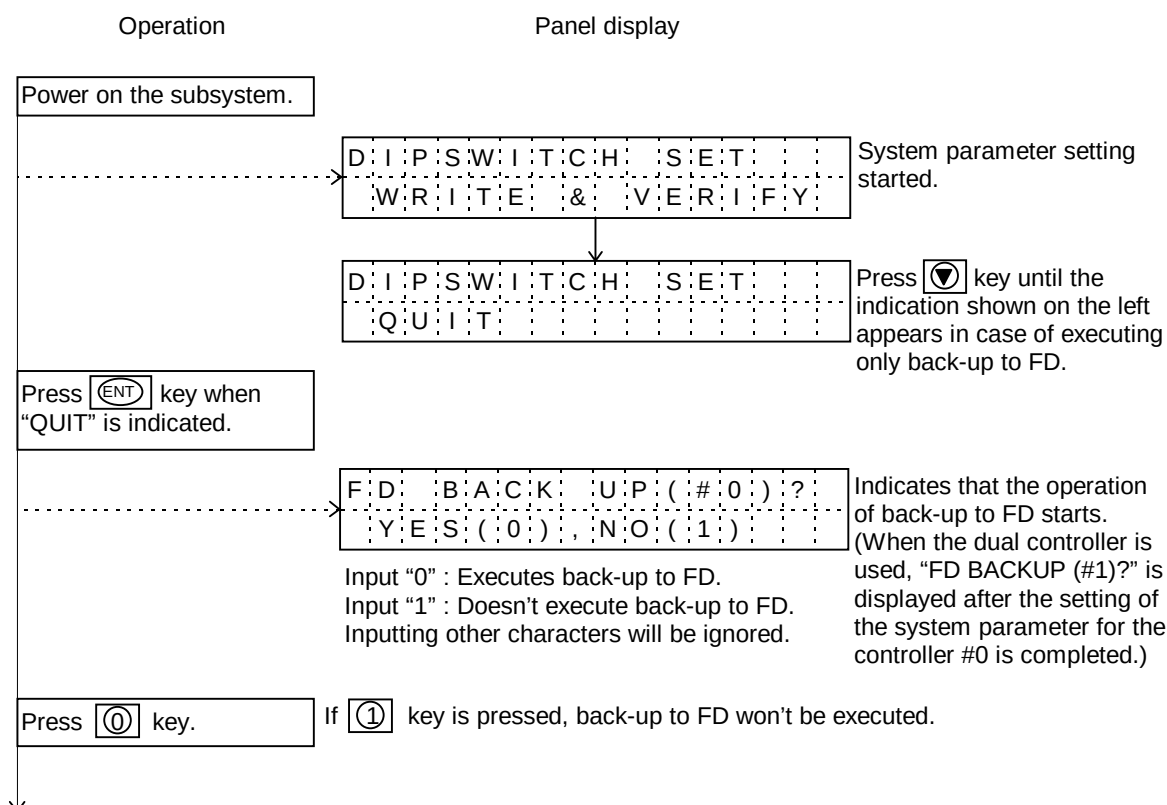
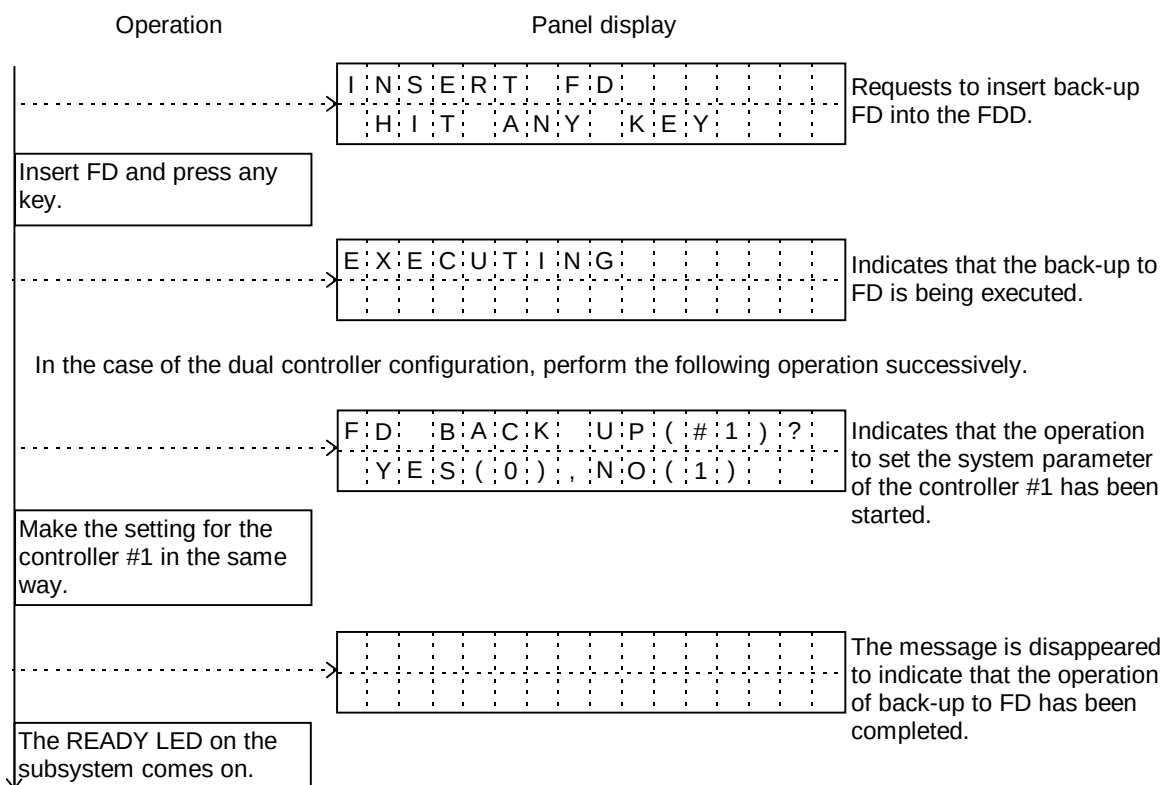


Figure 2.3.1 DIP Switches
(Back-up operation to FD is allowed)

- (3) Operate as described below.





(4) Set DIP switch No.4 as shown in Figure 2.3.2.

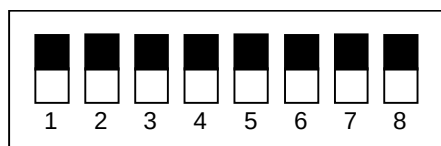
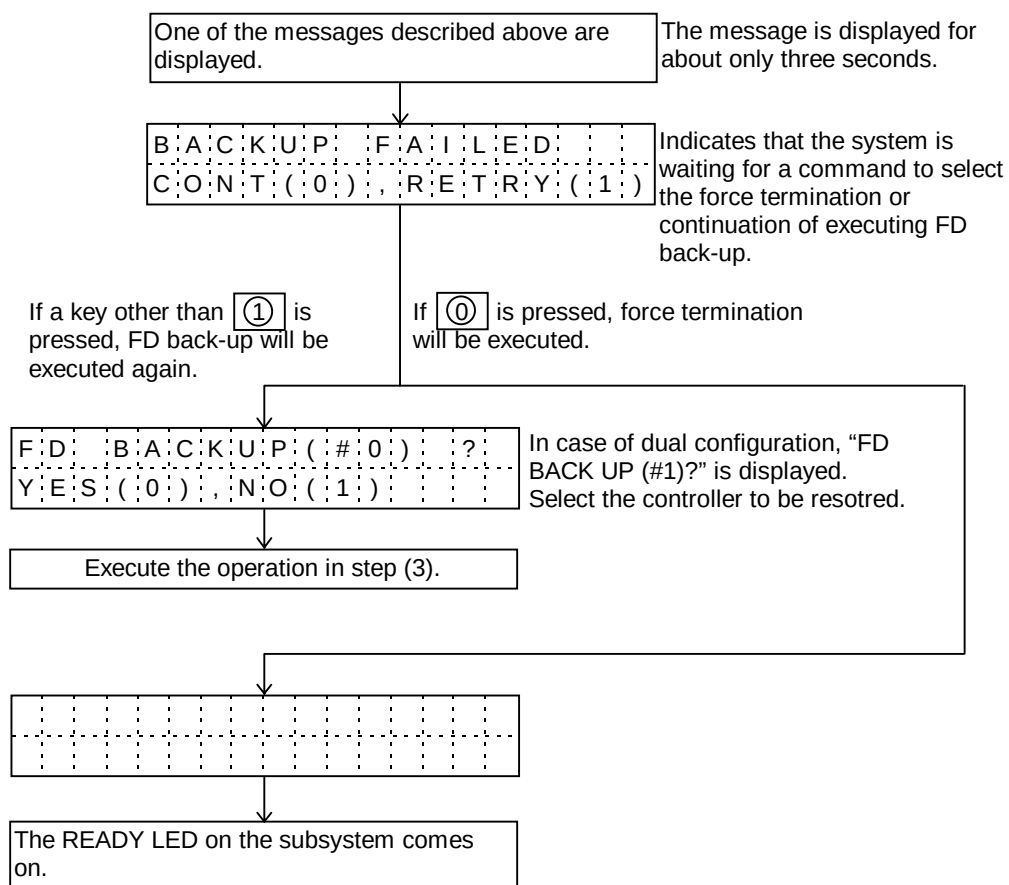


Figure 2.3.2 DIP Switches

Note 1 : While the back-up to FD is being executed, the messages described below are sometimes displayed.

- **FD NOT INSERTED**
FD isn't inserted. Insert FD into the FDD.
- **FD MOTOR NOT STARTED**
Starting of FD Motor ended in failure. Re-execute.
- **FILE WRITE ERROR ("BAD FD INSERTED" (Write-protected))**
FD which was inserted is not formatted, or write-protected. Format or release write-protection.
Write error occurred in FD. Insert another FD.

If these messages are displayed, back-up to FD hasn't been executed. So re-execute following the operation described below.



Note 2 : Use 3.5" FD (1.44MB) formatted by MS-DOS for back-up FD. Besides, note that the FD will be overwritten during back-up.

Note 3 : Even if back-up FD is left at FDD after back-up operation, error won't occur on the subsystem.

2.3.2 Restoring procedures from FD

- (1) Before power on the subsystem, set DIP switch No.3 as shown in Figure 2.3.3.

In case of dual controller system, set both the DIP switches as shown in Figure 2.3.3.

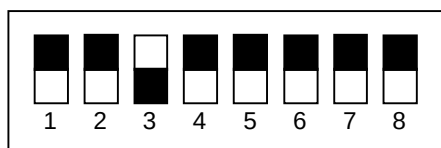
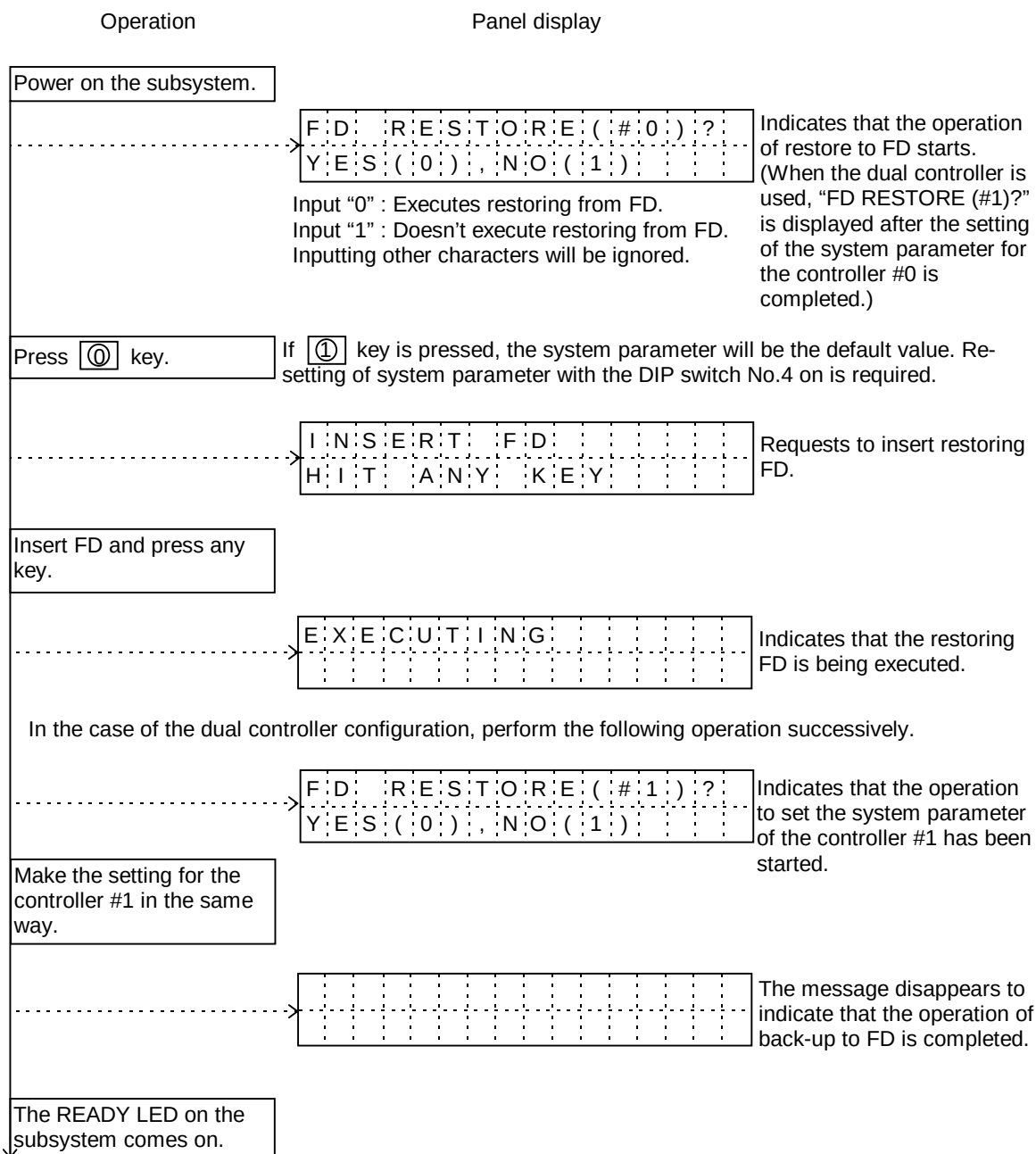


Figure 2.3.3 DIP Switches
(Restoring operation from FD is available)

- (2) Operate as described below.



(3) Set DIP switch No.3 as shown in Figure 2.3.4.

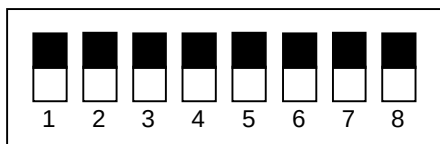
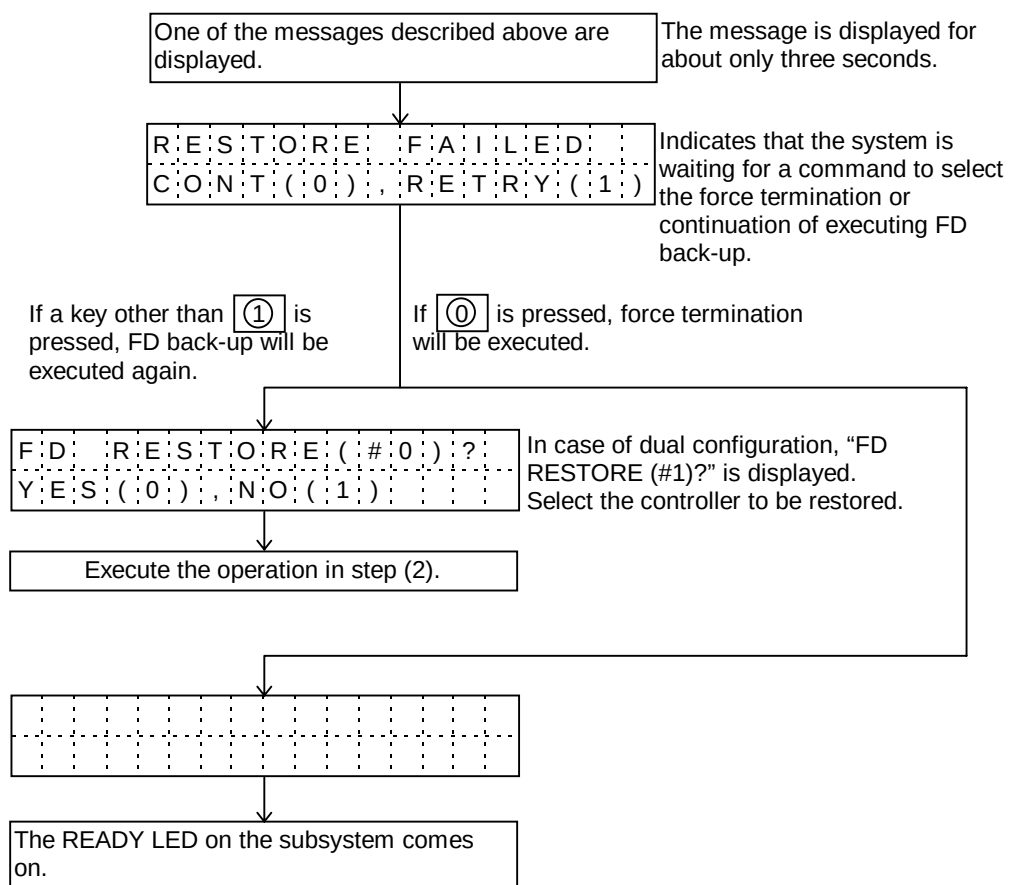


Figure 2.3.4 DIP Switches

Note 1 : While executing the restoring from FD, the messages described below are sometimes displayed.

- **FD NOT INSERTED**
FD isn't inserted. Insert FD into the FDD.
- **FD MOTOR NOT STARTED**
Starting of FD Motor ended in failure. Try again.
- **BAD FD INSERTED**
Inserted FD is not formatted. Format FD.
- **FILE READ ERROR**
Read error occurred in FD. Try again.

If these messages are displayed, restoring from FD hasn't been executed. So re-execute following the operation described below.



Note 2 : In case that restoring operation ended in failure and was force terminated, setting of EEPROM will be default value.

Accordingly, re-setting with the DIP switch No.4 On is required.

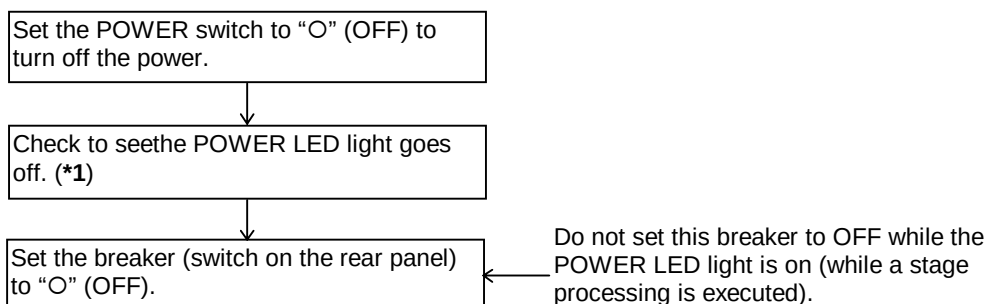
Note 3 : Even if FD which was used to restore is left at FDD after back-up operation, error won't occur on the subsystem.

2.4 Power OFF

Turn off the power correctly according to the Power OFF Procedure (1) shown below.

Notice : If optional features are not installed to the system correctly, user data may be lost.

(1) Power OFF procedure



If a power down occurs or the breaker is set to OFF by mistake before the POWER LED goes off, turn on the power right away according to the "(2) Power ON procedure" below, then execute the power off procedure above.

*1 Check the back-up state of the CACHE memory.

Be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

The CACHE memory of this unit provides write-after control. If data is not yet written, before the power is turned off, the unit automatically writes the data on the CACHE memory to the hard disk. This is called destaging. After this processing is completed, the power is turned off.

If the power is turned off in a state in which destaging cannot be completed due to an unexpected power interruption or a tripped circuit breaker, the CACHE memory switches to the back-up mode using the battery for data integrity. If any equipment of the unit is removed or inserted in this back-up mode, the battery may stop supplying power, resulting in the user data being lost. When you handle any equipment of the unit with the unit power off, be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

• Checking the back-up state of the cache memory

You can determine whether the unit is in the back-up mode by checking the indication of the CACHE PWR (green LED) on the CTL ASSY, as described below.

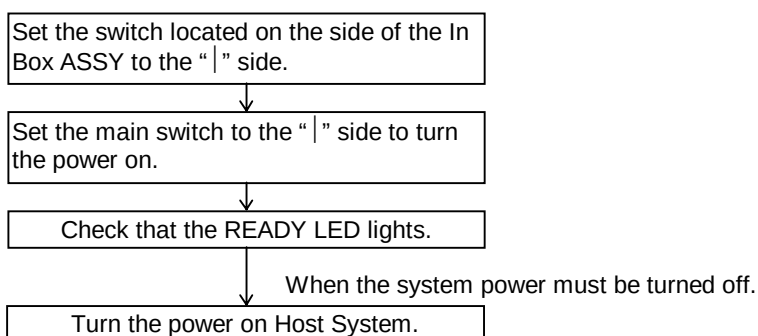
Set the circuit breaker on the rear of the unit to "I" (ON) with the power switch (POWER SW) set to "O" (OFF).

Determine the state of the memory from the indication of the CACHE PWR.

CACHE PWR LED on ----- Indicates the back-up mode.

CACHE PWR LED off ----- Indicates that the back-up mode is canceled.

(2) Power ON procedure



2.5 Installing the CTL ASSY (Upgrading from Single-System to Dual-System) and I/F ADAPTER ASSY

- (1) Insert a back-up floppy disk in a drive and make a back-up copy of the system parameter into the FD.
- (2) Turn off the unit. (See CK-OPTION0110.)

Notice : If the power is not turned off normally, the user's data might be lost.

- (3) Open the side covers.
- (4) Install a CACHE ASSY in the additional CTL ASSY. (Mount a CACHE ASSY of the same capacity in the same corresponding slot of the optional CTL ASSY as those of the already installed CTL ASSY respectively as shown on CK-OPTION0150.)
- (5) Insert the CTL ASSY in a predetermined position with the right and left levers opened. Push the right and left levers in the arrow-marked erection (→) at the same time. (See Figure 2.5.1.)
- (6) Install the additional I/F ADAPTER ASSY. (See Figure 2.5.2.)

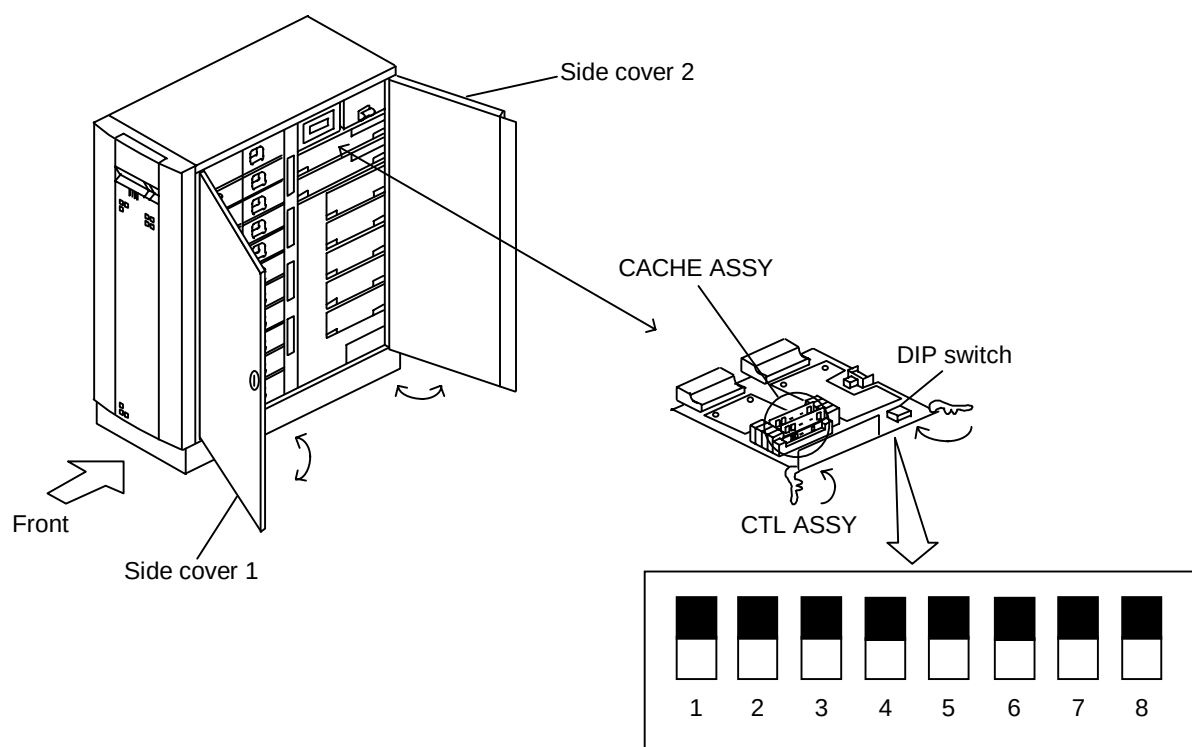


Figure 2.5.1 Installing the CTL ASSY

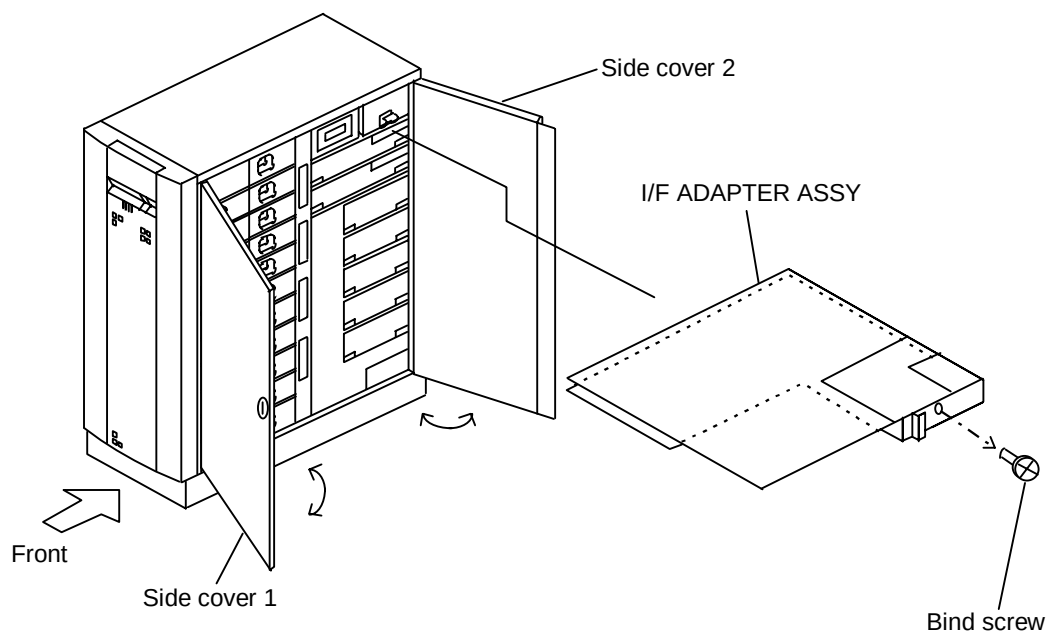
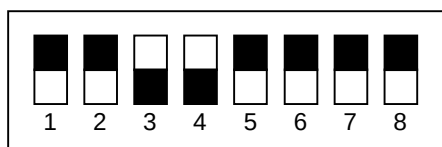


Figure 2.5.2 Installing the I/F ADAPTER ASSY

- (7) Connect Fibre Channel cable, terminator, LAN (option) cable RS232C cable.
- (8) Set the DIP SW of both CTL ASSYs as shown below. (See CK-OPTION0110.)



Note : Be sure to set the DIP SW of both CTL ASSYs.

- (9) Insert the system parameter back-up FD and restore the system parameter data from the FD. (See CK-OPTION0080.)

- (10) When system parameter set up menu appears as below, select “DUAL MODE” in “DUAL CONFIG” (setting of Dual operation attribute) menu. (See PANEL0080.)

Set the items #1, 3, 5, 6, 9, 16, 17 in system parameter set up menu (See PANEL0080) for each controller individually. (The other menus are common menus. Same settings are executed for both controllers. Modification by CTL1 is not available.)

- The system parameter setting menu appears on the panel in the order of CTL0 and CTL1. “■” appears on the panel when the CTL1 system parameter is to be set.

“■” not displayed : CTL0 system parameter is set.

“■” displayed : CTL1 system parameter is set.

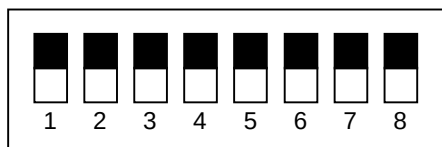


This indicates CTL0 system parameter setting.



This indicates CTL1 system parameter setting.

- (11) After the setting is ended, make a copy of the data into the back-up FD again. (See CK-OPTION0060.)
- (12) Check to see that READY LED is on.
- (13) Turn off the unit (by setting the POWER switch on the front panel to off).
- (14) Set the DIP SW on both boards as shown below.



- (15) Turn on the unit (by setting the POWER switch on the front panel to on). (See CK-OPTION0110.)
- (16) In a short while, the READY LED on the unit comes on.

Check to see “Version = XXXX/X” is displayed on the PANEL, and that corresponds to see system floppy disk version.

- (17) Close the side covers.

2.6 Installing the CACHE ASSY

- (1) Turn off the power according to the power-off procedure in CK-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Trouble shooting Chapter" (See TRBL0030) and turn off the power.

- (2) Open the side covers.

- (3) Remove the CTL ASSY. (See CK-OPTION0120.)

(When a DF-F350F-F3MCF has been installed already, remove both boards, and here after in the same way.)

- (4) Install a CACHE ASSY.

Note 1 : The capacity of the CACHE ASSYs to be mounted in cache slots #0 and #4, slots #1 and #5, slots #2 and #6, and slots #3 and #7 must be the same.

Note 2 : If a DF-F350F-F3MCF has been installed already, mount a CACHE ASSY of the same capacity in the same corresponding slot of the optional CTL ASSY as those of the already installed CTL ASSY respectively.

Note 3 : CACHE ASSY of the largest capacity must be mounted cache slots #0 and #4 in case that CACHE ASSYs of different capacity are used.

- (5) Mount the CTL ASSY.

- (6) Turn on the power according to the power-on procedure in CK-OPTION0110.

- (7) Close the side covers, and turn the power on. (See CK-OPTION0110.)

Installation example of CACHE ASSY

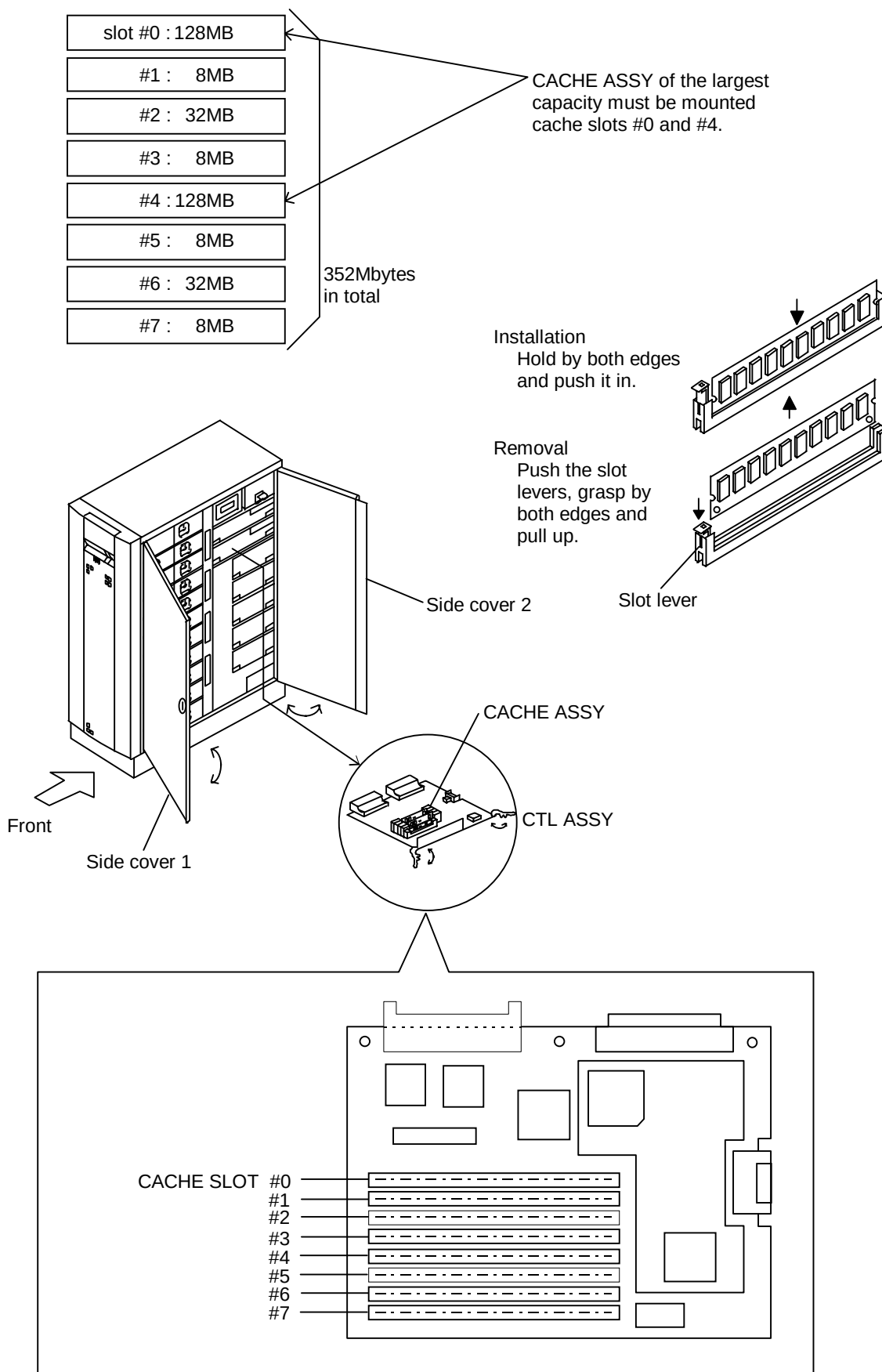


Figure 2.6.1 Installing a CACHE ASSY

2.7 Installing the LAN ASSY

- (1) Turn off the power according to the power-off procedure in CK-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

- (2) Open the side covers.
- (3) Remove the CTL ASSY. (See CK-OPTION0120.)
- (4) Install a LAN ASSY. (See Figure 2.7.1.)

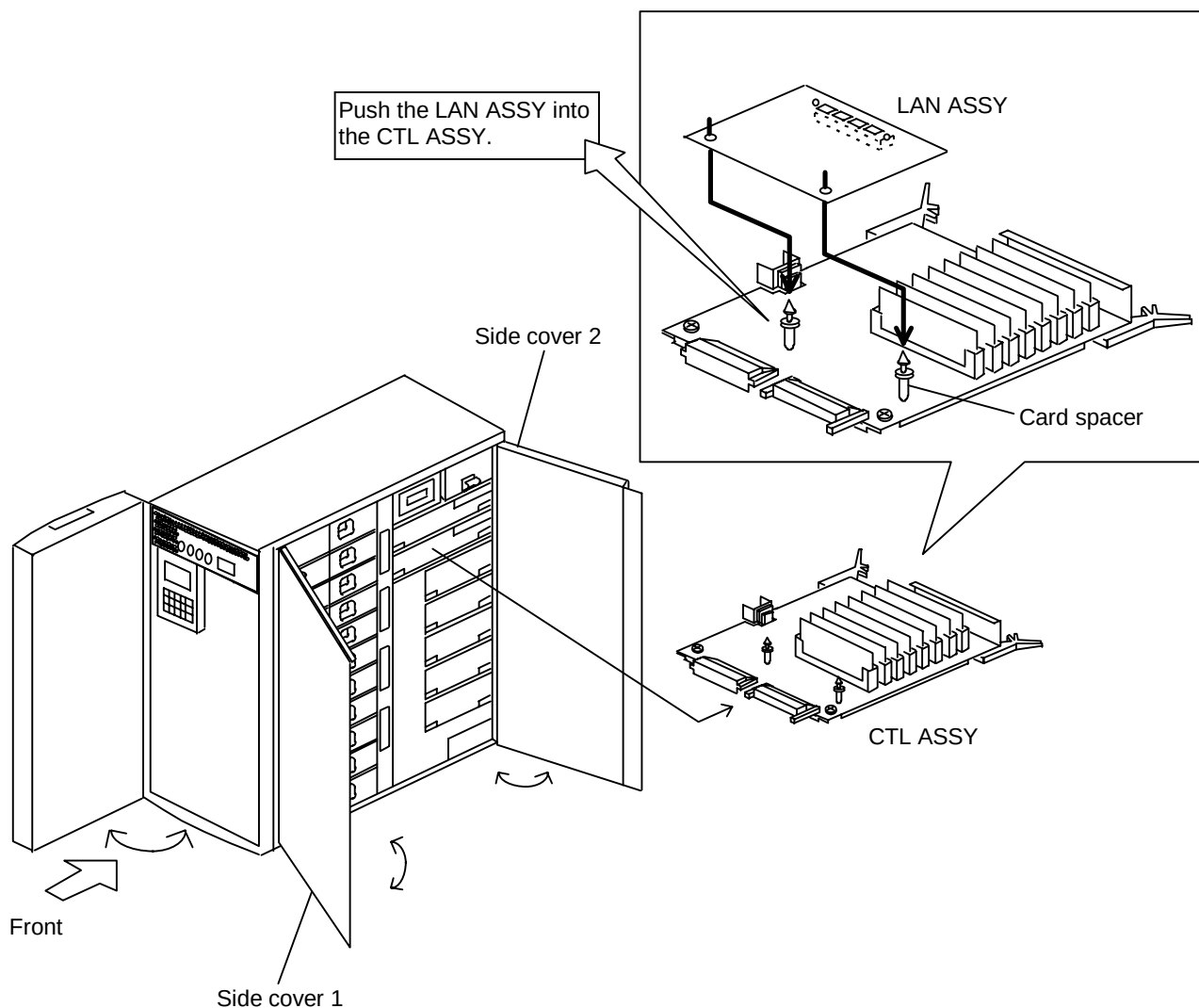
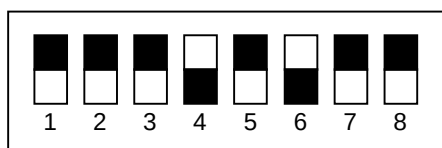


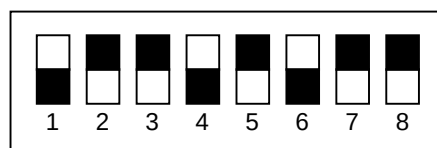
Figure 2.7.1 Installing a LAN ASSY

- (5) Mount the CTL ASSY.
 - (6) Set the DIP switches on the CTL ASSY as described below. (See CK-OPTION0120.) depending on the LAN ASSY to be used.
- (When a DF-F350F-F3MCF has been installed already, be sure to set the DIP switches on both CTL ASSYs.)

[DF-F350-G1M1]

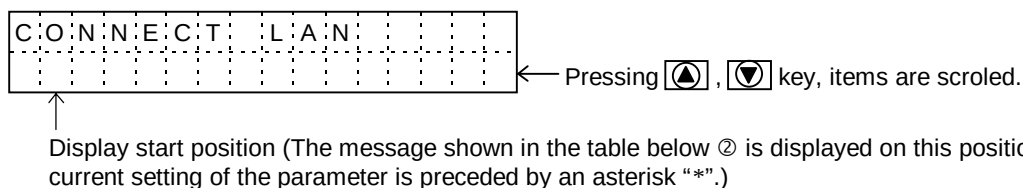


[DF-F350F-G3M1 (SNMP)]



- (7) Turn on the power according to the power-on procedure in CK-OPTION0110.
- (8) Open the front cover.
- (9) Set LAN connection state on the panel.

① Panel display



② Displayed Item

No.	Message display	Description
1	CONNECT	LAN connected
2	NOT CONNECT	LAN not connected

- (10) Set IP address on the panel. (See CK-INST0310)
- (11) Set SUB NET MASK. (See CK-INST0320)
- (12) Set DEFAULT GATEWAY address. (See CK-INST0330.)
- (13) Set System parameter on the panel. (See CK-INST0270.)
- (14) After setting ② in Chapter 5 and selecting “QUIT” on the panel, when “FD BACK UP” appears on the screen, insert a back-up FD and make a back-up copy of the system parameter. The “FD BACK UP” message may not appear for some unit types, so ignore this step in that case.



If this message appears, make a back-up copy of the data in the EEPROM into the BACKUP floppy disk. In case of dual configuration, "FD BACK UP (#1)?" is displayed. Select the controller to be restored.

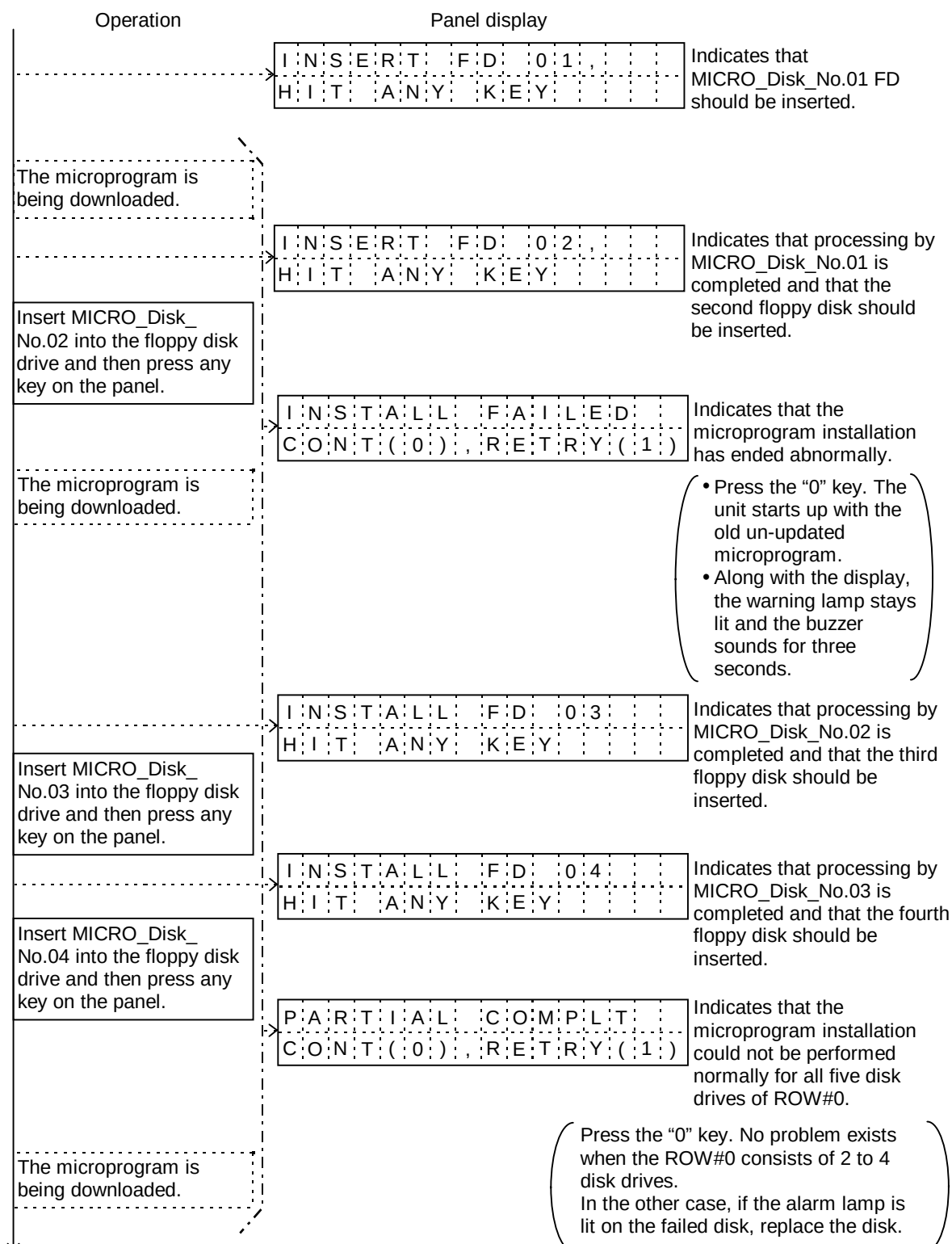
(15) Perform the following procedure.

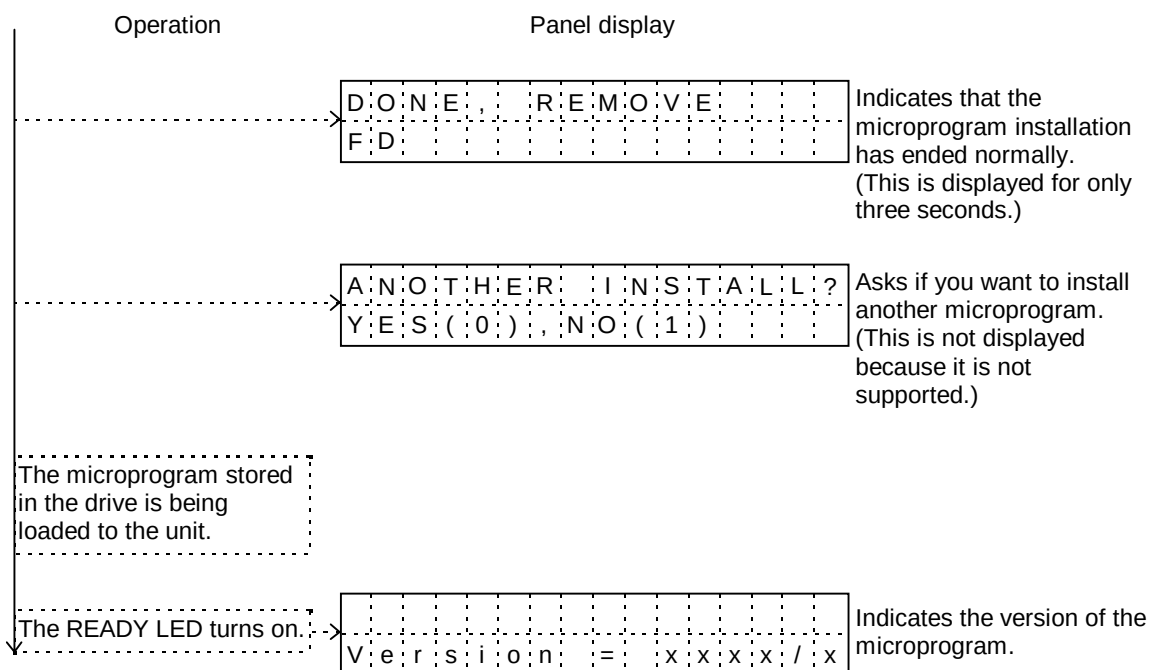
Note : Use a set of four FDs (containing a microprogram corresponding to the SNMP) supplied with the DF-F350F-G3M1 when it is shipped from the factory.

Meanings of the boxes in the "Operation" column

: Operator's action

: Internal state





- (16) Reset the DIP switches (4, 6 or 1, 4, 6) to the original positions after the system is ready.
(When a DF-F350F-F3MCF has been installed already, be sure to set the DIP switches on both CTL ASSYs.)
- (17) Close the front cover.
- (18) Close the side covers.

2.8 Installing the AC/DC Power Supply

- (1) Turn off the power according to the power-off procedure in CK-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

- (2) Removing procedure

- ① Open the side covers.
- ② Loosen the screw ① on the safety cover and disconnect one end of the FG cable.
- ③ Loosen the screws ② on the safety cover and remove the safety cover with moving the plates in the arrow-marked direction (→).
- ④ Insert the redundant AC/DC power supply in a predetermined position and push the handle in the arrow-marked direction (→).
- ⑤ Fix the FG Cable detached in (2) with screw ①.
- ⑥ Close the side covers.

- (3) Turn on the power according to the power-on procedure in CK-OPTION0110.

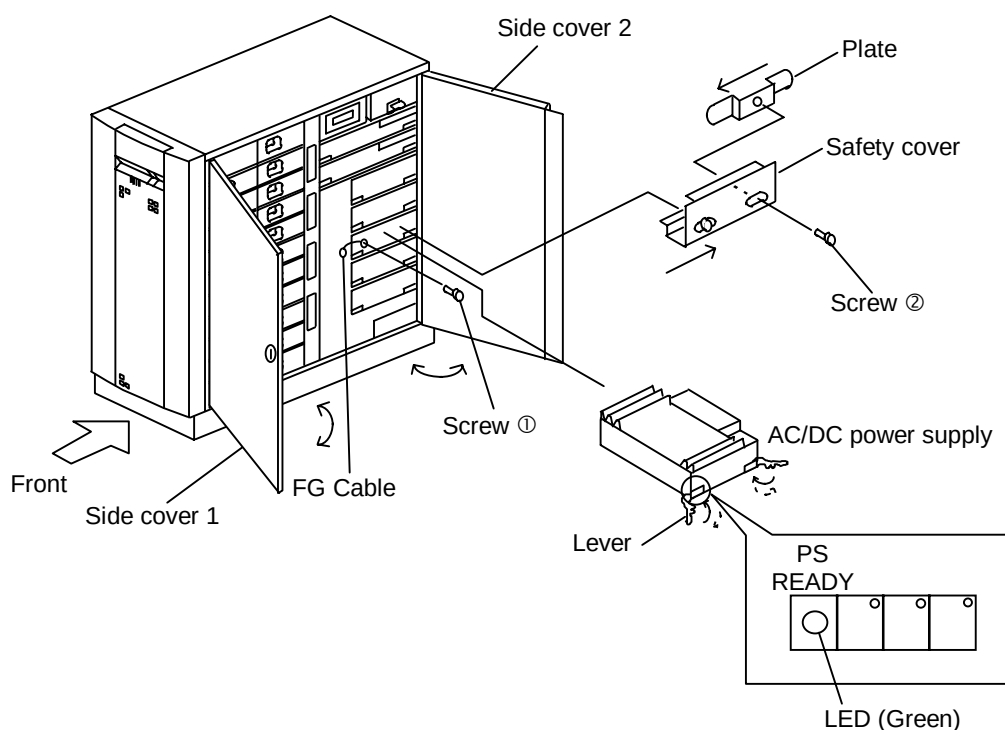
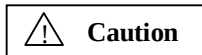


Figure 2.8.1 Installing the AC/DC Power Supply

2.9 Installing the HDU ASSY

Since the procedure differs depending on the cases below, be careful in installing the HDU ASSY.

- [1] Capacity expansion with HDU ASSY exchange
- [2] Capacity expansion with additional HDU ASSY installation
- [3] Installing a spare HDU ASSY



Caution

Do not subject the HDU ASSY to any impact or vibration since it is a precision component.

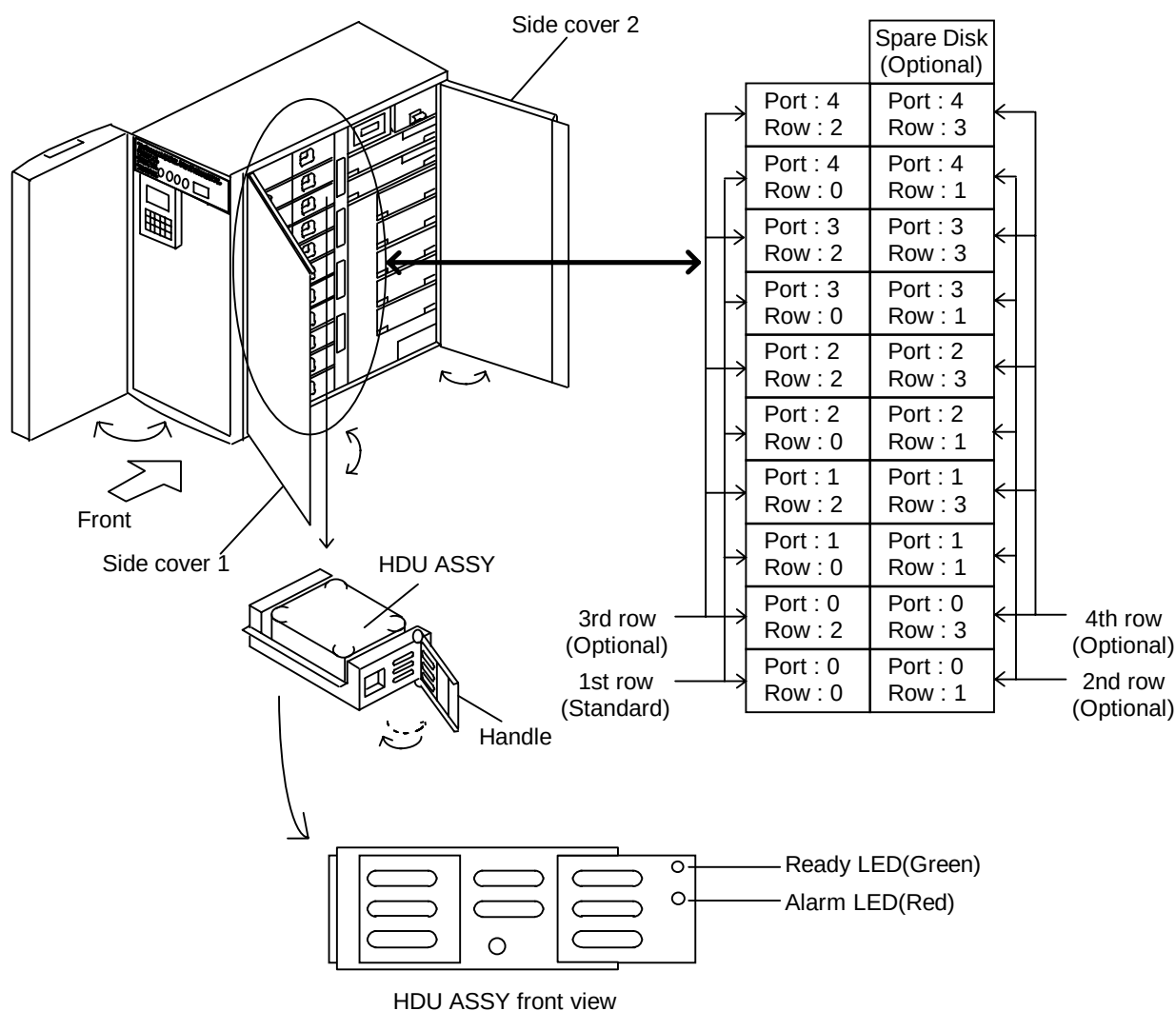


Figure 2.9.1 Installing the HDU ASSY

[1] Capacity expansion with HDU ASSY exchange

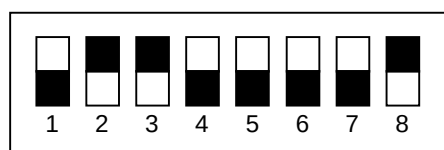
After this operation all the user's data will be lost. Be sure to make a back-up copy of data before beginning this operation. (See CK-OPTION0050.)

- (1) Turn off the power according to the power-off procedure in CK-OPTION0110.

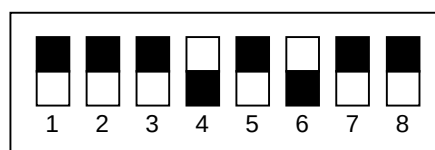
Notice : If the power is not turned off normally, the user's data might be lost.

- (2) Open the front cover and the side covers.
 (3) Remove the old HDU ASSY and set the new HDU ASSY. (See Figure 2.9.1 in CK-OPTION0210.)
 (4) Set the DIP switches on the CTL ASSY as described below.

(When a DF-F350F-F3MCF has been installed already, be sure to set the DIP switches on both CTL ASSYs.)



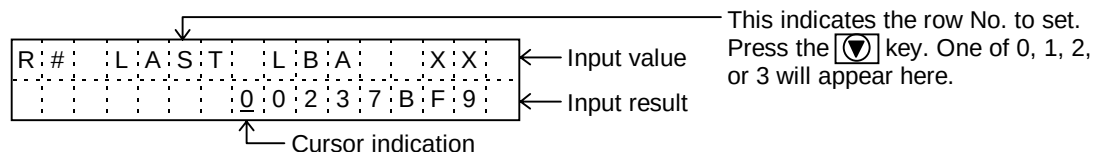
For ROW=0



For ROW≠0

- (5) Turn on the power according to the power-on procedure CK-OPTION0110.
 (6) Set LBA on the panel following the table below. Set the capacity of each drive following the display. (See CK-OPTION0240.)

- When ROW LAST LBA is displayed;



No.	Drive Capacity	Model	Final LBA No. (Hex)
1	2GB	DF-F350-A2E2	(3E696B)16
2	4GB	DF-F350-A2E4 DF-F350-A3E4	(7CD2D7)16
3	8GB	DF-F350-A1E8 DF-F350-A2E8	(1046C97)16
4	18GB	DF-F350-A1E18	(215D9B3)16

- (7) After selecting “QUIT” on the panel, when “FD BACK UP” appears on the screen, insert a back-up FD and make a back-up copy of the system parameter. The “FD BACK UP” message may not appear for some unit types, so ignore this step in that case.



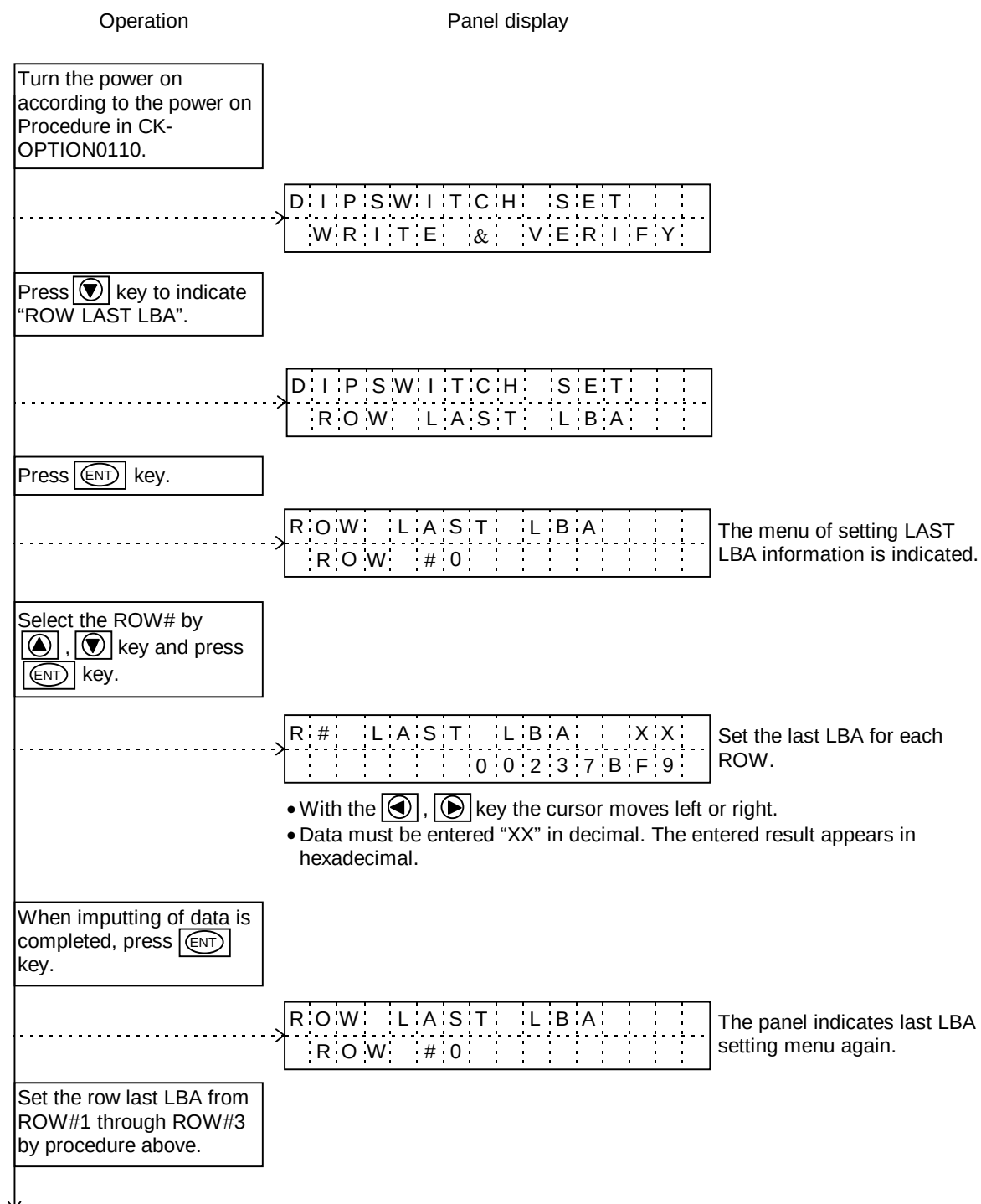
If this message appears, make a back-up copy of the data in the EEPROM into the back-up floppy disk.
In case of dual configuration, “FD BACK UP (#1)?” is displayed.
Select the controller to be restored.

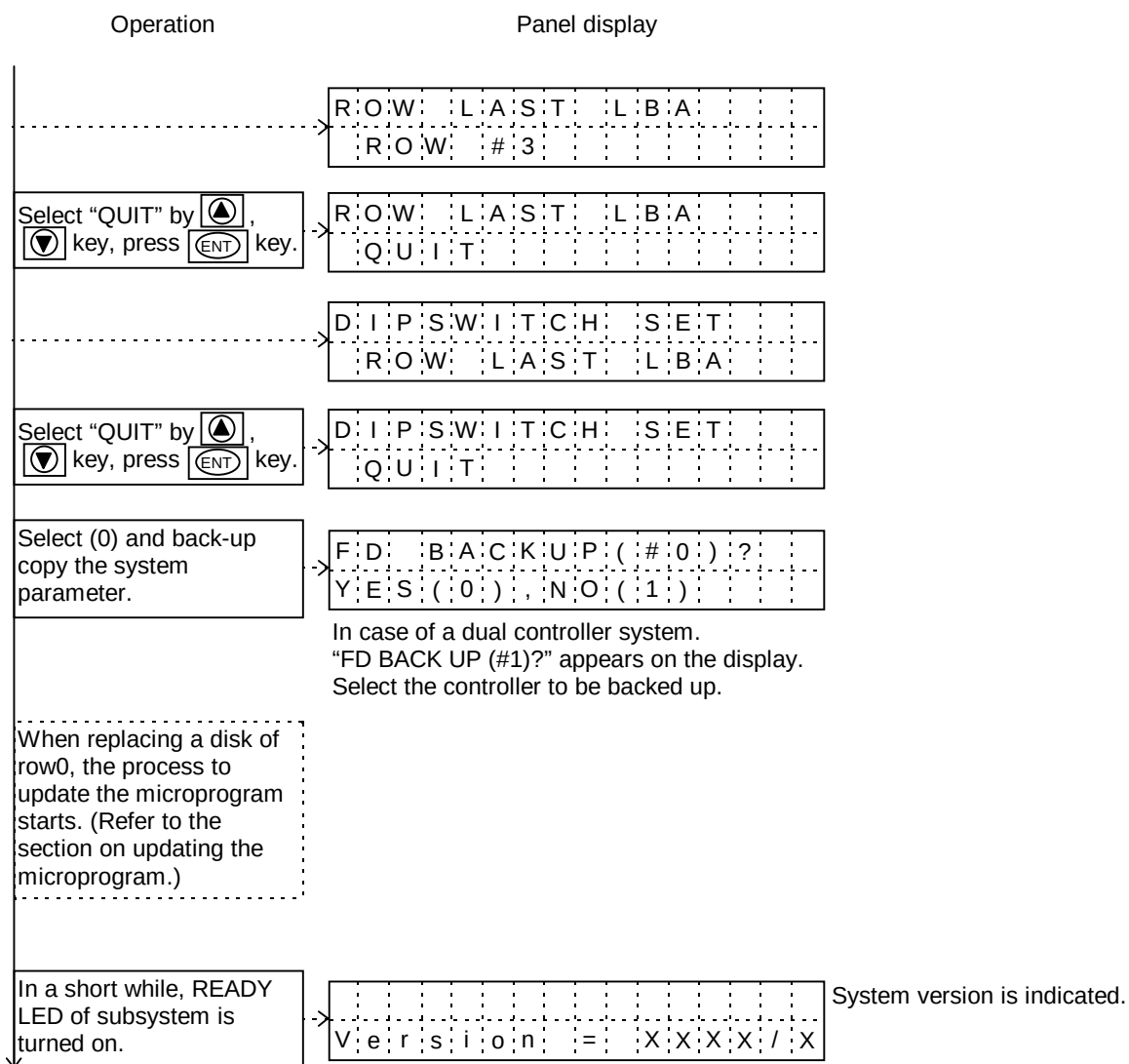
- (8) Set the DIP switches on the CTL ASSY as described below.



- (9) Only in case of exchanging ROW0 disk, revise the microprogram. (See section “MICROPROGRAM-FC”)
- (10) Set up the RAID group and the LU. (See Installation Chapter.)

Set the LAST LBA number on the panel according to the flow below.





[2] Capacity expansion with additional HDU ASSY installation

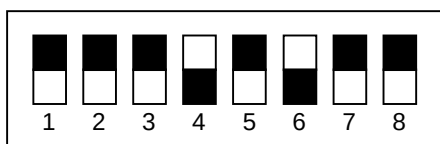
Additional HDU installation to a new ROW.

- (1) Turn off the power according to the power-off procedure in CK-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

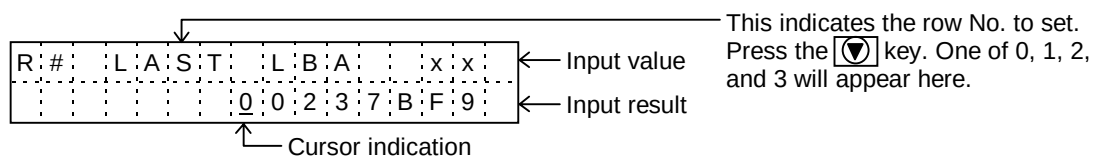
- (2) Open the front cover and the side cover.
 (3) Install an additional HDU ASSY.
 (4) Set the DIP switches 4 and 6 on the CTL ASSY to down.

(When a DF-F350F-F3MCF has been installed already, be sure to set the DIP switches on both CTL ASSYs.)



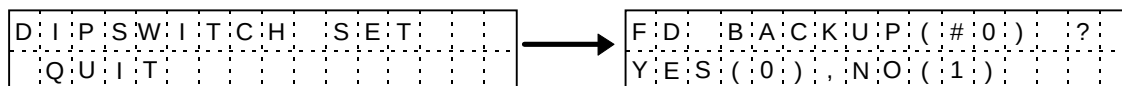
- (5) Turn on the power according to the power-on procedure in CK-OPTION0110.
 (6) Set the system LBA number with the panel according to the table below. In setting the available capacity of each drive follow ROW LAST LBA menu. Set the capacity following the displayed menu. (See CK-OPTION0240.)

- When ROW LAST LBA is displayed;



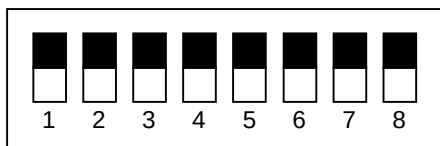
No.	Drive Capacity	Model	Final LBA No. (Hex)
1	2GB	DF-F350-A2E2	(3E696B)16
2	4GB	DF-F350-A2E4 DF-F350-A3E4	(7CD2D7)16
3	8GB	DF-F350-A1E8 DF-F350-A2E8	(1046C97)16
4	18GB	DF-F350-A1E18	(215D9B3)16

- (7) After selecting "QUIT" on the panel screen, when "FD BACK UP" appears on the screen, insert a back-up FD and make a back-up copy of system parameter. The "FD BACK UP" message may not appear for some unit types, so ignore this step in that case.



If this message appears, select (0) and make a back-up copy of the data in the EEPROM into the back-up floppy disk.
 In case of a dual system, it is displayed "FD BACK UP (#1)?" . Select the controller to be backed up.

- (8) Reset the DIP switch 4, 6 to the original positions after the system is ready.



- (9) Set up the RAID group and the LU. (See Installation Chapter.)

Notice : Deleting or re-formatting the set up RAID group or LU, the data is also deleted. Be sure to make a back-up copy of user's data before execution.

Additional HDU installation to existing ROW.

- (1) Turn off the power according to the power-off procedure in CK-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

- (2) Open the front cover and the side covers.

- (3) Install additional HDU.

Be sure to install an HDU of capacity no less than pre-installed HDUs. When an HDU of less capacity is installed, after power on (5), warning LED will light up and display shown in Figure 2.9.1 will appear.

Prepare an HDU of appropriate capacity and re-install from (1).

Set the capacity referring to the system parameter setting table.

H	Z	1	4	X	Y	P	O	N	C	A	P	-	X	Y

X : Port number

Y : Row number

Figure 2.9.1 Panel Display when Improper Capacity

- (4) Turn the power on following the power on procedure. (See CK-OPTION0110.)

- (5) Set up the RAID group and the LU. (See Installation Chapter.)

Notice : Deleting or re-formatting the set up RAID group or LU, the data is also deleted. Be sure to make a back-up copy of user's data before execution.

[3] Installing a spare HDU ASSY

- (1) Turn off the power according to the power-off procedure in CK-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

- (2) Open the front cover and the side cover.
- (3) Install a spare HDU ASSY.

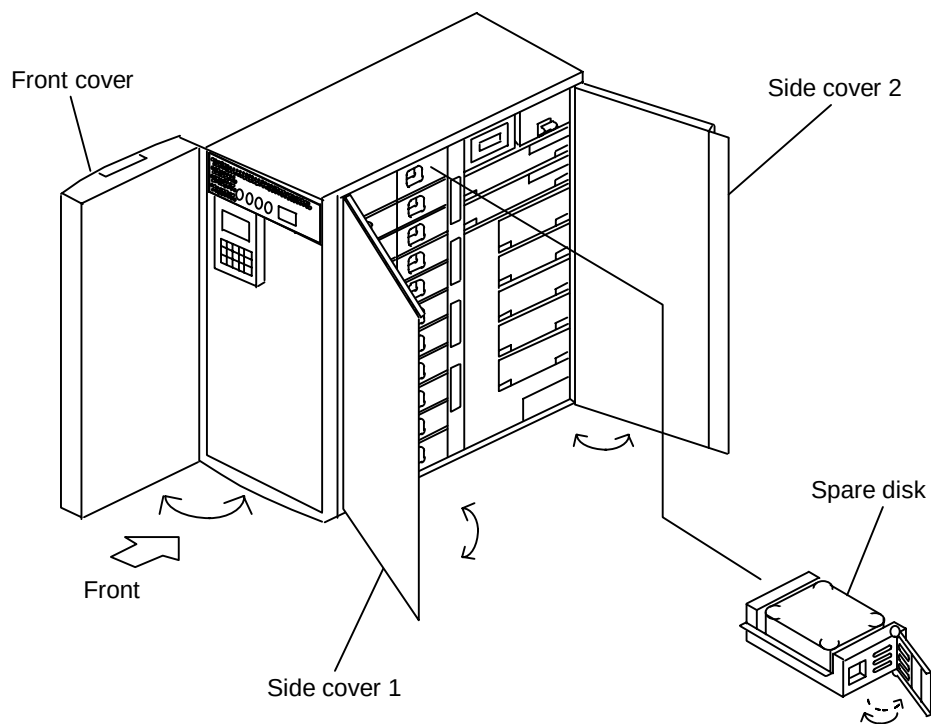
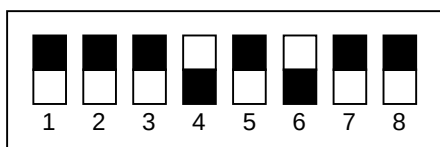


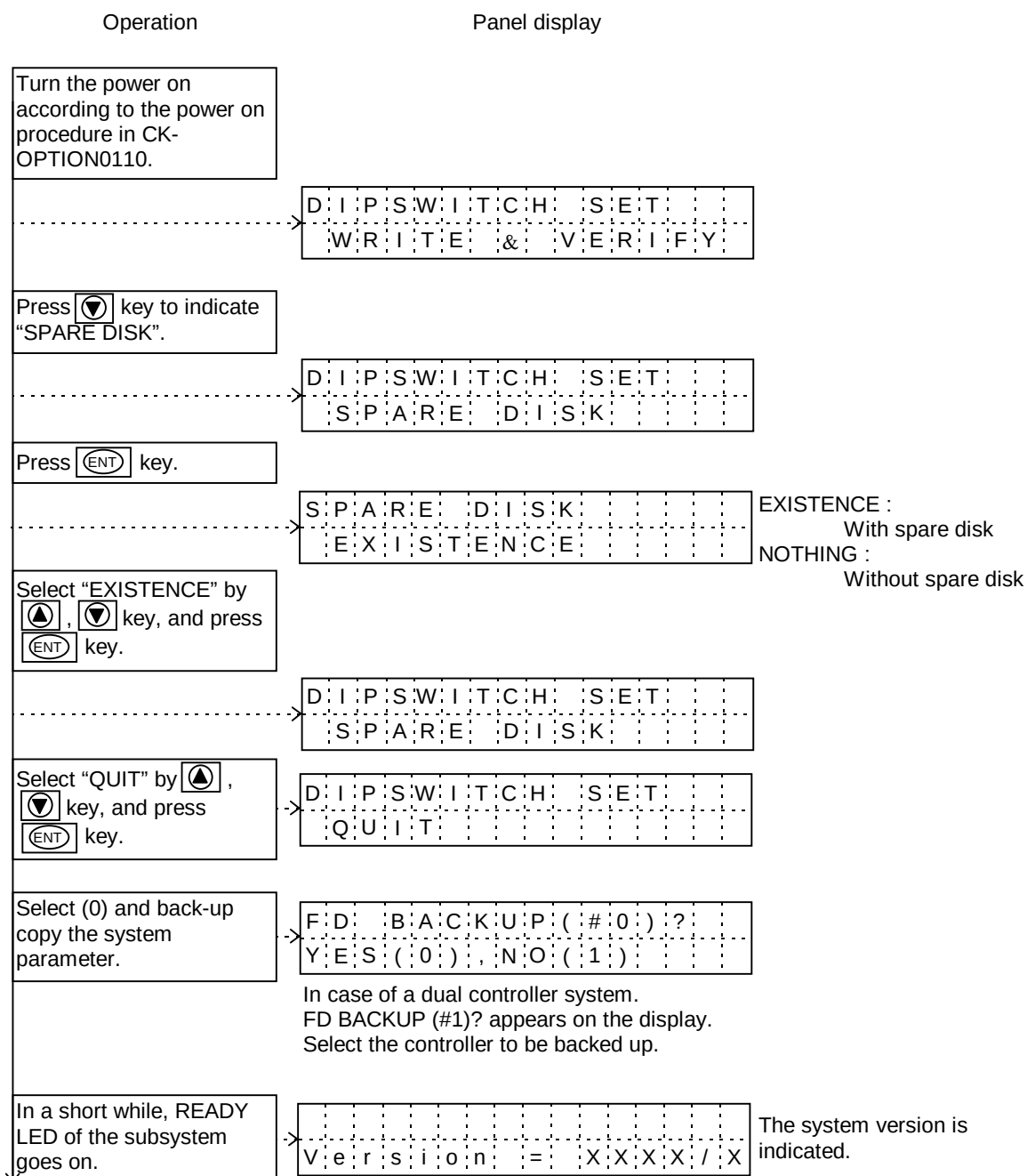
Figure 2.9.2 Installation of Spare Disk

- (4) Set the DIP switches 4 and 6 on the CTL ASSY to down.
(When a DF-F350F-F3MCF has been installed already, be sure to set the DIP switches on both CTL ASSYs.)

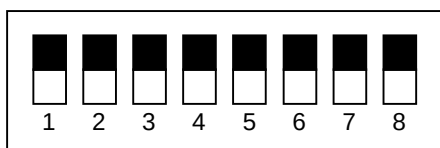


- (5) Turn on the power according to the power-on procedure in CK-OPTION0110.

(6) Set the spare disk from the PANEL according to the flow below.



- (7) Reset the DIP switches 4 and 6 to the original positions, after READY LED lit up.



- (8) Close front cover and side covers.

DF350F Disk Subsystem
10. PARTS CATALOG
(Cabinet Type)

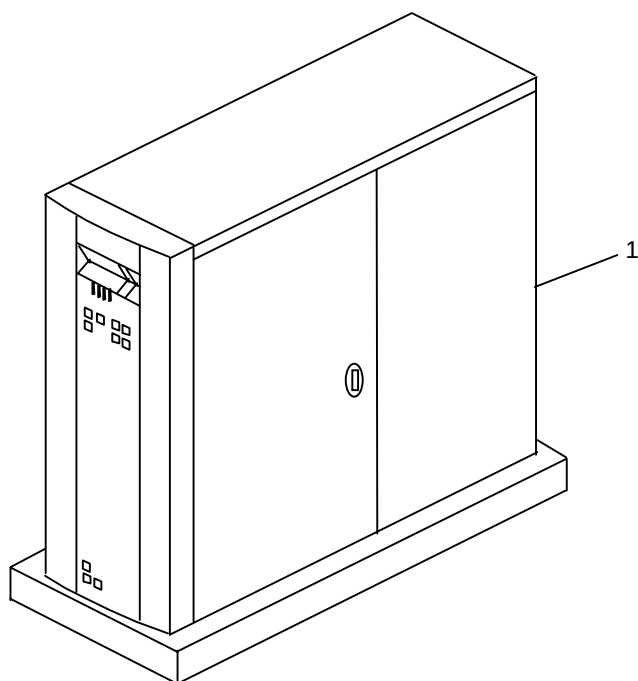
Rev.2

REV.	Date	DRW.	CHKD	APPD	Sheet No.	Description	Code
0	Jan.20.'98	A.Yamanashi	K.Aruga	H.Iwasaki	All	Issued	
1	Jul.31.'98	A.Yamanashi	K.Aruga	H.Iwasaki	0040	Added A2E8, A1E18.	AD
2	Oct.16.'98	A.Yamanashi			0040	Added DF-F350-A3E4.	AD

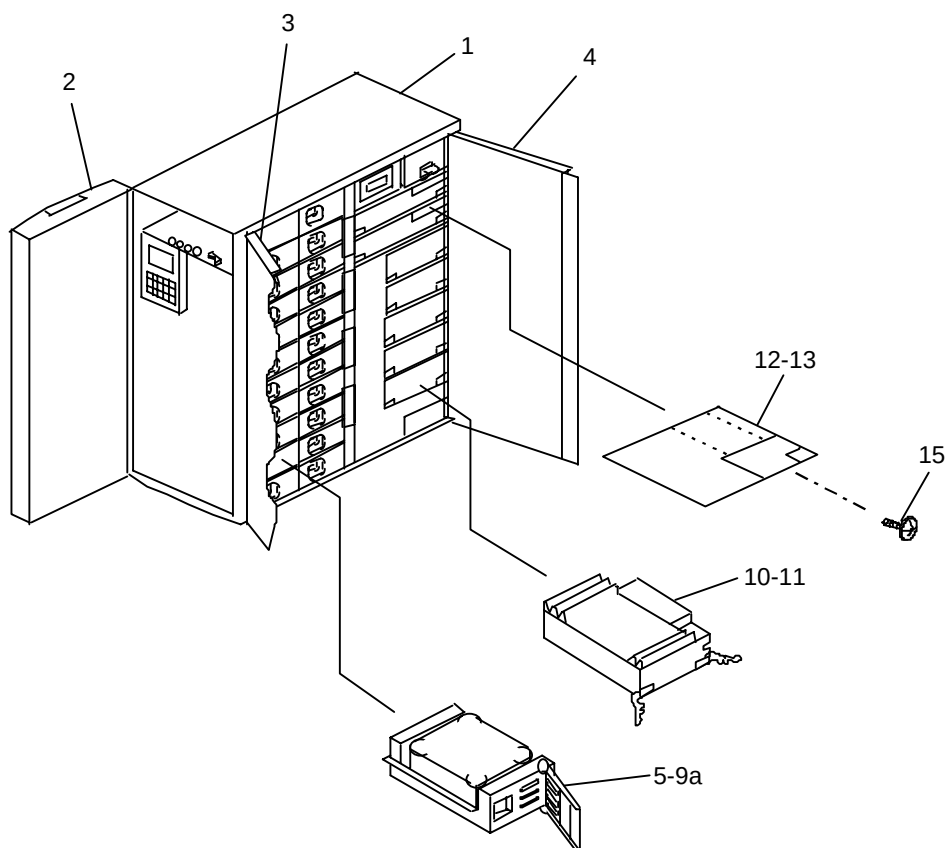
HOW TO USE THIS PARTS CATALOG

LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
1-		FINAL ASSY		
1	2100445-A	FINAL ASSY (SEE LIST 1)	1	
2	2100451-A	• FRONT COVER ASSY	1	
3	3240336-A	• SIDE COVER (R1) ASSY	1	
4	3240337-A	• SIDE COVER (R2) ASSY	1	
5	3243084-E	• HDU ASSY (DF-F350-A2E2)	2-21	S.P.
6	3243084-F	• HDU ASSY (DF-F350-A2E4)	2-21	S.P.
7	3243084-G	• HDU ASSY (DF-F350-A1E8)	2-21	S.P.

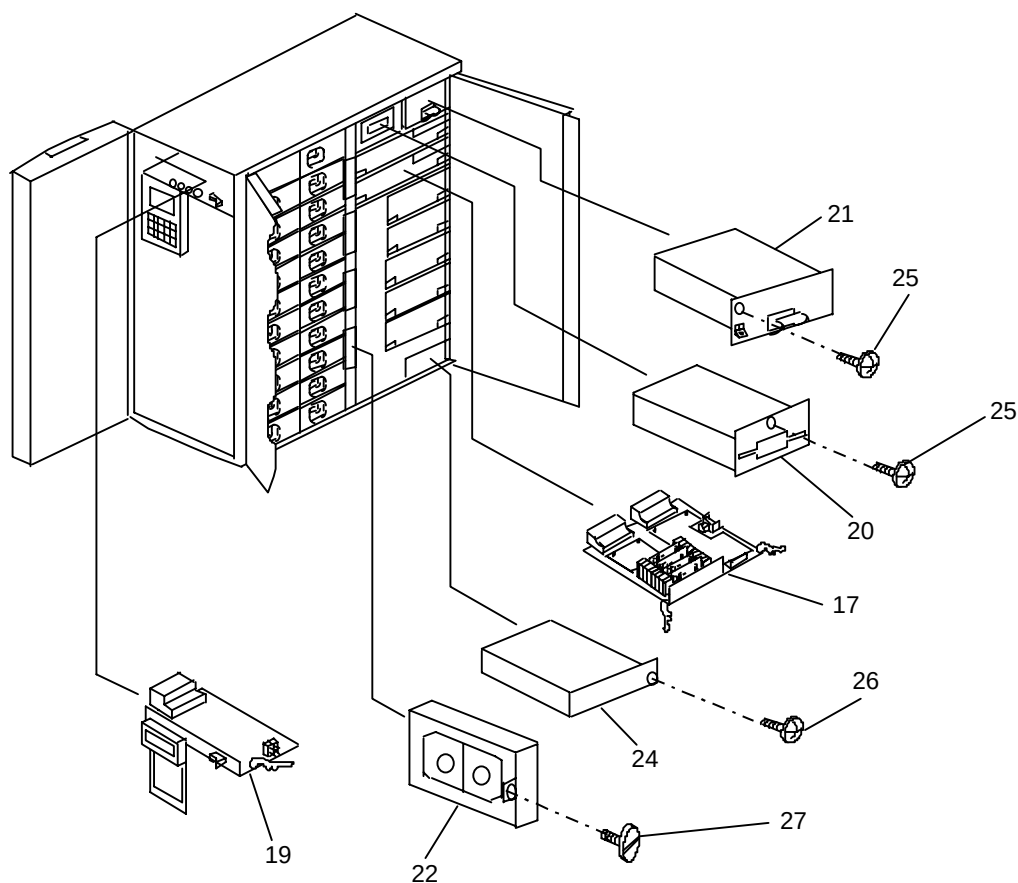
- ① indicates the list number of the assembly given on the visual index.
- ② indicates the item number given on the drawing in the catalog section.
- ③ indicates the part number.
- ④ has the following meaning.
- indicates an assembly or equivalent part.
 - indicates a subassembly or equivalent part included in an assembly indicated by....
- ⑤ indicates the unit type.
- ⑥ indicates the possible number of the subsystem.
- ⑦ indicates S.P.
- If S.P. is written in Remarks, the part or the assembly is spare parts.



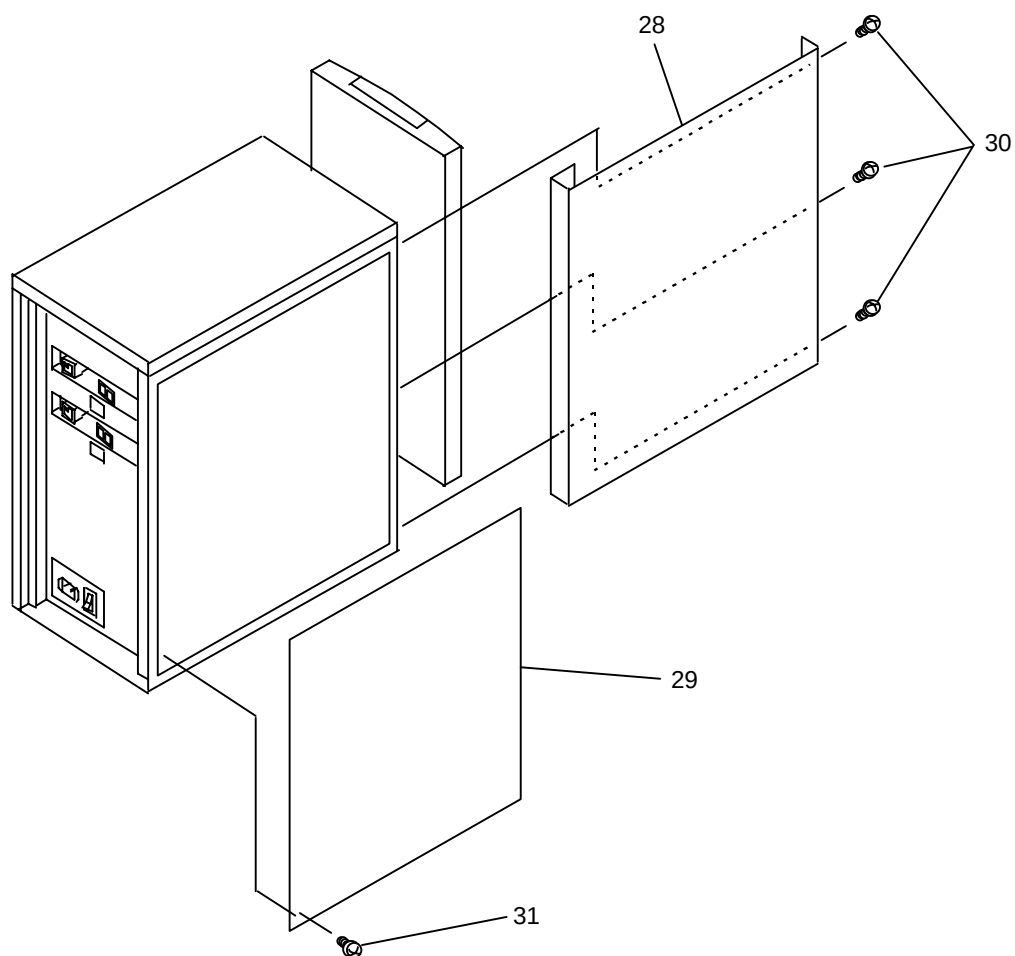
LIST NO.	NAME OF PARTS	SHEET NO.
1	FINAL ASSY	CK-PARTS0040



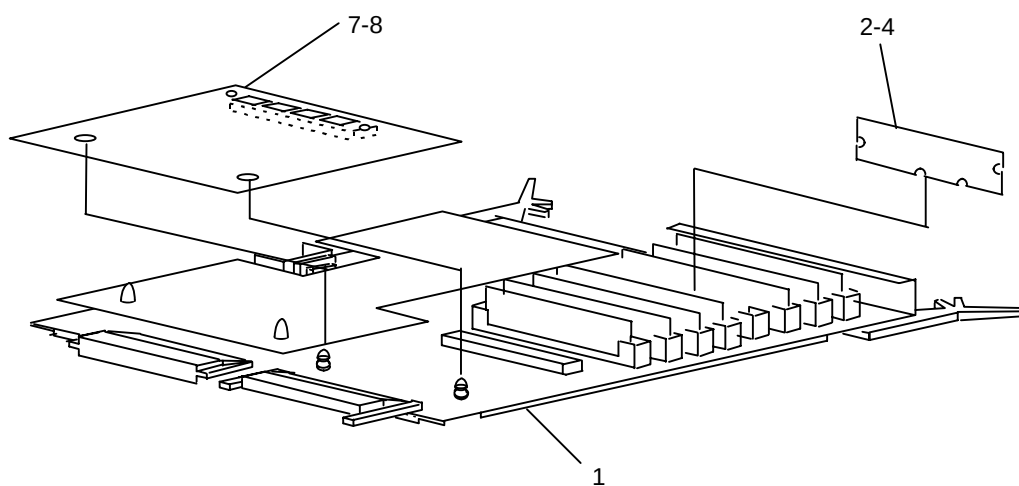
LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
1-		FINAL ASSY		
1	2100445-A	FINAL ASSY (SEE LIST 1)	1	
2	2100451-A	• FRONT COVER ASSY	1	
3	3240336-A	• SIDE COVER (R1) ASSY	1	
4	3240337-A	• SIDE COVER (R2) ASSY	1	
5	3243084-E	• HDU ASSY (DF-F350-A2E2)	2-21	S.P.
6	3243084-F	• HDU ASSY (DF-F350-A2E4)	2-21	S.P.
7	3252929-E	• HDU ASSY (DF-F350-A3E4)	2-21	S.P.
8	3243084-G	• HDU ASSY (DF-F350-A1E8)	2-21	S.P.
9	3252929-B	• HDU ASSY (DF-F350-A2E8)	2-21	S.P.
9a	3252929-A	• HDU ASSY (DF-F350-A1E18)	2-21	S.P.
10	5479203-1	• AC/DC ASSY (DF-F350F-B3M)	1-5	S.P.
11	3243406-A	• AC/DC ASSY (BLIND)	0-4	
12	3250739-C	• I/F ADAPTER ASSY (DF-F350F-DMON)	1-2	S.P.
13	3247183-1	• I/F ADAPTER ASSY (DUMMY)	1	
14				
15	SB706	• BIND SCREW (M2.5 × 6)	2	
16				



LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
1-				
17	3250738-A	• CTL ASSY (DF-F350F-F3MCF)	1	S.P.
18				
19	3237450-B	• SVP ASSY (DF-F350-L1ML)	1	S.P.
20	3237444-A	• FDD ASSY (DF-F350-M1M)	1	S.P.
21	3247182-A	• BATTERY ASSY (DF-F350-N1M10)	1	S.P.
22	3237448-C	• FAN ASSY (DF-F350-P1M)	4	S.P.
23				
24	5486142-303	• IN BOX ASSY (DF-F350-Q1C)	1	S.P.
25	SB306	• BIND SCREW (M3 × 6)	2	
26	3183101-2	• HWA BIND SCREW	1	
27	5483798-1	• THUMB SCREW	4	



LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
1-				
28	3240338-A	• SIDE COVER L ASSY	1	
29	1503500-C	• SZ612 PK ASSY	1	
30	SB306	• BIND SCREW (M3 × 6.3)	3	
31	SB308	• BIND SCREW (M3 × 8)	30	



LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
1-17-		CTL ASSY		
1	3250738-A	• CTL ASSY (DF-F350F-F3MCF)	1	S.P.
2	3247121-A	•• CACHE MEMORY (DF-F350-C8E)	2, 4, 6, 8	S.P.
3	3247121-B	•• CACHE MEMORY (DF-F350-C32E)	2, 4, 6, 8	S.P.
4	3247121-C	•• CACHE MEMORY (DF-F350-C128E)	2, 4, 6, 8	S.P.
5				
6				
7	5493862-A	•• LAN ASSY (DF-F350-G1M1)	0-1	S.P.
8	5493862-C	•• LAN ASSY (DF-F350F-G3M1)	0-1	S.P.

DF350F Disk Subsystem
7. PARTS REPLACEMENT
(Rack Mount (RKH/U1) Type)

Rev.2

REVISION CONTROL

Legend for revision codes : AD : Addition CH : Change CR : Correction DL : Deletion

Legend for Revision Codes: AD: Addition, CH: Change, CR: Correction, DE: Deletion							
REV.	Date	DRW.	CHKD	APPD	Sheet No.	Description	Code
0	Jan.20.'98	A.Yamanashi	K.Aruga	H.Iwasaki	All	Issued	
1	Jul.31.'98	A.Yamanashi	K.Aruga	H.Iwasaki	0040	Added A2E8, A1E18.	AD
					0350 0360 0530	Changed Note. Changed replacing procedure. Added (4), (5).	CH CH AD
2	Oct.16.'98	A.Yamanashi			0040	Added DF-F350-A3E4.	AD
					0100 0130	Added case of the dual controller. Added case of the dual controller.	AD AD

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2.3.1 Back-up procedure to FD	RH-REP0090
2.3.2 Restoring procedures from FD	RH-REP0130
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3.1 Attaching/Removing the Front Cover.....	RH-REP0160
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3.3 Opening/Closing the Front Panel.....	RH-REP0180
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when no spare disk is installed.....	RH-REP0210
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10. Replacing SVP ASSY	RH-REP0510
11. Replacing AC/DC power supply.....	RH-REP0530
12. Replacing In Box ASSY	RH-REP0550
13. Replacing CACHE ASSY	RH-REP0560
14. Replacing LAN ASSY.....	RH-REP0590

1. Mechanical Configuration

Figures 1.1 show mechanical configuration and parts location of this subsystem.

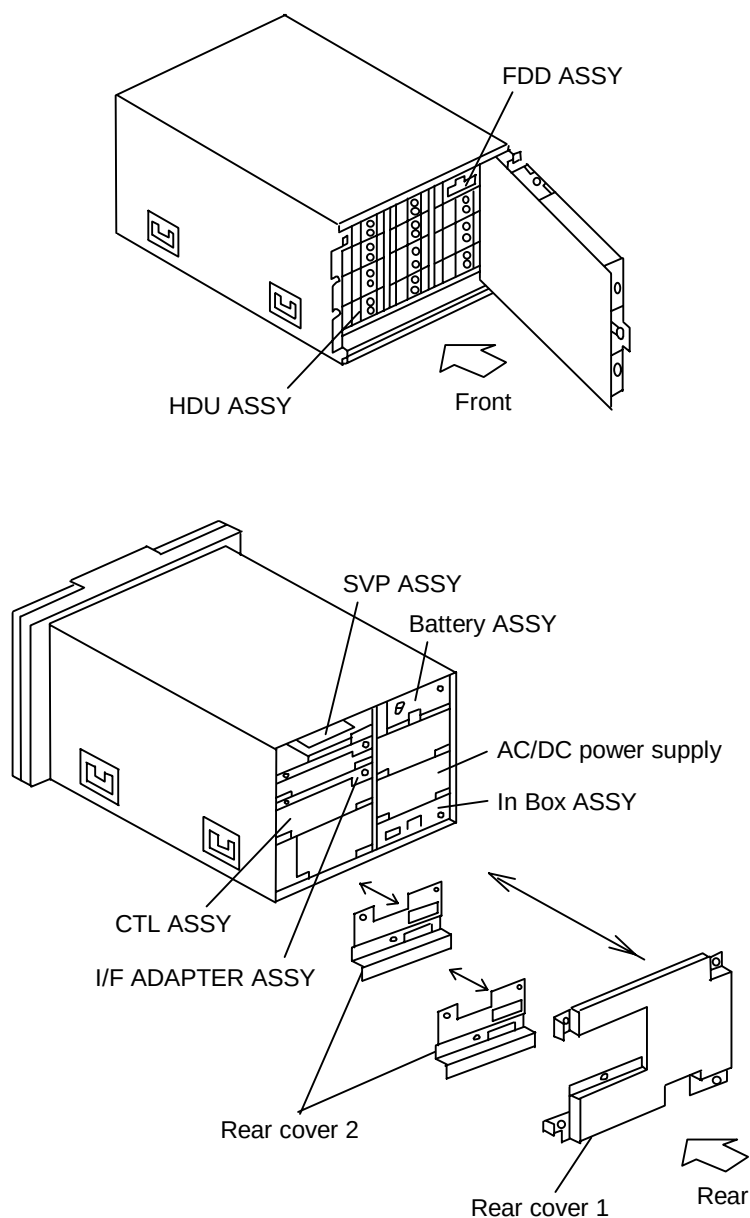


Figure 1.1 Appearance and Component Layout of DF350F (RKH)

2. Maintenance Procedure

(1) Turning power on/off when replacing parts

Turning on/off procedure varies depending on the parts to be replaced.

Follow the procedures described in the table below for replacing each part.

No	Product name	Drawing No.	Model	Turning on/off power	
				Option not provided	Option provided
1	HDU ASSY (2GB1"H)	3243084-E	DF-F350-A2E2	④	④
2	HDU ASSY (4GB1"H)	3243084-F	DF-F350-A2E4	④	④
3	HDU ASSY (4GB1"H)	3252929-E	DF-F350-A3E4	④	④
4	HDU ASSY (8GBH.H)	3243084-G	DF-F350-A1E8	④	④
5	HDU ASSY (8GB1'H)	3252929-B	DF-F350-A2E8	④	④
6	HDU ASSY (18GBH.H)	3252929-A	DF-F350-A1E18	④	④
7	Fan ASSY	3237448-C	DF-F350-P1M	③	—
8	Battery ASSY	3244611-A	DF-F350-N1RH	③	—
9	FDD ASSY	3244610-A	DF-F350F-M1RH	②	—
10	CTL ASSY	3250738-A	DF-F350F-F3MCF	②	③
11	I/F ADAPTER ASSY (Optical (Non OFC))	3250741-C	DF-F350F-DRON	①	①
12	SVP ASSY (SVP)	3243079-B	DF-F350-L1RH	②	—
13	SVP ASSY (PANEL)	3244612-B	DF-F350-L1RHL	②	—
14	AC/DC power supply	5479203-1	DF-F350F-B3M	②	③
15	In Box ASSY	5486142-302	DF-F350-Q1R	②	—
16	CACHE ASSY	3247121-A	DF-F350-C8E	①	—
17	CACHE ASSY	3247121-B	DF-F350-C32E	①	—
18	CACHE ASSY	3247121-C	DF-F350-C128E	①	—
19	LAN ASSY	5493862-A	DF-F350-G1M1	②	③
20	LAN ASSY (SNMP)	5493862-C	DF-F350F-G3M1	②	③

① Turning the power off DF350 Disk Subsystem and Host System.

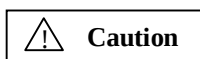
② Turning the power off DF350 Disk Subsystem.

③ Turning the power off is unnecessary.

④ Turning the power on DF350F Disk Subsystem.

Notice : When a part which requires to turn the power off or on for replacement (marked with ① and ②) is to be replaced, turn the power off correctly according to the instruction in RH-REP0050 beforehand.

Otherwise, there is a risk that the user data is destroyed.

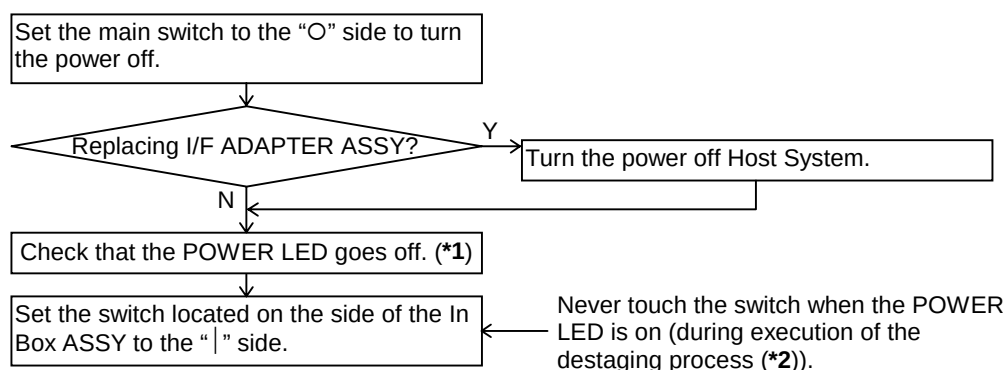


When replacing parts without turning off the power, do not put on metallic accessories or watches so that to avoid electric shock.

Be careful not to touch the electrified parts with a screwdriver etc.

2.1 Turning the Power On/Off for Each String

(1) Turning the power off



*1 Check the back-up state of the CACHE memory.

Be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

The CACHE memory of this unit provides write-after control. If data is not yet written, before the power is turned off, the unit automatically writes the data on the CACHE memory to the hard disk. This is called destaging. After this processing is completed, the power is turned off.

If the power is turned off in a state in which destaging cannot be completed due to an unexpected power interruption or a tripped circuit breaker, the CACHE memory switches to the back-up mode using the battery for data integrity. If any equipment of the unit is removed or inserted in this back-up mode, the battery may stop supplying power, resulting in the user data being lost. When you handle any equipment of the unit with the unit power off, be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

• Checking the back-up state of the cache memory

You can determine whether the unit is in the back-up mode by checking the indication of the CACHE PWR (green LED) on the CTL ASSY, as described below.

Set the circuit breaker on the rear of the unit to "I" (ON) with the power switch (POWER SW) set to "O" (OFF).

Determine the state of the memory from the indication of the CACHE PWR.

CACHE PWR LED on ----- Indicate the back-up mode.

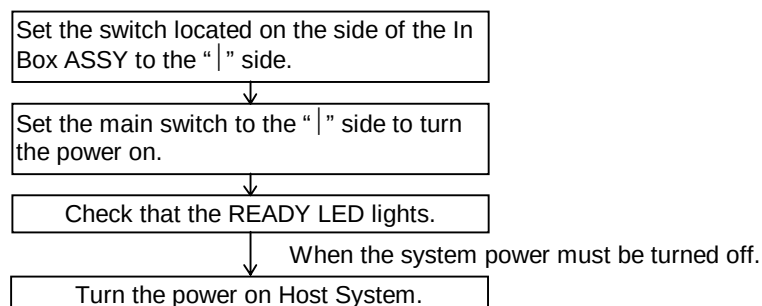
CACHE PWR LED off ----- Indicate that the back-up mode is canceled.

Notice : In case the data is not properly backed up, the user's data will be lost.

***2** The cache memory installed in this subsystem is controlled with a write-after method. When turning off the power, the subsystem automatically writes all the data left on the cache memory unwritten to the hard disk drive. (This operation is called a destaging.) The subsystem turns off the power when this process is completed. When the power is turned off according to the power failure or by the operation of the breaker, the destaging can not be performed. In this case, the subsystem enters the mode of battery back-up. If the system is kept in this state, the battery may be discharged and the user data might be lost. Therefore, be sure to follow the power-off procedure explained above.

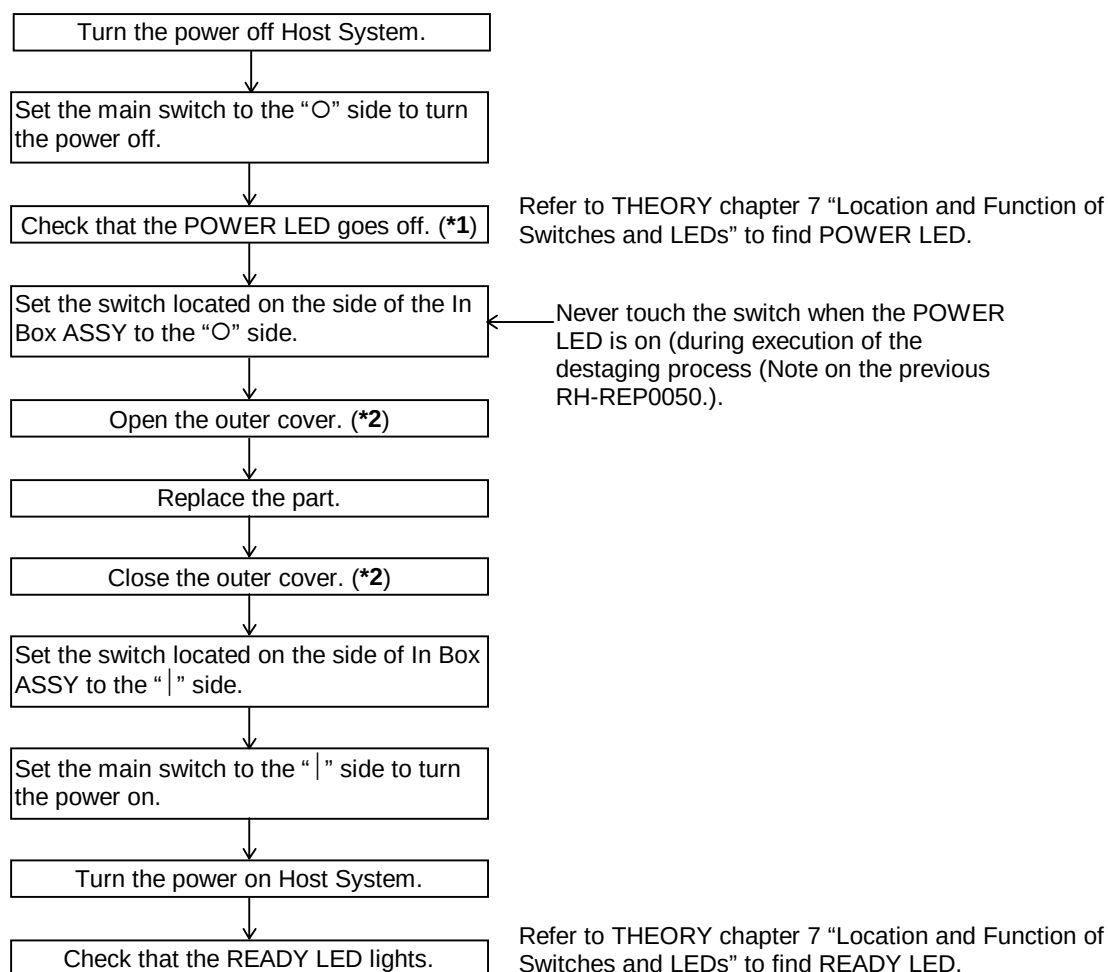
If the breaker is turned off due to power failure or by mistake before the POWER LED goes off, turn the power on again according to Item (2), "Turning the power on" promptly and then execute the power-off procedure explained above.

(2) Turning-ON procedure



2.2 Part Replacement Procedures

- (1) Procedure for the case of turning the power off both DF350F Disk Subsystem and Host System is inevitable.



Notice: In case the power is not normally turned off, the configuration data will be lost and the user's data will be lost.

***1** Check the back-up state of the CACHE memory.

Be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

The CACHE memory of this unit provides write-after control. If data is not yet written, before the power is turned off, the unit automatically writes the data on the CACHE memory to the hard disk. This is called destaging. After this processing is completed, the power is turned off.

If the power is turned off in a state in which destaging cannot be completed due to an unexpected power interruption or a tripped circuit breaker, the CACHE memory switches to the back-up mode using the battery for data integrity. If any equipment of the unit is removed or inserted in this back-up mode, the battery may stop supplying power, resulting in the user data being lost. When you handle any equipment of the unit with the unit power off, be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

- Checking the back-up state of the cache memory

You can determine whether the unit is in the back-up mode by checking the indication of the CACHE PWR (green LED) on the CTL ASSY, as described below.

Set the circuit breaker on the rear of the unit to "I" (ON) with the power switch (POWER SW) set to "O" (OFF).

Determine the state of the memory from the indication of the CACHE PWR.

CACHE PWR LED on ----- Indicate the back-up mode.

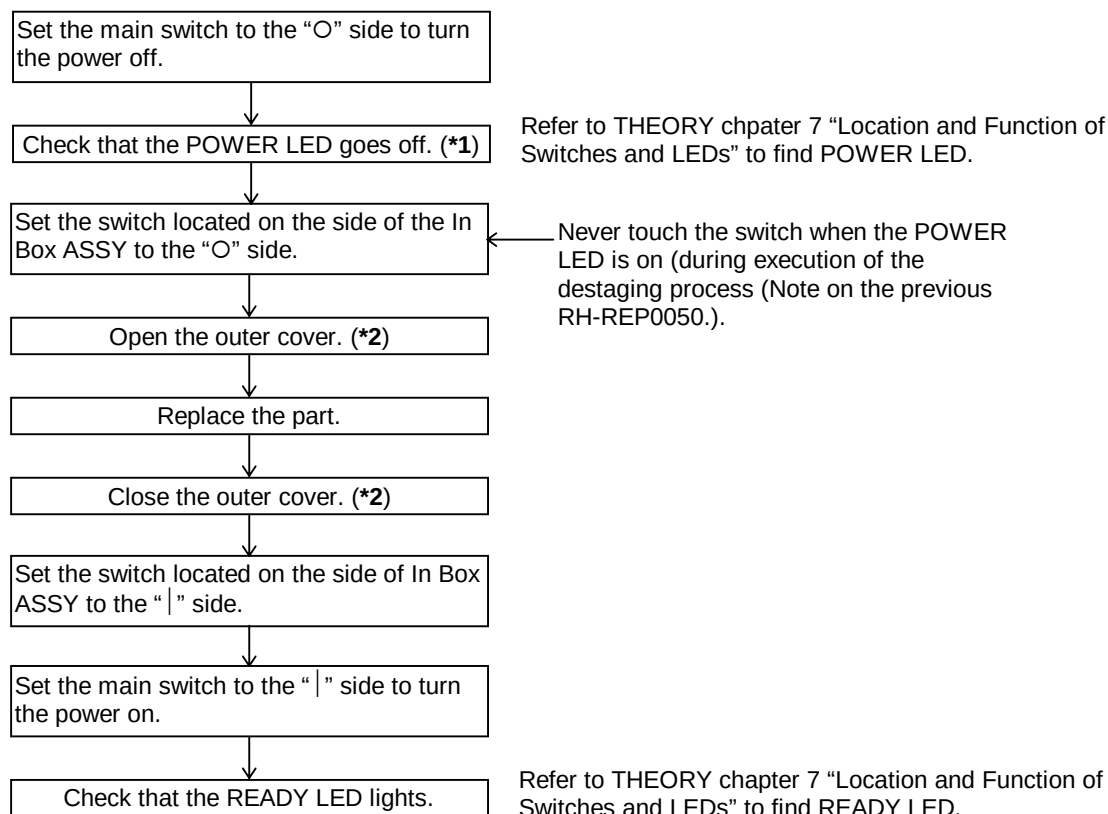
CACHE PWR LED off ----- Indicate that the back-up mode is canceled.

***2** Outer cover : Front cover

Rear cover 1

Rear cover 2

(2) Procedure for the case of turning the power off DF350F Disk Subsystem is inevitable.



Notice: In case the power is not normally turned off, the user's data might be lost.

***1** Check the back-up state of the CACHE memory.

Be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

The CACHE memory of this unit provides write-after control. If data is not yet written, before the power is turned off, the unit automatically writes the data on the CACHE memory to the hard disk. This is called destaging. After this processing is completed, the power is turned off.

If the power is turned off in a state in which destaging cannot be completed due to an unexpected power interruption or a tripped circuit breaker, the CACHE memory switches to the back-up mode using the battery for data integrity. If any equipment of the unit is removed or inserted in this back-up mode, the battery may stop supplying power, resulting in the user data being lost. When you handle any equipment of the unit with the unit power off, be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

- Checking the back-up state of the cache memory

You can determine whether the unit is in the back-up mode by checking the indication of the CACHE PWR (green LED) on the CTL ASSY, as described below.

Set the circuit breaker on the rear of the unit to "I" (ON) with the power switch (POWER SW) set to "O" (OFF).

Determine the state of the memory from the indication of the CACHE PWR.

CACHE PWR LED on ----- Indicate the back-up mode.

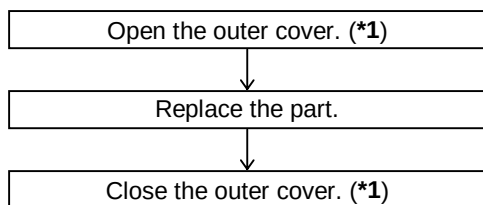
CACHE PWR LED off ----- Indicate that the back-up mode is canceled.

***2** Outer cover : Front cover

Rear cover 1

Rear cover 2

(3) Procedure for the case of turning the power off DF350F is either not necessary or prohibited.



*1 Outer cover : Front cover
Rear cover 1
Rear cover 2

2.3 Back-up Procedure of System Parameter

There are cases where system parameters (Buzzer setting, drive recovery mode, etc.) are copied to FD or restored from FD when installing optional parts or replacing parts. In this case, copy or restore system parameters following “2.3.1 Back-up procedure of system parameter” (RH-REP0090) or “2.3.2 Restore procedure of system parameter” (RH-REP0130).

(RAID configuration setting, LU configuration setting, etc. are not contained in system parameter.)

2.3.1 Back-up procedure to FD

- (1) Turn the power off according to RH-REP0050.

Notice: In case the power is not normally turned off, the user's data might be lost.

- (2) Before power on the subsystem, set DIP switch No.4 on CTL ASSY as shown in Figure 2.3.1.

Note : Be sure to set the same data for both controllers if the dual controller option (-F3MCF) has been installed.

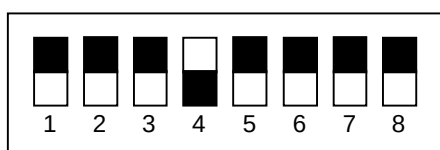
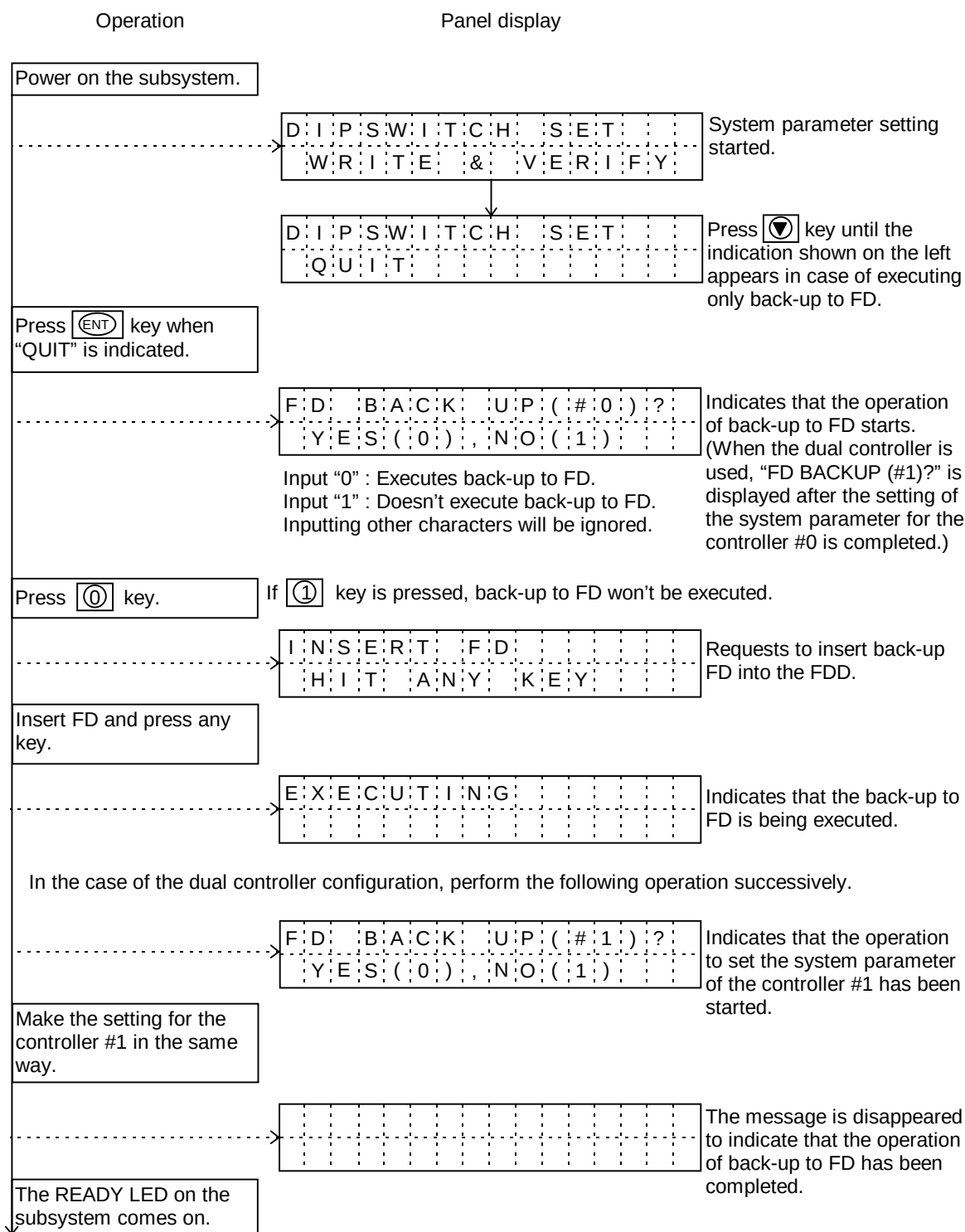


Figure 2.3.1 DIP Switches
(Back-up operation to FD is allowed)

(3) Operate as described below.



- (4) Set DIP switch No.4 to setting as shown in Figure 2.3.2.

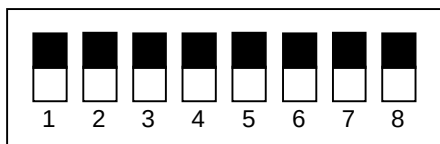
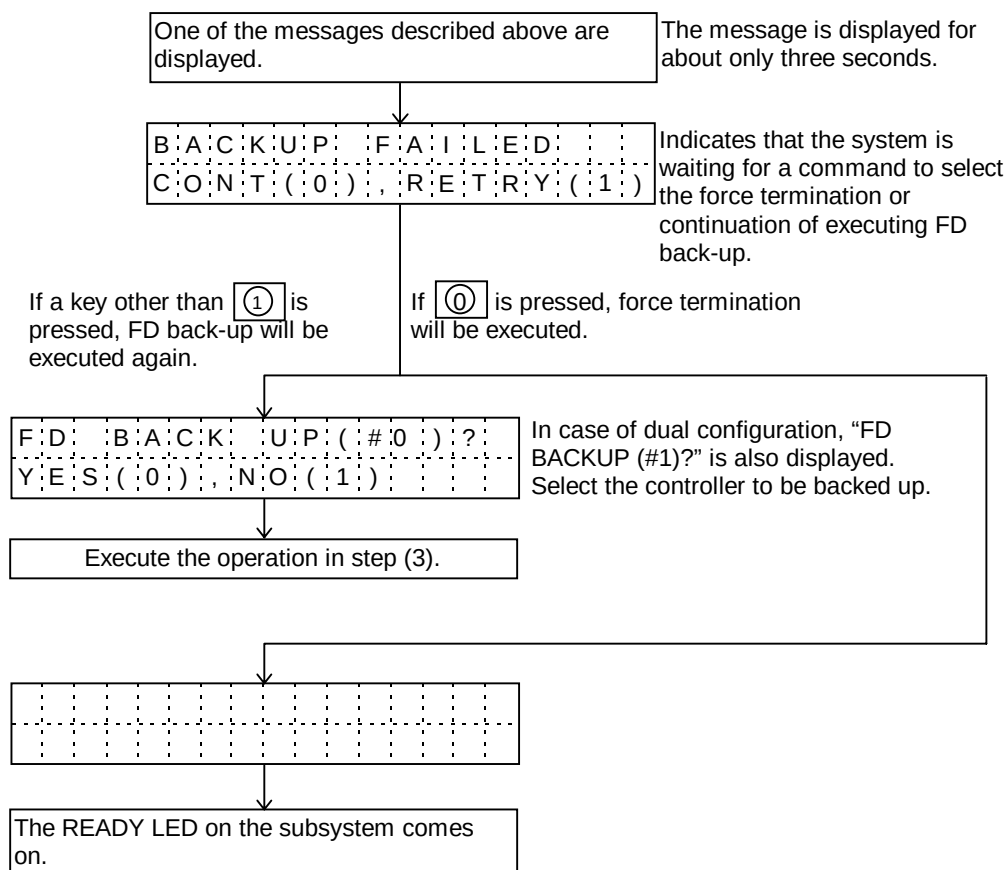


Figure 2.3.2 DIP Switches

Note 1 : While executing the back-up to FD, the messages described below are sometimes displayed.

- **FD NOT INSERTED**
FD isn't inserted. Insert FD into the FDD.
- **FD MOTOR NOT STARTED**
Starting of FD Motor ended in failure. Re-execute..
- **FILE WRITE ERROR**
FD which was inserted is not formatted, or write-protected. Format or release write-protection.
Write error occurred in FD. Insert another FD.

If these messages are displayed, back-up to FD hasn't been executed. So re-execute following the operation described below.



Note 2 : Use 3.5" FD (1.44MB) formatted by MS-DOS for back-up FD. Besides, note that the FD will be overwritten during back-up.

Note 3 : Even if back-up FD is left at FDD after back-up operation, error won't occur on the subsystem.

Note 4 : "EEPROM.DAT" or "EEPROM0.DAT" file is stored in system parameter backed up FD. The case of optional SNMP system, SNMP configuration environment files ("Config.TXT" and "NAME.TXT") are stored with system parameter file.

Note 5 : In case with optional SNMP system and system parameter is restored without SNMP configuration environment files, Subsystem becomes ready without SNMP function. In this case, the warning lamp on the panel comes on and one of messages below is shown on PANEL.

W:01601	F:D	E:R	R	
V:e r s i o n	=	X	X	X

W:01602	F:O:P:N	E:R	R	
V:e r s i o n	=	X	X	X

W:01600	S:N:M:P	I:N	V:1	
V:e r s i o n	=	X	X	X

Only Dual controller system.

This case, re-restore the subsystem with a FD in which SNMP configuration environment files is stored.

2.3.2 Restoring procedures from FD

- (1) Before power on the subsystem, set DIP switch No.3 as shown in Figure 2.3.3.

In case of dual controller system, set both the DIP switches as shown in Figure 2.3.3.

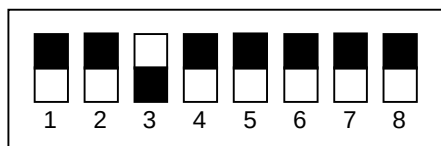
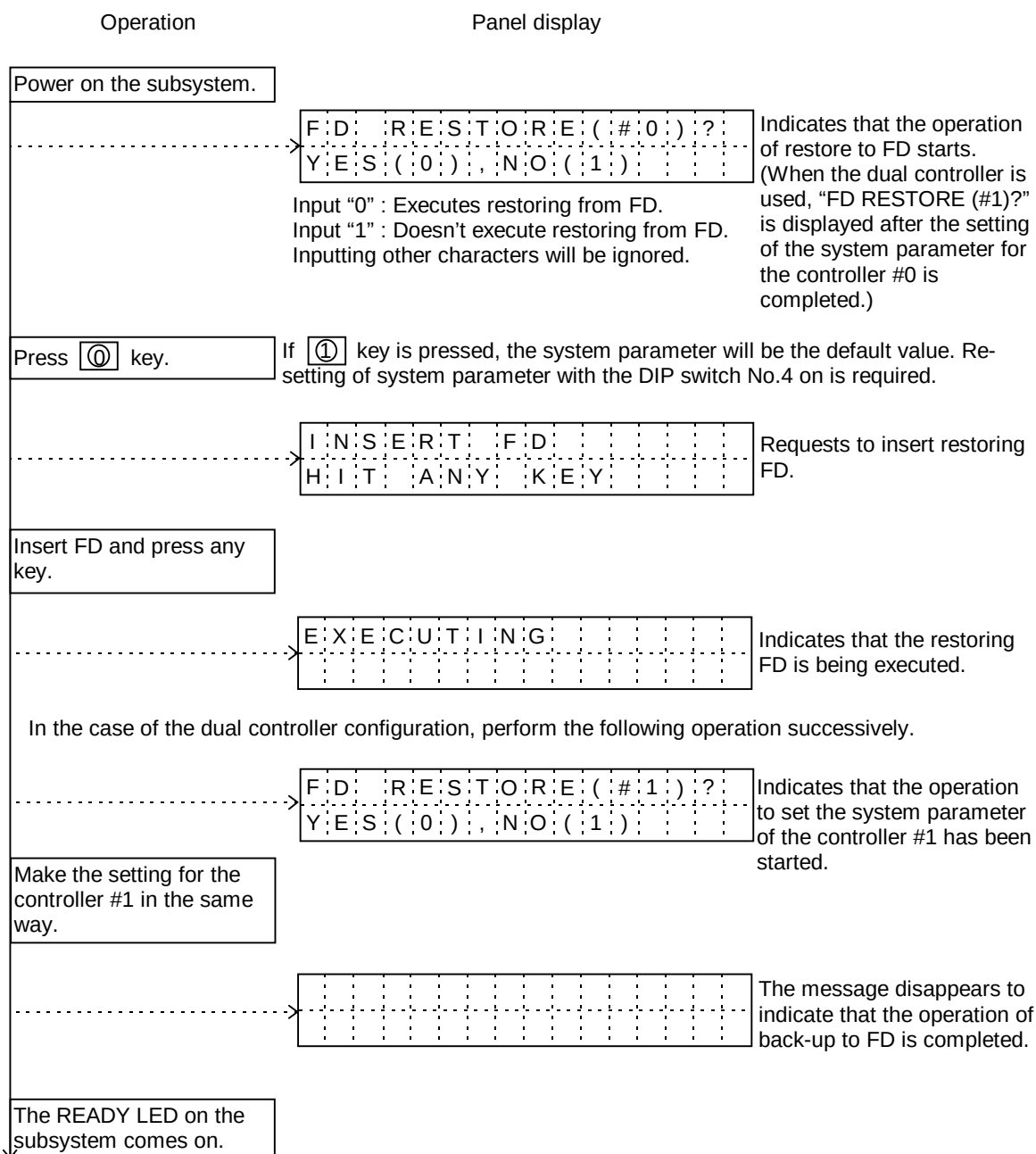


Figure 2.3.3 DIP Switches

(Restoring operation from FD is available)

- (2) Operate as described below.



(3) Set DIP switch No.3 as shown in Figure 2.3.4.

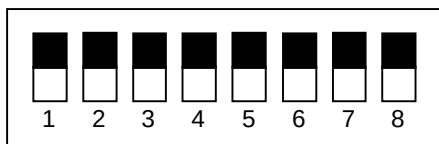
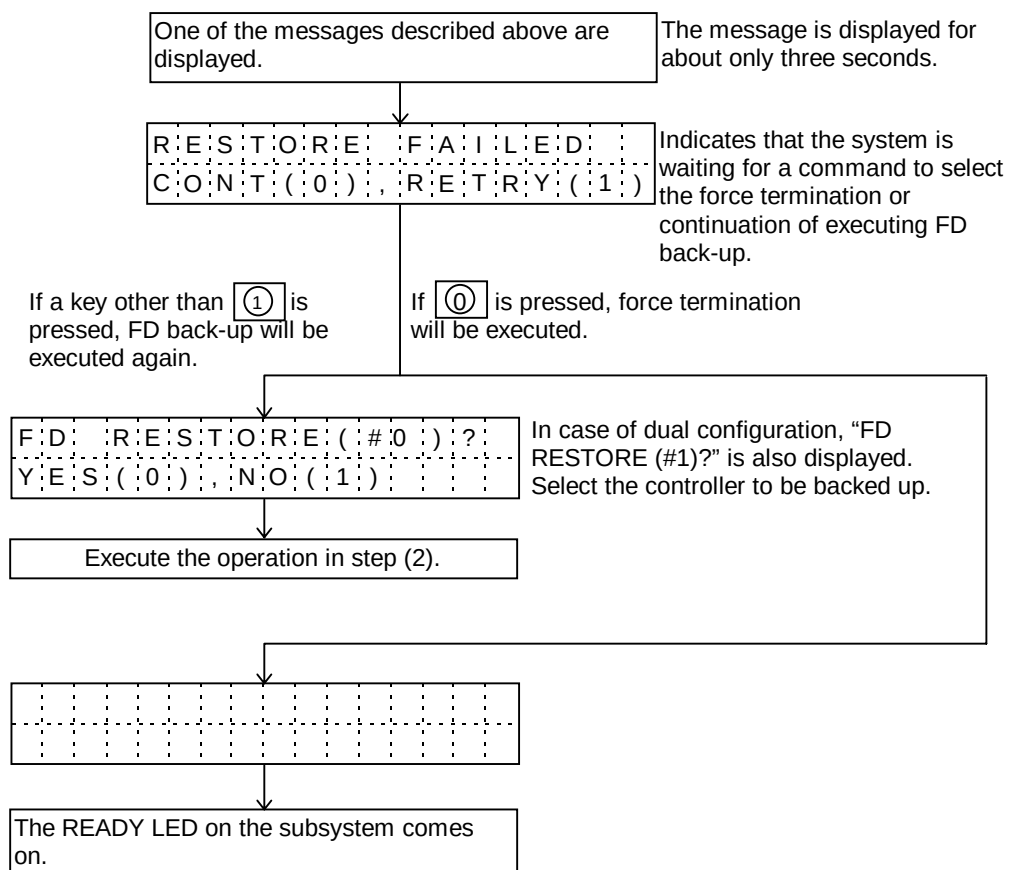


Figure 2.3.4 DIP Switches

Note 1 : While executing the restoring from FD, the messages described below are sometimes displayed.

- **FD NOT INSERTED**
FD isn't inserted. Insert FD into the FDD.
- **FD MOTOR NOT STARTED**
Starting of FD Motor ended in failure. Try again.
- **BAD FD INSERTED**
Inserted FD is not formatted. Format FD.
- **FILE READ ERROR**
Read error occurred in FD. Try again.

If these messages are displayed, restoring from FD hasn't been executed. So re-restore the system following the operation described below.



Note 2 : In case that restoring operation ended in failure and force terminated, setting of system parameter will be with default value.

Accordingly, re-setting with the DIP switch No.4 On is required.

Note 3 : Even if FD which was used to restore is left at FDD after back-up operation, error won't occur on the subsystem.

3. Attaching/Removing and Opening/Closing the Covers

3.1 Attaching/Removing the Front Cover

- (1) Removing the front cover. (See Figure 3.1.1.)

① Hold the grooves at both sides of the front cover and pull it toward you.

Notice : Open/Close the front cover carefully to avoid subjecting the subsystem to any impact since it has precision components.

- (2) Attaching the front cover. (See Figure 3.1.1.)

① Fit the guide plate of the main body with the slots of the front cover (four places), press the front cover against them.

Notice : Open/Close the side covers gently to avoid a shock. Precision components are installed.

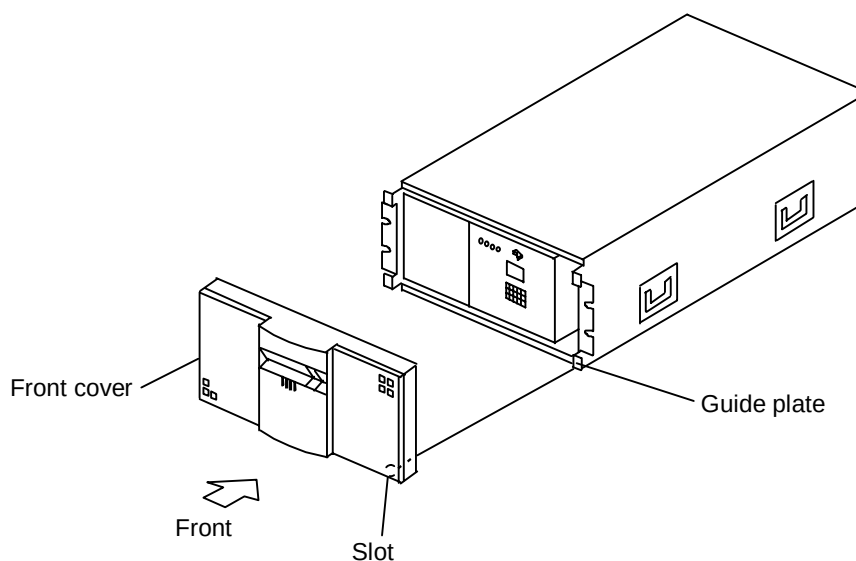


Figure 3.1.1 Attaching/Removing the Front Cover

3.2 Opening/Closing the Rear Cover

Tools : Philips screwdriver (No.2)

(1) Removing procedure (See Figure 3.2.1.)

- ① Remove (a) screw and 4 (b) screws, and remove rear cover 1.
- ② Remove 4 (a) screws of 2 rear cover 2s, and remove rear cover 2s.

Notice : Open/Close the front cover carefully to avoid subjecting the subsystem to any impact since it has precision components.

(2) Installing procedure. (See Figure 3.2.1.)

- ① Fix rear cover 2 then rear cover 1 in the reversed order as removing procedure.

Notice : Open/Close the side covers gently to avoid a shock. Precision components are installed.

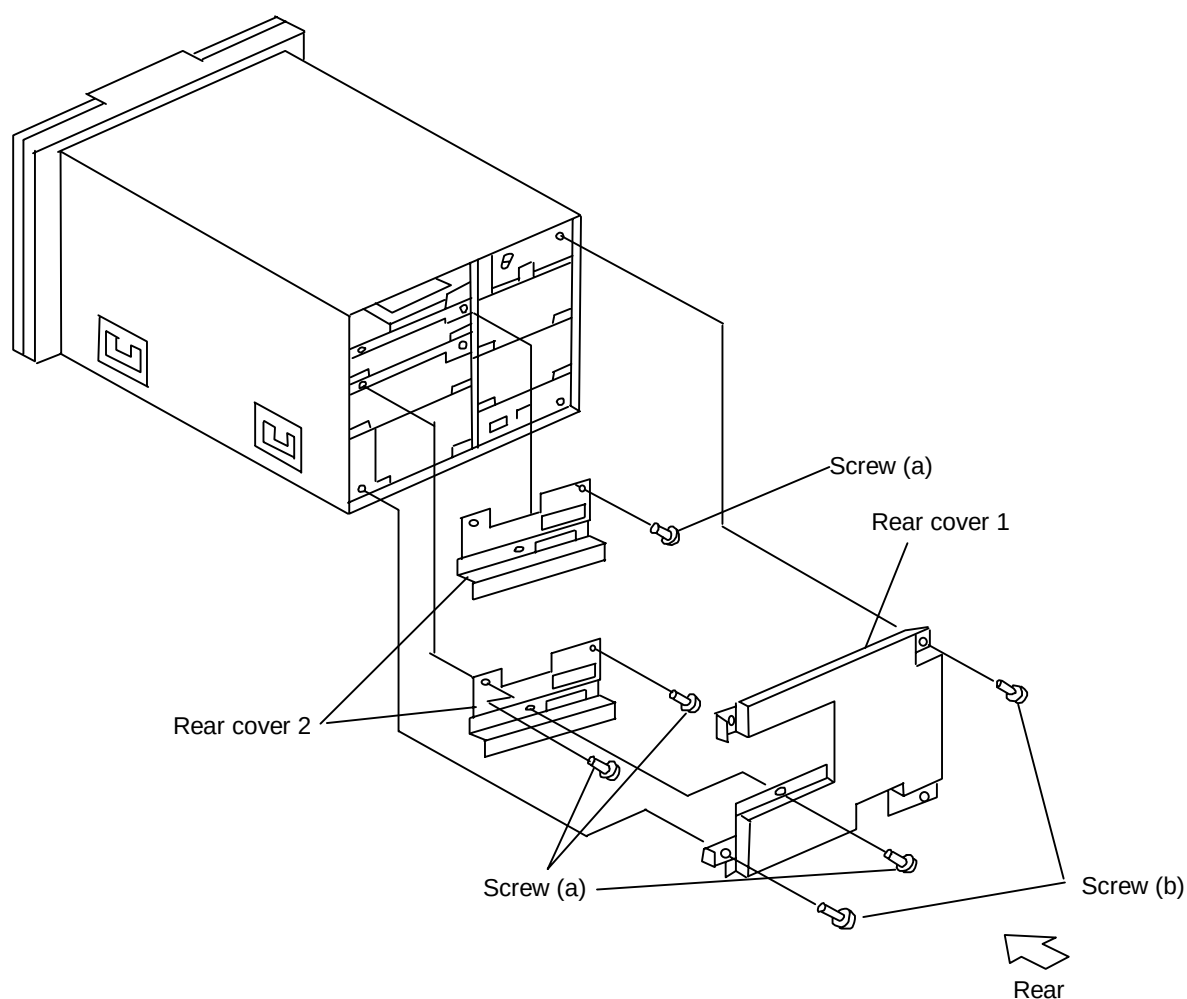


Figure 3.2.1 Opening/Closing the Rear Cover

3.3 Opening/Closing the Front Panel

(1) Opening the front panel. (See Figure 3.3.1.)

- ① Remove the front cover.
- ② Insert the key, turn it to the arrow direction (→) and hold the left of the front panel to open to the right.

Notice : Open/Close the front cover carefully to avoid subjecting the subsystem to any impact since it has precision components.

(2) Closing the front panel. (See Figure 3.3.1.)

- ① Close the front panel.
- ② Turn the key to the arrow direction (←) and secure the front panel.
- ③ Attach the front cover.

Notice : Keep the key carefully lest it should be lost.

Notice : Open/Close the side covers gently to avoid a shock. Precision components are installed.

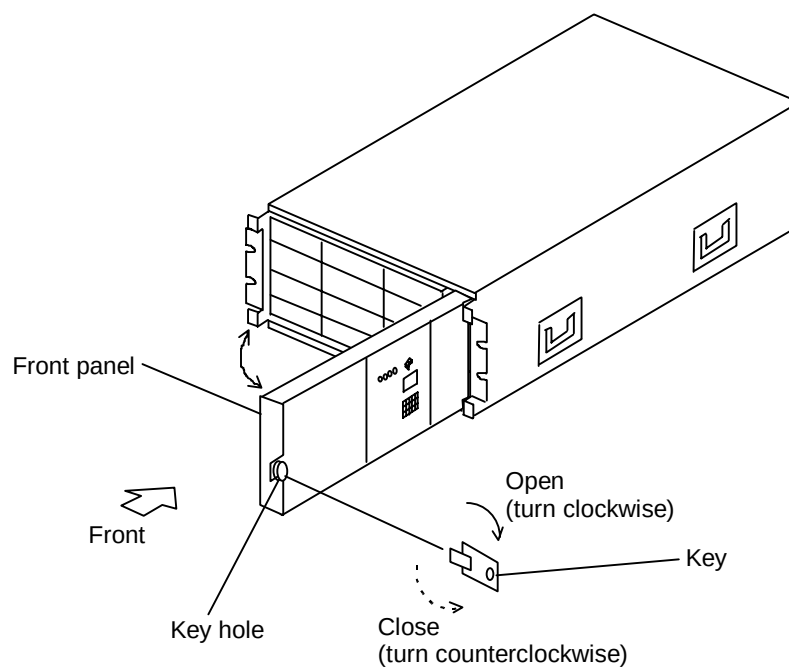


Figure 3.3.1 Opening/Closing the Front Panel

4. Replacing HDU ASSY

The method of replacing HDU varies depending on the RAID configuration.

When replacing the HDU ASSY, confirm the RAID configuration of the subsystem beforehand, and follow the procedure below according to the configuration.

To confirm the RAID configuration, refer to page PANEL0290 ((1) Reference/setting menu of RAID configuration information.)

Notice : Be sure to replace the HDU ASSY with the power kept on. (This procedure is except for when the Micro-Disk version is 0353 or earlier.)**

Proceed the replacement and the data recovery following the procedure below. RAID Specification of replacing HDU can be seen on the panel display. (See PANEL0290.)

Notice : If you delete or re-format the set-up RAID group or LU, user's data in that will be deleted. Be sure to back-up copy the user's data before these operation.

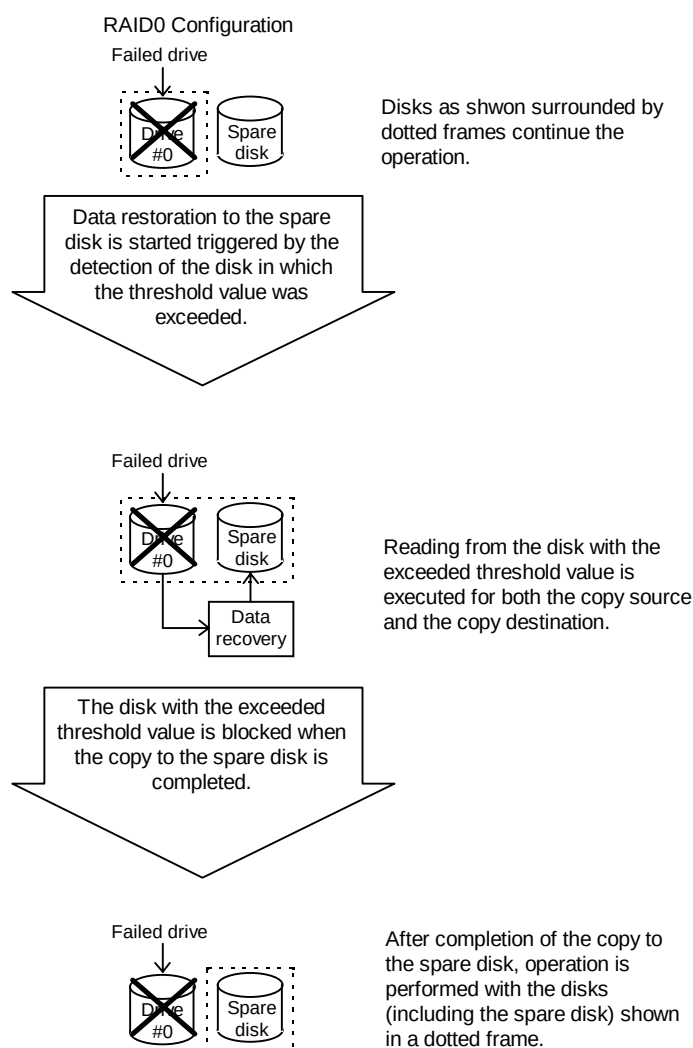
4.1 Procedure of Data Recovery and HDU Replacement Under RAID0 Configuration

4.1.1 Procedure of data recovery and HDU ASSY replacement when no spare disk is installed

- (1) Pull out the disk in which a failure occurred, and insert the replacement disk. For the specific procedures to remove and install the disk, see “HDU ASSY Replacement Procedure” on page RH-REP0300.
- (2) In a short time after the disk is inserted, the ALARM LED on the HDU ASSY goes out and the READY LED comes on. If the inserted disk is that of row 0, following messages will be displayed on the panel.
I00DXY SYS-CP-XY----- Starting system area recovery
I00EXY SYSRCV-XY----- Completing system area recovery
X : Port number, Y : Row number (XY indicates a location of the disk whose system area is being recovered (or has been recovered).)
If the ALARM LED of the HDU ASSY is on after the replacement, power off the subsystem and reexecute the replacement.
- (3) Execute an LU formatting. For the LU formatting procedure, see page RH-INST0780.
- (4) Restore the data using the backed up data.

4.1.2 When a spare disk is installed

When the Micro_Disk version is 0354** (** is optional) or later, data restoration to the spare disk is executed by the dynamic sparing function. Conditions for restoration to the spare disk and messages, etc. are the same as those to the RAID1, 5 and A. See pages RH-REP0230 through 0260.



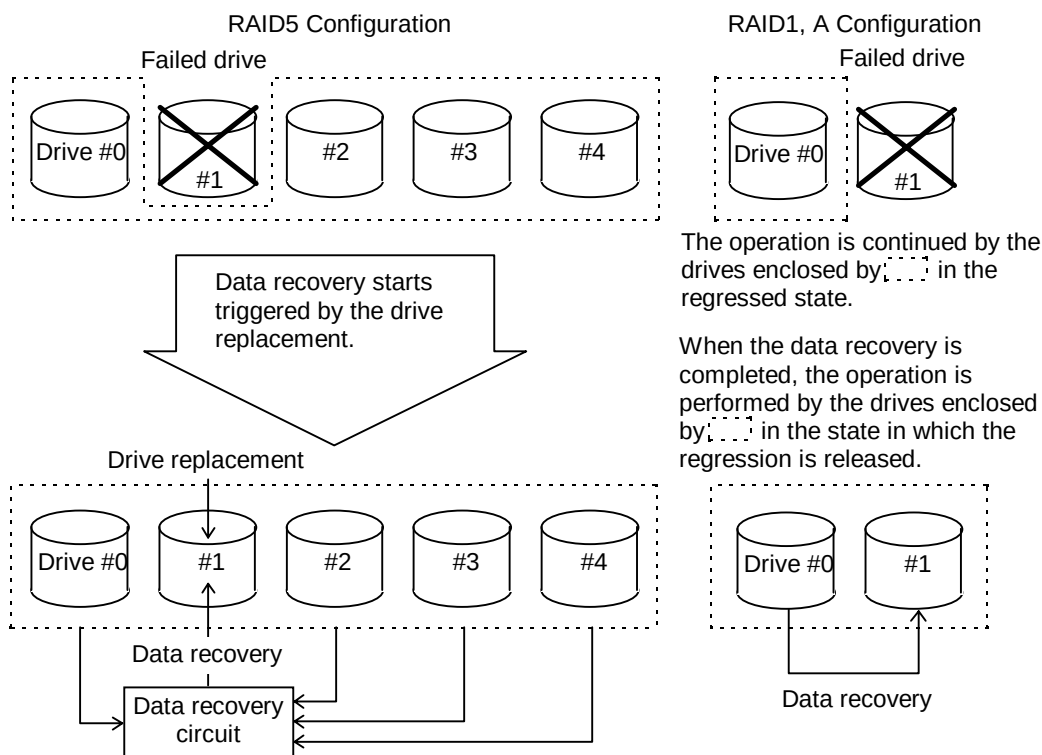
4.2 Procedure of Data Recovery and HDU Replacement Under RAID1, 5, A Configuration

4.2.1 Procedure of data recovery and HDU ASSY replacement when no spare disk is installed

When a failure occurred at a HDU ASSY, replace the failed HDU with a spare HDU.

To replace a HDU, refer to “4.3 HDU ASSY Replacement Procedure”. (See RH-REP0300.) With the replacement, data in the failed HDU will be automatically recovered. The panel display is described at “① Transition of panel display”. (See RH-REP0220.)

Note : When DRIVE MAINTN (RECOVER STATUS) is selected from the panel during data recovery, the progress rate (%) of the data recovery at the moment can be seen (to see the progress rate again, return to the previous screen and then select DRIVE MAINTN again).



In the following cases, the recovery will not start automatically. Operation to start the recovery is required.

- (1) When the drive recovery mode is set to “NOT AUTOMATIC MODE”, the data recovery will not start automatically when the drive is replaced.

In this case, it is necessary to instruct recovery from the panel. (For further details, refer to the Hitachi Disk Array Subsystem Panel Operation Manual.)

- (2) When failures occurred in plural drives, if the second faulty drive is replaced during data recovery of the first drive, the data recovery of the second drive will not start automatically.

In this case, it is necessary to remove and insert the second drive again after the data recovery for the first drive is completed. Or, it is necessary to instruct recovery from the panel. Select “DRIVE MAINTN (RECOVER STATUS)” and make sure that data recovery is completed normally.

① Transition of panel display

I00DXY SYS-CP-XY : Start of system area recovery (*)

I00EXY SYSRCV-XY : Completion of system area recovery (*)

I010XY RCV-ST-XY : Start of data area recovery

I011XY RCVEND-XY : Completion of data area recovery

I005XY DRVRCV-XY : Completion of drive recovery

Note : Symbols X and Y indicated above represent the following.

X indicates port No., Y indicates row No., and XY indicates the location of the drive under recovery.

* : Only with the replacement of HDU in Row = 0.

② Confirming completion of data recovery

Select DRIVE MAINT (RECOVER STATUS) with the panel and check to see that the data recovery is completed normally (COMP).

③ When the data recovery fails (I012XY RCVFLT-XY)

Select RECV ERR INFO from the panel and locate the faulty portion.

(a) Data recovery onto the replacement drive

(i) When the faulty portion is the replaced drive (PORT X, ROW Y)

- Replace the drive again.
- Make sure that the data recovery is completed normally (COMP).

(ii) When the faulty portion is other than the replaced drive

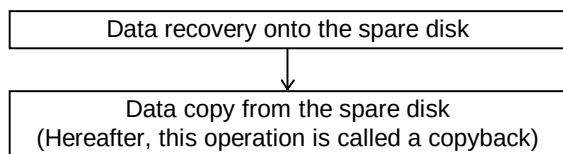
- Remove and insert the replaced drive and start data recovery again.
- Check to see that the data recovery is completed normally (COMP). When the data recovery is completed abnormally, it is a double failure, and cannot be recovered. Ask for an instruction. When the data recovery is completed normally, remove the failed drive (causing the system to be regressed) and replace the drive.

4.2.2 Procedures of data recovery and HDU ASSY replacement when a spare disk is installed

When a failure occurred in a HDU at a system with a spare drive, the data in the failed HDU is automatically recovered to the spare drive. After replacement of the failed HDU, the data in the spare drive will be copied back to the replaced HDU.

To replace HDU, refer to "4.3 HDU ASSY Replacement Procedure". (See RH-REP0300.) The panel display is described "Transition of Panel Display". (See RH-REP0280.)

Note : When DRIVE MAINT (RECOVER STATUS) is selected from the panel during data recovery, the progress rate (%) of the data recovery at the moment can be seen (to see the progress rate again, return to the previous screen and then select DRIVE MAINT again).



(1) Data recovery onto the spare disk

There are two types of data recovery onto the spare disk depending on the incentive.

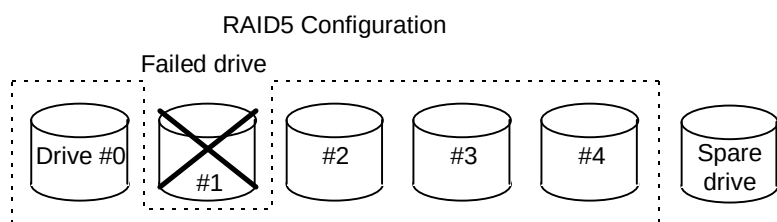
- Data recovery onto the spare disk when a failure in the disk is detected.
- Data copy onto the spare disk when a disk is detected in which the error count has exceeded its threshold value. (This operation will be called "dynamic sparing" hereafter. Note that some microprograms of certain version do not support the operation.)

(1-1) Data recovery onto the spare disk when a disk failure is detected.

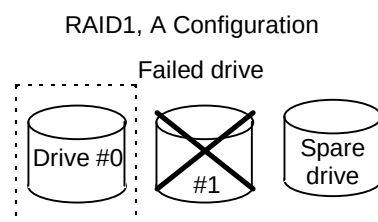
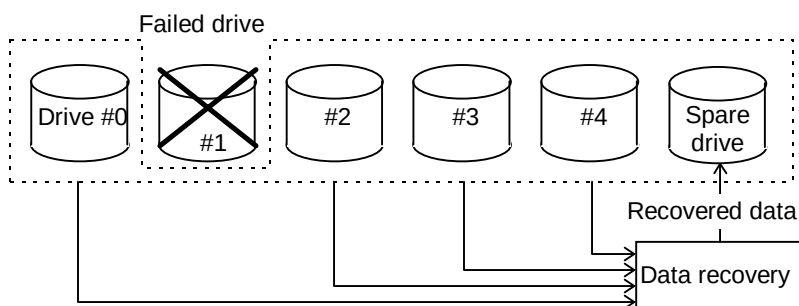
As to data recovery onto the spare disk, as shown in the drawing on the following page, when a drive failure occurs, the data of the failed drive is recovered automatically onto the spare disk.

Automatic recovery onto the spare disk is executed only under the following condition.

Condition : "When a drive failure is detected, the spare disk is an unused disk."

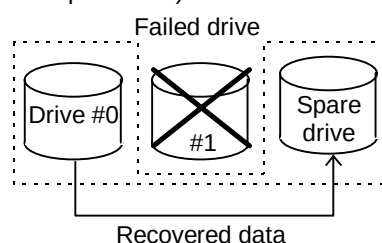


Data recovery onto the spare disk starts triggered by a detection of a drive failure.



The operation is continued by the drives enclosed by [] in the regressed state.

When the data recovery onto the spare disk is completed, the operation is performed by the drives enclosed by [] (including the spare drive).



In the following cases, the data recovery onto the spare disk will not start automatically. An action to start the data recovery is required.

- ① When the drive recovery mode is set to “NOT AUTOMATIC MODE”, the data recovery onto the spare disk will not start automatically.

In this case, it is necessary to instruct recovery onto the spare disk with the panel. (See RH-REP0320)

- ② If a further drive failure occurs while the spare disk is used already (data of a drive has been already recovered onto the spare disk), the data of the nearly failed drive will not be recovered onto the spare disk.

Even after the copyback is completed in the above state and the spare disk enters the unused state, the data of the second failed drive will not be recovered onto the spare disk.

- ③ If a disk of no failure (a 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 from the panel. (See RH-REP0320)

- ④ When the spare disk is replaced because a spare disk failure occurred during data recovery to the spare disk, the data recovery to the replaced spare disk will not start automatically. In this case, it is necessary to instruct recovery to the spare disk with the panel. (See RH-REP0320)

- ⑤ If a faulty drive is replaced during data recovery to the spare disk, the data copy back the replaced drive will not start automatically even after the data recovery to the spare disk is completed.

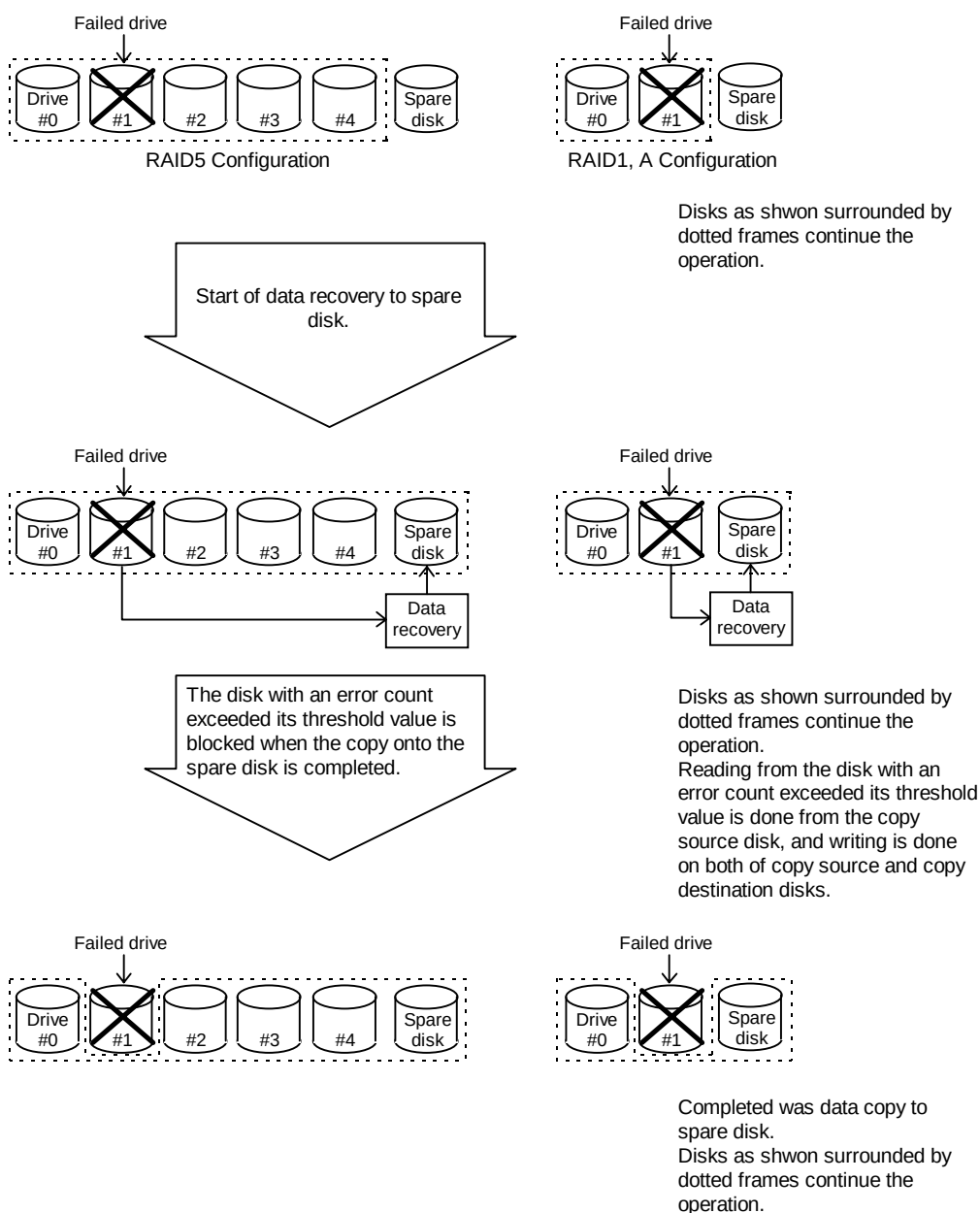
In this case, it is necessary to remove and insert the replaced drive again after the data recovery onto the spare disk is completed.

(1-2) 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 is detected in which the error count has exceeded its threshold value, data stored in the disk 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.

103■XY ■:0 - D
 ▲▲▲▲▲ -XY ▲▲▲▲▲ : Message text } See TRBL0310, 0320, 0330.

At the time when an error count exceeded its threshold value is detected, only a message display on the panel is done without blocking the concerning disk, 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 RH-REP0280 for panel display 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 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 sparing disk is being used for the data recovery.
- Another disk 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 (refer to pages RH-REP0210 through RH-REP0290).

Errors counted in the subsystem and default threshold values for them are listed below.

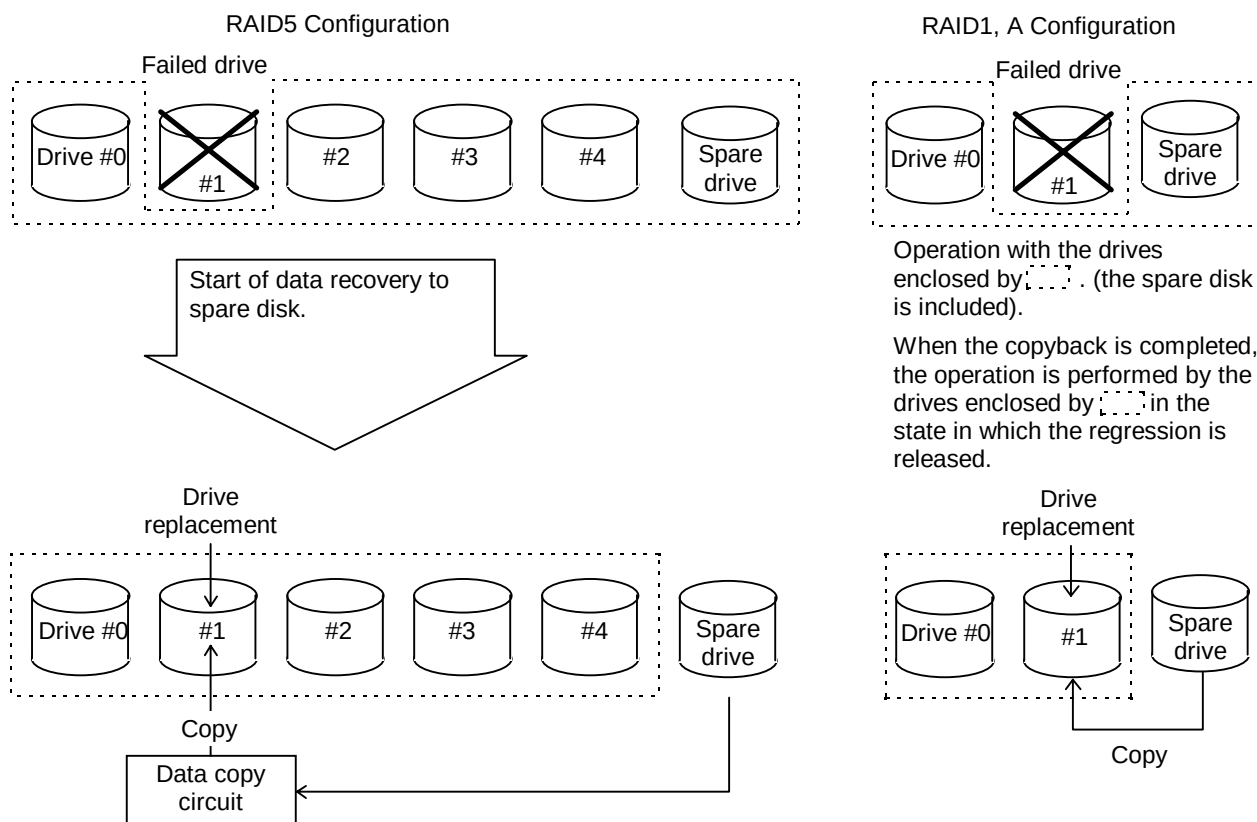
Item No.	Kind of error	Threshold (Default)
1	Drive mechanical error. (Recovered)	50
2	Drive mechanical error. (Unrecovered)	2
3	Drive medium error. (Recovered)	100
4	Drive medium error. (Unrecovered)	50
5	Drive R/W error. (Recovered)	10
6	Drive R/W error. (Unrecovered)	2
7	Drive I/F error. (Recovered)	50
8	Drive I/F error. (Unrecovered)	2
9	Drive hardware error. (Recovered)	50
10	Drive hardware error. (Unrecovered)	2
11	Drive SCSI I/F error. (Recovered)	50
12	Drive SCSI I/F error. (Unrecovered)	2
13	Collectable errors in online verify.	100
14	Uncollectable errors in online verify.	50

The threshold values above can be referred to and updated from the maintenance panel. (See page PANEL0520.)

Besides, the then error count can be referred to concerning the recovered or unrecovered drive media errors, correctable errors in online verify operations, correctable errors, and uncorrectable errors.

(2) Copyback

When a new drive is inserted to where a failure occurred as shown in the drawing below, the copyback will be executed automatically.



In the following cases, the copyback will not start automatically. Operation to start the copyback is required.

- ① When the copyback mode is set to "NOT AUTOMATIC MODE", the copyback will not start automatically after the drive replacement.

In this case, it is necessary to instruct copyback with the panel. (See RH-REP0280)

- ② If a faulty drive is replaced during data recovery to the spare disk, the data copy back to the replaced drive will not start automatically even after the data recovery to the spare disk is completed.

In this case, it is necessary to remove and insert the replacement drive again after the data recovery onto the spare disk is completed.

(a) Transition of panel display.

(i) Data recover (Data recovery onto the spare disk when a disk failure is detected.)

W202XY DRVALM-XY: Drive blocked

I01044 RCV-ST-44 : Start of data area recovery

I01144 RCVEND-44 : Completion of data area recovery

I006XY SPDRCN-XY : Completion of recovery onto spare disk

Note : Symbols X and Y indicated above represent the following.

X indicates port No., Y indicates row No., and XY indicates the location of the recovered drive.

(ii) Data recover (Dynamic sparing)

I01DXY DYNMSP-XY : Start of Dynamic sparing

I01044 RCV-ST-44 : Start of HDU ASSY recover

I01144 RCVEND-44 : Completion of data recovery

I006XY SPDRCN-XY : Completion of recovery onto spare disk

W202XY DRVALM-XY: Drive X, Y were blocked

Note : Symbols X and Y indicated above represent the following.

X indicates port No., Y indicates row No., and XY indicates the location of the recovered drive.

(iii) Copyback

I00DXY SYS-CP-XY : Start of system area recovery (*)

I00EXY SYSRCV-XY : Completion of system area recovery (*)

I010XY RCV-ST-XY : Start of data area recovery

I011XY RCVEND-XY : Completion of data area recovery

I005XY DRVRCV-XY : Completion of recovery onto the drive to which the data has been copied.

Note : Symbols X and Y indicated above represent the following.

X indicates port No., and Y indicates row No., and XY indicates the location of the drive to which the data is copied.

* : This message is displayed only when replacing HDU ASSY.

(b) Confirming completion of data recovery or copyback

Select DRIVE MAINTEN (RECOVER STATUS) from the panel and make sure that the data recovery is completed normally (COMP).

(c) When the data recovery fails (I012XY RCVFLT-XY)

Select RECV ERR INFO from the panel and locate the faulty portion.

(i) Data recovery to the spare disk

- When the faulty portion is the spare disk (PORT 4, ROW 4)

- ➊ Replace the spare disk. In this case, the data recovery to the spare disk will not start.
- ➋ Replace the drive at the regressed location. In this case, the data recovery onto the replacement drive starts.

- When the faulty portion is other than the spare disk

- ➊ Replace the drive at the regressed location. In this case, the data recovery to the replaced drive starts.

- ➋ Make sure that the data recovery ends normally (COMP).

When the data recovery is completed abnormally, it is a double failure, and cannot be recovered. (See 3. Trouble shooting chapter TRBL0840)

When the data recovery is completed normally, remove the failed drive (causing the system to be regressed) and replace the drive. (When the failed drive is removed, the data recovery to the spare disk will not start, where as when the drive is replaced, the data recovery to the replaced drive starts.)

(ii) When the dynamic sparing

- When the faulty portion is the spare disk (PORT 4, ROW 4)

- ➊ Replace the spare disk. In this case, the dynamic sparing will not start.
- ➋ Replace the drive at the regressed location. In this case, the data recovery onto the replacement drive starts.

- When the faulty portion is other than the spare disk

- ➊ Replace the drive at the regressed location. In this case, the data recovery to the replaced drive starts.

- ➋ Make sure that the data recovery ends normally (COMP).

When the data recovery is completed abnormally, it is a double failure, and cannot be recovered. (See 3. Trouble shooting chapter TRBL0840)

(iii) Copyback to the replaced drive from the spare disk

- When the faulty portion is the spare disk (PORT 4, ROW 4)

- ➊ Replace the spare disk. In this case, the data recovery onto the spare disk will not start.
- ➋ Replace the drive in the regressed location. In this case, the data recovery onto the replacement drive starts.

- ➌ Make sure that the data recovery is completed normally (COMP).

- When the faulty portion is other than the spare disk

- ➊ Replace the drive which failed during data recovery and make sure that the data recovery is completed normally (COMP).

- ➋ Replace the drive which is regressed first and make sure that the copyback is completed normally (COMP).

**Caution**

Do not subject the HDU ASSY to any impact or vibration since it is a precision component.

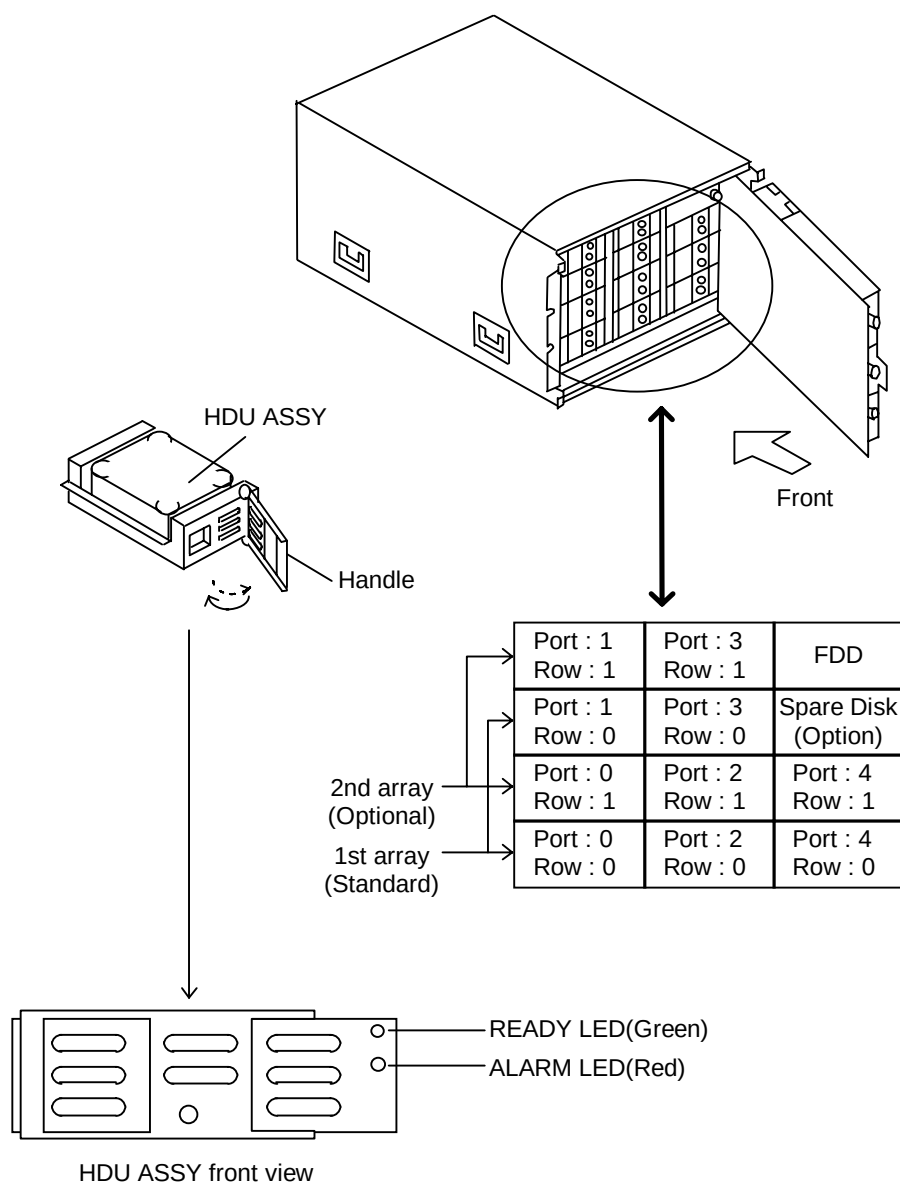
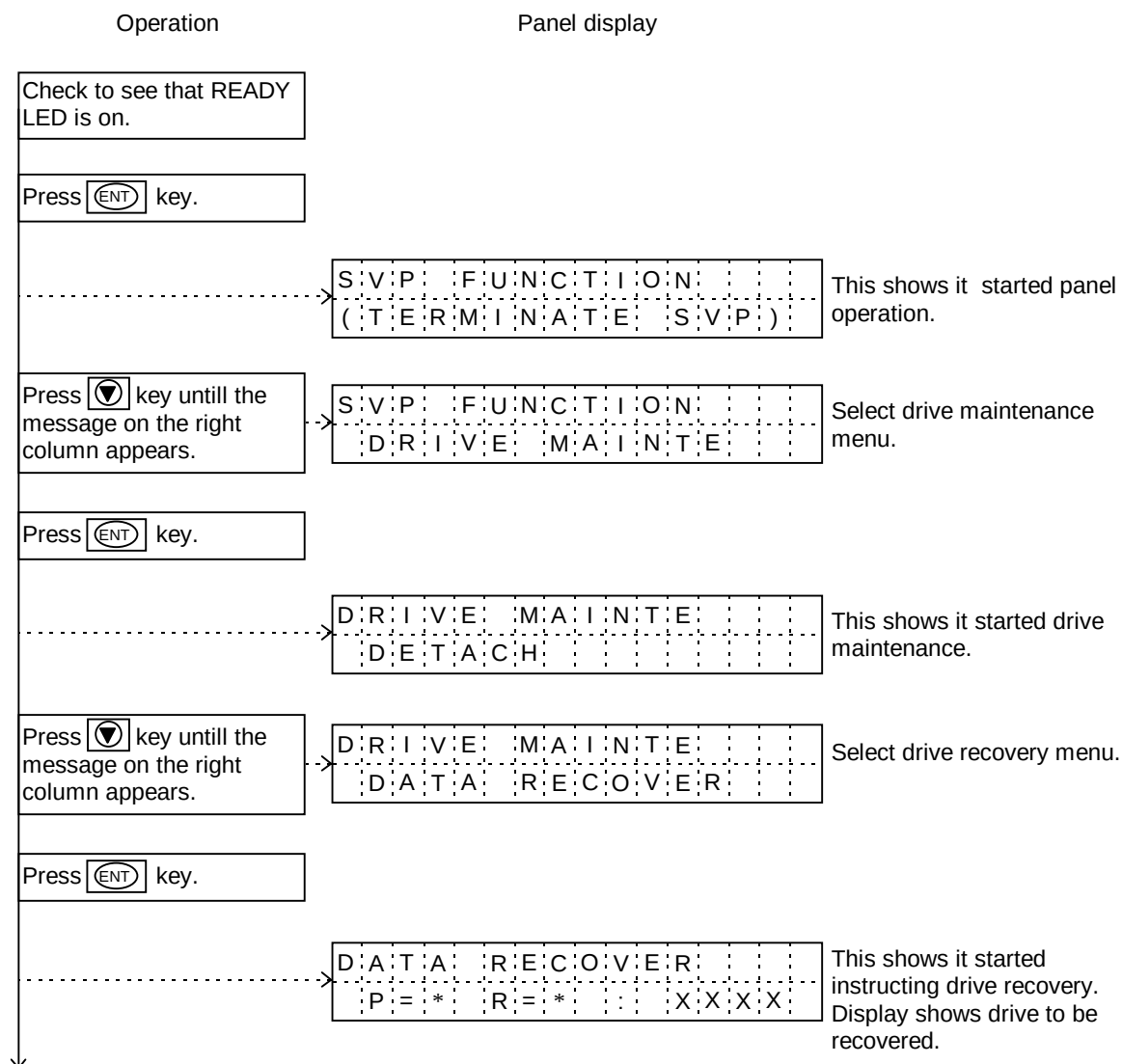


Figure 4.3.1 Replacing HDU ASSY

4.4 Manual Instruction of Data Recovery

This is for manually instructing data recovery. (In a case of dual controller system, which controller to process is automatically specified. No instruction of controller is required.) You can operate this function under device ready and LU#0 instituted (LU can be not formatted yet).

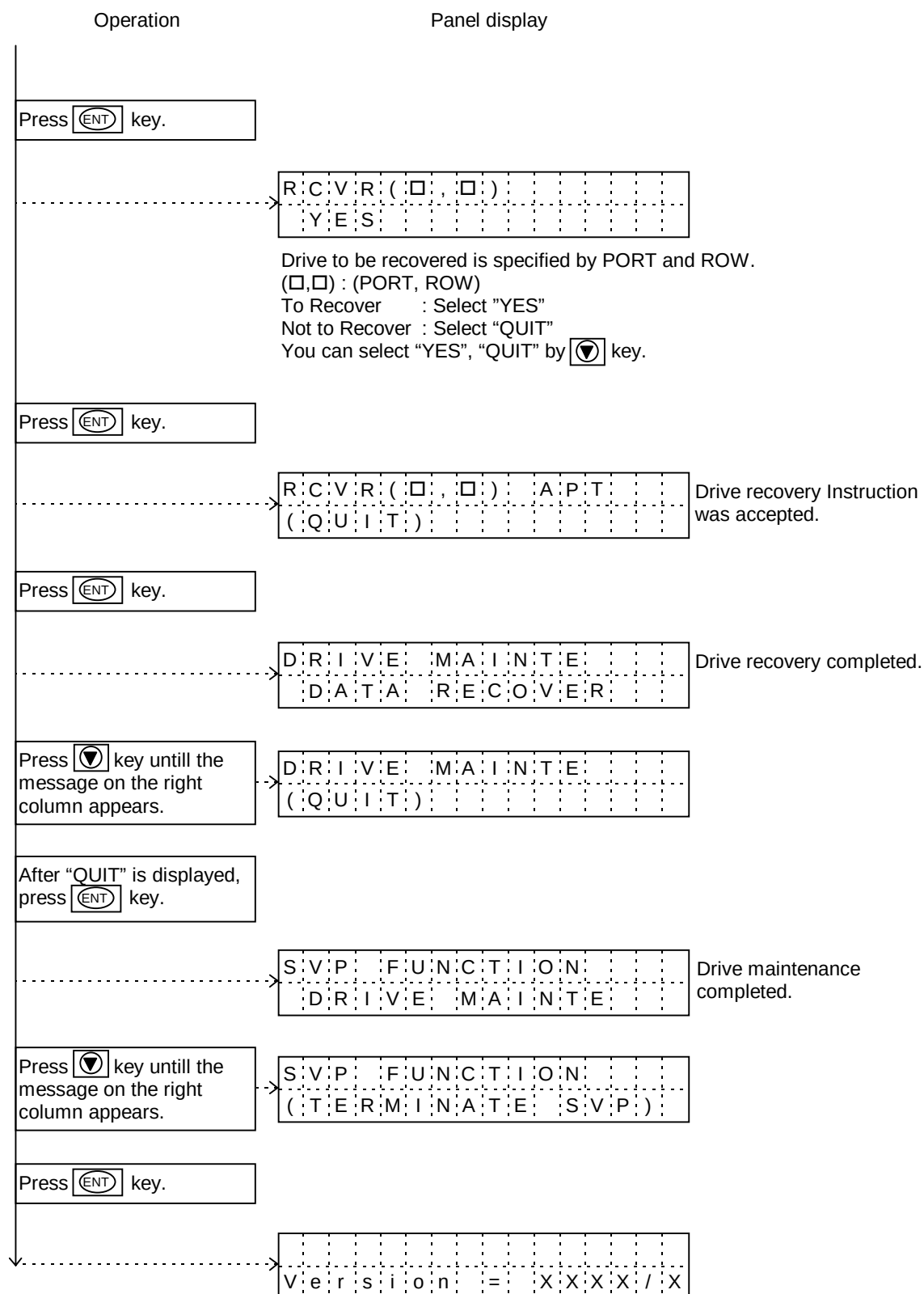


P=* : Port# of Drive to be recovered.

R=* : Row# of Drive to be recovered.

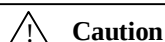
XXXX : Status of Drive to be recovered. Status is one of below.

- STDBY (not used)
- DETACH (blocked)
- NO : (RAID, LU not set yet)



5. Replacing Fan ASSY (See Figure 5.1.)

When replacing FAN ASSY, turning off the power is not required.



Caution

FAN is rotating with high speed, be careful not to be caught by the FAN.

(1) Removing procedure

- ① Remove the front cover and open the front panel, or open the rear cover, depending on which Fan ASSY is going to be replaced. (See RH-REP0160, 0170, 0180.)
- ② Remove thumbscrew and pull out Fan ASSY holding the handle.
(The WARNING LED comes on and a buzzer sounds. Press either key on the panel to stop them.)

(2) Installing procedure

- ① Install Fan ASSY to the predetermined position and tighten the thumbscrew.
- ② Check to see that WARNING LED goes off and it displays as (3).
- ③ Close the front panel and attach the front cover or close the rear cover. (See RH-REP0160, 0170, 0180.)

(3) Transition of panel display

I002XX FANRCV-XX----- Termination of fan failure recovery

(XX indicates the installing location)

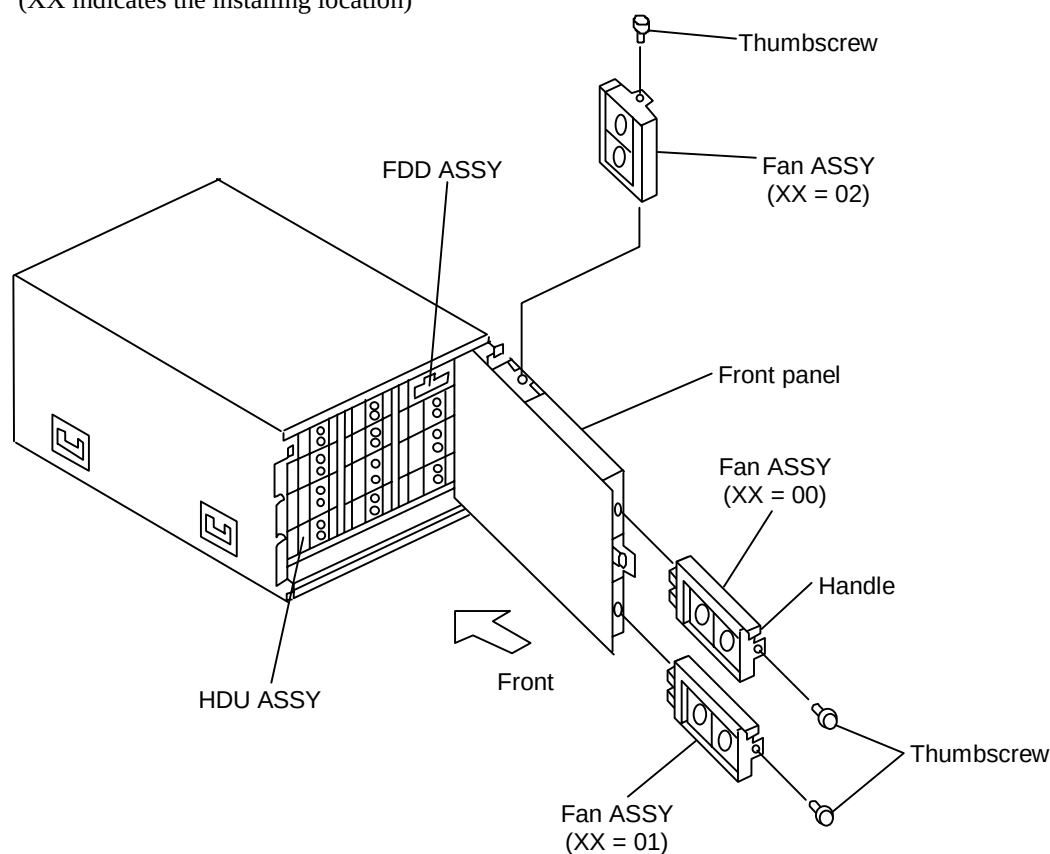


Figure 5.1 Replacing Fan ASSY

6. Replacing Battery ASSY (See Figure 6.1.)

When the battery is to be replaced without power being turned off (during power on), follow the procedure explained below (execute (1)② to (2)② promptly).

Notice 1 : In case the power is not normally turned off, the user's data might be lost.

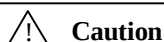
Notice 2 : In the power is already turned off, check the CACHE PWR LED (see page THEORY0200) to confirm that the cache back up is not being execute. In the case the cache back up is being executed, turn on and off the power (see page RH-REP0050).

Make sure that the power is turned off normally, then replace the Battery ASSY.

When the battery is to be replaced with power turned off, read RH-REP0050, "Turning the power off." and "Turning-ON procedure." thoroughly and follow RH-REP0060, "Part Replacement Procedures".

(1) Removing procedure

- ① Turn the switch on the Battery ASSY to "O" side.
(The WARNING LED comes on and a buzzer sounds. Press either key on the panel to stop them.)
- ② Remove the thumbscrews and pull the Battery ASSY to your side by grasping it by its handle.



Caution

Do not disintegrate removed Battery. It may cause burn or electric shock.

(2) Installing procedure

- ① Insert the Battery ASSY into the right place holding it by its handle and tighten the thumbscrew.
- ② Turn the switch on the Battery ASSY to "I" side.
- ③ Check to see that WARNING LED goes off and it displays as (3).

Note : When removing/mounting the Battery ASSY, turn the switch to "O" side.

(3) Transition of panel display

I00100 BATRCV ----- Termination of battery recovery

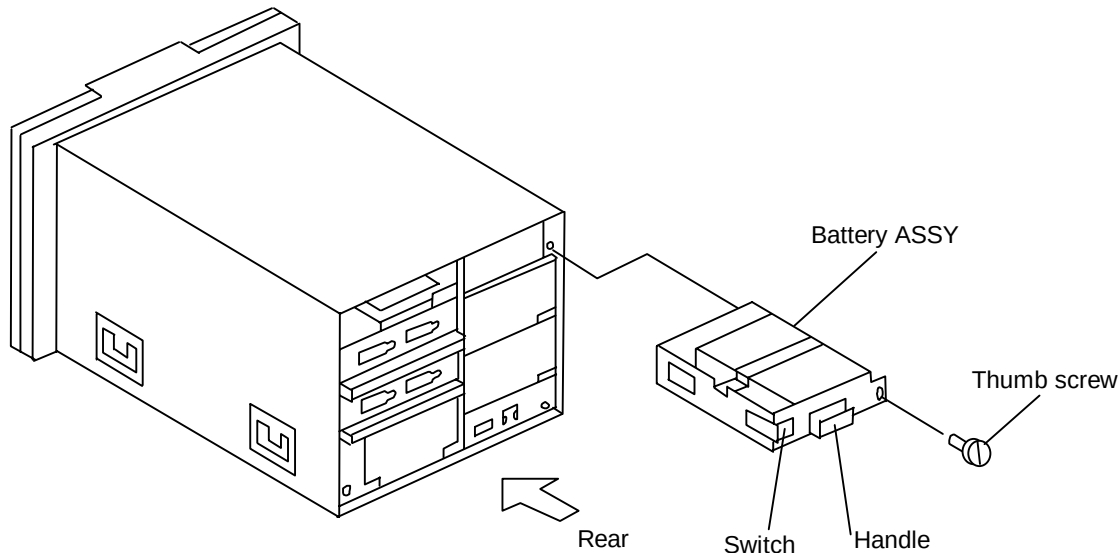


Figure 6.1 Replacing Battery ASSY

Note : The lead-acid battery is a precious resource which can be recycled.

The battery uses lead which is a heavy metal and sulfuric acid which is a deleterious substance. Therefore, never case it off at the place where the replacement of it is done.

When a part is to be replaced or a used product is to be discarded, take out the lead-acid battery to get it recycled.

See page "ENTRY0120" for the safety of depositing and storing the battery.

When the battery ASSY is replaced, power on the subsystem and charge the battery for more than two hours before returning the subsystem to the customer.

7. Replacing FDD ASSY (See Figure 7.1.)

(1) Removing procedure

- ① Turn off the subsystem following the power-off procedure explained in RH-REP0050.

Notice 1 : Be sure to read the above mentioned instruction because user's data may be lost if the power is not turned off normally.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Troubleshooting Section" (See TRBL0030) and turn off the power.

- ② Disconnect the power cable. When the power supply is duplicated, disconnect two cables.
- ③ Open the front cover and front panel.
- ④ Remove the thumbscrew and pull the FDD ASSY to your side grasping it by its handle.

(2) Installing procedure

- ① Insert the FDD ASSY into the right place holding it by its handle and tighten the thumbscrew.
- ② Connect the power cable.

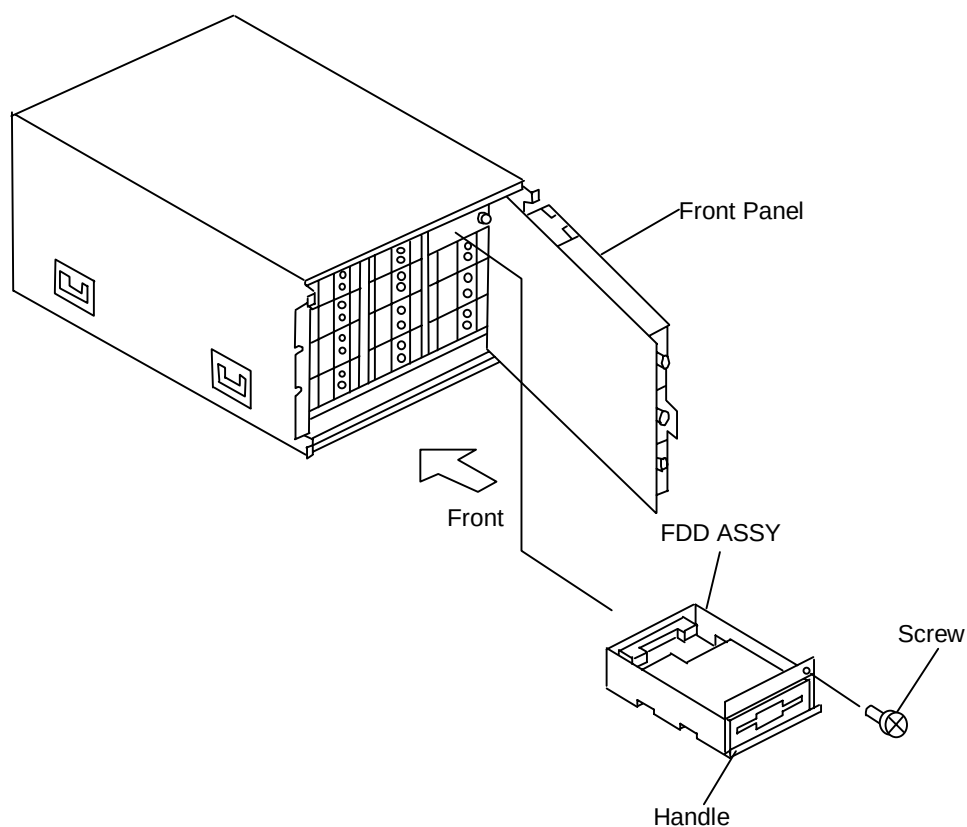


Figure 7.1 Replacing FDD ASSY

8. Replacing CTL ASSY (See Figure 8.1.1.)

The replacement procedure varies depending on whether the backup FD has been inserted or not. Perform the replacement following the procedure corresponding to the case.

- (1) When the backup FD has been inserted

Go to the replacement of the CTL ASSY when the backup FD has been inserted explained on page RH-REP0380.

- (2) When the backup FD has not been inserted

Go to the replacement of the CTL ASSY when the backup FD has not been inserted explained on page RH-REP0440.

8.1 When the backup FD has been inserted

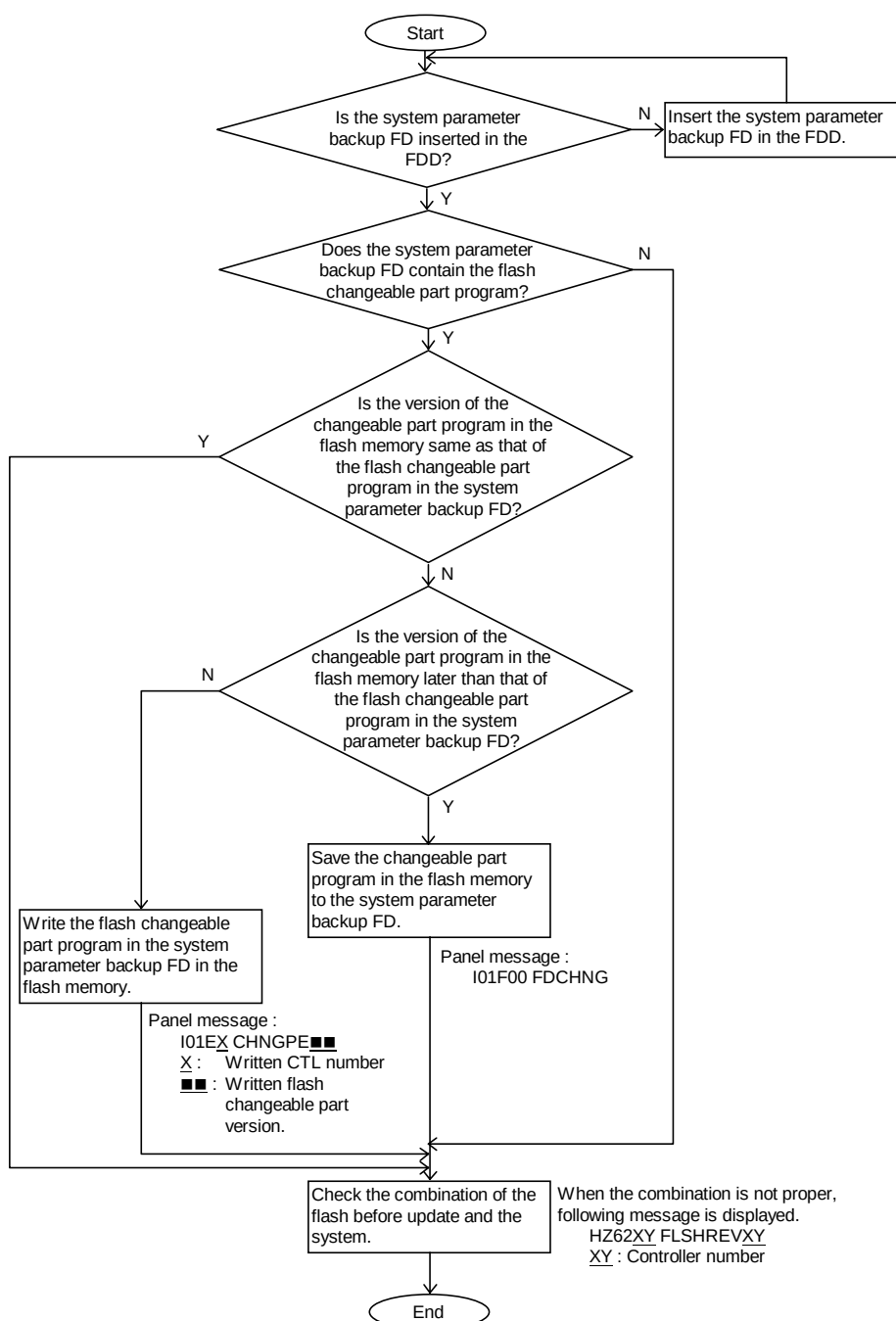
In this subsystem, the flash changeable part is updated automatically. To use the function the system parameter backup FD must be inserted.

By using the function, service person can replace the CTL ASSY without giving care to the combination of the Micro_Disk version and the flash changeable part version of the CTL ASSY.

(If the system parameter backup FD is not inserted when replacing the CTL ASSY, prepare the CTL ASSY whose flash changeable version is the same as that of the CTL ASSY to be replaced, or PE26 or later, and execute the replacement following the procedure explained in Section 8.2 “When the backup FD has not been inserted”).

Outline of flash changeable part automatic updating function

The following is a processing flow of the flash changeable part automatic updating function.



In case no optional redundant CTL installed

(1) Removing procedure

- ① Insert back-up FD into the FDD, copy the system parameter to FD.
(See RH-REP0090.)
- ② Turn off the subsystem following the power-off procedure explained in RH-REP0050.

Notice 1 : Be sure to read the above mentioned instruction because user's data may be lost if the power is not turned off normally.

Notice 2 : When the power has been already turned off, check the CACHE PWR LED (see page THEORY0200) to see if the cache backup is not being performed. If the cache backup is being performed, turn on and off the replacement after the power is turned off normally.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Troubleshooting Section" (See TRBL0030) and turn off the power.

- ③ Disconnect the cable (RS232C).
- ④ First open the rear cover 1 and then the rear cover 2. (See RH-REP0170.)
- ⑤ Open the right and left levers to the direction of arrows (···>) at the same time then remove the CTL ASSY.
- ⑥ Remove the CACHE ASSY and the LAN ASSY if installed.

(2) Installing procedure

- ① Prepare the FD in which the system parameter was copied in (1) ①. If it is not available, prepare the table of system parameter setting.
- ② Reinstall the removed CACHE ASSY and LAN ASSY in CTL ASSY. Be sure to install it in the same position as before.
- ③ Insert the CTL ASSY into the right place with its right and left levers being opened, then close the both levers to the direction of arrows (——>) at the same time.
Note : If the CTL ASSY is caught by something when it is installed, do not push it in forcibly. Retry the installation from the beginning. If forced, pins might be broken.
- ④ Connect the disconnected cables (RS232C).
- ⑤ Set No.3 of the DIP switch of the CTL ASSY to down position.



- ⑥ Turn on the subsystem according to the power-on procedure explained in RH-REP0050.
- ⑦ Set the system parameter of replaced CTL ASSY with the FD prepared at ①. (See RH-REP0130.)

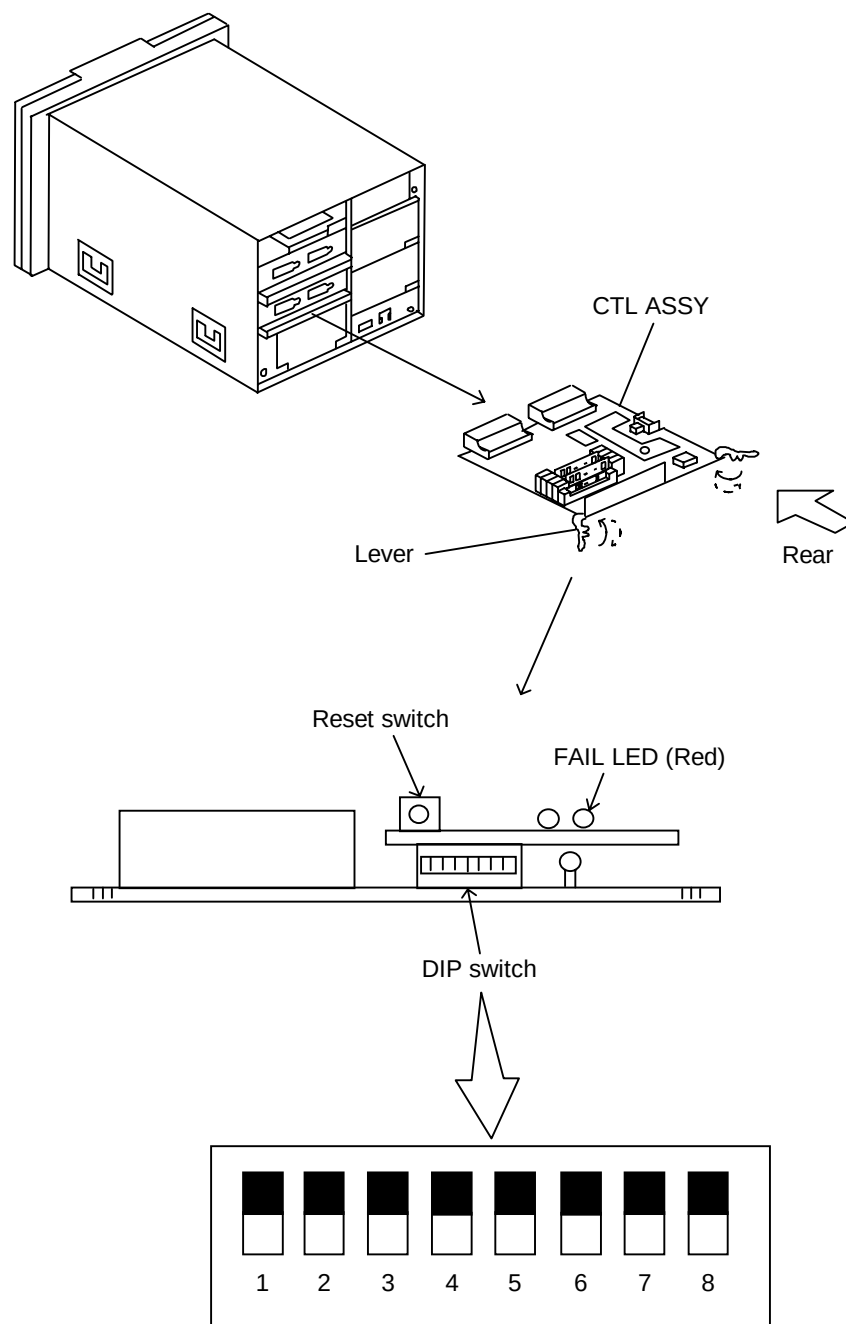
- ⑧ One of the following messages is displayed on the panel. It does not mean a failure. Confirm the message and recover the subsystem state by performing the corresponding operation.

Message on the panel	Subsystem state	Operation
Version = XXXX/X	Subsystem READY LED comes on.	Go to step ⑨
I01EX CHNGPE■■■ HZ62XY FLSHREVXY X : Controller number (0 or 1) ■■■ : Version of flash changeable part is displayed. XY : Controller number (01 or 10) is displayed.	Subsystem ALARM LED comes on. (Version of flash changeable part was updated to PE■■■. Current system cannot operate with the flash changeable part whose version is not updated.)	Operation1 : Return the DIP switch of the CTL ASSY. Operation2 : Turn off the power following the powering off procedure shown on page RH-REP0050. Operation3 : Turn on the power following the powering on procedure shown on page RH-REP0050. Check if the following message is displayed on the panel. Version = XXXX/X Operation4 : Paint the boxes on the CHANGEABLE revision label affixed on the CTL ASSY up to ■■■ (see RH-REP0450), then go to step ⑨.
I01EX CHNGPE■■■ Version = XXXX/X X : Controller number (0 or 1) ■■■ : Version of flash changeable part is displayed.	Subsystem READY LED comes on. (Version of flash changeable part was updated to PE■■■. Current system can operate with the flash changeable part whose version is not updated.)	Paint the boxes on the CHANGEABLE revision label affixed on the CTL ASSY up to ■■■ (see RH-REP0450), then go to step ⑨.

- ⑨ After READY LED come on, set No.3 of DIP switch to as shown.



- ⑩ Turn off the power according to the power off procedure in RH-REP0050.
 ⑪ Turn on the power according to the power on procedure in RH-REP0050. (Soon, the ASSY will enter the ready status.)
 ⑫ Close the rear covers 1 and 2. (See RH-REP0170.)

**Figure 8.1.1 Replacing CTL ASSY**

In case optional redundant CTL is installed

When the subsystem is of dual controllers, a controller can be replaced while the power on.

Notice 1: Do not replace (pull out) the CTL ASSY which operates normally. Before replacing the CTL ASSY, confirm that it is blocked (the FAIL LED in on).

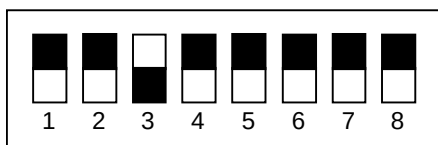
Notice 2: In this case, the controller must be replaced one after another. When Dual controllers are replaced at the same time, the power should be turned off before replacement.

(1) Removing procedure

- ① First open the rear cover 1 and then the rear cover 2. (See RH-REP0170.)
- ② Disconnect the cables (RS232C).
- ③ Confirm the blocked CTL ASSY (with the FAIL LED turned on). (See Figure 8.1.1.)
- ④ Take out the CTL ASSY by pulling both levers on left and right side at the same time toward the directions shown by allows (···→)
- ⑤ Remove the CACHE ASSY. If the LAN ASSY is installed, also remove it.

(2) Installing procedure

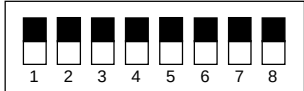
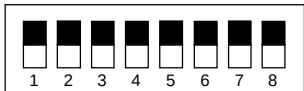
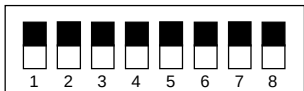
- ① Reinstall the removed CACHE ASSY and the LAN ASSY (option) in the new CTL ASSY. Be sure to install it in the same position as before.
- ② Set No.3 of the DIP switch of the CTL ASSY.



- ③ Insert the CTL ASSY into the right position with the right and left levers being opened, then close the both levers to the direction of arrows (—→) at the same time.

Note : If the CTL ASSY is caught by something when it is installed, do not push it in forcibly. Retry the installation from the beginning. If forced, pins might be broken.

- ④ One of the following messages is displayed on the panel. It does not mean a failure. Confirm the message and recover the subsystem state by performing the corresponding operation.

Message on the panel	Subsystem state	Operation
I619XX CTLRCV-XX XX : Controller number (00 or 01) is displayed.	The WARNING LED goes out and the READY LED of the subsystem comes on.	Return the DIP switch No.3 as shown below, then go to step ⑤ 
I01EX CHNGPE■■ HZ62XY FLSHREVXY H60422 CTLFAIL W015XX CTLALM-XX XX : Controller number (00 or 01) is displayed. X : Controller number (0 or 1) ■■ : Version of flash changeable part is displayed. XY : Controller number (01 or 10) is displayed.	The WARNING LED comes on, and the READY LED of the subsystem comes on in the state that one of the CTL ASSYs is blocked. (The flash changeable part has been updated to the version PE■■. Current system cannot operate with the flash changeable part of earlier version on the CTL ASSY inserted.)	Operation1 : Pull out the inserted CTL ASSY (with the FAIL LED turned on). Operation2 : Insert the CTL ASSY again. (Leave the DIP switch No.3 as set to on.) Operation3 : Return the DIP switch No.3 as shown in the Figure below when the WARNING lamp on the panel goes out and the following message is displayed on the panel.  Operation4 : Paint the boxes on the CHANGEABLE revision label affixed on the CTL ASSY up to ■■ (see RH-REP0450), then go to step ⑤. I619XX CTLRCV-XX
I01EX CHNGPE■■ I619XX CTLRCV-XX	The WARNING LED goes out and the READY LED of the subsystem comes on. (The flash changeable part has been updated to the version PE■■. However, the current system can operate with the flash changeable part of earlier version on the CTL ASSY inserted.)	Operation1 : Return the DIP switch No.3 as shown below.  Operation2 : Paint the boxes on the CHANGEABLE revision label affixed on the CTL ASSY up to ■■ (see RH-REP0450), then go to step ⑤.

- ⑤ Connect the disconnected cables (RS232C).
- ⑥ Close the rear covers 1 and 2. (See RH-REP0170.)

When replacing a CTL in a dual controller system (with Redundant CTL option), the system parameter is automatically loaded to the replaced CTL from another CTL. The setting with FD or manual setting is not required.

But, when both CTL ASSY failed at the same time, this automatic operation is not available. In this case, it is necessary to restore from FD. Operate in the same way as single controller.

When replacing a CTL in a dual controller system (with redundant CTL option) , replacement with power off is allowed. The procedure is similar to the replacement in a single controller system. In this case the setting of system parameter from FD or manual operation is also not necessary. (Though installing procedure ⑦ in the single controller system (without redundant CTL option) is not necessary.)

Painting flash revision label

Figure 8.1.2 shows how to paint the flash revision label. (It shows a case to paint the boxes up to PB26.)

Location of the label is shown in Figure 8.2.2.

FIXED	PEXX	01	02	03	04
		05	06	07	08
		09	10	11	12
		13	14	15	16
		17	18	19	20
CHNGABLE	PEXX	21	22	23	24
		25	26	27	28
		29	30	31	32
		33	34	35	36
		37	38	39	40

An example to paint the boxes of the CHANGEABLE label up to 26.

Figure 8.1.2 Revision Label Layout and Numbers to be Painted

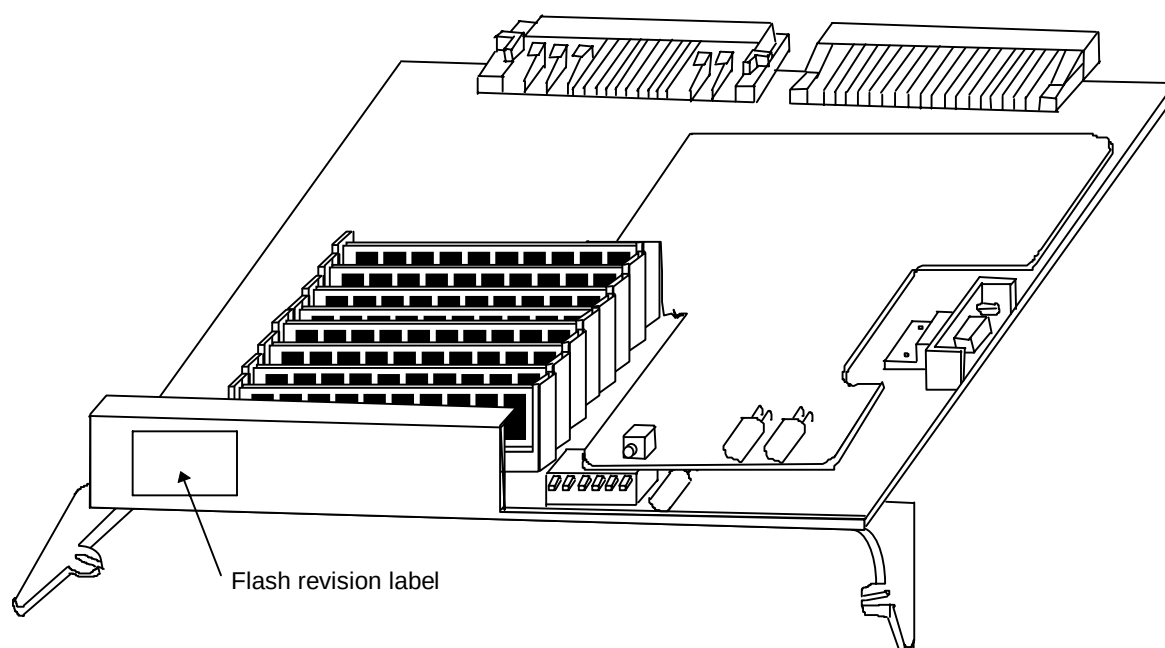


Figure 8.1.3 Location of Revision Label on CTL ASSY

8.2 When the backup FD has not been inserted

In case no optional redundant CTL installed

(1) Removing procedure

- ① Insert back-up FD into the FDD, copy the system parameter to FD.
(See RH-REP0090.)
- ② Turn off the subsystem following the power-off procedure explained in RH -REP0050.

Notice 1 : Be sure to read the above mentioned instruction because user's data may be lost if the power is not turned off normally.

Notice 2 : When the power has been already turned off, check the CACHE PWR LED (see page THEORY0200) to see if the cache backup is not being performed. If the cache backup is being performed, turn on and off the replacement after the power is turned off normally.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Troubleshooting Section" (See TRBL0030) and turn off the power.

- ③ Disconnect the cable (RS232C).
- ④ Remove rear cover 1 and rear cover 2. (See RH-REP0170.)
- ⑤ Open the right and left levers to the direction of arrows (···➤) at the same time then remove the CTL ASSY.
- ⑥ Remove the CACHE ASSY and the LAN ASSY if installed.

(2) Installing procedure

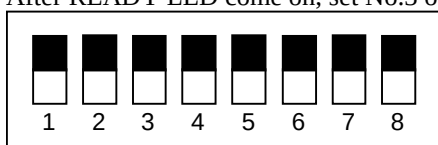
- ① Prepare the FD in which the system parameter was copied in (1) ①. If it is not available, prepare the table of system parameter setting.
- ② Reinstall the removed CACHE ASSY and LAN ASSY in CTL ASSY. Be sure to install it in the same position as before.
- ③ Insert the CTL ASSY into the right place with its right and left levers being opened, then close the both levers to the direction of arrows (—➔) at the same time.

Note : If the CTL ASSY is caught by something when it is installed, do not push it in forcibly. Retry the installation from the beginning. If forced, pins might be broken.

- ④ Connect the disconnected cables (RS232C).
- ⑤ Set No.3 of the DIP switch of the CTL ASSY to down position.



- ⑥ Turn on the subsystem according to the power-on procedure explained in RH -REP0050.
- ⑦ Set the system parameter of replaced CTL ASSY with the FD prepared at ①. (See RH -REP0130.) If no system parameter FD, proceed the setting the panel with the table prepared in ①. (Refer to PANEL Chapter.)
- ⑧ After READY LED come on, set No.3 of DIP switch to as shown.



- ⑨ Turn off the power according to the power off procedure in RH -REP0050.
- ⑩ Turn on the power according to the power on procedure in RH -REP0050. (Soon, the ASSY will enter the ready status.)
- ⑪ Install rear cover 1 and rear cover 2. (See RH-REP0170.)

In case optional redundant CTL is installed

When the subsystem is of dual controllers, a controller can be replaced while the power on.

Notice 1: Do not replace (pull out) the CTL ASSY which operates normally. Before replacing the CTL ASSY, confirm that it is blocked (the FAIL LED in on).

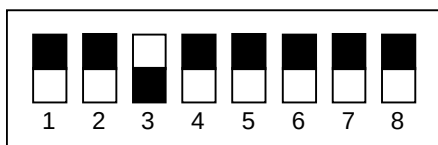
Notice 2: In this case, the controller must be replaced one after another. When Dual controllers are replaced at the same time, the power should be turned off before replacement.

(1) Removing procedure

- ① Remove rear cover1 and rear cover 2. (See RH-REP0170.)
- ② Disconnect the cables (RS232C).
- ③ Check to see which CTL ASSY is blocked (FAIL LED is lit up).
- ④ Open the right and left levers to the direction of arrows (···>) at the same time then remove the CTL ASSY.
- ⑤ Remove the CACHE ASSY and the LAN ASSY. (option)

(2) Installing procedure

- ① Reinstall the removed CACHE ASSY and the LAN ASSY (option) in the new CTL ASSY. Be sure to install it in the same position as before.
- ② Set No.3 of the DIP switch of the CTL ASSY.



- ③ Insert the CTL ASSY into the right position with the right and left levers being opened, then close the both levers to the direction of arrows (—>) at the same time.
- Note :** If the CTL ASSY is caught by something when it is installed, do not push it in forcibly. Retry the installation from the beginning. If forced, pins might be broken.
- ④ When the WARNING LED on PANEL goes off and the message below appears on the PANEL, set No.3 of DIP switch to as shown.



The message on the PANEL "I619XX CTL RCU-XX". (XX : Indicates the installing location < 00 or 01 >.)

- ⑤ Connect the disconnected cables (RS232C).

⑥ Install rear cover 1 and rear cover 2. (See RH-REP0170.)

When replacing a CTL in a dual controller system (with Redundant CTL option), the system parameter is automatically loaded to the replaced CTL from another CTL. The setting with FD or manual setting is not required.

But, when both CTL ASSY failed at the same time, this automatic operation is not available. In this case, it is necessary to restore from FD. Operate in the same way as single controller.

When replacing a CTL in a dual controller system (with redundant CTL option) , replacement with power off is allowed. The procedure is similar to the replacement in a single controller system. In this case the setting of system parameter from FD or manual operation is also not necessary. (Though installing procedure ⑦ in the single controller system (without redundant CTL option) is not necessary.)

9. Replacing I/F ADAPTER ASSY (See Figure 9.1, 9.2, 9.3 and Table 9.1.)

(1) Removing procedure

- ① Turn off the subsystem following the power-off procedure explained in RH-REP0050 and turn off the host system.

Notice 1 : In case the power is not normally turned off, the user's data might be lost.

Notice 2 : In the power is already turned off, check the CACHE PWR LED (see page THEORY0200) to confirm that the cache back up is not being execute. In the case the cache back up is being executed, turn on and off the power (see page RH-REP0050).

Make sure that the power is turned off normally, then replace the Battery ASSY.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC".

In this case refer to "Troubleshooting Section" (See TRBL0030) and turn off the power.

- ② Disconnect the Fibre channel cable, and the LAN cable (option).

Notice 3 : When removing or connecting the fibre channel cable, move the connector horizontally, carefully, and slowly.

- ③ Remove rear cover 1 and rear cover 2. (See RH-REP0170.)
- ④ Remove the screw and pull the I/F ADAPTER ASSY toward you to remove it.

(2) Mounting procedure

- ① Insert the I/F ADAPTER ASSY into the right place and tighten the screw.
- ② Connect the disconnected cables etc. (See Notice 3.)

Note 1 : When the controller is used in a dual configuration, connect the cables to the connectors corresponding to the host to be connected. (See Figure 9.2.)

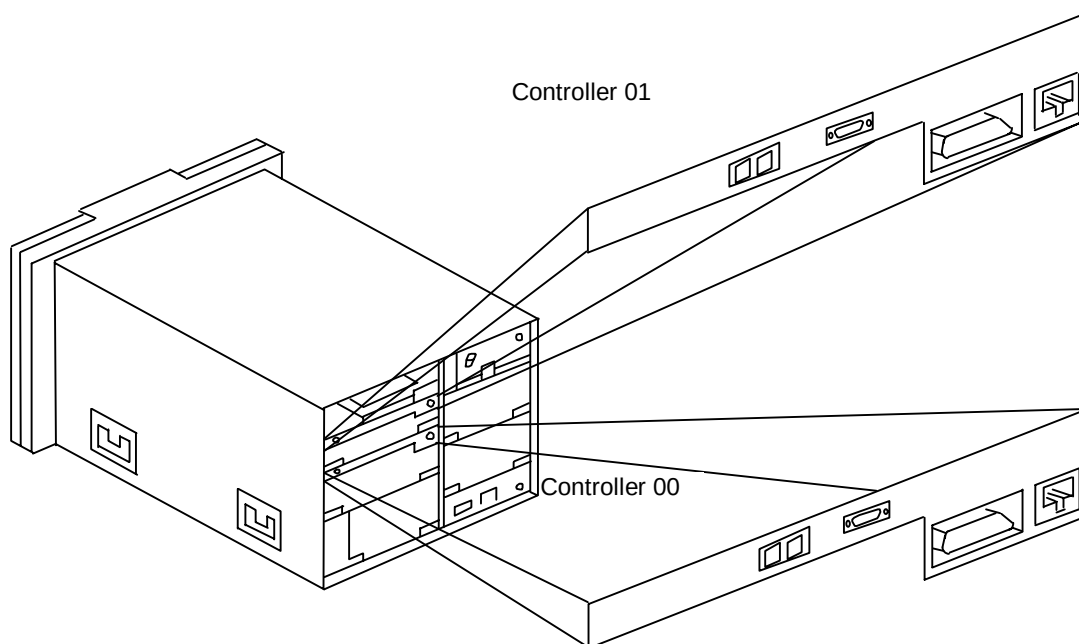


Figure 9.1 Fibre Connector Layout

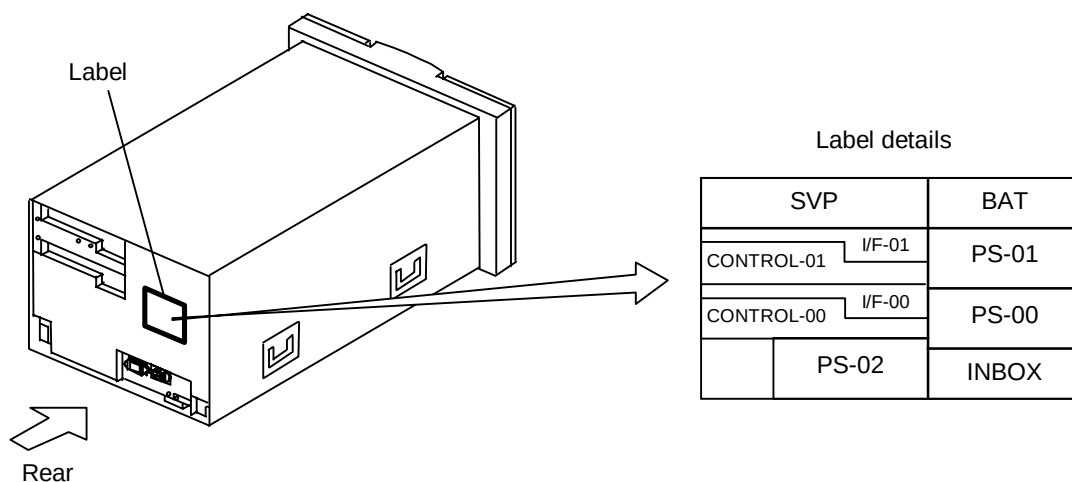


Figure 9.2 Label Layout

- ④ Install rear cover 1 and rear cover 2. (See RH-REP0170.)

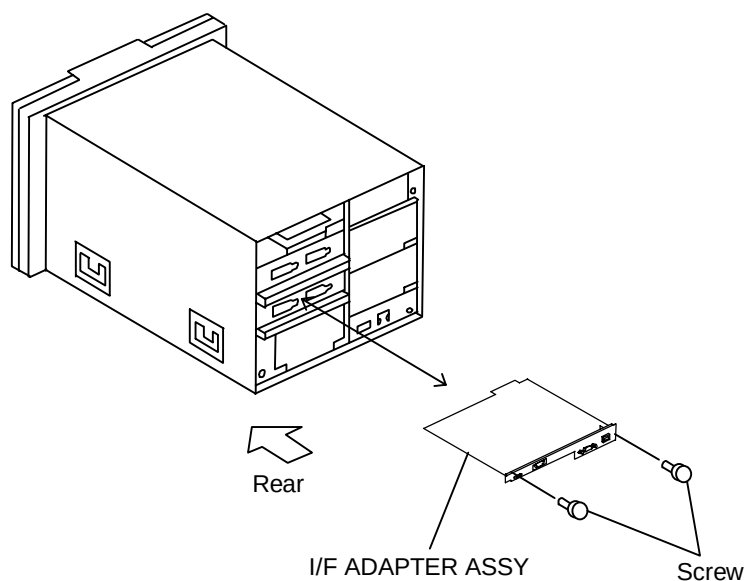


Figure 9.3 Replacing I/F ADAPTER ASSY

10. Replacing SVP ASSY (See Figures 10.1 and 10.2.)

(1) Removing procedure

- ① Turn off the subsystem following the power-off procedure explained in RH-REP0050. (Be sure to read and understand the procedure because if the power is turned off improperly, user data might be destroyed.)

Sometimes the subsystem does not go power off after the main switch turned to “O” side with panel display “TOOMNYPIN” or “SYSDTSVER” or “POFFCMUNC”.

In this case refer to “Trouble shooting Chapter” (See TRBL0030) and turn off the power.

- ② Check to see that POWER LED goes off.

Notice : In case the power is not normally turned off, the user’s data might be lost.

- ③ Turn the breaker at the rear to “O” side.
- ④ Remove the front cover and open the front panel. (See RH-REP0160, RH-REP0180.)
- ⑤ Remove 3 (a) screws and remove the panel.
- ⑥ Remove thumb screw and remove 3 Fan ASSY.
- ⑦ Loosen 2 (b) and 2 (c) screws and remove the fan cover.
- ⑧ Remove the connectors P1 and P4.
- ⑨ Remove 6 (d) screws and remove SVP ASSY.

(2) Mounting procedure

- ① Install the SVP ASSY in the reverse order to the removing.

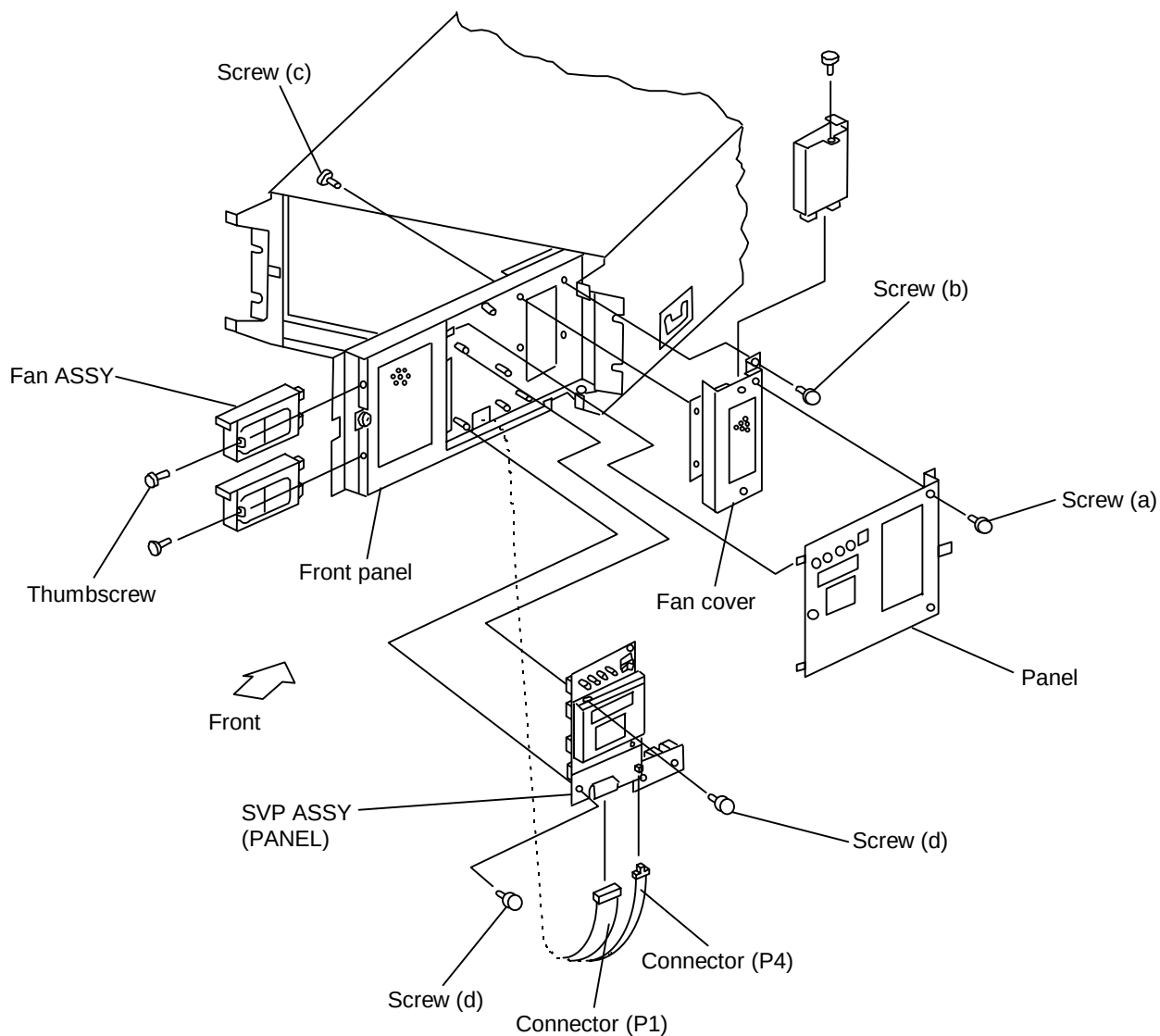


Figure 10.1 Replacing SVP ASSY (PANEL)

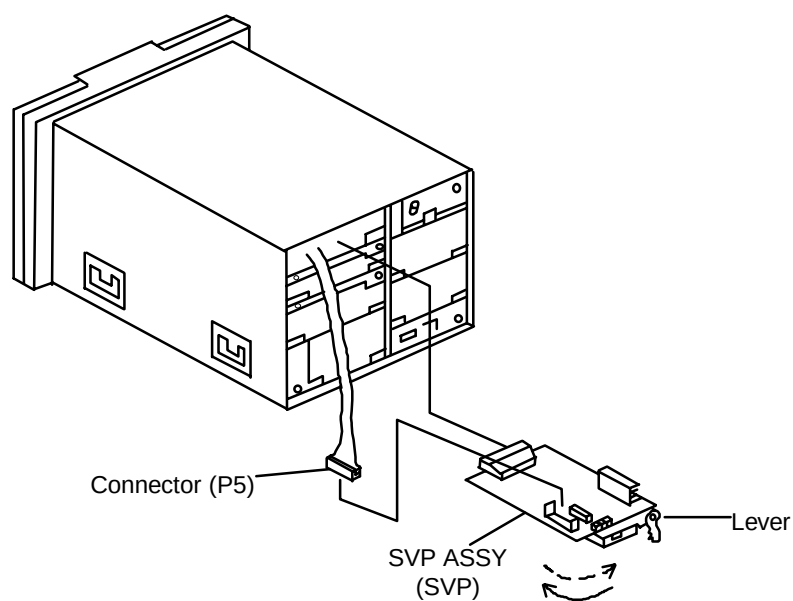


Figure 10.2 Replacing SVP ASSY (SVP)

11. Replacing AC/DC power supply (See Figure 11.1.)



Warning

Only the maintenance personnel can perform this replacement.

The operation by the user is prohibited.

Tool : Phillips screwdriver (No.2)

Confirm presence/absence of the redundant power supply. If there is a redundant power supply, a hot replacement is possible. Concerning the rack mount (RKH) type, when the number of the installed AC/DC power supplies is more than that of ROWs of the disk drives, it means that the subsystem has redundant power supply. When the redundant AC/DC power supply is not installed, follow the procedure from step (4).

Cases of redundant power supply installation

Number of ROWs of installed disk drive	Number of installed AC/DC power supplies
1(1 to 5 drives)	2 or more
2(6 to 10 drives)	3

(1) Removing procedure

- ① Remove the rear cover 1 and 2. (See RH-REP0160.)
- ② Disconnected the FG cable connected with the AC/DC power supply.
- ③ Pull the right and left levers at the same time to the direction of an arrow (····→) and remove the AC/DC power supply.

(2) Mounting procedure

- ① Press the “○” side of the In Box ASSY switch.
- ② Press the “○” side of the AC/DC power supply switch. Open the lever completely (in the direction of an arrow (····→)) and insert the AC/DC power supply to the right place. Then push the right and left levers at the same time to the direction of an arrow (—→).
- ③ Connect the FG cable with the AC/DC power supply.

(3) Transition of panel display

I003XX PSRCV-XX ----- DC power recovery is completed.

(In case with replacement while power on.)

When the subsystem is allowed to be shut off, it is recommended to replace the power supply in the following procedure.

(4) Removing procedure

- ① Turn off the subsystem following the power-off procedure explained in RH-REP0050.

Notice : In case the power is not normally turned off, the user's data might be lost.

Sometimes the subsystem does not go power off after the main switch turned to “○” side with panel display “TOOMNYPIN” or “SYSDTSVER” or “POFFCMUNC”.

In this case refer to “Trouble shooting Chapter” (See TRBL0030) and turn off the power.

- ② Remove the rear cover 1 and 2. (See RH-REP0160.)
- ③ Disconnected the FG cable connected with the AC/DC power supply.
- ④ Pull the right and left levers at the same time to the direction of an arrow (····→) and remove the AC/DC power supply.

(5) Mounting procedure

- ① Press the “○” side of the In Box ASSY switch.
- ② Press the “○” side of the AC/DC power supply switch. Open the lever completely (in the direction of an arrow (····→)) and insert the AC/DC power supply to the right place. Then push the right and left levers at the same time to the direction of an arrow (—→).
- ③ Connect the FG cable with the AC/DC power supply.
- ④ Turn on the subsystem following the power-on procedure explained in RH-REP0050.

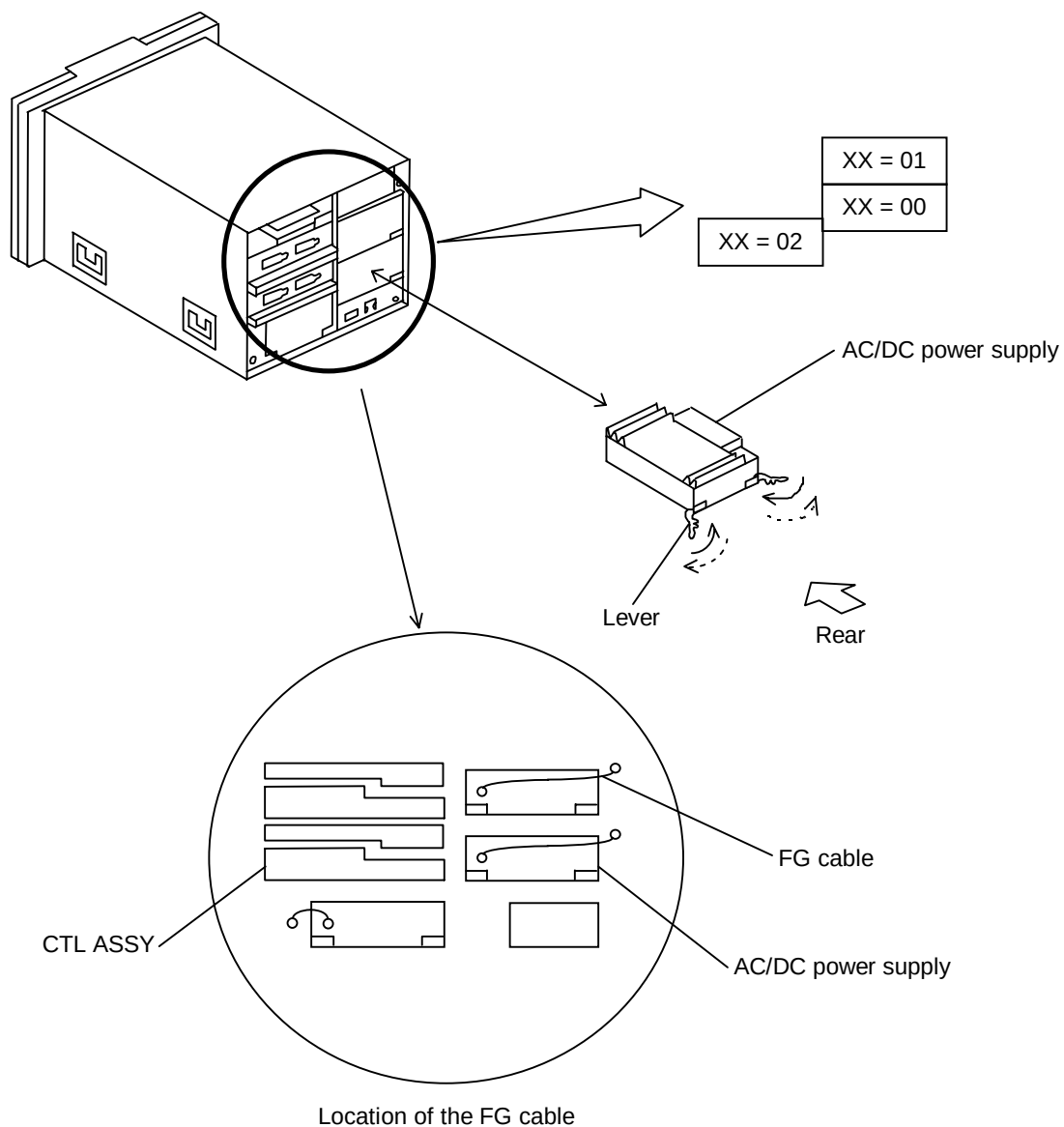
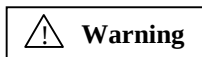


Figure 11.1 Replacing AC/DC power supply

12. Replacing In Box ASSY (See Figure 12.1.)



Do not touch inside of In Box ASSY. Electricity remains even if main switch is off.

(1) Removing procedure

- ① Turn off the subsystem following the power-off procedure explained in RH-REP0050.

Notice 1 : In case the power is not normally turned off, the user's data might be lost.

Notice 2 : In the power is already turned off, check the CACHE PWR LED (see page THEORY0200) to confirm that the cache back up is not being execute. In the case the cache back up is being executed, turn on and off the power (see page RH-REP0050).

Make sure that the power is turned off normally, then replace the Battery ASSY.

In this case refer to "Trouble shooting Chapter" (See TRBL0030) and turn off the power.

- ② Disconnect the power supply cable.
 - ③ Open rear cover 1 and rear cover 2. (See RH-REP0170.)
 - ④ Remove the screw and remove In Box ASSY.
- ### (2) Installing procedure
- ① Install In Box ASSY to the predetermined position and tighten the screw.
 - ② Connect the disconnected cables.
 - ③ Close rear cover 1 and rear cover 2. (See RH-REP0170.)
 - ④ Turn the power on following the power-on procedure in RH-REP0050.

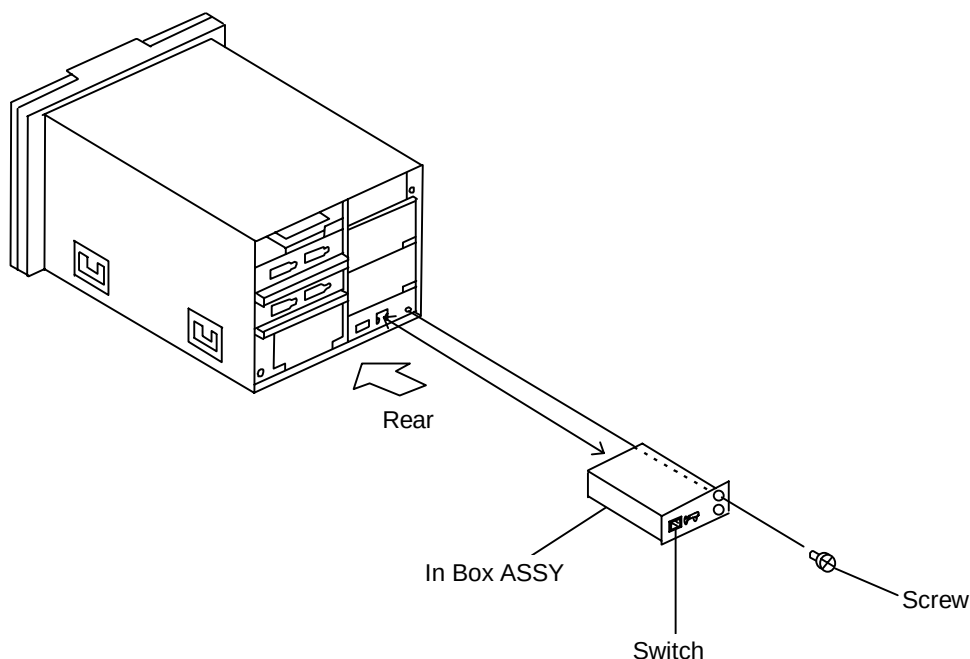


Figure 12.1 Replacing In Box ASSY

13. Replacing CACHE ASSY

In case no optional redundant CTL installed

(1) Procedures

- ① Turn off the subsystem following the power-off procedure explained in RH-REP0050.

Notice 1 : In case the power is not normally turned off, the user's data might be lost.

Notice 2 : In the power is already turned off, check the CACHE PWR LED (see page THEORY0200) to confirm that the cache back up is not being execute. In the case the cache back up is being executed, turn on and off the power (see page RH-REP0050).

Make sure that the power is turned off normally, then replace the Battery ASSY.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Trouble shooting Chapter" (See TRBL0030) and turn off the power.

- ② Open rear cover 1 and rear cover 2, and remove the CTL ASSY. (See RH-0370.)

- ③ Replace CACHE ASSY.

Note 1 : Slots #0 and #4, #1 and #5, #2 and #6, #3 and #7 are pairs respectively. Install the cache having the same capacity for these each pair slots..

Note 2 : CACHE ASSY of the largest capacity must be mounted cache slots #0 and #4 in case that CACHE ASSYs of different capacity are used.

- ④ Install the CTL ASSY.

- ⑤ Turn power on following the procedure explained in RH-REP0050.

- ⑥ Close the rear cover 1 and rear cover 2. (See RH-REP0170.)

- ⑦ Close the front cover.

Installation example of CACHE ASSY

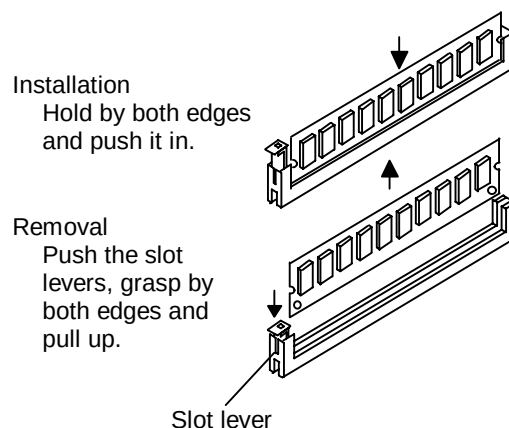
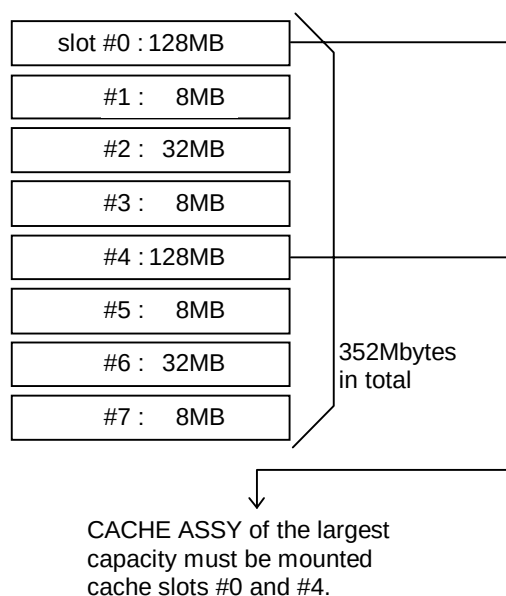


Figure 13.1 Replacing CACHE ASSY

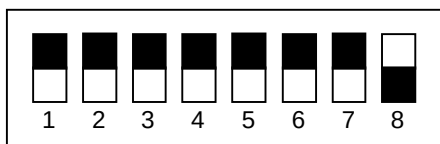
In case optional redundant CTL is installed

When the subsystem are dual controller system, CACHE ASSY can be replaced while the power on.

Notice : In this case, the CACHE ASSY must be replaced one controller at one time. In case CACHE ASSY for both CTL ASSY are replaced at the same time, turn the power off before replacement.

(1) Procedure

- ① Open rear cover 1 and rear cover 2. (See RH-REP0170.)
- ② Disconnect the cable (RS232C).
- ③ Set No.8 DIP switch of the corresponding CTL ASSY.

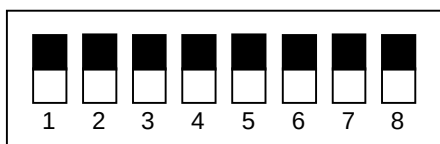


- ④ Push the reset switch of the corresponding CTL ASSY.
- ⑤ Wait ten seconds, check to see that FAIL LED on the CTL comes on and it enters into the blocked state. (See RH-REP0370.)
- ⑥ Open the right and left levers to the direction of arrows (→) at the same time then remove the CTL ASSY.
- ⑦ Replace the CACHE ASSY.

Note 1 : When replacing a cache, install the cache having the same capacity in slots #0 and #4, slots #1 and #5, slots #2 and #6, or slots #3 and #7.

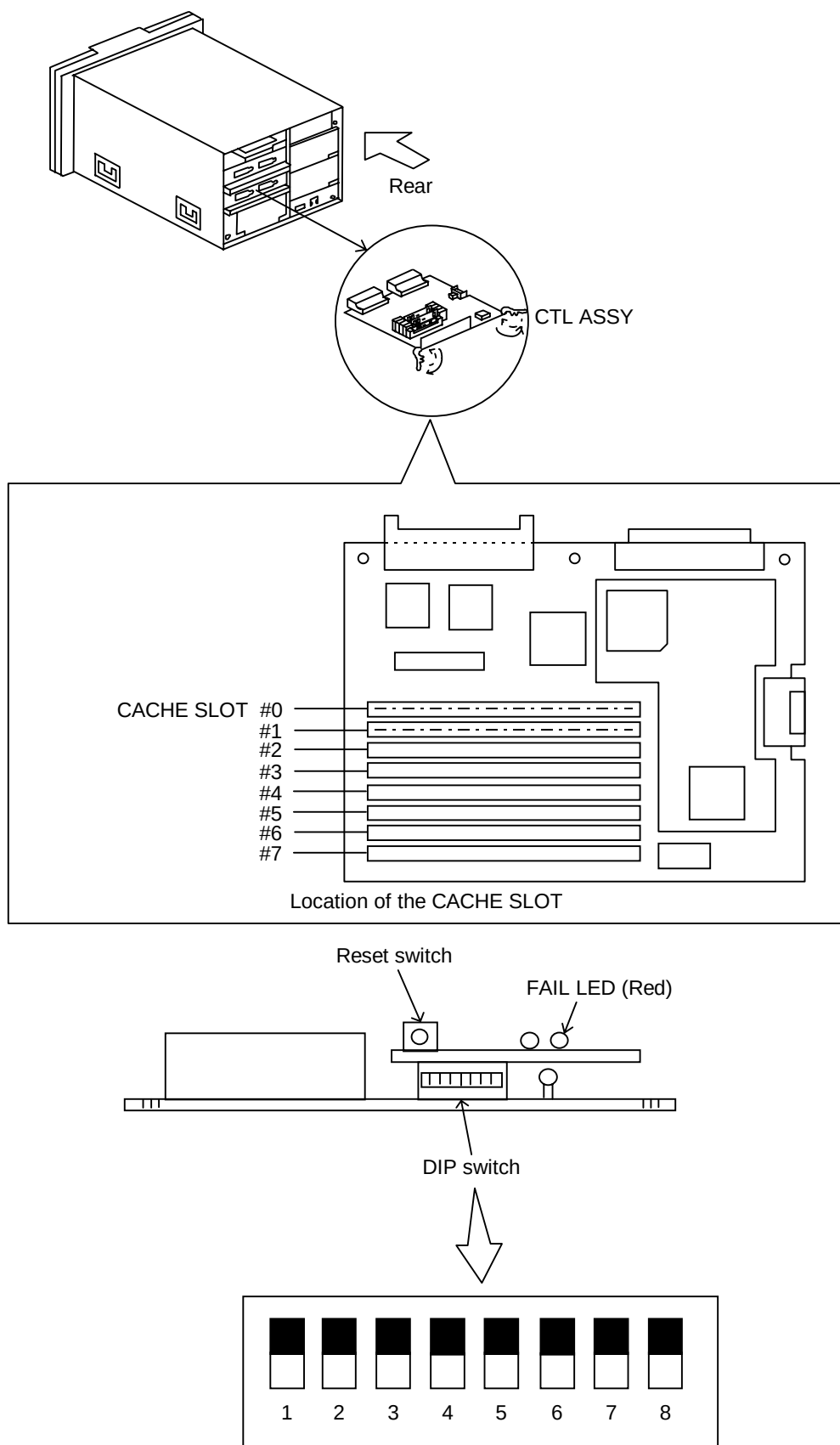
Note 2 : CACHE ASSY for the same slot of both CTL ASSY should have to same capacity.

Note 3 : CACHE ASSY of the largest capacity must be mounted cache slots #0 and #4 in case that CACHE ASSYs of different capacity are used.
- ⑧ Set No.8 of DIP switch to as shown.



- ⑨ Insert the CTL ASSY.
- ⑩ Connect the disconnected cable (RS232C).
- ⑪ Close rear cover 1 and rear cover 2. (See RH-REP0170.)

When an optional redundant CTL (for dual configuration) has been installed, the replacement can be performed with machine power off. In this case follow the same procedure as that for single configuration.



14. Replacing LAN ASSY

When no optional redundant CTL installed

Notice : Configuration setting change is sometimes required because Mac Address is changed after replacing LAN ASSY.

(1) Procedures

- ① Turn off the subsystem following the power-off procedure explained in RH-REP0050.

Notice 1 : In case the power is not normally turned off, the user's data might be lost.

Notice 2 : In the power is already turned off, check the CACHE PWR LED (see page THEORY0200) to confirm that the cache back up is not being execute. In the case the cache back up is being executed, turn on and off the power (see page RH-REP0050).

Make sure that the power is turned off normally, then replace the Battery ASSY.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Trouble shooting Chapter" (See TRBL0030) and turn off the power.

- ② Open the rear cover 1 and rear cover 2, and remove CTL ASSY. (See RH-REP0330.)
 ③ Pinch the latching heads of card spacers with needle-nose pliers etc. , then pull the LAN ASSY up with care not to touch with surrounding parts. (See Figure 14.1.)

Notice : If your hand or a tool touches with CTL ASSY, touched part may be damaged.

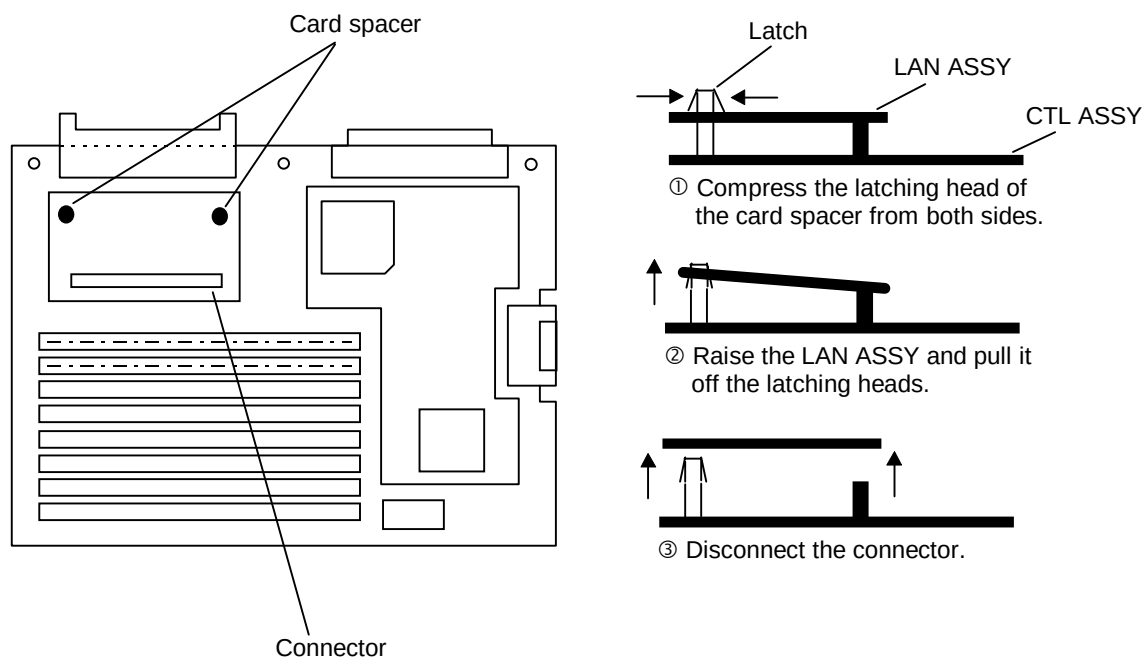


Figure 14.1 Replacing LAN ASSY (1)

- ④ Mount a LAN ASSY for replacement by aligning its mounting holes with the card spacers and pressing the LAN ASSY against the spacers until it is latched with clicks.
- ⑤ Reinstall the CTL ASSY.
- ⑥ Close the rear cover. (See RH-REP0170.)
- ⑦ Turn on the power. (See RH-REP0050.)

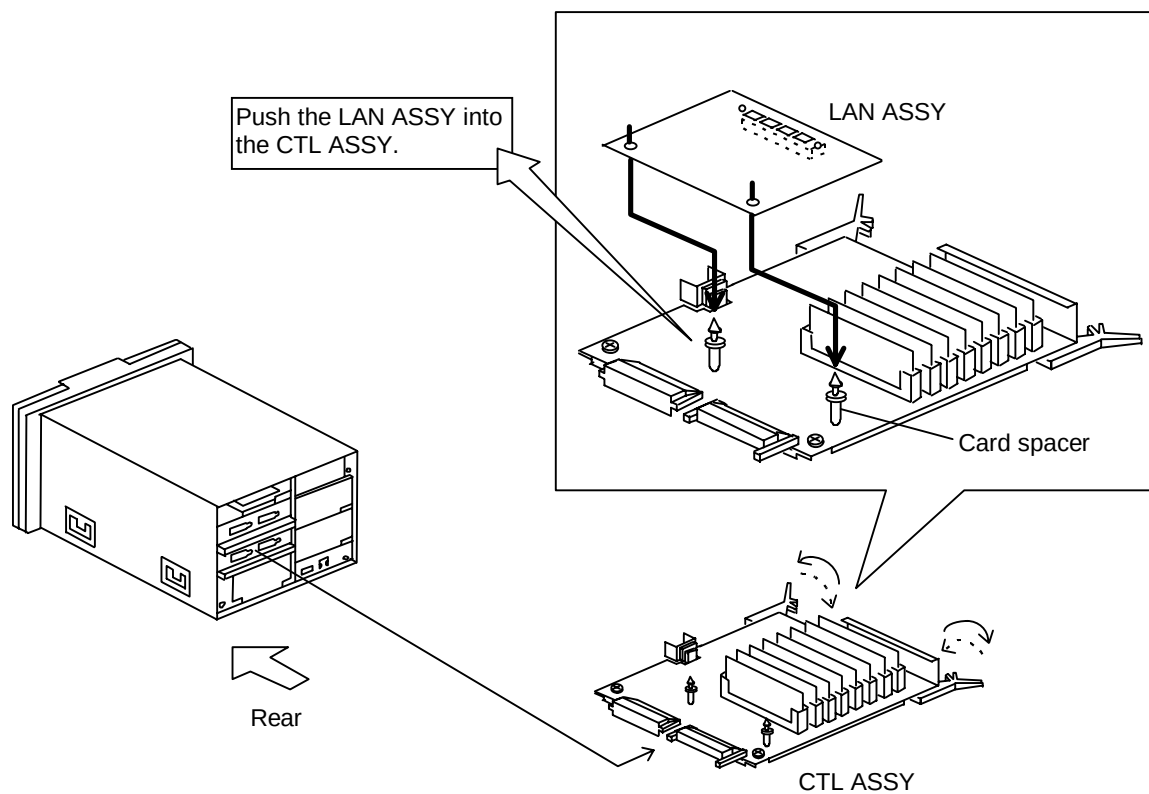


Figure 14.2 Replacing LAN ASSY (2)

When optional redundant CTL installed

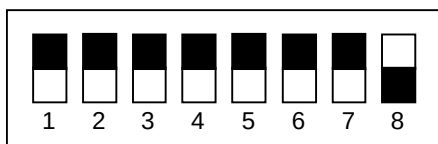
When the subsystem are dual controller system, LAN ASSY can be replaced while the power on.

Notice : When replacing LAN ASSY, perform the replacement for each CTL ASSY one after another.

When replacing both LAN ASSY at a time, turn off the power like the case of single configuration.

(1) Procedure

- ① Open rear cover 1 and rear cover 2. (See RH-REP0170.)
- ② Disconnect the cable (RS232C).
- ③ Set No.8 DIP switch of the corresponding CTL ASSY.



- ④ Push the reset switch of the corresponding CTL ASSY.
- ⑤ Wait ten seconds, check to see that the FAIL LED on the CTL ASSY comes on and it enters the blocked state. (See Figure 14.3.)
- ⑥ Open the right and left levers to the direction of arrows (→) at the same time then remove the CTL ASSY.
- ⑦ Remove the LAN ASSY by pulling it upward. Then mount a new LAN ASSY by aligning its mounting holes with the card spacers and pressing the LAN ASSY against the spacers until it is latched with clicks.
- ⑧ Set No.8 of DIP switch to as shown.



- ⑨ Reinstall the CTL ASSY.
- ⑩ Close the rear cover 1 and rear cover 2. (See RH-REP0170.)

When an optional redundant CTL (for dual configuration) has been installed, the replacement can be performed with machine power off. In this case follow the same procedure as that for single configuration.

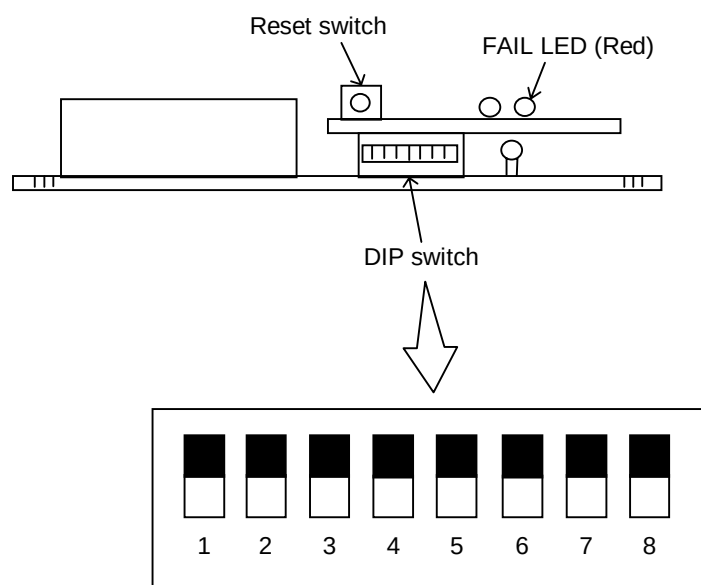


Figure 14.3 Replacing LAN ASSY (3)

DF350F Disk Subsystem
8. INSTALLATION
(Rack Mount (RKH/U1) Type)

Rev.2

REV.	Date	DRW.	CHKD	APPD	Sheet No.	Description	Code
0	Jan.20.'98	A.Yamanashi	K.Aruga	H.Iwasaki	All	Issued	
1	Jul.31.'98	A.Yamanashi	K.Aruga	H.Iwasaki	0020	Added 6.5.	AD
					0070	Added E2E8, E1E18, A2E8, A1E18	AD
					0080	Added E2E8, E1E18, A2E8, A1E18	AD
					0620	Added 'Replacing "■"', 0 and 1...' on the table.	AD
					0730	Added A2E8, A1E18.	AD
					1020-1040	These page were newly added.	AD
2	Oct.16.'98	A.Yamanashi			0070	Added A3E4, E3E4.	AD
					0080	Added A3E4, E3E4.	AD
					0450	Added case of the dual controller. (Pages 0900, 0930, 0970, 1000, 1030 were added by the same reason.)	AD
					0730	Added A3E4.	AD

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3.1.1 Unpacking.....	RH-INST0050
3.1.2 Inspecting all the components visually	RH-INST0070
3.1.3 Inspecting the subsystem components and addendum	RH-INST0090
3.2 Install the Subsystem.....	RH-INST0100
3.2.1 Install the Subsystem.....	RH-INST0100
3.3 Setting the Power Supply.....	RH-INST0180
3.4 Setting the Subsystem Parameter	RH-INST0200
3.5 Checking the Offline Operation.....	RH-INST0210
3.6 Connecting the Fibre Channel Cable.....	RH-INST0240
4. Setting the Subsystem Parameter	RH-INST0260
4.1 Setting the System Parameter.....	RH-INST0260
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4.3 Setting the Subsystem Configuration Information	RH-INST0540
4.3.1 Preparing of setting RAID/LU	RH-INST0550
4.3.2 Setting the RAID group.....	RH-INST0560
4.3.3 Setting LU.....	RH-INST0670
4.3.4 Setting other parameter.....	RH-INST0820
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5.1 Shifting to Hot Standby from Dual Active.....	RH-INST0840
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6.3 Using in the DATA SHARE Mode	RH-INST0960
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6.5 When Using the Subsystem in LU Blockade Mode	RH-INST1020

1. Appearance and Maintenance Area

1.1 Appearance

Figure 1.1.1 shows appearance of the DF350F disk subsystems. (Rack Mount (RKH) type)

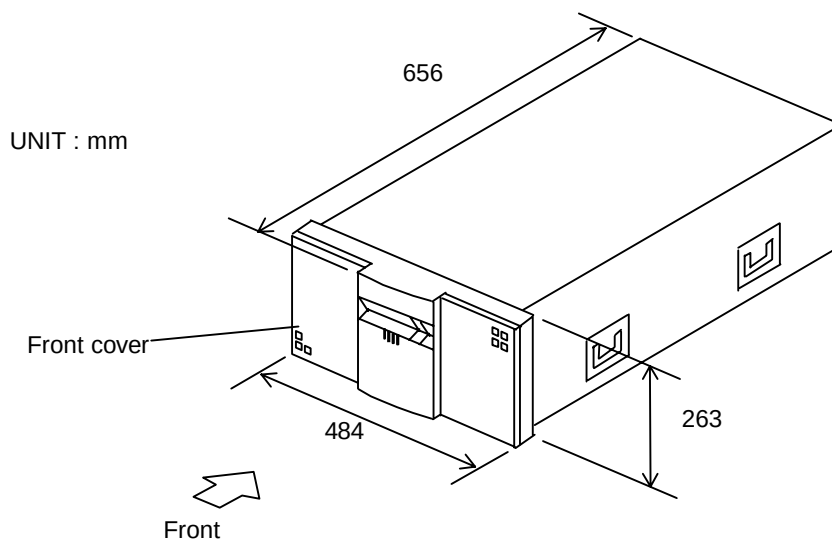


Figure 1.1.1 Appearance

1.2 Maintenance Area

Figure 1.2.1 shows maintenance area for the DF350F disk subsystems. (Rack Mount (RKH) type)

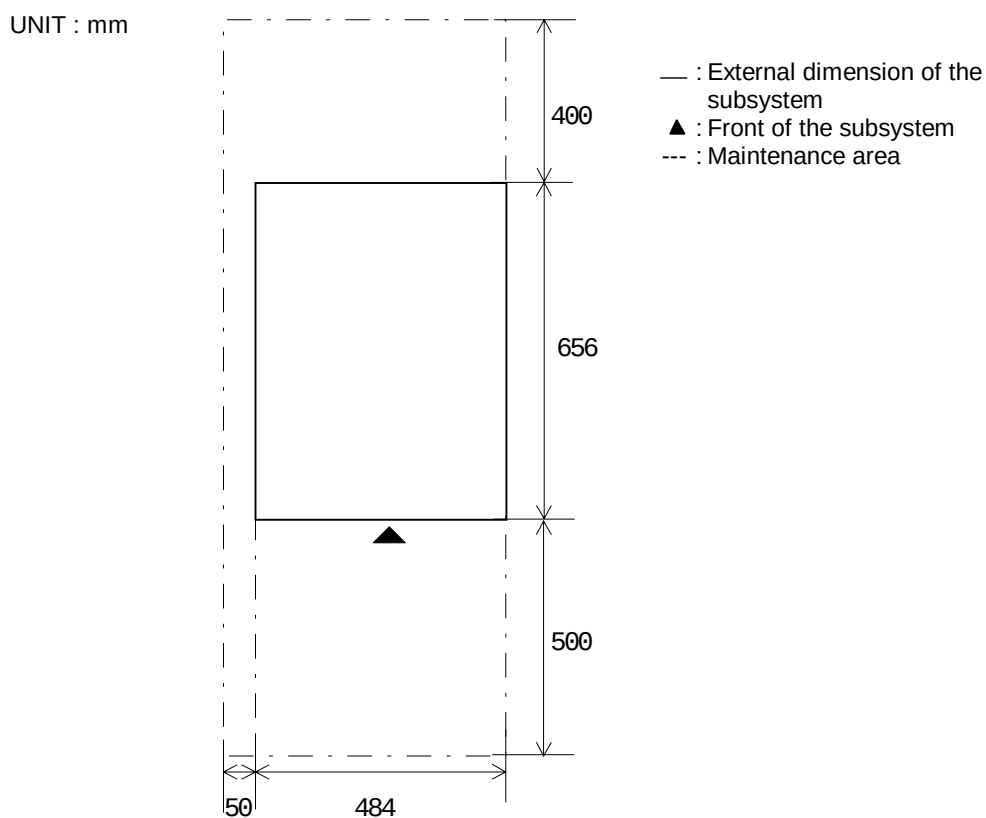


Figure 1.2.1 Maintenance Area

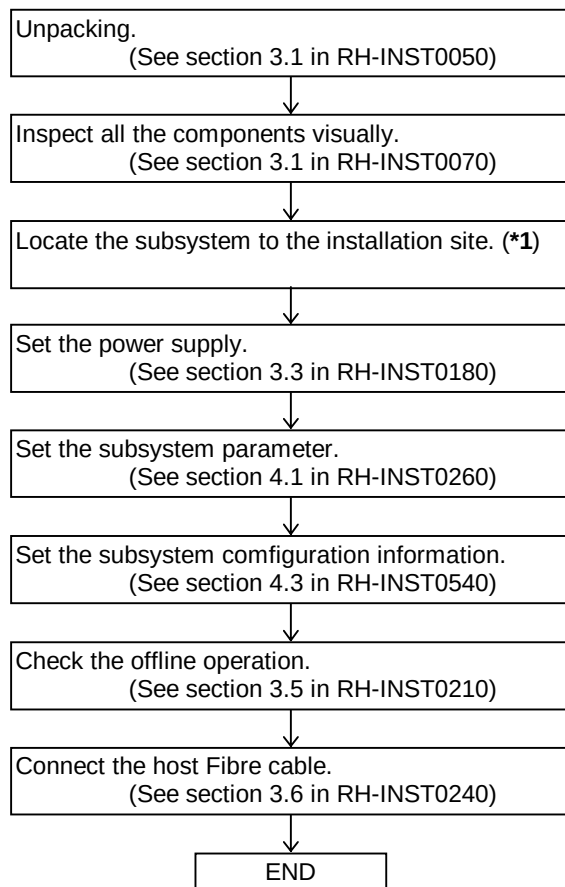
2. Installation

- (1) Tool needed for installation

Phillips screwdriver (No.2).

- (2) How to install

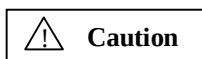
The following flow chart describes how to install the subsystem.



***1 : Place the subsystem with 30cm or more apart from the wall for both the front and the rear because of the ventilation.**

3. Installation Procedure

3.1 Inspecting all the Components



The unpacking and installation should be carried out by 2 or more personnel to prevent turning over of the device or being caught under the device.

3.1.1 Unpacking

- (1) Figure 3.1.1 shows how the subsystem has been packed.
- (2) Figures 3.1.2 to 3.1.4 show the subsystem without external packaging.
- (3) Unpacking
 - ① Loosen the polyester bands.
 - ② Remove nails for T/W.
 - ③ Remove the external packaging and packing materials.
 - ④ Take the subsystem out of the polyethylene bag.
 - ⑤ Keep keys (2pcs) in the box attached to the unit. (This key is used to open the front panel, so be careful not to lose.)
 - ⑥ Remove shock absorbing material and tapes, etc. attached to the device.
 - ⑦ Remove desiccating agent on the top of the device. (See Figure 3.1.3.)

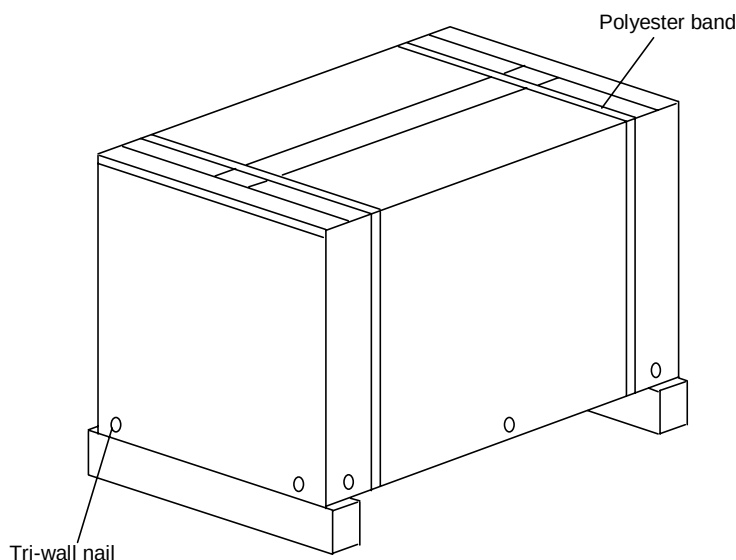


Figure 3.1.1 Subsystem being Packed

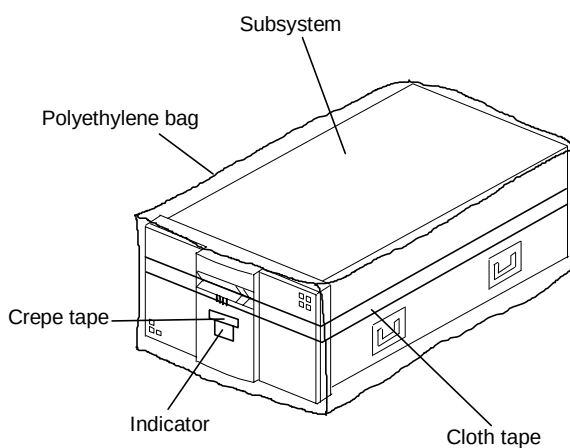


Figure 3.1.2 Subsystem without External Packaging

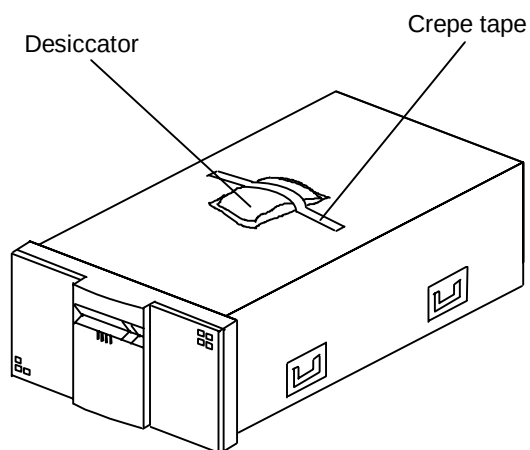


Figure 3.1.3 Location of Desiccantor

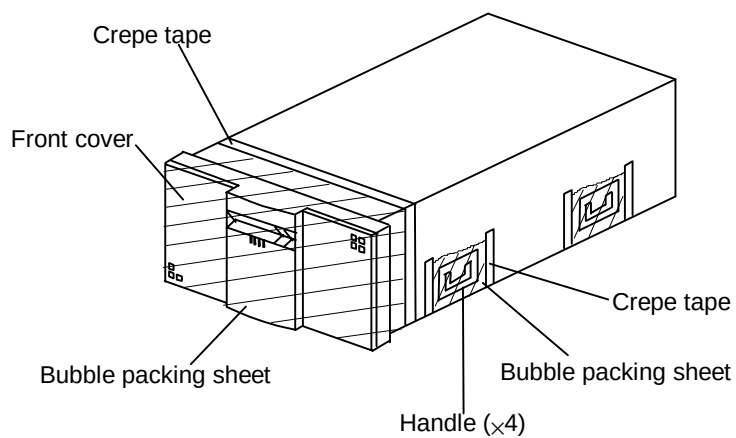


Figure 3.1.4 Front Cover Protection

3.1.2 Inspecting all the components visually

Check the following components before installation according to a customer's configuration.

Table 3.1.1 Mandatory Features

Model Name	Specification	Quantity	Comment
DF350F-RKH	Rack mount (RKH)	1	
DF-F350-E2E2 -E2E4 -E3E4 -E2E8 -E1E8 -E1E18	1"H disk drive (516B Format, 2.0GB × 5) (516B Format, 4.1GB × 5) (516B Format, 4.1GB × 5) (516B Format, 8.7GB × 5) Half height disk drive (516B Format, 8.7GB × 5) (516B Format, 17.8GB × 5)	1 (RAID5 :4D+1P)	HDU ASSY
DF-F350-A2E2 -A2E4 -A3E4 -A2E8 -A1E8 -A1E18	1"H disk drive (516B Format, 2.0GB × 1) (516B Format, 4.1GB × 1) (516B Format, 4.1GB × 1) (516B Format, 8.7GB × 1) Half height disk drive (516B Format, 8.7GB × 1) (516B Format, 17.8GB × 1)	1	HDU ASSY
DF-F350F-B3M	Power supply	1	AC/DC power supply
DF-F350-C8E -C32E -C128E	Cache memory (8MB) (32MB) (128MB)	2	CACHE ASSY
DF-F350F-DRON	Fibre Channel Optical (Non OFC) I/F, 100-M5-SN-I, SC connector.	1	I/F ADAPTER ASSY

Table 3.1.2 Optional Features

Model Name	Specification	Quantity	Comment
DF-F350-E2E2 -E2E4 -E3E4 -E2E8 -E1E8 -E1E18	1"H disk drive (516B Format, 2.0GB × 5) (516B Format, 4.1GB × 5) (516B Format, 4.1GB × 5) (516B Format, 8.7GB × 5) Half height disk drive (516B Format, 8.7GB × 5) (516B Format, 17.8GB × 5)	0 - 1	HDU ASSY
DF-F350-A2E2 -A2E4 -A3E4 -A2E8 -A1E8 -A1E18	1"H disk drive (516B Format, 2.0GB × 1) (516B Format, 4.1GB × 1) (516B Format, 4.1GB × 1) (516B Format, 8.7GB × 1) Half height disk drive (516B Format, 8.7GB × 1) (516B Format, 17.8GB × 1)	0 - 11	HDU ASSY
DF-F350-C8E -C32E -C128E	Cache memory (8MB) (32MB) (128MB)	0, 2, 4, 6 or 8	CACHE ASSY
DF-F350F-B3M	Spare power supply	0 - 2	AC/DC power supply
DF-F350-G1M1 DF-F350F-G3M1	LAN board LAN board (SNMP)	0 - 2	LAN ASSY
DF-F350F-F3MCF	Controller for dual composition	0 or 1	CTL ASSY
DF-F350F-DRON	Fibre channel Optical (Non OFC) I/F	0 or 1	I/F ADAPTER ASSY

Table 3.1.3 Accessories

Model Name	Specification	Quantity	Comment
DF-F350-J1 -J2 -J3	Power supply cable (Connector attached to two poles with earth) (Inlet type connector, EN60320 STANDARD SHEET C14)	0 or 1	
DF-F350-K050L -K150L -K068S -K268S -K168S -K350L	Interface cable (50PL, 1.5m) (50PL, 3m) (68PS, 1.5m) (68PS, 3m) (68PS, 5m) (50PL, 5m)	0 -	
DF-F350-S1	RS232C cable	0 -	

3.1.3 Inspecting the subsystem components and addendum

This subsection describes how to install the basic components into the subsystem.

Figures 3.1.5 and 3.1.6 show mechanical configuration and parts location of this subsystem.

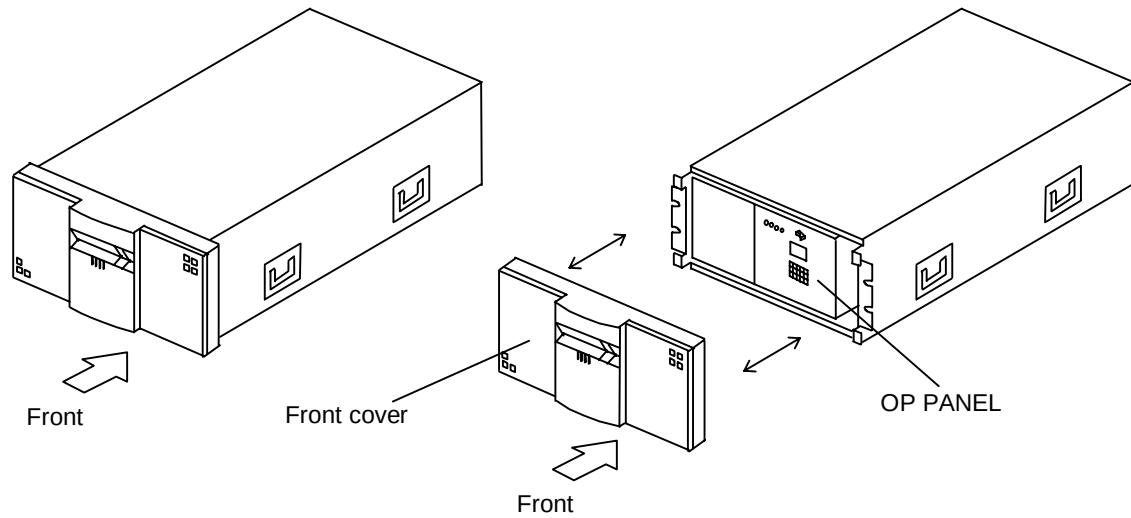


Figure 3.1.5 Appearance of DF350F Disk Subsystem (RACK MOUNT (RKH) type)

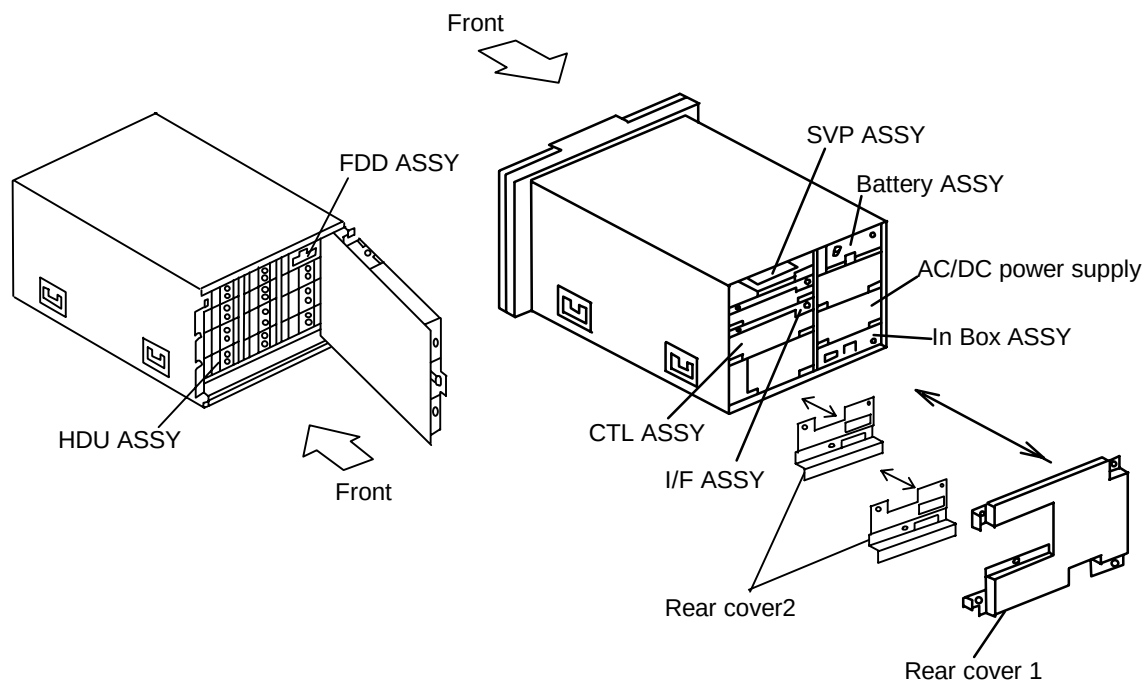
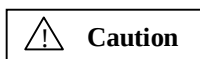


Figure 3.1.6 Parts Location

3.2 Install the Subsystem

3.2.1 Install the Subsystem



Caution

Do not block the ventilation. With the temperature rise, it may cause failure or fire.

(1) Attaching and Removing the Front Cover

- Removing procedure (See Figure 3.2.1.)

- ① Hold the grooves on both sides of the front cover and pull it toward you.

- Attaching procedure (See Figure 3.2.1.)

- ① Fit the guide plates of the main body with the slots of the front cover (four places) and press the front cover against them.

Notice : Attach/Remove the side covers carefully to avoid subjecting the subsystem to any impact since it has precision components.

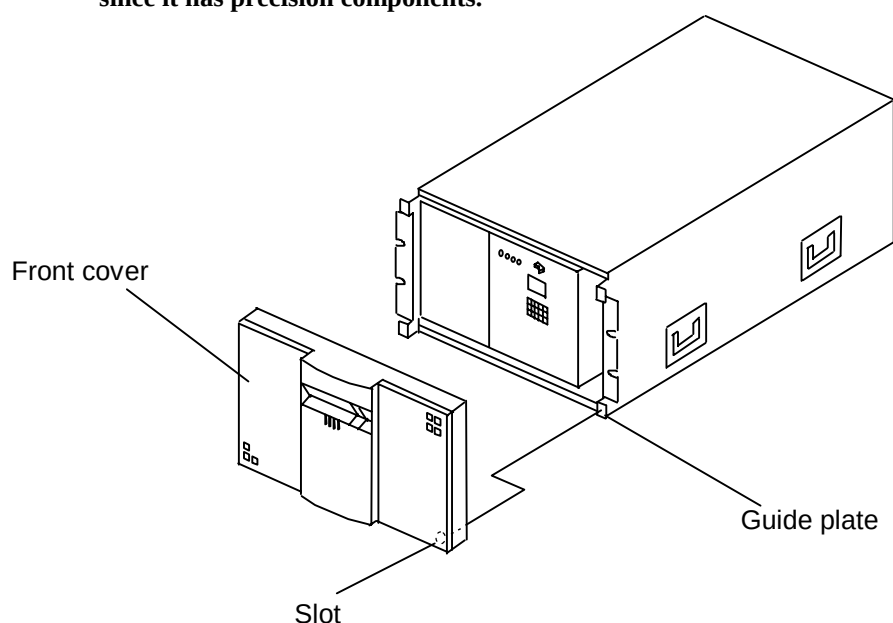


Figure 3.2.1 Attaching and Removing the Front Cover

(2) Opening/Closing the Front Panel

▪ Opening procedure

- ① Remove the front cover. (See RH-INST0100.)
- ② Insert the key attached to the subsystem into the key hole and turn it to the direction of an arrow (→) and open the front panel to the right.

Note : Open/Close the covers carefully to avoid subjecting the subsystem to any impact since it has precision components.

▪ Closing procedure

- ① Close the front panel.
- ② Turn the key to the direction of an arrow (↶) and secure the front panel.
- ③ Attach the front cover. (See RH-INST0100.)

Note : Keep the key carefully lest it should be lost.

Note : Open/Close the covers gently to avoid a shock. Precision components are installed.

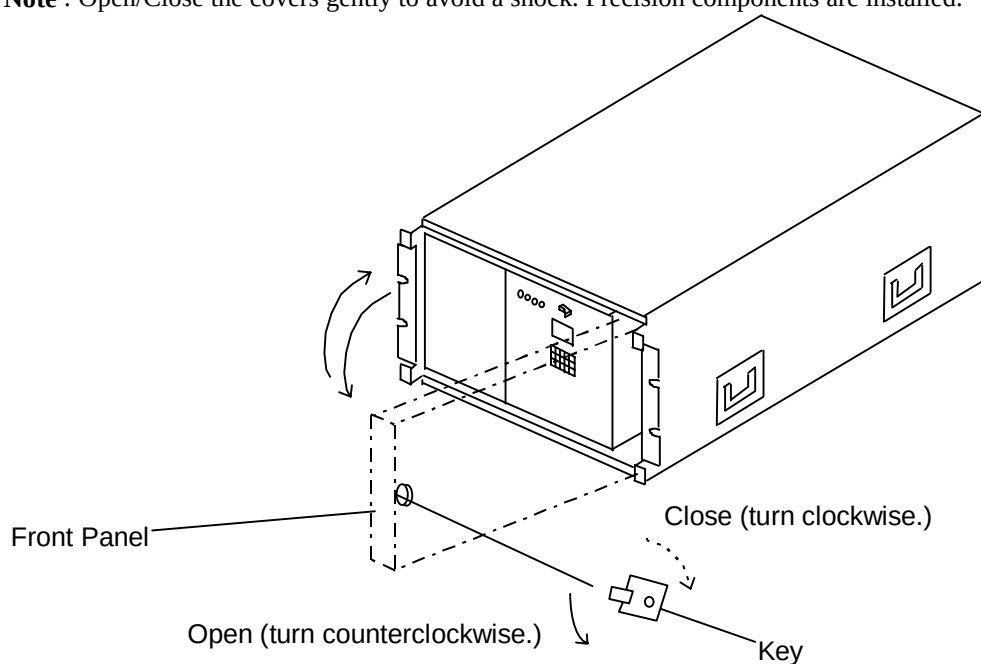


Figure 3.2.2 Opening/Closing the Front Panel

(3) Attaching and Remove the Rear Cover

▪ Removing procedure (See Figure 3.2.3.)

① Remove four screws ② and one screw ① of the rear cover 1.

② Remove four screws ① of each the two rear covers 2.

Note : Attach/Remove the rear covers carefully to avoid subjecting the subsystem to any impact since it has precision components.

▪ Attaching procedure (See Figure 3.2.3.)

① Install the rear covers 2 and 1 in this order, by reversing the procedures for removal.

Note : Attach/Remove the rear covers gently to avoid a shock. Precision components are in stalled.

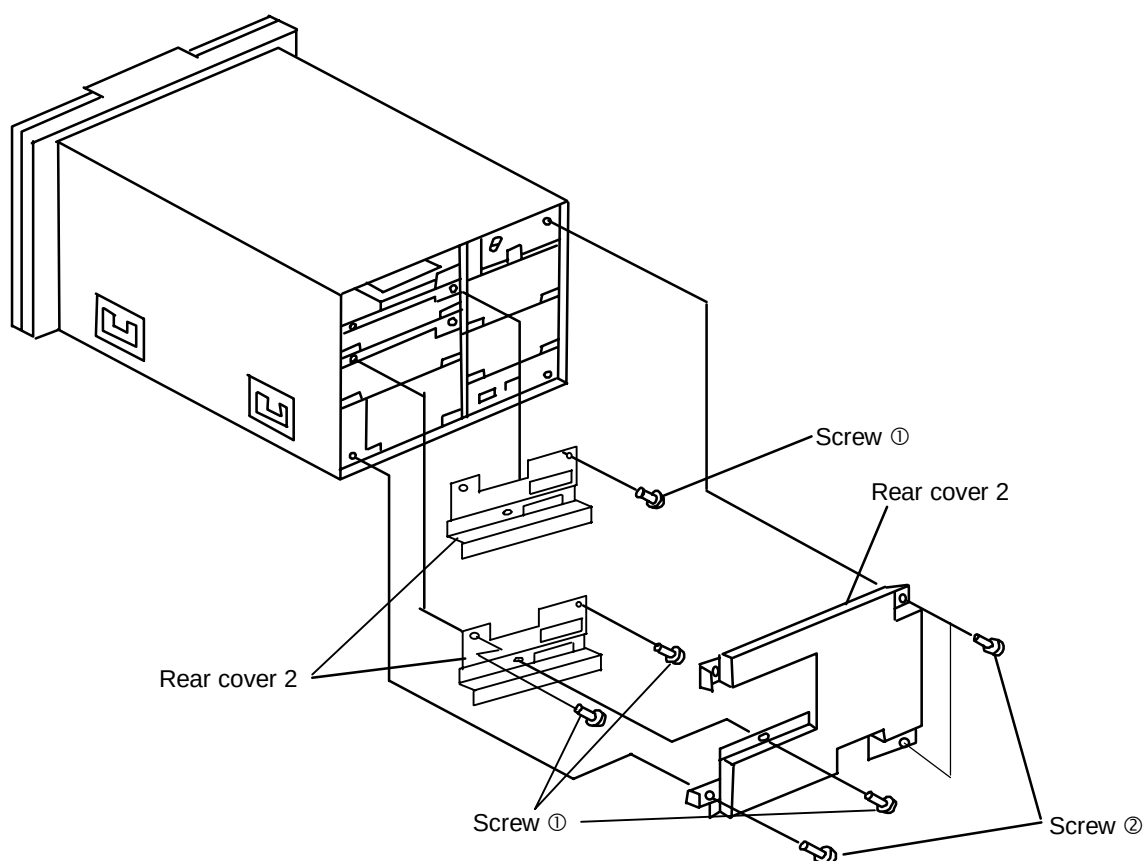
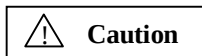


Figure 3.2.3 Attaching and Removing Rear Covers

(4) Installing HDU ASSY (See Figure 3.2.4.)

- ① Open the handle in the direction of an arrow (···→) completely and insert the HDU ASSY into the right place.
- ② Close the handle in the direction of an arrow (→).

**Caution**

Do not subject the HDU ASSY to any impact or vibration since it is a precision component.

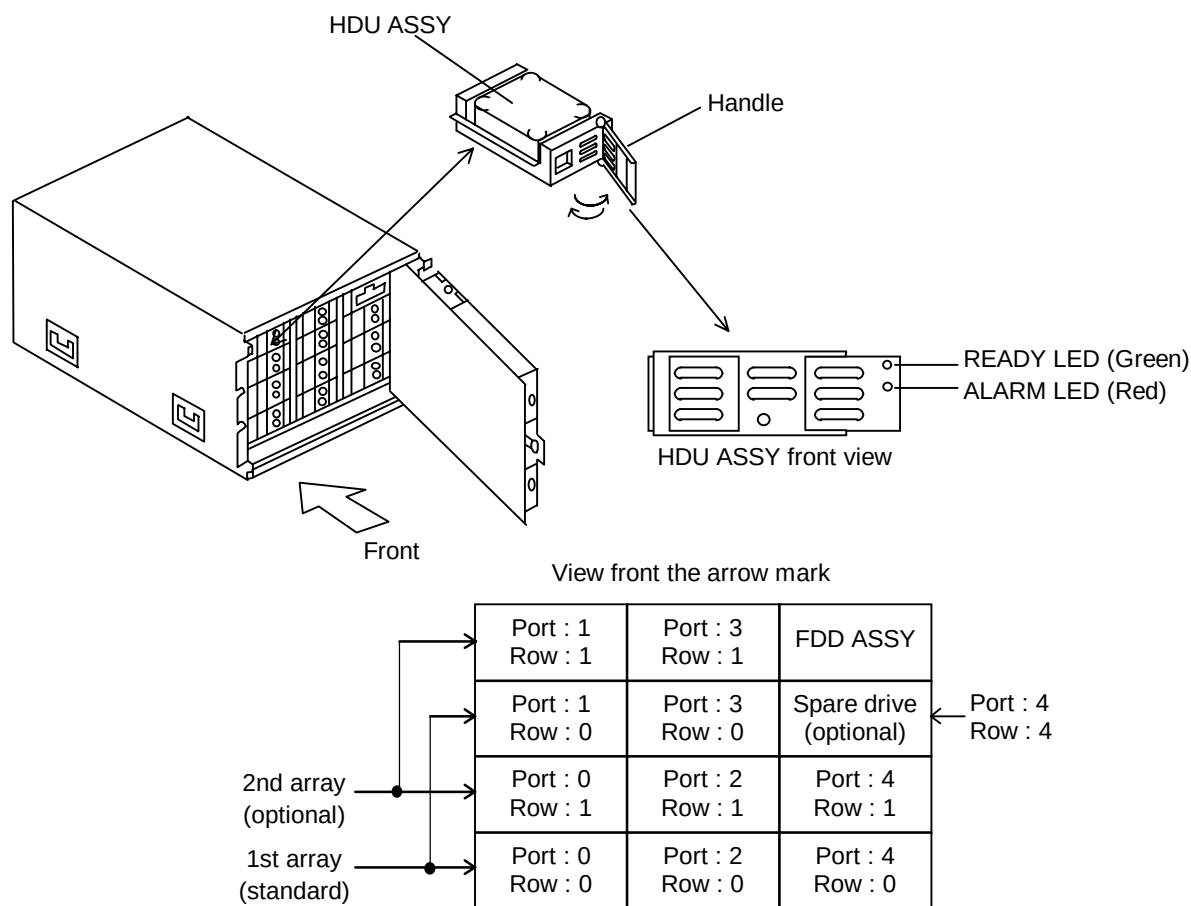
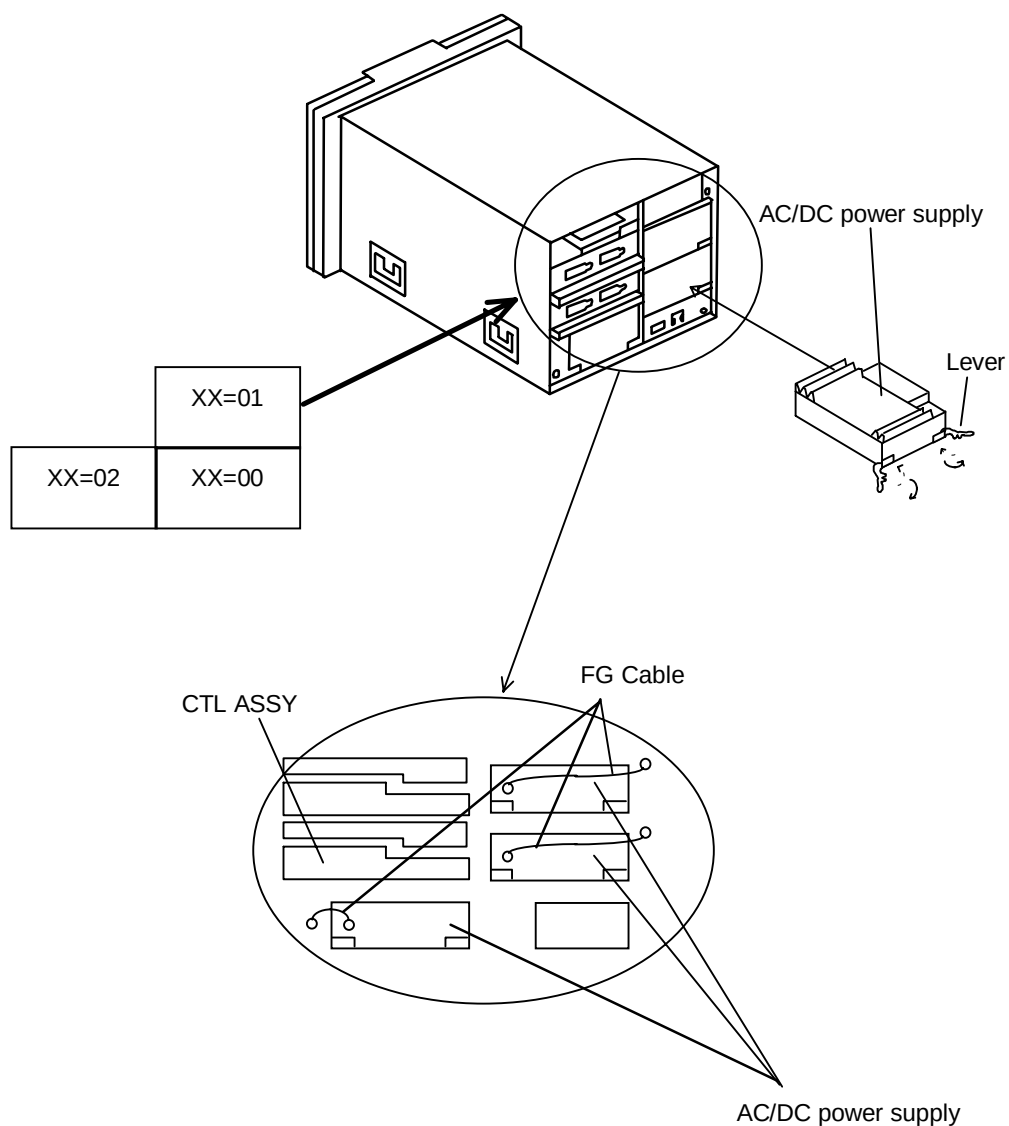


Figure 3.2.4 Installing HDU ASSY

(5) Setting AC/DC power supply (See Figure 3.2.5.)

- ① Insert the AC/DC power supply into the right place with its right and left levers being opened, then close the both levers to the direction of arrow (···→) at the same time.
- ② Connected the FG cable with the AC/DC power supply.

**Figure 3.2.5 Setting AC/DC Power Supply**

(6) Setting I/F ADAPTER ASSY (See Figure 3.2.6.)

- ① Insert the I/F ADAPTER ASSY into the right place and tighten the bind screw.

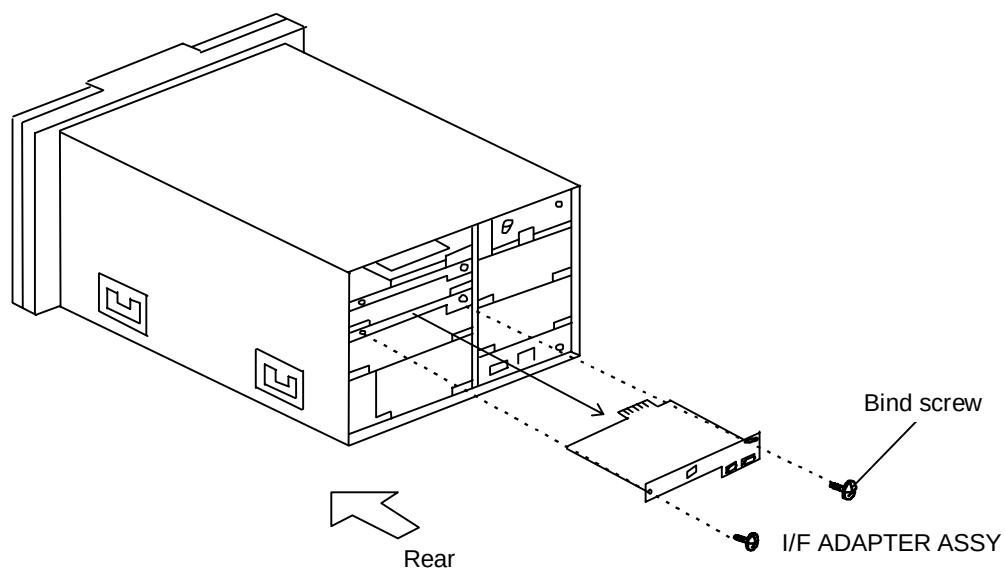


Figure 3.2.6 Setting I/F ADAPTER ASSY

(7) Installing CACHE ASSY (See Figure 3.2.7 and Figure 3.2.8..)

Note 1 : Be sure to install the cache assemblies having the same capacity in slots #0 and #4, slots #1 and #5, slots #2 and #6, or slots #3 and #7.

Note 2 : When the cache assemblies are to be inserted into the cache slots, insert them in the order of cache slots #0 and #4, cache slots #1 and #5, cache slots #2 and #6 and then cache slots #3 and #7.

Note 3 : Be sure to install the cache assembly having the maximum capacity in slot #0 and #4.

Note 4 : If the redundant CTL ASSY has been installed, install the cache assembly having the same capacity into the same slot.

- ① Remove the rear covers. (See RH-INST0120.)
- ② Pull out the CTL ASSY. Open the right and left levers to the direction of arrows (···➤) at the same time then remove the CTL ASSY.
- ③ Install the CACHE ASSY.
- ④ Insert the CTL ASSY into the former place. Insert the CTL ASSY into the right place with its right and left levers being opened, then close the both levers to the direction of arrows (➡) at the same times.
- ⑤ Attach the rear covers. (See RH-INST0120.)

Installation example of CACHE ASSY

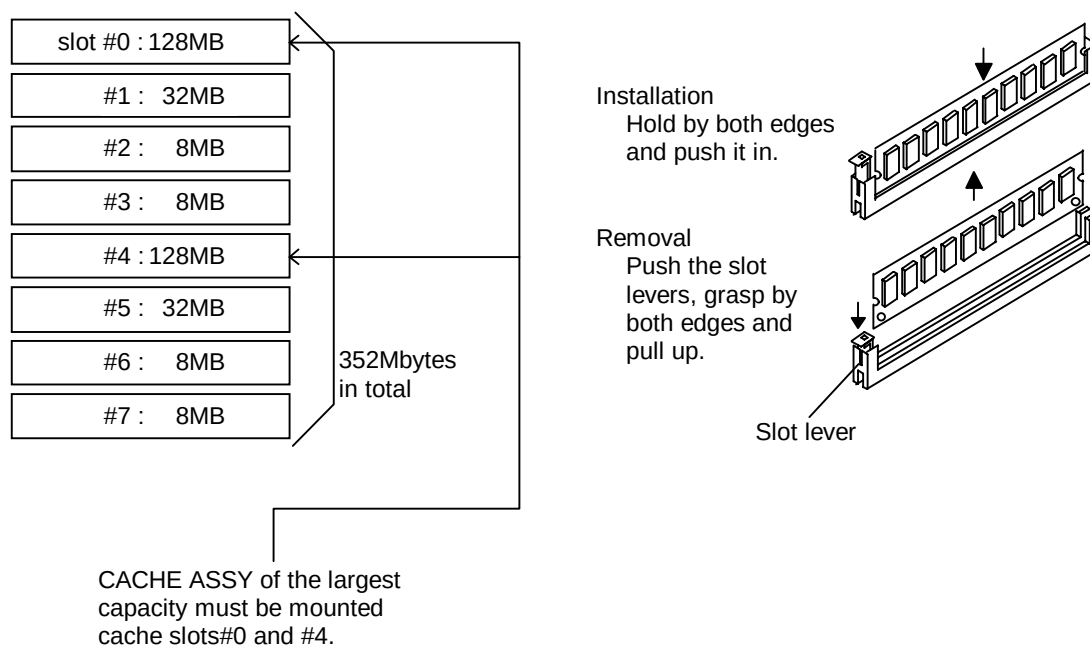
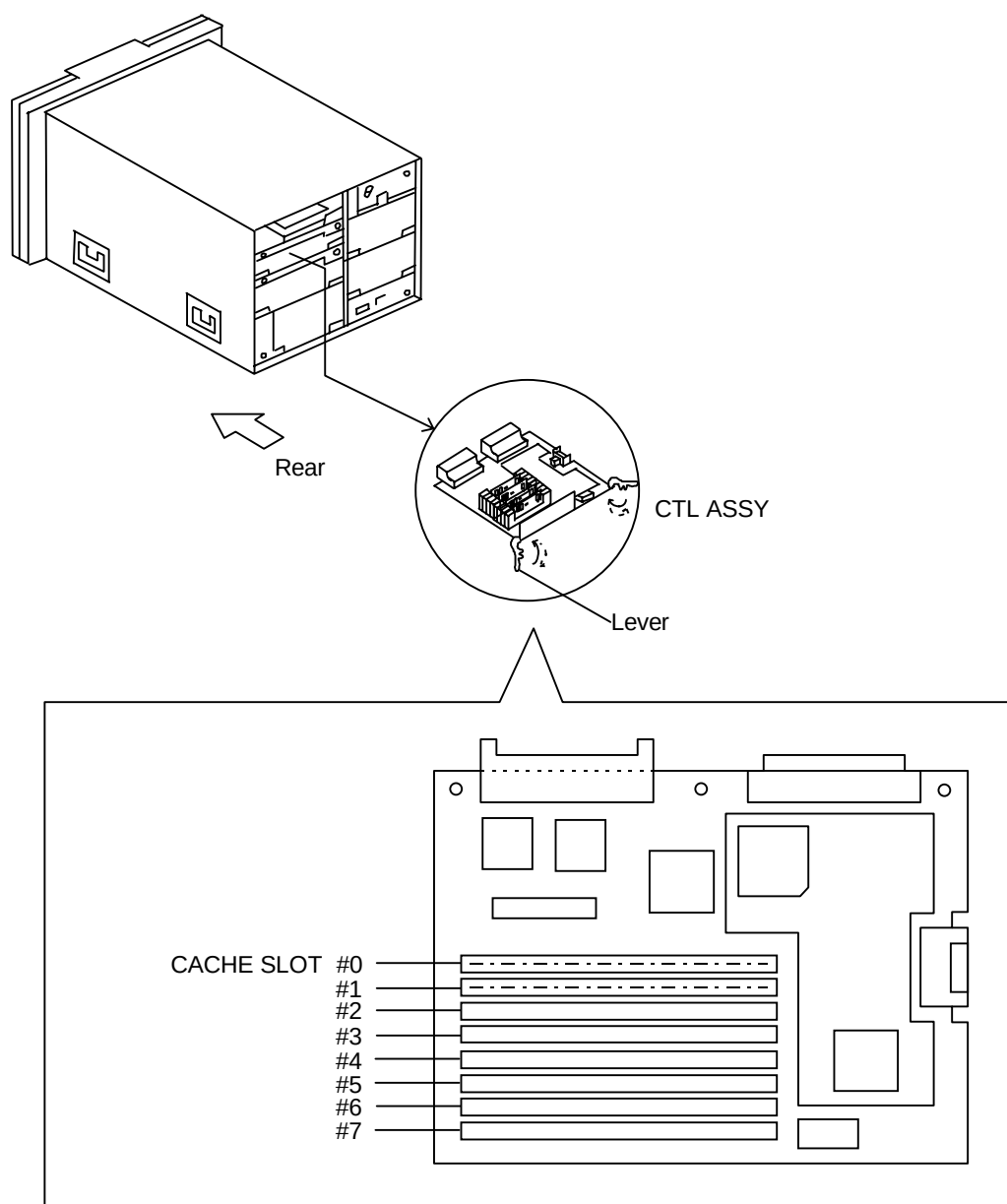


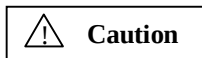
Figure 3.2.7 Installing CACHE ASSY

**Figure 3.2.8 Installing CACHE ASSY**

3.3 Setting the Power Supply

The power for the boards, drives, and fans of the DF350F disk subsystem is supplied by the In Box ASSY and AC/DC power supply converting AC to the DC power.

Turn the power on according to procedures (1) to (6) described below.



Make sure that AC cable is not damaged. It may cause electric shock or fire.

- (1) Verify that the breaker (switch at the rear side) is set to "O" (Off). Remove rear cover and turn on the power switch of the battery. (See Figure 3.3.1.)
- (2) Verify that all the DIP switches on the CTL ASSY are set to "Off" (upper position). Note, no need to remove CTL ASSY. (See Figure 3.3.2.)
- (3) Install rear cover. Then, attach AC cable. (See Figure 3.3.1.)
- (4) Turn on AC power.
- (5) Turn on the main switch. (See Figure 3.3.3.)
- (6) Make sure that the subsystem becomes ready a few minutes later.

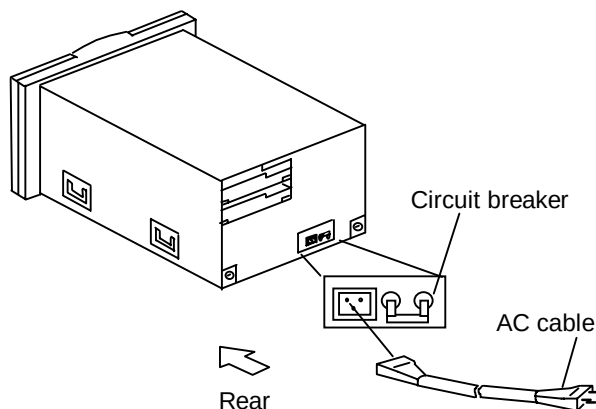


Figure 3.3.1 AC Cable Connection

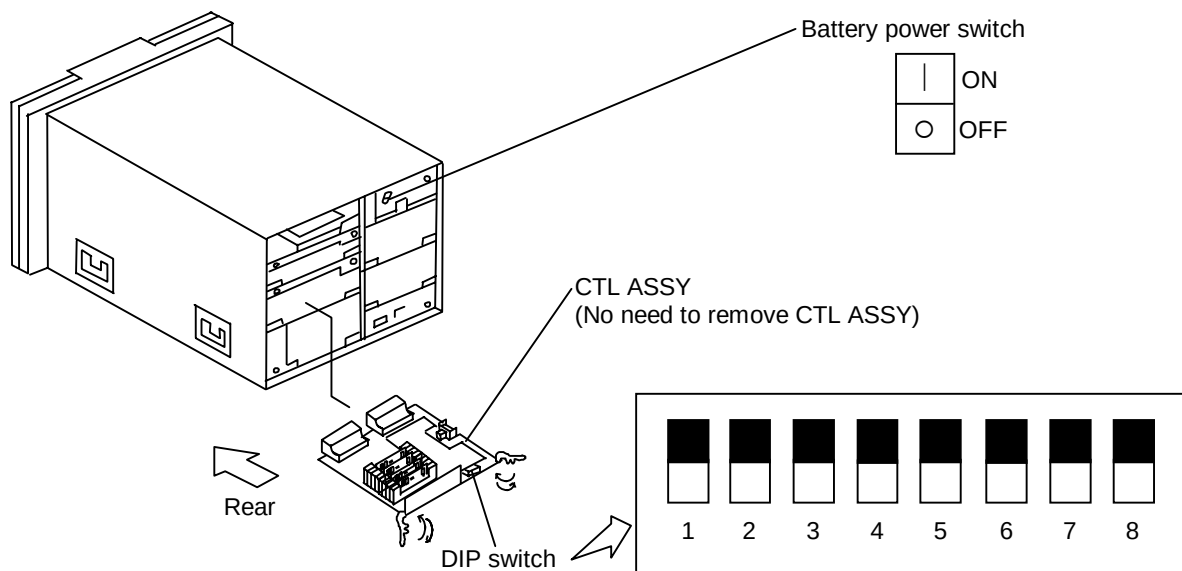


Figure 3.3.2 Inside Construction of the Subsystem

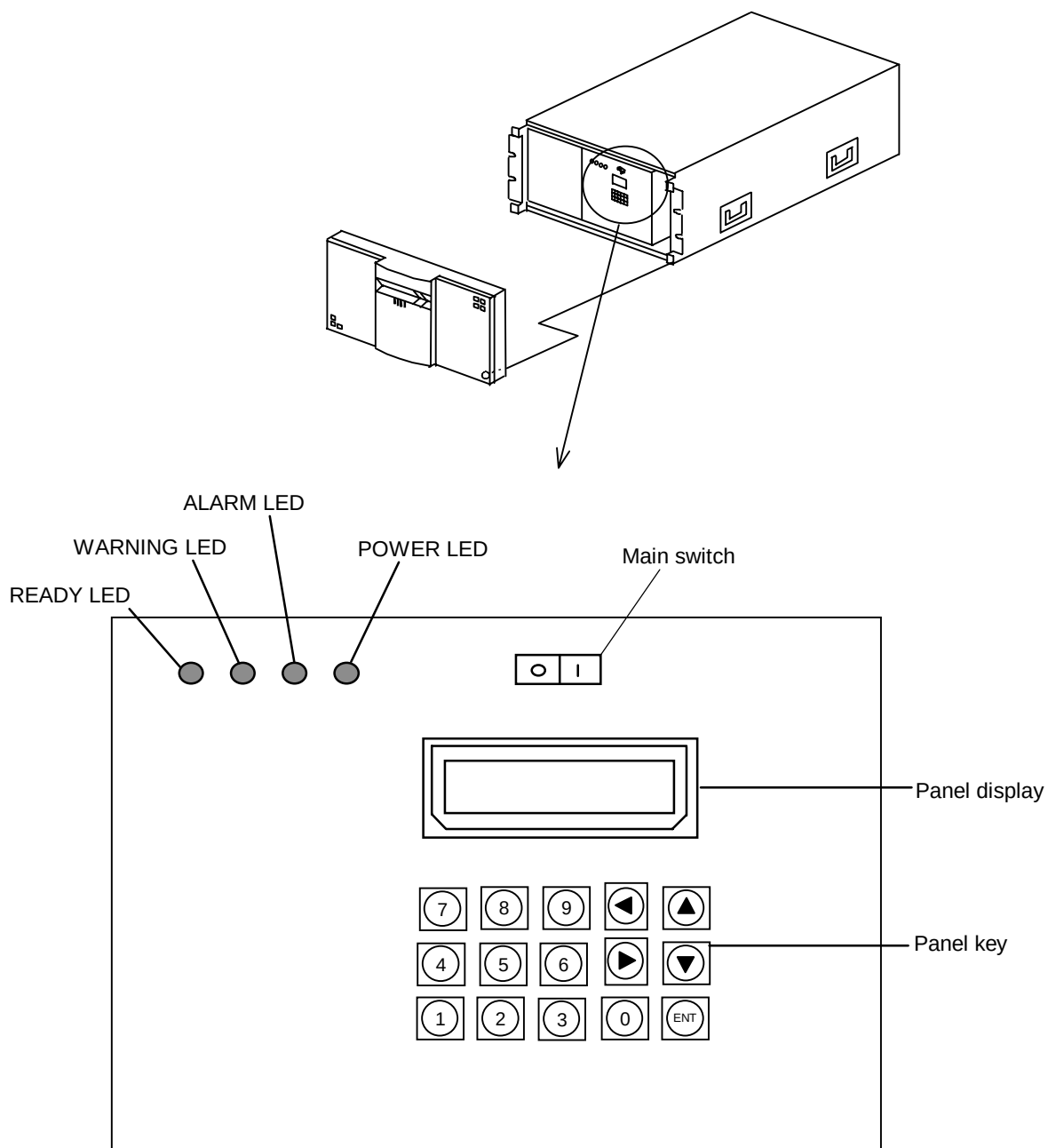


Figure 3.3.3 Panel

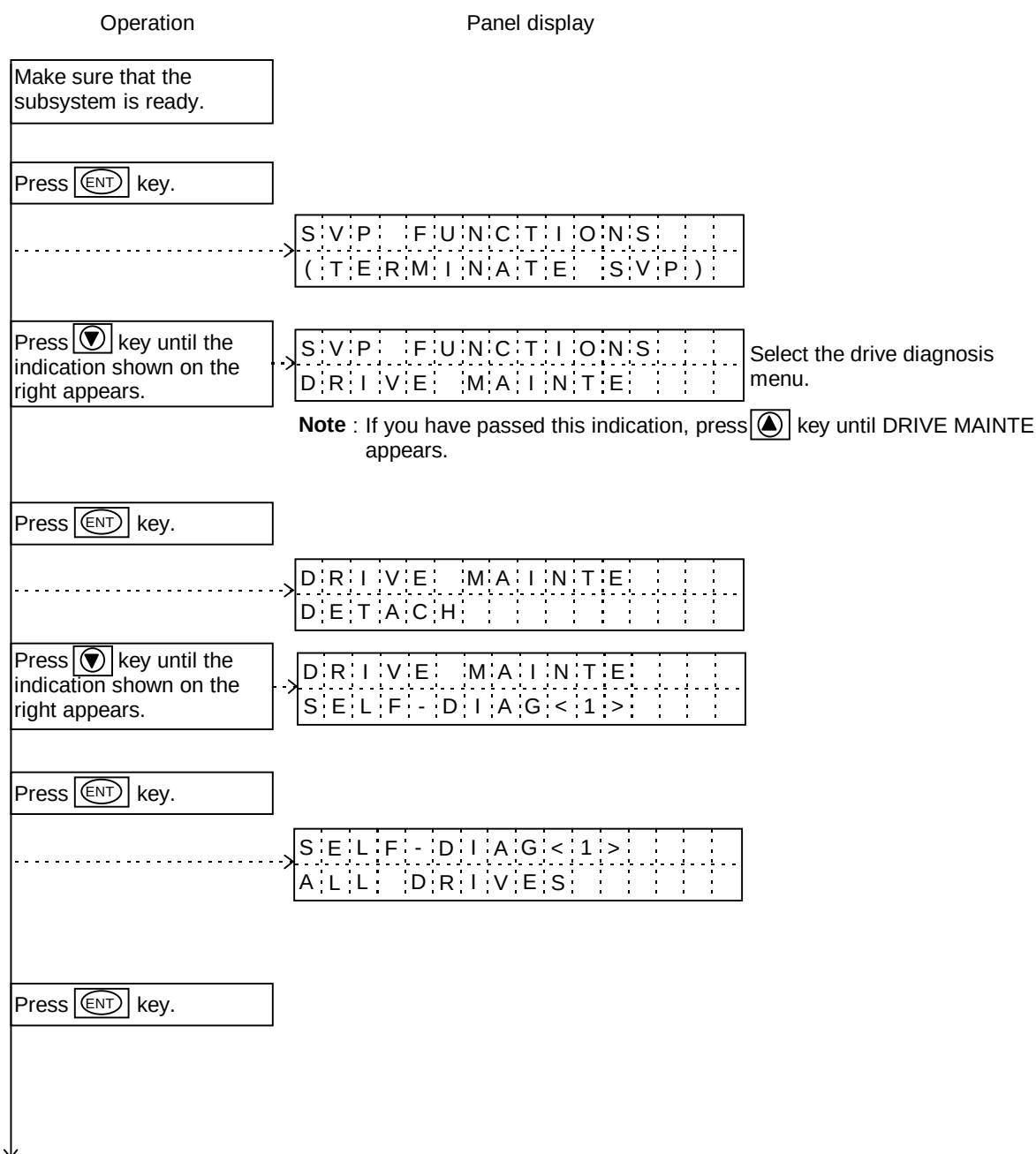
3.4 Setting the Subsystem Parameter

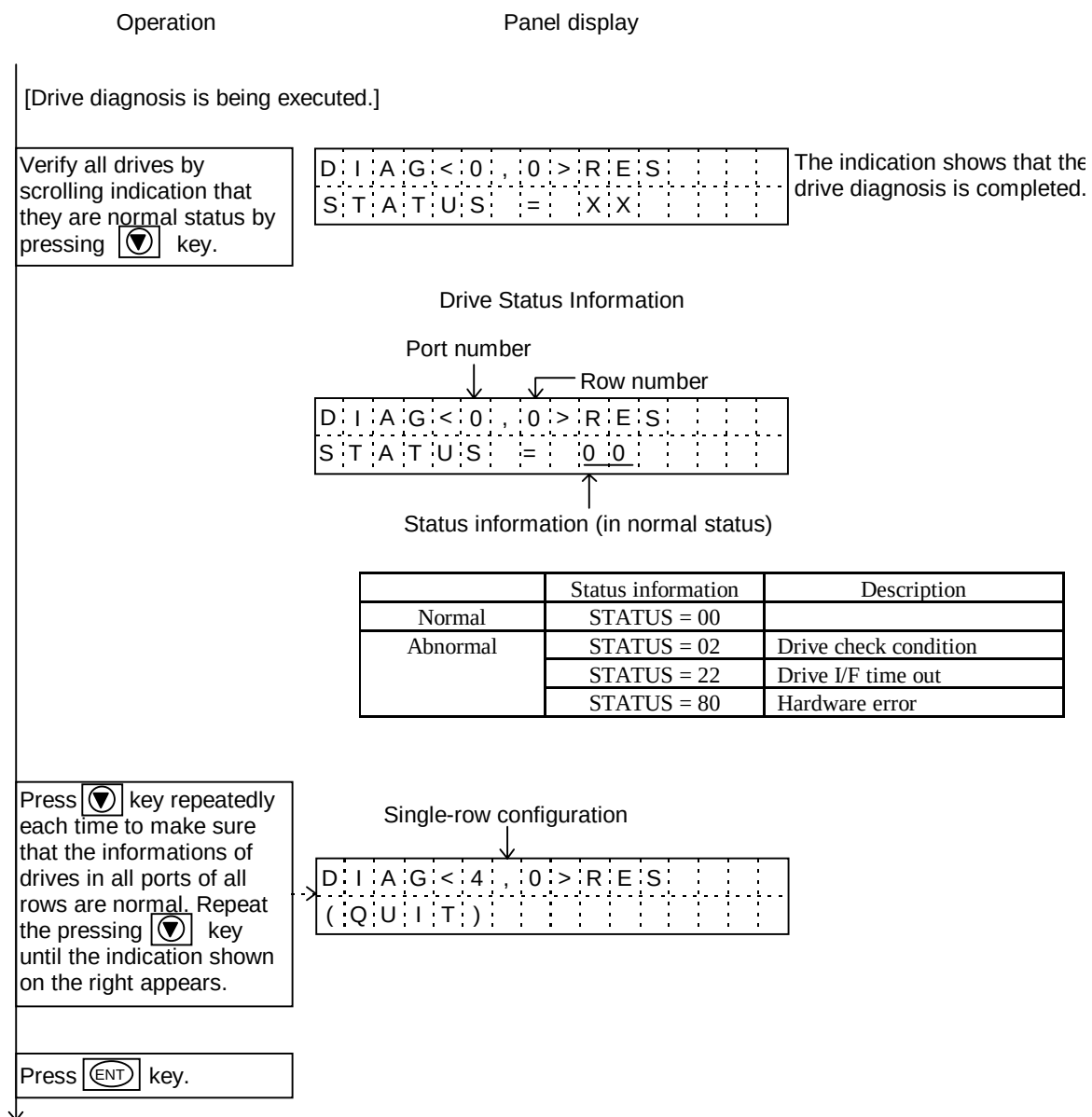
See Chapter “Setting the Subsystem Parameter” in RH-INST0260.

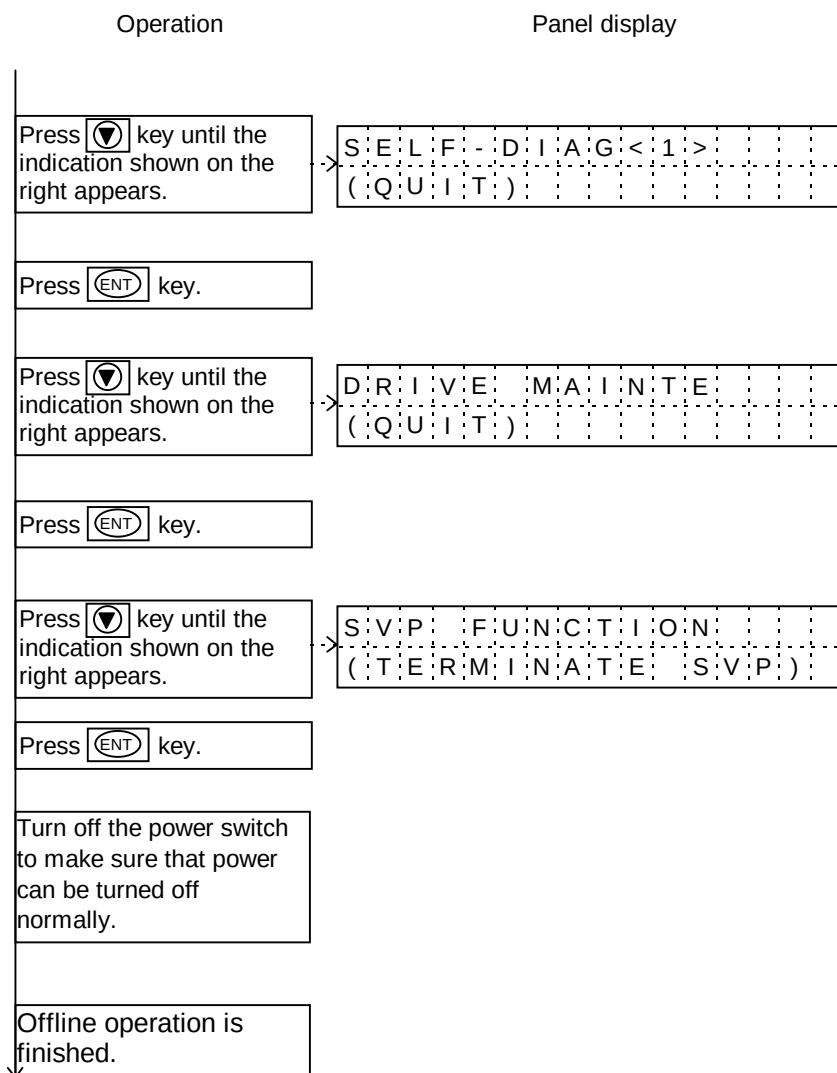
3.5 Checking the Offline Operation

After opening the front cover, execute the drive diagnosis using the Panel display and the ten key as instructed below, and make sure that the diagnosis is completed normally on each of all drives.

① Operate as described below.







3.6 Connecting the Fibre Cable

Connect the Fibre cables after confirming the controller number indicated on the label.

Note 1 : When the controller is used in a dual configuration, connect the cables to the connectors corresponding to the host to be connected. (See Figure 3.6.2.)

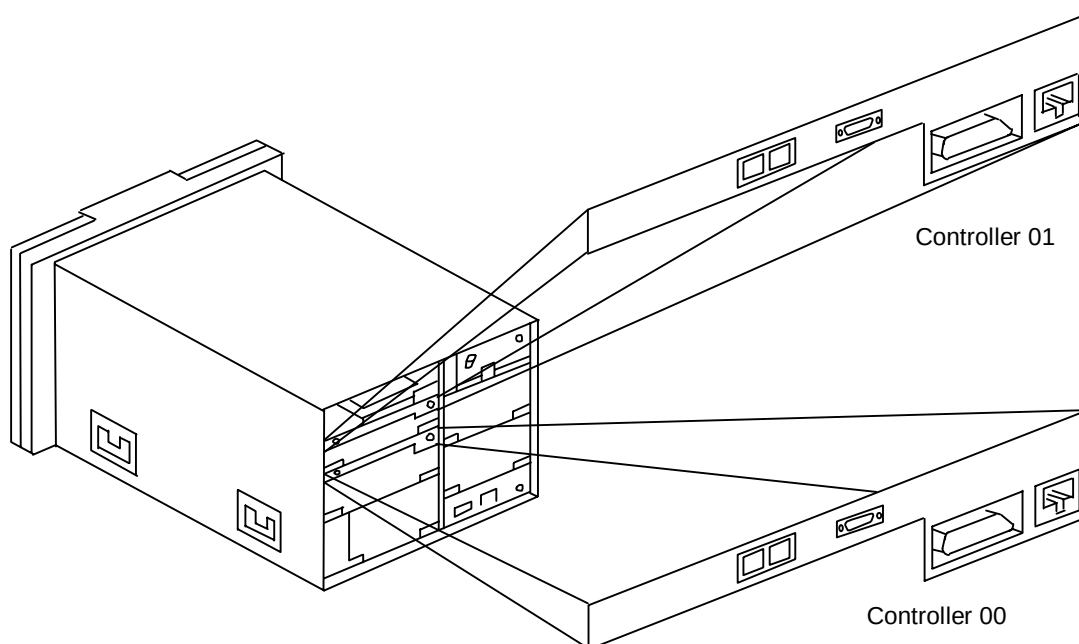


Figure 3.6.1 Fibre Connector Layout

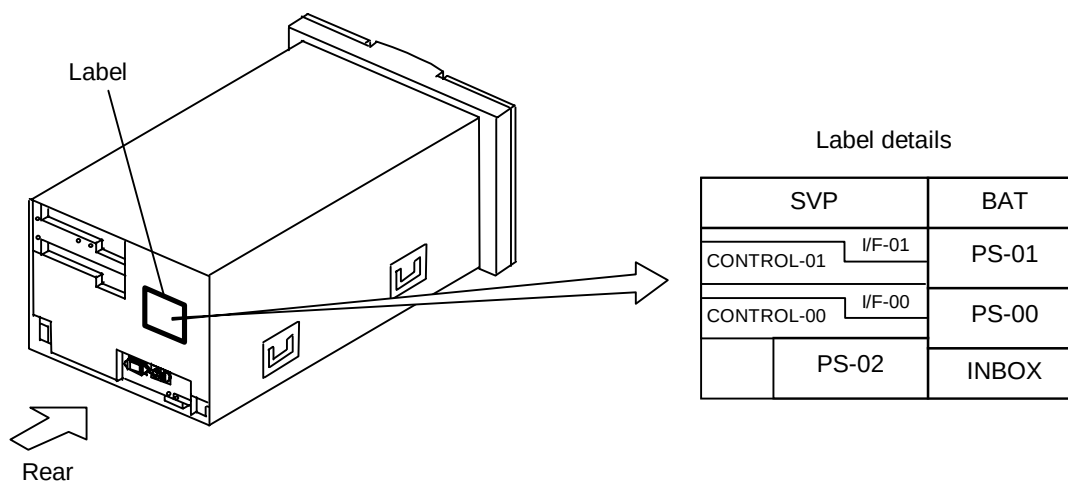
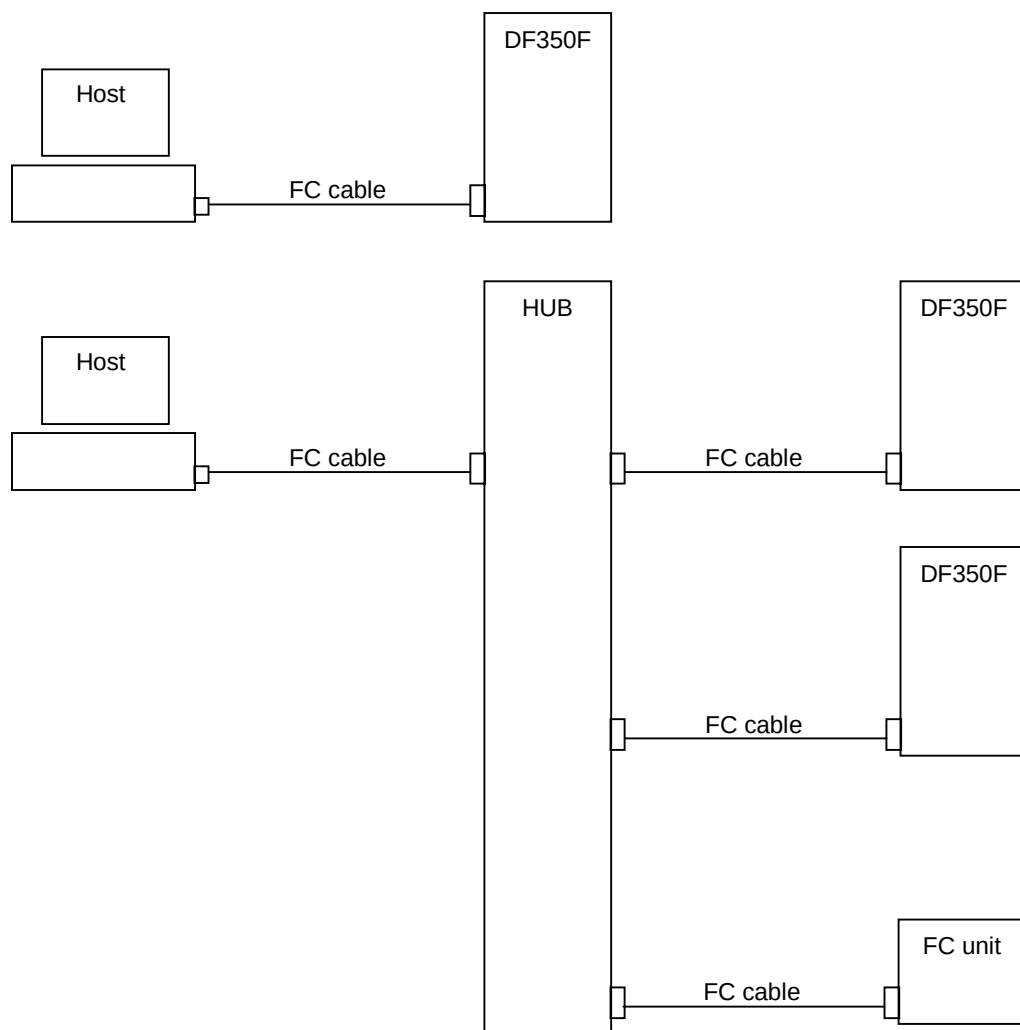


Figure 3.6.2 Label Layout

**Figure 3.6.3 Fibre Connections**

4. Setting the Subsystem Parameter

4.1 Setting the System Parameter

(1) Setting the system parameters and downloading

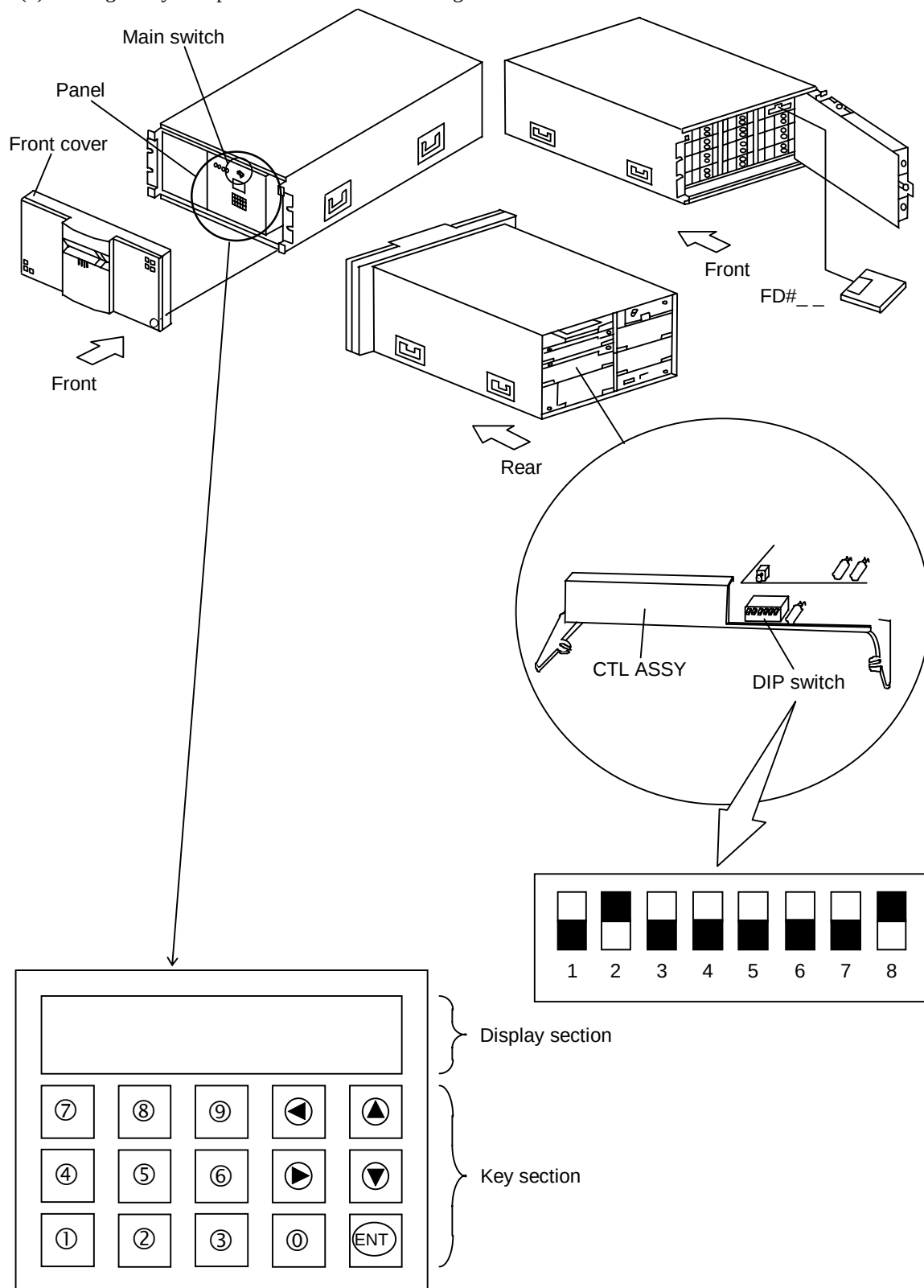
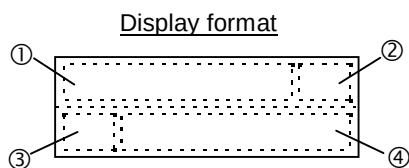


Figure 4.1.1 DIP Switches (System parameter is Set)

(1) Display

While setting up DIPSWITCH or SVP FUNCTION, menu etc. are displayed at panel display in the following display format .



① Menu title

There are two kinds of menu title described below.

DIPSWITCH SET:

For setting the target ID, buzzer, etc.

SVP FUNCTION:

For the operations other than described above.

② Warning

A hatch mark “#” indicates that a message has occurred in the host command processing during panel operation.

③ Current setting

An asterisk “*” indicates the item currently set.

④ Menu item/parameter value

This indicates the menu item or the parameter value entered from the panel.

One display is provided for the two controllers. You can determine which of the two controllers displayed the message as follows.

Message from the controller No. 0: The first (left most) character is in uppercase.

Message from the controller No. 1: The first (left most) character is in lowercase.

Example) Controller No. 0: DIPSWITCH SET

Controller No. 1: dIPSWITCH SET

For the dual controllers, the message with the display format 1 and the menu title with the display format 2 are displayed as indicated above. (For the panel operation messages, the first (left most) character is always in uppercase regardless of the controller No.)

For the single controller, the first (left most) character is always in uppercase.

(2) Keys

Use the - keys for panel operation.



Used for entering the parameter values.



Used for determining the menu or the input parameter.

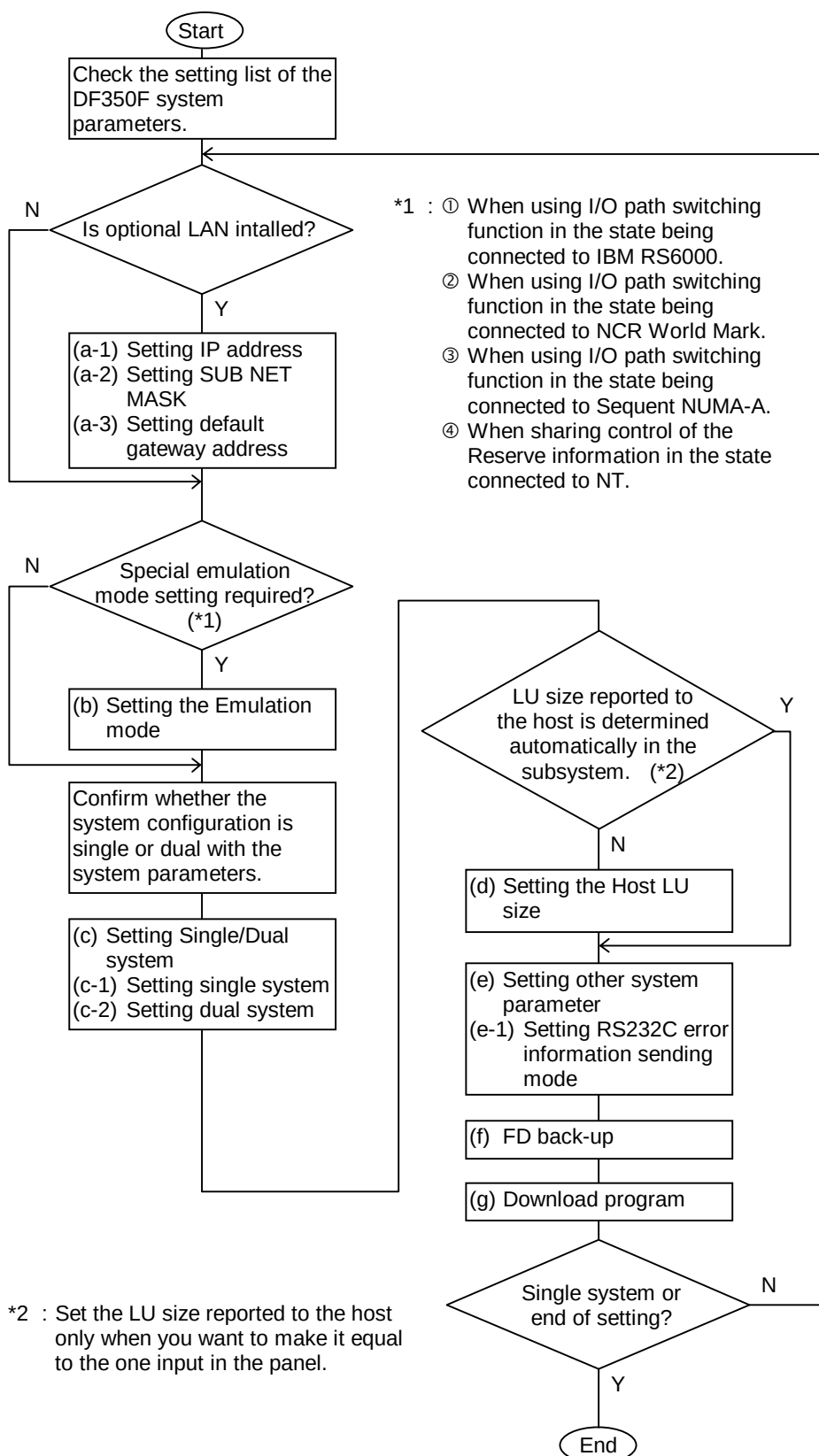


Used for determining the parameter input position.



Used for selecting the menu.

Operate as the flow described below.



Operate as described below.

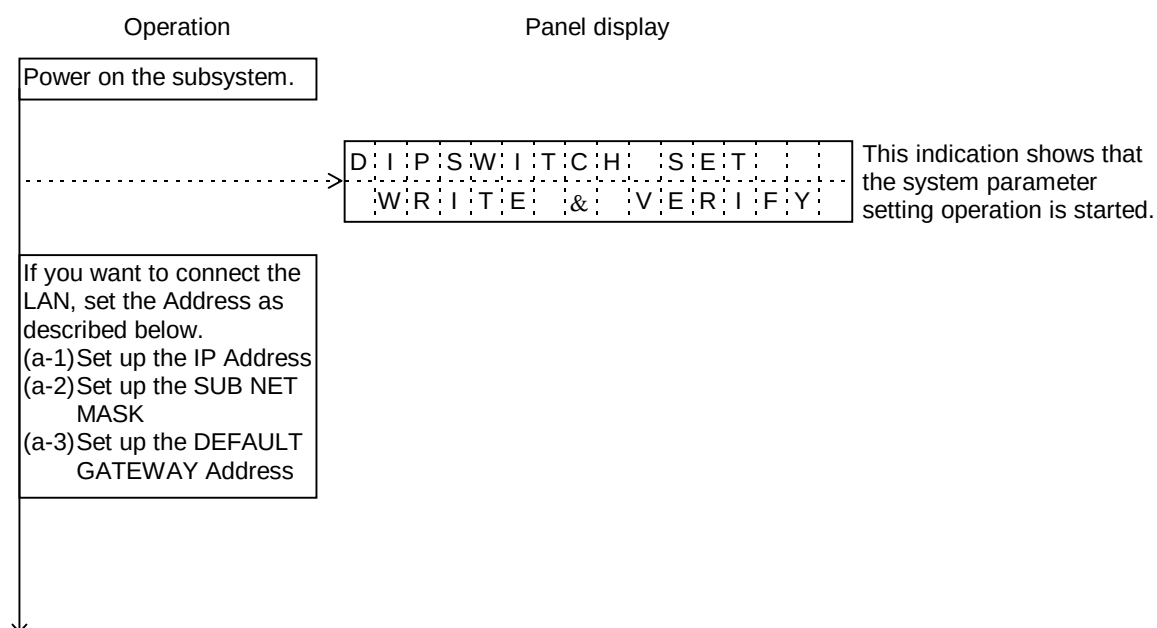
- (1) Before powering on the subsystem, set DIP switches No. 4 and 6 as shown in Figure 4.1.2 .

In case of Dual Controller system (installed DF-F350F-F3MCF) , set DIP switches of both controllers.

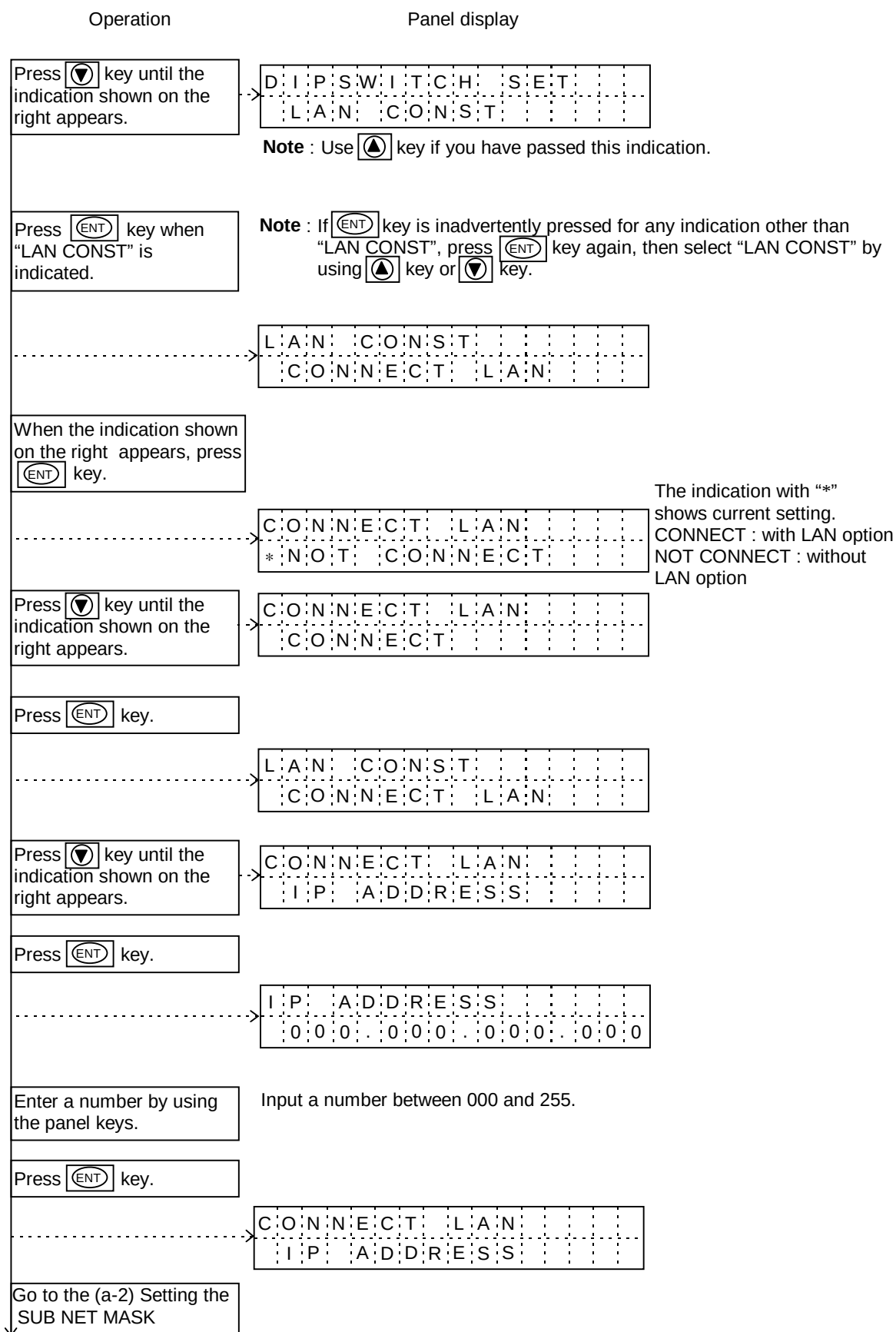


Figure 4.1.2 DIP switches (For setting the system parameter)

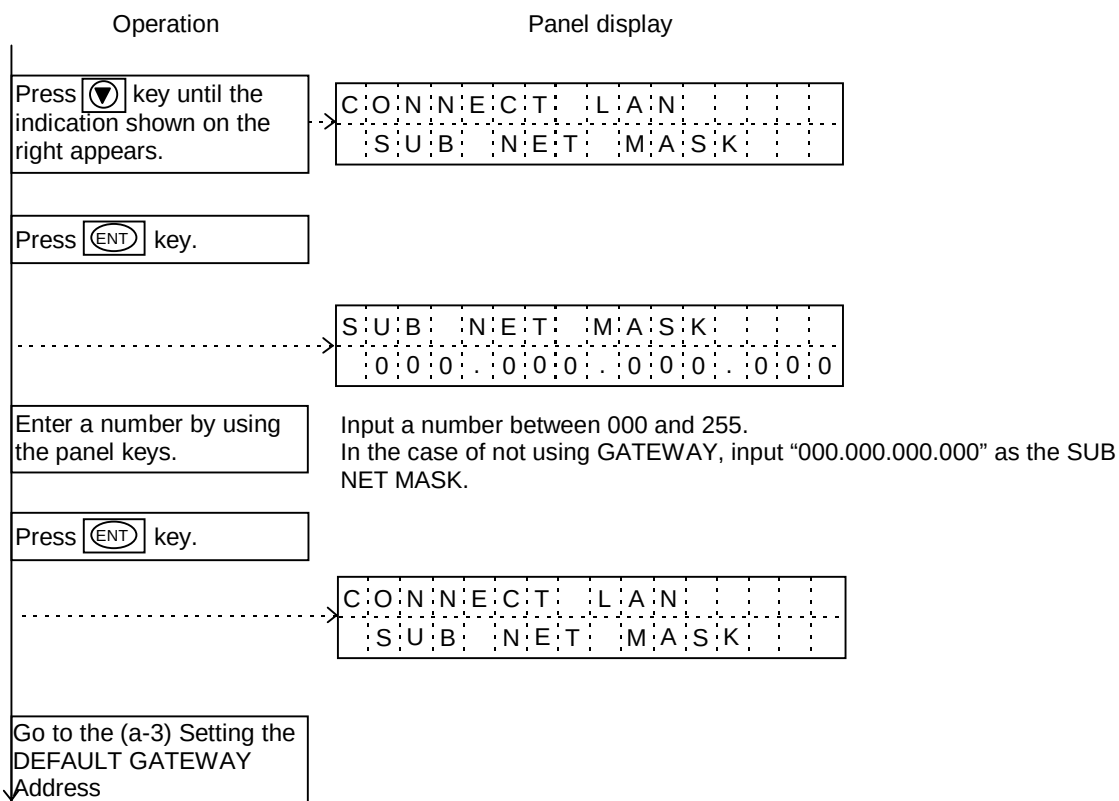
- (2) Operate panel's keys as described below.



(a-1) Setting the IP address.



(a-2) Setting the SUB NET MASK

***Note**

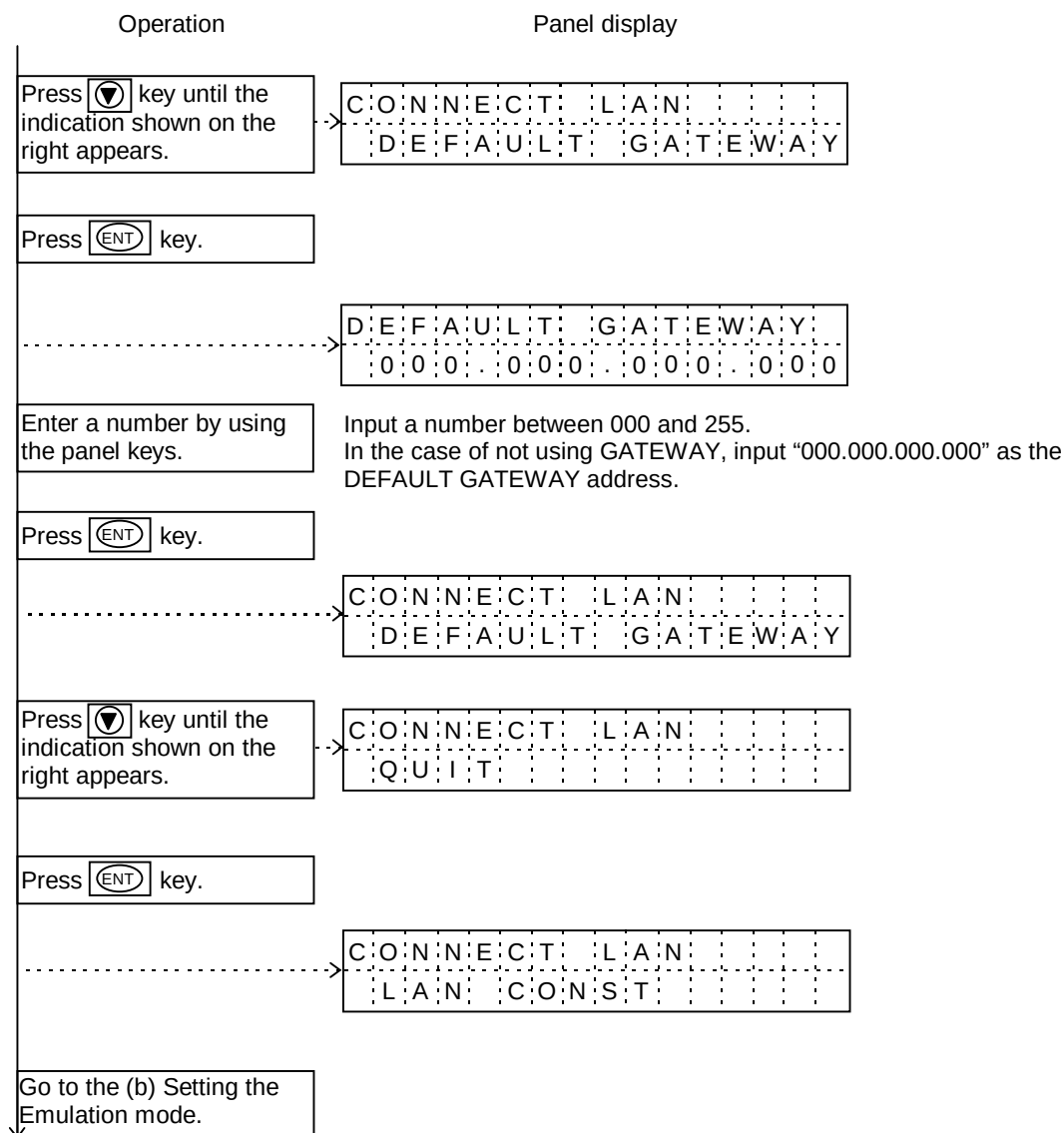
If "000.000.000.000" as the SUB NET MASK is set, this subsystem automatically adopts default SUB NET MASK for each IP address as described in the table 4.1.1.

Table 4.1.1 Default SUB NET MASK related with IP address

No.	IP Address of the subsystem	DEFAULT SUB NET MASK
1	from 000.000.000.000 to 127.255.255.255	255.000.000.000
2	from 128.000.000.000 to 191.255.255.255	255.255.000.000
3	others	255.255.255.000

If a smaller SUB NET MASK than default number is entered, this subsystem adopts default number.

(a-3) Setting the DEFAULT GATEWAY address

***Note**

If an invalid GATEWAY address is set (the IP address of the device is different from network address.), either of warning messages as shown below is displayed until the READY LED of the subsystem lights on.

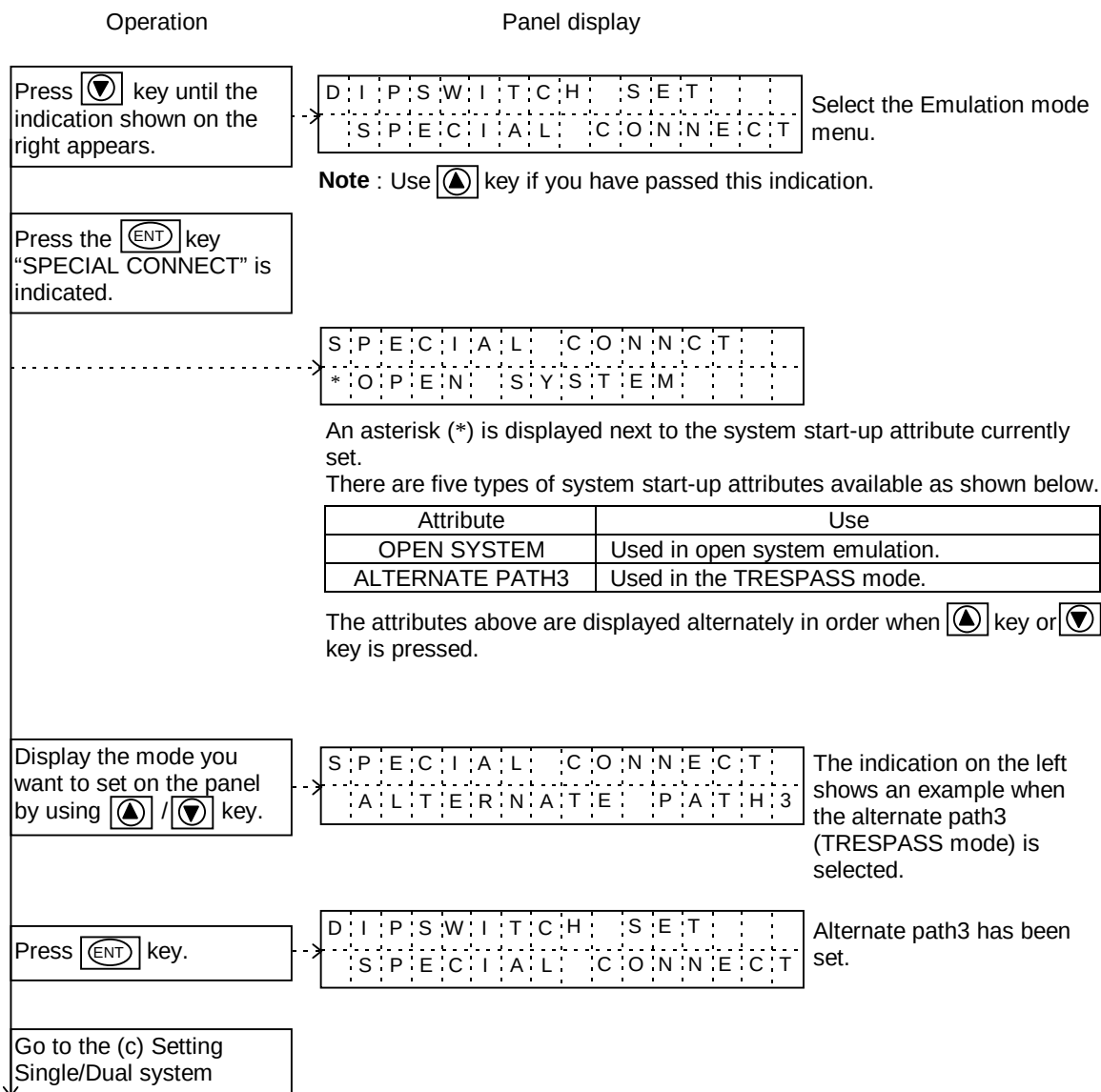
Power off the subsystem and set IP address and default GATEWAY address correctly.

W	0	1	7	0	0	G	A	D	E	R	R		

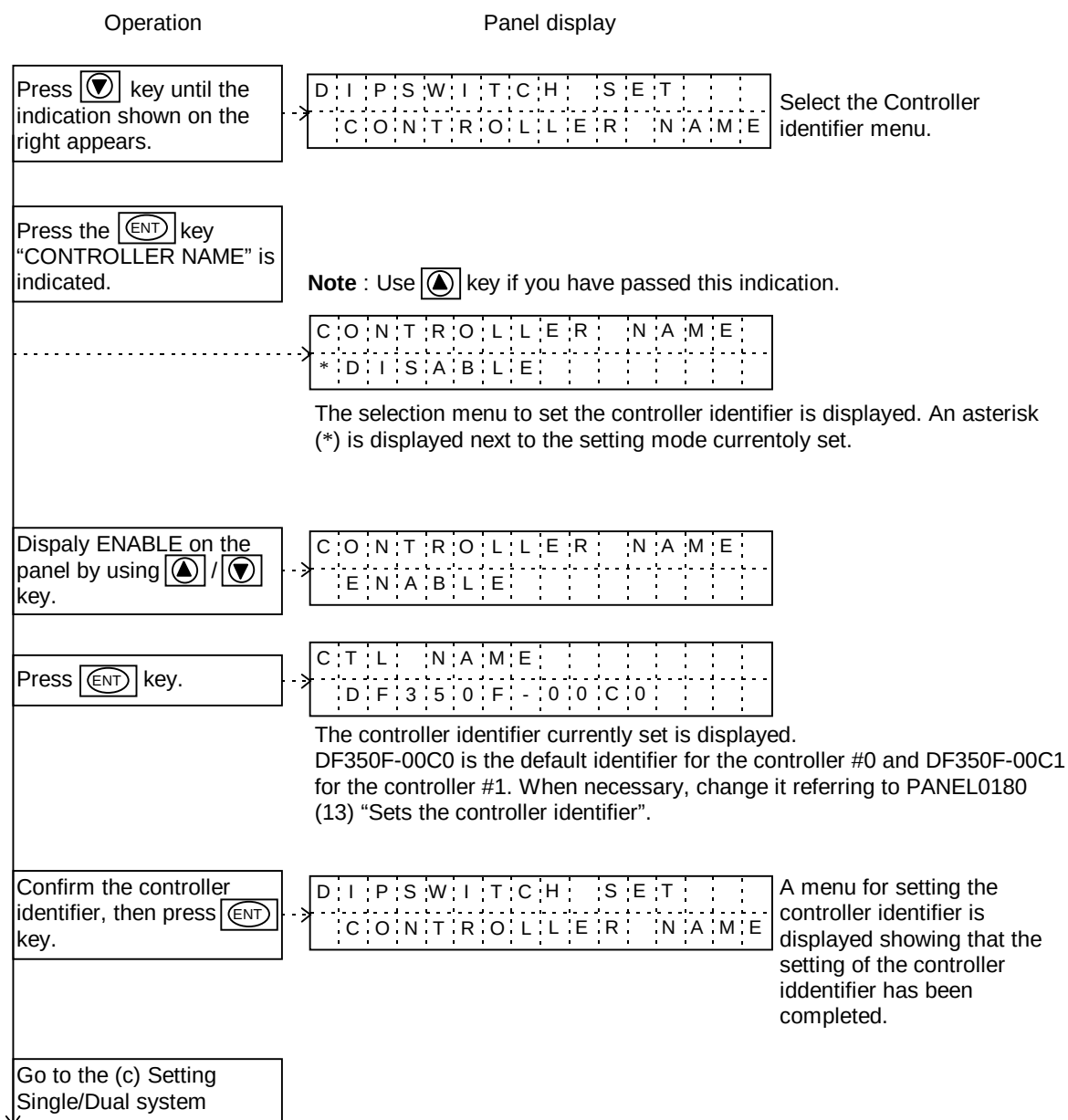
W	0	1	7	0	0	G	A	D	E	R	R	-	X

X : controllers No.

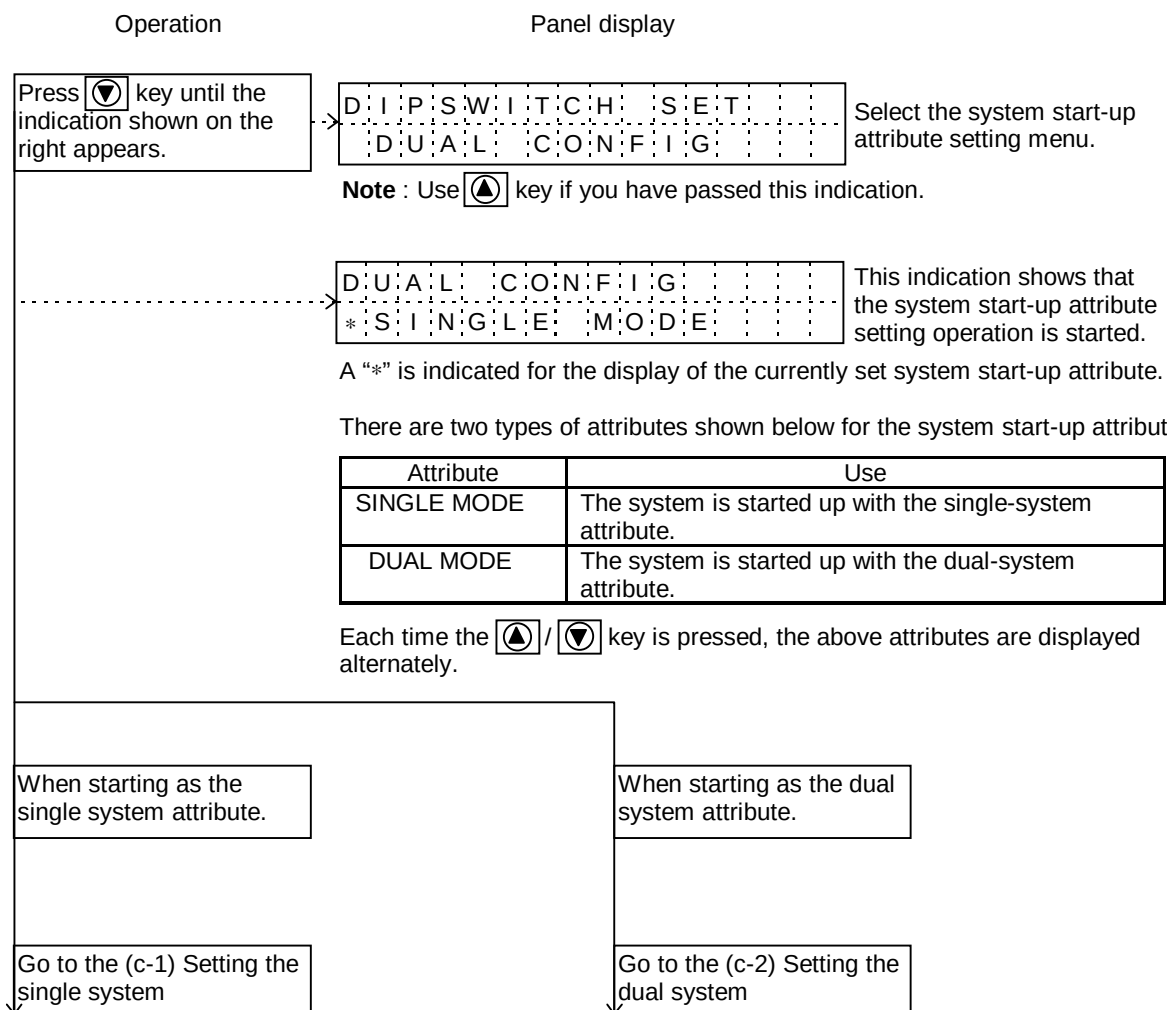
(b) Setting the Emulation mode



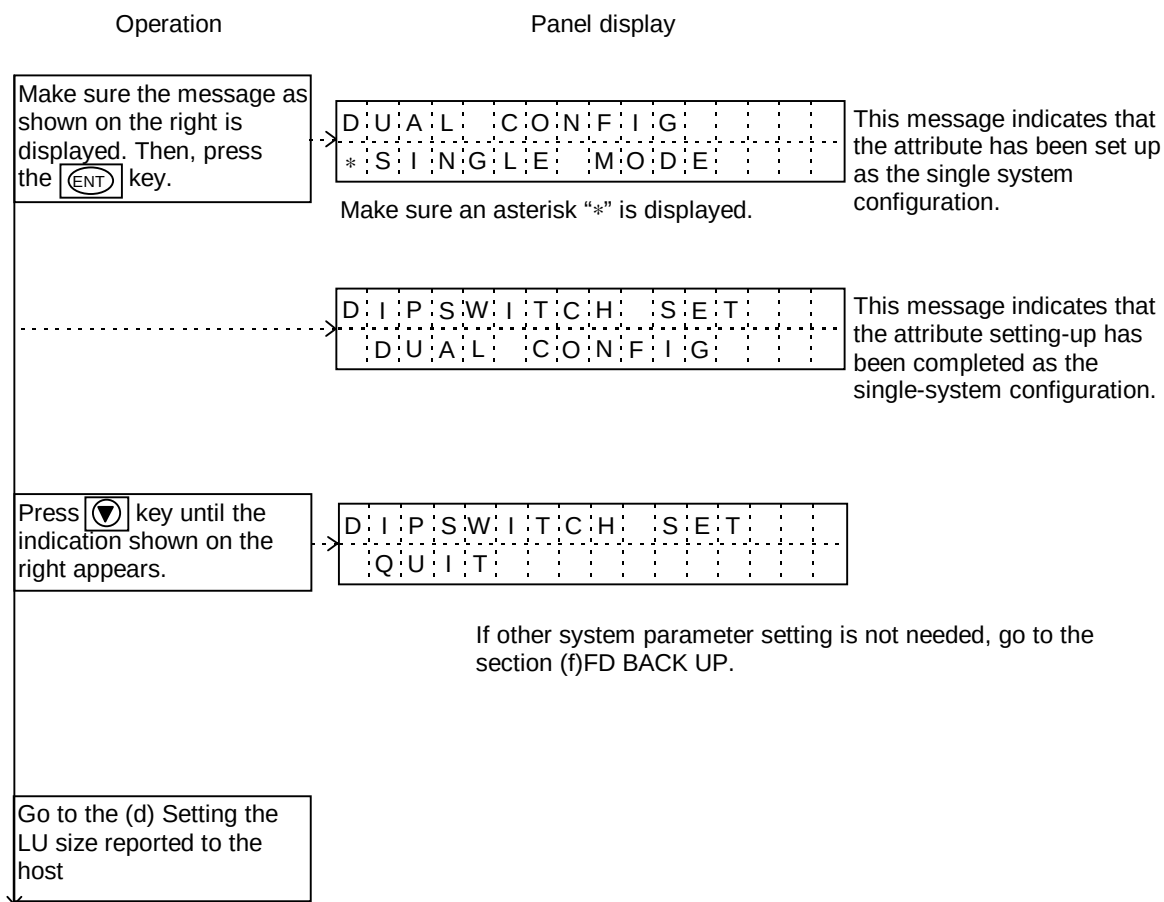
When the alternate path3 is selected, go to the single/dual system setting.



(c) Setting Single/Dual system



(c-1) Setting the single system



(c-2) Setting the dual system

There are five operating modes available as shown in Table 4.1.2.

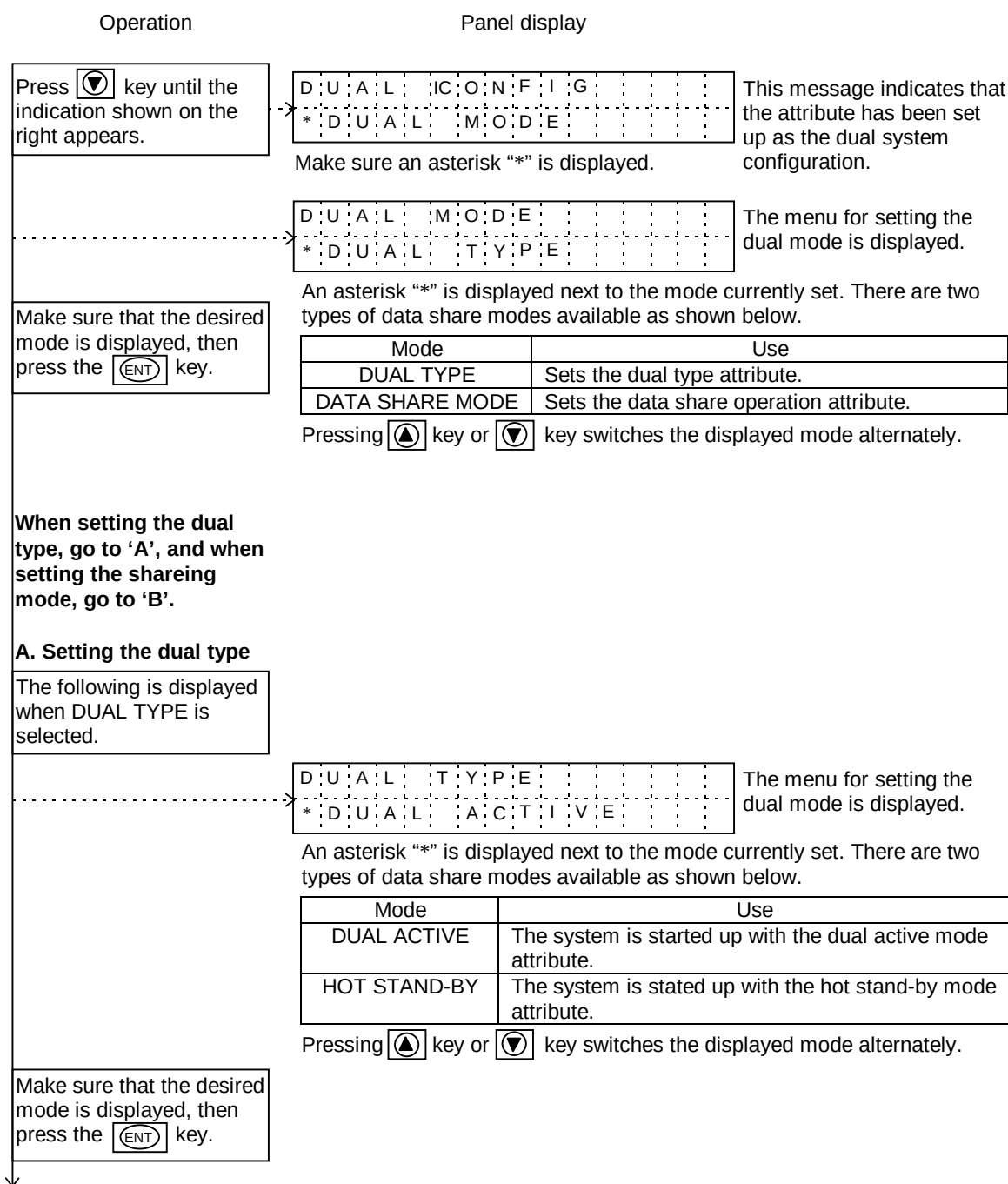
To validate each mode, panel setting shown in the Table 4.1.2 is required.

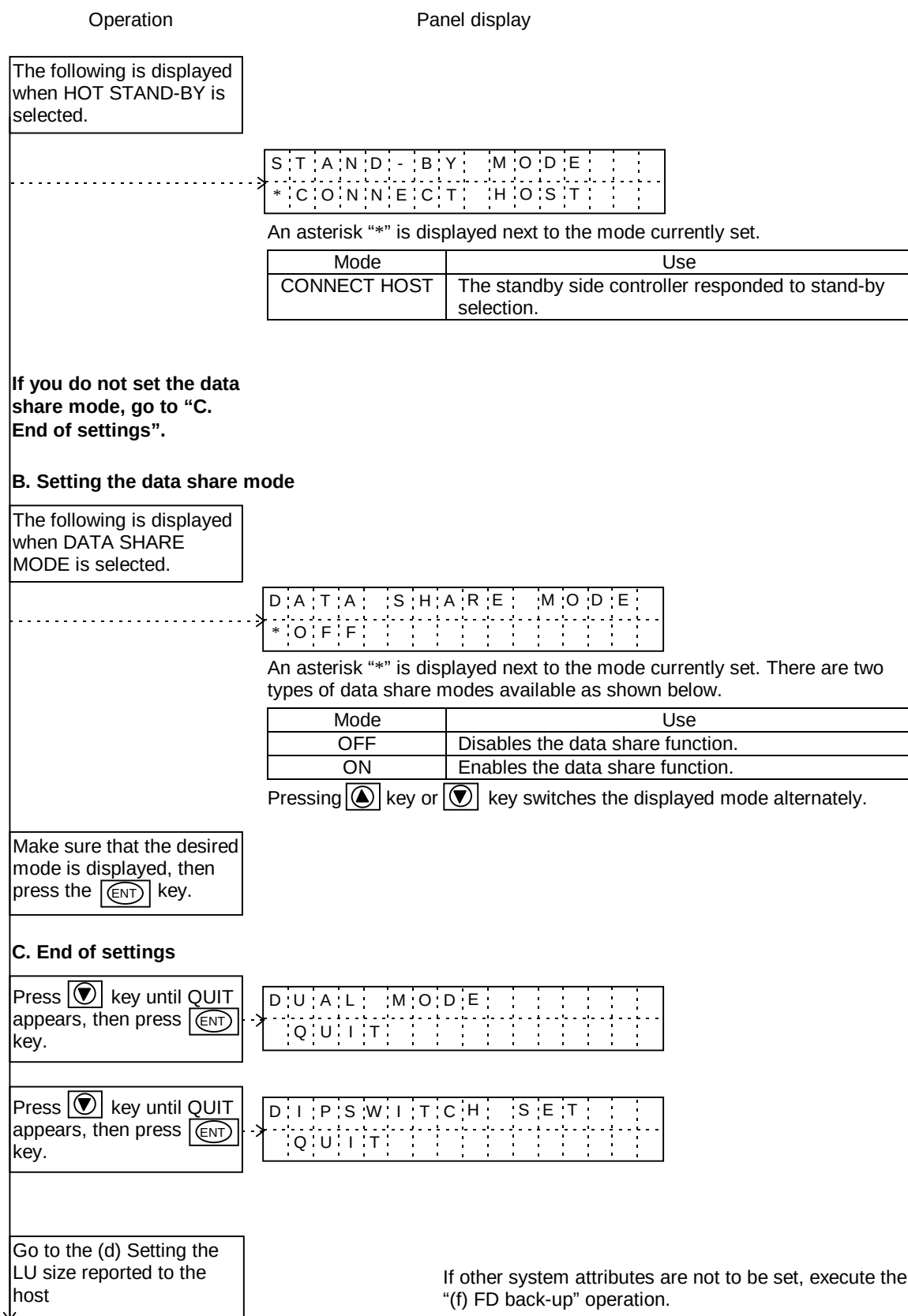
Perform the operations instructed in item (d) and succeeding items referring to the Table 4.1.2.

Table 4.1.2 Active mode and panel setting (Dual system configuration)

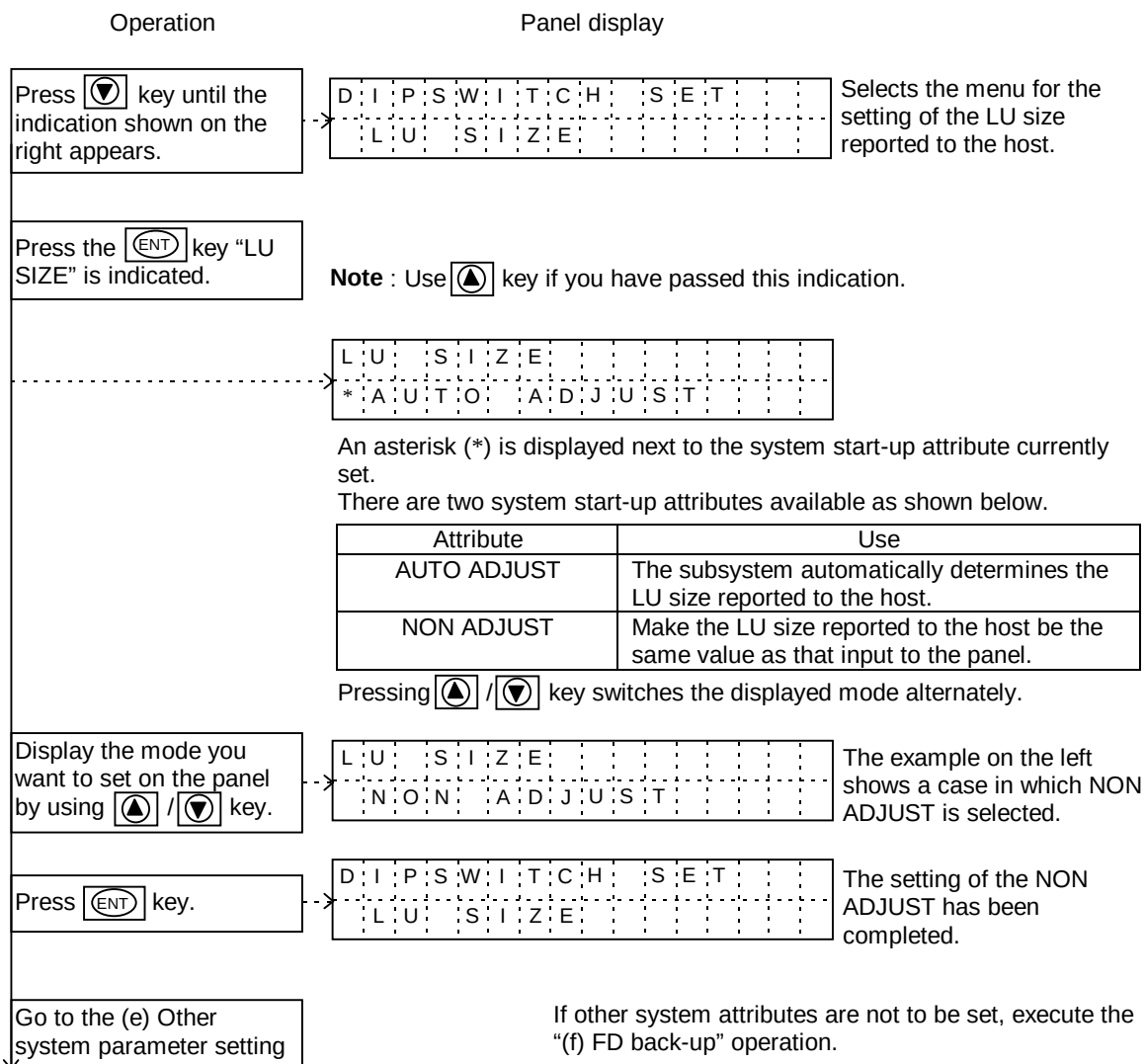
Active mode		Panel set		
		DUAL TYPE	STAND-BY MODE	DATA SHARE MODE
HOT STAND-BY	Normal	HOT STAND-BY	CONNECT HOST	OFF
	Data share (*1)			ON
DUAL ACTIVE	Normal	DUAL ACTIVE	Invalid	OFF
	Data share (*1)			ON

*1 : This function can be used in Micro_disk_Ver.354 or later.





(d) Setting the LU size reported to the host



(e) Other System Parameter Setting

Besides (a) Setting the IP address and (c) Setting SINGLE/DUAL system, there are several setting functions as below. The setting at the factory shipment is shown on the table in the addendum to the device.

To change the setting, see "PANEL0080".

The menu items and their usage are as follows.

(The item Nos. 1, 3, 5, 9, 16 and 17 in the following table must be set for each controller.)

No.	Menu item	Usage	Contents		Factory setting
			Parameter	How to set	
1	WRITE & VERIFY	Specifies the write and verify execution mode.	ON : Does not inhibit the write and verify execution mode. OFF : Inhibits the write and verify execution mode.	Select	ON
2	STRIPE SIZE	Specifies the data striping size.	16KB : Stripes the data in 16kbytes. 32KB : Stripes the data in 32kbytes. 64KB : Stripes the data in 64kbytes.	Select	64KB
3	LAN CONST	Specifies the LAN configuration information. ① CONNECT LAN Specifies whether or not the LAN board is mounted.	CONNECT : LAN board is mounted. NOT CONNECT : LAN board is not mounted.	Select	Depending on the configuration from the factory
		② IP ADDRESS Sets the IP address.	Enters the numerical value using the panel keypad.	Enter	000.000.000.000
		③ SUB NET MASK	Enters the numerical value using the panel keypad.	Enter	000.000.000.000
		④ DEFAULT GATEWAY	Enters the numerical value using the panel keypad.	Enter	000.000.000.000
		⑤ ETHER ADDRESS (*1)	Enters the numerical value using the panel keypad.	Only for reference	??????????
4	CONNECT VMS	Specifies whether or not the VMS is connected.	CONNECT : Connects the VMS. NOT CONNECT : Does not connect the VMS.	Select	NOT CONNECT
5	SPECIAL CONNECT (*2)	Specifies the emulation mode.	OPEN SYSTEM : Open system emulation mode ALTERNATE PATH3 : TRESPASS mode	Select	OPEN SYSTEM

*1 Changing the ETHER ADDRESS with this menu is impossible after shipment.

*2 This menu can be used in the Flash Program Ver.PE24 and later.

No.	Menu item	Usage	Contents		Factory setting
			Parameter	How to set	
6	HOST BLK SIZE	Specifies the drive format size.	512B : The drive format size is 512bytes per block.	Fixed	512B
7	ERROR INF	Specifies the error information send mode for the RS232C.	OFF : Inhibit outflow of information. ON (NORMAL) : Does not inhibit outflow of information. ON (HITRACK) : Does not inhibit outflow of information for the HITRACK.	Select	Depending on the unit's factory setting (OFF for Japan)
8	CONTROLLER	Specifies the controller type.	MINI TOWER : Mini tower (MK) HIGH RACK MOUNT : Rackmount (RKH) CABINET, WRACK : Cabinet type (CK), Rackmount (RKWH)	Select	Depending on the configuration from the factory
9	SPARE DISK	Specifies whether or not the spare disk is mounted.	EXISTENCE : Spare disk mounted NOTHING : Spare disk not mounted	Select	Depending on the configuration from the factory
10	SERIAL NO	Specifies the serial No. of the controller.	Enters the numerical value using the panel keypad.	Enter	
11	ROM V/R	Specifies the ROM microprogram revision.	Enters the numerical value using the panel keypad.	Enter	Revision from the factory
12	RAM V/R	Specifies the RAM microprogram revision.	Enters the numerical value using the panel keypad.	Enter	Revision from the factory
13	CONTROLLER NAME	Sets the controller identifier.	DISABLE : Setting of the controller identifier is invalid. ENABLE : Setting of the controller identifier is valid. CTL NAME : Controller identifier.	Select	DISABLE
14	ROW LAST LBA (*3)	Specifies the capacity that a single drive uses (for each ROW).	Enters the numerical value using the panel keypad.	Enter	Depending on the configuration from the factory
15	BUZZER	Specifies whether or not the buzzer sounds when displaying the warning or fault message.	ENABLE : Buzzer sounds. DISABLE : Buzzer does not sound.	Select	ENABLE
16	SYSTEM ERROR	Specifies the operation if the processor failure occurs.	AUTO RESET : Resets a fault. SYSTEM DOWN : Shutdown the system.	Select	AUTO RESET

*3 The ROW LAST LBA is displayed for setting the capacity that a single drive uses. Sets the capacity according to the menu displayed.

No.	Menu item	Usage	Contents		Factory setting
			Parameter	How to set	
17	INQUIRY INF	Specifies the vendor name, model name, and command queuing.	VENDOR TYPE : Vendor name PRODUCT TYPE : Model name COMMAND QUEUING : Command queuing ON : Executes the command queuing. OFF : Inhibits the command queuing.	Enter Enter Select	VENDOR TYPE = HITACHI PRODUCT TYPE = DF350F COMMAND QUEUING = ON
18	DUAL CONFIG	Specifies the system startup attribute.	SINGLE MODE : Single system attribute DUAL MODE : Dual system attribute DUAL ACTIVE : Dual stand-by configuration setting HOT STAND-BY : Hot stand-by configuration setting DATA SHARE MODE : Data share mode attribute (*5) OFF : Not used in the Data share mode ON : Used in the Data share mode	Select	Depending on the configuration from the factory
19	SYS REV	Limit the revision Nos. of installing system.	Displays the startup program revision.	—	“0354”
20	OPTION	Specifies the optional function when using it.	Enters the option code using the panel keypad.	Enter	“0000”
21	BOOT PROG V/R	Displays the startup program revision.	Displays the startup program revision.	—	
22	RTC SET	Sets the internal clock.	Enters the time using the panel keypad.	Enter	Year, month, day, day of the week, hour, minute, second
23	QUIT	Terminates the parameter input.	Enters using the panel keypad.	Enter	

*4 This menu can be used in the Flash Program Ver.PE24 or later.

*5 This function can be used in Micro_Disk_Ver.0354 or later.

(e-1) Setting RS232C error information sending mode

In order to use the failure notification program, the setting for the “ERROR INF” of the system parameter must be changed to “ON (NORMAL)”.

Operation	Panel display
	D I P S W I T C H S E T W R I T E & V E R I F Y
Press  key until the indication shown on the right appears. Press  key.	D I P S W I T C H S E T E R R O R I N F
	Note : Use  key if you have passed this indication.
Confirm that the indication is changed as shown on the right, which shows that the ERROR INF setting operation is started.	E R R O R I N F * O F F
Press  or  key until the indication shown on the right appears. Press  key.	E R R O R I N F O N (N O R M A L)
Make sure that the message as shown on the right is displayed.	D I P S W I T C H S E T E R R O R I N F
Press  or  key until the indication shown on the right appears. Press  key.	D I P S W I T C H S E T Q U I T
For the dual system, an indication shown on the right appears. Make the setting in the same way as the above.	D I P S W I T C H S E T ■ W R I T E & V E R I F Y

(f) FD back-up.

There are cases where System Parameters (Buzzer setting, drive recovery mode, etc.) needs to be backed up to FD or restored from FD when installing optional parts or replacing parts. This case, perform back-up to FD or restore from FD according to “2.3.1 Back-up procedure to FD (RH-OPTION0050.)” or “2.3.2 Restoring procedures to FD (RH-OPTION0080.)”.

(Raid configuration setting, LU configuration setting, etc are not contained in system parameter.)

Back-up procedure to FD

- (1) Turn the power off according to RH-OPTION0110.

Notice: In case the power is not normally turned off, the user's data might be lost.

- (2) Before power on the subsystem, set DIP switch No.4 on CTL ASSY as shown in Figure 4.1.2.

Note : Be sure to set the same data for both controllers if the dual controller option (-F3MCF) has been installed.

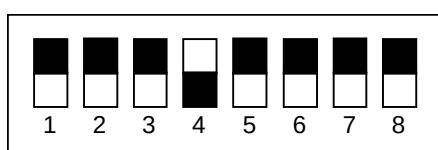
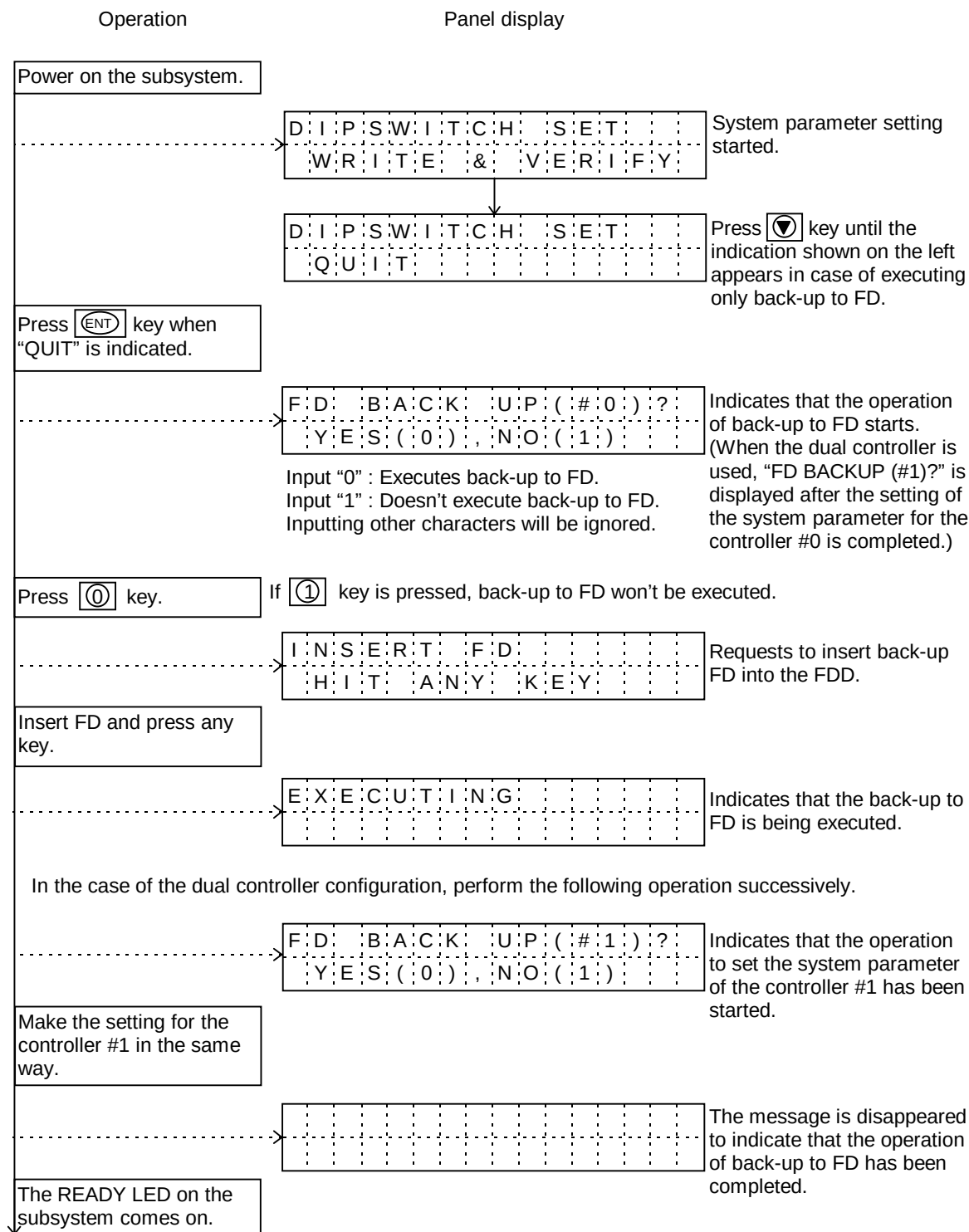


Figure 4.1.2 DIP Switches

(3) Operate panel's keys as described below.



(4) Set DIP switch No.4 as shown in Figure 4.1.3.

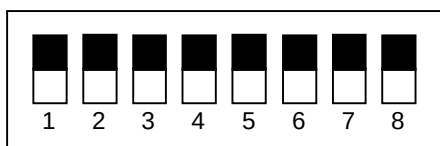
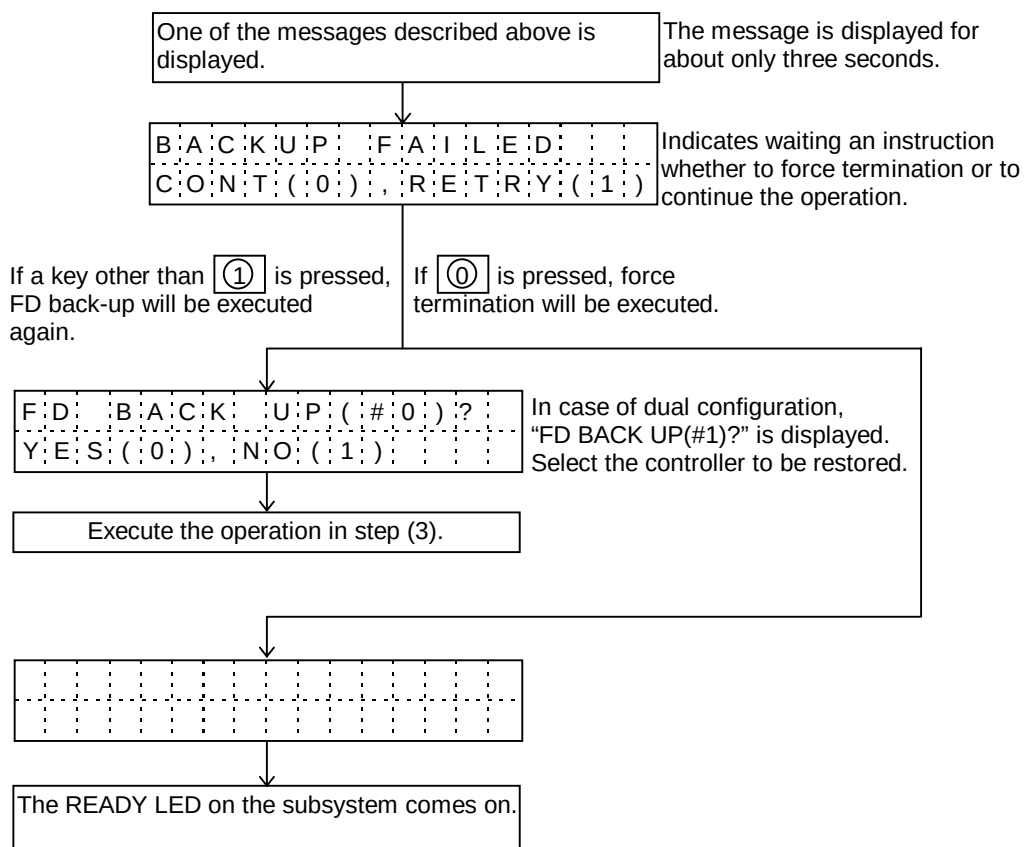


Figure 4.1.3 DIP Switches

Note 1 : While the back-up to FD is being executed, the following messages may be displayed.

- **FD NOT INSERTED**
FD isn't inserted. Insert FD into the FDD.
- **FD MOTOR NOT STARTED**
Starting failure of the FD drive motor occurred. Try again.
- **FILE WRITE ERROR**
FD which was inserted is not formatted, or is the condition of write-protected. Format or release write-protection.
Write error occurred in FD which was inserted. Insert another FD.

If these messages are displayed, back-up to FD hasn't been executed. So try again following the operation described below.



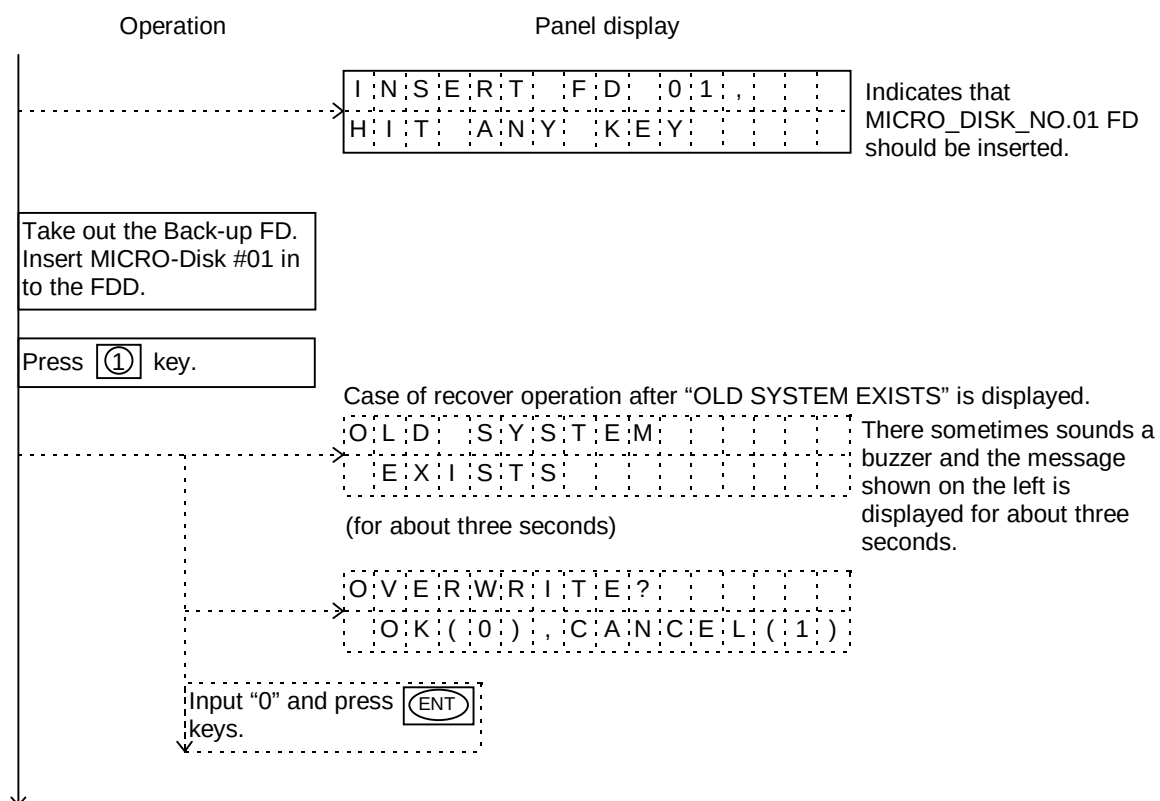
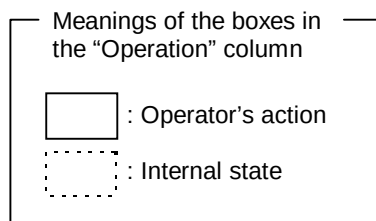
Note 2 : Use 3.5" FD (1.44MB) formatted by MS-DOS for back-up FD. Note that the FD will be overwritten in back-up.

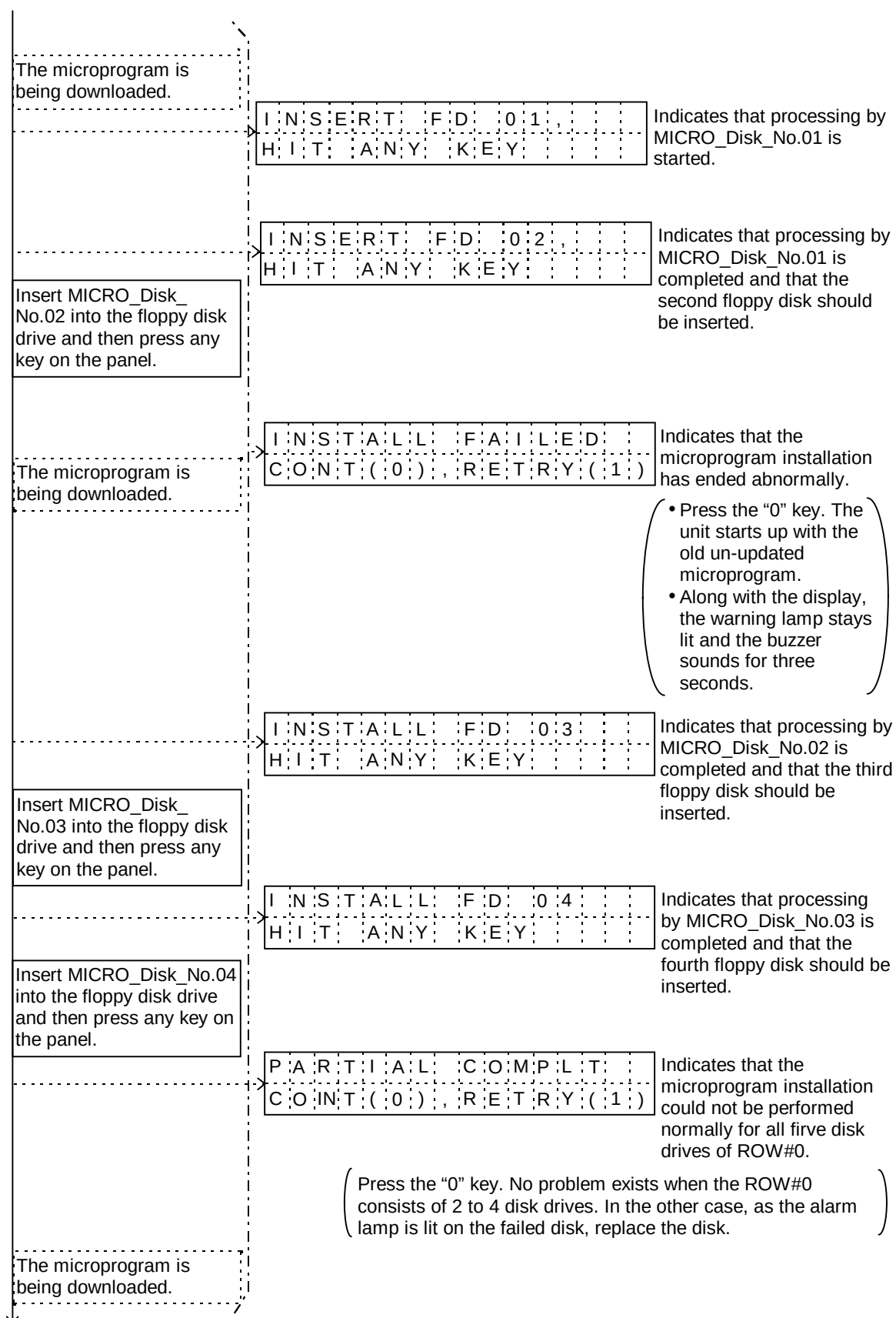
Note 3 : Even if back-up FD is left at FDD after back-up operation, no error will occur on the subsystem.

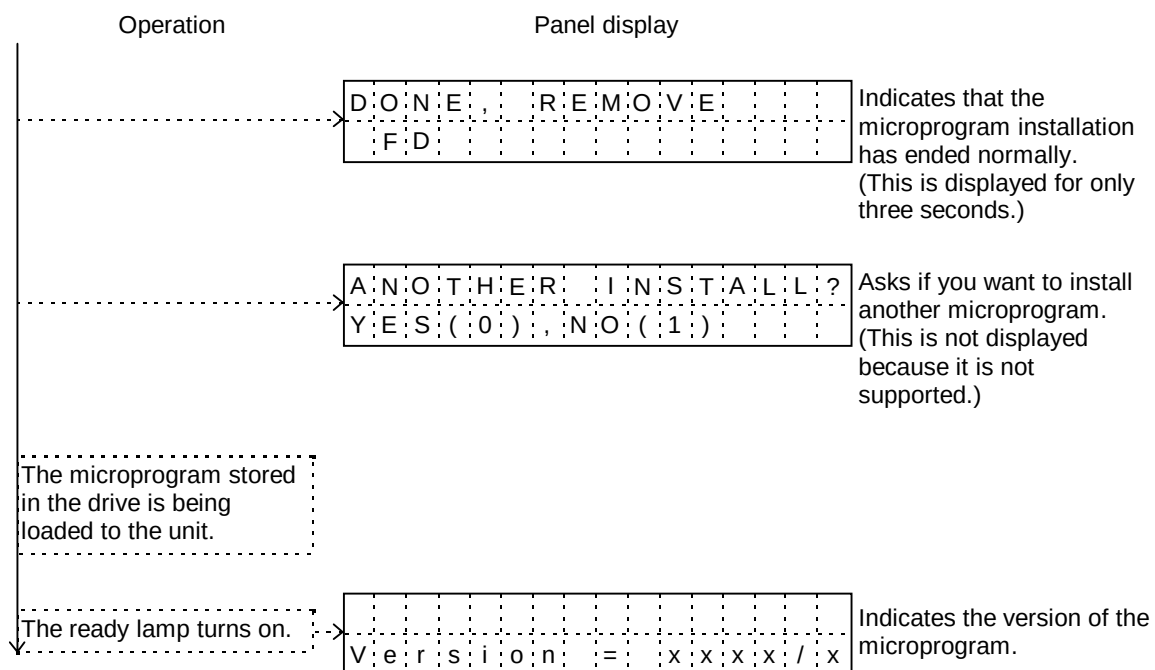
(g) Download Program

Download program is used to update the microprogram stored in the drive. Three floppy disks are used for downloading.

Note : Be sure that no drive failure is present before updating the microprogram.







(1) Set DIP switch No.1 as shown in Figure 4.1.4.

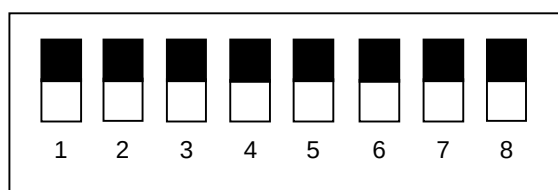


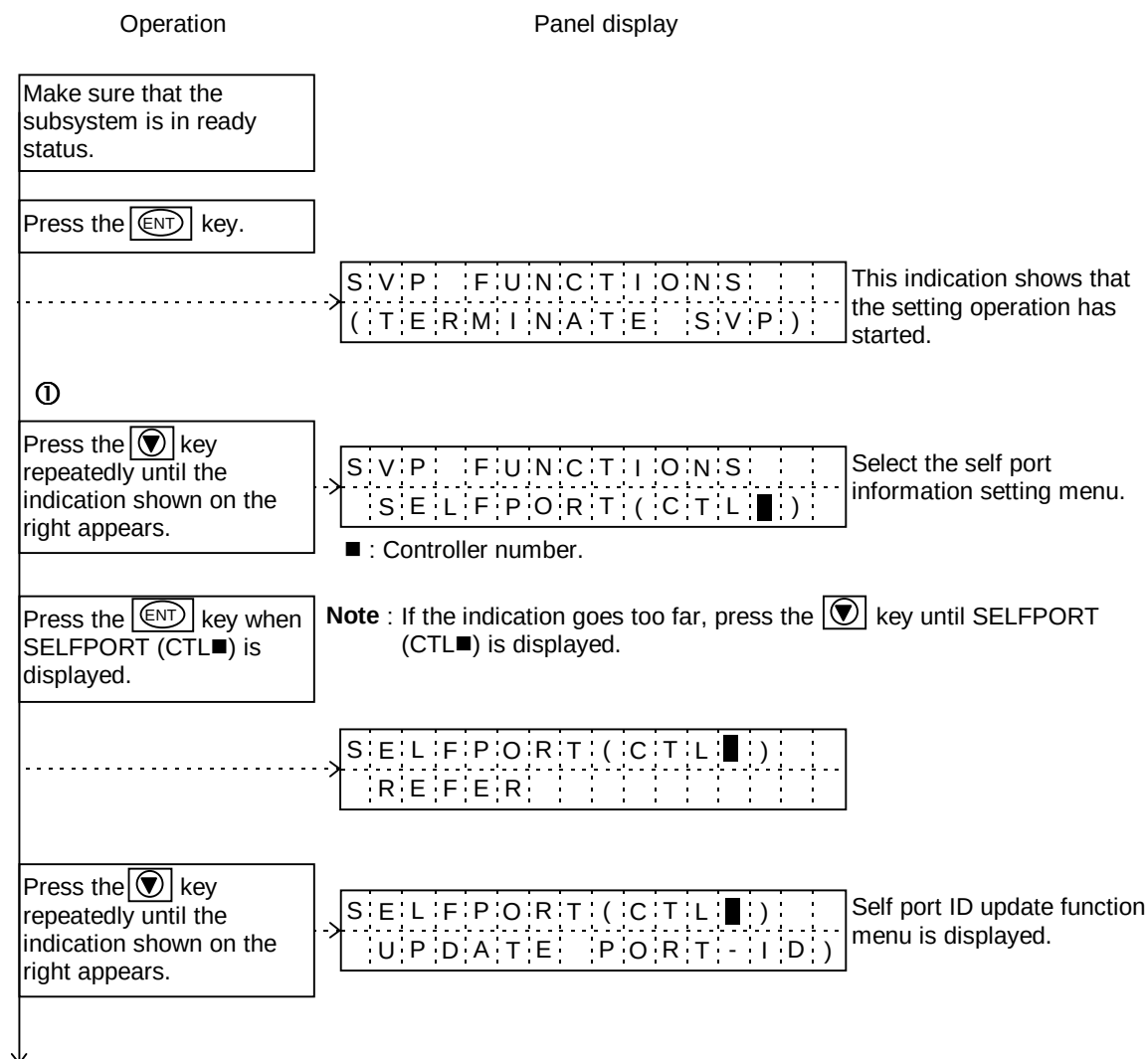
Figure 4.1.4 Standard DIP Switch Settings

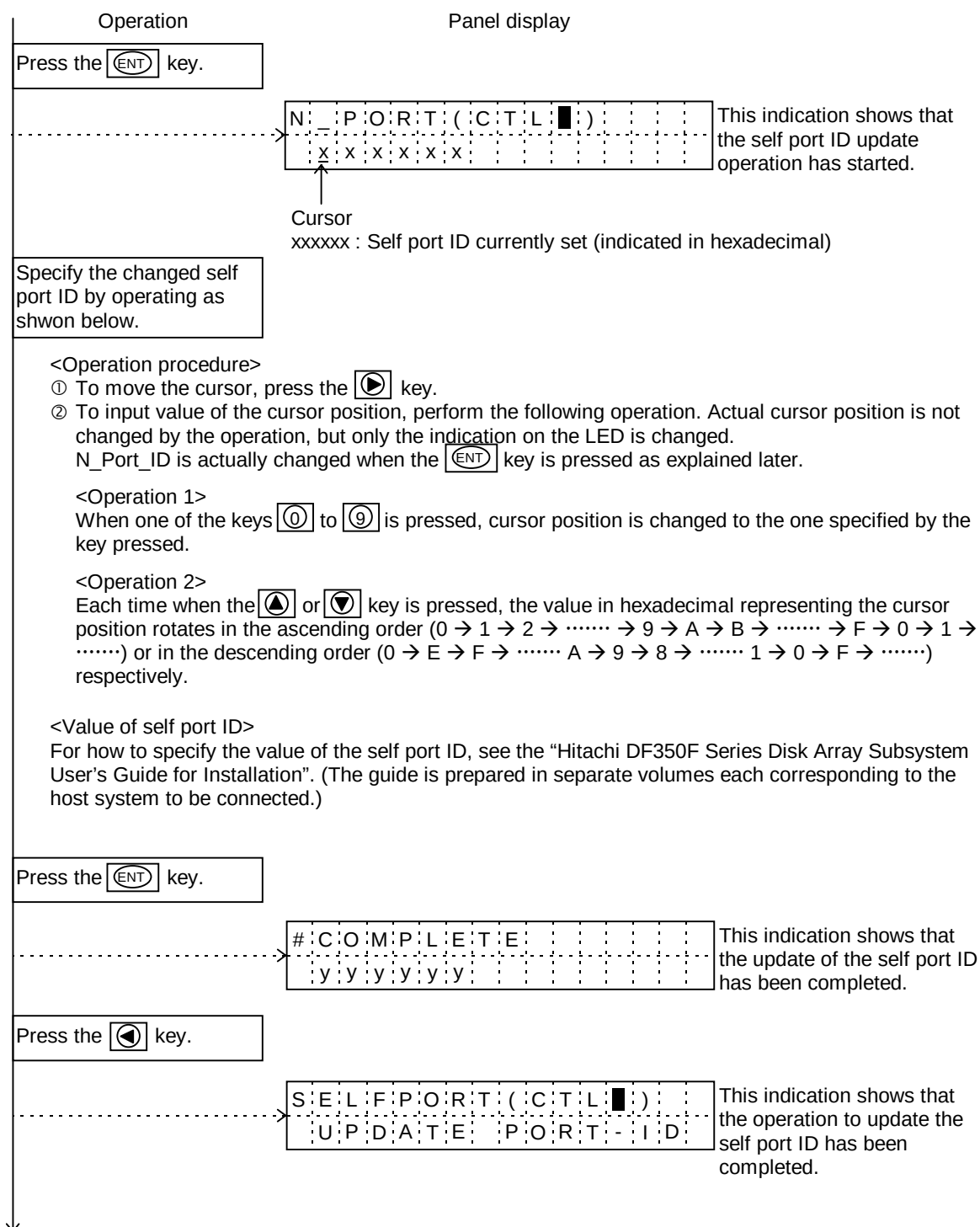
Note : If the dual controller option (DF-F350F-F3MCF) is installed, use the same settings for both controllers.

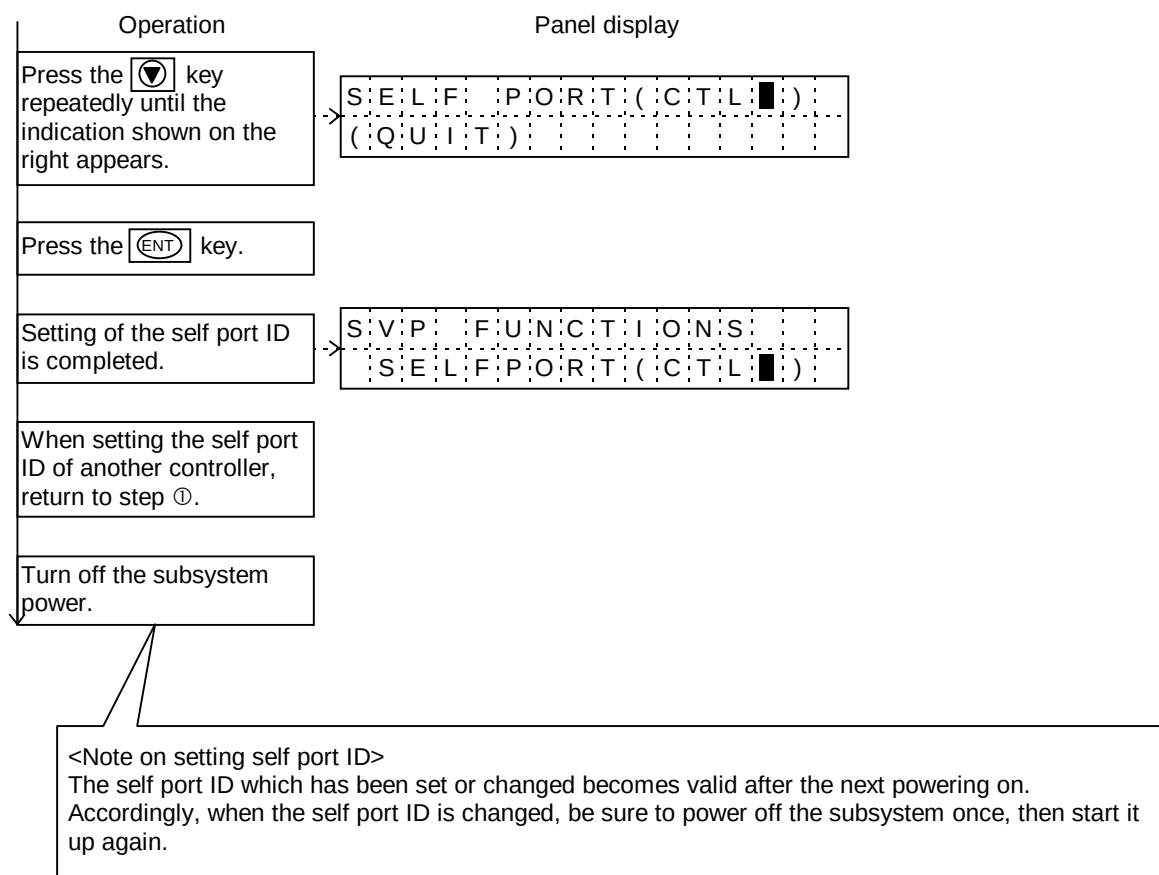
4.2 Setting Self Port ID

The self port IDs have been set to FFFFFFFF for both the controller 0 and controller 1 when the subsystem is shipped from the factory.

Operate following the procedure below.



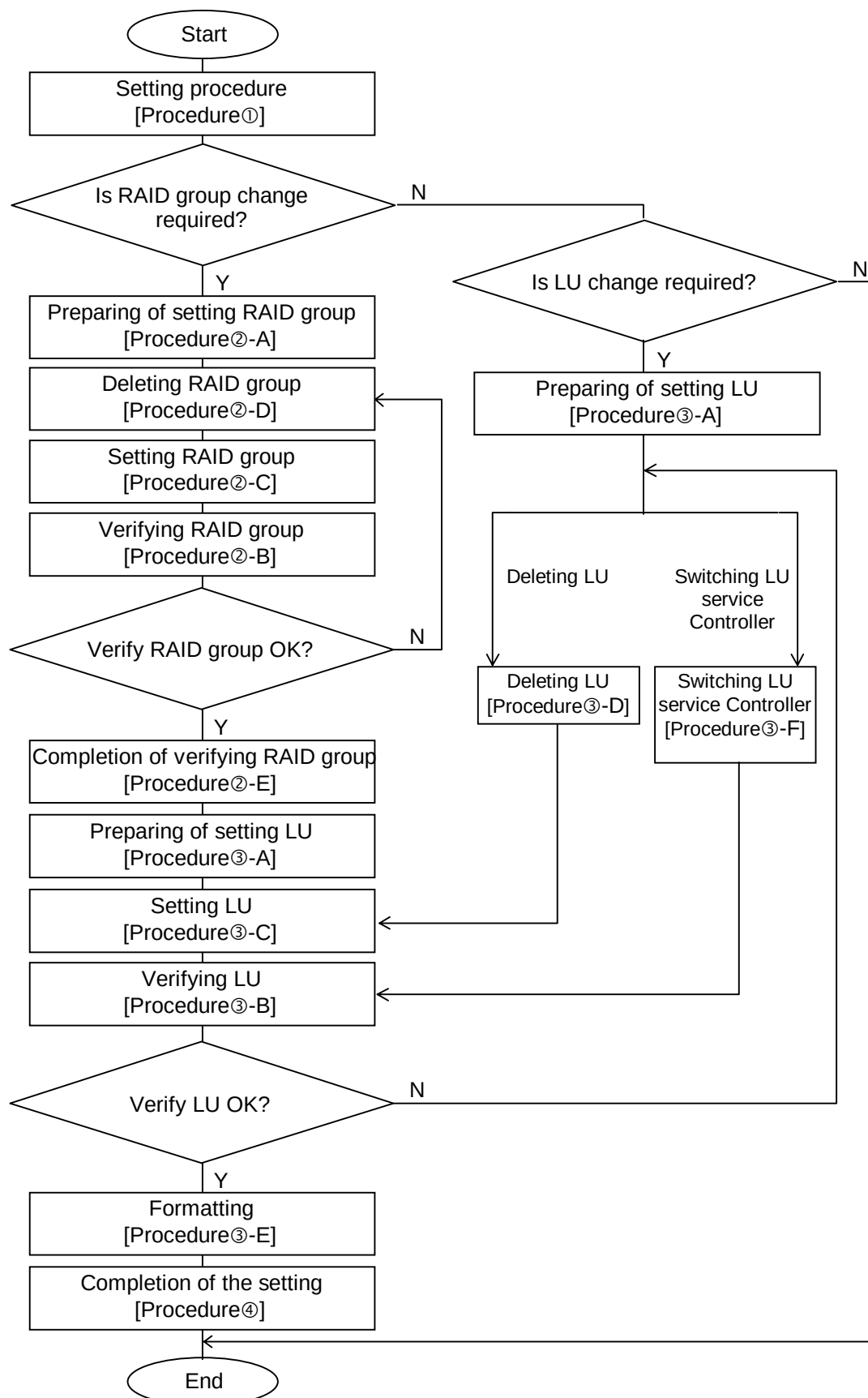




4.3 Setting the Subsystem Configuration Information

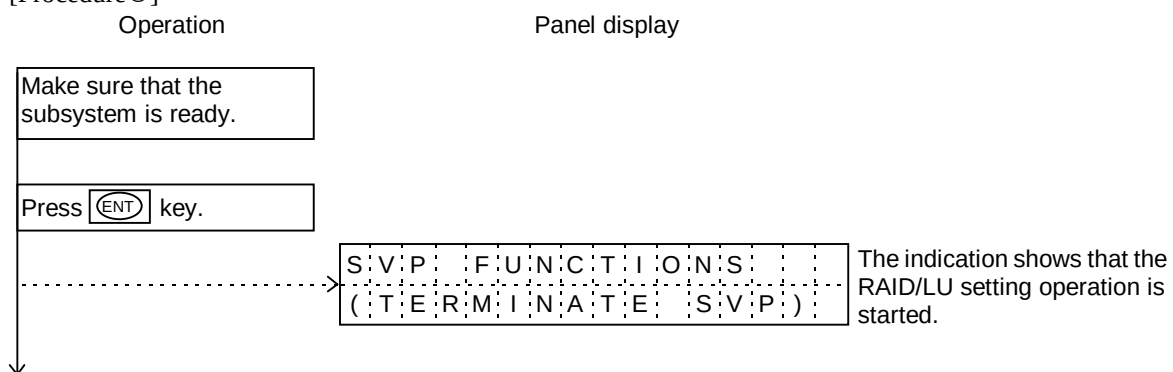
This function can be used when the subsystem is ready.

(During this operation, READ/WRITE command issued from the host cannot be executed. When the host command is received, Not Ready is reported to the host.)



4.3.1 Preparing of setting RAID/LU

[Procedure①]



When changing RAID group, go to procedure ②-A "Preparing of setting RAID group".
 When changing no RAID group but LU, go to procedure ③-A "Preparing of setting LU".
 When changing no RAID group and LU, go to quit.

4.3.2 Setting the RAID group

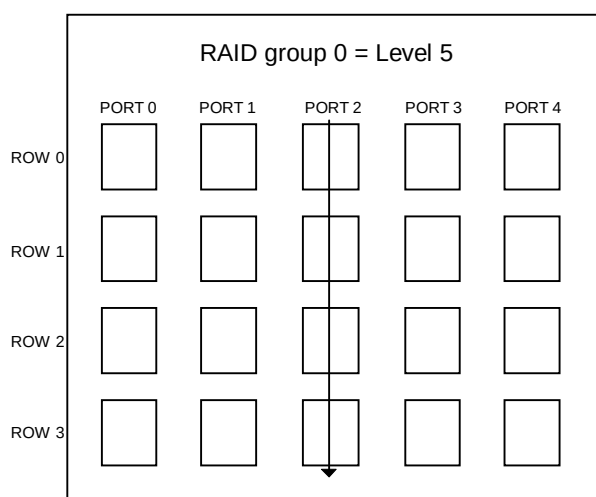
This function is used for setting, deleting and referring the RAID group. This function can be used when the subsystem is ready.

(Setting the DIP switch and turning off/on the subsystem are not required. Read/Write operation from the host can not be executed during this function. When the host command is received, Not Ready is reported to the host.)

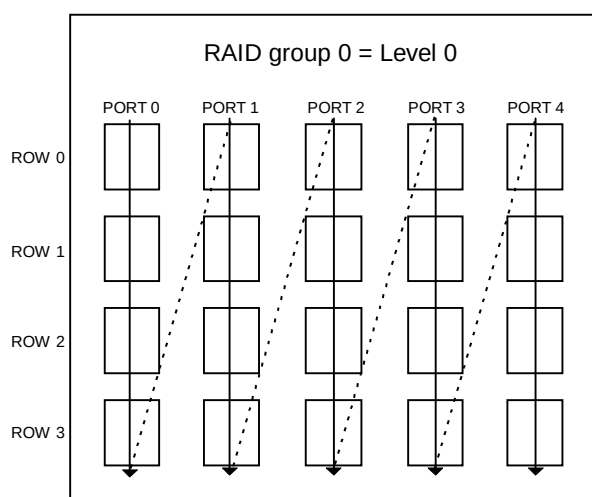
Notice : By deleting the RAID group all user data of the deleted RAID group is lost. Back up user data before deleting the RAID group.

RAID group and RAID level can be set as shown below by using this setting function.

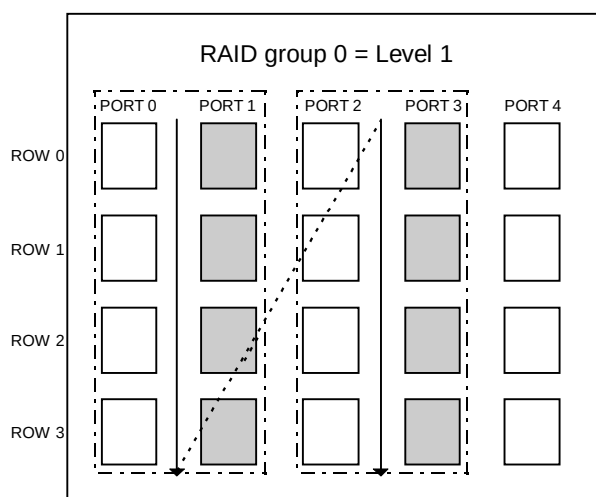
Setting one RAID group with the entire subsystem. (Arrows “↓” indicate the direction of storing data.)



The function stores data in the way executing the data striping over four disks and generating parity data on one disk.

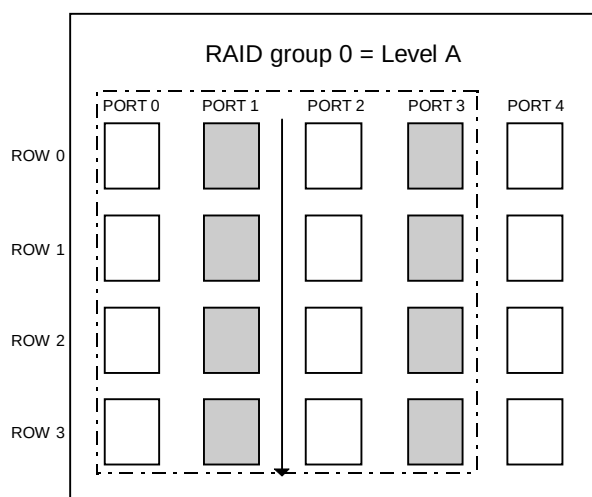


The function stores data without executing neither the data striping nor parity data generation.



The function stores data in the way doubly writing it on the main disk and sub-disk without executing the data striping.

□ : indicates a main disk
 ■ : indicates a sub-disk

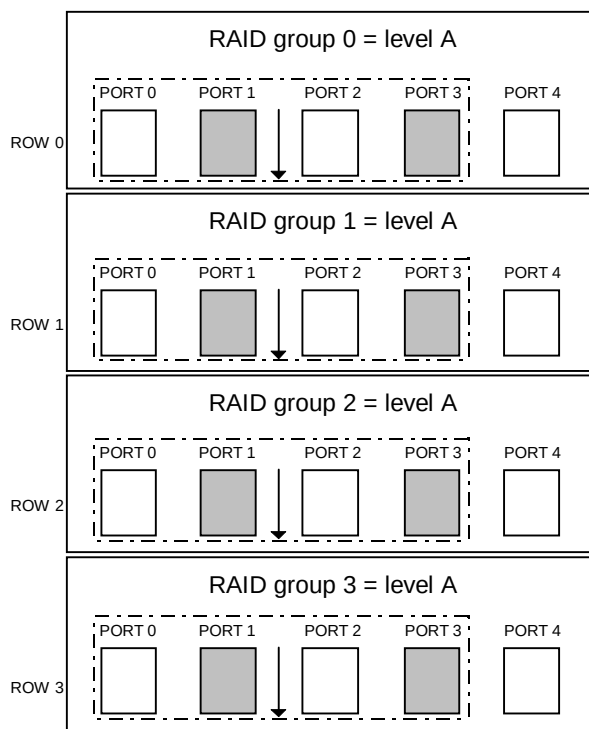
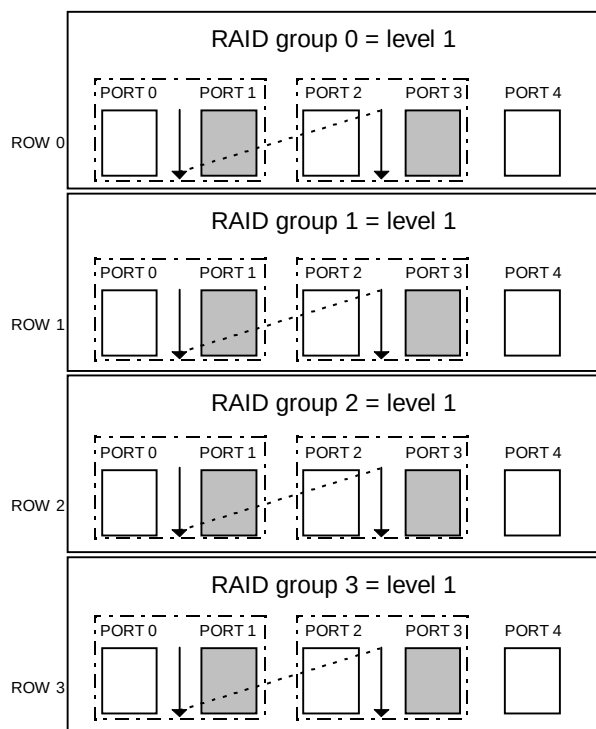
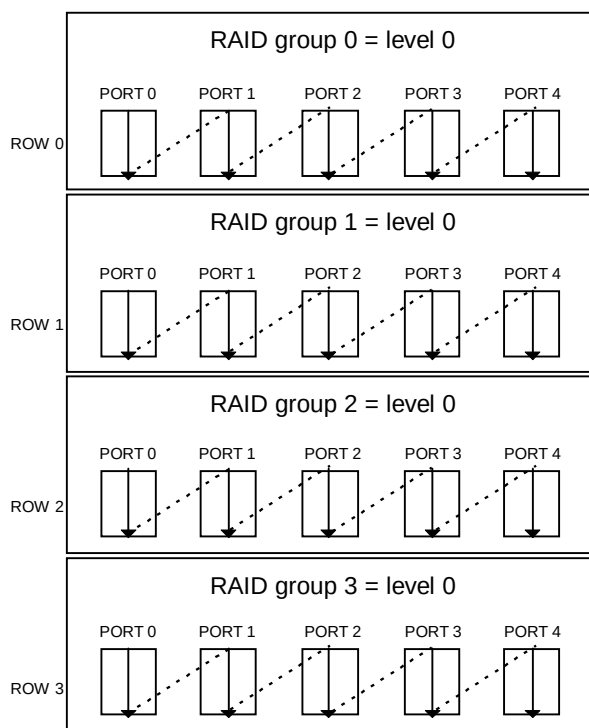
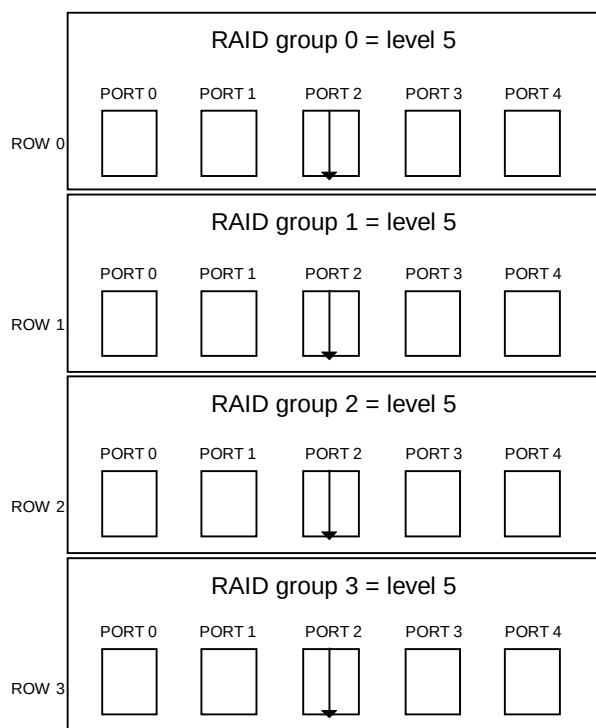


The function stores data in the way doubly writing it on the main disk and sub-disk and executing the data striping over two disks of port 0 and port 2.

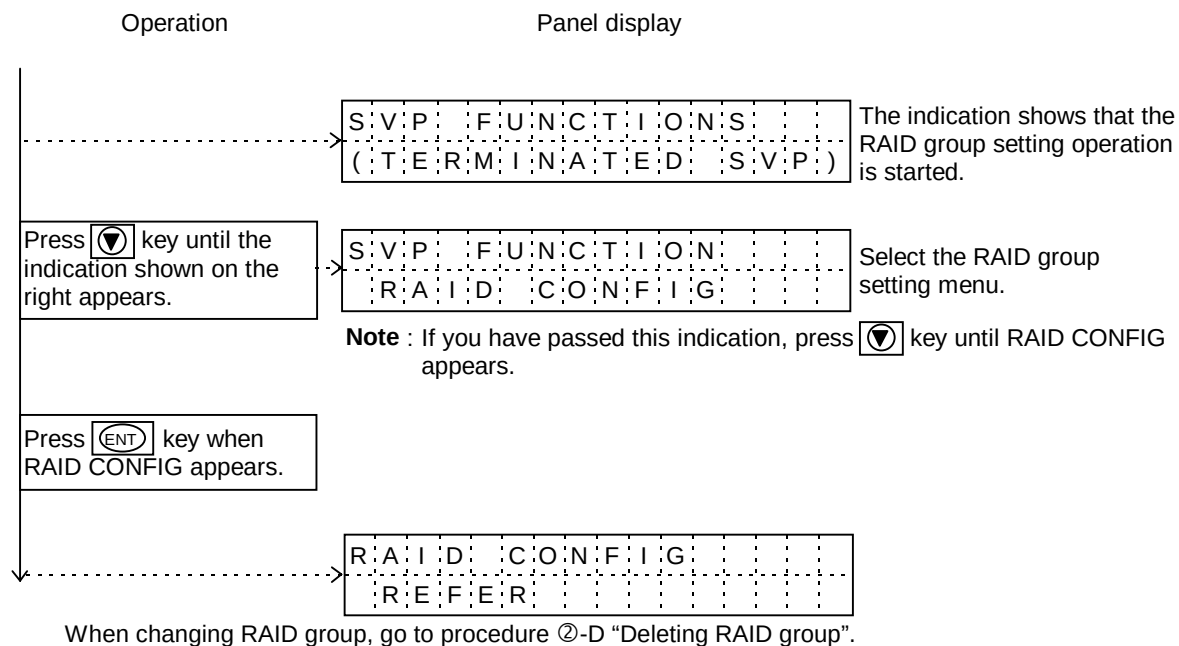
□ : indicates a main disk
 ■ : indicates a sub-disk

Setting one RAID group with each row of disks (Arrows “↓” indicates the direction of storing data.)

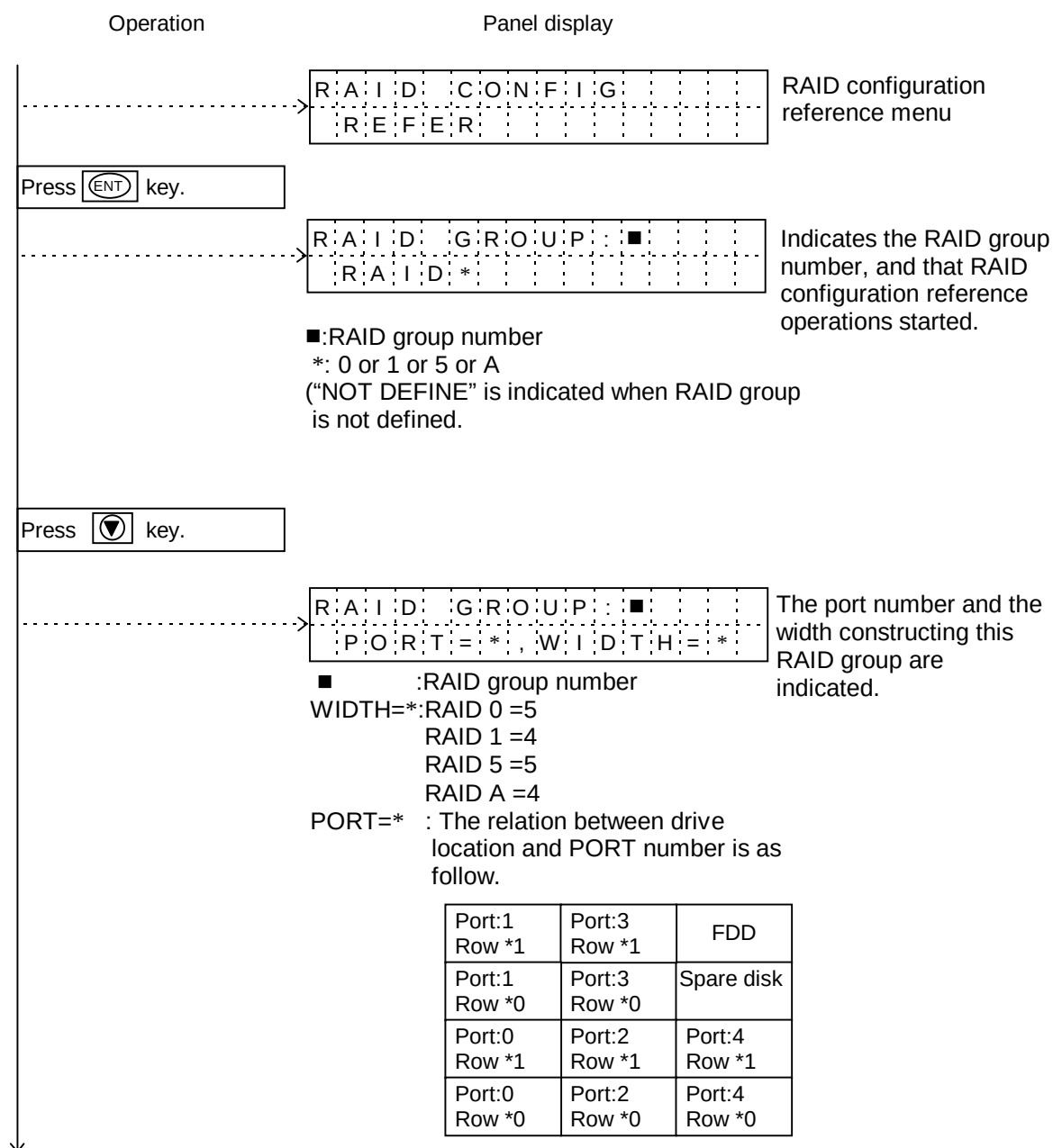
Data cannot be stored extending over two or more RAID groups even if RAID levels of them are the same. The following are examples having set RAID groups of the same RAID level, however, each row has its own RAID level.

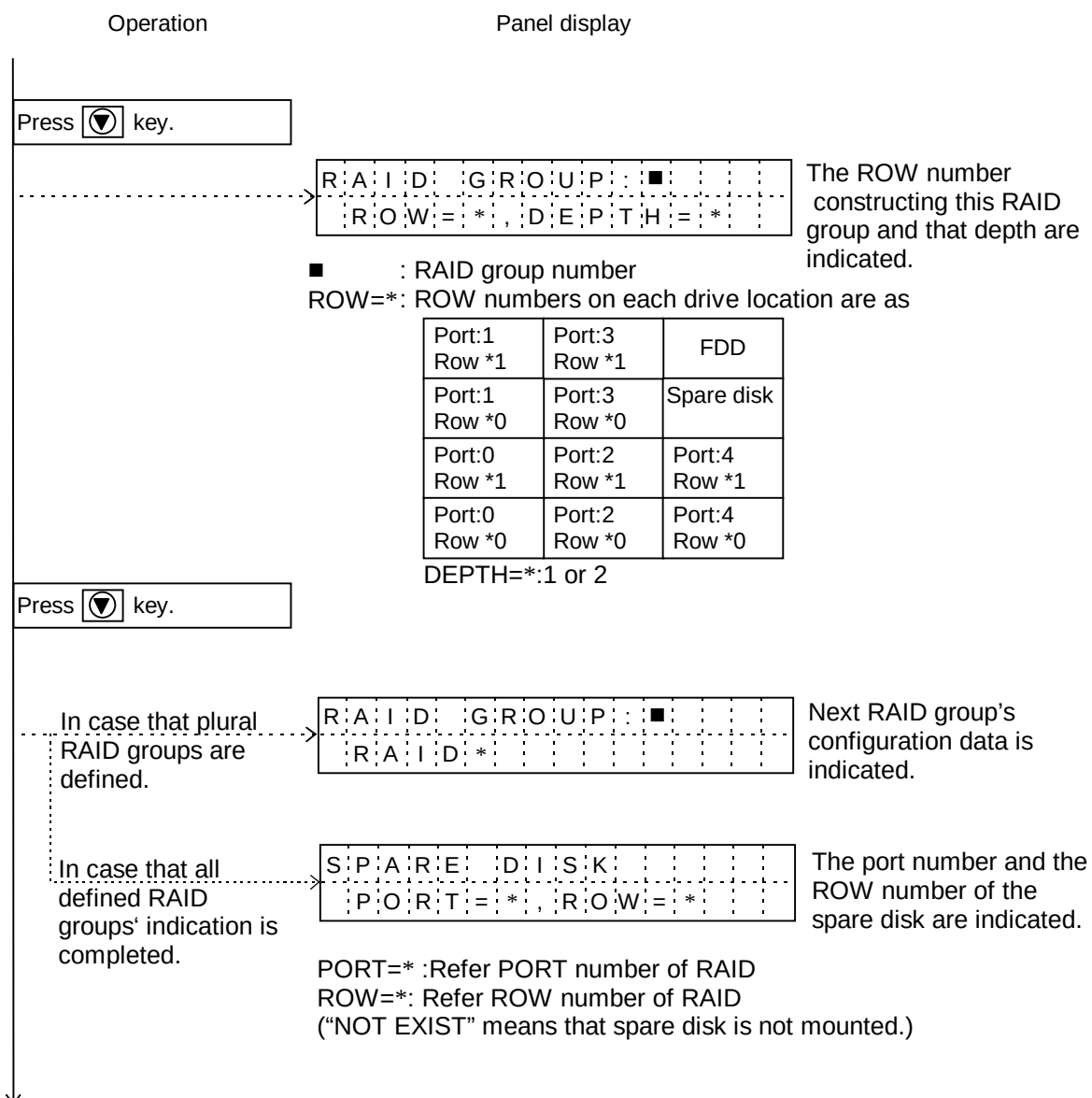


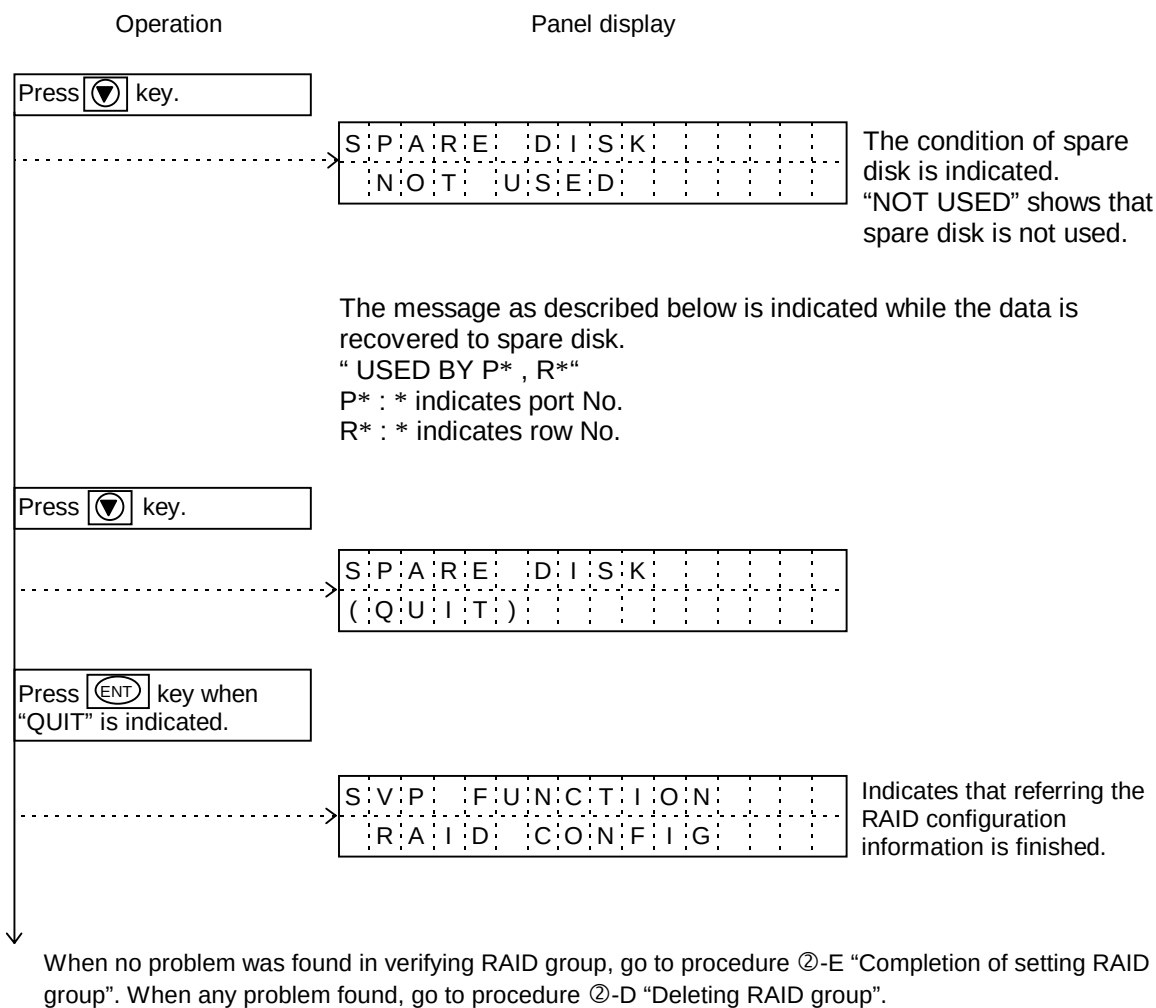
[Procedure②-A] Preparing of setting RAID group



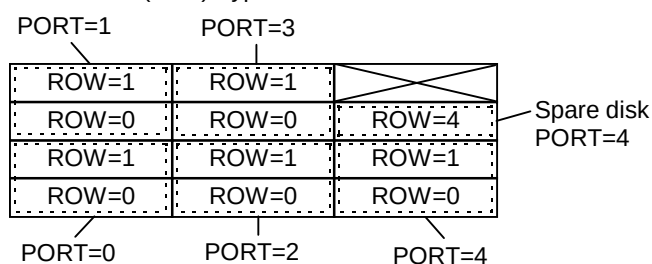
[Procedure②-B] Verifying RAID group







Rack Mount (RKH) Type



[Procedure②-C] Setting RAID group

Operation

Panel display

Pressing  key until the indication shown on the right appears.

R A I D C O N F I G
I N S T I T U T E

Display the menu of adding RAID group.

Press  key.

I N S R A I D G R P : ■
A L L R A I D 5

Indicates that adding the RAID group started.

■ : additional RAID group number

(Not used RAID group is indicated in order of small number automatically.)

Additional item as described below is indicated in the second line by pressing  key.

No.	Item indicated	Function	Remark
1	ALL RAID5	The maximum configuration range (ports and rows) of the subsystem in use is defined as the RAID5, RAID1, RAID0 or RAID A group.	
2	ALL RAID1		
3	ALL RAID0		
4	ALL RAID A		
5	ROW = ■, RAID5	Selected when the RAID group is defined for each row. Replacing "■", 0 and 1 are displayed sequentially.	
6	ROW = ■, RAID1		
7	ROW = ■, RAID0		
8	ROW = ■, RAID A		

Press  key when Item you want to set appears.

I N S R O W = ■ R A I D 5 ?
Y E S

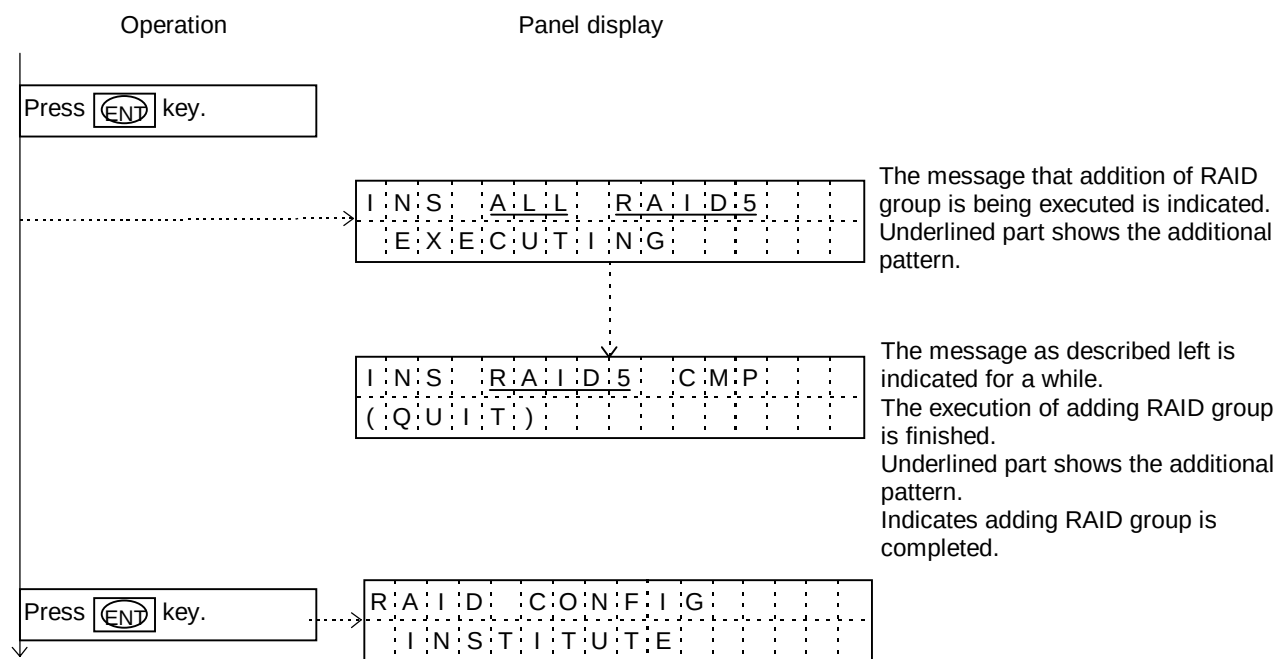
The message to verify additional RAID group is indicated.

Underlined part shows the additional pattern.

(Above is an example in which ROW = ■, RAID5 is selected.)

Pressing , "(QUIT)" is displayed.

In this state, pressing , adding RAID group will be terminated.



Go to procedure ②-B "Verifying RAID group"

Note : Set RAID group for each ROW when you want to set it for each ROW.

[Procedure②-D] Deleting RAID group

Notice : With this operation, Logical Units are deleted, and the user's data will be lost. Be sure to make back up copy before this operation.

Operation

Panel display

Press  key until the indication shown on the right appears.

RAID CONFIG
DELETE

Menu of deleting RAID group is displayed.

Press  key.

DELETE
ALL RAID

Contents of the second-line indication

No.	Item indicated	Function
1	ALL RAID	Deletes all RAID group.
2	RG■ (RAID*)	Deletes appointed RAID group. (■ : RAID group No. * : RAID level)
3	(QUIT)	Returns to the preceding menu.
4	(TERMINATE SVP)	Complete the SVP operation by maintenance panel.

Select item as described right you want to set by  /  key and press  key .

Note : "NO EFFECT" is indicated when no deletable RAID group exists.

Go to ① when you want to delete all RAID groups , Go to ② when you want to delete appointed RAID group.

①Deleting all RAID groups

Operation

Panel display

Select item as described right you want to set by  /  key and press  key .

DEL ALL RAID?
(QUIT)

The message to verify the deletion of RAID group is displayed.

Contents of the second-line indication

No.	Item indicated	Function
1	(QUIT)	Returns to the preceding menu.
2	YES	Deletes all RAID groups.

DEL ALL RAID
EXECUTING

All RAID groups are deleting.

DEL RAID CMP
(QUIT)

When the deletion is completed, the left indication appears.
The execution of deleting RAID group is finished.

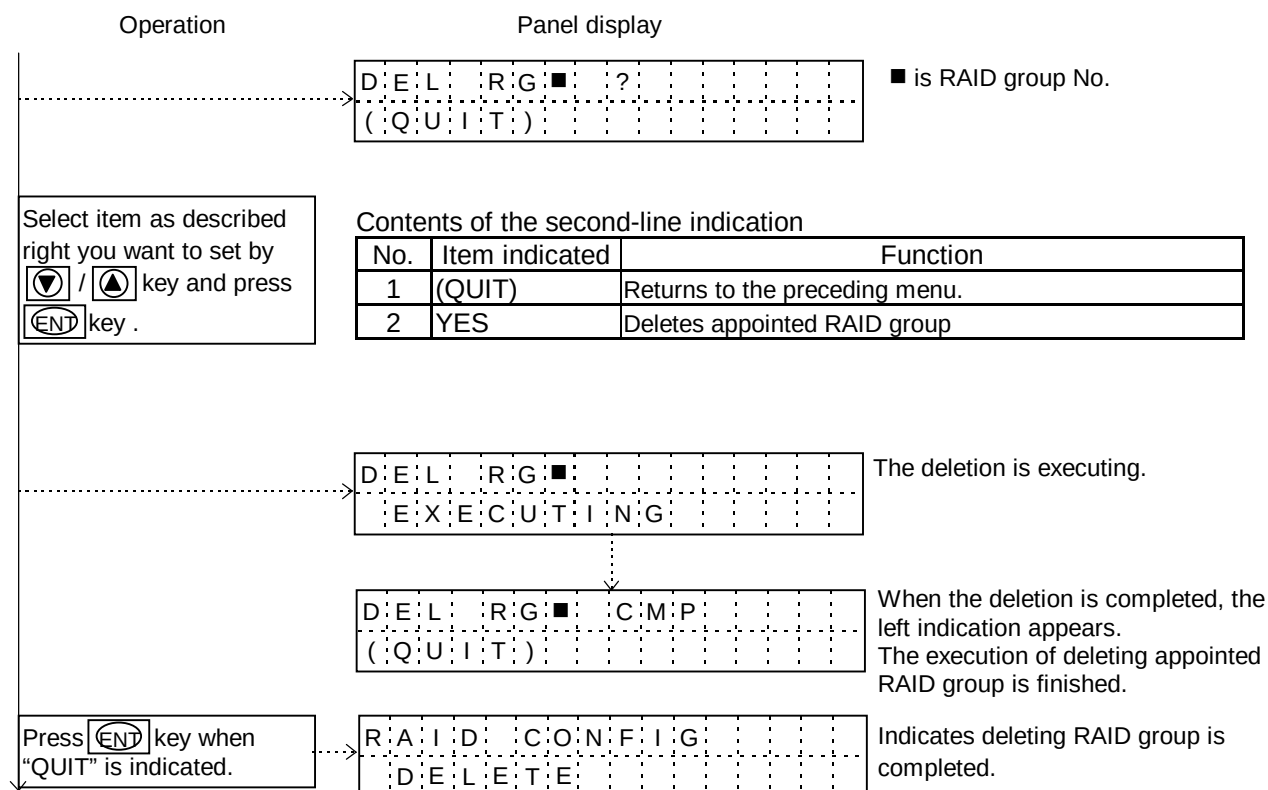
Select "QUIT" by  key and press  key.

RAID CONFIG
DELETE

Indicates deleting RAID group is completed.

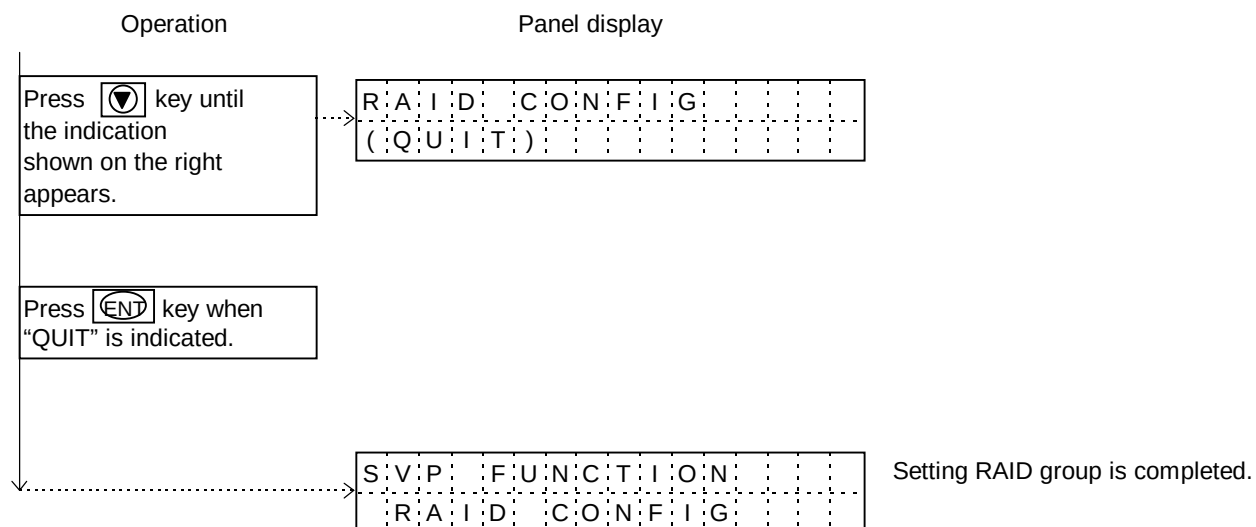
Go to procedure ②-C "Setting RAID group".

②Deleting appointed RAID group



Go to procedure ②-C "Setting RAID group".

Procedure②-E] Completion of setting RAID group



4.3.3 Setting LU

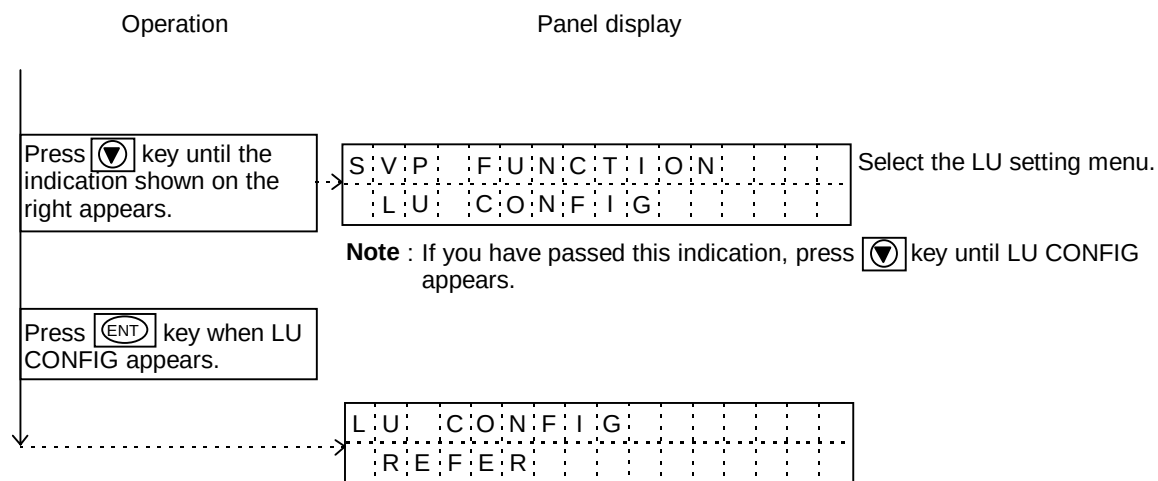
Following procedures are used to set, delete, refer, or format the LU.

This function can be used when the subsystem is ready.

Notice : All user data is lost by deleting the LU.

Be sure to back-up the user data before deleting the LU.

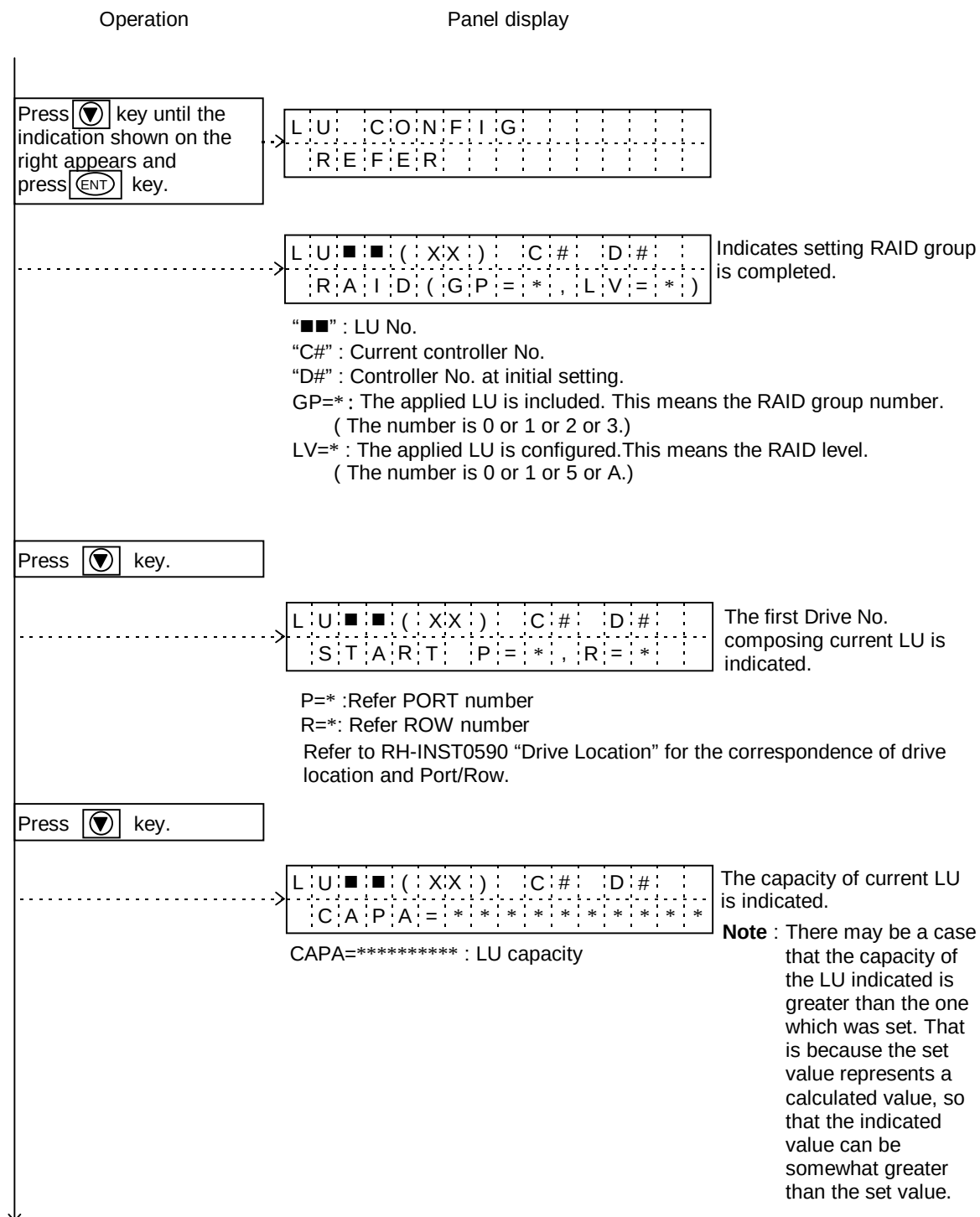
[Procedure③-A] Preparing of setting LU

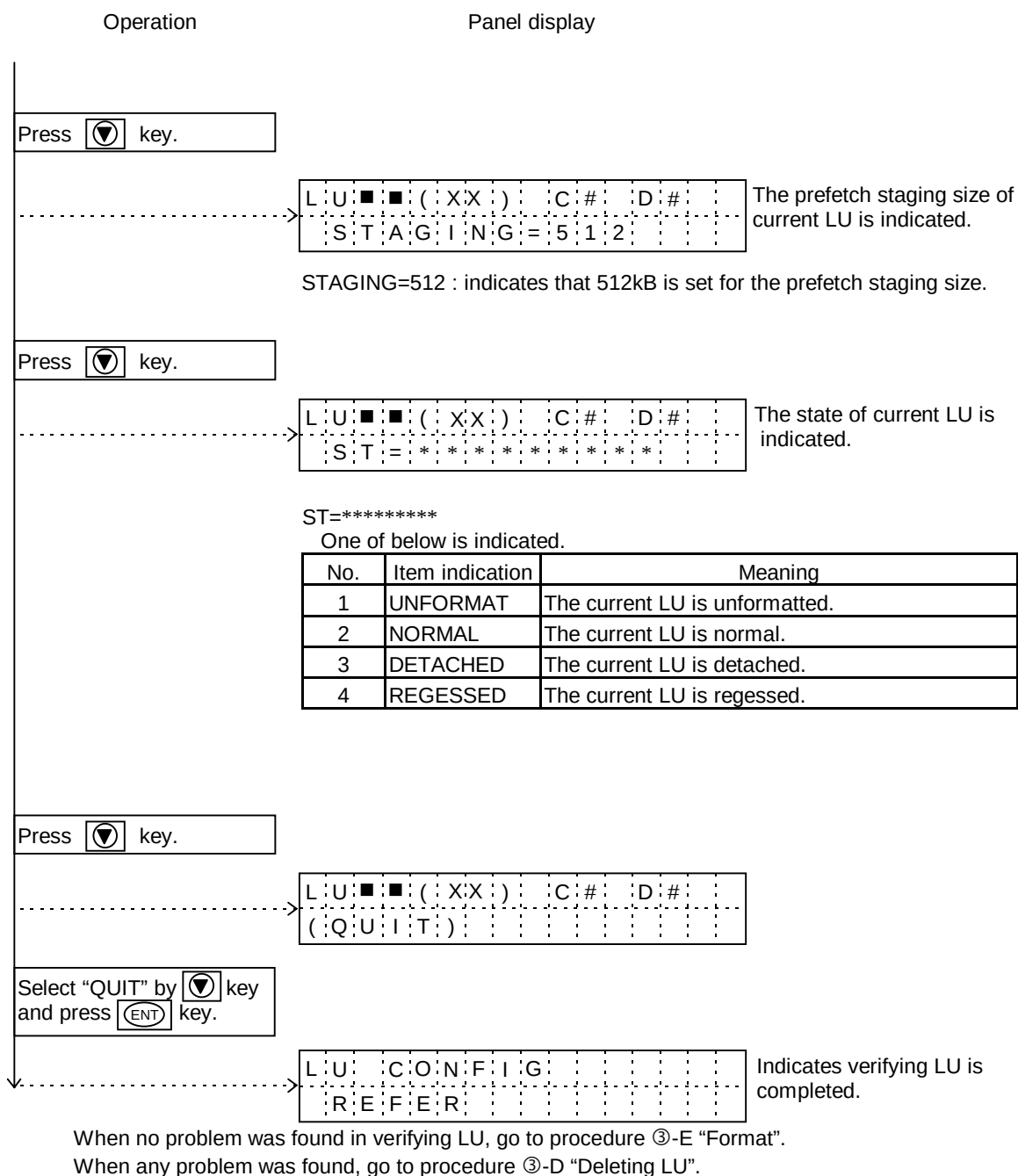


When RAID group is already set, go to procedure ③-C "Setting LU".

When changing no RAID group, go to procedure ③-D "Deleting LU".

[Procedure③-B] Verifying LU





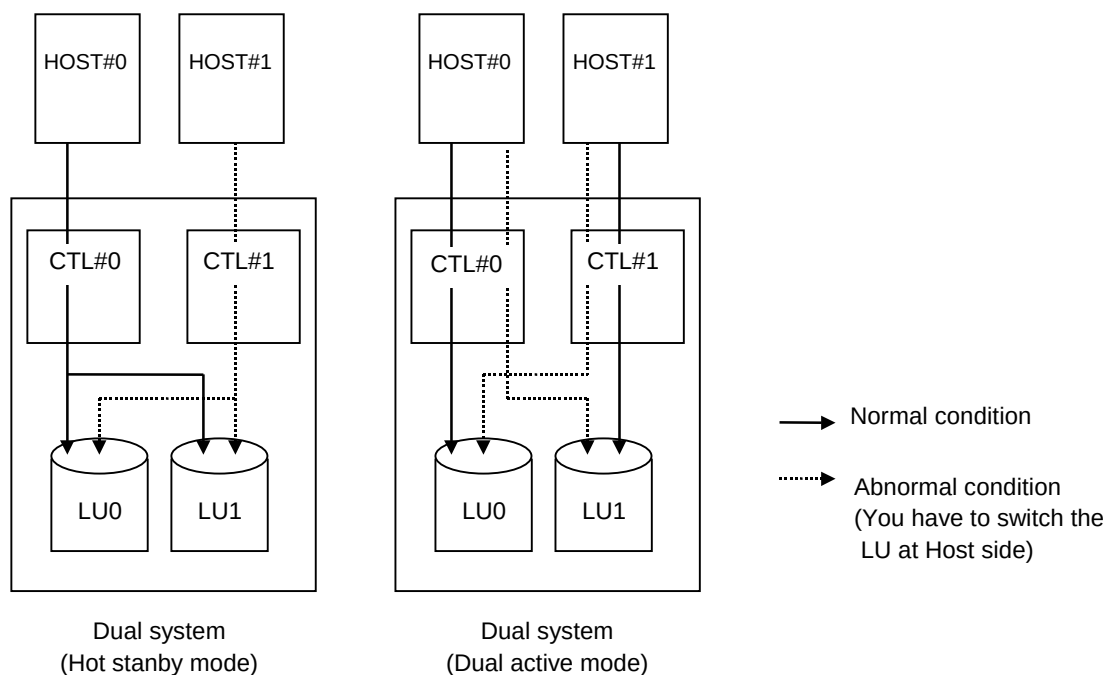
[Procedure③-C] Setting LU

Note) You have to assign service controller to set the LU when dual active mode is selected in the dual system.

Refer to the figure as described below to set the LU assigned service controller.

In the case of example as described above, select “INSTITUTE (CTL0)” when you set LU0 and “INSTITUTE (CTL1)” when set LU1.

In case a service controller is assigned to LU#0 and #1, it is possible to access from HOST#0 and #1, however the data transmitting performance is lowered because of switching LU.

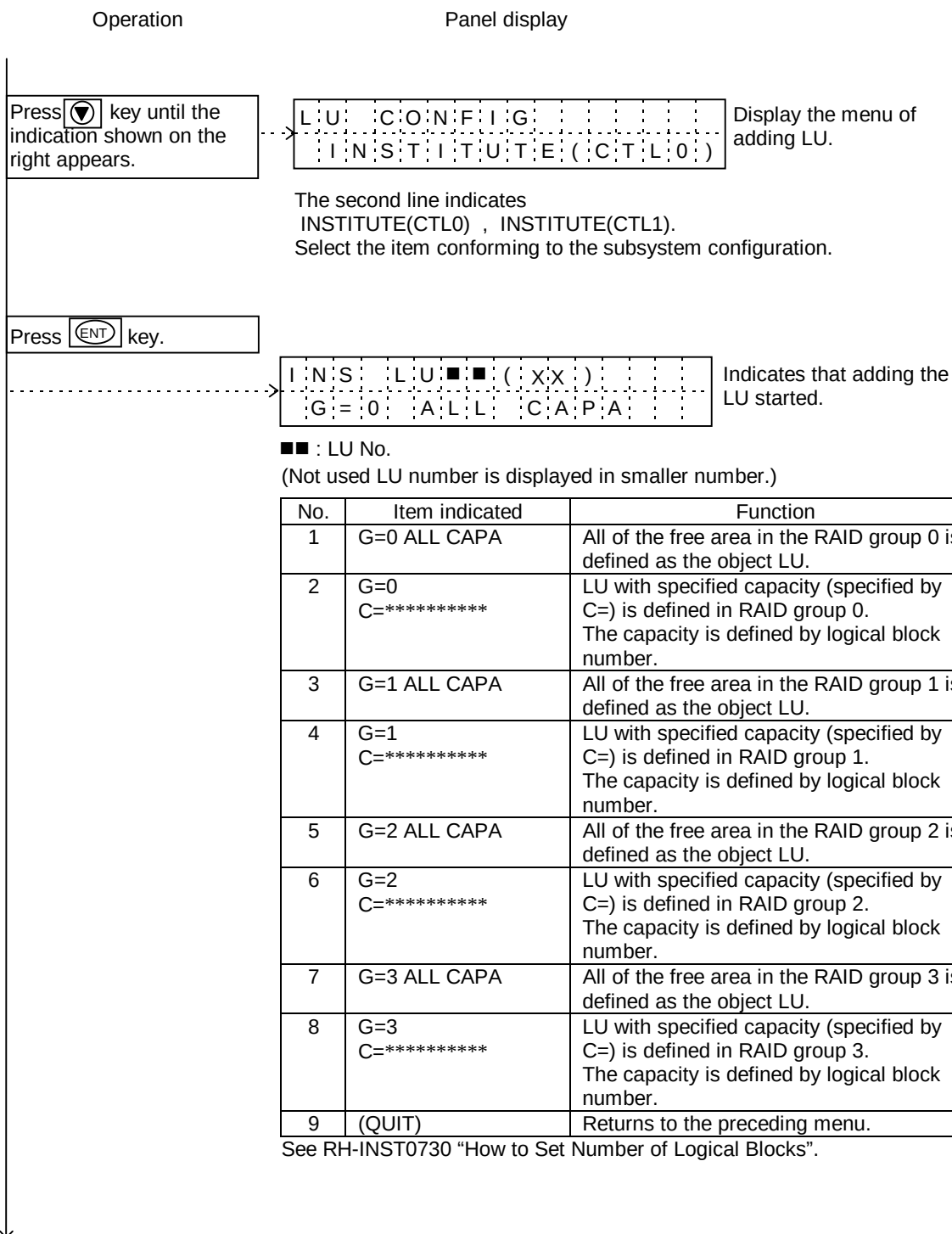


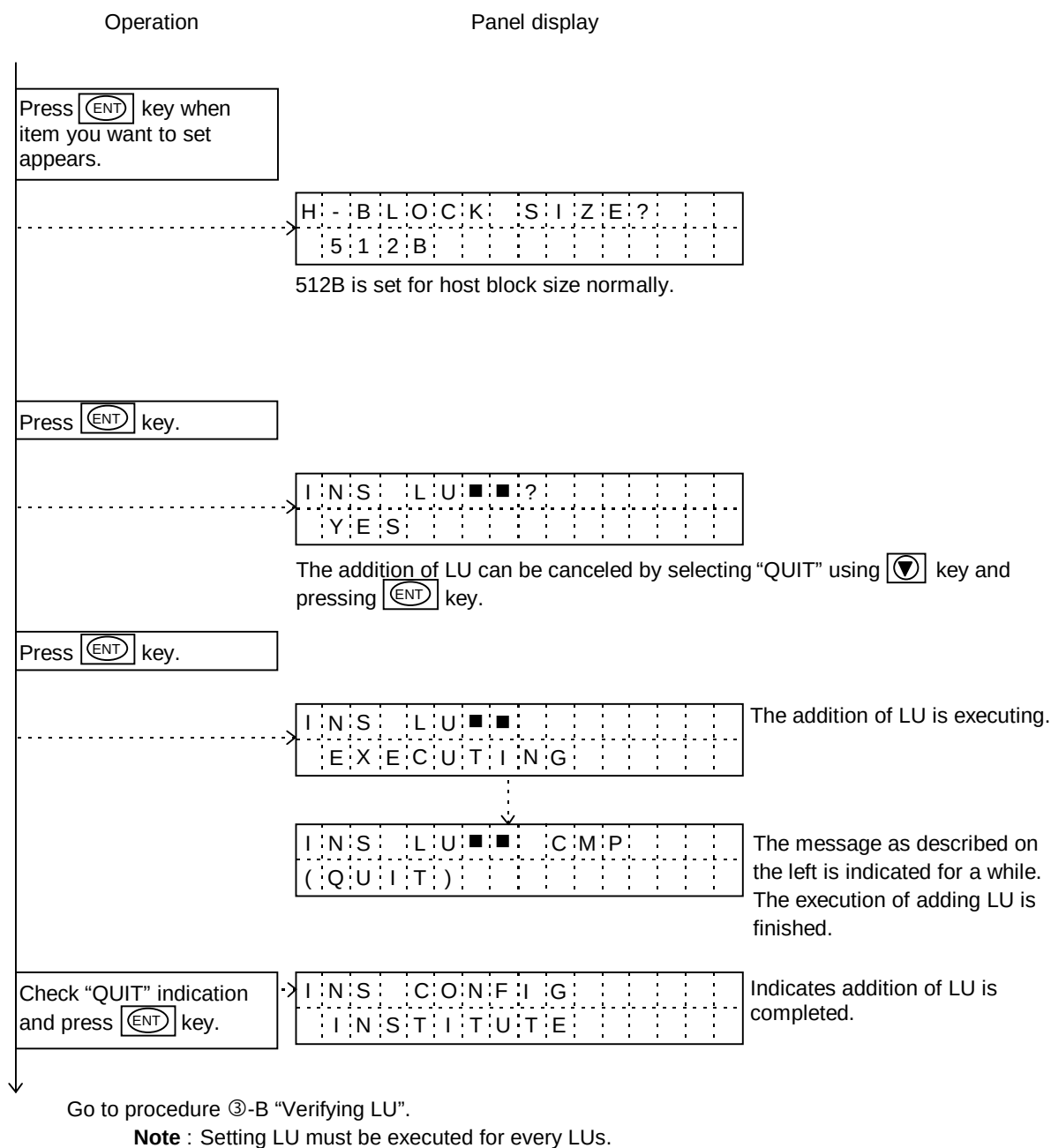
* The function of “Hot standby mode”.

It is possible that the system is continued to execute commands by switching the direction of the commands from Host system to the other controller, if the Host system or the controller failure occurs.

* The function of “Dual active mode”

Controller #0 and #1 are the service controller of LU#0 and #1 respectively.





Supplement / How to Set Number of Logical Blocks

G=*

C=*****



Enter a value (number of logical blocks) here.

- (1) All RAID groups can be divided into up to 8 logical units.
- (2) Set the number of logical blocks to be set for each logical unit to multiples of the following values according to the RAID level.

RAID0	128
RAID1	128
RAIDA	256
RAID5(4D+1P)	512

- (3) When dividing each RAID group into multiple logical units, the total number of blocks in each logical units must be set to the number of logical blocks per row as shown below or less.
- (4) The following lists the number of logical blocks per row.

① When five drives are mounted on a row (four drives for RAID1 and RAIDA);

RAID configuration \ Model (Capacity)	DF-F350-A2E2 (2.0GB)	DF-F350-A2E4 DF-F350-A3E4 (4.1GB)	DF-F350-A1E8 DF-F350-A2E8 (8.7GB)	DF-F350-A1E18 (17.8GB)
RAID0	20,200,960	40,652,160	85,085,440	174,681,600
RAID1/RAIDA	8,080,384	16,260,864	34,034,176	69,872,640
RAID5(4D+1P)	16,160,768	32,521,728	68,068,352	139,745,280

② When n drives are mounted on a row (n < 5);

- RAID0

Number of logical blocks = $m^{(*1)} \times n^{(*2)}$

- RAID1

Number of logical blocks = $m^{(*1)} \times \text{int}(n/2)^{(*3)}$

*1: Refer to the table below for m.

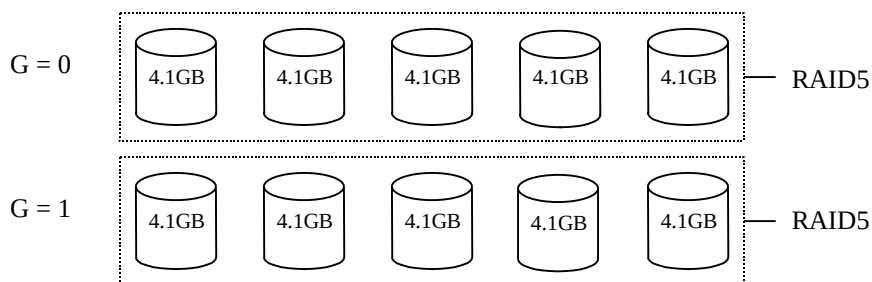
*2: n is 2 or larger in this case.

*3: int means "rounding down".

	DF-F350-A2E2	DF-F350-A2E4 DF-F350-A3E4	DF-F350-A1E8 DF-F350-A2E8	DF-F350-A1E18
Capacity	(2.0GB)	(4.1GB)	(8.7GB)	(17.8GB)
m	4,040,192	8,130,432	17,017,088	34,936,320

(5) Examples of the number of logical blocks set are shown below.

Example ① An example of a logical unit of disk (4.1GB 10units) is devied into 4LUs.



Groups 0 to 1 are all defined as RAID5 and all the groups are divided into eight logical units each with almost the same capacity. Each group is thus divided into two logical units.

- Group 0

Since the number of logical blocks for RAID5 is taken as 32,521,728 ($512 \times 63,519$) from subsection ① of (4), the result becomes $63,519 \div 2 \doteq 31,760$.

Thus, enter the following.

LU0: G=0

C=16,261,120 ($512 \times 31,760$)

LU1: C=16,260,608 ($512 \times (63,519-31,760)$)

- Groups 1

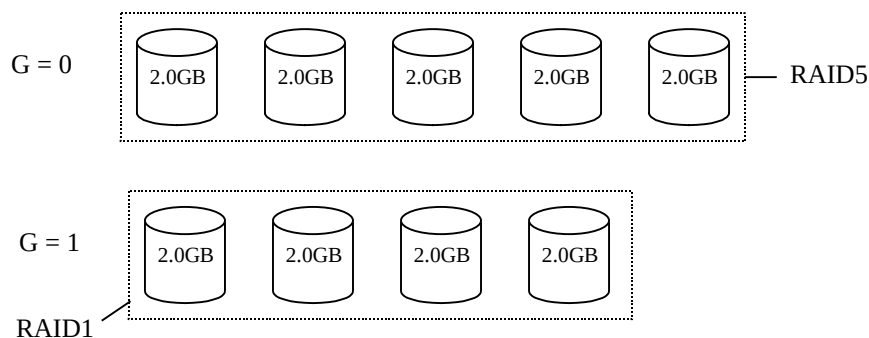
Enter LU2 to LU3 in the same way as for Group 0.

LU2 : G=1

C=16,261,120

LU3 : C=16,260,608

Example ② An example of a logical unit of disk (2.0GB 9units) is devied into 5LUs.



The following shows an example in which a mixture of different RAID levels is used between Group 0 and 1, and each group is divided into logical units with a capacity different from each other.

- Group 0

Since the number of logical blocks for RAID5 is taken as 16,160,768 ($512 \times 31,564$) from subsection ① of (4), Group 0 is divided into three LUs as shown below.

Enter the following.

LU0 : G=0

C=800,768($512 \times 1,564$)

LU1 : C=5,120,000($512 \times 10,000$)

LU2 : C=10,240,000($512 \times (31,564-1,564-10,000)$)

- Group 1

Since the number of logical blocks for RAID1 is calculated as $4,040,192 \times \text{int}(4/2) = 8,080,384$ ($128 \times 63,128$) from subsection ② of (4), Group 1 can be divided into two LUs as shown below.

Enter the following.

LU3 : G=1

C=2,960,384($128 \times 23,128$)

LU4 : C=5,120,000($128 \times (63,128-23,128)$)

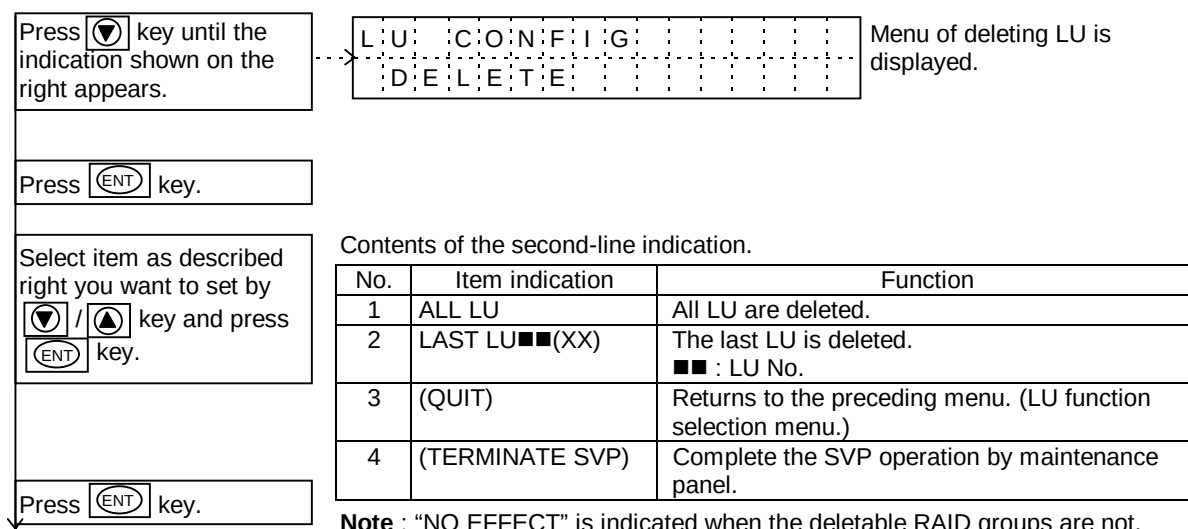
[Procedure③-D] Deleting LU

Note : All user data is lost by deleting the LU.

Be sure to back-up the user data before deleting the LU.

Operation

Panel display



In case of deletion of all LU, go to ①.

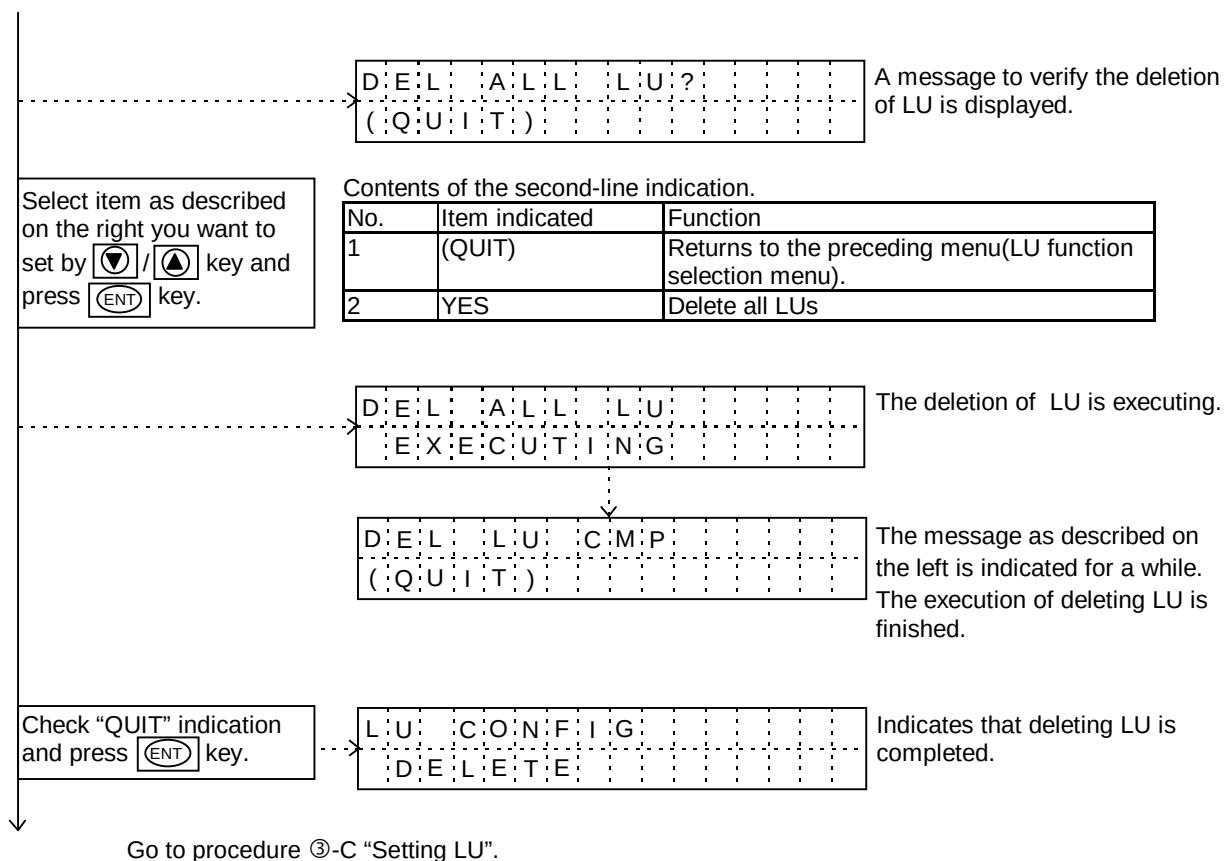
In case of deletion of the last LU, go to ②.

To cancel this operation menu, choose QUIT.

①Deleting all LU

Operation

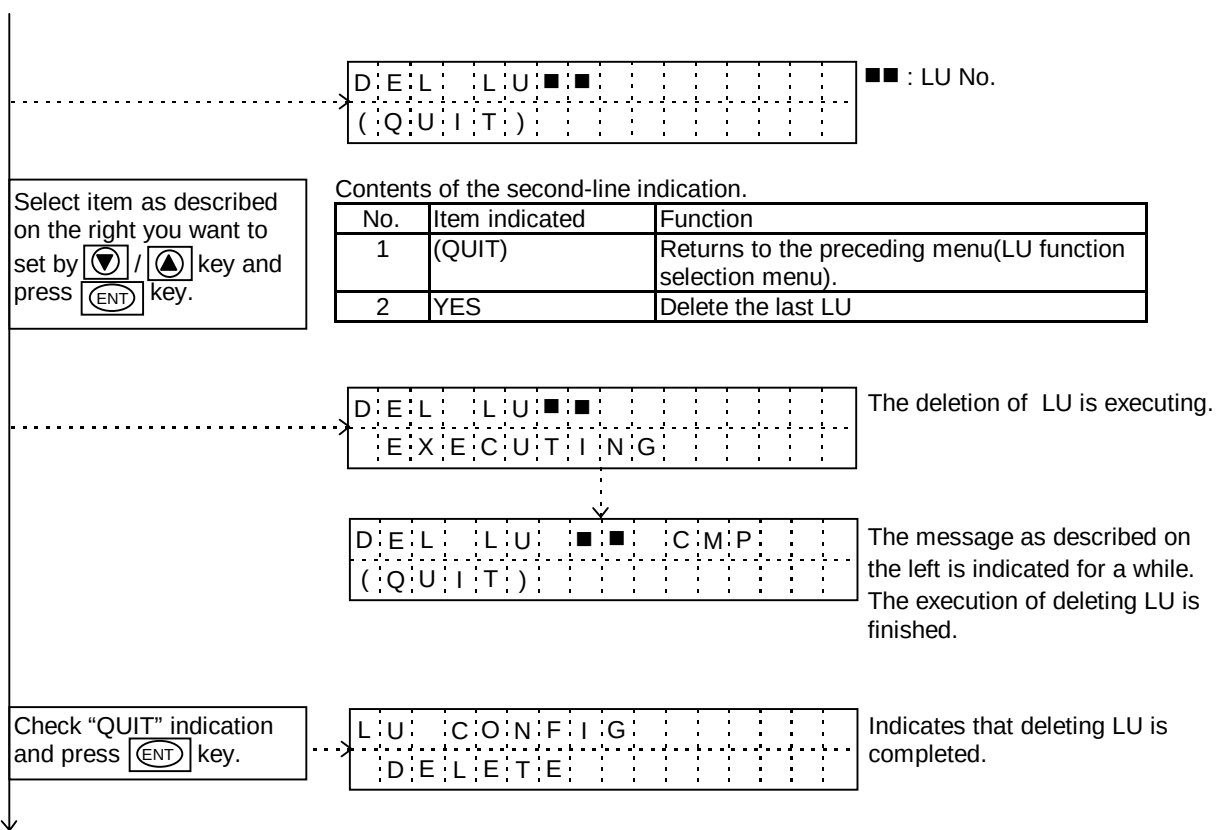
Panel display



②Deleting the last LU

Operation

Panel display

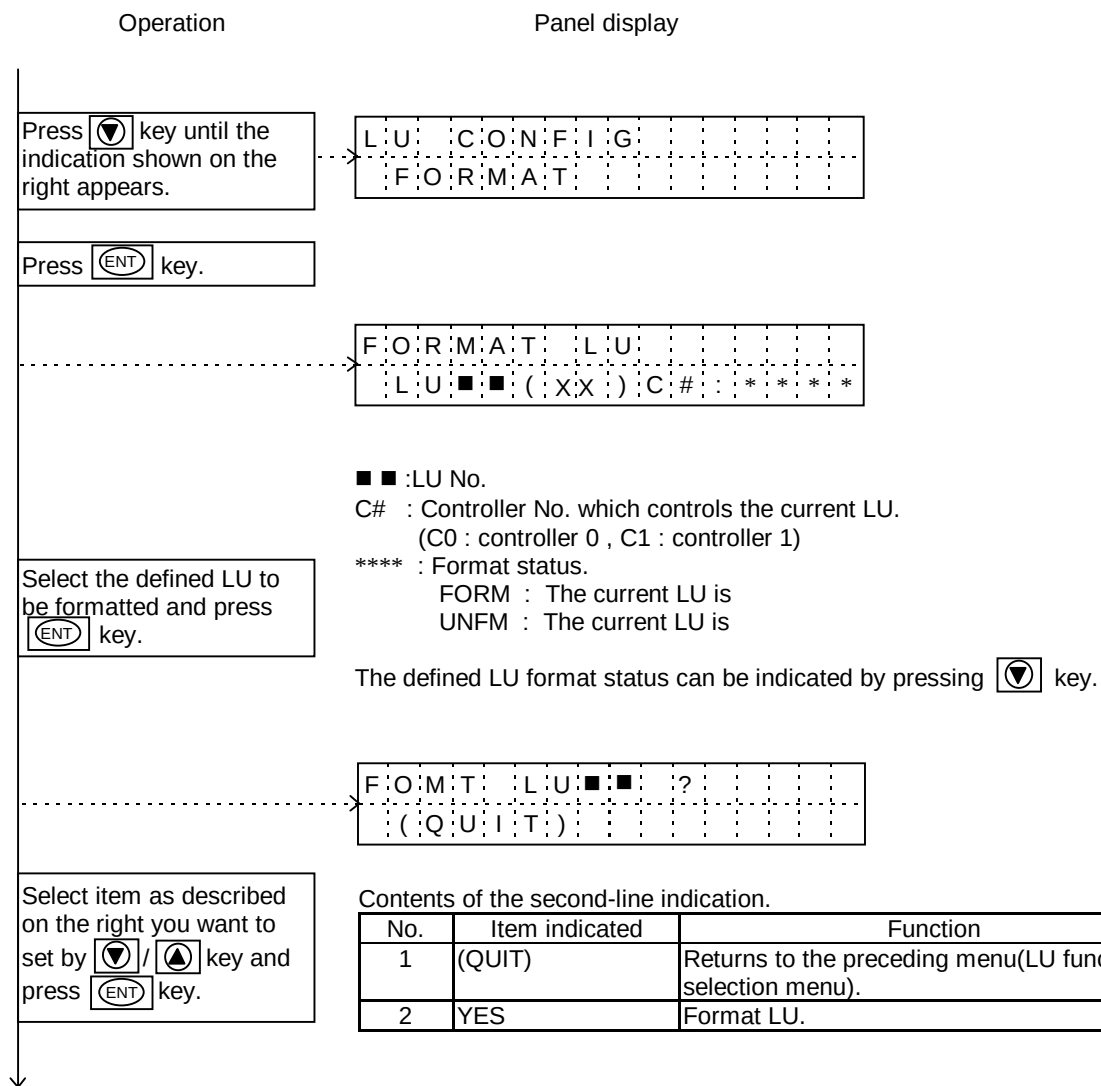


Go to procedure ③-C "Setting LU".

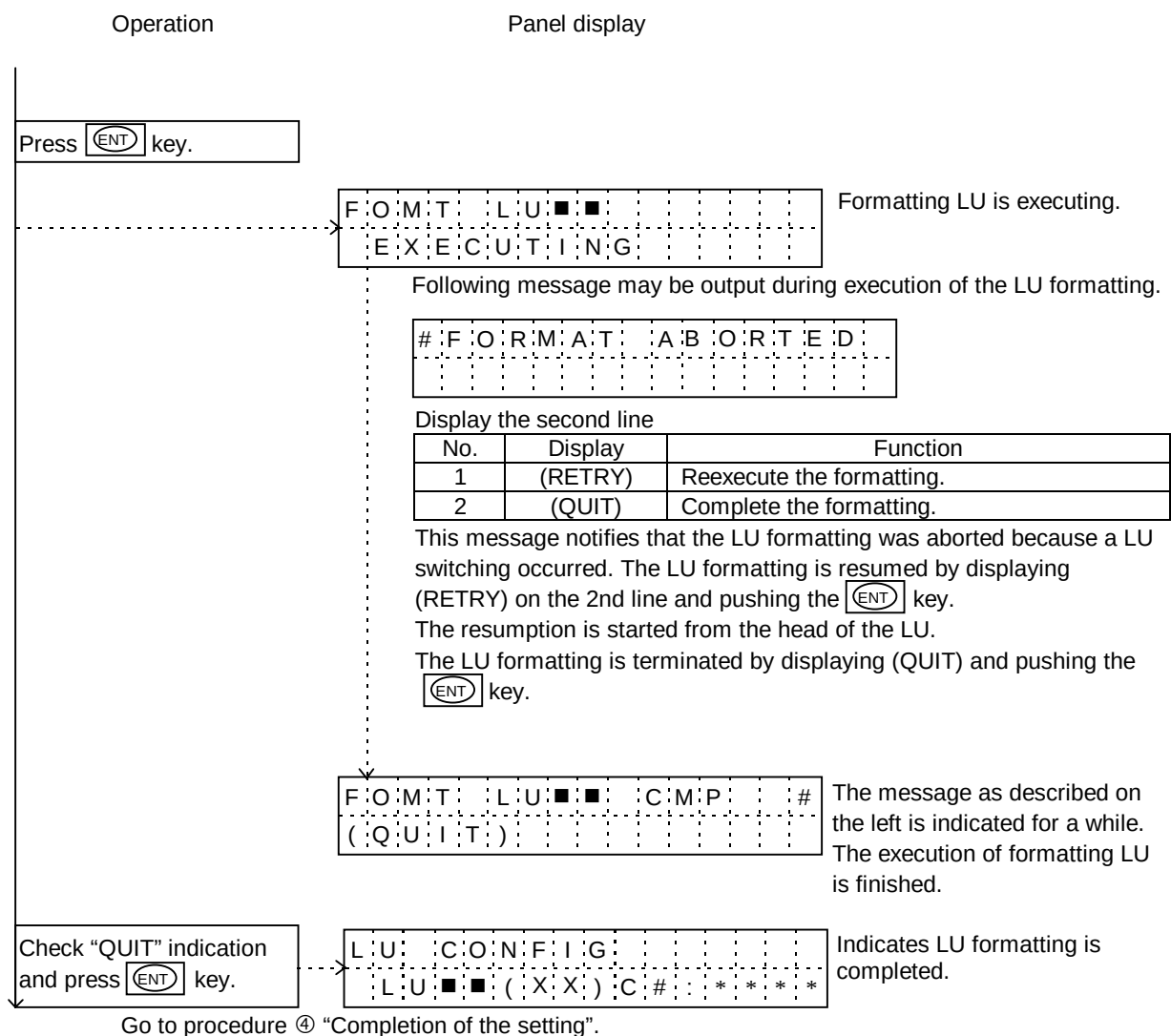
[Procedure③-E] Formatting

Notice : Note that user data will be lost by formatting the formatted LU.

Besides, be sure to execute the LU formatting for each set LU. When the microprogram of version 0354 or later is used, read/write access from the upper device is possible to the LUs other than that being formatted. Accordingly, the formatting for the LU newly added can be executed while executing usual jobs after the addition of the row(s) following the procedures explained on pages RH-OPTION0250 - 0340.

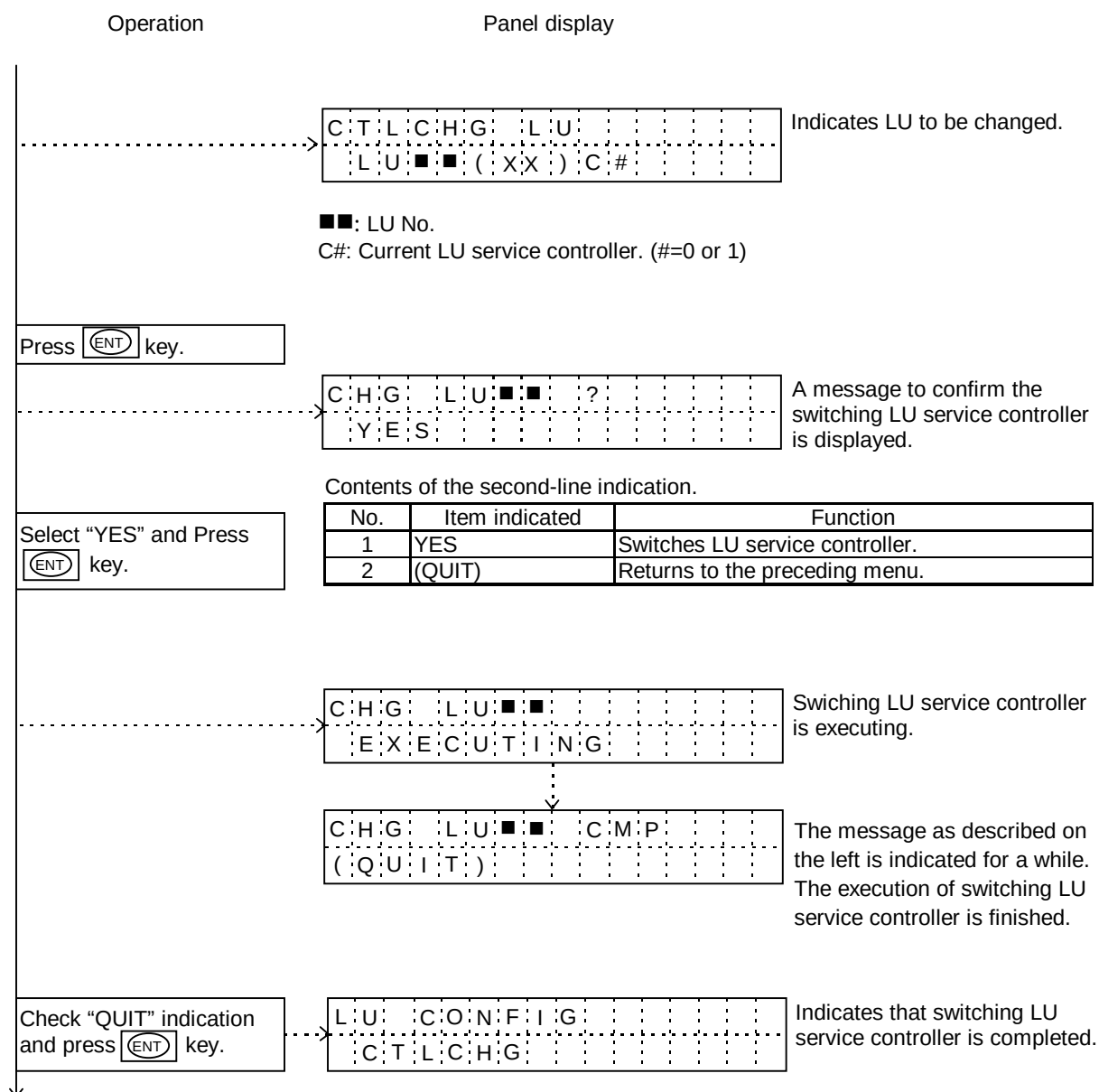


Note : LU format must be executed every set LUs.



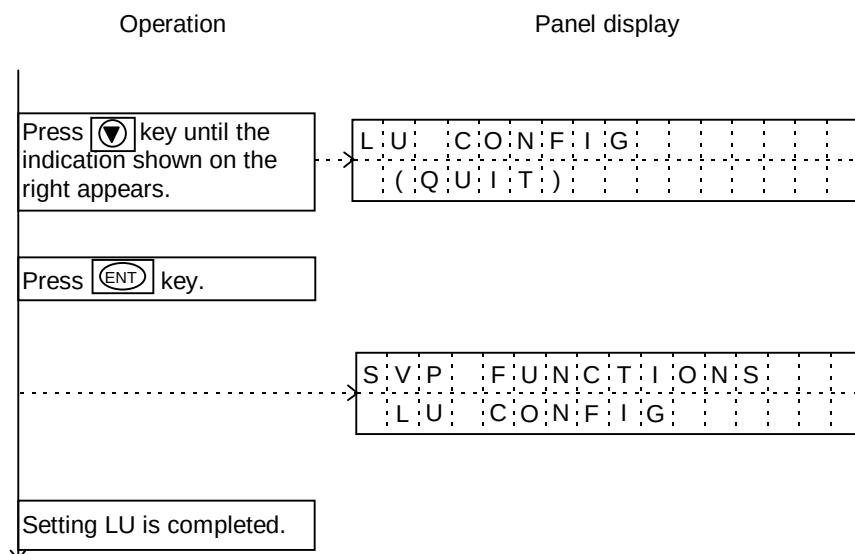
[Procedure③-F] Switching LU service Controller

Note : This function can be used when dual active mode in the dual system is set.



Note : Turn on the power of the subsystem again to make valid switching LU service controller.

[Procedure④] Completion of the setting



LU setting for dual controller configuration

In the case of dual controller configuration(Dual active mode), each LU has to be allocated to a controller which controls that LU in the LU setting operation.

But in the case of dual controller configuration(Hot standby mode), all LU are automatically allocated to the controller #0. (When one of the controllers is blocked, all LU are automatically allocated to the other controller.)

4.2.4 Setting other parameter

The menu items and the use are shown below. Refer to PANEL chapter (PANEL0260) to change the parameter shown below. The function shown below can be used when the subsystem is ready and the LU#0 is already defined.

No.	Menu item	Use	Description	Setting before shipment
1	RAID CONFIG	RAID configuration information reference/setting menu	① Reference to RAID configuration information ② Definition of RAID group ③ Deletion of RAID group	
2	LU CONFIG	LU configuration information reference/setting menu	① Reference to LU configuration information ② Definition of LU ③ Deletion of LU ④ Formatting of LU ⑤ Switching LU service controller	
3	SYSTEM OPT (CUR)	System option setting (Only a current value)	① Drive recovery execution mode ② Copyback recovery mode ③ Correction copy recovery mode ④ Setting of the dynamic sparing starting mode. ⑤ Setting of the interval time in the recovery ⑥ Setting of the unit of recovery processing ⑦ Setting of the Online Verify function ⑧ Setting of the idling time	
	SYSTEM OPT (SVD)	System option setting (A saved value and current value)	① Drive recovery execution mode ② Copyback recovery mode ③ Correction copy recovery mode ④ Setting of the dynamic sparing starting mode. ⑤ Setting of the interval time in the recovery ⑥ Setting of the unit of recovery processing ⑦ Setting of the Online Verify function ⑧ Setting of the idling time ⑨ Setting of the job time-out limit ⑩ Setting of the number of detections in the execution of the reselection time-out ⑪ Setting of the TRESPASS mode (*1)	
4	DRIVE MAINTEN	Drive maintenance menu	① Instruction of drive detaching ② Instruction of drive recovery ③ Reference to drive data recovery status ④ Drive self diagnosis ⑤ Parity matching check ⑥ ECC check ⑦ LA check ⑧ Drive format ⑨ Recovery of system information ⑩ Reference of the disk failure statistical information.	

*1 : This menu is displayed only when ALTERNATE PATH3 has been set by SPECIAL CONNECT of the system parameter.

No.	Menu item	Use	Description	Setting before shipment
5	MICRO VER/REV	Microprogram version/revision numbers reference menu	① Reference to microprogram version/revision	
6	GATHERING (CTL0)	Gathers information of the controller #0 in FD in case of dual system configuration	① Output of dump information being stored in the drive to floppy disk ② Output of trace information being stored in the drive to floppy disk ③ Output of trace information being stored in the memory to floppy disk	
7	GATHERING (CTL1)	Gathers information of the controller #1 in FD in case of dual system configuration	① Output of dump information being stored in the drive to floppy disk ② Output of trace information being stored in the drive to floppy disk ③ Output of trace information being stored in the memory to floppy disk	
8	MEMORY MAINT	Memory content reference/update menu	① Reference/update of memory content	
9	RECV ERR INFO	Error display of recovery when the power is on	① Displays the errors occur during recovery operation performed while power is on	
10	PIN INFO	Display of PIN existence of every LU	① Display of PIN data existence	
11	WARNING INFO	Display of unrecovered warning information	The current warning information is indicated	
12	CLEAR LOG(CTL0)	Clearing log information of controller #0	Log information related controller and host I/F is cleared	
13	CLEAR LOG(CTL1)	Clearing log information of controller #1	Log information related controller and host I/F is cleared	
14	THRESHOLD	Reference/set threshold value.	Reference/set threshold value.	
15	TOPOLOGY (CTL0)	Reference/set the topological information for controller 0.	Reference/set the topological information (FC_AL, Fabric).	
16	TOPOLOGY (CTL1)	Reference/set the topological information for controller 1.	Reference/set the topological information (FC_AL, Fabric).	
17	SELFPORT (CTL0)	Reference/set port information for controller 0.	Reference/set own port information.	
18	SELFPORT (CTL1)	Reference/set port information for controller 1.	Reference/set own port information.	
19	SECURITY (CTL0)	Reference/set security information for controller 0.	① Enable/disable the access check. ② Reference/set host identification information.	
20	SECURITY (CTL1)	Reference/set security information for controller 1.	① Enable/disable the access check. ② Reference/set host identification information.	
21	FFC REV (CTL0)	Refers to the revision number of the FFC firmware of the controller 0.	Display of the revision number of each type of firmware in FFC.	
22	FFC REV (CTL1)	Refers to the revision number of the FFC firmware of the controller 1.	Display of the revision number of each type of firmware in FFC.	

5. Changing the Configuration

5.1 Shifting to Hot Standby from Dual Active

Shifting to Hot Standby from Dual Active while the controller is blocked cannot be performed. Perform the shifting after the blockage is recovered. If PIN segment exists, shifting cannot be performed. Perform the shifting after the PIN segment is recovered.

To see if PIN segment exists, refer to PANEL chapter (PANEL0620 (8)).

- (1) Before turning the power on, set DIP switch No.4 as Figure 5.1.1.

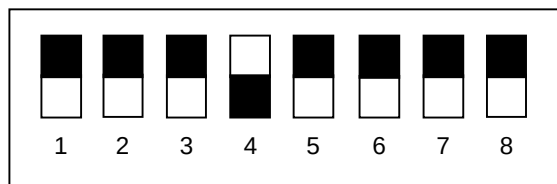
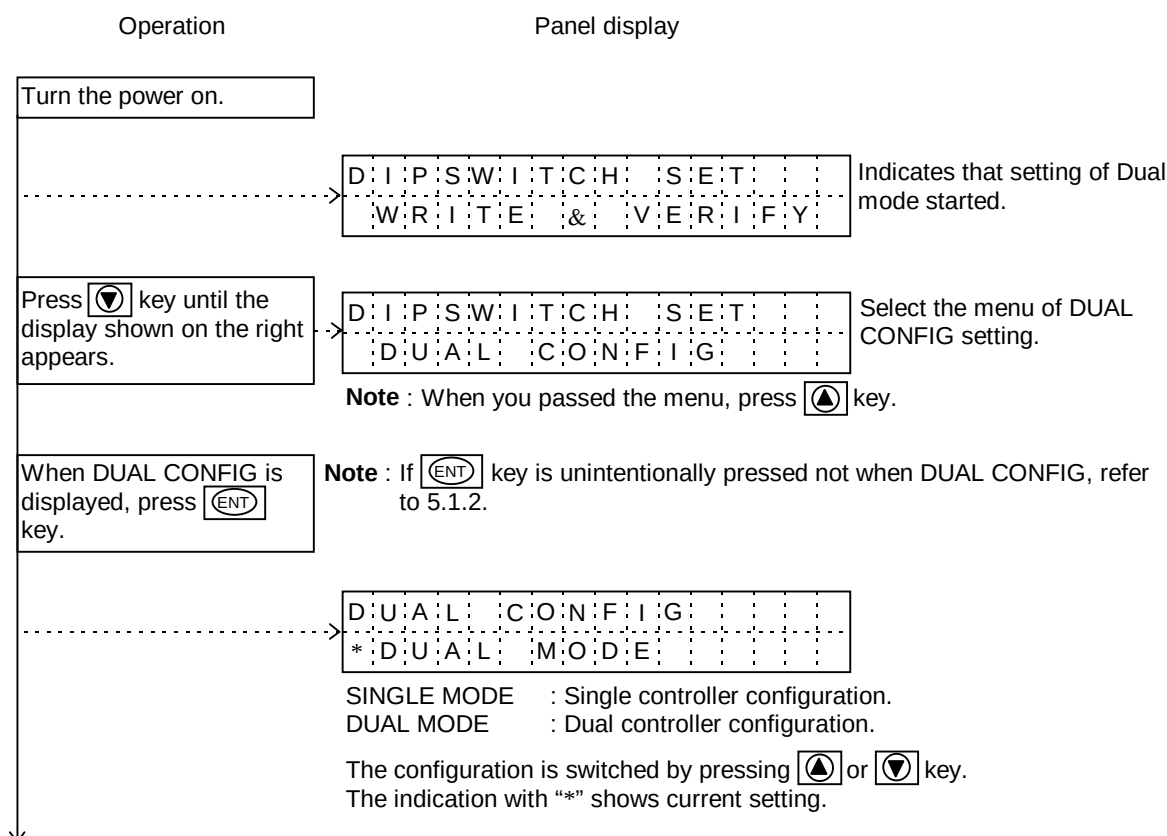
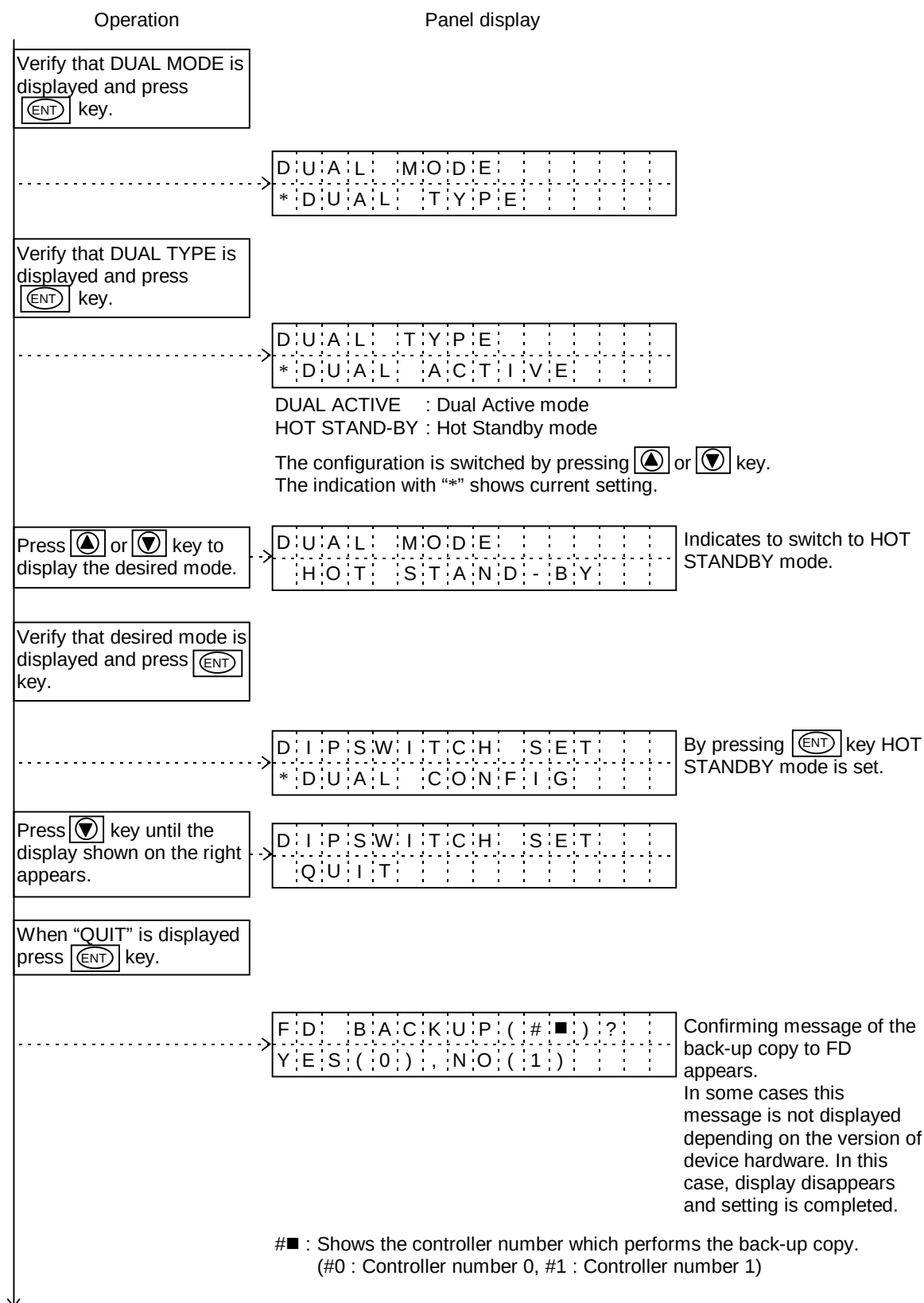
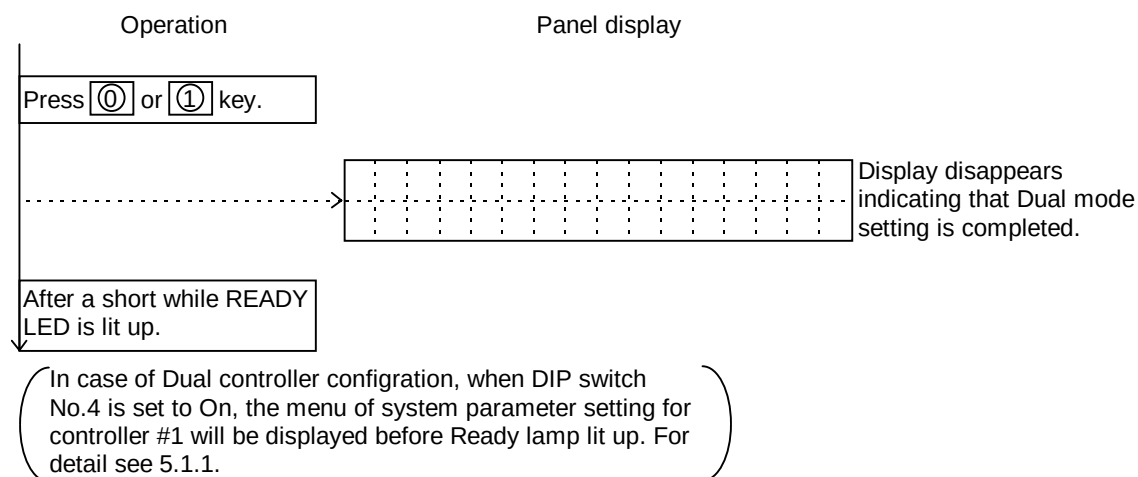


Figure 5.1.1 DIP switch for shifting to Dual system

- (2) Perform as the procedure shown below.







(3) Set DIP switch No.4 as Figure 5.1.2. (Shifting to Dual System has not started yet.)

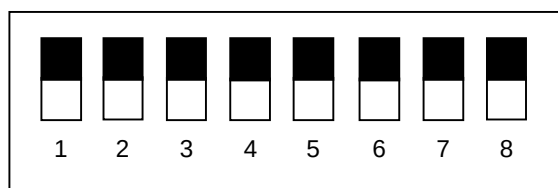


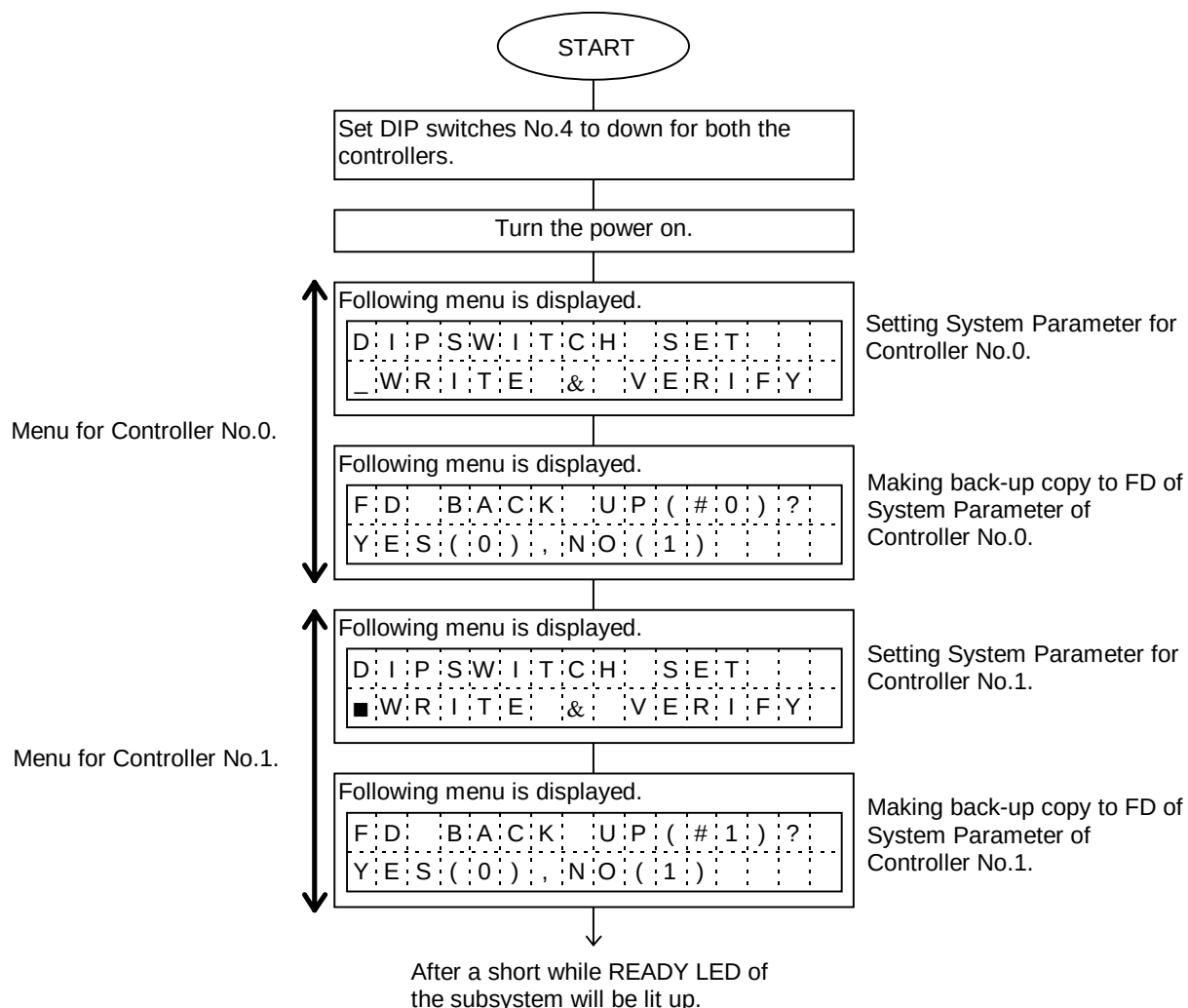
Figure 5.1.2 DIP Switch, shifting to Dual System has not started yet.

Note 1 : When setting Dual mode under dual controller, the setting of controller No.0 will be valid. The setting of controller No.1 will be ignored.

Note 2 : After switching to Dual Active configuration from Hot Standby configuration, Controller No.0 will be the LU Service Controller for previously set LU. To switch LU Service Controller No.1, see “6 PANEL Chapter” (PANEL0370 (2-5)).

5.1.1 Operation of system parameter setting menu under dual controller configuration

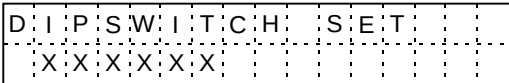
Set DIP switches No.4 to down for both controllers under dual controller configuration, and turn the power off to set the information on EEPROMs of both the controllers.



Note : In case one of DIP switches No.4 is set to down under dual controller configuration, after completion of menu setting for the corresponding controller, READY LED of the subsystem will be lit up.

5.1.2 Returning procedure in system parameter setting menu

During system parameter setting menu when wrong menu is selected ( key is pressed), the method of returning for each menu is shown below.

After the operation below  is displayed.

(XXXXXX : Wrongly selected menu)

Then select desired menu by pressing  or  key.

No.	Menu	Procedure to return
1	WRITE&VERIFY	Press  key.
2	STRIPE SIZE	Press  key.
3	LAN CONST	Press  key to display "QUIT" and press  key.
4	CONNECT VMS	Press  key.
5	ERROR INF	Press  key.
6	CONTROLLER	Press  key.
7	SPARE DISK	Press  key.
8	SERIAL NO	Press  key.
9	ROM V/R	Press  key.
10	RAM V/R	Press  key.
11	ROW LAST LBA	When Menu is ROW LAST LBA : Press  key to display "QUIT", then press  key.
12	BUZZER	Press  key.
13	SYSTEM ERROR	Press  key.
14	INQUIRY INF	Press  key to display "QUIT" and press  key.
15	RTC SET	Press  key to display "QUIT(ENT KEY)" and press  key.

6. Subsystem Settings for Use in Special Modes

6.1 When Connecting to Host Board Adapter Based on HP Tachyon

When connecting the subsystem to the Host Board Adapter based on the HP Tachyon, change the subsystem mode to this mode before using the subsystem.

- (1) Before turning the power on, set DIP switch No.4 as Figure 6.1.1.

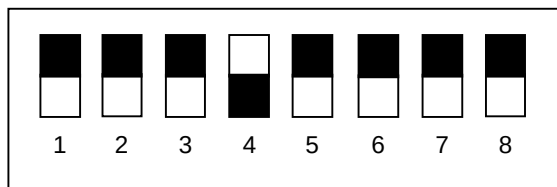
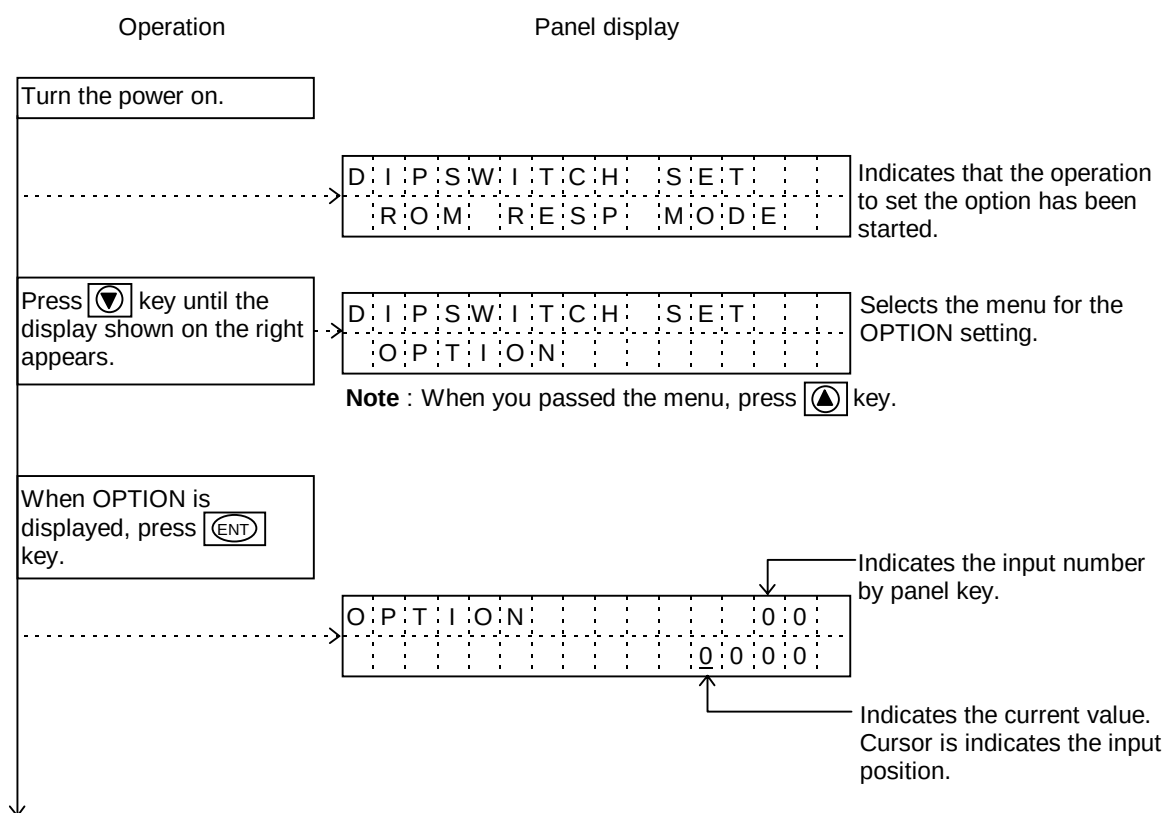
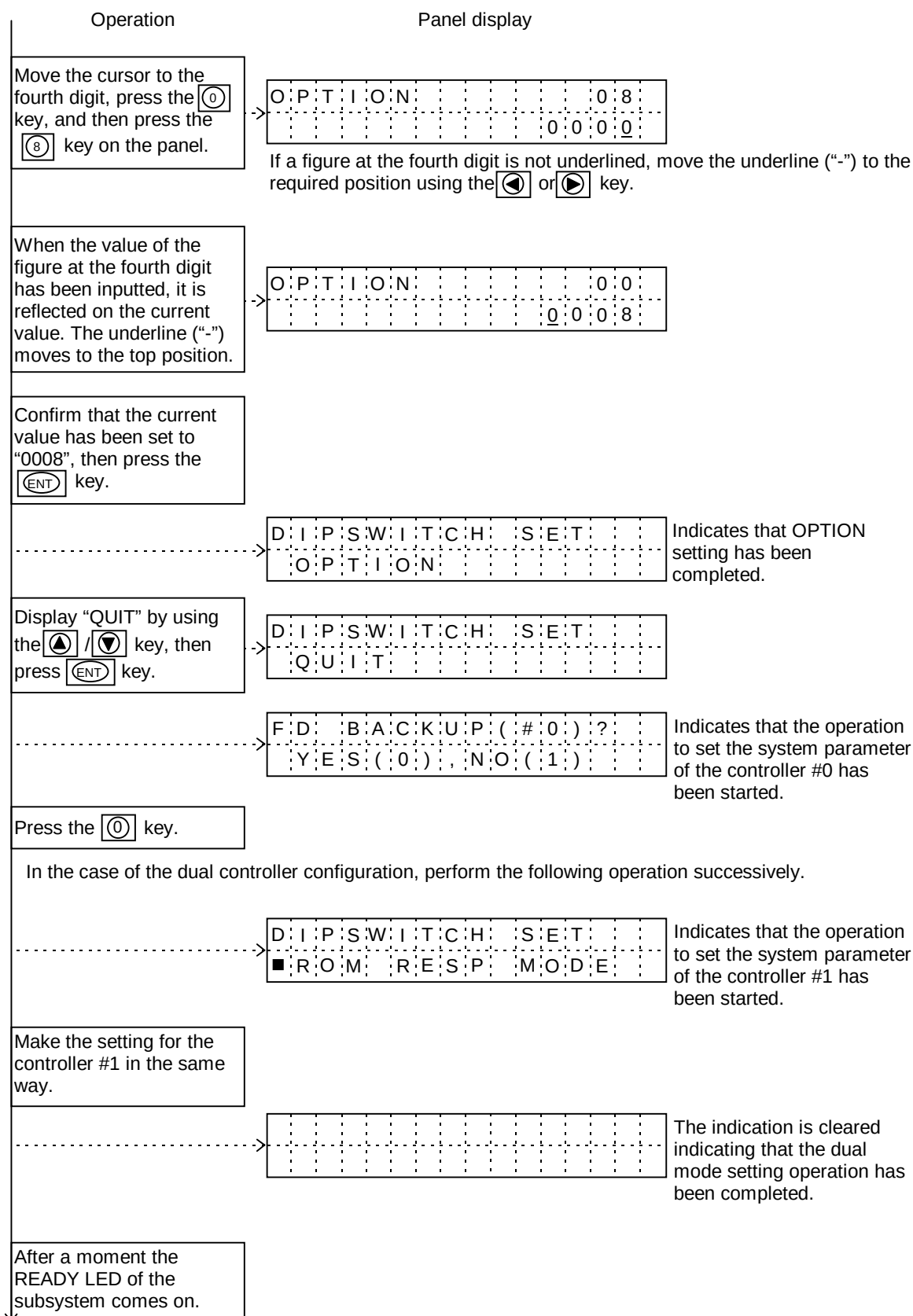


Figure 6.1.1 DIP Switches (Being set for System parameter settings)

- (2) Perform as the procedure shown below.





(3) Set the DIP switch No.4 as shown in Figure 6.1.2.



Figure 6.1.2 DIP switches (Being set for Standard setting)

6.2 When Using I/O Path Switching Function in the State Being Connected to Sequent NUMA-A

When using the I/O path switching function in the state being connected to Sequent NUMA-A, setting of the emulation mode and the setting of the TRESPASS mode from the SVP function is needed.

- (1) Before turning the power on, set DIP switch No.4 as Figure 6.2.1.

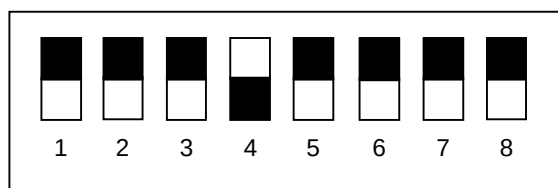
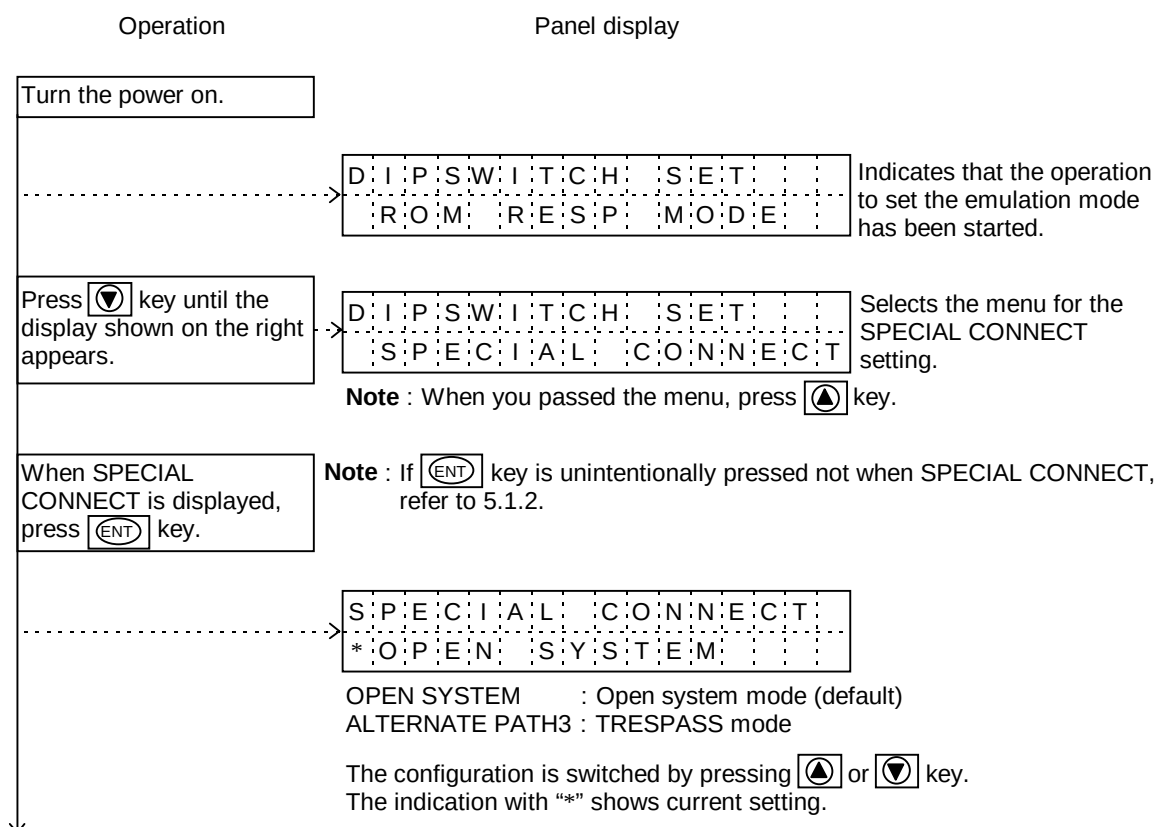
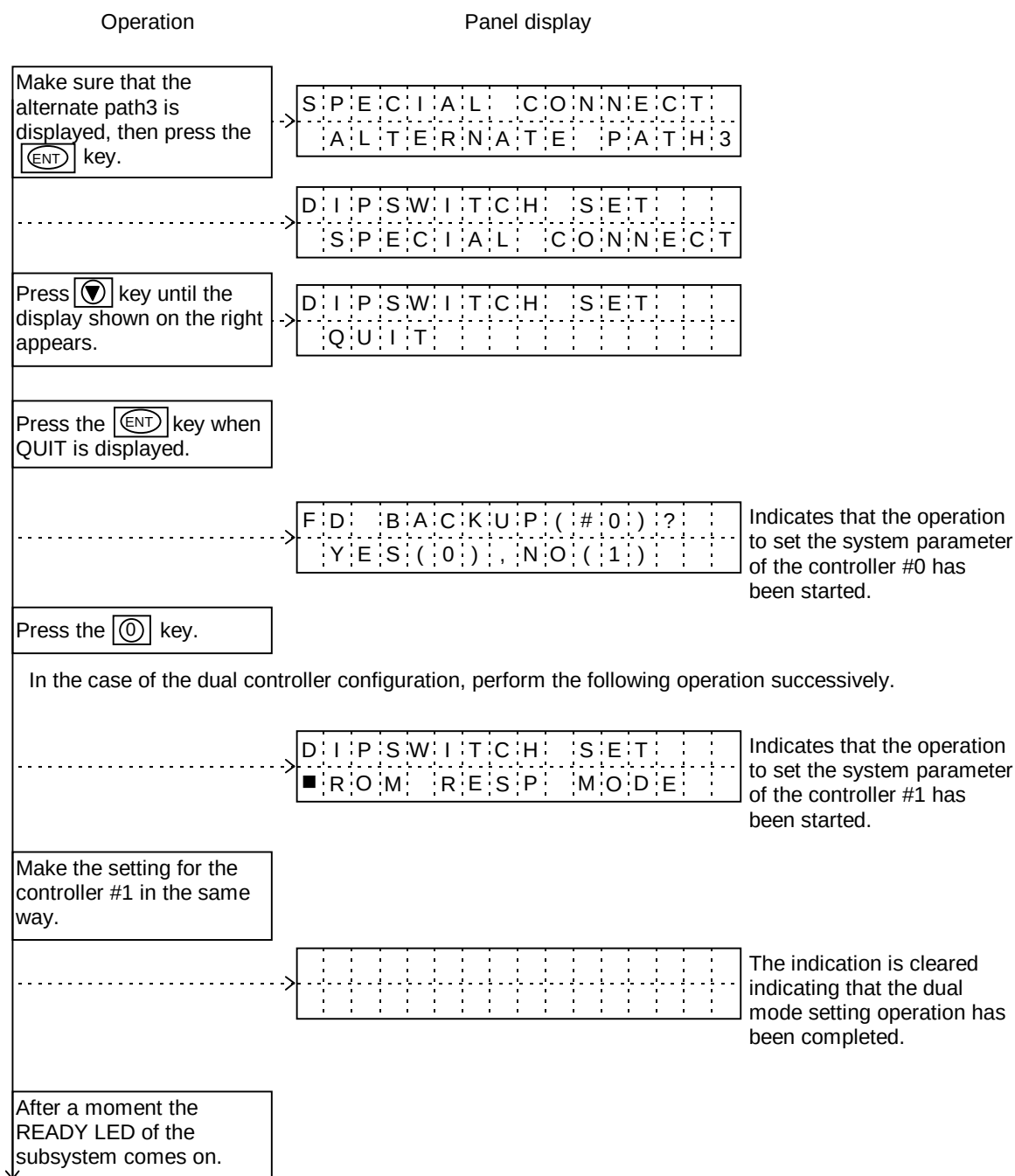


Figure 6.2.1 DIP Switches (Being set for System parameter settings)

- (2) Perform as the procedure shown below.





(3) Set the DIP switch No.4 as shown in Figure 6.2.2.

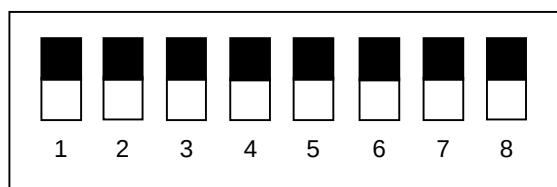
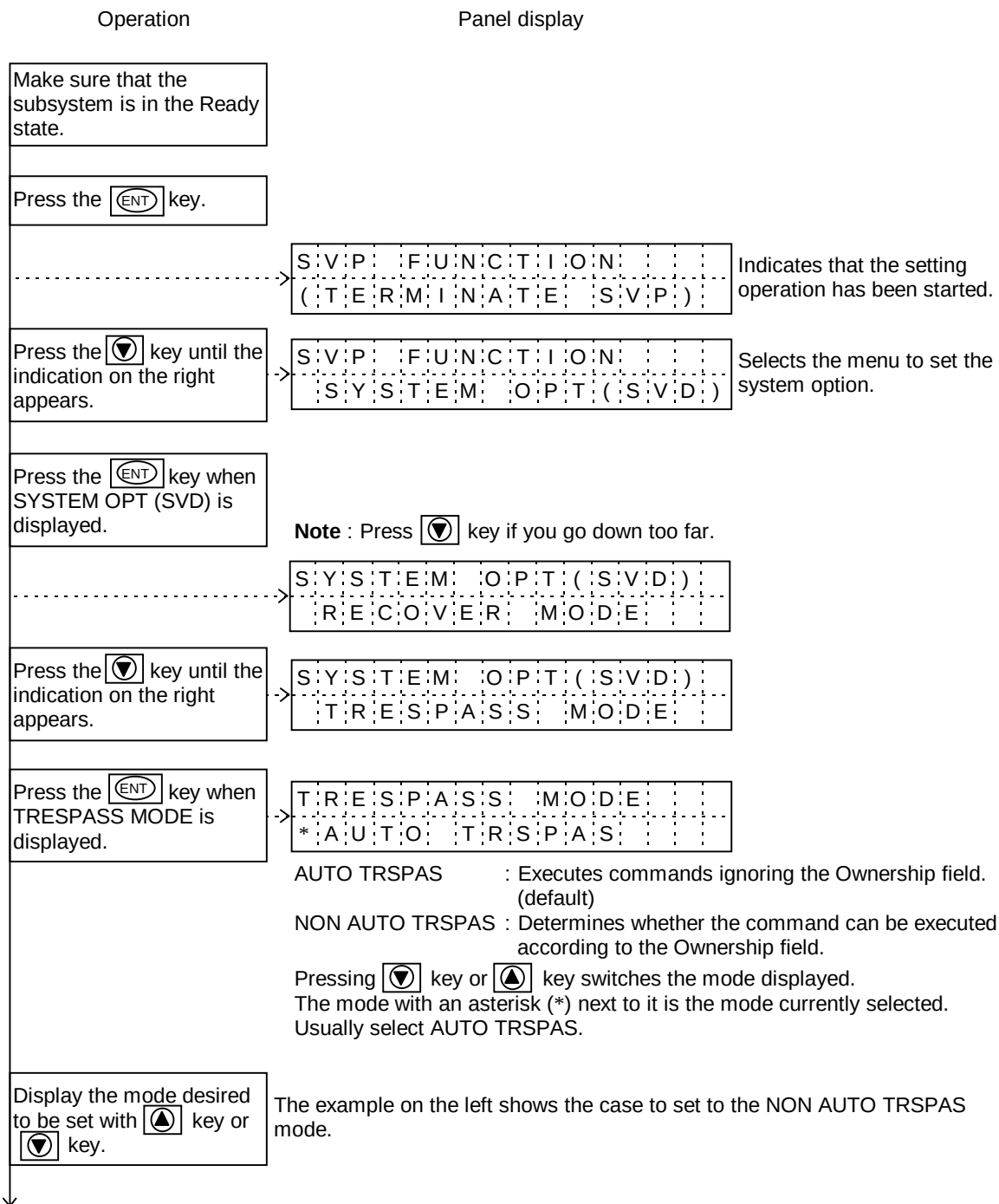
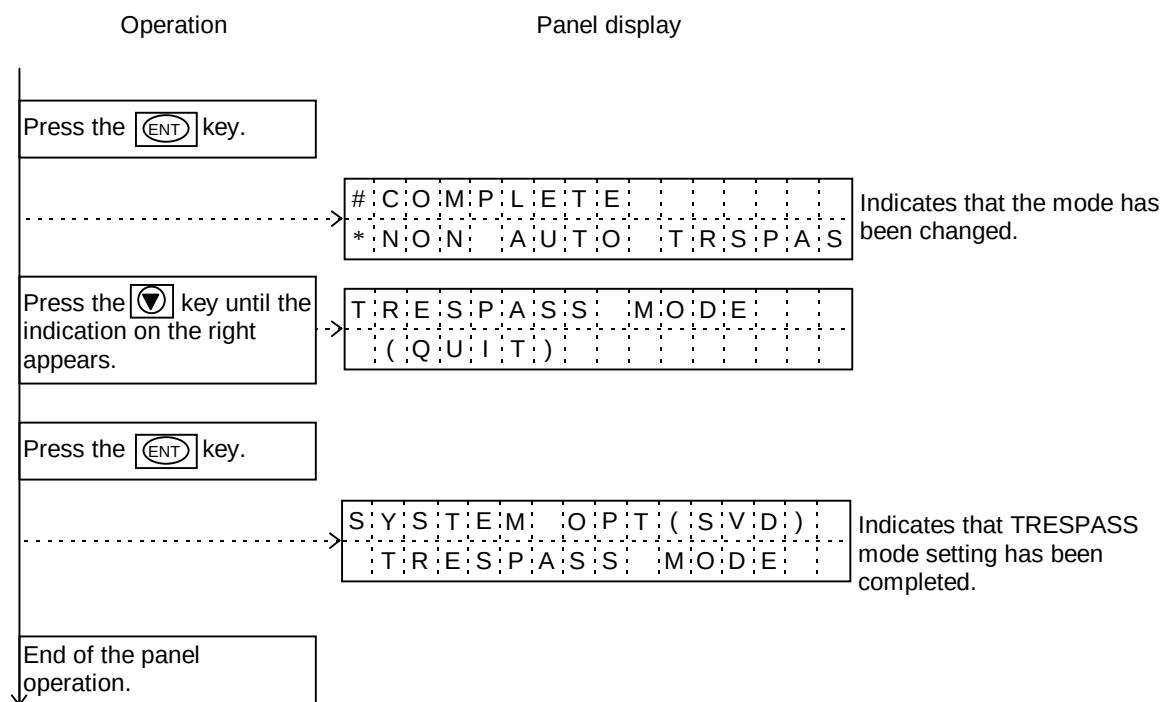


Figure 6.2.2 DIP switches (Being set for Standard setting)

(4) Setting the TRESPASS mode.

This function can be used when the subsystem is in the Ready state. (There is no need to set the DIP switch or reset the power. Ready/write operation cannot be executed from the host while this operation is being performed. When the host command is received, "Not Ready" is returned to the host.)





6.3 Using in the DATA SHARE MODE

- (1) Before turning the power on, set DIP switch No.4 as Figure 6.3.1.

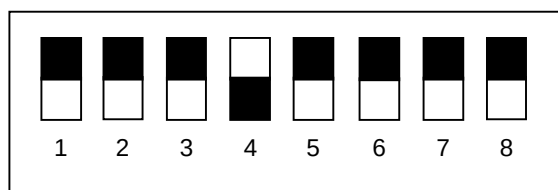
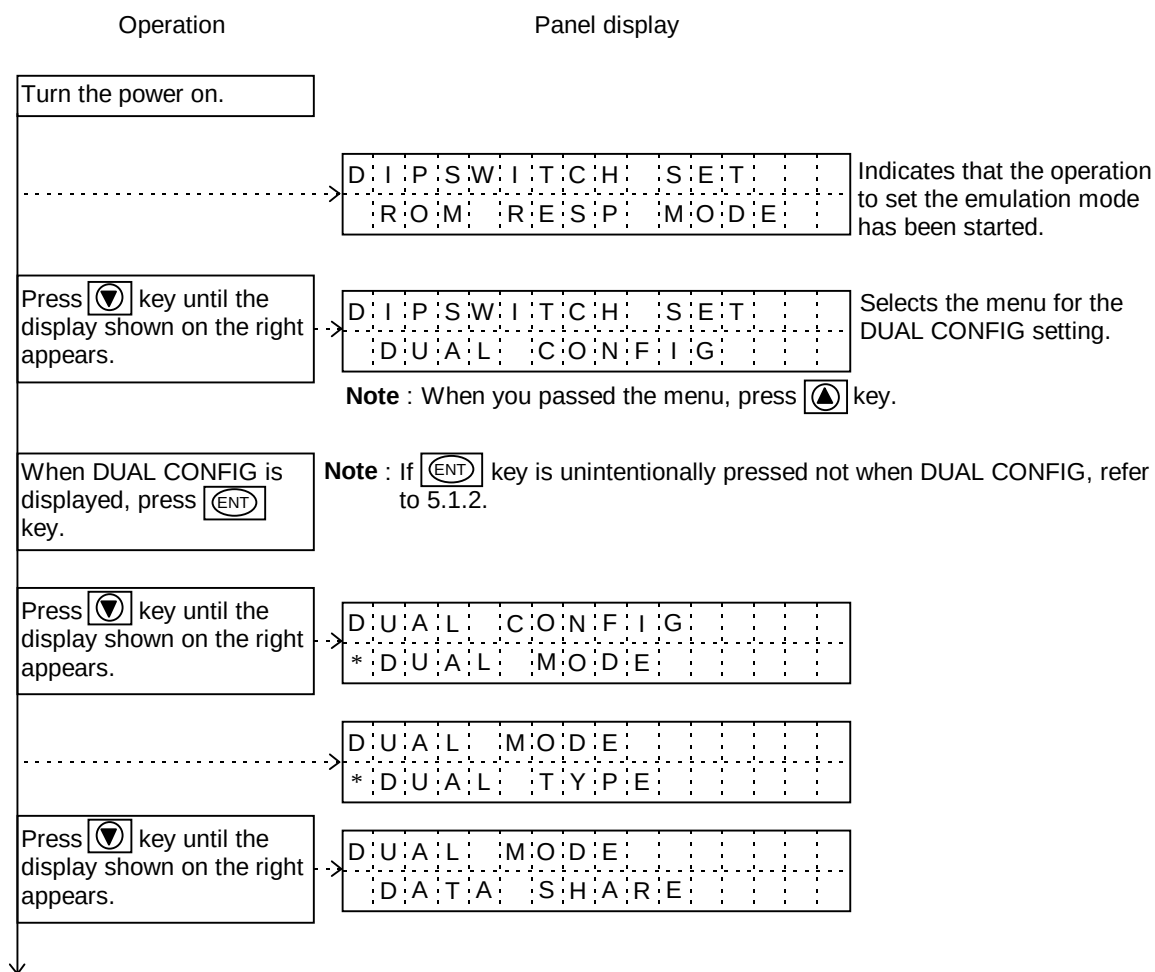
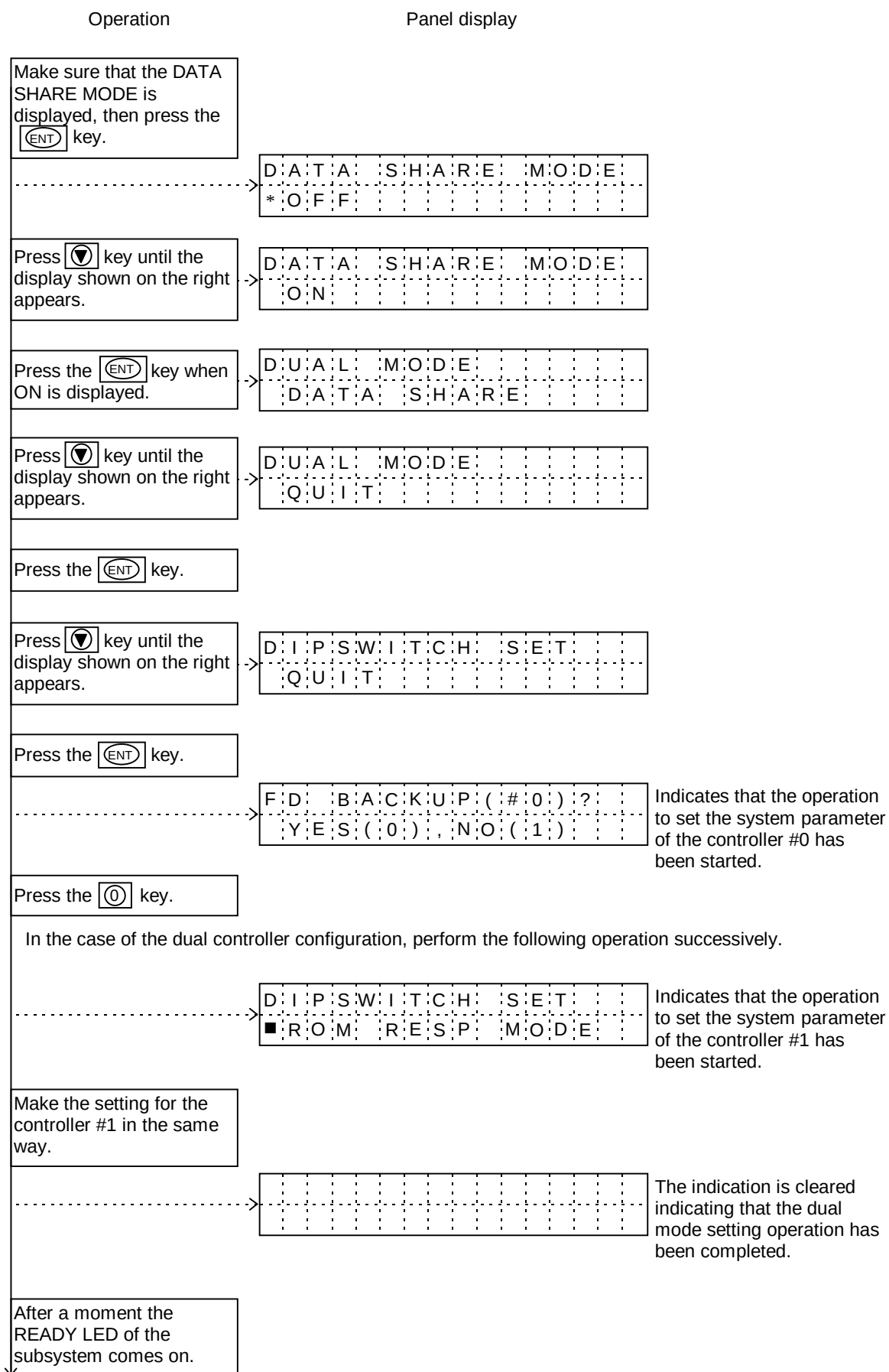


Figure 6.3.1 DIP Switches (Being set for System parameter settings)

- (2) Perform as the procedure shown below.





(3) Set the DIP switch No.4 as shown in Figure 6.3.2.

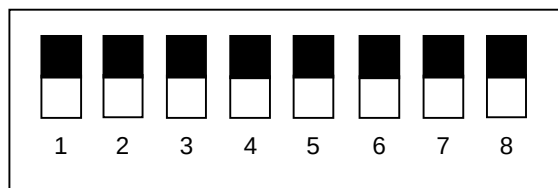


Figure 6.3.2 DIP switches (Being set for Standard setting)

6.4 When Sun OS Solaris 2.5.1 (Aug. '97 version) or Later Is Used by the Host Side

If the following message is displayed on the console screen while executing SUN Format command, use the subsystem with its mode changed to this one.

[Computing capacity exceeds actual disk capacity.]

- (1) Before turning the power on, set DIP switch No.4 as Figure 6.4.1.

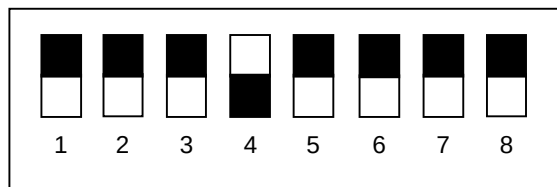
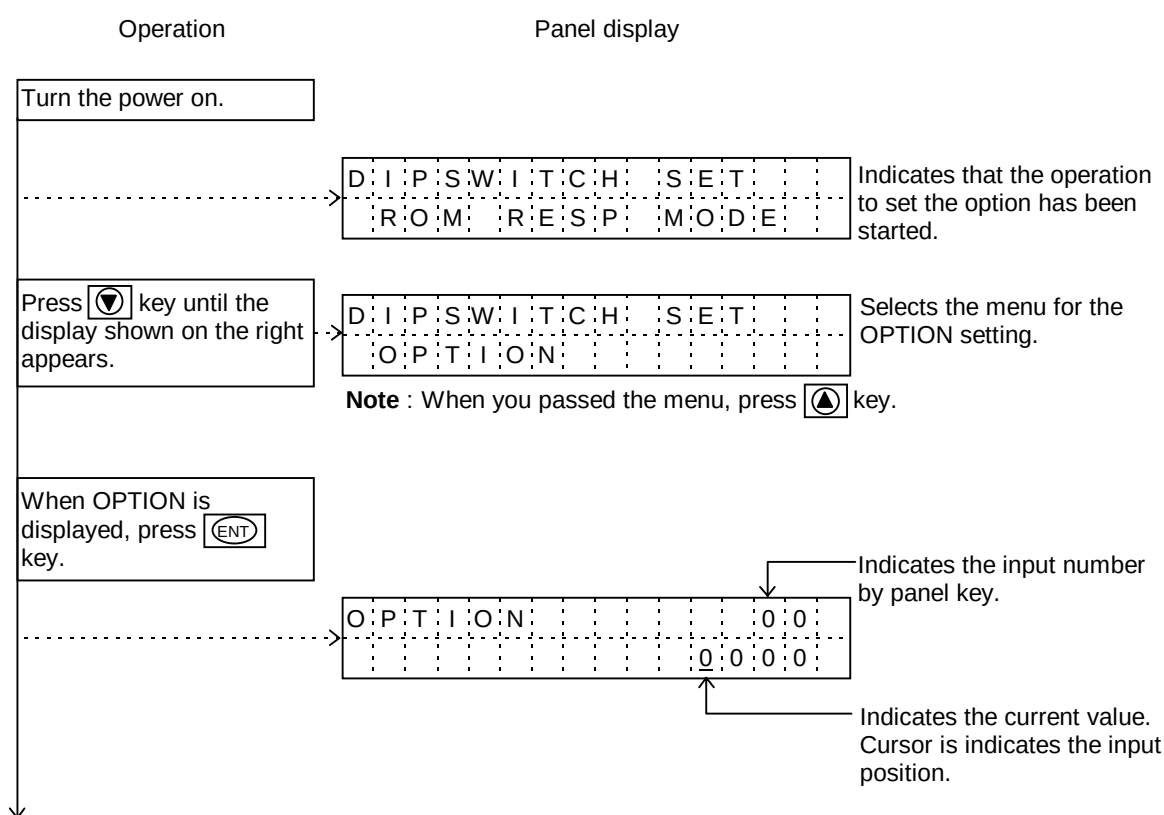
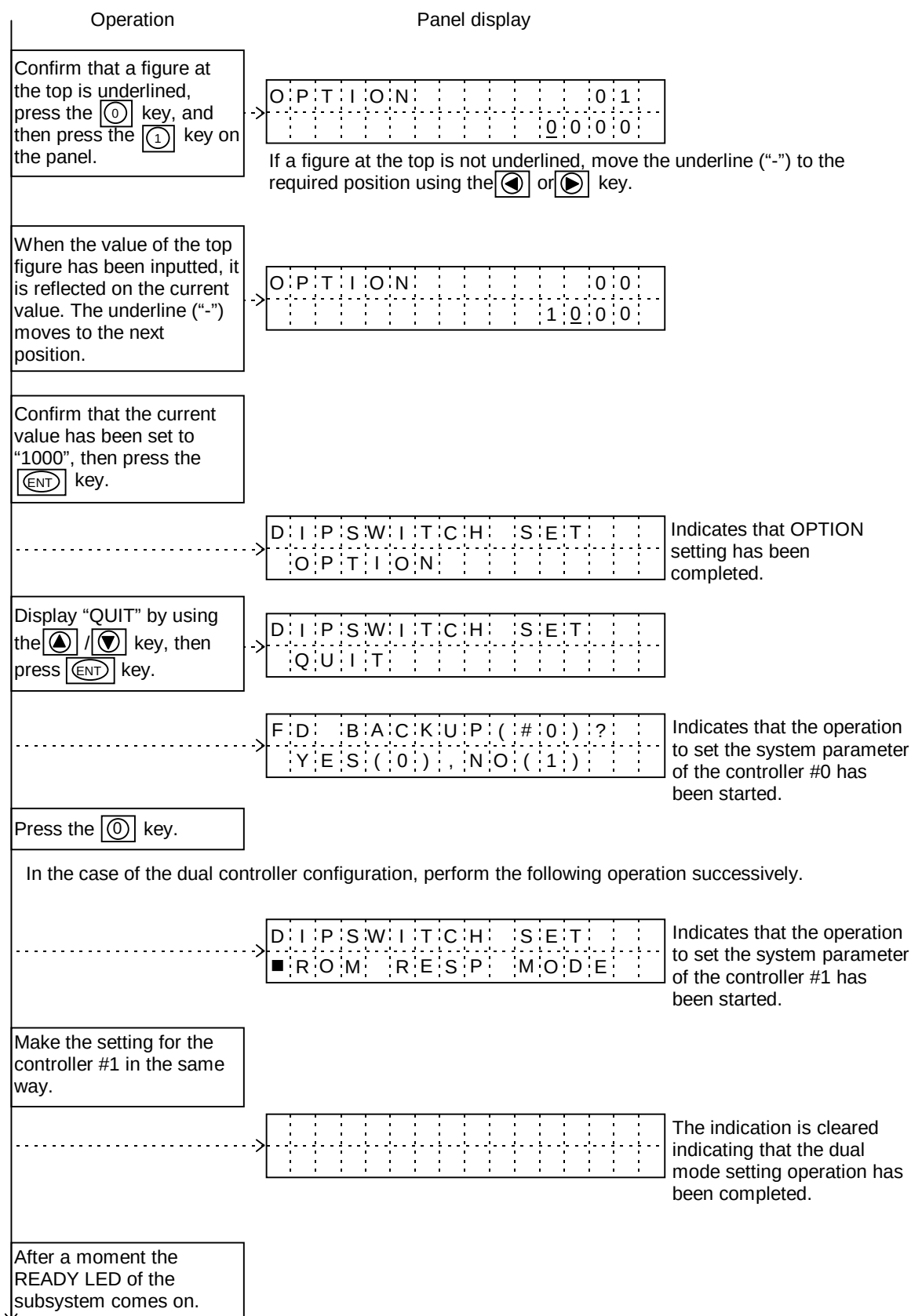


Figure 6.4.1 DIP Switches (Being set for System parameter settings)

- (2) Perform as the procedure shown below.





(3) Set the DIP switch No.4 as shown in Figure 6.4.2.

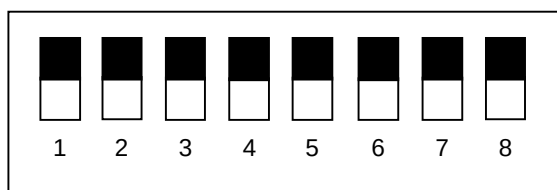


Figure 6.4.2 DIP switches (Being set for Standard setting)

6.5 When Using the Subsystem in LU Blockade Mode

When the subsystem is used in this mode, if a blockade failure occurs on the second disk in the same ROW, the disk concerned is blocked and the LU in which the disk concerned is included is blocked.

When the LU is blocked, data cannot be read from or written onto the LU concerned. If the blocked LU is accessed, a sense key/sense code=0313180 is reported.

To use the subsystem in this mode, the microprogram must be Ver.0355/B or later.

- (1) Before turning the power on, set DIP switch No.4 as Figure 6.5.1.

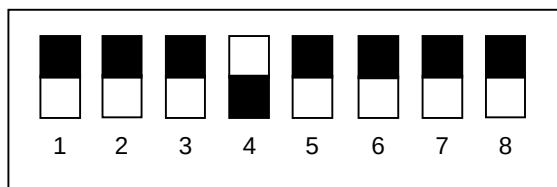
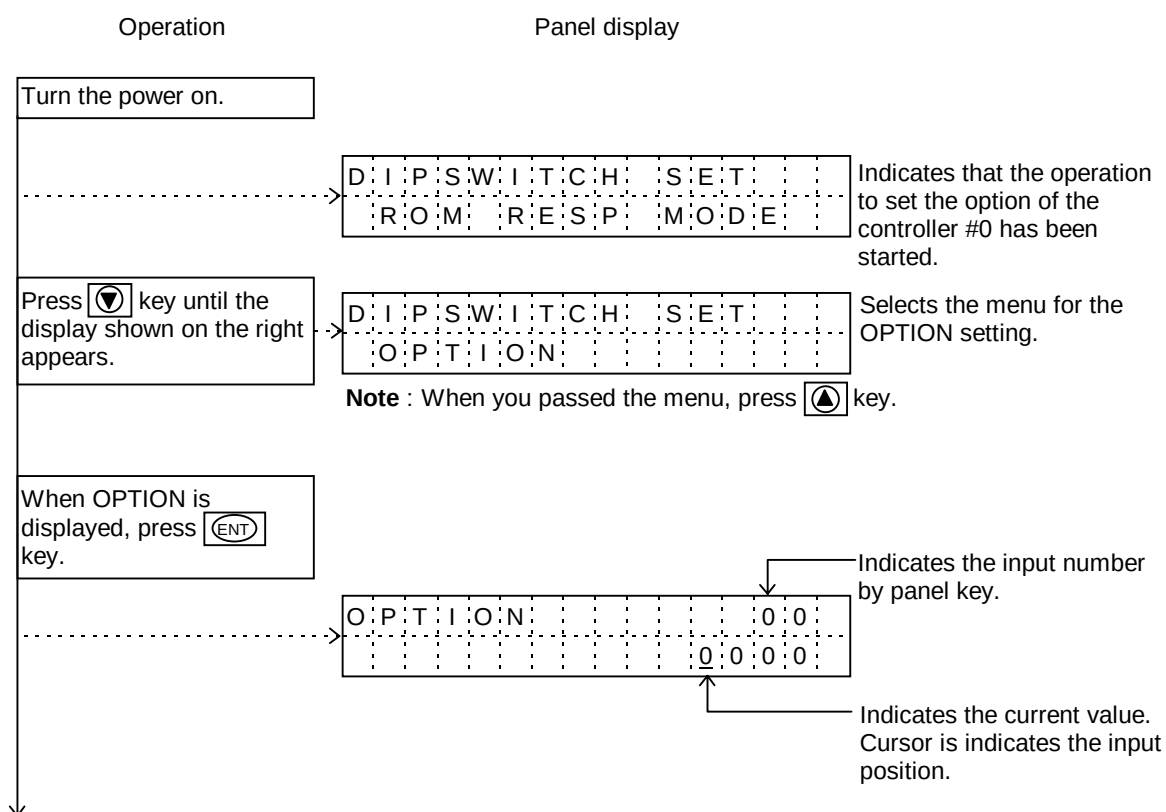
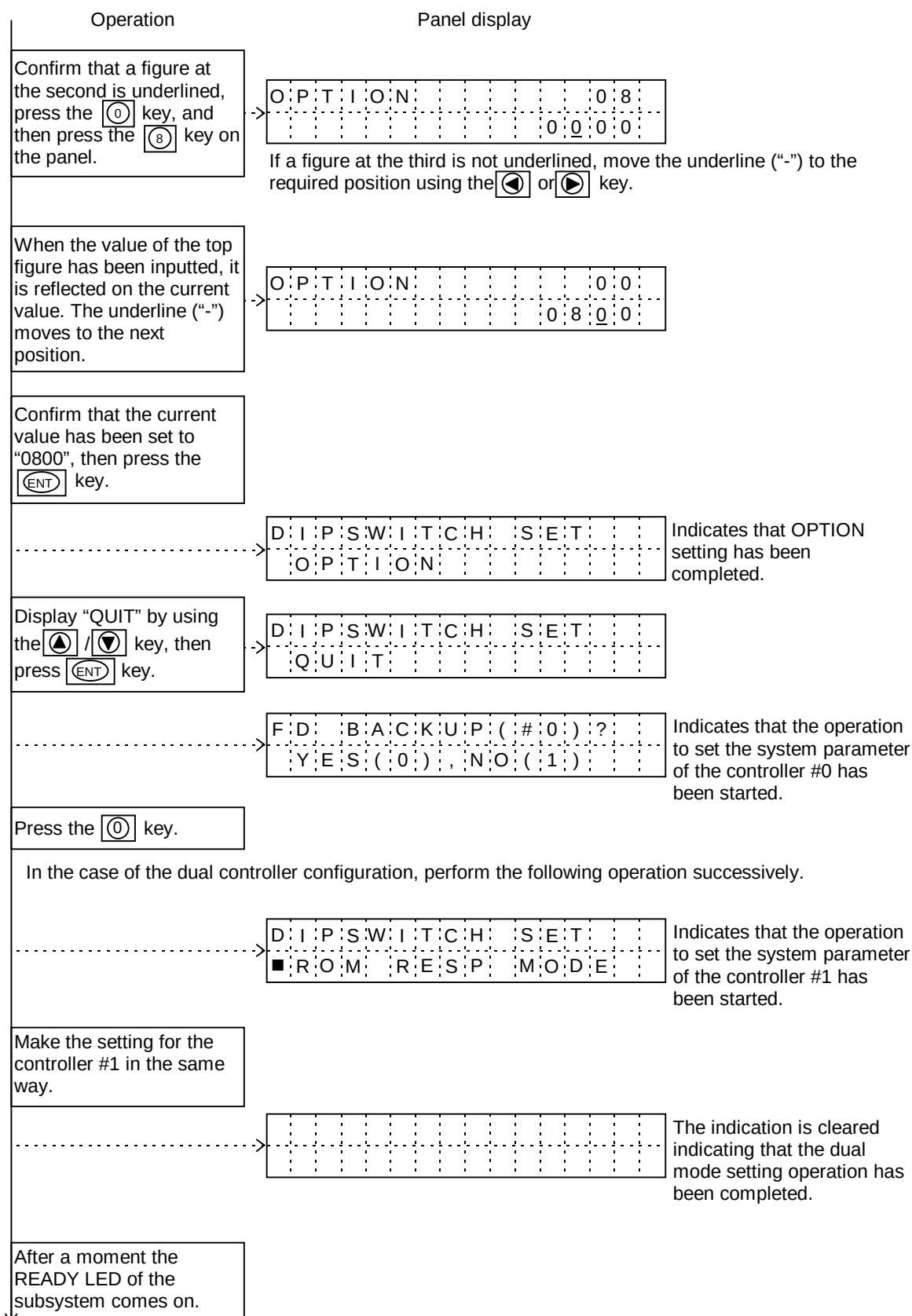


Figure 6.5.1 DIP Switches (Being set for System parameter settings)

- (2) Perform as the procedure shown below.





(3) Set the DIP switch No.4 as shown in Figure 6.5.2.

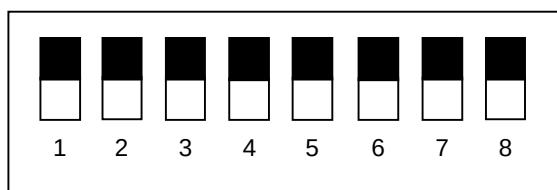


Figure 6.5.2 DIP switches (Being set for Standard setting)

DF350F Disk Subsystem
9. OPTIONAL INSTALLATION
(Rack Mount (RKH/U1) Type)

Rev.2

REVISION CONTROL

Legend for revision codes : AD : Addition CH : Change CR : Correction DL : Deletion

REV.	Date	DRW.	CHKD	APPD	Sheet No.	Description	Code
0	Jan.20.'98	A.Yamanashi	K.Aruga	H.Iwasaki	All	Issued	
1	Jul.31.'98	A.Yamanashi	K.Aruga	H.Iwasaki	0260 0300	Added A2E8, A1E18. Added A2E8, A1E18.	AD AD
2	Oct.15.'98	A.Yamanashi			0050 0060 0080 0260 0300	Added case of the dual controller. Added case of the dual controller. Added case of the dual controller. Added A3E4. Added A3E4.	AD AD AD AD AD

1. Note when Installing the Optional Features

- (1) Be sure to back-up copy user data before installing the optional features. A miss-operation might cause the loss of user's data.
- (2) Back-up the system parameter according to "Back-up Procedure of System Parameter". (See RH-OPTION0050.)
- (3) Power off the subsystem according to power off procedure before installing the optional features. If not, user's data might be lost.

2. Installing the Optional Features

2.1 Unit Appearance Check

Check visually the unit appearance for distortion or damage during the transportation.

2.2 Checking Items of System Components and the Other Items Shipped with the Unit

Check items and quantities of system components (model, serial number, and quantity) and other items shipped together with the unit. Cross-check with the packing list.

2.3 Back-up Procedure of System Parameter

There are cases where System Parameters (Buzzer setting, drive recovery mode, etc.) are need to be copied to FD or restored from FD when installing optional parts or replacing parts. In this case, copy or restore system parameters following "Back-up procedure to FD" (See RH-OPTION0050) or "Restoring procedures from FD" (See RH-OPTION0080).

(RAID configuration setting, LU configuration setting, etc. are not contained in system parameter.)

2.3.1 Back-up procedure to FD

- (1) Turn the power off according to RH-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

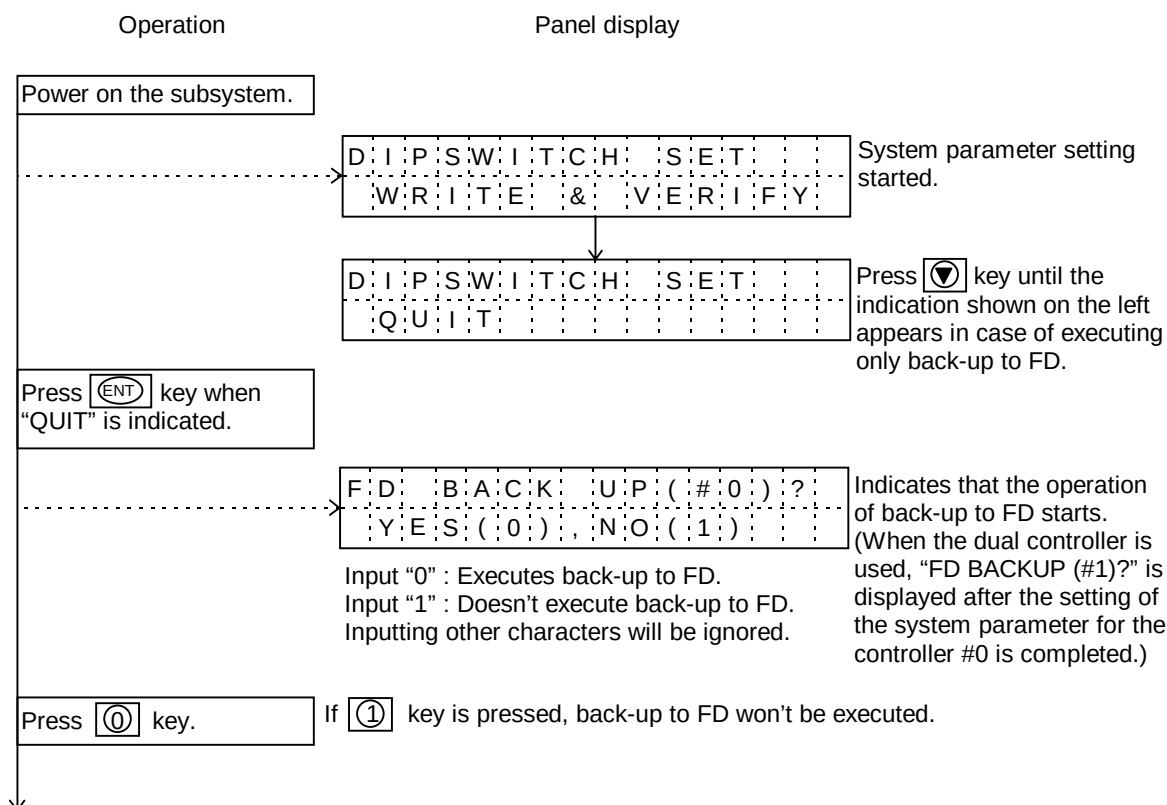
- (2) Before power on the subsystem, set DIP switch No.4 as shown in Figure 2.3.1.

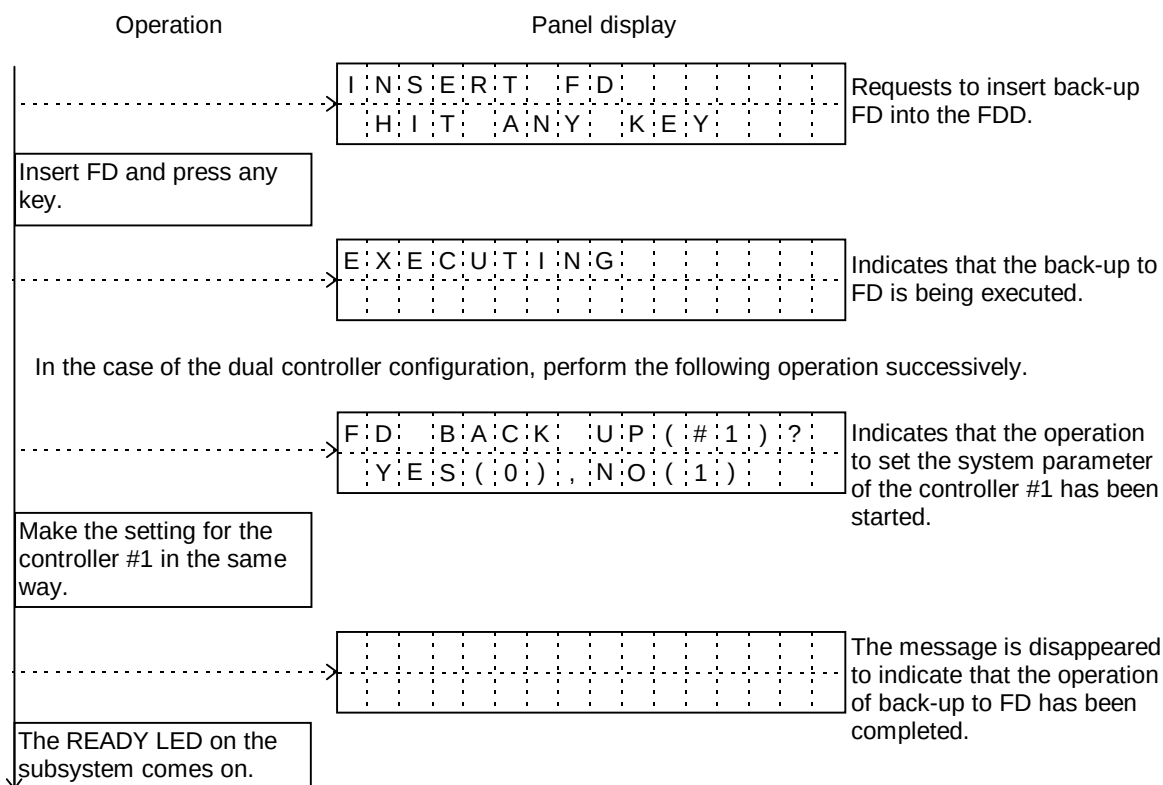
Note : Be sure to set the same data for both controllers if the dual controller option (-F3MCF) has been installed.



Figure 2.3.1 DIP Switches
(Back-up operation to FD is allowed)

- (3) Operate as described below.





(4) Set DIP switch No.4 as shown in Figure 2.3.2.

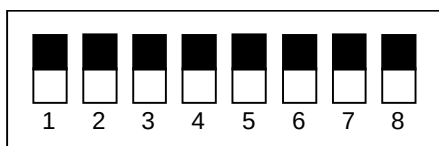
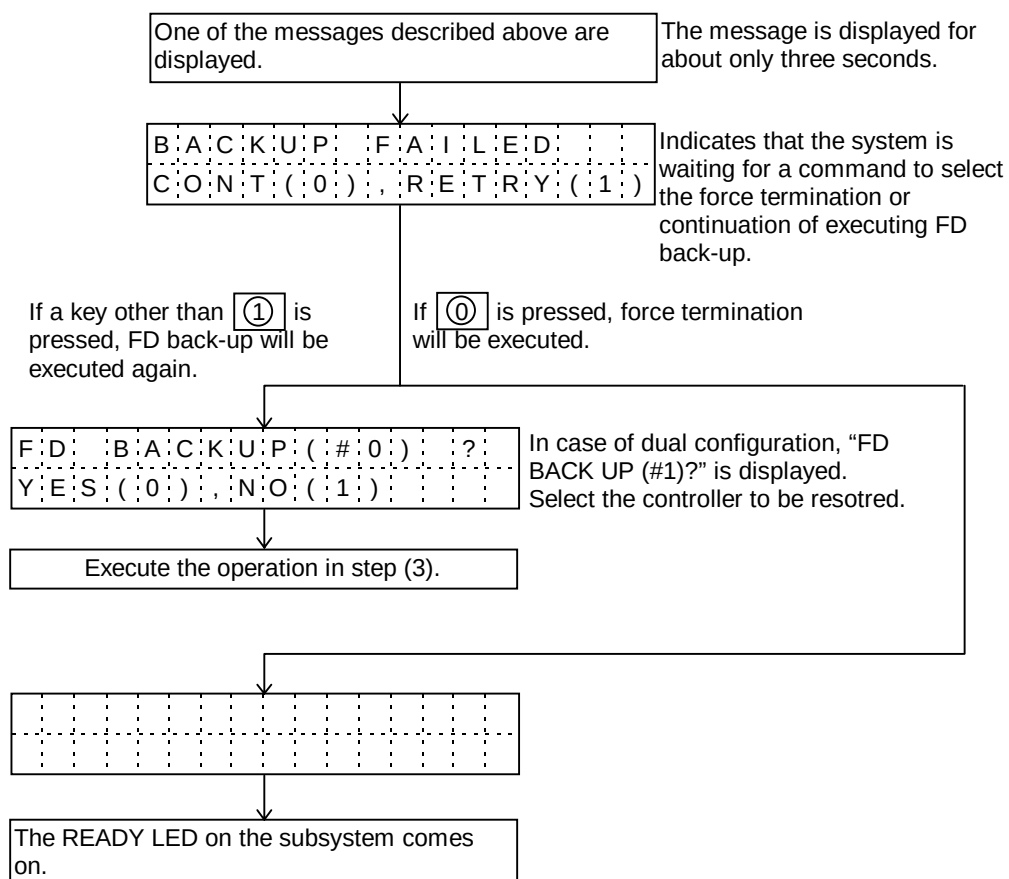


Figure 2.3.2 DIP Switches

Note 1 : While the back-up to FD is being executed, the messages described below are sometimes displayed.

- **FD NOT INSERTED**
FD isn't inserted. Insert FD into the FDD.
- **FD MOTOR NOT STARTED**
Starting of FD Motor ended in failure. Re-execute.
- **FILE WRITE ERROR**
FD which was inserted is not formatted, or write-protected. Format or release write-protection.
Write error occurred in FD. Insert another FD.

If these messages are displayed, back-up to FD hasn't been executed. So re-execute following the operation described below.



Note 2 : Use 3.5" FD (1.44MB) formatted by MS-DOS for back-up FD. Besides, note that the FD will be overwritten during back-up.

Note 3 : Even if back-up FD is left at FDD after back-up operation, error won't occur on the subsystem.

2.3.2 Restoring procedures from FD

- (1) Before power on the subsystem, set DIP switch No.3 as shown in Figure 2.3.3.

In case of dual controller system, set both the DIP switches as shown in Figure 2.3.3.

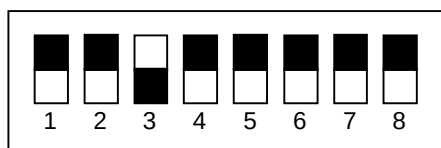
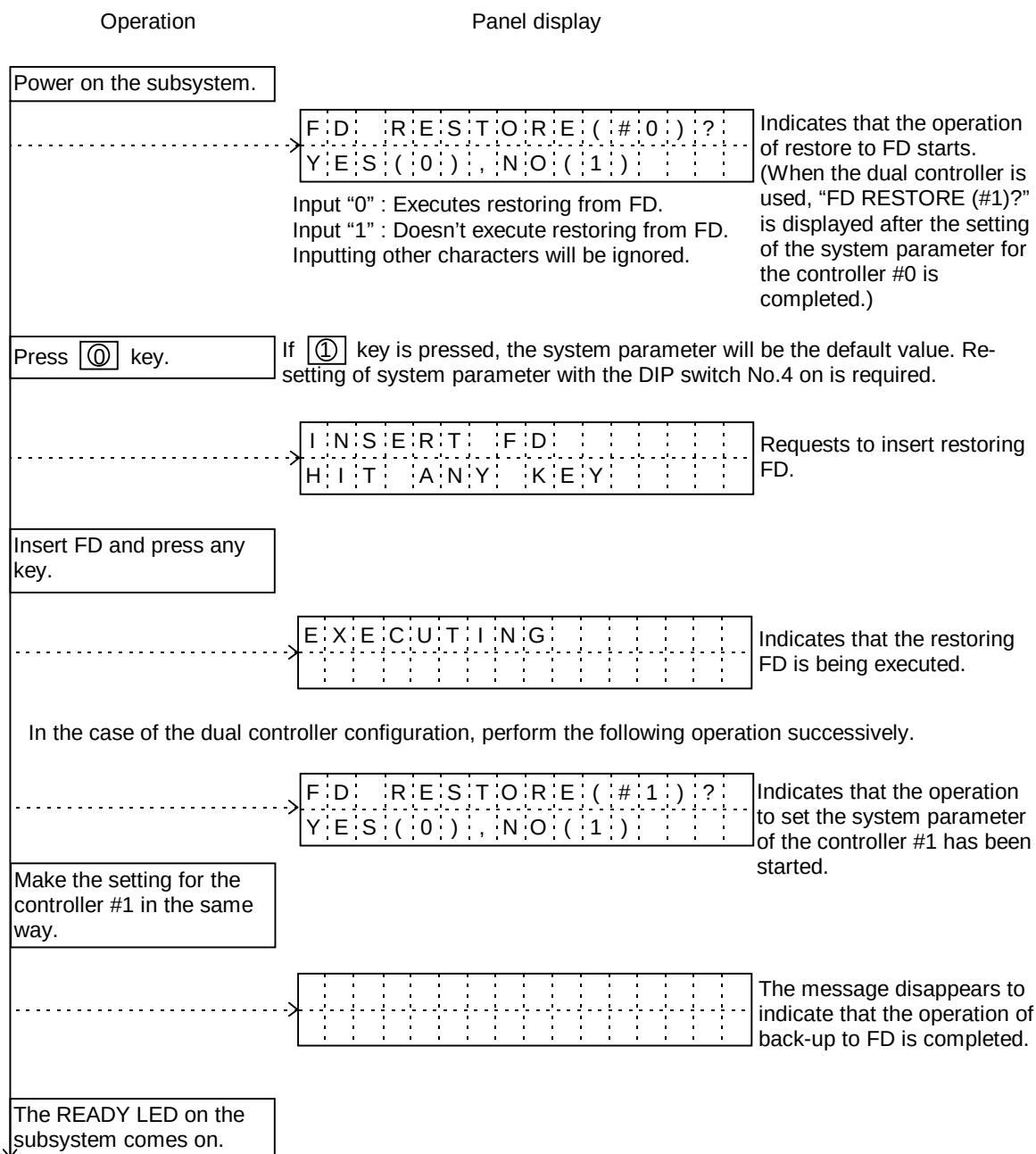


Figure 2.3.3 DIP Switches
(Restoring operation from FD is available)

- (2) Operate as described below.



(3) Set DIP switch No.3 as shown in Figure 2.3.4.

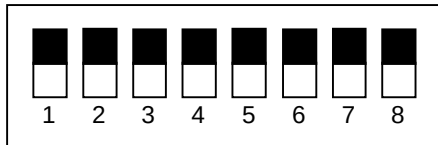
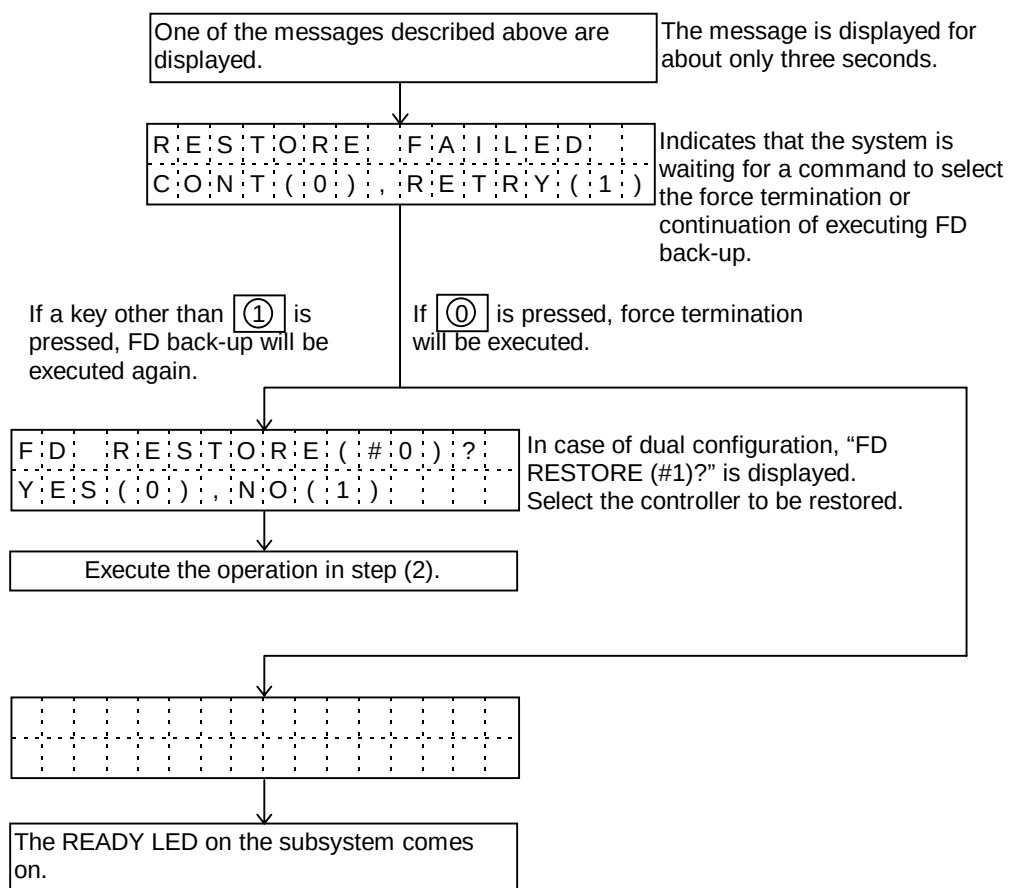


Figure 2.3.4 DIP Switches

Note 1 : While executing the restoring from FD, the messages described below are sometimes displayed.

- **FD NOT INSERTED**
FD isn't inserted. Insert FD into the FDD.
- **FD MOTOR NOT STARTED**
Starting of FD Motor ended in failure. Try again.
- **BAD FD INSERTED**
Inserted FD is not formatted. Format FD.
- **FILE READ ERROR**
Read error occurred in FD. Try again.

If these messages are displayed, restoring from FD hasn't been executed. So re-execute following the operation described below.



Note 2 : In case that restoring operation ended in failure and was force terminated, setting of EEPROM will be default value.

Accordingly, re-setting with the DIP switch No.4 On is required.

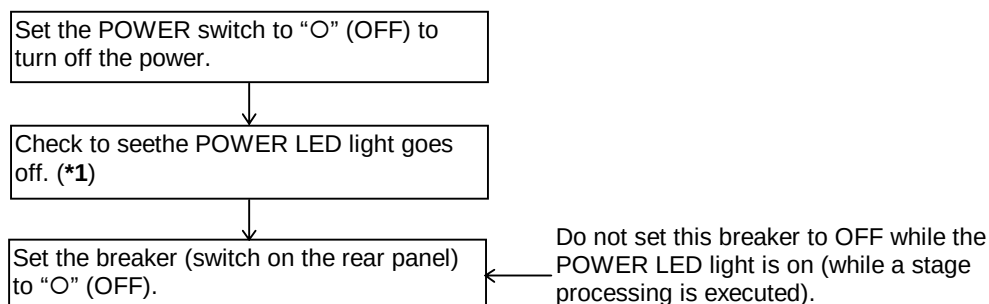
Note 3 : Even if FD which was used to restore is left at FDD after back-up operation, error won't occur on the subsystem.

2.4 Power OFF

Turn off the power correctly according to the Power OFF Procedure (1) shown below.

Notice : If optional features are not installed to the system correctly, user data may be lost.

(1) Power OFF procedure



If a power down occurs or the breaker is set to OFF by mistake before the POWER LED goes off, turn on the power right away according to the "(2) Power ON procedure" below, then execute the power off procedure above.

*1 Check the back-up state of the CACHE memory.

Be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

The CACHE memory of this unit provides write-after control. If data is not yet written, before the power is turned off, the unit automatically writes the data on the CACHE memory to the hard disk. This is called destaging. After this processing is completed, the power is turned off.

If the power is turned off in a state in which destaging cannot be completed due to an unexpected power interruption or a tripped circuit breaker, the CACHE memory switches to the back-up mode using the battery for data integrity. If any equipment of the unit is removed or inserted in this back-up mode, the battery may stop supplying power, resulting in the user data being lost. When you handle any equipment of the unit with the unit power off, be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

• Checking the back-up state of the cache memory

You can determine whether the unit is in the back-up mode by checking the indication of the CACHE PWR (green LED) on the CTL ASSY, as described below.

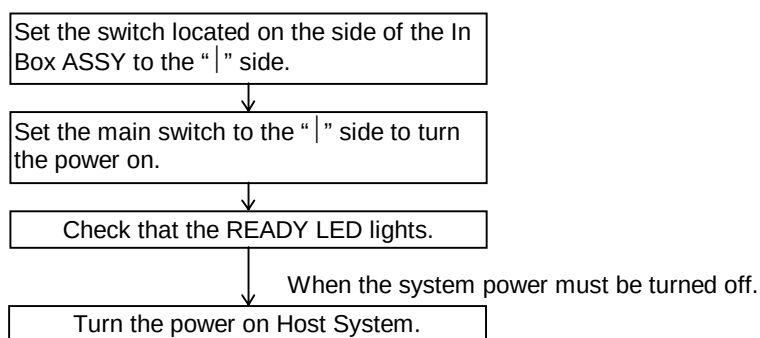
Set the circuit breaker on the rear of the unit to "I" (ON) with the power switch (POWER SW) set to "O" (OFF).

Determine the state of the memory from the indication of the CACHE PWR.

CACHE PWR LED on ----- Indicates the back-up mode.

CACHE PWR LED off ----- Indicates that the back-up mode is canceled.

(2) Power ON procedure



2.5 Attaching/Removing and Opening/Closing the Covers

2.5.1 Attaching/Removing the front cover

- (1) Removing procedure. (See Figure 2.5.1.)

① Hold the grooves at both sides of the front cover and pull it toward you.

Notice : Attach/Remove the front cover carefully to avoid subjecting the subsystem to any impact since it has precision components.

- (2) Attaching procedure. (See Figure 2.5.1.)

① Fit the guide plate of the main body with the slots of the front cover (four places), press the front cover against them.

Notice : Attach/Remove the front cover gently to avoid a shock. Precision components are installed.

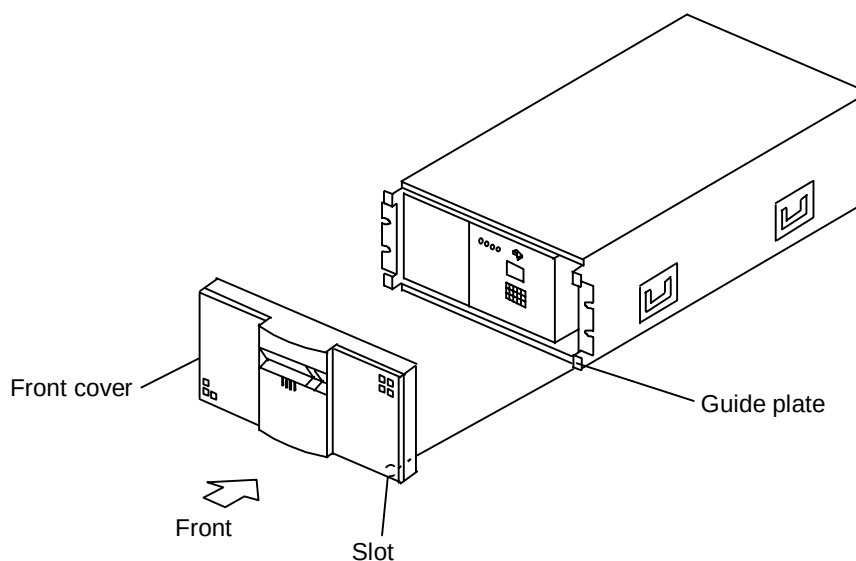


Figure 2.5.1 Attaching/Removing the Front Cover

2.5.2 Opening/Closing the front panel

(1) Opening procedure (See Figure 2.5.2.)

- ① Remove the front cover. (See RH-OPTION0120.)
- ② Insert the key, turn it to the arrow direction (· · · ➤) and hold the left of the front panel to open to the right.

Notice : Open/Close the covers carefully to avoid subjecting the subsystem to any impact since it has precision components.

(2) Closing procedure (See Figure 2.5.2.)

- ① Close the front panel.
- ② Turn the key to the arrow direction (—→) and secure the front panel.
- ③ Attach the front cover.

Notice : Keep the key carefully lest it should be lost.

Notice : Open/Close the covers gently to avoid a shock. Precision components are installed.

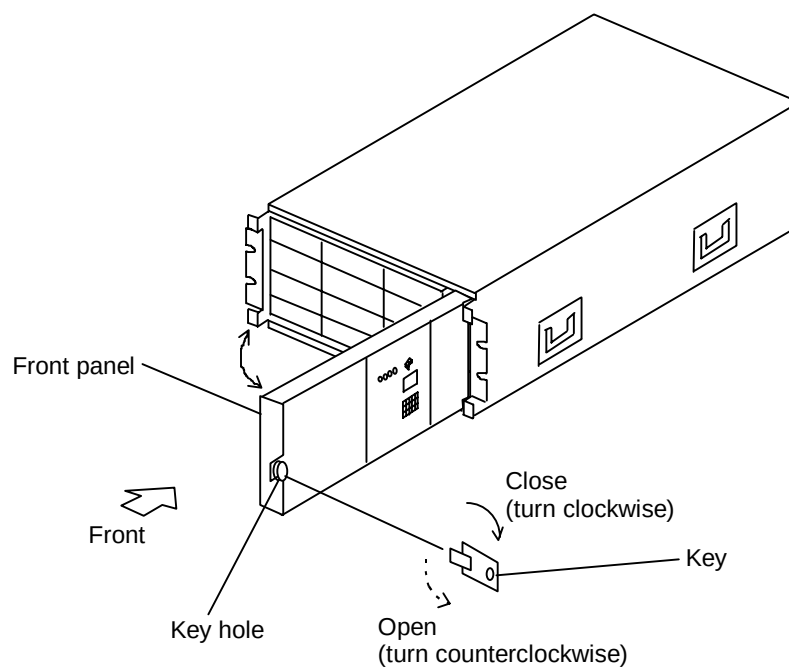


Figure 2.5.2 Opening/Closing the Front Panel

2.5.3 Attaching/Removing the rear covers

Tools : Philips screwdriver (No.2)

(1) Removing procedure (See Figure 2.5.3.)

- ① Remove (a) screw and 4 (b) screws, and remove rear cover 1.
- ② Remove 4 (a) screws of 2 rear cover 2s, and remove rear cover 2s.

Notice : Attach/Remove the rear covers carefully to avoid subjecting the subsystem to any impact since it has precision components.

(2) Installing procedure. (See Figure 2.5.3.)

- ① Fix rear cover 2 then rear cover 1 in the reversed order as removing procedure.

Notice : Attach/Remove the rear covers gently to avoid a shock. Precision components are installed.

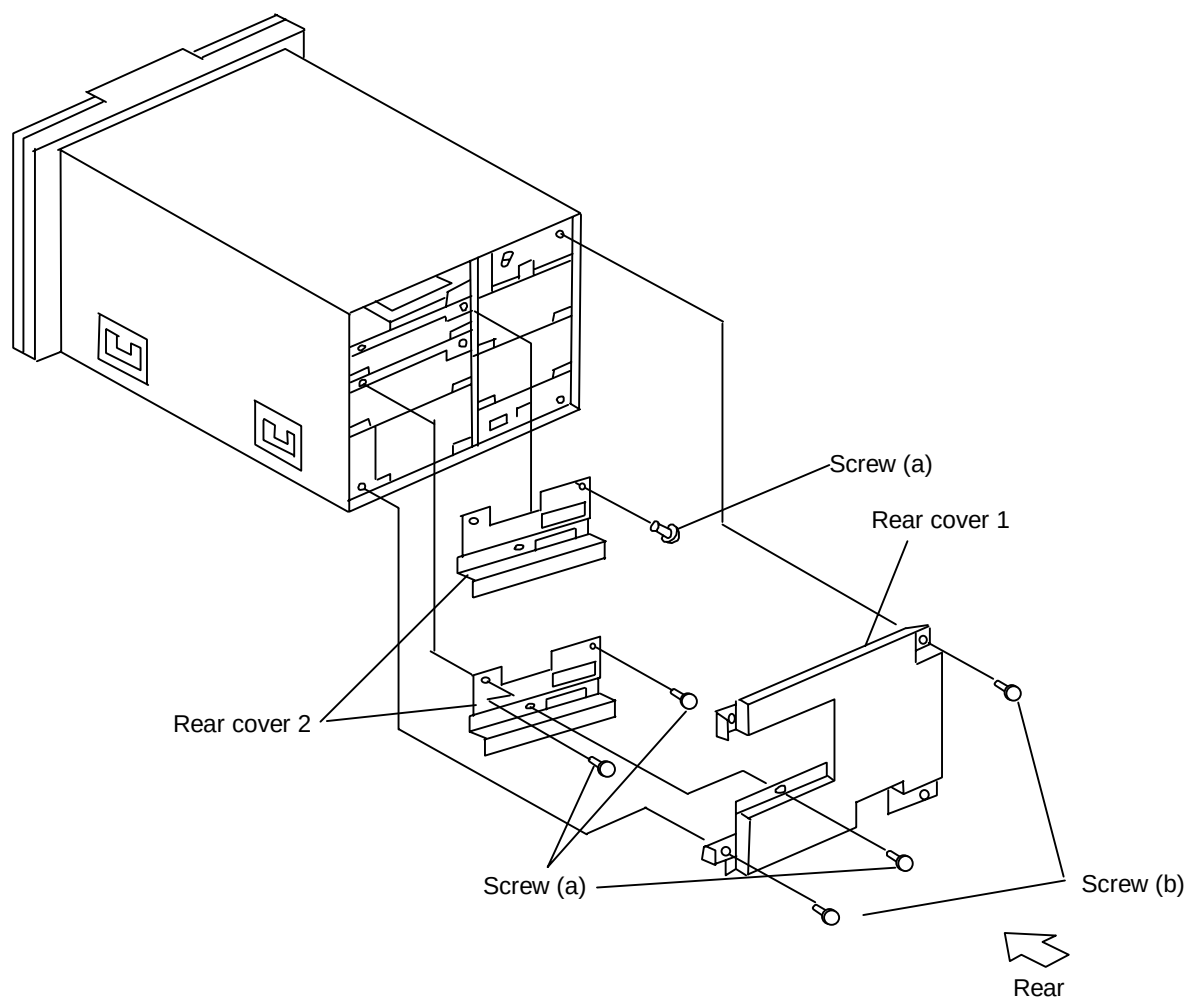


Figure 2.5.3 Opening/Closing the Rear Cover

2.6 Installing the CTL ASSY (Upgrading from Single-System to Dual-System) and I/F ADAPTER ASSY

- (1) Insert a back-up floppy disk in a drive and make a back-up copy of the system parameter into the FD.
- (2) Turn off the unit. (See RH-OPTION0110.)

Notice : If the power is not turned off normally, the user's data might be lost.

- (3) Remove rear cover 1 and 2.
- (4) Install a CACHE ASSY in the additional CTL ASSY. (Mount a CACHE ASSY of the same capacity in the same corresponding slot of the optional CTL ASSY as those of the already installed CTL ASSY respectively as shown on RH-OPTION0180.)
- (5) Insert the CTL ASSY in a predetermined position with the right and left levers opened. Push the right and left levers in the arrow-marked erection (→) at the same time. (See Figure 2.6.1.)
- (6) Install the additional I/F ADAPTER ASSY. (See Figure 2.6.2.)

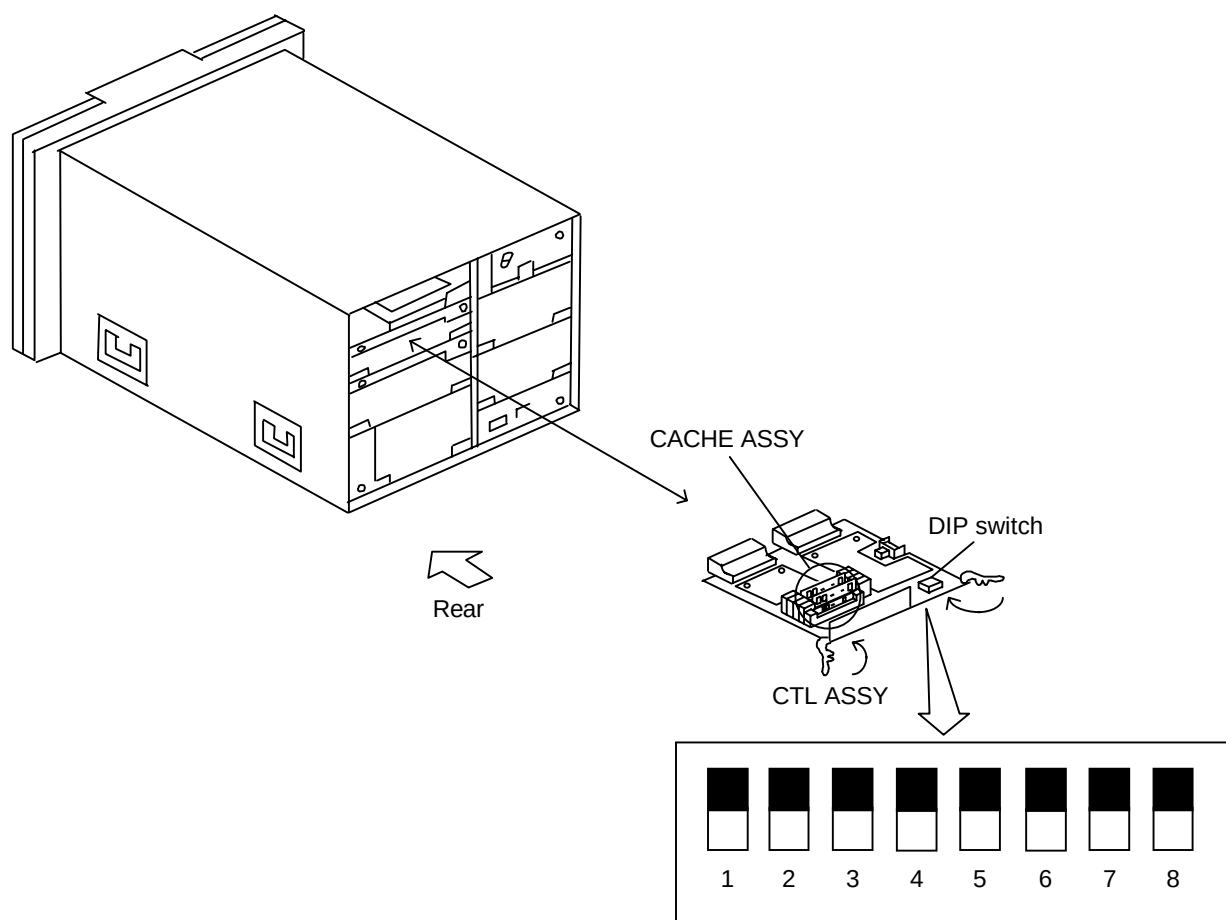


Figure 2.6.1 Installing the CTL ASSY

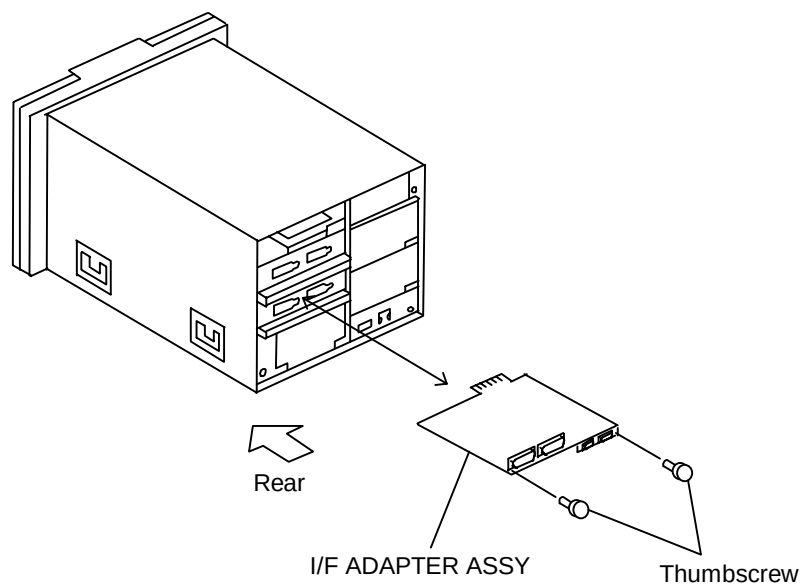
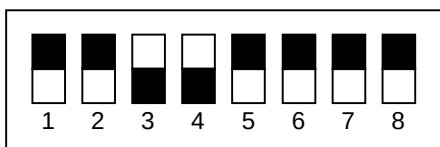


Figure 2.6.2 Installing the I/F ADAPTER ASSY

- (7) Connect Fibre cable, LAN (option) cable RS232C cable.
- (8) Set the DIP SW of both CTL ASSYs as shown below. (See RH-OPTION0110.)



Note : Be sure to set the DIP SW of both CTL ASSYs.

- (9) Insert the system parameter back-up FD and restore the system parameter data from the FD. (See RH-OPTION0080.)

- (10) When system parameter set up menu appears as below, select “DUAL MODE” in “DUAL CONFIG” (setting of Dual operation attribute) menu. (See PANEL0080.)

Set the items #1, 3, 5, 6, 9, 16 and 17 in system parameter set up menu (See PANEL0080) for each controller individually. (The other menus are common menus. Same settings are executed for both controllers. Modification by CTL1 is not available.)

- The system parameter setting menu appears on the panel in the order of CTL0 and CTL1. “■” appears on the panel when the CTL1 system parameter is to be set.

“■” not displayed : CTL0 system parameter is set.

“■” displayed : CTL1 system parameter is set.

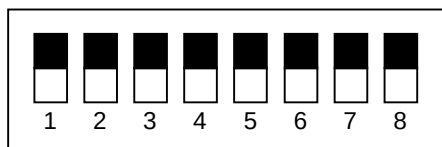


This indicates CTL0 system parameter setting.



This indicates CTL1 system parameter setting.

- (11) After the setting is ended, make a copy of the data into the back-up FD again. (See RH-OPTION0060.)
- (12) Check to see that READY LED is on.
- (13) Turn off the unit (by setting the POWER switch on the front panel to off).
- (14) Set the DIP SW on both boards as shown below.



- (15) Turn on the unit (by setting the POWER switch on the front panel to on). (See RH-OPTION0110.)
- (16) In a short while, the READY LED on the unit comes on.
Check to see “Version XXXX/X” is displayed on the PANEL, and that corresponds to see system floppy disk version.
- (17) Attach Rear Cover 1 and 2.

2.7 Installing the CACHE ASSY

- (1) Turn off the power according to the power-off procedure in RH-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Trouble shooting Section" (See TRBL0030) and turn off the power.

- (2) Remove Rear Cover 1 and 2.

- (3) Remove the CTL ASSY. (See RH-OPTION0150.)

(When a DF-F350F-F3MCF has been installed already, remove both boards, and here after in the same way.)

- (4) Install a CACHE ASSY.

Note 1 : The capacity of the CACHE ASSYs to be mounted in cache slots #0 and #4, slots #1 and #5, slots #2 and #6, and slots #3 and #7 must be the same.

Note 2 : If a DF-F350F-F3MCF has been installed already, mount a CACHE ASSY of the same capacity in the same corresponding slot of the optional CTL ASSY as those of the already installed CTL ASSY respectively.

Note 3 : CACHE ASSY of the largest capacity must be mounted cache slots #0 and #4 in case that CACHE ASSYs of different capacity are used.

- (5) Mount the CTL ASSY.

- (6) Attach Rear Cover 1 and 2 and turn the power on following RH-OPTION0110.

Installation example of CACHE ASSY

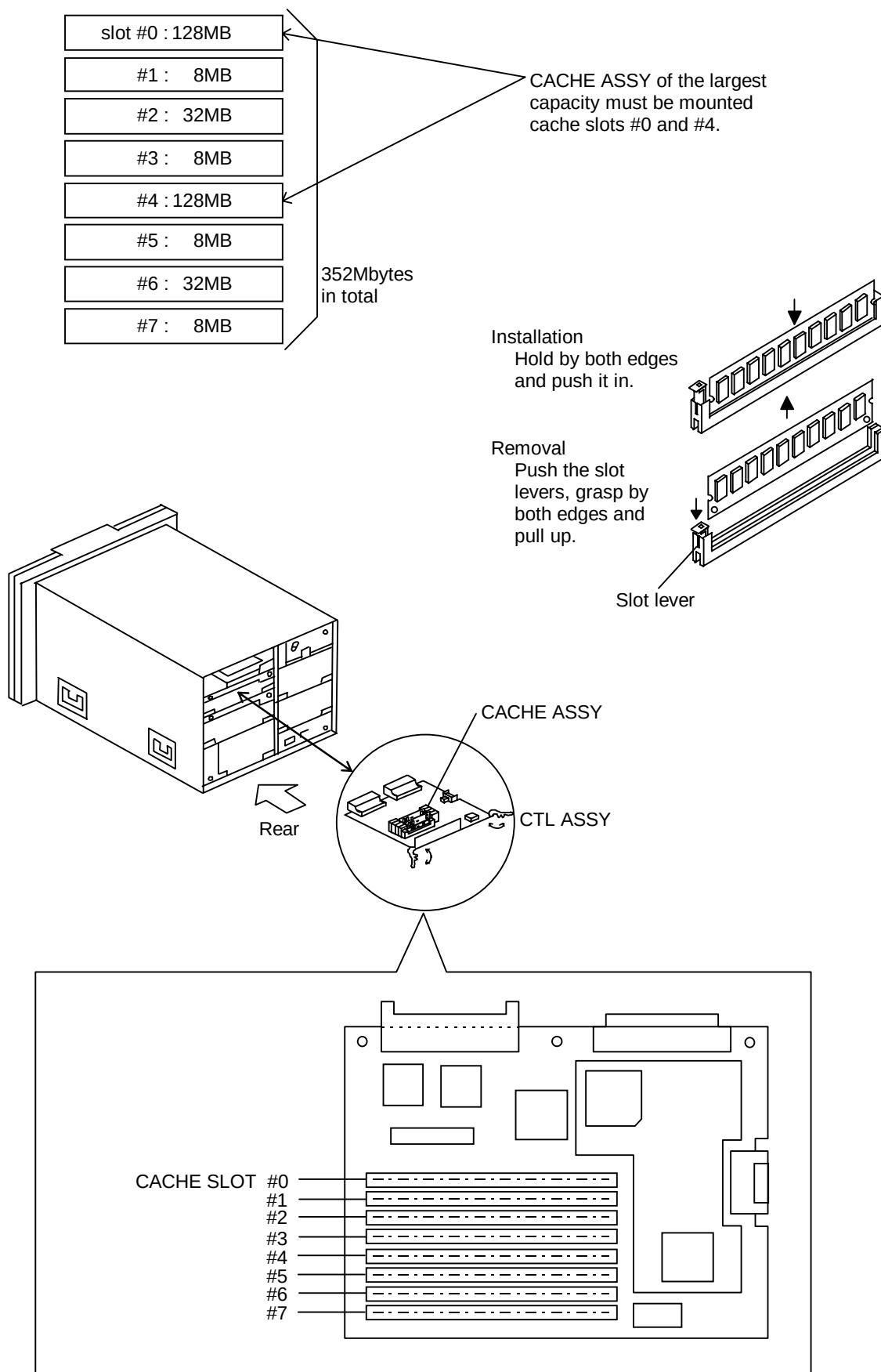


Figure 2.7.1 Installing a CACHE ASSY

2.8 Installing the LAN ASSY

- (1) Turn off the power according to the power-off procedure in RH-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

- (2) Remove rear cover 1 and 2.
- (3) Remove the CTL ASSY. (See RH-OPTION0150.)
- (4) Install a LAN ASSY. (See Figure 2.8.1.)

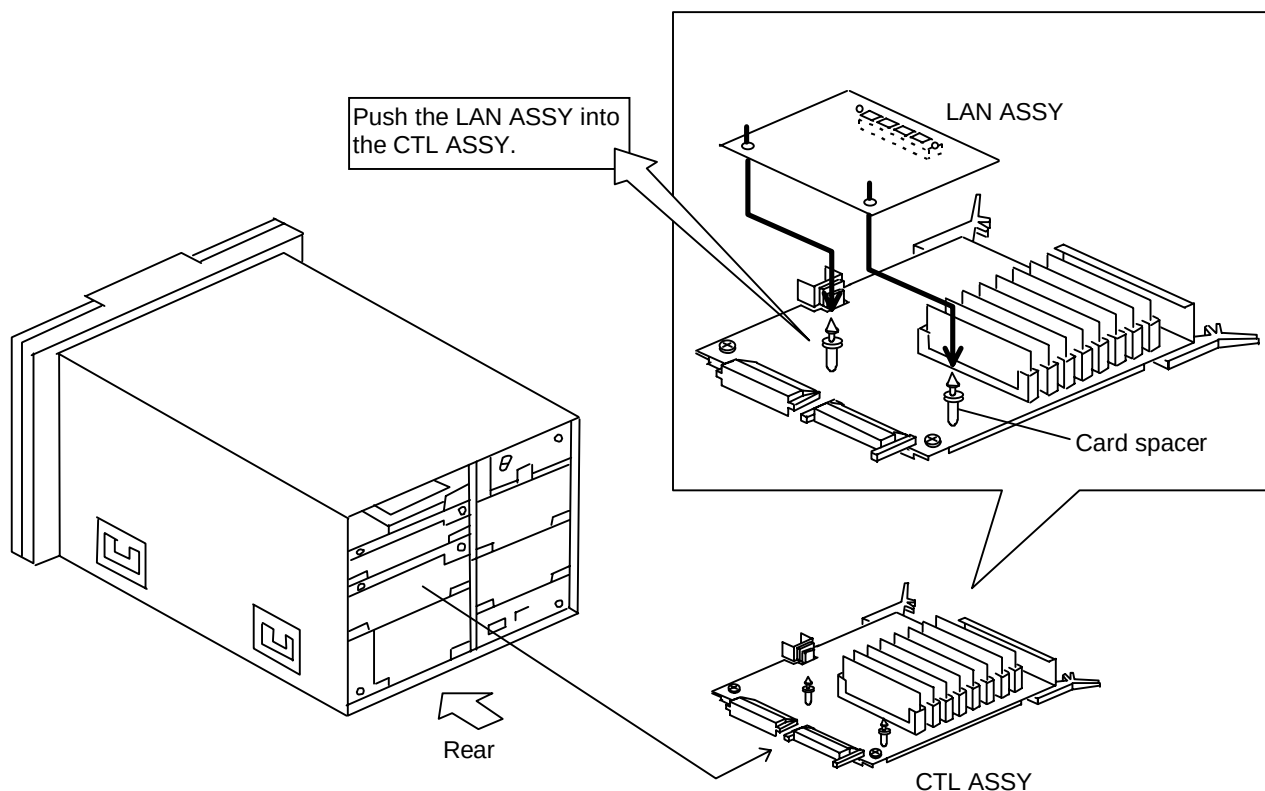
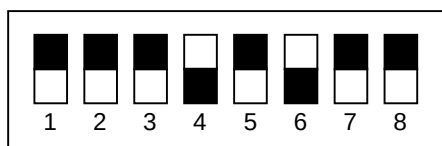


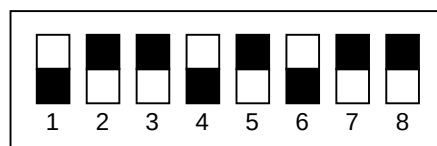
Figure 2.8.1 Installing a LAN ASSY

- (5) Mount the CTL ASSY.
- (6) Set the DIP switches on the CTL ASSY as described below. (See RH-OPTION0150.) depending on the LAN ASSY to be used.
(When a DF-F350F-F3MCF has been installed already, be sure to set the DIP switches on both CTL ASSYs.)

[DF-F350-G1M1]



[DF-F350F-G3M1 (SNMP)]



- (7) Turn on the power according to the power-on procedure in RH-OPTION0110.
- (8) Remove the front cover.
- (9) Set LAN connection state on the panel.

① Panel display

C	:	O	:	N	:	N	:	E	:	C	:	T	:						

← Pressing  ,  key, items are scrolled.

↑
Display start position (The message shown in the table below ② is displayed on this position. The current setting of the parameter is preceded by an asterisk "*".)

② Displayed Item

No.	Message display	Description
1	CONNECT	LAN connected
2	NOT CONNECT	LAN not connected

- (10) Set IP address on the panel. (See RH-INST0300)
- (11) Set SUB NET MASK. (See RH-INST0310)
- (12) Set DEFAULT GATEWAY address. (See RH-INST0320.)
- (13) Set System parameter on the panel. (See RH-INST0260.)
- (14) After setting ② in Chapter 5 and selecting "QUIT" on the panel, when "FD BACK UP" appears on the screen, insert a back-up FD and make a back-up copy of the system parameter. The "FD BACK UP" message may not appear for some unit types, so ignore this step in that case.

D	I	P	S	W	I	T	C	H	:	S	E	T	:					
Q	U	I	T	:														

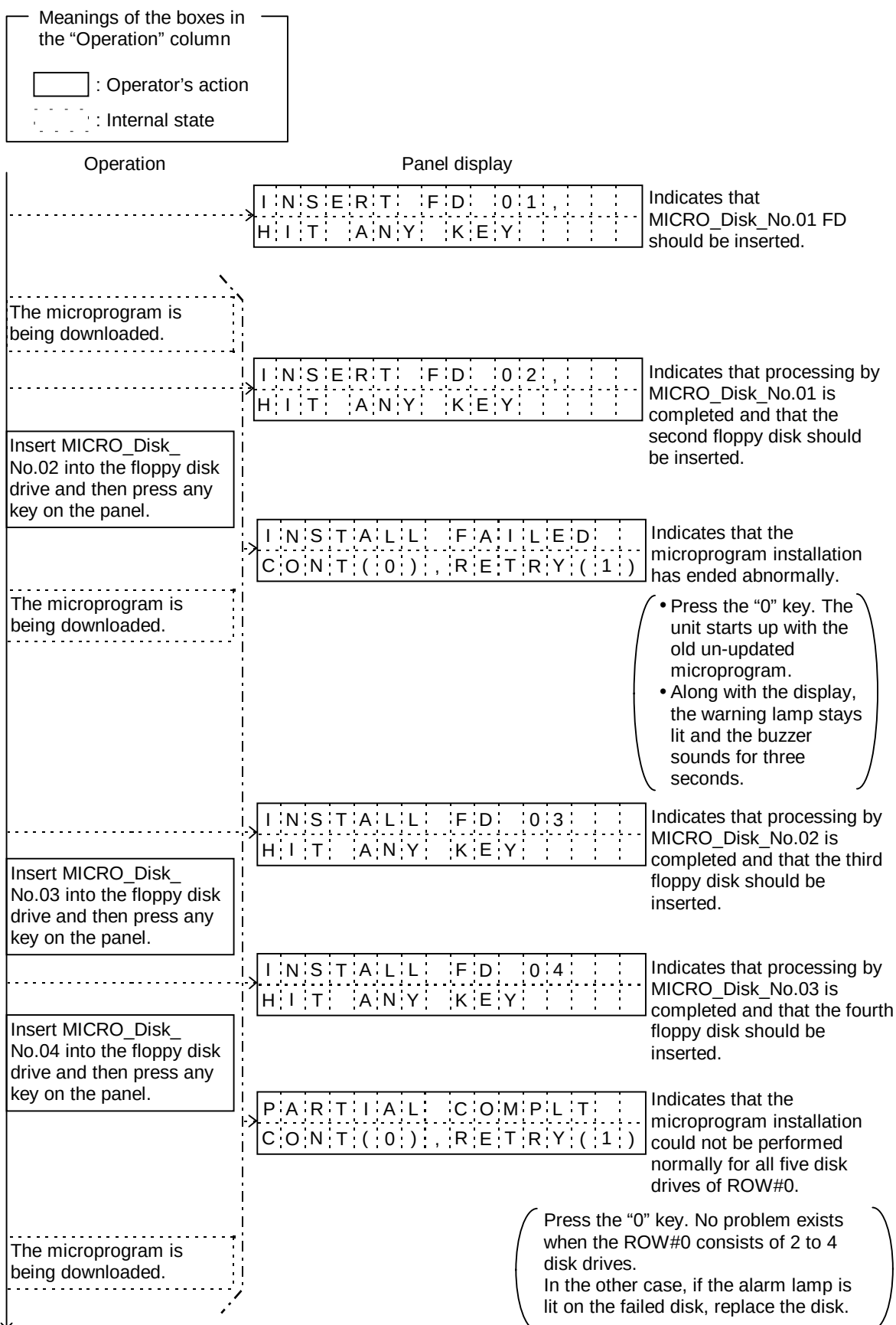


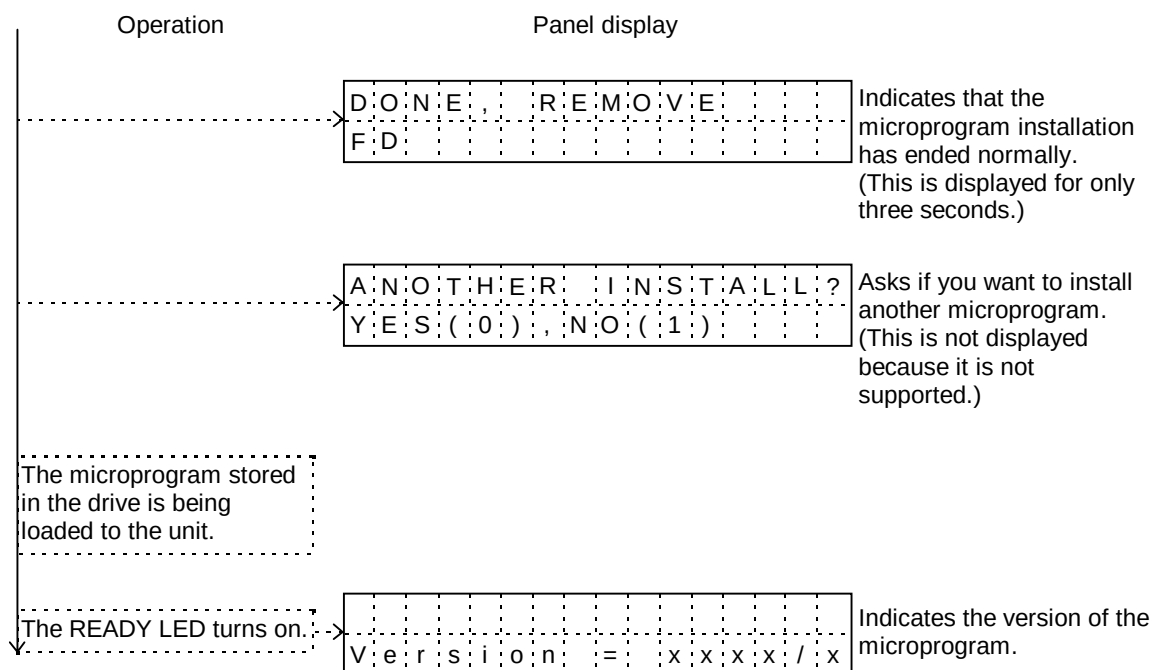
F	D	:	B	A	C	K	U	P	:	(	#	0	)	:	?			
Y	E	S	:	(	0	)	:	,	N	O	:	(	1	)	:			

If this message appears, make a back-up copy of the data in the EEPROM into the BACKUP floppy disk.
In case of dual configuration, "FD BACK UP (#1)?" is displayed. Select the controller to be restored.

(15) Perform the following procedure.

Note : Use a set of four FDs (containing a microprogram corresponding to the SNMP) supplied with the DF-F350F-G3M1 when it is shipped from the factory.





- (16) Reset the DIP switches (4, 6 or 1, 4, 6) to the original positions after the system is ready.
- (17) Close the front cover.
- (18) Close the side covers.

2.9 Installing the AC/DC Power Supply

(1) Turn off the power according to the power-off procedure in RH-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

(2) Removing procedure

- ① Remove rear cover 1 and 2.
- ② Loosen the screw ① on the safety cover and disconnect one end of the FG cable.
- ③ Loosen the screws ② on the safety cover and remove the safety cover with moving the plates in the arrow-marked direction (→).
- ④ Insert the redundant AC/DC power supply in a predetermined position and push the handle in the arrow-marked direction (→).
- ⑤ Fix the FG cable detached in (2) with screw ①.
- ⑥ Attach rear cover 1 and 2.

(3) Turn on the power according to the power-on procedure RH-OPTION0110.

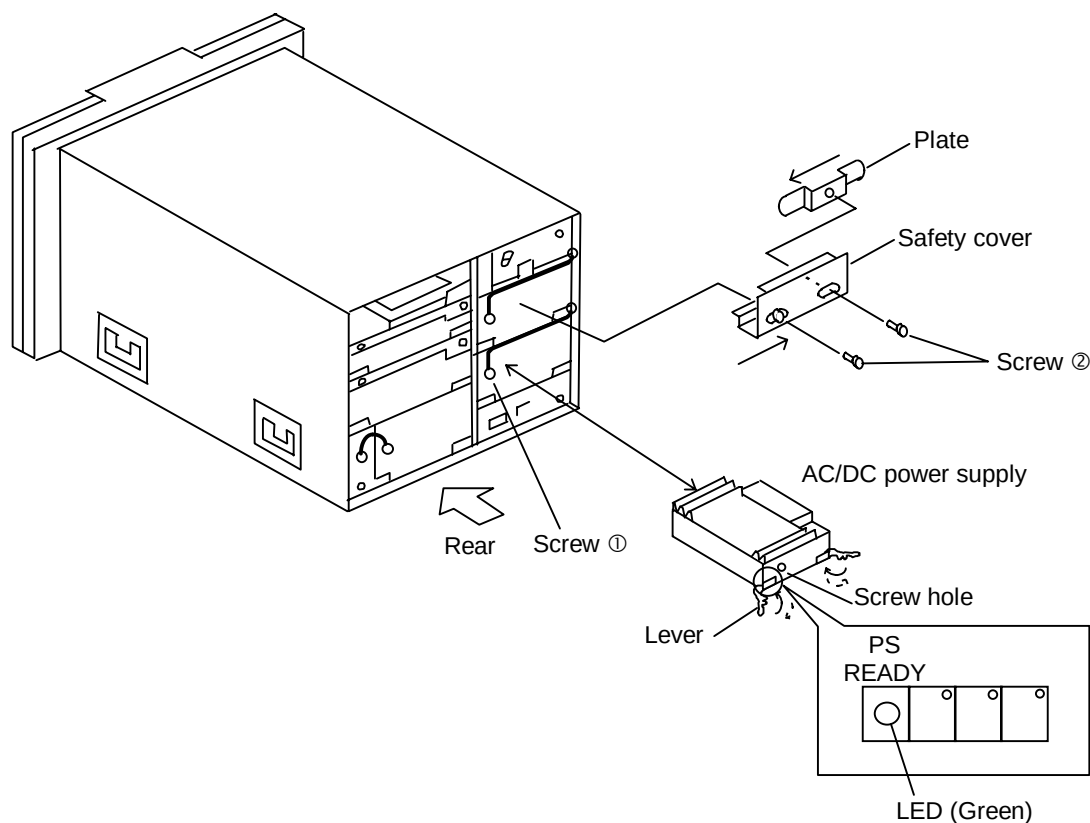
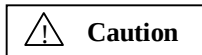


Figure 2.9.1 Installing the AC/DC Power Supply

2.10 Installing the HDU ASSY

Since the procedure differs depending on the cases below, be careful in installing the HDU ASSY.

- [1] Capacity expansion with HDU ASSY exchange
- [2] Capacity expansion with additional HDU ASSY installation
- [3] Installing a spare HDU ASSY



Caution

Do not subject the HDU ASSY to any impact or vibration since it is a precision component.

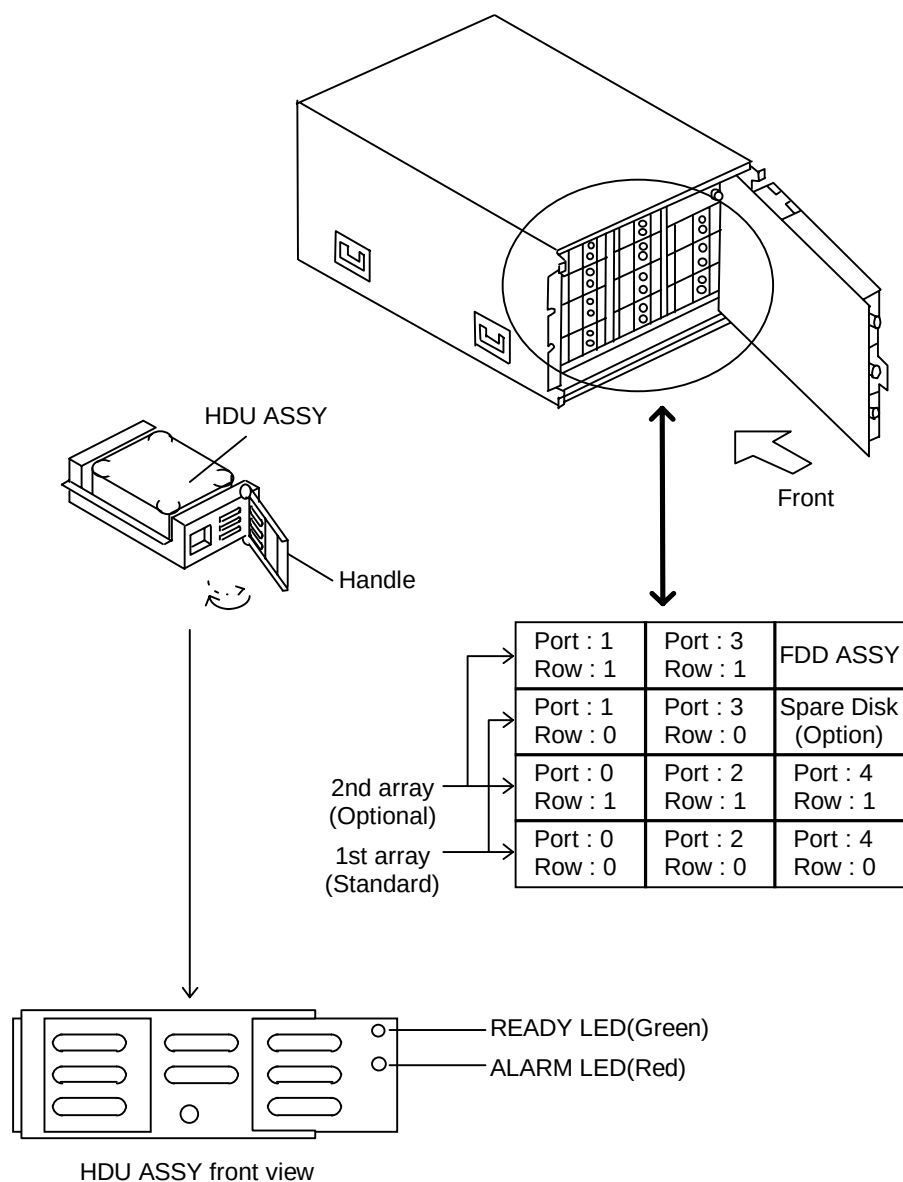


Figure 2.10.1 Installing the HDU ASSY

[1] Capacity expansion with HDU ASSY exchange

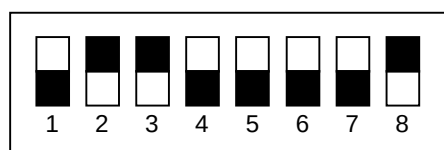
After this operation all the user's data will be lost. Be sure to make a back-up copy of data before beginning this operation. (See RH-OPTION0050.)

- (1) Turn off the power according to the power-off procedure in RH-OPTION0110.

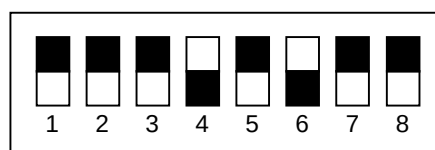
Notice : If the power is not turned off normally, the user's data might be lost.

- (2) Remove the front cover and open the front panel.
 (3) Remove the old HDU ASSY and set the new HDU ASSY. (See Figure 2.10.1 in RH-OPTION0230.)
 (4) Set the DIP switches on the CTL ASSY as described below.

(When a DF-F350F-F3MCF has been installed already, be sure to set the DIP switches on both CTL ASSYs.)



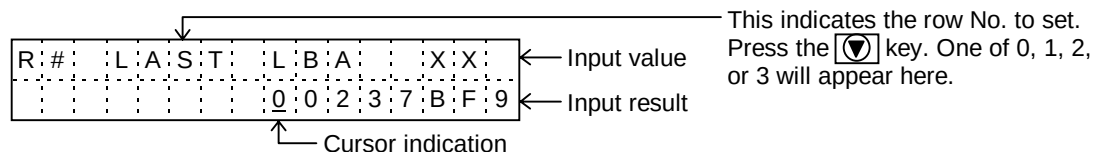
For ROW=0



For ROW≠0

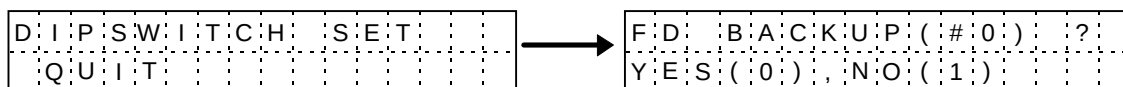
- (5) Turn on the power according to the power-on procedure RH-OPTION0110.
 (6) Set LBA on the panel following the table below. Set the capacity of each drive following the display. (See RH-OPTION0280.)

- When ROW LAST LBA is displayed;



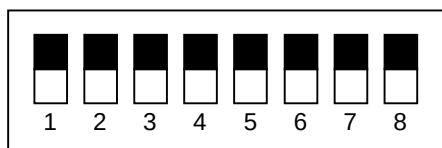
No.	Drive Capacity	Model	Final LBA No. (Hex)
1	2GB	DF-F350-A2E2	(3E696B)16
2	4GB	DF-F350-A2E4 DF-F350-A3E4	(7CD2D7)16
3	8GB	DF-F350-A1E8 DF-F350-A2E8	(1046C97)16
4	18GB	DF-F350-A1E18	(215D9B3)16

- (7) After selecting “QUIT” on the panel, when “FD BACK UP” appears on the screen, insert a back-up FD and make a back-up copy of the system parameter. The “FD BACK UP” message may not appear for some unit types, so ignore this step in that case.



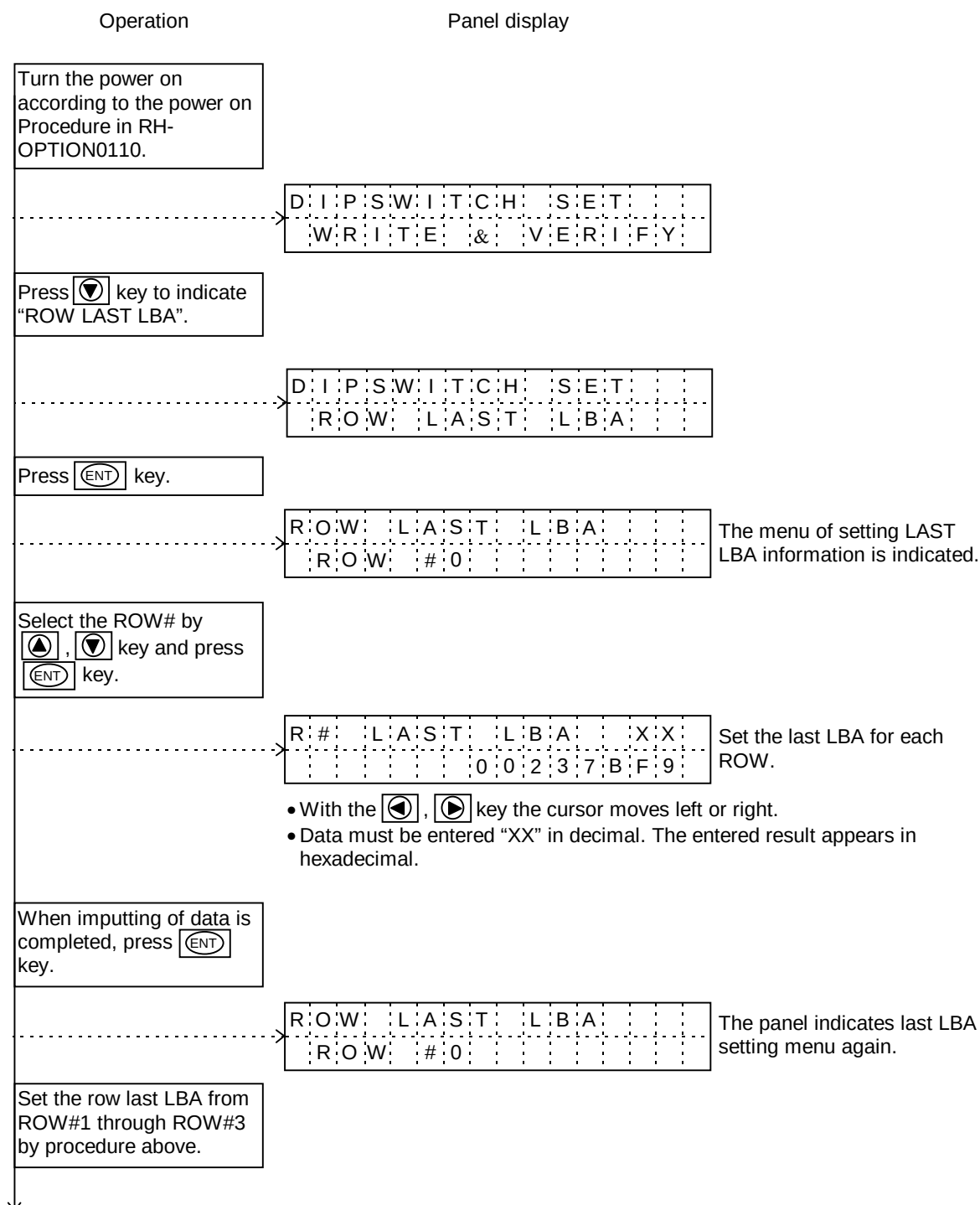
If this message appears, make a back-up copy of the data in the EEPROM into the back-up floppy disk.
In case of dual configuration, “FD BACK UP (#1)?” is displayed.
Select the controller to be restored.

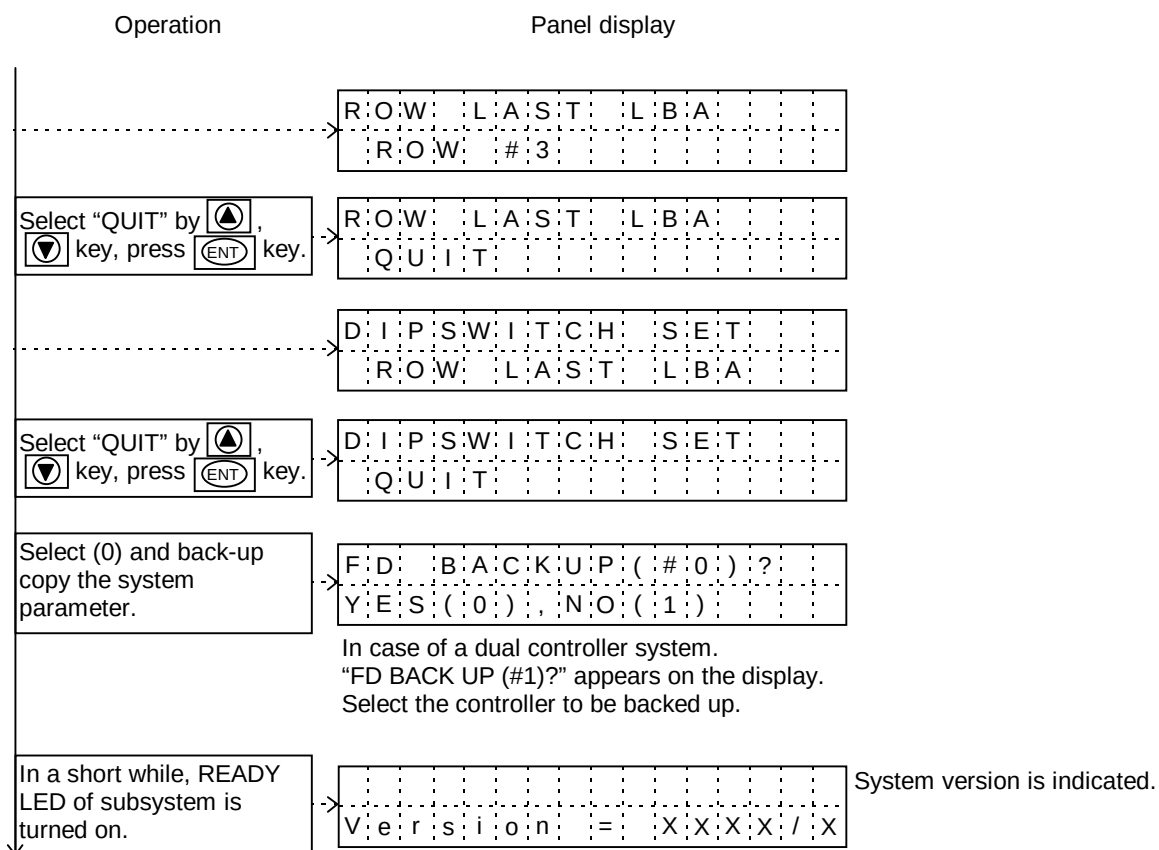
- (8) Set the DIP switches on the CTL ASSY as described below.



- (9) Only in case of exchanging ROW0 disk, revise the microprogram. (See “5 MICROPROGRAM-FC” Chapter)
- (10) Set up the RAID group and the LU. (See Installation Chapter.)
- (11) Close the front panel.
- (12) Attach the front cover.

Set the LAST LBA number on the panel according to the flow below.





[2] Capacity expansion with additional HDU ASSY installation

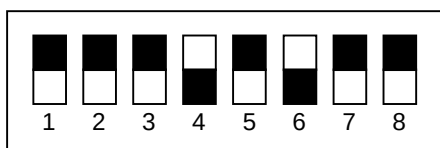
Additional HDU installation to a new ROW.

- (1) Turn off the power according to the power-off procedure in RH-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

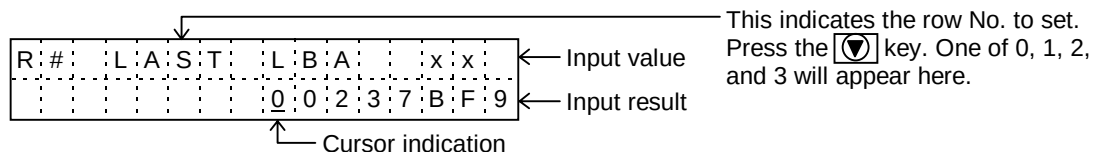
- (2) Remove the front cover and open the front panel.
 (3) Open the rear covers 1, 2.
 (4) Install an additional HDU ASSY.
 (5) Set the DIP switches 4 and 6 on the CTL ASSY to down.

(When a DF-F350F-F3MCF has been installed already, be sure to set the DIP switches on both CTL ASSYs.)



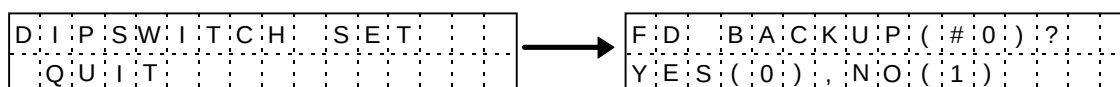
- (6) Turn on the power according to the power-on procedure in RH-OPTION0110.
 (7) Set the system LBA number with the panel according to the table below. In setting the available capacity of each drive follow ROW LAST LBA menu. Set the capacity following the displayed menu. (See RH-OPTION0260.)

- When ROW LAST LBA is displayed;



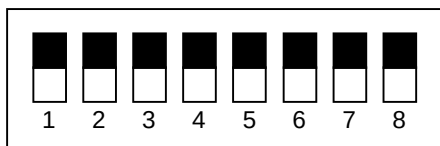
No.	Drive Capacity	Model	Final LBA No. (Hex)
1	2GB	DF-F350-A2E2	(3E696B)16
2	4GB	DF-F350-A2E4 DF-F350-A3E4	(7CD2D7)16
3	8GB	DF-F350-A1E8 DF-F350-A2E8	(1046C97)16
4	18GB	DF-F350-A1E18	(215D9B3)16

- (7) After selecting "QUIT" on the panel screen, when "FD BACK UP" appears on the screen, insert a back-up FD and make a back-up copy of system parameter. The "FD BACK UP" message may not appear for some unit types, so ignore this step in that case.



If this message appears, select (0) and make a back-up copy of the data in the EEPROM into the back-up floppy disk.
 In case of a dual system, it is displayed "FD BACK UP (#1)?". Select the controller to be backed up.

- (8) Reset the DIP switch 4, 6 to the original positions after the system is ready.



- (9) Set up the RAID group and the LU. (See Installation Chapter.)

Notice : Deleting or re-formatting the set up RAID group or LU, the data is also deleted. Be sure to make a back-up copy of user's data before execution.

- (10) Close the front panel and rear covers 1, 2.

- (11) Attach the front cover.

Additional HDU installation to existing ROW.

- (1) Turn off the power according to the power-off procedure in RH-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

- (2) Remove the front cover and open the front panel.

- (3) Install additional HDU.

Be sure to install an HDU of capacity no less than pre-installed HDUs. When an HDU of less capacity is installed, after power on (5), warning LED will light up and display shown in Figure 2.10.2 will appear.

Prepare an HDU of appropriate capacity and re-install from (1).

Set the capacity referring to the system parameter setting table.

H	:	Z	:	1	:	4	:	X	:	Y	:	P	:	O	:	N	:	C	:	A	:	P	:	-	:	X	:	Y
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

X : Port number

Y : Row number

Figure 2.10.2 Panel Display when Improper Capacity

- (4) Turn the power on following the power on procedure. (See RH-OPTION0110.)

- (5) Set up the RAID group and the LU. (See Installation Chapter.)

Notice : Deleting or re-formatting the set up RAID group or LU, the data is also deleted. Be sure to make a back-up copy of user's data before execution.

[3] Installing a spare HDU ASSY

- (1) Turn off the power according to the power-off procedure in RH-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

- (2) Remove the front cover and open the front panel.
 (3) Open the rear covers 1, 2.
 (4) Install a spare HDU ASSY.

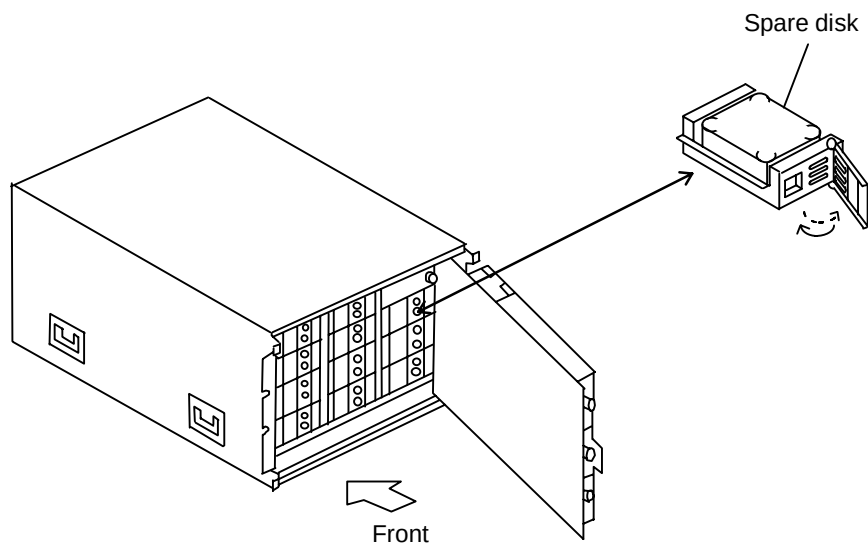
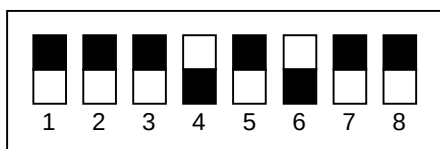


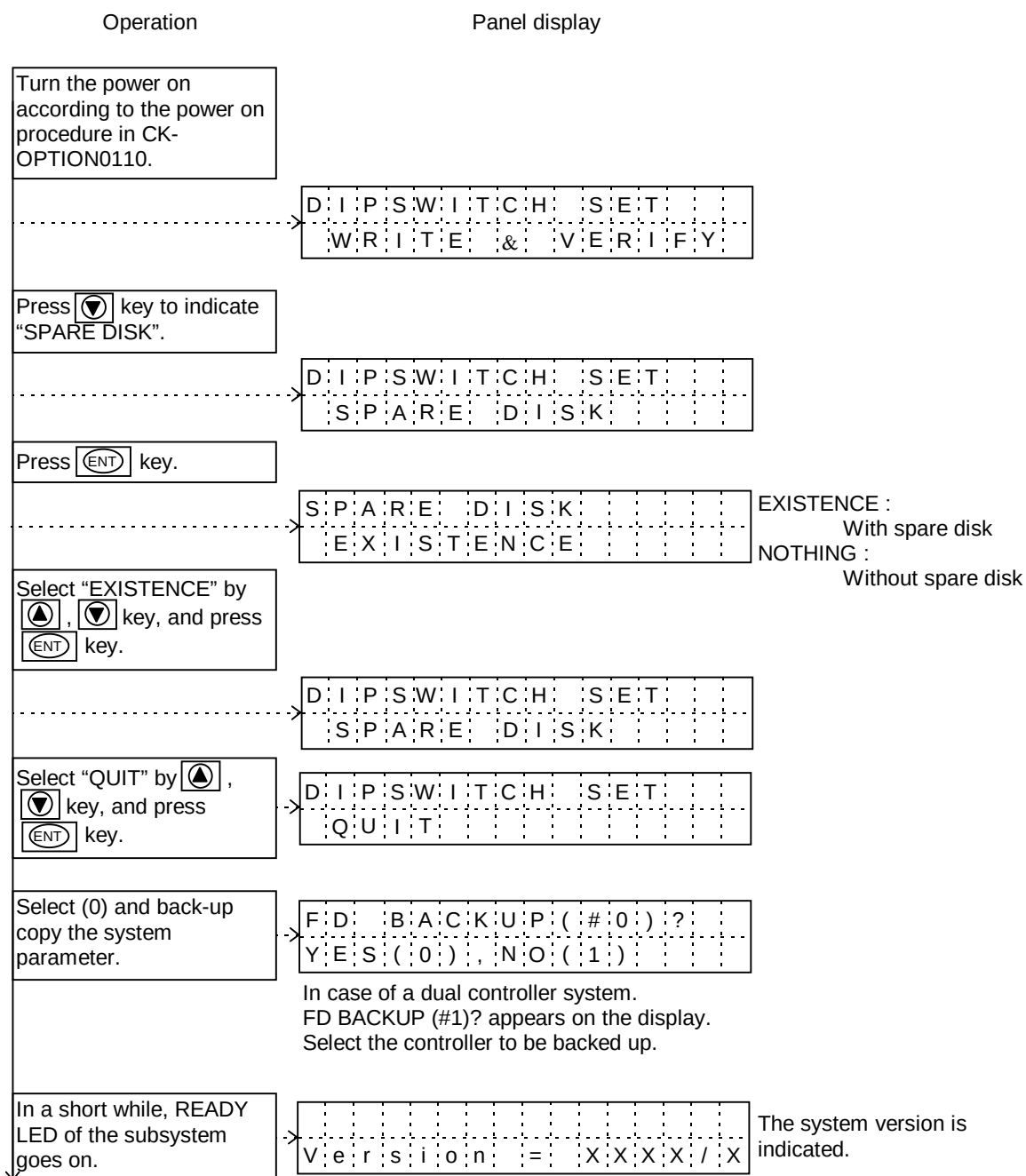
Figure 2.10.3 Installation of Spare Disk

- (5) Set the DIP switches 4 and 6 on the CTL ASSY to down.
 (When a DF-F350F-F3MCF has been installed already, be sure to set the DIP switches on both CTL ASSYs.)

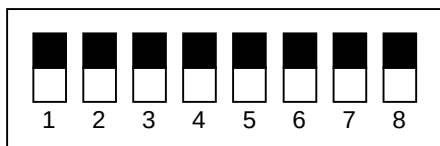


- (6) Turn on the power according to the power-on procedure in RH-OPTION0110.

(7) Set the spare disk from the PANEL according to the flow below.



- (8) Reset the DIP switches 4 and 6 to the original positions, after READY LED lit up.



- (9) Close the front panel and rear cover 1, 2.

- (10) Attach the front panel.

DF350F Disk Subsystem
10. PARTS CATALOG
(Rack Mount (RKH/U1) Type)

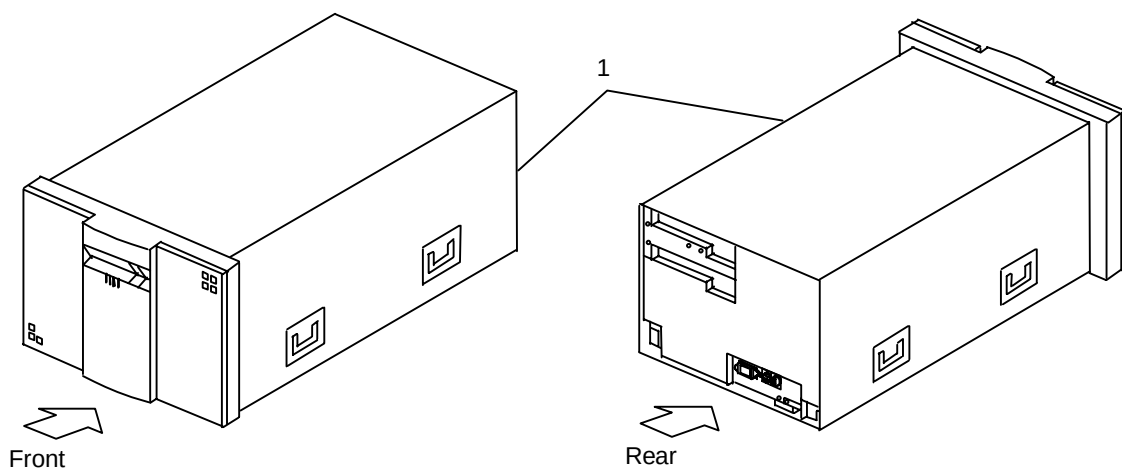
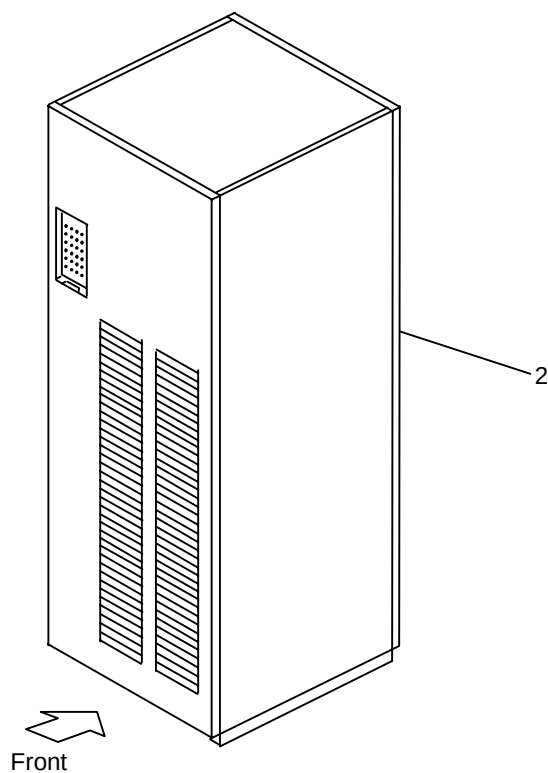
Rev.2

REV.	Date	DRW.	CHKD	APPD	Sheet No.	Description	Code
0	Jan.20.'98	A.Yamanashi	K.Aruga	H.Iwasaki	All	Issued	
1	Jul.31.'98	A.Yamanashi	K.Aruga	H.Iwasaki	0040	Added A2E8, A1E18.	AD
2	Oct.16.'98	A.Yamanashi			0040	Added A3E4.	AD

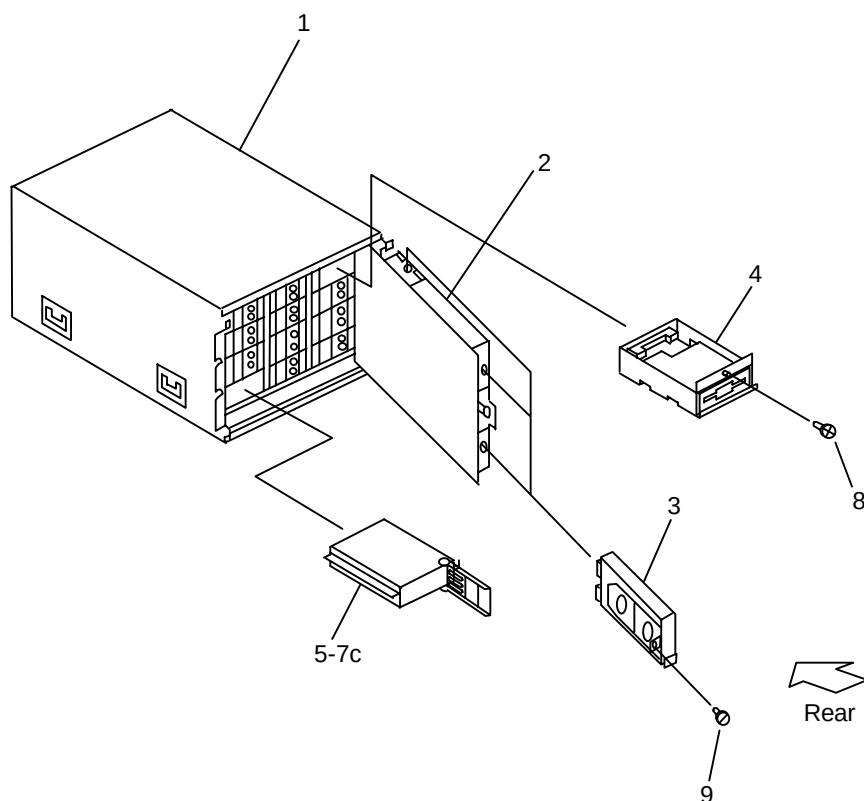
HOW TO USE THIS PARTS CATALOG

LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
1-		FINAL ASSY		
1	3244615-C	FINAL ASSY (SEE LIST1)	1	
2	2099945-A	• FRONT PANEL ASSY	1	
3	3237448-C	• FAN ASSY (DF-F350-P1M)	3	S.P.
4	3244610-A	• FDD ASSY (DF-F350-M1RH)	1	S.P.
5	3243084-E	• HDU ASSY (DF-F350-A2E2)	2-11	S.P.
6	3243084-F	• HDU ASSY (DF-F350-A2E4)	2-11	S.P.
7	3243084-G	• HDU ASSY (DF-F350-A1E8)	2-11	S.P.

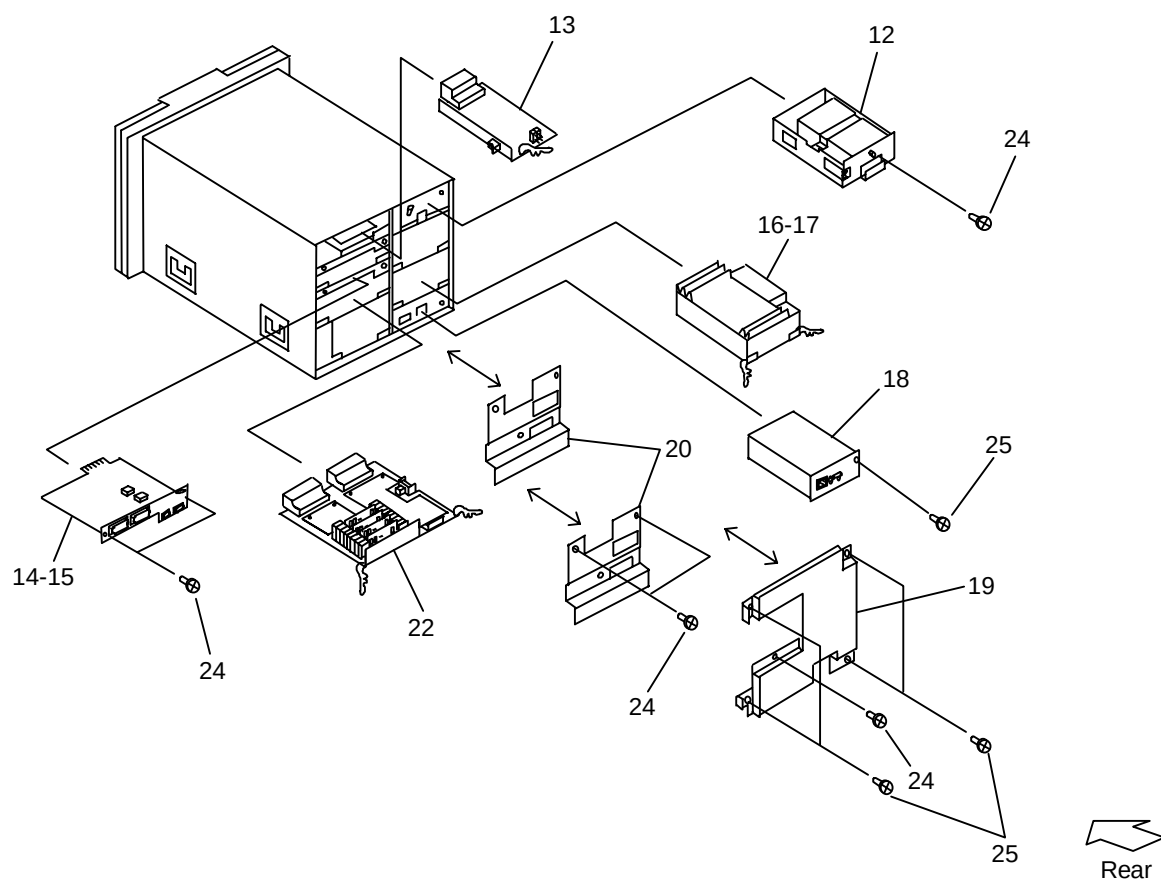
- ① indicates the list number of the assembly given on the visual index.
- ② indicates the item number given on the drawing in the catalog section.
- ③ indicates the part number.
- ④ has the following meaning.
- indicates an assembly or equivalent part.
 - indicates a subassembly or equivalent part included in an assembly indicated by....
- ⑤ indicates the unit type.
- ⑥ indicates the possible number of the subsystem.
- ⑦ indicates S.P.
- If S.P. is written in Remarks, the part or the assembly is spare parts.

**Rack Mount (RKH) Type****DF-F350-U1**

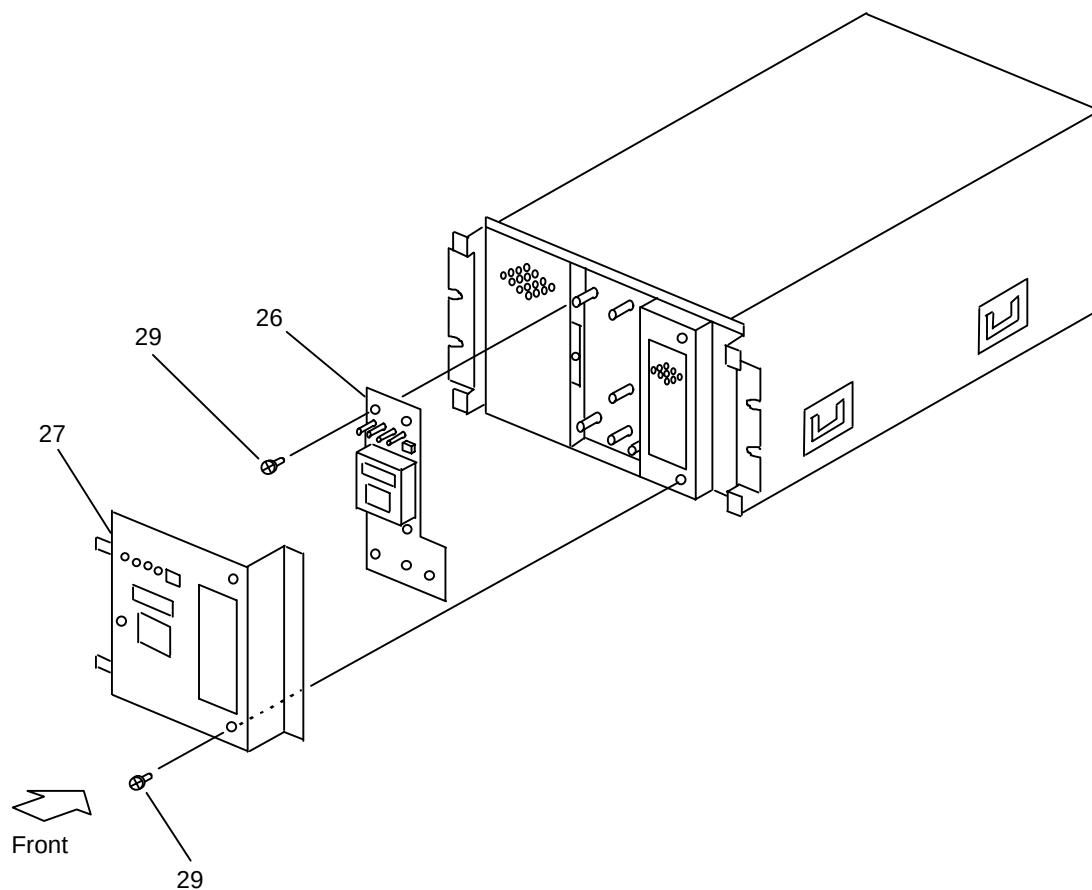
LIST NO.	NAME OF PARTS	SHEET NO.
1	FINAL ASSY (RKH)	RH-PARTS0040
2	FINAL ASSY (U1)	RH-PARTS0090



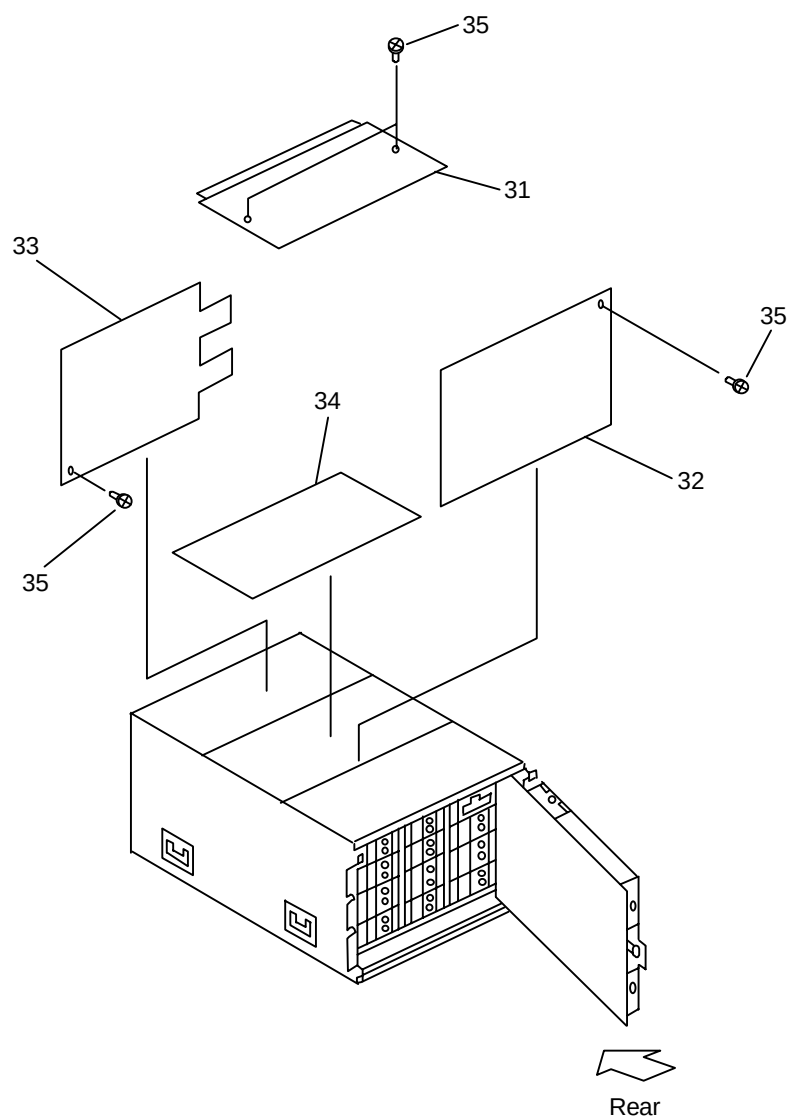
LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
1-		FINAL ASSY		
1	3244615-C	FINAL ASSY (SEE LIST1)	1	
2	2099945-A	• FRONT PANEL ASSY	1	
3	3237448-C	• FAN ASSY (DF-F350-P1M)	3	S.P.
4	3244610-A	• FDD ASSY (DF-F350-M1RH)	1	S.P.
5	3243084-E	• HDU ASSY (DF-F350-A2E2)	2-11	S.P.
6	3243084-F	• HDU ASSY (DF-F350-A2E4)	2-11	S.P.
7	3252929-E	• HDU ASSY (DF-F350-A3E4)	2-11	S.P.
7a	3243084-G	• HDU ASSY (DF-F350-A1E8)	2-11	S.P.
7b	3252929-B	• HDU ASSY (DF-F350-A2E8)	2-11	S.P.
7c	3252929-A	• HDU ASSY (DF-F350-A1E18)	2-11	S.P.
8	SB306	• BIND SCREW (M3 × 6.3)	1	
9	5483798-1	• THUMBSCREW	3	
10				



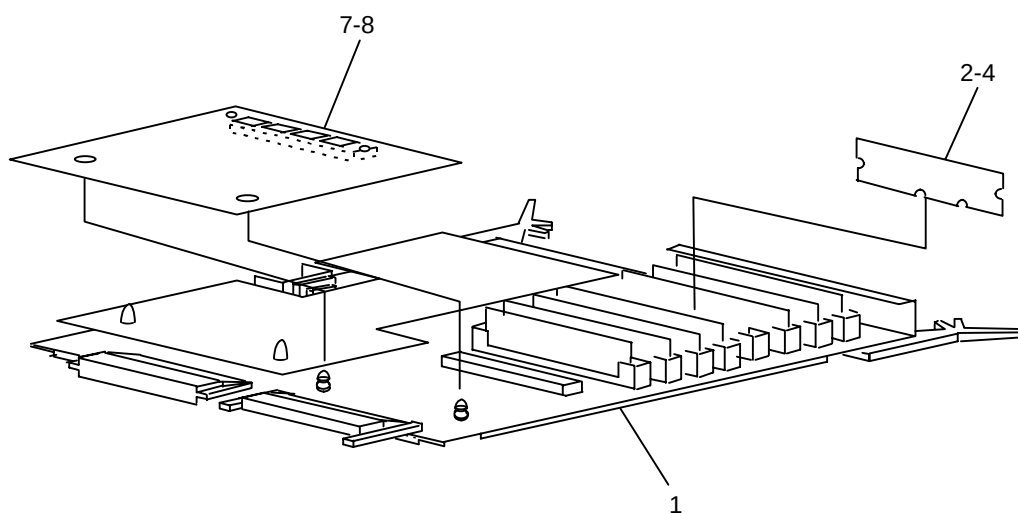
LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
1-				
11		• BATTERY ASSY (DF-F350-N1RH)	1	S.P.
12	3244611-A	• SVP ASSY (SVP) (DF-F350-L1RH)	1	
13	3243079-B			
14	3244773-1	• I/F ASSY (DUMMY)	0-1	S.P.
15	3250741-C	• I/F ADAPTER ASSY (DF-F350F-DRON)	1-2	
16	5479203-1	• AC/DC SUPPLY (DF-F350F-B3M)	1-3	S.P.
17	3243406-A	• AC/DC ASSY (BLIND)	0-2	
18	5486142-302	• IN BOX ASSY (DF-F350F-Q1R)	1	
19	3244614-A	• REAR COVER (1)	1	
20	3244692-B	• REAR COVER (2)	2	
21				
22	3250738-A	• CTL ASSY (DF-F350F-F3MCF)	1	S.P.
23				
24	SB306	• BIND SCREW (M3 × 6.3)	8	
25	SB408	• BIND SCREW (M4 × 8)	5	



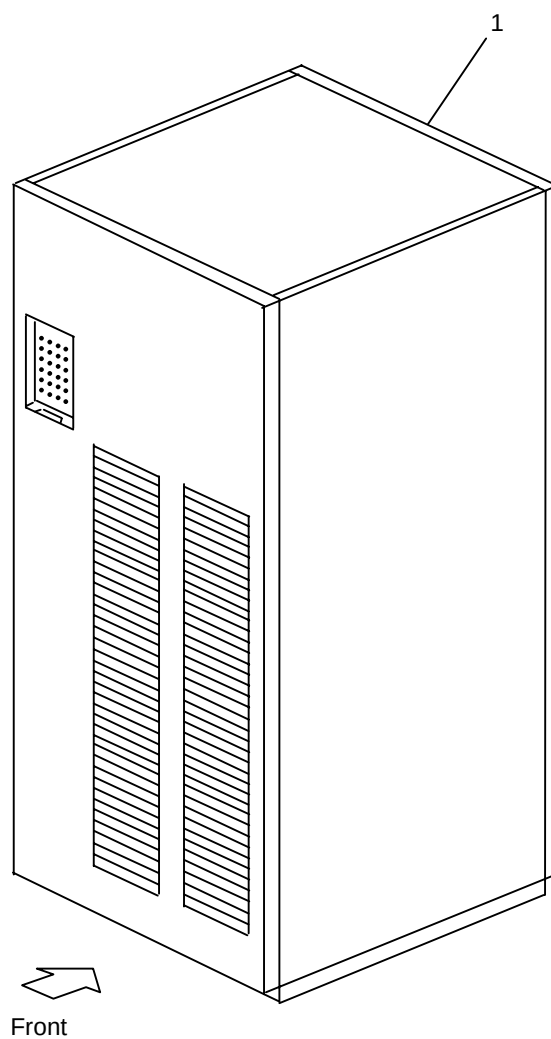
LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
1-				
26	3244612-B	• SVP ASSY (PANEL) (DF-F350-L1RHL)	1	S.P.
27	3244774-A	• COVER (LCD) ASSY	1	
28				
29	SB306	• BIND SCREW (M3 × 6.3)	9	
30				



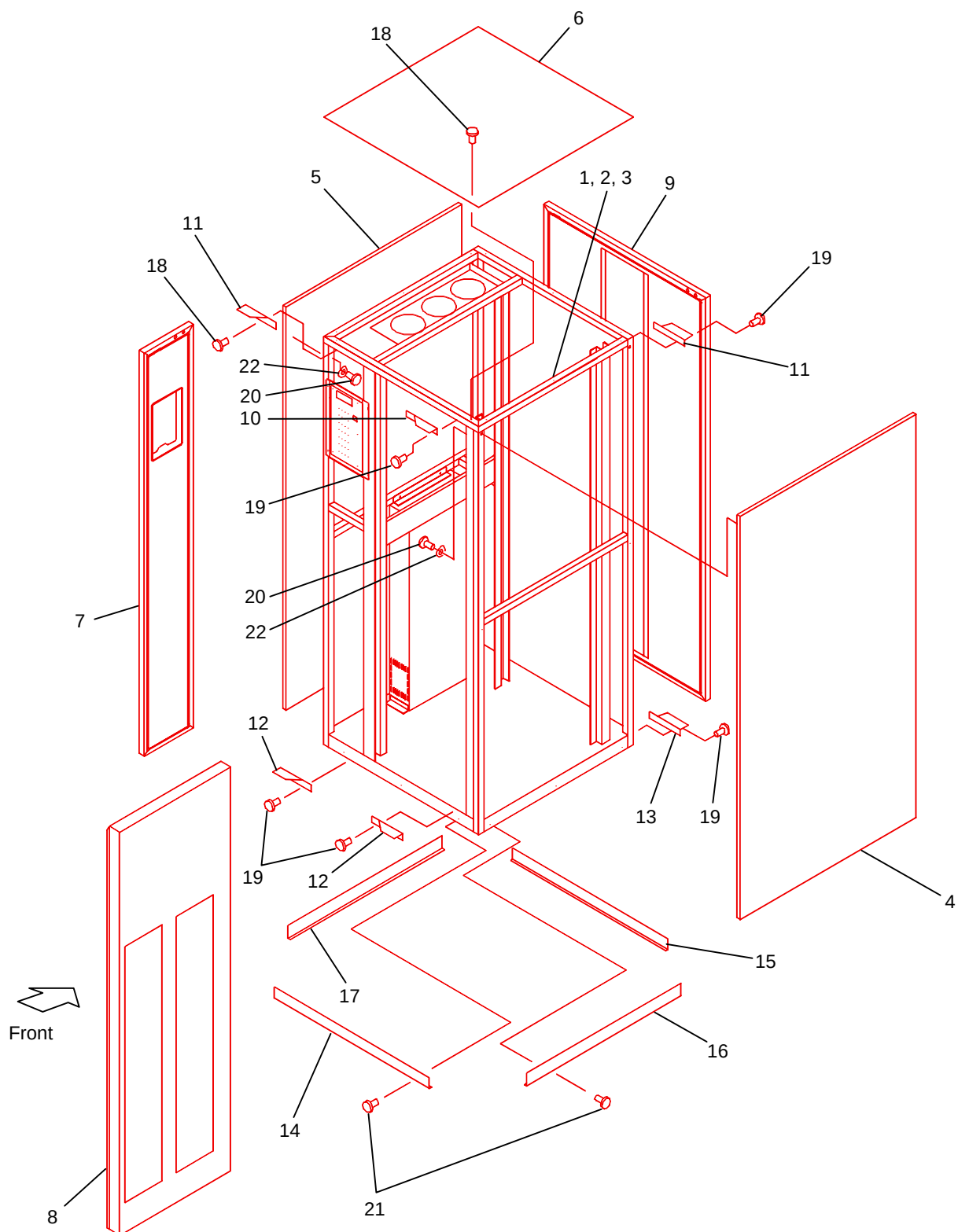
LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
1-				
31	3240448-A	• TOP COVER	1	
32	1504079-A	• SZ786 PK ASSY	1	
33	1504080-B	• SZ787 PK ASSY	1	
34	1504081-A	• SZ788 PK ASSY	1	
35	SB306	• BIND SCREW (M3 × 6.3)	40	
36				



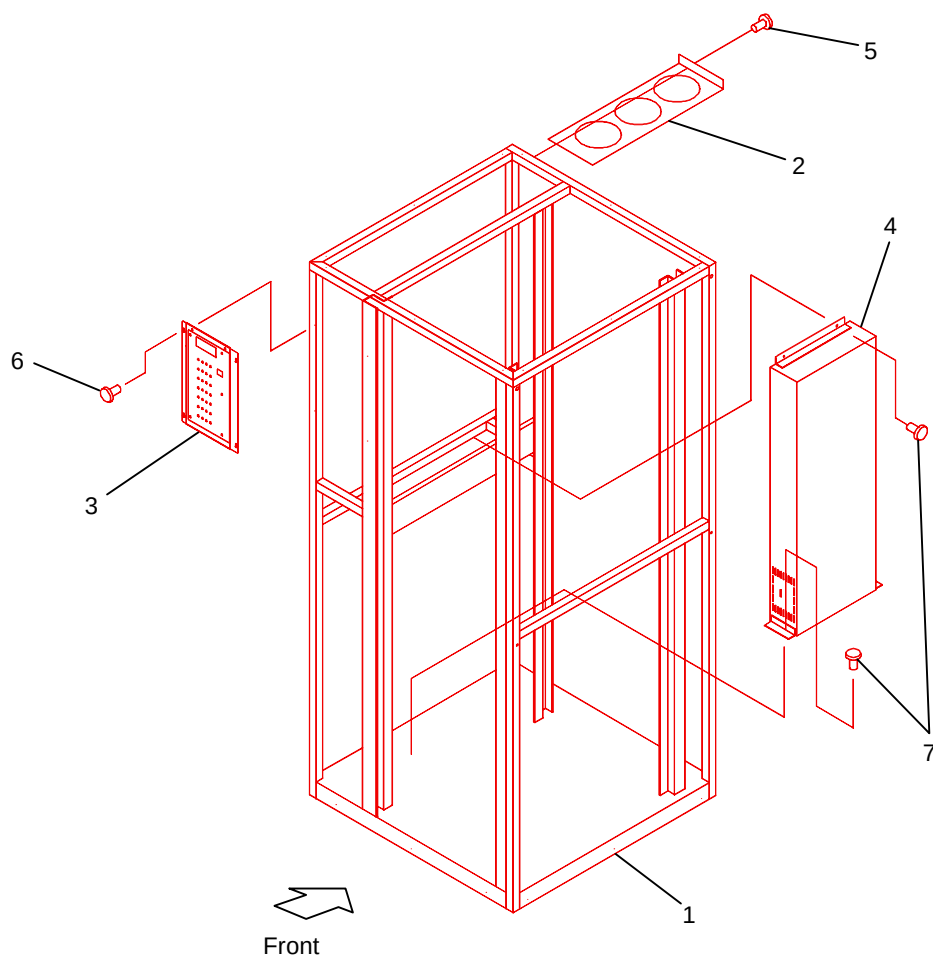
LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
1-22-		CTL ASSY		
1	3250738-A	• CTL ASSY (DF-F350F-F3MCF)	1	S.P.
2	3247121-A	•• CACHE MEMORY (DF-F350-C8E)	2, 4, 6, 8	S.P.
3	3247121-B	•• CACHE MEMORY (DF-F350-C32E)	2, 4, 6, 8	S.P.
4	3247121-C	•• CACHE MEMORY (DF-F350-C128E)	2, 4, 6, 8	S.P.
5				
6				
7	5493862-A	•• LAN ASSY (DF-F350-G1M1)	0-1	S.P.
8	5493862-C	•• LAN ASSY (DF-F350F-G3M1)	0-1	S.P.



LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
2-		FINAL ASSY		
1		FINAL ASSY (SEE LIST 2)		



LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
2-		FINAL ASSY		
1	1504062-	FINAL ASSY (DF-F350-U1)	1	
2	1504061-A	• FRAME ASSY	1	
3	3244527-A	•• FRAME (SUB) ASSY (SEE LIST 2-2)		
4	3244609-A	• SIDE COVER ASSY	1	
5	3244609-B	• SIDE COVER ASSY	1	
6	3243432-1	• COVER (TOP)		
7	1504057-A	• FRONT DOOR (A) ASSY	1	
8	1504058-A	• FRONT DOOR (B) ASSY	1	
9	1504059-A	• REAR DOOR ASSY	1	
10	5460631-A	• HINGE ASM (U)	1	
11	5460631-B	• HINGE ASM (U)	2	
12	5460630-A	• HINGE ASM (L)	1	
13	5460630-B	• HINGE ASM (L)	2	
14	3244508-1	• SKIRT (FRONT)	1	
15	3244508-2	• SKIRT (REAR)	1	
16	3244509-1	• SKIRT (SIDE R)	1	
17	3244509-2	• SKIRT (SIDE L)	1	
18	3183101-1	• HWA BIND SCREW	12	
19	BS510	• HEXAGON SOCKET BOLT (M5 × 10)	12	
20	SB536	• BIND SCREW (M5 × 36)	8	
21	5409006-1	• SCREW (BLACK)	12	
22	2051001-532	• LL WASHER	8	
23				



LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
2-2-		FRAME ASSY		
1	3244527-A	• FRAME (SUB) ASSY	1	
2	2099974-A	•• FAN (U1) ASSY	1	
3	3244608-A	•• OP PANEL ASSY	1	
4	5490538-A	•• PDB (POWER DISTRIBUTION BOX)	1	
5	SB416	• BIND SCREW (M4 × 16)	2	
6	SB316	• BIND SCREW (M3 × 16)	4	
7	SB408	• HEXAGON SOCKET BOLT (M4 × 8)	6	

DF350F Disk Subsystem

11. INSTALLING IN RACK FRAME

(Rack Mount (RKH/U1) Type)

Rev.2

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

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REVISION CONTROL

Legend for revision codes : AD : Addition CH : Change CR : Correction DL : Deletion

REV.	Date	DRW.	CHKD	APPD	Sheet No.	Description	Code
0	Jan.20.'98	T.Okada	K.Aruga	H.Iwasaki	All	Issued	
1	Jul.31.'98	A.Yamanashi	K.Aruga	H.Iwasaki	0130 0230	Changed CAUTION. Cahnged CAUTION.	CH CH
2	Oct.16.'98	A.Yamanashi			0120	Added 12, 13 on URASD table.	AD

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1.2 Optional Parts Required for Installation	RH-FRAME0040
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1.4.4 Installing the spacer.....	RH-FRAME0090
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1. Installing Into HP Rack Frame

1.1 Space (Height Inside the Rack) Required for Installation

The space of 7 units height (EIA standard) is required to install DF350F-RKH into the HP rack.

1.2 Optional Parts Required for Installation (Model names : DF-F350-URHP)

Table 1.2.1 shows optional parts required to install one DF350F-RKH disk subsystem.

Table 1.2.1 Parts Required for Installation of DF-F350-URHP

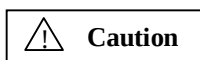
No.	Part No.	Part Name	Qty.	Remarks
①	3243426-1	Rail	1	For right hand side
②	3243426-2	Rail	1	For left hand side
③	5490710-1	Stopper	1	For the rail (R)
④	5490710-2	Stopper	1	For the rail (L)
⑤	5486490-1	Spacer (HP)	2	RKH
⑥	3250931-1	Spacer (HP)	2	RKWH (Not used RKH)
⑦	5486485-1	Fastener	14	For securing the subsystem/rails (2 spares are included)
⑧	BH612	Bolt (M6 × 12.5)	4	For securing the spacer (HP) (2 spares are included)
⑨	SB516	Binding screw (M5 × 16)	10	For securing the rail (2 spares are included)
⑩	BS508	Hexagon socket head bolt (M5 × 8)	6	For securing the stoppers (2 spares are included)
⑪	SB532	Binding screw (M5 × 32)	6	For securing the subsystem (2 spares are included)
⑫	WP005	Washer (M5)	6	For the hexagon socket head bolt (2 spares are included)
⑬	3243319-69	Nameplate (parts)	1	Already affixed to the rail
⑭	5409042-3	Repeat binder	3	For securing SCSI and AC cables on the subsystem

1.3 Tools Required

- Socket wrench (4mm)
- Spanner (10mm)
- Philips screwdriver (No.2)
- Torque wrench (T25) (*1)

*1 : Used to remove parts previously installed in the HP frame.

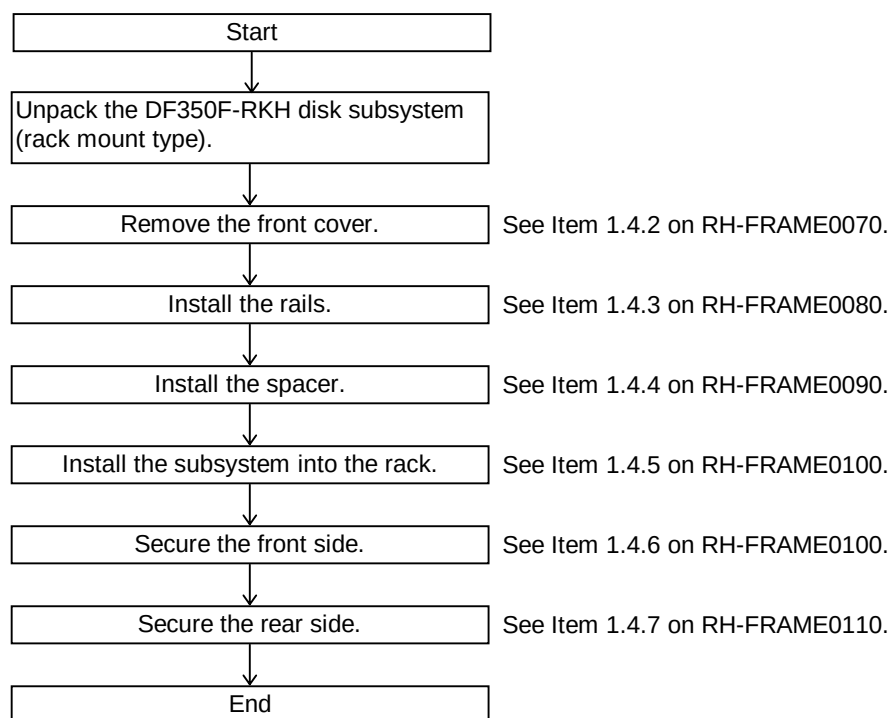
1.4 Installing the Subsystem into the Rack



- The leveling bolts of the frame should have been lowered to touch the floor before installing the subsystem into the rack.
Do not attempt to start installation before lower the leveling bolts (to prevent the equipment from falling).
- Do not drawout two or more subsystems from the rack at a time (to prevent the equipment from falling).
- Be sure to perform the work with two or more persons. The weight of the DF350F-RKH disk subsystem is approximately 60kg.
- Install subsystems to the rack starting from the bottom position, in order to prevent turning over.
- Do the work following other safety instructions concerning HP rack frame.

1.4.1 Procedures for installation

Install the unit following the procedure below.



1.4.2 Removing and installing the front cover

(1) Removal and installation of the front cover.

① Removal

Hold the grooves located on both sides of the front cover and pull the front cover toward you to remove it.

② Installation

Mate the grooves of the front cover with the guide plate of the subsystem, and secure the front cover by pressing its four corners.

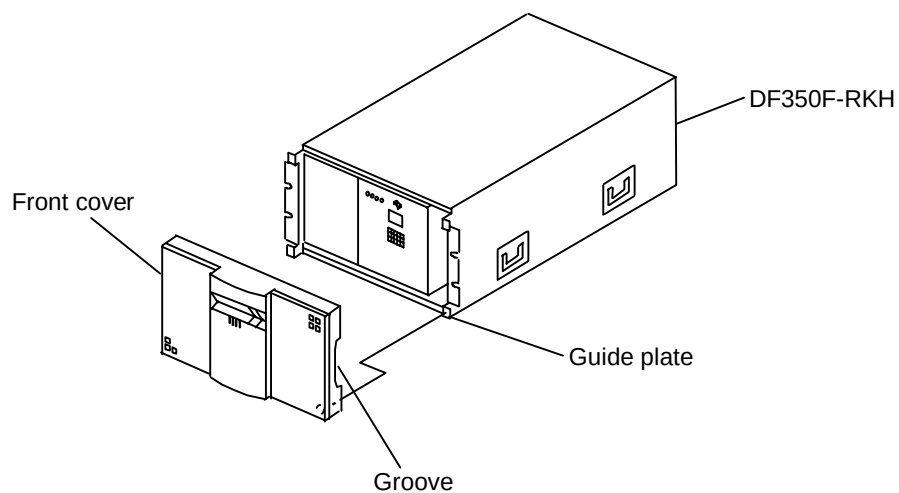


Figure 1.4.1 Removing and Installing the Front Cover

1.4.3 Installing the rails (See Figure 1.4.2 and 1.4.3.)

- (1) Temporarily secure the ③ Stopper (R) to the ① Rail (R) using ⑩ Hexagon socket head bolts (M5 × 8) and ⑫ Washer (M5) (at two places). (See Figure 1.4.2.)
- (2) Insert the protruded portions of the ① Rail (R) into the rectangular holes on both the front and rear sides of the rack frame at right hand side of the desired installing position. (See Figure 1.4.3.)
- (3) Install the fasteners aligning their holes with the holes of the rail and the rack frame (at two places each on the front and rear sides). (See Figure 1.4.3.)
- (4) Secure the ① Rail (R) using the ⑨ Binding screws (M5 × 16) (at two places each on the front and rear sides).
- (5) Temporarily attach the ④ Stopper (L) to the ② Rail (L), and secure the ② Rail (L) to the rack frame in the same way.

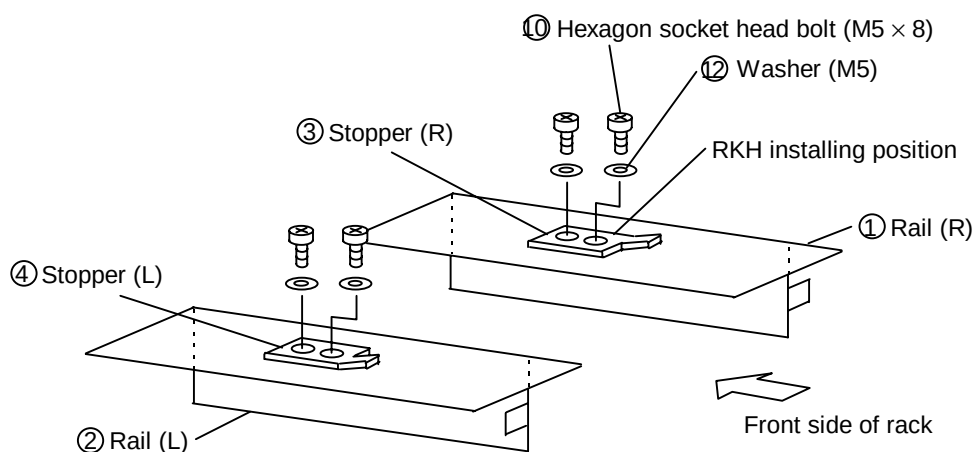


Figure 1.4.2 Temporary Attachment of the Stopper

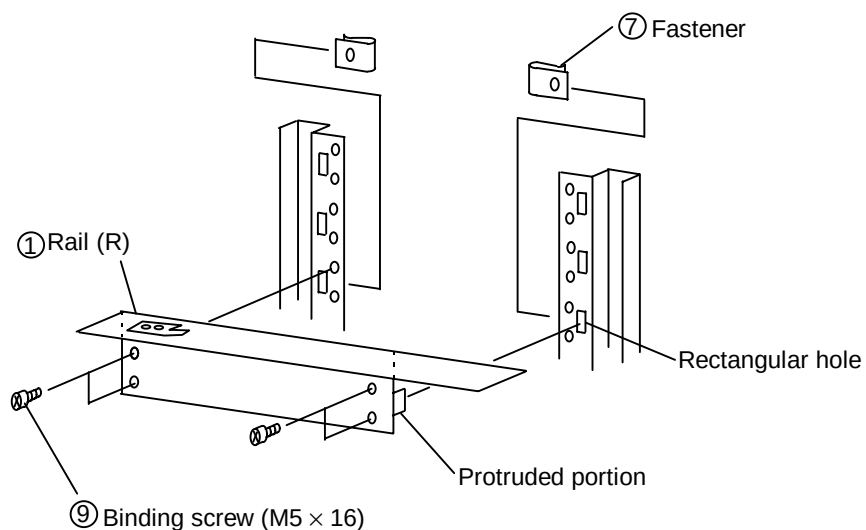


Figure 1.4.3 Securing the Rail to the Rack Frame

1.4.4 Installing the spacer (See Figures 1.4.4 and 1.4.5.)

- (1) Insert the ⑧ Bolt (M6 × 12.5) into the hole in the face of the rack frame from the inner side, place the indented side of the ⑤ Spacer (HP) against the rack, and secure the spacer so that it becomes parallel with the rack frame (two places, on the right and left sides).
- (2) Install the fasteners to the rack frame at the positions where the spacer is indented at 1st and 3rd indentations.

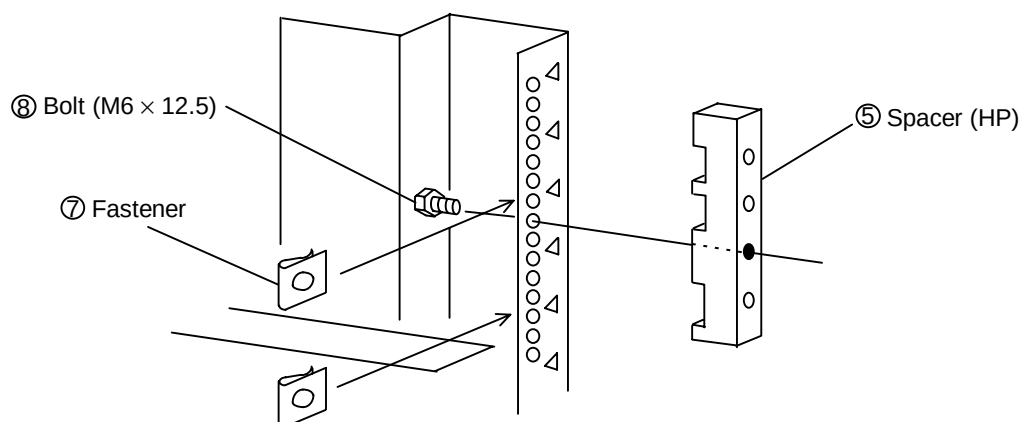


Figure 1.4.4 Installing the Spacer and Fasteners

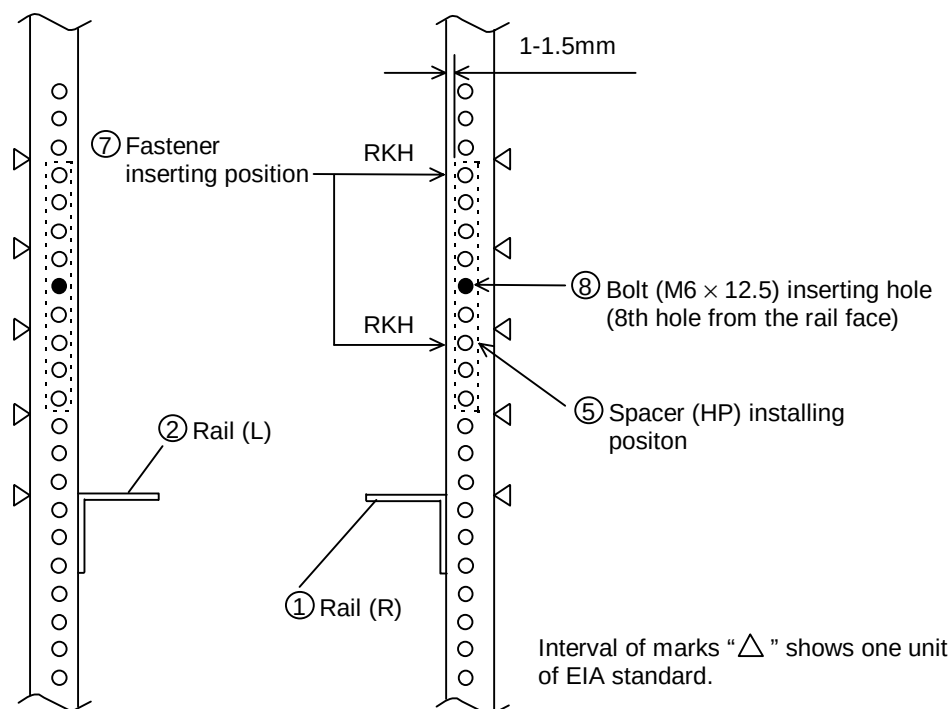
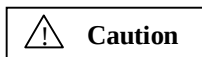


Figure 1.4.5 Relationship between the Installing Positions of the Rail and the Spacer (HP)

1.4.5 Installing the subsystem into the rack (See Figure 1.4.6.)



The mass of the DF350F-RKH is approximately 60kg. Be sure to hold it by its handles with two or more persons when installing it in the rack frame.

Make sure that the front panel of the DF350F-RKH is secured tightly before installing the DF350F-RKH in the rack frame. If not, the front panel may come off during the installation causing a personal injury.

- (1) Hold the four handles and place the subsystem on the rails. Then, push it all the way into the rack.

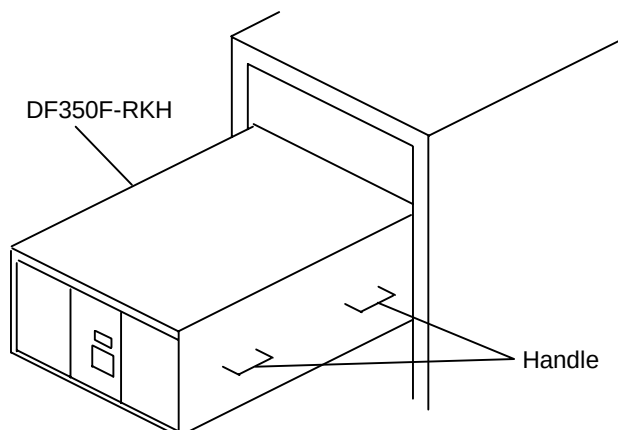


Figure 1.4.6 Installing the Subsystem in the Rack

1.4.6 Securing the front side of the subsystem (See Figure 1.4.7.)

- (1) Secure the subsystem at four places using the ⑪ Binding screws (M5 × 32).
- (2) Reinstall the front cover by pressing it against the subsystem. (See Figure 1.4.1.)

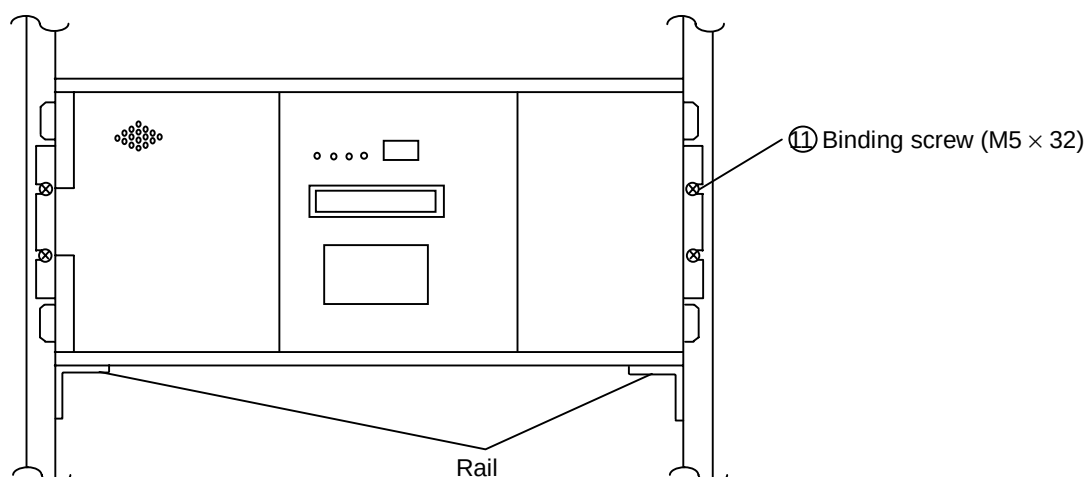


Figure 1.4.7 Securing the Front Side of the Subsystem

1.4.7 Securing the rear side of the subsystem (See Figure 1.4.8.)

- (1) Slide the ③ Stopper (1) and ④ Stopper (2) in the direction shown by arrows to engage their bent tips with the rear bottom of the subsystem.
- (2) Tighten the ⑩ Hexagon socket head bolts (M5 × 8) fastening the stoppers to secure the rear side of the subsystem.

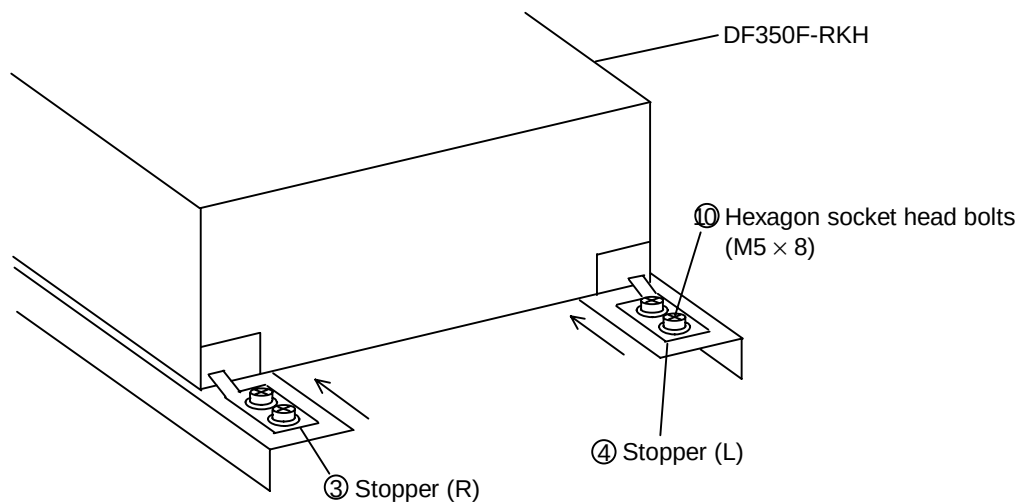


Figure 1.4.8 Securing the Rear Side of the Subsystem

2. Installing Into IBM AS/400 (9309) Rack Frame

2.1 Space (Height Inside the Rack) Required for Installation

The space of 6 units height (EIA standard) is required to install DF350F-RKH into the IBM AS/400 (9309) rack.

2.2 Optional Parts Required for Installation (Model names : DF-F350-URAS)

Table 2.2.1 shows optional parts required to install one DF350F-RKH disk subsystem.

Table 2.2.1 Parts Required for Installation of DF-F350-URAS

No.	Part No.	Part Name	Qty.	Remarks
①	2098876-A	Rail	1	For right hand side
②	2098876-B	Rail	1	For left hand side
③	5490710-1	Stopper	1	For the rail (L)
④	5490710-2	Stopper	1	For the rail (R)
⑤	5486419-1	Fastener (M5)	10	For securing the subsystem/rails (2 spares are included)
⑥	SB516	Bind screw (M5 × 16)	14	For securing the rail/subsystem (2 spares are included)
⑦	BS508	Hexagon socket head bolt (M5 × 8)	6	For securing the stopper (2 spares are included)
⑧	WP005	Washer (M5)	6	For the hexagon socket head bolt (2 spares are included)
⑨	5409042-3	Repeat binder	3	For securing SCSI and AC cables on the subsystem
⑩	3243319-68	Nameplate (parts)	1	Already affixed to the rail
⑪	5486321-1	Stopper (R)	1	For DF300-RK
⑫	5486321-2	Stopper (L)	1	For DF300-RK

* The No. 11 and 12 optional parts are not used for installation of DF350F-RKH.

Table 2.2.2 Parts Required for Installation of DF-F350-URASD

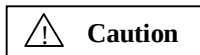
No.	Part No.	Part Name	Qty.	Remarks
①	2102429-A	Rail	1	For right hand side
②	2102429-B	Rail	1	For left hand side
③	5490710-1	Stopper	1	For left hand side
④	5490710-2	Stopper	1	For right hand side
⑤	5486419-1	Fastener (M5)	10	For securing the subsystem/rails (4 spares are included)
⑥	SB516	Bind screw (M5 × 16)	12	For securing the rail/subsystem (4 spares are included)
⑦	BS508	Hexagon socket head bolt (M5 × 8)	6	For securing the stopper (2 spares are included)
⑧	2051001-513	LL Washer	6	For the hexagon socket head bolt (2 spares are included)
⑨	5409042-3	Repeat binder	3	For securing SCSI and AC cables on the subsystem
⑩	3243319-205	Nameplate (parts)	1	Already affixed to the rail
⑪	SB416	Bind screw (M4 × 16)	4	For securing the rails For DF300-RK
⑫	BS406	Hexagon socket head bolt (M4 × 6.3)	4	
⑬	2051001-413	LL washer	4	

* The No. 11, 12, and 13 optional parts are not used for installation of DF350F-RKH.

2.3 Tools Required

- Philips screwdriver (No.2)
- Socket wrench (4mm)

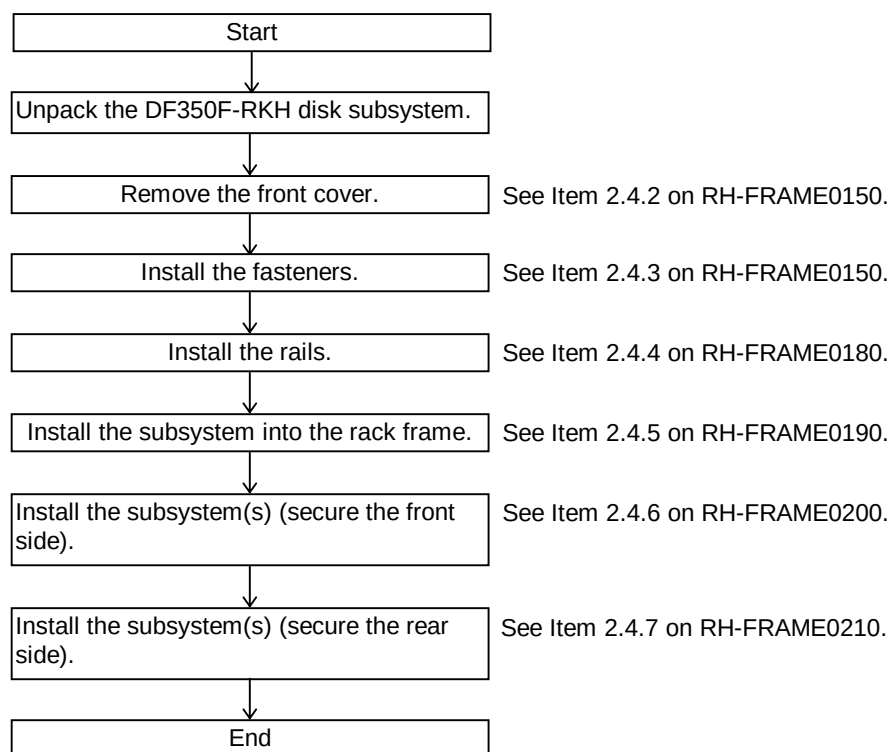
2.4 Installing the Subsystem into the Rack Frame



- The leveling bolts of the frame should have been lowered to touch the floor before installing the subsystem into the rack.
Do not attempt to start installation before lower the leveling bolts (to prevent the equipment from falling).
- Do not drawout two or more subsystems from the rack at a time (to prevent the equipment from falling).
- Be sure to perform the work with two or more persons. The weight of the DF350F-RKH disk subsystem is approximately 60kg.
- Install subsystems to the rack starting from the bottom position, in order to prevent turning over.
- Do the work following other safety instructions concerning IBM AS/400 (9309) rack frame.

2.4.1 Procedures for installation

Install the unit following the procedure below.



2.4.2 Removing and installing the front cover

(1) Removal and installation of the front cover.

① Removal

Hold the grooves located on both sides of the front cover and pull the front cover toward you to remove it.

② Installation

Mate the grooves of the front cover with the guide plate of the subsystem, and secure the front cover by pressing its four corners.

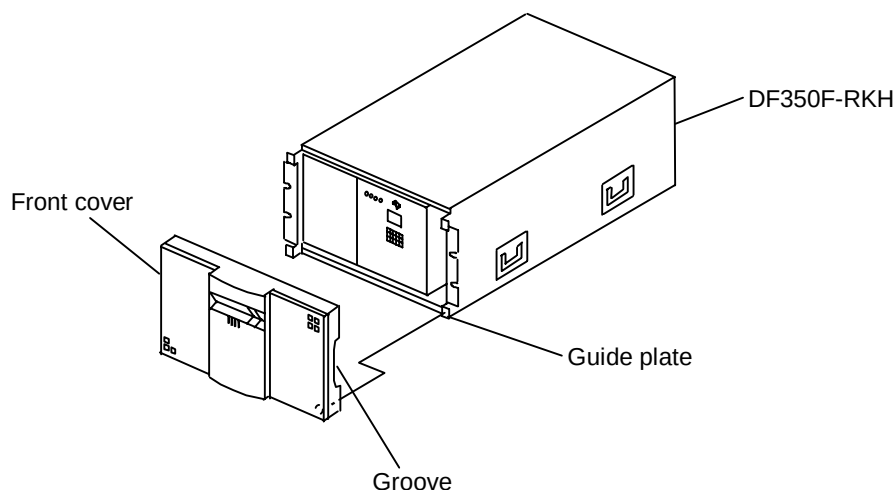


Figure 2.4.2 Removing and Installing the Front Cover

2.4.3 Installing the fasteners (See Figure 2.4.3 (a) to 2.4.3 (c).)

- (1) Insert the fasteners on the front side of the rack frame with their flat sides facing toward you.
- (2) Insert the fasteners to the top holes of upper 1st and 3rd units from the unit where the rail is to be installed.
- (3) Insert the fasteners on the rear side of the rack frame with their flat sides facing toward you.
- (4) Insert the fasteners to the top hole of the unit where the rail is to be installed and the middle hole of upper 1st unit.

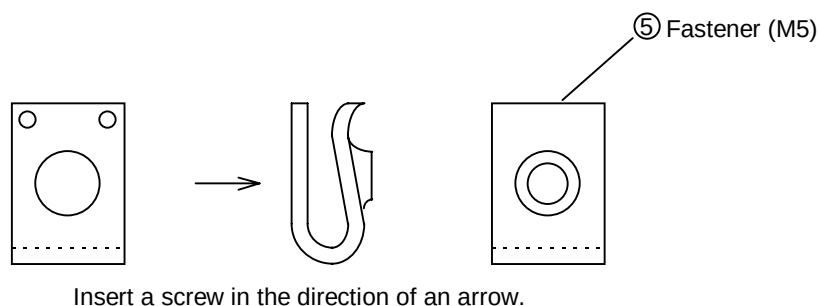
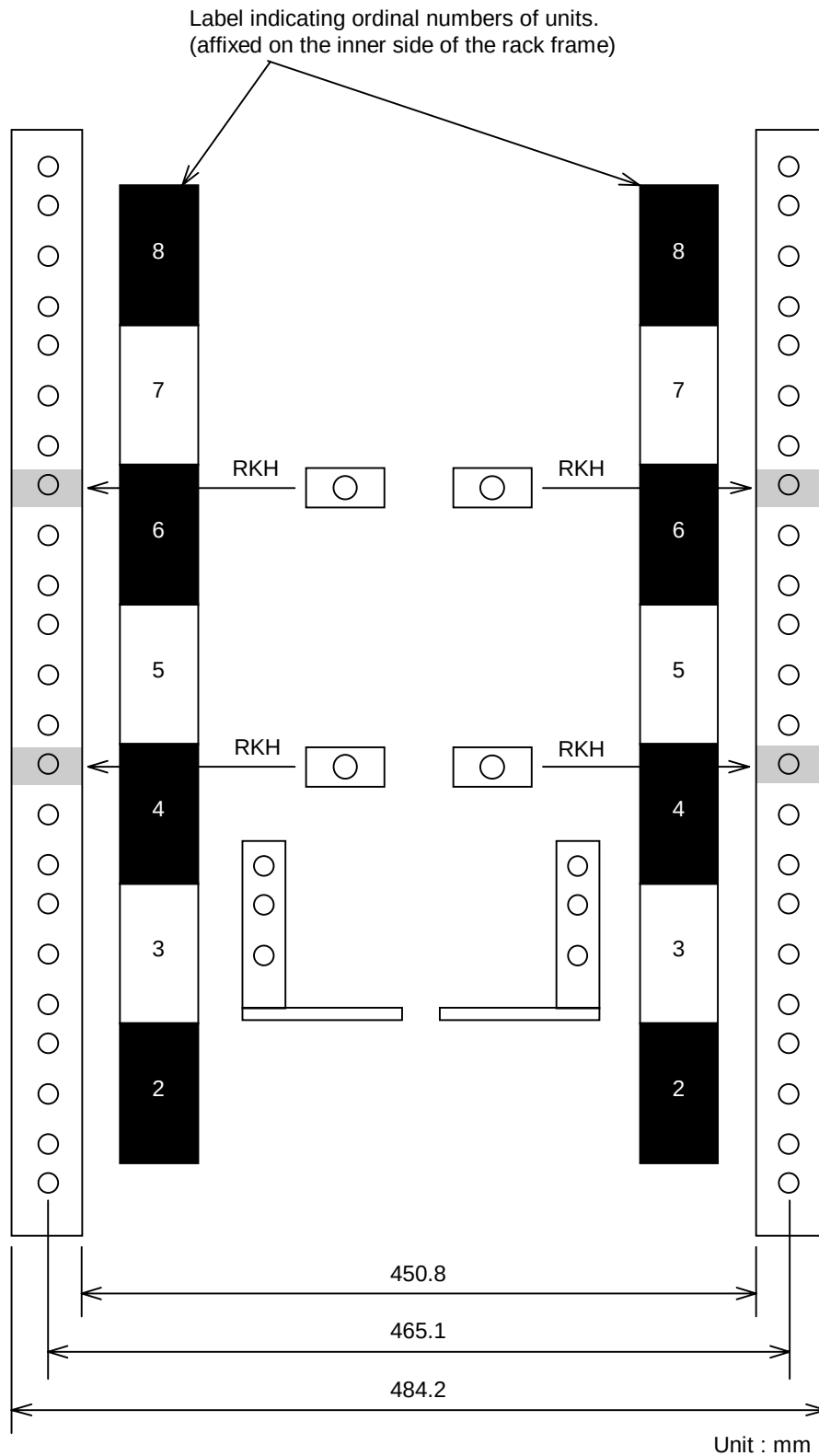


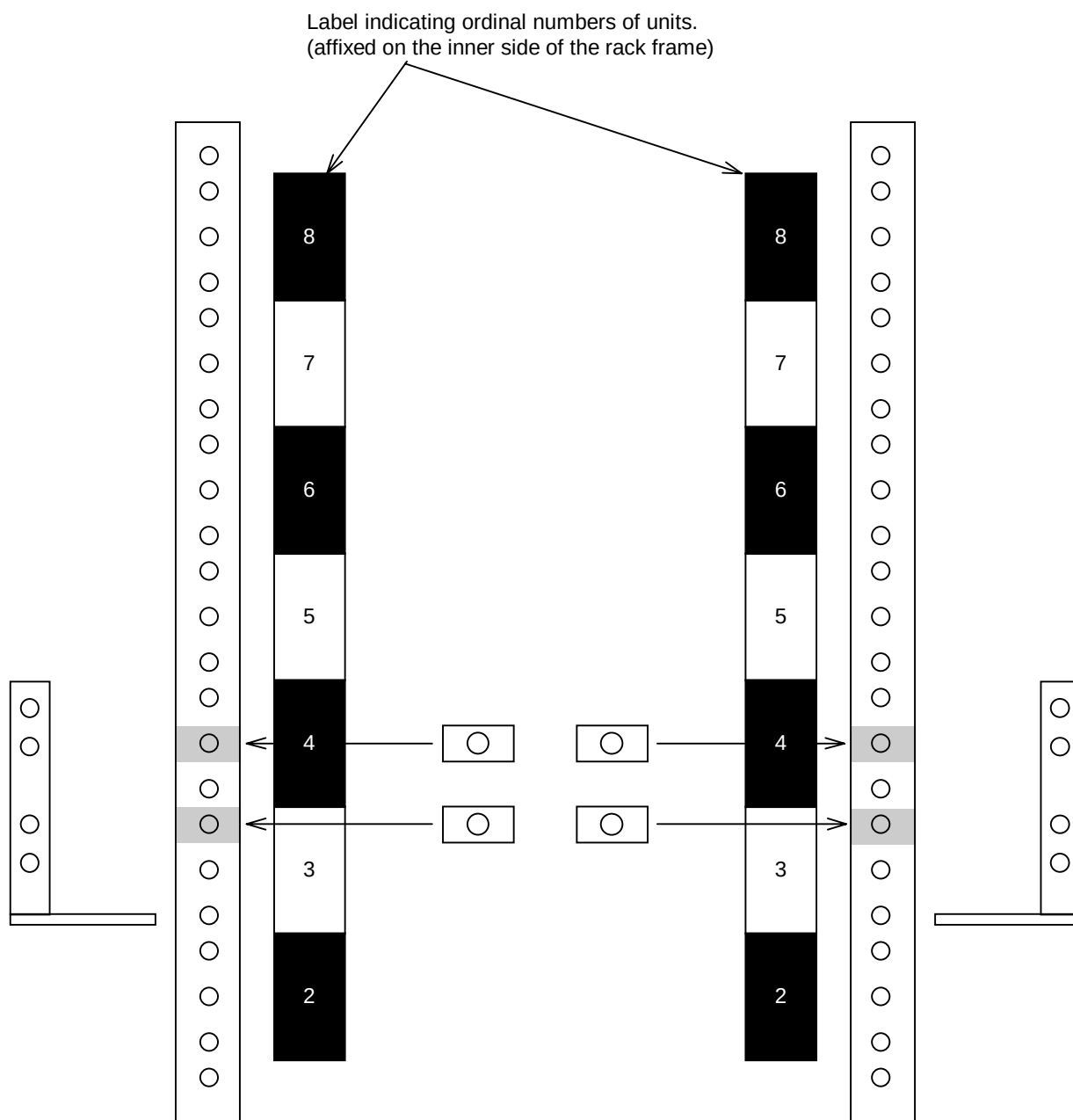
Figure 2.4.3 (a) Fastener



Note 1 : A figure “” indicates the fastener.

Note 2 : Above diagram shows the composition when the rails are installed at the 3rd unit.

Figure 2.4.3 (b) Fastener Installing Locations in the Front of the Rack Frame



Note 1 : A figure “” indicates the fastener.

Note 2 : Above diagram shows the composition when the rails are installed at the 3rd unit.

Figure 2.4.3 (c) Fastener Installing Locations in the Rear of the Rack Frame

2.4.4 Installing the rails (See Figure 2.4.4.)

- (1) Fix the ④ Stopper (R) to the ① Rail (R) temporarily with ⑦ Hexagon socket head bolts ($M5 \times 8$) and ⑧ Washers (M5) or LL Washers.
- (2) Insert the ① Rail (R) into the rack frame and secure it with ⑥ Bind screws ($M5 \times 16$) (both front and rear sides).
- (3) Fix the ③ Stopper (L) temporarily to the ② Rail (L), insert the ② Rail (L) into the rack frame and secure it in the same way.

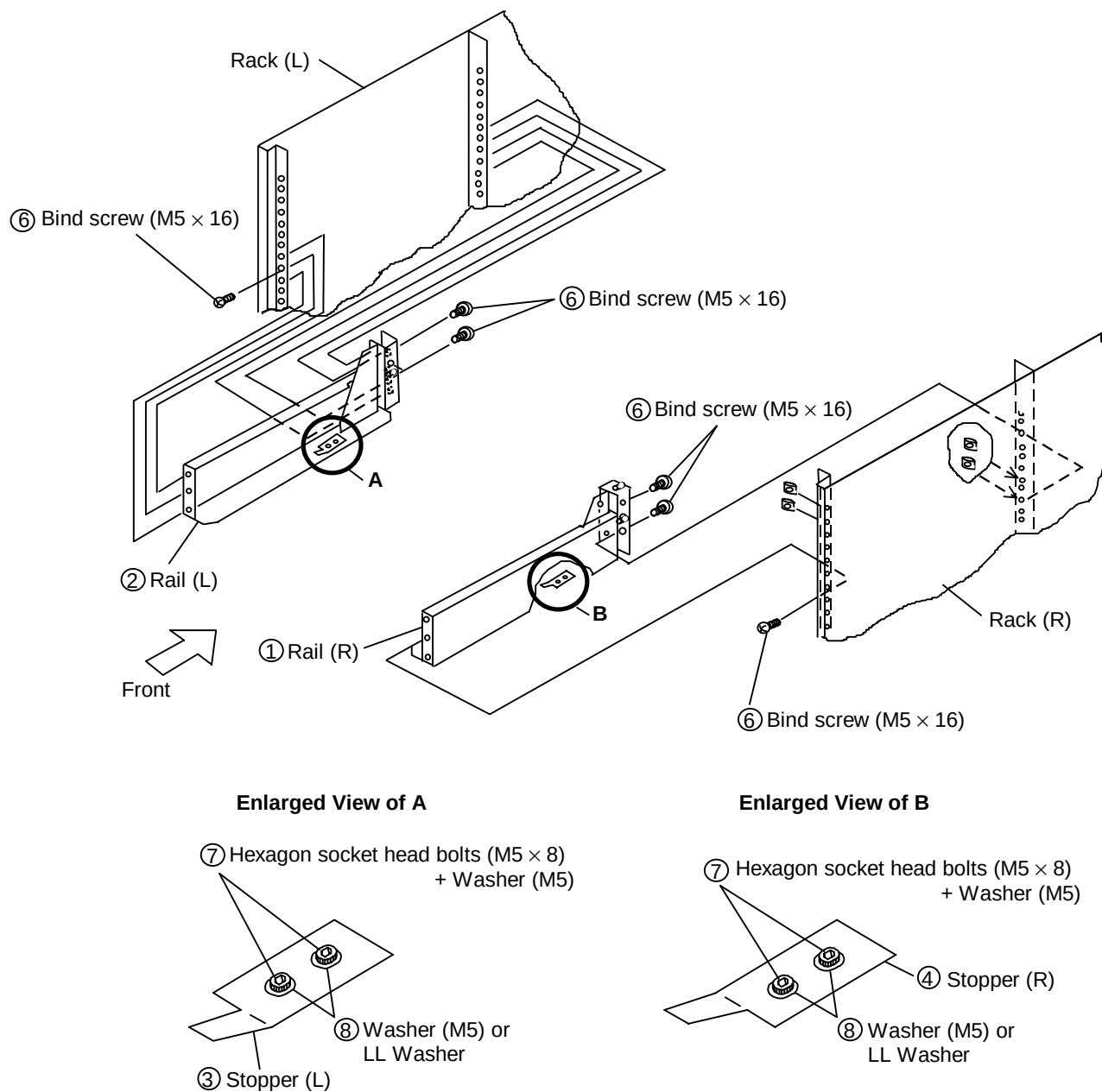
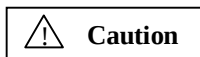


Figure 2.4.4 Installing the Rails

2.4.5 Installing the subsystem into the rack (See Figure 2.4.5.)



The mass of the DF350F-RKH is approximately 60kg. Be sure to hold it by its handles with two or more persons when installing it in the rack frame.

Make sure that the front panel of the DF350F-RKH is secured tightly before installing the DF350F-RKH in the rack frame. If not, the front panel may come off during the installation causing a personal injury.

- (1) Hold the four handles and place the subsystem on the rails. Then, push it gently all the way into the rack frame.

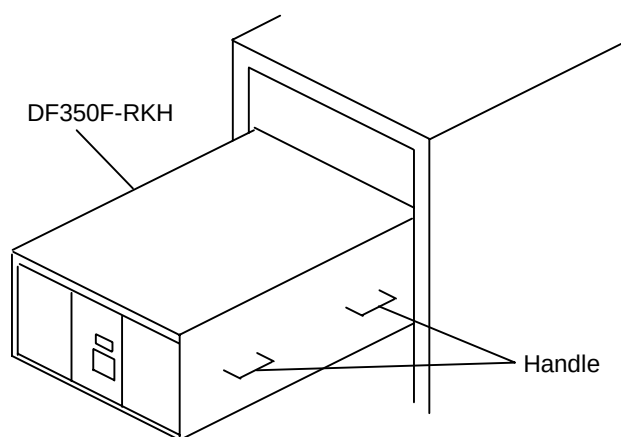


Figure 2.4.5 Installing the Subsystem in the Rack

2.4.6 Securing the front side of the subsystem (See Figure 2.4.6.)

- (1) Secure the subsystem at four places using the ⑥ Binding screws (M5 × 16).
- (2) Reinstall the front cover by pressing it against the subsystem. (See Figure 2.4.2.)

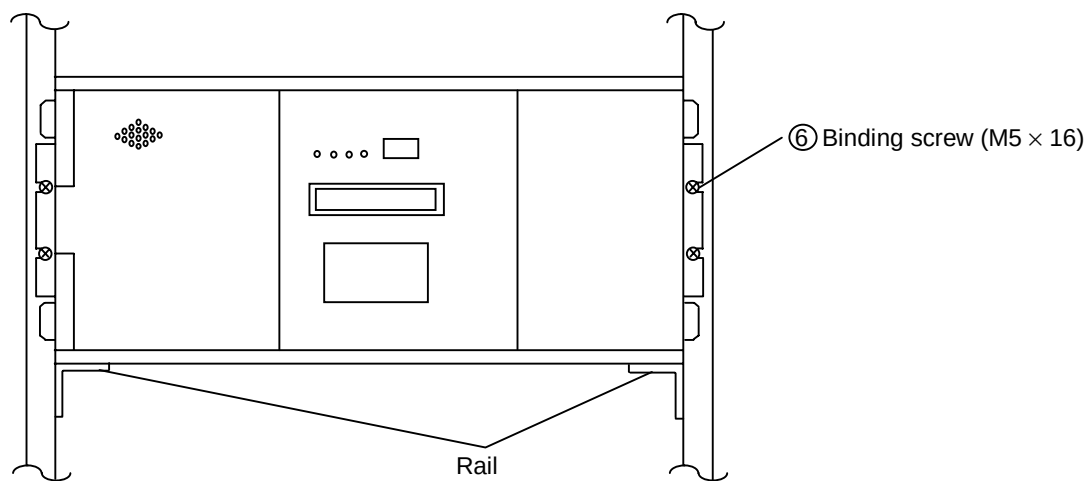


Figure 2.4.6 Securing the Front Side of the Subsystem

2.4.7 Securing the rear side (See Figure 2.4.7.)

- (1) Slide the ③ Stopper (1) and ④ Stopper (2) in the direction shown by arrows to engage their bent tips with the rear bottom of the subsystem.
- (2) Tighten the ⑦ Hexagon socket head bolts (M5 × 8) fastening the stoppers to secure the rear side of the subsystem.

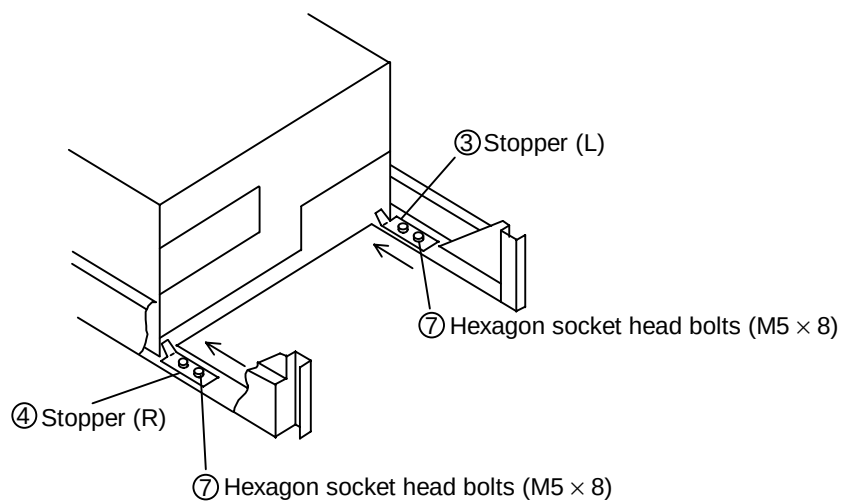


Figure 2.4.7 Securing the Rear Side

3. Installing Into Hitachi Rack Frame (U1)

3.1 Space (Height Inside the Rack) Required for Installation

The space of 6 units height (EIA standard) is required to install DF350F-RKH into the Hitachi rack.

3.2 Optional Parts Required for Installation (Model names : DF-F350-URHT)

Table 3.2.1 shows optional parts required to install one DF350F-RKH disk subsystem.

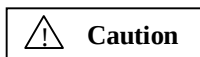
Table 3.2.1 Parts Required for Installation of DF-F350-URHT

No.	Part No.	Part Name	Qty.	Remarks
①	3243500-1	Rail	1	For right hand side
②	3243500-2	Rail	1	For left hand side
③	5490715-1	Stopper	1	For the rail (R)
④	5490715-2	Stopper	1	For the rail (L)
⑤	5486467-2	Nut plate	4	For securing the rail
⑥	5490724-A	Nut plate ASSY	2	
⑦	BS520	Hexagon socket head bolt (M5 × 20)	10	For securing the rail (2 spares are included)
⑧	BS508	Hexagon socket head bolt (M5 × 8)	4	For securing the stopper (2 spares are included)
⑨	SB408	Bind screw (M4 × 8)	6	For securing the nut plate/bracket (2 spares are included)
⑩	SB510	Bind screw (M5 × 10)	6	For securing the subsystem (2 spares are included)
⑪	3243319-69	Nameplate (parts)	1	Already affixed to the rail
⑫	5486468-1	Clamper (1)	2	For securing the AC cables
⑬	3244501-1	Bracket	1	For securing the AC cables
⑭	SB306	Binding screw (M3 × 6.3)	6	For securing the clamper (2 spares are included)
⑮	5409042-3	Repeat binder	3	For securing SCSI and AC cables on the subsystem

3.3 Tools Required

- Socket wrench (4mm)
- Spanner (10mm)
- Philips screwdriver (No.2)

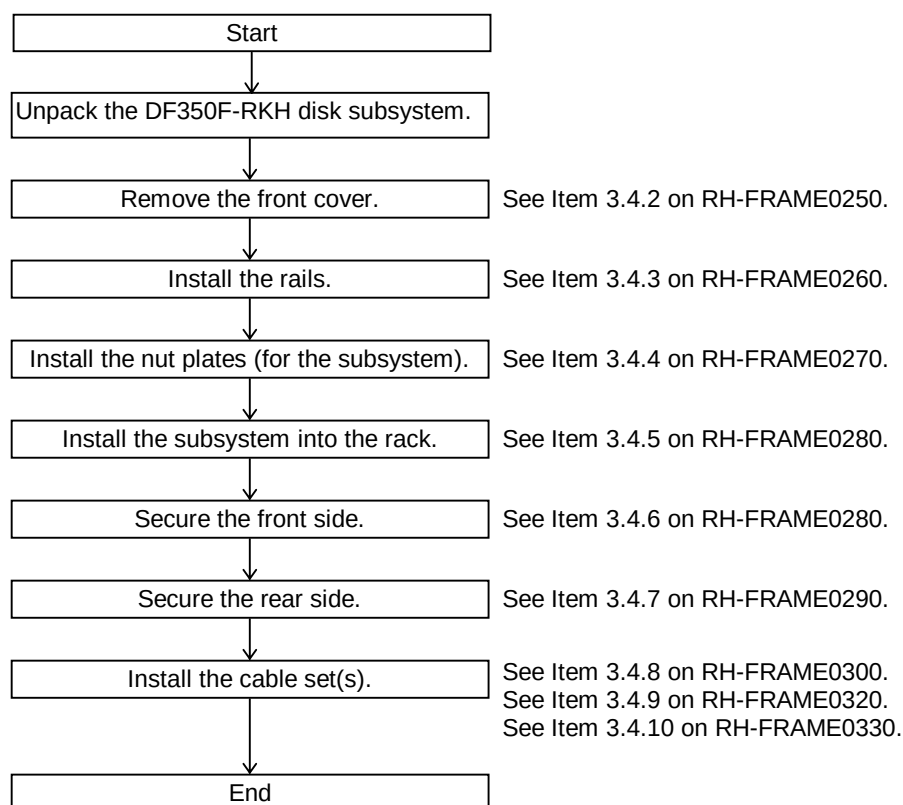
3.4 Installing the Subsystem into the Rack



- The leveling bolts of the frame should have been lowered to touch the floor before installing the subsystem into the rack.
Do not attempt to start installation before lower the leveling bolts (to prevent the equipment from falling).
- Do not drawout two or more subsystems from the rack at a time (to prevent the equipment from falling).
- Be sure to perform the work with two or more persons. The weight of the DF350F-RKH disk subsystem is approximately 60kg.
- Install subsystems to the rack starting from the bottom position, in order to prevent turning over.

3.4.1 Procedures for installation

Install the unit following the procedure below.



3.4.2 Removing and installing the front cover

(1) Removal and installation of the front cover.

① Removal

Hold the grooves located on both sides of the front cover and pull the front cover toward you to remove it.

② Installation

Mate the grooves of the front cover with the guide plate of the subsystem, and secure the front cover by pressing its four corners .

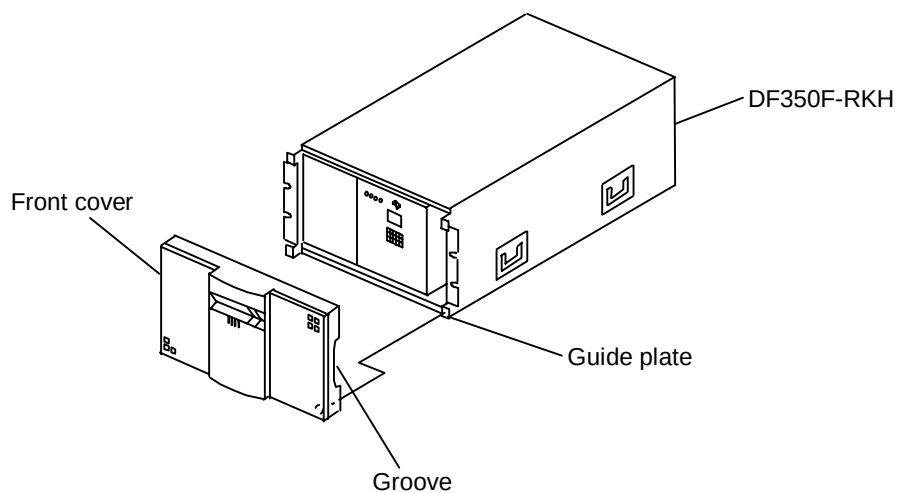


Figure 3.4.1 Removing and Installing the Front Cover

3.4.3 Installing the rails (See Figure 3.4.2 and 3.4.3.)

- (1) Temporarily secure the ③ Stopper (R) to the ① Rail (R) using ⑧ Hexagon socket head bolts (M5 × 8). (See Figure 3.4.2.)
- (2) Insert the protruded portions of the ① Rail (R) into the rectangular holes on both the front and rear sides of the rack frame at right hand side of the desired installing position. (See Figure 3.4.3.)
- (3) Position the ⑤ Nut plates (for securing rails aligning their holes with the holes of the rail) and the rack frame and secure the ① Rail (R) with two ⑦ Hexagon socket head bolts (M5 × 20) (at two places each on the front and rear sides). (See Figure 3.4.3.)
- (4) Temporarily attach the ④ Stopper (L) to the ② Rail (L), and secure the ② Rail (L) to the rack frame in the same way.

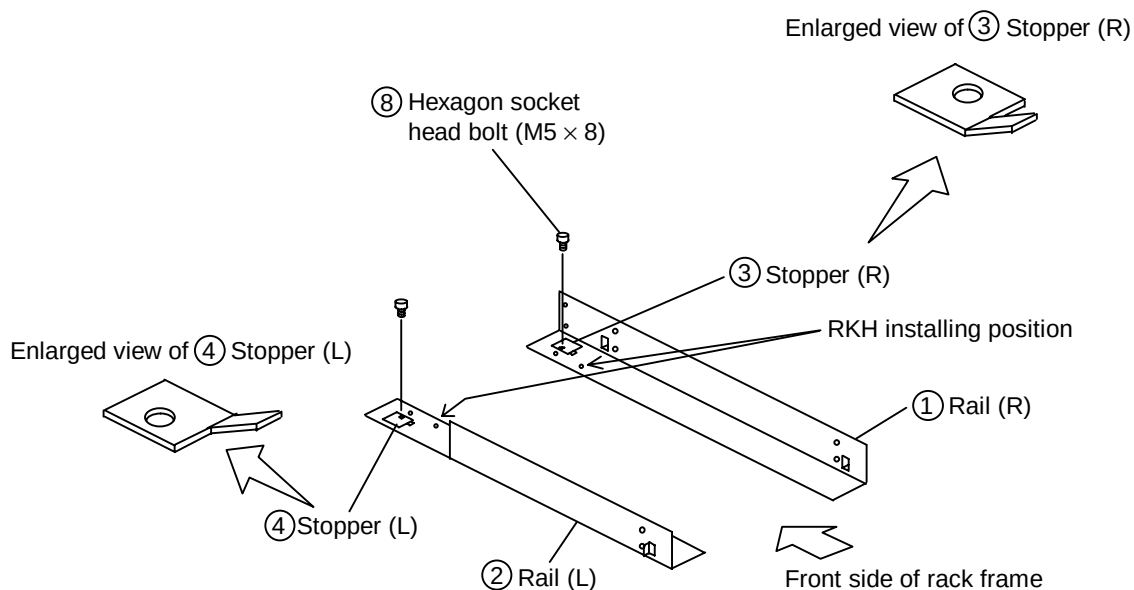


Figure 3.4.2 Temporary Attachment of the Stopper

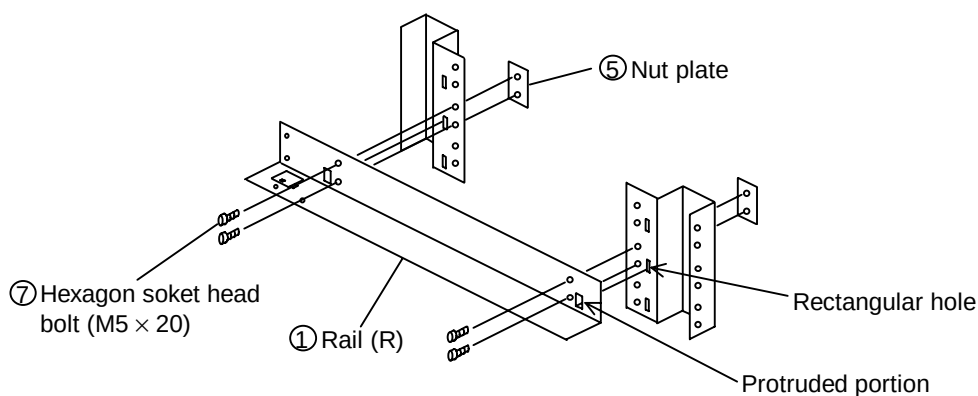


Figure 3.4.3 Securing the Rail to the Rack Frame

3.4.4 Installing the nut plate assys (for securing the subsystem) (See Figure 3.4.4.)

- (1) Position the ⑥ Nut plate ASSY on the inner side of the rack frame aligning its lowermost screw hole with a hole of the rack frame (3rd hole from the face of the rail).
- (2) Secure the ⑥ Nut plate ASSY with two ⑨ Bind screws (M4 × 8) so that it becomes parallel with the edge of the rack frame.

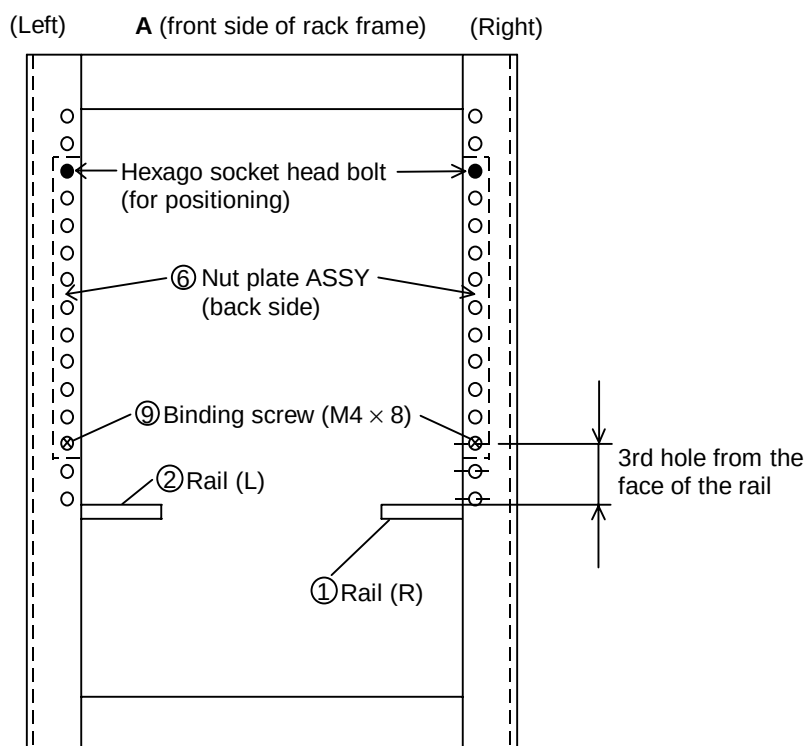
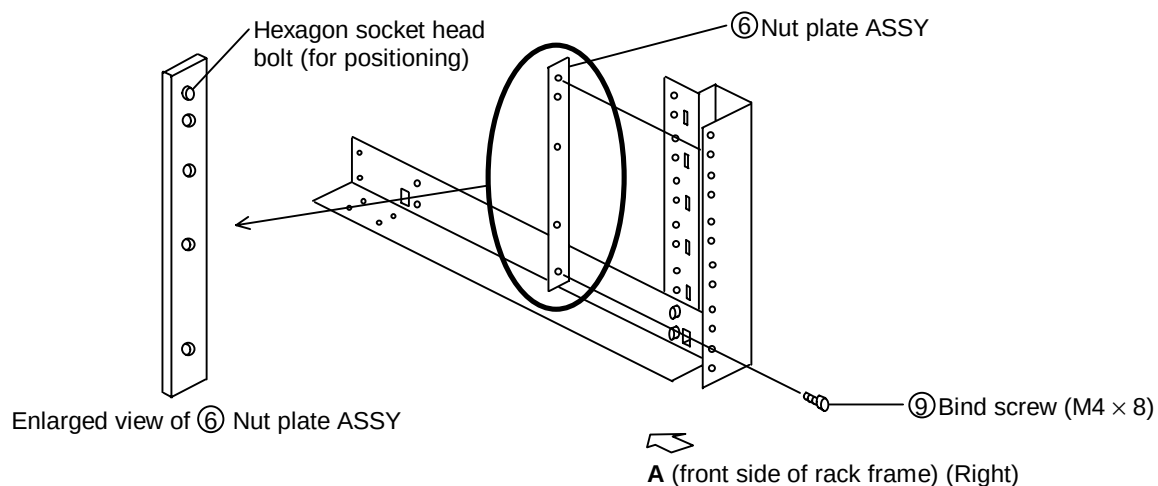
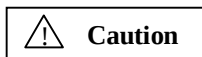


Figure 3.4.4 Installing the Nut Plate ASSY (for Securing the Subsystem)

3.4.5 Installing the subsystem into the rack (See Figure 3.4.5.)



The mass of the DF350F-RKH is approximately 60kg. Be sure to hold it by its handles with two or more persons when installing it in the rack frame.

Make sure that the front panel of the DF350F-RKH is secured tightly before installing the DF350F-RKH in the rack frame. If not, the front panel may come off during the installation causing a personal injury.

- (1) Hold the four handles and place the subsystem on the rails. Then, push it all the way into the rack.

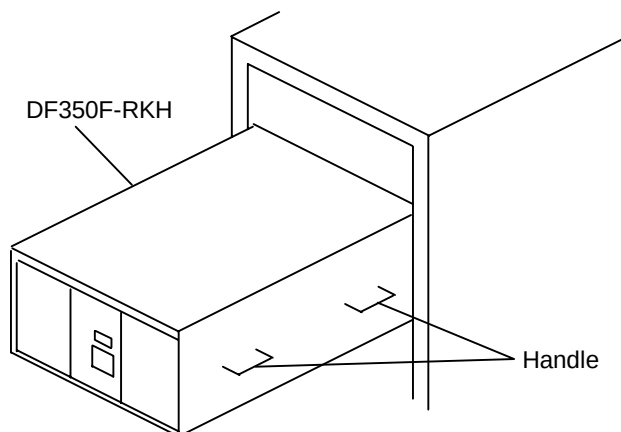


Figure 3.4.5 Installing the Subsystem in the Rack

3.4.6 Securing the front side of the subsystem (See Figure 3.4.6.)

- (1) Secure the subsystem at four places using the ⑩ Bind screws (M5 × 10).
- (2) Mate the latches of the front cover with the protruded portions of the subsystem, and secure the front cover by pressing its four corners. (See Figure 3.4.1.)

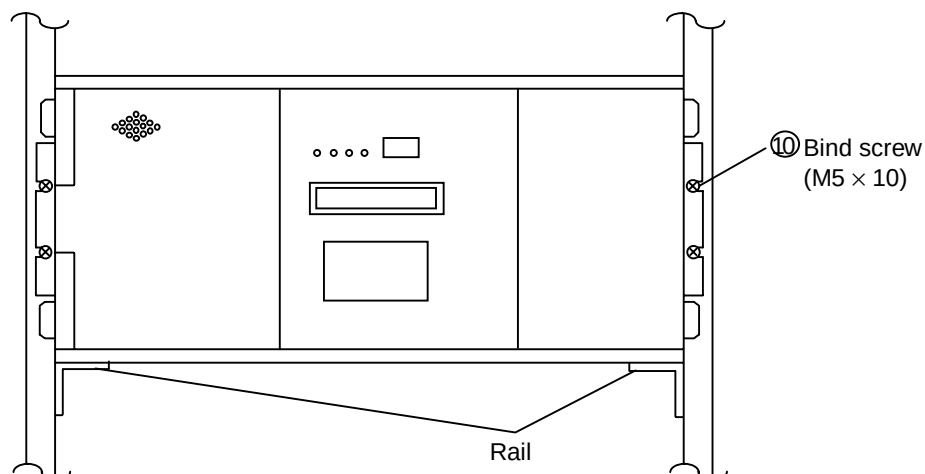


Figure 3.4.6 Securing the Front Side of the Subsystem

3.4.7 Securing the rear side of the subsystem (See Figure 3.4.7.)

- (1) Slide the ③ Stopper (R) and ④ Stopper (L) in the direction shown by arrows to engage their bent tips with the rear bottom of the subsystem.
- (2) Tighten the ⑧ Hexagon socket head bolts (M5 × 8) fastening the stoppers to secure the rear side of the subsystem.

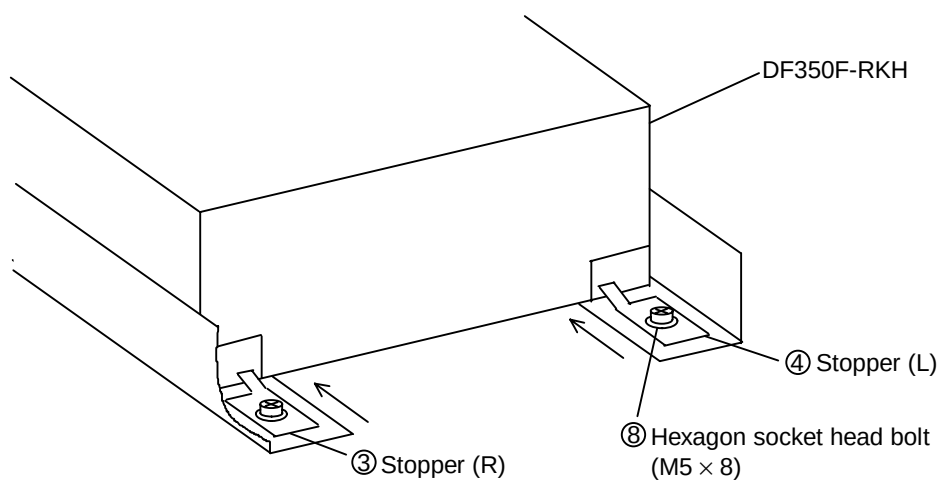


Figure 3.4.7 Securing the Rear Side of the Subsystem

3.4.8 Connection and disconnection of AC cable sets to/from subsystems

- (1) Connect or disconnect the AC cable sets to/from the subsystem(s) installed on the rack following the procedures shown below.
- (2) Connecting procedure for each subsystem. (See Figure 3.4.8.)
 - ① Turn off the PDB breaker (CB1).
 - ② Plug the socket of the AC cable set into the inlet of the subsystem.
 - ③ Fix the ⑬ Bracket with the two ⑨ Bind screws (M4 × 8) and pass the AC cable sets through two ⑫ Clampers (1).
 - ④ Plug the socket of the AC cable set into the PDB.
- (3) Disconnecting procedure for each subsystem.
 - ① Turn off the PDB breaker (CB1).
 - ② Unplug the socket of the AC cable set from the inlet of the subsystem and the outlet of the PDB.
 - ③ Loosen the four ⑭ Bind screws (M3 × 6.3). Remove the ⑫ Clampers (1).

Note : On completion of work, fix the ⑫ Clampers (1) to the ⑬ Bracket with the four ⑭ Bind screws (M3 × 6.3).

Notice : Do not attach the Clampers (1) and Bracket to the lowermost rail.

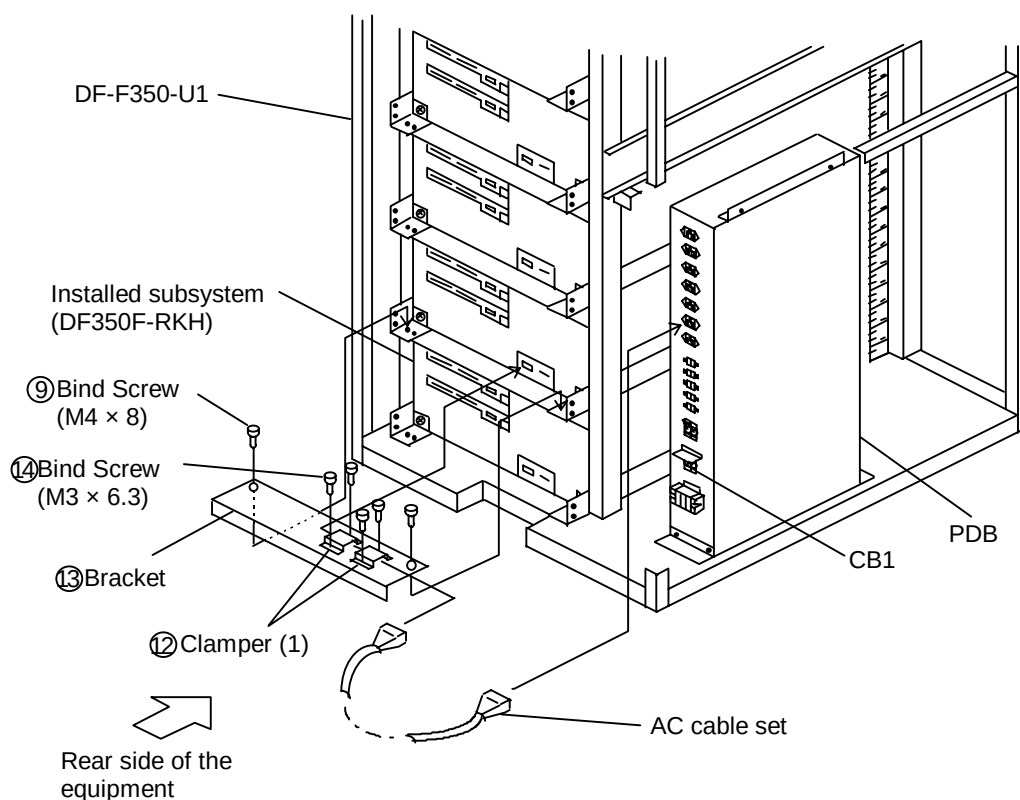
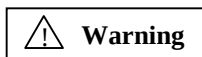
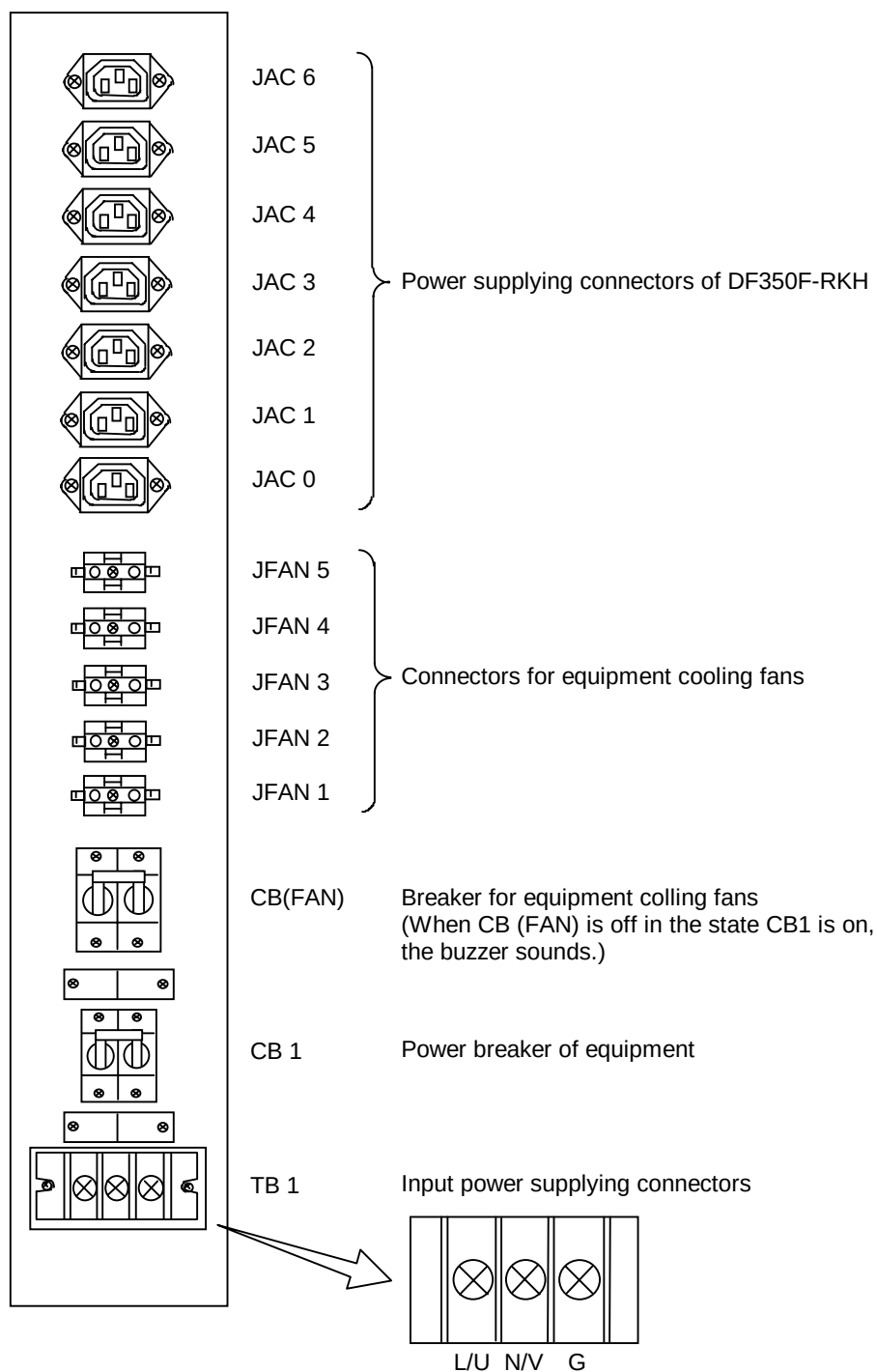


Figure 3.4.8 Connection and Disconnection of AC Cable set(s) to Subsystem(s)



A large leak current flows when plural subsystems of DF350F-RKH are installed. Be sure to ground them for preventing an electric shock accident.

Figure 3.4.9 Appearance of PDB

3.4.9 Connection of relay cables between panel assembly and DF350F-RKHs

(1) Procedures to connect relay cables to DF350F-RKHs.

- ① Remove the SVPs from the subsystems. (For the SVP removal procedure, refer to the manual of the subsystem.)
- ② Plug the connectors (P6-0 to P6-6) of the subsystems installed on the DF-F350-U1 into J6s of the SVPs of the subsystems. (Perform these works one by one starting from the lowermost subsystem.)
- ③ Reinstall the SVPs in the subsystems. (For the SVP installing procedure, refer to the manual of the subsystem.)

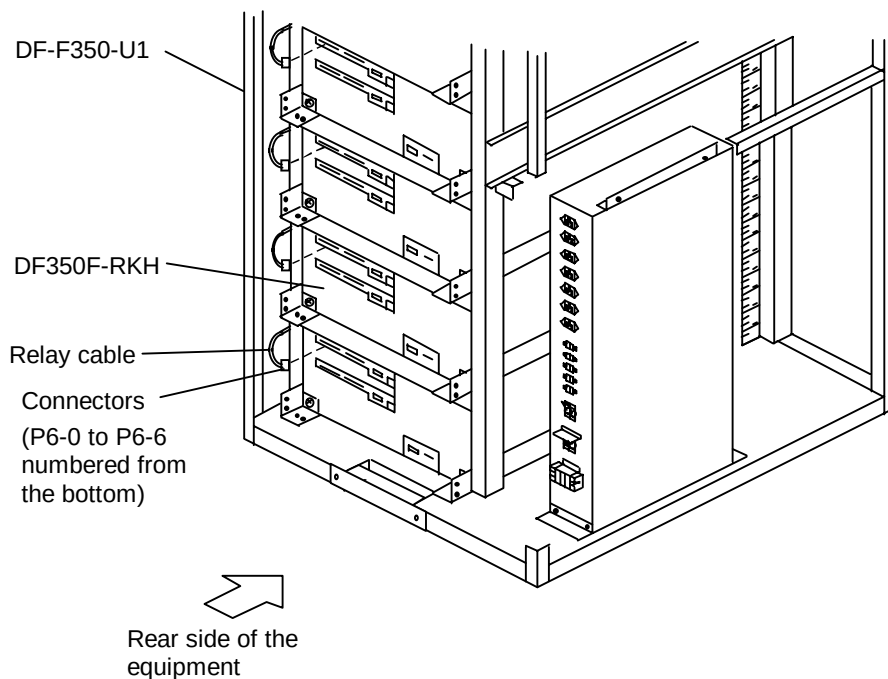


Figure 3.4.10 Connection of Relay Cables (for DF350F-RKHs)

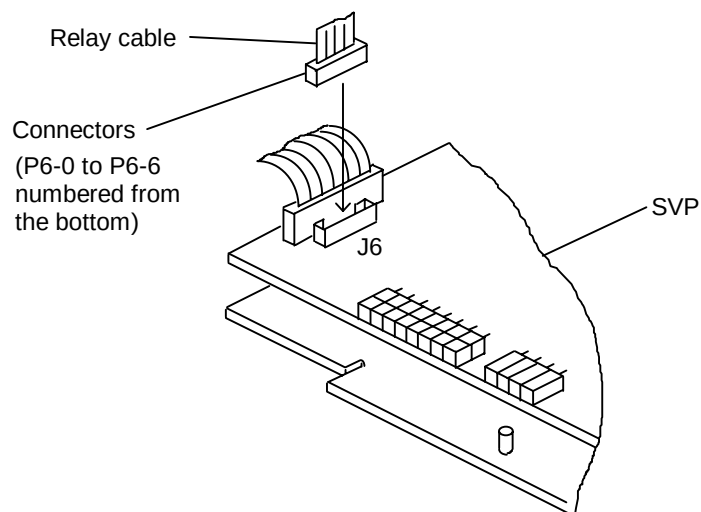


Figure 3.4.1 Relay Cable Connection to SVP

3.4.10 Fixing I/F cables of subsystems (See Figure 3.4.12 and 3.4.13.)

(1) Fixing method '1'. (See Figure 3.4.12.)

- ① Loosen the screws, and remove plates (1) and (2).
- ② Pass the I/F cable through the hole onto the floor. Press plates (1) and (2) against the cable in the direction of the arrows (→), then tighten four screws.

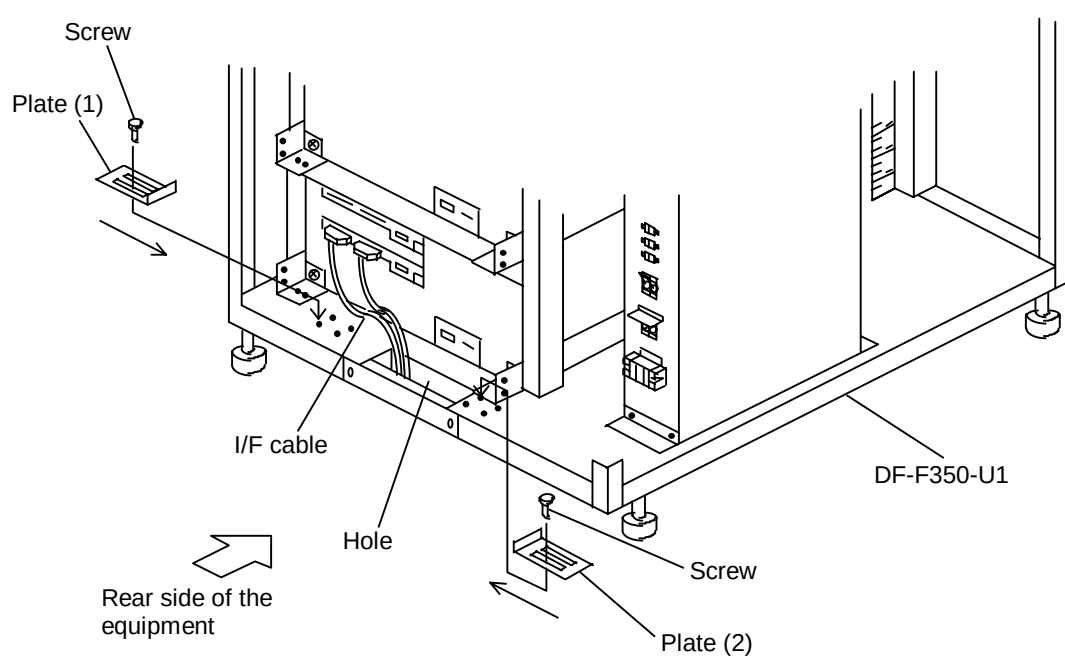


Figure 3.4.12 Fixing I/F Cable (Method '1')

(2) Fixing method '2'. (See Figure 3.4.13.)

- ① Loosen the screws, and remove plates (1), (2) and (3).
- ② Pass the I/F cable through the hole onto the floor. Tighten two screws. Attach plate (3).
- ③ Press the plates (1) and (2) against the cable in the direction of the arrows (→), and tighten four screws.

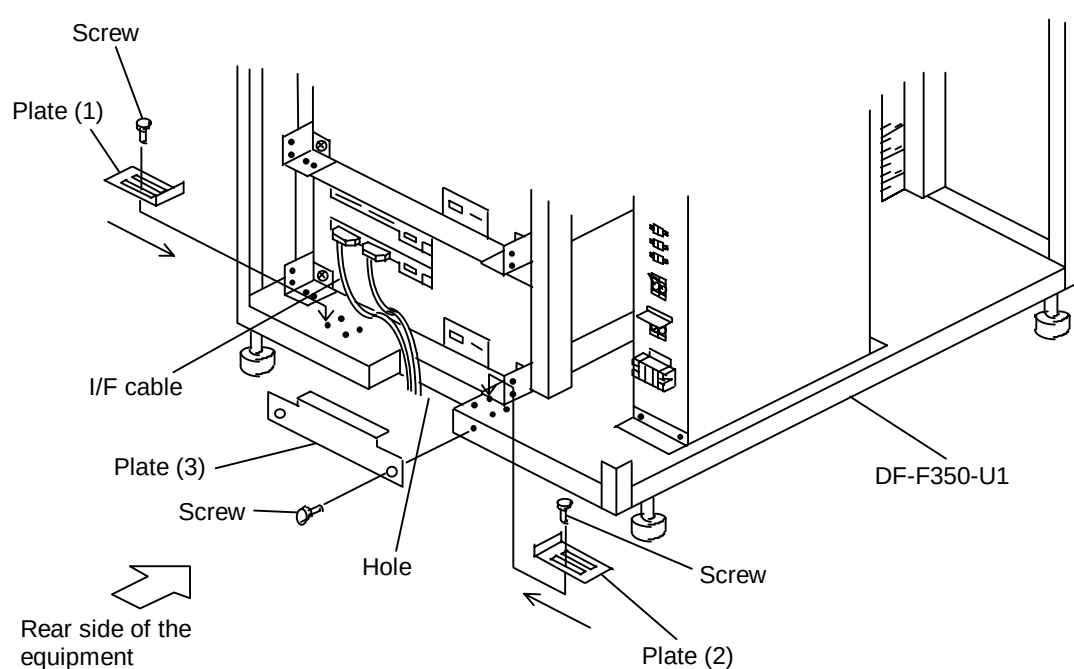


Figure 3.4.13 Fixing I/F Cable (Method '2')

DF350F Disk Subsystem
7. PARTS REPLACEMENT
(Rack Mount (RKWH/U2) Type)

Rev.2

REV.	Date	DRW.	CHKD	APPD	Sheet No.	Description	Code
0	Jan.20.'98	A.Yamanashi	K.Aruga	H.Iwasaki	All	Issued	
1	Jul.31.'98	A.Yamanashi	K.Aruga	H.Iwasaki	0040	Added A2E8, A1E18.	AD
					0350 0360 0520	Changed Note. Changed replacing procedure. Added (4), (5).	CH CH AD
2	Oct.16.'98	A.Yamanashi			0020	Added "Procedures for replacing I/F ADAPTER ASSY or BATTERY ASSY".	AD
					0040	Added A3E4.	AD
					0100	Added case of the dual controller.	AD
					0130	Added case of the dual controller.	AD
					0350	Added "Procedures for replacing I/F ADAPTER ASSY or BATTERY ASSY".	AD
					0490	Added "Procedures for replacing I/F ADAPTER ASSY or BATTERY ASSY".	AD
					0610	This page was newly added.	AD

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2.3.1 Back-up procedure to FD	RW-REP0090
2.3.2 Restoring procedures from FD	RW-REP0130
3. Attaching/Removing and Opening/Closing the Covers.....	RW-REP0160
3.1 Attaching/Removing the Front Bezel	RW-REP0160
3.2 Opening/Closing the Rear Cover	RW-REP0170
3.3 Opening/Closing the Front Panel.....	RW-REP0180
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4.1.1 Procedure of data recovery and HDU ASSY replacement	
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4.2 Procedures of Data Recovery and HDU Replacement	
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when no spare disk is installed.....	RW-REP0210
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10. Replacing SVP ASSY	RW-REP0510
11. Replacing AC/DC power supply.....	RW-REP0520
12. Replacing In Box ASSY	RW-REP0540
13. Replacing CACHE ASSY	RW-REP0550
14. Replacing LAN ASSY.....	RW-REP0580
15. Procedure for Replacing I/F ADAPTER ASSY or BATTERY ASSY	RW-REP0610

1. Mechanical Configuration

Figures 1.1 show mechanical configuration and parts location of this subsystem.

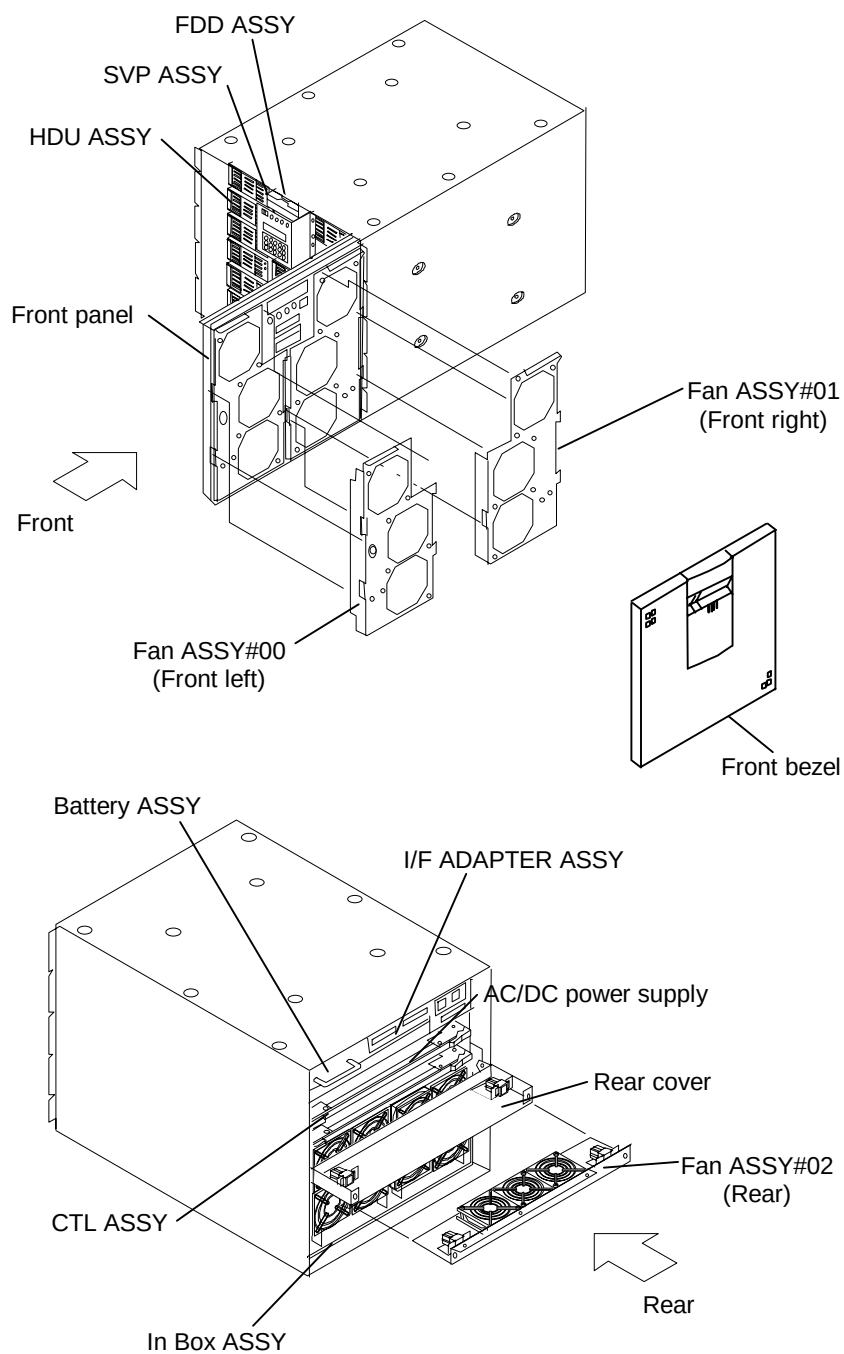


Figure 1.1 Appearance and Component Layout of DF350F (RKWH)

2. Maintenance Procedure

(1) Turning power on/off when replacing parts

Turning on/off procedure varies depending on the parts to be replaced.

Follow the procedures described in the table below for replacing each part.

No.	Product name	Drawing No.	Model	Turning on/off power	
				Option not provided	Option provided
1	HDU ASSY (2GB1"H)	3243084-E	DF-F350-A2E2	④	④
2	HDU ASSY (4GB1"H)	3243084-F	DF-F350-A2E4	④	④
3	HDU ASSY (4GB1"H)	3252929-E	DF-F350-A3E4	④	④
4	HDU ASSY (8GBH.H)	3243084-G	DF-F350-A1E8	④	④
5	HDU ASSY (8GB1"H)	3252929-B	DF-F350-A2E8	④	④
6	HDU ASSY (18GBH.H)	3252929-A	DF-F350-A1E18	④	④
7	Fan ASSY (front left) #00	2099367-A	DF-F350-P1RW	③	—
8	Fan ASSY (front right) #01	2099368-A	DF-F350-P2RW	③	—
9	Fan ASSY (rear) #02	3245118-A	DF-F350-P3RW	③	—
10	Battery ASSY	2099365-B	DF-F350-N2RW	③	—
11	FDD ASSY	3245116-A	DF-F350-M1RW	②	—
12	CTL ASSY	3250742-A	DF-F350F-F3WCF	②	③
13	I/F ADAPTER ASSY (Optical (Non OFC))	3250743-C	DF-F350F-DWON	①	①
14	SVP ASSY	3247397-A	DF-F350-L1WL	②	—
15	AC/DC power supply	5486141-302	DF-F350-B1RW	②	③
16	In Box ASSY	5486142-305	DF-F350-Q1RW	②	—
17	CACHE ASSY	3247121-A	DF-F350-C8E	①	—
18	CACHE ASSY	3247121-B	DF-F350-C32E	①	—
19	CACHE ASSY	3247121-C	DF-F350-C128E	①	—
20	LAN ASSY	5493862-A	DF-F350-G1M1	②	③
21	LAN ASSY (SNMP)	5493862-C	DF-F350F-G3M1	②	③

① Turning the power off DF350F Disk Subsystem and Host System.

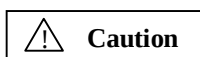
② Turning the power off DF350F Disk Subsystem.

③ Turning the power off is unnecessary.

④ Turning the power on DF350F Disk Subsystem.

Notice : When a part which requires to turn the power off or on for replacement (marked with ① and ②) is to be replaced, turn the power off correctly according to the instruction in RW-REP0050 beforehand.

Otherwise, there is a risk that the user data is destroyed.

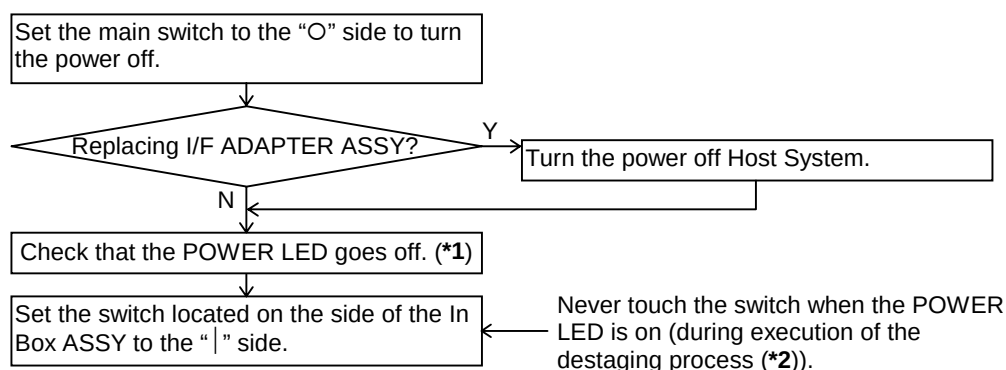


When replacing parts without turning off the power, do not put on metallic accessories or watches so that to avoid electric shock.

Be careful not to touch the electrified parts with a screwdriver etc.

2.1 Turning the Power On/Off for Each String

(1) Turning the power off



*1 Check the back-up state of the CACHE memory.

Be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

The CACHE memory of this unit provides write-after control. If data is not yet written, before the power is turned off, the unit automatically writes the data on the CACHE memory to the hard disk. This is called destaging. After this processing is completed, the power is turned off.

If the power is turned off in a state in which destaging cannot be completed due to an unexpected power interruption or a tripped circuit breaker, the CACHE memory switches to the back-up mode using the battery for data integrity. If any equipment of the unit is removed or inserted in this back-up mode, the battery may stop supplying power, resulting in the user data being lost. When you handle any equipment of the unit with the unit power off, be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

• Checking the back-up state of the cache memory

You can determine whether the unit is in the back-up mode by checking the indication of the CACHE PWR (green LED) on the CTL ASSY, as described below.

Set the circuit breaker on the rear of the unit to "I" (ON) with the power switch (POWER SW) set to "O" (OFF).

Determine the state of the memory from the indication of the CACHE PWR.

CACHE PWR LED on ----- Indicate the back-up mode.

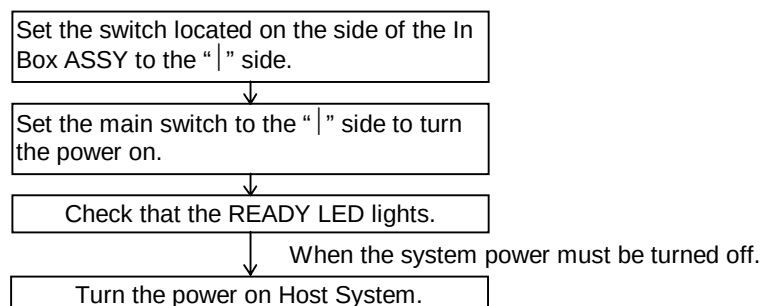
CACHE PWR LED off ----- Indicate that the back-up mode is canceled.

Notice : In case the data is not properly backed up, the user's data will be lost.

***2** The cache memory installed in this subsystem is controlled with a write-after method. When turning off the power, the subsystem automatically writes all the data left on the cache memory unwritten to the hard disk drive. (This operation is called a destaging.) The subsystem turns off the power when this process is completed. When the power is turned off according to the power failure or by the operation of the breaker, the destaging can not be performed. In this case, the subsystem enters the mode of battery back-up. If the system is kept in this state, the battery may be discharged and the user data might be lost. Therefore, be sure to follow the power-off procedure explained above.

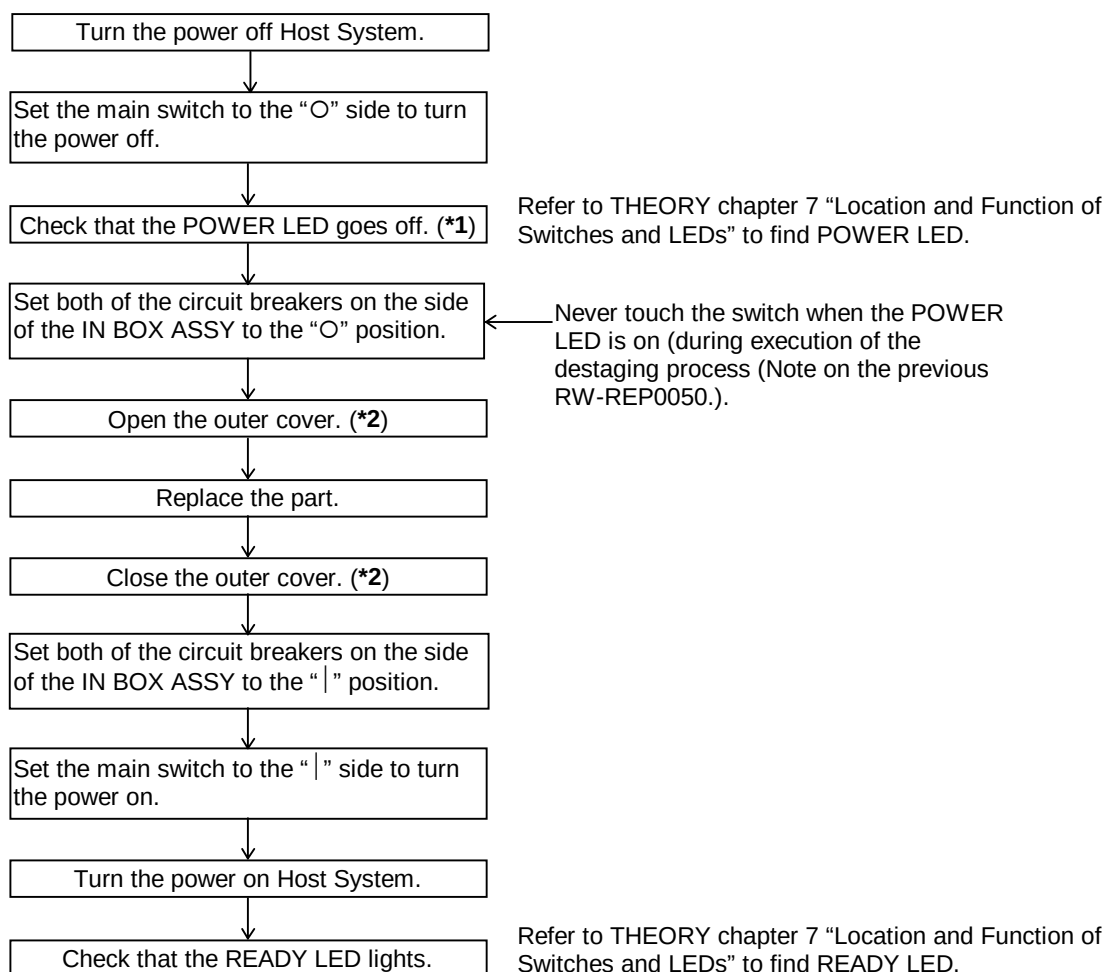
If the breaker is turned off due to power failure or by mistake before the POWER LED goes off, turn the power on again according to Item (2), "Turning the power on" promptly and then execute the power-off procedure explained above.

(2) Turning-ON procedure



2.2 Part Replacement Procedures

- (1) Procedure for the case of turning the power off both DF350F Disk Subsystem and Host System is inevitable.



Notice: In case the power is not normally turned off, the configuration data will be lost and the user's data will be lost.

***1** Check the back-up state of the CACHE memory.

Be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

The CACHE memory of this unit provides write-after control. If data is not yet written, before the power is turned off, the unit automatically writes the data on the CACHE memory to the hard disk. This is called destaging. After this processing is completed, the power is turned off.

If the power is turned off in a state in which destaging cannot be completed due to an unexpected power interruption or a tripped circuit breaker, the CACHE memory switches to the back-up mode using the battery for data integrity. If any equipment of the unit is removed or inserted in this back-up mode, the battery may stop supplying power, resulting in the user data being lost. When you handle any equipment of the unit with the unit power off, be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

- Checking the back-up state of the cache memory

You can determine whether the unit is in the back-up mode by checking the indication of the CACHE PWR (green LED) on the CTL ASSY, as described below.

Set the circuit breaker on the rear of the unit to "I" (ON) with the power switch (POWER SW) set to "O" (OFF).

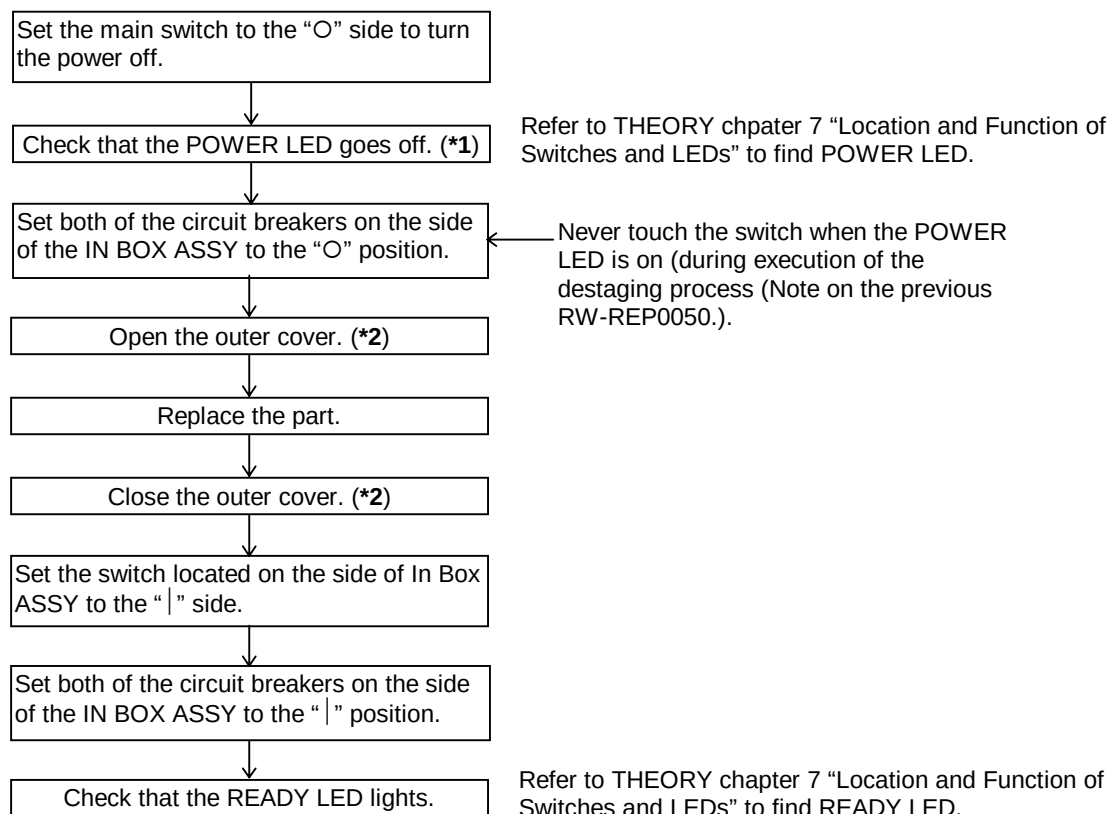
Determine the state of the memory from the indication of the CACHE PWR.

CACHE PWR LED on ----- Indicate the back-up mode.

CACHE PWR LED off ----- Indicate that the back-up mode is canceled.

***2** Outer cover : Front bezel
Rear cover

(2) Procedure for the case of turning the power off DF350F Disk Subsystem is inevitable.



Notice: In case the power is not normally turned off, the user's data might be lost.

***1** Check the back-up state of the CACHE memory.

Be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

The CACHE memory of this unit provides write-after control. If data is not yet written, before the power is turned off, the unit automatically writes the data on the CACHE memory to the hard disk. This is called destaging. After this processing is completed, the power is turned off.

If the power is turned off in a state in which destaging cannot be completed due to an unexpected power interruption or a tripped circuit breaker, the CACHE memory switches to the back-up mode using the battery for data integrity. If any equipment of the unit is removed or inserted in this back-up mode, the battery may stop supplying power, resulting in the user data being lost. When you handle any equipment of the unit with the unit power off, be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

- Checking the back-up state of the cache memory

You can determine whether the unit is in the back-up mode by checking the indication of the CACHE PWR (green LED) on the CTL ASSY, as described below.

Set the circuit breaker on the rear of the unit to "I" (ON) with the power switch (POWER SW) set to "O" (OFF).

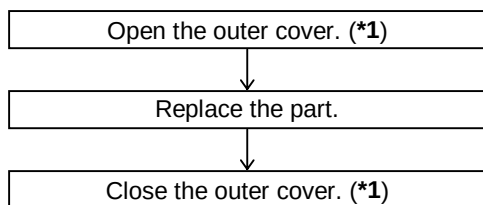
Determine the state of the memory from the indication of the CACHE PWR.

CACHE PWR LED on ----- Indicate the back-up mode.

CACHE PWR LED off ----- Indicate that the back-up mode is canceled.

***2** Outer cover : Front bezel
Rear cover

(3) Procedure for the case of turning the power off DF350F is either not necessary or prohibited.



*1 Outer cover : Front cover
Rear cover

2.3 Back-up Procedure of System Parameter

There are cases where system parameters (Buzzer setting, drive recovery mode, etc.) are copied to FD or restored from FD when installing optional parts or replacing parts. In this case, copy or restore system parameters following “2.3.1 Back-up procedure of system parameter” (RW-REP0090) or “2.3.2 Restore procedure of system parameter” (RW-REP0130).

(RAID configuration setting, LU configuration setting, etc. are not contained in system parameter.)

2.3.1 Back-up procedure to FD

- (1) Turn the power off according to RW-REP0050.

Notice: In case the power is not normally turned off, the user's data might be lost.

- (2) Before power on the subsystem, set DIP switch No.4 on CTL ASSY as shown in Figure 2.3.1.

Note : Be sure to set the same data for both controllers if the dual controller option (-F3WCF) has been installed.

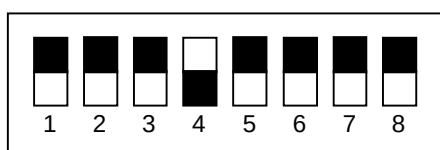
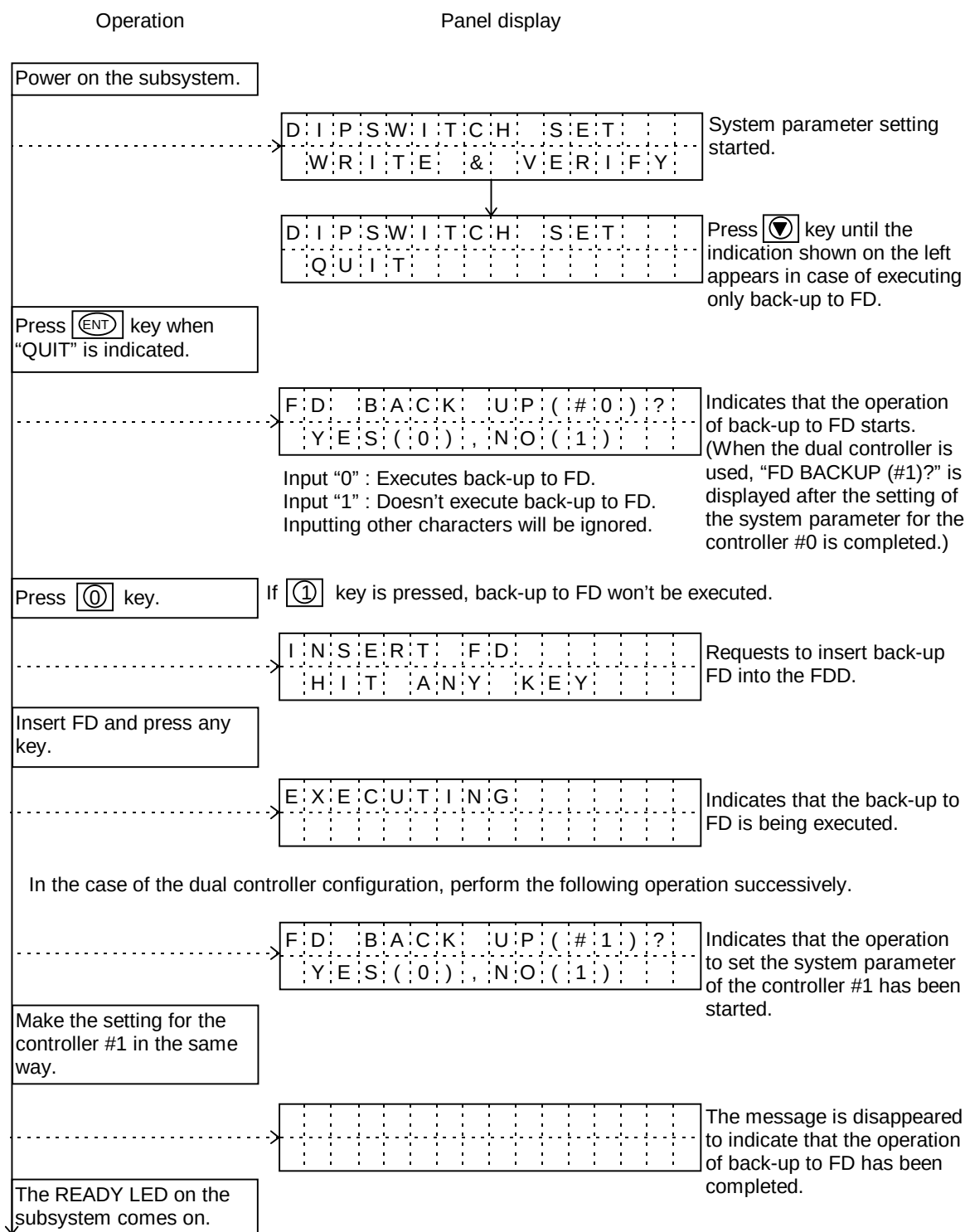


Figure 2.3.1 DIP Switches
(Back-up operation to FD is allowed)

(3) Operate as described below.



(4) Set DIP switch No.4 to setting as shown in Figure 2.3.2.

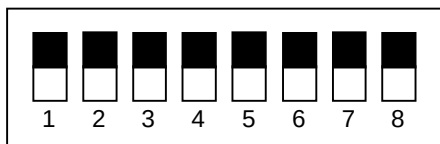
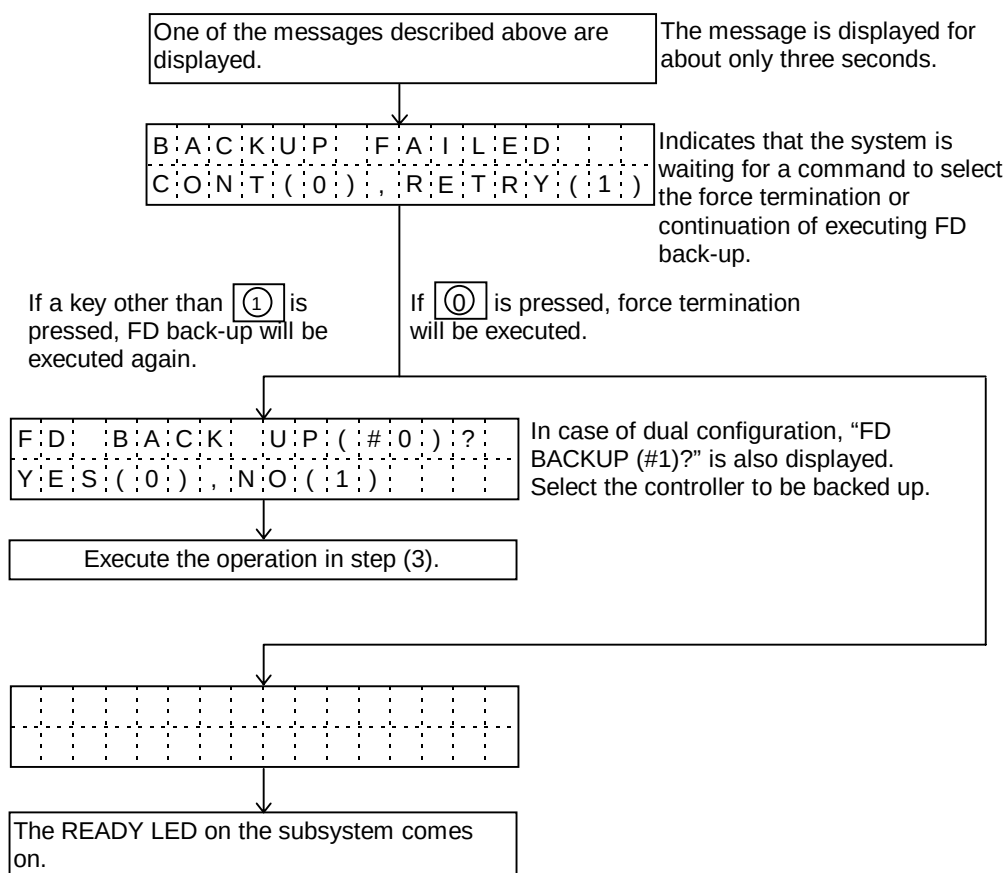


Figure 2.3.2 DIP Switches

Note 1 : While executing the back-up to FD, the messages described below are sometimes displayed.

- **FD NOT INSERTED**
FD isn't inserted. Insert FD into the FDD.
- **FD MOTOR NOT STARTED**
Starting of FD Motor ended in failure. Re-execute..
- **FILE WRITE ERROR**
FD which was inserted is not formatted, or write-protected. Format or release write-protection.
Write error occurred in FD. Insert another FD.

If these messages are displayed, back-up to FD hasn't been executed. So re-execute following the operation described below.



Note 2 : Use 3.5" FD (1.44MB) formatted by MS-DOS for back-up FD. Besides, note that the FD will be overwritten during back-up.

Note 3 : Even if back-up FD is left at FDD after back-up operation, error won't occur on the subsystem.

Note 4 : "EEPROM.DAT" or "EEPROM0.DAT" file is stored in system parameter backed up FD. The case of optional SNMP system, SNMP configuration environment files ("Config.TXT" and "NAME.TXT") are stored with system parameter file.

Note 5 : In case with optional SNMP system and system parameter is restored without SNMP configuration environment files, Subsystem becomes ready without SNMP function. In this case, the warning lamp on the panel comes on and one of messages below is shown on PANEL.

W	0	1	6	0	1	F	D	E	R	R
V	E	R	S	I	O	N	=	X	X	X

W	0	1	6	0	2	F	O	P	N	E	R	R
V	E	R	S	I	O	N	=	X	X	X	X	X

W	0	1	6	0	0	S	N	M	P	I	N	V	1
V	E	R	S	I	O	N	=	X	X	X	X	X	X

Only Dual controller system.

This case, re-restore the subsystem with a FD in which SNMP configuration environment files is stored.

2.3.2 Restoring procedures from FD

- (1) Before power on the subsystem, set DIP switch No.3 as shown in Figure 2.3.3.

In case of dual controller system, set both the DIP switches as shown in Figure 2.3.3.

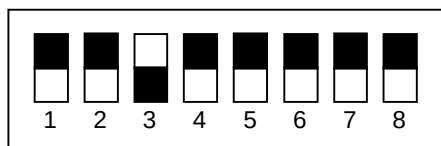
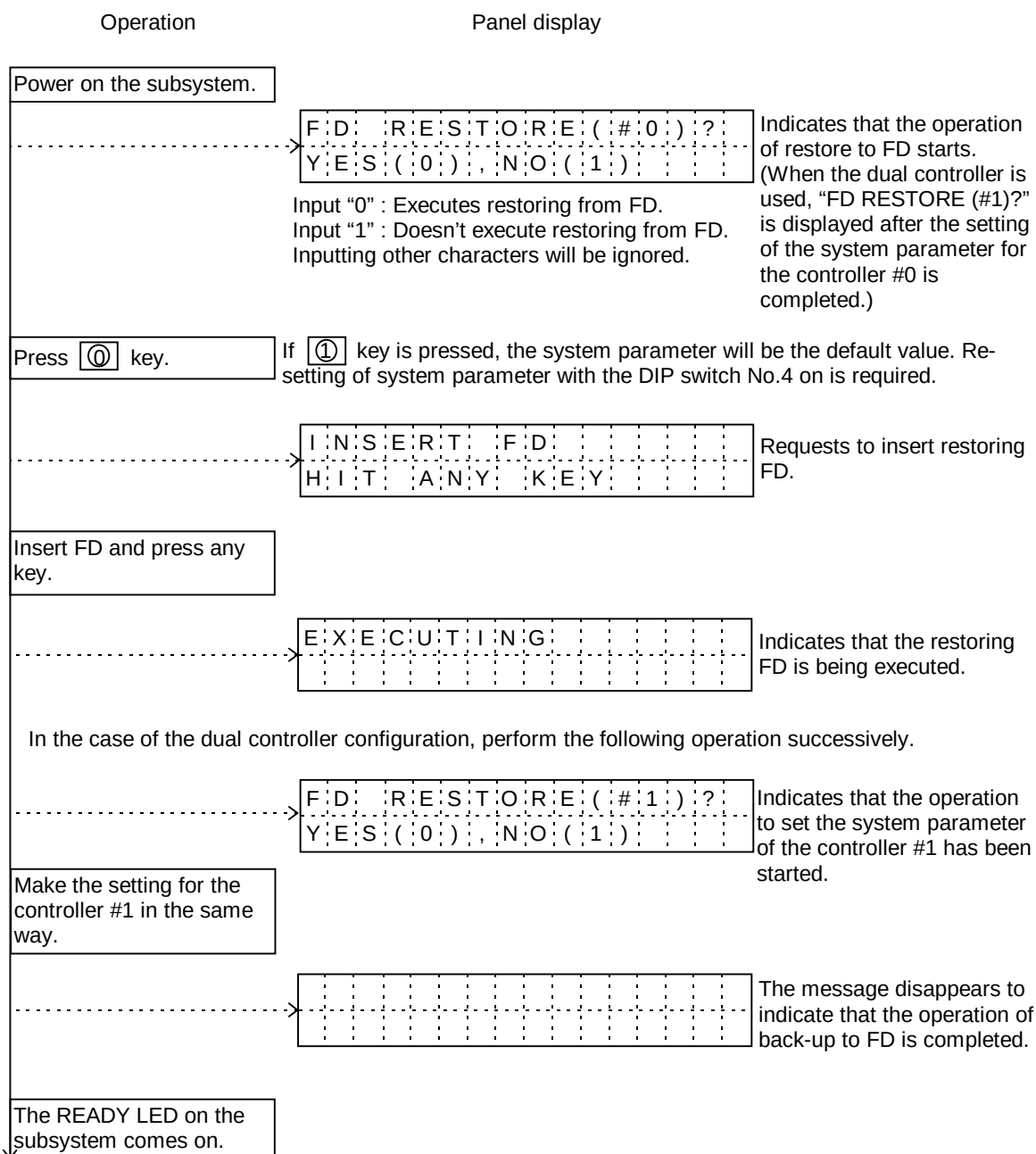


Figure 2.3.3 DIP Switches

(Restoring operation from FD is available)

- (2) Operate as described below.



(3) Set DIP switch No.3 as shown in Figure 2.3.4.

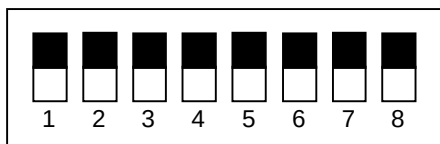
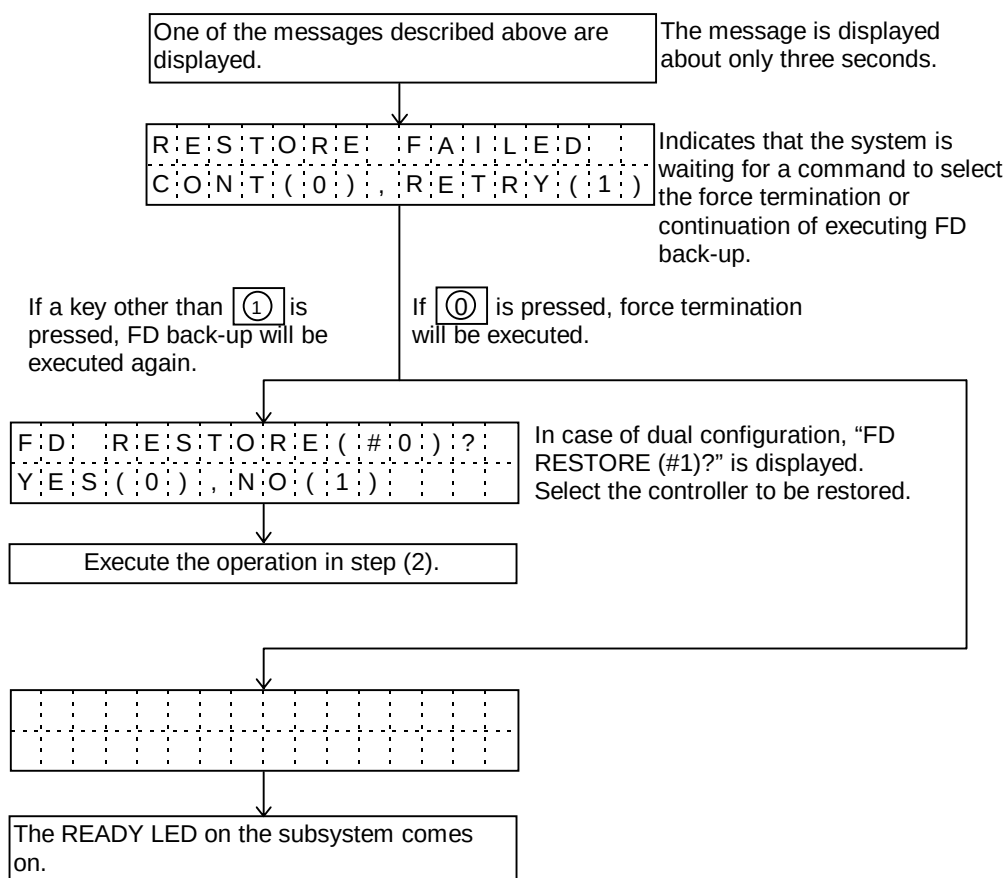


Figure 2.3.4 DIP Switches

Note 1 : While executing the restoring from FD, the messages described below are sometimes displayed.

- **FD NOT INSERTED**
FD isn't inserted. Insert FD into the FDD.
- **FD MOTOR NOT STARTED**
Starting of FD Motor ended in failure. Try again.
- **BAD FD INSERTED**
Inserted FD is not formatted. Format FD.
- **FILE READ ERROR**
Read error occurred in FD. Try again.

If these messages are displayed, restoring from FD hasn't been executed. So re-restore the system following the operation described below.



Note 2 : In case that restoring operation ended in failure and force terminated, setting of system parameter will be with default value.

Accordingly, re-setting with the DIP switch No.4 On is required.

Note 3 : Even if FD which was used to restore is left at FDD after back-up operation, error won't occur on the subsystem.

3. Attaching/Removing and Opening/Closing the Covers

3.1 Attaching/Removing the Front Bezel

- (1) Removing the front bezel. (See Figure 3.1.1.)

① Hold the grooves at both sides of the front bezel and pull it toward you.

Notice : Open/Close the front bezel carefully to avoid subjecting the subsystem to any impact since it has precision components.

- (2) Attaching the front bezel. (See Figure 3.1.1.)

① Fit the guide plate of the main body with the slots of the front bezel (four places), press the front bezel against them.

Notice : Open/Close the front bezel gently to avoid a shock. Precision components are installed.

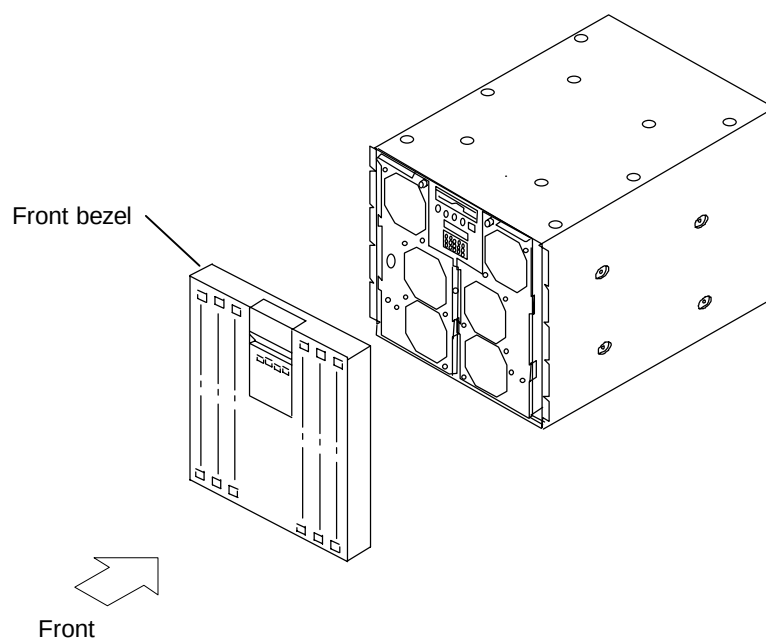


Figure 3.1.1 Attaching/Removing the Front Bezel

3.2 Opening/Closing the Rear Cover

Tools : Philips screwdriver (No.2)

(1) Removing the rear cover. (See Figure 3.2.1)

① Remove the 2 thumbscrews and open the rear cover.

Notice : Open/Close the rear cover carefully to avoid subjecting the subsystem to any impact since it has precision components.

(2) Attaching the rear cover. (See Figure 3.2.1.)

① Attach the rear cover in the reversed order as (1).

Notice : Open/Close the rear cover gently to avoid a shock. Precision components are installed.

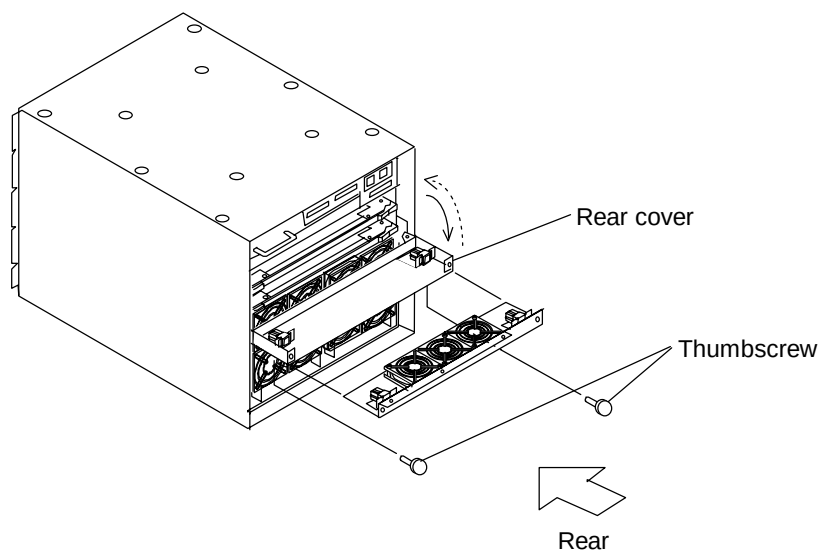


Figure 3.2.1 Opening/Closing the Rear Cover

3.3 Opening/Closing the Front Panel

(1) Opening the front panel. (See Figure 3.3.1.)

- ① Remove the front bezel.
- ② Insert the key, turn it to the arrow direction (→) and hold the left of the front panel to open to the right.

Notice : Open/Close the covers carefully to avoid subjecting the subsystem to any impact since it has precision components.

(2) Closing the front panel. (See Figure 3.3.1.)

- ① Close the front panel.
- ② Turn the key to the arrow direction (←) and secure the front panel.
- ③ Attach the front bezel.

Notice : Keep the key carefully lest it should be lost.

Notice : Open/Close the covers gently to avoid a shock. Precision components are installed.

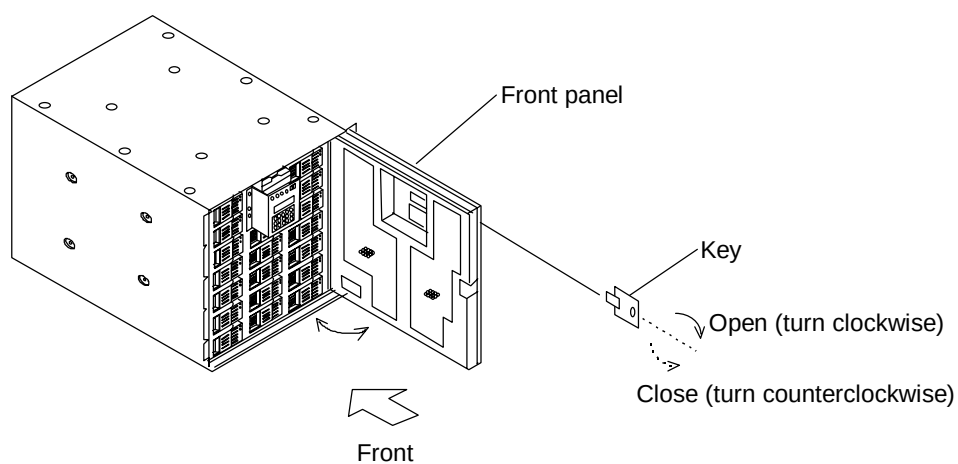


Figure 3.3.1 Opening/Closing the Front Panel

4. Replacing HDU ASSY

The method of replacing HDU varies depending on the RAID configuration.

When replacing the HDU ASSY, confirm the RAID configuration of the subsystem beforehand, and follow the procedure below according to the configuration.

To confirm the RAID configuration, refer to page PANEL0290 ((1) Reference/setting menu of RAID configuration information.)

Notice : Be sure to replace the HDU ASSY with the power kept on. . (This procedure is except for when the Micro-Disk version is 0353 or earlier.)**

Proceed the replacement and the data recovery following the procedure below. RAID Specification of replacing HDU can be seen on the panel display. (See PANEL0450.)

Notice : If you delete or re-format the set-up RAID group or LU, user's data in that will be deleted. Be sure to back-up copy the user's data before these operation.

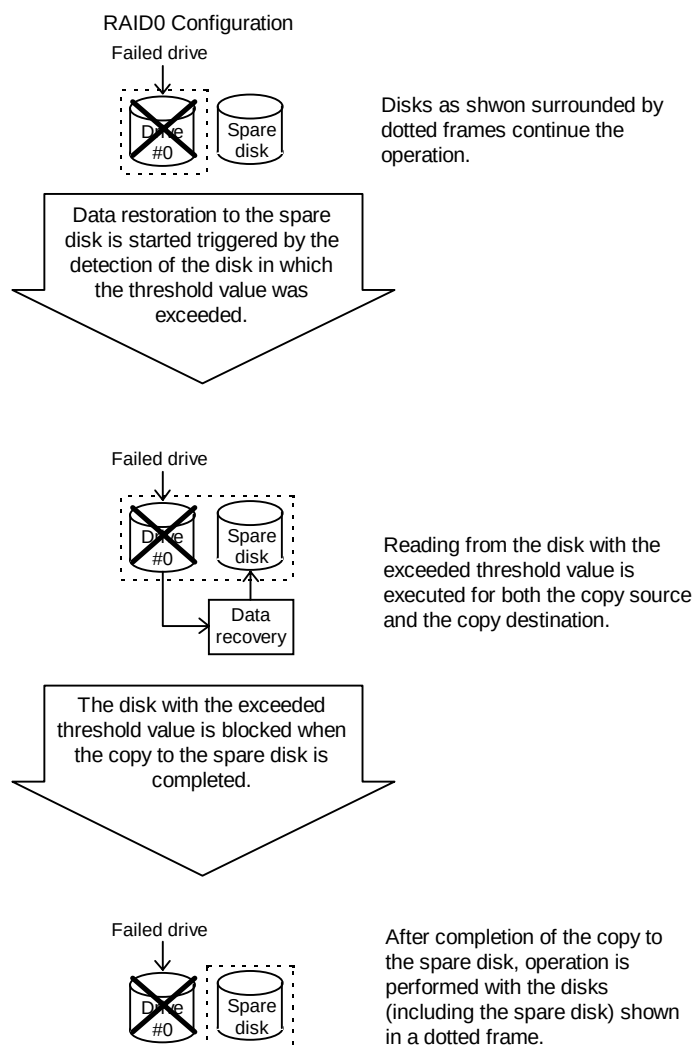
4.1 Procedure of Data Recovery and HDU Replacement Under RAID0 Configuration

4.1.1 Procedure of data recovery and HDU ASSY replacement when no spare disk is installed

- (1) Pull out the disk in which a failure occurred, and insert the replacement disk. For the specific procedures to remove and install the disk, see "HDU ASSY Replacement Procedure" on page RW-REP0300.
- (2) In a short time after the disk is inserted, the ALARM LED on the HDU ASSY goes out and the READY LED comes on. If the inserted disk is that of row 0, following messages will be displayed on the panel.
 I00DXY SYS-CP-XY----- Starting system area recovery
 I00EXY SYSRCV-XY----- Completing system area recovery
 X : Port number, Y : Row number (XY indicates a location of the disk whose system area is being recovered (or has been recovered).)
 If the ALARM LED of the HDU ASSY is on after the replacement, power off the subsystem and reexecute the replacement.
- (3) Execute an LU formatting. For the LU formatting procedure, see page RW-INST0780.
- (4) Restore the data using the backed up data.

4.1.2 When a spare disk is installed

When the Micro_Disk version is 0354** (** is optional) or later, data restoration to the spare disk is executed by the dynamic sparing function. Conditions for restoration to the spare disk and messages, etc. are the same as those to the RAID1, 5 and A. See pages RW-REP0230 through 0260.



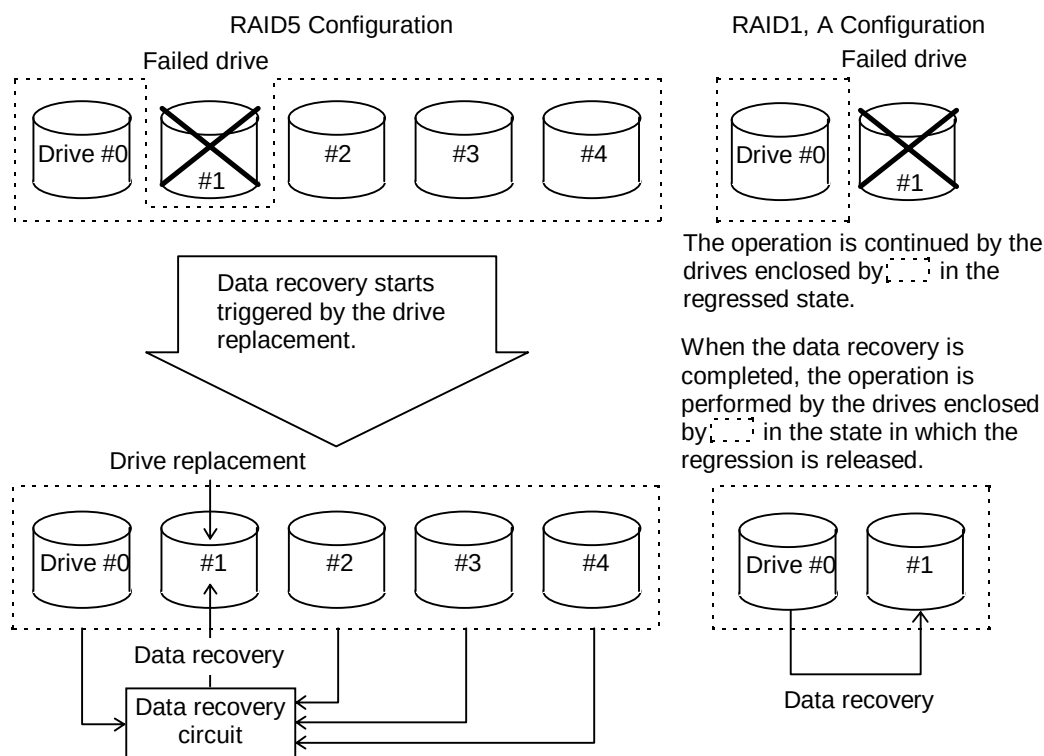
4.2 Procedure of Data Recovery and HDU Replacement Under RAID1, 5, A Configuration

4.2.1 Procedure of data recovery and HDU ASSY replacement when no spare disk is installed

When a failure occurred at a HDU ASSY, replace the failed HDU with a spare HDU.

To replace a HDU, refer to “4.3 HDU ASSY Replacement Procedure”. (See RW-REP0300.) With the replacement, data in the failed HDU will be automatically recovered. The panel display is described at “① Transition of panel display”. (See RW-REP0220.)

Note : When DRIVE MAINTN (RECOVER STATUS) is selected from the panel during data recovery, the progress rate (%) of the data recovery at the moment can be seen (to see the progress rate again, return to the previous screen and then select DRIVE MAINTN again).



In the following cases, the recovery will not start automatically. Operation to start the recovery is required.

- (1) When the drive recovery mode is set to “NOT AUTOMATIC MODE”, the data recovery will not start automatically when the drive is replaced.

In this case, it is necessary to instruct recovery from the panel. (See RW-REP0320.)

- (2) When failures occurred in plural drives, if the second faulty drive is replaced during data recovery of the first drive, the data recovery of the second drive will not start automatically.

In this case, it is necessary to remove and insert the second drive again after the data recovery for the first drive is completed. Or, it is necessary to instruct recovery from the panel. Select “DRIVE MAINTN (RECOVER STATUS)” and make sure that data recovery is completed normally.

① Transition of panel display

I00DXY SYS-CP-XY : Start of system area recovery (*)

I00EXY SYSRCV-XY : Completion of system area recovery (*)

I010XY RCV-ST-XY : Start of data area recovery

I011XY RCVEND-XY : Completion of data area recovery

I005XY DRVRCV-XY : Completion of drive recovery

Note : Symbols X and Y indicated above represent the following.

X indicates port No., Y indicates row No., and XY indicates the location of the drive under recovery.

* : Only with the replacement of HDU in Row = 0.

② Confirming completion of data recovery

Select DRIVE MAINT (RECOVER STATUS) with the panel and check to see that the data recovery is completed normally (COMP).

③ When the data recovery fails (I012XY RCVFLT-XY)

Select RECV ERR INFO from the panel and locate the faulty portion.

(a) Data recovery onto the replacement drive

(i) When the faulty portion is the replaced drive (PORT X, ROW Y)

- Replace the drive again.
- Make sure that the data recovery is completed normally (COMP).

(ii) When the faulty portion is other than the replaced drive

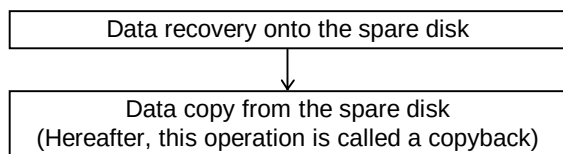
- Remove and insert the replaced drive and start data recovery again.
- Check to see that the data recovery is completed normally (COMP). When the data recovery is completed abnormally, it is a double failure, and cannot be recovered. Ask for an instruction. When the data recovery is completed normally, remove the failed drive (causing the system to be regressed) and replace the drive.

4.2.2 Procedures of data recovery and HDU ASSY replacement when a spare disk is installed

When a failure occurred in a HDU at a system with a spare drive, the data in the failed HDU is automatically recovered to the spare drive. After replacement of the failed HDU, the data in the spare drive will be copied back to the replaced HDU.

To replace HDU, refer to "4.3 HDU ASSY Replacement Procedure". (See RW-REP0300.) The panel display is described "Transition of Panel Display". (See RW-REP0280.)

Note : When DRIVE MAINT (RECOVER STATUS) is selected from the panel during data recovery, the progress rate (%) of the data recovery at the moment can be seen (to see the progress rate again, return to the previous screen and then select DRIVE MAINT again).



(1) Data recovery onto the spare disk

There are two types of data recovery onto the spare disk depending on the incentive.

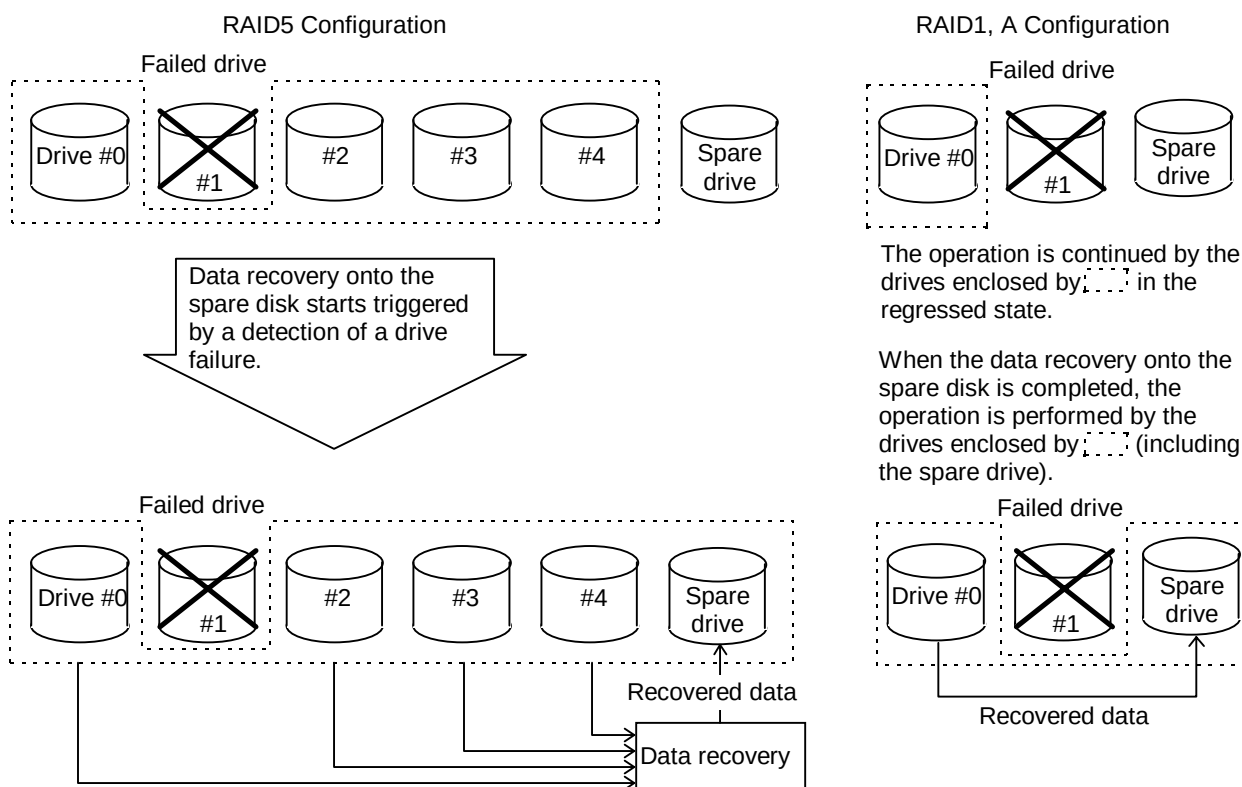
- Data recovery onto the spare disk when a failure in the disk is detected.
- Data copy onto the spare disk when a disk is detected in which the error count has exceeded its threshold value. (This operation will be called "dynamic sparing" hereafter. Note that some microprograms of certain version do not support the operation.)

(1-1) 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 drive failure occurs, the data of the failed drive is recovered automatically onto the spare disk.

Automatic recovery onto the spare disk is executed only under the following condition.

Condition : "When a 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.

- ① When the drive recovery mode is set to "NOT AUTOMATIC MODE", the data recovery onto the spare disk will not start automatically.

In this case, it is necessary to instruct recovery onto the spare disk with the panel. (See RW-REP0320)

- ② If a further drive failure occurs while the spare disk is used already (data of a drive has been already recovered onto the spare disk), the data of the nearly failed drive will not be recovered onto the spare disk.

Even after the copyback is completed in the above state and the spare disk enters the unused state, the data of the second failed drive will not be recovered onto the spare disk.

- ③ If a disk of no failure (a 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 from the panel. (See RW-REP0320)
- ④ When the spare disk is replaced because a spare disk failure occurred during data recovery to the spare disk, the data recovery to the replaced spare disk will not start automatically. In this case, it is necessary to instruct recovery to the spare disk with the panel. (See RW-REP0320)
- ⑤ If a faulty drive is replaced during data recovery to the spare disk, the data copy back the replaced drive will not start automatically even after the data recovery to the spare disk is completed.

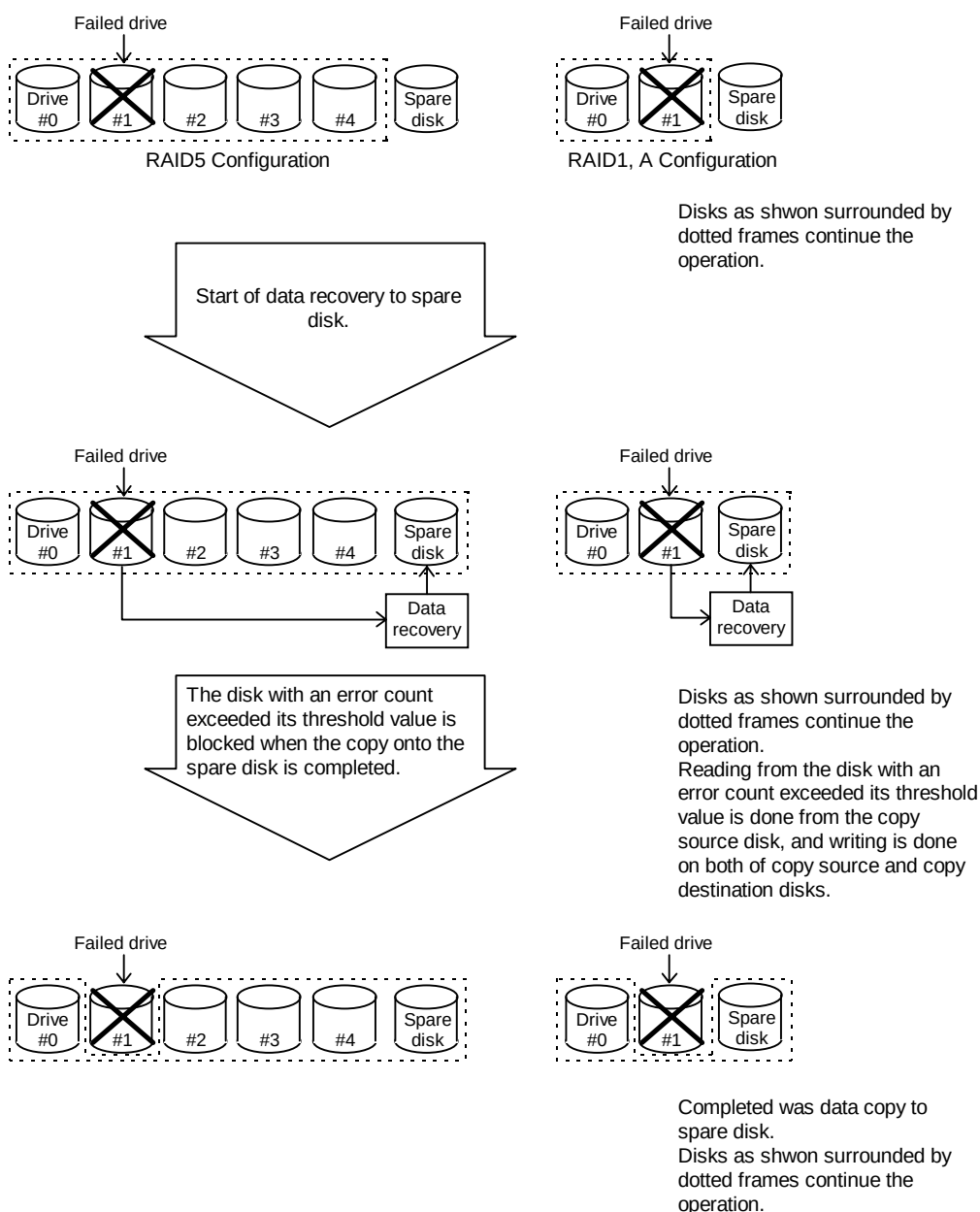
In this case, it is necessary to remove and insert the replaced drive again after the data recovery onto the spare disk is completed.

(1-2) 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 is detected in which the error count has exceeded its threshold value, data stored in the disk 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.

103■XY ■:0 - D
 ▲▲▲▲▲ -XY ▲▲▲▲▲ : Message text } See TRBL0310, 0320, 0330.

At the time when an error count exceeded its threshold value is detected, only a message display on the panel is done without blocking the concerning disk, 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 RW-REP0280 for panel display 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 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 sparing disk is being used for the data recovery.
- Another disk 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 (refer to pages RW-REP0210 through RW-REP0290).

Errors counted in the subsystem and default threshold values for them are listed below.

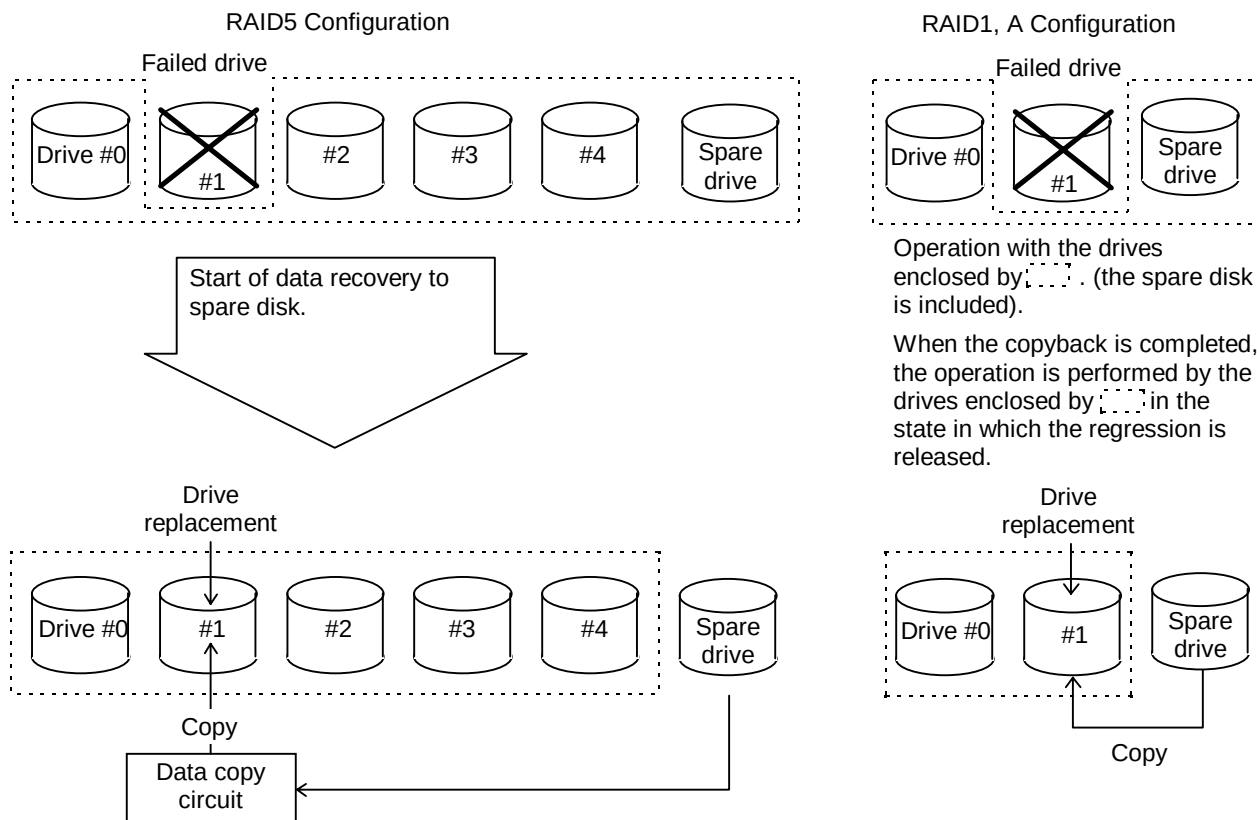
Item No.	Kind of error	Threshold (Default)
1	Drive mechanical error. (Recovered)	50
2	Drive mechanical error. (Unrecovered)	2
3	Drive medium error. (Recovered)	100
4	Drive medium error. (Unrecovered)	50
5	Drive R/W error. (Recovered)	10
6	Drive R/W error. (Unrecovered)	2
7	Drive I/F error. (Recovered)	50
8	Drive I/F error. (Unrecovered)	2
9	Drive hardware error. (Recovered)	50
10	Drive hardware error. (Unrecovered)	2
11	Drive SCSI I/F error. (Recovered)	50
12	Drive SCSI I/F error. (Unrecovered)	2
13	Collectable errors in online verify.	100
14	Uncollectable errors in online verify.	50

The threshold values above can be referred to and updated from the maintenance panel. (See page PANEL0520.)

Besides, the then error count can be referred to concerning the recovered or unrecovered drive media errors, correctable errors in online verify operations, correctable errors, and uncorrectable errors.

(2) Copyback

When a new drive is inserted to where a failure occurred as shown in the drawing below, the copyback will be executed automatically.



In the following cases, the copyback will not start automatically. Operation to start the copyback is required.

- ① When the copyback mode is set to "NOT AUTOMATIC MODE", the copyback will not start automatically after the drive replacement.

In this case, it is necessary to instruct copyback with the panel. (See RW-REP0280)

- ② If a faulty drive is replaced during data recovery to the spare disk, the data copy back to the replaced drive will not start automatically even after the data recovery to the spare disk is completed.

In this case, it is necessary to remove and insert the replacement drive again after the data recovery onto the spare disk is completed.

(a) Transition of panel display.

(i) Data recover (Data recovery onto the spare disk when a disk failure is detected.)

W202XY DRVALM-XY: Drive blocked

I01044 RCV-ST-44 : Start of data area recovery

I01144 RCVEND-44 : Completion of data area recovery

I006XY SPDRCN-XY : Completion of recovery onto spare disk

Note : Symbols X and Y indicated above represent the following.

X indicates port No., Y indicates row No., and XY indicates the location of the recovered drive.

(ii) Data recover (Dynamic sparing)

I01DXY DYNMSP-XY : Start of Dynamic sparing

I01044 RCV-ST-44 : Start of HDU ASSY recover

I01144 RCVEND-44 : Completion of data recovery

I006XY SPDRCN-XY : Completion of recovery onto spare disk

W202XY DRVALM-XY: Drive X, Y were blocked

Note : Symbols X and Y indicated above represent the following.

X indicates port No., Y indicates row No., and XY indicates the location of the recovered drive.

(iii) Copyback

I00DXY SYS-CP-XY : Start of system area recovery (*)

I00EXY SYSRCV-XY : Completion of system area recovery (*)

I010XY RCV-ST-XY : Start of data area recovery

I011XY RCVEND-XY : Completion of data area recovery

I005XY DRVRCV-XY : Completion of recovery onto the drive to which the data has been copied.

Note : Symbols X and Y indicated above represent the following.

X indicates port No., and Y indicates row No., and XY indicates the location of the drive to which the data is copied.

* : This message is displayed only when replacing HDU ASSY.

(b) Confirming completion of data recovery or copyback

Select DRIVE MAINTEN (RECOVER STATUS) from the panel and make sure that the data recovery is completed normally (COMP).

(c) When the data recovery fails (I012XY RCVFLT-XY)

Select RECV ERR INFO from the panel and locate the faulty portion.

(i) Data recovery to the spare disk

- When the faulty portion is the spare disk (PORT 4, ROW 4)

❶ Replace the spare disk. In this case, the data recovery to the spare disk will not start.

❷ Replace the drive at the regressed location. In this case, the data recovery onto the replacement drive starts.

- When the faulty portion is other than the spare disk

❶ Replace the drive at the regressed location. In this case, the data recovery to the replaced drive starts.

❷ Make sure that the data recovery ends normally (COMP).

When the data recovery is completed abnormally, it is a double failure, and cannot be recovered. (See 3. Trouble shooting chapter TRBL0840)

When the data recovery is completed normally, remove the failed drive (causing the system to be regressed) and replace the drive. (When the failed drive is removed, the data recovery to the spare disk will not start, where as when the drive is replaced, the data recovery to the replaced drive starts.)

(ii) When the dynamic sparing

- When the faulty portion is the spare disk (PORT 4, ROW 4)

❶ Replace the spare disk. In this case, the dynamic sparing will not start.

❷ Replace the drive at the regressed location. In this case, the data recovery onto the replacement drive starts.

- When the faulty portion is other than the spare disk

❶ Replace the drive at the regressed location. In this case, the data recovery to the replaced drive starts.

❷ Make sure that the data recovery ends normally (COMP).

When the data recovery is completed abnormally, it is a double failure, and cannot be recovered. (See 3. Trouble shooting chapter TRBL0840)

(iii) Copyback to the replaced drive from the spare disk

- When the faulty portion is the spare disk (PORT 4, ROW 4)

❶ Replace the spare disk. In this case, the data recovery onto the spare disk will not start.

❷ Replace the drive in the regressed location. In this case, the data recovery onto the replacement drive starts.

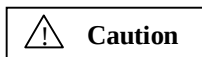
❸ Make sure that the data recovery is completed normally (COMP).

- When the faulty portion is other than the spare disk

❶ Replace the drive which failed during data recovery and make sure that the data recovery is completed normally (COMP).

❷ Replace the drive which is regressed first and make sure that the copyback is completed normally (COMP).

4.3 HDU ASSY Replacement Procedure (See Figure 4.3.1.)



Do not subject the HDU ASSY to any impact or vibration since it is a precision component.

(1) Removing procedure

- ① Remove the front bezel and open the front panel. (See RW-REP0160, RW-REP0180.)
- ② Check to see the drive installing location of the message text DRVALM-XY (XY indicates the installing location) on the panel is correct and the ALARM LED of the HDU ASSY is on.

W	2	0	2	X	Y	D	R	V	A	L	M	-	X	Y

X : Port number

Y : Row number

- ③ Open the handle in the direction of the arrow (···➤) and pull it out and remove the HDU ASSY.

Notice : Be sure to replace the HDU ASSY when the subsystem is in the ready state. (If the HDU assembly is replaced when the power of the subsystem is off, the data recovery operation will not start.)

(2) Installing procedure

- ① Open the handle fully, insert the HDU ASSY in place, and rotate the handle in the direction of the arrow (—→).

**Caution**

Do not subject the HDU ASSY to any impact or vibration since it is a precision component.

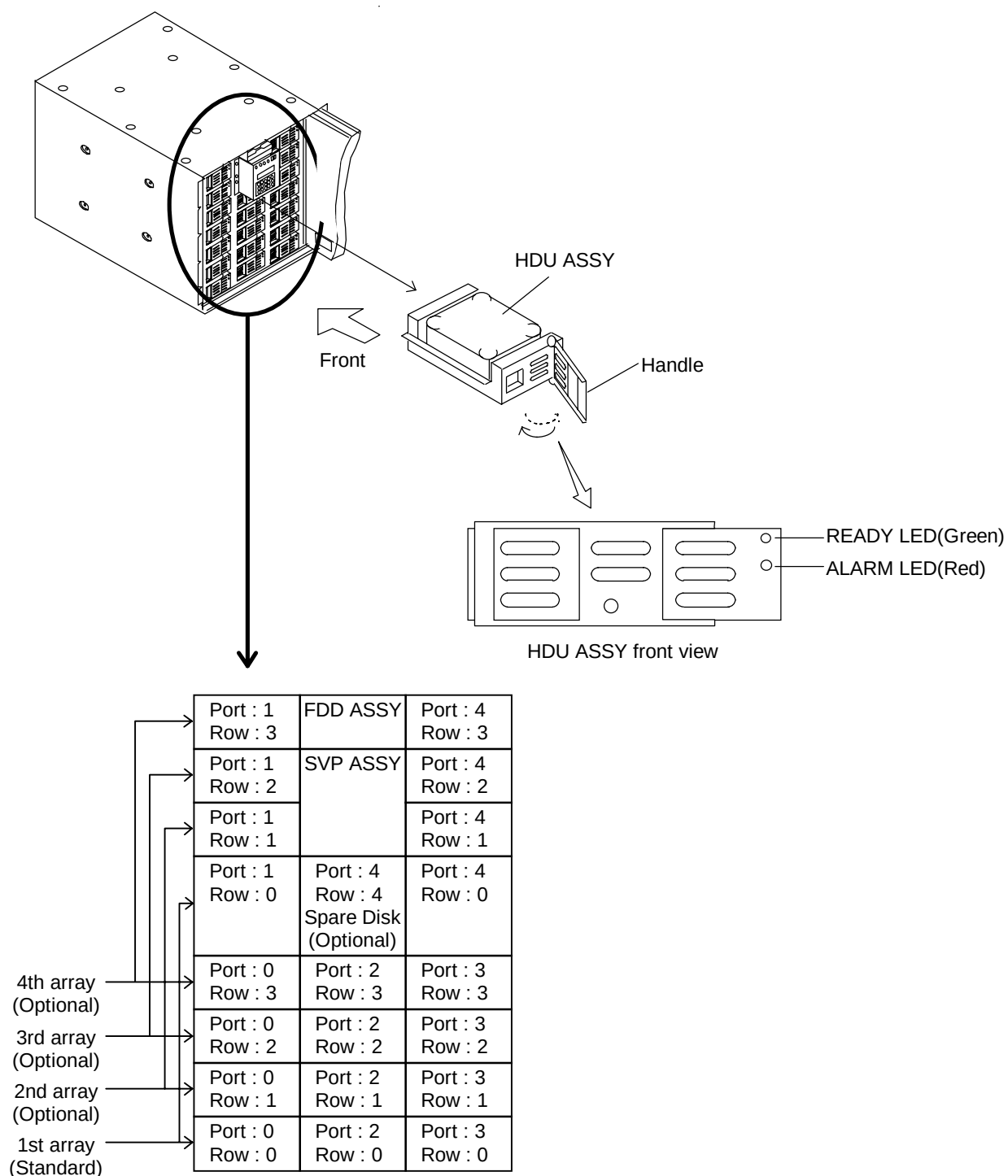
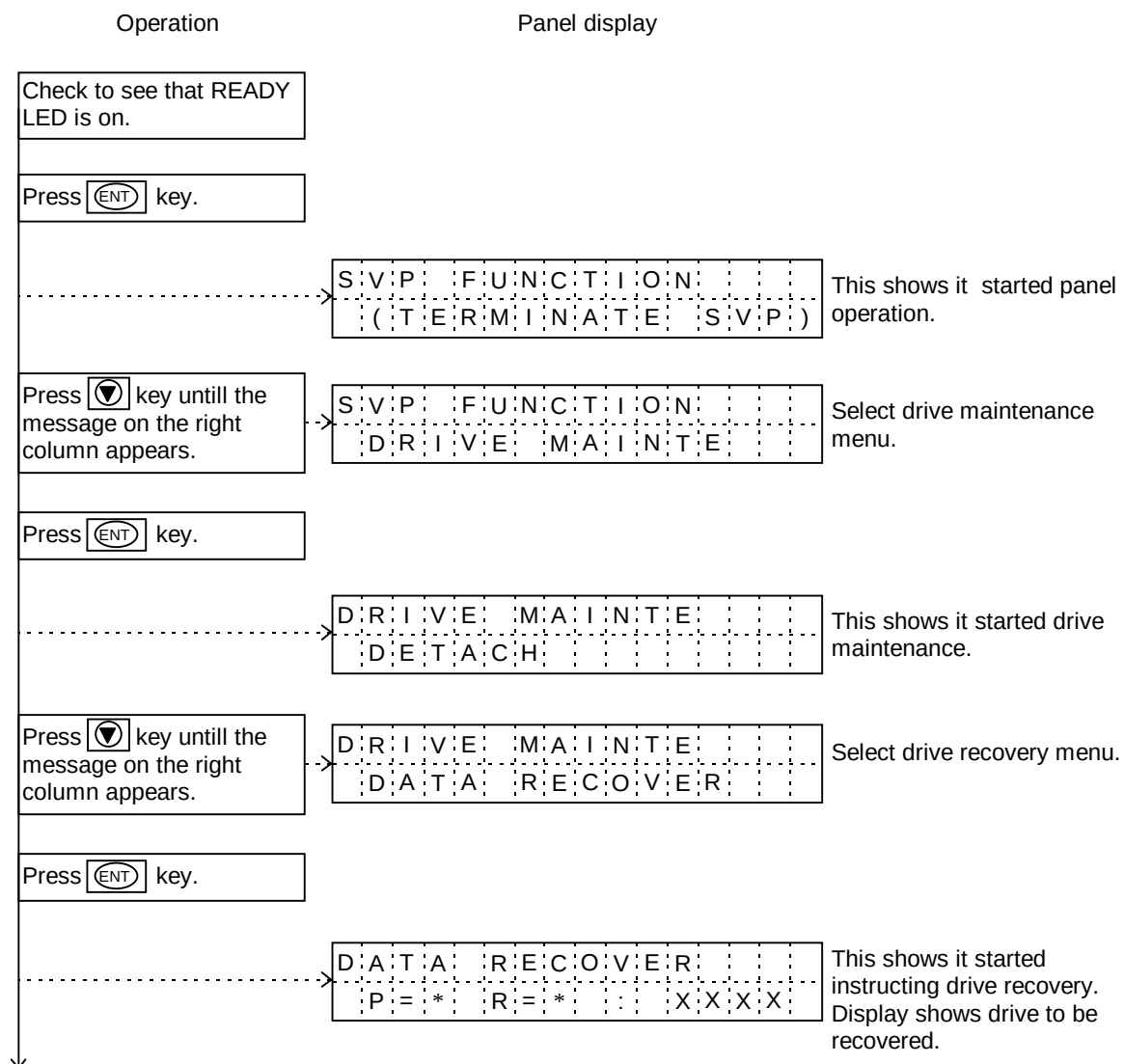


Figure 4.3.1 Replacing HDU ASSY

4.4 Manual Instruction of Data Recovery

This is for manually instructing data recovery. (In a case of dual controller system, which controller to process is automatically specified. No instruction of controller is required.) You can operate this function under device ready and LU#0 instituted (LU can be not formatted yet).

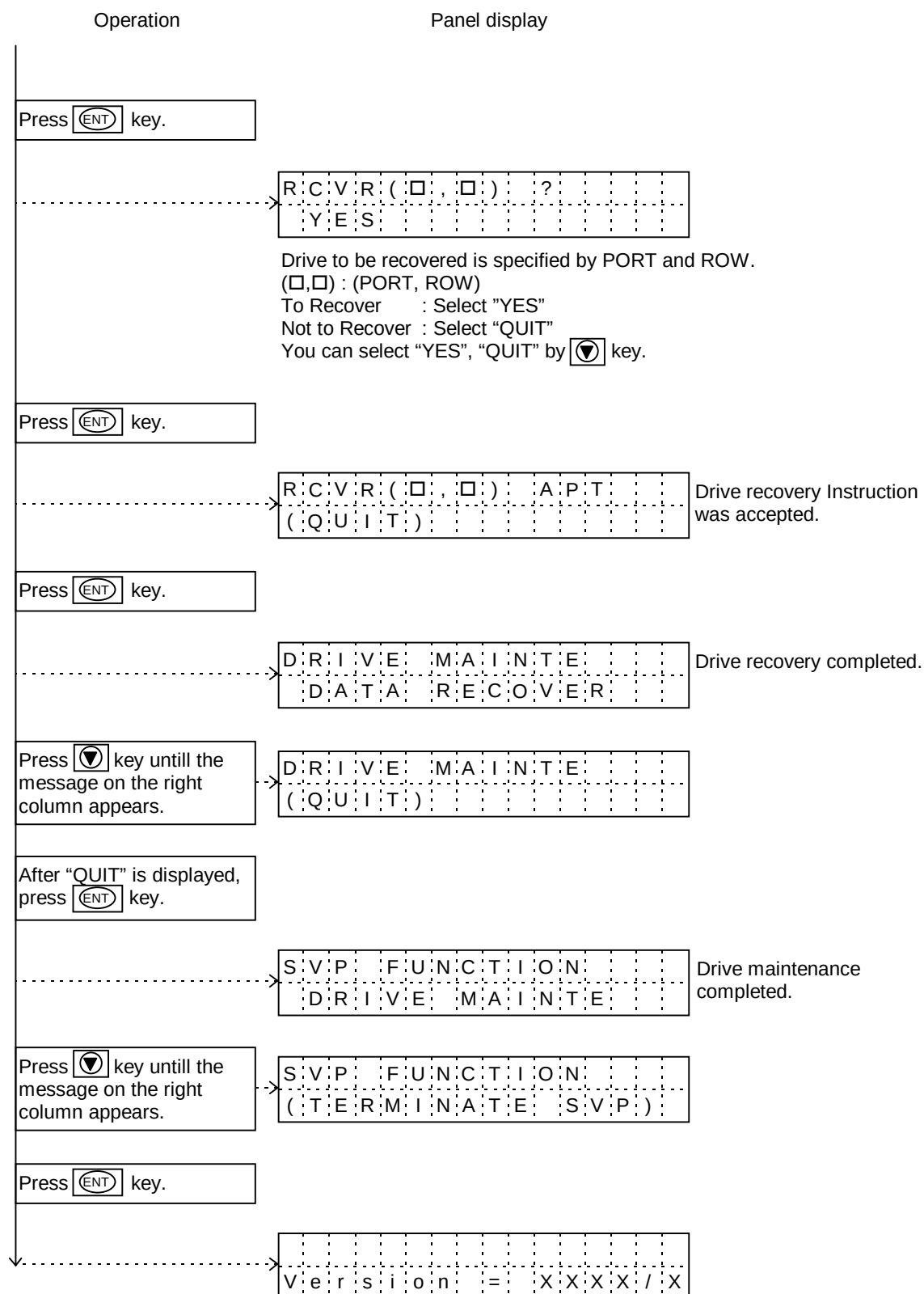


P=* : Port# of Drive to be recovered.

R=* : Row# of Drive to be recovered.

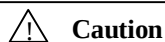
XXXX : Status of Drive to be recovered. Status is one of below.

- STDBY (not used)
- DETACH (blocked)
- NO : (RAID, LU not set yet)



5. Replacing Fan ASSY (See Figure 5.1.)

When replacing FAN ASSY, turning off the power is not required.



Caution

FAN is rotating with high speed, be careful not to be caught by the FAN.

(1) Removing procedure

- ① Remove the front bezel and open the front panel, or open the rear cover, depending on which Fan ASSY is going to be replaced. (See RW-REP0160, 0170, 0180.)
- ② Remove the thumbscrew and pull Fan ASSY toward you.
(The WARNING LED comes on and a buzzer sounds. Press either key on the panel to stop them.)

(2) Installing procedure

- ① Install Fan ASSY to the predetermined position and tighten the thumbscrew.
- ② Check to see that WARNING LED goes off and it displays as (3).
- ③ Close the front panel and attach the front bezel or close the rear cover. (See RW-REP0160, 0170, 0180.)

(3) Transition of panel display

I002XX FANRCV-XX-----Termination of fan failure recovery

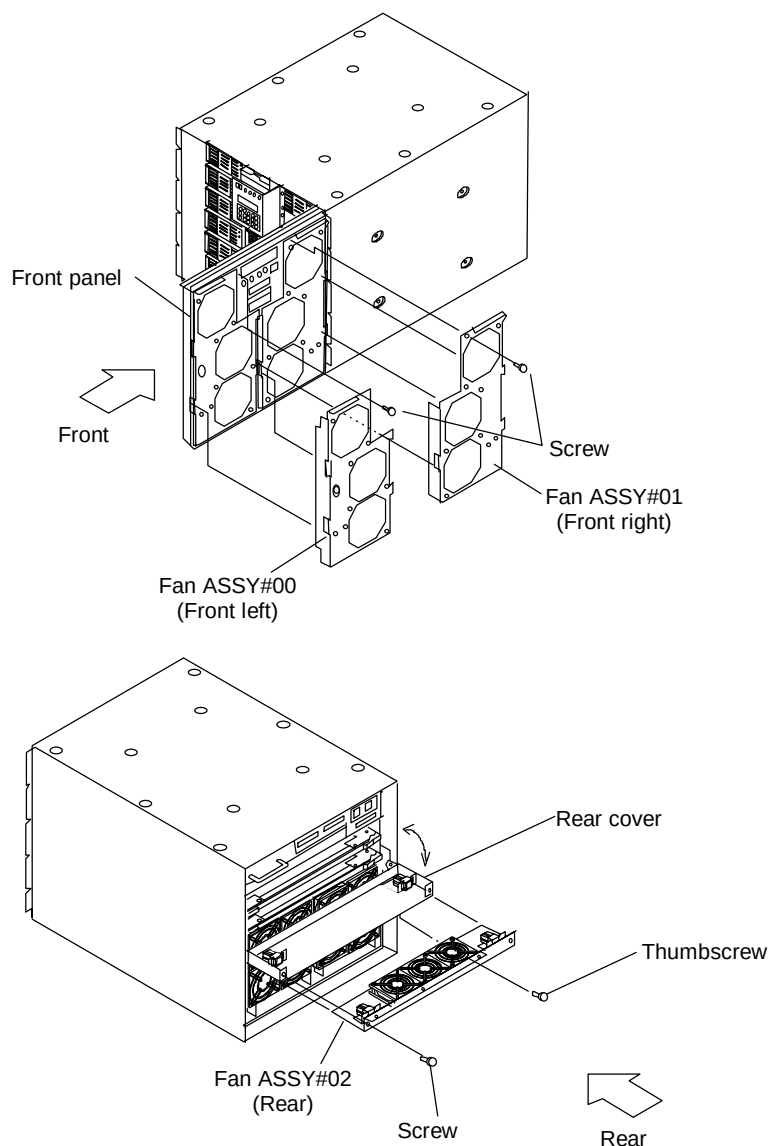


Figure 5.1 Replacing Fan ASSY

6. Replacing Battery ASSY (See Figure 6.1.)

When the subsystem is mounted on the DF-F350-U2 rack frame, start the following work after completing the works explained in “15. Procedure for Replacing I/F ADAPTER ASSY or BATTERY ASSY” on page RW-REP0610.

When the battery is to be replaced without power being turned off (during power on), follow the procedure explained below (execute (1)② to (2)② promptly).

Notice 1 : In case the power is not normally turned off, the user's data might be lost.

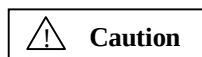
Notice 2 : If the power is already turned off, check the CACHE PWR LED (see page THEORY0210) to confirm that the cache back up is not being execute. In the case the cache back up is being executed, turn on and off the power (see page RW-REP0050).

Make sure that the power is turned off normally, then replace the Battery ASSY.

When the battery is to be replaced with power turned off, read RW-REP0050, “Turning the power off.” and “Turning-ON procedure.” thoroughly and follow RW-REP0060, “Part Replacement Procedures”.

(1) Removing procedure

- ① Turn the switch on the Battery ASSY to “O” side.
(The WARNING LED comes on and a buzzer sounds. Press either key on the panel to stop them.)
- ② Remove the thumbscrews and pull the Battery ASSY to your side by grasping it by its handle.



Caution

Do not disintegrate removed Battery. It may cause burn or electric shock.

(2) Installing procedure

- ① Insert the Battery ASSY into the right place holding it by its handle and tighten the thumbscrew.
- ② Turn the switch on the Battery ASSY to “I” side.
- ③ Check to see that WARNING LED goes off and it displays as (3).

Note : When removing/mounting the Battery ASSY, turn the switch to “O” side.

(3) Transition of panel display

I00100 BATRCV ----- Termination of battery recovery

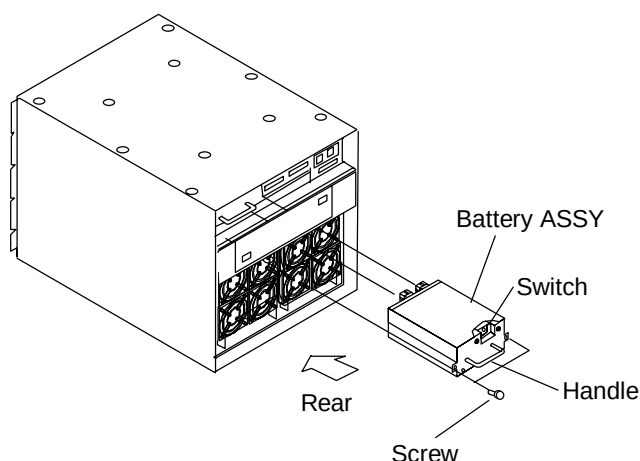


Figure 6.1 Replacing Battery ASSY

Note : The lead-acid battery is a precious resource which can be recycled.

The battery uses lead which is a heavy metal and sulfuric acid which is a deleterious substance. Therefore, never case it off at the place where the replacement of it is done.

When a part is to be replaced or a used product is to be discarded, take out the lead-acid battery to get it recycled. See page “ENTRY0130” for the safety of depositing and storing the battery.

When the battery ASSY is replaced, power on the subsystem and charge the battery for more than two hours before returning the subsystem to the customer.

7. Replacing FDD ASSY (See Figure 7.1.)

(1) Removing procedure

- ① Turn off the subsystem following the power-off procedure explained in RW-REP0050.

Notice 1 : Be sure to read the above mentioned instruction because user's data may be lost if the power is not turned off normally.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Troubleshooting Section" (See TRBL0030) and turn off the power.

- ② Disconnect the power cable. When the power supply is duplicated, disconnect two cables.
- ③ Open the front bezel and front panel.
- ④ Remove the thumbscrew and pull the FDD ASSY to your side grasping it by its handle.

(2) Installing procedure

- ① Insert the FDD ASSY into the right place holding it by its handle and tighten the thumbscrew.
- ② Connect the power cable.

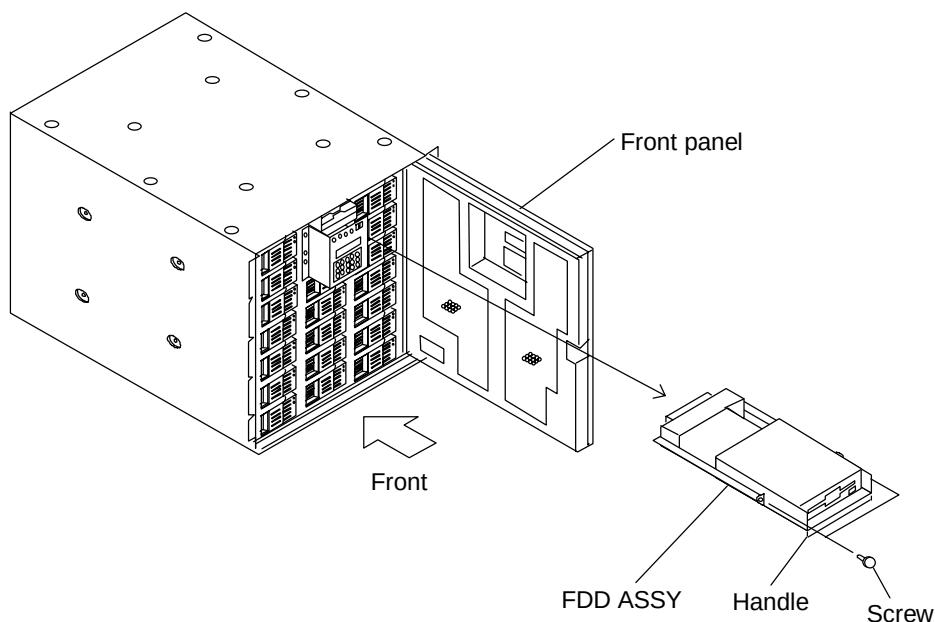


Figure 7.1 Replacing FDD ASSY

8. Replacing CTL ASSY (See Figure 8.1.1.)

The replacement procedure varies depending on whether the backup FD has been inserted or not. Perform the replacement following the procedure corresponding to the case.

- (1) When the backup FD has been inserted

Go to the replacement of the CTL ASSY when the backup FD has been inserted explained on page RW-REP0380.

- (2) When the backup FD has not been inserted

Go to the replacement of the CTL ASSY when the backup FD has not been inserted explained on page RW-REP0460.

8.1 When the backup FD has been inserted

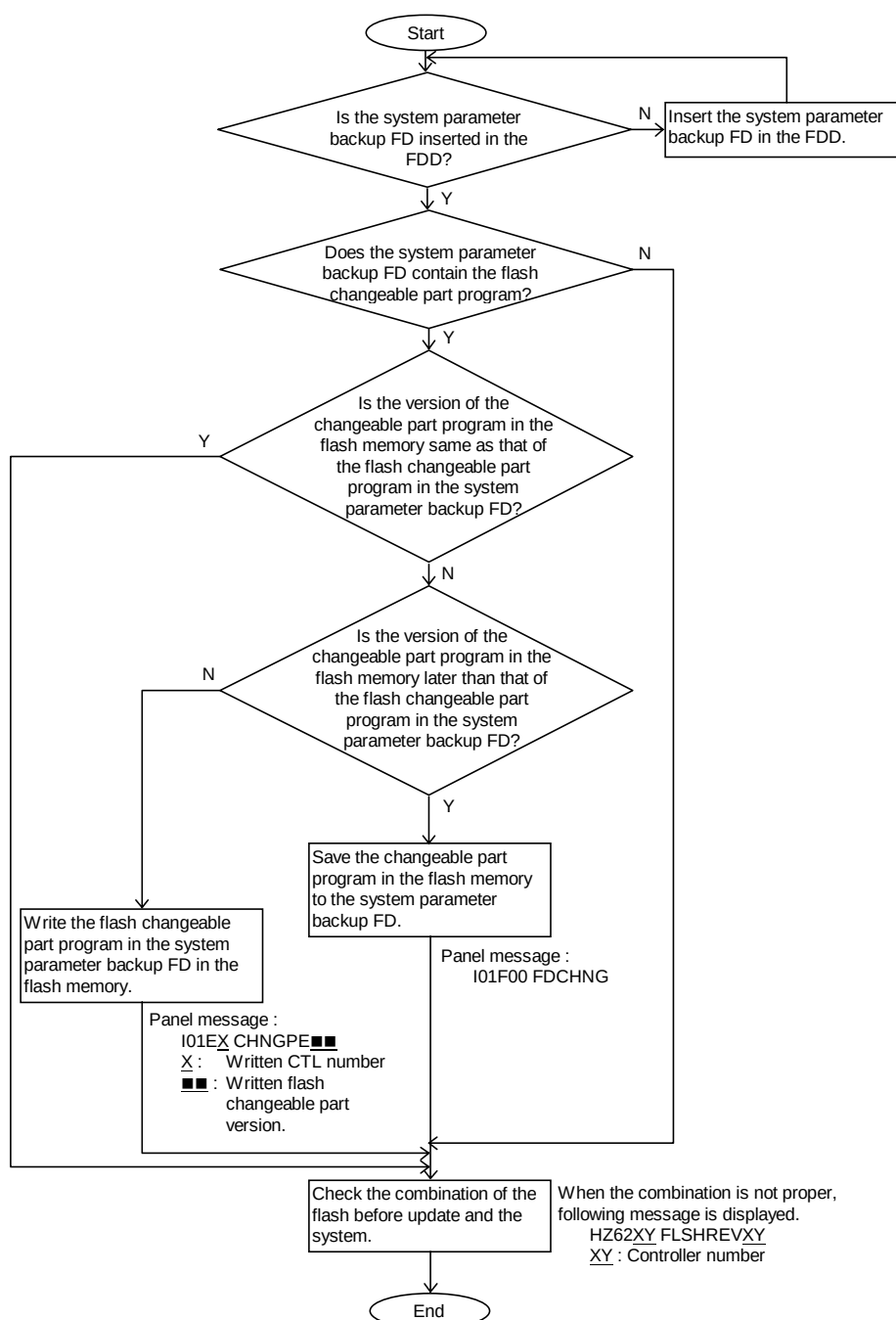
In this subsystem, the flash changeable part is updated automatically. To use the function the system parameter backup FD must be inserted.

By using the function, service person can replace the CTL ASSY without giving care to the combination of the Micro_Disk version and the flash changeable part version of the CTL ASSY.

(If the system parameter backup FD is not inserted when replacing the CTL ASSY, prepare the CTL ASSY whose flash changeable version is the same as that of the CTL ASSY to be replaced, or PE26 or later, and execute the replacement following the procedure explained in Section 8.2 “When the backup FD has not been inserted”).

Outline of flash changeable part automatic updating function

The following is a processing flow of the flash changeable part automatic updating function.



In case no optional redundant CTL installed

(1) Removing procedure

- ① Insert back-up FD into the FDD, copy the system parameter to FD.
(See RW-REP0090.)
- ② Turn off the subsystem following the power-off procedure explained in RW-REP0050.

Notice 1 : Be sure to read the above mentioned instruction because user's data may be lost if the power is not turned off normally.

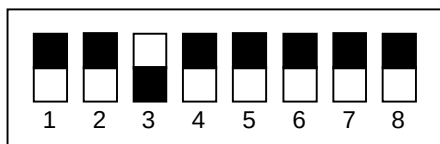
Notice 2 : When the power has been already turned off, check the CACHE PWR LED (see page THEORY0210) to see if the cache backup is not being performed. If the cache backup is being performed, turn on and off the replacement after the power is turned off normally.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Troubleshooting Section" (See TRBL0030) and turn off the power.

- ③ Disconnect the cable (RS232C).
- ④ First open the rear cover. (See RW-REP0170.)
- ⑤ Open the right and left levers to the direction of arrows (···➤) at the same time then remove the CTL ASSY.
- ⑥ Remove the CACHE ASSY and the LAN ASSY if installed.

(2) Installing procedure

- ① Prepare the FD in which the system parameter was copied in (1) ①. If it is not available, prepare the table of system parameter setting.
- ② Reinstall the removed CACHE ASSY and LAN ASSY in CTL ASSY. Be sure to install it in the same position as before.
- ③ Insert the CTL ASSY into the right place with its right and left levers being opened, then close the both levers to the direction of arrows (—→) at the same time.
Note : If the CTL ASSY is caught by something when it is installed, do not push it in forcibly. Retry the installation from the beginning. If forced, pins might be broken.
- ④ Connect the disconnected cables (RS232C).
- ⑤ Set No.3 of the DIP switch of the CTL ASSY to down position.



- ⑥ Turn on the subsystem according to the power-on procedure explained in RW-REP0050.
- ⑦ Set the system parameter of replaced CTL ASSY with the FD prepared at ①. (See RW-REP0130.)

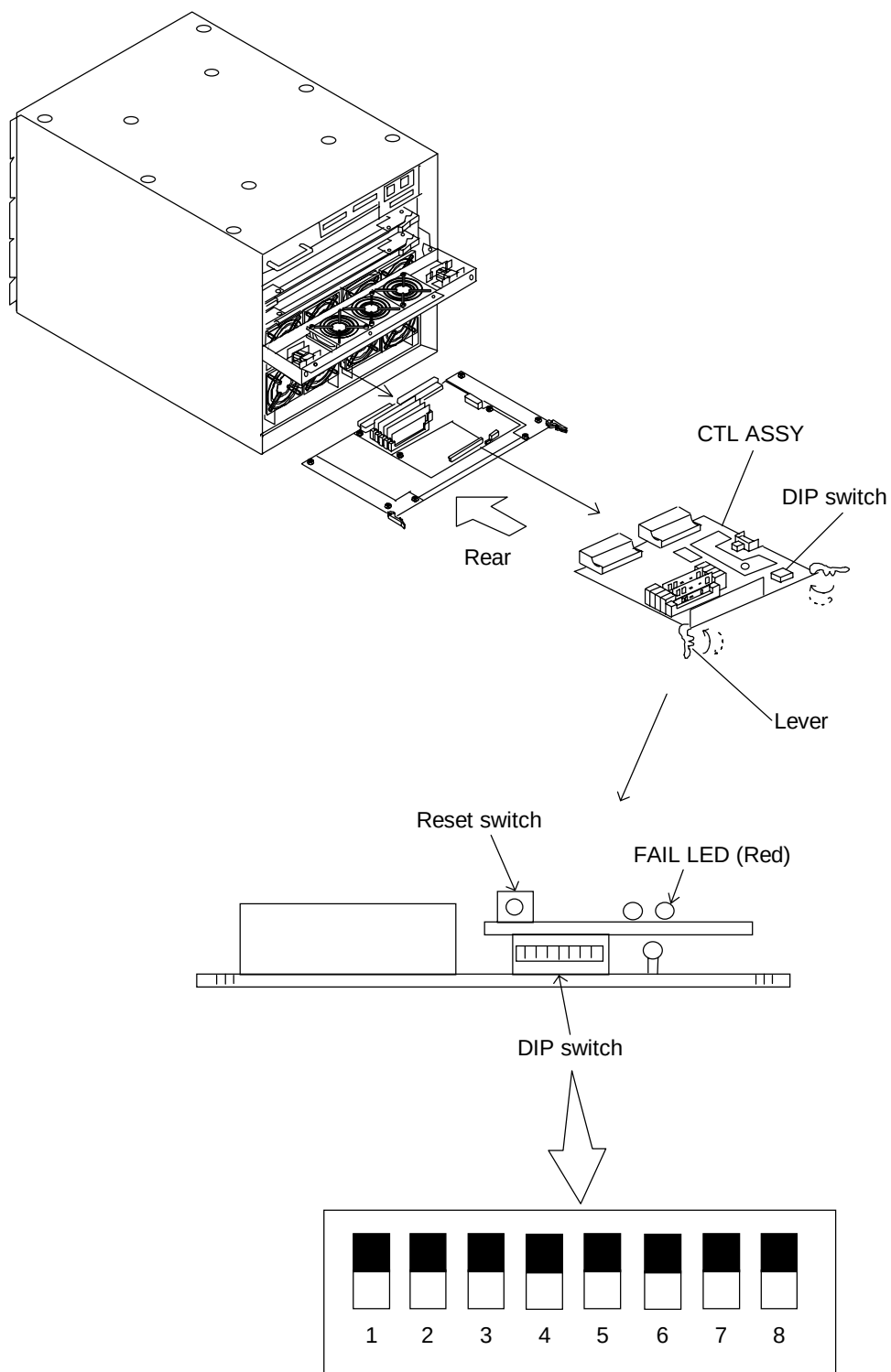
- ⑧ One of the following messages is displayed on the panel. It does not mean a failure. Confirm the message and recover the subsystem state by performing the corresponding operation.

Message on the panel	Subsystem state	Operation
Version = XXXX/X	Subsystem READY LED comes on.	Go to step ⑨
I01EX CHNGPE■■■ HZ62XY FLSHREVXY X : Controller number (0 or 1) ■■■ : Version of flash changeable part is displayed. XY : Controller number (01 or 10) is displayed.	Subsystem ALARM LED comes on. (Version of flash changeable part was updated to PE■■■. Current system cannot operate with the flash changeable part whose version is not updated.)	Operation1 : Return the DIP switch of the CTL ASSY. Operation2 : Turn off the power following the powering off procedure shown on page RW-REP0050. Operation3 : Turn on the power following the powering on procedure shown on page RW-REP0050. Check if the following message is displayed on the panel. Version = XXXX/X Operation4 : Paint the boxes on the CHANGEABLE revision label affixed on the CTL ASSY up to ■■■ (see RW-REP0450), then go to step ⑨.
I01EX CHNGPE■■■ Version = XXXX/X X : Controller number (0 or 1) ■■■ : Version of flash changeable part is displayed.	Subsystem READY LED comes on. (Version of flash changeable part was updated to PE■■■. Current system can operate with the flash changeable part whose version is not updated.)	Paint the boxes on the CHANGEABLE revision label affixed on the CTL ASSY up to ■■■ (see RW-REP0450), then go to step ⑨.

- ⑨ After READY LED come on, set No.3 of DIP switch to as shown.



- ⑩ Turn off the power according to the power off procedure in RW-REP0050.
 ⑪ Turn on the power according to the power on procedure in RW-REP0050. (Soon, the ASSY will enter the ready status.)
 ⑫ Close the rear cover. (See RW-REP0170.)

**Figure 8.1.1 Replacing CTL ASSY**

In case optional redundant CTL is installed

When the subsystem is of dual controllers, a controller can be replaced while the power on.

Notice 1: Do not replace (pull out) the CTL ASSY which operates normally. Before replacing the CTL ASSY, confirm that it is blocked (the FAIL LED in on).

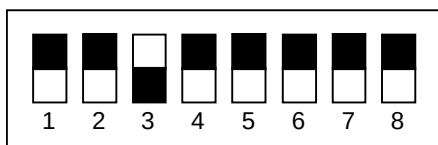
Notice 2: In this case, the controller must be replaced one after another. When Dual controllers are replaced at the same time, the power should be turned off before replacement.

(1) Removing procedure

- ① First open the side cover 1 and then the side cover 2. (See RW-REP0170.)
- ② Disconnect the cables (RS232C).
- ③ Confirm the blocked CTL ASSY (with the FAIL LED turned on). (See Figure 8.1.1.)
- ④ Take out the CTL ASSY by pulling both levers on left and right side at the same time toward the directions shown by allows (···➤)
- ⑤ Remove the CACHE ASSY. If the LAN ASSY is installed, also remove it.

(2) Installing procedure

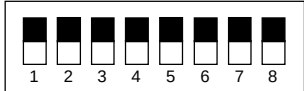
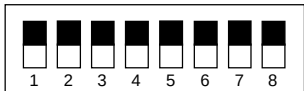
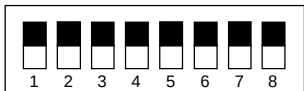
- ① Reinstall the removed CACHE ASSY and the LAN ASSY (option) in the new CTL ASSY. Be sure to install it in the same position as before.
- ② Set No.3 of the DIP switch of the CTL ASSY.



- ③ Insert the CTL ASSY into the right position with the right and left levers being opened, then close the both levers to the direction of arrows (—→) at the same time.

Note : If the CTL ASSY is caught by something when it is installed, do not push it in forcibly. Retry the installation from the beginning. If forced, pins might be broken.

- ④ One of the following messages is displayed on the panel. It does not mean a failure. Confirm the message and recover the subsystem state by performing the corresponding operation.

Message on the panel	Subsystem state	Operation
I619XX CTLRCV-XX XX : Controller number (00 or 01) is displayed.	The WARNING LED goes out and the READY LED of the subsystem comes on.	Return the DIP switch No.3 as shown below, then go to step ⑤ 
I01EX CHNGPE■■ HZ62XY FLSHREVXY H60422 CTLFAIL W015XX CTLALM-XX XX : Controller number (00 or 01) is displayed. X : Controller number (0 or 1) ■■ : Version of flash changeable part is displayed. XY : Controller number (01 or 10) is displayed.	The WARNING LED comes on, and the READY LED of the subsystem comes on in the state that one of the CTL ASSYs is blocked. (The flash changeable part has been updated to the version PE■■. Current system cannot operate with the flash changeable part of earlier version on the CTL ASSY inserted.)	Operation1 : Pull out the inserted CTL ASSY (with the FAIL LED turned on). Operation2 : Insert the CTL ASSY again. (Leave the DIP switch No.3 as set to on.) Operation3 : Return the DIP switch No.3 as shown in the Figure below when the WARNING lamp on the panel goes out and the following message is displayed on the panel.  Operation4 : Paint the boxes on the CHANGEABLE revision label affixed on the CTL ASSY up to ■■ (see RW-REP0450), then go to step ⑤. I619XX CTLRCV-XX
I01EX CHNGPE■■ I619XX CTLRCV-XX	The WARNING LED goes out and the READY LED of the subsystem comes on. (The flash changeable part has been updated to the version PE■■. However, the current system can operate with the flash changeable part of earlier version on the CTL ASSY inserted.)	Operation1 : Return the DIP switch No.3 as shown below.  Operation2 : Paint the boxes on the CHANGEABLE revision label affixed on the CTL ASSY up to ■■ (see RW-REP0450), then go to step ⑤.

- ⑤ Connect the disconnected cables (RS232C).
- ⑥ Close the rear cover. (See RW-REP0170.)

When replacing a CTL in a dual controller system (with Redundant CTL option), the system parameter is automatically loaded to the replaced CTL from another CTL. The setting with FD or manual setting is not required.

But, when both CTL ASSY failed at the same time, this automatic operation is not available. In this case, it is necessary to restore from FD. Operate in the same way as single controller.

When replacing a CTL in a dual controller system (with redundant CTL option) , replacement with power off is allowed. The procedure is similar to the replacement in a single controller system. In this case the setting of system parameter from FD or manual operation is also not necessary. (Though installing procedure ⑦ in the single controller system (without redundant CTL option) is not necessary.)

Painting flash revision label

Figure 8.1.2 shows how to paint the flash revision label. (It shows a case to paint the boxes up to PE26.)

Location of the label is shown in Figure 8.1.3.

FIXED	PEXX	01	02	03	04
		05	06	07	08
		09	10	11	12
		13	14	15	16
		17	18	19	20
CHNGABLE	PEXX	21	22	23	24
		25	26	27	28
		29	30	31	32
		33	34	35	36
		37	38	39	40

An example to paint the boxes of the CHANGEABLE label up to 26.

Figure 8.1.2 Revision Label Layout and Numbers to be Painted

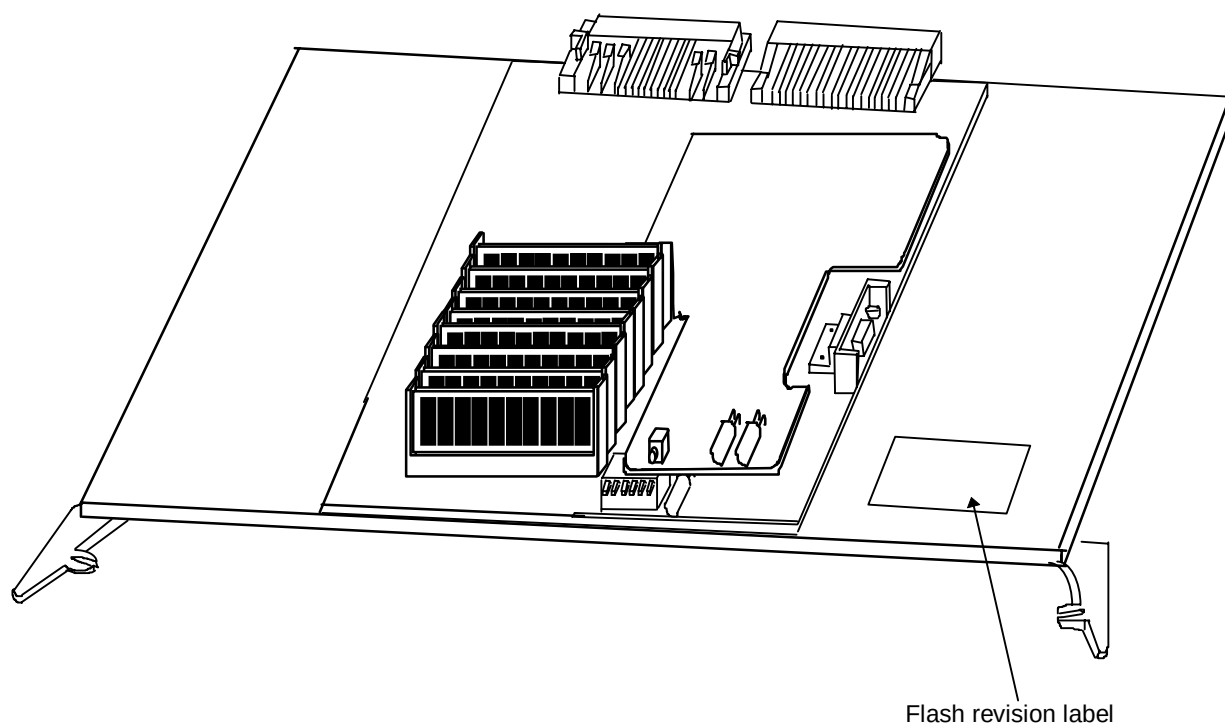


Figure 8.1.3 Location of Revision Label on CTL ASSY

8.2 When the backup FD has not been inserted

In case no optional redundant CTL installed

(1) Removing procedure

- ① Insert back-up FD into the FDD, copy the system parameter to FD.

(See RW-REP0090.)

- ② Turn off the subsystem following the power-off procedure explained in RW -REP0050.

Notice 1 : Be sure to read the above mentioned instruction because user's data may be lost if the power is not turned off normally.

Notice 2 : When the power has been already turned off, check the CACHE PWR LED (see page THEORY0210) to see if the cache backup is not being performed. If the cache backup is being performed, turn on and off the replacement after the power is turned off normally.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Troubleshooting Section" (See TRBL0030) and turn off the power.

- ③ Disconnect the cable (RS232C).
- ④ Open the rear cover. (See RW-REP0170.)
- ⑤ Open the right and left levers to the direction of arrows (···➤) at the same time then remove the CTL ASSY.
- ⑥ Remove the CACHE ASSY and the LAN ASSY if installed.

(2) Installing procedure

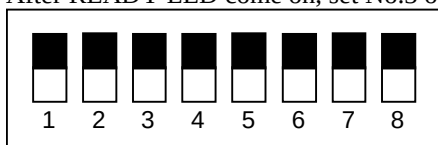
- ① Prepare the FD in which the system parameter was copied in (1) ①. If it is not available, prepare the table of system parameter setting.
- ② Reinstall the removed CACHE ASSY and LAN ASSY in CTL ASSY. Be sure to install it in the same position as before.
- ③ Insert the CTL ASSY into the right place with its right and left levers being opened, then close the both levers to the direction of arrows (—→) at the same time.

Note : If the CTL ASSY is caught by something when it is installed, do not push it in forcibly. Retry the installation from the beginning. If forced, pins might be broken.

- ④ Connect the disconnected cables (RS232C).
- ⑤ Set No.3 of the DIP switch of the CTL ASSY to down position.



- ⑥ Turn on the subsystem according to the power-on procedure explained in RW -REP0050.
- ⑦ Set the system parameter of replaced CTL ASSY with the FD prepared at ①. (See RW-REP0130.) If no system parameter FD, proceed the setting the panel with the table prepared in ①. (Refer to PANEL Chapter.)
- ⑧ After READY LED come on, set No.3 of DIP switch to as shown.



- ⑨ Turn off the power according to the power off procedure in RW-REP0050.
- ⑩ Turn on the power according to the power on procedure in RW-REP0050. (Soon, the ASSY will enter the ready status.)
- ⑪ Close the rear cover. (See RW-REP0170.)

In case optional redundant CTL is installed

When the subsystem is of dual controllers, a controller can be replaced while the power on.

Notice 1: Do not replace (pull out) the CTL ASSY which operates normally. Before replacing the CTL ASSY, confirm that it is blocked (the FAIL LED is on).

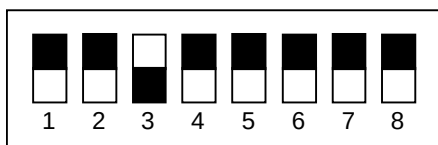
Notice 2: In this case, the controller must be replaced one after another. When Dual controllers are replaced at the same time, the power should be turned off before replacement.

(1) Removing procedure

- ① Open the rear cover. (See RW-REP0170.)
- ② Disconnect the cables (RS232C).
- ③ Check to see which CTL ASSY is blocked (FAIL LED is lit up).
- ④ Open the right and left levers to the direction of arrows (···➤) at the same time then remove the CTL ASSY.
- ⑤ Remove the CACHE ASSY and the LAN ASSY. (option)

(2) Installing procedure

- ① Reinstall the removed CACHE ASSY and the LAN ASSY (option) in the new CTL ASSY. Be sure to install it in the same position as before.
- ② Set No.3 of the DIP switch of the CTL ASSY.



- ③ Insert the CTL ASSY into the right position with the right and left levers being opened, then close the both levers to the direction of arrows (—→) at the same time.
- Note :** If the CTL ASSY is caught by something when it is installed, do not push it in forcibly. Retry the installation from the beginning. If forced, pins might be broken.
- ④ When the WARNING LED on PANEL goes off and the message below appears on the PANEL, set No.3 of DIP switch to as shown.



The message on the PANEL "I619XX CTL RCU-XX". (XX : Indicates the installing location < 00 or 01 >.)

- ⑤ Connect the disconnected cables (RS232C).

⑥ Close the rear cover. (See RW-REP0170.)

When replacing a CTL in a dual controller system (with Redundant CTL option), the system parameter is automatically loaded to the replaced CTL from another CTL. The setting with FD or manual setting is not required.

But, when both CTL ASSY failed at the same time, this automatic operation is not available. In this case, it is necessary to restore from FD. Operate in the same way as single controller.

When replacing a CTL in a dual controller system (with redundant CTL option) , replacement with power off is allowed. The procedure is similar to the replacement in a single controller system. In this case the setting of system parameter from FD or manual operation is also not necessary. (Though installing procedure ⑦ in the single controller system (without redundant CTL option) is not necessary.)

9. Replacing I/F ADAPTER ASSY (See Figure 9.1, 9.2, 9.3.)

When the subsystem is mounted on the DF-F350-U2 rack frame, start the following work after completing the works explained in “15. Procedure for Replacing I/F ADAPTER ASSY or BATTERY ASSY” on page RW-REP0610.

(1) Removing procedure

- ① Turn off the subsystem following the power-off procedure explained in RW-REP0050 and turn off the host system.

Notice 1 : In case the power is not normally turned off, the user's data might be lost.

Notice 2 : If the power is already turned off, check the CACHE PWR LED (see page THEORY0210) to confirm that the cache back up is not being execute. In the case the cache back up is being executed, turn on and off the power (see page RW-REP0050).

Make sure that the power is turned off normally, then replace the Battery ASSY.

Sometimes the subsystem does not go power off after the main switch turned to “O” side with panel display “TOOMNYPIN” or “SYSDTSVER” or “POFFCMUNC”.

In this case refer to “Troubleshooting Section” (See TRBL0030) and turn off the power.

- ② Disconnect the Fibre channel cable, and the LAN cable (option).

Notice 3 : When removing or connecting the fibre channel cable, move the connector horizontally, carefully, and slowly.

- ③ Open the rear cover. (See RW-REP0170.)
- ④ Remove the bind screw and pull the I/F ADAPTER ASSY toward you to remove it.

(2) Mounting procedure

- ① Insert the I/F ADAPTER ASSY into the right place and tighten the bind screw.
- ② Connect the disconnected cables etc. (See Notice 3.)

Note 1 : When the controller is used in a dual configuration, connect the cables to the connectors corresponding to the host to be connected. (See Figure 9.2.)

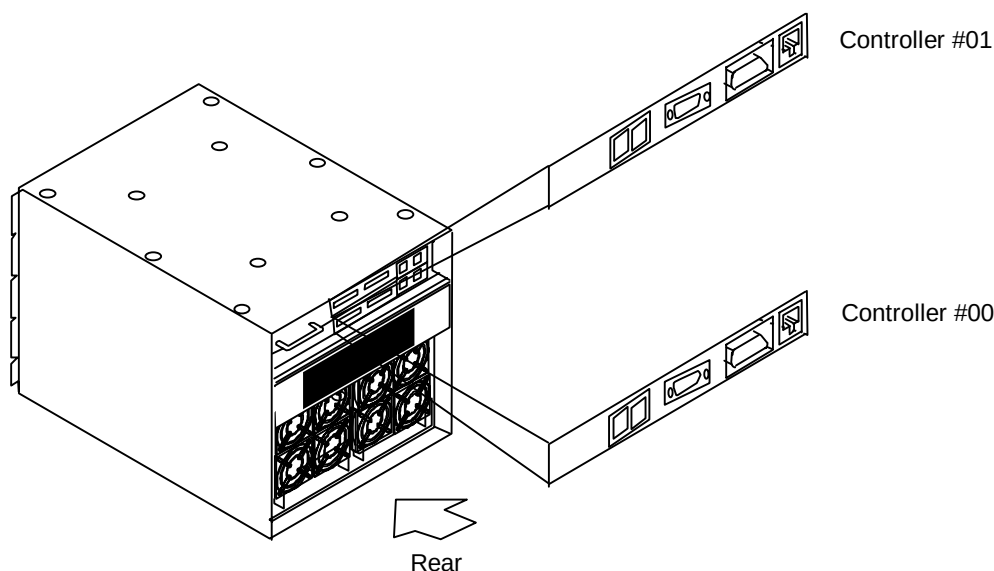


Figure 9.1 Fibre Connector Layout

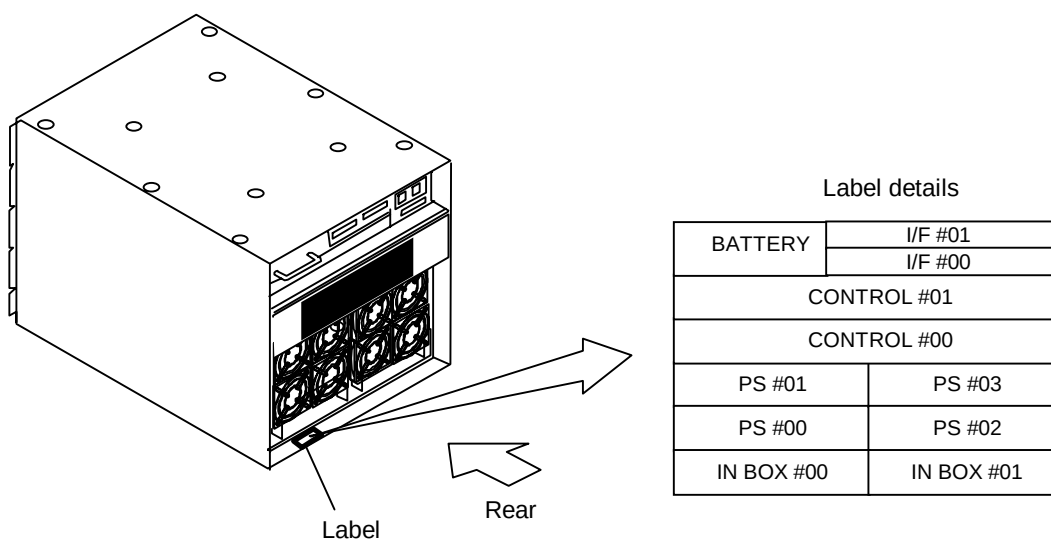


Figure 9.2 Label Layout

④ Close the rear cover. (See RW-REP0170.)

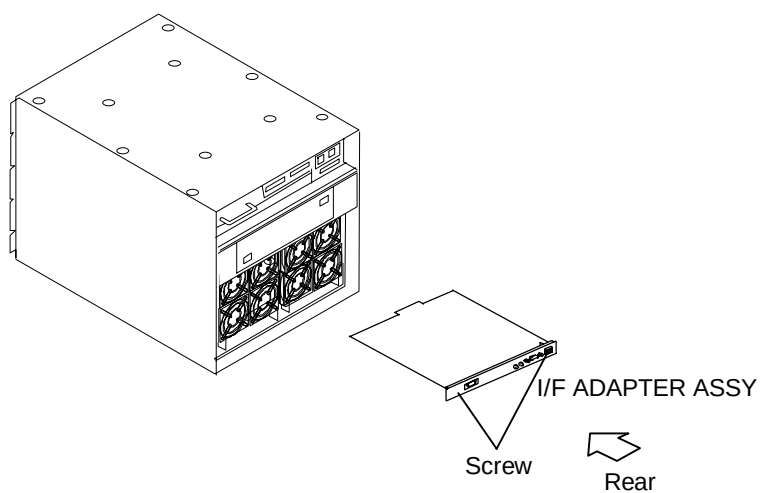


Figure 9.3 Replacing I/F ADAPTER ASSY

10. Replacing SVP ASSY (See Figures 10.1)

(1) Removing procedure

- ① Turn off the subsystem following the power-off procedure explained in RW-REP0050. (Be sure to read and understand the procedure because if the power is turned off improperly, user data might be destroyed.)

Sometimes the subsystem does not go power off after the main switch turned to “O” side with panel display “TOOMNYPIN” or “SYSDTSVER” or “POFFCMUNC”.

In this case refer to “Trouble shooting Chapter” (See TRBL0030) and turn off the power.

- ② Check to see that POWER LED goes off.

Notice : In case the power is not normally turned off, the user’s data might be lost.

- ③ Turn the breaker at the rear to “O” side.
- ④ Remove the front bezel and open the front panel. (See RW-REP0160, RW-REP0180.)
- ⑤ Remove screw.
- ⑥ Remove SVP ASSY.

(2) Mounting procedure

- ① Install the SVP ASSY in the reverse order of the removing.

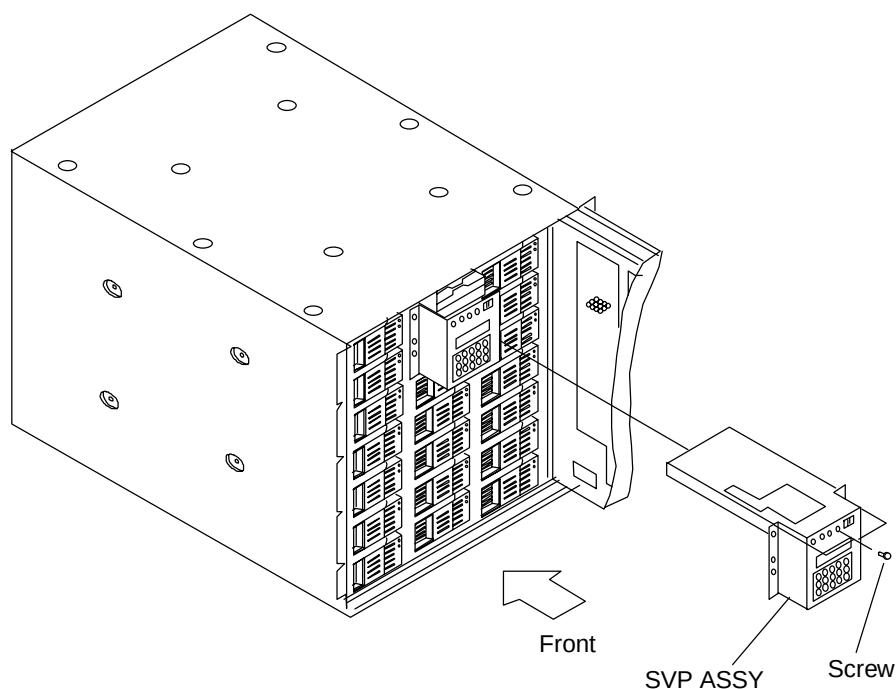


Figure 10.1 Replacing SVP ASSY

11. Replacing AC/DC power supply (See Figure 11.1.)



**Only the maintenance personnel can perform this replacement.
The operation by the user is prohibited.**

Tool : Phillips screwdriver (No.2)

Because the rack mount (RKWH) type is equipped with a redundant power supply as a standard, a hot replacement of the power supply is possible.

(1) Removing procedure

- ① Remove the screw and the AC/DC power supply.

(2) Mounting procedure

- ① Insert the AC/DC power supply to the right place, and tighten the screw.

(3) Transition of panel display

I003XX PSRCV-XX ----- DC power recovery is completed.

(In case with replacement while power on.)

When the subsystem is allowed to be shut off, it is recommended to replace the power supply in the following procedure.

(4) Removing procedure

- ① Turn off the subsystem following the power-off procedure explained in RW-REP0050.

Notice : In case the power is not normally turned off, the user's data might be lost.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC".

In this case refer to "Trouble shooting Chapter" (See TRBL0030) and turn off the power.

- ② Remove the screw and the AC/DC power supply.

(5) Mounting procedure

- ① Press the "O" side of the In Box ASSY switch.
- ② Press the "O" side of the AC/DC power supply switch. Insert the AC/DC power supply to the right place, and tighten the screw.
- ③ Turn on the subsystem following the power-on procedure explained in RW-REP0050.

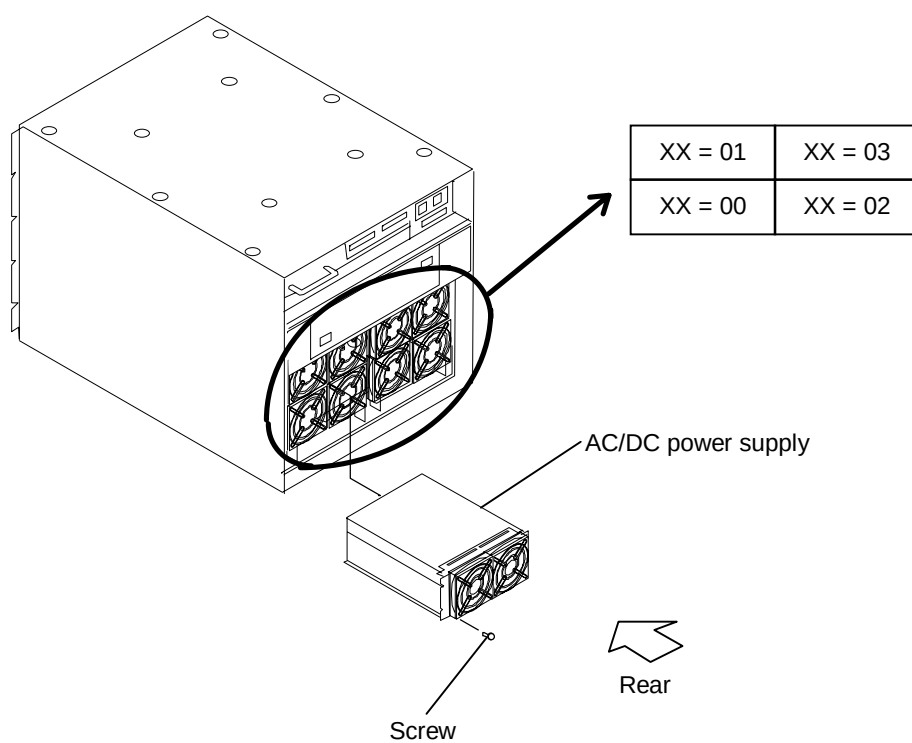
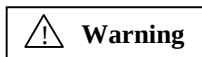


Figure 11.1 Replacing AC/DC power supply

12. Replacing In Box ASSY (See Figure 12.1.)



Do not touch inside of In Box ASSY. Electricity remains even if main switch is off.

(1) Removing procedure

- ① Turn off the subsystem following the power-off procedure explained in RW-REP0050.

Notice 1 : In case the power is not normally turned off, the user's data might be lost.

Notice 2 : If the power is already turned off, check the CACHE PWR LED (see page THEORY0210) to confirm that the cache back up is not being execute. In the case the cache back up is being executed, turn on and off the power (see page RW-REP0050).

Make sure that the power is turned off normally, then replace the Battery ASSY.

In this case refer to "Trouble shooting Chapter" (See TRBL0030) and turn off the power.

- ② Disconnect the two power supply cables.
- ③ Remove the screw and remove In Box ASSY.

(2) Installing procedure

- ① Install In Box ASSY to the predetermined position and tighten the screw.
- ② Connect the disconnected cables.
- ③ Turn the power on following the power-on procedure in RW-REP0050.

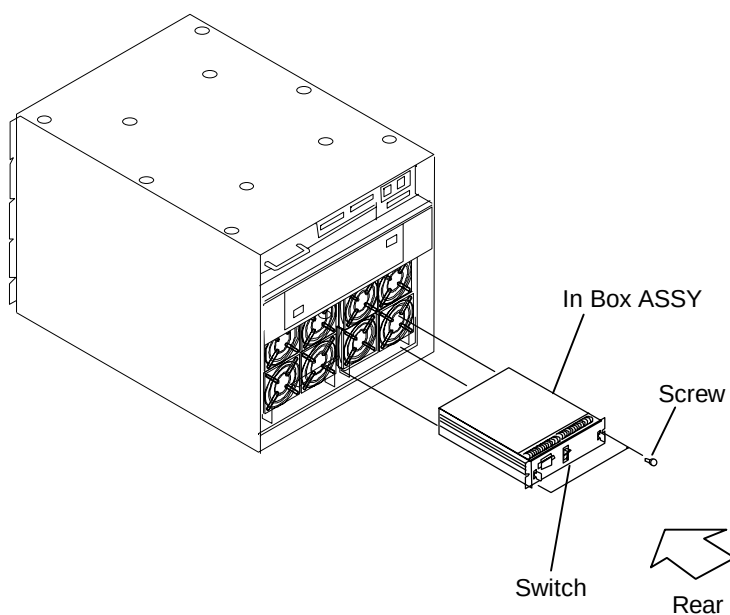


Figure 12.1 Replacing In Box ASSY

13. Replacing CACHE ASSY

In case no optional redundant CTL installed

(1) Procedures

① Turn off the subsystem following the power-off procedure explained in RW-REP0050.

Notice 1 : In case the power is not normally turned off, the user's data might be lost.

Notice 2 : If the power is already turned off, check the CACHE PWR LED (see page THEORY0210) to confirm that the cache back up is not being execute. In the case the cache back up is being executed, turn on and off the power (see page RW-REP0050).

Make sure that the power is turned off normally, then replace the Battery ASSY.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Trouble shooting Chapter" (See TRBL0030) and turn off the power.

② Open the rear cover to remove CTL ASSY. (See RW-REP0370.)

③ Replace CACHE ASSY.

Note 1 : Slots #0 and #4, #1 and #5, #2 and #6, #3 and #7 are pairs respectively. Install the cache having the same capacity for these each pair slots..

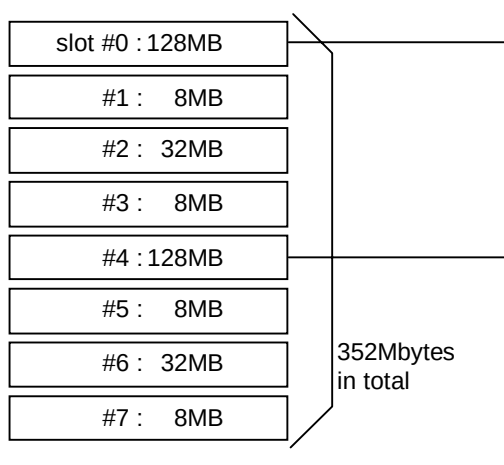
Note 2 : CACHE ASSY of the largest capacity must be mounted cache slots #0 and #4 in case that CACHE ASSYs of different capacity are used.

④ Install the CTL ASSY.

⑤ Turn power on following the procedure explained in RW-REP0050.

⑥ Close the rear cover. (See RW-REP0170.)

Installation example of CACHE ASSY



CACHE ASSY of the largest capacity must be mounted cache slots #0 and #4.

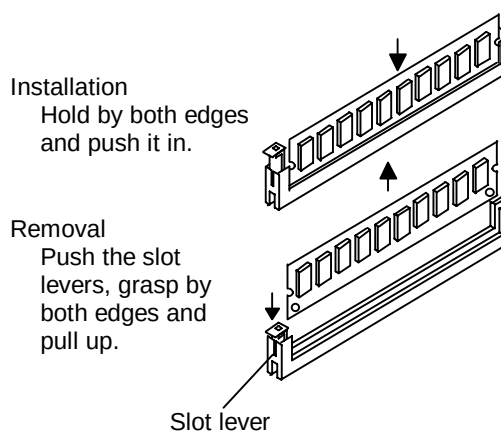


Figure 13.1 Replacing CACHE ASSY

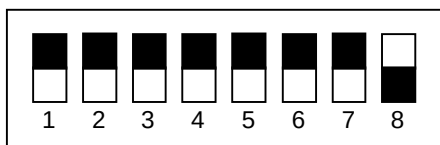
In case optional redundant CTL is installed

When the subsystem are dual controller system, CACHE ASSY can be replaced while the power on.

Notice : In this case, the CACHE ASSY must be replaced one controller at one time. In case CACHE ASSY for both CTL ASSY are replaced at the same time, turn the power off before replacement.

(1) Procedure

- ① Open the rear cover. (See RW-REP0170.)
- ② Disconnect the cable (RS232C).
- ③ Set No.8 DIP switch of the corresponding CTL ASSY.

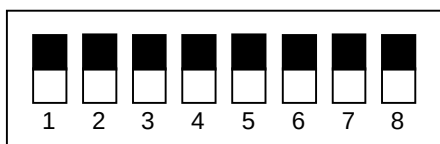


- ④ Push the reset switch of the corresponding CTL ASSY.
- ⑤ Wait ten seconds, check to see that FAIL LED on the CTL comes on and it enters into the blocked state. (See RW-REP0370.)
- ⑥ Open the right and left levers to the direction of arrows (→) at the same time then remove the CTL ASSY.
- ⑦ Replace the CACHE ASSY.

Note 1 : When replacing a cache, install the cache having the same capacity in slots #0 and #4, slots #1 and #5, slots #2 and #6, or slots #3 and #7.

Note 2 : CACHE ASSY for the same slot of both CTL ASSY should have to same capacity.

Note 3 : CACHE ASSY of the largest capacity must be mounted cache slots #0 and #4 in case that CACHE ASSYs of different capacity are used.
- ⑧ Set No.8 of DIP switch to as shown.



- ⑨ Insert the CTL ASSY.
- ⑩ Connect the disconnected cable (RS232C).
- ⑪ Close the rear cover. (See RW-REP0170.)

When an optional redundant CTL (for dual configuration) has been installed, the replacement can be performed with machine power off. In this case follow the same procedure as that for single configuration.

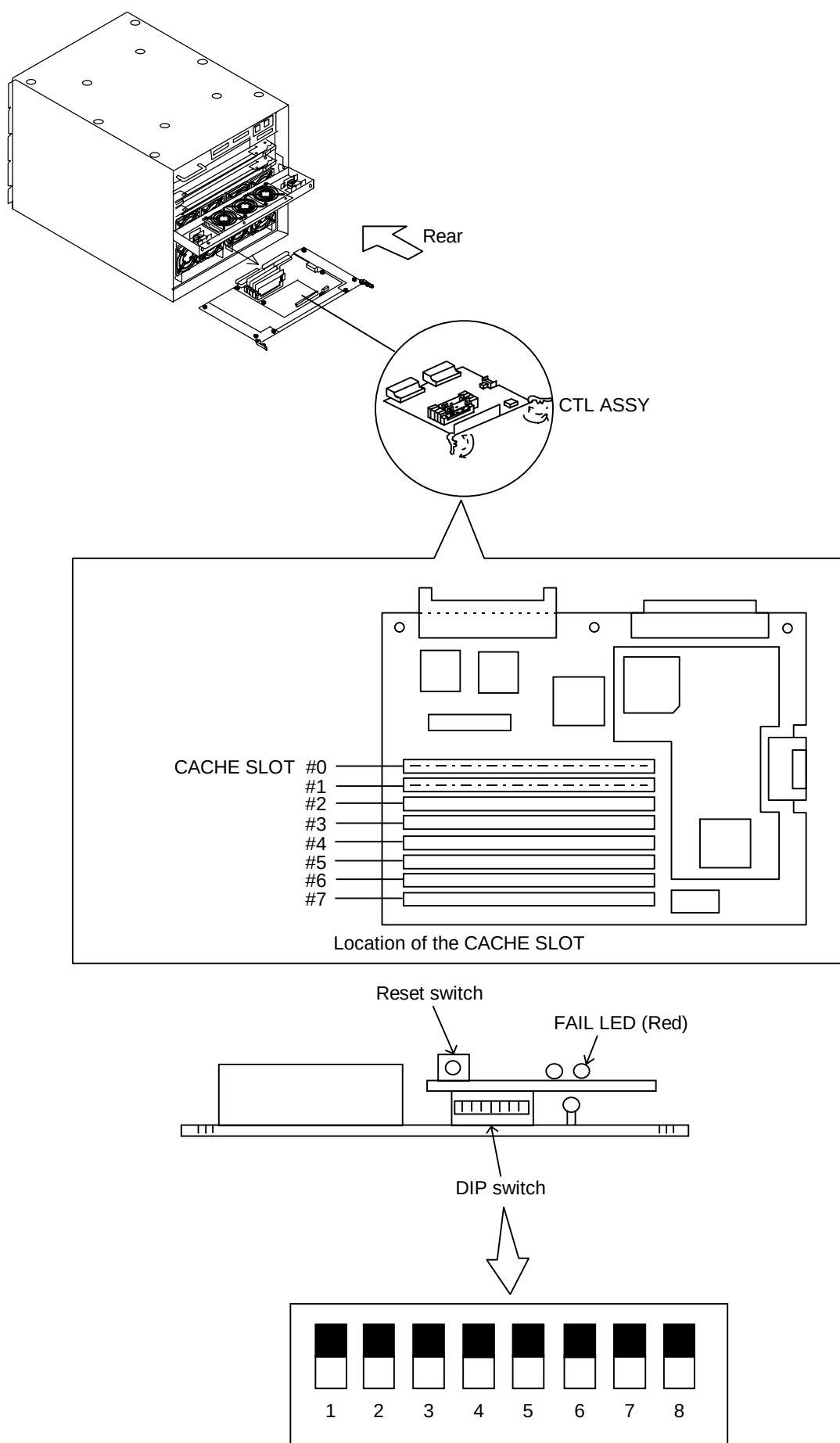


Figure 13.2 CTL ASSY

14. Replacing LAN ASSY

When no optional redundant CTL installed

Note : Configuration setting change is sometimes required because Mac Address is changed after replacing LAN ASSY.

(1) Procedures

① Turn off the subsystem following the power-off procedure explained in RW-REP0050.

Notice 1 : In case the power is not normally turned off, the user's data might be lost.

Notice 2 : If the power is already turned off, check the CACHE PWR LED (see page THEORY0210) to confirm that the cache back up is not being execute. In the case the cache back up is being executed, turn on and off the power (see page RW-REP0050).

Make sure that the power is turned off normally, then replace the Battery ASSY.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Trouble shooting Chapter" (See TRBL0030) and turn off the power.

② Open the rear cover and remove CTL ASSY. (See RW-REP0370.)

③ Pinch the latching heads of card spacers with needle-nose pliers etc. , then pull the LAN ASSY up with care not to touch with surrounding parts. (See Figure 14.1.)

Notice : If your hand or a tool touches with CTL ASSY, touched part may be damaged.

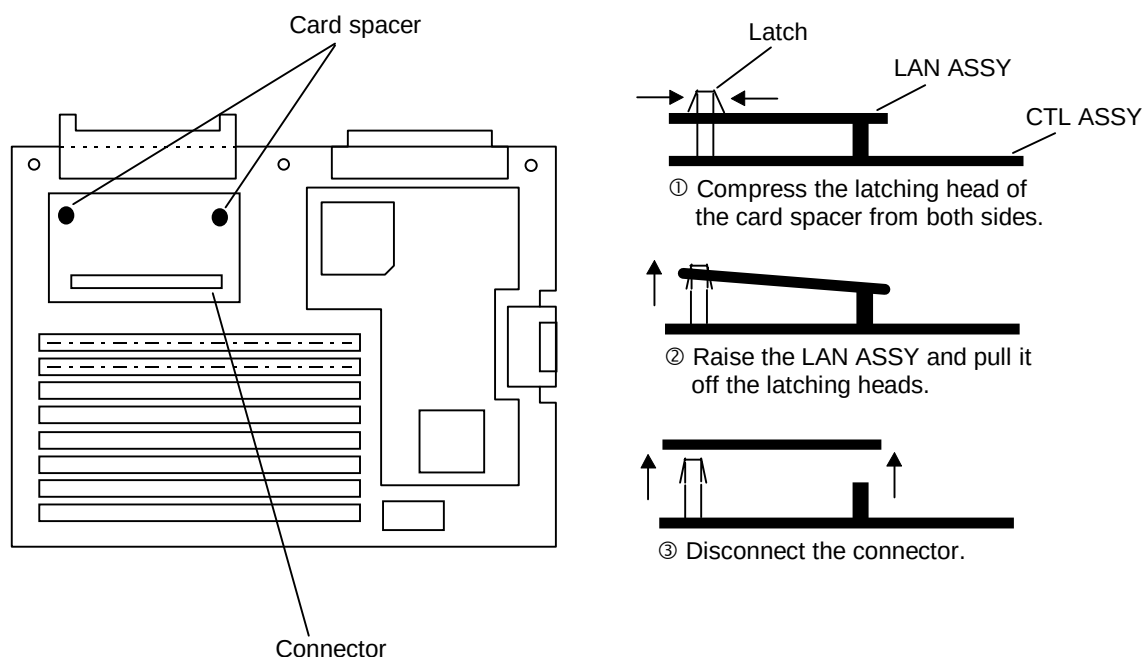


Figure 14.1 Replacing LAN ASSY (1)

- ④ Mount a LAN ASSY for replacement by aligning its mounting holes with the card spacers and pressing the LAN ASSY against the spacers until it is latched with clicks.
- ⑤ Reinstall the CTL ASSY.
- ⑥ Close the rear cover. (See RW-REP0170.)
- ⑦ Turn on the power. (See RW-REP0050.)

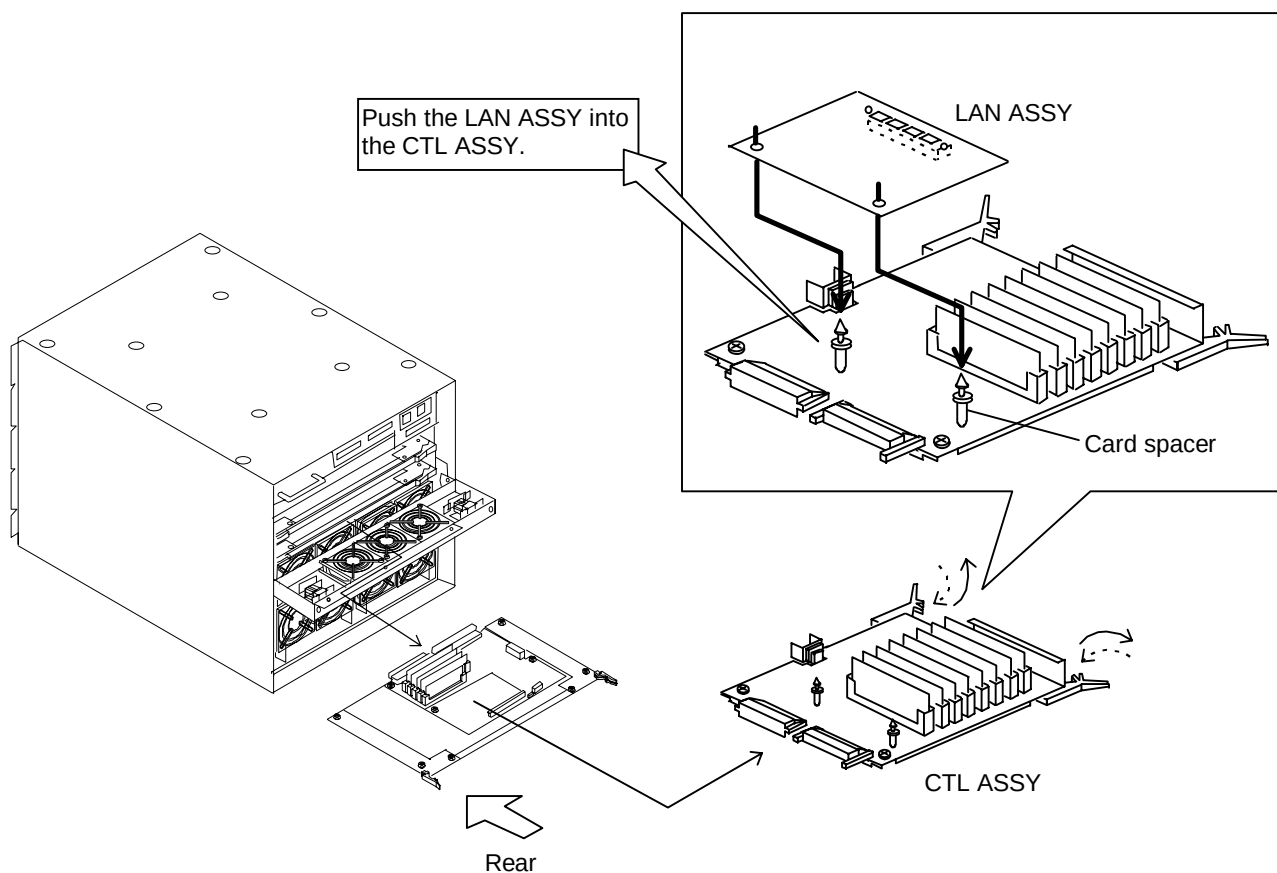


Figure 14.2 Replacing LAN ASSY (2)

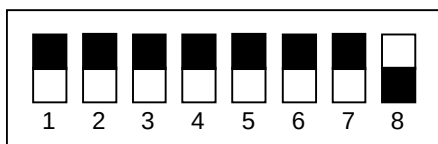
When optional redundant CTL installed

When the subsystem are dual controller system, LAN ASSY can be replaced while the power on.

Notice : When replacing LAN ASSY, perform the replacement for each CTL ASSY one after another.
When replacing both LAN ASSY at a time, turn off the power like the case of single configuration.

(1) Procedure

- ① Open the rear cover. (See RW-REP0170.)
- ② Disconnect the cable (RS232C).
- ③ Set No.8 DIP switch of the corresponding CTL ASSY.



- ④ Push the reset switch of the corresponding CTL ASSY.
- ⑤ Wait ten seconds, check to see that the FAIL LED on the CTL ASSY comes on and it enters the blocked state. (See Figure 14.3.)
- ⑥ Open the right and left levers to the direction of arrows (→) at the same time then remove the CTL ASSY.
- ⑦ Remove the LAN ASSY by pulling it upward. Then mount a new LAN ASSY by aligning its mounting holes with the card spacers and pressing the LAN ASSY against the spacers until it is latched with clicks.
- ⑧ Set No.8 of DIP switch to as shown.



- ⑨ Reinstall the CTL ASSY.
- ⑩ Close the rear cover. (See RW-REP0170.)

When an optional redundant CTL (for dual configuration) has been installed, the replacement can be performed with machine power off. In this case follow the same procedure as that for single configuration.

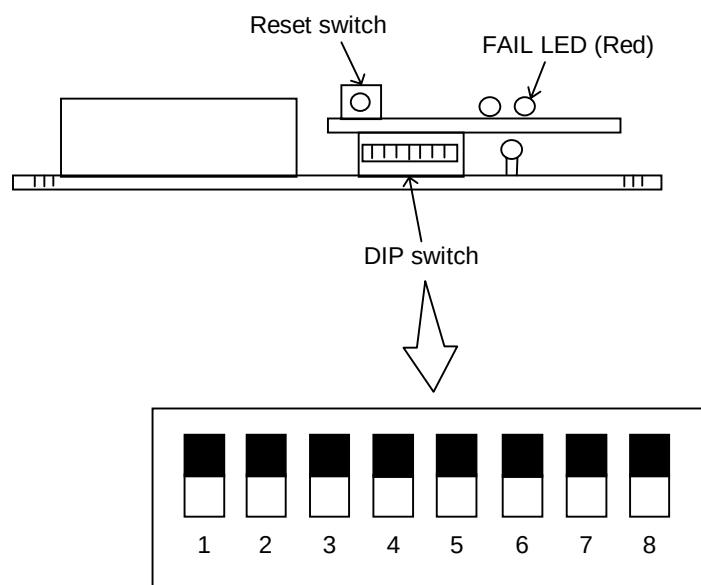


Figure 14.3 Replacing LAN ASSY (3)

15. Procedure for Replacing I/F ADAPTER ASSY or BATTERY ASSY

- (1) Open the rear door of the U2 rack frame.
- (2) Remove the CHANNEL-1 above the I/F ADAPTER ASSY or the BATTERY ASSY to be replaced by removing four SB510 screws.

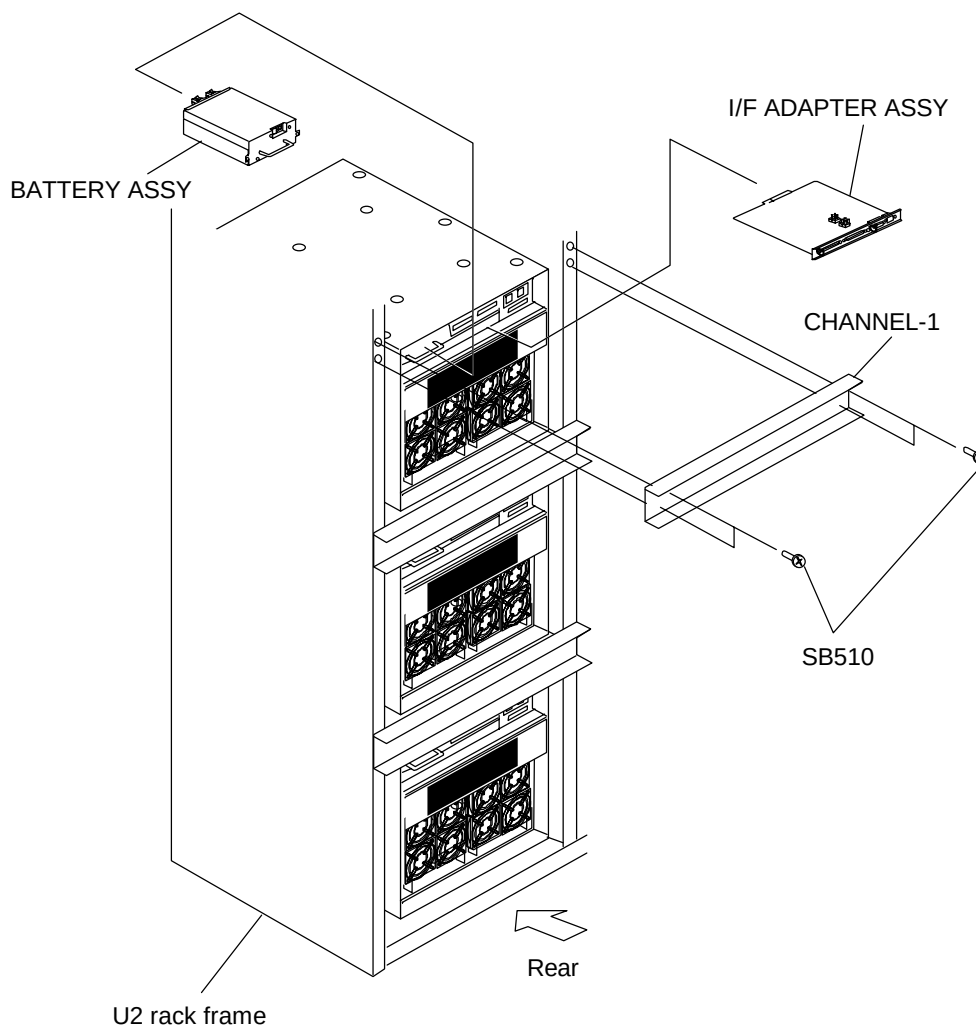


Figure 15.1 Replacement of the I/F ADAPTER ASSY and the BATTERY ASSY when the Subsystem is Mounted on the Rack Frame

- (3) Remove and replace the I/F ADAPTER ASSY or the BATTERY ASSY.
- (4) Reinstall the removed CHANNEL-1 with the four SB510 screws.
- (5) Close the rear door of the U2 rack frame.

DF350F Disk Subsystem
8. INSTALLATION
(Rack Mount (RKWH/U2) Type)

Rev.2

REVISION CONTROL

Legend for revision codes : AD : Addition CH : Change CR : Correction DL : Deletion

REV.	Date	DRW.	CHKD	APPD	Sheet No.	Description	Code
0	Jan.20.'98	A.Yamanashi	K.Aruga	H.Iwasaki	All	Issued	
1	Jul.31.'98	A.Yamanashi	K.Aruga	H.Iwasaki	0020 0070 0080 0730 1020-1040	Added 6.5. Added E2E8, E1E18, A2E8, A1E18 Added E2E8, E1E18, A2E8, A1E18 Added A2E8, A1E18. These page were newly added.	AD AD AD AD AD
2	Oct.16.'98	A.Yamanashi			0070 0080 0450 0730	Added A3E4, E3E4. Added A3E4, E3E4. Added case of the dual controller. (Pages 0900, 0930, 0970, 1000, 1030 were added by the same reason.) Added A3E4.	AD AD AD AD

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3.1.3 Inspecting the subsystem components and addendum	RW-INST0090
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3.4 Setting the Subsystem Parameter	RW-INST0200
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1. Appearance and Maintenance Area

1.1 Appearance

Figure 1.1.1 shows appearance of the DF350F disk subsystems. (Rack Mount (RKWH) type)

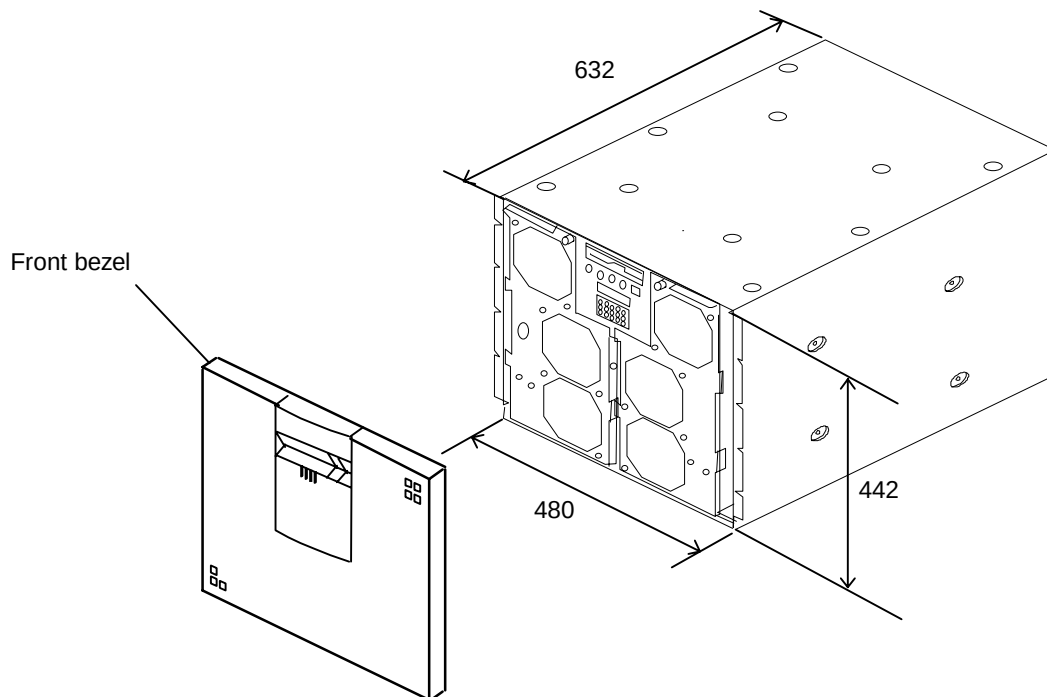


Figure 1.1.1 Appearance

1.2 Maintenance Area

Figure 1.2.1 shows maintenance area for the DF350F disk subsystems. (Rack Mount (RKWH) type)

UNIT : mm

- : External dimension of the subsystem
- ▲ : Front of the subsystem
- : Maintenance area

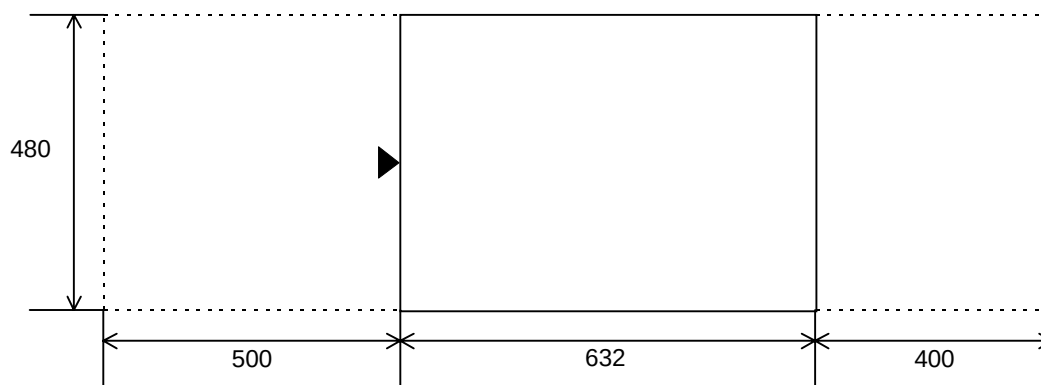


Figure 1.2.1 Maintenance Area

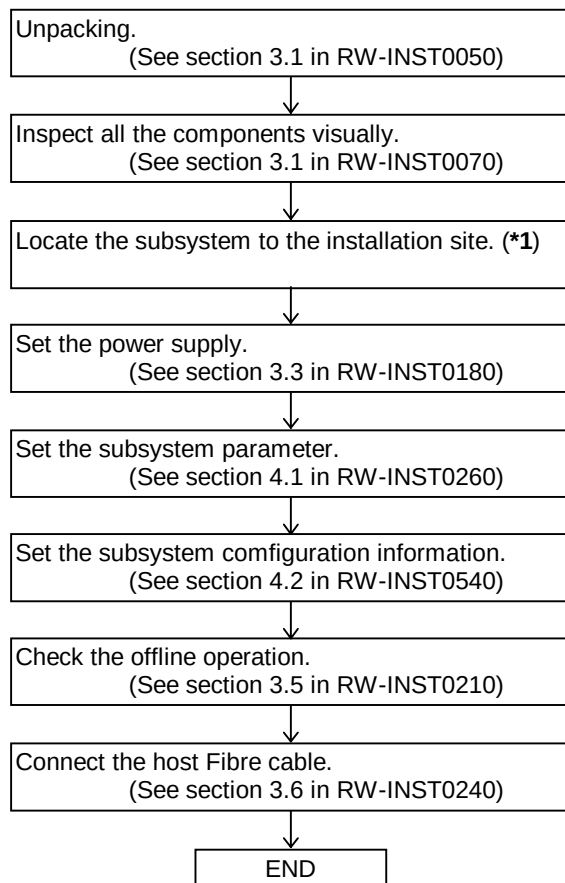
2. Installation

- (1) Tool needed for installation

Phillips screwdriver (No.2).

- (2) How to install

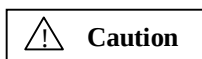
The following flow chart describes how to install the subsystem.



***1 : Place the subsystem with 30cm or more apart from the wall for both the front and the rear because of the ventilation.**

3. Installation Procedure

3.1 Inspecting all the Components



The unpacking and installation should be carried out by 2 or more personnel to prevent turning over of the device or being caught under the device.

3.1.1 Unpacking

- (1) Figure 3.1.1 shows how the subsystem has been packed.
- (2) Figures 3.1.2 to 3.1.4 show the subsystem without external packaging.
- (3) Unpacking
 - ① Loosen the polyester bands.
 - ② Remove nails for T/W.
 - ③ Remove the external packaging and packing materials.
 - ④ Take the subsystem out of the polyethylene bag.
 - ⑤ Keep keys (2pcs) in the box attached to the unit. (This key is used to open the front panel, so be careful not to lose.)
 - ⑥ Remove shock absorbing material and tapes, etc. attached to the device.
 - ⑦ Remove desiccating agent on the top of the device. (See Figure 3.1.3.)

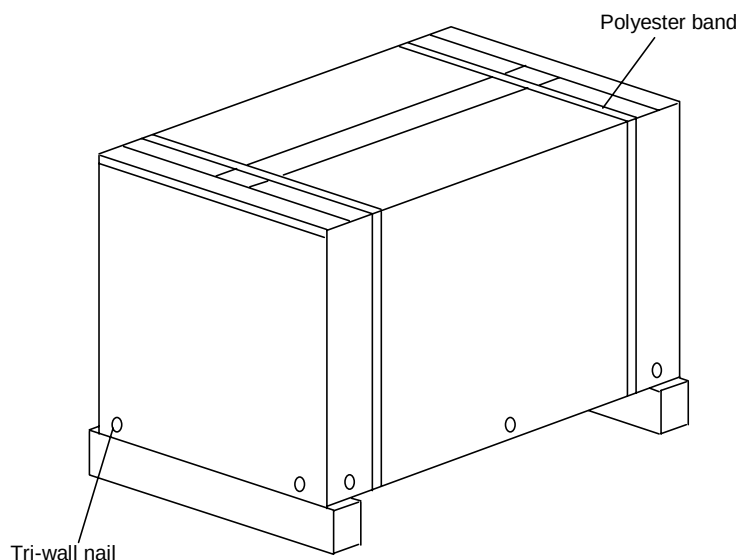


Figure 3.1.1 Subsystem being Packed

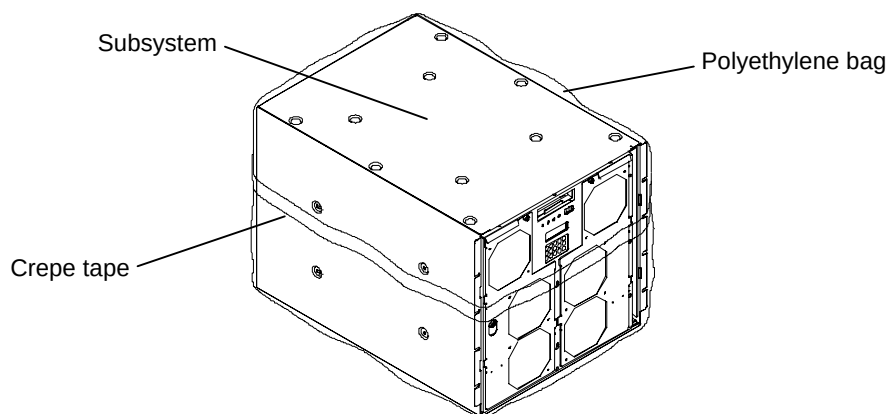


Figure 3.1.2 Subsystem without External Packaging

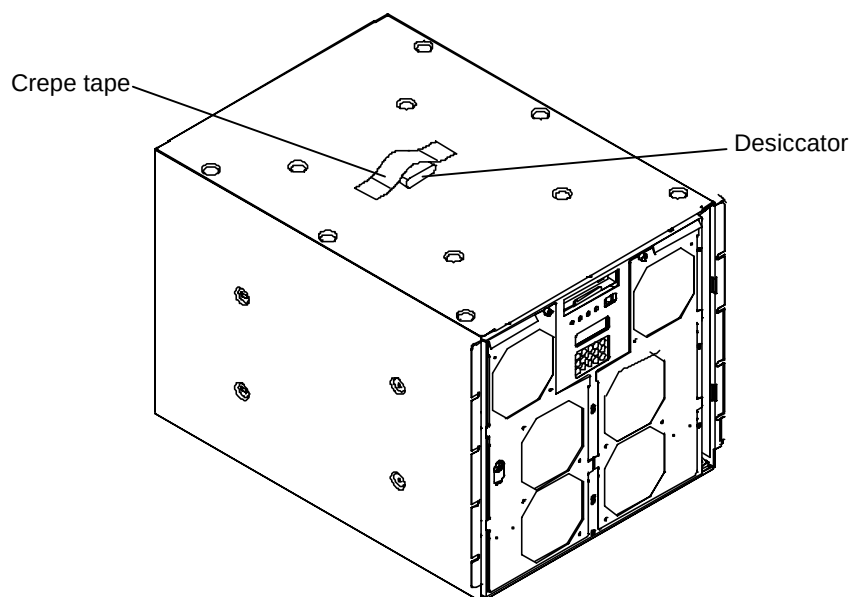


Figure 3.1.3 Location of Desiccator

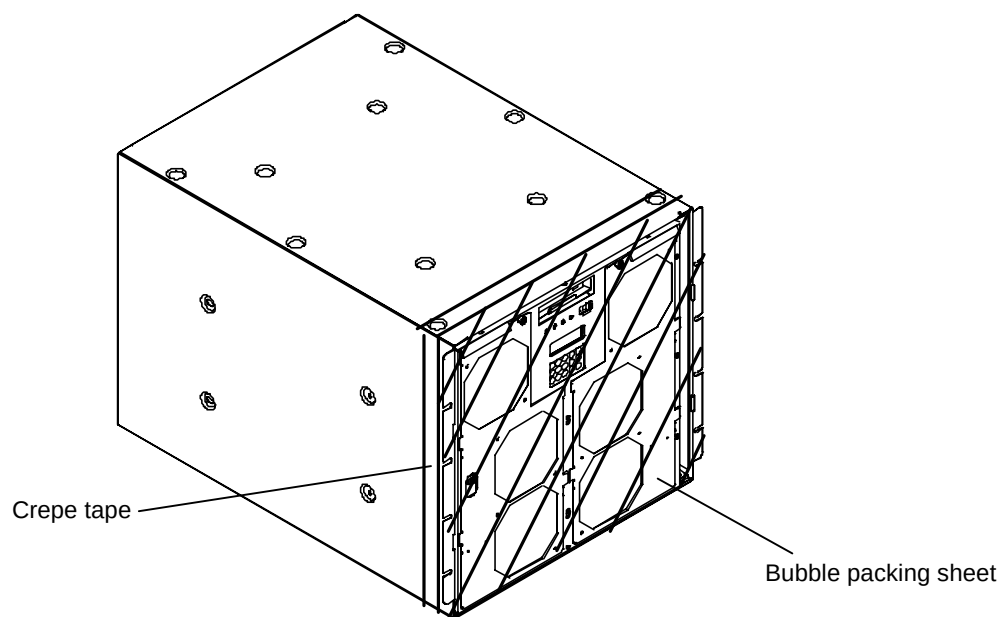


Figure 3.1.4 Front Cover Protection

3.1.2 Inspecting all the components visually

Check the following components before installation according to a customer's configuration.

Table 3.1.1 Mandatory Features

Model Name	Specification	Quantity	Comment
DF350F-RKWH	Rack Mount (RKWH)	1	(Installed AC/DC power supply)
DF-F350-E2E2 -E2E4 -E3E4 -E2E8 -E1E8 -E1E18	1"H disk drive (516B Format, 2.0GB × 5) (516B Format, 4.1GB × 5) (516B Format, 4.1GB × 5) (516B Format, 8.7GB × 5) Half height disk drive (516B Format, 8.7GB × 5) (516B Format, 17.8GB × 5)	1 (RAID5 :4D+1P)	HDU ASSY
DF-F350-A2E2 -A2E4 -A3E4 -A2E8 -A1E8 -A1E18	1"H disk drive (516B Format, 2.0GB × 1) (516B Format, 4.1GB × 1) (516B Format, 4.1GB × 1) (516B Format, 8.7GB × 1) Half height disk drive (516B Format, 8.7GB × 1) (516B Format, 17.8GB × 1)	1	HDU ASSY
DF-F350-C8E -C32E -C128E	Cache memory (8MB) (32MB) (128MB)	2	CACHE ASSY
DF-F350F-DWON	Fibre Channel Optical (Non OFC) I/F, 100-M5-SN-I, SC connector.	1	I/F ADAPTER ASSY

Table 3.1.2 Optional Features

Model Name	Specification	Quantity	Comment
DF-F350-E2E2 -E2E4 -E3E4 -E2E8 -E1E8 -E1E18	1”H disk drive (516B Format, 2.0GB × 5) (516B Format, 4.1GB × 5) (516B Format, 4.1GB × 5) (516B Format, 8.7GB × 5) Half height disk drive (516B Format, 8.7GB × 5) (516B Format, 17.8GB × 5)	0 - 3	HDU ASSY
DF-F350-A2E2 -A2E4 -A3E4 -A2E8 -A1E8 -A1E18	1”H disk drive (516B Format, 2.0GB × 1) (516B Format, 4.1GB × 1) (516B Format, 4.1GB × 1) (516B Format, 8.7GB × 1) Half height disk drive (516B Format, 8.7GB × 1) (516B Format, 17.8GB × 1)	0 - 21	HDU ASSY
DF-F350-C8E -C32E -C128E	Cache memory (8MB) (32MB) (128MB)	0, 2, 4, 6 or 8	CACHE ASSY
DF-F350-G1M1 DF-F350F-G3M1	LAN board LAN board (SNMP)	0 - 2	LAN ASSY
DF-F350F-F3WCF	Controller for dual composition	0 or 1	CTL ASSY
DF-F350F-DWON	Fibre channel Optical (Non OFC) I/F	0 or 1	I/F ADAPTER ASSY

Table 3.1.3 Accessories

Model Name	Specification	Quantity	Comment
DF-F350-J1 -J2 -J3	Power supply cable (Connector attached to two poles with earth) (Inlet type connector, EN60320 STANDARD SHEET C14)	0 or 1	
DF-F350-K050L -K150L -K068S -K268S -K168S -K350L	Interface cable (50PL, 1.5m) (50PL, 3m) (68PS, 1.5m) (68PS, 3m) (68PS, 5m) (50PL, 5m)	0 -	
DF-F350-S1	RS232C cable	0 -	

3.1.3 Inspecting the subsystem components and addendum

This subsection describes how to install the basic components into the subsystem.

Figures 3.1.5 and 3.1.6 show mechanical configuration and parts location of this subsystem.

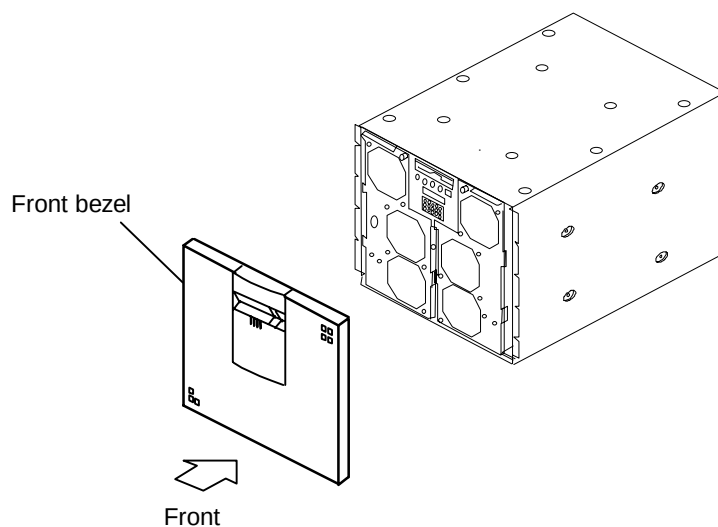


Figure 3.1.5 Appearance of DF350F Disk Subsystem (RACK MOUNT (RKWH) type)

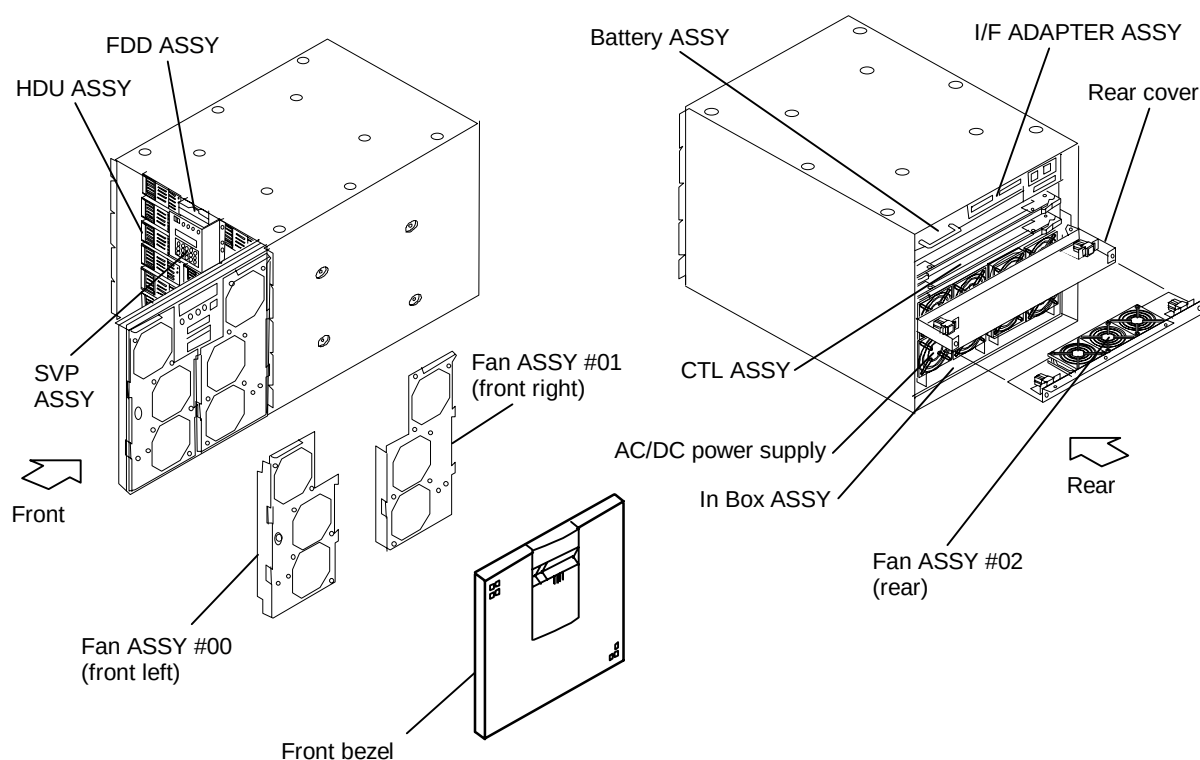


Figure 3.1.6 Parts Location

3.2 Install the Subsystem

3.2.1 Requirement of installing

(1) Elevated Operating Ambient Temperature

If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient.

Therefore, consideration should be given to installing the equipment in an environment compatible with the manufacture's maximum rated ambient temperature (T_{mra}).

(2) Reduced Air Flow

Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.

(3) Mechanical Loading

Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

(4) Circuit Overloading

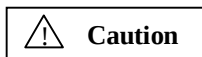
Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

(5) Reliable Earthing

Reliable earthing of rack-mounted equipment should be maintained.

Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g., use of power strips).

3.2.2 Install the subsystem



Do not block the ventilation. With the temperature rise, it may cause failure or fire.

(1) Attaching and Removing the Front Cover

▪ Removing procedure (See Figure 3.2.1.)

① Hold the grooves on both sides of the front bezel and pull it toward you.

▪ Attaching procedure (See Figure 3.2.1.)

① Fit the guide plates of the main body and press the front bezel against them.

Notice : Attach/Remove the front bezel carefully to avoid subjecting the subsystem to any impact since it has precision components.

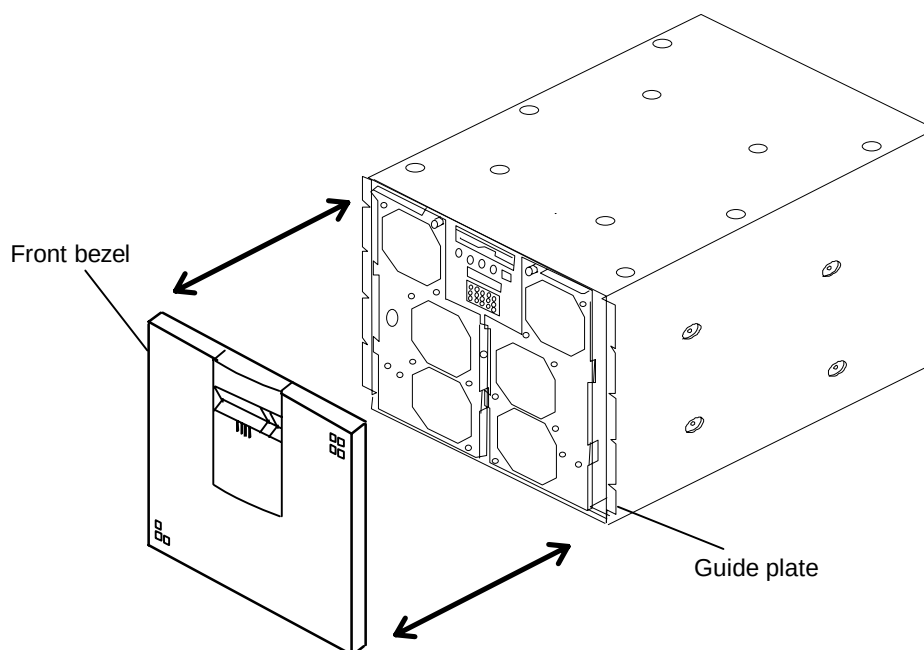


Figure 3.2.1 Attaching and Removing the Front Bezel

(2) Opening/Closing the front panel

▪ Opening procedure

- ① Remove the front bezel. (See RW-INST0110.)
- ② Insert the key attached to the subsystem into the key hole and turn it to the direction of an arrow (→) and open the front panel to the right.

Note : Open/Close the covers carefully to avoid subjecting the subsystem to any impact since it has precision components.

▪ Closing procedure

- ① Close the front panel.
- ② Turn the key to the direction of an arrow (↶) and secure the front panel.

Attach the front bezel. (See RH-INST0110.)

Note : Keep the key carefully lest it should be lost.

Note : Open/Close the bezel gently to avoid a shock. Precision components are installed.

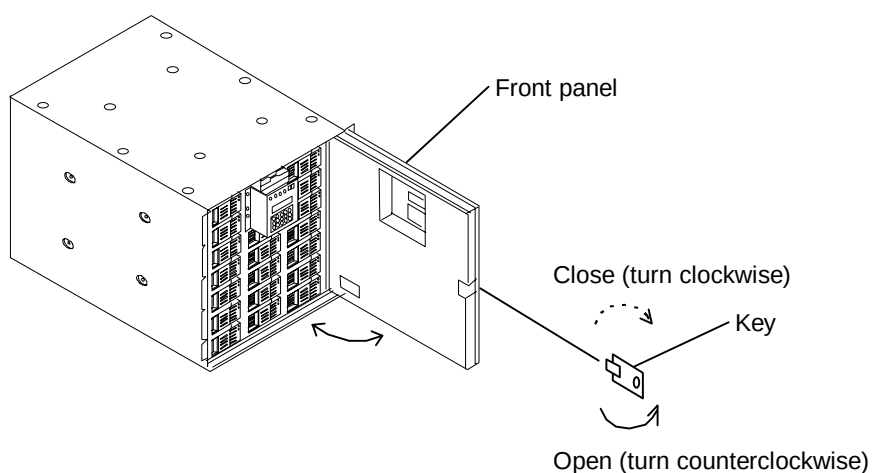


Figure 3.2.2 Opening/Closing the Front Panel

(3) Opening/Closing the rear cover

▪ Opening procedure (See Figure 3.2.3.)

- ① Remove 2 thumb screws of rear cover and open rear cover.

Note : Open/Close the rear cover carefully to avoid subjecting the subsystem to any impact since it has precision components.

▪ Closing procedure (See Figure 3.2.3.)

- ① Close rear cover in the reversed order of removing procedure.

Note : Open/Close the rear cover gently to avoid a shock. Precision components are installed.

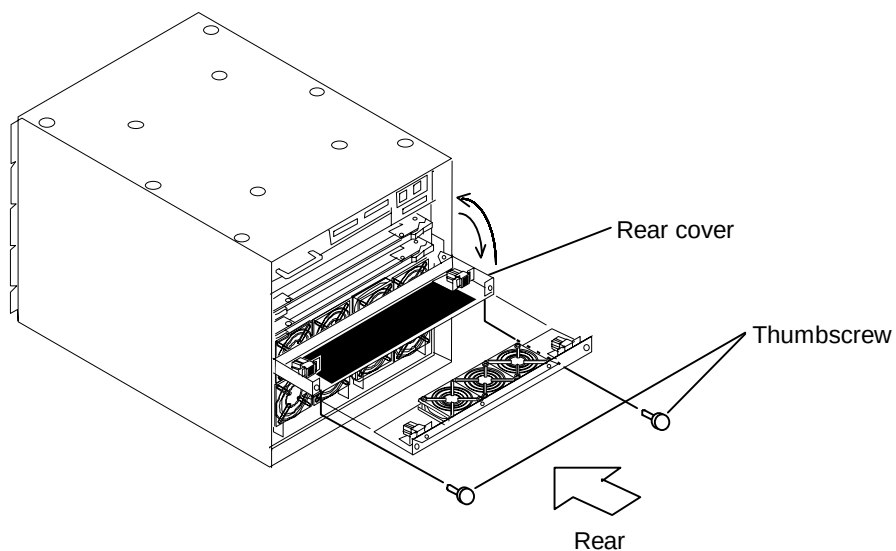
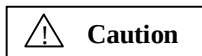


Figure 3.2.3 Opening/Closing the Rear Cover

(4) Installing HDU ASSY (See Figure 3.2.4.)

- ① Open the handle in the direction of an arrow (···→) completely and insert the HDU ASSY into the right place.
- ② Close the handle in the direction of an arrow (→→).

**Caution**

Do not subject the HDU ASSY to any impact or vibration since it is a precision component.

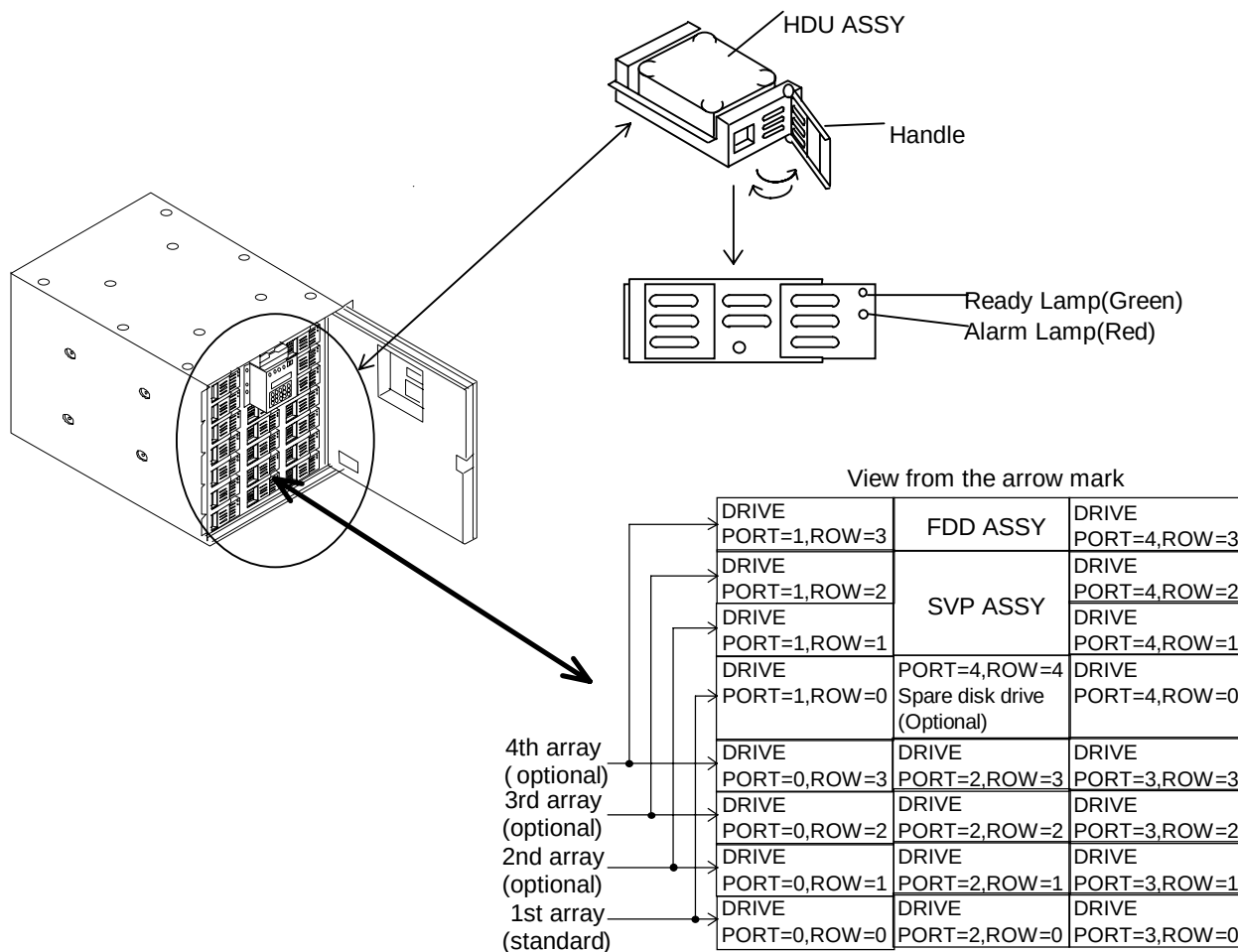


Figure 3.2.4 Installing HDU ASSY

(5) Setting I/F ADAPTER ASSY (See Figure 3.2.5.)

- ① Insert the I/F ADAPTER ASSY into the right place and tighten the two bind screws.

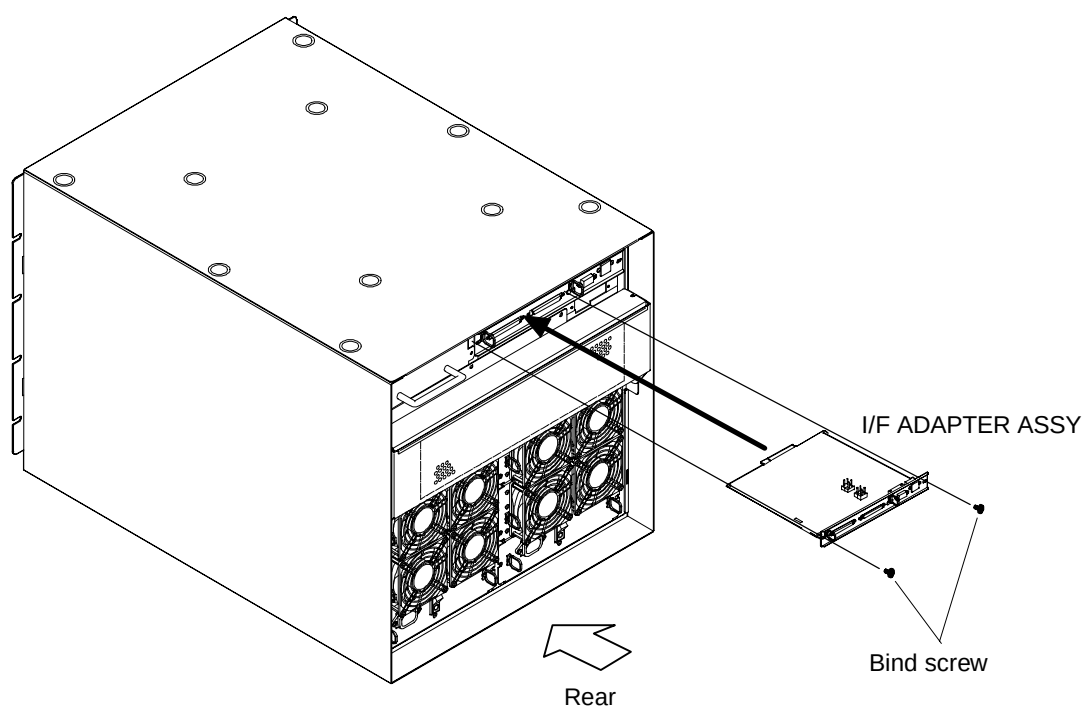


Figure 3.2.5 Setting I/F ADAPTER ASSY

(6) Installing CACHE ASSY (See Figure 3.2.6 and Figure 3.2.7.)

Note 1 : Be sure to install the cache assemblies having the same capacity in slots #0 and #4, slots #1 and #5, slots #2 and #6, or slots #3 and #7.

Note 2 : When the cache assemblies are to be inserted into the cache slots, insert them in the order of cache slots #0 and #4, cache slots #1 and #5, cache slots #2 and #6 and then cache slots #3 and #7.

Note 3 : Be sure to install the cache assembly having the maximum capacity in slot #0 and #4.

Note 4 : If the redundant CTL ASSY has been installed, install the cache assembly having the same capacity into the same slot.

- ① Open the rear cover. (See RW-INST0130.)
- ② Pull out the CTL ASSY. Open the right and left levers to the direction of arrows (···➤) at the same time then remove the CTL ASSY.
- ③ Install the CACHE ASSY.
- ④ Insert the CTL ASSY into the former place. Insert the CTL ASSY into the right place with its right and left levers being opened, then close the both levers to the direction of arrows (➡) at the same times.
- ⑤ Close the rear cover. (See RW-INST0120.)

Installation example of CACHE ASSY

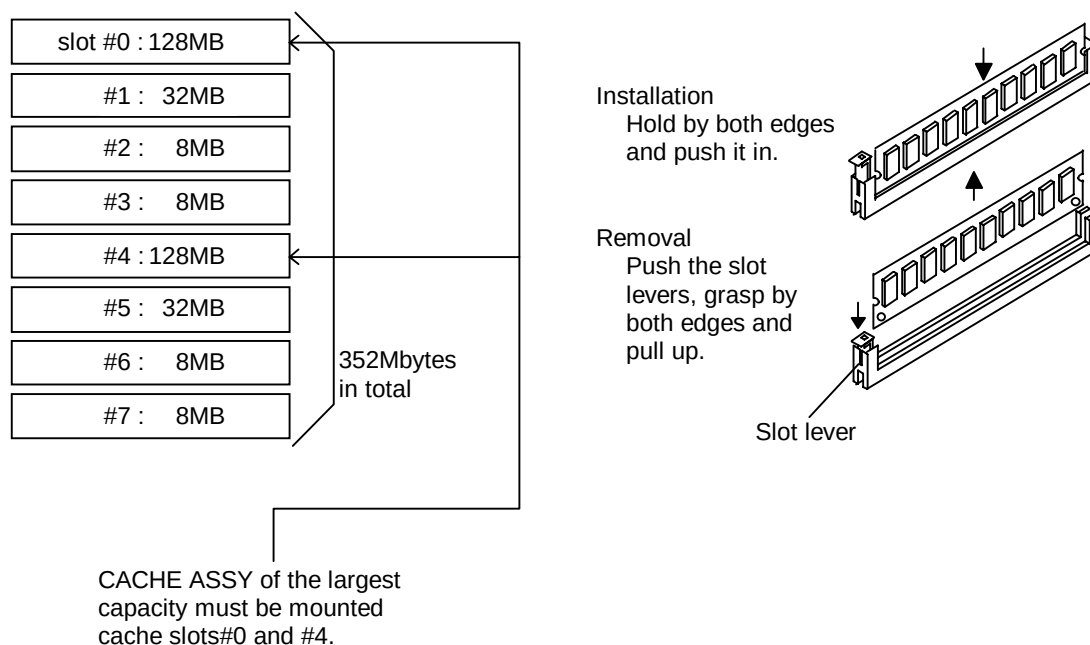


Figure 3.2.6 Installing CACHE ASSY

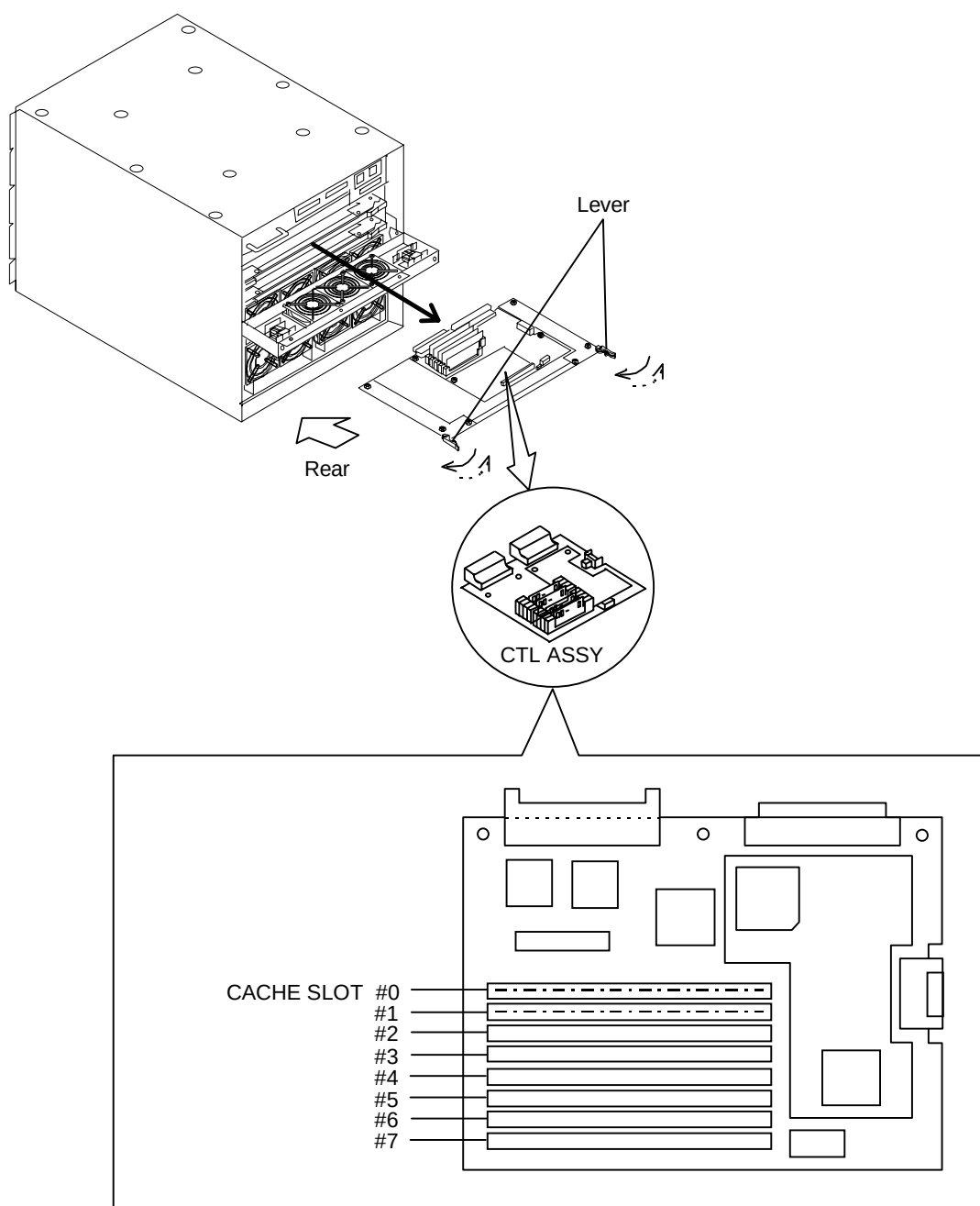
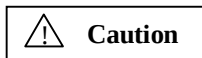


Figure 3.2.7 Installing CACHE ASSY

3.3 Setting the Power Supply

The power for the boards, drives, and fans of the DF350F disk subsystem is supplied by the In Box ASSY and AC/DC power supply converting AC to the DC power.

Turn the power on according to procedures (1) to (6) described below.



Make sure that AC cable is not damaged. It may cause electric shock or fire.

- (1) Verify that the breaker (switch at the rear side) is set to “O” (Off). Then, attach AC cable. (See Figure 3.3.1.)
- (2) Turn on AC power.
- (3) Turn “On” the power switch of the battery (at the rear side of the unit). Then turn “On” the breaker (1). (See Figure 3.3.2.)
- (4) Verify that all the DIP switches are set to “Off” (upper position). Note, no need to remove CTL ASSY.
- (5) Close front panel and turn “On” the main switch. (See Figure 3.3.3.)
- (6) Make sure that the subsystem becomes ready a few minutes later.

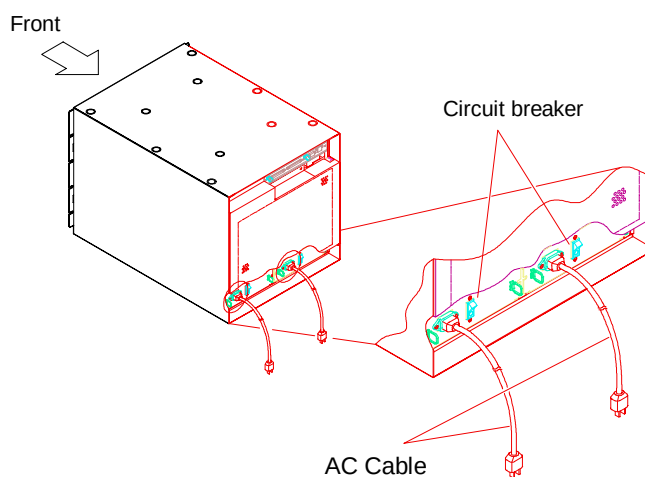


Figure 3.3.1 AC Cable Connection

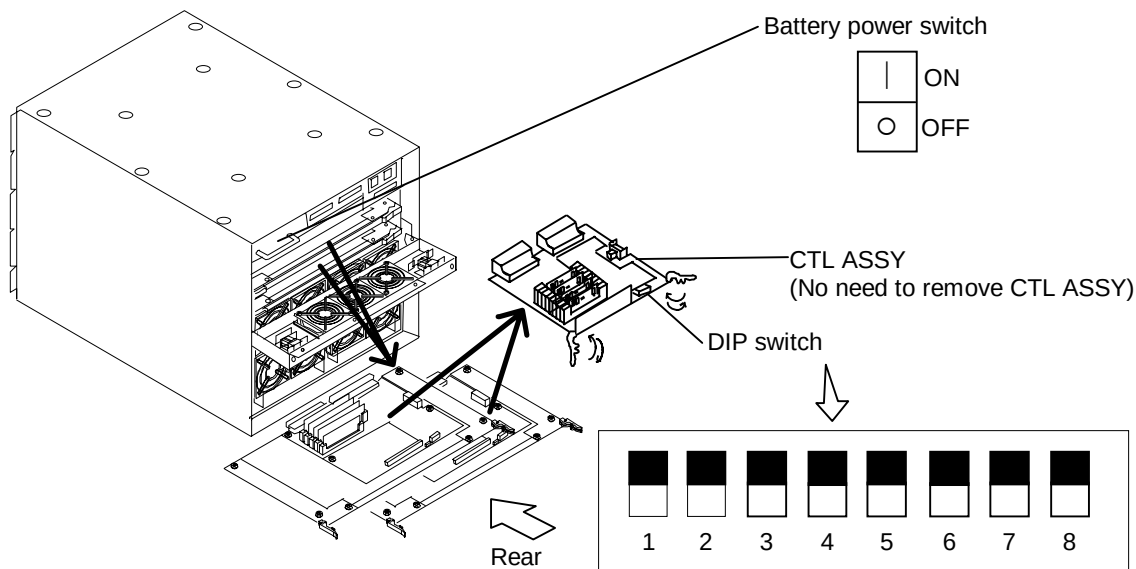
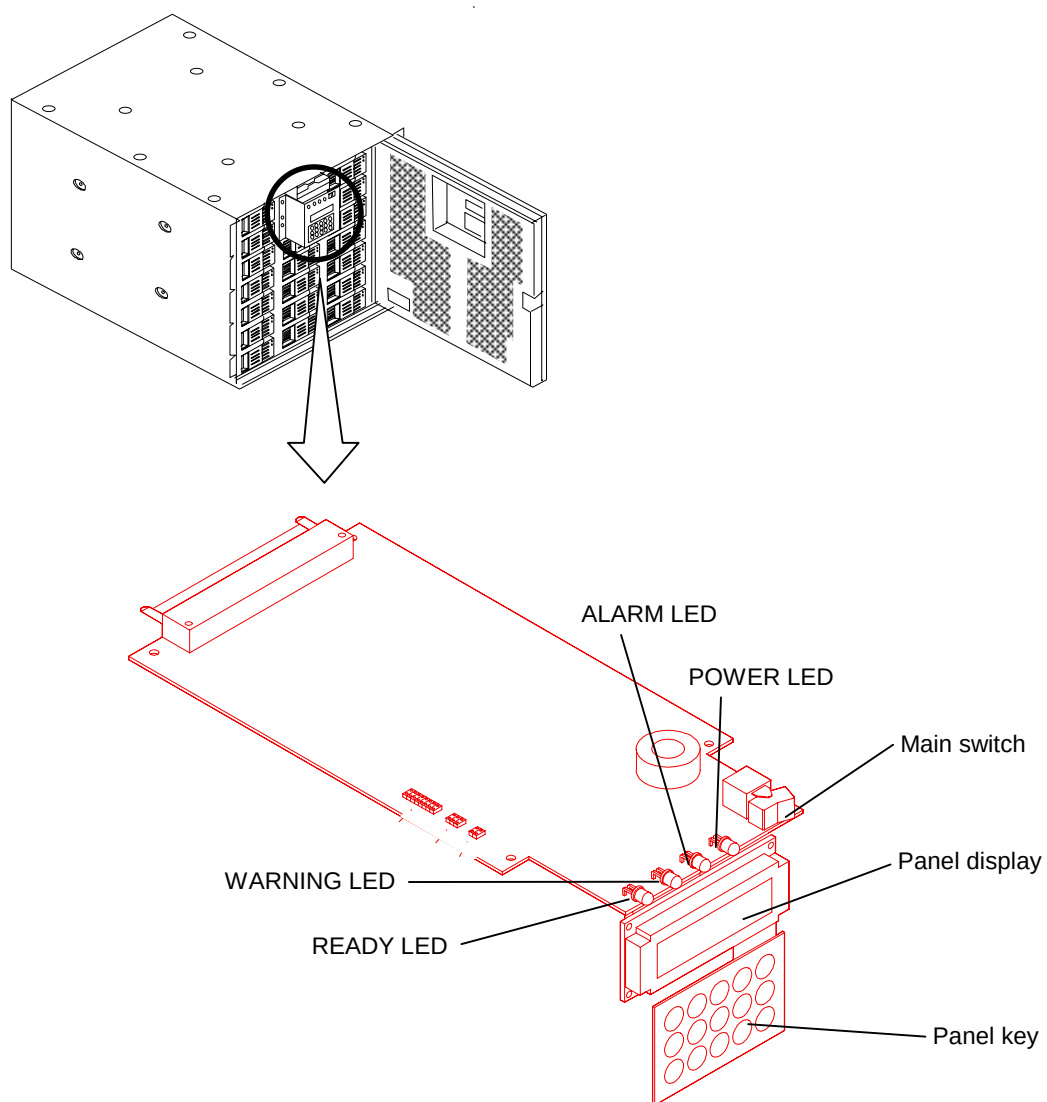


Figure 3.3.2 Inside Construction of the Subsystem

**Figure 3.3.3 Panel**

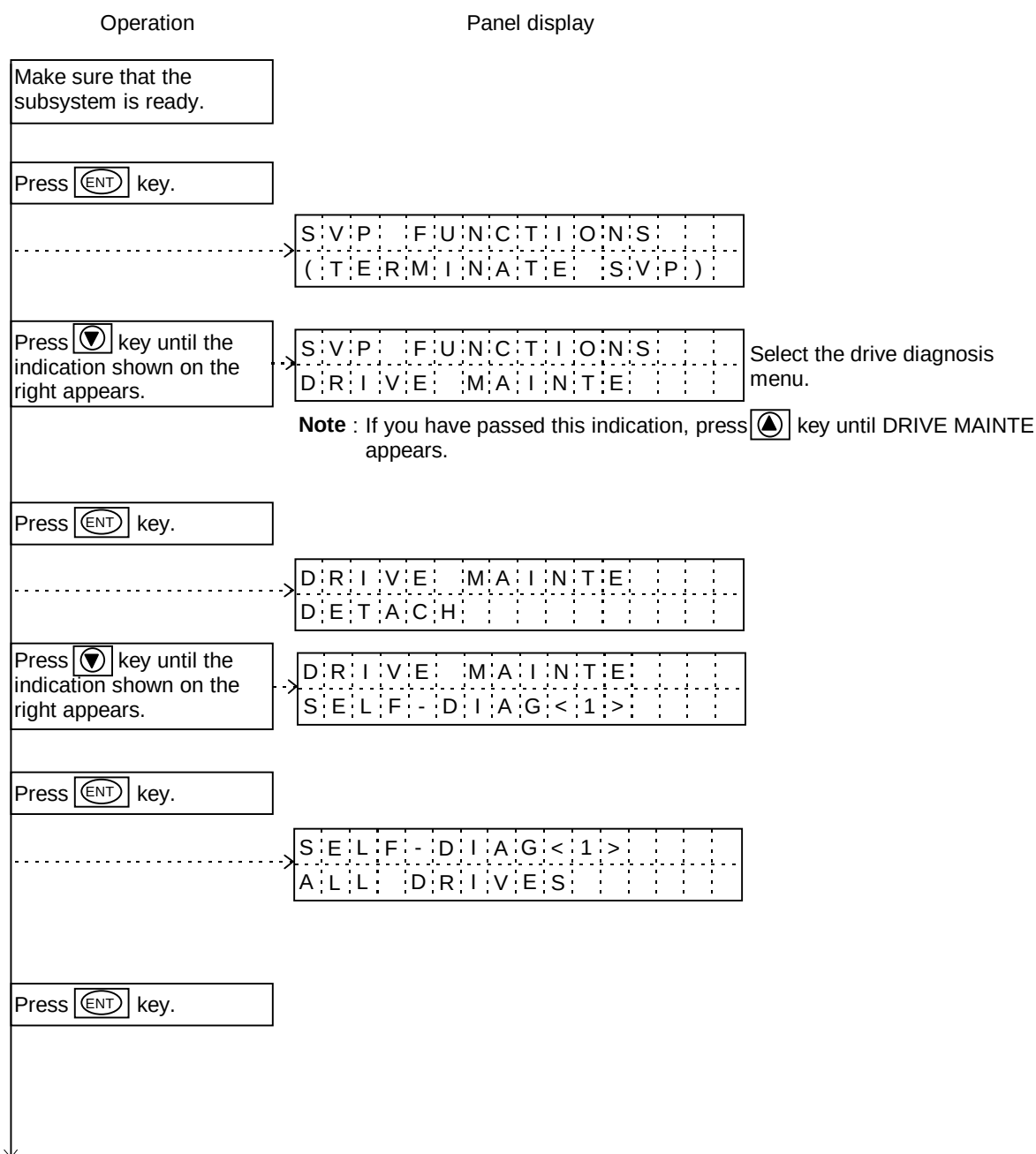
3.4 Setting the Subsystem Parameter

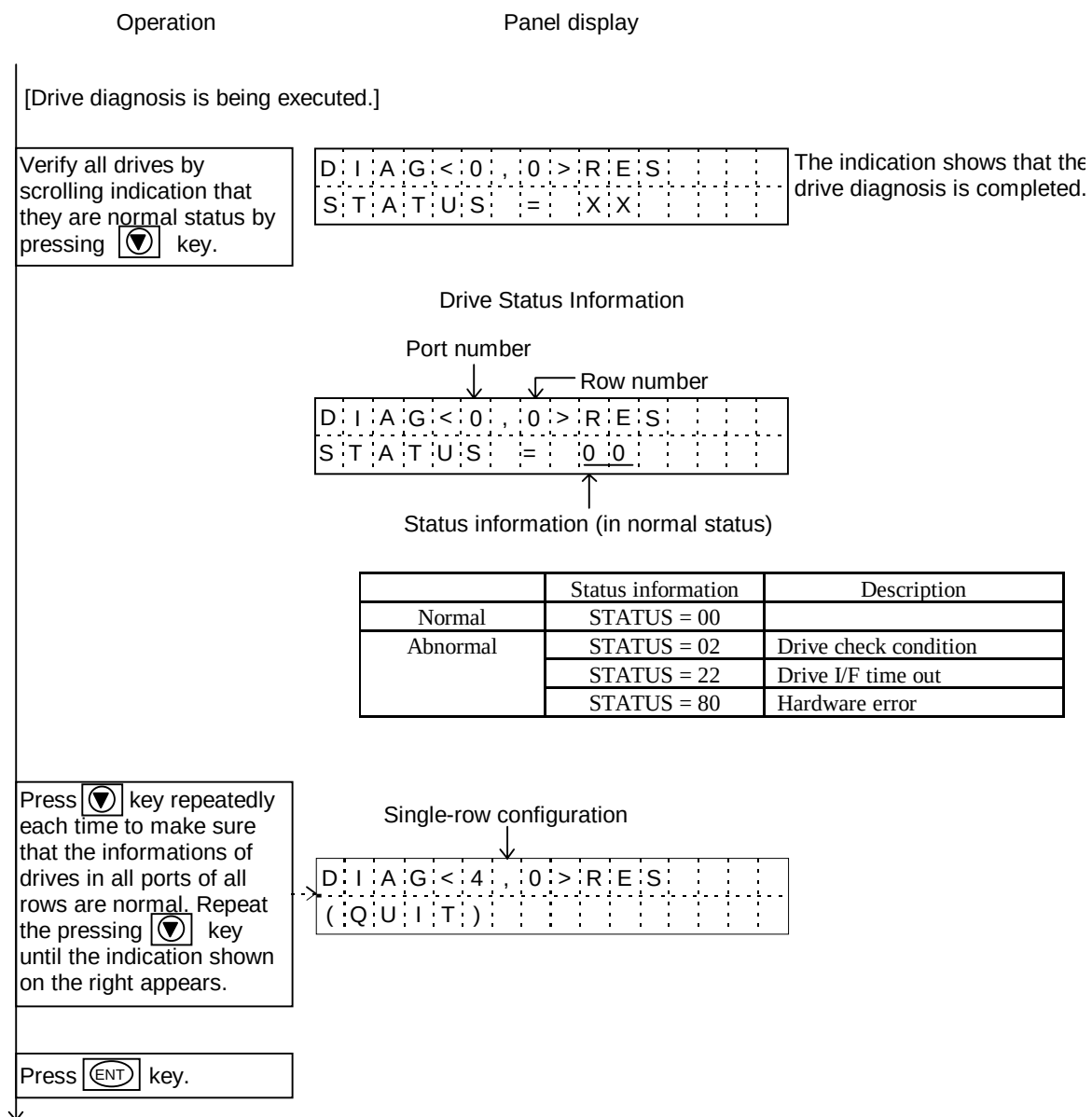
See Chapter “Setting the Subsystem Parameter” in RW-INST0260.

3.5 Checking the Offline Operation

After opening the front cover, execute the drive diagnosis using the Panel display and the ten key as instructed below, and make sure that the diagnosis is completed normally on each of all drives.

① Operate as described below.





Operation	Panel display
Press  key until the indication shown on the right appears.	→ SELF-DIAG < 1 > (QUIT)
Press  key.	
Press  key until the indication shown on the right appears.	→ DRIVE MAINTEN (QUIT)
Press  key.	
Press  key until the indication shown on the right appears.	→ SVP FUNCTIONS (TERMINATE SVP)
Press  key.	
Turn off the power switch to make sure that power can be turned off normally.	
Offline operation is finished.	

3.6 Connecting the Fibre Cable

Connect the Fibre cables after confirming the controller number indicated on the label.

Note 1 : When the controller is used in a dual configuration, connect the cables to the connectors corresponding to the host to be connected. (See Figure 3.6.2.)

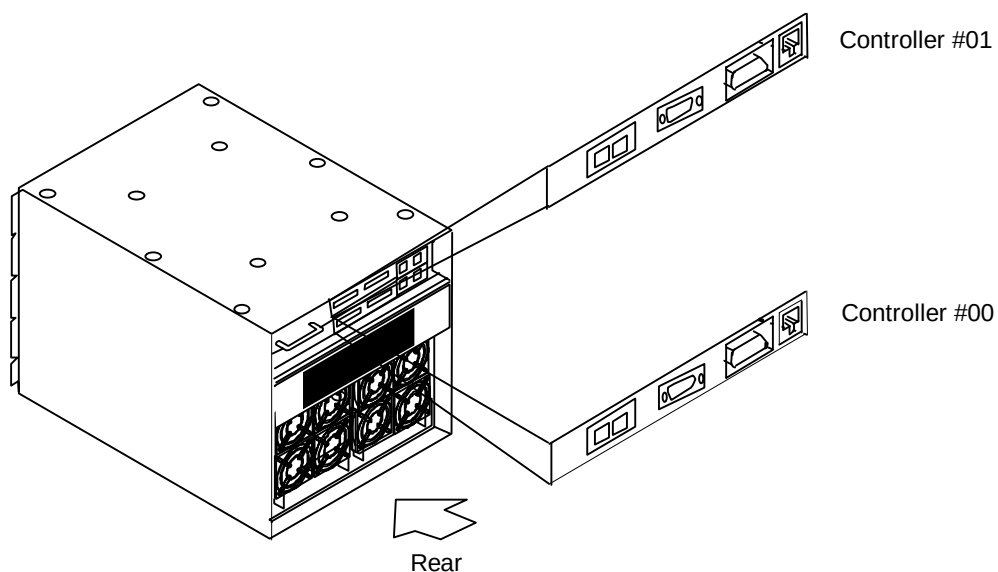


Figure 3.6.1 Fibre Channel Connector Layout

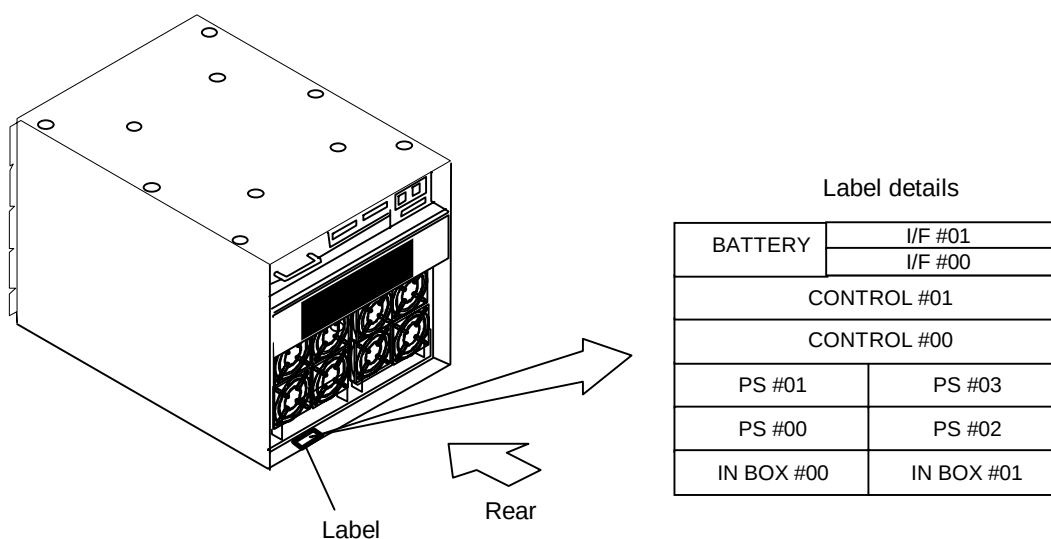
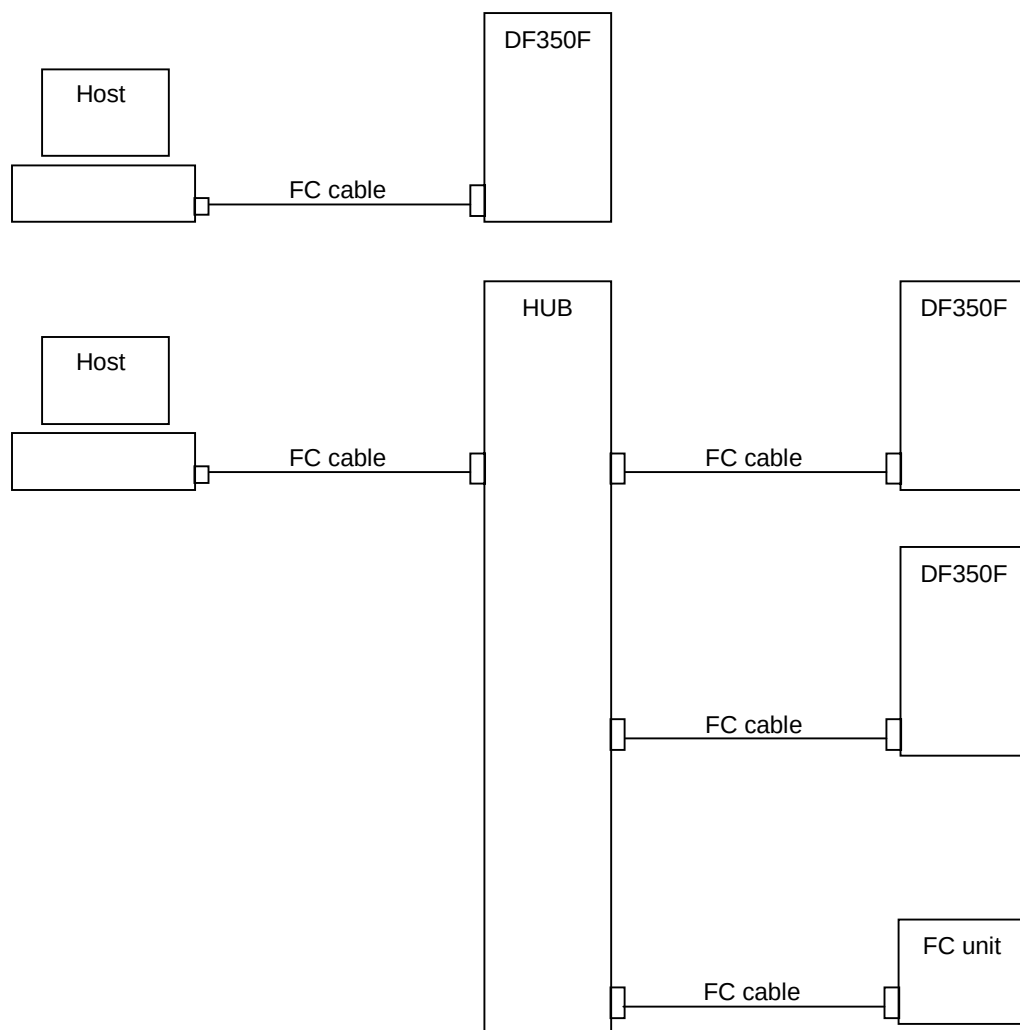


Figure 3.7.2 Label Layout

**Figure 3.6.3 Fibre Channel Connections**

4. Setting the Subsystem Parameter

4.1 Setting the System Parameter

(1) Setting the system parameters and downloading

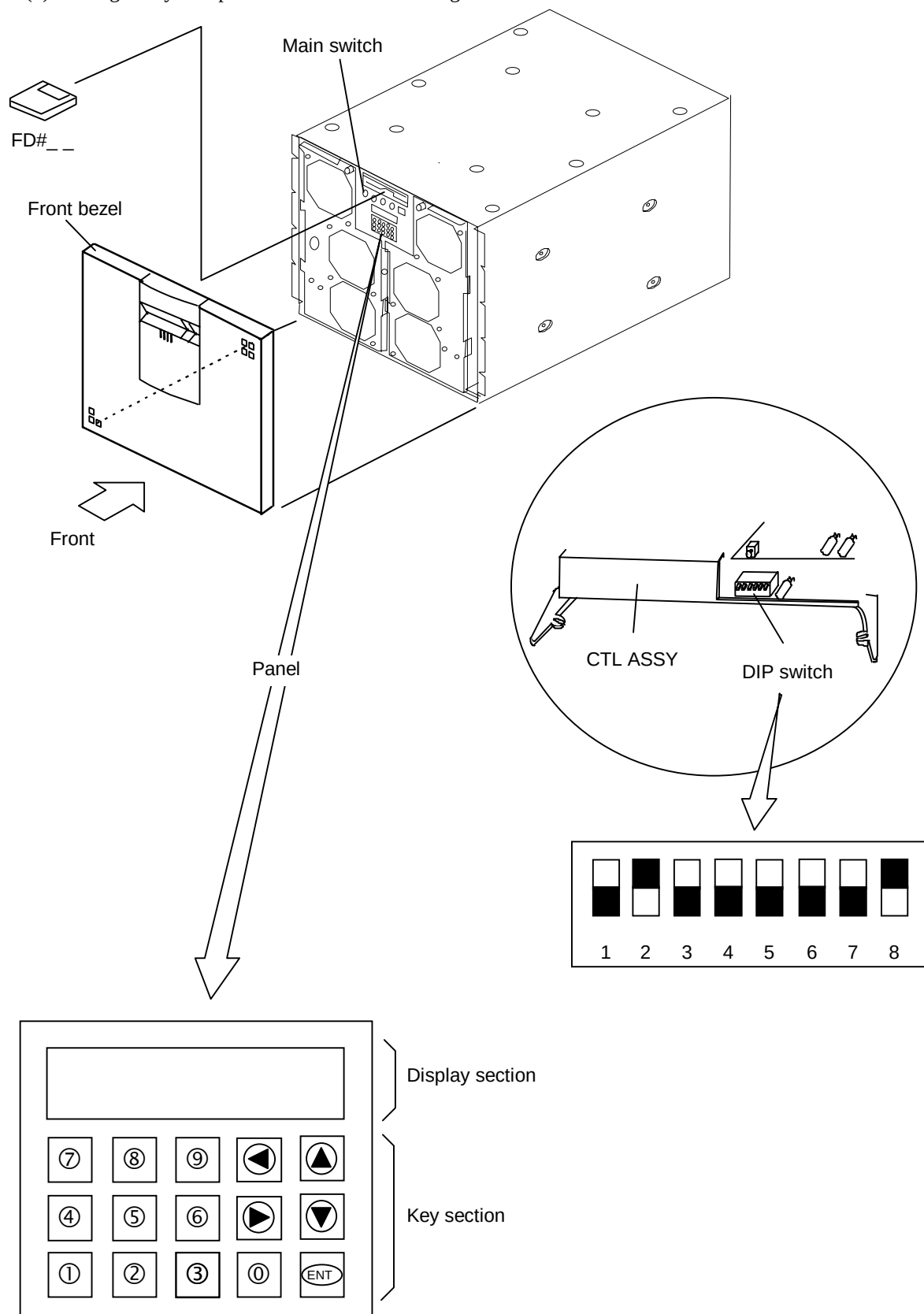
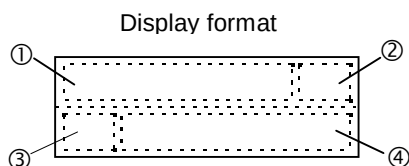


Figure 4.1.1 DIP Switches (System parameter is Set)

(1) Display

While setting up DIPSWITCH or SVP FUNCTION, menu etc. are displayed at panel display in the following display format .



① Menu title

There are two kinds of menu title described below.

DIPSWITCH SET:

For setting the target ID, buzzer, etc.

SVP FUNCTION:

For the operations other than described above.

② Warning

A hatch mark “#” indicates that a message has occurred in the host command processing during panel operation.

③ Current setting

An asterisk “*” indicates the item currently set.

④ Menu item/parameter value

This indicates the menu item or the parameter value entered from the panel.

One display is provided for the two controllers. You can determine which of the two controllers displayed the message as follows.

Message from the controller No. 0: The first (left most) character is in uppercase.

Message from the controller No. 1: The first (left most) character is in lowercase.

Example) Controller No. 0: DIPSWITCH SET

Controller No. 1: dIPSWITCH SET

For the dual controllers, the message with the display format 1 and the menu title with the display format 2 are displayed as indicated above. (For the panel operation messages, the first (left most) character is always in uppercase regardless of the controller No.)

For the single controller, the first (left most) character is always in uppercase.

(2) Keys

Use the - keys for panel operation.



Used for entering the parameter values.



Used for determining the menu or the input parameter.

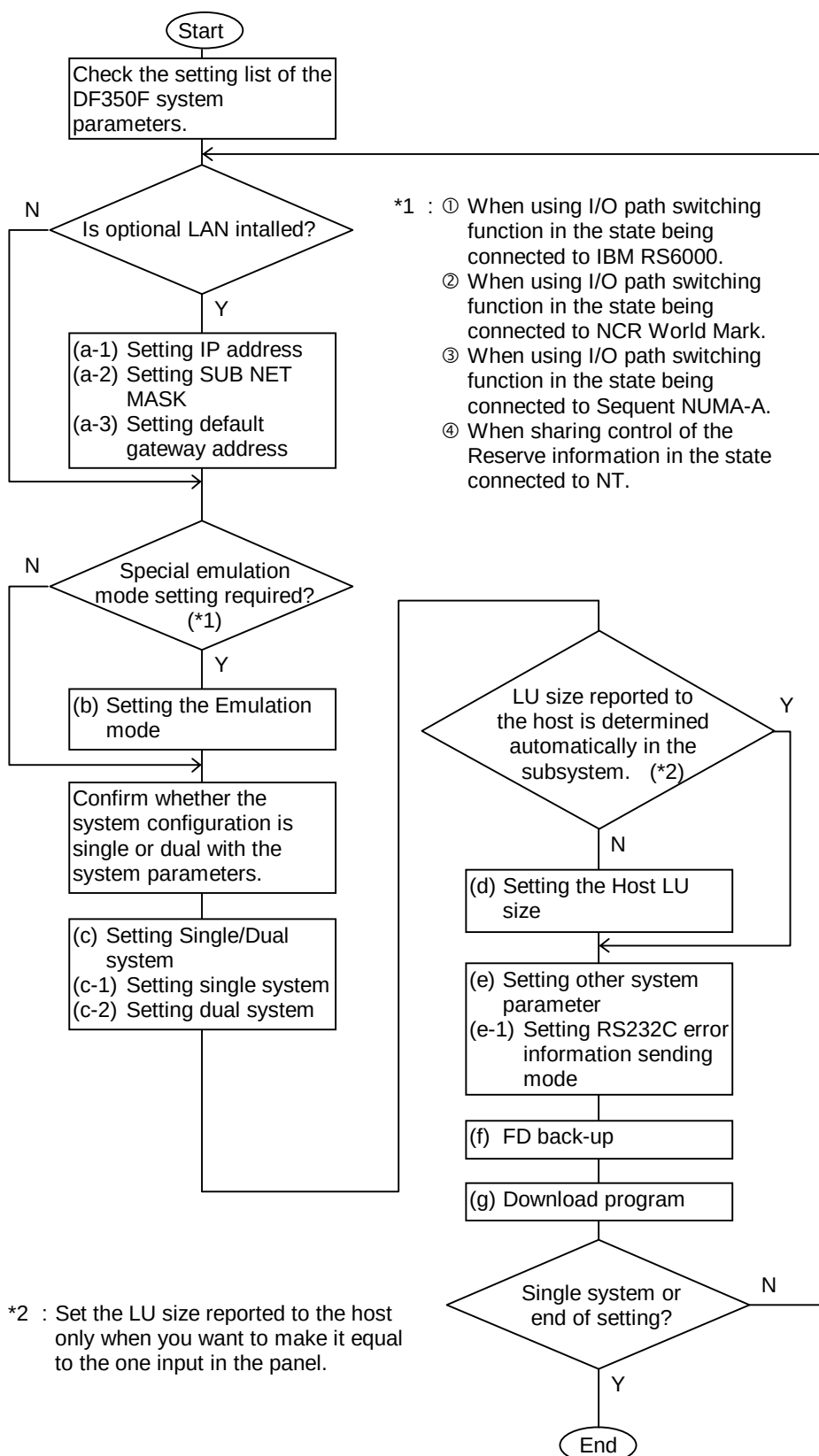


Used for determining the parameter input position.



Used for selecting the menu.

Operate as the flow described below.



Operate as described below.

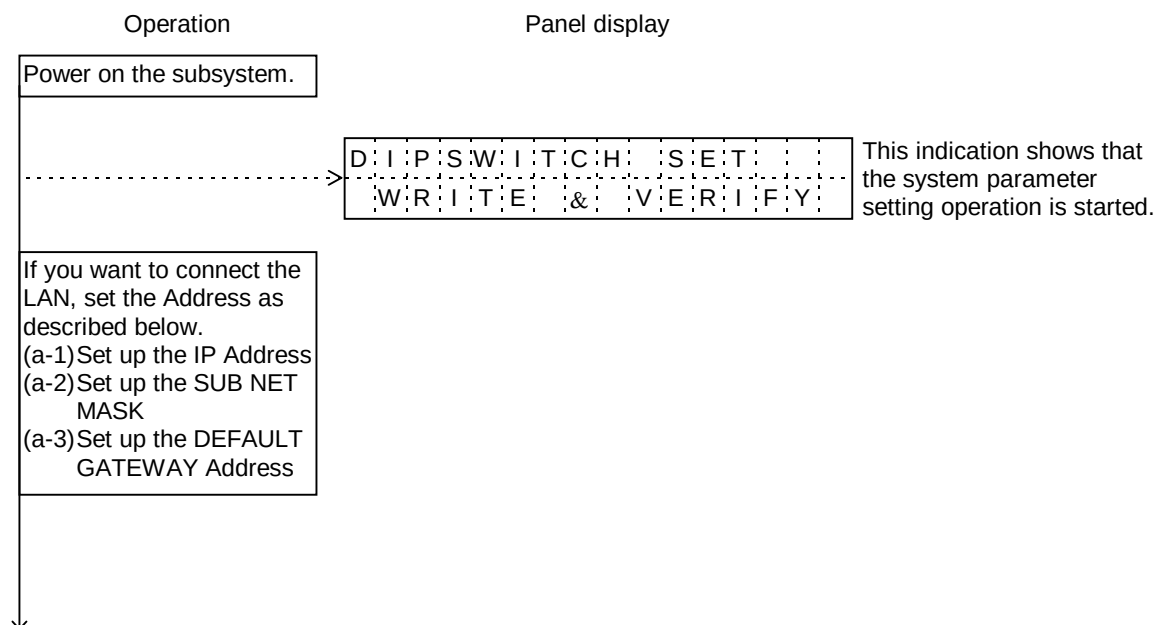
- (1) Before powering on the subsystem, set DIP switches No. 4, 6 as shown in Figure 4.1.2 .

In case of Dual Controller system (installed DF-F350F-F3WCF) , set DIP switches of both controllers.

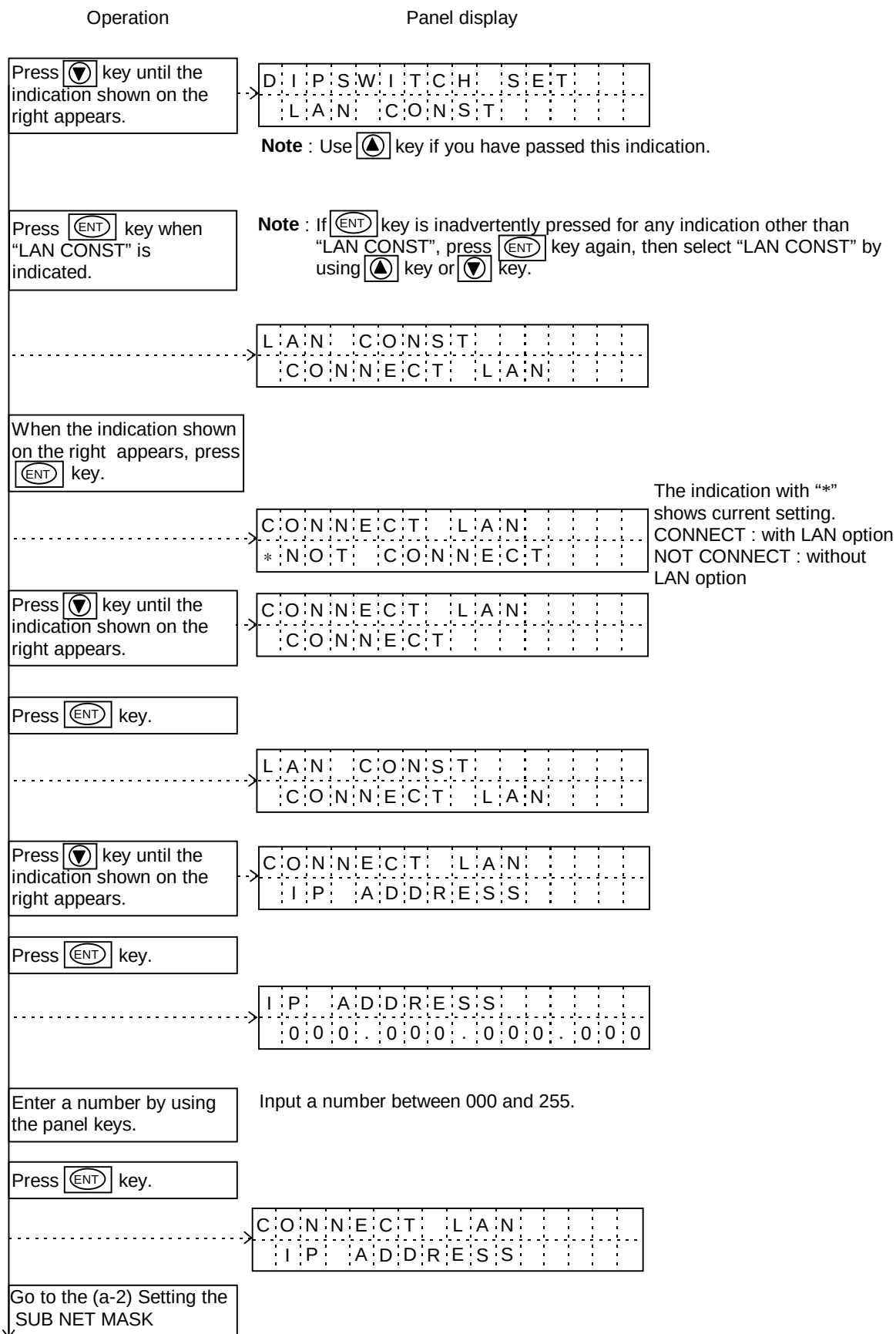


Figure 4.1.2 DIP switches (For setting the system parameter)

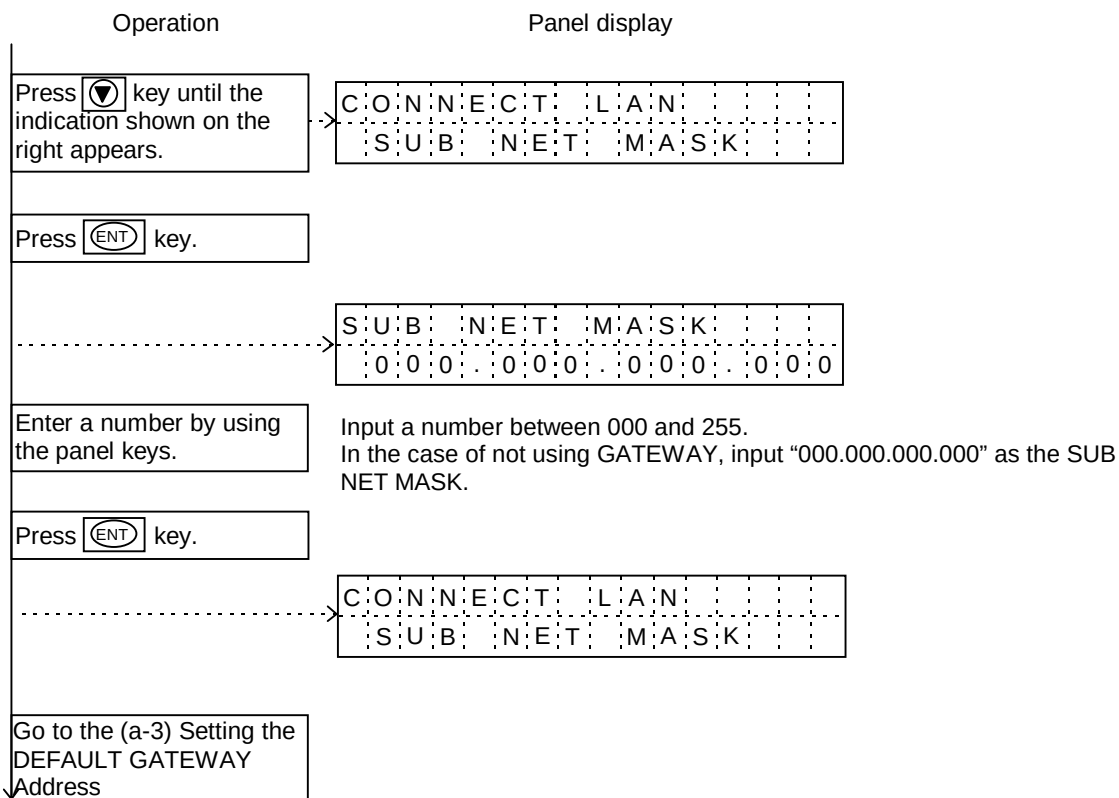
- (2) Operate panel's keys as described below.



(a-1) Setting the IP address.



(a-2) Setting the SUB NET MASK

***Note**

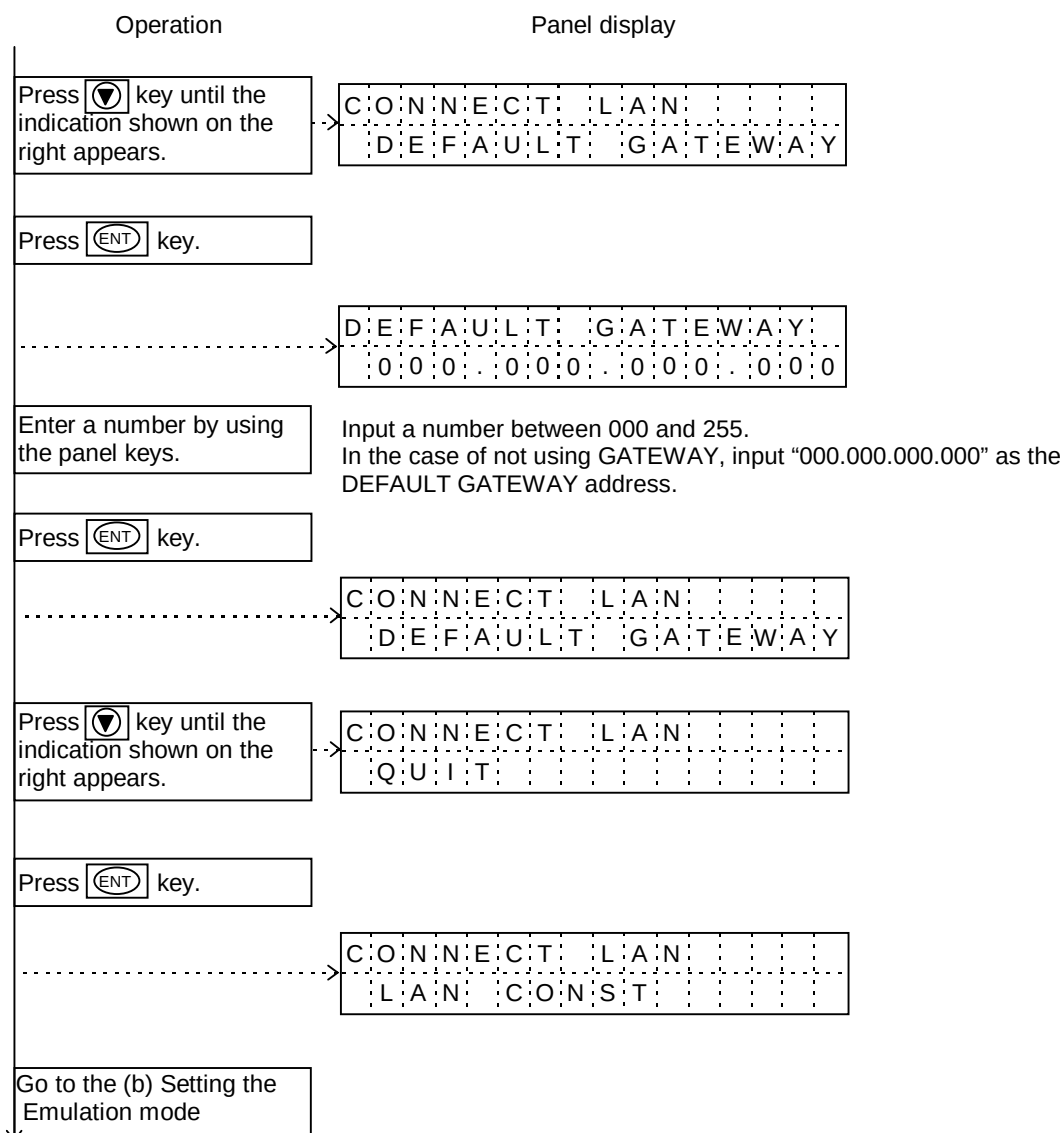
If "000.000.000.000" as the SUB NET MASK is set, this subsystem automatically adopts default SUB NET MASK for each IP address as described in the table 4.1.1.

Table 4.1.1 Default SUB NET MASK related with IP address

No.	IP Address of the subsystem	DEFAULT SUB NET MASK
1	from 000.000.000.000 to 127.255.255.255	255.000.000.000
2	from 128.000.000.000 to 191.255.255.255	255.255.000.000
3	others	255.255.255.000

If a smaller SUB NET MASK than default number is entered, this subsystem adopts default number.

(a-3) Setting the DEFAULT GATEWAY address

***Note**

If an invalid GATEWAY address is set (the IP address of the device is different from network address.), either of warning messages as shown below is displayed until the READY LED of the subsystem lights on.

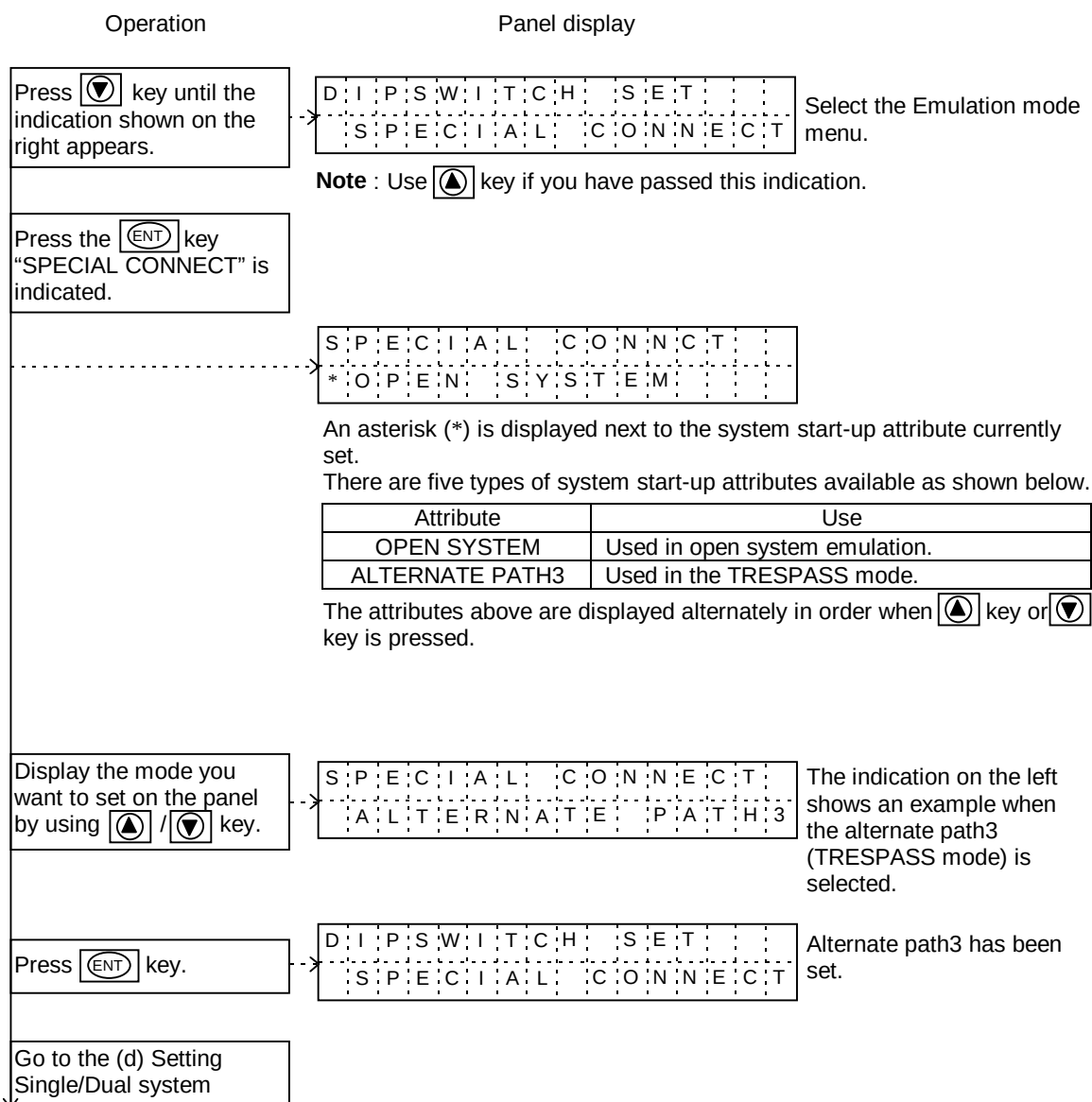
Power off the subsystem and set IP address and default GATEWAY address correctly.

W	0	1	7	0	0	G	A	D	E	R	R		
				.		.		.					

W	0	1	7	0	0	G	A	D	E	R	R	-	X
				.		.		.					

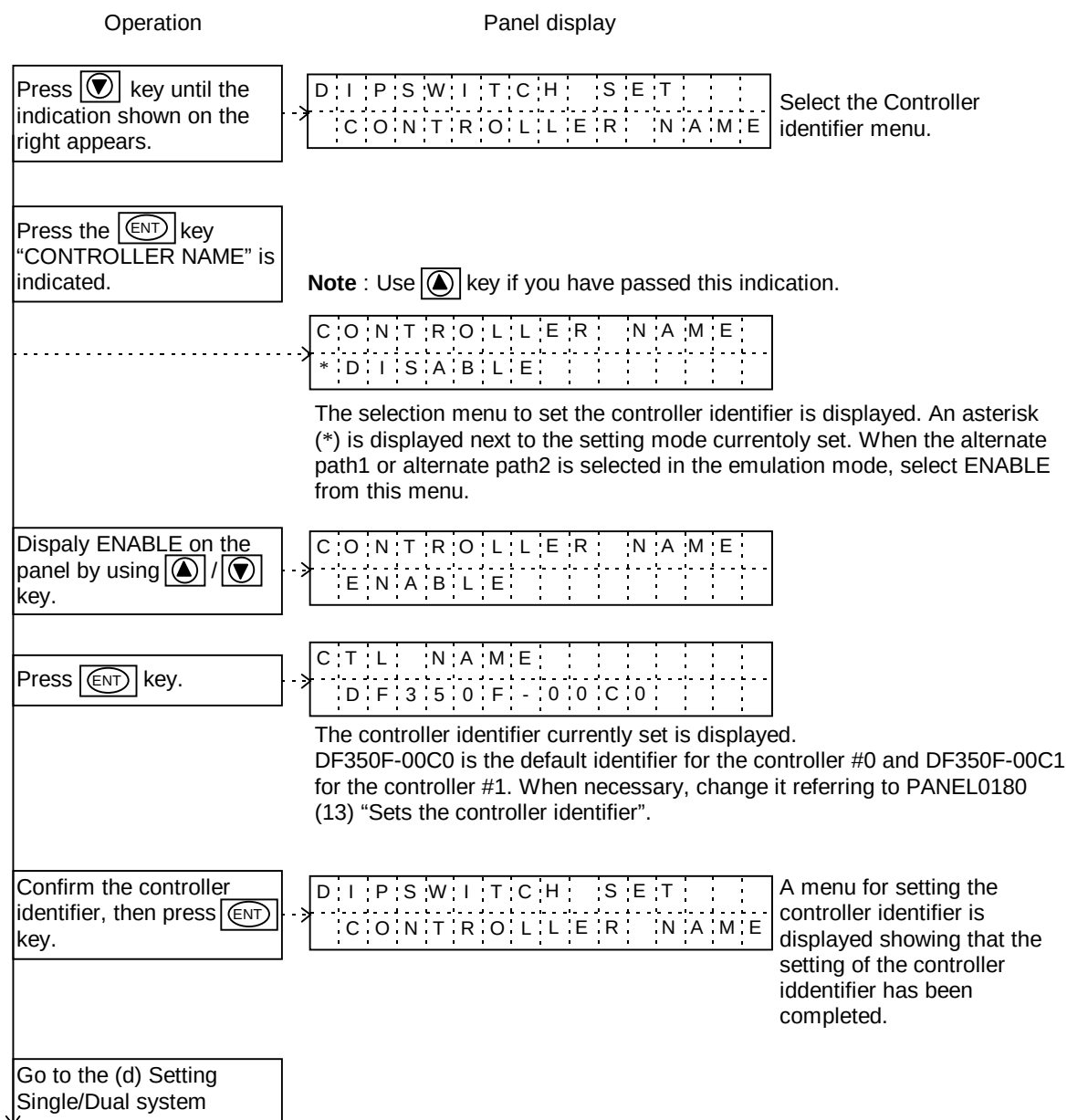
X : controllers No.

(b) Setting the Emulation mode

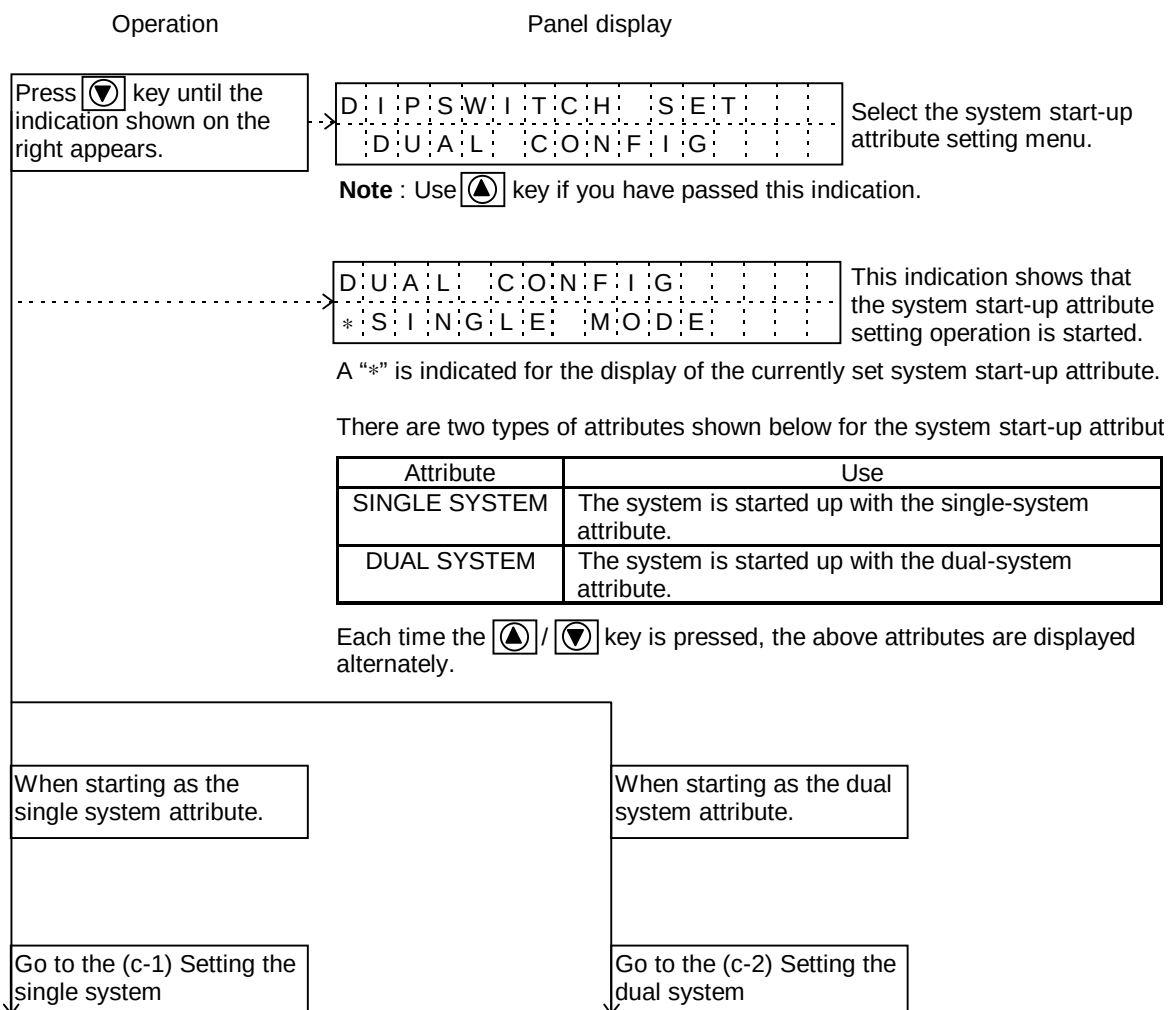


When the alternate path1 or alternate path2 is selected, set the controller name, product type. (See RW-INST0340.)

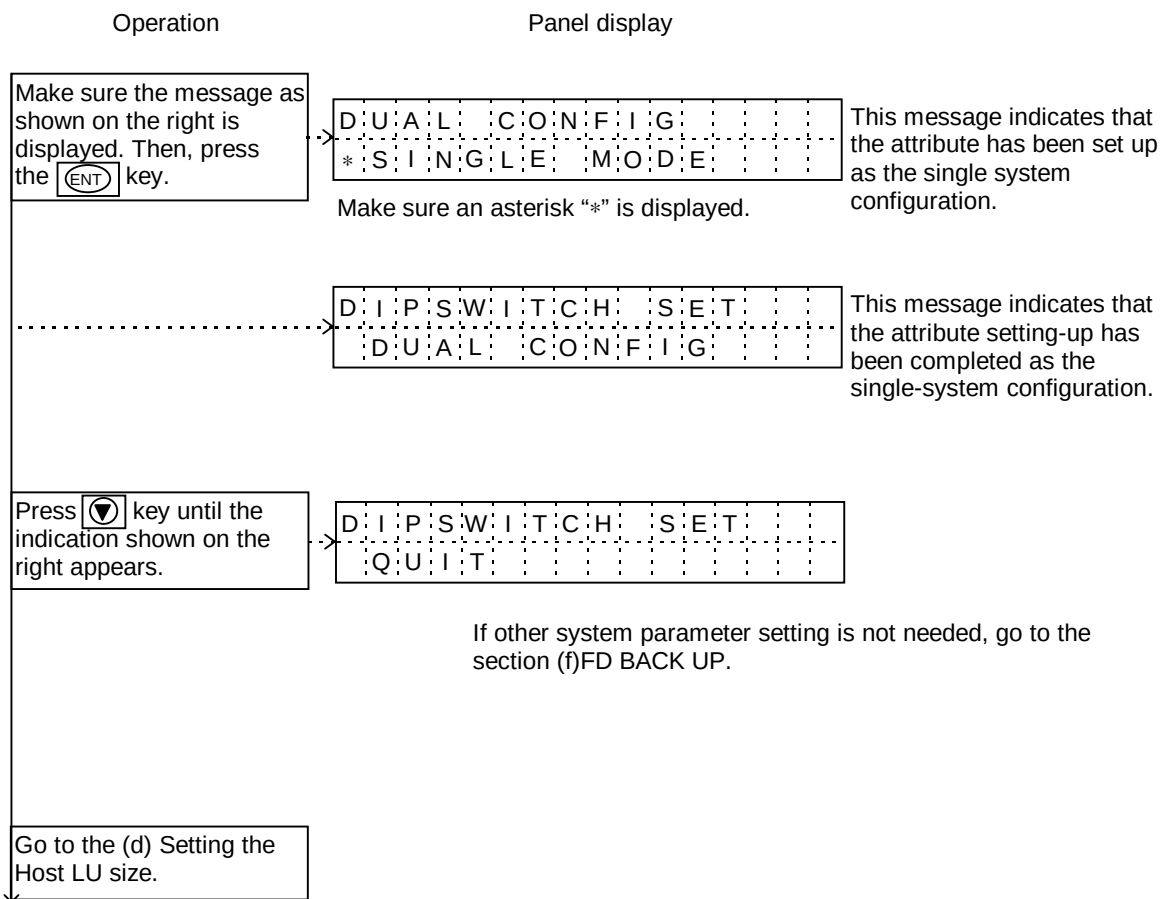
When the alternate path3 is selected, go to the single/dual system setting.



(c) Setting Single/Dual system



(c-1) Setting the single system



(c-2) Setting the dual system

There are five operating modes available as shown in Table 4.1.2.

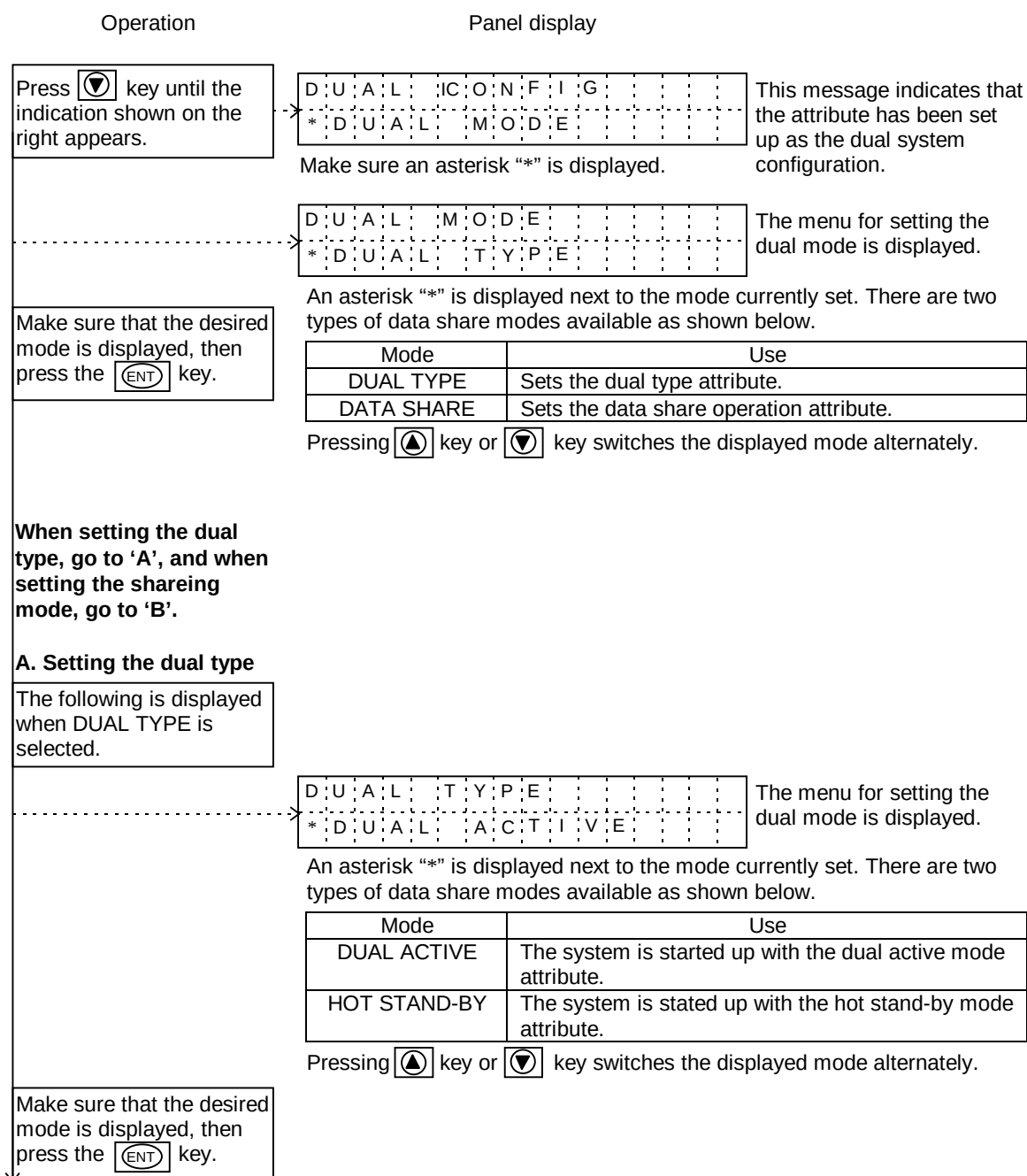
To validate each mode, panel setting shown in the Table 4.1.2 is required.

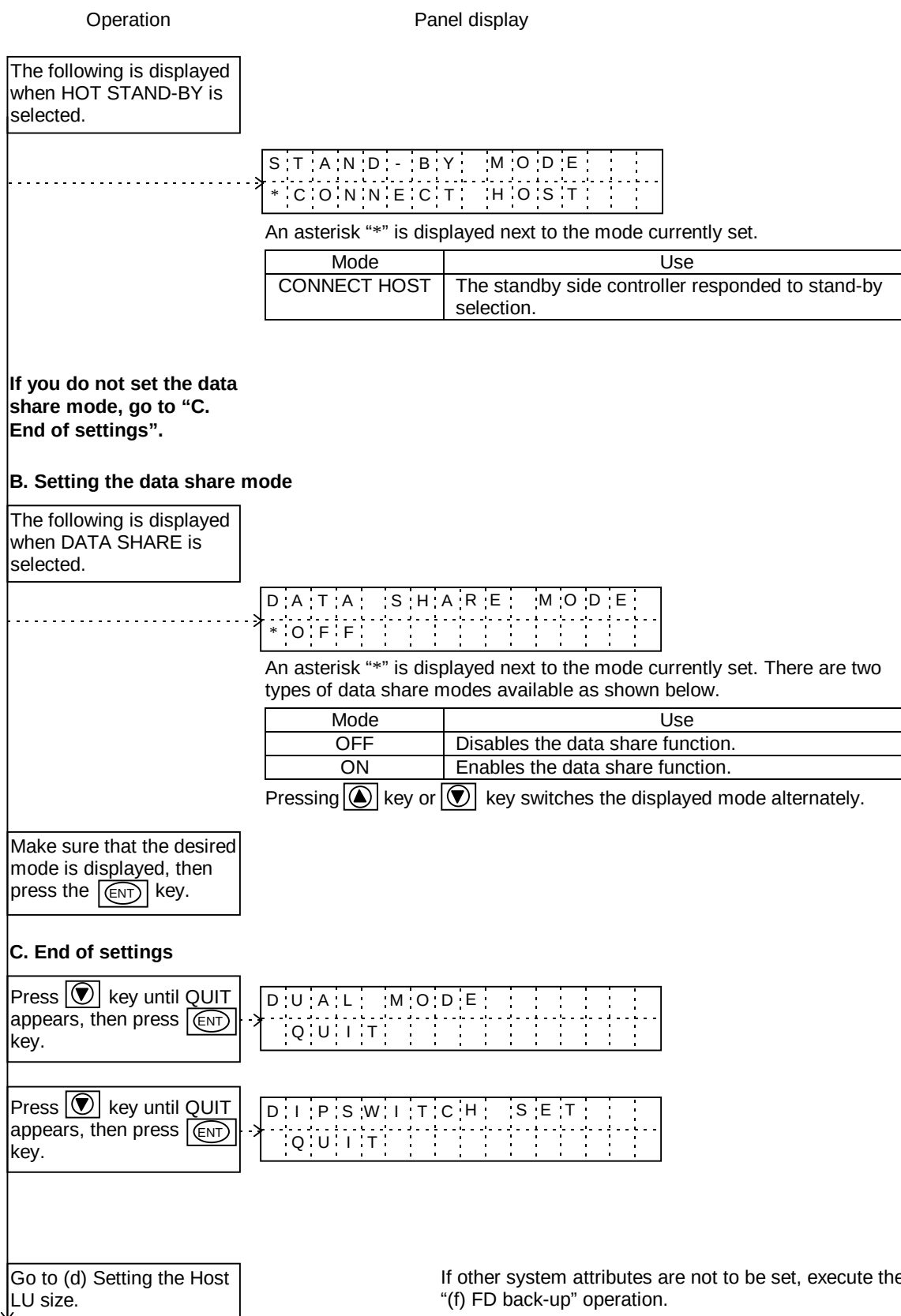
Perform the operations instructed in item (d) and succeeding items referring to the Table 4.1.2.

Table 4.1.2 Active mode and panel setting (Dual system configuration)

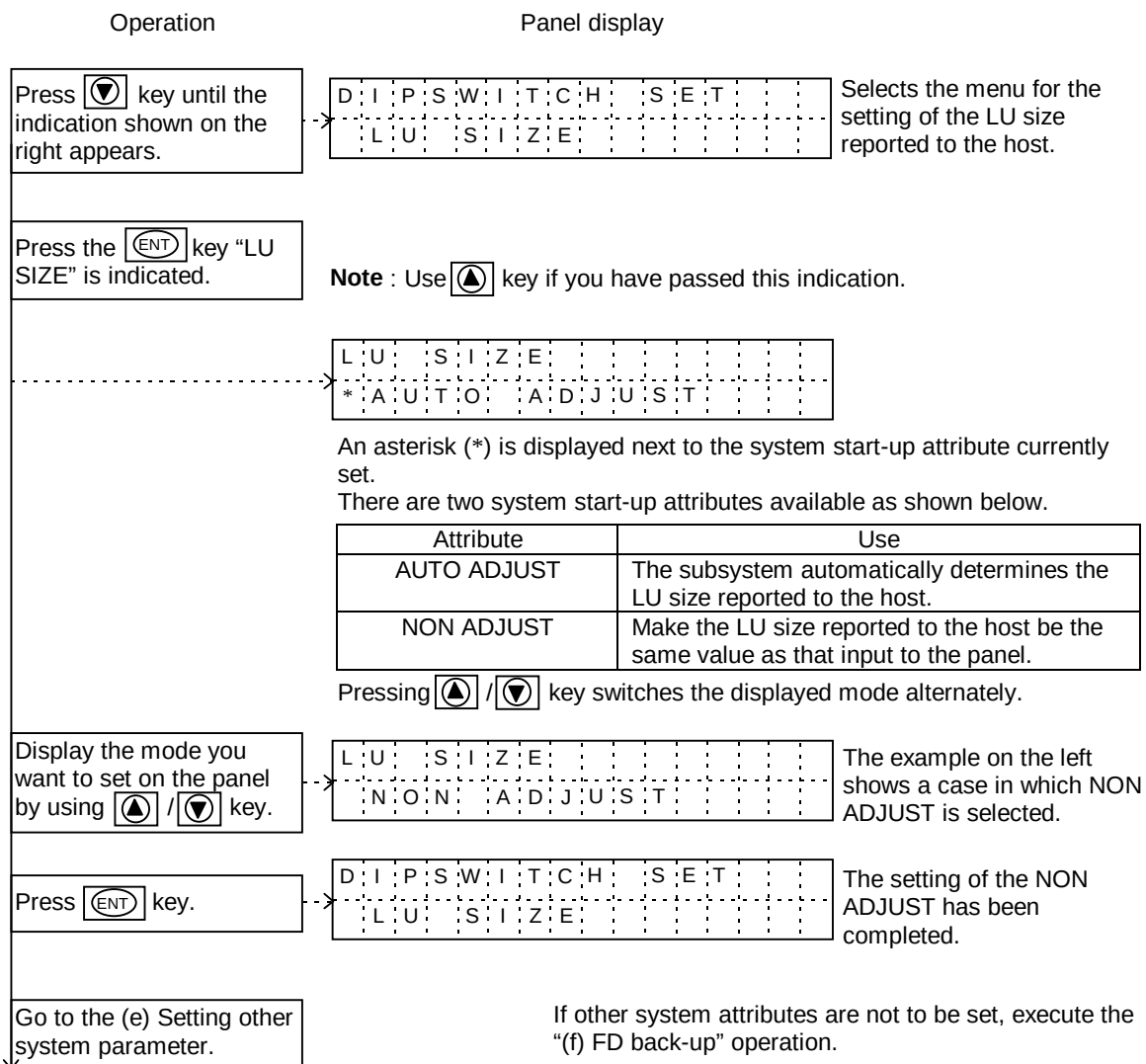
Active mode		Panel set		
		DUAL TYPE	STAND-BY MODE	DATA SHARE MODE
HOT STAND-BY	Normal	HOT STAND-BY	CONNECT HOST	OFF
	Data share (*1)			ON
DUAL ACTIVE	Normal	DUAL ACTIVE	Invalid	OFF
	Data share (*1)			ON

*1 : This function can be used in Micro_disk_Ver.354 or later.





(d) Setting the LU size reported to the host



(e) Other System Parameter Setting

Besides (a) Setting the IP address, (c) Setting SINGLE/DUAL system, there are several setting functions as below. The setting at the factory shipment is shown on the table in the addendum to the device.

To change the setting, see "PANEL0080".

The menu items and their usage are as follows.

(The item Nos. 1, 3, 5, 9, 16 and 17, and 18 in the following table must be set for each controller.)

No.	Menu item	Usage	Contents		Factory setting
			Parameter	How to set	
1	WRITE & VERIFY	Specifies the write and verify execution mode.	ON : Does not inhibit the write and verify execution mode. OFF : Inhibits the write and verify execution mode.	Select	ON
2	STRIPE SIZE	Specifies the data striping size.	16KB : Stripes the data in 16kbytes. 32KB : Stripes the data in 32kbytes. 64KB : Stripes the data in 64kbytes.	Select	64KB
3	LAN CONST	Specifies the LAN configuration information. ① CONNECT LAN Specifies whether or not the LAN board is mounted.	CONNECT : LAN board is mounted. NOT CONNECT : LAN board is not mounted.	Select	Depending on the configuration from the factory
		② IP ADDRESS Sets the IP address.	Enters the numerical value using the panel keypad.	Enter	000.000.000.000
		③ SUB NET MASK	Enters the numerical value using the panel keypad.	Enter	000.000.000.000
		④ DEFAULT GATEWAY	Enters the numerical value using the panel keypad.	Enter	000.000.000.000
		⑤ ETHER ADDRESS (*1)	Enters the numerical value using the panel keypad.	Only for reference	???????????
4	CONNECT VMS	Specifies whether or not the VMS is connected.	CONNECT : Connects the VMS. NOT CONNECT : Does not connect the VMS.	Select	NOT CONNECT
5	SPECIAL CONNECT (*2)	Specifies the emulation mode.	OPEN SYSTEM : Open system emulation mode ALTERNATE PATH3 : TRESPASS mode	Select	OPEN SYSTEM

*1 Changing the ETHER ADDRESS with this menu is impossible after shipment.

*2 This menu can be used in the Flash Program Ver.PE24 and later.

No.	Menu item	Usage	Contents		Factory setting
			Parameter	How to set	
6	HOST BLK SIZE	Specifies the drive format size.	512B : The drive format size is 512bytes per block.	Fixed	512B
7	ERROR INF	Specifies the error information send mode for the RS232C.	OFF : Inhibit outflow of information. ON (NORMAL) : Does not inhibit outflow of information. ON (HITRACK) : Does not inhibit outflow of information for the HITRACK.	Select	Depending on the unit's factory setting (OFF for Japan)
8	CONTROLLER	Specifies the controller type.	MINI TOWER : Mini tower (MK) HIGH RACK MOUNT : Rackmount (RKH) CABINET, WRACK : Cabinet type (CK), Rackmount (RKWH)	Select	Depending on the configuration from the factory
9	SPARE DISK	Specifies whether or not the spare disk is mounted.	EXISTENCE : Spare disk mounted NOTHING : Spare disk not mounted	Select	Depending on the configuration from the factory
10	SERIAL NO	Specifies the serial No. of the controller.	Enters the numerical value using the panel keypad.	Enter	
11	ROM V/R	Specifies the ROM microprogram revision.	Enters the numerical value using the panel keypad.	Enter	Revision from the factory
12	RAM V/R	Specifies the RAM microprogram revision.	Enters the numerical value using the panel keypad.	Enter	Revision from the factory
13	CONTROLLER NAME	Sets the controller identifier.	DISABLE : Setting of the controller identifier is invalid. ENABLE : Setting of the controller identifier is valid. CTL NAME : Controller identifier.	Select	DISABLE
14	ROW LAST LBA (*3)	Specifies the capacity that a single drive uses (for each ROW).	Enters the numerical value using the panel keypad.	Enter	Depending on the configuration from the factory
15	BUZZER	Specifies whether or not the buzzer sounds when displaying the warning or fault message.	ENABLE : Buzzer sounds. DISABLE : Buzzer does not sound.	Select	ENABLE
16	SYSTEM ERROR	Specifies the operation if the processor failure occurs.	AUTO RESET : Resets a fault. SYSTEM DOWN : Shutdown the system.	Select	AUTO RESET

*3 The ROW LAST LBA is displayed for setting the capacity that a single drive uses. Sets the capacity according to the menu displayed.

No.	Menu item	Usage	Contents		Factory setting
			Parameter	How to set	
17	INQUIRY INF	Specifies the vendor name, model name, and command queuing.	VENDOR TYPE : Vendor name PRODUCT TYPE : Model name COMMAND QUEUING : Command queuing ON : Executes the command queuing. OFF : Inhibits the command queuing.	Enter Enter Select	VENDOR TYPE = HITACHI PRODUCT TYPE = DF350F COMMAND QUEUING = ON
18	DUAL CONFIG	Specifies the system startup attribute.	SINGLE MODE : Single system attribute DUAL MODE : Dual system attribute DUAL ACTIVE : Dual stand-by configuration setting HOT STAND-BY : Hot stand-by configuration setting DATA SHARE MODE : Data share mode attribute (*5) OFF : Not used in the Data share mode ON : Used in the Data share mode	Select	Depending on the configuration from the factory
19	SYS REV	Limit the revision Nos. of installing system.	Displays the startup program revision.	—	“0354”
20	OPTION	Specifies the optional function when using it.	Enters the option code using the panel keypad.	Enter	“0000”
21	BOOT PROG V/R	Displays the startup program revision.	Displays the startup program revision.	—	
22	RTC SET	Sets the internal clock.	Enters the time using the panel keypad.	Enter	Year, month, day, day of the week, hour, minute, second
23	QUIT	Terminates the parameter input.	Enters using the panel keypad.	Enter	

*4 This menu can be used in the Flash Program Ver.PE24 or later.

*5 This function can be used in Micro_Disk_Ver.0354 or later.

(e-1) Setting RS232C error information sending mode

In order to use the failure notification program, the setting for the “ERROR INF” of the system parameter must be changed to “ON (NORMAL)”.

Operation	Panel display
	D I P S W I T C H S E T W R I T E & V E R I F Y
Press  key until the indication shown on the right appears. Press  key.	D I P S W I T C H S E T E R R O R I N F
	Note : Use  key if you have passed this indication.
Confirm that the indication is changed as shown on the right, which shows that the ERROR INF setting operation is started.	E R R O R I N F * O F F
Press  or  key until the indication shown on the right appears. Press  key.	E R R O R I N F O N (N O R M A L)
Make sure that the message as shown on the right is displayed.	D I P S W I T C H S E T E R R O R I N F
Press  or  key until the indication shown on the right appears. Press  key.	D I P S W I T C H S E T Q U I T
For the dual system, an indication shown on the right appears. Make the setting in the same way as the above.	D I P S W I T C H S E T ■ W R I T E & V E R I F Y

(f) FD back-up.

There are cases where System Parameters (Buzzer setting, drive recovery mode, etc.) needs to be backed up to FD or restored from FD when installing optional parts or replacing parts. This case, perform back-up to FD or restore from FD according to “2.3.1 Back-up procedure to FD (RW-OPTION0050.)” or “2.3.2 Restoring procedures to FD (RW-OPTION0080.)”.

(Raid configuration setting, LU configuration setting, etc are not contained in system parameter.)

Back-up procedure to FD

- (1) Turn the power off according to RW-OPTION0110.

Notice: In case the power is not normally turned off, the user's data might be lost.

- (2) Before power on the subsystem, set DIP switch No.4 on CTL ASSY as shown in Figure 4.1.3.

Note : Be sure to set the same data for both controllers if the dual controller option (-F3WCF) has been installed.

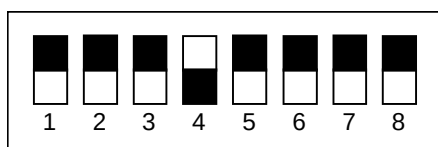
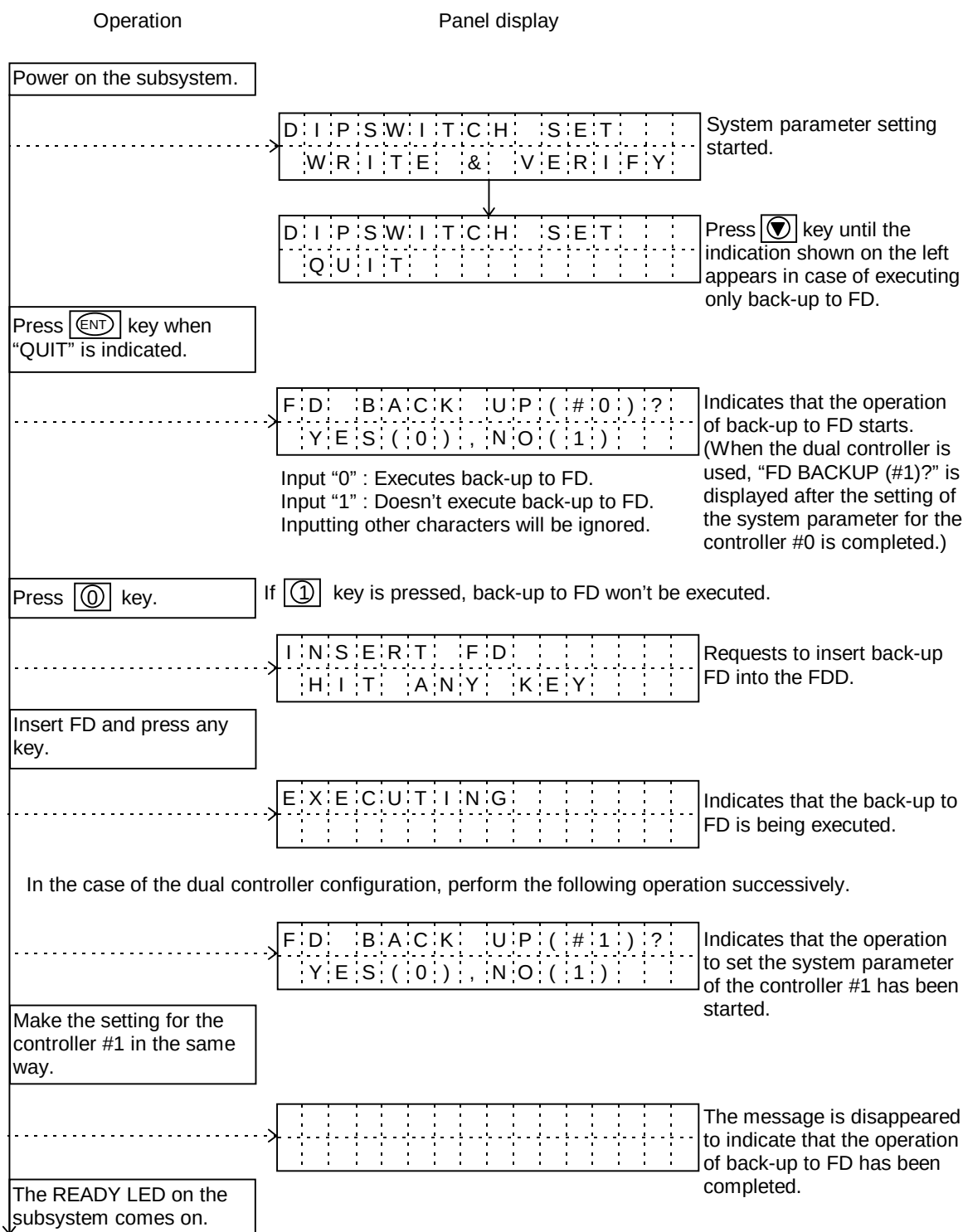


Figure 4.1.3 DIP Switches

(3) Operate panel's keys as described below.



(4) Set DIP switch No.4 as shown in Figure 4.1.4.

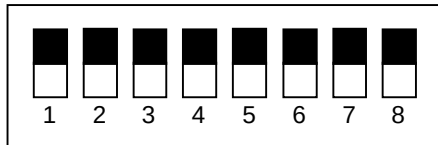
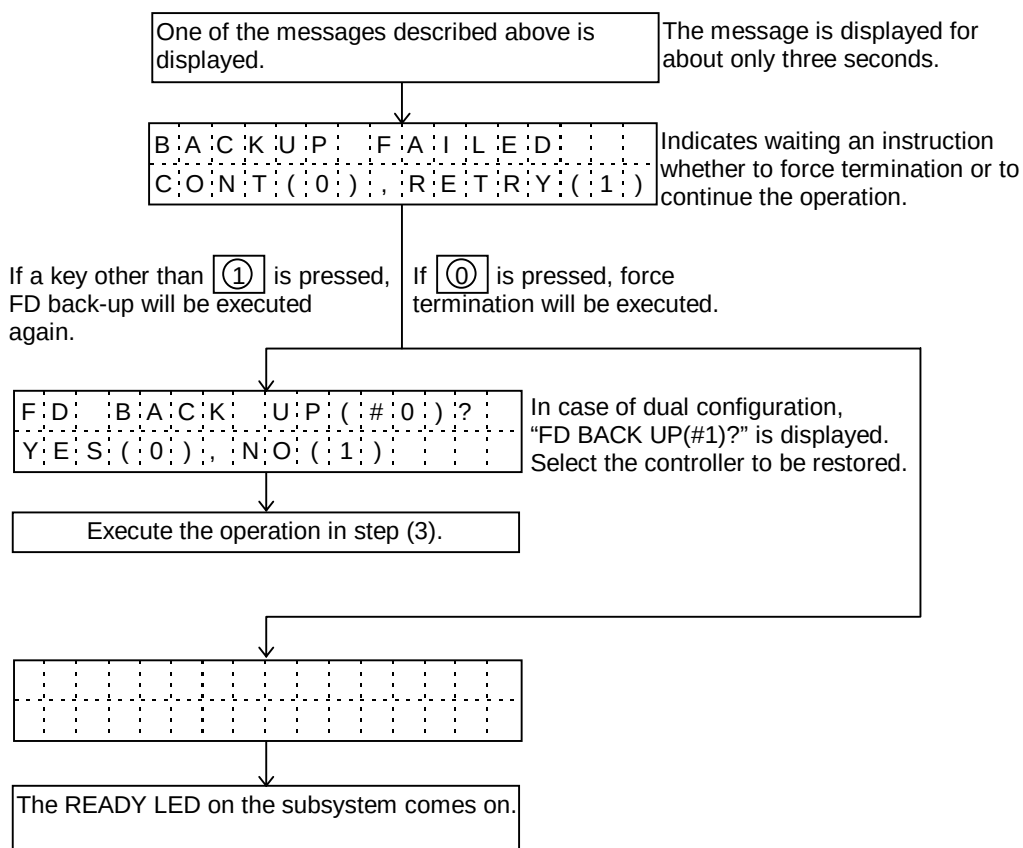


Figure 4.1.4 DIP Switches

Note 1 : While the back-up to FD is being executed, the following messages may be displayed.

- **FD NOT INSERTED**
FD isn't inserted. Insert FD into the FDD.
- **FD MOTOR NOT STARTED**
Starting failure of the FD drive motor occurred. Try again.
- **FILE WRITE ERROR**
FD which was inserted is not formatted, or is the condition of write-protected. Format or release write-protection.
Write error occurred in FD which was inserted. Insert another FD.

If these messages are displayed, back-up to FD hasn't been executed. So try again following the operation described below.



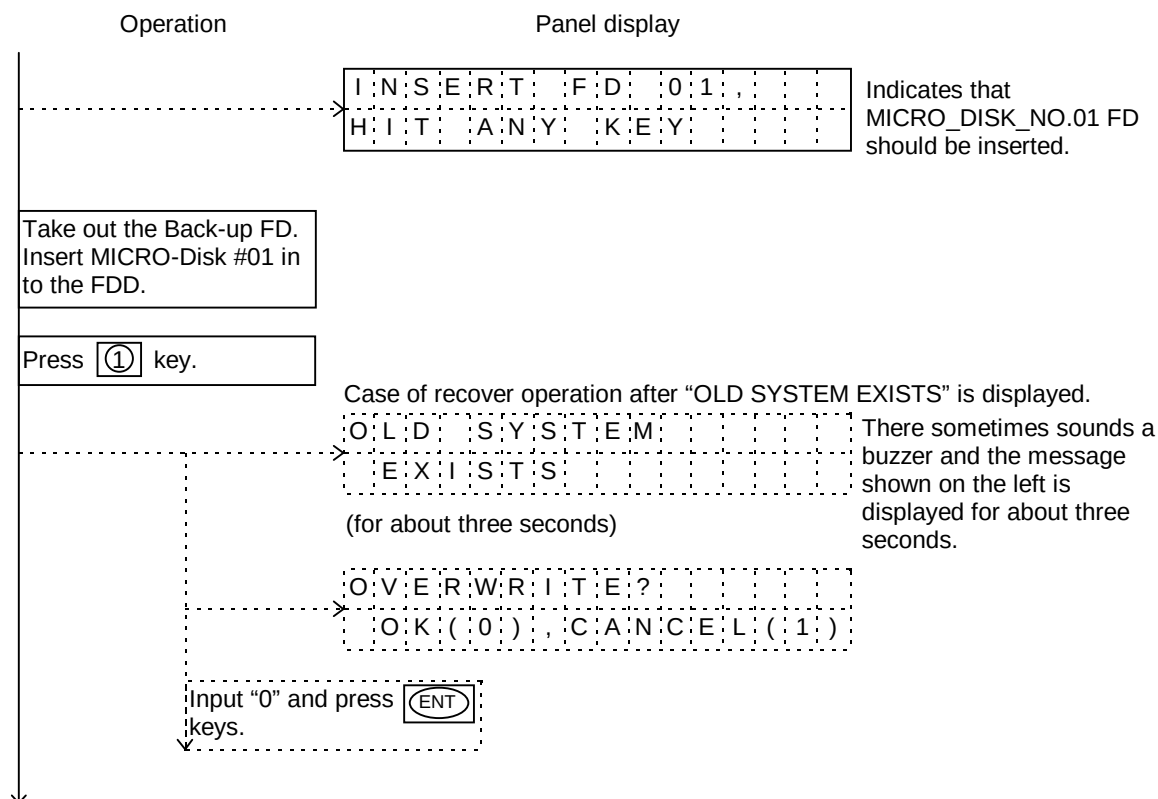
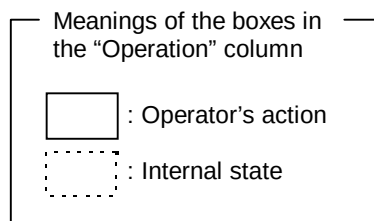
Note 2 : Use 3.5" FD (1.44MB) formatted by MS-DOS for back-up FD. Note that the FD will be overwritten in back-up.

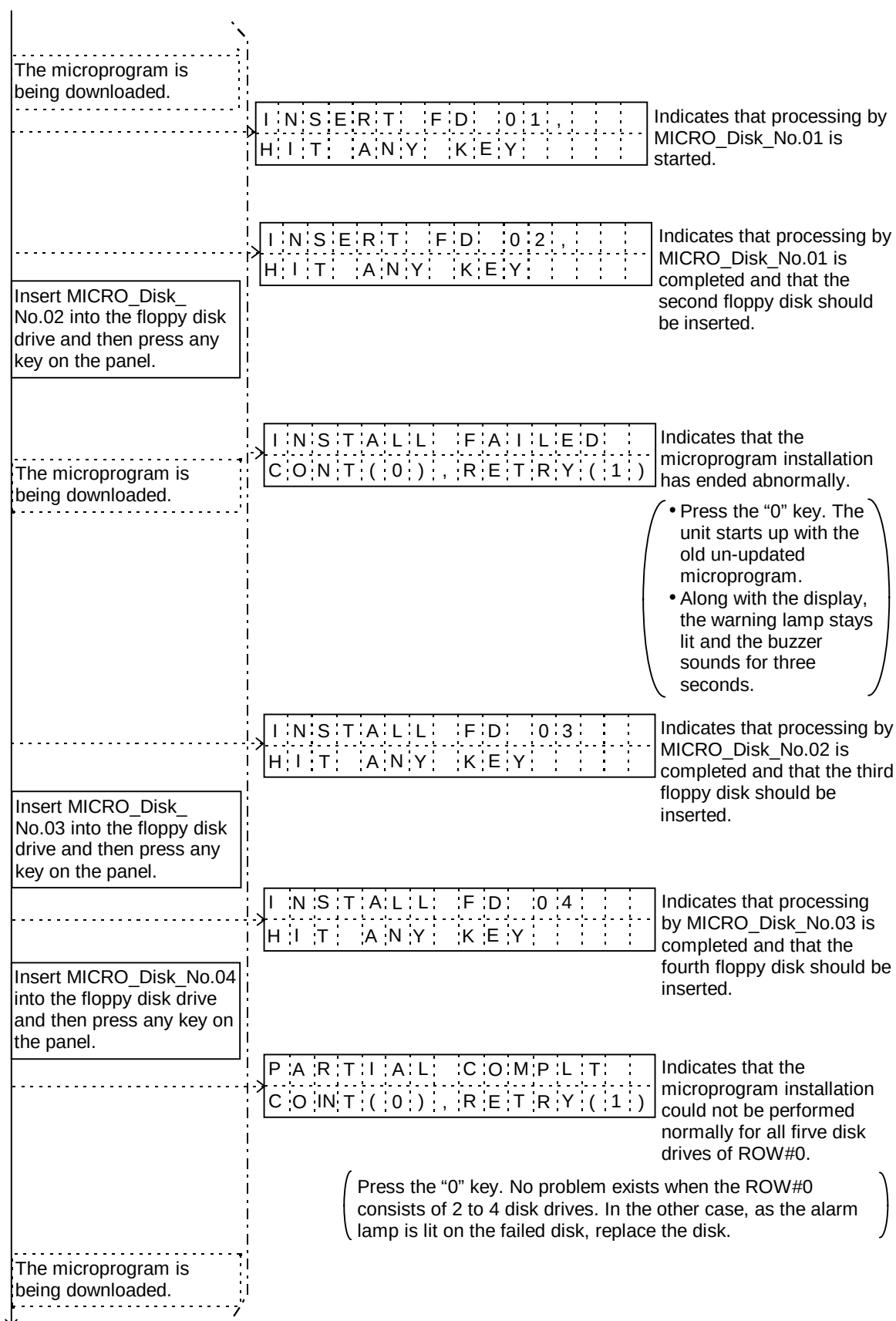
Note 3 : Even if back-up FD is left at FDD after back-up operation, no error will occur on the subsystem.

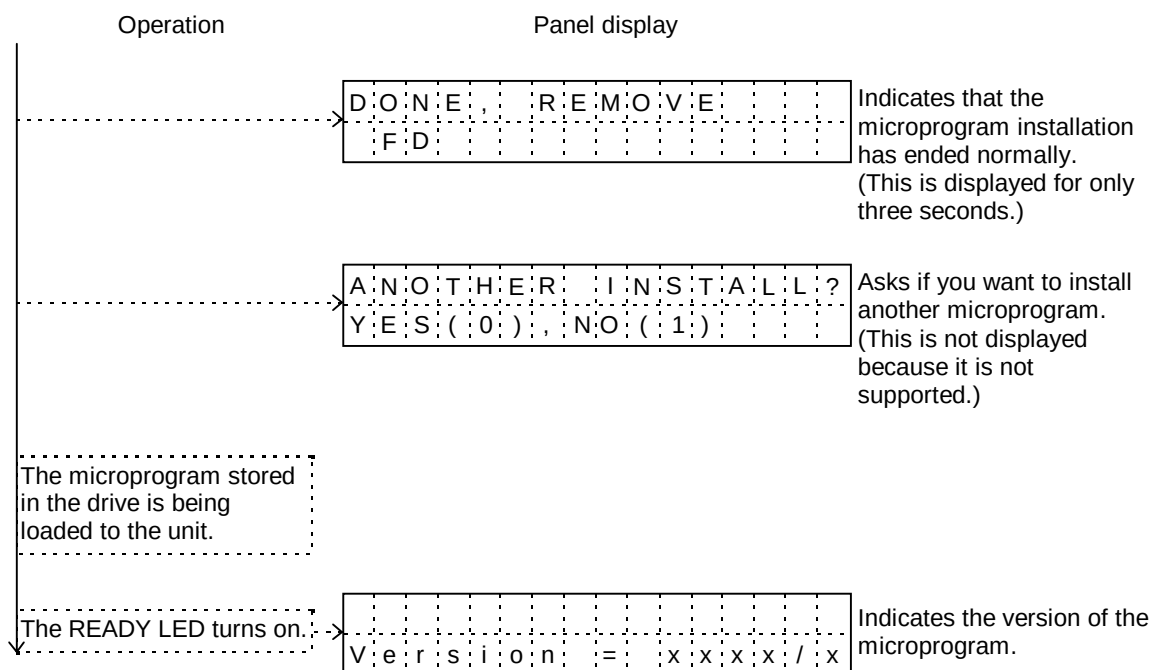
(g) Download Program

Download program is used to update the microprogram stored in the drive. Three floppy disks are used for downloading.

Note : Be sure that no drive failure is present before updating the microprogram.







(1) Set DIP switch No.1 as shown in Figure 4.1.5.

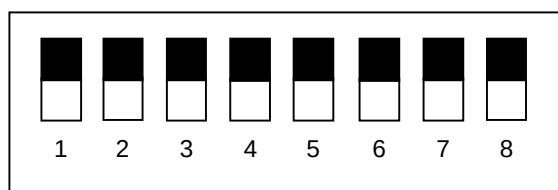


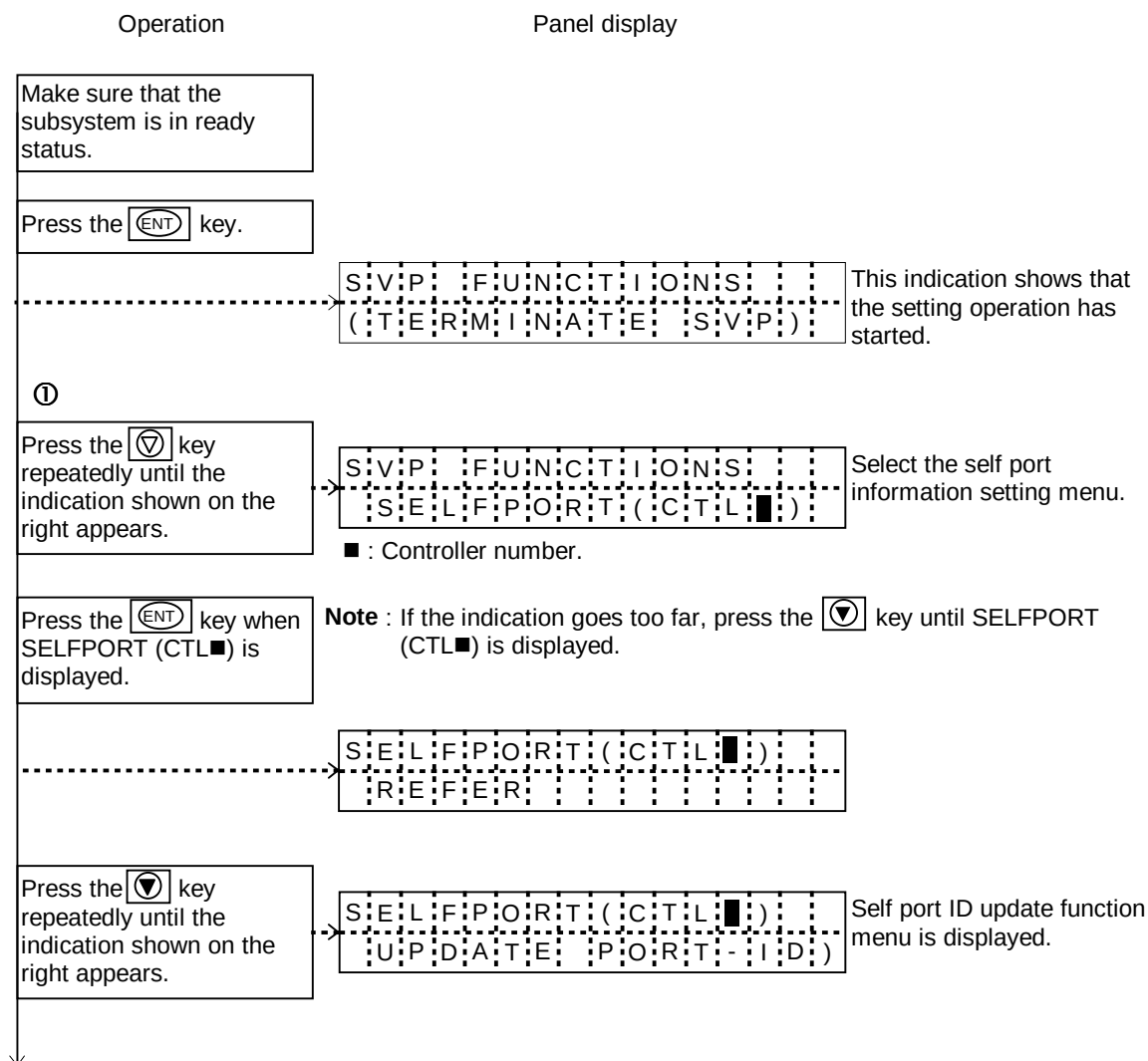
Figure 4.1.5 Standard DIP Switch Settings

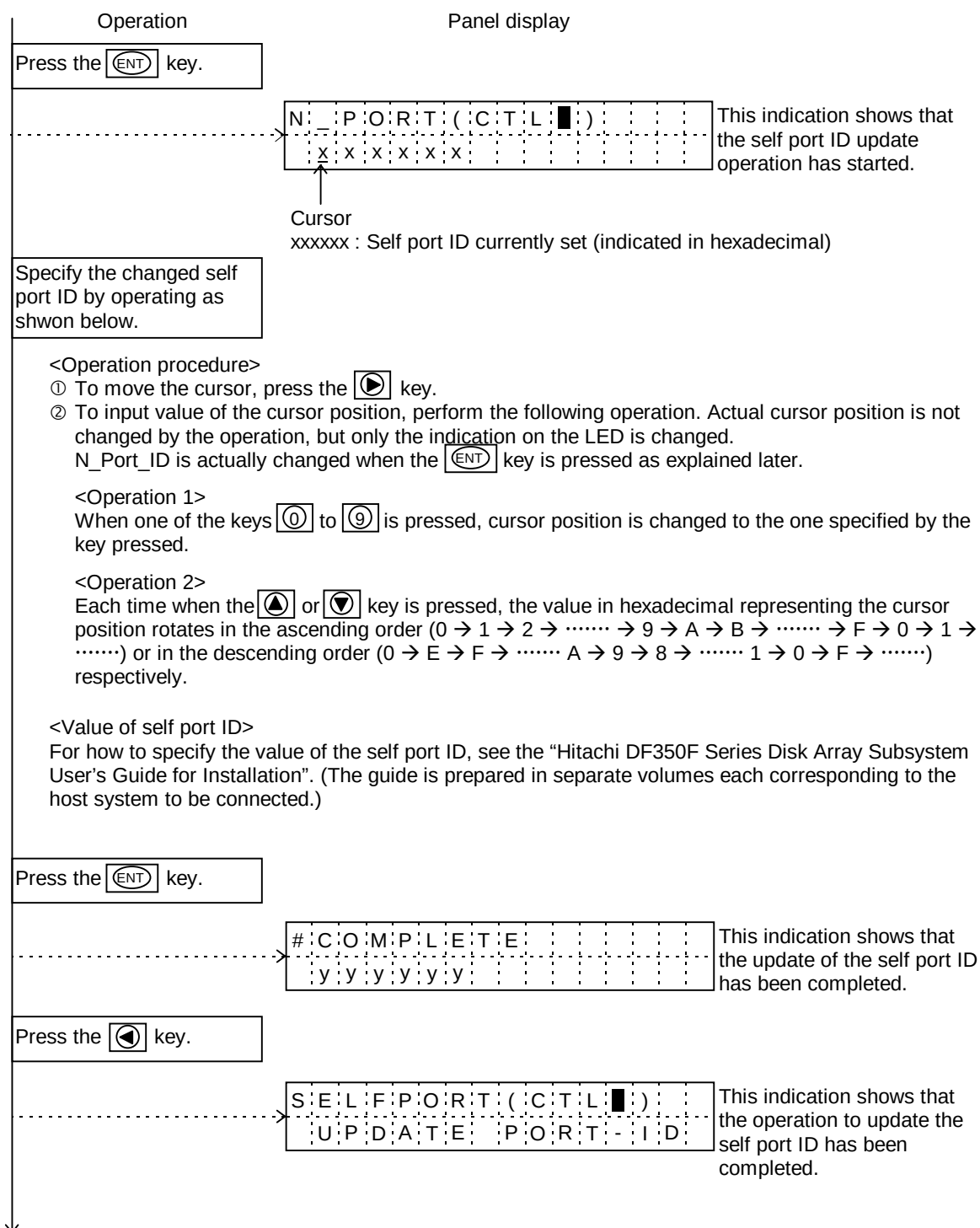
Note : If the dual controller option (DF-F350F-F3WCF) is installed, use the same settings for both controllers.

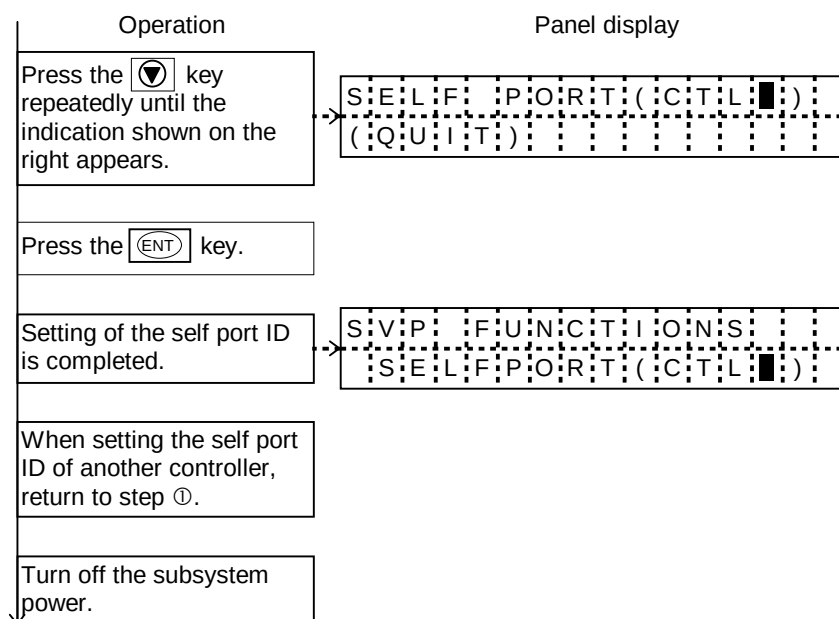
4.2 Setting Self Port ID

The self port IDs have been set to FFFFFFFF for both the controller 0 and controller 1 when the subsystem is shipped from the factory.

Operate following the procedure below.







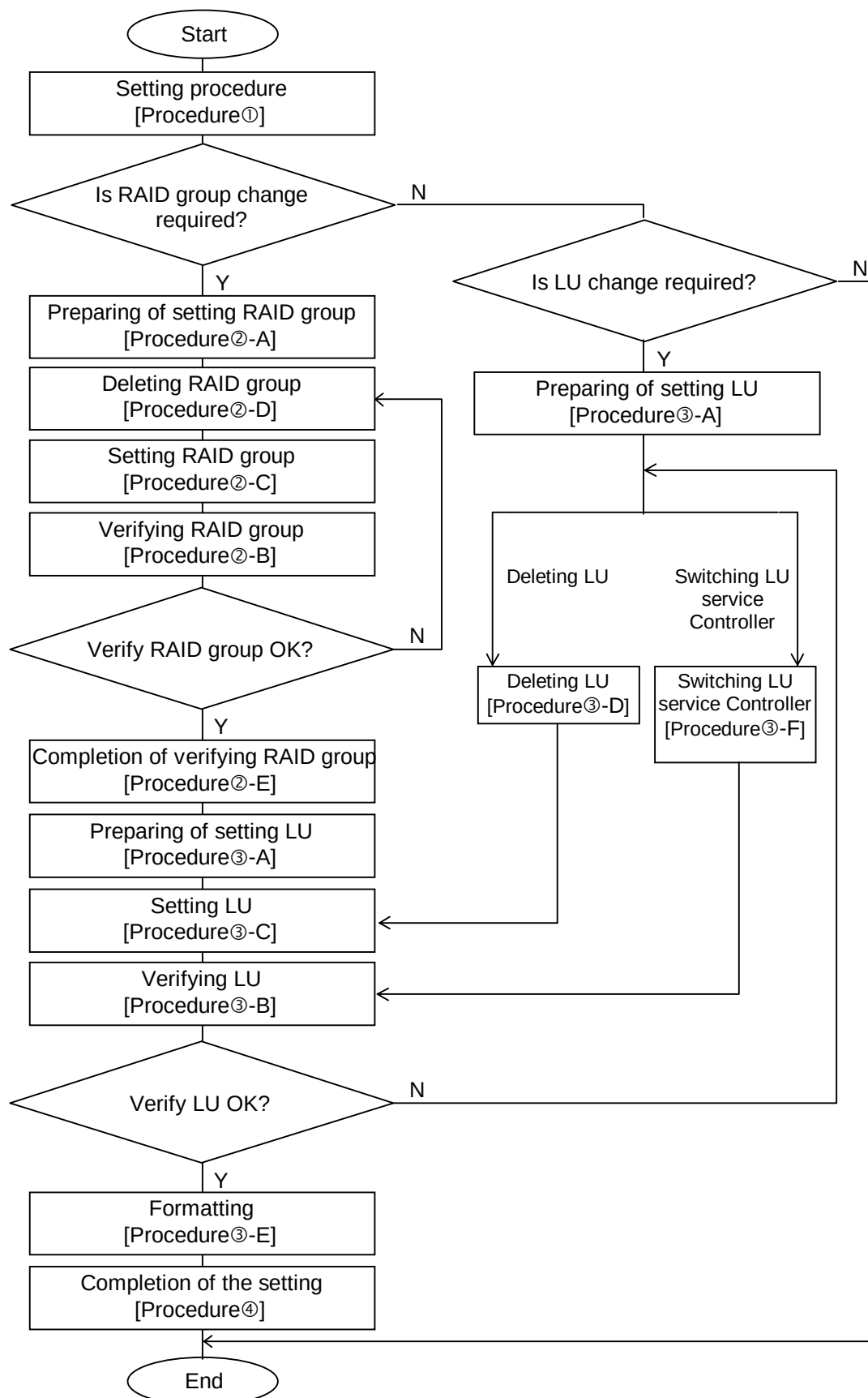
<Note on setting self port ID>

The self port ID which has been set or changed becomes valid after the next powering on. Accordingly, when the self port ID is changed, be sure to power off the subsystem once, then start it up again.

4.3 Setting the Subsystem Configuration Information

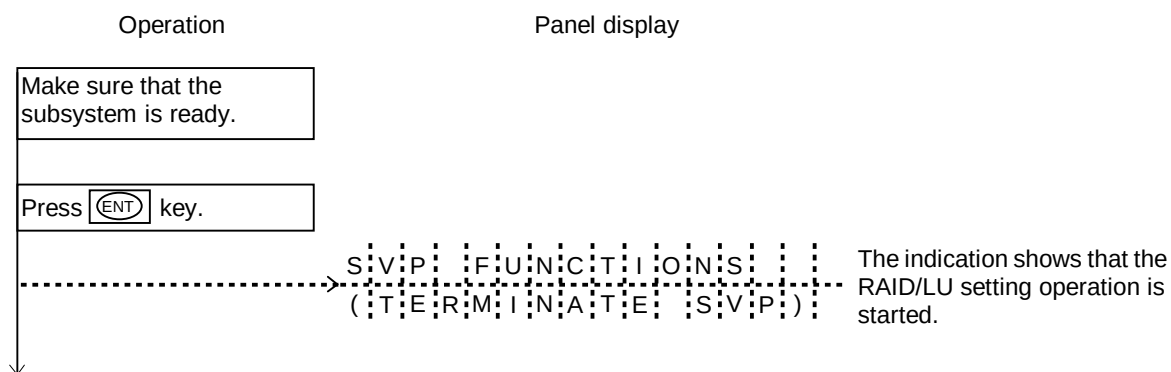
This function can be used when the subsystem is ready.

(During this operation, READ/WRITE command issued from the host cannot be executed. When the host command is received, Not Ready is reported to the host.)



4.3.1 Preparing of setting RAID/LU

[Procedure①]



When changing RAID group, go to procedure ②-A "Preparing of setting RAID group".
 When changing no RAID group but LU, go to procedure ③-A "Preparing of setting LU".
 When changing no RAID group and LU, go to quit.

4.3.2 Setting the RAID group

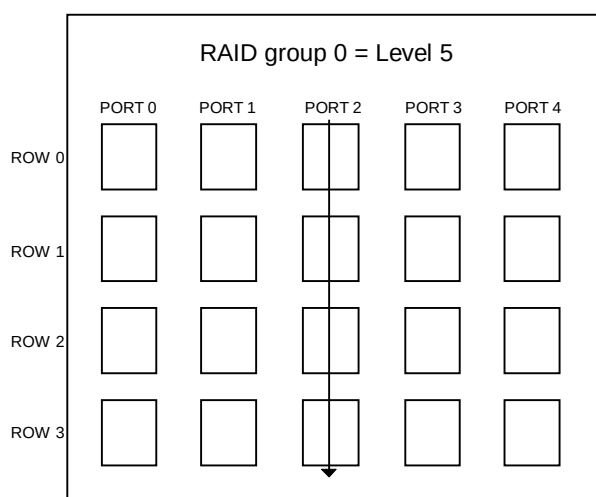
This function is used for setting, deleting and referring the RAID group. This function can be used when the subsystem is ready.

(Setting the DIP switch and turning off/on the subsystem are not required. Read/Write operation from the host can not be executed during this function. When the host command is received, Not Ready is reported to the host.)

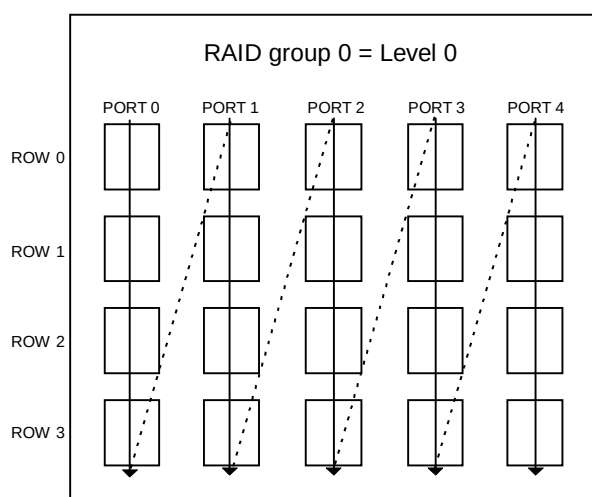
Notice : By deleting the RAID group all user data of the deleted RAID group is lost. Back up user data before deleting the RAID group.

RAID group and RAID level can be set as shown below by using this setting function.

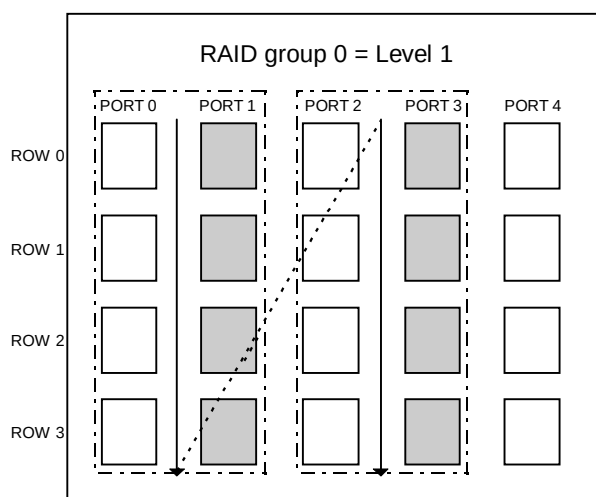
Setting one RAID group with the entire subsystem. (Arrows “↓” indicate the direction of storing data.)



The function stores data in the way executing the data striping over four disks and generating parity data on one disk.

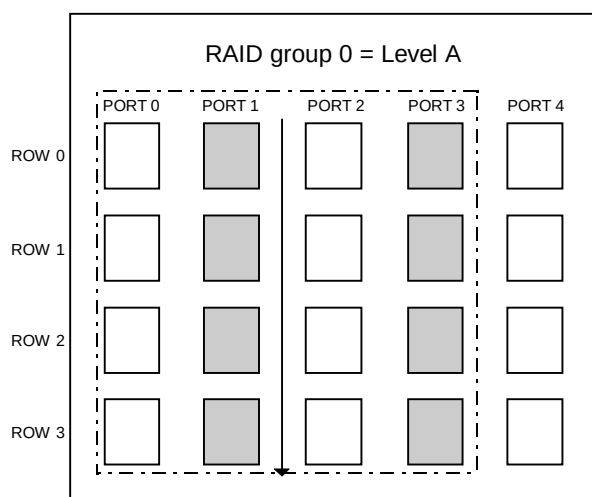


The function stores data without executing neither the data striping nor parity data generation.



The function stores data in the way doubly writing it on the main disk and sub-disk without executing the data striping.

□ : indicates a main disk
 ■ : indicates a sub-disk

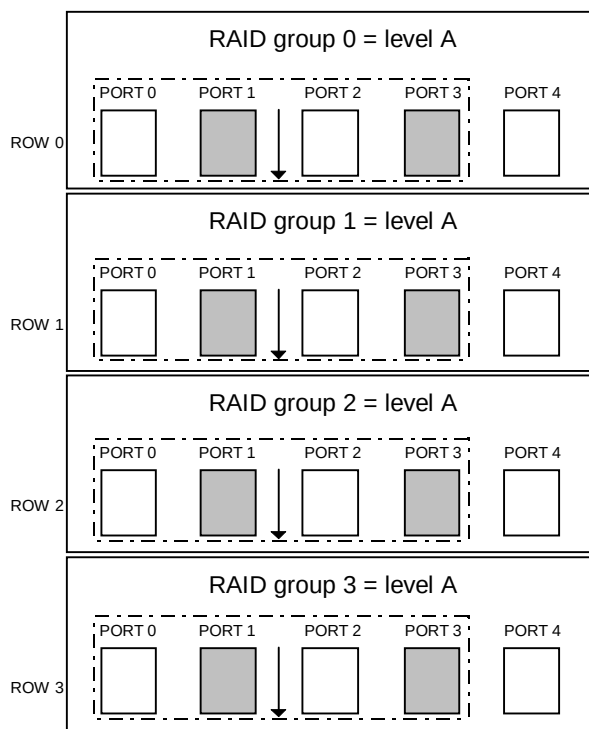
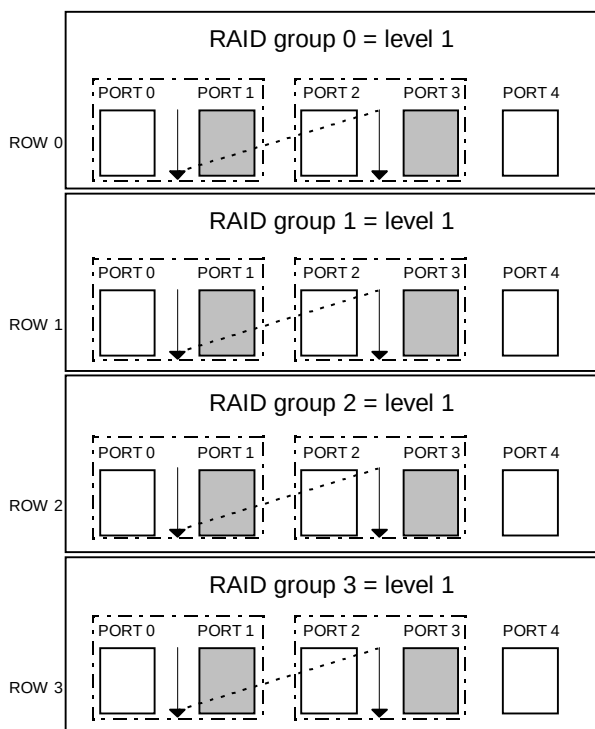
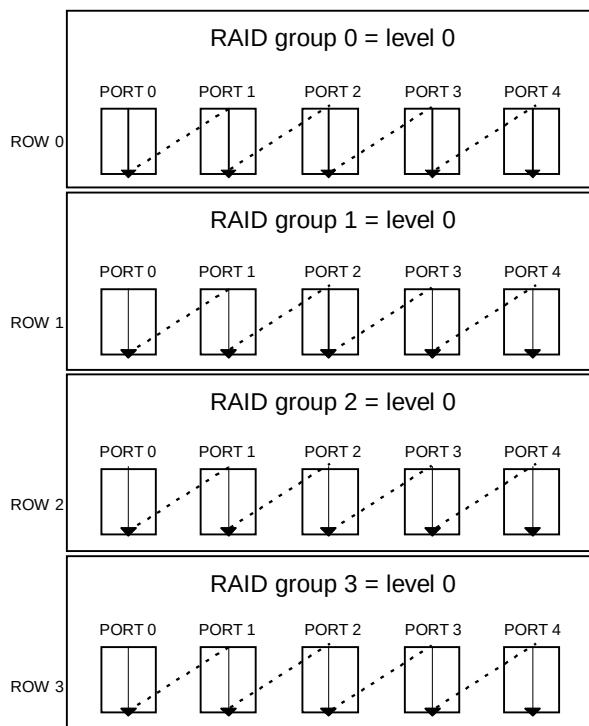
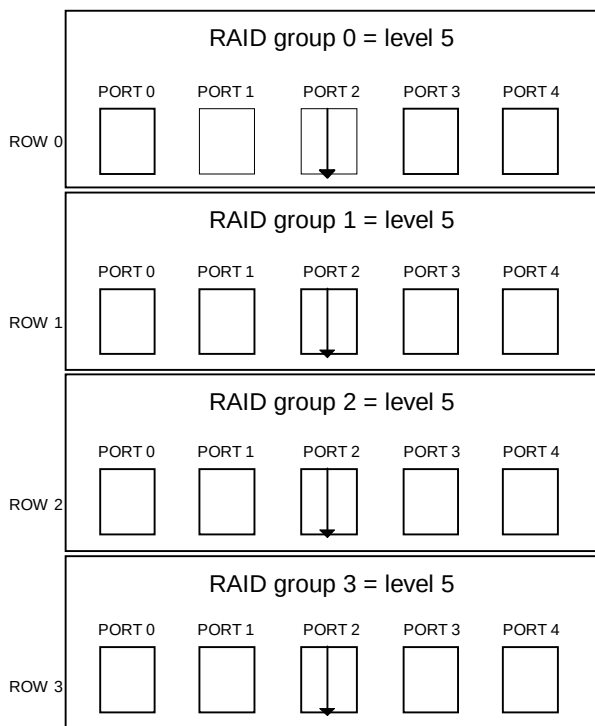


The function stores data in the way doubly writing it on the main disk and sub-disk and executing the data striping over two disks of port 0 and port 2.

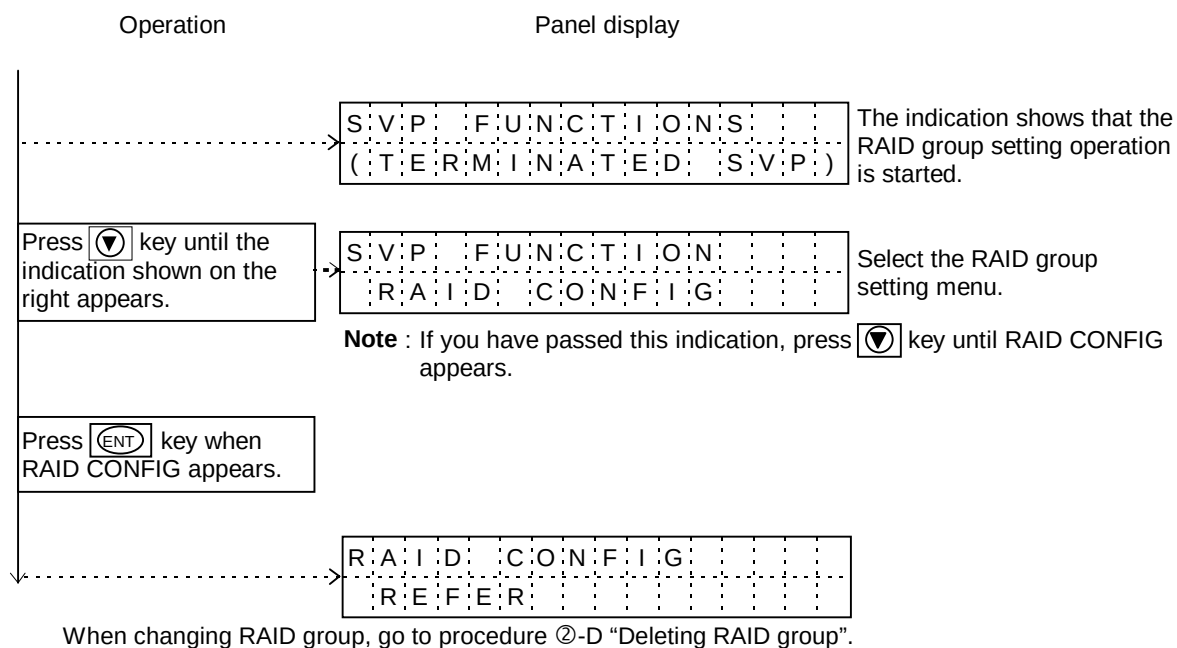
□ : indicates a main disk
 ■ : indicates a sub-disk

Setting one RAID group with each row of disks (Arrows “↓” indicates the direction of storing data.)

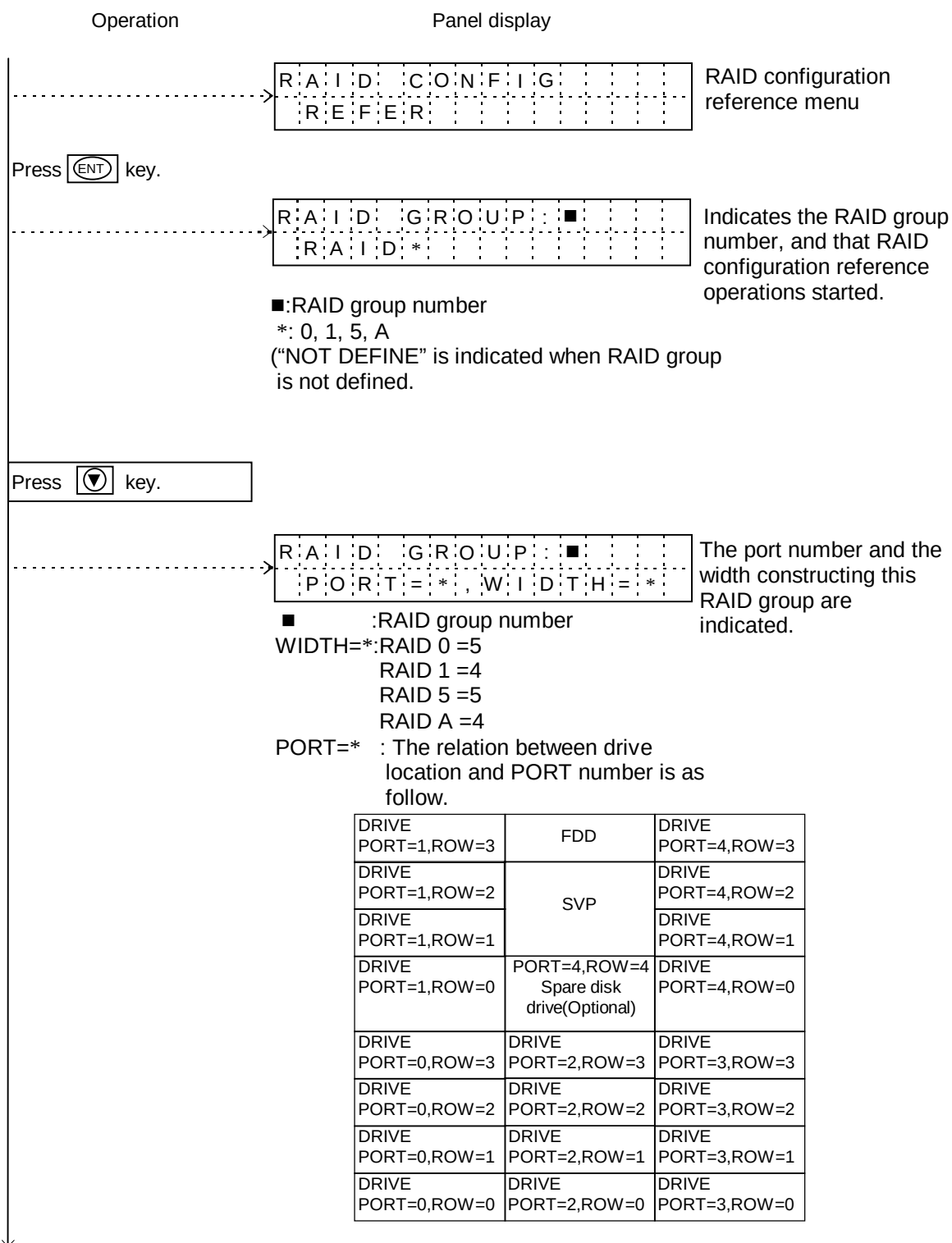
Data cannot be stored extending over two or more RAID groups even if RAID levels of them are the same. The following are examples having set RAID groups of the same RAID level, however, each row has its own RAID level.

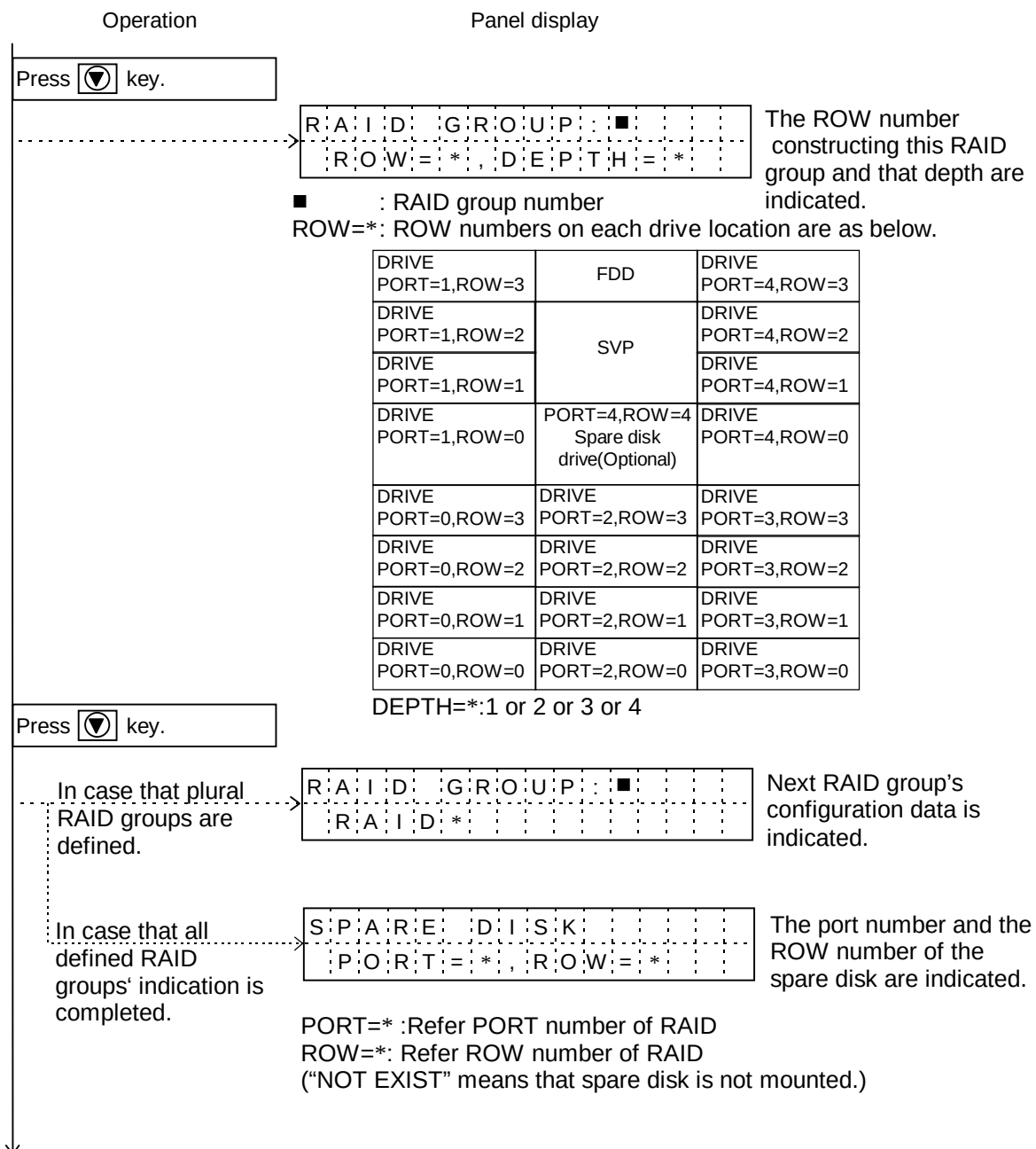


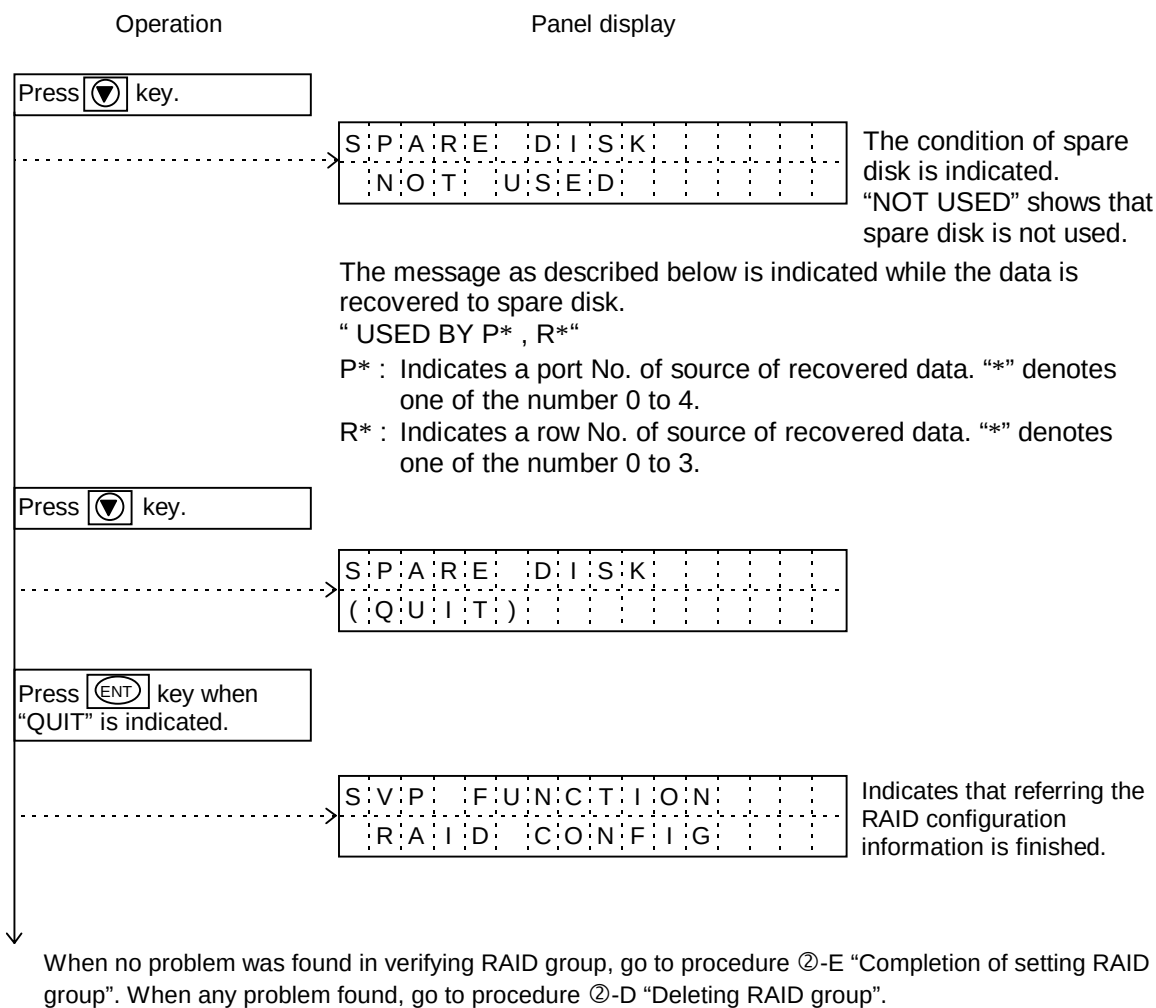
[Procedure②-A] Preparing of setting RAID group



[Procedure②-B] Verifying RAID group



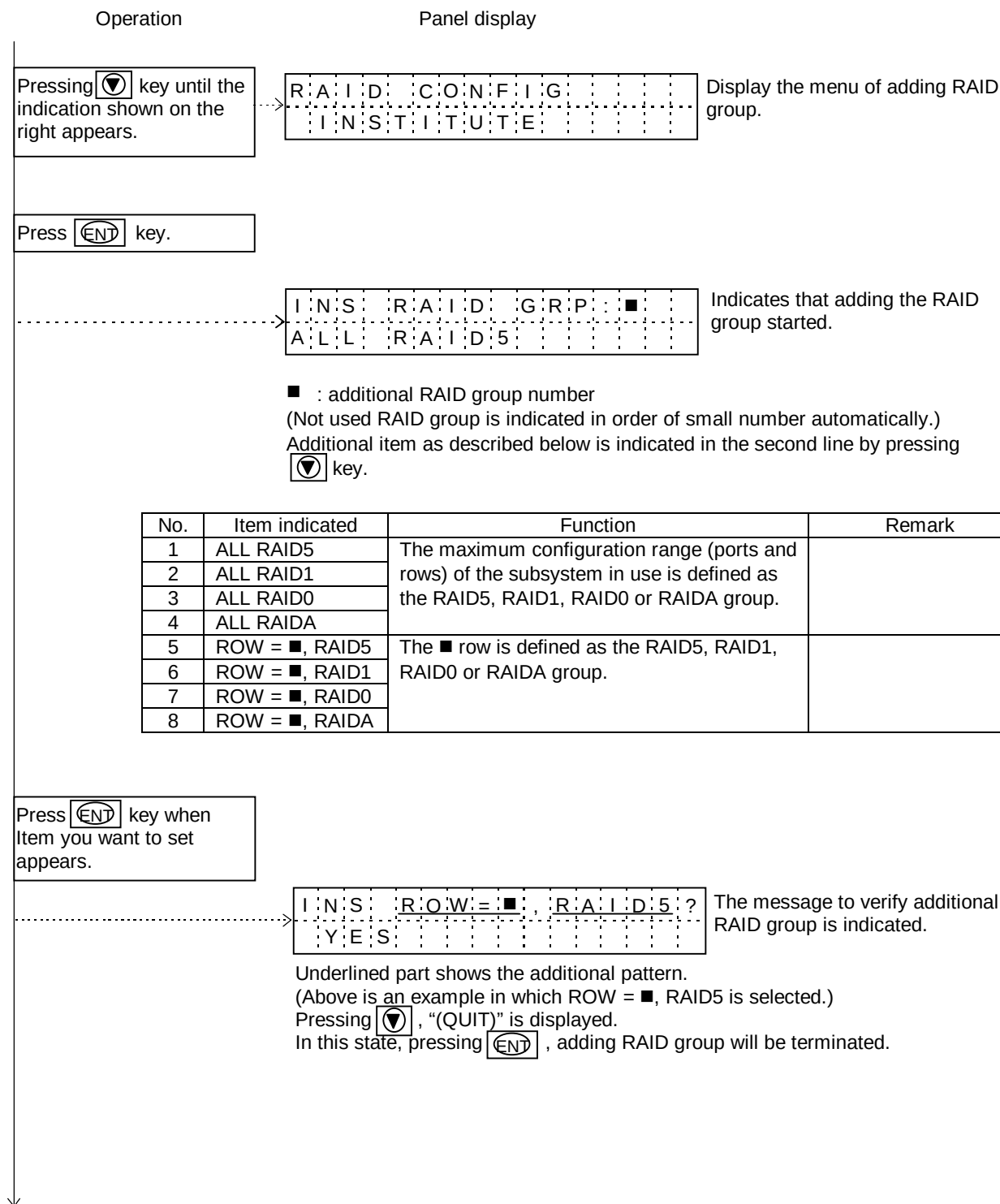


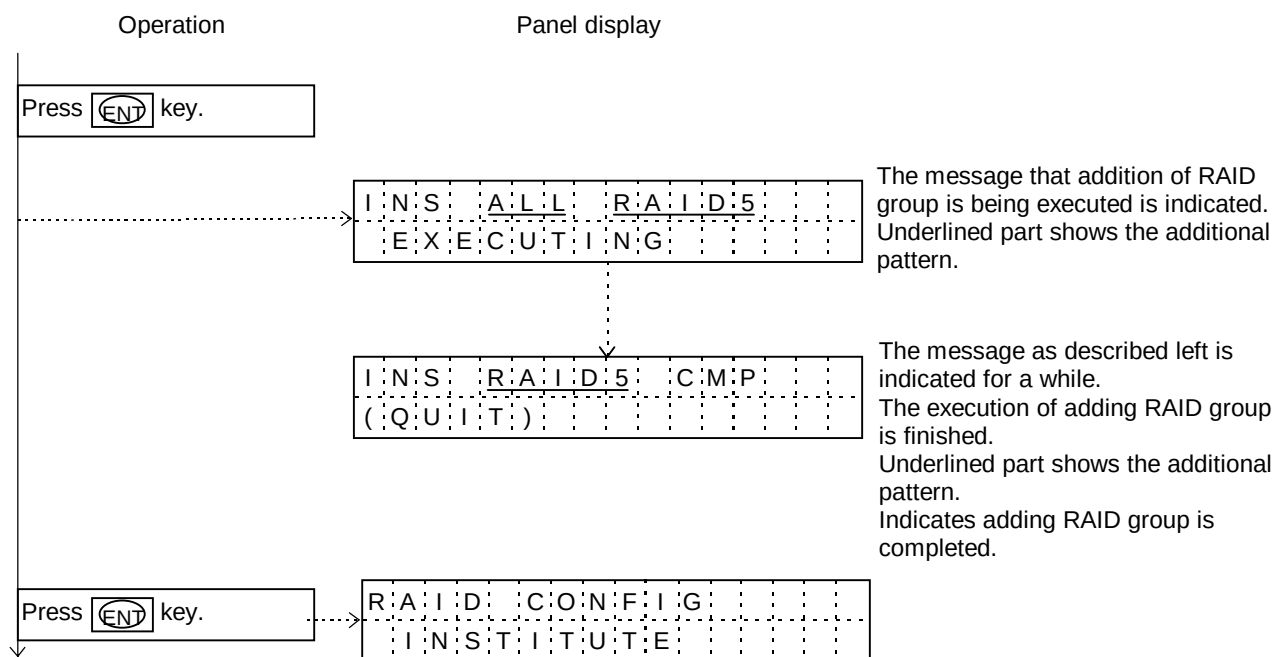


Rack Mount (RKWH) Type

DRIVE PORT=1, ROW=3	FDD ASSY	DRIVE PORT=4, ROW=3
DRIVE PORT=1, ROW=2	SVP ASSY	DRIVE PORT=4, ROW=2
DRIVE PORT=1, ROW=1		DRIVE PORT=4, ROW=1
DRIVE PORT=1, ROW=0	PORT=4, ROW=4 Spare disk drive (Optional)	DRIVE PORT=4, ROW=0
DRIVE PORT=0, ROW=3	DRIVE PORT=2, ROW=3	DRIVE PORT=3, ROW=3
DRIVE PORT=0, ROW=2	DRIVE PORT=2, ROW=2	DRIVE PORT=3, ROW=2
DRIVE PORT=0, ROW=1	DRIVE PORT=2, ROW=1	DRIVE PORT=3, ROW=1
DRIVE PORT=0, ROW=0	DRIVE PORT=2, ROW=0	DRIVE PORT=3, ROW=0

[Procedure②-C] Setting RAID group





Go to procedure ②-B "Verifying RAID group"

Note : Set RAID group for each ROW when you want to set it for each ROW.

[Procedure②-D] Deleting RAID group

Notice : With this operation, Logical Units are deleted, and the user's data will be lost. Be sure to make back up copy before this operation.

Operation

Panel display

Press  key until the indication shown on the right appears.

RAID CONFIG
DELETE

Menu of deleting RAID group is displayed.

Press  key.

DELETE
ALL RAID

Contents of the second-line indication

No.	Item indicated	Function
1	ALL RAID	Deletes all RAID group.
2	RG■ (RAID*)	Deletes appointed RAID group. (■ : RAID group No. * : RAID level)
3	(QUIT)	Returns to the preceding menu.
4	(TERMINATE SVP)	Complete the SVP operation by maintenance panel.

Select item as described right you want to set by  /  key and press  key .

Note : "NO EFFECT" is indicated when no deletable RAID group exists.

Go to ① when you want to delete all RAID groups , Go to ② when you want to delete appointed RAID group.

①Deleting all RAID groups

Operation

Panel display

Select item as described right you want to set by  /  key and press  key .

DEL ALL RAID?
(QUIT)

The message to verify the deletion of RAID group is displayed.

Contents of the second-line indication

No.	Item indicated	Function
1	(QUIT)	Returns to the preceding menu.
2	YES	Deletes all RAID groups.

DEL ALL RAID
EXECUTING

All RAID groups are deleting.

DEL RAID CMP
(QUIT)

When the deletion is completed, the left indication appears.
The execution of deleting RAID group is finished.

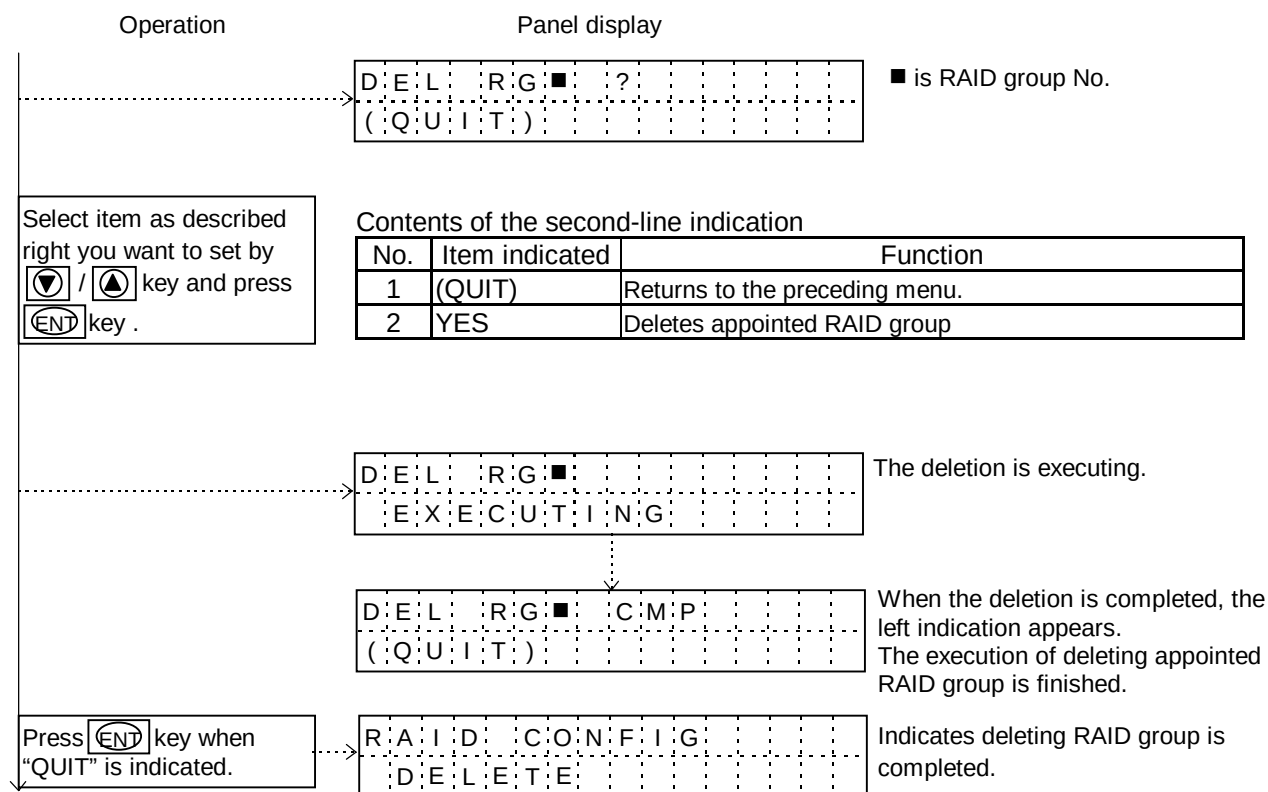
Select "QUIT" by  key and press  key.

RAID CONFIG
DELETE

Indicates deleting RAID group is completed.

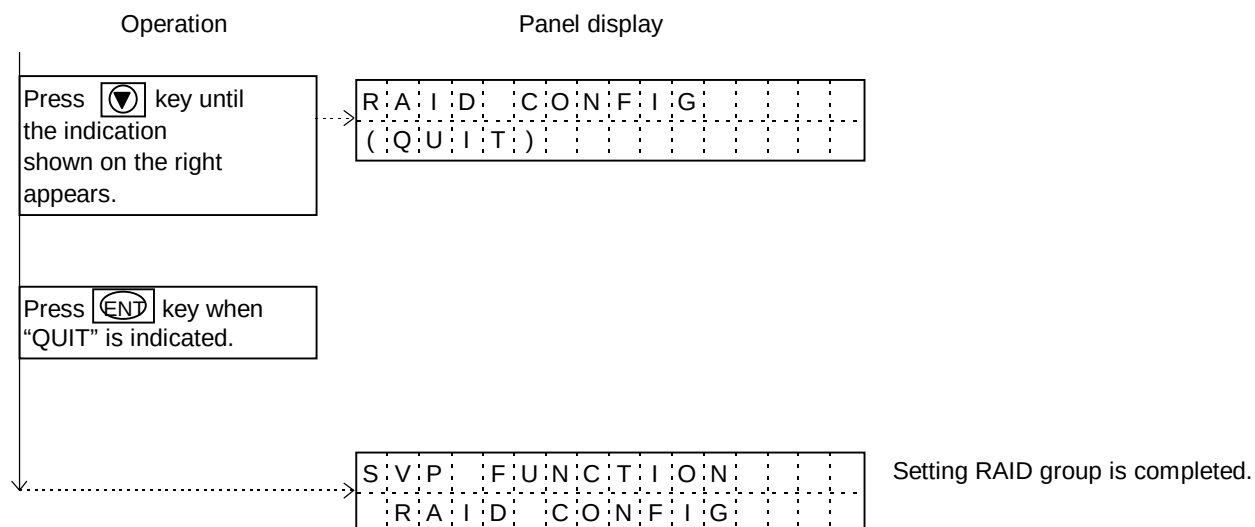
Go to procedure ②-C "Setting RAID group".

②Deleting appointed RAID group



Go to procedure ②-C "Setting RAID group".

[Procedure②-E] Completion of setting RAID group



4.3.3 Setting LU

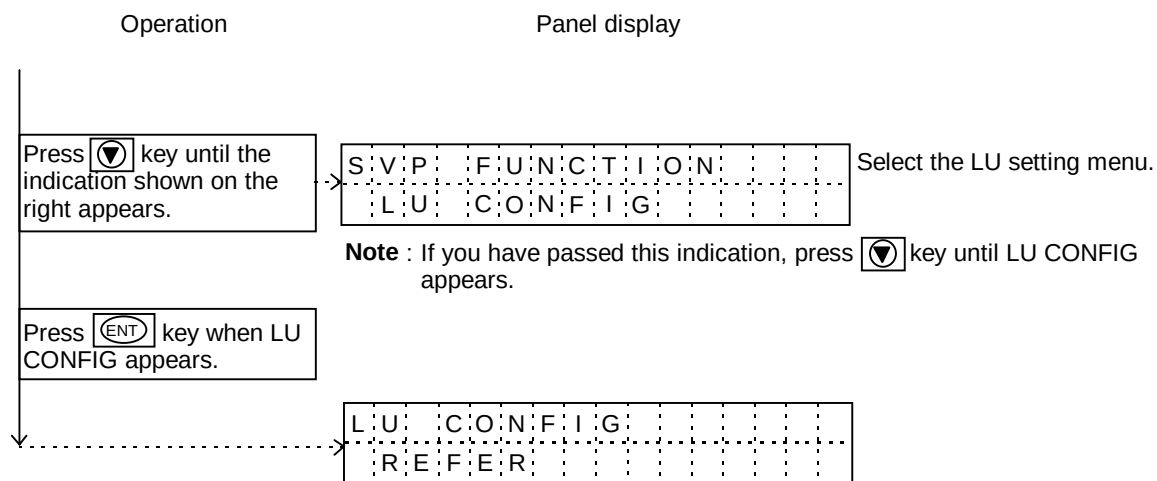
Following procedures are used to set, delete, refer, or format the LU.

This function can be used when the subsystem is ready.

Notice : All user data is lost by deleting the LU.

Be sure to back-up the user data before deleting the LU.

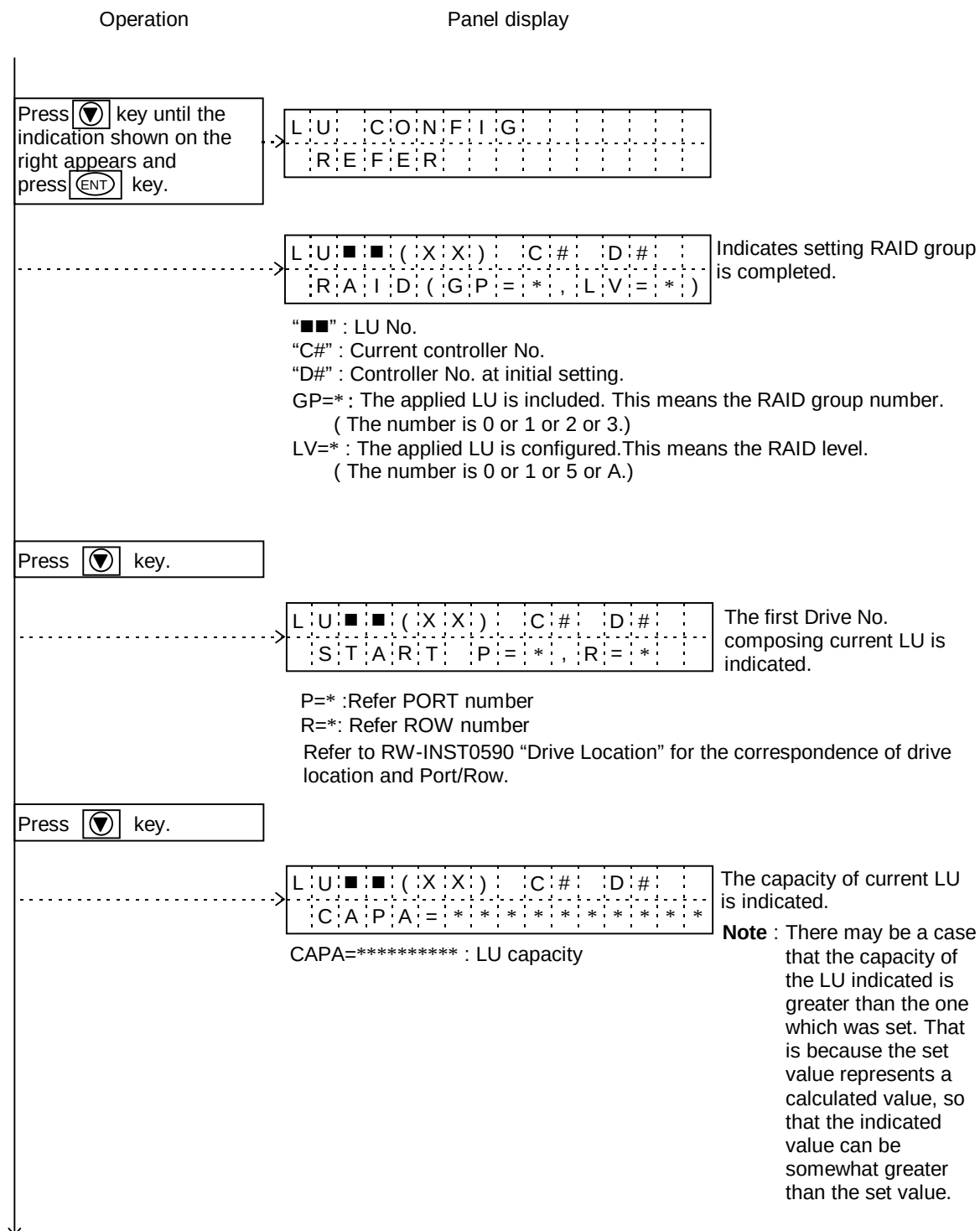
[Procedure③-A] Preparing of setting LU

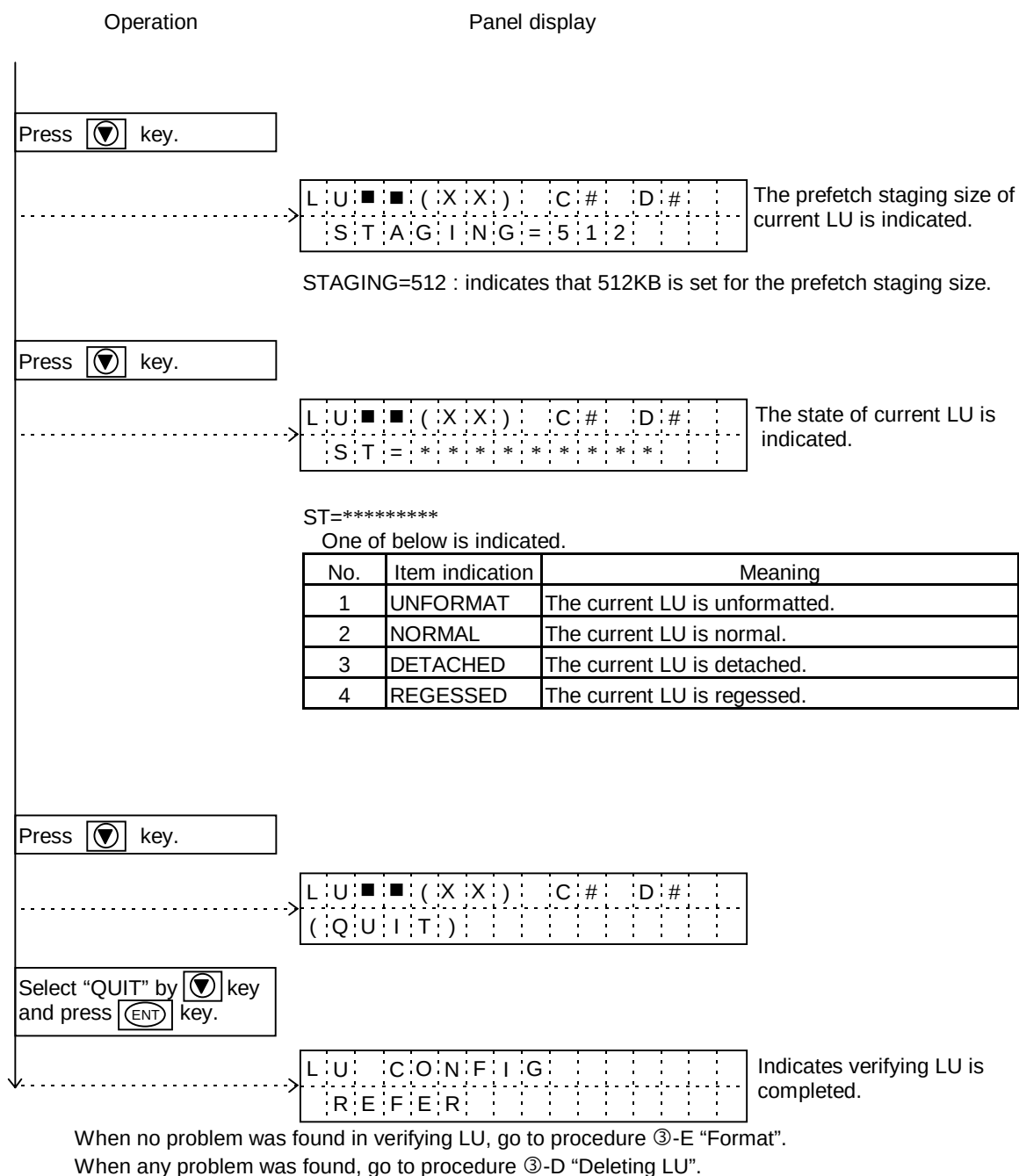


When RAID group is already set, go to procedure ③-C "Setting LU".

When changing no RAID group, go to procedure ③-D "Deleting LU".

[Procedure③-B] Verifying LU





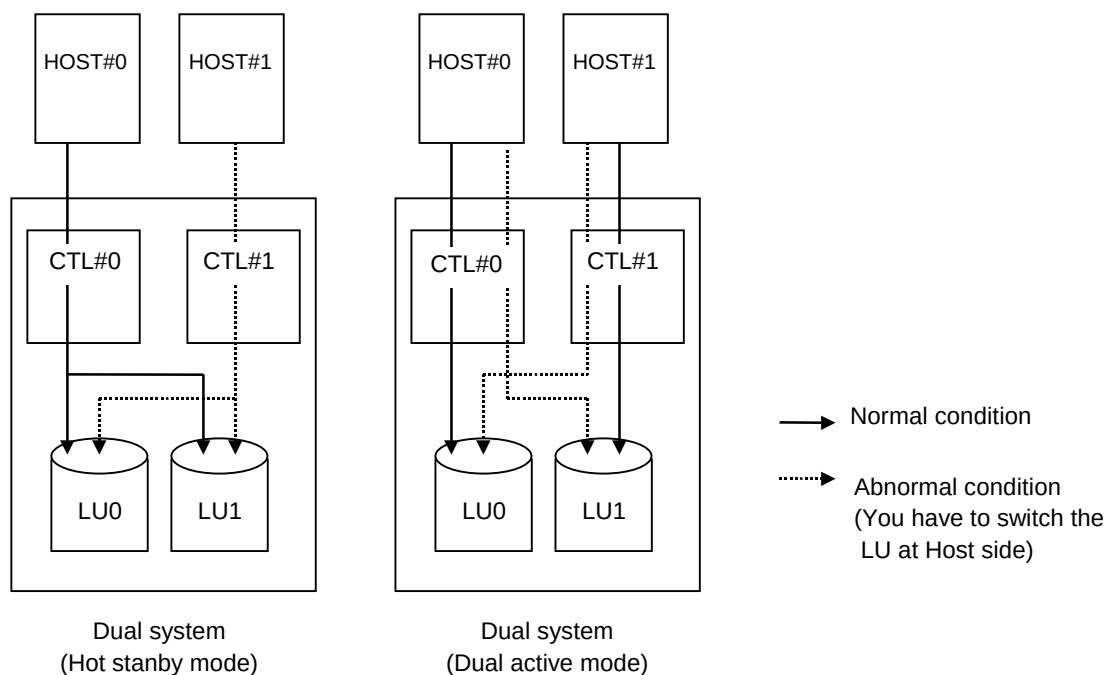
[Procedure③-C] Setting LU

Note) You have to assign service controller to set the LU when dual active mode is selected in the dual system.

Refer to the figure as described below to set the LU assigned service controller.

In the case of example as described above, select “INSTITUTE (CTL0)” when you set LU0 and “INSTITUTE (CTL1)” when set LU1.

In case a service controller is assigned to LU#0 and #1, it is possible to access from HOST#0 and #1, however the data transmitting performance is lowered because of switching LU.

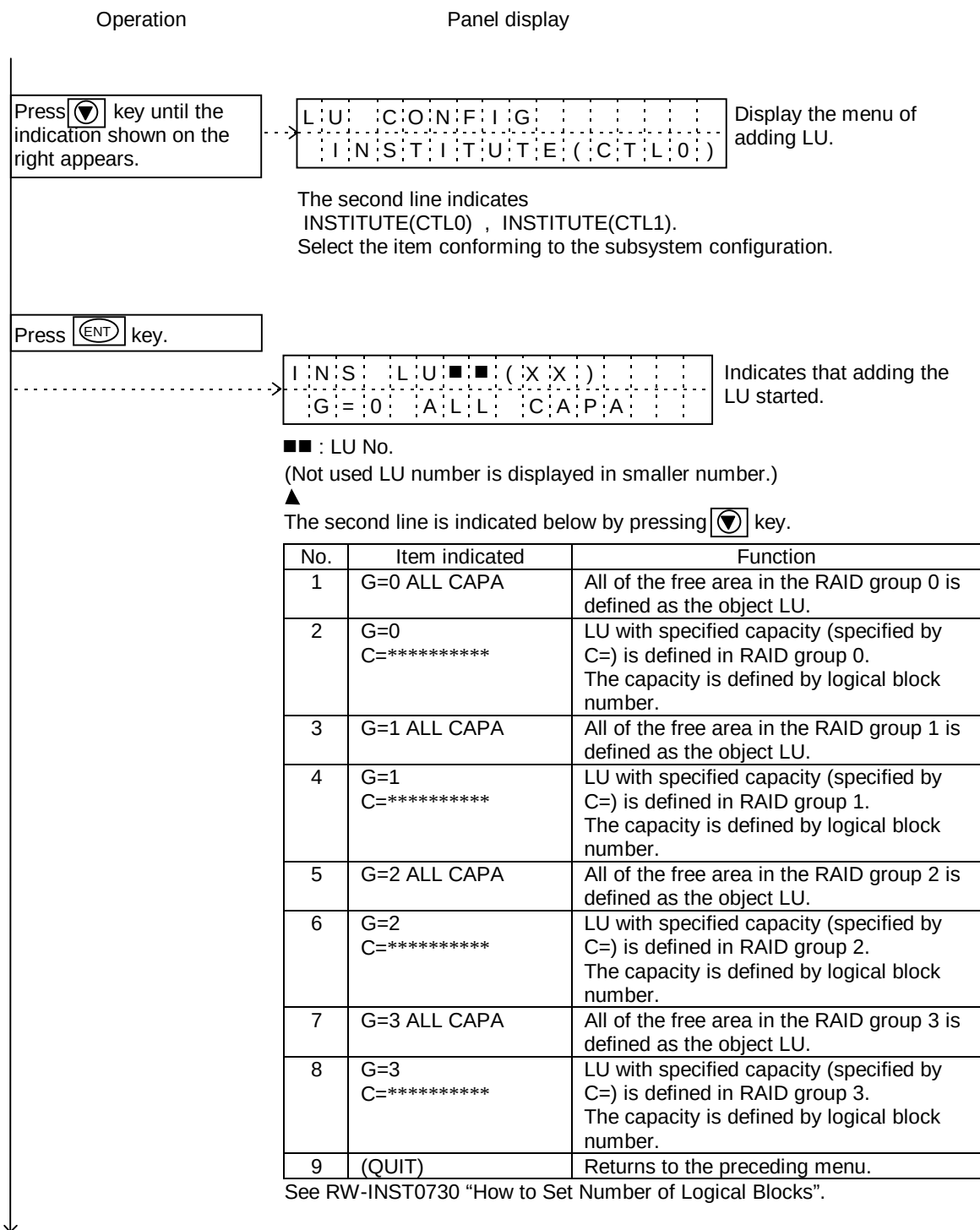


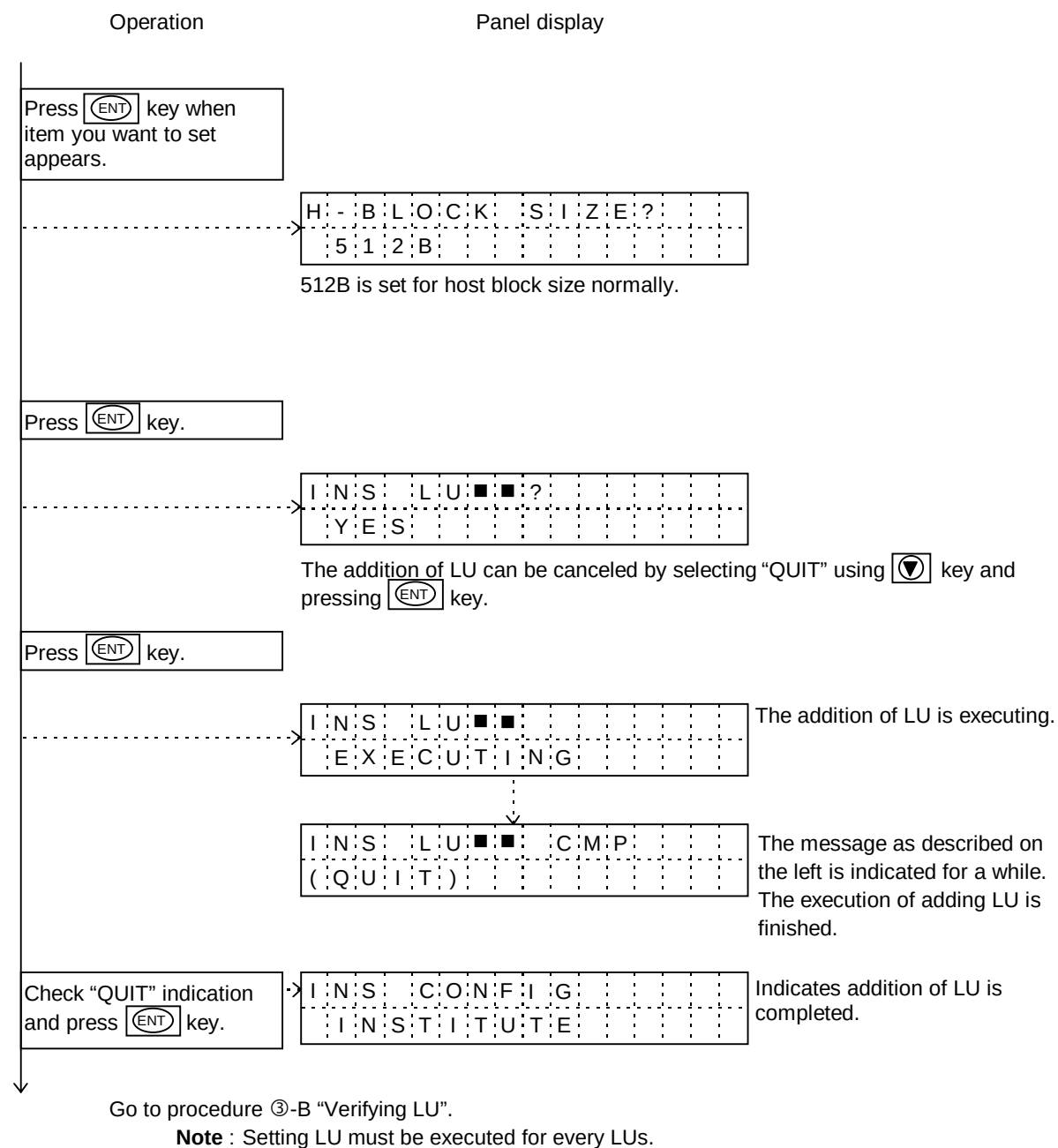
* The function of “Hot standby mode”.

It is possible that the system is continued to execute commands by switching the direction of the commands from Host system to the other controller, if the Host system or the controller failure occurs.

* The function of “Dual active mode”

Controller #0 and #1 are the service controller of LU#0 and #1 respectively.





Supplement / How to Set Number of Logical Blocks

G=*

C=*****



Enter a value (number of logical blocks) here.

- (1) All RAID groups can be divided into up to 8 logical units.
- (2) Set the number of logical blocks to be set for each logical unit to multiples of the following values according to the RAID level.

RAID0	128
RAID1	128
RAIDA	256
RAID5(4D+1P)	512

- (3) When dividing each RAID group into multiple logical units, the total number of blocks in each logical units must be set to the number of logical blocks per row as shown below or less.
- (4) The following lists the number of logical blocks per row.

① When five drives are mounted on a row (four drives for RAID1 and RAIDA);

RAID configuration \ Model (Capacity)	DF-F350-A2E2 (2.0GB)	DF-F350-A2E4 DF-F350-A3E4 (4.1GB)	DF-F350-A1E8 DF-F350-A2E8 (8.7GB)	DF-F350-A1E18 (17.8GB)
RAID0	20,200,960	40,652,160	85,085,440	174,681,600
RAID1/RAIDA	8,080,384	16,260,864	34,034,176	69,872,640
RAID5(4D+1P)	16,160,768	32,521,728	68,068,352	139,745,280

② When n drives are mounted on a row (n < 5);

- RAID0

Number of logical blocks = $m^{(*1)} \times n^{(*2)}$

- RAID1

Number of logical blocks = $m^{(*1)} \times \text{int}(n/2)^{(*3)}$

*1: Refer to the table below for m.

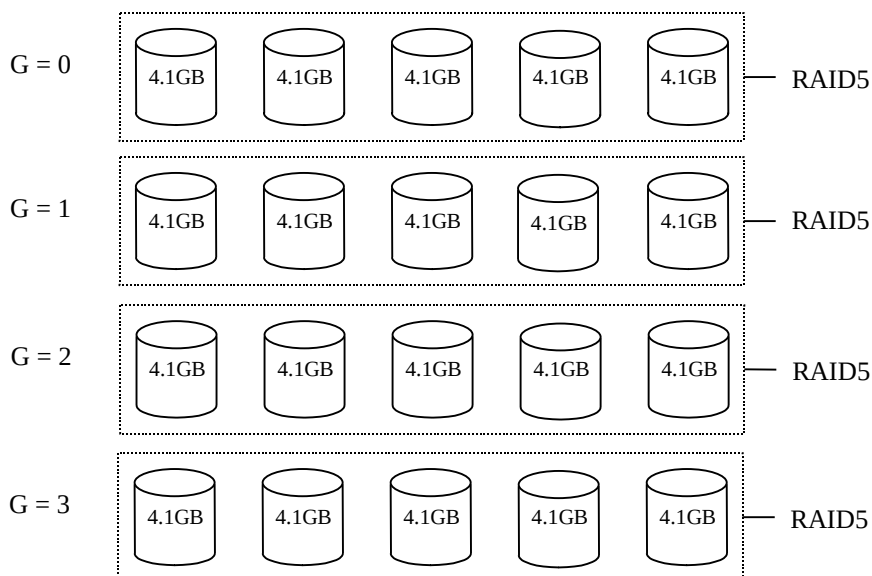
*2: n is 2 or larger in this case.

*3: int means "rounding down".

	DF-F350-A2E2	DF-F350-A2E4 DF-F350-A3E4	DF-F350-A1E8 DF-F350-A2E8	DF-F350-A1E18
Capacity	(2.0GB)	(4.1GB)	(8.7GB)	(17.8GB)
m	4,040,192	8,130,432	17,017,088	34,936,320

(5) Examples of the number of logical blocks set are shown below.

Example ① An example of a logical unit of disk (4.1GB 20units) is devied into 8LUs.



Groups 0 to 3 are all defined as RAID5 and all the groups are divided into eight logical units each with almost the same capacity. Each group is thus divided into two logical units.

- Group 0

Since the number of logical blocks for RAID5 is taken as 32,521,728 ($512 \times 63,519$) from subsection ① of (4), the result becomes $63,519 \div 2 \doteq 31,760$.

Thus, enter the following.

LU0: G=0

C=16,261,120 ($512 \times 31,760$)

LU1: C=16,260,608 ($512 \times (63,519 - 31,760)$)

- Groups 1 - 3

Enter LU2 to LU7 in the same way as for Group 0.

LU2 : G=1

C=16,261,120

LU3 : C=16,260,608

LU4 : G=2

C=16,261,120

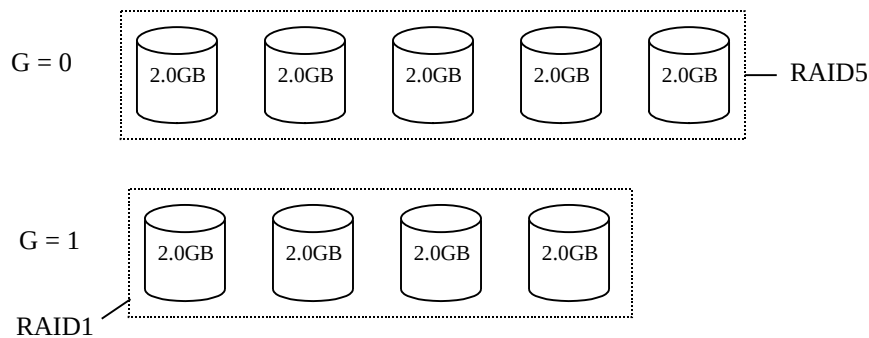
LU5 : C=16,260,608

LU6 : G=3

C=16,261,120

LU7 : C=16,260,608

Example ② An example of a logical unit of disk (2.0GB 9units) is devied into 5LUs.



The following shows an example in which a mixture of different RAID levels is used between Group 0 and 1, and each group is divided into logical units with a capacity different from each other.

- Group 0

Since the number of logical blocks for RAID5 is taken as 16,160,768 ($512 \times 31,564$) from subsection ① of (4), Group 0 is divided into three LUs as shown below.

Enter the following.

LU0 : G=0

C=800,768($512 \times 1,564$)

LU1 : C=5,120,000($512 \times 10,000$)

LU2 : C=10,240,000($512 \times (31,564-1,564-10,000)$)

- Group 1

Since the number of logical blocks for RAID1 is calculated as $4,040,192 \times \text{int}(4/2) = 8,080,384$ ($128 \times 63,128$) from subsection ② of (4), Group 1 can be divided into two LUs as shown below.

Enter the following.

LU3 : G=1

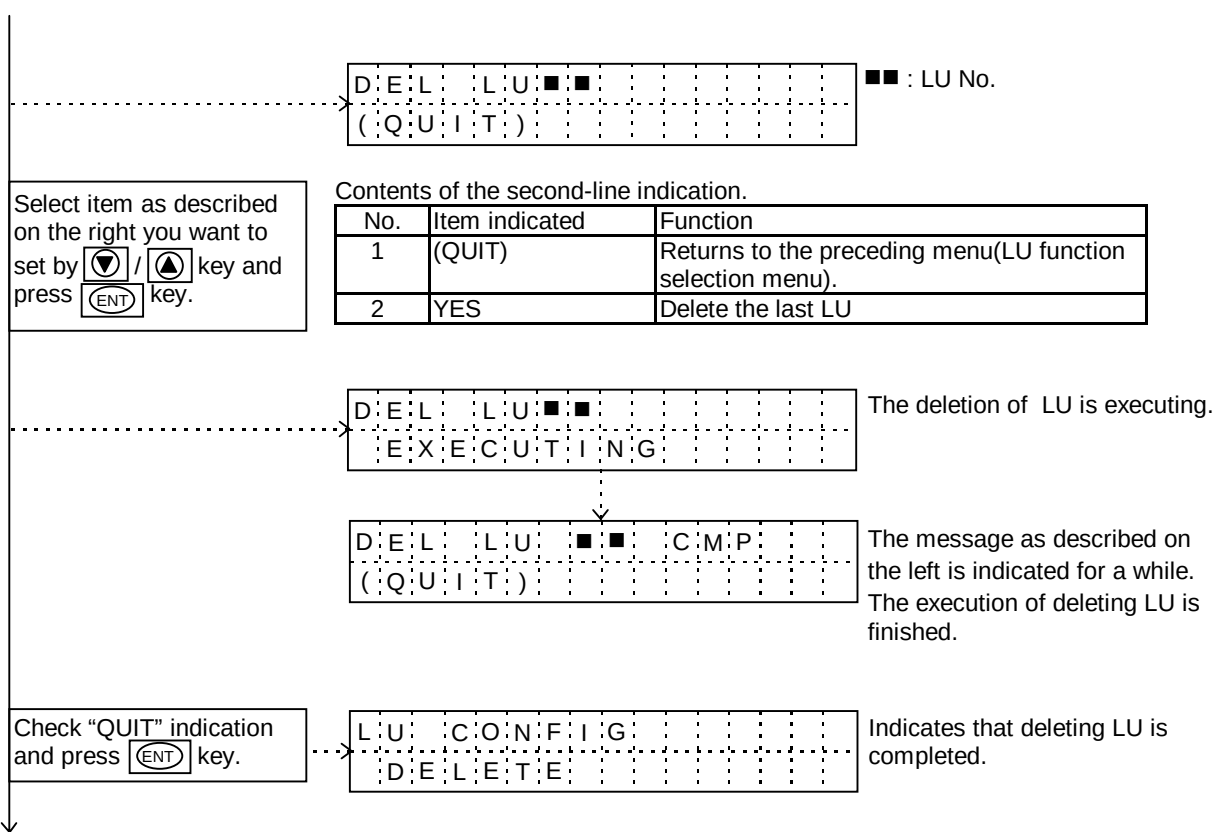
C=2,960,384($128 \times 23,128$)

LU4 : C=5,120,000($128 \times (63,128-23,128)$)

②Deleting the last LU

Operation

Panel display

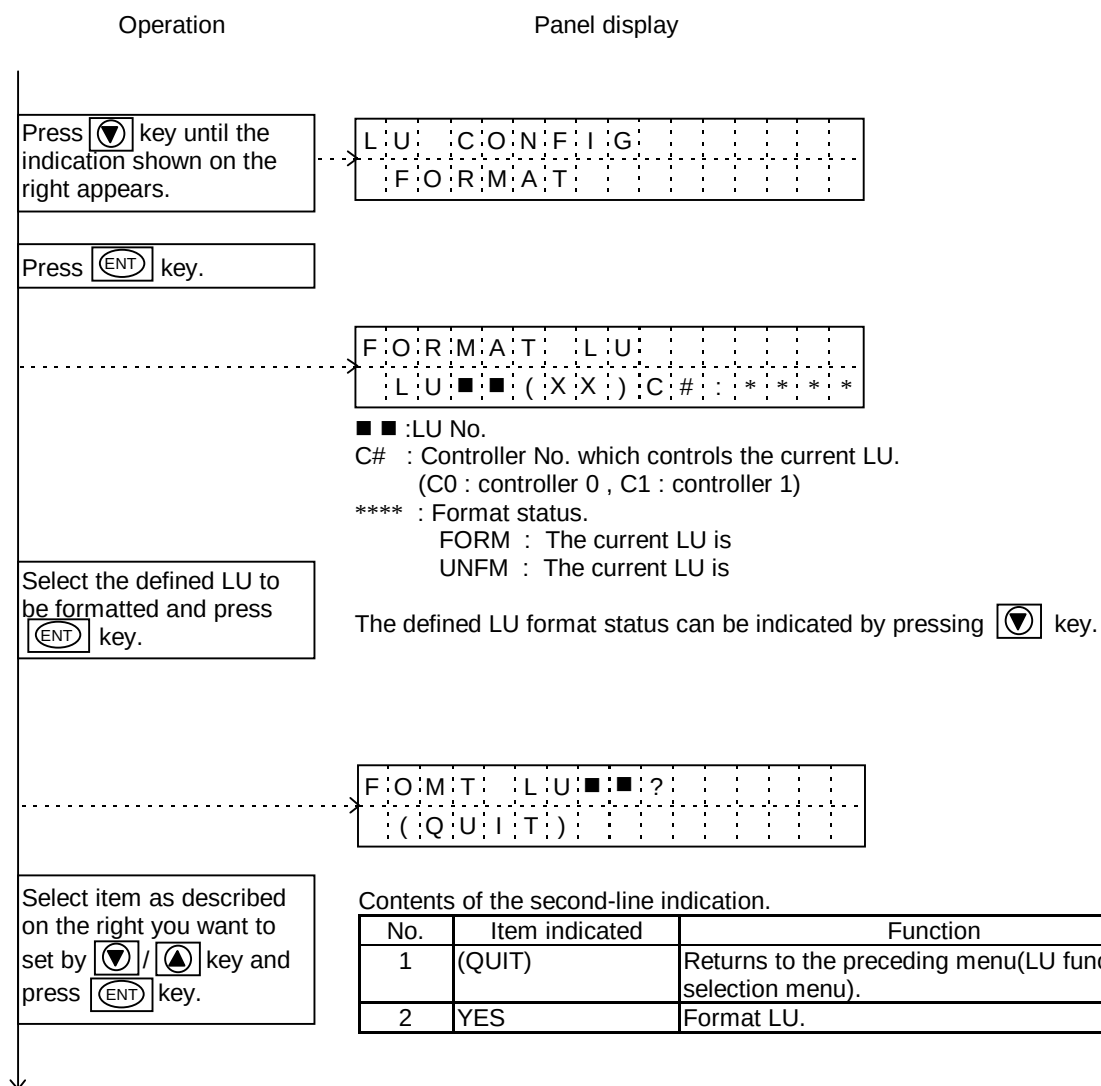


Go to procedure ③-C "Setting LU".

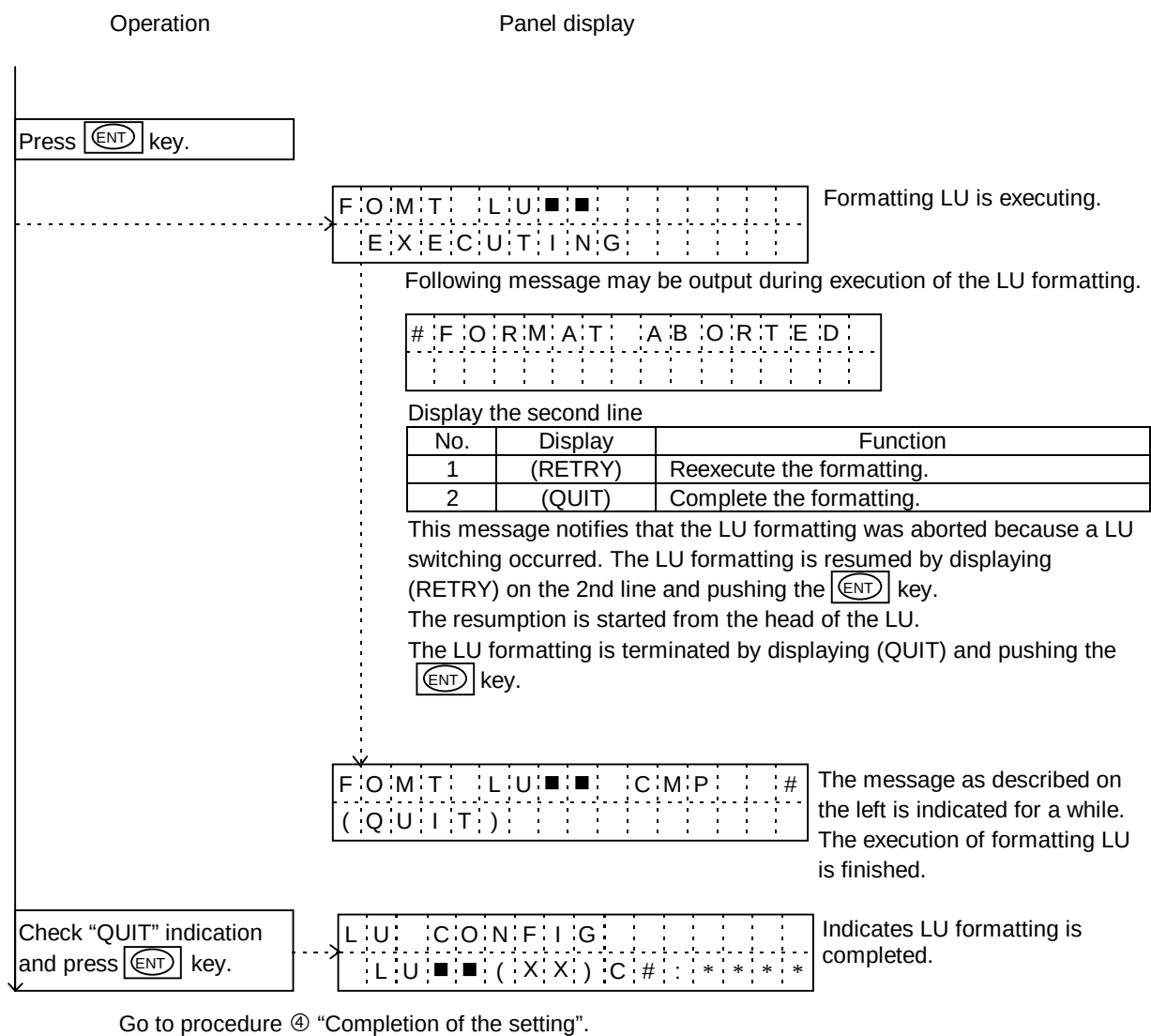
[Procedure③-E] Formatting

Notice : Note that user data will be lost by formatting the formatted LU.

Besides, be sure to execute the LU formatting for each set LU. When the microprogram of version 0354 or later is used, read/write access from the upper device is possible to the LUs other than that being formatted. Accordingly, the formatting for the LU newly added can be executed while executing usual jobs after the addition of the row(s) following the procedures explained on pages RW-OPTION0240 - 0330.

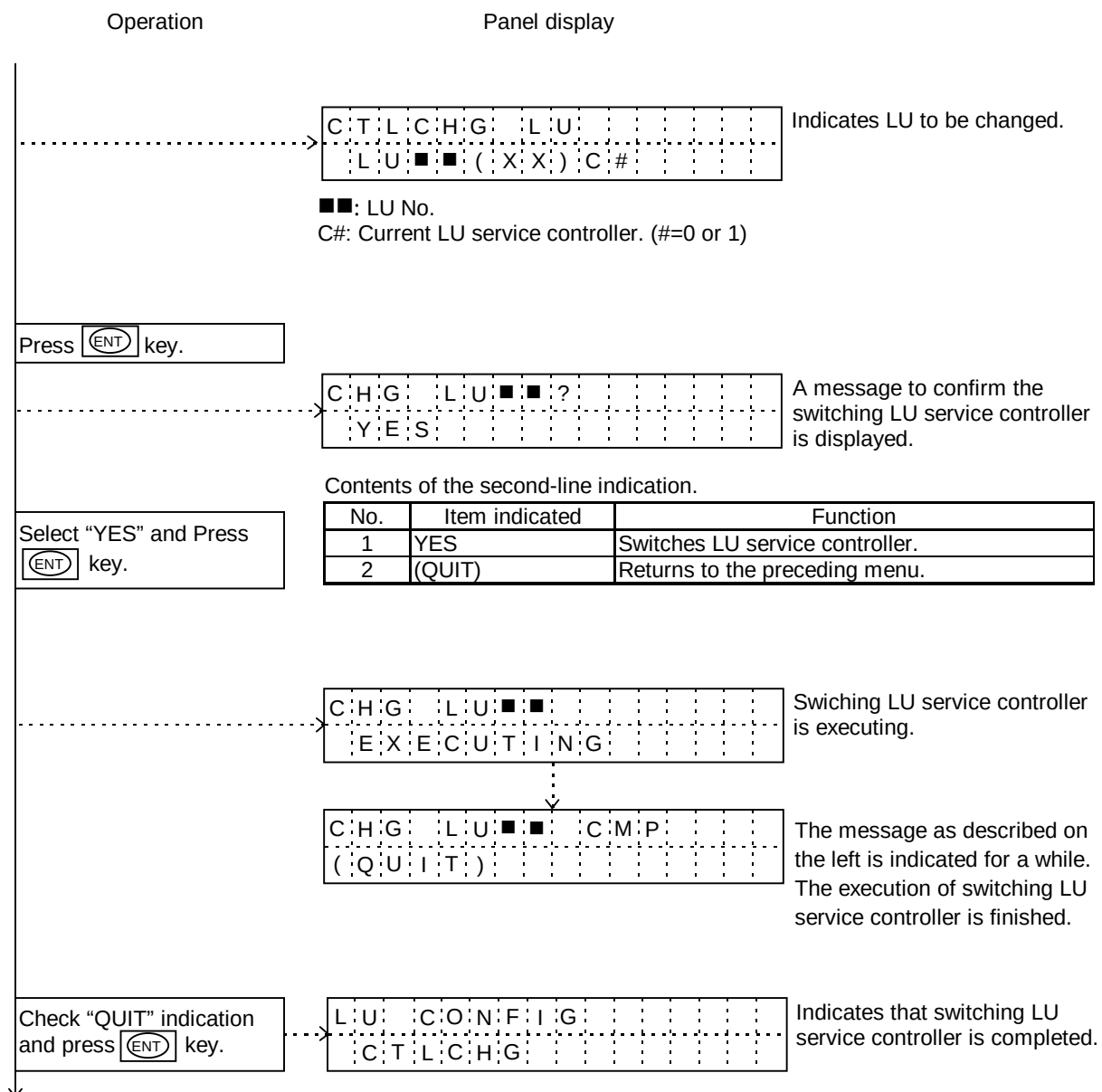


Note : LU format must be executed every set LUs.



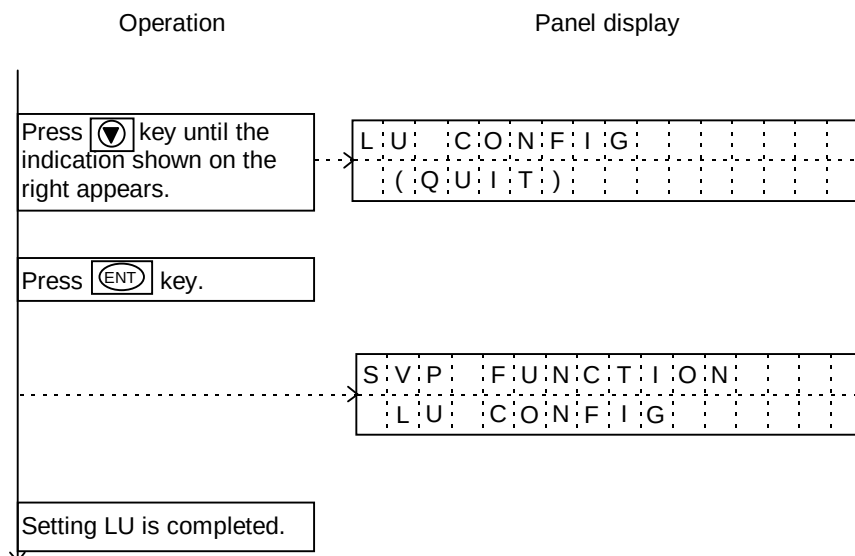
[Procedure③-F] Switching LU service Controller

Note : This function can be used when dual active mode in the dual system is set.



Note : Turn on the power of the subsystem again to make valid switching LU service controller.

[Procedure④] Completion of the setting



LU setting for dual controller configuration

In the case of dual controller configuration(Dual active mode), each LU has to be allocated to a controller which controls that LU in the LU setting operation.

But in the case of dual controller configuration(Hot standby mode), all LU are automatically allocated to the controller #0. (When one of the controllers is blocked, all LU are automatically allocated to the other controller.)

4.3.4 Setting other parameter

The menu items and the use are shown below. Refer to PANEL chapter (PANEL0260) to change the parameter shown below. The function shown below can be used when the subsystem is ready and the LU#0 is already defined.

No.	Menu item	Use	Description	Setting before shipment
1	RAID CONFIG	RAID configuration information reference/setting menu	① Reference to RAID configuration information ② Definition of RAID group ③ Deletion of RAID group	
2	LU CONFIG	LU configuration information reference/setting menu	① Reference to LU configuration information ② Definition of LU ③ Deletion of LU ④ Formatting of LU ⑤ Switching LU service controller	
3	SYSTEM OPT (CUR)	System option setting (Only a current value)	① Drive recovery execution mode ② Copyback recovery mode ③ Correction copy recovery mode ④ Setting of the dynamic sparing starting mode. ⑤ Setting of the interval time in the recovery ⑥ Setting of the unit of recovery processing ⑦ Setting of the Online Verify function ⑧ Setting of the idling time	
	SYSTEM OPT (SVD)	System option setting (A saved value and current value)	① Drive recovery execution mode ② Copyback recovery mode ③ Correction copy recovery mode ④ Setting of the dynamic sparing starting mode. ⑤ Setting of the interval time in the recovery ⑥ Setting of the unit of recovery processing ⑦ Setting of the Online Verify function ⑧ Setting of the idling time ⑨ Setting of the job time-out limit ⑩ Setting of the number of detections in the execution of the reselection time-out ⑪ Setting of the TRESPASS mode (*1)	
4	DRIVE MAINTEN	Drive maintenance menu	① Instruction of drive detaching ② Instruction of drive recovery ③ Reference to drive data recovery status ④ Drive self diagnosis ⑤ Parity matching check ⑥ ECC check ⑦ LA check ⑧ Drive format ⑨ Recovery of system information ⑩ Reference of the disk failure statistical information.	

*1 : This menu is displayed only when ALTERNATE PATH3 has been set by SPECIAL CONNECT of the system parameter.

No.	Menu item	Use	Description	Setting before shipment
5	MICRO VER/REV	Microprogram version/revision numbers reference menu	① Reference to microprogram version/revision	
6	GATHERING (CTL0)	Gathers information of the controller #0 in FD in case of dual system configuration	① Output of dump information being stored in the drive to floppy disk ② Output of trace information being stored in the drive to floppy disk ③ Output of trace information being stored in the memory to floppy disk	
7	GATHERING (CTL1)	Gathers information of the controller #1 in FD in case of dual system configuration	① Output of dump information being stored in the drive to floppy disk ② Output of trace information being stored in the drive to floppy disk ③ Output of trace information being stored in the memory to floppy disk	
8	MEMORY MAINT	Memory content reference/update menu	① Reference/update of memory content	
9	RECV ERR INFO	Error display of recovery when the power is on	① Displays the errors occur during recovery operation performed while power is on	
10	PIN INFO	Display of PIN existence of every LU	① Display of PIN data existence	
11	WARNING INFO	Display of unrecovered warning information	The current warning information is indicated	
12	CLEAR LOG(CTL0)	Clearing log information of controller #0	Log information related controller and host I/F is cleared	
13	CLEAR LOG(CTL1)	Clearing log information of controller #1	Log information related controller and host I/F is cleared	
14	THRESHOLD	Reference/set threshold value.	Reference/set threshold value.	
15	TOPOLOGY (CTL0)	Reference/set the topological information for controller 0.	Reference/set the topological information (FC_AL, Fabric).	
16	TOPOLOGY (CTL1)	Reference/set the topological information for controller 1.	Reference/set the topological information (FC_AL, Fabric).	
17	SELFPORT (CTL0)	Reference/set port information for controller 0.	Reference/set own port information.	
18	SELFPORT (CTL1)	Reference/set port information for controller 1.	Reference/set own port information.	
19	SECURITY (CTL0)	Reference/set security information for controller 0.	① Enable/disable the access check. ② Reference/set host identification information.	
20	SECURITY (CTL1)	Reference/set security information for controller 1.	① Enable/disable the access check. ② Reference/set host identification information.	
21	FFC REV (CTL0)	Refers to the revision number of the FFC firmware of the controller 0.	Display of the revision number of each type of firmware in FFC.	
22	FFC REV (CTL1)	Refers to the revision number of the FFC firmware of the controller 1.	Display of the revision number of each type of firmware in FFC.	

5. Changing the Configuration

5.1 Shifting to Hot Standby from Dual Active

Shifting to Hot Standby from Dual Active while the controller is blocked cannot be performed. Perform the shifting after the blockage is recovered. If PIN segment exists, shifting cannot be performed. Perform the shifting after the PIN segment is recovered.

To see if PIN segment exists, refer to PANEL chapter (PANEL0620 (8)).

- (1) Before turning the power on, set DIP switch No.4 as Figure 5.1.1.

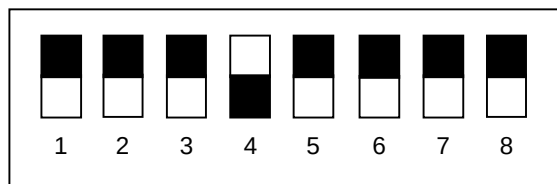
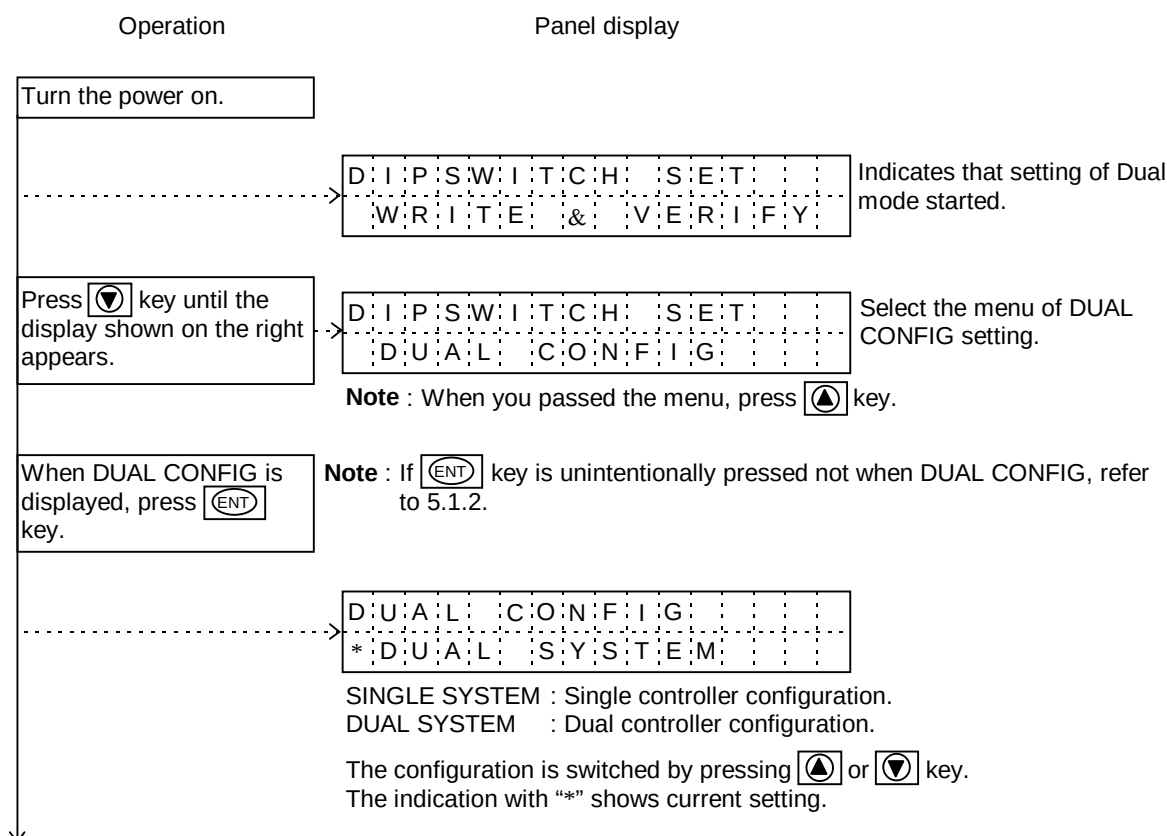
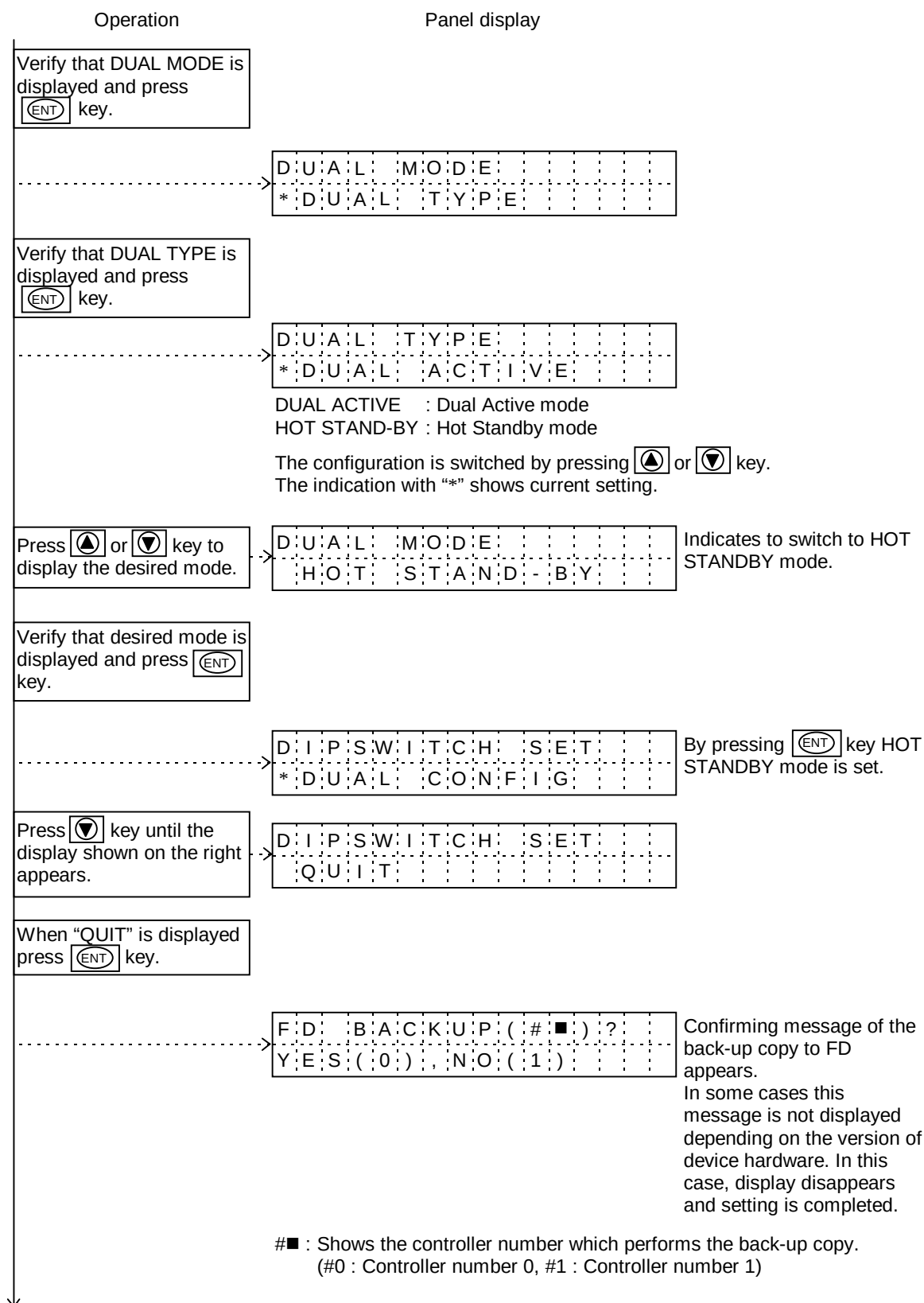
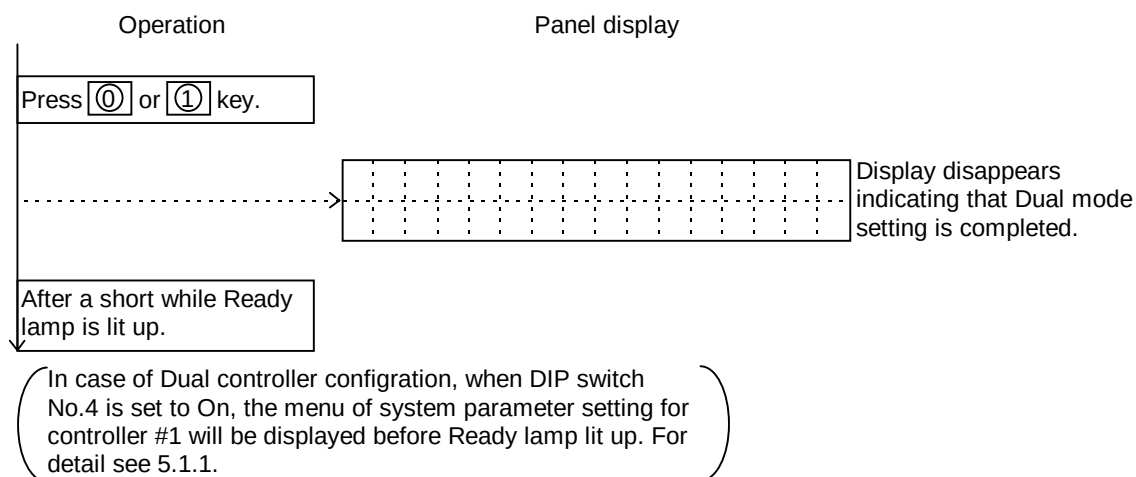


Figure 5.1.1 DIP switch for shifting to Dual system

- (2) Perform as the procedure shown below.







(3) Set DIP switch No.4 as Figure 5.1.2. (Shifting to Dual System has not started yet.)

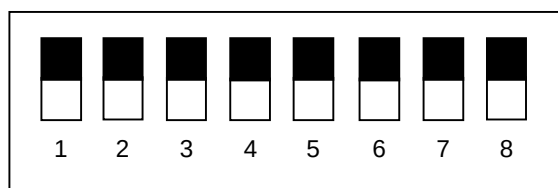


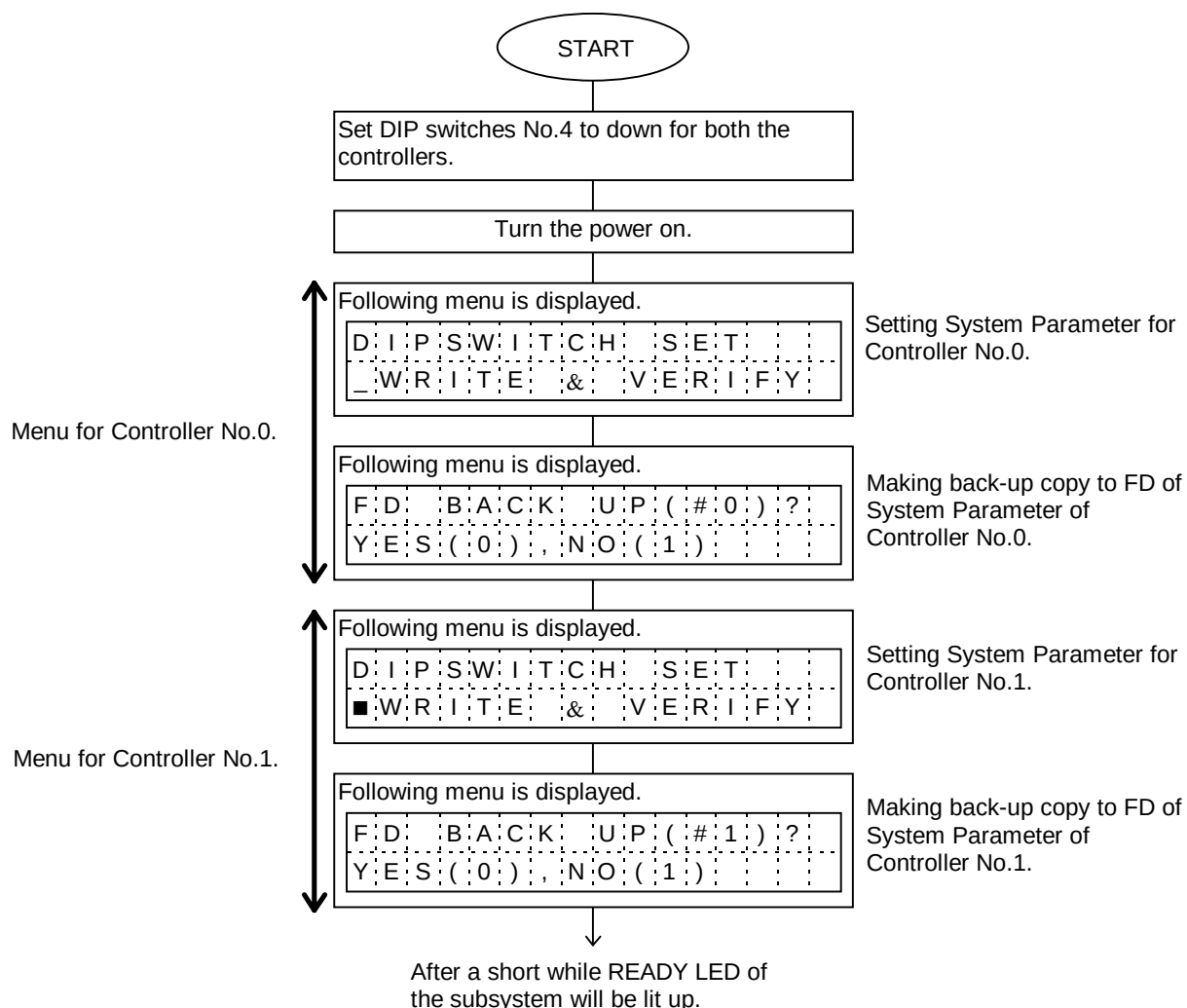
Figure 5.1.2 DIP Switch, shifting to Dual System has not started yet.

Note 1 : When setting Dual mode under dual controller, the setting of controller No.0 will be valid. The setting of controller No.1 will be ignored.

Note 2 : After switching to Dual Active configuration from Hot Standby configuration, Controller No.0 will be the LU Service Controller for previously set LU. To switch LU Service Controller No.1, see “6 PANEL Chapter” (PANEL0370 (2-5)).

5.1.1 Operation of system parameter setting menu under dual controller configuration

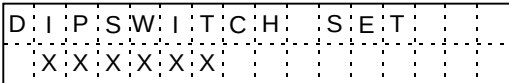
Set DIP switches No.4 to down for both controllers under dual controller configuration, and turn the power off to set the information on EEPROMs of both the controllers.



Note : In case one of DIP switches No.4 is set to down under dual controller configuration, after completion of menu setting for the corresponding controller, READY LED of the subsystem will be lit up.

5.1.2 Returning procedure in system parameter setting menu

During system parameter setting menu when wrong menu is selected ( key is pressed), the method of returning for each menu is shown below.

After the operation below  is displayed.

(XXXXXX : Wrongly selected menu)

Then select desired menu by pressing  or  key.

No.	Menu	Procedure to return
1	WRITE&VERIFY	Press  key.
2	STRIPE SIZE	Press  key.
3	LAN CONST	Press  key to display "QUIT" and press  key.
4	CONNECT VMS	Press  key.
5	ERROR INF	Press  key.
6	CONTROLLER	Press  key.
7	SPARE DISK	Press  key.
8	SERIAL NO	Press  key.
9	ROM V/R	Press  key.
10	RAM V/R	Press  key.
11	ROW LAST LBA	When Menu is ROW LAST LBA : Press  key to display "QUIT", then press  key.
12	BUZZER	Press  key.
13	SYSTEM ERROR	Press  key.
14	INQUIRY INF	Press  key to display "QUIT" and press  key.
15	RTC SET	Press  key to display "QUIT(ENT KEY)" and press  key.

6. Subsystem Settings for Use in Special Modes

6.1 When Connecting to Host Board Adapter Based on HP Tachyon

When connecting the subsystem to the Host Board Adapter based on the HP Tachyon, change the subsystem mode to this mode before using the subsystem.

- (1) Before turning the power on, set DIP switch No.4 as Figure 6.1.1.

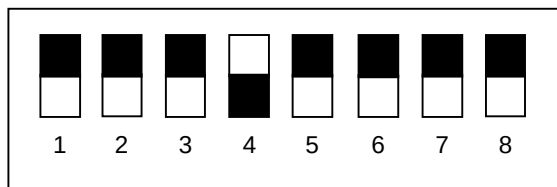
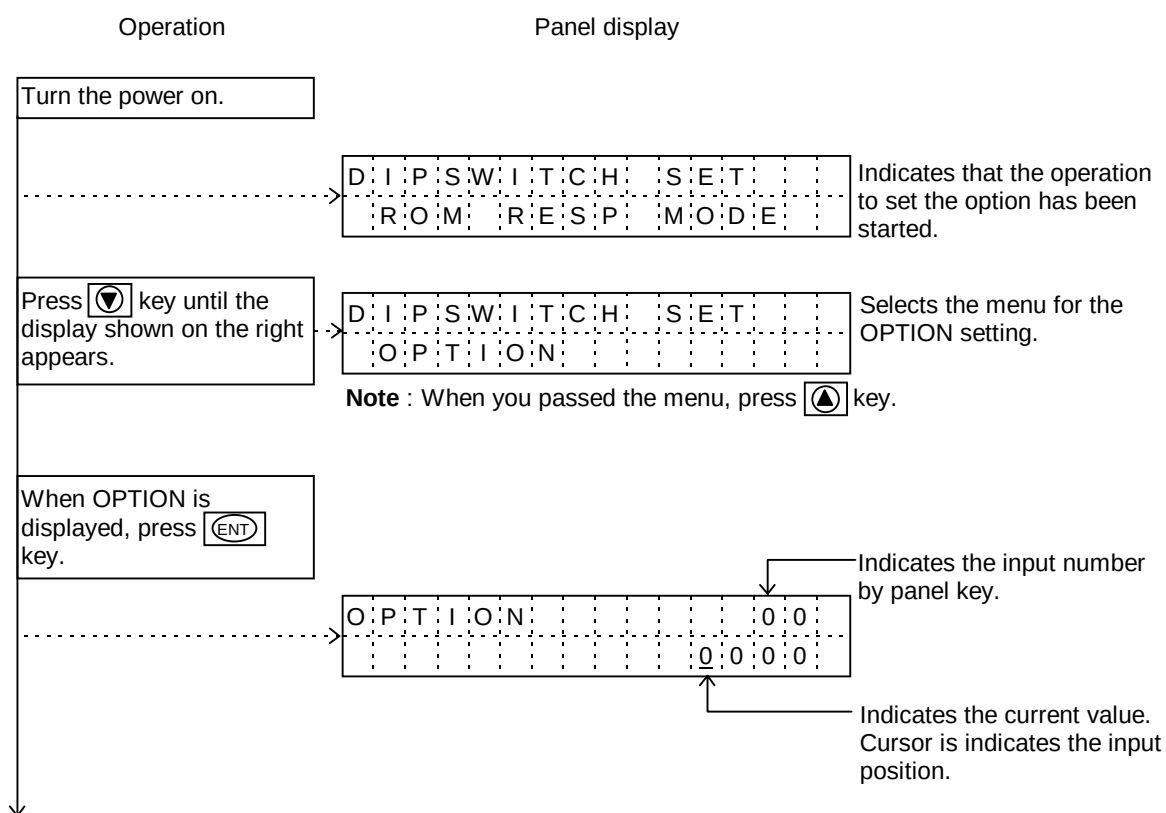
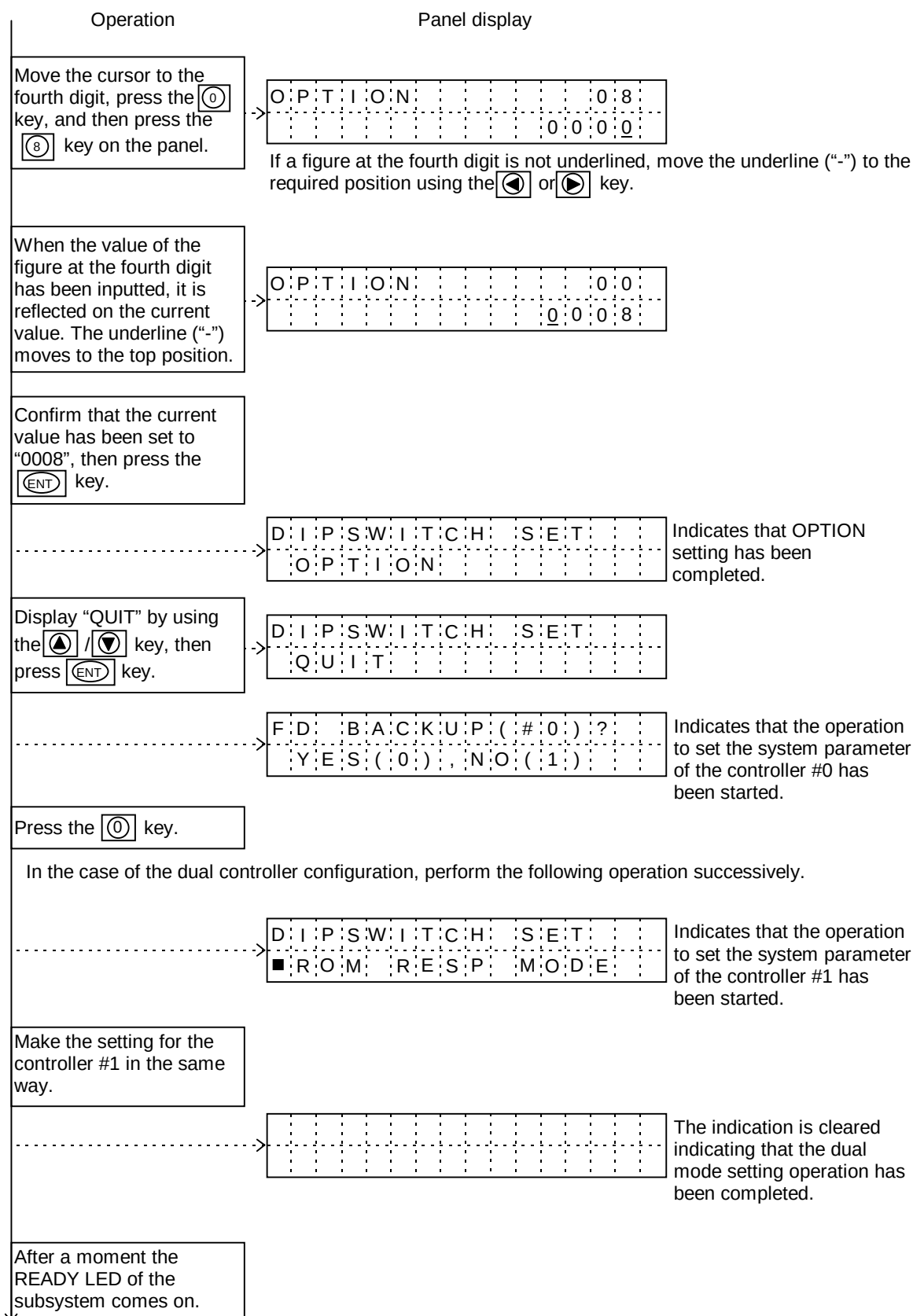


Figure 6.1.1 DIP Switches (Being set for System parameter settings)

- (2) Perform as the procedure shown below.





(3) Set the DIP switch No.4 as shown in Figure 6.1.2.

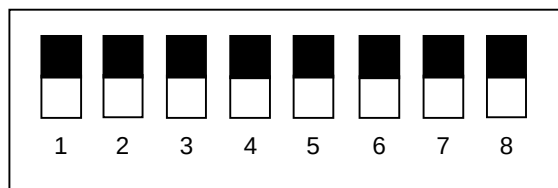


Figure 6.1.2 DIP switches (Being set for Standard setting)

6.2 When Using I/O Path Switching Function in the State Being Connected to Sequent NUMA-A

When using the I/O path switching function in the state being connected to Sequent NUMA-A, setting of the emulation mode and the setting of the TRESPASS mode from the SVP function is needed.

- (1) Before turning the power on, set DIP switch No.4 as Figure 6.2.1.

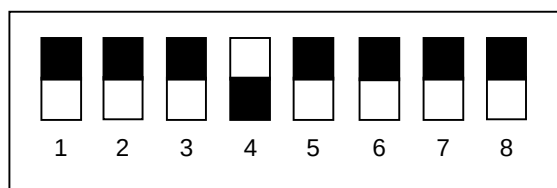
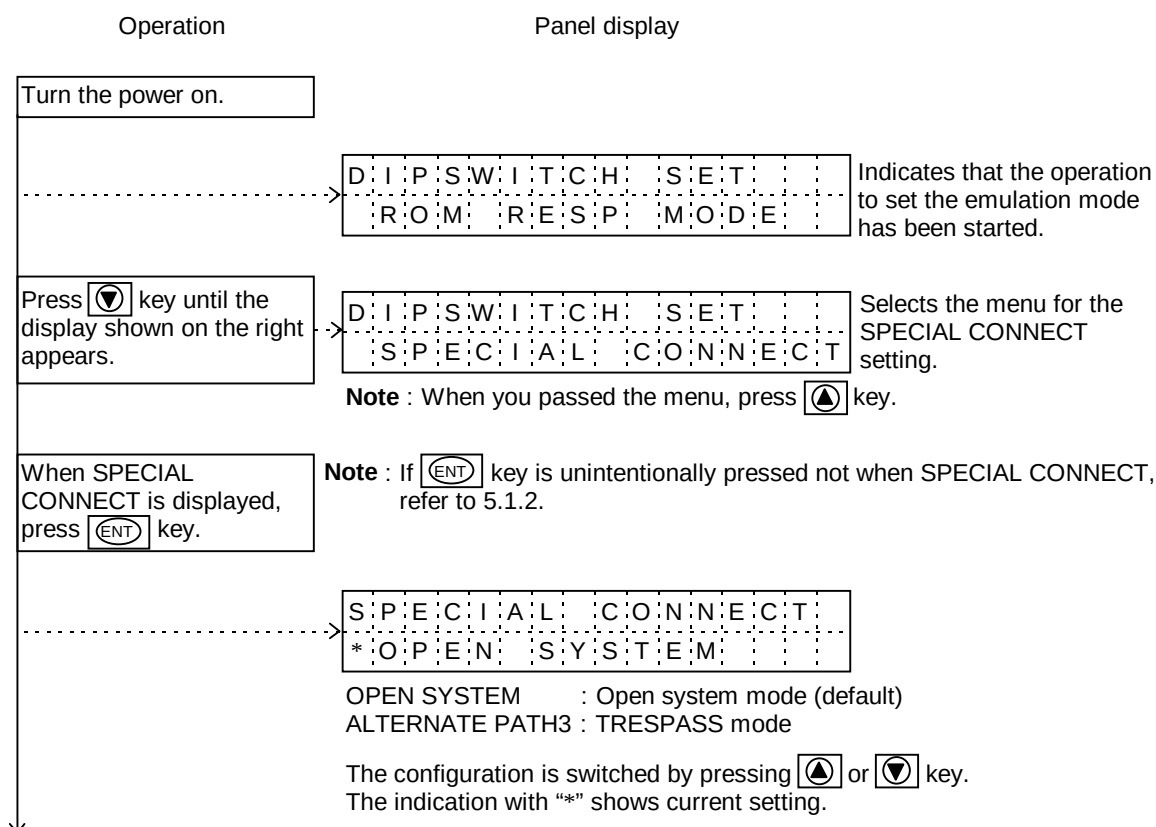
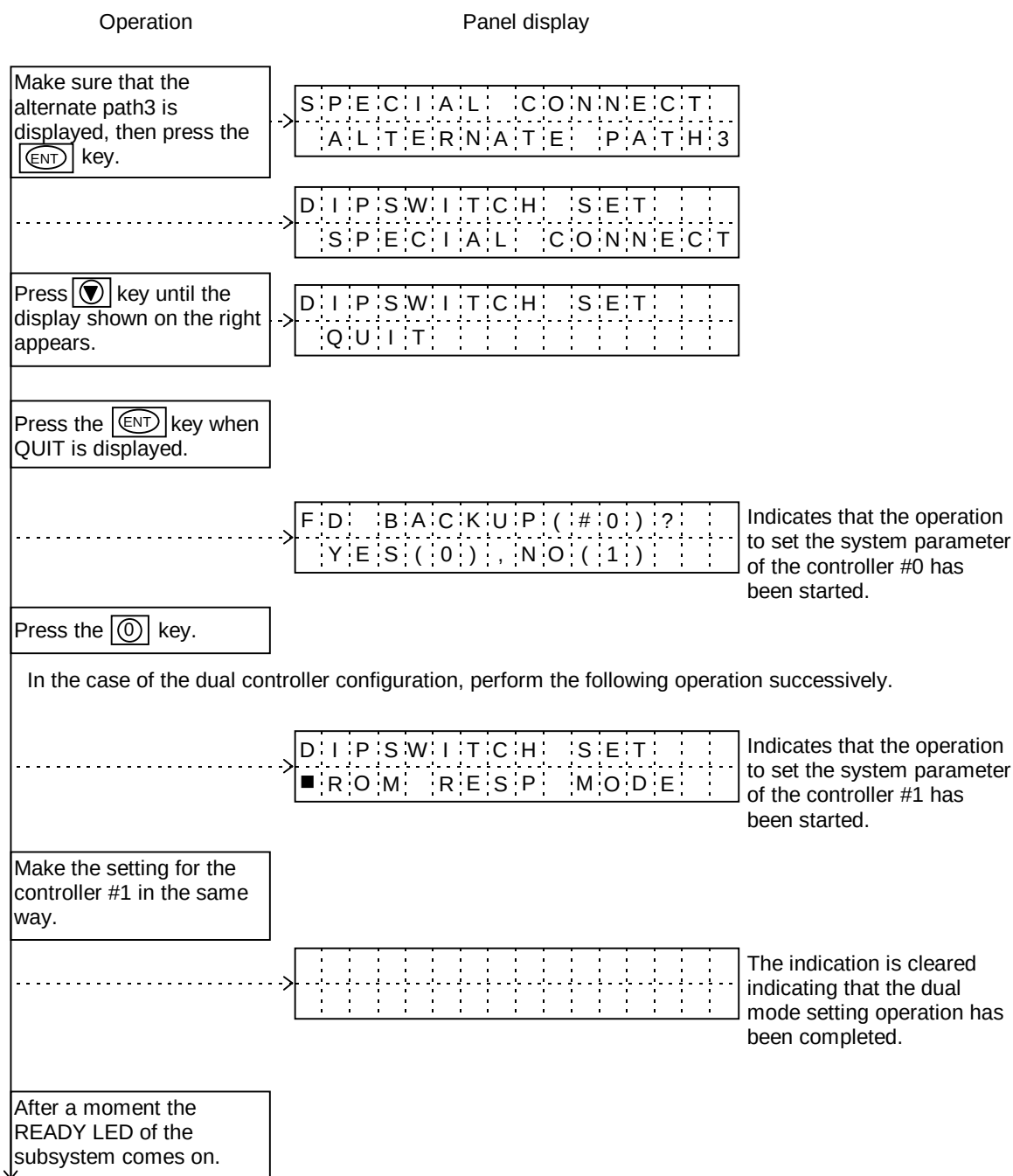


Figure 6.2.1 DIP Switches (Being set for System parameter settings)

- (2) Perform as the procedure shown below.





(3) Set the DIP switch No.4 as shown in Figure 6.2.2.

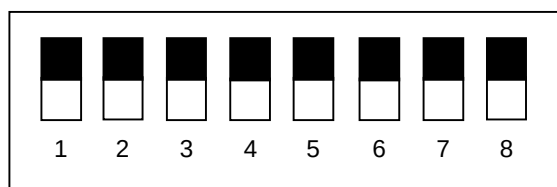
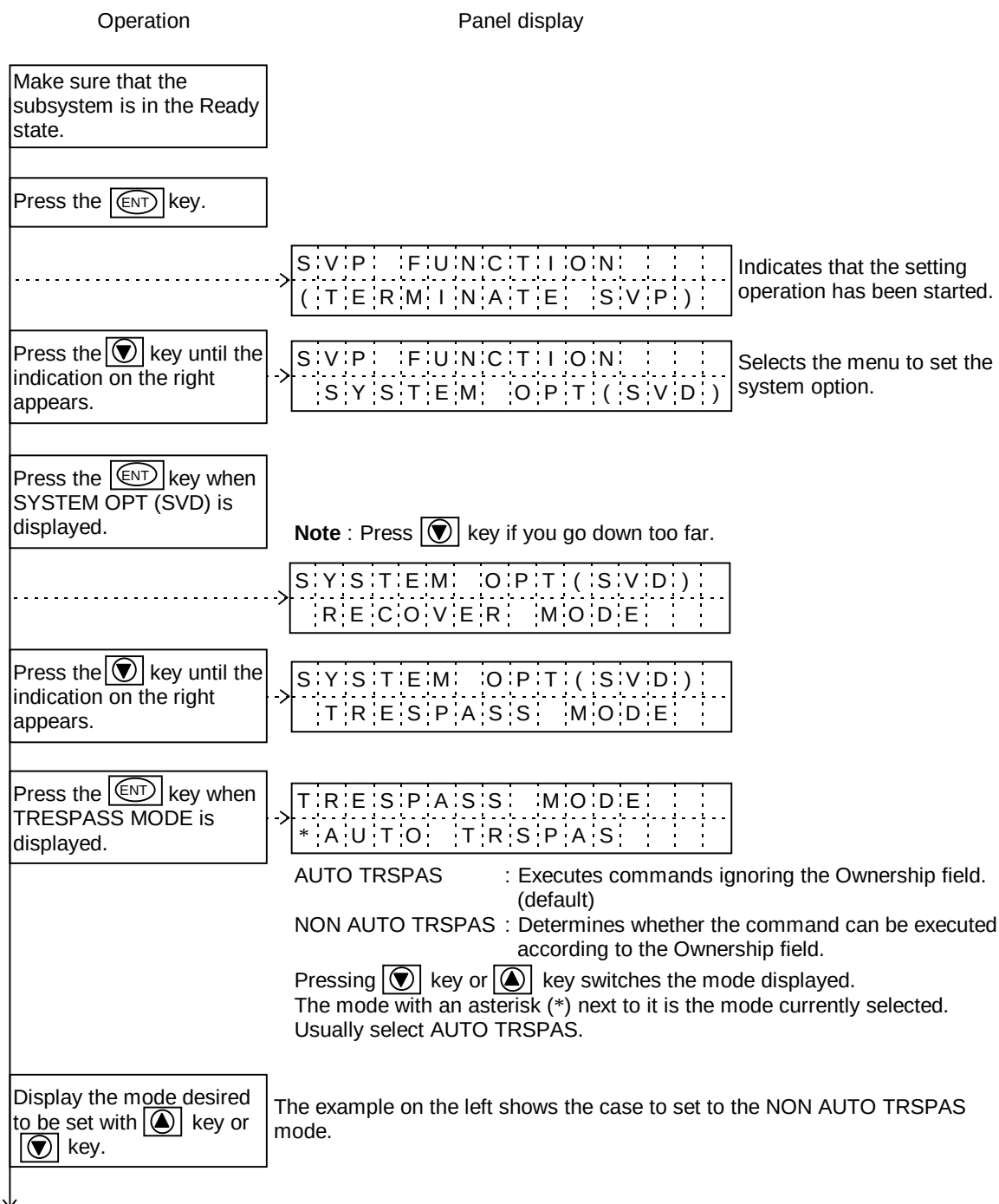
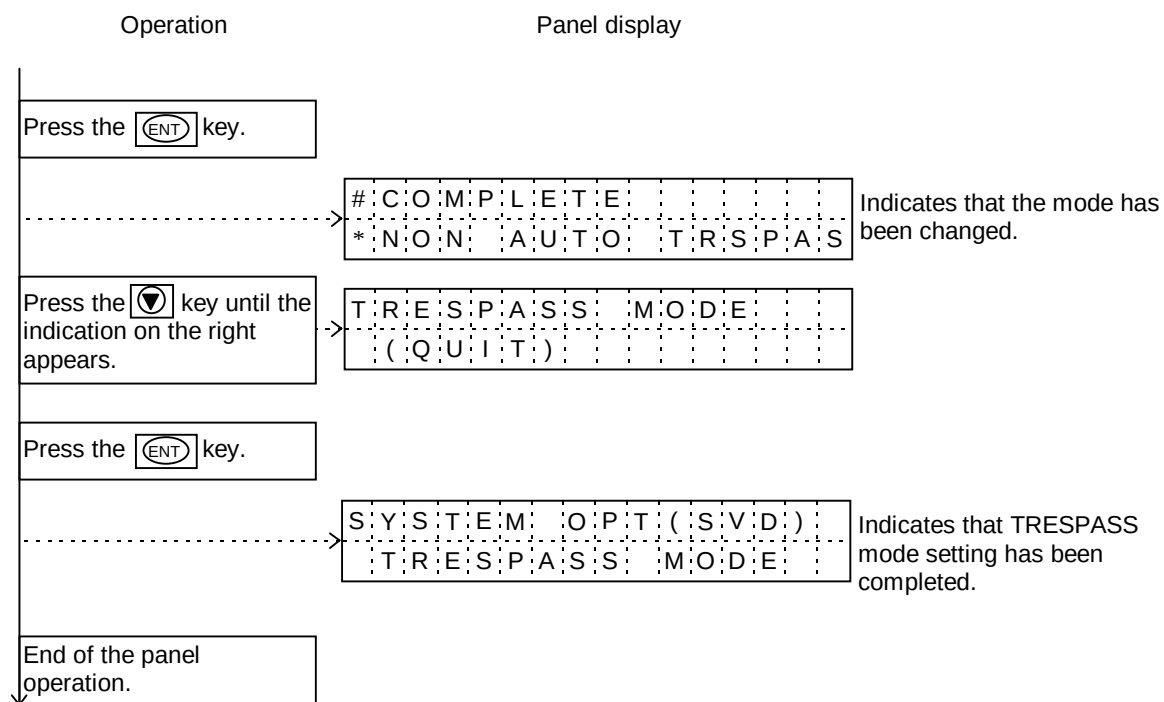


Figure 6.2.2 DIP switches (Being set for Standard setting)

(4) Setting the TRESPASS mode.

This function can be used when the subsystem is in the Ready state. (There is no need to set the DIP switch or reset the power. Ready/write operation cannot be executed from the host while this operation is being performed. When the host command is received, "Not Ready" is returned to the host.)





6.3 Using in the DATA SHARE MODE

- (1) Before turning the power on, set DIP switch No.4 as Figure 6.3.1.

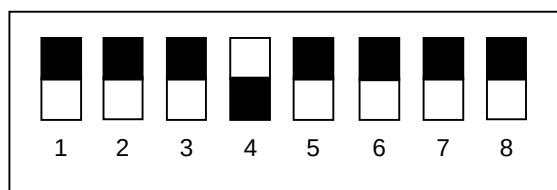
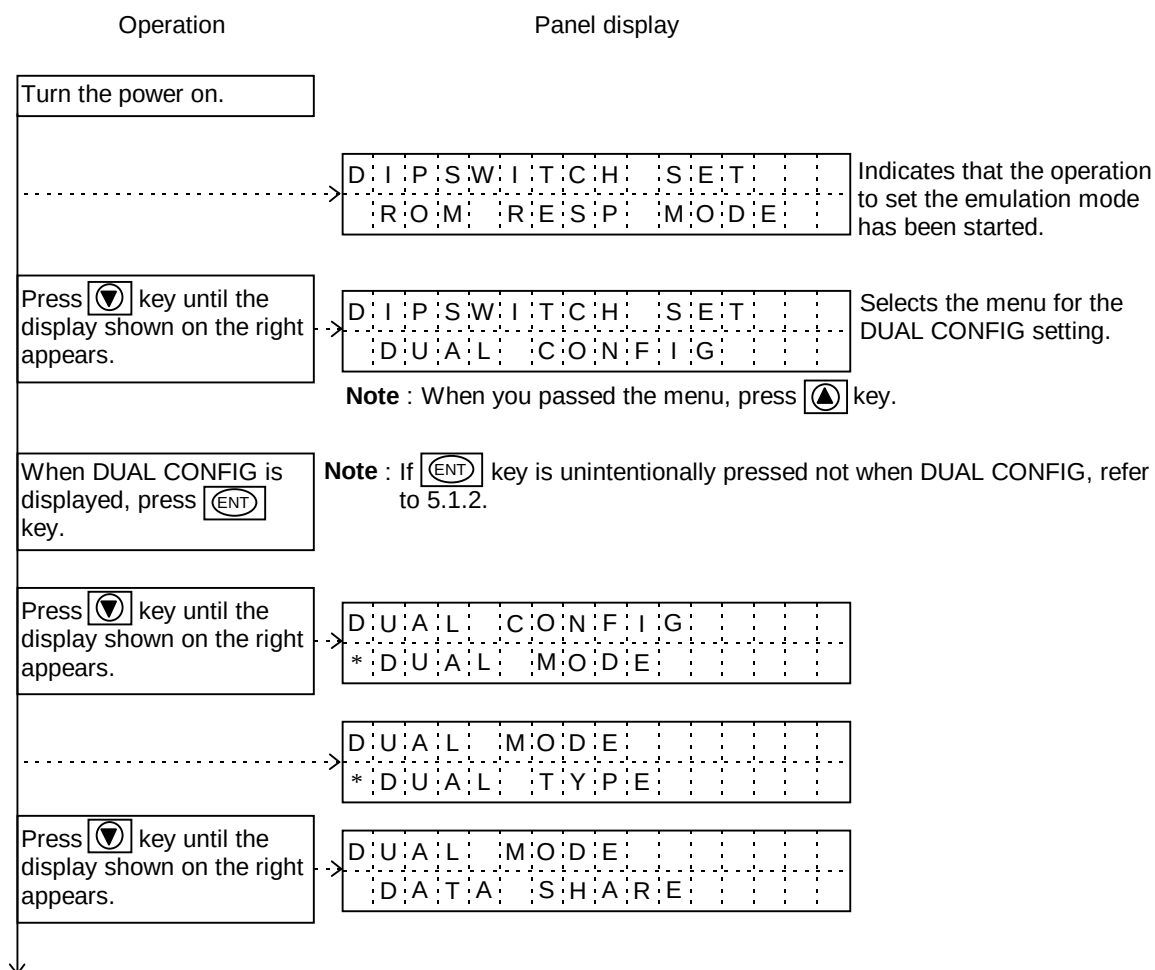
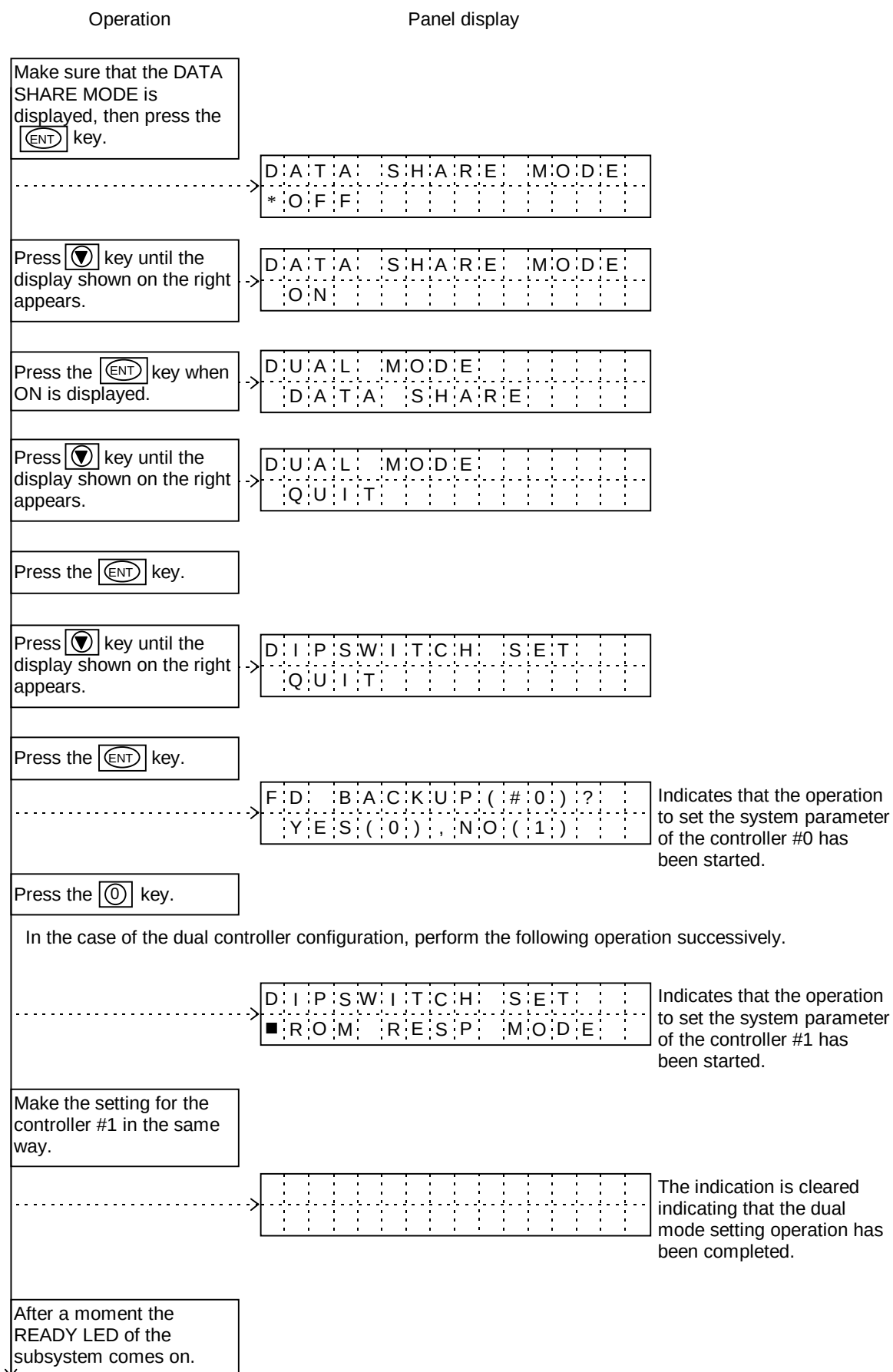


Figure 6.3.1 DIP Switches (Being set for System parameter settings)

- (2) Perform as the procedure shown below.





(3) Set the DIP switch No.4 as shown in Figure 6.3.2.



Figure 6.3.2 DIP switches (Being set for Standard setting)

6.4 When Sun OS Solaris 2.5.1 (Aug. '97 version) or Later Is Used by the Host Side

If the following message is displayed on the console screen while executing SUN Format command, use the subsystem with its mode changed to this one.

[Computing capacity exceeds actual disk capacity.]

- (1) Before turning the power on, set DIP switch No.4 as Figure 6.4.1.

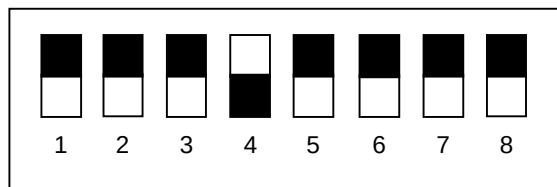
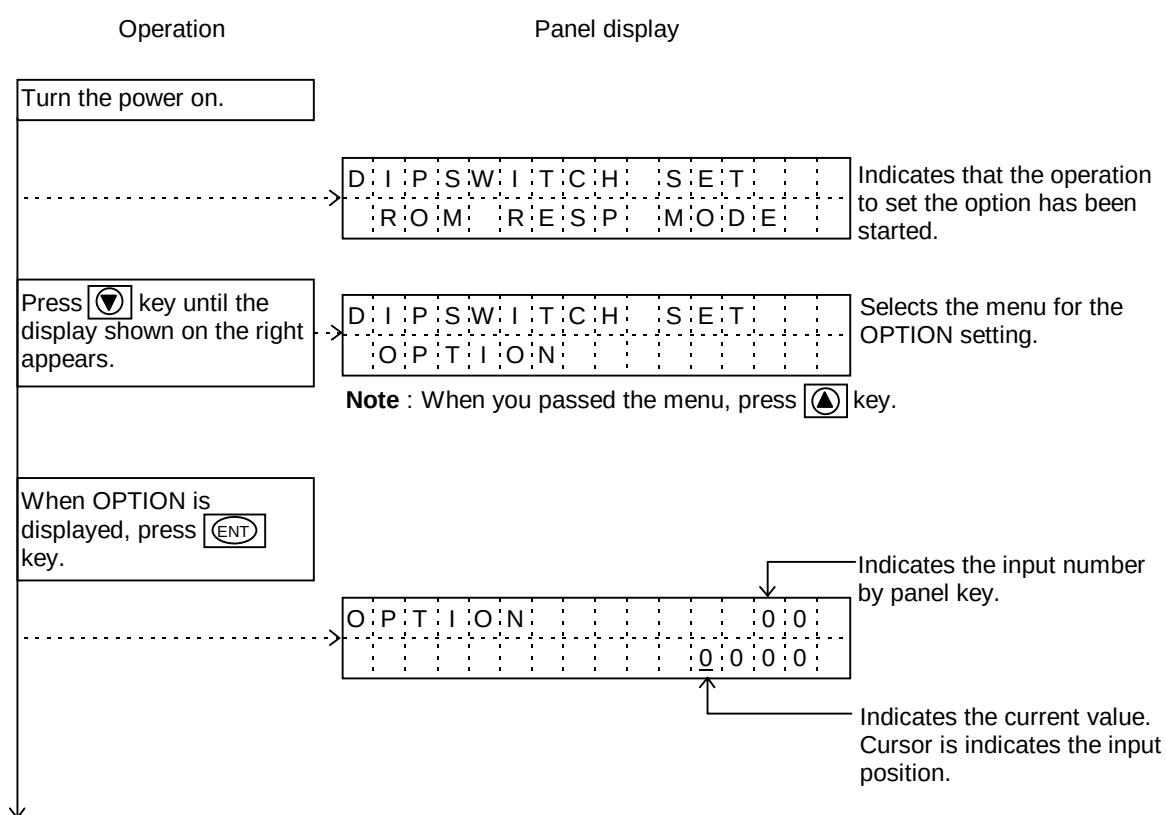
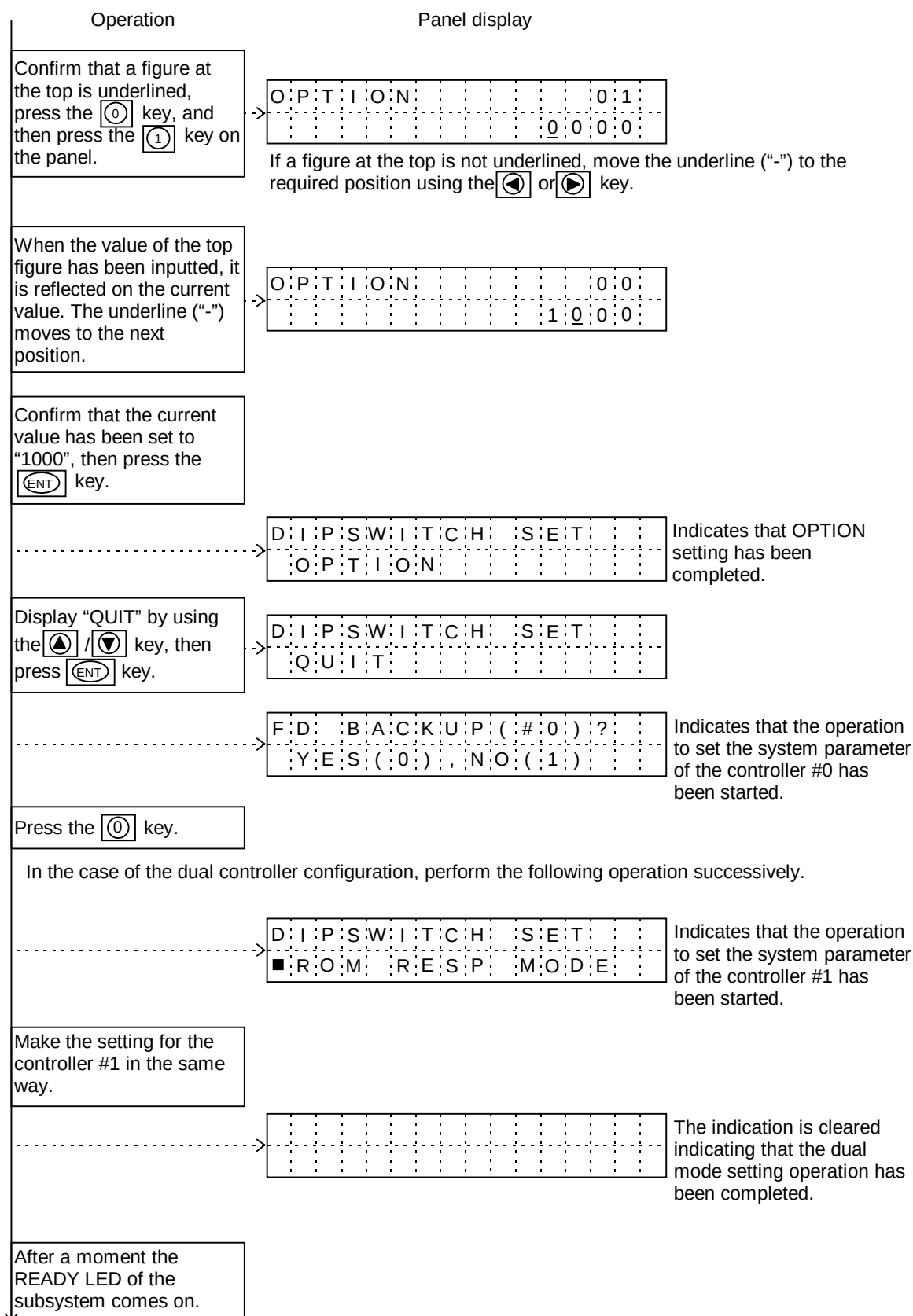


Figure 6.4.1 DIP Switches (Being set for System parameter settings)

- (2) Perform as the procedure shown below.





(3) Set the DIP switch No.4 as shown in Figure 6.4.2.



Figure 6.4.2 DIP switches (Being set for Standard setting)

6.5 When Using the Subsystem in LU Blockade Mode

When the subsystem is used in this mode, if a blockade failure occurs on the second disk in the same ROW, the disk concerned is blocked and the LU in which the disk concerned is included is blocked.

When the LU is blocked, data cannot be read from or written onto the LU concerned. If the blocked LU is accessed, a sense key/sense code=0313180 is reported.

To use the subsystem in this mode, the microprogram must be Ver.0355/B or later.

- (1) Before turning the power on, set DIP switch No.4 as Figure 6.5.1.

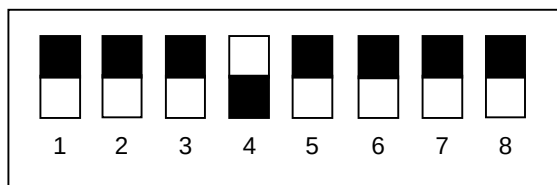
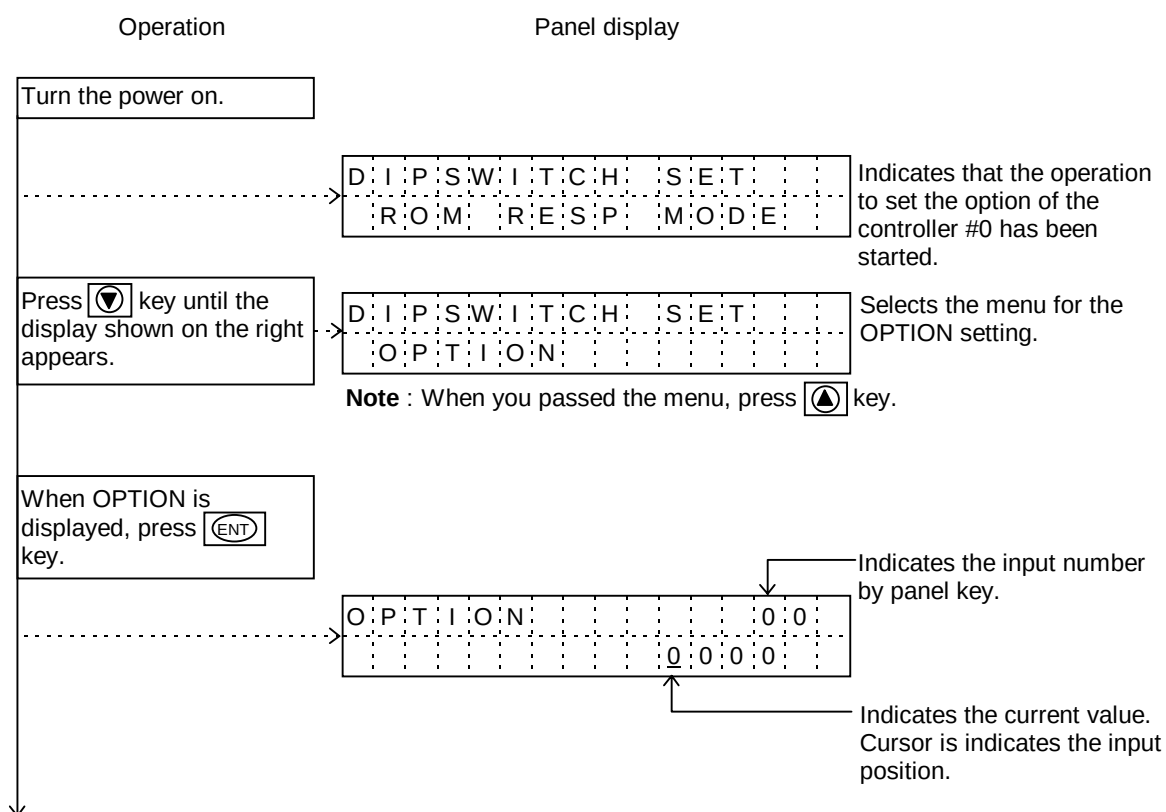
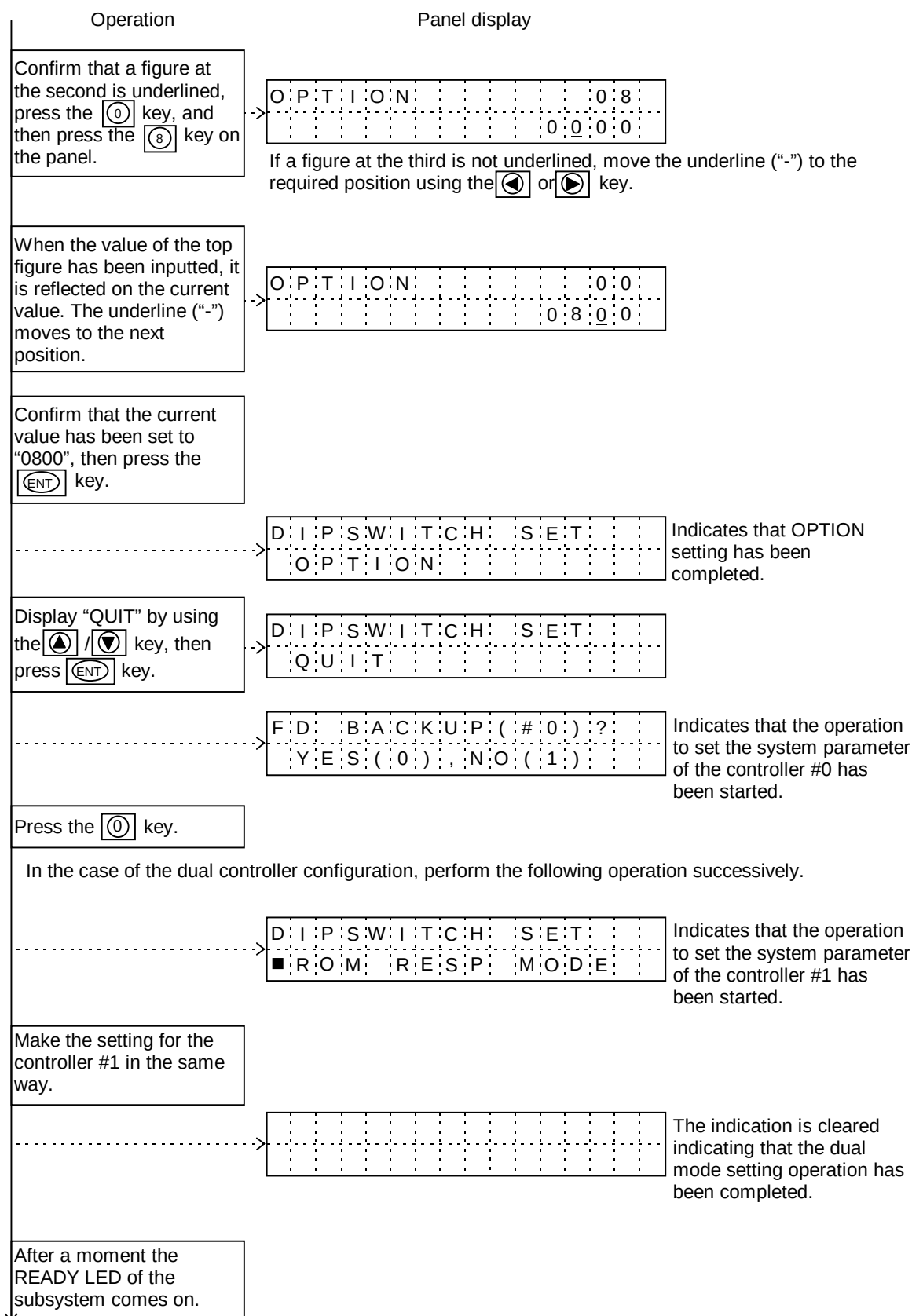


Figure 6.5.1 DIP Switches (Being set for System parameter settings)

- (2) Perform as the procedure shown below.





(3) Set the DIP switch No.4 as shown in Figure 6.5.2.



Figure 6.5.2 DIP switches (Being set for Standard setting)

DF350F Disk Subsystem
9. OPTIONAL INSTALLATION
(Rack Mount (RKWH/U2) Type)

Rev.2

REVISION CONTROL

Legend for revision codes : AD : Addition CH : Change CR : Correction DL : Deletion

REV.	Date	DRW.	CHKD	APPD	Sheet No.	Description	Code
0	Jan.20.'98	A.Yamanashi	K.Aruga	H.Iwasaki	All	Issued	
1	Jul.31.'98	A.Yamanashi	K.Aruga	H.Iwasaki	0250 0290	Added A2E8, A1E18. Added A2E8, A1E18.	AD AD
2	Oct.16.'98	A.Yamanashi			0050 0060 0080 0250 0290	Added case of the dual controller. Added case of the dual controller. Added case of the dual controller. Added A3E4. Added A3E4.	AD AD AD AD AD

1. Note when Installing the Optional Features

- (1) Be sure to back-up copy user data before installing the optional features. A miss-operation might cause the loss of user's data.
- (2) Back-up the system parameter according to “Back-up Procedure of System Parameter”. (See RW-OPTION0050.)
- (3) Power off the subsystem according to power off procedure before installing the optional features. If not, user's data might be lost.

2. Installing the Optional Features

2.1 Unit Appearance Check

Check visually the unit appearance for distortion or damage during the transportation.

2.2 Checking Items of System Components and the Other Items Shipped with the Unit

Check items and quantities of system components (model, serial number, and quantity) and other items shipped together with the unit. Cross-check with the packing list.

2.3 Back-up Procedure of System Parameter

There are cases where System Parameters (Buzzer setting, drive recovery mode, etc.) are need to be copied to FD or restored from FD when installing optional parts or replacing parts. In this case, copy or restore system parameters following "Back-up procedure to FD" (See RW-OPTION0050) or "Restoring procedures from FD" (See RW-OPTION0080).

(RAID configuration setting, LU configuration setting, etc. are not contained in system parameter.)

2.3.1 Back-up procedure to FD

- (1) Turn the power off according to RW-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

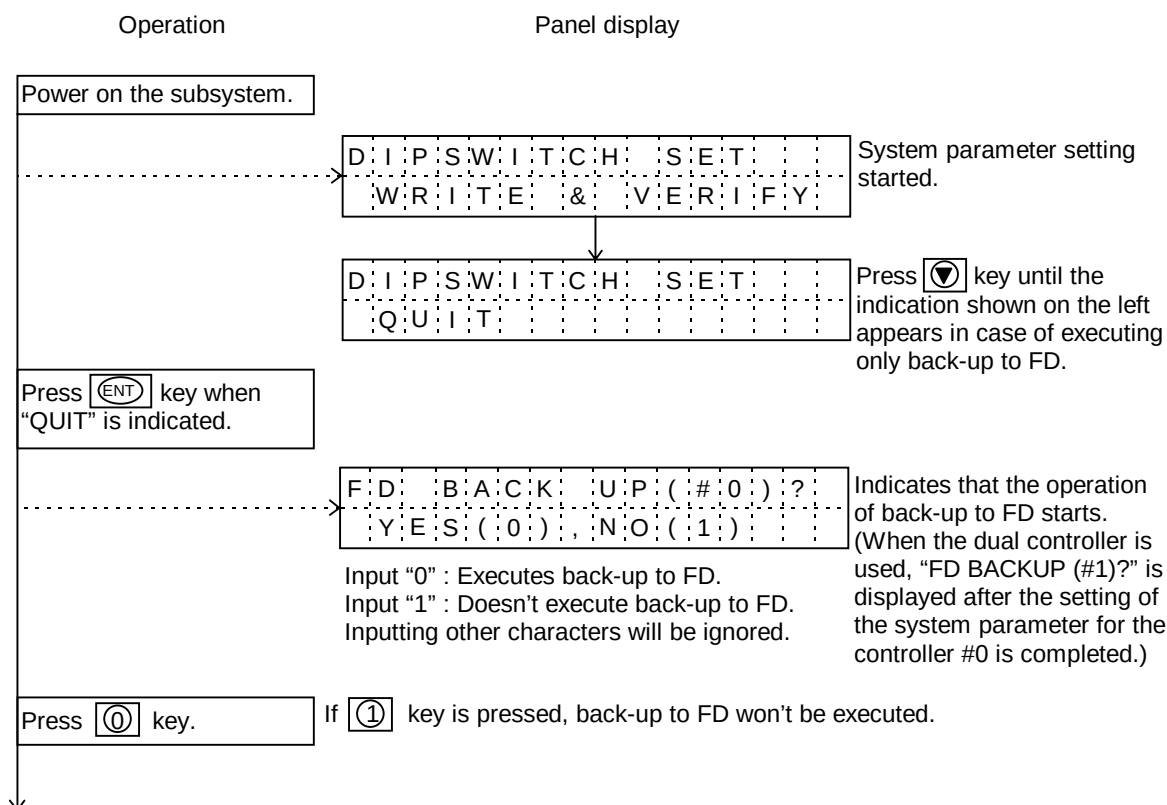
- (2) Before power on the subsystem, set DIP switch No.4 as shown in Figure 2.3.1.

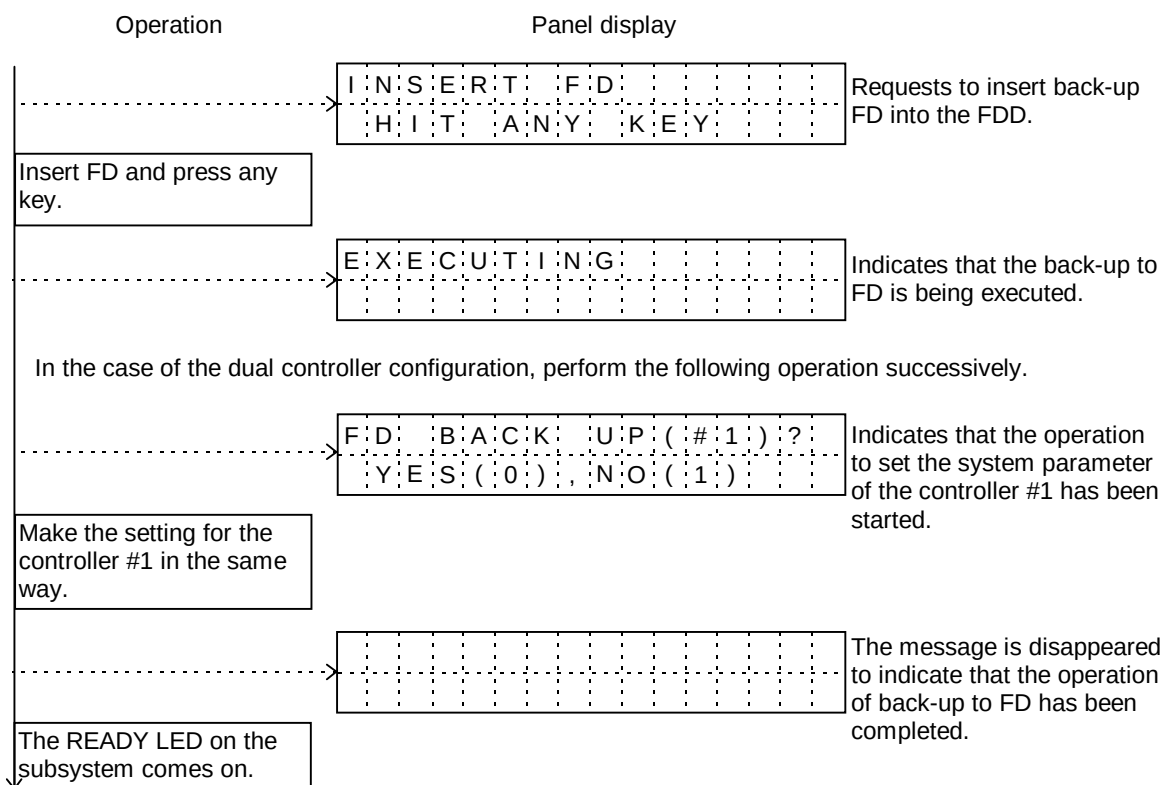
Note : Be sure to set the same data for both controllers if the dual controller option (-F3WCF) has been installed.



Figure 2.3.1 DIP Switches
(Back-up operation to FD is allowed)

- (3) Operate as described below.





(4) Set DIP switch No.4 as shown in Figure 2.3.2.

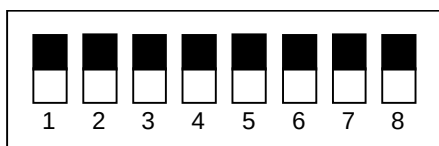
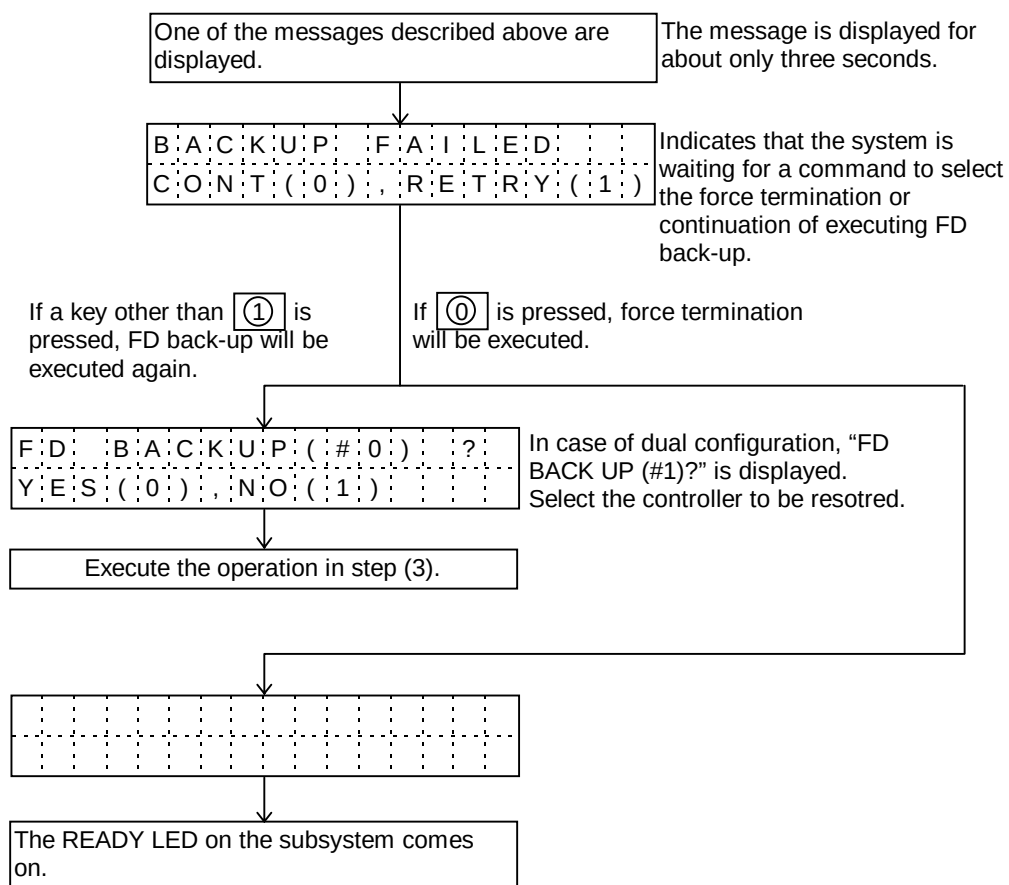


Figure 2.3.2 DIP Switches

Note 1 : While the back-up to FD is being executed, the messages described below are sometimes displayed.

- **FD NOT INSERTED**
FD isn't inserted. Insert FD into the FDD.
- **FD MOTOR NOT STARTED**
Starting of FD Motor ended in failure. Re-execute.
- **FILE WRITE ERROR**
FD which was inserted is not formatted, or write-protected. Format or release write-protection.
Write error occurred in FD. Insert another FD.

If these messages are displayed, back-up to FD hasn't been executed. So re-execute following the operation described below.



Note 2 : Use 3.5" FD (1.44MB) formatted by MS-DOS for back-up FD. Besides, note that the FD will be overwritten during back-up.

Note 3 : Even if back-up FD is left at FDD after back-up operation, error won't occur on the subsystem.

2.3.2 Restoring procedures from FD

- (1) Before power on the subsystem, set DIP switch No.3 as shown in Figure 2.3.3.

In case of dual controller system, set both the DIP switches as shown in Figure 2.3.3.

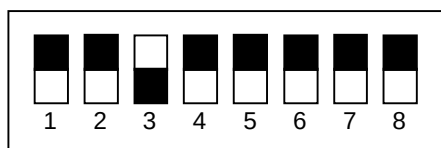
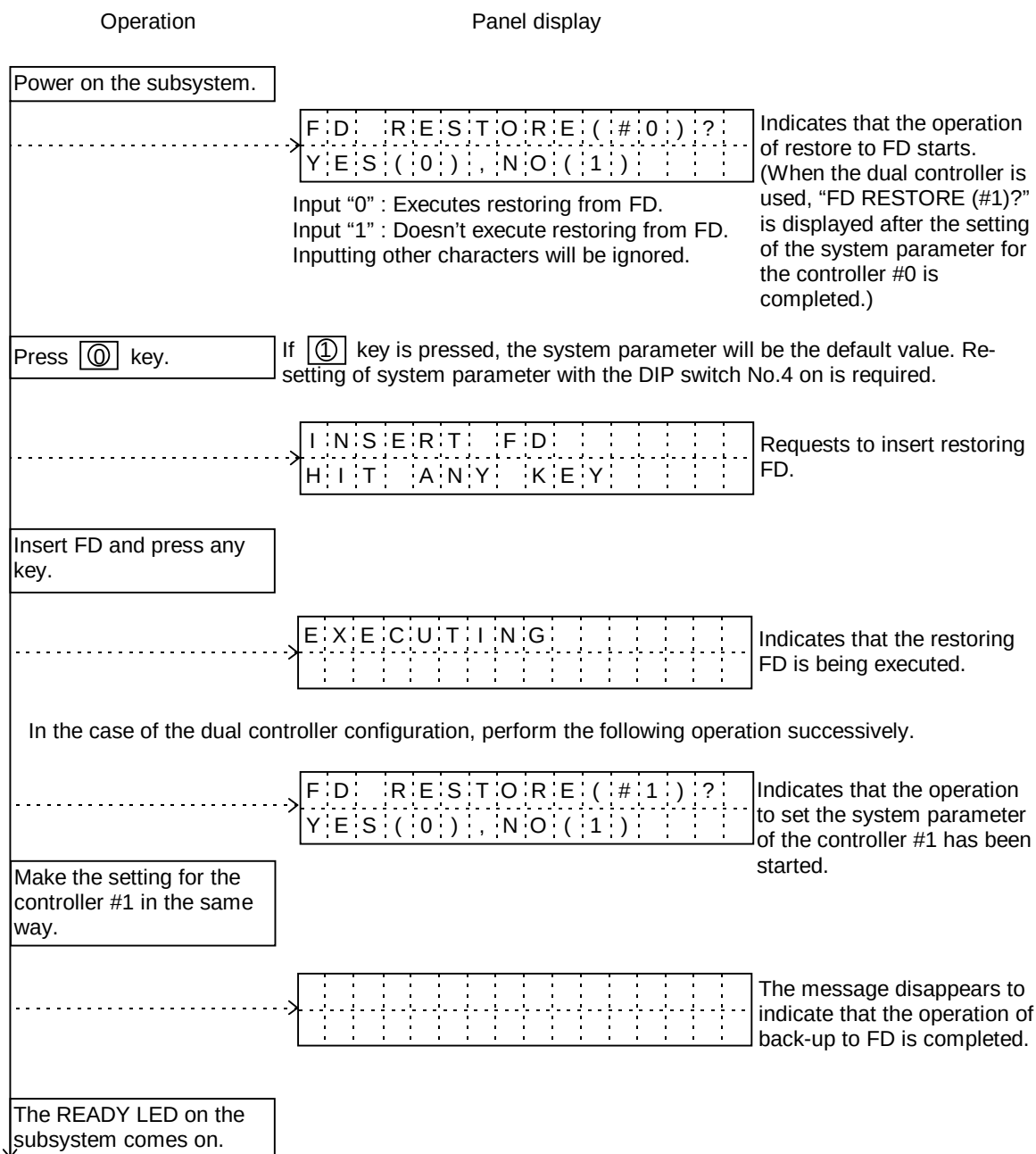


Figure 2.3.3 DIP Switches
(Restoring operation from FD is available)

- (2) Operate as described below.



(3) Set DIP switch No.3 as shown in Figure 2.3.4.

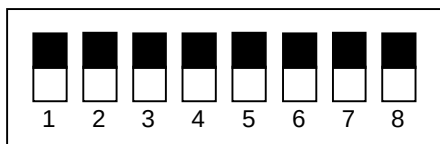
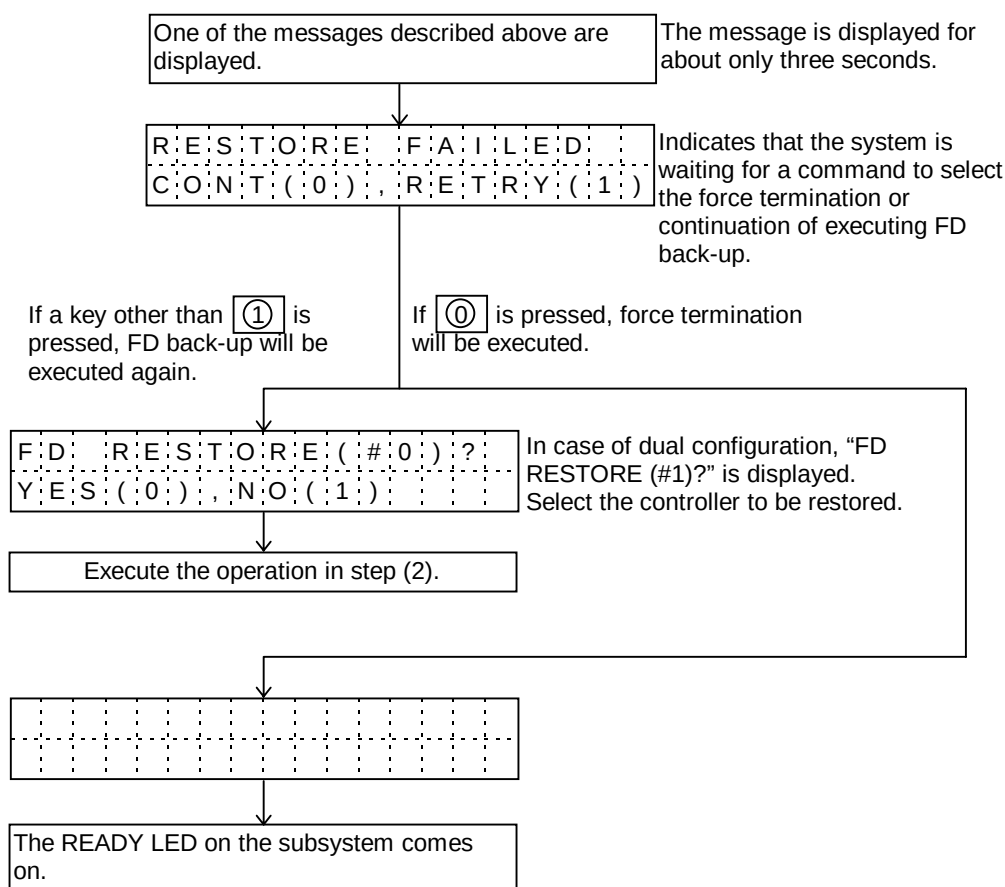


Figure 2.3.4 DIP Switches

Note 1 : While executing the restoring from FD, the messages described below are sometimes displayed.

- **FD NOT INSERTED**
FD isn't inserted. Insert FD into the FDD.
- **FD MOTOR NOT STARTED**
Starting of FD Motor ended in failure. Try again.
- **BAD FD INSERTED**
Inserted FD is not formatted. Format FD.
- **FILE READ ERROR**
Read error occurred in FD. Try again.

If these messages are displayed, restoring from FD hasn't been executed. So re-execute following the operation described below.



Note 2 : In case that restoring operation ended in failure and was force terminated, setting of EEPROM will be default value.

Accordingly, re-setting with the DIP switch No.4 On is required.

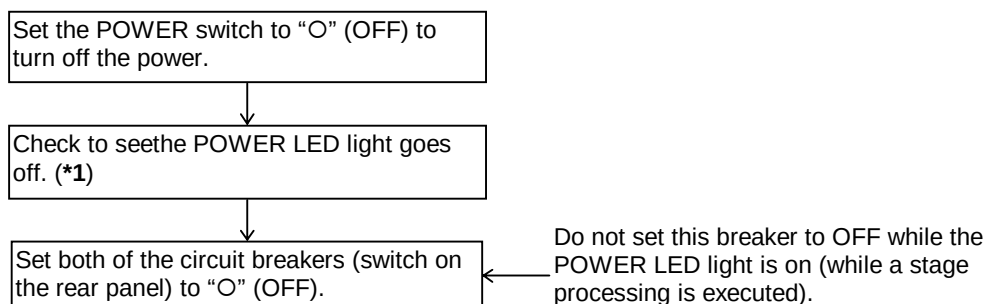
Note 3 : Even if FD which was used to restore is left at FDD after back-up operation, error won't occur on the subsystem.

2.4 Power OFF

Turn off the power correctly according to the Power OFF Procedure (1) shown below.

Notice : If optional features are not installed to the system correctly, user data may be lost.

(1) Power OFF procedure



If a power down occurs or the breaker is set to OFF by mistake before the POWER LED goes off, turn on the power right away according to the "(2) Power ON procedure" below, then execute the power off procedure above.

*1 Check the back-up state of the CACHE memory.

Be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

The CACHE memory of this unit provides write-after control. If data is not yet written, before the power is turned off, the unit automatically writes the data on the CACHE memory to the hard disk. This is called destaging. After this processing is completed, the power is turned off.

If the power is turned off in a state in which destaging cannot be completed due to an unexpected power interruption or a tripped circuit breaker, the CACHE memory switches to the back-up mode using the battery for data integrity. If any equipment of the unit is removed or inserted in this back-up mode, the battery may stop supplying power, resulting in the user data being lost. When you handle any equipment of the unit with the unit power off, be sure to check the back-up state of the CACHE memory and make sure that the back-up mode is canceled before starting maintenance work.

- Checking the back-up state of the cache memory

You can determine whether the unit is in the back-up mode by checking the indication of the CACHE PWR (green LED) on the CTL ASSY, as described below.

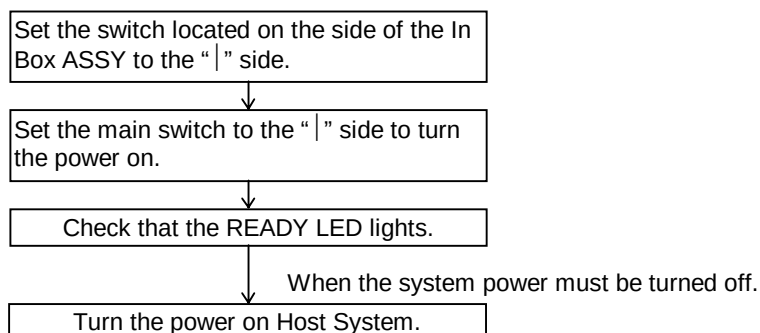
Set the circuit breaker on the rear of the unit to "I" (ON) with the power switch (POWER SW) set to "O" (OFF).

Determine the state of the memory from the indication of the CACHE PWR.

CACHE PWR LED on ----- Indicates the back-up mode.

CACHE PWR LED off ----- Indicates that the back-up mode is canceled.

(2) Power ON procedure



2.5 Attaching/Removing and Opening/Closing the Covers

2.5.1 Attaching/Removing the front bezel

(1) Removing procedure (See Figure 2.5.1.)

- ① Hold the grooves located on both sides of front bezel and pull front bezel toward you to remove it.

Notice : Attach/Remove the front bezel carefully to avoid subjecting the subsystem to any impact since it has precision components.

(2) Attaching procedure (See Figure 2.5.1.)

- ① Mate the grooves of the front bezel with the guide plate of the subsystem, and secure front bezel by pressing its four corners.

Notice : Attach/Remove the front bezel gently to avoid a shock. Precision components are installed.

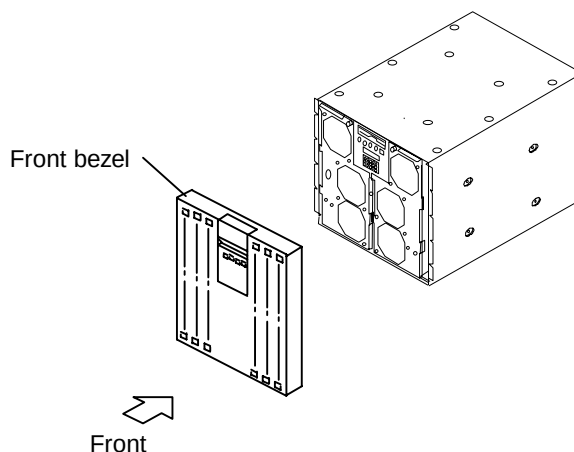


Figure 2.5.1 Attaching/Removing the Front Bezel

2.5.2 Opening/Closing the front panel

(1) Opening procedure (See Figure 2.5.2.)

- ① Remove the front bezel. (See RW-OPTION0120.)
- ② Insert the key into the key hole and turn it to the direction of an arrow (→), and hold the left side of front panel and open it to the right.

Notice : Open/Close the covers carefully to avoid subjecting the subsystem to any impact since it has precision components.

(2) Closing procedure (See Figure 2.5.2.)

- ① Close the front panel.
- ② Turn the key to arrow(←) direction and fix front panel.
- ③ Install front bezel.

Note : Keep the key carefully lest it should be lost.

Notice : Open/Close the covers gently to avoid a shock. Precision components are installed.

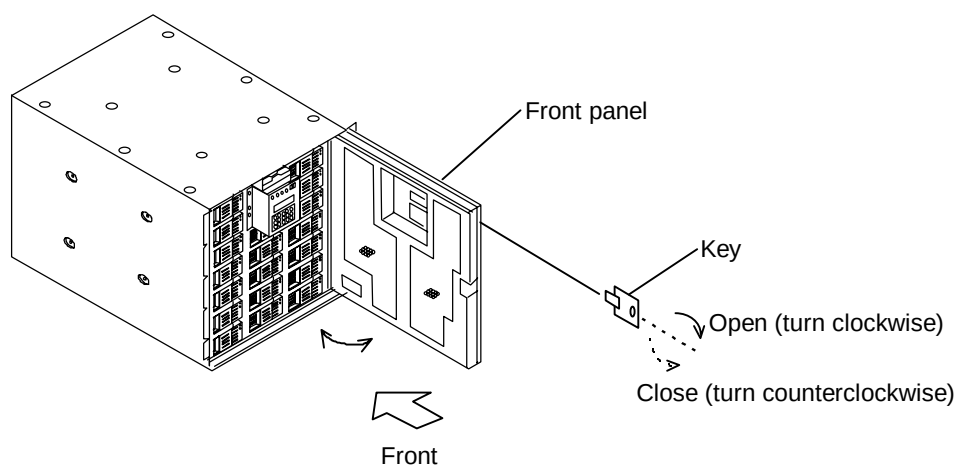


Figure 2.5.2 Opening/Closing the Front Panel

2.5.3 Opening/Closing the rear cover

(1) Opening procedure (See Figure 2.5.3.)

- ① Remove 2 thumb screws of rear cover and open rear cover.

Notice : Open/Close the rear cover carefully to avoid subjecting the subsystem to any impact since it has precision components.

(2) Closing procedure (See Figure 2.5.3.)

- ① Close rear cover in the reversed order of removing procedure.

Notice : Open/Close the rear cover gently to avoid a shock. Precision components are installed.

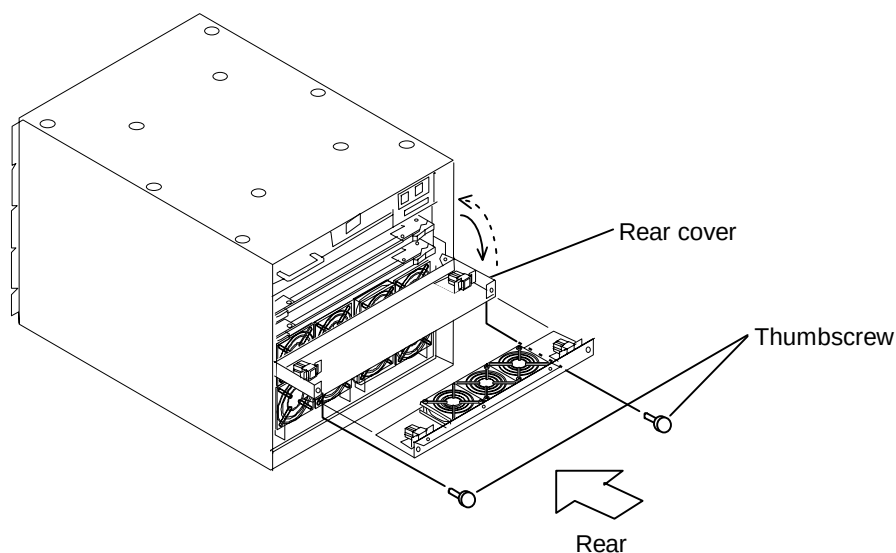


Figure 2.5.3 Opening/Closing the Rear Cover

2.6 Installing the CTL ASSY (Upgrading from Single-System to Dual-System) and I/F ADAPTER ASSY

- (1) Insert a back-up floppy disk in a drive and make a back-up copy of the system parameter into the FD.
- (2) Turn off the unit. (See RW-OPTION0110.)

Notice : If the power is not turned off normally, the user's data might be lost.

- (3) Open rear cover.
- (4) Install a CACHE ASSY in the additional CTL ASSY. (Mount a CACHE ASSY of the same capacity in the same corresponding slot of the optional CTL ASSY as those of the already installed CTL ASSY respectively as shown on RW-OPTION0180.)
- (5) Install the additional I/F ADAPTER ASSY. (See Figure 2.6.1.)
- (6) Insert the CTL ASSY in a predetermined position with the right and left levers opened. Push the right and left levers in the arrow-marked erection (→) at the same time. (See Figure 2.6.2.)

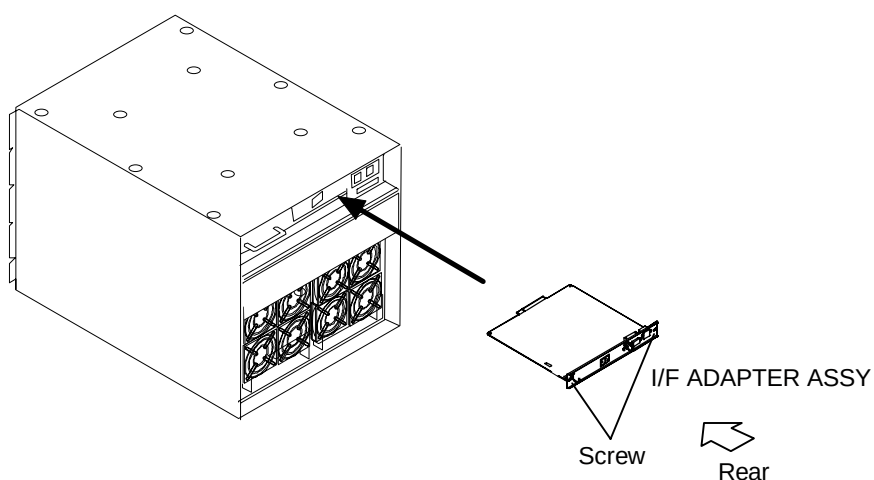


Figure 2.6.1 Installing the I/F ADAPTER ASSY

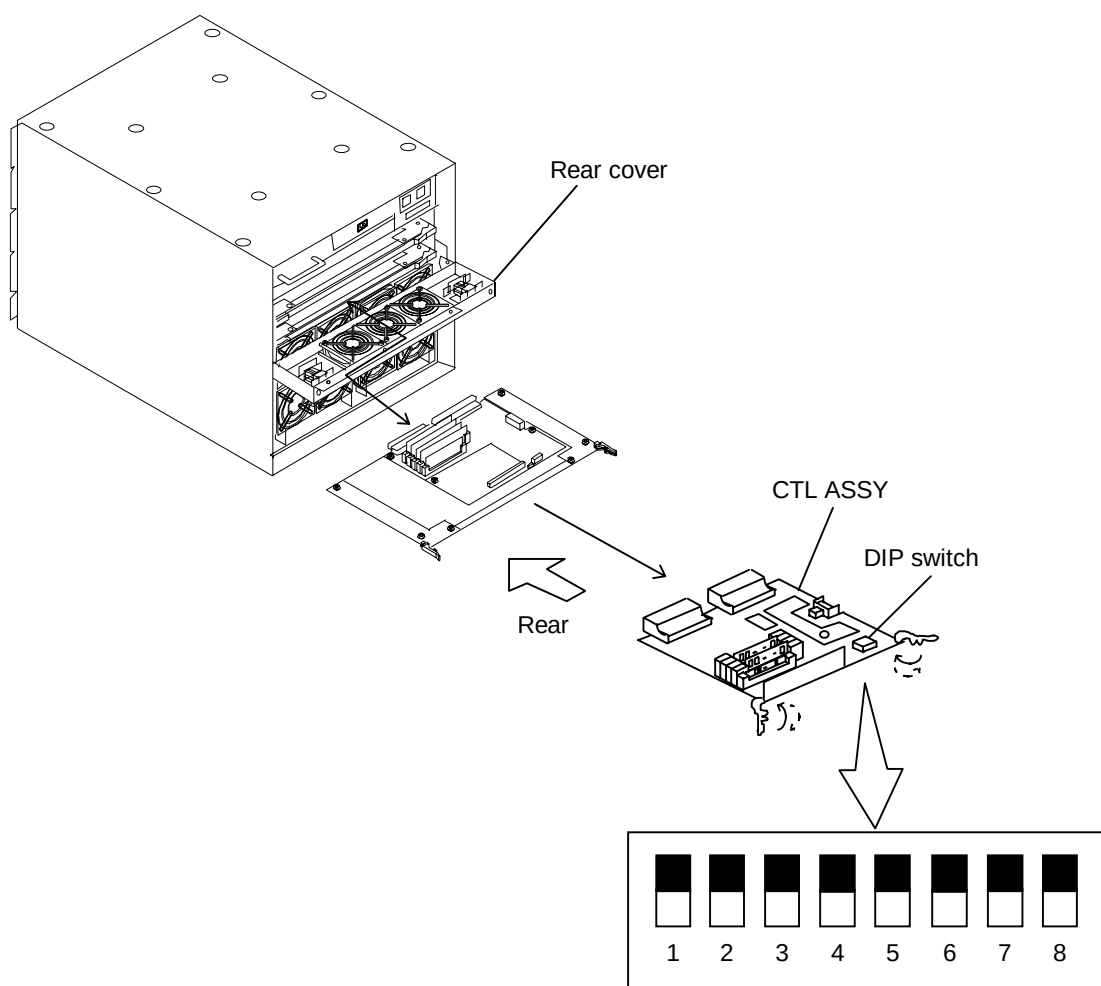
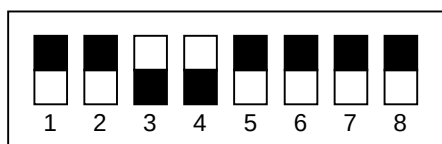


Figure 2.6.2 Installing the CTL ASSY

- (7) Connect FC cable, LAN (option) cable RS232C cable.
- (8) Set the DIP SW of both CTL ASSYs as shown below. Then, power on the unit. (See RW-OPTION0110.)



Note : Be sure to set the DIP SW of both CTL ASSYs.

- (9) Insert the system parameter back-up FD and restore the system parameter data from the FD. (See RW-OPTION0080.)

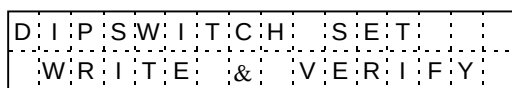
- (10) When system parameter set up menu appears as below, select "DUAL MODE" in "DUAL CONFIG" (setting of Dual operation attribute) menu. (See PANEL0080.)

Set the items #1, 3, 5, 6, 9, 16 and 17 in system parameter set up menu (See PANEL0080) for each controller individually. (The other menus are common menus. Same settings are executed for both controllers. Modification by CTL1 is not available.)

- The system parameter setting menu appears on the panel in the order of CTL0 and CTL1. "■" appears on the panel when the CTL1 system parameter is to be set.

"■" not displayed : CTL0 system parameter is set.

"■" displayed : CTL1 system parameter is set.

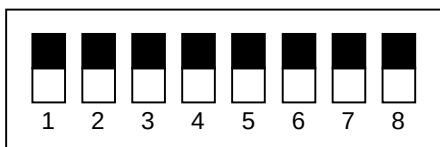


This indicates CTL0 system parameter setting.



This indicates CTL1 system parameter setting.

- (11) After the setting is ended, make a copy of the data into the back-up FD again. (See RW-OPTION0050.)
- (12) Check to see that READY LED is on.
- (13) Turn off the unit (by setting the POWER switch on the front panel to off).
- (14) Set the DIP SW on both boards as shown below.



- (15) Turn on the unit (by setting the POWER switch on the front panel to on). (See RW-OPTION0110.)
- (16) In a short while, the READY LED on the unit comes on.
Check to see "Version = XXXX/X" is displayed on the PANEL, and that corresponds to see system floppy disk version.
- (17) Close rear cover.

2.7 Installing the CACHE ASSY

- (1) Turn off the power according to the power-off procedure in RW-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

Sometimes the subsystem does not go power off after the main switch turned to "O" side with panel display "TOOMNYPIN" or "SYSDTSVER" or "POFFCMUNC". In this case refer to "Trouble shooting Section" (See TRBL0030) and turn off the power.

- (2) Open rear cover.
 (3) Remove the CTL ASSY. (See RW-OPTION0150.)
 (When a DF-F350F-F3WCF has been installed already, remove both boards, and here after in the same way.)
 (4) Install a CACHE ASSY.

Note 1 : The capacity of the CACHE ASSYs to be mounted in cache slots #0 and #4, slots #1 and #5, slots #2 and #6, and slots #3 and #7 must be the same.

Note 2 : If a DF-F350F-F3WCF has been installed already, mount a CACHE ASSY of the same capacity in the same corresponding slot of the optional CTL ASSY as those of the already installed CTL ASSY respectively.

Note 3 : CACHE ASSY of the largest capacity must be mounted cache slots #0 and #4 in case that CACHE ASSYs of different capacity are used.

- (5) Mount the CTL ASSY.
 (6) Close rear cover and turn on the power according to the power on procedure(RW-OPTION0110)

Installation example of CACHE ASSY

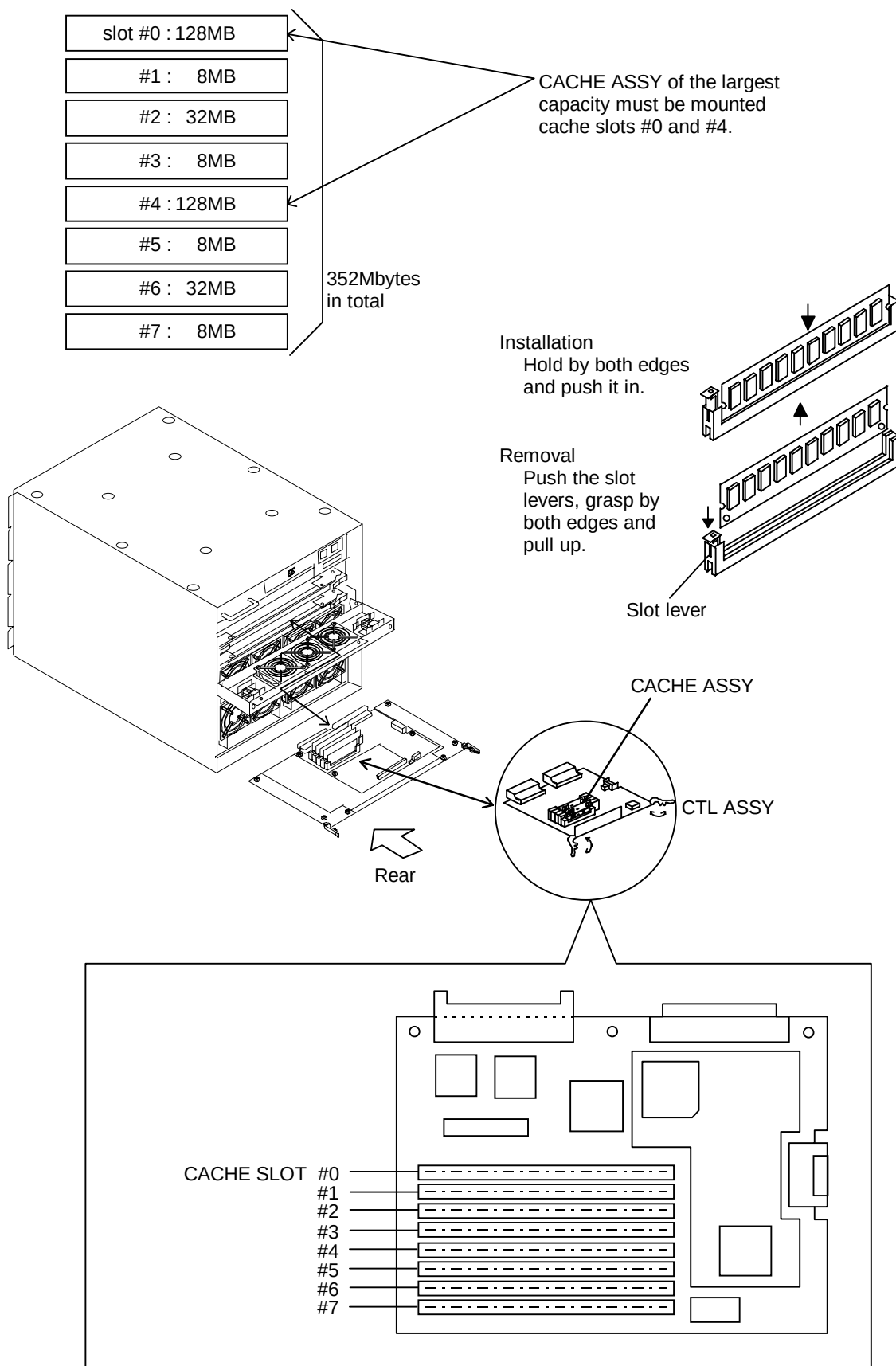


Figure 2.7.1 Installing a CACHE ASSY

2.8 Installing the LAN ASSY

- (1) Turn off the power according to the power-off procedure in RW-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

- (2) Open rear cover.
- (3) Remove the CTL ASSY. (See RW-OPTION0150.)
- (4) Install a LAN ASSY. (See Figure 2.8.1.)

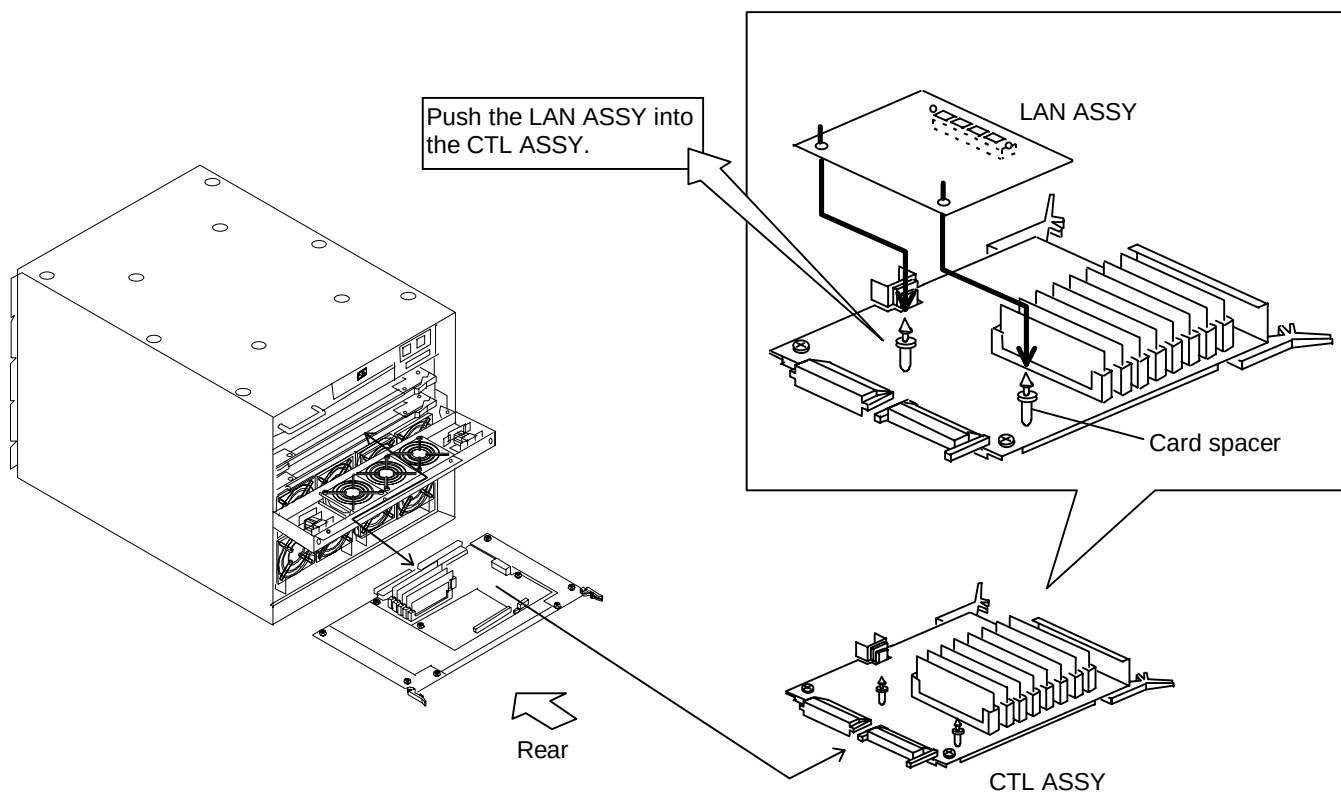
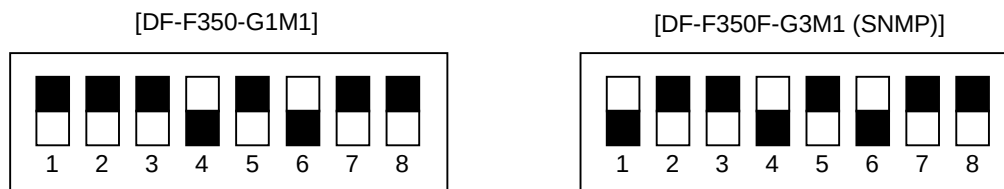


Figure 2.8.1 Installing a LAN ASSY

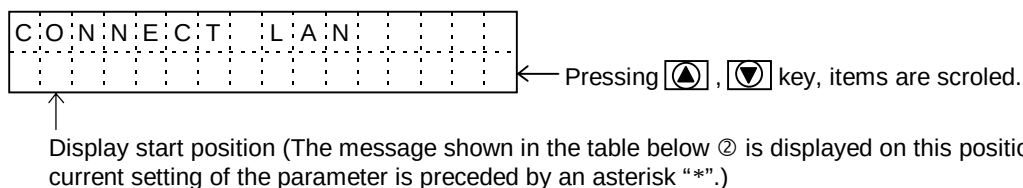
- (5) Mount the CTL ASSY.
- (6) Set the DIP switches on the CTL ASSY as described below. (See RW-OPTION0150.) depending on the LAN ASSY to be used.

(When a DF-F350F-F3WCF has been installed already, be sure to set the DIP switches on both CTL ASSYs.)



- (7) Turn on the power according to the power-on procedure in RW-OPTION0110.
- (8) Remove the front bezel.
- (9) Set LAN connection state on the panel.

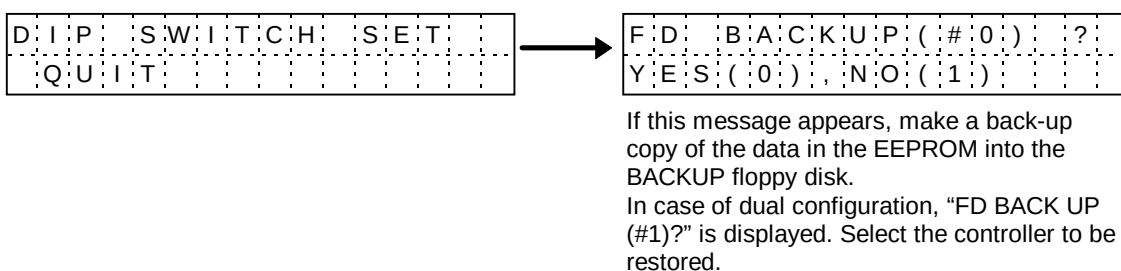
① Panel display



② Displayed Item

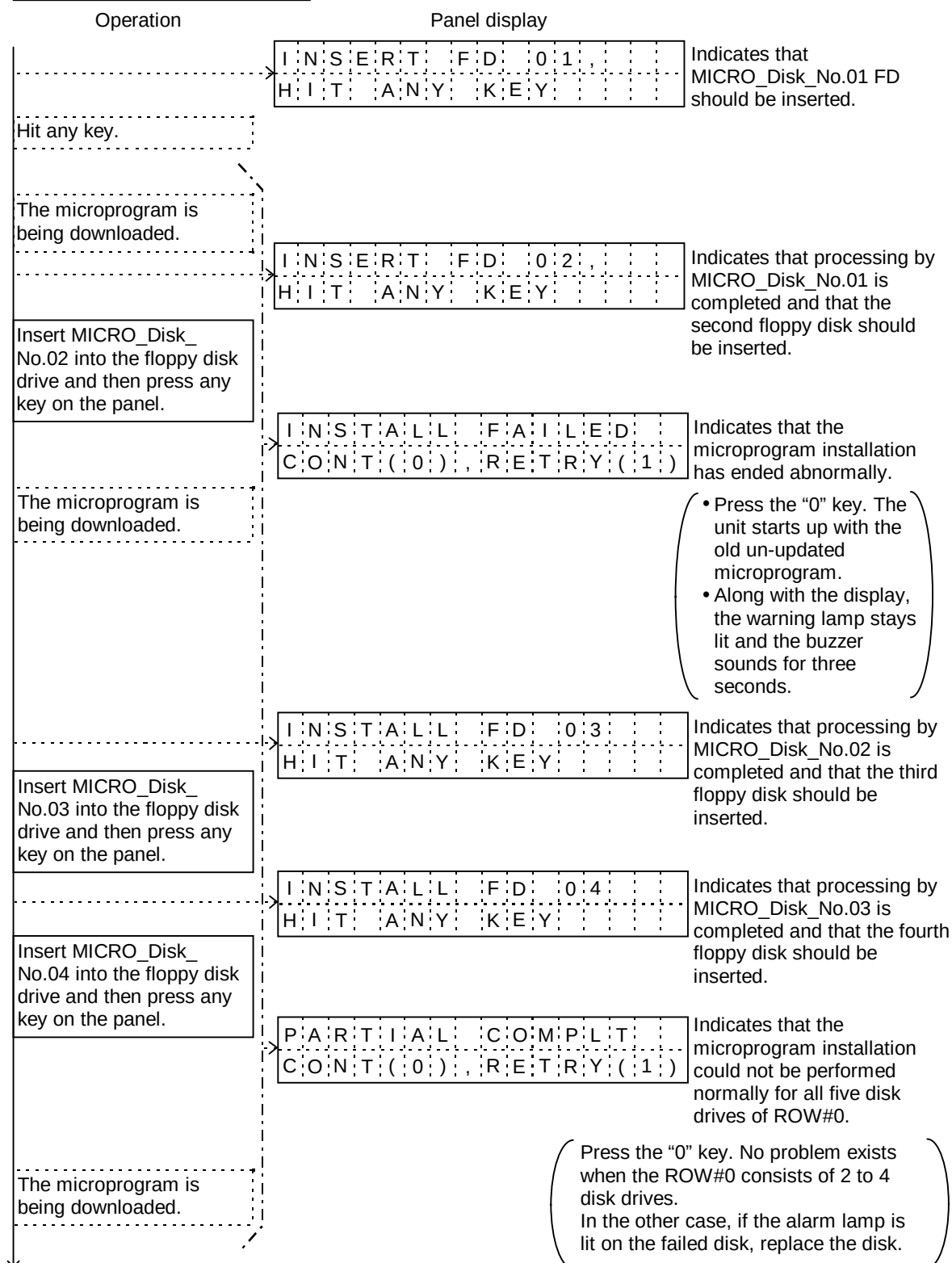
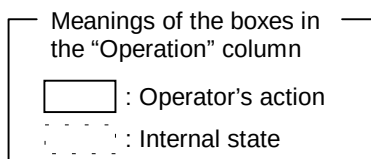
No.	Message display	Description
1	CONNECT	LAN connected
2	NOT CONNECT	LAN not connected

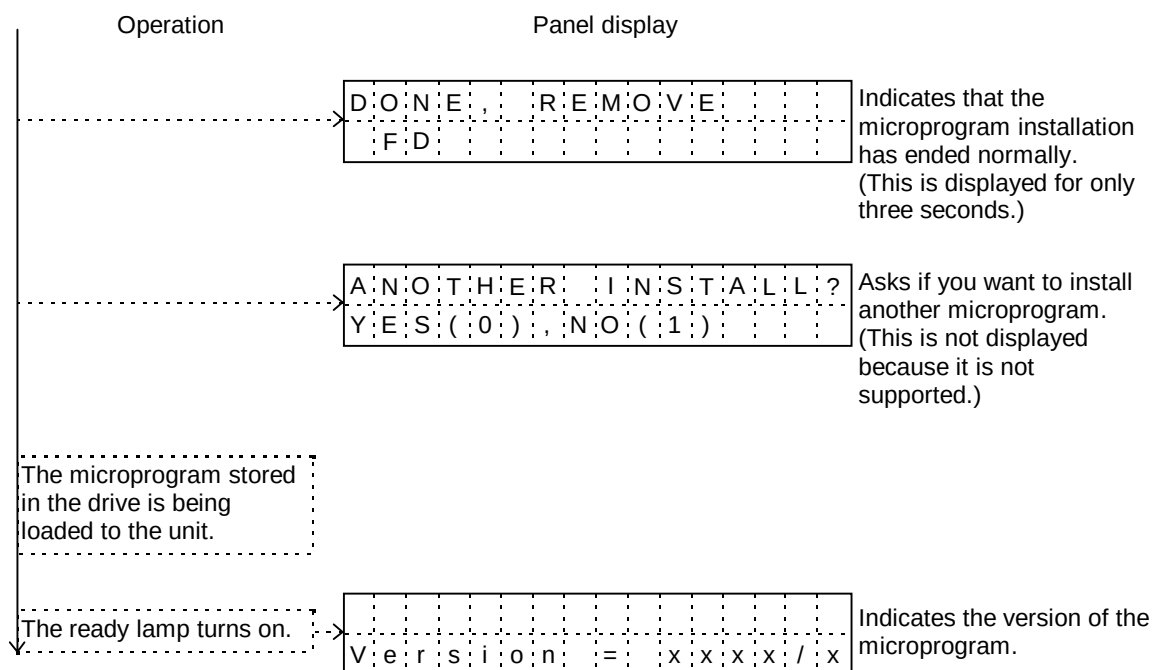
- (10) Set IP address on the panel. (See RW-INST0300)
- (11) Set SUB NET MASK. (See RW-INST0310)
- (12) Set DEFAULT GATEWAY address. (See RW-INST0320.)
- (13) Set System parameter on the panel. (See RW-INST0260.)
- (14) After setting ② in Chapter 5 and selecting “QUIT” on the panel, when “FD BACK UP” appears on the screen, insert a back-up FD and make a back-up copy of the system parameter. The “FD BACK UP” message may not appear for some unit types, so ignore this step in that case.



(15) Perform the following procedure.

Note : Use a set of four FDs (containing a microprogram corresponding to the SNMP) supplied with the DF-F350F-G3M1 when it is shipped from the factory.





(16) Reset the DIP switches (1, 4, 6) to the original positions after the system is ready.

(17) Close the front bezel.

(18) Close the side covers.

2.9 Installing the HDU ASSY

Since the procedure differs depending on the cases below, be careful in installing the HDU ASSY.

- [1] Capacity expansion with HDU ASSY exchange
- [2] Capacity expansion with additional HDU ASSY installation
- [3] Installing a spare HDU ASSY



Caution

Do not subject the HDU ASSY to any impact or vibration since it is a precision component.

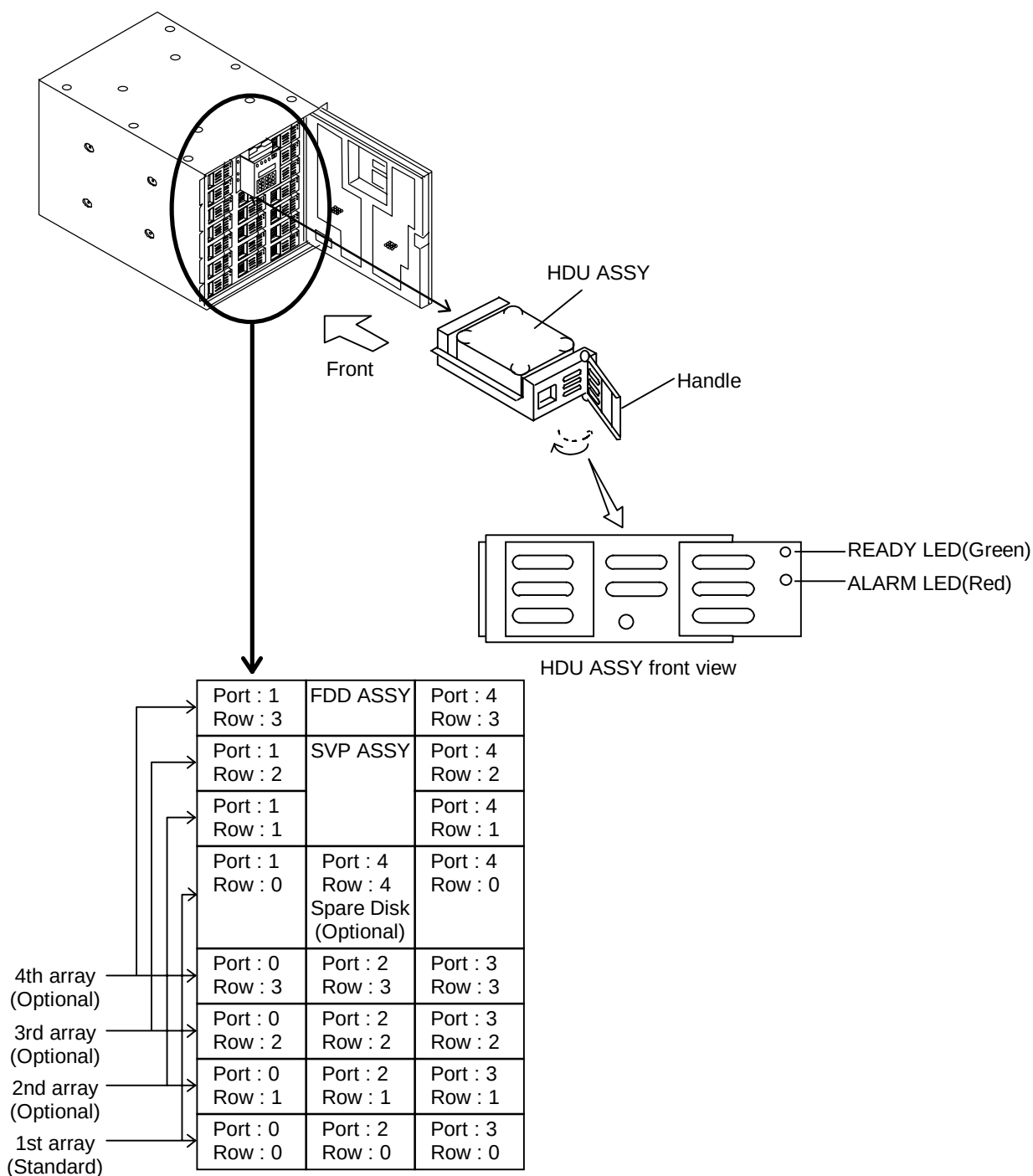


Figure 2.9.1 Installing the HDU ASSY

[1] Capacity expansion with HDU ASSY exchange

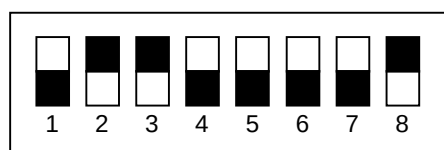
After this operation all the user's data will be lost. Be sure to make a back-up copy of data before beginning this operation. (See RW-OPTION0050.)

- (1) Turn off the power according to the power-off procedure in RW-OPTION0110.

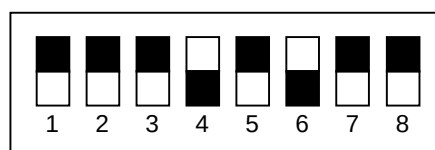
Notice : If the power is not turned off normally, the user's data might be lost.

- (2) Remove the front bezel, open the front panel and rear cover.
 (3) Remove the old HDU ASSY and set the new HDU ASSY. (See Figure 2.9.1 in RW-OPTION0240.)
 (4) Set the DIP switches 4 and 6 on the CTL ASSY to down.

(When a DF-F350F-F2WCF has been installed already, be sure to set the DIP switches on both CTL ASSYs.)



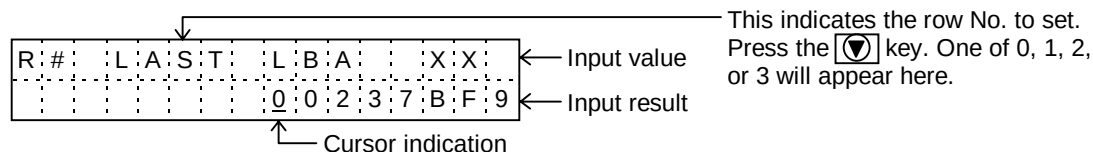
For ROW=0



For ROW≠0

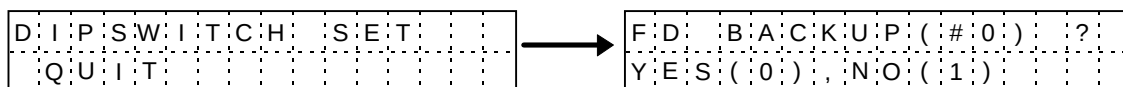
- (5) Turn on the power according to the power-on procedure RW-OPTION0110.
 (6) Set LBA on the panel following the table below. Set the capacity of each drive following the display. (See RW-OPTION0270.)

- When ROW LAST LBA is displayed;



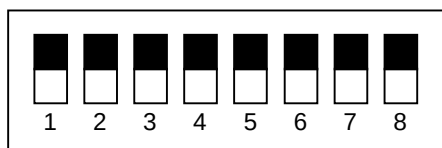
No.	Drive Capacity	Model	Final LBA No. (Hex)
1	2GB	DF-F350-A2E2	(3E696B)16
2	4GB	DF-F350-A2E4 DF-F350-A3E4	(7CD2D7)16
3	8GB	DF-F350-A1E8 DF-F350-A2E8	(1046C97)16
4	18GB	DF-F350-A1E18	(215D9B3)16

- (7) After selecting “QUIT” on the panel, when “FD BACK UP” appears on the screen, insert a back-up FD and make a back-up copy of the system parameter. The “FD BACK UP” message may not appear for some unit types, so ignore this step in that case.



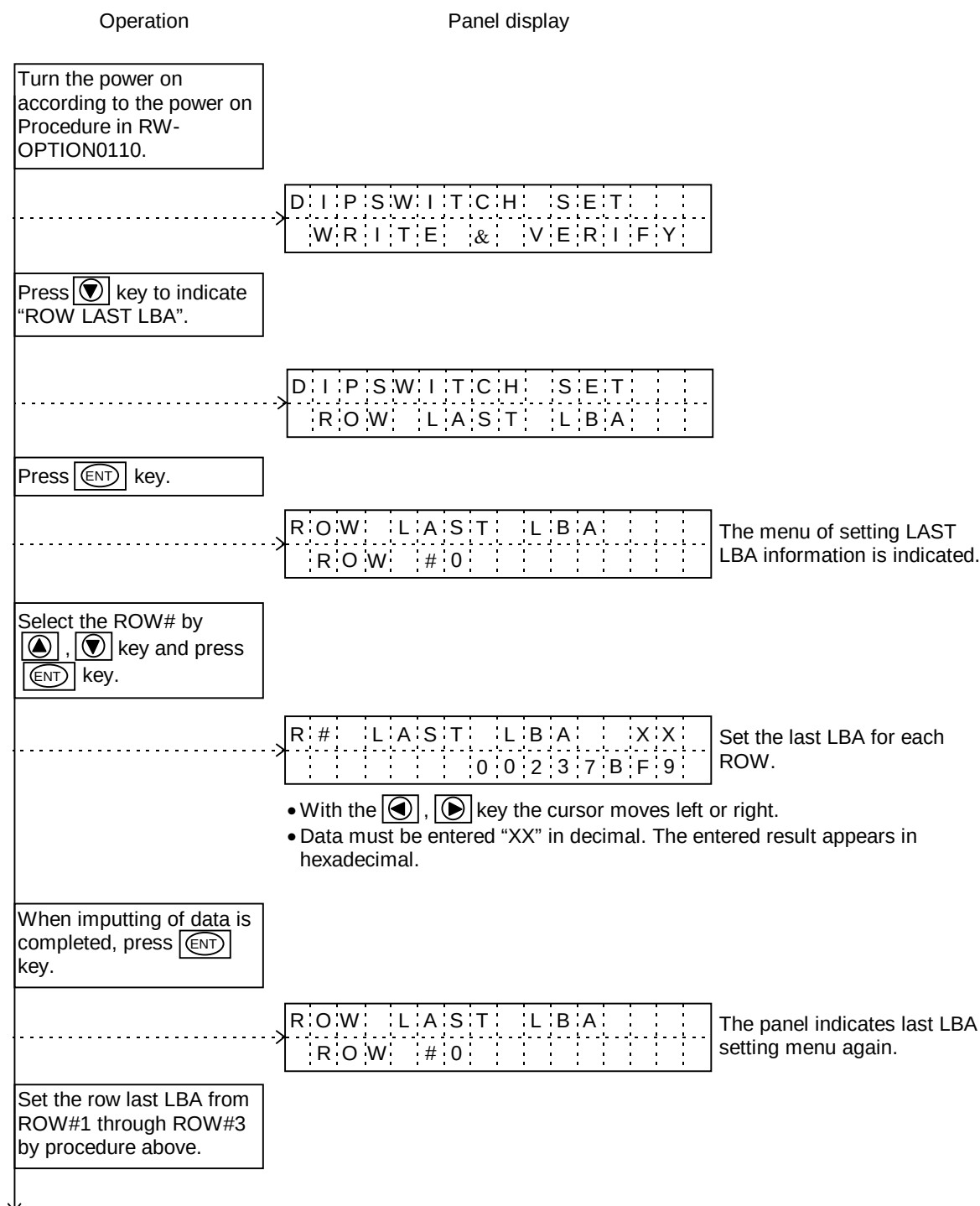
If this message appears, make a back-up copy of the data in the EEPROM into the back-up floppy disk.
In case of dual configuration, “FD BACK UP (#1)?” is displayed.
Select the controller to be restored.

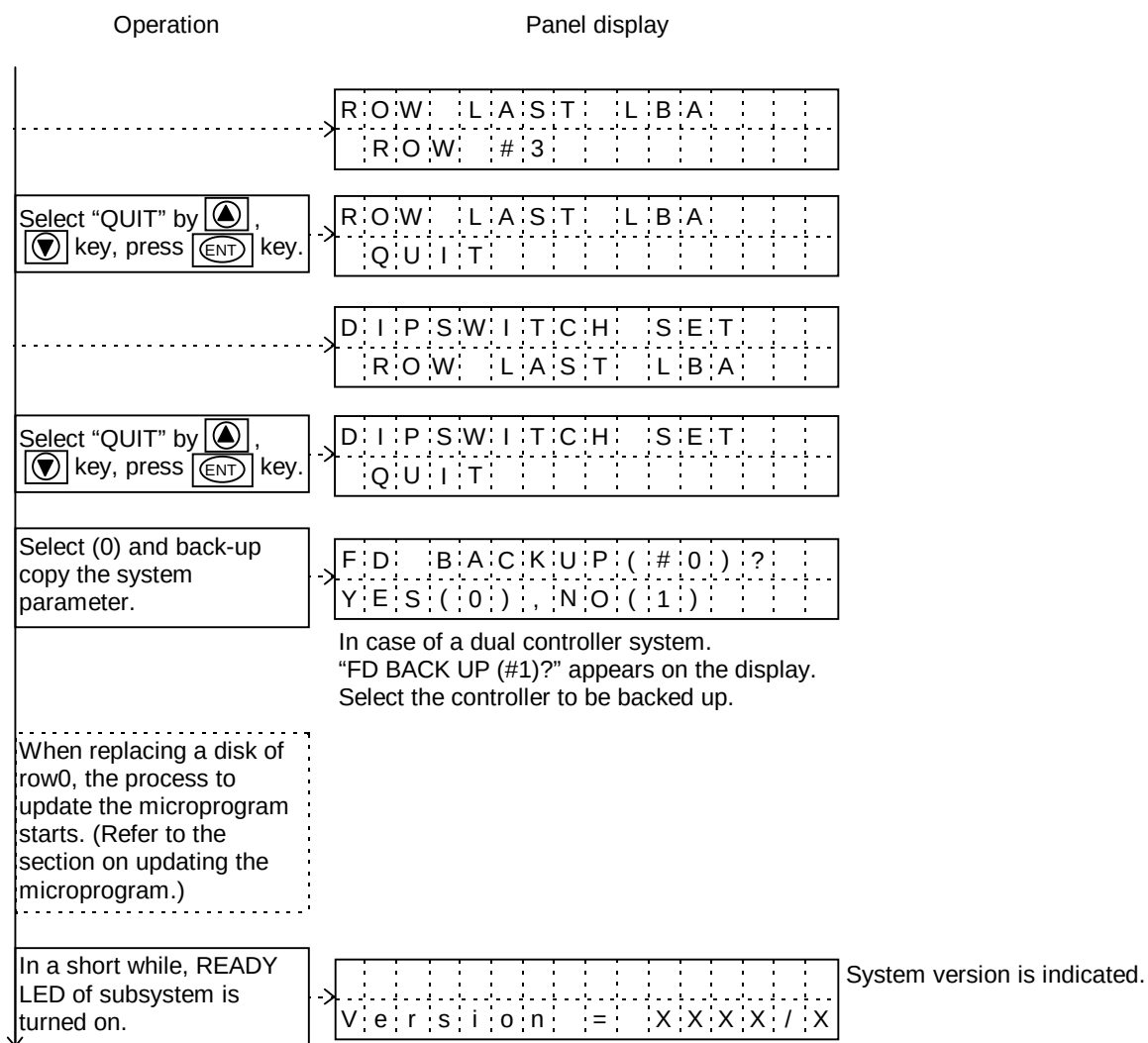
- (8) Reset the DIP switch 4 and 6 to the original positions after the system is ready.



- (9) Only in case of exchanging ROW0 disk, revise the microprogram. (See “5 MICROPROGRAM-FC” Chapter)
- (10) Set up the RAID group and the LU. (See Installation Chapter.)
- (11) Close the front panel and rear cover.
- (12) Attach the front bezel.

Set the LAST LBA number on the panel according to the flow below.





[2] Capacity expansion with additional HDU ASSY installation

Additional HDU installation to a new ROW.

- (1) Turn off the power according to the power-off procedure in RW-OPTION0110.

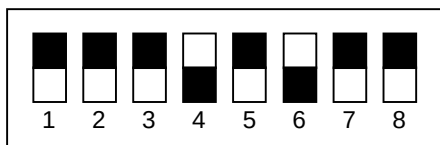
Notice : If the power is not turned off normally, the user's data might be lost.

- (2) Remove the front bezel, open the front panel and rear cover.

- (3) Install an additional HDU ASSY.

- (4) Set the DIP switches 4 and 6 on the CTL ASSY to down.

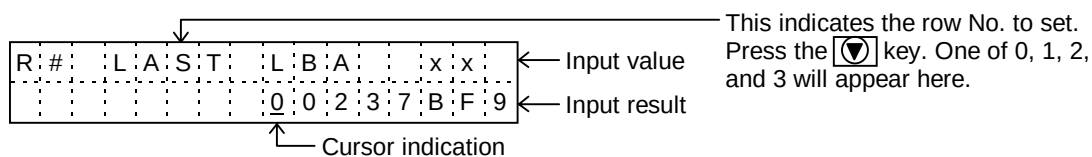
(When a DF-F350F-F3WCF has been installed already, be sure to set the DIP switches on both CTL ASSYs.)



- (5) Turn on the power according to the power-on procedure in RW-OPTION0110.

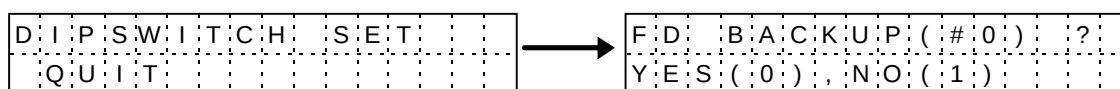
- (6) Set the system LBA number with the panel according to the table below. In setting the available capacity of each drive follow ROW LAST LBA menu. Set the capacity following the displayed menu. (See RW-OPTION0270.)

- When ROW LAST LBA is displayed;



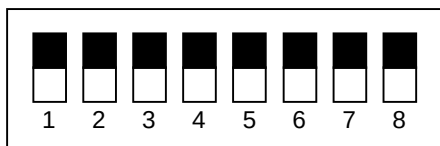
No.	Drive Capacity	Model	Final LBA No. (Hex)
1	2GB	DF-F350-A2E2	(3E696B)16
2	4GB	DF-F350-A2E4 DF-F350-A3E4	(7CD2D7)16
3	8GB	DF-F350-A1E8 DF-F350-A2E8	(1046C97)16
4	18GB	DF-F350-A1E18	(215D9B3)16

- (7) After selecting "QUIT" on the panel screen, when "FD BACK UP" appears on the screen, insert a back-up FD and make a back-up copy of system parameter. The "FD BACK UP" message may not appear for some unit types, so ignore this step in that case.



If this message appears, select (0) and make a back-up copy of the data in the EEPROM into the back-up floppy disk.
In case of a dual system, it is displayed "FD BACK UP (#1)?". Select the controller to be backed up.

- (8) Reset the DIP switch 4, 6 to the original positions after the system is ready.



- (9) Set up the RAID group and the LU. (See Installation Chapter.)

Notice : Deleting or re-formatting the set up RAID group or LU, the data is also deleted. Be sure to make a back-up copy of user's data before execution.

- (10) Close the front panel and rear cover.

- (11) Attach the front bezel.

Additional HDU installation to existing ROW.

- (1) Turn off the power according to the power-off procedure in RW-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

- (2) Remove the front bezel and open the front panel.

- (3) Install additional HDU.

Be sure to install an HDU of capacity no less than pre-installed HDUs. When an HDU of less capacity is installed, after power on (5), warning LED will light up and display shown in Figure 2.9.2 will appear.

Prepare an HDU of appropriate capacity and re-install from (1).

Set the capacity referring to the system parameter setting table.

H	Z	1	4	X	Y	P	O	N	C	A	P	-	X	Y

X : Port number

Y : Row number

Figure 2.9.2 Panel Display when Improper Capacity

- (4) Turn the power on following the power on procedure. (See RW-OPTION0110.)

- (5) Set up the RAID group and the LU. (See Installation Chapter.)

Notice : Deleting or re-formatting the set up RAID group or LU, the data is also deleted. Be sure to make a back-up copy of user's data before execution.

[3] Installing a spare HDU ASSY

- (1) Turn off the power according to the power-off procedure in RW-OPTION0110.

Notice : If the power is not turned off normally, the user's data might be lost.

- (2) Remove the front bezel, open the front panel and rear cover.
 (3) Install a spare HDU ASSY.

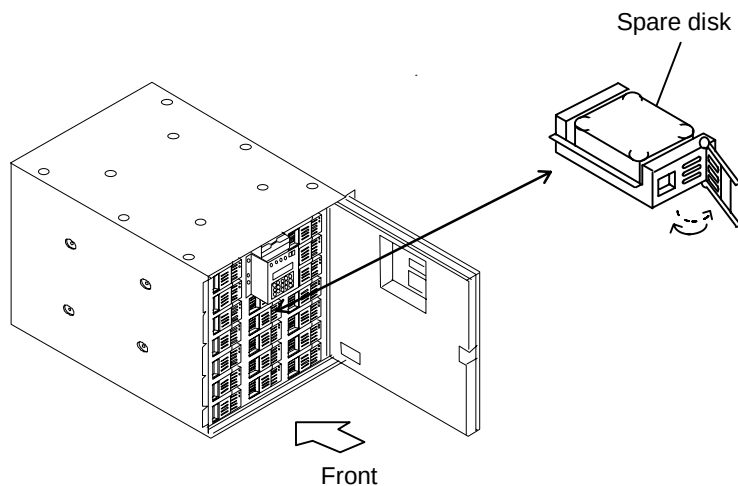
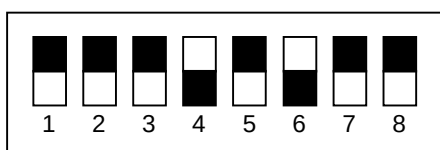


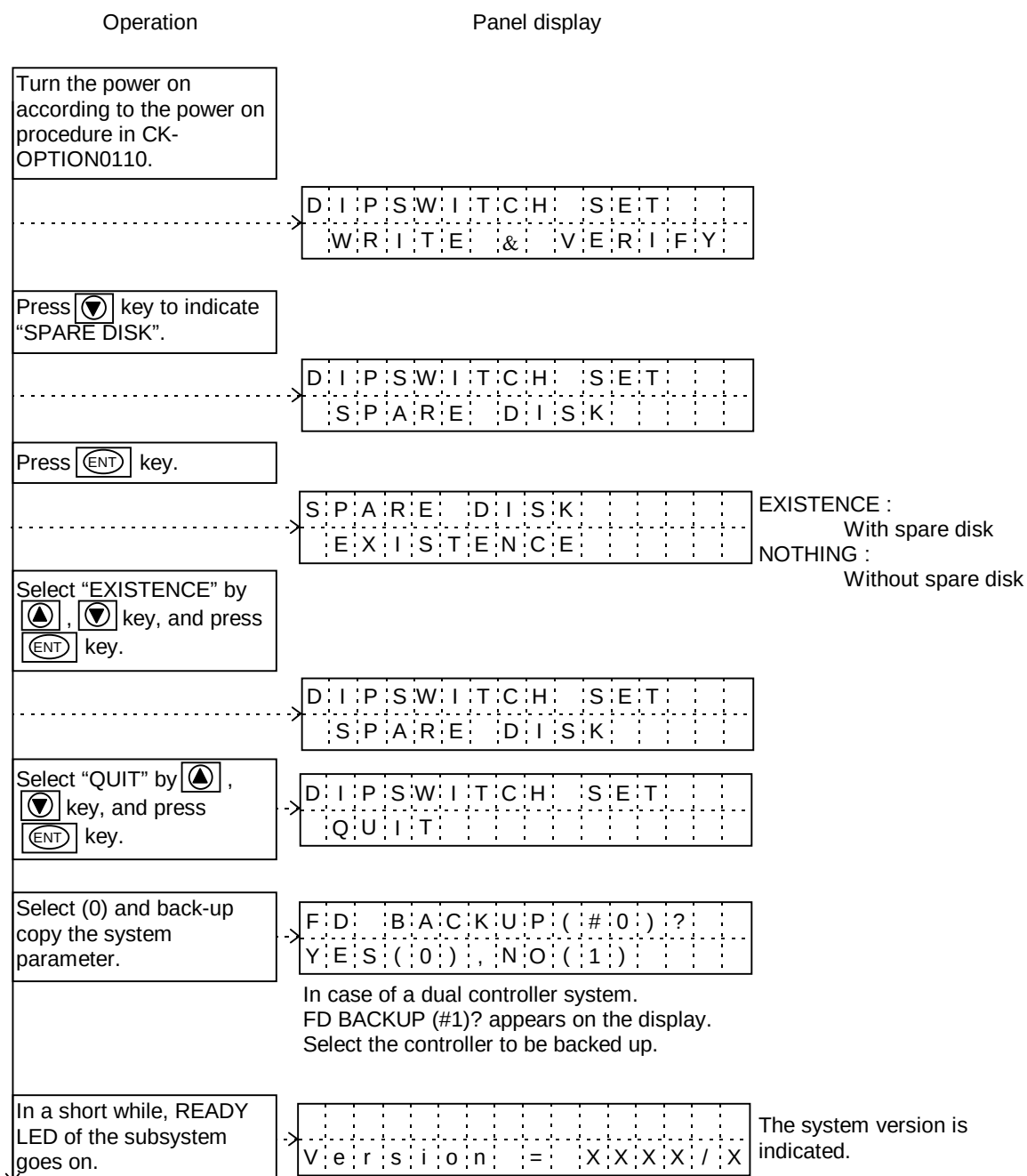
Figure 2.9.3 Installation of Spare Disk

- (4) Set the DIP switches 4 and 6 on the CTL ASSY to down.
 (When a DF-F350F-F3WCF has been installed already, be sure to set the DIP switches on both CTL ASSYs.)

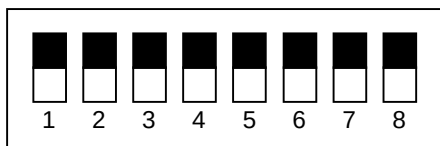


- (5) Turn on the power according to the power-on procedure in RW-OPTION0110.

(6) Set the spare disk from the PANEL according to the flow below.



- (7) Reset the DIP switches 4 and 6 to the original positions, after READY LED lit up.



- (8) Close the front panel and rear cover.

- (9) Attach the front bezel.

DF350F Disk Subsystem
10. PARTS CATALOG
(Rack Mount (RKWH/U2) Type)

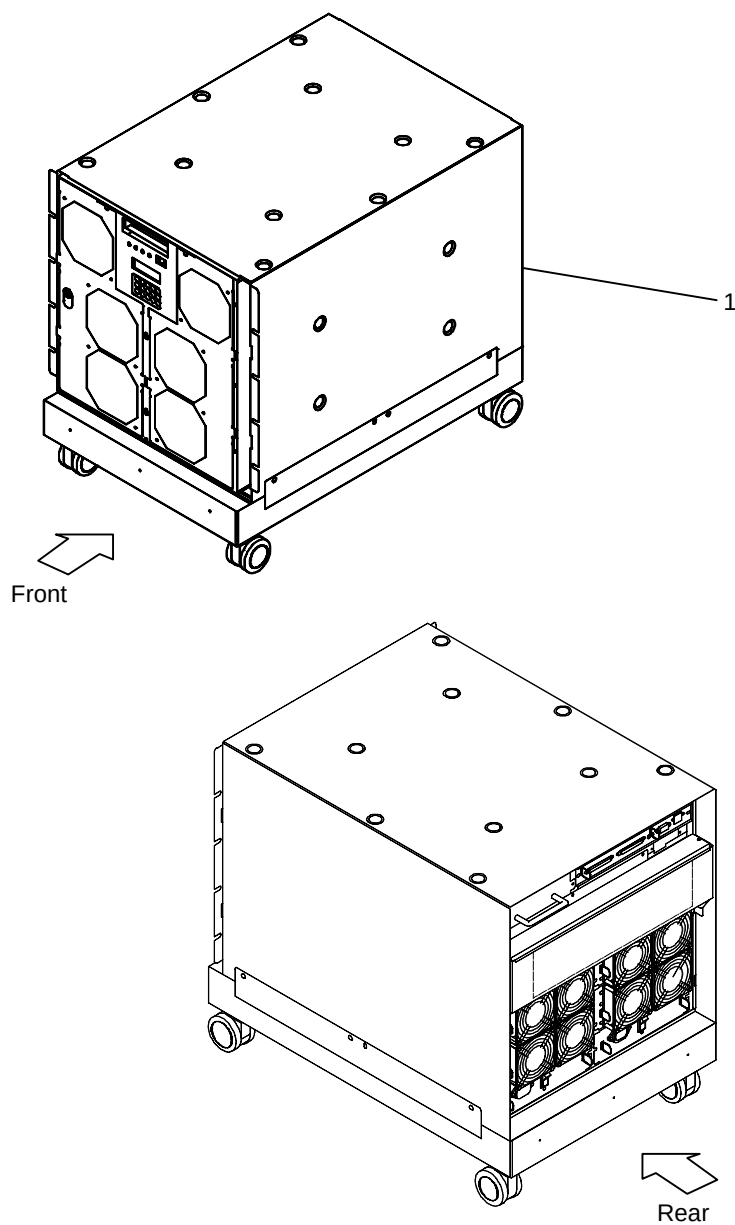
Rev.2

REV.	Date	DRW.	CHKD	APPD	Sheet No.	Description	Code
0	Jan.20.'98	A.Yamanashi	K.Aruga	H.Iwasaki	All	Issued	
1	Jul.31.'98	A.Yamanashi	K.Aruga	H.Iwasaki	0040	Added A2E8, A1E18.	AD
2	Oct.16.'98	A.Yamanashi			0040 0100	Added A3E4. Added CHANNEL-1.	AD AD

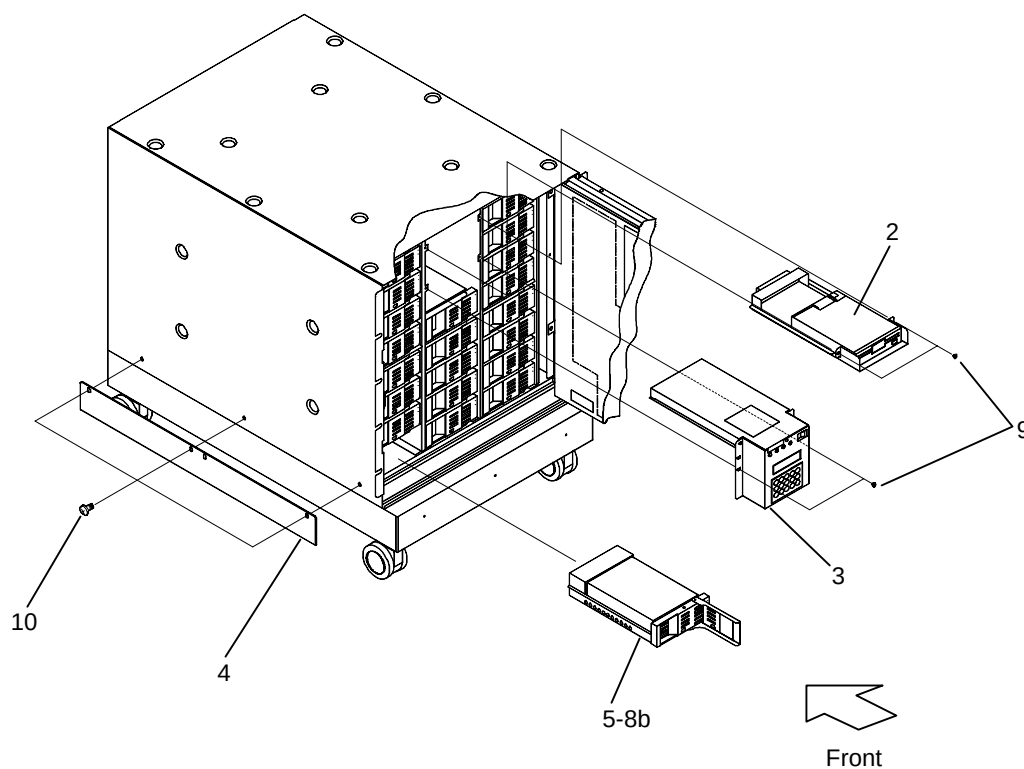
HOW TO USE THIS PARTS CATALOG

LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
1-		FINAL ASSY		
1	1504188-A	FINAL ASSY (SEE LIST 1)	1	
2	3240337-A	• FDD ASSY	1	S.P.
3	3247397-A	• SVP PANEL ASSY	1	S.P.
4	3247273-1	• PLATE	1	
5	3243084-E	• HDU ASSY (DF-F350-A2E2)	2-21	S.P.
6	3243084-F	• HDU ASSY (DF-F350-A2E4)	2-21	S.P.
7	3243084-G	• HDU ASSY (DF-F350-A1E8)	2-21	S.P.

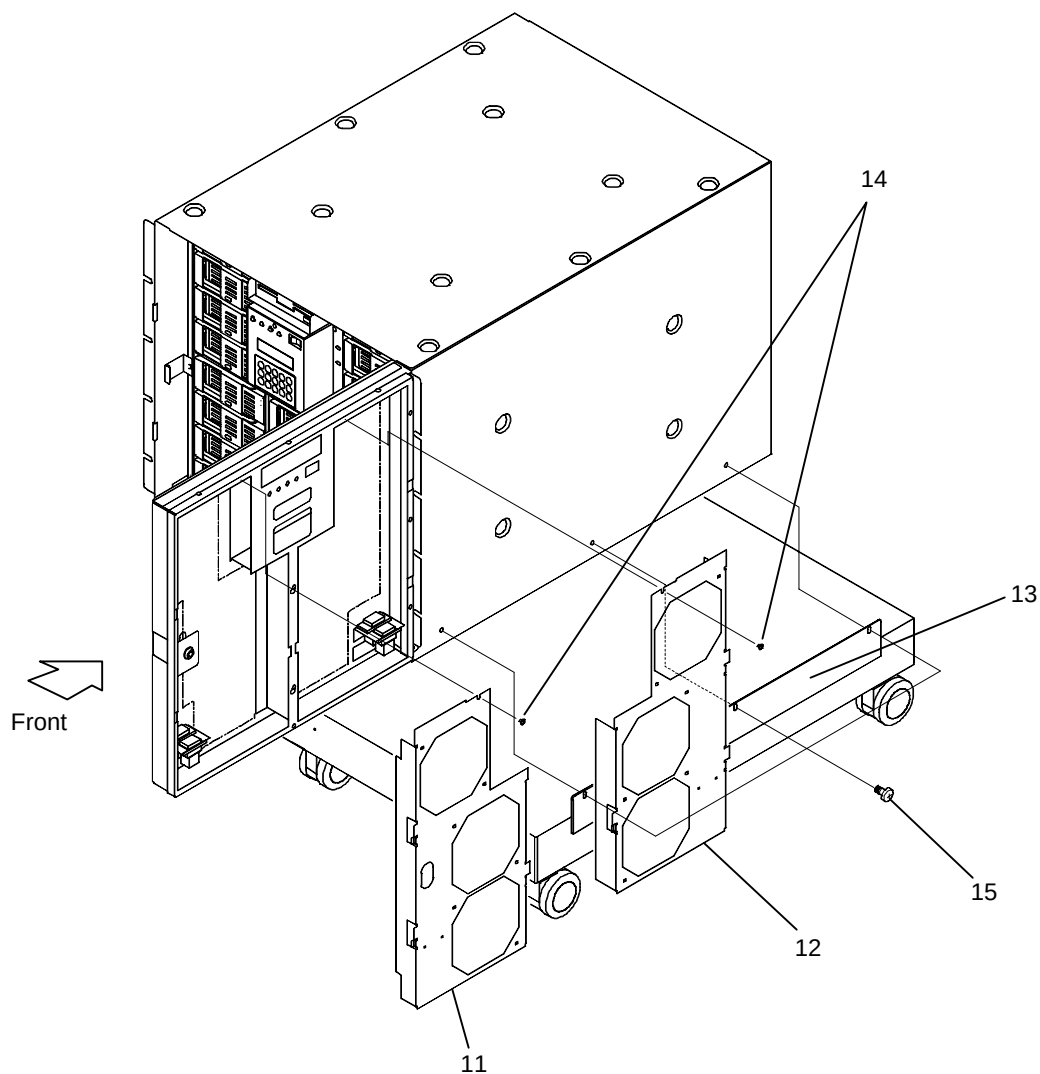
- ① indicates the list number of the assembly given on the visual index.
- ② indicates the item number given on the drawing in the catalog section.
- ③ indicates the part number.
- ④ has the following meaning.
- indicates an assembly or equivalent part.
 - indicates a subassembly or equivalent part included in an assembly indicated by....
- ⑤ indicates the unit type.
- ⑥ indicates the possible number of the subsystem.
- ⑦ indicates S.P.
- If S.P. is written in Remarks, the part or the assembly is spare parts.



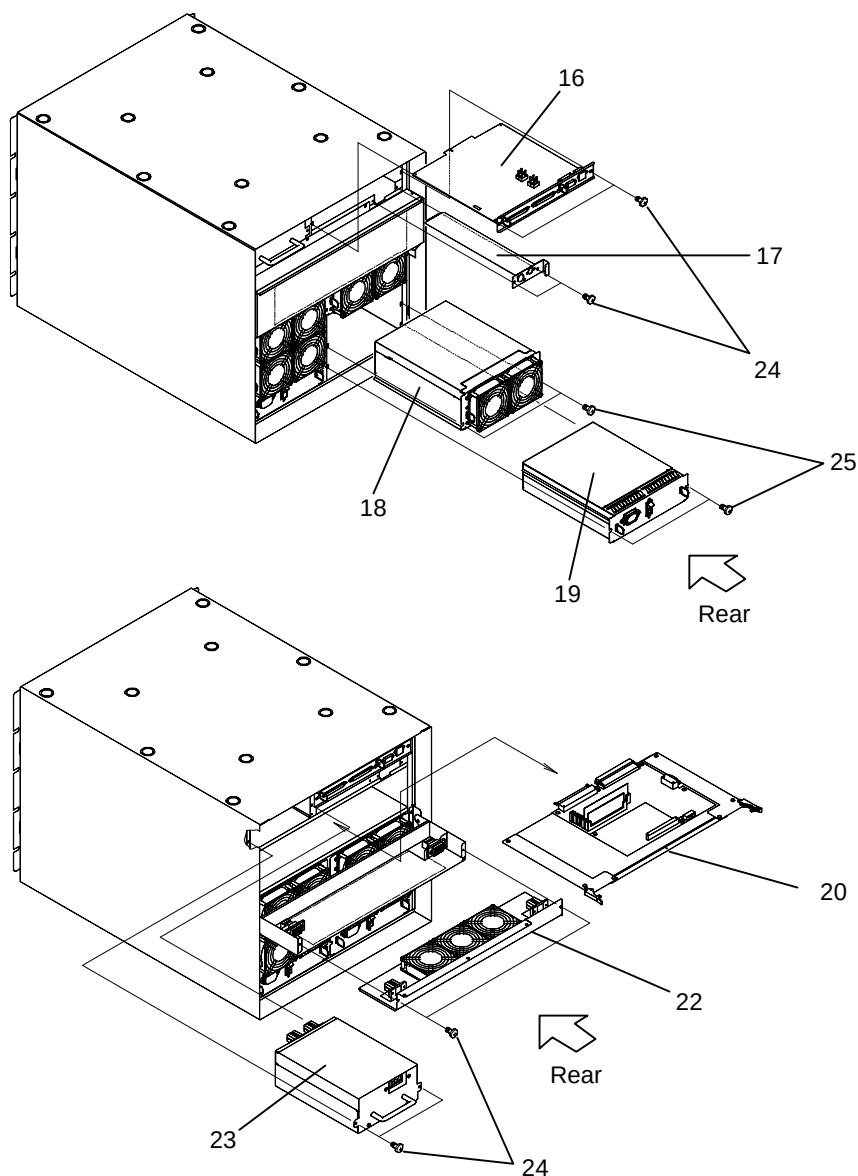
LIST NO.	NAME OF PARTS	SHEET NO.
1	FINAL ASSY	RW-PARTS0040



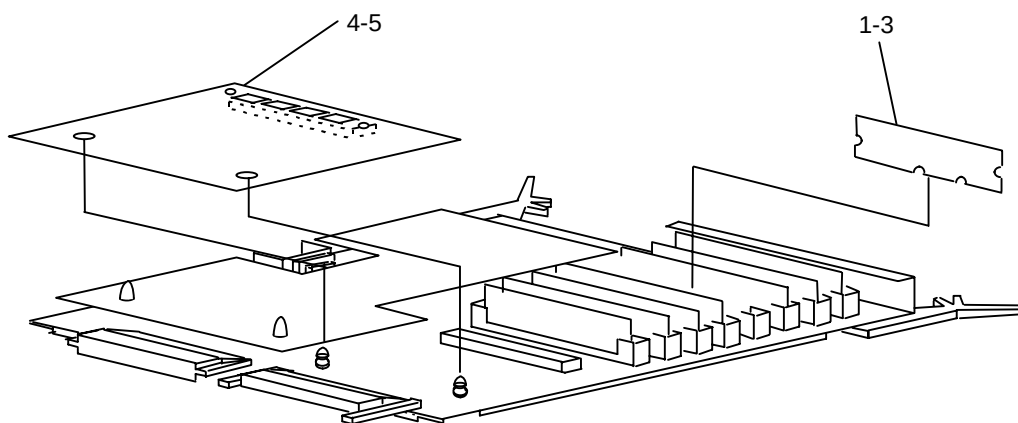
LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
1-		FINAL ASSY		
1	1504188-A	FINAL ASSY (SEE LIST 1)	1	
2	3245116-A	• FDD ASSY (DF-F350-M1RW)	1	S.P.
3	3247397-A	• SVP PANEL ASSY (DF-F350-L1WL)	1	S.P.
4	3247273-1	• PLATE	1	
5	3243084-E	• HDU ASSY (DF-F350-A2E2)	2-21	S.P.
6	3243084-F	• HDU ASSY (DF-F350-A2E4)	2-21	S.P.
7	3252929-E	• HDU ASSY (DF-F350-A3E4)	2-21	S.P.
8	3243084-G	• HDU ASSY (DF-F350-A1E8)	2-21	S.P.
8a	3252929-B	• HDU ASSY (DF-F350-A2E8)	2-21	S.P.
8b	3252929-A	• HDU ASSY (DF-F350-A1E18)	2-21	S.P.
9	SB306	• BIND SCREW (M3 × 6)	4	
10	SB408	• BIND SCREW (M4 × 8)	3	



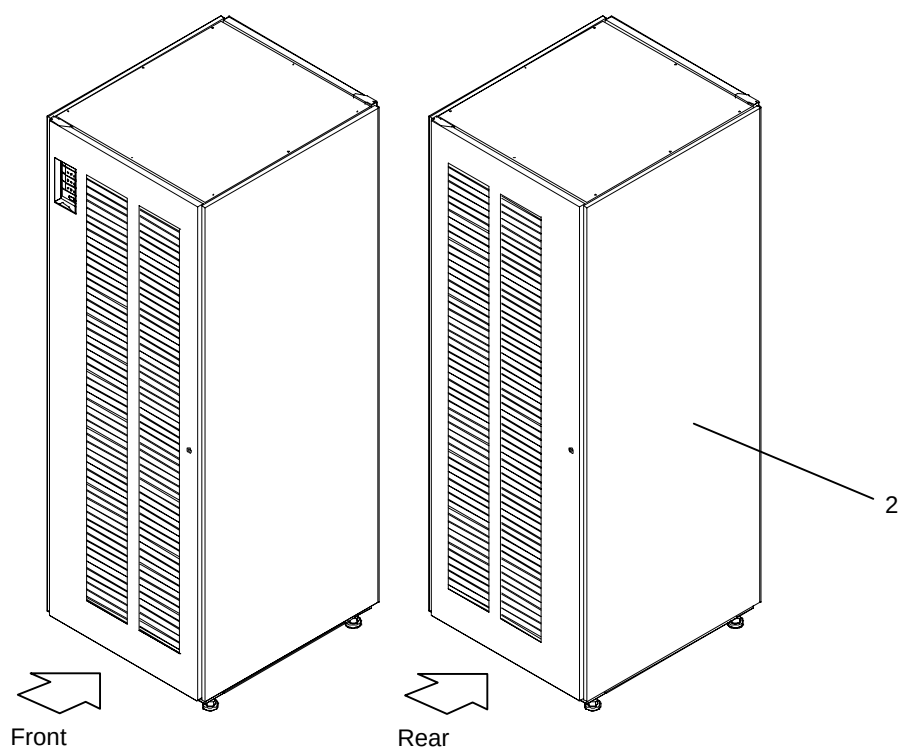
LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
1-		FINAL ASSY		
11	2099367-A	• FAN (F-L) ASSY (DF-F350-P1RW)	1	S.P.
12	2099368-A	• FAN (F-R) ASSY (DF-F350-P2RW)	1	S.P.
13	2100472-A	• CART ASSY	1	
14	SB306	• BIND SCREW (M3 × 6)	2	
15	SB408	• BIND SCREW (M4 × 8)	3	



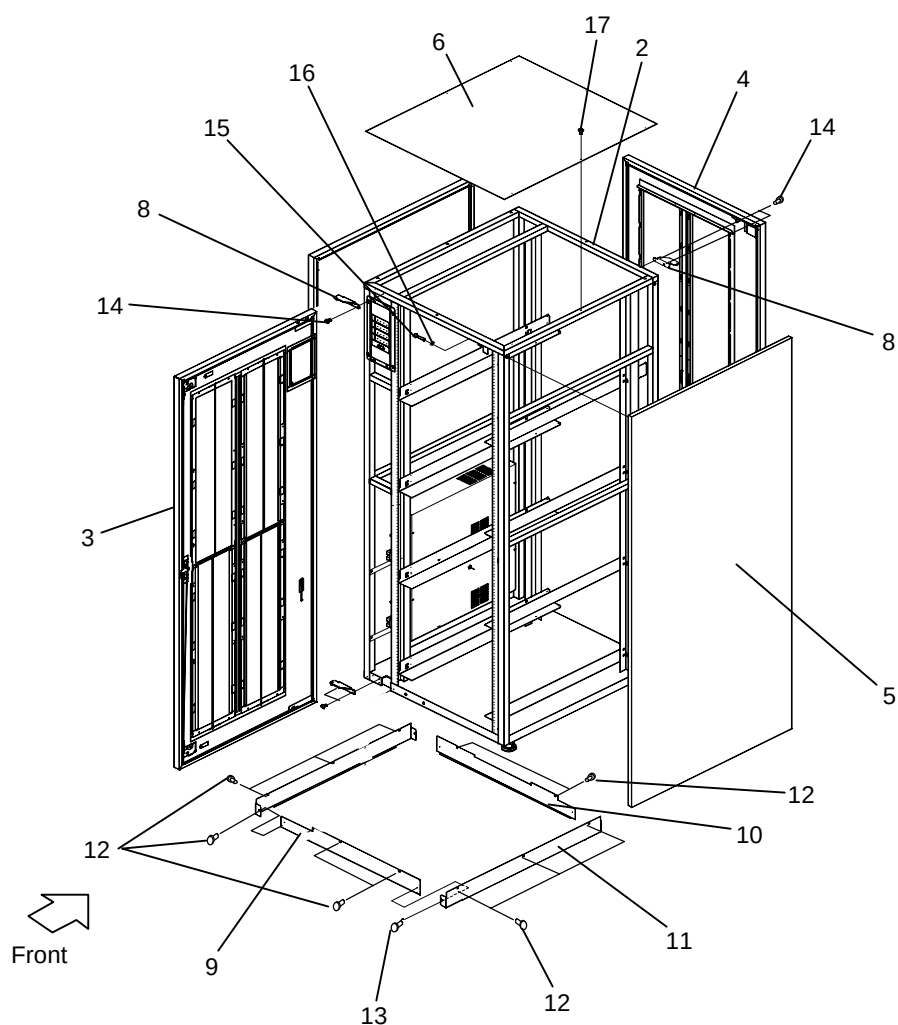
LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
1-		FINAL ASSY		
16	3250743-C	• I/F ADAPTER ASSY (DF-F350F-DWON)	1-2	S.P.
17	5494034-A	• HI-OP ASSY	1	
18	5486141-302	• AC/DC POWER SUPPLY (DF-F350-B1RW)	4	S.P.
19	5486142-305	• IN BOX ASSY (DF-F350-Q1RW)	2	S.P.
20	3250742-A	• CTL ASSY (DF-F350F-F3WCF)	1	S.P.
21				
22	3245118-A	• FAN (R) ASSY (DF-F350-P3RW)	1	S.P.
23	2099365-B	• BATTERY ASSY (DF-F350-N2RW)	1	S.P.
24	SB306	• BIND SCREW (M3 × 6)	8	
25	SB408	• BIND SCREW (M4 × 8)	4	



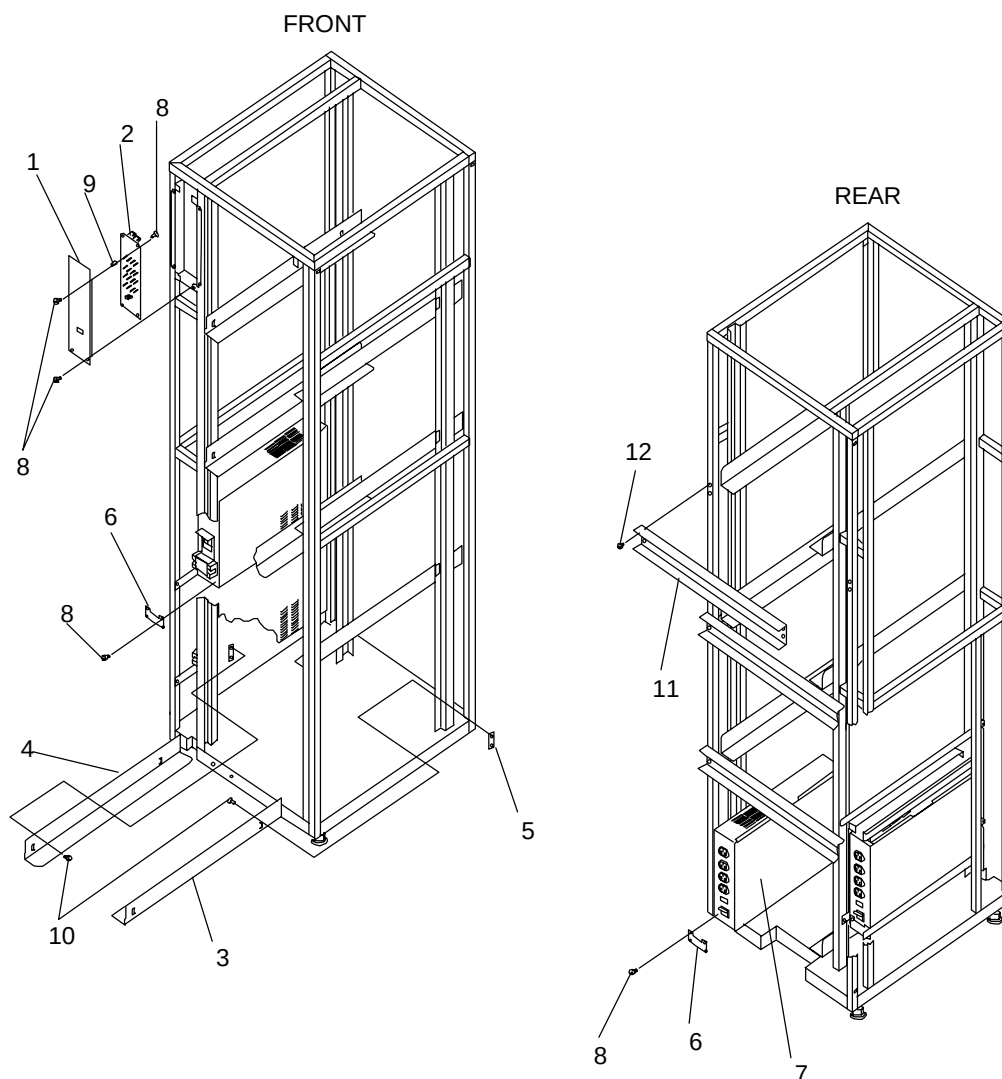
LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
1-20-		FINAL ASSY		
1	3247121-A	•• CACHE MEMORY (DF-F350-C8E)	2, 4, 6, 8	S.P.
2	3247121-B	•• CACHE MEMORY (DF-F350-C32E)	2, 4, 6, 8	S.P.
3	3247121-C	•• CACHE MEMORY (DF-F350-C128E)	2, 4, 6, 8	S.P.
4	5493862-A	•• LAN ASSY (DF-F350-G1M1)	0-1	S.P.
5	5493862-C	•• LAN ASSY (DF-F350F-G3M1)	0-1	S.P.



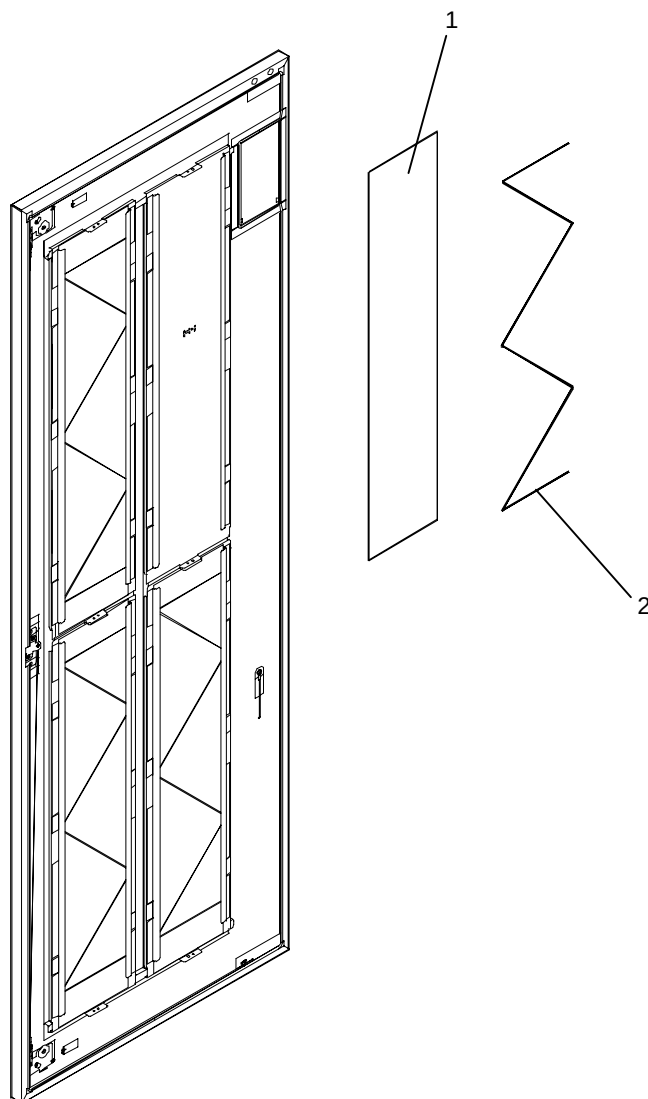
LIST NO.	NAME OF PARTS	SHEET NO.
2	FINAL ASSY	RW-PARTS0090



LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
2-		FINAL ASSY		
1	1504440-A	FINAL ASSY (U2)	1	
2	1504439-A	• SUB FINAL ASSY	1	
3	1504437-A	• FRONT DOOR ASSY	1	
4	1504438-A	• REAR DOOR ASSY	1	
5	3245128-A	• SIDE COVER ASSY	1	
6	3245112-1	• TOP COVER	1	
7	5460630-B	• HINGE ASM (L)	2	
8	5460631-B	• HINGE ASM (U)	2	
9	3245121-1	• SKIRT (FRONT)	1	
10	3245122-1	• SKIRT (REAR)	1	
11	3245123-1	• SKIRT (SIDE)	2	
12	5409006-1	• SCREW (BLACK)	10	
13	5411531-2	• SCREW (BLACK)	4	
14	BS510	• HEXAGON SOCKET BOLT	4	
15	SB536	• BIND SCREW (M5 × 36)	4	
16	2051001-532	• LL WASHER	4	
17	3183101-1	• HWA BIND SCREW	8	



LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
2-2-	1504439-A	SUB FINAL ASSY		
1	3247197-1	• PANEL (OP)	1	S.P.
2	2100418-A	• SH045-A PK ASSY	1	
3	3247413-1	• RAIL (HT)	4	
4	3247413-2	• RAIL (HT)	4	
5	5486467-1	• PLATE NUT	16	
6	5494025-1	• STOPPER (PDB)	4	S.P.
7	5490856-A	• PDB ASSY	2	
8	SB306	• BIND SCREW (M3 × 6)	18	
9	3183001-312	• LONG NUT	4	
10	BS510	• HEXAGON SOCKET BOLT	4	
11	3247412-1	• CHANNEL-1	3	
12	SB510	• BIND SCREW (M5 × 10)	12	



LIST AND INDEX NUMBER	PARTS NUMBER	NAME OF PARTS	UNIT PER ASSY	REMARKS
2-3-	1504437-A	FRONT DOOR ASSY		
1	3245124-1	• FILTER	4	S.P.
2	3245163-1	• FILTER STOPPER	4	
3				
4				
5				

DF350F Disk Subsystem

11. INSTALLING IN RACK FRAME

(Rack Mount (RKWH/U2) Type)

Rev.2

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

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This publication does not contain ® or ™ in its text.

REV.	Date	DRW.	CHKD	APPD	Sheet No.	Description	Code
0	Jan.20.'98	A.Yamanashi	K.Aruga	H.Iwasaki	All	Issued	
1	Jul.31.'98	A.Yamanashi	K.Aruga	H.Iwasaki	0150 0260	Changed CAUTION. Changed CAUTION.	CH CH
2	Oct.16.'98	A.Yamanashi			0140	Added 12, 13 on URASD table.	AD

FRAME

1. Installing Into HP Rack Frame	RW-FRAME0040
1.1 Space (Height Inside the Rack) Required for Installation	RW-FRAME0040
1.2 Optional Parts Required for Installation	RW-FRAME0040
1.3 Tools Required.....	RW-FRAME0050
1.4 Installing the Subsystem into the Rack	RW-FRAME0050
1.4.1 Procedures for installation	RW-FRAME0060
1.4.2 Removing and installing the front bezel.....	RW-FRAME0070
1.4.3 Installing the rails	RW-FRAME0080
1.4.4 Installing the spacer.....	RW-FRAME0090
1.4.5 Install the subsystem into the rack	RW-FRAME0110
1.4.6 Securing the front side of the subsystem	RW-FRAME0120
1.4.7 Securing the rear side of the subsystem	RW-FRAME0130
2. Installing Into IBM AS/400 (9309) Rack Frame.....	RW-FRAME0140
2.1 Space (Height Inside the Rack) Required for Installation	RW-FRAME0140
2.2 Optional Parts Required for Installation	RW-FRAME0140
2.3 Tools Required.....	RW-FRAME0150
2.4 Installing the Subsystem into the Rack Frame	RW-FRAME0150
2.4.1 Procedures for installation	RW-FRAME0160
2.4.2 Removing and installing the front bezel.....	RW-FRAME0170
2.4.3 Installing the fasteners.....	RW-FRAME0180
2.4.4 Installing the rails	RW-FRAME0210
2.4.5 Install the subsystem into the rack	RW-FRAME0220
2.4.6 Securing the front side of the subsystem	RW-FRAME0230
2.4.7 Securing the rear side of the subsystem	RW-FRAME0240
3. Installing Into Hitachi Rack Frame (U2)	RW-FRAME0250
3.1 Space (Height Inside the Rack) Required for Installation	RW-FRAME0250
3.2 Optional Parts Required for Installation	RW-FRAME0250
3.3 Tools Required.....	RW-FRAME0260
3.4 Installing the Subsystem into the Rack	RW-FRAME0260
3.4.1 Procedures for installation	RW-FRAME0270
3.4.2 Removing and installing the front bezel.....	RW-FRAME0280
3.4.3 Installing the rails	RW-FRAME0290
3.4.4 Installing the nut plate assys (for securing the subsystem)	RW-FRAME0300
3.4.5 Install the subsystem into the rack	RW-FRAME0310
3.4.6 Securing the front side of the subsystem	RW-FRAME0320
3.4.7 Securing the rear side of the subsystem	RW-FRAME0330
3.4.8 Connection and disconnection of AC cable sets to/from subsystem.....	RW-FRAME0340
3.4.9 Connection of relay cables between panel assembly and DF350-RKWHs.....	RW-FRAME0360
3.4.10 Fixing I/F cables of subsystems	RW-FRAME0370

1. Installing Into HP Rack Frame

1.1 Space (Height Inside the Rack) Required for Installation

The space of 11(=10+1) units height (EIA standard) is required to install DF350F-RKWH into the HP rack.

1.2 Optional Parts Required for Installation (Model names : DF-F350-URHP)

Table 1.2.1 shows optional parts required to install one DF350F-RKWH disk subsystem.

Table 1.2.1 Parts Required for Installation of DF-F350-URHP

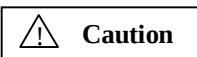
No.	Part No.	Part Name	Qty.	Remarks
①	3243426-1	Rail	1	For right hand side
②	3243426-2	Rail	1	For left hand side
③	5490710-1	Stopper	1	For the rail (R)
④	5490710-2	Stopper	1	For the rail (L)
⑤	3250931-1	Spacer (HP)	2	RKWH
⑥	5486490-1	Spacer (HP)	2	RKH (Not used RKWH)
⑦	5486485-1	Fastener	14	For securing the subsystem/rails (2 spares are included)
⑧	BH612	Bolt (M6 × 12.5)	4	For securing the spacer (HP) (2 spares are included)
⑨	SB516	Binding screw (M5 × 16)	10	For securing the rail (2 spares are included)
⑩	BS508	Hexagon socket head bolt (M5 × 8)	6	For securing the stoppers (2 spares are included)
⑪	SB532	Binding screw (M5 × 32)	6	For securing the subsystem (2 spares are included)
⑫	WP005	Washer (M5)	6	For the hexagon socket head bolt (2 spares are included)
⑬	3243319-69	Nameplate (parts)	1	Already affixed to the rail
⑭	5409042-3	Repeat binder	3	For securing SCSI and AC cables on the subsystem

1.3 Tools Required

- Socket wrench (4mm)
- Spanner (10mm)
- Philips screwdriver (No.2)
- Torque wrench (T25) (*1)

*1 : Used to remove parts previously installed in the HP frame.

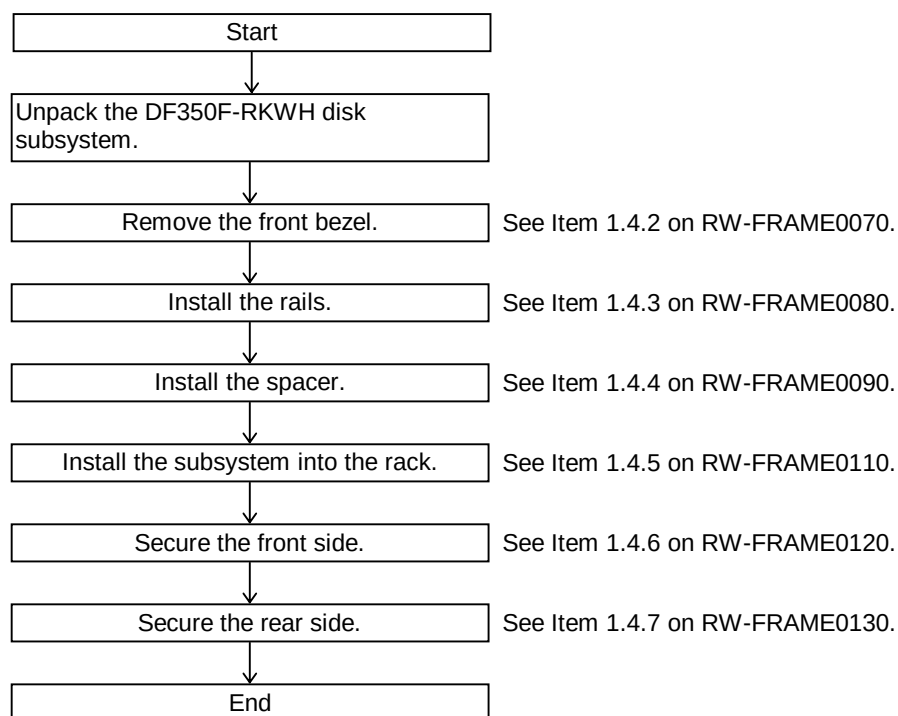
1.4 Installing the Subsystem into the Rack



- The leveling bolts of the frame should have been lowered to touch the floor before installing the subsystem into the rack.
Do not attempt to start installation before lower the leveling bolts (to prevent the equipment from falling).
- Do not drawout two or more subsystems from the rack at a time (to prevent the equipment from falling).
- Be sure to perform the work with two or more persons. The weight of the DF350F-RKWH disk subsystem is approximately 105kg.
- Install subsystems to the rack starting from the bottom position, in order to prevent turning over.
- The carrier is not fixed to the rack frame. Therefore take care when lifting/mounting the unit from/on the carrier.
- Do the work following other safety instructions concerning HP rack frame.

1.4.1 Procedures for installation

Install the unit following the procedure below.



1.4.2 Removing and installing the front bezel

(1) Removal and installation of the front bezel.

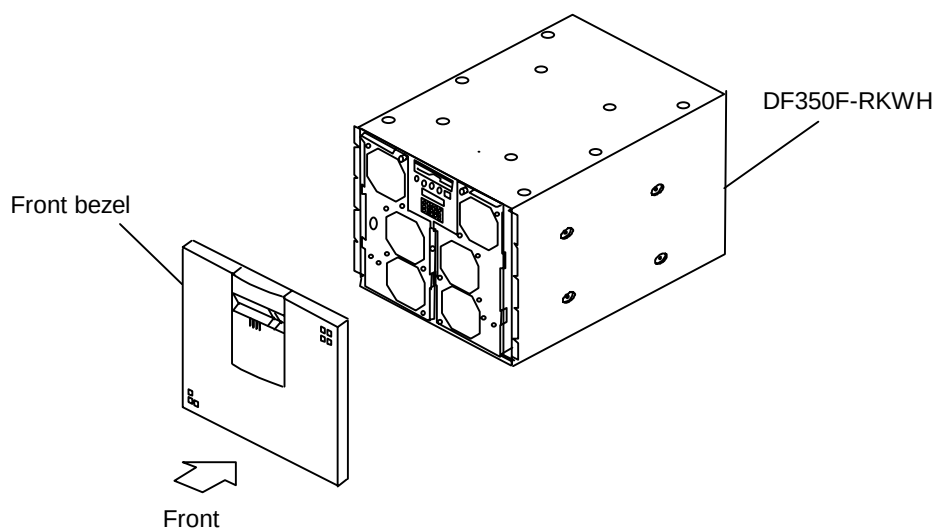


Figure 1.4.1 Removing and Installing the Front Bezel

(2) Removal and installation of the front panel.

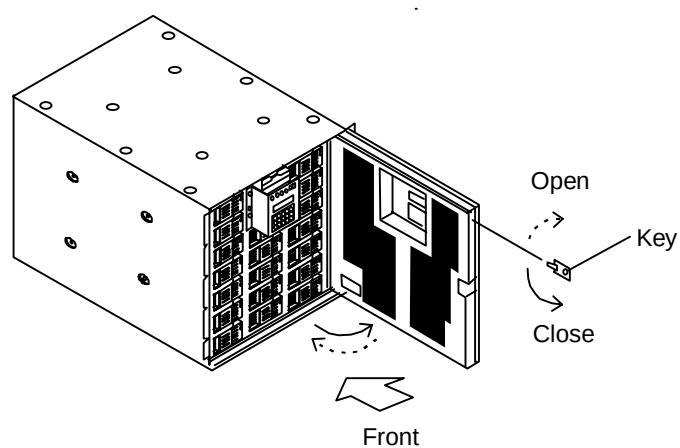


Figure 1.4.2 Opening and Closing the Front Panel

1.4.3 Installing the rails (See Figure 1.4.3 and 1.4.4.)

- (1) Temporarily secure the ③ Stopper (R) to the ① Rail (R) using ⑩ Hexagon socket head bolts (M5 × 8) and ⑫ Washer (M5) (at two places). (See Figure 1.4.3.)
- (2) Insert the protruded portions of the ① Rail (R) into the rectangular holes on both the front and rear sides of the rack frame at right hand side of the desired installing position. (See Figure 1.4.4.)
- (3) Install the fasteners aligning their holes with the holes of the rail and the rack frame (at two places each on the front and rear sides). (See Figure 1.4.4.)
- (4) Secure the ① Rail (R) using the ⑨ Binding screws (M5 × 16) (at two places each on the front and rear sides).
- (5) Temporarily attach the ④ Stopper (L) to the ② Rail (L), and secure the ② Rail (L) to the rack frame in the same way.

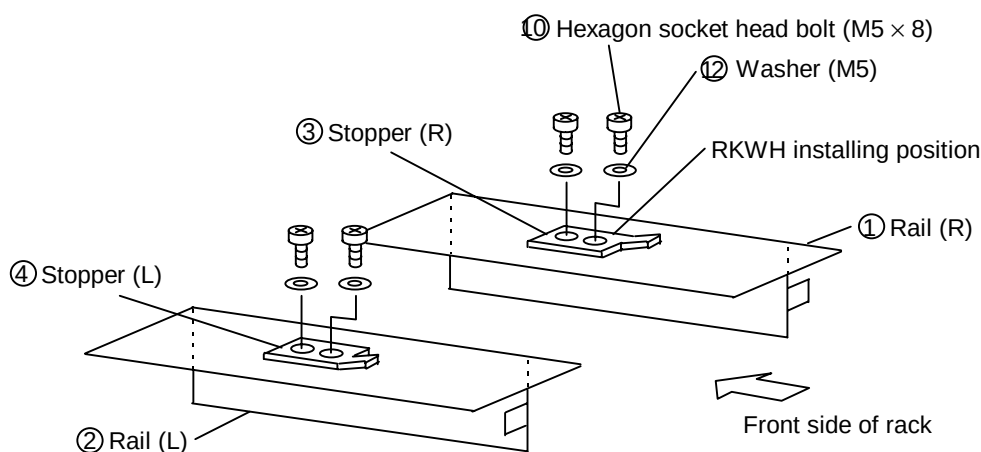


Figure 1.4.3 Temporary Attachment of the Stopper

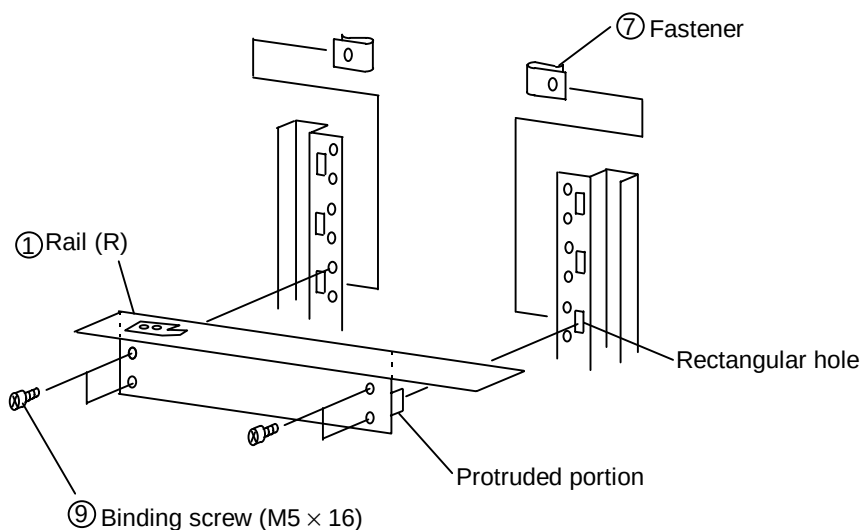


Figure 1.4.4 Securing the Rail to the Rack Frame

1.4.4 Installing the spacer (See Figures 1.4.5 and 1.4.6.)

- (1) Insert the ⑧ Bolt (M6 × 12.5) into the hole in the face of the rack frame from the inner side, place the indented side of the ⑤ Spacer (HP) against the rack, and secure the spacer so that it becomes parallel with the rack frame (two places, on the right and left sides).
- (2) Install the fasteners to the rack frame at the positions where the spacer is indented at 2nd and 8th indentations.

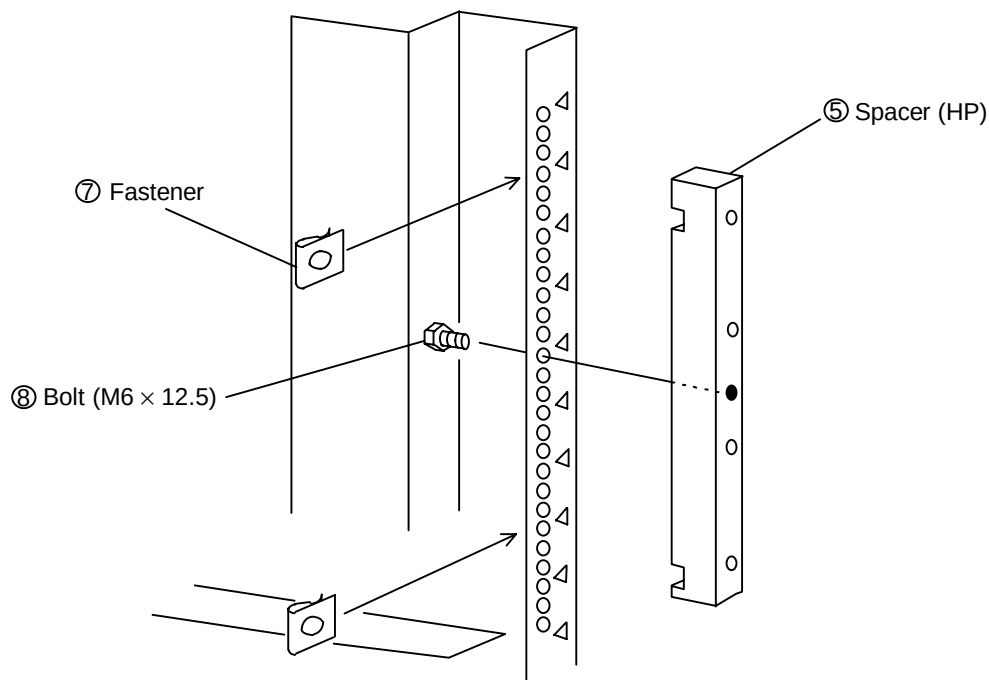


Figure 1.4.5 Installing the Spacer (HP) and Fasteners

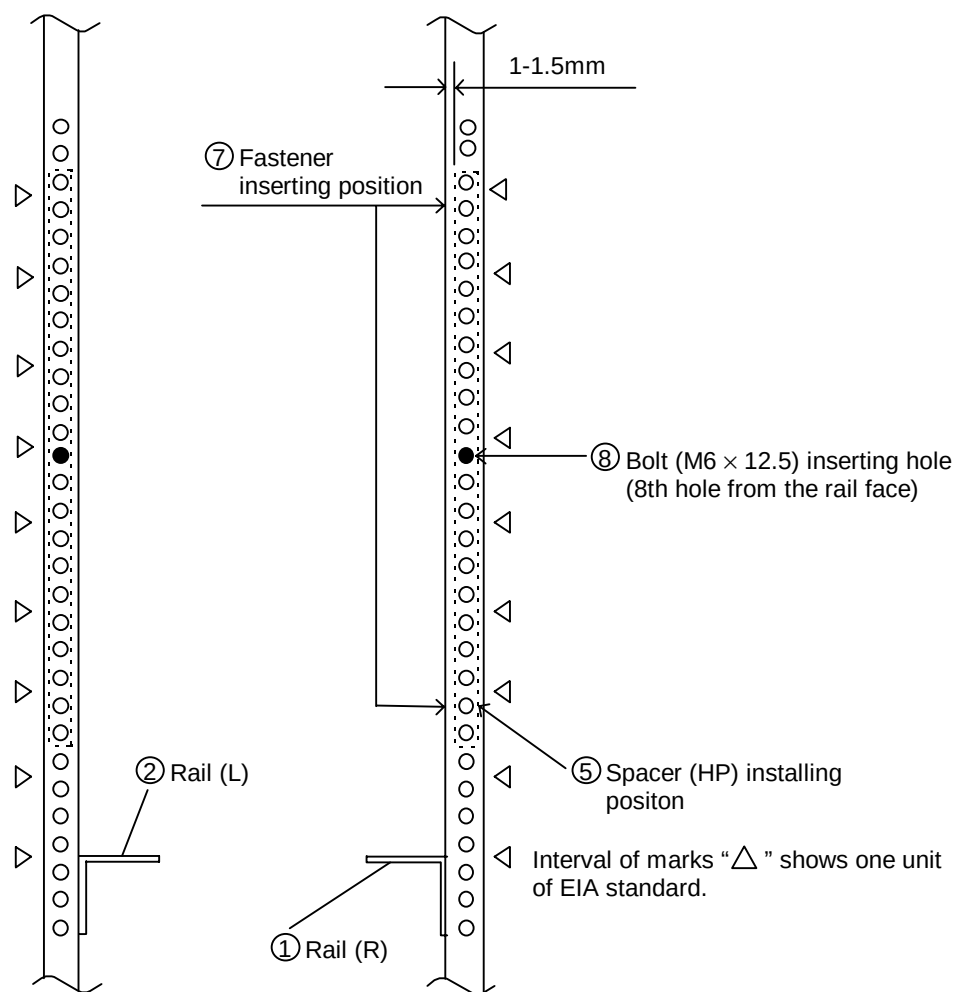
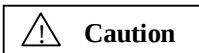


Figure 1.4.6 Relationship between the Installing Positions of the Rail and the Spacer (HP)

1.4.5 Install the subsystem into the rack (See Figure 1.4.7.)



The mass of the DF350F-RKWH is approximately 105kg. Be sure to hold it by its handles with two or more persons when installing it in the rack frame.

Make sure that the front panel of the DF350F-RKWH is secured tightly before installing the DF350F-RKWH in the rack frame. If not, the front panel may come off during the installation causing a personal injury.

- (1) Place the DF350F-RKWH unit on the elevator of the lifter.
- (2) Move it to the rack frame installing position.
- (3) Place it on the rails in the rack frame.
- (4) Push it towards the rear of the rack frame gently.

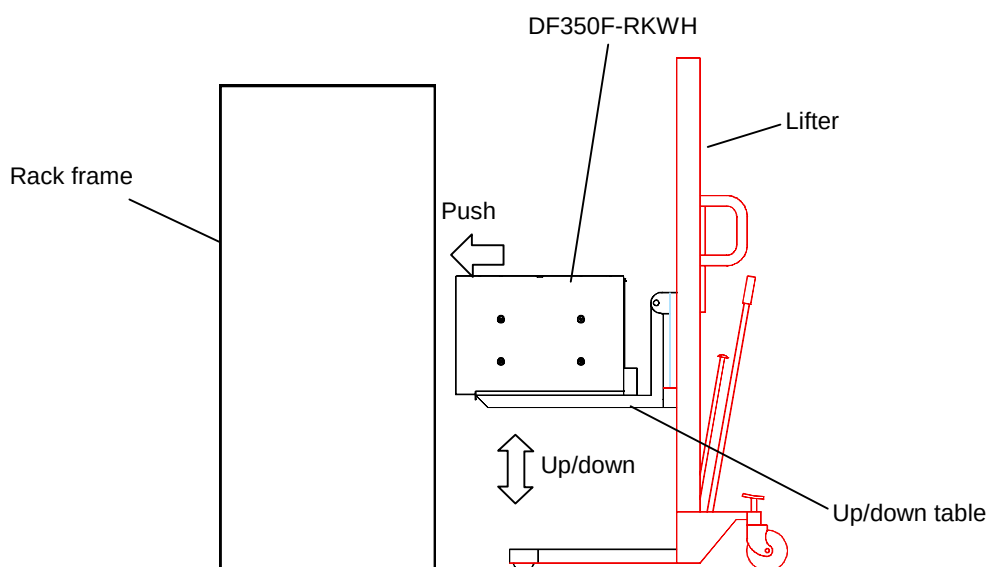


Figure 1.4.7 Install the DF350F-RKWH into the Rack Frame

1.4.6 Securing the front side of the subsystem (See Figure 1.4.8.)

- (1) Secure the subsystem at four places using the ⑪ Binding screws (M5 × 32).
- (2) Attaching the front bezel. (See RW-FRAME0070.)

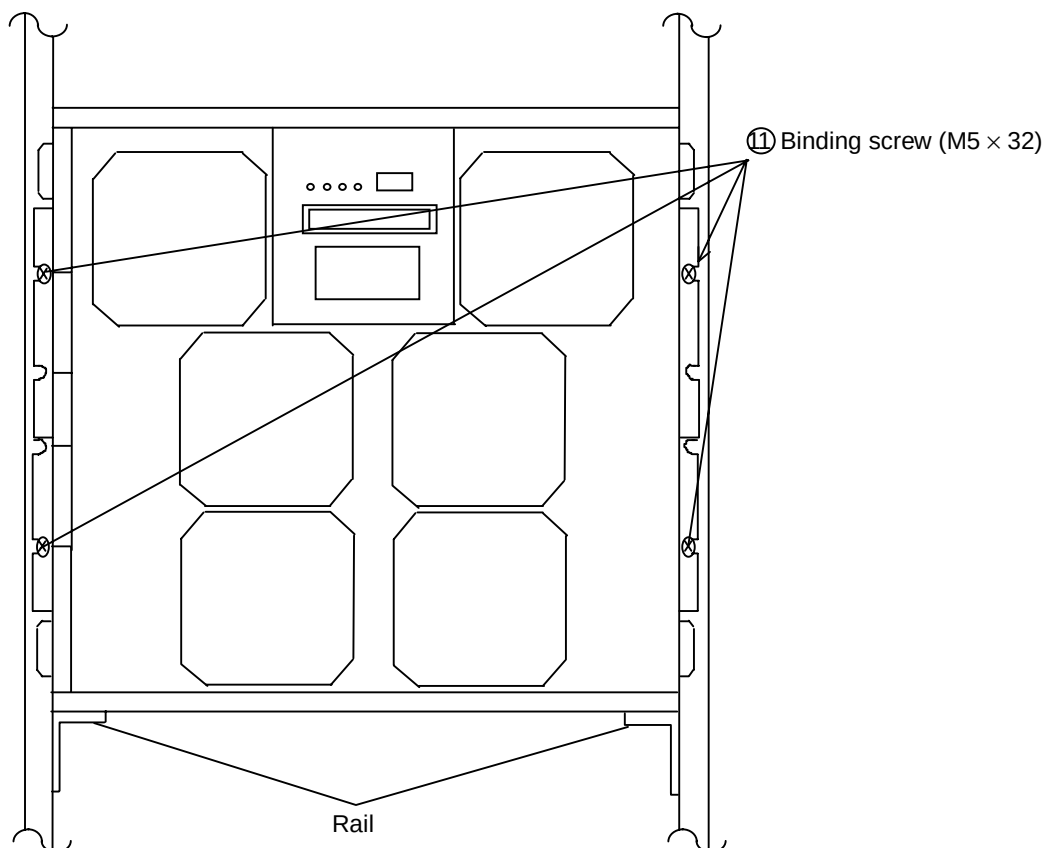


Figure 1.4.8 Securing the Front Side of the Subsystem

1.4.7 Securing the rear side of the subsystem (See Figure 1.4.9.)

- (1) Slide the ③ Stopper (1) and ④ Stopper (2) in the direction shown by arrows to engage their bent tips with the rear bottom of the subsystem.
- (2) Tighten the ⑩ Hexagon socket head bolts (M5 × 8) fastening the stoppers to secure the rear side of the subsystem.

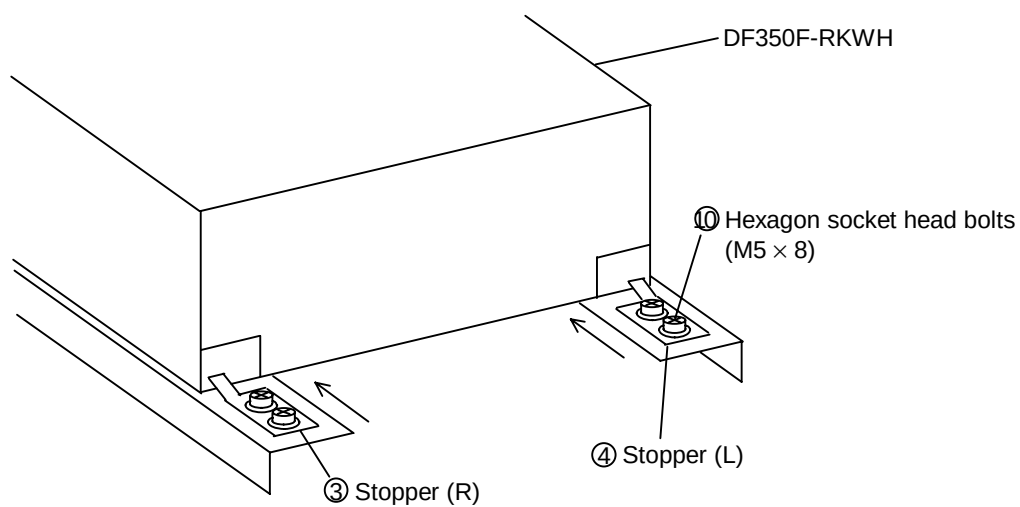


Figure 1.4.9 Securing the Rear Side of the Subsystem

2. Installing Into IBM AS/400 (9309) Rack Frame

2.1 Space (Height Inside the Rack) Required for Installation

The space of 10 units height (EIA standard) is required to install DF350F-RKWH into the IBM AS/400 (9309) rack.

2.2 Optional Parts Required for Installation (Model names : DF-F350F-URAS)

Table 2.2.1 shows optional parts required to install one DF350F-RKWH disk subsystem.

Table 2.2.1 Parts Required for Installation of DF-F350-URAS

No.	Part No.	Part Name	Qty.	Remarks
①	2098876-A	Rail	1	For right hand side
②	2098876-B	Rail	1	For left hand side
③	5490710-1	Stopper	1	For the rail (L)
④	5490710-2	Stopper	1	For the rail (R)
⑤	5486419-1	Fastener (M5)	10	For securing the subsystem/rails (2 spares are included)
⑥	SB516	Bind screw (M5 × 16)	14	For securing the rail/subsystem (2 spares are included)
⑦	BS508	Hexagon socket head bolt (M5 × 8)	6	For securing the stopper (2 spares are included)
⑧	WP005	Washer (M5)	6	For the hexagon socket head bolt (2 spares are included)
⑨	5409042-3	Repeat binder	3	For securing FC and AC cables on the subsystem
⑩	3243319-68	Nameplate (parts)	1	Already affixed to the rail
⑪	5486321-1	Stopper	1	For DF350F-RK
⑫	5486321-2	Stopper	1	For DF350F-RK

* : The No.11 and 12 optional parts are not used for installation of DF350F-RKWH.

Table 2.2.2 Parts Required for Installation of DF-F350-URASD

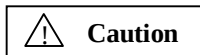
No.	Part No.	Part Name	Qty.	Remarks
①	2102429-A	Rail	1	For right hand side
②	2102429-B	Rail	1	For left hand side
③	5490710-1	Stopper	1	For left hand side
④	5490710-2	Stopper	1	For right hand side
⑤	5486419-1	Fastener (M5)	10	For securing the subsystem/rails (4 spares are included)
⑥	SB516	Bind screw (M5 × 16)	12	For securing the rail/subsystem (4 spares are included)
⑦	BS508	Hexagon socket head bolt (M5 × 8)	6	For securing the stopper (2 spares are included)
⑧	2051001-513	LL Washer	6	For the hexagon socket head bolt (2 spares are included)
⑨	5409042-3	Repeat binder	3	For securing FC and AC cables on the subsystem
⑩	3243319-205	Nameplate (parts)	1	Already affixed to the rail
⑪	SB416	Bind screw (M4 × 16)	4	For securing the rails For DF350F-RK
⑫	BS406	Hexagon socket head bolt (M4 × 6.3)	4	
⑬	2051001-413	LL washer	4	

* : The No.11, 12, and 13 optional parts are not used for installation of DF350F-RKWH.

2.3 Tools Required

- Philips screwdriver (No.2)
- Socket wrench (4mm)

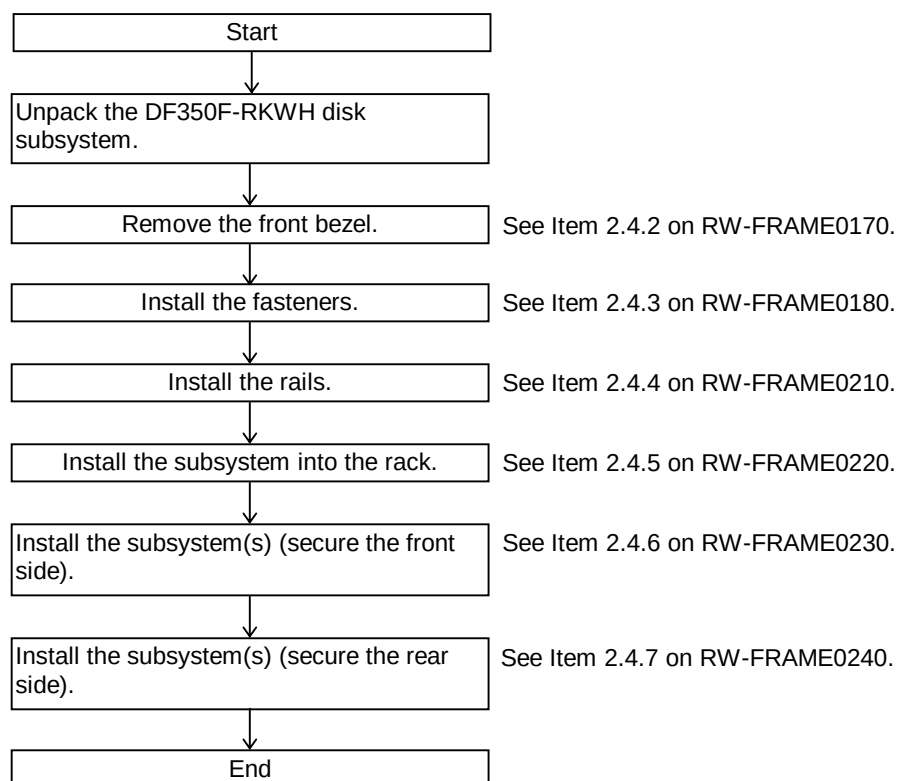
2.4 Installing the Subsystem into the Rack Frame



- The leveling bolts of the frame should have been lowered to touch the floor before installing the subsystem into the rack.
Do not attempt to start installation before lower the leveling bolts (to prevent the equipment from falling).
- Do not drawout two or more subsystems from the rack at a time (to prevent the equipment from falling).
- Be sure to perform the work with two or more persons. The weight of the DF350F-RKWH disk subsystem is approximately 105kg.
- Install subsystems to the rack starting from the bottom position, in order to prevent turning over.
- The carrier is not fixed to the rack frame. Therefore take care when lifting/mounting the unit from/on the carrier.
- Do the work following other safety instructions concerning IBM AS/400 (9309) rack frame.

2.4.1 Procedures for installation

Install the unit following the procedure below.



2.4.2 Removing and installing the front bezel

(1) Removal and installation of the front bezel.

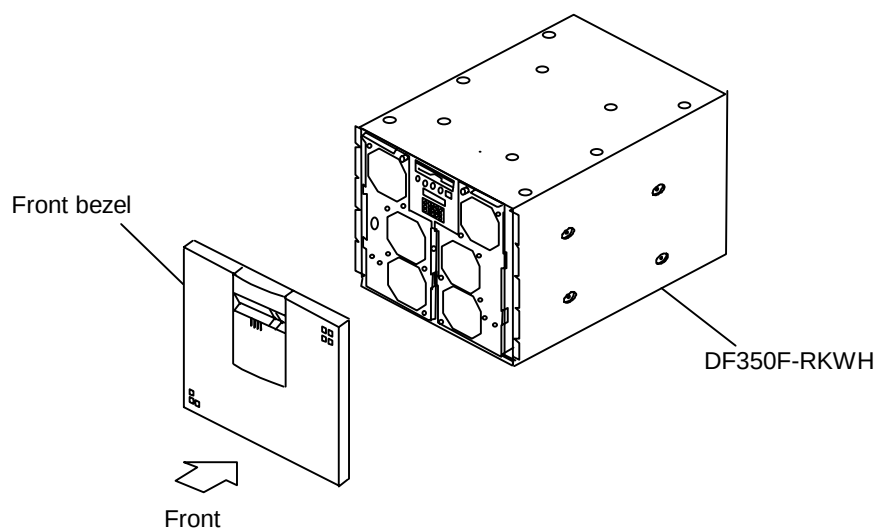


Figure 2.4.1 Removing and Installing the Front Bezel

(2) Removal and installation of the front panel.

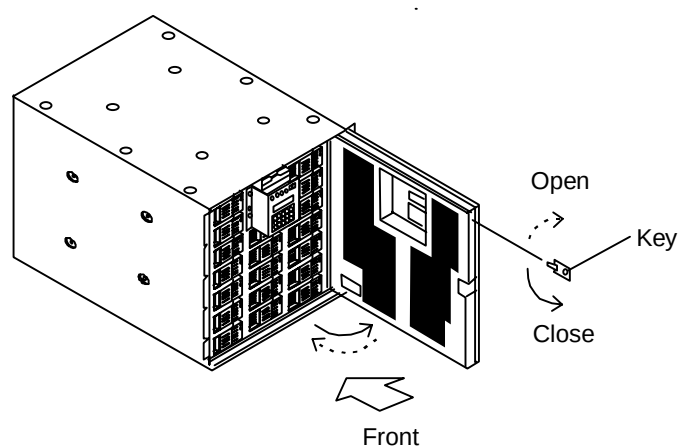
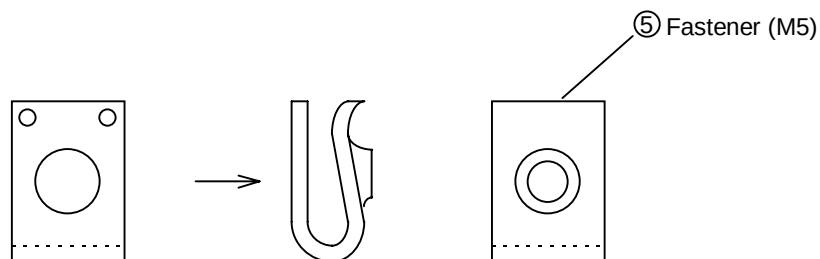


Figure 2.4.2 Opening and Closing the Front Panel

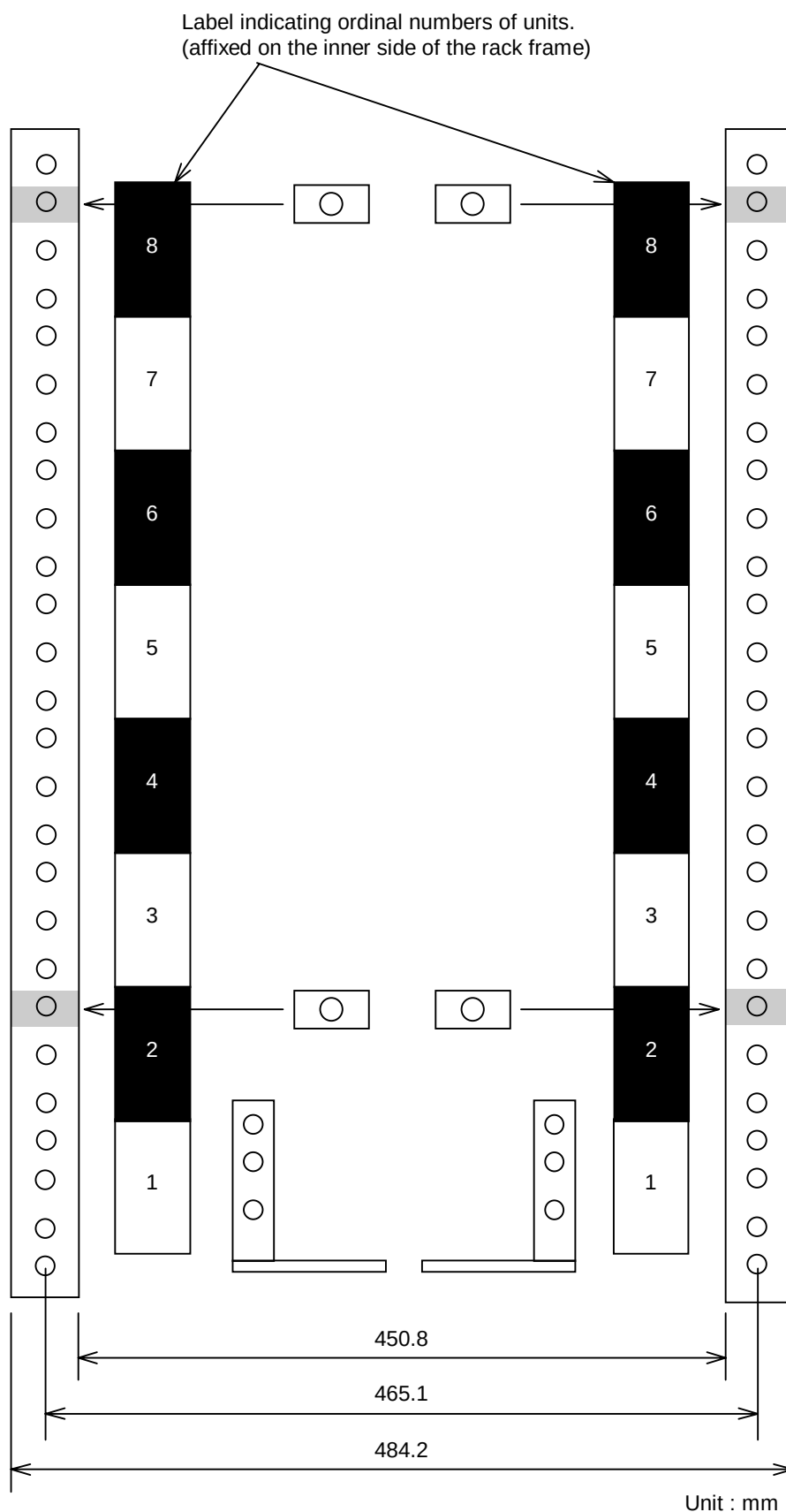
2.4.3 Installing the fasteners (See Figure 2.4.3 (a) to 2.4.3 (c).)

- (1) Insert the fasteners on the front side of the rack frame with their flat sides facing toward you.
- (2) Insert the fasteners to the top holes of upper 1st and 3rd units from the unit where the rail is to be installed.
- (3) Insert the fasteners on the rear side of the rack frame with their flat sides facing toward you.
- (4) Insert the fasteners to the top hole of the unit where the rail is to be installed and the middle hole of upper 1st unit.



Insert a screw in the direction of an arrow.

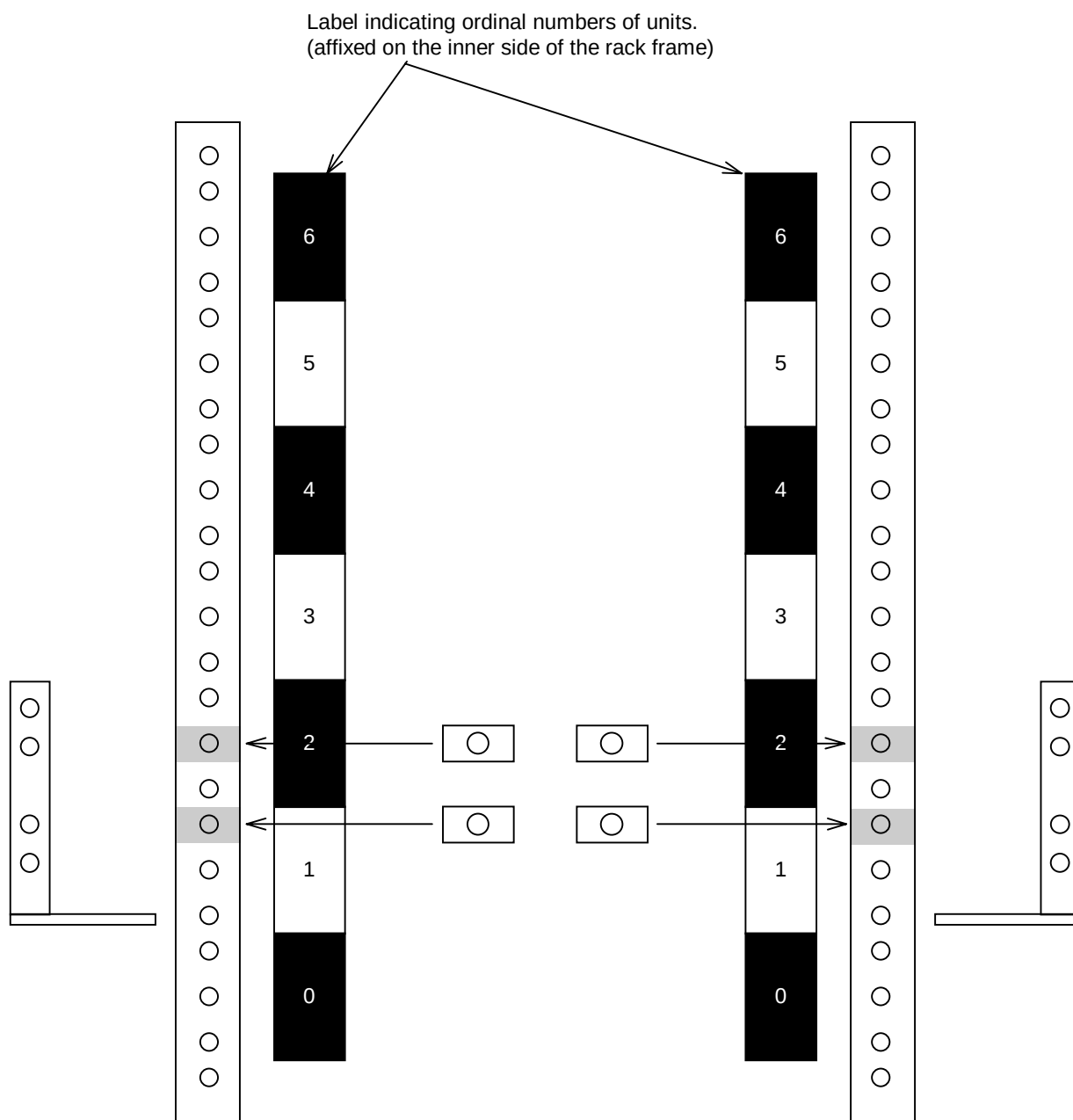
Figure 2.4.3 (a) Fastener



Note 1 : A figure “” indicates the fastener.

Note 2 : Above diagram shows the composition when the rails are installed at the 3rd unit.

Figure 2.4.3 (b) Fastener Installing Locations in the Front of the Rack Frame



Note 1 : A figure “” indicates the fastener.

Note 2 : Above diagram shows the composition when the rails are installed at the 3rd unit.

Figure 2.4.3 (c) Fastener Installing Locations in the Rear of the Rack Frame

2.4.4 Installing the rails (See Figure 2.4.4.)

- (1) Fix the ④ Stopper (R) to the ① Rail (R) temporarily with ⑦ Hexagon socket head bolts (M5 × 8) and ⑧ Washers (M5) or LL Washers.
- (2) Insert the ① Rail (R) into the rack frame and secure it with ⑥ Bind screws (M5 × 16) (both front and rear sides).
- (3) Fix the ③ Stopper (L) temporarily to the ② Rail (L), insert the ② Rail (L) into the rack frame and secure it in the same way.

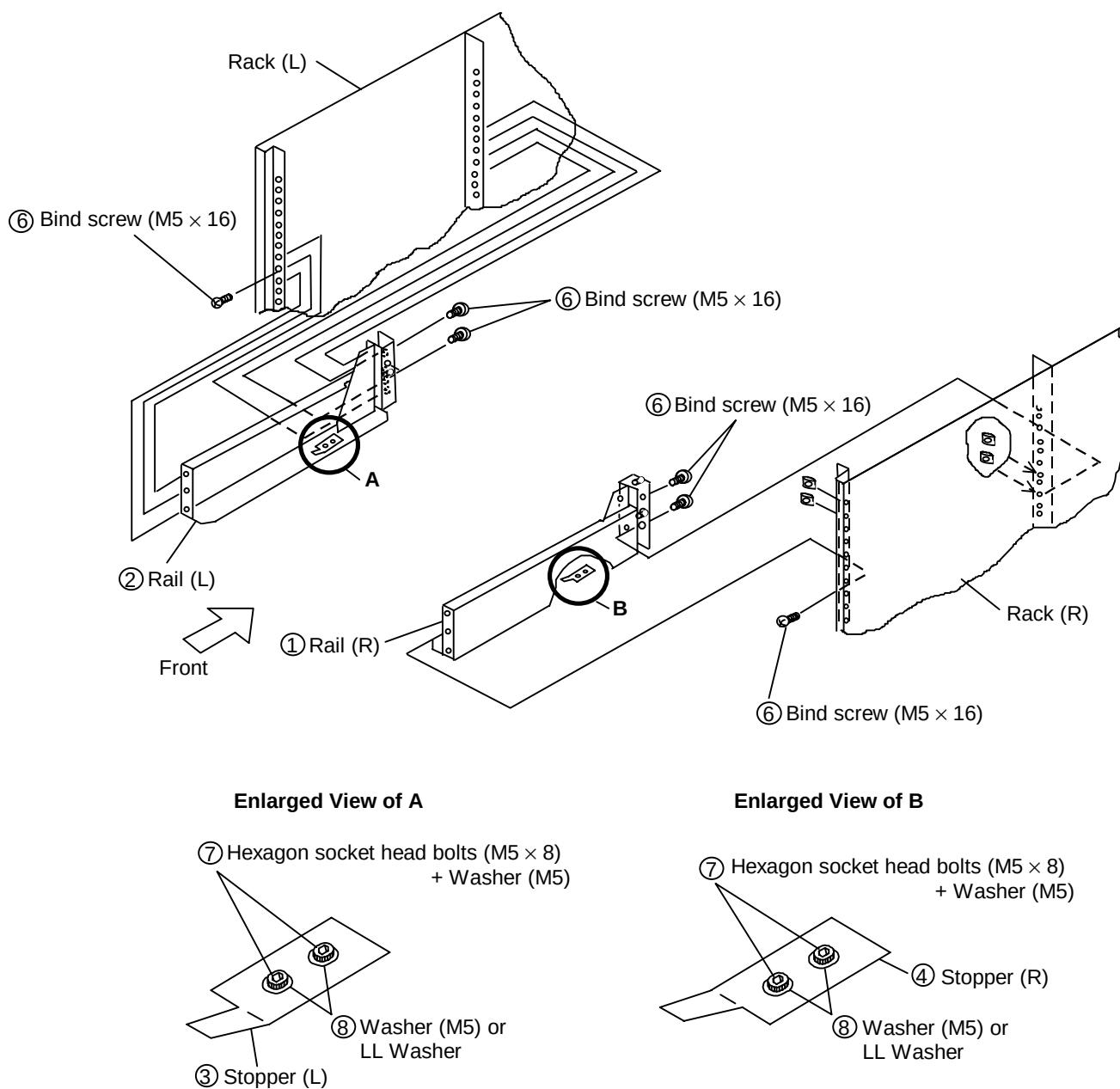
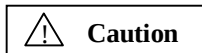


Figure 2.4.4 Installing the Rails

2.4.5 Install the subsystem into the rack (See Figure 2.4.5.)



The mass of the DF350F-RKWH is approximately 105kg. Be sure to hold it by its handles with two or more persons when installing it in the rack frame.

Make sure that the front panel of the DF350F-RKWH is secured tightly before installing the DF350F-RKWH in the rack frame. If not, the front panel may come off during the installation causing a personal injury.

- (1) Place the DF350F-RKWH unit on the elevator of the lifter.
- (2) Move it to the rack frame installing position.
- (3) Place it on the rails in the rack frame.
- (4) Push it towards the rear of the rack frame gently.

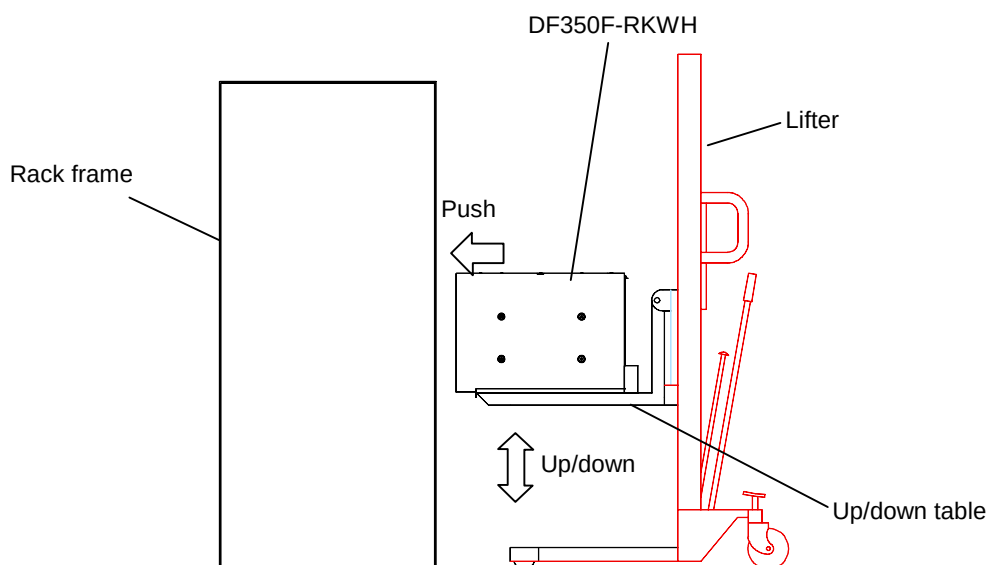


Figure 2.4.5 Install the DF350F-RKWH into the Rack Frame

2.4.6 Securing the front side of the subsystem (See Figure 2.4.6.)

- (1) Secure the subsystem at four places using the ⑥ Binding screws (M5 × 16).
- (2) Attaching the front bezel. (See RW-FRAME0070.)

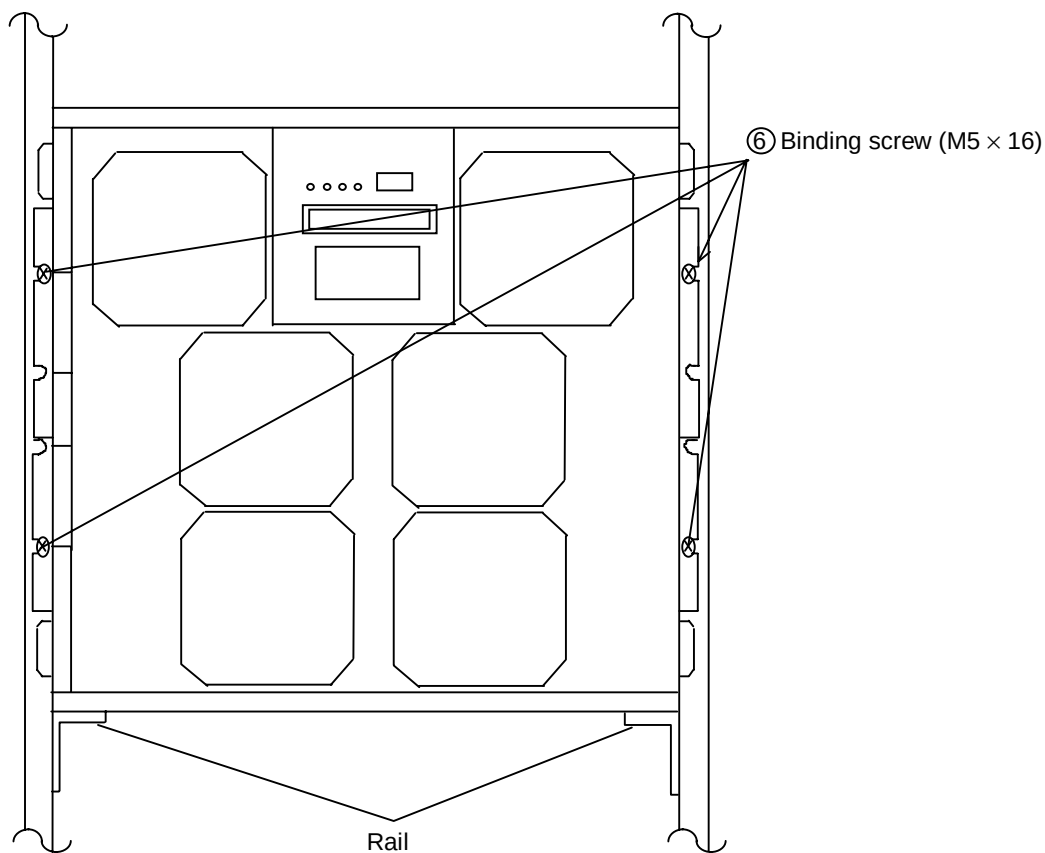


Figure 2.4.6 Securing the Front Side of the Subsystem

2.4.7 Securing the rear side of the subsystem (See Figure 2.4.7.)

- (1) Slide the ③ Stopper (1) and ④ Stopper (2) in the direction shown by arrows to engage their bent tips with the rear bottom of the subsystem.
- (2) Tighten the ⑦ Hexagon socket head bolts (M5 × 8) fastening the stoppers to secure the rear side of the subsystem.

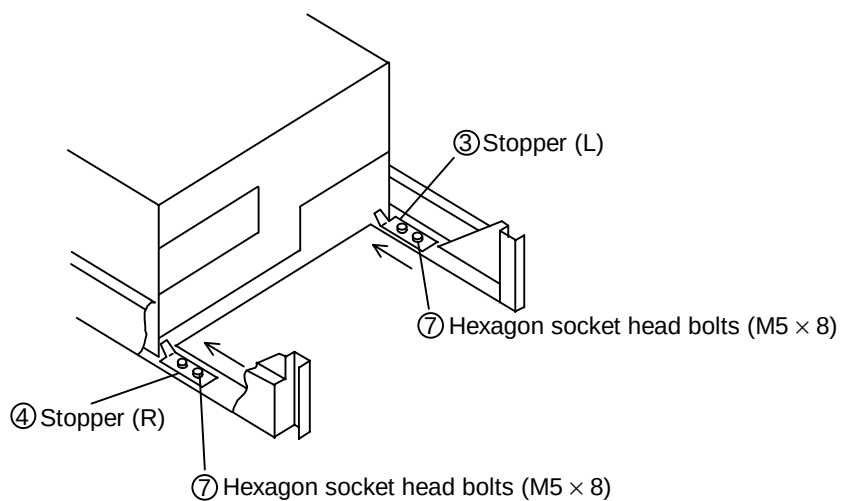


Figure 2.4.7 Securing the Rear Side of the Subsystem

3. Installing Into Hitachi Rack Frame (U2)

3.1 Space (Height Inside the Rack) Required for Installation

The space of 10 units height (EIA standard) is required to install DF350F-RKWH into the Hitachi rack.

3.2 Optional Parts Required for Installation (Model names : DF-F350-URHT)

Table 3.2.1 shows optional parts required to install one DF350F-RKWH disk subsystem.

Table 3.2.1 Parts Required for Installation of DF-F350-URHT

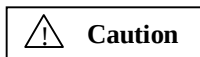
No.	Part No.	Part Name	Qty.	Remarks
①	3243500-1	Rail	1	For right hand side (*1)
②	3243500-2	Rail	1	For left hand side (*1)
③	5490715-1	Stopper	1	For the rail (R)
④	5490715-2	Stopper	1	For the rail (L)
⑤	5486467-2	Nut plate	4	For securing the rail (*1)
⑥	5490724-A	Nut plate ASSY	2	
⑦	BS520	Hexagon socket head bolt (M5 × 20)	10	For securing the rail (2 spares are included) (*1)
⑧	BS508	Hexagon socket head bolt (M5 × 8)	4	For securing the stopper (2 spares are included)
⑨	SB408	Bind screw (M4 × 8)	6	For securing the nut plate/bracket (2 spares are included)
⑩	SB510	Bind screw (M5 × 10)	6	For securing the subsystem (2 spares are included)
⑪	3243319-67	Nameplate (parts)	1	Already affixed to the rail
⑫	5486468-1	Clamper (1)	2	For securing the AC cables
⑬	3244501-1	Bracket	1	For securing the AC cables
⑭	SB306	Bind screw (M3 × 6.3)	6	For securing the clamper (2 spares are included)
⑮	5409042-3	Repeat binder	3	For securing SCSI and AC cables on the subsystem

*1 : Not used DF350F-RKWH.

3.3 Tools Required

- Socket wrench (4mm)
- Spanner (10mm)
- Philips screwdriver (No.2)

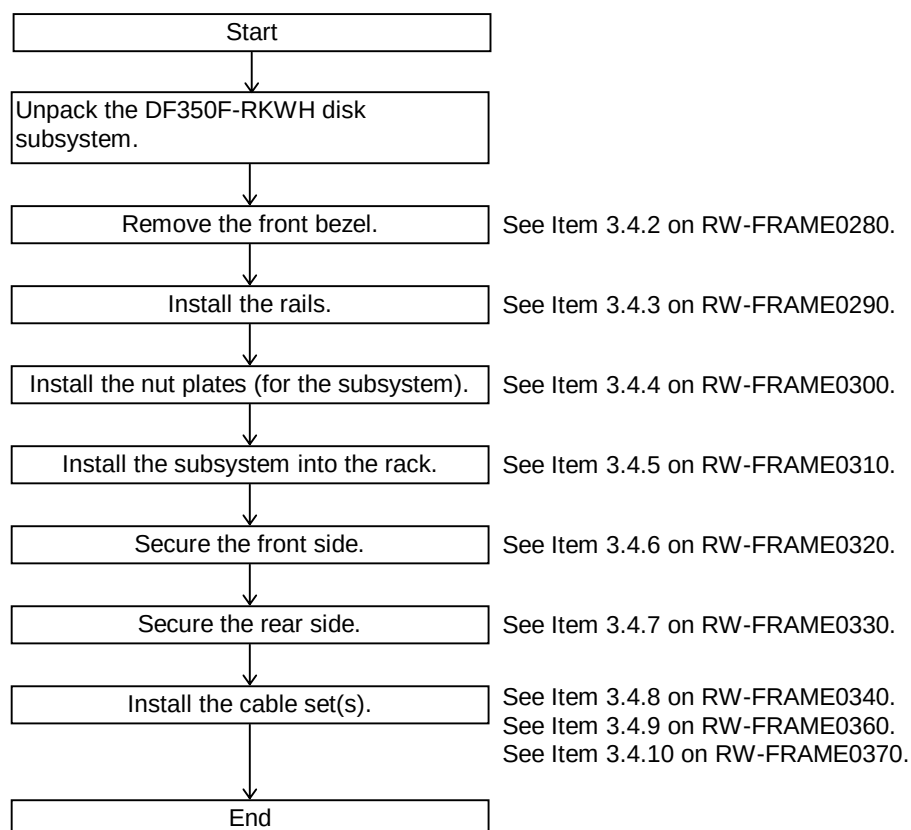
3.4 Installing the Subsystem into the Rack



- The leveling bolts of the frame should have been lowered to touch the floor before installing the subsystem into the rack.
Do not attempt to start installation before lower the leveling bolts (to prevent the equipment from falling).
- Do not drawout two or more subsystems from the rack at a time (to prevent the equipment from falling).
- Be sure to perform the work with two or more persons. The weight of the DF350F-RKWH disk subsystem is approximately 105kg.
- Install subsystems to the rack starting from the bottom position, in order to prevent turning over.
- The carrier is not fixed to the rack frame. Therefore take care when lifting/mounting the unit from/on the carrier.

3.4.1 Procedures for installation

Install the unit following the procedure below.



3.4.2 Removing and installing the front bezel

- (1) Removal and installation of the front bezel.

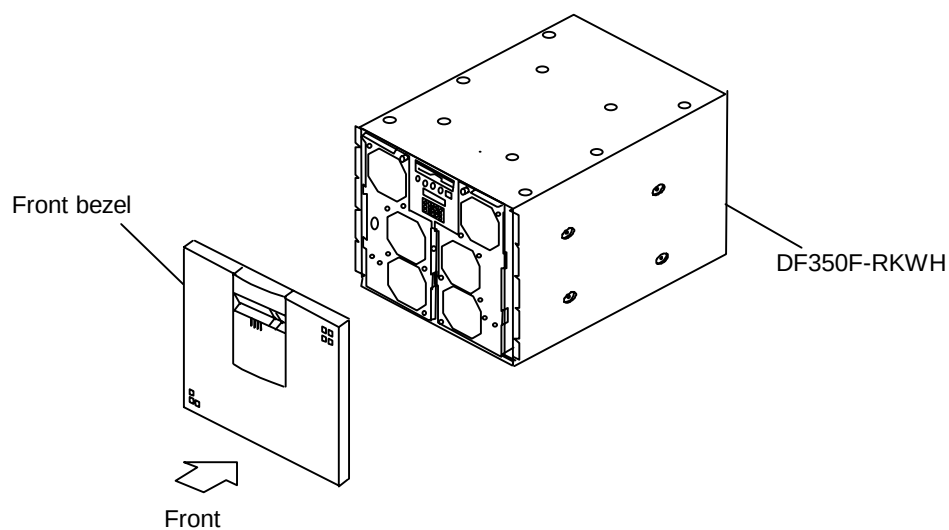


Figure 3.4.1 Removing and Installing the Front Bezel

- (2) Removal and installation of the front panel.

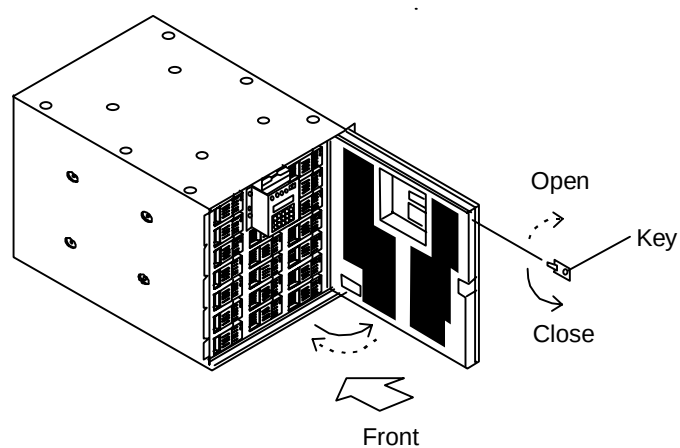


Figure 3.4.2 Opening and Closing the Front Panel

3.4.3 Installing the rails (See Figure 3.4.3 and 3.4.4.)

- (1) Temporarily secure the ③ Stopper (R) to the ① Rail (R) using ⑧ Hexagon socket head bolts (M5 × 8). (See Figure 3.4.3.)
- (2) Insert the protruded portions of the ① Rail (R) into the rectangular holes on both the front and rear sides of the rack frame at right hand side of the desired installing position. (See Figure 3.4.4.)
- (3) Position the ⑤ Nut plates (for securing rails aligning their holes with the holes of the rail) and the rack frame and secure the ① Rail (R) with two ⑦ Hexagon socket head bolts (M5 × 20) (at two places each on the front and rear sides). (See Figure 3.4.4.)
- (4) Temporarily attach the ④ Stopper (L) to the ② Rail (L), and secure the ② Rail (L) to the rack frame in the same way.

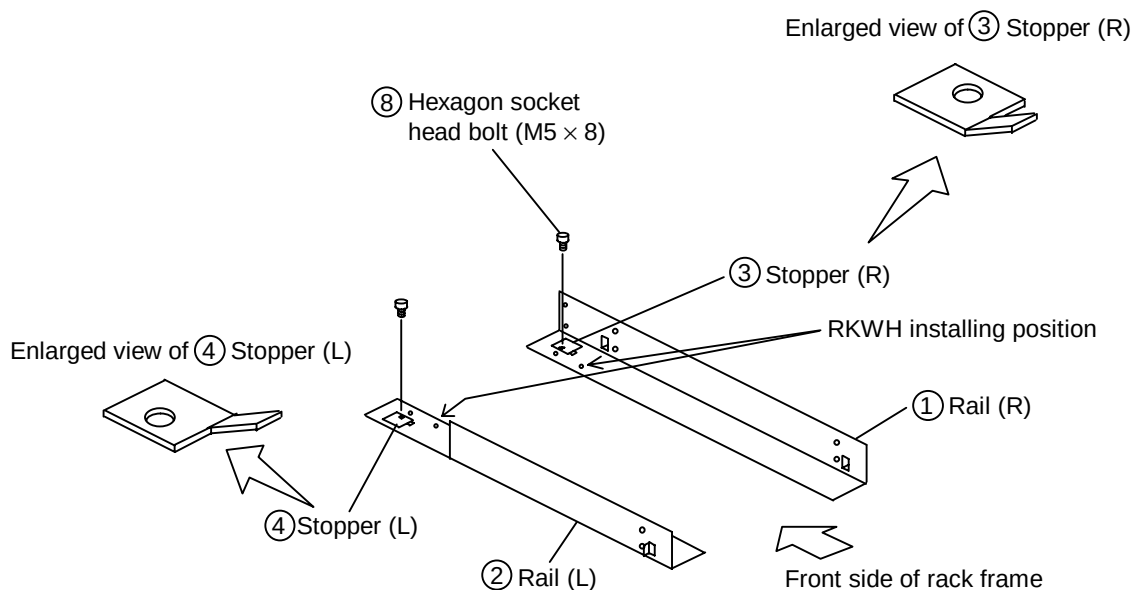


Figure 3.4.3 Temporary Attachment of the Stopper

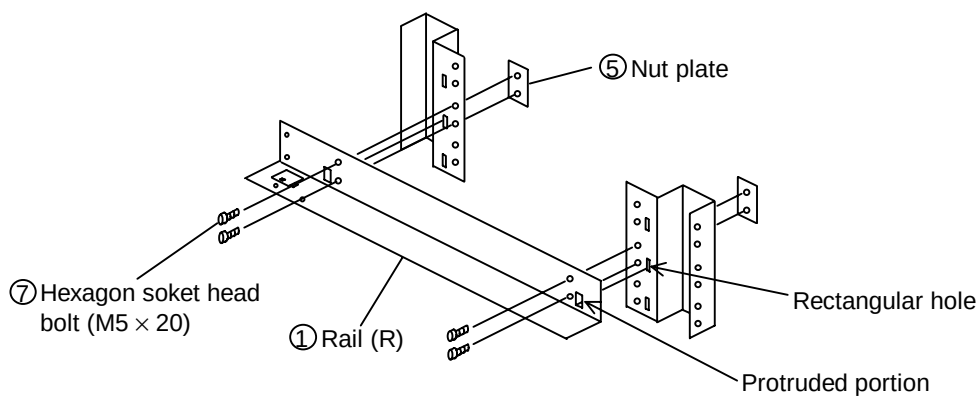


Figure 3.4.4 Securing the Rail to the Rack Frame

3.4.4 Installing the nut plate assys (for securing the subsystem) (See Figure 3.4.5.)

- (1) Position the ⑥ Nut plate ASSY on the inner side of the rack frame aligning its lowermost screw hole with a hole of the rack frame (3rd hole from the face of the rail).
- (2) Secure the ⑥ Nut plate ASSY with two ⑨ Bind screws (M4 × 8) so that it becomes parallel with the edge of the rack frame.

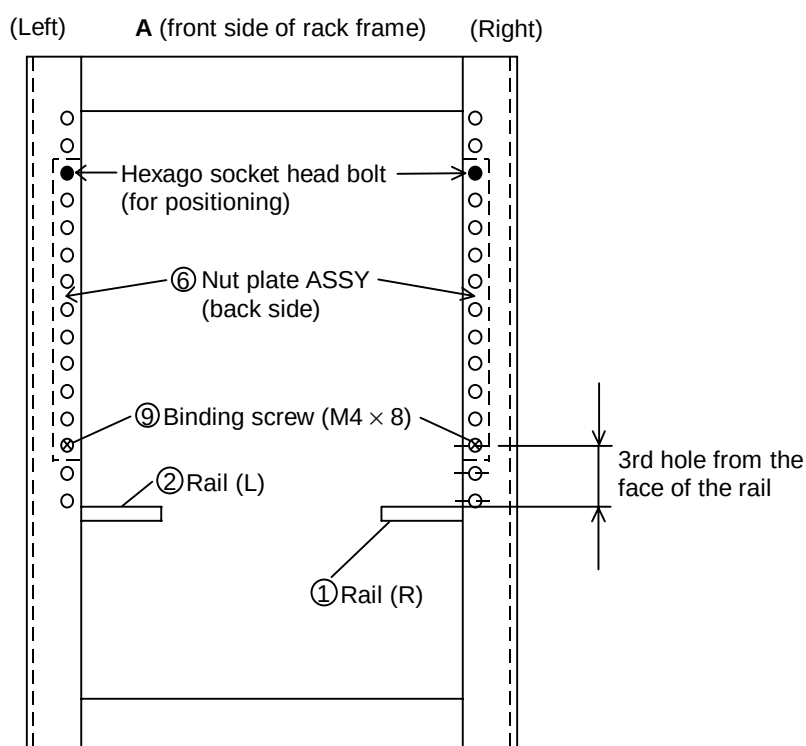
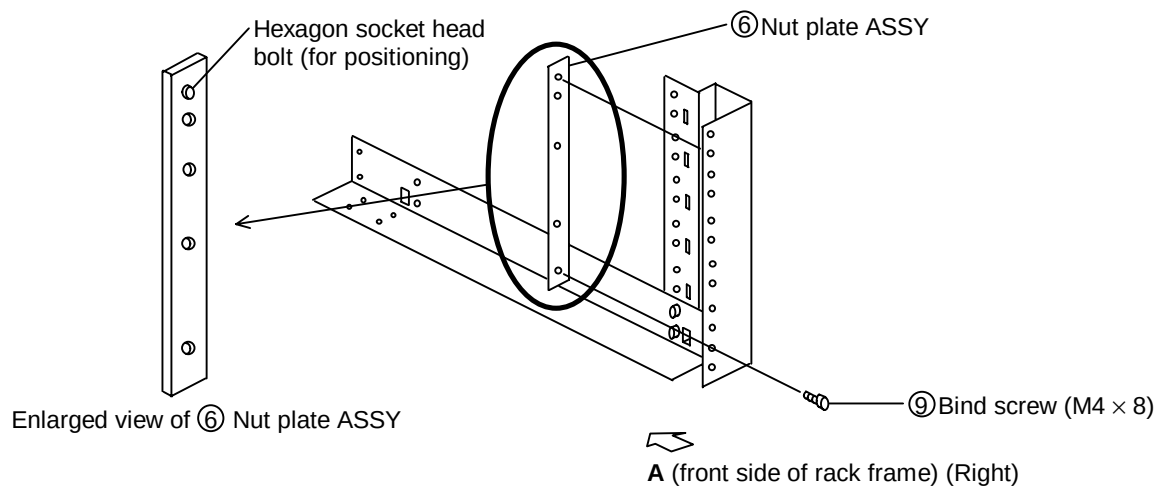
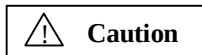


Figure 3.4.5 Installing the Nut Plate ASSY (for Securing the Subsystem)

3.4.5 Install the subsystem into the rack (See Figure 3.4.6.)



The mass of the DF350F-RKWH is approximately 105kg. Be sure to hold it by its handles with two or more persons when installing it in the rack frame.

Make sure that the front panel of the DF350F-RKWH is secured tightly before installing the DF350F-RKWH in the rack frame. If not, the front panel may come off during the installation causing a personal injury.

- (1) Place the DF350F-RKWH unit on the elevator of the lifter.
- (2) Move it to the rack frame installing position.
- (3) Place it on the rails in the rack frame.
- (4) Push it towards the rear of the rack frame gently.

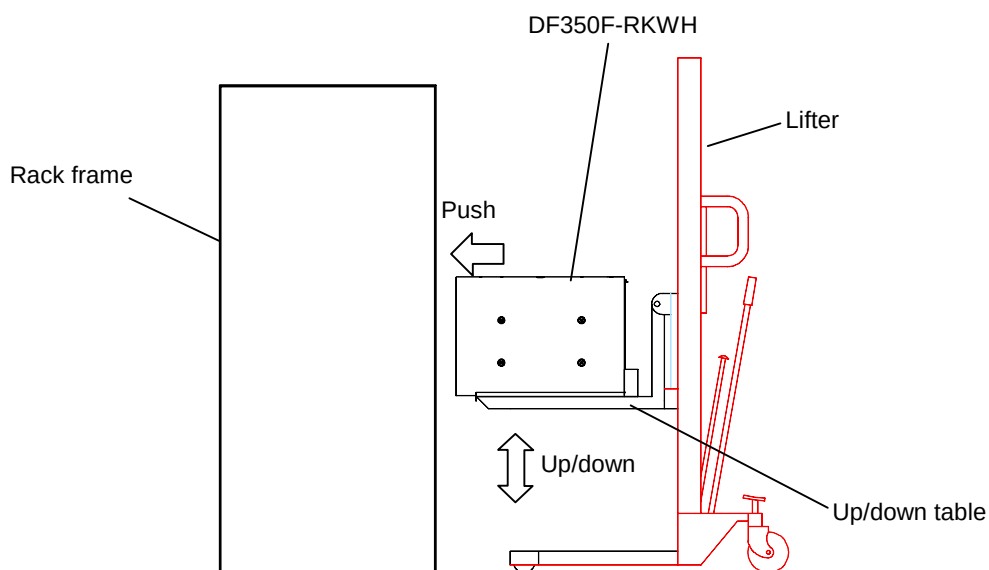


Figure 3.4.6 Install the DF350F-RKWH into the Rack Frame

3.4.6 Securing the front side of the subsystem (See Figure 3.4.7.)

- (1) Secure the subsystem at four places using the ⑩ Binding screws (M5 × 10).
- (2) Attaching the front bezel. (See RW-FRAME0070.)

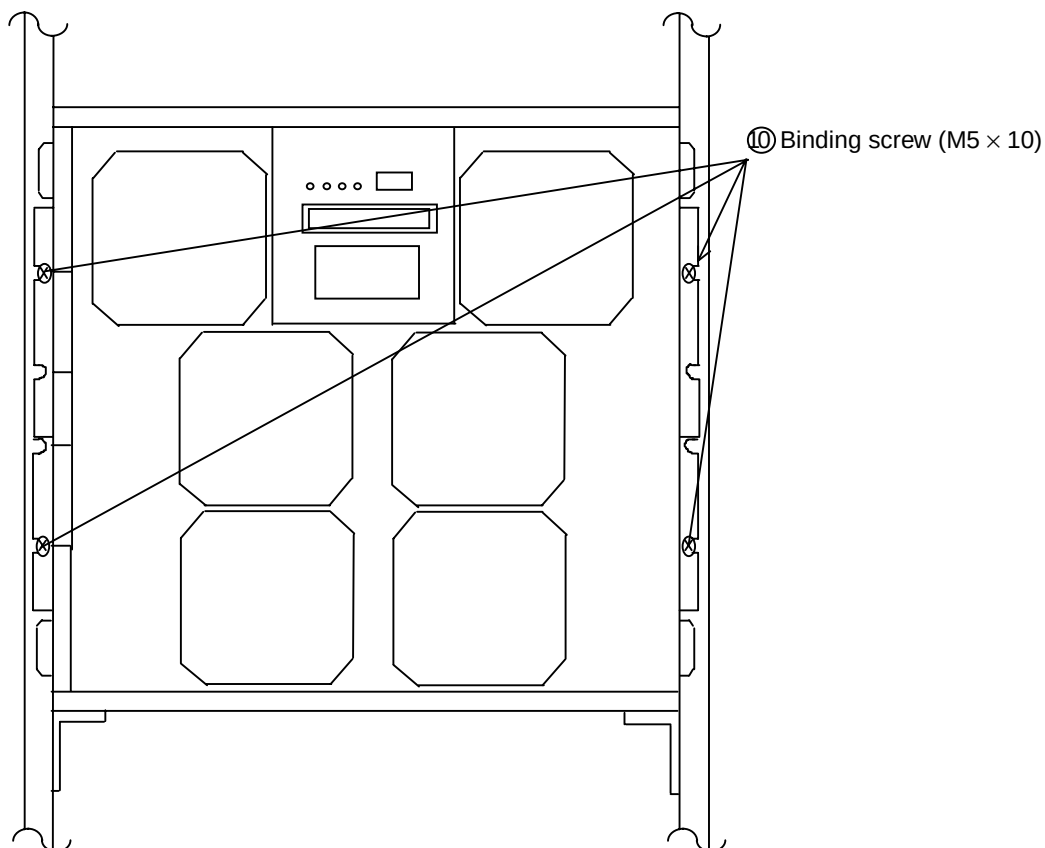


Figure 3.4.7 Securing the Front Side of the Subsystem

3.4.7 Securing the rear side of the subsystem (See Figure 3.4.8.)

- (1) Slide the ③ Stopper (R) and ④ Stopper (L) in the direction shown by arrows to engage their bent tips with the rear bottom of the subsystem.
- (2) Tighten the ⑧ Hexagon socket head bolts (M5 × 8) fastening the stoppers to secure the rear side of the subsystem.

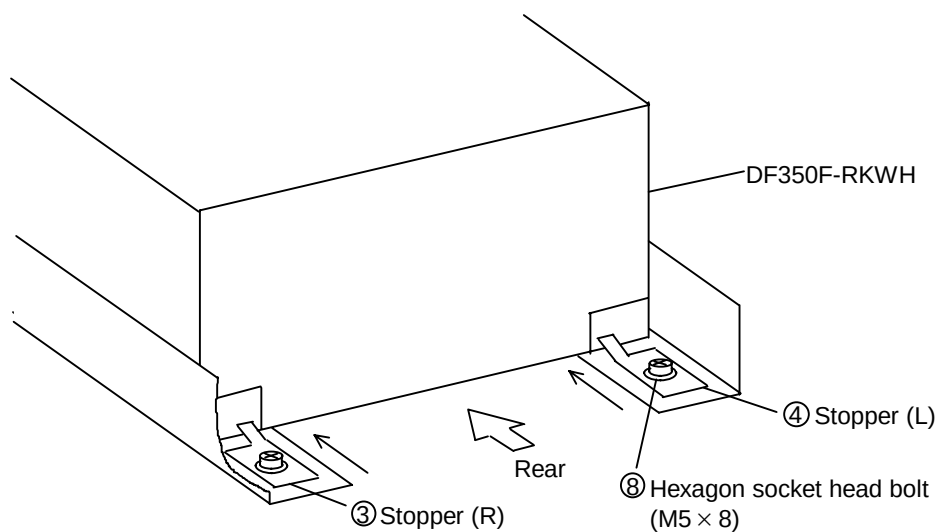


Figure 3.4.8 Securing the Rear Side of the Subsystem

3.4.8 Connection and disconnection of AC cable sets to/from subsystems

- (1) Connect or disconnect the AC cable sets to/from the subsystem(s) installed on the rack following the procedures shown below.
- (2) Connecting procedure for each subsystem. (See Figure 3.4.9.)
 - ① Turn off the PDB breaker (CB1).
 - ② Plug the socket of the AC cable set into the inlet of the subsystem.
 - ③ Fix the ⑬ Bracket with the two ⑨ Bind screws ($M4 \times 8$) and pass the AC cable sets through two ⑫ Clampers (1).
 - ④ Plug the socket of the AC cable set into the PDB.
- (3) Disconnecting procedure for each subsystem.
 - ① Turn off the PDB breaker (CB1).
 - ② Unplug the socket of the AC cable set from the inlet of the subsystem and the outlet of the PDB.
 - ③ Loosen the four ⑭ Bind screws ($M3 \times 6.3$). Remove the ⑫ Clampers (1).

Note : On completion of work, fix the ⑫ Clampers (1) to the ⑬ Bracket with the four ⑭ Bind screws ($M3 \times 6.3$).

Notice : Do not fix the lowermost AC cable by the binder.

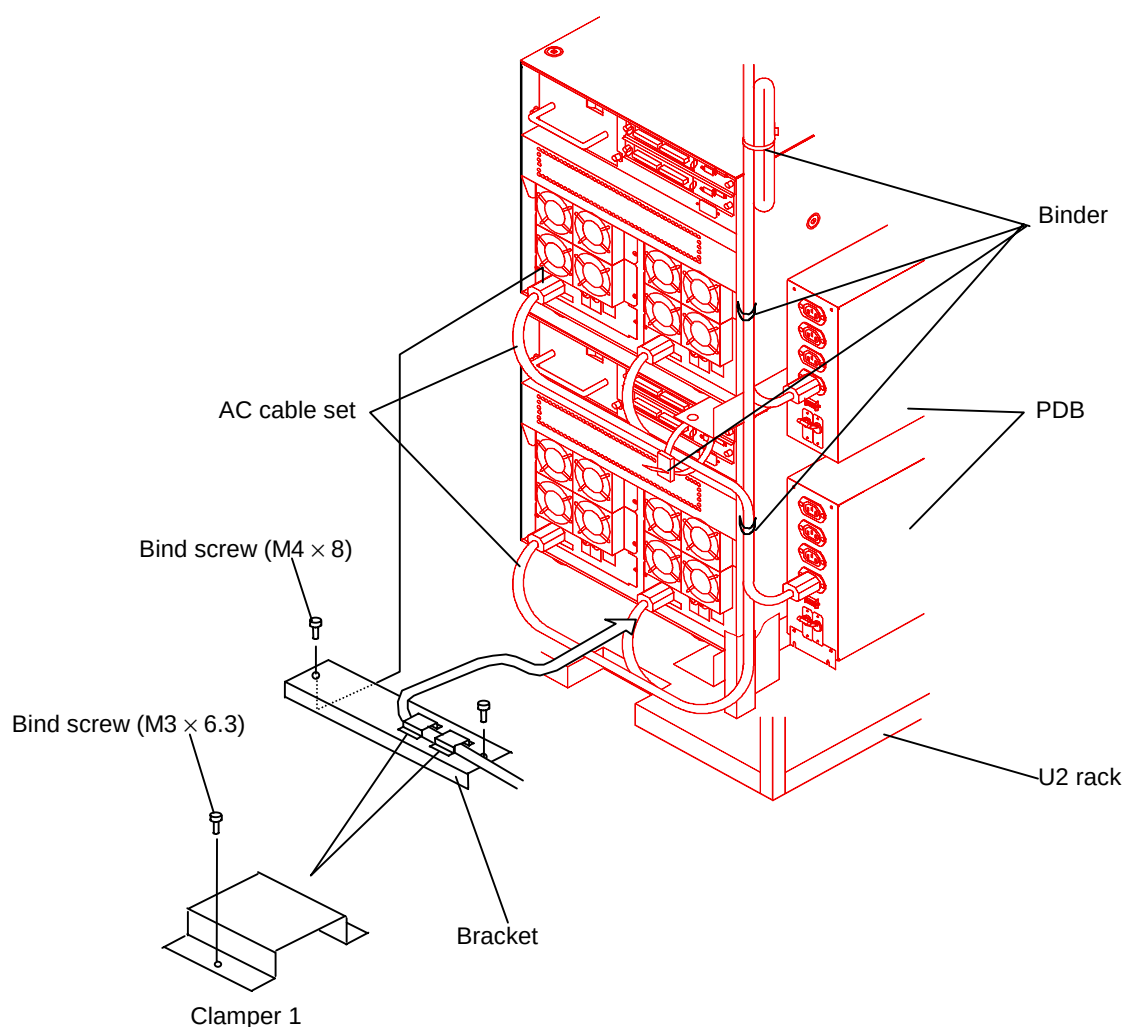
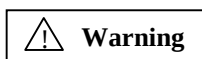
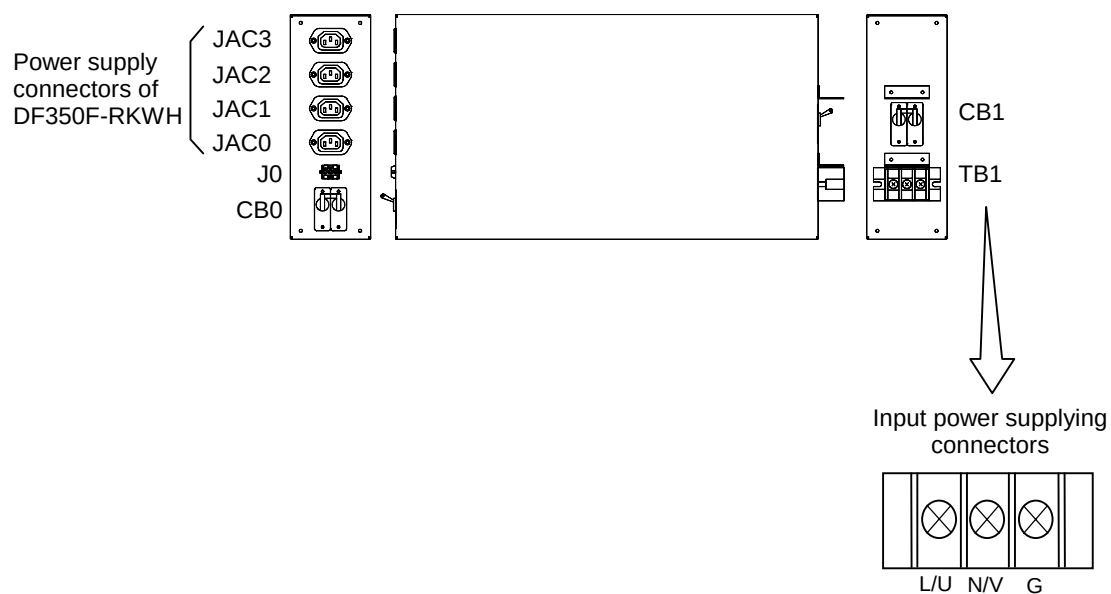


Figure 3.4.9 Connection and Disconnection of AC Cable set(s) to Subsystem(s)



A large leak current flows when plural subsystems of DF350F-RKWH are installed. Be sure to ground them for preventing an electric shock accident.

Figure 3.4.10 Appearance of PDB

3.4.9 Connection of relay cables between panel assembly and DF350F-RKWHs

(1) Procedures to connect relay cables to DF350F-RKWHs.

- ① Plug the connectors (P10 to P13) of the subsystems installed on the DF-F350-U2 into J10 to J13 of the subsystems. (Perform these works one by one starting from the lowermost subsystem.)

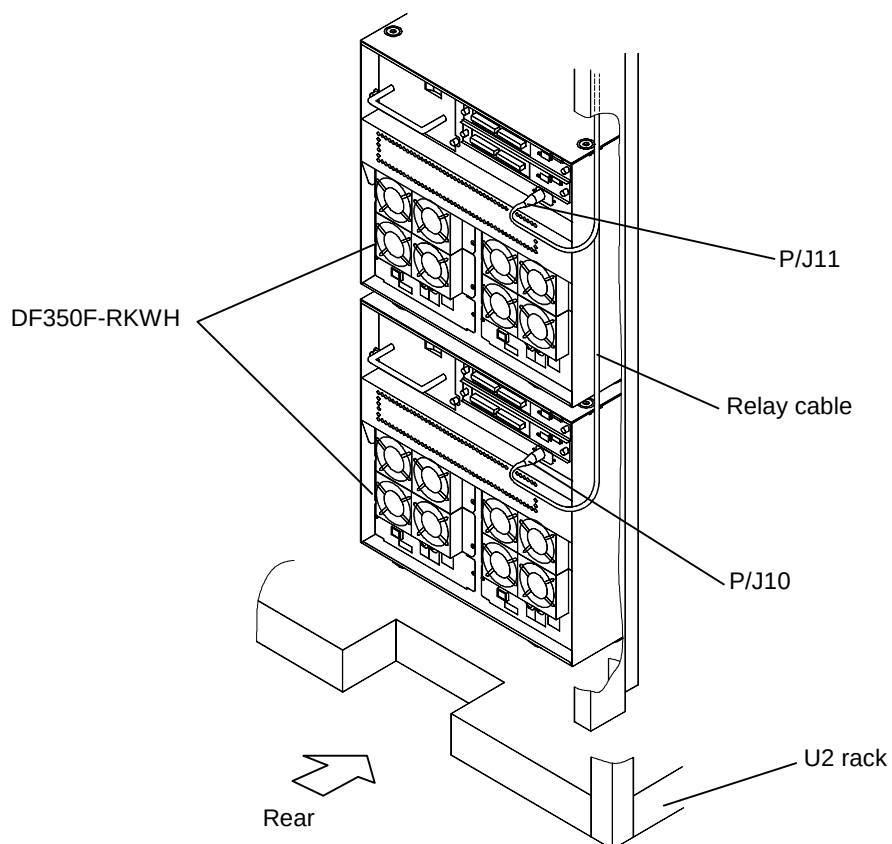


Figure 3.4.11 Connection of Relay Cables (for DF350F-RKWHs)

3.4.10 Fixing I/F cables of subsystems (See Figure 3.4.12.)

- ① Loosen the screws, and remove plates (1), (2) and (3).
- ② Pass the I/F cable through the hole onto the floor. Tighten two screws. Attach plate (3).
- ③ Press the plates (1) and (2) against the cable in the direction of the arrows (→), and tighten four screws.

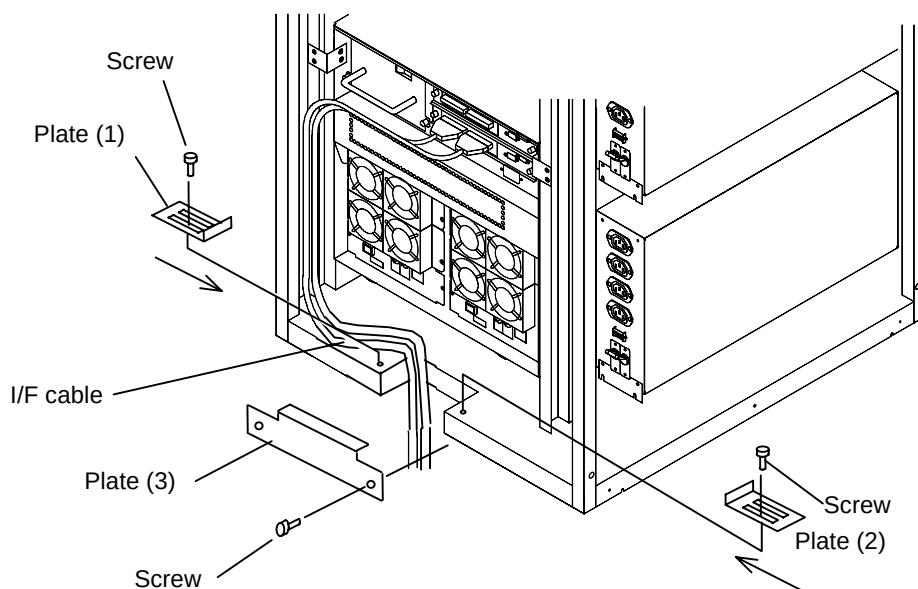


Figure 3.4.12 Fixing I/F Cable