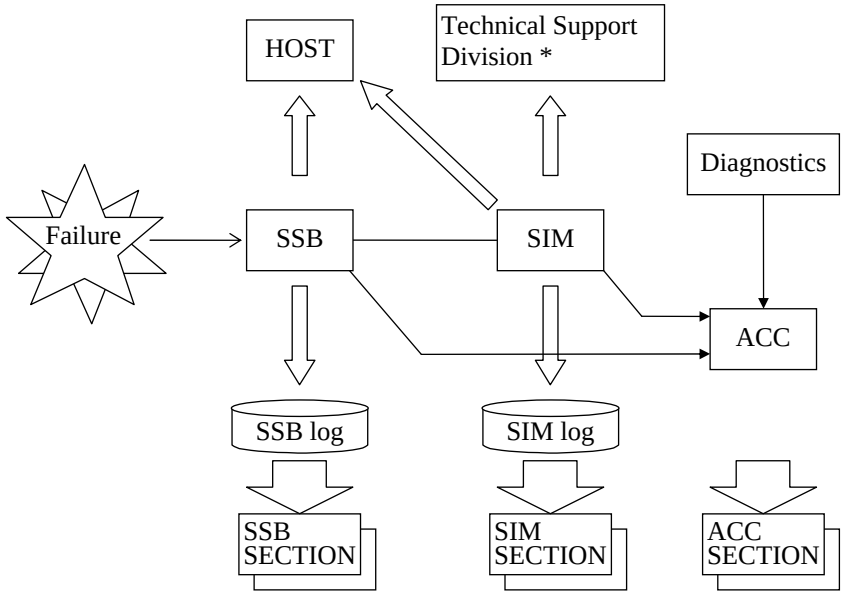
TROUBLE SHOOTING SECTION

Contents

1. Overview of TRBL

The figure below shows the flowchart of creating and reporting the SIM and SSB after the DKC microprogram has detected a failure. It also shows the section of maintenance manual which should be referred to.



Perform the maintenance work based on SIM and ACC in DKC710I.
Since the subsystem starts its maintenance work based on the SIM and ACC, if a failure occurs check the ACC first and start trouble shooting.
For the failure which does not produce the ACC, isolate the failed part depending on its phenomenon.

*: Technical Support Division: Responsible section of maintenance service and technical support.

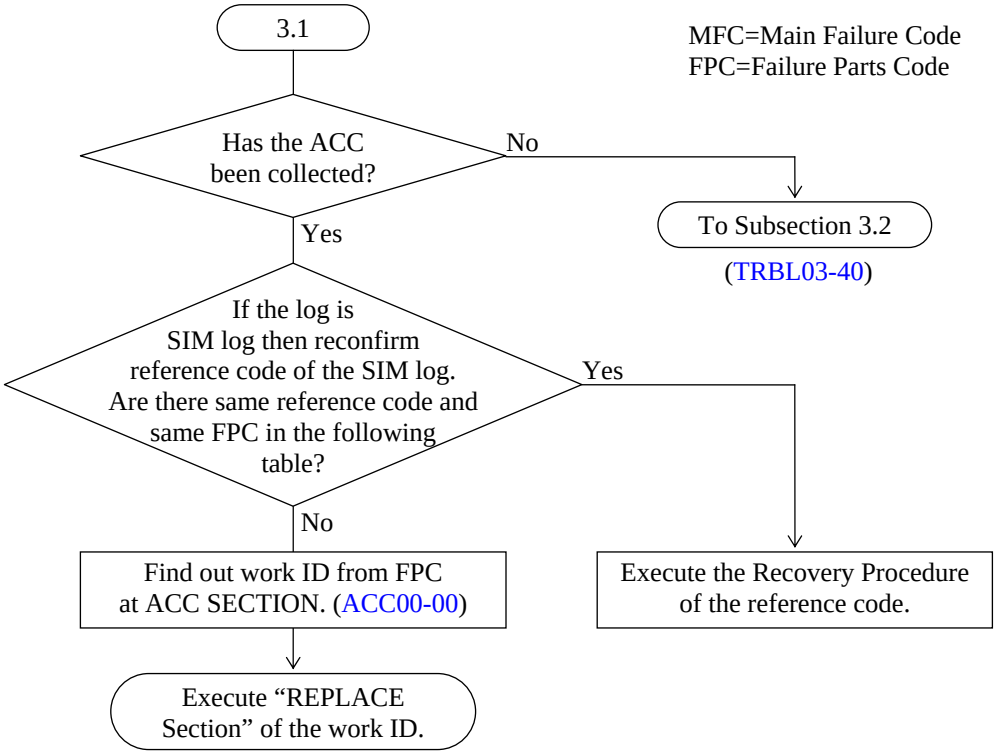
Note: You should execute recovery operations for install/de-install failures, exchanging failures, etc. at time zone with a little business influence.

2. Point out a Failed Part

[1] The ACC has been collected ---------- See TRBL03-10
[2] The ACC has not been collected ---------- See TRBL03-40

3. Isolating a Failed Part

3.1 Analyze the SIM log, SSB log or Remote Diagnostic Data



Reference Code	Recovery Procedure
DF6XXX, DF7XXX	5.1 Isolation and Recovery Procedures for SAS common path Error (TRBL05-10)
DF8XXX, DF9XXX	
1400X0, 1500X0, 73XXYY	5.2 Recovery Procedure for DKC processor failure / SVP failure (TRBL05-40)
3999XY	5.3 Error Recovery Procedure during CHA/DKA replacement (TRBL05-70)
3993XX, FFE40X, FFF90X	5.5 Recovery Procedure for CACHE Replace Failure (TRBL05-130)
FFF50X	5.6 Recovery Procedure for Cache Error (Both sides) (TRBL05-140)
452XXX, 462XXX, 455XXX, 465XXX, 454XXX, 464XXX	5.8 Drive failure recovery procedure (TRBL05-160)
FFE30X	5.9 Recovery Procedure for SM Capacities Inequality (TRBL05-310)
FFF0XX, FFF1XX, FFF2XX, FFE2XX	5.10 Cache Memory Error Isolation Procedure (TRBL05-340)
CF90XY	5.11 Recovery Procedure for LDEV Blocking (TRBL05-360)
DFAXXX, DFBXXX	
EF9XXX	
BFB2XX	5.13 Environment monitors PS status disagreement error (TRBL05-400)
BF4XXX, BF5XXX	5.14 PS warning error (TRBL05-450)
FFDE01, FFDE02, FFDE03	5.16 Recovery procedure when WDCP information is lost (TRBL05-500)
399EXX, 399FXX	5.19 Recovery Procedure for Injustice CE MODE and Injustice CE DATA (TRBL05-530)
BFE3A2	5.21 Duplex SVP Setup failed (TRBL05-600)
3072XY	5.22 Recovery Procedure for the Case Where the CHK3 Threshold Over Occurs (TRBL05-610)
BFADXX	5.23 Cable connection error (TRBL05-620)
AC76XY	5.27 Error recovery procedure of the unclosed DKU FAN Door (TRBL05-690)
BFCXYZ	5.28 Recovery procedure of the HDD FAN Error (TRBL05-700)
FFE800	5.29 Recovery procedure for inconsistency between Memory installation and definitions (TRBL05-710)
BF201X, BF211X	5.30 At The Time of Voltage Alarm Detection (TRBL05-720)
BFA2XX	5.31 At The Time of External Temperature Discrepancy Detection (TRBL05-740)
BF11XX, BF12XX	5.32 At The Time of External Temperature WARN (+ or -) Detection (TRBL05-770)
BF10XX	5.33 At The Time of External Temperature ALARM Detection (TRBL05-790)
BF15XX	5.34 At The Time of Internal Temperature WARN Detection (TRBL05-840)
BF13XX, BF14XX	5.35 At The Time of Internal Temperature ALARM Detection (TRBL05-870)
FFCE0X, FFCFYX, 6100-02	5.36 Instruction of Isolating a Failed Part in Cache Volatilization (TRBL05-900)
FFFEXX	5.37 Recovery Procedure for forcible volatile mode (TRBL05-930)
3080XX	5.38 Receiving WCHK1 Dump (TRBL05-950)
FFCC0X	5.39 Recovery procedure when CM/CMA patrol check error occurs (TRBL05-970)
DFCXXX, DFDXXX	5.40 Isolation and Recovery Procedure for Drive Link Rate Error (TRBL05-990)

(To be continued)

(Continued from preceding sheet.)

Reference Code	Recovery Procedure
D4XYYY	6. TrueCopy for Mainframe/TrueCopy Error Recovery (TRBL06-10)
DBXYYY, D48Y-YY, D4EY-YY, DBEY-YY, D4DY-YY, DBDY-YY	
2180XY, 2182-XY	
47DXYY, 47E700, 4B0XYY, 47E600, 4B2XYY, 47E500, 47E000	8. ShadowImage for Mainframe/ShadowImage/FlashCopy (R) V2/ FlashCopy (R) SE Error Recovery (TRBL08-10)
2190XY	9. Recovery procedure of AL_PA conflict (TRBL09-10)
47FYXX	10. Volume Migration Error Recovery (TRBL10-10)
4821XX	14. Recovery Procedure for DCR Pre-Staging ABNORMAL END (TRBL14-10)
21D0XY, 21D2XY, EFD000	15. External Storage Maintenance (TRBL15-10)
47EC00	18. Recovery procedure for Copy-on-Write Snapshot/Thin Image (TRBL18-10)
601XXX, 602XXX	18.3 Procedure for Recovery from Pool failure (TRBL18-40)
603000	18.4 Procedure for Recovery from Pool failure (TRBL18-50)
670000	18.6 Procedure to recovery from Thin Image failure (TRBL18-70)
623XXX	20.3 Recovery procedure for the Pool failure (TRBL20-40)
624000	20.5 Recovery procedure for the Pool failure (TRBL20-60)
625000	20.6 Recovery procedure for the Pool failure (TRBL20-70)
627XXX	20.7 Recovery procedure for the POOL VOL blockaded (TRBL20-71)
628000	20.8 The release procedure for the Protection attribute of Data Retention Utility (TRBL20-72)
DFA0XY	Collect Dump/Log and T.S.D. call
EF50XY	
6600XX	
505XYY, 508XYY	Collect Dump/Log/FMD Dump and T.S.D. call
21A8XX	21. SFP Module Failure Detection (TRBL21-10)
7C0300	22. Correspondence when detecting the audit log FTP transfer failure (TRBL22-10)
410001, 410002	24. SATA HDD/FLASH DRIVE/Encrypted PG LDEV FORMATTING Failure Detection (TRBL24-10)
180000, 180100	26. Failure Recovery while Using the System Disk (TRBL26-10)
21D4XX, EFD400	27. Recovery procedure of the Mainframe Fibre Data Migration in case of failure (TRBL27-10)
BF9BXX	29. Recovery Procedure for Mismatch of SSVPMN micro program version (TRBL29-10)
CF83XY	30. Recovery procedure for DMA Blocking (TRBL30-10)
CF12XX, BFF1XX	31. Recovery when several SAS PORT blocked/SSW access errors are occurred at the same time (TRBL31-10)
30A100	32. Recovery procedure for DKC blocked (TRBL32-10)

(To be continued)

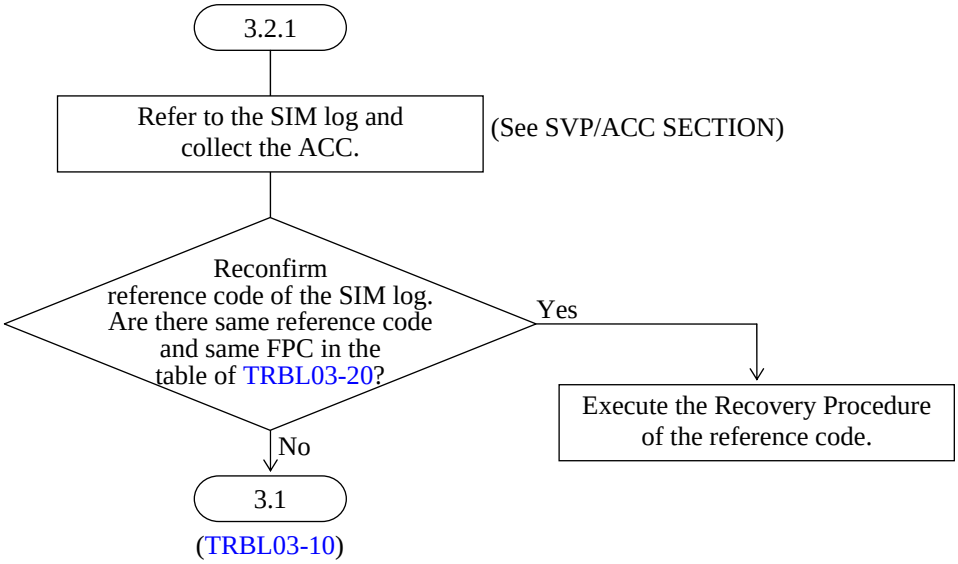
(Continued from preceding sheet.)

Reference Code	Recovery Procedure
DEF0XX	33. Quorum Disk Error Recovery (TRBL33-10)
7FFA00	34. Synchronization time failure (TRBL34-10)
3A0XYY	36. Recovery procedure for LDEV Blockade by the effect of microcode error (TRBL36-10)
7C0400	37. Recovery procedure for Abnormal End of DumpTool (TRBL37-10)
BFF1XX, BFDXXX	38. Recovery procedure when SSW access error or HDDPWR warning occurs (TRBL38-10)
7C0500	39. Recovery procedure when detected invalid SIM data (TRBL39-10)
50EXYY	40. Recovery Procedure When No Charging of FMD Occurs (TRBL40-10)
FE00XX	41. Procedure when SIM = FE00XX Is Generated (TRBL41-10)
FE02XX	42. Procedure when SIM = FE02XX Is Generated (TRBL42-10)
CF6XYY	43. Recovery procedure in the event of Logical DMA blockage failure (TRBL43-10)

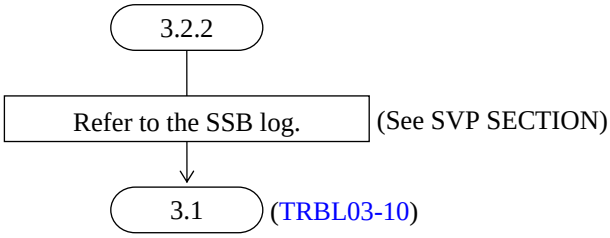
3.2 A failure has been reported to the customer but the DKC has not been connected to the Remote Maintenance

Isolate the failed part depending on the following phenomenon.

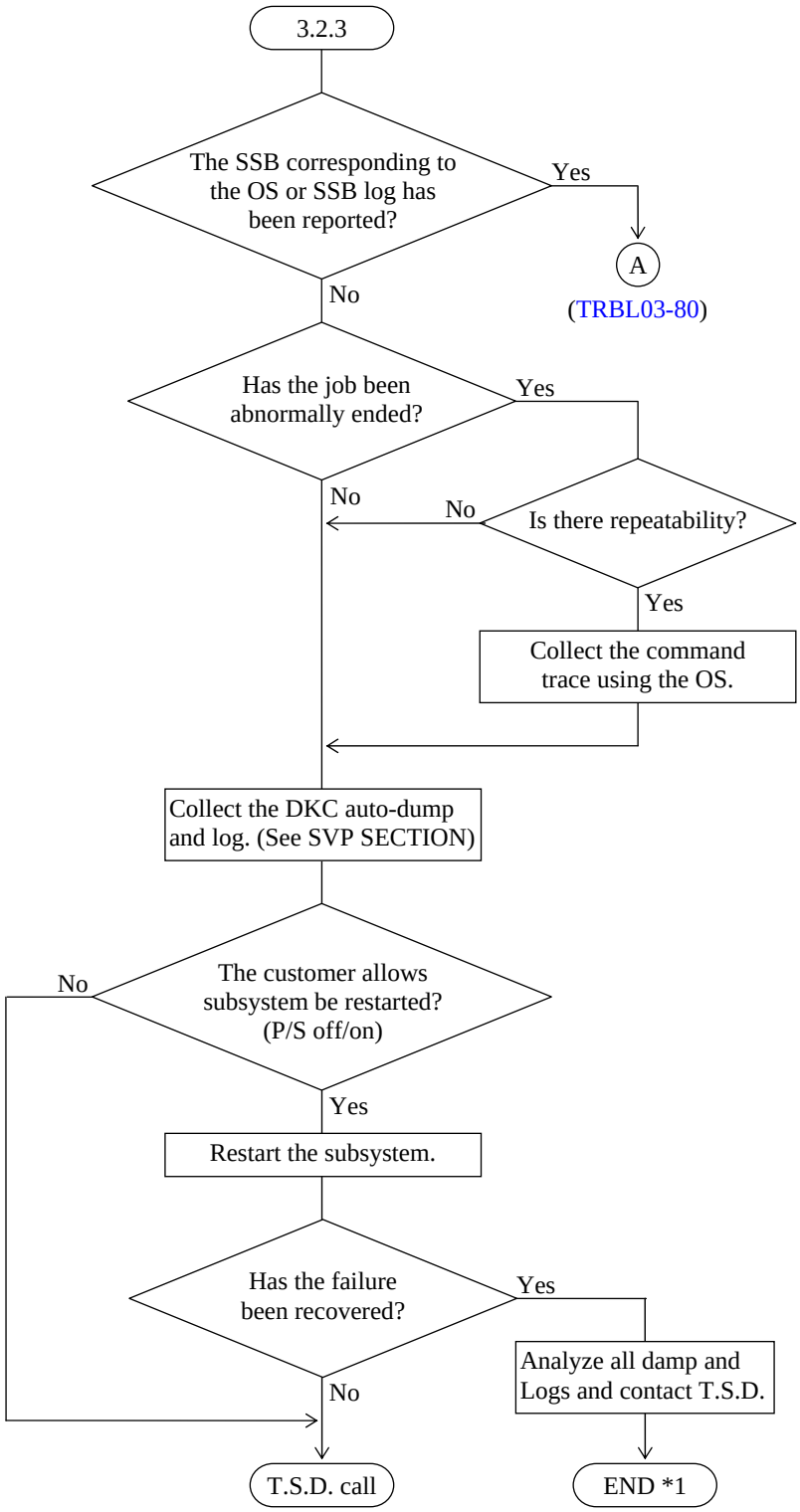
3.2.1 SIM has been reported



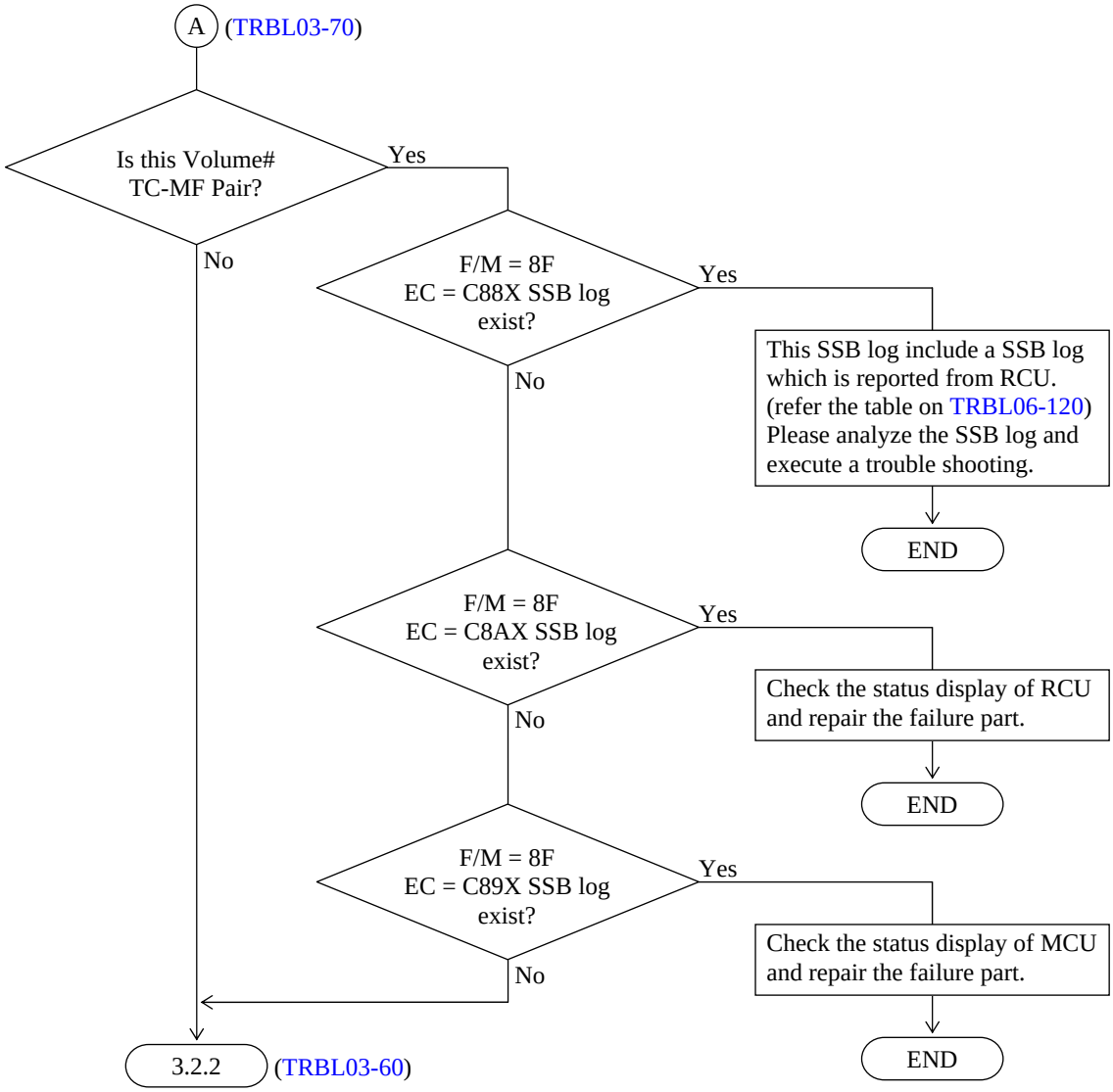
3.2.2 SSB has been reported



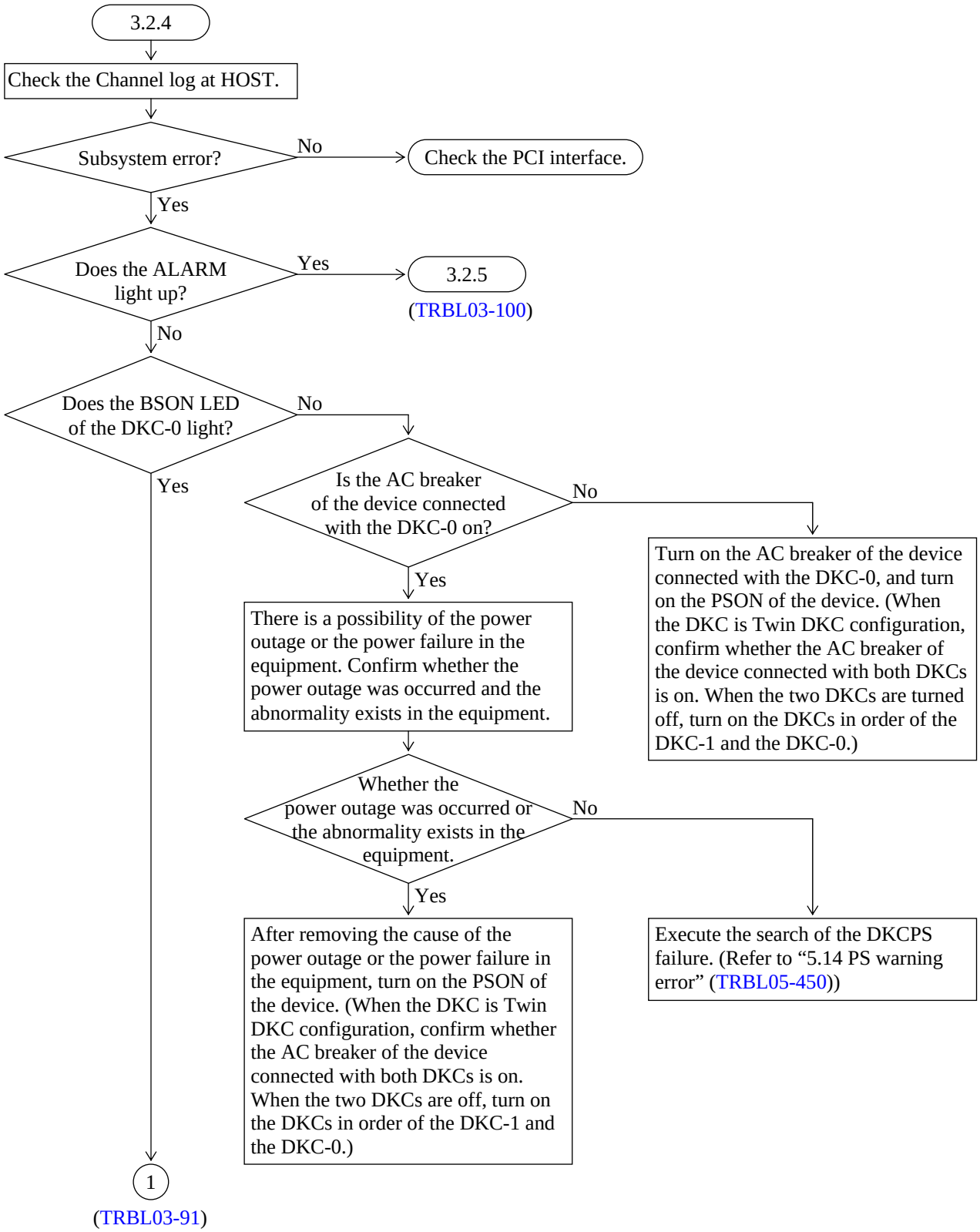
3.2.3 OS cannot recover the subsystem error (MIH, Job ABEND)

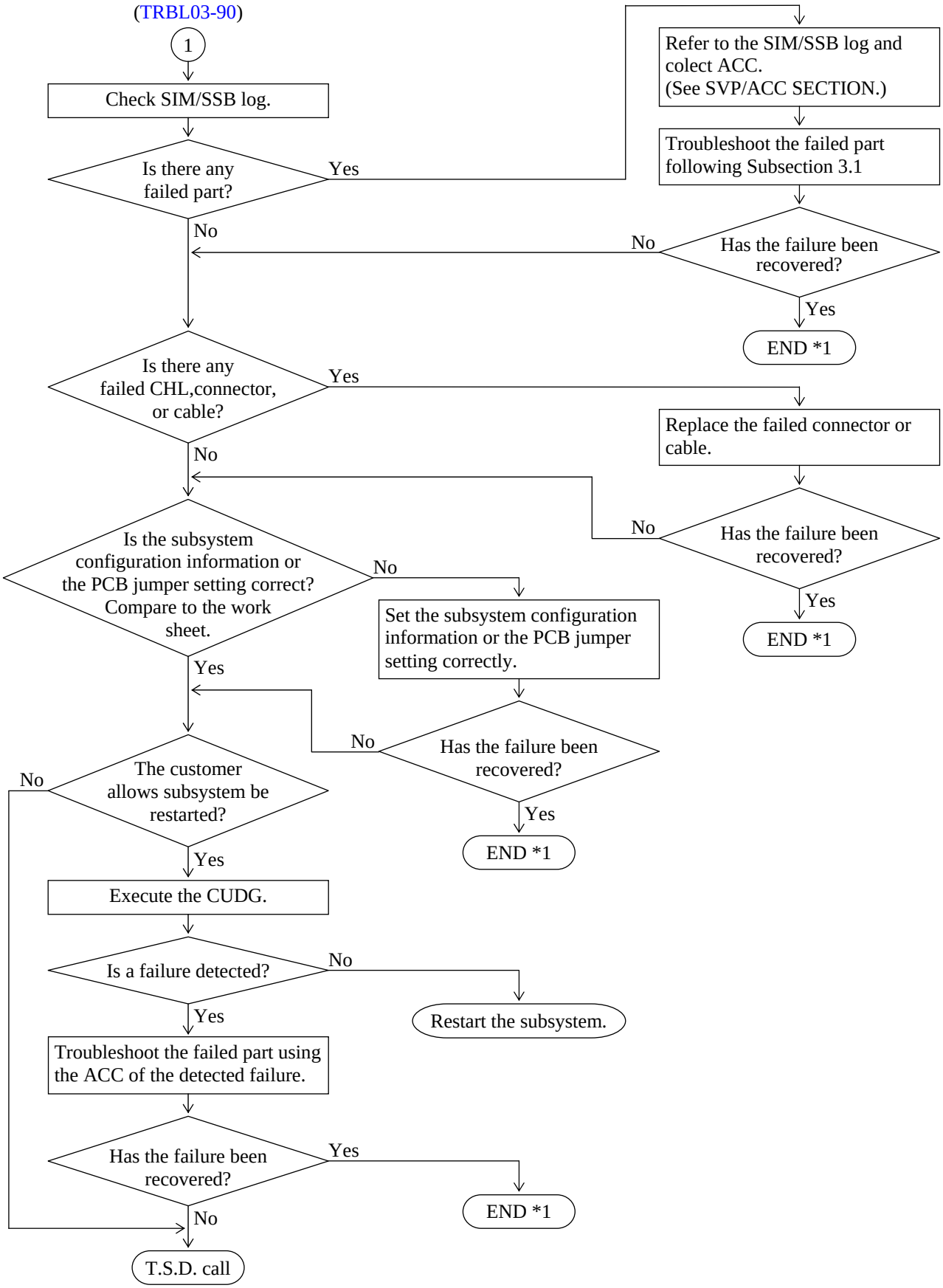


*1: If you finished the Maintenance, delete the log and SIM complete. (Refer to SVP02-220, 650)



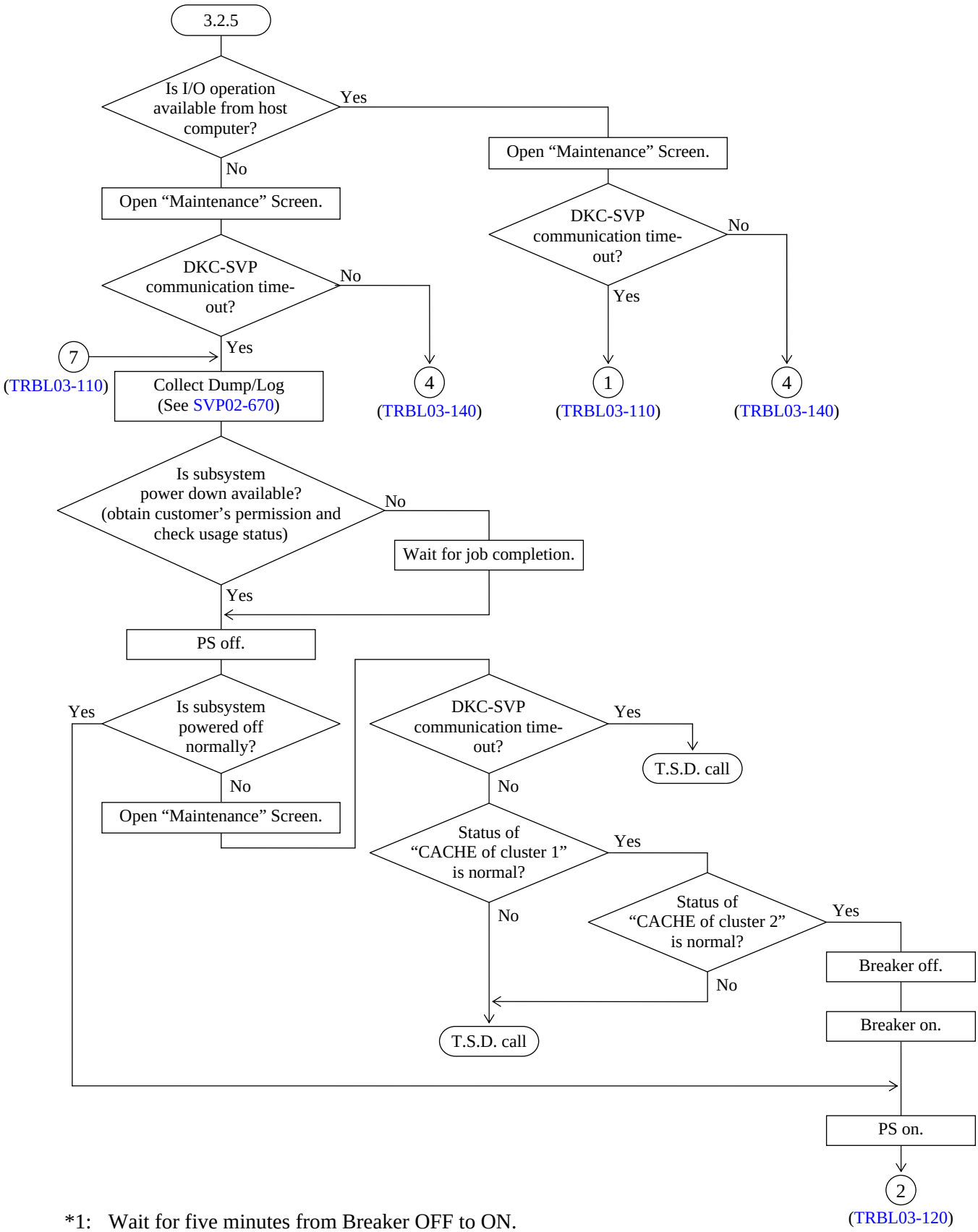
3.2.4 OS has detected the subsystem error (ICC, CC = 3)





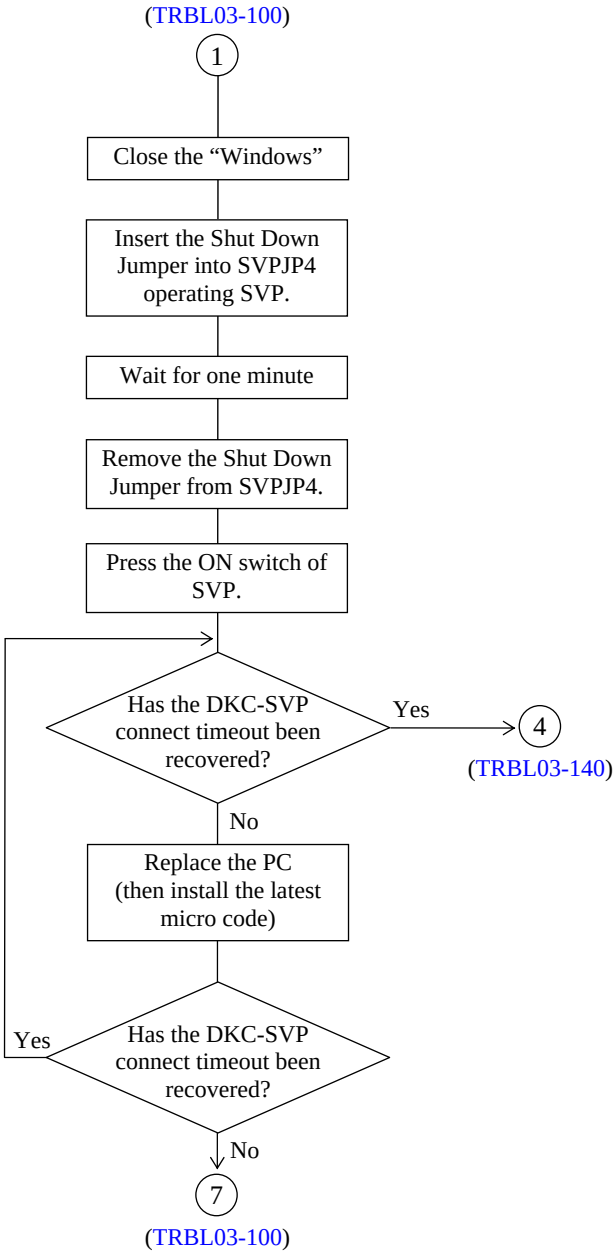
*1: If you finished the Maintenance, delete the log and SIM complete. (Refer to SVP02-220, 650)

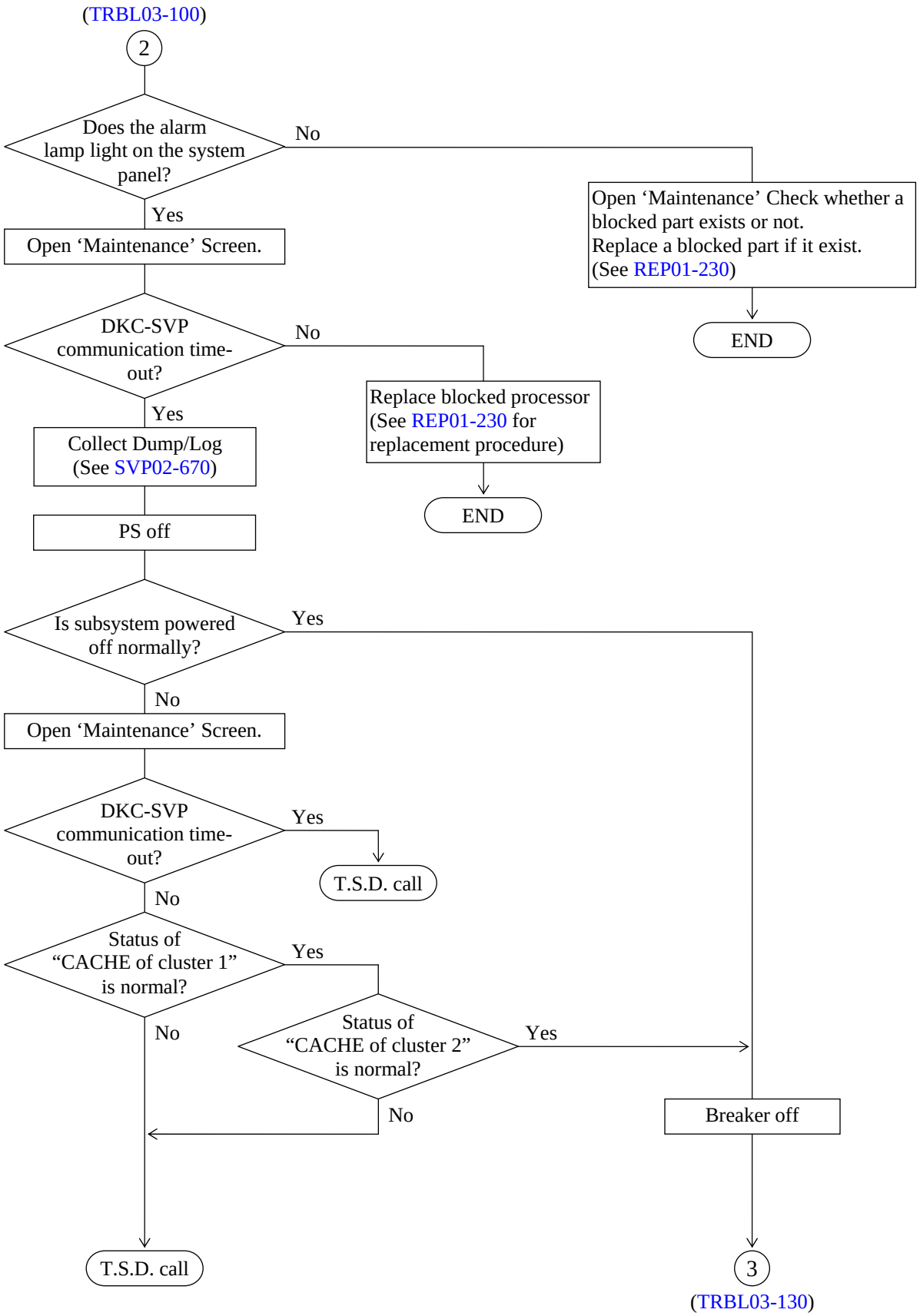
3.2.5 The lamp on the subsystem panel has failed



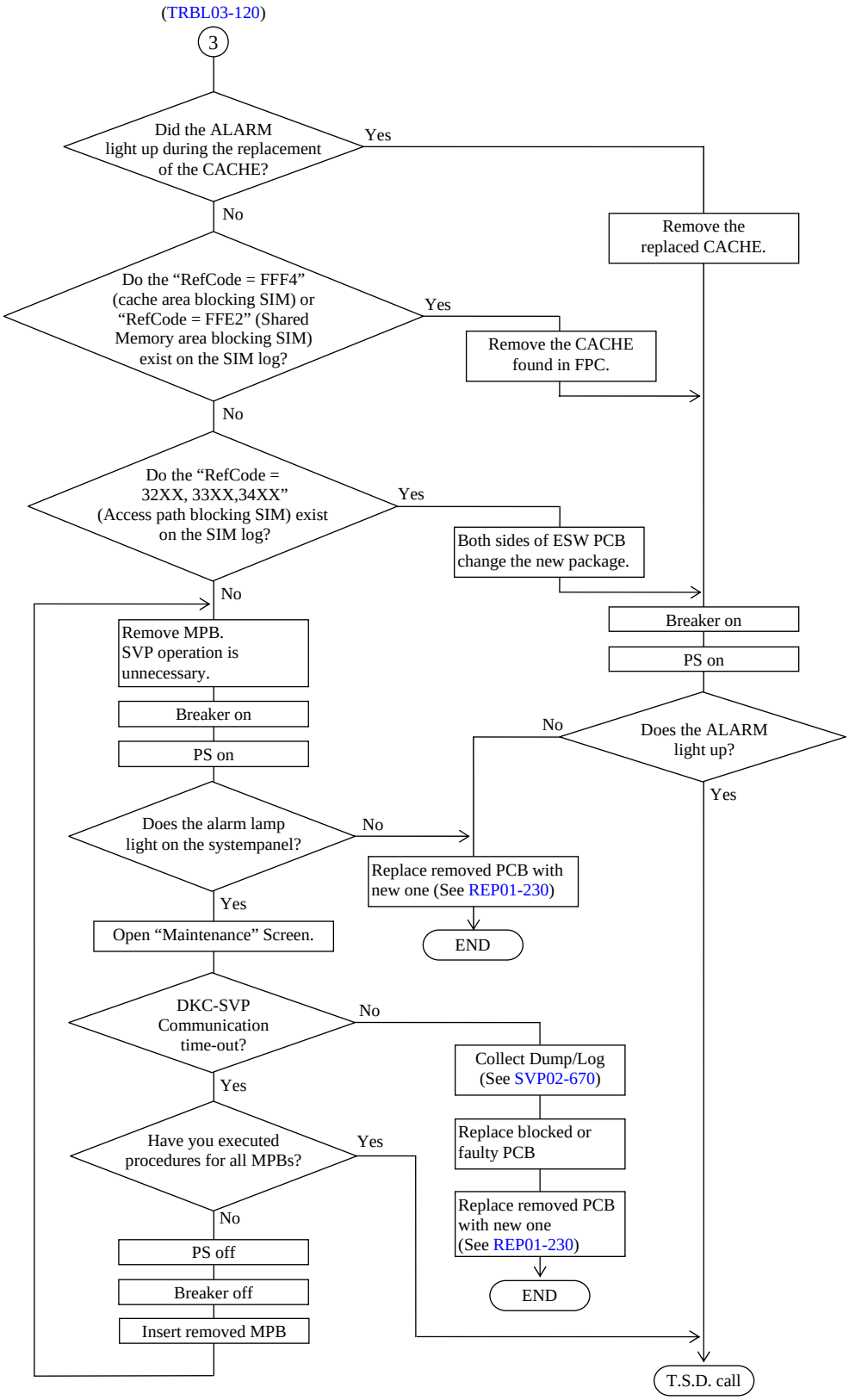
*1: Wait for five minutes from Breaker OFF to ON.

TRBL03-110

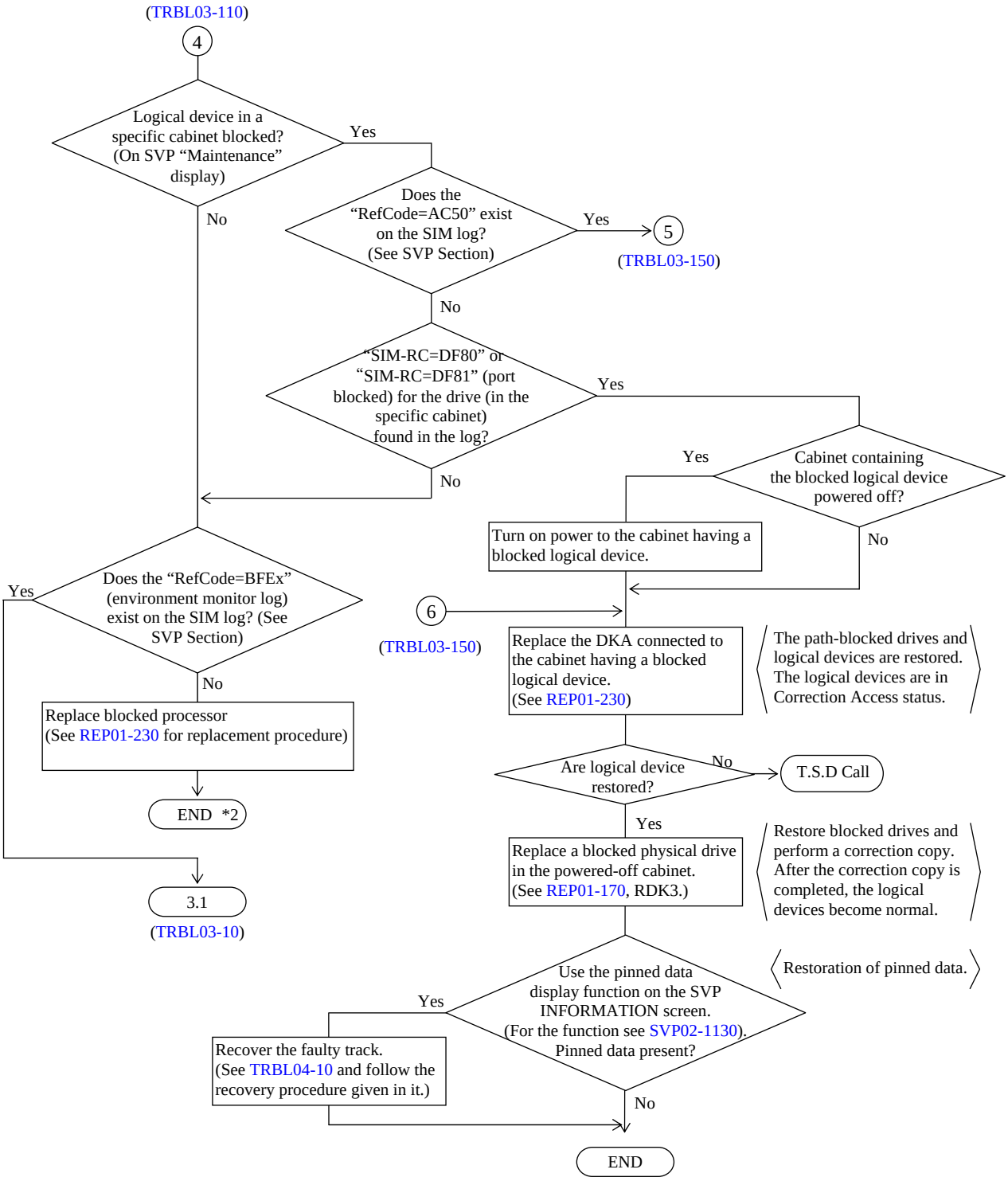




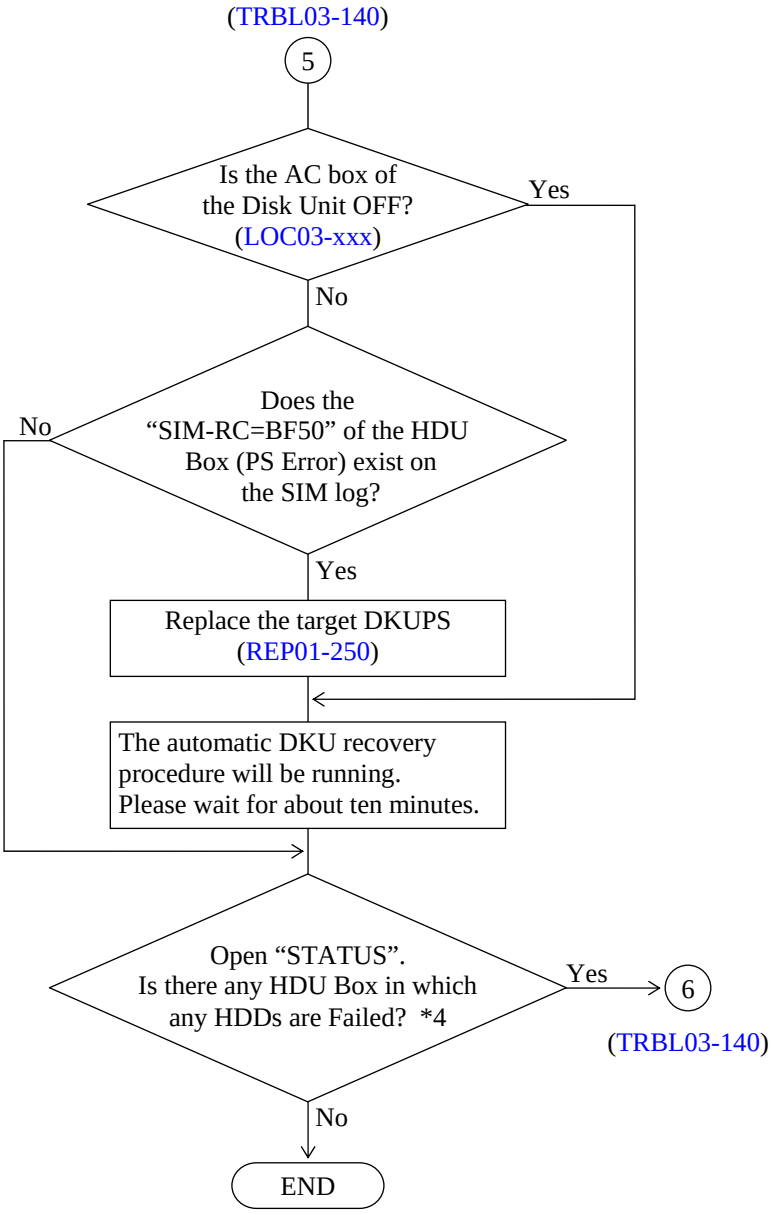
TRBL03-130



TRBL03-140



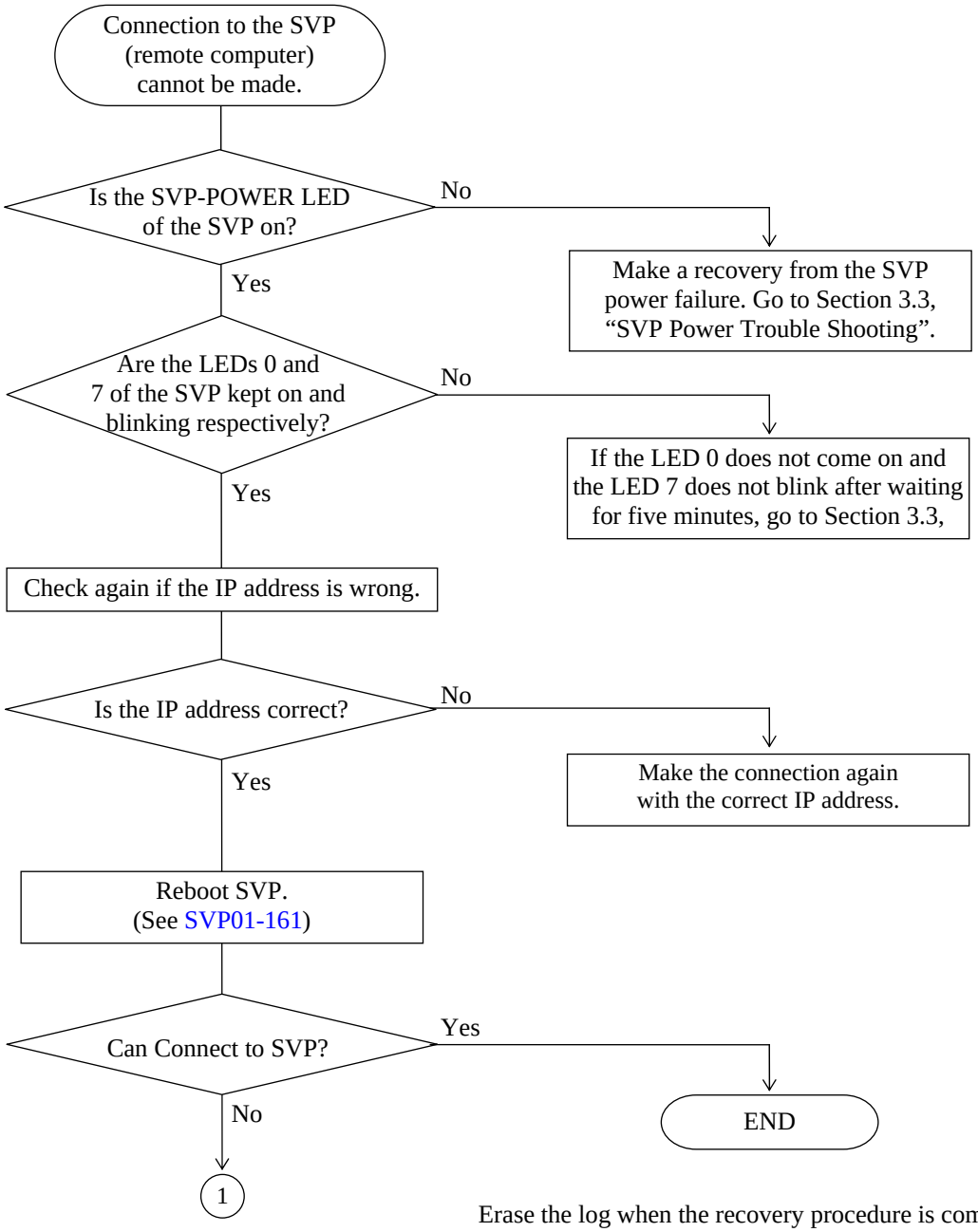
*2: If you finished the Maintenance, delete the log and SIM complete. (Refer to SVP02-220, 650)



*4: The automatic DKU recovery procedure is not effective for some cases.
Eg. very short period power down.

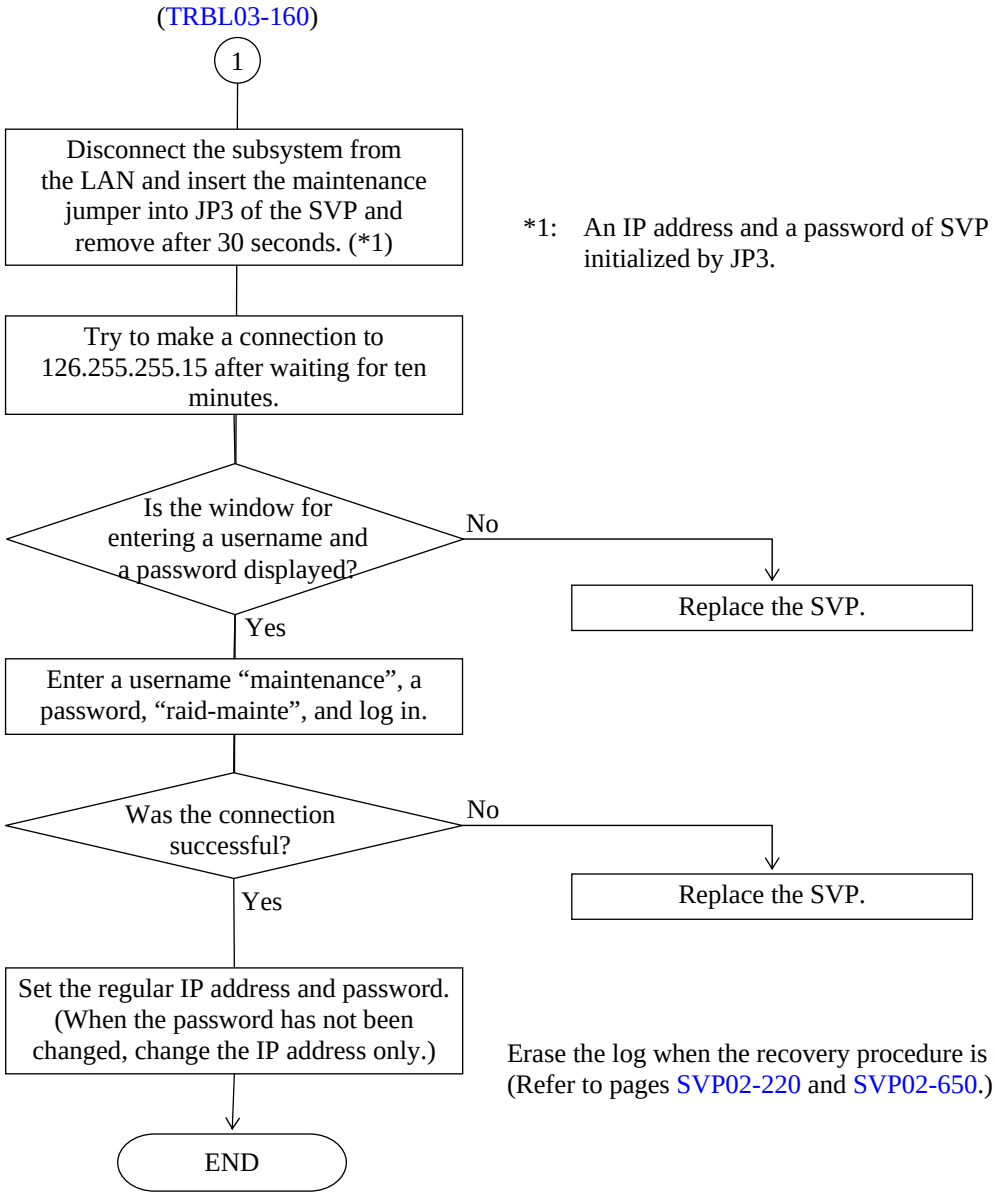
3.2.6 Procedure for recovery from SVP failure

3.2.6.1 When connection to the SVP (remote computer) cannot be made



(TRBL03-161)

Erase the log when the recovery procedure is completed.
(Refer to pages SVP02-220 and SVP02-650.)



*1: An IP address and a password of SVP are initialized by JP3.

Erase the log when the recovery procedure is completed. (Refer to pages SVP02-220 and SVP02-650.)

3.2.6.1.1 SVP OS Recovery procedure

<Pre procedure>

1. Open the rear door.
2. Turn off the power for the SVP. (Press both “ON” and “OFF” switch at the same time for 5 seconds or more.)

[SVP OS Recovery Procedure]

(1) Confirm the power status of the SVP (It should be off). If the “POWER LED” is off, then the SVP’s power status is off (DCIN LED is always on).

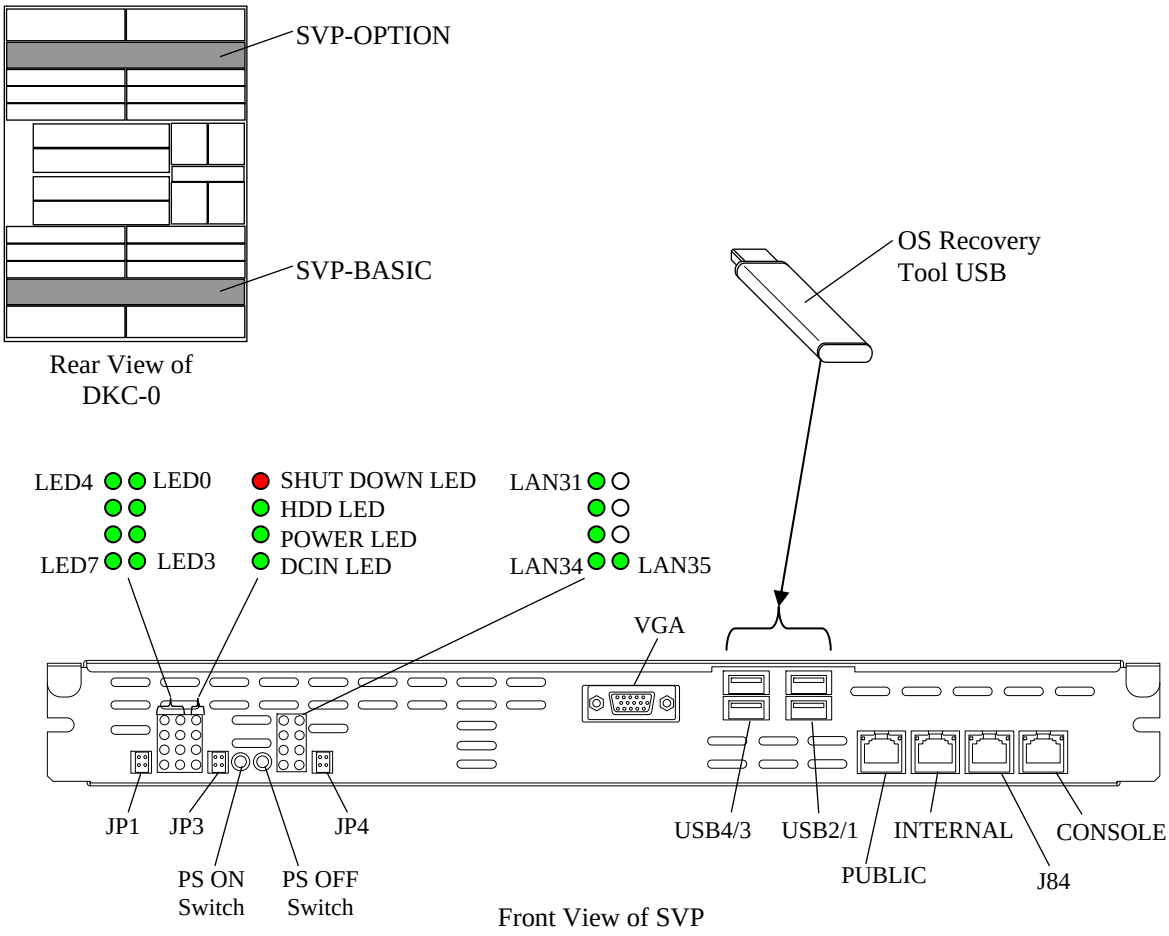
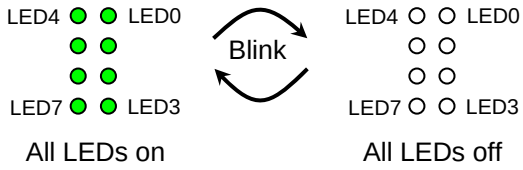


Fig. 3.2.6.1.1-1 System structure of the DKC710I

(2) Insert a Maintenance Jumper to JP1 on the SVP. And insert the “DKC710I SVP OS Recovery Tool USB” to the USB port, and press the “ON” switch. Then, the SVP will start (“POWER LED” will be on).

(3) A few minutes after from the SVP started, “OS Recovery Tool” will be loaded from the USB port, and executed.

(4) At the first step, from LED0 to LED7 (all of status LEDs) will be blinked, and Beep will be sounded intermittently. Then, press the “OFF” switch to go to the second step.



All LEDs on All LEDs off

Fig. 3.2.6.1.1-2 Status LED’s condition in the first step

However, if you want to interrupt the OS Recovery Procedure, you should turn off the power of SVP.
(Press both “ON” and “OFF” switch at the same time for 5 seconds or more. Then, the SVP’s power will go off.)

(5) At the third step, OS Recovery Tool performs recovery of the OS from the Backup partition. This process requires about 5 minutes (*1). During this process, from LED4 to LED7 (4 status LEDs) will be on.

(*1) Do not turn off the power of SVP during this process. It might cause fatal error to the SVP.

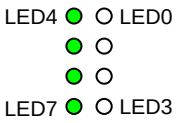


Fig. 3.2.6.1.1-3 Status LED’s condition in the third step

(6) After the recovery process finished, all of the status LEDs will be on, and the beep will sound intermittently.
If any error occurred on the recovery process, 2 LED groups (LED0 to 3 / LED4 to 7) will be on or off alternately.

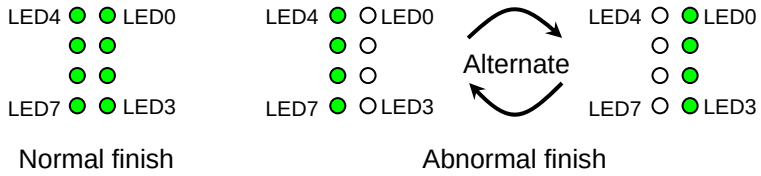


Fig. 3.2.6.1.1-4 Status LED's condition after the recovery process

Confirm that the recovery process finished normally, and then turn off the power of the SVP. Remove the "OS Recovery Tool USB", and turn on the power of the SVP again.

If the recovery process finished abnormally, then retry the recovery procedure.
If the process finished abnormally again, the SVP has some hardware failure.
(It requires replacing the SVP)

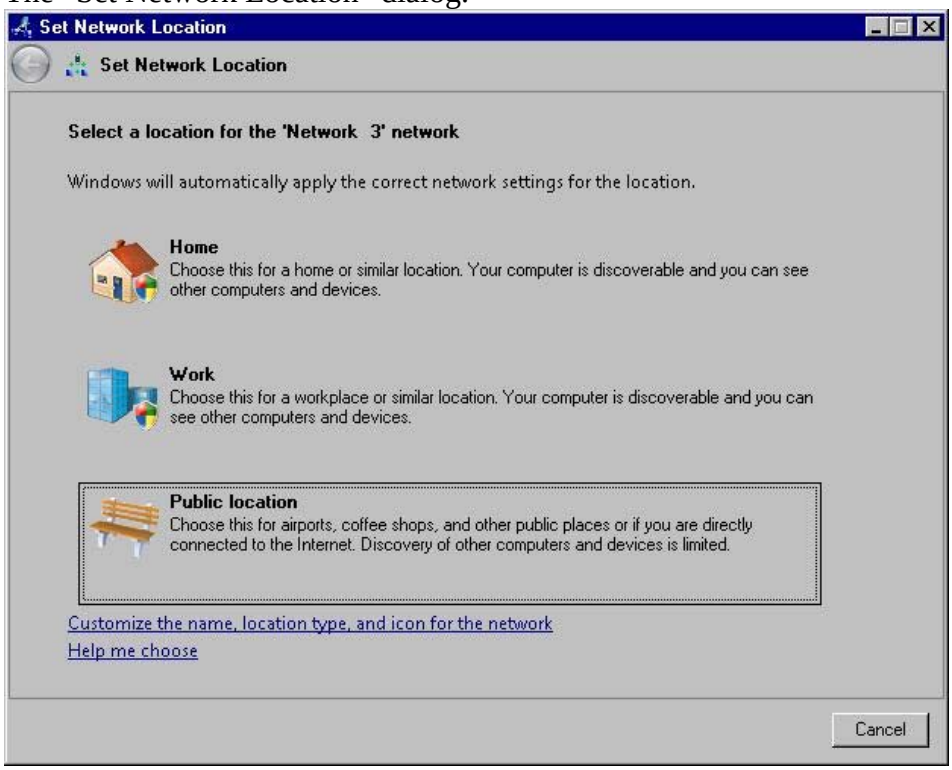
(7) After the OS recovered normally, the Security Patch Programs should be installed to SVP (Please refer to each ECN about the details of them).

(8) At the final step, install the Microprogram to the SVP. And, after the final step finished, remove a Maintenance Jumper from the SVP.

3.2.6.2 About Other SVP troubles

(1) Action when the “Set Network Location” dialog is displayed.
“Set Network Location” dialog might be displayed on the SVP screen at the opportunity when the network environment of Public LAN changed.
There is no influence on the SVP function by this screen’s being displayed.
Please close according to the following procedure.

(a) The “Set Network Location” dialog.



(b) How to close the “Set Network Location” dialog.
Press (CL) the [Cancel] button in the lower right of the dialog.

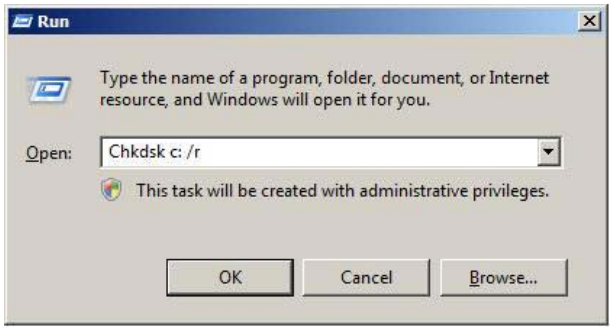
(2) Action when the SVP HD (Hard Drive) may be failed.
If SVP HD (Hard Drive) may be failed, do as following procedures.

(a) Set JP1
JP1(PW OFF/ON control JP) is set to SVP.

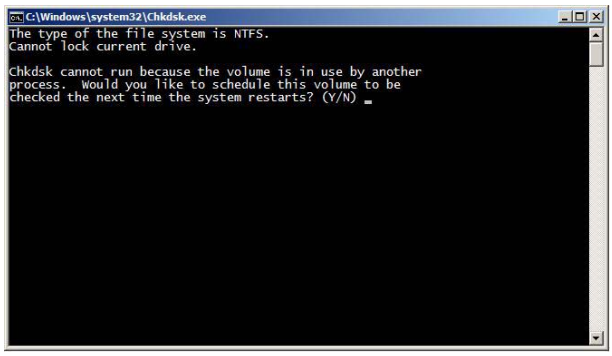
(b) Select [Run]
Select (CL) [Run...] from the [Start] menu.

(c) Execute of disk check
Enter the following command in the "Open:" box and select (CL) the [OK] button.

Chkdsk c: /r



(d) Schedule of disk check
Please input [Y] to the message of "Chkdsk cannot run because the volume is in use by another process. Would you like to schedule this volume to be checked the next time the system restarts?".

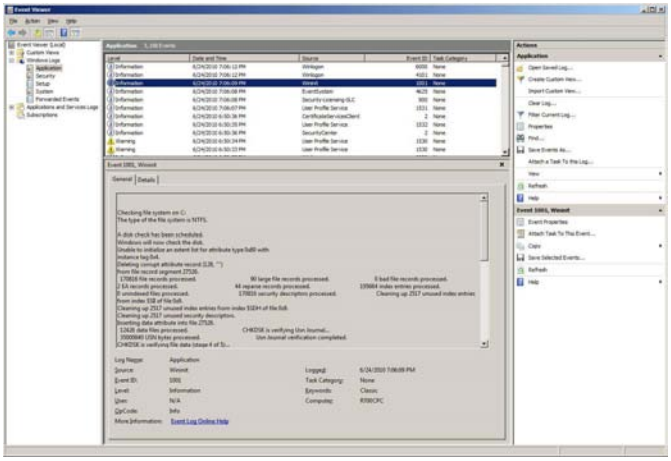


Note: The disk check of SVP is performed after the reboot of SVP.
A disk check takes about 1 hour.
(Time changes in the state of SVP PC.)

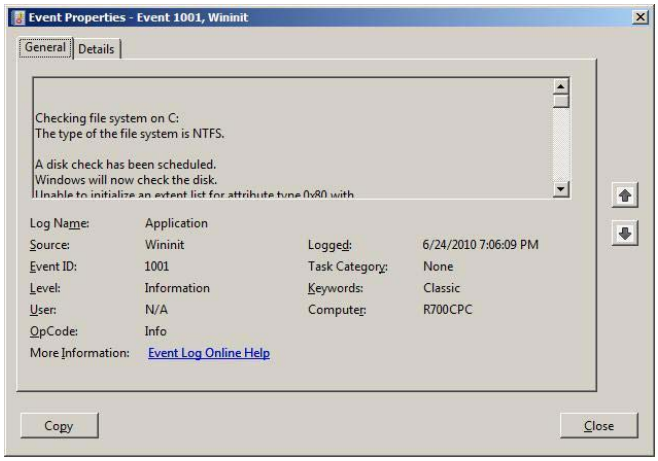
(e) SVP reboot
Press SVP PS OFF Switch, and SVP is stopped.
Make sure that SVP POWER LED is off, and then press SVP PS ON Switch. SVP is started. (See LOC03-130)

(f) Displaying the Event Viewer
Please start an event viewer, after a disk check is completed and SVP started, and select (DC) [Windows Logs] - [Application].

(g) Display of diagnosis result
Select (DC) the thing of “Wininit” from [Source] of the list of events.



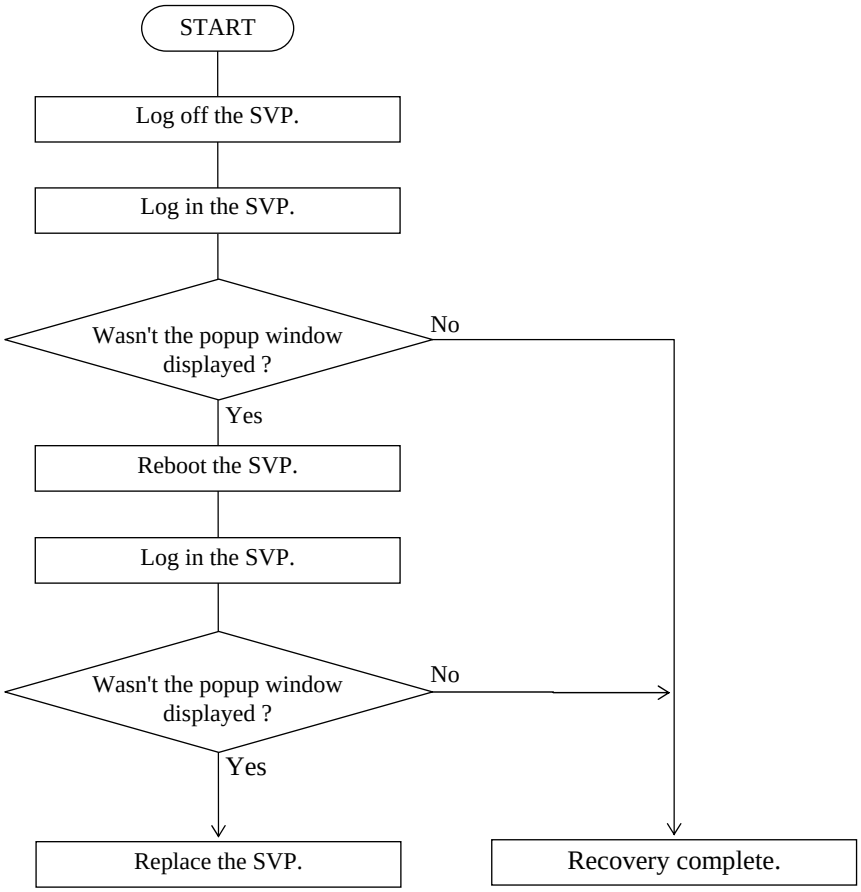
(h) Details of diagnosis result
The result of the disk check is displayed.



(3) Action when the “Your user profile was not loaded correctly.” popup is displayed.
“Your user profile was not loaded correctly.” popup might be displayed on the Task tray of Windows at the opportunity when the SVP logged in.
The SVP function might not work correctly.
Please deal with it according to the following procedure.

(a) The “Your user profile was not loaded correctly.” popup

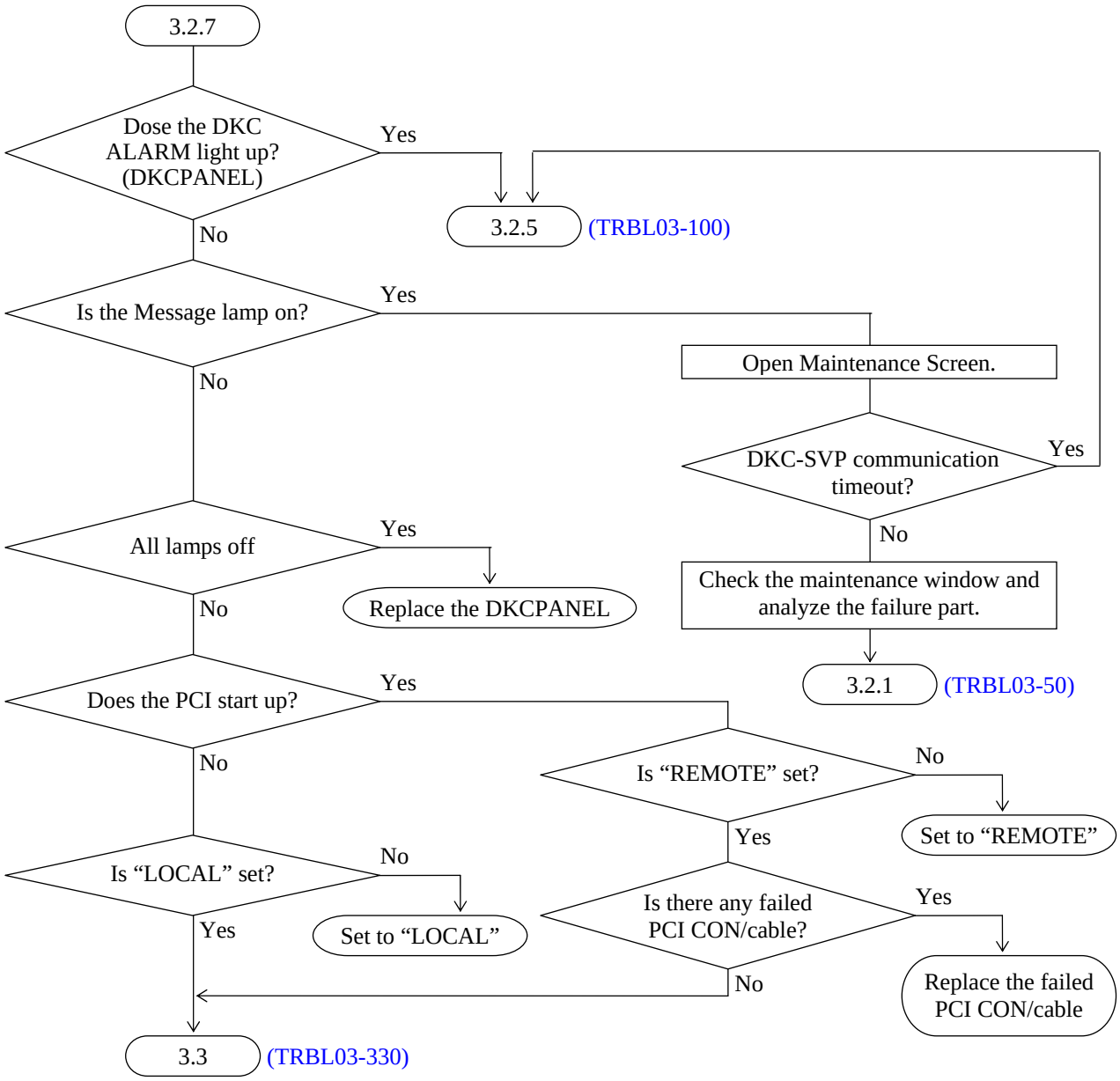
(b) Action



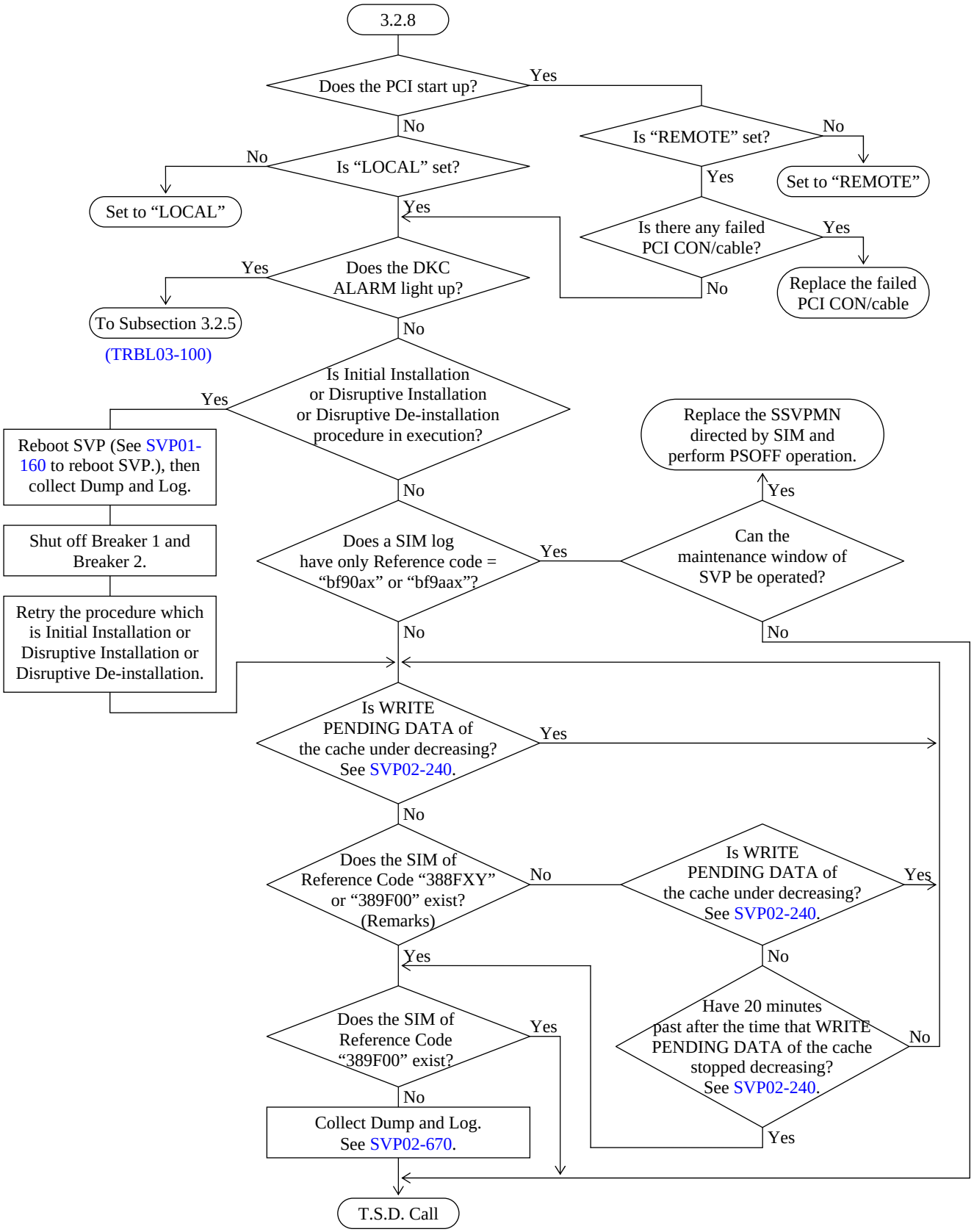
(4) Action in the case you cannot operate SVP because the SVP screen is not displayed (black screen) etc. when logging into SVP.
Reboot SVP and log in again according to the following procedure.

- SVP reboot
  1. Press SVP PS OFF Switch, and SVP is stopped.
  2. Make sure that SVP POWER LED is off, and then press SVP PS ON Switch. SVP is started. (See LOC03-130)

3.2.7 A failure has occurred when turning the power on



3.2.8 The power cannot be turned off



Remarks

- There is a case that it takes more than 10 minutes to report SIM of Reference Code “388FXY” or “389F00”, and that especially it takes about 1 hour in case that emergency destage does not complete.
- There is a case that p/s off procedure is normally finished, even after SIM of Reference Code “388FXY” or “389F00” is reported.
- If DKC710I is powered off when external storage mapped by DKC710I is PS/OFF or power failure, there is a possibility that DKC710I cannot be turned off. (Because Write Pending data of the external storage mapped by DKC710I remains in Cache of DKC710I) SIM = 388FXY is reported. In this case, execute “Disconnect subsystem” operation of UVM after starting up the external storage and power off DKC710I. And execute the power off procedure of external storage.

3.2.9 Multiple parts have failed

Maintenance Priority

If there are many parts which need maintenance in the system, you should plan the maintenance schedule under the priority mentioned in this page.

If you have to maintain two parts, first you should maintain a part whose priority is higher than the other.

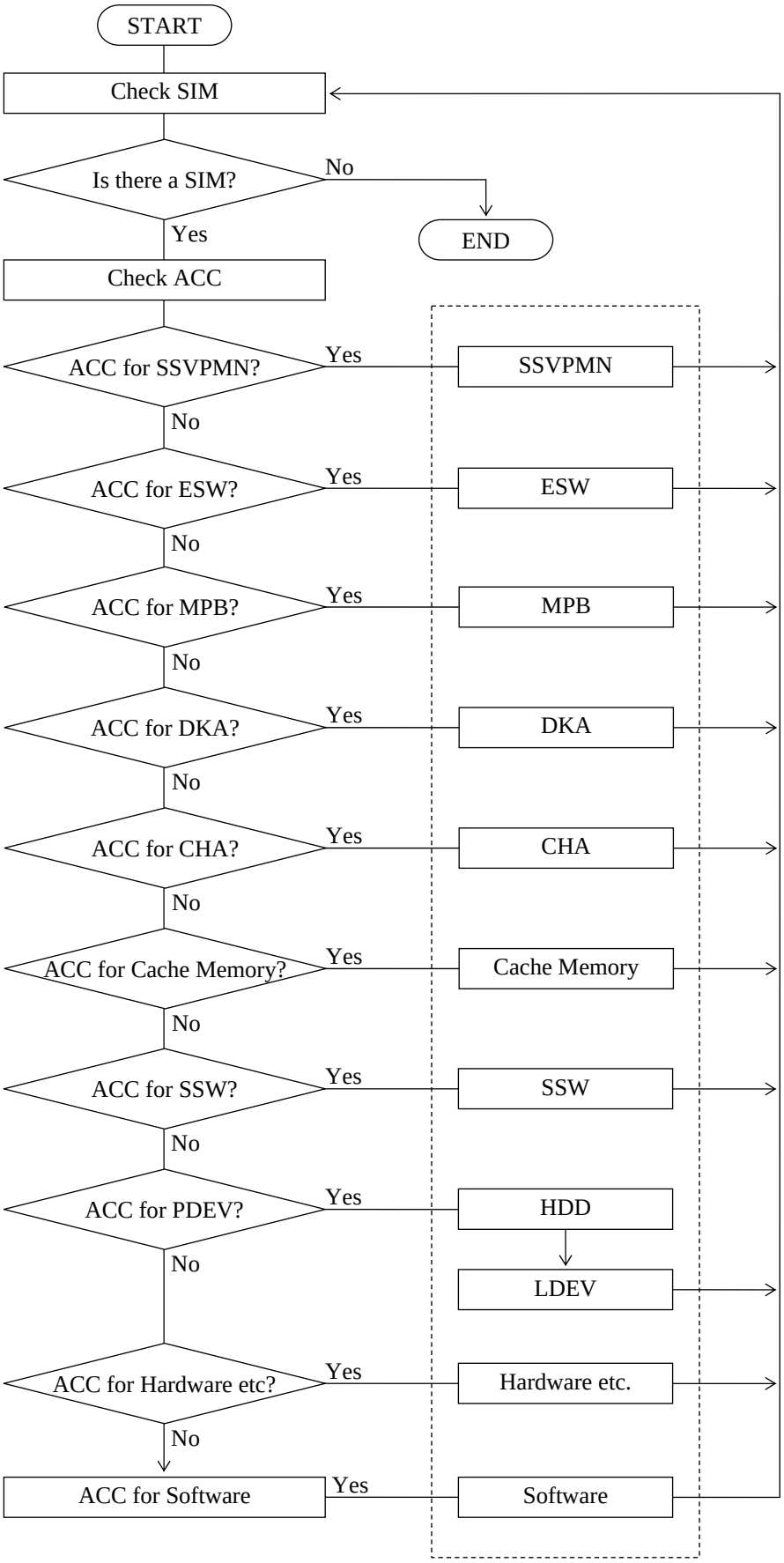
Table 3.2.9-1 shows that a part with a smaller priority number has a higher priority.

When the failure is not restored even if the maintenance with a high priority is performed or when the maintenance work with a high priority fails, go to the maintenance work of the next priority.

Table 3.2.9-1 Priority Table

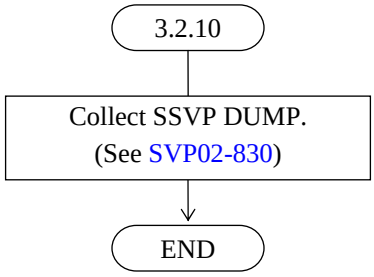
Priority	Parts name	Maintenance method
1	SSVPMN	Replace
2	ESW	Replace
3	MPB	Replace
4	DKA	Replace
5	CHA	Replace
6	Cache Memory	Replace
7	SSW	Replace
8	HDD	Replace
9	LDEV	Format or Restore
10	Hardware etc.	Replace
11	Software	Exchange

When the SVP High Reliability Kit has been installed and an SVP fail over (SIM=7FF3XX) is detected, at first, take actions to resolve the failure (SIM=7FF3XX).

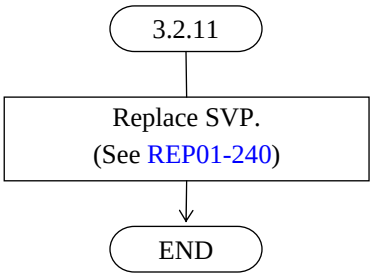


3.2.10 SSVP alarm lamp has been blinking or has lighted on

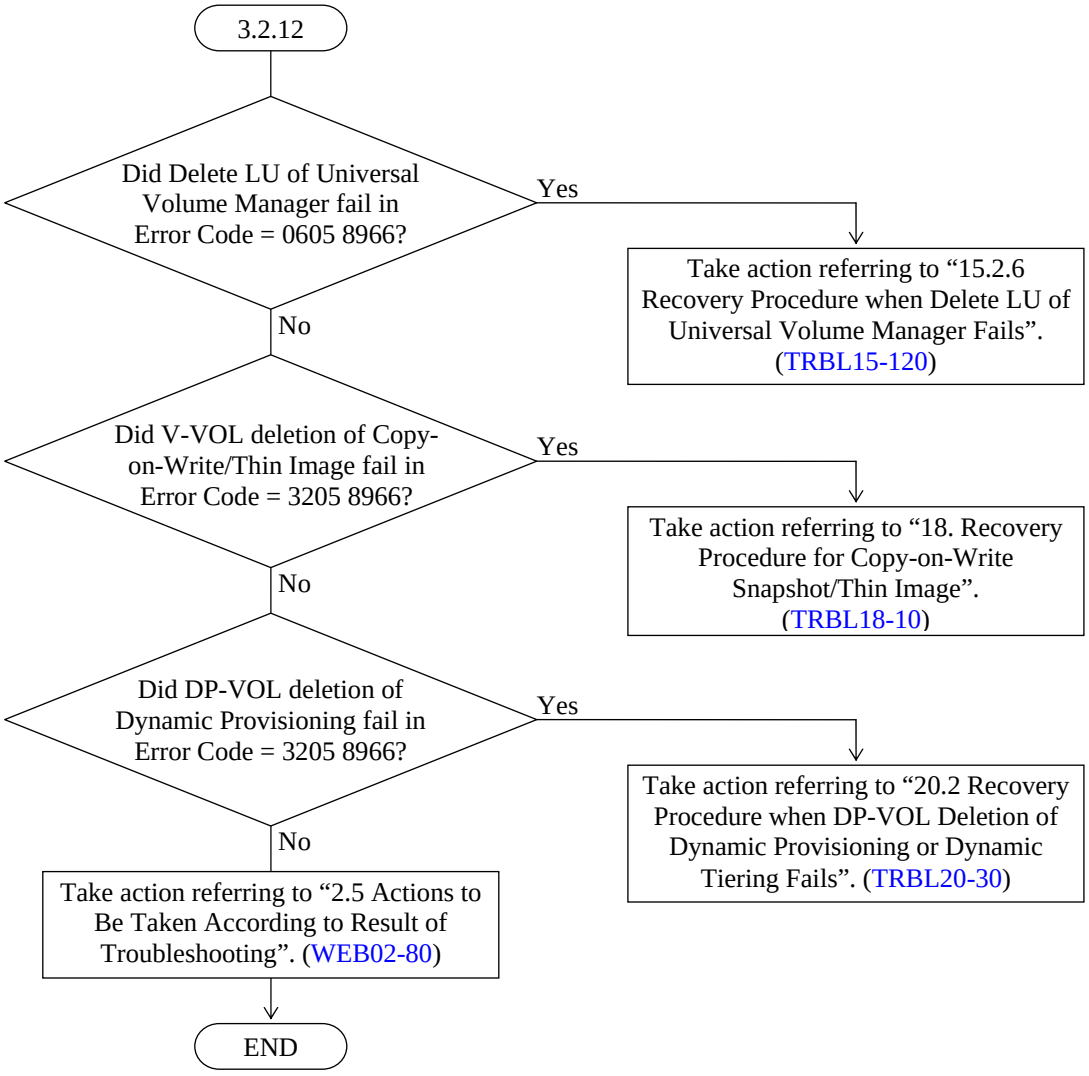
Collect SSVP DUMP.
When the SVP High Reliability Kit has been installed and an SVP fail over (SIM=7FF3XX) is detected, at first, take actions to resolve the failure (SIM=7FF3XX).



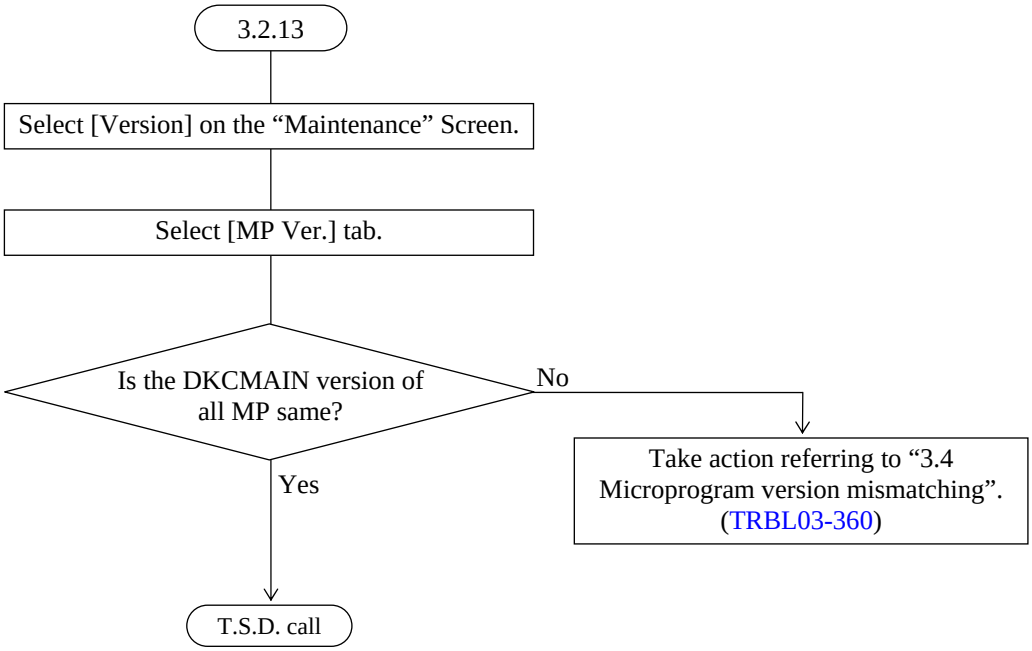
3.2.11 MESSAGE lamp has been blinking



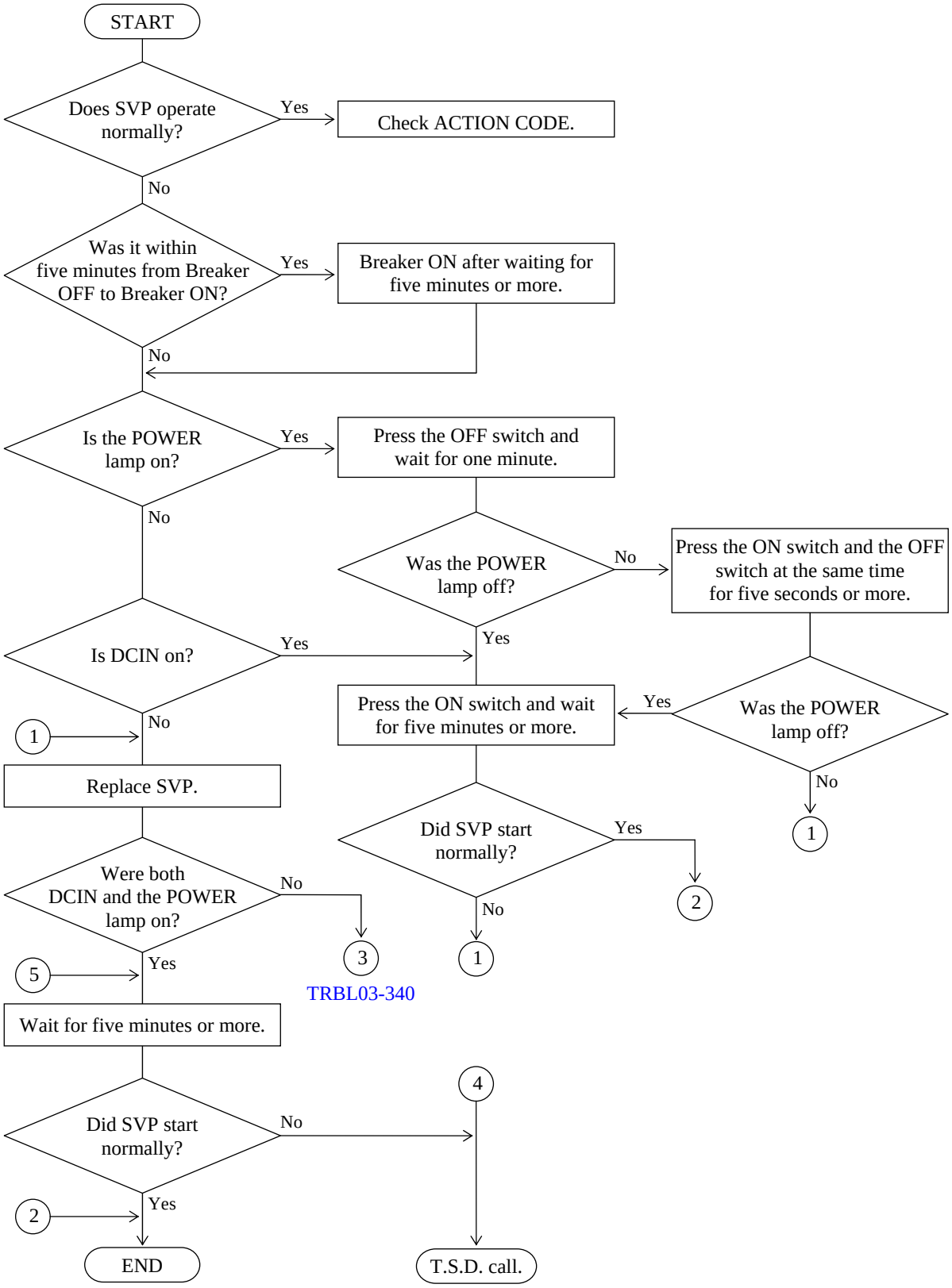
3.2.12 Web Console failure

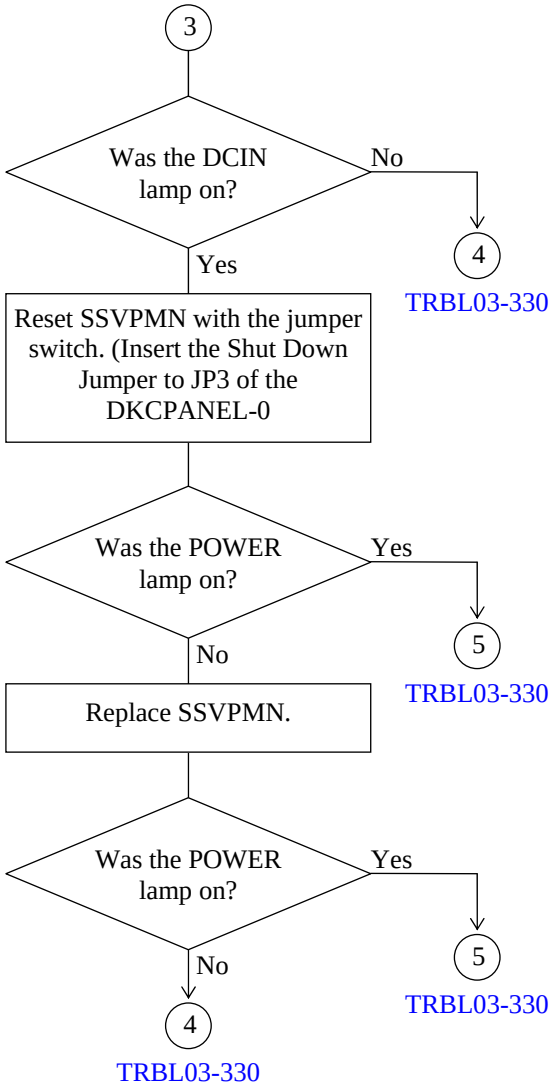


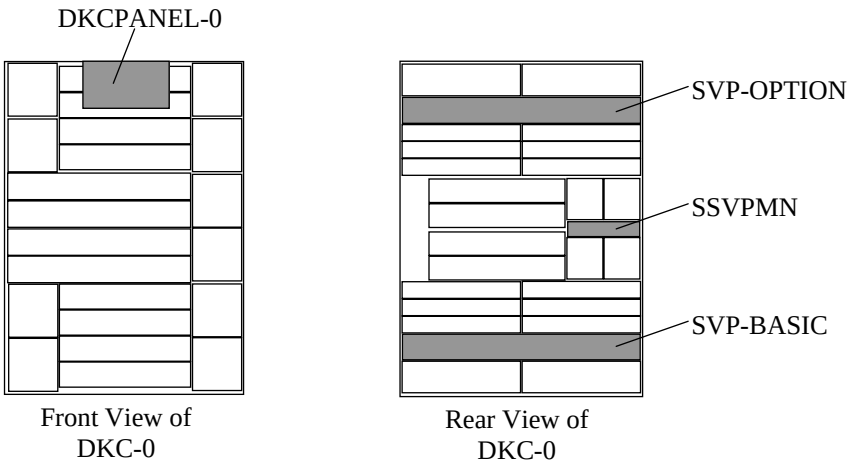
3.2.13 Recovery procedure of LDEV installation/uninstallation failure

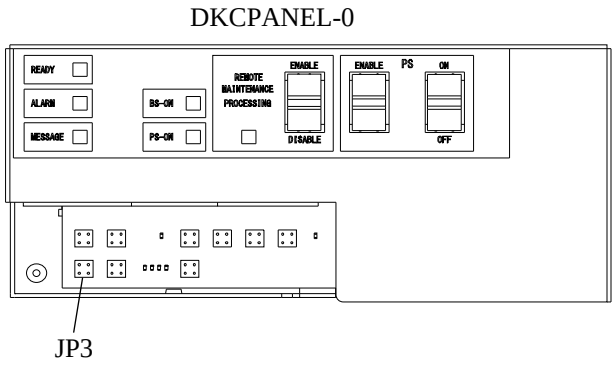


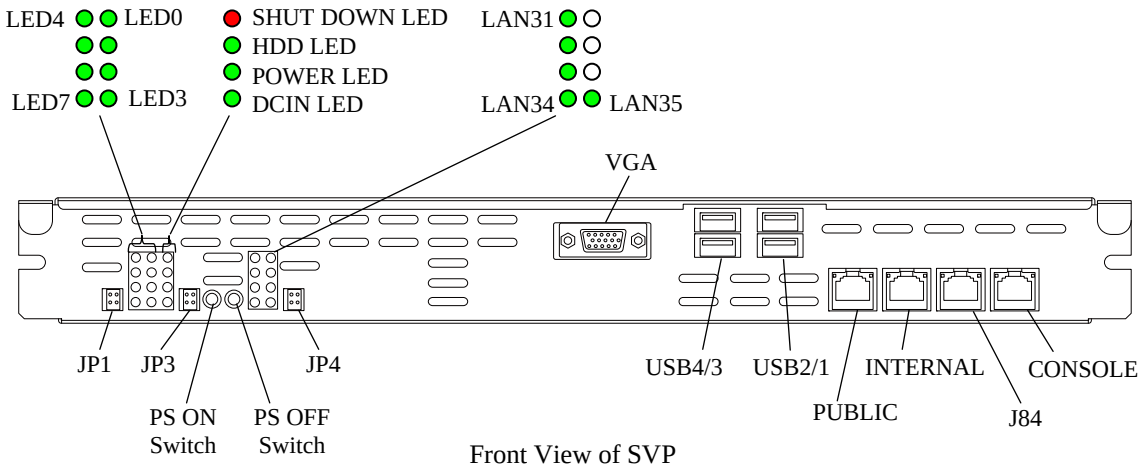
3.3 SVP Power Trouble Shooting











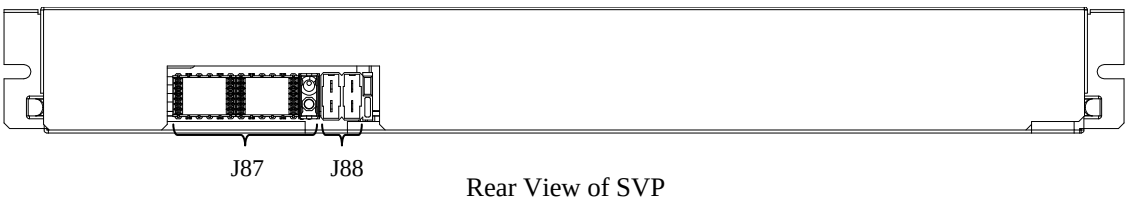
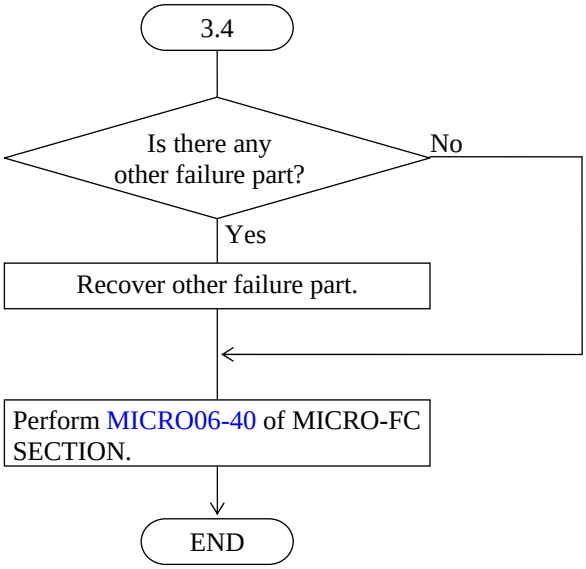


Fig. 3.3-1 Parts Location

3.4 Microprogram version mismatching



4. Recovery for Pinned Tracks

Hardware errors sometimes cause a pinned track.
This document explains pinned tracks and how to recover from them.
The following reports inform of the occurrence of a pinned track:

- Permanent Data Check
- Repeated report of Host Adapter CHK2 on the same track
- SIM report of a pinned track

SIM REF. CODE	Meaning	Comment
EF4X-YY	Unable to write a track to a PDEV	X: CU# (*) YY: LDEV#
FF4X-YY	Unable to process a track to or from Cache	
EF5X-XX	Unable to write a track to a device in the external storage system	
FF5X-XX	Unable to read a track from a device in the external storage system	

*: CU# is detected only lower figure in SIM-RC (CU#0 - CU#0XF).
Look at the SVP information-Content-SIM-Error Location.

To recover pinned tracks, the following information is necessary:

- Address in LDEV (LDEV number, Cylinder & Head address)
- First and last Cylinder & Head addresses of the stripe containing the pinned track
- The error type of the pinned track (Write or ECC/LRC)
- The PDEV number of the drive containing the pinned track

This information can be obtained from the “Pinned Data Display Function” (SVP03-510) of the SVP.

There are 4 types of pinned track error:

Display on SVP	Meaning	Recovery
Write Error	Unable to write a track to a PDEV	Replacement of PDEV
ECC/LRC Error	Unable to process a track to or from Cache	Data recovery
External VOL Write Error	Unable to write a track to a device in the external storage system	After recovering the external storage system, perform a dummy replacement of the cache package
External VOL Read Error	Unable to read a track from a device in the external storage system	After recovering the external storage system, perform a dummy replacement of the cache package

Pages TRBL04-XX explain the error types of pinned tracks and have flowcharts for recovery.
For TC-MF/TC volumes, the flowcharts for recovery are shown in TRBL06-220 through TRBL06-240.

For SI-MF/SI volumes, the flowcharts for recovery are shown in TRBL08-10.
For OPEN volumes, the flowcharts for recovery are shown in TRBL07-180.
For UR data volumes or journal volumes, the flowcharts for recovery are shown in TRBL17-110.
For Pool volumes of Copy-On-Write Snapshot or Thin Image, the flowcharts for recovery are shown in TRBL18-60.

ECC/LRC Error

Causes:

(1) An ECC/LRC type of a pinned track occurs when a CHK2 error occurs during data transfer between cache and channel, or between cache and drive. If it is a temporary error, such as transfer timeout, the error may be recovered and the PIN may be deleted by retrying the operation. When the retry operation fails because the track is the dirty data, Permanent Data Check may occur, and data will be lost. The host has to reconstruct the data using the backup file etc.

(2) An ECC/LRC type of a pinned track occurs when the host failed to write data to the cache due to the failures in two or more drives (In RAID6, 3 or more drives). If it is a temporary failure, the PIN may be deleted when the host retries the operation. However, data check will be reported to the host.

(3) When a parity track cannot be created due to a drive failure etc., an ECC/LRC type of a pinned track occurs, and only the data will be destaged. The ECC/LRC type of a pinned track will be recovered when the entire stripe is written.

(4) When the data cannot be read from the source drive during correction copy, the target track cannot be recovered. As a result, the track will become an ECC/LRC pinned track. This will lead to Permanent Data Check, and the original data will be lost.

(5) This error occurs when the emergency destage, which is performed because of a cache failure or a cache maintenance operation or P/S OFF, failed due to TOV etc., and the error could not be recovered despite retrying.

Result of host I/O operation:

(1) When a track with an ECC/LRC error is accessed by a host I/O and the data can be read, the result will be a normal end.

(2) If the data cannot be read, there will be a failure reported of Permanent Data Check. In this case the data is lost.

(3) Repeated Host Adapter CHK2 errors reported. Data is usually still readable but is not being destaged from cache.

Recovering ECC/LRC pinned tracks:

(1) Execute ICKDSF ANALYZE SCAN using LDEV, CC, HH information from the SVP PINNED TRACK display to determine whether Failure is reported or not.
   (a) No Failure. Data can be read. Read the data and save it to tape, another volume, or memory, etc.
   (b) Failure. Data cannot be read. It must be reconstructed by host from backup files, etc.

(2) Run ICKDSF INSPECT NOPRESRVE (NOCHECK if 3390-3R) to the affected track. This will write all zeros to the track and will clear the pinned track indication.

(3) Restore the track with the saved data from step 1a or the reconstructed data 1b.

(4) If a Pinned Track recurs, resolve hardware problem and repeat steps 1-3.

(5) If CC and HH information in the SVP PINNED TRACK shows outside the user area, this indicates that a pinned track occurred in the management area. In this case, clear the pinned track by the LDEV Format after backing up the data. (The number of user cylinders can be referred on the 'Customized Volume Size Define' of the SVP Refer Configuration.)

Pinned Track disappearance:
Under certain circumstances, pinned tracks may disappear with no recovery action having been taken.
This can occur from:
(1) The entire stripe is written. This discards all the old data & parity in the stripe.
(2) A Format Write from R1 is issued to the pinned track. This rewrites the entire stripe and all old data in the stripe is discarded.
(3) If dirty data that could not be destaged due to CHK2 error is read successfully by the host, pinned tracks will be turned off.
(4) If a parity track is unable to be destaged due to a drive failure and the drive is replaced using Correction Copy (drive replacement by copying to a spare will not clear Pinned Tracks).

Write Error

Cause:
A write error type of pinned track will be made when the data destaging process to a PDEV is unsuccessful due to a drive failure. When a drive failure occurs, the drive and the DKC both attempt to recover the problem. If the recovery attempts are unsuccessful, a Write type pinned track is posted. The recovery attempts are:
(1) Media failure : Automatic reallocation of data to an alternate sector.
(2) Other failure : Alternate path retry.
Write error count for each PDEV is stored in the DKC. If the write error count for a PDEV exceeds the threshold value, the PDEV is blocked. Only one PDEV per parity group will be blocked. One blocked PDEV in a parity group will not stop DKC operation to that parity group. However, the parity group will be in correction access mode. If a write type pinned track is accessed by the host after its PDEV has been blocked, the pinned track status will be reset.

Result of host I/O operation:
All access to write type pinned tracks will be successful and return a normal end.

Recovering Write Error pinned tracks:
Replace the PDEV with the pinned track. At this time if there is already a blocked PDEV in the same parity group, replace the blocked PDEV first. Then replace the PDEV with the pinned track. If more than one PDEV in a parity group has write error pinned tracks, check the ORM display on the SVP Panel.
Replace the PDEV with the highest error rate first, then second highest, etc. The pinned track(s) will be recovered by correction copy.

External VOL Write Error

Cause:
When write processing is performed for a device in an external storage system, and Check Condition (Medium Error) is received due to a drive failure of the external storage system, External VOL Write Error is set.

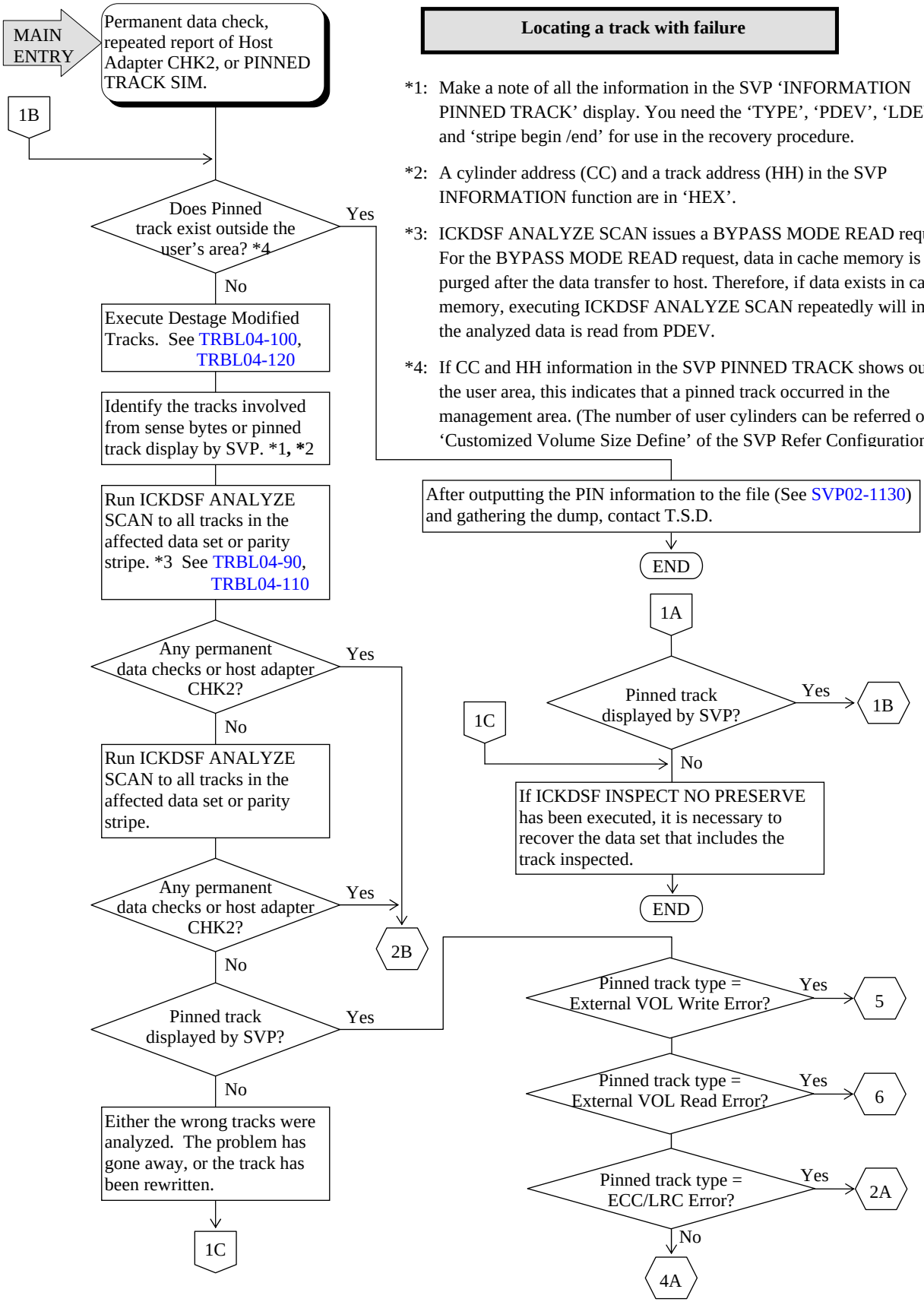
How to recover:
After recovering the device in the external storage system, perform a dummy replacement of the cache package.
In addition, after recovering the device in the external storage system, you can remove pinned track of the external devices by writing I/O from the host. However, please note that the customer data stored in external devices is destroyed. Because the data will be overwritten by the I/O.

External VOL Read Error

Cause:
When read processing from the device in the external storage system is performed, and Check Condition (Medium Error) is received due to a drive failure in the external storage system, External VOL Read Error is set.

How to recover:
After recovering the device in the external storage system, perform a dummy replacement of the cache package.
In addition, after recovering the device in the external storage system, you can remove pinned track of the external devices by writing I/O from the host. However, please note that the customer data stored in external devices is destroyed. Because the data will be overwritten by the I/O.

4.1 Recovery Procedure for Pinned Tracks



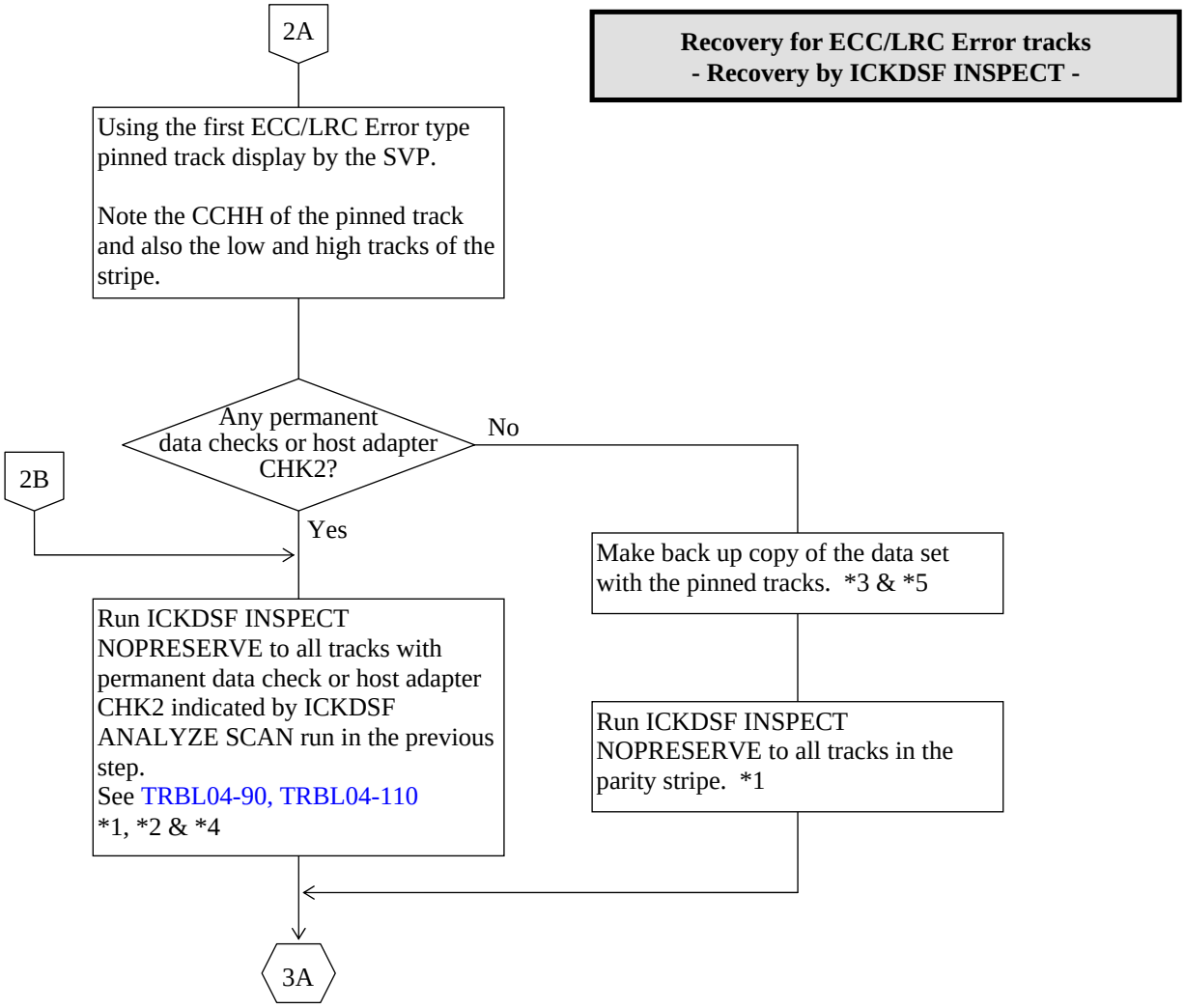
Locating a track with failure

*1: Make a note of all the information in the SVP 'INFORMATION PINNED TRACK' display. You need the 'TYPE', 'PDEV', 'LDEV' and 'stripe begin /end' for use in the recovery procedure.

*2: A cylinder address (CC) and a track address (HH) in the SVP INFORMATION function are in 'HEX'.

*3: ICKDSF ANALYZE SCAN issues a BYPASS MODE READ request. For the BYPASS MODE READ request, data in cache memory is purged after the data transfer to host. Therefore, if data exists in cache memory, executing ICKDSF ANALYZE SCAN repeatedly will insure the analyzed data is read from PDEV.

*4: If CC and HH information in the SVP PINNED TRACK shows outside the user area, this indicates that a pinned track occurred in the management area. (The number of user cylinders can be referred on the 'Customized Volume Size Define' of the SVP Refer Configuration.)



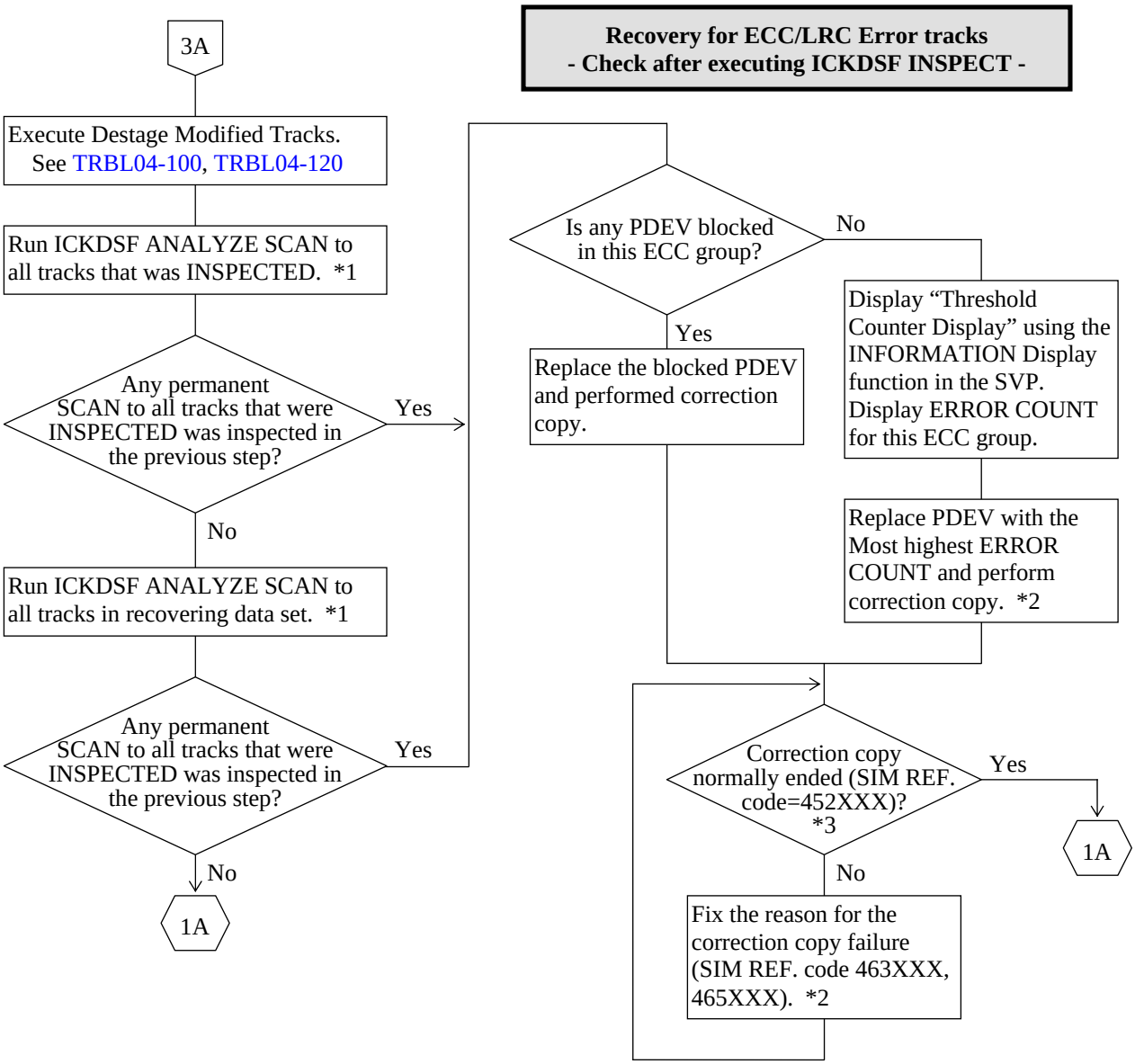
*1: Remember all tracks on which the ICKDSF INSPECT NO PRESERVE is run as customer data has been lost. Customer will have to recover files for each data set.

*2: If you execute ICKDSF INSPECT in the tracks of VTOC, the volume should be set to offline. In this case the entire volume will have to be restored.

*3: • During a file recovery from the backup procedure to the restore procedure of the data set, the data set can not be accessed until the recovery is complete.
• If a file recovery for PDS data is set, execute the backup/restore procedure to the data set (all members).

*4: When the drive emulation type is 3390-3R, add NOCHECK to ICKDSF INSPECT parameter.
When the DKC emulation type is 2105/2107, add NOCHECK to ICKDSF INSPECT parameter.

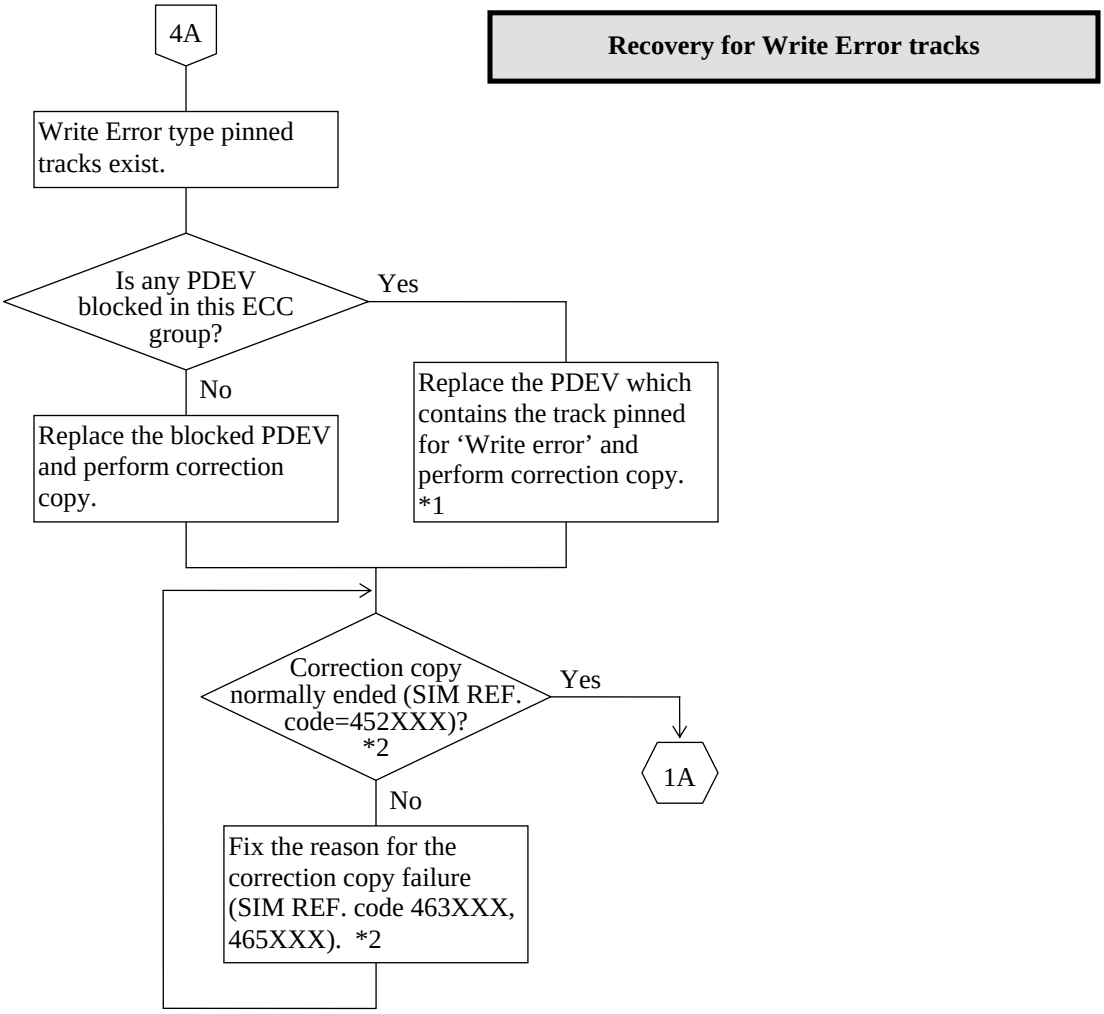
*5: ① Execute File Back up for dataset including pinned track. Store the backed-up file to another media (tape or another dasd).
② After executing NO PRESERVE INSPECT, restore the backed-up file to its original location.



*1 Repeat ICKDSF ANALYZE SCAN twice for the purpose verifying the data written on the physical device actually.

*2 If Spare drives are available, you can perform Drive Copy instead of Correction copy.

*3 If Drive copy ended abnormally, SIM REF. code is "463XXX" or "465XXX".



*1 If spare drives are available, you can perform Drive copy instead of Correction copy.
*2 If Drive copy ended abnormally, SIM REF. code is "463XXX" or "465XXX".

JCL example (under MVS)

A. Check if any pinned track by using DSF (ANALYZE).

[In case target LDEV to be recovered is ONLINE state]

```
//ANALYZE  JOB  MSGCLASS=x,MSGLEVEL=(1,1)
//STEP    EXEC  PGM=ICKDSF
//SYSPRINT  DD  SYSOUT=*
//DASD      DD  UNIT=DASD,VOL=SER=xxxxxx,DISP=SHR
//SYSIN     DD  *
 ANALYZE DDNAME(DASD) SCAN
/*
//
```

[In case target LDEV to be recovered is OFFLINE state]

```
//ANALYZE  JOB  MSGCLASS=x,MSGLEVEL=(1,1)
//STEP    EXEC  PGM=ICKDSF
//SYSPRINT  DD  SYSOUT=*
//SYSIN     DD  *
 ANALYZE UNIT(cuu) SCAN
/*
//
```

B. Recover pinned tracks by using DSF (INSPECT).

(1) When the drive emulation type is other than 3390-3R.
When the DKC emulation type is other than 2105/2107.

[In case target LDEV to be recovered is ONLINE state]

```
//INSPECT  JOB  MSGCLASS=x,MSGLEVEL=(1,1)
//STEP    EXEC  PGM=ICKDSF
//SYSPRINT  DD  SYSOUT=*
//DASD      DD  UNIT=DASD,VOL=SER=xxxxxx,DISP=SHR
//SYSIN     DD  *
 INSPECT DDNAME(DASD) NOVERIFY NOPRESERVE –
 FROM(X'ccc',X'h') TO(X'ccc',X'h')
/*
//
```

[In case target LDEV to be recovered is OFFLINE state]

```
//INSPECT  JOB  MSGCLASS=x,MSGLEVEL=(1,1)
//STEP    EXEC  PGM=ICKDSF
//SYSPRINT  DD  SYSOUT=*
//SYSIN     DD  *
 INSPECT UNIT(cuu) NOVERIFY NOPRESERVE –
 FROM(X'ccc',X'h') TO(X'ccc',X'h')
/*
//
```

(2) When the drive emulation type is 3390-3R.
When the DKC emulation type is 2105/2107.

[In case target LDEV to be recovered is ONLINE state]

```
//INSPECT  JOB  MSGCLASS=x,MSGLEVEL=(1,1)
//STEP    EXEC  PGM=ICKDSF
//SYSPRINT  DD  SYSOUT=*
//DASD      DD  UNIT=DASD,VOL=SER=xxxxxx,DISP=SHR
//SYSIN     DD  *
 INSPECT DDNAME(DASD) NOVERIFY NOPRESERVE NOCHECK –
 TRACKS(X'ccc',X'h')
/*
//
```

[In case target LDEV to be recovered is OFFLINE state]

```
//INSPECT  JOB  MSGCLASS=x,MSGLEVEL=(1,1)
//STEP    EXEC  PGM=ICKDSF
//SYSPRINT  DD  SYSOUT=*
//SYSIN     DD  *
 INSPECT UNIT(cuu) NOVERIFY NOPRESERVE NOCHKCK –
 TRACKS(X'ccc',X'h')
/*
//
```

C. Execute Destage Modified Tracks

```
//DESTDATA JOB  MSGCLASS=x,MSGLEVEL=(1,1),REGION=nnnnK
//STEP1   EXEC  PGM=IDCAMS
//SYSPRINT  DD  SYSOUT=*
//SYSIN     DD  *
 SETCACHE VOLUME(xxxxxx) unit(DASD) DESTAGE
/*
//
```


Operation example (under VM)

Note: This recovery procedure is executable only under VM/ESA 1.1 or higher release with DEVMAINT authority.

A. Check if any pinned track by using DSF (ANALYZE).

```
Ickdsf
ICK030E DEFINE INPUT...
Console
CONSOLE
ICK031E DEFINE OUTPUT...
Console
CONSOLE
ICKDSF - CMS DEVICE SUPPORT FACILITY...

ENTER INPUT COMMAND:
analyze unit(cuu) scan
    .
    .
end
 END
```

B. Recover pinned tracks by using DSF (INSPECT).

(1) When the drive emulation type is other than 3390-3R.

```
ickdsf
ICK030E DEFINE INPUT...
Console
CONSOLE
ICK031E DEFINE OUTPUT...
Console
CONSOLE
ICKDSF - CMS DEVICE SUPPORT FACILITY...

ENTER INPUT COMMAND:
inspect unit(cuu) norecovery nopriserve from(x'ccc',x'h'
to(x'ccc',x'h')
    .
    .
end
 END
```

(2) When the drive emulation type is 3390-3R.

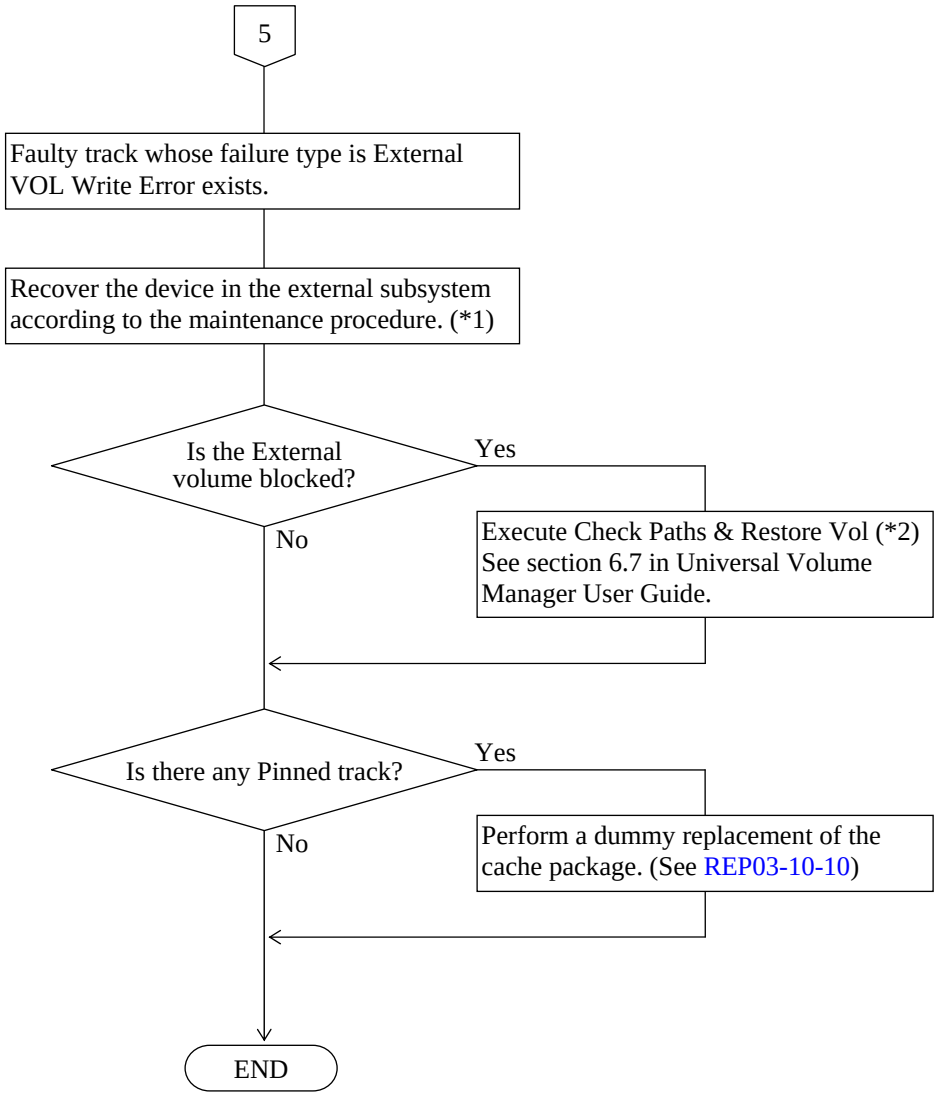
```
ickdsf
ICK030E DEFINE INPUT...
Console
CONSOLE
ICK031E DEFINE OUTPUT...
Console
CONSOLE
ICKDSF - CMS DEVICE SUPPORT FACILITY...

ENTER INPUT COMMAND:
inspect unit(cuu) norecovery nopriserve nocheck tracks(x'ccc',x'h')
    .
    .
end
 END
```

C. Execute Destage Modified Tracks

```
destage rdev
```

Recovery from External VOL Write Error

When an External VOL Write Error occurs, perform the following recovery procedure.

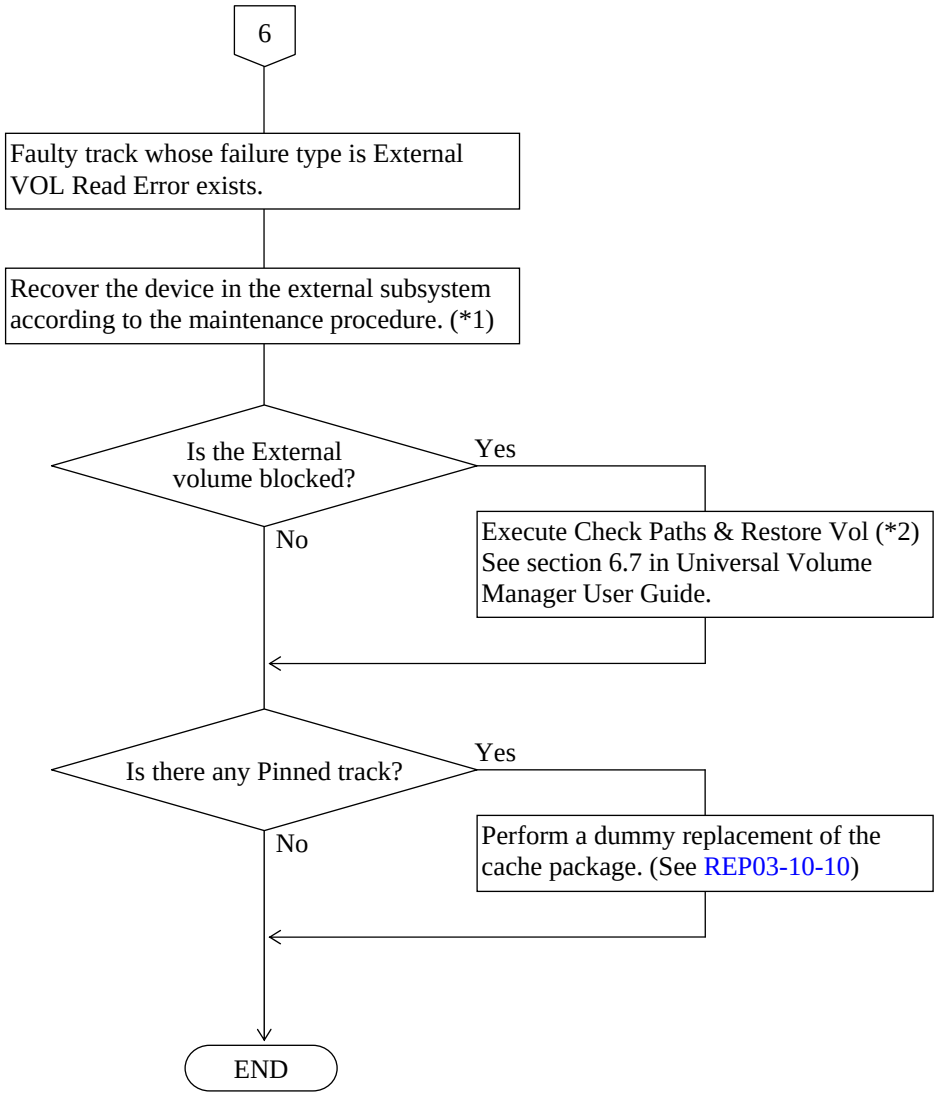


*1: It should be done in the external subsystem. The user needs to ask the service personnel of the external subsystem to perform the maintenance operation of the subsystem. (If the external subsystem is Hitachi storage, recover the faulty part according to the maintenance manual.)

*2: It should be done using Storage Navigator. Ask the customer to perform the recovery operation by using Storage Navigator according to the User Guide.

Recovery from External VOL Read Error

When an External VOL Read Error occurs, perform the following recovery procedure.



*1: It should be done in the external subsystem. The user needs to ask the service personnel of the external subsystem to perform the maintenance operation of the subsystem. (If the external subsystem is Hitachi storage, recover the faulty part according to the maintenance manual.)

*2: It should be done using Storage Navigator. Ask the customer to perform the recovery operation by using Storage Navigator according to the User Guide.

5. Error Recovery

5.1 Isolation and Recovery Procedures for Common SAS Error (SIM = DF6XXX, DF7XXX, DF8XXX, DF9XXX)

When a port error SIM for a drive (PDEV) is reported, this section provides the procedures for judging whether the error is caused by the pertinent drive error or common SAS error, and how to recover the error.

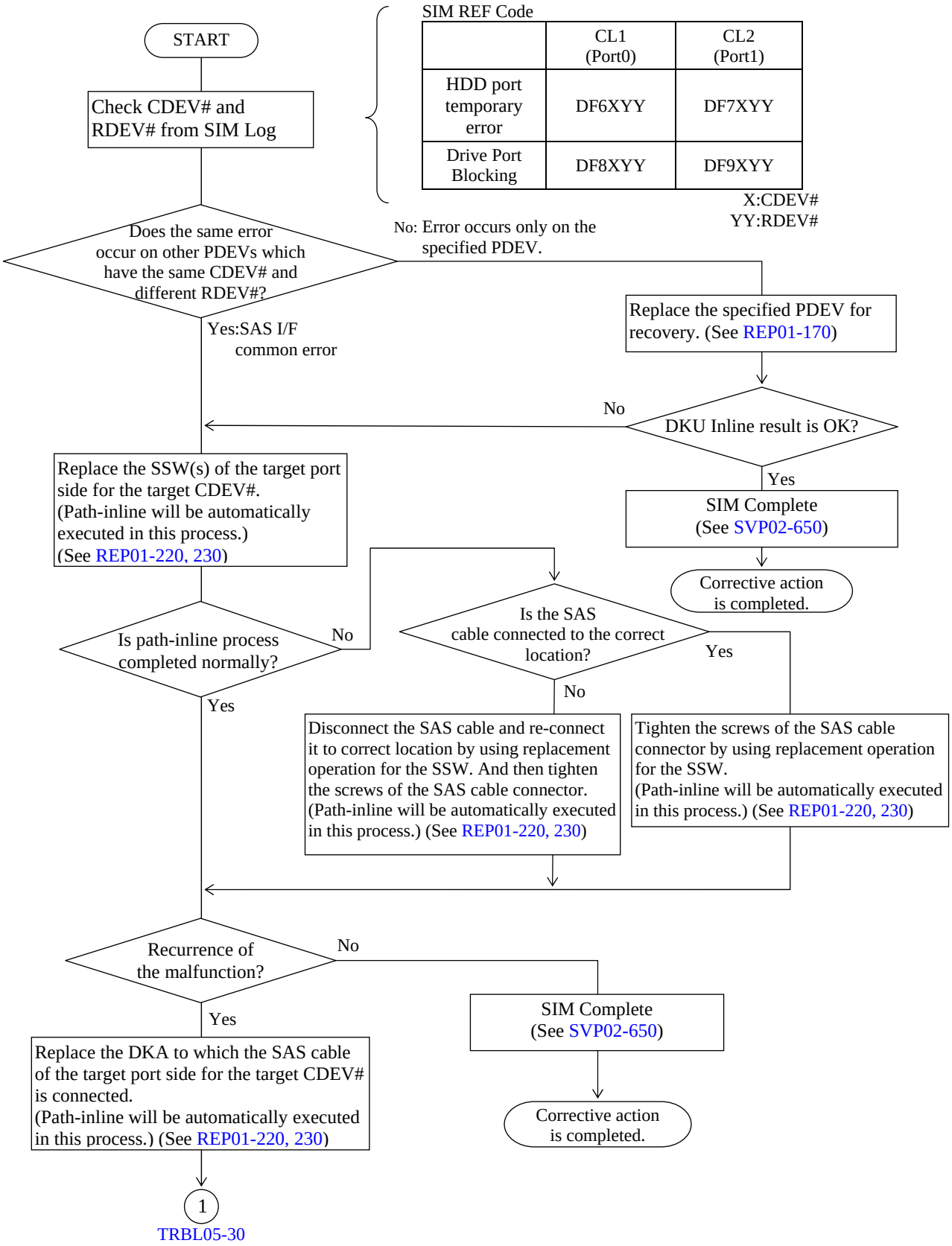
As a HDD port error SIM managed in each PDEV, a Port temporary error (REF code = DF6XXX, DF7XXX) is reported when a warning is issued, and Port blocking (REF code = DF8XXX, DF9XXX) is reported when the equipment is blocked (X: CDEV#, YY: RDEV#).

Possible causes for the malfunction are:

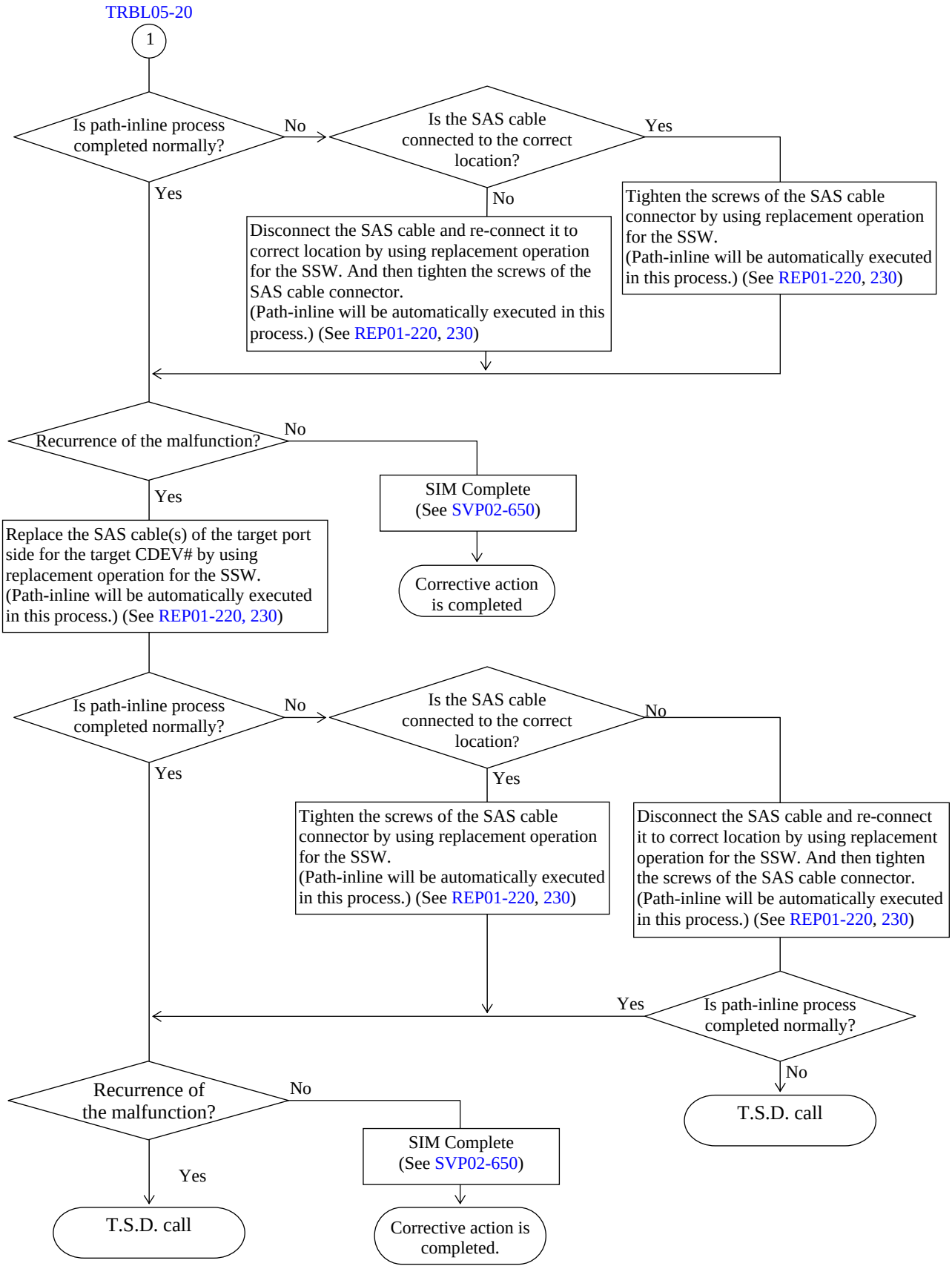
(1) Failure of drive specified in FPC
(2) Defects in SAS Chip for DKF
(3) Defects in SAS Loop (cable, SSW (expander))
(4) Other drive failure
(5) HDU Box platter failure

Before performing the maintenance and replacement only for the failed drive, follow these isolation and recovery procedures to check that a common SAS port error occurs on other PDEVs on the same SAS I/F. If a common error exists, perform the appropriate recovery for the common error parts.

Common SAS Error Isolation Procedure



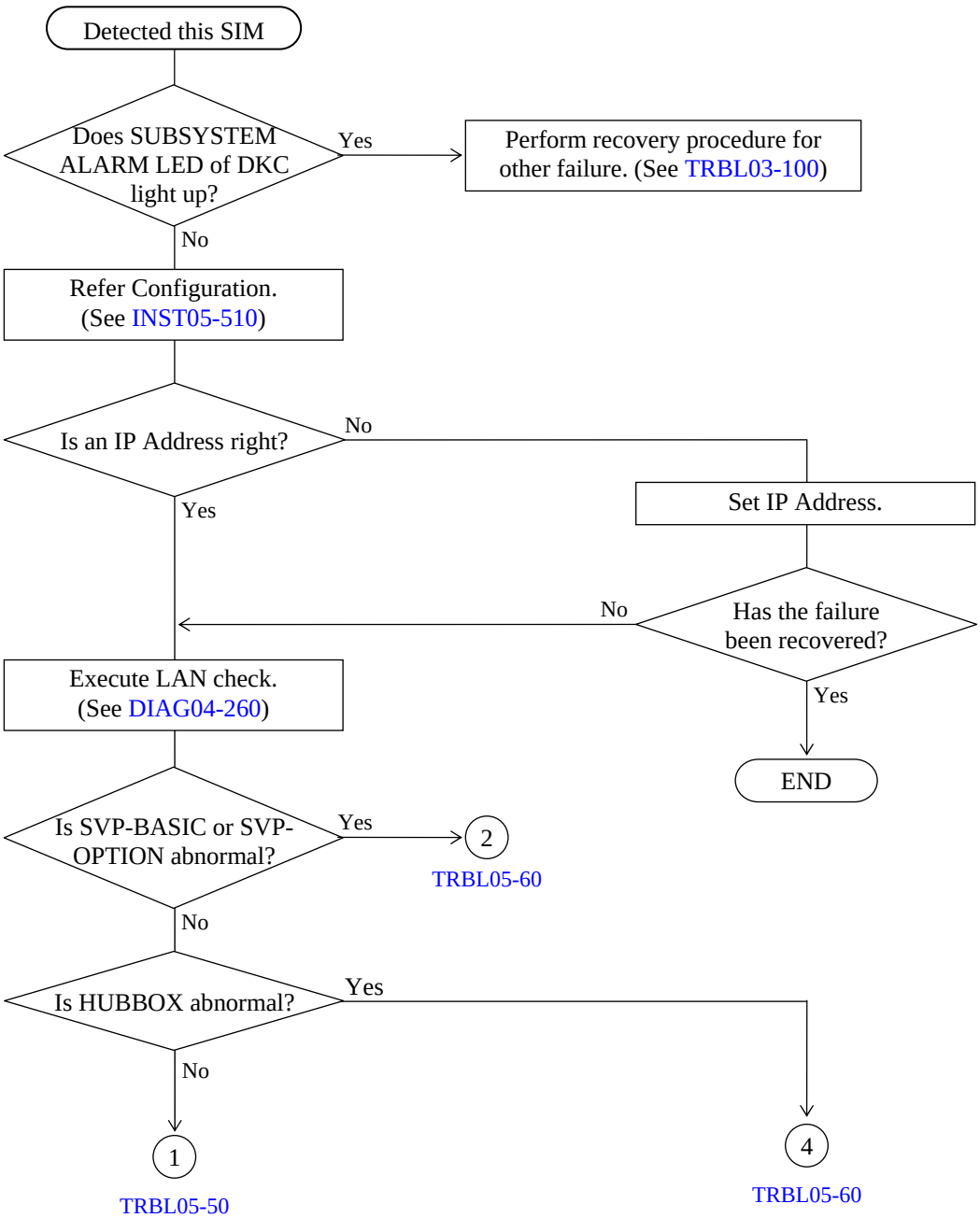
TRBL05-30

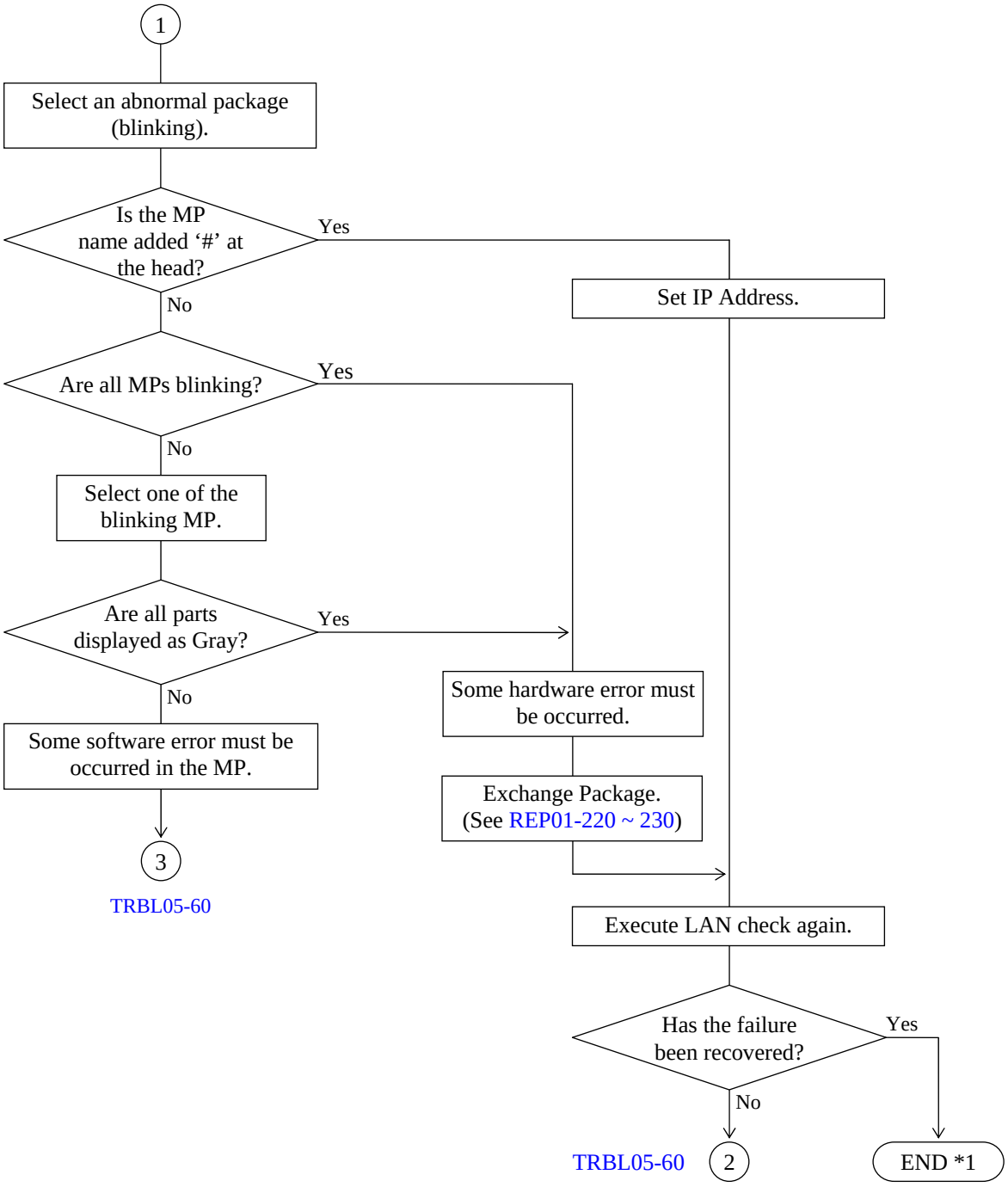


5.2 Recovery Procedure for DKC processor failure / SVP failure (SIM = 1400X0, 1500X0, 73XXYY)

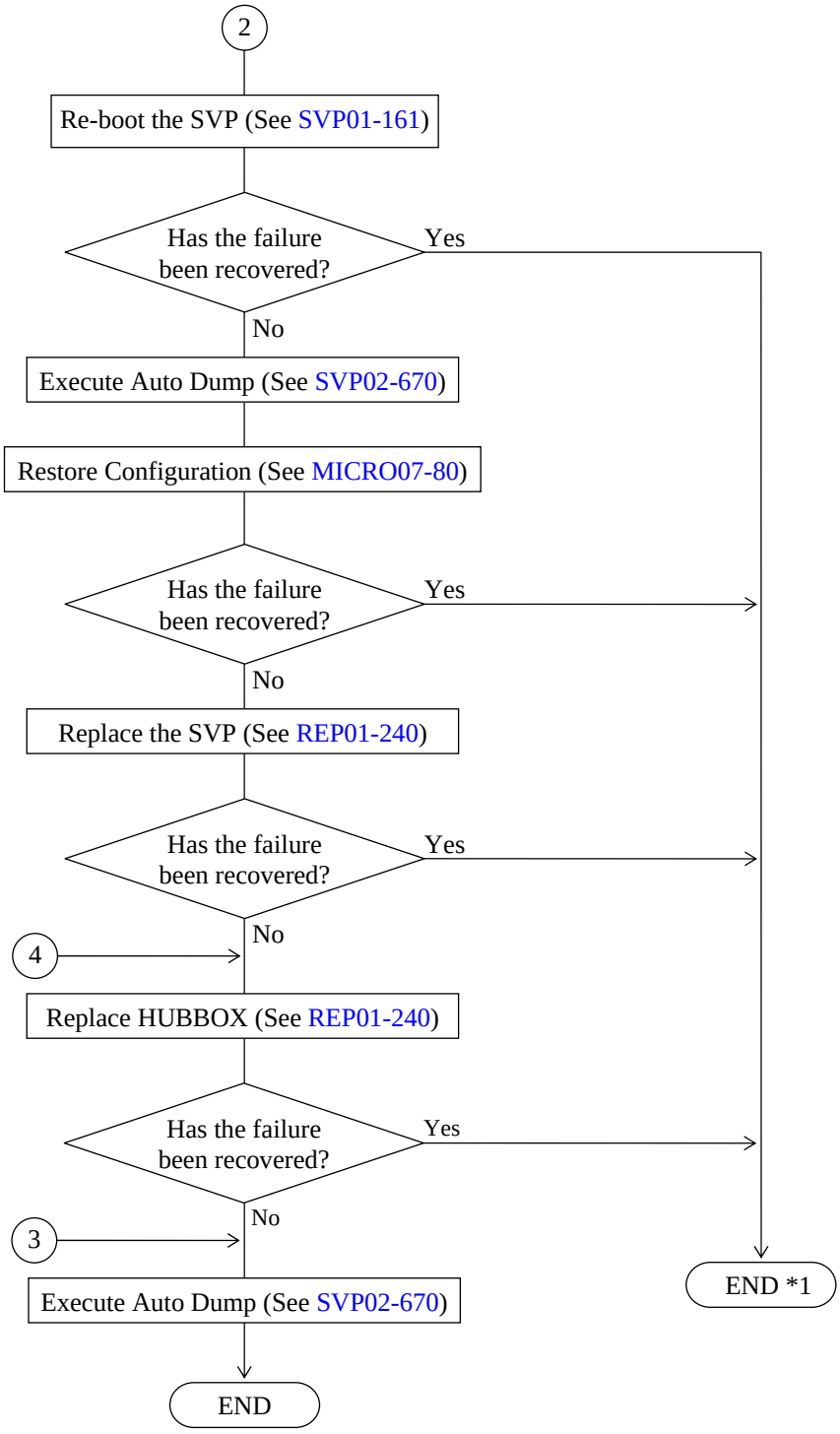
CAUTION

The storage system that detected this SIM may fell into serious error state due to DKC processor abnormality. Therefore, restore the storage system according to the following flow immediately.





*1: After finishing the error recovery, execute SIM complete and delete logs. (Refer to SVP02-220, 650)

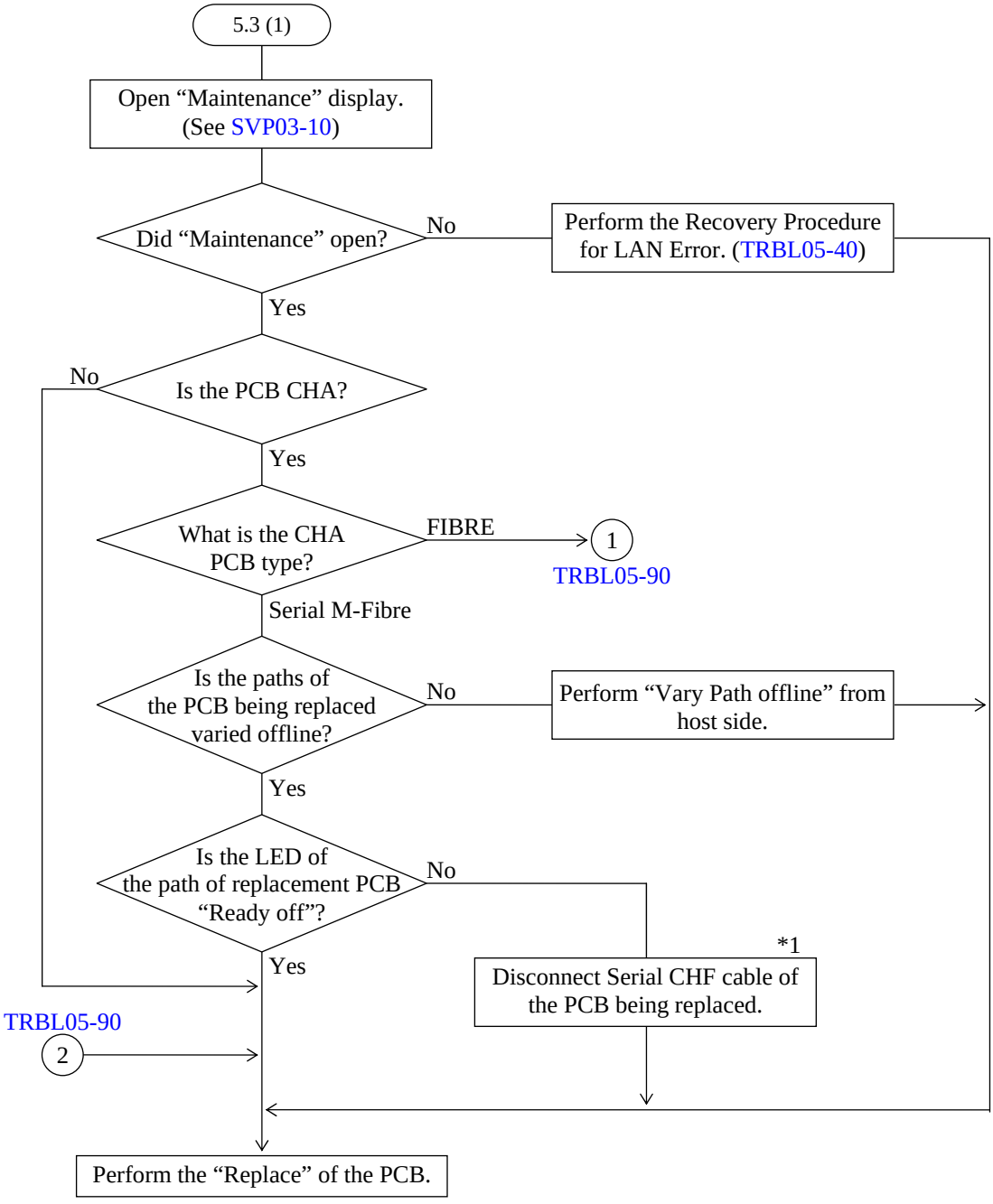


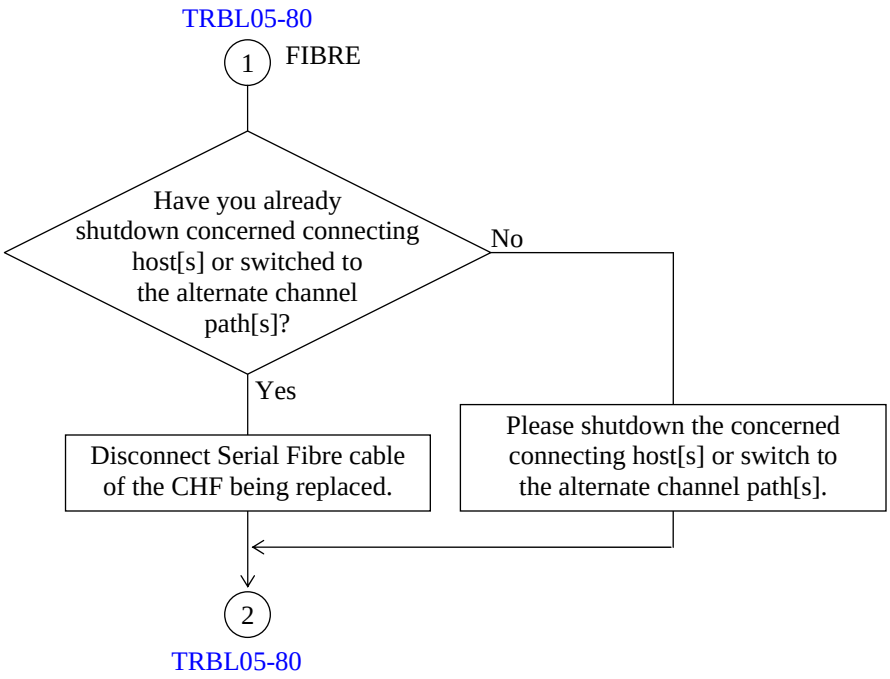
5.3 Error Recovery Procedure during CHA/DKA replacement

Perform the appropriate recovery procedure according to case (1), (2) or (3).

(1) Blocking error occurrence

If the error message is displayed when CHA/DKA is being blocked (when the message “The CHA is being blocked...” or “The DKA is being blocked...” is being displayed), perform the following recovery procedures.

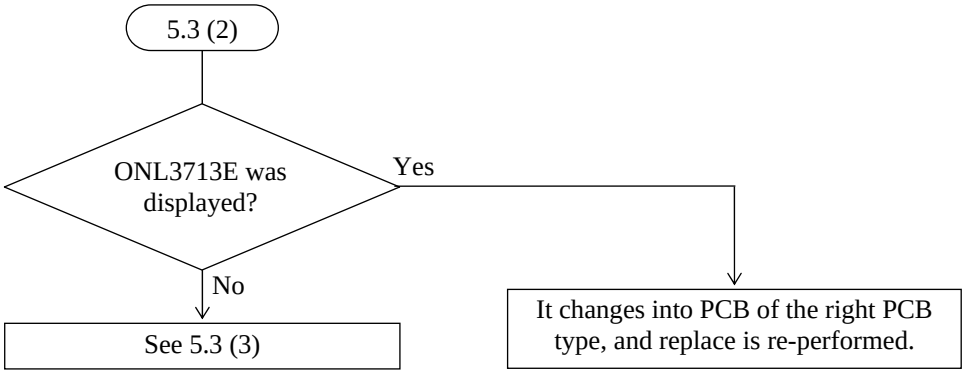




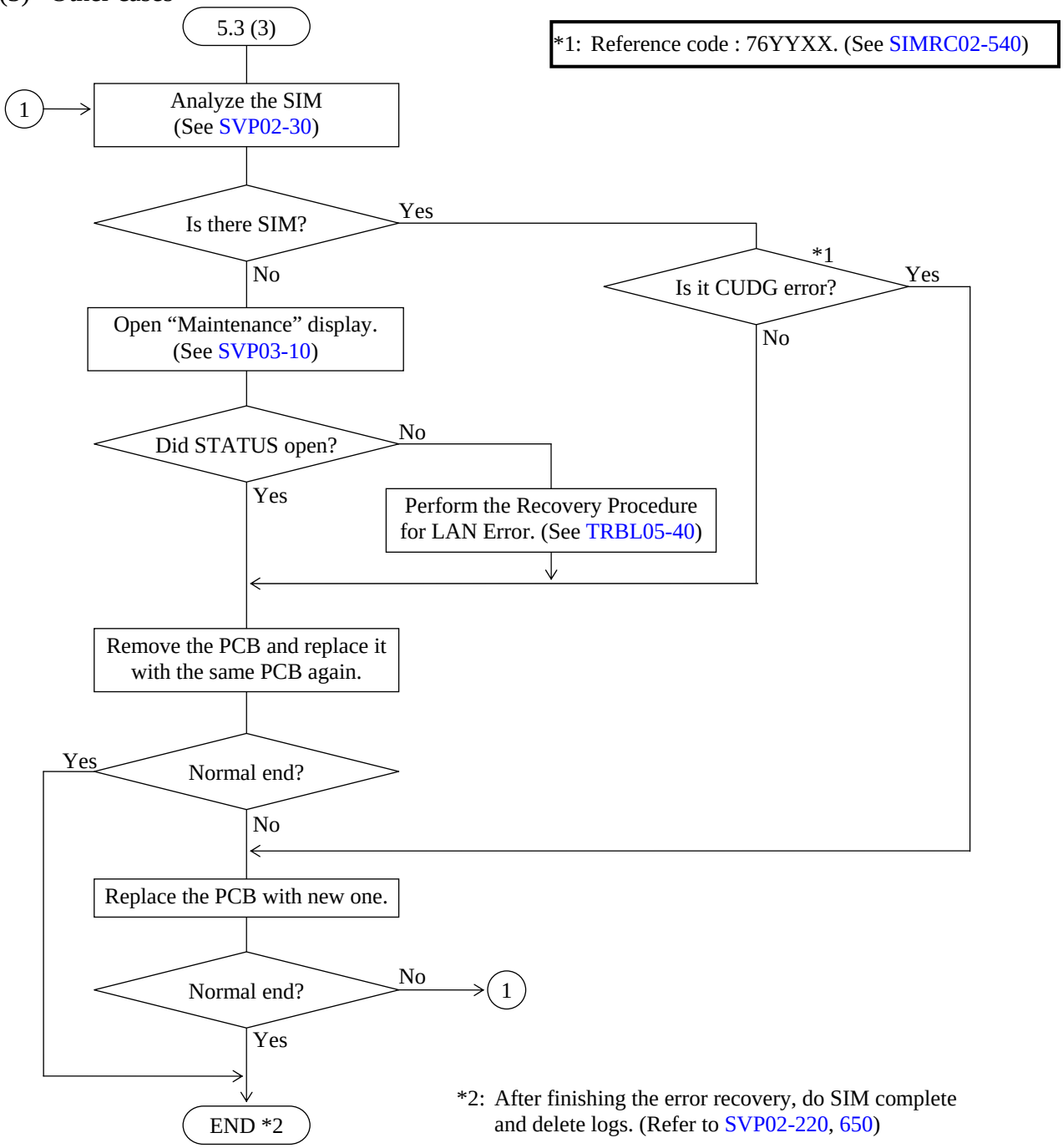
*1) After this operating, error message may be displayed at host side.

(2) Restoring error occurrence

If the error message is displayed when CHA/DKA is being restored (“Restoring (CHA-nnn)” or “Restoring (DKA-nnn)” is being displayed), perform the following recovery procedures.



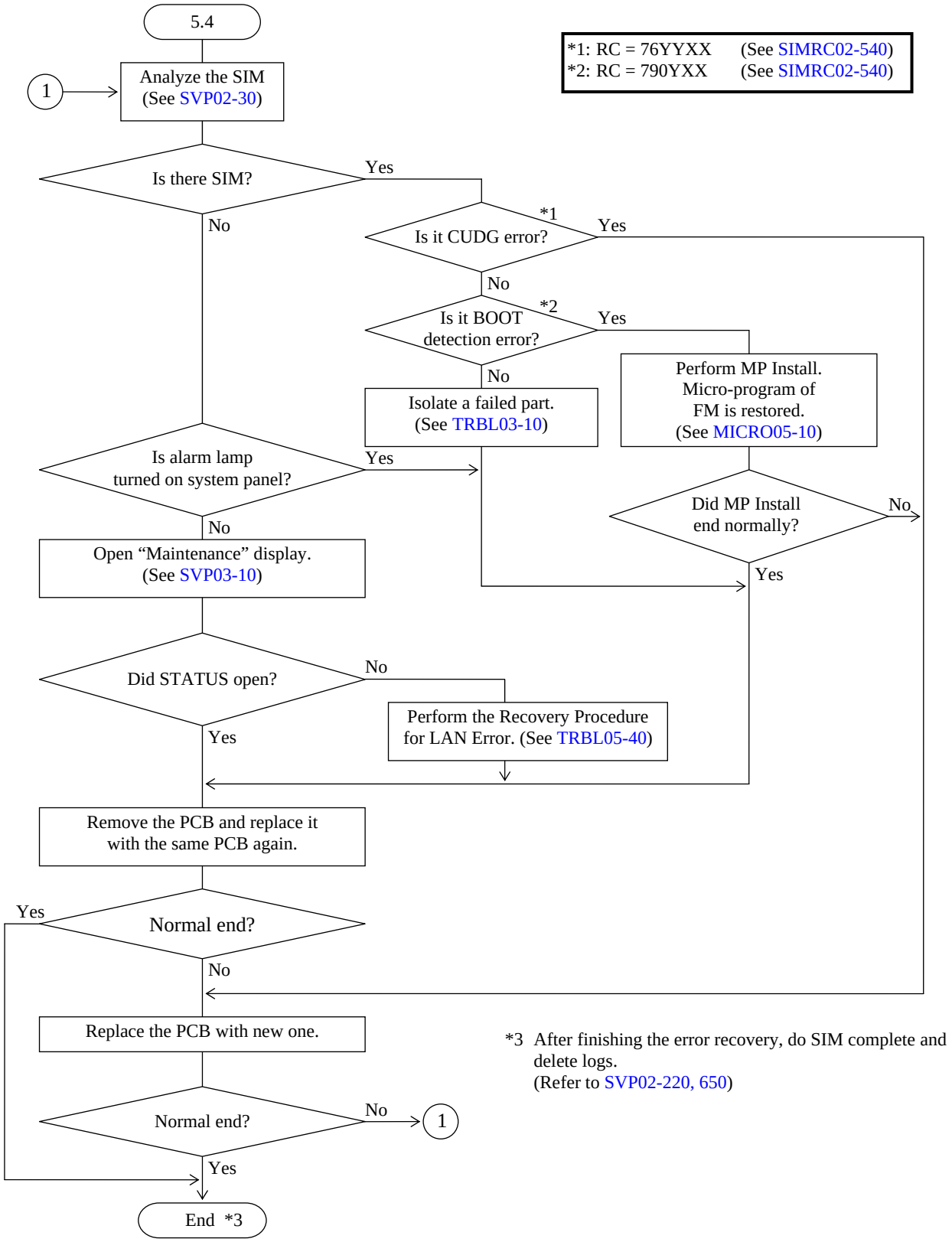
(3) Other cases



*1: Reference code : 76YYXX. (See SIMRC02-540)

*2: After finishing the error recovery, do SIM complete and delete logs. (Refer to SVP02-220, 650)

5.4 Recovery Procedure for MP Replace



5.5 Recovery Procedure for CACHE Replace Failure (SIM = 3993XX, FFE40X, FFF90X)

This recovery procedure is provided for CACHE replacement when replace failure SIM is reported.

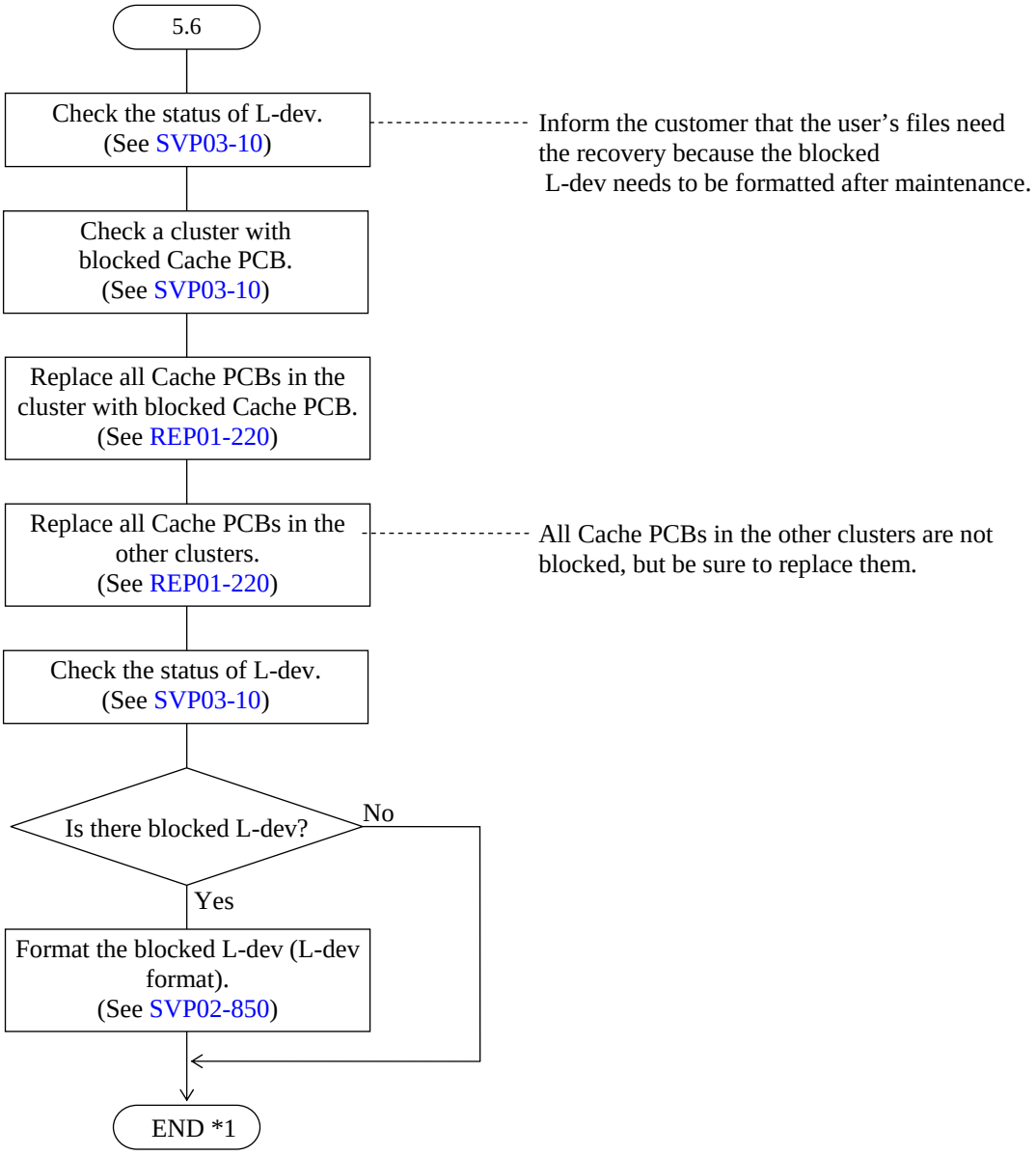
- CACHE replace failure caused by processor error
  (REF code = 0x3993XX, 0x3D93XX : XX = PCB ID, MP ID in PCB)
  ① Remove the process or MPB shown in the SIM REF code.
  In this case, CHK3 or other equipment error are reported because no processing is performed.
  ② Retry the suspended CACHE replacement.
  ③ Replace removed PCB in Step ①.

- CACHE replace failure caused by Shared Memory error
  (REF code = 0xFFE40X : X:(0) = side A, (1) = side B)
  ① Conduct CACHE replacement again.
  ② When normal end, CACHE replacement is completed.
  ③ When SM failure SIM(REF code = 0xFFE40X) is reported again, replace CACHE PCB (Basic) of the same CL side.

- SM restore failure by cause of CACHE memory
  (REF code = 0xFFF90X : X:(0) = side A, (1) = side B)
  ① Mounting of the same CL side as CACHE PCB that fails in the replacement CACHE PCB (Basic and Option) replacement is executed.
  If you see “A failed part still exists and should be serviced first. Do you want to stop this process?” on the screen, select [No], and use the password to keep on performing CACHE PCB replacement proceeding in terms of replacement.
  ② It replaces it in service parts CACHE PCB different from CACHE PCB that fails in the replacement when failing in the replacement according to the procedure of ①.
  ③ It wants to do the failure end after the work of ② is completed CACHE PCB and the replacement is executed again.

5.6 Recovery Procedure for Cache Error (Both sides) (SIM = FFF50X)

This procedure is to recover errors of the both sides of cache (SIM = FFF5) at powering on the subsystem.
At this time, if pending data (non-written data to the drive) exists on the cache, the drive will be blocked and the L-dev formatted drive will be required.



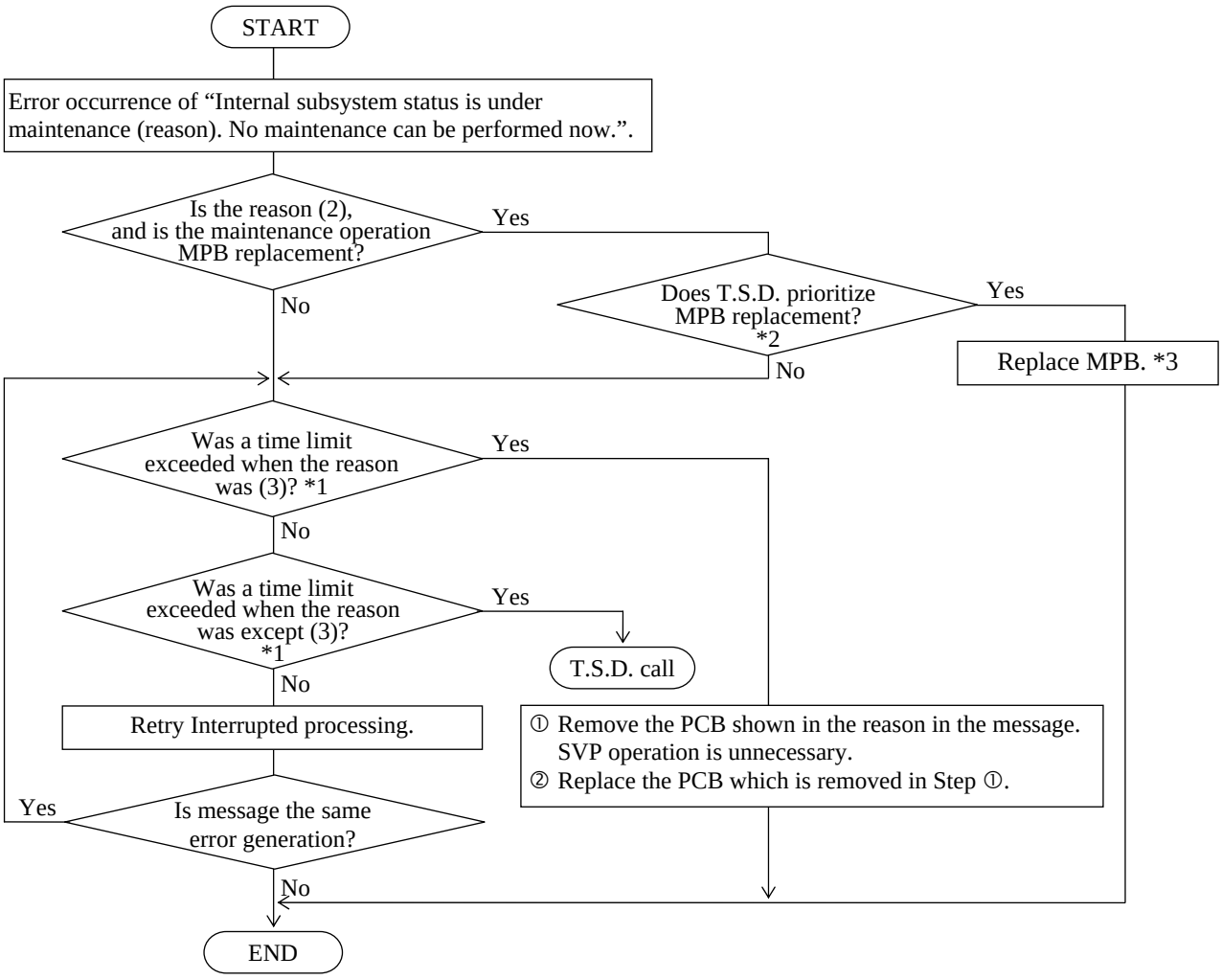
*1: After finishing the error recovery, do SIM complete and delete logs. (SVP02-220, 650)

5.7 Recovery Procedures for Status in changing is not released

The SVP protects maintenance operation while the DKC is changing its status. If the SVP detects such condition before executing maintenance process, the message (SVP0734W) as “Internal subsystem status is under maintenance (reason). No maintenance can be performed now.” or the message (SVP0615W) as “Internal subsystem status is under maintenance (reason). No maintenance can be performed now. Do you want to stop this process?” is displayed. The reason is one of the following messages.

(1) LDEV format in progress.
(2) Copy in progress.
(3) MPB-XXX (or CHA-XXX or DKA-XXX) status is changing
XXX: location number
(4) Cluster-X (or Cluster-1 & Cluster-2) status is changing
X: Cluster number
(5) OEM drive micro exchange in progress
(6) Configuration is changing
(7) Extent shredding is in progress
(8) Maintenance job in progress

If one of the above messages appears, try the following recovery procedure.



*1: The time limit value of the reason is shown below.
(1) It takes about 2 hours per 16 LDEV for LDEV format.
(2) It takes about 12 hours per drive for copy.
(3) It takes about 10 minutes for MPB/CHA/DKA.
(4) It takes about 4 hours for CACHE/SM (depending on cache size/SM size) in maximum.
(5) It takes for several day or several months for OEM drive micro exchange (depending on the number of PDEV).
(6) It takes about 3 minutes for Configuration change in maximum.
(7) It takes about 6 hours per 16 LDEV for Shredding (depending on the number of LDEV format execution).
(8) During maintenance job, if LDEV High-Speed Format is in process, refer to THEORY03-09-20.
If LDEV High-Speed Format is not executed, it takes about 1 hour.

*2: Contact T.S.D. and confirm the prioritized operation.
*3: Replace MPB according to the following procedure.

Note: If Correction Copy is running, check the progress.
If it almost completes, wait until it completes, and then replace MPB.

(1) From the 'Maintenance' window, interrupt the copy processing.

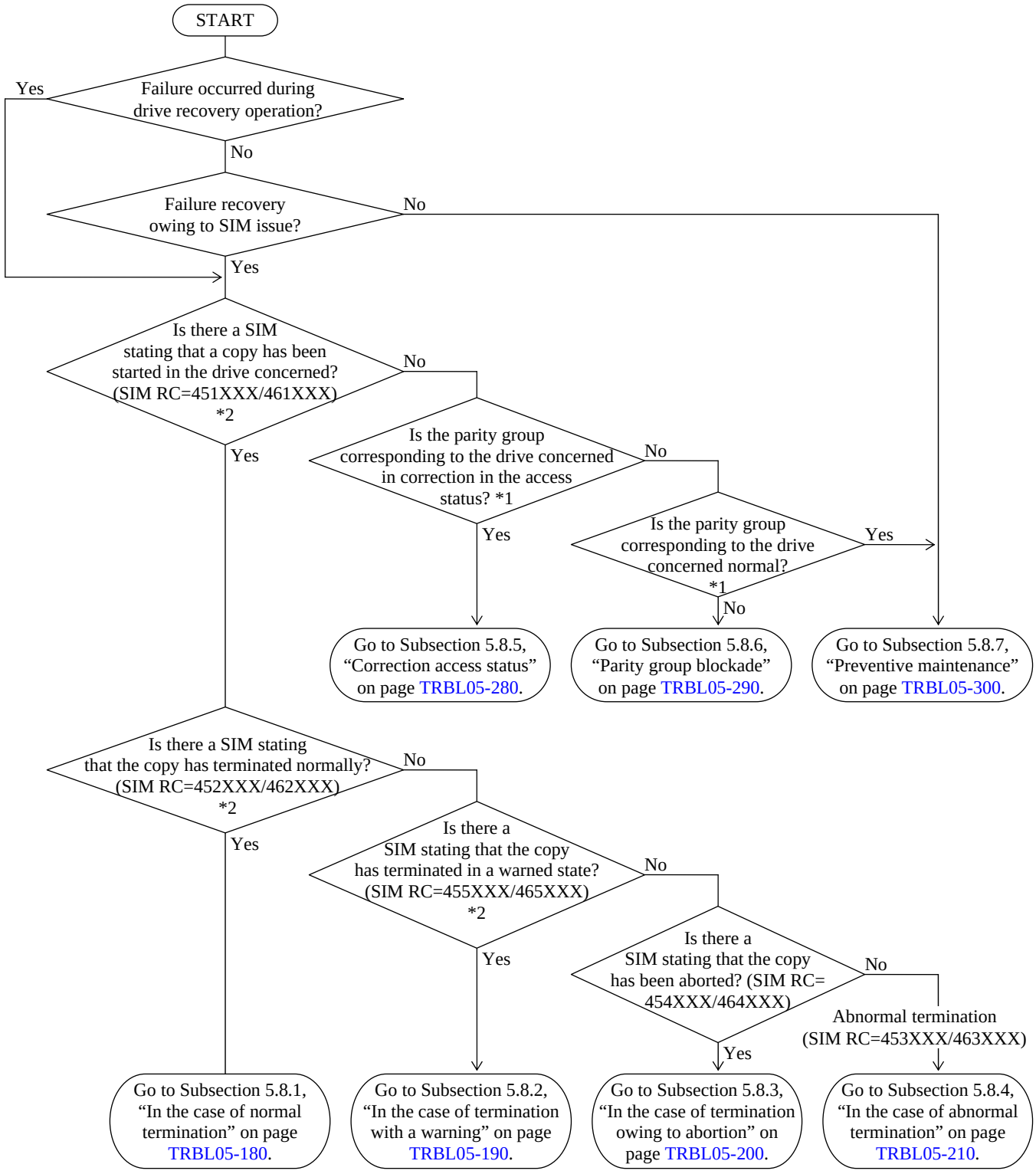
Note: A blocked HDD may be detected again, and the copy processing could run again. In such a case, interrupt the copy processing again.

(2) Replace MPB.
(3) Re-execute the interrupted copy processing according to the following.
- Dynamic Sparing : In the 'Maintenance' window, select HDD and select [Others]-[Spare Disk].
- Correction Copy : In the 'Maintenance' window, select HDD and select [Others]-[Correction Copy].
- Copy Back : Replace the blocked HDD.

5.8 Drive failure recovery procedure

Explanation:
Types of the drive copy are shown below. Confirm the copy type and execute the drive recovery procedure.

Copy type	Description	Operation occasion
Correction copy	This is an operation to restore and copy the data of the blocked drive using the data of another drive and parity data when the data drive is blocked. • A correction copy to the spare drive is referred to as another drive correction copy. • A correction copy to the replacement drive which has been installed instead of the blocked drive is referred to as a self-drive correction copy.	• Automatic operation owing to a failure • Operation instructed by the maintenance personnel
Drive copy	This is an operation to copy data to the spare drive from the data drive. A copy automatically performed owing to a warning level failure is referred to as dynamic sparing.	• Automatic operation owing to a failure • Operation instructed by the maintenance personnel
Copy back	This is a copy for returning data which has been copied to the spare drive by another drive correction copy or drive copy to the original data drive.	• Operation instructed by the maintenance personnel

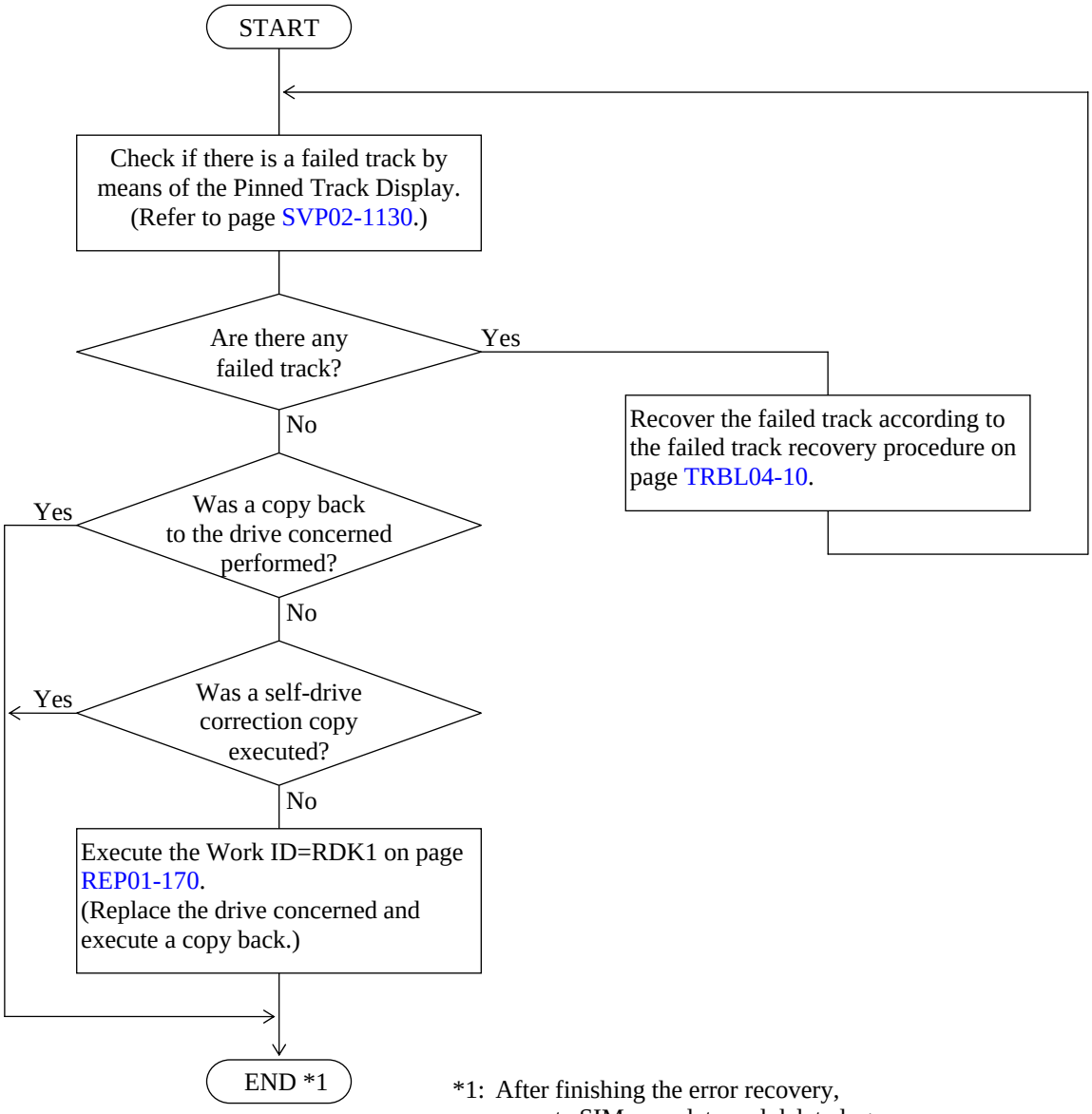


*1: Confirm the status of the parity group corresponding to the drive concerned by means of the SVP status.
For the procedure for referring to the SVP status, refer to Section 3.6, "Logical device window" on page SVP03-280.

*2: The term "copy" means drive copy, copy back, or correction copy.

5.8.1 In the case of normal termination (SIM RC = 452XXX, 462XXX)

The procedure below is that used after a drive copy, copy back, or correction copy terminates normally.



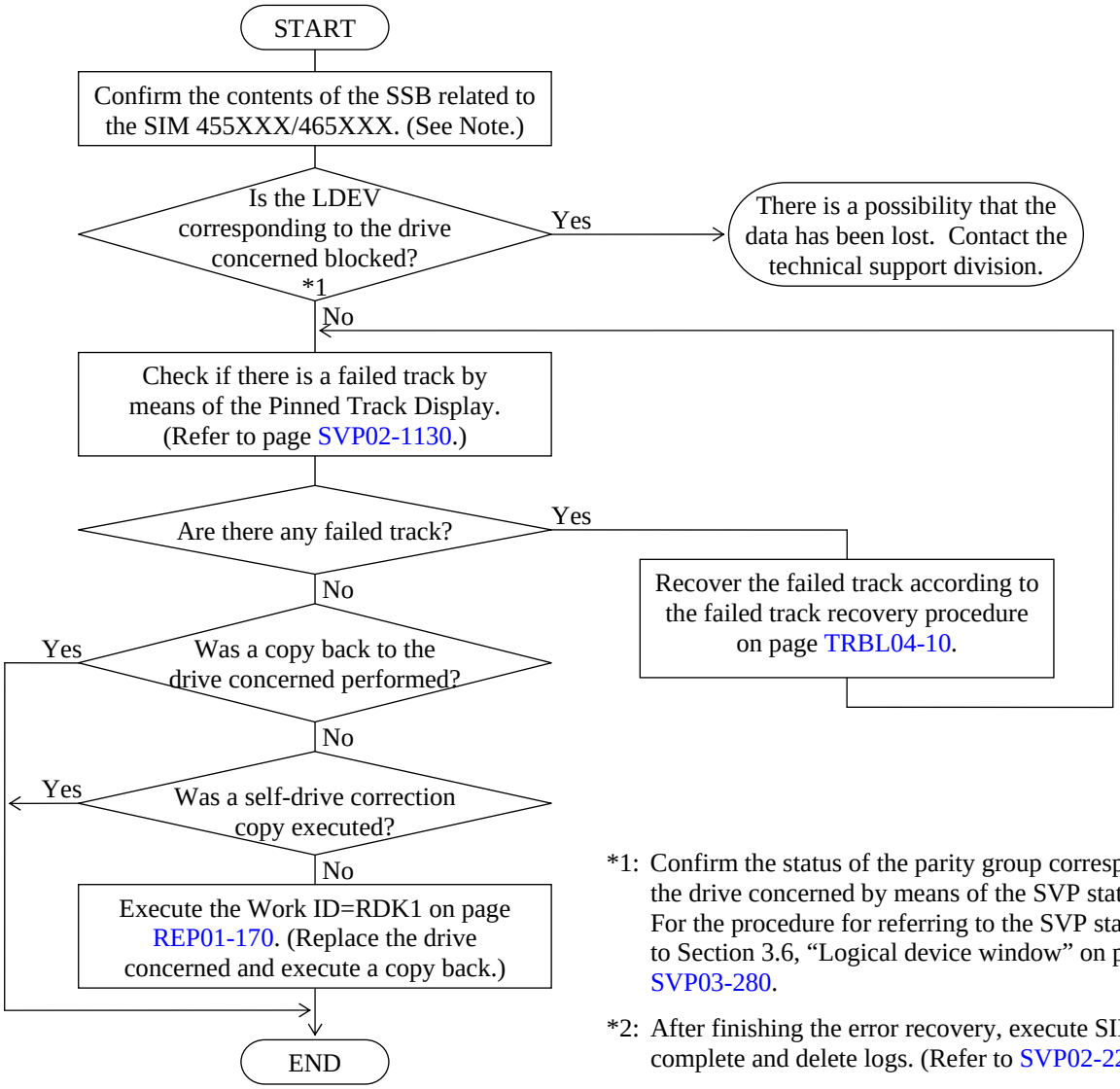
*1: After finishing the error recovery, execute SIM complete and delete logs. (Refer to SVP02-220, 650)

5.8.2 In the case of termination with a warning (SIM RC = 455XXX, 465XXX)

The procedure explained below is that used when the drive copy, copy back, or correction copy terminates but one of the following is detected:

(1) A failed track was detected, but the copy was continued.

(2) One or more blocked LDEVs were detected in the same parity group. Copy of data of the blocked LDEVs was skipped.



*1: Confirm the status of the parity group corresponding to the drive concerned by means of the SVP status. For the procedure for referring to the SVP status, refer to Section 3.6, “Logical device window” on page SVP03-280.

*2: After finishing the error recovery, execute SIM complete and delete logs. (Refer to SVP02-220, 650)

Note: Meaning of bytes 40 to 7E of SSB F/M=9F EC=9355 related to SIM RC=455XXX/465XXX

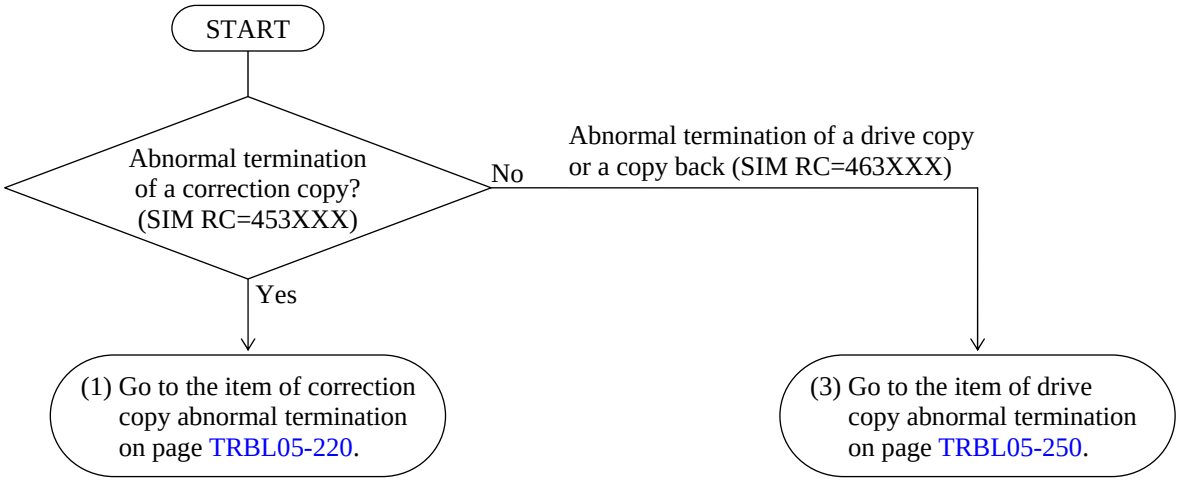
Byte (Hex.)	Item	Meaning
40	Number of failed tracks	Number of failed tracks
41	Number of blocked LDEVs	Number of blocked LDEVs
42 : 7D	Blocked LDEV #0 : Blocked LDEV #29	Blocked LDEV No. (Up to 30 LDEVs can be inputted from the top.) However, 0Xff is inputted in the unused part.
7E	E.O.D	Means the end of data

5.8.3 In the case of termination owing to abortion (SIM RC = 454XXX, 464XXX)

The procedure below is that used when a drive copy, copy back, or correction copy is aborted owing to the SVP operation by the service personnel. Since the status of the drive concerned is that before starting copy, execute the recovery operation for the same drive once again.

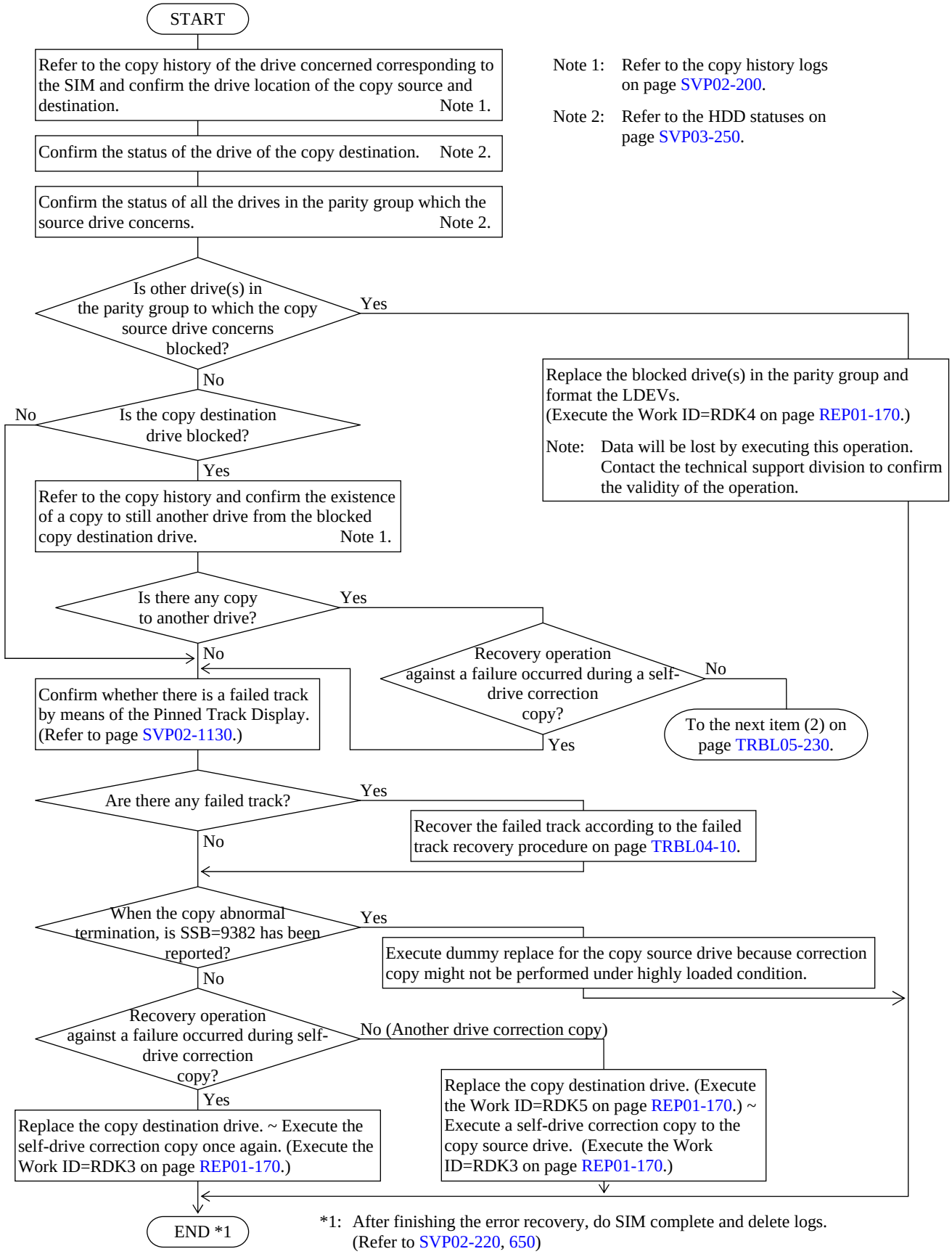
5.8.4 In the case of abnormal termination (SIM RC = 453XXX, 463XXX)

The procedure below is that used when a drive copy, copy back, or correction copy terminates abnormally.
Since the recovery procedure may differ depending on the copy type, confirm the description on page TRBL05-160 and execute the following procedure.



(1) In the case of correction copy abnormal termination

The procedure below is that used when a correction copy terminates abnormally.



Note 1: Refer to the copy history logs on page SVP02-200.

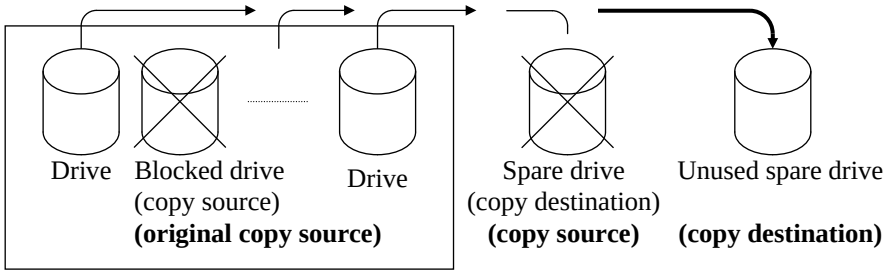
Note 2: Refer to the HDD statuses on page SVP03-250.

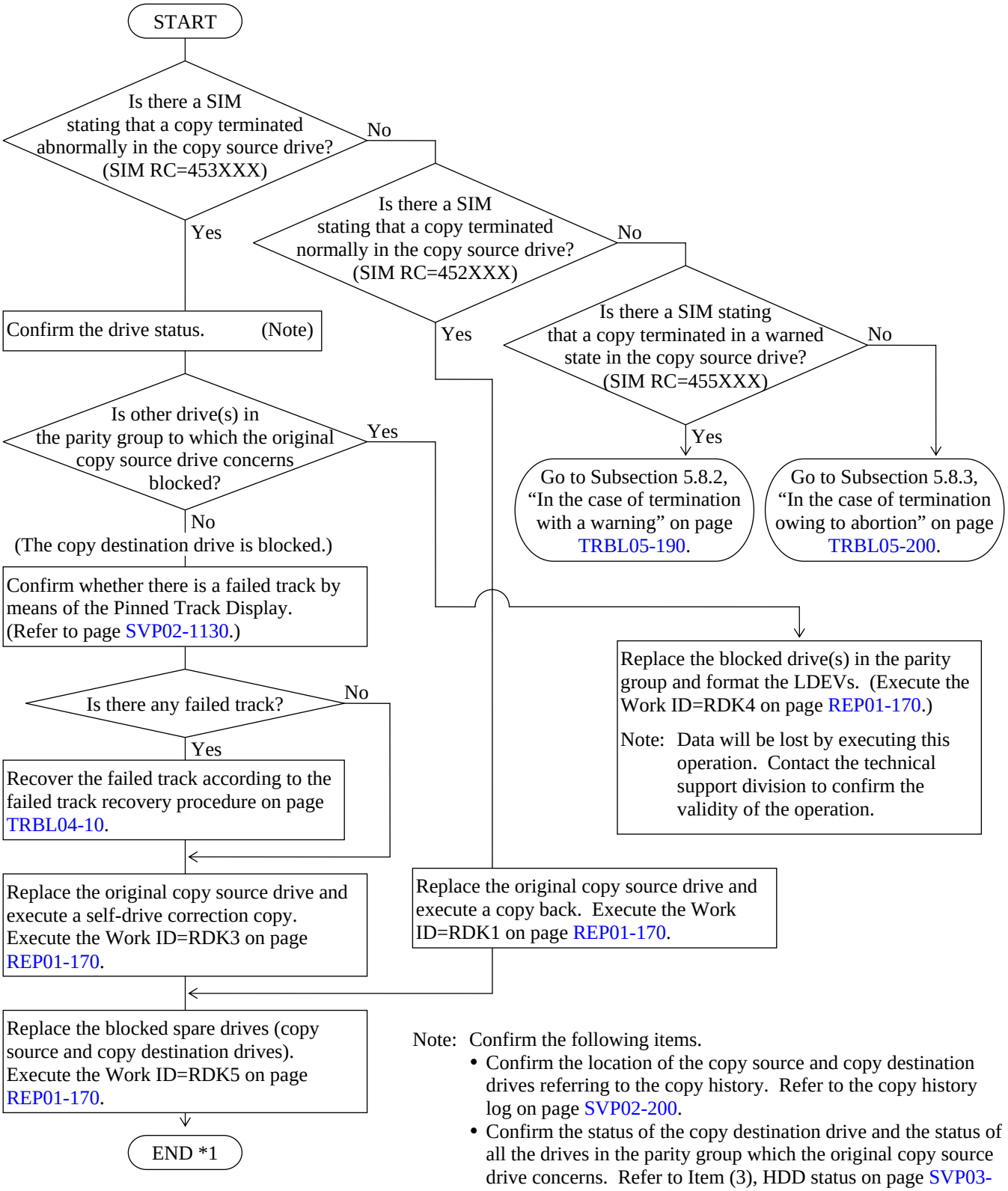
*1: After finishing the error recovery, do SIM complete and delete logs. (Refer to SVP02-220, 650)

(2) In the case of correction copy abnormal termination (in which an unused spare drive is available)

This is a case in which a correction copy terminates abnormally owing to a failure in the copy destination drive. However, if an unused spare drive exists, the correction copy is automatically performed to the unused spare drive.

In the following procedure, the copy source is referred to as a original copy source, the copy destination is referred to as a copy source, and the unused spare drive is referred to as a copy destination.





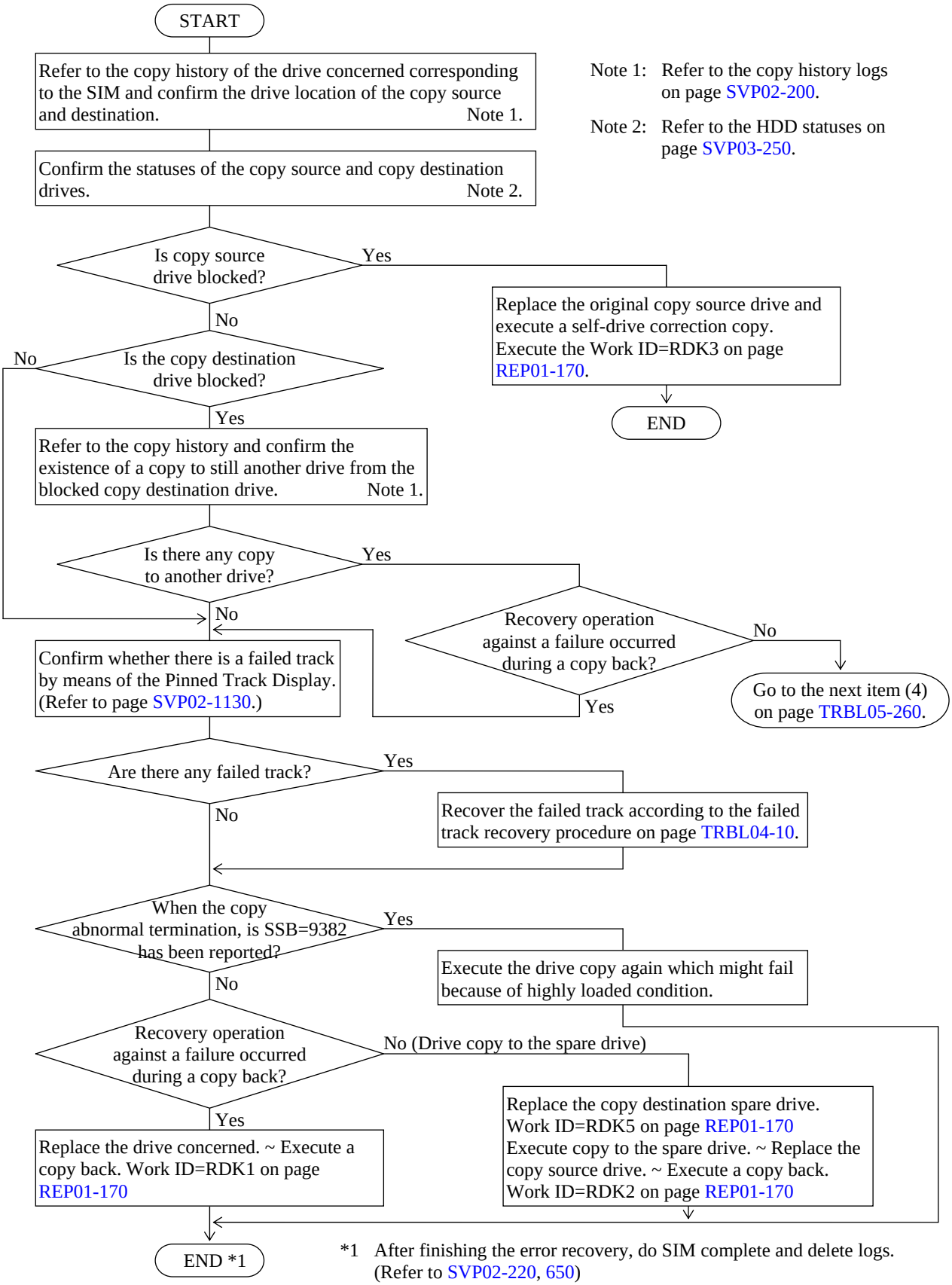
Note: Confirm the following items.

- Confirm the location of the copy source and copy destination drives referring to the copy history. Refer to the copy history log on page SVP02-200.
- Confirm the status of the copy destination drive and the status of all the drives in the parity group which the original copy source drive concerns. Refer to Item (3), HDD status on page SVP03-250.

*1: After finishing the error recovery, do SIM complete and delete logs. (Refer to SVP02-220, 650)

(3) In the case of drive copy abnormal termination

The procedure below is that used when a drive copy or a copy back terminates abnormally.

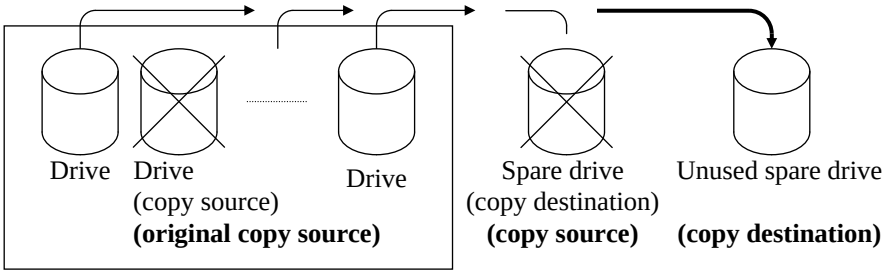


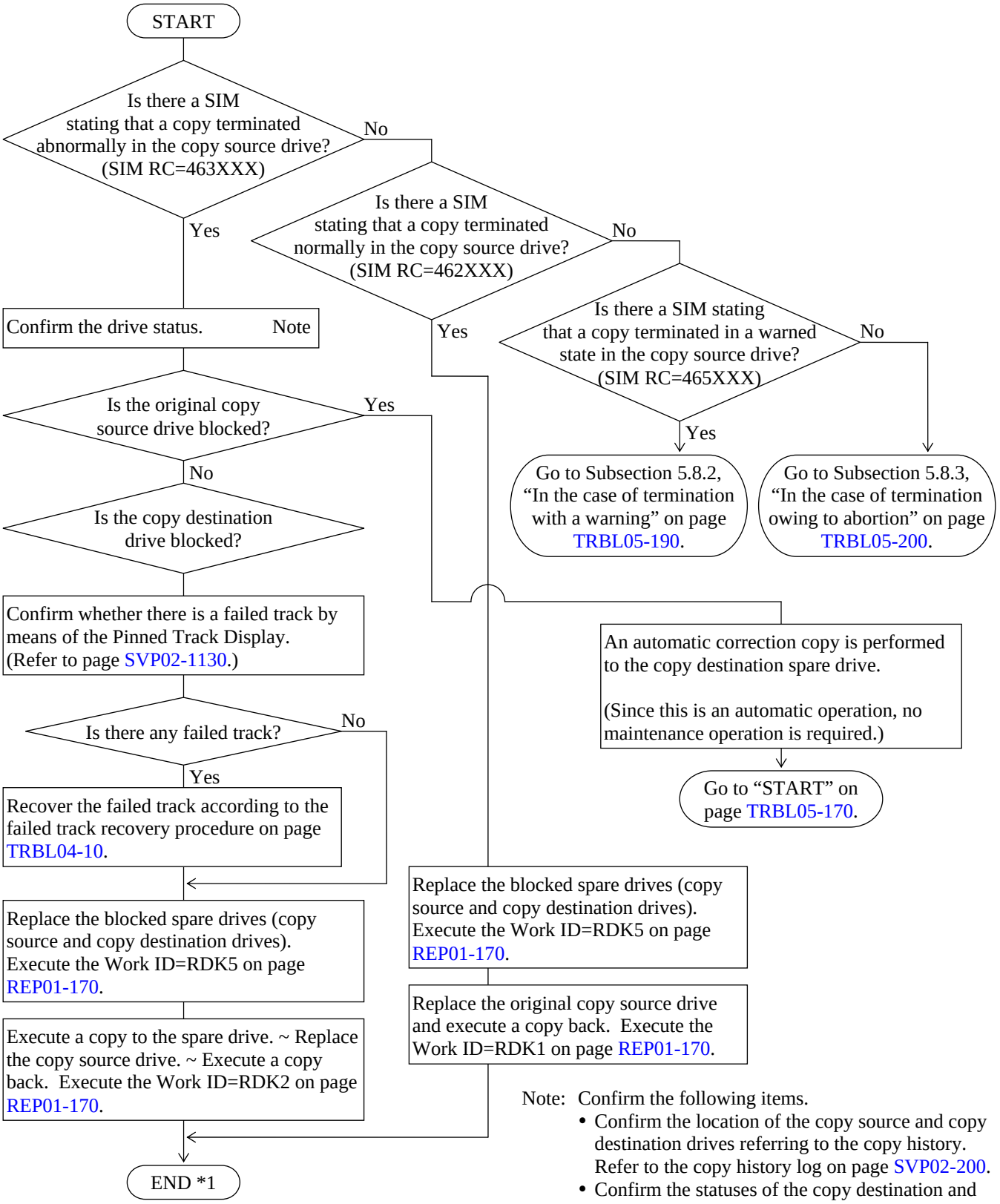
Note 1: Refer to the copy history logs on page SVP02-200.

Note 2: Refer to the HDD statuses on page SVP03-250.

*1 After finishing the error recovery, do SIM complete and delete logs. (Refer to SVP02-220, 650)

(4) In the case of drive copy abnormal termination (in which an unused spare drive is available)
This is a case in which a drive copy terminates abnormally owing to a failure in the copy destination drive. However, if an unused spare drive exists, the drive copy is automatically performed to the unused spare drive.
In the following procedure, the copy source is referred to as an original copy source, the copy destination is referred to as a copy source, and the unused spare drive is referred to as a copy destination.





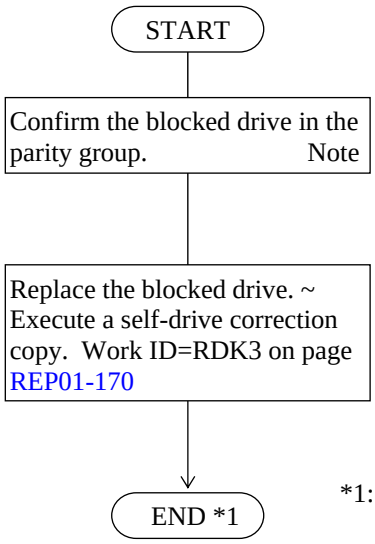
Note: Confirm the following items.

- Confirm the location of the copy source and copy destination drives referring to the copy history. Refer to the copy history log on page SVP02-200.
- Confirm the statuses of the copy destination and the original copy source drives. Refer to Item (3), HDD status on page SVP03-250.

*1: After finishing the error recovery, do SIM complete and delete logs. (Refer to SVP02-220, 650)

5.8.5 Correction access status

The procedure below is that used when one drive in the parity group is blocked.

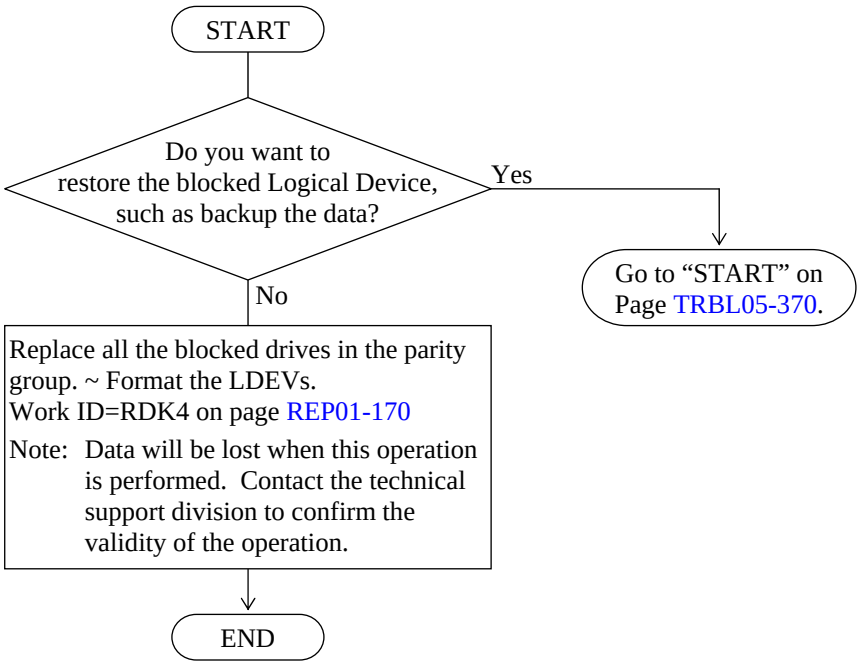


Note: Refer to Item (3), HDD status on page SVP03-250.

*1: After finishing the error recovery, execute SIM complete and delete logs. (Refer to SVP02-220, 650)

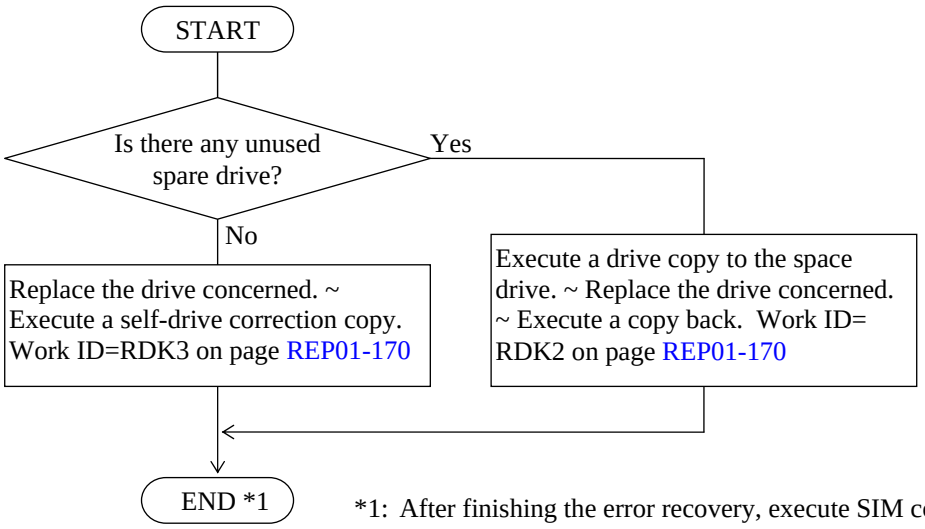
5.8.6 Parity group blockade

The procedure below is that used when the two or more drives are blocked in the parity group.



5.8.7 Preventive maintenance

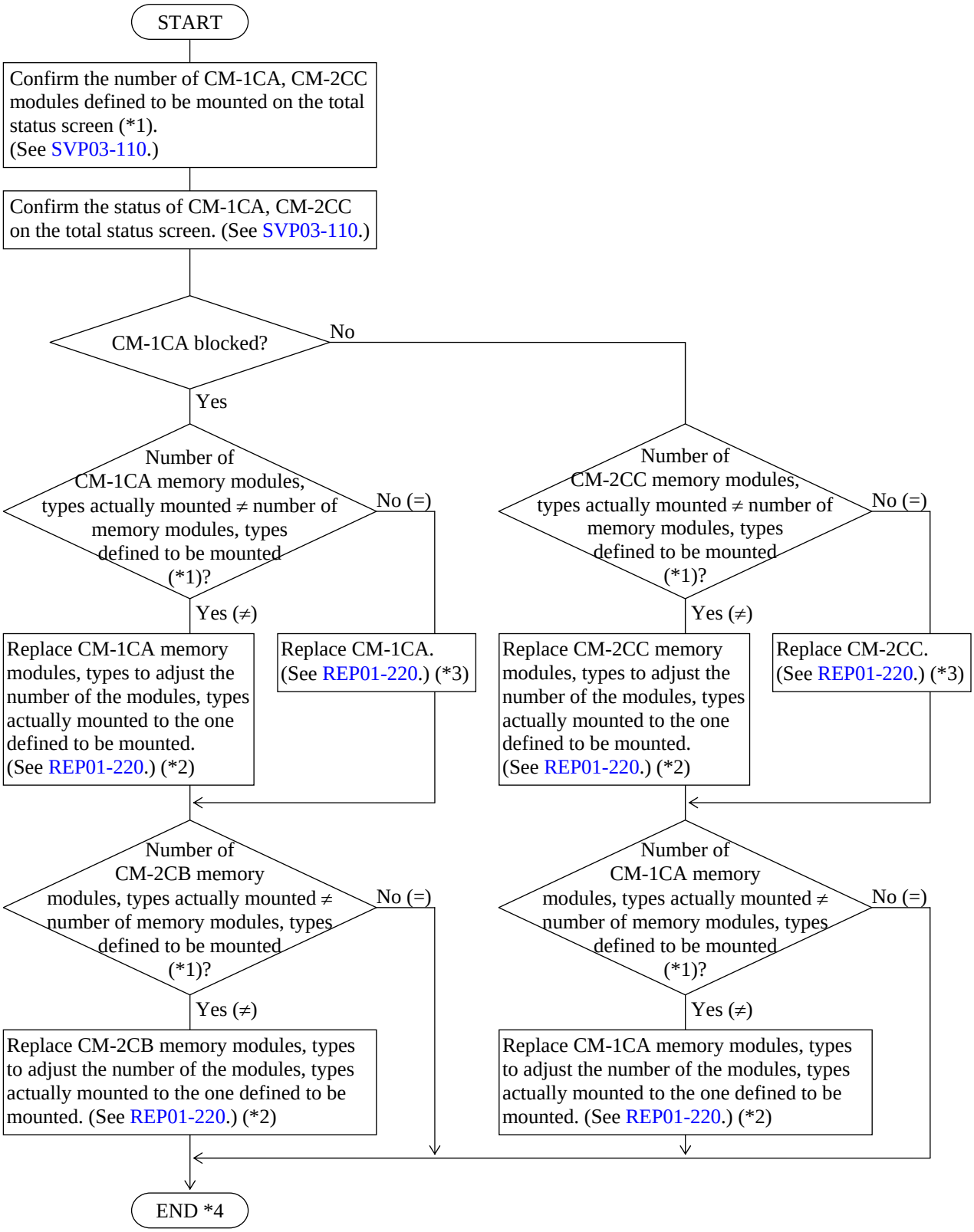
The procedure below is that used when the drive is not blocked but it must be replaced.



*1: After finishing the error recovery, execute SIM complete and delete logs. (Refer to SVP02-220, 650)

5.9 Recovery Procedure for SM Capacities Inequality (SIM = FFE30X)

The mounted SM capacities inequality error (FFE30x) should be recovered following the procedure below.
This error occurs if an SM is blocked because the mounted SM capacity differs between CM-1CA and CM-2CC. Therefore, the number of memory modules, types mounted must be adjusted correctly to recover this error.



*1: Number of memory modules indicated not to be “not-mounted” on the status screen.

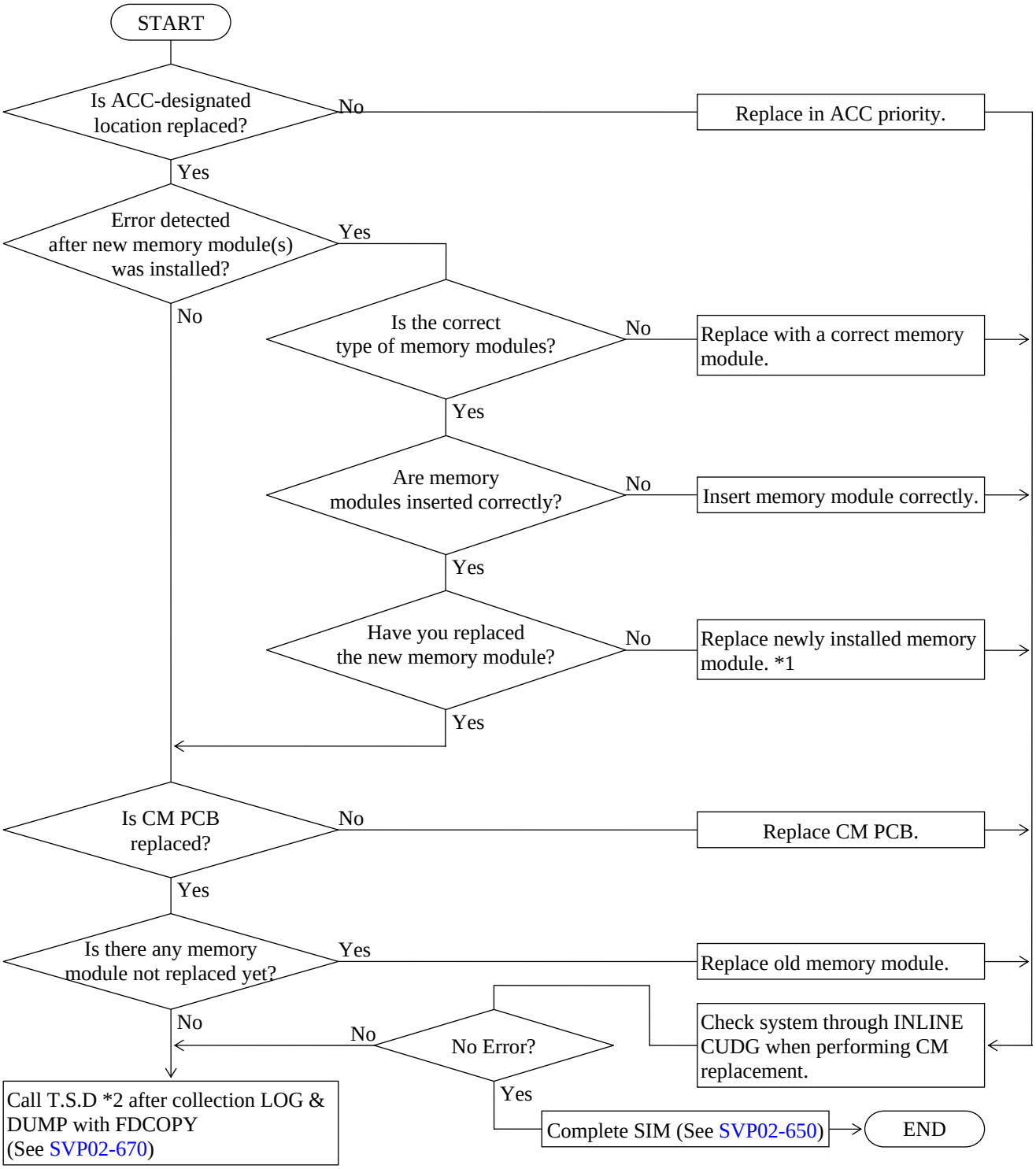
*2: Confirm the number of mounted memory modules, types to adjust it.

*3: No need to adjust the number of memory modules, types mounted nor replace any of them.

*4: After finishing the error recovery, do SIM complete and delete logs.
(Refer to SVP02-220, 650)

5.10 Cache Memory Error Isolation Procedure (SIM = FFF0XX, FFF1XX, FFF2XX, FFE2XX)

Isolate a cache memory or shared memory error according to the procedure given below.



*1: If there are multiple module groups, replace one by one.
If the symptom is not cleared even after replacement, de-install newly installed memory modules to return to the original configuration.

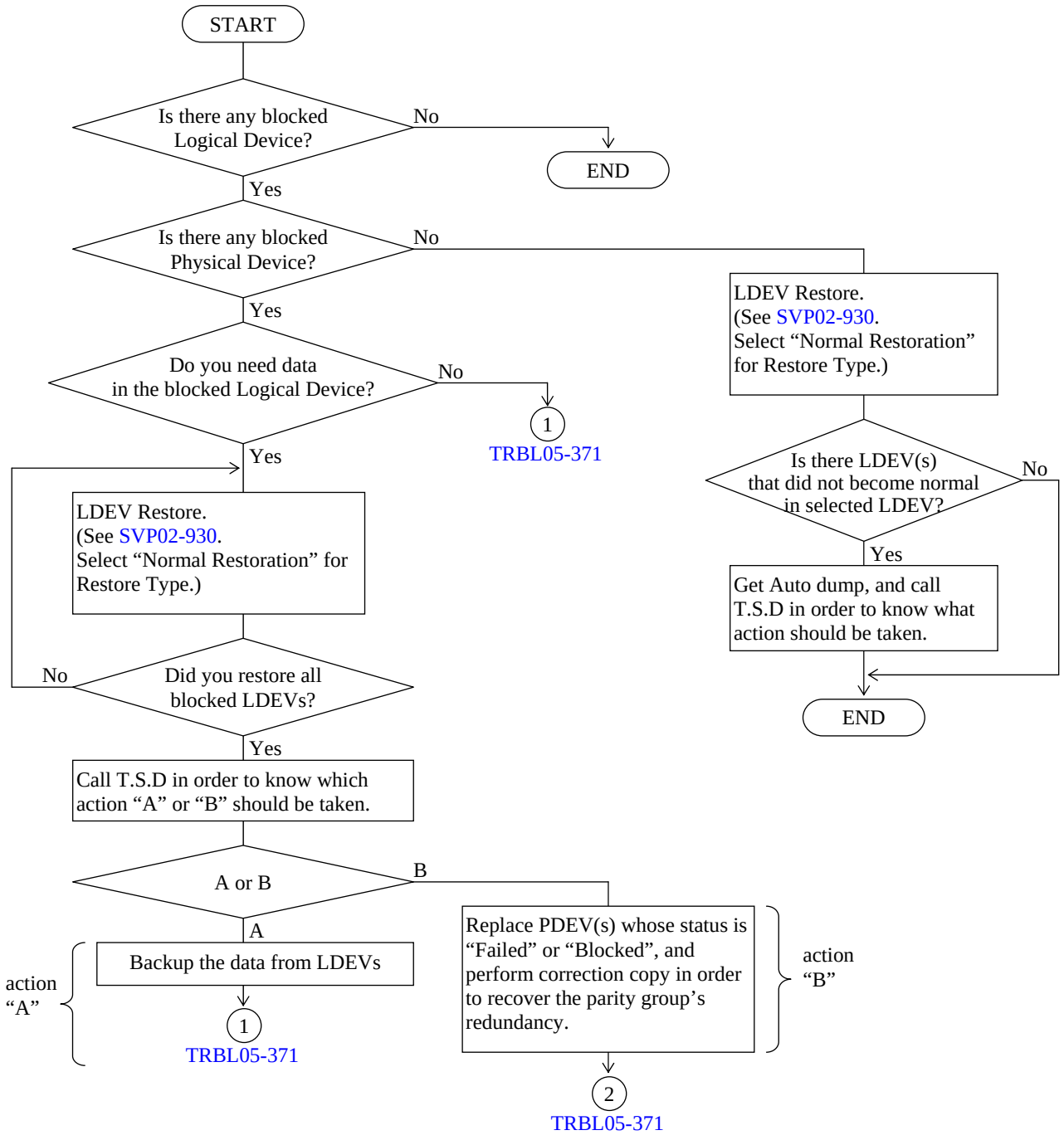
*2: T.S.D : Technical Support Division

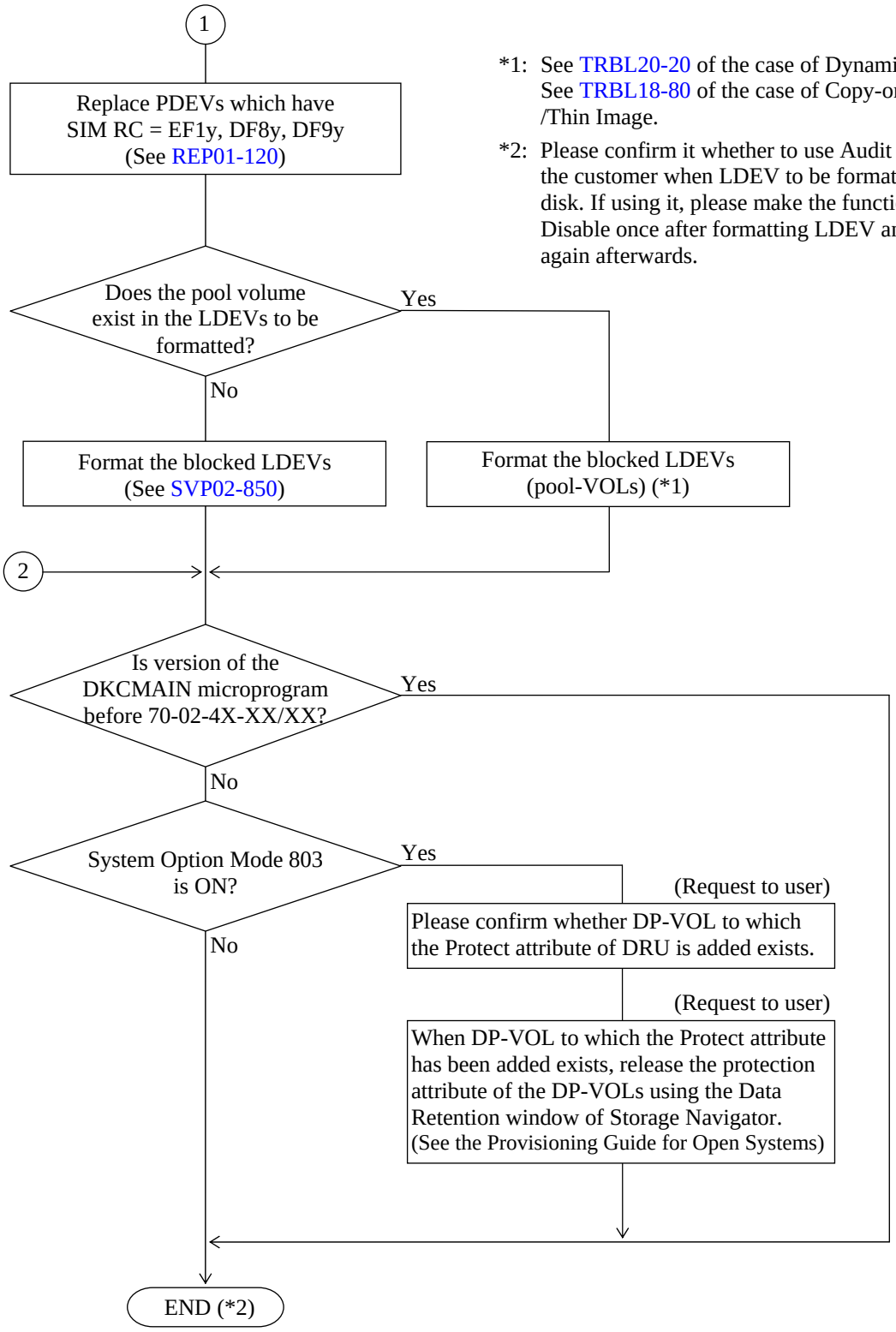
5.11 Recovery Procedure for LDEV Blocking (SIM = EF9XXX, DFAXXX, DFBXXX)

When LDEVs are blocked in the case of blocking several PDEVs (SIM RC=EF9Yxx, DFAYxx, DFBYxx), perform the following recovery procedures.
Be sure to call T.S.D. before you perform PDEV replace. It causes a DATA-LOSS in some cases.

Notice : When you execute a Recovery Procedure for LDEV Blocking, you must delete the TC-MF pair.
After recovering it, if necessary, you execute establish pair.

SIM RC = EF9y, DFAy, DFBy





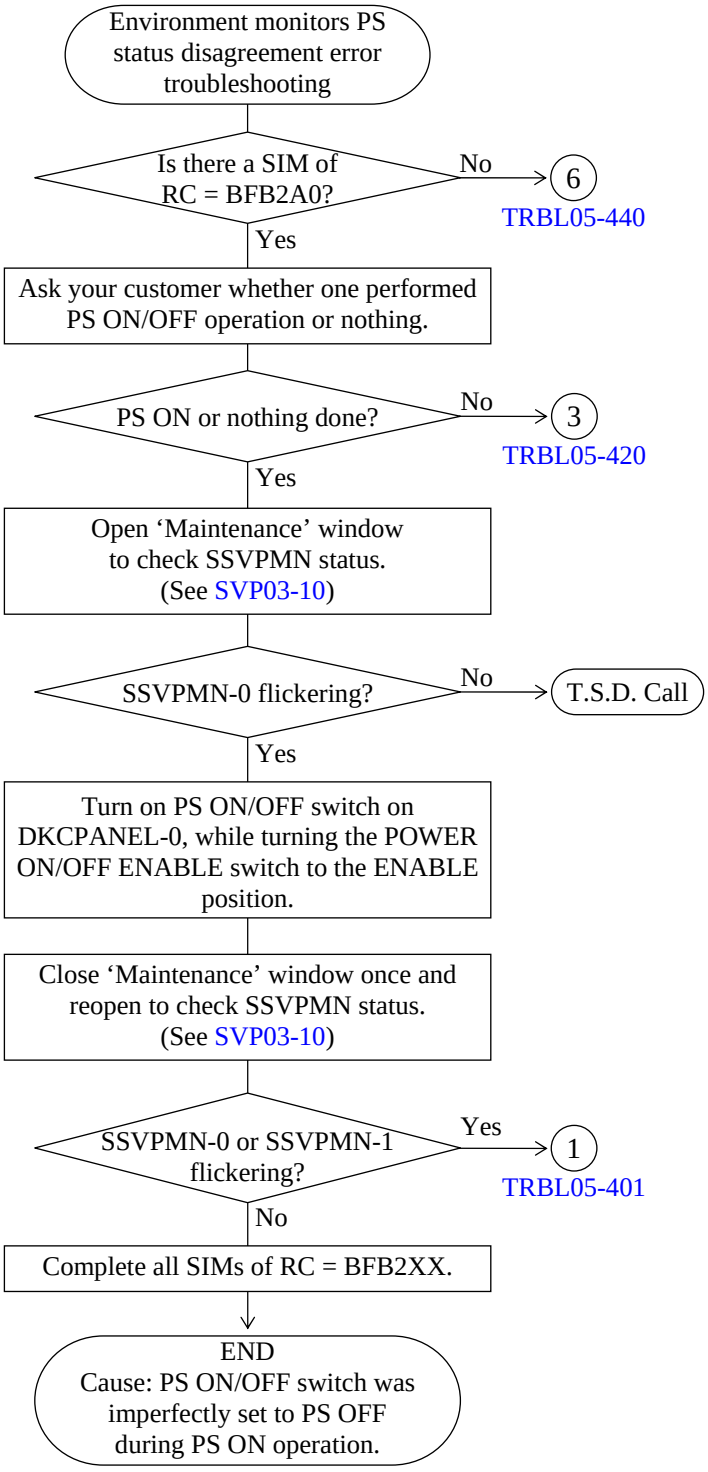
*1: See TRBL20-20 of the case of Dynamic Provisioning
See TRBL18-80 of the case of Copy-on-Write Snapshot /Thin Image.

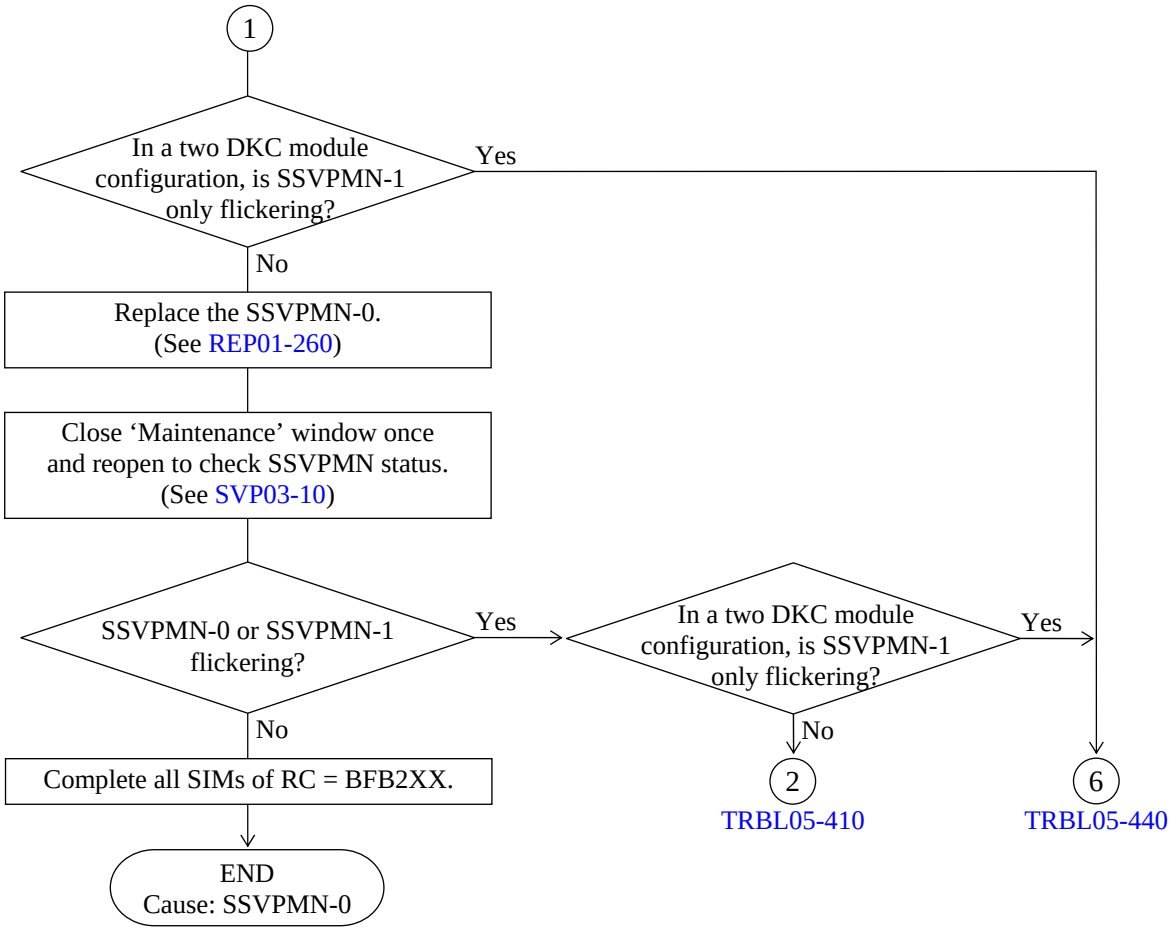
*2: Please confirm it whether to use Audit Log Buffer for the customer when LDEV to be formatted is a system disk. If using it, please make the function being used Disable once after formatting LDEV and set it to Enable again afterwards.

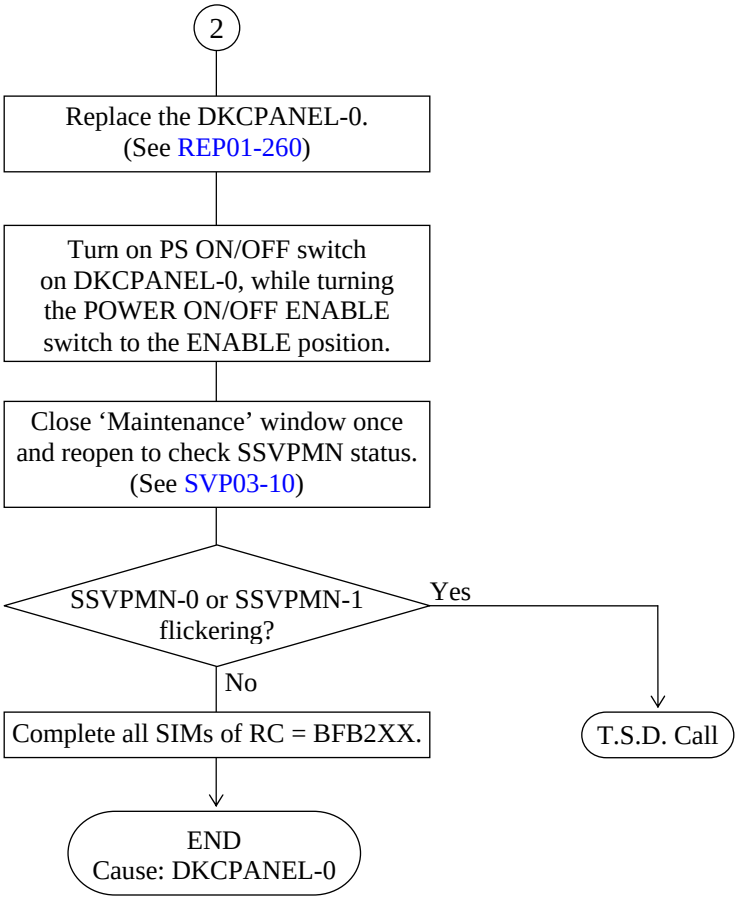
5.12 (Blank)

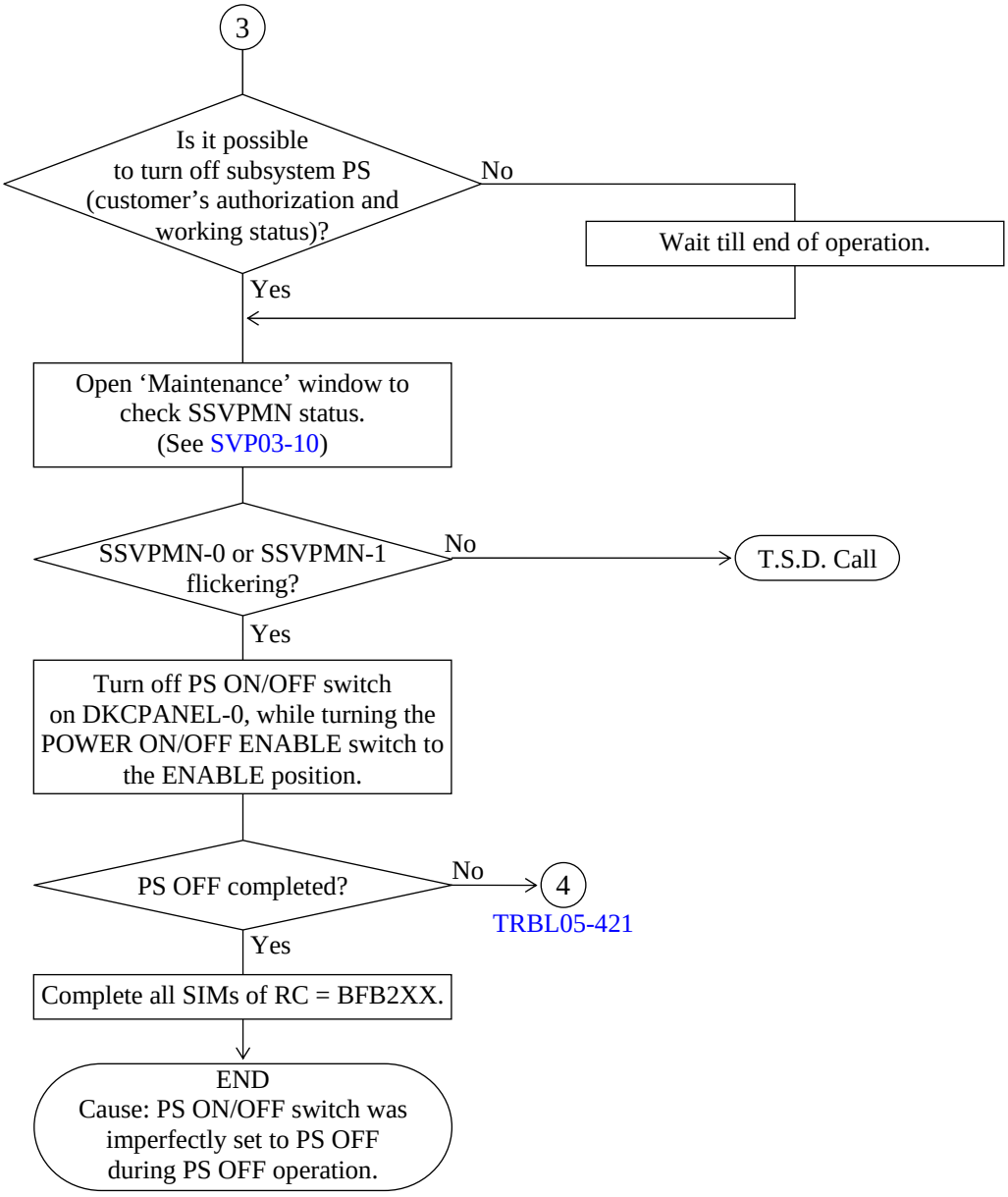
Blank Sheet

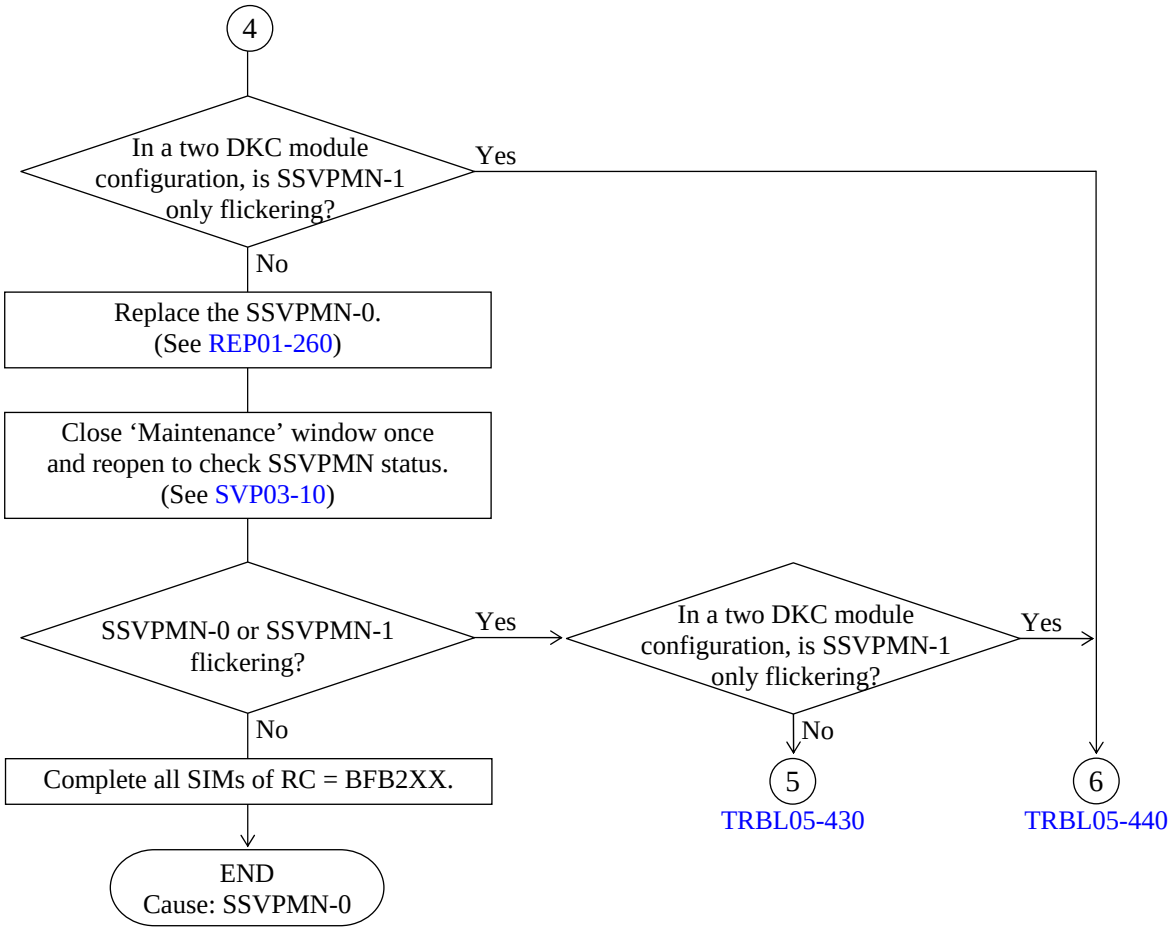
5.13 Environment monitors PS status disagreement error (SIM = BFB2XX)

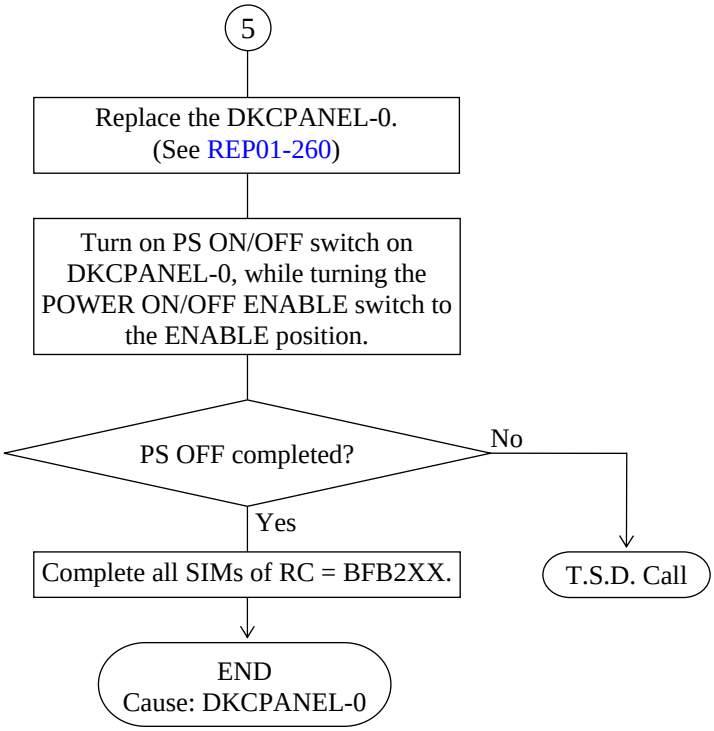


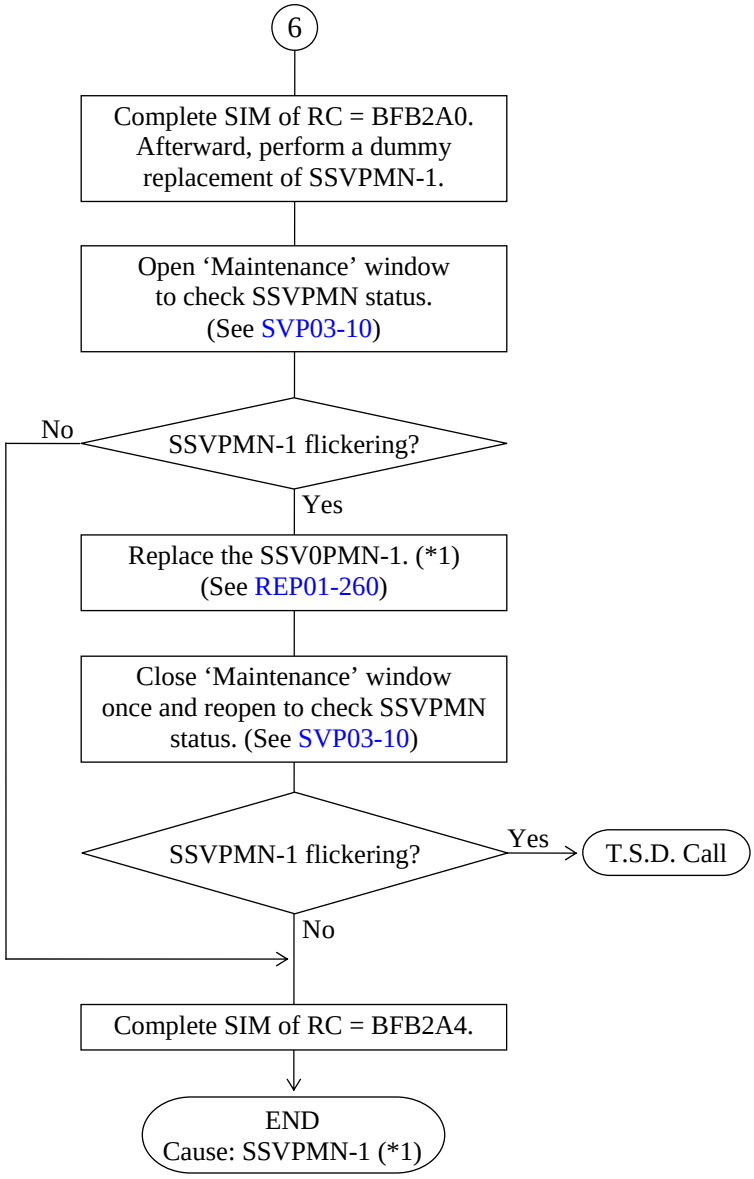








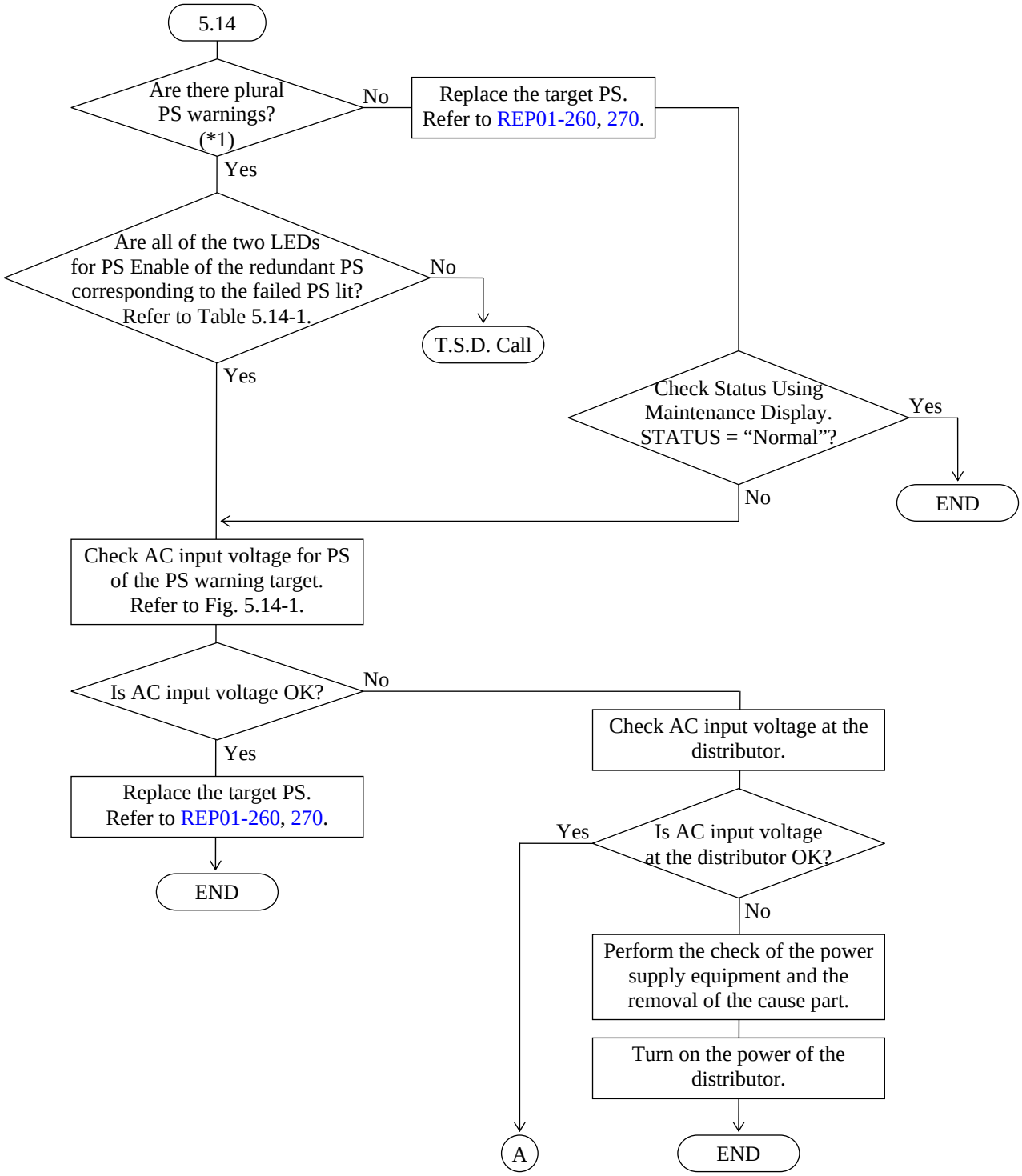


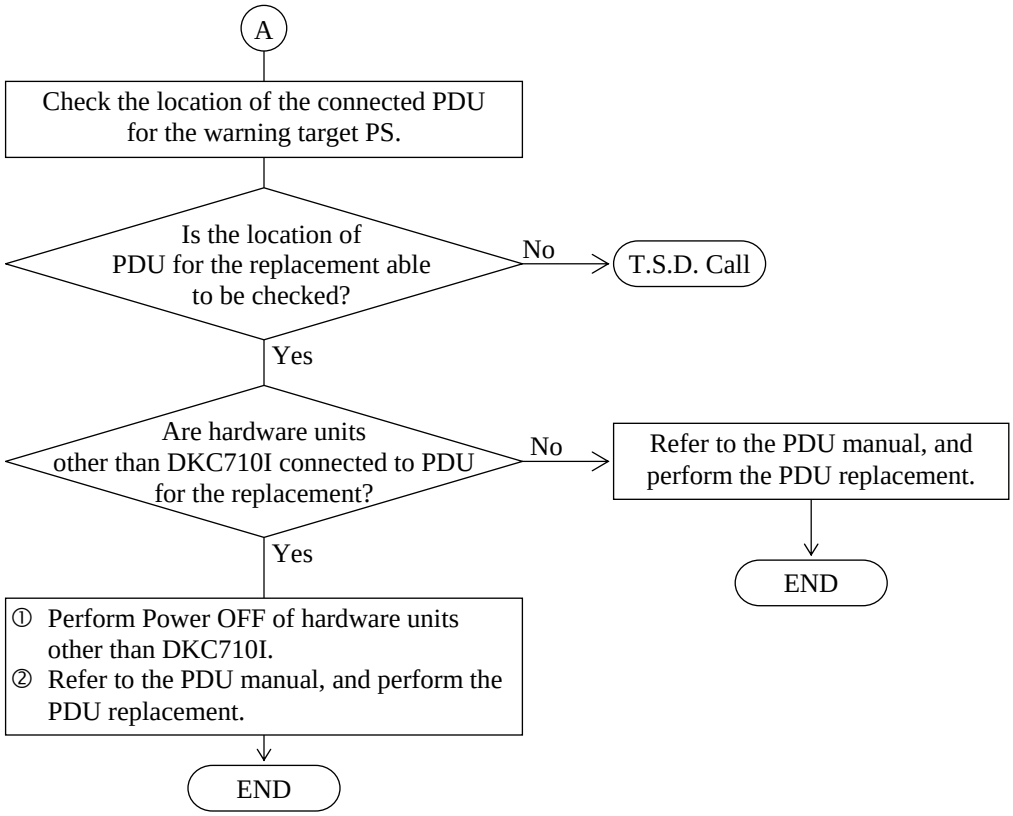


*1: If a dummy replacement is instructed, perform the dummy replacement. If SSVPMN-1 is recovered by the dummy replacement, the SSVPMN-1 is not failure.

5.14 PS warning error (SIM = BF4XXX, BF5XXX)

Before replacement please check that the circuit breaker is on and that the PS cable ASSY between PDU and DKCPS/DKUPS is connected correctly before replacement of DKCPS/DKUPS is performed.
If you find problem with the circuit breaker or the connection, correct the problem. Refer to the INSTALLATION SECTION of Maintenance Manual when you correct the problem.





*1: The following relevant SIMs may be created when PS system failure occurred. In this case, no replacement of SSVPMN is necessary.

DKC No.	Failure Cases	Relevant SIM Reference Code
DKC-0	DKCPS-0 failure or AC input voltage of DKCPS-0 failure.	BFAFA0
	DKCPS-1 failure or AC input voltage of DKCPS-1 failure.	BFAFA1
DKC-1	DKCPS-0 failure or AC input voltage of DKCPS-0 failure.	BFAFA4
	DKCPS-1 failure or AC input voltage of DKCPS-1 failure .	BFAFA5

*2: Refer to LOC03-180 for Location of the LED for PS Enable.

Table 5.14-1 Correspondence Table from PS Warning Location to Redundant PS Location

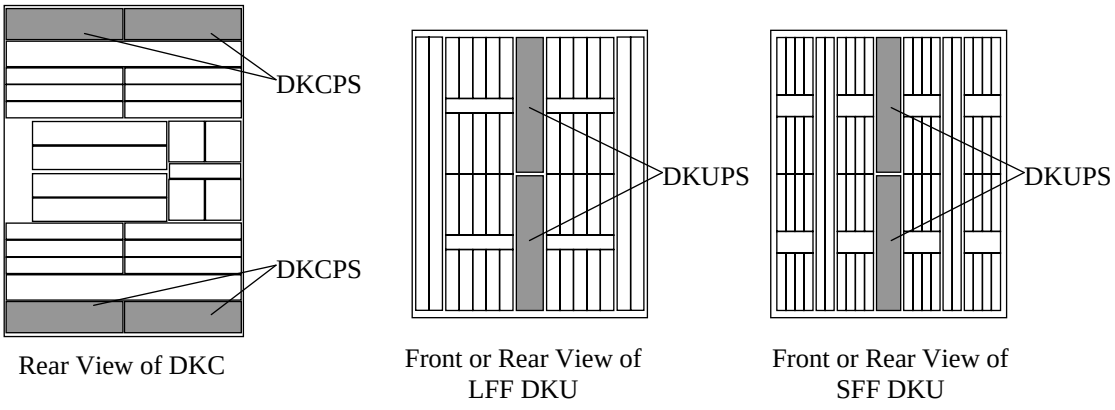
No.	PS Warning Location	Redundant PS Location	
1	DKCPS-0	→	DKCPS-1
2	DKCPS-1	→	DKCPS-0
3	DKCPS-2	→	DKCPS-3
4	DKCPS-3	→	DKCPS-2
5	DKUPS-xy0	→	DKUPS-xy1
6	DKUPS-xy1	→	DKUPS-xy0
7	DKUPS-xy2	→	DKUPS-xy3
8	DKUPS-xy3	→	DKUPS-xy2

Note 1: For example, if Location of PS warning is “DKCPS-0”, Location of the corresponding redundant PS becomes “DKCPS-1”.
At this time, if the LED (Green) for PS Enable of “DKCPS-1” is lit, it is redundant so that the maintenance replacement of “DKCPS-0”, etc. is possible.
If the LED (Green) for PS Enable of “DKCPS-1” is off, it is not redundant so that the maintenance replacement of “DKCPS-0”, etc. is impossible (T.S.D. Call).

Note 2: DKUPS-xy0
x: DKC No. 0, 1
y: DKU No. 0, 1, 2, 3, 4, 5, 6, 7

[AC Input voltage check]

a. Remove the cable of target PS.
b. Measure AC input voltage at terminal of removed cables.



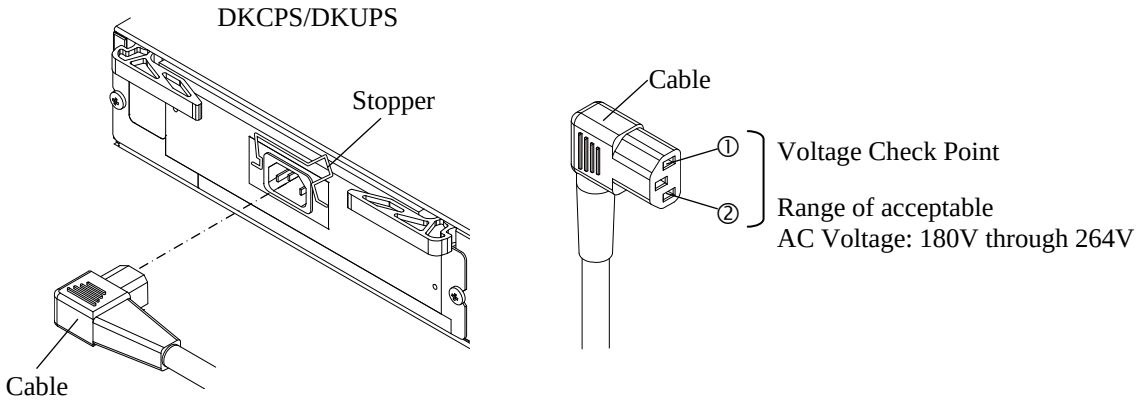
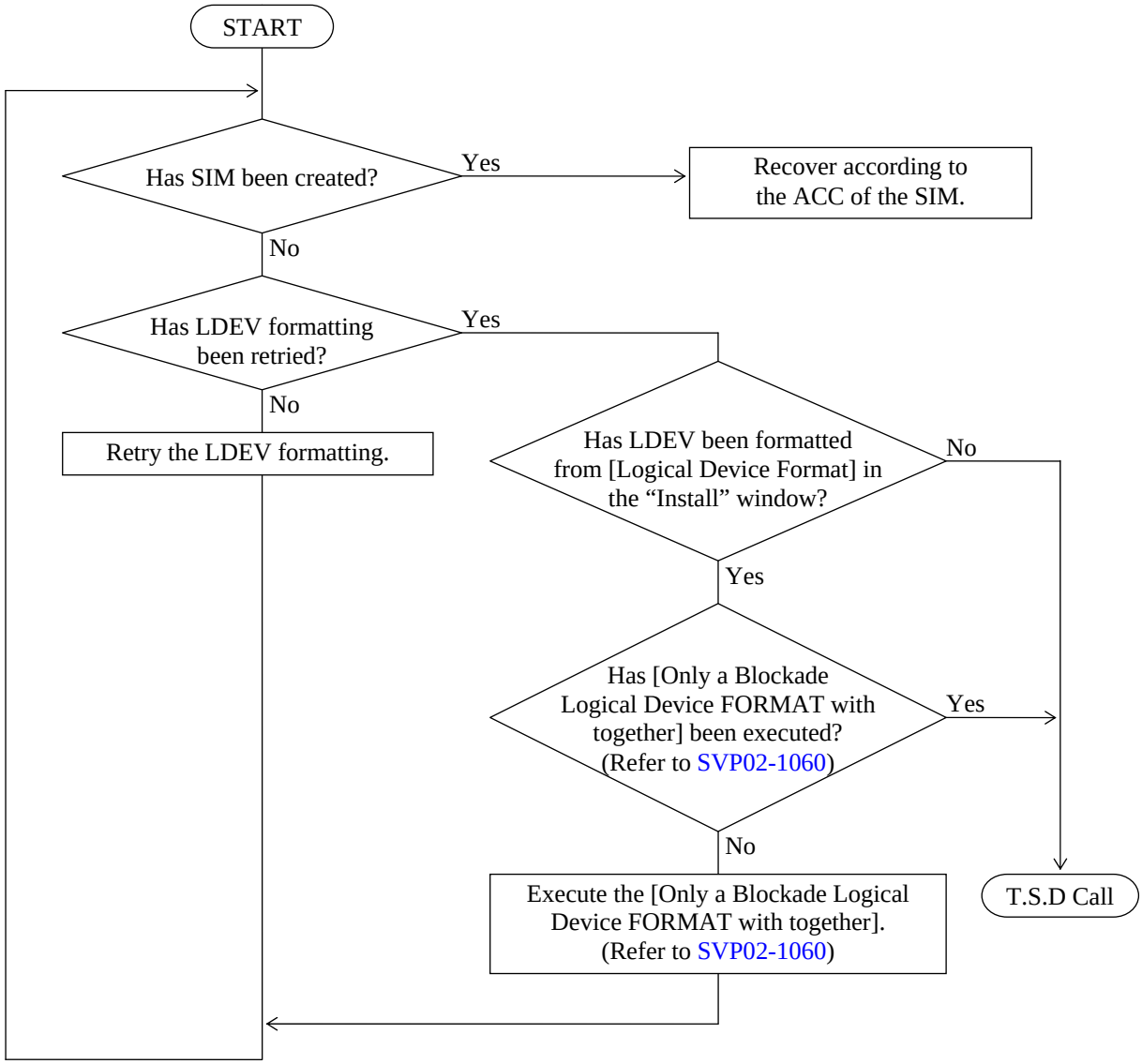


Fig. 5.14-1 AC Input Voltage Check

5.15 Recovery procedure when LDEV formatting failed

When “Formatting logical devices rejected by DKC.” or “Formatting the logical device is failed.” is displayed at the end of the LDEV formatting and when “Blocked” is displayed for the LDEV formatted by “Logical Device Status”, make a recovery according to the following procedure.



5.16 Recovery procedure when WDCP information is lost (SIM = FFDE01, FFDE02, FFDE03)

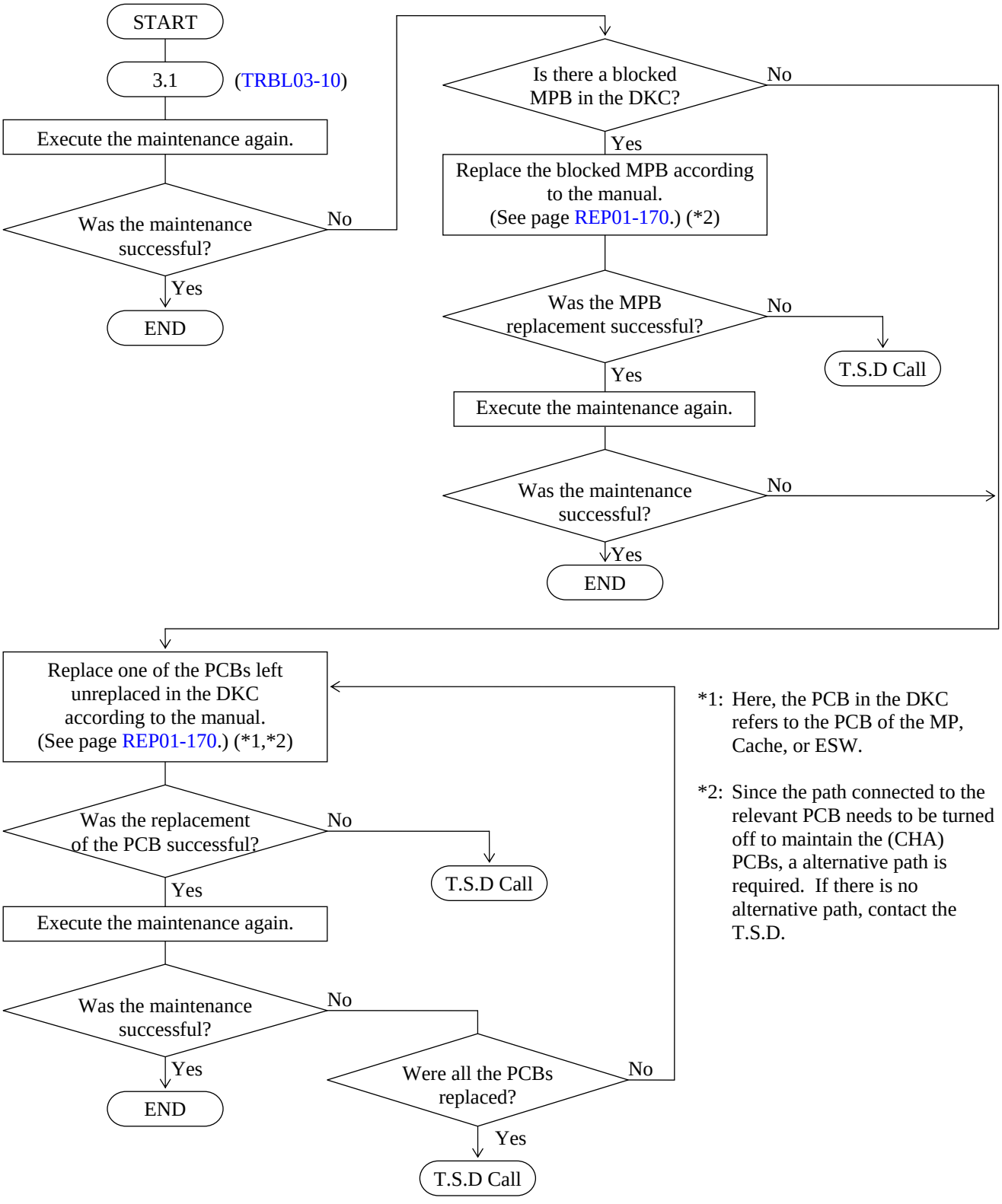
(1) When only this SIM is reported
When this SIM is reported at the time of OFFLINE micro exchange performed, no maintenance is required.
When this SIM is reported at the time of the subsystem powering on, (a) failure(s) may occur in the cache PCB or cache memory. Replace the failed part(s).

(2) When another SIM is reported together with this SIM
When the SIM concerning the cache, perform the maintenance of the failed part(s).
When the SIM not concerning the above is reported at the same time, perform the maintenance of the failed part(s) and see "(1) When only this SIM is reported".

(3) WDCP system recovery procedure
For the procedure for recovering the WDCP system, see the instruction manual of the OS concerned.

5.17 Recovery procedure when recovering SM is impossible

The following flowchart shows the recovery procedure when SM cannot be recovered during Cache PCB replacement, SM/CM installation/de-installation, or cluster recovery procedure.

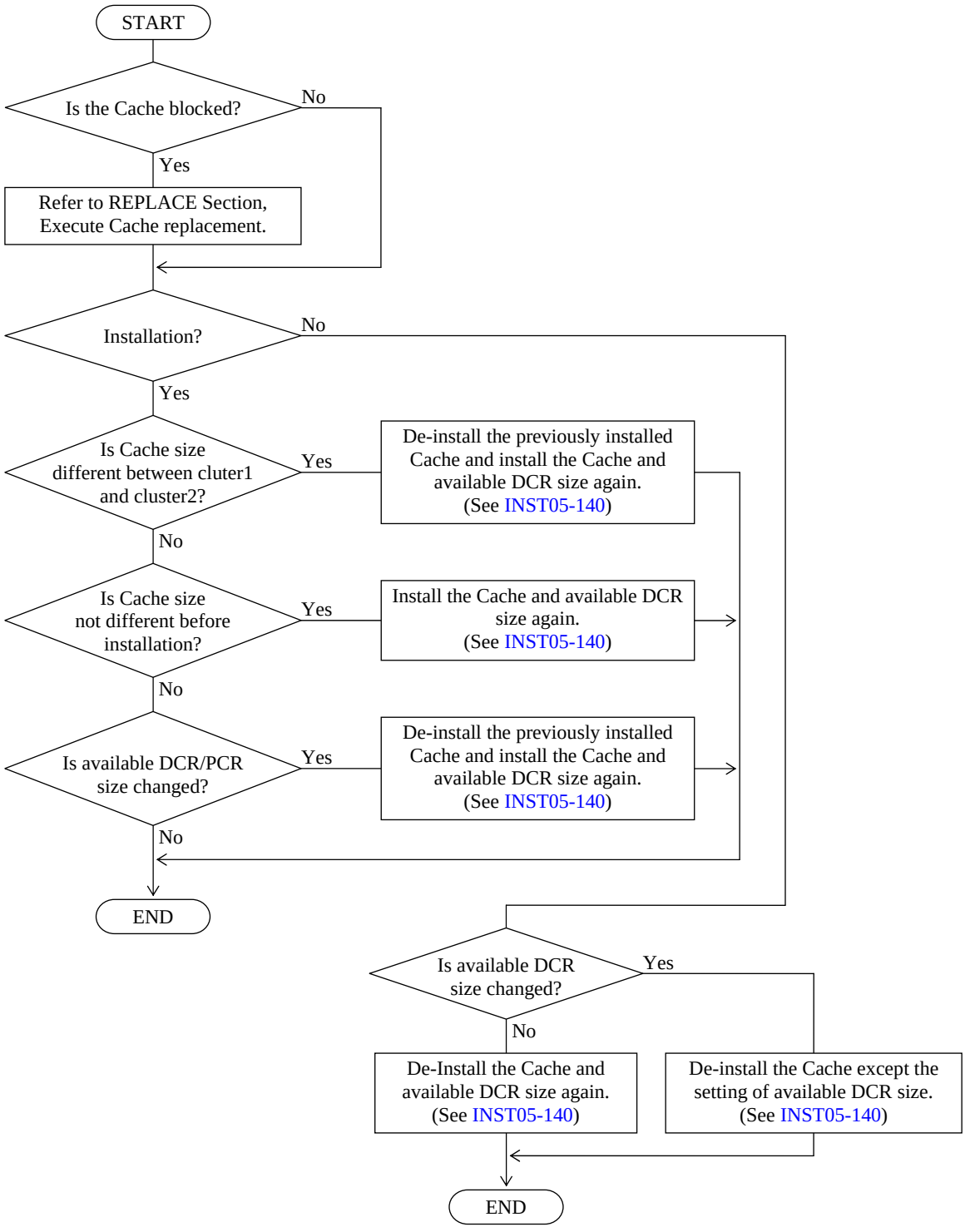


*1: Here, the PCB in the DKC refers to the PCB of the MP, Cache, or ESW.

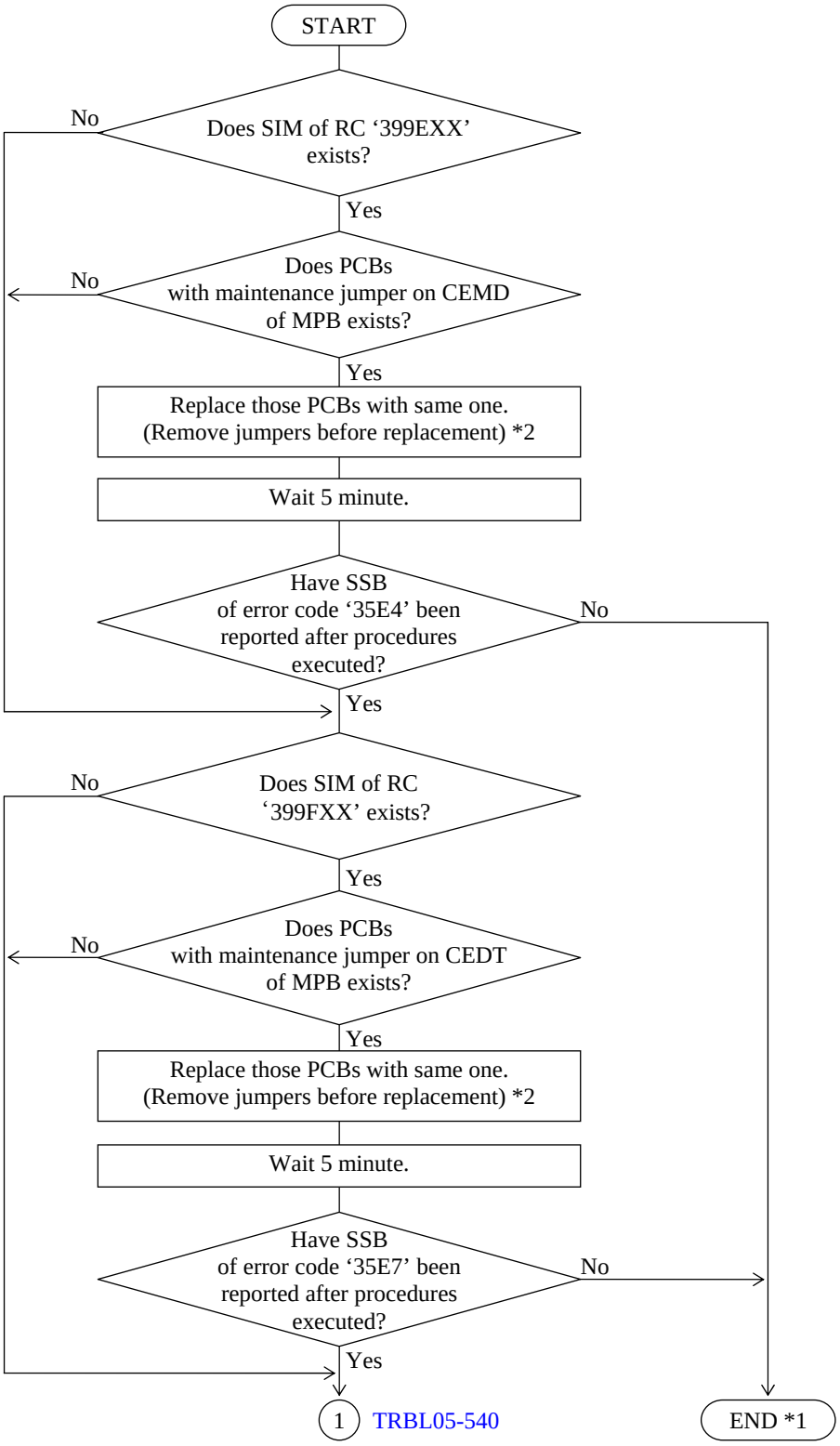
*2: Since the path connected to the relevant PCB needs to be turned off to maintain the (CHA) PCBs, a alternative path is required. If there is no alternative path, contact the T.S.D.

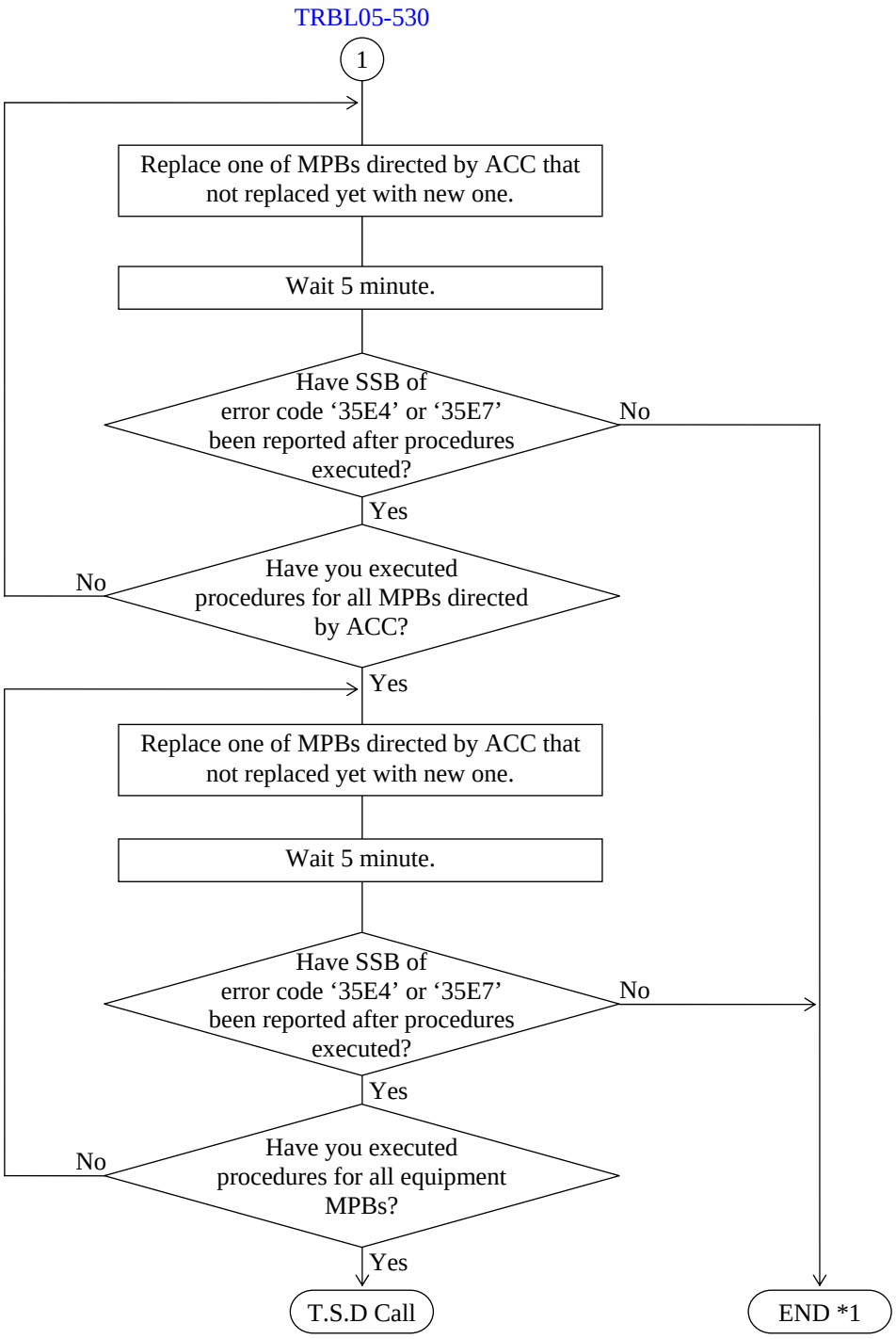
5.18 Recovery procedure when installation/de-installation Cache and DCR is impossible

The recovery procedure when installation/de-installation Cache and DCR available size simultaneously is impossible.



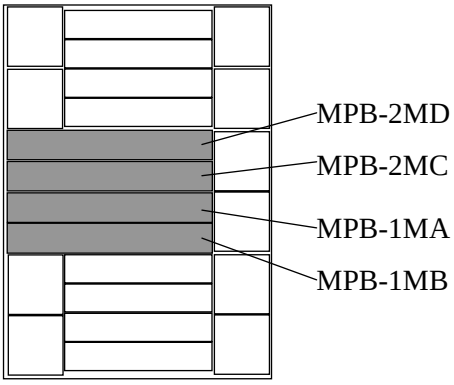
5.19 Recovery Procedure for Injustice CE MODE and Injustice CE DATA (SIM = 399EXX, 399FXX)





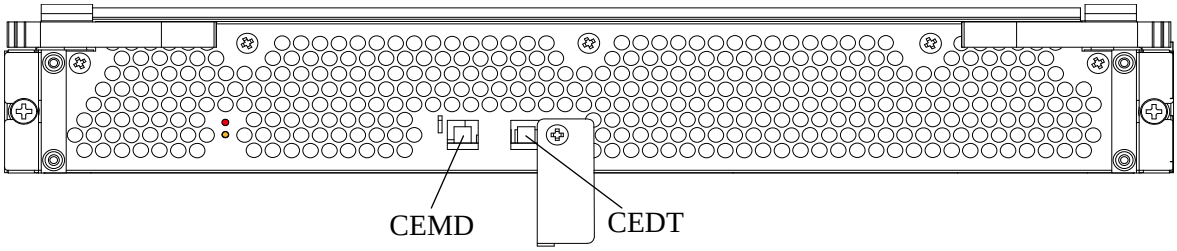
*1: After finishing the error recovery, execute SIM complete.
(Refer to SVP02-220, 650)

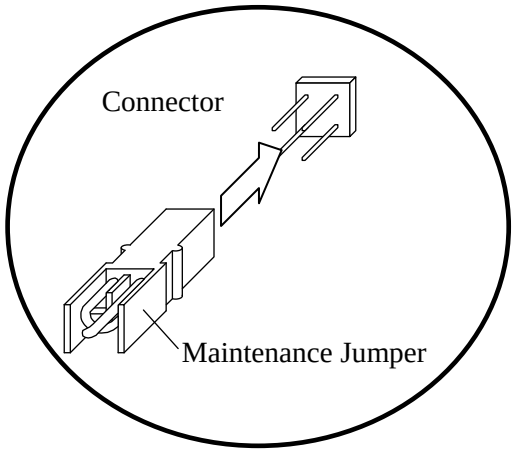
*2: Remove shut down jumpers. (Refer to blew)



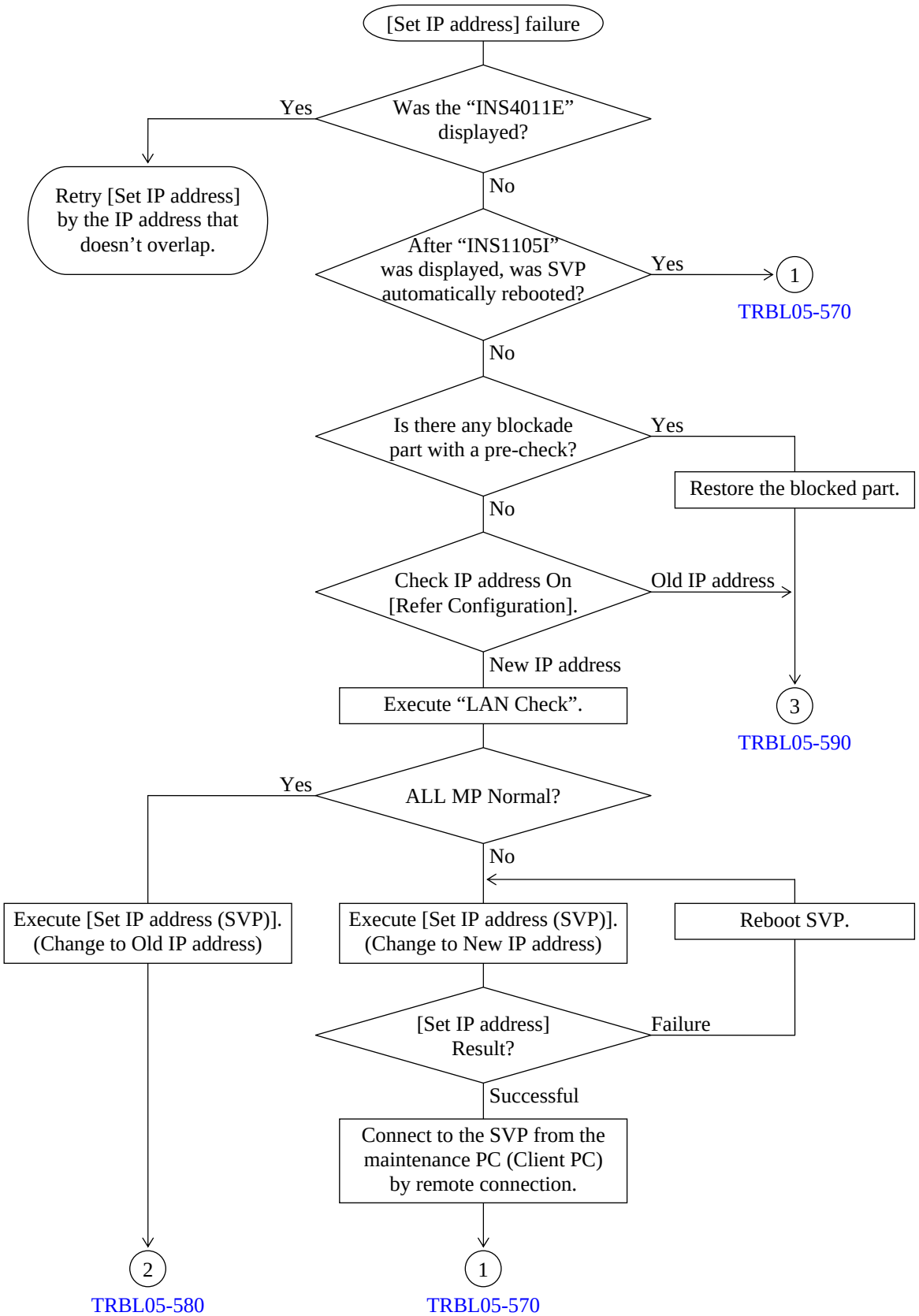
Front View of DKC

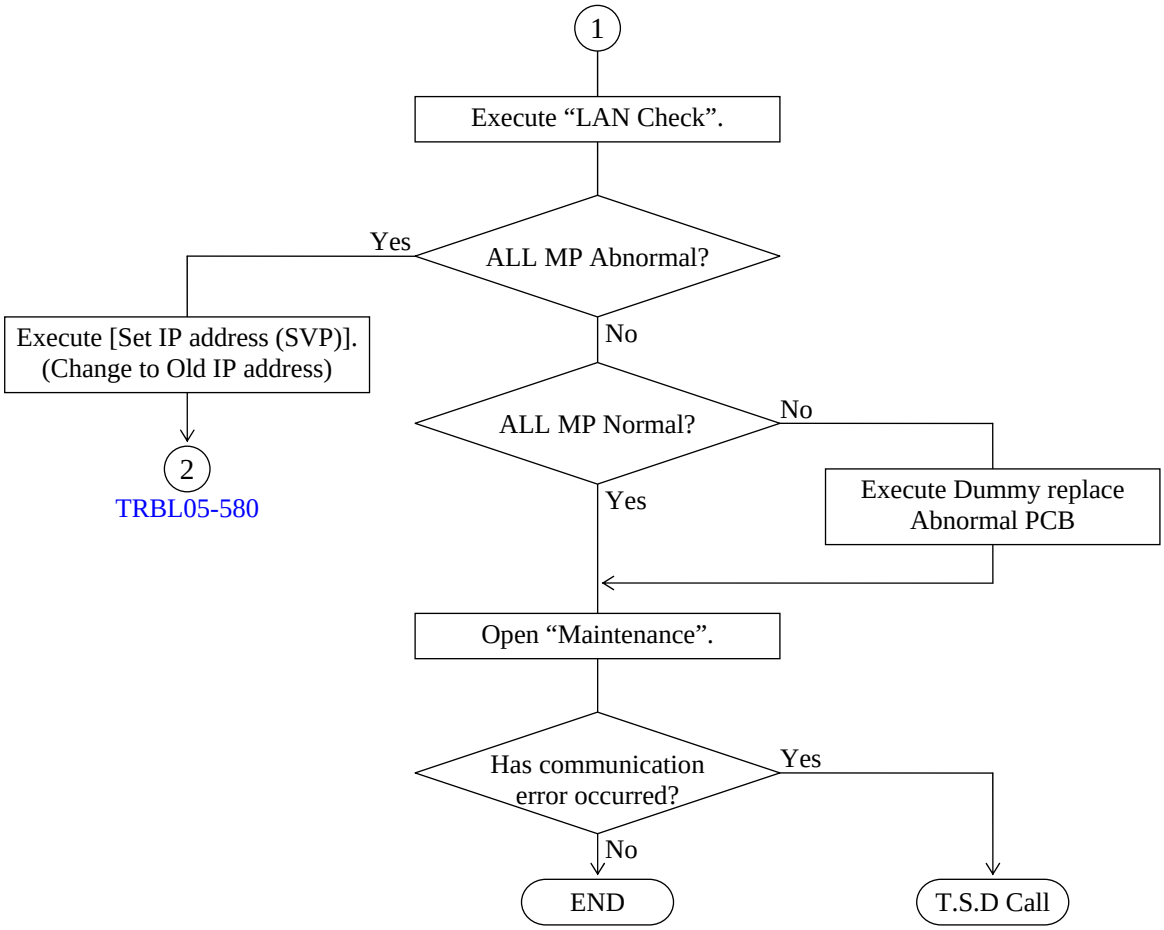
MPB

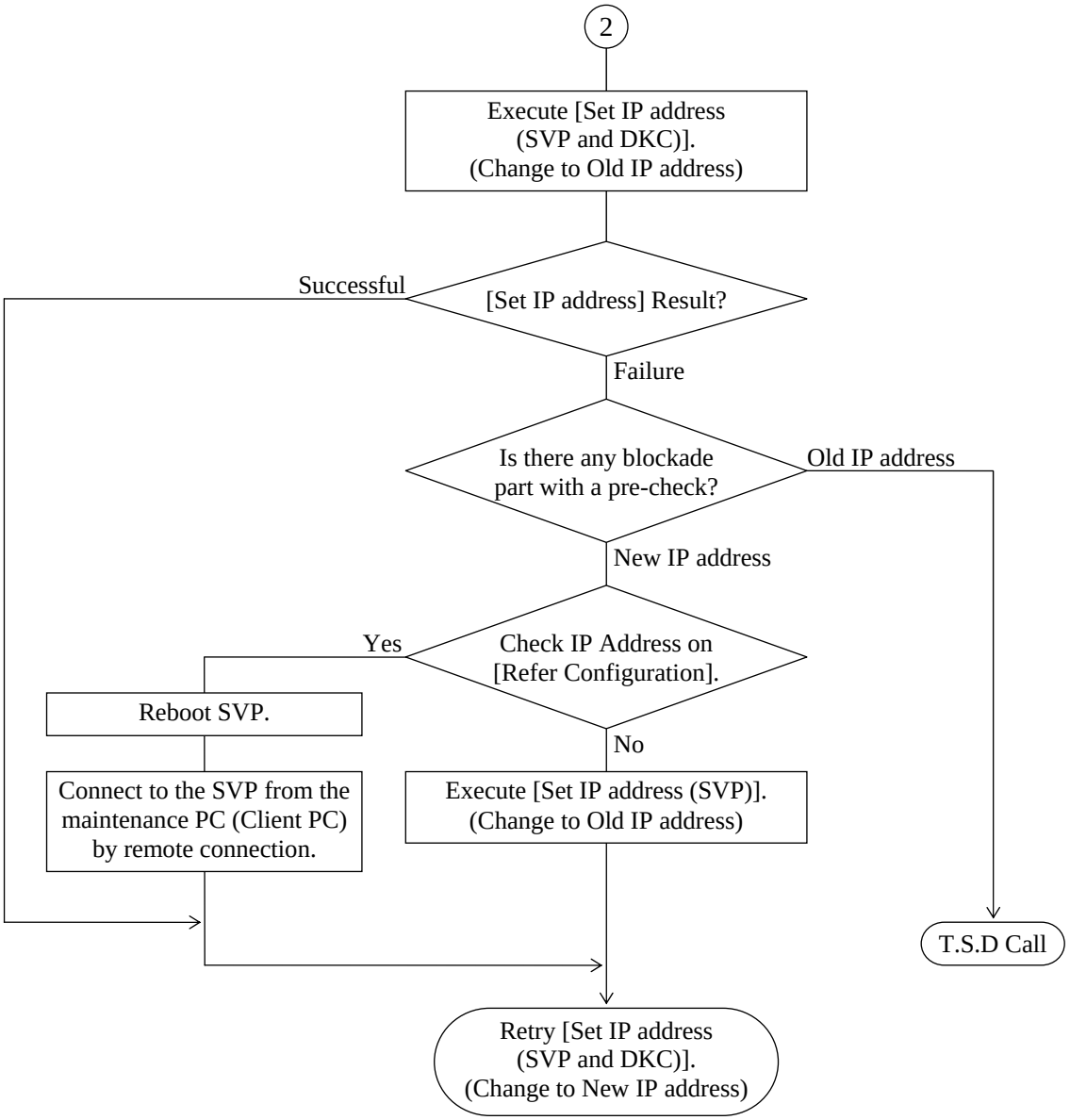


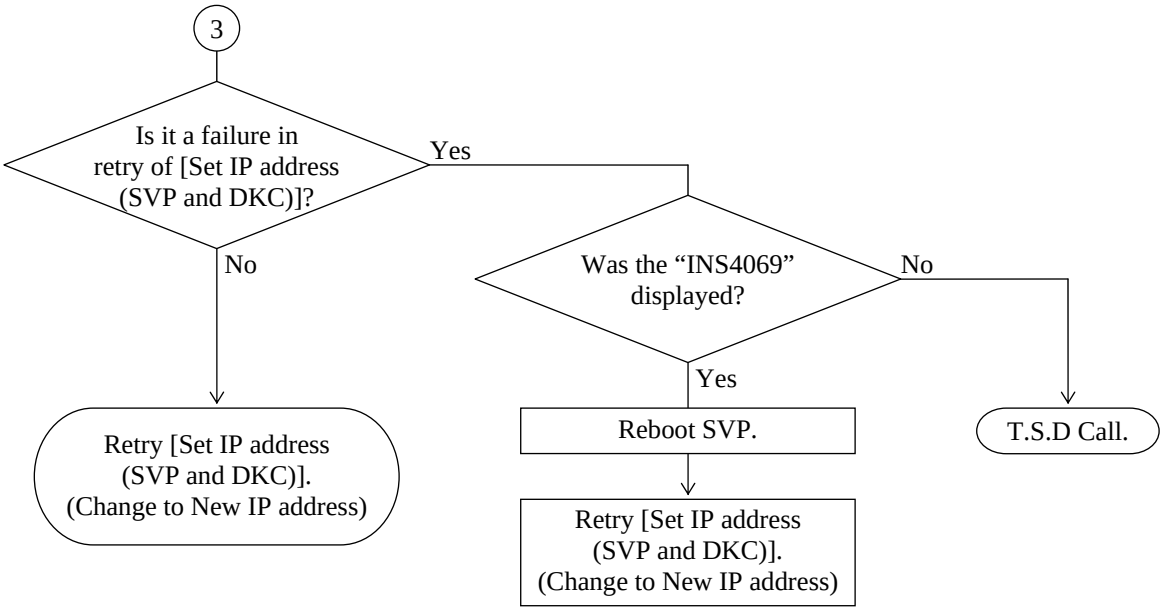


5.20 Recovery Procedure when Change the IP Address failed



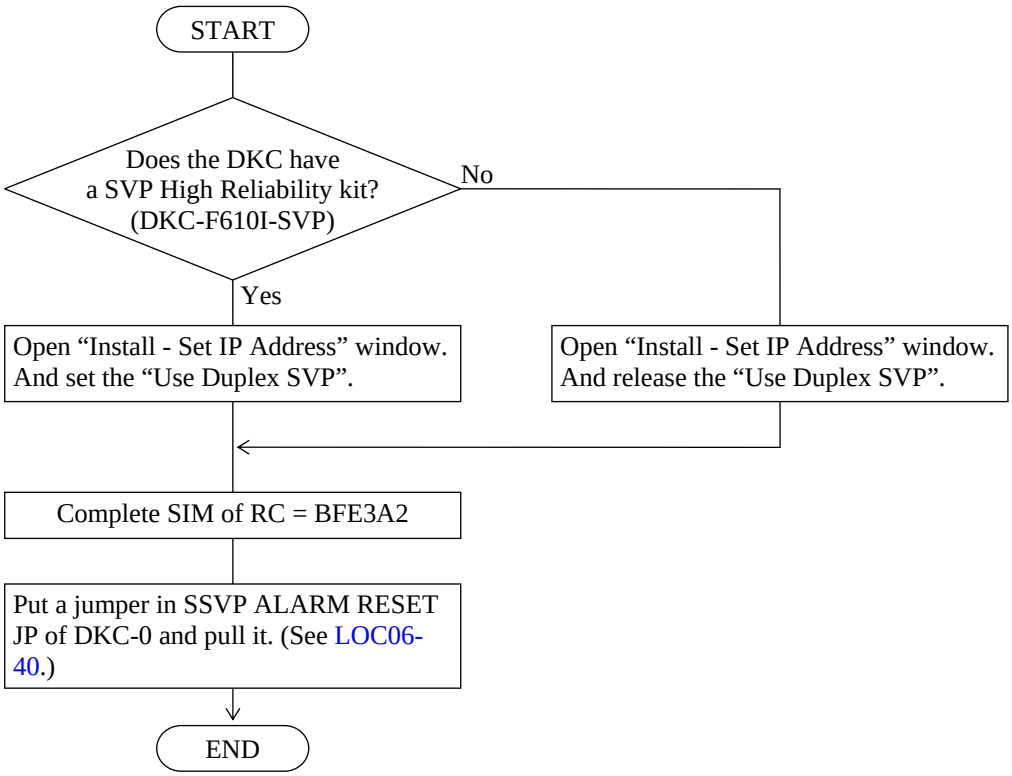




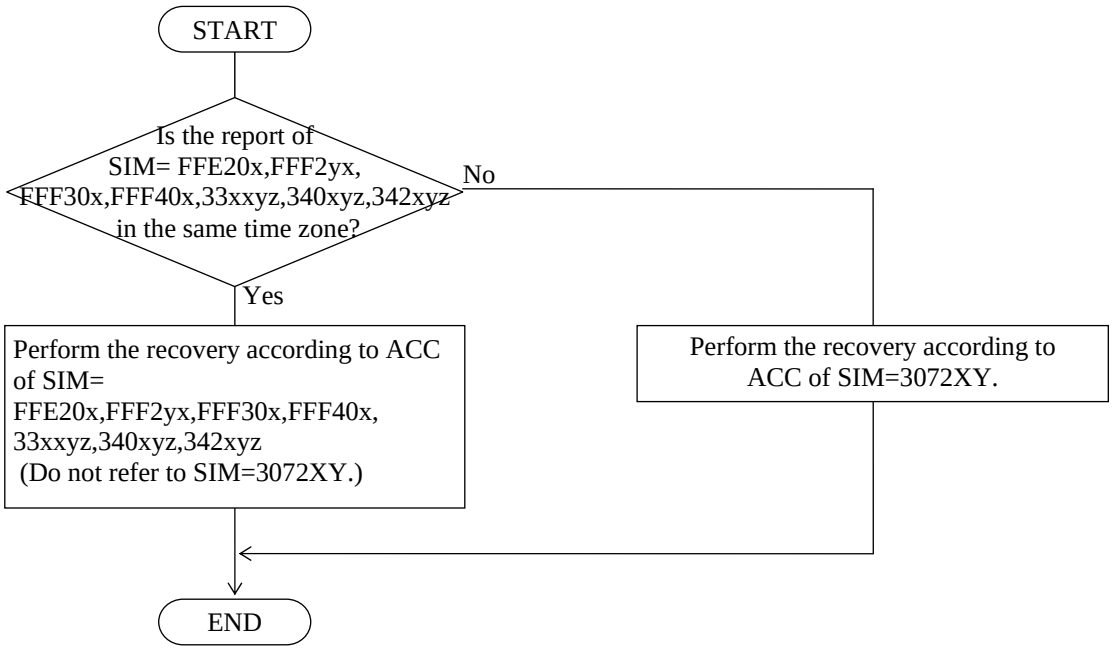


*: If the IP address change fails though [Set IP address (SVP and DKC)] is retired after SVP reboot, replace the SVP before retrying [Set IP address (SVP and DKC)].

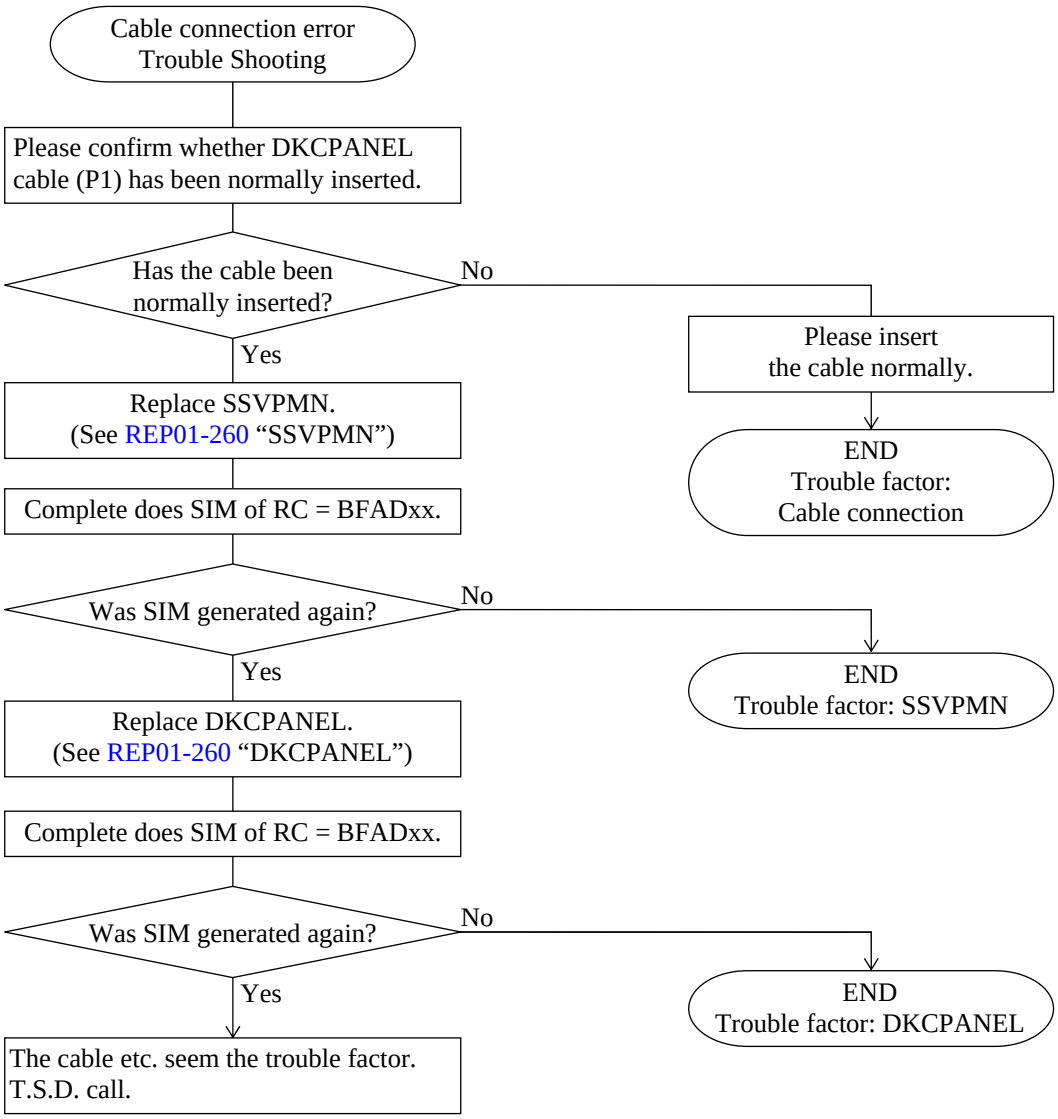
5.21 Duplex SVP Setup failed (SIM = BFE3A2)

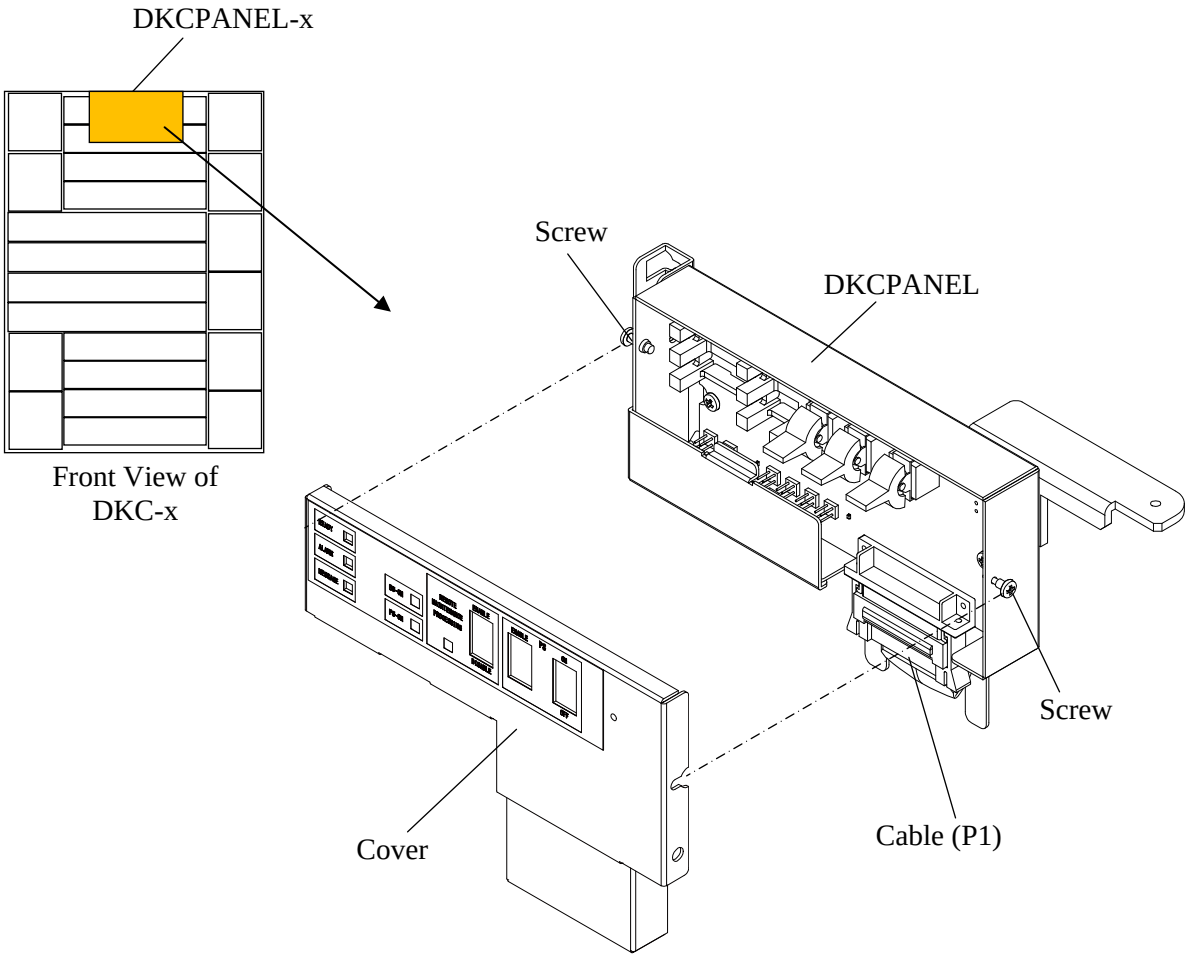


5.22 Recovery Procedure for the Case Where the CHK3 Threshold Over Occurs (SIM = 3072XY)



5.23 Cable connection error (SIM = BFADXX)

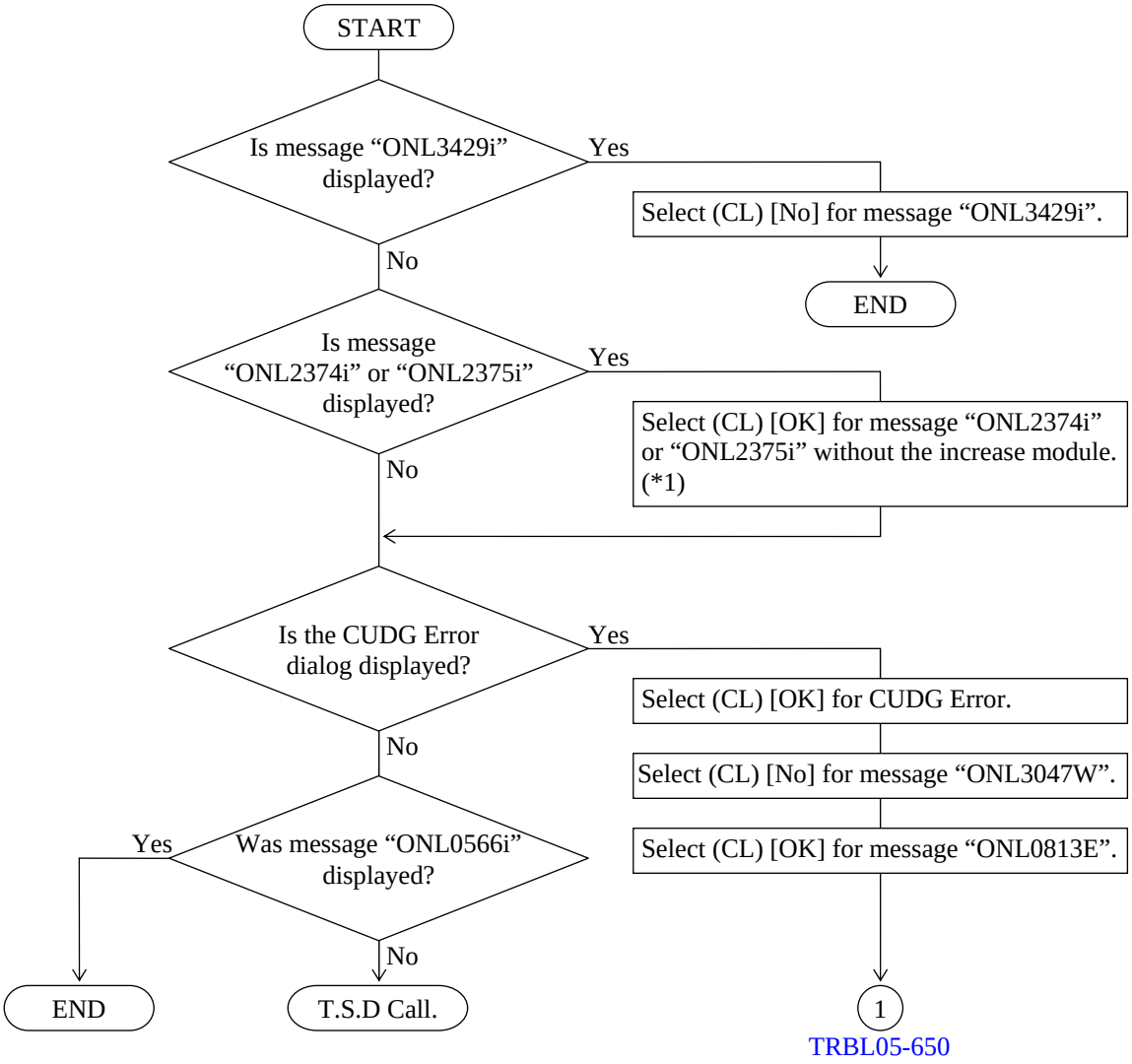


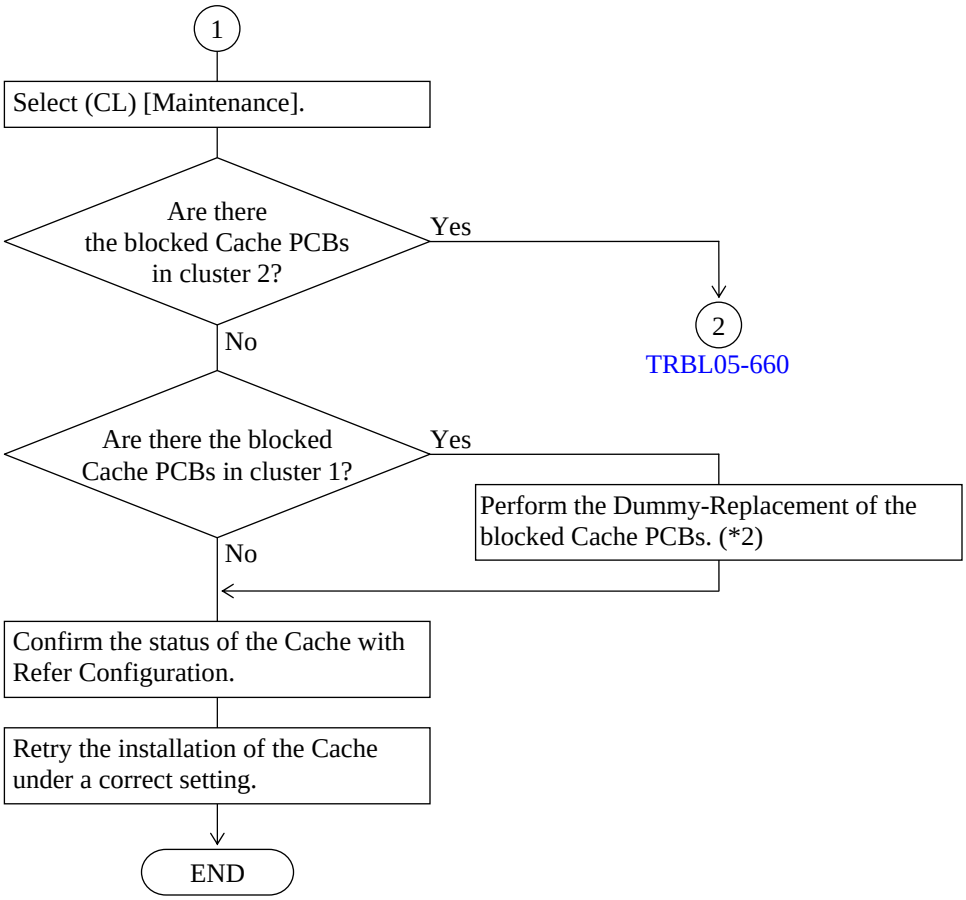


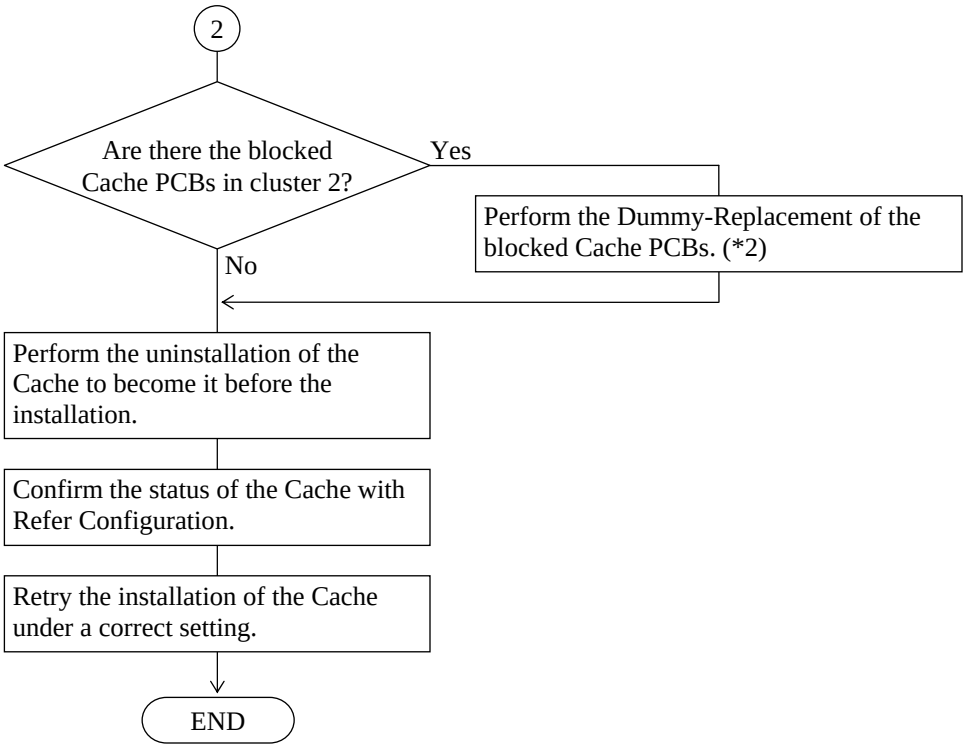
(Note) x: DKC No. 0, 1

5.24 Recovery procedure for mistake of setting when CACHE are installed

Perform the recovery according to the following procedures when you make a mistake in the setting by the Cache increase operation.





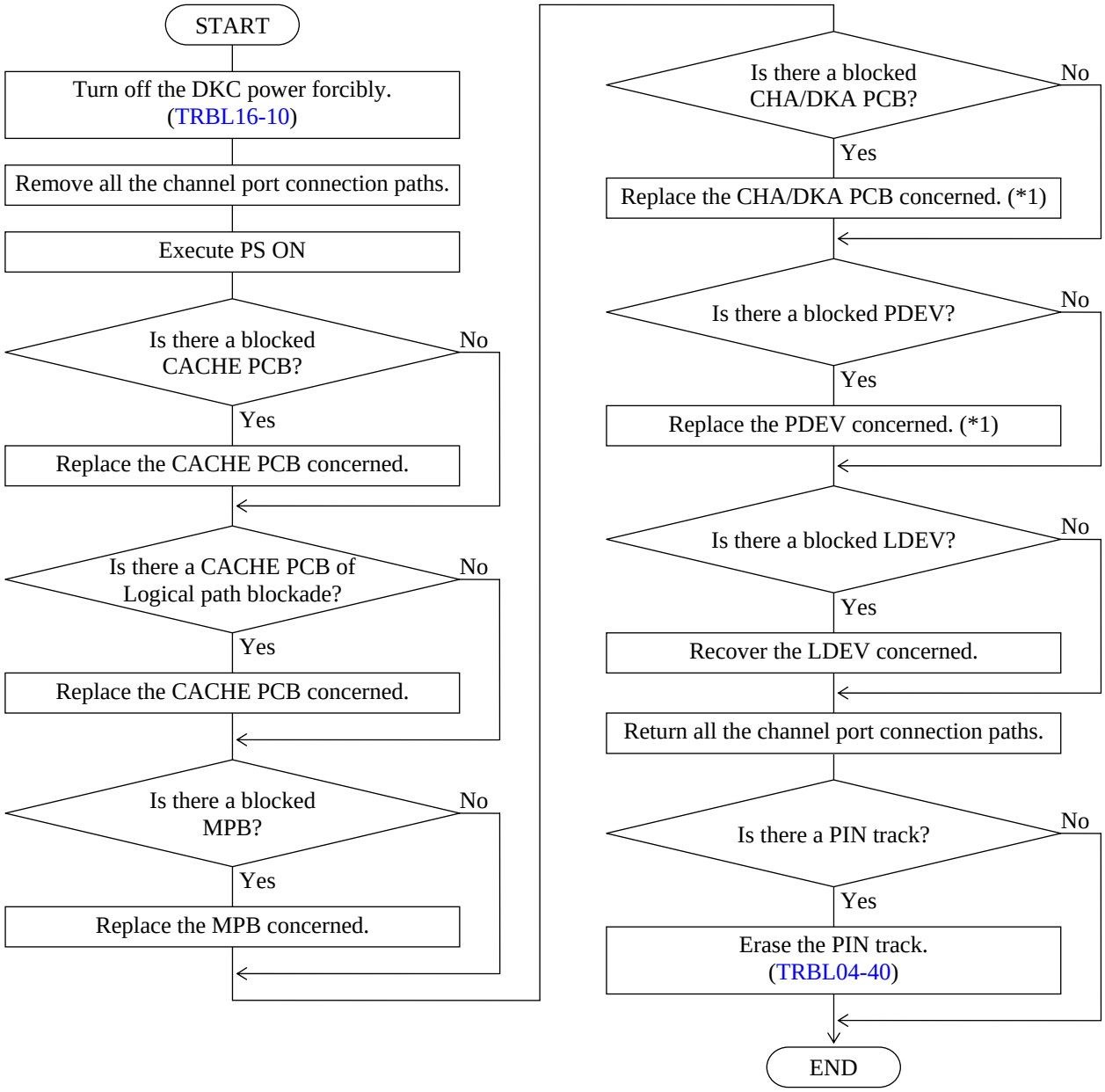


*1: Pull out and insert the PCB that lights LED.
*2: Pull out the increased memory modules.

5.25 Recovery procedure when a CACHE double-sided failure occurs

If a failure occurs in the normal side of the CACHE while one side of the CACHE or SM is blocked, you will not be able to access a part or all of the data on the CACHE. This status is called a CACHE double-sided failure, and the following SIM may be reported incidentally. If you cannot recover the device in the recovery procedure corresponding to each SIM, recover it according to the following processing flow.

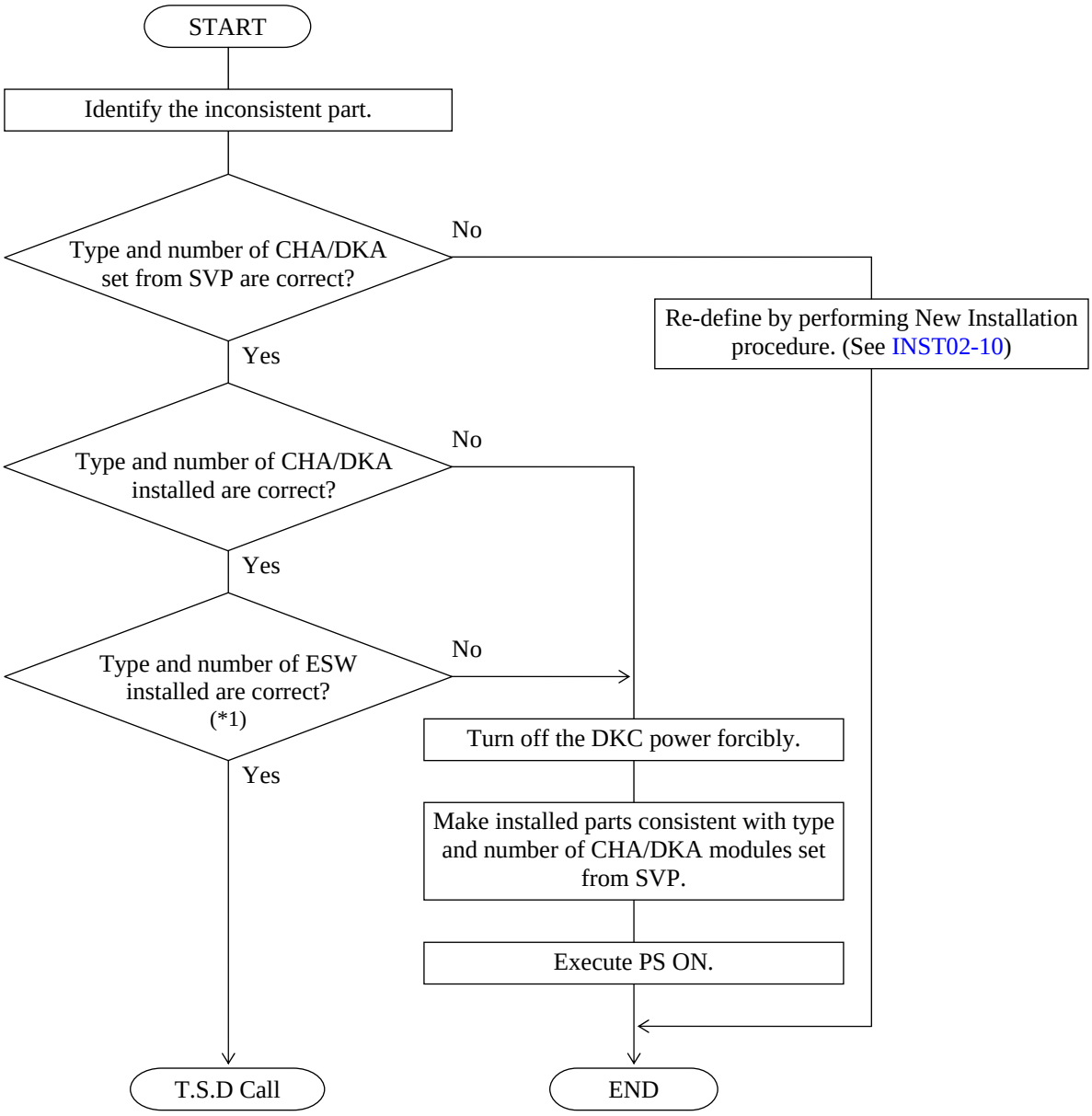
[SIM which may be reported at the time of a CACHE double-sided failure]
RC = 3073XX, 3080XX, 32XXYZ, 340XYZ, CF82XX, CF83XX, CF87XX, CFBXXX, FF4XYY, DF8XXX, DF9XXX, EFYXXX



*1: If the blockade factor is definitely a CACHE double-sided failure, dummy replacement is possible.

5.26 Recovery Procedure for Warning of CHA/DKA Type (SIM RC = 3C9500)

When CHA/DKA installation and definitions set from SVP are inconsistent (SIM-RC = 3C9500), follow the procedure below to recover from the inconsistency.

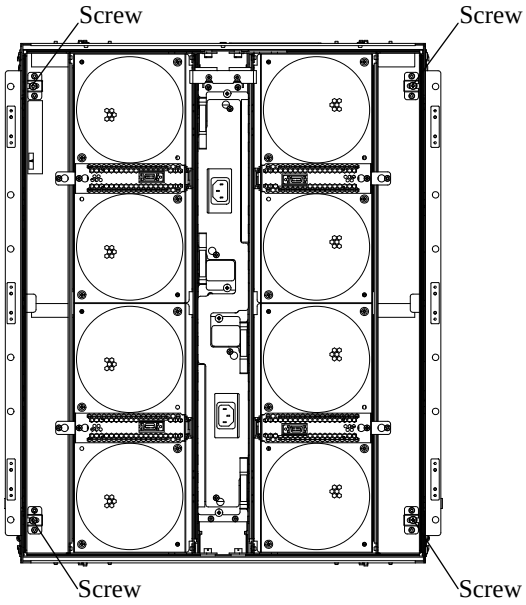


*1: See "3.12.4.21 Installation Procedure of Express Switch (DKC-F710I-ESW)" (INST03-12C-6040)

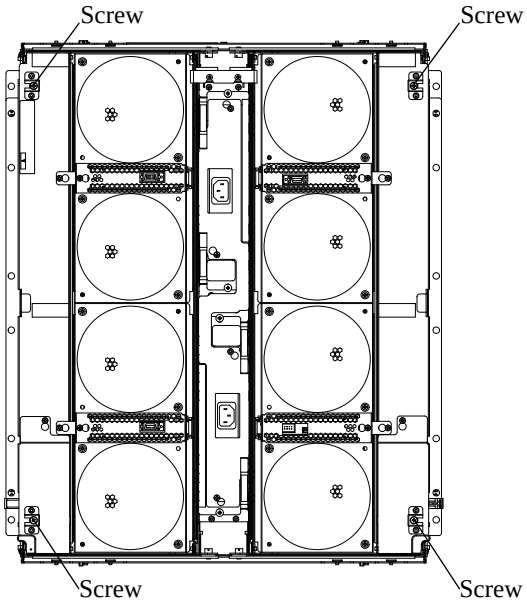
5.27 Error recovery procedure of the unclosed DKU FAN Door (SIM = AC76XY, AC77XX, AC78XX)

The error recovery procedure of the unclosed DKU FAN Door is described below.

(1) • SIM = AC76XY (X: Module No. (0-1), Y: DKU No. (0-7))
Some of the FAN Door of the appropriate DKU is not fully closed,
Tighten the FAN Door with the screws (eight places in total) and close the FAN Door perfectly, because some of the FAN Door of the appropriate DKU is not fully closed.
• SIM = AC77XX (XX: DKU FAN No. (Refer to SIMRC02-451))
SIM = AC78XX (XX: DKU FAN No. (Refer to SIMRC02-451))
FAN Door of the appropriate DKU is opened. Close the FAN Door perfectly, because some of the FAN of the appropriate DKU is error.



DKU Front



DKU Rear

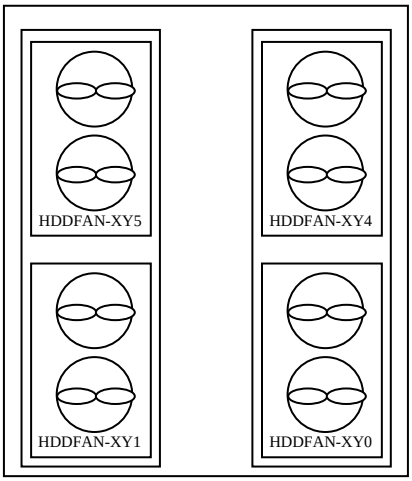
(2) Wait 30 seconds after complete the procedure (1).
(3) Complete the SIM of the procedure (1).

5.28 Recovery procedure of the HDDFAN Error (SIM = BFCXYZ)

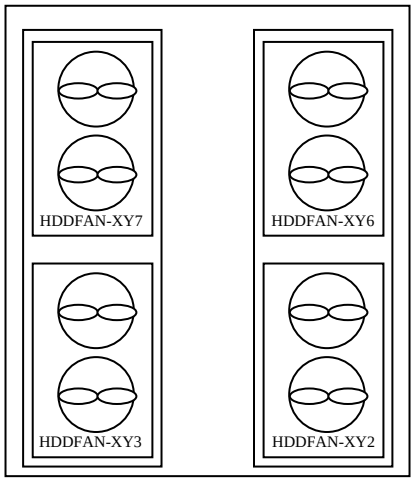
The recovery procedure of the HDDFAN error is described below.

The FAN location where the SIM appears is identified with the last 3 digits that is shown as “XYZ” in SIM.

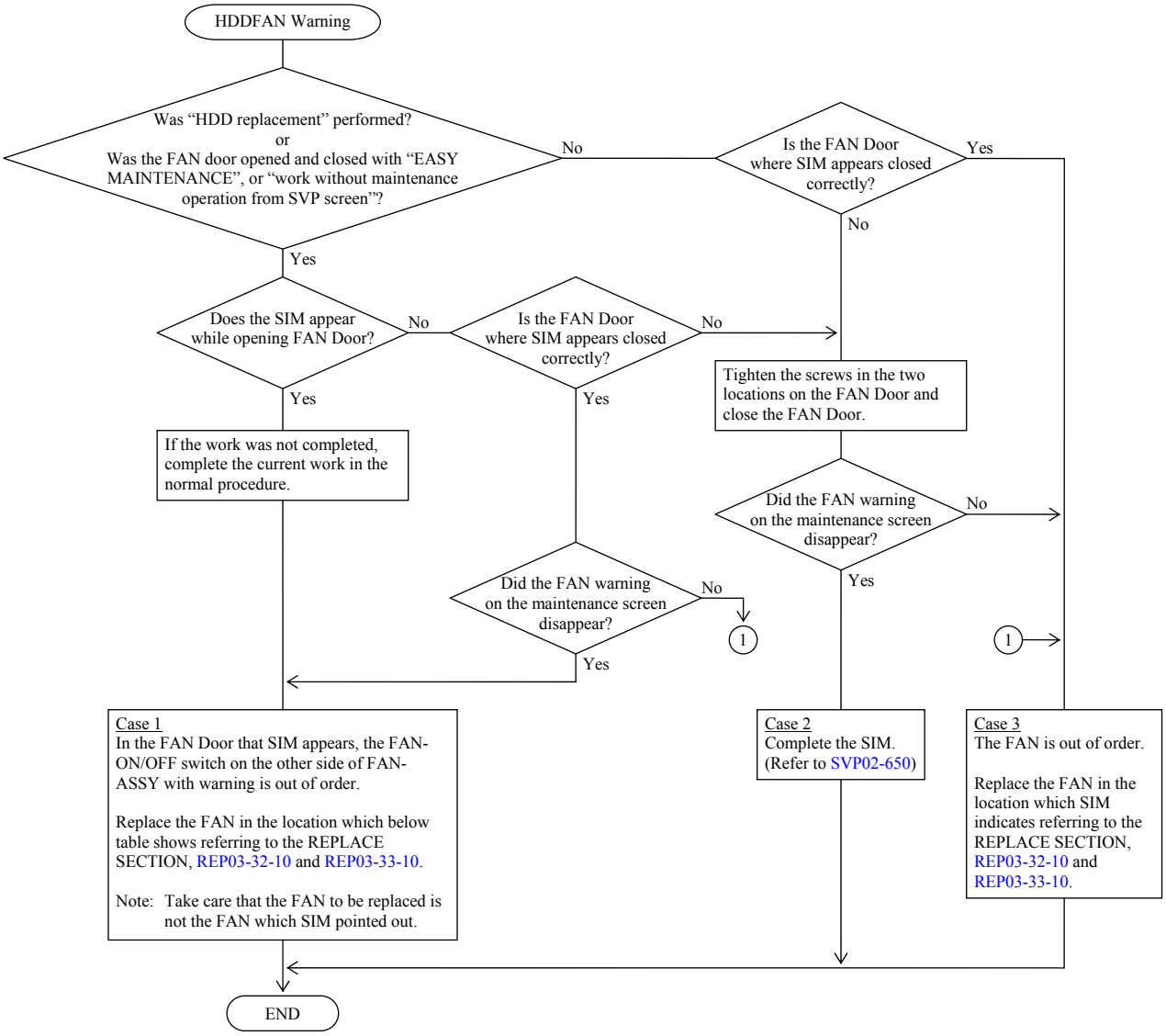
X: Module Address (0-1)
Y: DKU Address (0-7)
Z: FAN Address (0-7)



[Front View]



[Rear View]

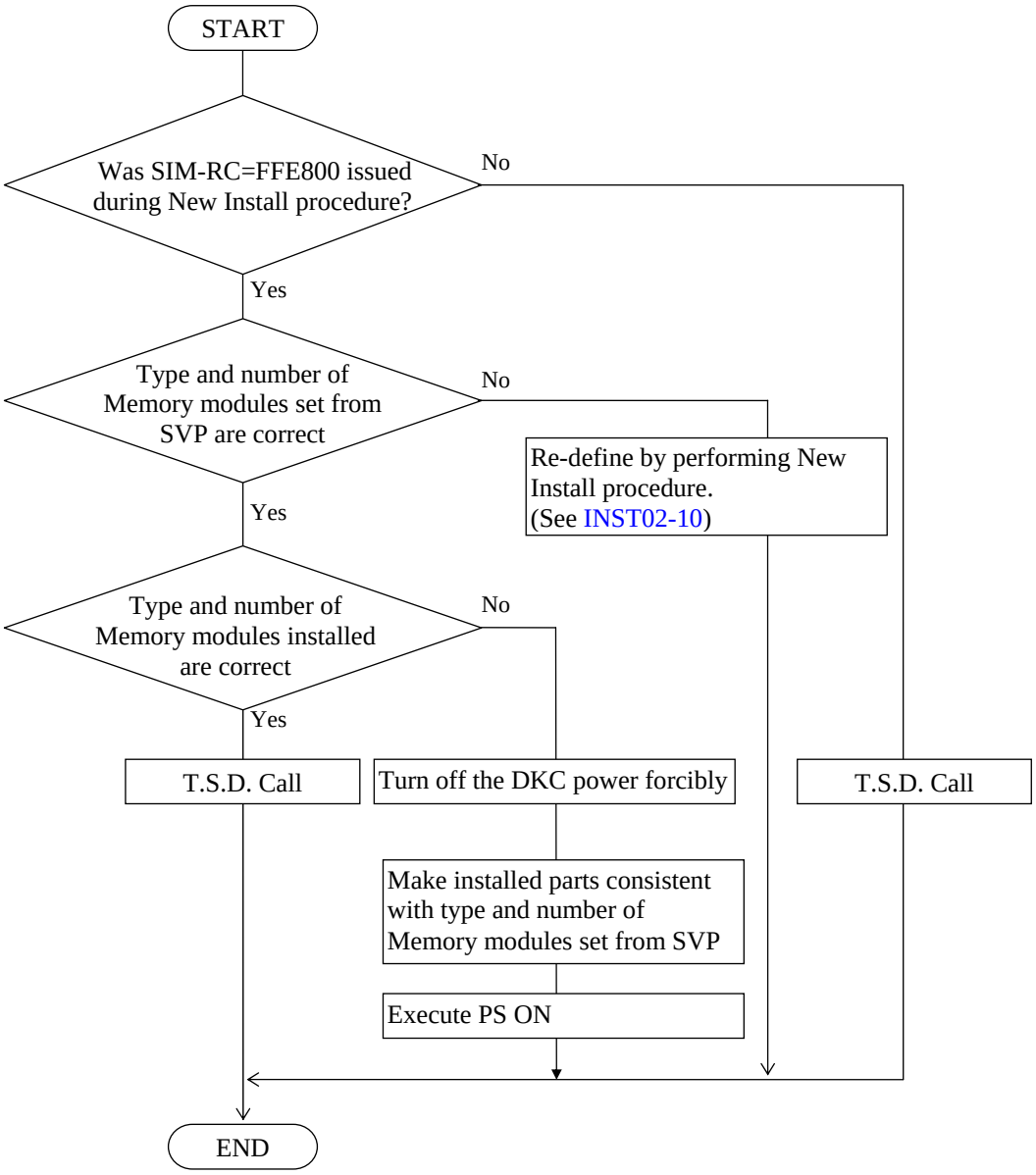


Case 1: The table of objective HDDFANs for replacing.

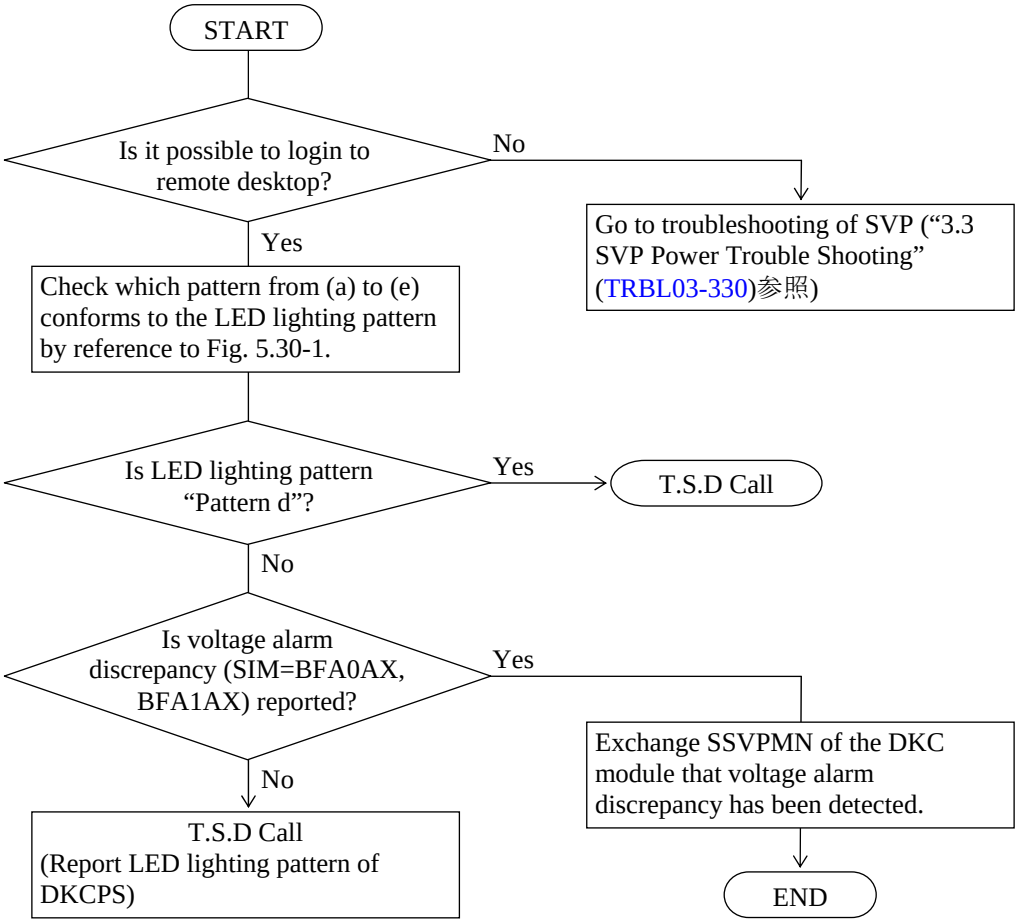
The location where the FAN warning SIM pointed out		The HDDFAN to be replaced
XY0	→	XY4
XY1	→	XY5
XY2	→	XY6
XY3	→	XY7
XY4	→	XY0
XY5	→	XY1
XY6	→	XY2
XY7	→	XY3

5.29 Recovery procedure for inconsistency between Memory installation and definitions (SIM = FFE800)

When Memory installation and definitions set from SVP are inconsistent (SIM-RC = FFE800), follow the procedure below to recover from the inconsistency. This SIM indicates that “Type of Memory module installed is inconsistent with the type set from SVP” or “the number of Memory modules installed is inconsistent with the number set from SVP” in the package.

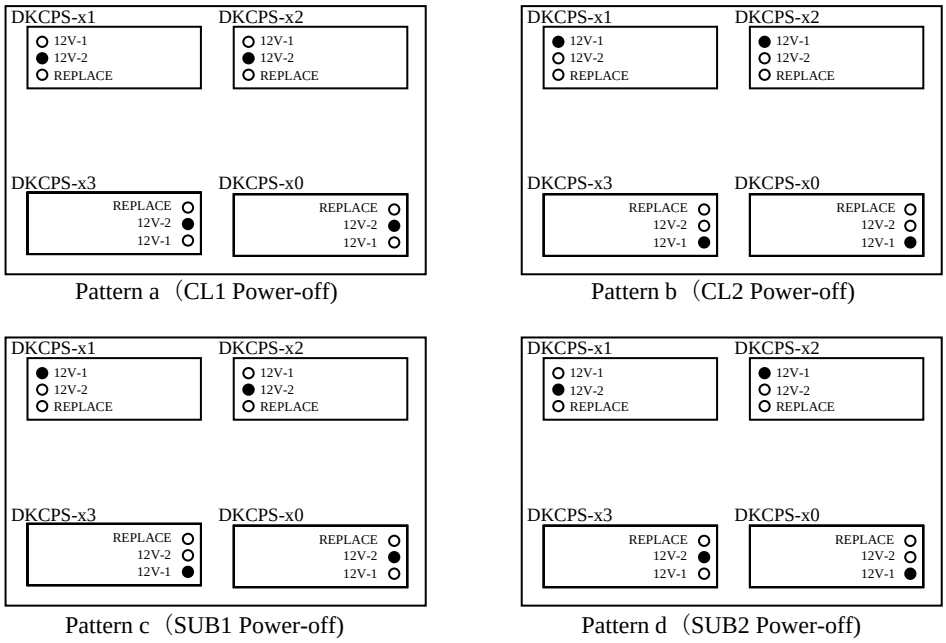


5.30 At The Time of Voltage Alarm Detection (SIM = BF201X, BF211X)



[Special Instruction at T.S.D Call]

- Collect Normal Dump.
- Record the LED lighting conditions of the DKCPS of DKC module. (See Fig. 5.30-1 and Fig. 5.30-2)
- Check whether abnormalities in appearance and unusual odor parts exist.



Pattern a（CL1 Power-off）　　Pattern b（CL2 Power-off）

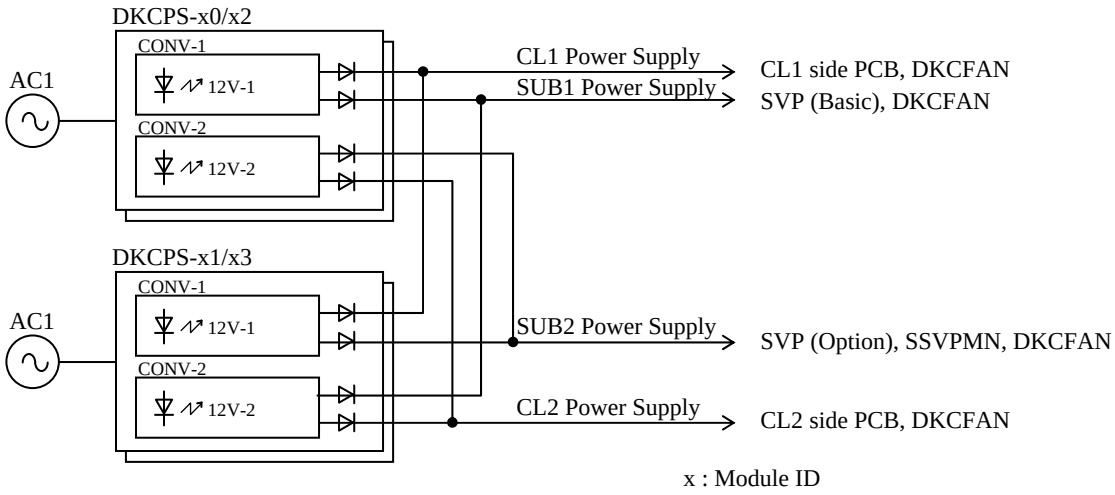
Pattern c（SUB1 Power-off）　　Pattern d（SUB2 Power-off）

(Neither of the above corresponds.)
*In this case, record the LED lighting condition.

●: lighted
○ : unlighted

Pattern e (Others)

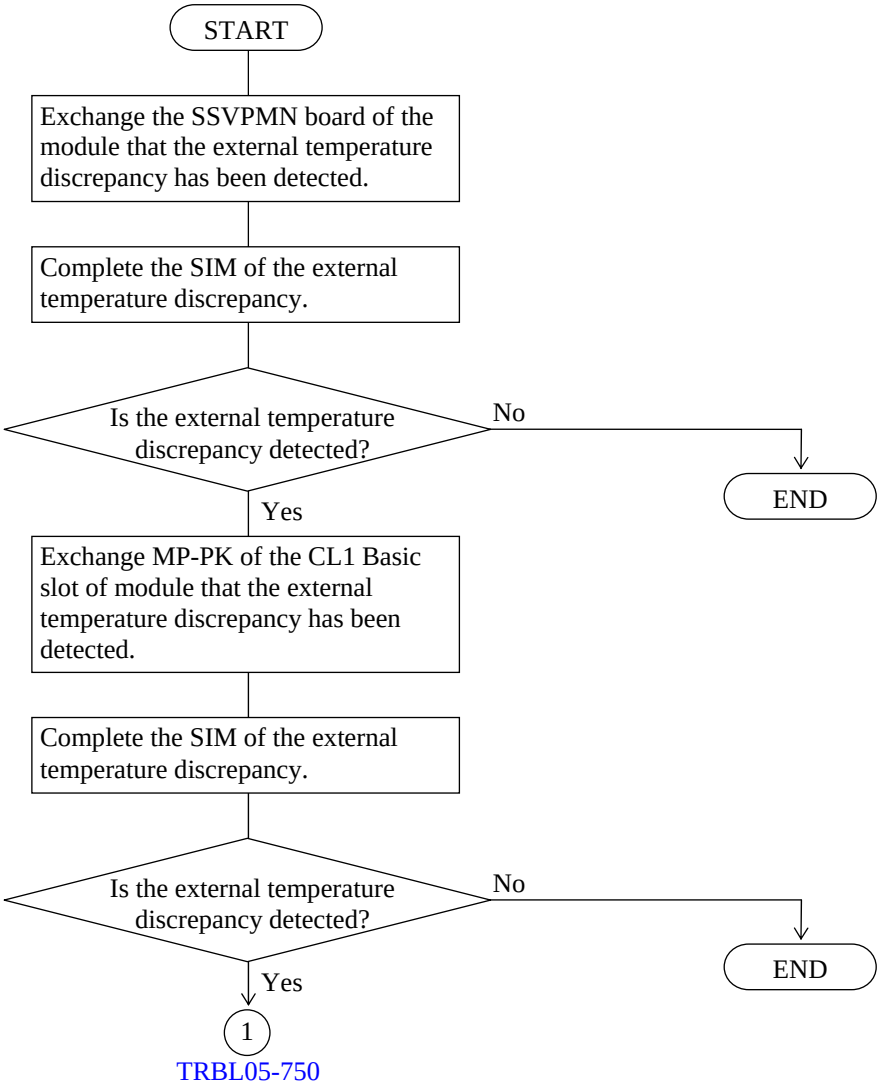
Fig. 5.30-1 DKCPS LED Lighting Patterns in the Second Side 12V Power Supply Off (Rear Side of DKC Module)

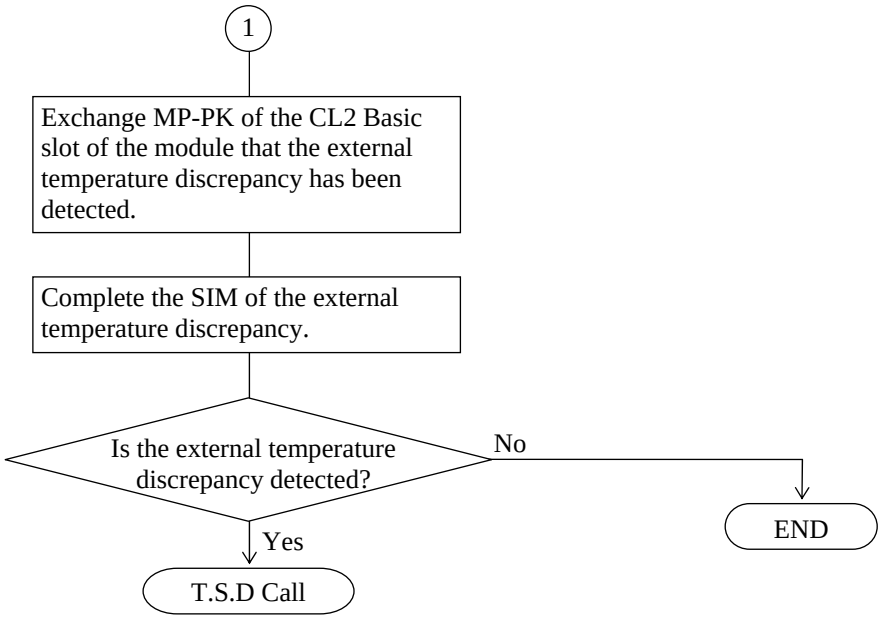


x : Module ID

Fig. 5.30-2 Diagram of The Secondary Side 12V Power Supply

5.31 At The Time of External Temperature Discrepancy Detection (SIM = BFA2XX)





[Special Instruction at T.S.D Call]

- Collect Normal Dump.
- Check whether the MB-PCB of Basic slot has been properly loaded.
- Check whether the dummy cover of PK has been properly loaded.
- Check whether there is any obstruction of intake air/exhaust air pipe line exists on the front side (intake air side) or the rear side (exhaust air side) of the DKC module.
- Check whether the external temperature environment is abnormal, or was abnormal.

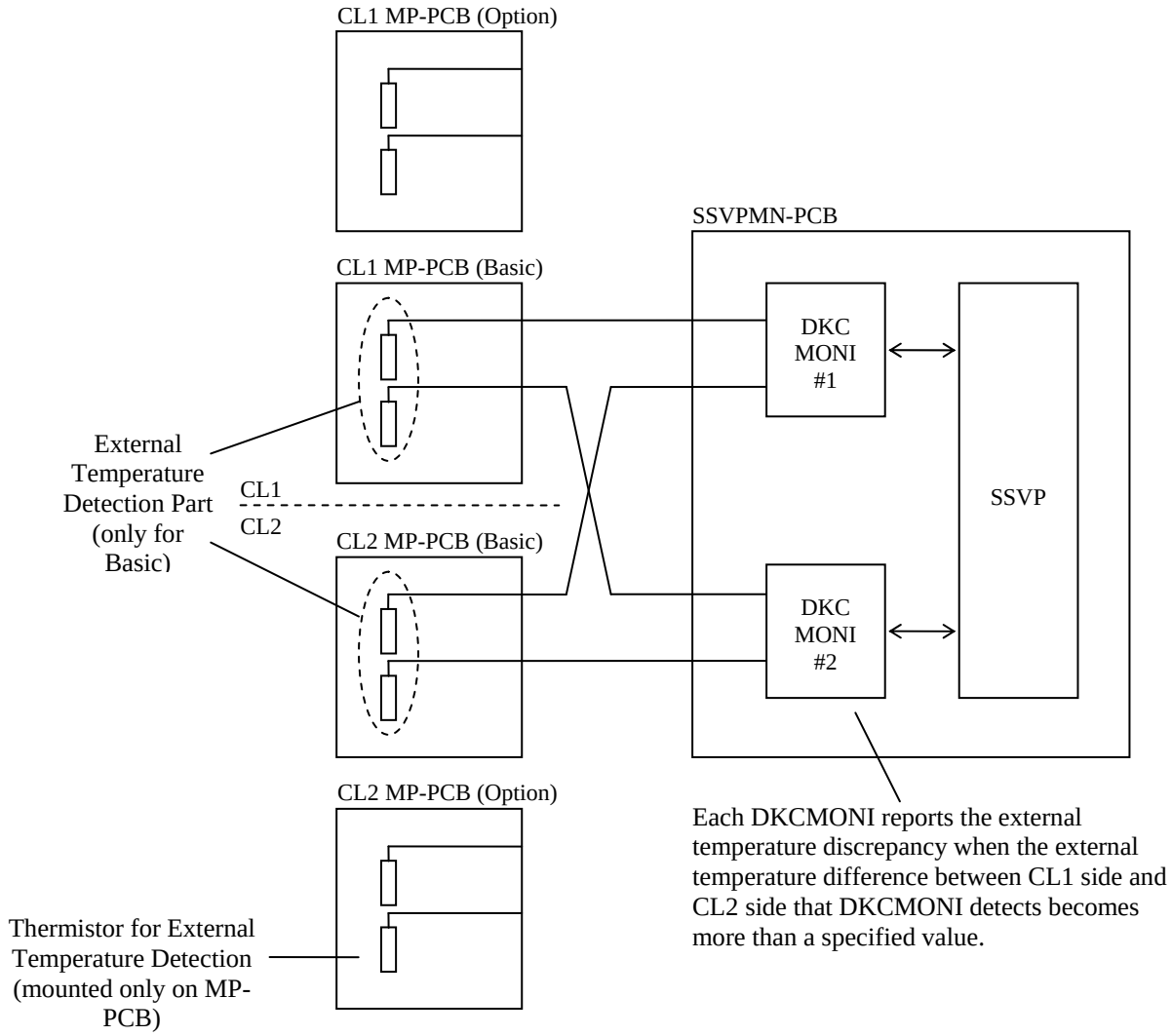
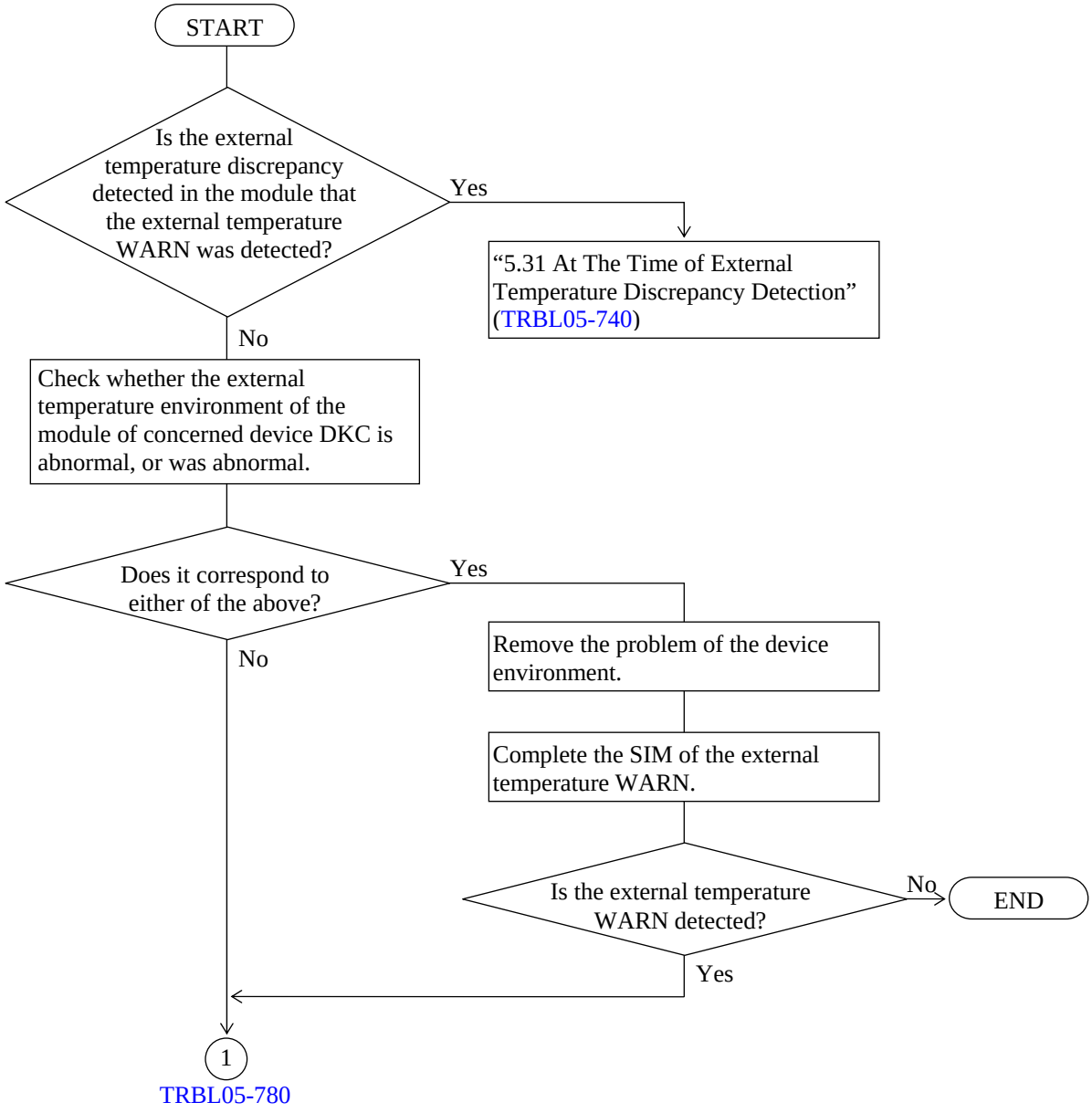
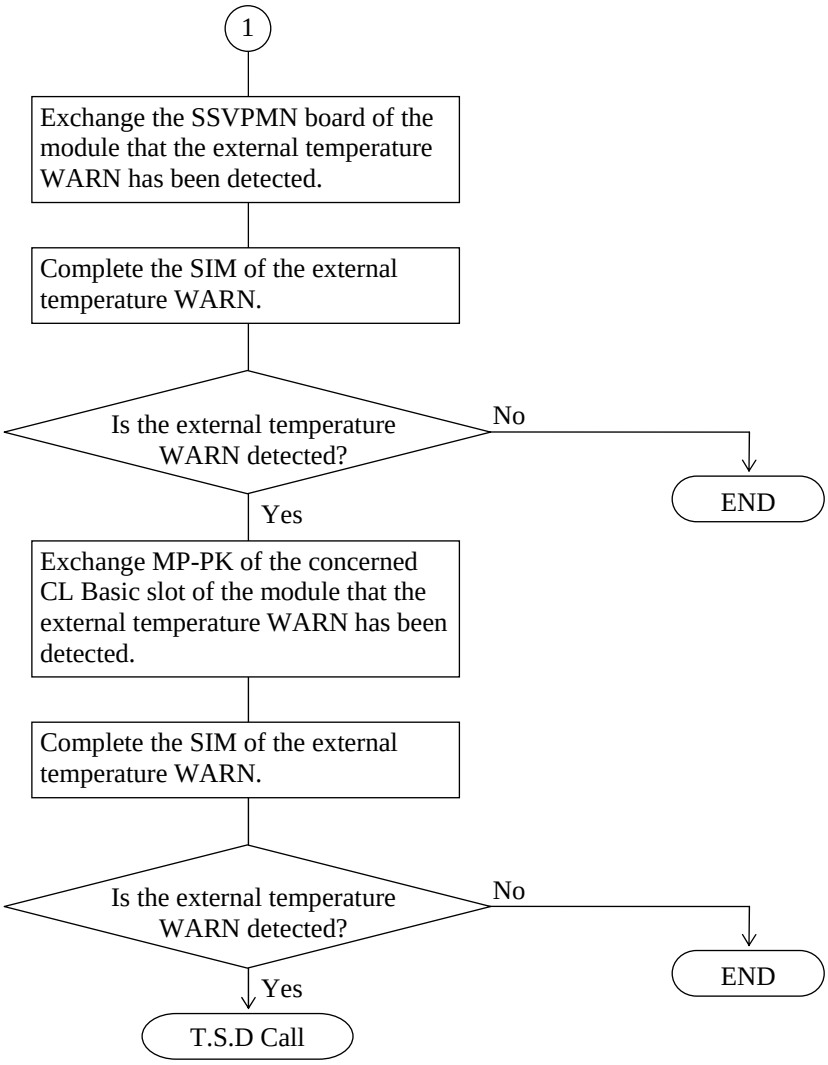


Fig. 5.31-1 Diagram of External Temperature Detection

5.32 At The Time of External Temperature WARN (+or -) Detection (SIM = BF11XX, BF12XX)

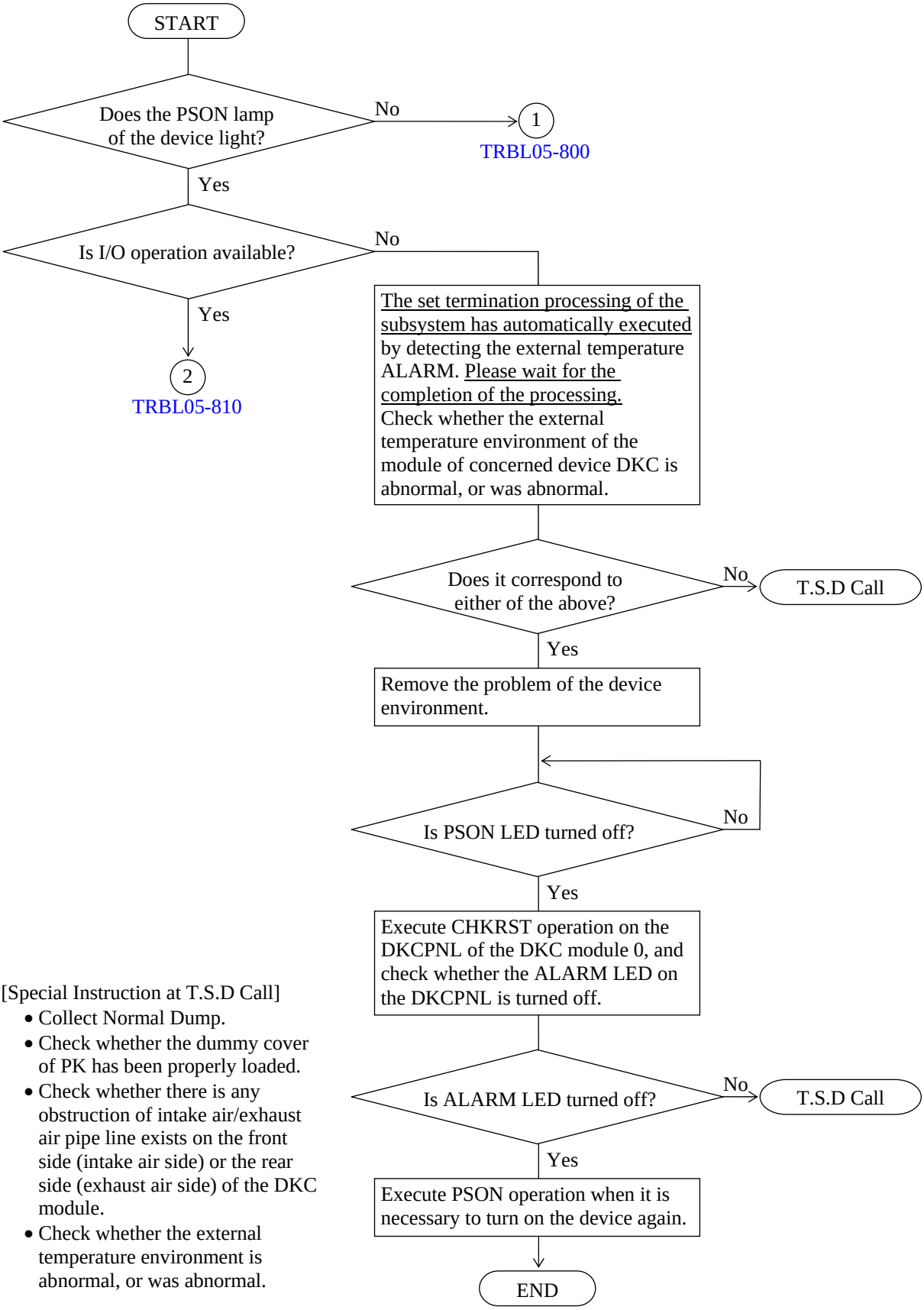




[Special Instruction at T.S.D Call]

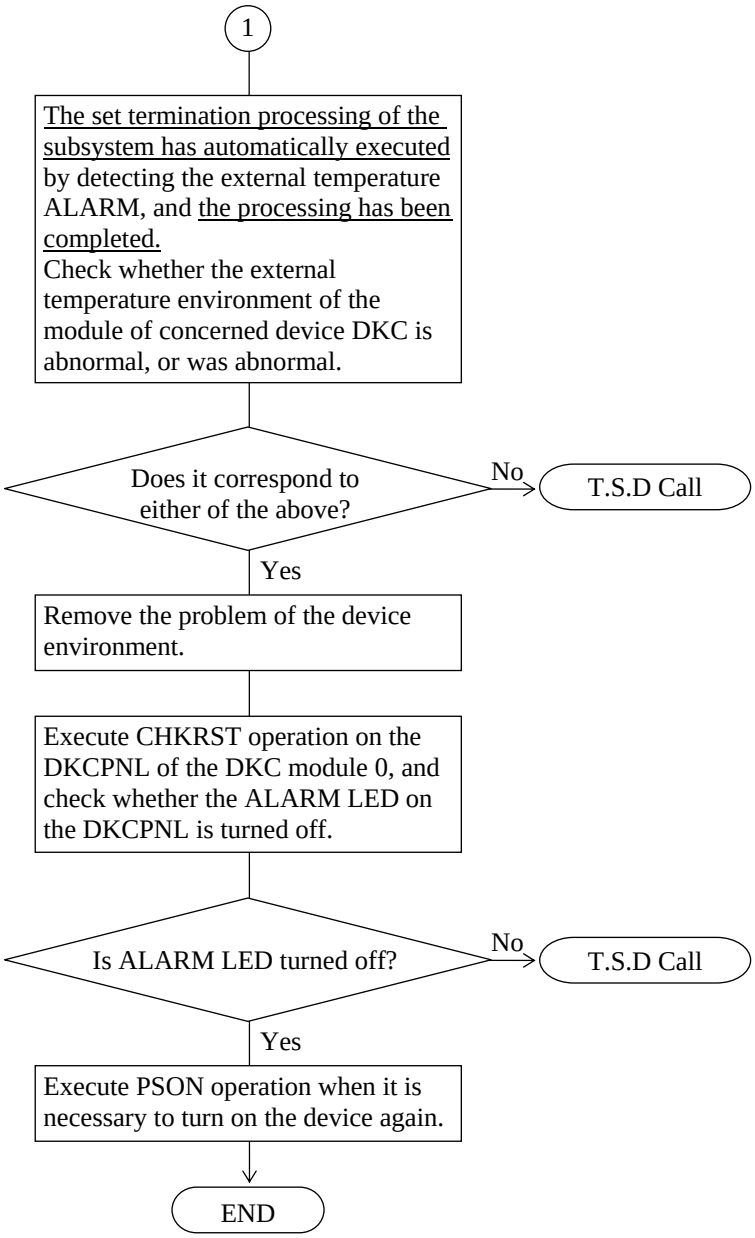
- Collect Normal Dump.
- Check whether the dummy cover of PK has been properly loaded.
- Check whether there is any obstruction of intake air/exhaust air pipe line exists on the front side (intake air side) or the rear side (exhaust air side) of the DKC module.
- Check whether the external temperature environment is abnormal, or was abnormal.

5.33 At The Time of External Temperature ALARM Detection (SIM = BF10XX)



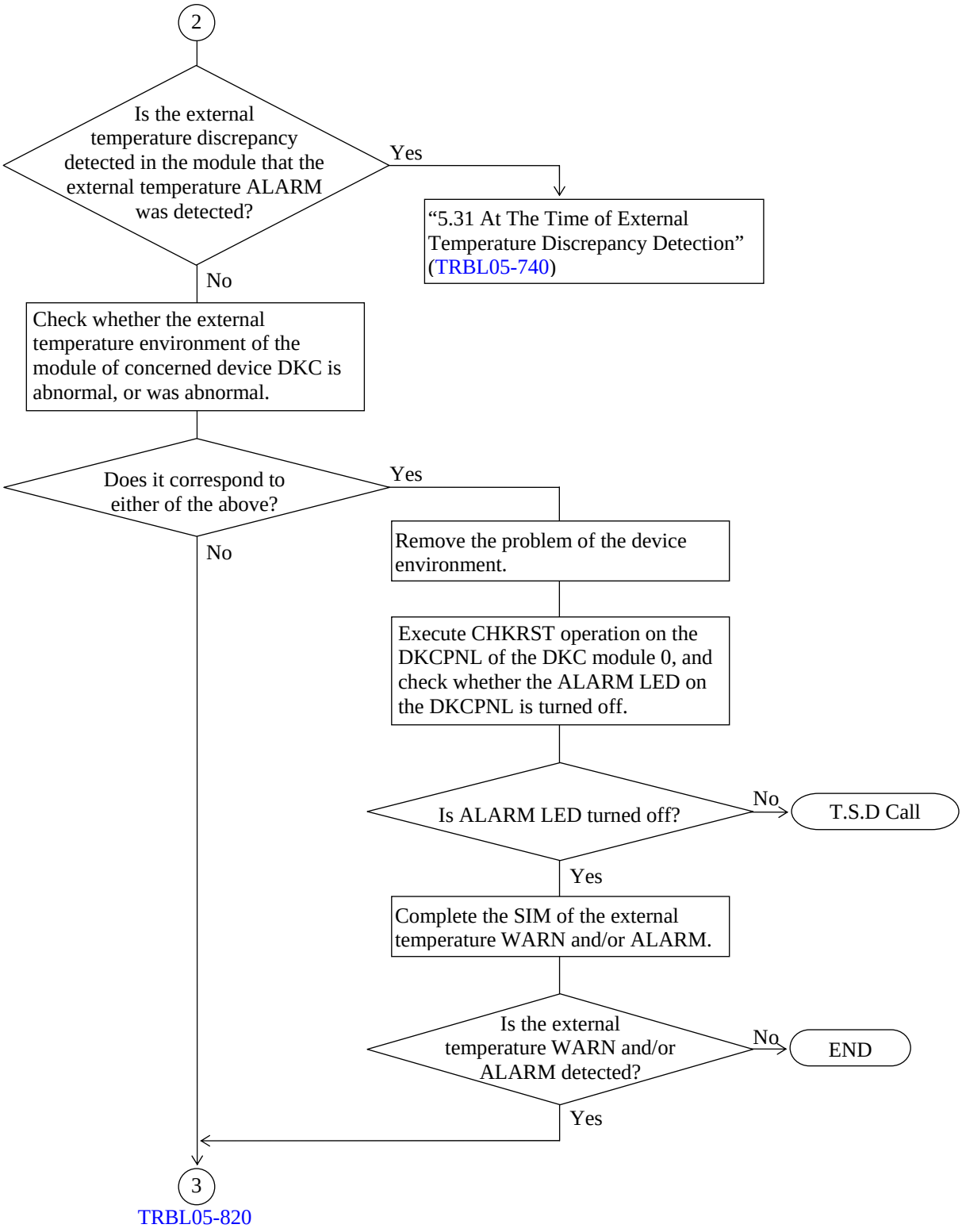
[Special Instruction at T.S.D Call]

- Collect Normal Dump.
- Check whether the dummy cover of PK has been properly loaded.
- Check whether there is any obstruction of intake air/exhaust air pipe line exists on the front side (intake air side) or the rear side (exhaust air side) of the DKC module.
- Check whether the external temperature environment is abnormal, or was abnormal.



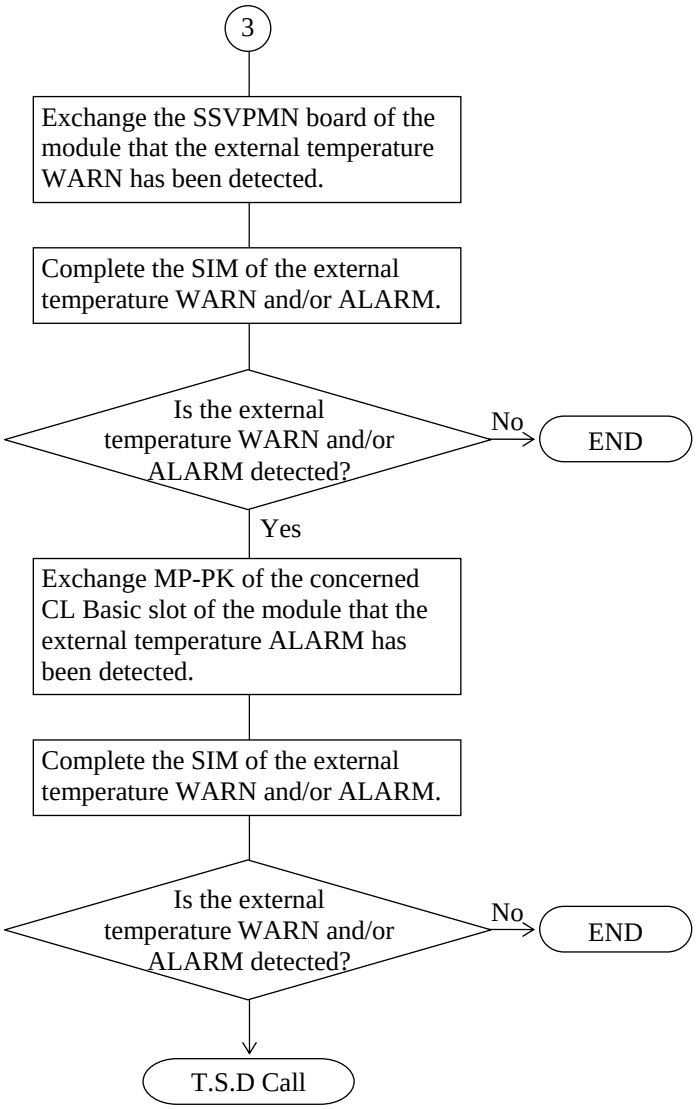
[Special Instruction at T.S.D Call]

- Collect Normal Dump.
- Check whether the dummy cover of PK has been properly loaded.
- Check whether there is any obstruction of intake air/exhaust air pipe line exists on the front side (intake air side) or the rear side (exhaust air side) of the DKC module.
- Check whether the external temperature environment is abnormal, or was abnormal.



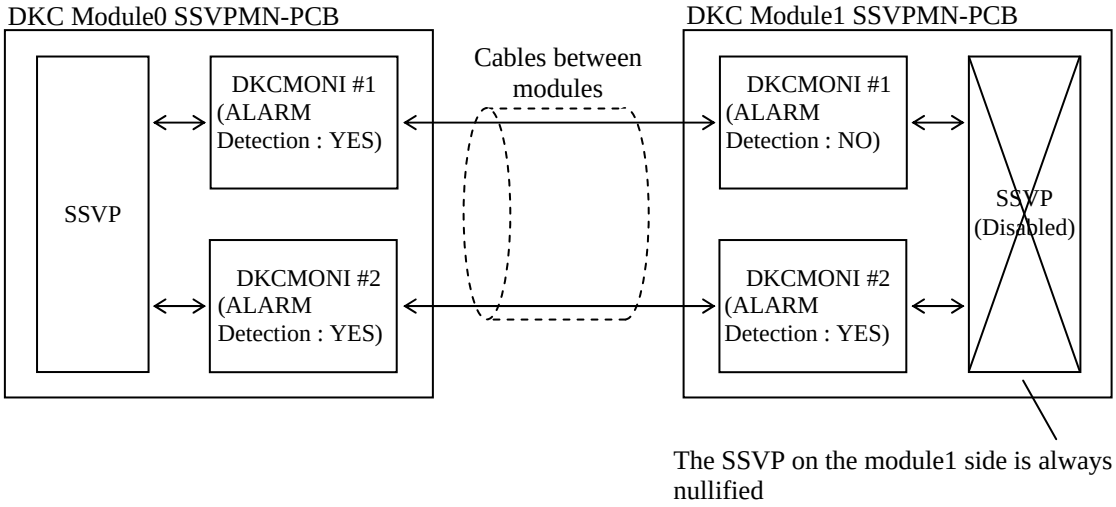
[Special Instruction at T.S.D Call]

- Collect Normal Dump.
- Check whether the dummy cover of PK has been properly loaded.
- Check whether there is any obstruction of intake air/exhaust air pipe line exists on the front side (intake air side) or the rear side (exhaust air side) of the DKC module.
- Check whether the external temperature environment is abnormal, or was abnormal.



[Special Instruction at T.S.D Call]

- Collect Normal Dump.
- Check whether the dummy cover of PK has been properly loaded.
- Check whether there is any obstruction of intake air/exhaust air pipe line exists on the front side (intake air side) or the rear side (exhaust air side) of the DKC module.
- Check whether the external temperature environment is abnormal, or was abnormal.

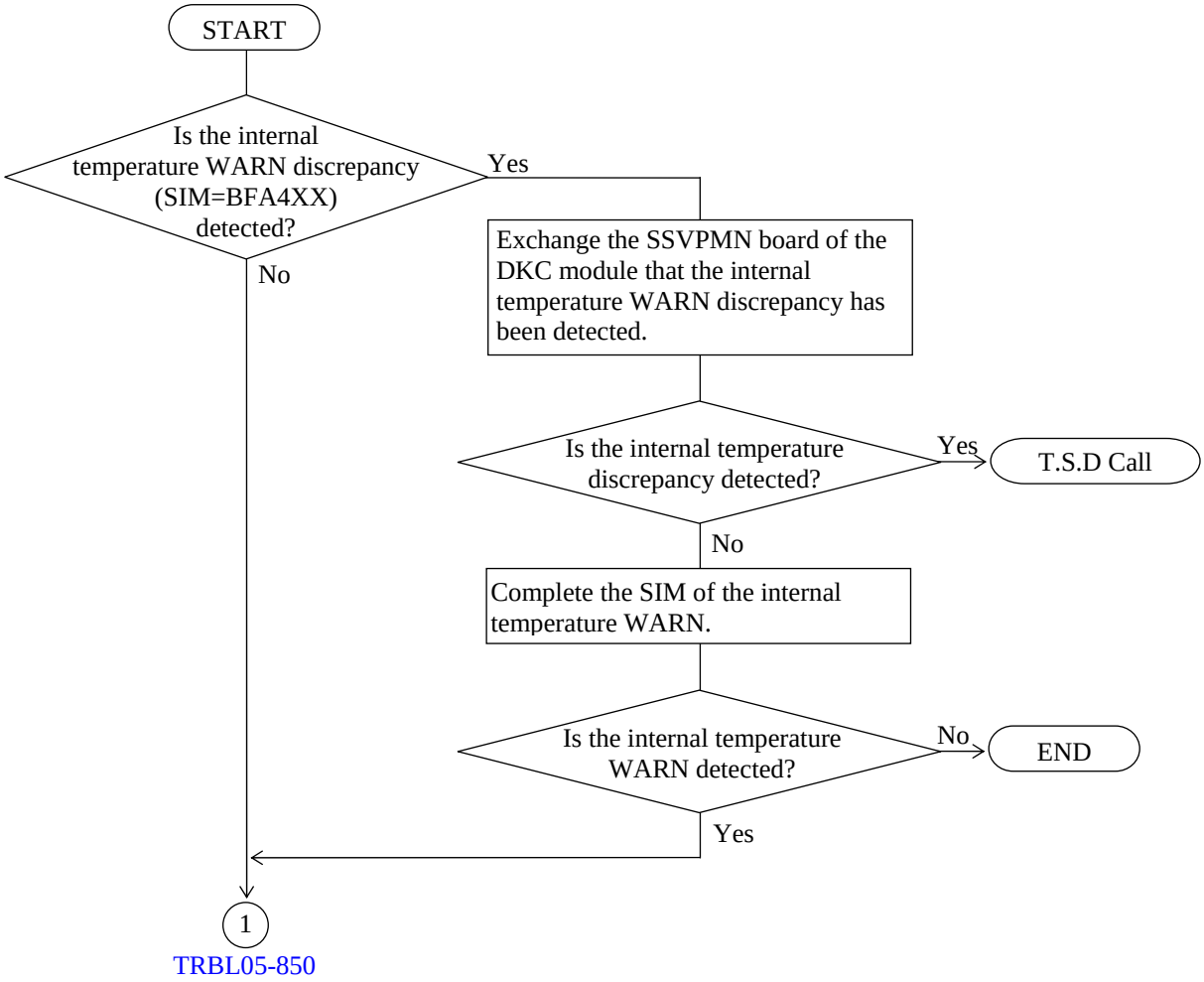


[Note]

- Execution of the set termination processing by detecting the external temperature ALARM is executed when all DKCMONIs (two DKCMONIs for one module configuration and four DKCMONIs for two modules configuration) in the subsystem detect the external temperature ALARM. (Omit the process under the above-mentioned condition.)
- The SIM is generated individually per DKCMONI. (two DKCMONIs for one module configuration and four DKCMONIs for two modules configuration)
- ALARM LED lights when the external temperature ALARM is detected by either of the DKCMONI in the subsystem.
- When detecting the external temperature ALARM, the ALARM state is kept even if the temperature drops, and the PSON operation is not accepted.

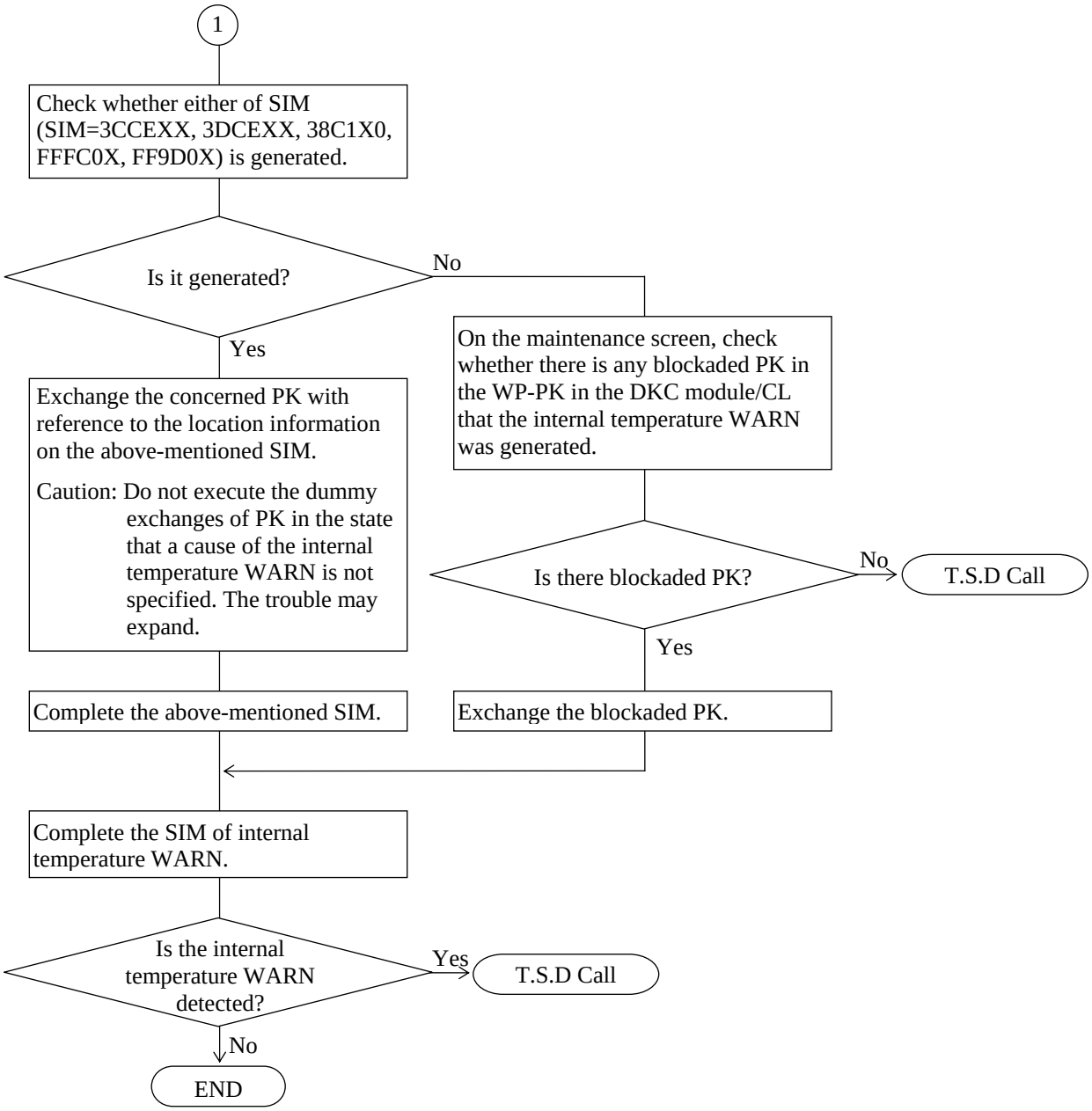
Fig. 5.33-1 Performance Pattern Diagram of External Temperature ALARM Detection in DKC2 Module Configuration

5.34 At The Time of Internal Temperature WARN Detection (SIM = BF15XX)



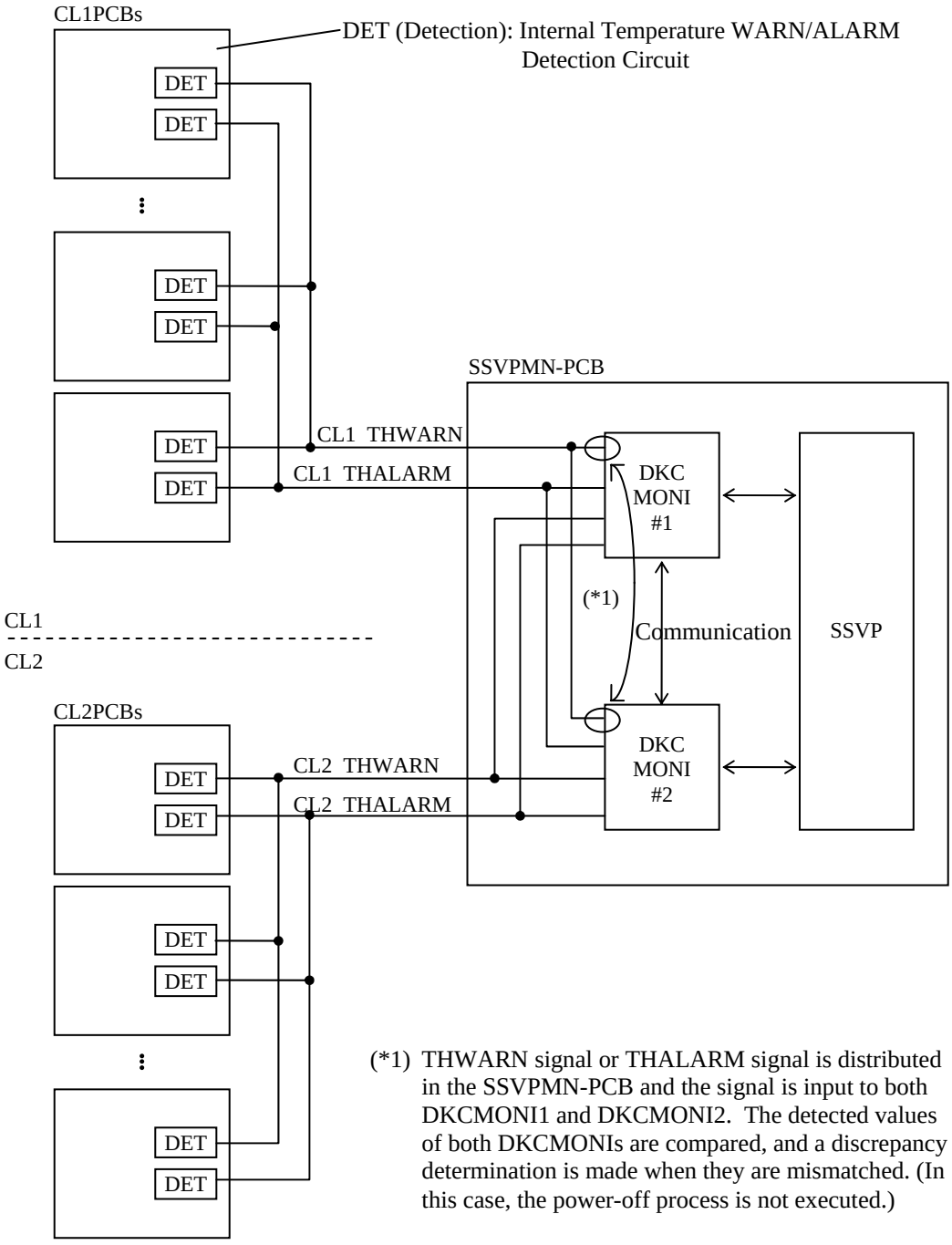
[Special Instruction at T.S.D Call]

- Collect Normal Dump.
- Check whether the dummy cover of PK has been properly loaded.
- Check whether there is any obstruction of intake air/exhaust air pipe line exists on the front side (intake air side) or the rear side (exhaust air side) of the DKC module.
- Check whether the external temperature environment is abnormal, or was abnormal.



[Special Instruction at T.S.D Call]

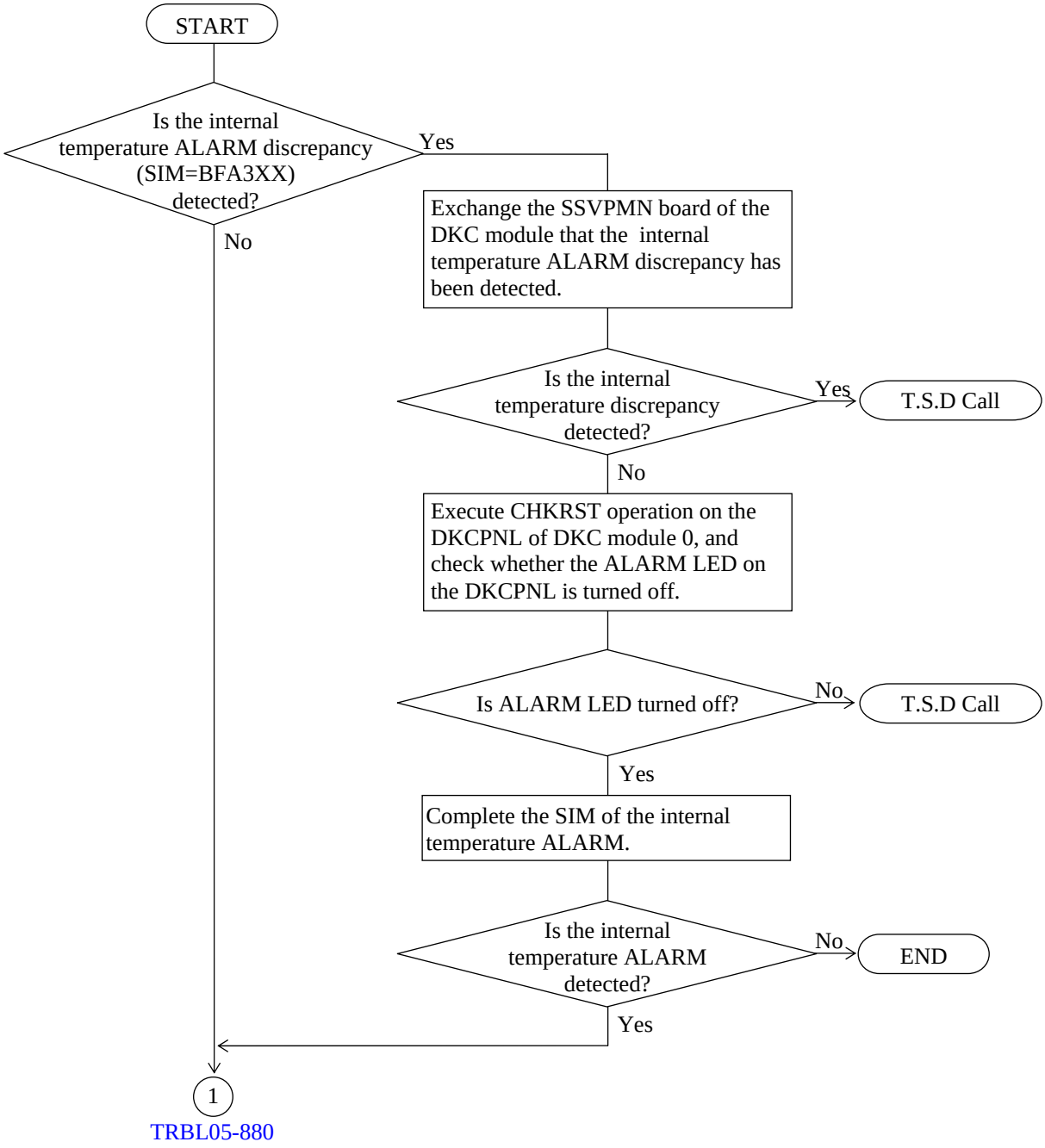
- Collect Normal Dump.
- Check whether the dummy cover of PK has been properly loaded.
- Check whether there is any obstruction of intake air/exhaust air pipe line exists on the front side (intake air side) or the rear side (exhaust air side) of the DKC module.
- Check whether the external temperature environment is abnormal, or was abnormal.
- Check whether abnormalities in appearance and unusual odor parts exist.



(*1) THWARN signal or THALARM signal is distributed in the SSVPMN-PCB and the signal is input to both DKCMONI1 and DKCMONI2. The detected values of both DKCMONIs are compared, and a discrepancy determination is made when they are mismatched. (In this case, the power-off process is not executed.)

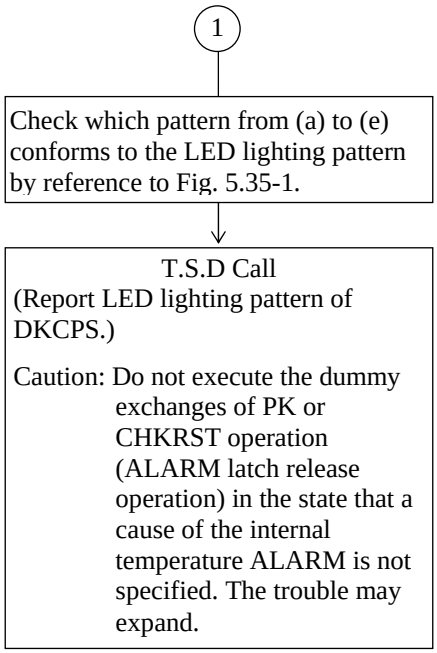
Fig. 5.34-1 Diagram of Internal Temperature WARN/ALARM Detection

5.35 At The Time of Internal Temperature ALARM Detection (SIM = BF13XX, BF14XX)



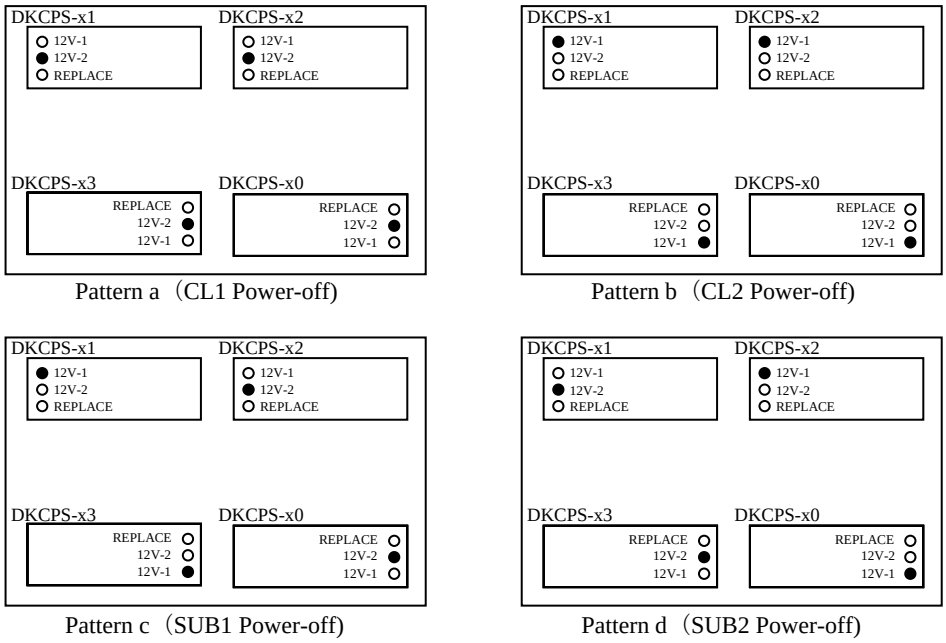
[Special Instruction at T.S.D Call]

- Collect Normal Dump.
- Check whether the dummy cover of PK has been properly loaded.
- Check whether there is any obstruction of intake air/exhaust air pipe line exists on the front side (intake air side) or the rear side (exhaust air side) of the DKC module.
- Check whether the external temperature environment is abnormal, or was abnormal.
- Check whether abnormalities in appearance and unusual odor parts exist.



[Special Instruction at T.S.D Call]

- Collect Normal Dump.
- Check whether the dummy cover of PK has been properly loaded.
- Check whether there is any obstruction of intake air/exhaust air pipe line exists on the front side (intake air side) or the rear side (exhaust air side) of the DKC module.
- Check whether the external temperature environment is abnormal, or was abnormal.
- Check whether abnormalities in appearance and unusual odor parts exist.



Pattern a（CL1 Power-off）　Pattern b（CL2 Power-off）

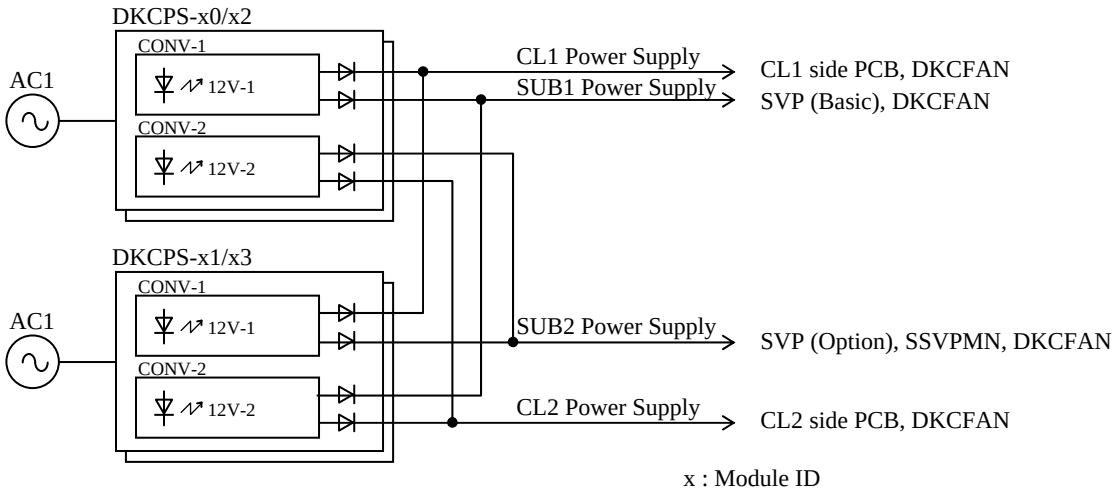
Pattern c（SUB1 Power-off）　Pattern d（SUB2 Power-off）

(Neither of the above corresponds.)
*In this case, record the LED lighting condition.

●: lighted
○ : unlighted

Pattern e (Others)

Fig. 5.35-1 DKCPS LED Lighting Patterns in the Second Side 12V Power Supply Off (Rear Side of DKC Module)

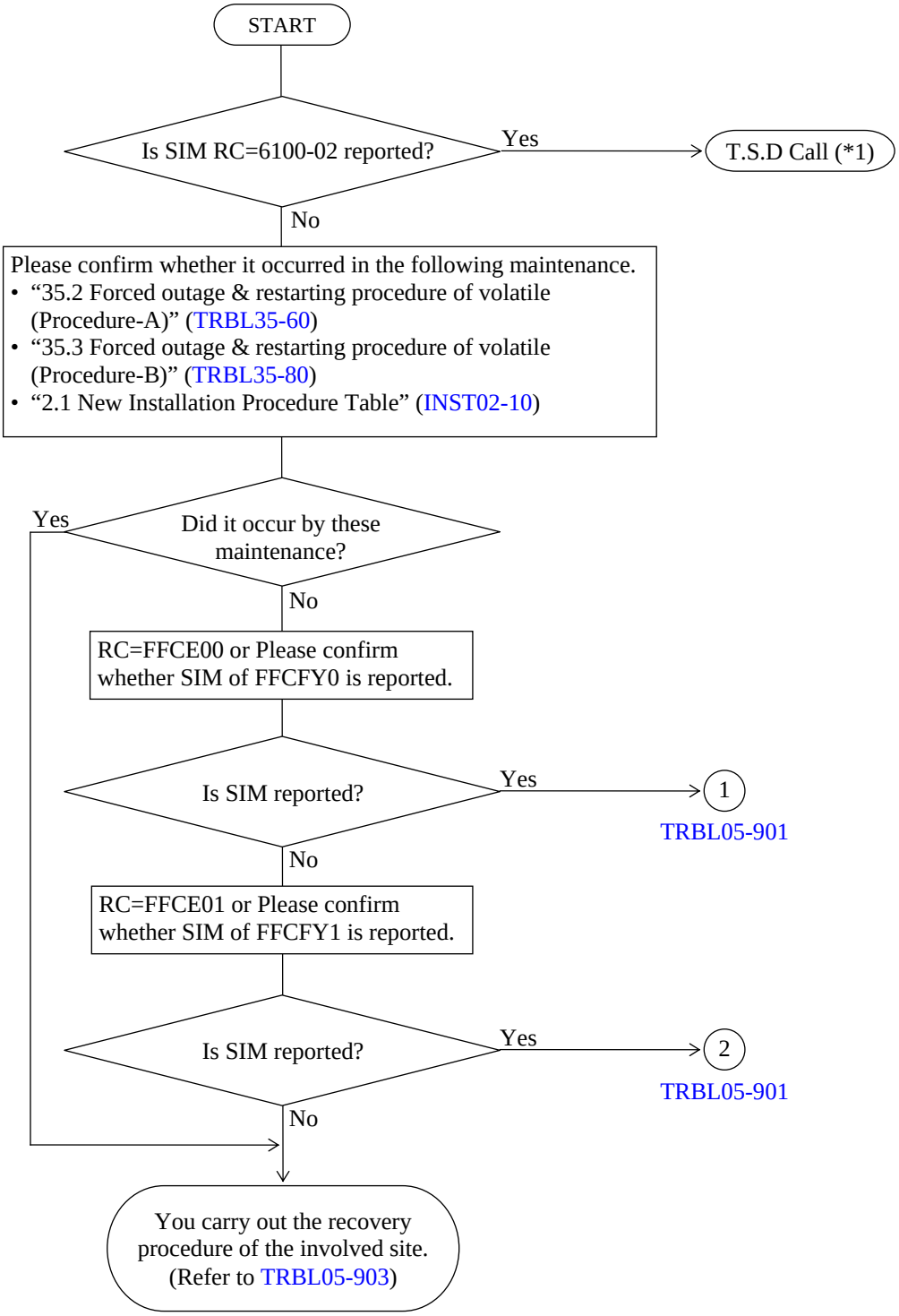


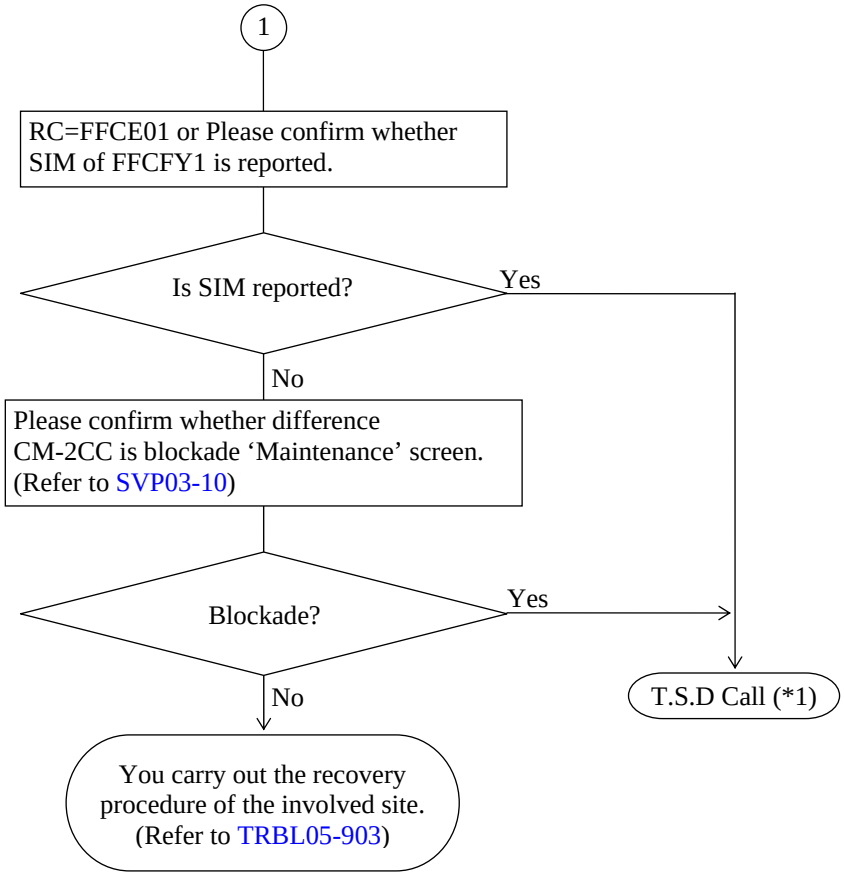
x : Module ID

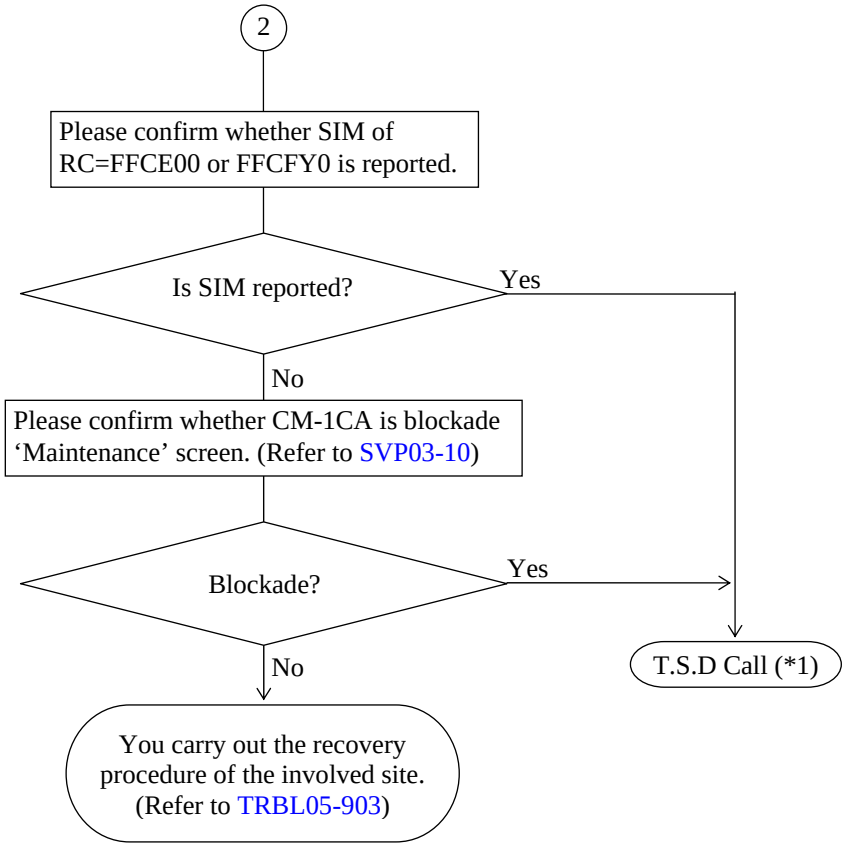
Fig. 5.35-2 Diagram of The Secondary Side 12V Power Supply

5.36 Instruction of Isolating a Failed Part in Cache Volatilization (SIM = FFCE0X, FFCFYX, 6100-02)

At the time of the cash volatilization, you carry out the recovery of the involved site according to the ACC or the detailed information that it is displayed the following procedure by SSB screen to classify involved sites after enforcement.







(*1) The SM information is not restored. DKC is in following condition.

Name of the P.P.	Phenomenon
TC	In case of Pending or Suspend status, percentage that P-VOL and S-VOL are synchronized goes down to 0% and copy processing time takes long.
UR	In case of Pending or Suspend status, percentage that P-VOL and S-VOL are synchronized goes down to 0% and copy processing time takes long.
SI	Refer to (*2)
Snapshot/Thin Image	All Snapshot/Thin Image pairs are deleted.
	All POOL is blocked.
VM	Percentage that P-VOL and S-VOL are synchronized goes down to 0% (differential bitmap is cleared) and copy processing time takes long.
FCv2	All established FC relations are deleted.
Quick Format	Data will be lost from LDEV that carrying out Quick Format.
Dynamic Provisioning/ Dynamic Tiering	The data stored in HDP-VOL is lost.

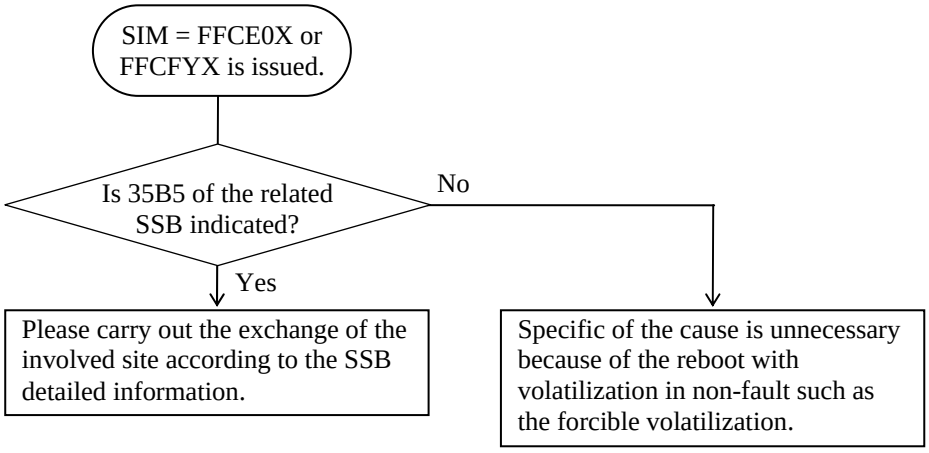
(*2) PS/OFF phenomenon varies according to a ShadowImage pair state before carrying out PS/OFF.

Name of the P.P.	Pair Status (Open Pair Status/MF Pair Status)	Phenomenon
SI	COPY (PD)/Pending	Percentage that P-VOL and S-VOL are synchronized goes down to 0% and copy processing time takes long.
	PAIR/Duplex	Percentage that P-VOL and S-VOL are synchronized goes down to 0%.
	COPY (SP)/SP-Pend	Pair Status turns into PSUE/Suspend.
	PSUS (SP)/V-Split	Pair Status turns into PSUE/Suspend.
	PSUS/Split	Percentage that P-VOL and S-VOL are synchronized goes down to 0% and copy processing time will takes long in next resynchronization.
	COPY (RS)/Resync	Percentage that P-VOL and S-VOL are synchronized goes down to 0% and copy processing time takes long.
	COPY (RS-R)/Resync-R	Percentage that P-VOL and S-VOL are synchronized goes down to 0% and copy processing time takes long.
	PSUE/Suspend	None

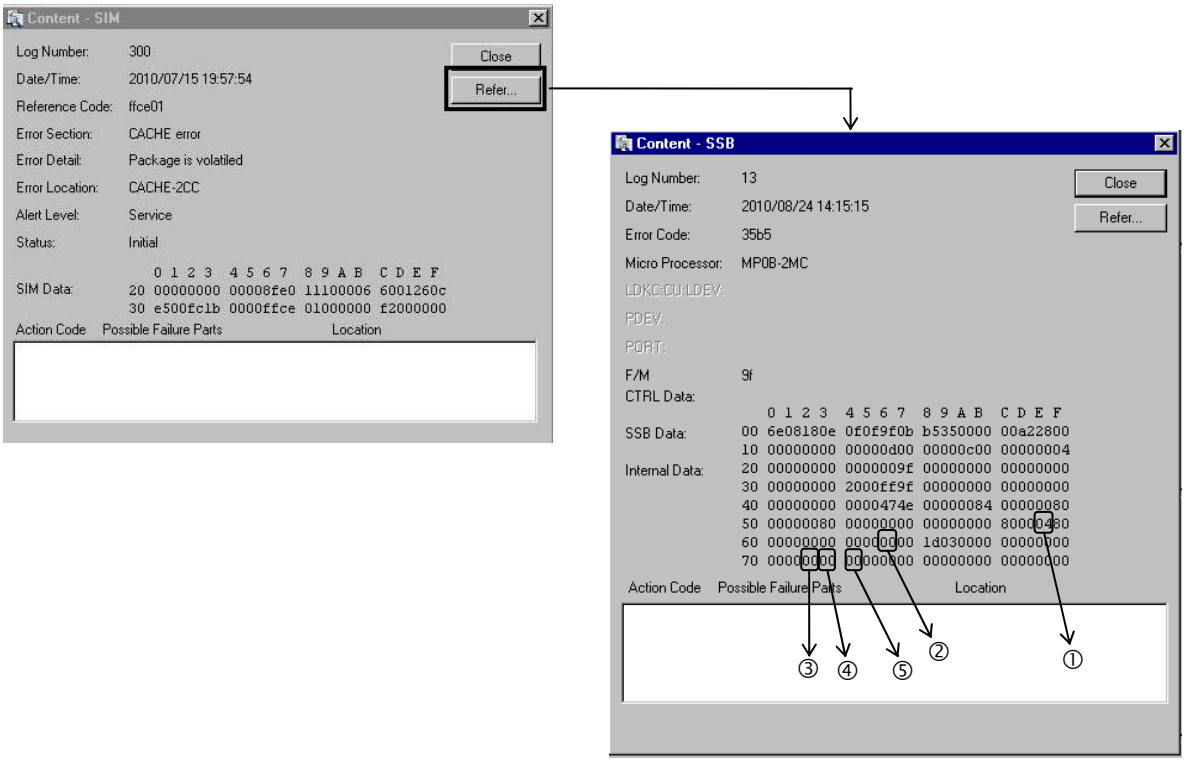
<SIM = FFCE0X and FFCFYX in the case of “SEE MANUAL”>

SIM = FFCE0X or FFCFYX → Related SSB 35B5

When SIM = FFCE0X or FFCFYX is issued, check the related SSB to specify the cause of the volatilization.



With reference to the TRBL05-910, isolate the failed part according to the Byte5E (①), Byte66 (②), Byte72 (③), Byte73 (④) and Byte74 (⑤) of the related SSB 35B5. When Byte5E (①), Byte66 (②), Byte72 (③), Byte73 (④) and Byte74 (⑤) are 0; of TRBL05-920 change it in order of (1) to (6), and please carry it out.



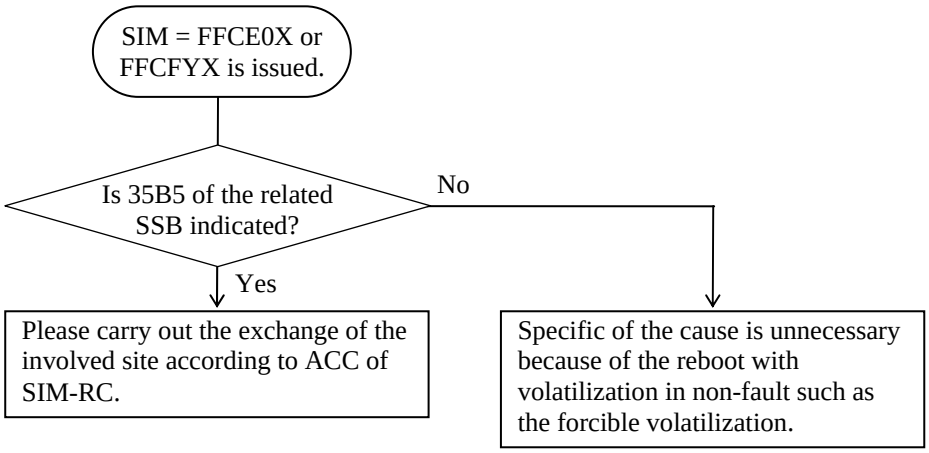
#	Byte	Bit	Replacement Parts	
①	5E	7	FAN (both sides of CPC) (FAN Assembly)	
		6	CPC (WP741-A)	
		5	CPC (WP741-A)	
		4	CPC (WP741-A)	
		3	SSD1 (Cache SSD)	
		2	SSD0 (Cache SSD)	
		1	CPC (WP741-A)	
		0	BATTERY (Cache Battery)	
②	66	7	CPC (WP741-A)	
		6	CPC (WP741-A)	
		5	CPC (WP741-A)	
		4	CPC (WP741-A)	
		3	CM00, CM01, CM20, and CM21 (Cache memory)	
		2	CM10, CM11, CM30 and CM31 (Cache memory)	
		1	CPC (WP741-A)	
		0	CPC (WP741-A)	
③	72	7	CPC (WP741-A)	
		6	CPC (WP741-A)	
		5	CPC (WP741-A)	
		4	CPC (WP741-A)	
		3	None	
		2	None	
		1	None	
		0	FAN (both sides of CPC) (FAN Assembly)	
④	73	7	CPC (WP741-A)	
		6	CPC (WP741-A)	
		5	CPC (WP741-A)	
		4	SSD1 (Cache SSD)	
		3	SSD0 (Cache SSD)	
		2	CPC (WP741-A)	
		1	BATTERY (Cache Battery)	
		0	None	
⑤	74	—	Refer to TRBL05-921	

This instruction points out the part with high possibility of failure. However, execute the replacement in the following procedure when the error continues even if it is exchanged.

(1) SSD0 (Cache SSD)
(2) SSD1 (Cache SSD)
(3) CPC (WP741-A)
(4) CM00, CM01, CM20 and CM21 (Cache memory)
(5) CM10, CM11, CM30 and CM31 (Cache memory)
(6) BATTERY (Cache Battery)

Moreover, through the multiple failed parts may be pointed out according to the cause of the error, in that case, replace all the point out parts.

<SIM = FFCE0X and FFCFYX are cases expect “SEE MANUAL”>



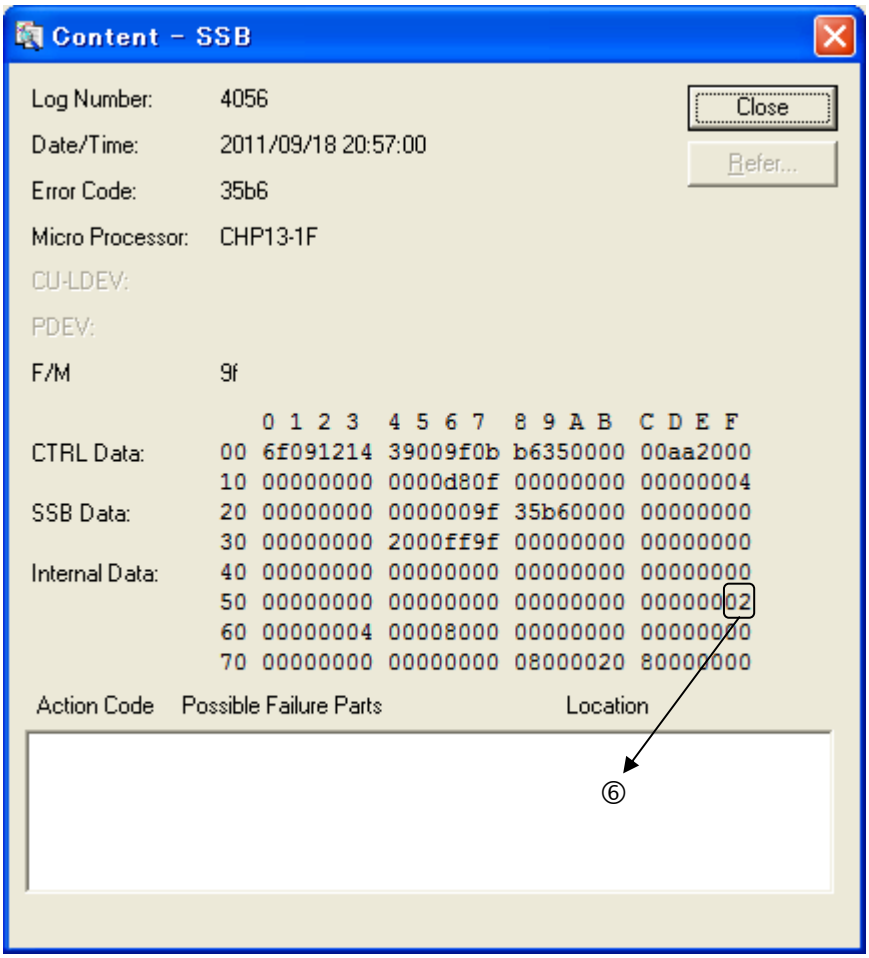
Isolate a failed part by taking the following procedure according to the value of TRBL05-903 "SSB 35B5 Byte74".

Byte74

0x80 : Failure of Cache SSD. Identify a possible failure part according to SSB 35B6.
Other than 0x80 : Failure of CM PCB. Replace CPC.

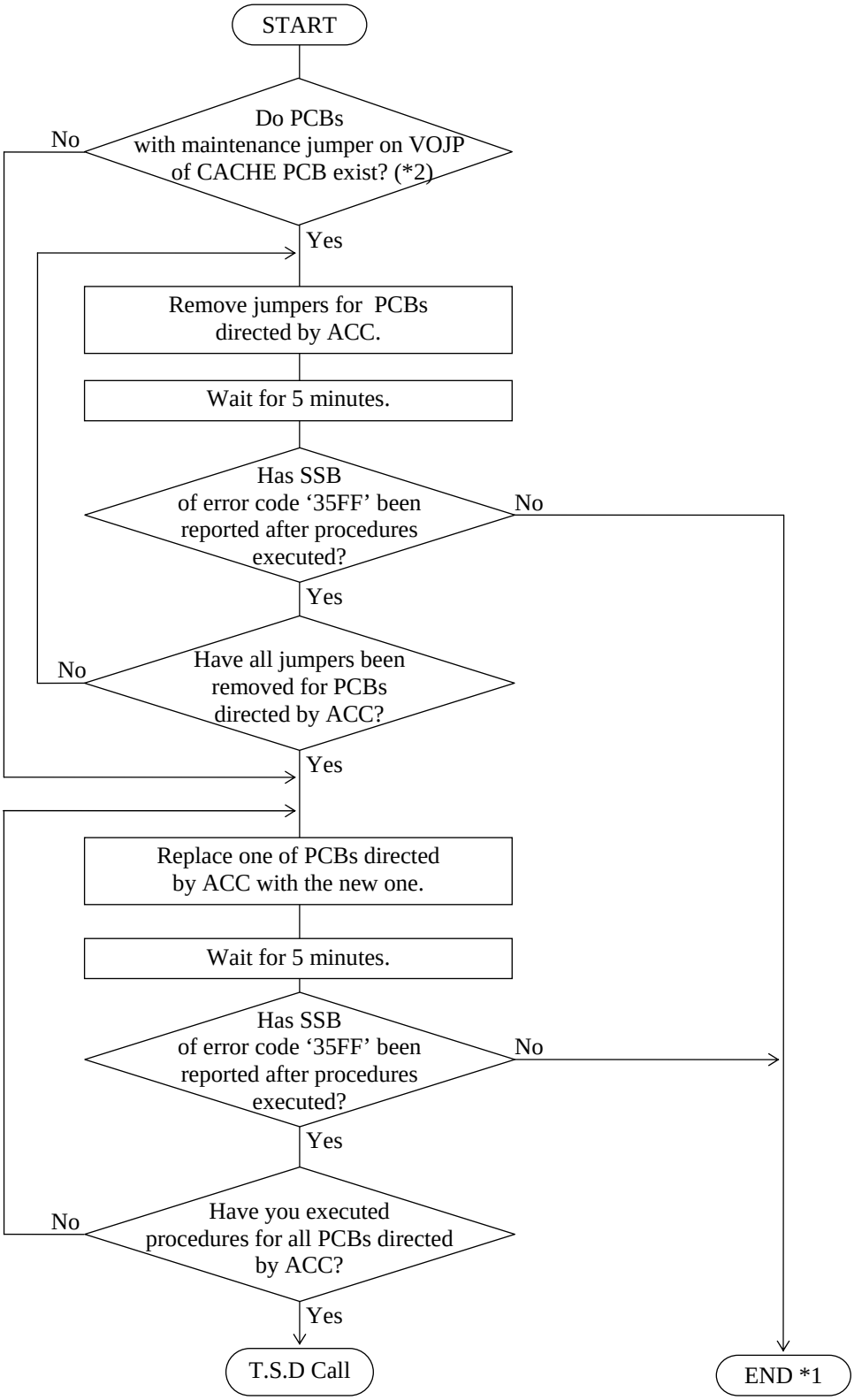
[Identifying a replacement part according to SSB 35B6]

Cache SSD is failed. Identify Cache SSD to be replaced as follows.



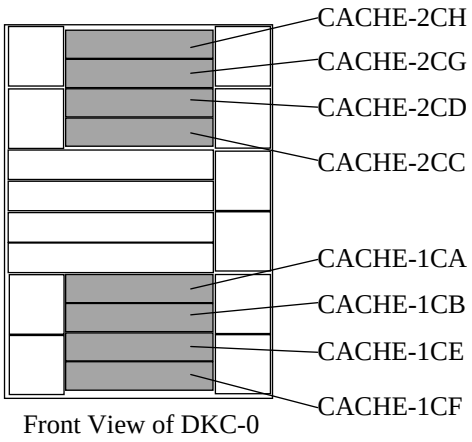
⑥ Byte 5F	Replacement Parts	Remarks
01	SSD0 (Cache SSD)	
02	SSD1 (Cache SSD)	
00	SSD0 (Cache SSD) and SSD1 (Cache SSD)	

5.37 Recovery Procedure for forcible volatile mode (SIM = FFFEXX)

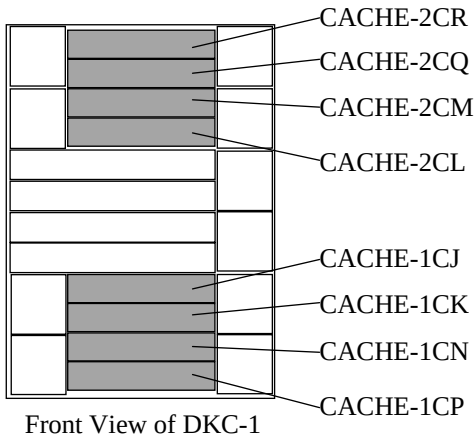


*1: After finishing the error recovery, execute SIM complete and delete logs. (Refer to SVP02-220, 650)

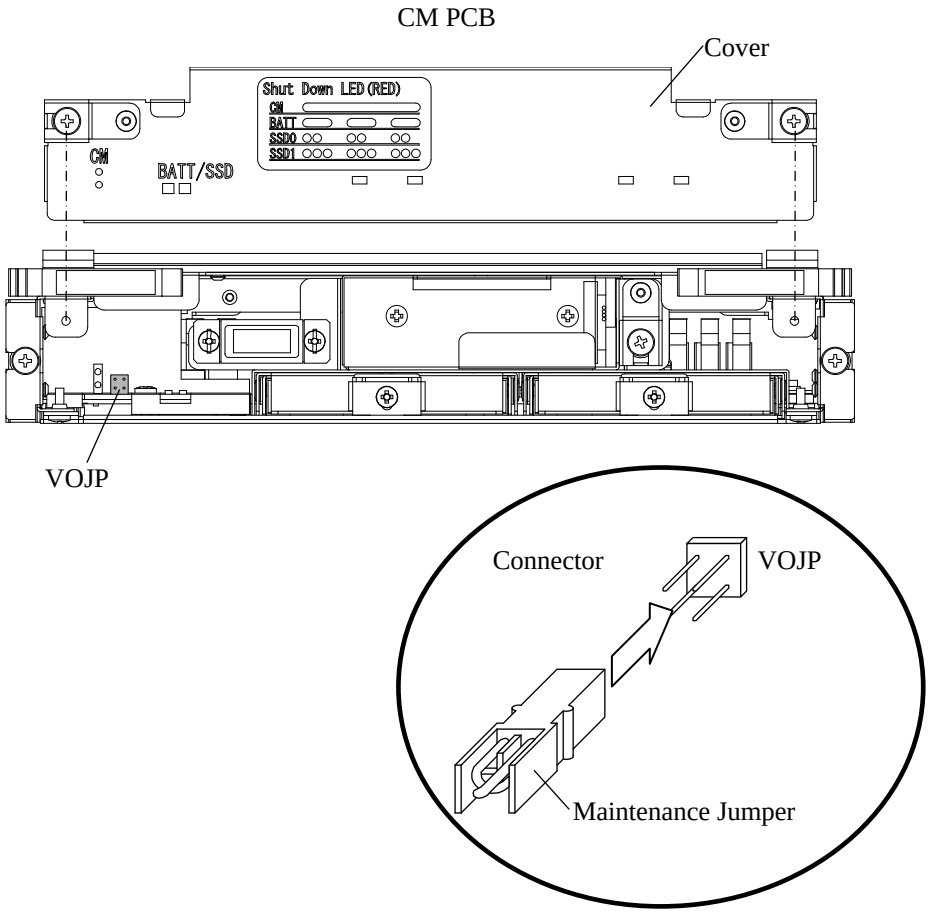
*2: Remove shut down jumpers. (Refer to blew)



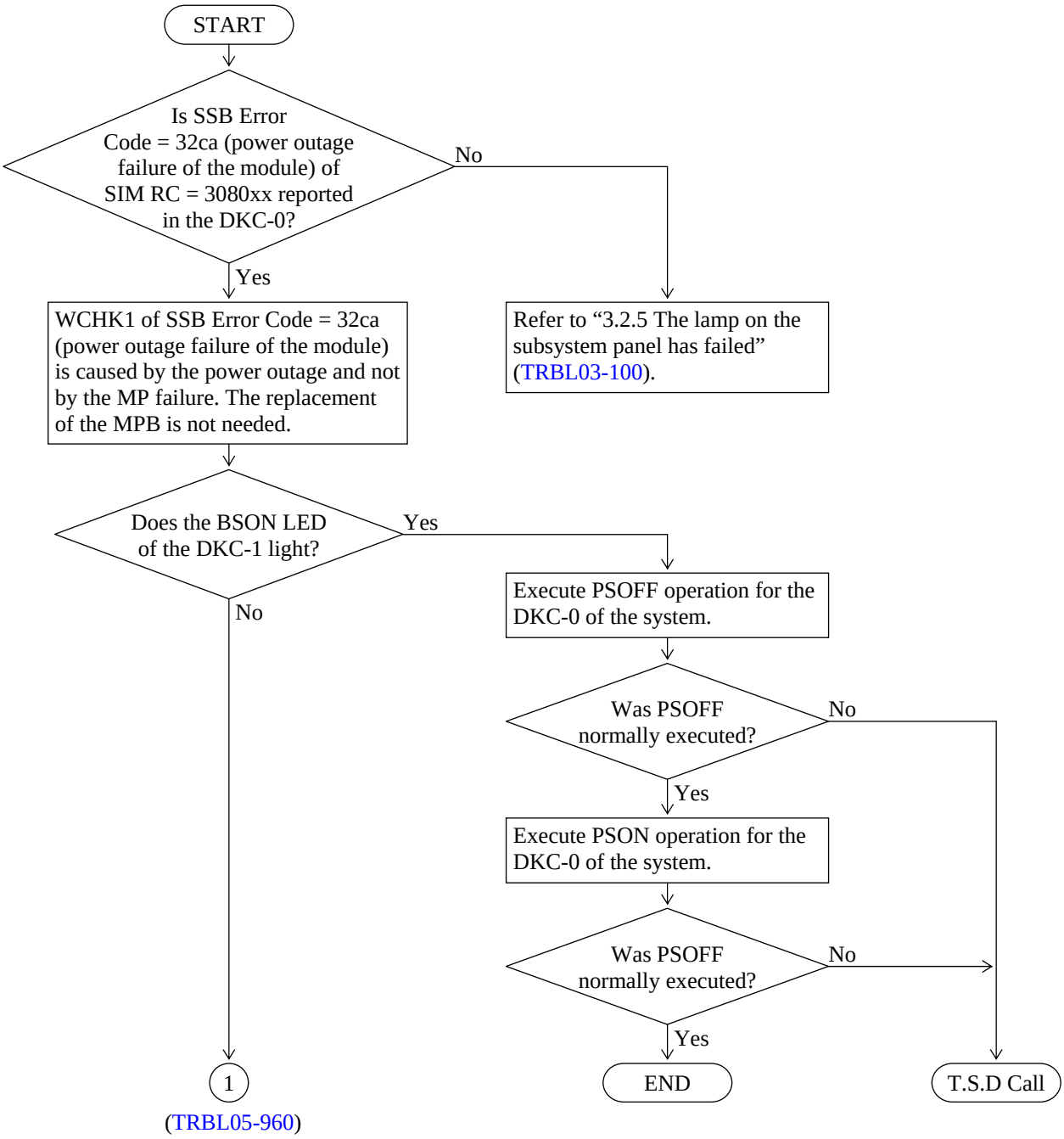
Front View of DKC-0

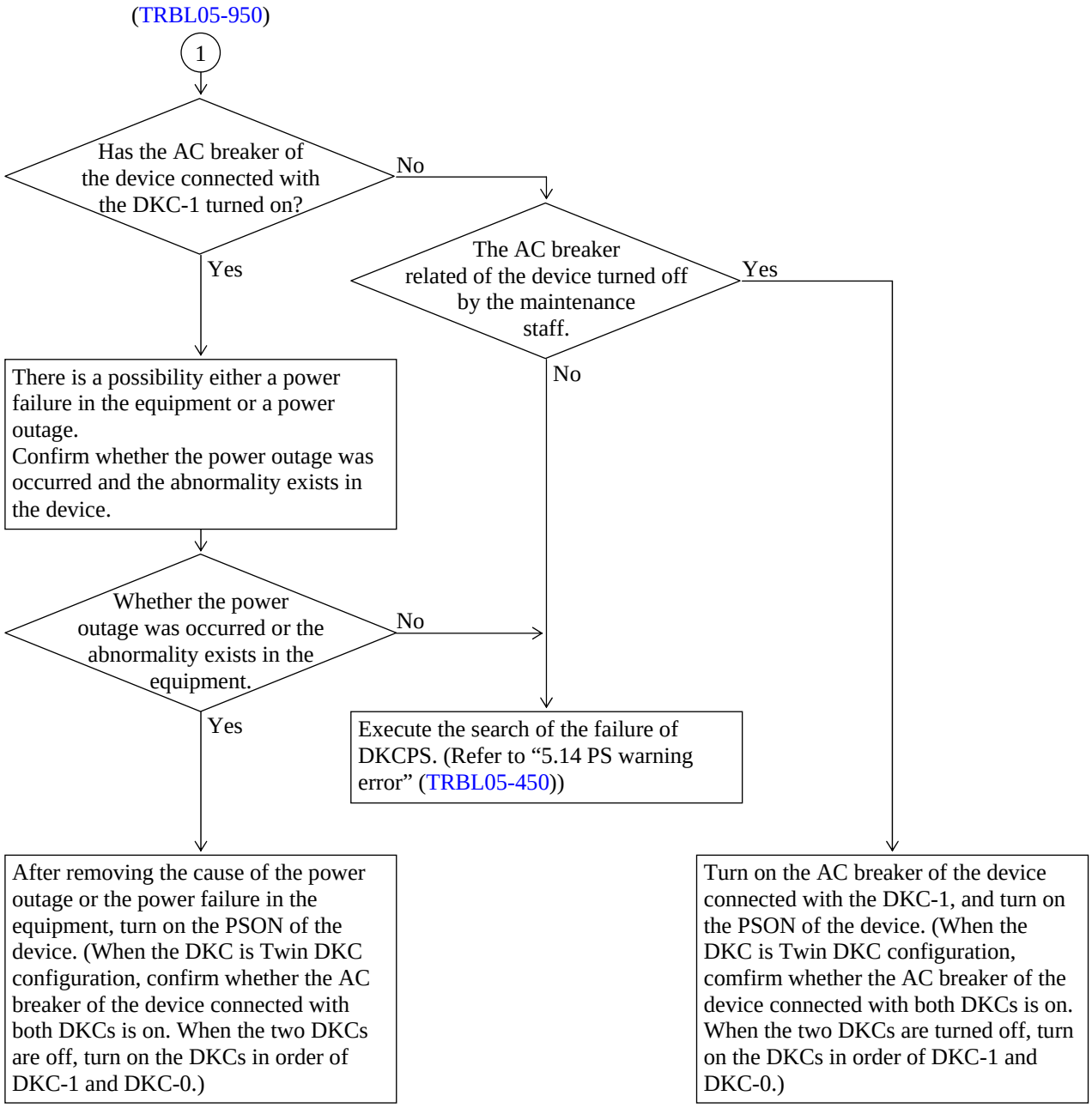


Front View of DKC-1

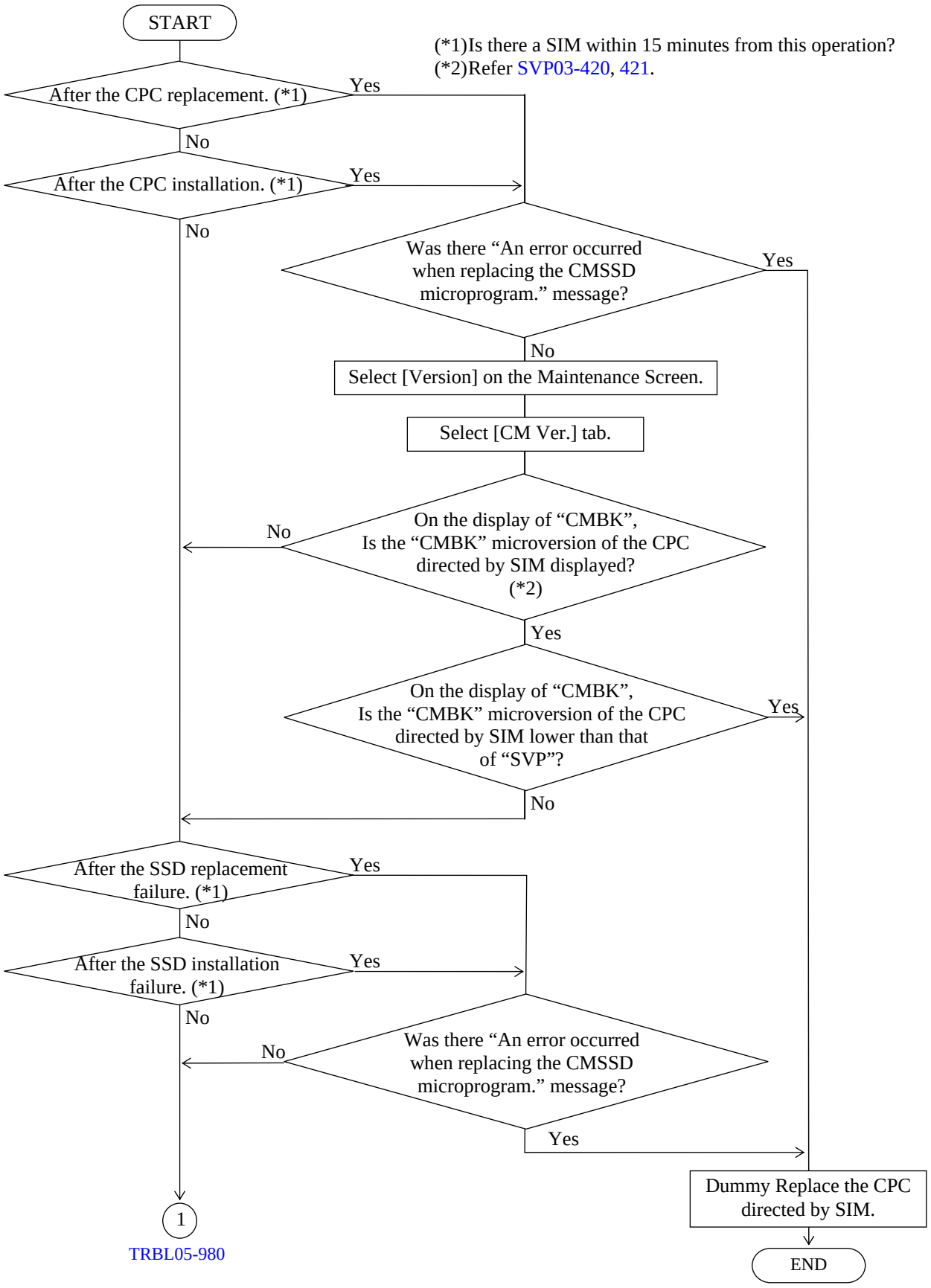


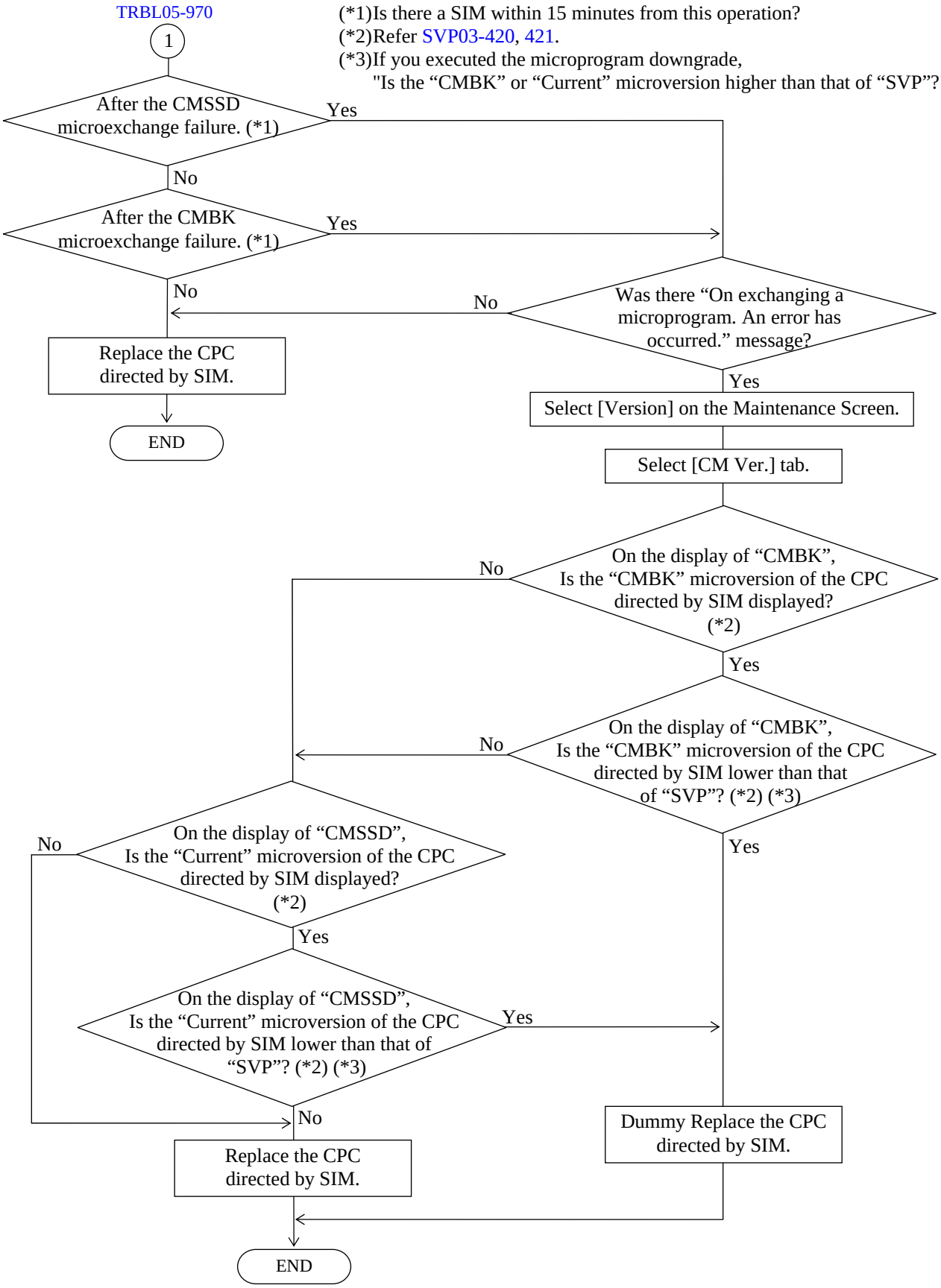
5.38 Receiving WCHK1 Dump (SIM = 3080XX)





5.39 Recovery procedure when CM/CMA patrol check error occurs (SIM = FFCC0X)





5.40 Isolation and Recovery Procedure for Drive Link Rate Error (SIM = DFCXXX, DFDXXX)

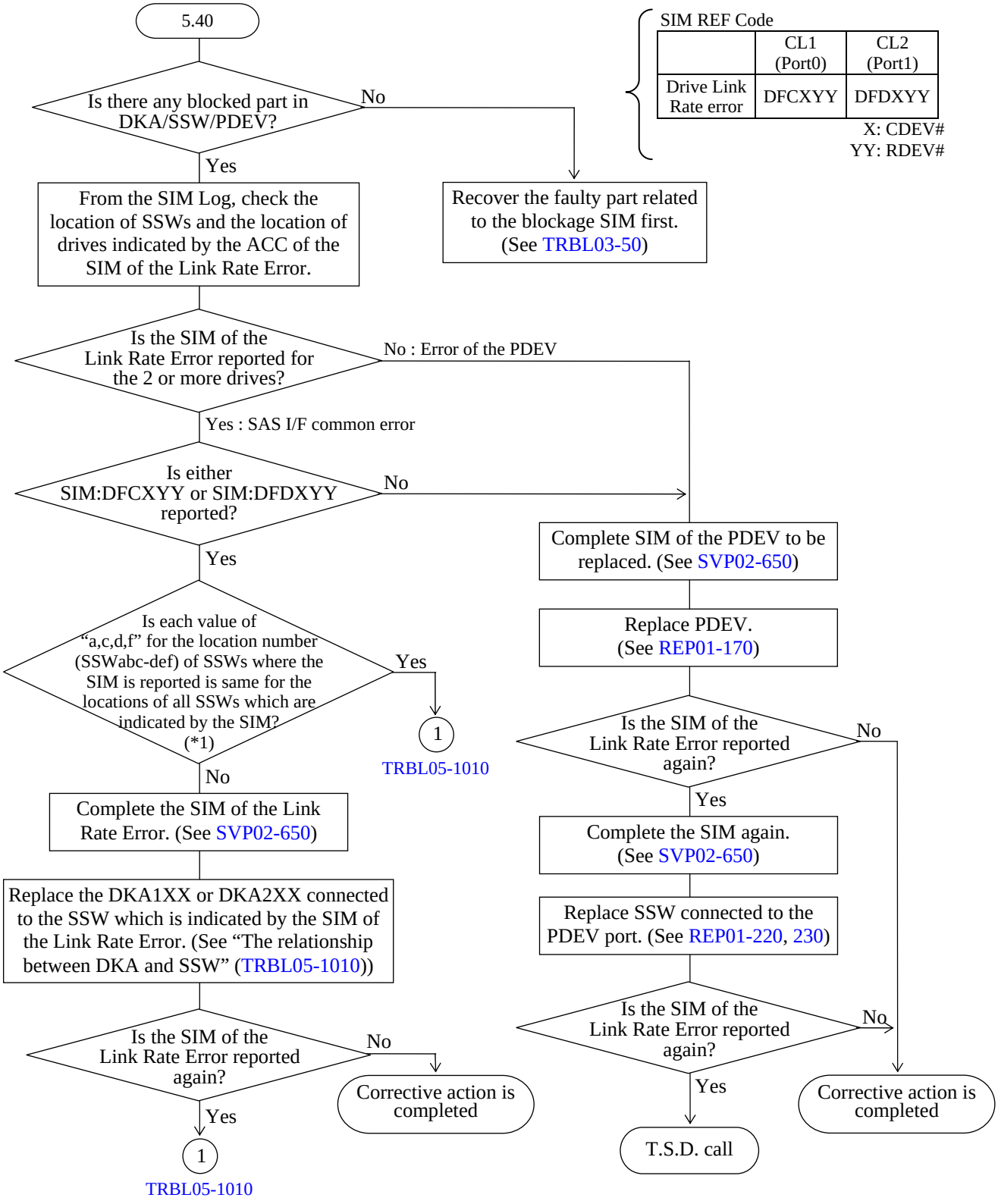
This section describes the method to judge whether a link rate error of a specific drive (PDEV) is caused by a drive failure or an SSW failure and the recovery method when a link rate error SIM is reported.

With this SIM, when setting Link Rate for each drive port of each PDEV fails, a drive port link rate error of Path 0 (REF code = DFCXYY) or a drive port link rate error of Path 1 (REF code = DFDXYY) is reported (X: CDEV#, YY: RDEV#).

Possible causes of this failure include:

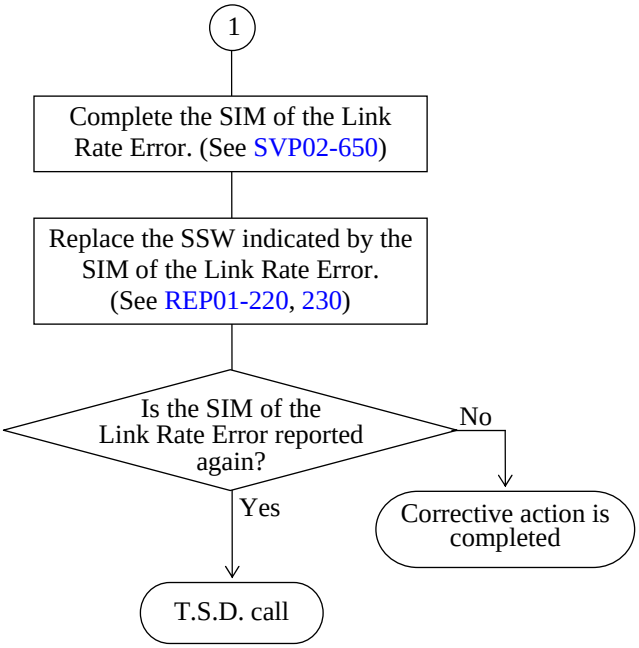
(1) Failure of the drive
(2) Failure of SSW (EXP)

Therefore before replacing the faulty drive with a service part, isolate the failure and recover it by performing the appropriate recovery procedure.



*1: The following table shows the examples of the relationship of the location number (SSWabc-def)

#	The location number of SSW #1 where the SIM is reported	The location number of SSW #2 where the SIM is reported	Is each value of "a,c,d,f" for the location number (SSWabc-def) same
1	SSW001-LP1	SSW031-LP1	Yes
2	SSW111-HP0	SSW011-HP0	No



<The relationship between DKA and SSW>

The following table explains the relationship between the SSW location where the SIM of the Link Rate Error is reported and the DKA location.

SSW Location where the SIM is reported (*1)	DKA Location
SSW0x0-HP0	1AU/1AL
SSW0x1-HP0	
SSW0x2-HP0	
SSW0x3-HP0	
SSW0x0-LP1	2MU/2ML
SSW0x1-LP1	
SSW0x2-LP1	
SSW0x3-LP1	
SSW1x0-HP0	1LU/1LL
SSW1x1-HP0	
SSW1x2-HP0	
SSW1x3-HP0	
SSW1x0-LP1	2XU/2XL
SSW1x1-LP1	
SSW1x2-LP1	
SSW1x3-LP1	

*1: “x” represents the number from 0 to 7.

5.41 Recovery procedure for double failure during CACHE (Basic) maintenance (including Installation/De-Installation)

This section provides the recovery procedure in the event of a failure in CACHE (Basic) while one side of the cache is used during maintenance (Installation/De-Installation) of CACHE (Basic).

⚠ CAUTION

- This operation assumes a double failure during maintenance of CACHE (Basic). If you use this procedure without permission, the system could go down. User data and configuration information could be lost due to the operation. Do not perform it unless you are instructed to do so by the T.S.D.
- This operation temporarily restores DP-VOLs mapping of the storage system using the SM data that is backed up to the cache SSD before maintenance of CACHE (Basic) and enables to read user data in DP-VOLs. But because of the following reason, after user data is read, you need to perform pool initialization to initialize the HDP / HDT configuration. After pool initialization, you need to store the user data of HDP / HDT in the recovered storage system again. Before completing pool initialization, do not use DP-VOLs for other program products.
  The backup processing to cache SSD is performed regardless of the SM update processing. If the update occurs in both the backed up SM area and the SM area waiting for backup during backup, the backup data (mapping information of DP-VOLs) would be inconsistent.
  Even if you boot up the storage system with the backup data, since the mapping information of DP-VOLs is inconsistent, DP-VOLs cannot be used continuously.
- If page allocation/rebalance/tier relocation etc. runs during SSD backup, the SM data that is backed up to cache SSD by SM update becomes inconsistent, and the mapping information (backup data) used for the recovery procedure may become inconsistent. If hosts cannot read user data while recovery procedure is performed, zero data (No Record in the case of Mainframe systems) is reported. After the data is read, the user needs to examine the user data.
- Because HTI uses the same SM as HDP / HDT, SM data becomes inconsistent. Since SM data cannot be corrected until pool initialization is performed, do not create HTI pair before pool initialization
- For this operation, prepare the following.
  - Host that reads user data from the storage system in which a double failure occurs
  - A storage system for backup to store the read user data
  - A set of new part for the CPK (Basic) in which a double failure occurs (CPK, cache SSD, cache battery)

(To be continued)

(Continued from preceding sheet)

- The DKC processor failure / SVP failure SIM (73XXYY) and Warning for forcible volatile mode (FFFE0X) may occur during this work. Just complete them when the work is finished.
- If you change the location of CPK after you turn the breaker of the PDU off, user data and configuration information could be lost. Please do not change the location of CPK after you turn the breaker of the PDU off.
- After this operation is completed, please refer to the MICRO-FC SECTION (MICRO07-10), and make sure to re-perform the process of configuration information (Config) Version Up with the media whose version is the same as the one of configuration information (Config) of the storage system.
- This work includes the procedure of removing cache SSDs. When performing this work, record the location and FRU number of each cache SSD to be removed so that the location can correspond to the FRU number. If the location of the cache SSD cannot correspond to the FRU number, the consistency of mapping information (backup data) will be lost.

Perform the procedure to restore the following storage system configuration to the one around the beginning of CACHE (Basic) maintenance.

Table 5.41-1 Storage system configuration to be restored

#	Storage system configuration information to be restored	Effect
1	Mapping information of DP-VOLs.	Able to read user data in DP-VOLs of Dynamic provisioning / Dynamic Tiering from the host. (*1), (*2), (*3)

*1: After user data is read, you need to perform pool initialization to initialize the HDP/HDT configuration. After pool initialization, you need to store the user data of HDP/HDT in the recovered storage system again. Before completing pool initialization, do not use DP-VOLs for other program products.

*2: Because HTI uses the same SM as HDP/HDT, SM data becomes inconsistent.
Since SM data cannot be corrected until pool initialization is performed, do not create HTI pair before pool initialization.

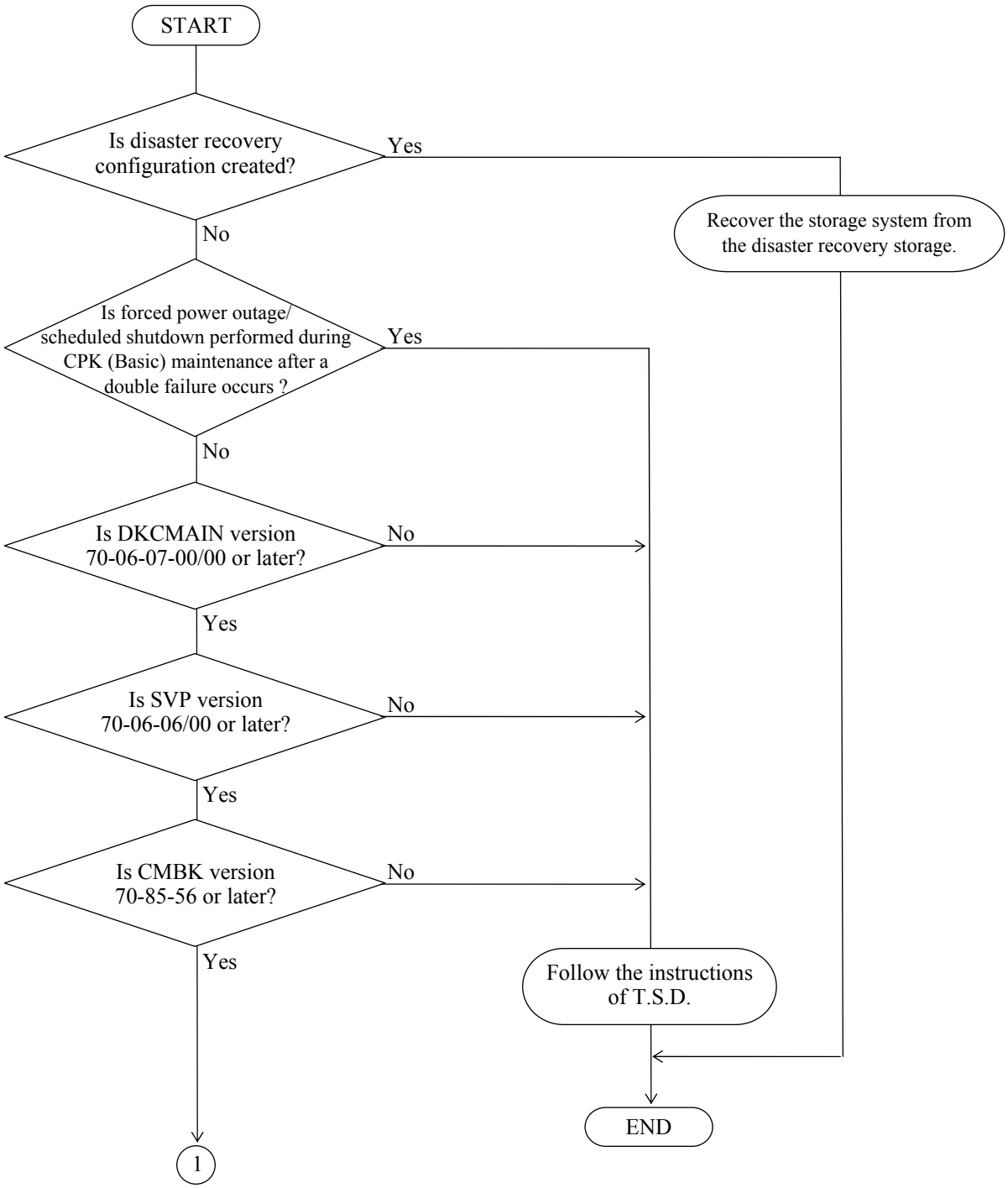
*3: If page allocation/rebalance/tier relocation etc. runs during SSD backup, the SM data that is backed up to cache SSD by SM update becomes inconsistent, and the mapping information (backup data) used for the recovery procedure may become inconsistent.
If hosts cannot read user data while recovery procedure is performed, zero data (No Record in the case of Mainframe systems) is reported. After the data is read, the user needs to examine the user data.

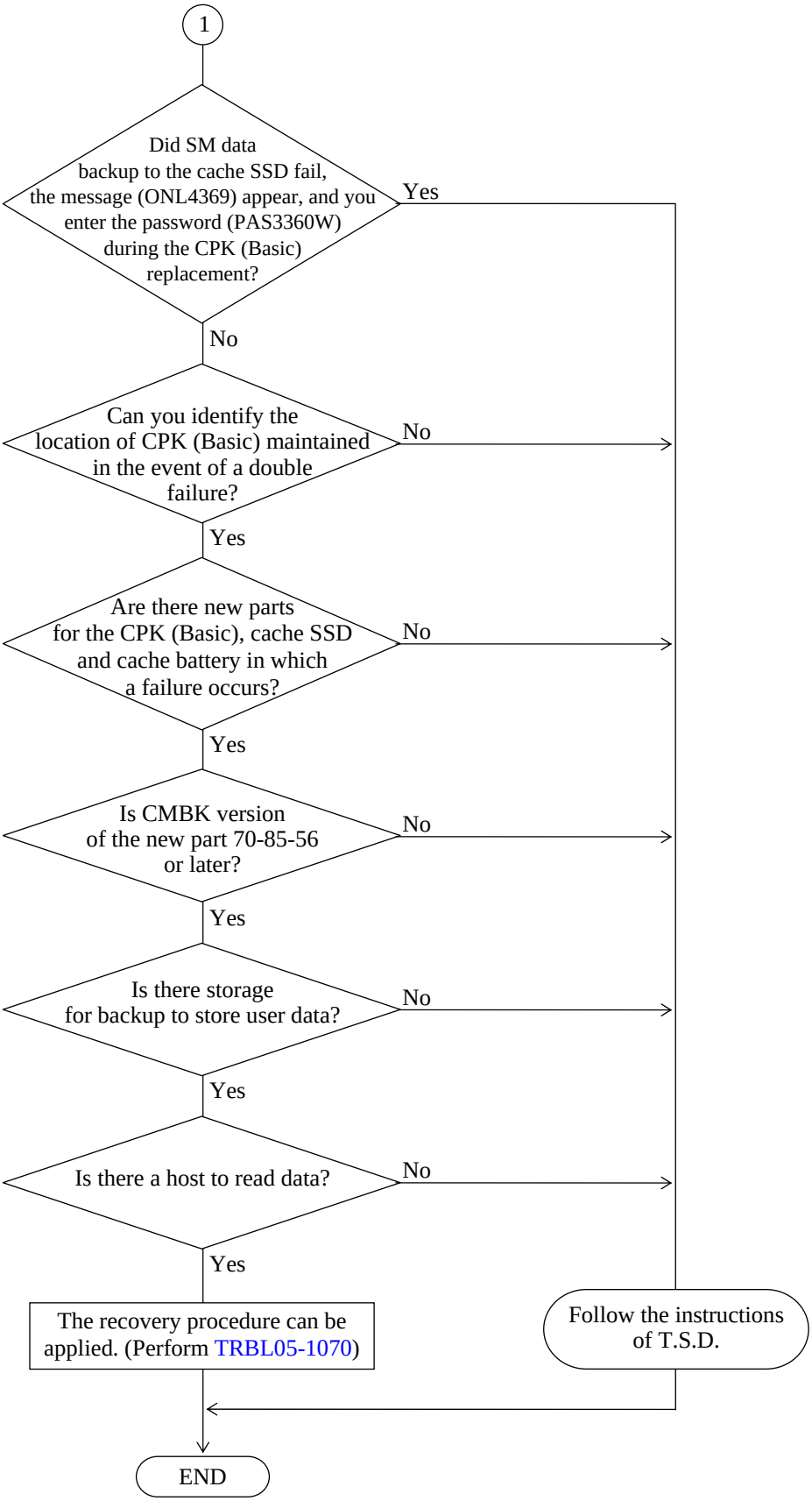
The recovery procedures for a double failure vary depending on the maintenance operations of CPK (Basic) performed in the event of a double failure. The following Table 5.41-2 shows the relationship between maintenance operations of CPK (Basic) performed in the event of a double failure and the recovery procedures.

Table 5.41-2 The relationship between maintenance operations performed in the event of a double failure and the recovery procedures

#	Maintenance operations of CPK (Basic) performed in the event of a double failure	Recovery procedures for a double failure
1	CPK (Basic) replace (REP03-10-10)	TRBL05-1050 ~ TRBL05-1120
2	Change CM Module (Basic) group size (SVP02-2050)	TRBL05-1130 ~ TRBL05-1210
3	Installation of Additional Cache Memory (INST03-10-10) De-Installation of Additional Cache Memory (INST04-03-10)	
4	Installation of SM Size without adding Cache Memory (INST03-19-10) De-Installation of SM Size without removing Cache Memory (INST04-13-10)	

When a double failure occurs in CPK (Basic), a time-out error of the SVP 'Maintenance' window (ONL0117E) occurs.
When a time-out error of the SVP 'Maintenance' window occurs during CPK (Basic) replace (REP03-10-10), perform the operations according to the following flow in cooperation with the T.S.D.





Take the following steps (1) to (28).
(If you mistake recovery procedure, you cannot recover the system. If you detect something abnormal during the operations, stop the recovery procedure. Collect “Config Backup” and “Normal” dump with the Auto Dump (SVP02-670), and then contact T.S.D.)

*1: Prepare a one-time password to set SOM157 and SOM970. (It takes about five hours to set SOM157 and SOM970)

*2: Prepare a one-time password to execute force restore of LDEVs.
(It takes about six hours to execute force restore of LDEVs)

(1) Remove the sheet metal of CPK (Basic) (*3) of the opposite side of the CPK (Basic) (*3) for which maintenance is to be performed. See LOCATION SECTION (LOC02-190) and collect the cache SSD.
Before removing the sheet metal and cache SSDs, be sure to perform the procedure shown below.

*3: When you maintain the CPK in the “CACHE-1CA”, the opposite side of the CPK means “CACHE-2CC”.
When you maintain the CPK in the “CACHE-2CC”, the opposite side of the CPK means “CACHE-1CA”.

Procedure to Be Performed

A maintenance person must record cache SSD installation locations (SSD0 or SSD1 in the figure below) and FRU number labels (seal put on the sheet metal of each SSD with 20 digits alphanumeric characters) so that the location and the FRU number of each SSD can correspond to each other.
(Use the table below and enter the FRU numbers in the Before Removal field.)

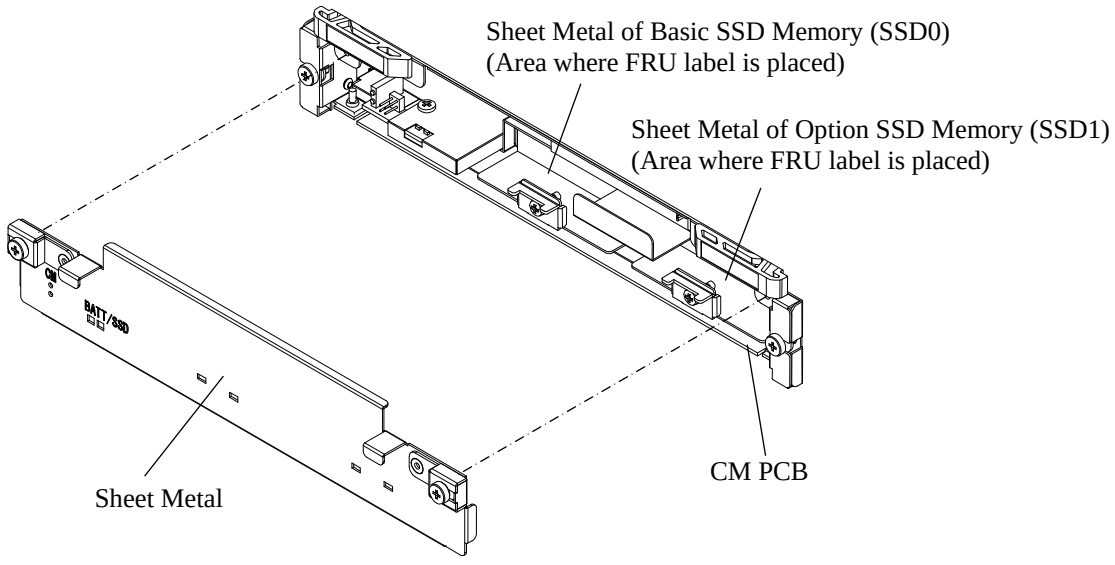


Fig. 5.41-1 Cache SSD Replacement

Enter the FRU number of the cache SSD installed in the CPK which is located in the opposite side of the CPK maintained in step (1).

Table 5.41-3 Recording FRU Number in Cache SSD Replacement

Before Removal (The cache SSD collected in step (1))		After Installation (The cache SSD which you must mount on a new part of CPK (Basic))		Check
SSD Location	FRU Number	SSD Location	FRU Number	
SSD0	xxxxxxxxxxxxxxxxxxxx	SSD0	Enter the number in step (14)	
SSD1	yyyyyyyyyyyyyyyyyyyy	SSD1		

(2) Refer to the SVP SECTION (SVP01-160), and turn off the power supply of the SVP.

(3) Turn off the PDU breakers (PDU-000, PDU-001, PDU-100, PDU-101) that are connected to the DKC.
(Refer to Fig. 35-1 (TRBL35-20))

(4) Turn off the PDU breakers (PDU-010, PDU-011, PDU-020, PDU-021, PDU-030, PDU-031, PDU-040, PDU-041, PDU-050, PDU-051, PDU-110, PDU-111, PDU-120, PDU-121, PDU-130, PDU-131, PDU-140, PDU-141, PDU-150, PDU-151) that are connected to the DKU.
(Refer to Fig. 35-2 (TRBL35-30))

(5) Perform cold replacement for CPK (Basic) (*4) which is located in the opposite side of the maintained CPK with a new part to restore the same configuration as before the maintenance.
(Refer to Fig. 2.2-1 (LOC02-20))
At this time, install cache SSD and cache battery for the new parts. Do not install the cache SSD collected in the step (1).

*4: When you maintain the CPK in the “CACHE-1CA”, the opposite side of the CPK means “CACHE-2CC”.
When you maintain the CPK in the “CACHE-2CC”, the opposite side of the CPK means “CACHE-1CA”.

(6) Remove the CPK (Basic) for which maintenance is to be performed.
(Refer to Fig. 2.2-1 (LOC02-20))

(7) Turn on the PDU breakers (PDU-010, PDU-011, PDU-020, PDU-021, PDU-030, PDU-031, PDU-040, PDU-041, PDU-050, PDU-051, PDU-110, PDU-111, PDU-120, PDU-121, PDU-130, PDU-131, PDU-140, PDU-141, PDU-150, PDU-151) that are connected to the DKU.
(Refer to Fig. 35-3 (TRBL35-40))

(8) Turn on the PDU breakers (PDU-000, PDU-001, PDU-100, PDU-101) that are connected to the DKC.
(Refer to Fig. 35-4 (TRBL35-50))

(9) Refer to the INSTALLATION SECTION "3.14.1 Power ON Procedure" (INST03-14-10), and turn on the POWER ON/OFF switch, and wait until the status becomes System Ready.

Check whether all expected results of POWER ON of table 5.41-4 are met. If any one of them is not met, collect "Config Backup" and "Normal" dump with the Auto Dump (SVP02-670), and then contact T.S.D.

Table 5.41-4 Expected results of POWER ON

#	Item	Expected results
1	Time until the system status becomes System Ready.	The system status becomes System Ready within 130 min after turning on the POWER ON switch.
2	CPK (Basic) PCB Status	PCB Status of the CPK (Basic) for which cold replacement was performed in step (5) is "Normal" after the system status becomes System Ready.
3		PCB Status of the CPK (Basic) removed in step (6) is "Access Error" after the system status becomes System Ready.

(10) After the status becomes System Ready, refer to the INSTALLATION SECTION (INST05-640) and set both System Option Mode 157 and System Option Mode 970 to ON (*1). Wait until SSB = AFB0 (*5) is output (less than 60 minutes).

*5: Make sure to check that SSB = AFB0 is output. If you don't check that SSB is output, you cannot recover the system. If SSB is not output, collect "Normal" dump with the Auto Dump (SVP02-670), and then contact T.S.D.

(11) Refer to the SVP SECTION (SVP01-160), and turn off the power supply of the SVP.

(12) Turn off the PDU breakers (PDU-000, PDU-001, PDU-100, PDU-101) that are connected to the DKC.
(Refer to Fig. 35-1 (TRBL35-20))

(13) Turn off the PDU breakers (PDU-010, PDU-011, PDU-020, PDU-021, PDU-030, PDU-031, PDU-040, PDU-041, PDU-050, PDU-051, PDU-110, PDU-111, PDU-120, PDU-121, PDU-130, PDU-131, PDU-140, PDU-141, PDU-150, PDU-151) that are connected to the DKU.
(Refer to Fig. 35-2 (TRBL35-30))

(14) Replace the cache SSD collected in step (1) with the cache SSD of the new CPK (Basic) for which cold replacement is performed (*6) in step (5).

*6: Leave the CPK (Basic) removed in the step (6) removed.

Note

After installing cache SSDs, enter the FRU numbers corresponding to the installed SSD locations in the After Installation field in the table that was used in Procedure (1) and check that the location and FRU number of each SSD in the After Installation field are identical to those in the Before Removal field. If they are found to be identical, enter OK in the Check field in the table.

Table 5.41-5 Checking FRU Number in Cache SSD Replacement

Before Removal (The cache SSD collected in step (1))		After Installation (The cache SSD which you must mount on a new part of CPK (Basic))		Check
SSD Location	FRU Number	SSD Location	FRU Number	
SSD0	xxxxxxxxxxxxxxxxxxx	SSD0	xxxxxxxxxxxxxxxxxxx	OK
SSD1	yyyyyyyyyyyyyyyyyyy	SSD1	yyyyyyyyyyyyyyyyyyy	OK

(15) Detach the sheet metal of all CPK, and then insert (*7) VOJPs (volatile JP) to all CPK referring to LOCATION SECTION (LOC06-150).

*7: If you don't insert VOJPs to all CPKs, you cannot recover the system. Make sure to check that VOJPs are inserted to all CPKs.

(16) Turn on the PDU breakers (PDU-010, PDU-011, PDU-020, PDU-021, PDU-030, PDU-031, PDU-040, PDU-041, PDU-050, PDU-051, PDU-110, PDU-111, PDU-120, PDU-121, PDU-130, PDU-131, PDU-140, PDU-141, PDU-150, PDU-151) that are connected to the DKU. (Refer to Fig. 35-3 (TRBL35-40))

(17) Turn on (*8) the PDU breakers (PDU-000, PDU-001, PDU-100, PDU-101) that are connected to the DKC.
(Refer to Fig. 35-4 (TRBL35-50))

*8: Please check that SHUT DOWN LEDs (LOC03-30) of all CPKs light up.
If any one of SHUT DOWN LEDs doesn't light up, contact T.S.D.

(18) Refer to the INSTALLATION SECTION "3.14.1 Power ON Procedure" (INST03-14-10), and turn on the POWER ON/OFF switch, and wait until the status becomes System Ready.

Check whether all expected results of POWER ON of table 5.41-6 are met. If any one of them is not met, collect "Config Backup" and "Normal" dump with the Auto Dump (SVP02-670), and then contact T.S.D.

Table 5.41-6 Expected results of POWER ON

#	Item	Expected results
1	Time until the system status becomes System Ready.	The system status becomes System Ready within 130 min after turning on the POWER ON switch.
2	CPK (Basic) PCB Status	PCB Status of the CPK (Basic) removed in step (6) is "Access Error" after the system status becomes System Ready.
3		PCB Status of the CPK (Basic) in which the cache SSD was replaced in step (14) is "Normal" after the system status becomes System Ready.
4	SHUT DOWN LEDs of all CPKs	SHUT DOWN LEDs of all CPKs (Refer to LOC03-30) light up.

(19) After the status becomes System Ready, remove VOJPs (volatile JP) from all CPK referring to LOCATION SECTION (LOC06-150), and then install the sheet metal of all CPK.

(20) Complete all SIM-RC = FFFE0X.

(21) Refer to the INSTALLATION SECTION (INST05-640) and set System Option Mode 970 to OFF (*1). Wait until SSB = AFB0 (*9) is output
(less than 60 minutes).

*9: Make sure to check that SSB = AFB0 is output. If you don't check that SSB is output, you cannot recover the system. If SSB is not output, collect "Normal" dump with the Auto Dump (SVP02-670), and then contact T.S.D.

(22) Replace (*10) the CKP (Basic) removed in step (6) with a new part.

*10: Perform dummy replacement if originally CPK (Basic) maintenance and was replaced by a new part.

(23) When SIM-RC = FFCE0X, SIM-RC = FFCFYX, or SIM-RC = 6100-02 was reported, you might lose user data and configuration information. Please isolate a faulty part with reference to TRBL05-900.
When the faulty part is CPK (Basic) replaced in step (22), if the failure was recovered in step (22), there is no problem. Complete the related SIM.

(24) Perform force restore (*2) of pool-VOLs and DP-VOLs.
(Refer to SVP SECTION (SVP02-960))

(25) Refer to the INSTALLATION SECTION (INST05-640) and set System Option Mode 157 to OFF (*1)

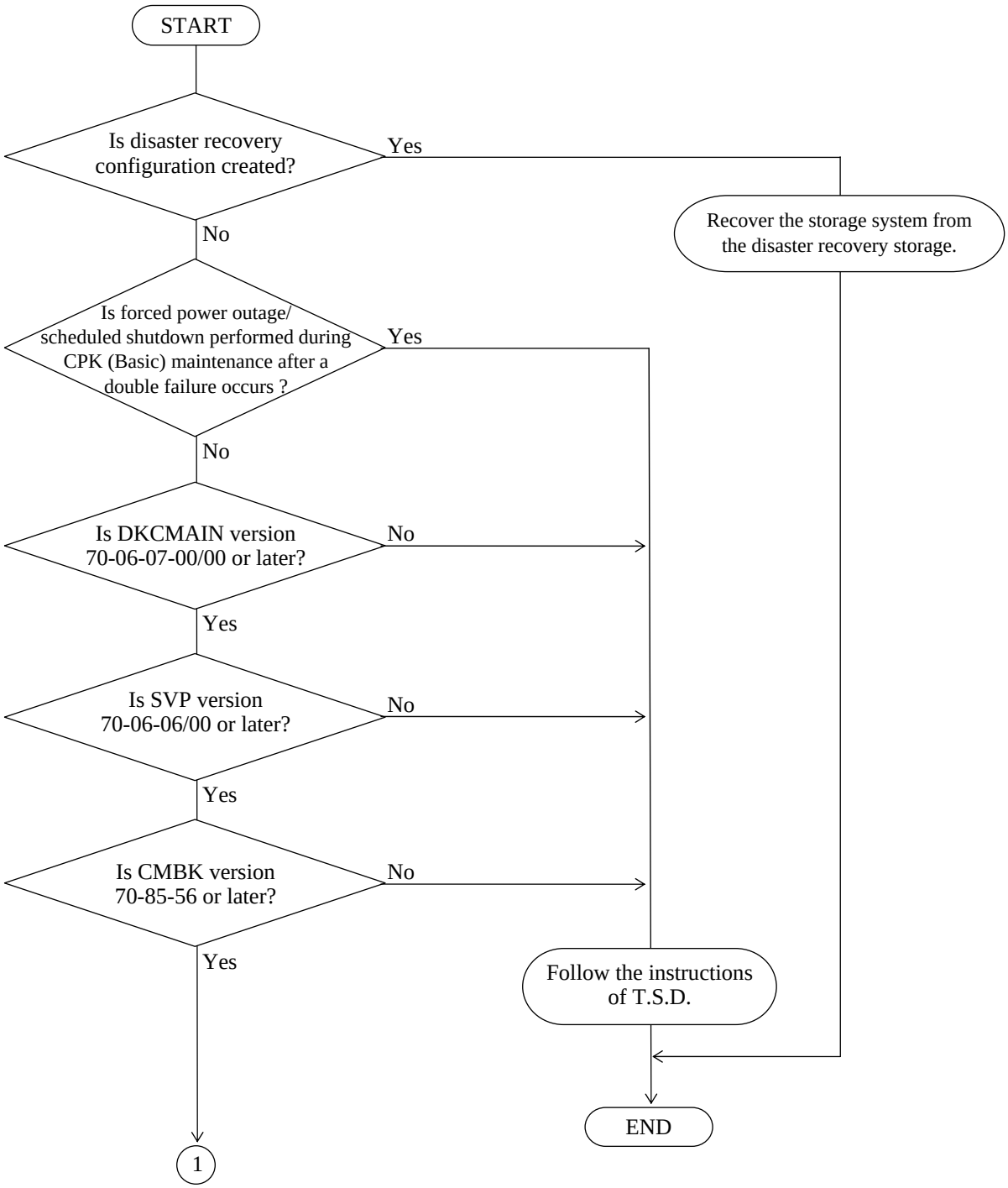
(26) Back up necessary user data in DP-VOL to the storage for backup.

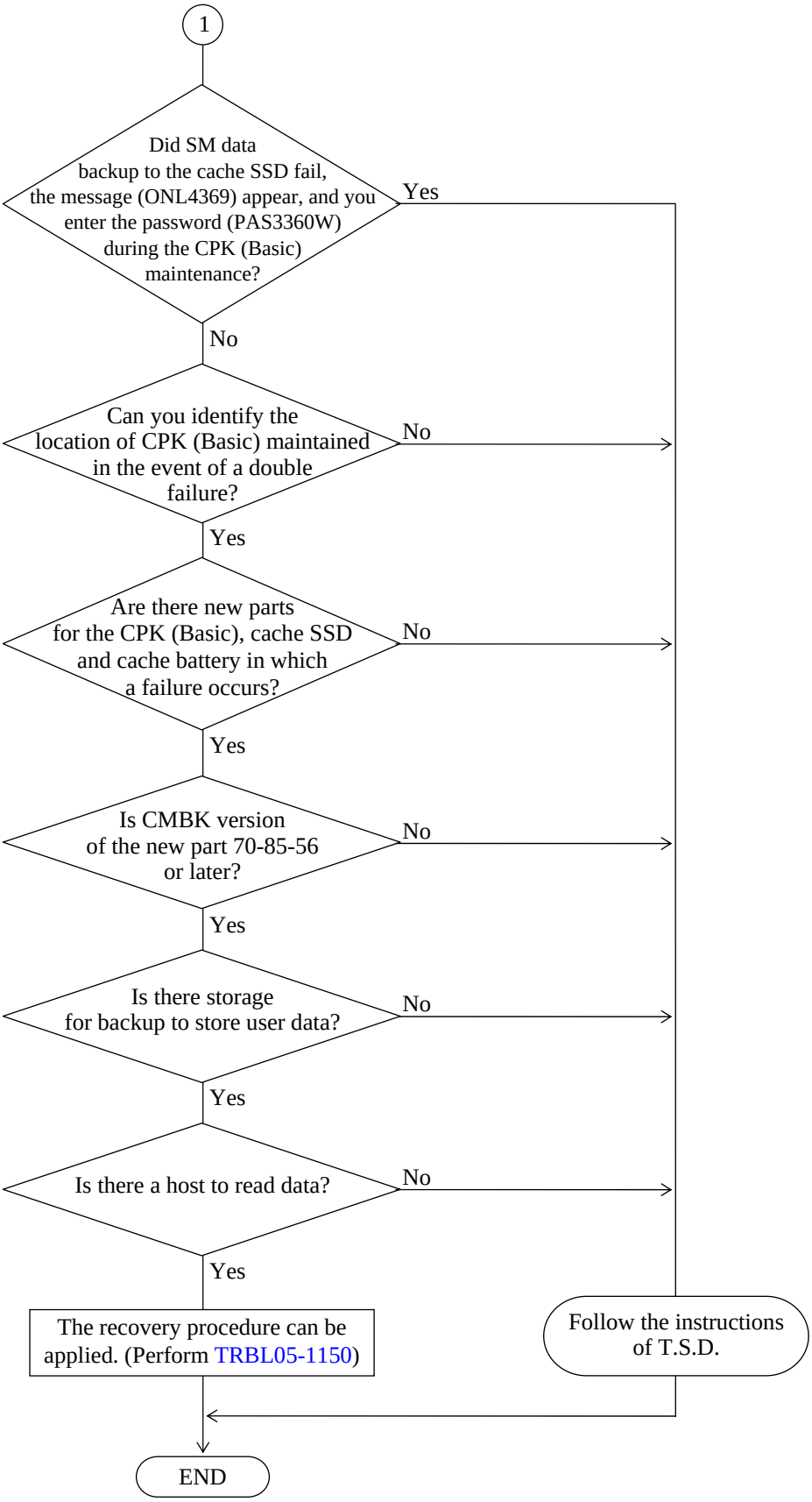
(27) Perform pool initialization with reference to TRBL20-100.

(28) Restore the backup data from the storage for backup to DP-VOL.

(29) Examine the user data.

When a double failure occurs in CPK (Basic), a time-out error of the SVP 'Maintenance' window (ONL0117E) occurs.
When a time-out error of the SVP 'Maintenance' window occurs during CPK (Basic) maintenance (SVP02-2050, INST03-10-10, INST04-03-10, INST03-19-10, INST04-13-10), perform the operations according to the following flow in cooperation with the T.S.D.





Take the following steps (1) to (30).
(If you mistake recovery procedure, you cannot recover the system. If you detect something abnormal during the operations, stop the recovery procedure. Collect “Config Backup” and “Normal” dump with the Auto Dump (SVP02-670), and then contact T.S.D.)

*1: Prepare a one-time password to set SOM157 and SOM970. (It takes about five hours to set SOM157 and SOM970)

*2: Prepare a one-time password to execute force restore of LDEVs.
(It takes about five hours to execute force restore of LDEVs)

(1) Remove the sheet metal of CPK (Basic) (*3) of the opposite side of the CPK (Basic) (*3) for which maintenance is to be performed. See LOCATION SECTION (LOC02-190) and collect the cache SSD.
Before removing the sheet metal and cache SSDs, be sure to perform the procedure shown below.

*3: When you maintain the CPK in the “CACHE-1CA”, the opposite side of the CPK means “CACHE-2CC”.
When you maintain the CPK in the “CACHE-2CC”, the opposite side of the CPK means “CACHE-1CA”.

Procedure to Be Performed

A maintenance person must record cache SSD installation locations (SSD0 or SSD1 in the figure below) and FRU number labels (seal put on the sheet metal of each SSD with 20 digits alphanumeric characters) so that the location and the FRU number of each SSD can correspond to each other.
(Use the table below and enter the FRU numbers in the Before Removal field.)

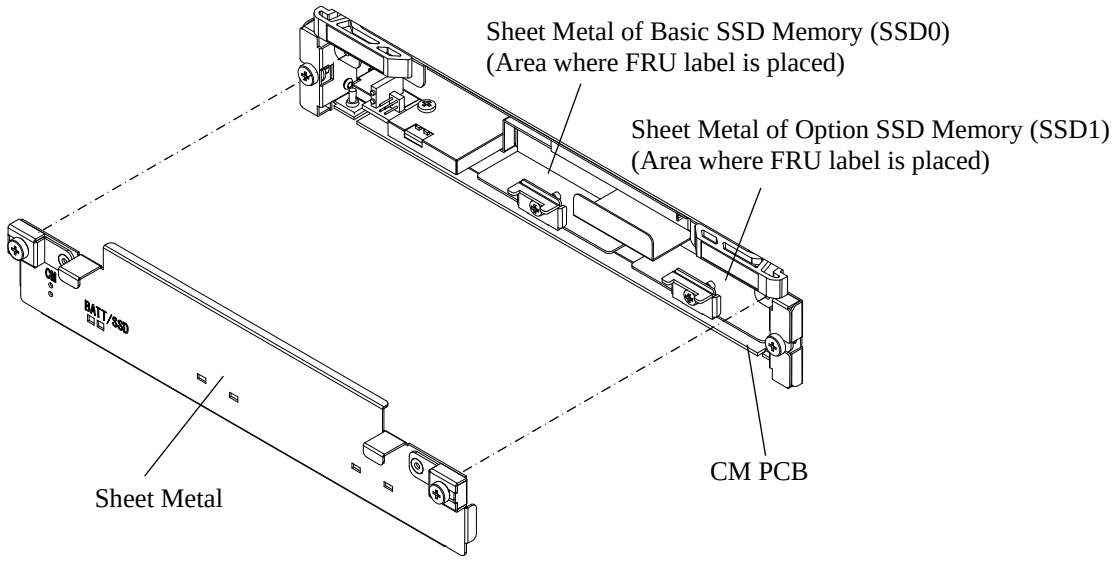


Fig. 5.41-2 Cache SSD Replacement

Enter the FRU number of the cache SSD installed in the CPK which is located in the opposite side of the CPK maintained in step (1).

Table 5.41-7 Recording FRU Number in Cache SSD Replacement

Before Removal (The cache SSD collected in step (1))		After Installation (The cache SSD which you must mount on a new part of CPK (Basic))		Check
SSD Location	FRU Number	SSD Location	FRU Number	
SSD0	xxxxxxxxxxxxxxxxxxxx	SSD0	Enter the number in step (16)	
SSD1	yyyyyyyyyyyyyyyyyyyy	SSD1		

(2) Refer to the SVP SECTION (SVP01-160), and turn off the power supply of the SVP.

(3) Turn off the PDU breakers (PDU-000, PDU-001, PDU-100, PDU-101) that are connected to the DKC.
(Refer to Fig. 35-1 (TRBL35-20))

(4) Turn off the PDU breakers (PDU-010, PDU-011, PDU-020, PDU-021, PDU-030, PDU-031, PDU-040, PDU-041, PDU-050, PDU-051, PDU-110, PDU-111, PDU-120, PDU-121, PDU-130, PDU-131, PDU-140, PDU-141, PDU-150, PDU-151) that are connected to the DKU.
(Refer to Fig. 35-2 (TRBL35-30))

(5) Perform cold replacement for CPK (Basic) (*4) which is located in the opposite side of the maintained CPK with a new part to restore the same configuration as before the maintenance.
(Refer to Fig. 2.2-1 (LOC02-20))
At this time, install cache SSD and cache battery for the new parts. Do not install the cache SSD collected in the step (1).

*4: When you maintain the CPK in the “CACHE-1CA”, the opposite side of the CPK means “CACHE-2CC”.
When you maintain the CPK in the “CACHE-2CC”, the opposite side of the CPK means “CACHE-1CA”.

(6) Remove the CPK (Basic) for which maintenance is to be performed.
(Refer to Fig. 2.2-1 (LOC02-20))

(7) Turn on the PDU breakers (PDU-010, PDU-011, PDU-020, PDU-021, PDU-030, PDU-031, PDU-040, PDU-041, PDU-050, PDU-051, PDU-110, PDU-111, PDU-120, PDU-121, PDU-130, PDU-131, PDU-140, PDU-141, PDU-150, PDU-151) that are connected to the DKU.
(Refer to Fig. 35-3 (TRBL35-40))

(8) Turn on the PDU breakers (PDU-000, PDU-001, PDU-100, PDU-101) that are connected to the DKC.
(Refer to Fig. 35-4 (TRBL35-50))

(9) Refer to the INSTALLATION SECTION "3.14.1 Power ON Procedure" (INST03-14-10), and turn on the POWER ON/OFF switch, and wait until the status becomes System Ready.

Check whether all expected results of POWER ON of table 5.41-8 are met. If any one of them is not met, collect "Config Backup" and "Normal" dump with the Auto Dump (SVP02-670), and then contact T.S.D.

Table 5.41-8 Expected results of POWER ON

#	Item	Expected results
1	Time until the system status becomes System Ready.	The system status becomes System Ready within 130 min after turning on the POWER ON switch.
2	CPK (Basic) PCB Status	PCB Status of the CPK (Basic) for which cold replacement was performed in step (5) is "Normal" after the system status becomes System Ready.
3		PCB Status of the CPK (Basic) removed in step (6) is "Access Error" after the system status becomes System Ready.

(10) After the status becomes System Ready, perform the following operation based on the location of CPK (Basic) maintained in the event of a double failure.

#	Maintenance operations of CPK (Basic) performed in the event of a double failure	Operation
1	Change CM Module (Basic) group size (SVP02-2050)	Refer to the Table 5.41-9
2	Installation of Additional Cache Memory (INST03-10-10) De-Installation of Additional Cache Memory (INST04-03-10)	Refer to the Table 5.41-10
3	Installation of SM Size without adding Cache Memory (INST03-19-10) De-Installation of SM Size without removing Cache Memory (INST04-13-10)	

Table 5.41-9 Case 1: The maintenance was the change of the CM Module group size

The CPK (Basic) maintained in the event of a double failure	Operation
The first CPK (Basic) was maintained.	Restore the configuration of the CM Module of the CPK (Basic) to the same configuration as before the maintenance, and then go to step (11).
The second CPK (Basic) was maintained.	Retry the maintenance operation of CPK (Basic) which failed in the event of a double failure to maintain consistency between the SM data backed up to the cache SSD and the configuration information of the storage system. After completing the maintenance, go to step (11).

Table 5.41-10 Case 2: The maintenance was other than the change of the CM Module group size

The location of CPK (Basic) maintained in the event of a double failure	Operation
CACHE-1CA	Go to step (11).
CACHE-2CC	Retry the maintenance operation of CPK (Basic) which failed in the event of a double failure to maintain consistency between the SM data backed up to the cache SSD and the configuration information of the storage system. After completing the maintenance, go to step (11).

(11) Refer to the INSTALLATION SECTION (INST05-640) and set both System Option Mode 157 and System Option Mode 970 to ON (*1). Wait until SSB = AFB0 (*5) is output (less than 60 minutes).

*5: Make sure to check that SSB = AFB0 is output. If you don't check that SSB is output, you cannot recover the system. If SSB is not output, collect "Normal" dump with the Auto Dump (SVP02-670), and then contact T.S.D.

(12) Refer to the SVP SECTION (SVP01-160), and turn off the power supply of the SVP.

(13) Turn off the PDU breakers (PDU-000, PDU-001, PDU-100, PDU-101) that are connected to the DKC.
(Refer to Fig. 35-1 (TRBL35-20))

(14) Turn off the PDU breakers (PDU-010, PDU-011, PDU-020, PDU-021, PDU-030, PDU-031, PDU-040, PDU-041, PDU-050, PDU-051, PDU-110, PDU-111, PDU-120, PDU-121, PDU-130, PDU-131, PDU-140, PDU-141, PDU-150, PDU-151) that are connected to the DKU.
(Refer to Fig. 35-2 (TRBL35-30))

(15) Remove the CPK (Basic) for which maintenance is to be performed.
(Refer to the Fig. 2.2-1 (LOC02-20))

(16) Replace (*6) the cache SSD collected in step (1) with the cache SSD of the new CPK (Basic) for which cold replacement is performed in step (5).

*6: Leave the CPK (Basic) removed in the step (15) removed.

Note

After installing cache SSDs, enter the FRU numbers corresponding to the installed SSD locations in the After Installation field in the table that was used in Procedure (1) and check that the location and FRU number of each SSD in the After Installation field are identical to those in the Before Removal field. If they are found to be identical, enter OK in the Check field in the table.

Table 5.41-11 Checking FRU Number in Cache SSD Replacement

Before Removal (The cache SSD collected in step (1))		After Installation (The cache SSD which you must mount on a new part of CPK (Basic))		Check
SSD Location	FRU Number	SSD Location	FRU Number	
SSD0	xxxxxxxxxxxxxxxxxxx	SSD0	xxxxxxxxxxxxxxxxxxx	OK
SSD1	yyyyyyyyyyyyyyyyyyy	SSD1	yyyyyyyyyyyyyyyyyyy	OK

(17) Detach the sheet metal of all CPK, and then insert (*7) VOJPs (volatile JP) to all CPK referring to LOCATION SECTION (LOC06-150).

*7: If you don't insert VOJPs to all CPKs, you cannot recover the system. Make sure to check that VOJPs are inserted to all CPKs.

(18) Turn on the PDU breakers (PDU-010, PDU-011, PDU-020, PDU-021, PDU-030, PDU-031, PDU-040, PDU-041, PDU-050, PDU-051, PDU-110, PDU-111, PDU-120, PDU-121, PDU-130, PDU-131, PDU-140, PDU-141, PDU-150, PDU-151) that are connected to the DKU. (Refer to Fig. 35-3 (TRBL35-40))

(19) Turn on (*8) the PDU breakers (PDU-000, PDU-001, PDU-100, PDU-101) that are connected to the DKC.
(Refer to Fig. 35-4 (TRBL35-50))

*8: Please check that SHUT DOWN LEDs (LOC03-30) of all CPKs light up.
If any one of SHUT DOWN LEDs doesn't light up, contact T.S.D.

(20) Refer to the INSTALLATION SECTION "3.14.1 Power ON Procedure" (INST03-14-10), and turn on the POWER ON/OFF switch, and wait until the status becomes System Ready.

Check whether all expected results of POWER ON of table 5.41-12 are met. If any one of them is not met, collect "Normal" dump with the Auto Dump (SVP02-670), and then contact T.S.D.

Table 5.41-12 Expected results of POWER ON

#	Item	Expected results
1	Time until the system status becomes System Ready.	The system status becomes System Ready within 130 min after turning on the POWER ON switch.
2	CPK (Basic) PCB Status	PCB Status of the CPK (Basic) removed in step (15) is "Access Error" after the system status becomes System Ready.
3		PCB Status of the CPK (Basic) in which the cache SSD was replaced in step (16) is "Normal" after the system status becomes System Ready.
4	SHUT DOWN LEDs of all CPKs	SHUT DOWN LEDs of all CPKs (Refer to LOC03-30) light up.

(21) After the status becomes System Ready, remove VOJPs (volatile JP) from all CPK referring to LOCATION SECTION (LOC06-150), and then install the sheet metal of all CPK.

(22) Complete all SIM-RC = FFFE0X.

(23) Refer to the INSTALLATION SECTION (INST05-640) and set System Option Mode 970 to OFF (*1). Wait until SSB = AFB0 (*9) is output
(less than 60 minutes).

*9: Make sure to check that SSB = AFB0 is output. If you don't check that SSB is output, you cannot recover the system. If SSB is not output, collect "Normal" dump with the Auto Dump (SVP02-670), and then contact T.S.D.

(24) Replace (*10) the CKP (Basic) removed in step (15) with a new part.

*10: Perform dummy replacement if originally CPK (Basic) maintenance and was replaced by a new part.

(25) When SIM-RC = FFCE0X, SIM-RC = FFCFYX, or SIM-RC = 6100-02 was reported, you might lose user data and configuration information. Please isolate a faulty part with reference to TRBL05-900.
When the faulty part is CPK (Basic) replaced in step (24), if the failure was recovered in step (24), there is no problem. Complete the related SIM.

(26) Perform force restore (*2) of pool-VOLs and DP-VOLs.
(Refer to SVP02-960)

(27) Refer to the INSTALLATION SECTION (INST05-640) and set System Option Mode 157 to OFF (*1)

(28) Back up necessary user data in DP-VOL to the storage for backup.

(29) Perform pool initialization with reference to TRBL20-100.

(30) Restore the backup data from the storage for backup to DP-VOL.

(31) Examine the user data.

6. TrueCopy for Mainframe/TrueCopy/HAM Error Recovery

6.1 Recovery Procedure for TrueCopy for Mainframe Error

Hardware error sometimes causes TrueCopy for Mainframe error which is a pair suspend or a path disable.
This document explain the TrueCopy for Mainframe Error and how to recover it.
Following reports indicate TrueCopy for Mainframe error occurrence.

- SIM report of TC-MF path disable occurrence
- SIM report of TC-MF pair suspend occurrence
- SIM report of RCU Acute or Serious Level SIM detection
- SIM report of RCU Moderate Level SIM detection

Table 6.1-1 TrueCopy for Mainframe SIM REF.CODE

SIM REF. CODE	Meaning	Remarks
D4XY-YY	TC-MF pair is suspended	X:0~5 or FYYY:LDEV number
D4EY-YY	RCU Acute or Serious Level SIM reported	YYY:LDEV number
D4DY-YY	RCU Moderate Level SIM reported	YYY:LDEV number
2180-XY	TC-MF path is disabled	X: CHA PCB # Y: Port# in PCB
2182-XY	MCU has received the notification of communication line error detection from extender.	X: CHA PCB # Y: Port# in PCB

Following pages explain each error type of TrueCopy for Mainframe Error and recovery flow chart for the TrueCopy for Mainframe Error is showed. Concerning to the Disaster Recovery Procedures, please refer to THEORY SECTION (THEORY03-13-370 ~ 480).

Note: Please check a fence Level Parameter for the suspended pair by SVP Pair Option. And if M-VOL Fence Level is ‘R-VOL Data’ or M-VOL Fence Level is ‘R-VOL Status’ and suspended SIM is ‘D4FYYY’, write I/O operations to the M-VOL will be rejected (THEORY03-13-250). So you must execute Delete Pair for the suspended pair, before execution of the recovery flow chart.
If you find out the F/M = ‘8F’ SSB log which have following error code (C870, C871, C872), it is not the original cause of the suspended pair. It means that the SSB log is created by the pair status change timing. So you have no need to execute a recovery action.

6.2 TrueCopy Error Recovery Procedure

A TrueCopy pair suspension or a TrueCopy pass blockade may occur owing to hardware errors. This section explains the recovery procedure against them.
Occurrences of TrueCopy errors can be known through the following.

- TrueCopy error message on the Syslog outputted by the RAID manager/TrueCopy *
- Report of a TrueCopy pass blockade occurrence by the SIM
- Report of a TrueCopy pair suspension occurrence by the SIM

Table 6.2-1 TrueCopy SIM REF.CODE

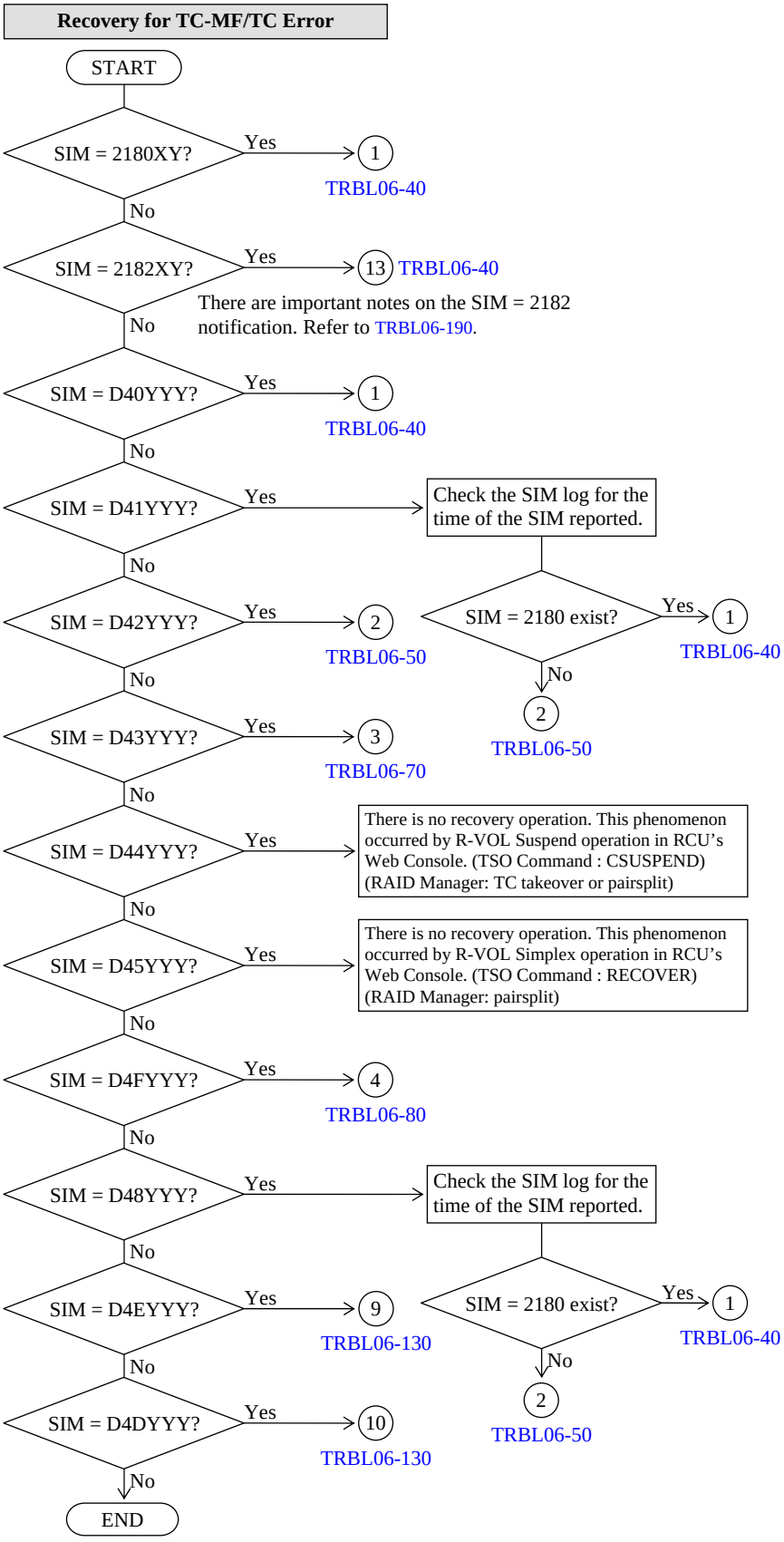
SIM REF. CODE	Meaning	Remarks
D4XY-YY	TrueCopy pair suspend	X: 0 - 2, 4 - 5 or FYYY: LDEV number
2180-XY	TrueCopy pass blockade	X: CHA PCB # Y: Port# in PCB
2182-XY	MCU has received the notification of communication line error detection from extender.	X: CHA PCB # Y: Port# in PCB

SIM outputted when the TrueCopy is suspended or the TrueCopy pass is blocked has the same REF. CODE and meaning as those outputted when the TrueCopy for Mainframe pair is suspended or the TrueCopy for Mainframe pass is blocked.
Furthermore, the error recovery procedure is the same as that against an TrueCopy for Mainframe error. Therefore, follow the procedures shown in the flowcharts on page TRBL06-30 and succeeding pages to recover from a TrueCopy pair error.

When a message indicating that a TrueCopy pair error has occurred is displayed on the Syslog, check the SIM log of the connected DKC and confirm the conformance of the message on the Syslog with the SIM logged on the DKC side before starting the recovery using the above flow chart.

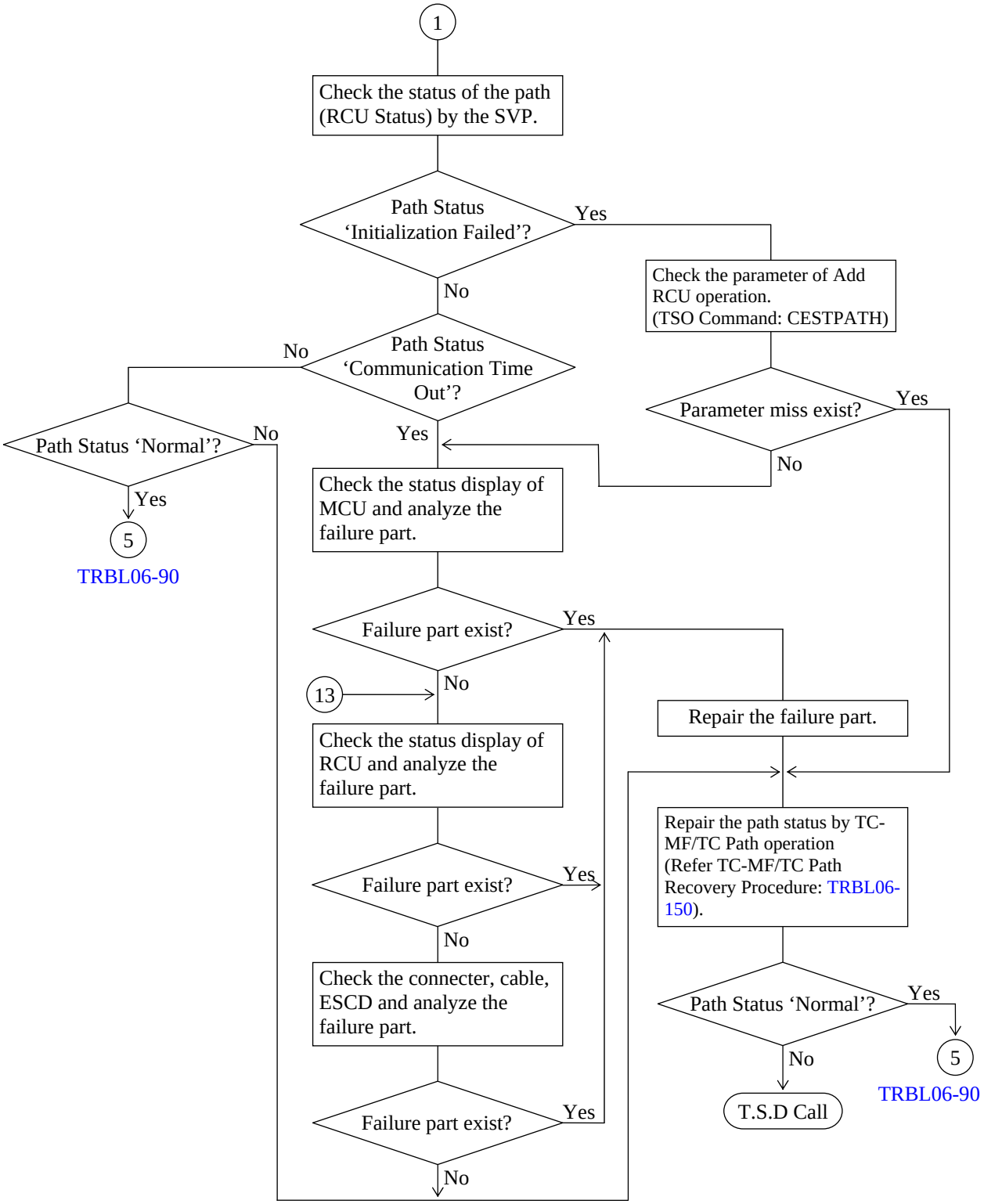
*: When the TrueCopy pair is suspended, the RAID manager/TrueCopy displays the following message on the Syslog.

[HORCM_102] Detected a suspending status on this paired volume
(Volume: ○○○○, code: XXXX).
○○○○ : Volume name
XXXX : Factor code



Note : You can control and manage your TC-MF configuration by using TSO commands or DSF commands for PPRC.

TC-MF/TC Path Recovery Section



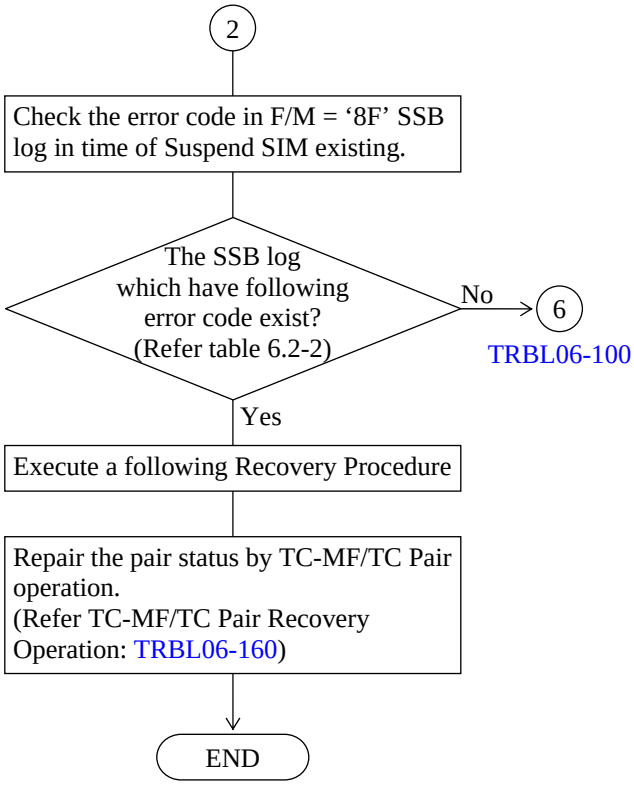
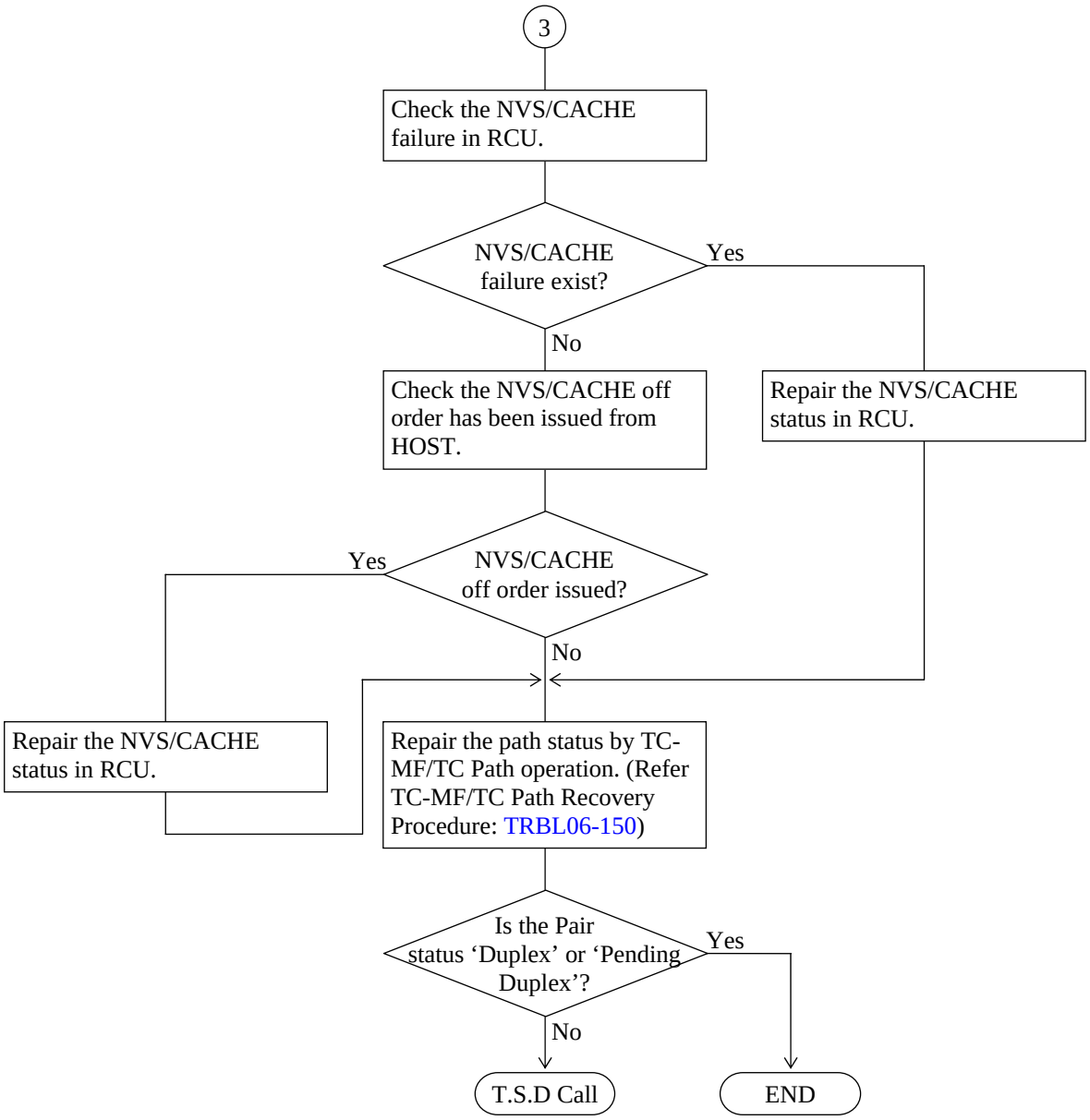
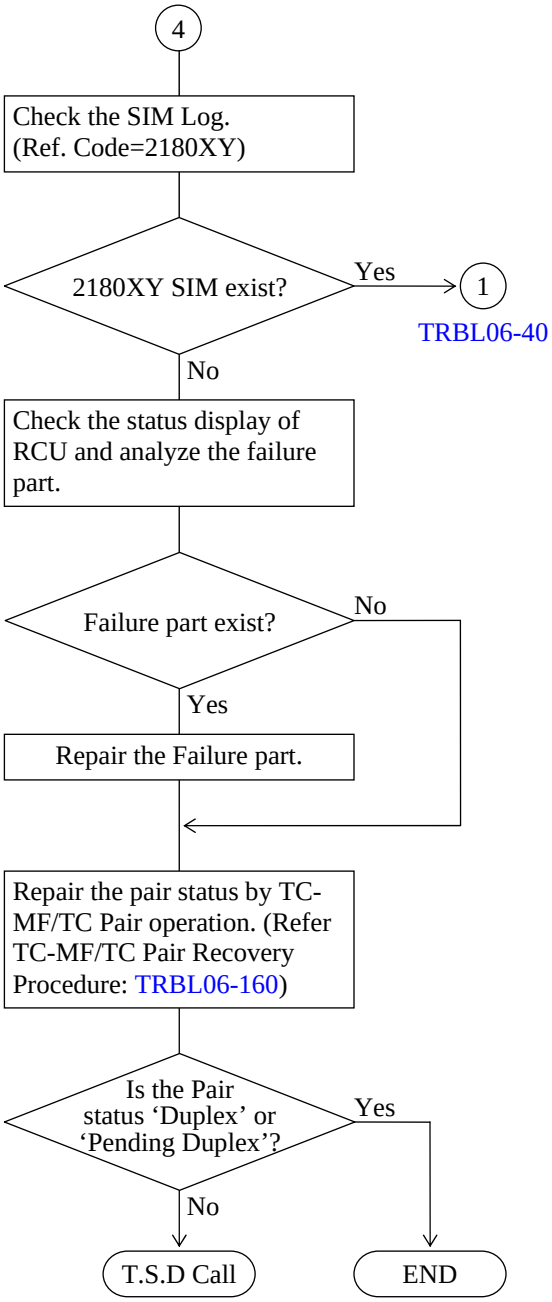
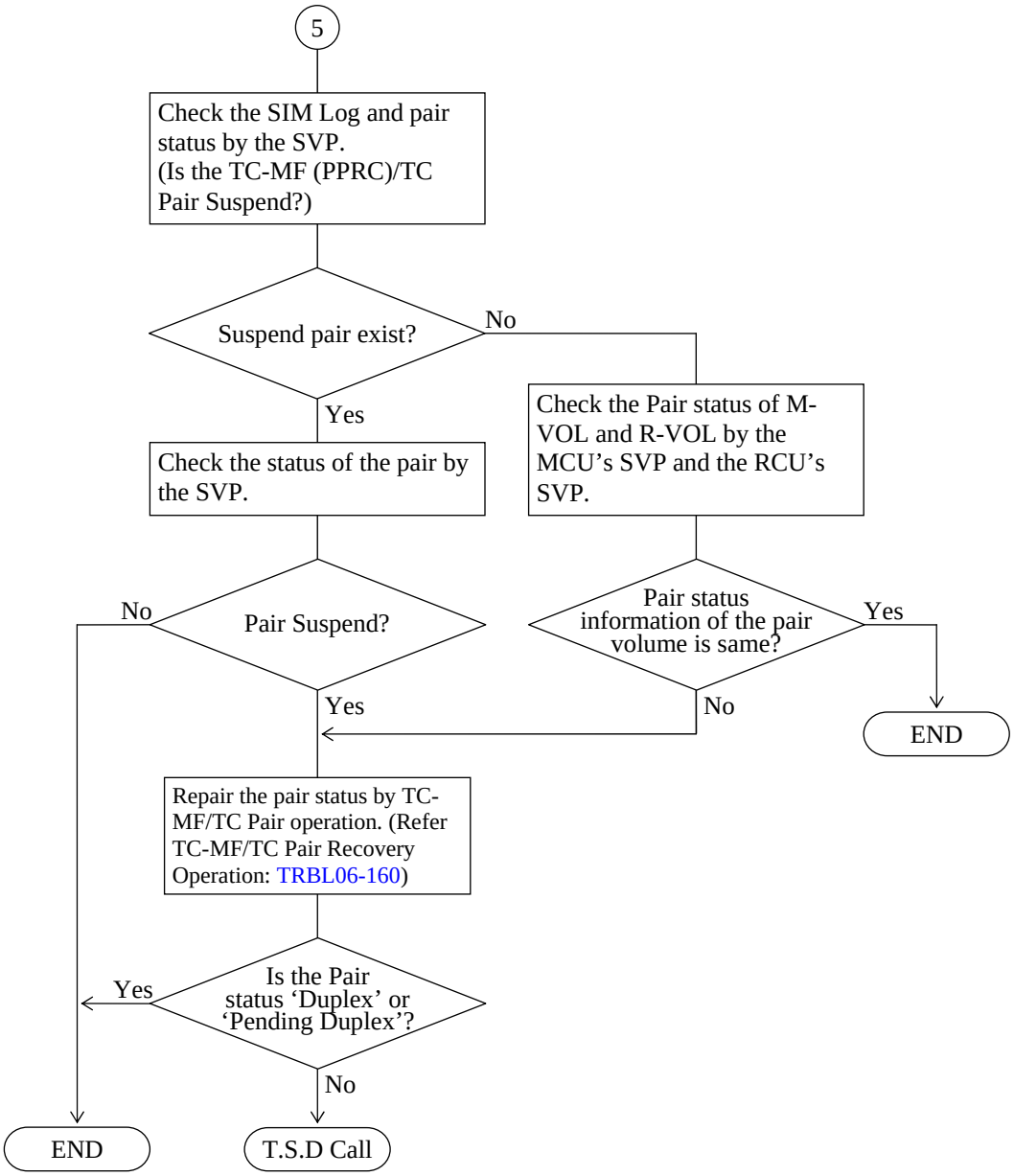


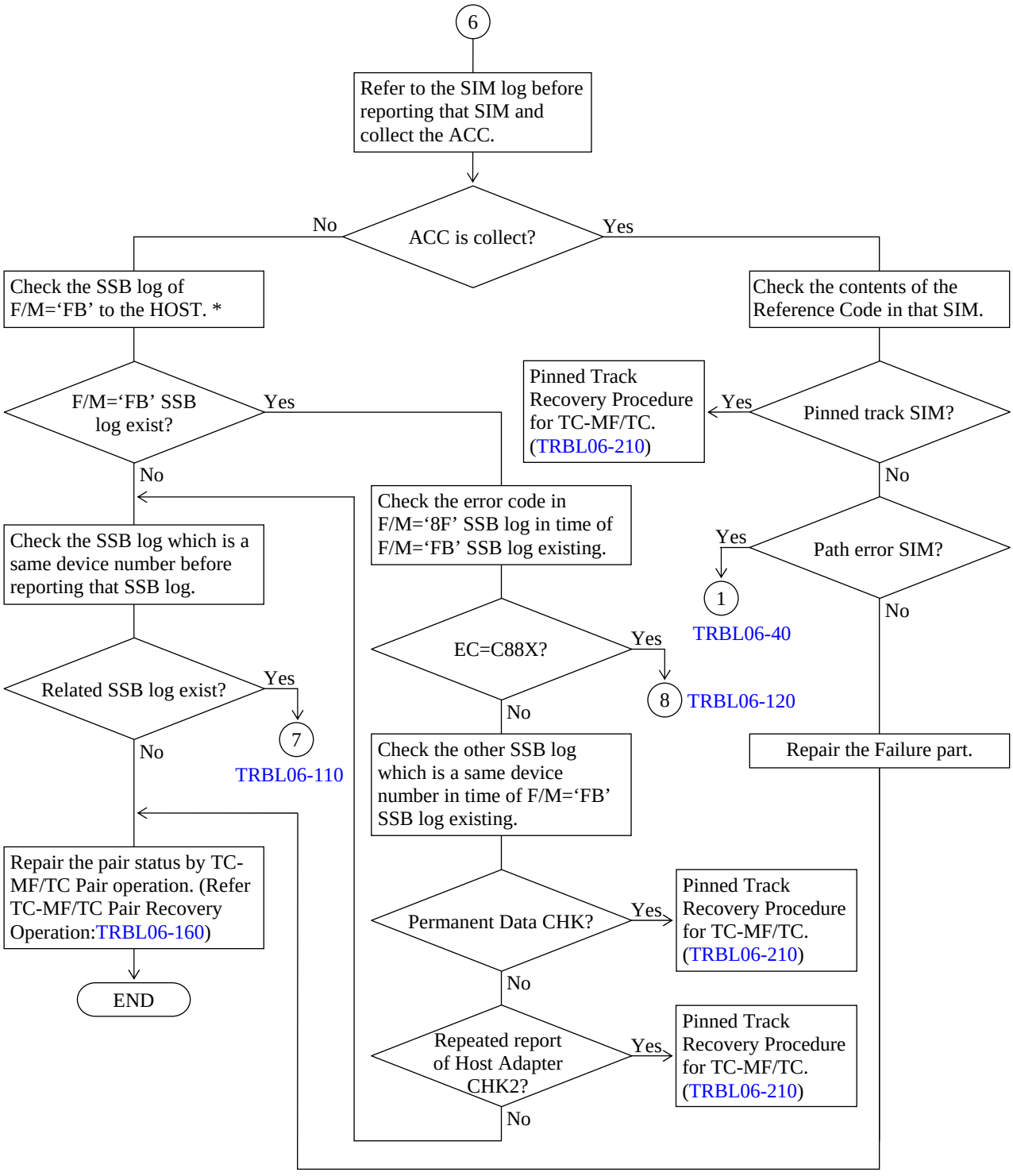
Table 6.2-2 TrueCopy for Mainframe Recovery Procedure for F/M = '8F'

No.	F/M	error code	mean	Recovery Procedure
1	8F	C4CE	Detect a nonstandard R0 track in M-VOL. (TC-MF or PPRC operation)	Change the track format to standard R0 track for the following track. CCHD is as follows. (use DSF INSPECT NOPRESERVE) LDEV in the 'SSB log' window : M-VOL# SSB log byte44/45:CYL# byte46:HD#

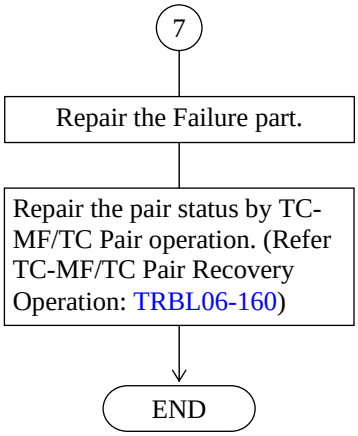


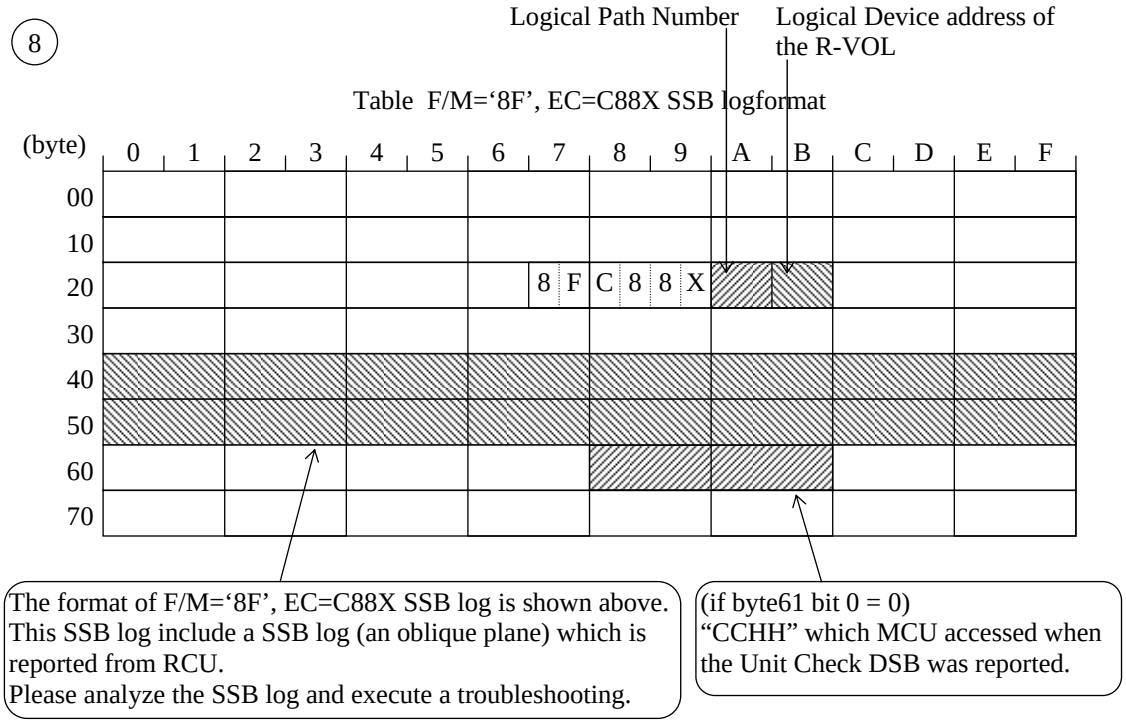


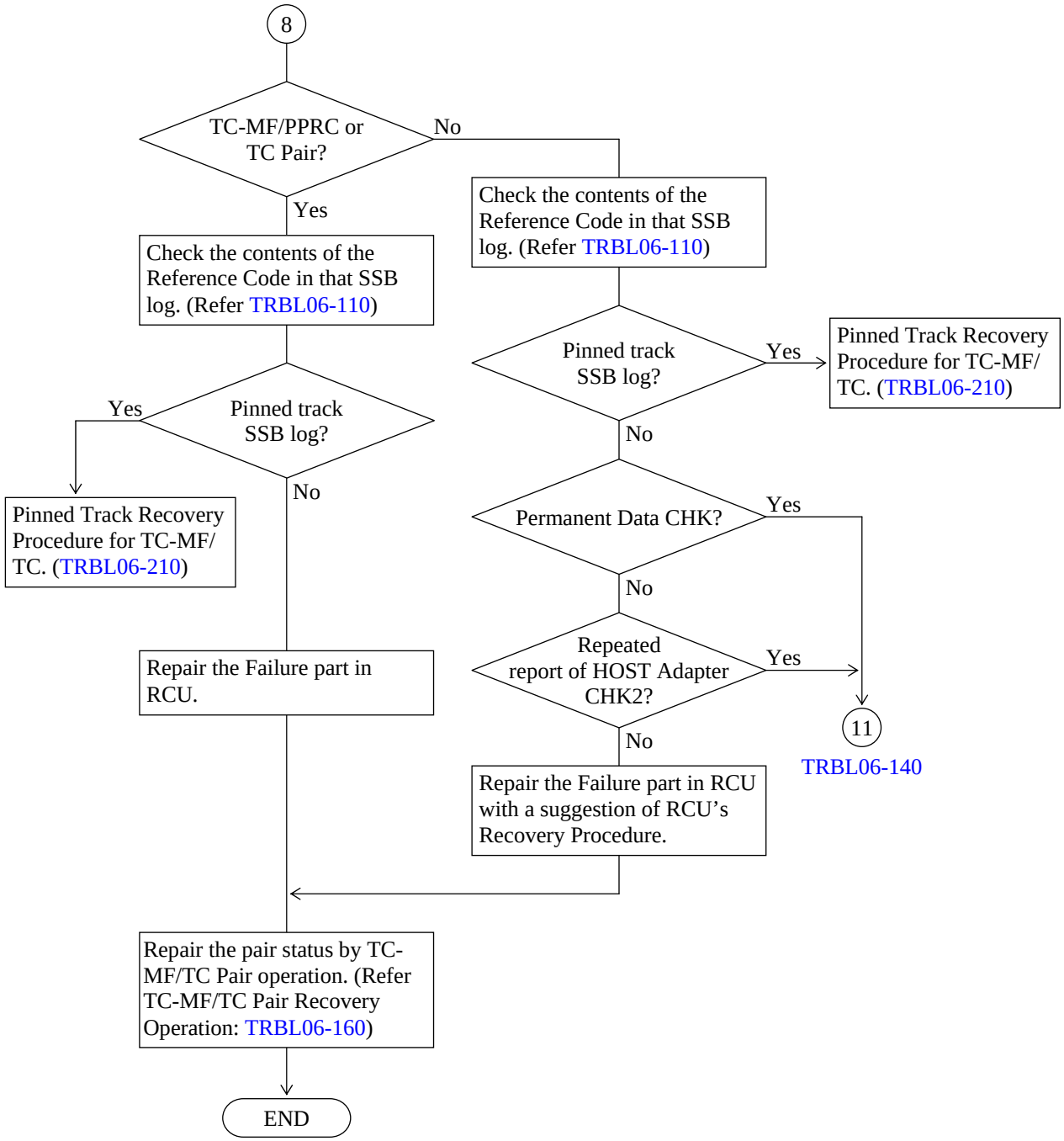


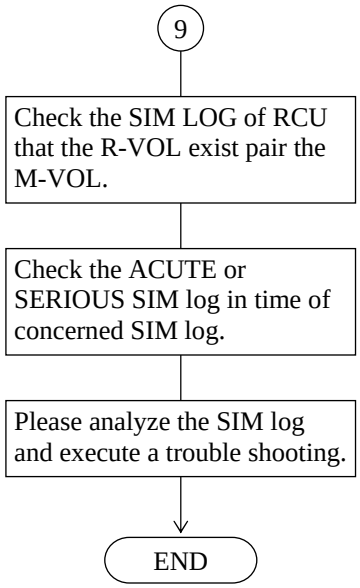


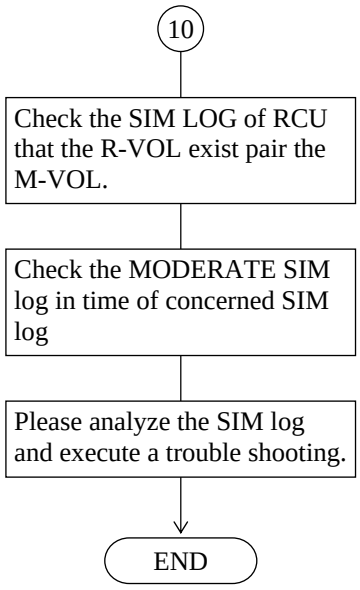
*: In the case of the TrueCopy, confirm the SSB Log of F/M='FB' in the suspended volume concerned. When the log of 'FB' does not exist, confirm the SSB error code of FM='FB' in the time zone for reporting a SIM concerned.

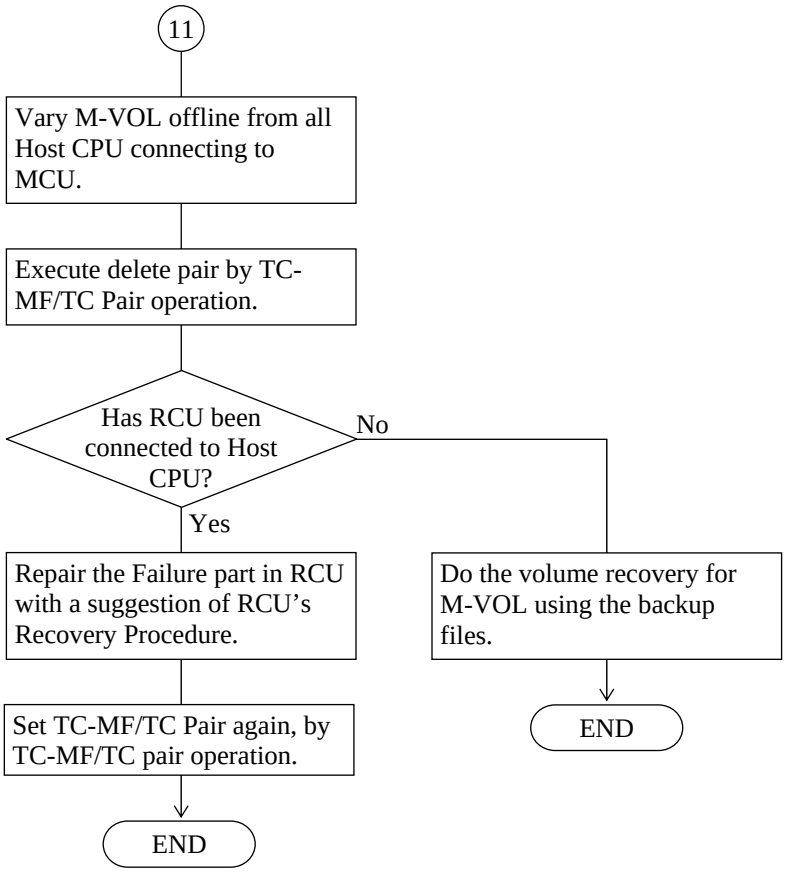




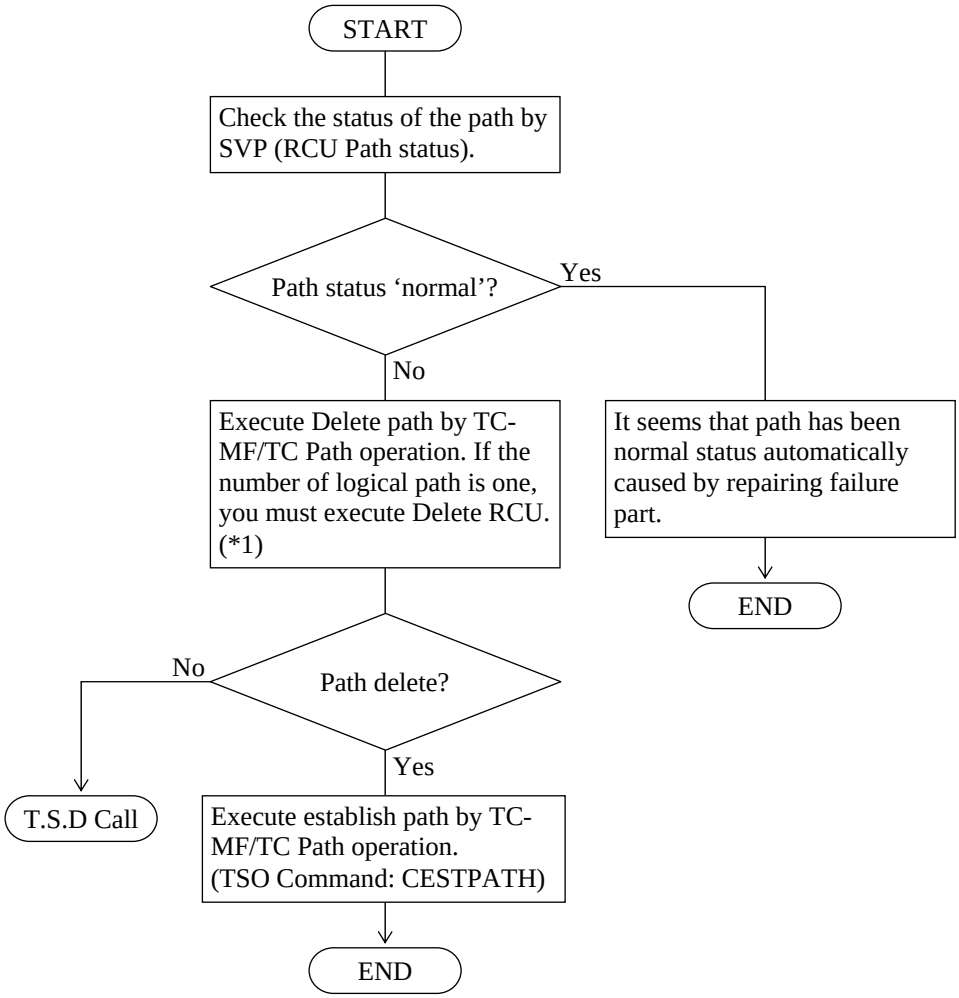






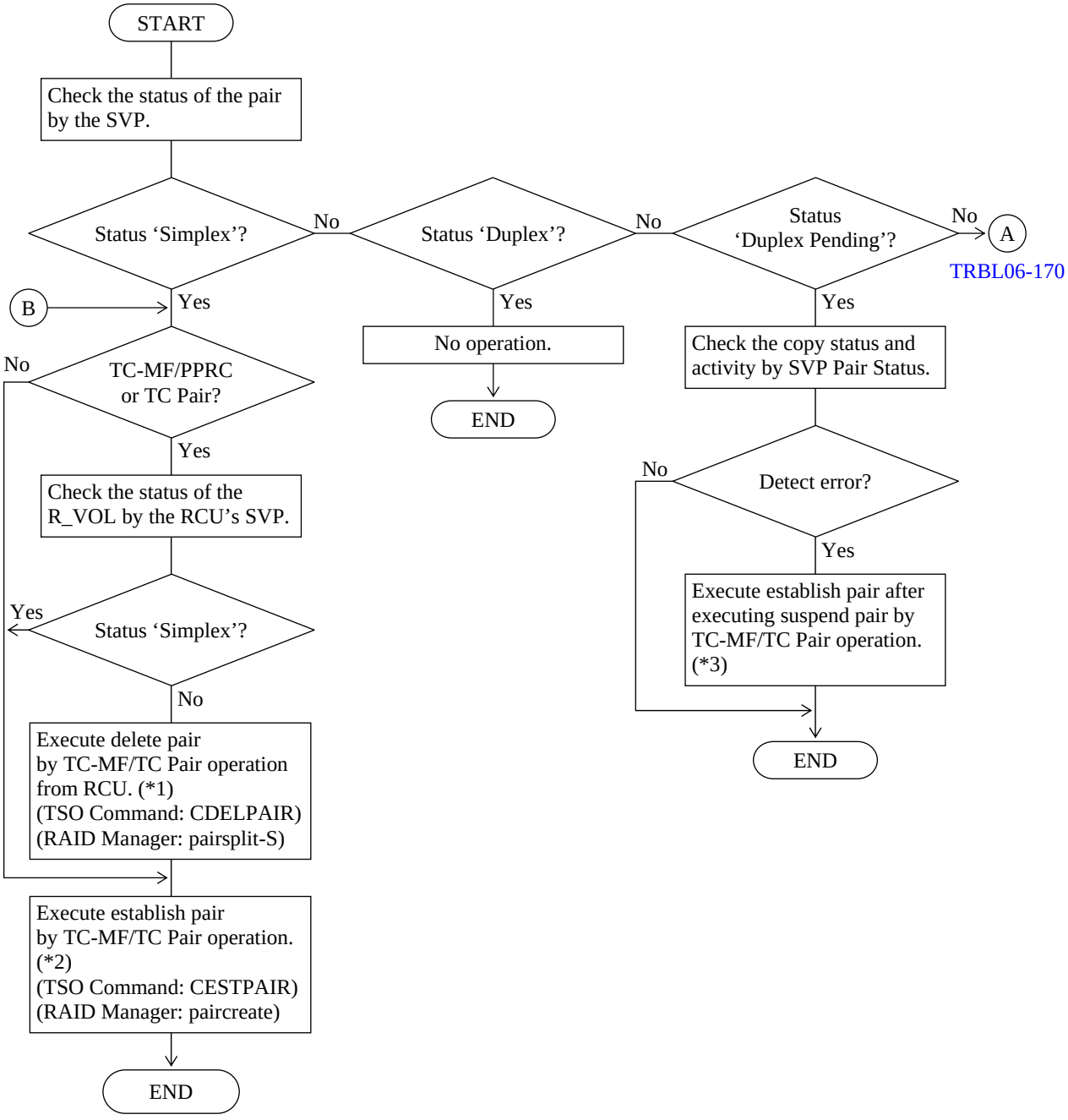


TC-MF/TC Path Recovery Procedure



*1: For TSO Command operation, you issue CESTPATH Command, specified the path that established by the last CESTPATH Command issued except failed path. If the number of logical path is one, you must issue CDELPATH Command. (Refer IBM PPRCOPY Commands Manual)

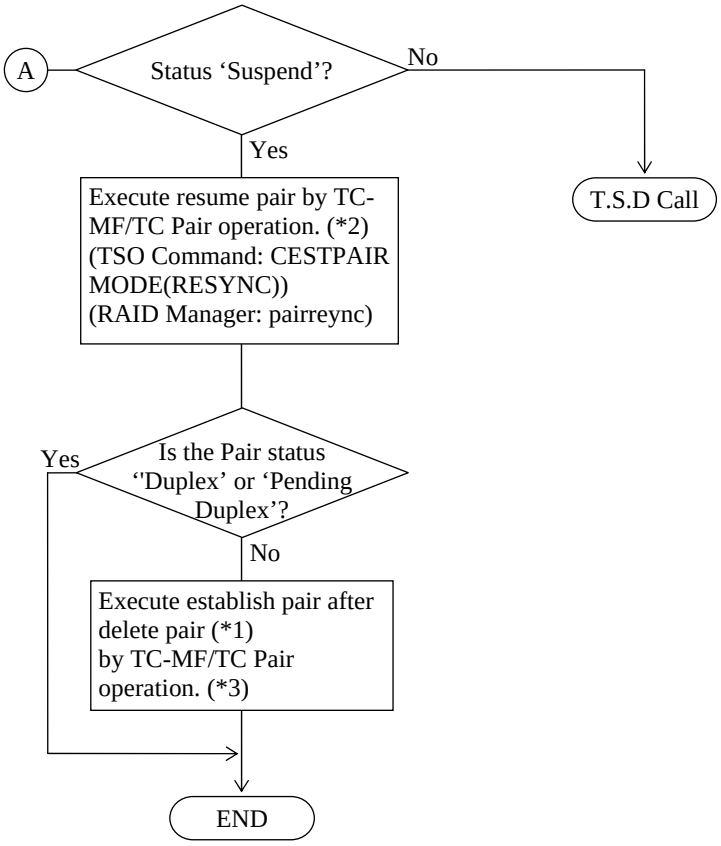
TC-MF/TC Pair Recovery Operation (1/2)



*2: If delete pair operation is executed according to *1, please establish pair operation to these TC-MF/TC pairs.

*3: For TSO Commnad operation, you issue CESTPAIR Command after CSUSPEND Command issued In the case of the RAID Manager, issue the Pairresync command after the Pairsplit command is issued.

TC-MF/TC Pair Recovery Operation (2/2)



*1: If delete pair operation does not complete, please try force delete pair operation.

*2: If TrueCopy pair detail is 'SSWS (S-VOL Swapping)' on the RAID manager (pairdisplay-fc), please execute resync pair operation (pairresync-swaps).

*3: For TSO Command operation, you issue CESTPAIR Command after CDELPAIR Command issued.
In the case of the RAID Manager, issue the Paircreate command after the Pairsplit-S command is issued.

Recovery Operation of the Suspended TrueCopy Pair

This document which is addition of the TrueCopy for Mainframe/TrueCopy Pair Recovery Operation (TRBL06-160) explain the recovery operation for the suspended TrueCopy pair in the extended LU.

After repairing the failure part, execute a resume (pair resync) operation for the suspended pair. TrueCopy resume operation can be executed from SVP, Web Console, and RAID Manager. A means, an object and a procedure of the resume operation are shown in a following table.

Table6.2-3 TrueCopy Resume Operation Procedure in the extended LU

means	object	procedure
Web Console	Logical Unit	(1) Check the volume number of the suspend pair from the F/M = “FB” SSB. (2) Check the LU pair status which comprises the suspended pair volume is a “PSUS”, “PSUE”, or “PDUB”. (3) Execute a “Pairresync” operation to the LU pair. (4) Check the pair status is a “Pair” (“Duplex”) or a “Copy” (“Pending Duplex”).
RAID Manager	Logical Unit	(1) Check the volume number of the suspend pair from the F/M = “FB” SSB. (2) Check the LU pair status which comprises the suspended pair volume is a “PSUS”, “PSUE”, or “PDUB”. (3) A pairresync command issues to the suspended LU pair. (4) Check the pair status is a “Pair” (“Duplex”) or a “Copy” (“Pending Duplex”).

If pair status does not change “Pair” (“Duplex”) or a “COPY” (“Pending Duplex”) after executing a “Pairresync” operation (pairresync command for RAID Manager), please try “Pairsplit -S” operation (pairsplit -s command for RAID Manager), and execute “Paircreate” operation (paircreate command for RAID Manager) again.

Procedure when the host hangs
If a host hangs up while it is writing data in TrueCopy P-Vols, data difference between paird P-Vol and S-Vol may occur because of reasons as follows.

1. A write command didn't finish normally for some reason in DKC and it reported check condition to the host, but because of the hang-up, the host didn't retry the command.
2. During a process of a write command in DKC, a reset message was issued from the host and stopped the write command process, but because of the hang-up, the host didn't retry the command.

In this case, since write data of the last write command before hang-up was not written on the disk completely, please restart the job in order to complete the aborted command.

Recovery procedure when an error of TrueCopy pair operation occurs
When either MCU or RCU is in a highly loaded condition, a pair operation (a command for paircreate, pairsplit, or pairsplit-S) from a RAID Manager to one or multiple TrueCopy pair volume(s) may fail in (EX_CMDRJE or EX_CMDIOE). In this case, please check the pair status of the volumes that are objects of the operation. If the status is the same as before the pair operation, please retry the same pair operation.

Special mentions on SIM = 2182-XY
The SIM = 2182 host report is supported for the TrueCopy for Mainframe/TrueCopy activity with the CNT extender (Ultranet) between the MCU and RCU.
The SIM = 2182 indicates that the extender has detected a failure that occurred in a communication line and the failure has been reported to the MCU.
However, there are several special mentions on the SIM = 2182 report.

[Special mentions]
① When one extender has some alternative communication lines and a failure occurs on one line, the device will retry for another active line. Therefore, no line failure report is sent from the extender when the retrying succeeds.
② -The remote copy logical path that has received a line failure notification from the line extender is blocked (Path status: Communication Time Out).
-When recovering the logical path, please follow the TrueCopy for Mainframe/TrueCopy Path Recovery Procedure (TRBL06-150).

Special note of pair recovery procedure when SIM=D4FY-YY is generated
The special note in the recovery procedure from Web Console when this SIM is generated when Paircreate or the Resume operation is executed, and the state of the pair enters the following states is shown below.

■ When this SIM is generated when pair create is operated
It ..state of the pair.. ..following.. explains the deletion of the object pair (make to Simplex(SMPL)) on the RCU side when becoming PVOL = Simplex(SMPL), SVOL = Duplex(PAIR) or Pending(COPY).

The recovery procedure:
Please execute the recovery work referring to this trouble shoot section usually.

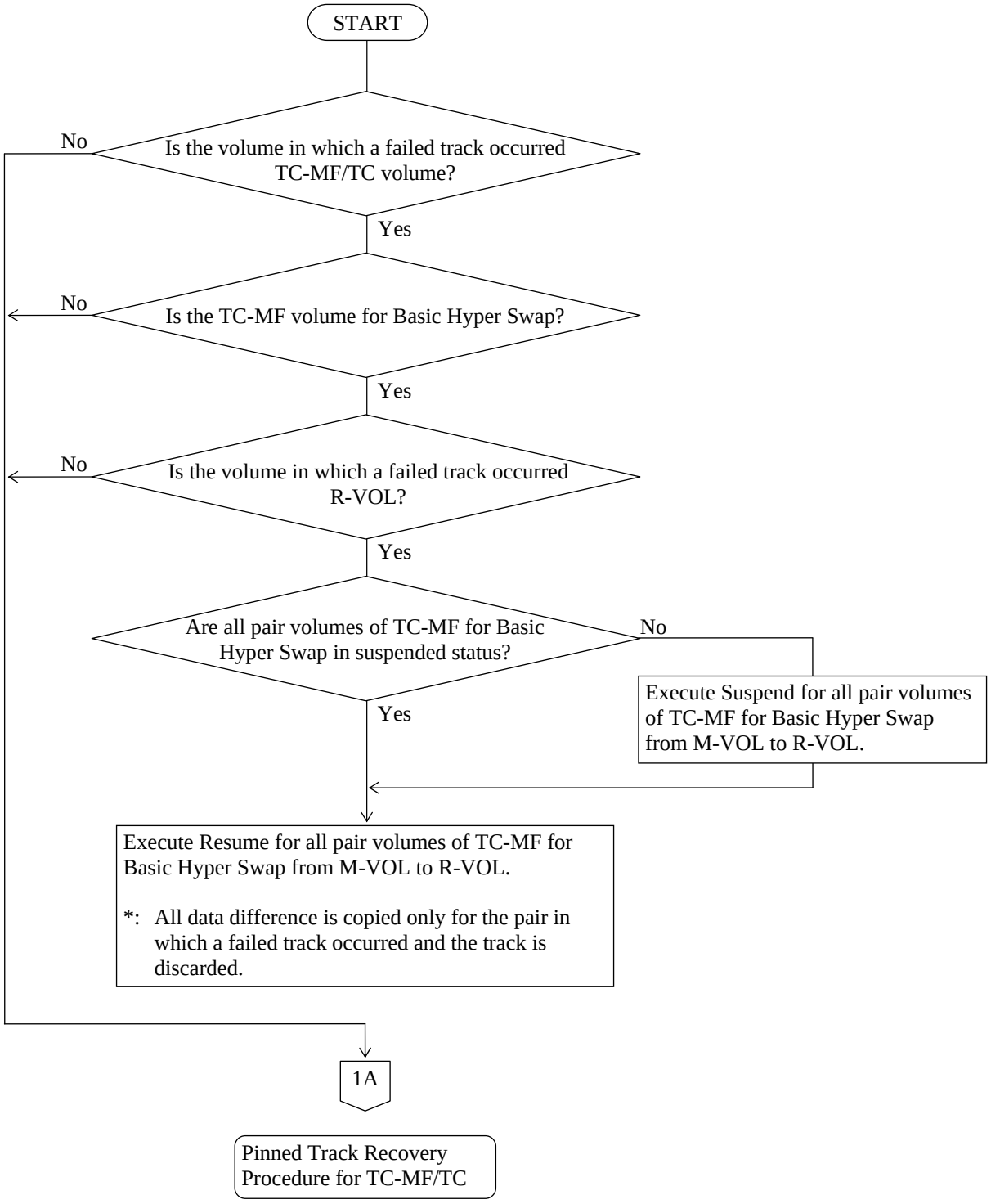
(1) For TrueCopy/TrueCopy for Mainframe
The Delete pair operation is executed to SVOL, and it wishes the execution of Pair create again.

■ When this SIM is generated when Resume is operated
The state of the pair is PVOL = Suspend(PSUx), SVOL = Duplex(PAIR) or Pending. (COPY)

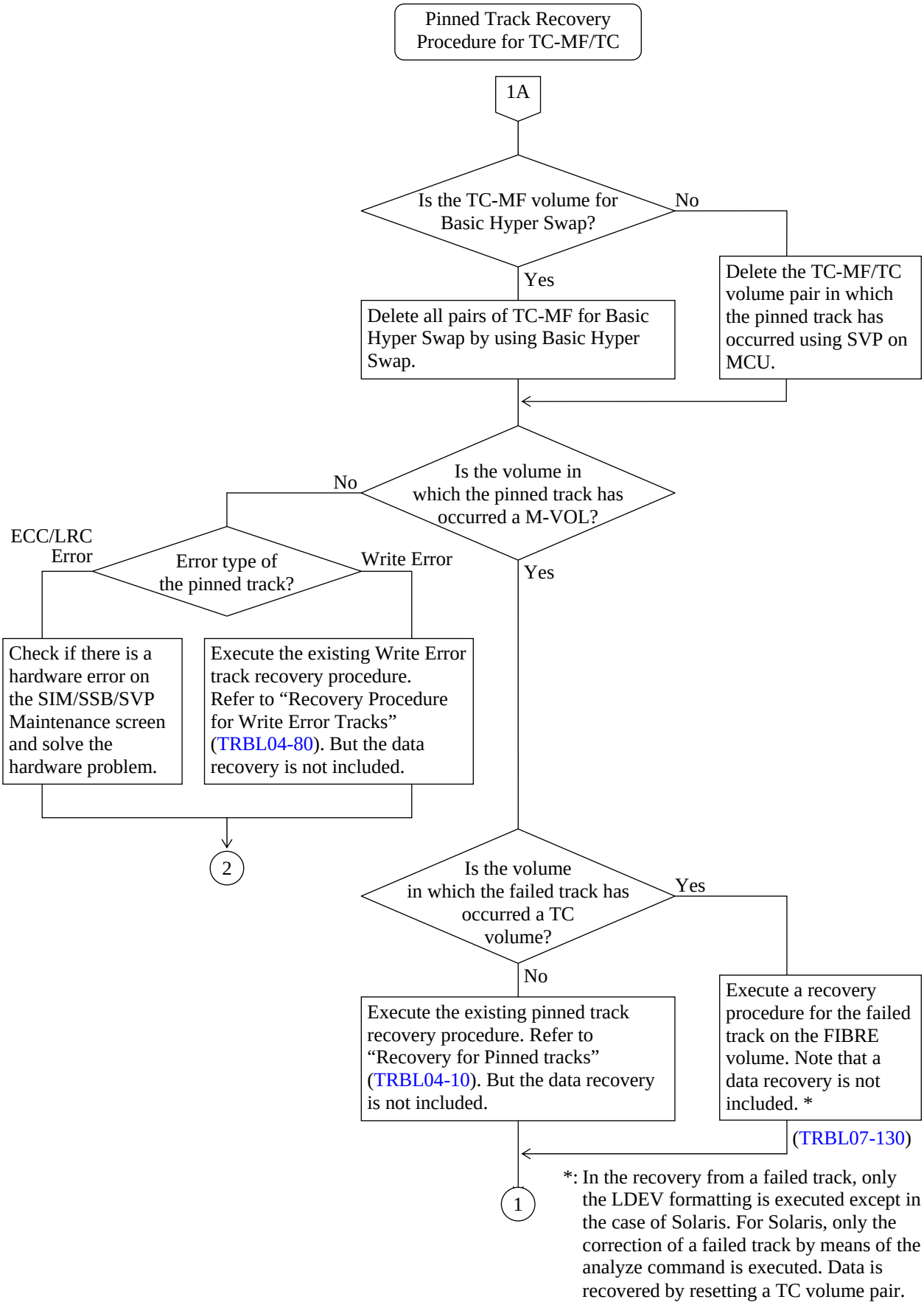
The recovery procedure:
Please execute the recovery work referring to this trouble shoot section usually.

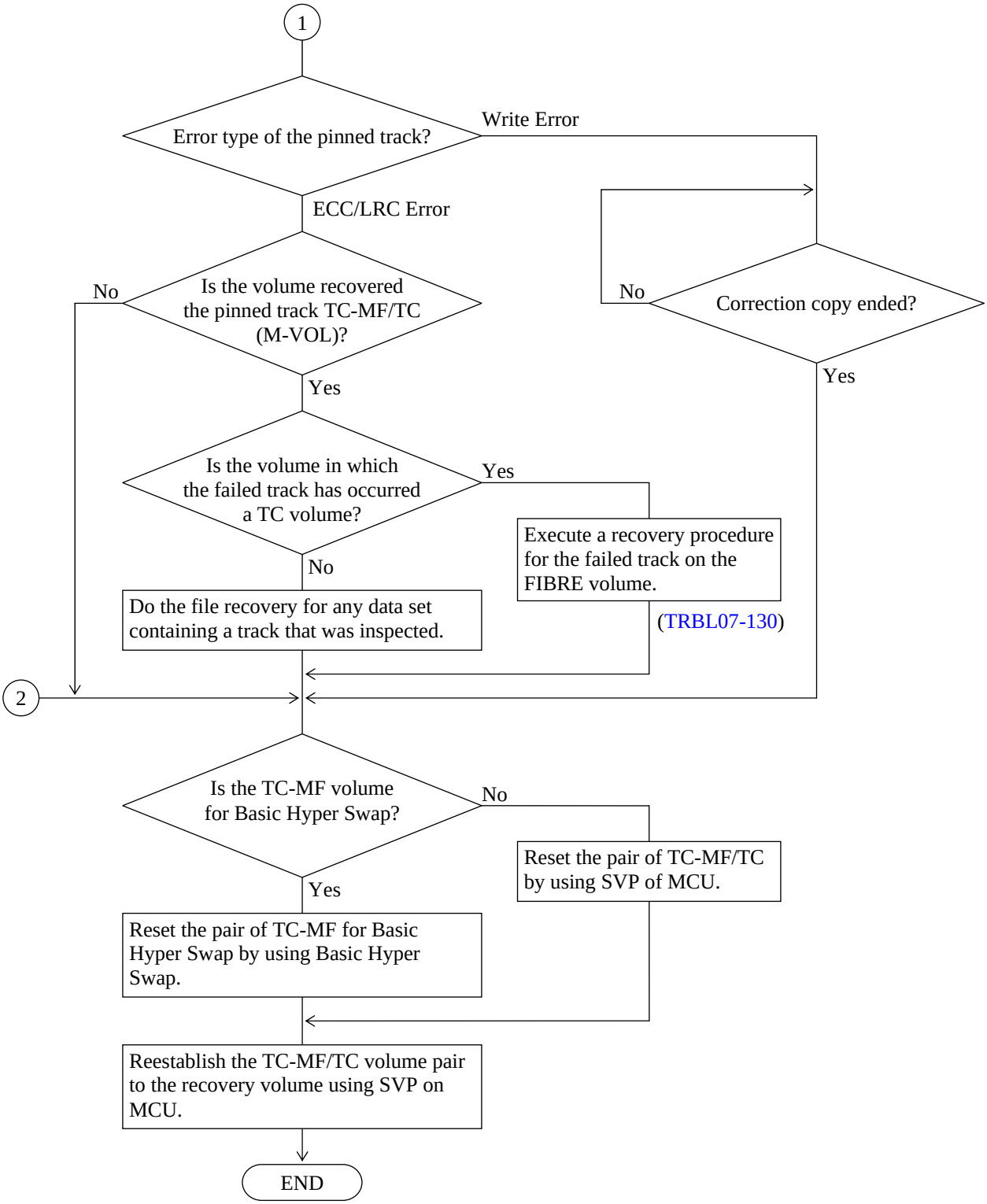
6.3 Pinned Track Recovery Procedure for TrueCopy for Mainframe/TrueCopy

Pinned track recovery procedure for TrueCopy for Mainframe/TrueCopy is as follows.



Note: If the pinned track has occurred in both M-VOL and R-VOL, recover the volumes according to the following sequence.
TrueCopy for Mainframe/TrueCopy : ① M-VOL → ② R-VOL





6.4 Recovery Action of Path Status Error

Path Status	Factor	Recovery Action
“Nothing”	Establishing path or deleting path	Delete the path with “Edit Path” or “Delete RCU”, add a new path with “Edit Path” or “Add RCU”.
“Initialization Failed”	Incorrect the physical connection between the MCU and RCU	Correct the physical path connection between the MCU, RCU and the path relay equipment.
	Incorrect the Port topology settings.(Fibre connection)	Setup the port topology of the both MCU and RCU correctly.
	Blockade of the MP or Port on the RCU.	Repair the MP status or Port status on the RCU.
	Broken the connection cable physically.	Replace the broken cable.
	Incorrect the path relay equipment settings or the path relay equipment doesn't work.	Correct the path relay equipment settings or repair it.
“Communication Time Out”	Blockade of the MP or Port on the MCU.	Repair the MP status or Port status on the MCU.
“Resource Shortage (MCU)”	MCU resource over.	Too many path in the MCU or the RCU.Delete the paths and RCUs not currently in use.
“Resource Shortage (RCU)”	RCU resource over.	
“Serial Number Mismatch”	Incorrect the RCU S/N or Controller ID. (Fibre connection)	Delete the path with “Delete RCU”, add a new path with the correct RCU S/N and Controller ID with “Add RCU” again.
	Incorrect the physical connection between the MCU and RCU.	Correct the physical path connection between the MCU, RCU and the path relay equipment.
	Incorrect the Port topology settings. (Fibre connection)	Setup the port topology of the both MCU and RCU correctly.
	Blockade of the MP or Port on the RCU.	Repair the MP status or Port status on the RCU.
	Broken the connection cable physically.	Replace the broken cable.
	Incorrect the path relay equipment settings or the path relay equipment doesn’t work.	Correct the path relay equipment settings or repair it.

(To be continued)

(Continued from the preceding page)

Path Status	Factor	Recovery Action
“Invalid Port”	Specified port is not existence on the MCU.	Delete the path with “Edit Path” or “Delete RCU”, add a new path with correct port on MCU again.
	Incorrect specified port type “Serial/Fibre”.	Delete the path with “Edit Path” or “Delete RCU”, add a new path with correct port type “Serial/Fibre” again.
	Specified MCU port type is not Initiator.	Change the channel type of the MCU port to Initiator.
	Incorrect the specified CU of MCU. (Serial connection)	Delete the path with “Edit Path” or “Delete RCU”, and add a new path with correct CU again.
	Incorrect the specified link address. (Serial connection)	When MCU and RCU connects directly, set the link address to except "00".When MCU and RCU does not connect directly, set the link address to “00”.
	Exists the same path.	Confirm the MCU port , link address or RCU port, and logical address or CU#, and delete the path with “Edit Path”.
“RCU Port Number Mismatch”	Incorrect the specified RCU port.	Delete the path with “Edit Path” or “Delete RCU”, and add a new path with correct RCU port again.
	Incorrect the physical connection between the MCU and RCU.	Correct the physical path connection between the MCU, RCU and the path relay equipment.
	Incorrect the Port topology settings. (Fibre connection)	Setup the port topology of the both MCU and RCU correctly.
	Blockade of the MP or Port on the RCU.	Repair the MP status or Port status on the RCU.
	Broken the connection cable physically.	Replace the broken cable.
	Incorrect the path relay equipment settings or the path relay equipment doesn't work.	Correct the path relay equipment settings or repair it.
“RCU Port type is not RCU Target”	Incorrect specified RCU port.	Delete the path with “Edit Path” or “Delete RCU”, and add a new path with correct RCU port again.
	Specified RCU port type is not RCU Target.	Change the channel type of the RCU port to RCU Target.
“Communication Failed”	Blockade of the MP or Port on the RCU.	Repair the MP status or Port status on the RCU.
	The path relay equipment doesn’t work.	Repair the path relay equipment

(To be continued)

(Continued from the preceding page)

Path Status	Factor	Recovery Action
“Logical Blockade”	MCU Port doesn’t work.	Repair the port status on the MCU.
	RCU Port doesn’t work.	Repair the port status on the RCU, and delete the path with “Edit path” or “Delete RCU” and add the path with “Edit path” or “Add RCU” again.
	The path relay equipment doesn’t work.	Repair the path relay equipment, and delete the path with “Edit path” or “Delete RCU” and add the path with “Edit path” or “Add RCU” again.
	Broken the connection cable physically.	Replace the broken cable, and delete the path with “Edit path” or “Delete RCU” and add the path with “Edit path” or “Add RCU” again.
“Program Error”	Detected program error.	Delete the path with “Edit path” or “Delete RCU”, and add the path with “Edit path” or “Add RCU” again.

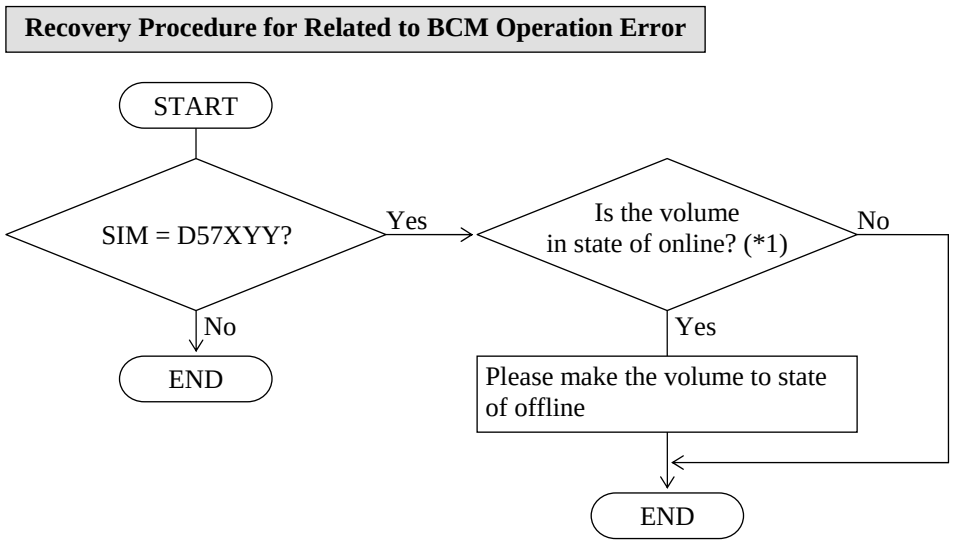
6.5 Recovery Procedure for Related to BCM Operation Error

The following SIM may be reported by BCM operation. The meaning and the recovery procedure are described to the following.

Table 6.5-1 SIM related to BCM operation

SIM REF. CODE	Meaning	Remarks
D57XYY	Command device operation was executed in state of Command device was ONLINE	X: CU# YY: LDEV#

The flow chart of recovery procedure when the above-mentioned SIM was reported by the BCM operation is shown as follows.



*1: Please refer to “Error Location” of SIM for the volume number.

6.6 Recovery Procedure for HAM Error

Recovery Procedure for HAM Error is basically the same as Recovery Procedure for TrueCopy for Mainframe Error.
Peculiar notes to Recovery Procedure for HAM Error are shown below.

(1) Notes when HAM pair is deleted
When the pair deletion of HAM is necessary, procedure of pair deletion is different while it is operated with P-VOL or S-VOL. Procedure of judging while it is operated with P-VOL or S-VOL, and of pair deletion is shown below.

Note: It is necessary that to stop I/O operation, if it is operated with S-VOL.

<Procedure of judging while it is operated with P-VOL or S-VOL>
[Using SVP/StorageNavigator]
1. Open the TrueCopy Operation window.
2. Check column “VOL Access” of both P-VOL and S-VOL of HAM pair.

3-1 If “VOL Access” of both P-VOL and S-VOL are displayed “blank” it is judged that is operated with P-VOL.
3-2 If “VOL Access” of P-VOL is displayed “Access” it is judged that is operated with P-VOL.
3-3 If “VOL Access” of S-VOL is displayed “Access” it is judged that is operated with S-VOL.
3-4 Case other than the above please judge using HDLM while it is operated with P-VOL or S-VOL.

[Using HDLM]
1. If HDLM Path to P-VOL is online state it is judged that is operated with P-VOL.
2. If HDLM path to P-VOL is offline state and path to S-VOL is online state, it is judged that is operated with S-VOL.
3. Case other than the above please judge using SVP or StorageNavigator while it is operated with P-VOL or S-VOL.

Note: When both judgment using SVP or StorageNavigator and that using HDLM are also impossible, please contact the Technical Support Division.

<Procedure of pair deletion in case it is operated with P-VOL>

1. Change to offline HDLM paths to S-VOL.
2. Delete HAM pair.
3. Create HAM pair from MCU to RCU.
4. Execute SET HAM operation at S-VOL.
5. Change to online HDLM paths to S-VOL.

<Procedure of pair deletion in case it is operated with S-VOL>

1. Stop I/O and application executed on S-VOL.
2. Delete HAM pair.
3. Execute TrueCopy pair creation from RCU to MCU and copy the latest data of RCU to MCU.
4. After completing copy from RCU to MCU, delete TrueCopy pair.
5. Create HAM pair from MCU to RCU.
6. Execute SET HAM operation at S-VOL.
7. Change to online HDLM paths to P-VOL.
8. Resume I/O and application.

7. Trouble shooting of Openplatform

7.1 Trouble shooting of error on host Fibre channel interface

7.1.1 Outline

This section describes troubleshooting of error on host Fibre channel interface.

7.1.1.1 Possible failures and causes of them

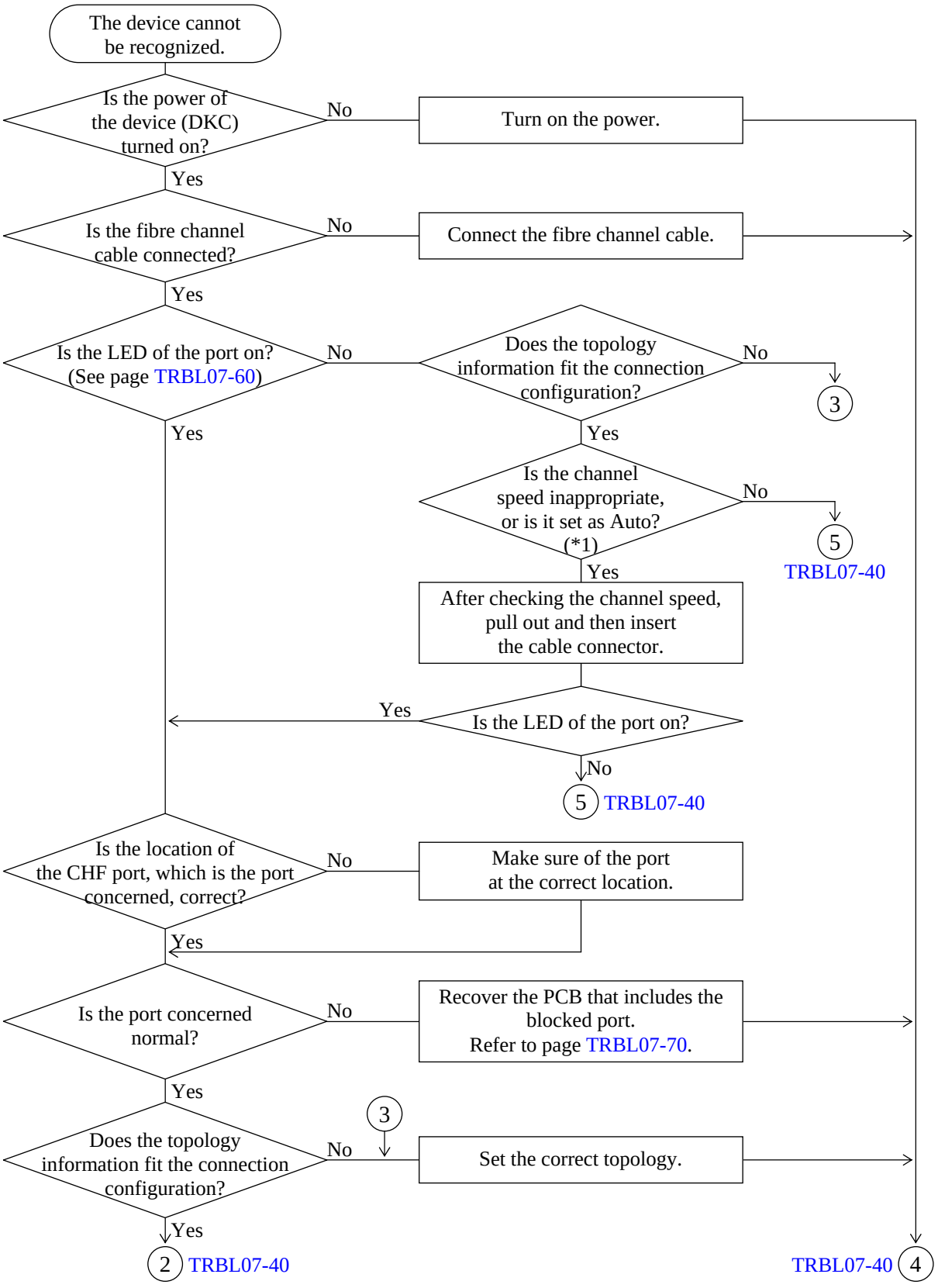
Table 7.1.1-1 Possible error and cause

No.	Possible error	Cause
1	DKC710I LDEV is not recognized by Fibre initiator	(1) SCSI installation, i.e. recognition and connecting procedure from SCSI initiator is not executed correctly (2) Problem of Fibre cable or connection (3) Problem of Fibre initiator. Fibre board, device driver version, parameters, etc. (4) SCSI path definition from SVP (5) The Host Reserve status is left uncanceled. (6) Other

7.1.1.2 Matters must be or desirable to be checked

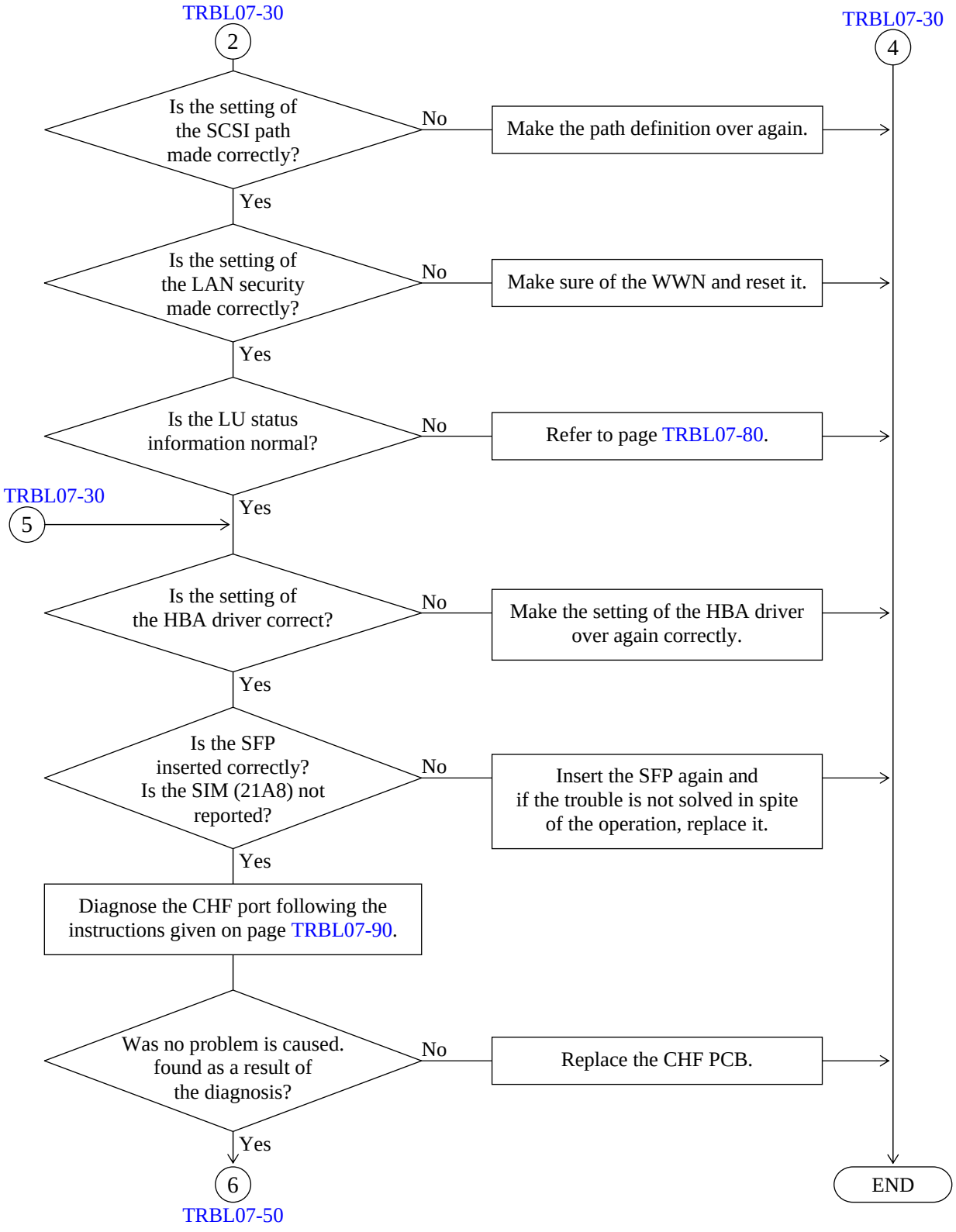
Item	Checkpoint	Check method
1	Is the Ready LED on the DKC on?	Check the subsystem visually.
2	Is the LED of the port, which corresponds to the failed SCSI port, on? Open the System window from Action menu of Storage Navigator main window and check whether the port status indicator is on.	Check the subsystem visually.
3	Is the location of the CHF port correctly understood?	Refer to LOC04-10 ~ 40.
4	Is the status of the FCP corresponding to the failed SCSI path normal?	Check if the FCP is normal by selecting the PCB status in the Maintenance window and viewing the statuses of the FCP (see page TRBL07-70).
5	Is the fibre channel cable connected to the fibre channel board of the server firmly?	Pull out and then insert the cable connector.
6	Is it a problem of the cable?	Replace the cable.
7	Is the SFP of the PCB normal?	SIM: Check if the 21A8 is output. Make sure of the type and status (Short or Long) of the SFP through the CHA information concerned in the Maintenance window. Pull out and then inset the SFP.
8	Did not the AL-PA duplicate in the fibre channel?	SIM: Check if the 2190 is output.
9	Is the topology not wrong?	Turn on/off the Fabric setting. Make sure which is adopted, the FC-AL or Point to Point?
10	Is the path from the SVP set correctly?	Check the SCSI path of the port concerned.
11	Is the device defined as the SCSI path normal?	Check the LU status information in the Maintenance window.
12	Is the setting of the driver normal?	Check the setting of the driver.
13	Is the HBA normal?	Replace the HBA.
14	Is the fibre channel port correct?	Check the fibre channel information (on page TRBL07-90) of the SVP Monitor.
15	Are the combinations of PCB types and the equipment to be connected correct?	If the type of PCB is 8UFC/16UFC, make sure the channel speed of the equipment (HBA, switch, etc) to be connected is not 1Gbps. *: If the type of PCB is 8UFC/16UFC, set the host channel speed from anyone of 2G/4G/8Gbps since the channel speed of 1G is not supported.

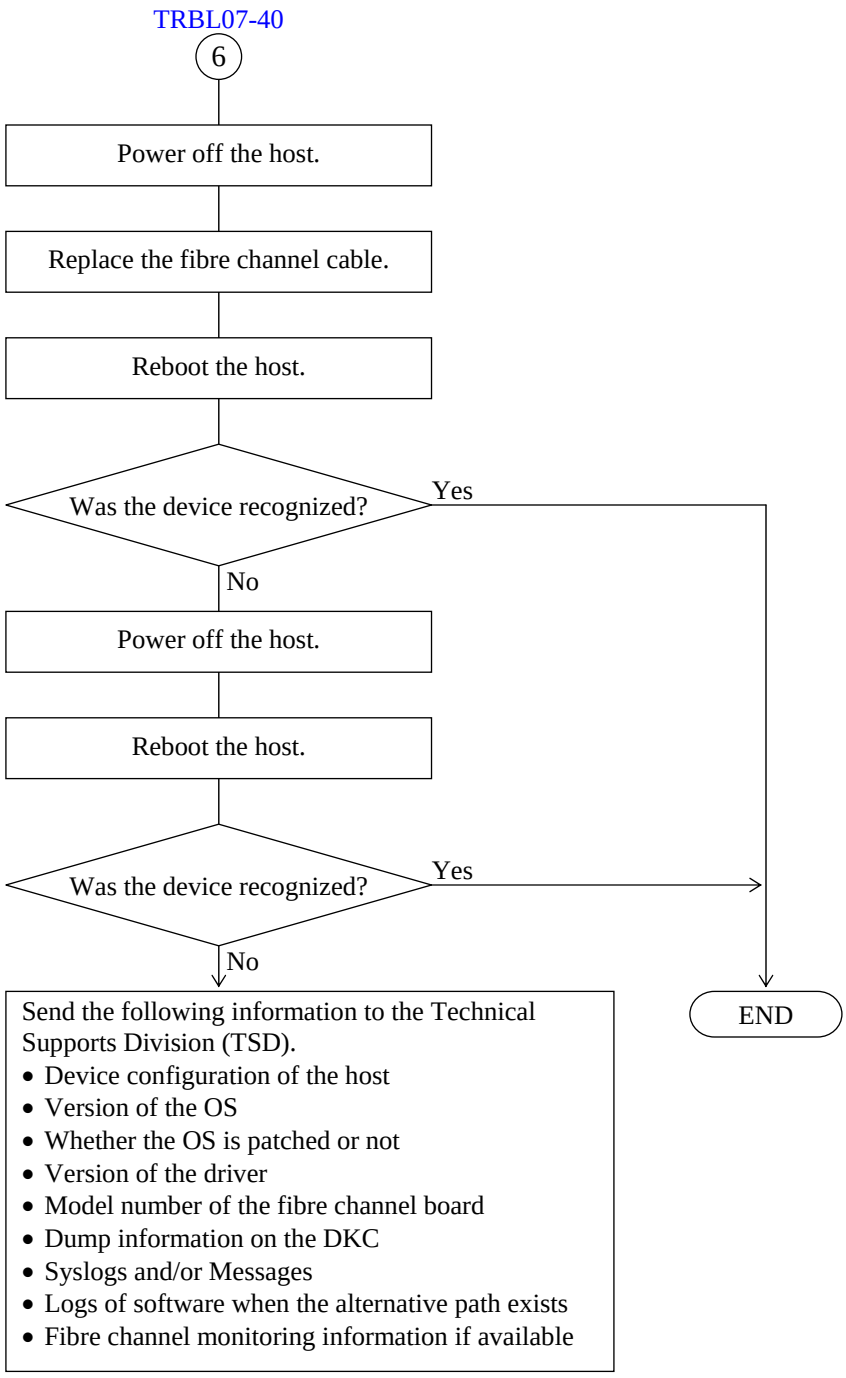
7.1.2 Troubleshooting flowchart to be used when the device is not recognized



*1: If the type of PCB is 8UFC/16UFC, set the host channel speed from anyone of 2G/4G/8Gbps since the channel speed of 1G is not supported.

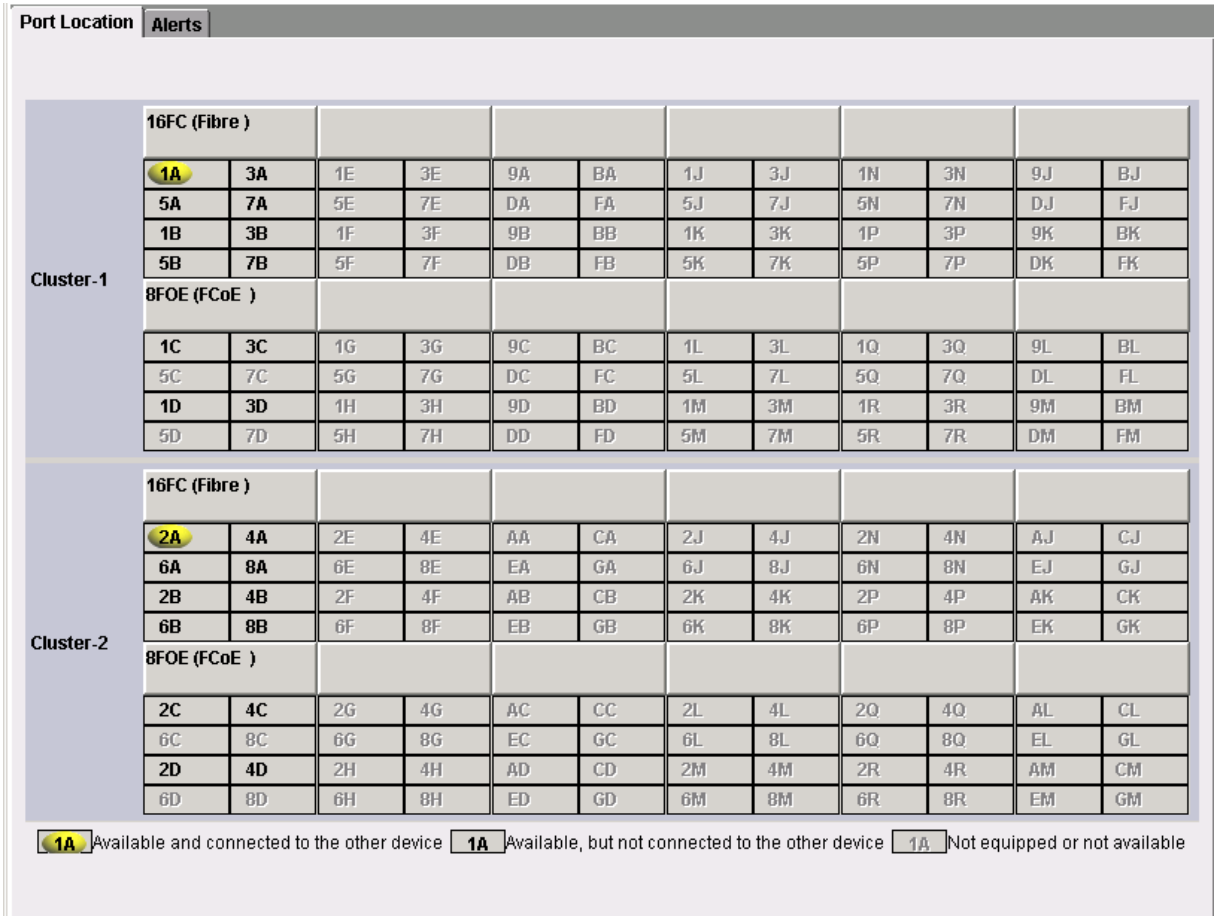
TRBL07-40





7.1.3 Procedure for checking out the subsystem port status

In the “Port Location” window ([Actions]-[Component]-[View Port Location]) of Storage Navigator, system equipment information of the disk drives of the disk subsystem being connected is displayed. As the system equipment information, the basic and port information are displayed.



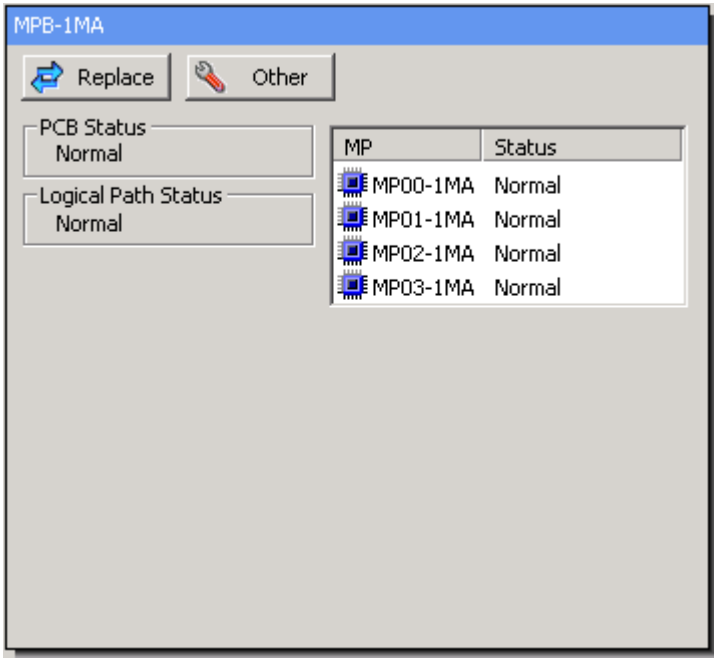
In the “Port Location” box, the statuses of the ports are displayed in the image of the practical subsystem.
The “Cluster-1” or “Cluster-2” represents the each cluster. In the upper and lower parts of the “Port Location” box, lists of ports of the Cluster-1 and Cluster-2 are displayed respectively. Sixteen PCBs (Printed Circuit Boards) are displayed for the each cluster. As the headwords of the port list, names of PCBs are displayed.

A name, LED status, and installation information of the port are displayed for the each PCB. Meanings of the displays of the port names are explained below.

Port name	Means
Black letters in a colored oval	The port is installed and in use.
Black letters	The port is installed and ready for use.
Gray letters	The port is not installed or out of use.

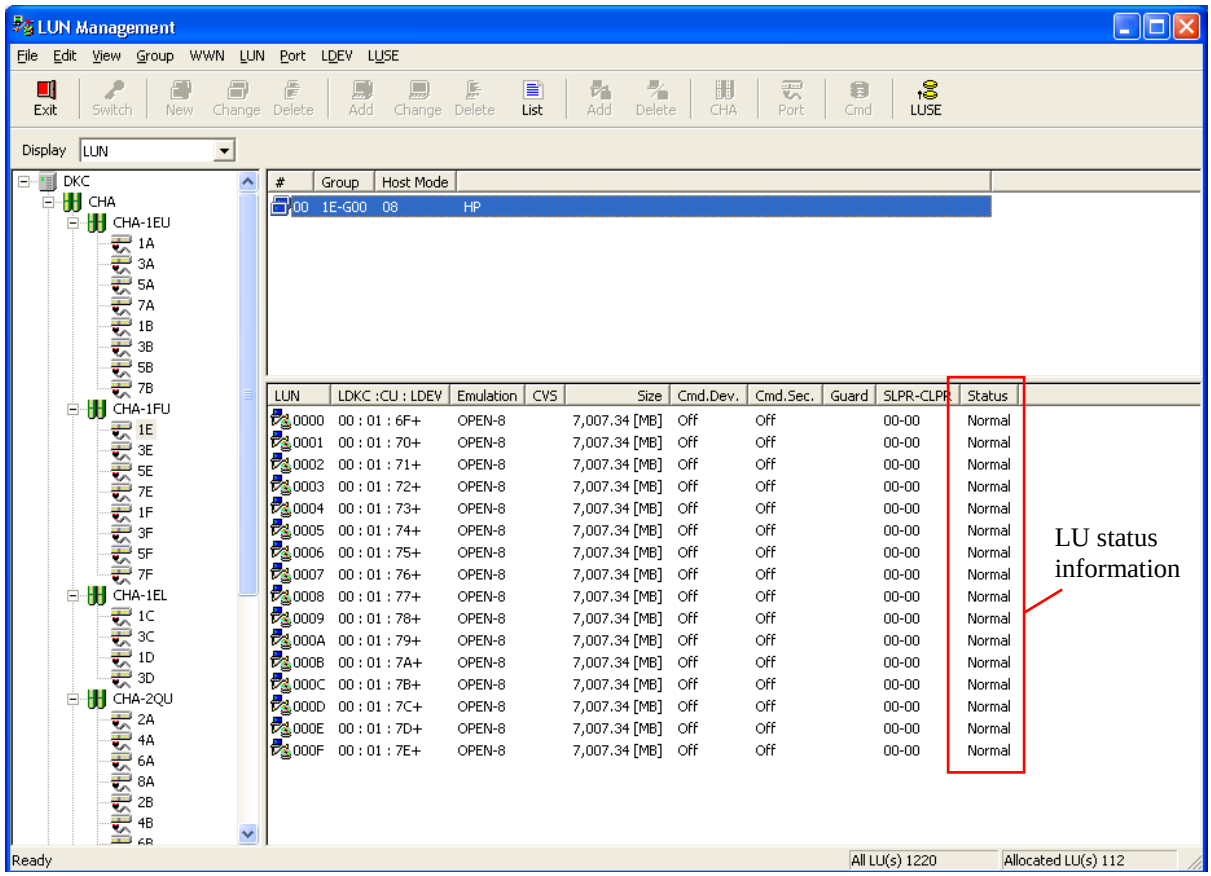
7.1.4 Procedure for checking normalcy of the processor

Select the MPB in the Maintenance window, and check the normalcy of the processor in the following window.
When they are normal, “Normal” is displayed in the Status column as shown below.



7.1.5 Procedure for checking the LUN status information

Select LUN Management in the Maintenance window.
Select View from the tabs at the top of the window and check off the LUN Status.
Then you can check the LU status information of each host group.
Check if the displayed status information is not Blockade or Reserve. If the displayed status is not Normal, it is highly possible that the device cannot be recognized because of the status.
Therefore, call the TSD having the following window attached.



7.1.6 Procedure for locating where a fibre channel failure occurred

Select the following items in the SVP Monitor window and check the counts at the time when the device recognition is executed.
When the count has been made, it is possible that a part of the path concerned has a problem.
Therefore, locate the part according to an estimation suggested by the port information.
The counts are displayed at intervals of five seconds.
The counts are not advanced normally, but they are advanced when a link failure occurs or a problem occurs in the subsystem port or a connected device.
Locate the failed part according to the actions listed for the count that has been advanced.

If the device cannot be recognized in spite of the locating actions, call the T.S.D.

	Monitor type	Information Monitor
1	Port	Loss of Signal Count (Fibre)
2		Bad Received Character Count (Fibre)
3		Loss of Synchronization Count (Fibre)
4		Link Failure Count (Fibre)
5		Received EOFa Count (Fibre)
6		Discarded Frame Count (Fibre)
7		Bad CRC Count (Fibre)
8		Protocol Error Count (Fibre)
9		Expired Frame Count (Fibre)

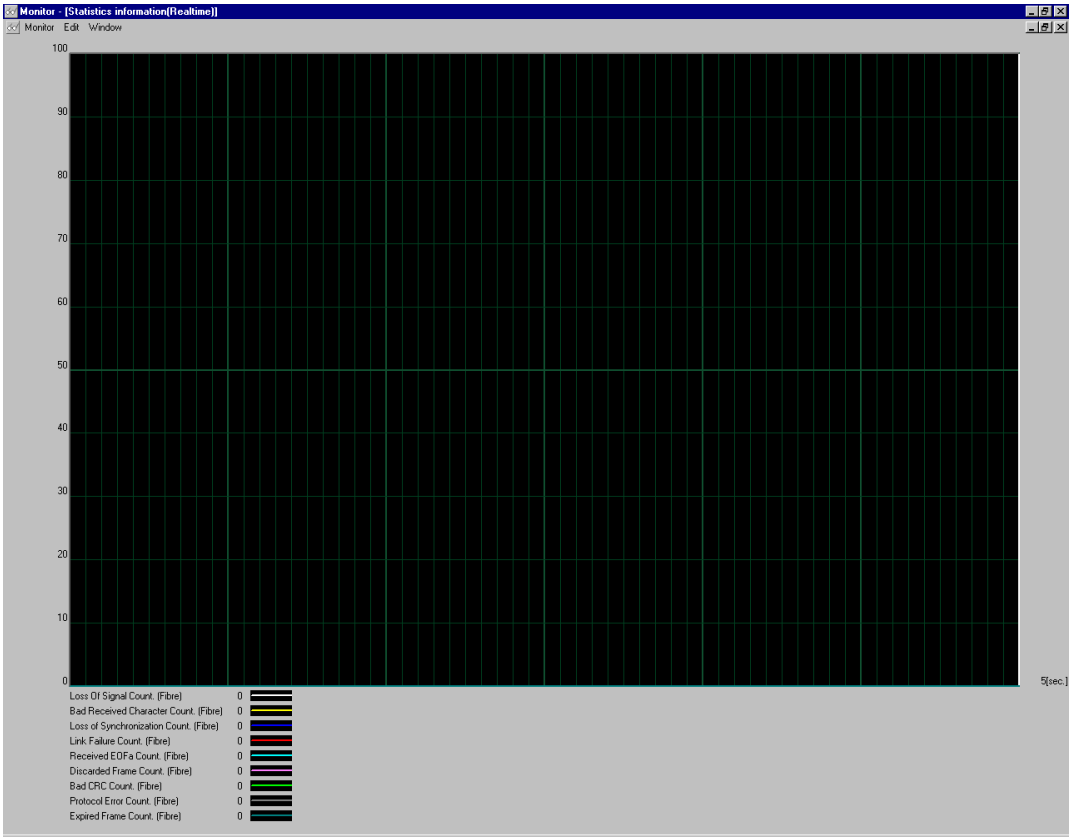


Table 7.1.6-1 Table for Locating Part in which a Fibre Channel Failure Occurs

Item	Name	Description	Estimated cause	Actions to be taken
1	Loss Of Signal Count	• This information shows the count of the losses of signals detected by the Fibre I/F controller. (The loss of signal: A state in which the optical input signal cannot be sensed)	• The optical signal is not output from the connected port. • Break of the connecting cable • The connecting cable connector is not inserted correctly.	• Check whether the optical signal is emitted from the connected port. • Pulling out and reinsertion of the connecting cable connector • Replacement of the SFP of the Switch • Replacement of the HBA • Replacement of the SFP of the CHF PCB • Replacement of the connecting cable • Replacement of the CHF PCB
2	Bad Received Character Count	• This information shows the count of failures in the 8-bit/10-bit conversion. (The failure: A state in which characters cannot be converted)	• Degradation of the optical signal emitted from the connected port • Break of the connecting cable (contact failure) • Imperfect insertion of the connecting cable connector • Auto Negotiation of the connected port [8FC/16FC: 1-4Gb] [8UFC/16UFC: 2-8Gb] (This is not a problem.) • Pulling out and reinsertion of the cable connector [8FC/16FC: 1-4Gb] [8UFC/16UFC: 2-8Gb] (This is not a problem.) • Reboot or tuning on/off of the host/Switch (This is not a problem.)	• Pulling out and reinsertion of the connecting cable connector • Replacement of the connecting cable • Replacement of the SFP of the Switch • Replacement of the HBA • Replacement of the SFP of the CHF PCB • Replacement of the CHF PCB
3	Loss of Synchronization Count	• This information shows the count of failures in the signal synchronization. (The phenomenon: The optical signal can be sensed but no synchronization pattern can be sensed.)	• Degradation of the optical signal emitted from the connected port • Break of the connecting cable (contact failure) • Auto Negotiation of the connected port [8FC/16FC: 1-4Gb] [8UFC/16UFC: 2-8Gb] (This is not a problem.) • Pulling out and reinsertion of the cable connector (This is not a problem.) • Reboot or tuning on/off of the host/Switch (This is not a problem.)	• Pulling out and reinsertion of the connecting cable connector • Replacement of the connecting cable • Replacement of the SFP of the Switch • Replacement of the HBA • Replacement of the SFP of the CHF PCB • Replacement of the CHF PCB

(To be continued)

(Continued from preceding page)

Item	Name	Description	Estimated cause	Actions to be taken
4	Link Failure Count	• This information shows the count of the link failures detected. (The phenomena: The optical signal cannot be sensed, the state, in which the synchronizing pattern cannot be sensed, has lasted longer than 100ms, or the Lip signal cannot be sensed when the loop is constructed (the protocol on the other port side is abnormal))	• Degradation of the optical signal emitted from the connected port • Break of the connecting cable (contact failure) • Imperfect insertion of the connecting cable connector • Auto Negotiation of the connected port [8FC/16FC: 1-4Gb] [8UFC/16UFC: 2-8Gb] (This is not a problem.) • Pulling out and reinsertion of the cable connector (This is not a problem.) • Reboot or tuning on/off of the host/Switch (This is not a problem.)	• Pulling out and reinsertion of the connecting cable connector • Replacement of the connecting cable • Replacement of the SFP of the Switch • Replacement of the HBA • Replacement of the SFP of the CHF PCB • Replacement of the CHF PCB
5	Received EOFa Count	• This information shows the count of reception of the EOFa's. (The phenomenon: A frame sent from the other port was received but it was invalidated by the delimiter.)	• A problem of the frame output from the host • A problem of the frame output from the Switch • A problem of the quality of the signals transmitted between the host and Switch	• Replacement of the SFP between the HBA and Switch • Replacement of the cable between the HBA and Switch • Replacement of the HBA
6	Discarded Frame Count	• This information shows the count of discard of received frames that were illegal. (The phenomenon: A frame sent from the other port was received but it was invalid.)	• A problem of the quality of the signals transmitted between the host and Switch • A problem of the frame output from the host • A problem of the frame output from the Switch	• An amount of flowing data between the host and Switch differs from that between the Switch and RAID. Reduce the amount of data that flows into the Switch.
7	Bad CRC Count	• This information shows the count of frames, in which the CRC errors occurred when the valid EOF's were received. (The phenomenon: A CRC error occurred in the frame received from the other port.)	• A problem of the quality of the signals transmitted between the host and Switch • A problem of the frame output from the host • A problem of the frame output from the Switch	• Pulling out and reinsertion of the connecting cable • Replacement of the connecting cable • Replacement of the SFP of the Switch • Replacement of the HBA • Replacement of the SFP of the CHF PCB • Replacement of the CHF PCB

(To be continued)

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Item	Name	Description	Estimated cause	Actions to be taken
8	Protocol Error Count	• This information shows the count of reception of the LRRs at the times of the linking up. (The phenomena: A protocol error in the communication with the other port or reception of a unexpected sequence in the linking up sequence)	• A problem of the timing in the sequence of the linking up with the connected port (This is not a problem if the linking up can be done.)	• Replacement of the SFP of the Switch • Replacement of the HBA • Replacement of the SFP of the CHF PCB • Replacement of the CHF PCB
9	Expired Frame Count	• This information shows the count of frames each of which was discarded because a state in which it could not be sent lasted so long that the retention expired. (The state was such that the frame was waiting for the R-RDY of the other port.)	• A problem of the quality of the signals transmitted between the host and Switch • A problem of the frame output from the host • A problem of the frame output from the Switch	• Replacement of the SFP between the HBA and Switch • Replacement of the cable between the HBA and Switch • Replacement of the HBA • An examination of the host/Switch (An inquiry of the manufacturer)

7.2 Pinned track recovery of SCSI LDEV

This chapter shows about the explanation and the recovery procedure for faulty tracks in the OPEN-VOL.

7.2.1 Faulty Tracks

Hardware error sometimes causes pinned track to occur.
The following reports are to inform pinned track occurrence.

- The read-error report or the time-out error report from Application occurs.
- SIM report of pinned track occurrence.

SIM REF.CODE	Meaning	Comment
EF4X-XX	Unable to write to PDEV on a track.	X-XX : CU-LDEV number
FF4X-XX	Unable to read from cache on a track.	X-XX : CU-LDEV number
EF5X-XX	Unable to write a track to a device in the external storage system.	X-XX : CU-LDEV number
FF5X-XX	Unable to read a track from a device in the external storage system.	X-XX : CU-LDEV number

To recover pinned tracks, the following information about the pinned track to be recovered are necessary.

- Address in LDEV (LDEV number)
- First and last LBA of stripe including the pinned track (*1)
- Error type of the pinned track
- PDEV number including the pinned track

These information can be obtained by “Pinned Data indication” (SVP02-1130) in SVP.

*1: LBA : Logical Block Address

7.2.2 Error Types

Pinned track has 4 error types as follows.

Display on SVP		Meaning	Cause	Recovery method
Slot	Reason			
—	Write Error	Unable to write to PDEV.	Drive error	Replacement of PDEV
DATA	ECC/LRC Error	Unable to read from Cache.	Cache error	File recovery
PRTY	ECC/LRC Error	Unable to generate parity	Cache error	—
DATA	External VOL Write Error	Unable to write a track to a device in the external storage system	Device failure of external storage system	After recovering the external storage system, perform a dummy replacement of the cache package
DATA	External VOL Read Error	Unable to read a track from a device in the external storage system	Device failure of external storage system	After recovering the external storage system, perform a dummy replacement of the cache package

The following document explains each error type of the pinned track and shows the recovery flow chart for the ECC/LRC Error in the OPEN-VOL and for the External VOL Read Error of the external storage system device. As for the pinned track except the ECC/LRC error condition in the OPEN-VOL and External VOL Read Error, refer to TRBL04-10 section.

7.2.2.1 ECC/LRC Error

Cause

(1) An ECC/LRC type of a pinned track occurs when a CHK2 error occurs during data transfer between cache and channel, or between cache and drive. If it is a temporary error, such as transfer timeout, the error may be recovered and the PIN may be deleted by retrying the operation. When the retry operation fails because the track is the dirty data, Permanent Data Check may occur, and data will be lost. The host has to reconstruct the data using the backup file etc.

(2) An ECC/LRC type of a pinned track occurs when the host failed to write data to the cache due to the failures in two or more drives (In RAID6, 3 or more drives). If it is a temporary failure, the PIN may be deleted when the host retries the operation. However, data check will be reported to the host.

(3) When a parity track cannot be created due to a drive failure etc., an ECC/LRC type of a pinned track occurs, and only the data will be destaged. The ECC/LRC type of a pinned track will be recovered when the entire stripe is written.

(4) When the data cannot be read from the source drive during correction copy, the target track cannot be recovered. As a result, the track will become an ECC/LRC pinned track. This will lead to Permanent Data Check, and the original data will be lost.

(5) This error occurs when the emergency destage, which is performed because of a cache failure or a cache maintenance operation or P/S OFF, failed due to TOV etc., and the error could not be recovered despite retrying. If the error occurs when the power is being turned off (P/S OFF), the power will be turned off while the dirty data is still stored in the cache. The data will be retained by the battery. The emergency destage will be performed again when the power is turned on (P/S ON), and the pinned track will be recovered.

Result of host I/O operation

When a track with an ECC/LRC Error is accessed, the result of the host I/O operation is as follows;

(a) If the read in the track is possible, the host I/O operation ends normally.

(b) If it isn't possible to read a track, "(03)h: Medium Error" or "(0b)h: Abort" to I/O operation is reported to the host. In this case, data is lost.

The outline of the recovery procedure

A track with ECC/LRC Error means that the original data for the track may be lost. Therefore, we recommend to a customer that a recovery of the data for the track with ECC/LRC Error in the OPEN-VOL should be performed from a back-up file etc.
A recovery method for the track with ECC/LRC Error in the OPEN-VOL is as follows;

(1) It change into the state that I/O is not issued from connection server.
(It changes into the state that there is not a process/JOB on a server. Details apply to the procedure of each servers side.)
(2) Check whether a blocked CHA part exists or not. Restore a blocked CHA part if it exist.
(3) Obtains the LDKC number and the CU-LDEV number which the pinned track occurred by "Pinned Data Indication" (SVP02-1130) in SVP and the head and the last LBAs of the pinned track.
(4) Executes the "showrel" tool and examine the relation in fault LDEV and the device which the file system recognizes.
(5) Checks a volume on the file system which is composed of the device and also checks data in the volume. (Using the command like sum)
(6) Requests the customer the recovery of the data with "I/O error" or "read error" from a back-up file, etc.
(7) Confirms pinned track information by "Pinned Data Indication" (SVP02-1130) in SVP. If there is not a display of the pinned track and the system test result is normal, the recovery is ended. If a new pinned track occurs, back to the process of hard error recovery.
(8) If an old pinned track display is left, executes the Pin Track Tool.
(9) For the "slot:PRTY" display, the Pin Track Tool isn't necessary.
It is automatically recovered when the pinned track of the "slot:DATA" display is recovered.
(10) If "Pinned Data Indication" (SVP02-1130) in SVP doesn't indicate LBAs of pinned track, this indicates that a pinned track occurred OPEN-VOL other than the user area. After backing up the user data, use the LDEV Format to clear the pinned track.

The cancellation of the faulty tracks

When data is written to the whole stripe, the whole stripe data is fixed and the fault track is canceled.

7.2.2.2 Write Error

Cause

Write Error type of a pinned track is caused when the data de-staging process to the PDEV failed due to a drive failure. When a drive failure occurs, the drive itself and the DKC perform the following recovery procedure. A write Error occurs when the following recovery procedure failed.

(1) Medium failure : Automatic reallocation of alternate sector.
(2) Other failure : Alternate path retry.

Write Error count information per PDEV is stored in DKC. When a Write Error count exceeds the threshold value, the PDEV is blocked. One PDEV blocked per parity group will not stop the DKC operation to the parity group. When a track with Write Error is accessed by the host after the PDEV is blocked, the Write Error status will reset.

Result of host I/O operation

Any access to a track with Write Error will be successful.

Recovery Method

The PDEV containing a track with Write Error is replaced. At this time, if the blocked PDEV already exist within the parity group, first replace the blocked PDEV which already exists. Next, replace the PDEV containing a track with Write Error. Also, if there are many PDEVs containing a track with Write Error, check the ORM Display on the SVP Panel, then replace the PDEV with the Highest Error Rate. A track with Write Error is recovered by a correction copy.

7.2.2.3 External VOL Write Error

Cause

When write processing is performed for a device in an external storage system, and Check Condition (Medium Error) is received due to a drive failure of the external storage system, External VOL Write Error is set.

How to recover

After recovering the device in the external storage system, perform a dummy replacement of the cache package.
In addition, after recovering the device in the external storage system, you can remove pinned track of the external devices by writing I/O from the host. However, please note that the customer data stored in external devices is destroyed. Because the data will be overwritten by the I/O.

7.2.2.4 External VOL Read Error

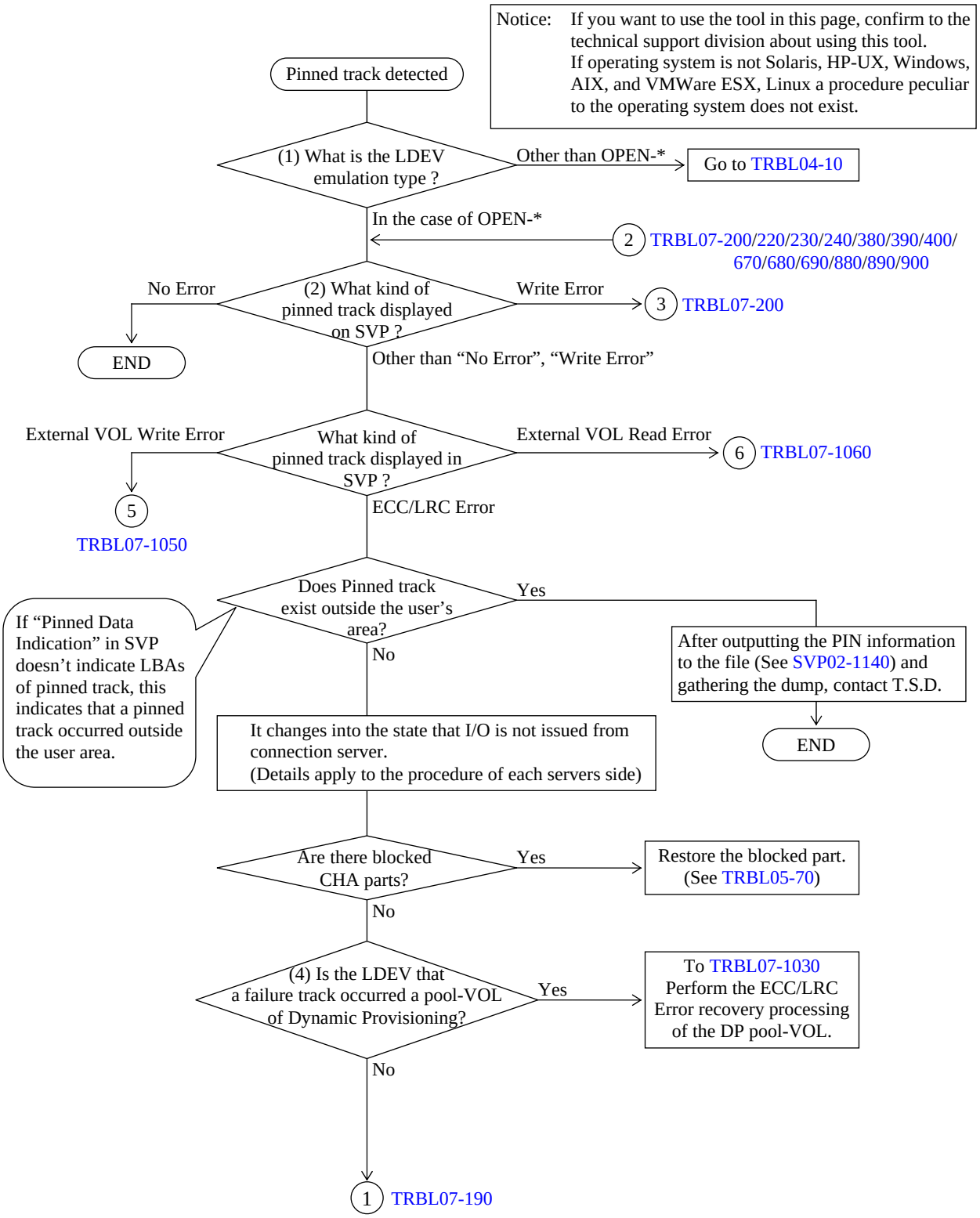
Cause

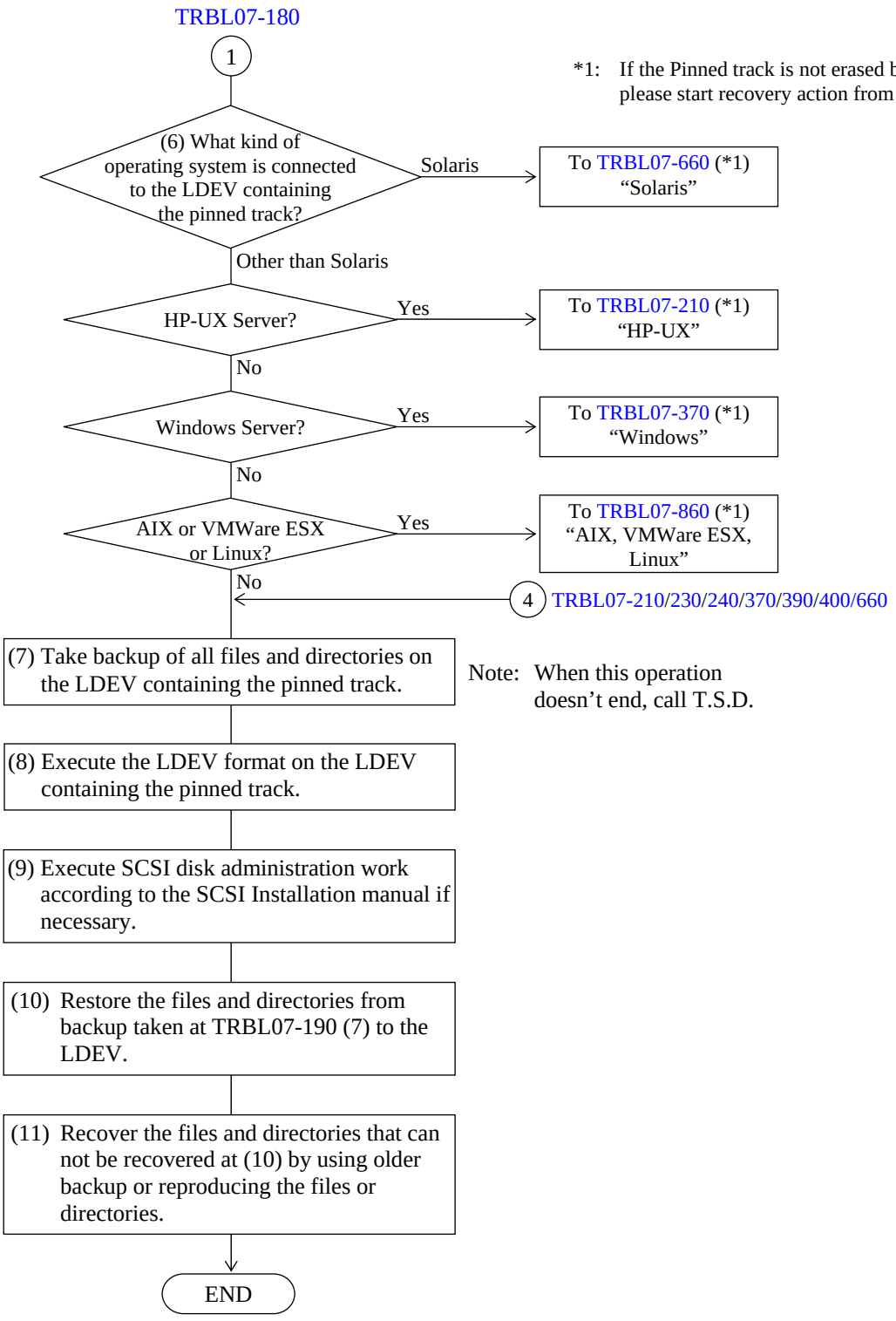
When read processing from the device in the external storage system is performed, and Check Condition (Medium Error) is received due to a drive failure in the external storage system, External VOL Read Error is set.

How to recover

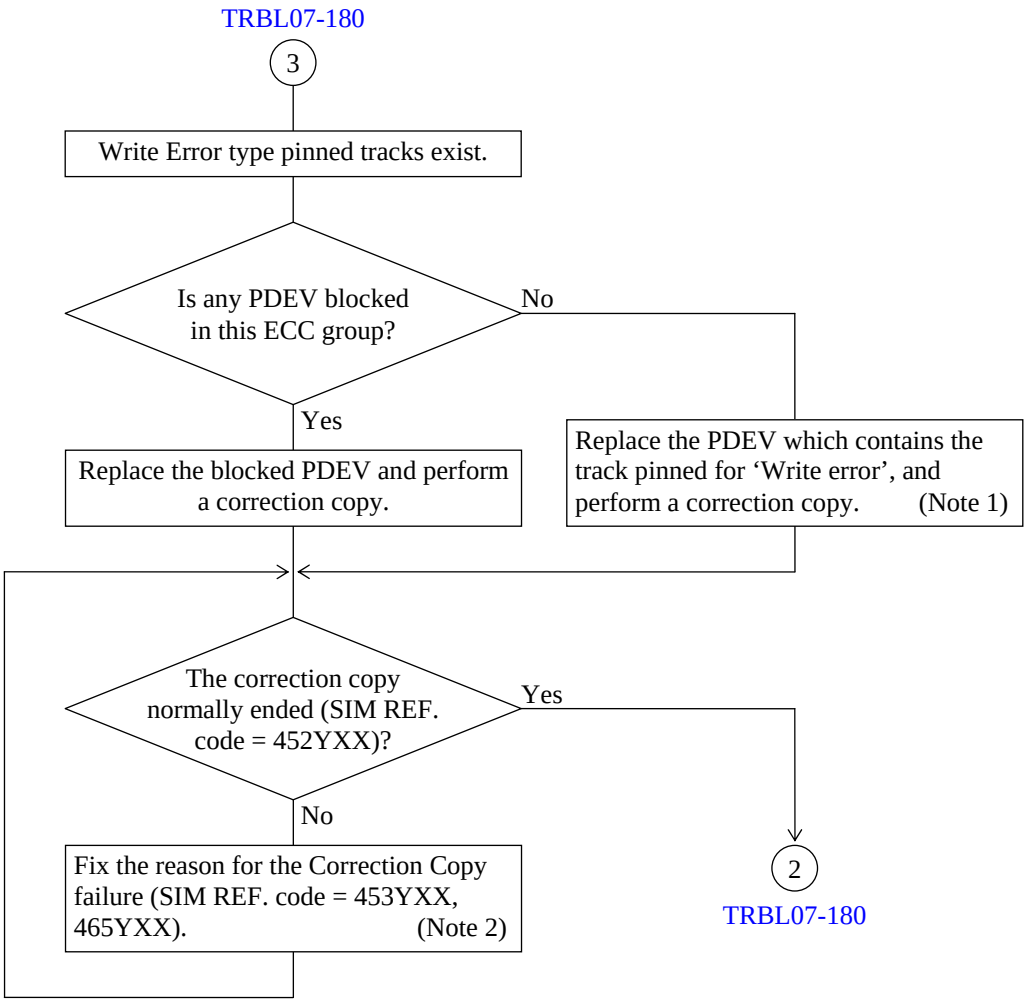
After recovering the device in the external storage system, perform a dummy replacement of the cache package.
In addition, after recovering the device in the external storage system, you can remove pinned track of the external devices by writing I/O from the host. However, please note that the customer data stored in external devices is destroyed. Because the data will be overwritten by the I/O.

7.2.3 Pinned track erasing procedure





*1: If the Pinned track is not erased by these actions, please start recovery action from ④.



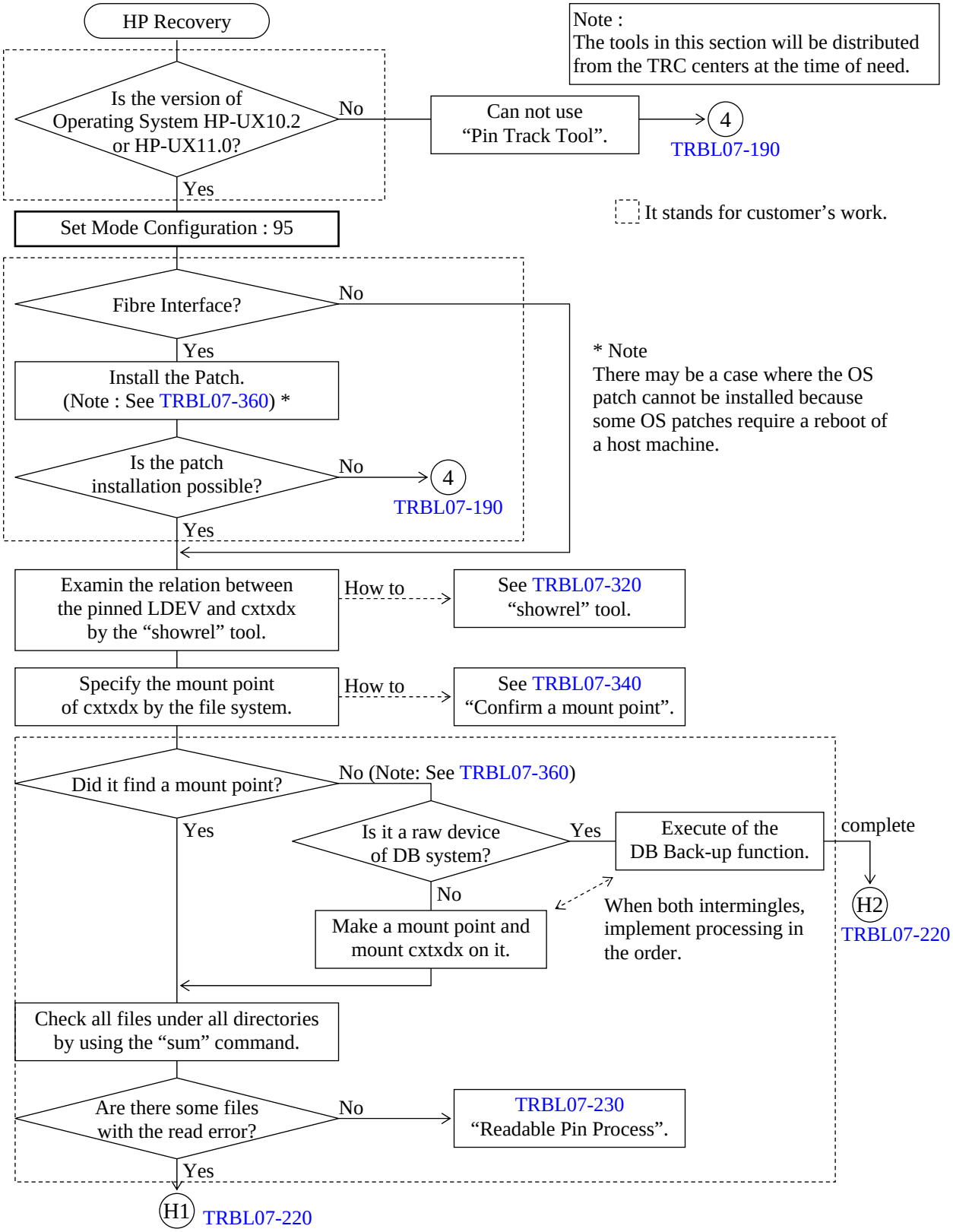
Note 1: If spare drives are available, you can perform Drive copy instead of Correction copy.

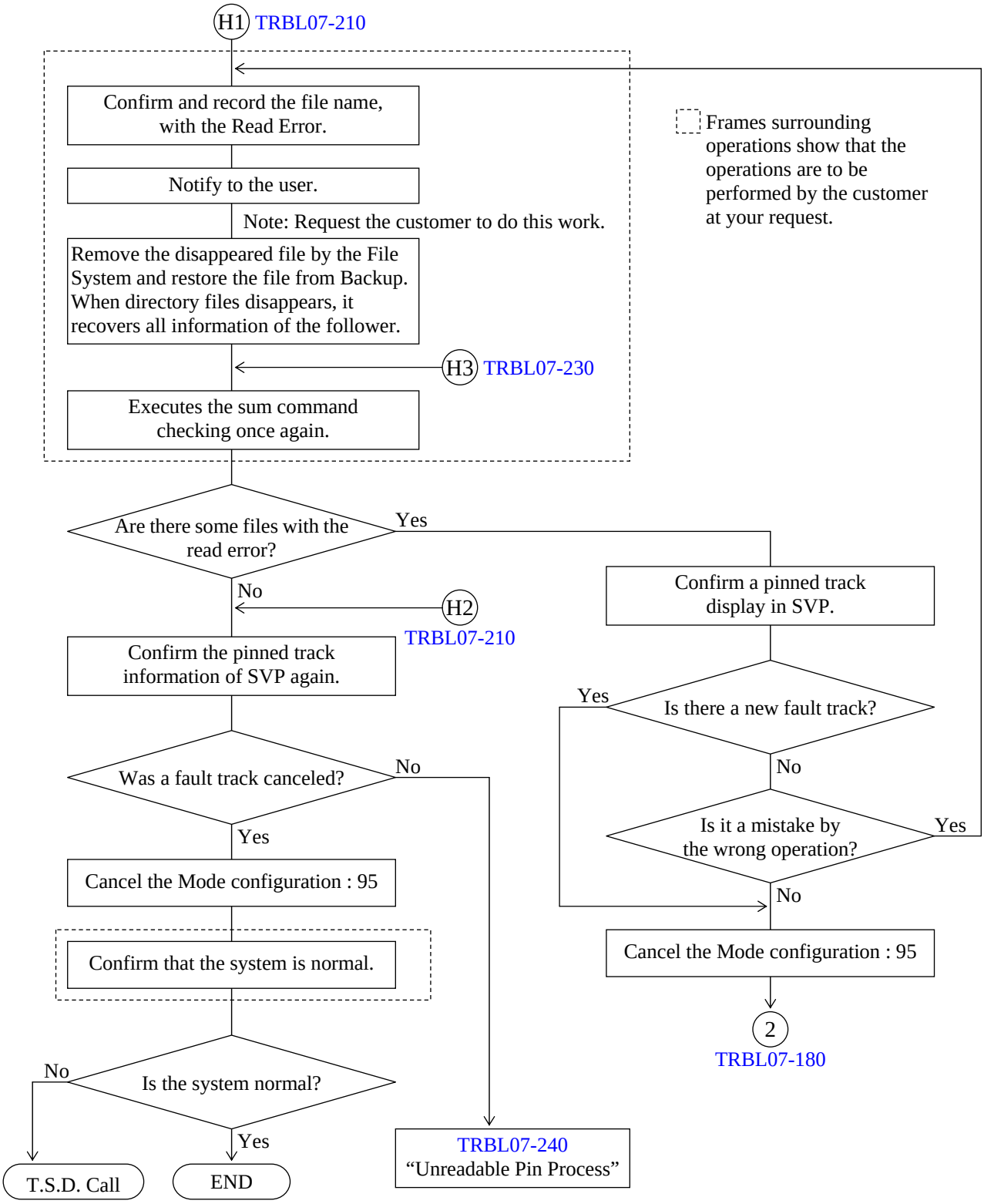
Note 2: If Drive copy abnormally ended, the SIM REF. code is "453YXX" or "465YXX".

7.2.3.1 HP-UX Procedure

This chapter shows the pinned track erasing flow about the HP-UX system.

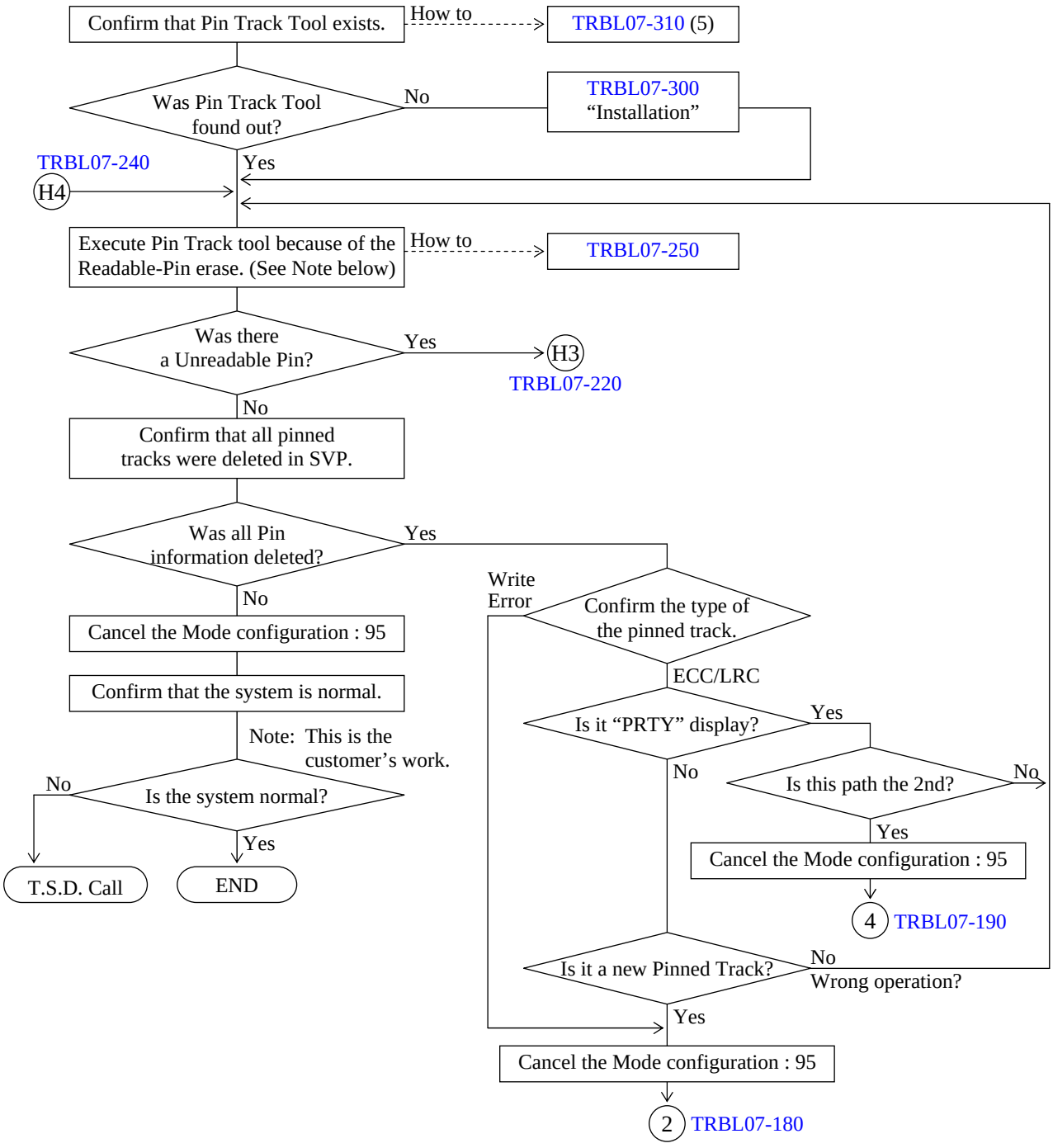
Procedure Flow





Readable Pin Process

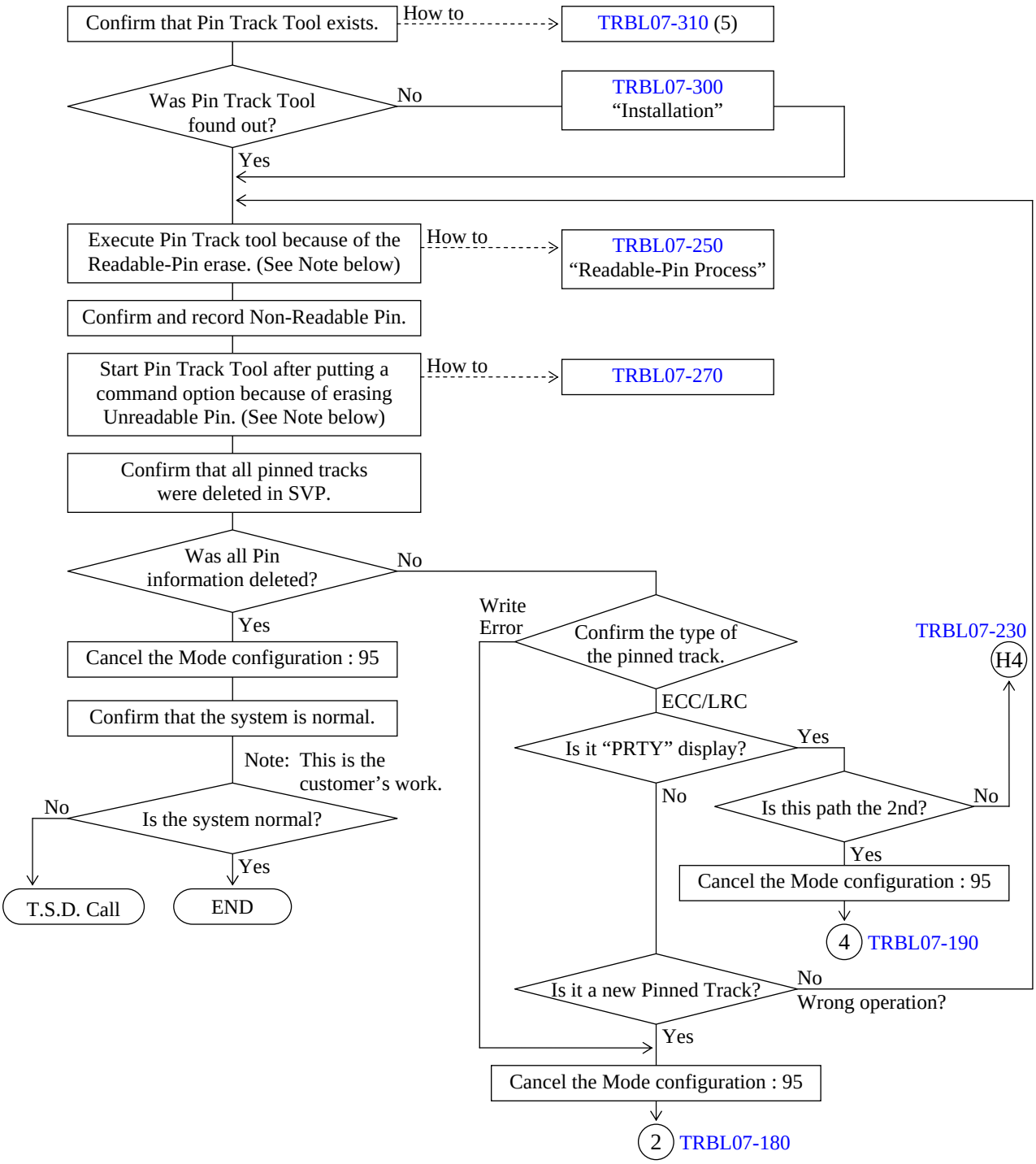
The erasing flow in the readable pinned track by Pin Track Tool is as follows.



Note: — On an SIM reported owing to a use of the Pin Track Tool —
When two or more Pins have been generated in the LBAs adjacent in the same LU, a generation of a new temporary Pin caused by the parity calculation performed in the Pin Track process may occur and a SIM may be reported. Since this Pin is erased at the same time when the erasing process of the Pin concerned completes, complete the SIM when the erasure of all the Pins by the Pin Track Tool is confirmed.

Unreadable Pin Process

The erasing flow in the unreadable pinned track by Pin Track Tool is as follows.



Note: — On an SIM reported owing to a use of the Pin Track Tool —
When two or more Pins have been generated in the LBAs adjacent in the same LU, a generation of a new temporary Pin caused by the parity calculation performed in the Pin Track process may occur and a SIM may be reported. Since this Pin is erased at the same time when the erasing process of the Pin concerned completes, complete the SIM when the erasure of all the Pins by the Pin Track Tool is confirmed.

Operation of Readable-Pin Process (HP-UX)

This clause describes how to operate the Pin Track Tool to erase Readable-Pin.
<Operation>

(1) Move to the directory of the Pin Track Tool.
 # cd /usr/raidopen/pinhp

(2) Execute the Pin Track Tool without a command option.
 # ./pinhp.exe -log (Put pass "./")

Note: This option "-log" collects detailed logs.
However, when processing LBA with (60)h length, the log becomes about 400KB.
Be careful of the available capacity of the disk. (refer to TRBL07-330)

(3) According to the question, input the appropriate information.
./pinhp.exe -log
Input Device Name -> **/dev/rdsk/c3t0d0**
Input Start LBA Data -> **180**
Input End LBA Data -> **1df**
→ (Input the LBA number which was acquired from SVP. Do not input the LBA of the "slot:PRTY" display.)
Input Next LBA ?(Y/N) -> **n** (When there still is a fault track in the same Device, it inputs "y".)
Input Next Device ?(Y/N) -> **n** (When erasing different Device at the same time, it inputs "y".)

(4) Because an input data list is displayed, check the input information.

Device Name	Start LBA	End LBA
/dev/rdsk/c3t0d0	**0000000000000180**	**00000000000001DF**

Before you try to proceed the readable pin,
please check the pin information on SVP.
If the pin data has been cleared, please do not try to proceed the pin data again.
Do you want to do the process of the readable Pin?
Please input[y/n(default n)] : **y**

When the input is not collect, input "n" or just hit [Return] and then start the procedure again from (2).
Confirm whether or not a pinned track is deleted from the display of SVP.
When the data is already deleted, input "n" or just hit [return]. When canceled, input "y" and [return].

(5) When the Pin is judged, Unreadable through the pin type judgment, go to TRBL07-270.
Unreadable Pin:

Device Name	Start LBA	End LBA
/dev/rdsk/c3t0d0	0000000000000180	00000000000001DF

Note: This tool recognizes an inputted range as the 1 processing unit.
Therefore, the range where Unreadable pin exists is displayed in the inputted range.

(6) When Pin Track Tool ends, a log file (month -day -hour -minute -second .log) is made on the same directory. (Eg:0614200552.log)
As for the log file, the execution result of the Pin Track processing is recorded.
Confirm that processing was normally ended (there is “Pin Track Process completed” in the log file).

Operation of Unreadable Pin Process (HP-UX)

This clause describes how to operate the Pin Track Tool to erase Unreadable Pin.
<Operation>

(1) Move to the directory of the Pin Track Tool.
 # cd /usr/raidopen/pinhp

(2) Put a command option and execute a pin recovery tool.
 # ./pinhp.exe -f -log (Put command option "-f")

Note: This option "-log" collects detailed logs.
However, when processing LBA with (60)h length, the log becomes about 400KB.
Be careful of the available capacity of the disk. (refer to TRBL07-330)

(3) According to the question, input the appropriate information.
./pinhp.exe -f -log
Input Device Name -> **/dev/rdsk/c3t0d0**
Input Start LBA Data-> **180** } ⟶ Input the LBA number which was acquired from SVP.
Input End LBA Data -> **1df** } ⟶ Do not input the LBA of the "slot:PRTY" display.
Input Next LBA ?(Y/N) -> **n** (when there still is a fault track in the same device, it input "y".)
Input Next Device ?(Y/N) -> **n** (When erasing different device at the same time, it inputs "y".)

(4) Because an input data list is displayed, check the input information.

Device Name	Start LBA	End LBA
/dev/rdsk/c3t0d0	**0000000000000180**	**00000000000001DF**

Before you try to proceed the readable pin,
please check the pin information on SVP.
If the pin data has been cleared, please do not try to proceed the pin data again.
Do you want to do the process of the readable Pin?
Please input[y/n(default n)]: y

When the Input is not correct, input "n" or just hit [Return] and then start the procedure again From (2).
Confirm whether or not a pinned track is deleted from the display of SVP.
When the data is already deleted, input "n" or just hit [return]. When canceled, input "y" and [return].

(5) When Unreadable Pin is judged, the following message is displayed.

```
Unreadable Pin:
Device Name          Start LBA           End LBA
/dev/rdsk/c3t0d0     0000000000000180    00000000000001DF
Do you want to do the process of the unreadable Pin?
WARNING! if you input 'y', Pin Blocks will be over written by '0'.
Please input[y/n(default n)]: y
```

When erasing by the "0" writing to Unreadable Pin, input "y" and [Return].

Note: This tool recognizes an inputted range as the 1 processing unit.
Therefore, the range where Unreadable pin exists is displayed in the inputted range.

(6) When "y" is chosen by (5), the check message is displayed at once for every number of inputs. In case of plural number input, an operator can cancel the pin recovery processing for the device which you does not want to execute.

```
Unreadable Pin:
Device Name          Start LBA           End LBA
/dev/rdsk/c3t0d0     0000000000000180    00000000000001DF
Do you want to do the process of the unreadable Pin?
WARNING! if you input 'y', Pin Blocks will be over written by '0'.
Please input[y/n(default n)]:y
Do you want to do the process of the unreadable Pin? (The strip of LBA is
0000000000000180-00000000000001DF). (Y/N)
```

(7) When Pin Track Tool ends, a log file (month -day -hour -minute -second .log) is made on the same directory. (Eg:0614200552.log)
As for the log file, the execution result of the Pin Track processing is recorded.
Confirm that processing was normally ended (there is "Pin Track Process completed" in the log file).

How to read the Read Test for whole of a disk (HP-UX)

This chapter describes how to discover the Unreadable Pin on select device.
This processing requires long time.

(1) Move to the directory of the Pin Track Tool.
 # cd /usr/raidopen/pinhp

(2) Execute the Pin Track Tool without a command option.
 # ./pinhp.exe -all (The "-f" will become invalid if this option is used.)

(3) According to the question, input the appropriate information.
 # ./pinhp.exe –all
Input Device Name -> /dev/rdsk/c3t0d0
Input Next Device ?(Y/N) ->n (Recommend to "n") (When erasing different Device at the same time, it inputs "y")

(4) The Input data list is displayed.

Device Name	Start LBA	End LBA
/dev/rdsk/c3t0d0	**0000000000000000**	**00000000001F2285**

Show all domain of LAB which is specified device, and execute.

(5) When Pin Track Tool ends, a log file (month -day -hour -minute -second .log) is made on the same directory. (Eg:0614200552.log)
The log when two area (120-17F, 1E023F) of Unreadable Pin exists in specified DeviceName becomes as follows.

```
Input Device Name = /dev/rdsk/c3t0d0
ERROR: Read Error LBA 0000000000000120-000000000000017F
ERROR: Read Error LBA 00000000000001E0-000000000000023F
```

Note: The area and number of Unreadable Pin listed by other factors here may differ from the area and number of Unreadable Pin displayed by SVP.

Installation of Pin Track Tool (HP-UX)

This clause describes the installation of Pin Track Tool.

The preliminary preparation

If work logs need to be collected by the Pin Track Tool, confirm that there is the disk capacity for collecting in the work log.
An installation procedure from the tape device (Eg: 4mmDDS-DAT) is shown below.

Installation

(1) Login to the host as “root”.

(2) Move to the install area by the “cd” command and make a directory “raidopen”.
 # cd /usr (Eg: Move to the “/usr”)
 # mkdir raidopen (Eg: Make the directory “raidopen”)

(3) Move to the created directory and copy a file from the tape by the “tar” command.
 # cd raidopen (Eg: Move to the “raidopen”)

-In case of DDS-DAT-(Devide Name depends on each host)
 # mt -t /dev/rmt/0m rew (Eg: Rewing a tape)
 # tar -xvf /dev/rmt/0m (Eg: copy a file from the tape.)
 # tar -xvf ./pinhpXX.tar (Eg: copy the tar file for HP-UX)

-In case of CD-ROM-(Devide Name depends on each host)
 # mount -F cdfs -o cdcase /dev/dsk/c2t6d0 SD_CDROM (Eg: mount the CD-ROM)
 # tar -xvf /SD_CDROM/program/ment/pintrack/hp_ux/pinhpXX.tar
(Eg: copy a file from the CD-ROM.)

(4) After the thawing is complete, confirm a file name.
 # cd ./pinhp (Eg: Move to the directory made by the thawing.)
 # ls -l (Eg: Display a file list.)

(5) Refer to the contents of "Ver-Rev.txt" file and confirm each file size of the list.
 # more /usr/raidopen/pinhp/Ver-Rev.txt display contents of the file

```
HITACHI RAID Subsystem PinTrackTool for HP-UX
      Ver XX-YY-/Z (Revision ID)
All right reserved, Copyright (c) 1999,2004, Hitachi Ltd.
File size (Bytes)  pinhp.exe (Module ID)
File size (Bytes)  showrelh.exe (Module ID)
```

Confirm that the contents of "Ver-Rev.txt" and a list of the "ls -l" command are identical.

File preservation and the way of removing Pin Track Tool

- Log-File preservation

(1) Compress the log file made by the pin recovery.

# cd /usr/raidopen/pinhp	(Eg: Move to the working directory.)
# mkdir ./log	(Eg: Make to the directory for Log-file.)
# mv *.log ./log	(Eg: Move logfiles to the directory for Log-file.)
# tar -cvf pinlog.tar ./log	(Eg: Make the tar file from logdir.)
# compress pinlog.tar	(Eg: Compress the "pinlog.tar" file.)

(2) Preserve the log file at the tape and rewind it.

# tar -cvf /dev/rmt/0m pinlog.tar.Z	(Eg: Preserve log file)
# mt -t /dev/rmt/0m rew	(Eg: rewind the tape)

- The way of removing Pin Track Tool

The removal of the Pin Track Tool deletes all bottoms of the installed directory.

# cd /	(Eg: Move to the root directory.)
# \rm -r /usr/raidopen/pinhp*	(Eg: Deletes all bottoms of the installed directory)

The acquisition of the device information (HP-UX)

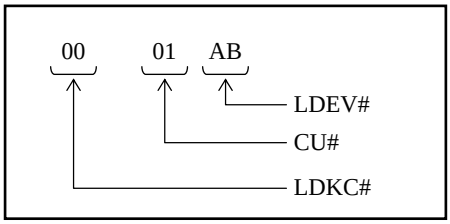
This chapter describes the tool “showrel” to acquire the device information.

(1) Move to the installed directory.
 # cd /usr/raidopen/pinhp

(2) Input commands as follows.
 # ./showrelh.exe (Put the path “./”)

<Display Example>
The display depends on the specification of the disk subsystem.
For the Hitachi specification, it is displayed as follows.

```
#./showrelh.exe

    Device File      ---> Port   Serial#  LDKC# LDEV#

    /dev/rdsk/c0t0d1 ---> CL1M      3ABE     00  01A6
    /dev/rdsk/c0t0d2 ---> CL1M      3ABE     00  01A7
    /dev/rdsk/c0t0d3 ---> CL1M      3ABE     00  01A8
    /dev/rdsk/c0t0d4 ---> CL1M      3ABE     00  01A9
    /dev/rdsk/c0t0d5 ---> CL1M      3ABE     00  01AA
    /dev/rdsk/c0t0d6 ---> CL1M      3ABE     00  01AB
```



For the OEM specification, it is displayed as follows.
The point of view of LDKC:CU:LDEV# is the same.

```
#./showrelh.exe

    Device File      ---> Port   Serial#  LDKC#  LDEV#

    /dev/rdsk/c7t2d1 ---> CL2E  00010028     00  03C0
    /dev/rdsk/c7t2d2 ---> CL2E  00010028     00  03C1
    /dev/rdsk/c7t2d3 ---> CL2E  00010028     00  03C2
    /dev/rdsk/c7t2d4 ---> CL2E  00010028     00  03C3
    /dev/rdsk/c7t2d5 ---> CL2E  00010028     00  03C4
    /dev/rdsk/c7t2d6 ---> CL2E  00010028     00  03C5
```

“LDEV#” is composed of the CU number and the LDEV number. Confirm LDKC#, CU# and LDEV# with the pinned track displayed in SVP and specify a clearing device file.
Device File name is input information to Pin Track Tool.

(Example)
Above mentioned “For the Hitachi specification”,
LDKC# = **00**, LDEV# = **01AB** → Device File = **/dev/rdsk/c0t0d6**

Notice: In the case of HP-UX, If there is LDEV that is non given LUN#, LDKC#= 00 / LDEV#= 159F or LDKC#= FF / LDEV#= FFFF are displayed to LUN# non-given a definition by showrelh.exe.

The way of collecting detailed information (HP-UX)

It is possible to collect the detailed information of the erasing process when putting a command option to Pin Track Tool and starting the process.

 # ./ pinhp.exe (-f) -log

Like the following, it outputs read data and write data in the log file.

<Display Example>
Unreadable LBA is displayed by "*".

```
Input Device Name = /dev/rdsk/c1t0d0
Input Start LBA = 0000000000000180
Input End LBA = 00000000000001DF
/dev/rdsk/c1t0d0, Start LBA=0000000000000180, End LBA=00000000000001df readable PIN Track read
error
Read Data:  Top Pin No = 0000000000000180
  00000000: ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** **
  00000010: ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** **
  00000020: ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** **
  00000030: ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** **
  00000040: ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** **
   •    •    •
Read Data:  Top Pin No=0000000000000181
   •    •    •
Read Data:  Top Pin No=0000000000000182
   •    •    •
Read Data:  Top Pin No=0000000000000183
   •    •    •
Read Data:  Top Pin No=00000000000001DF
  000001A0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  000001B0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  000001C0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  000001D0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  000001E0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  000001F0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

Read Data  (After Writing):  Top Pin No=00000000000001DF
  000001A0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  000001B0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  000001C0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  000001D0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  000001E0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  000001F0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

Write Data:  Top Pin No=0000000000000180
   •    •    •
  00000000: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  00000010: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  00000020: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  00000030: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  00000040: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
   •    •    •
   •    •    •
   •    •    •
  0000BFC0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  0000BFD0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  0000BFE0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  0000BFF0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
/dev/rdsk/c1t0d0, Start LBA=0000000000000180, End LBA=00000000000001DF Pin Track Process
completed!!
```

Unreadable data!

Execute LBA!

Note: In the processed range, log information is recorded.

This log is executing read processing by the 1 LBA unit.

It is indicated data which is read, written, and compared.

This log shows to have processed all ranges in the writing at once.

The way of examining Mount Point which has a Pinned Track (HP-UX)

Note: As for the following work, request a system administrator to operate.

(1) Input the "vgdisplay" command and to display a Volume Group list.
 # vgdisplay -v

(2) Specify "lvol(/dev/vgx/lvolx)" which is composed of Physical Volume(cxtxdx) with the Pinned Track.

<Display Example>

```
--- Volume groups ---
VG Name                     /dev/vg11
VG Write Access             read/write
VG Status                   available
Max LV                      255
Cur LV                      1
Open LV                     1
Max PV                      16
Cur PV                      4
Act PV                      4
Max PE per PV               1016
VGDA                        8
PE Size (Mbytes)            4
Total PE                    2344
Alloc PE                    2000
Free PE                     344
Total PVG                   0
Total Spare PVs             0
Total Spare PVs in use      0

--- Logical volumes ---
LV Name                     /dev/vg11/lvol1
LV Status                   available/syncd
LV Size (Mbytes)            8000
Current LE                  2000
Allocated PE                2000
Used PV                     4


--- Physical volumes ---
PV Name                     /dev/dsk/c9t1d0
PV Status                   available
Total PE                    586
Free PE                     0

PV Name                     /dev/dsk/c9t1d1
PV Status                   available
Total PE                    586
Free PE                     0

PV Name                     /dev/dsk/c9t1d2
PV Status                   available
Total PE                    586
Free PE                     0

PV Name                     /dev/dsk/c9t1d3
PV Status                   available
Total PE                    586
Free PE                     344
```

Volume Group Name

"/dev/vgl1/lvol1" is made in a Volume Group ("/dev/vgl1")

PV(cxtxdx) which composes volume group "/dev/vgl1" is displayed.

(3) Check if "./etc/fstab" is displayed.
#cat /etc/fstab

(4) Specify all the mount points for PV which was confirmed in "vgdisplay".

<Display Example>

```
# System /etc/fstab file.  Static information about the file systems
# See fstab(4) and sam(1M) for further details on configuring devices.
/dev/vg00/lvol3 / vxfs delaylog 0 1
/dev/vg00/lvol1 /stand hfs defaults 0 1
/dev/vg00/lvol4 /tmp vxfs delaylog 0 2
/dev/vg00/lvol5 /home vxfs delaylog 0 2
/dev/vg00/lvol6 /opt vxfs delaylog 0 2
/dev/vg00/lvol7 /usr vxfs delaylog 0 2
/dev/vg00/lvol8 /var vxfs delaylog 0 2
/dev/vg00/lvol10 /home1 vxfs rw,suid,nolargefiles,delaylog,datainlog 0 2
/dev/vg11/lvol1 /open3 vxfs delaylog 0 4
```

mount point (in bold)

(5) Input the "bdf" command and confirm the mount point.
#bdf

<Display Example>

```
Filesystem          kbytes      used      avail    %used    Mounted on
/dev/vg00/lvol3      86016     26109      56212      32%    /
/dev/vg00/lvol1      67733     31932      29027      52%    /stand
/dev/vg00/lvol8     512000    159876     331072      33%    /var
/dev/vg00/lvol7     614400    428475     174362      71%    /usr
/dev/vg00/lvol4      32768      1131      29663       4%    /tmp
/dev/vg00/lvol6     258048    102174     146171      41%    /opt
/dev/vg00/lvol10   1544192      2858    1445062       0%    /home1
/dev/vg00/lvol5      20480      6078      13595      31%    /home
/dev/vg11/lvol1    8192000   3149893    4726982      40%    /open3
```

(6) Determine Mount Point to check by the "sum" command.

The attention item for HP-UX

This clause explains notes when using Pin Track Tool.

The notes for use of the Pin Track Tool

(1) Specify the start and end LBAs (*1) in SVP for the setting range of Pin Track Tool. 1 slot is composed of 96 LBAs ((60)h LBA).
*1: One slot of OPEN-VOL is composed of 96LBAs except for OPEN-V and 512LBAs for OPEN-V.

(2) Pin Track Tool is not a tool to recover data. Therefore, when Unreadable Pin occurs, it is necessary to be restored using the back-up data of the customer.

(3) There is a case that O/S patch is prepared which has an influence to the fault track read operation. For HP Server which has Fibre Interface, the following patch is necessary.

- PHSS_18326 Fibre Channel Mass Storage Driver Patch. (HP-UX10.2)
- PHSS_18652 Fibre Channel Mass Storage Driver Patch. (HP-UX11.0)
  or XSWGR1100 HP-UX General Release Patches, June 2001
  XSWHWCR1100 HP-UX Hardware Enablement and Critical Patches, June 2001 : (HP-UX11.0)
- PHCO_18217 Cumulative SAM/ObAM Patch. (HP-UX10.2)
- PHKL_16751 SIG_IGN/SIGCLD,LVM,JFS,PCI/SCSI cumulative patch. (HP-UX10.2)

The patch information of OS may change at frequent intervals. Confirm the latest information.
Request the system administrator to install patch.
When the system administrator judges this action may impact on the system, cancel the Mode Configuration:95 and return to TRBL07-180 ④.

(4) When it isn't possible to use Pin Track Tool, use the LDEV Format to clear.

(5) Because HP-UX executing retry to read the pinned track where it isn't possible to read many times, It sometimes takes 12 hours maximum about processing 1 slot.

The erasing process of Pinned Track on the DB (HP-UX, Solaris)

DB has two types of the Pinned Track erasing.

(1) Raw device-based Data Base type :
Without passing O/S, by the physical level, the data base soft wear manages a disk.
(It is managed by the LBA unit on the physical level.)
The device of local type isn't mounted on File System. Then, it has a powerful back-up function.

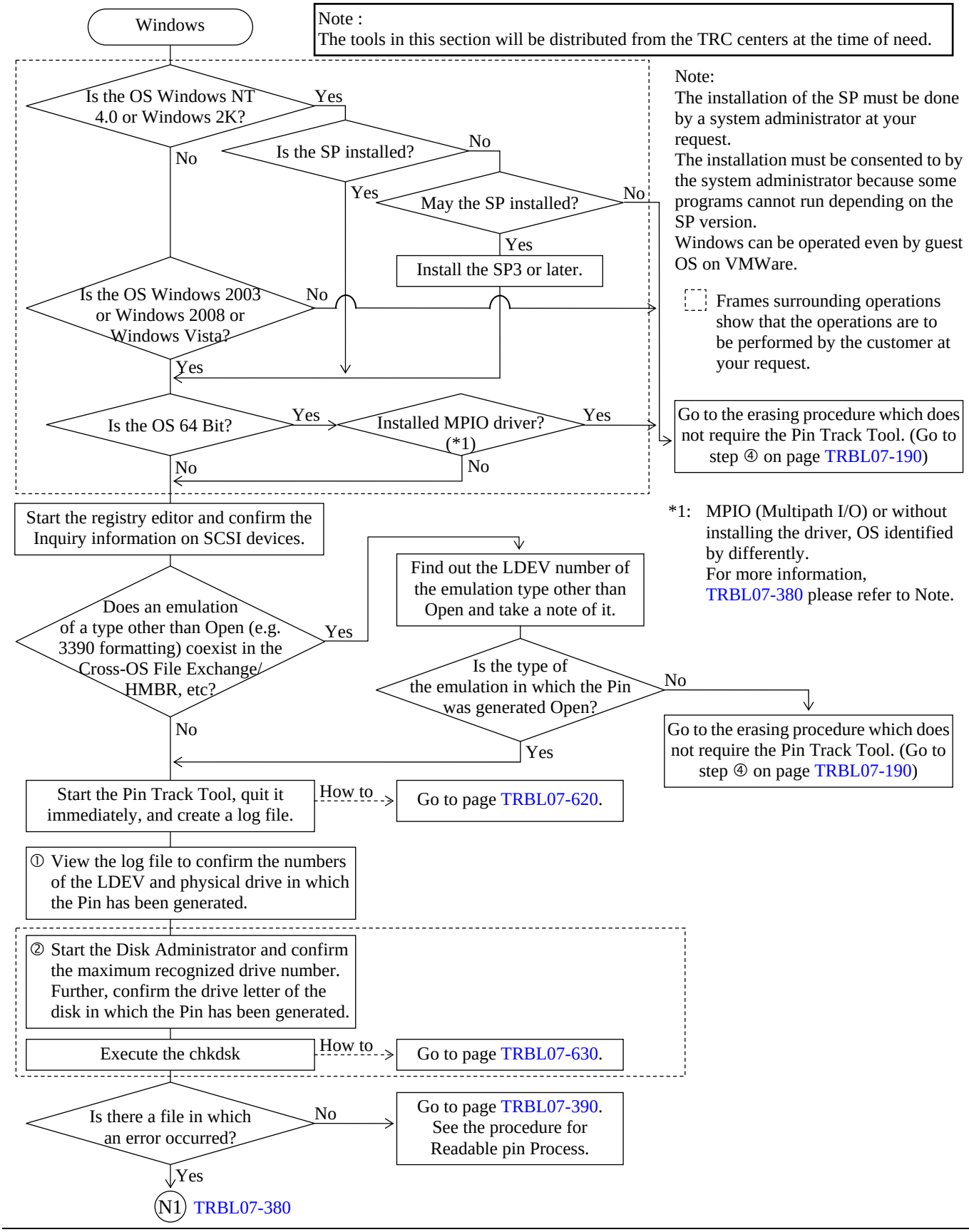
(2) File system-based Data Base type :
Mounted an File System.

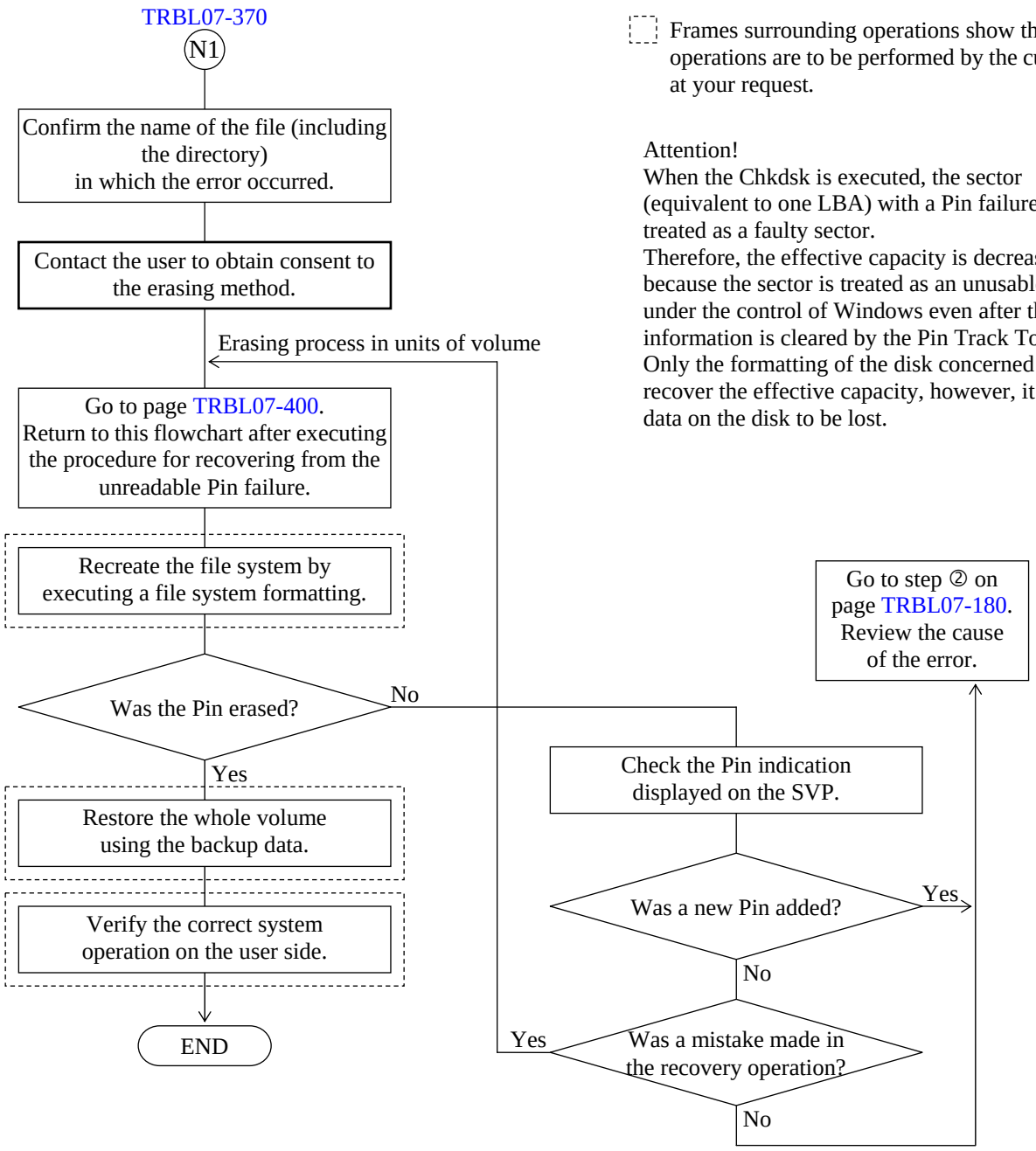
In case of (2), it is necessary to be restored from the backup data.
In case of (1), it be restored by the backup-restore feature of the DBMS.

If a pin is left after the data recovers, erase a pin by the Pin Track Tool.
The most important thing is to execute the recovery function in the DB software.

7.2.3.2 Procedure on Windows

- The following is an erasing procedure to be used when a Pin failure occurs on Windows.

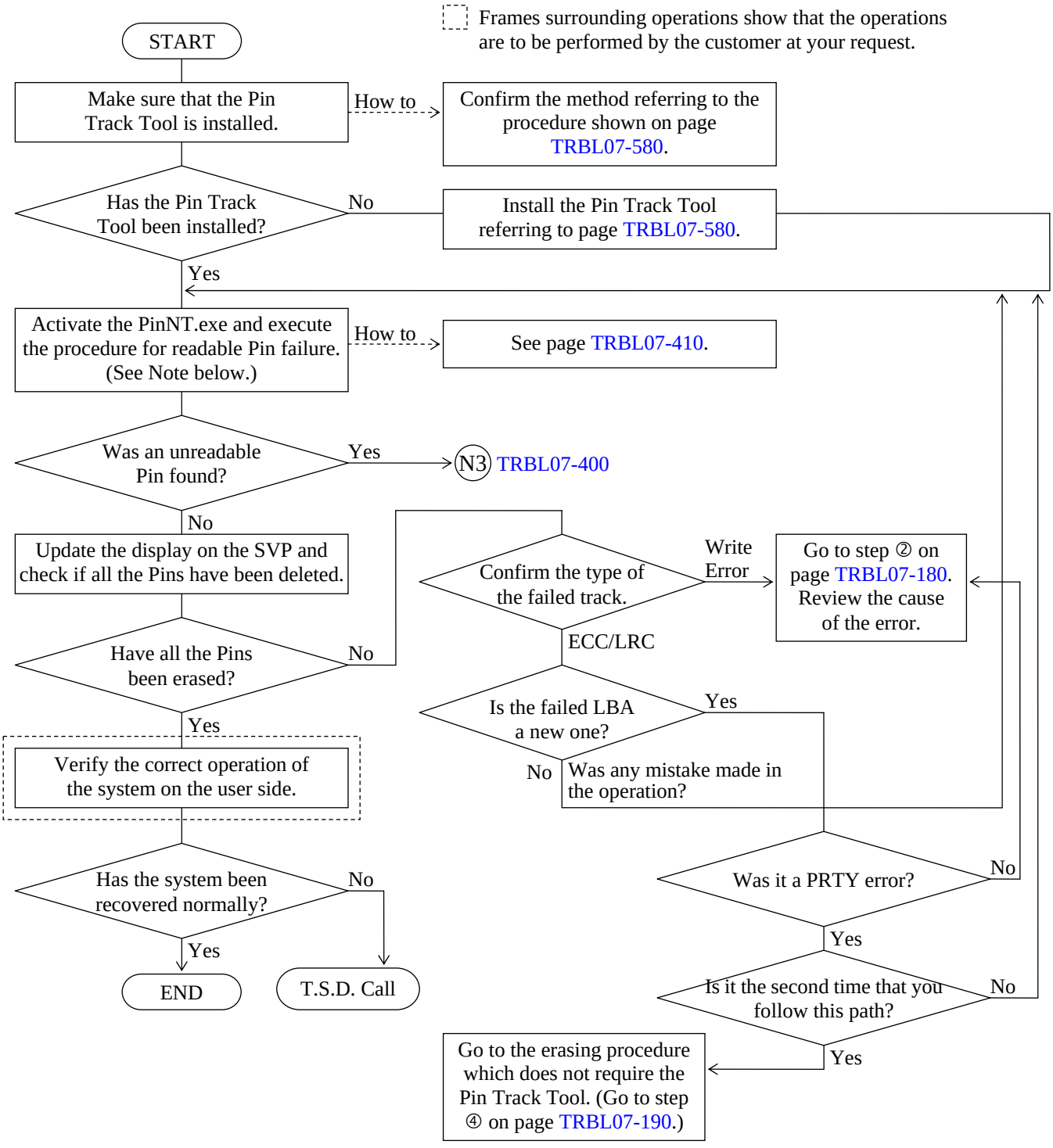




Note: — Checking for MPIO driver installation —

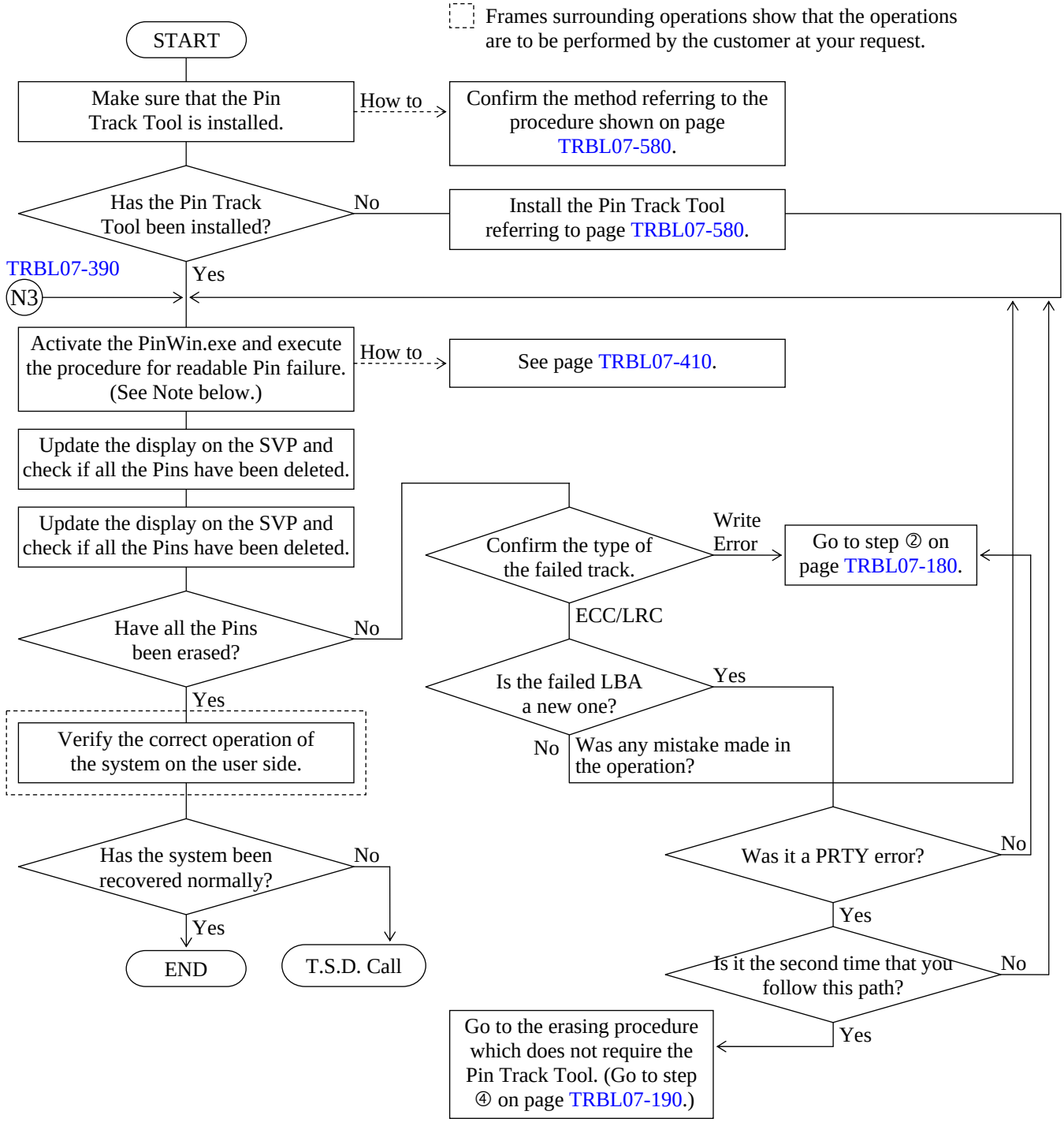
- Windows 2008: From the command prompt, “ServerManagerCmd.exe-query” please run.
- Otherwise, Windows 2008: OS not supported by the confirmation of installation status. Multipath I/O. If you have any software installed to the management, MPIO driver is installed.

Readable Pin Process (Windows)



Note: — On an SIM reported owing to a use of the Pin Track Tool —
When two or more Pins have been generated in the LBAs adjacent in the same LU, a generation of a new temporary Pin caused by the parity calculation performed in the Pin Track process may occur and an SIM may be reported. Since this Pin is erased at the same time when the erasing process of the Pin concerned completes, complete the SIM when the erasure of all the Pins by the Pin Track Tool is confirmed.

Unreadable Pin Process (Windows)



Note: — On an SIM reported owing to a use of the Pin Track Tool —

When two or more Pins have been generated in the LBAs adjacent in the same LU, a generation of a new temporary Pin caused by the parity calculation performed in the Pin Track process may occur and an SIM may be reported. Since this Pin is erased at the same time when the erasing process of the Pin concerned completes, complete the SIM when it is confirmed that all the Pins have been erased by the Pin Track Tool.

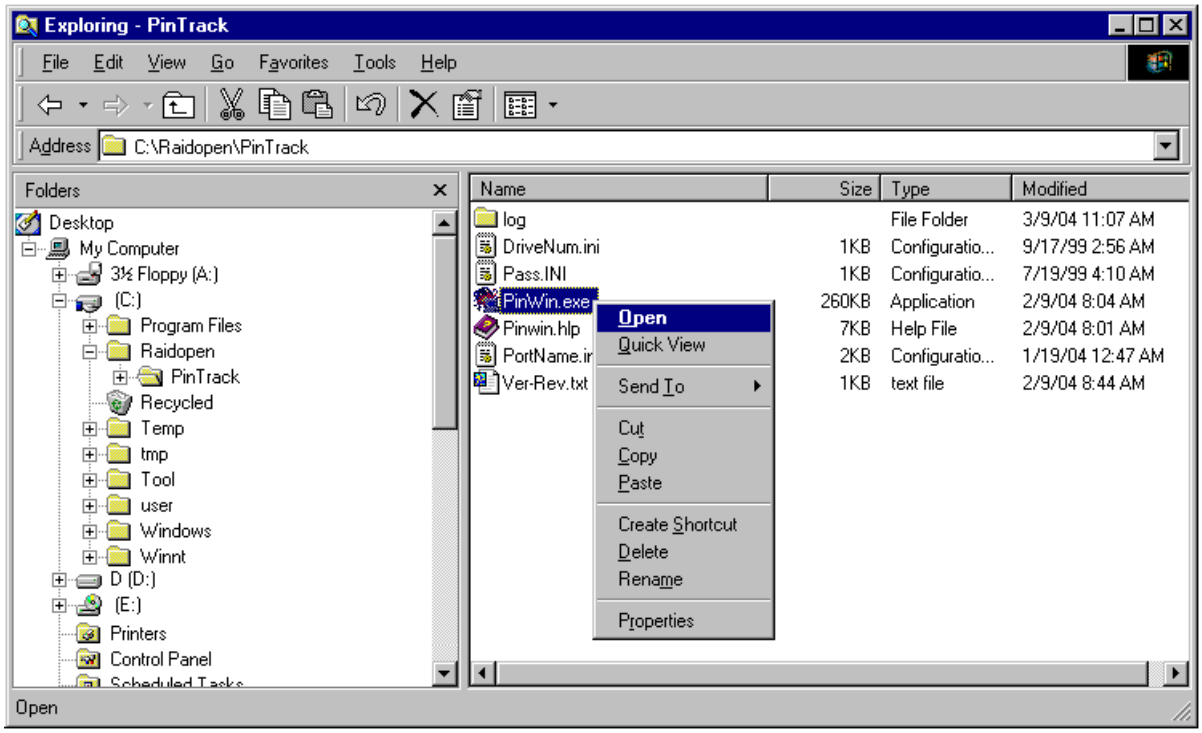
Operation of Readable Pin Process (Windows)

The following explains how to operate the Pin Track Tool for erasing a readable Pin.
The procedure for erasing a readable Pin is to be firstly applied to all types of Pins.
A Pin which cannot be erased by the readable Pin erasing process will be erased by a process which treats it as an unreadable Pin.

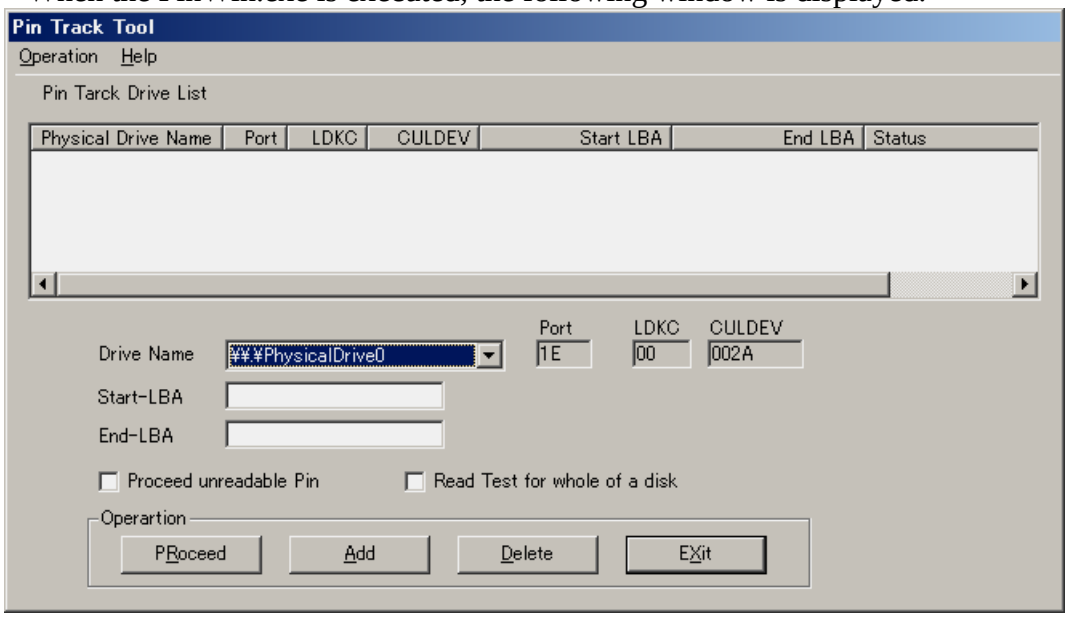
> Note: — On an SIM reported owing to a use of the Pin Track Tool —
>
> When two or more Pins have been generated in the LBAs adjacent in the same LU, a generation of a new temporary Pin caused by the parity calculation performed in the Pin Track process may occur and an SIM may be reported.
> Since this Pin is erased at the same time when the erasing process of the Pin concerned completes, complete the SIM when it is confirmed that all the Pins have been erased by the Pin Track Tool.

(1) Activate the PinWin.exe

- Execute the PinWin.exe in the folder in which the tool is installed after activating it by selecting “Open” by clicking it with the right mouse button or double-clicking it with the left mouse button.



• When the PinWin.exe is executed, the following window is displayed.

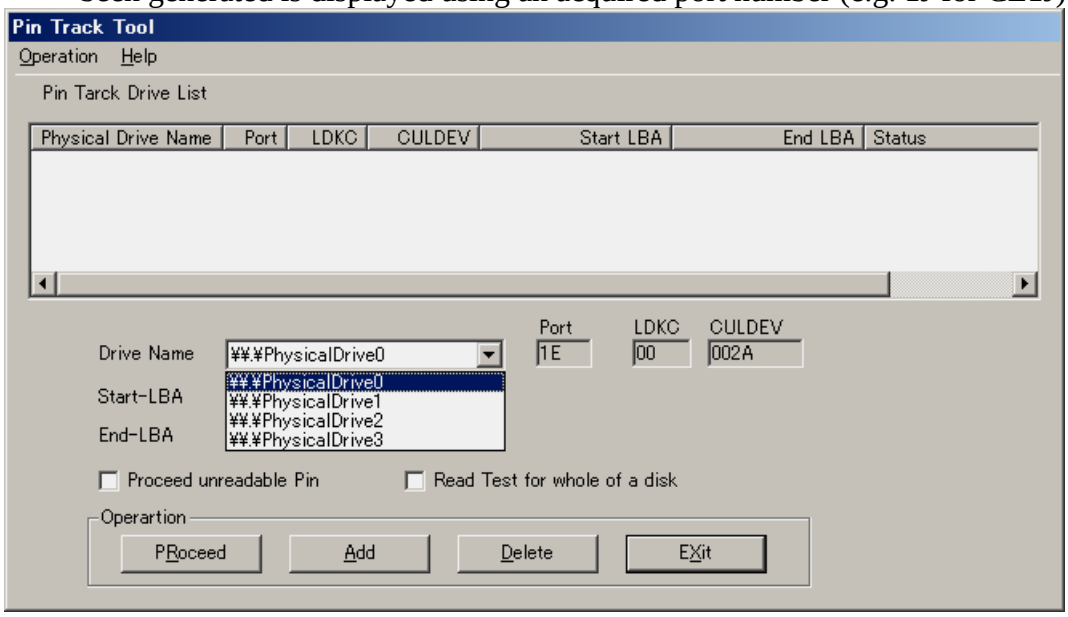


(2) Input the information, which has been got from the SVP, on the device from which the Pin is to be erased.

Note: You can enter two or more Pins in order.

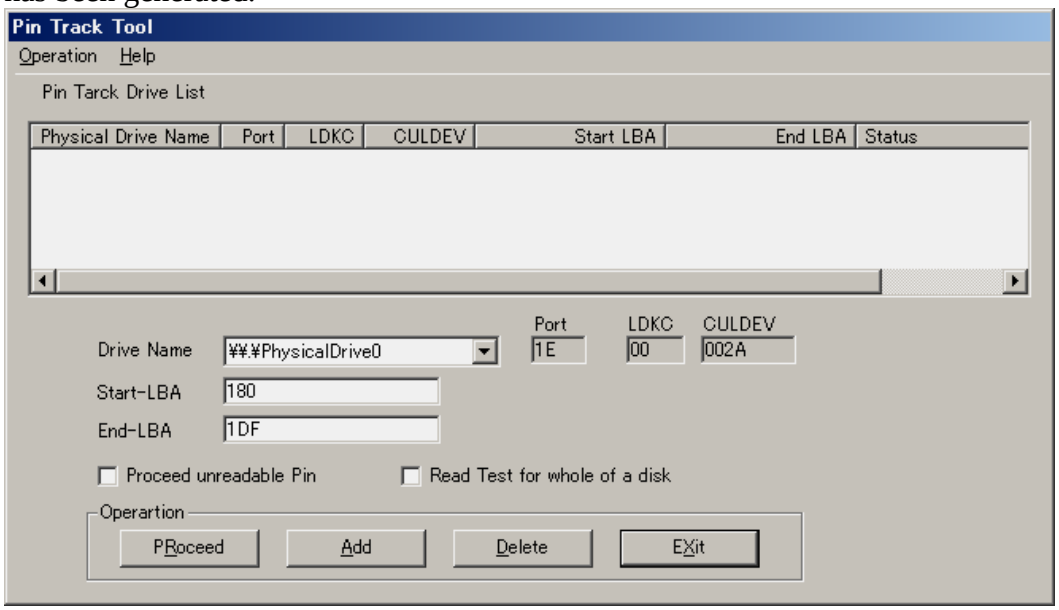
① Find a name of a drive to which the LDEV in which the Pin has been generated is allocated.

• Select a physical drive for which the LDEV number of the device in which the Pin has been generated is displayed using an acquired port number (e.g. 1J for CL1J).



Note: The drive names are not sorted in order of the drive numbers.

Input the Start LBA and End LBA of the drive input in step ① to specify the range where the Pin has been generated.

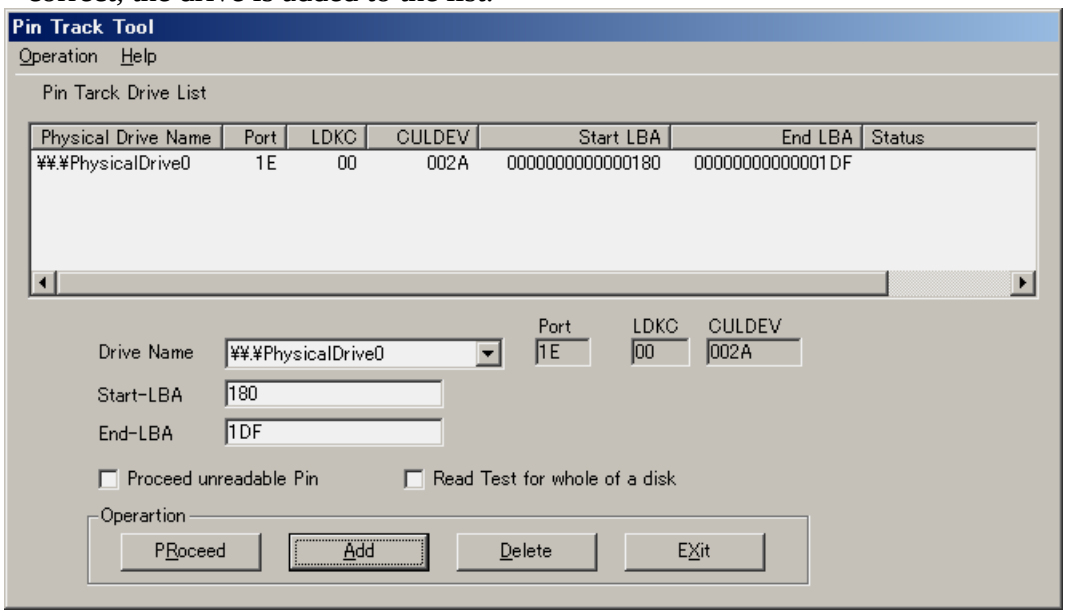


- When specifying the LBAs, the allowable range for them is as follows.
  Other than OPEN-V [End LBA - Start LBA ≤ 0x5F]
  OPEN-V [End LBA - Start LBA ≤ 0x1FF]

  Input the range of the 0x5F (except for OPEN-V) or 0x1FF (OPEN-V) shown on the SVP.

(3) Add the input device to the Pin Track Device List.

- When the “Add” button is clicked after making sure that the selected and input items are correct, the drive is added to the list.



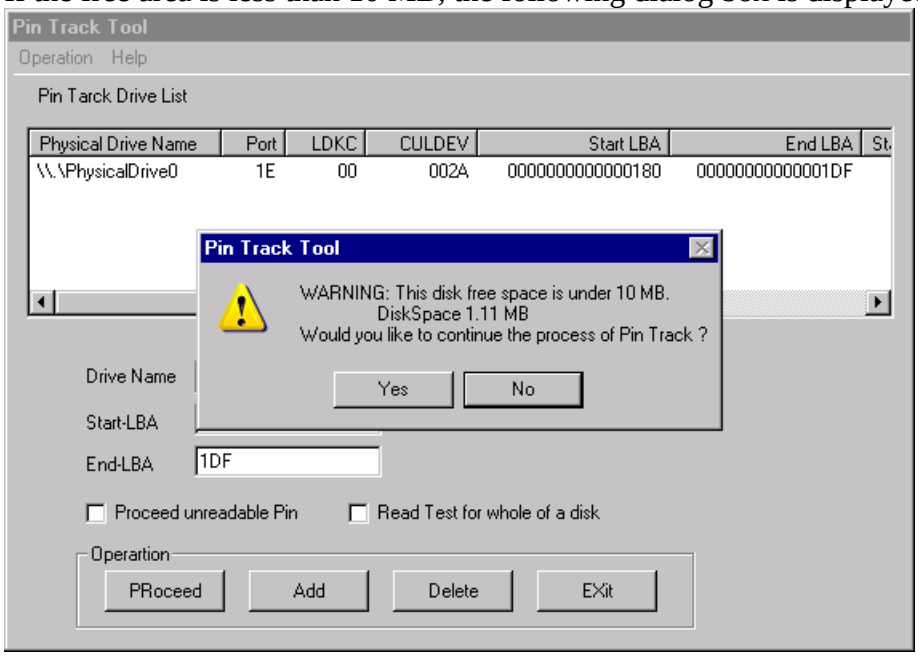
(4) Erase the readable Pin.

- Check if the input information is correct. When correcting it, select the device and input the LBA over again by selecting the item concerned from the list and clicking the “Delete” button.
- When you want to add two or more devices, you can do it by repeating the input.
  When they are added, the Pin erasing process is applied to them in an ascending order of the listing.

Note: Since the readable Pin is to be erased here, do not check off the check box of the Unreadable PIN.

• When no wrong input is found, click the “PRoceed” button to erase the readable Pin.

When the “PRoceed” button is clicked, the program checks whether a free area for outputting a log is ensured in the current drive in which the Pin Track Tool is installed.
If the free area is less than 10 MB, the following dialog box is displayed to warn it.



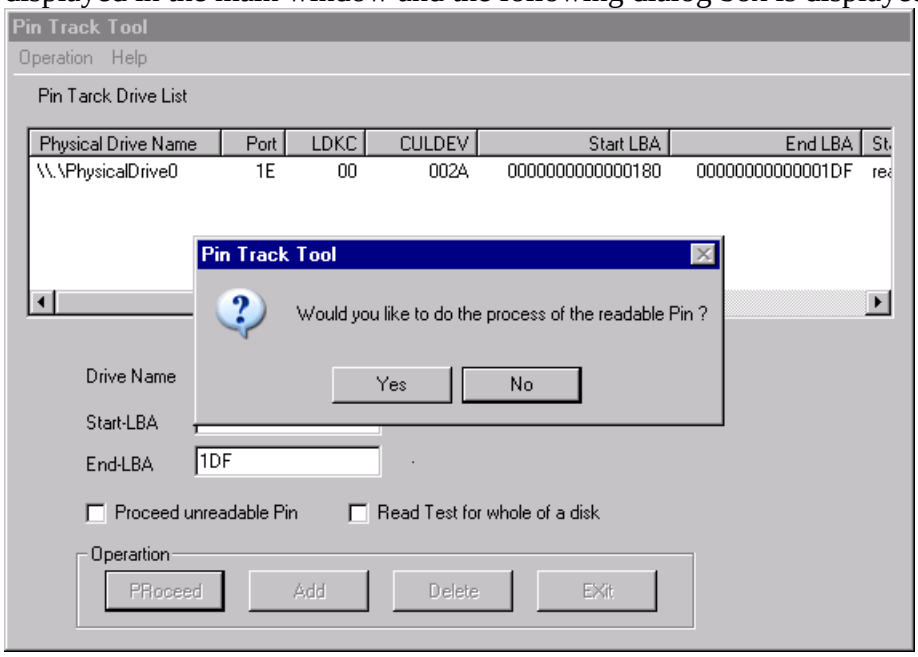
The current free area on the disk is displayed in the dialog box. A free area of approximately 400KB is required for (60)h length SLOT to erase a Pin. When the necessary free area is provided, the processing can be continued.

Note: Install the program in a drive in which the enough free area can be ensured.

When “Yes” is selected, the processing is continued. If the disk capacity is less than that required for the log, as large log file as can be accommodated is acquired.
Normally, select “Yes” only when the free area is enough.

When “No” is selected, the routine is returned to the main window. If the option has been checked off, it is cancelled. Ensure a free area in the drive, put the collected log file in order, or install the program in another drive.

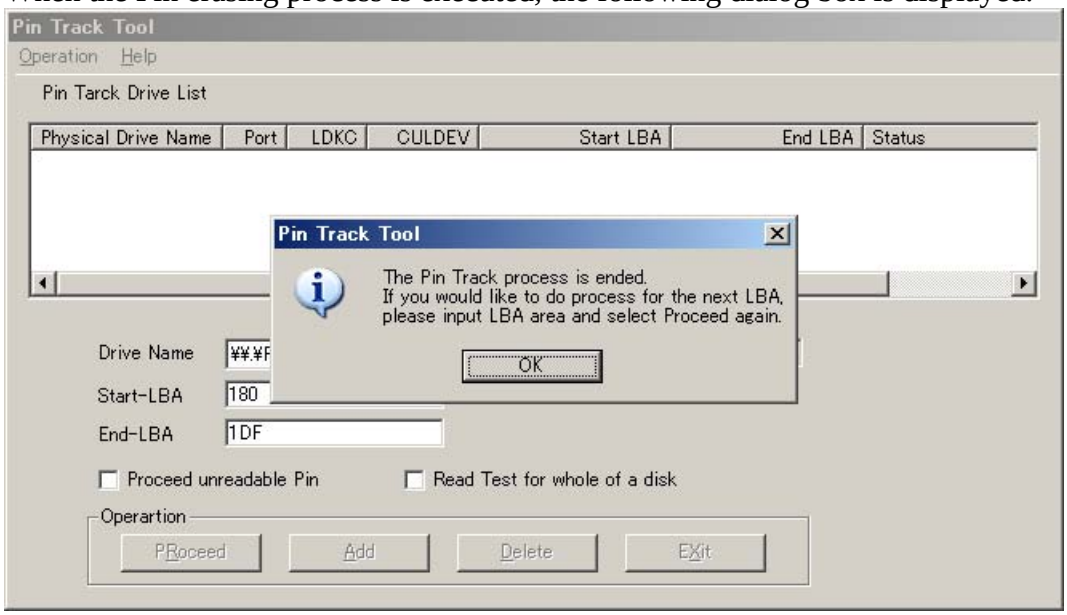
When the “PRoceed” button is clicked to continue the processing, status of each drive is displayed in the main window and the following dialog box is displayed.



When “readable-pin” is displayed in the “Status” column, it shows that the slot is a readable Pin. When “Unreadable-pin” is displayed in the “Status” column, it shows that the slot is an unreadable Pin.

- Update the display on the SVP before executing the erasing process and check if the Pin of the input device has been erased.
  When the Pin has already been erased, click the “No” button to return to the main window.
  When the Pin has not been erased, click the “Yes” button to erase the readable Pin.

(5) The Pin erasing process is executed.
When the Pin erasing process is executed, the following dialog box is displayed.



When the Pin erasing process completes normally, the items are deleted from the list automatically. Confirm the execution result of the Pin erasing process in the log file.

- Open the PinTrack.log file in the folder in which the tool is installed by using a memo pad, etc.

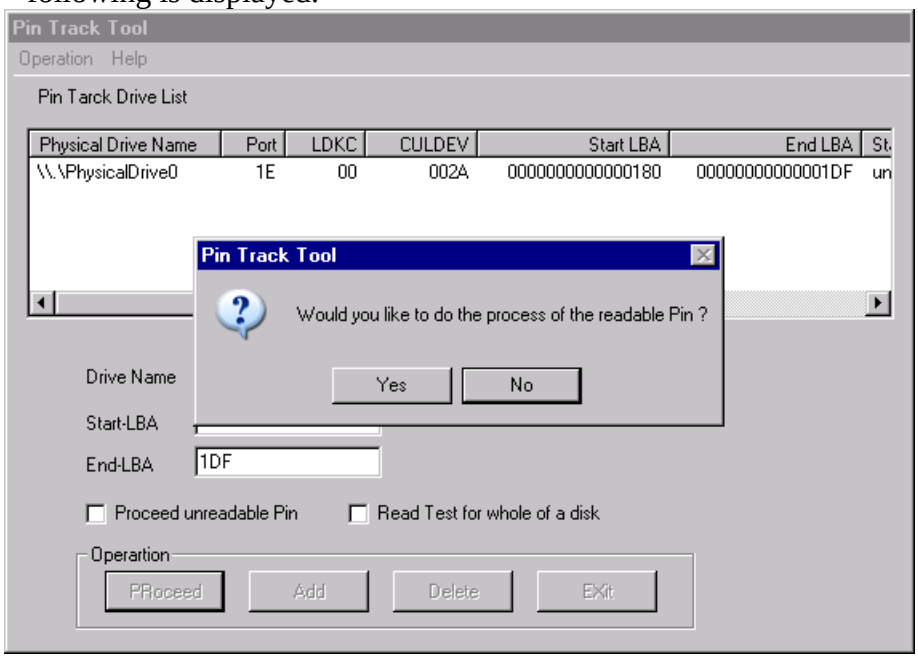
```
2000/03/27 13:22:16 Pin Track Tool started.

\\.\PhysicalDrive0
                      No information

\\.\PhysicalDrive1
                      Product Serial R500 00030036 0042
                      Port Number    1E
                      LDKC Number    00
                      LDEV Number    002A
                      Disk Capacity  2461040640 bytes
                      Maximum LBA    000000000049583F

\\.\PhysicalDrive2
\\.\PhysicalDrive3
\\.\PhysicalDrive4


\\.\PhysicalDrive9
                      Product Serial R500 00030036 0023
                      Port Number    2F
                      LDKC Number    00
                      LDEV Number    0017
                      Disk Capacity  2461040640 bytes
                      Maximum LBA    000000000049583F

Read Data: Top Pin No=0000000000000180
  00000000:00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  00000010:00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  00000020:00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

  0000BFE0:00 00 00 00 00 00 00 00 00 00 00 00 3E BC 12 E6
  0000BFF0:00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

Read Data  (After Writing):  Top Pin No=0000000000000180
  00000000:00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  00000010:00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  00000020:00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

  0000BFE0:00 00 00 00 00 00 00 00 00 00 00 00 3E BC 12 E6
  0000BFF0:00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

Write Data: Top Pin No=0000000000000180
  00000000:00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  00000010:00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  00000020:00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

  0000BFE0:00 00 00 00 00 00 00 00 00 00 00 00 3E BC 12 E6
  0000BFF0:00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

2000/03/27 13:23:13
\\.\PhysicalDrive9,Start LBA=0000000000000180,End LBA=00000000000001DF,The Pin Track
process is completed.
2000/03/27 13:23:48 Pin Track Tool is exited.
```

The log file is backed up to the log folder under the directory in which the tool is installed with a name given as “PinTrack-year-month-date-hours-minutes-seconds.log”.

- When “The Pin Track process is completed.” is displayed in the log file, it means that the Pin has been erased. View the display on the SVP to confirm that the Pin has been erased.

(6) When you erase another readable Pin successively, repeat the procedure from step (2).

- When an unreadable Pin exists in the device added to the list
  When the “PRoceed” button is pressed in the case where an unreadable Pin exists in the list, the following is displayed.



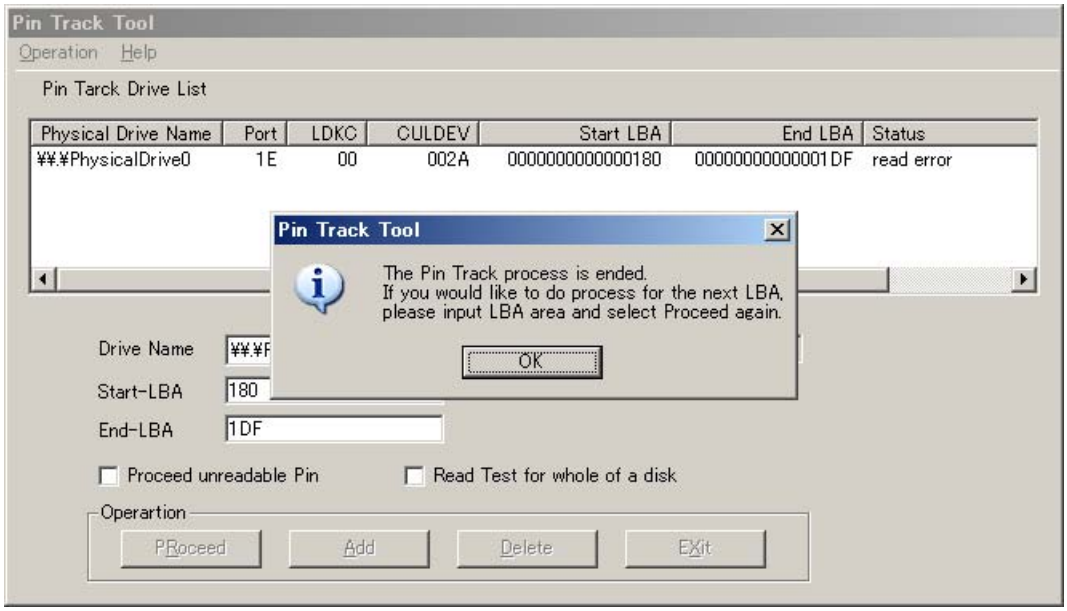
“unreadable” is displayed in the “Status” column showing that the slot is an unreadable Pin. In this case, the Pin is not erased even if the procedure for erasing a readable Pin is executed and the device is not deleted from the list as follows.

The log when two area (120-17F, 1E023F) of Unreadable Pin exists in specified DeviceName (PhysicalDrive2) becomes as follows.

```
2002/09/03 14:17:55 Pin Track Tool started.

\\.\PhysicalDrive0
       No information
\\.\PhysicalDrive1
       Product Serial No information
       Port Number    NG
       LDKC Number    NG
       LDEV Number    NG
       Disk Capacity  0 bytes
       Maximum LBA    FFFFFFFFFFFFFFFF

\\.\PhysicalDrive2
       Product Serial HITACHI R5016F700009
       Port Number    1K
       LDKC Number    00
       LDEV Number    0009
       Disk Capacity  2461040640 bytes
       Maximum LBA    000000000049583F

2002/09/03 14:18:00
\\.\PhysicalDrive2, Start LBA=0000000000000120, End LBA=000000000000017F,
An error occurred when reading.
2002/09/03 14:18:00
\\.\PhysicalDrive2, Start LBA=00000000000001E0, End LBA=000000000000023F,
An error occurred when reading.
2002/09/03 14:18:40 Pin Track Tool is exited.
```

➡ Device information is recorded here. When displayed on [Product Serial] as [No information], it is a device besides an object.

➡ It is listed here when there is area of Unreadable Pin.



When the status is changed to “read error” and the device remains in the list, go to Subsection TRBL07-520, “Operation of Unreadable Pin Process”.

Operation of Unreadable Pin Process (Windows)

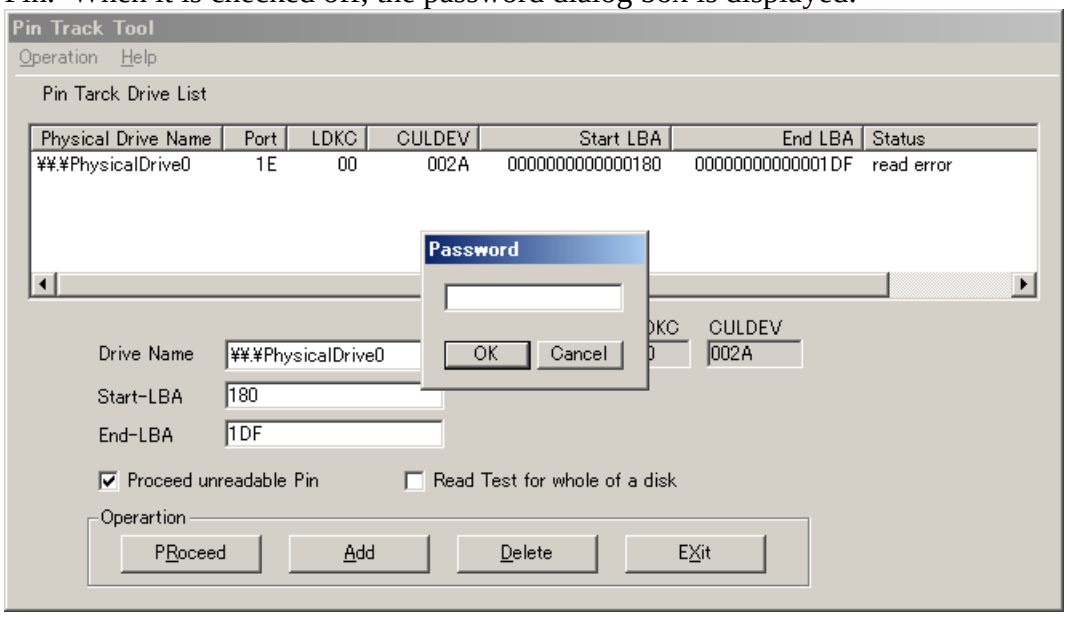
The following explains how to operate the Pin Track Tool for erasing an unreadable Pin. Since the procedure for erasing a readable Pin is to be applied to all the Pins first, follow the procedure below after executing the procedure given in Subsection TRBL07-410, "Operation of Readable Pin Process".

> Note: — On an SIM reported owing to a use of the Pin Track tool —
>
> When two or more Pins have been generated in the LBAs adjacent in the same LU, a generation of a new temporary Pin caused by the parity calculation performed in the Pin Track process may occur and an SIM may be reported.
> Since this Pin is erased at the same time when the erasing process of the Pin concerned completes, complete the SIM when it is confirmed that all the Pins have been erased by the Pin Track Tool.

(1) When the log file (PinTrack.log) is open, close it.

(2) Reconfirm the device, which was not deleted from the list when the readable Pin erasing process was executed, and the display on the SVP.

(3) Specify the unreadable Pin erasing process.
After confirming that the input information is correct, check off the check box of the Unreadable Pin. When it is checked off, the password dialog box is displayed.

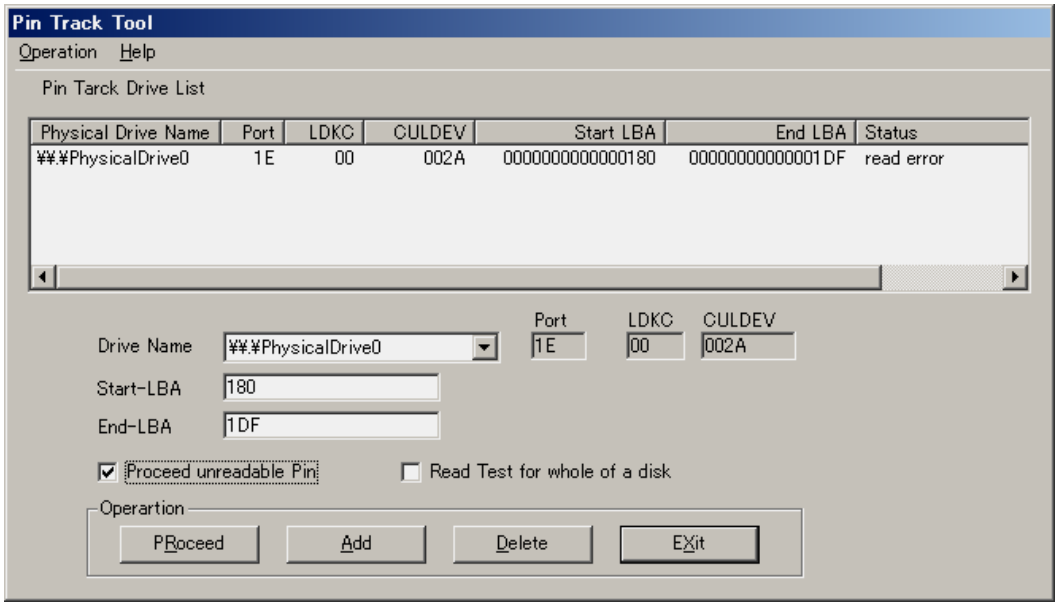


The password is to be obtained from the Technical Support Division. Without the password, the unreadable Pin cannot be erased.
Input the password and click the "OK" button.
When the correct password is input, the check box is checked off.

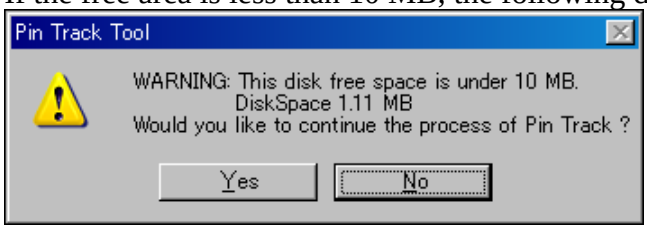
If the box is not checked off although the correct password has been input, copy the Pass.INI file in the folder in which the tool is installed from the media for installation again.

(3) Erase the unreadable Pin.

- Check off the check box. When no wrong input is found, click the "PRoceed" button to erase the unreadable Pin.



When the "PRoceed" button is clicked, the program checks whether a free area for outputting a log is ensured in the current drive in which the Pin Track Tool is installed.
If the free area is less than 10 MB, the following dialog box is displayed to warn it.



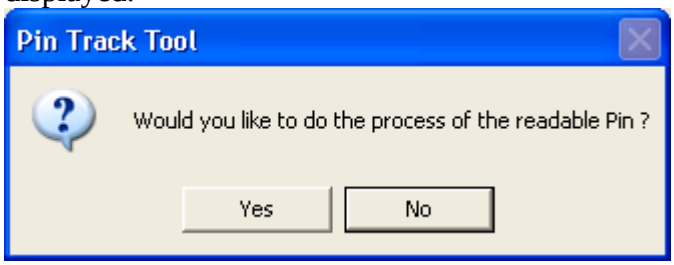
The current free area on the disk is displayed in the dialog box. A free area of approximately 400KB is required for (60)h length SLOT to erase a Pin. When the necessary free area is provided, the processing can be continued.

Note: Install the program in a drive in which the enough free area can be ensured.

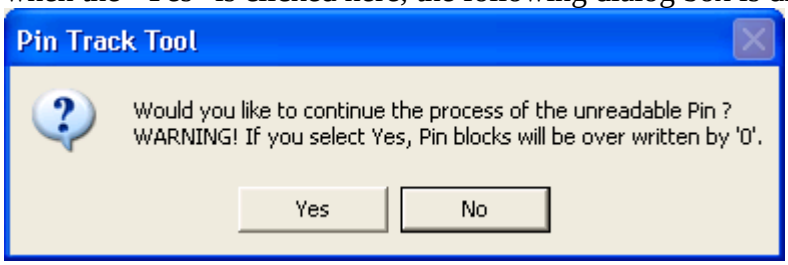
When "Yes" is selected, the processing is continued. If the disk capacity is less than that required for the log, as large log file as can be accommodated is acquired.
Normally, select "Yes" only when the free area is enough.

When "No" is selected, the routine is returned to the main window. If the option has been checked off, it is cancelled. Ensure a free area in the drive, put the collected log file in order, or install the program in another drive.

When the “PRoceed” button is clicked to continue the processing, the following dialog box is displayed.

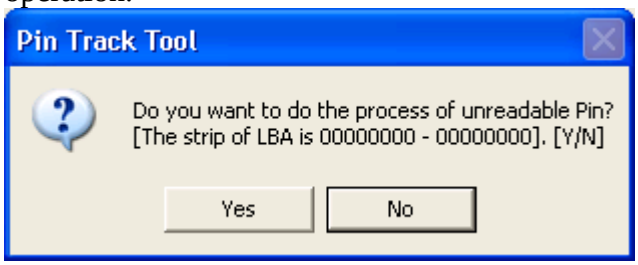


Try to erase the readable Pin first. When the readable Pin Track process cannot be executed when the “Yes” is clicked here, the following dialog box is displayed.



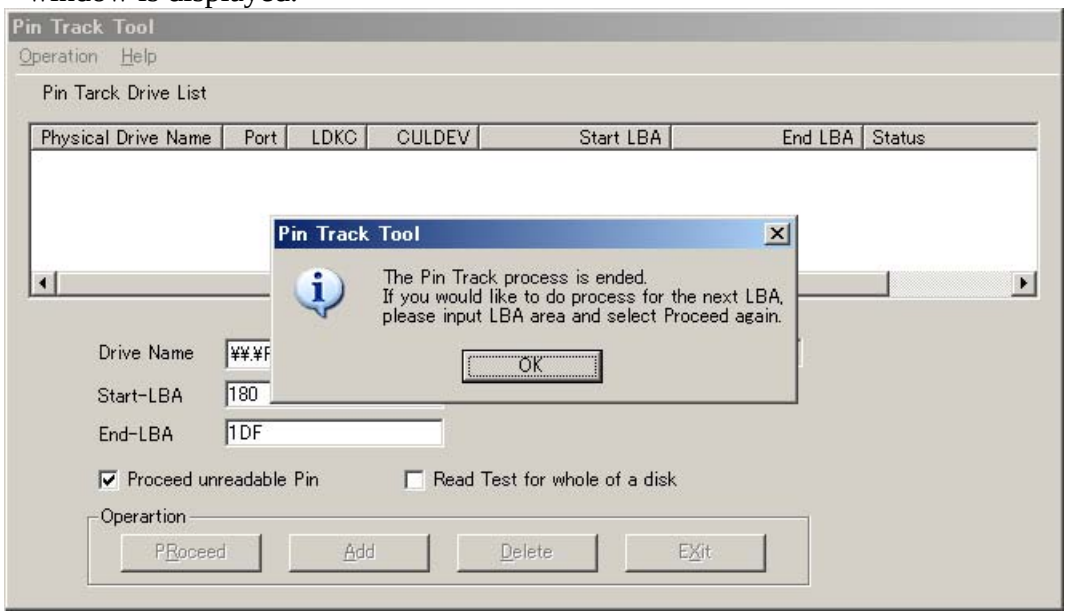
A dialog box for confirming whether to execute the unreadable Pin Track process is displayed. Execution of the unreadable Pin Track process must be decided carefully because it overwrites the Pin blocks with “0” data.

In case of the unreadable pin erasing operation, Confirmation of execution is demanded every contents in the pin track drive list. Operator can select execution or cancellation for each operation.



- Update the display on the SVP before executing the unreadable Pin Track process and check if the Pin of the input device has been erased. When the Pin has already been erased, click the "No" button to return to the main window.

- When the Pin has not been erased, click the "Yes" button to erase the unreadable Pin. When the "Yes" button is clicked, the unreadable Pin Track process is executed and the following window is displayed.



(4) Check the log of the Pin Track Tool.

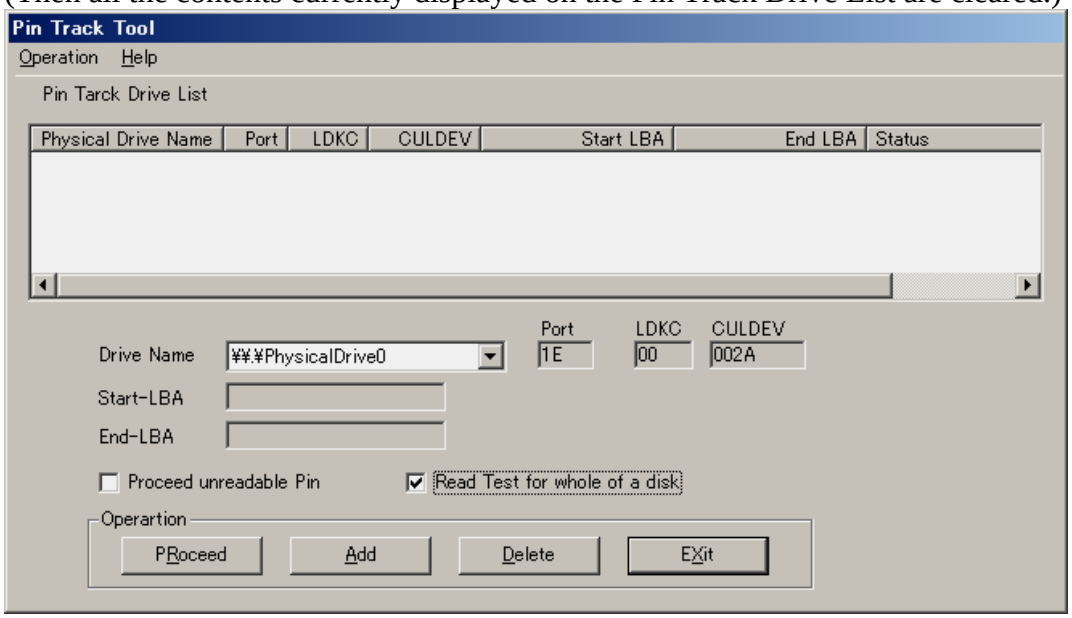
- Open the PinTrack.log file in the folder in which the tool is installed by using a memo pad, etc. The log file is backed up to the log folder under the directory in which the tool is installed with a name given as "PinTrack-year-month-date-hours-minutes-seconds.log".
- When "Pin Track process is completed" is displayed in the log file, it means that the Pin has been erased.
  View the display on the SVP to confirm that the Pin has been erased.

(5) When you proceed another Pin successively, repeat the "Operation of Readable Pin Process" in TRBL07-410.

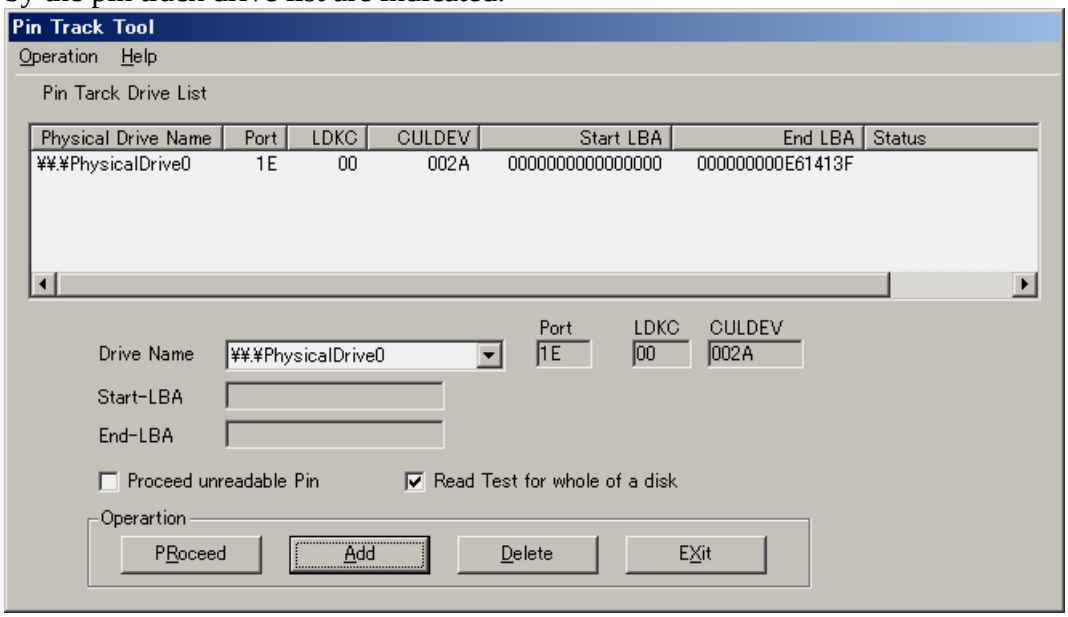
How to Read Test for whole of a disk (Windows)

This chapter describes how to discover the Unreadable Pin on select device.
This processing requires long time.

(1) If a check box “Read Test for whole of a disk” is clicked, It becomes impossible to input “Start LBA” and “End LBA”.
(Then all the contents currently displayed on the Pin Track Drive List are cleared.)



(2) Select device name and click the add button, Drive and all domain of LBA which are specified by the pin track drive list are indicated.



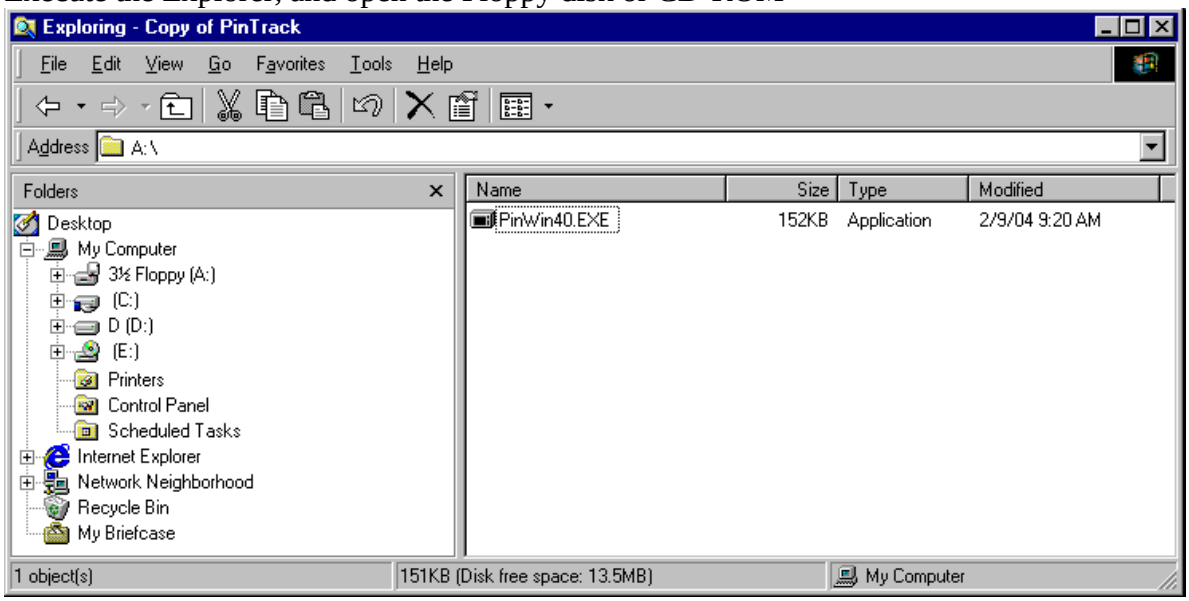
(3) All LBA in the selected device is started by clicking “PRoceed” button.
(This function is only reading and writing is not performed.)

Installation of Pin Track Tool (Windows)

Note: Perform the installation only when it is required.

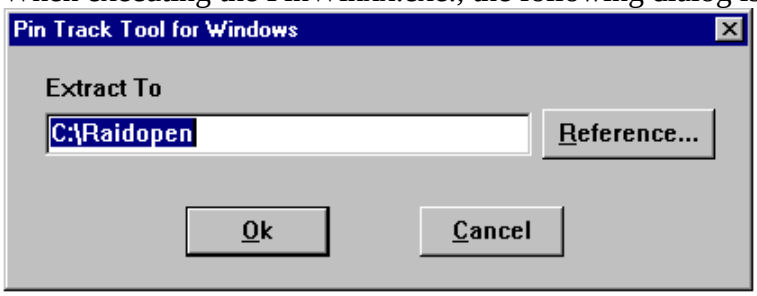
<Preparation>
The Pin Track Tool is provided being contained in one 3.5-inch floppy disk or CD-ROM. A free area of more than 10 MB is required on the disk on which the program is to be installed as the area for collecting a log. The size of the log file is approximately 400 KB per one erasing process for (60)h length SLOT. The log is collected in the log folder under the folder in which the tool is to be installed each time the Pin erasing process completes.
Since the log is collected after the processing, prepare an empty floppy disk.

<Copying from floppy disk to local disk>
(1) Logon to the Windows system as administrator permission.
(2) Execute the Explorer, and open the Floppy disk or CD-ROM



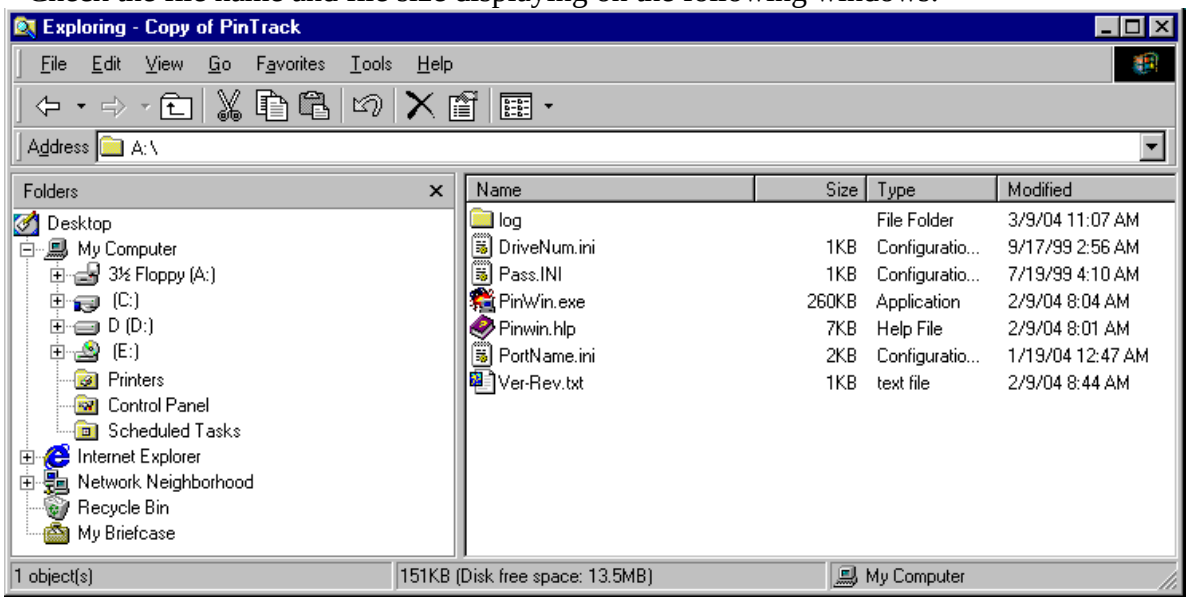
For CD-ROM, the path is different.
(Example : X:\Program\Ment\PINTRACK\WIN\)

(3) When executing the PinWinxx.exe., the following dialog is displayed.



(4) If you specify an extracting folder and click the [OK] button, Pin Track Tool are extracted by itself.

• Check the file name and file size displaying on the following windows.



The execution file name is PinWin.exe. When the PinWin.exe is executed, a log file, PinTrack.log, is created in the folder in which the tool has been installed. When the program is quit, the log file is copied to the log folder with a name given as "PinTrack-year-month-date-hours-minutes-seconds.log".

• Log file
In the log file, only the head LBA of Read/Write data of specified device is recorded. It can also record Read/Write data of all the LBAs.

Note: When logs of all the LBAs are recorded, a log file of approximately 400 KB is created for (60)h length SLOT for each erasing process in the list. Therefore, be careful of the free capacity on the disk on which the tool is installed.

When a log of only the head LBA is recorded, open the DriveNum.ini file in the folder in which the tool is installed and replace "LogMode=1" with "LogMode=0".

Data in the log file is recorded in the format shown below.

```
2000/03/27 13:22:16 Pin Track Tool started.

\\.\PhysicalDrive0
                      No information

\\.\PhysicalDrive1
                      Product Serial R500 00030036 0042
                      Port Number    1E
                      LDKC Number    00
                      LDEV Number    002A
                      Disk Capacity  2461040640 bytes
                      Maximum LBA    000000000049583F

2000/03/27 13:23:13
\\.\PhysicalDrive1,Start LBA=0000000000000180, LBA=00000000000001DF,An error occurred when
reading.

Read Data: Top Pin No=0000000000000180
  00000000:** ** ** ** ** ** ** ** ** ** ** ** ** ** ** **
  00000010:** ** ** ** ** ** ** ** ** ** ** ** ** ** ** **
  00000020:** ** ** ** ** ** ** ** ** ** ** ** ** ** ** **

  0000BFE0:** ** ** ** ** ** ** ** ** ** ** ** ** ** ** **
  0000BFF0:** ** ** ** ** ** ** ** ** ** ** ** ** ** ** **

Read Data: Top Pin No=0000000000000181
Read Data: Top Pin No=0000000000000182

Read Data: Top Pin No=00000000000001DF
  0000BFE0:** ** ** ** ** ** ** ** ** ** ** ** ** ** ** **
  0000BFF0:** ** ** ** ** ** ** ** ** ** ** ** ** ** ** **


Write Data: Top Pin No=0000000000000180
  00000000:00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  00000010:00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  00000020:00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

  0000BFE0:00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  0000BFF0:00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

2000/03/27 13:24:13
\\.\PhysicalDrive9,Start LBA=0000000000000180,End LBA=00000000000001DF,The Pin Track
process is completed.
2000/03/27 13:24:48 Pin Track Tool is exited.
```

[Displayed items]

Time when the program was started	: Date and time are indicated.
SCSI device information	: Port No., LDKC No., LDEV No., disk capacity, maximum LBA, etc. are displayed.
Read log	: Readable Pins in a specified LBA range are displayed in the lump. Unreadable Pins are displayed for each LBA. Each unreadable Pin is recorded with an asterisk (*).
Write log	: Pins in a specified LBA range are displayed in the lump.
Entered information	: Selected devices, Start LBA, and End LBA are displayed.
Error information	: When a Pin is unreadable, “read error” is displayed. Besides, when an error occurs in the program, details of it are displayed.
Time when the program is quit	: Date and time are displayed.

Log file saving and de-installation

Note: Perform the de-installation only when it is required.

<Saving of log file>

(1) Save the log file which executed Pin Track Tool.
Execute Explorer to open the folder in which the tool is installed.
(2) Insert the empty floppy disk prepared for the log collection and copy the whole log directory to the floppy disk.
(3) Delete the files under the log directory if they are not necessary.

<De-installation of Pin Track Tool>

To uninstall the Pin Track Tool, delete all the files concerned by deleting the whole PinTrack folder in which the tool is installed.

Acquisition of disk information

You can confirm information of the disk connected to Windows by viewing the log file.

(1) Execute the PinWin.exe.
(2) When the window is displayed, open the PinTrack.log file.
(3) A list of the connected devices is recorded in the file.

<Log file>

- For disks other than the disk subsystem, “No Information” is displayed.
- Since the disk information is acquired using the OS function, the recording order in the log may vary.

<Variation of device information>

The display in the log file varies depending on the disk subsystem configuration.

For the HITACHI Specification

```
\\.\PhysicalDrive14
Product Serial  HITACHI R5003ABE0108
Port Number              2N
LDKC Number              00
LDEV Number            0108
Disk Capacity     2461040640 bytes
Maximum LBA       000000000049583F
```

The “LDEV Number” is the intact “Product Serial” expressed in hexadecimal.

For the OEM Specification

```
\\.\PhysicalDrive13
Product Serial   R500 00015038 0012
Port Number              1J
LDKC Number              00
LDEV Number            000C
Disk Capacity     1874903040 bytes
Maximum LBA       000000000037E05F
```

The “LDEV Number” is the “Product Serial” converted from hexadecimal to decimal.

Identification of files affected by Pin failure

When a drive letter possible to have a Pin failure is found, identify files affected by the failure using the chkdsk command.

(1) Execute Explorer, click the drive concerned by the right mouse button, and display the property.
(2) Open the tool tab and click “Check” in the “Error Check”.
(3) Check off all the check disk options and click the “Start” button.
(4) When the dialog box is displayed, follow the instruction given in it.
(5) Perform the above operations for all the drives concerned.

Verification of files and recovery of them using backup

When a file is repaired or partially deleted by the chkdsk command, verify whether the file is normal. When the file was partially deleted or broken, delete the file and restore it using the backup.
After the file is recovered normally, check the Pin status. If a Pin remains, erase it by executing the readable Pin Track process first.

7.2.3.3 Procedure on Solaris

The following is an erasing procedure to be used when a Pin failure occurs on Solaris.

= Notices =

In Solaris, disk device is shown as cXtYdZsN, which denotes controller, SCSI target ID, logical unit number, and slice (partition). One LDEV can be logically divided into eight portions, s0 to s7, and the each portion can be used as a disk drive. For a slice, a capacity can be set in units of cylinder, and the user accesses each slice treating it as a disk drive having LBAs starting from LBA 0.
In Solaris, note that some restrictions on the Pin erasing are induced by handling the disk drive as cXtYdZsN.

- Ensure a free capacity on the disk on which the Pin Track Tool is to be installed.
  The showrel tool, which identifies device files of Solaris according to the LDEV and LBA range shown on the SVP, creates a temporary file on the disk in order to acquire device information. If the free capacity on the disk is insufficient, the information cannot be displayed accurately.

- The Pin erasing process cannot be applied to all the LBAs.
  In Solaris, the last two cylinders are not allocated to the file system because they are reserved as alternate cylinders. For example, in OPEN-3, the two of the total 3338 cylinders (a range of the LBA from 0x494D00 to 0x49583F out of LBAs maximum LBA number in which is 0x495840) are not allocated to the data cylinders. Therefore, if a Pin including such a range is generated, the Pin shown on the SVP cannot be erased because I/Os cannot be issued. The remedy for it is limited to an elimination of unreadable LBAs in the file system.

- The Pin Track Tool cannot be used against a Pin including the inaccessible cylinder.
  In the case where cylinders are divided to be allocated to slices and there exist cylinders which are not allocated to any of the slices, if a Pin including such a range is generated, the Pin shown on the SVP cannot be erased because I/Os cannot be issued. The remedy for it is limited to an elimination of unreadable LBAs in the file system.

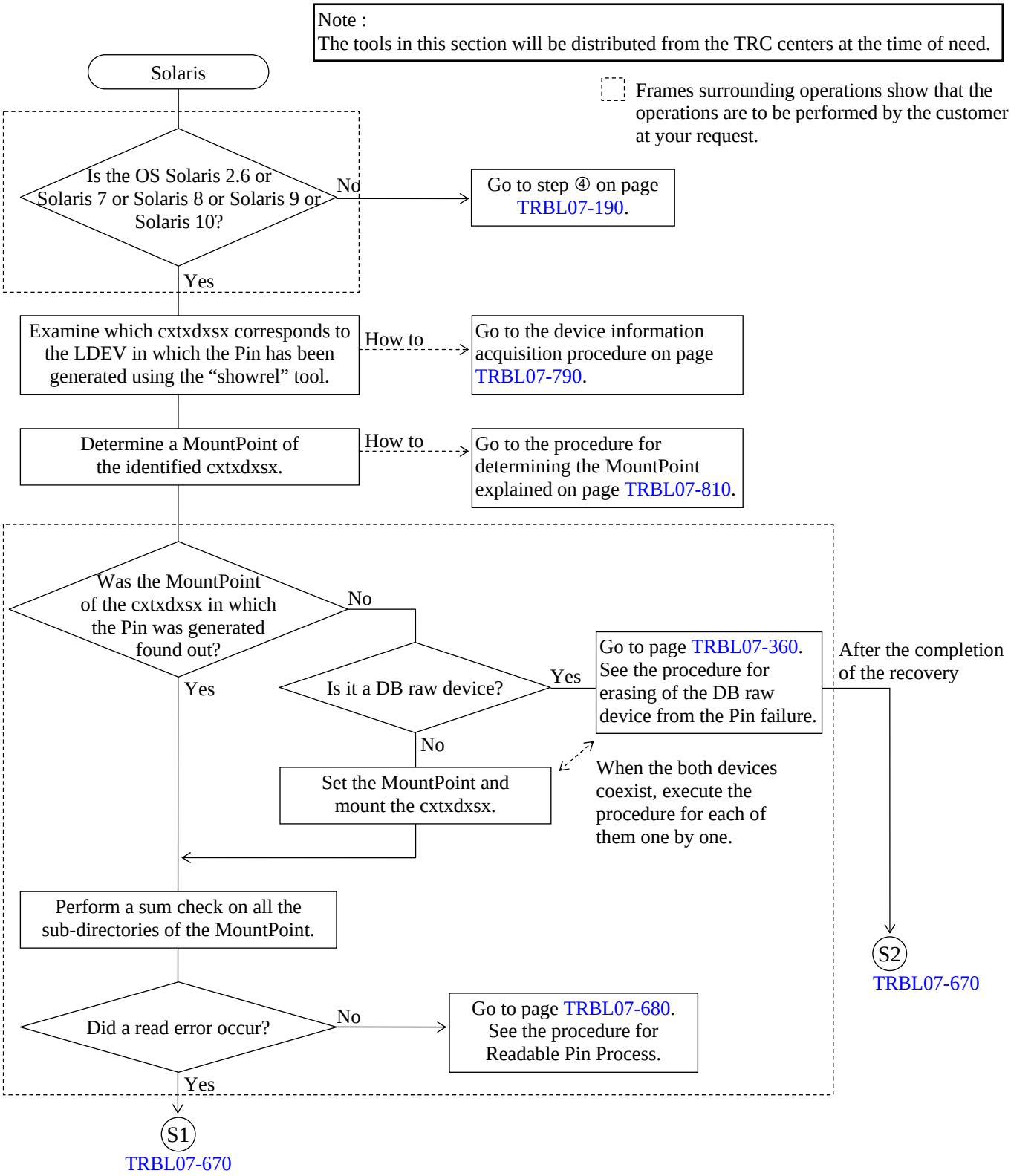
- When an unreadable Pin is generated in the head LBA, the Pin cannot be erased.
  The management information including the device geometry is recorded in the range of LBA0x0 to 0x5F (except for OPEN-V), LBA0x0 to 0x1FF (OPEN-V), to the slot#15. If a Pin including this range is generated, the device cannot be recognized to be a disk by the OS. Format the LDEV following the maintenance manual.

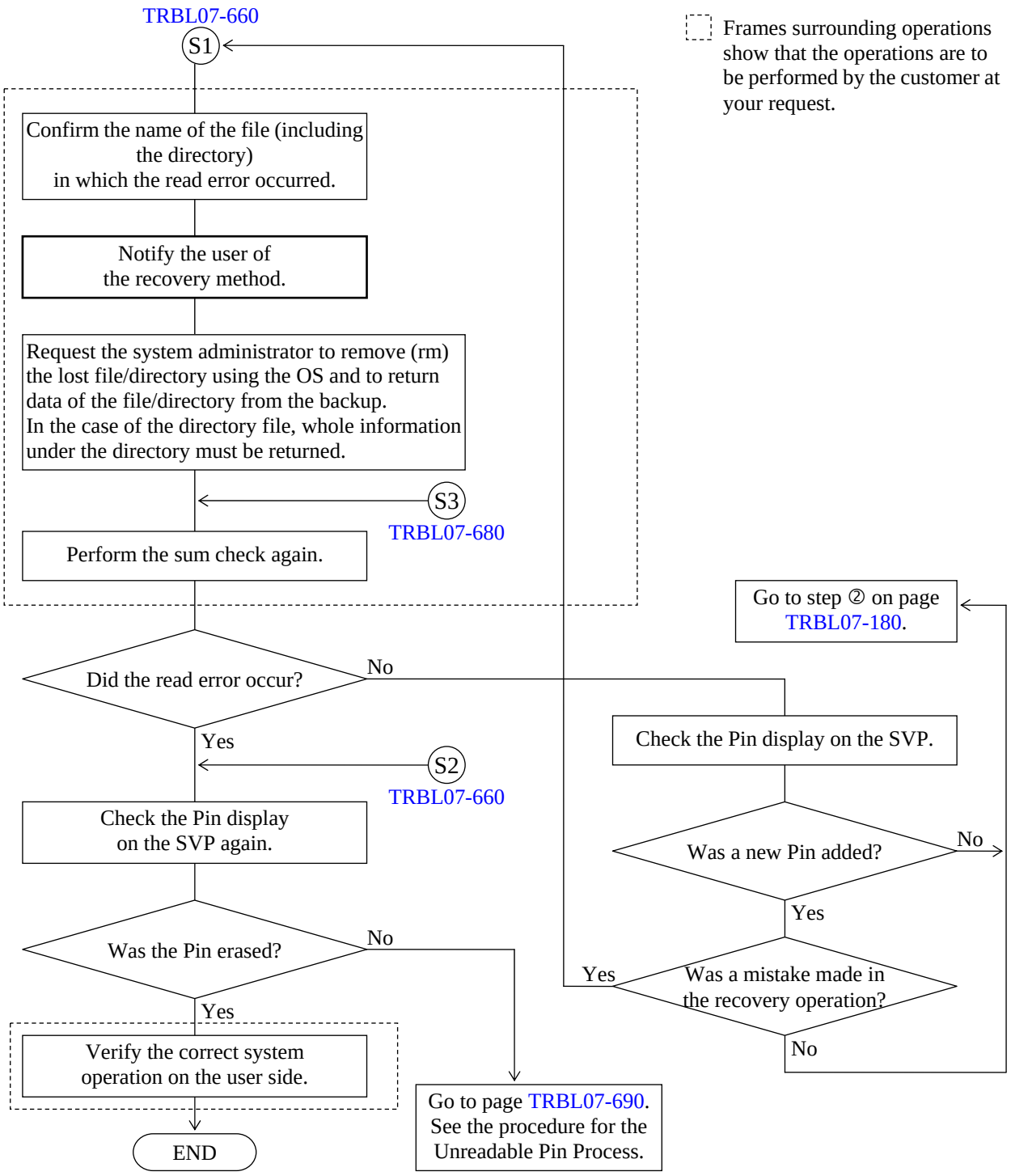
- Specify the LBA to be input in the Pin Track Tool correctly.
  When the input LBA is wrong, Solaris judges the specified range to be an unreadable Pin. Even if you try to apply the unreadable Pin Track process to it specifying the range, a write error will be caused and it is not erased. Make sure that the input LBA is correct before executing the process.

- After executing the Pin Track process, verify that the processing has completed normally referring to a log.
  To verify the execution result of the Pin Track process, refer to the log file. Read/write errors are not displayed on the screen. Furthermore, check if the input information was correct when a write error occurred as described above.

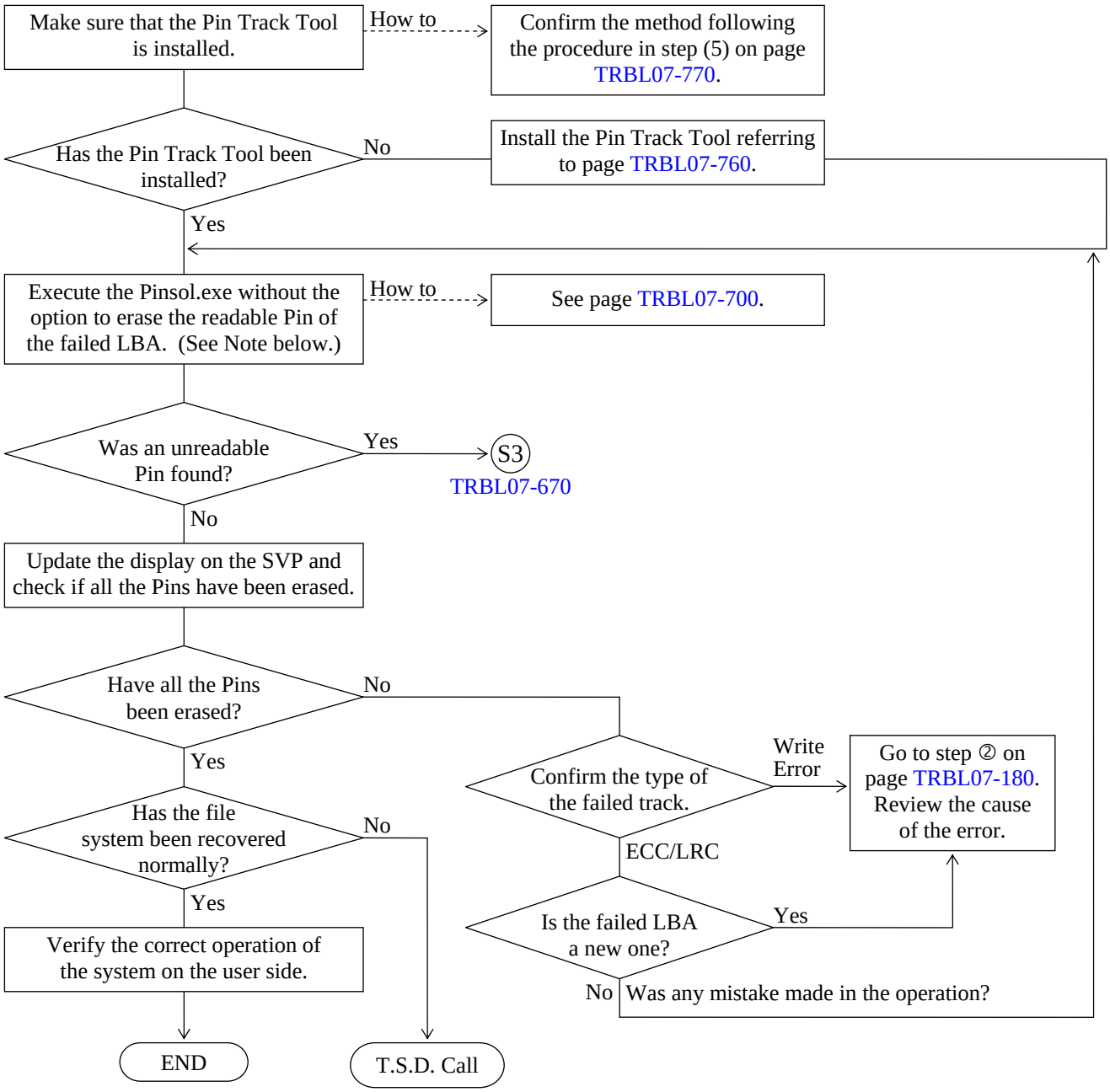
When you have to eliminate the unreadable LBA in the file system on the above conditions, operate according to the flowchart on the following pages.

○ The following is an erasing procedure to be used when a Pin failure occurs on Solaris.



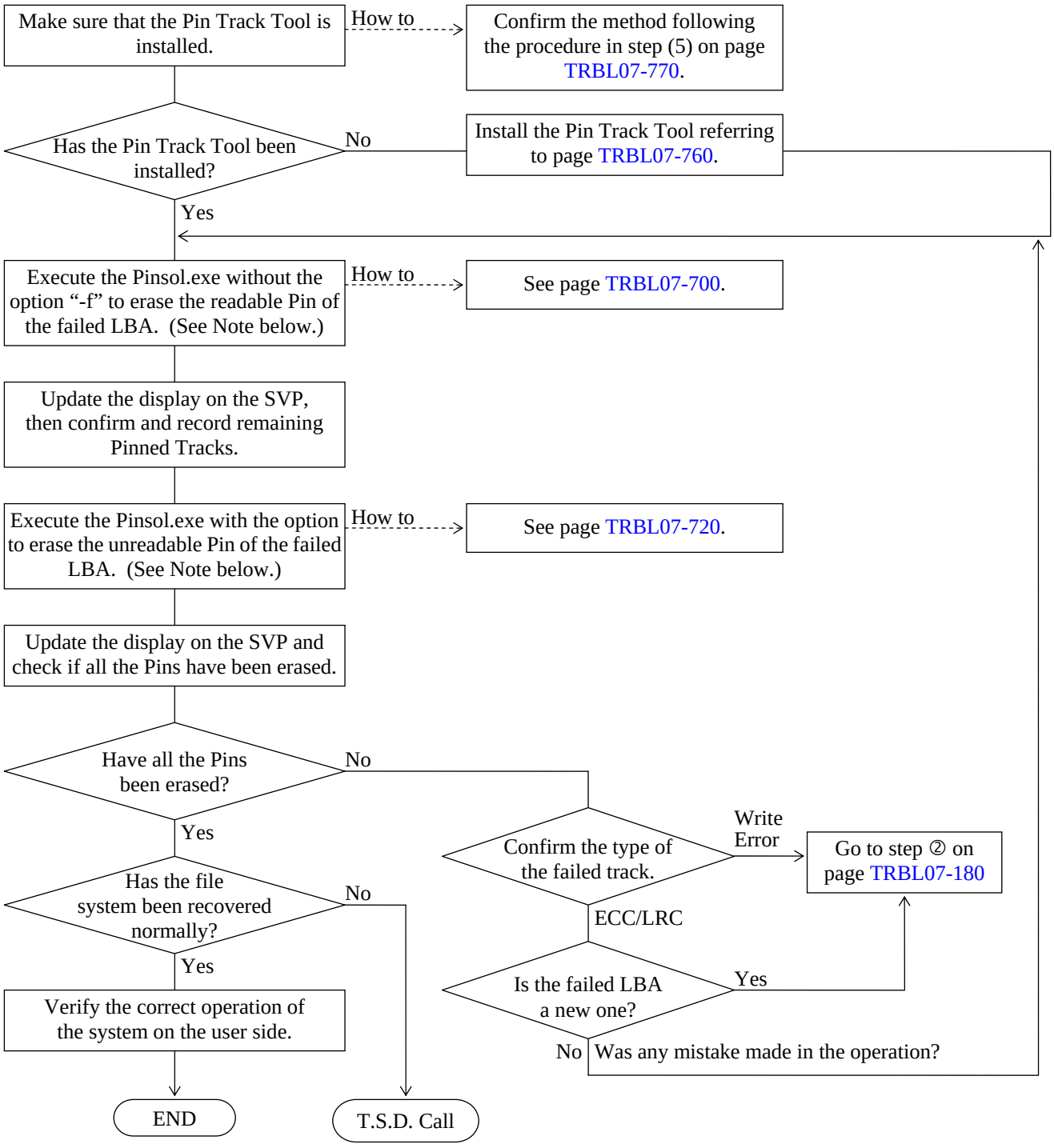


Readable Pin Process (Solaris)



Note: — On an SIM reported owing to a use of the Pin Track Tool —
When two or more Pins have been generated in the LBAs adjacent in the same LU, a generation of a new temporary Pin caused by the parity calculation performed in the Pin Track process may occur and a SIM may be reported. Since this Pin is erased at the same time when the erasing process of the Pin concerned completes, complete the SIM when the erasure of all the Pins by the Pin Track Tool is confirmed.

Unreadable Pin Process (Solaris)



Note: — On an SIM reported owing to a use of the Pin Track Tool —
When two or more Pins have been generated in the LBAs adjacent in the same LU, a generation of a new temporary Pin caused by the parity calculation performed in the Pin Track process may occur and a SIM may be reported. Since this Pin is erased at the same time when the erasing process of the Pin concerned completes, complete the SIM when it is confirmed that all the Pins have been erased by the Pin Track Tool.

Operation of Readable Pin Process (Solaris)

The following explains how to operate the Pin Track Tool for erasing a readable Pin.

> Note: — On an SIM reported owing to a use of the Pin Track Tool —
>
> When two or more Pins have been generated in the LBAs adjacent in the same LU, a generation of a new Pin caused by the parity calculation performed in the Pin Track process may occur and an SIM may be reported.
> Since this Pin is erased at the same time when the erasing process of the Pin concerned completes, complete the SIM when it is confirmed that all the Pins have been erased by the Pin Track Tool.

(1) Move to the directory of the installed Pin Track Tool.
#cd /usr/raidopen/pinsol

(2) Execute the pinsol.exe without the option.
./pinsol.exe -log Execute with a path "./".

(3) Input the following information in response to questions.

```
# ./pinsol.exe -log
Input Device Name -> /dev/rdsk/c3t0d0s2      Input the cxtydzsn.
Input Start LBA Data-> 180                   Input the Start LBA.
Input End LBA Data-> 1df                     Input the End LBA.
Input Next LBA? (Y/N) ->n                    When two or more LBAs exist in the same
                                             device, input "y".
Input Next Device ? (Y/N) ->n  (Input of "n" is recommended.)
                                             When erasing Pins of two or more devices
                                             simultaneously, input "y".
```

To input the LBA, convert the LBA of the LDEV shown by the SVP into the slice of Solaris the device file of which corresponds to the LBA, and input the slice. For the conversion of indication between the LBA and slice, refer to "Acquisition of Device Information" (TRBL07-790).
The showrel tool may display the two or more corresponding LBAs depending on the slice structure. In this case, the same LBA range is possible to be designated as different slices. Execute the Pin erasing process for the LBAs in the list shown by the showrel one by one in a descending order, and check the display on the SVP each time.

Note: When the input LBA does not exist in the device file of the specified slice, it is judged to be an unreadable Pin and causes a write error if the operation is continued leaving it as it is. Make sure that the input information is correct before starting the processing and that the Pin has been erased normally referring to the log after the processing terminates.

(4) Since the input data and a message for confirming whether to erase the Pin, check if the input data is correct.

Device Name	Start LBA	End LBA
/dev/rdsk/c3t0d0s2	0000000000000180	00000000000001DF

Before you try to proceed the readable pin,
please check the pin information on SVP.
If the pin data have been created, please do not try to proceed the pin track again.
Do you want to do the process of the readable Pin?
Please input[y/n(default n)]:y
If the input data is incorrect, input “n” or simply press the “Return” key and perform the data input over again from step (2).
Update the display on the SVP and check if the Pin concerned has been erased following the message.
When the Pin has already been erased, terminate the processing by inputting “n” or simply press the “Return” key.
When the Pin has not been erased, input “y” and press the “Return” key.

(5) When the Pin is judged unreadable through the Pin type judgment, go to TRBL07-720.
Unreadable Pin:

Device Name	Start LBA	End LBA
/dev/rdsk/c3t0d0s2	0000000000000180	00000000000001DF

(6) When the Pin Track Tool is quit, a log file is created on the same directory.
The log file name is given as “mm-dd-hh-m‘m’-ss.log” (m: month; d: date; h: hours; m’: minutes; s: seconds).
Example:

0614200552.log means a log file created at 5minutes and 52 seconds after 20 o’clock on June 14.

In the log file, the execution result of the Pin Track process is recorded. Make sure that the process has completed normally by checking if “pin track process complete” is displayed.

Operation of Unreadable Pin Process (Solaris)

The following explains how to operate the pintool for erasing an unreadable Pin.

> Note: — On an SIM reported owing to a use of the Pin Track Tool —
>
> When two or more Pins have been generated in the LBAs adjacent in the same LU, a generation of a new temporary Pin caused by the parity calculation performed in the Pin Track process may occur and an SIM may be reported.
> Since this Pin is erased at the same time when the erasing process of the Pin concerned completes, complete the SIM when it is confirmed that all the Pins have been erased by the Pin Track Tool.

(1) Move to the directory of the installed Pin Track Tool.
cd /usr/raidopen/pinsol

(2) Execute the pintool with the option.
./pinsol.exe -f -log — When "-f" is added, the unreadable LBA is overwritten with "0" data.

(3) Input the following information in response to questions.

```
# ./pinsol.exe  -f  -log
Input Device Name -> /dev/rdsk/c3t0d0s2      Input the cxtydzsn.
Input Start LBA Data-> 180                   Input the Start LBA.
Input End LBA Data-> 1df                     Input the End LBA.
Input Next LBA ?(Y/N) ->n                    When two or more LBAs exist in the same
                                             device, input "y".
Input Next Device ?(Y/N) ->n  (Input of "n" is recommended.)
                                             When erasing Pins of two or more devices
                                             simultaneously, input "y".
```

To input the LBA, convert the LBA of the LDEV shown by the SVP into the slice of Solaris the device file of which corresponds to the LBA, and input the slice. For the conversion of indication between the LBA and slice, refer to "Acquisition of device information" (TRBL07-790).
The showrel tool may display the two or more corresponding LBAs depending on the slice structure. In this case, the same LBA range is possible to be designated as different slices. Execute the Pin erasing process for the LBAs in the list shown by the showrel one by one in a descending order, and check the display on the SVP each time.

Note: When the input LBA does not exist in the device file of the specified slice, it is judged to be an unreadable Pin and causes a write error if the operation is continued leaving it as it is. Make sure that the input information is correct before starting the processing and that the Pin has been erased normally referring to the log after the processing terminates.

(4) Since the input data and a message for confirming whether to erase the Pin, check if the input data is correct.

Device Name	Start LBA	End LBA
/dev/rdsk/c3t0d0s2	0000000000000180	00000000000001DF

Before you try to proceed the readable pin,
please check the pin information on SVP.
If the pin data have been created, please do not try to proceed the pin track again.
Do you want to do the process of the readable Pin?
Please input[y/n(default n)]:y
If the input data is incorrect, input “n” or simply press the “Return” key and perform the data input over again from step (2).
Update the display on the SVP and check if the Pin concerned has been erased following the message.
When the Pin has already been erased, terminate the processing by inputting “n” or simply press the “Return” key.
When the Pin has not been erased, input “y” and press the “Return” key.

(5) The following message is displayed and the Pin is judged unreadable through the Pin type judgment.

Unreadable Pin:

Device Name	Start LBA	End LBA
/dev/rdsk/c3t0d0s2	0000000000000180	00000000000001DF

Do you want to do the process of the unreadable Pin?
WARNING! if you input ‘y’, Pin Blocks will be over written by ‘0’.
Please input[y/n(default n)]:y
In the Pin Track Process, the window may be changed into monochrome, and the following message may be showed on the window. In the case, please do not pay attention to them. After 3 minutes or so, the window will back to originally status.
Example:

This is a message which it is displayed on the monochromic window.
WARNING: /sbus@if, 0/fc0@1, 0/sd@0, 0(sd15)
Error for Command: read Error Level: Retryable (or Fatal)
Requested Block: 766560 Error Block: 766560
Vender: HP Serial Number: 0450F4290000
Sense key: Media Error
ASC: 0x11 (unrecovered read error), ASCQ: 0x0, FRU: 0x0

(6) When “y” is chosen by (5), the check message is displayed at once for every number of inputs. In case of plural number input, an operator can cancel the pin recovery processing for the device which you does not want to execute.

```
Unreadable Pin:
Device Name              Start LBA            End LBA
/dev/rdsk/c3t0d0s2       0000000000000180     00000000000001DF
Do you want to do the process of the unreadable Pin?
WARNING! if you input ‘y’,Pin Blocks will be over written by ‘0’.
Please input[y/n(default n)]:y
Do you want to do the process of the unreadable Pin? (The strip of LBA is
0000000000000180-00000000000001DF). (Y/N)
```

(7) When Pin Track Tool ends, a log file (month -day -hour -minute -second .log) is made on the same directory. (Eg:0614200552.log)
As for the log file, the execution result of the Pin Track processing is recorded. Make sure that the process has completed normally by checking if “pin track process complete” is displayed.

How to read the Read Test for whole of a disk (Solaris)

This chapter describes how to discover the Unreadable Pin on select device.
This processing requires long time.

(1) Move to the directory of the Pin Track Tool.
 # cd /usr/raidopen/pinsol

(2) Execute the Pin Track Tool without a command option.
 # ./pinsol.exe -all (The "-f" will become invalid if this option is used.)

(3) According to the question, input the appropriate information.
 # ./pinsol.exe –all
Input Device Name -> /dev/rdsk/c3t0d0s2
(Please input the slice which indicate the whole device.) (Usually indicated "s2".)
Input Next Device ?(Y/N) ->n
(Recommend to "n") (When erasing different Device at the same time, it inputs "y")

(4) The Input data list is displayed.

Device Name	Start LBA	End LBA
/dev/rdsk/c3t0d0s2	**0000000000000000**	**00000000001F2285**

Show all domain of LAB which is specified device, and execute.

(5) When Pin Track Tool ends, a log file (month -day -hour -minute -second .log) is made on the same directory. (Eg:0614200552.log)
The log when two area (120-17F, 1E023F) of Unreadable Pin exists in specified DeviceName becomes as follows.

```
Input Device Name = /dev/rdsk/c3t0d0s2
ERROR: Read Error LBA 0000000000000120-000000000000017F
ERROR: Read Error LBA 00000000000001E0-000000000000023F
```

Note: The area and number of Unreadable Pin listed by other factors here may differ from the area and number of Unreadable Pin displayed by SVP.

Installation of Pin Track Tool (Solaris)

Perform the installation only when it is required.

<Preparation>
Since the Pin Track Tool is provided being contained in a 4-mm DDS DAT or 3.5-inch floppy disks, a drive for installing it is necessary in the host device which controls the Pin erasing operation or on the network which includes the device concerned.
Acquire a name for the device beforehand.
Besides, ensure a free area on the disk necessary for a log collection because a log of approximately 400 bytes per failed track is output for (60)h length SLOT when the log is collected using the pintool.

Note: If the free capacity on the disk is insufficient, the whole information cannot be collected.

The showrel tool for LBA-slice conversion ensures a memory and creates a temporary file in order to acquire device information. Make sure that the memory capacity (larger than 128MB/CPU) and the disk free capacity (larger than 10MB) sufficient for the server are ensured.

<Copying from media to disk>
(1) Login to the host as “root”.

(2) Move to the install directory by the “cd” command and make a directory “raidopen”.
```
# cd  /usr                (Move to the “/usr”)
# mkdir  raidopen         (Make the directory “raidopen”)
# cd  raidopen            (Move to the “raidopen”)
```

(3) Move to the created directory and copy the files from the distribution medium.
```
<In the case of DDS DAT>        (device name depends on each host.)
# mt  -t  /dev/rmt/0  rew       (Rewind a tape.)
# tar  -xvf  /dev/rmt/0         (Copy a file from the tape.)
# tar  –xvf  pinsolXX.tar       (Copy the tar file for Solalis.)
<In case of the Floppy disk or CD-ROM>
# volcheck                      recognize a floppy disk or CD-ROM
```
confirm the label, and copy the files from the distribution medium.
```
# tar  -xvf  /floppy/no_name/PINSOLxx.TAR       (Floppy)
# tar  -xvf  /cdrom/zzzz/program/ment/pintrack/solaris/pinsolXX.tar          (CD-ROM)
```

Note: (The volume label (no_name) and directory name (ZZZZ) is depend on the system.)

If the copy from the floppy disk to the disk ends, it takes out a floppy disk.
```
# eject                 Eject the medium.
```

If necessary, it pushes an eject button and it takes out a floppy disk.

(4) After the thawing is complete, confirm the file name.
cd ./pinsol (Move to the directory made by the thawing.)
ls -l (Display a file list.)

(5) Refer to the contents of the "Ver-Rev.txt" file and confirm each file size of the list.
more /usr/raidopen/pisol/Ver-Rev.txt display contents of the file

HITACHI RAID Subsystem PinTrackTool for Solaris
Ver XX-YY-/Z (Revision ID)
All right reserved, Copyright (c) 1999,2004, Hitachi Ltd.
File Size (Bytes) pinsol.exe (Module ID)
File Size (Bytes) showrels.exe (Module ID)
File Size (Bytes) port.dat (Module ID)

Refer to the contents of "Ver-Rev.txt" file and confirm each file size of the list.

Saving of log file and de-installation of Pin erasing tool

Perform the de-installation only when it is required.

<Saving of log file>
In order to save the log file created through the Pin erasure, compress the file.

# cd /usr/raidopen/pinsol	Move to the execution directory.
# mkdir ./log	Create a directory for the log file.
# mv *.log ./log	Move the log file to the logdir.
# tar -cvf pinlog.tar ./log	Create the tar file.
# compress pinlog.tar	Compress the tar file.

Save the log file to the media.

# tar -cvf /dev/rmt/0 pinlog.tar.Z	(In the case of DDS DAT)
# tar -cvf /vol/dev/rdiskette0/unlabeled pinlog.tar.Z	(In the case of floppy disk (tar))
# cp pinlog pinlog.tar.Z /vol/dev/rdiskette0/raidopen	(In the case of floppy disk(DOS))

<De-installation of Pin Track Tool>
To uninstall the Pin Track Tool, delete all the files concerned by deleting the whole directory in which the tool is installed.

# cd /	Move to the root directory.
# \rm -r /usr/raidopen/pinsol*	Delete files created under the /usr/raidopen. When "\" is added, the alias is invalidated.

Procedure for collecting detail log

You can acquire detailed information on the erasing process from the Pin failure by adding the option to the Pin Track Tool.

Method of use: ./pinsd.exe(-f) -log

By executing the above, you can acquire data which was read and written in the process for erasing from the Pin failure.

Example:

```
Input Device Name = /dev/rdsk/c1t0d0s2
Input Start LBA = 0000000000000180
Input End LBA = 00000000000001DF
/dev/rdsk/c1t0d0s2, Start LBA=0000000000000180, End LBA=00000000000001df readable Pin Track
read error
Read Data:  Top Pin No=0000000000000180
  00000000: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  00000010: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  00000020: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  00000030: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  00000040: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
• • •
Read Data:  Top Pin No=0000000000000181
• • •
Read Data:  Top Pin No=0000000000000182
• • •
Read Data:  Top Pin No=0000000000000183
• • •
Read Data:  Top Pin No=00000000000001DF
  000001A0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  000001B0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  000001C0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  000001D0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  000001E0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  000001F0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Write Data:  Top Pin No=0000000000000180
• • •
  00000000: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  00000010: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  00000020: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  00000030: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  00000040: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
• • •
• • •
• • •
  0000BFC0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  0000BFD0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  0000BFE0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  0000BFF0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
/dev/rdsk/c1t0d0s2, Start LBA=0000000000000180, End LBA=00000000000001DF Pin Track Process
is complete!!
```

The log size is approximately 400 KB per one Pin erasure for (60)h length SLOT.
When the -log option is not added, data for each LBA is recorded for each of reading and writing.

Acquisition of device information (how to use showrel tool) on Solaris

When the program has been installed, confirm the failed track information.

(1) Move to the installed directory.
cd /usr/raidopen/pinsol Moving of the directory

(2) Execute the following program

```
# ./showrels.exe                                Add the ./ path and execute.
Input LDKC -> 00                                Input the LDKC# shown on the SVP.
Input LDEV -> 000A                              Input the CU:LDEV# shown on the SVP.
Input Start LBA -> 0000000000044000             Input the start LBA shown on the SVP.
Input End LBA -> 000000000004405F               Input the End LBA shown on the SVP.
```

Input example and output result.

```
#./showrels.exe
Input LDKC -> 00
Input LDEV -> 0123
Input Start LBA -> 000000000000ABE0
Input End LBA -> 000000000000AC3F

DeviceName=c0t1d0s6 Port=1A LDKC=00 LDEV=0123
           Start=0000000000000FA0 End=0000000000000FFF
```

The LDKC number is indicated with the number of two figures. The LDEV number is indicated with the CU:LDEV number of four figures. Confirm the LDKC number, CU number and LDEV number of the Pin displayed on the SVP and identify the slice of the device file. The device file name identified here is used as the input information in the process for the Pin failure.

Note:

- The showrel tool issues commands peculiar to the disk subsystem to all the disk devices in order to acquire device information. Therefore, when the command is issued to a disk other than the disk subsystem such as a built-in disk, an error (Illegal Request) may be reported to the system. It is not a problem, though.
- When an unreadable Pin is generated in the slot#15 including the head LBA in which the disk management information is recorded, the device information cannot be acquired because the disk becomes unable to respond to the OS.
- The disk device of the object may not be labeled when “Error: Target devices do not exist.” is output.

The following may be displayed depending on the setting of the slice.

When there is no information of the input LDEV in the device management table.

```
LDKC=00,LDEV=010C   This is not a target disk.
```

Check if the input LDEV number is correct.

When an LDEV which does not belong to any slice is input

```
DeviceName=c2t3d0s6 Port=1D LDKC=00 LDEV=0189 The target LBA is missing or invalid.
```

In this case, the Pin shown on the SVP cannot be erased. However, it does not have any effect on the file system.

When a Pin extends over multiple slices

```
DeviceName=c0t1d0s5 Port=1A LDKC=00 LDEV=000A
                          Start=0000000000001357 End=0000000000001387
DeviceName=c0t1d0s1 Port=1A LDKC=00 LDEV=000A
                          Start=0000000000000000 End=000000000000002F
```

When it is displayed that a Pin extends over multiple slices, specify the LBA displayed for each slice when executing the pinsol.exe. The Pin cannot be erased unless all the range concerned are processed by the pinsol.exe.

When an LDEV is allocated to multiple ports

```
DeviceName=c1t1d0s6 Port=1A LDKC=00 LDEV=0123
                          Start=0000000000000FA0 End=0000000000000FFF
DeviceName=c0t3d0s6 Port=1C LDKC=00 LDEV=0123
                          Start=0000000000000FA0 End=0000000000000FFF
```

When an LDEV is displayed at the different ports with the same LBA range of the slice, a single LDEV is allocated to multiple ports. In this case, specify any one of the devices to execute the pinsol.exe.

When multiple LBAs are displayed for an LDEV

```
DeviceName=c0t3d0s2 Port=1A LDKC=00 LDEV=0123
                          Start=0000000000000FA0 End=0000000000000FFF
DeviceName=c0t3d0s6 Port=1A LDKC=00 LDEV=0123
                          Start=0000000000000FA0 End=0000000000000FFF
```

When two slices are displayed with the same LBA range for an LDEV, a slice to which the same cylinder is allocated may exist. Normally one of the slices is 2. In this case, specify a device described ahead in order to execute the pinsol.exe. If the Pin is not erased when the SVP display is checked after the Pin erasing process has terminated normally, execute the pinsol.exe for another device.

Procedure for determining MountPoint (on Solaris)

The following operation must be performed by the system administrator at your request checking result at each step.

Display by the showrel

When the showrel explained in TRBL07-790 is used, the LDKC number, and the LDEV number shown on the SVP and to which device file the range between the Start LBA and End LBA corresponds are displayed. Refer to TRBL07-790, "How to use showrel tool".

Display by prtvtoc

Input "#prtvtoc <raw-device-name>" to display the slice list and find out all the slices in which Pins have been generated.

```
* /dev/rdsk/c0t1d0s5 partition map
*
* Dimension:
*  512 bytes/sector
*  80 sectors/tarck
*  9 tracks/cylinder
*  720 sectors/cylinders
*  2500 cylinders
*  1151 accsessible cylinders
*
* Flags:
* 1: unmountable
* 10: read-only
*
*                         First    Sector  Last
* Partition    Tag    Flags    Sector     Count     Sector   Mount Directory
     0          2      00       0       76320    76319
     1          3      01     76320     132480   208799
     2          5      00       0       828720   828719
     5          6      00     208800    131760   340559     /opt
     6          4      00     340560    447120   787679     /usr
     7          8      00     787680    41040    828719     /export/home
```

You can confirm the current MountPoint by viewing the display of the Mount Directory.

Determination using /etc/vfstab

Find out the MountPoint where the /dev/dsk/cxtydzsn is mounted using the #cat/etc/fstab.

```
# cat /etc/vfstab
#device         device          mount           FS      fsck    mount   mount
#to mount       to fsck         point           type    pass    at boot options
fd      -       /dev/fd fd      -       no      -
/proc   -       /proc   proc    -       no      -
/dev/dsk/c0t3d0s1       -       -       swap    -       no      -
/dev/dsk/c0t3d0s0       /dev/rdsk/c0t3d0s0      /       ufs     1   no   -
/dev/dsk/c0t3d0s6       /dev/rdsk/c0t3d0s6      /usr    ufs     1   no   -
/dev/dsk/c0t3d0s3       /dev/rdsk/c0t3d0s3      /var    ufs     1   no   -
/dev/dsk/c0t3d0s7       /dev/rdsk/c0t3d0s7      /export/home    ufs     2   yes   -
/dev/dsk/c0t1d0s7       /dev/rdsk/c0t1d0s7      /export/home1   ufs     3   yes   -
swap    -       /tmp    tmpfs   -       yes     -
#
```

You can make sure whether the object device is mounted automatically or not.

Determination using df

Reconfirm the “Ivol name” and “mount point” recognized by the filesystem using the #df -k.

```
# df -k
Filesystem          kbytes     used    avail  capacity  Mounted on
/dev/dsk/c0t3d0s0    76767    17735    58956        24%  /
/dev/dsk/c0t3d0s6   738902   552048   185931        75%  /usr
/proc                    0        0        0         0%  /proc
fd                       0        0        0         0%  /dev/fd
/dev/dsk/c0t3d0s3    30807    17911    12866        59%  /var
/dev/dsk/c0t3d0s7    53535     7923    45559        15%  /export/home
/dev/dsk/c0t1d0s7   489702   189635   299578        39%  /export/home1
swap                121856      212   121644         1%  /tmp
/dev/dsk/c1t0d0s0  7095037  2163405  4860682        31%  /open9-0
/dev/dsk/c1t1d0s0  7095757  2049632  4975168        30%  /open9-1
#
```

You can make sure whether the object device is being mounted currently or not.

Decide the MountPoint to be checked by the “sum” command following the procedure above.

Blank Sheet

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7.2.3.4 Procedure on AIX, VMWare ESX, Linux

The following shows how to erase a pin failure on AIX, VMWare ESX, Linux.

=Notices=

○ Ensure a free capacity on the disk on which the Pin Track Tool is to be installed.

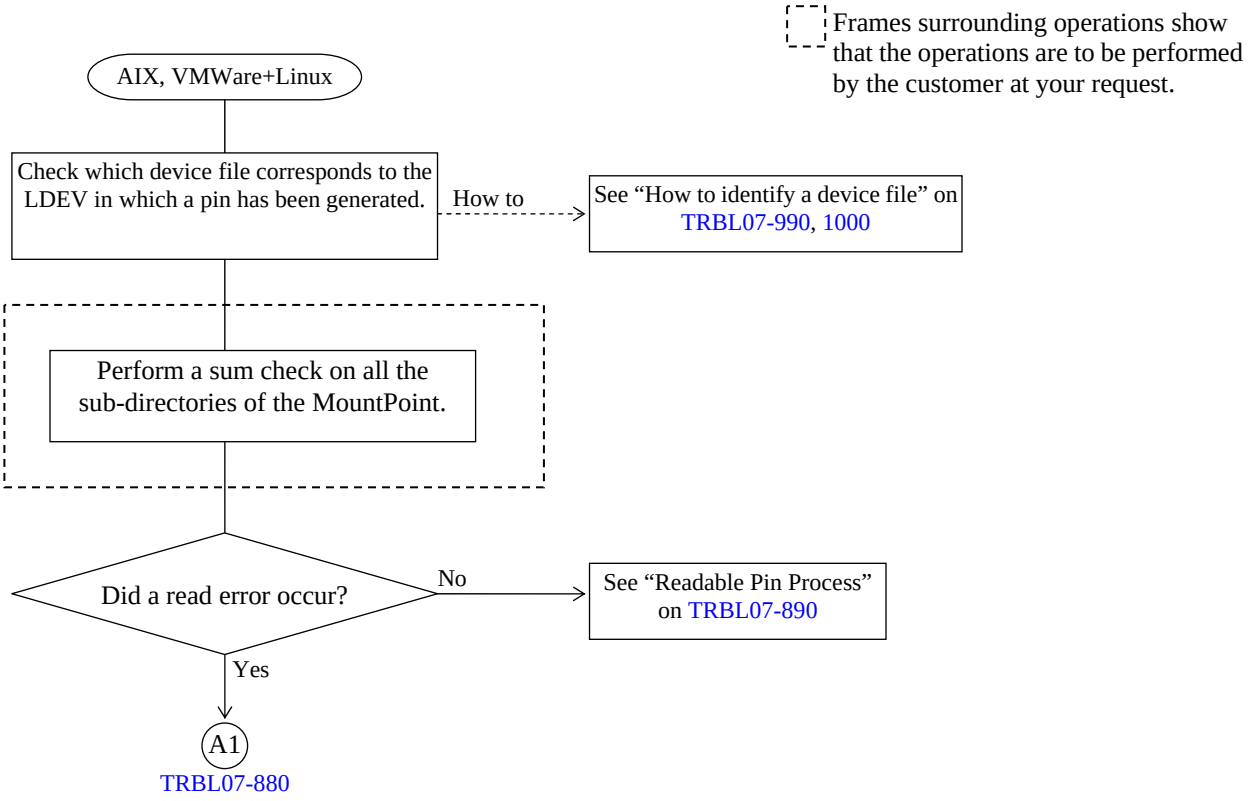
○ When an unreadable pin is generated in the head LBA, the pin cannot be erased.
The management information including the device geometry is recorded in the range of LBA0x0 to 0x5F (except for OPEN-V), LBA0x0 to 0x1FF (OPEN-V), to the slot#15. If a pin including this range is generated, the device cannot be recognized to be a disk by the OS. Format the LDEV following the maintenance manual.

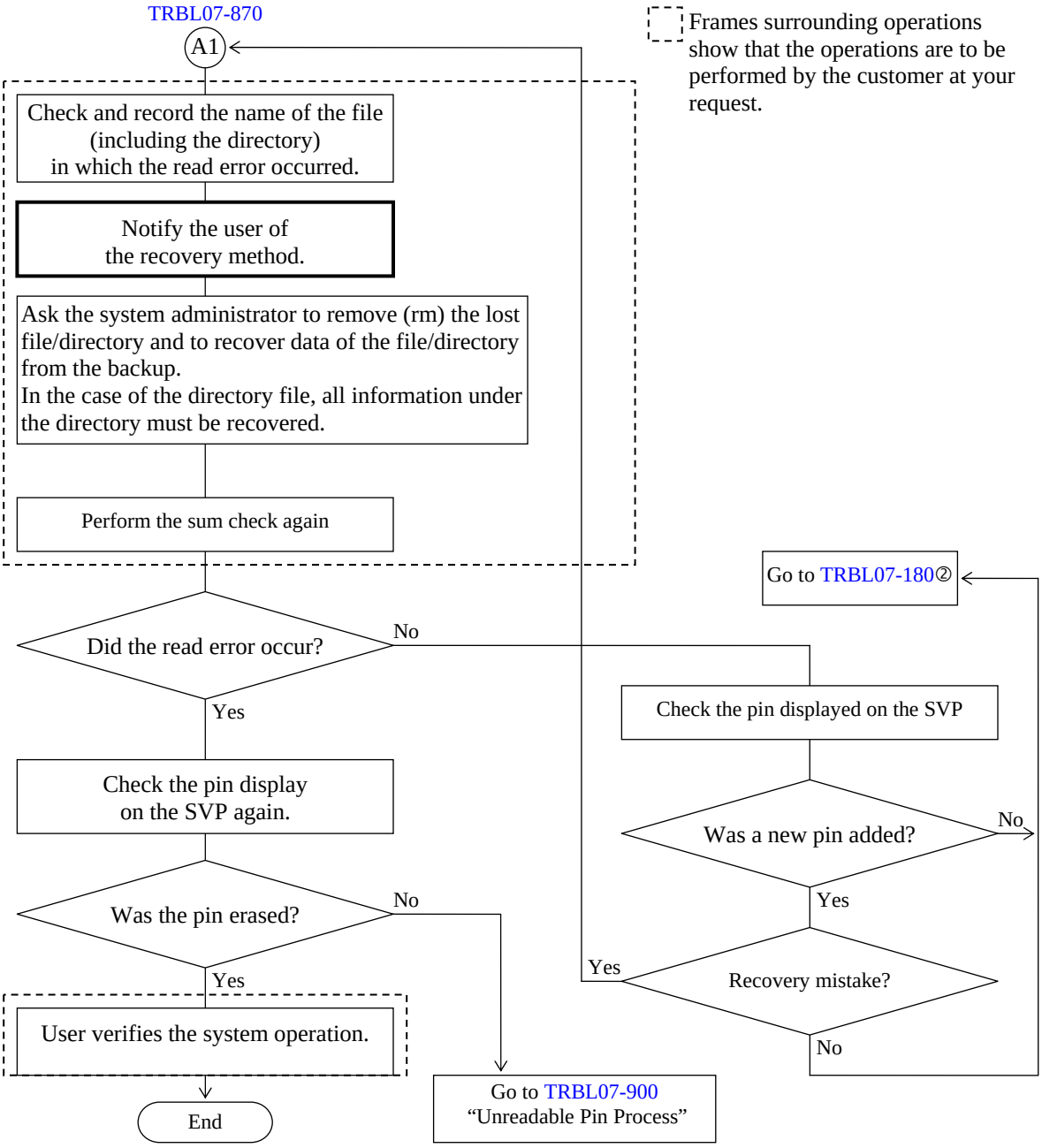
○ Specify the LBA to be input in the Pin Track Tool correctly.
The host cannot determine whether or not a pin has been generated in the input LBA. It performs a pin recovery or erases an unreadable pin for the input LBA. Therefore, if you input information improperly, data may be lost.

○ After executing the pin track process, see the log to confirm that it has completed normally.

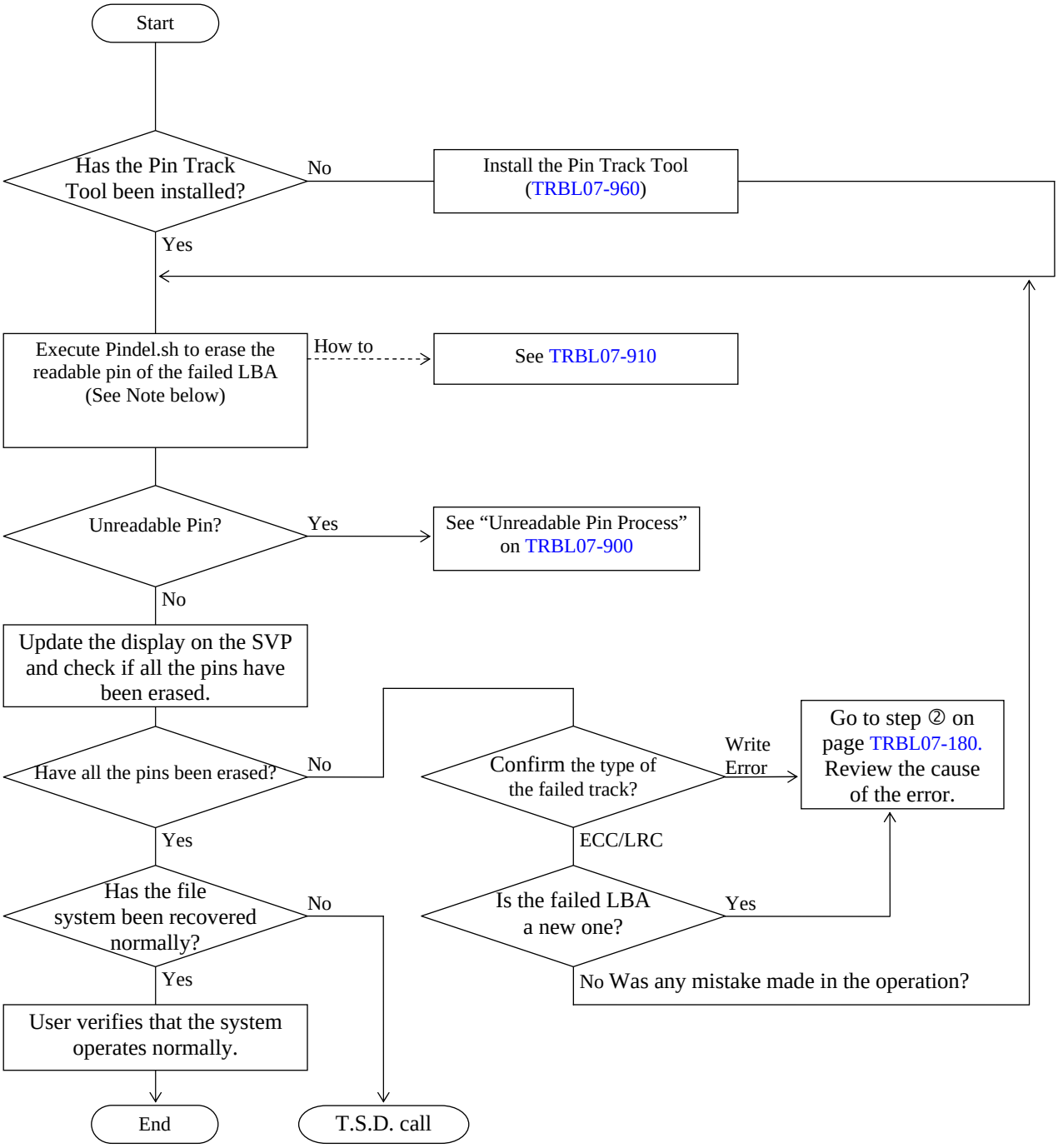
To delete the unreadable LBA in the file system under the above-described conditions, perform operations according to the flowchart on the following pages.

○ The flow shows the procedure in the case a pin failure occurs on AIX, VMWare ESX, Linux.



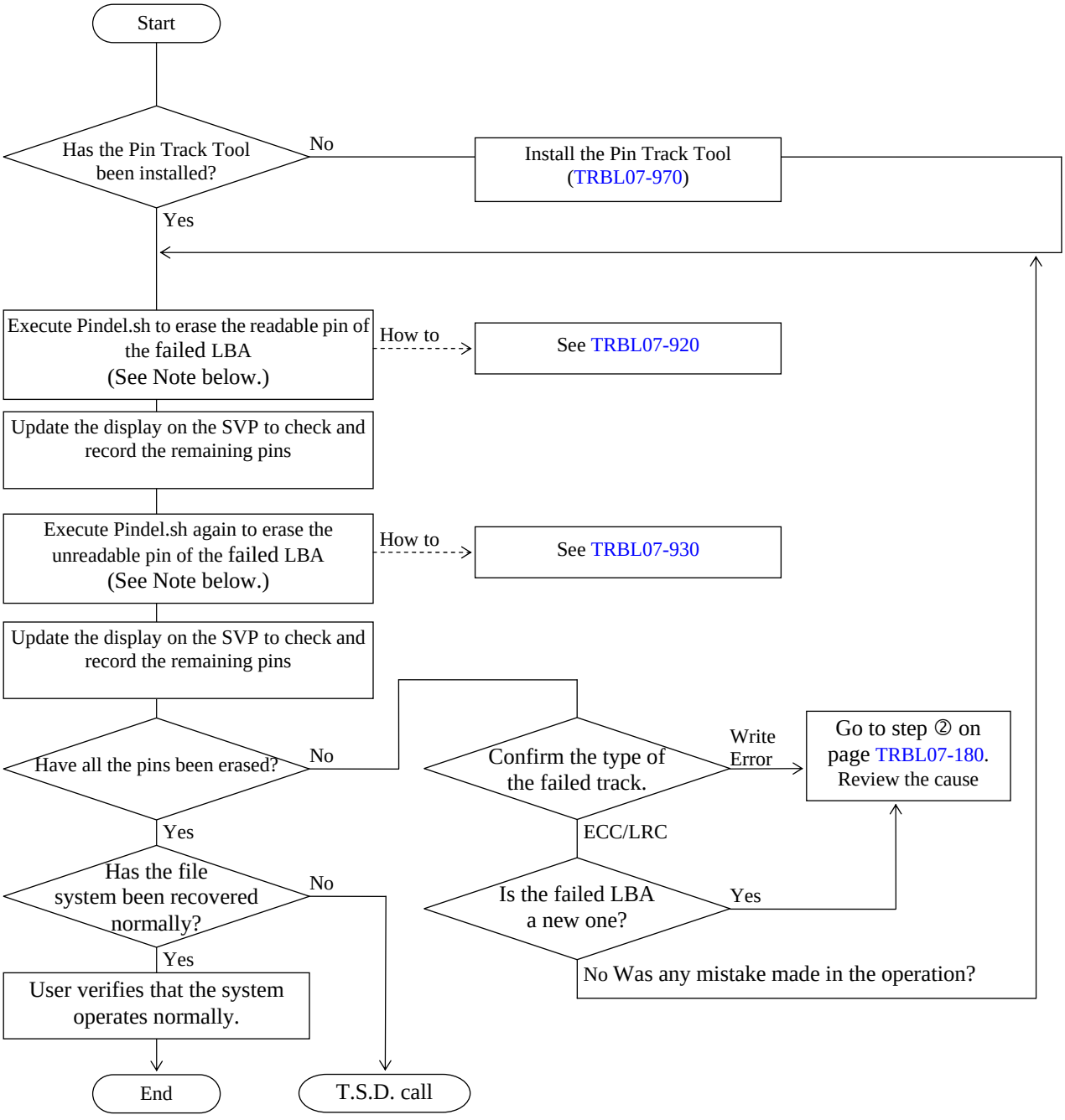


Readable Pin Process (AIX, VMWare ESX, Linux)



Note: — On an SIM reported owing to a use of the Pin Track Tool —
When two or more pins have been generated in the LBAs adjacent in the same LU, a generation of a new temporary pin caused by the parity calculation performed in the Pin Track process may occur and a SIM may be reported. Since this pin is erased at the same time when the erasing process of the pin concerned completes, complete the SIM when the erasure of all the pins by the Pin Track Tool is confirmed.

Unreadable Pin Process (AIX, VMWare ESX, Linux)



Note: — On an SIM reported owing to a use of the Pin Track Tool —

When two or more Pins have been generated in the LBAs adjacent in the same LU, a generation of a new temporary Pin caused by the parity calculation performed in the Pin Track process may occur and a SIM may be reported. Since this Pin is erased at the same time when the erasing process of the Pin concerned completes, complete the SIM when it is confirmed that all the Pins have been erased by the Pin Track Tool.

How to erase Readable Pin (AIX, VMWare ESX, Linux)

The following explains how to operate the Pin Track Tool to erase a readable pin.
(The tool is available also on Tru64.)

> Note: — On an SIM reported owing to a use of the Pin Track Tool —
>
> When two or more Pins have been generated in the LBAs adjacent in the same LU, a generation of a new Pin caused by the parity calculation performed in the Pin Track process may occur and an SIM may be reported.
> Since this Pin is erased at the same time when the erasing process of the Pin concerned completes, complete the SIM when it is confirmed that all the Pins have been erased by the Pin Track Tool.

(1) Move to the directory of the installed Pin Track Tool.
```
# cd  /usr/raidopen/pinsh
```

(2) Execute the pindel.sh without the option.
```
# ./Pindel.sh
```

(3) Input the following information in response to questions.
```
# ./Pindel.sh
Pin Recovery Tool Ver. 01-03 start.
(If you want to cancel the program,please input “q”.)
Input Device Name ->/dev/rhdisk69      Input the RAW device file name (/dev/rhdiskXX)
Input Start LBA Data ->20000           Input the Start LBA
Input End LBA Data ->201ff             Input the End LBA
```

When you make an input mistake and want to redo it from the start, enter “q”. The program will stop.

Before inputting an LBA, check which device file on the AIX host corresponds to the LBA of the LDEV displayed on the SVP. See TRBL07-990 “How to identify a device file”.

Note: Make sure to specify a RAW device file (rhdiskXX) as a device file. Do not specify a block device (hdiskXX).
Input the LBA to the Pin Track Tool accurately.
If you input it improperly, data loss may occur.

(4) When the LBA is read successfully, the following messages are displayed.

Please wait. Now Reading Pin...
Finished.
Before you try to proceed the readable pin,
please check the pin information on SVP.
If the pin track has been cleared,
please do not try to proceed the pin recovery again.
Do you want to do the process of the readable Pin?(Y/N)

Follow the messages and refresh the display on the SVP to see if the pin has been cleared.
If it has been cleared, enter “n” to exit.
If not, enter “y”.

(5) When the pin is judged as an “unreadable pin” through the pin type judgment as follows, go to TRBL07-930.

Please wait. Now Reading Pin...
Failed.
Do you want to do the process of the unreadable Pin? (The strip of LBA is 0x20000-0x201ff)(Y/N)

(6) When the pindel.sh starts, a log file will be created on the same directory.
The log file name is given as “MM-dd-hh-mm-ss.log”.
<Example>
0614200552.log → Log file created on June 14 at 20:05:52 (hour:minutes:seconds).

In the log file, the execution result of erasing the pin is recorded. Make sure that the process has completed normally by confirming that “Pin Recovery process completed!!” is displayed.

How to erase unreadable pin (AIX, VMWare ESX, Linux)

The following explains how to operate the Pin Track Tool to erase an unreadable pin.
(The tool is available also on Tru64.)

> Note: — On an SIM reported owing to a use of the Pin Track Tool —
>
> When two or more Pins have been generated in the LBAs adjacent in the same LU, a generation of a new temporary Pin caused by the parity calculation performed in the Pin Track process may occur and an SIM may be reported.
> Since this Pin is erased at the same time when the erasing process of the Pin concerned completes, complete the SIM when it is confirmed that all the Pins have been erased by the Pin Track Tool.

(1) Move to the directory of the installed Pin Track Tool.
cd /usr/raidopen/pinsh

(2) Execute the pindel.sh
./pindel.sh

(3) Input the following information in response to questions.
./Pindel.sh
Pin Recovery Tool Ver. 01-03 start.
(If you want to cancel the program,please input “q”.)
Input Device Name ->/dev/rhdisk69 Input the RAW device file name (/dev/rhdiskXX)
Input Start LBA Data ->20000 Input the Start LBA
Input End LBA Data ->201ff Input the End LBA

When you make an input mistake and want to redo it from the start, enter “q”. The program will stop.

Before inputting an LBA, check which device file on the AIX corresponds to the LBA of the LDEV displayed on the SVP. See TRBL07-990 “How to identify a device file”.

Note: Make sure to specify a RAW device file (rhdiskXX) as a device file. Do not specify a block device (hdiskXX).
Input the LBA to the Pin Track Tool accurately.
If you input it improperly, data loss may occur.

(4) When the LBA is read successfully, the following messages are displayed.
Please wait. Now Reading Pin...
Finished.
Before you try to proceed the readable pin,
please check the pin information on SVP.
If the pin track has been cleared,
please do not try to proceed the pin recovery again.
Do you want to do the process of the readable Pin?(Y/N)

Follow the messages and refresh the display on the SVP to see if the pin has been cleared.
If it has been cleared, enter “n” to exit.
If not, enter “y”.

(5) When the pin is judged as an “unreadable pin” through the pin type judgment as follows, the following message is displayed.

Please wait. Now Reading Pin...
Failed.
Do you want to do the process of the unreadable Pin? (The strip of LBA is 0x20000-0x201ff)(Y/N)

(6) “Y” is selected in (5), data will be erased for the LBA area in which a pin is generated. When it succeeds, the following message will be displayed.
When an error occurs, follow the procedure described in TRBL07-900 to review the cause of the failure.

Please wait. Now Clearing Pin ... Finished. Pin Recovery process completed!! (unreadable Pin)

(7) When the pindel.sh ends, a log file will be created on the same directory.
The log file name is given as “mm-dd-hh-mm-ss.log”.
<Example>
0614200552.log → Log file created on June 14 at 20:05:52 (Hour:Minutes:Seconds).

In the log file, the execution result of erasing the pin is recorded. Make sure that the process has completed normally by confirming that “Pin Recovery process completed!!” is displayed.

Installation of Pin Track Tool

Perform the installation only when it is required.

<Preparation>
Since the Pin Track Tool is provided being contained in a 4-mm DDS DAT or 3.5-inch floppy disks, a drive for installing it is necessary in the host device which controls the Pin erasing operation or on the network which includes the device concerned.
Acquire a name for the device beforehand.
Besides, ensure a free area on the disk necessary for a log collection because a log of approximately 400 bytes per failed track is output for (60)h length SLOT when the log is collected using the pintool.

Note: If the free capacity on the disk is insufficient, the whole information cannot be collected.

<Copying from media to disk>
(1) Login to the AIX machine as “root”.

(2) Move to the install directory by the “cd” command and make a directory “raidopen”.

```
# cd  /usr                    (Move to the “/usr”)
# mkdir  raidopen             (Make the directory “raidopen”)
# cd  raidopen                (Move to the “raidopen”)
```

(3) Execute the following command to decompress pinshXX.tar and copy the files from the medium to the created directory.

```
# tar  -xvf  /cdrom/zzzz/program/ment/pintrack/sh/pinshXX.tar  (CD-ROM)
```

Note: The directory name (ZZZZ) may be different.

(4) After the file is decompressed, confirm the file name.

# cd ./pinsh	(Move to the directory created as a result of the decompression)
# ls -l	(Display a file list.)

(5) Specify the –ver option and execute Pindel.sh to confirm the version.

./Pindel.sh -ver

```
HITACHI RAID Subsystem Pin Track Tool for AIX,Tru64,VMWare ESX,Linux
              Ver XX-YY
All right reserved, Copyright (c) 2007-2008, Hitachi Ltd.
File size(Bytes)  Pindel.sh  (Module ID)
```

Confirm that the contents of the file above and the data displayed with the ls command are consistent.

Saving the log file and uninstalling Pin Track Tool

Perform the uninstallation only when it is required.

<Saving the log file>
To save the log file created through the pin recovery, compress the file.

# cd /usr/raidopen/pinsh	Move to the execution directory.
# mkdir ./log	Create a directory for the log file.
# mv *.log ./log	Move the log file to logdir.
# tar -cvf pinlog.tar ./log	Create a tar file.

Save the log file to the media.

# tar -cvf /dev/rmt/0 pinlog.tar.Z	(In the case of DDS DAT)
# tar -cvf /vol/dev/rdiskette0/unlabeled pinlog.tar.Z	(In the case of floppy disk (tar))
# cp pinlog pinlog.tar.Z /vol/dev/rdiskette0/raidopen	(In the case of floppy disk(DOS))

<Uninstalling the Pin Track Tool>
To uninstall the Pin Track Tool, delete all the files concerned by deleting the whole directory in which the tool is installed.

# cd /	Move to the root directory.
# \rm -r /usr/raidopen/pinsh*	Delete files created under /usr/raidopen. When "\" is added, the alias is invalidated.

How to identify a device file (AIX)

The following shows an example of associating a device file, which is to be the input information of the Pin Track Tool, with the LDEV in which a pin is generated.

(1) Execute the following command to display a list of disk devices that are enabled on the AIX.

```
lsdev -C -c disk
```

The result of execution is as follows. “Available” devices are the disk devices that can receive I/Os.

```
# lsdev -C -c disk
.........
.........
hdisk65 Defined 06-08-02          Hitachi Disk Array (Fibre)
hdisk66 Defined 06-08-02          Hitachi Disk Array (Fibre)
hdisk67 Defined 06-08-02          Hitachi Disk Array (Fibre)
hdisk68 Available 06-08-02        Hitachi Disk Array (Fibre)
hdisk69 Available 06-08-02        Hitachi Disk Array (Fibre)
hdisk70 Available 06-08-02        Hitachi Disk Array (Fibre)
```

(2) Next, execute the following command to check the details of the “Available” devices (Example for hdisk69).

```
lsattr -E -l hdisk69|grep lun_id
```

The result of execution is as follows.

```
# lsattr -E -l hdisk69|grep lun_id
lun_id        0x1000000000000    Logical Unit Number ID
```

The result shows that the LDEV of the LUN = 1 is associated with hdisk69.
When the LDEV with the pin is LDKC:CU:LDEV = 00:08:05 and LUN = 1, the corresponding device file is hdisk69.
You can check LUN in the LUNM window on the SVP or Web Console.

In this case, specify a RAW device file /dev/rhdisk69 to the Pin Track Tool.
(Do not specify a block device (/dev/hdisk69). Data loss may occur.)

How to identify a device file (VMWare ESX, Linux)

The following shows an example of associating a device file, which is to be the input information of the Pin Track Tool, with the LDEV in which a pin is generated.

(1) Execute the following command to display a list of disk devices that are enabled on the VMWare ESX, Linux.

```
cat /proc/scsi/scsi
```

The result of execution is as follows. The one whose “Model” is “OPEN-* (etc. OPEN-V)” are the LU devices that can receive I/Os.

```
# cat /proc/scsi/scsi
.........
Host: scsi3 Channel: 00 Id: 00 Lun: 00
  Vendor: HITACHI  Model: OPEN-V          Rev: 5008
  Type:   Direct-Access                   ANSI SCSI revision: 03
Host: scsi3 Channel: 00 Id: 00 Lun: 01
  Vendor: HITACHI  Model: OPEN-V          Rev: 5008
  Type:   Direct-Access                   ANSI SCSI revision: 03
```

(2) Next, the disk device name corresponding to a peculiar Lun number is confirmed by the following commands. First of all, the file to which it refers by the following commands is confirmed.

```
# ls -la /var/log/messages*
```

The result of execution is as follows.

```
-rw-------  1 root  root   18423  Jun  11 10:11 /var/log/messages
-rw-------  1 root  root   36883  Jun   8 04:03 /var/log/messages.1
-rw-------  1 root  root    1560  Jun   1 04:03 /var/log/messages.2
-rw-------  1 root  root   19539  May  25 04:03 /var/log/messages.3
-rw-------  1 root  root    2604  May  18 04:03 /var/log/messages.4
```

The file date looks for the latest one by the above-mentioned. /var/log/messages is the latest here.

Next, the following commands are executed.

```
# more /var/log/messages
```

The result of execution is as follows.

```
# more /var/log/messages
.........
Jun 11 10:09:32 x86AS30 kernel: Attached scsi disk sdb at scsi3, channel 0, id 0, lun 0
Jun 11 10:09:32 x86AS30 kernel: Attached scsi disk sdc at scsi3, channel 0, id 0, lun 1
.........
```

The result shows that the LDEV of the LUN = 1 is associated with sdb from “Attached scsi disk”. When the LDEV with the pin is LDKC:CU:LDEV = 00:08:05 and LUN = 1, the corresponding device file is sdb.
You can check LUN in the LUNM window on the SVP or Web Console.

In this case, because the block device file of the object becomes /dev/sdb, the device file specified for Pin Track Tool becomes RAW device file linked with /dev/sdb.
(Do not specify a block device (/dev/sdb). Data loss may occur.)

First of all, to confirm linked the RAW device files, the following commands are executed.

```
# raw -qa
```

The execution result is as follows.

```
/dev/raw/raw1: bound to major 8, minor 0
/dev/raw/raw2: bound to major 8, minor 1
.........
```

Next, the following commands are executed. It corresponds to the numerical value of major that the figure that is behind “disk” is respectively in the above-mentioned result and minor.

```
# ls -l /dev/sdb
```

The execution result is as follows.

```
brw-rw---- 1 root disk 8, 0 May 6 2008 sdb
```

Therefore, the RAW device file becomes /dev/raw/raw1.

7.2.3.5 List of Pin Track Tool directories

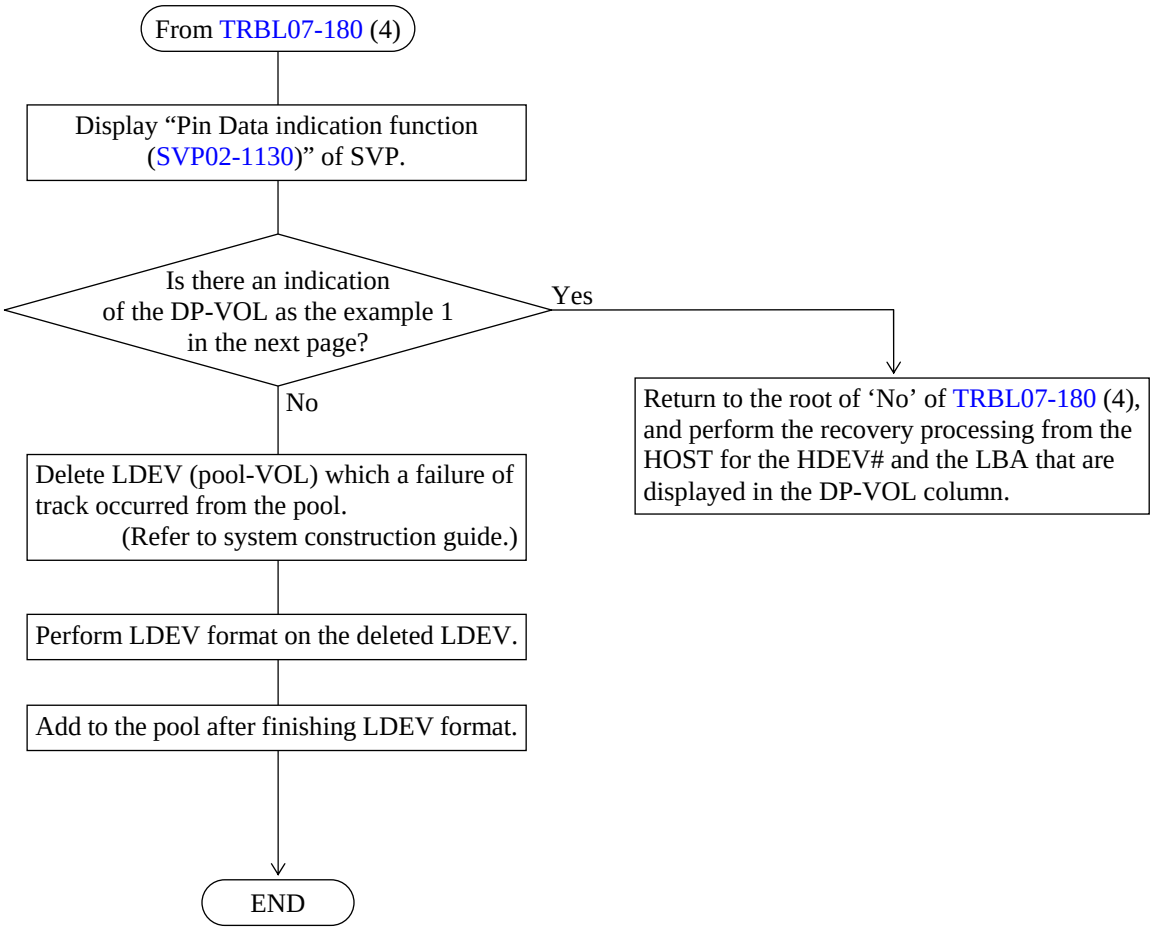
- /program/MENT/pintrack/readme-e.txt

- /program/MENT/pintrack/HP-UX/pinhpXX.tar
- /program/MENT/pintrack /Sh/pinshXX.tar
- /program/MENT/pintrack /Solaris/pinsolXX.tar
- /program/MENT/pintrack /Windows/PinWinxx.exe

7.2.3.6 ECC/LRC Error recovery processing of DP pool-VOL

When an ECC/LRC Error occurs in a pool-VOL, perform the following recovery method because an I/O cannot be issued directly from the HOST for the track concerned.

*1: In case of a Write Error, perform TRBL07-200 as well as the normal VOL and recover it.
*2: The LDEV that a POOL ID is displayed on the logical device window of the maintenance window is a pool-VOL.



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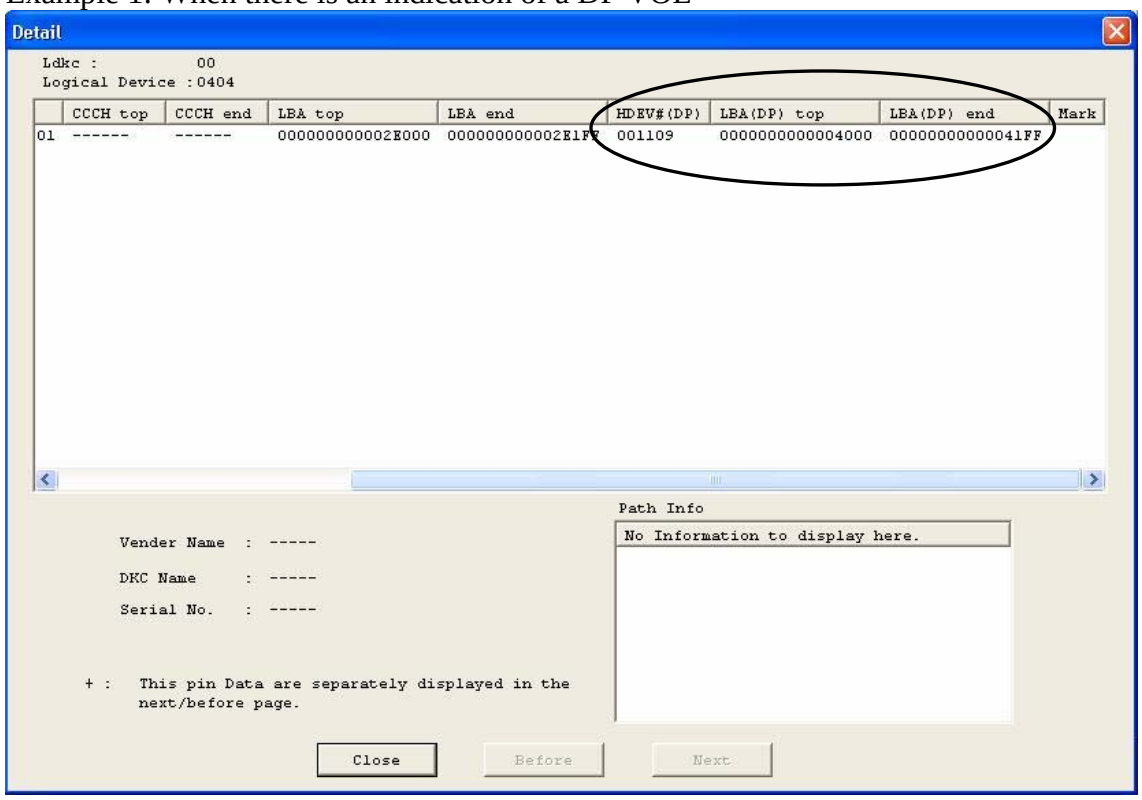
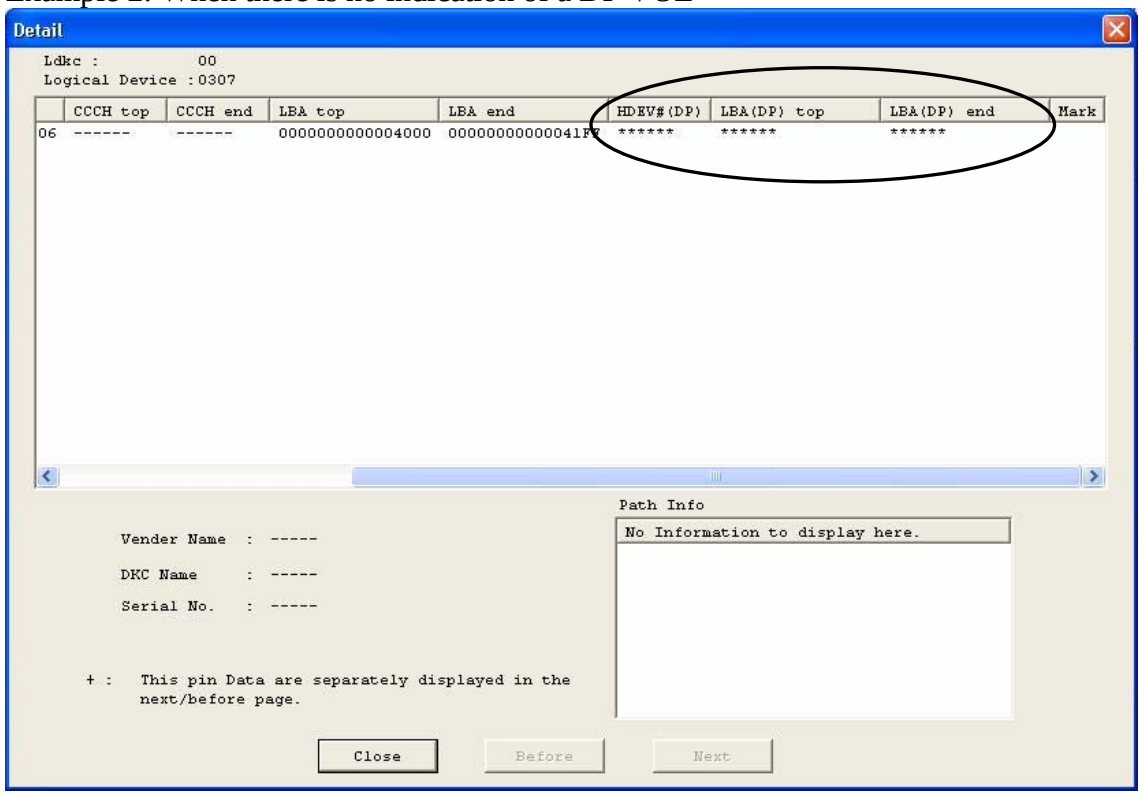
Example 1: When there is an indication of a DP VOL

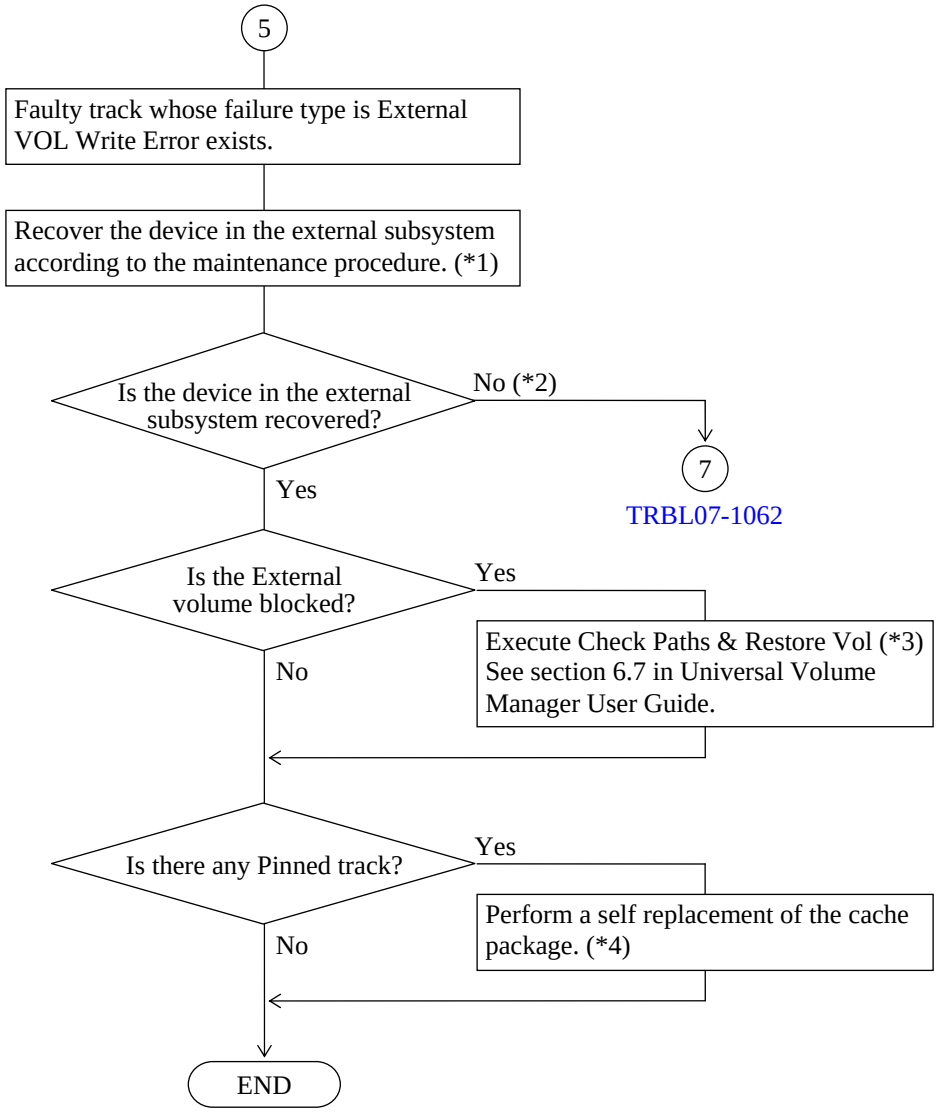


Example 2: When there is no indication of a DP VOL



7.2.3.7 Recovery from External VOL Write Error

When an External VOL Write Error occurs, perform the following recovery procedure.



*1: It should be done in the external subsystem. The user needs to ask the service personnel of the external subsystem to perform the maintenance operation of the subsystem. (If the external subsystem is Hitachi storage, recover the faulty part according to the maintenance manual.)

*2: Because data on device of external subsystem cannot be secured with this case, it is not possible to recommend it. However, because the maintenance (Example: micro-program exchange) of VSP controlled so that pinned track may exist can be executed, it is likely to execute it in an urgent case to give priority to the recovery of hardware failure of VSP unit.

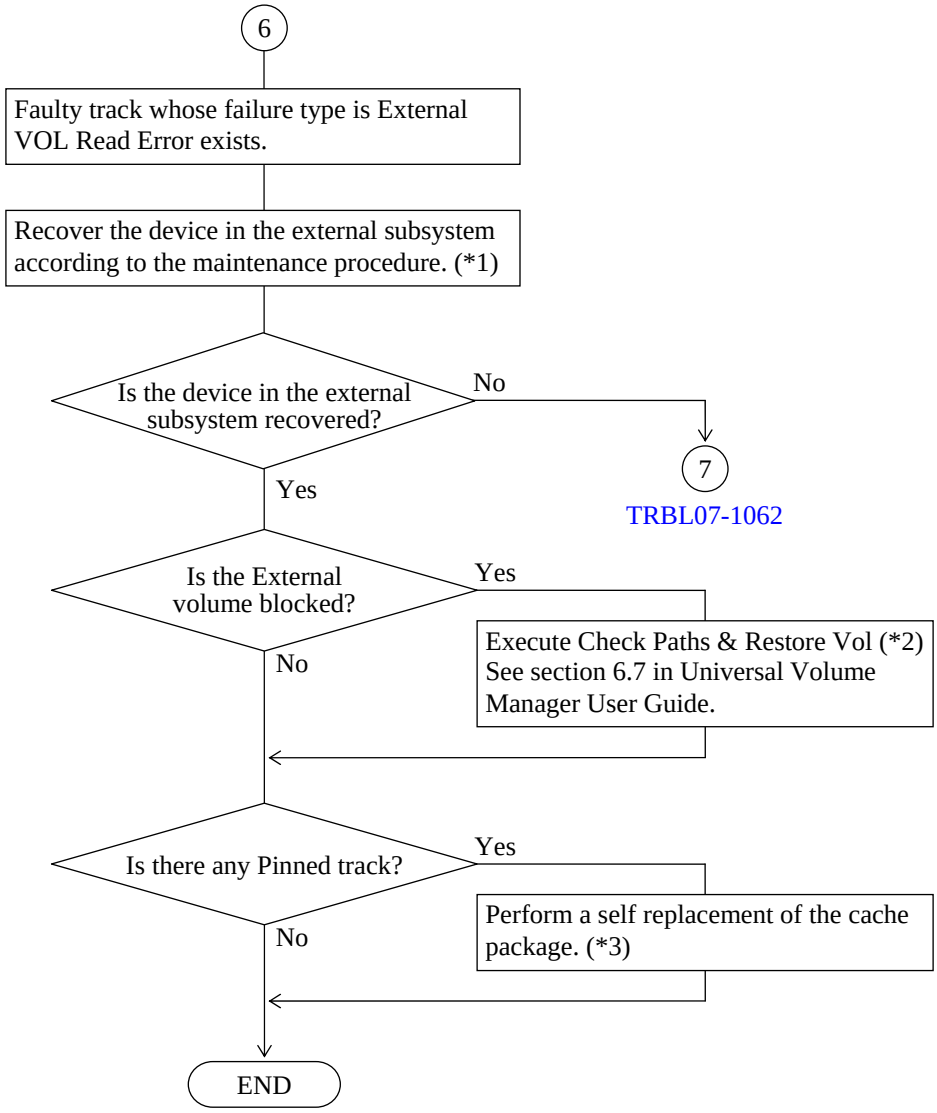
*3: It should be done using Storage Navigator. Ask the customer to perform the recovery operation by using Storage Navigator according to the User Guide.

*4: Please perform a self replacement of the cache package according to the either (1) or (2) following procedures. Please refer to REP03-10-10 to know how to replace.
(1) If you know the cache package which PIN exists, please self replacement of the cache package.
(2) If you don't know the cache package which PIN exists, please execute the following procedures.
- When Cache-1CB/2CD is not installed, perform (a) in order on one of either side (*5).
  (a) Perform self replacement of Cache- Basic PCB.
- When Cache-1CB/2CD is installed, perform (a) to (e) in order on one of either side (*5).
  (a) Change the SVP mode to mode.
  (b) Block Cache-1CB.
  (c) Perform self replacement of Cache-Basic PCB. (Because there is a blocked Cache package, it is necessary to perform it forcibly by entering the password.)
  (d) Perform self replacement of Cache-Option1 PCB.
  (e) Restore the SVP mode to the original one.

*5: In case of A side, Cache-Basic PCB = Cache-1CA, Cache-Option1 PCB = Cache-1CB
In case of B side, Cache-Basic PCB = Cache-2CC, Cache-Option1 PCB = Cache-2CD

7.2.3.8 Recovery from External VOL Read Error

When an External VOL Read Error occurs, perform the following recovery procedure.



*1: It should be done in the external subsystem. The user needs to ask the service personnel of the external subsystem to perform the maintenance operation of the subsystem. (If the external subsystem is Hitachi storage, recover the faulty part according to the maintenance manual.)

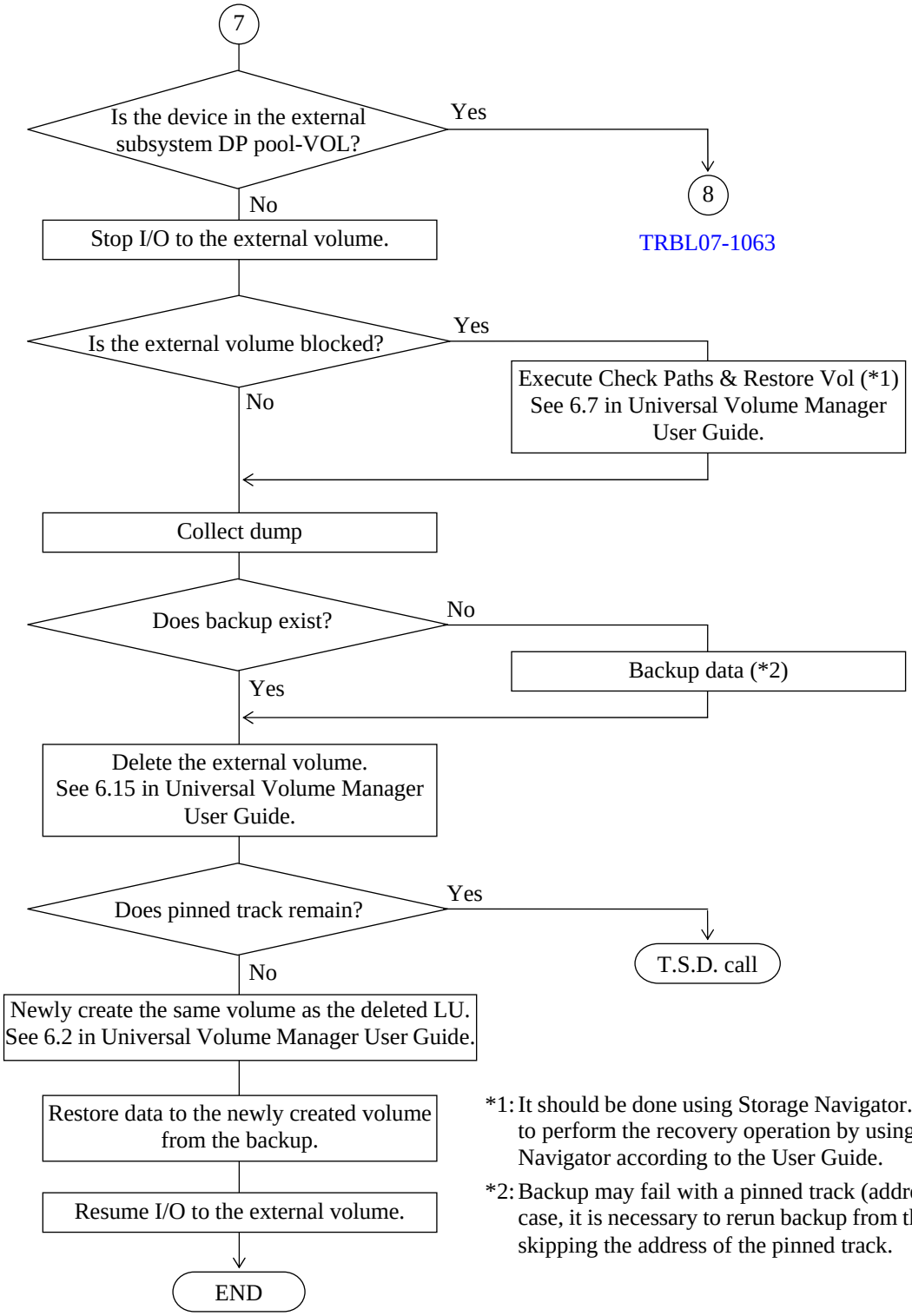
*2: It should be done using Storage Navigator. Ask the customer to perform the recovery operation by using Storage Navigator according to the User Guide.

*3: Please perform a self replacement of the cache package according to the either (1) or (2) following procedures. Please refer to REP03-10-10 to know how to replace.
(1) If you know the cache package which PIN exists, please self replacement of the cache package.
(2) If you don't know the cache package which PIN exists, please execute the following procedures.
- When Cache-1CB/2CD is not installed, perform (a) in order on one of either side (*4).
  (a) Perform self replacement of Cache-Basic PCB.
- When Cache-1CB/2CD is installed, perform (a) to (e) in order on one of either side (*4).
  (a) Change the SVP mode to mode.
  (b) Block Cache-1CB.
  (c) Perform self replacement of Cache-Basic PCB. (Because there is a blocked Cache package, it is necessary to perform it forcibly by entering the password.)
  (d) Perform self replacement of Cache-Option1 PCB.
  (e) Restore the SVP mode to the original one.

*4: In case of A side, Cache-Basic PCB = Cache-1CA, Cache-Option1 PCB = Cache-1CB
In case of B side, Cache-Basic PCB = Cache-2CC, Cache-Option1 PCB = Cache-2CD

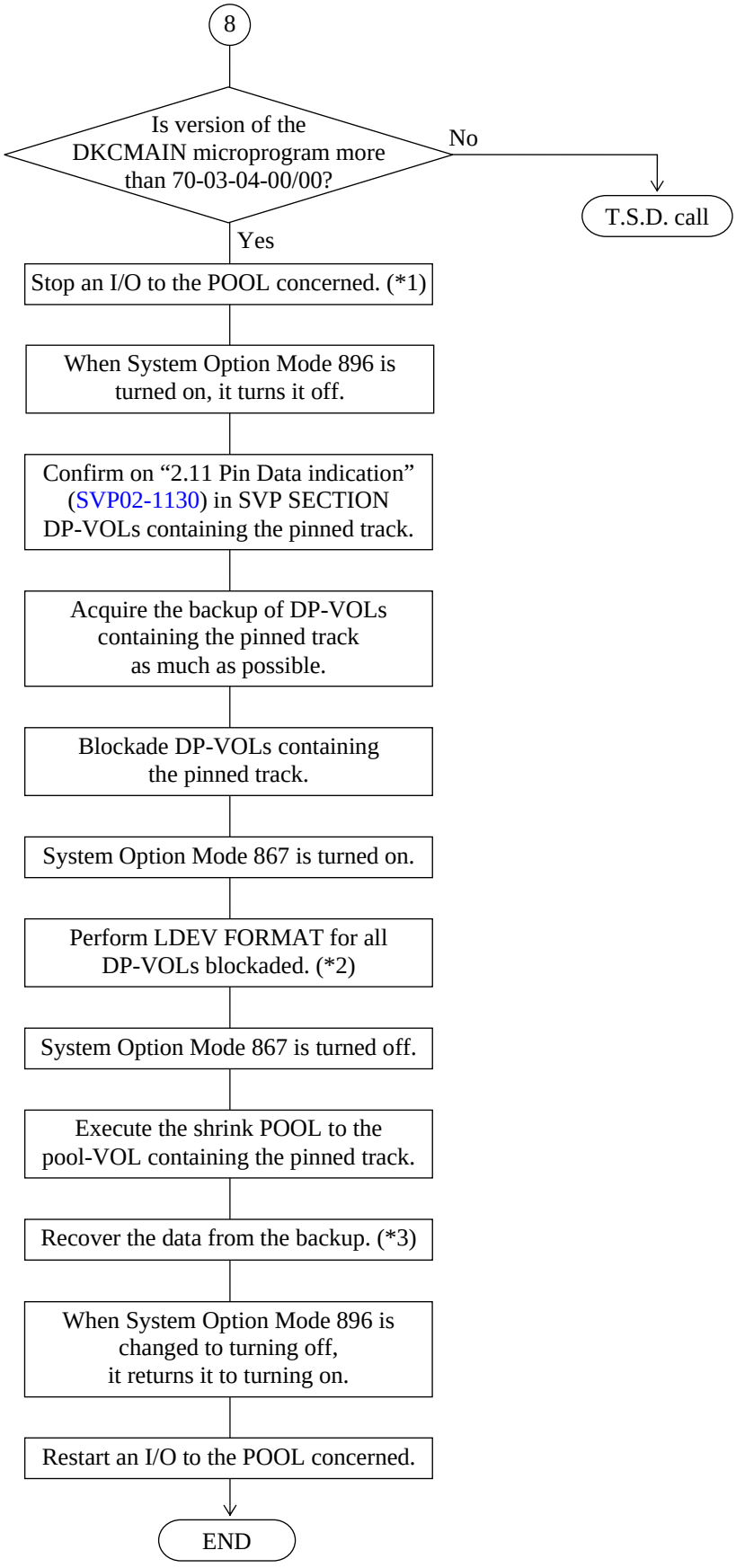
7.2.3.9 Recovery processing of the device in the external subsystem

When the device of an external subsystem is not recovered, perform the following recovery procedure.



*1: It should be done using Storage Navigator. Ask the customer to perform the recovery operation by using Storage Navigator according to the User Guide.

*2: Backup may fail with a pinned track (address). In such a case, it is necessary to rerun backup from the next address by skipping the address of the pinned track.



*1: It is necessary to stop an I/O, so that other DP-VOLs should not use the area released by LDEV FORMAT again.

*2: The area of pool-VOL allocated in DP-VOL is released by turning on System Option Mode 867 and performing LDEV FORMAT to DP-VOL.
As a result, the area where pinned track occurred is separated from DP-VOL.

*3: Please be careful when restoring data from a backup.
If data is backed up per volume (DP-VOL), unallocated areas in the volume are also backed up. Therefore when the data is restored, a write operation is performed also for the unallocated areas, and the areas become allocated (though with zero data), resulting in an increase in the used pool capacity. If many DP-VOLs are restored at a time, the pool may become full.
To restore DP-VOLs, perform the following procedure for each of all DP-VOLs.

(1) Restore the data from the backup

(2) Perform the Reclaim Zero Pages processing

Note: When data is restored per file from the backup, only the consumed (allocated) areas are restored from the backup, so you do not have to perform the Reclaim Zero Pages processing.

7.3 Procedure for getting dump and recovering CHA in the case of CHA protocol control LSI failure

7.3.1 Outline

If a system failure of the protocol control LSI that is installed in 8FOE (FCoE) CHA occurs, a port failure (SIM=2120XX) that blocks the FCoE channel port that is controlled by the LSI occurs. In this case, the SSB code that shows the protocol control LSI failure is reported from DKC, and you need to get the dump information to analyze the system failure of the protocol control LSI. This section describes the procedure for getting dump and recovering the faulty part.

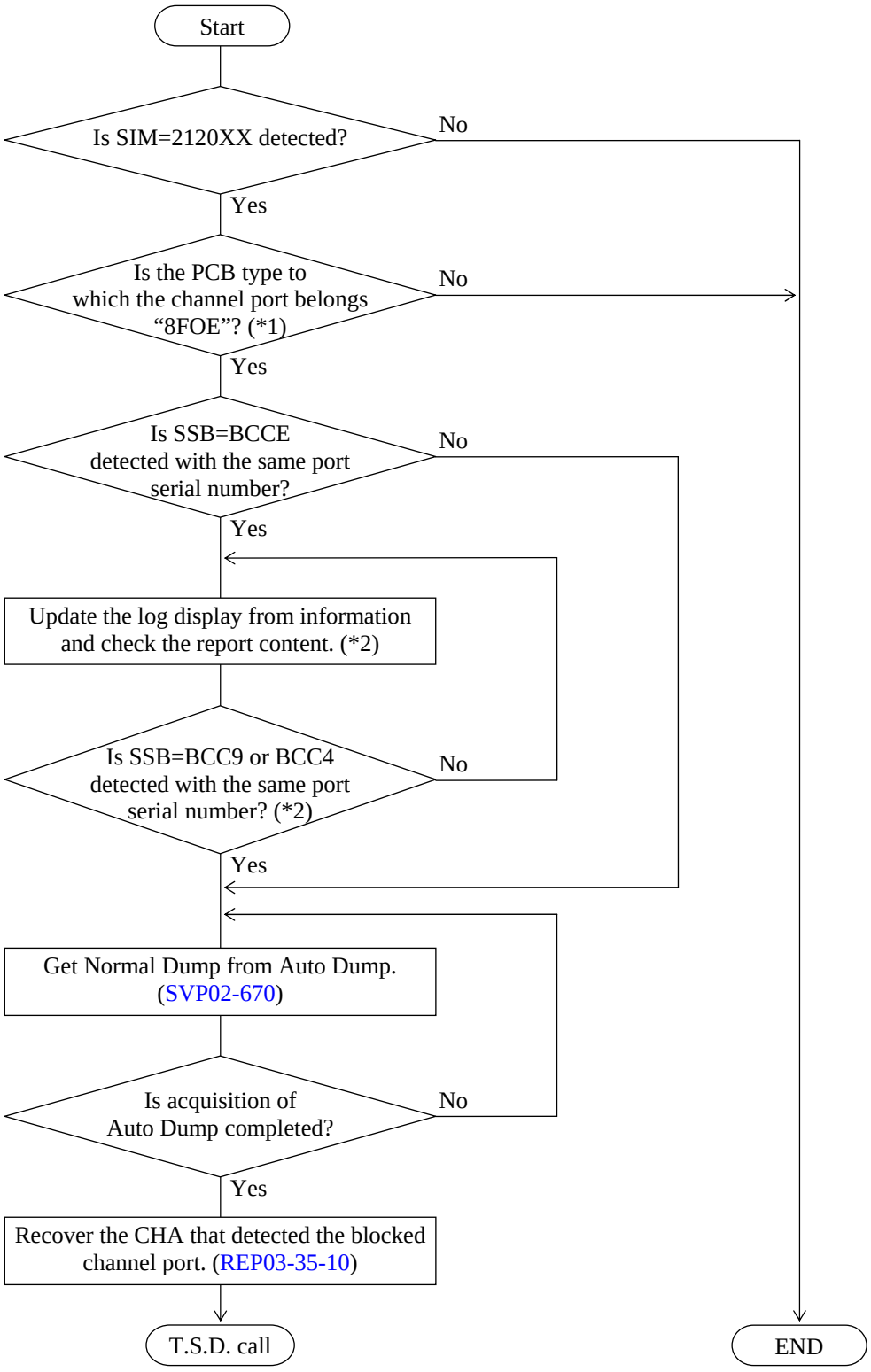
Table 7.3.1-1 SSB code reported when CHA protocol LSI failure occurs

#	SSB code	Description	Remarks
1	BCCE	A system failure of the protocol control LSI was detected	It is reported when a protocol control LSI failure is detected. Collection of dump information starts in DKC.
2	BCC4	Dump collection of the protocol control LSI is stopped, and you can get dump	It may be reported when an MP failure is detected, or a power cycle, MP maintenance, micro-program exchange, or 8FOE CHA maintenance is performed during dump collection of the protocol control LSI.
3	BCC9	Dump collection of the protocol control LSI is completed, and you can get dump	It is reported when dump collection of the protocol control LSI is completed. After that, if acquisition of Normal Dump is not completed, or if 8FOE that detected the failure is not recovered, dump collection of the protocol control LSI is not performed when a new failure is detected.

Table 7.3.1-2 Matters must be or desirable to be checked

#	Check point	Check method
1	Is the channel port serial number that detected a blocked channel port (SIM reference code=2120XX) an FCoE channel port?	Confirm that the channel port serial number shown in SIM=2120XX in Information is consistent with the faulty channel port serial number shown in Maintenance and the PCB type is 8FOE.
2	Is a blocked channel port detected, and is SSB code=BCCE detected around the same time?	See SIM and Log in Information to check if SIM: 2120XX and SSB:BCCE were detected in the same channel port around the same time.

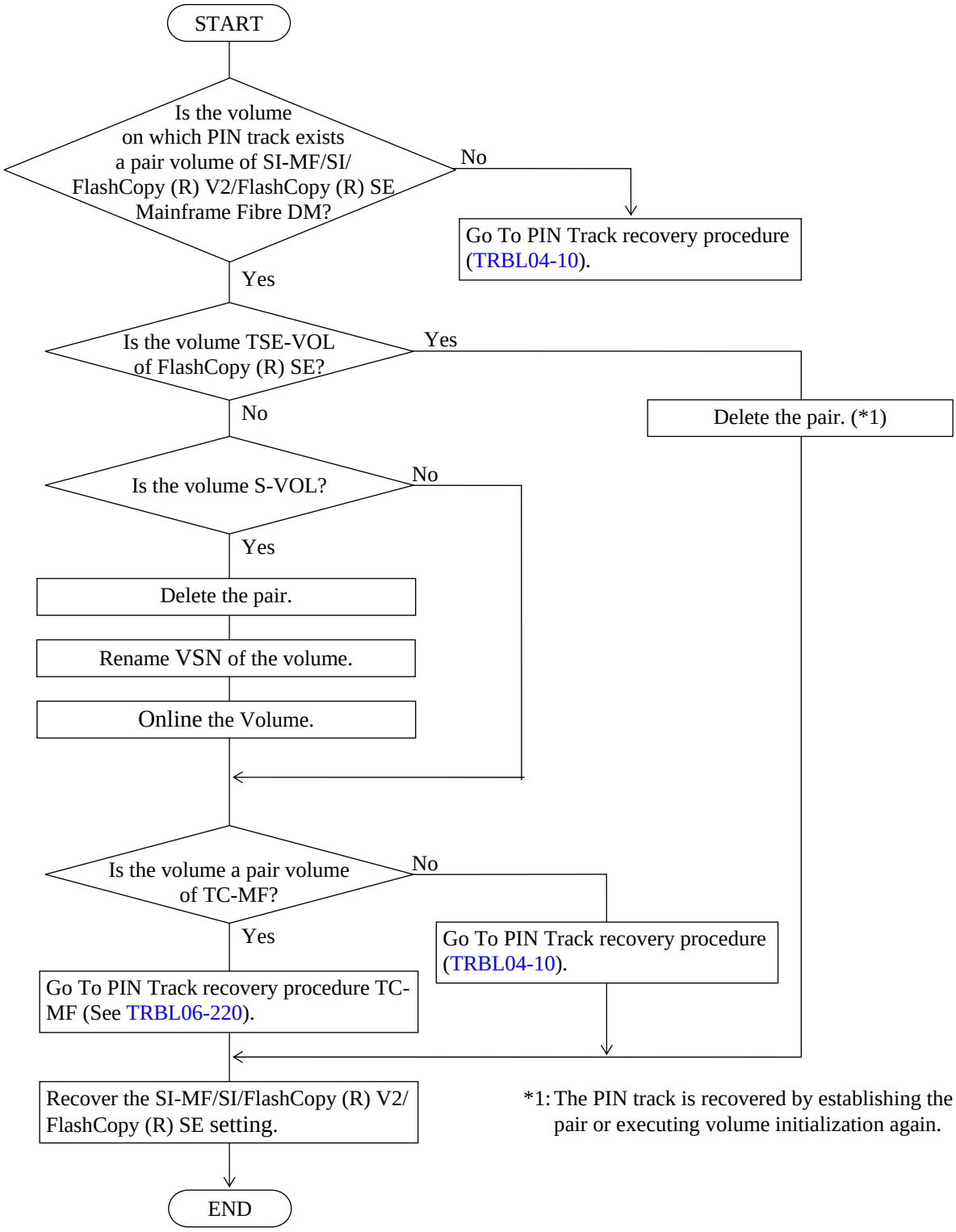
7.3.2 Method to get dump and recover CHA in the case of protocol control LSI failure



*1: If it is not 8FOE, check the type of PCB that detected the failure and the applicable action item.
*2: The time required from when the blocked channel port is detected until the SSB code that shows the end of Dump collection is reported in the case of the protocol control LSI failure of 8FOE is about 20 minutes.

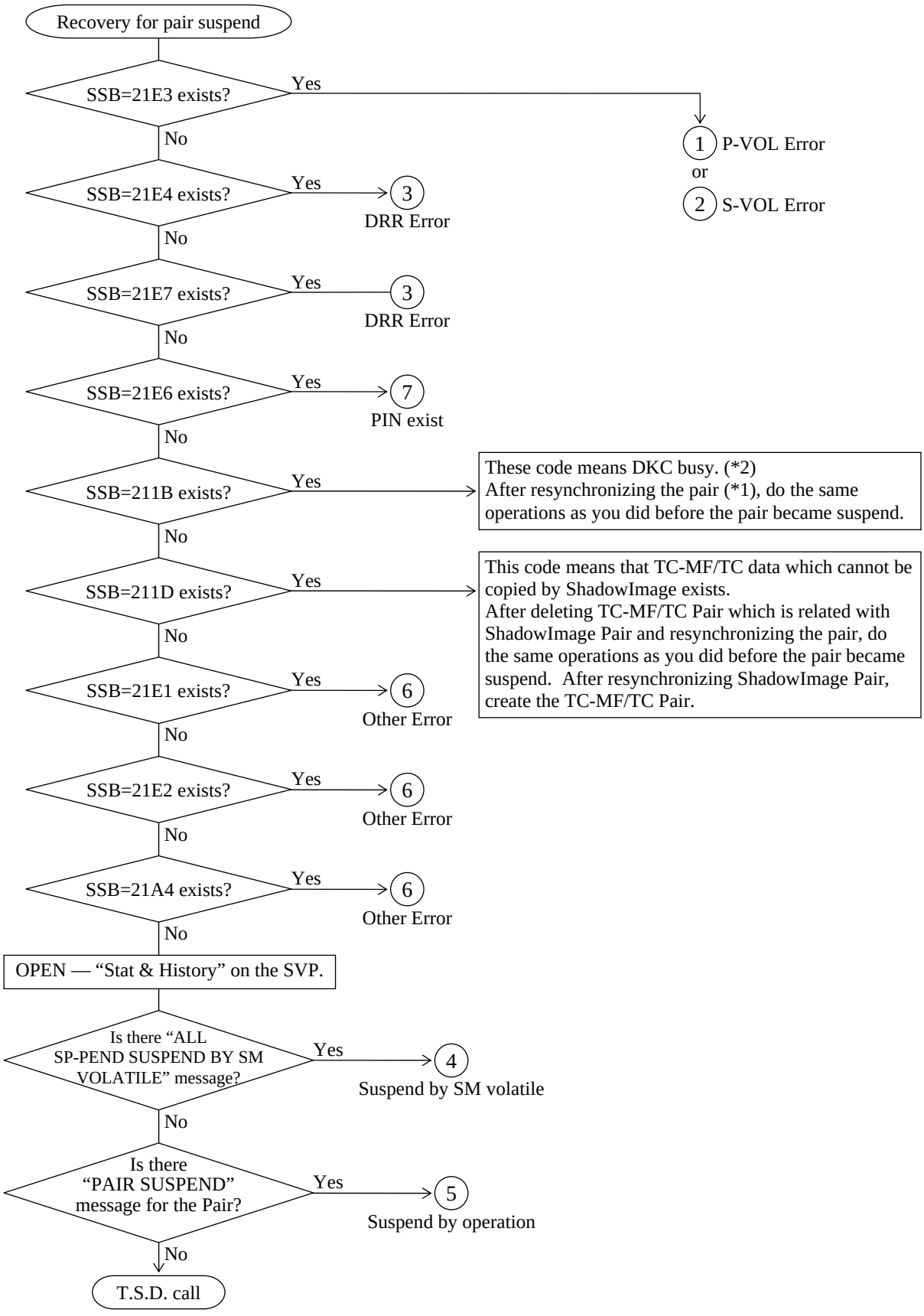
8. ShadowImage for Mainframe/ShadowImage/FlashCopy (R) V2/ FlashCopy (R) SE Error Recovery

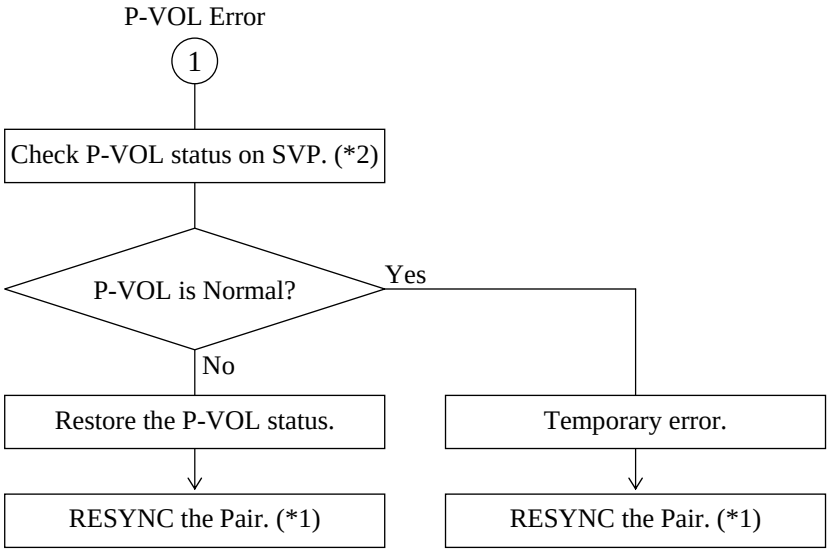
8.1 PIN Track recovery procedure

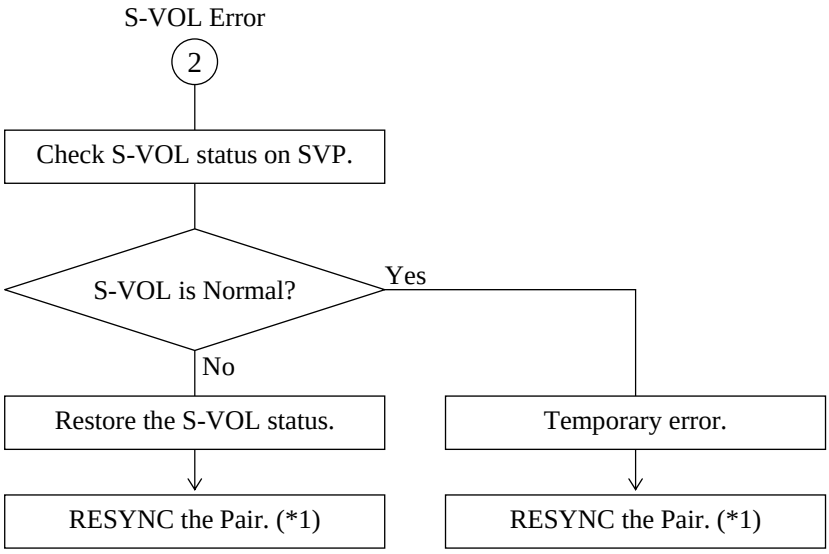


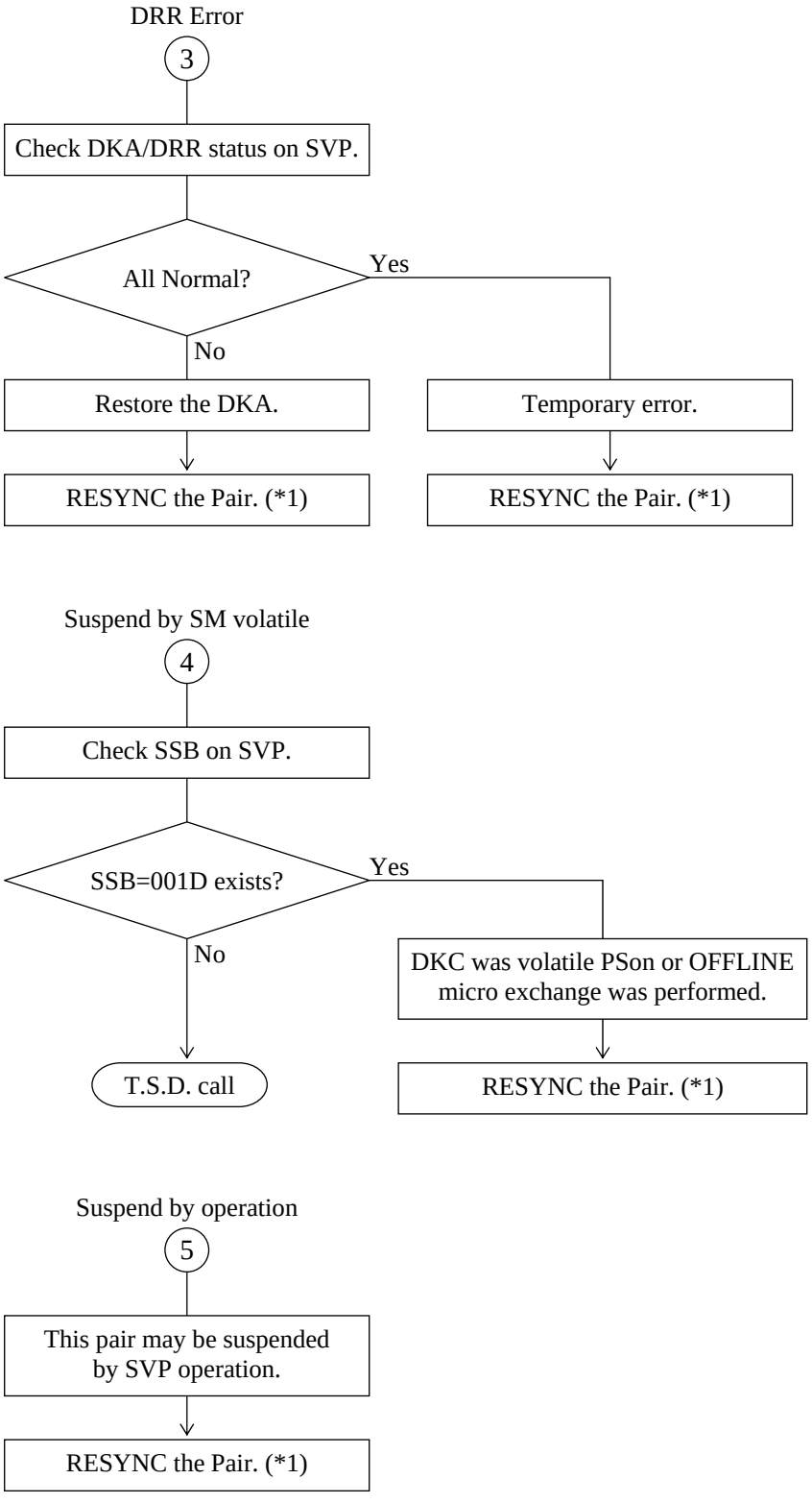
*1: The PIN track is recovered by establishing the pair or executing volume initialization again.

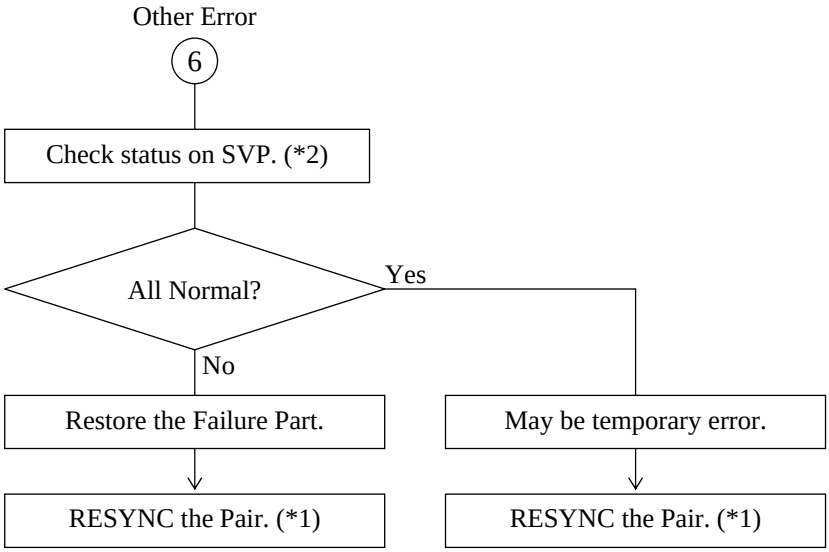
8.2 Recovery Procedure for ShadowImage for Mainframe/ShadowImage/Mainframe Fibre DM Suspend Pair (SIM = 47DXYY, 7FF102, 47E700)

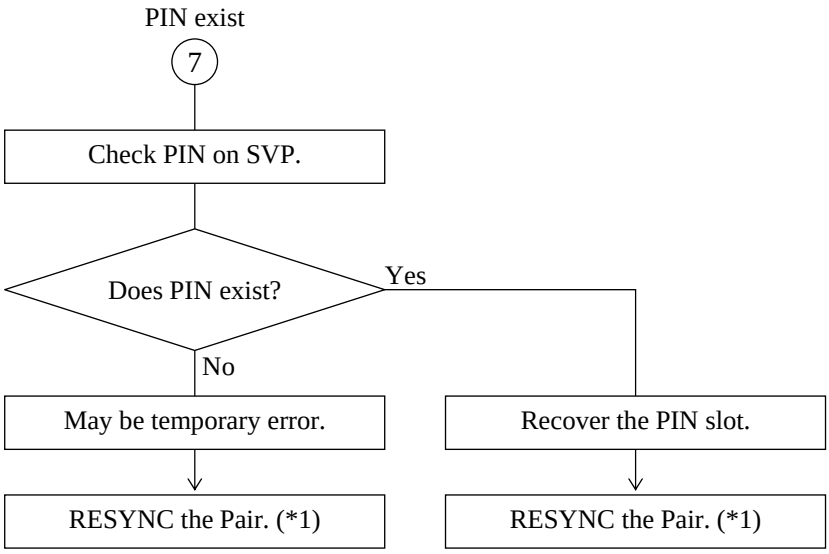










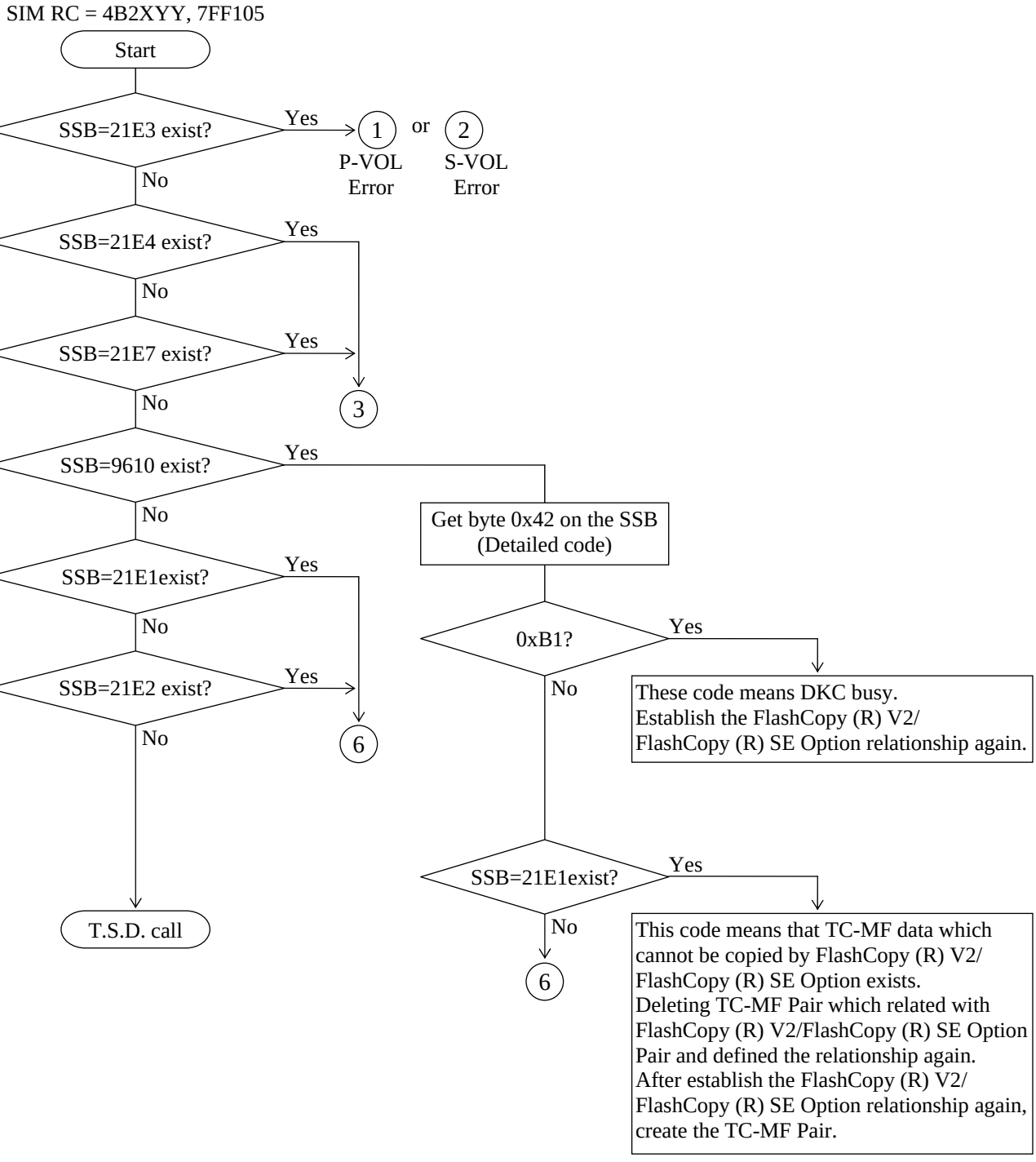


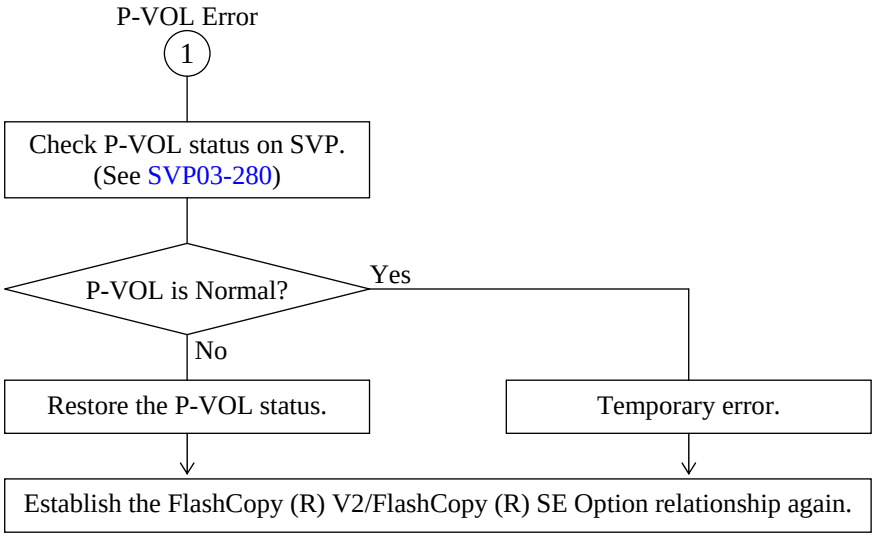
*1: In the case of Mainframe Fibre DM pair, resync the pair if pair status is Suspend (Mig) or create the pair again after deleting the pair if pair status is Suspend.

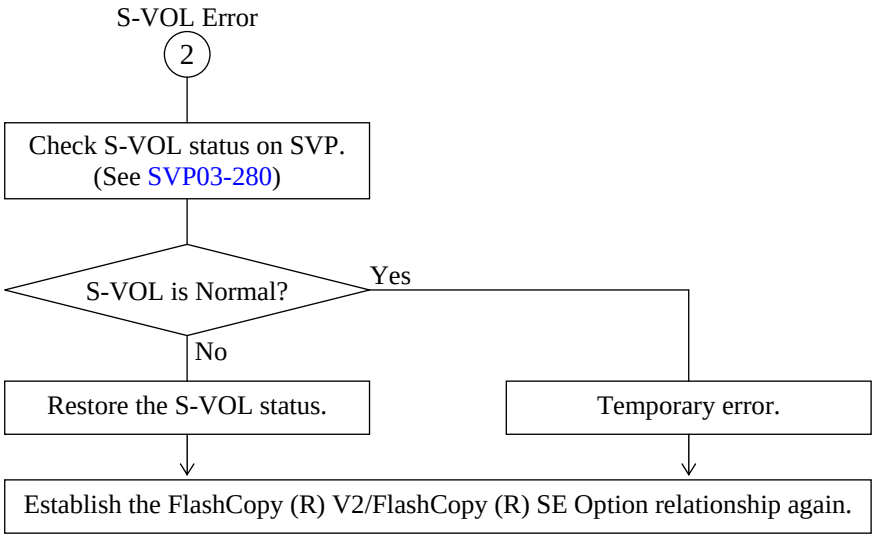
*2: In the case of Mainframe Fibre DM pair, follow the Mainframe Fibre DM recovery procedure.
(See TRBL27-10.)

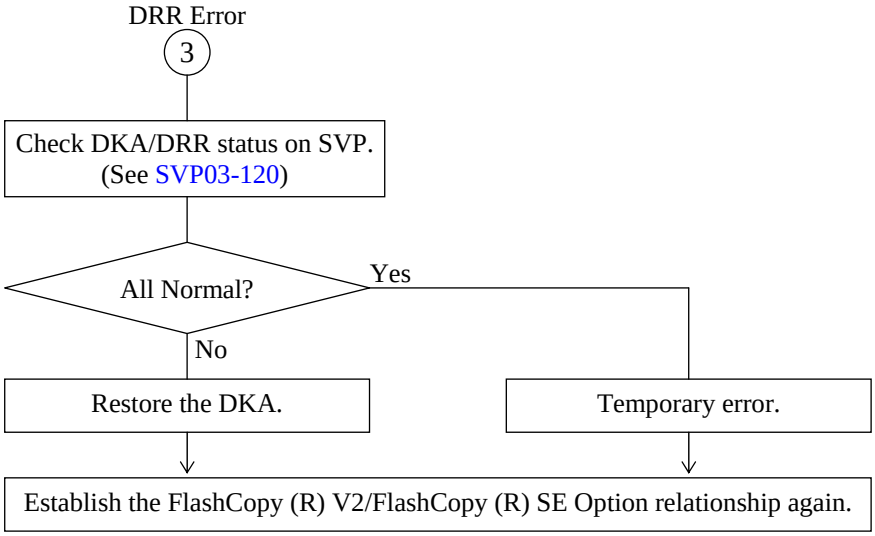
8.3 Procedure for Recovery from FlashCopy (R) V2/FlashCopy (R) SE Option failure (SIM = 4B2XYY, 7FF105, 47E500)

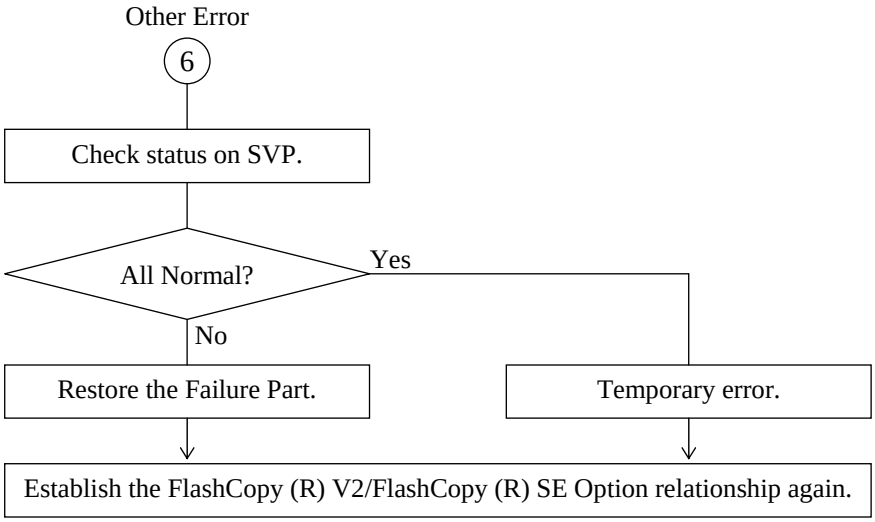
The procedure for recovery from a failure occurs in a pair of FlashCopy (R) V2/FlashCopy (R) SE Option is explained below.



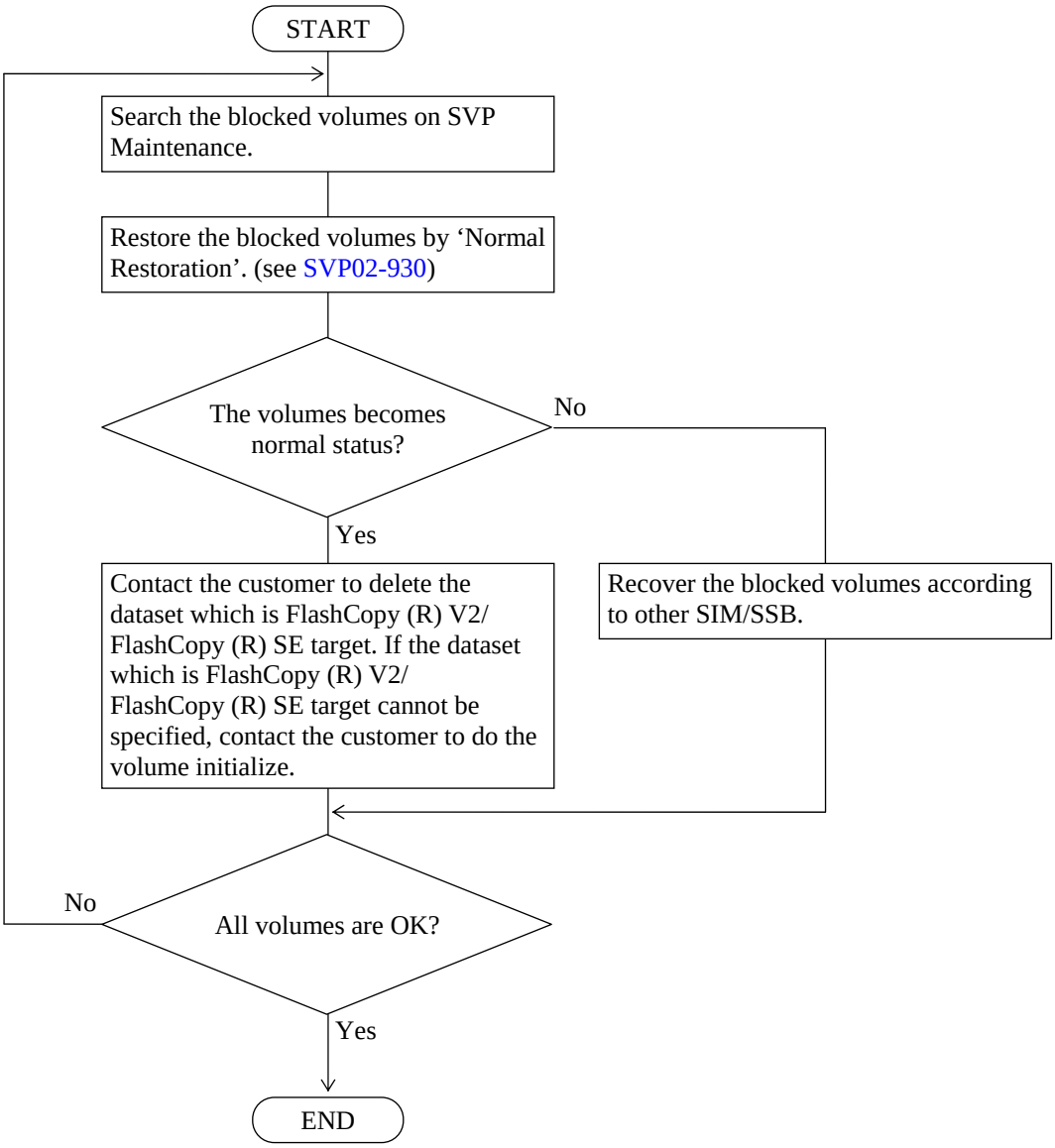




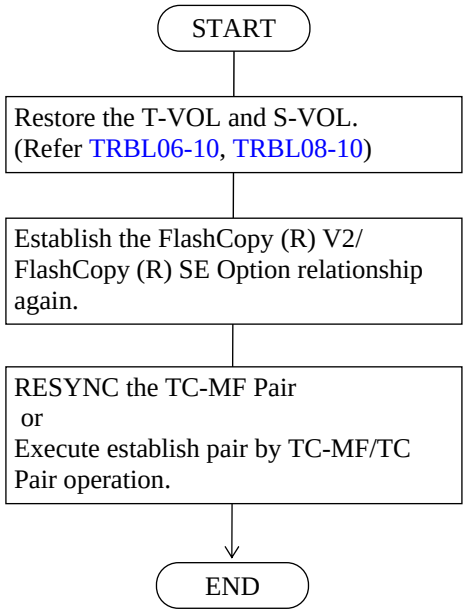




SIM RC = 47E500



8.3.1 Procedure for Recovery from FlashCopy (R) V2/FlashCopy (R) SE and TrueCopy for Mainframe cooperation (SIM = 4B2XYY, 47E500)



8.4 Recovery for inconsistency of System Option MODE80 and ShadowImage for Mainframe/ShadowImage setting (SIM = 47E000)

(1) and (2) are inconsistent. Please call T.S.D, and off System Option MODE80 or off ShadowImage for Mainframe/ShadowImage Swap&Freeze function.

(1) System Option MODE80 is on.
(2) ShadowImage for Mainframe/ShadowImage Swap&Freeze function is on.

8.5 Output of the online path information (SSB = 2084)

There is a case where the following commands such as the P.P. pair operation and the reserve setting become a command reject and cannot be executed because the target device is online.

ShadowImage, ShadowImage for Mainframe, FlashCopy (R) V2, FlashCopy (R) SE

When they become a command reject, specify the online path from the contents of SSB=2084, and make the target path offline.

Note: The number of SSB=2084 is limited by about 1 in ten seconds. Therefore, after taking paths offline by way of Figure 8.5.2-1, P.P. command operation might fail with SSB=2084 again. If this happens, repeat steps of Figure 8.5.2-1.

8.5.1 Output information

Display SSB=2084 from the SSB log referring to SVP02-30.
The information shown below is output to Internal Data of SSB=2084.

- The maximum of seven PIDs are output with SSB=2084 to be output.
- The total number of online paths of the device shown in the byte 0x40 ~ 0x43 is output.

Table 8.5.1-1 SSB=2084: Details of output information

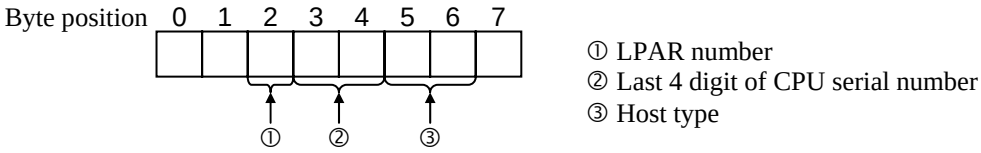
Byte	Contents	Remarks
0x40 ~ 0x43	Device number (CU: LDEV number) of which the online path check was performed	
0x44	The number (1 ~ 7) of effective PIDs output in SSB concerned	
0x45 ~ 0x46	The total number of online paths (1 ~ 2048) shown in the byte 0x40 ~ 0x43	
0x47	Preparation (0)	
0x48 ~ 0x4F	PID1	Refer to the details of PID.
0x50 ~ 0x57	PID2	Refer to the details of PID.
0x58 ~ 0x5F	PID3	Refer to the details of PID.
0x60 ~ 0x67	PID4	Refer to the details of PID.
0x68 ~ 0x6F	PID5	Refer to the details of PID.
0x70 ~ 0x77	PID6	Refer to the details of PID.
0x78 ~ 0x7F	PID7	Refer to the details of PID.

Note: When the total number of online paths > effective PIDs output, there is the information of the online path which is not output. Retry the command operation after making the path offline referring to Figure 8.5.2-1.

Internal Data		0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
	40	HDEV#				*1	*2		*3	PID1							
	50	PID2								PID3							
	60	PID4								PID5							
	70	PID6								PID7							

*1: The number of effective PIDs output in SSB concerned
*2: The total number of online paths of the device shown in the byte 0x40 ~ 0x43
*3: Preparation (0)

Figure 8.5.1-1 SSB=2084: Position of output information



Note: This does not show All digits of CPU serial number. Therefore, you might not be able to determine the host that has an online path. If this is the case, it is necessary to confirm online paths from all the hosts that have the same 4 digit of CPU serial number. If you use a volume from two or more hosts with the same last four digits of serial number and host type, it is recommended to use the volume from different LPAR number of the hosts.

Figure 8.5.1-2 Details of PID

8.5.2 To continue the operation

When the volume of the operation target is online, acquire the online path information of the target volume according to the following procedure, and make it offline. After that, retry the command.

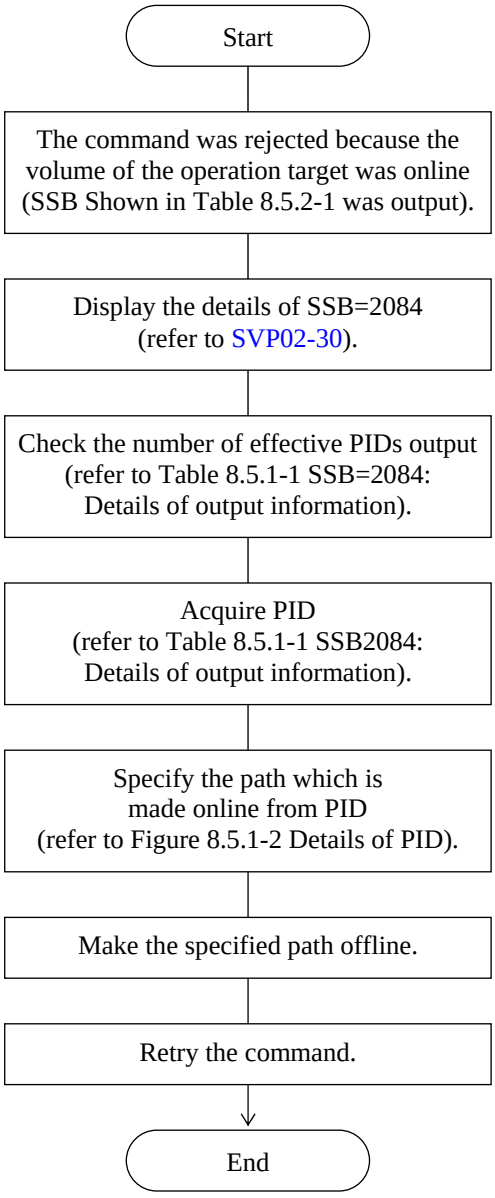


Table 8.5.2-1 SSB output by command operation

Output SSB	command	P.P.
2312	Pair create	ShadowImage ShadowImage for Mainframe
	Resync	
	Restore	
	Reserve setting	
2352	Restore	ShadowImage ShadowImage for Mainframe
231f		
9655	Pair create	FlashCopy (R) V2 FlashCopy (R) SE

Note: When the total number of online paths > effective PIDs output, SSB=2084 is output again (refer to Table 8.5.1-1 SSB=2084: Details of output information).

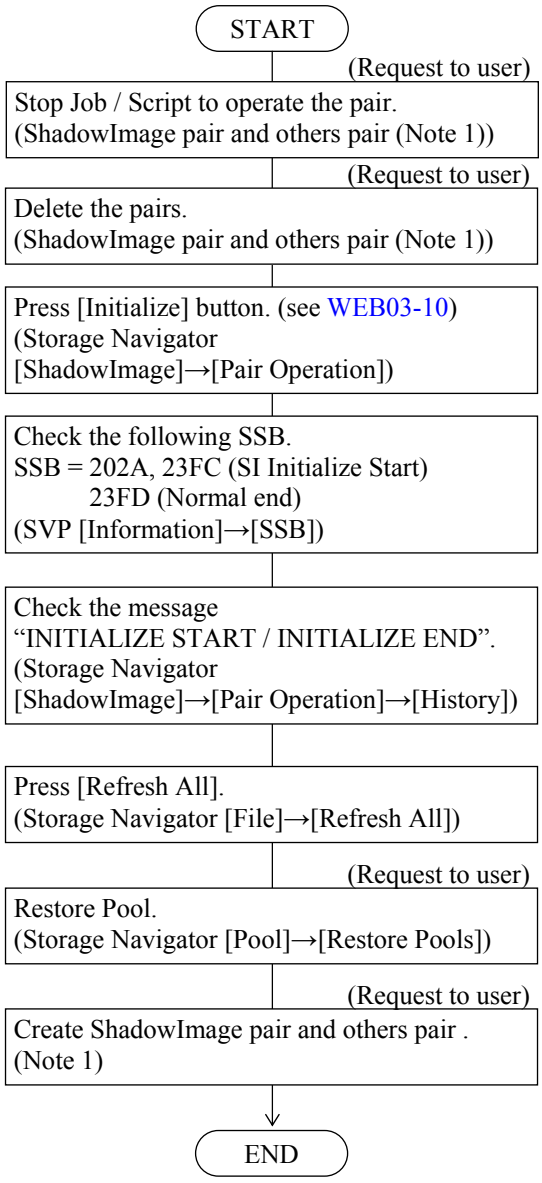
Figure 8.5.2-1 Procedure for continuing the operation

8.6 ShadowImage Initialize procedure

Note 1: When the [Initialize] button is pressed, pairs formed by the following P.P. are also deleted. And VOLs of reserve attribute are also deleted. And the pool of Copy-on-Write Snapshot is blockaded. [ShadowImage / ShadowImage z/OS (R) / Volume Migration / FlashCopy (R) V2 / FlashCopy (R) SE / Copy-on-Write Snapshot / Thin Image]

Note 2: Perform the operation only when it is directed by the Technical Service Division.

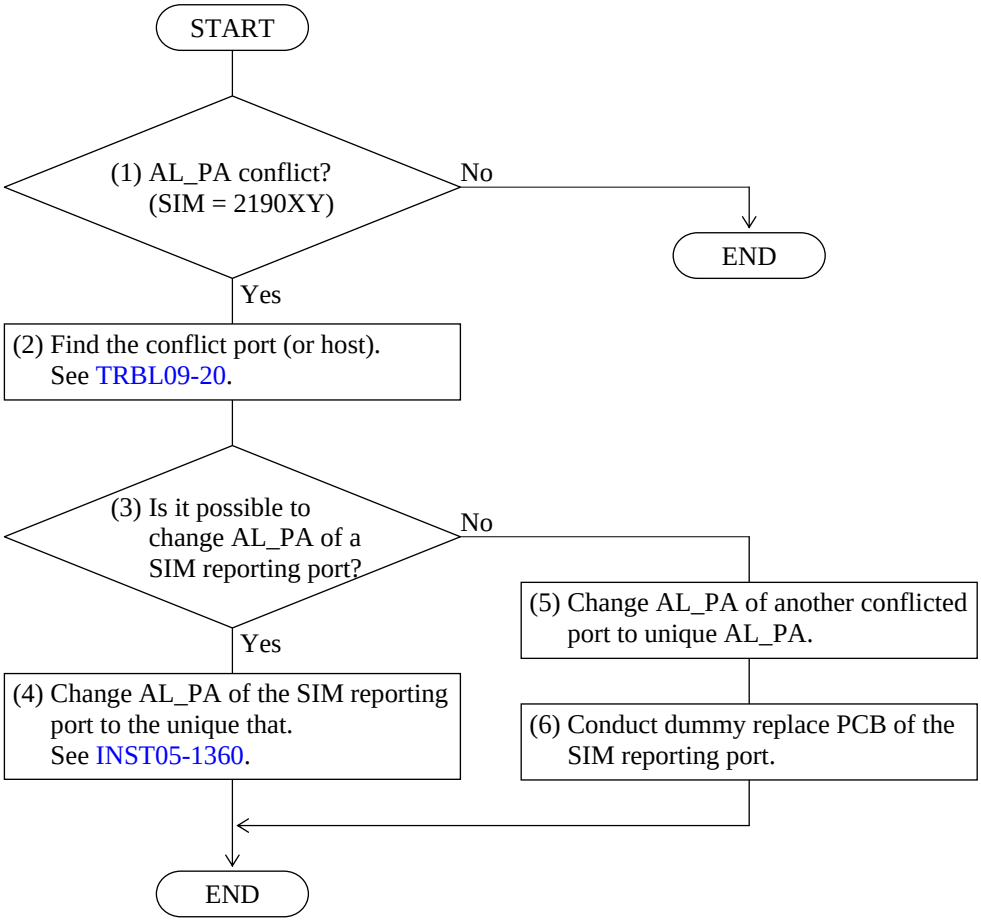
Note 3: For the password, refer to the Technical Service Division.



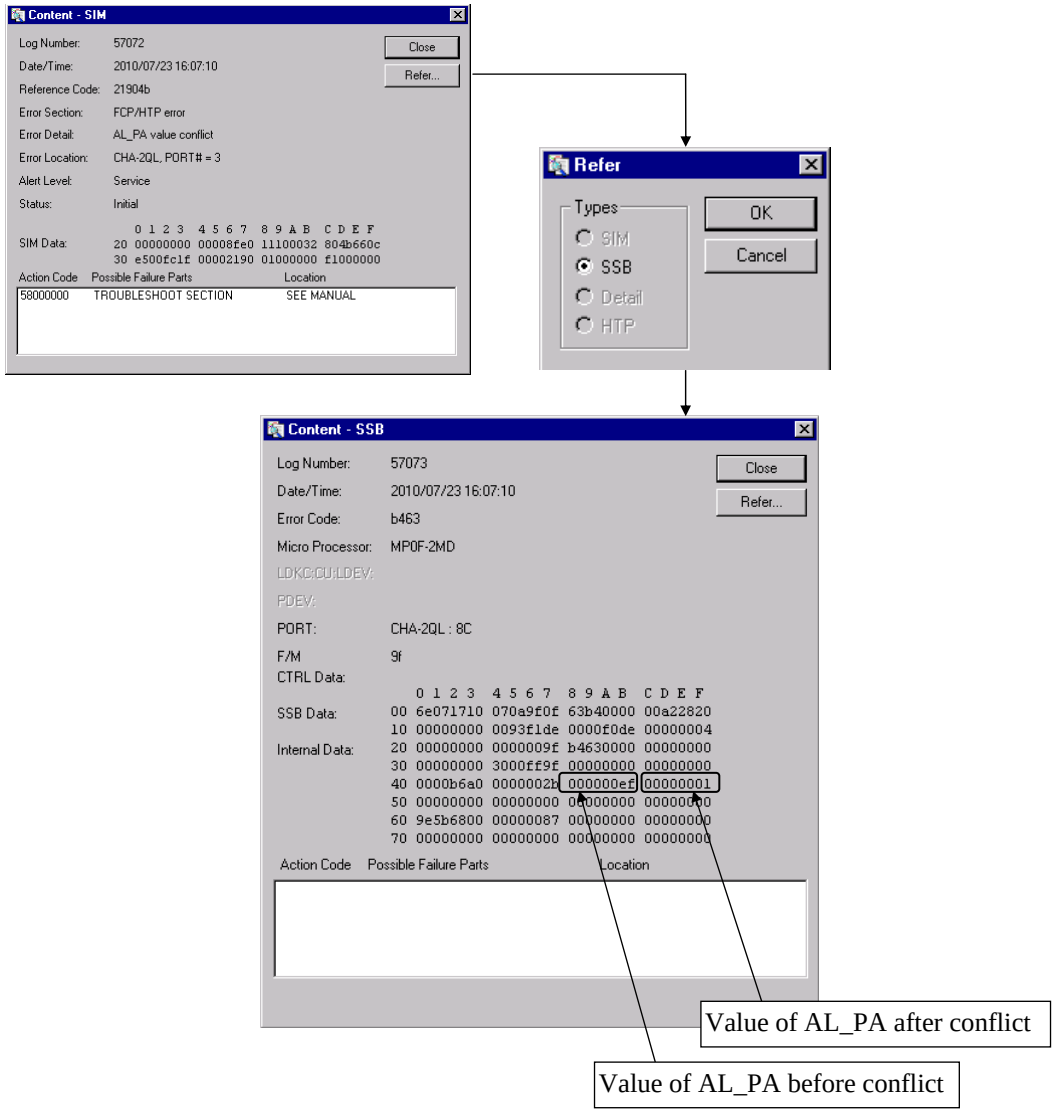
SSB LIST (After pressing [Initialize] button, the following SSB are of no matter)
9693, afb2, afb3

9. Recovery procedure of AL_PA conflict (SIM = 2190XY)

The following flow chart is a recovery procedure in the case where AL_PA of the nodes (CHF port, Host's Fibre channel port) which exist on the same loop overlaps. Before performing the following recovery procedure, the AL_PA of a SIM reporting port is automatically changed into an other AL_PA from previously given AL_PA. But AL_PA doesn't affect the values on SVP.



Note: Whether AL_PA of (3) is changed or not depends on the condition under operation.



1. Please refer to the SSB corresponded to the SIM (=2190XY) to specify values of AL_PA before/after conflict.
2. When the value of AL_PA before conflict is determined, please find CHF port or Host's Fibre channel port whose AL_PA conflicts with this port.

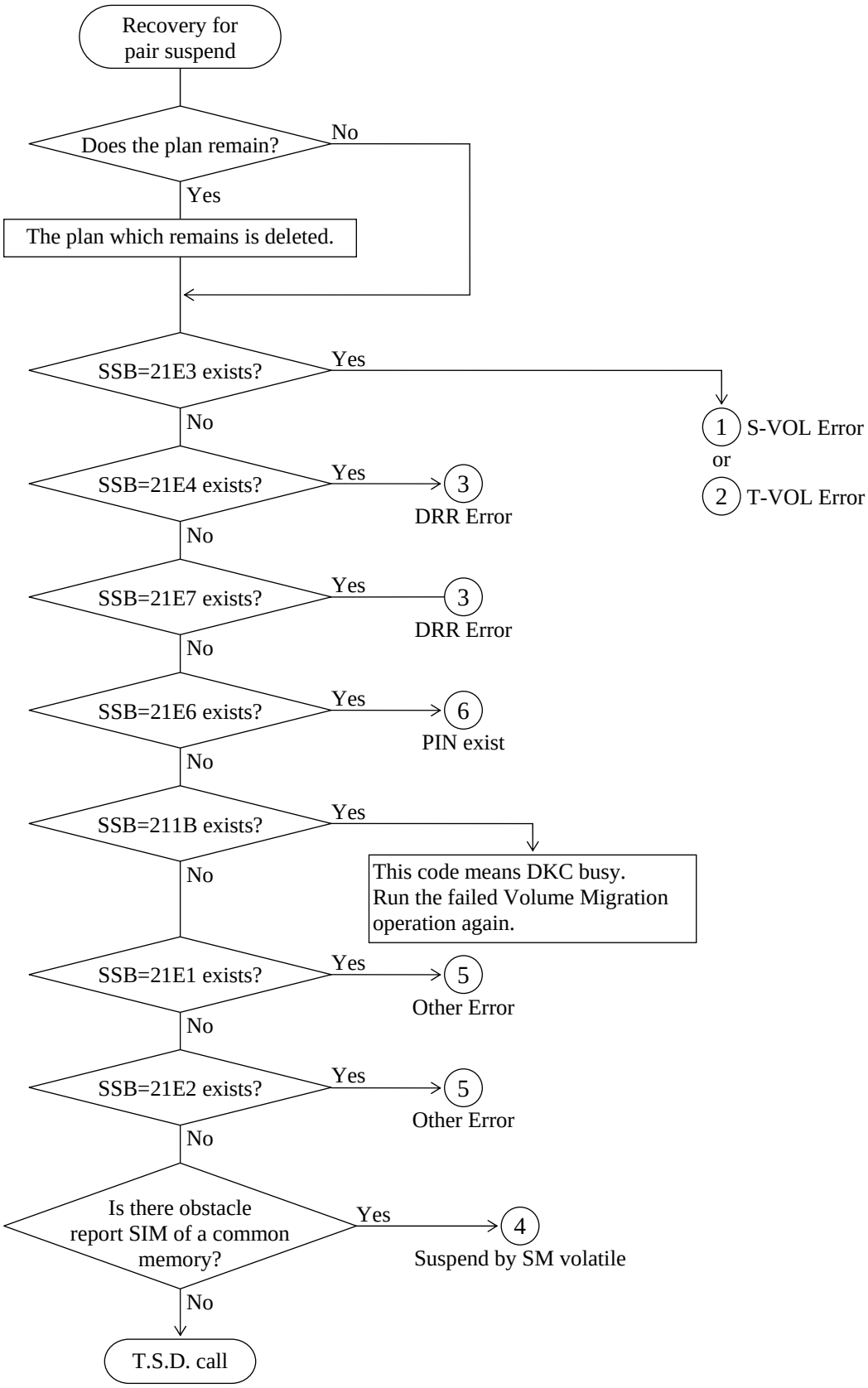
10. Volume Migration Error Recovery

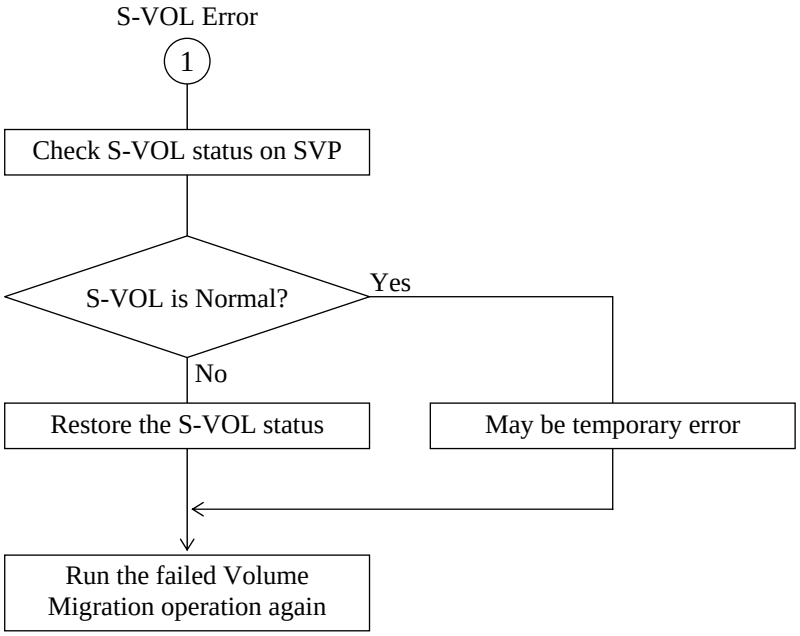
When it lapses into the state where a system does not expect, volume move processing of Volume Migration sometimes carries out an unusual end. In this case, the state of S-VOL and T-VOL which was during movement is not changing from the state before movement. So, there is no necessity of daring carry out recovery to resume VOL move processing. Please resume processing after checking states, such as a hard part, with reference to SSB/SIM.
Please carry out recovery procedure with reference to the following flowchart.

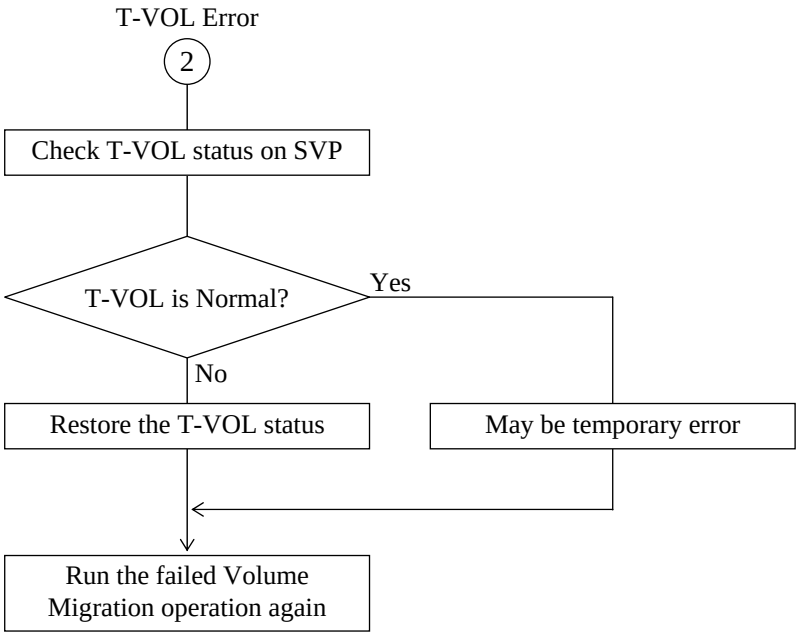
Table 10.1-1 Volume Migration SIM REF.CODE

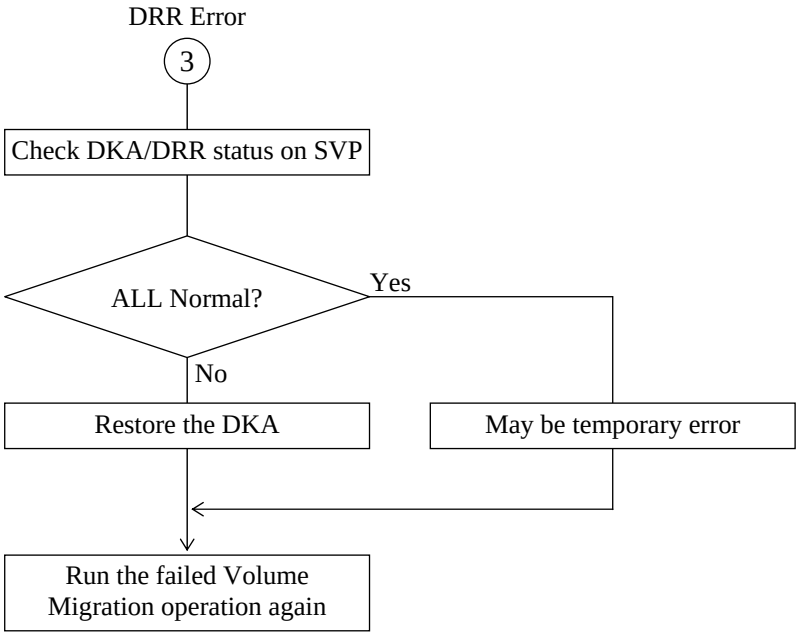
SIM REF. CODE	meaning	comment
47FYXX 7FF106	Volume Migration VOL Move unusual end	YXX: The lower 12 bits of Secondary Volume #. Y = The lower 4 bits of CU# X = LDEV#

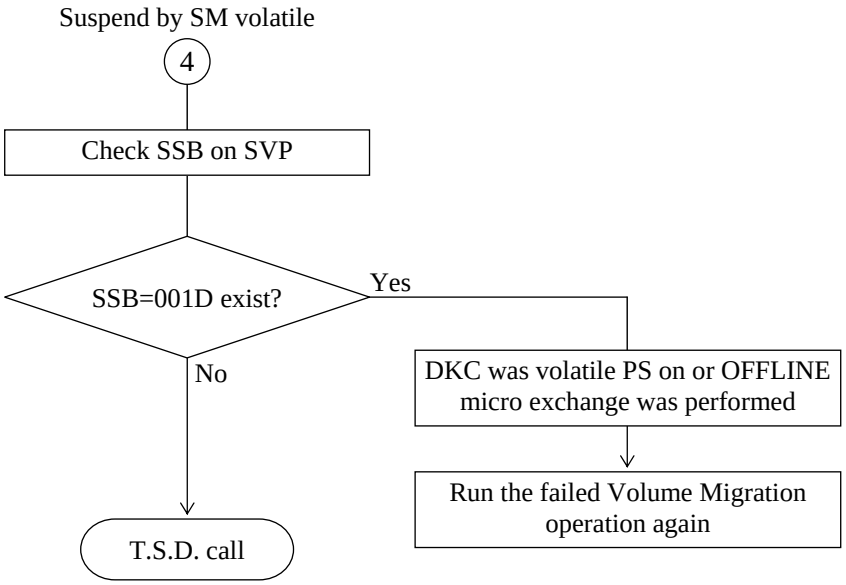
10.1 Volume Migration Error Recovery Flowchart

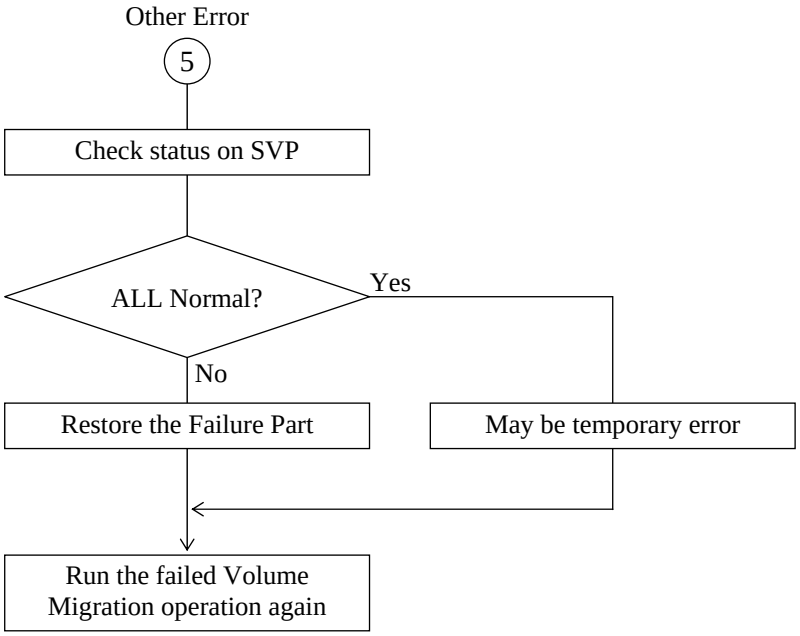


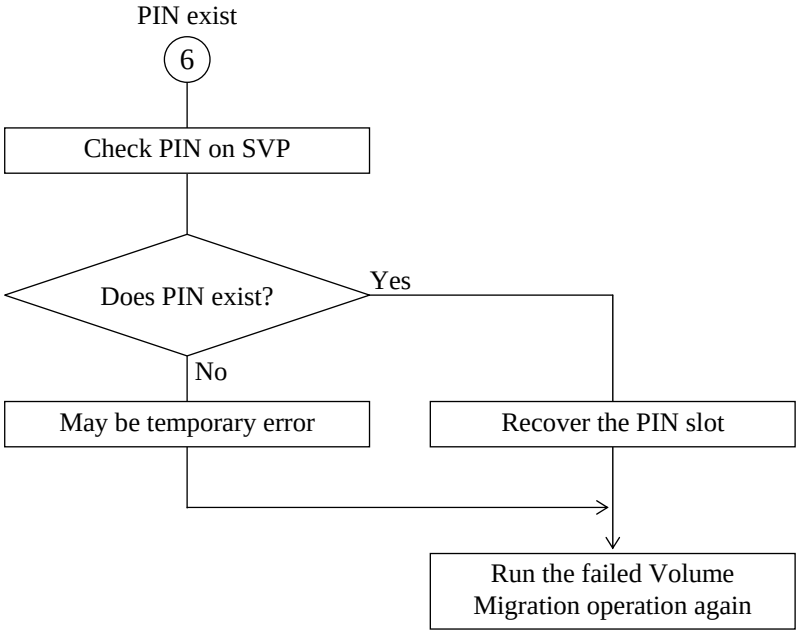












10.2 Output of the online path information (SSB = 2084)

There is a case where the command such as the reserve setting of VolumeMigration becomes a command reject and cannot be executed because the target device is online.

When it becomes a command reject, specify the online path from the contents of SSB=2084, and make the target path offline.

Note: The number of SSB=2084 is limited by about 1 in ten seconds. Therefore, after taking paths offline by way of Figure 10.2.2-1, P.P. command operation might fail with SSB=2084 again. If this happens, repeat steps of Figure 10.2.2-1.

10.2.1 Output information

Display SSB=2084 from the SSB log referring to SVP02-30.
The information shown below is output to Internal Data of SSB=2084.

- The maximum of seven PIDs are output with SSB=2084 to be output.
- The total number of online paths of the device shown in the byte 0x40 ~ 0x43 is output.

Table 10.2.1-1 SSB=2084: Details of output information

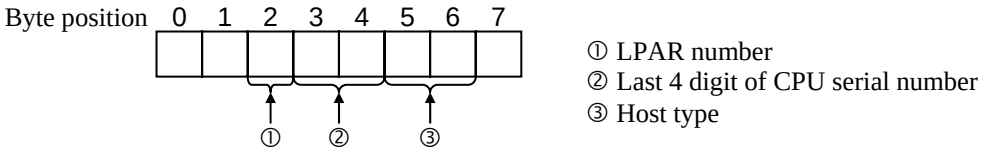
Byte	Contents	Remarks
0x40 ~ 0x43	Device number (CU: LDEV number) of which the online path check was performed	
0x44	The number (1 ~ 7) of effective PIDs output in SSB concerned	
0x45 ~ 0x46	The total number of online paths (1 ~ 2048) shown in the byte 0x40 ~ 0x43	
0x47	Preparation (0)	
0x48 ~ 0x4F	PID1	Refer to the details of PID.
0x50 ~ 0x57	PID2	Refer to the details of PID.
0x58 ~ 0x5F	PID3	Refer to the details of PID.
0x60 ~ 0x67	PID4	Refer to the details of PID.
0x68 ~ 0x6F	PID5	Refer to the details of PID.
0x70 ~ 0x77	PID6	Refer to the details of PID.
0x78 ~ 0x7F	PID7	Refer to the details of PID.

Note: When the total number of online paths > effective PIDs output, there is the information of the online path which is not output. Retry the command operation after making the path offline referring to Figure 10.2.2-1.

Internal Data		0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
	40	HDEV#				*1	*2		*3	PID1							
	50	PID2								PID3							
	60	PID4								PID5							
	70	PID6								PID7							

*1: The number of effective PIDs output in SSB concerned
*2: The total number of online paths of the device shown in the byte 0x40 ~ 0x43
*3: Preparation (0)

Figure 10.2.1-1 SSB=2084: Position of output information



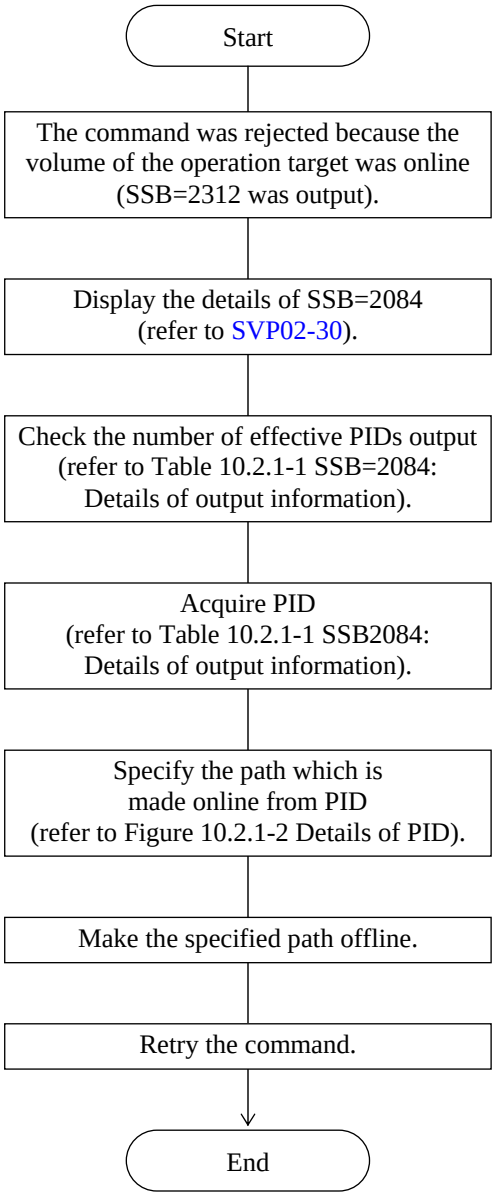
Note: This does not show All digits of CPU serial number. Therefore, you might not be able to determine the host that has an online path. If this is the case, it is necessary to confirm online paths from all the hosts that have the same 4 digit of CPU serial number. If you use a volume from two or more hosts with the same last four digits of serial number and host type, it is recommended to use the volume from different LPAR number of the hosts.

Figure 10.2.1-2 Details of PID

Note: If the command that is retried after the online path with the LPAR number is placed offline is still rejected due to the same online path, check the item “LGCL” in Logical Path Information (see SVP03-490) in the SVP screen to identify the path.

10.2.2 To continue the operation

When the volume of the operation target is online, acquire the online path information of the target volume according to the following procedure, and make it offline. After that, retry the command.



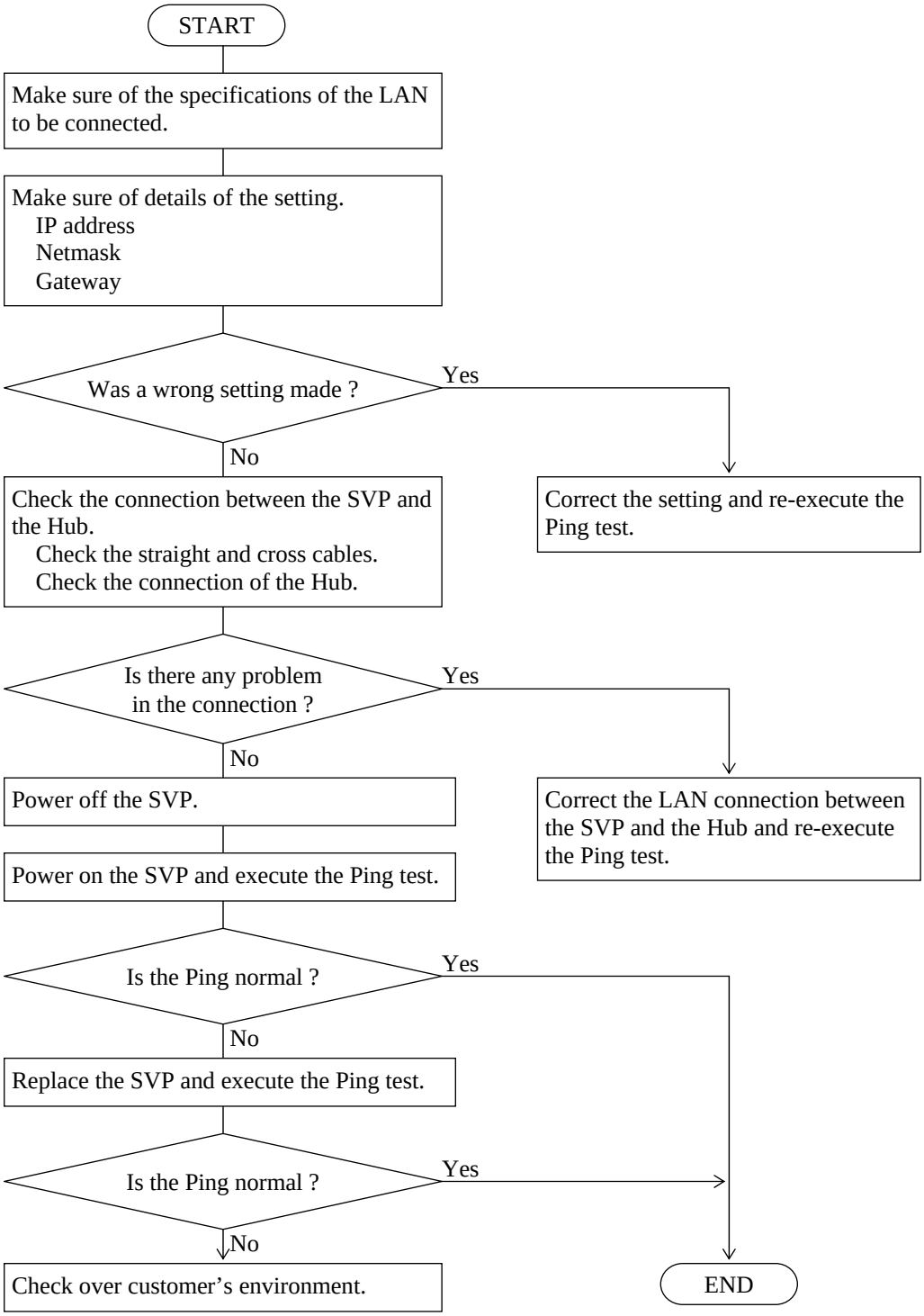
Note: When the total number of online paths > effective PIDs output, SSB=2084 is output again (refer to Table 10.2.1-1 SSB=2084: Details of output information).

Figure 10.2.2-1 Procedure for continuing the operation

11. Recovery from SNMP Failure

A procedure for coping with a trouble occurs during a check to be done after installation of a P.P. of the SNMP is shown below.

11.1 SNMP Ping Test Troubleshooting



11.2 When the trap cannot be received though the Ping reaches the Manager PC prepared by a customer

1. Check the setting of the SNMP Agent. (Check it in the SNMP setting window on Web Console.)
   (1) Make sure that the "Extension SNMP" has been checked off.
   → If not, check it off.

   (2) Check if the Community name has been added.
   → If not, add it.

   (3) Check if the setting of the SNMP Agent is that in which the Manager PC concerned is specified as a receiver of the trap.
   → If it is wrongly specified, make the trap receiver to be added with or changed to the IP address of the Manager PC.

   (4) In the case of the cold start trap at the time when the SVP is rebooted
   Check if the setting on the Manager side is that in which the trap of the cold start can be received.
   → Check if the setting is not the one in which only the failure trap is received by means of a masking.

2. When the Firewall/Gateway exists in the network between the SVP and the PC prepared by a customer, check if the UDPs of the Ports #161 and #162 allow the passing.
   → Ask the customer to change the setting to allow the passing.

3. Check the customer's Manager for the setting of the trap reception.
   → Ask the customer to check if the setting is correct.

11.3 SNMP Trap Information

Failure information supported by the SNMP is shown below.

(1) Specifications of the extended trap

Item	Specification	Remarks
SNMP Community	Community name that is set	
PDU Type	Trap PDU	
Enterprise ID	Agent identifier	
Agent IP Address	Agent IP address	
Generic Trap Code	Enterprise Specific	
Specific Trap Code	See the following Table (2).	
Extended Trap PDU	See the following Table (3).	

(2) Specific trap codes

Each of these codes is shown as the Kind in a trace file.

Code	Name	Meaning
1	RaidEventAcute	Report on failure occurrence: Subsystem shut off completely.
2	RaidEventUserSerious	Report on failure occurrence: Operation of a failed part shut off.
3	RaidEventUserModerate	Report on failure occurrence: A partial failure occurred.
4	RaidEventUserService	Report on failure occurrence: A slight failure occurred.
100	RaidCommandFinished	Report on completion of execution of a requested command

(3) Extended trap PDU

The following is information notified to the Manager as the trap.

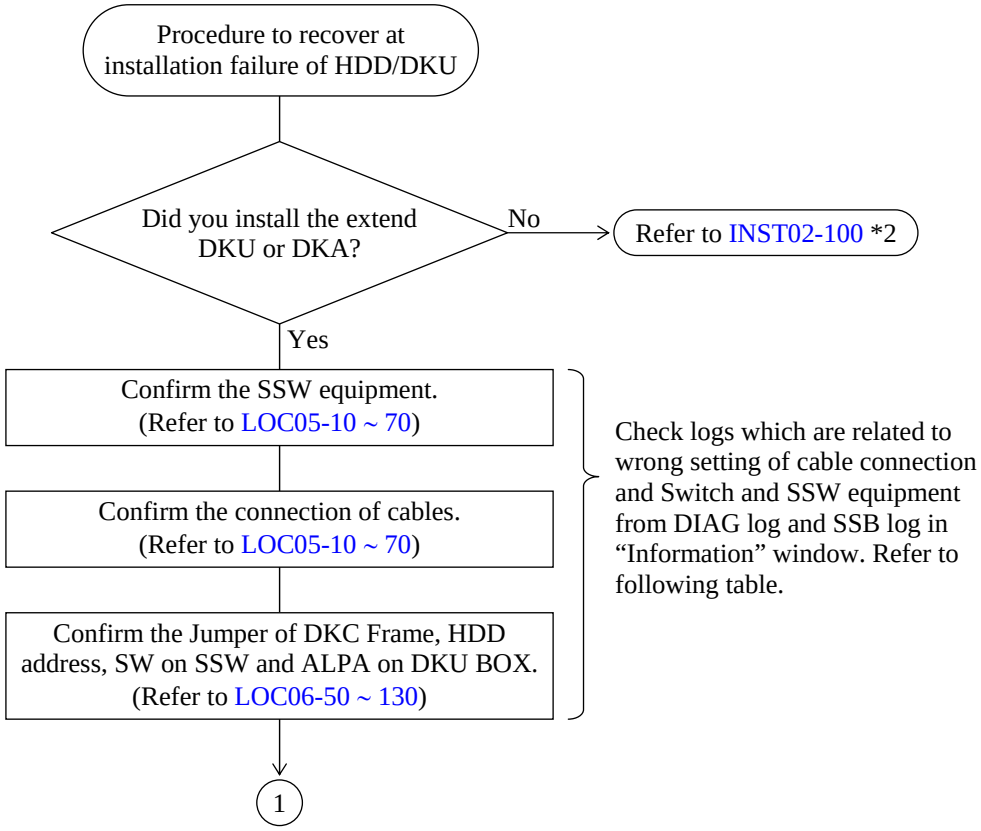
Name	Type	Description
EventTrapSerialNumber	Integer	Serial number of the DKC in which a failure occurred
EventTrapNickname	DisplayString	Nickname of the subsystem in which a failure occurred
EventTrapREFCODE	DisplayString	Reference code of a failure: See the following Table (4).
EventTrapPartsID	Object IDENTIFIER	Part in which a failure occurred

(4) Reference codes

Detail of failure	Reference code
Processor failure	21XXXX, 30XXXX, 3FXXXX, CFXXXX
Bus failure	FFEAXX, FFFAXX
Shared memory failure	FFEXXX
Cache failure	FFFXXX
Drive failure	43XXXX, 45XXXX, 46XXXX, DFXXXX, EFXXXX
Power system failure	ACXXXX, BF2XXX, BF3XXX, BF4XXX, BF6XXX
Battery failure	BF5XXX
Fan failure	BF7XXX
Other environmental failure	14XXXX, 74XXXX, BF1XXX, BF8XXX

12. Recovery procedure of HDD/DKU installation failure

12.1 Installation failure of HDD/DKU



Diag Log Error Code	Meaning (See DIAG06-110 ~ 200)	
Ax AB (x = 0, 1, 5, 6)	Wrong Phy ID	*1
Ax AC (x = 0, 1, 5, 6)	SAS Address Data disagreement.	*1, *2
Ax AD (x = 0, 1, 5, 6)	SAS Address Data disagreement	*1, *2
Ax AE (x = 0, 1, 5, 6)	SAS Address Data disagreement	*1, *2
Ax 5E (x = 0, 1, 5, 6)	SSW that doesn't exist in configuration information is equipped.	*3

*1: There is a possibility of wrong setting of Switch on SSW or ALPA on DKU BOX indicated by DiagLog.

*2: There is a possibility of wrong SAS cable connection indicated by DiagLog.

*3: There is a possibility being equipped for SSW that doesn't exist in configuration information.
Please confirm the configuration of DKU and equipping SSW.

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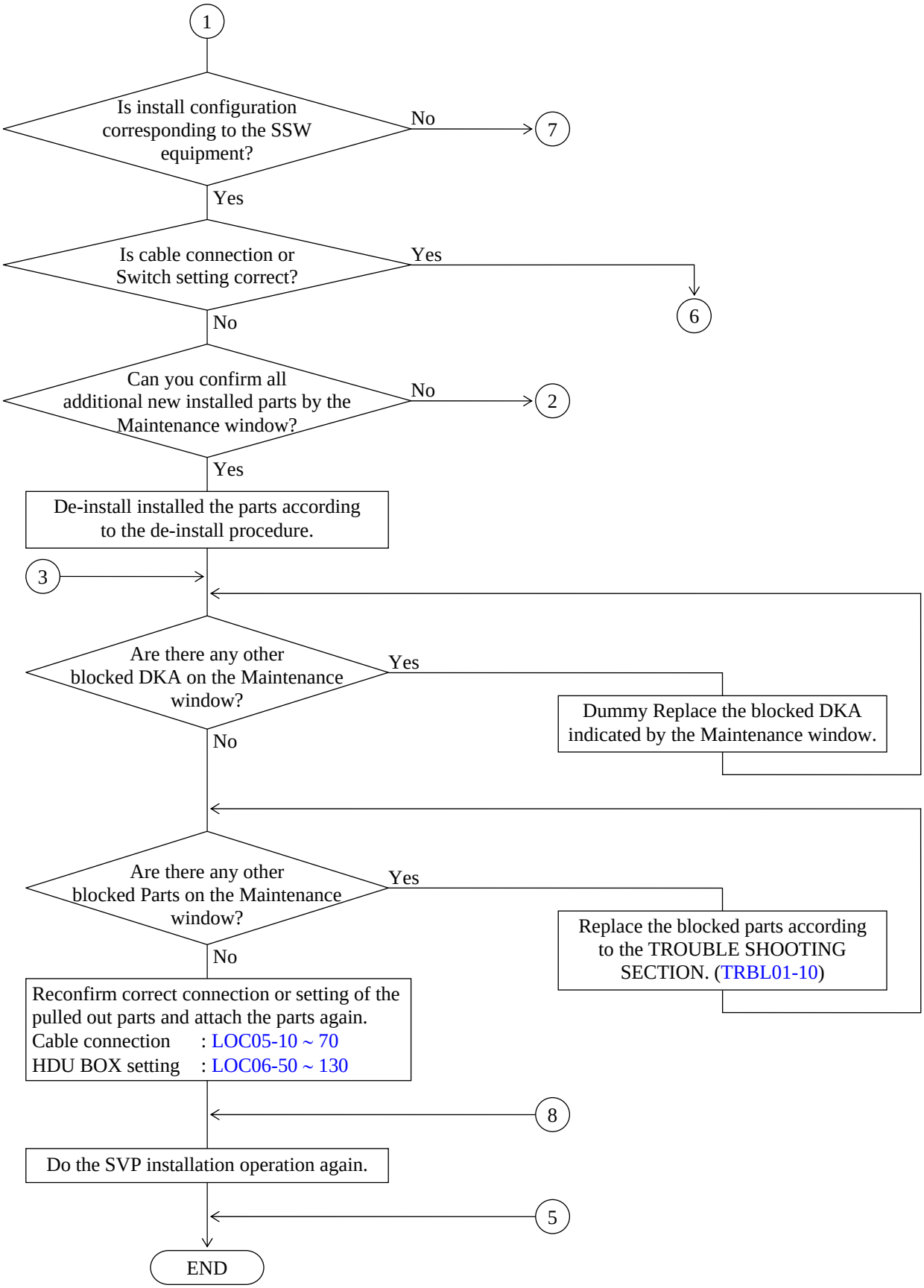
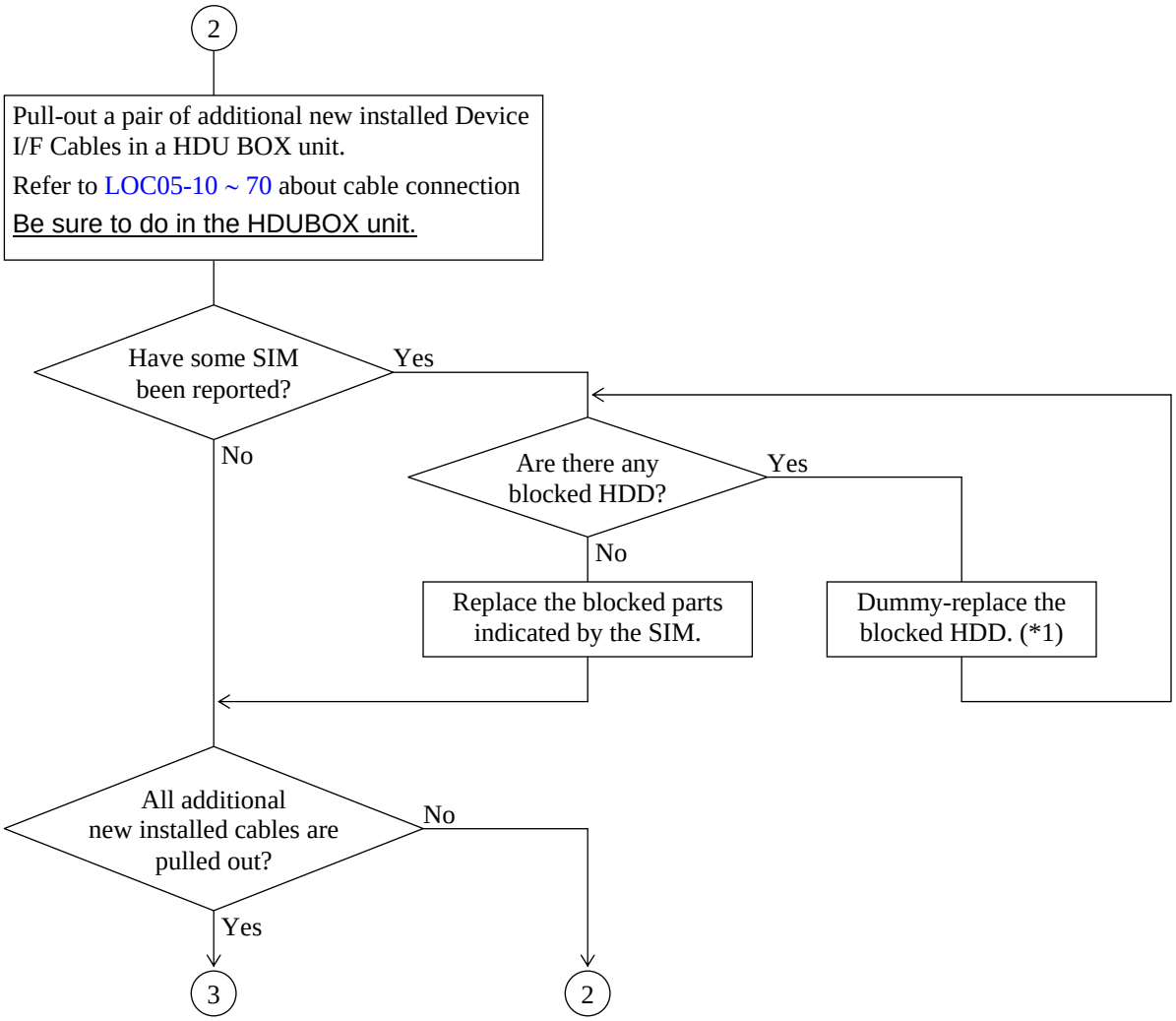
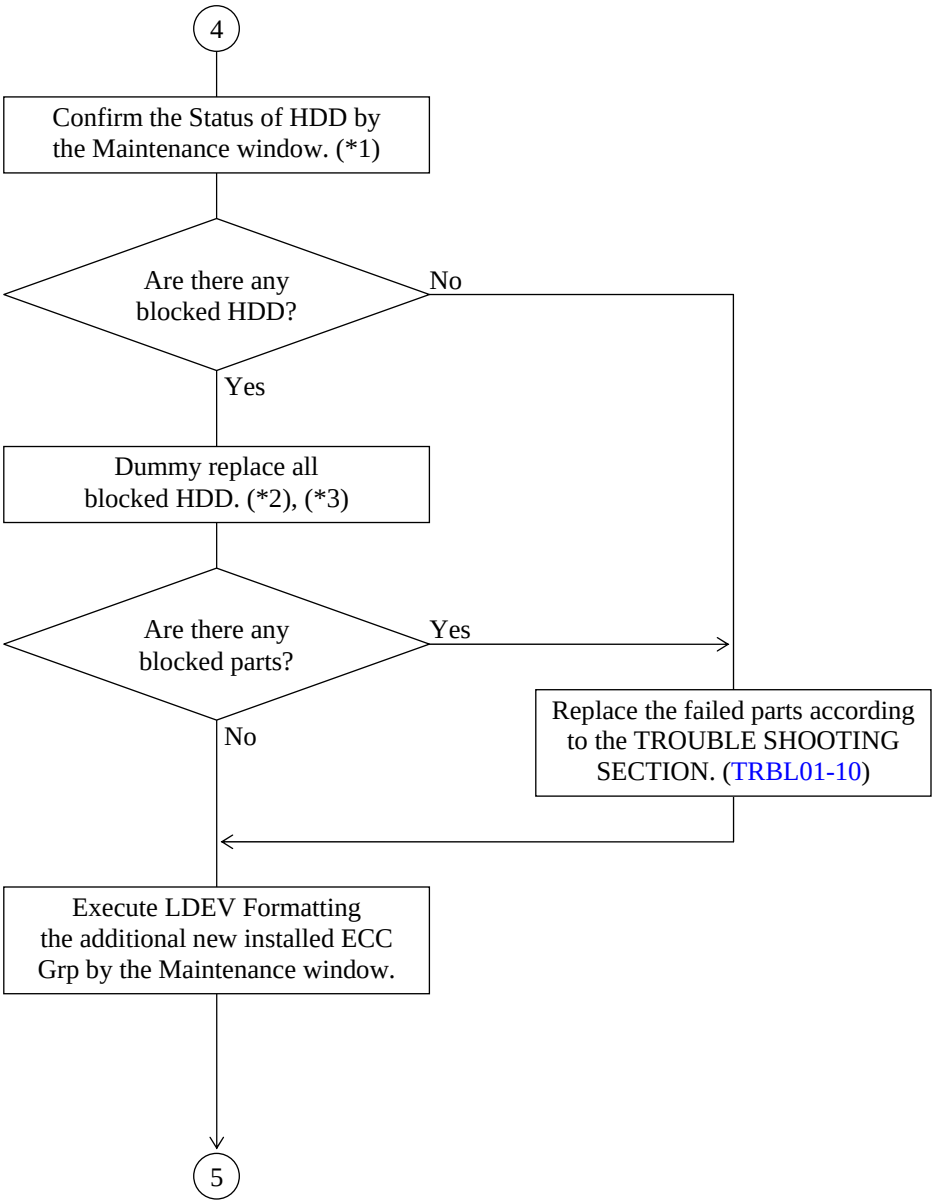




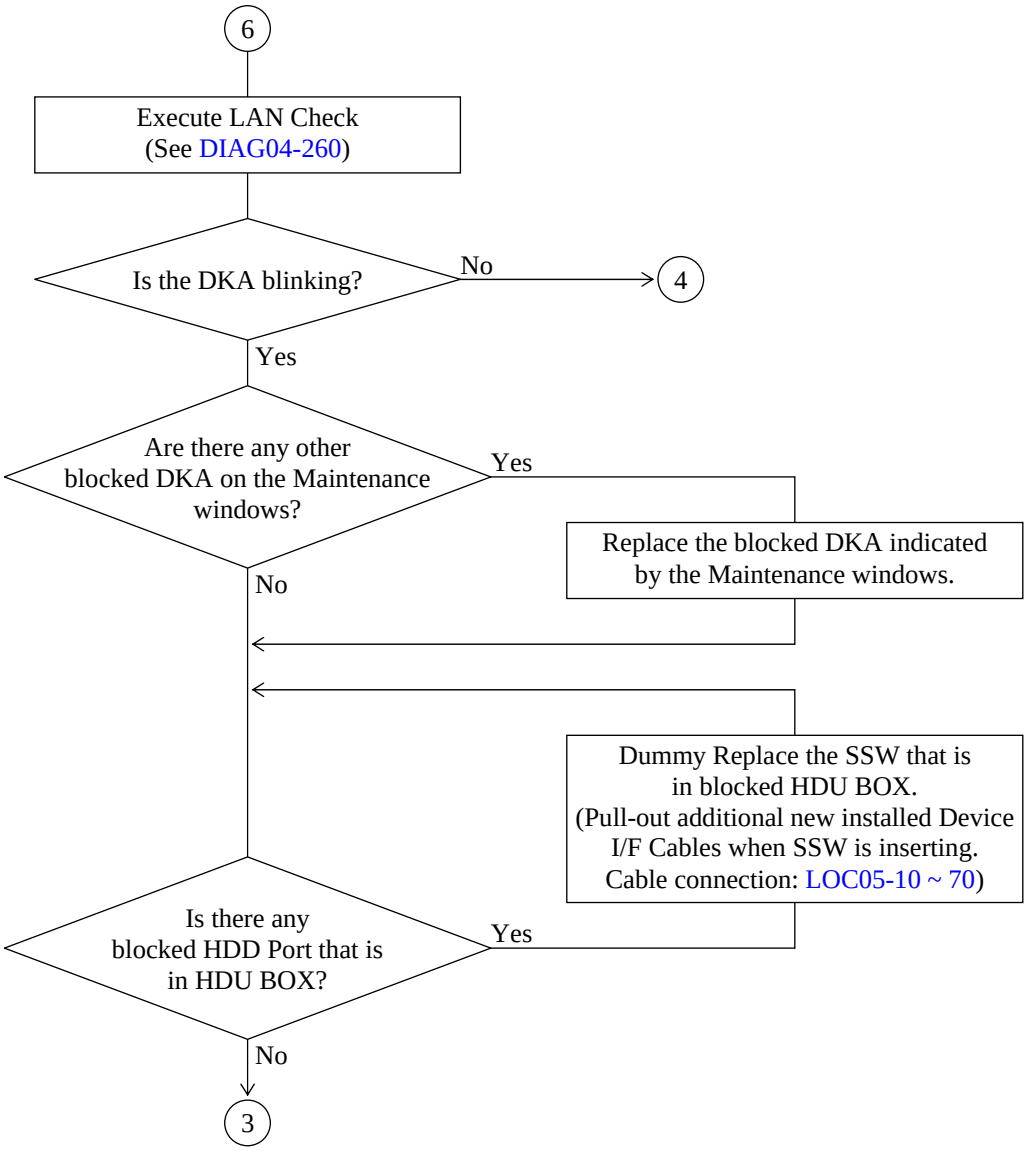
*1: Before insert the HDD, please confirm the HDD type name. (Refer to THEORY03-07-40)

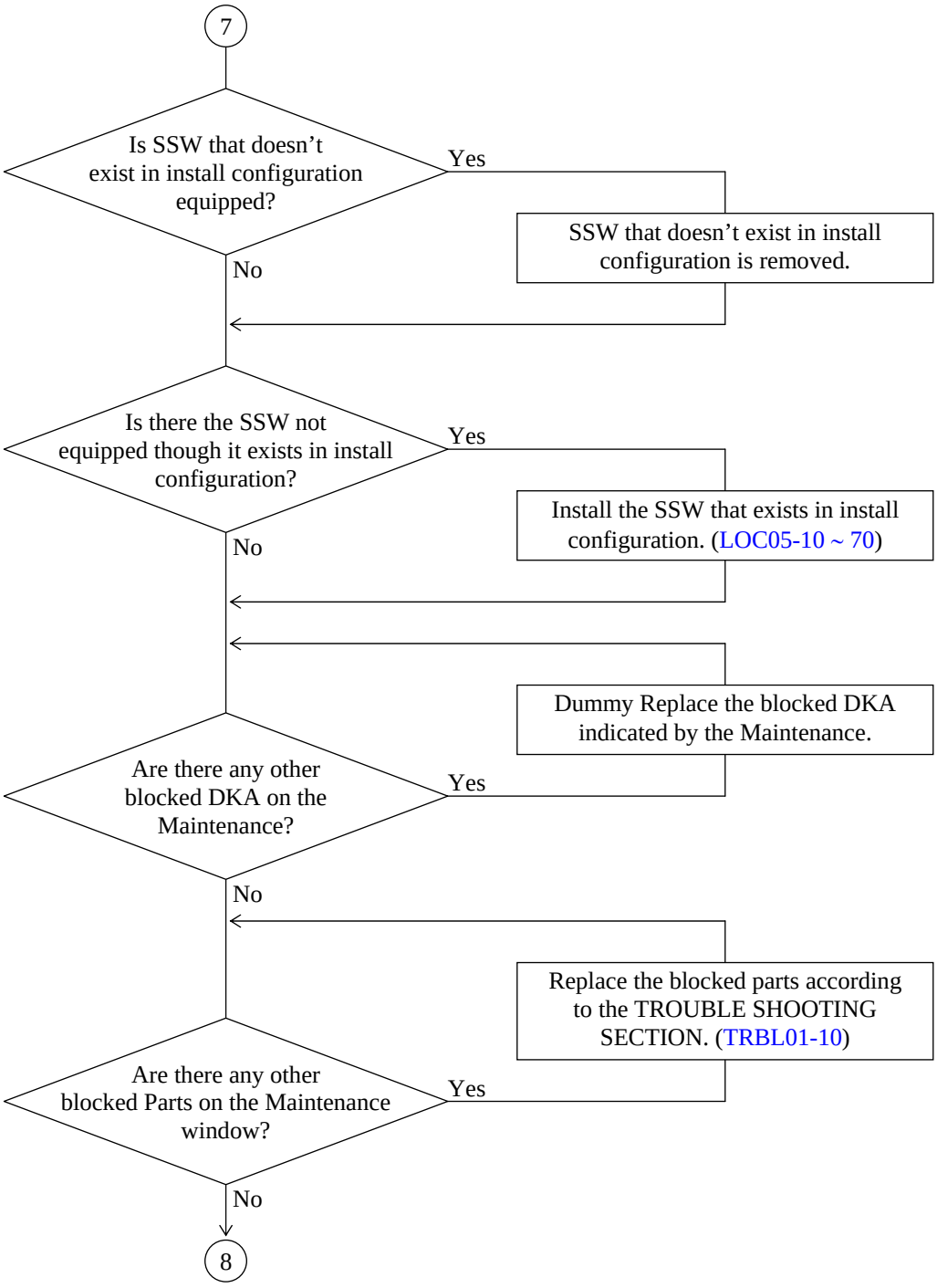


*1: Confirm whether HDD is mounted according to the Maintenance window.

*2: When dummy replacing fails 3 times, please replace with new HDD.

*3: Before insert the HDD, please confirm the HDD type name. (Refer to THEORY03-07-40)





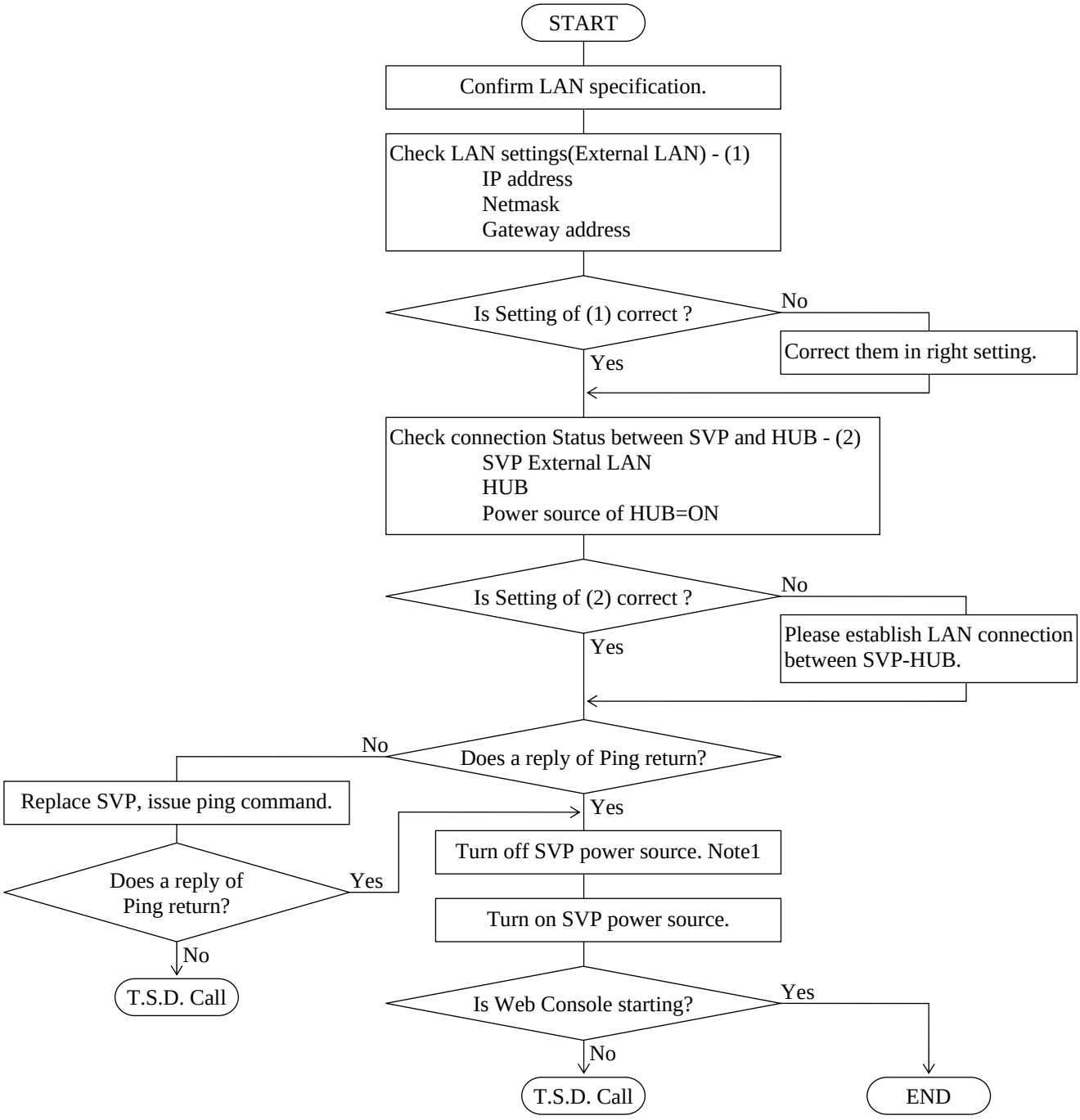
12.2 Case that LED of SSW is lighting after installation of DKA

Red LED of SSW may light when DKA is re-installed after the MP failure had been occurred during de-installation of DKA.
In that case, please dummy-replace that SSW.

13. Web Console Error Recovery

Recover it referring to troubleshooting in the WEB CONSOLE section in advance.
If not solved yet, recover it according to the following procedure.

13.1 Recovery Procedure for Web Console Error



Note1: The state that excluded LAN cable connection of SVP side of External LAN or LAN cable connection of HUB side or a power supply of HUB is an Off state, and reboot SVP, and Web Console cannot start when connected outside LAN after that. Moreover, when you cannot start Web Console, please reboot SVP.

14. Recovery Procedure for DCR Pre-Staging ABNORMAL END

The recovery method for DCR Pre-Staging ABNORMAL END (SIM RC=4821-X0) factor is shown below. (*1)

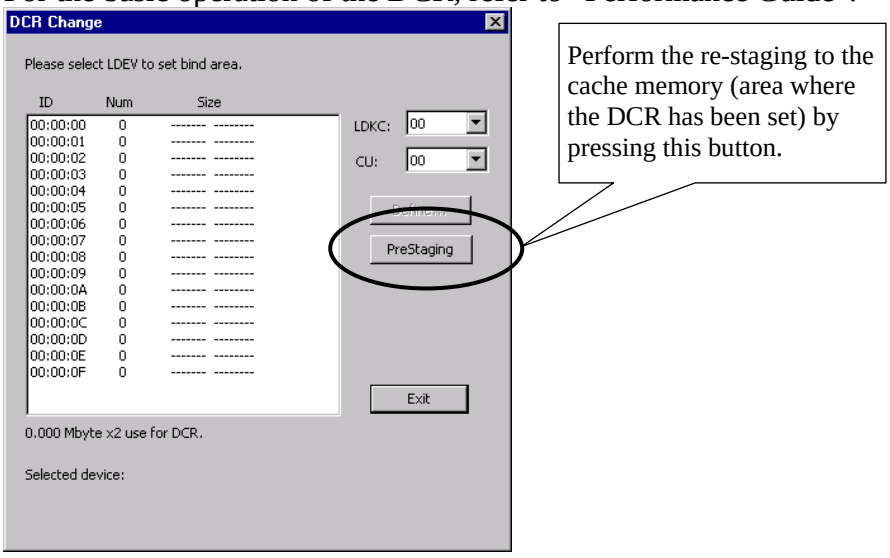
Factor X0	Meaning	The recovery method
“10”	No DCR PP	Pre-staging re-execution from the DCR change window after DCR PP Install. (*2)
“20”	Subsystem Busy	Pre-staging re-execution from the DCR change window. (*2)
“40”	Staging Time Over	Pre-staging re-execution from the DCR change window. (*2)
“50”	Cache or SM Blockade	The cache or SM blockade occurs. Please recover the cache or SM referring to the maintenance manual. (TROUBLE SHOOTING SECTION)
“60”	LDEV Warning	LDEV is Failure State. Pre-staging re-execution from the DCR change window after LDEV recovery. (*2)
“70”	Staging Failure	HDD is Failure State. Pre-staging re-execution from the DCR change window after HDD recovery. (*2)
“80”	P/S OFF	Pre-staging re-execution after P/S ON. (*2)
“90”	Pre-Staging Canceled	Pre-staging re-execution from the DCR change window. (*2)
“A0”	Cache Over Load	Pre-Staging Re-perform from the DCR change window at the time of low loading. (*2)

*1: When the message mentioned above has not been reported though DCR Pre-Staging was terminated abnormally, please press [PreStaging] button on the DCR change window.

A recovery procedure against each factor of the abnormal end (SIM RC=4821-EX) of the DCR Pre-Staging that is automatically started at the time of the subsystem powering on or maintenance of the cache is shown below.

Factor EX	Meaning	The recovery method
"E1"	No DCR PP	Pre-staging re-execution from the DCR change window after DCR PP Install. (*2)
"E2"	Subsystem Busy	Pre-staging re-execution from the DCR change window. (*2)
"E4"	Staging Time Over	Pre-staging re-execution from the DCR change window. (*2)
"E5"	Cache or SM Blockade	The cache or SM blockade occurs. Please recover the cache or SM referring to the maintenance manual. (TROUBLE SHOOTING SECTION) Please advance maintenance at cache or SM blockade occurs by maintenance. Moreover, when the maintenance of LDEV (making, deletion, and recovery) is executed, this SIM is reported. In this case, please Pre-staging re-execution from the DCR change window after completing the maintenance of LDEV (making, deletion, and recovery). (*2)
"E6"	LDEV Warning	LDEV is Failure State. Pre-staging re-execution from the DCR change window after LDEV recovery. (*2)
"E7"	Staging Failure	HDD is Failure State. Pre-staging re-execution from the DCR change window after HDD recovery. (*2)
"E8"	P/S OFF	Automatic Pre-staging re-execution after P/S ON.
"E9"	PreStaging Cancel	Pre-Staging Re-perform from the DCR change window. (*2)
"EA"	Cache Over Load	Pre-Staging Re-perform from the DCR change window at the time of low loading. (*2)

*2: [PreStaging] button
For the basic operation of the DCR, refer to "Performance Guide".



15. External Storage Maintenance

15.1 Maintenance for External Storage

The following is a collection of matters to be given considerations when doing maintenance works or failure recovery actions for the external storage connected by means of the Universal Volume Manager function.

15.1.1 Matters to be given considerations when Doing Maintenance Works for External Storage

CAUTION

Before you change settings of the external storage, you must delete the external volume mapping after executing [Disconnect external volumes]. After you change settings of the external storage, you must remap the external volume. If you do not remap the volume, the external volume cannot be used in the DKC710I subsystem.

The examples of external storage settings which require the re-mapping of external volume are as follows:

(a) Changing WWNs of every target ports which connect to the DKC710I subsystem
(b) Changing the serial number of the external storage
(c) Changing LUNs of volumes of the external storage
(d) Reducing the volume capacity of the external storage so that the volume capacity is smaller than when volume mapping was performed

Besides, re-mapping is required for Universal Volume Manager after you change external storage settings that require modification on the host side when hosts are connected directly to a external storage.

In the above case (a), if you do NOT change WWNs of EVERY target ports, you do not have to delete the external volumes.

The following procedure is the way to change settings of the external storage without deleting the external volumes:

1. Changing WWNs of part of target ports which connect to the DKC710I subsystem. After the process, external paths using the target ports are blocked.
2. Adding new external paths using the target ports.
3. Deleting the blocked external paths.

Before you delete the external volume mapping, make sure that the volume has no LU paths, and that the volume is not a component of any pairs (such as TrueCopy pairs).

For detailed information on deleting the external volume mapping, see section “Hitachi Universal Volume Manager User Guide” - “Deleting external volume mapping”.

For detailed information on mapping external volume, see section “Hitachi Universal Volume Manager User Guide” - “Mapping an external volume”.

When a maintenance work is done for the external storage, an SIM report (Assist report) may be issued by the Disk Subsystem during the maintenance work.
When doing a maintenance work for the external storage, therefore, set the REMOTE MAINTENANCE switch on the Disk Subsystem side to DISABLE before starting the work. Check the SIM and its contents after the maintenance work is completed to judge whether the SIM is one of those that are to be issued during maintenance works shown in “15.6 Appendix”. If the SIM is the one described above, execute the SIM completion and reset the switch to ENABLE. If not, take actions according to the customer’s conditions (urgency).
Do the maintenance works for the external storage following guidelines explained below.

(1) When doing a maintenance work for the external storage
- ① Make sure that an alternative path (in the Normal status) exists between the Disk Subsystem and the external storage. (Refer to “15.1.3 Procedure for Operating Storage Navigator” Procedure 1.)
- ② When an alternative path exists correctly between the clusters of the Disk Subsystem, leave it as it is and do the maintenance work following procedures for the external storage.
- ③ If no alternative path exists, have the customer stop access to the server concerned and perform the operation (Disconnect External Volume) to disconnect the external storage concerned on the Disk Subsystem side. (Refer to “15.1.3 Procedure for Operating Storage Navigator” Procedure 2.)
- ④ Do the maintenance work following the procedure for the external storage.
- ⑤ After the maintenance work for the external storage is completed, perform the operation (Reconnect External Volumes) to reconnect the external storage concerned on the Disk Subsystem side. (Refer to “15.1.3 Procedure for Operating Storage Navigator” Procedure 3.)

(2) Notices
- ① Even if the alternative path exists, the SIM (21D0) informing of the path blockade is reported via the Disk Subsystem when the path is switched to the alternative path. In this case, the path status on the Disk Subsystem side is recovered from the blockade automatically when a factor, which caused the blockade, on the external storage side is removed.
- ② Because the external storage is in the Single Path mode when it is the SANRISE 9500V series device, a path with a high priority is switched back automatically as the path to be used when it is restored. In the maintenance work, make sure that the path has been switched back after the maintenance work for the external storage (Hitachi storage only) is completed. (Refer to “15.1.3 Procedure for Operating Storage Navigator” Procedure 4.)
- ③ Because the external storage is in the Multiple Path mode when it is the SANRISE 2000 Series or SANRISE 9900V series or SANRISE USP, NSC / USP V, USP VM device, make sure that the path is recovered from the blockade (the path status is changed to Normal). Further, check the SIM and its contents after all the maintenance works are completed to judge whether the SIM is one of those that are to be issued during maintenance works shown in “15.6 Appendix”. If the SIM is the one described above, execute the SIM completion and turn on the Assist report.

15.1.2 Procedures to Specify a Maintenance Action when a SIM Caused by a Factor on the External Storage Side (21D0XY, 21D2XY, EFD000, EF5XXX or FF5XXX) Is Reported

The following SIMs may be reported by the Disk Subsystem when a failure occurs in the external storage or during a maintenance work. In such a case, specify the maintenance work following the procedure shown below.

(1) In the case of the Hitachi external storage (SANRISE series device), check if an Assist report has been sent from both of the Disk Subsystem and the external storage.
When only a SIM (21D0XY, 21D2XY, EFD000, EF5XXX or FF5XXX) informing of a failure in the external storage is issued by the Disk Subsystem and a failure is also reported by the external storage, it is highly possible that the SIM (21D0XY, 21D2XY, EFD000, EF5XXX or FF5XXX) is issued by the Disk Subsystem according to the failure that has occurred in the external storage.
In this case, specify a cause of the failure according to the failure information of the external storage.

(2) Basically, take actions following instructions given in the TROUBLE SHOOTING SECTION according to the contents of the SIM reported to the Disk Subsystem.

(3) If you fail to specify the cause or solve the trouble finally, contact the Technical Supports Division (T.S.D.). In such a case, send dumps / traces of both the Disk Subsystem and the external storage (Hitachi external storage only) to the T.S.D.
Procedure for a dump from the Disk Subsystem: Refer to Subsection 2.9 in the SVP SECTION, “Dump/Auto Dump.”
Procedure for a dump from the DF600: Refer to the Maintenance Manual of the DF.

(4) When the external storage is not Hitachi-manufactured, send only the dump from the Disk Subsystem to the T.S.D. Besides, request the customer to make the external storage recover from the failure.

Table 2-1

SIM code	SSB code	Host report	Detailed description	Page bearing troubleshooting instructions
EFD0	AD10	Issued	Blockade of the external device	TRBL15-50
21D0	AD11	Issued	Blockade of the path connecting the external device	TRBL15-50 TRBL15-70
21D1	AD12	Not issued	Recovery of the path connecting the external device	
21D2	AD60	Issued	Response time-out of external device	TRBL15-90
EF5X	89CB	Not issued	Abnormal end of Write in External subsystem	TRBL04-10
FF5X	89CC	Not issued	Abnormal end of Read in External subsystem	TRBL04-10

15.1.3 Procedure for Operating Storage Navigator

Procedure 0:
Procedure for starting Storage Navigator through the SVP
Refer to Section 2.2 in Web Console Section.

Procedure 1:
Procedure to make sure of existence of an alternative path between the Disk Subsystem and the external storage
Refer to Section “Setting the external paths” in “Hitachi Universal Volume Manager User Guide”.
In the path setting window, make sure that a path in the “Normal” status exists in the “Configured path” besides the path to be maintained.

Procedure 2:
Procedure for disconnecting the external storage (Disconnect External Volume operation)
Refer to Section “Disconnecting external storage system or disconnecting external volume” in “Hitachi Universal Volume Manager User Guide”.

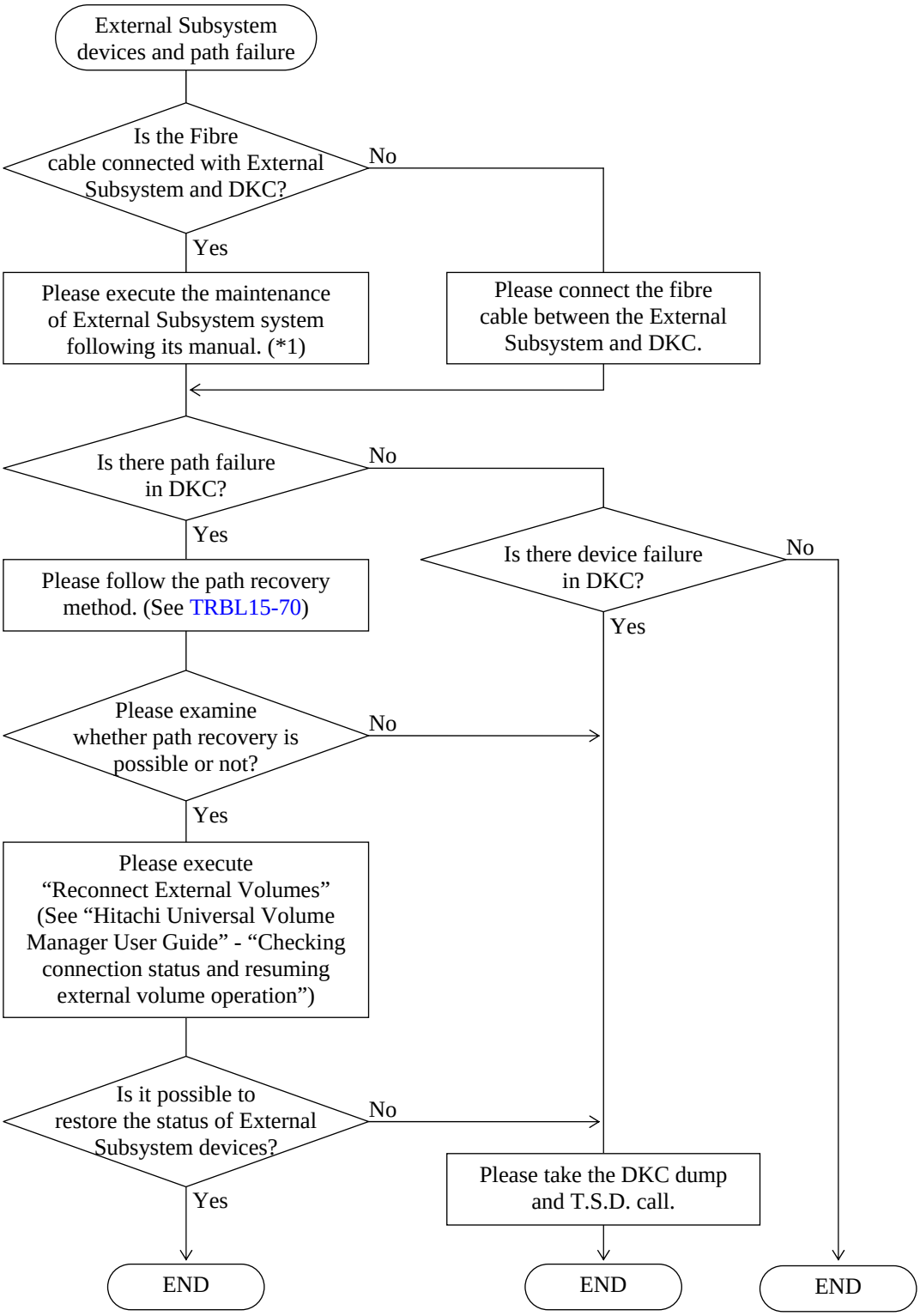
Procedure 3:
Procedure for reconnecting the external storage (Reconnect External Volumes Operation)
Refer to Section “Checking connection status and resuming external volume operation” in “Hitachi Universal Volume Manager User Guide”.

Procedure 4:
Procedure for making sure that the alternative path has been switched back
Refer to Section “Setting the external paths” in “Hitachi Universal Volume Manager User Guide”.
In the path setting window, make sure that the status of the path to be maintained in the “Configured path” is “Normal.” If the status is not “Normal,” close the path setting window once. Display the path setting window again after waiting for a while (about five minutes).

15.2 External devices Error Recovery

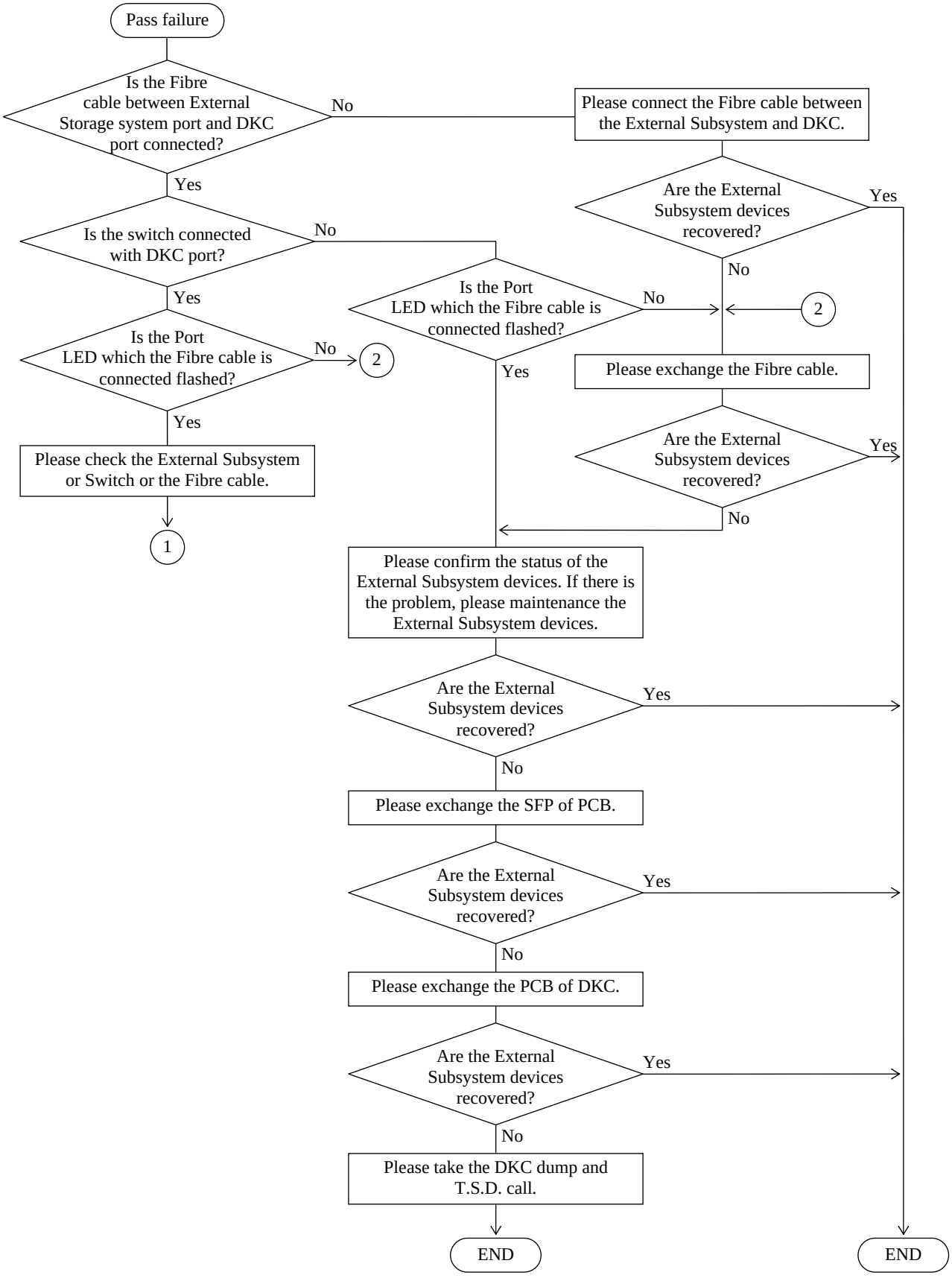
The following is the recovery procedure when the External Devices Error (SIM = 21D0-XY, EFD000) is occurred.

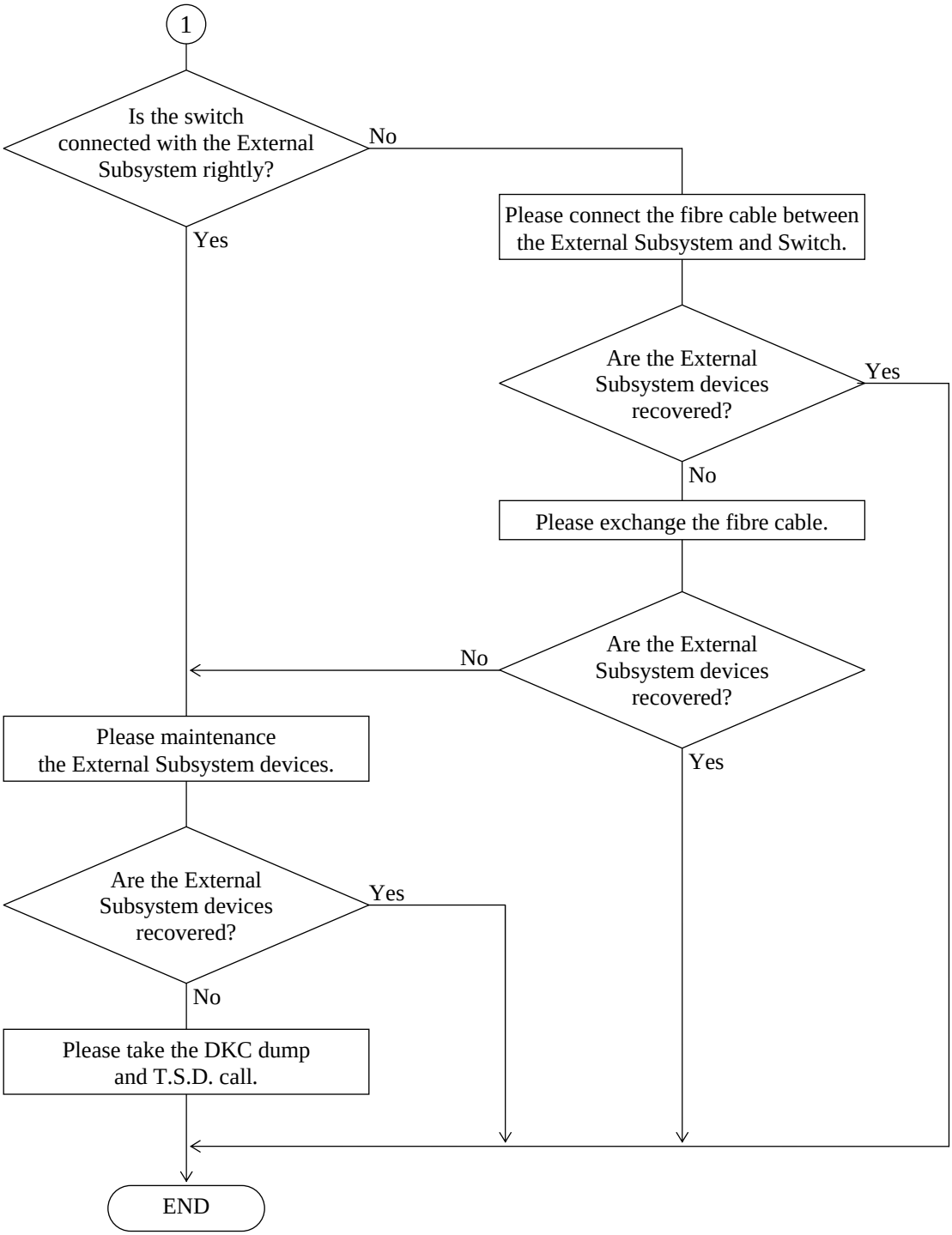
15.2.1 Path failure and Device failure recovery method (SIM = 21D0-XY, EFD000)



*1: If the data of the blocked device is unnecessary, you can format the device at the external subsystem to recover it. But when the emulation type of the device is set for mainframe system, be sure to perform “Write to Control Blocks” operation from Virtual LVI function at the DKC.

15.2.2 Path failure recovery method (SIM = 21D0-XY)

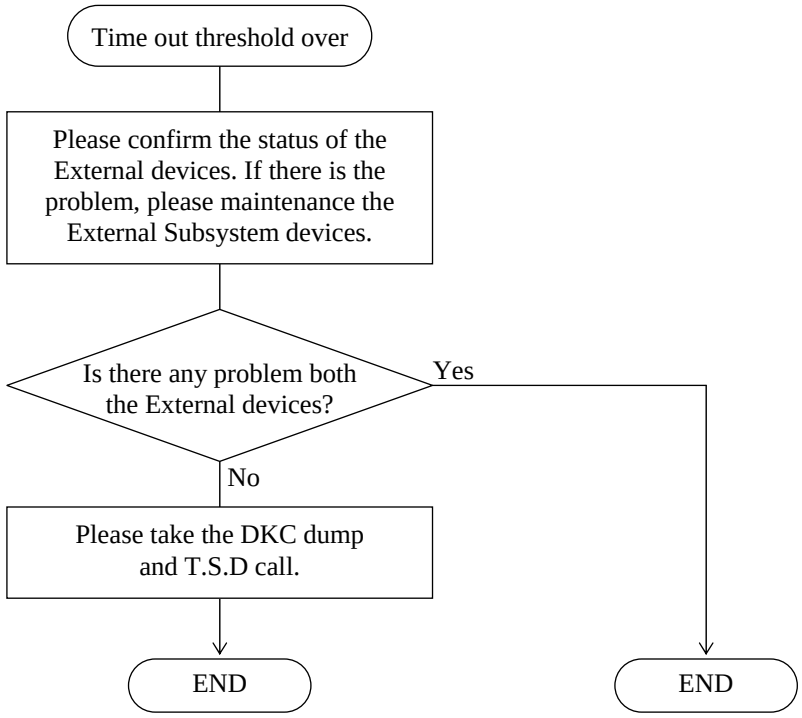




15.2.3 (Blank)

15.2.4 External Subsystem path response time out threshold over recovery method (SIM = 21D2-XY)

SIM = 21D2-XY



15.2.5 Coping method when the external device and the external volume are not recognized

Check the detailed data of EC=ACF0 (the result of discovery is an unsupported device), and perform the coping method shown in the table below.
However, since it is deterred for five minutes in units of MP, EC=ACF0 is reported only once, even if there are two or more factors. When there are two or more factors, remove the factors and execute it again five minutes later from the previous execution.

Detailed format of SSB EC=ACF0

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0																
10																
20								9	F	A	C	F	0	Factor code		
30	LUN (*)															
40											WWN of external storage (*)					
50	WWN (continued)															
60																
70																

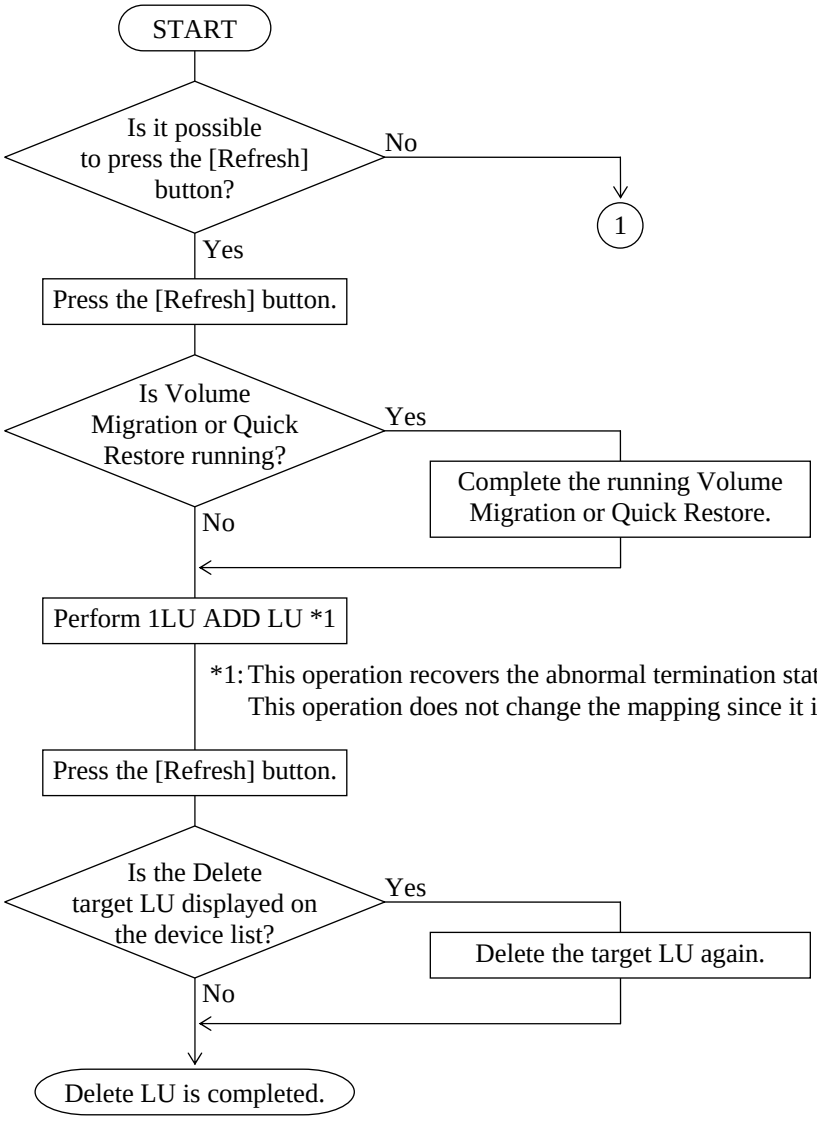
*: The information may not be stored depending on the factor.

Factor code	Content	Coping Method
0x00000000	• The information of the external storage acquired by the Port (WWN) discovery is not in the profile information. • The external device is the LU for storage management	• Connect the storage supported by UVM. • Apply the micro version of RAID which supported the storage concerned. • Install the profile tool supporting the storage concerned. • When the LU for storage management (Universal Xport, etc.) exists, define the LU for data of LU number smaller than the LU number or delete the LU for storage management from the port concerned.
0x00000003	• The remote command device of the external storage was discovered by the cascade connection.	• Do not perform the cascade connection of the remote command device. • Make the remote command device invisible from DKC710I.

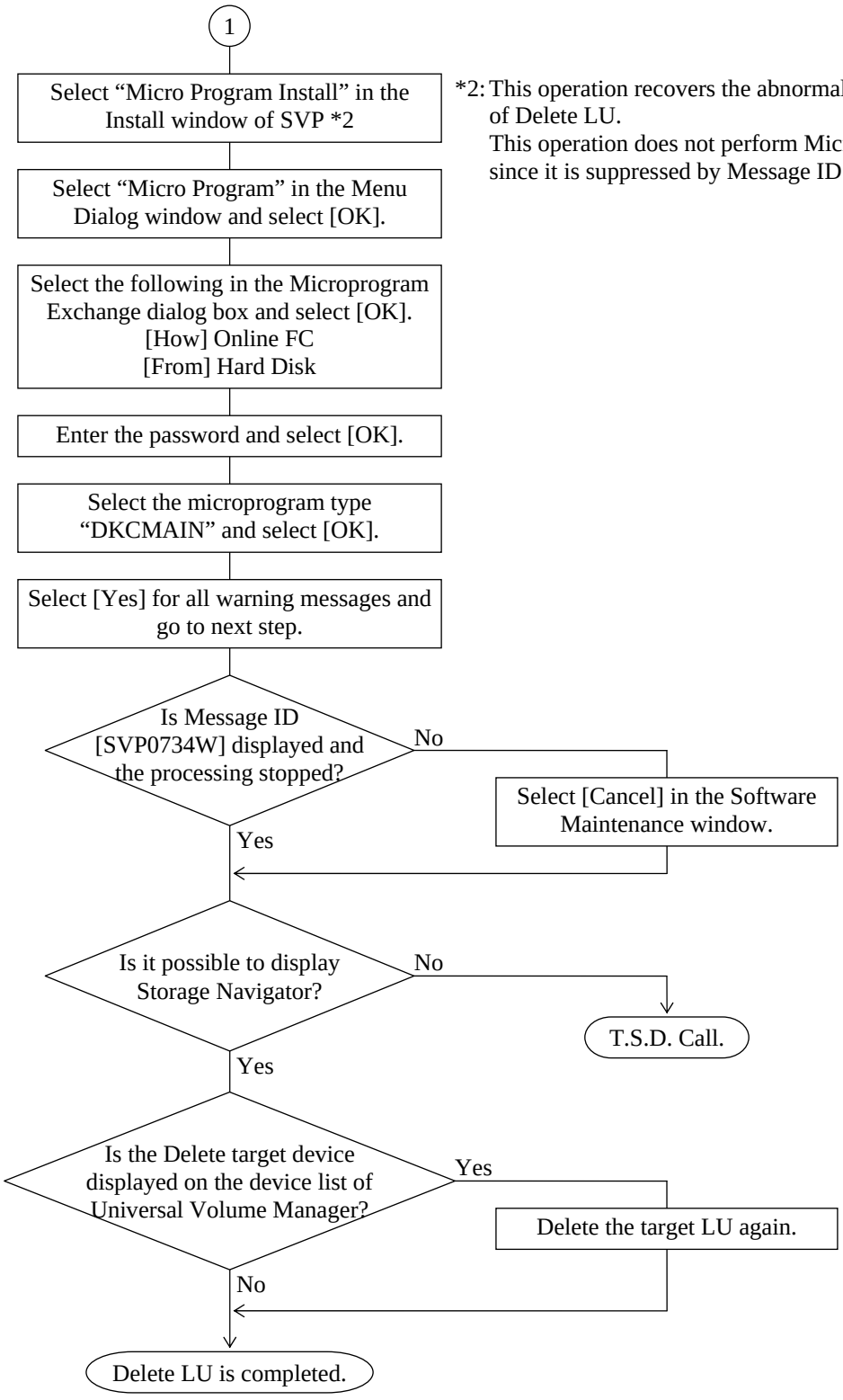
Factor code	Content	Coping Method
0x00000006	• The information of the external device acquired by the LDEV (LU) discovery is not in the profile information. • The external device is the LU for storage management.	• Connect the storage supported by UVM. • Apply the micro version of RAID which supported the storage concerned. • Install the profile tool supporting the storage concerned. • Set the LU for storage management invisible from RAID.
0x00000007	• The device concerned is other than the direct access device.	• Check the status of the external storage and the external device, and make it normal.
0x00000008	• The capacity of the external device is less than the supported capacity of UVM.	• Make the capacity of the external device more than or equal to the capacity supported by UVM. • Define the device concerned so that it is invisible from DKC710I.
0x00000009	• The Report LUN information cannot be acquired. • The LU definition is not performed to the connection port of the external storage.	• Check the status of the external storage and the external device, and make it normal. • Perform the LU definition to the connection port of the external storage.
0x0000000A	• Login for the external storage failed.	• Check the status of the port on the external storage side, and make it normal. • Perform the WWN registration, etc. on the external storage side, and make the login from DKC710I possible.
0x0000000B	• The external device returned RESERVATION CONFLICT.	• Cancel Reserve of the external device.
0x0000000C	• An error response was returned when sending the command to the external device.	• Check the status of the external storage and the external device, and make it normal.
0x0000000E	• The abnormal command response occurred a total of eight times or more for one device.	• Check the status of the external storage and the external device, and make it normal.
0x0000000F	• Emulation type of the external device is not supported.	• Define the device concerned so that it is invisible from DKC710I. • Change host mode to any mode except “4C UVM” at the port of external storage. • Change emulation type to any type, which is supported, at the external device.
0x00000010	• There is no information about valid LUN at “Report LUN”. • The LU definition is not performed to the connection port of the external storage.	• Check the status of the external storage and the external device, and make it normal. • Perform the LU definition to the connection port of the external storage.
Others	• The acquisition of the information of the external storage and the external device failed.	• Check the status of the external storage and the external device, and make it normal.

15.2.6 Recovery Procedure when Delete LU of Universal Volume Manager Fails (Storage Navigator Error Code = 0605 8966)

The recovery procedure when Delete LU processing of Universal Volume Manager fails in Error Code [0605 8966] is shown below.



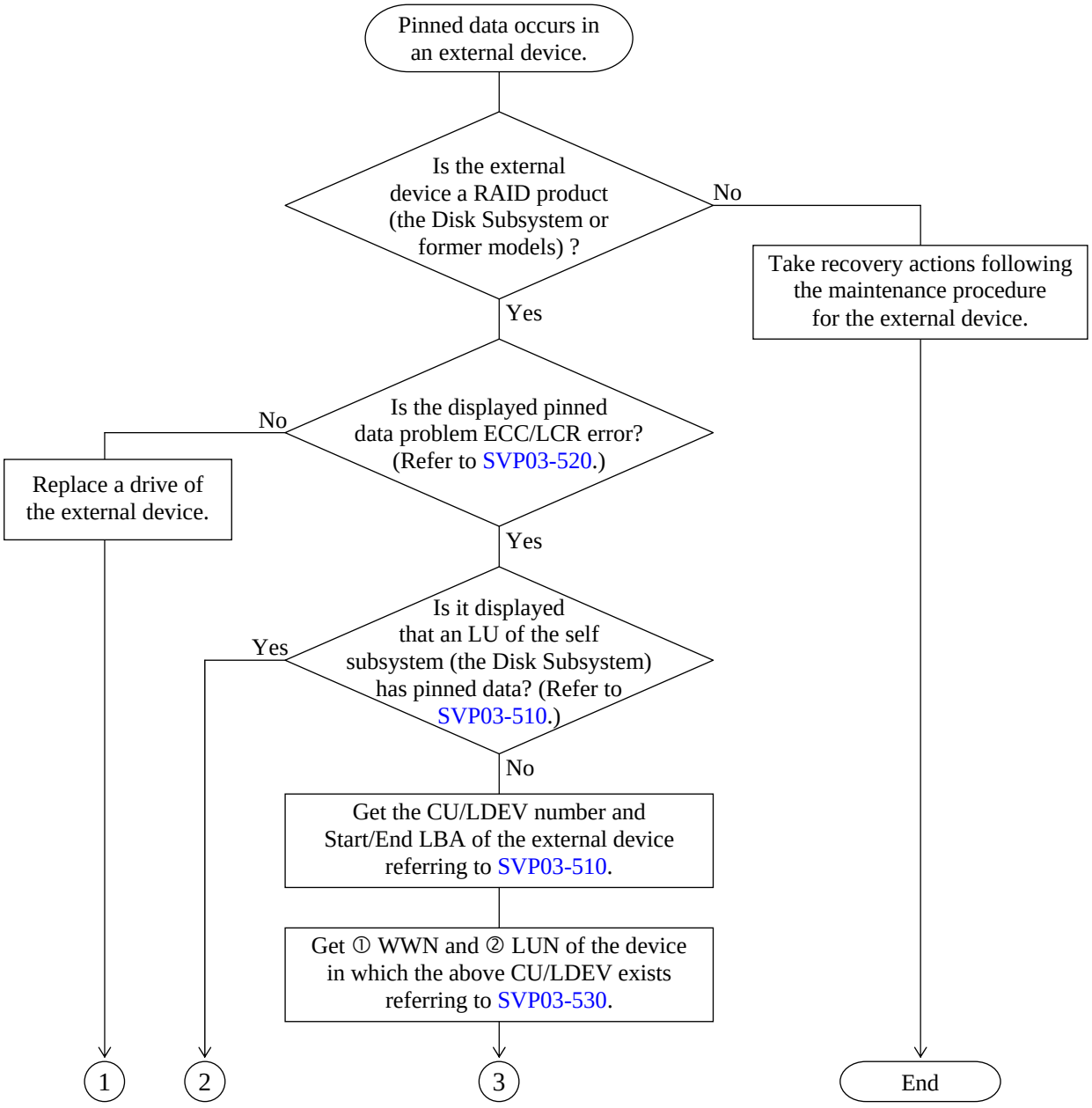
*1: This operation recovers the abnormal termination status of Delete LU.
This operation does not change the mapping since it is suppressed by Error Code [605 2095].

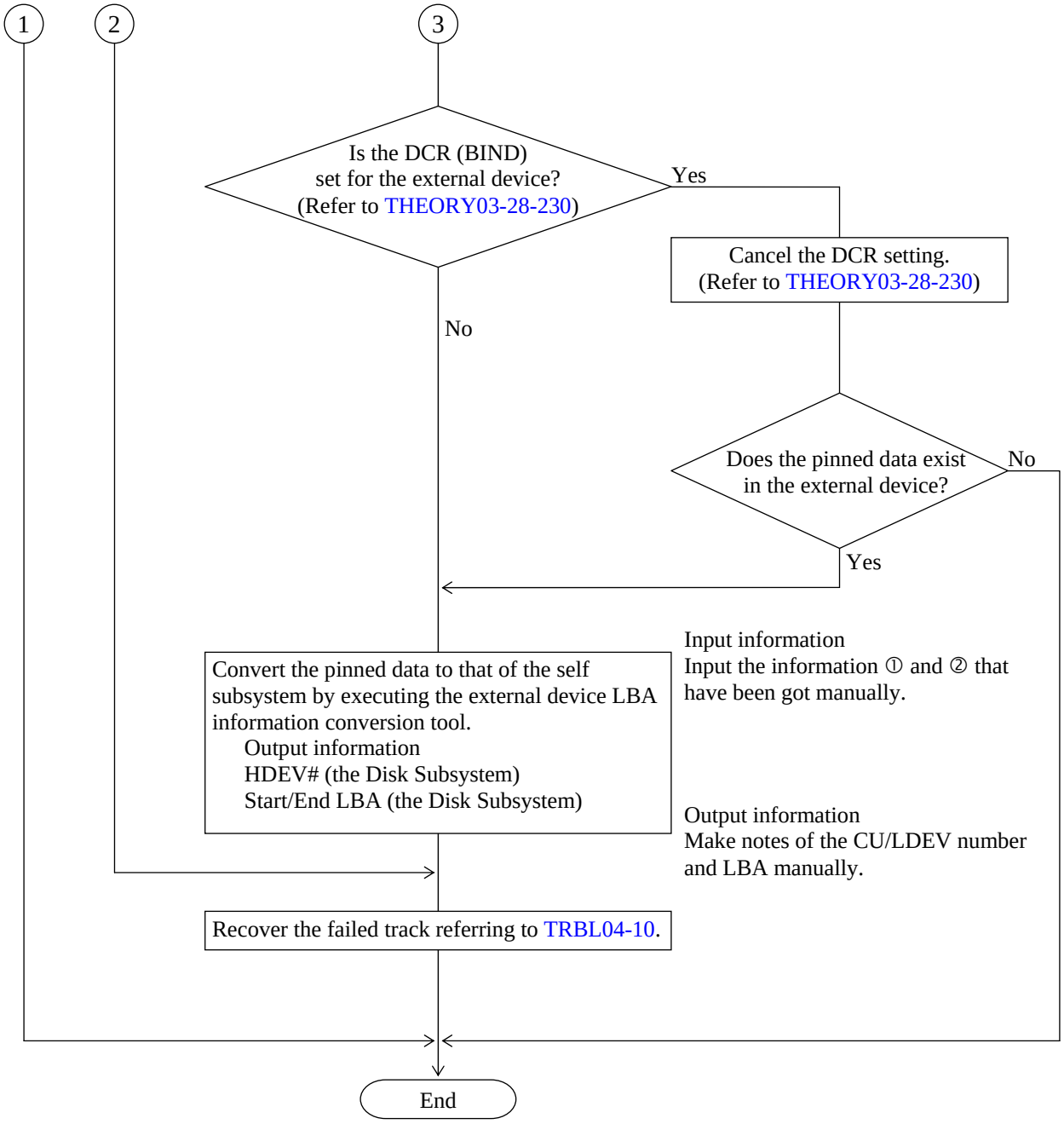


*2: This operation recovers the abnormal termination status of Delete LU.
This operation does not perform Micro Program Install since it is suppressed by Message ID [SVP0734W].

15.3 Procedure for Eliminating Pinned Data in External Storage

A procedure for eliminating pinned data when it occurs in an external device is shown below.

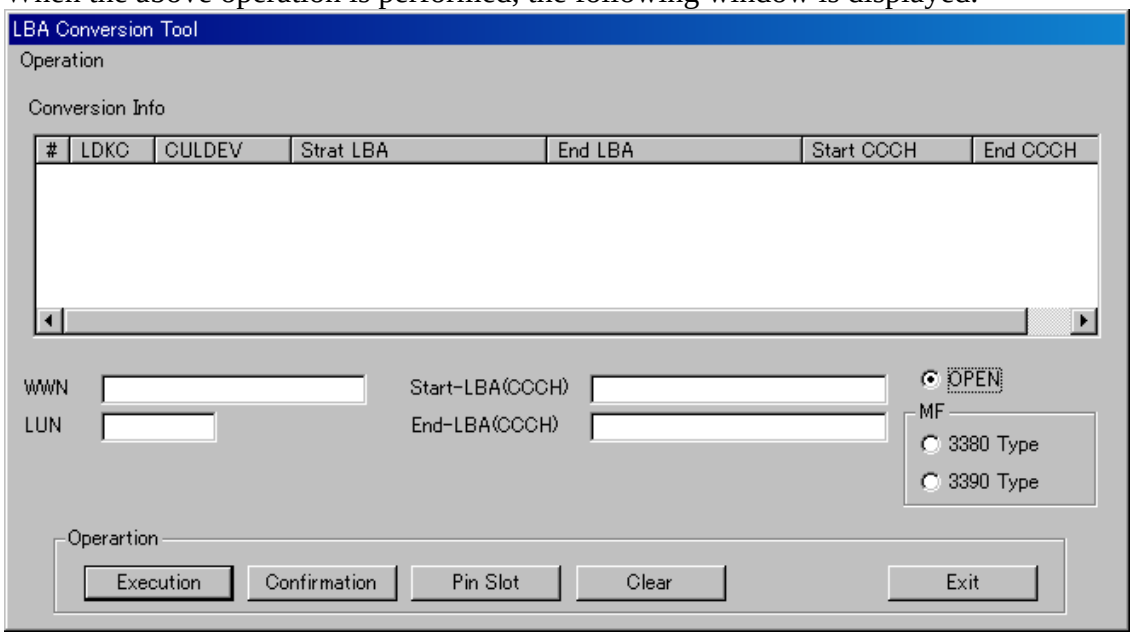




15.4 Procedure for Operating the External Device LBA Conversion Tool

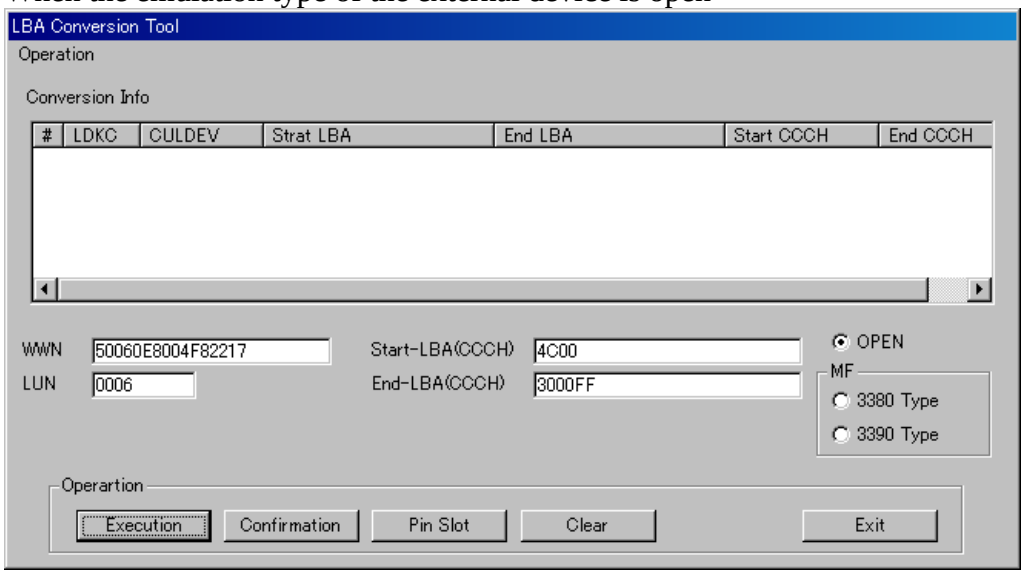
1. <Procedure for starting the tool>
   Select (CL) [Run...] from the [Start] menu. Enter “C:\DKC200\mp\pc\LbaCon.exe” and select (CL) the [OK] button.

   When the above operation is performed, the following window is displayed.

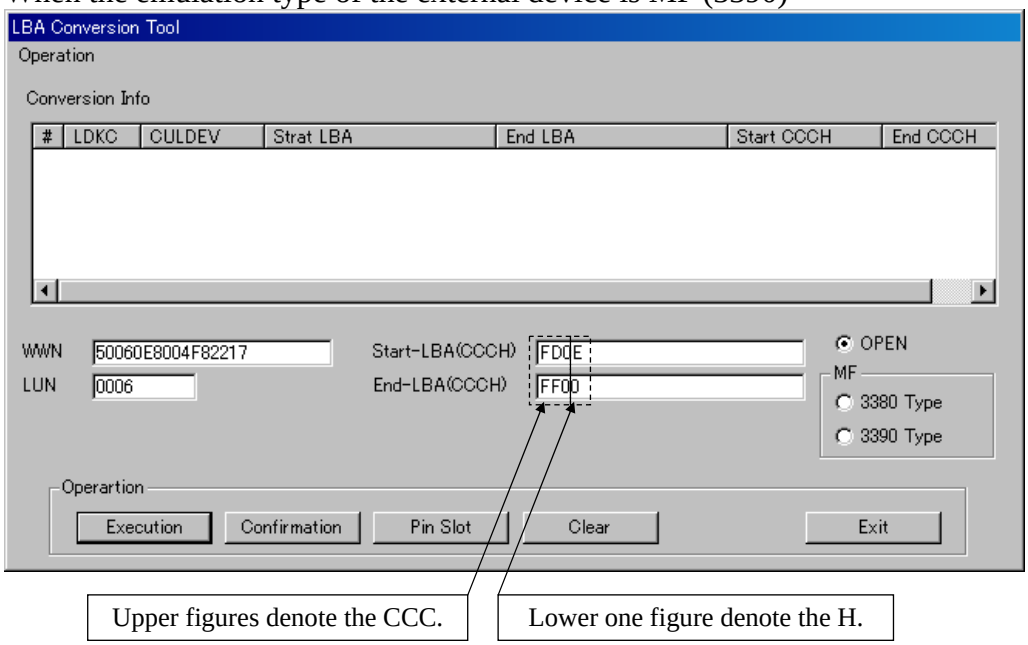


2. <Entering the information to be converted>
Enter the WWN, LUN, and Start and End LBA (CCCH, in the case of the MF type device) of the external device and select (CL) the emulation type (open, 3380, or 3390) of the device whose LBA you want to convert using the radio button.

When the emulation type of the external device is open



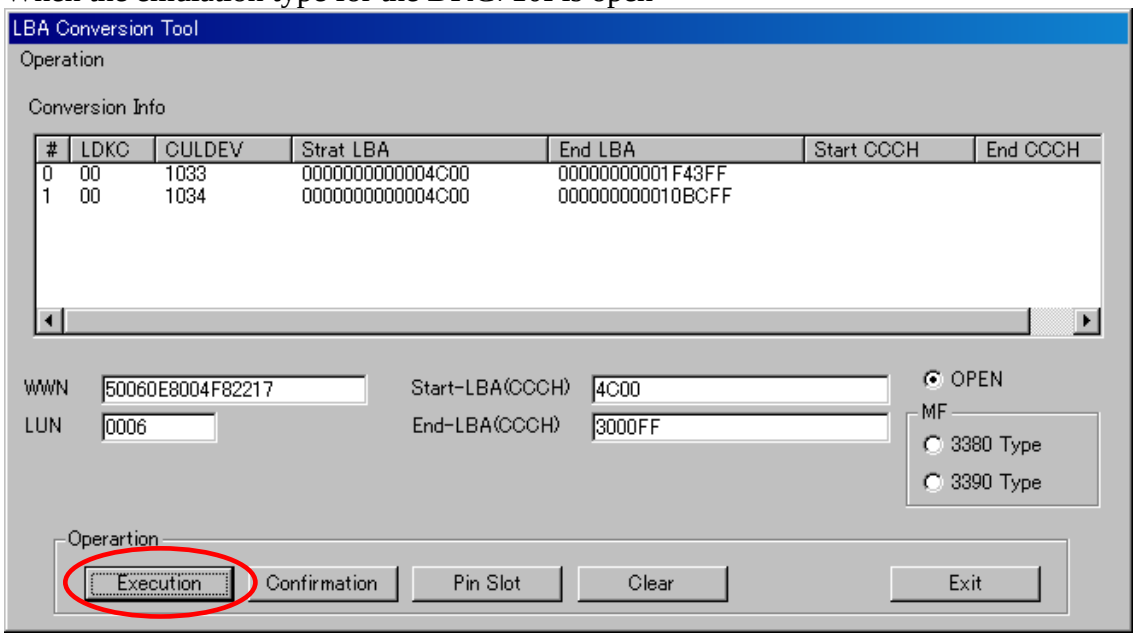
When the emulation type of the external device is MF (3390)



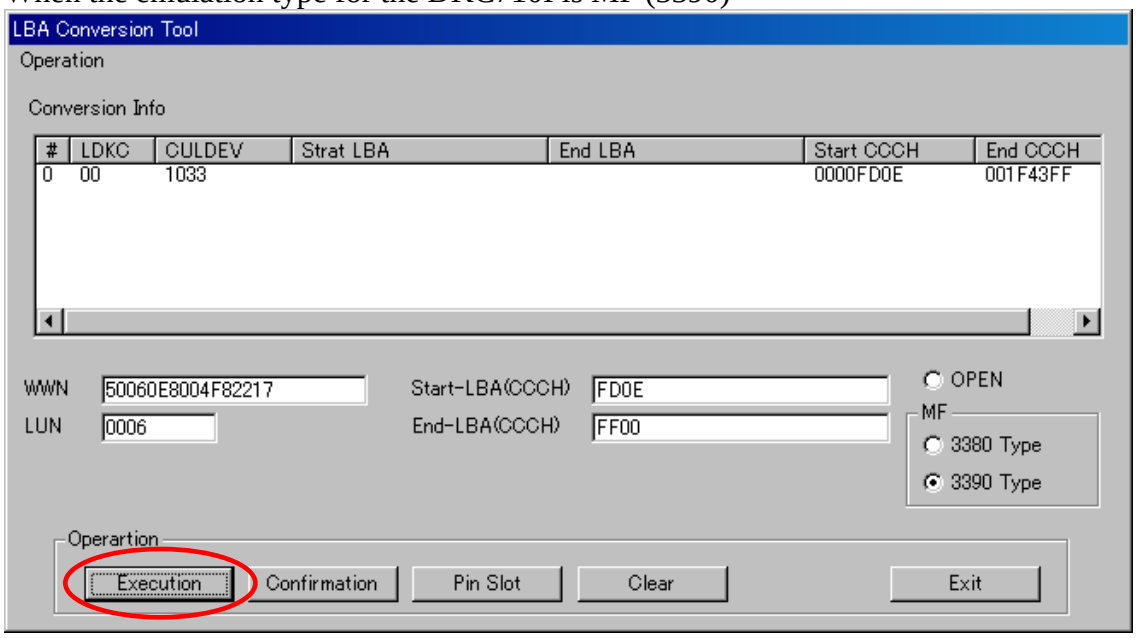
Note: (1) The maximum number of figures of the Start/End LBA is 16.
(2) As to the Start/End CCCH, enter H as the lower one figure and CCC as the upper figures.
(3) If you make a wrong selection of the emulation type (open, 3398, or 3390), you cannot get correct information.

3. <Executing the conversion>
When you press the [Execution] button after making sure that the information you have entered is correct, the converted LDKC#, CULDEV#, start LBA (CCCH), and end LBA (CCCH) for the DKC710I is displayed in the Conversion Info list.

When the emulation type for the DKC710I is open

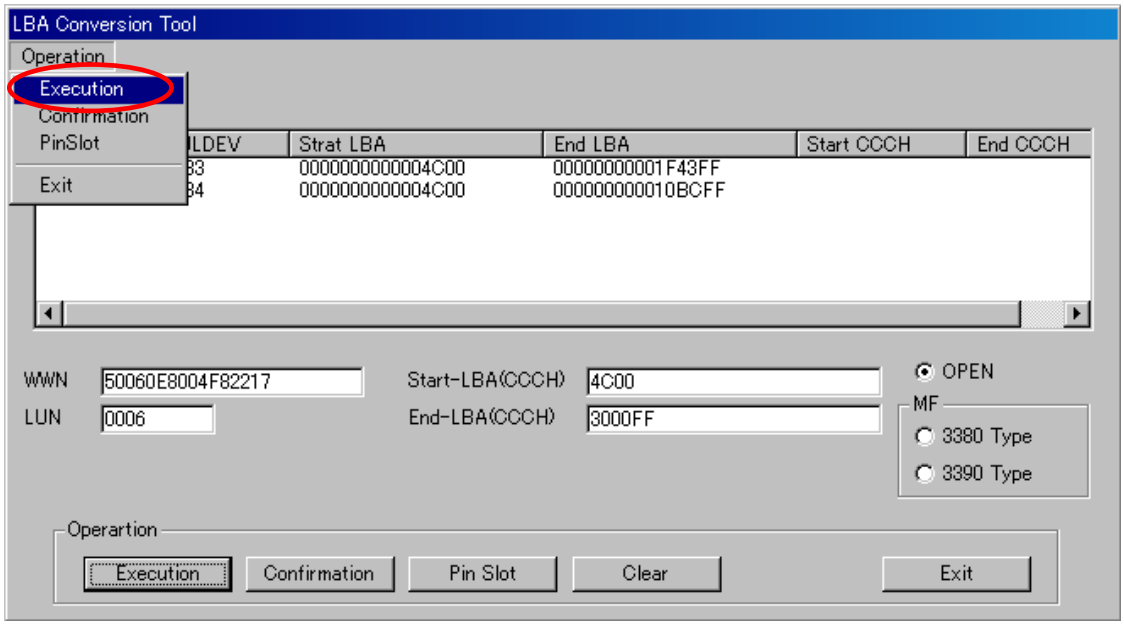


When the emulation type for the DKC710I is MF (3390)

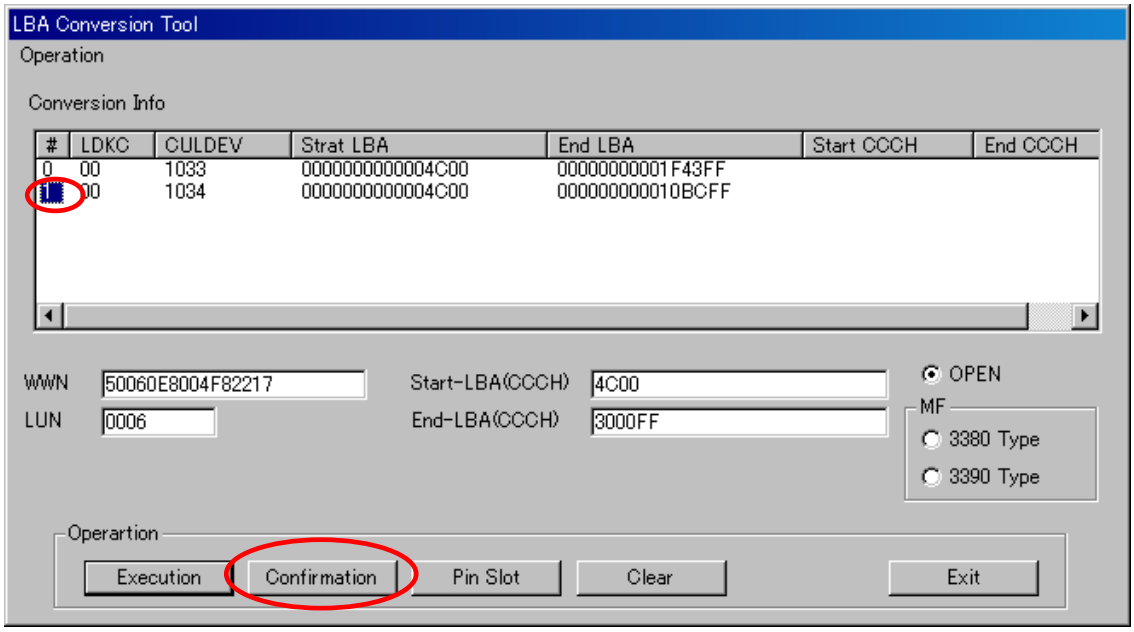


Note: When two or more LDEVs extend over the range of the specified LBA (CCCH), information on all the LDEVs concerned is displayed.

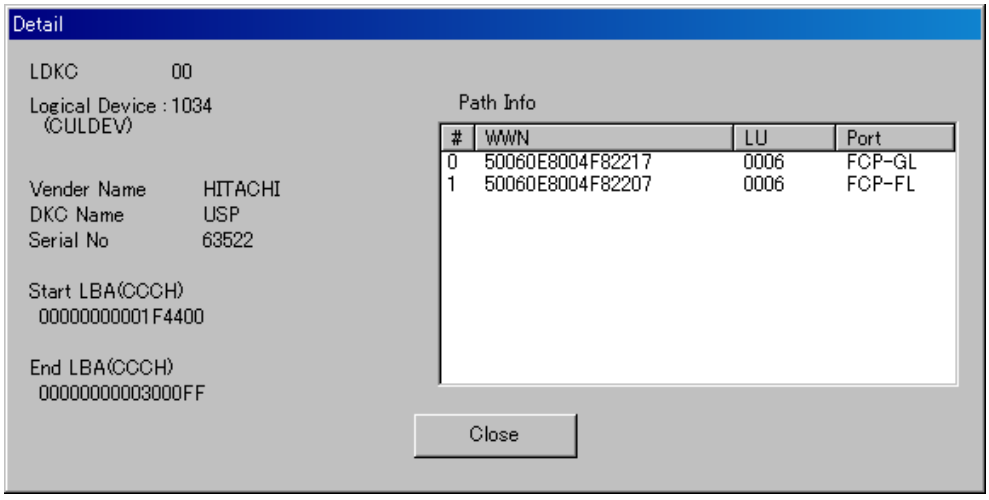
You can also execute the conversion by selecting the [Execution] button from the [Operation] menu bar.



4. <Verifying the converted information>
Select (CL) an item number of the converted information (in the "#" column) and press the [Confirmation] button.



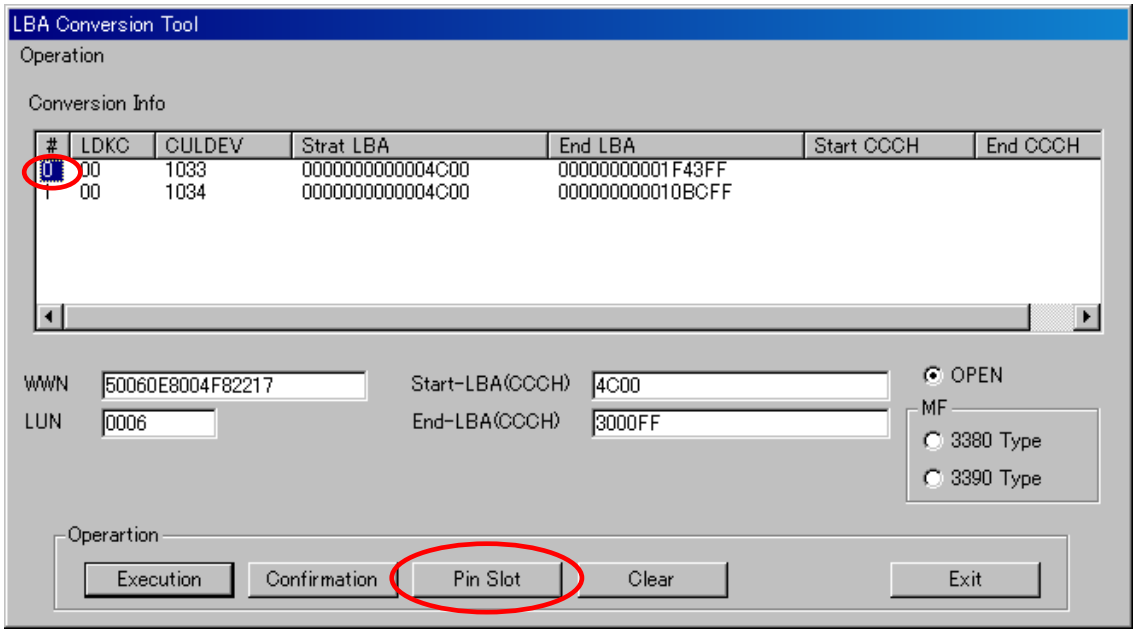
When the process is completed, the LDKC number and the CULDEV number for the DKC710I, the Start and End LBA (CCCH, in the case of the MF type) for the external device, and the Vender Name, DKC Name, Serial No, and path information of the external device are displayed.



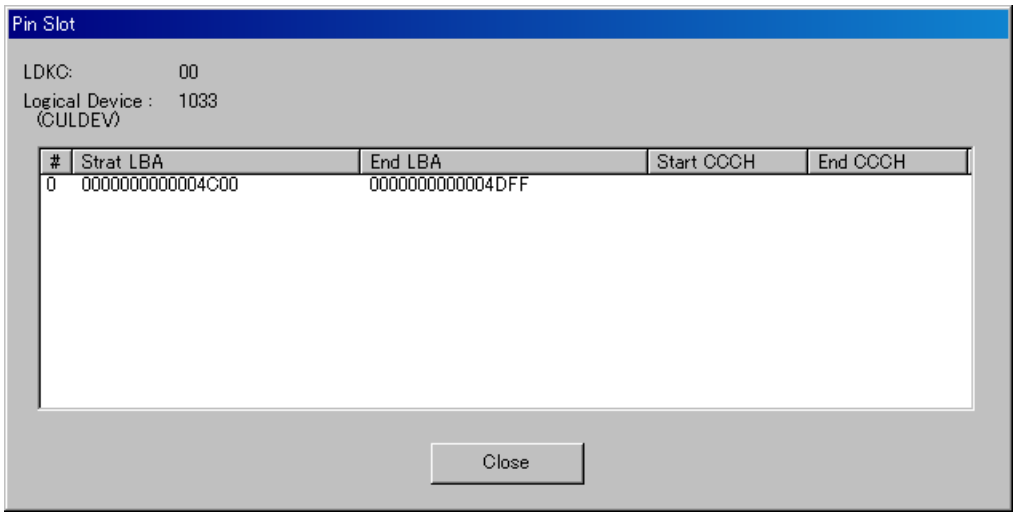
Note: Up to eight (the maximum number of paths) pieces of path information are displayed.

You can also execute this process by selecting the [Confirmation] button from the [Operation] menu bar besides pressing the [Execution] button.

5. <Displaying the Pin Slot>
Select (CL) an item number of the converted information (in the "#" column) and press the [Pin Slot] button.



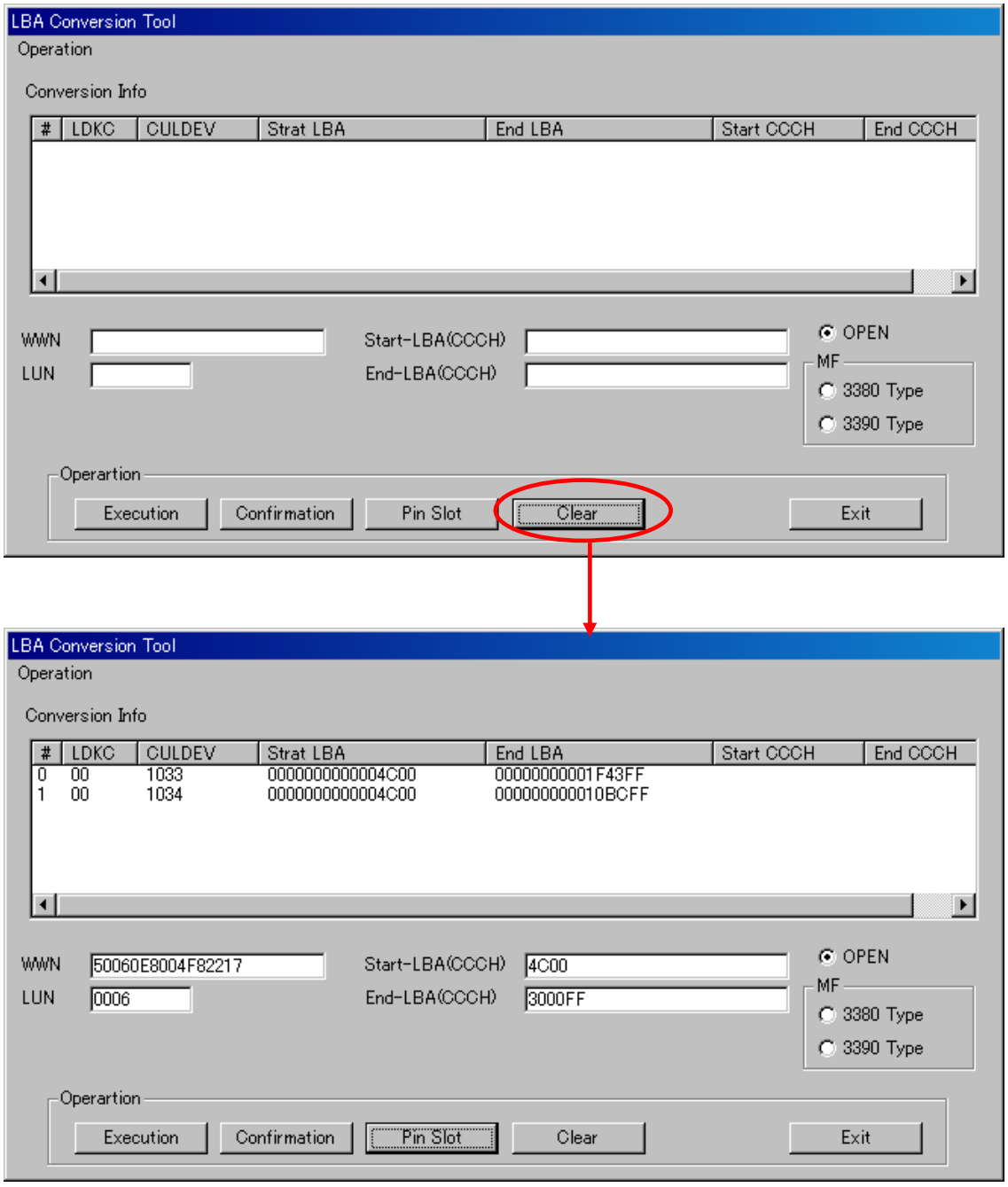
When the process is completed, the Start and End LBA (CCCH) of the slot concerning the converted LBA are displayed. (Display of the Start/End LBA (CCCH) in the case where the Pin Erasure Tool is used: The display is done for each slot.)



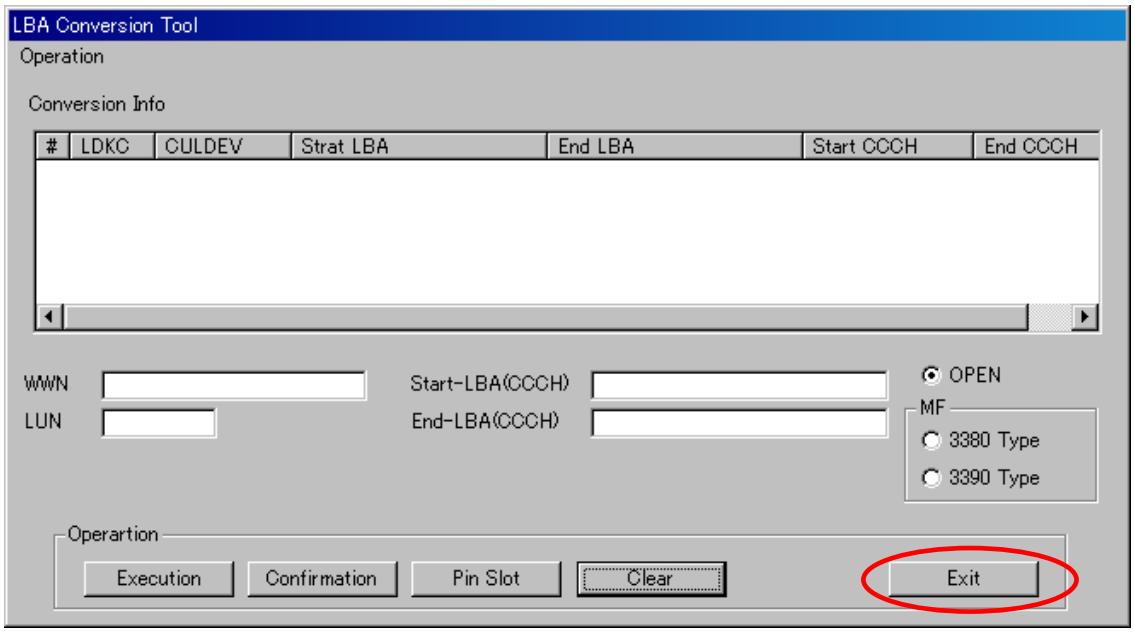
Note: • Up to 128 pieces of information can be displayed.
• When the terminal slot is displayed, it may be displayed as smaller than one slot size.

You can also execute this process by selecting the [Pin Slot] button from the [Operation] menu bar besides pressing the [Execution] button.

6. <Procedure for erasing information displayed in the main window>
When you press the [Clear] button in the main window, information displayed in the window is erased.



7. <Procedure for quitting the tool>
   To quit the tool, press the [Exit] button in the main window.



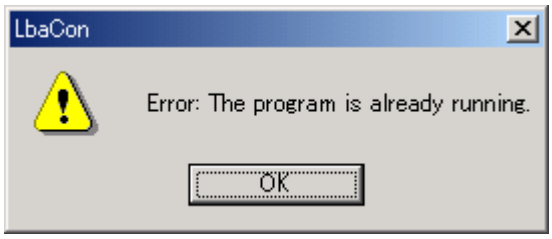
You can also execute this process by selecting the [Exit] button from the [Operation] menu bar besides pressing the [Execution] button.

8. <Warning and error dialog boxes>

Warning and error dialog boxes are shown below.

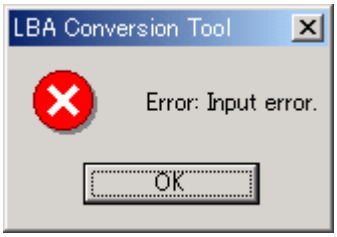
(1) Warning about start of the tool

When the following dialog box is displayed, the tool has already been started.



(2) Input error

When the following dialog box is displayed, the data that has been entered is incorrect.
Check the data that you entered.



(3) WWN error

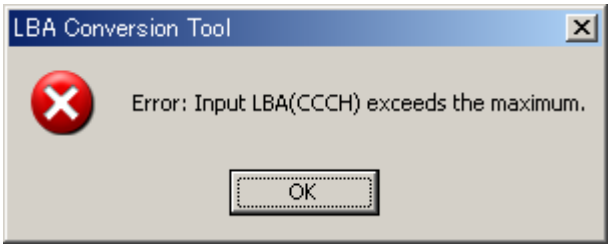
When the following dialog box is displayed, the WWN that has been entered does not exist. Check the WWN that you entered.

(4) External device error

When the following dialog box is displayed, the external device corresponding to the WWN and LUN that have been specified does not exist.
Check the WWN and LUN that you entered.

(5) LBA specification error

When the following dialog box is displayed, the value of the specified LBA (CCCH) exceeds the maximum LBA value of the device.
Check the LBA value that you entered.



(6) Memory reservation error
When the following dialog box is displayed, the memory failed to be reserved.

(7) Config error
When the following dialog box is displayed, the configuration information could not be got correctly.

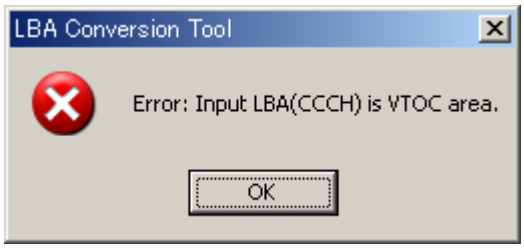
(8) Device error
When the following dialog box is displayed, the LDEV corresponding to the specified LBA does not exist.

(9) Item specification error
When the following dialog box is displayed, the item was not specified at the times of the verification and the Pin Slot display.

(10) Internal logical error
When the following dialog box is displayed, an error occurred in the internal logic.

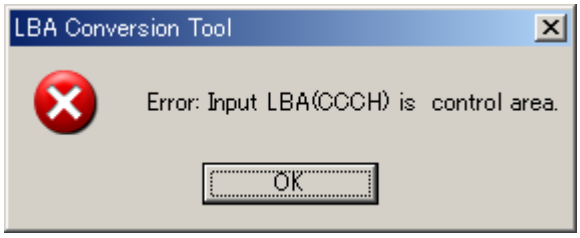
(11) VTOC area specification error

The specified LBA (CCCH) is the VTOC area.



(12) Control area specification error

The specified LBA (CCCH) is a control area.



(13) Error of maximum number of displayed items

The number of displayed items in the PINSLOT window exceeded the allowable maximum value.

9. <Restriction>
Restriction on this tool is shown below.

(1) Display of a converted LBA at the time when the LBA is verified
An LBA that is displayed when it is verified may be different from that which was entered in the case where the information on an external device whose emulation type is open is converted to that on a device that is mapped onto the MF (intermediate) type.

Note: When information on an external device whose emulation type is open is converted to that on a device that is mapped onto the MF (intermediate) type, the LBA is converted to the CCCH. When the converted information is verified, on the other hand, the converted CCCH is returned to the LBA. Therefore, the inconsistency is resulted. (The information displayed is edited for each slot.)

15.5 Matters to Be Given Considerations when Performing Data Restoration of External Volume

Because write data to an external LDEV is stored in the cache of the Disk Subsystem once and then written to an LU of the external device by means of the asynchronous destaging operation, it is possible that Write Pending Data remains in the cache of the Disk Subsystem when a failure occurs in the external device.
Therefore, it is required to make data restoration being conscious of the Write Pending Data.

(1) When making restoration using backup data of a host
   (a) Restore an LU of the external device.
   (b) Restore a virtual LDEV of the Disk Subsystem.
   (c) Restore the data using backup data of a host.

(2) When making restoration using backup data of the Disk Subsystem function
   (a) Restore an LU of the external device.
   (b) Restore a virtual LDEV of the Disk Subsystem.
   (c) Restore the data using the Disk Subsystem function.

(3) When making restoration using backup data of the external device
   (a) Restore an LU of the external device.
   (b) Restore a virtual LDEV of the Disk Subsystem.
   (c) Make the Disk Subsystem execute the “Disconnect External Volumes” for the LU concerned. (The Write Pending Data is written to the external device.)
   (d) Make the external device restore the LU data of the external device using the backup data.
   (e) Restore the virtual LDEV by making the Disk Subsystem execute the “Reconnect External Volumes” for the virtual LDEV.

15.6 Appendix

SIMs Possible to Be Detected in the DKC710I Side during a Maintenance or Recovery Work Being Done for SANRISE AMS/9500V when SANRISE AMS/9500V Series Device Is Used as External Storage

				SIM reported by the Disk Subsystem	
No	Maintenance operation for DF600	Effect on the Disk Subsystem	Operation of the Disk Subsystem	①	②
1	CTL replacement	Link Down	Switching to alternative path or path blockade *1	○	○
2	Reboot (subsystem)	Link Down	Switching to alternative path or path blockade *1	○	○

No	Failure occurs in DF600	Effect on the Disk Subsystem	Operation of the Disk Subsystem	①	②
1	Power stoppage	Link Down	Path detachment → Virtual volume blockade	○	○
2	CTL detachment	Link Down	Switching to alternative path or path blockade *1	○	○
3	CTL automatic reboot	Link down for two minutes	Switching to alternative path or path blockade *1	○	○
4	FC path failure	CRC error, frequent occurrence of Lip, etc.	Path blockade depending on frequency of failures *1	○	○

No	Field maintenance operation for DF600	Effect on the Disk Subsystem	Operation of the Disk Subsystem	①	②
1	Microprogram replacement (with subsystem power on or off)	Link Down	Switching to alternative path or path blockade *1	○	○
2	Deliberate shutdown	Link Down	Switching to alternative path or path blockade *1	○	○

*1: LDEV is blockaded when no alternative path exists.

① 21D0XY Blockade of an external storage path
② EFD000 Blockade of an external storage device
③ 21D2XY Excess of threshold value of path response time

As to ③, it may occur when a process is delayed because of a failure occurs in the AMS/9500V series or FC path and the time limit is exceeded.

16. Procedure for Forced Powering Off of DKC

There are four ways of Forced Powering Off. Please refer to a way which is appropriate for your work.

No.	Section Title	Storing data in SM/CM in cache SSDs (*1)	Volatilizing data in SM/CM	Page
1	Procedure for Forced Powering Off of DKC	No	Non-volatilization (Data in SM/CM is held because of power supply to CM PCBs.)	TRBL16-10
2	Forced outage & restarting procedure of nonvolatile	Yes	Non-volatilization (Data in SM/CM is restored from cache SSDs.)	TRBL35-11 (*2)
3	Forced outage & restarting procedure of volatile (Procedure-A)	No	Volatilization (All data in SM/CM is deleted.)	TRBL35-60
4	Forced outage & restarting procedure of volatile (Procedure-B)	Yes	Volatilization (Only specific data (*3) in SM/CM is restored from cache SSDs.)	TRBL35-80 (*2)

*1: When data in SM/CM is stored in cache SSDs, batteries are used. Therefore, energy in batteries is consumed.

*2: If data in SM/CM cannot be stored in cache SSDs, No.2 and No.4 ways are not available.

*3: Only management information of both Quick Format and HDP is restored from cache SSDs. The other data in SM/CM is deleted.

When this operation is performed, the power of the DKC is forced to be turned off immediately. At this time, the power of DKC, DKU and FAN becomes the following conditions. When restarting the device after the power is forcibly turned off, turn the power on with reference to INST03-14-10, and make sure the READY lamp of the device is on.

(DKC)

After the power was forcibly turned off, the auxiliary power supplies the power to the FAN and some PCBs (MP, CM or the like) and the data in the CM is backed up because the AC input is supplied to the auxiliary power in the subsystem. (The data is transferred in the cache flash memory with the battery when the AC input is turned off in this state, however do not perform it without direction by manufacture.)

(DKU)

The DKU is not turned off. When turning off the power of DKU, turn off the PDU breaker with reference to THEORY SECTION. (THEORY03-25-10)

⚠ CAUTION

- This operation supposes a special case such as a recovery from a failure unlike the usual powering off operation. Do not perform this operation without a direction given by the T.S.D because a system down may be caused if it is performed without due notice.
- The DKC processor failure / SVP failure SIM (73XXYY) may occur during this work. Just complete them, when the work is finished.
- Check whether VOJPs (Volatile JP) of the CACHE are not inserted in the PCB before performing the operation. Performing the operation with VOJPs are inserted will result in data loss of customer. Refer to the LOCATION SECTION (LOC06-150), and make sure the VOJP is not inserted in the PCB of all CM.

a. Loosen the screw of the DKCPANEL, and remove the cover.

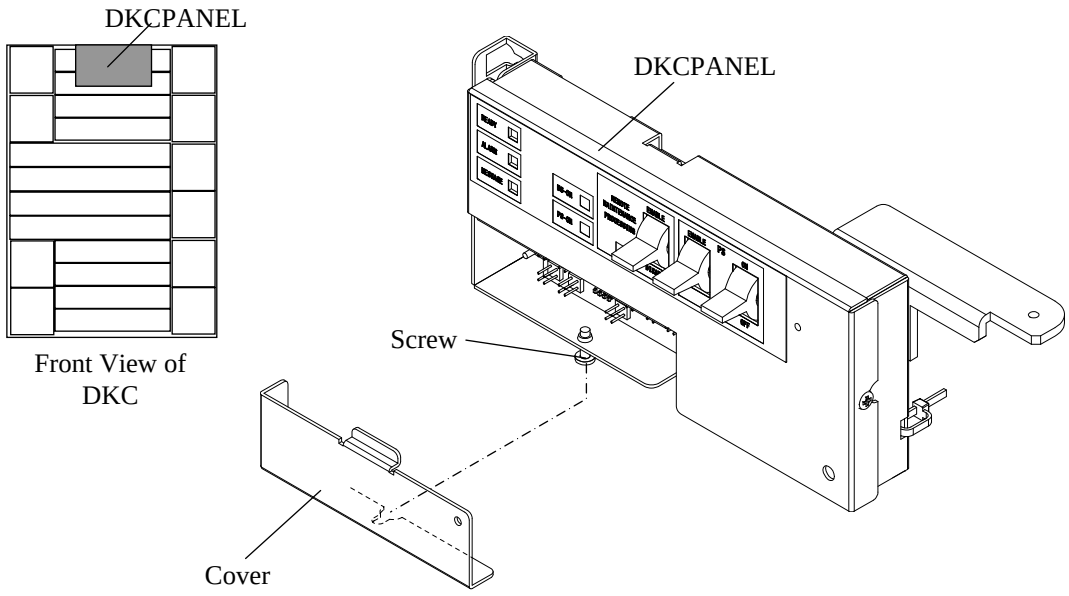


Fig. 16-1 Removal of Cover

b. Insert the maintenance jumper into the FORCE MODE Jumper (JP5) on the DKCPANEL.
c. After the insertion of the maintenance jumper, wait for five seconds or more, and check the FORCE MODE LED lights.
d. Pull out the maintenance jumper within ten seconds after the FORCE MODE LED lights.
e. Be sure the FORCE MODE LED lights. (It switches to the FORCE MODE. However, when the maintenance jumper is not pulled out within 10 seconds, the FORCE MODE LED is turned off, and it does not switch to the FORCE MODE.)
f. Insert the maintenance jumper into the SYSFORCE OFF jumper (JP6) with the FORCE MODE LED lights. (The FORCE MODE is released automatically and the FORCE MODE LED is turned off, when a certain period of time passes without inserting the SYSFORCE OFF jumper. In this case, repeat the procedure from b.)
g. Remove the maintenance jumper after the PS-ON LED is turned off.
h. Install the cover on the DKCPANEL, and secure it with the screw. (Refer to Fig. 16-1.)

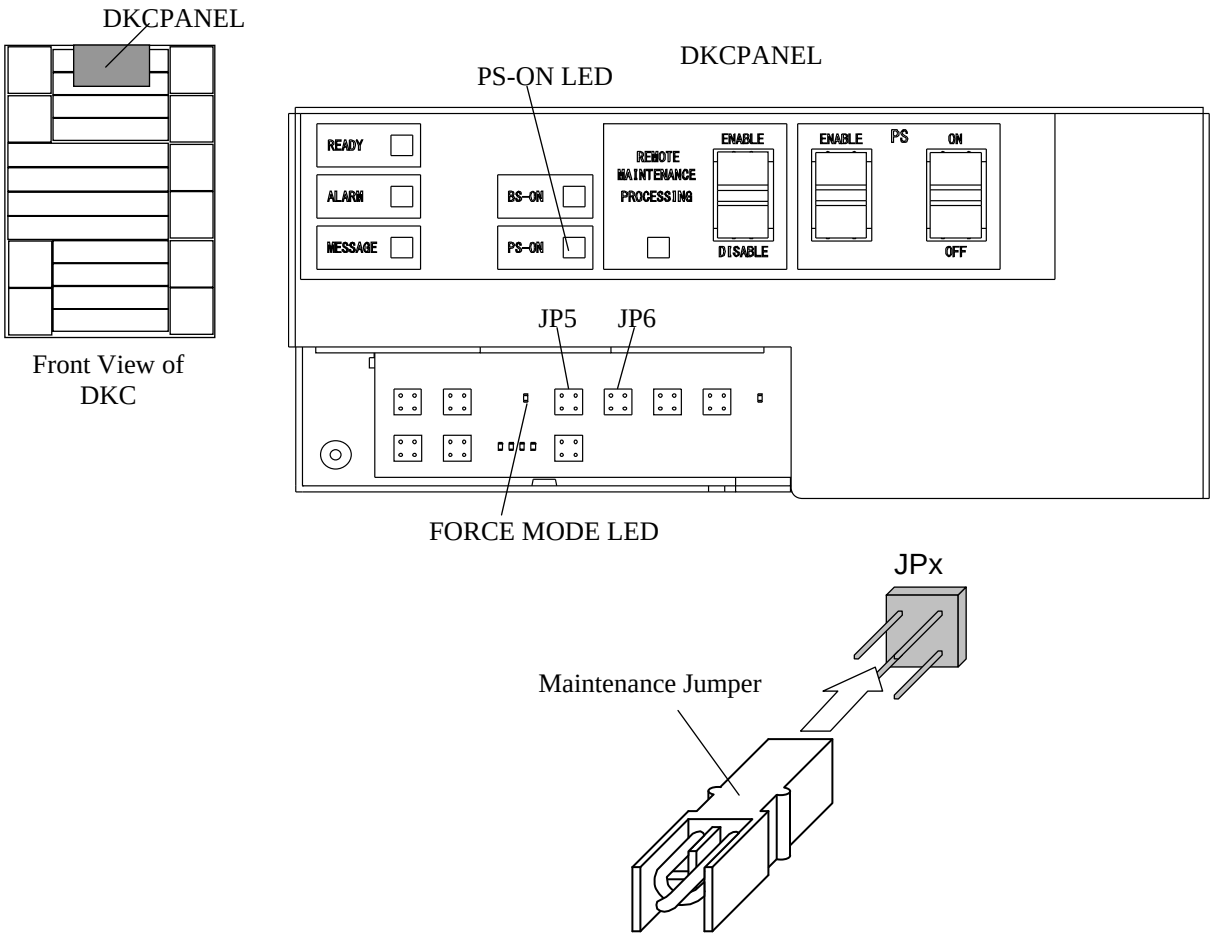


Fig. 16-2 Insertion of Maintenance Jumper

17. Recovery from UR Failure

17.1 Procedure for Recovery from UR Failure

The UR pair suspension or UR path blockade may occur triggered by a hardware failure.
This section contains explanation of the UR failure and procedures for recovery from the failure.
Occurrence of the UR failure can be known through the following.

- SIM report on occurrence of path blockade
- SIM report on occurrence of pair suspension
- UR failure message in the Syslog output by RAID Manage/UR or RAID Manager/TT, in the case of the UR (Open)*1

SIM REF.CODE	Meaning	Remarks
2180-XY	Path blockade	X: CHA PCB # Y: Port# in PCB
DCXY-YY	UR pair suspension	X: 0 to 2, 4 to A, or F YY: LDEV number
DCEX-ZZ	JNL overflow warning	X: 0 to 3 ZZ: Journal group number
DCFX-ZZ	Read JNL interruption	X: 0 to 3 ZZ: Journal group number

The UR supports the Force Delete Pair function. When recovery from the failure using an ordinary procedure is unsuccessful, take a recovery action performing Force Delete Pair operation.

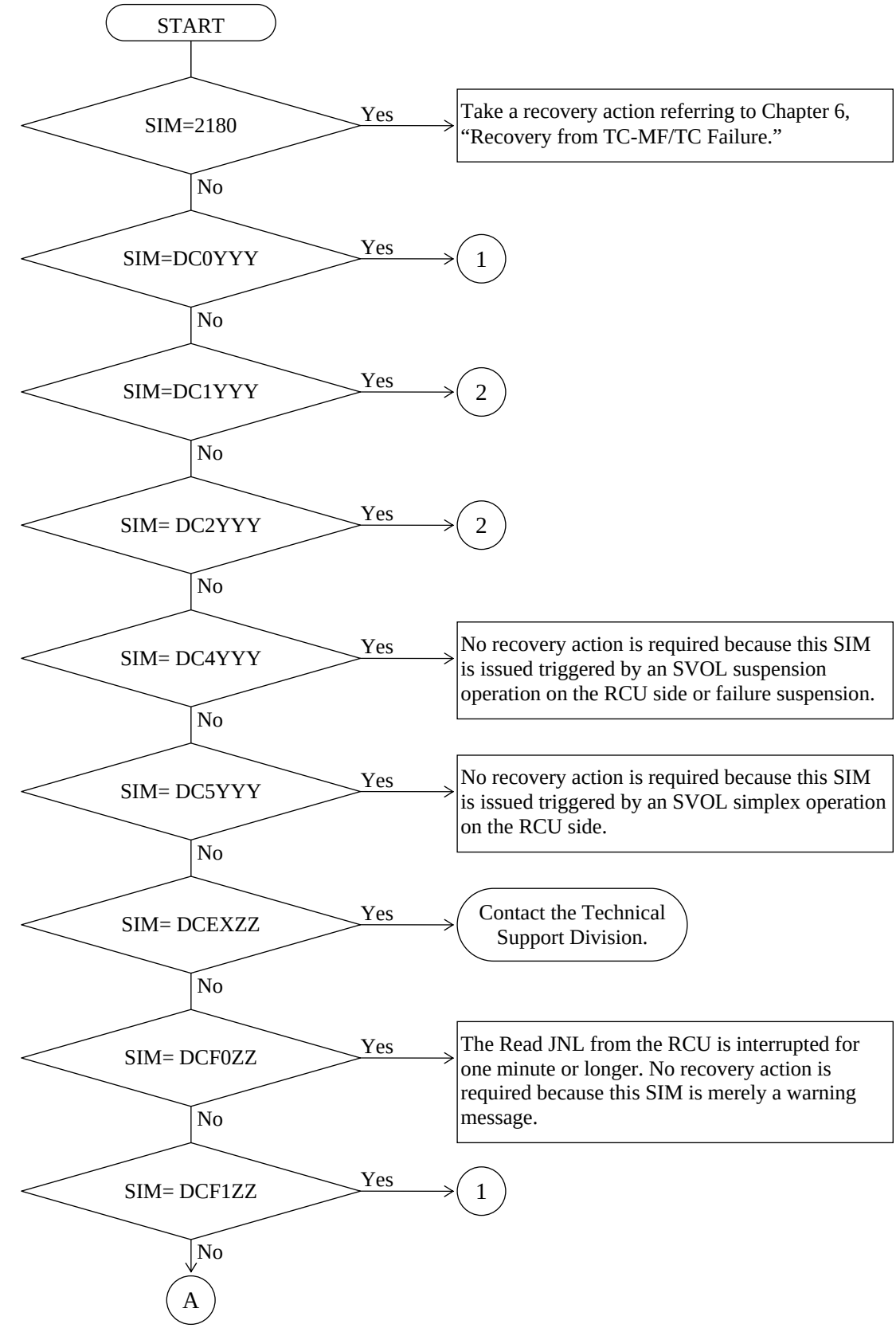
*1: When an UR pair is suspended, RAID Manager/UR or RAID Manager/TT displays the following message in the Syslog.

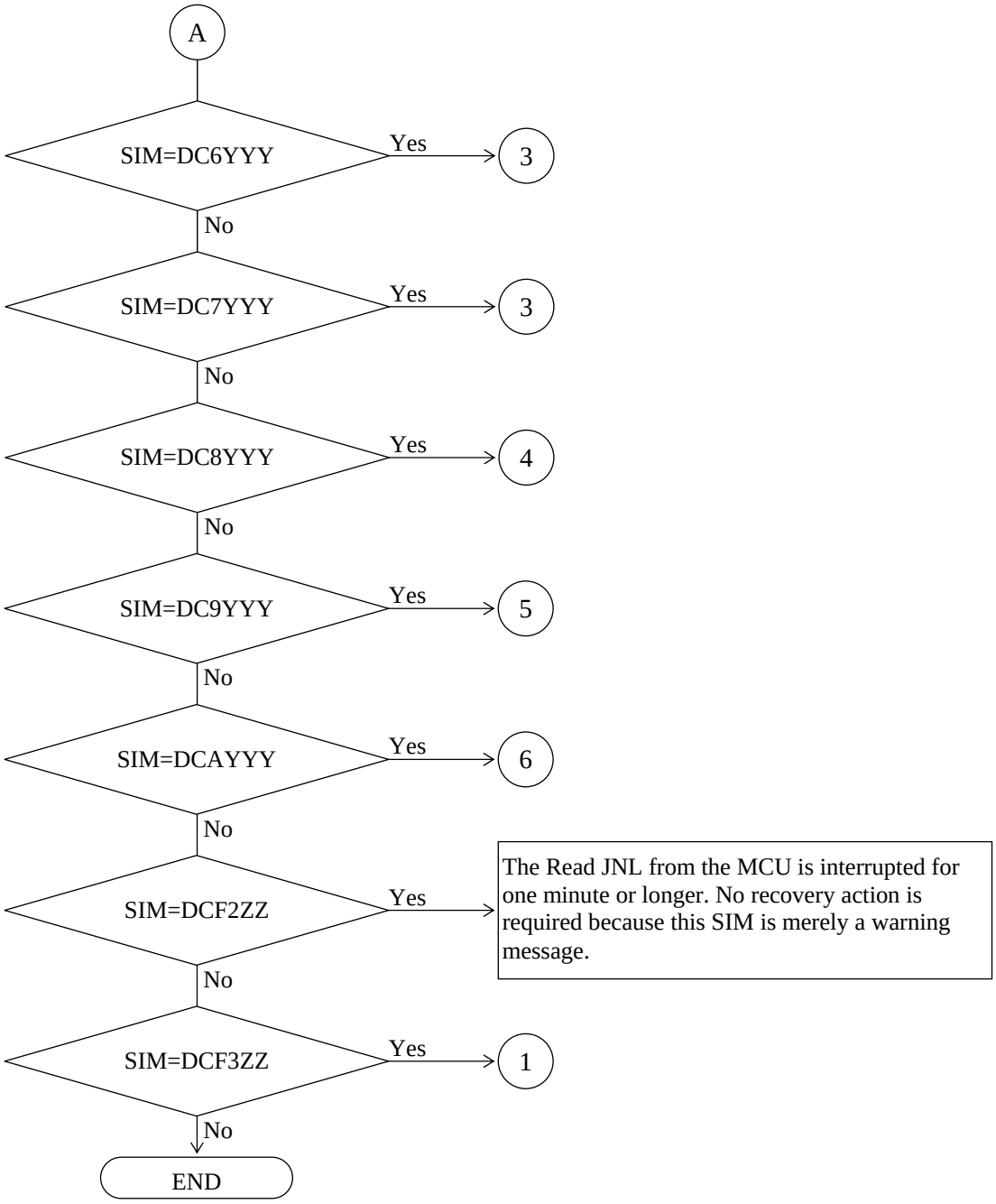
[HORCM_102] Deleted a suspending status on this paired volume
(Volume:○○○○, code:XXXX).

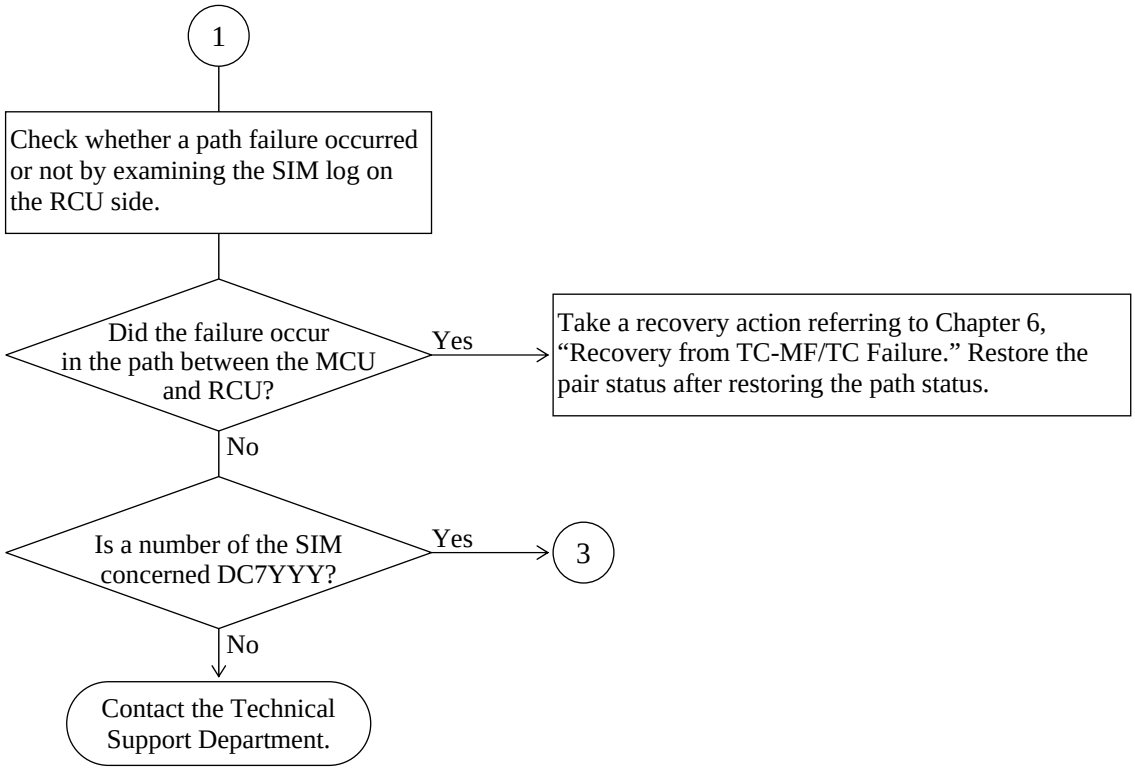
○○○○ : Volume name
XXXX : Factor code

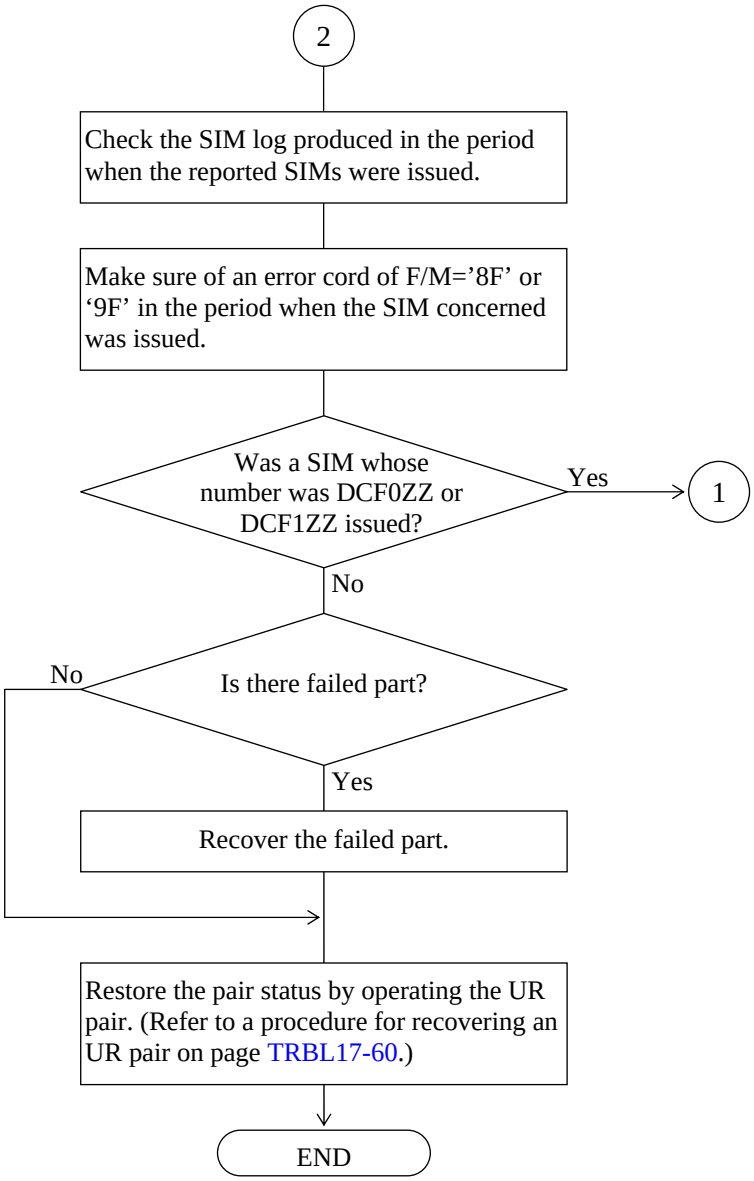
When a message that informs of occurrence of an UR pair failure is displayed in the Syslog, it is required to check the SIM(s) of the connected DKC and understand correspondence of messages in the Syslog to SIMs logged on the DKC side before starting the recovery action.

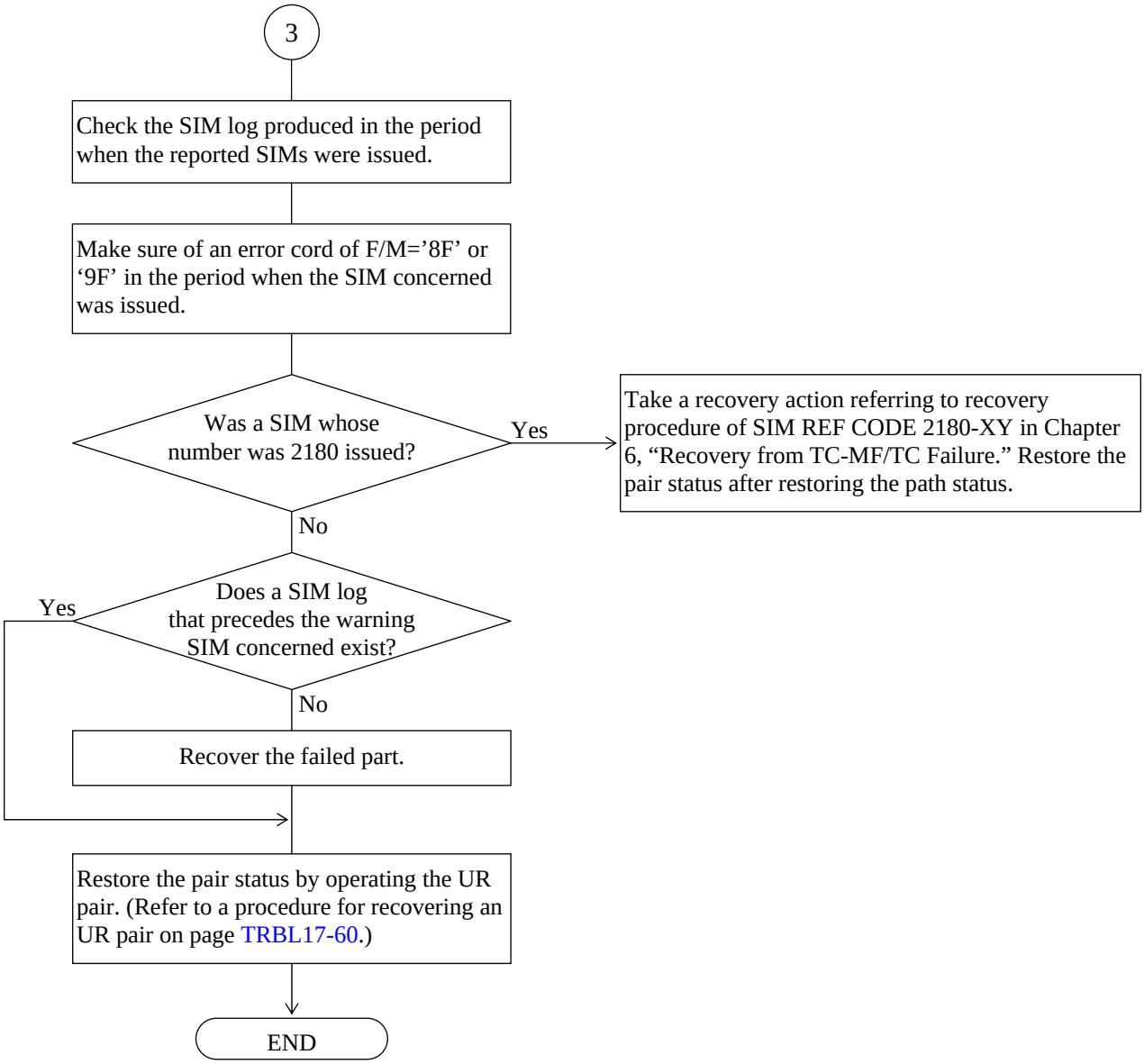
Recovery from the UR failure

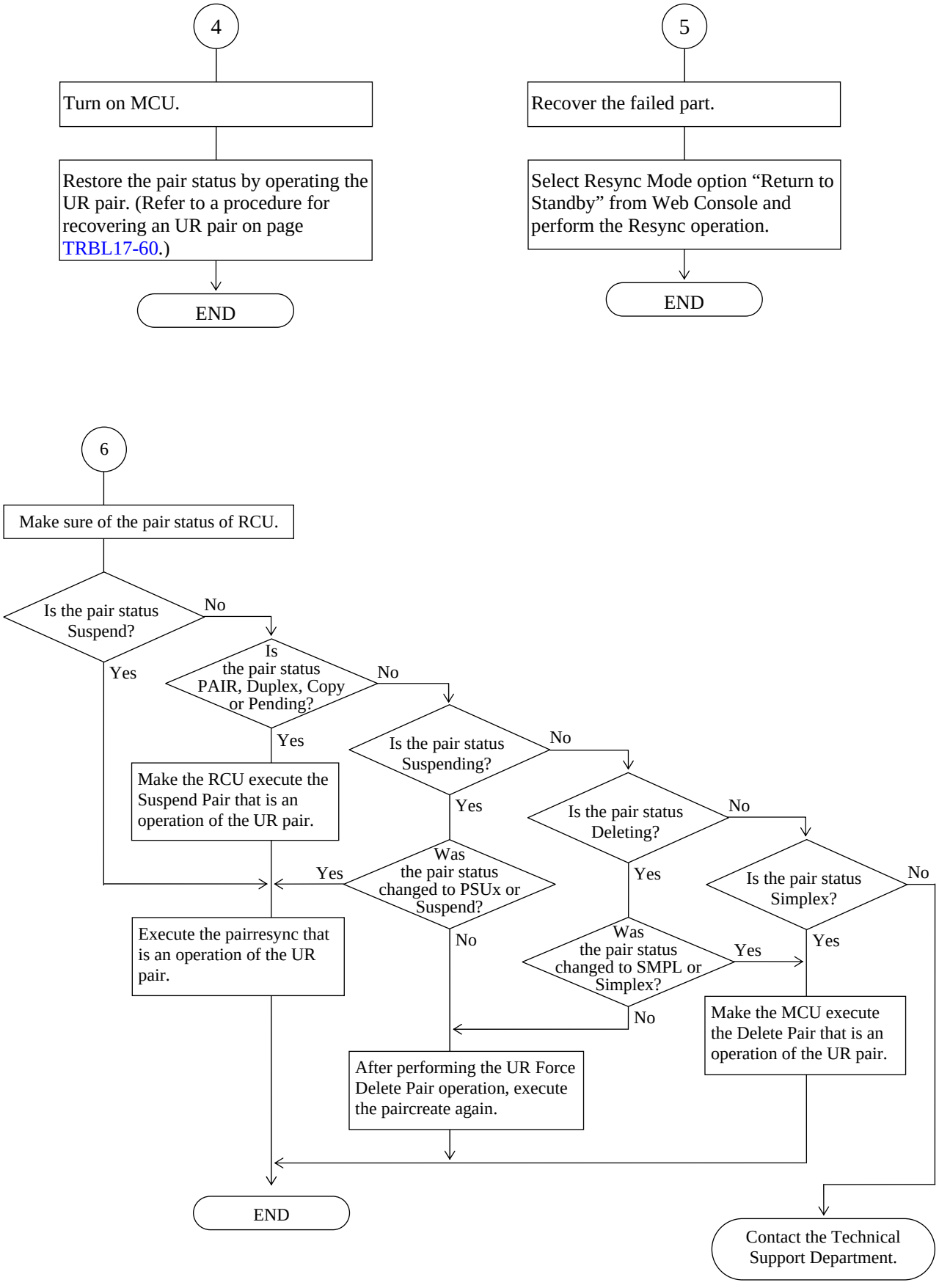




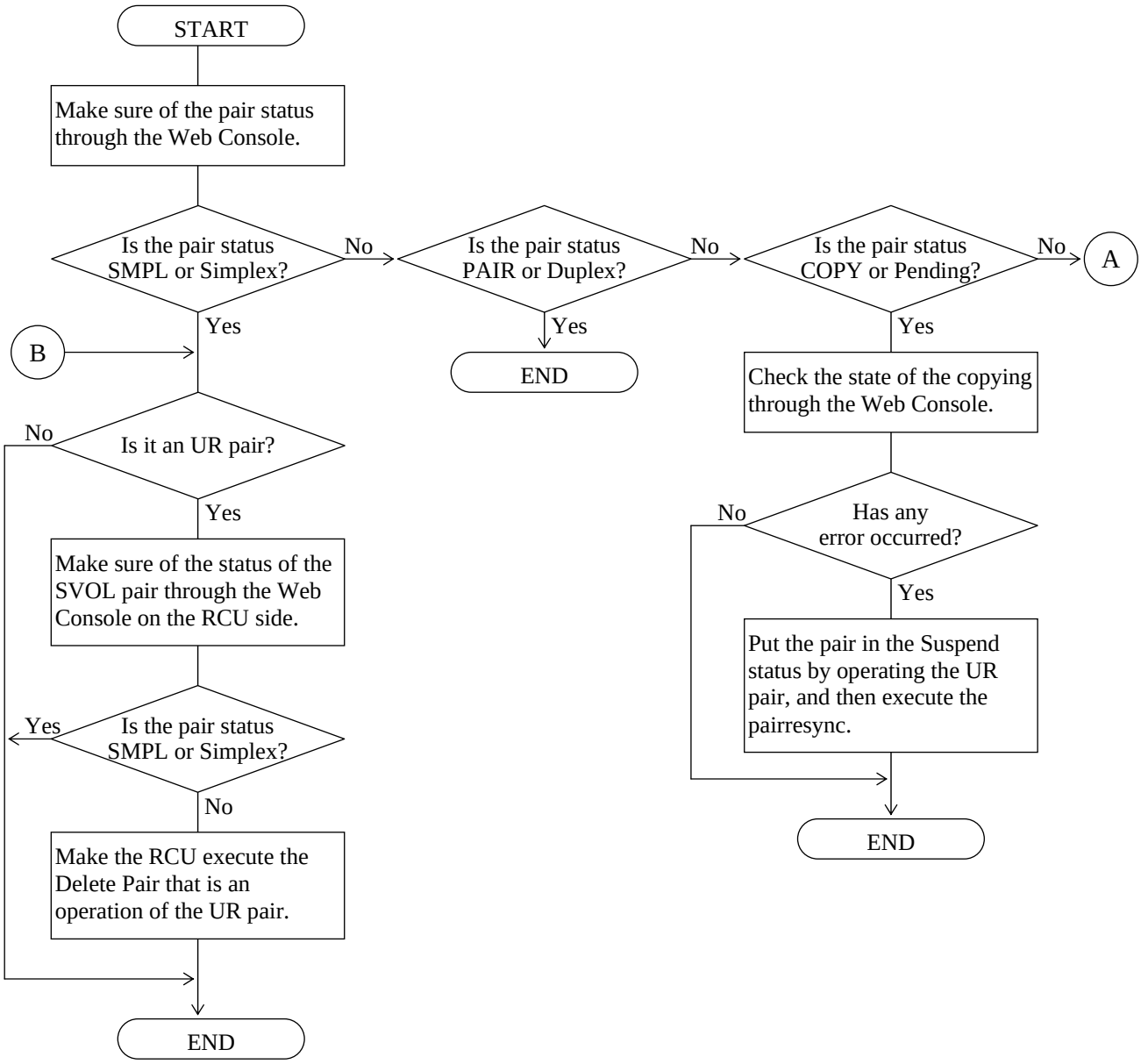








17.2 Procedure for Recovering UR Pair



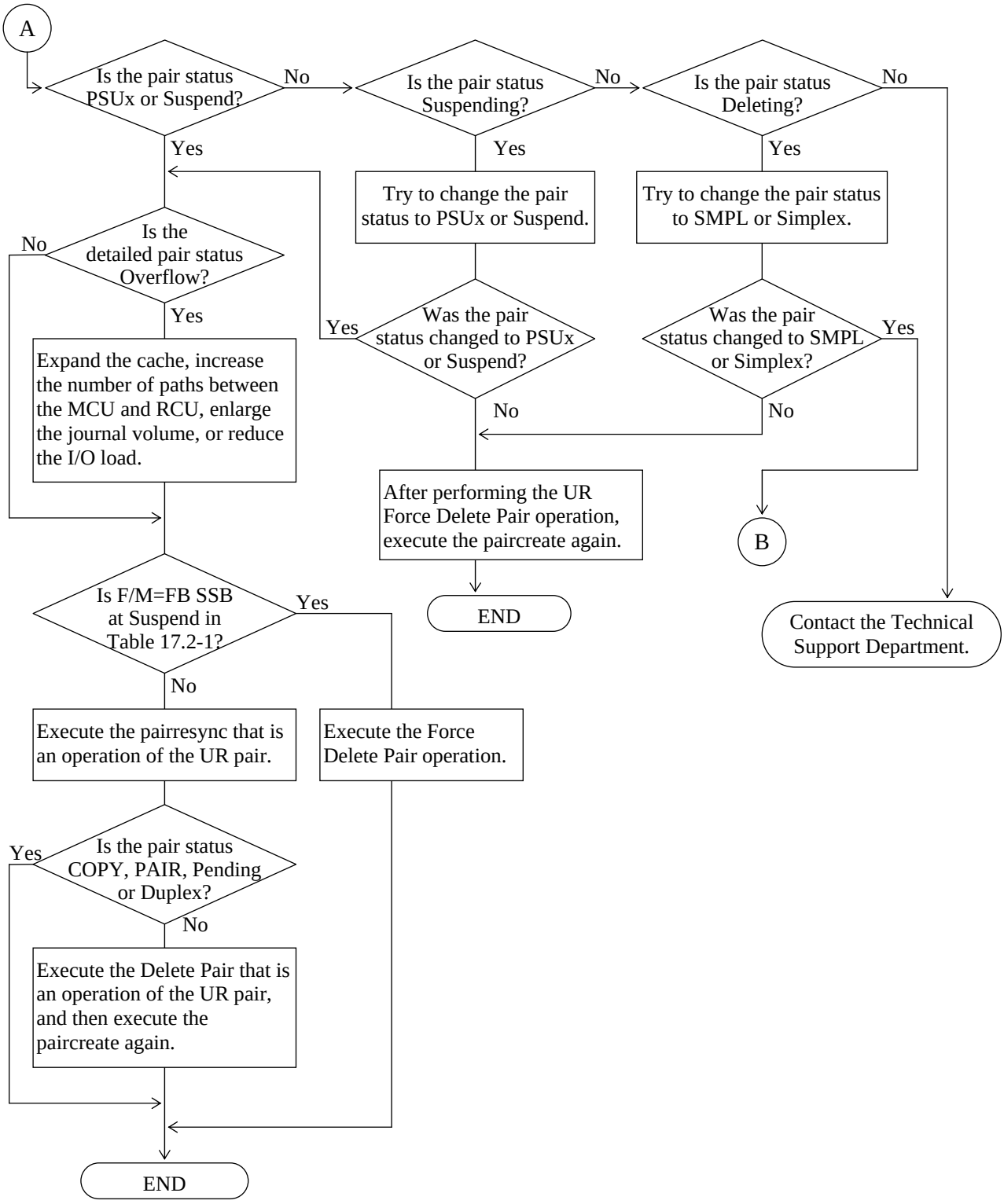


Table 17.2-1 Force Delete Pair Target F/M=FB SSB

No.	F/M	Error Code	Meaning
1	FB	EF60 to EF66	JNL-cache remains with the device of remote-side.

17.3 Force Delete Pair Operation

The Force Delete Pair operation is a remedy function for the cases where an UR pair is put in the following abnormal states. Apply this function to both of the MCU and RCU.

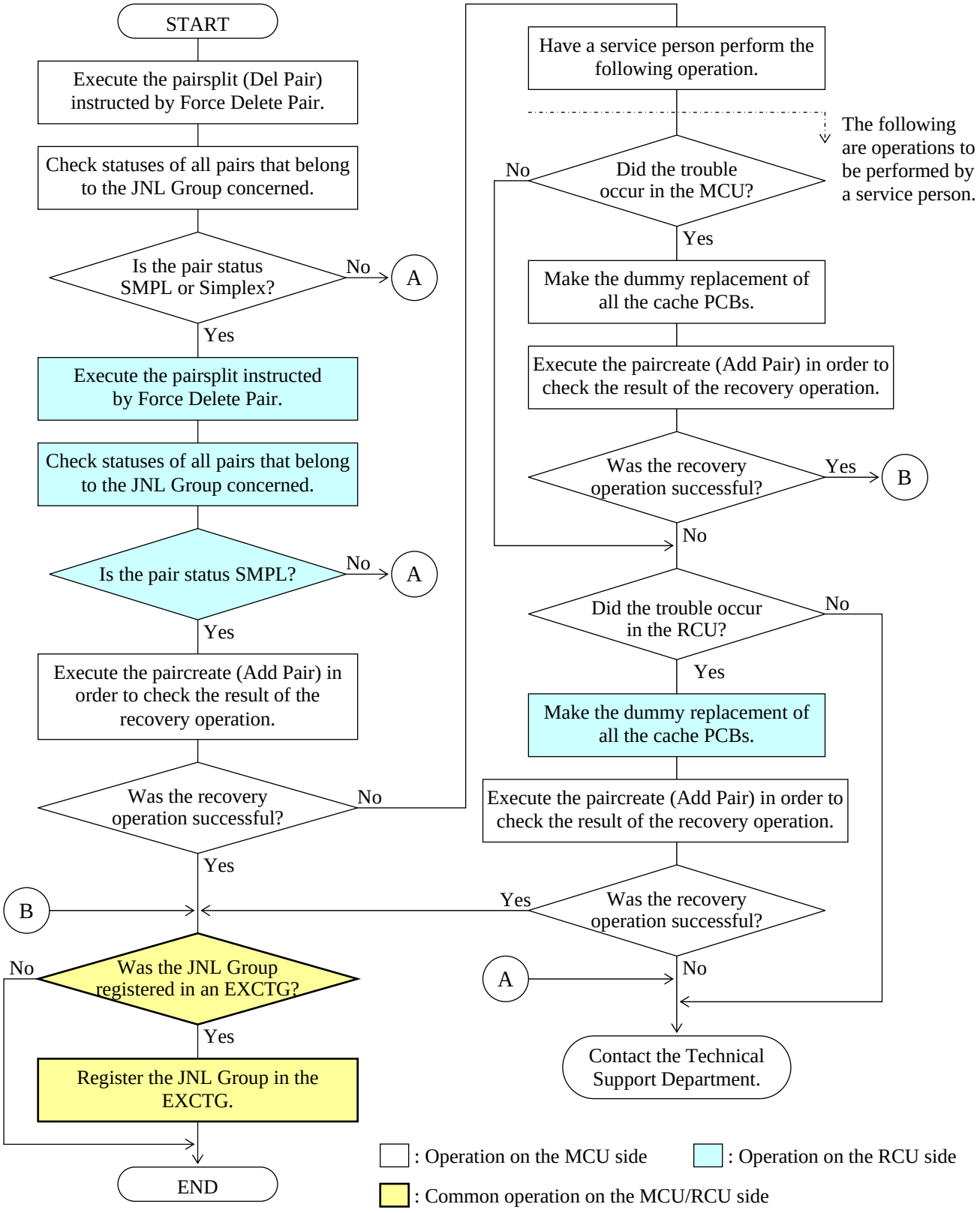
- The pair was suspended owing to a trouble such as a failure and the pair status did not change but remained as Suspend.
- Though the Delete Pair or Suspend Pair operation terminated normally, the pair status remained as Deleting or Suspend.
- Please do not execute the Force Delete operation when all pairs in JNL Group are the pair status of Duplex or DuplexPend.

Notices

- All the data volumes that belong to the group (JNLG) concerned are placed in the Simplex status because Force Delete Pair operates in the Group mode.
- As a result of performance of Force Delete Pair operation on the MCU side, data that has not been transferred to the RCU is abandoned.
  As a result of performance of Force Delete Pair operation on the RCU side, data that has not been authorized is abandoned.
- There is a possibility that host I/O to the pair concerned becomes time out when the pair status of Duplex/DuplexPend exists in JNL Group.

After the Force Delete Pair operations for the MCU and RCU are completed, perform the paircreate operation again in order to make sure that the pair has got out from the abnormal state.
When doing that, specify the JNL Group number as the same value as former one.

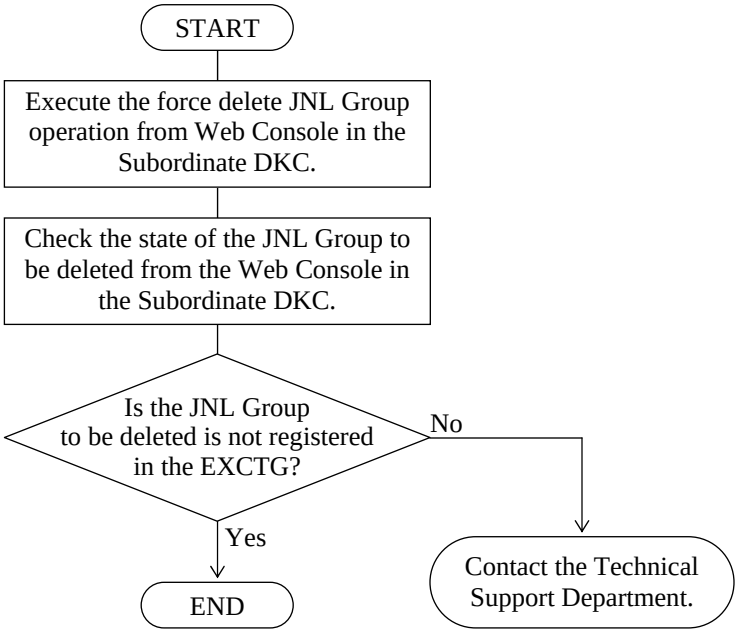
If the pair status is not restored in spite of the Force Delete Pair operation, make dummy replacement of all the cache PCBs for the subsystem concerned.



17.4 Force Delete JNL Group Operation

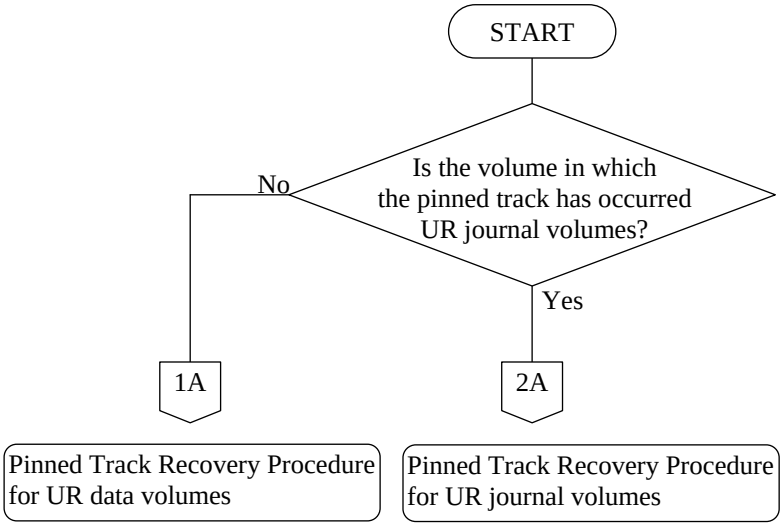
In the UR 4x4, the registration or deletion to Extended Consistency Group (EXCTG) of JNL Group in Subordinate DKC are operated from Supervisor DKC. The Force Delete JNL Group operation is a remedy function to delete JNL Group from EXCTG forcibly when deleting JNL Group of Subordinate DKC from EXCTG can not be executed.

Notice:
- The force Delete JNL Group operation can be executed regardless of the state of JNL Group.
- JNL Group deleted from the EXCTG forcibly continues operation as JNL Group that is unregistered to EXCTG. Therefore, a remote copy from MCU to RCU is continued.



17.5 Pinned Track Recovery Procedure for UR

Pinned track recovery procedure for UR is as follows.

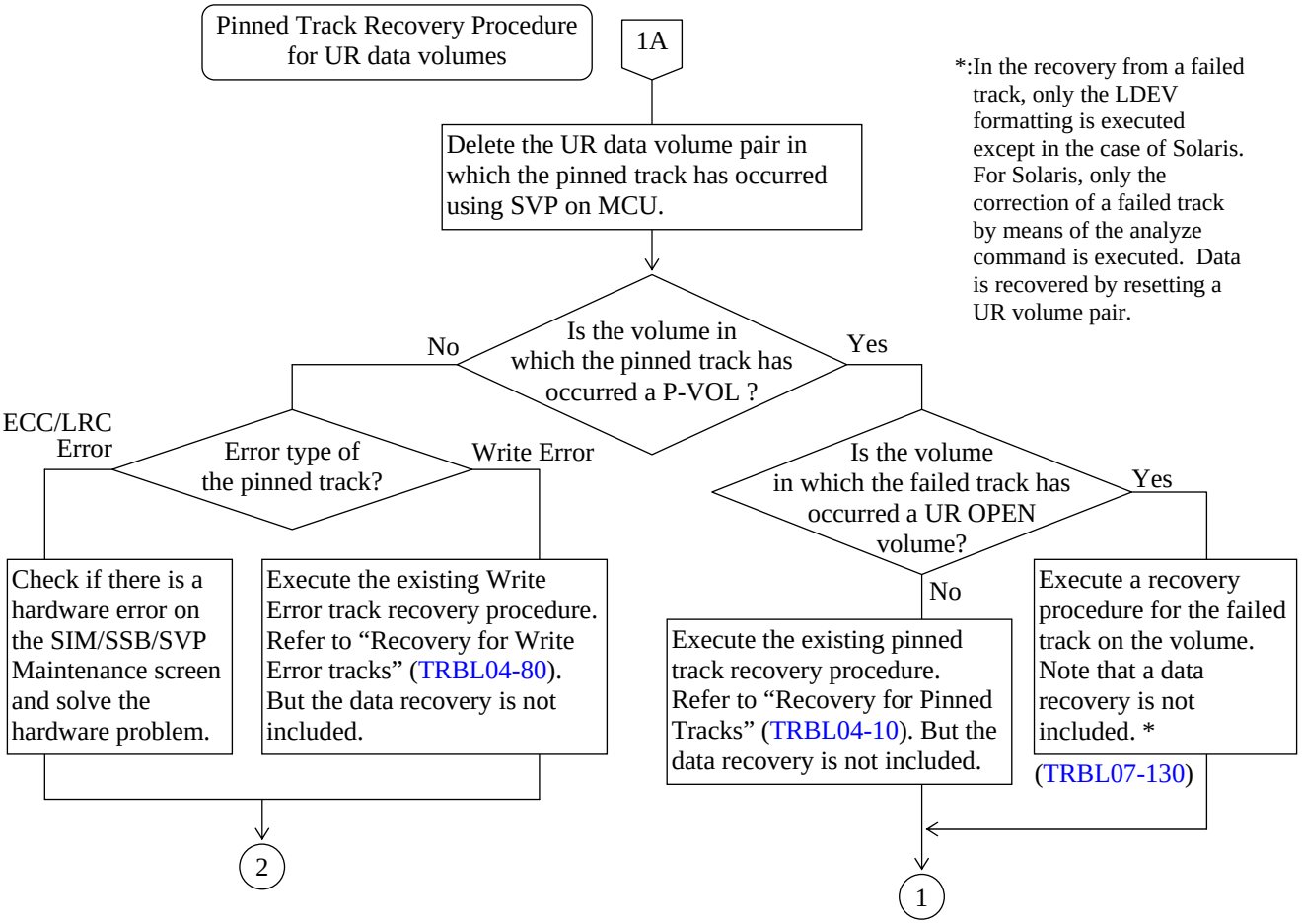


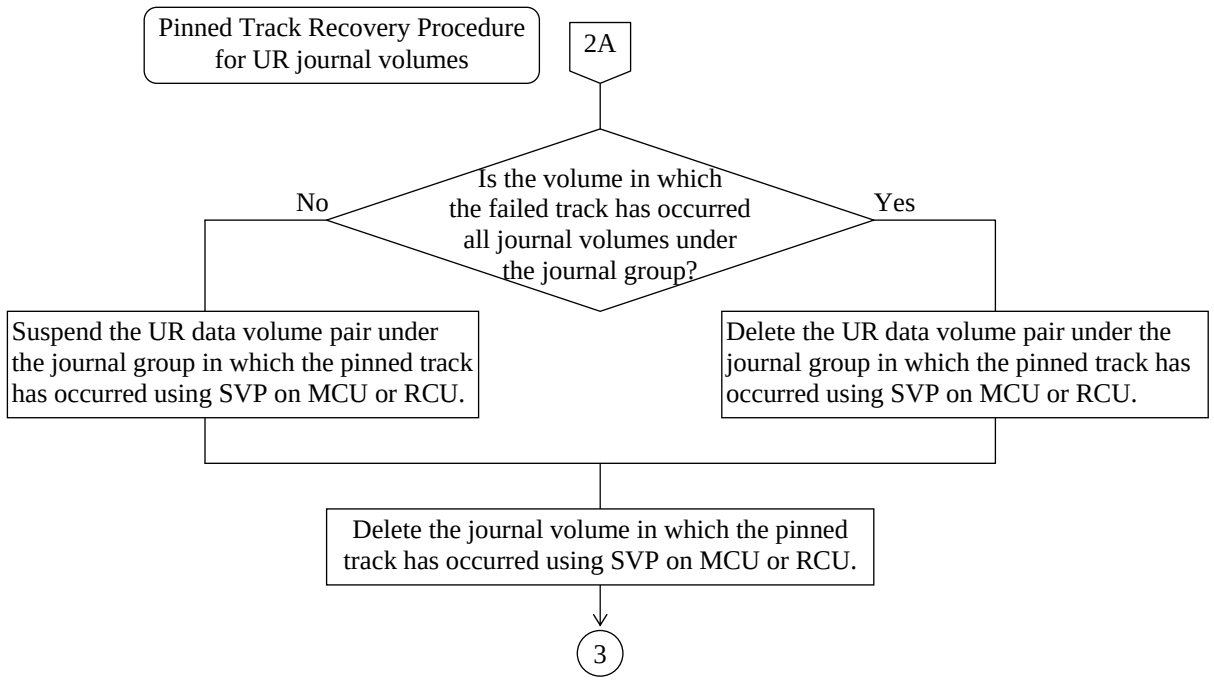
Note: If the pinned track has occurred in both P-VOL and S-VOL, recover the volumes according to the following sequence.

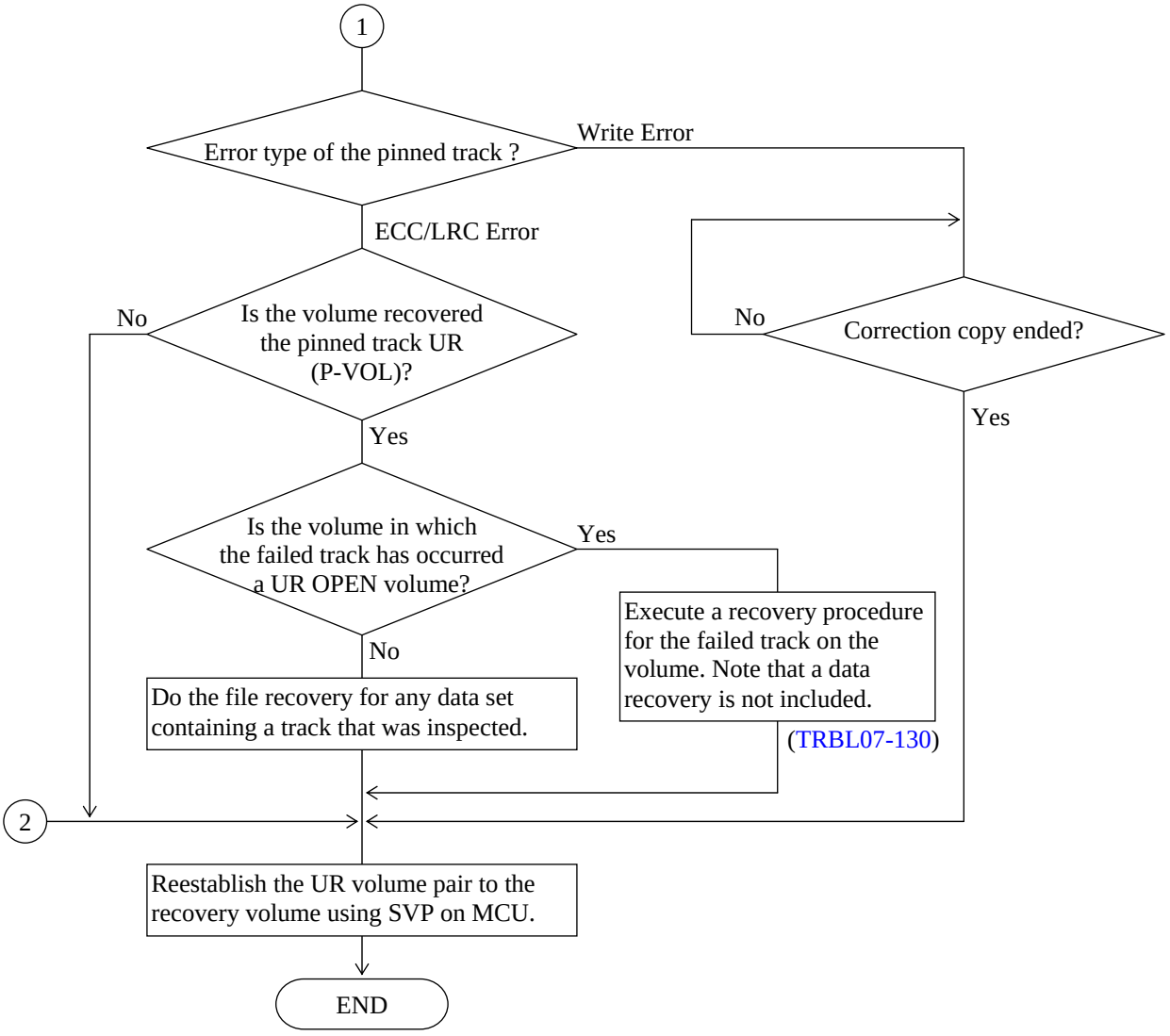
UR : ① P-VOL → ② S-VOL

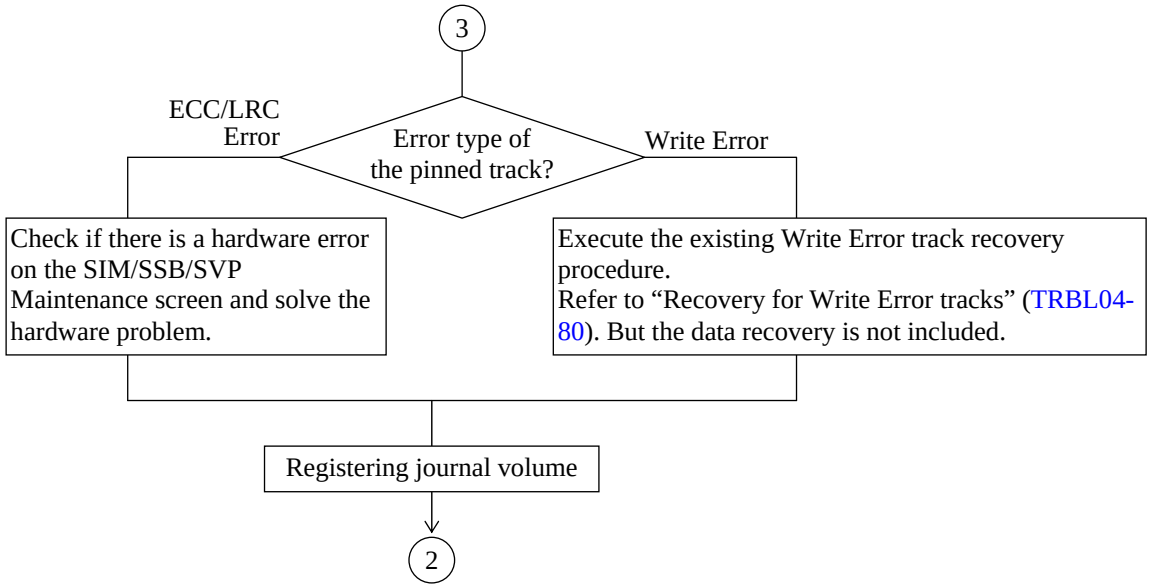
If the pinned track has occurred in both data volumes and journal volumes, recover the volumes according to the following sequence.

① data volumes → ② journal volumes









17.6 UR Microprogram Version-Down Replacement Procedure (3DC Multi-target Configuration)

When the UR pair for the delta resync exists, and the microprogram replacement is performed from the version of 70-01-4x or later to the version before 70-01-4x by the microprogram replacement, the error message is output.
Here, when the bit pattern of the message content is “UR for the delta resync support”, the procedure for performing the microprogram replacement is shown.

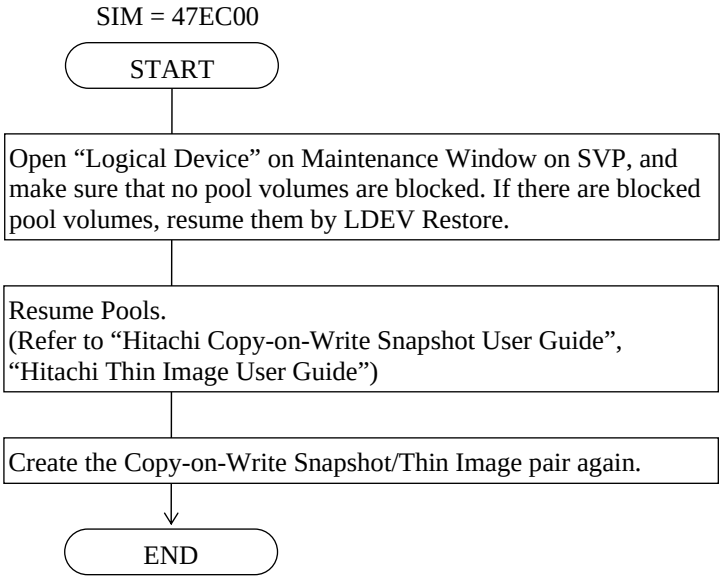
Note:
- Please make the micro version of each site the same when UR pair for the delta resync makes is Performed in 3DC Multi-target Configuration.
- Exchange the Microprogram versions from the order of Delta of R-Site (*1) and P-Site (*2) and L-Site (*3) in Microprogram Version-Down of the Microprogram Version replace order.

Procedure:
(1) It deletes it when it is confirmed whether there is P or L or R site, and there is UR pair for the delta resync.
(2) Execute microprogram Version-Down replacement at R-Site.
(3) Execute microprogram Version-Down replacement at P-Site
(4) Execute microprogram Version-Down replacement at L-Site.

*1: UR secondary site of 3DC Multi-target Configuration is R-Site.
*2: UR primary site of 3DC Multi-target Configuration is P-Site.
*3: UR pair for the delta resync primary site of 3DC Multi-target Configuration is L-Site

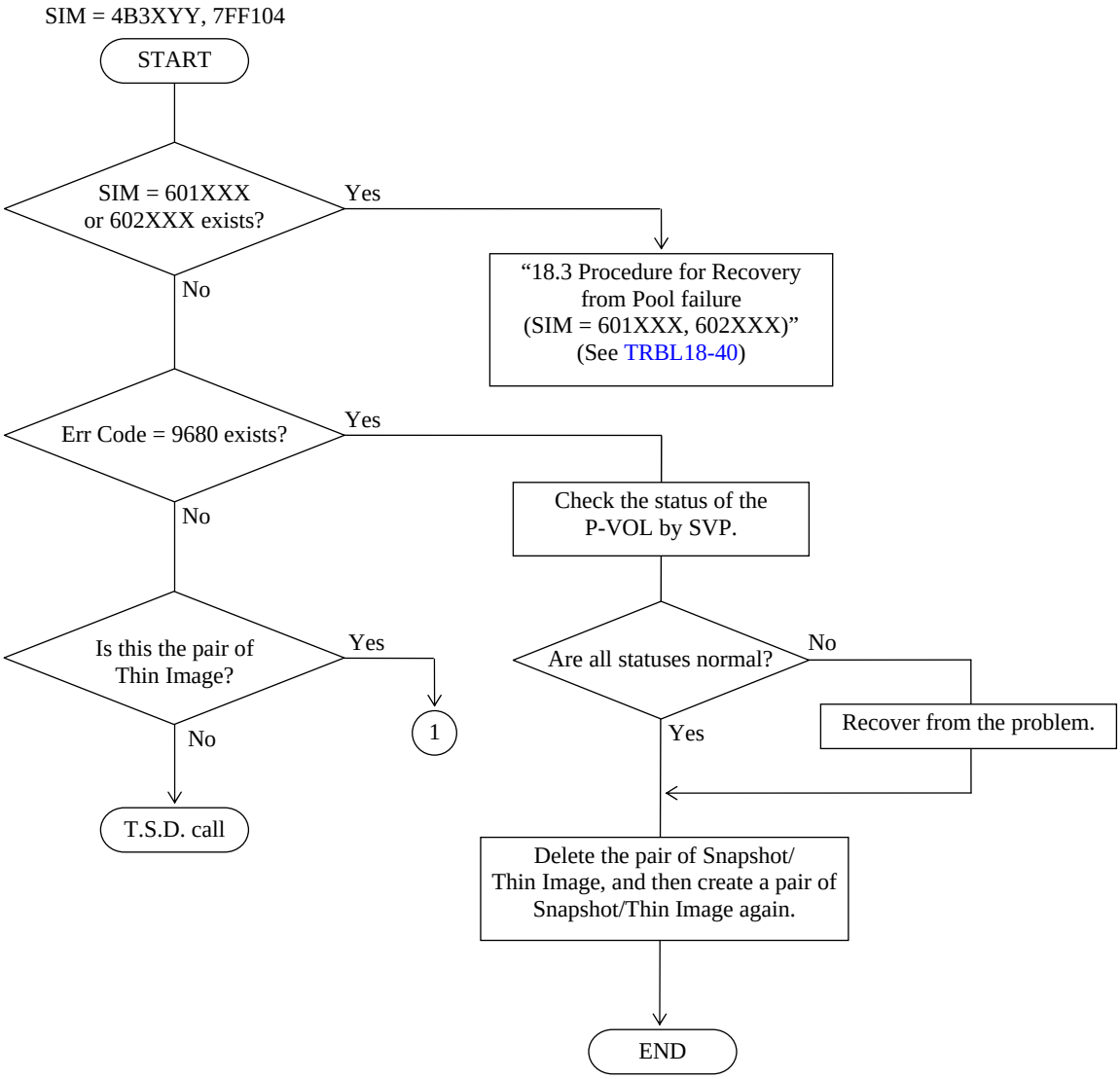
18. Recovery procedure for Copy-on-Write Snapshot/Thin Image

18.1 PS-ON with SM Volatilization (SIM = 47EC00)

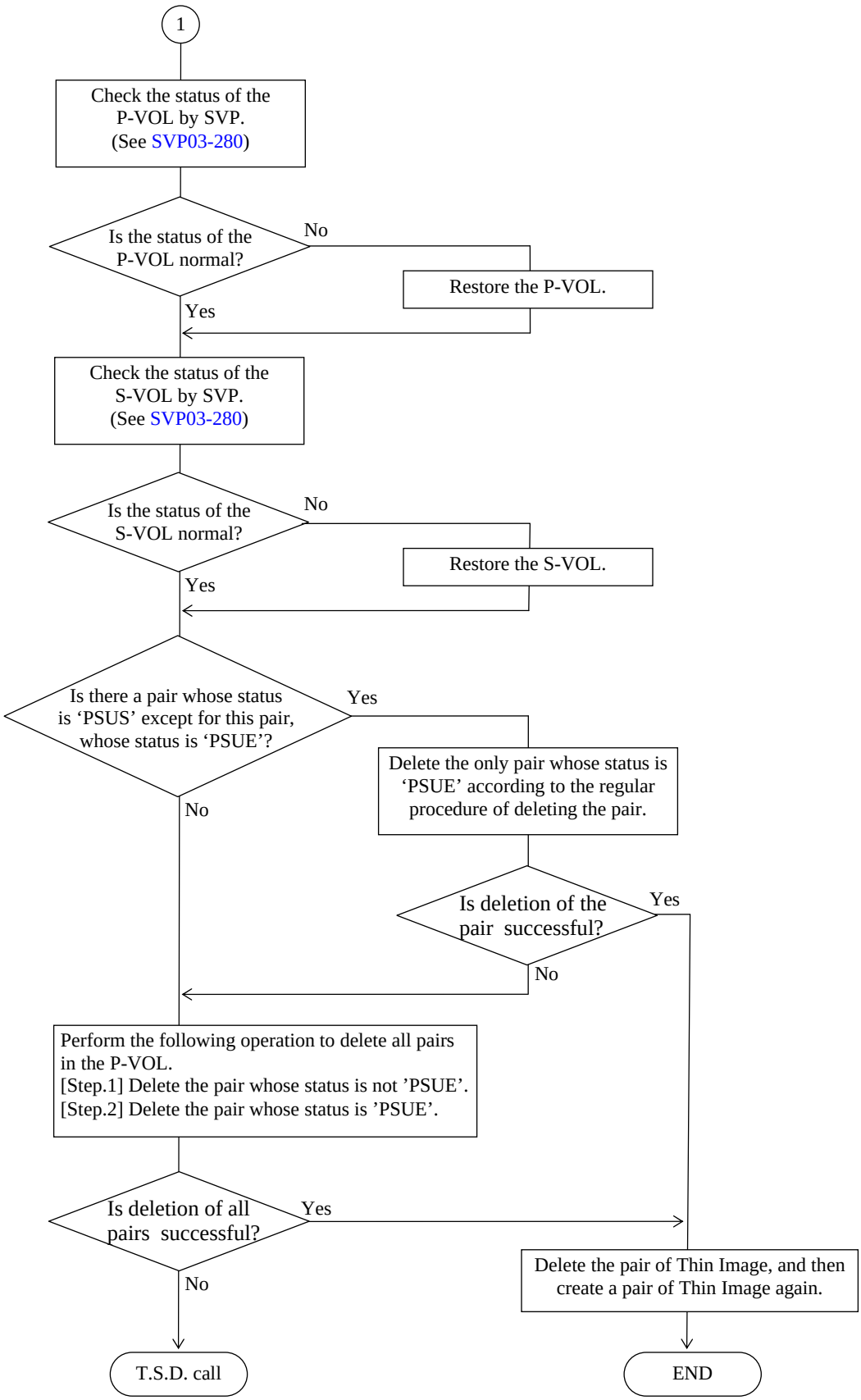


18.2 Procedure for Recovery from Copy-on-Write Snapshot/Thin Image failure (SIM = 4B3XYY, 7FF104)

The procedure for recovery from a failure occurs in a pair of Copy-on-Write Snapshot/Thin Image is explained below.

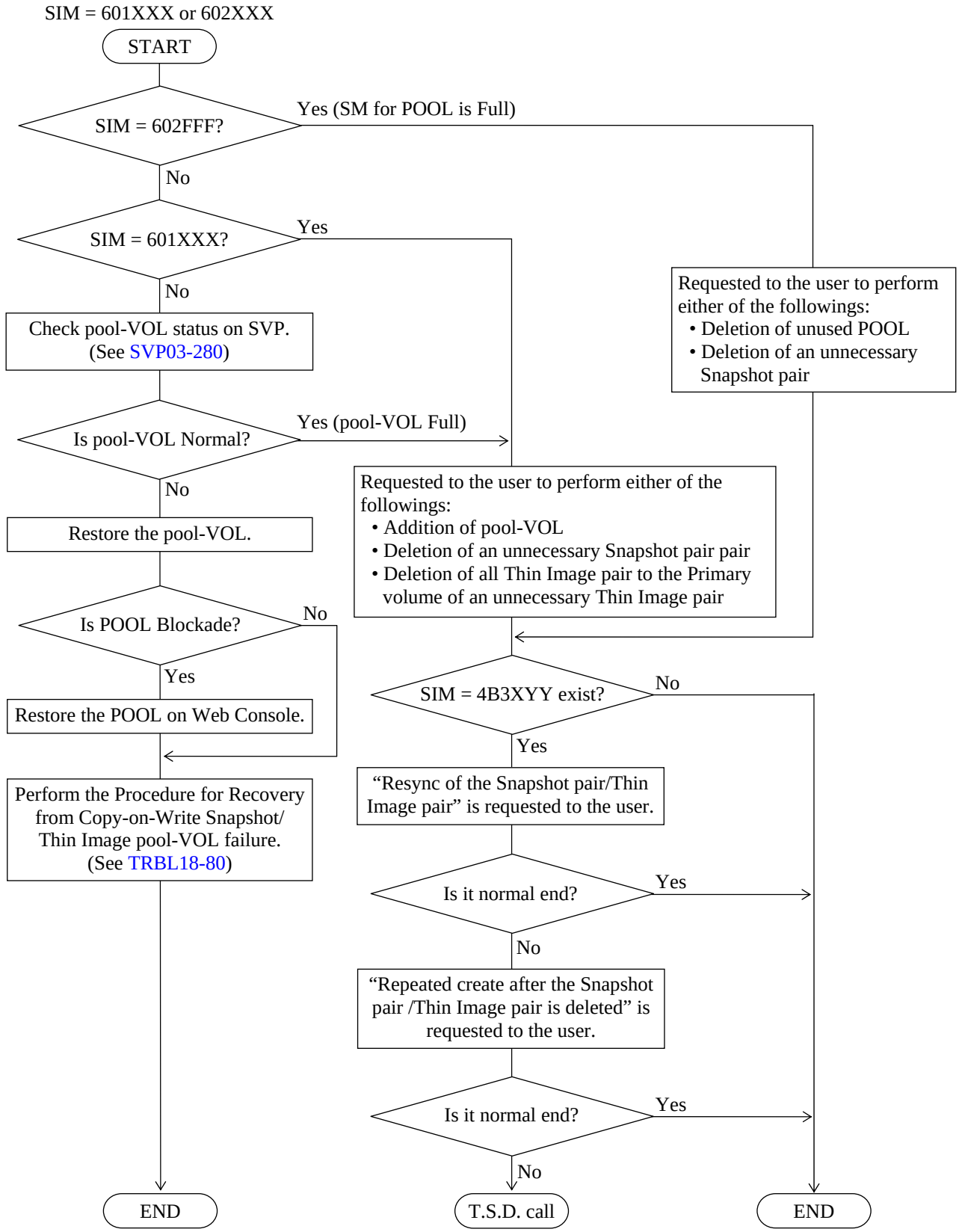


Thin Image Pair Error



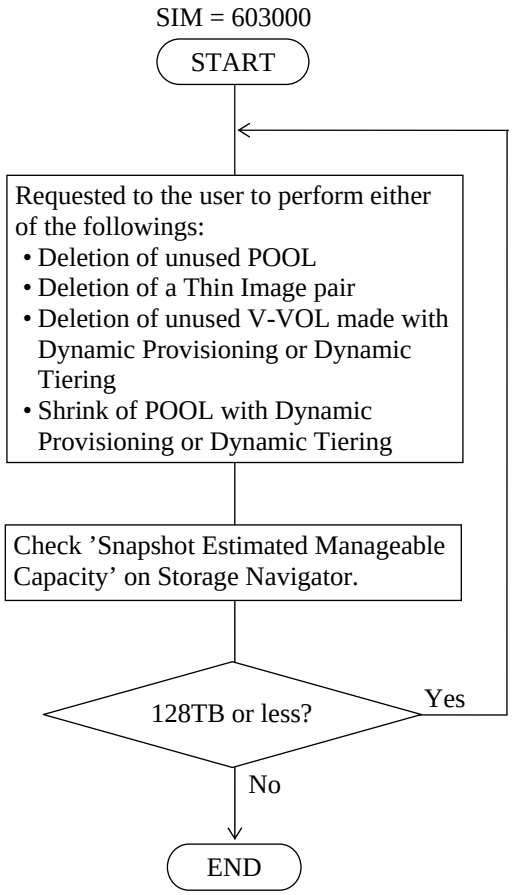
18.3 Procedure for Recovery from Pool failure (SIM = 601XXX, 602XXX)

The procedure for recovery from a failure occurs in the Pool is explained below.



18.4 Procedure for Recovery from Pool failure (SIM = 603000)

The procedure for recovery from a failure occurs in the Pool is explained below.

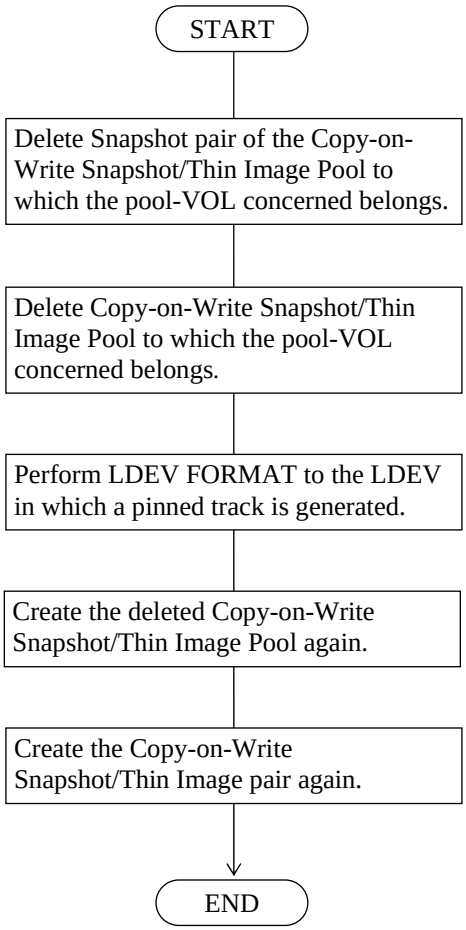


18.5 ECC/LRC Error recovery processing of Copy-on-Write Snapshot/ Thin Image pool-VOL

When an ECC/LRC Error occurs in a pool-VOL, perform the following recovery method because an I/O cannot be issued directly from the HOST for the track concerned.

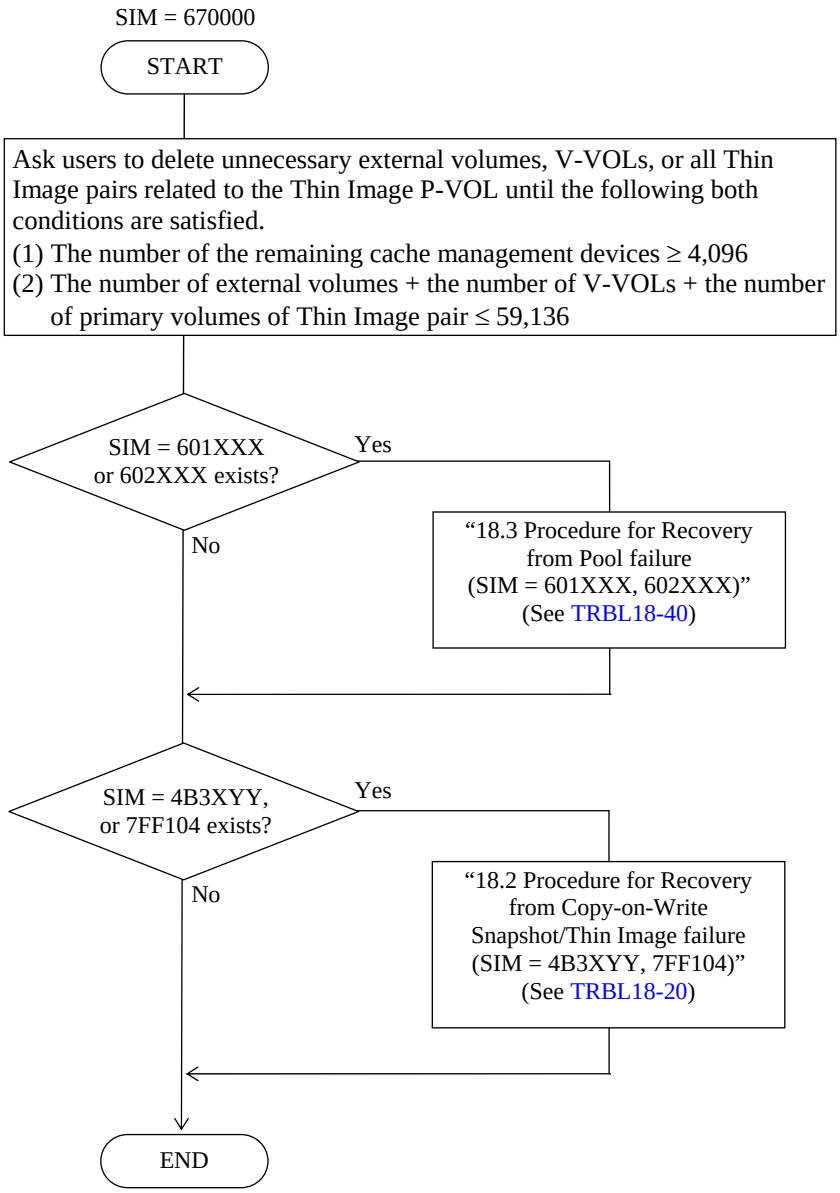
*1: In case of a Write Error, perform TRBL07-200 as well as the normal VOL and recover it.

*2: The LDEV that a POOL ID is displayed on the logical device window of the maintenance window is a pool-VOL.



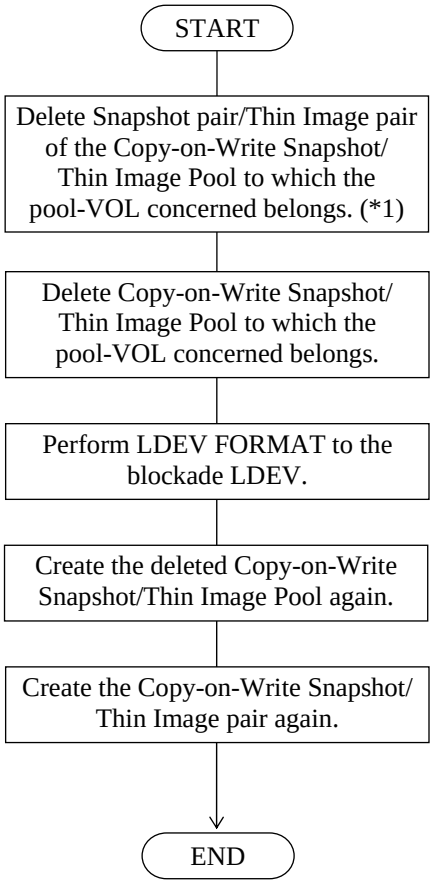
18.6 Procedure to recovery from Thin Image failure (SIM = 670000)

The procedure to recovery from a Thin Image failure is explained below.



18.7 Procedure for Recovery from Copy-on-Write Snapshot/Thin Image pool-VOL failure

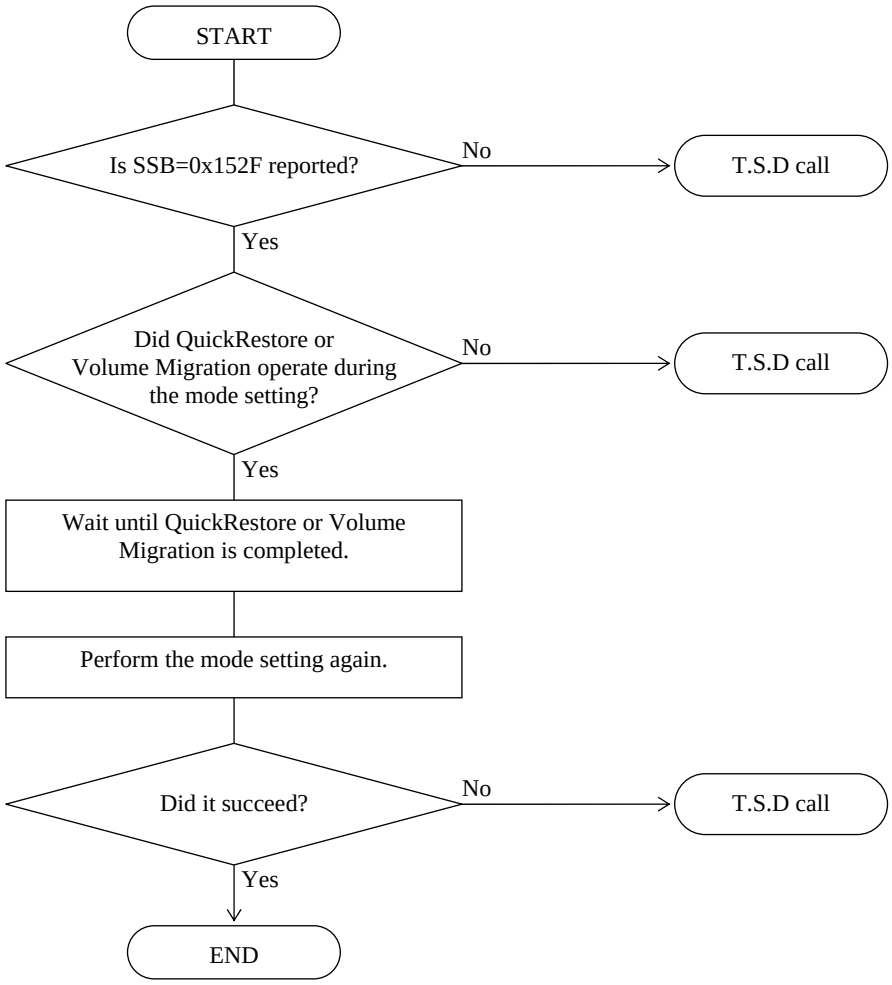
The procedure for recovery from a failure occurs in a pool-VOL of Copy-on-Write Snapshot/Thin Image is explained below.



*1 When the deletion of Snapshot pair/Thin Image pair fails and the pair status is changed PSUE, Snapshot pair/Thin Image pair can be deleted by executing it again.

19. Correspondence at the time of the mode setting failure of System Option

When “Operation was rejected by DKC.” and “Change Configuration was failed.” were displayed during the mode setting execution of System Option, correspond it in the following procedure.



20. Failure recovery of Dynamic Provisioning or Dynamic Tiering

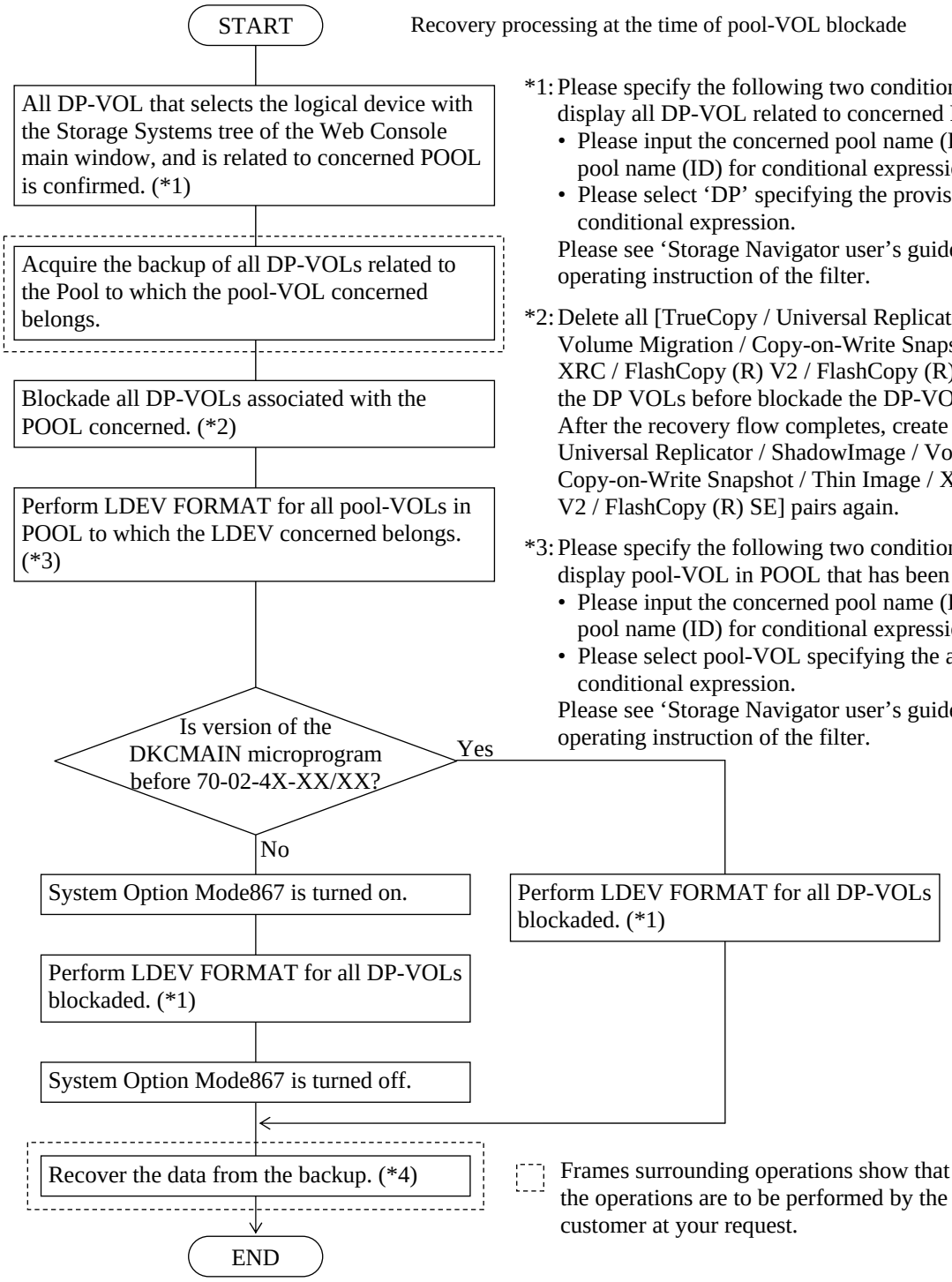
20.1 Recover method at the time of POOL VOL blockade (when two or more are blocked in RAID Gr to which POOL VOL belongs (three or more in case of RAID6))

Dynamic Provisioning or Dynamic Tiering become as follows. In this case, data cannot be recovered.

Item	Status
DP-VOL status	Normal
POOL status	Warning
POOL VOL status	Normal + Blocked (only LDEV is blocked in RAID Gr where two or more (three or more in case of RAID6) are blocked)
IO access	Partially possible (Access to normal POOL VOL is possible.)
Association with DP-VOL and POOL	Yes

Recovery method

Perform the recovery by the following flow.



*1: Please specify the following two conditions for the filter to display all DP-VOL related to concerned POOL.
- Please input the concerned pool name (ID) specifying the pool name (ID) for conditional expression.
- Please select 'DP' specifying the provisioning type for conditional expression.

Please see 'Storage Navigator user's guide' about the operating instruction of the filter.

*2: Delete all [TrueCopy / Universal Replicator / ShadowImage / Volume Migration / Copy-on-Write Snapshot / Thin Image / XRC / FlashCopy (R) V2 / FlashCopy (R) SE] pairs that use the DP VOLs before blockade the DP-VOLs.
After the recovery flow completes, create [TrueCopy / Universal Replicator / ShadowImage / Volume Migration / Copy-on-Write Snapshot / Thin Image / XRC / FlashCopy (R) V2 / FlashCopy (R) SE] pairs again.

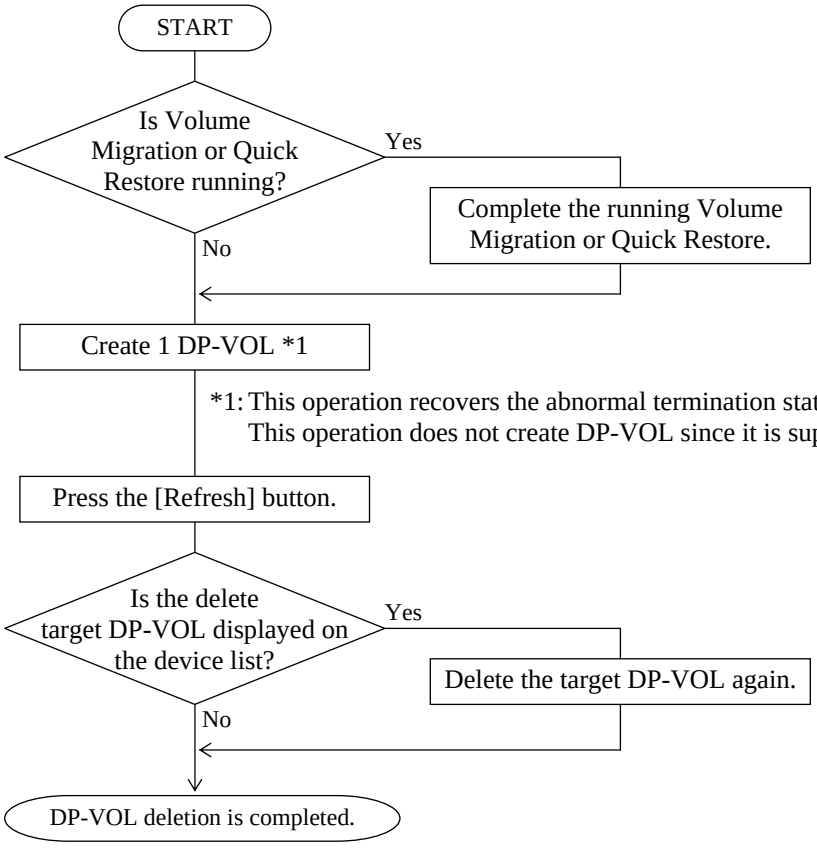
*3: Please specify the following two conditions for the filter to display pool-VOL in POOL that has been blockaded.
- Please input the concerned pool name (ID) specifying the pool name (ID) for conditional expression.
- Please select pool-VOL specifying the attribute for conditional expression.

Please see 'Storage Navigator user's guide' about the operating instruction of the filter.

*4: Please be careful when restoring data from a backup.
If data is backed up per volume (DP-VOL), unallocated areas in the volume are also backed up. Therefore when the data is restored, a write operation is performed also for the unallocated areas, and the areas become allocated (though with zero data), resulting in an increase in the used pool capacity. If many DP-VOLs are restored at a time, the pool may become full.
To restore DP-VOLs, perform the following procedure for each of all DP-VOLs.
(1) Restore the data from the backup
(2) Perform the Reclaim Zero Pages processing
Note: When data is restored per file from the backup, only the consumed (allocated) areas are restored from the backup, so you do not have to perform the Reclaim Zero Pages processing.

20.2 Recovery Procedure when DP-VOL Deletion of Dynamic Provisioning or Dynamic Tiering Fails (Storage Navigator Error Code = 3205 8966)

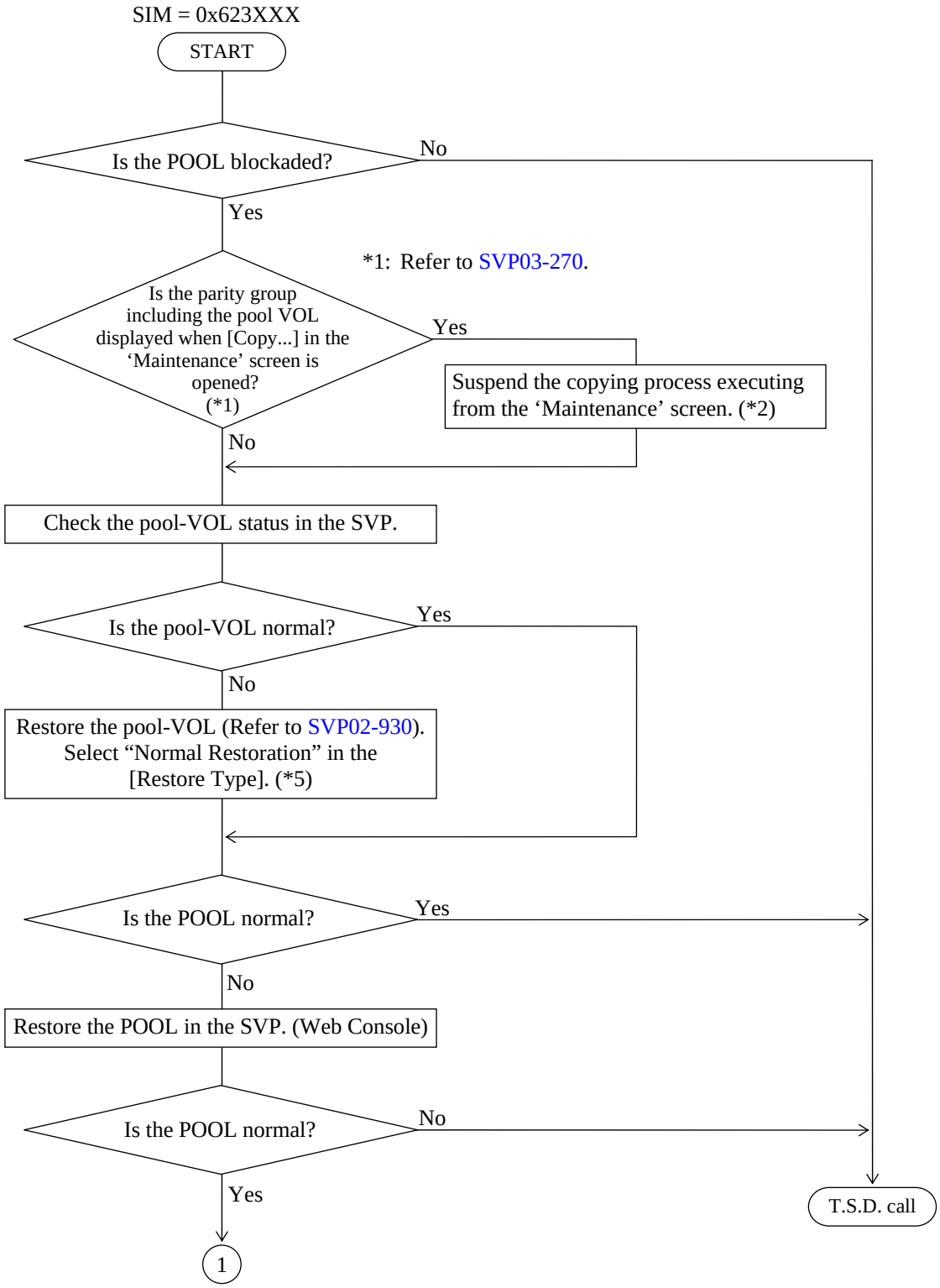
The recovery procedure when DP-VOL deletion processing of Dynamic Provisioning or Dynamic Tiering fails in Error Code [3205 8966] is shown below.

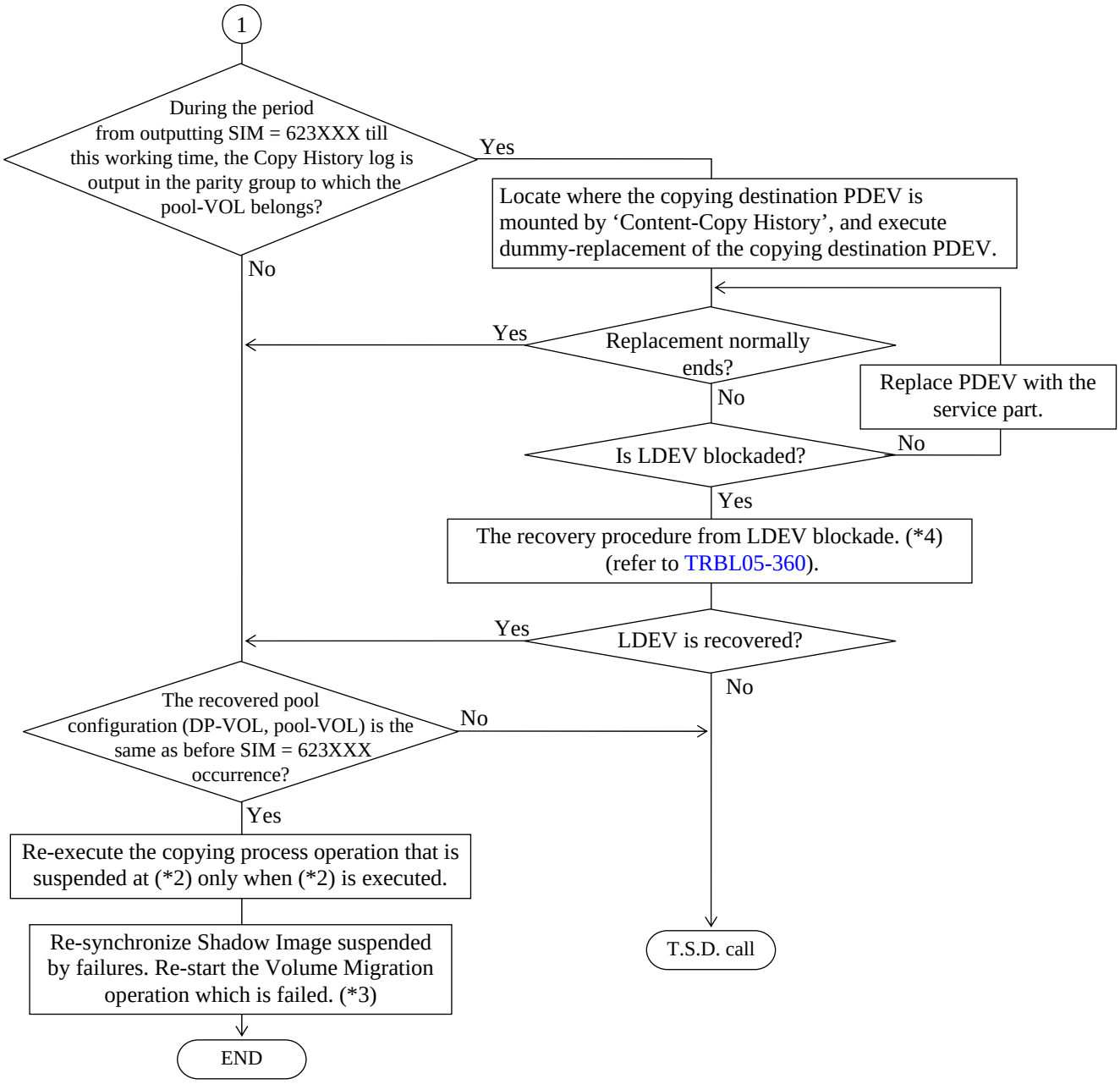


*1: This operation recovers the abnormal termination status of DP-VOL deletion.
This operation does not create DP-VOL since it is suppressed by Error Code [3205 2095].

20.3 Recovery procedure for the Pool failure (SIM = 623XXX)

The recovery procedure for the failure of the pool used in the Dynamic Provisioning or Dynamic Tiering is shown here.





Note: Procedure to recover DP-VOL:
Please recover the pool of Dynamic Provisioning or Dynamic Tiering referring to "Provisioning Guide for Open Systems" or "Provisioning Guide for Mainframe Systems".
DP-VOL recovers by recovering the pool of Dynamic Provisioning or Dynamic Tiering.
Please confirm all the pool of Dynamic Provisioning or Dynamic Tiering has recovered when DP-VOL is not recovered.
Please execute LDEV format or execute force LDEV recovery from SVP after all the pool of Dynamic Provisioning or Dynamic Tiering has recovered.

*2: Set SVP to [Modify Mode], and suspend the copying process that is executing by [Other] -> [Drive Interrupt].

*3: When the pool is blockaded, the Shadow Image pair using DP-VOL related with the blockaded pool may be suspended by failures, and VOL migration process of Volume Migration may end abnormally.

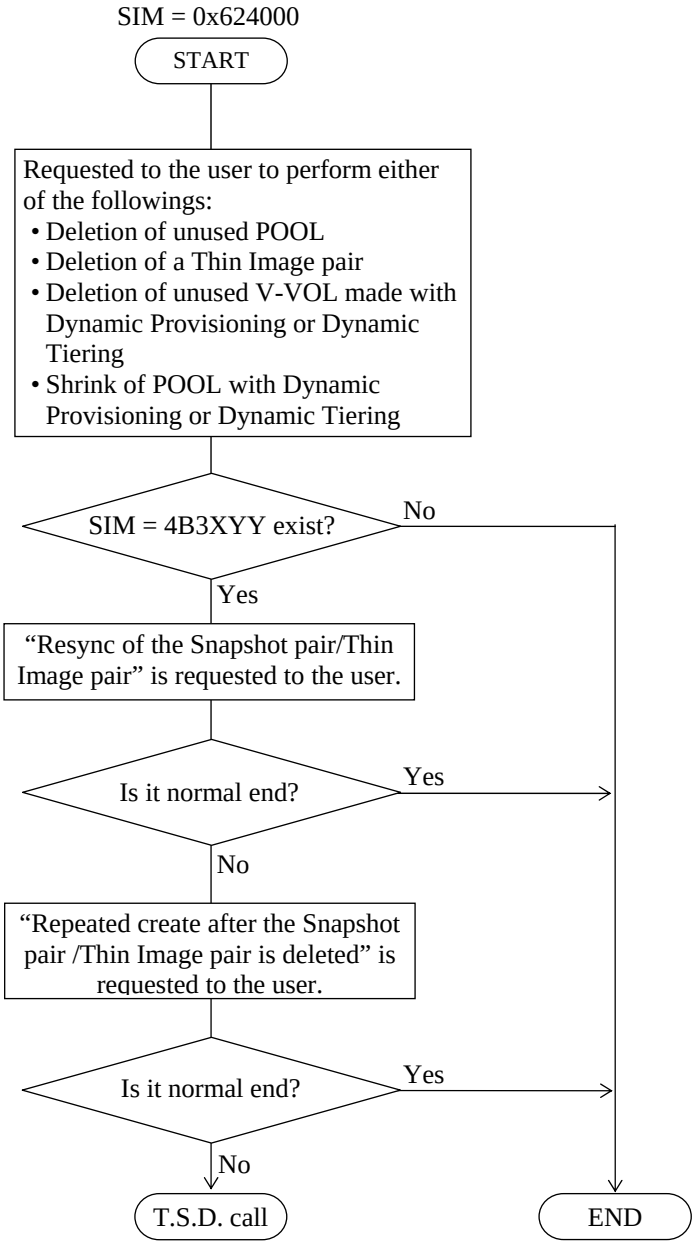
*4: Be sure to choose "B" for "the action to be taken" in the flowchart of the recovery procedure from LDEV blockade. When "A" is mistakenly chosen, data recovery will fail.

*5: When the status of the pool-VOL is not changed into "Normal", collect the Auto dump and ask the Technical Supports Division (T.S.D.) for what action should be taken.

20.4 (Blank)

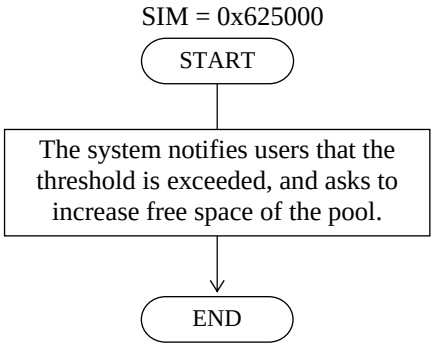
20.5 Recovery procedure for the Pool failure (SIM = 624000)

The recovery procedure for the failure of the pool used in the Dynamic Provisioning or Dynamic Tiering or Thin Image is shown here.



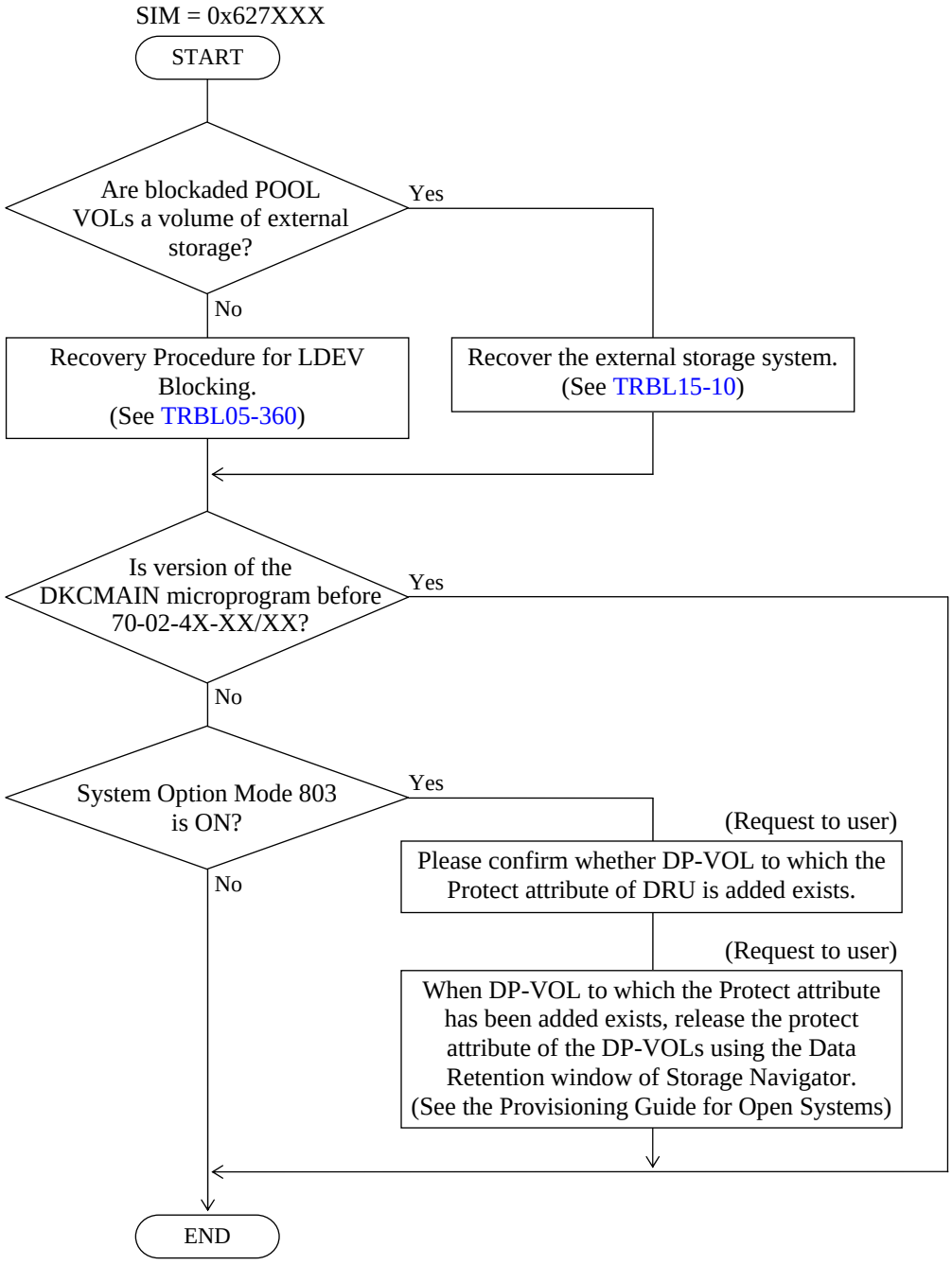
20.6 Recovery procedure for the Pool failure (SIM = 625000)

The recovery procedure for the failure of the pool used in the Dynamic Provisioning or Dynamic Tiering is shown here.



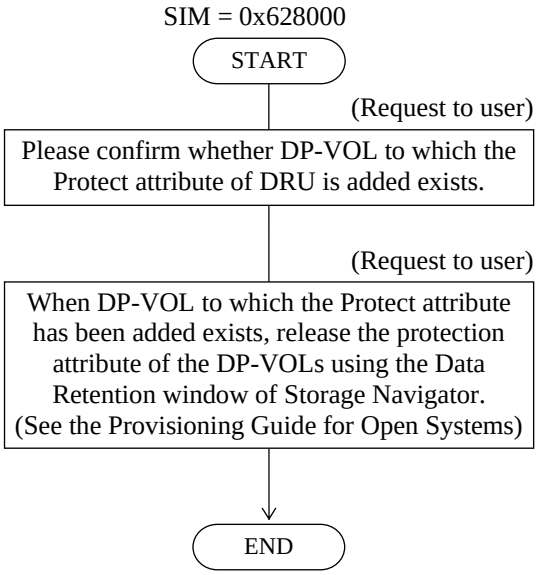
20.7 Recovery procedure for the POOL VOL blockaded (SIM = 627XXX)

The recovery procedure for the POOL VOL blockaded used in the Dynamic Provisioning or Dynamic Tiering is shown here.



20.8 The release procedure for the Protection attribute of Data Retention Utility (SIM = 628000)

The release procedure for the Protection attribute of Data Retention Utility set to the Dynamic Provisioning or Dynamic Tiering is shown here.



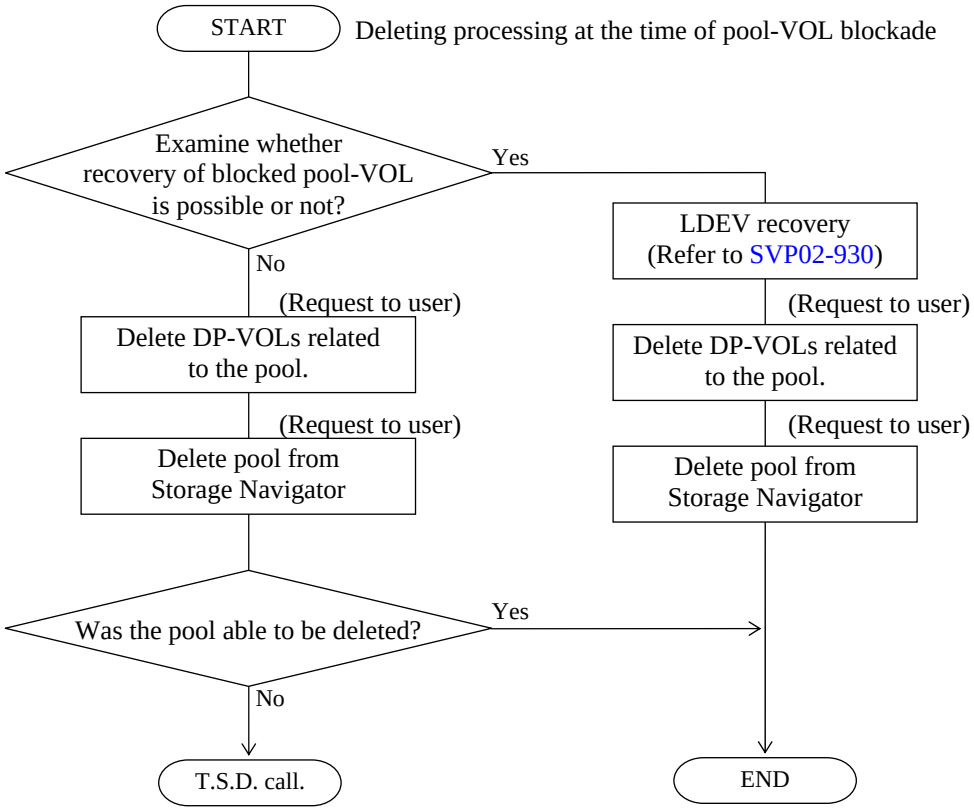
20.9 Deleting method at the time of POOL VOL blockade (When external volumes are removed to which POOL VOL belong)

Dynamic Provisioning or Dynamic Tiering become as follows. In this case, data cannot be recovered.

Item	Status
DP-VOL status	None
POOL status	Normal (usage rate > 0%)
pool-VOL status	Blocked
IO access	Impropriety
Association with DP-VOL and POOL	None (Note that the association is being released and exists internally)

Recovery method

Perform the recovery by the following flow.



20.10 Initialize Pools procedure

Note 1: When Initialize Pools executed, the pool of all Dynamic Provisioning / Dynamic Tiering / Thin Image is blockaded.

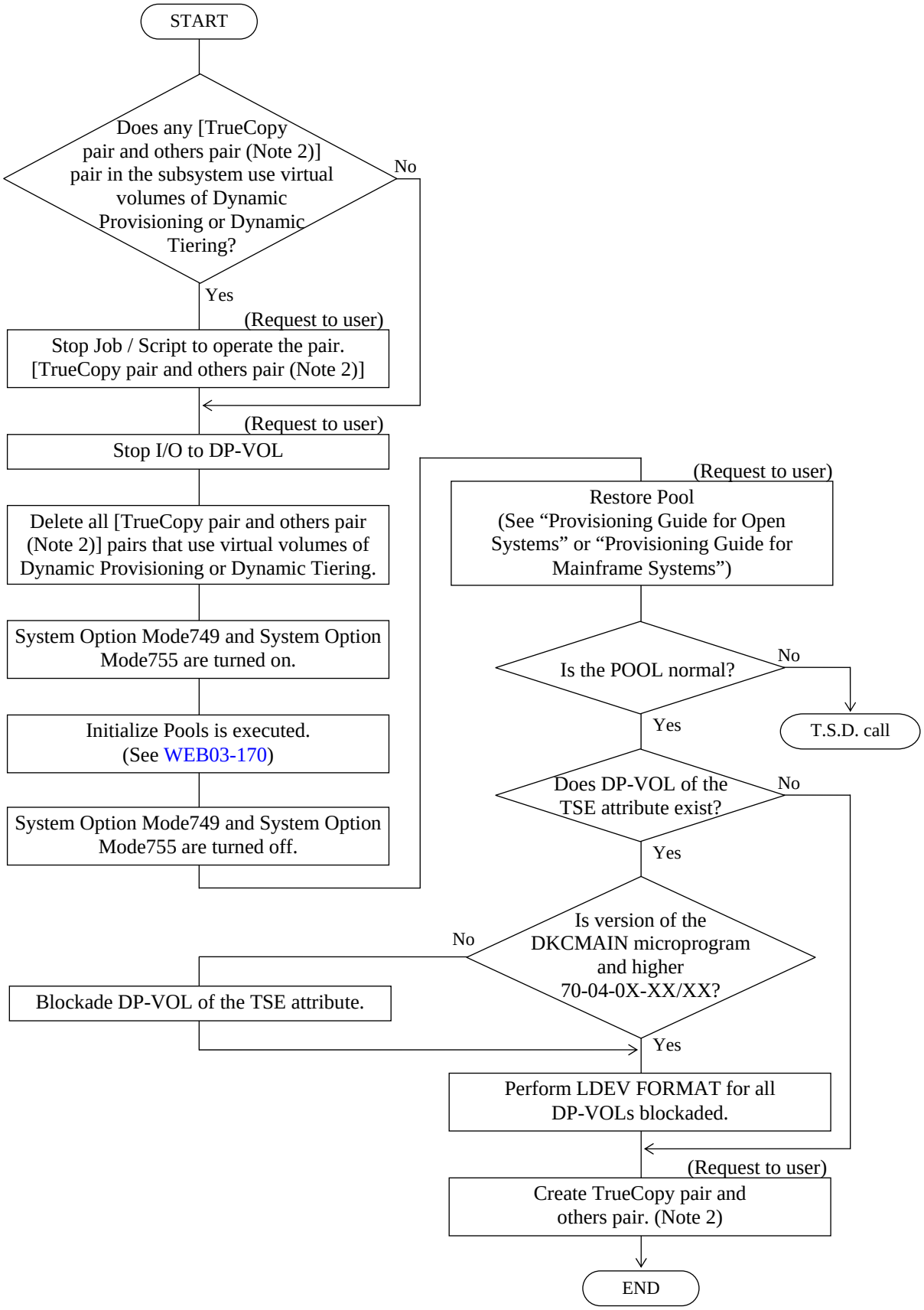
Note 2: In the case [TrueCopy / Universal Replicator / ShadowImage / Volume Migration / Copy-on-Write Snapshot / XRC / FlashCopy (R) V2 / FlashCopy (R) SE] use virtual volumes of Dynamic Provisioning or Dynamic Tiering, delete all [TrueCopy / Universal Replicator / ShadowImage / Volume Migration / Copy-on-Write Snapshot / XRC / FlashCopy (R) V2 / FlashCopy (R) SE] pairs that use the virtual volumes before performing Initialize Pools.
After Initialize Pools completes, create [TrueCopy / Universal Replicator / ShadowImage / Volume Migration / Copy-on-Write Snapshot / XRC / FlashCopy (R) V2 / FlashCopy (R) SE] pairs again.
During Initialize Pools, don't create [TrueCopy / Universal Replicator / ShadowImage / Volume Migration / Copy-on-Write Snapshot / XRC / FlashCopy (R) V2 / FlashCopy (R) SE] pairs with Virtual Volumes of Dynamic Provisioning or Dynamic Tiering. In the case create those pairs, initialize and paircreate operation may fail.

Note 3: Delete all Thin Image pairs before performing Initialize Pools.
After Initialize Pools completes, create Thin Image pairs again.
During Initialize Pools, don't create Thin Image pairs. In the case create Thin Image pairs, initialize and paircreate operation may fail.

Note 4: Do not execute the maintenance of Dynamic Provisioning until the pool restores normally after executing Initialize Pools.

Note 5: Perform the operation only when it is directed by the Technical Support Division.

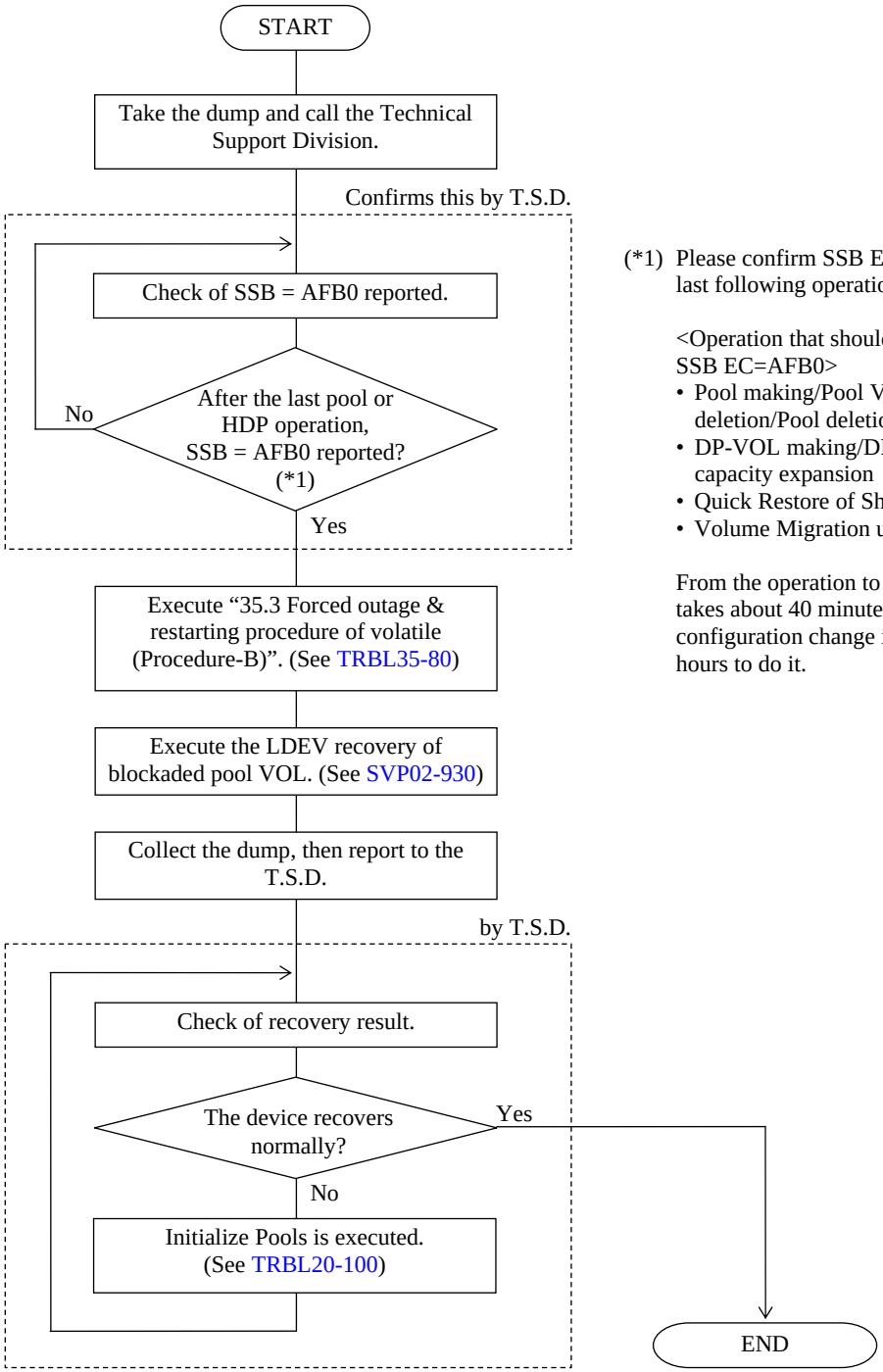
Note 6: For the password, refer to the Technical Support Division.



20.11 Recovery procedure by power turned off and volatilizing PS ON for Dynamic Provisioning or Dynamic Tiering

CAUTION

This operation supposes a special case such as a recovery from a failure unlike the usual powering off operation. Do not perform this operation without a direction given by the Technical Support Division.



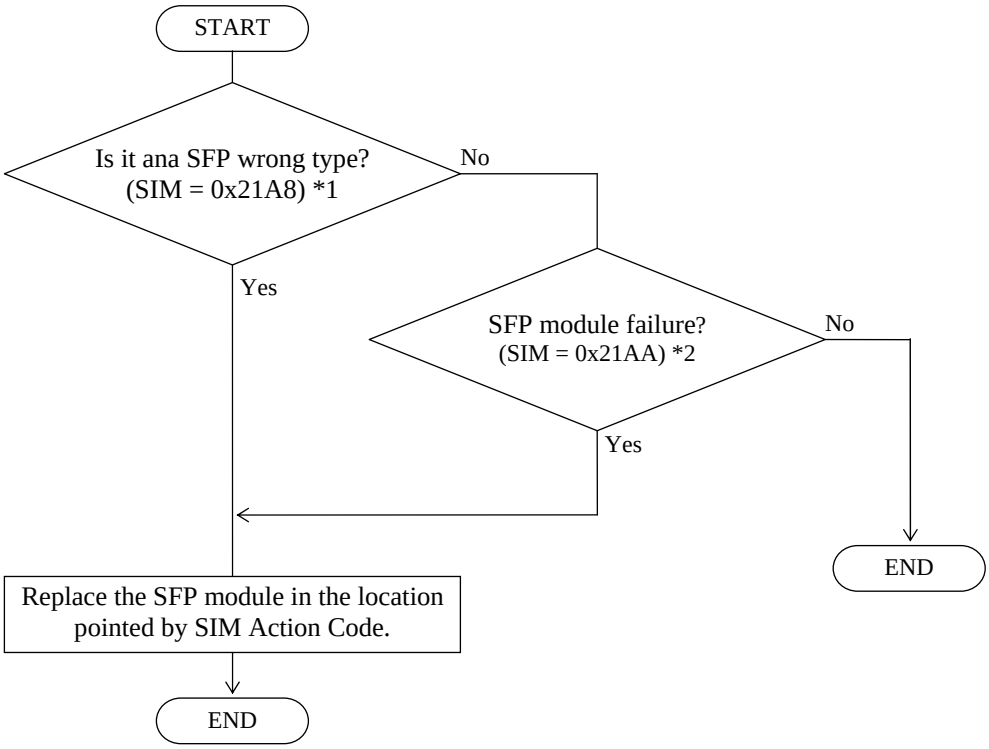
(*1) Please confirm SSB EC=AFB0 was output after the last following operation is executed.

<Operation that should confirm report of SSB EC=AFB0>
- Pool making/Pool VOL addition/Pool VOL deletion/Pool deletion
- DP-VOL making/DP-VOL deletion/DP-VOL capacity expansion
- Quick Restore of ShadowImage using DP-VOL
- Volume Migration using DP-VOL

From the operation to the report of SSB, it usually takes about 40 minutes. However, when the configuration change is repeated, it might take several hours to do it.

21. SFP Module Failure Detection (SIM = 0x21A8, 0x21AA)

The recovery procedure when an SFP module failure occurs is indicated.

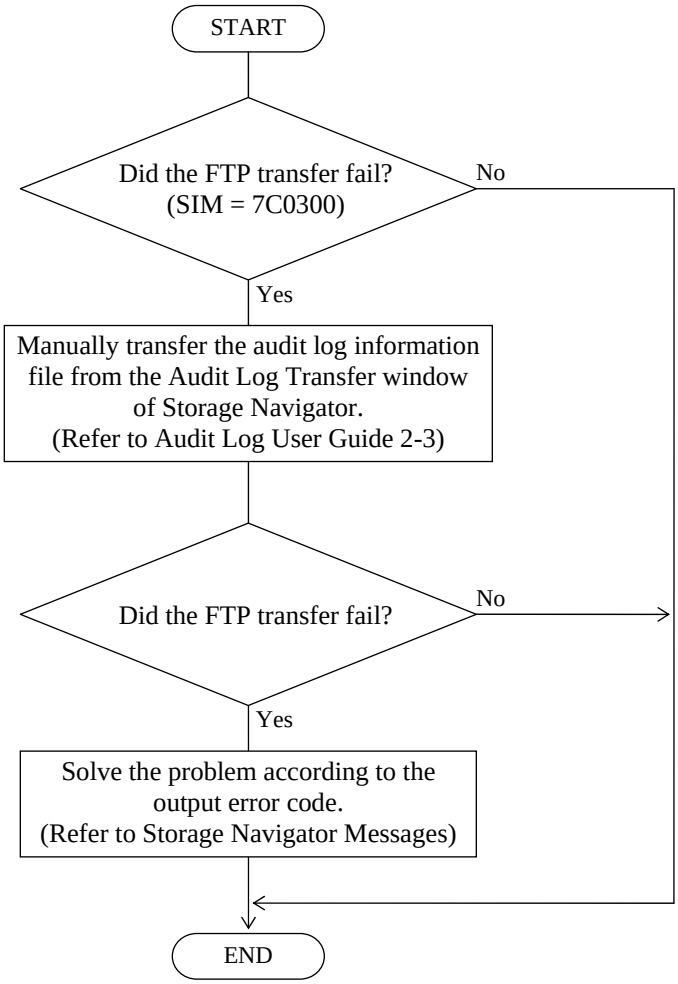


*1: SFP wrong type factors
- When a LongWave SFP is used in the ShortWave setting port and a ShortWave SFP is used in the LongWave setting port.
- When an unsupported SFP transceiver is installed.
- When the information on the SFP is not recognized correctly.

*2: SFP module failure factors
- When SFP module hardware failure is occurred.
- When an unsupported SFP transceiver is installed.

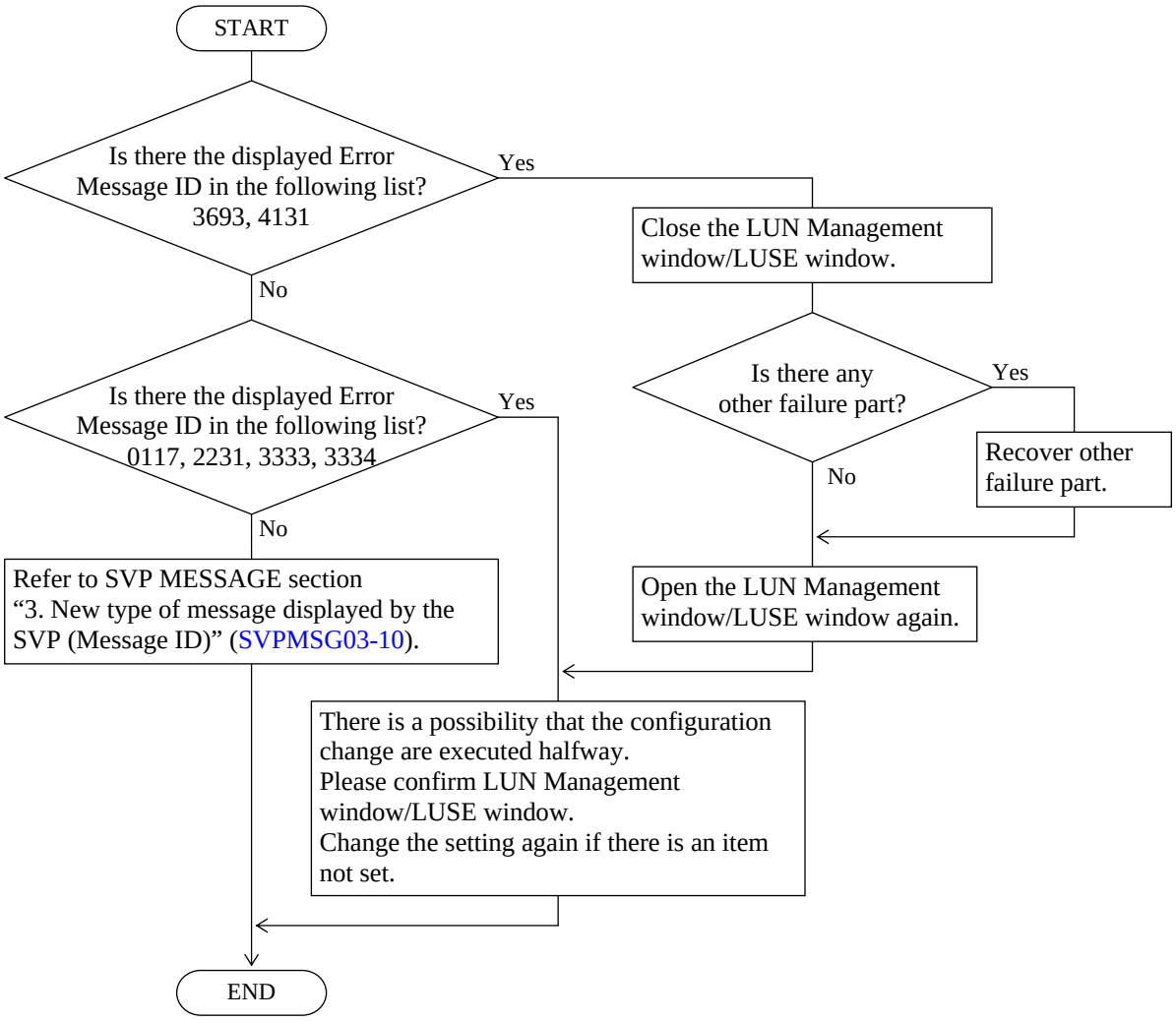
22. Correspondence when detecting the audit log FTP transfer failure (SIM = 7C0300)

The recover procedure when failing to the audit log FPT transfer is indicated.



23. LUN Management/LUSE Error Recovery on SVP Change Configuration

This section describes about troubleshooting of the error recovery for LUN Management/LUSE on SVP Change Configuration.



24. SATA HDD/FLASH DRIVE/Encrypted PG LDEV FORMATTING Failure Detection (SIM = 0x4100-0x)

4100-02: Some ECC Groups are failed at LDEV Formatting.

One or more ECC Groups failed at LDEV formatting exists.

When SIM related to HDD or SAS Port has been generated at the same time, measures of this SIM should be executed.

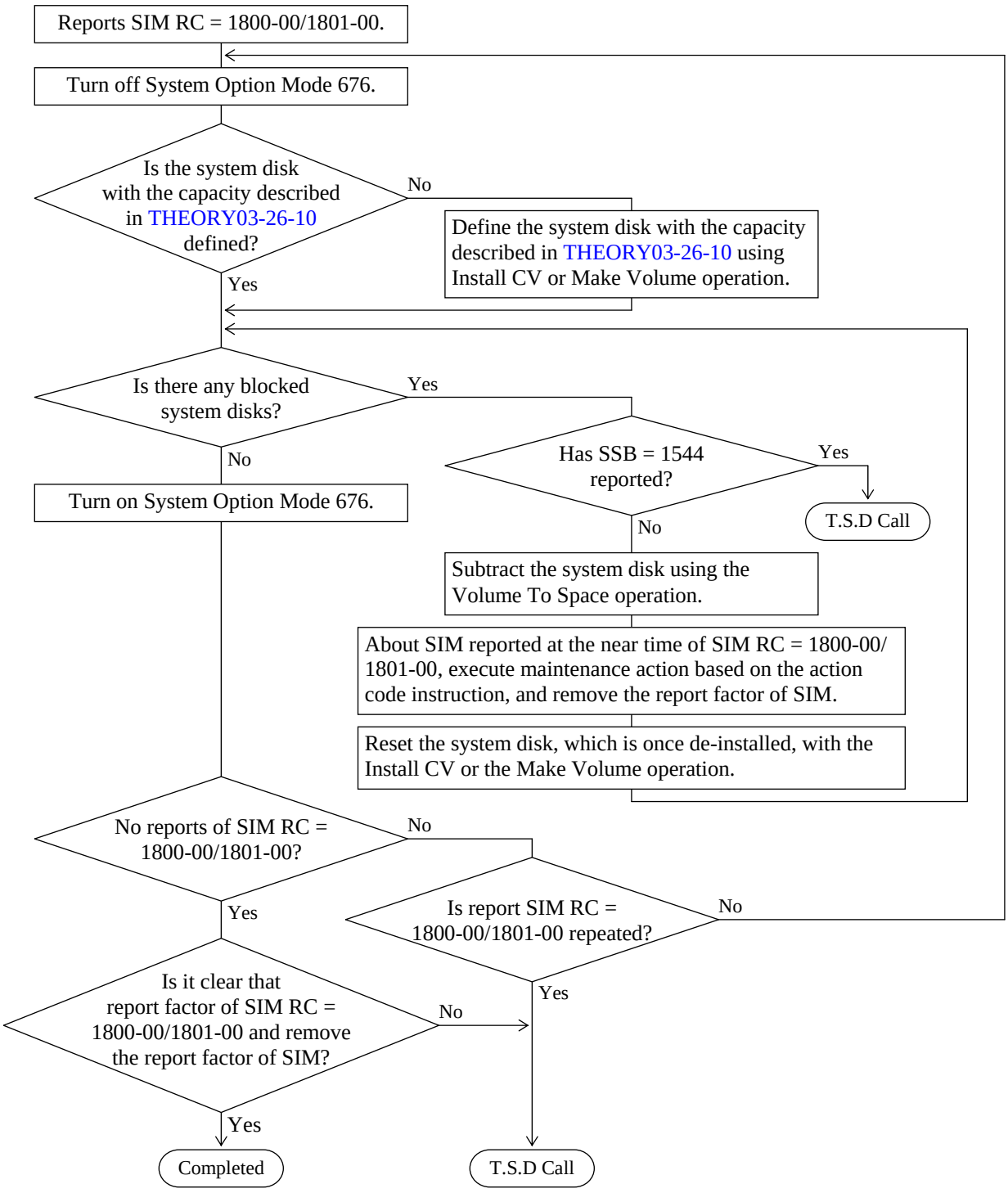
4100-01: LDEV Formatting is failed

Take the dump and call the Technical Support Division.

25. (Blank)

26. Failure Recovery while Using the System Disk (SIM = 180000, 180100)

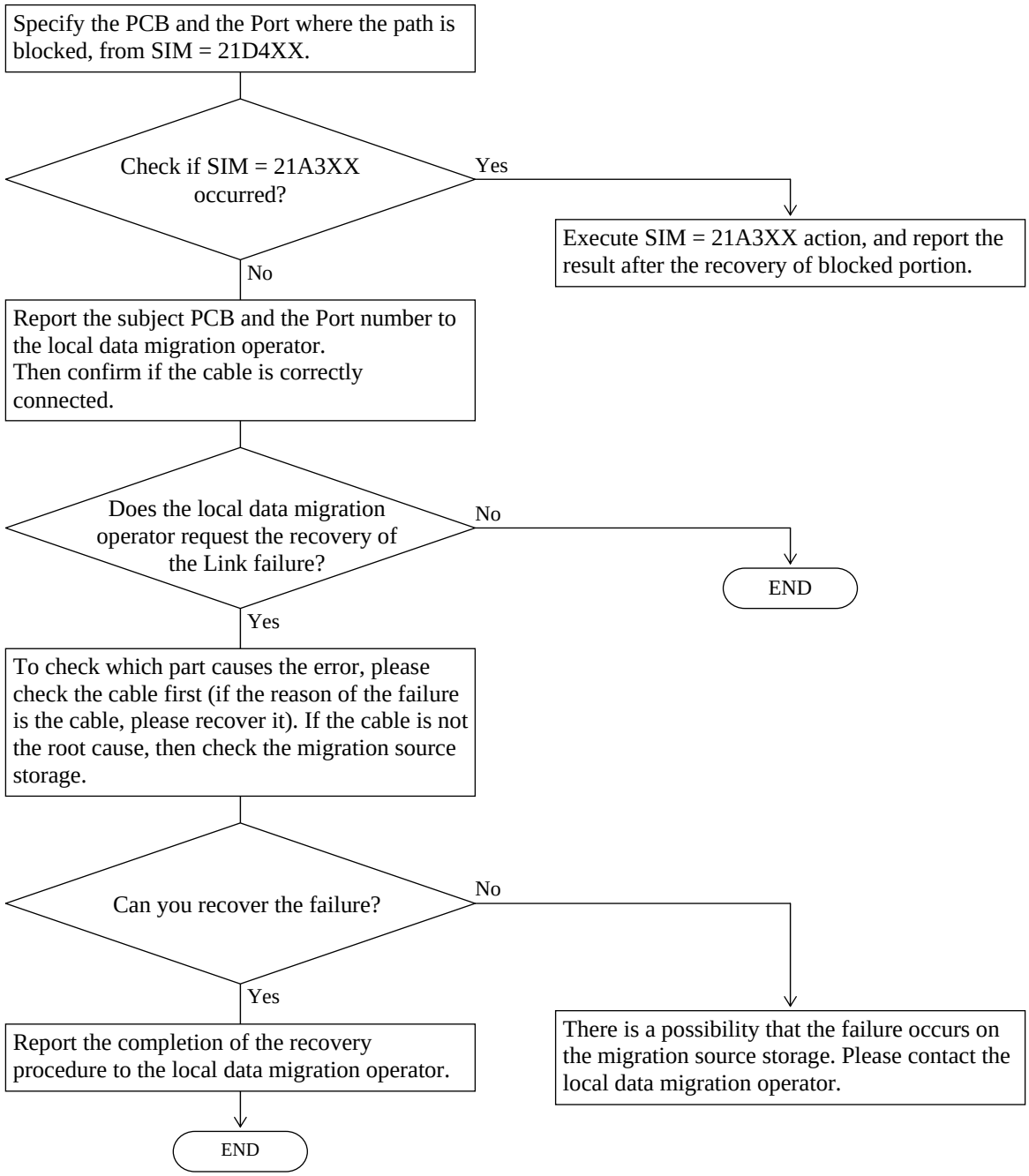
SIM RC = 1800-00 is a log which warns that the Audit log has disappeared before storing the system disk.
SIM RC = 1801-00 is a log which warns that Audit log cannot be transferred to the system disk.
Both logs are reported when system disk storage function of the Audit log is enable (when System Option Mode 676 is ON), and the actions when these logs have been reported is described as follows.



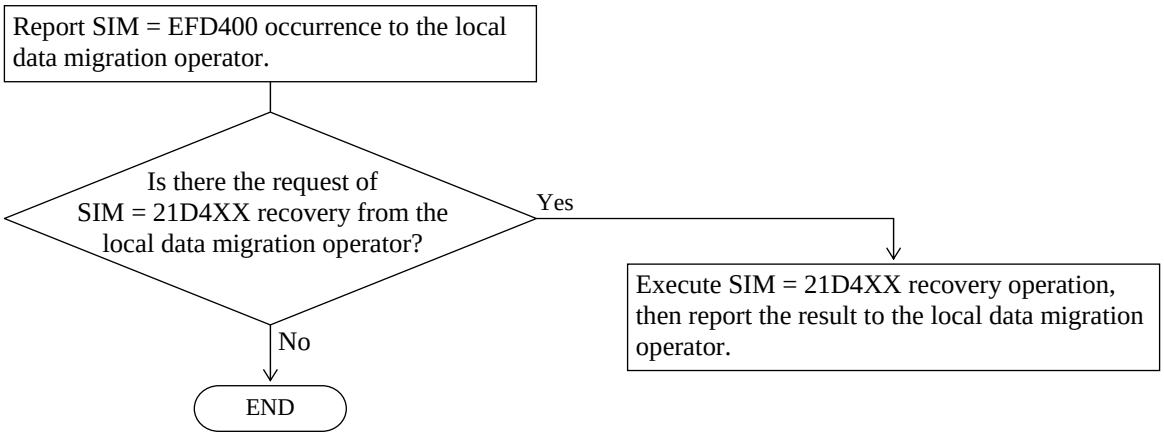
27. Recovery procedure of the Mainframe Fibre Data Migration in case of failure (SIM = 21D4XX, EFD400, 47DXYY, 47E700)

On the failure of the Mainframe Fibre Data Migration, the following shows the recovery procedures for the each of factors: SIM = 21D4XX (Mainframe Fibre DM Path blocked, SIM = EFD400 (Mainframe Fibre DM Source Device blocked), and SIM = 47DXYY/47E700 (ShadowImage pair of Mainframe Fibre DM is suspended).

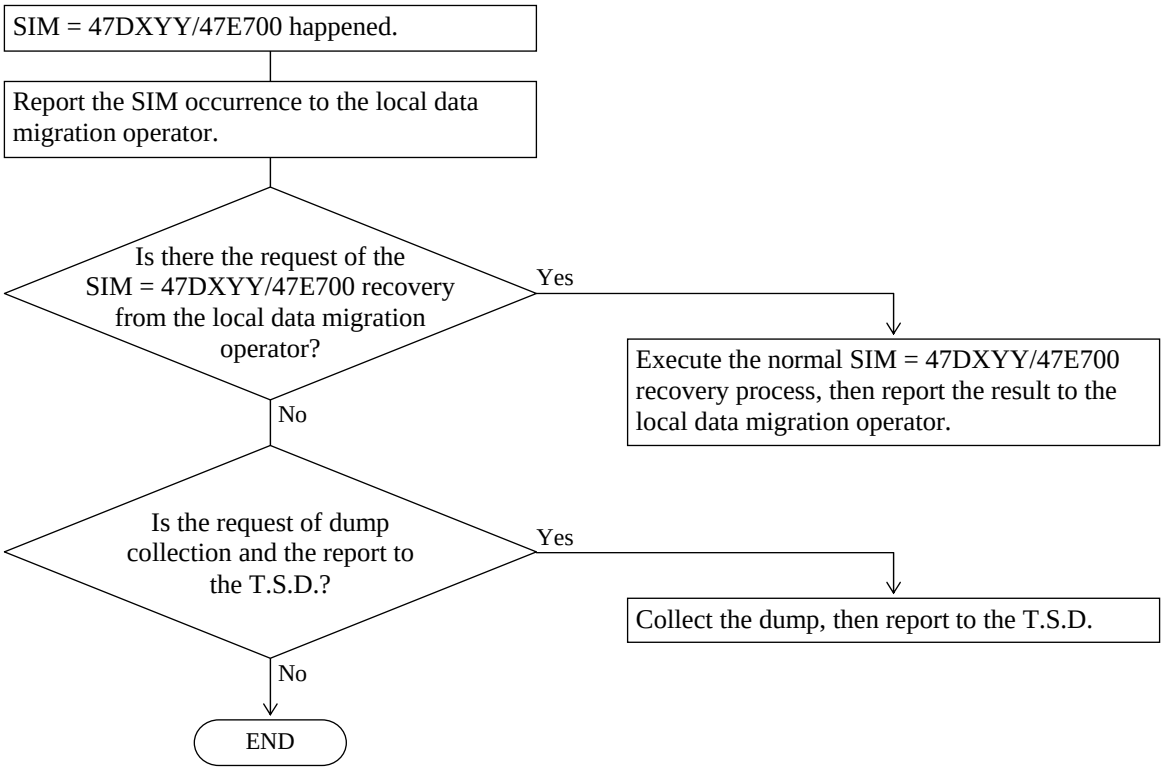
(1) SIM = 21D4XX



(2) SIM = EFD400



(3) SIM = 47DXYY/47E700



28. MP Blockade Reset Function

(1) Usage Guideline

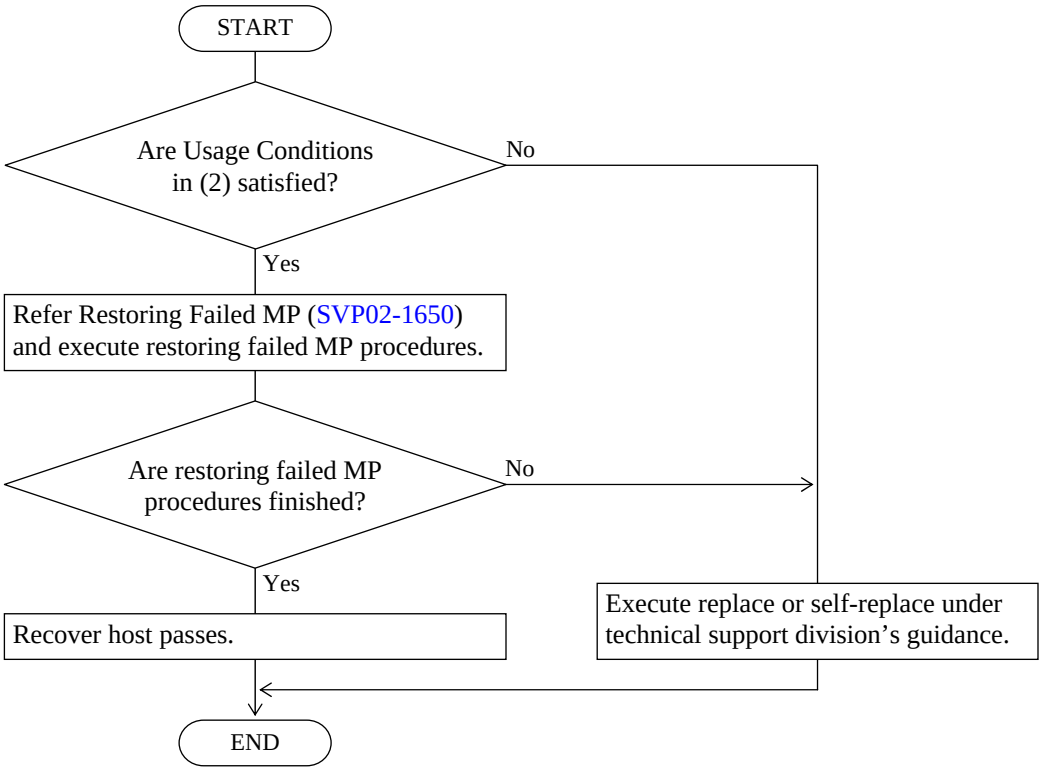
- This is a special function to recover a MP blockade operation without the need to self-replace the card under certain conditions specified below.
- To use this function, please open a case with your Technical Support Division and proceed under their guidance.

(2) Usage Conditions

- To recover a MP in which WCHK1 occurred due to a microprogram problem.
  Eg.) Cache of WCHK1 is EC = 1644.
- Requested as a recovery procedure for an issue notified by an Early Notice/Alert.
- Requested by following the procedure described in Maintenance Manual.

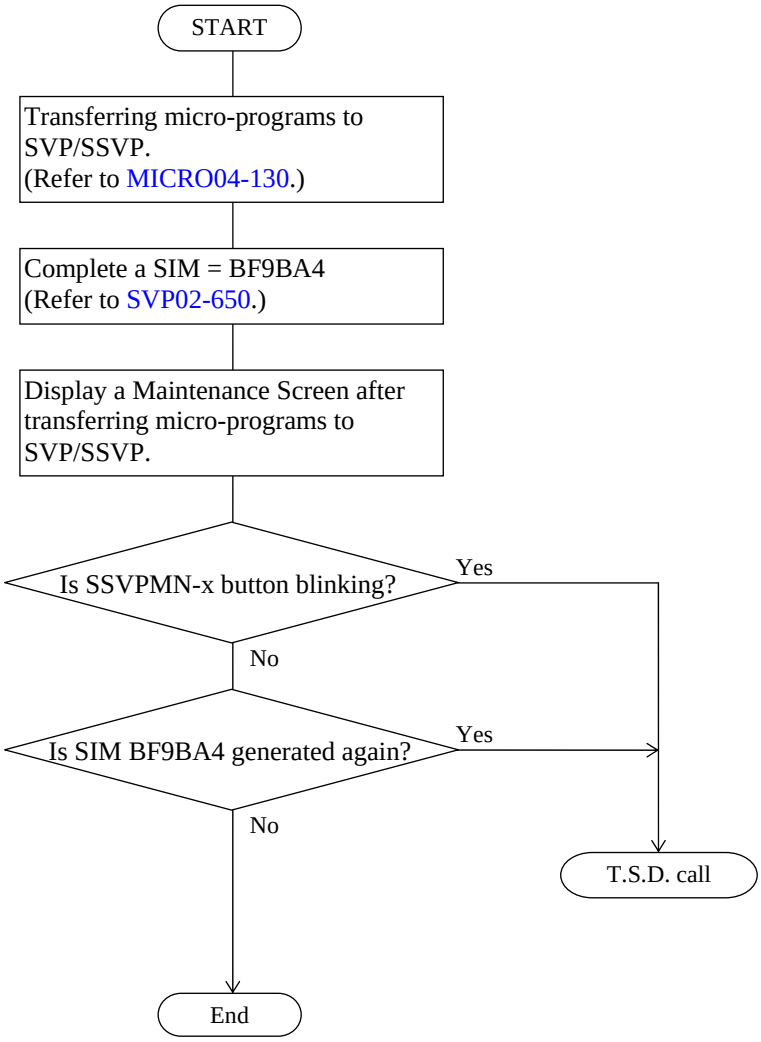
Not to be used to recover hardware failures.

(3) MP Reset Procedure Flowchart

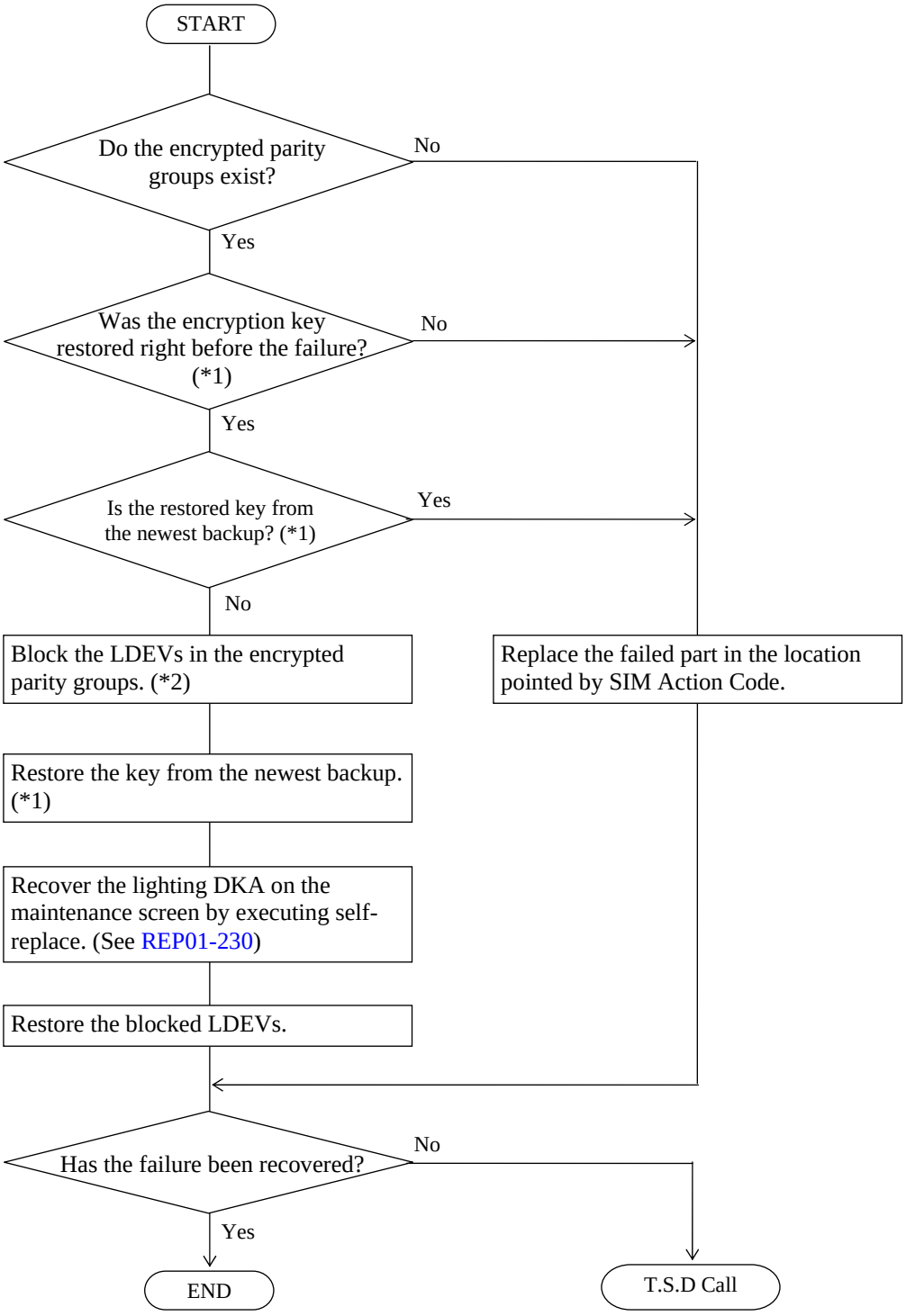


29. Recovery Procedure for Mismatch of SSVPMN micro program version (SIM = BF9BA4)

When “Mismatch of SSVPMN micro program version” are occurred, make a recovery according to the following procedure.



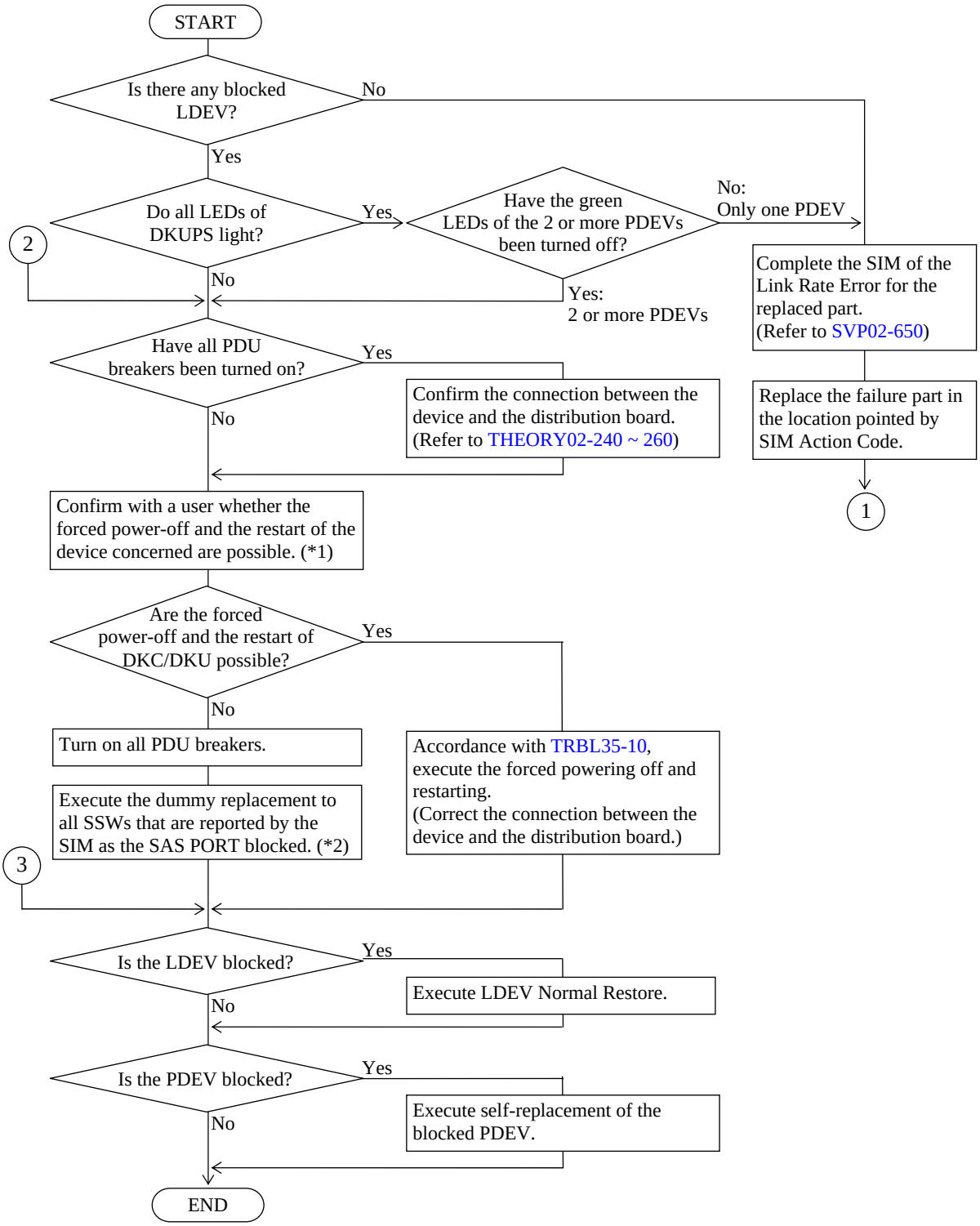
30. Recovery procedure for DMA Blocking (SIM = CF83XY)



*1: The backup and restoration of the encryption key must be performed by the customer security administrator. Please request the customer security administrator to confirm settings and operate.
*2: Please block the LDEVs with 'Logical Device' window of SVP.

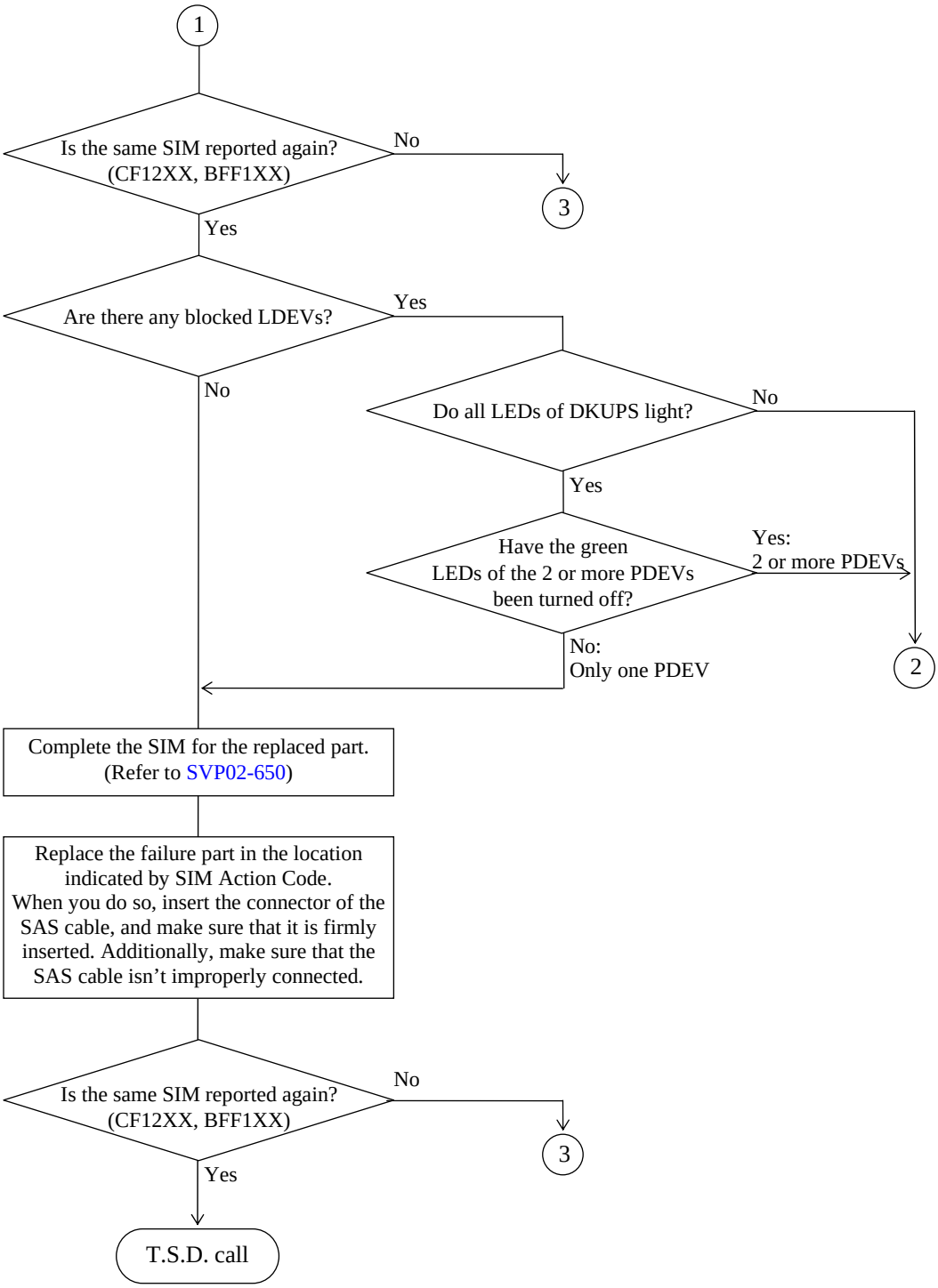
31. Recovery when several SAS PORT blocked/SSW access errors are occurred at the same time (SIM = CF12XX, BFF1XX)

It recovers according to the following procedures when several SAS PORT blocked / SSW access errors (SIM = CF12XX, BFF1XX) are occurred at the same time.



*1: When the device and the distribution board are wrongly connected, explain it to the customer, stop the device according to the plan, and correct the connection.

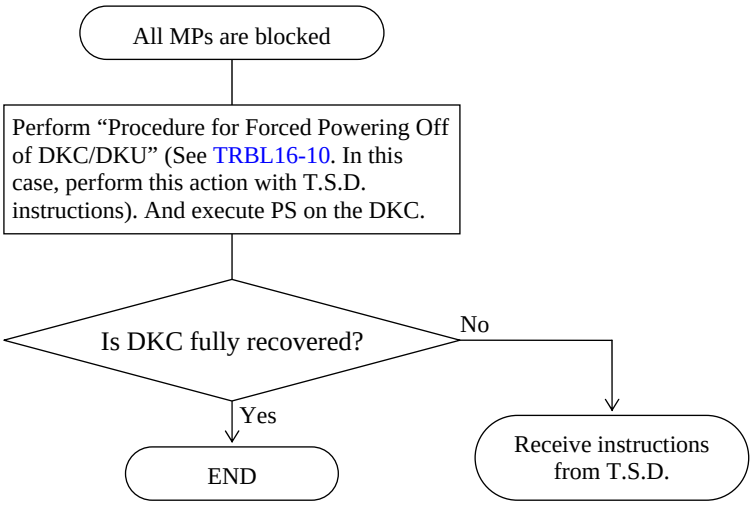
*2: • Insert the SSW 10 or more seconds later after pulling it out.
• After SSW replacement, the SIM (CF11XX, CF12XX, BFF1XX) related to another SSW may be reported.



32. Recovery procedure for DKC blocked (SIM = 30A100)

CAUTION

Perform this action that a special procedure is included in, by instructions of T.S.D.



33. Quorum Disk Error Recovery

When you use HAM, Hardware error sometimes causes Quorum Disk error.

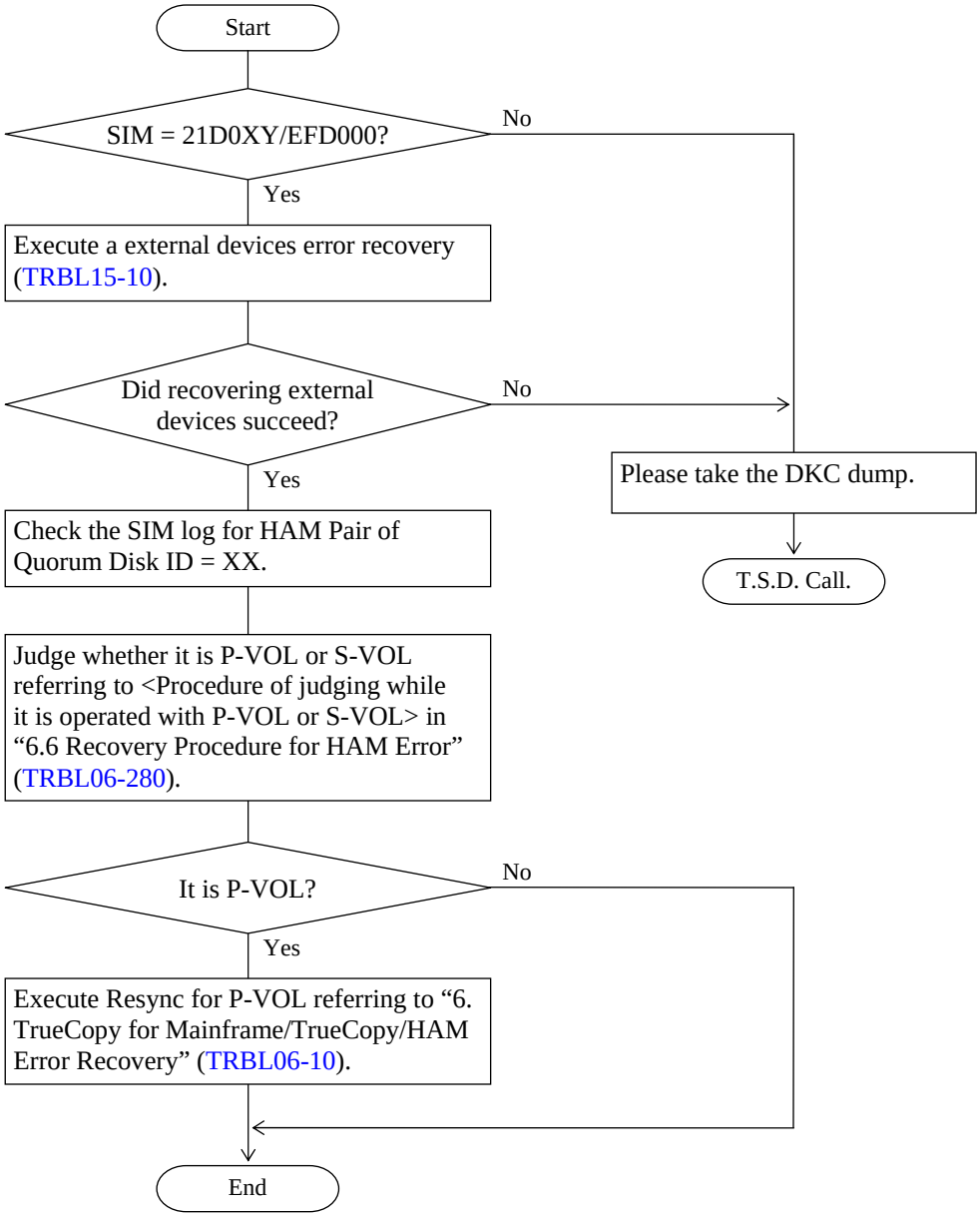
This document explain the Quorum Disk error and how to recover it.
Following reports indicate Quorum Disk error occurrence.

- SIM report of Quorum Disk Blocked occurrence

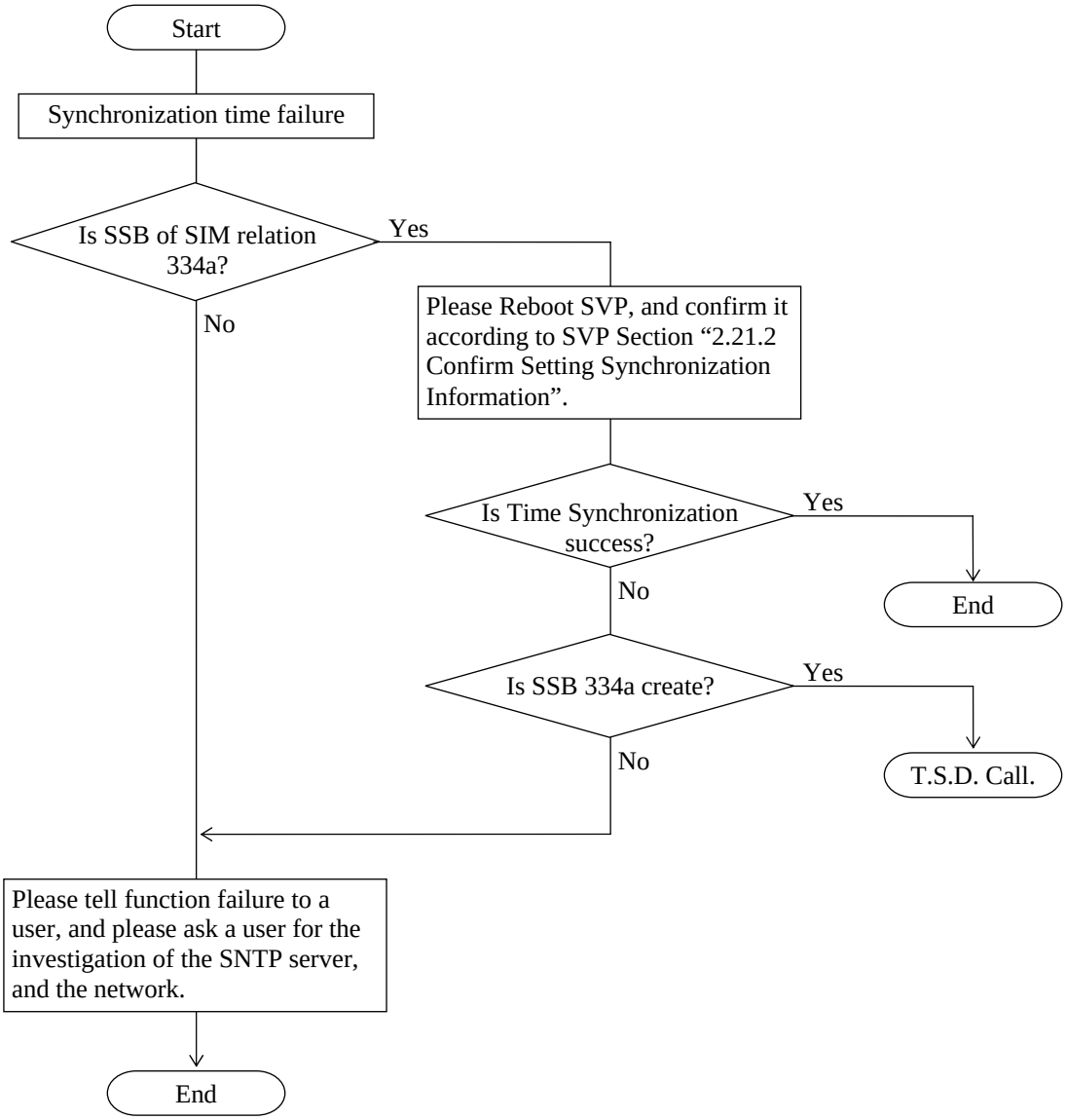
Table 33-1 Quorum Disk SIM REF. CODE

SIM REF. CODE	Meaning	Remarks
DEF0-XX	Quorum Disk Blocked	XX : Quorum Disk ID

33.1 Recovery Procedure for Quorum Disk Blocked (SIM = DEF0XX)



34. Synchronization time failure (SIM = 7FFA00)



35. Forced Outage & Restarting Procedure of DKC/DKU

There are four ways of Forced Powering Off. Please refer to a way which is appropriate for your work.

No.	Section Title	Storing data in SM/CM in cache SSDs (*1)	Volatilizing data in SM/CM	Page
1	Procedure for Forced Powering Off of DKC	No	Non-volatilization (Data in SM/CM is held because of power supply to CM PCBs.)	TRBL16-10
2	Forced outage & restarting procedure of nonvolatile	Yes	Non-volatilization (Data in SM/CM is restored from cache SSDs.)	TRBL35-11 (*2)
3	Forced outage & restarting procedure of volatile (Procedure-A)	No	Volatilization (All data in SM/CM is deleted.)	TRBL35-60
4	Forced outage & restarting procedure of volatile (Procedure-B)	Yes	Volatilization (Only specific data (*3) in SM/CM is restored from cache SSDs.)	TRBL35-80 (*2)

*1: When data in SM/CM is stored in cache SSDs, batteries are used. Therefore, energy in batteries is consumed.

*2: If data in SM/CM cannot be stored in cache SSDs, No.2 and No.4 ways are not available.

*3: Only management information of both Quick Format and HDP is restored from cache SSDs. The other data in SM/CM is deleted.

35.1 Forced outage & restarting procedure of nonvolatile

When this procedure is executed, the AC input of the power supply of the DKC and the DKU is compulsorily cut off, and the power supply is turned off immediately. The data in the CM is stored to the cache SSD, and is restored to the cache memory after restart.
To restart system of SM/CM volatilizing, refer to “35.2 Forced outage & restarting procedure of volatile (Procedure-A)” and “35.3 Forced outage & restarting procedure of volatile (Procedure-B)”.

CAUTION

- This operation supposes a special case such as a recovery from a failure unlike the usual powering off operation. Do not perform this operation without a direction given by the T.S.D. because a system down may be caused if it is performed without due notice.
- The DKC processor failure / SVP failure SIM (73XXYY) may occur during this work. Just complete them, when the work is finished.
- Check whether VOJPs (Volatile JP) of the CACHE are not inserted in the PCB before performing the operation. Performing the operation with VOJPs are inserted will result in data loss of customer. Refer to the LOCATION SECTION (LOC06-150), and make sure the VOJP is not inserted in the PCB of all CM.

a. Display the initial screen of SVP according to “1. How to Operate the SVP (PC)” (SVP01-10) of the SVP SECTION.
Refer to “3.1.5.3 Attachment/Removal Procedure of CE Laptop PC” (INST03-01-120) for the procedure of attachment, removal, and connection of the CE Laptop PC.

b. Select (CL) [Maintenance Components]-[Maintenance Other Components] from the menu of the ‘Action’ window to display ‘Maintenance Other Components’ window.

c. Select (CL) [Maintenance] button to display ‘Maintenance’ window.

d. Check whether there is blinking part in all CM PCBs and the batteries installed in the device.

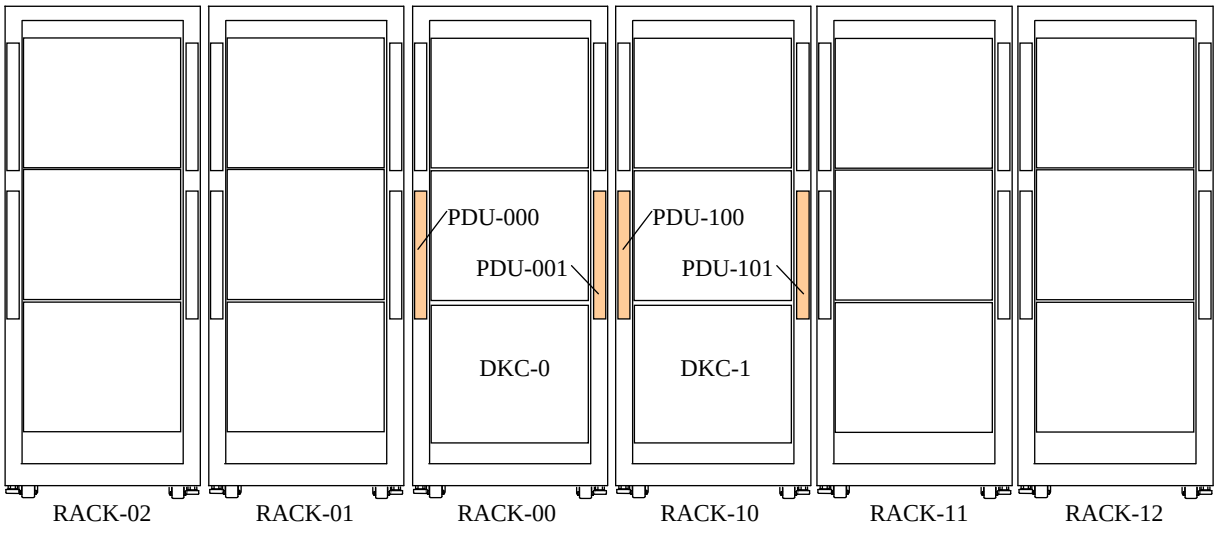
<When there is a blinking part>
Try this procedure again after recovering the problem part, except when other instructions exist from T.S.D.

<When there is no blinking part or the recovery of all the problem parts is completed>
Select (CL) [Exit], close ‘Maintenance’ window, and go to the next section.

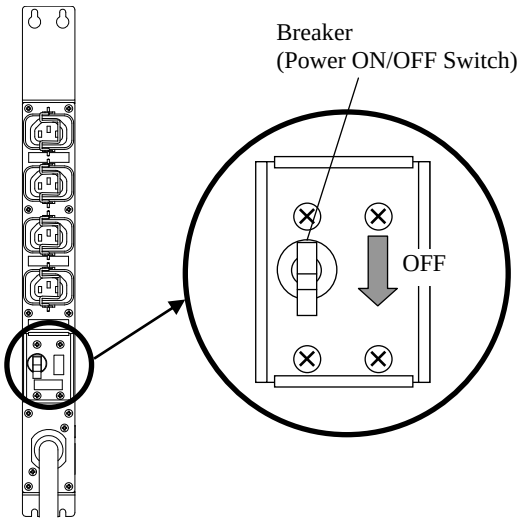
e. Refer to the SVP SECTION (SVP01-160), and turn off the power supply of the SVP.

f. Turn off the PDU breakers (PDU-000, PDU-001, PDU-100, PDU-101) that are connected to the DKC.

[Example]



Rear View

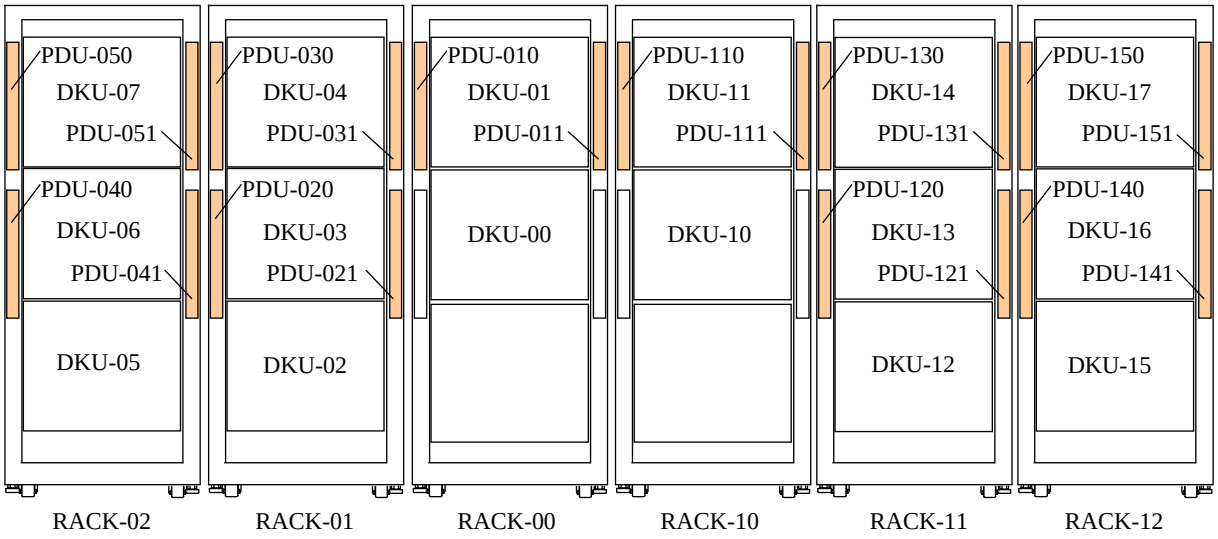


Front of PDU30

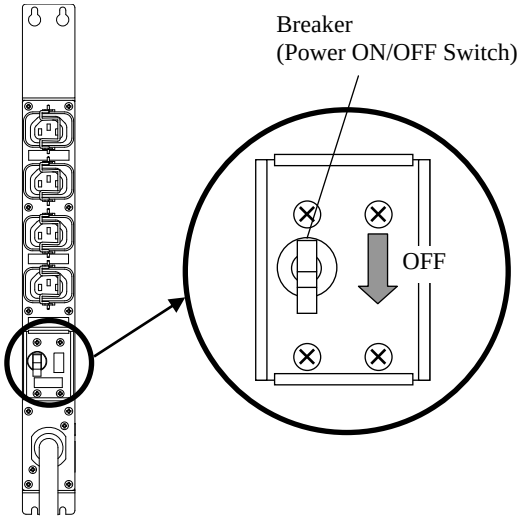
Fig. 35-1 Turning Off PDU Breaker

g. Turn off the PDU breakers (PDU-010, PDU-011, PDU-020, PDU-021, PDU-030, PDU-031, PDU-040, PDU-041, PDU-050, PDU-051, PDU-110, PDU-111, PDU-120, PDU-121, PDU-130, PDU-131, PDU-140, PDU-141, PDU-150, PDU-151) that are connected to the DKU.

[Example]



Rear View



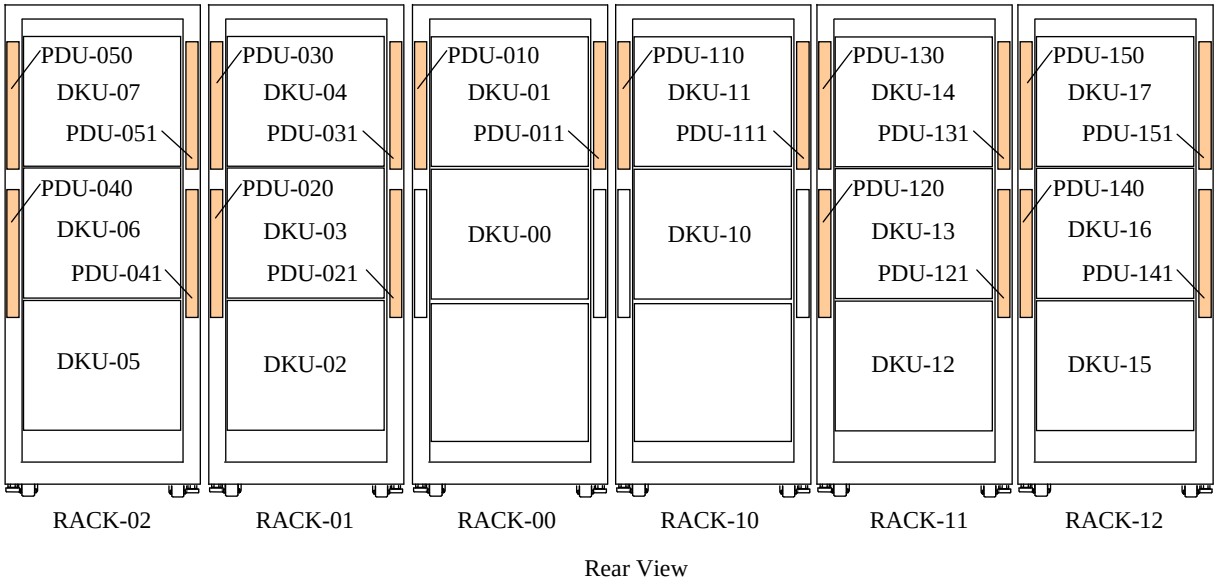
Front of PDU30

Fig. 35-2 Turning Off PDU Breaker

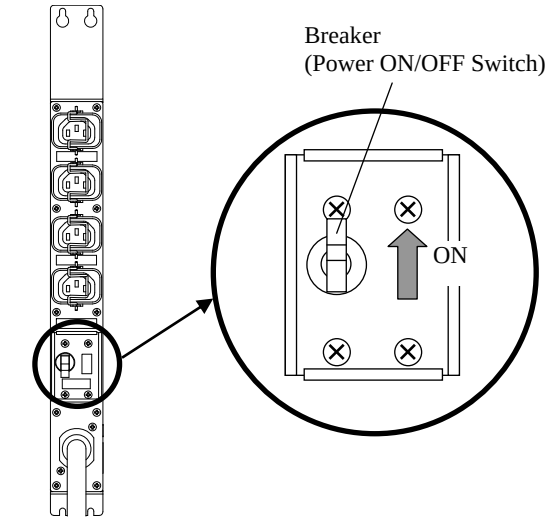
h. Take an interval of 10 seconds or more.

i. Turn on the PDU breakers (PDU-010, PDU-011, PDU-020, PDU-021, PDU-030, PDU-031, PDU-040, PDU-041, PDU-050, PDU-051, PDU-110, PDU-111, PDU-120, PDU-121, PDU-130, PDU-131, PDU-140, PDU-141, PDU-150, PDU-151) that are connected to the DKU.

[Example]



Rear View

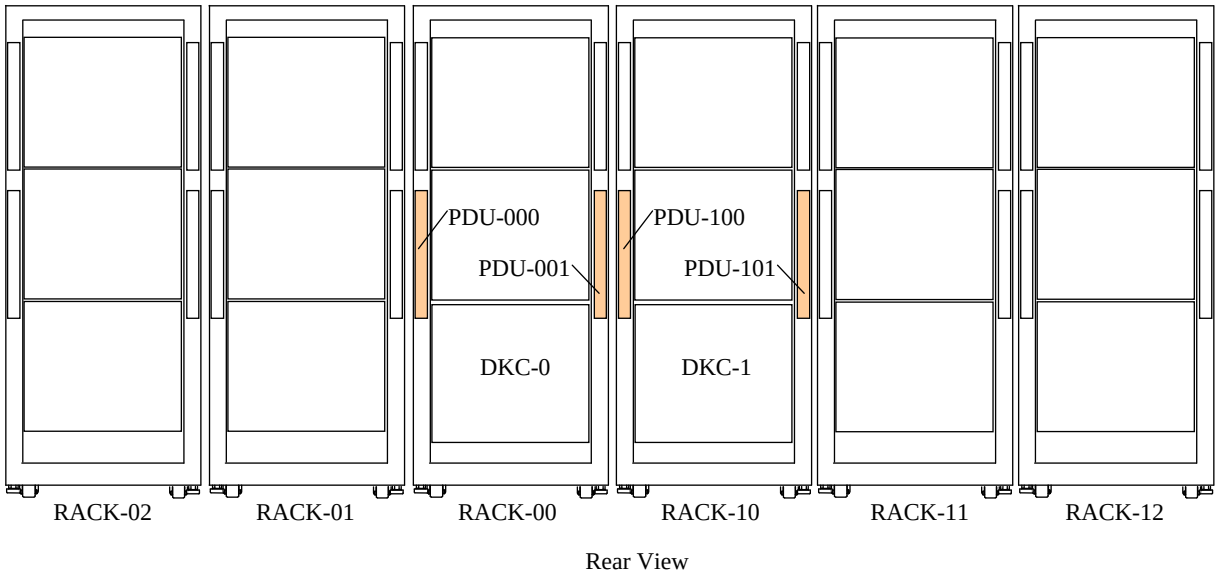


Front of PDU30

Fig. 35-3 Turning On PDU Breaker

j. Turn on the PDU breakers (PDU-000, PDU-001, PDU-100, PDU-101) that are connected to the DKC.

[Example]



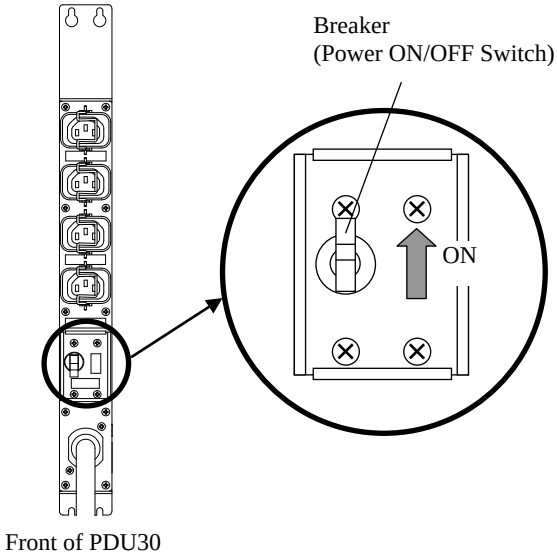


Fig. 35-4 Turning On PDU Breaker

k. Refer to “3.14.1 Power ON Procedure” (INST03-14-10), and turn on the POWER ON/OFF switch.

35.2 Forced outage & restarting procedure of volatile (Procedure-A)

When this procedure is executed, the AC input of the power supply of the DKC and the DKU is compulsorily cut off, and the power supply is turned off immediately. Using this procedure, the data in the CM is not stored to the cache SSD. Therefore, when you restart the system the SM/CM is volatile.
To restart system of SM/CM nonvolatilizing, please refer to “35.1 Forced outage & restarting procedure of nonvolatile” (TRBL35-11).

CAUTION

- This operation supposes a special case such as a recovery from a failure unlike the usual powering off operation. Do not perform this operation without a direction given by the T.S.D. because a system down may be caused if it is performed without due notice.
- The DKC processor failure / SVP failure SIM (73XXYY) may occur during this work. Just complete them, when the work is finished.
- The forced outage and restarting procedure of volatilize has 2 varieties. The range of volatilizing of SM are different between “Procedure-A” and “Procedure-B”. Follow the instruction of T.S.D. to do “Procedure-A” shown here or to do “Procedure-B” shown in “35.3 Forced outage & restarting procedure of volatile (Procedure-B)” (TRBL35-80).
- After this Operation was completed, please refer the MICRO-FC SECTION (MICRO07-10), and re-perform Config Version Up with the media of the version same as Config on the device by all means.

a. Display the initial screen of SVP according to “1. How to Operate the SVP (PC)” (SVP01-10) of the SVP SECTION.
Refer to “3.1.5.3 Attachment/Removal Procedure of CE Laptop PC” (INST03-01-120) for the procedure of attachment, removal, and connection of the CE Laptop PC.

b. Select (CL) [Maintenance Components]-[Maintenance Other Components] from the menu of the ‘Action’ window to display ‘Maintenance Other Components’ window.

c. Select (CL) [Maintenance] button to display ‘Maintenance’ window.

d. Check whether there is blinking part in all CM PCBs and the batteries installed in the device.

<When there is a blinking part>
Try this procedure again after recovering the problem part, except when other instructions exist from T.S.D.

<When there is no blinking part or the recovery of all the problem parts is completed>
Select (CL) [Exit], close ‘Maintenance’ window, and go to the next section.

e. Refer to the SVP SECTION (SVP01-160), and turn off the power supply of the SVP.

f. Detach the sheet metal of all CPC, then insert VOJPs (volatile JP) to all CPC referring to LOCATION SECTION (LOC06-150).

g. Confirm the SHUT DOWN LED of all CPC (LED ⑪ of Figure 3.2-1 of LOC03-30) is lit referring to LOCATION SECTION (LOC06-150).
→ If any LED is not lit, stop the procedure and contact the T.S.D.

h. Turn off the PDU breakers (PDU-000, PDU-001, PDU-100, PDU-101) that are connected to the DKC.
→ Refer to Fig. 35-1 (TRBL35-20).

i. Turn off the PDU breakers (PDU-010, PDU-011, PDU-020, PDU-021, PDU-030, PDU-031, PDU-040, PDU-041, PDU-050, PDU-051, PDU-110, PDU-111, PDU-120, PDU-121, PDU-130, PDU-131, PDU-140, PDU-141, PDU-150, PDU-151) that are connected to the DKU.
→ Refer to Fig. 35-2 (TRBL35-30).

j. Take an interval of 10 seconds or more.

k. Confirm all LED of all CPC were turned off referring to LOCATION SECTION (LOC06-150).
→ If any LED is still lit, stop the procedure and contact the T.S.D.

l. Decant VOJPs (volatile JP) from all CPC referring to LOCATION SECTION (LOC06-150), then install the sheet metal of all CPC.

m. Turn on the PDU breakers (PDU-010, PDU-011, PDU-020, PDU-021, PDU-030, PDU-031, PDU-040, PDU-041, PDU-050, PDU-051, PDU-110, PDU-111, PDU-120, PDU-121, PDU-130, PDU-131, PDU-140, PDU-141, PDU-150, PDU-151) that are connected to the DKU.
→ Refer to Fig. 35-3 (TRBL35-40).

n. Turn on the PDU breakers (PDU-000, PDU-001, PDU-100, PDU-101) that are connected to the DKC.
→ Refer to Fig. 35-4 (TRBL35-50).

o. Refer to “3.14.1 Power ON Procedure” (INST03-14-10), and turn on the POWER ON/OFF switch.

35.3 Forced outage & restarting procedure of volatile (Procedure-B)

When this procedure is executed, the AC input of the power supply of the DKC and the DKU is compulsorily cut off, and the power supply is turned off immediately. Using this procedure, the data in the CM is not restored from the cache SSD. Therefore, when you restart the system the SM/CM is volatile.
To restart system of SM/CM nonvolatilizing, please refer to “35.1 Forced outage & restarting procedure of nonvolatile” (TRBL35-11).

CAUTION

- This operation supposes a special case such as a recovery from a failure unlike the usual powering off operation. Do not perform this operation without a direction given by the T.S.D. because a system down may be caused if it is performed without due notice.
- The DKC processor failure / SVP failure SIM (73XXYY) may occur during this work. Just complete them, when the work is finished.
- The forced outage and restarting procedure of volatilize has 2 varieties. The range of volatilizing of SM are different between "Procedure-A" and "Procedure-B". Follow the instruction of T.S.D. to do "Procedure-A" shown in “35.2 Forced outage & restarting procedure of volatile (Procedure-A)” (TRBL35-60) or to do "Procedure-B" shown in here.
- Do not change the location of CACHE after breaker off, because the user data and the configuration information may be lost.
- After this Operation was completed, please refer the MICRO-FC SECTION (MICRO07-10), and re-perform Config Version Up with the media of the version same as Config on the device by all means.

a. Display the initial screen of SVP according to “1. How to Operate the SVP (PC)” (SVP01-10) of the SVP SECTION.
Refer to “3.1.5.3 Attachment/Removal Procedure of CE Laptop PC” (INST03-01-120) for the procedure of attachment, removal, and connection of the CE Laptop PC.

b. Select (CL) [Maintenance Components]-[Maintenance Other Components] from the menu of the ‘Action’ window to display ‘Maintenance Other Components’ window.

c. Select (CL) [Maintenance] button to display ‘Maintenance’ window.

d. Check whether there is blinking part in all CM PCBs and the batteries installed in the device.

<When there is a blinking part>
Try this procedure again after recovering the problem part, except when other instructions exist from T.S.D.

<When there is no blinking part or the recovery of all the problem parts is completed>
Select (CL) [Exit], close ‘Maintenance’ window, and go to the next section.

e. Refer to the SVP SECTION (SVP01-160), and turn off the power supply of the SVP.

f. Turn off the PDU breakers (PDU-000, PDU-001, PDU-100, PDU-101) that are connected to the DKC.
→ Refer to Fig. 35-1 (TRBL35-20).

g. Turn off the PDU breakers (PDU-010, PDU-011, PDU-020, PDU-021, PDU-030, PDU-031, PDU-040, PDU-041, PDU-050, PDU-051, PDU-110, PDU-111, PDU-120, PDU-121, PDU-130, PDU-131, PDU-140, PDU-141, PDU-150, PDU-151) that are connected to the DKU.
→ Refer to Fig. 35-2 (TRBL35-30).

h. Confirm all LED of all CACHE were turned off, referring to LOCATION SECTION (LOC03-30). (It may take up to max 20 minutes to the LED to go out.)
→ If any LED is still lit, stop the procedure and contact the T.S.D.

i. Detach the sheet metal of all CPC, then insert VOJPs (volatile JP) to all CPC referring to LOCATION SECTION (LOC06-150).

j. Turn on the PDU breakers (PDU-010, PDU-011, PDU-020, PDU-021, PDU-030, PDU-031, PDU-040, PDU-041, PDU-050, PDU-051, PDU-110, PDU-111, PDU-120, PDU-121, PDU-130, PDU-131, PDU-140, PDU-141, PDU-150, PDU-151) that are connected to the DKU.
→ Refer to Fig. 35-3 (TRBL35-40).

k. Turn on the PDU breakers (PDU-000, PDU-001, PDU-100, PDU-101) that are connected to the DKC.
→ Refer to Fig. 35-4 (TRBL35-50).

l. Confirm the SHUT DOWN LED of all CPC (LED ⑪ of Figure 3.2-1 of LOC03-30) is lit referring to LOCATION SECTION (LOC06-150).
→ If any LED is not lit, stop the procedure and contact the T.S.D.

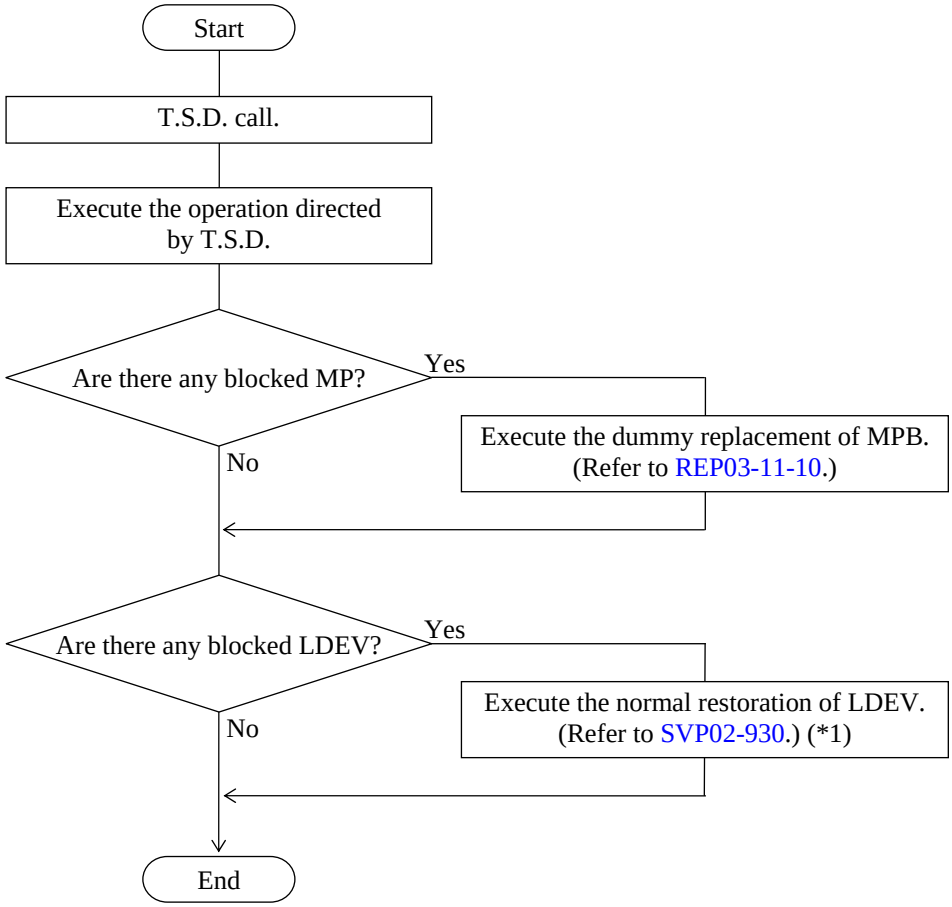
m. Refer to “3.14.1 Power ON Procedure” (INST03-14-10), and turn on the POWER ON/OFF switch.

n. After system is ready, remove VOJPs (volatile JP) from all CACHE and turn the cover back of all CACHE, referring to LOCATION SECTION (LOC06-150).

o. Complete all SIM-RC = FFFE0X.

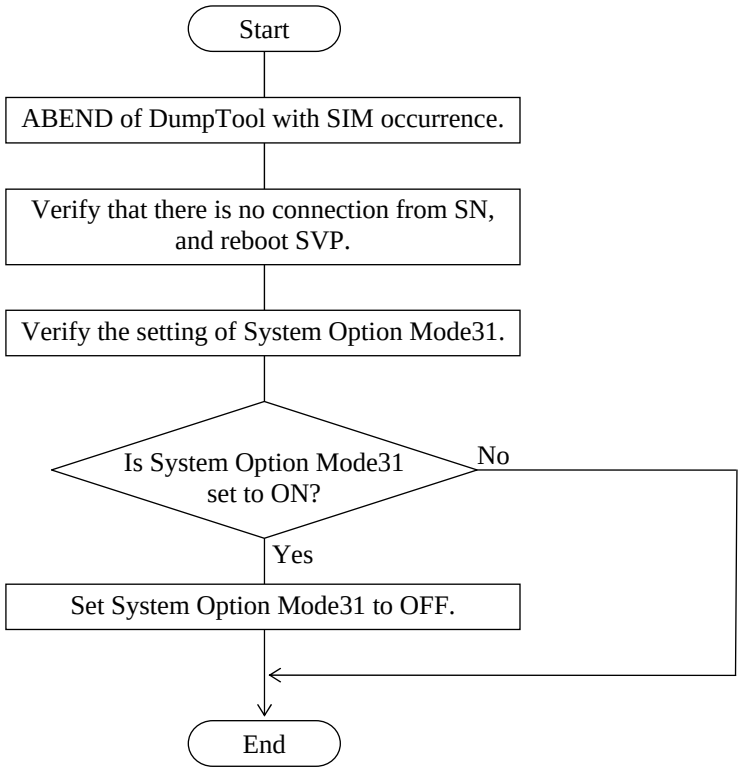
p. When SIM-RC = FFCE0X, FFCFYX, either 6100-02 of, SIM were reported, you might lose user data, constitution information. Please carry out involved site limit reason with reference to TRBL05-900.

36. Recovery procedure for LDEV Blockade by the effect of microcode error (SIM = 3A0XYY)



*1: Delete [TrueCopy / Universal Replicator / ShadowImage / Volume Migration / Copy-on-Write Snapshot / Thin Image / XRC / FlashCopy (R) V2 / FlashCopy (R) SE] pairs that use the LDEV before restoring the LDEV.
After the recovery flow completes, create pairs again.

37. Recovery procedure for Abnormal End of DumpTool (SIM = 7C0400)



38. Recovery procedure when SSW access error (SIM = BFF1XX) or HDDPWR warning (SIM = BFDXXX) occurs

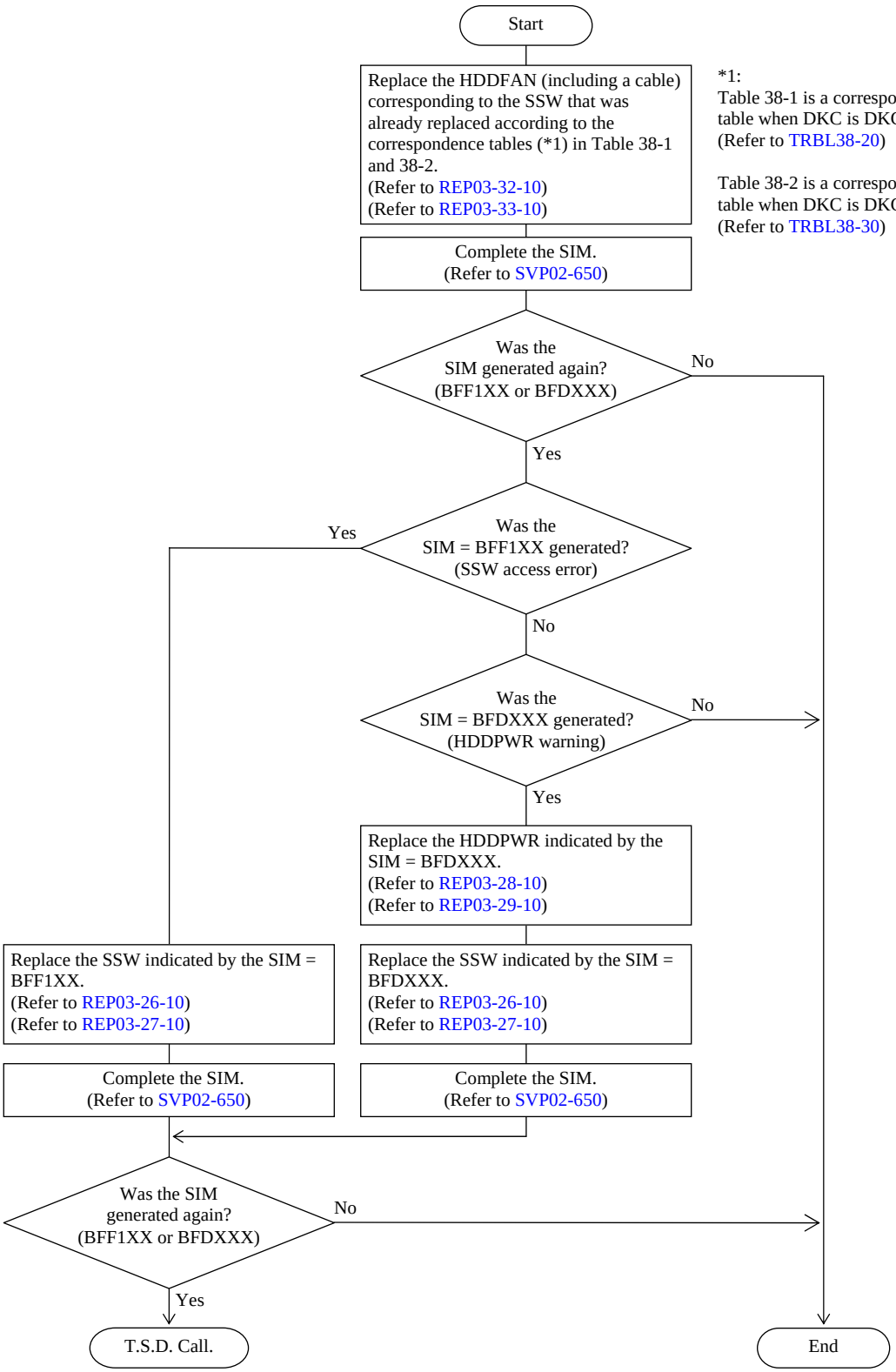


Table 38-1 Correspondence Table (when DKC is DKC-0)

HDDFAN to be replaced	SSW already replaced
HDDFAN-000	SSW000-HP0
HDDFAN-001	SSW001-HP0
HDDFAN-002	SSW002-HP0
HDDFAN-003	SSW003-HP0
HDDFAN-004	SSW000-LP1
HDDFAN-005	SSW001-LP1
HDDFAN-006	SSW002-LP1
HDDFAN-007	SSW003-LP1
HDDFAN-010	SSW010-HP0
HDDFAN-011	SSW011-HP0
HDDFAN-012	SSW012-HP0
HDDFAN-013	SSW013-HP0
HDDFAN-014	SSW010-LP1
HDDFAN-015	SSW011-LP1
HDDFAN-016	SSW012-LP1
HDDFAN-017	SSW013-LP1
HDDFAN-020	SSW020-HP0
HDDFAN-021	SSW021-HP0
HDDFAN-022	SSW022-HP0
HDDFAN-023	SSW023-HP0
HDDFAN-024	SSW020-LP1
HDDFAN-025	SSW021-LP1
HDDFAN-026	SSW022-LP1
HDDFAN-027	SSW023-LP1
HDDFAN-030	SSW030-HP0
HDDFAN-031	SSW031-HP0
HDDFAN-032	SSW032-HP0
HDDFAN-033	SSW033-HP0
HDDFAN-034	SSW030-LP1
HDDFAN-035	SSW031-LP1
HDDFAN-036	SSW032-LP1
HDDFAN-037	SSW033-LP1

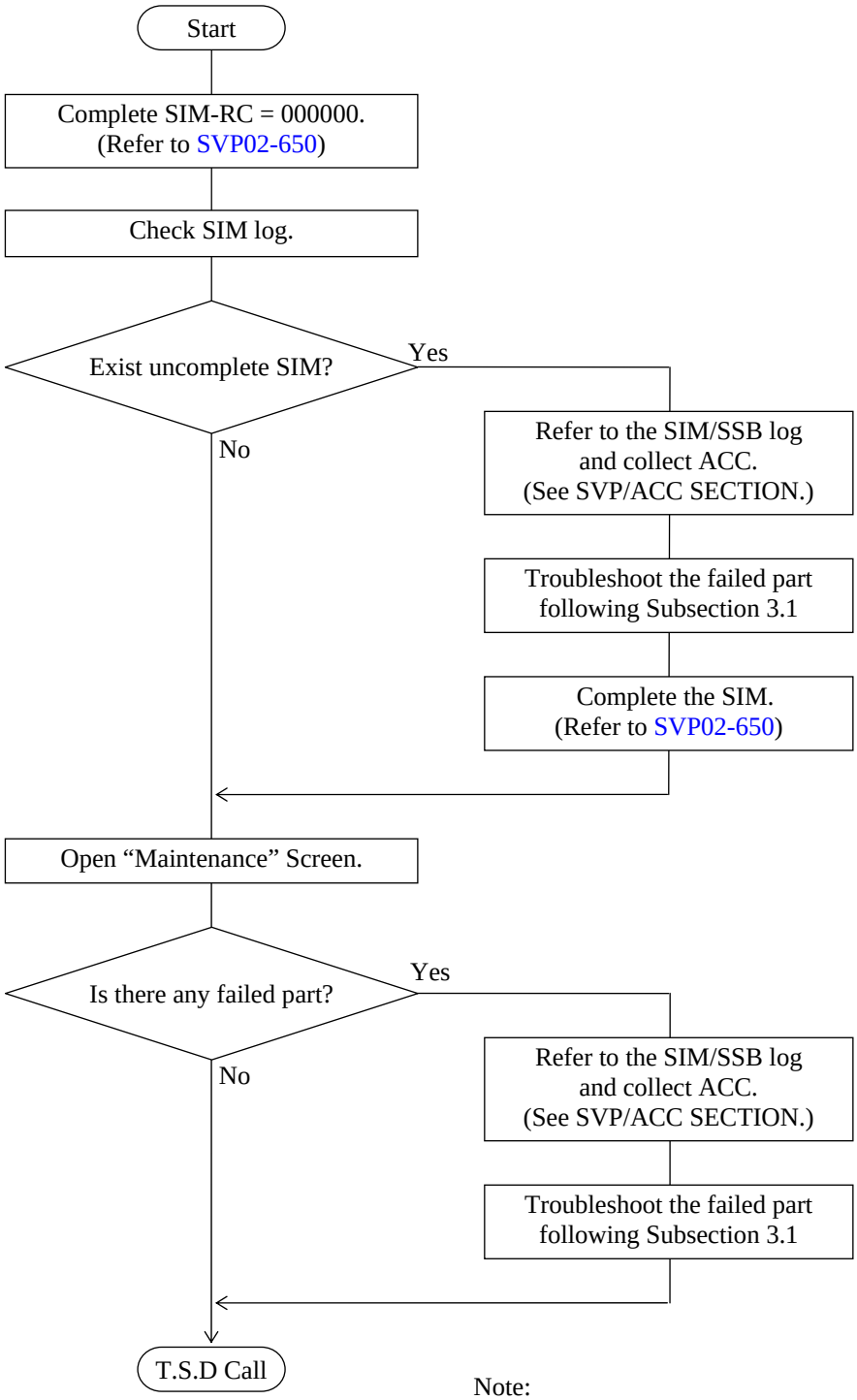
HDDFAN to be replaced	SSW already replaced
HDDFAN-040	SSW040-HP0
HDDFAN-041	SSW041-HP0
HDDFAN-042	SSW042-HP0
HDDFAN-043	SSW043-HP0
HDDFAN-044	SSW040-LP1
HDDFAN-045	SSW041-LP1
HDDFAN-046	SSW042-LP1
HDDFAN-047	SSW043-LP1
HDDFAN-050	SSW050-HP0
HDDFAN-051	SSW051-HP0
HDDFAN-052	SSW052-HP0
HDDFAN-053	SSW053-HP0
HDDFAN-054	SSW050-LP1
HDDFAN-055	SSW051-LP1
HDDFAN-056	SSW052-LP1
HDDFAN-057	SSW053-LP1
HDDFAN-060	SSW060-HP0
HDDFAN-061	SSW061-HP0
HDDFAN-062	SSW062-HP0
HDDFAN-063	SSW063-HP0
HDDFAN-064	SSW060-LP1
HDDFAN-065	SSW061-LP1
HDDFAN-066	SSW062-LP1
HDDFAN-067	SSW063-LP1
HDDFAN-070	SSW070-HP0
HDDFAN-071	SSW071-HP0
HDDFAN-072	SSW072-HP0
HDDFAN-073	SSW073-HP0
HDDFAN-074	SSW070-LP1
HDDFAN-075	SSW071-LP1
HDDFAN-076	SSW072-LP1
HDDFAN-077	SSW073-LP1

Table 38-2 Correspondence Table (when DKC is DKC-1)

HDDFAN to be replaced	SSW already replaced
HDDFAN-100	SSW100-HP0
HDDFAN-101	SSW101-HP0
HDDFAN-102	SSW102-HP0
HDDFAN-103	SSW103-HP0
HDDFAN-104	SSW100-LP1
HDDFAN-105	SSW101-LP1
HDDFAN-106	SSW102-LP1
HDDFAN-107	SSW103-LP1
HDDFAN-110	SSW110-HP0
HDDFAN-111	SSW111-HP0
HDDFAN-112	SSW112-HP0
HDDFAN-113	SSW113-HP0
HDDFAN-114	SSW110-LP1
HDDFAN-115	SSW111-LP1
HDDFAN-116	SSW112-LP1
HDDFAN-117	SSW113-LP1
HDDFAN-120	SSW120-HP0
HDDFAN-121	SSW121-HP0
HDDFAN-122	SSW122-HP0
HDDFAN-123	SSW123-HP0
HDDFAN-124	SSW120-LP1
HDDFAN-125	SSW121-LP1
HDDFAN-126	SSW122-LP1
HDDFAN-127	SSW123-LP1
HDDFAN-130	SSW130-HP0
HDDFAN-131	SSW131-HP0
HDDFAN-132	SSW132-HP0
HDDFAN-133	SSW133-HP0
HDDFAN-134	SSW130-LP1
HDDFAN-135	SSW131-LP1
HDDFAN-136	SSW132-LP1
HDDFAN-137	SSW133-LP1

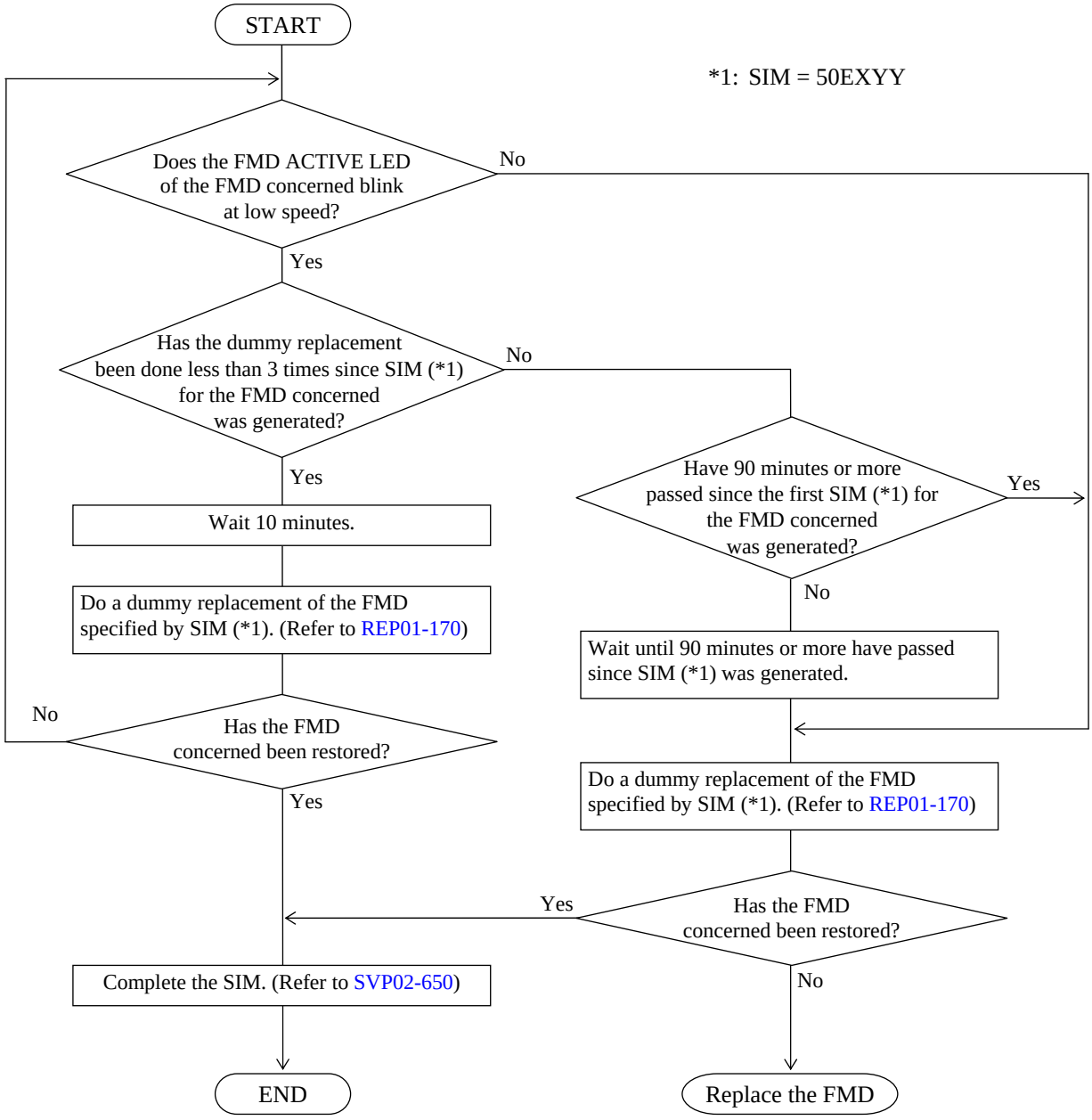
HDDFAN to be replaced	SSW already replaced
HDDFAN-140	SSW140-HP0
HDDFAN-141	SSW141-HP0
HDDFAN-142	SSW142-HP0
HDDFAN-143	SSW143-HP0
HDDFAN-144	SSW140-LP1
HDDFAN-145	SSW141-LP1
HDDFAN-146	SSW142-LP1
HDDFAN-147	SSW143-LP1
HDDFAN-150	SSW150-HP0
HDDFAN-151	SSW151-HP0
HDDFAN-152	SSW152-HP0
HDDFAN-153	SSW153-HP0
HDDFAN-154	SSW150-LP1
HDDFAN-155	SSW151-LP1
HDDFAN-156	SSW152-LP1
HDDFAN-157	SSW153-LP1
HDDFAN-160	SSW160-HP0
HDDFAN-161	SSW161-HP0
HDDFAN-162	SSW162-HP0
HDDFAN-163	SSW163-HP0
HDDFAN-164	SSW160-LP1
HDDFAN-165	SSW161-LP1
HDDFAN-166	SSW162-LP1
HDDFAN-167	SSW163-LP1
HDDFAN-170	SSW170-HP0
HDDFAN-171	SSW171-HP0
HDDFAN-172	SSW172-HP0
HDDFAN-173	SSW173-HP0
HDDFAN-174	SSW170-LP1
HDDFAN-175	SSW171-LP1
HDDFAN-176	SSW172-LP1
HDDFAN-177	SSW173-LP1

39. Recovery procedure for detected invalid SIM data (SIM = 7C0500)



Note:
When SIM = 000000 is logged, SSB 3358 is logged whenever open [Information]-[Log]-[SIM] screen. If delete SIM Log (Refer to SVP02-220), the detection of this SSB stops.

40. Recovery Procedure When No Charging of FMD Occurs (SIM = 50EXYY)



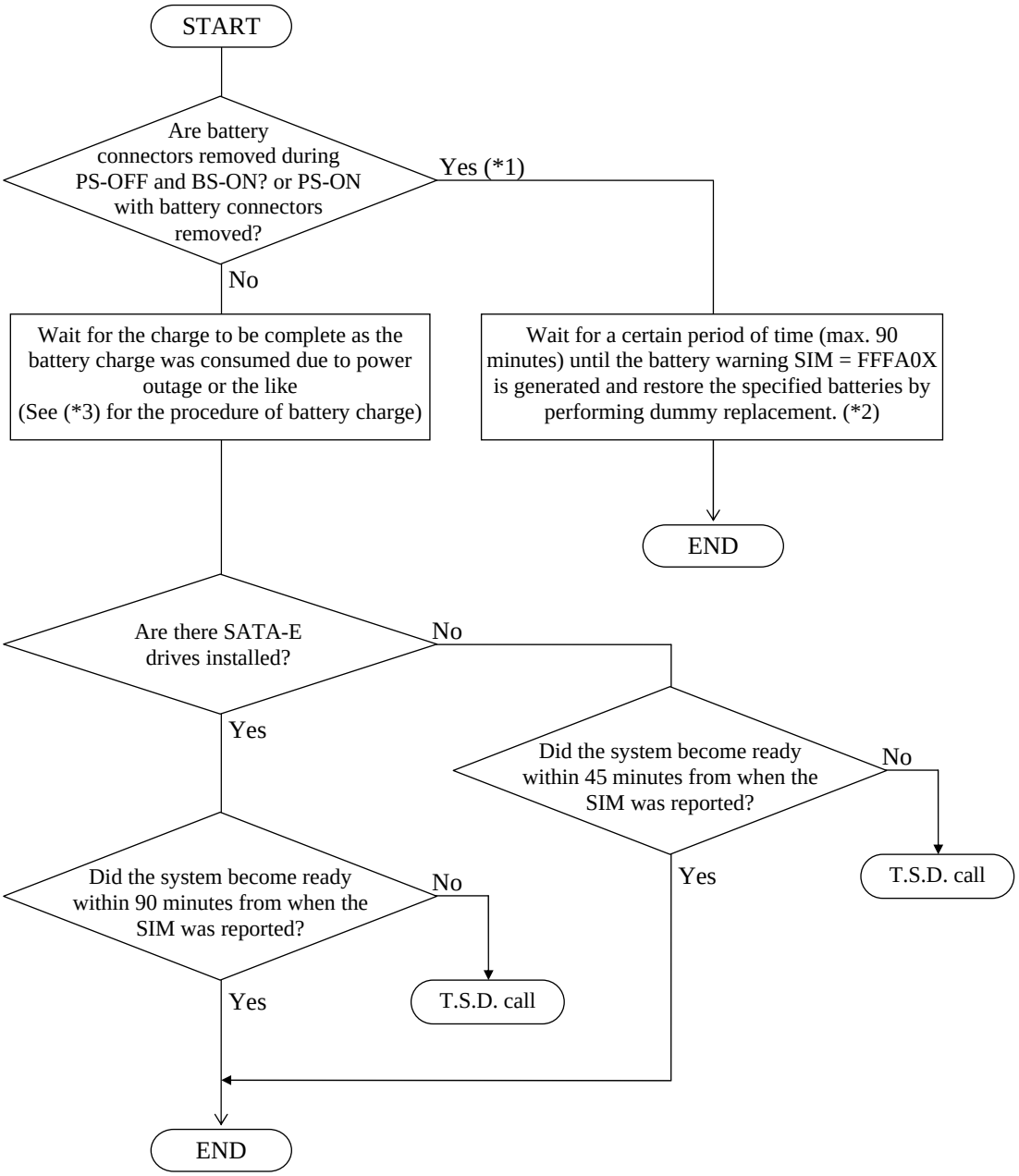
41. Procedure when SIM = FE00XX is Generated

- In the case that there are SATA-E drives
  If this SIM is reported, the battery charge level is below 50% and the system is waiting for start up.
  It takes a maximum of 90 minutes until the battery charge level becomes 50% or more.

- In the case that there are no SATA-E drives
  If this SIM is reported, the battery charge level is below 25% and the system is waiting for start up.
  It takes a maximum of 45 minutes until the battery charge level becomes 25% or more.

For details, “2.2.3 Hardware Component (8) Battery”. (THEORY02-180)

If the battery connectors are removed when the subsystem has electricity and the BS-ON LED is on or if the subsystem is powered on with the battery connectors removed, the subsystem is prohibited from starting for a certain period of time (maximum 90 minutes) and the battery charging SIM = FE00XX and the battery warning SIM = FFFA0X are generated as cache data backup cannot be performed in the case of power outage.
If the battery warning SIM = FFFA0X is generated by removing the battery connectors, follow procedure TRBL41-11 *1 shown below as the battery cannot be recovered by connecting.



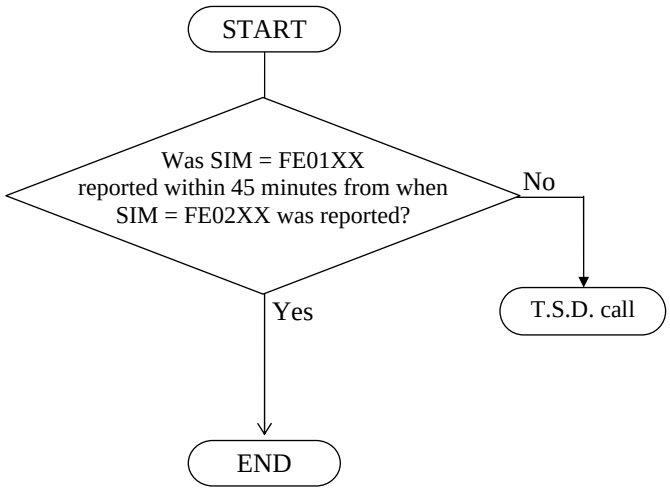
*2: <Important> In this stage, Cache data backup cannot be performed until the battery warning is recovered. Stop data access to the subsystem until battery warning is recovered and perform maintenance operation promptly.

*3: Turn on the breakers on the PDPs and the PDUs, which makes the BS-ON LED lit, and then charge the batteries until the BATTERY CHARGE LED (See LOCATION SECTION (LOC03-30～40)) goes from blinking (charge in progress) to solid (charge completed).

42. Procedure when SIM = FE02XX is Generated

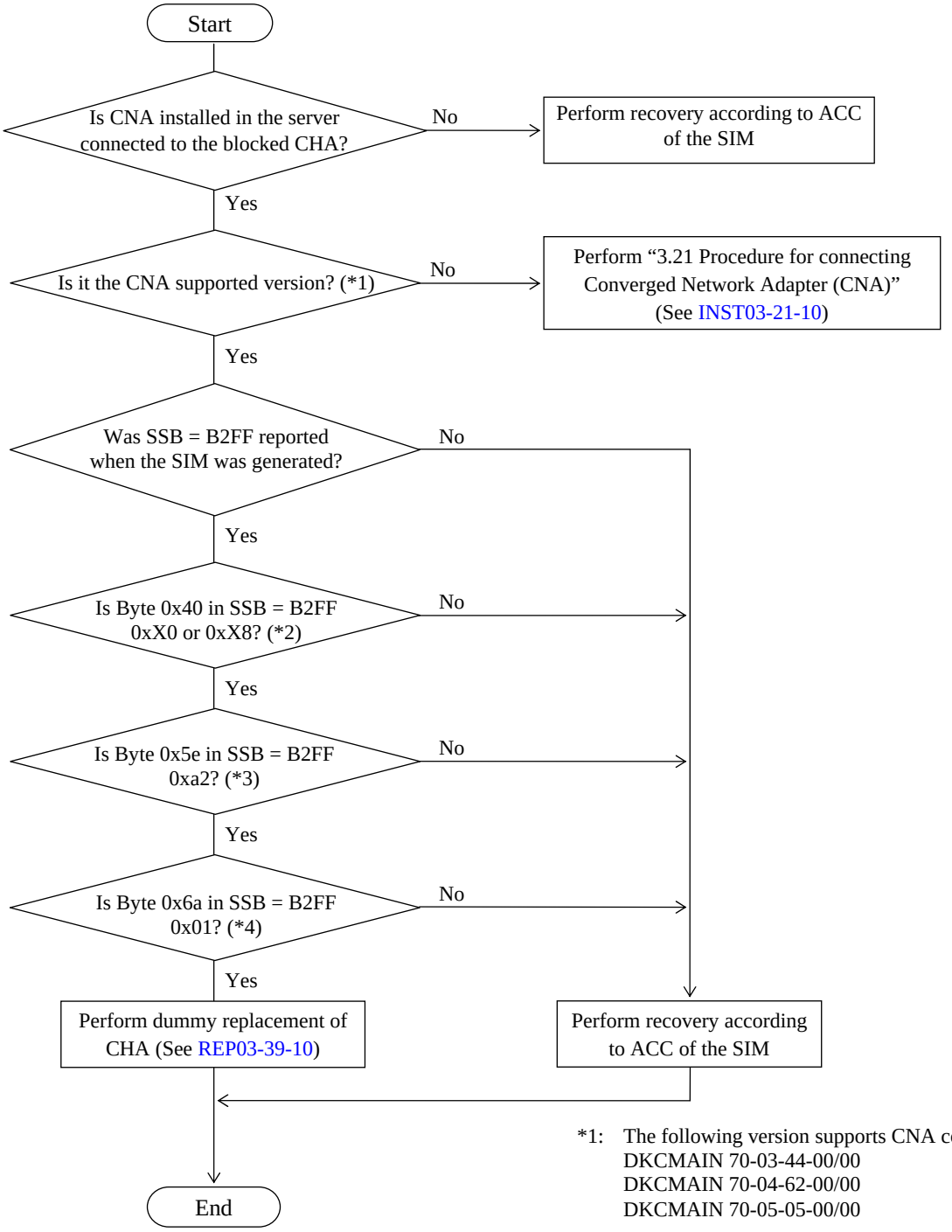
If this SIM is reported, the battery charge level is below 50% and the system operates in cache through mode. It takes a maximum of 45 minutes until the battery charge level becomes 50% or more. SIM=FE01XX is reported when the battery charge level becomes 50% or more.

For details, “2.2.3 Hardware Component (8) Battery”. (THEORY02-180)



43. Recovery procedure in the event of Logical DMA blockage failure (SIM = CF6XYY)

When dummy replacement of CHA is not performed or the storage system is not power cycled after the micro-program version that supports Converged Network Adapter (hereinafter referred to as "CNA") connection is applied, Logical DMA blockage (SIM = CF6XYY) may occur. When this SIM is generated, perform the following procedure to isolate the failure.



*1: The following version supports CNA connection.
DKCMAIN 70-03-44-00/00
DKCMAIN 70-04-62-00/00
DKCMAIN 70-05-05-00/00

*2, *3, *4: See the following information in SSB display