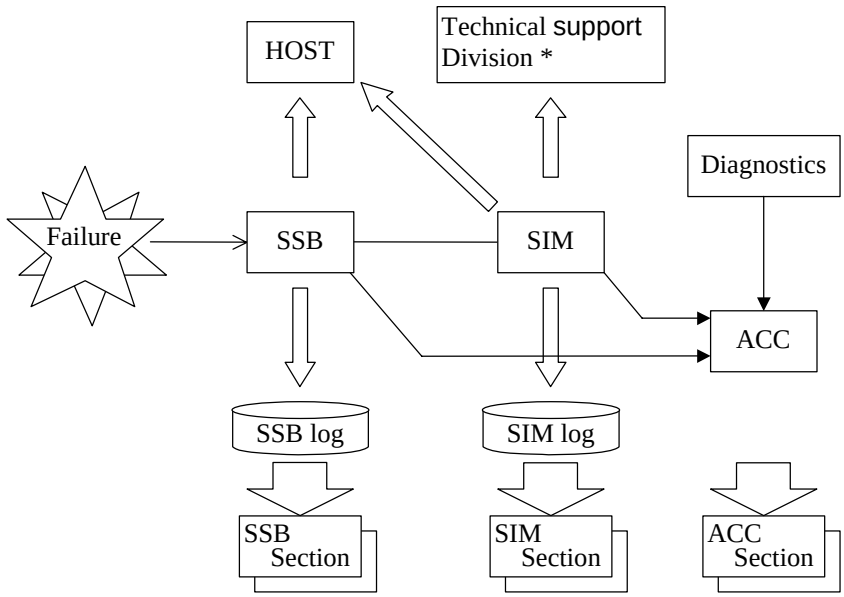
TROUBLE SHOOTING SECTION

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.



Since the subsystem starts its maintenance work based on the SIM and ACC, if a failure occurs check the ACC first and start troubleshooting.
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.

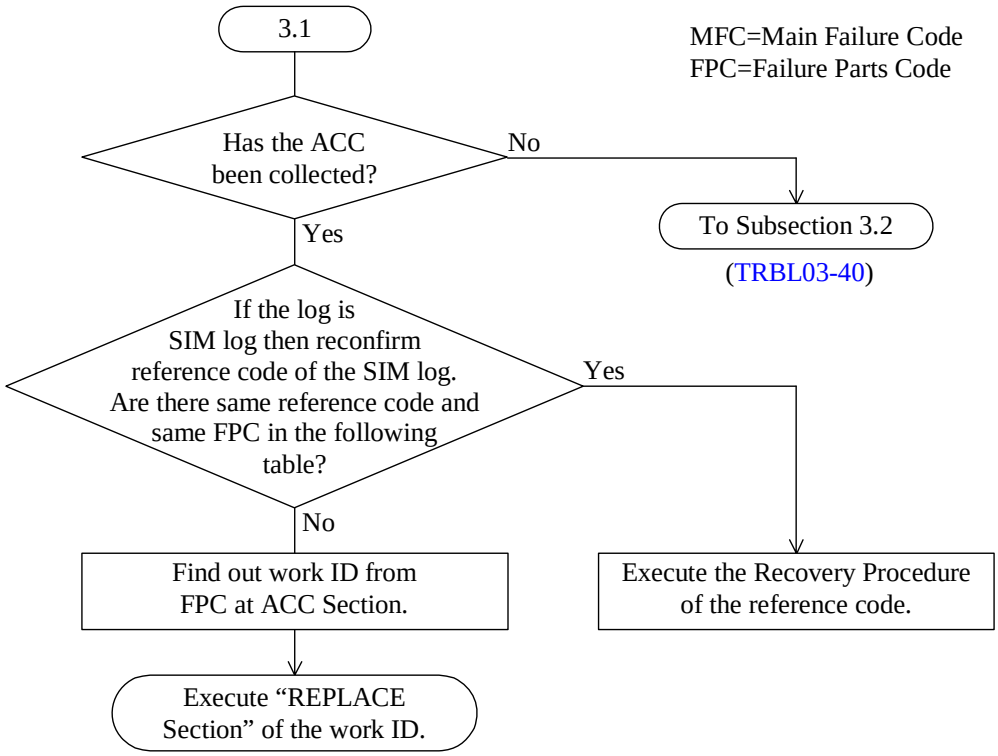
Note: You should execute recovery operations for install/de-install failures, exchanging failures, etc. at time zone with a little business influence.

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



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

Reference Code	Recovery Procedure
BF9XXX	5.1 FSW Access Error/FSW LED Bus Test Error (TRBL05-10)
3DAXXX	
DF6XXX, DF7XXX	5.2 Isolation and Recovery Procedures for Common Fibre Loop Error (TRBL05-20)
DF8XXX, DF9XXX	
1400X0, 1500X0, 73XX00	5.3 Recovery Procedure for LAN Error (TRBL05-90)
3999XY, 76YYXX, 790YXX	5.4 Error Recovery Procedure during CHA/DKA replacement (TRBL05-130)
3993XX, 3D93XX, FFE40X, FFF90X	5.5 Recovery Procedure for CACHE/SM Replace Failure (TRBL05-250)
FFF50X	5.6 Recovery Procedure for Cache Error (Both sides) (TRBL05-260)
FFE30X	5.9 Recovery Procedure for SM Capacities Inequality between clusters (TRBL05-430)
FFF0XX, FFF1XX, FFF2XX, FFE0XX, FFE1XX, FFE2XX	5.10 Cache Memory Error Isolation Procedure (TRBL05-460)
CF90XY	5.11 Recovery Procedure for LDEV Blocking (TRBL05-470)
DFAXXX, DFBXXX	
EF9XXX	
BF2XYY	5.12 Voltage alarm (TRBL05-490)
BFA1XX	5.13 Environment monitors disagreement error (TRBL05-510)
BF3XXX, BF4XXX	5.14 PS warning error (TRBL05-560)
FFDE01, FFDE02, FFDE03, FFDE04	5.16 Recovery procedure when WDCP information is lost (TRBL05-590)
399AXY, 3D9AXY	5.20 Recovery Procedure for Warning of SM DISABLE (TRBL05-630)
399DXX, 399EXX, 399FXX, 3D9DXX, 3D9EXX, 3D9FXX, FFF60X, FFF70X, FF200X, FF210X, FFD60X, FFD70X, FFD80X	5.21 Recovery Procedure for Injustice DC voltage control and Injustice CE MODE (TRBL05-640)
BFE3A2	5.23 Duplex SVP Setup failed (TRBL05-700)
38C000, 3CC000	5.24 Recovery Procedure for the Case Where the PS/OFF Warning Occurs (TRBL05-710)
3072XY	5.25 Recovery Procedure for the Case Where the CHK3 Threshold Over Occurs (TRBL05-720)
BFF2XX	5.26 Cable connection error (TRBL05-730)
FFE800	5.29 Recovery procedure for inconsistency between SM installation and definitions (TRBL05-790)

(To be continued.)

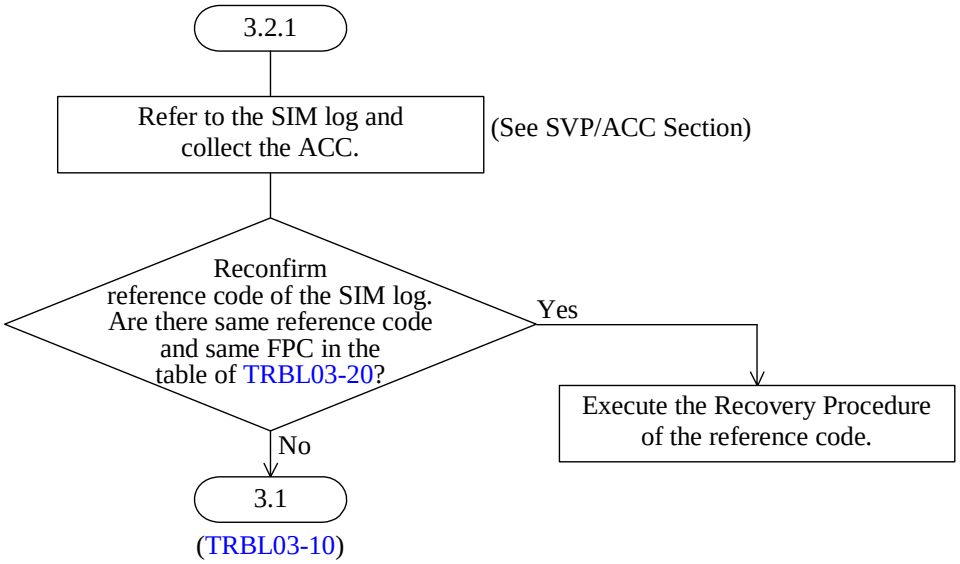
(Continued from preceding sheet.)

Reference Code	Recovery Procedure
D4XYYY	6. HRC/HORC 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. HMRCF/HOMRCF/FlashCopy (R)/FlashCopy (R) version 2 Error Recovery (TRBL08-10)
2190XY	9. Recovery procedure of AL_PA conflict (TRBL09-10)
47FYXX	10. HIHSM Error Recovery (TRBL10-10)
4821XX	14. Recovery Procedure for DCR Pre-Staging ABNORMAL END (TRBL14-10)
21D0XY, 21D2XY, EFD000	15. External devices Error Recovery (TRBL15-10)
47EC00	18. Recovery procedure for Copy-on-Write Snapshot (TRBL18-10)
601XXX, 602XXXX	18.3 Procedure for Recovery from Pool failure (SIM = 601XXX, 602XXX) (TRBL18-50)
6100XX	20. Actions to be Taken in the case where Save of the SM Control Information Fails (SIM = 6100XX) (TRBL20-10)
623XXX	22.3 Recovery procedure for the Pool failure (SIM = 623XXX) (TRBL22-50)
640XXX	22.4 Recovery procedure for the Pool failure (SIM = 640XXX) (TRBL22-60)
624000	22.5 Recovery procedure for the Pool failure (SIM = 624000) (TRBL22-70)
625000	22.6 Recovery procedure for the Pool failure (SIM = 625000) (TRBL22-80)
DFA0XY	Collect Dump/Log and T.S.D call
EF50XY	
6600XX	
21A8XX	26. SFP Module Failure Detection (TRBL26-10)
7C0300	27. Correspondence when detecting the audit log FTP transfer failure (TRBL27-10)
410001, 410002	29. SATA HDD/FLASH DRIVE/Encrypted PG LDEV FORMATTING Failure Detection (TRBL29-10)
650001, 650002	30. Failure Recovery During Quick Format (TRBL30-10)
180000, 180100, 650000, 650001, 650002	31. Failure Recovery while Using the System Disk (TRBL31-10)
21D4XX, EFD400	32. Recovery procedure of the FICON Data Migration in case of failure (TRBL32-10)
3180XY	34. Recovery Procedure for EDKA WCHK1 (TRBL34-10)
DEA0XX, DEF0XX	35. Quorum Disk Error Recovery (TRBL35-10)
30A0XX, 31A000, 30A100	36. Recovery procedure for DKC/MP PCB blocked (TRBL36-10)

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

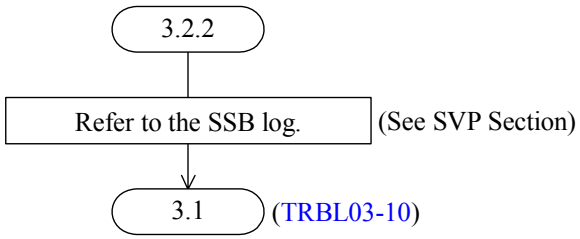
Isolate the failed part depending on the following phenomenon.

3.2.1 SIM has been reported

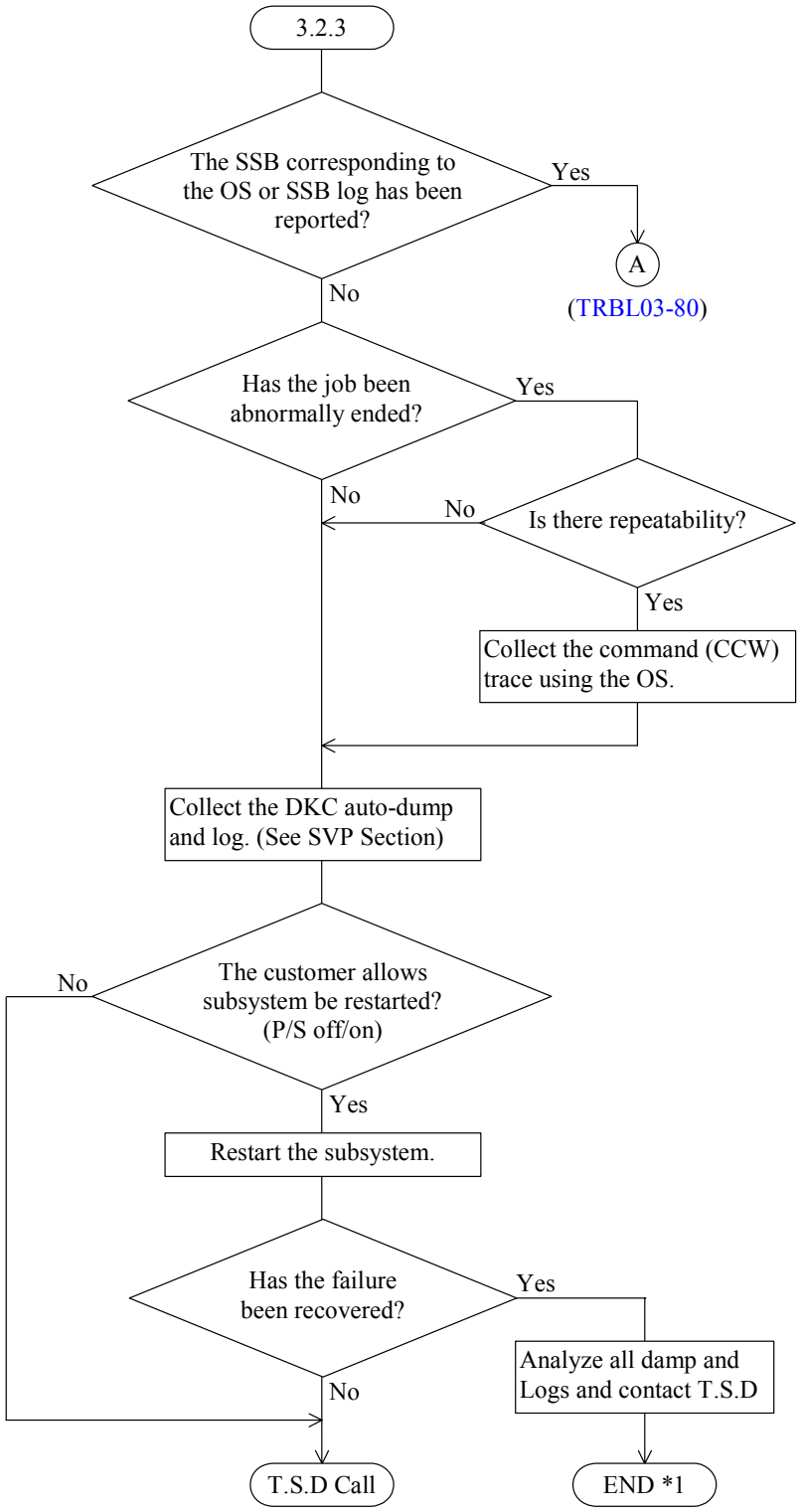


Notice:	You should execute recovery operation at time zone with a little business influence when the ACC indicates multiple parts.

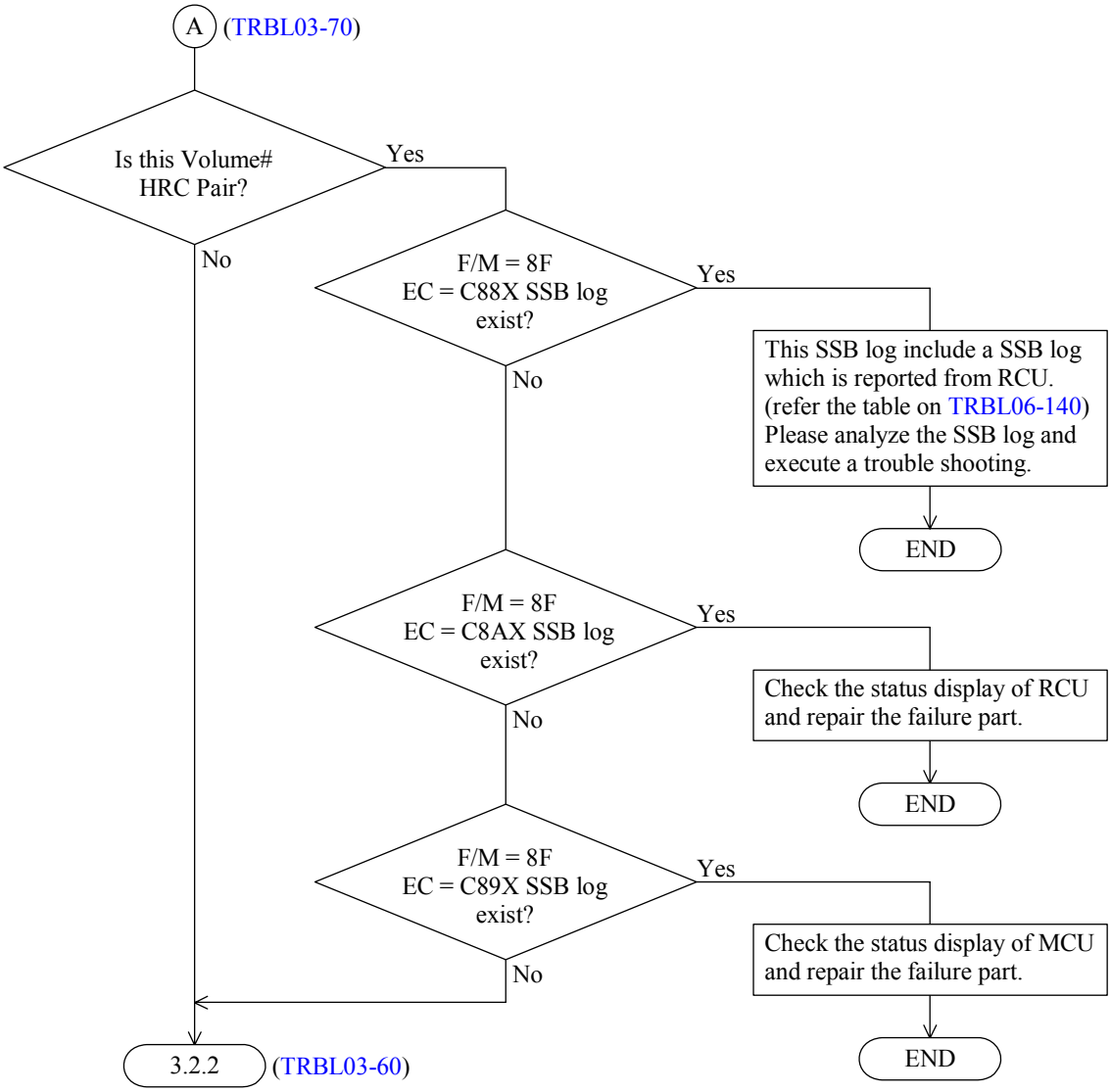
3.2.2 SSB has been reported



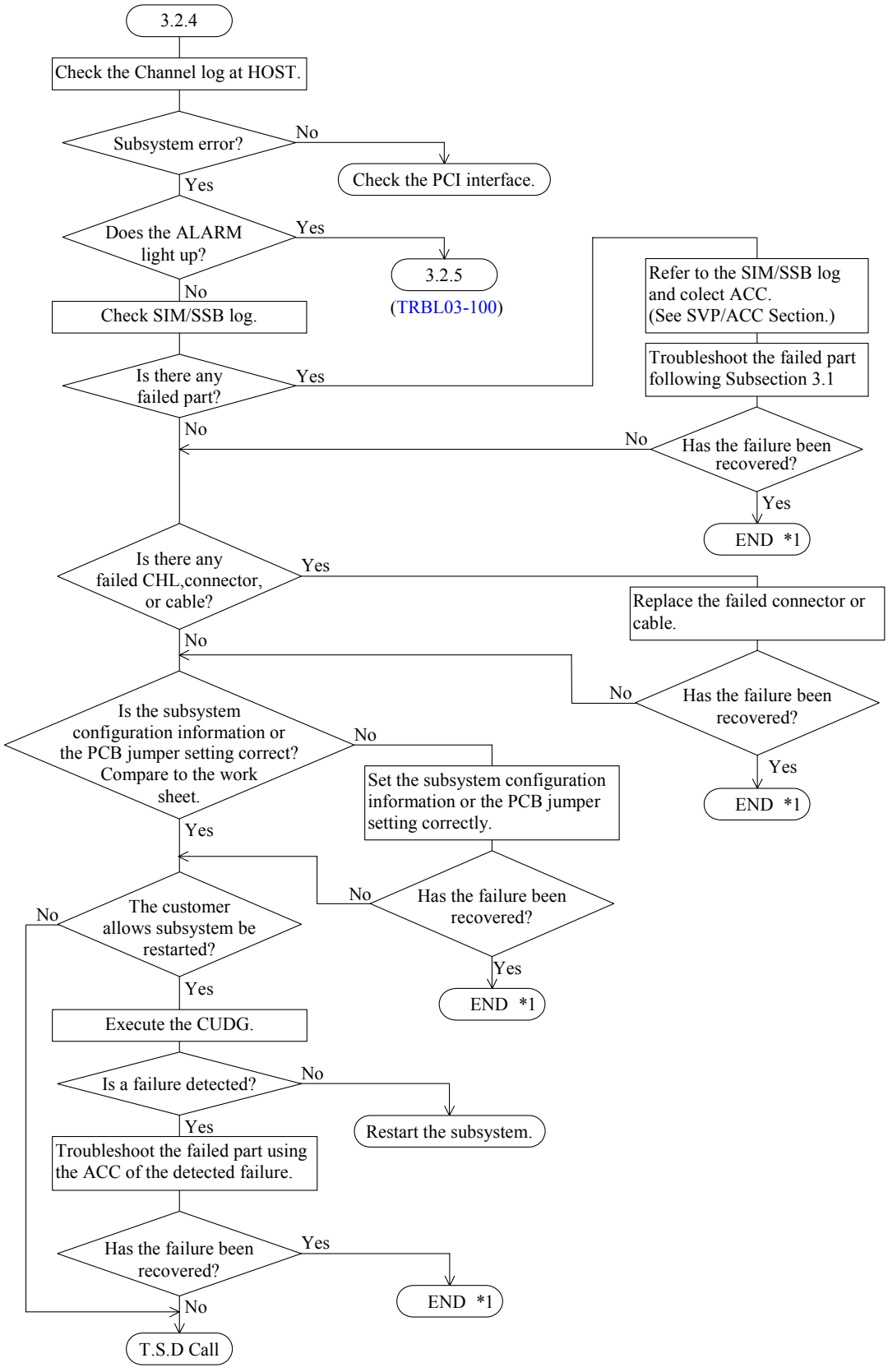
3.2.3 OS cannot recover the subsystem error (MIH, Job ABEND)



*1: If you finished the Maintenance, delete the log and SIM complete. (Refer to SVP02-170, 560)

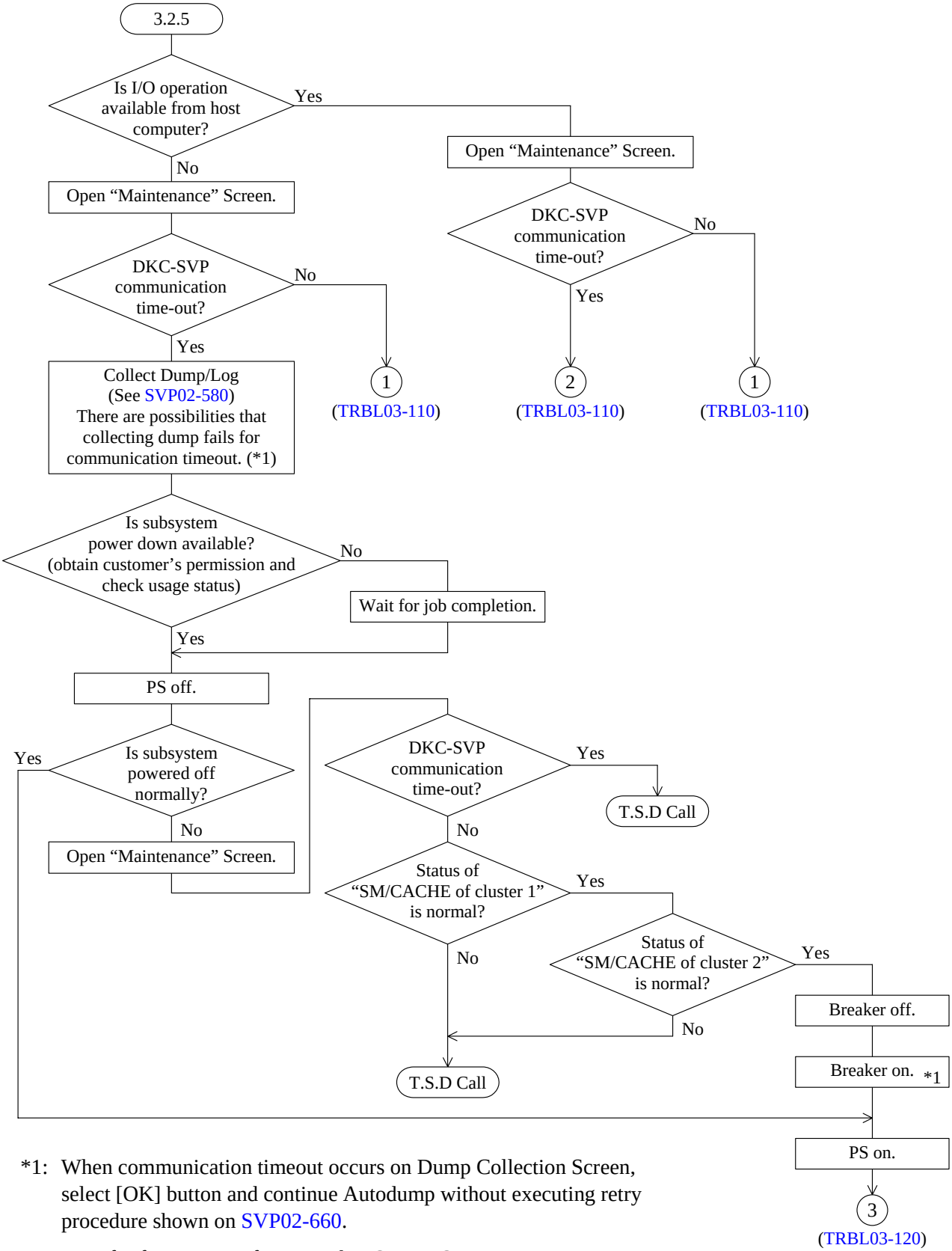


3.2.4 OS has detected the subsystem error (ICC, CC = 3)



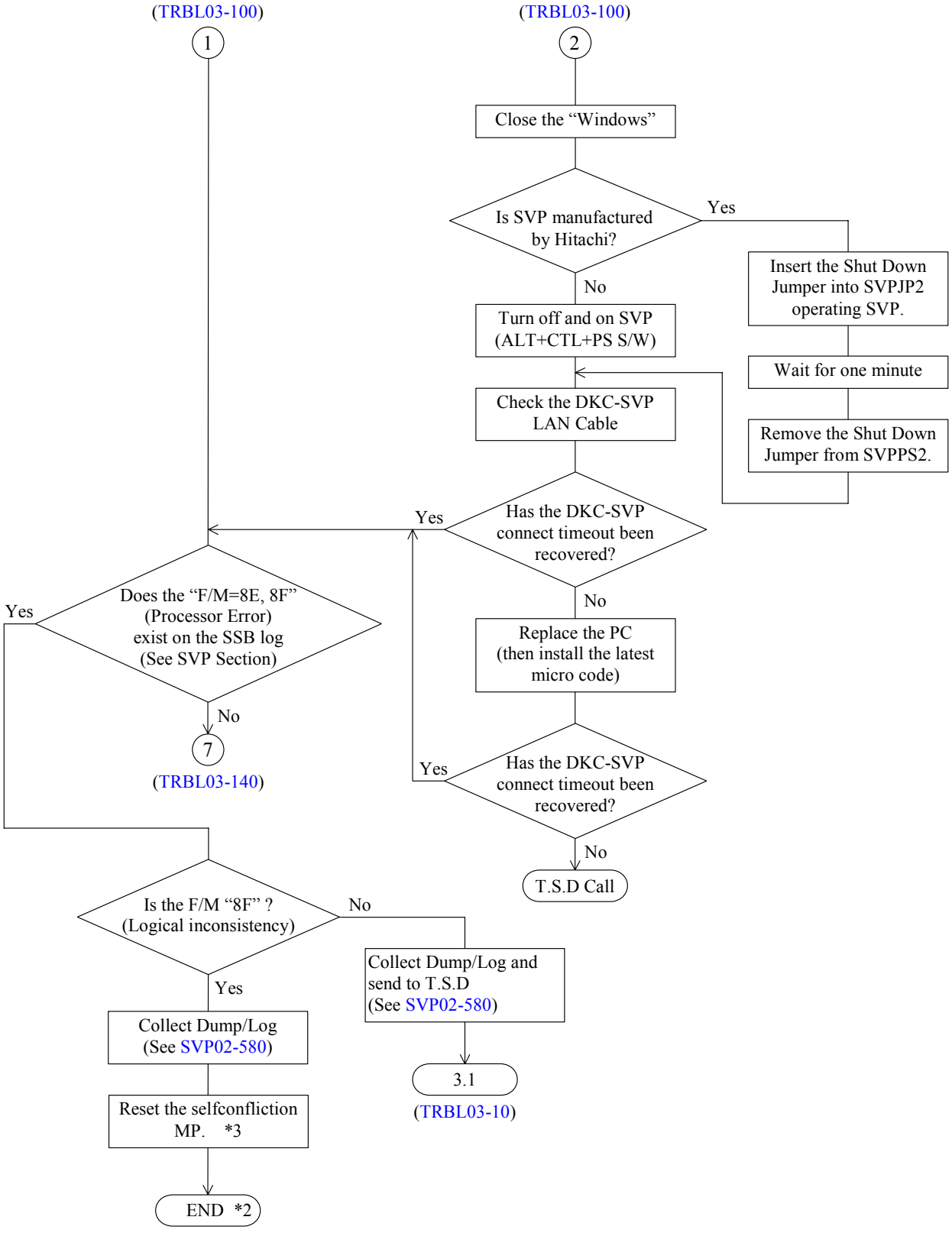
*1: If you finished the Maintenance, delete the log and SIM complete. (Refer to SVP02-170, 560)

3.2.5 The lamp on the subsystem panel has failed



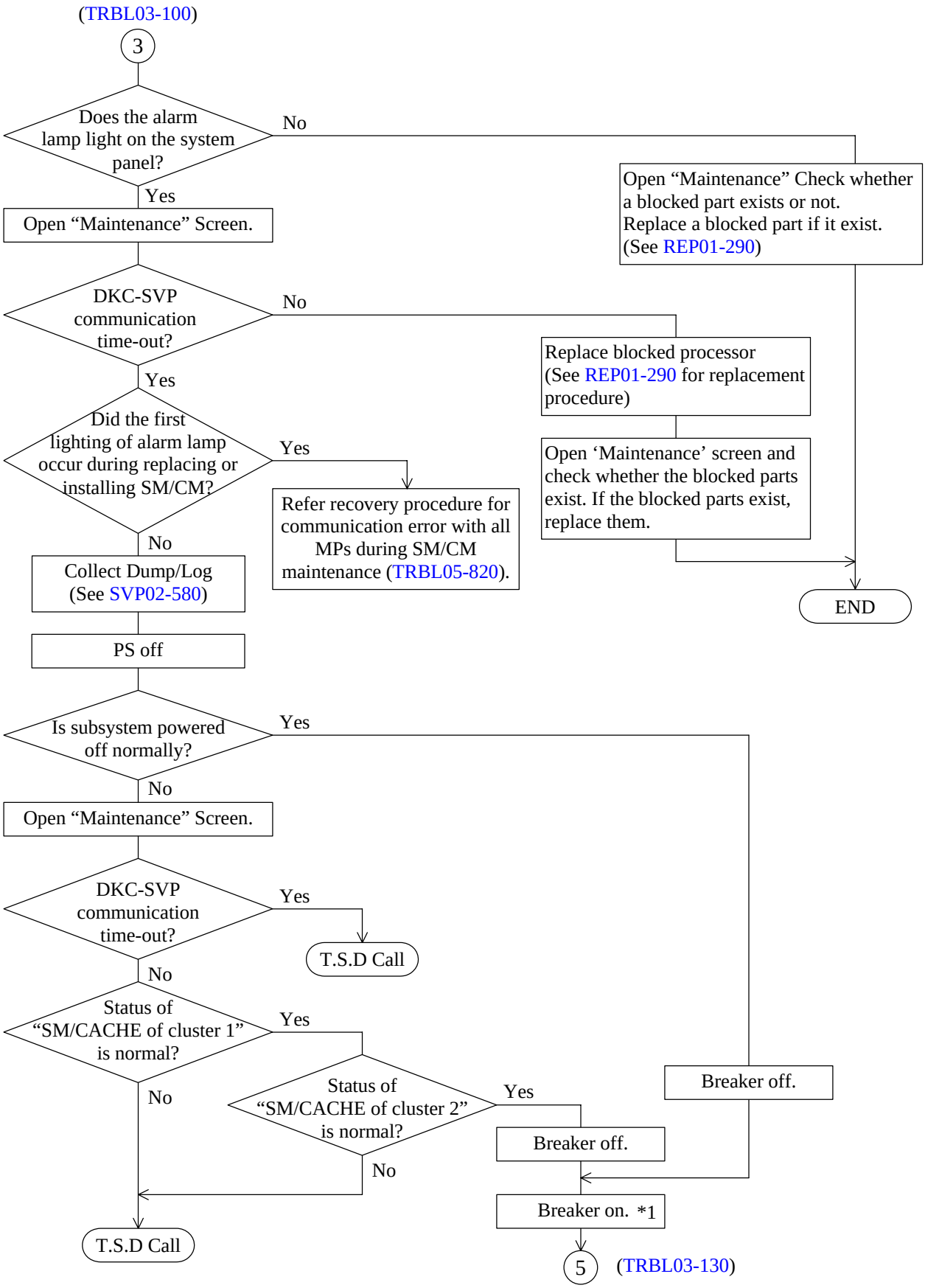
*1: When communication timeout occurs on Dump Collection Screen, select [OK] button and continue Autodump without executing retry procedure shown on SVP02-660.

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

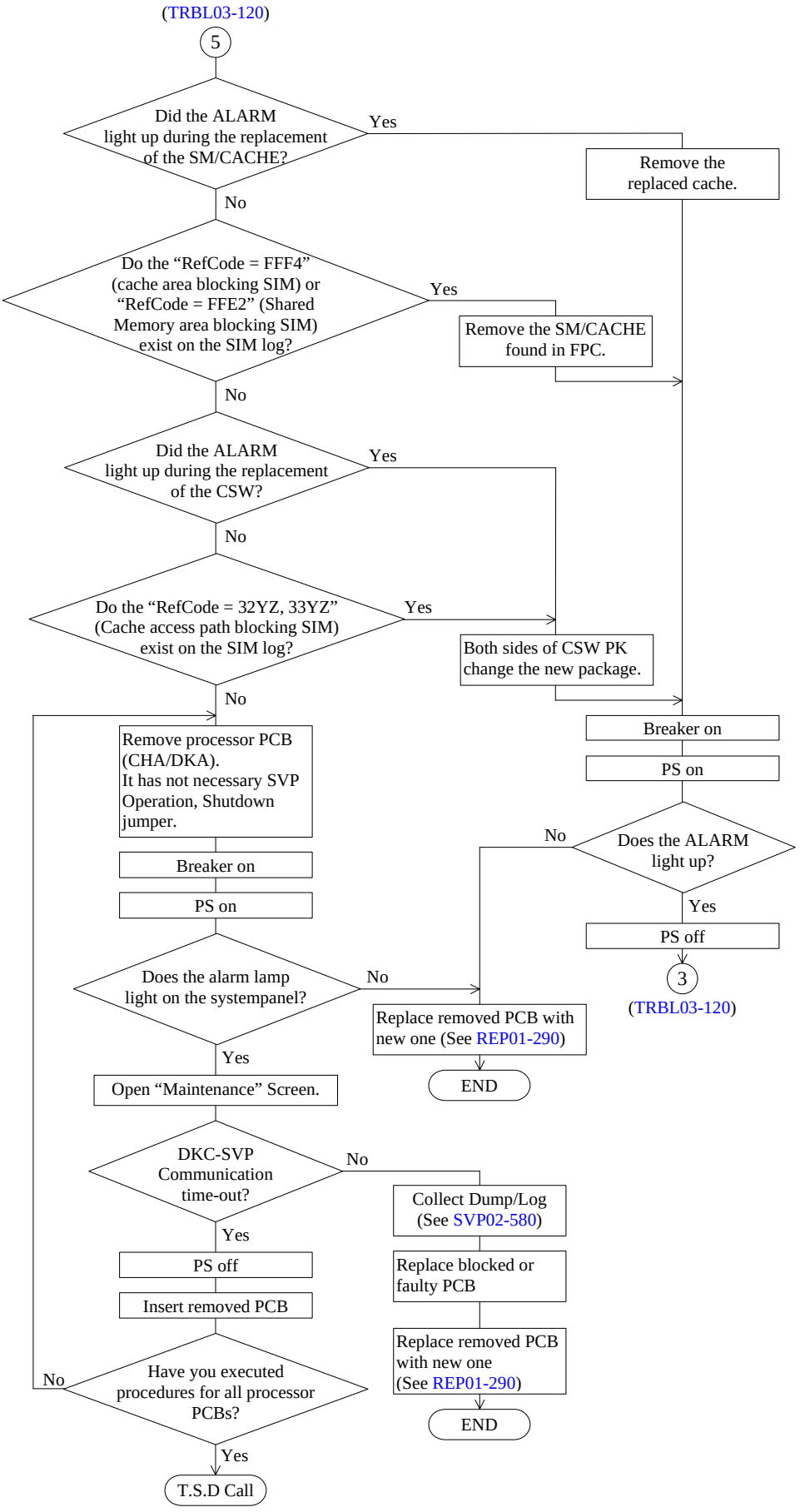


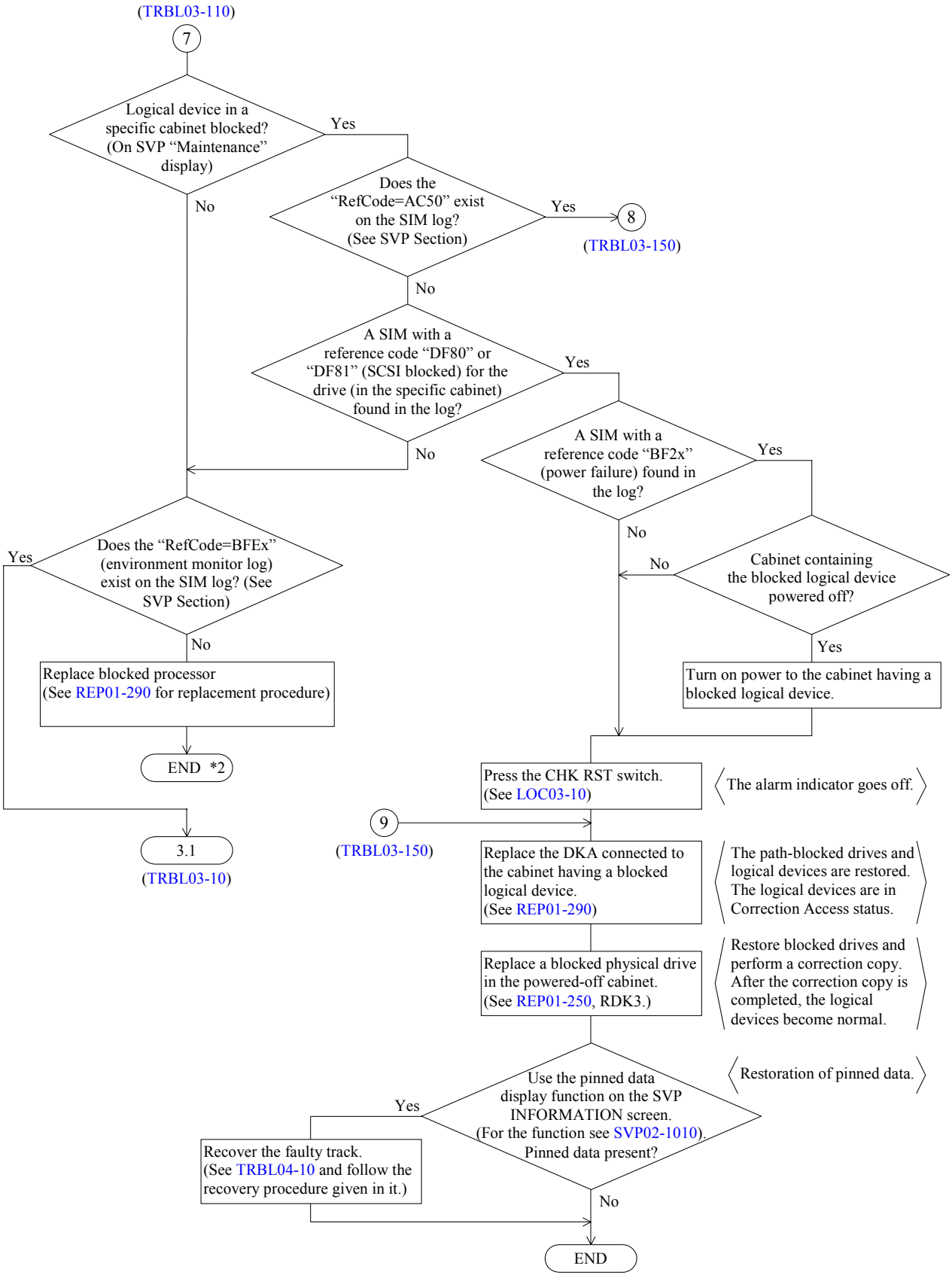
*2: If you finished the Maintenance, delete the log and SIM complete. (Refer to SVP02-170, 560)

*3: Replace the failure processor PCB.

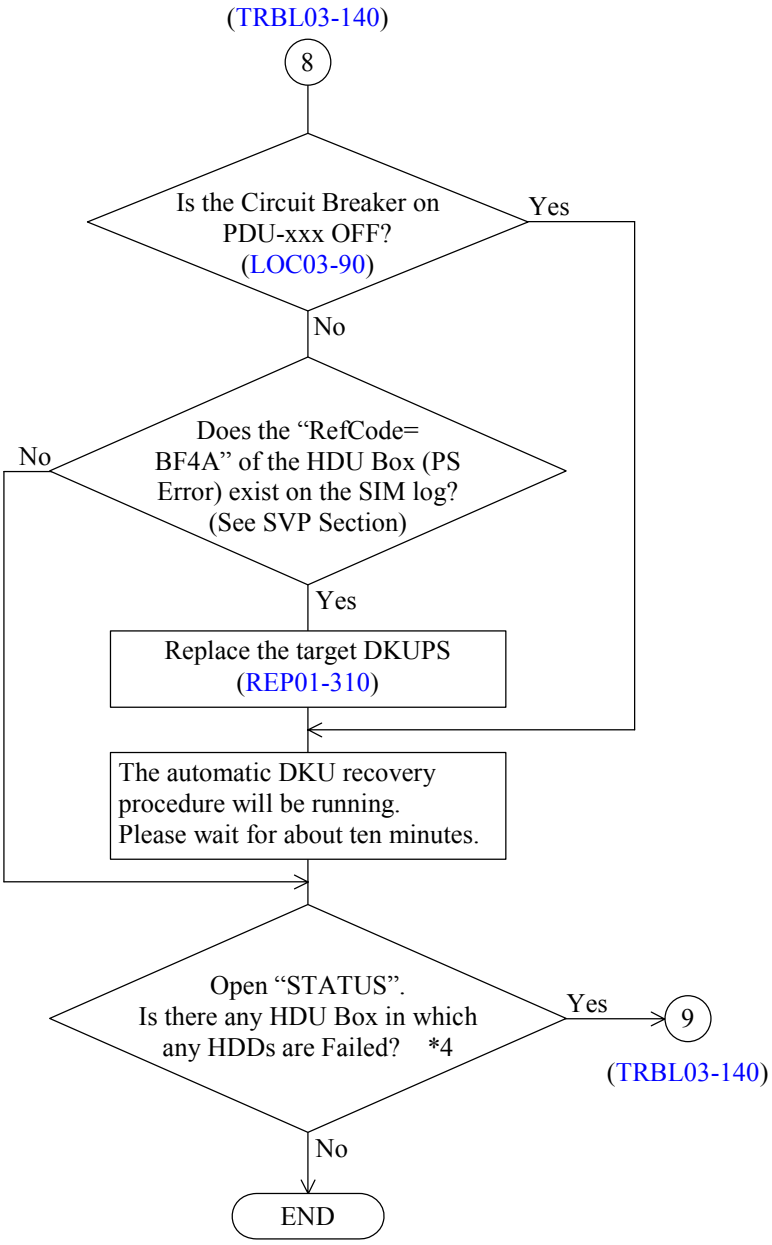


*1: Wait for five minutes from Breaker OFF to ON.





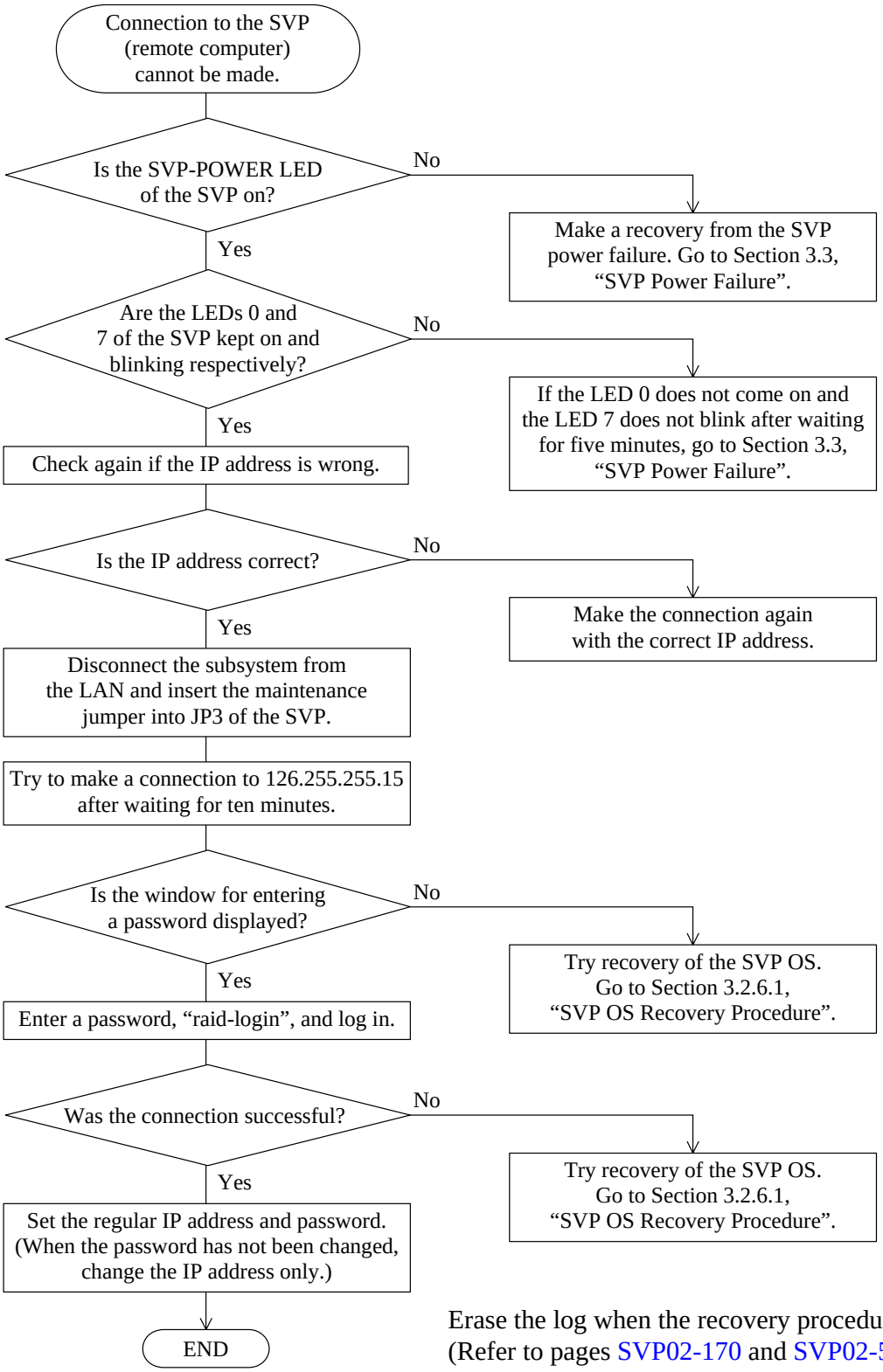
*2: If you finished the Maintenance, delete the log and SIM complete. (Refer to SVP02-170, 560)



*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



Erase the log when the recovery procedure is completed. (Refer to pages SVP02-170 and SVP02-560.)

3.2.6.2 SVP OS Recovery procedure

Attention:

This procedure requires approx. 30 min. except installation of Security Patch and Microprogram.
And this procedure is not always recovered of the SVP OS.
Therefore don't execute this procedure when the customer requires rapid recovery. (Replacing the SVP as it is)

Note 1: Please remove MODEM card before using OS recovery.
If OS re-establishment continue without removing them, SVP will restart with wrong setting.

Note 2: Please remove wrote-protection of the Recover Tool FD.
If the Recovery Tool FD is write-protected, OS re-establishment will not finish correctly.

<Pre procedure>

1. Open the front door and then open the DKC panel.
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).

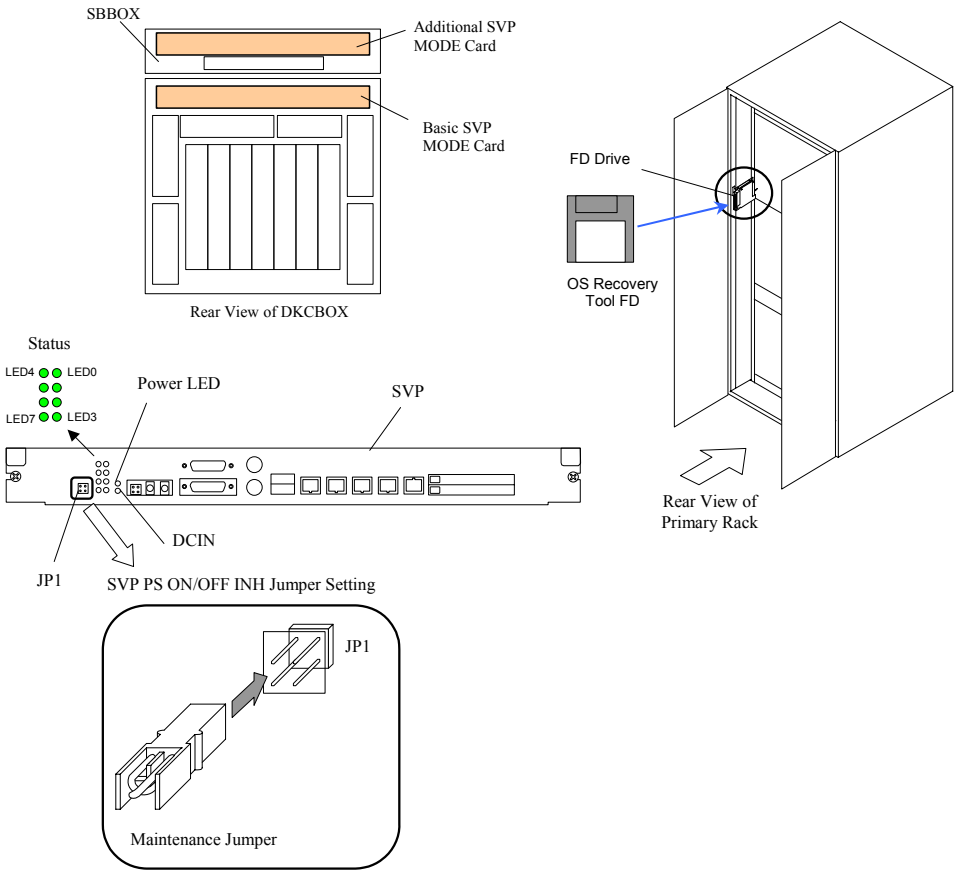


Fig. 3.2.6.1-1 System structure of the DKC610I

(2) Insert a Maintenance Jumper to JP1 on the SVP. And insert the “DKC610I SVP OS Recovery Tool FD”(*1) to the FD Drive, and press the “ON” switch. Then, the SVP will start (“POWER LED” will be on).

(*1) Please confirm the “Write Protect Switch” of the Tool FD. It should be “No Protect” side.

(3) A few minutes after from the SVP started, “OS Recovery Tool” will be loaded from the FD Drive, 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.

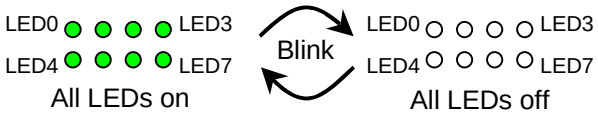


Fig. 3.2.6.1-2 Status LED’s condition in the first step

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 second step, Beep will stop and, LED6 and LED7 will be on. Then, press the “OFF” switch again to go to the third step.

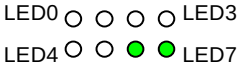


Fig. 3.2.6.1-3 Status LED’s condition in the second step

(6) At the third step, OS Recovery Tool performs recovery of the OS from the Backup partition. This process requires about 10 minutes (*2). During this process, from LED4 to LED7 (4 status LEDs) will be on.

(*2) Don’t turn off the power of SVP during this process. It might cause fatal error to the SVP.

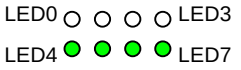


Fig. 3.2.6.1-4 Status LED’s condition in the third step

(7) 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.

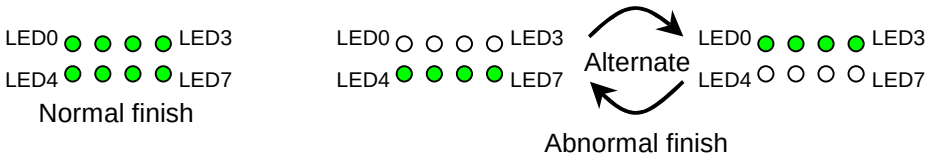


Fig. 3.2.6.1-5 Status LED's condition after the recovery process

Confirm that the recovery process finished normally, and then turn off the power of the SVP. (Press both "ON" and "OFF" switch at the same time for 5 seconds or more.)
Remove the OS Recovery Tool FD from the FD drive, and turn on the power of the SVP again. (Press the "ON" switch.)

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)

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

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

3.2.6.3 About Other SVP troubles

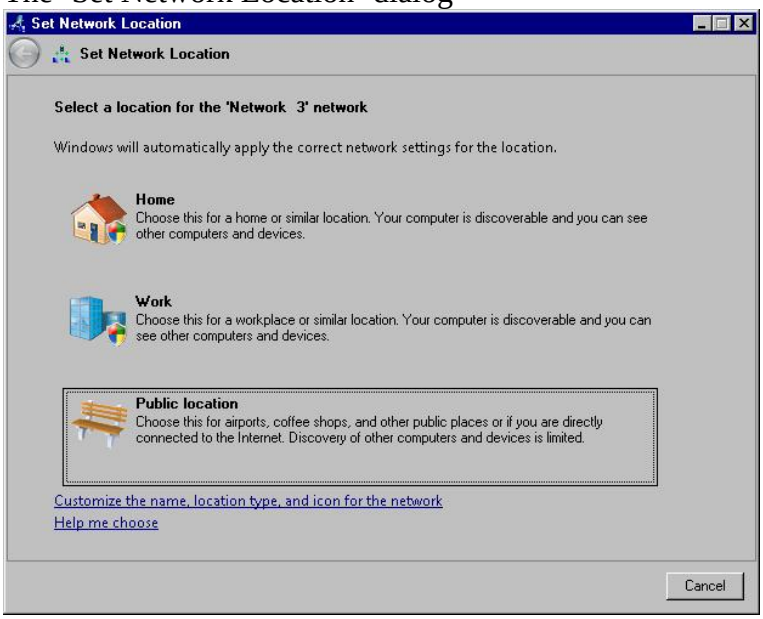
(1) Action when the ‘Set Network Location’ dialog is displayed

‘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.

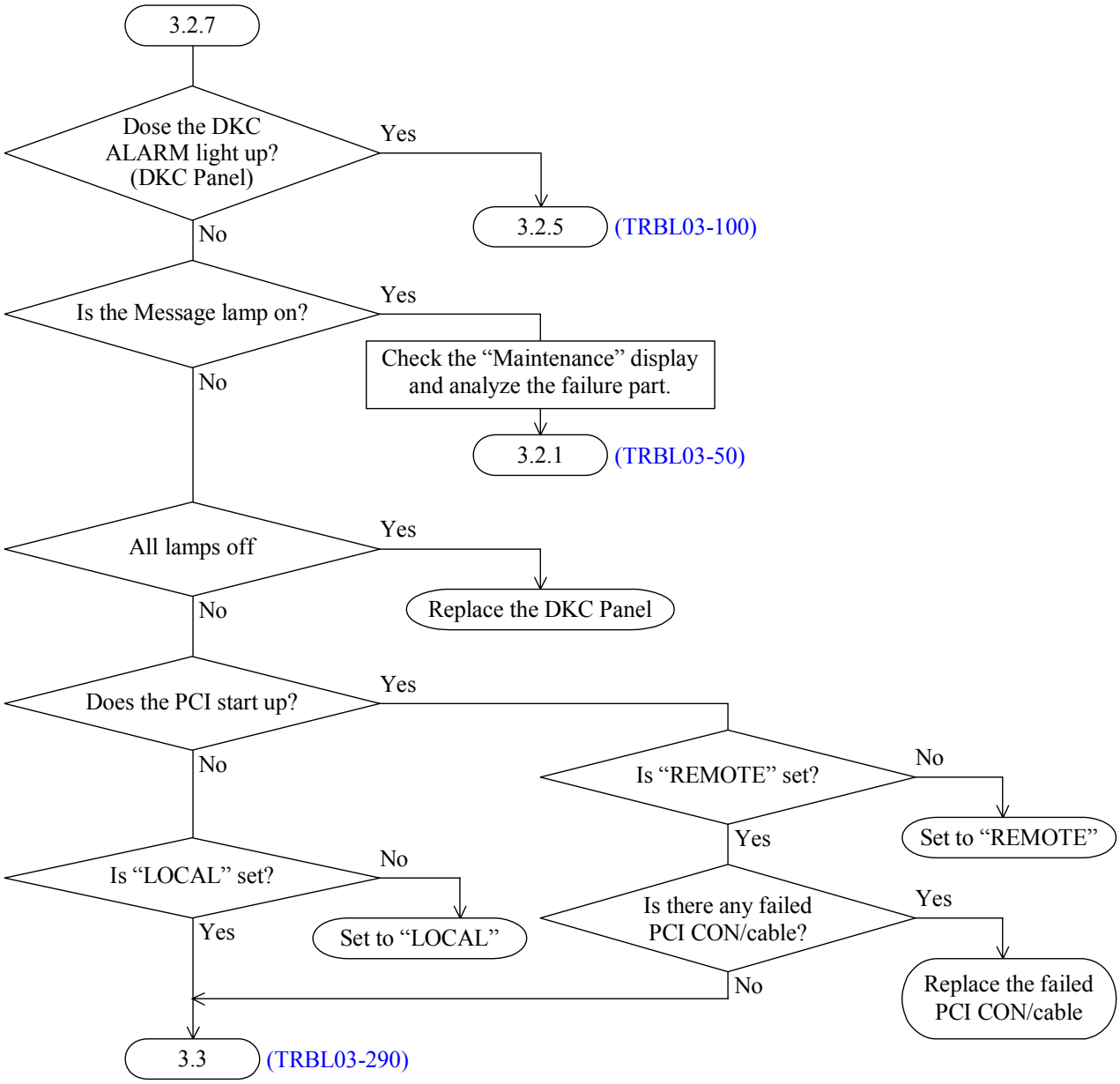
(a) The ‘Set Network Location’ dialog



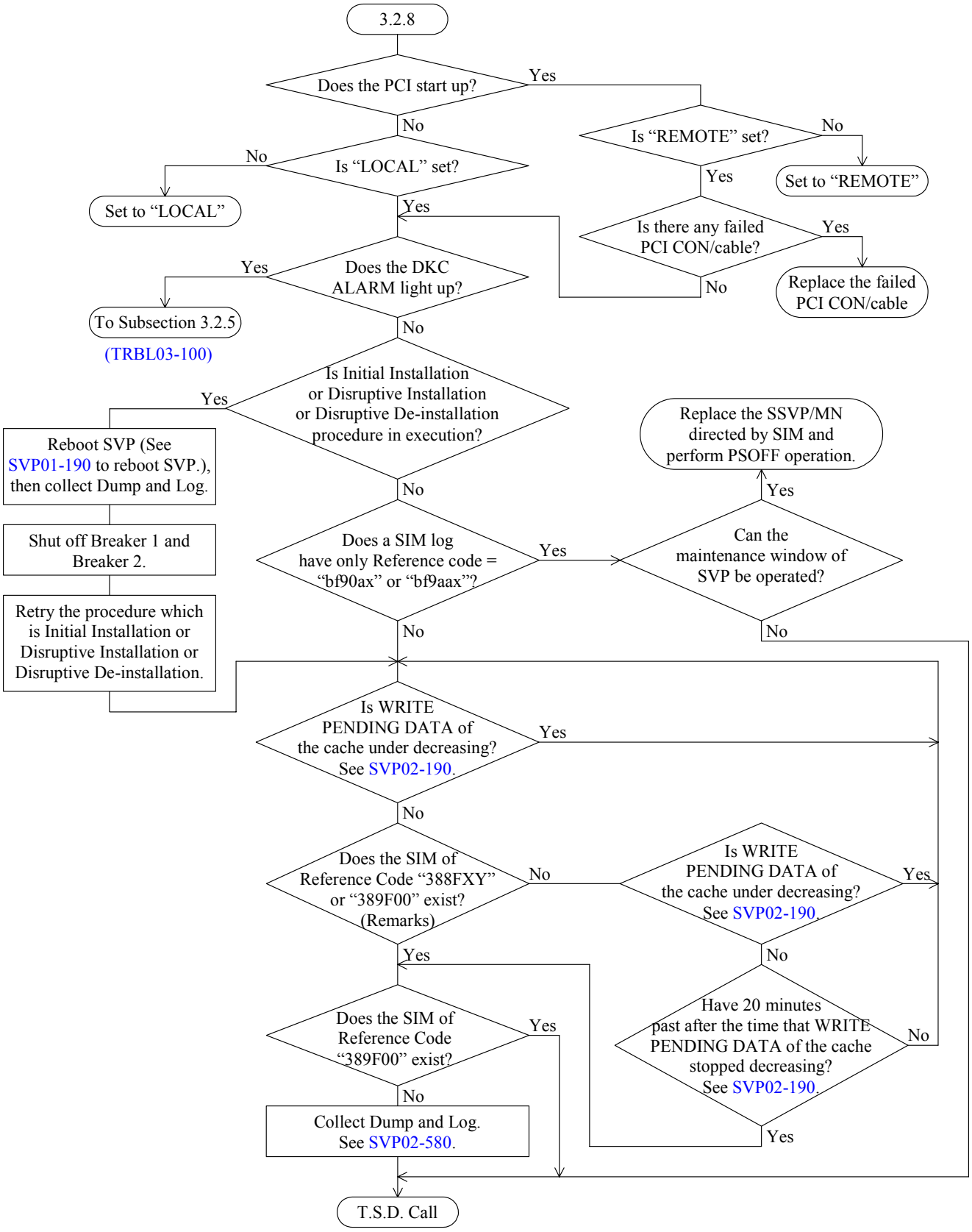
(b) How to close the ‘Set Network Location’ dialog

- Press (CL) the [Cancel] button in the lower right of the dialog.

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 USP V is powered off when external storage mapped by USP V is PS/OFF or power failure, there is a possibility that USP V cannot be turned off. (Because Write Pending data of the external storage mapped by USP V remains in Cache of USP V) SIM=388FXY is reported. In this case, execute “Disconnect subsystem” operation of UVM after starting up the external storage and power off USP V. 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.

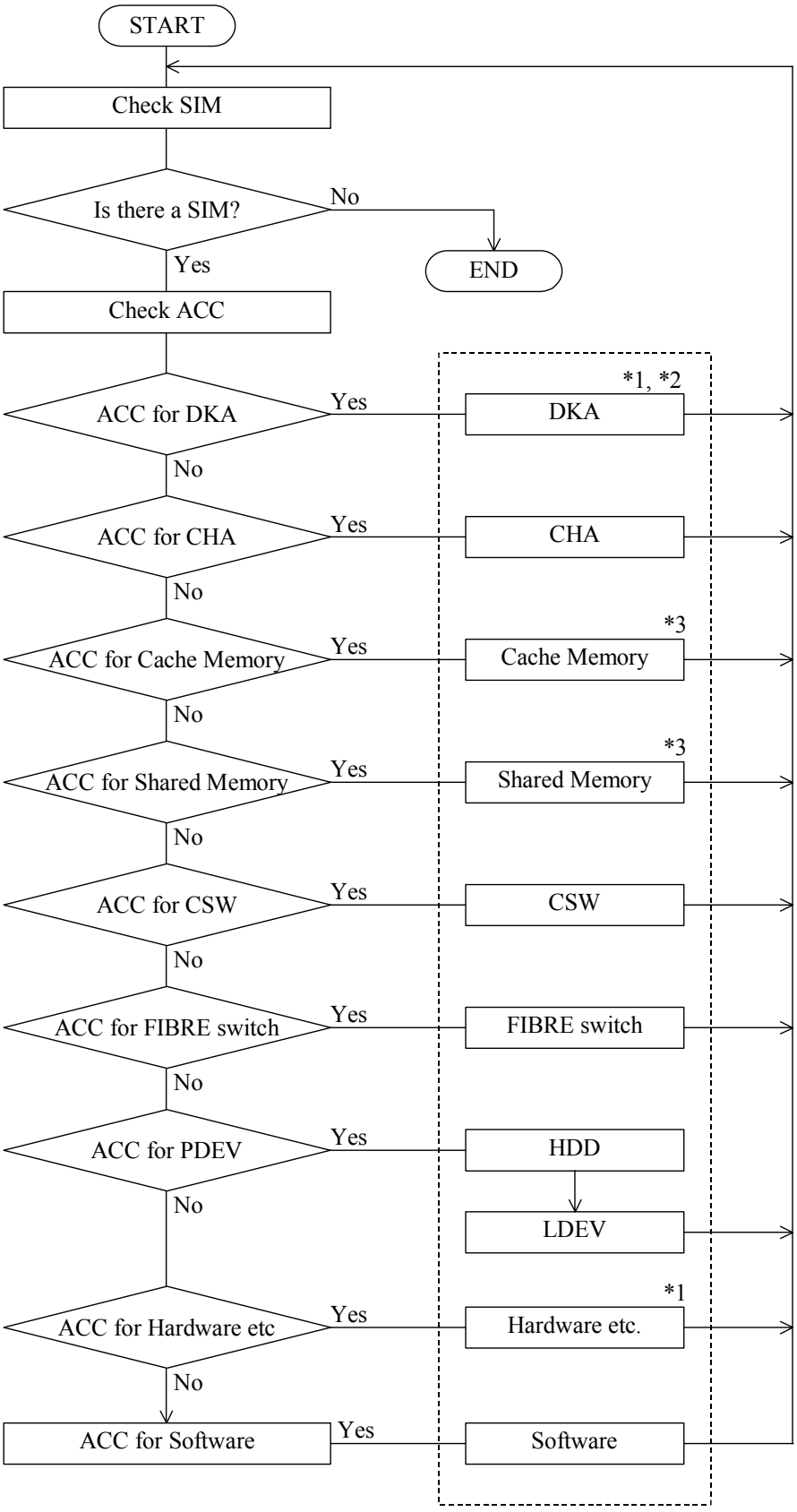
Table 3.2.9-1 shows that a part with a smaller priority number has a higher priority.

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

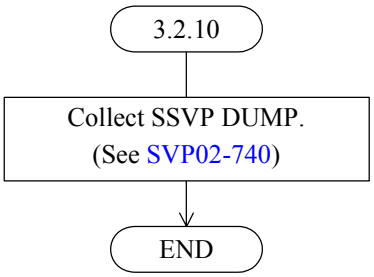
Priority	Parts name	Maintenance method
1	DKA	Replace
2	CHA	Replace
3	Cache Memory	Replace
4	Shared Memory	Replace
5	CSW	Replace
6	FIBRE switch	Replace
7	HDD	Replace
8	LDEV	Format or Restore
9	Hardware etc.	Replace
10	Software	Exchange

Notice: You should execute recovery operation at time zone with a little business influence when the ACC indicates multiple parts.

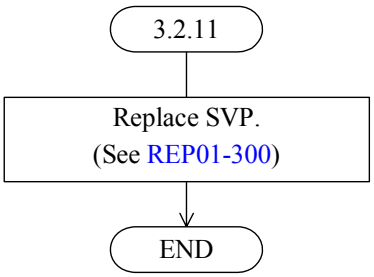


*1: When the SSVP is abnormal, replace the SSVP first.
*2: When the LAN communication is abnormal, replace the CSW first.
*3: When the Cache recovery fails and the CSW is included in the failed part of the ACC, replace the CSW first.

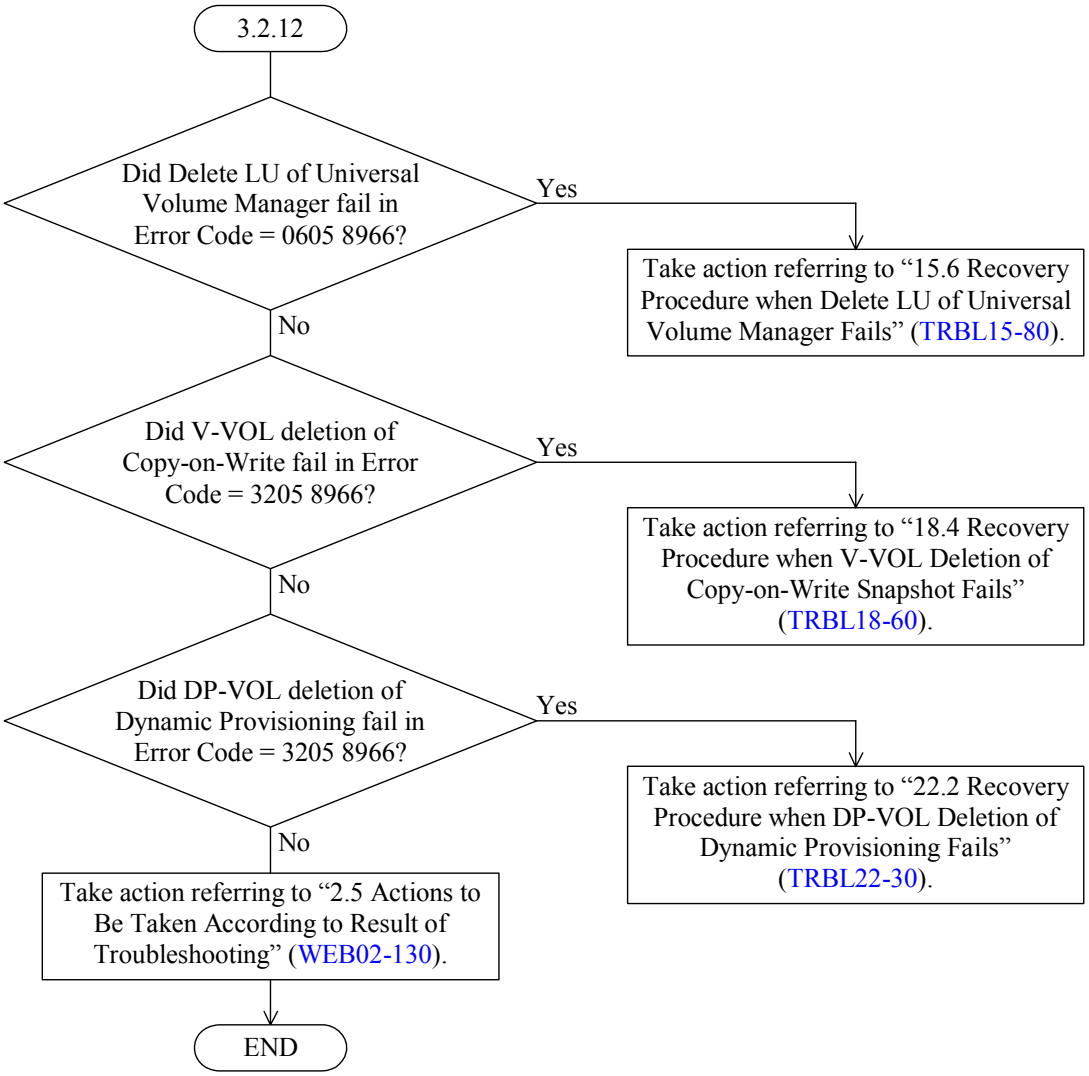
3.2.10 SSVP alarm lamp has been blinking or has lighted on



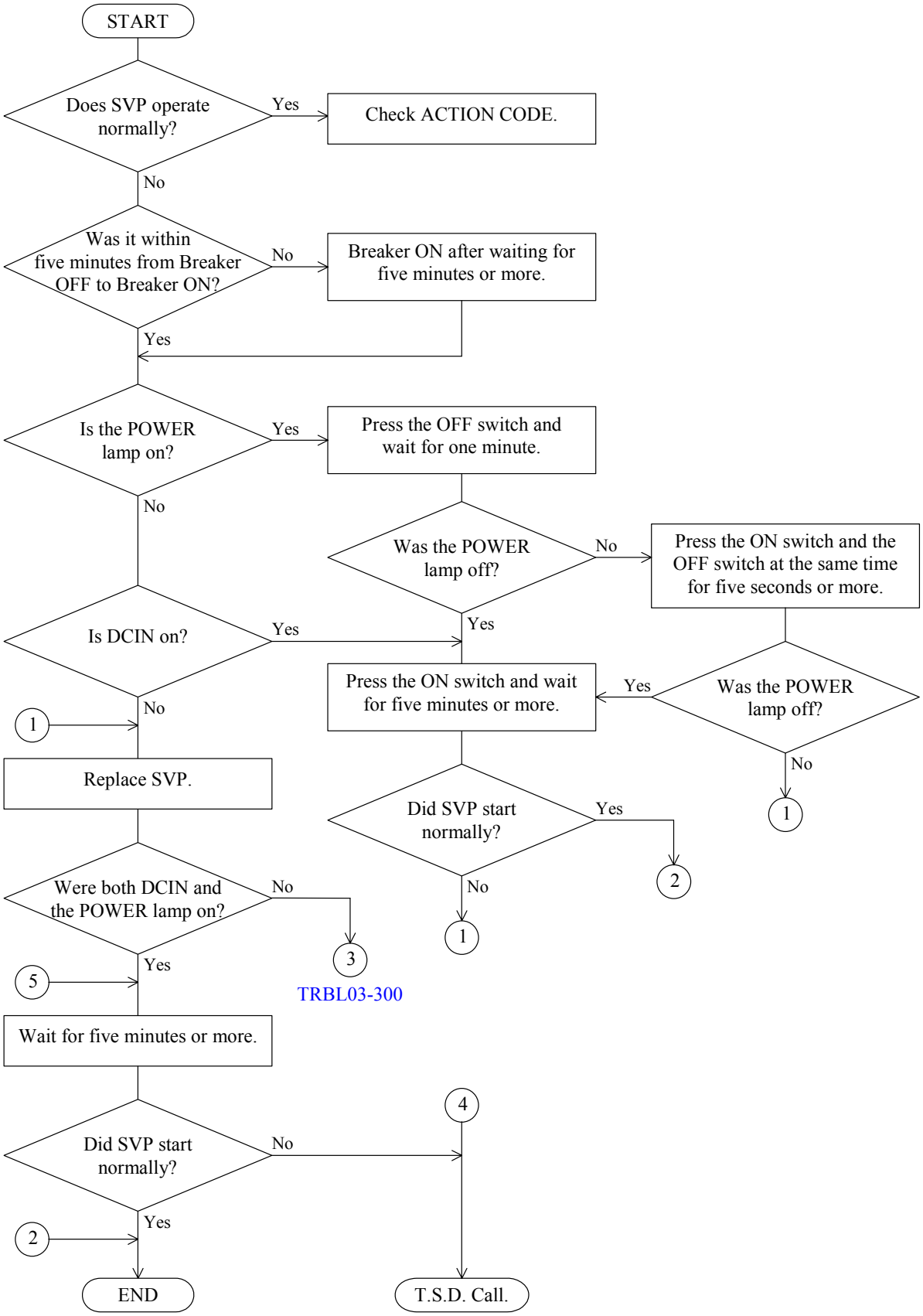
3.2.11 MESSAGE lamp has been blinking

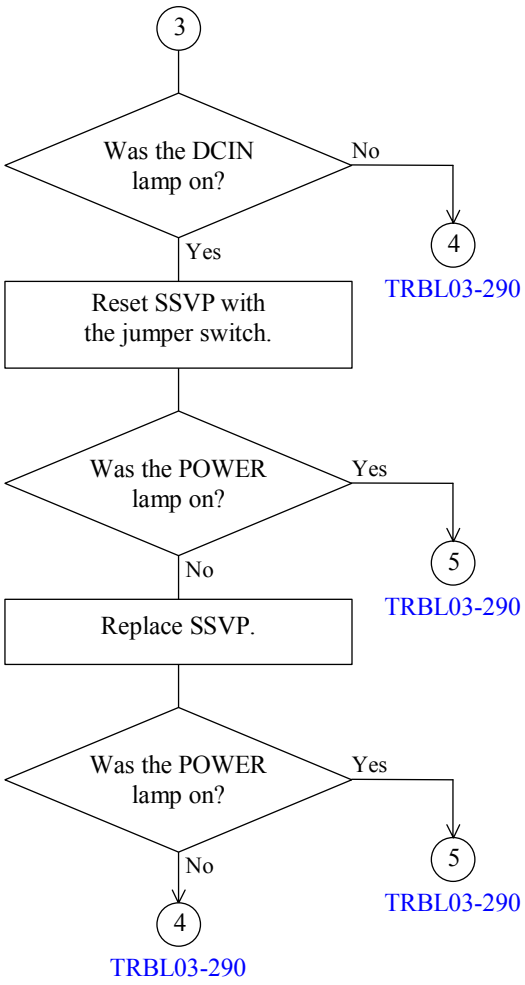


3.2.12 Web Console failure



3.3 SVP Power Trouble Shooting





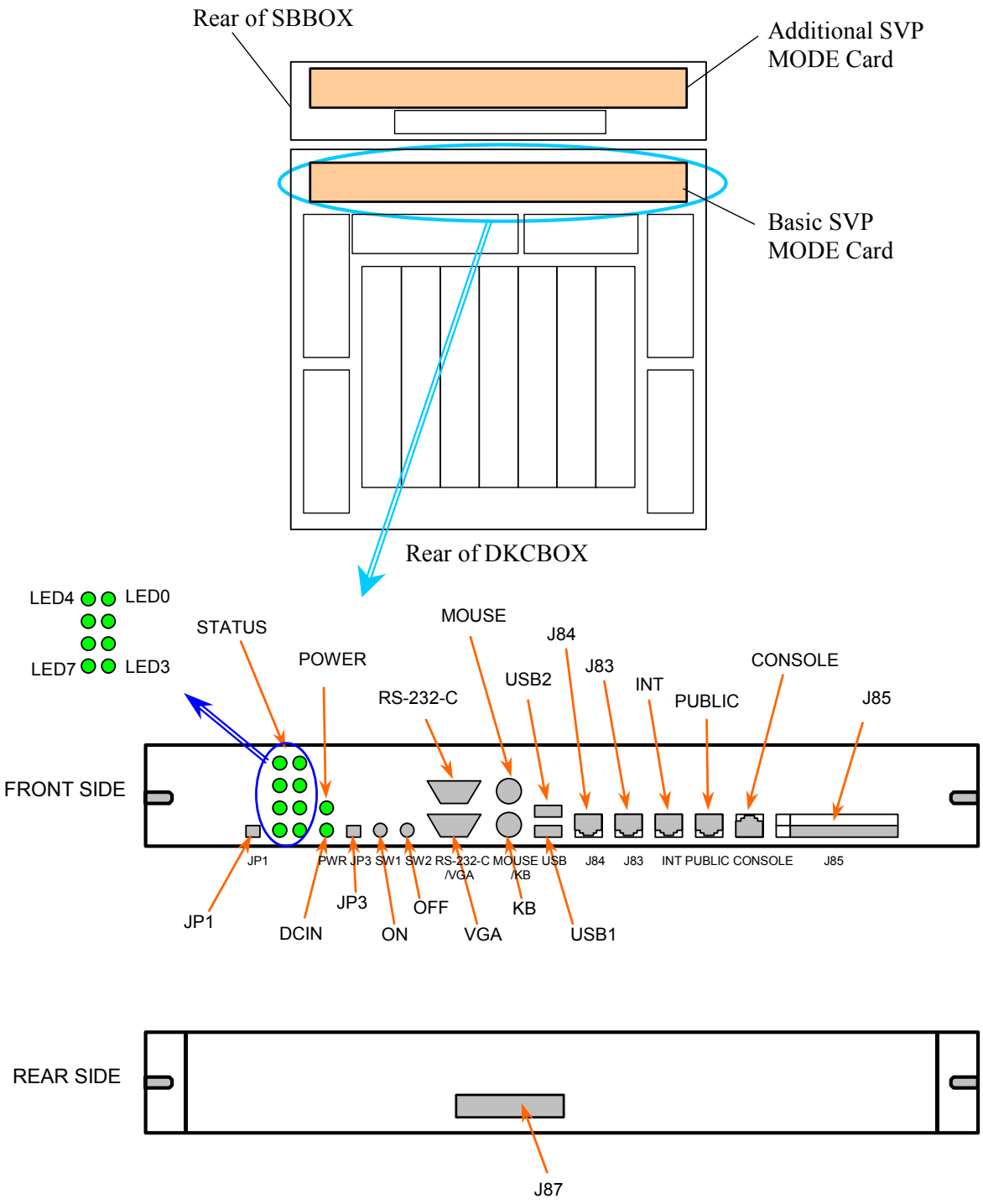
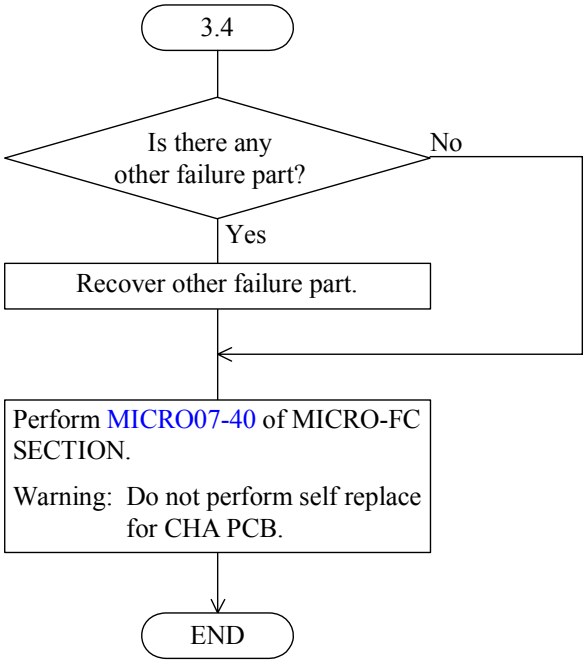


Fig. 3.3-1 Parts Location

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	X:CU# (*) YY:LDEV#
EF5X-XX	Unable to write a track to a device in the external subsystem	X: CU# (*) XX: LDEV#
FF5X-XX	Unable to read a track from a device in the external subsystem	X: CU# (*) XX: LDEV#

*: 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” (SVP03-450) 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 subsystem	After recovering the external subsystem, perform a dummy replacement of the cache package
External VOL Read Error	Unable to read a track from a device in the external subsystem	After recovering the external subsystem, perform a dummy replacement of the cache package

Pages TRBL04-XX explain the error types of pinned tracks and have flowcharts for recovery.
For HRC volumes, the flowcharts for recovery are shown in TRBL06-270 through TRBL06-290.

For HMRCF 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.

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. 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. However, if the power is not turned on within 36 hours (Memory backup mode: 36 hours), the data will be lost, and an ECC/LRC type of a pinned track will occur.

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 subsystem, and Check Condition (Medium Error) is received due to a drive failure of the external subsystem, External VOL Write Error is set.

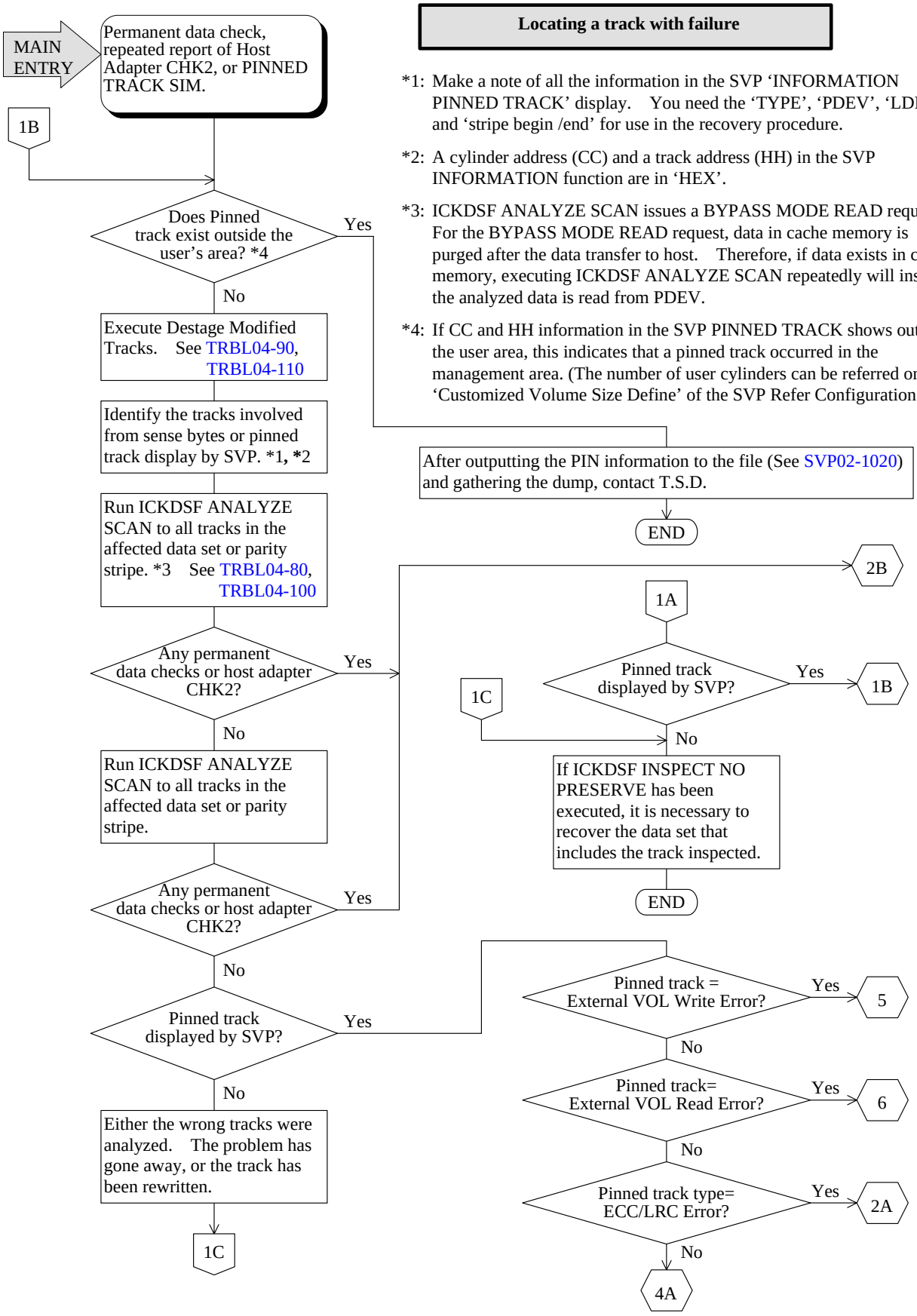
How to recover:
After recovering the device in the external storage subsystem, perform a dummy replacement of the cache package.

External VOL Read Error

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

How to recover:
After recovering the device in the external subsystem, perform a dummy replacement of the cache package.

4.1 Recovery Procedure for Pinned Tracks



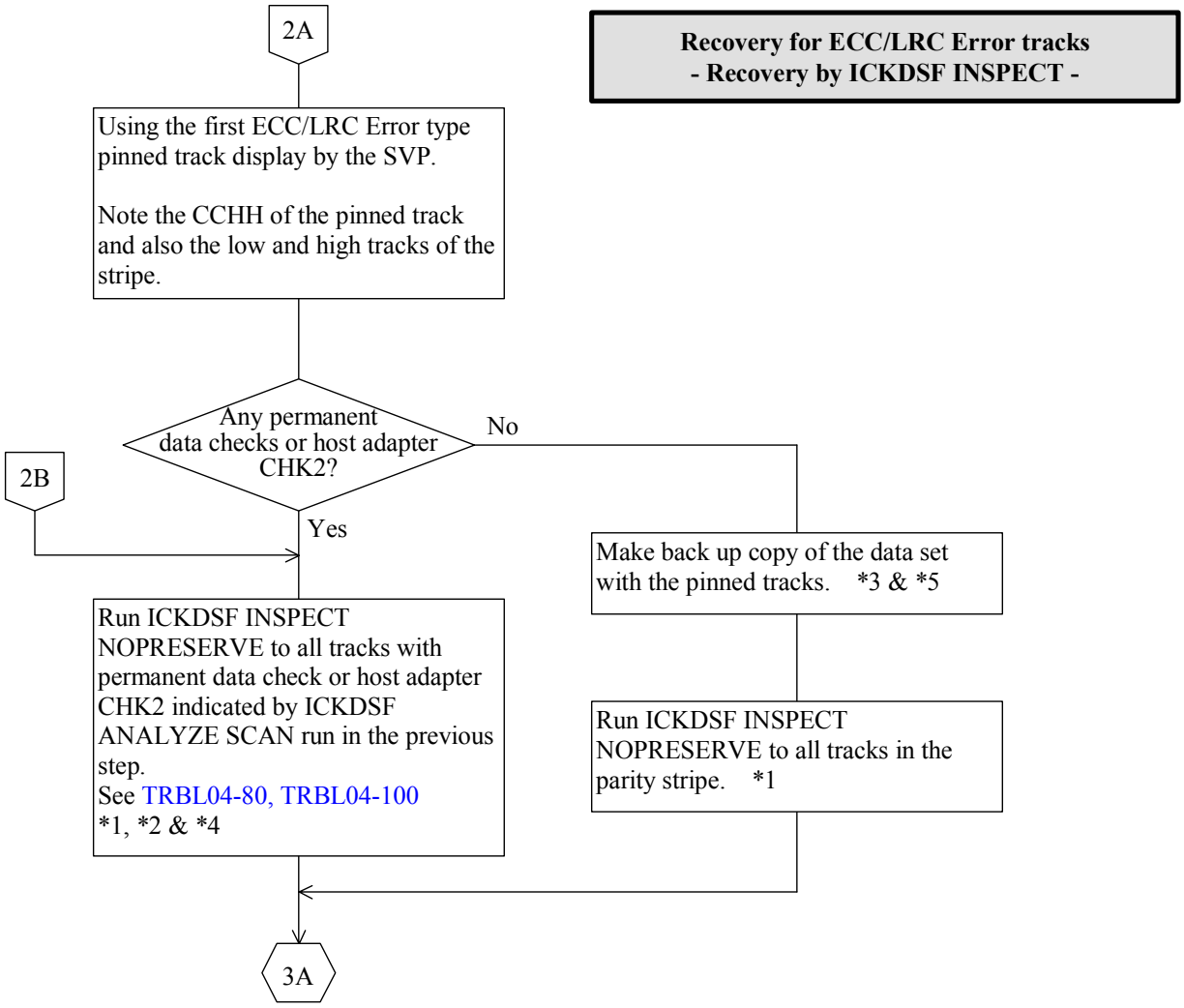
Locating a track with failure

*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.)



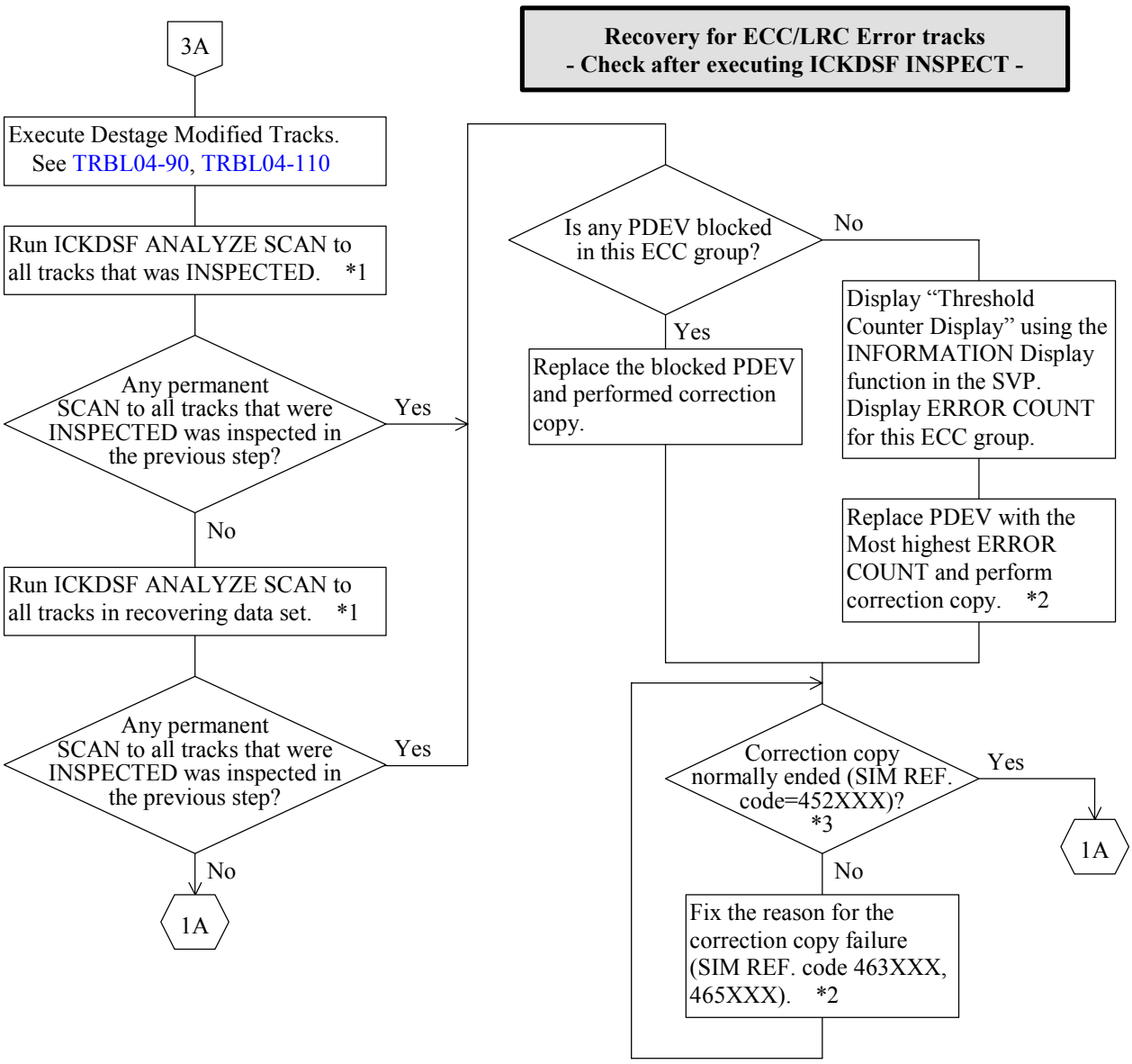
*1: Remember all tracks on which the ICKDSF INSPECT NO PRESERVE is run as customer data has been lost. Customer will have to recover files for each data set.

*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.

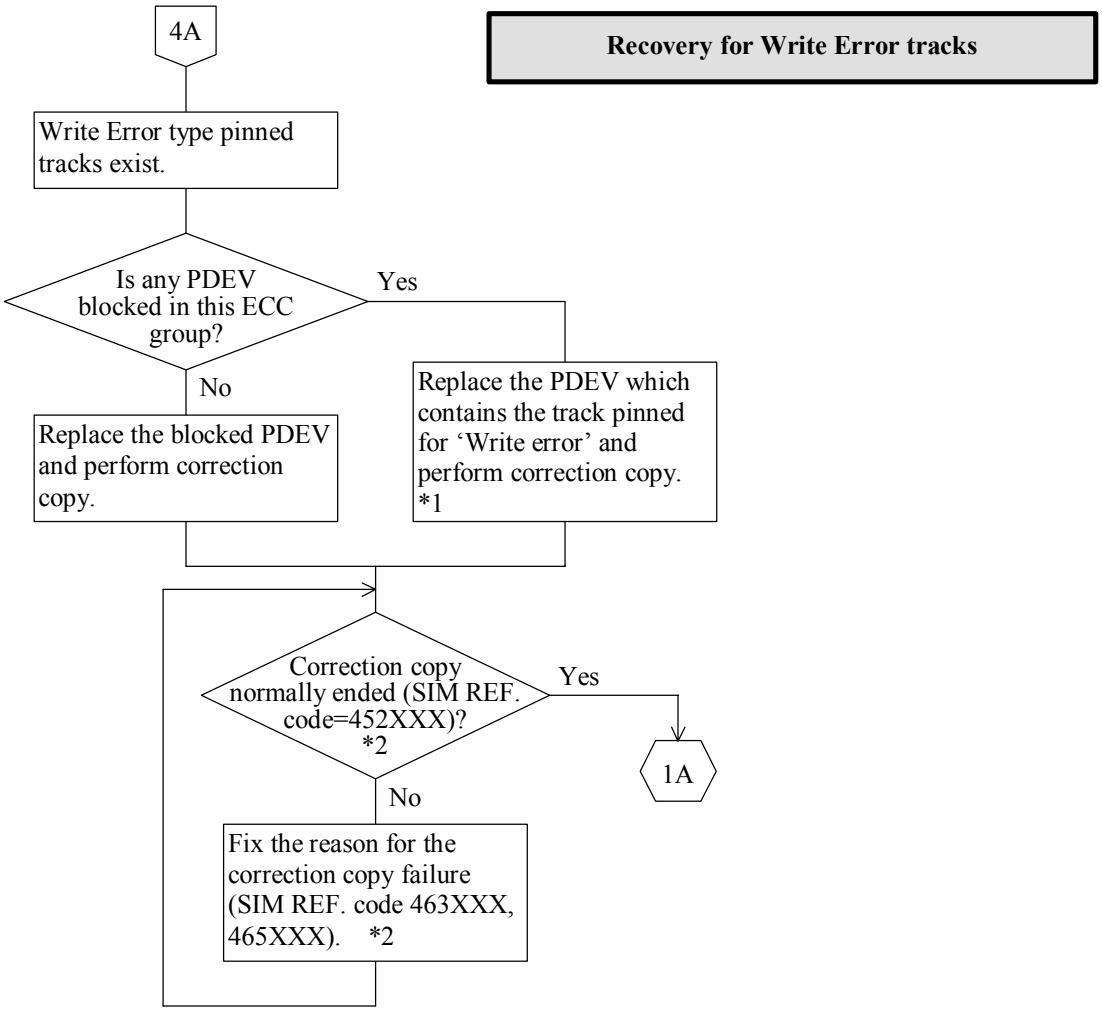
*5: ① Execute File Back up for dataset including pinned track. Store the backed-up file to another media (tape or another dasd).
② After executing NO PRESERVE INSPECT, restore the backed-up file to its original location.



*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.

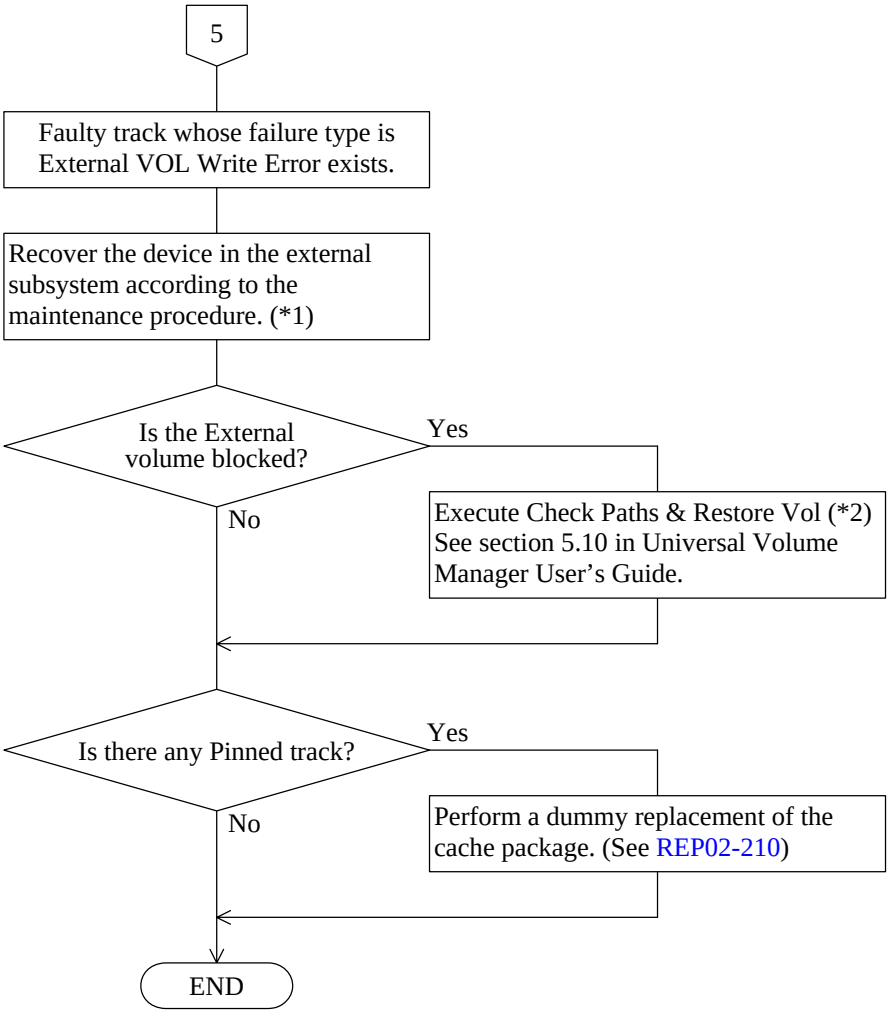
```
ickdsf
ICK030E DEFINE INPUT...
Console
CONSOLE
ICK031E DEFINE OUTPUT...
Console
CONSOLE
ICKDSF - CMS DEVICE SUPPORT FACILITY...

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.

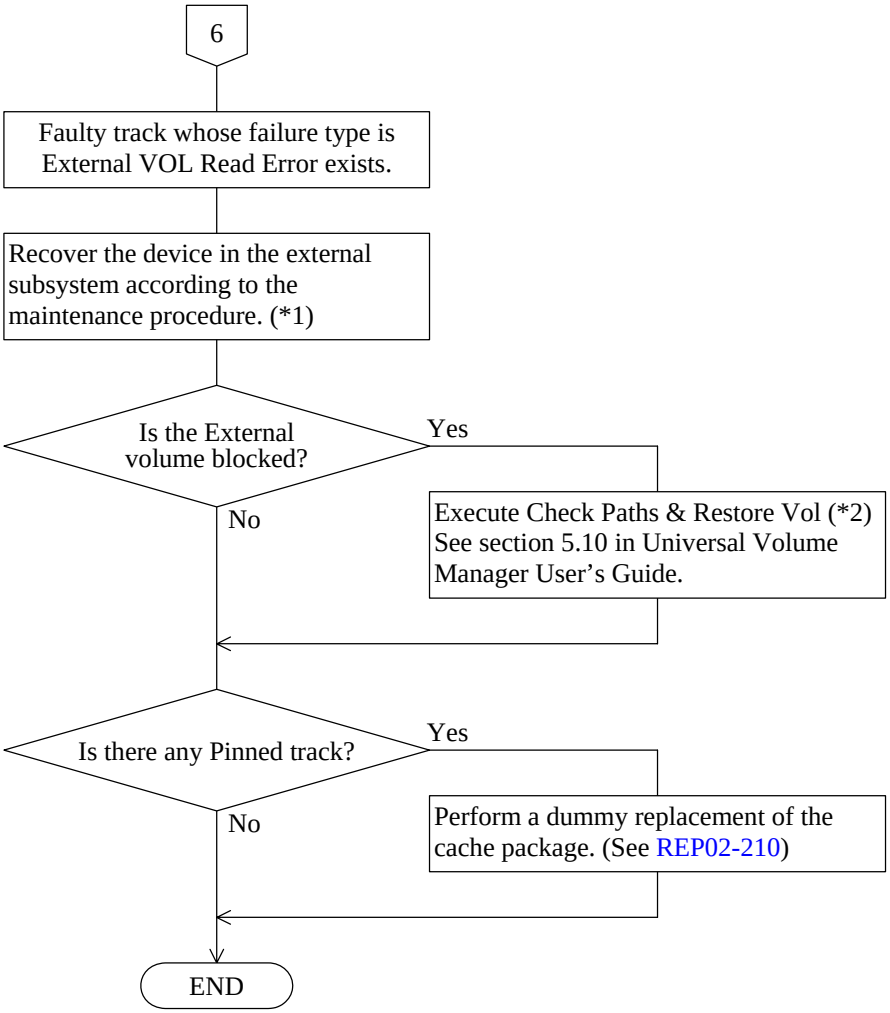


*1: It should be done in the external subsystem. The user needs to ask the service personnel of the external subsystem to perform the maintenance operation of the subsystem. (If the external subsystem is Hitachi storage, recover the faulty part according to the maintenance manual.)

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

Recovery from External VOL Read Error

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

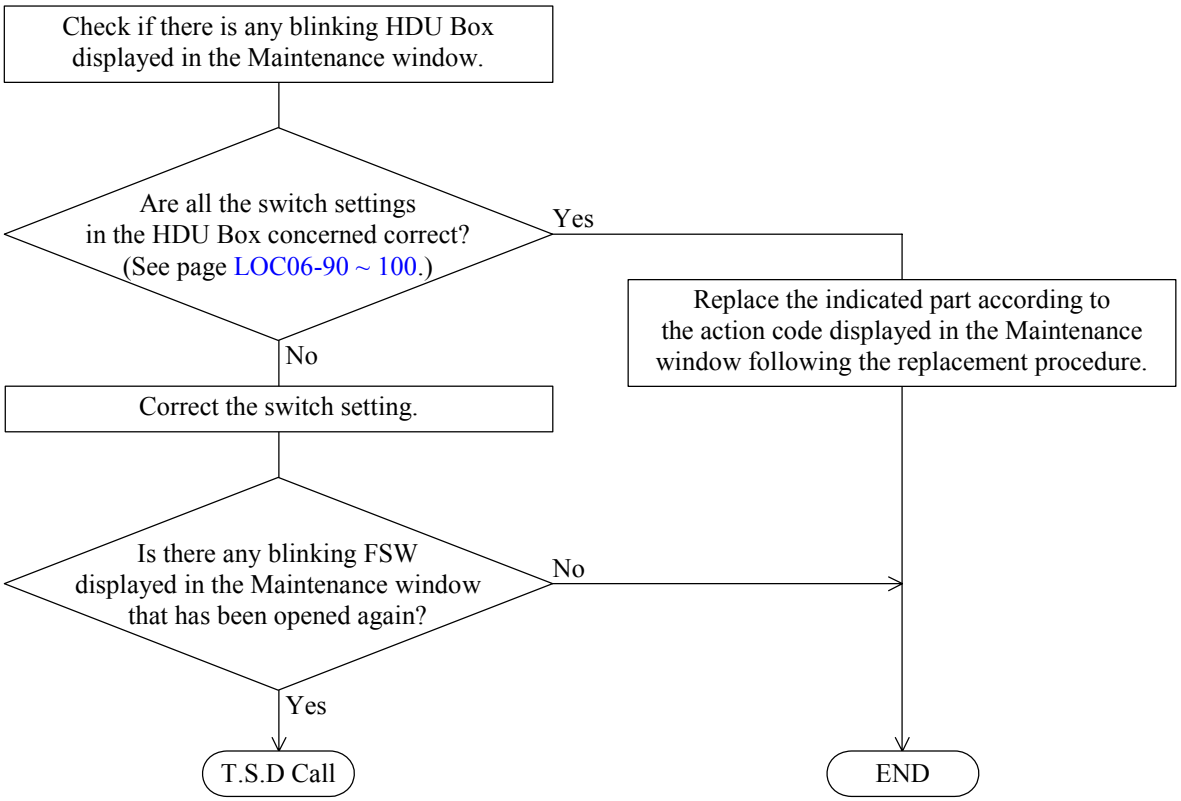


*1: It should be done in the external subsystem. The user needs to ask the service personnel of the external subsystem to perform the maintenance operation of the subsystem. (If the external subsystem is Hitachi storage, recover the faulty part according to the maintenance manual.)

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

5. Error Recovery

5.1 FSW Access Error/FSW LED Bus Test Error (SIM = BF9XXX, 3DAXXX)



5.2 Isolation and Recovery Procedures for Common Fibre Loop Error (SIM = DF6XXX, DF7XXX, DF8XXX, DF9XXX)

When a Fibre 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 Fibre Loop error, and how to recover the error.

As a Fibre port error SIM managed in each PDEV, a Fibre temporary error (REF code = DF6XXX, DF7XXX) is reported when a warning is issued, and Fibre blocking (REF code = DF8XXX, DF9XXX) is reported when the equipment is blocked (XXX: Refer to Fig. 5.2-1).

Possible causes for the malfunction are:

(1) Failure of drive specified in FPC
(2) Defects in Fibre Chip for DKF
(3) Defects in Fibre Loop (cable, FSW(Fibre switch))
(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 Fibre port error occurs on other PDEVs on the same Fibre Loop. If a common error exists, perform the appropriate recovery for the common error parts.

Fig 5.2-1 RAID600 Relation of CDEV#/RDEV# - SIM# (1/4)

		CDEV#															
		0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07	0x08	0x09	0x0a	0x0b	0x0c	0x0d	0x0e	0x0f
RDEV	0x00	000	080	100	180	200	280	300	380	400	480	500	580	600	680	700	780
	0x01	001	081	101	181	201	281	301	381	401	481	501	581	601	681	701	781
	0x02	002	082	102	182	202	282	302	382	402	482	502	582	602	682	702	782
	0x03	003	083	103	183	203	283	303	383	403	483	503	583	603	683	703	783
	0x04	004	084	104	184	204	284	304	384	404	484	504	584	604	684	704	784
	0x05	005	085	105	185	205	285	305	385	405	485	505	585	605	685	705	785
	0x06	006	086	106	186	206	286	306	386	406	486	506	586	606	686	706	786
	0x07	007	087	107	187	207	287	307	387	407	487	507	587	607	687	707	787
	0x08	008	088	108	188	208	288	308	388	408	488	508	588	608	688	708	788
	0x09	009	089	109	189	209	289	309	389	409	489	509	589	609	689	709	789
	0x0a	00A	08A	10A	18A	20A	28A	30A	38A	40A	48A	50A	58A	60A	68A	70A	78A
	0x0b	00B	08B	10B	18B	20B	28B	30B	38B	40B	48B	50B	58B	60B	68B	70B	78B
	0x0c	00C	08C	10C	18C	20C	28C	30C	38C	40C	48C	50C	58C	60C	68C	70C	78C
	0x0d	00D	08D	10D	18D	20D	28D	30D	38D	40D	48D	50D	58D	60D	68D	70D	78D
	0x0e	00E	08E	10E	18E	20E	28E	30E	38E	40E	48E	50E	58E	60E	68E	70E	78E
	0x0f	00F	08F	10F	18F	20F	28F	30F	38F	40F	48F	50F	58F	60F	68F	70F	78F
	0x10	010	090	110	190	210	290	310	390	410	490	510	590	610	690	710	790
	0x11	011	091	111	191	211	291	311	391	411	491	511	591	611	691	711	791
	0x12	012	092	112	192	212	292	312	392	412	492	512	592	612	692	712	792
	0x13	013	093	113	193	213	293	313	393	413	493	513	593	613	693	713	793
	0x14	014	094	114	194	214	294	314	394	414	494	514	594	614	694	714	794
	0x15	015	095	115	195	215	295	315	395	415	495	515	595	615	695	715	795
	0x16	016	096	116	196	216	296	316	396	416	496	516	596	616	696	716	796
	0x17	017	097	117	197	217	297	317	397	417	497	517	597	617	697	717	797
	0x18	018	098	118	198	218	298	318	398	418	498	518	598	618	698	718	798
	0x19	019	099	119	199	219	299	319	399	419	499	519	599	619	699	719	799
	0x1a	01A	09A	11A	19A	21A	29A	31A	39A	41A	49A	51A	59A	61A	69A	71A	79A
	0x1b	01B	09B	11B	19B	21B	29B	31B	39B	41B	49B	51B	59B	61B	69B	71B	79B
	0x1c	01C	09C	11C	19C	21C	29C	31C	39C	41C	49C	51C	59C	61C	69C	71C	79C
	0x1d	01D	09D	11D	19D	21D	29D	31D	39D	41D	49D	51D	59D	61D	69D	71D	79D
	0x1e	01E	09E	11E	19E	21E	29E	31E	39E	41E	49E	51E	59E	61E	69E	71E	79E
	0x1f	01F	09F	11F	19F	21F	29F	31F	39F	41F	49F	51F	59F	61F	69F	71F	79F
	0x20	020	0A0	120	1A0	220	2A0	320	3A0	420	4A0	520	5A0	620	6A0	720	7A0
	0x21	021	0A1	121	1A1	221	2A1	321	3A1	421	4A1	521	5A1	621	6A1	721	7A1
	0x22	022	0A2	122	1A2	222	2A2	322	3A2	422	4A2	522	5A2	622	6A2	722	7A2
	0x23	023	0A3	123	1A3	223	2A3	323	3A3	423	4A3	523	5A3	623	6A3	723	7A3
	0x24	024	0A4	124	1A4	224	2A4	324	3A4	424	4A4	524	5A4	624	6A4	724	7A4
	0x25	025	0A5	125	1A5	225	2A5	325	3A5	425	4A5	525	5A5	625	6A5	725	7A5
	0x26	026	0A6	126	1A6	226	2A6	326	3A6	426	4A6	526	5A6	626	6A6	726	7A6
	0x27	027	0A7	127	1A7	227	2A7	327	3A7	427	4A7	527	5A7	627	6A7	727	7A7

Fig 5.2-1 RAID600 Relation of CDEV#/RDEV# - SIM# (2/4)

		CDEV#															
		0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07	0x08	0x09	0x0a	0x0b	0x0c	0x0d	0x0e	0x0f
RDEV	0x28	028	0A8	128	1A8	228	2A8	328	3A8	428	4A8	528	5A8	628	6A8	728	7A8
	0x29	029	0A9	129	1A9	229	2A9	329	3A9	429	4A9	529	5A9	629	6A9	729	7A9
	0x2a	02A	0AA	12A	1AA	22A	2AA	32A	3AA	42A	4AA	52A	5AA	62A	6AA	72A	7AA
	0x2b	02B	0AB	12B	1AB	22B	2AB	32B	3AB	42B	4AB	52B	5AB	62B	6AB	72B	7AB
	0x2c	02C	0AC	12C	1AC	22C	2AC	32C	3AC	42C	4AC	52C	5AC	62C	6AC	72C	7AC
	0x2d	02D	0AD	12D	1AD	22D	2AD	32D	3AD	42D	4AD	52D	5AD	62D	6AD	72D	7AD
	0x2e	02E	0AE	12E	1AE	22E	2AE	32E	3AE	42E	4AE	52E	5AE	62E	6AE	72E	7AE
	0x2f	02F	0AF	12F	1AF	22F	2AF	32F	3AF	42F	4AF	52F	5AF	62F	6AF	72F	7AF
	0x30	030	0B0	130	1B0	230	2B0	330	3B0	430	4B0	530	5B0	630	6B0	730	7B0
	0x31	031	0B1	131	1B1	231	2B1	331	3B1	431	4B1	531	5B1	631	6B1	731	7B1
	0x32	032	0B2	132	1B2	232	2B2	332	3B2	432	4B2	532	5B2	632	6B2	732	7B2
	0x33	033	0B3	133	1B3	233	2B3	333	3B3	433	4B3	533	5B3	633	6B3	733	7B3
	0x34	034	0B4	134	1B4	234	2B4	334	3B4	434	4B4	534	5B4	634	6B4	734	7B4
	0x35	035	0B5	135	1B5	235	2B5	335	3B5	435	4B5	535	5B5	635	6B5	735	7B5
	0x36	036	0B6	136	1B6	236	2B6	336	3B6	436	4B6	536	5B6	636	6B6	736	7B6
	0x37	037	0B7	137	1B7	237	2B7	337	3B7	437	4B7	537	5B7	637	6B7	737	7B7
	0x38	038	0B8	138	1B8	238	2B8	338	3B8	438	4B8	538	5B8	638	6B8	738	7B8
	0x39	039	0B9	139	1B9	239	2B9	339	3B9	439	4B9	539	5B9	639	6B9	739	7B9
	0x3a	03A	0BA	13A	1BA	23A	2BA	33A	3BA	43A	4BA	53A	5BA	63A	6BA	73A	7BA
	0x3b	03B	0BB	13B	1BB	23B	2BB	33B	3BB	43B	4BB	53B	5BB	63B	6BB	73B	7BB
	0x3c	03C	0BC	13C	1BC	23C	2BC	33C	3BC	43C	4BC	53C	5BC	63C	6BC	73C	7BC
	0x3d	03D	0BD	13D	1BD	23D	2BD	33D	3BD	43D	4BD	53D	5BD	63D	6BD	73D	7BD
	0x3e	03E	0BE	13E	1BE	23E	2BE	33E	3BE	43E	4BE	53E	5BE	63E	6BE	73E	7BE
	0x3f	03F	0BF	13F	1BF	23F	2BF	33F	3BF	43F	4BF	53F	5BF	63F	6BF	73F	7BF
	0x40	040	0C0	140	1C0	240	2C0	340	3C0	440	4C0	540	5C0	640	6C0	740	7C0
	0x41	041	0C1	141	1C1	241	2C1	341	3C1	441	4C1	541	5C1	641	6C1	741	7C1
	0x42	042	0C2	142	1C2	242	2C2	342	3C2	442	4C2	542	5C2	642	6C2	742	7C2
	0x43	043	0C3	143	1C3	243	2C3	343	3C3	443	4C3	543	5C3	643	6C3	743	7C3
	0x44	044	0C4	144	1C4	244	2C4	344	3C4	444	4C4	544	5C4	644	6C4	744	7C4
	0x45	045	0C5	145	1C5	245	2C5	345	3C5	445	4C5	545	5C5	645	6C5	745	7C5
	0x46	046	0C6	146	1C6	246	2C6	346	3C6	446	4C6	546	5C6	646	6C6	746	7C6
	0x47	047	0C7	147	1C7	247	2C7	347	3C7	447	4C7	547	5C7	647	6C7	747	7C7
	0x48	048	0C8	148	1C8	248	2C8	348	3C8	448	4C8	548	5C8	648	6C8	748	7C8
	0x49	049	0C9	149	1C9	249	2C9	349	3C9	449	4C9	549	5C9	649	6C9	749	7C9
	0x4a	04A	0CA	14A	1CA	24A	2CA	34A	3CA	44A	4CA	54A	5CA	64A	6CA	74A	7CA
	0x4b	04B	0CB	14B	1CB	24B	2CB	34B	3CB	44B	4CB	54B	5CB	64B	6CB	74B	7CB
	0x4c	04C	0CC	14C	1CC	24C	2CC	34C	3CC	44C	4CC	54C	5CC	64C	6CC	74C	7CC
	0x4d	04D	0CD	14D	1CD	24D	2CD	34D	3CD	44D	4CD	54D	5CD	64D	6CD	74D	7CD
	0x4e	04E	0CE	14E	1CE	24E	2CE	34E	3CE	44E	4CE	54E	5CE	64E	6CE	74E	7CE
	0x4f	04F	0CF	14F	1CF	24F	2CF	34F	3CF	44F	4CF	54F	5CF	64F	6CF	74F	7CF

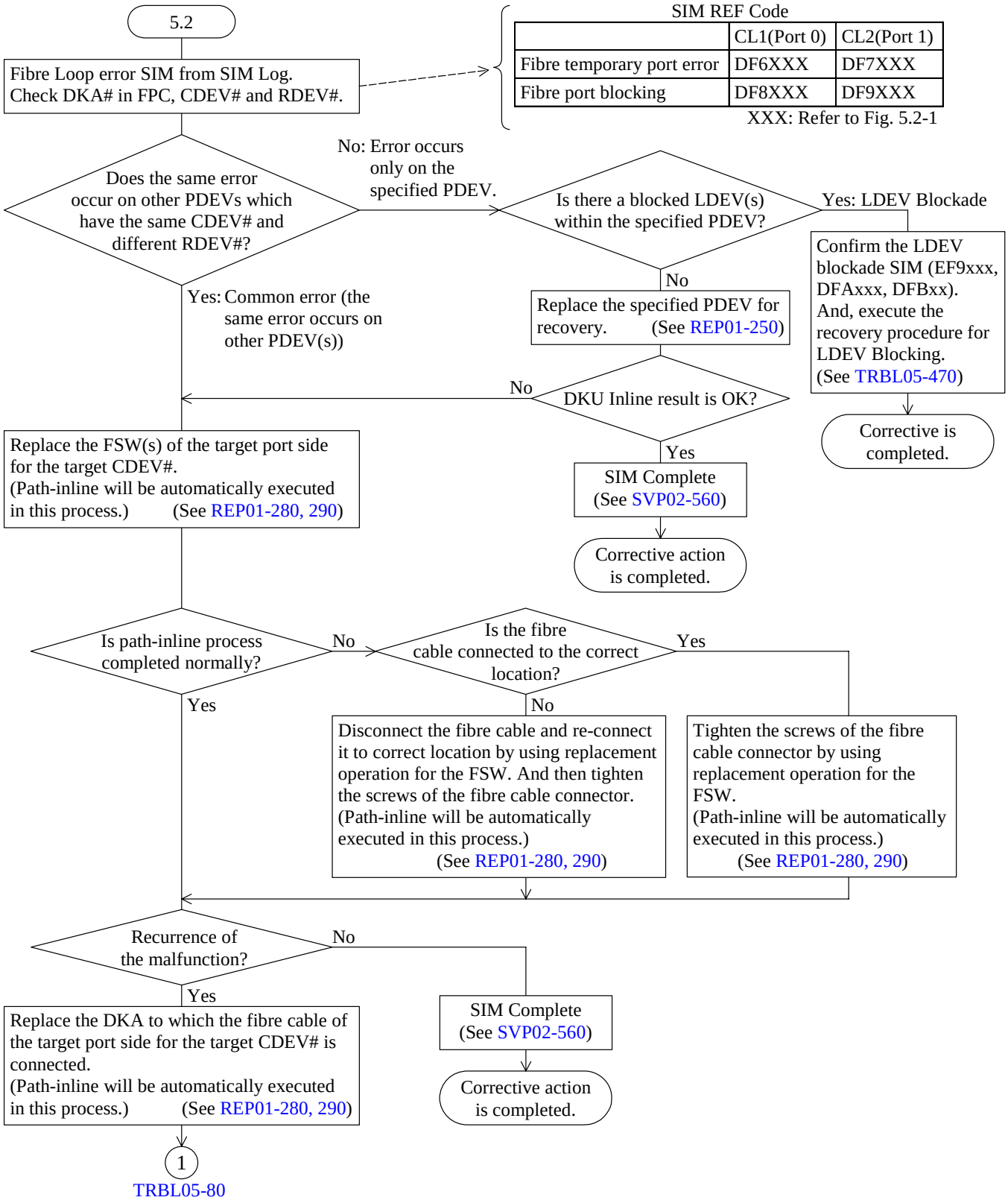
Fig 5.2-1 RAID600 Relation of CDEV#/RDEV# - SIM# (3/4)

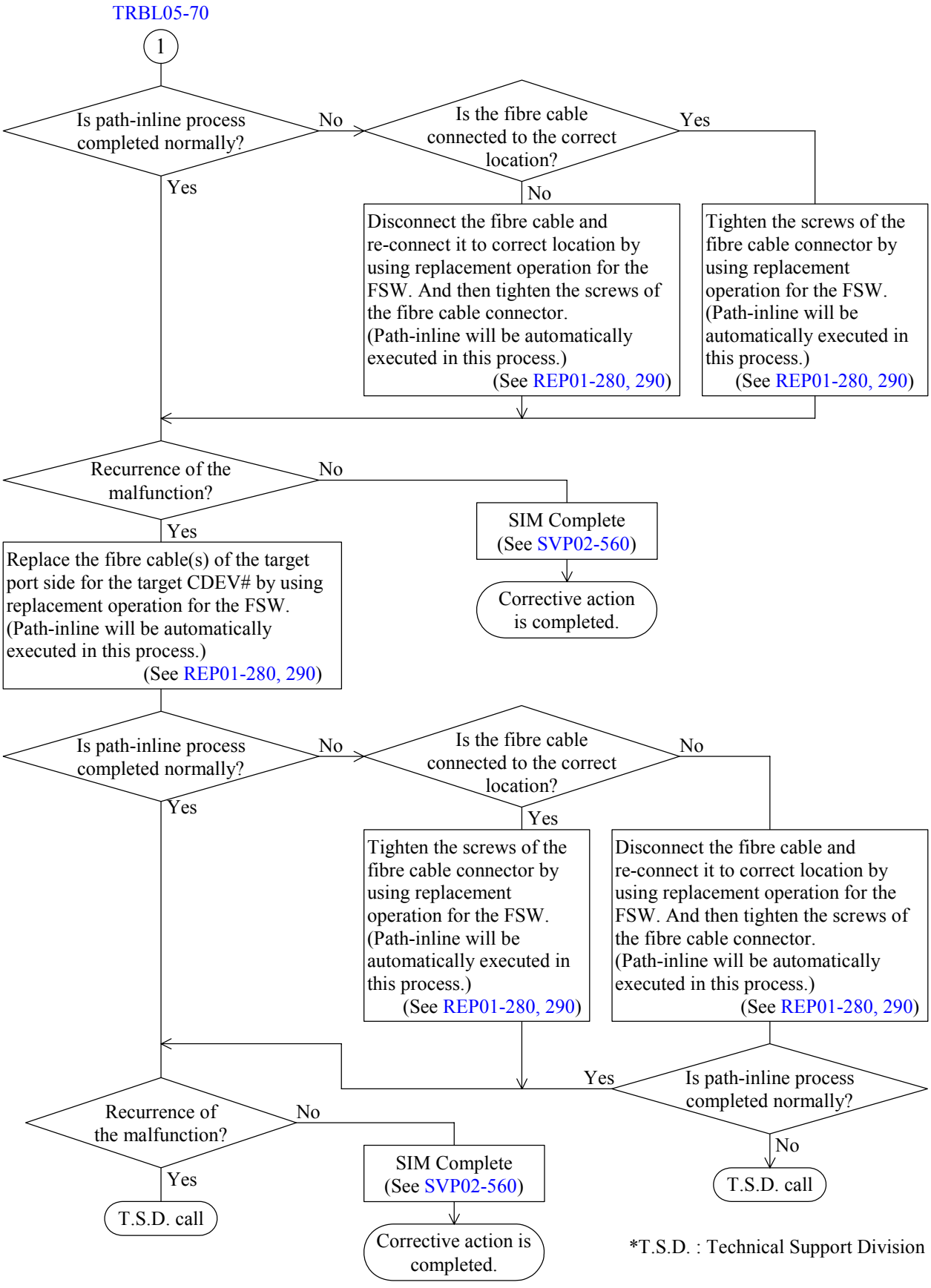
		CDEV#															
		0x10	0x11	0x12	0x13	0x14	0x15	0x16	0x17	0x18	0x19	0x1a	0x1b	0x1c	0x1d	0x1e	0x1F
RDEV	0x00	800	880	900	980	A00	A80	B00	B80	C00	C80	D00	D80	E00	E80	F00	F80
	0x01	801	881	901	981	A01	A81	B01	B81	C01	C81	D01	D81	E01	E81	F01	F81
	0x02	802	882	902	982	A02	A82	B02	B82	C02	C82	D02	D82	E02	E82	F02	F82
	0x03	803	883	903	983	A03	A83	B03	B83	C03	C83	D03	D83	E03	E83	F03	F83
	0x04	804	884	904	984	A04	A84	B04	B84	C04	C84	D04	D84	E04	E84	F04	F84
	0x05	805	885	905	985	A05	A85	B05	B85	C05	C85	D05	D85	E05	E85	F05	F85
	0x06	806	886	906	986	A06	A86	B06	B86	C06	C86	D06	D86	E06	E86	F06	F86
	0x07	807	887	907	987	A07	A87	B07	B87	C07	C87	D07	D87	E07	E87	F07	F87
	0x08	808	888	908	988	A08	A88	B08	B88	C08	C88	D08	D88	E08	E88	F08	F88
	0x09	809	889	909	989	A09	A89	B09	B89	C09	C89	D09	D89	E09	E89	F09	F89
	0x0a	80A	88A	90A	98A	A0A	A8A	B0A	B8A	C0A	C8A	D0A	D8A	E0A	E8A	F0A	F8A
	0x0b	80B	88B	90B	98B	A0B	A8B	B0B	B8B	C0B	C8B	D0B	D8B	E0B	E8B	F0B	F8B
	0x0c	80C	88C	90C	98C	A0C	A8C	B0C	B8C	C0C	C8C	D0C	D8C	E0C	E8C	F0C	F8C
	0x0d	80D	88D	90D	98D	A0D	A8D	B0D	B8D	C0D	C8D	D0D	D8D	E0D	E8D	F0D	F8D
	0x0e	80E	88E	90E	98E	A0E	A8E	B0E	B8E	C0E	C8E	D0E	D8E	E0E	E8E	F0E	F8E
	0x0f	80F	88F	90F	98F	A0F	A8F	B0F	B8F	C0F	C8F	D0F	D8F	E0F	E8F	F0F	F8F
	0x10	810	890	910	990	A10	A90	B10	B90	C10	C90	D10	D90	E10	E90	F10	F90
	0x11	811	891	911	991	A11	A91	B11	B91	C11	C91	D11	D91	E11	E91	F11	F91
	0x12	812	892	912	992	A12	A92	B12	B92	C12	C92	D12	D92	E12	E92	F12	F92
	0x13	813	893	913	993	A13	A93	B13	B93	C13	C93	D13	D93	E13	E93	F13	F93
	0x14	814	894	914	994	A14	A94	B14	B94	C14	C94	D14	D94	E14	E94	F14	F94
	0x15	815	895	915	995	A15	A95	B15	B95	C15	C95	D15	D95	E15	E95	F15	F95
	0x16	816	896	916	996	A16	A96	B16	B96	C16	C96	D16	D96	E16	E96	F16	F96
	0x17	817	897	917	997	A17	A97	B17	B97	C17	C97	D17	D97	E17	E97	F17	F97
	0x18	818	898	918	998	A18	A98	B18	B98	C18	C98	D18	D98	E18	E98	F18	F98
	0x19	819	899	919	999	A19	A99	B19	B99	C19	C99	D19	D99	E19	E99	F19	F99
	0x1a	81A	89A	91A	99A	A1A	A9A	B1A	B9A	C1A	C9A	D1A	D9A	E1A	E9A	F1A	F9A
	0x1b	81B	89B	91B	99B	A1B	A9B	B1B	B9B	C1B	C9B	D1B	D9B	E1B	E9B	F1B	F9B
	0x1c	81C	89C	91C	99C	A1C	A9C	B1C	B9C	C1C	C9C	D1C	D9C	E1C	E9C	F1C	F9C
	0x1d	81D	89D	91D	99D	A1D	A9D	B1D	B9D	C1D	C9D	D1D	D9D	E1D	E9D	F1D	F9D
	0x1e	81E	89E	91E	99E	A1E	A9E	B1E	B9E	C1E	C9E	D1E	D9E	E1E	E9E	F1E	F9E
	0x1f	81F	89F	91F	99F	A1F	A9F	B1F	B9F	C1F	C9F	D1F	D9F	E1F	E9F	F1F	F9F
	0x20	820	8A0	920	9A0	A20	AA0	B20	BA0	C20	CA0	D20	DA0	E20	EA0	F20	FA0
	0x21	821	8A1	921	9A1	A21	AA1	B21	BA1	C21	CA1	D21	DA1	E21	EA1	F21	FA1
	0x22	822	8A2	922	9A2	A22	AA2	B22	BA2	C22	CA2	D22	DA2	E22	EA2	F22	FA2
	0x23	823	8A3	923	9A3	A23	AA3	B23	BA3	C23	CA3	D23	DA3	E23	EA3	F23	FA3
	0x24	824	8A4	924	9A4	A24	AA4	B24	BA4	C24	CA4	D24	DA4	E24	EA4	F24	FA4
	0x25	825	8A5	925	9A5	A25	AA5	B25	BA5	C25	CA5	D25	DA5	E25	EA5	F25	FA5
	0x26	826	8A6	926	9A6	A26	AA6	B26	BA6	C26	CA6	D26	DA6	E26	EA6	F26	FA6
	0x27	827	8A7	927	9A7	A27	AA7	B27	BA7	C27	CA7	D27	DA7	E27	EA7	F27	FA7

Fig 5.2-1 RAID600 Relation of CDEV#/RDEV# - SIM# (4/4)

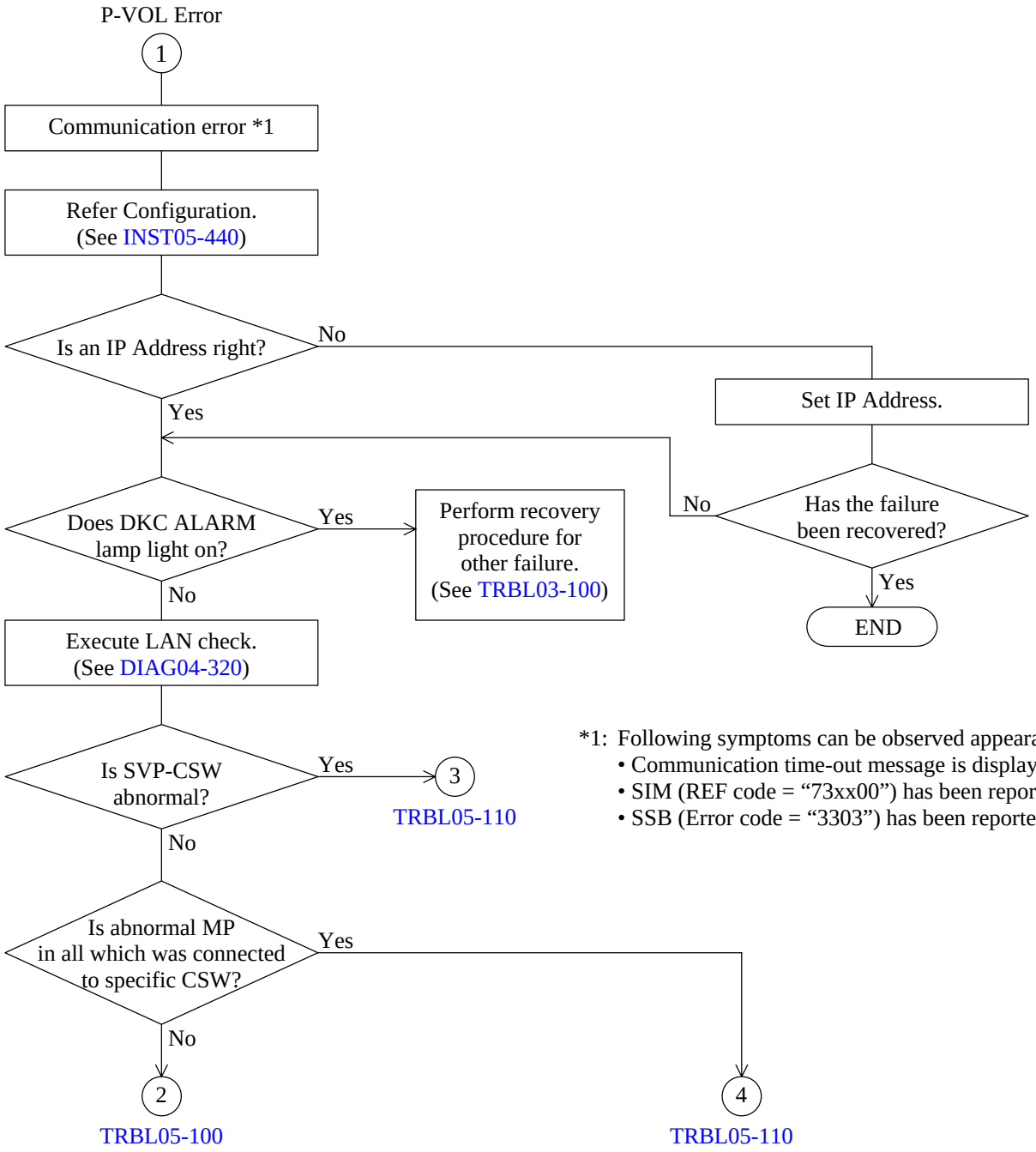
		CDEV#															
		0x10	0x11	0x12	0x13	0x14	0x15	0x16	0x17	0x18	0x19	0x1a	0x1b	0x1c	0x1d	0x1e	0x1f
RDEV	0x28	828	8A8	928	9A8	A28	AA8	B28	BA8	C28	CA8	D28	DA8	E28	EA8	F28	FA8
	0x29	829	8A9	929	9A9	A29	AA9	B29	BA9	C29	CA9	D29	DA9	E29	EA9	F29	FA9
	0x2a	02A	8AA	92A	9AA	A2A	AAA	B2A	BAA	C2A	CAA	D2A	DAA	E2A	EAA	F2A	FAA
	0x2b	82B	8AB	92B	9AB	A2B	AAB	B2B	BAB	C2B	CAB	D2B	DAB	E2B	EAB	F2B	FAB
	0x2c	82C	8AC	92C	9AC	A2C	AAC	B2C	BAC	C2C	CAC	D2C	DAC	E2C	EAC	F2C	FAC
	0x2d	82D	8AD	92D	9AD	A2D	AAD	B2D	BAD	C2D	CAD	D2D	DAD	E2D	EAD	F2D	FAD
	0x2e	82E	8AE	92E	9AE	A2E	AAE	B2E	BAE	C2E	CAE	D2E	DAE	E2E	EAE	F2E	FAE
	0x2f	82F	8AF	92F	9AF	A2F	AAF	B2F	BAF	C2F	CAF	D2F	DAF	E2F	EAF	F2F	FAF
	0x30	830	8B0	930	9B0	A30	AB0	B30	BB0	C30	CB0	D30	DB0	E30	EB0	F30	FB0
	0x31	831	8B1	931	9B1	A31	AB1	B31	BB1	C31	CB1	D31	DB1	E31	EB1	F31	FB1
	0x32	832	8B2	932	9B2	A32	AB2	B32	BB2	C32	CB2	D32	DB2	E32	EB2	F32	FB2
	0x33	833	8B3	933	9B3	A33	AB3	B33	BB3	C33	CB3	D33	DB3	E33	EB3	F33	FB3
	0x34	834	8B4	934	9B4	A34	AB4	B34	BB4	C34	CB4	D34	DB4	E34	EB4	F34	FB4
	0x35	835	8B5	935	9B5	A35	AB5	B35	BB5	C35	CB5	D35	DB5	E35	EB5	F35	FB5
	0x36	836	8B6	936	9B6	A36	AB6	B36	BB6	C36	CB6	D36	DB6	E36	EB6	F36	FB6
	0x37	837	8B7	937	9B7	A37	AB7	B37	BB7	C37	CB7	D37	DB7	E37	EB7	F37	FB7
	0x38	838	8B8	938	9B8	A38	AB8	B38	BB8	C38	CB8	D38	DB8	E38	EB8	F38	FB8
	0x39	839	8B9	939	9B9	A39	AB9	B39	BB9	C39	CB9	D39	DB9	E39	EB9	F39	FB9
	0x3a	83A	8BA	93A	9BA	A3A	ABA	B3A	BBA	C3A	CBA	D3A	DBA	E3A	EBA	F3A	FBA
	0x3b	83B	8BB	93B	9BB	A3B	ABB	B3B	BBB	C3B	CBB	D3B	DBB	E3B	EBB	F3B	FBB
	0x3c	83C	8BC	93C	9BC	A3C	ABC	B3C	BBC	C3C	CBC	D3C	DBC	E3C	EBC	F3C	FBC
	0x3d	83D	8BD	93D	9BD	A3D	ABD	B3D	BBD	C3D	CBD	D3D	DBD	E3D	EBD	F3D	FBD
	0x3e	83E	8BE	93E	9BE	A3E	ABE	B3E	BBE	C3E	CBE	D3E	DBE	E3E	EBE	F3E	FBE
	0x3f	83F	8BF	93F	9BF	A3F	ABF	B3F	BBF	C3F	CBF	D3F	DBF	E3F	EBF	F3F	FBF
	0x40	840	8C0	940	9C0	A40	AC0	B40	BC0	C40	CC0	D40	DC0	E40	EC0	F40	FC0
	0x41	841	8C1	941	9C1	A41	AC1	B41	BC1	C41	CC1	D41	DC1	E41	EC1	F41	FC1
	0x42	842	8C2	942	9C2	A42	AC2	B42	BC2	C42	CC2	D42	DC2	E42	EC2	F42	FC2
	0x43	843	8C3	943	9C3	A43	AC3	B43	BC3	C43	CC3	D43	DC3	E43	EC3	F43	FC3
	0x44	844	8C4	944	9C4	A44	AC4	B44	BC4	C44	CC4	D44	DC4	E44	EC4	F44	FC4
	0x45	845	8C5	945	9C5	A45	AC5	B45	BC5	C45	CC5	D45	DC5	E45	EC5	F45	FC5
	0x46	846	8C6	946	9C6	A46	AC6	B46	BC6	C46	CC6	D46	DC6	E46	EC6	F46	FC6
	0x47	847	8C7	947	9C7	A47	AC7	B47	BC7	C47	CC7	D47	DC7	E47	EC7	F47	FC7
	0x48	848	8C8	948	9C8	A48	AC8	B48	BC8	C48	CC8	D48	DC8	E48	EC8	F48	FC8
	0x49	849	8C9	949	9C9	A49	AC9	B49	BC9	C49	CC9	D49	DC9	E49	EC9	F49	FC9
	0x4a	84A	8CA	94A	9CA	A4A	ACA	B4A	BCA	C4A	CCA	D4A	DCA	E4A	ECA	F4A	FCA
	0x4b	84B	8CB	94B	9CB	A4B	ACB	B4B	BCB	C4B	CCB	D4B	DCB	E4B	ECB	F4B	FCB
	0x4c	84C	8CC	94C	9CC	A4C	ACC	B4C	BCC	C4C	CCC	D4C	DCC	E4C	ECC	F4C	FCC
	0x4d	84D	8CD	94D	9CD	A4D	ACD	B4D	BCD	C4D	CCD	D4D	DCD	E4D	ECD	F4D	FCD
	0x4e	84E	8CE	94E	9CE	A4E	ACE	B4E	BCE	C4E	CCE	D4E	DCE	E4E	ECE	F4E	FCE
	0x4f	84F	8CF	94F	9CF	A4F	ACF	B4F	BCF	C4F	CCF	D4F	DCF	E4F	ECF	F4F	FCF

Common Fibre Loop Error Isolation Procedure

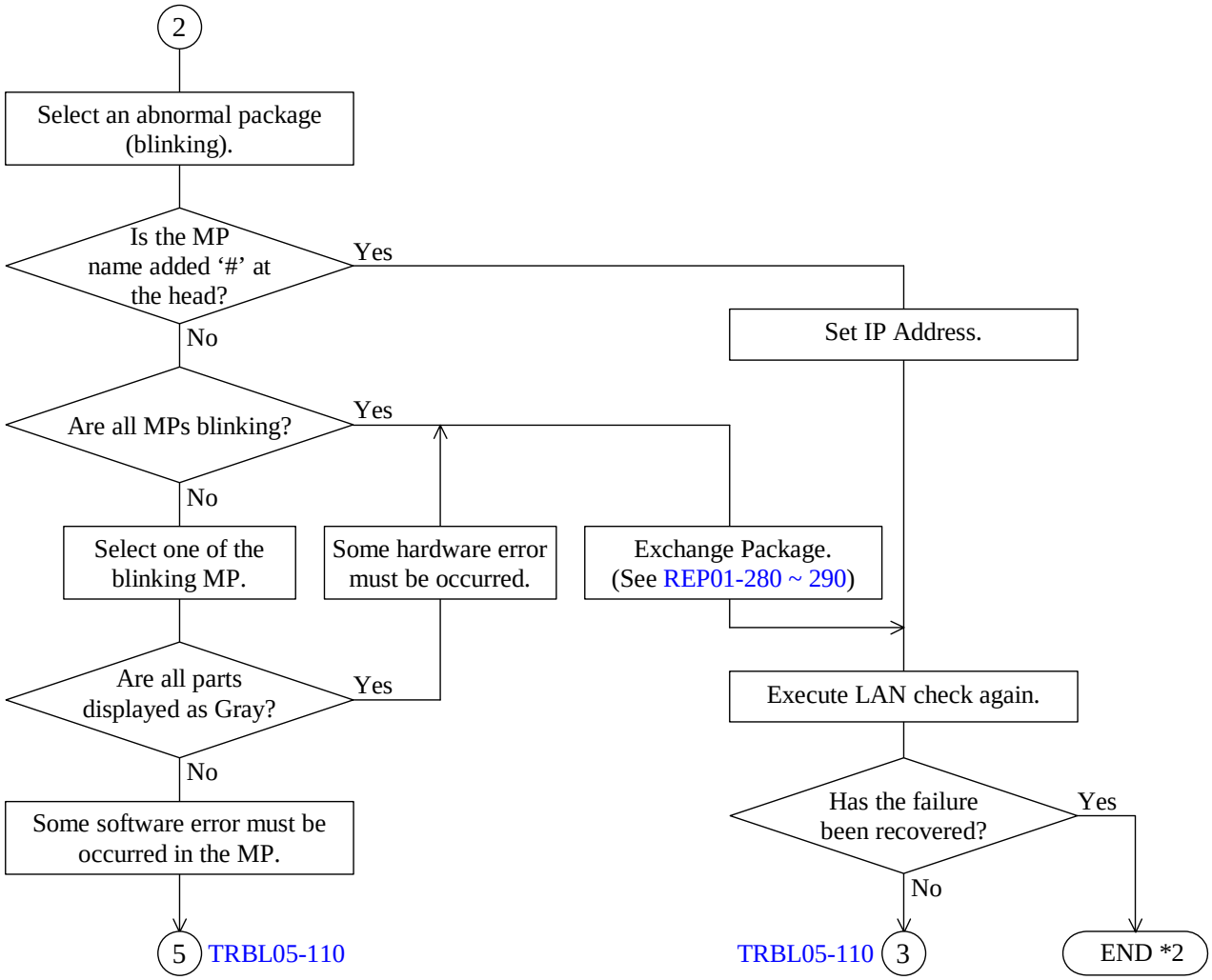




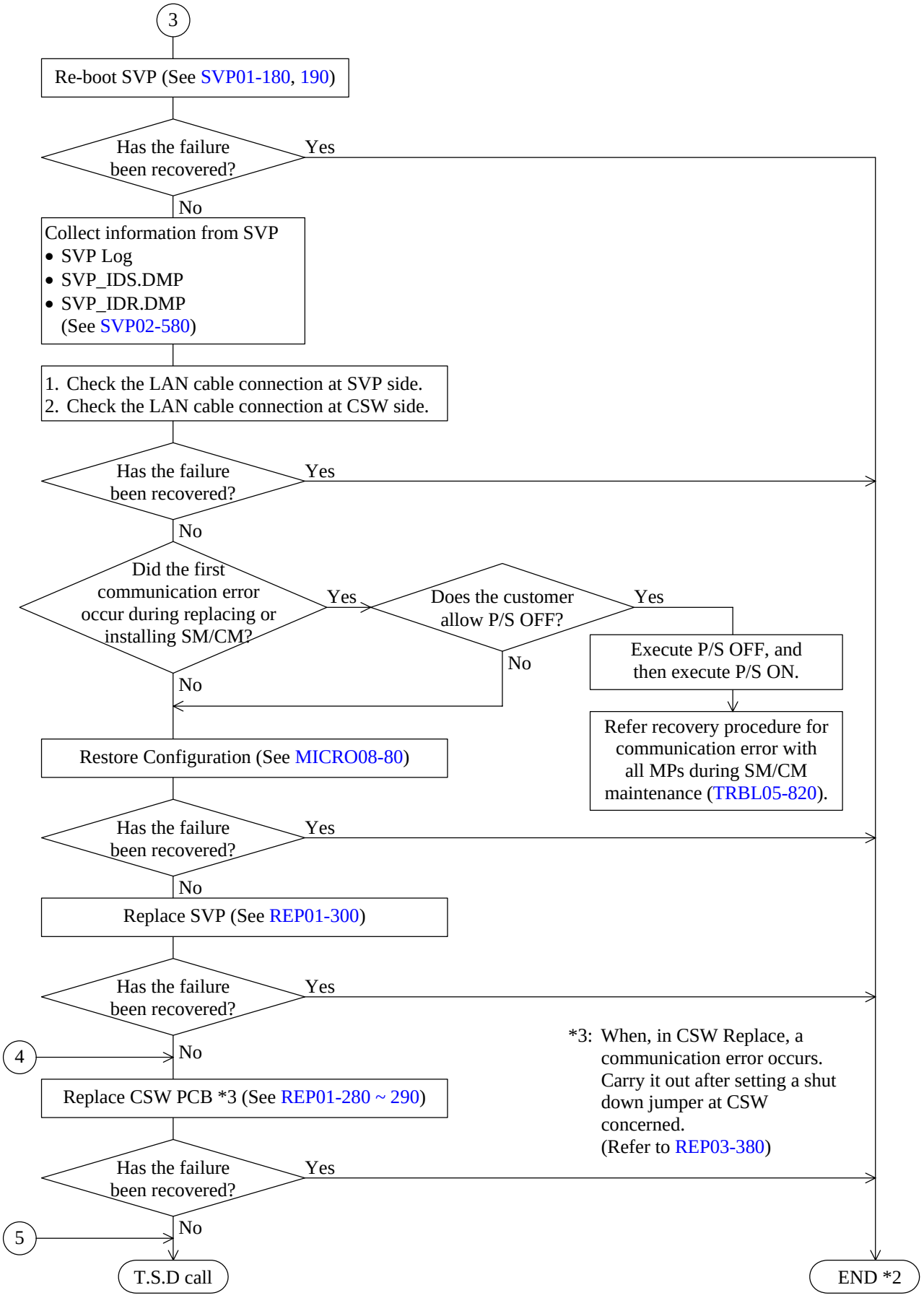
5.3 Recovery Procedure for LAN Error (SIM = 1400X0, 1500X0, 73XX00)



*1: Following symptoms can be observed appearance
- Communication time-out message is displayed.
- SIM (REF code = “73xx00”) has been reported.
- SSB (Error code = “3303”) has been reported.

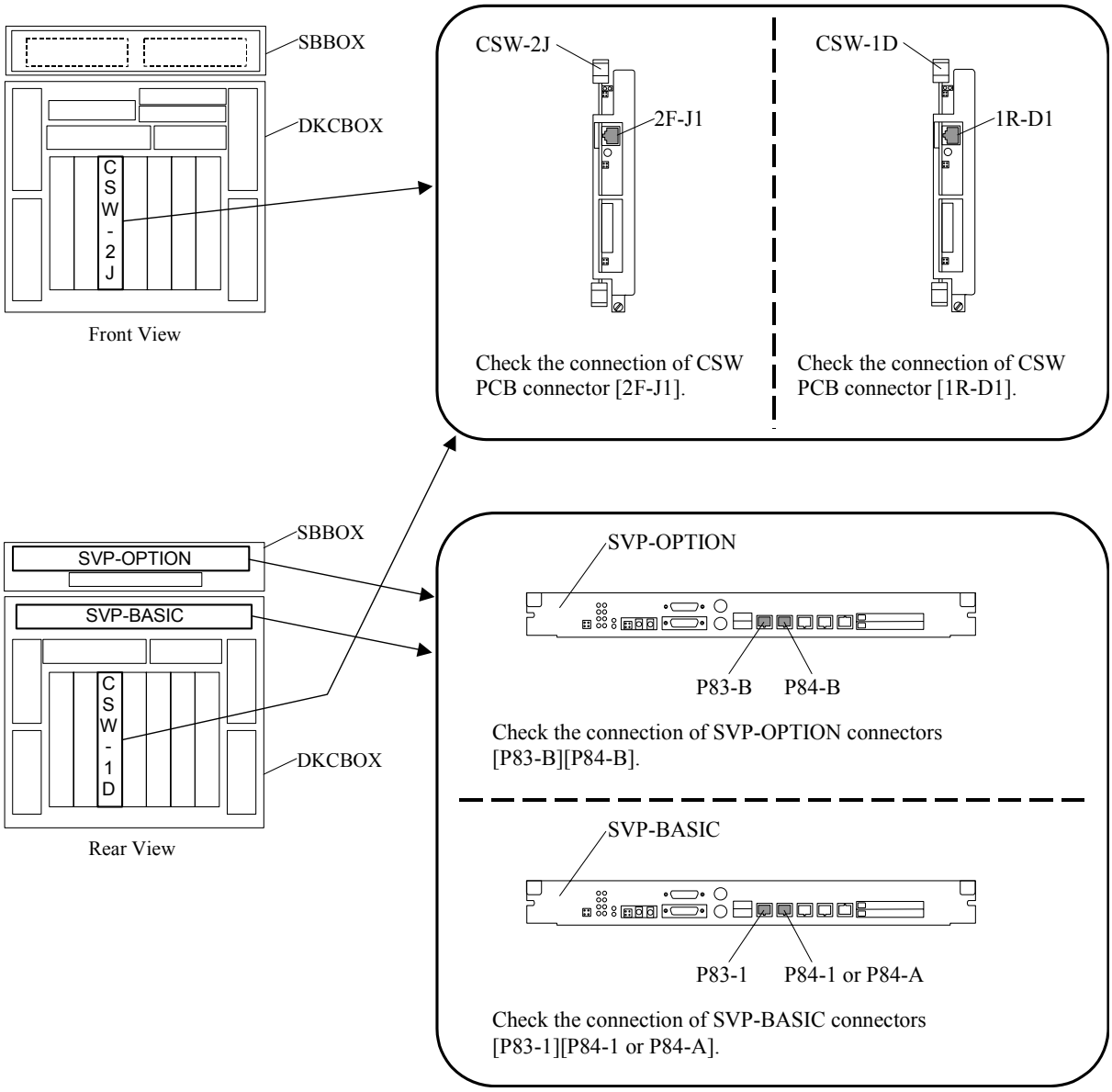


*2: After finishing the error recovery, execute SIM complete and delete logs. (Refer to SVP02-170, 560)



Check the connection of LAN cables

* If all MPs LAN is blocked, disconnect and connect LAN connectors.
Do not connect/disconnect LAN connectors when LAN is working.



5.4 Error Recovery Procedure during CHA/DKA replacement

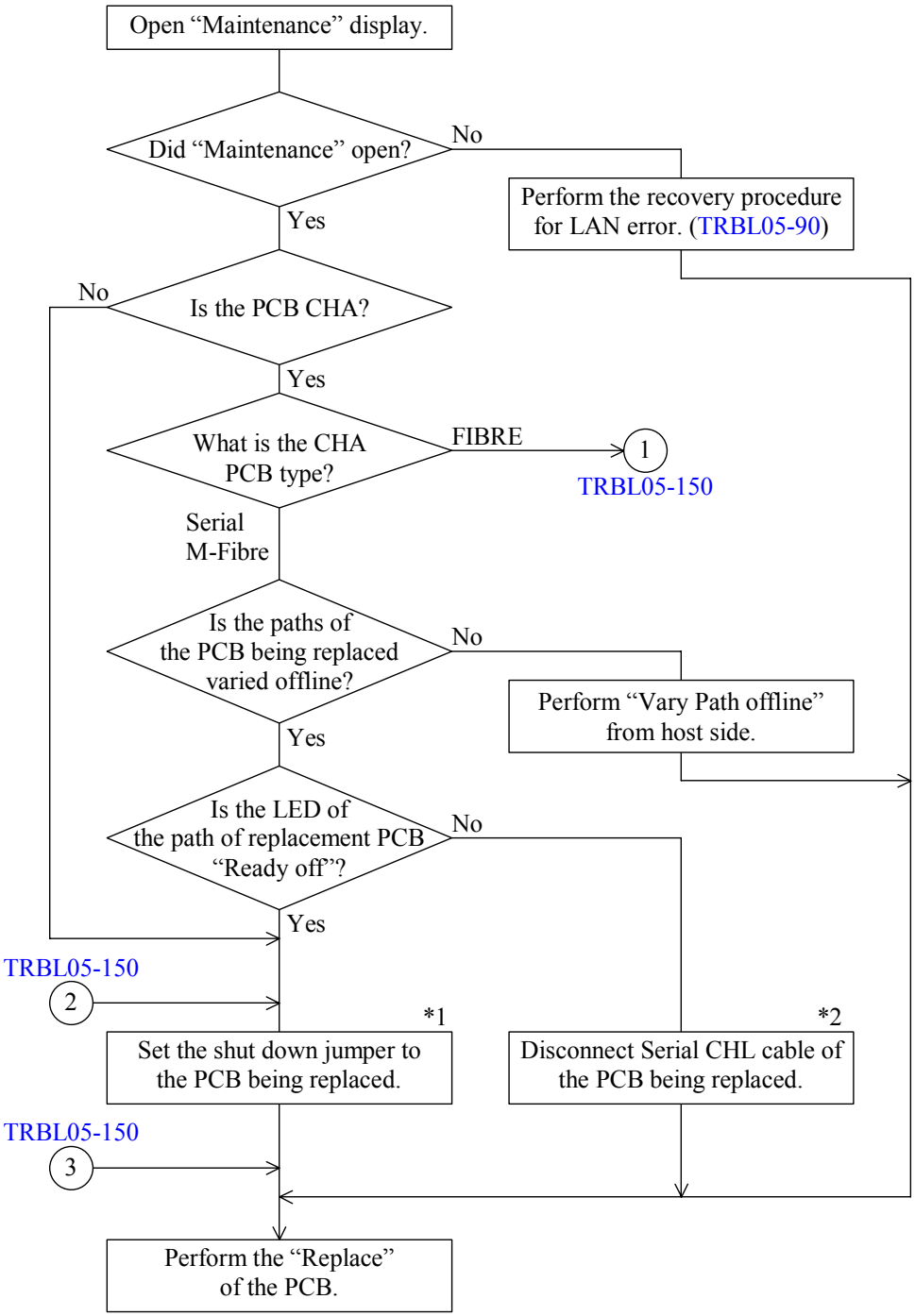
Perform the appropriate recovery procedure according to case (1), (2), (2a) or (3).

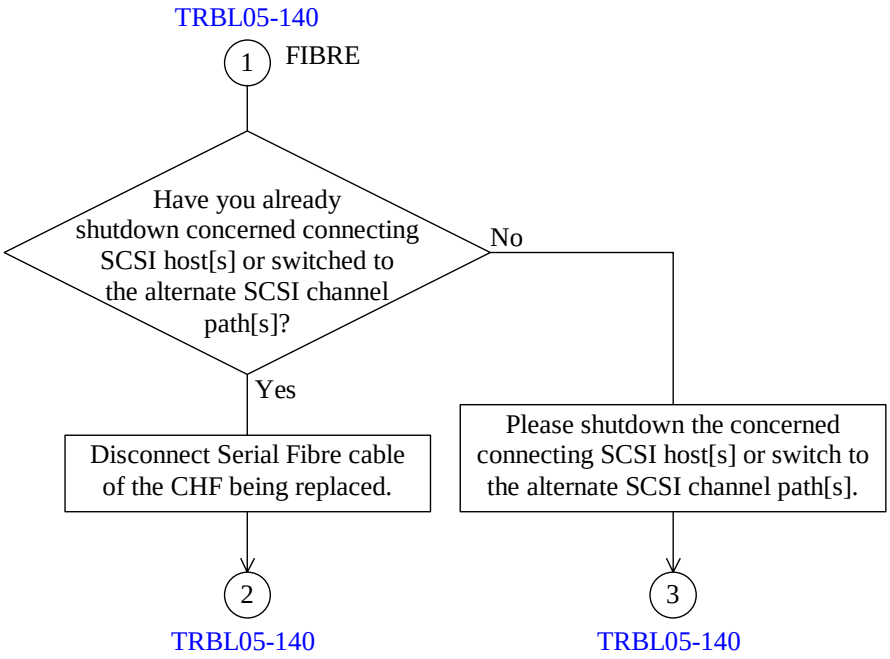
Notice: You should execute recovery operations for install/de-install failures, exchanging failures, etc. at time zone with a little business influence.

(1) Blocking error occurrence

If the following 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.

"Connection error occurred. SVP-DKC"

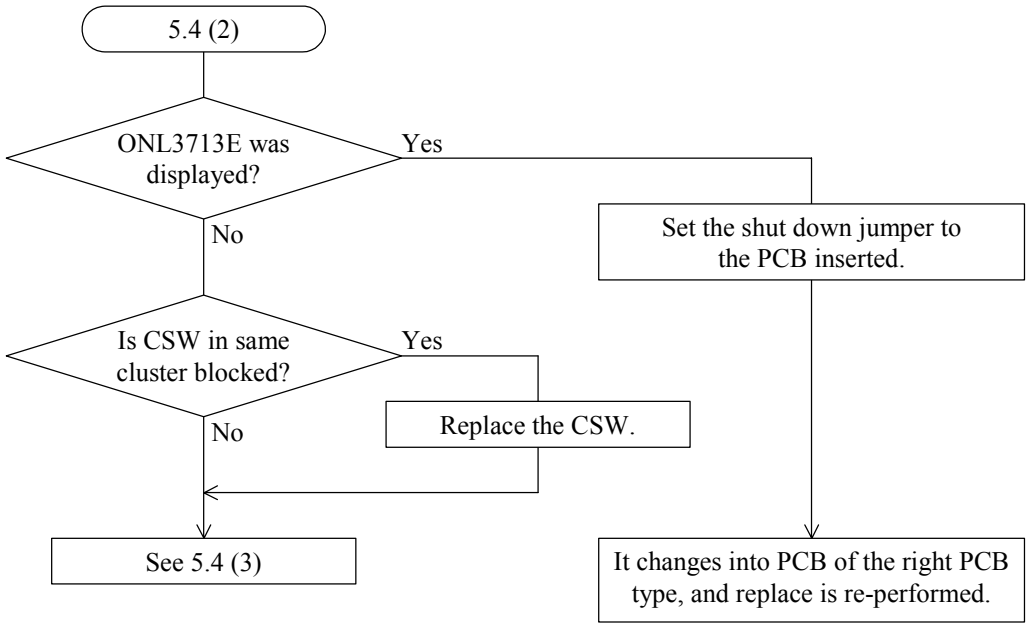




*1) After this operation, error SIM and SSB may occur. Refer to the following pages for shut down jumper insertion method depending on the type of PCB.
- Serial Channel CHA : see #1 in REP03-180
- Fibre Channel CHA : see #1 in REP03-220
- M-Fibre Channel CHA : see #1 in REP03-260
- DKA : see #1 in REP03-340

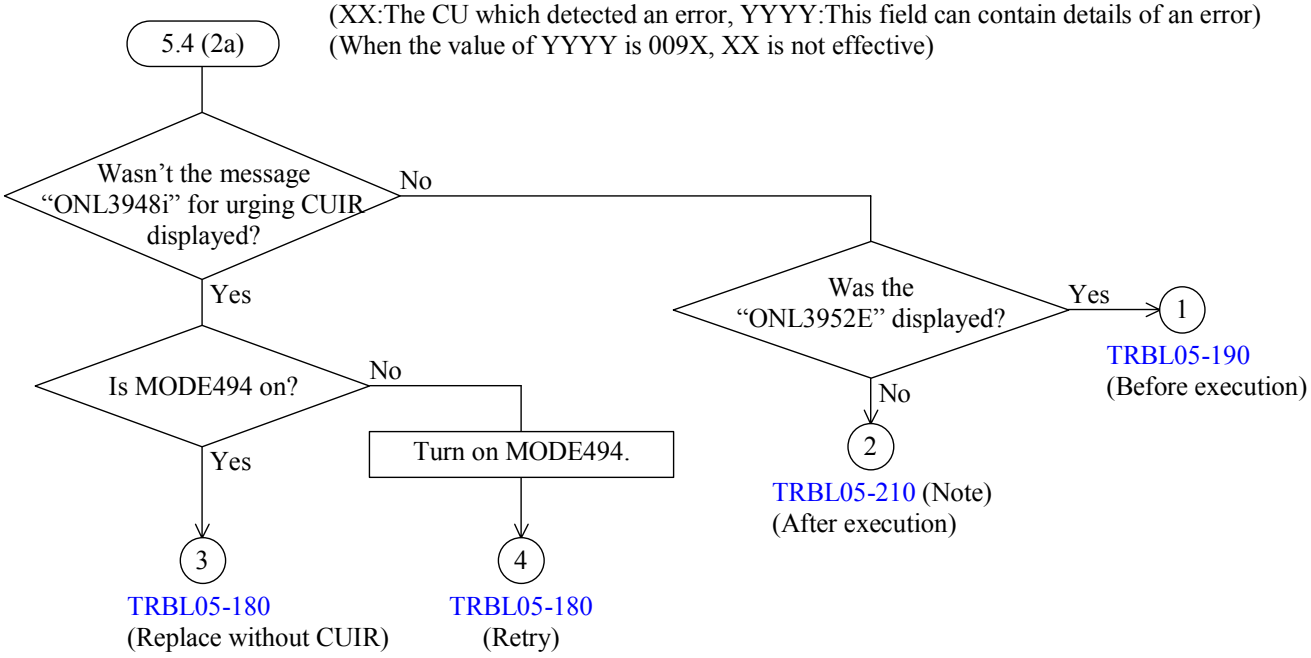
*2) After this operating, error message may be displayed at host side.

(2) Restoring error occurrence
If the message is displayed when CHA/DKA is being Restored ("Waiting for Power Event...Usually, several minutes (maximum 15 minutes.)" is being displayed), perform the following recovery procedures.



(2a) CUIR Error Occurrence

- MODE494: System option for validating CUIR
- CUIR Reason Code [XXYYYY]: The detailed code of 6 digits displayed simultaneously with message ID "ONL3952E" or "ONL3953E"
  (XX:The CU which detected an error, YYYY:This field can contain details of an error)
  (When the value of YYYY is 009X, XX is not effective)

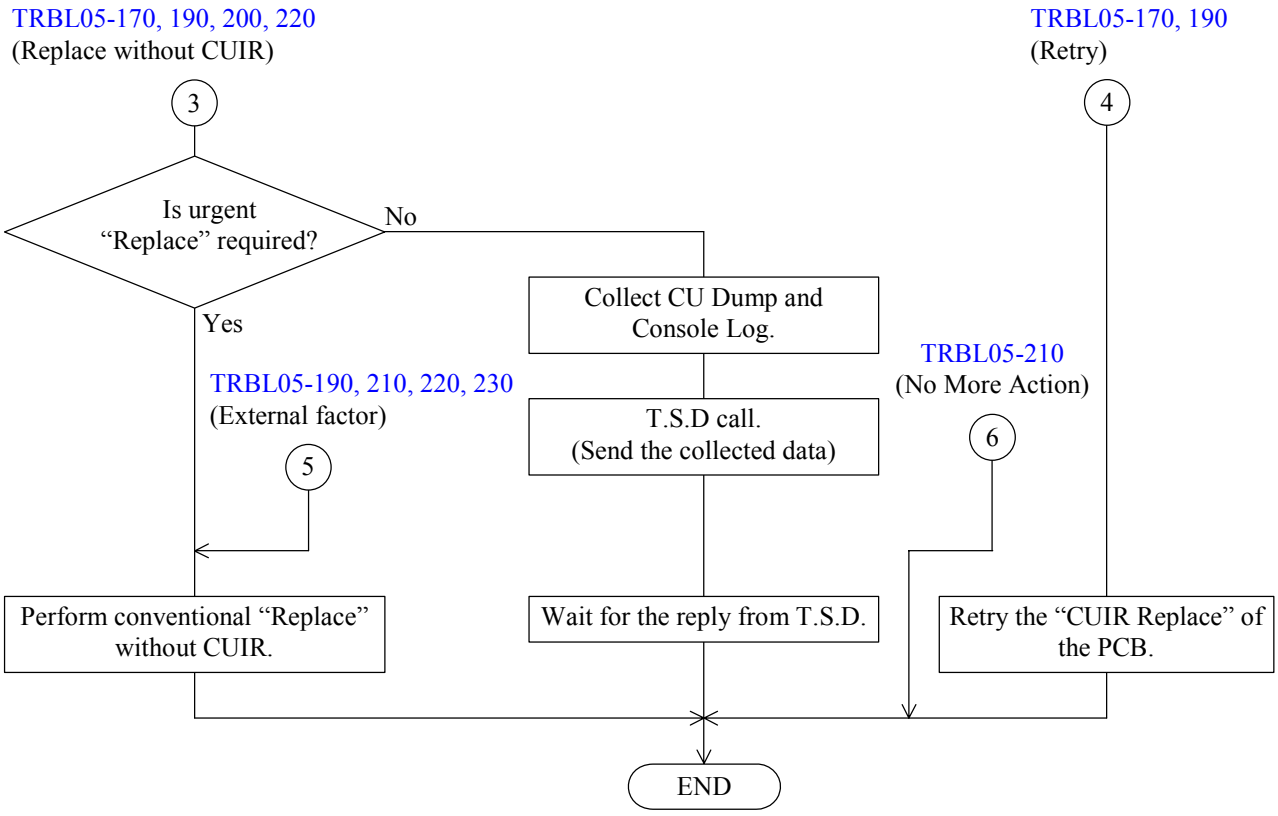


(Note)
The case which reached this point ② surely needs to recover the paths.

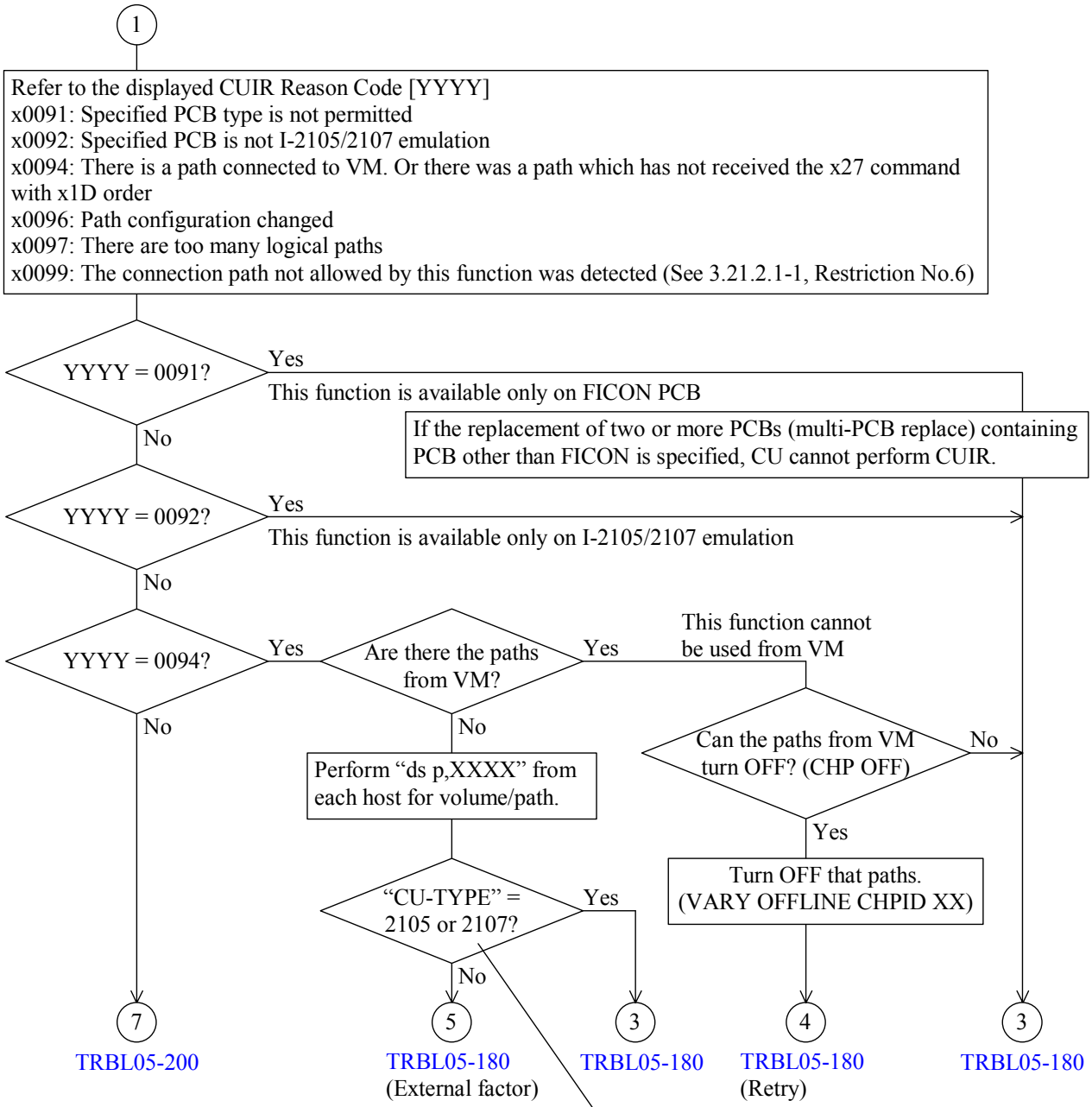
The hosts(LPARs)/paths/volumes of Quiesce state should have the following messages:
IOS275I C.U.I.R. REQUEST TO QUIESCE THE FOLLOWING PATH(S):
CHPID xx TO DEVICE(S) XXXX-XXXX
IOS281I C.U.I.R. REQUEST SUCCESSFUL

Perform procedure of 'Recover all the paths in the Quiesce state' (See TRBL05-230).
- From all hosts(LPARs), To all CHPIDs and To all Volumes

If this recovery is skipped, you will encounter the following problems.
- Next CUIR error
- Conventional REPLACE error without CUIR
- Abnormal end of job
- Descent of a performance
- System operation without the redundancy of a path (no alternate path)

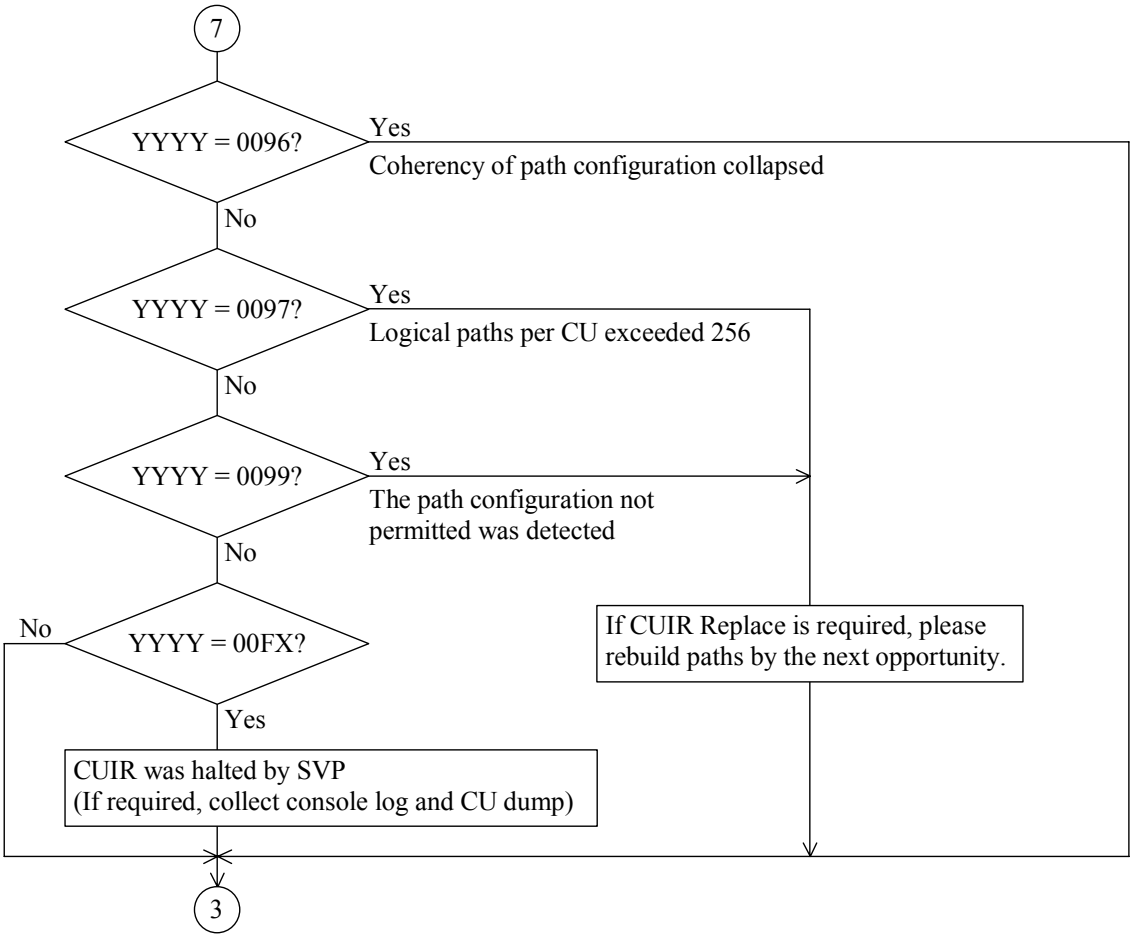


TRBL05-170
(Before execution)

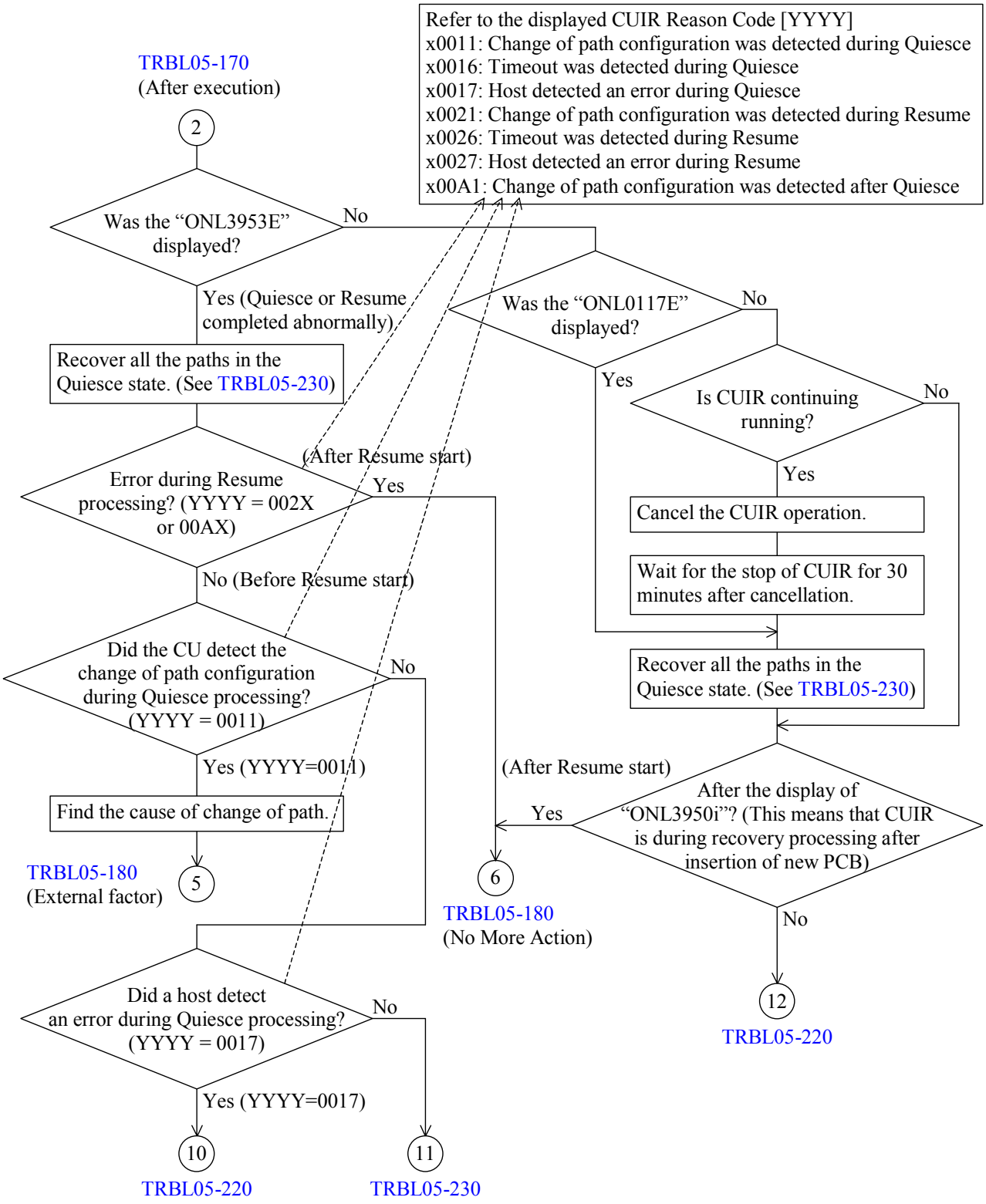


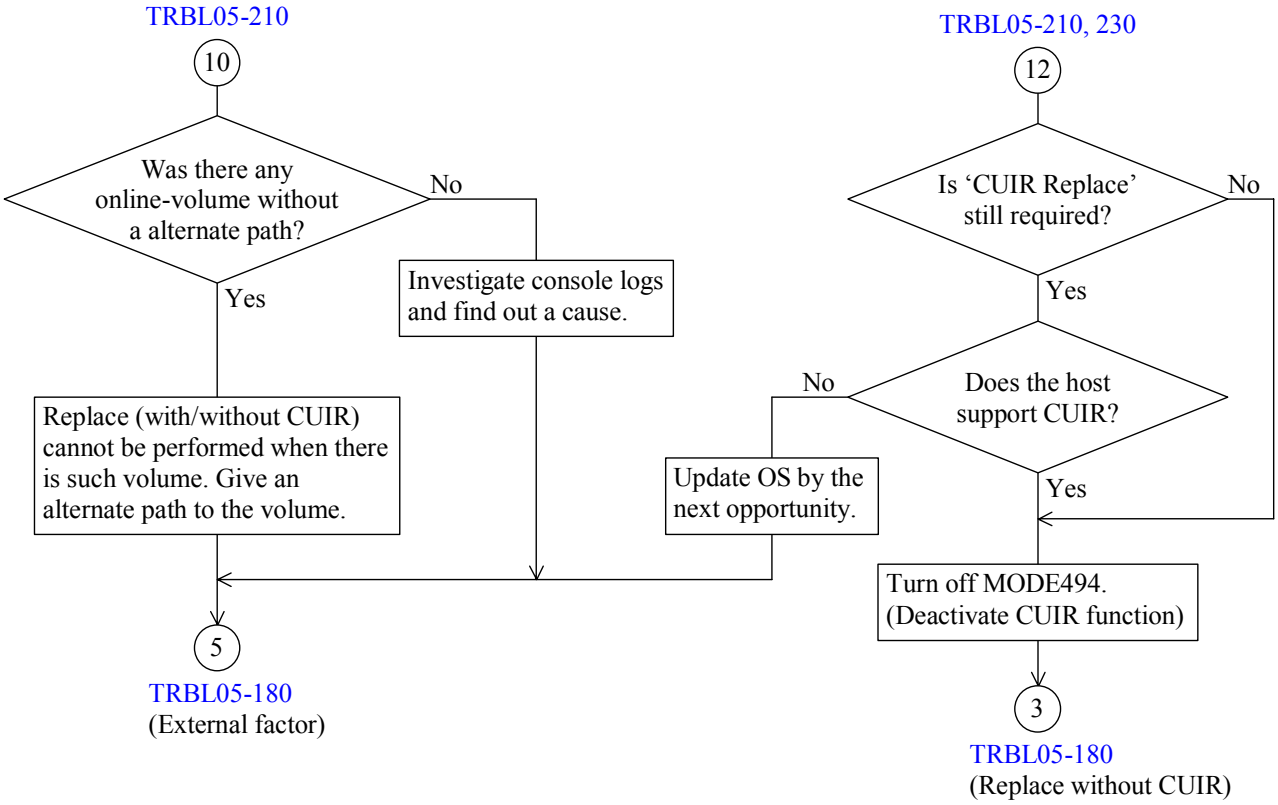

```
ds p,XXXX
    ^^^^DEV#
-----
DS P,XXXX
IEE459I 09.17.12 DEVSERV PATHS 067
UNIT DTYPE  M CNT VOLSER  CHPID=PATH STATUS
    RTYPE   SSID CFW TC   DFW   PIN  DC-STATE CCA  DDC   ALT  CU-TYPE
XXXX,33903 ,O,000,xxXXXX,xx=- xx=+ xx=-
    2105    xxxx  Y  YY.  YY.    N   SIMPLEX   05   05       3990-6
********************** SYMBOL DEFINITIONS **********************
O = ONLINE                    + = PATH AVAILABLE
- = LOGICALLY OFF, PHYSICALLY OFF
```

TRBL05-190



TRBL05-180
(Replace without CUIR)



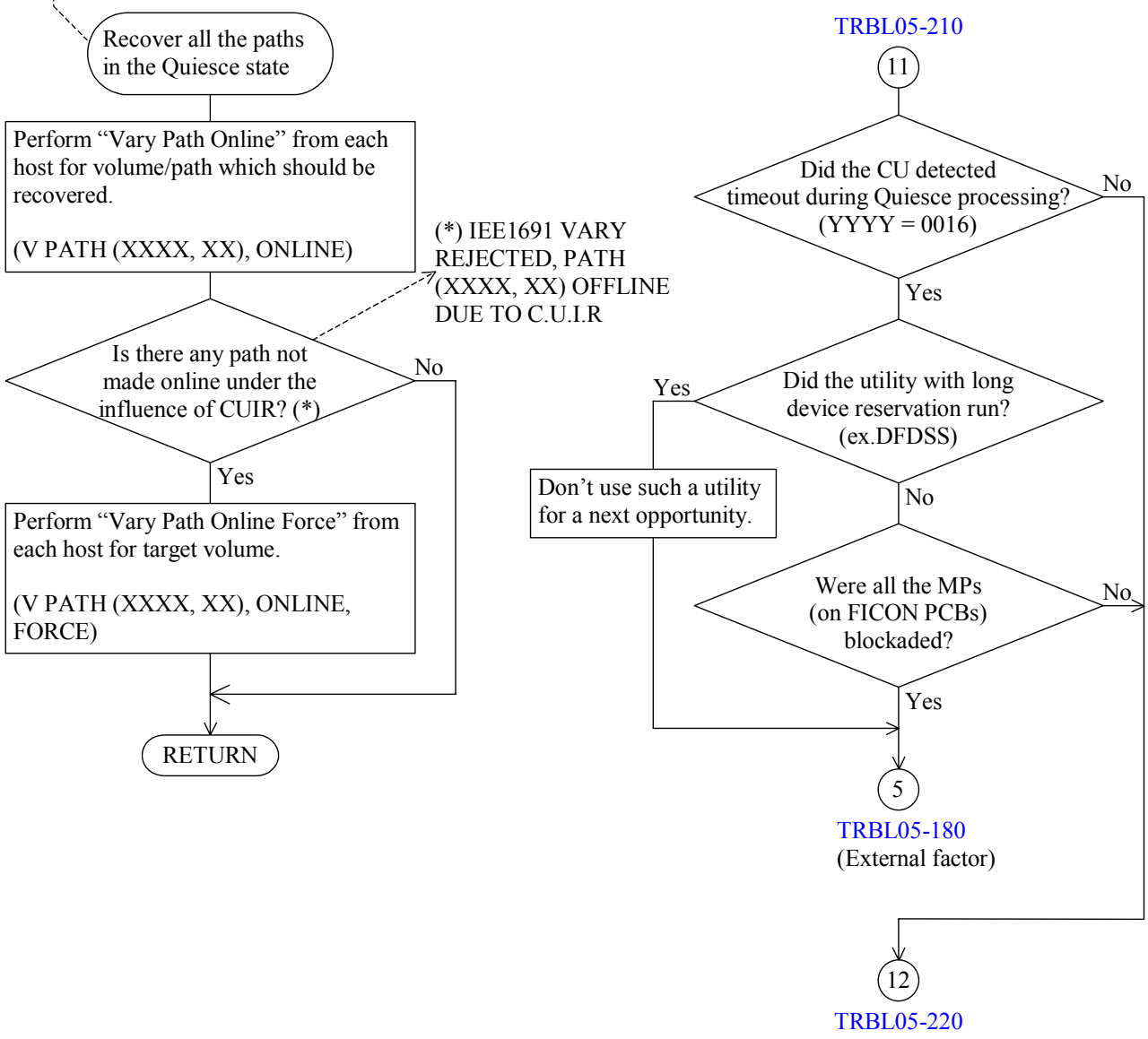


The case which reached this point surely needs to recover the paths.

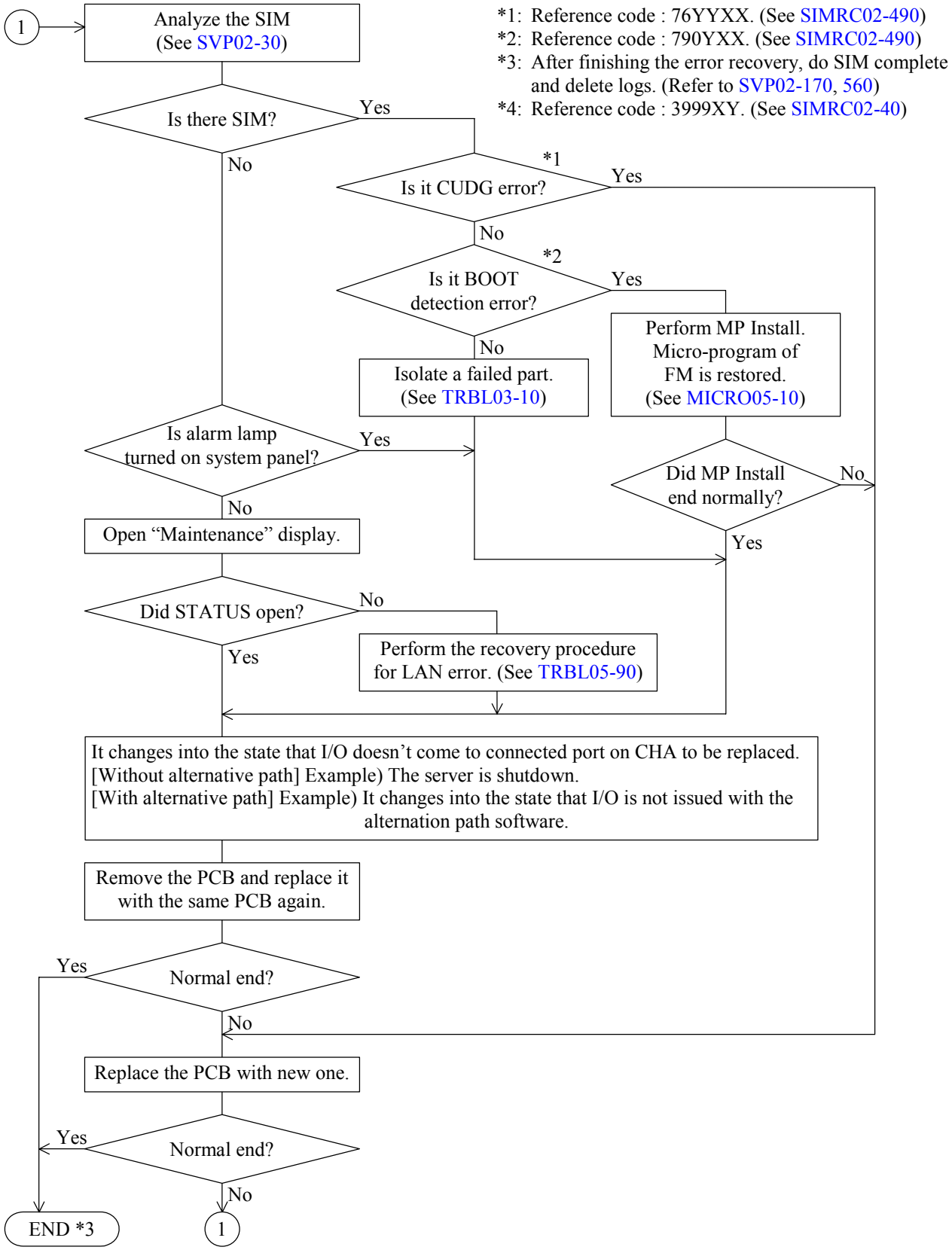
The hosts(LPARs)/paths/volumes of Quiesce state should have the following messages:
IOS275I C.U.I.R. REQUEST TO QUIESCE THE FOLLOWING PATH(S):
CHPID xx TO DEVICE(S) XXXX-XXXX
IOS281I C.U.I.R. REQUEST SUCCESSFUL

Perform procedure of 'Recover all the paths in the Quiesce state'.
- From all hosts(LPARs), To all CHPIDs and To all Volumes

If this recovery is skipped, you will encounter the following problems.
- Next CUIR error
- Conventional REPLACE error without CUIR
- Abnormal end of job
- Descent of a performance
- System operation without the redundancy of a path (no alternate path)



(3) Other cases



5.5 Recovery Procedure for CACHE/SM Replace Failure (SIM = 3993XX, 3D93XX, FFE40X, FFF90X)

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

- CACHE/SM replace failure caused by processor error
  (REF code = 0x3993XX, 0x3D93XX : XX = PCB ID, MP ID in PCB)
  ① Insert the shut down jumper into the processor PCB shown in the SIM REF code.
  (Serial channel CHA see #1 REP03-180)
  (Fibre channel CHA see #1 REP03-220)
  (M-Fibre channel CHA see #1 REP03-260)
  (DKA see #1 REP03-340)
  In this case, CHK3 or other equipment error are reported because no processing is performed.
  However, you should ignore these errors.
  ② Retry the suspended CACHE/SM replacement.
  ③ Replace the PCB into which the shut down jumper inserted in Step ①.

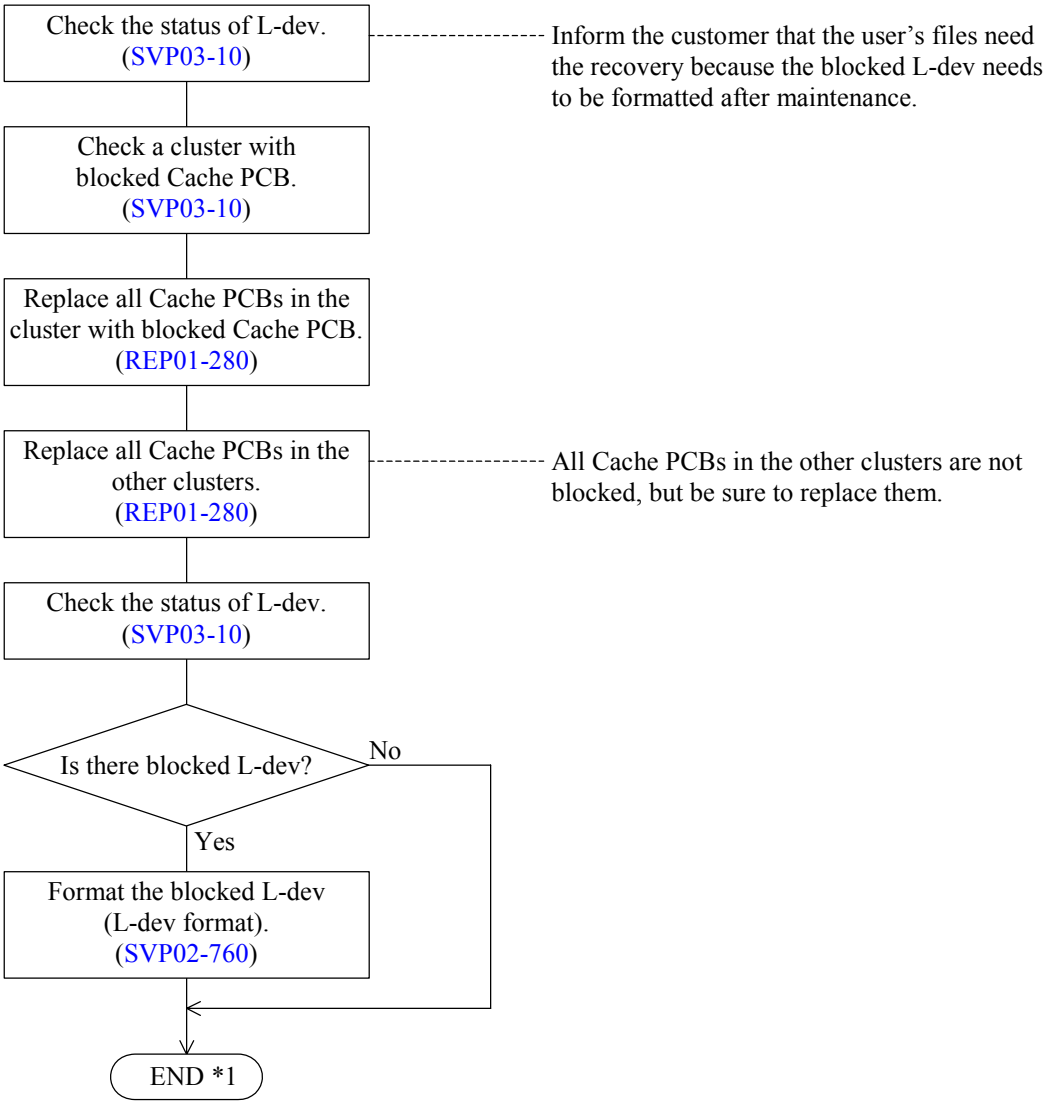
- CACHE/SM replace failure caused by Shared Memory error
  (REF code = FFE40X : X:(0) = side A, (1) = side B)
  When this SIM occurs, SM failure can be the cause. But, when SM failure occurred without INLINE CUDG error, this error maybe caused by intermittent error. Therefore,
  ① Conduct CACHE/SM replacement again.
  ② When normal end, CACHE/SM replacement is completed.
  ③ When SM failure SIM is reported again, replace other CACHE/SM P/K which was not replaced.

- SM PK replacement failure by cause of CACHE memory
  (REF code = 0xFFF90X : X:(0) = side A, (1) = side B)
  ① Mounting of the same CL side as SM P/K that fails in the replacement CACHE P/K (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 P/K replacement proceeding in terms of replacement.
  ② It replaces it in service parts CACHE P/K different from CACHE P/K 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 SM P/K and the replacement is executed again.

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

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.



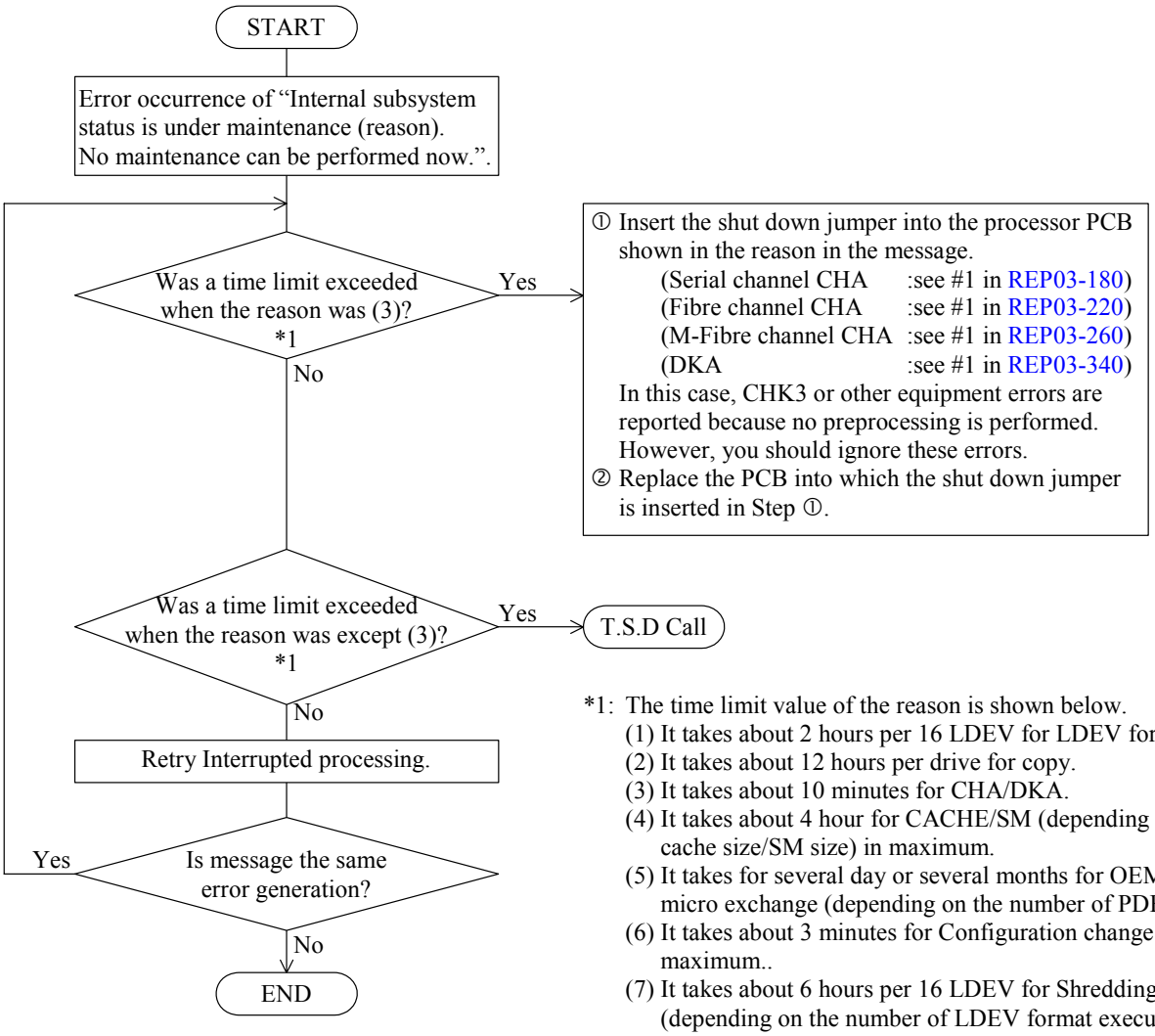
*1: After finishing the error recovery, do SIM complete and delete logs. (SVP02-170, 560)

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 as "Internal subsystem status is under maintenance (reason). No maintenance can be performed now." is displayed. The reason is one of the following messages.

(1) LDEV format in progress.
(2) Copy in progress.
(3) CHA-xx (or DKA-xx)) status is changing
XX: package 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

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

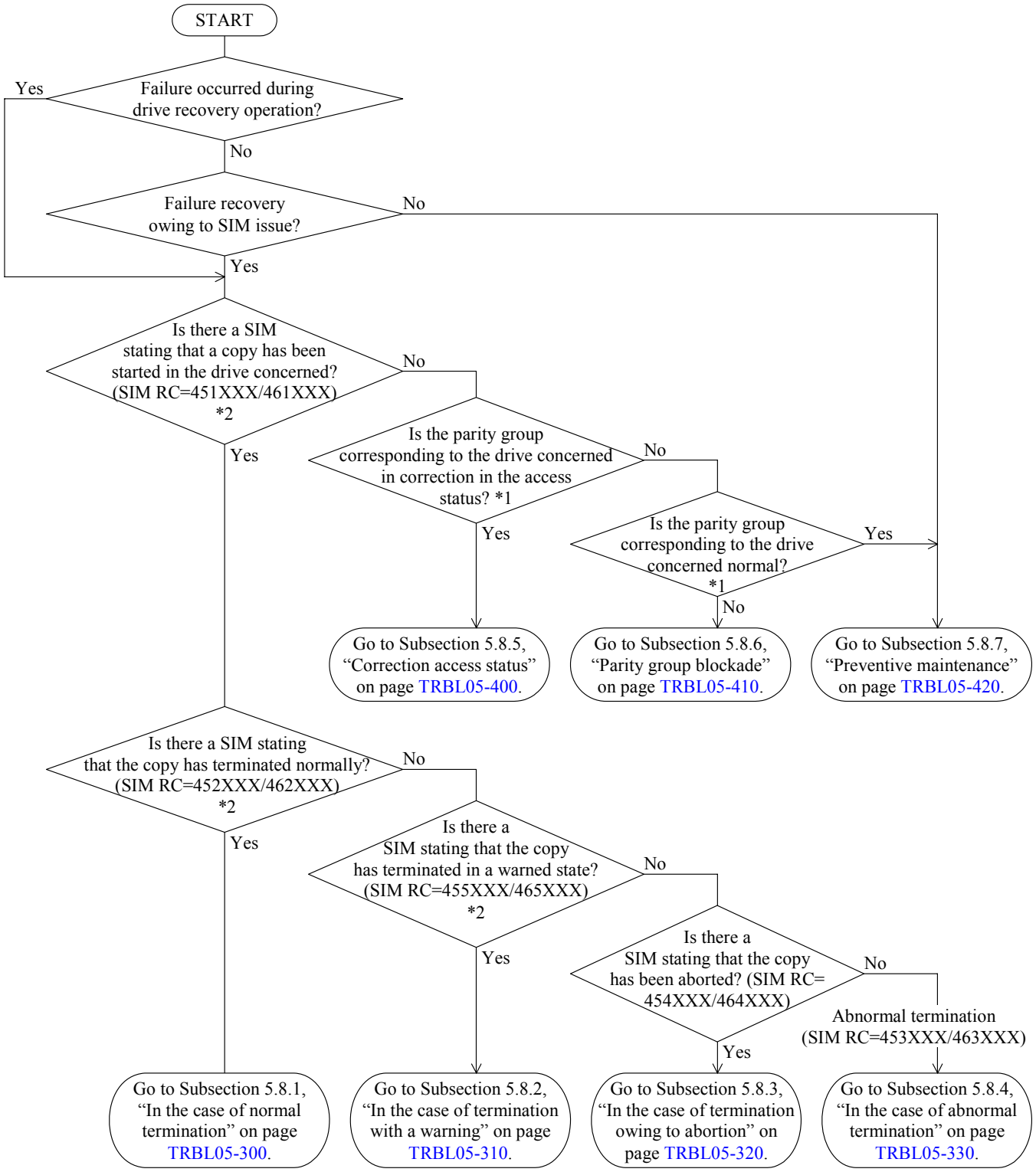


*1: The time limit value of the reason is shown below.
(1) It takes about 2 hours per 16 LDEV for LDEV format.
(2) It takes about 12 hours per drive for copy.
(3) It takes about 10 minutes for CHA/DKA.
(4) It takes about 4 hour for CACHE/SM (depending on cache size/SM size) in maximum.
(5) It takes for 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).

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

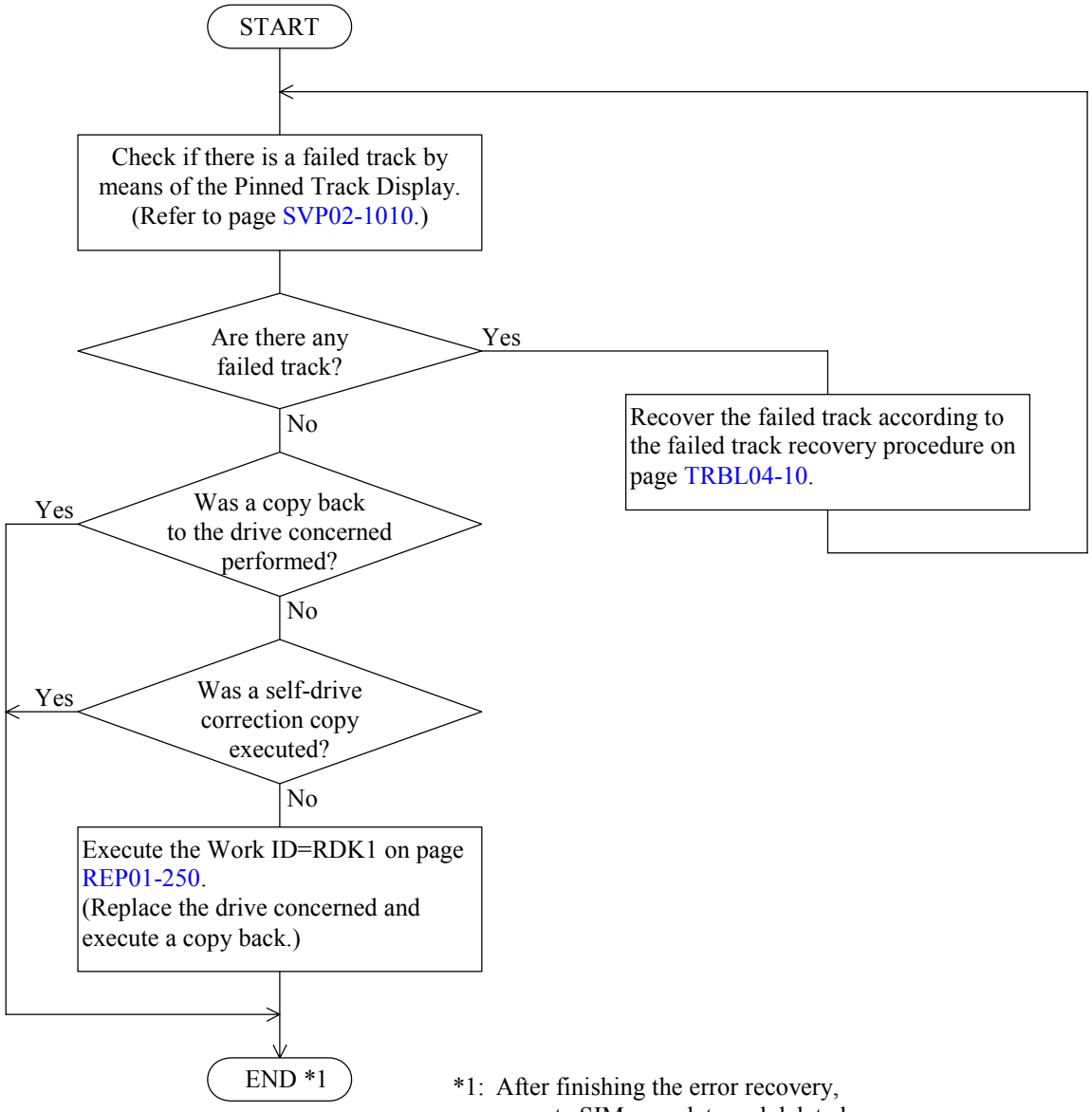


*1: Confirm the status of the parity group corresponding to the drive concerned by means of the SVP status.
For the procedure for referring to the SVP status, refer to Section 3.6, "Logical device window" on page SVP03-260.

*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.



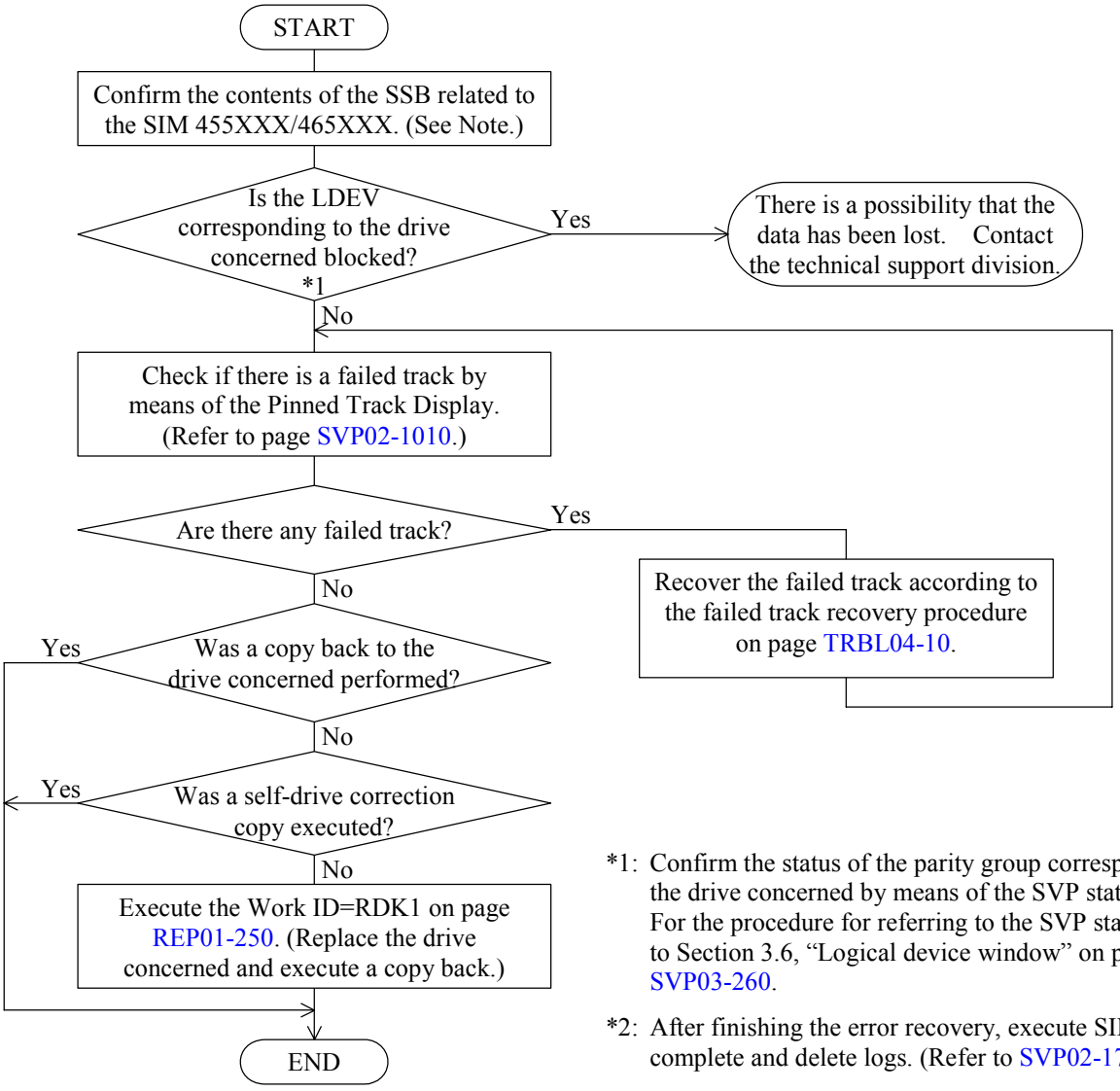
*1: After finishing the error recovery, execute SIM complete and delete logs. (Refer to SVP02-170, 560)

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 SVP03-260.

*2: After finishing the error recovery, execute SIM complete and delete logs. (Refer to SVP02-170, 560)

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

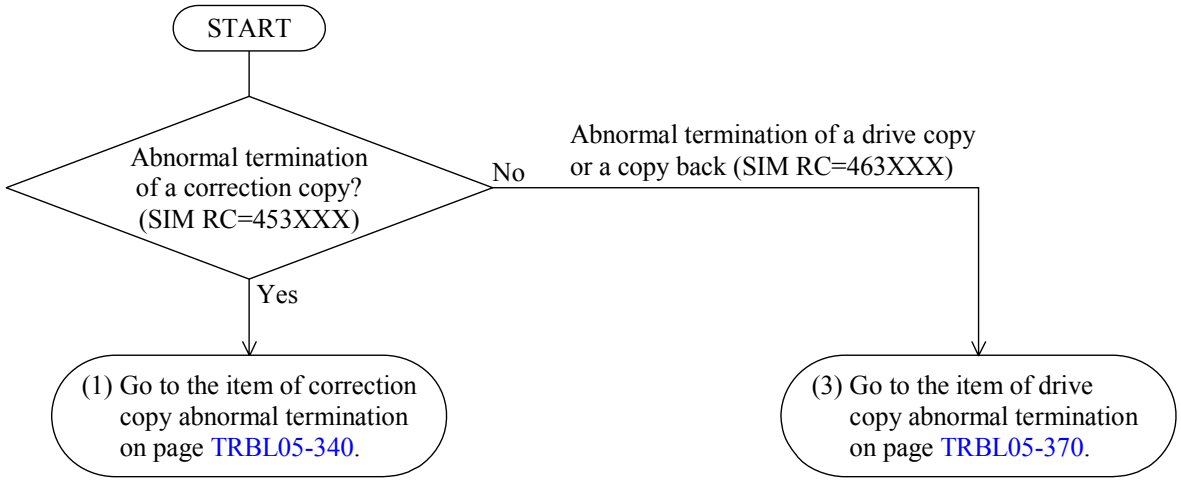
Byte (Hex.)	Item	Meaning
40	Number of failed tracks	Number of failed tracks
41	Number of blocked LDEVs	Number of blocked LDEVs
42 : 7D	Blocked LDEV #0 : Blocked LDEV #29	Blocked LDEV No. (Up to 30 LDEVs can be inputted from the top.) However, 0Xff is inputted in the unused part.
7E	E.O.D	Means the end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

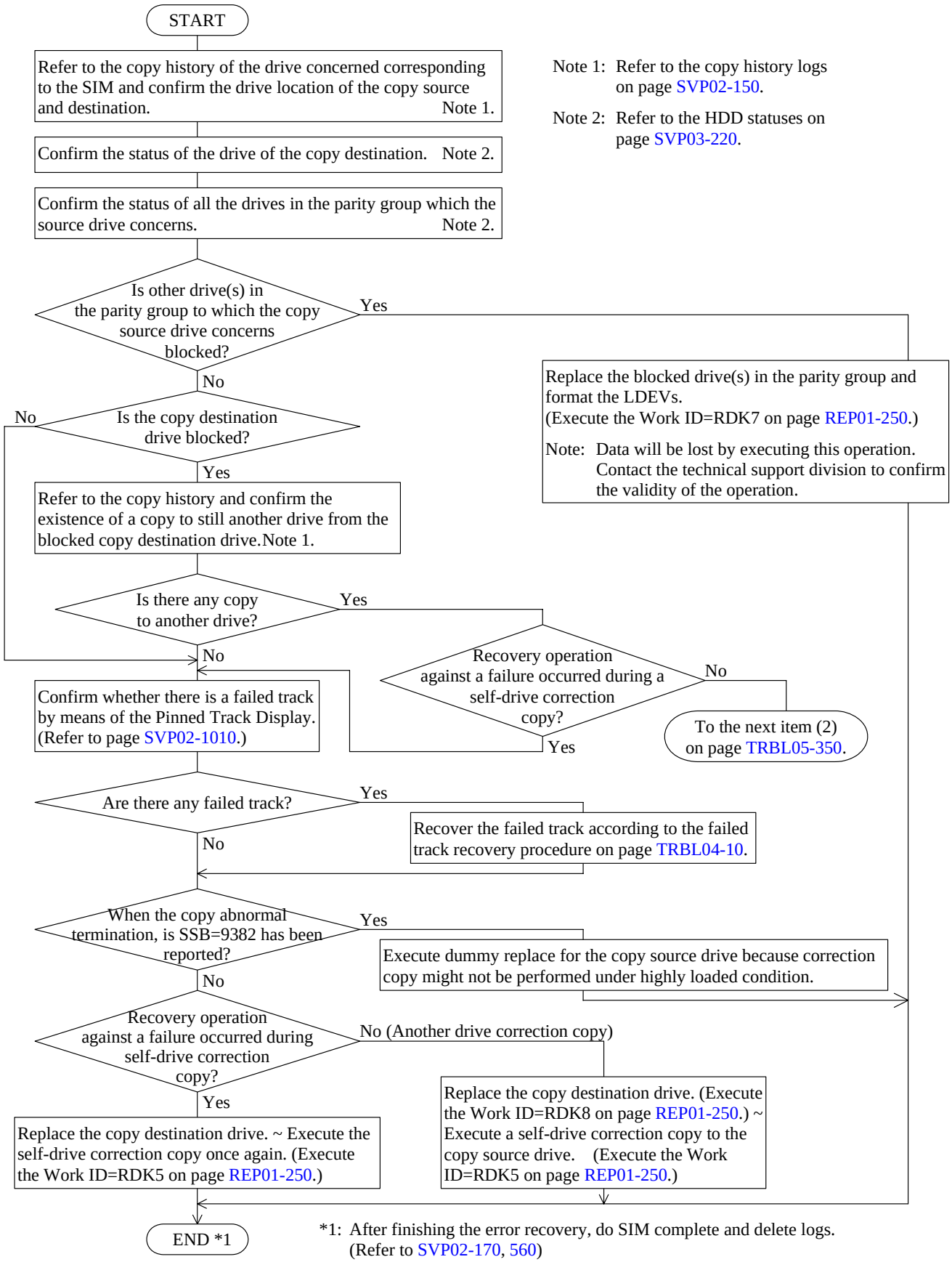
5.8.4 In the case of abnormal termination (SIM RC = 453XXX, 463XXX)

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 TRBL05-280 and execute the following procedure.



(1) In the case of correction copy abnormal termination

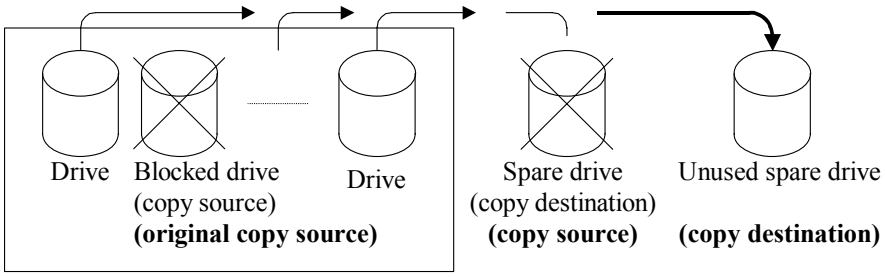
The procedure below is that used when a correction copy terminates abnormally.

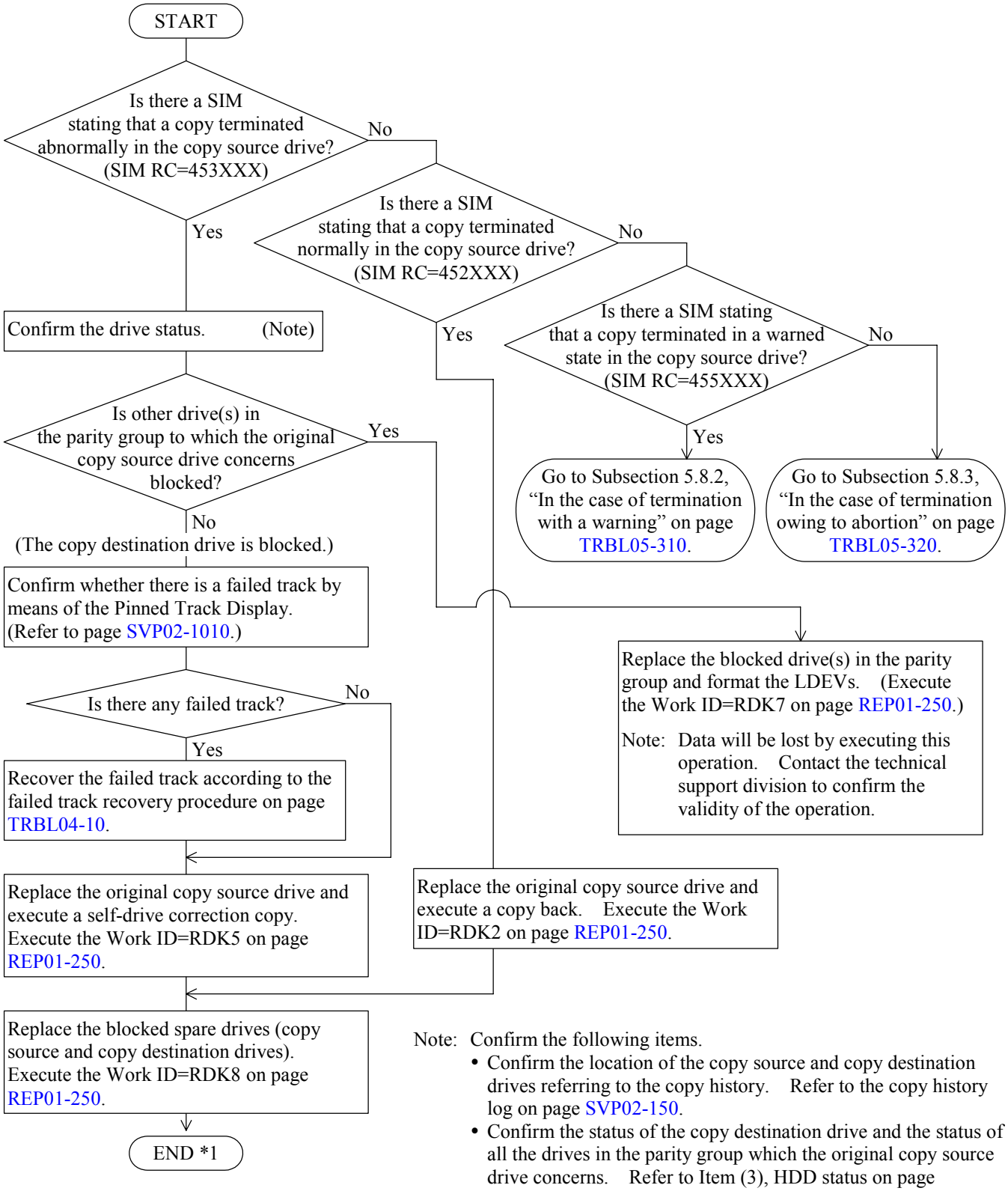


(2) In the case of correction copy abnormal termination (in which an unused spare drive is available)

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.





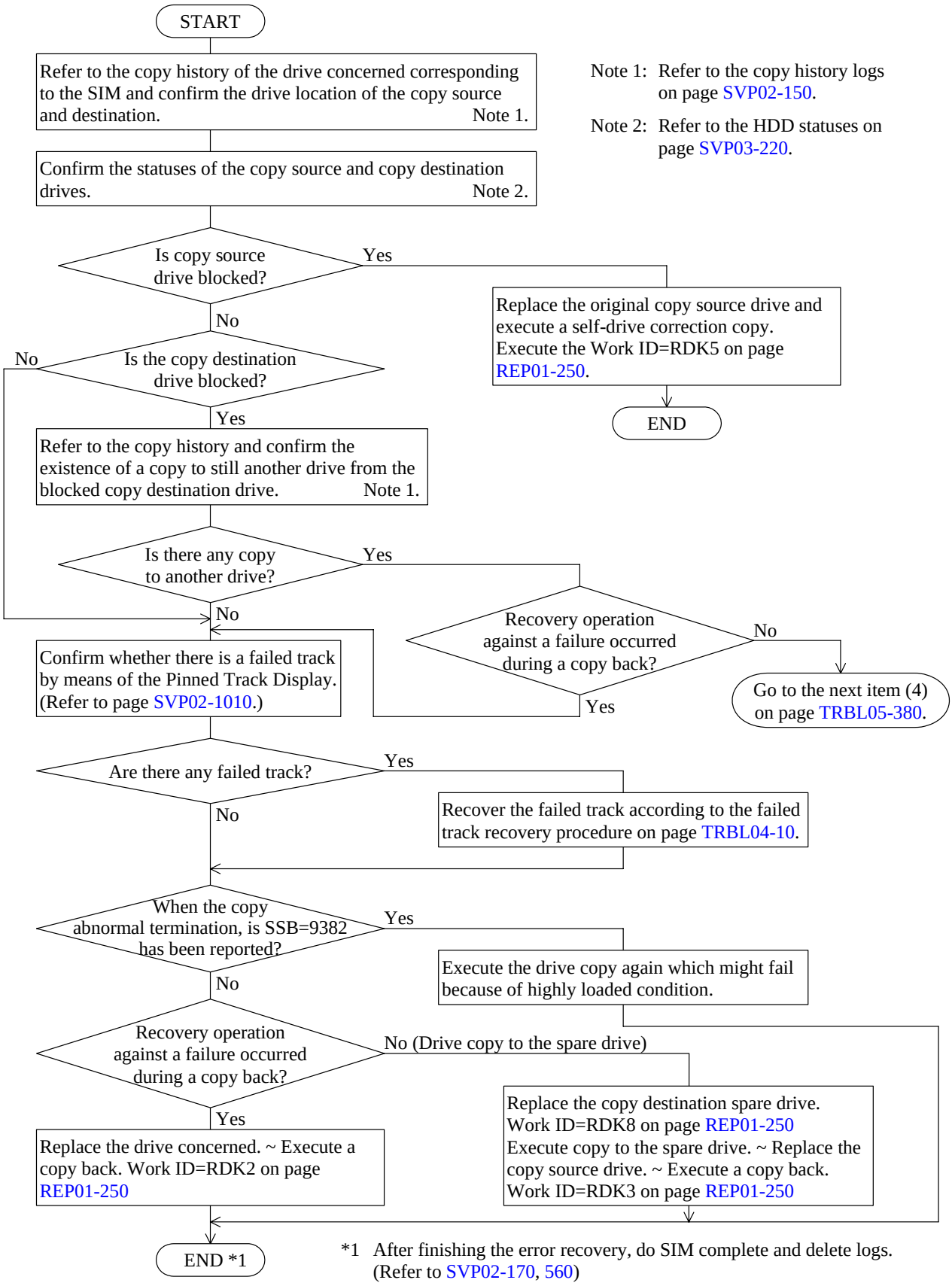
Note: Confirm the following items.

- Confirm the location of the copy source and copy destination drives referring to the copy history. Refer to the copy history log on page SVP02-150.
- 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 SVP03-220.

*1: After finishing the error recovery, do SIM complete and delete logs. (Refer to SVP02-170, 560)

(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.

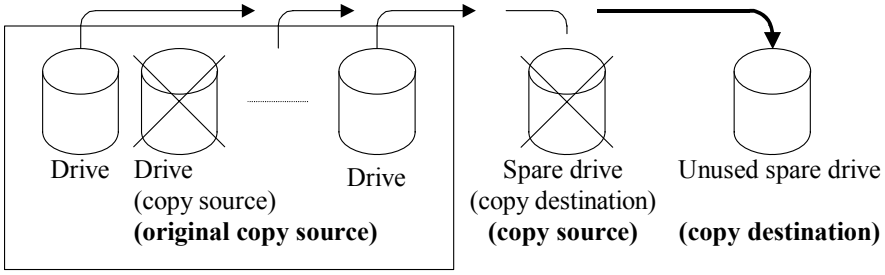


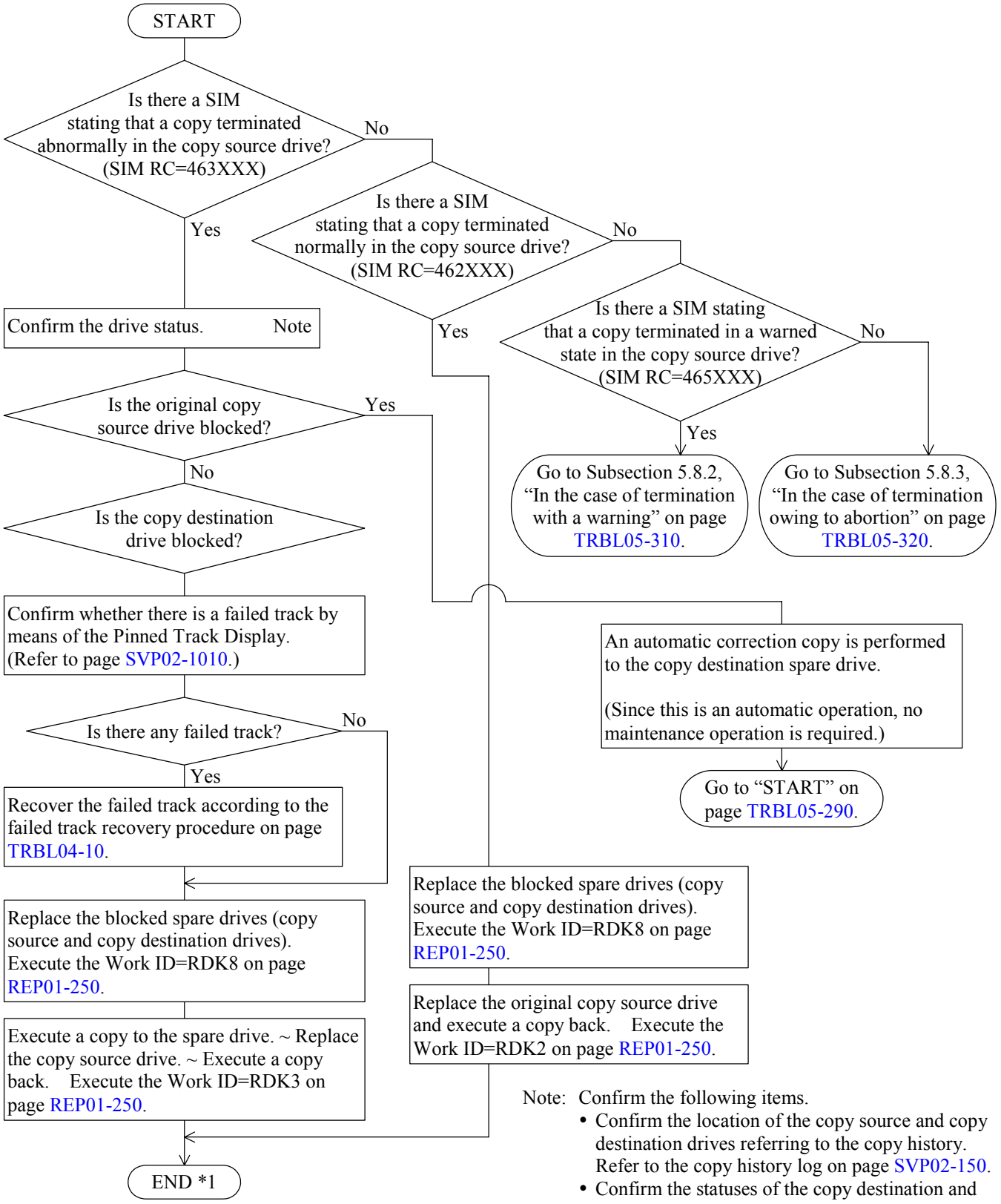
Note 1: Refer to the copy history logs on page SVP02-150.

Note 2: Refer to the HDD statuses on page SVP03-220.

*1 After finishing the error recovery, do SIM complete and delete logs. (Refer to SVP02-170, 560)

(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.



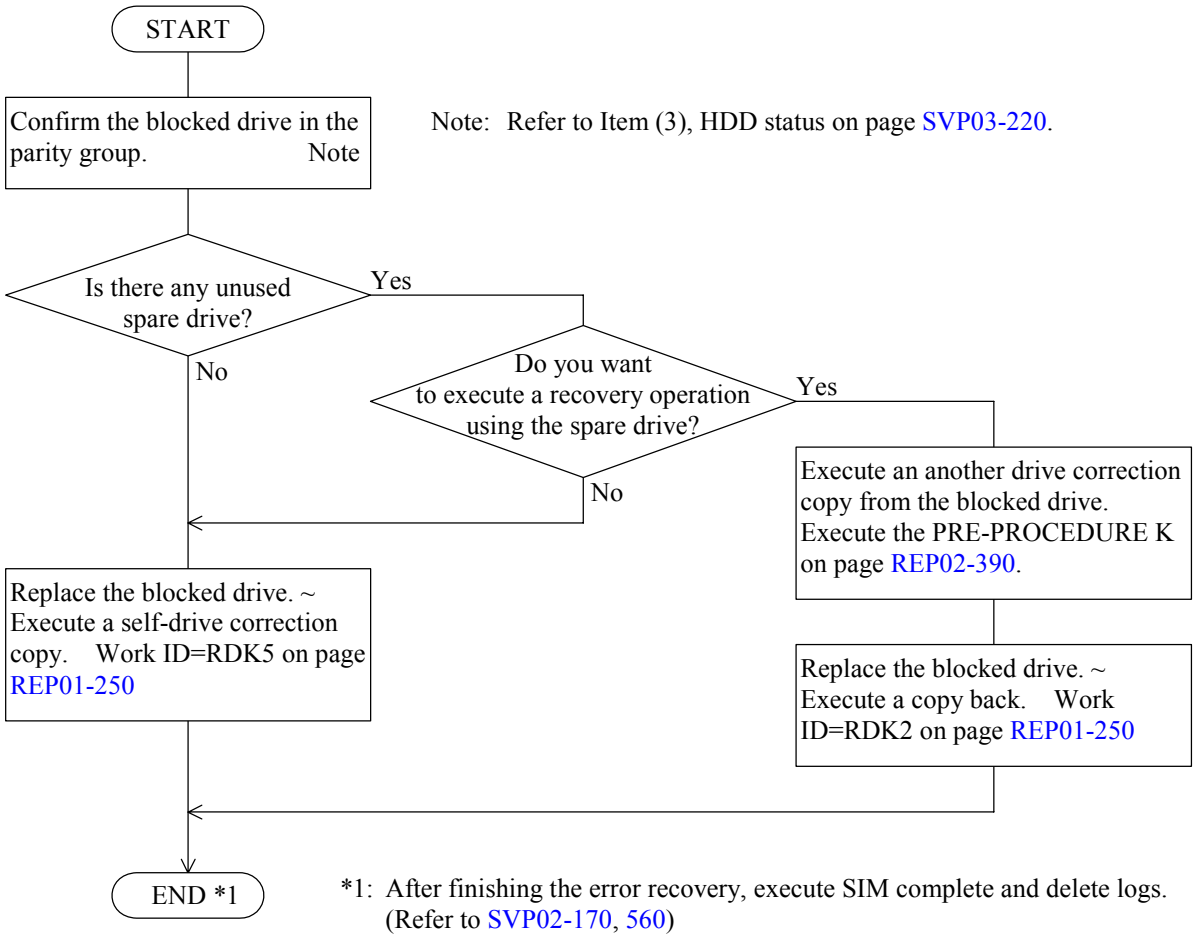


Note: Confirm the following items.
- Confirm the location of the copy source and copy destination drives referring to the copy history. Refer to the copy history log on page SVP02-150.
- Confirm the statuses of the copy destination and the original copy source drives. Refer to Item (3), HDD status on page SVP03-220.

*1: After finishing the error recovery, do SIM complete and delete logs. (Refer to SVP02-170, 560)

5.8.5 Correction access status

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

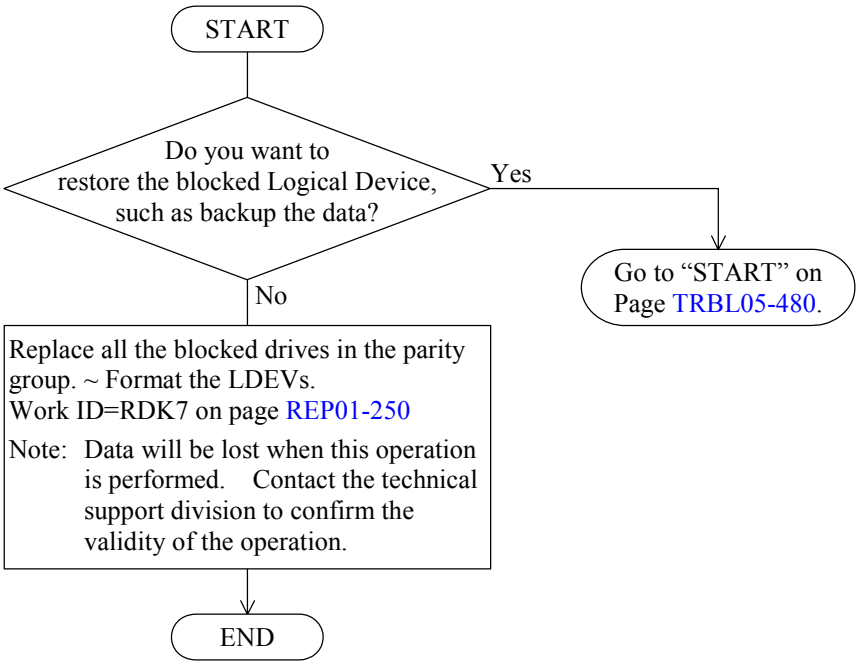


Note: Refer to Item (3), HDD status on page SVP03-220.

*1: After finishing the error recovery, execute SIM complete and delete logs. (Refer to SVP02-170, 560)

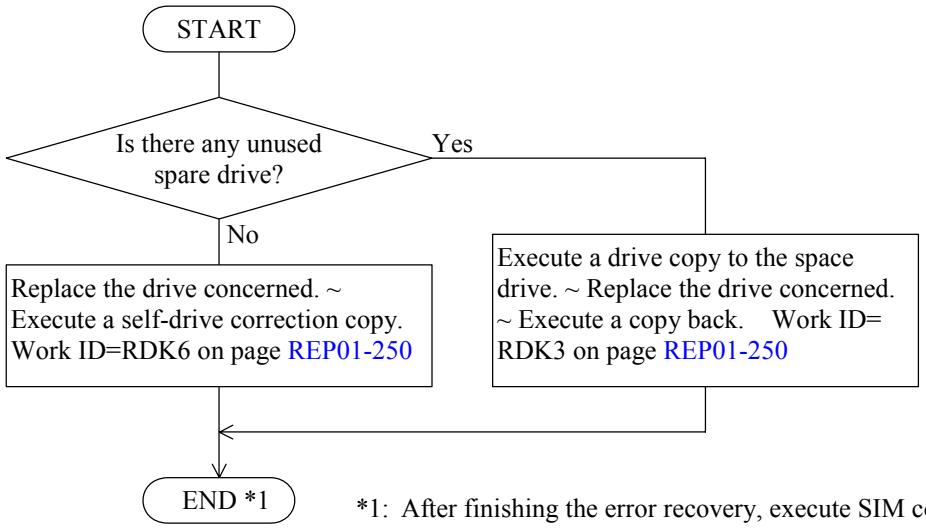
5.8.6 Parity group blockade

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



5.8.7 Preventive maintenance

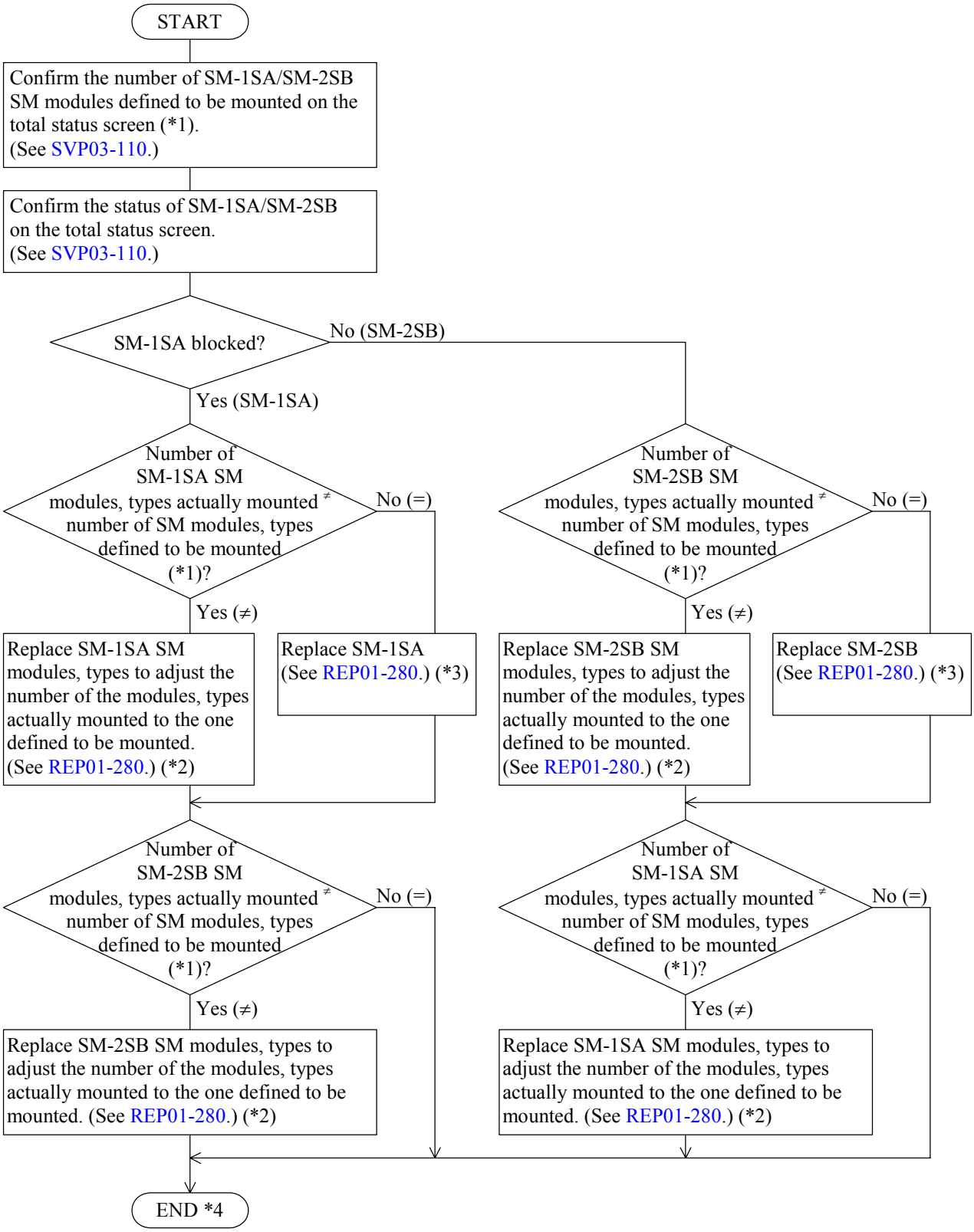
The procedure below is that used when the drive is not blocked but it must be replaced.



*1: After finishing the error recovery, execute SIM complete and delete logs. (Refer to SVP02-170, 560)

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

The mounted SM capacities inequality error (ffe30x/FPC = 80000000) should be recovered following the procedure below.
This error occurs if an SM is blocked because the mounted SM capacity differs between SM-1SA, SM-2SB (PCBs mounting SM modules). Therefore, the number of SM modules, types mounted must be adjusted correctly to recover this error.



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

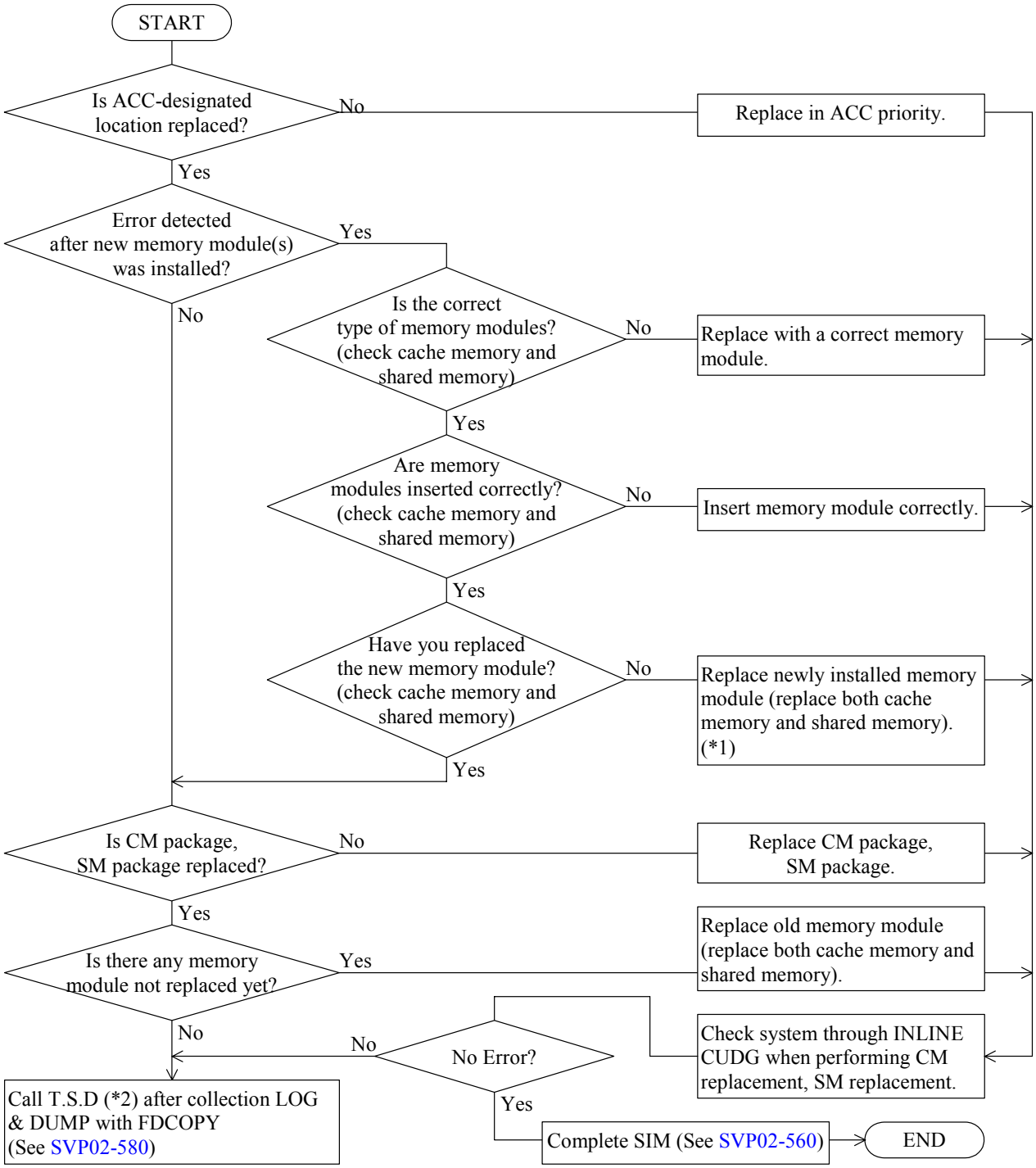
*2: Confirm the number of mounted SM modules, types to adjust it.

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

*4: After finishing the error recovery, do SIM complete and delete logs.
(Refer to SVP02-170, 560)

5.10 Cache Memory Error Isolation Procedure (SIM = FFF0XX, FFF1XX, FFF2XX, FFE0XX, FFE1XX, 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.

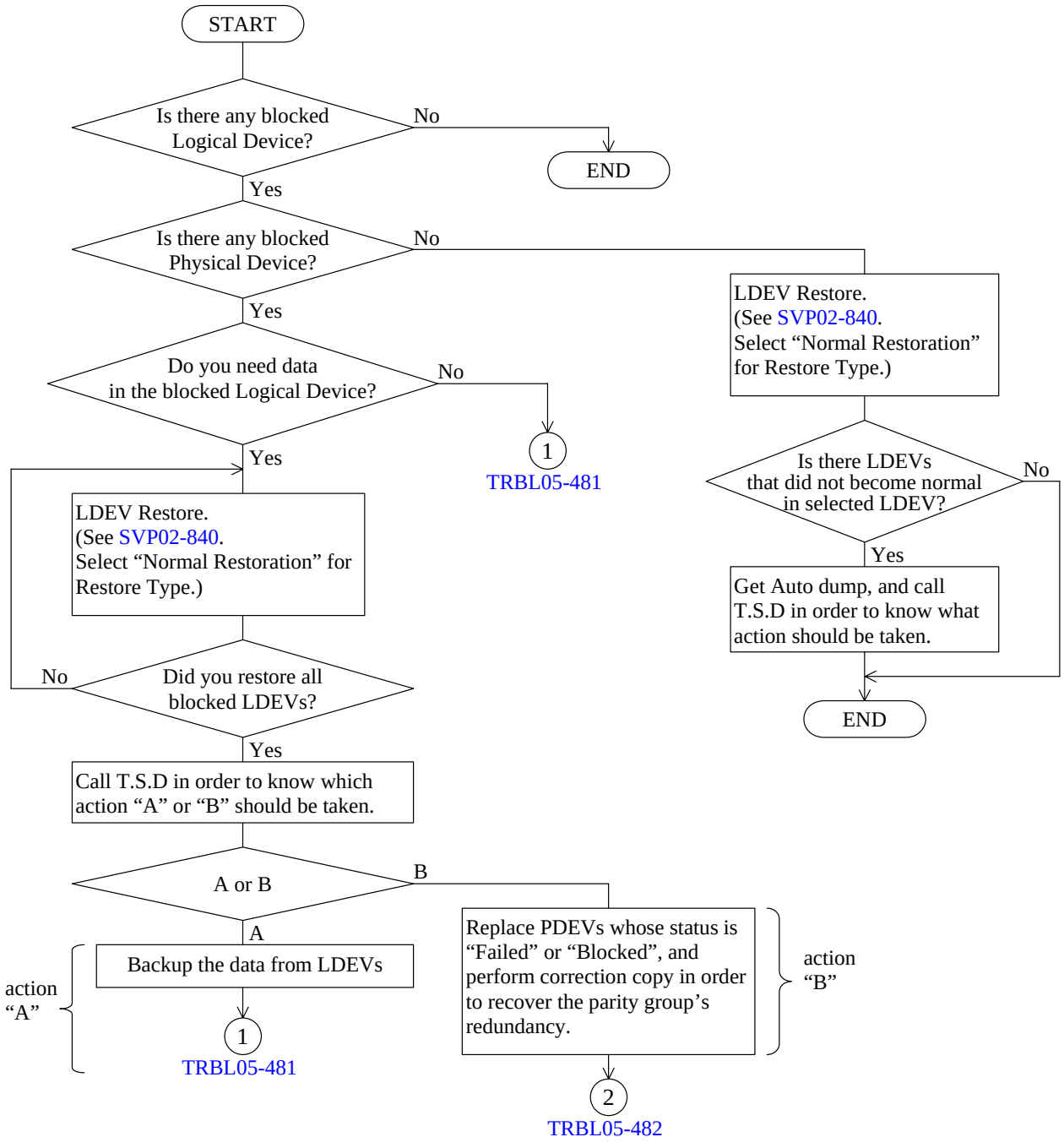
*2: T.S.D : Technical Support Division

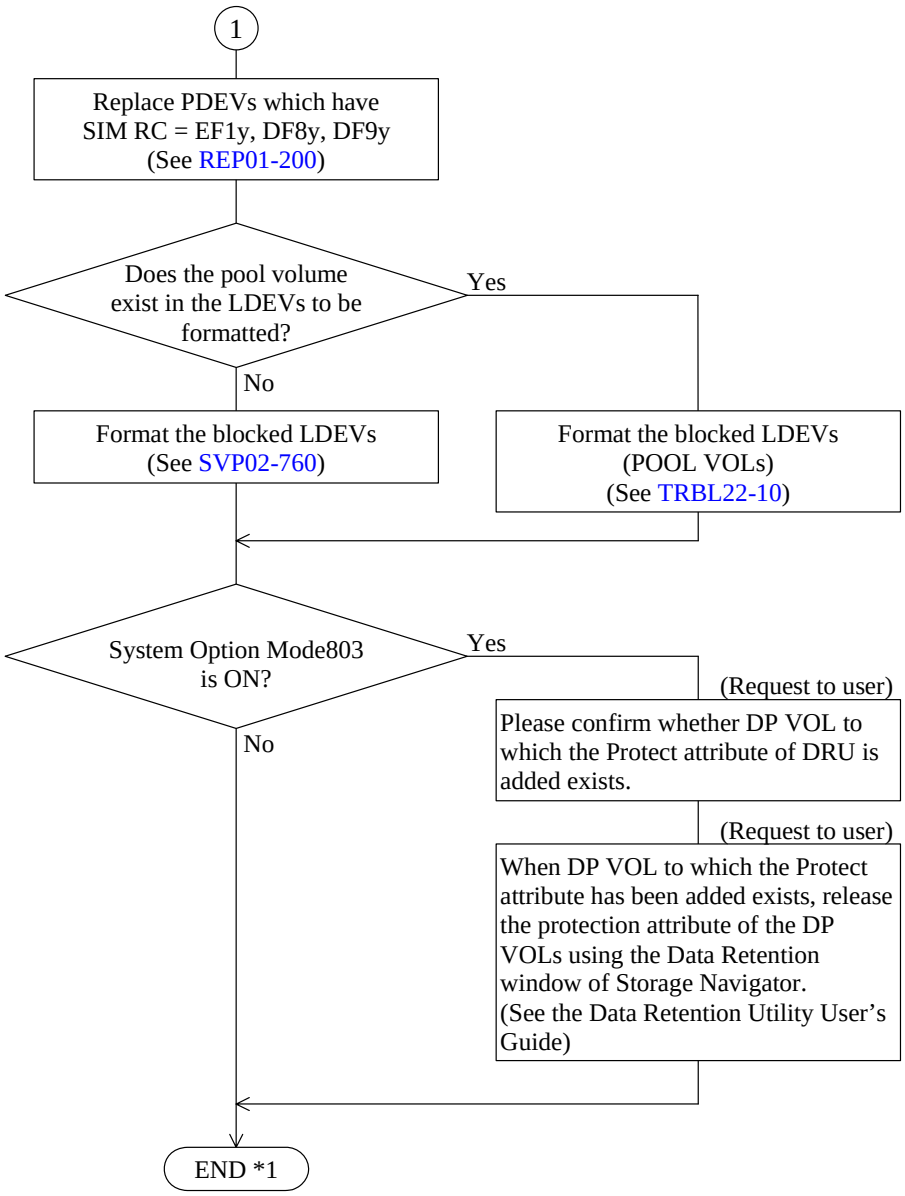
5.11 Recovery Procedure for LDEV Blocking (SIM = EF9XXX, DFAXXX, DFBXXX)

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.
As for the following procedures, the microprogram version of DKCMAIN corresponds more than 60-08-0X-XX/XX.
Please refer to TRBL05-483 for microprogram version before 60-07-XX-XX/XX.

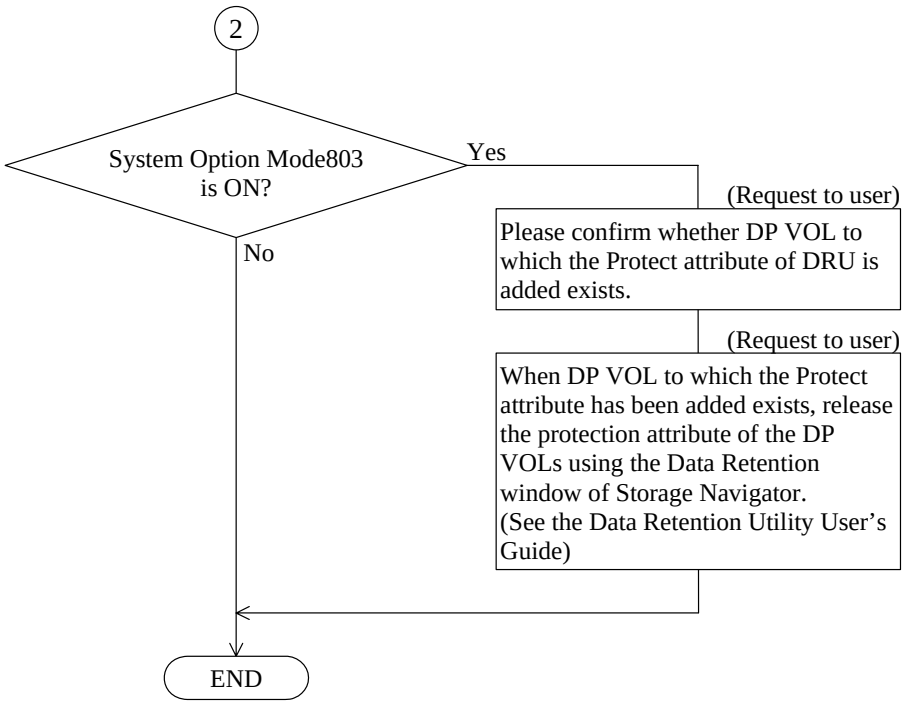
Notice : When you execute a Recovery Procedure for LDEV Blocking, you must delete the HRC pair.
After recovering it, if necessary, you execute establish pair.

SIM RC = EF9y, DFAy, DFBy





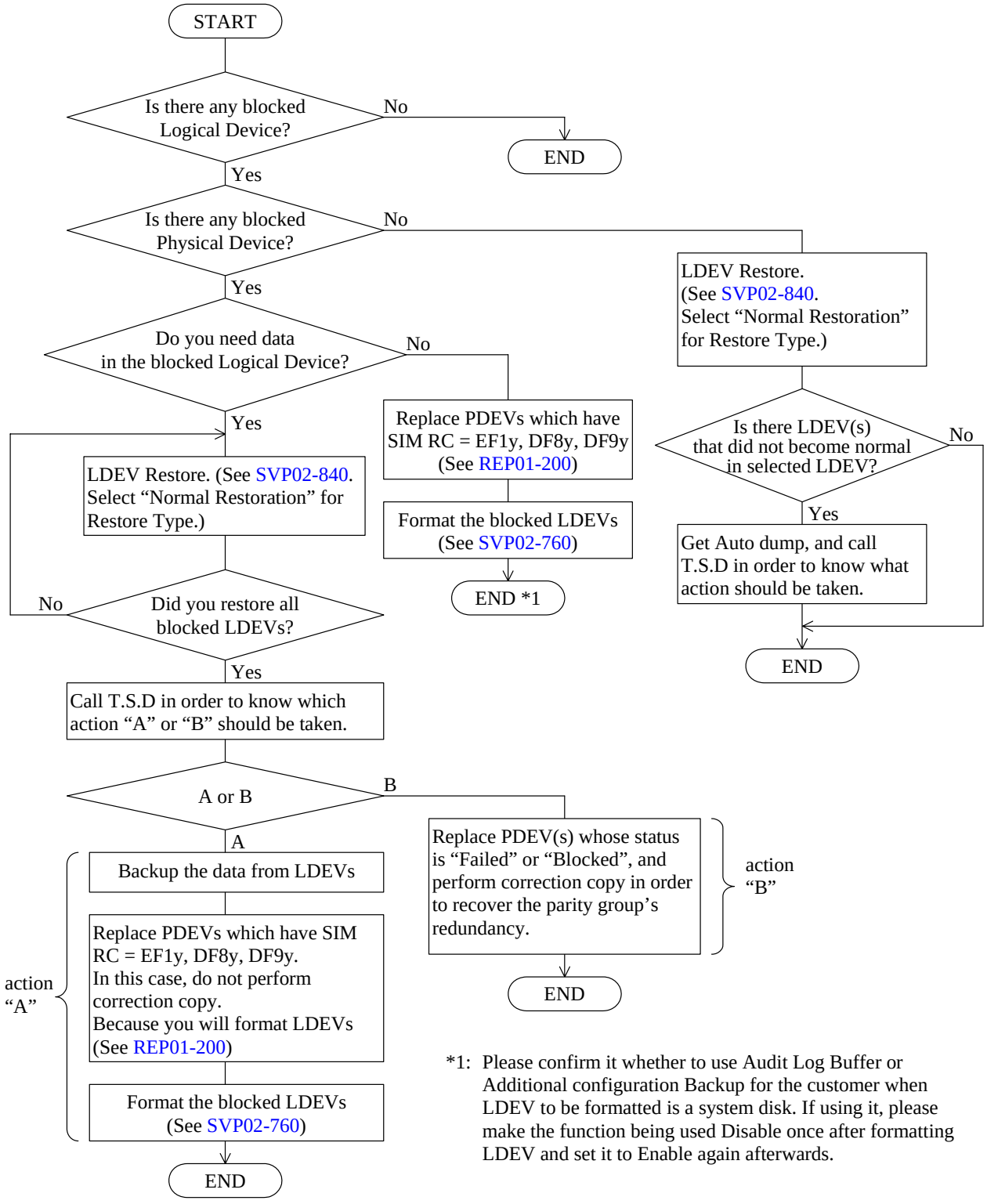
*1: Please confirm it whether to use Audit Log Buffer or Additional configuration Back up for the customer when LDEV to be formatted is a system disk. If using it, please make the function being used Disable once after formatting LDEV and set it to Enable again afterwards.



As for the following procedures, the microprogram version of DKCMAIN corresponds before 60-07-XX-XX/XX.
Please refer to TRBL05-470 for microprogram version more than 60-08-0X-XX/XX.

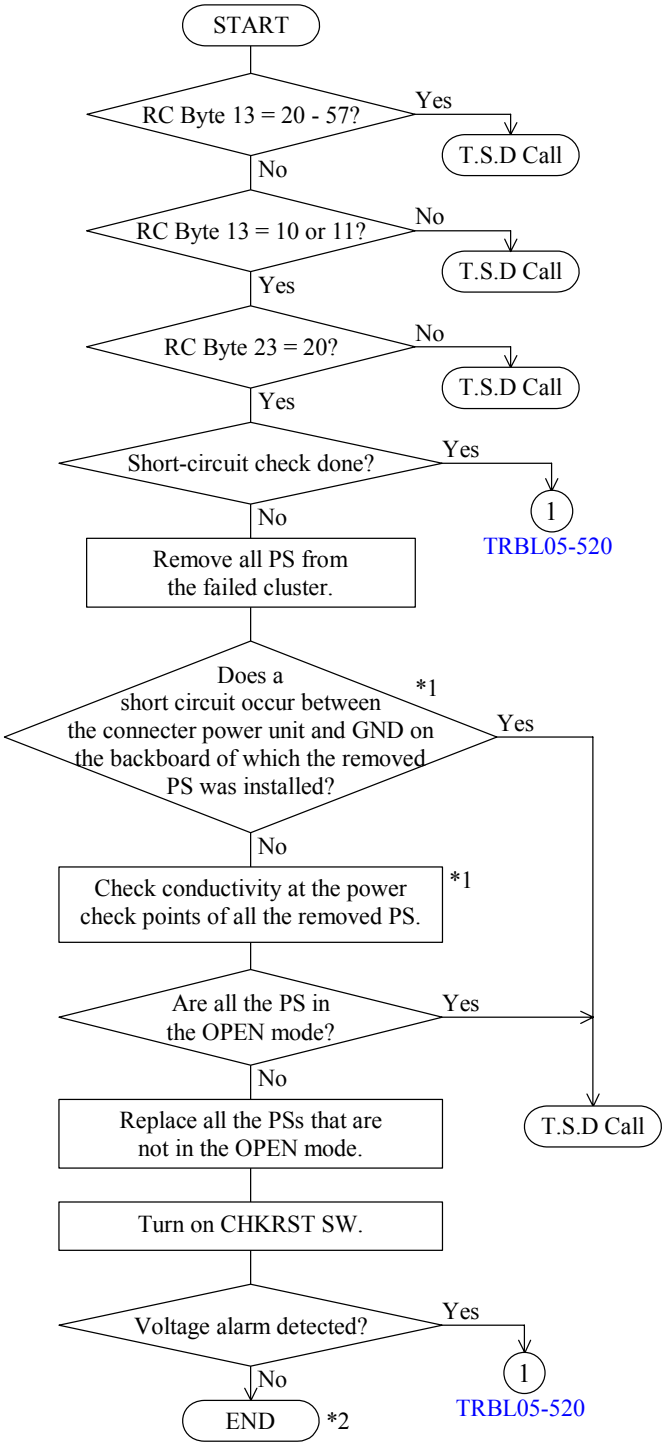
Notice : When you execute a Recovery Procedure for LDEV Blocking, you must delete the HRC pair. After recovering it, if necessary, you execute establish pair.

SIM RC = EF9y, DFAy, DFBy



*1: Please confirm it whether to use Audit Log Buffer or Additional configuration Backup 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 Voltage alarm (SIM = BF2XYY)



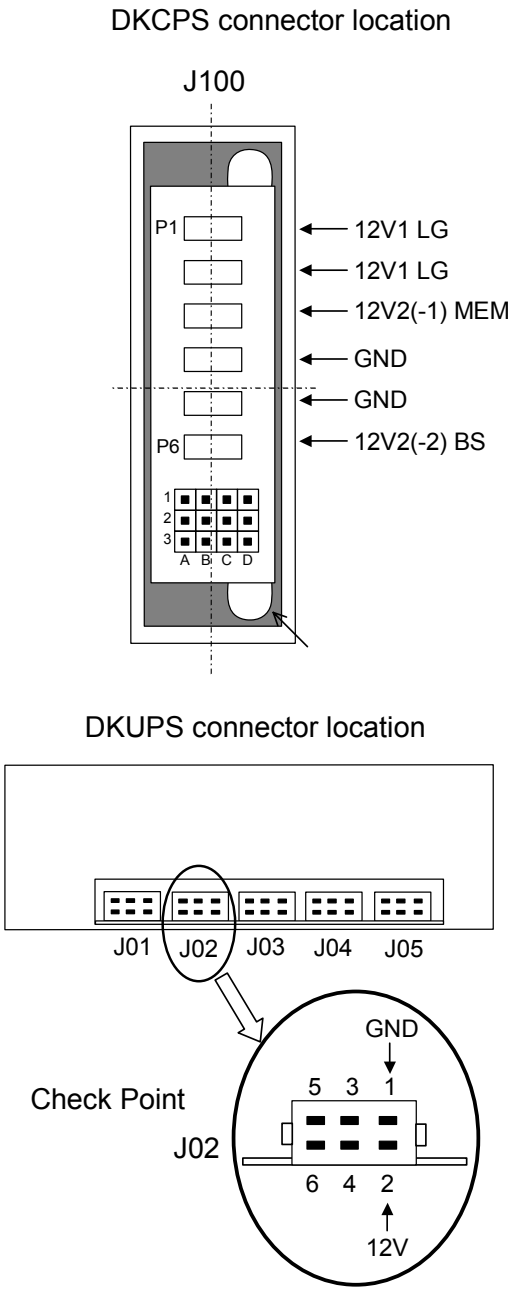
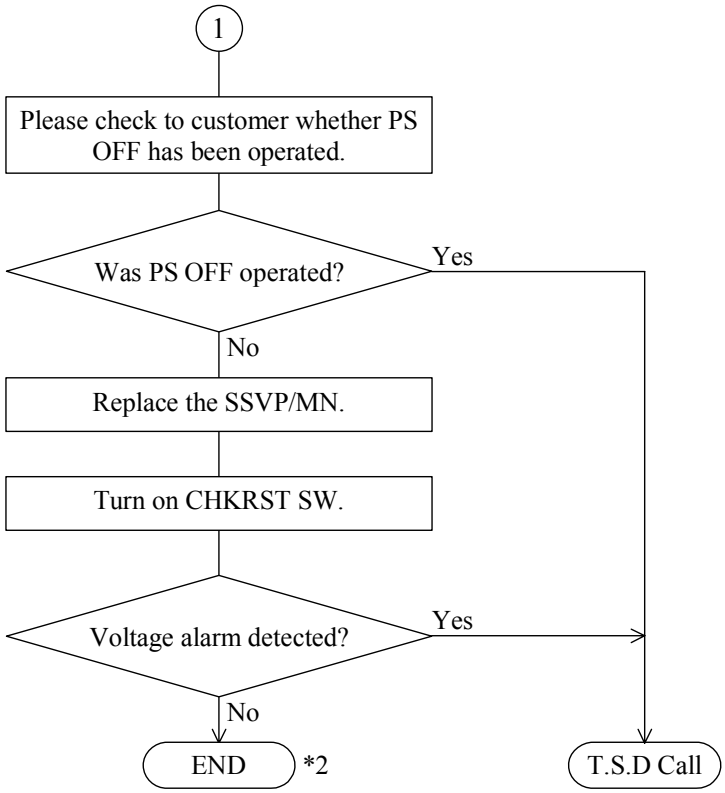


Fig. 5.12-1 Connector location of PS

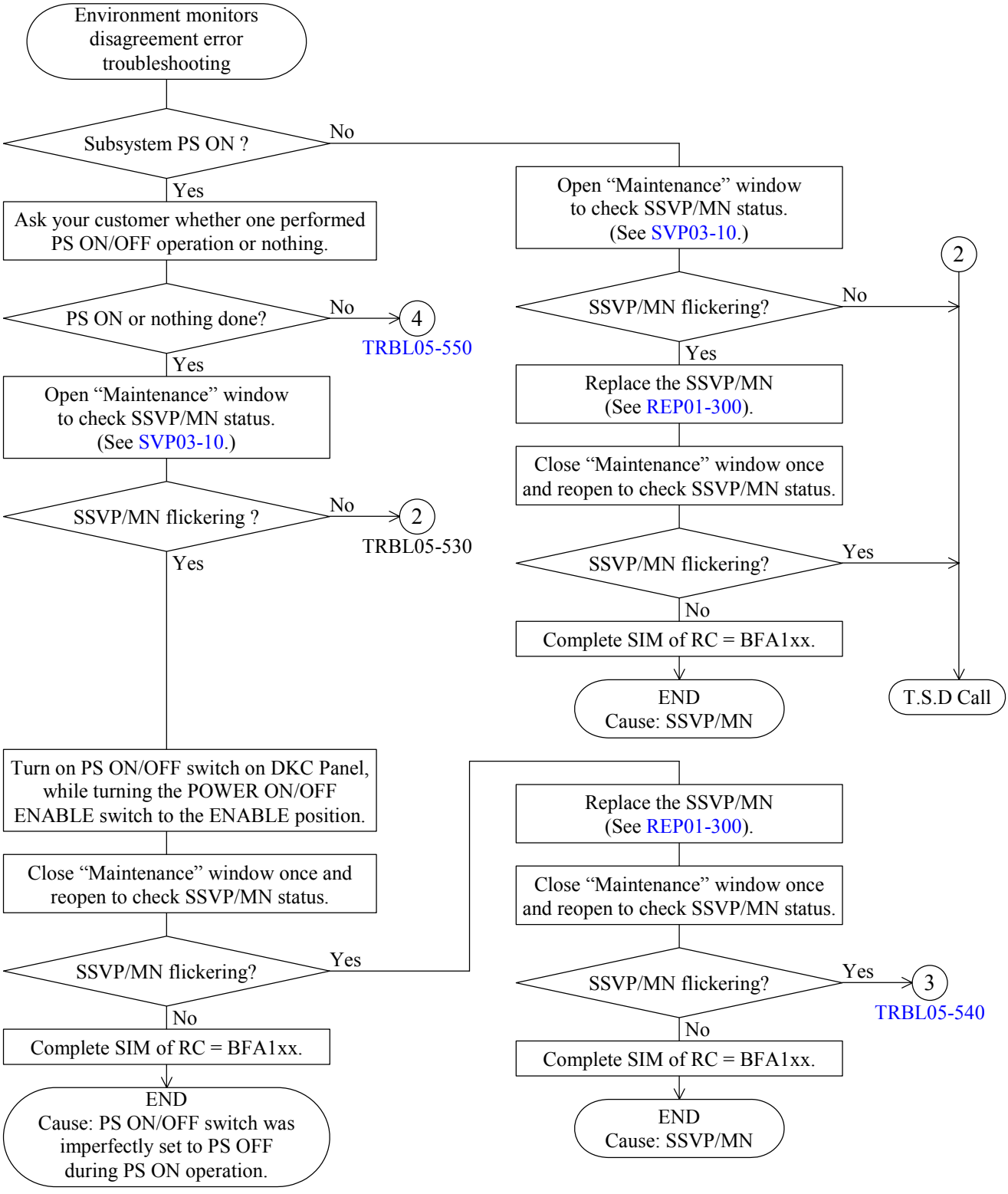
*1: <For DKC> Between P1 and P4, P2 and P4, P3 and P4, P6 and P4
<For DKU> Between J02-1 and J02-2

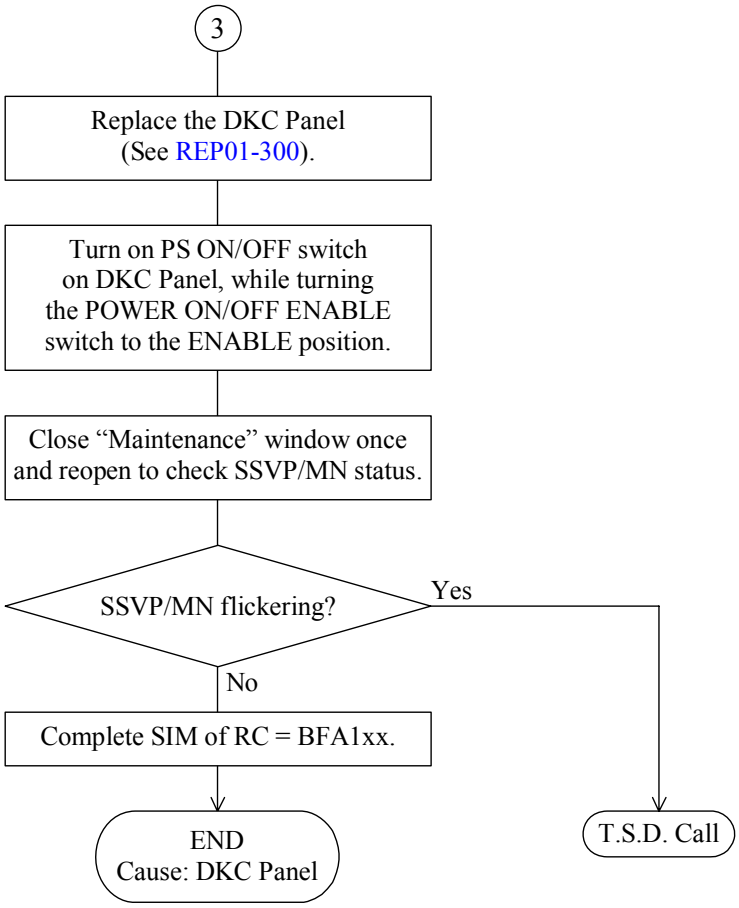
*2: If you finish the maintenance, delete the log, SIM complete and recover Cluster.

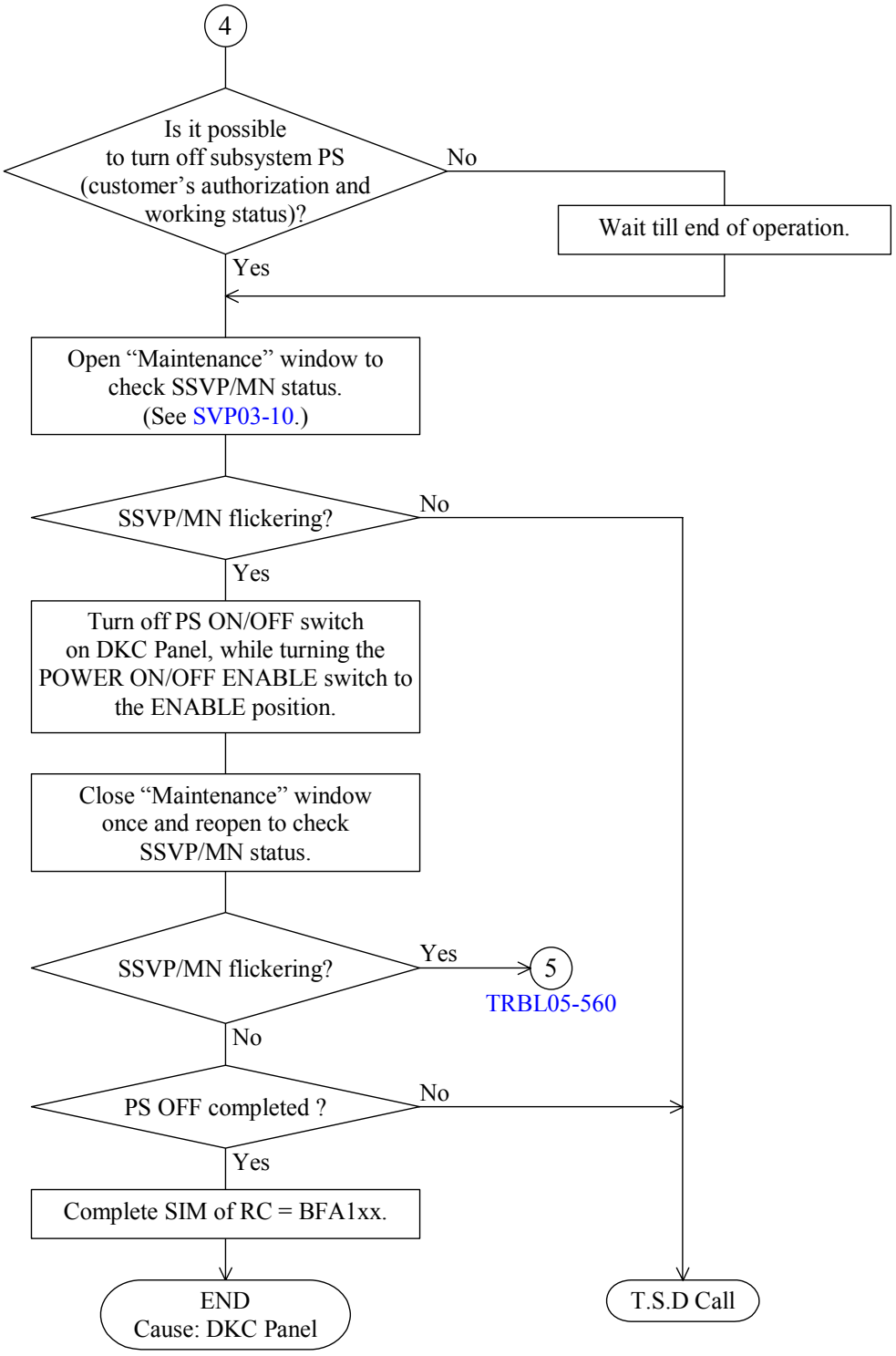


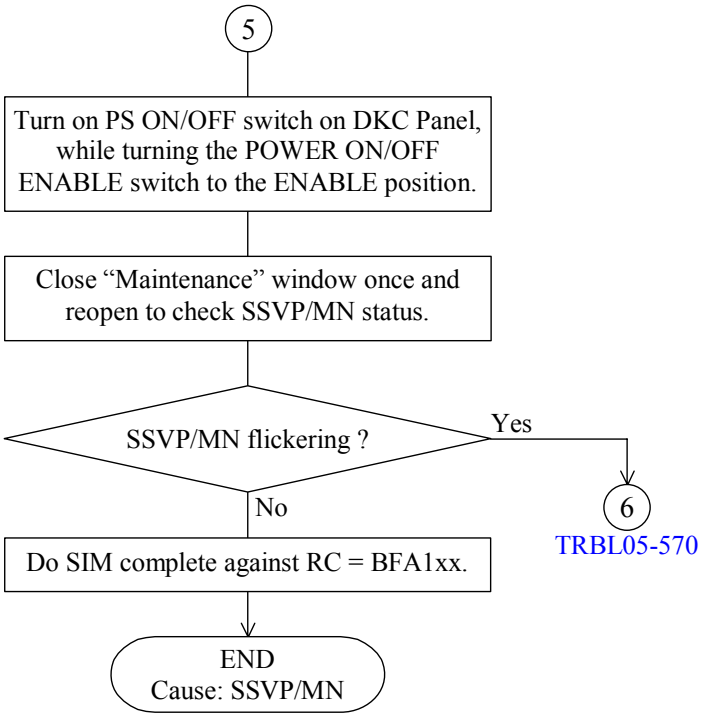
*2: If you finish the maintenance, delete the log, SIM complete and recover Cluster.

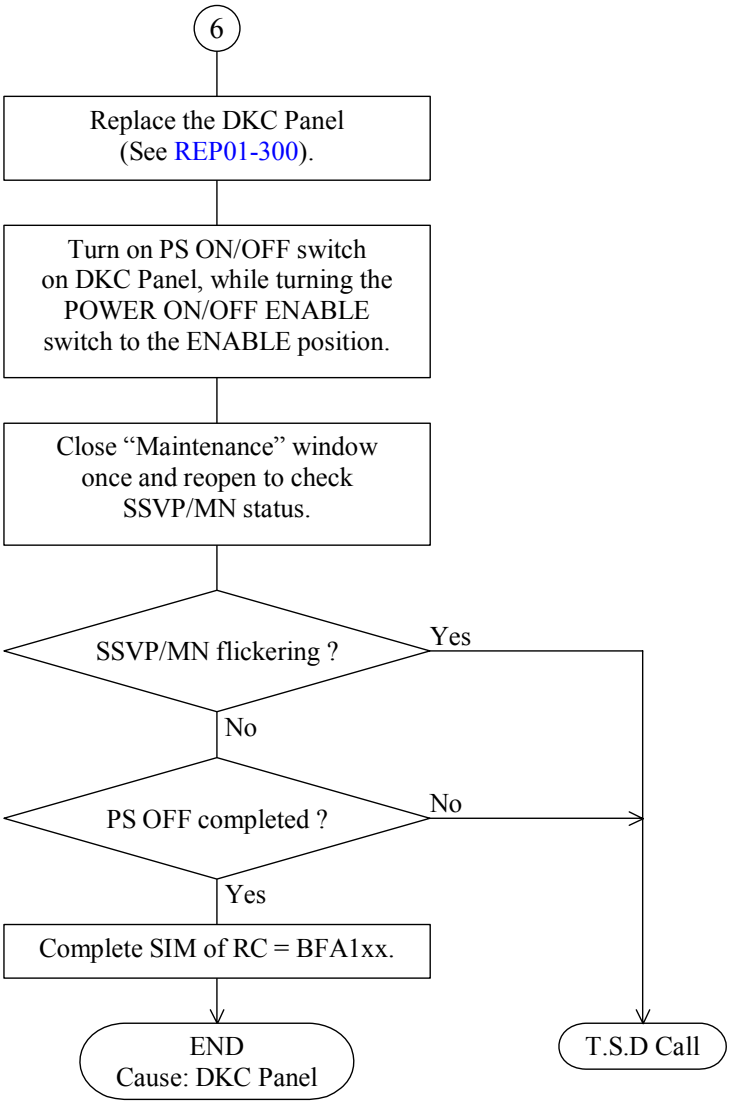
5.13 Environment monitors disagreement error (SIM = BFA1XX)



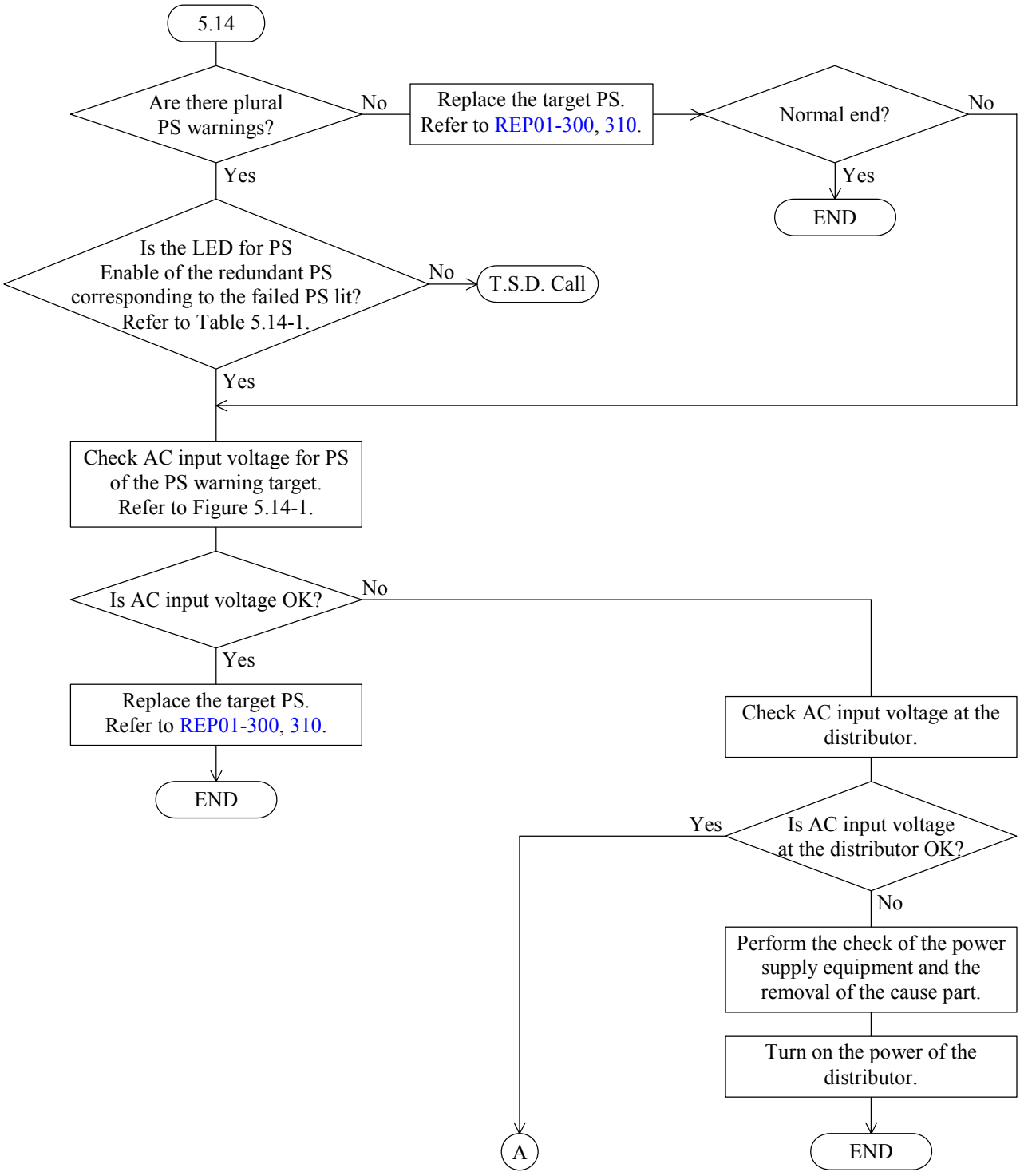


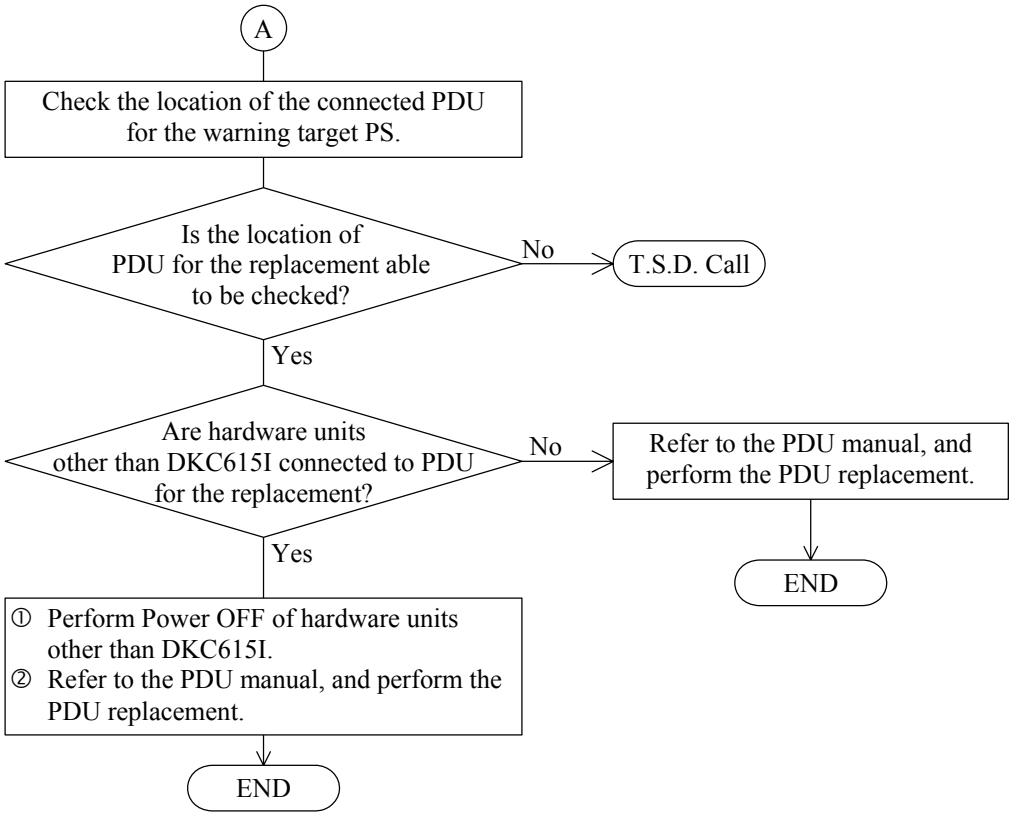






5.14 PS warning error (SIM = BF3XXX, BF4XXX)





*1: Refer to LOC03-50 and LOC03-70 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	PS-11	→	PS-12
2	PS-12	→	PS-11
3	PS-21	→	PS-22
4	PS-22	→	PS-21
5	DKUPS-001 and 011	→	DKUPS-000 and 010
6	DKUPS-000 and 010	→	DKUPS-001 and 011
7	DKUPS-021 and 031	→	DKUPS-020 and 030
8	DKUPS-020 and 030	→	DKUPS-021 and 031
9	DKUPS-101 and 111	→	DKUPS-100 and 110
10	DKUPS-100 and 110	→	DKUPS-101 and 111
11	DKUPS-121 and 131	→	DKUPS-120 and 130
12	DKUPS-120 and 130	→	DKUPS-121 and 131
13	DKUPS-201 and 211	→	DKUPS-200 and 210
14	DKUPS-200 and 210	→	DKUPS-201 and 211
15	DKUPS-221 and 231	→	DKUPS-220 and 230
16	DKUPS-220 and 230	→	DKUPS-221 and 231
17	DKUPS-301 and 311	→	DKUPS-300 and 310
18	DKUPS-300 and 310	→	DKUPS-301 and 311
19	DKUPS-321 and 331	→	DKUPS-320 and 330
20	DKUPS-320 and 330	→	DKUPS-321 and 331

Note: For example, if Location of PS warning is “PS-11”, Location of the corresponding redundant PS becomes “PS-12”.
At this time, if the LED (Green) for PS Enable of “PS-12” is lit, it is redundant so that the maintenance replacement of “PS-11”, etc. is possible.
If the LED (Green) for PS Enable of “PS-12” is off, it is not redundant so that the maintenance replacement of “PS-11”, etc. is impossible (T.S.D. Call).

[AC Input voltage check]

a. Remove the cable of target PS.

b. Measure AC input voltage at connector terminal of target PS.

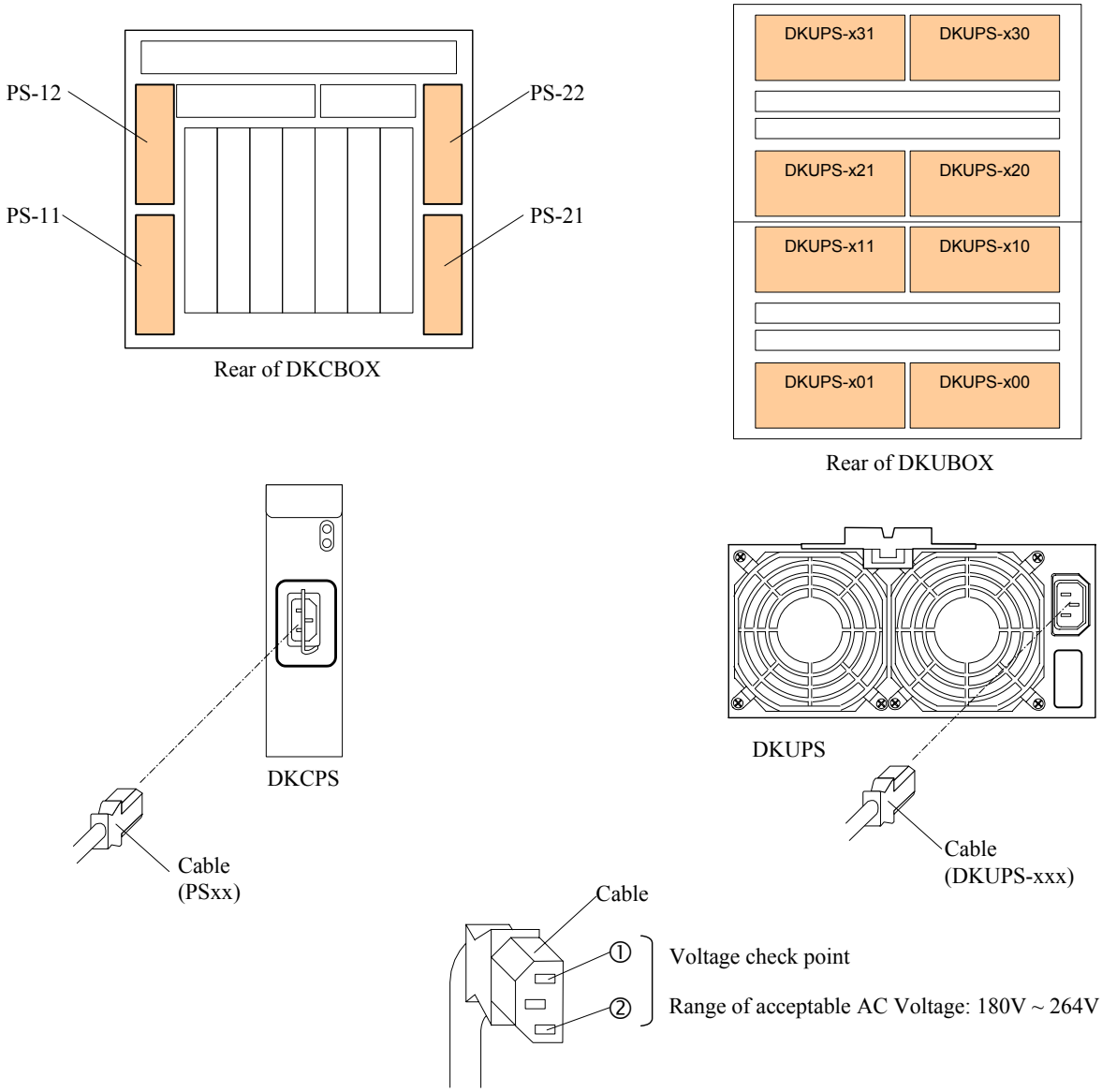
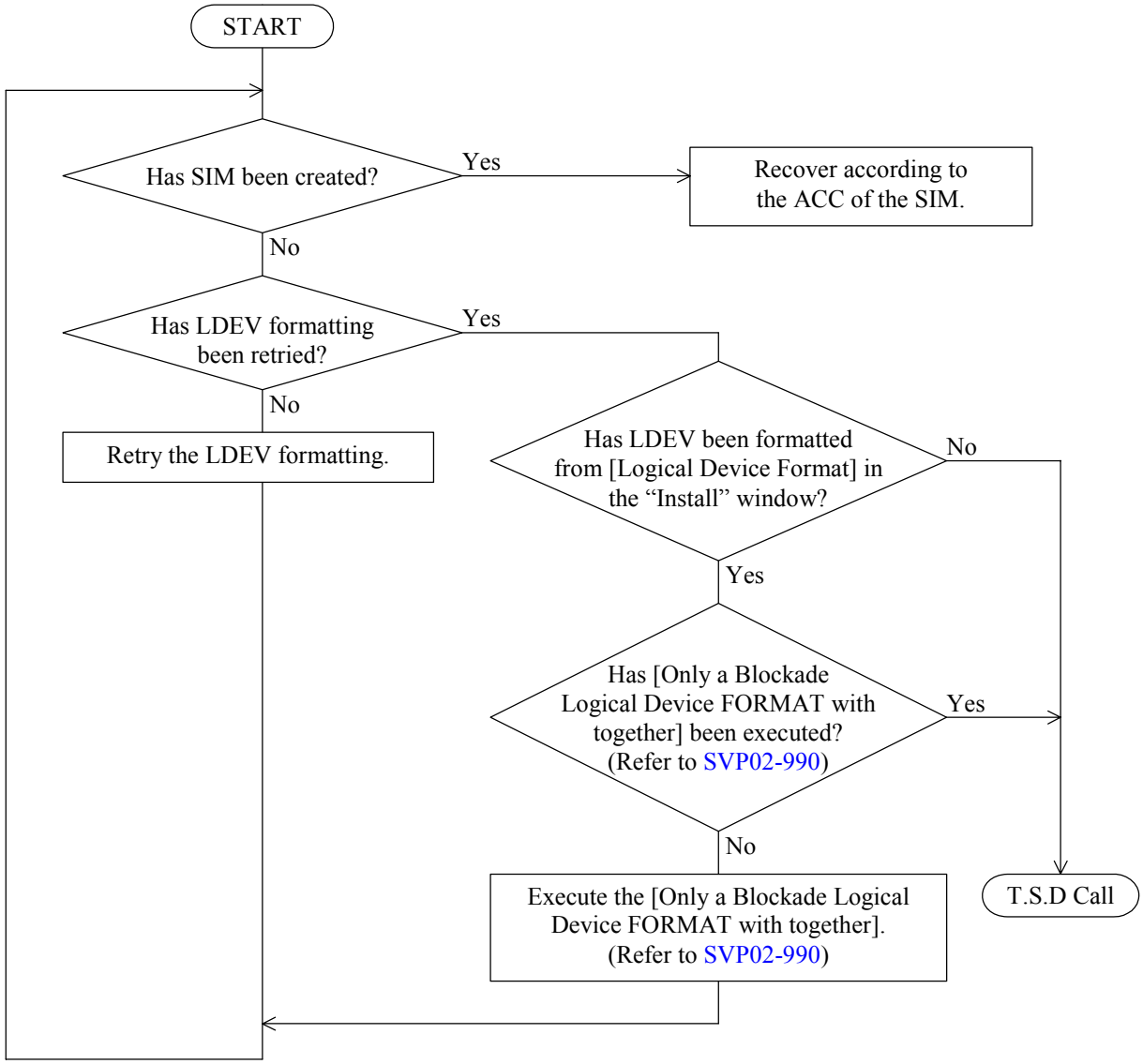


Fig. 5.14-1 AC Input Voltage Check

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, FFDE04)

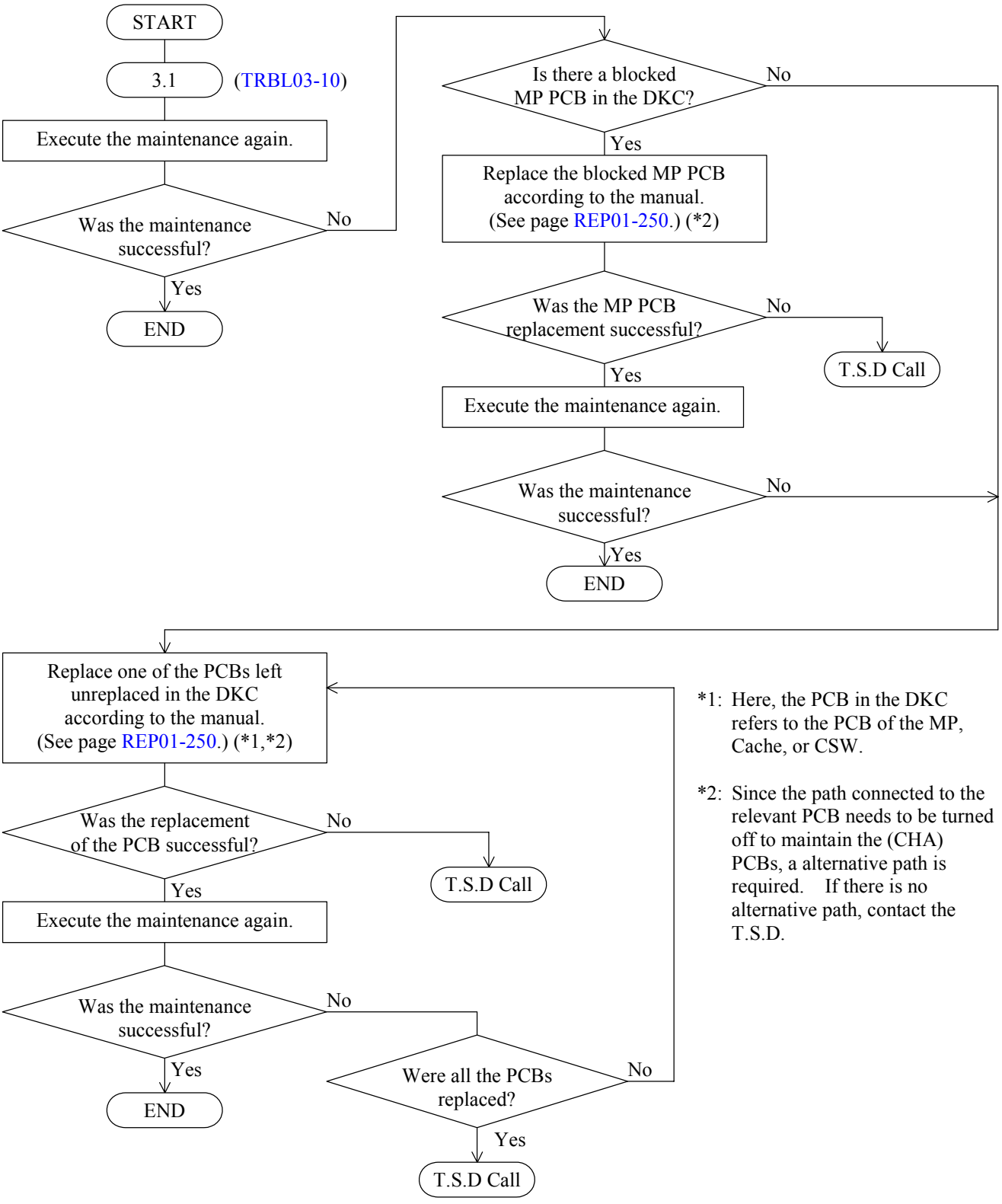
(1) When only this SIM is reported
When this SIM is reported at the time of the subsystem powering on (Memory Backup Mode 36 hours or more) after the previous breaker turning off, no maintenance is required.
When this SIM is reported at the time of the subsystem powering on (Memory Backup Mode less than 36 hours) after the previous breaker turning off, (a) failure(s) may occur in the cache PCB, cache memory, battery, or battery charge. Replace the failed part(s).

(2) When another SIM is reported together with this SIM
When the SIM concerning the cache, shared memory, or battery, 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.

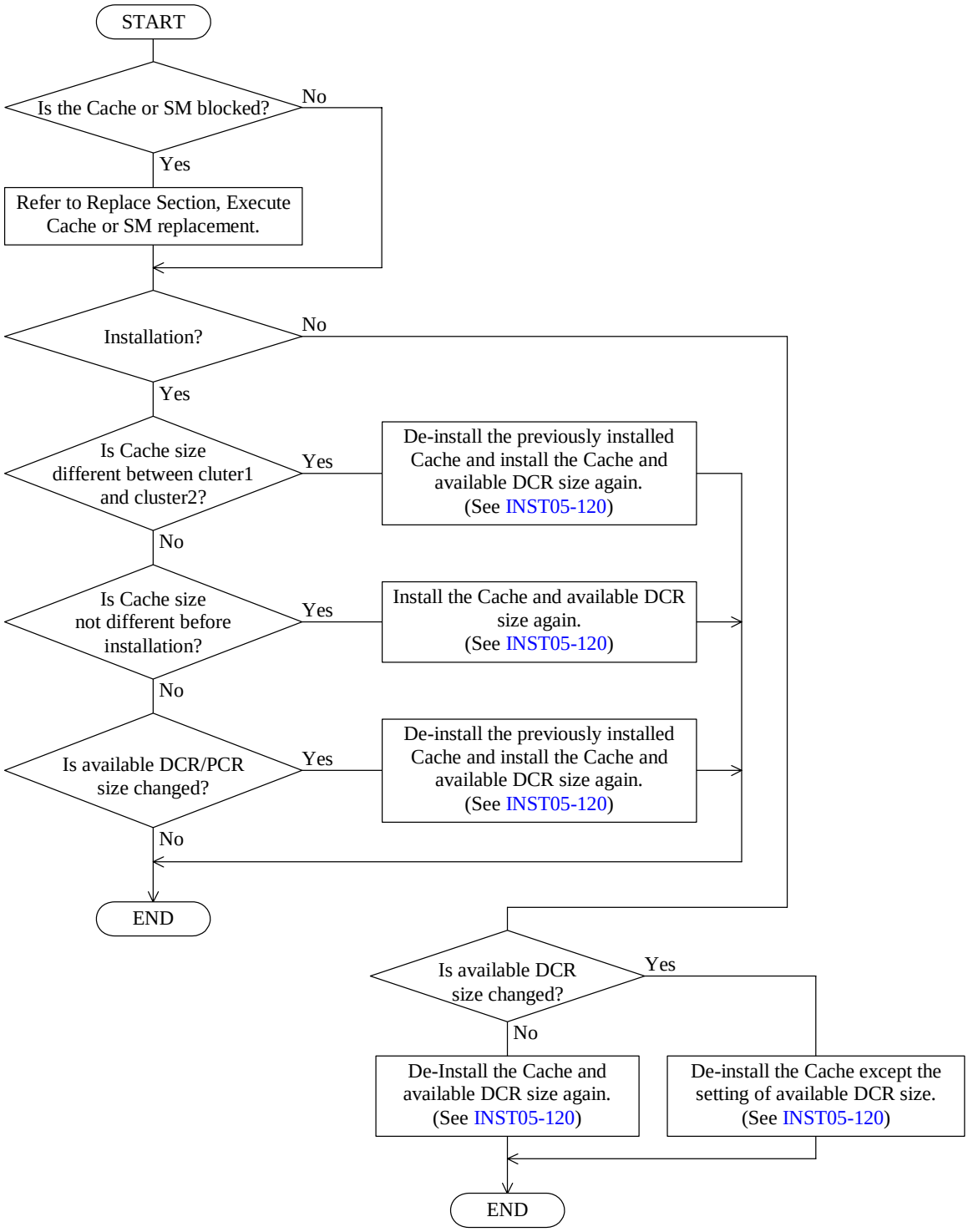


*1: Here, the PCB in the DKC refers to the PCB of the MP, Cache, or CSW.

*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

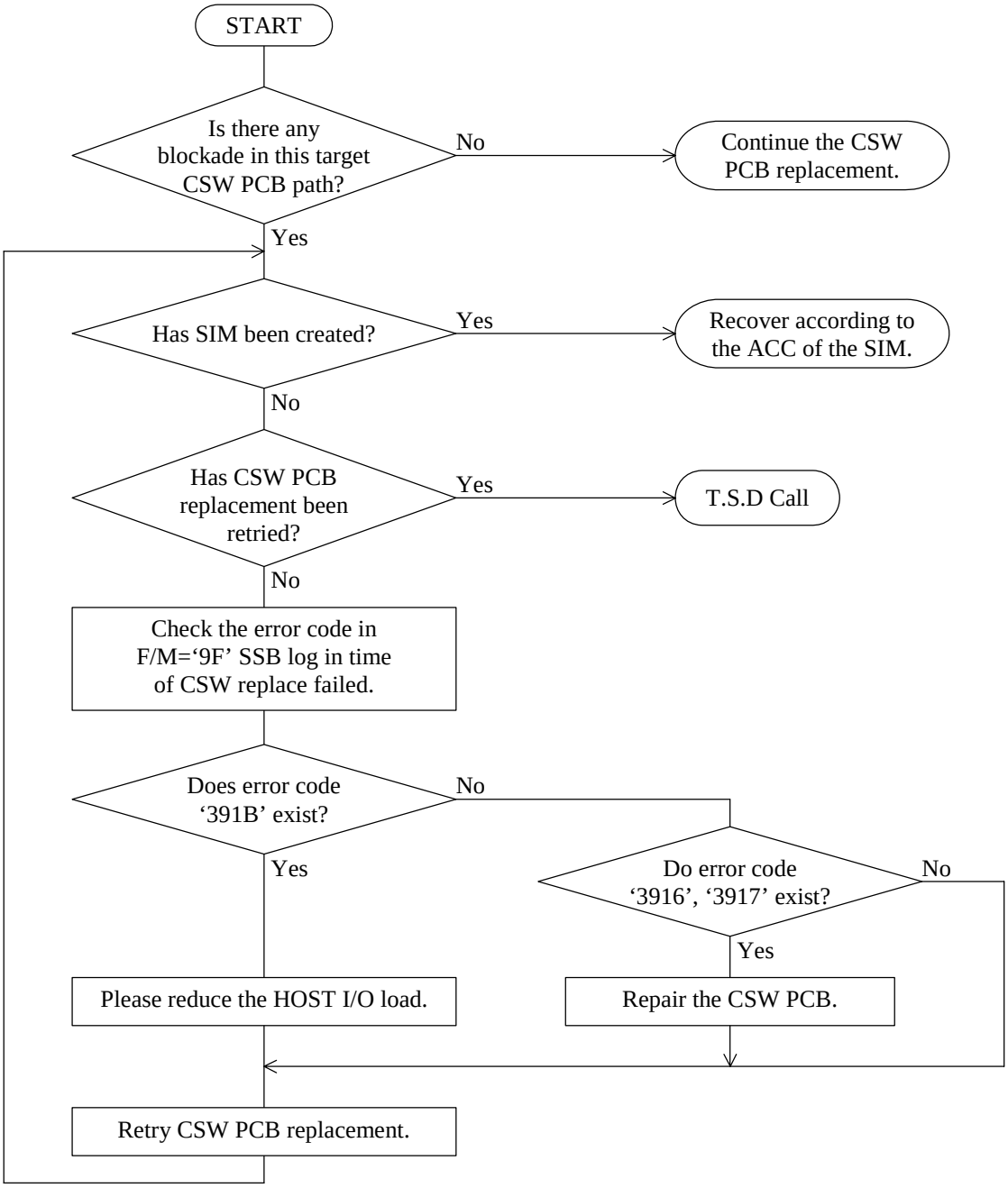
The recovery procedure when installation/de-installation Cache and DCR available size simultaneously is impossible.



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

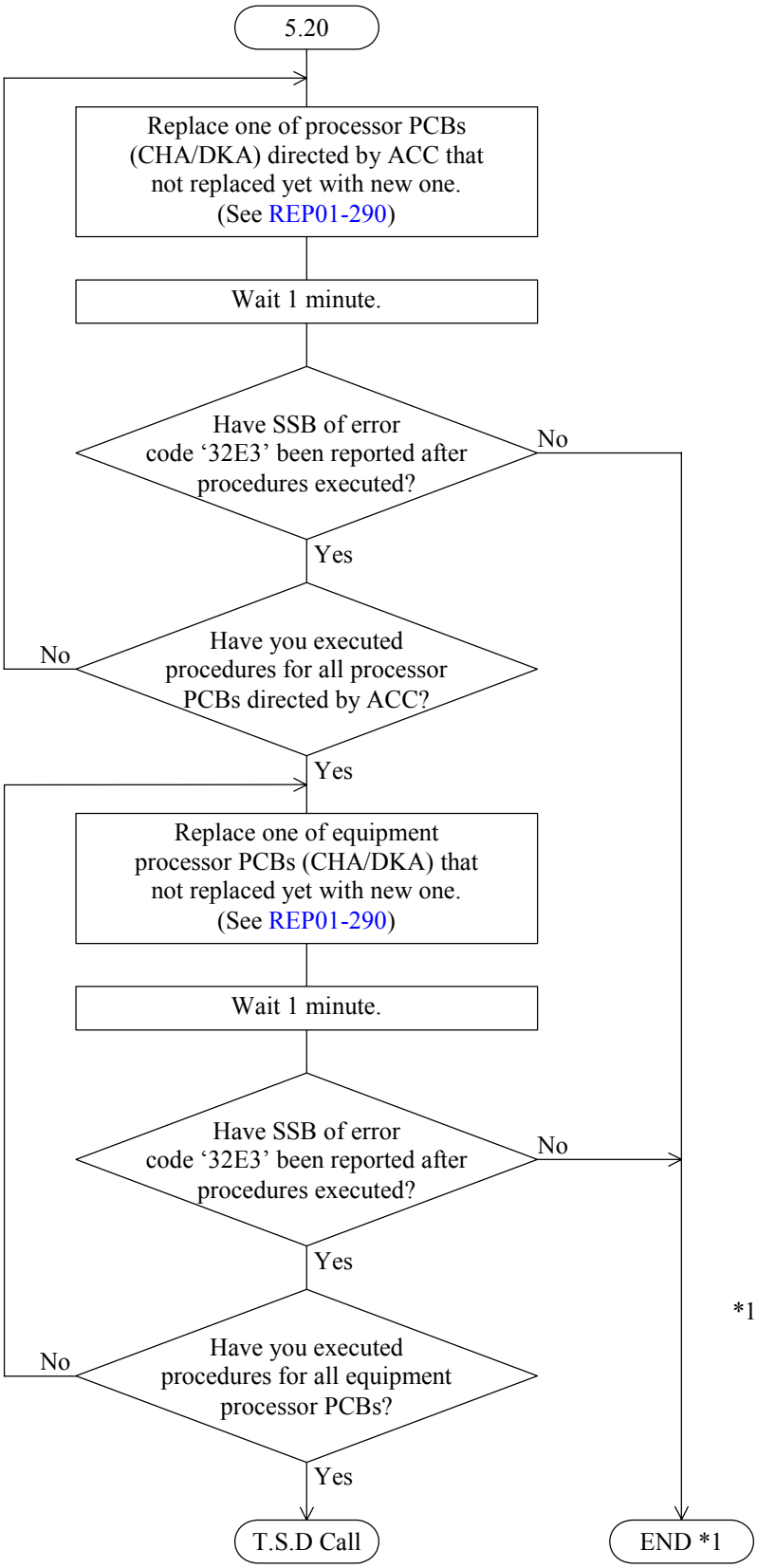
5.19 Recovery procedure for failed CSW PCB replacement

When “Some Memory access paths are blockade. Do you want to refer to the path Status?” is displayed at the end of the CSW PCB replacement, recover the status according to the following procedure.



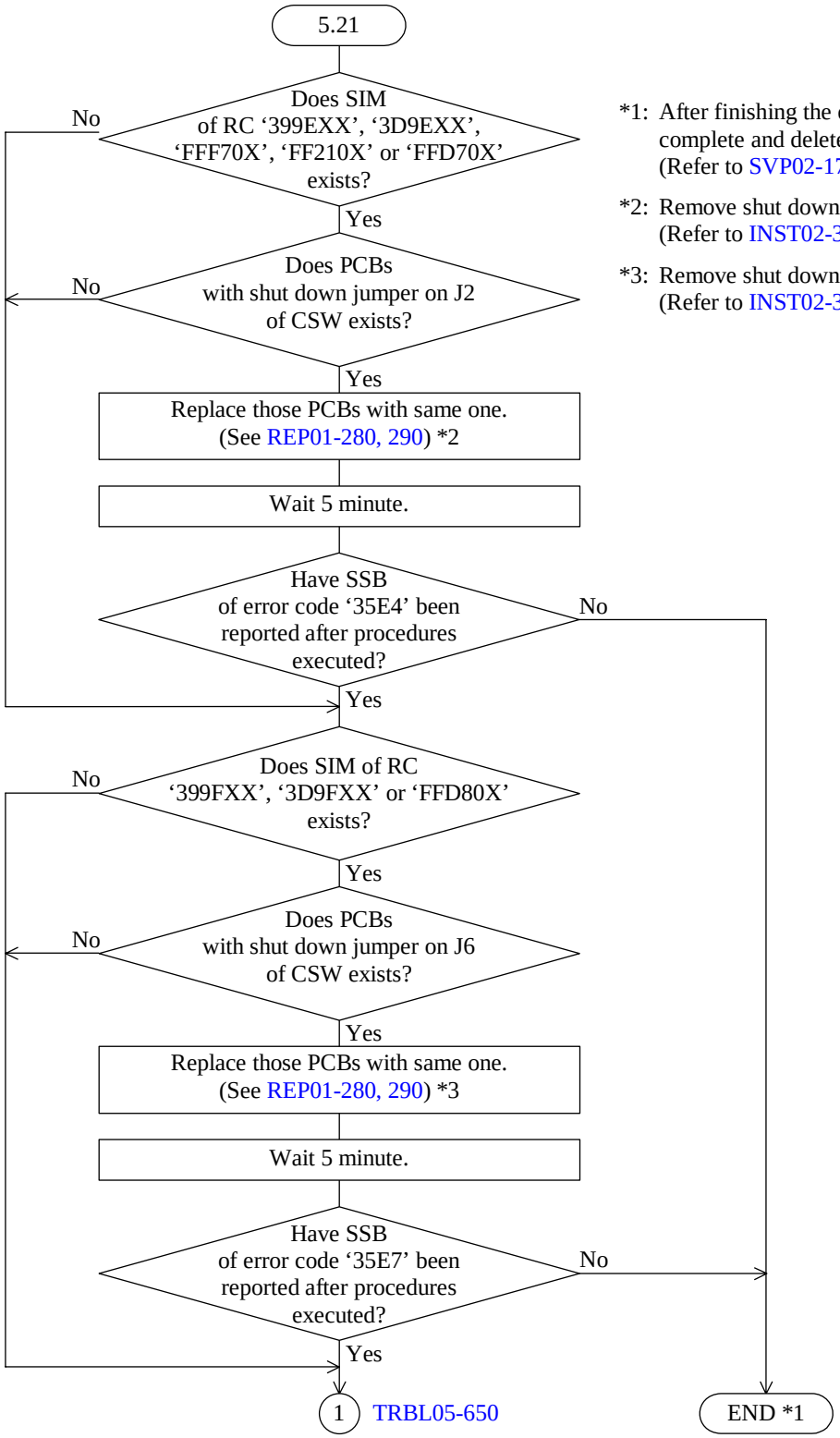
Notice: You should execute recovery operations for install/de-install failures, exchanging failures, etc. at time zone with a little business influence.

5.20 Recovery Procedure for Warning of SM DISABLE (SIM = 399AXY, 3D9AXY)



*1: After finishing the error recovery, execute SIM complete and delete logs. (Refer to SVP02-170, 560)

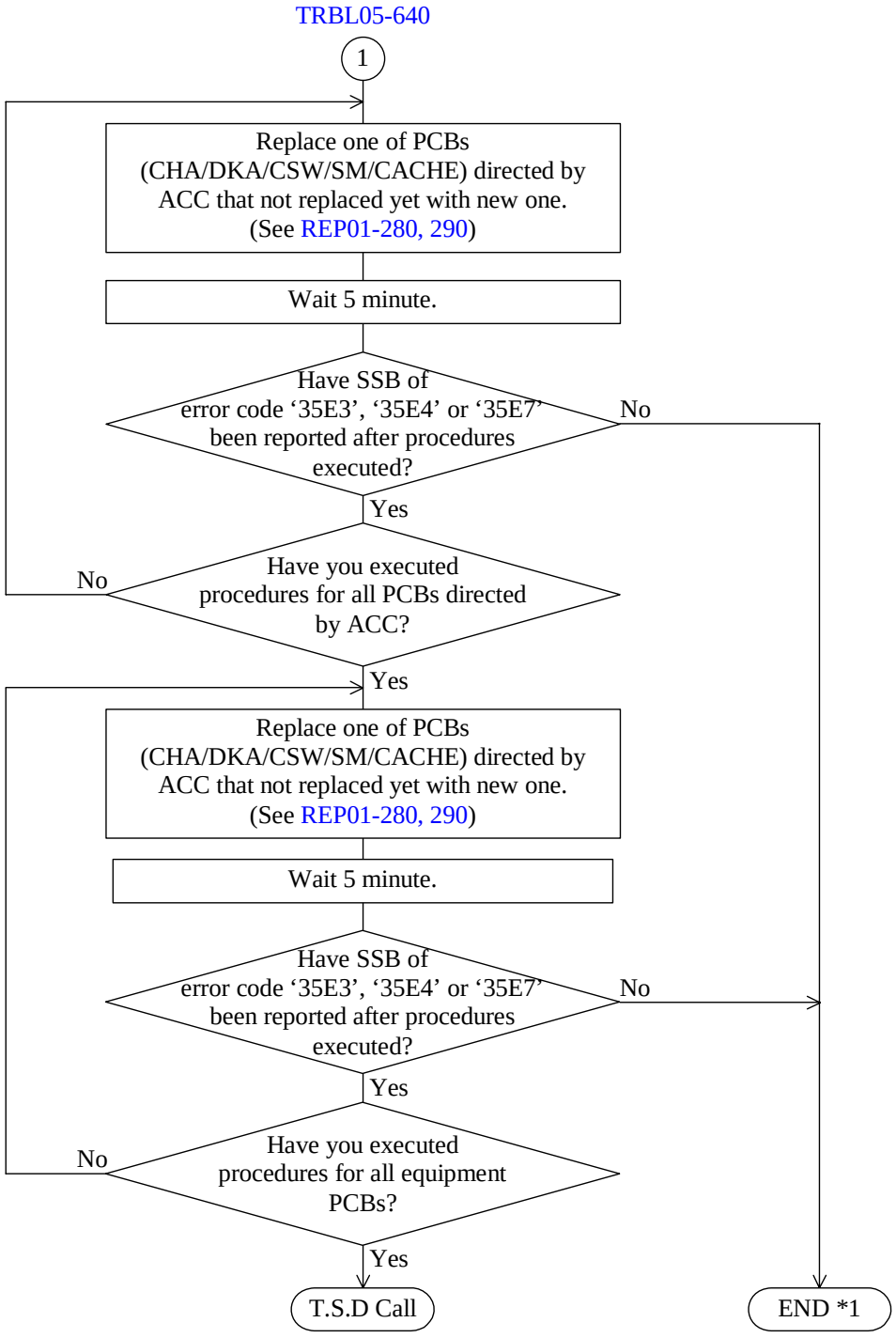
5.21 Recovery Procedure for Injustice DC voltage control and Injustice CE MODE (SIM = 399DXX, 399EXX, 399FXX, 3D9DXX, 3D9EXX, 3D9FXX, FFF60X, FFF70X, FF200X, FF210X, FFD60X, FFD70X, FFD80X)



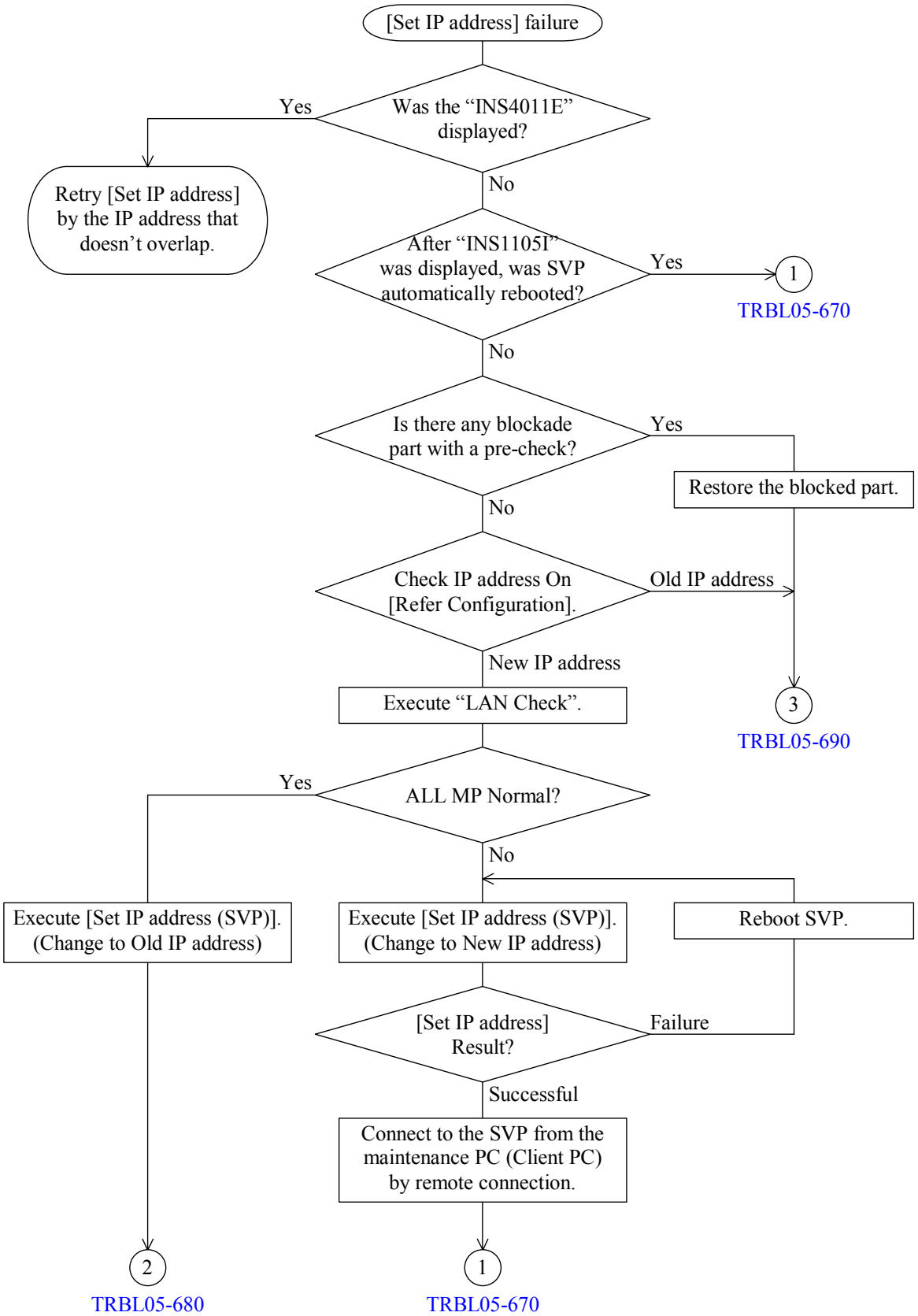
*1: After finishing the error recovery, execute SIM complete and delete logs. (Refer to SVP02-170, 560)

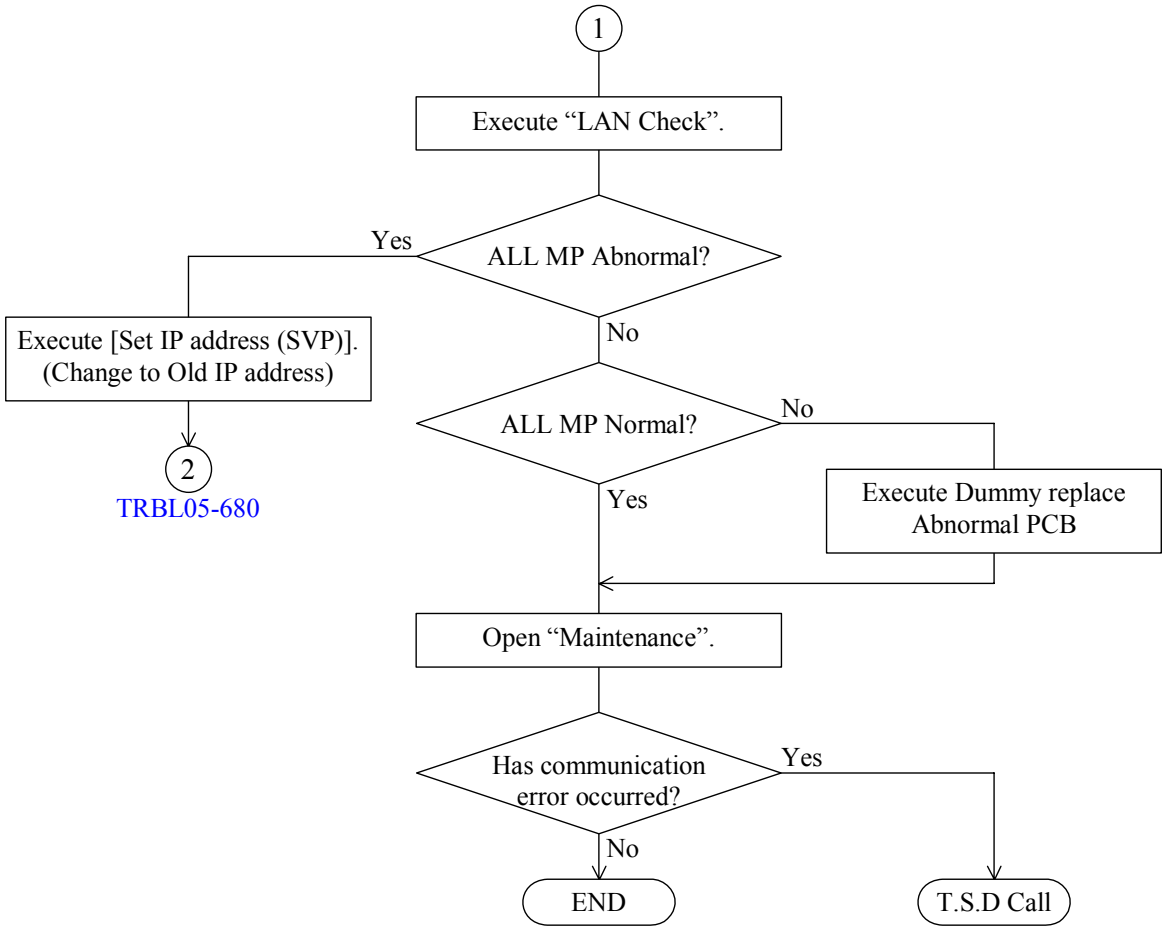
*2: Remove shut down jumper from J2 of CSW PCB. (Refer to INST02-30)

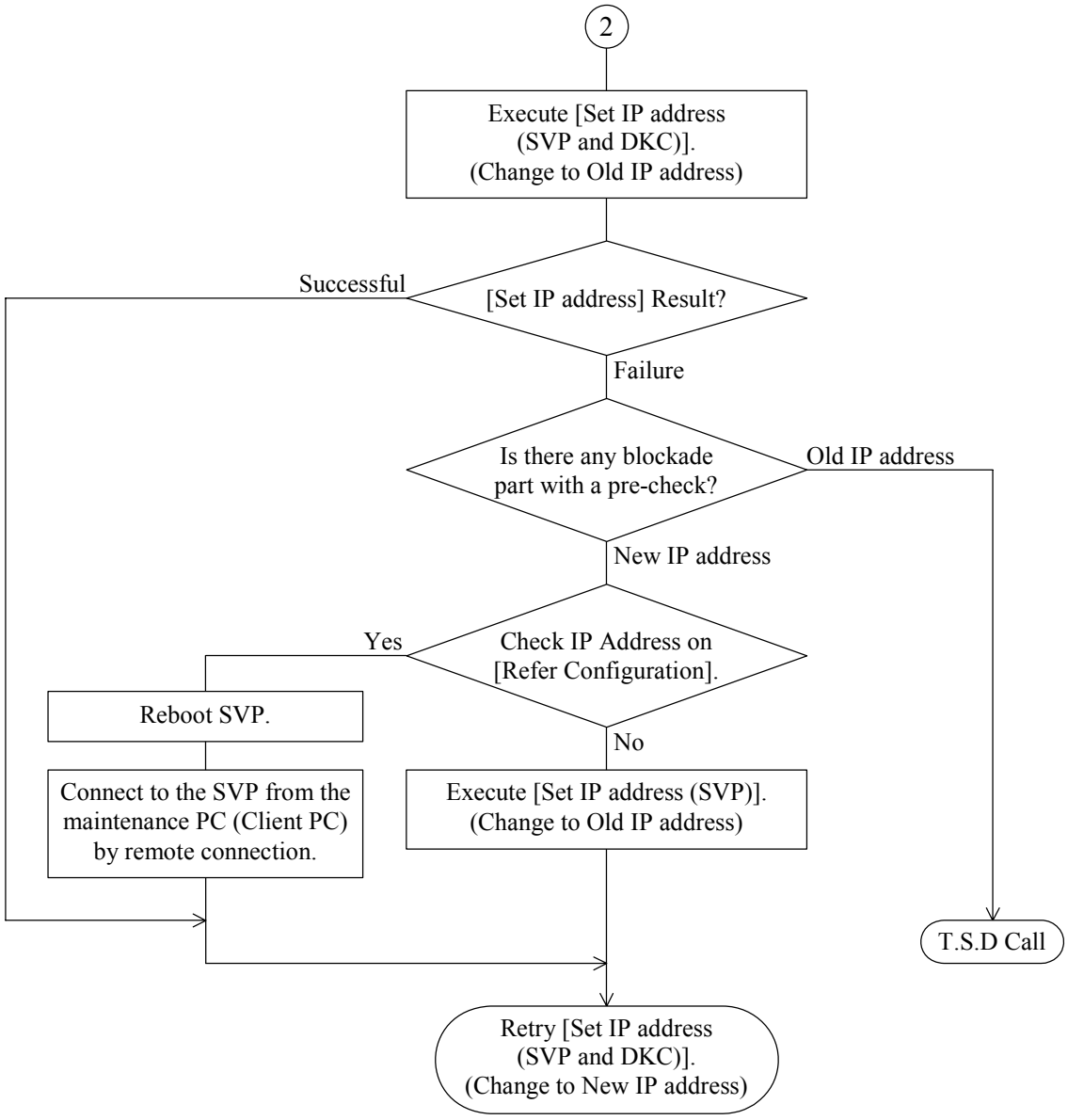
*3: Remove shut down jumper from J6 of CSW PCB. (Refer to INST02-30)

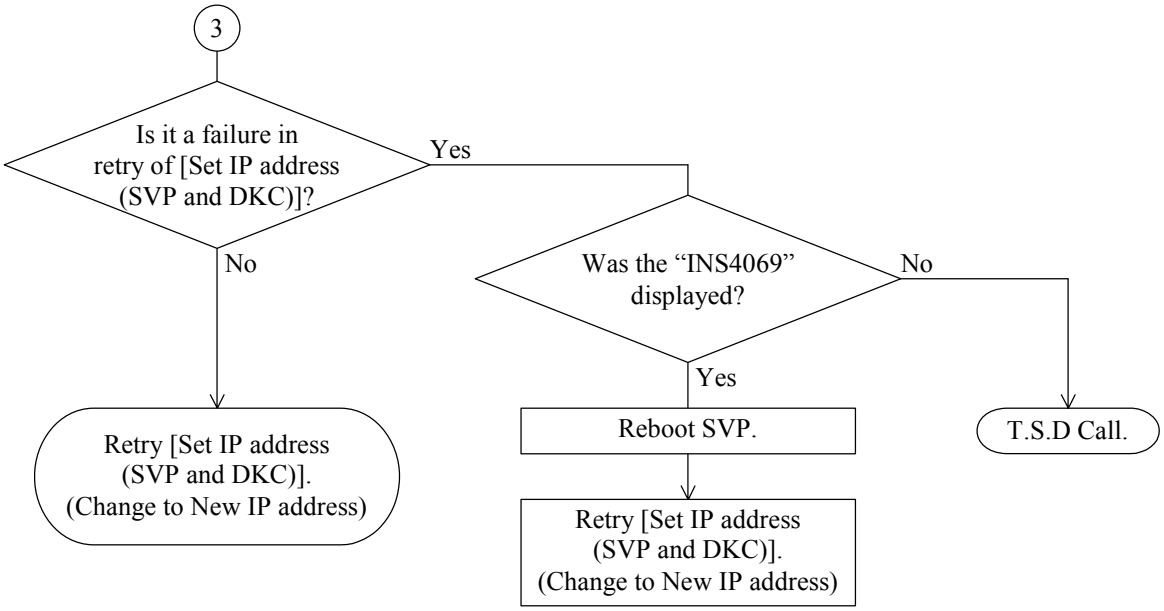


5.22 Recovery Procedure when Change the IP Address failed



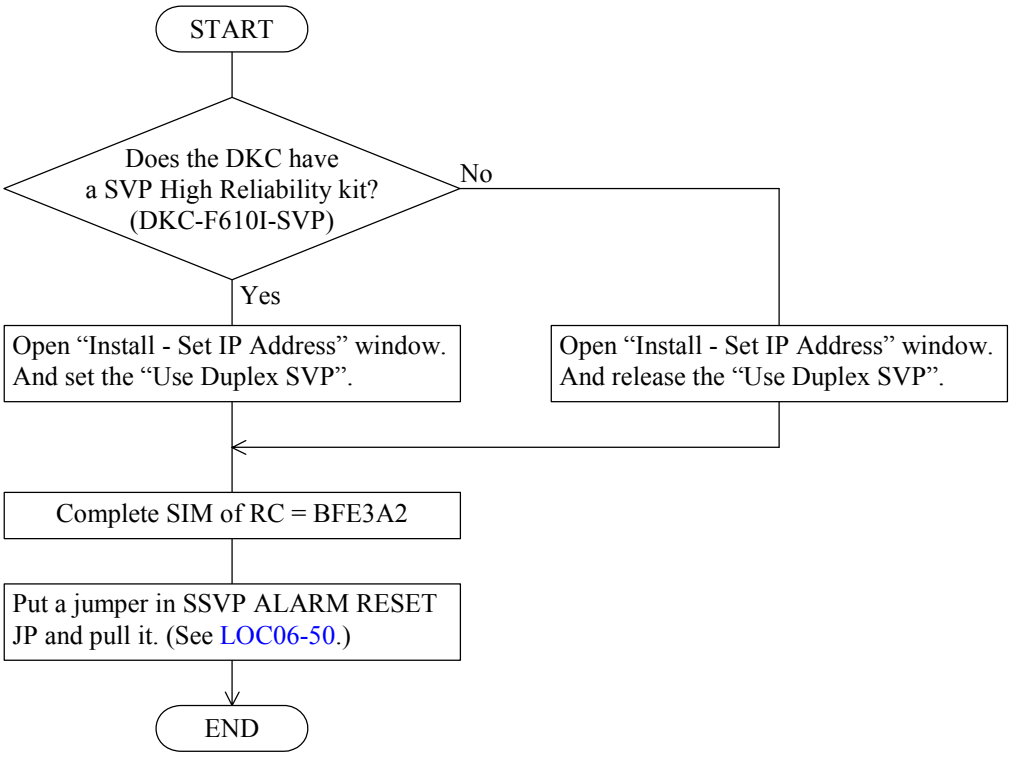






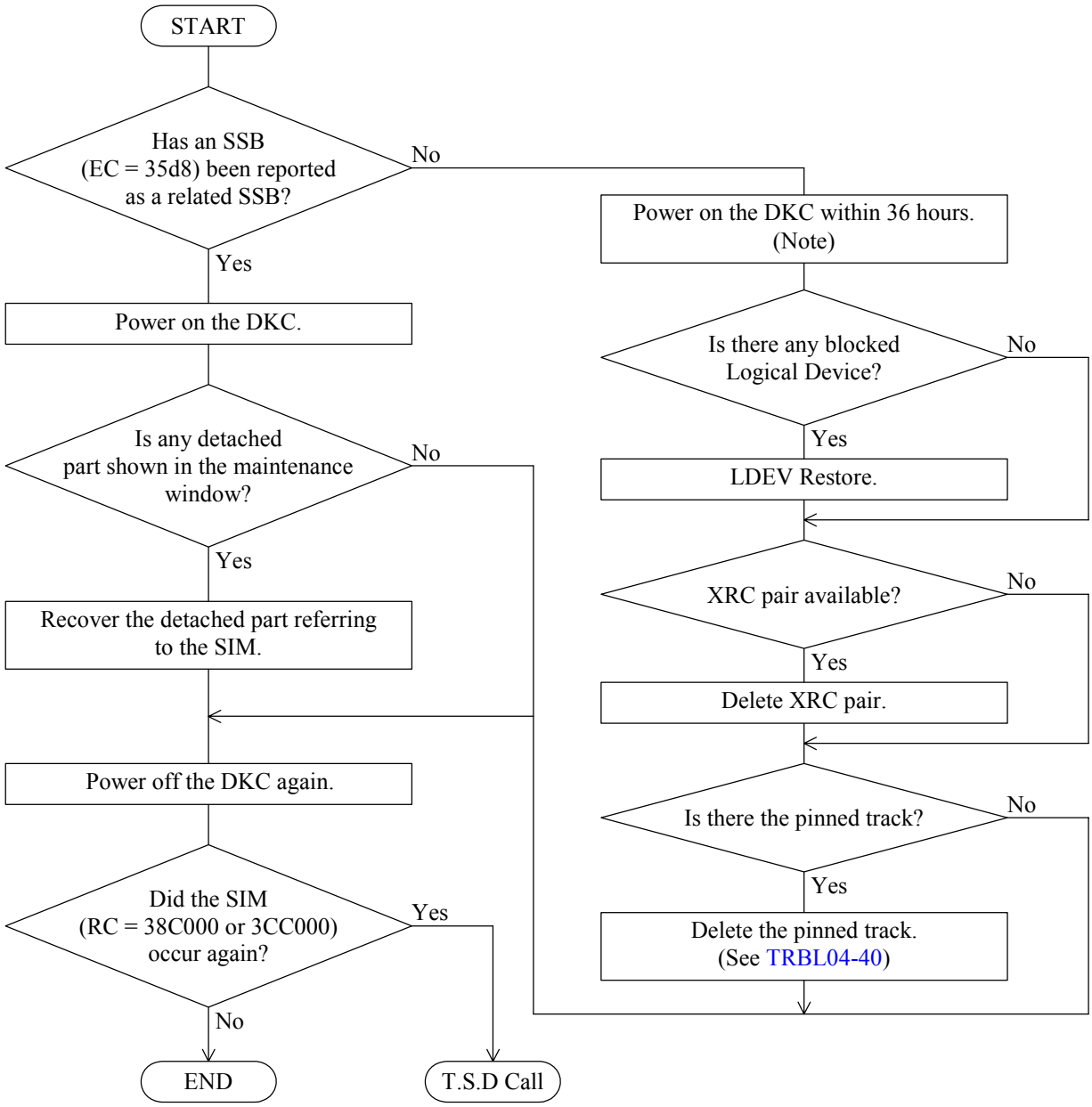
*: If the IP address change fails though [Set IP address (SVP and DKC)] is retried after SVP reboot, replace the SVP before retrying [Set IP address (SVP and DKC)].

5.23 Duplex SVP Setup failed (SIM = BFE3A2)



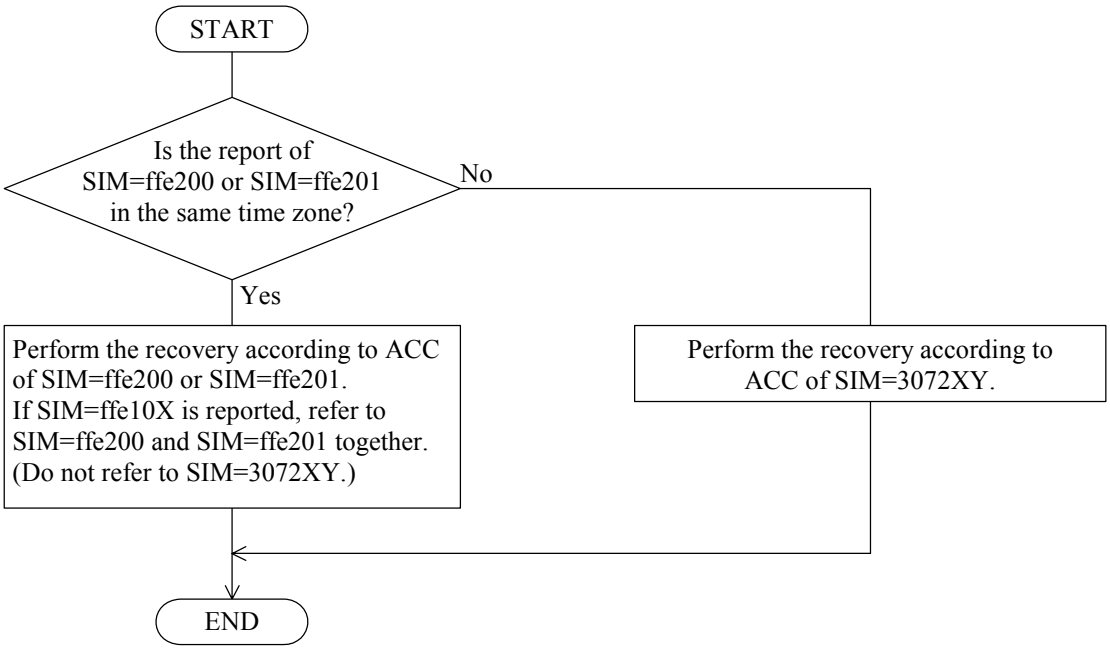
5.24 Recovery Procedure for the Case Where the PS/OFF Warning Occurs

Procedure to be used when the SIM (RC: 38C000 or 3CC000) is reported at the time of the DKC powering off.

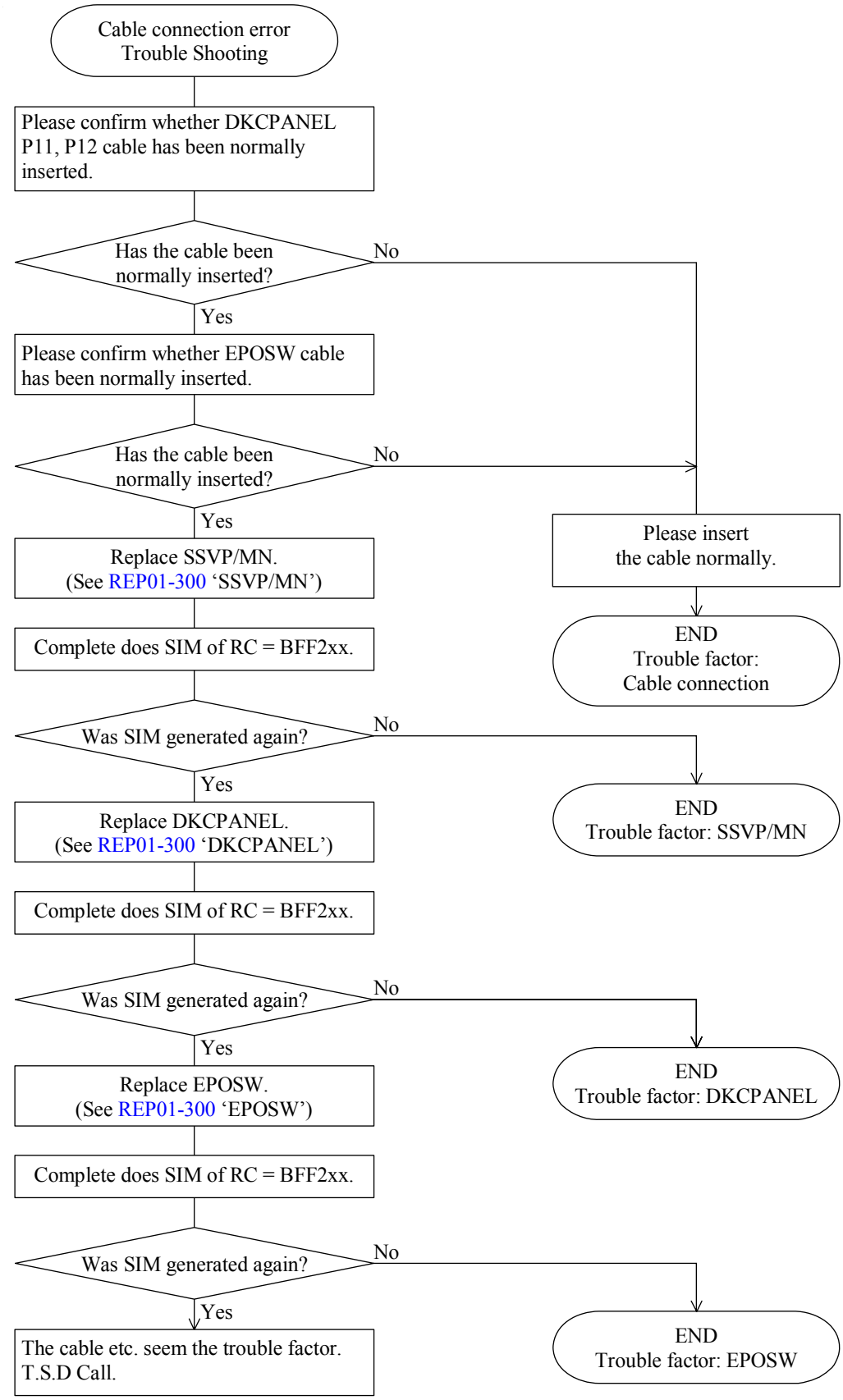


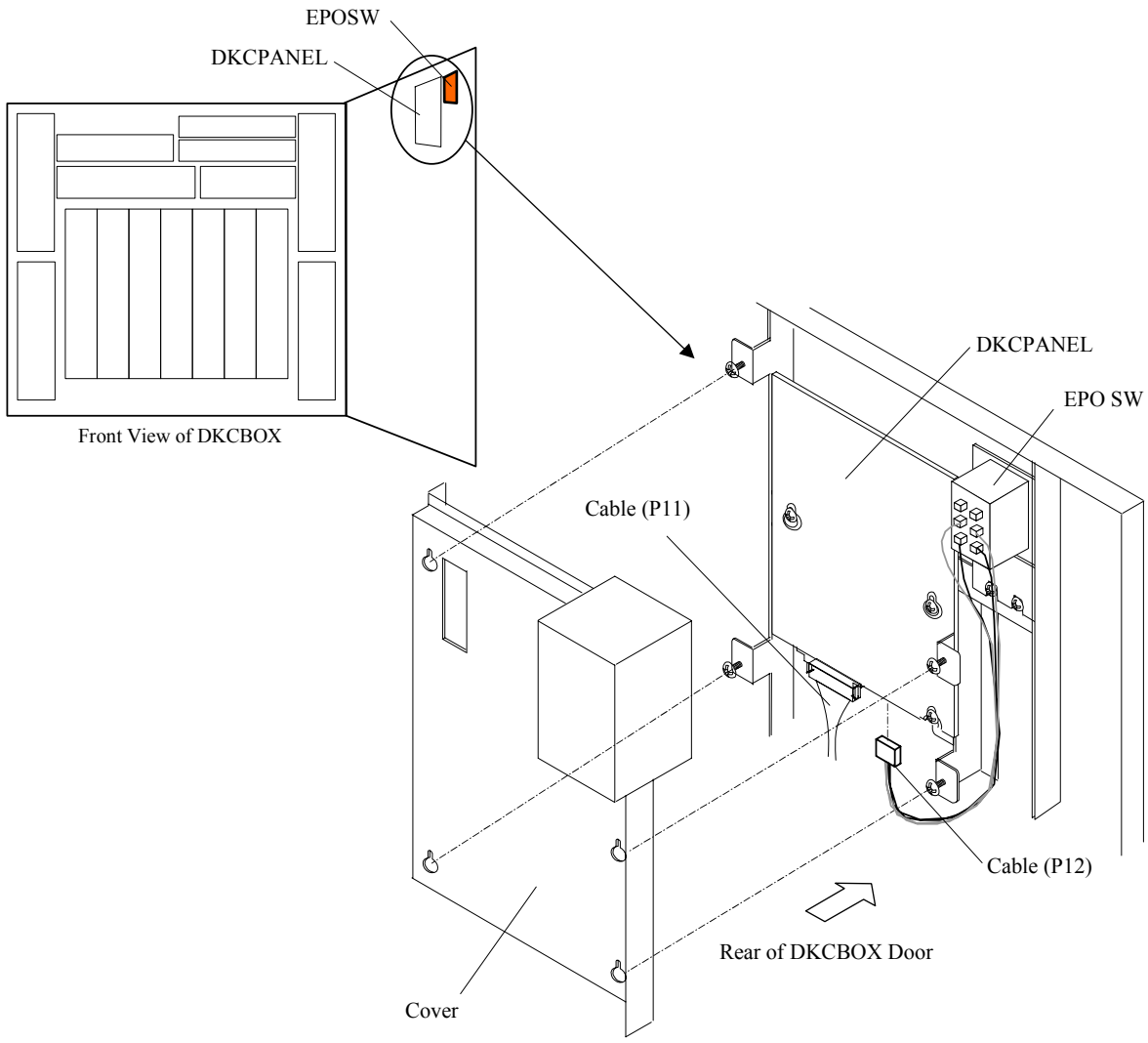
Note: Since the Cache PCB must be backed up because pinned data exists in the cache memory, backing up of the SM can be ensured for 36 hours only.
Therefore, the powering off must be done after the pinned data has been erased when the base power is turned off for 36 hours or longer.

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



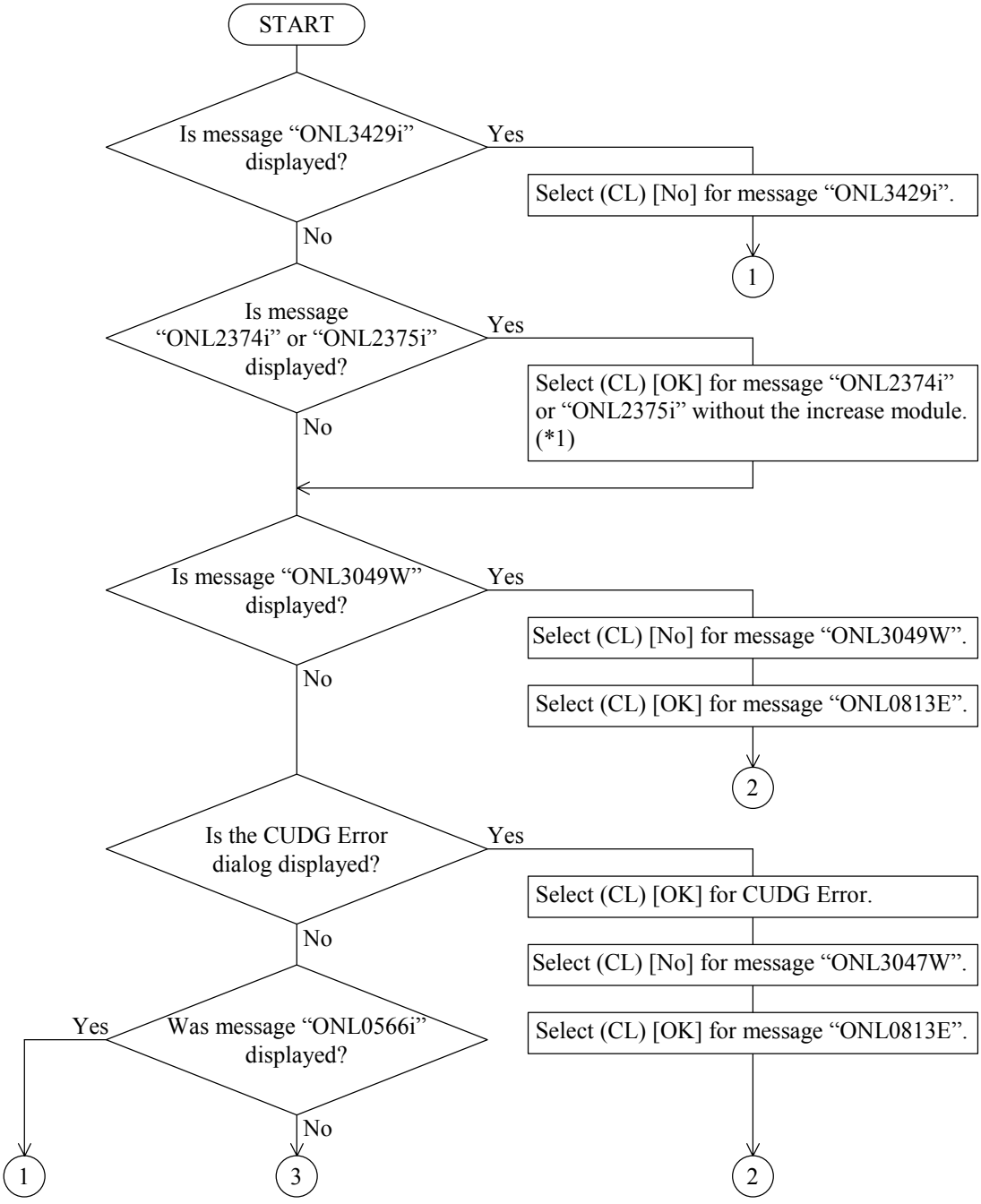
5.26 Cable connection error (SIM = BFF2XX)

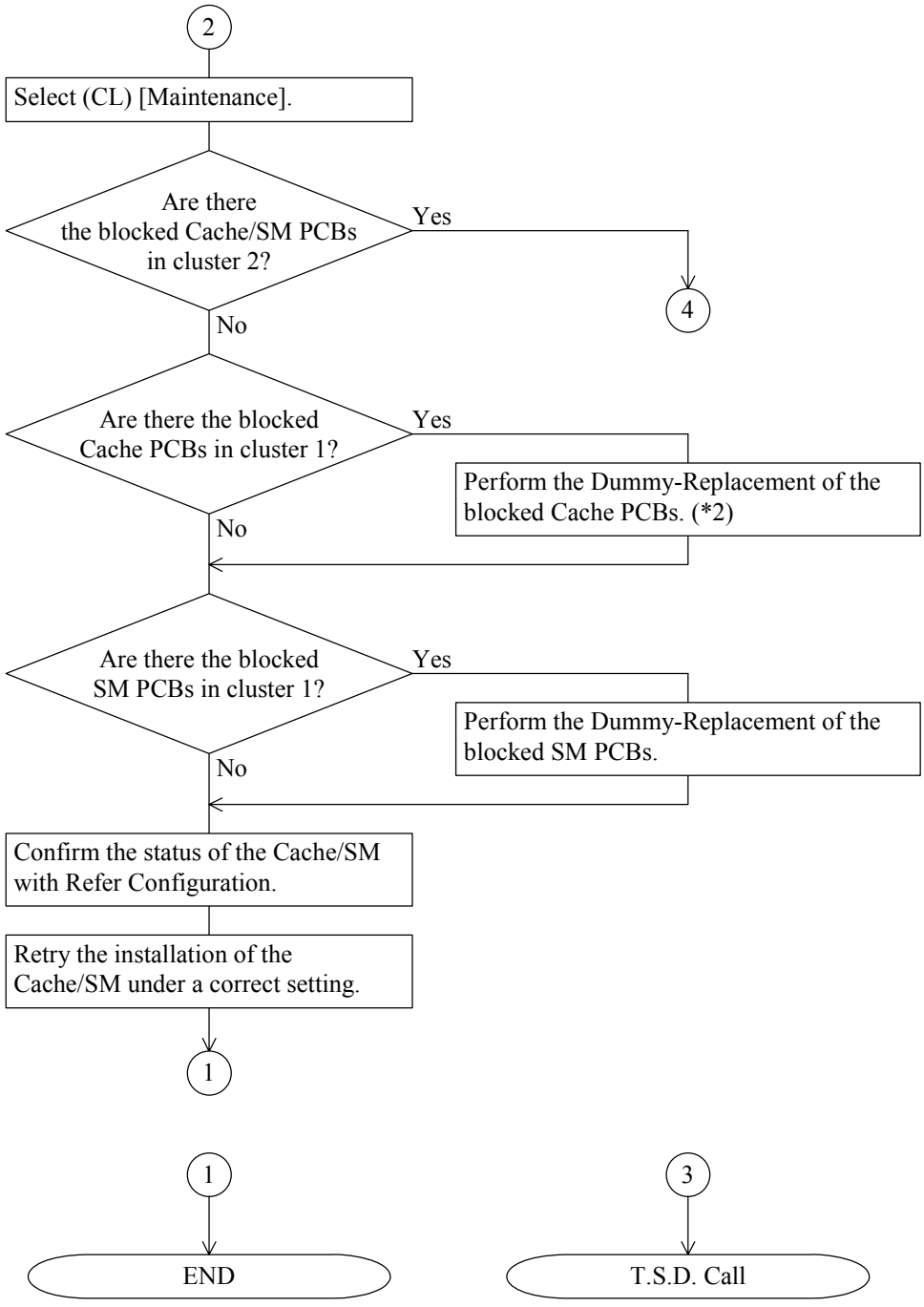


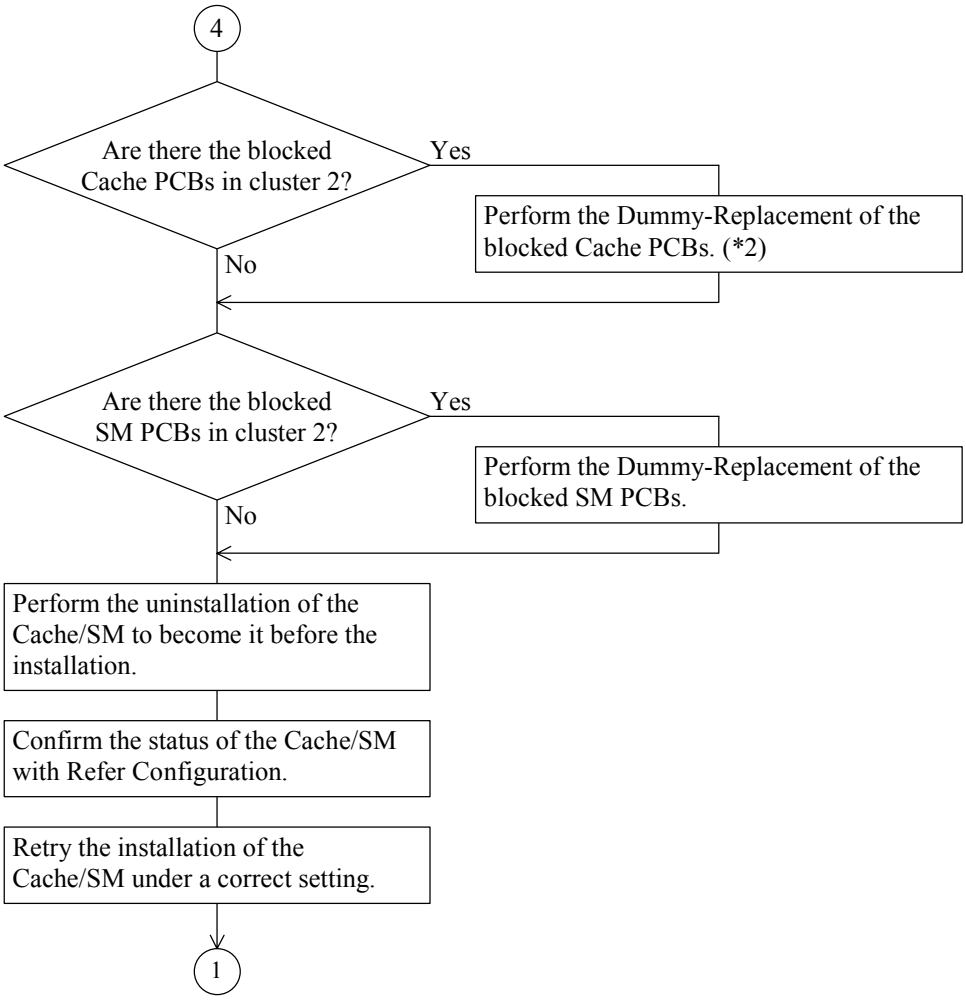


5.27 Recovery procedure for mistake of setting when CACHE/SM are installed

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





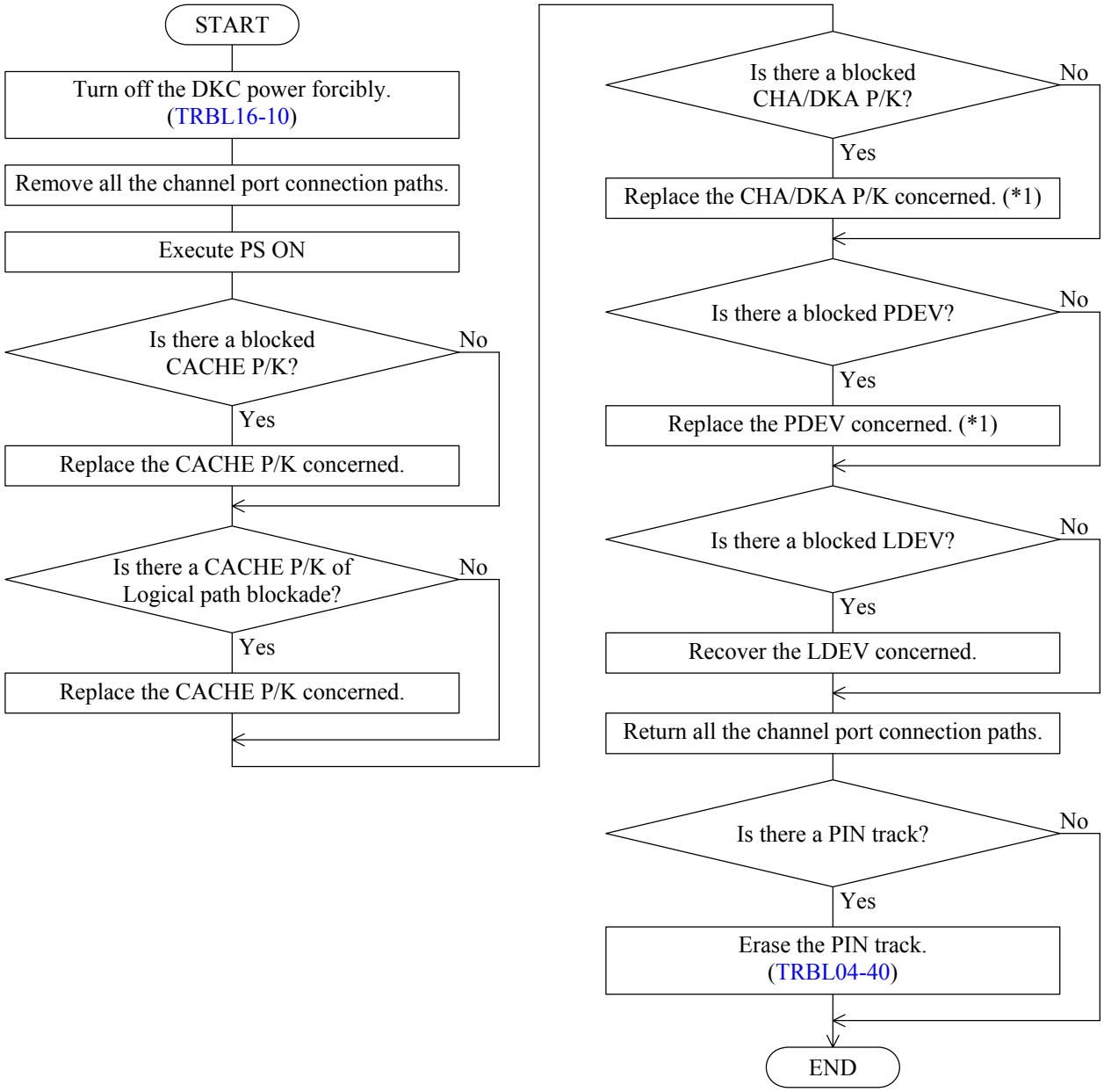


*1: Pull out and insert the PCB that lights LED.
*2: Pull out the increased memory modules.

5.28 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.

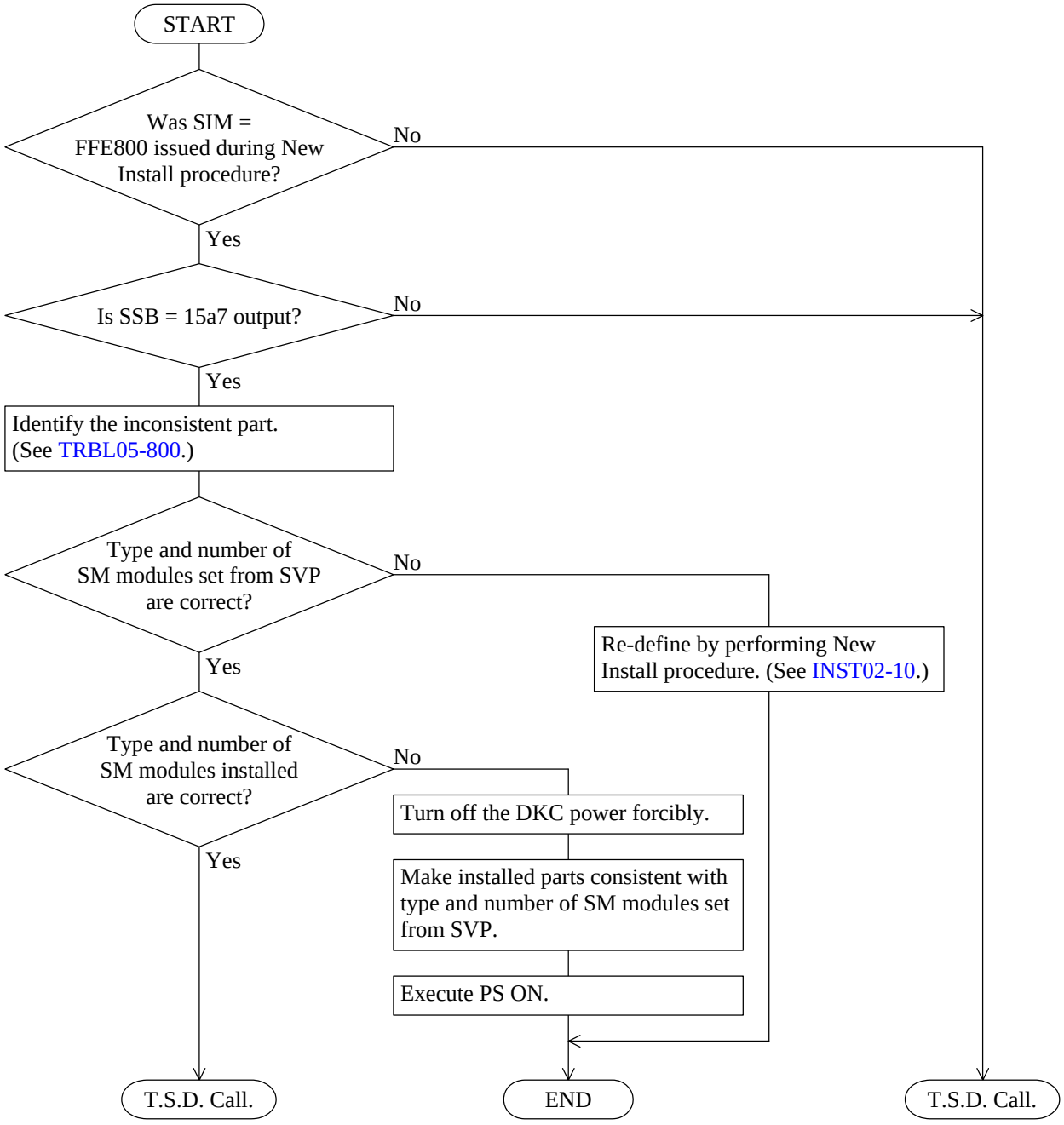
[SIM which may be reported at the time of a CACHE double-sided failure]
RC = 3073XX, 3173XX, 3080XX, 3180XX, 32ZYXX, 33ZYXX, CF82XX, CF83XX, FF4XYY, DF8XXX, DF9XXX, EFYXXX



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

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

When SM installation and definitions set from SVP are inconsistent (SIM = FFE800), follow the procedure below to recover from the inconsistency. This SIM indicates that “Type of SM module installed is inconsistent with the type set from SVP” or “the number of SM modules installed is inconsistent with the number set from SVP” in the package in which SM is installed (SM-1SA, SM-2SB, SM-1SC, SM-2SD). If they are inconsistent, it is necessary to make them consistent. When this SIM is issued, the related SSB = 15a7 is issued.



5.29.1 How to identify inconsistent parts when SM installation and definitions are inconsistent

See Byte 5C to 6B of the related SSB = 15a7 output with SIM = FFE800 to identify inconsistent parts. Each 2 bytes starting from Byte 5C shows information of one package. Information of total eight packages is shown; the installation status (four packages) and the definition set from SVP (four packages) (See Table 5.29.1-1 Byte format). When information of one package is displayed, each 2 bits from the rightmost bit shows information of one module, and information of eight modules in one package is shown (See Table 5.29.1-2 Bit format).

Table 5.29.1-1 Byte format

byte	+0	+2	+4	+6	+8	+A	+C	+E
+50							Installation status	
							SM-1SA	SM-2SB
+60	Installation status		Definition set from SVP					
	SM-1SC	SM-2SD	SM-1SA	SM-2SB	SM-1SC	SM-2SD		

Table 5.29.1-2 Bit format

bit	+0	+2	+4	+6	+8	+a	+c	+e
+0	SM 07	SM 06	SM 05	SM 04	SM 03	SM 02	SM 01	SM 00

00: Not defined or not installed
01: S2GQ
10: S4GQ

“00/01/10” above shows information of one module in binary digits.

The following shows an example analysis of “Fig. 5.29.1-1 Output example of related SSB = 15a7”.

		0 1 2 3	4 5 6 7	8 9 A B	C D E F
CTRL Data:	00	6d0c180a	0c099fa2	a7150000	00822800
	10	00000000	00000200	00000100	00000004
SSB Data:	20	00000000	0000009f	15a70000	00000000
	30	00000000	8004ff9f	00000000	00000000
Internal Data:	40	01a70000	00000000	6571636b	① ②
	50	③ ④	⑤ ⑥	⑦ ⑧	00aa00aa
	60	0aaa0aaa	00aa00aa	05550555	0000000c
	70	00000000	00000000	00000000	00000000

Fig. 5.29.1-1 Output example of related SSB = 15a7

Status of installed module				Status of defined module			
①	②	③	④	⑤	⑥	⑦	⑧
0x00aa	0x00aa	0x0aaa	0x0aaa	0x00aa	0x00aa	0x0555	0x0555

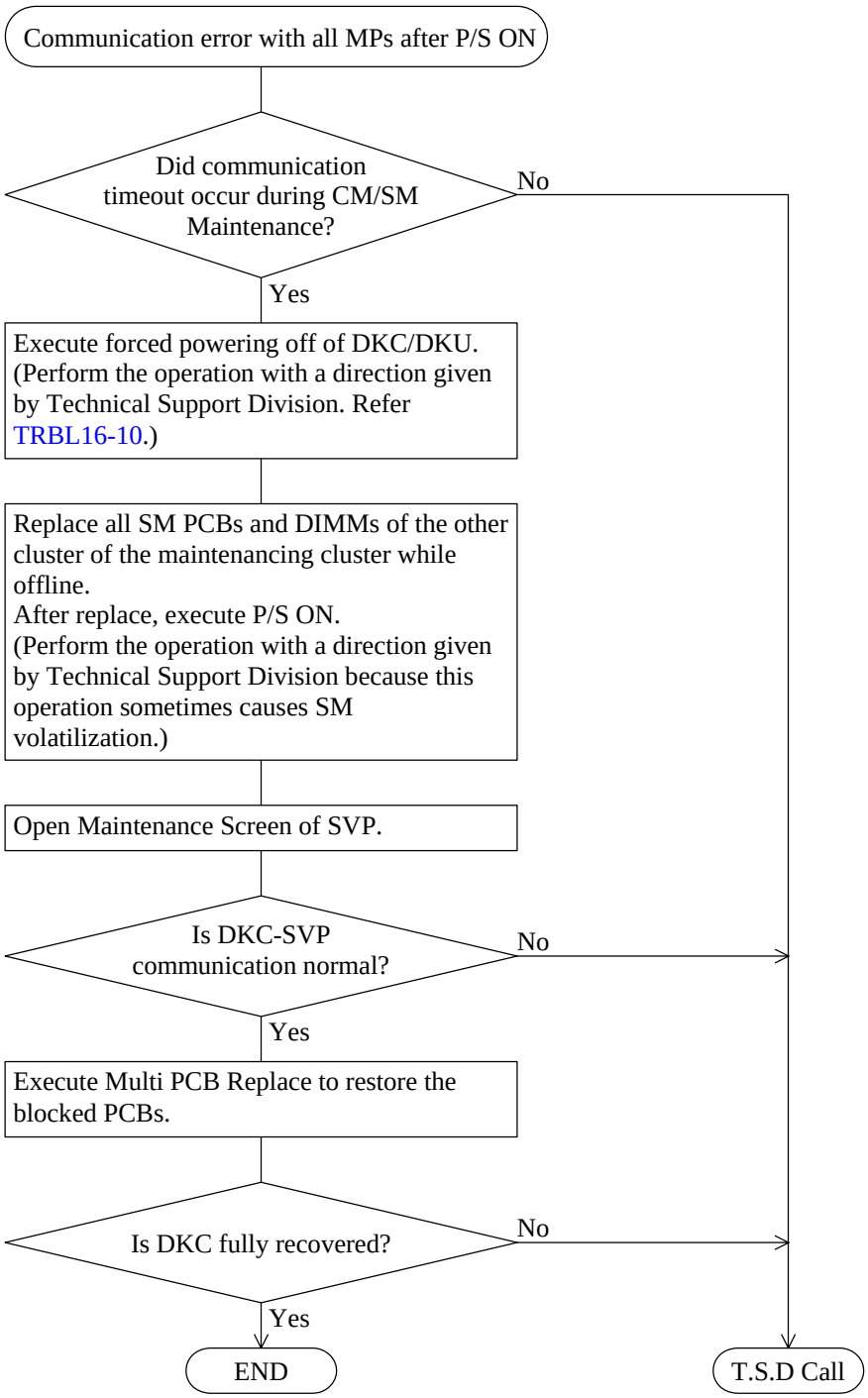
		Status of installed module								Status of defined module							
		SM07	SM06	SM05	SM04	SM03	SM02	SM01	SM00	SM07	SM06	SM05	SM04	SM03	SM02	SM01	SM00
SM-1SA	①/⑤	0		0		a		a		0		0		a		a	
		0 0 0 0		0 0 0 0		1 0 1 0		1 0 1 0		0 0 0 0		0 0 0 0		1 0 1 0		1 0 1 0	
		Not installed	Not installed	Not installed	Not installed	S4GQ	S4GQ	S4GQ	S4GQ	Not installed	Not installed	Not installed	Not installed	S4GQ	S4GQ	S4GQ	S4GQ
SM-2SB	②/⑥	0		0		a		a		0		0		a		a	
		0 0 0 0		0 0 0 0		1 0 1 0		1 0 1 0		0 0 0 0		0 0 0 0		1 0 1 0		1 0 1 0	
		Not installed	Not installed	Not installed	Not installed	S4GQ	S4GQ	S4GQ	S4GQ	Not installed	Not installed	Not installed	Not installed	S4GQ	S4GQ	S4GQ	S4GQ
SM-1SC	③/⑦	0		a		a		a		0		5		5		5	
		0 0 0 0		1 0 1 0		1 0 1 0		1 0 1 0		0 0 0 0		0 1 0 1		0 1 0 1		0 1 0 1	
		Not installed	Not installed	S4GQ	S4GQ	S4GQ	S4GQ	S4GQ	S4GQ	Not installed	Not installed	S2GQ	S2GQ	S2GQ	S2GQ	S2GQ	S2GQ
SM-2SD	④/⑧	0		a		a		a		0		5		5		5	
		0 0 0 0		1 0 1 0		1 0 1 0		1 0 1 0		0 0 0 0		0 1 0 1		0 1 0 1		0 1 0 1	
		Not installed	Not installed	S4GQ	S4GQ	S4GQ	S4GQ	S4GQ	S4GQ	Not installed	Not installed	S2GQ	S2GQ	S2GQ	S2GQ	S2GQ	S2GQ

*: Gray cells show inconsistent parts. For the locations, see INST07-110.

5.30 Recovery procedure for P/S ON failure after communication error with all MPs during SM/CM maintenance

CAUTION

Do not perform this operation without a direction given by Technical Support Division because it includes the special procedure.



6. HRC/HORC/HAM Error Recovery

6.1 Recovery Procedure for HRC Error

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

- SIM report of HRC path disable occurrence
- SIM report of HRC 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 HRC SIM REF.CODE

SIM REF. CODE	Meaning	Remarks
D4XY-YY	HRC pair is suspended	X:0~5 or FYYY:LDEV number
DBXY-YY	HRC Asynchronous pair is suspended	X:0~8 or FYYY:LDEV number
D4EY-YY	RCU Acute or Serious Level SIM reported	YYY:LDEV number
DBEY-YY	RCU (Asynchronous pair) Acute or Serious Level SIM reported.	YYY:LDEV number
D4DY-YY	RCU Moderate Level SIM reported	YYY:LDEV number
DBDY-YY	RCU (Asynchronous pair) Moderate Level SIM reported.	YYY:LDEV number
2180-XY	HRC path is disabled	X:Prosessor No. Y:LCP No.
2182-XY	MCU has received the notification of communication line error detection from extender.	X:Prosessor No. Y:LCP No.

Following pages explain each error type of HRC Error and recovery flow chart for the HRC Error is showed. Concerning to the Disaster Recovery Procedures, please refer to THEORY SECTION (THEORY03-840 ~ 950).

The delete pair operation with Delete Pair by Force option is supported for HRC asynchronous recovery procedure. If hung-up conditions may occur at HRC asynchronous, this operation can be executed from SVP or Remote Console. Refer to Force Delete Operation (TRBL06-220).

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. 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 HORC Error Recovery Procedure

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

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

Table 6.2-1 HORC SIM REF.CODE

SIM REF. CODE	Meaning	Remarks
D4XY-YY	HORC pair suspend	X: 0 - 2, 4 - 5 or FYYY: LDEV number
DBXY-YY	HORC Asynchronous pair suspend	X: 0 - 8, FYYY: LDEV number
2180-XY	HORC pass blockade	X: Processor # Y: LCP#
2182-XY	MCU has received the notification of communication line error detection from extender.	X: Processor # Y: LCP#

SIM outputted when the HORC is suspended or the HORC pass is blocked has the same REF. CODE and meaning as those outputted when the HRC pair is suspended or the HRC pass is blocked.
Furthermore, the error recovery procedure is the same as that against an HRC error. Therefore, follow the procedures shown in the flowcharts on page TRBL06-50 and succeeding pages to recover from a HORC pair error.

When a message indicating that a HORC 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.

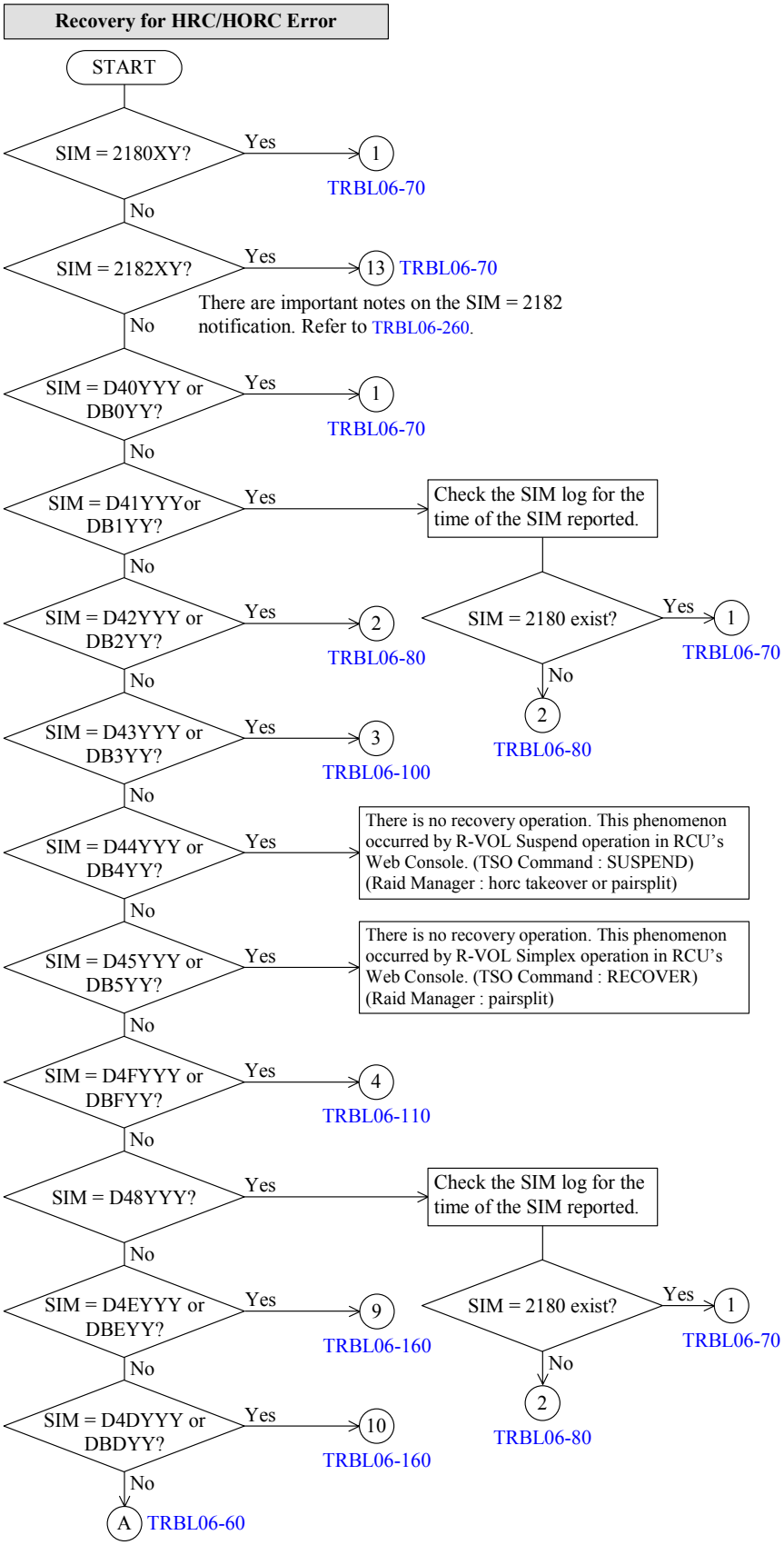
*: When the HORC pair is suspended, the RAID manager/HORC displays the following message on the Syslog.

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

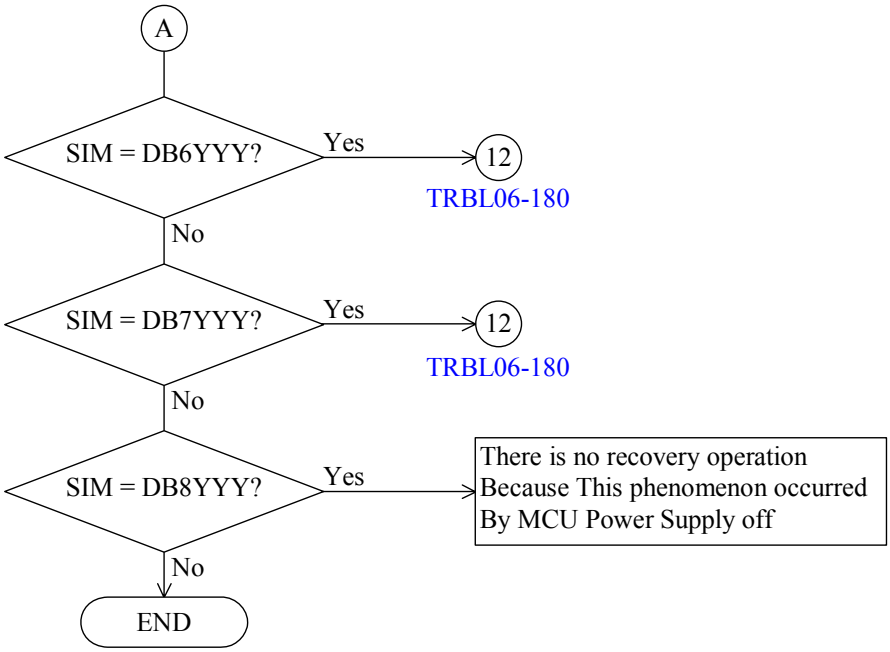
○○○○ : Volume name

XXXX : Factor code

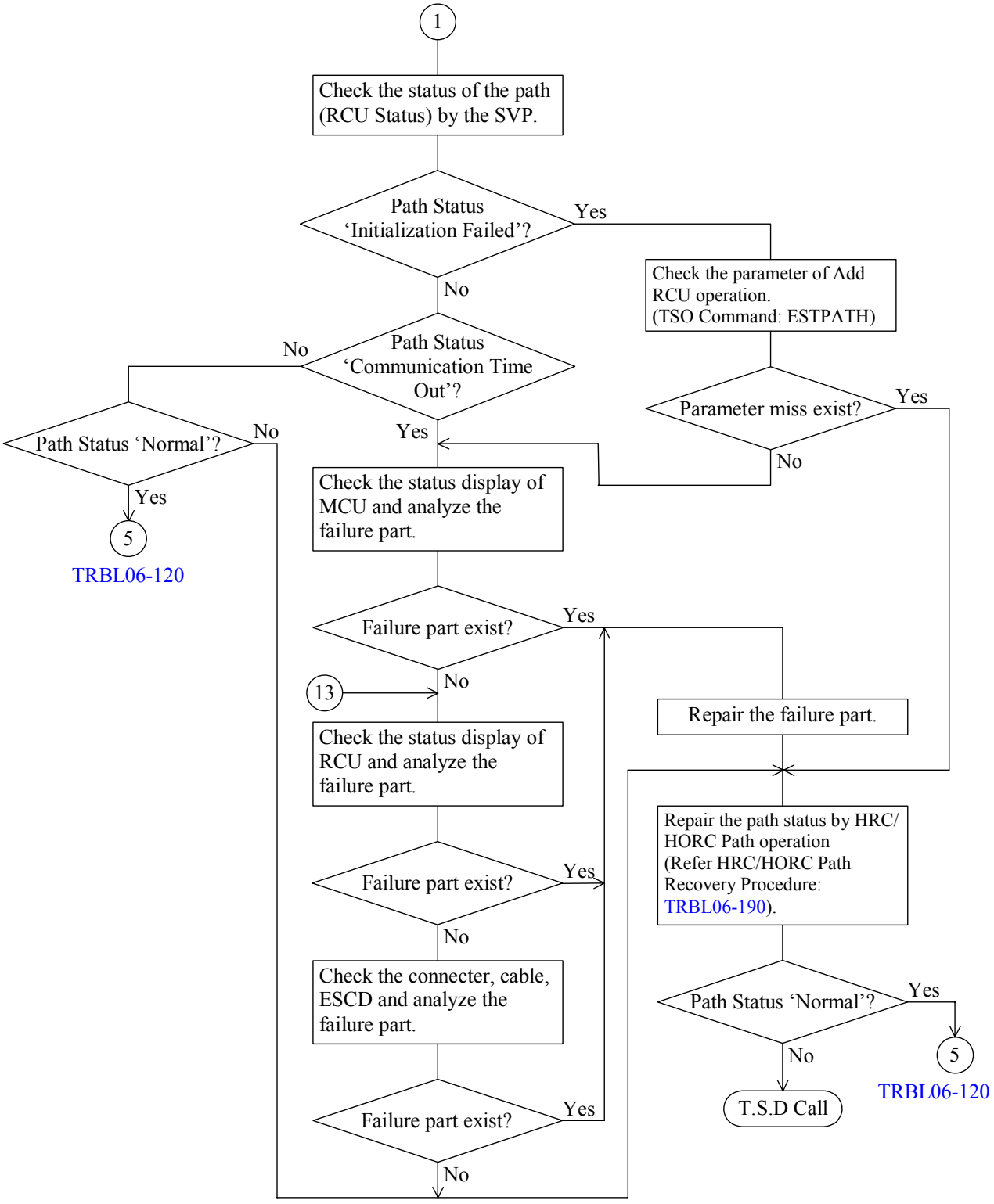
The delete pair operation with Delete Pair by Force option is supported for HORC asynchronous recovery procedure. If hung-up conditions may occur at HORC asynchronous, this operation can be executed from SVP or Remote Console. Refer to Force Delete Operation(TRBL06-220).
When the pair status is 'Suspending' a command for creating pairs or deleting pairs from RAID manager is rejected [EX_CMDRJE] at HORC asynchronous. In this case, retry the command after the pair status is fixed (PSUE, PFUS).



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



HRC/HORC Path Recovery Section



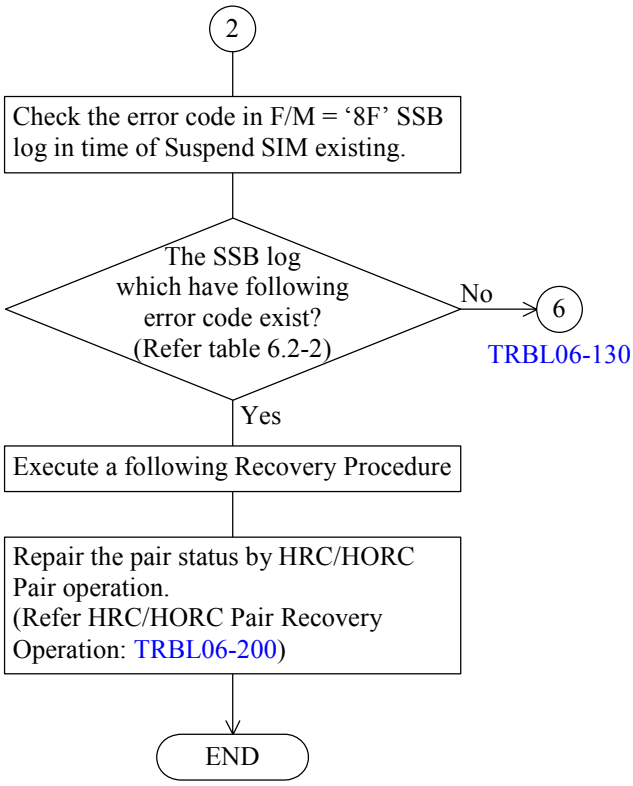
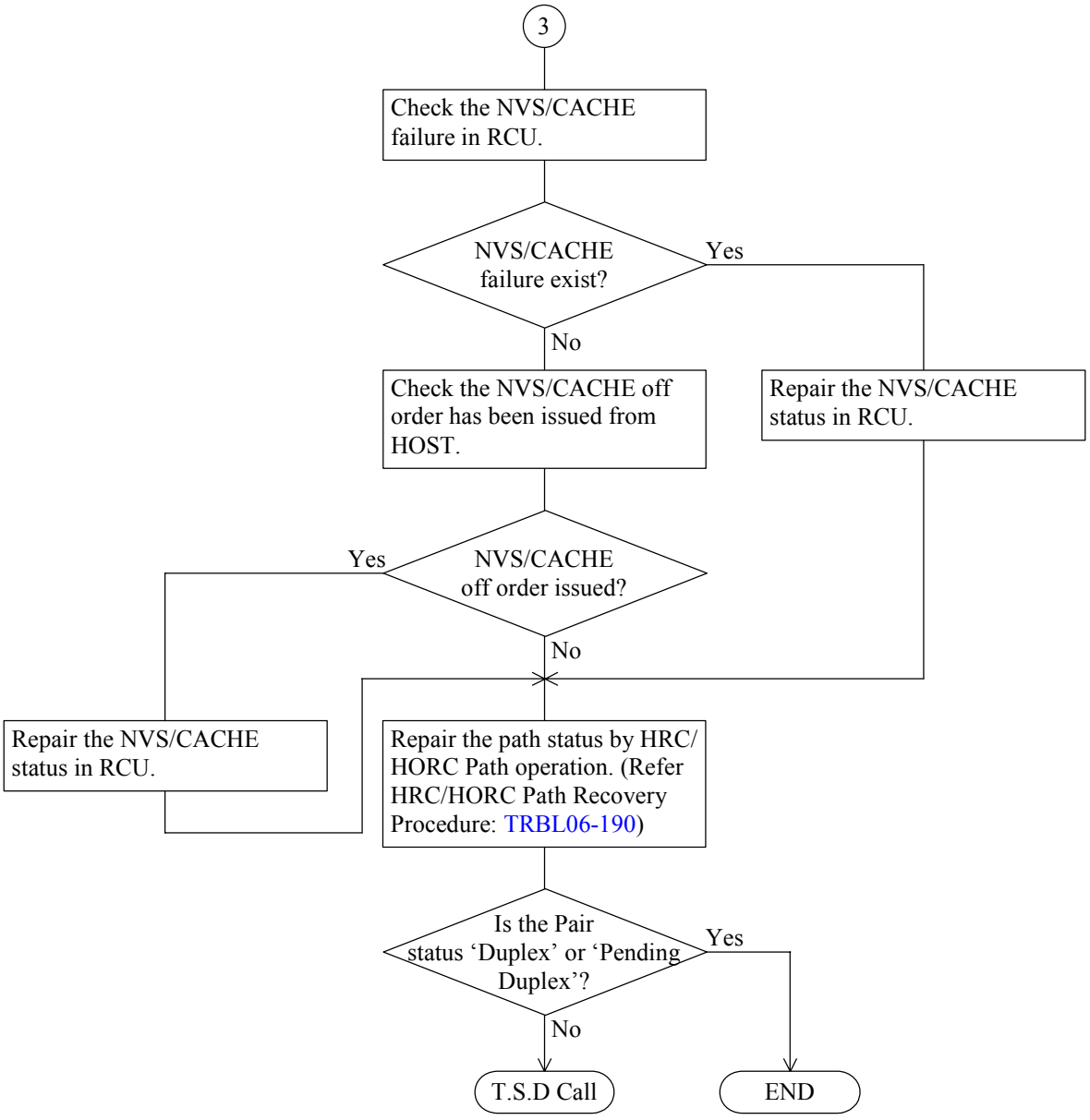
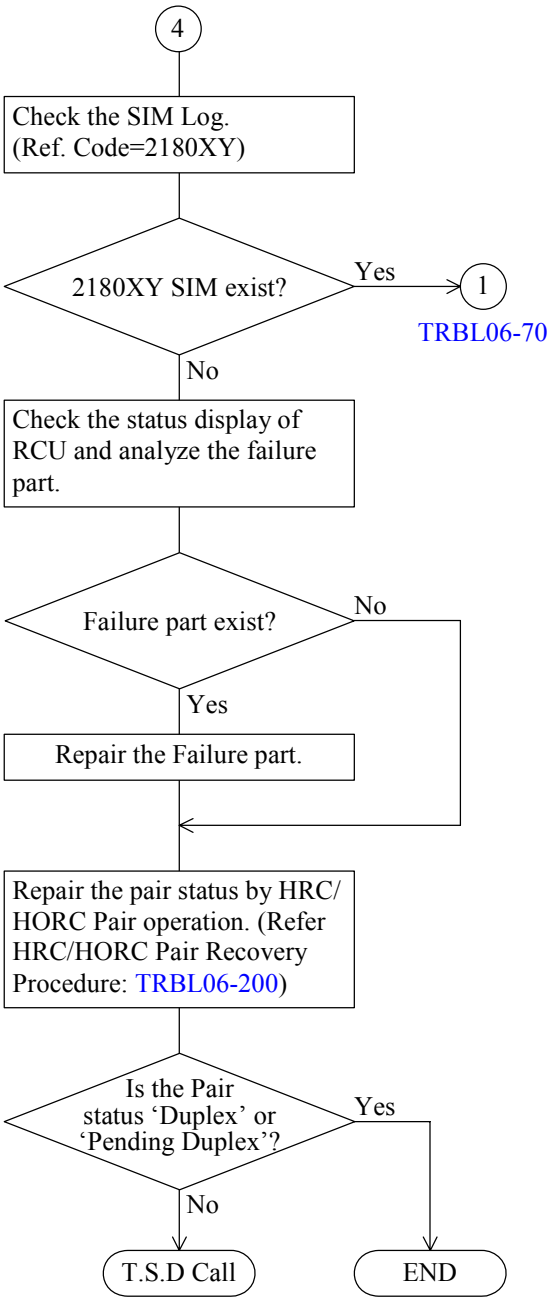
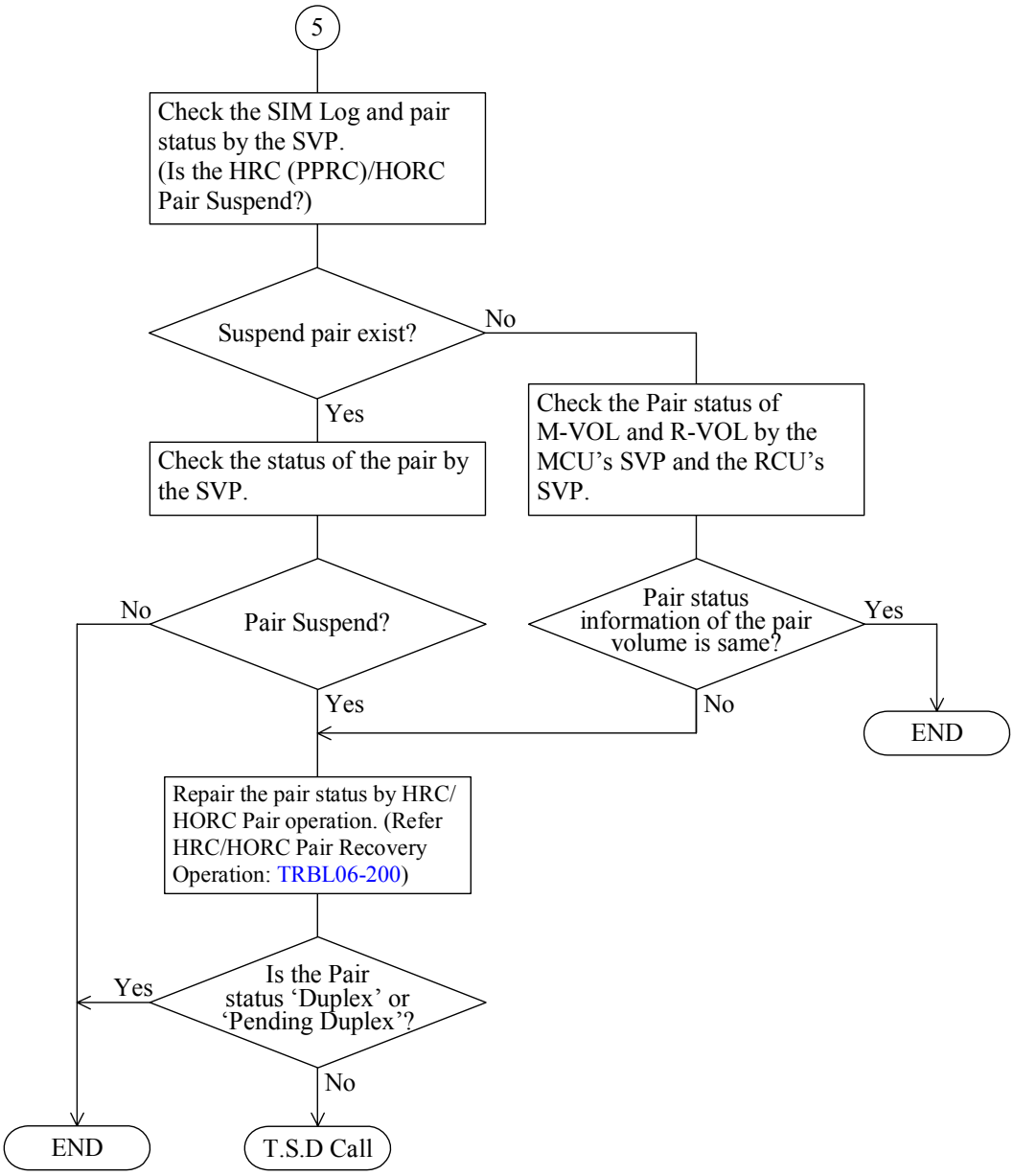


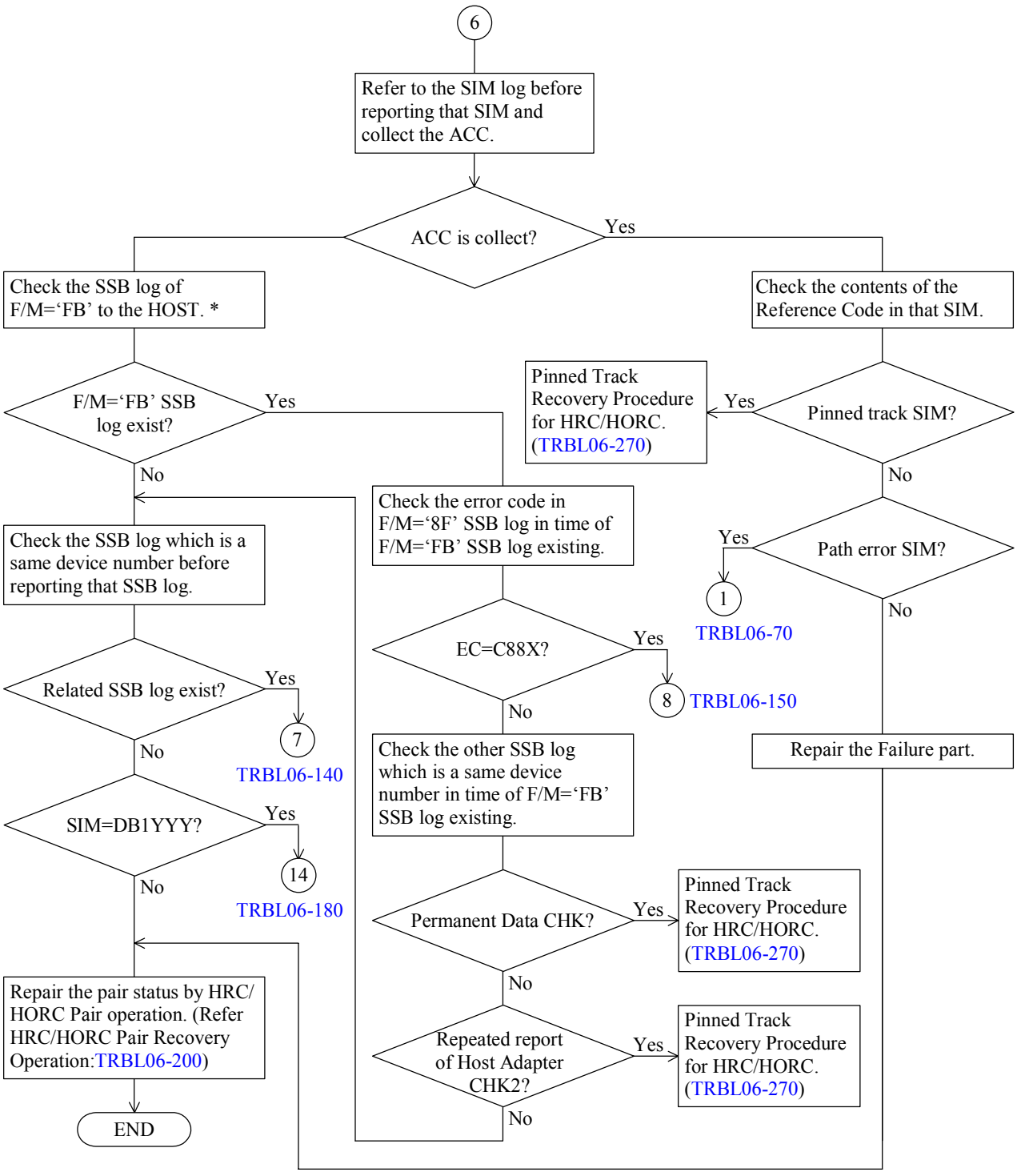
Table 6.2-2 HRC Recovery Procedure for F/M = '8F'

No.	F/M	error code	mean	Recovery Procedure
1	8F	C4CE	Detect a nonstandard R0 track in M-VOL. (HRC 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#

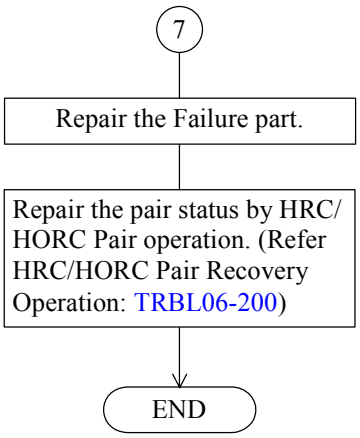








*: In the case of the HORC, confirm the SSB Log of F/M='FB' in the suspended volume concerned. When the log of 'FB' does not exist, confirm the SSB error code of FM='FB' in the time zone for reporting a SIM concerned.



8

Table F/M='8F', EC=C88X SSB logformat

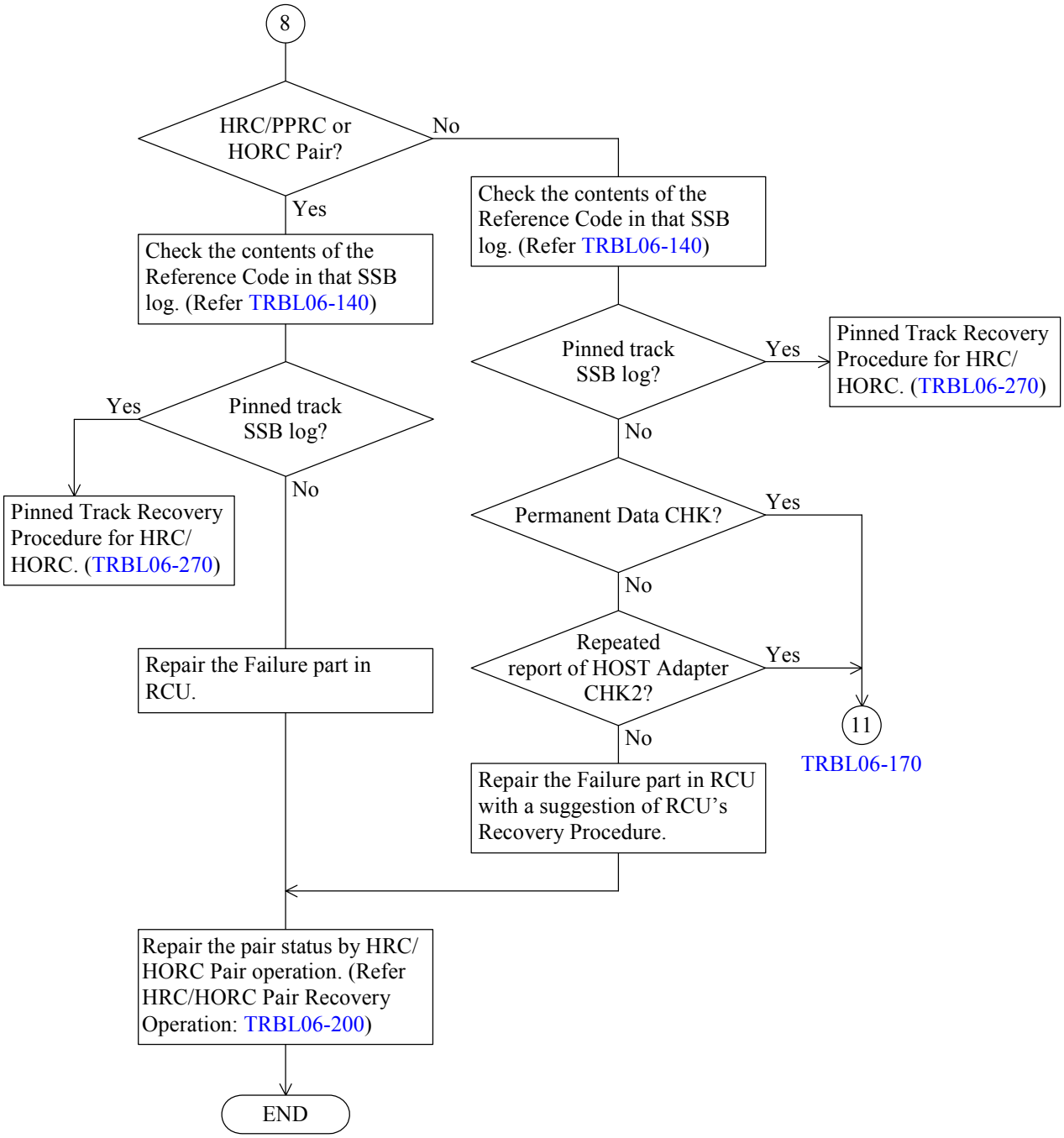
(byte)	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00																
10																
20							8	F	C	8	8	X				
30																
40																
50																
60																
70																

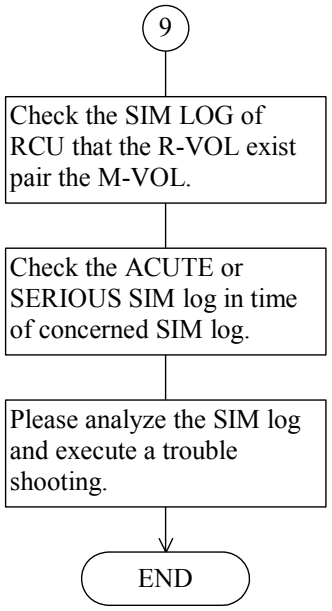
Logical Path Number

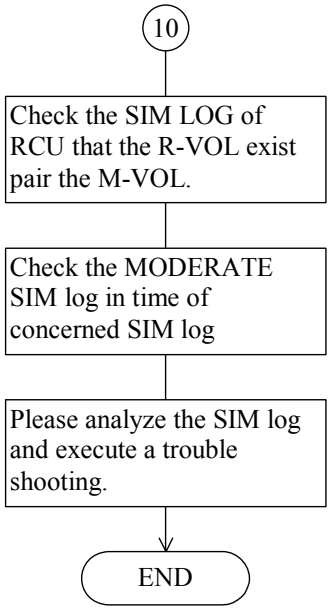
Logical Device address of the R-VOL

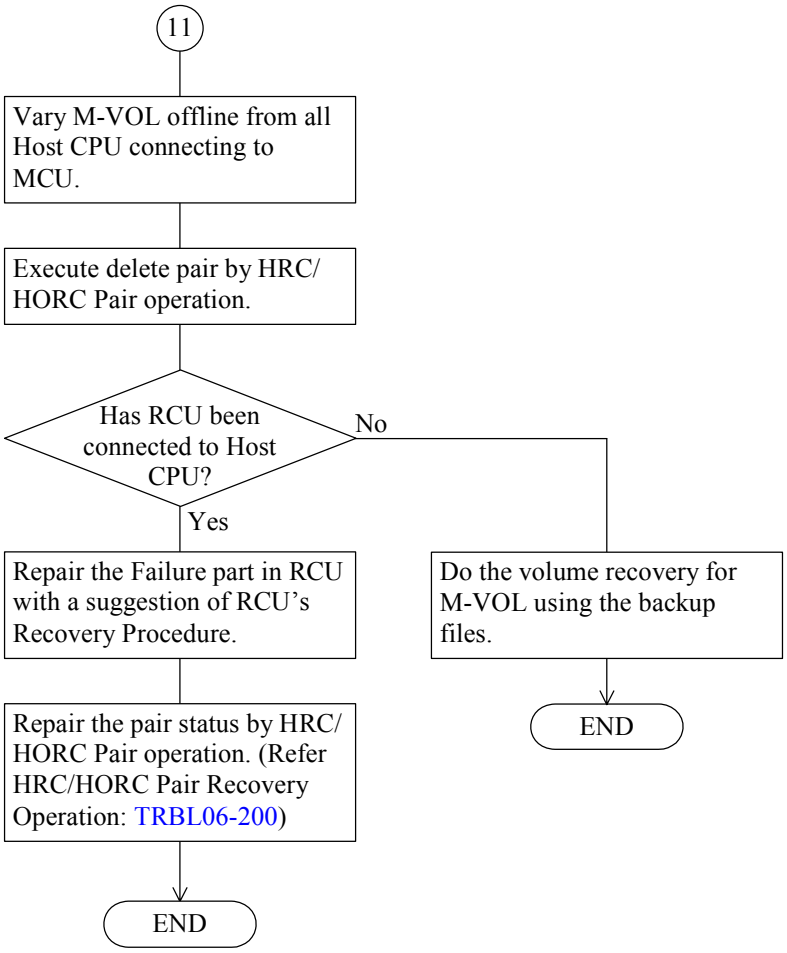
The format of F/M='8F', EC=C88X SSB log is shown above.
This SSB log include a SSB log (an oblique plane) which is reported from RCU.
Please analyze the SSB log and execute a troubleshooting.

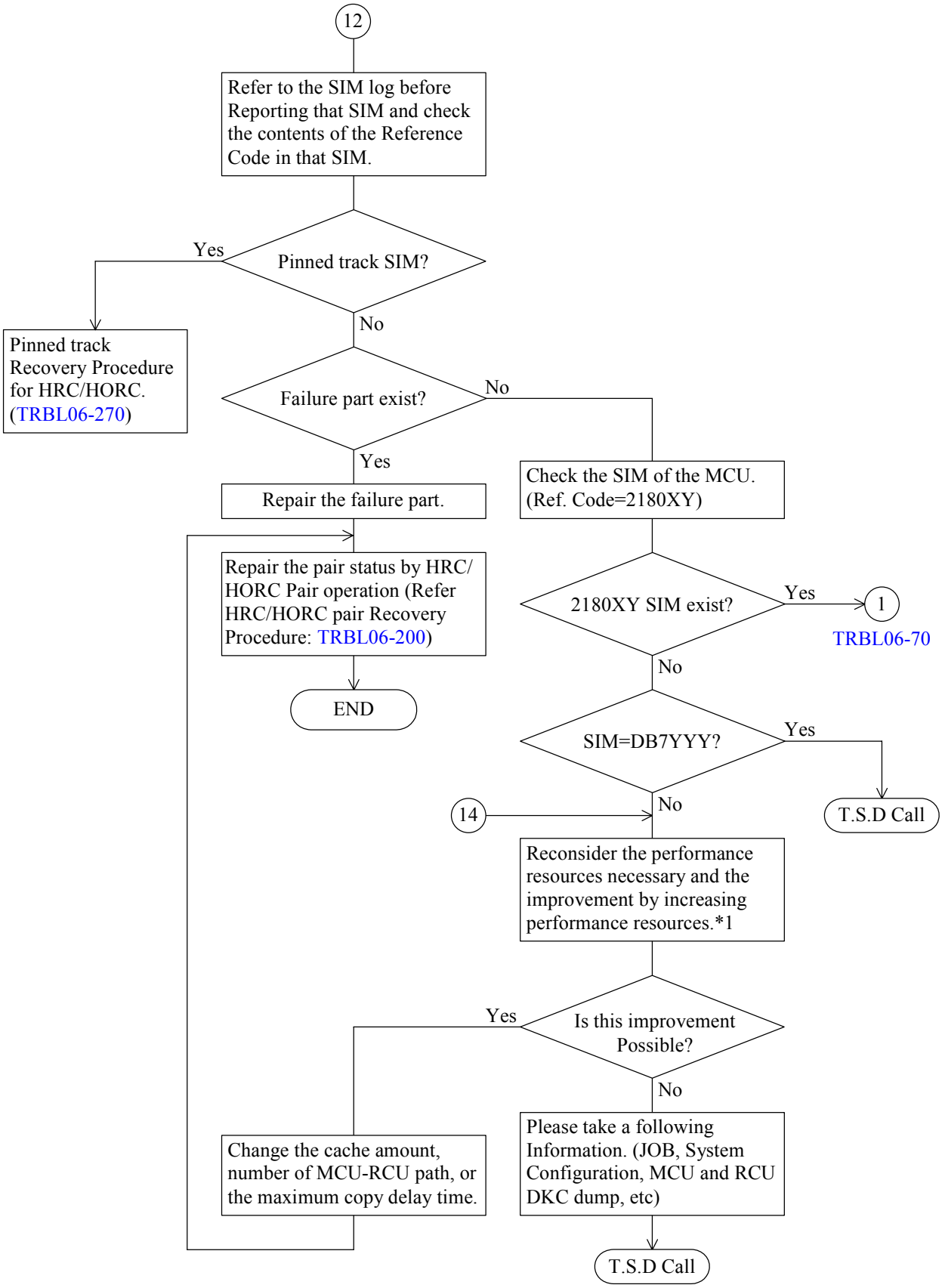
(if byte61 bit 0 = 0)
"CCHH" which MCU accessed when the Unit Check DSB was reported.





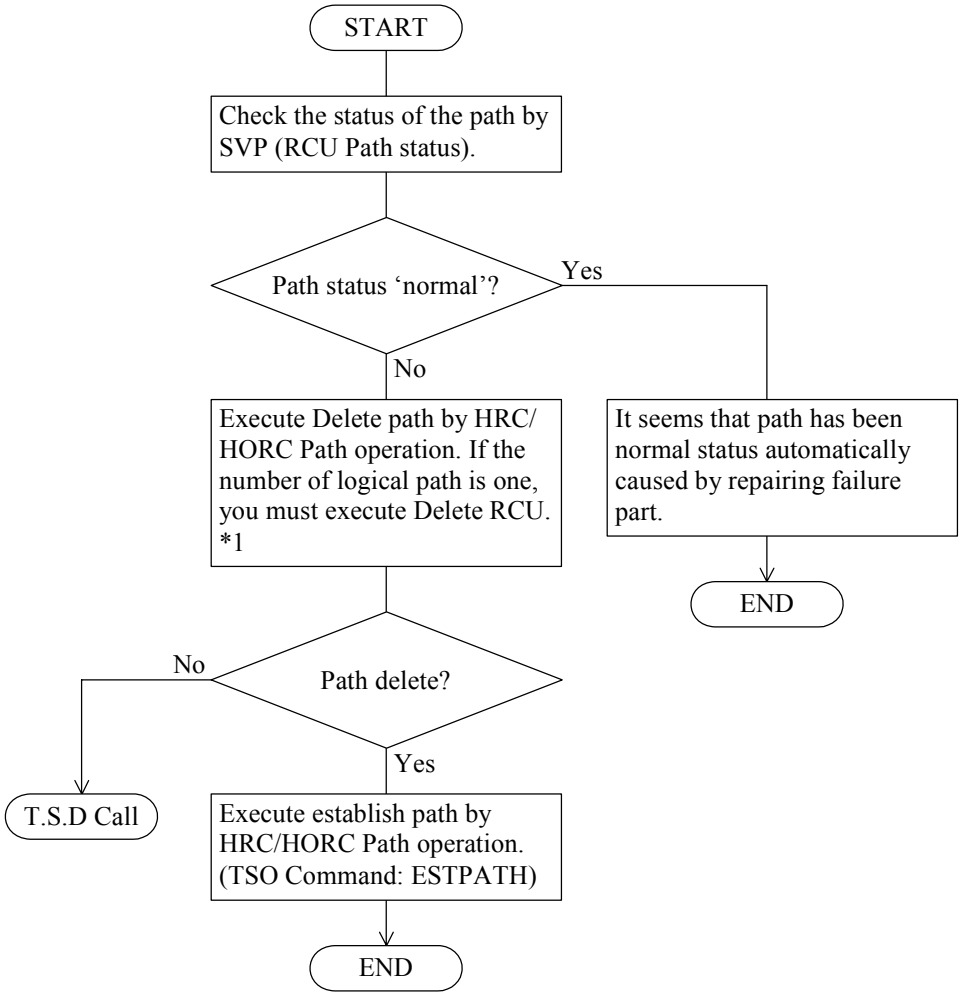






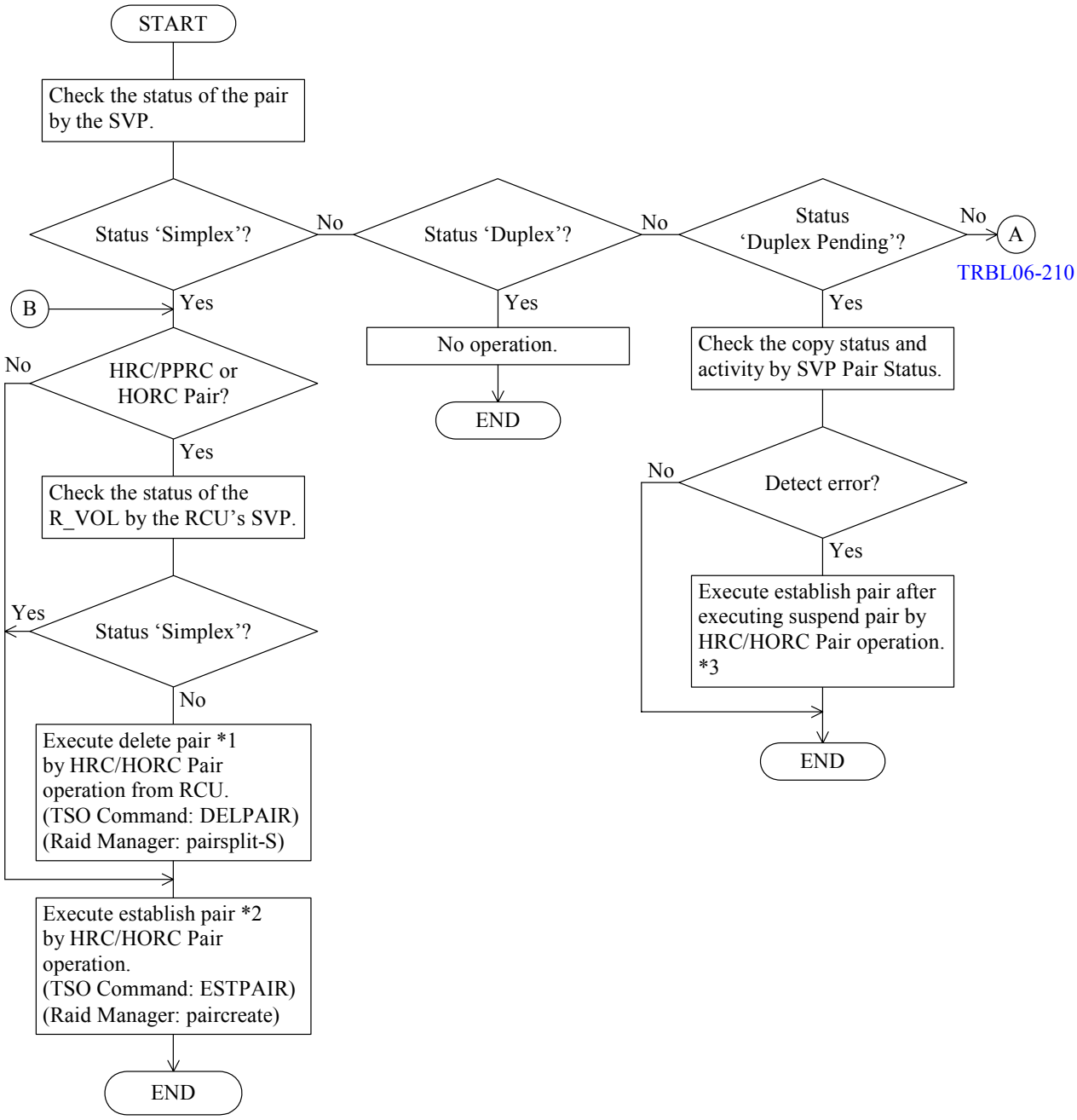
*1: Cache amount, number of MCU-RCU path, etc.

HRC/HORC Path Recovery Procedure



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

HRC/HORC Pair Recovery Operation (1/2)



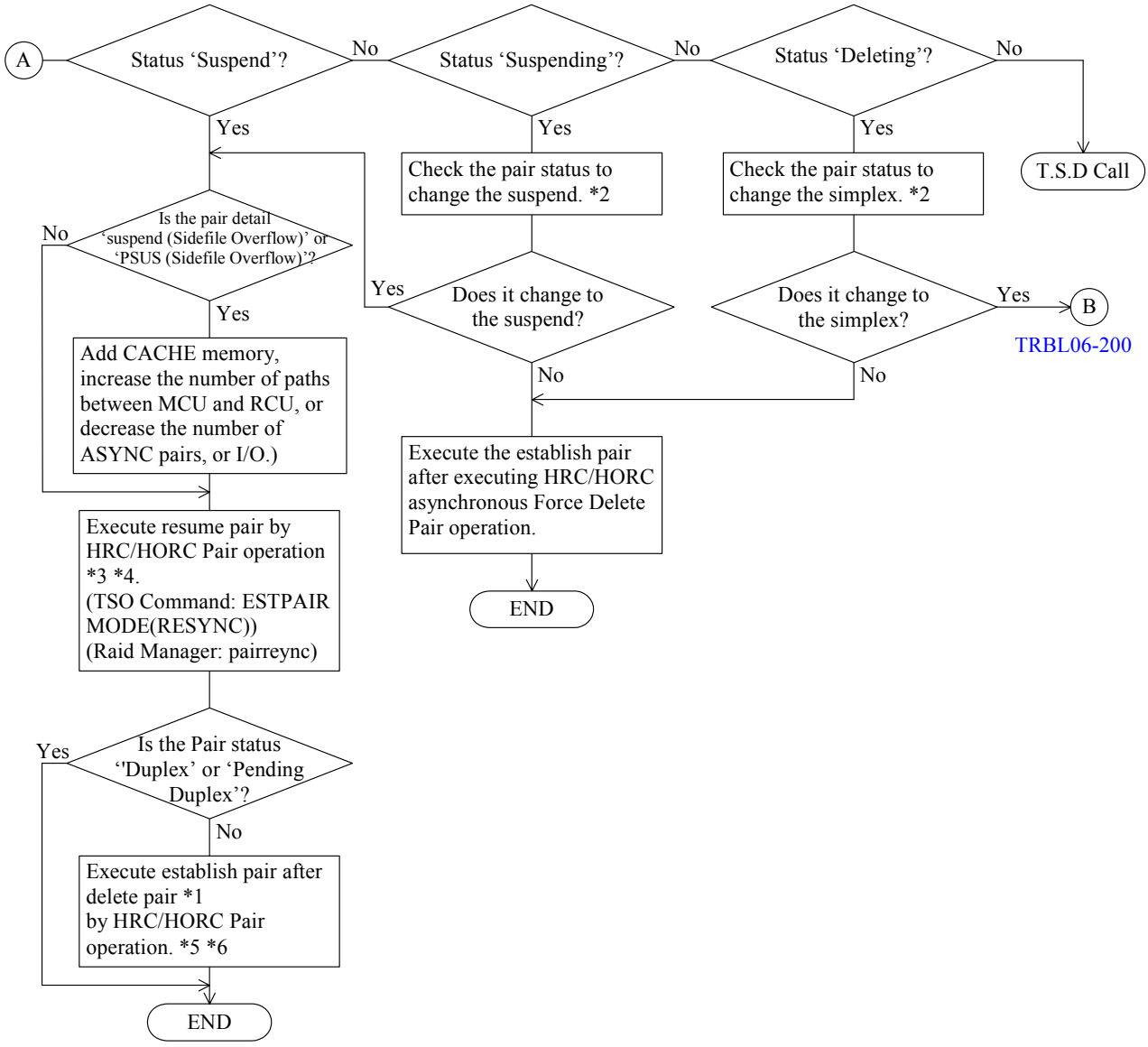
*1: If suspended SIM is 'DBFYYY', and another HRC pair with the same Consystency Group existed, please execute suspend pair operation to the all HRC pair with the same Consystency group before delete pair operation. If delete pair operation does not complete, please try force delete pair operation.

*2: If suspend pair operation is executed according to note1, please execute resume pair operation to these HRC pairs.

*3: For TSO Commnad operation, you issue ESTPAIR Command after SUSPEND Command issued In the case of the Raid Manager, issue the Pairresync command after the Pairsplit command is issued.

note: If HRC asynchronous operation does not complete, please refer TRBL06-220.

HRC/HORC Pair Recovery Operation (2/2)



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

*2: Please waite a long time at least longer than specified by Maximum Copy Delay Time parameter.

*3: If suspended SIM is 'DBFYYY', and another HRC pair with the same Consystency Group existed, please execute suspend pair operation to the all HRC pair with the same Consystency Group before resume pair operation. After that, please execute resume pair operation with the Group option to these pairs.

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

*5: For TSO Command operation, you issue ESTPAIR Command after DELPAIR Command issued. In the case of the Raid Manager, issue the Paircreate command after the Pairsplit-S command is issued.

*6: After force-deleting a HORC asynchronous pair whose detailed status was 'SSWS (S-VOL Swapping)', please delete the C/T group from Web Console, which the deleted pair belonged to, before executing paircreate.

Note: If HRC asynchronous operation does not complete, Please refer TRBL06-220.

HRC/HORC asynchronous Pair Recovery Operation

HRC/HORC asynchronous pair recovery operation is the same as it of the HRC synchronous pair basically. Please pay attention to the following.

(1) Extent of the suspend pair volume
When the volume pair which error level is Group is suspended due to the failure, all volume pairs in the same consistency group will be suspended together. In this case, All volume pairs in the same consistency group are in need of Resume Pair operation.

On condition that failure volume pair status is the Duplex pending(volume failure occur during Initial Copy), suspend is only this volume.

(2) Resume pair Operation
It specifies whether all suspended volume pairs, which belong to the same consistency group and whose M-VOLs are behind this MCU, should be resumed together or not.

(3) Force Delete Operation
This section describes the error recovery procedures to recover from the following hung-up conditions:

- The volume pairs were suspended due to some kind of failure. However the pair status of the affected volume pairs remained **unchanged from Suspending** for a long time (at least longer than specified by Maximum Copy Delay Time parameter).
- **Delete Pair** or **Suspend Pair** operation completed without error message. However the pair status of the volume pairs to be deleted or suspended remained **unchanged from Deleting or Suspending** for a long time (at least longer than specified by Maximum Copy Delay Time parameter).
- Add Pair operation failed with Web Console messages **‘6005 8808’** or **‘6005 8809’** and the operation could not complete after several times of reties.
- **Suspend Pair, Delete Pair** or **Delete Group** operation failed with Web Console messages **‘6005 8844’**, **‘6005 8855’** or **‘6005 8880’** respectively and the operation could not complete after several times of retries.

The recovery procedure is described in the next figure on TRBL06-240.

(3-1) Operating Delete Pair with Delete Pair by Force option

Delete pair operation with Delete Pair by Force option is effective to recover from such hung-up conditions. Being specified with this option, the specified control unit (MCU or RCU) performs the forcible delete process as follows:

- Changes the volume status of all the volumes that are behind the specified control unit and belong to the consistency group to simplex.
- Discard all the record sets that are pending (not sent to the RCU or not settled yet) in the specified control unit.

Note that the specified control unit performs the forcible delete without communicating with the paired control unit. Since both the MCU and RCU manages volume pair status and can have the pending record set within, this operation **must be done at both the MCU and RCU**.

(3-2) Re-establishing Volume Pair

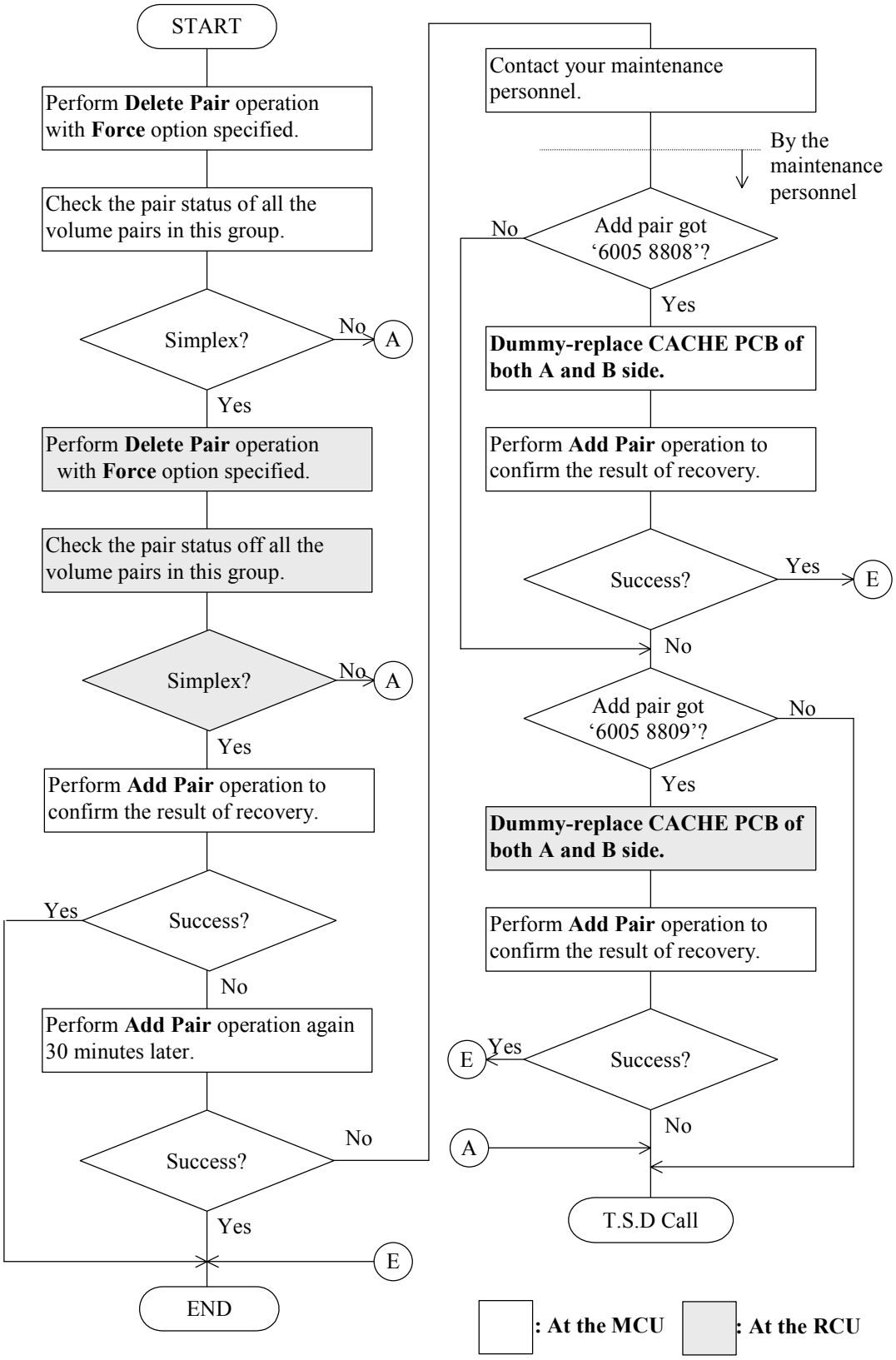
After completing delete pair operation at both the MCU and RCU, establish volume pair(s) again to check that hung-up conditions are recovered. Be sure that **the same consistency group number** must be specified as before. If the different consistency group number is specified, the result is unpredictable.

(3-3) Performing Dummy-Replacement of CACHE PCB

If the delete pair operation can not recover from hung-up conditions (establishing volume pair results in failure with message ‘6005 8808’ or ‘6005 8809’), some inconsistent condition may remain in the Sidefile structure. To recover from this situation, dummy-replacement of CACHE PCB requires to be performed for **both A and B sides**. The operated control unit discards all the inconsistent Sidefiles during replacement procedure.

Only the Sidefiles of the deleted consistency group is discarded. Therefore dummy-replacement can be performed while other consistency groups are working at the control unit.

HRC asynchronous Force Delete Operation



Recovery Operation of the Suspended HORC Pair

This document which is addition of the HRC/HORC Pair Recovery Operation (TRBL06-200) explain the recovery operation for the suspended HORC pair in the extended LU.

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

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

means	object	procedure
Web Console	Volume	(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 "Suspend", "Duplex (W)", or "Pending Duplex (W)". (3) Execute a resume pair operation to the suspended volume pair. (4) Check the pair status is a "Duplex" or a "Pending Duplex".
	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 "Suspend", "Duplex (W)", or "Pending Duplex (W)". (3) Execute a resume pair operation to the suspended LU pair. (4) Check the pair status is a "Duplex" or a "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 "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 "Duplex" or "Pending Duplex" after executing a resume operation, please try delete pair operation (pairsplit-s command for Raid Manager), and execute Add pair operation (paircreate command for Raid Manager) again.

Procedure when the host hangs

If a host hangs up while it is writing data in HORC 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 HORC 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 HORC 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 HRC/HORC 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 or the ESCON link of a remote site 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 HRC/HORC path recovery procedure (TRBL06-190).

Special note of pair recovery procedure when SIM=D4FY-YY or SIM= DBFY -YY is generated
The special note in the recovery procedure from WebCon 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.

(2) For TrueCopy Asynchronous/TrueCopy Asynchronous for Mainframe
- When another SVOL doesn't exist in same Group #
The Delete pair operation is executed to SVOL, and it wishes the execution of Pair create again.

- In case of the same Group existence of another SVOL, Duplex(PAIR) or Pending(COPY)
Please execute pairsplit(Suspend) by the Group specification for the initial state “Make to Simplex(SMPL)” and SVOL that wants to do.
Next, please confirm the thing that SVOL that wants to do with the initial state enters the state of Suspend (*), and execute Delete pair by the Volume(LU) specification.
It wishes the execution of Pair create again after the above-mentioned is completed.

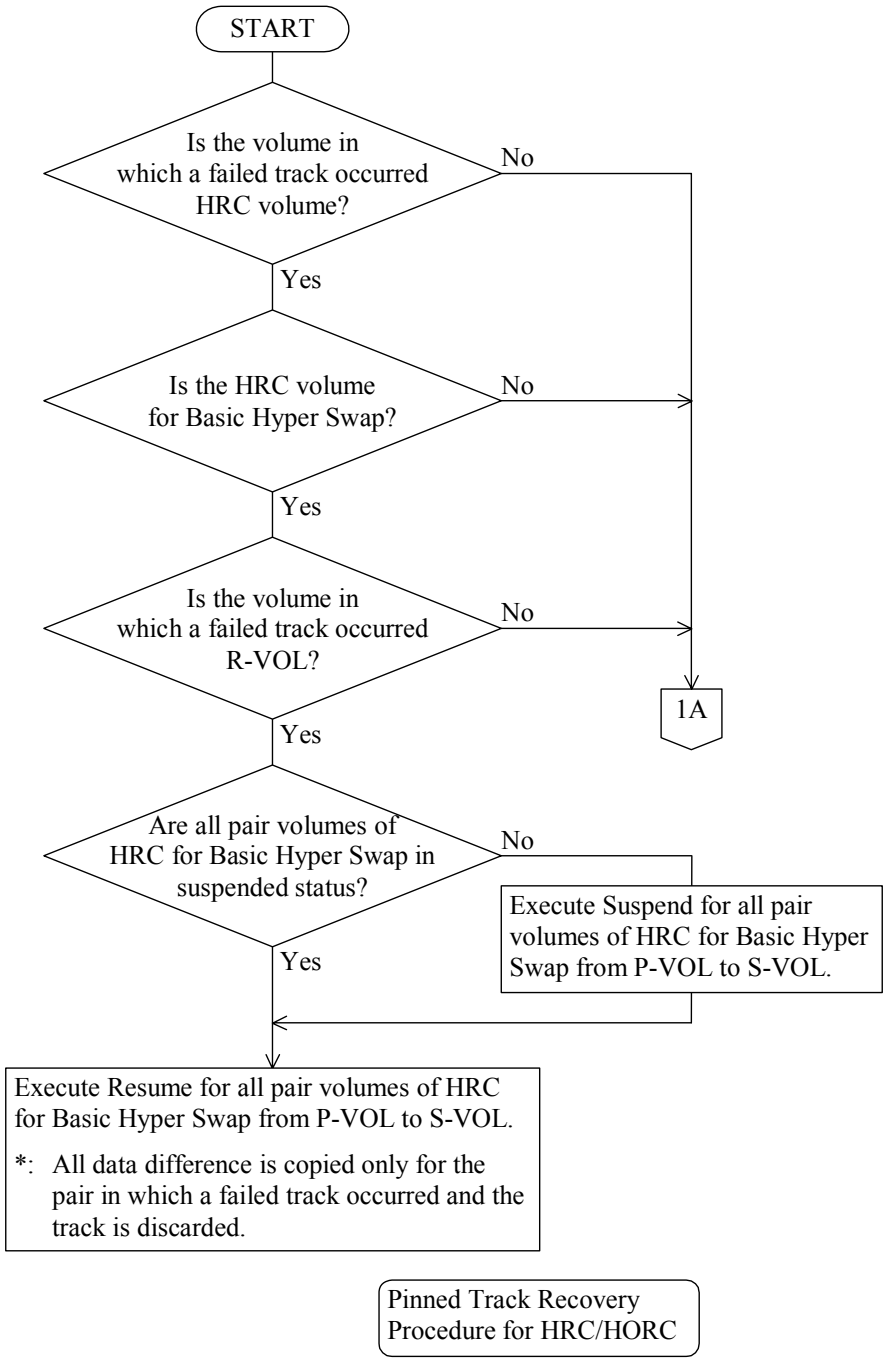
(*) It becomes Suspended though the state of Suspending continues by about five minutes.

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

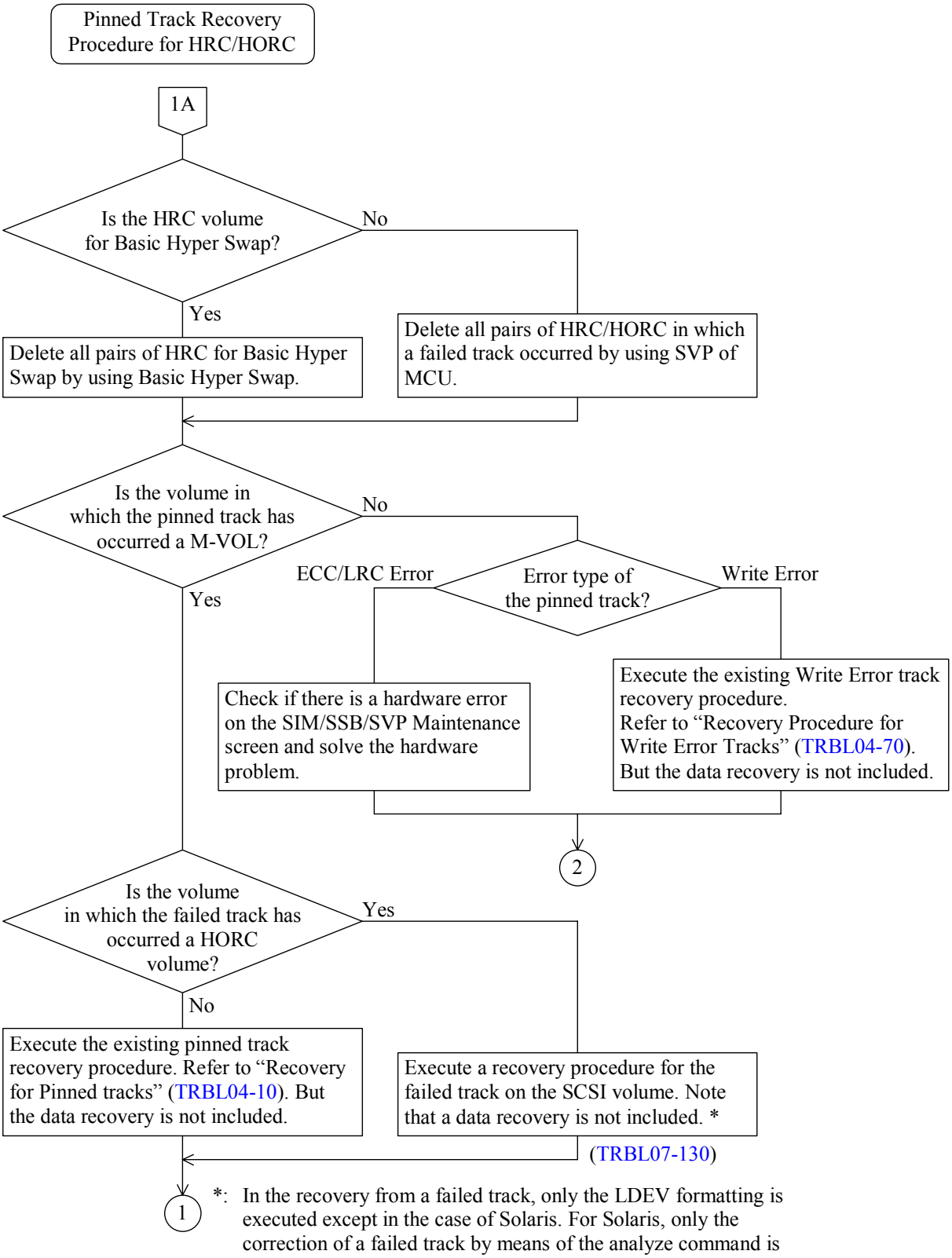
The recovery procedure:
Please execute the recovery work referring to this trouble shoot section usually.

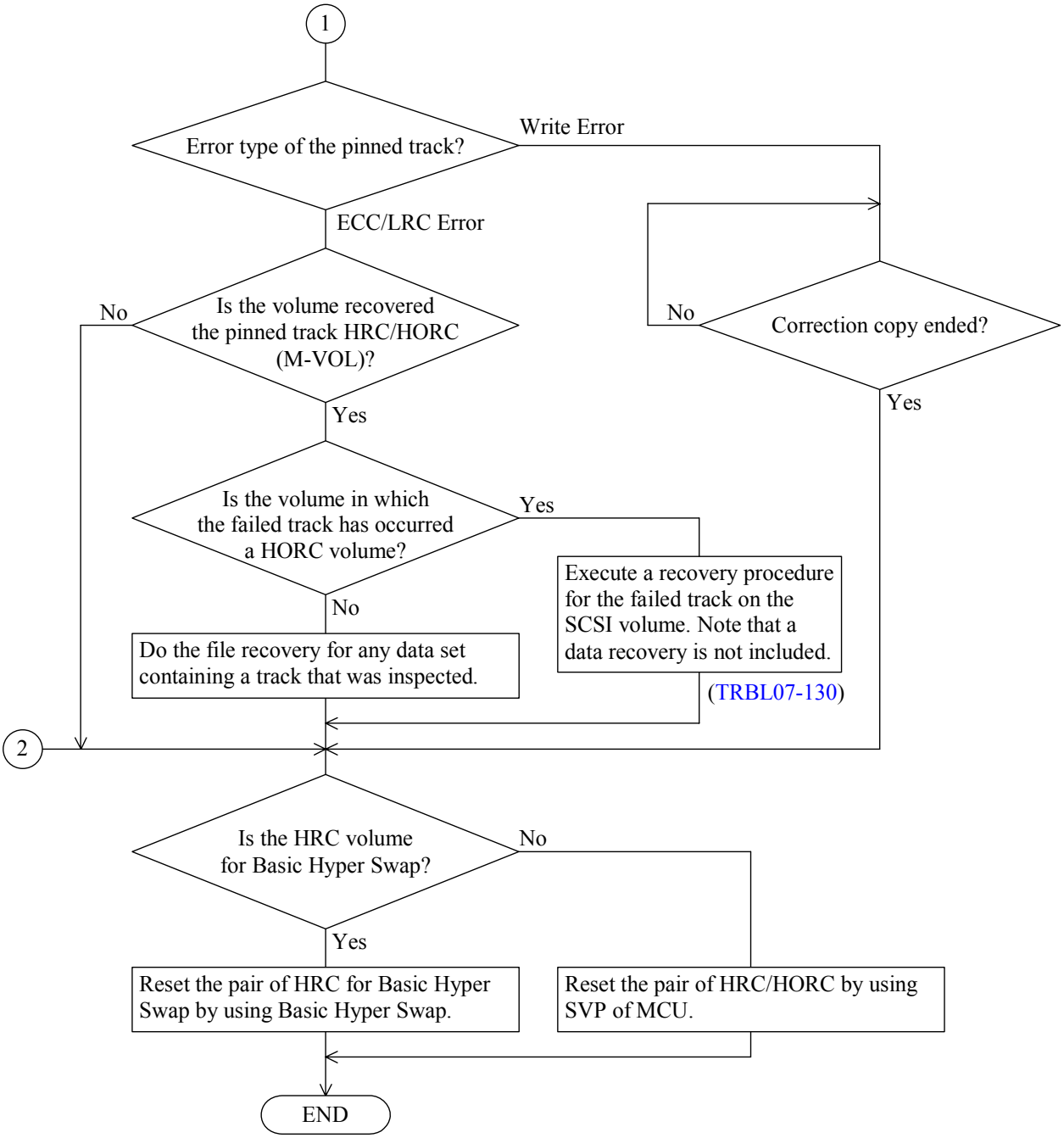
6.3 Pinned Track Recovery Procedure for HRC/HORC

Pinned track recovery procedure for HRC/HORC 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.
HRC/HORC : 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.

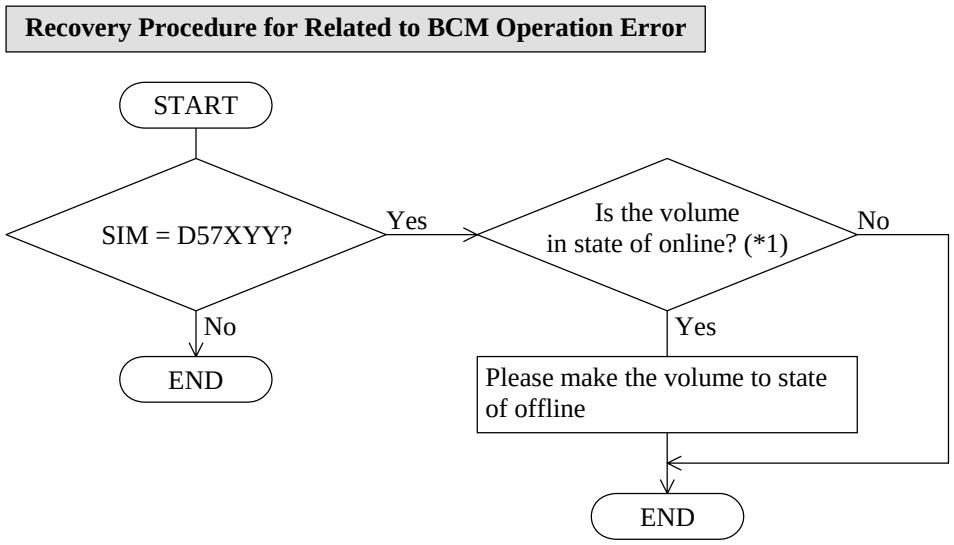
6.5 Recovery Procedure for Related to BCM Operation Error

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 HRC 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 HORC 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 HORC pair creation from RCU to MCU and copy the latest data of RCU to MCU.
4. After completing copy from RCU to MCU, delete HORC 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 Multiplatform

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

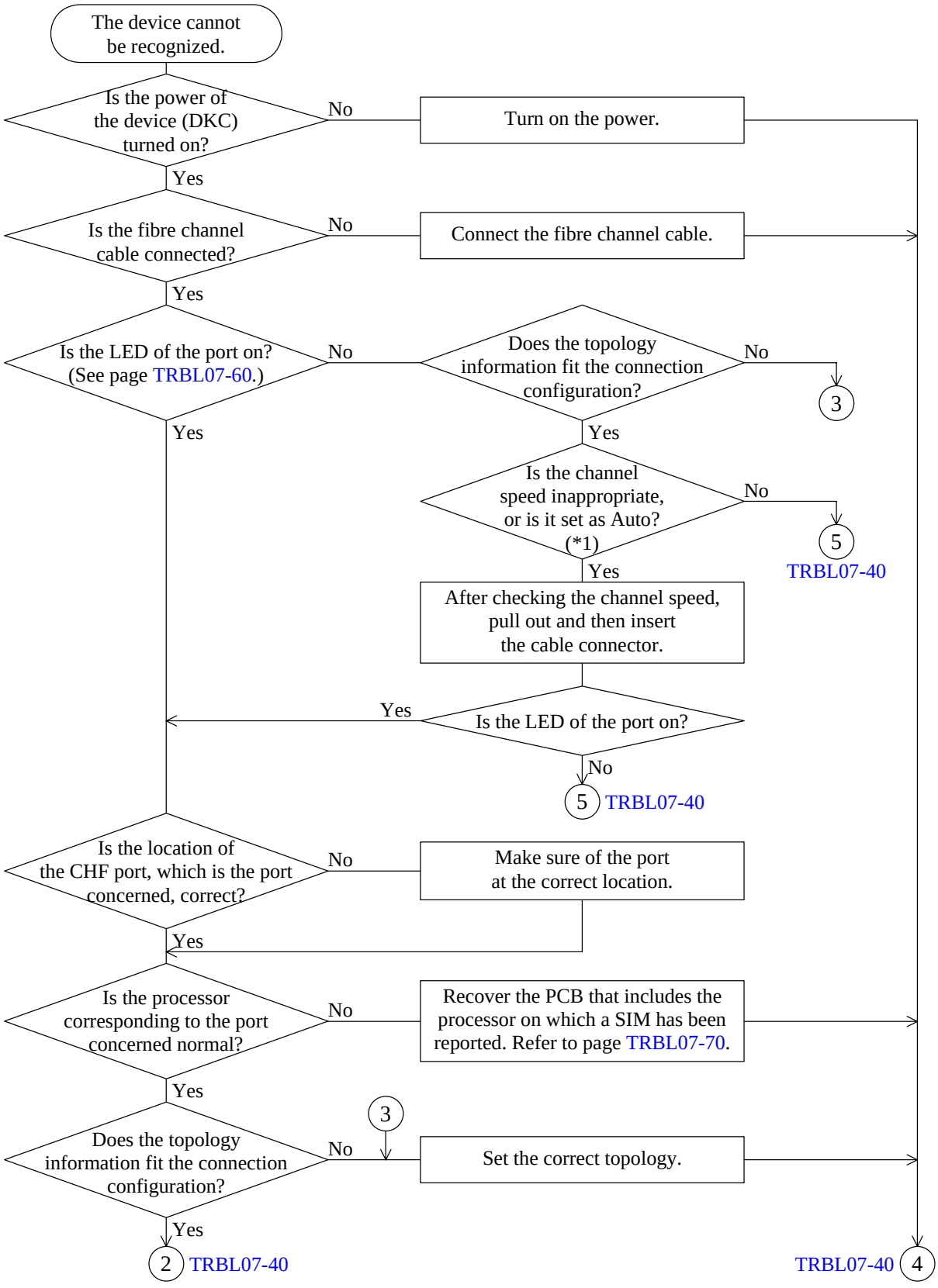
No.	Possible error	Cause
1	DKC610 LDEV is not recognized by Fibre initiator	(1) SCSI installation, i.e. recognition and connecting procedure from SCSI initiator is not executed correctly (2) Problem of Fibre cable or connection (3) Problem of Fibre initiator. Fibre board, device driver version, parameters, 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

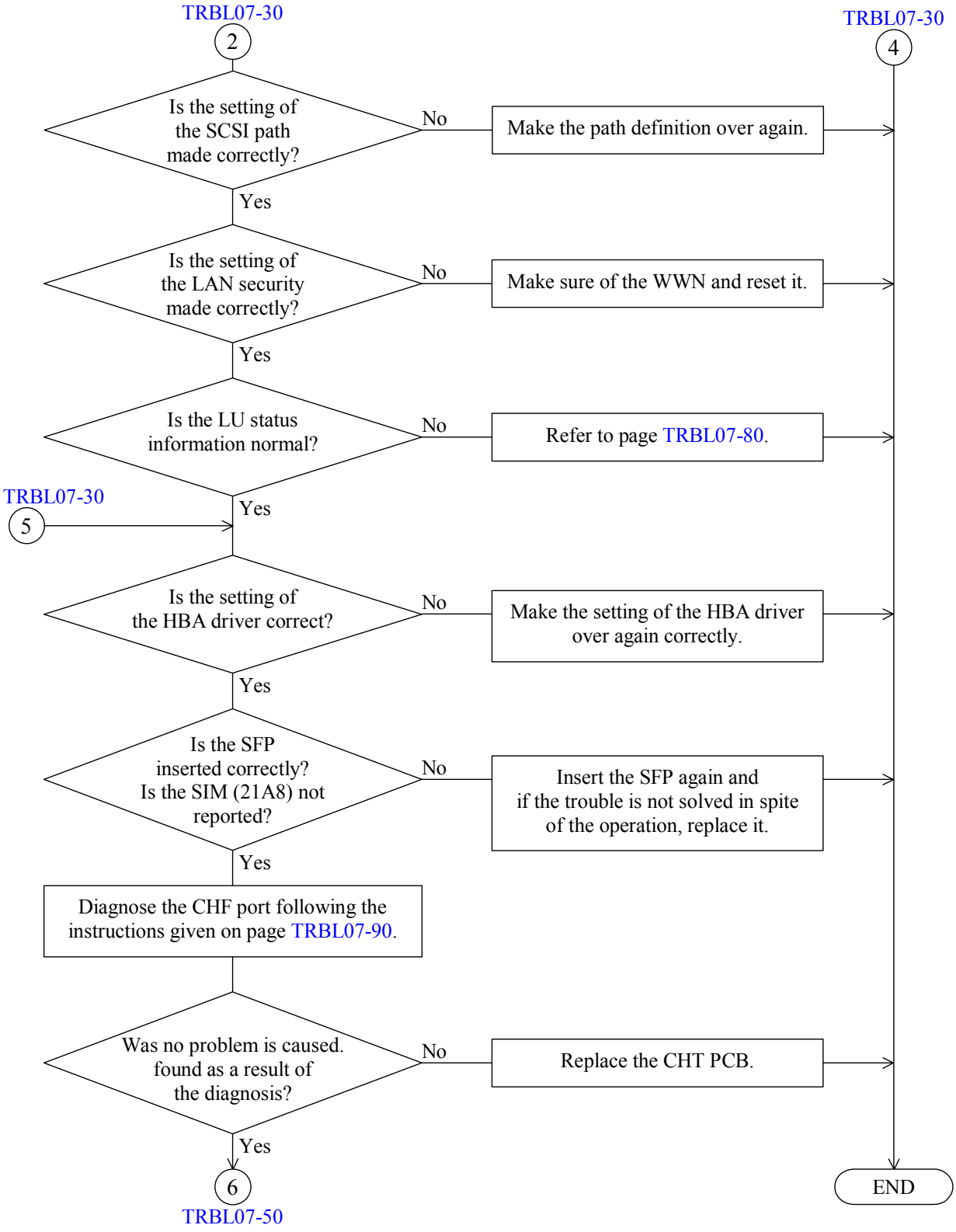
Item	Checkpoint	Check method
1	Is the Ready LED on the DKC on?	Check the subsystem visually.
2	Is the LED of the port, which corresponds to the failed SCSI port, on? Select the System window in the Storage Navigator main window and check whether the port status indicator is on.	Check the subsystem visually.
3	Is the location of the CHF port correctly understood?	Refer to pages LOC4-10 to LOC4-20 (*1).
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 CHP and 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 8US, make sure the channel speed of the equipment (HBA, switch, etc) to be connected is not 1Gbps. *: If the type of PCB is 8US, set the host channel speed from anyone of 2G/4G/8Gbps since the channel speed of 1G is not supported.

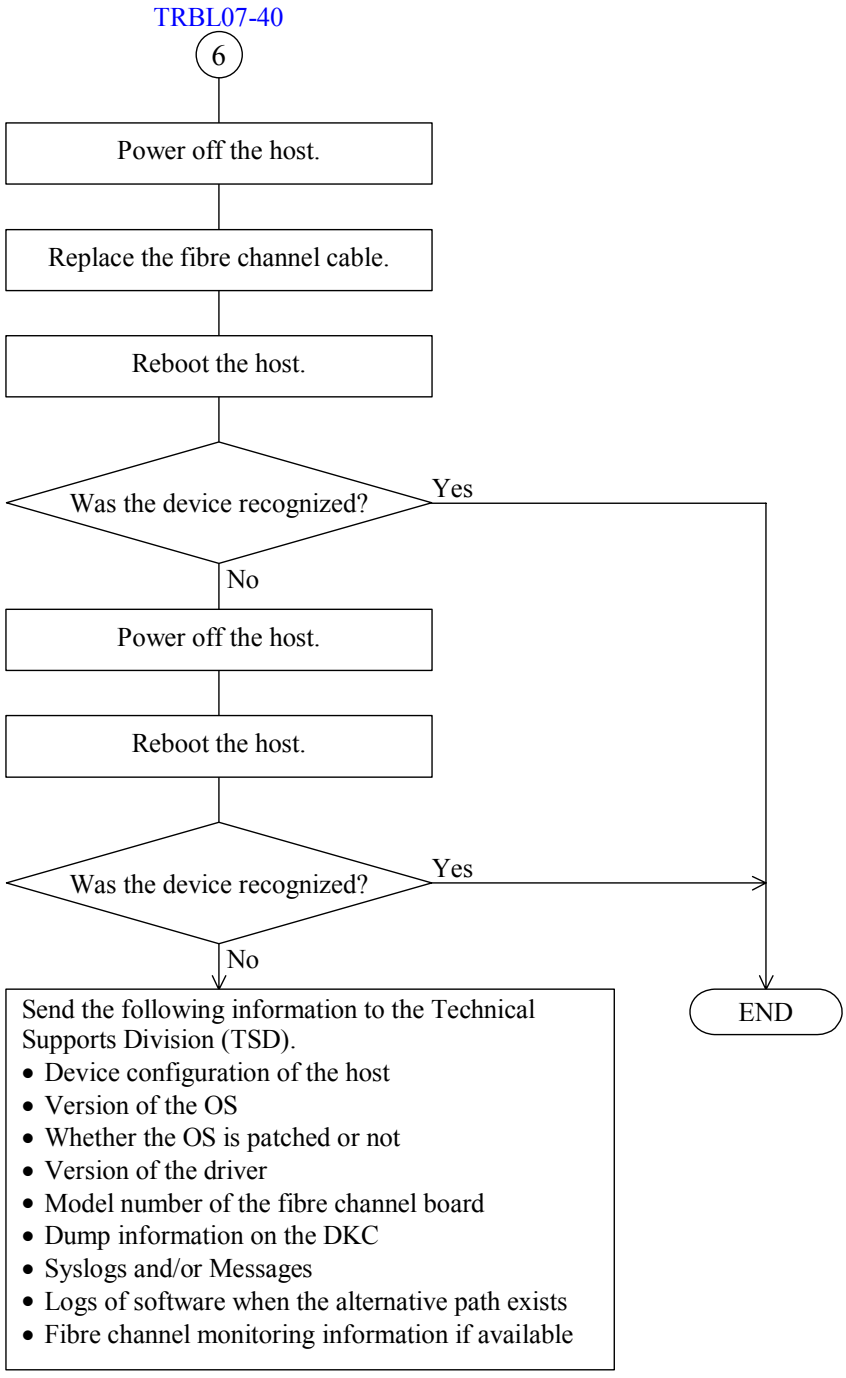
*1: Two alternate ports are assigned for the ports of the same processor.

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



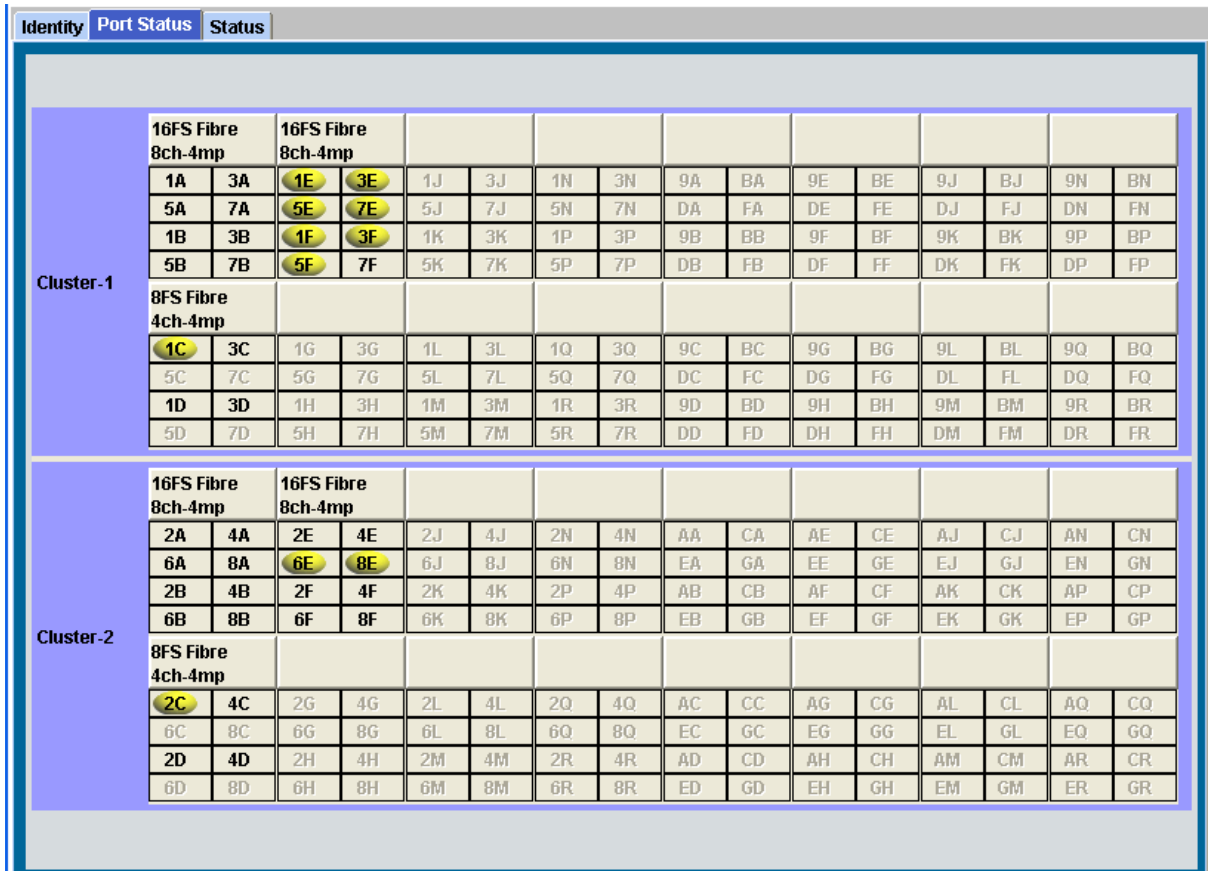
*1: If the type of PCB is 8US, set the host channel speed from anyone of 2G/4G/8Gbps since the channel speed of 1G is not supported.





7.1.3 Procedure for checking out the subsystem port status

In the “System” window 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.



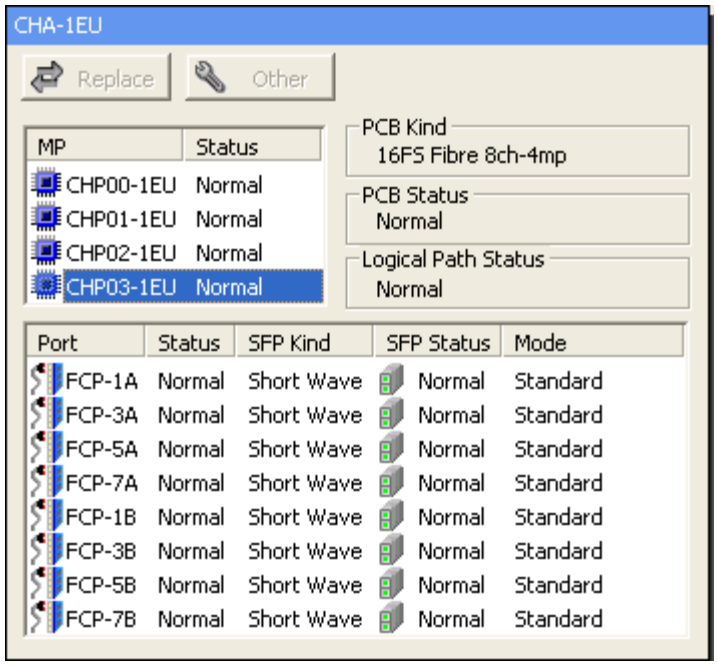
In the “Port Status” box, the statuses of the ports are displayed in the image of the practical subsystem.
The “Cluster-1” or “Cluster-2” represents the each cluster. In the upper and lower parts of the “Port Status” box, lists of ports of the Cluster-1 and Cluster-2 are displayed respectively. Sixteen 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.

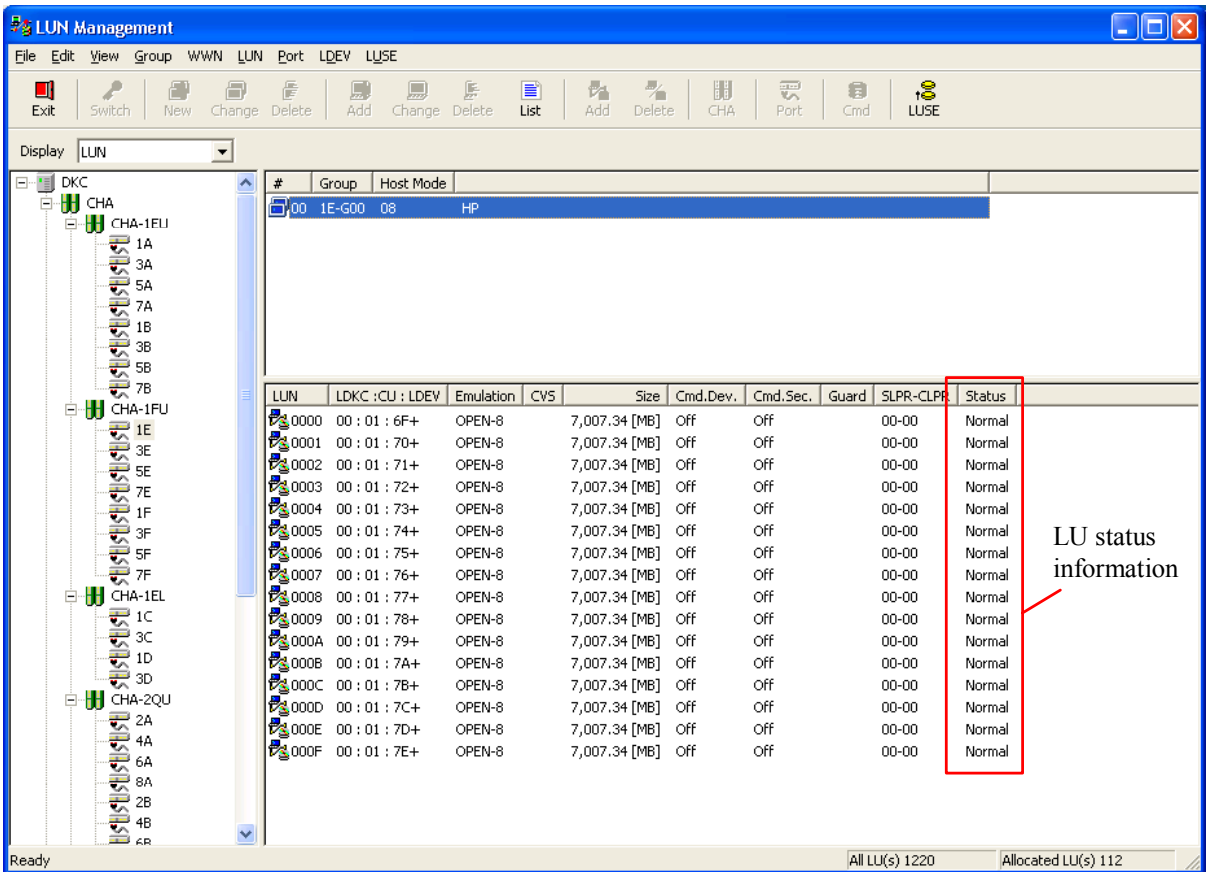
7.1.4 Procedure for checking normalcy of the processor

Select the PCB to which the failed port belongs in the Maintenance window, and check the normalcy of the port and 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 TSD.

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

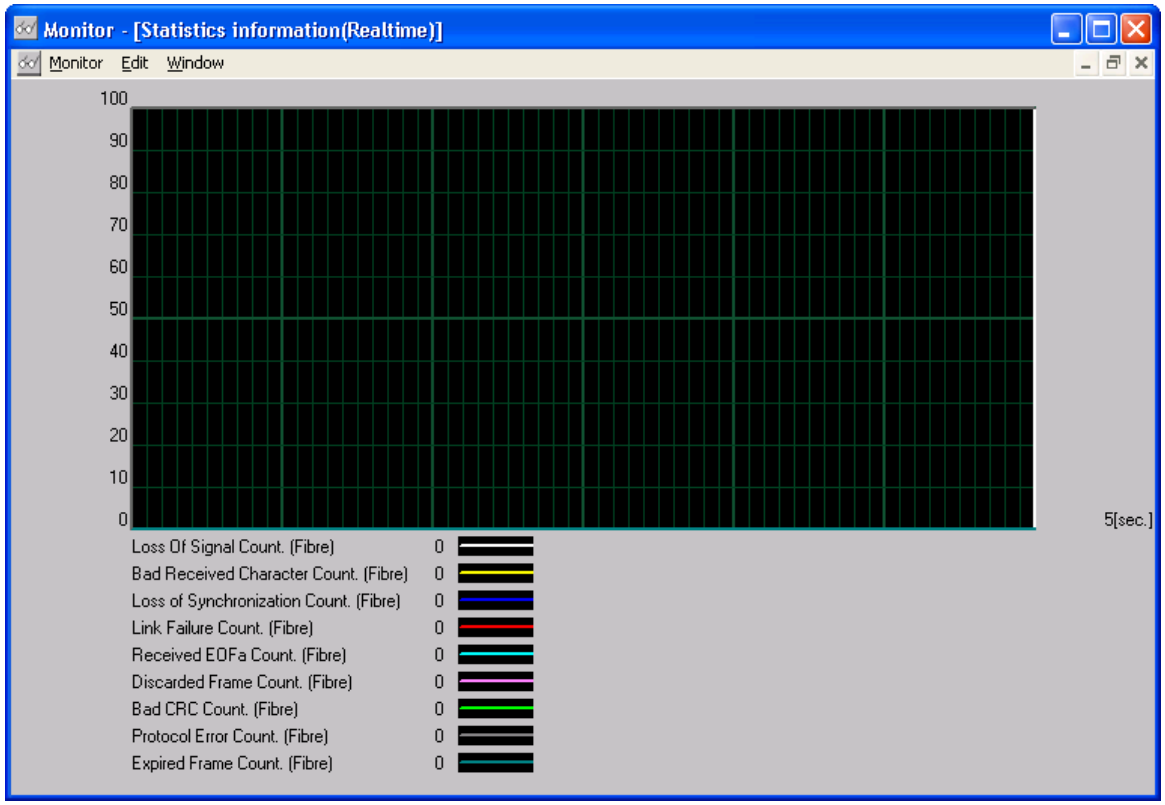


Table 7.1.6-1 Table for Locating Part in which a Fibre Channel Failure Occurs

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 CHT PCB • Replacement of the connecting cable • Replacement of the CHT 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 (1 or 4 Gbytes) of the connected port (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 CHT PCB • Replacement of the CHT 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 (1 or 4 Gbytes) of the connected port (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 CHT PCB • Replacement of the CHT PCB

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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 (1 or 4 Gbytes) of the connected port (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 CHT PCB • Replacement of the CHT 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 CHT PCB • Replacement of the CHT PCB

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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 CHT PCB • Replacement of the CHT 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 subsystem	X-XX:CU-LDEV number
FF5X-XX	Unable to read a track from a device in the external subsystem	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” (SVP02-1010) 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 to a device in the external subsystem	Device failure of external subsystem	After recovering the external subsystem, perform a dummy replacement of the cache package
DATA	External VOL Read Error	Unable to read from a device in the external subsystem	Device failure of external subsystem	After recovering the external subsystem, 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 subsystem 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. However, if the power is not turned on within 36 hours (Memory backup mode: 36 hours), the data will be lost, and an ECC/LRC type of a pinned track will occur.

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" (SVP02-1010) 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" (SVP02-1010) 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" (SVP02-1010) 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 subsystem, and Check Condition (Medium Error) is received due to a drive failure of the external subsystem, External VOL Write Error is set.

How to recover:

After recovering the device in the external subsystem, perform a dummy replacement of the cache package.

7.2.2.4 External VOL Read Error

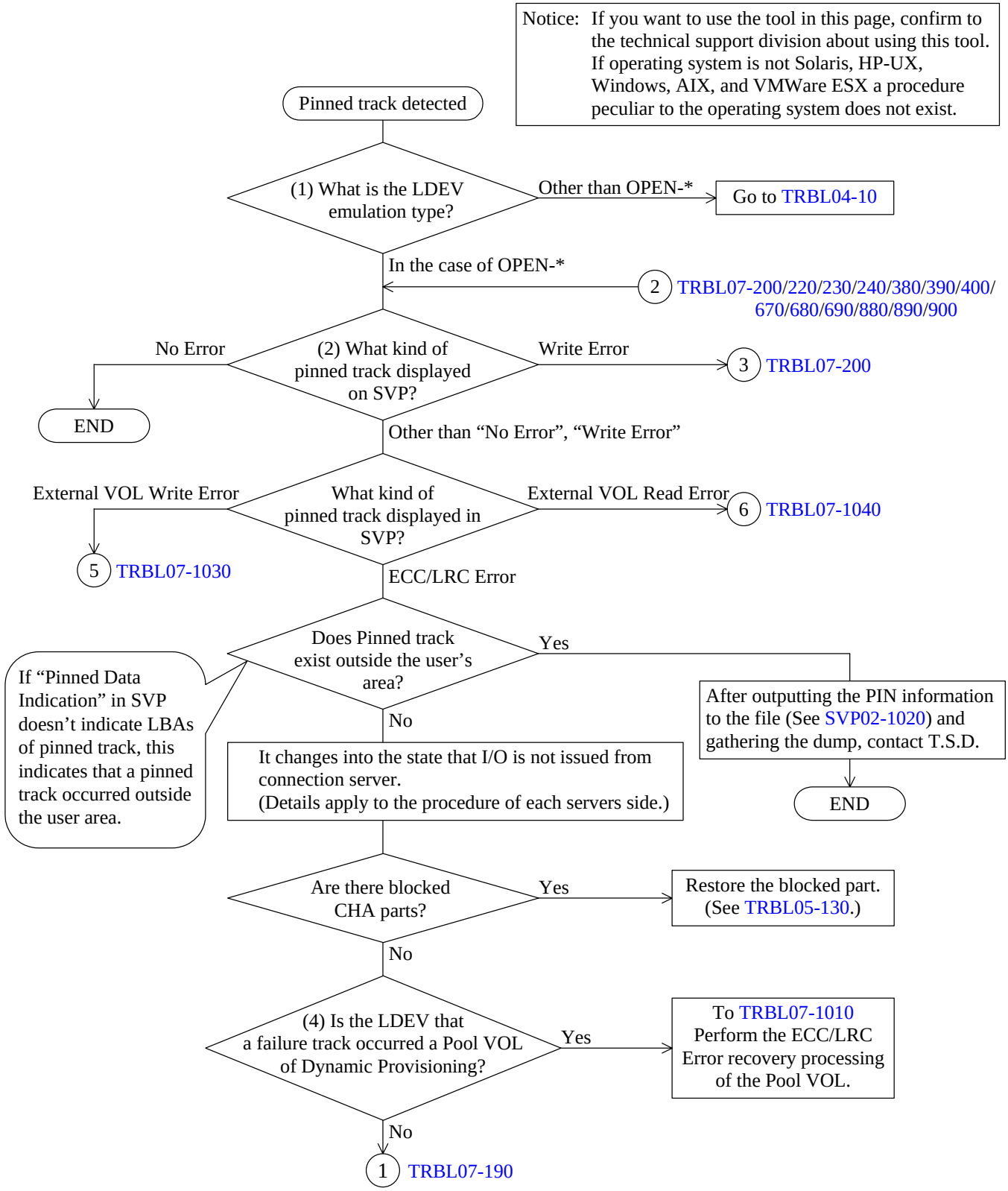
Cause:

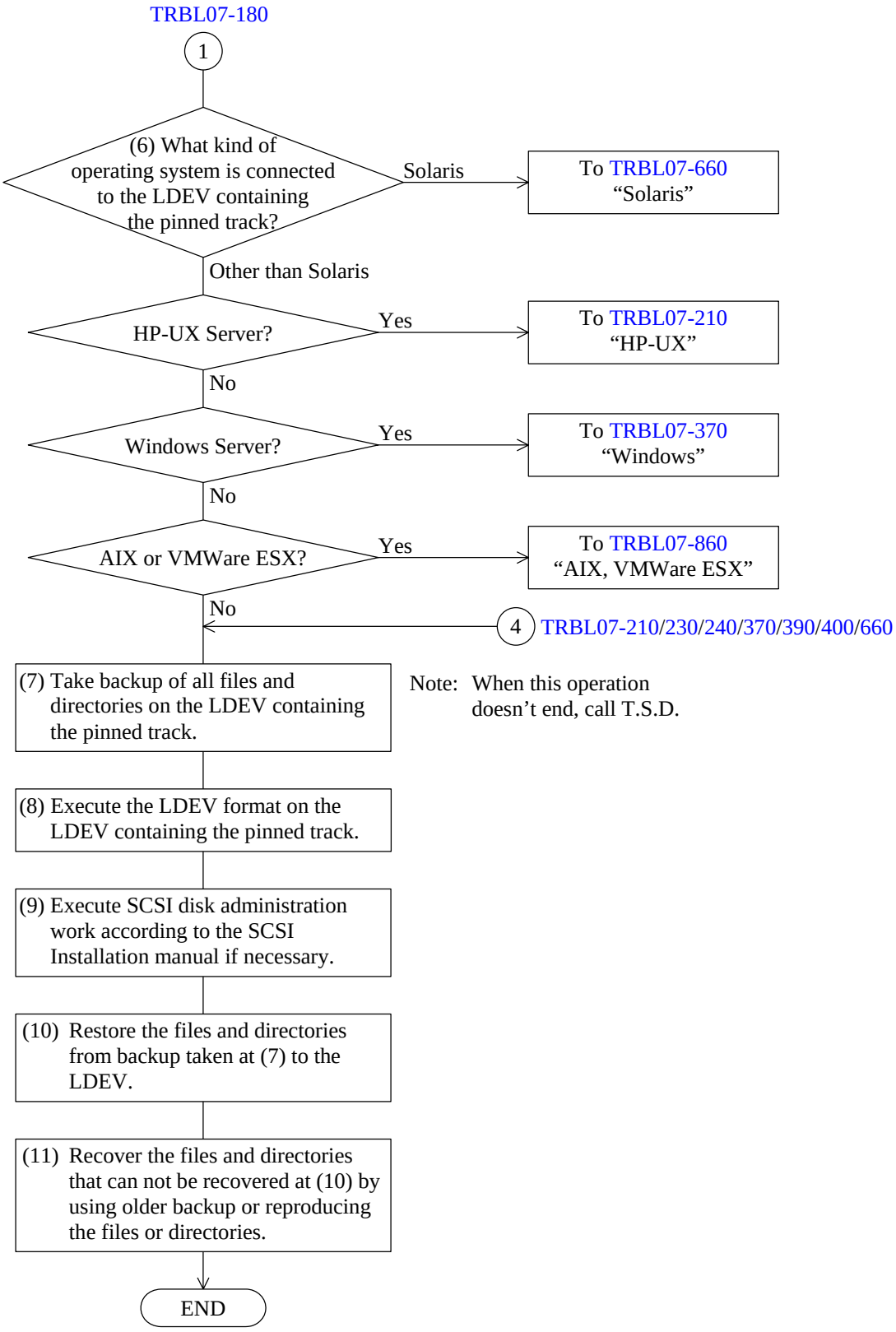
When read processing from the device in the external subsystem is performed, and Check Condition (Medium Error) is received due to a drive failure in the external subsystem, External VOL Read Error is set.

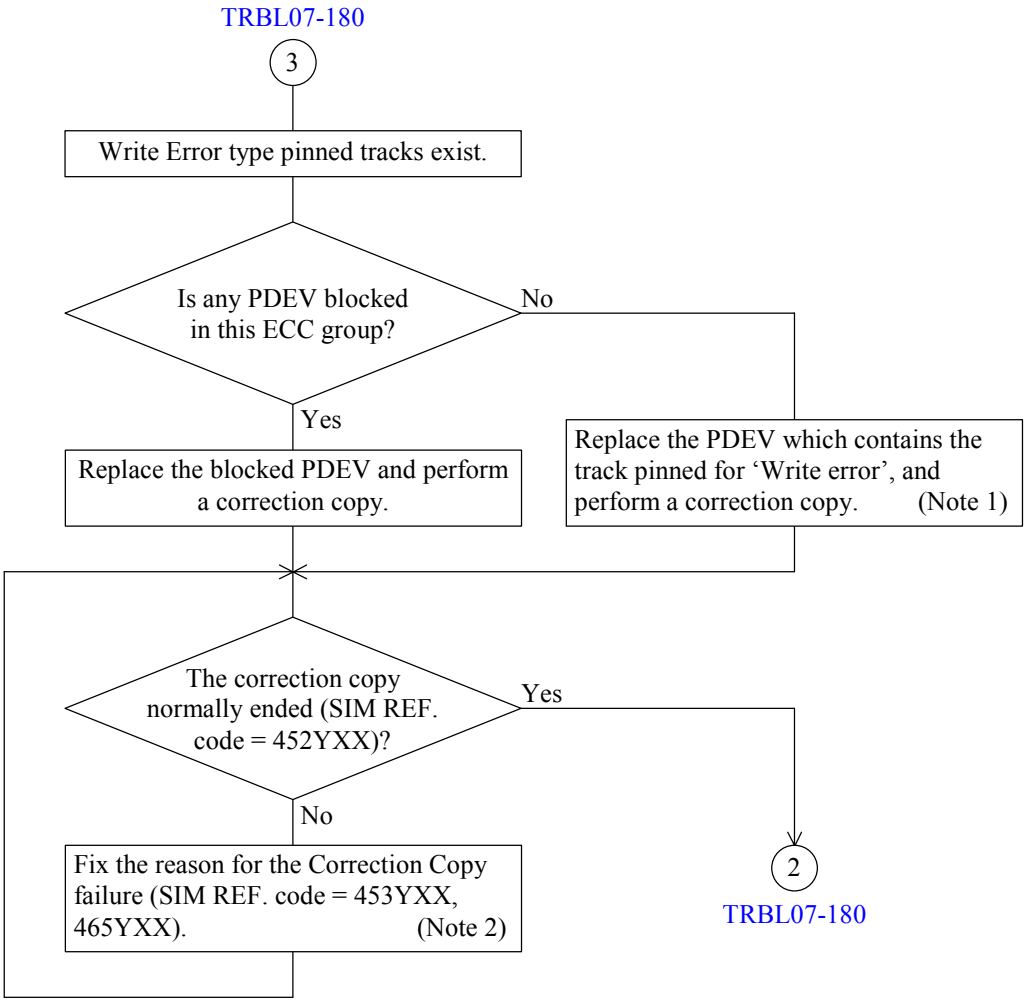
How to recover:

After recovering the device in the external subsystem, perform a dummy replacement of the cache package.

7.2.3 Pinned track erasing procedure







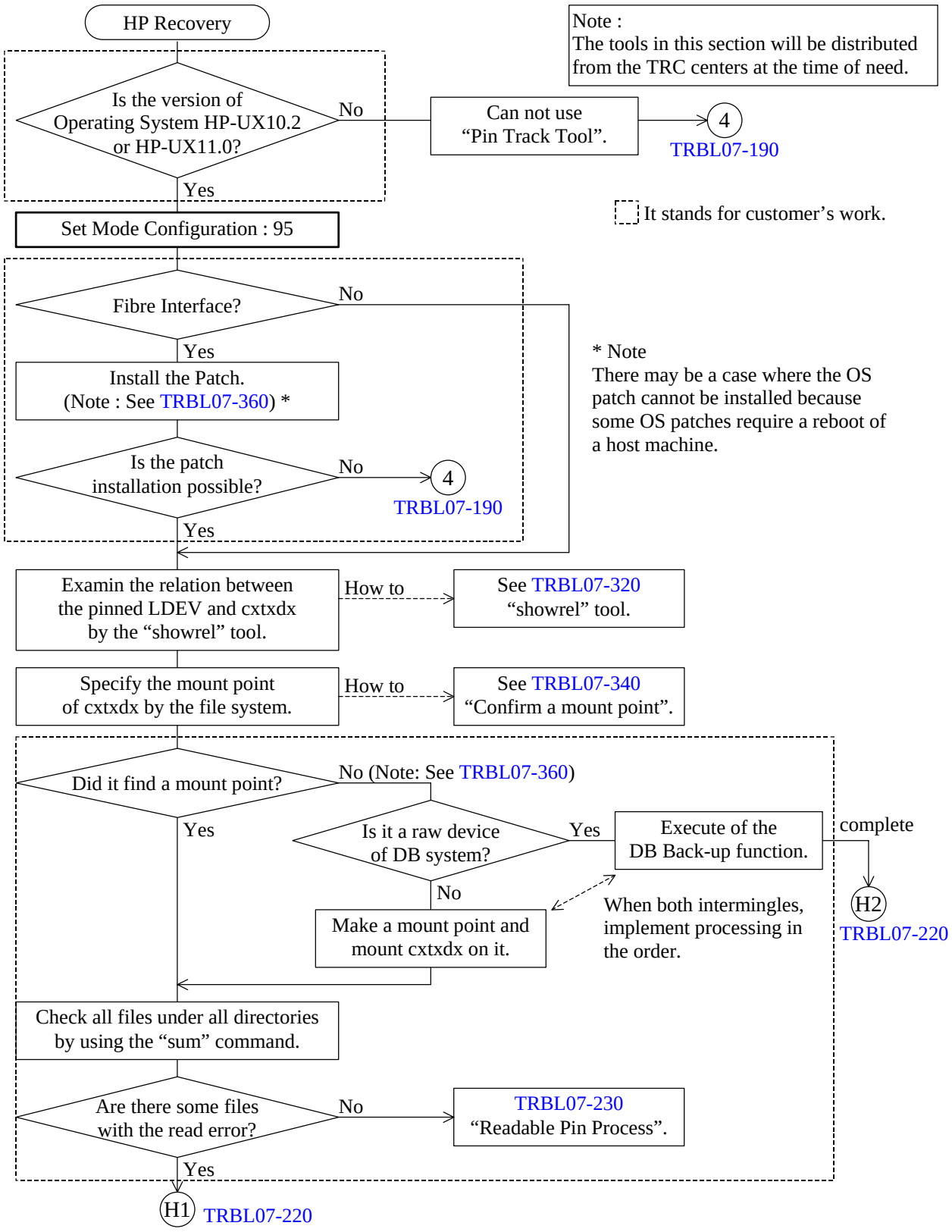
Note 1: If spare drives are available, you can perform Drive copy instead of Correction copy.

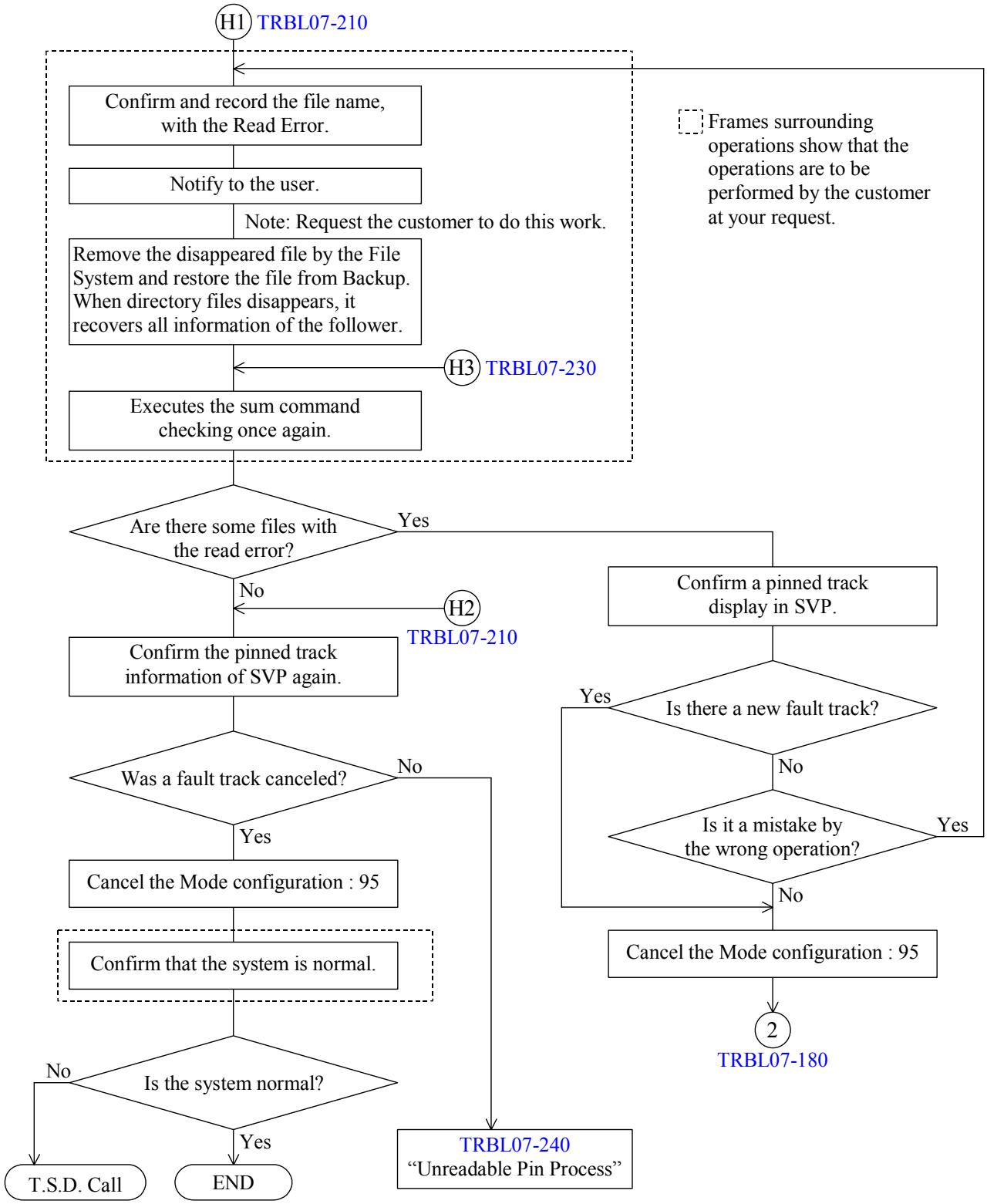
Note 2: If Drive copy abnormally ended, the SIM REF. code is "453YXX" or "465YXX".

7.2.3.1 HP-UX Procedure

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

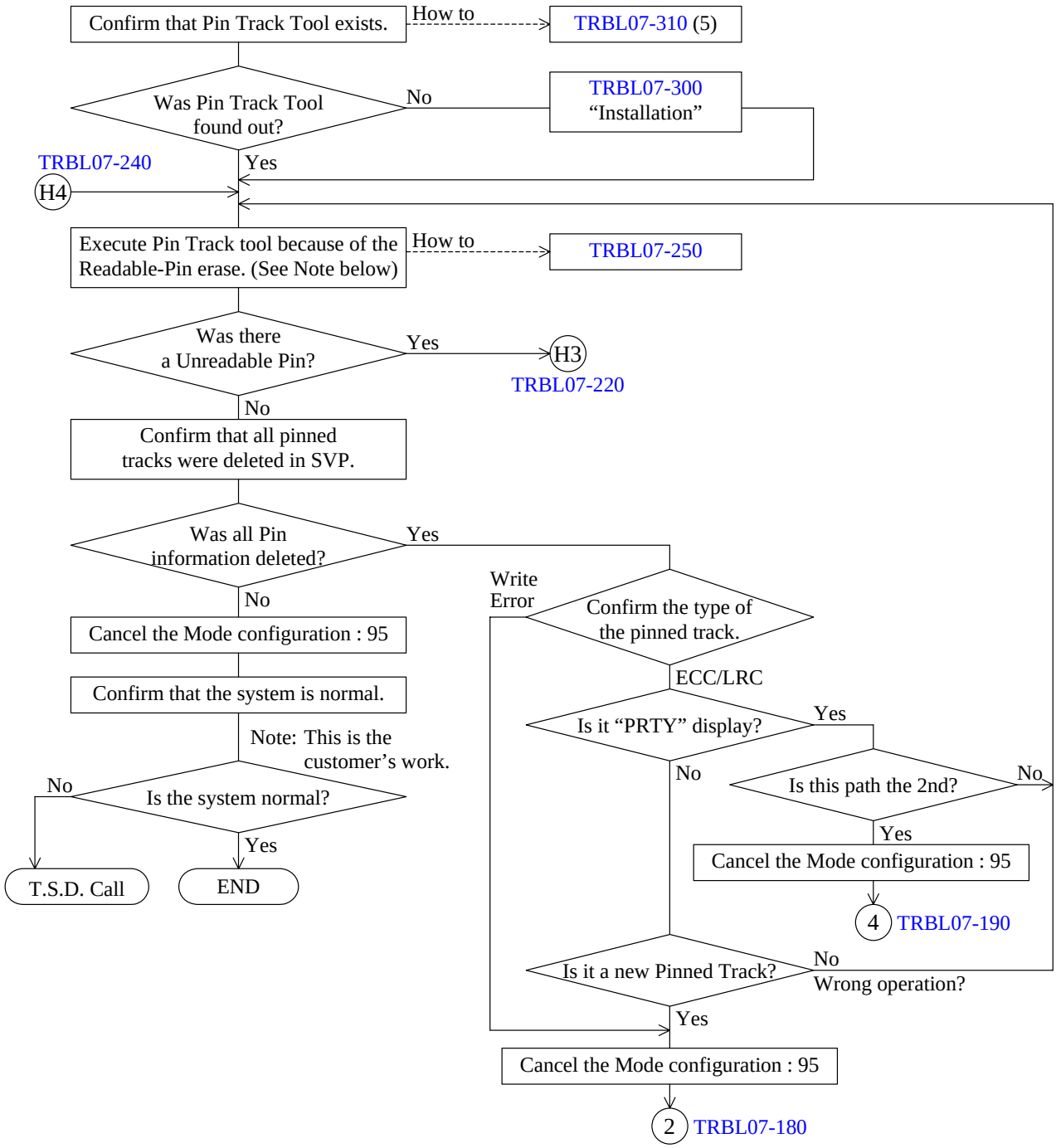
Procedure Flow





Readable Pin Process

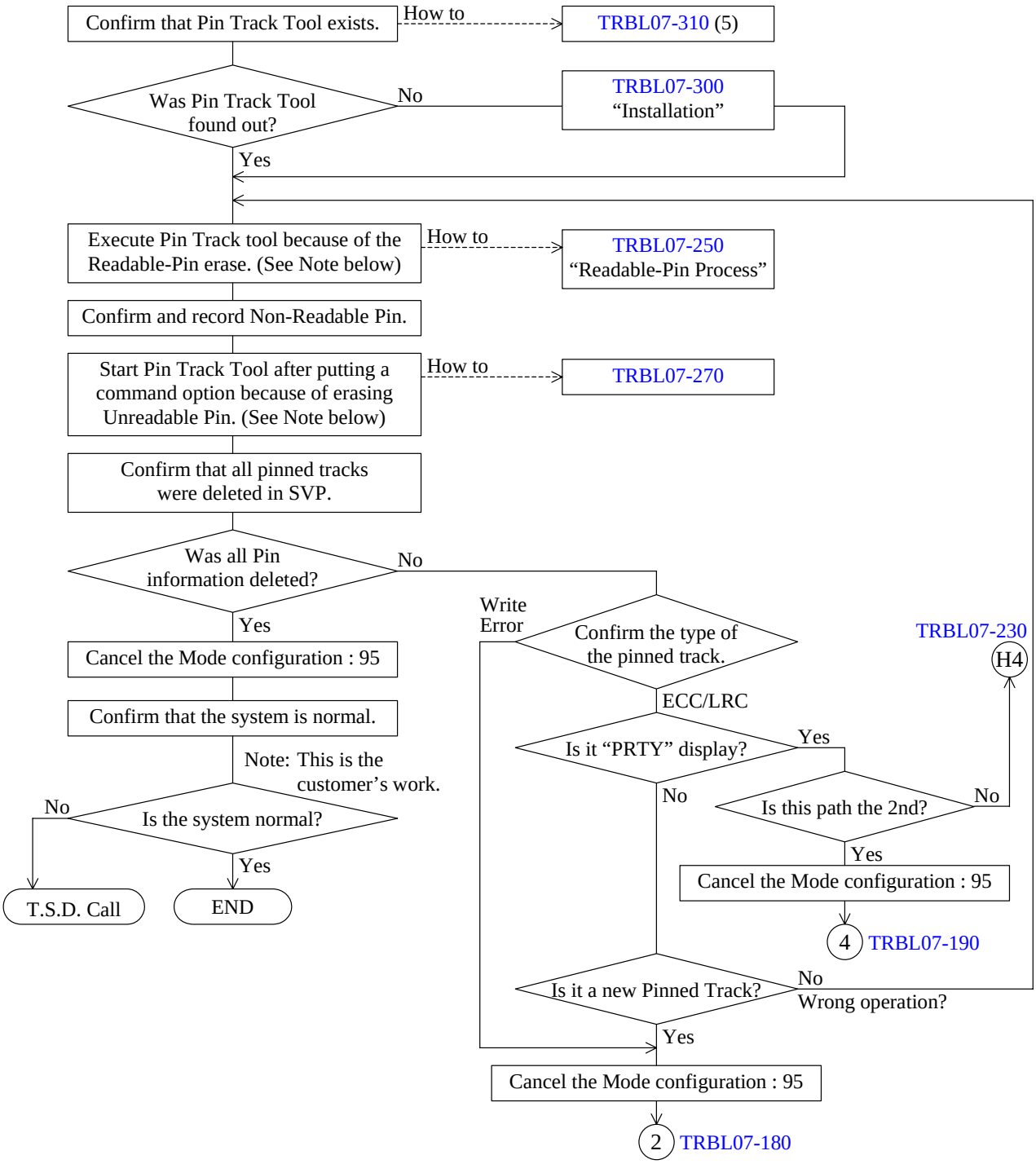
The erasing flow in the readable pinned track by Pin Track Tool is as follows.



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)

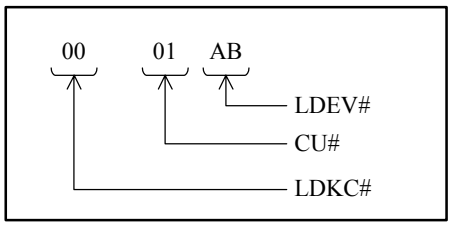
This chapter describes the tool "showrel" to acquire the device information.

(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.

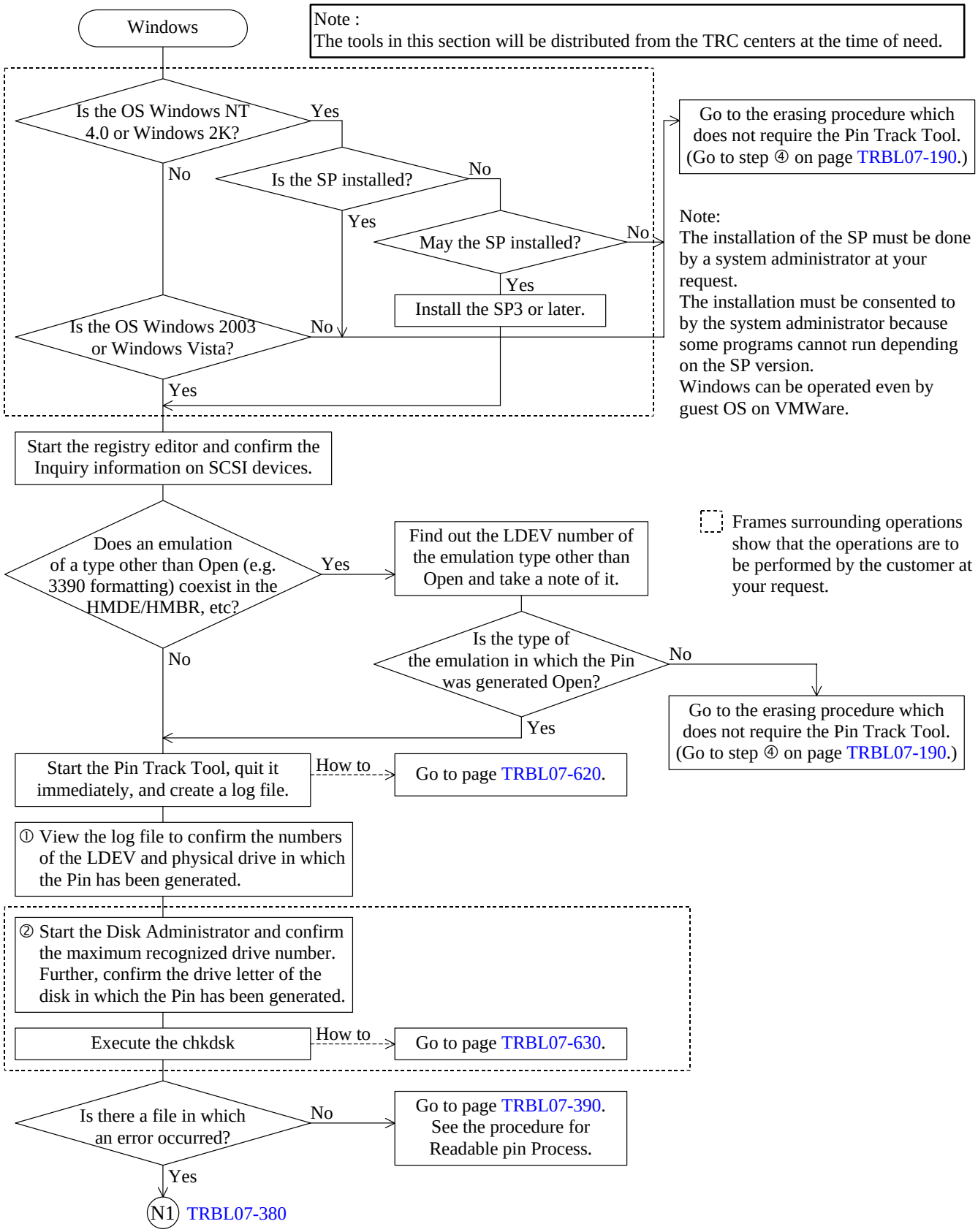
(2) File system-based Data Base type :
Mounted an File System.

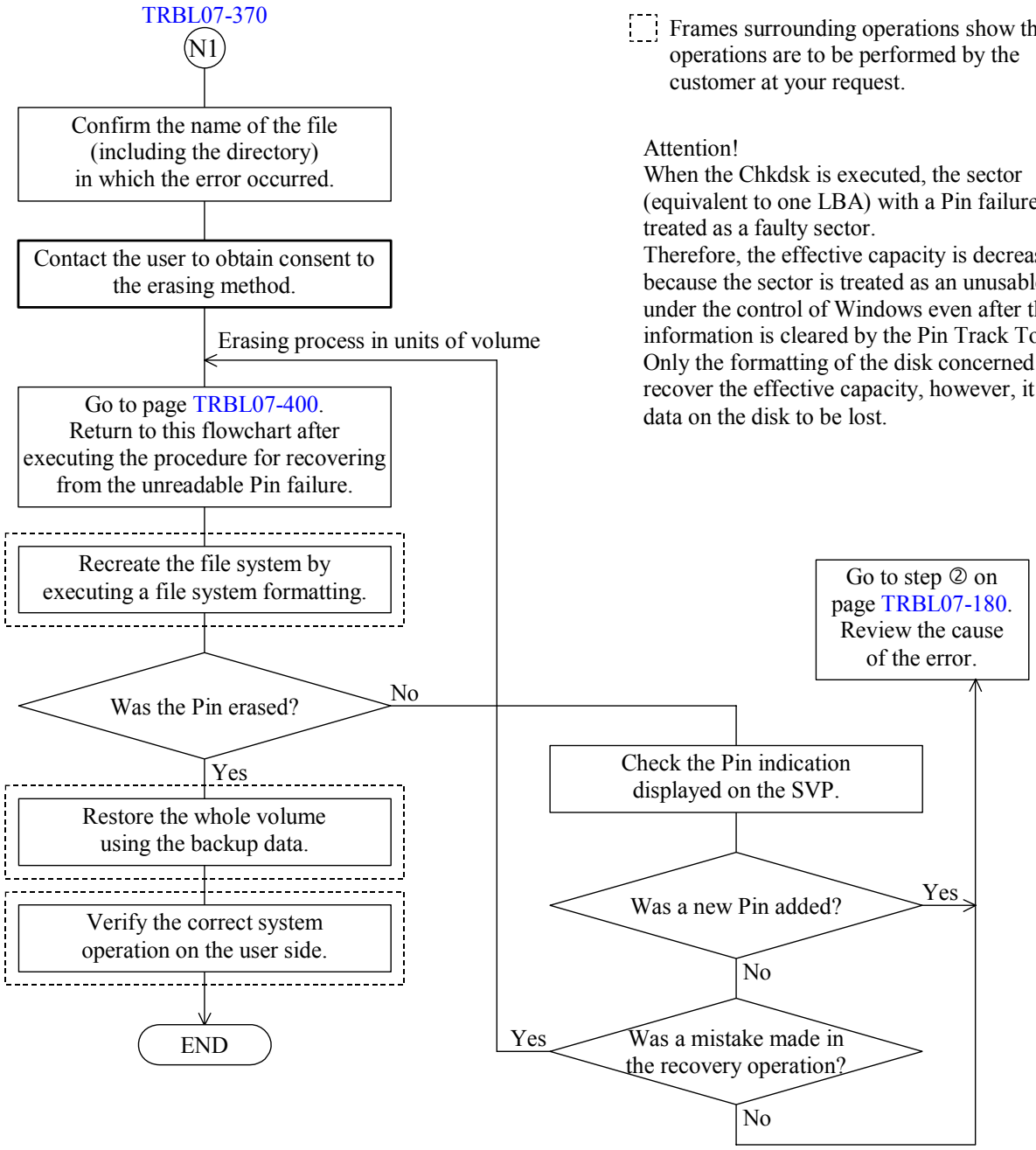
In case of (2), it is necessary to be restored from the backup data.
In case of (1), it be restored by the backup-restore feature of the DBMS.

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.

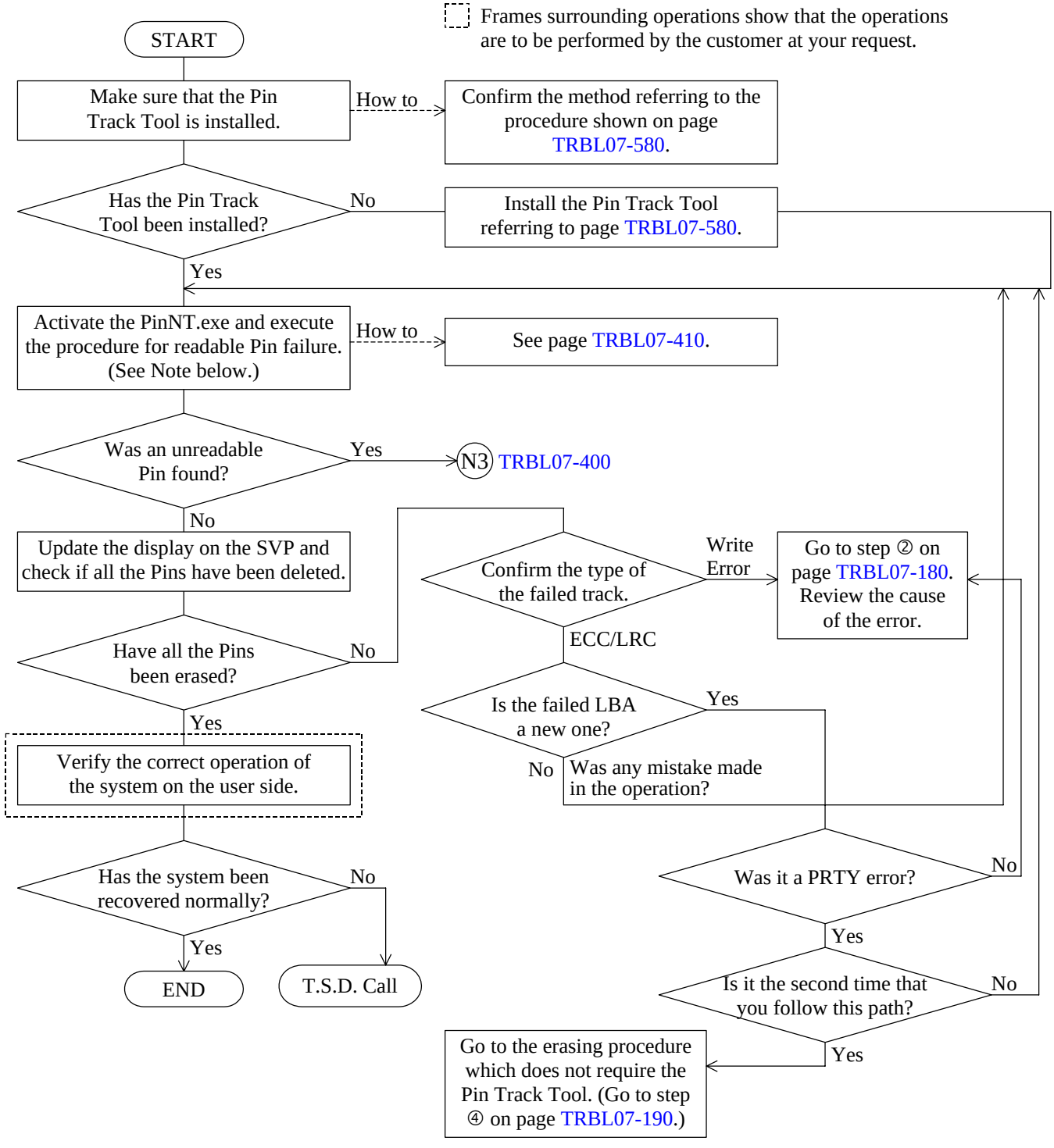




Frames surrounding operations show that the operations are to be performed by the customer at your request.

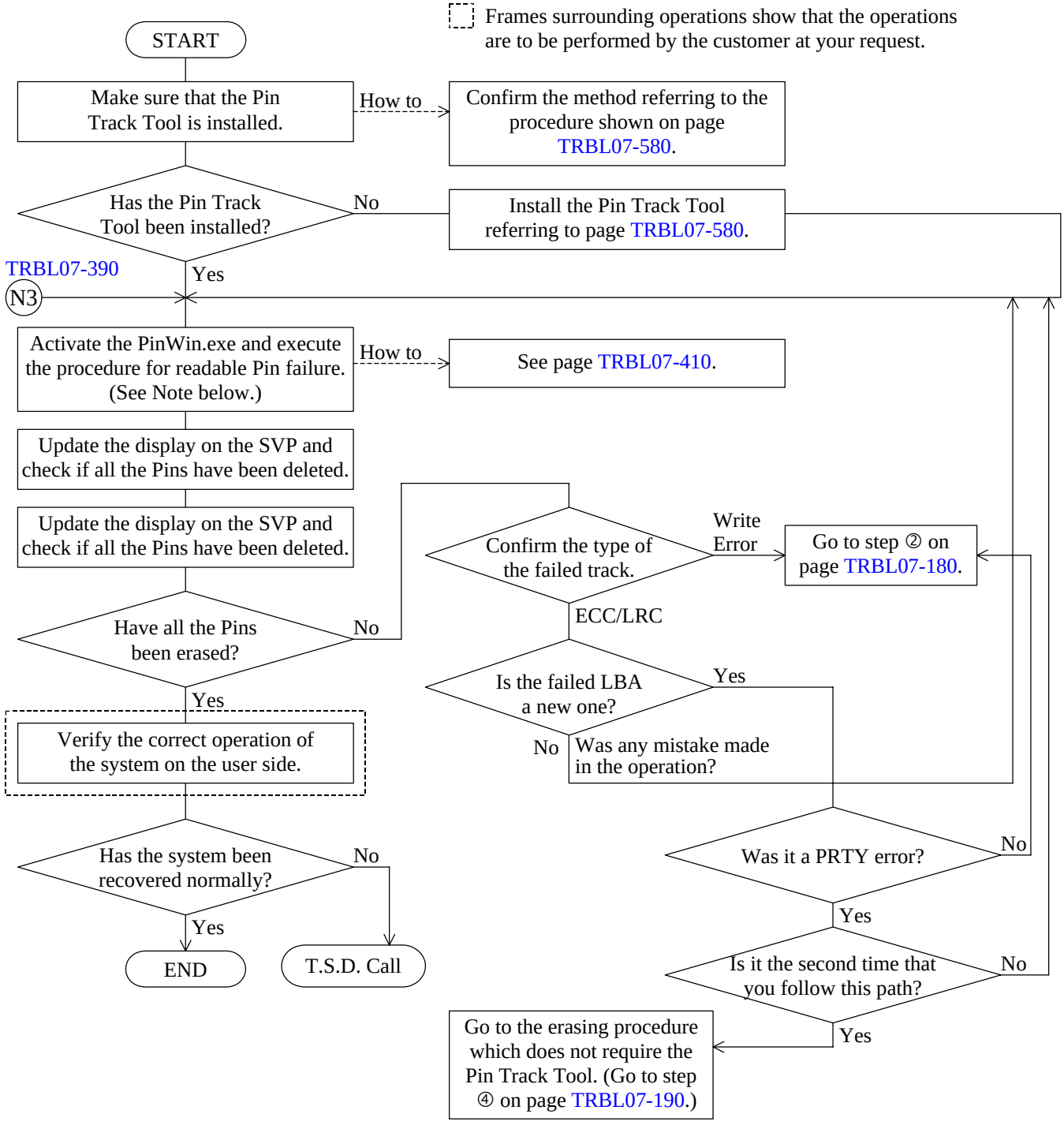
Attention!
When the Chkdsk is executed, the sector (equivalent to one LBA) with a Pin failure is treated as a faulty sector.
Therefore, the effective capacity is decreased because the sector is treated as an unusable one under the control of Windows even after the Pin information is cleared by the Pin Track Tool.
Only the formatting of the disk concerned can recover the effective capacity, however, it causes data on the disk to be lost.

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.

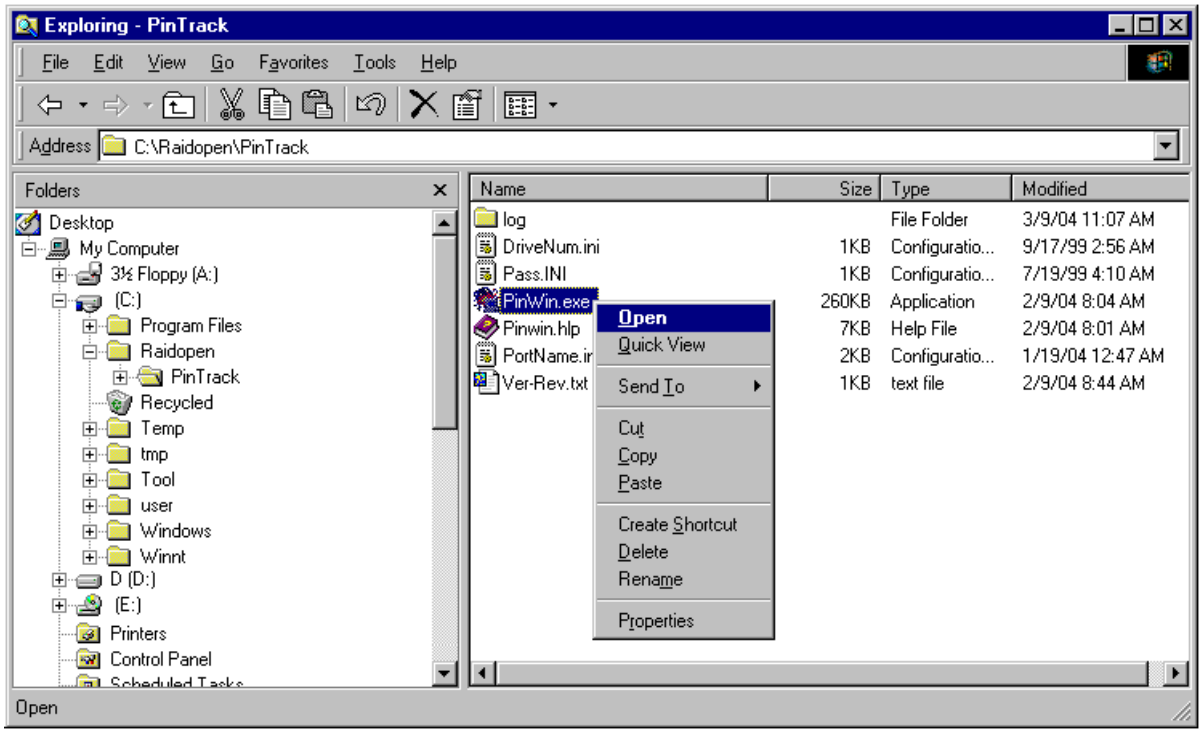
Operation of Readable Pin Process (Windows)

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.

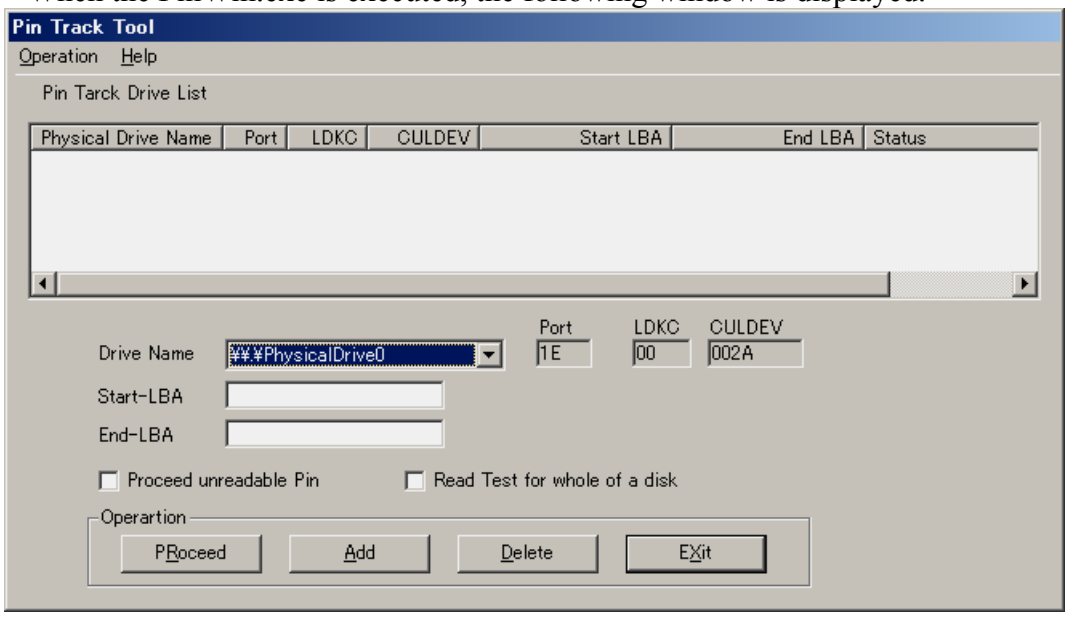
> Note: — On an SIM reported owing to a use of the Pin Track Tool —
>
> When two or more Pins have been generated in the LBAs adjacent in the same LU, a generation of a new temporary Pin caused by the parity calculation performed in the Pin Track process may occur and an SIM may be reported.
> Since 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.

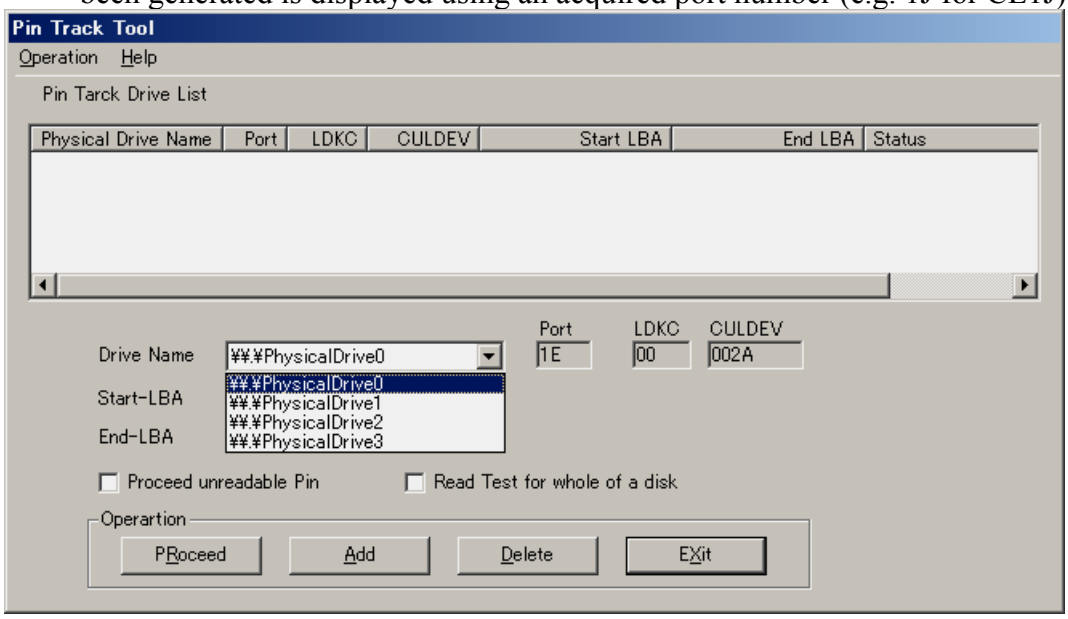


(2) Input the information, which has been got from the SVP, on the device from which the Pin is to be erased.

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

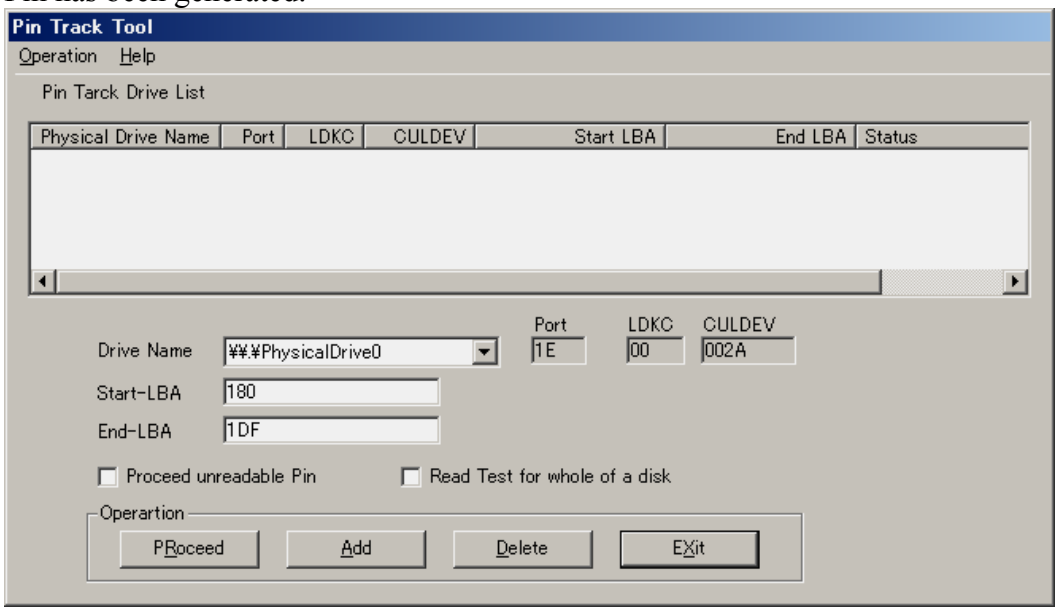
① Find a name of a drive to which the LDEV in which the Pin has been generated is allocated.

• 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.

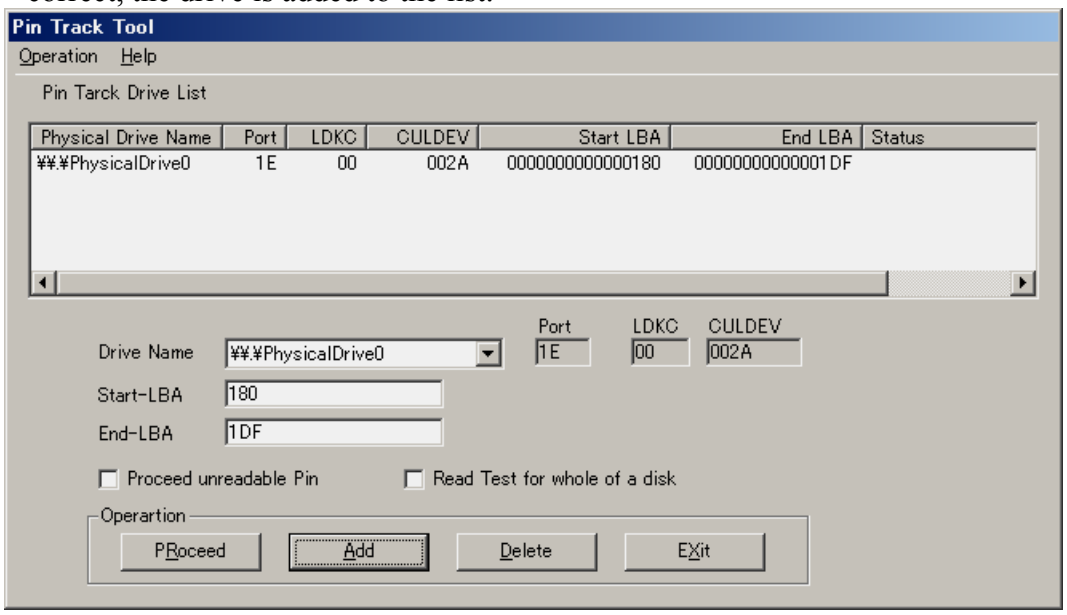


- When specifying the LBAs, the allowable range for them is as follows.
  Other than OPEN-V [End LBA - Start LBA ≤ 0x5F]
  OPEN-V [End LBA - Start LBA ≤ 0x1FF]

  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.



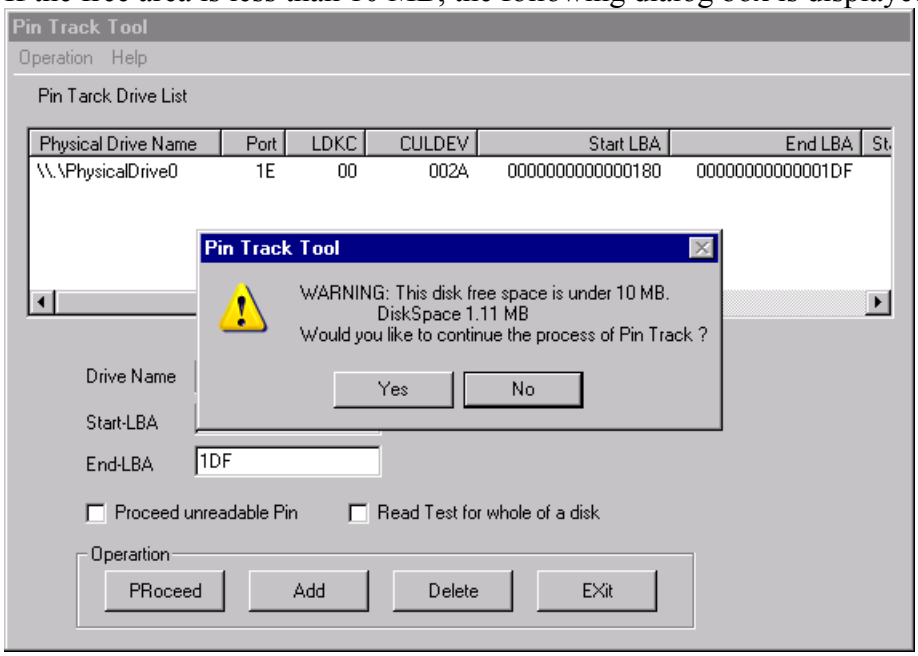
(4) Erase the readable Pin.

- 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.



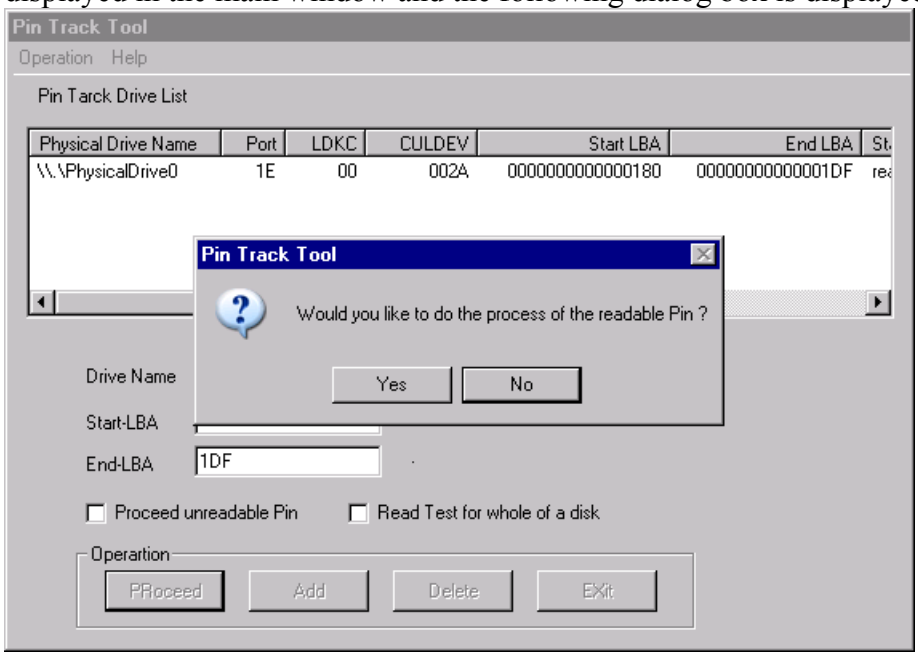
The current free area on the disk is displayed in the dialog box. A free area of approximately 400KB is required for (60)h length SLOT to erase a Pin. When the necessary free area is provided, the processing can be continued.

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.

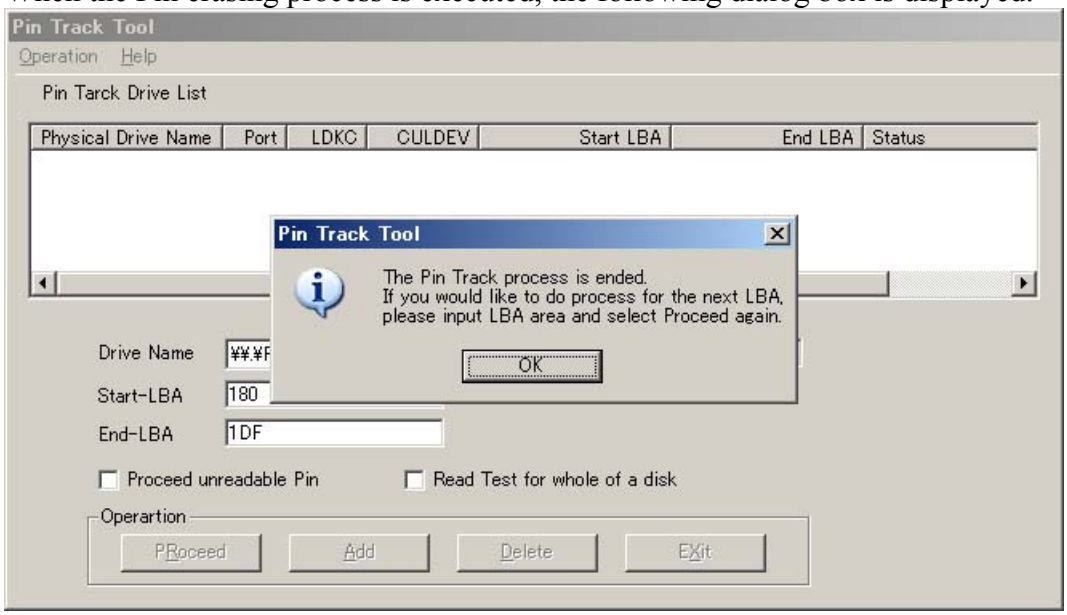
When the “PRoceed” button is clicked to continue the processing, status of each drive is displayed in the main window and the following dialog box is displayed.



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.

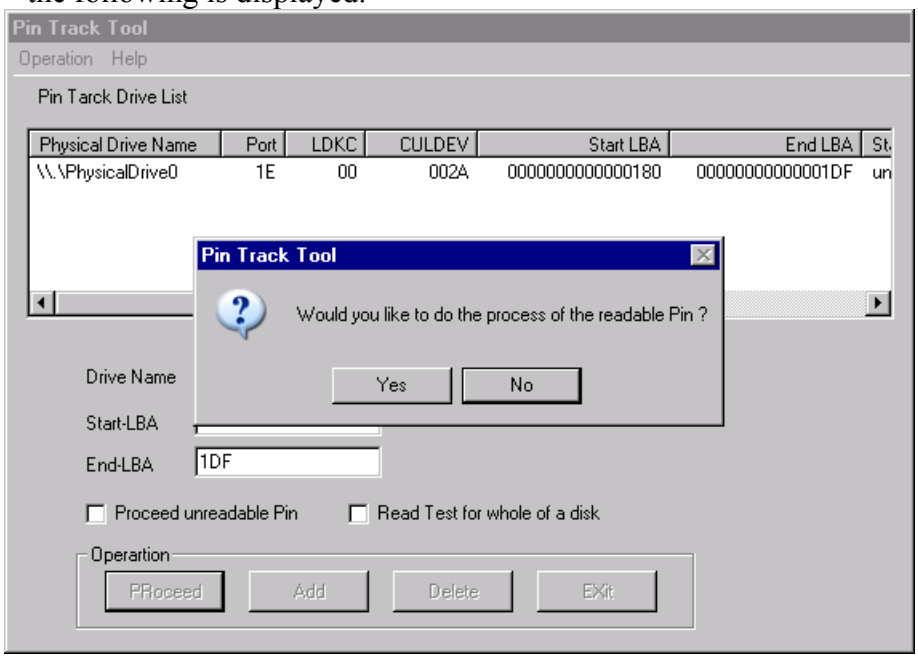
```
2000/03/27 13:22:16 Pin Track Tool started.

\\.\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.



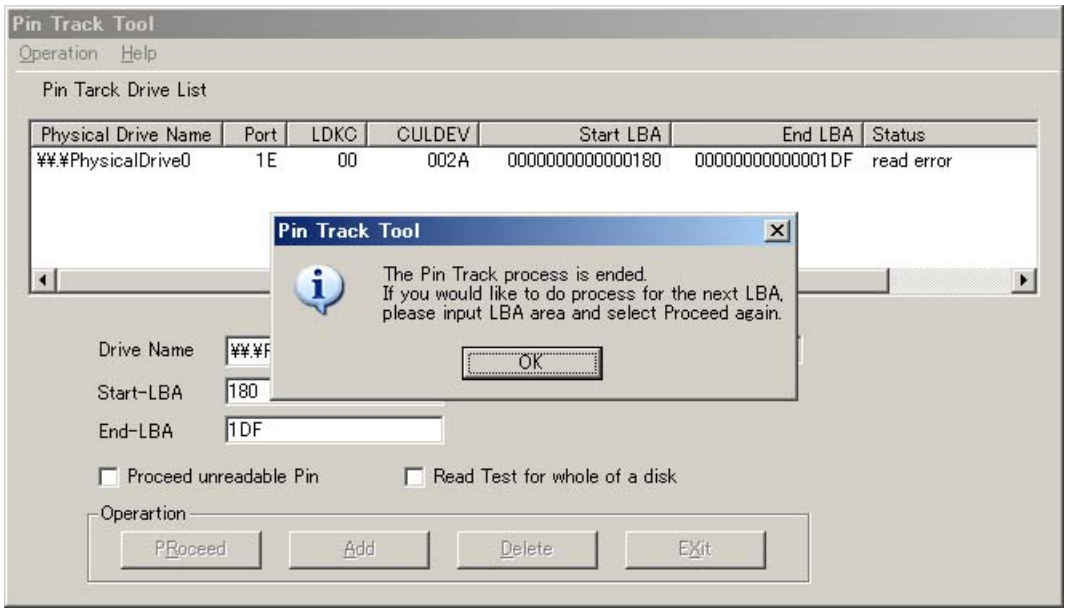
“unreadable” is displayed in the “Status” column showing that the slot is an unreadable Pin. In this case, the Pin is not erased even if the procedure for erasing a readable Pin is executed and the device is not deleted from the list as follows.

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)

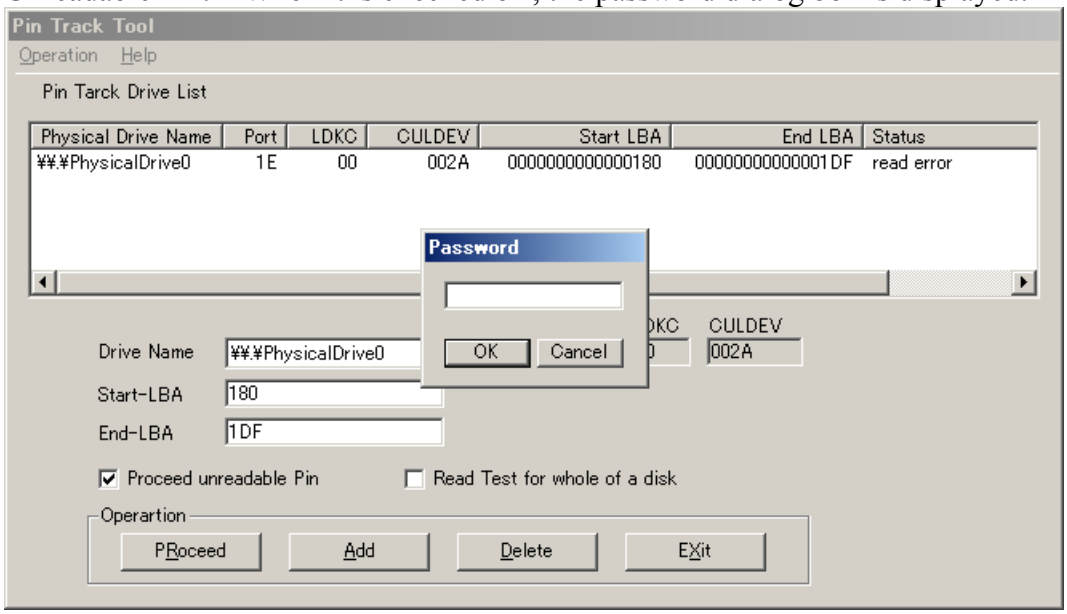
The following explains how to operate the Pin Track Tool for erasing an unreadable Pin. Since the procedure for erasing a readable Pin is to be applied to all the Pins first, follow the procedure below after executing the procedure given in Subsection TRBL07-410, "Operation of Readable Pin Process".

> 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.

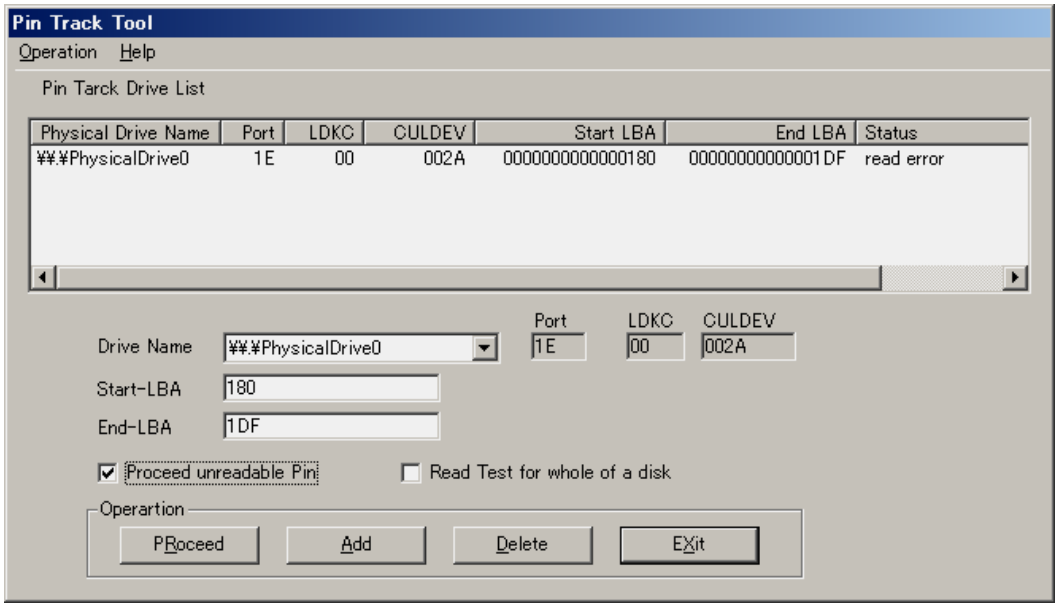


The password is to be obtained from the Technical Support Division. Without the password, the unreadable Pin cannot be erased.
Input the password and click the "OK" button.
When the correct password is input, the check box is checked off.

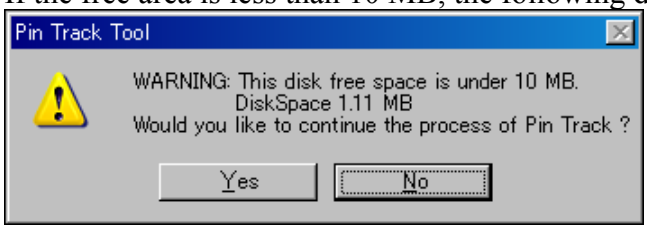
If the box is not checked off although the correct password has been input, copy the Pass.INI file in the folder in which the tool is installed from the media for installation again.

(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.



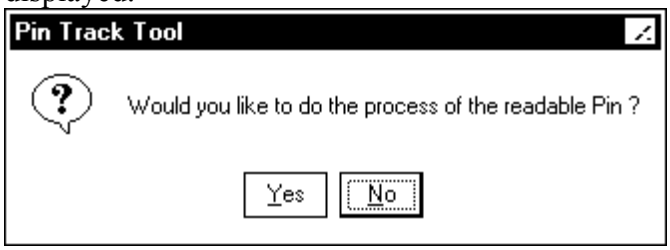
The current free area on the disk is displayed in the dialog box. A free area of approximately 400KB is required for (60)h length SLOT to erase a Pin. When the necessary free area is provided, the processing can be continued.

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

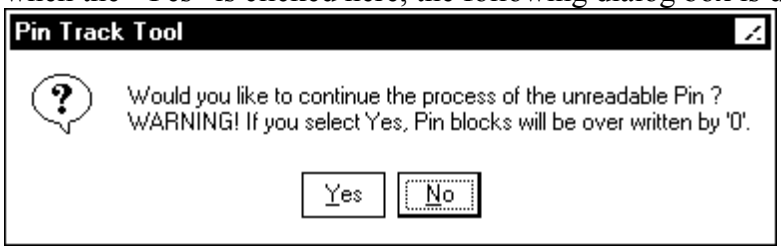
When "Yes" is selected, the processing is continued. If the disk capacity is less than that required for the log, as large log file as can be accommodated is acquired.
Normally, select "Yes" only when the free area is enough.

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.

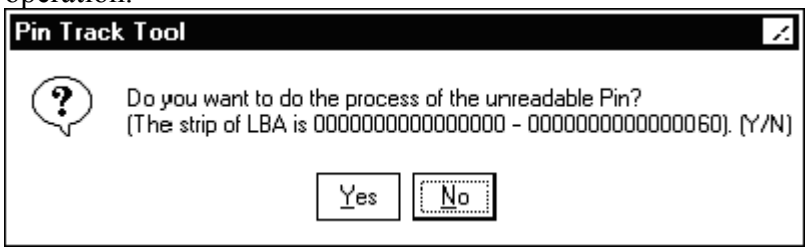


Try to erase the readable Pin first. When the readable Pin Track process cannot be executed when the “Yes” is clicked here, the following dialog box is displayed.



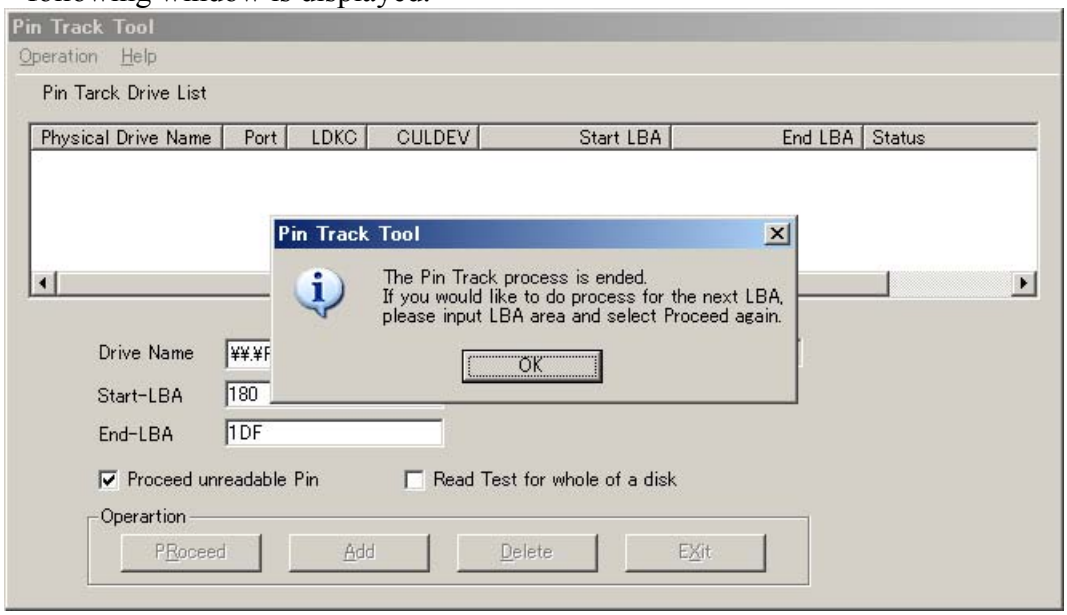
A dialog box for confirming whether to execute the unreadable Pin Track process is displayed. Execution of the unreadable Pin Track process must be decided carefully because it overwrites the Pin blocks with “0” data.

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.

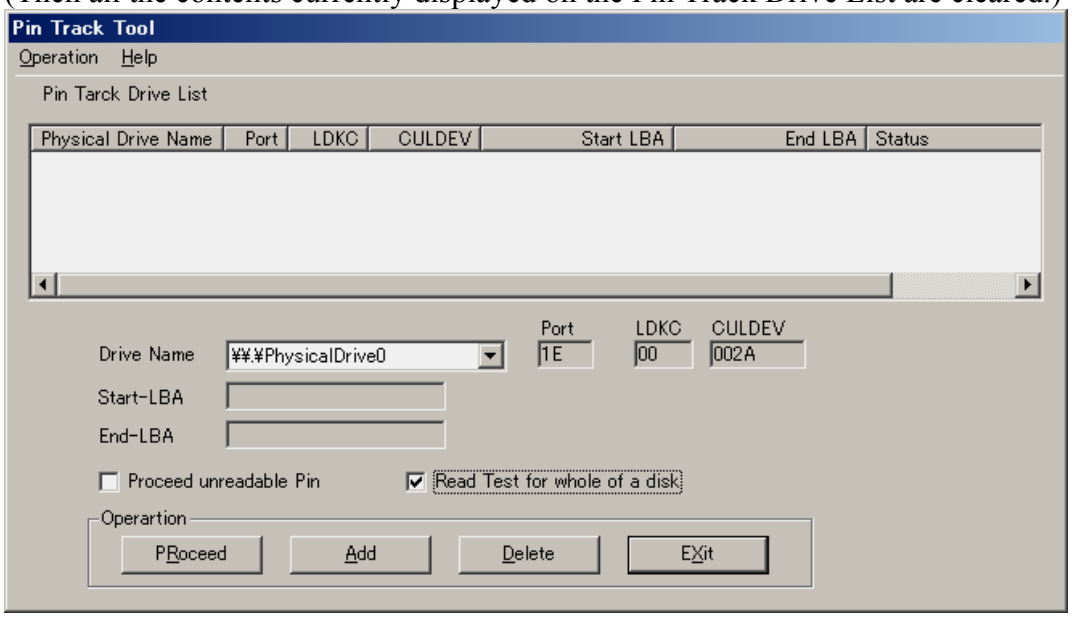
- Open the PinTrack.log file in the folder in which the tool is installed by using a memo pad, etc.
  The log file is backed up to the log folder under the directory in which the tool is installed with a name given as "PinTrack-year-month-date-hours-minutes-seconds.log".
- When "Pin Track process is 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.

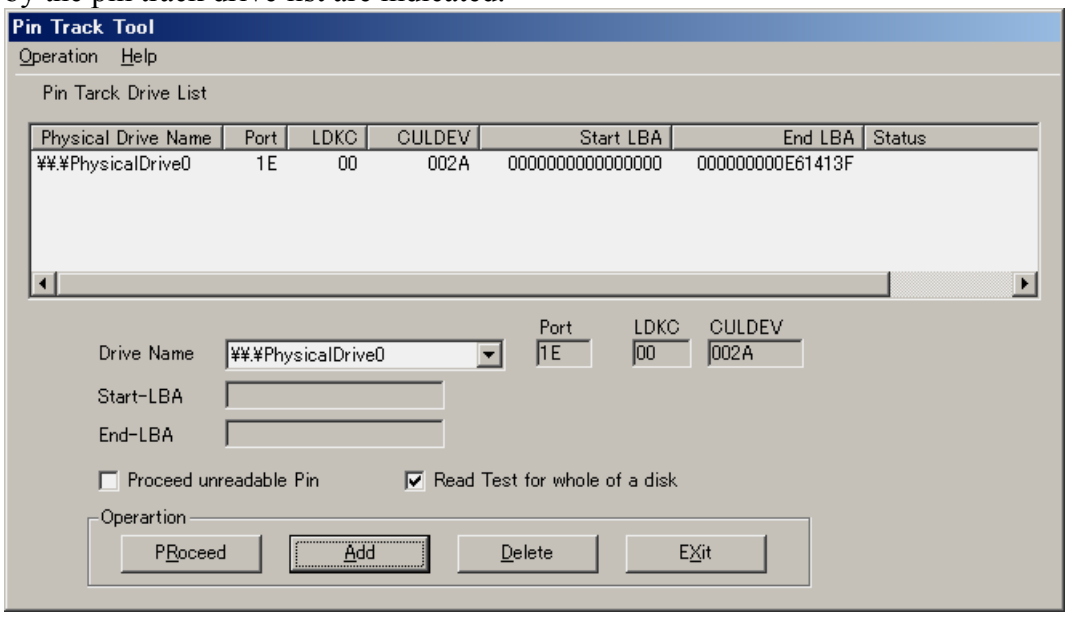
How to Read Test for whole of a disk (Windows)

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.



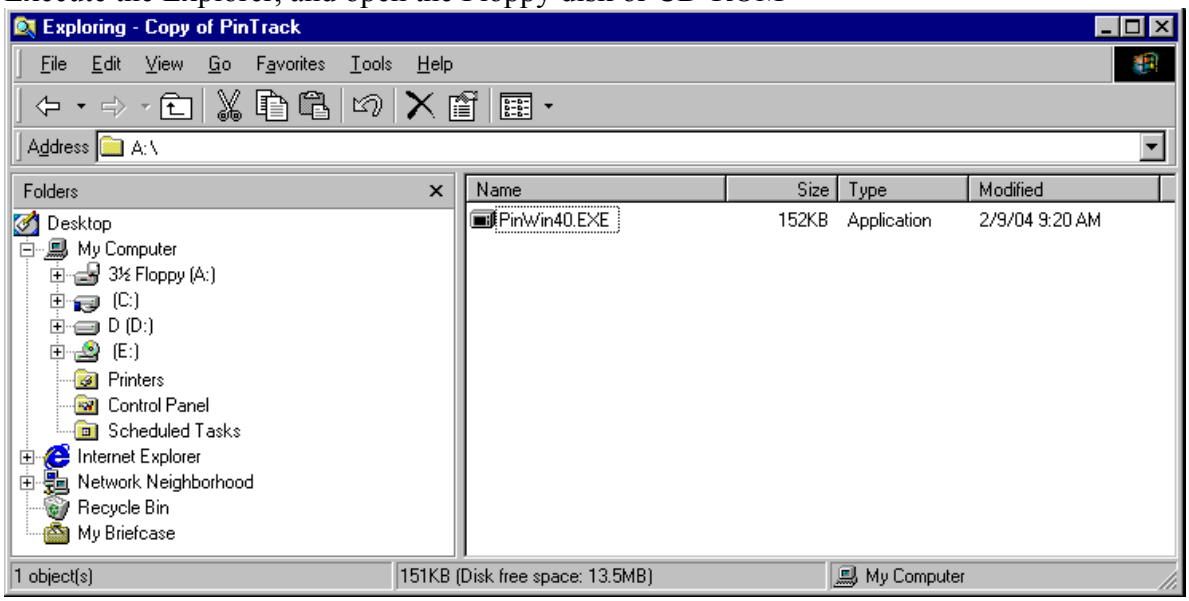
(3) All LBA in the selected device is started by clicking “PRoceed” button.
(This function is only reading and writing is not performed.)

Installation of Pin Track Tool (Windows)

Note: Perform the installation only when it is required.

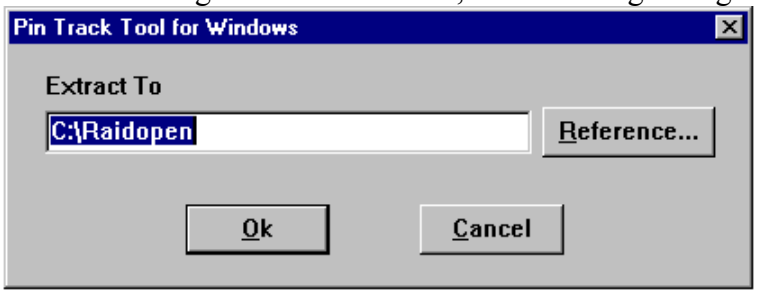
<Preparation>
The Pin Track Tool is provided being contained in one 3.5-inch floppy disk or CD-ROM. A free area of more than 10 MB is required on the disk on which the program is to be installed as the area for collecting a log. The size of the log file is approximately 400 KB per one erasing process 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



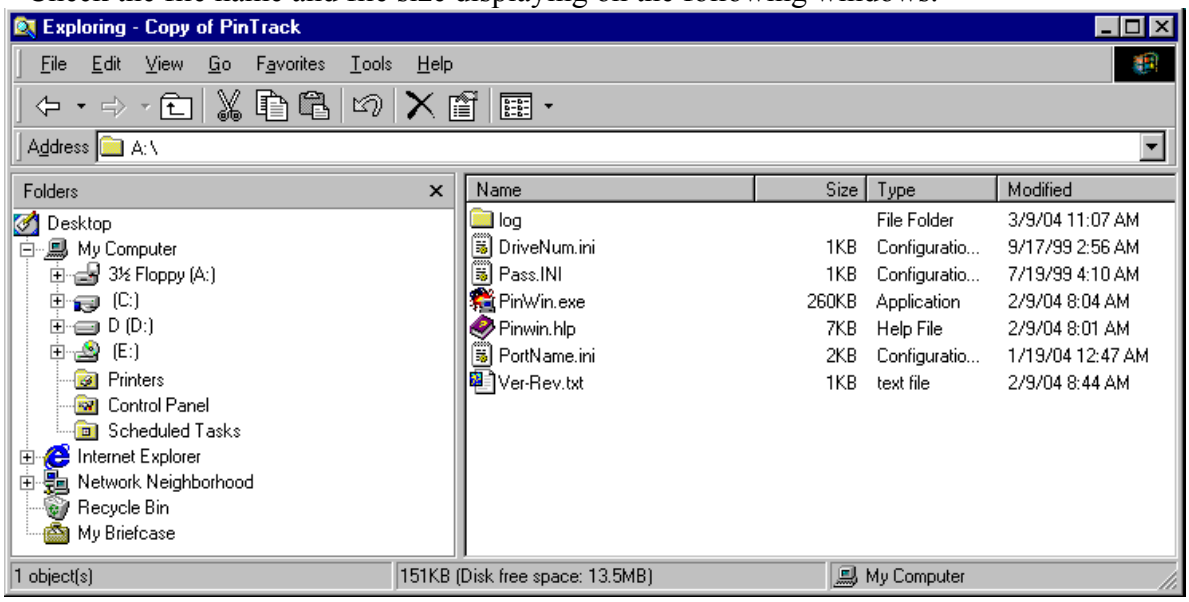
For CD-ROM, the path is different.
(Example : X:\Program\Ment\PINTRACK\WIN\)

(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.

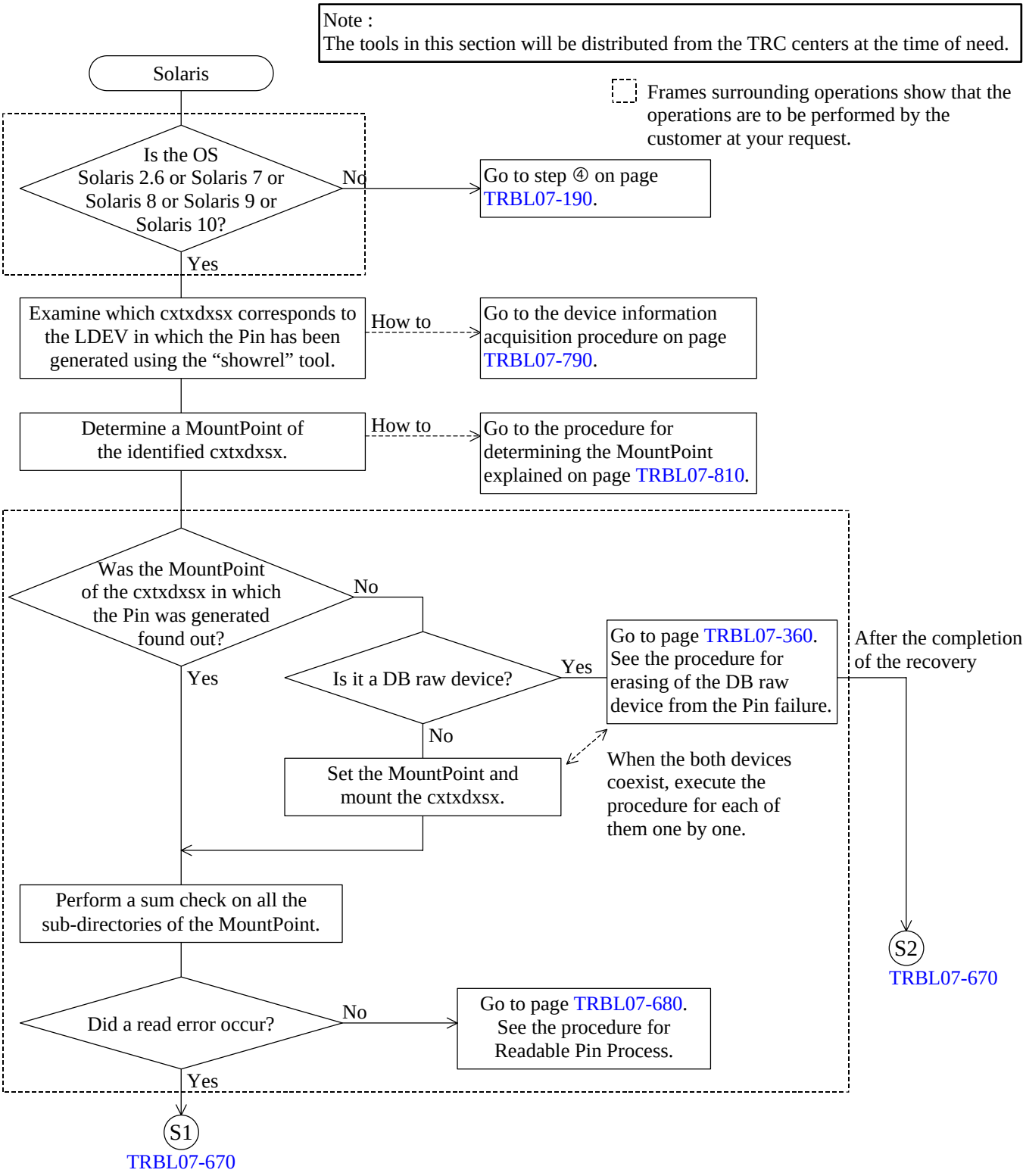
- When an unreadable Pin is generated in the head LBA, the Pin cannot be erased.
  The management information including the device geometry is recorded in the range of LBA0x0 to 0x5F (except for OPEN-V), LBA0x0 to 0x1FF (OPEN-V), to the slot#15. If a Pin including this range is generated, the device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

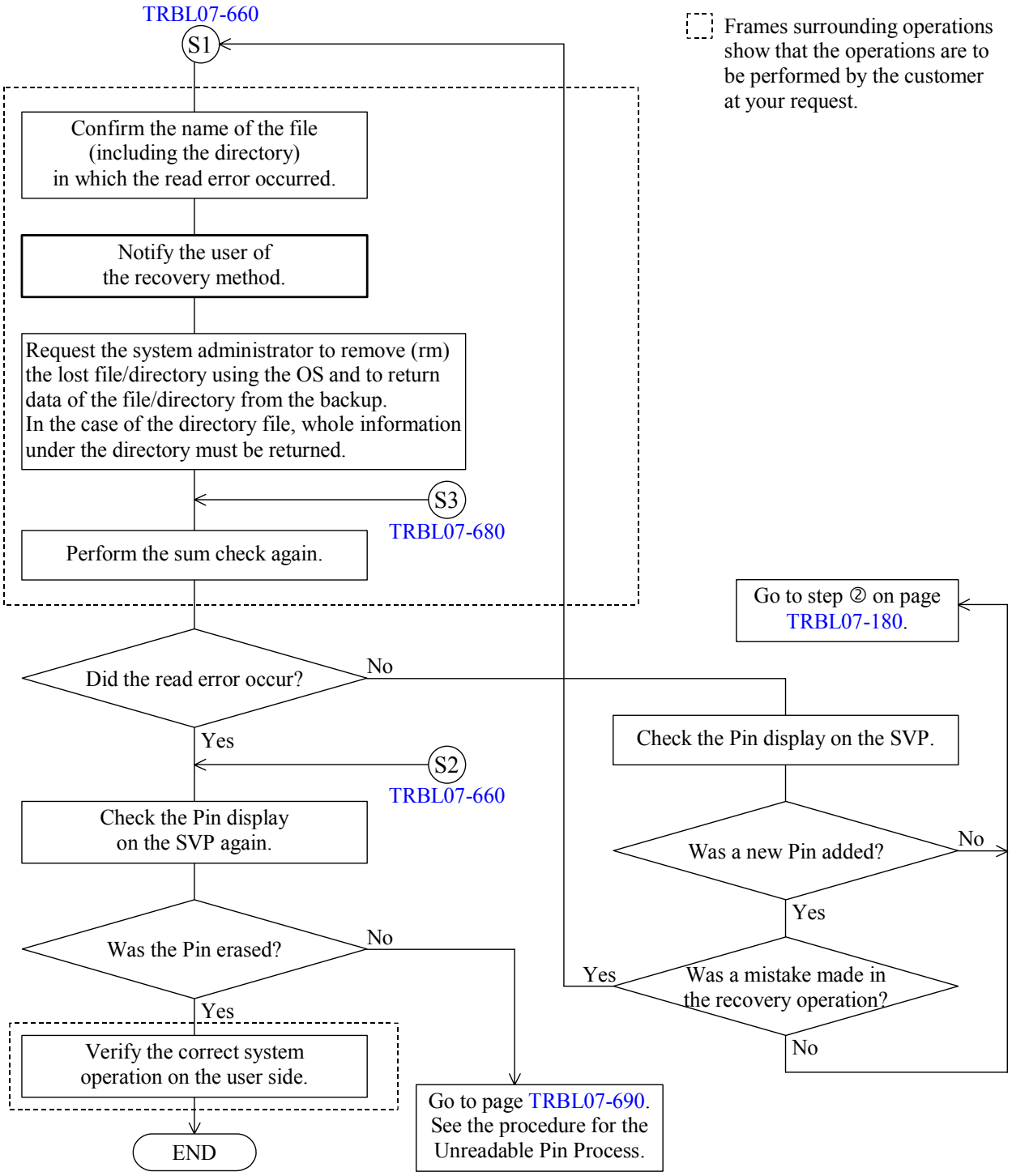
- Specify the LBA to be input in the Pin Track Tool correctly.
  When the input LBA is wrong, Solaris judges the specified range to be an unreadable Pin. Even if you try to apply the unreadable Pin Track process to it specifying the range, a write error will be caused and it is not erased. Make sure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

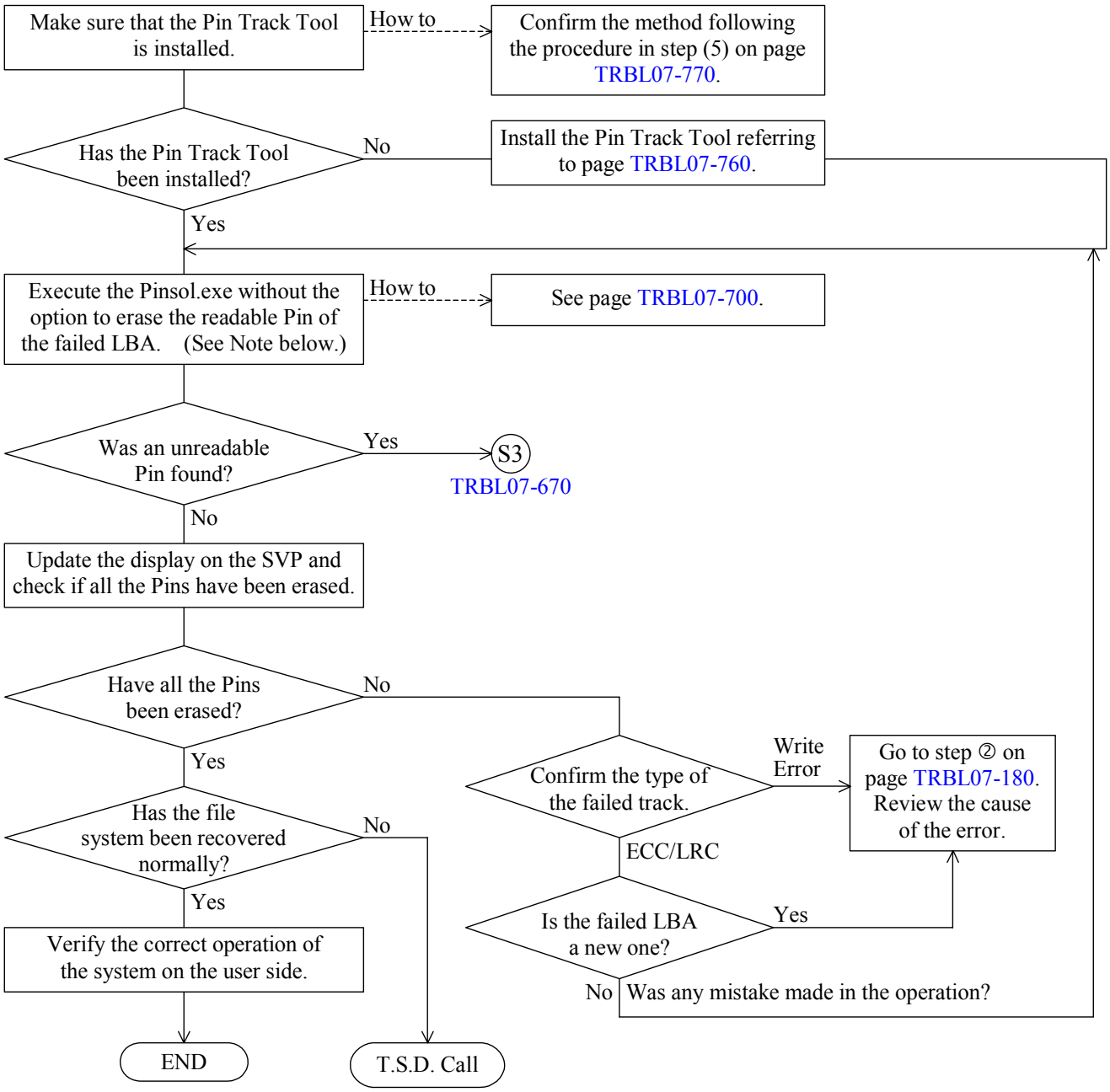
When you have to eliminate the unreadable LBA in the file system on the above conditions, operate according to the flowchart on the following pages.

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



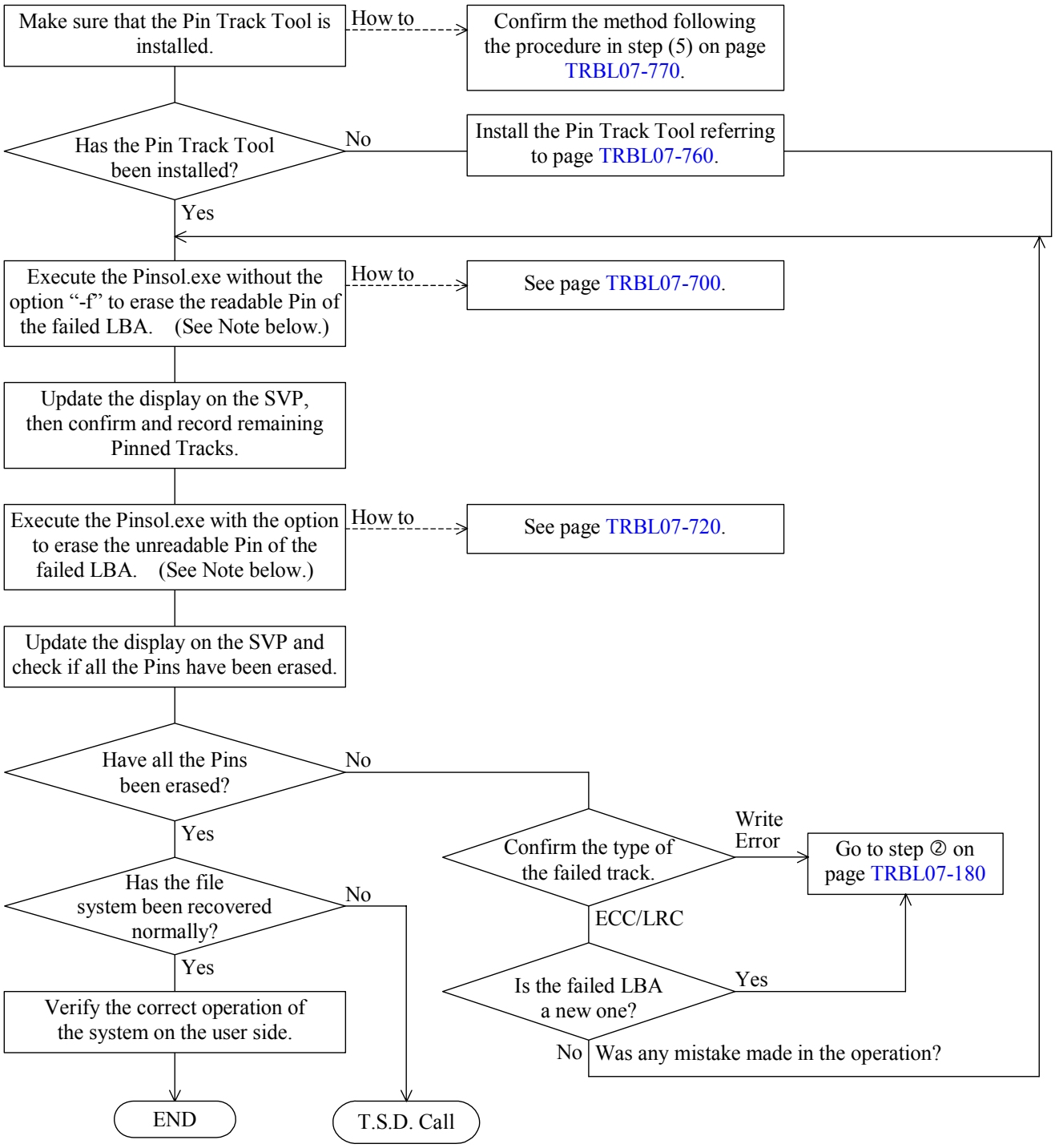


Readable Pin Process (Solaris)



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 Section 6.2, "Acquisition of Device Information".
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 Section TRBL07-790, "Acquisition of device information".
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=00000000000000FA0 End=00000000000000FFF
DeviceName=c0t3d0s6 Port=1C LDKC=00 LDEV=0123
                          Start=00000000000000FA0 End=00000000000000FFF
```

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=00000000000000FA0 End=00000000000000FFF
DeviceName=c0t3d0s6 Port=1A LDKC=00 LDEV=0123
                          Start=00000000000000FA0 End=00000000000000FFF
```

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

Blank Sheet

Blank Sheet

7.2.3.4 Procedure on AIX, VMWare ESX

The following shows how to erase a pin failure on AIX, VMWare ESX.

=Notices=

○ Ensure a free capacity on the disk on which the Pin Track Tool is to be installed.

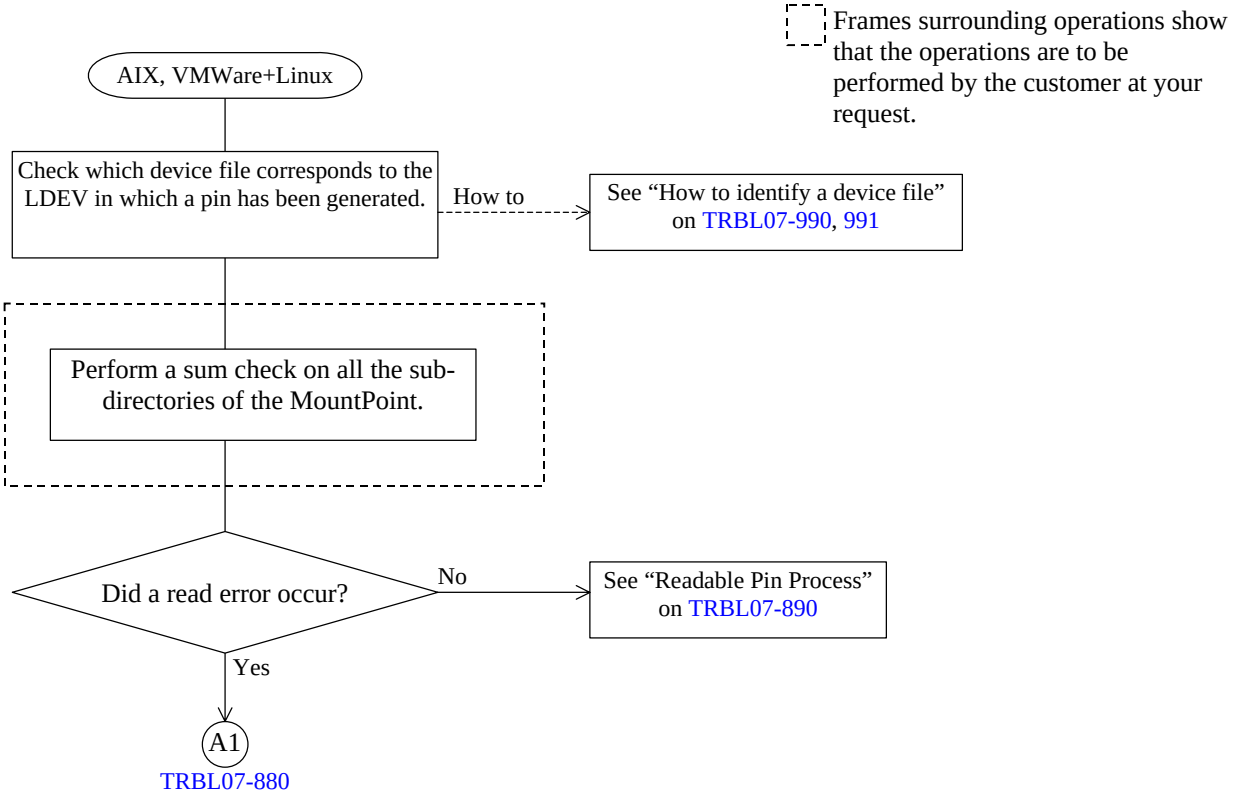
○ When an unreadable pin is generated in the head LBA, the pin cannot be erased.
The management information including the device geometry is recorded in the range of LBA0x0 to 0x5F (except for OPEN-V), LBA0x0 to 0x1FF (OPEN-V), to the slot#15. If a pin including this range is generated, the device cannot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

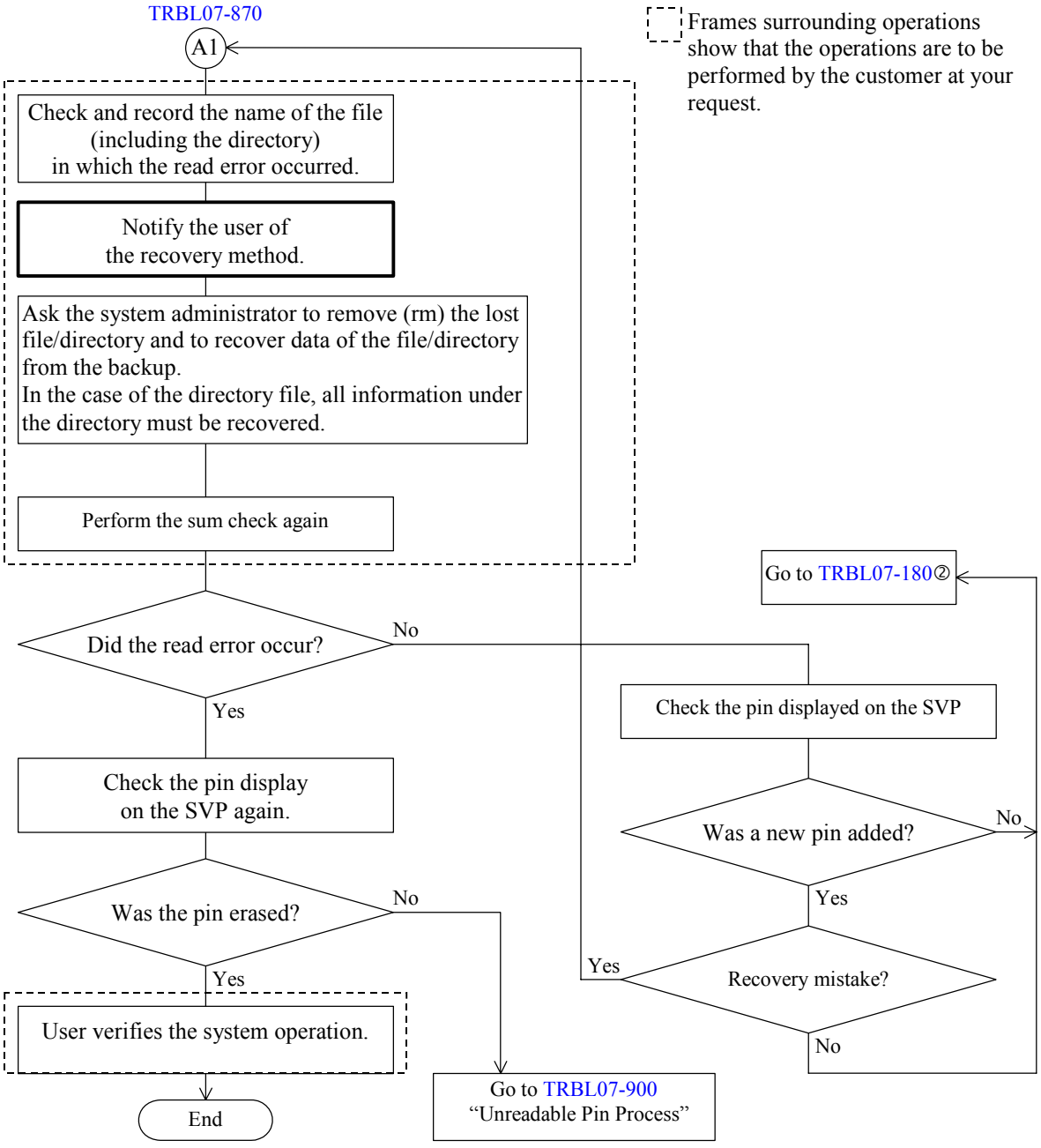
○ Specify the LBA to be input in the Pin Track Tool correctly.
The host cannot determine whether or not a pin has been generated in the input LBA. It performs a pin recovery or erases an unreadable pin for the input LBA. Therefore, if you input information improperly, data may be lost.

○ After executing the pin track process, see the log to confirm that it has completed normally.

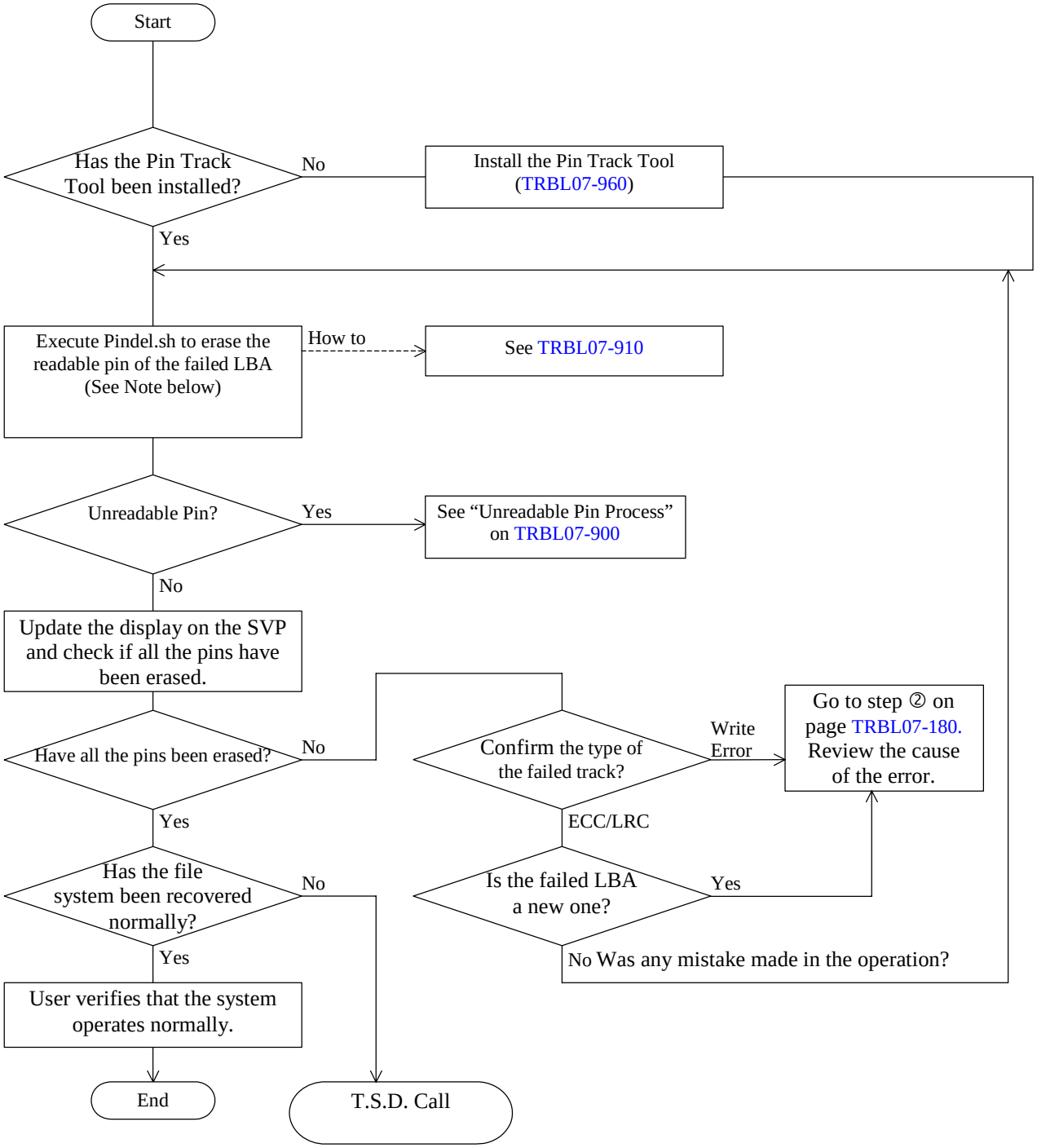
To delete the unreadable LBA in the file system under the above-described conditions, perform operations according to the flowchart on the following pages.

○ The flow shows the procedure in the case a pin failure occurs on AIX, VMWare ESX.



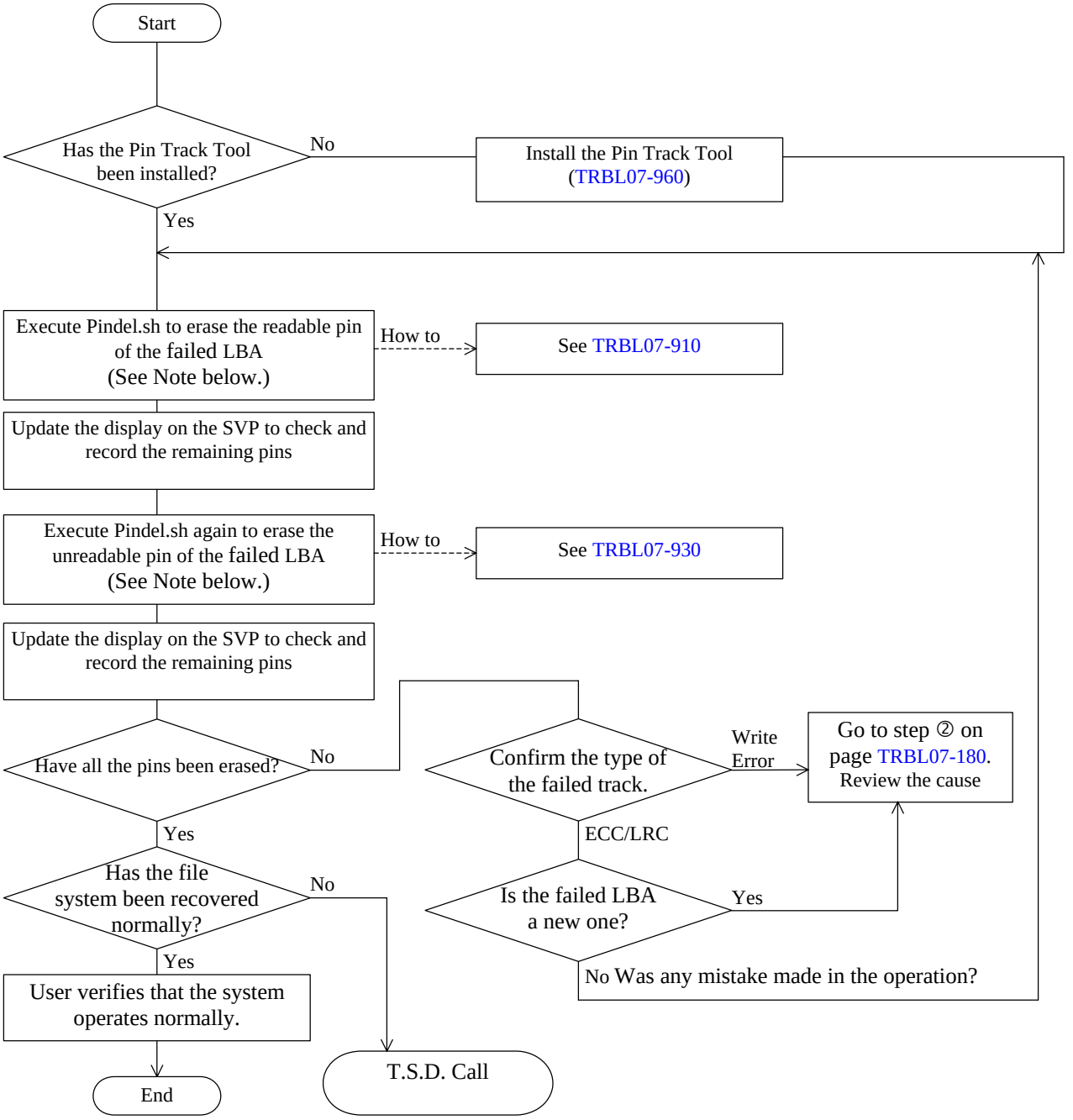


Readable Pin Process (AIX, VMWare ESX)



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)



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)

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)

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
             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)

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.

```
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 WebConsole.

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

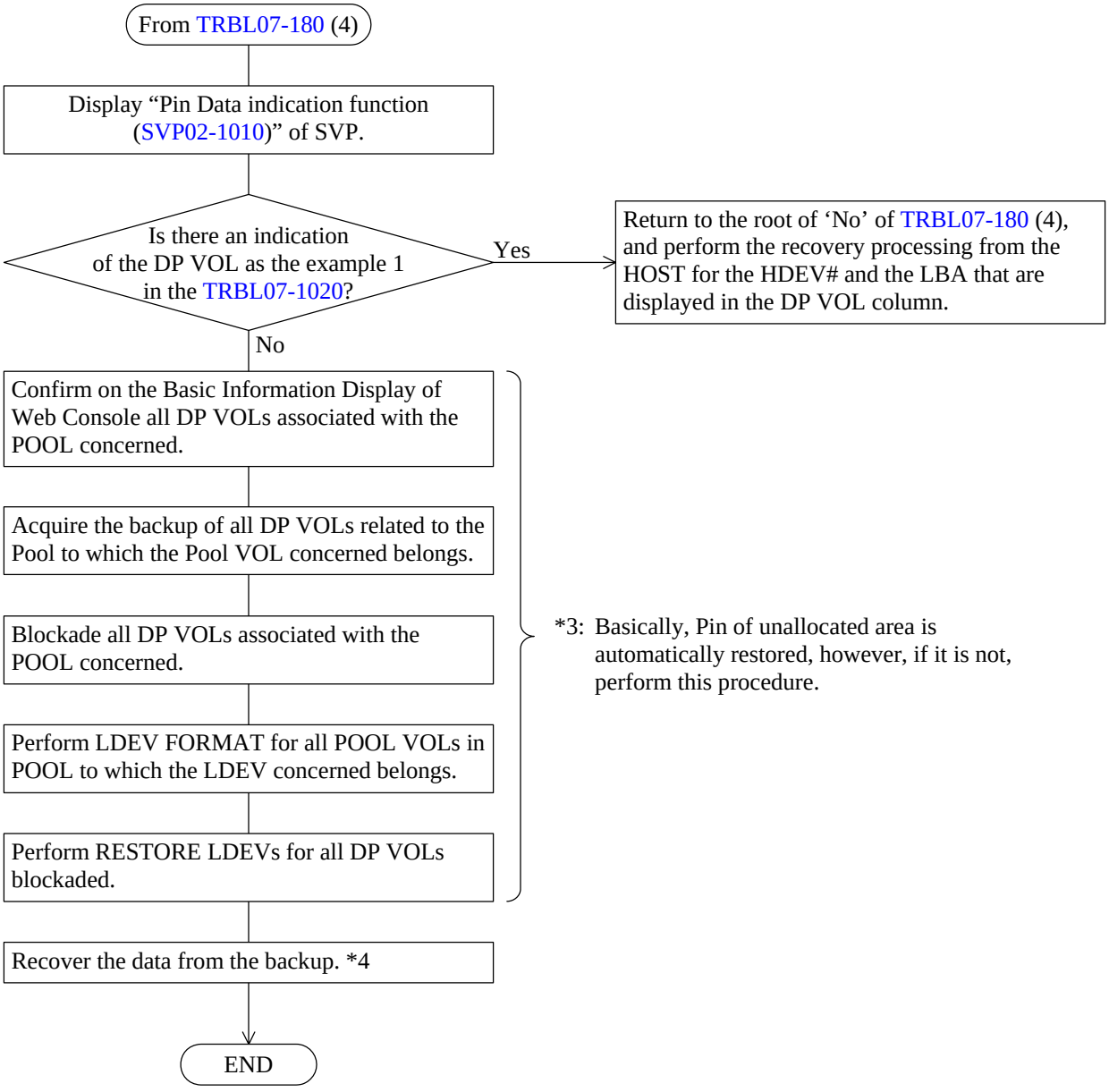
- /program/MENT/pintrack/readme-e.txt

- /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 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.
As for the following procedures, the microprogram version of DKCMAIN corresponds more than 60-06-27-XX/XX or 60-07-56-XX/XX. Please refer to TRBL07-1012 for microprogram version before 60-06-26-XX/XX or 60-07-55-XX/XX.

*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.



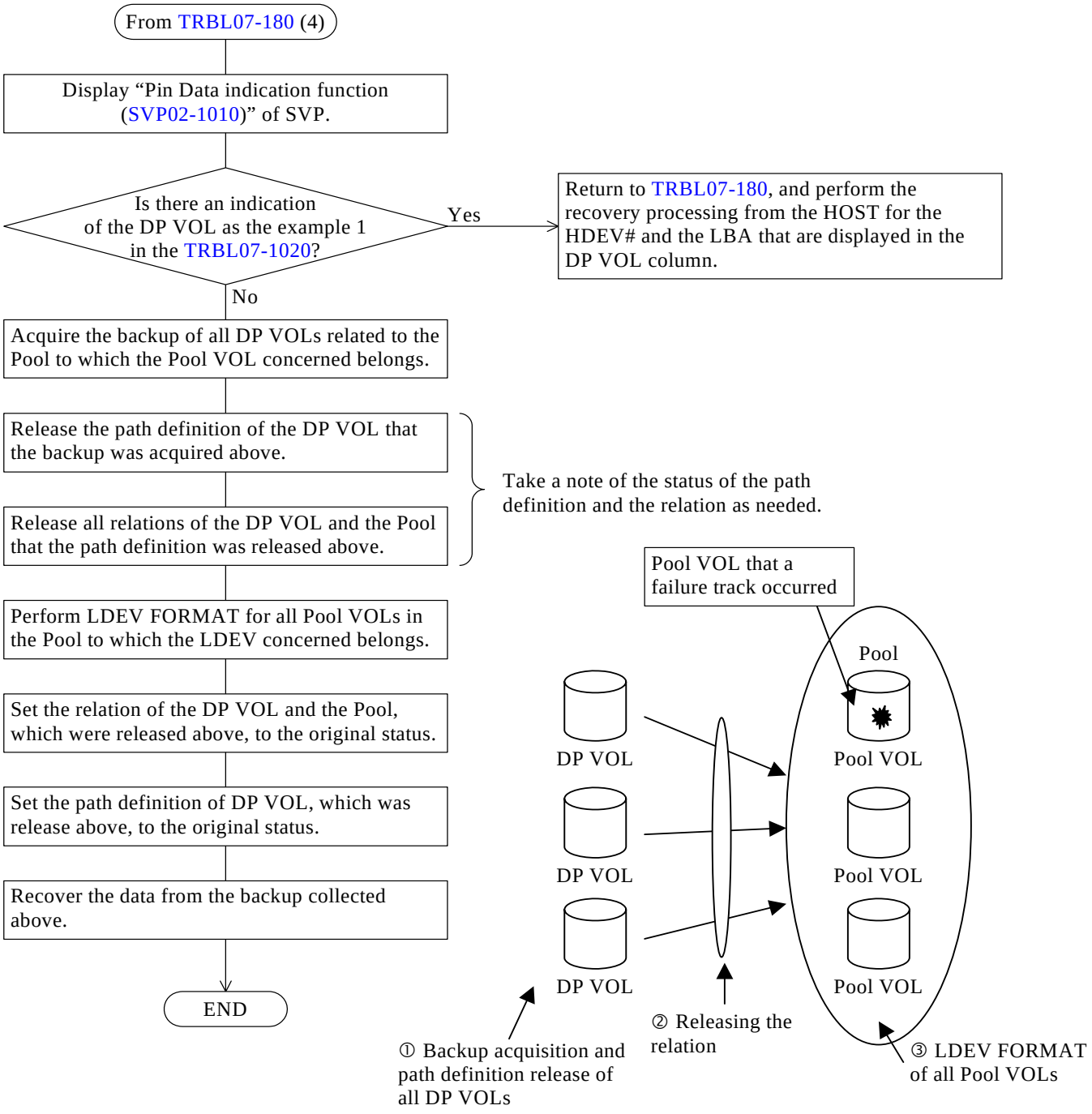
*4: Please be careful when restoring data from a backup.
If data is backed up per volume (DP VOL), unallocated areas in the volume are also backed up. Therefore when the data is restored, a write operation is performed also for the unallocated areas, and the areas become allocated (though with zero data), 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.

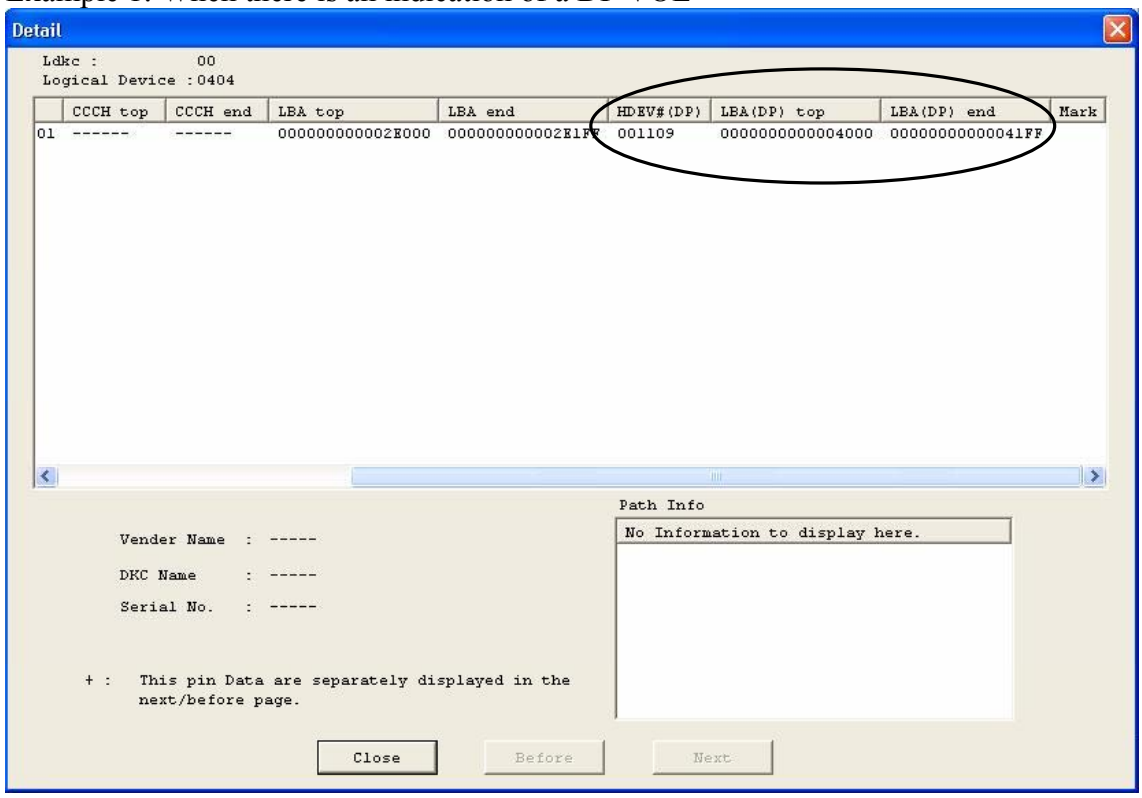
As for the following procedures, the microprogram version of DKCMAIN corresponds before 60-06-26-XX/XX or 60-07-55-XX/XX.
Please refer to TRBL07-1010 for microprogram version more than 60-06-27-XX/XX or 60-07-56-XX/XX.

*1: In case of a Write Error, perform TRBL07-200 as well as the normal VOL and recover it.

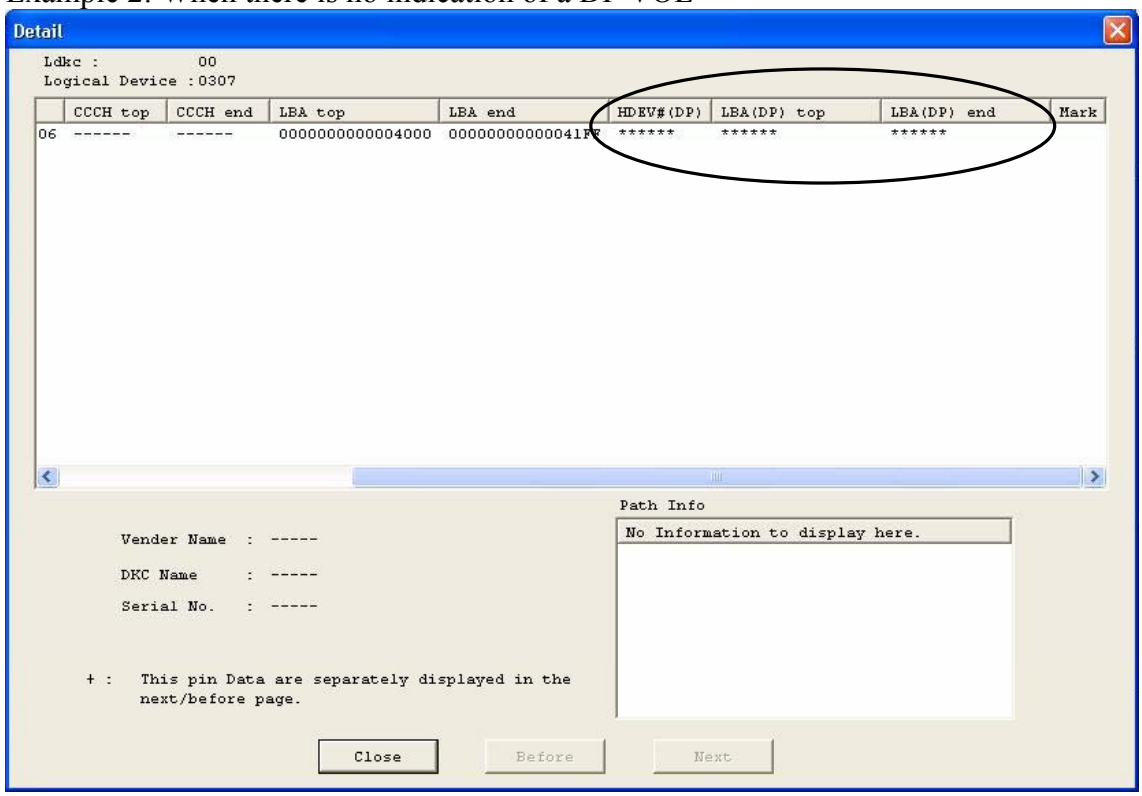
*2: The LDEV that a POOL ID is displayed on the logical device window of the maintenance window is a Pool VOL.



Example 1: When there is an indication of a DP VOL

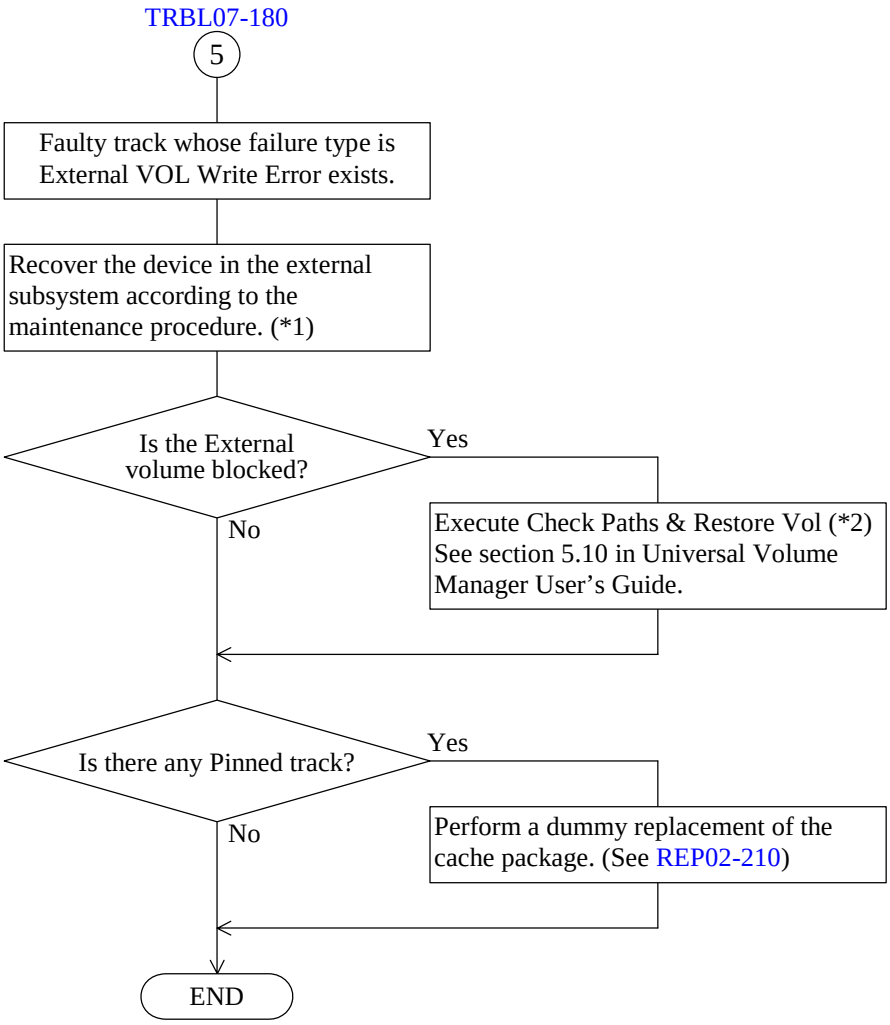


Example 2: When there is no indication of a DP VOL



7.2.3.7 Recovery from External VOL Write Error

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

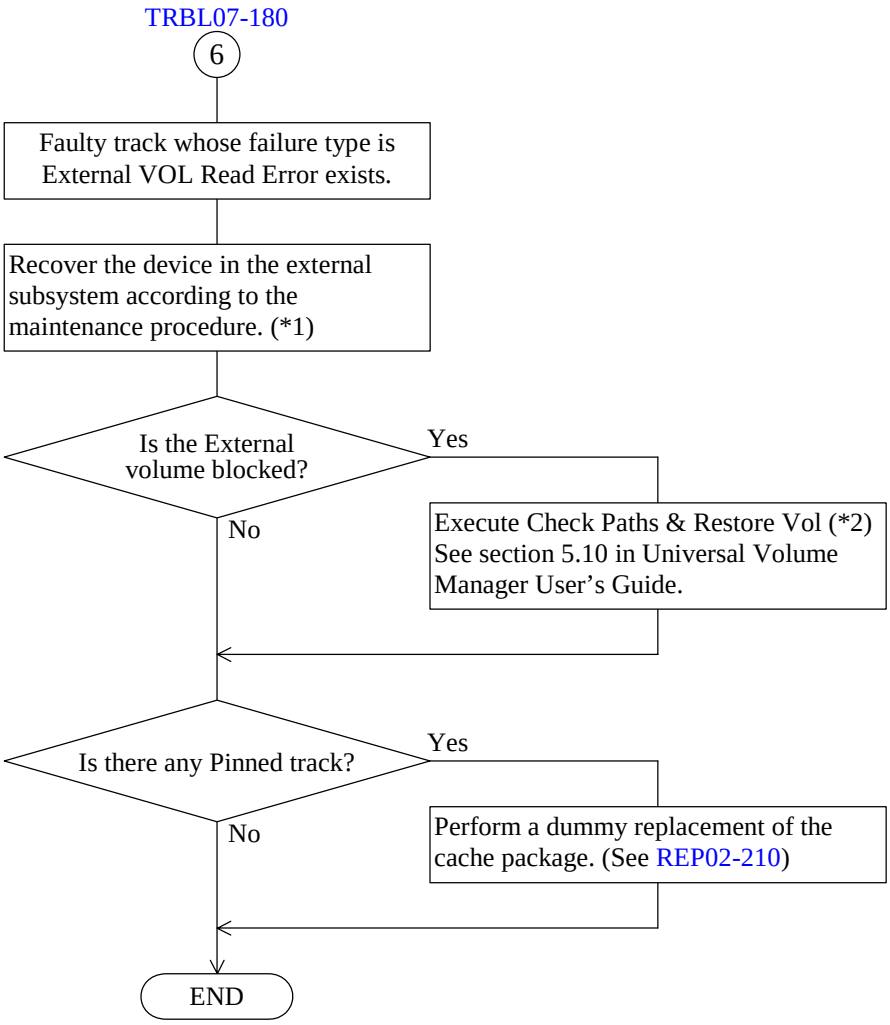


*1: It should be done in the external subsystem. The user needs to ask the service personnel of the external subsystem to perform the maintenance operation of the subsystem. (If the external subsystem is Hitachi storage, recover the faulty part according to the maintenance manual.)

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

7.2.3.8 Recovery from External VOL Read Error

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

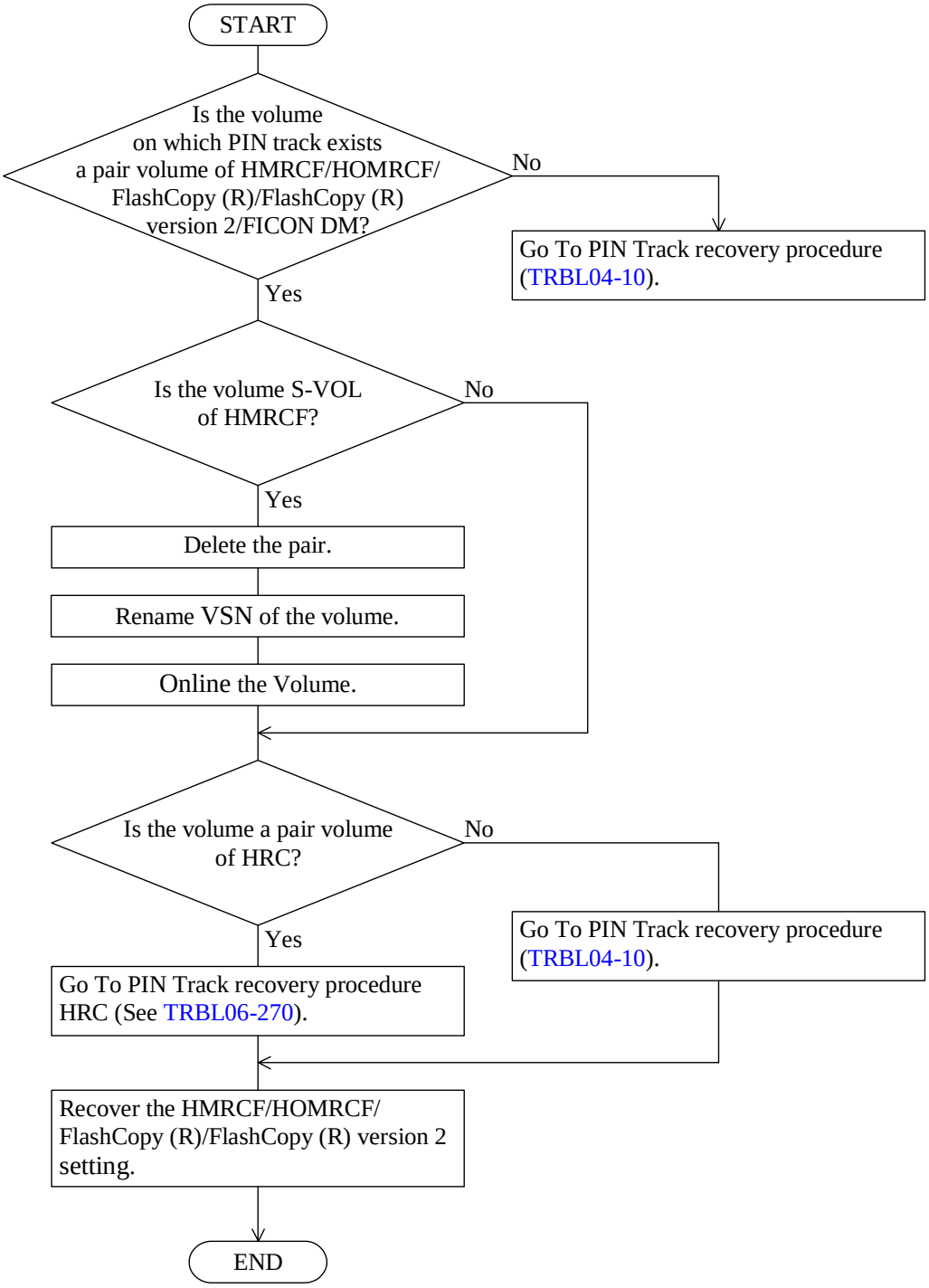


*1: It should be done in the external subsystem. The user needs to ask the service personnel of the external subsystem to perform the maintenance operation of the subsystem. (If the external subsystem is Hitachi storage, recover the faulty part according to the maintenance manual.)

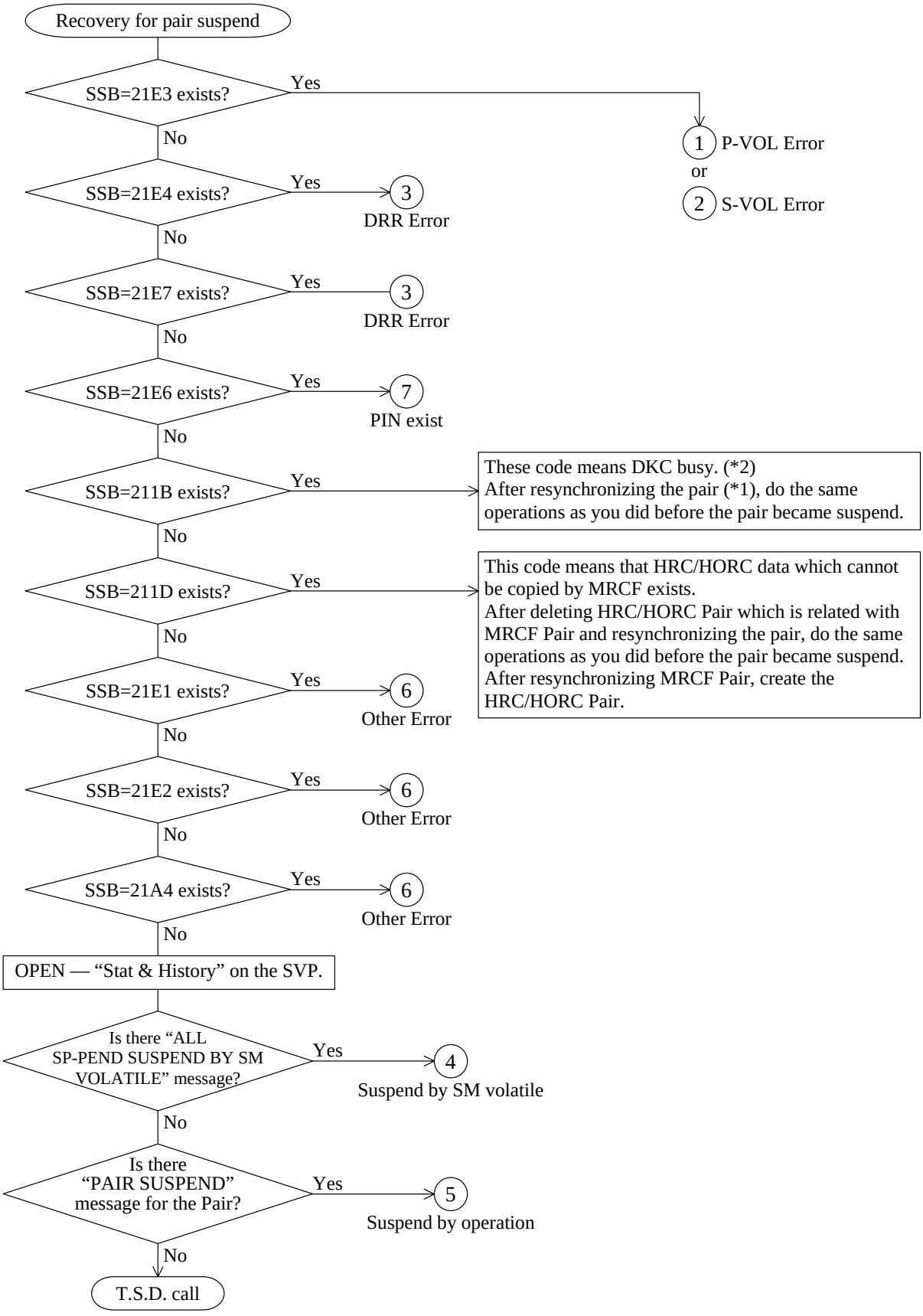
*2: It should be done using Storage Navigator. Ask the customer to perform the recovery operation by using Storage Navigator according to the User's Guide.

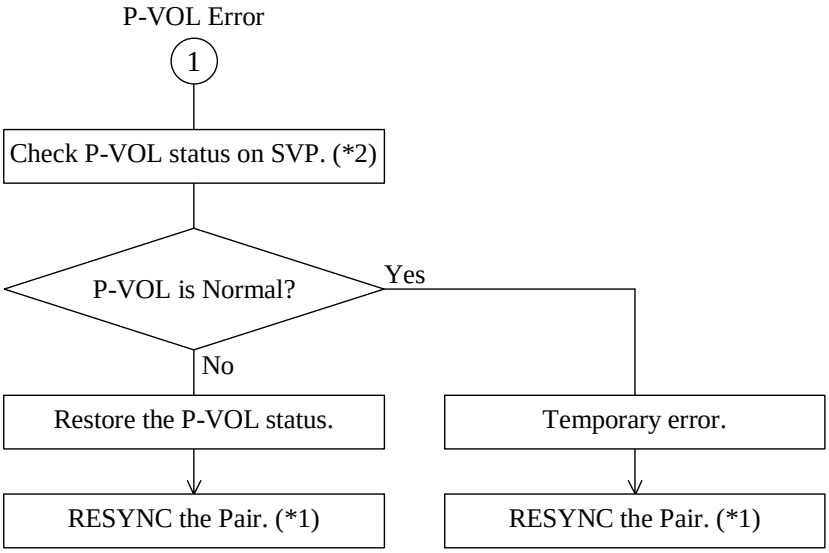
8. HMRCF/HOMRCF/FlashCopy (R)/FlashCopy (R) version 2 Error Recovery

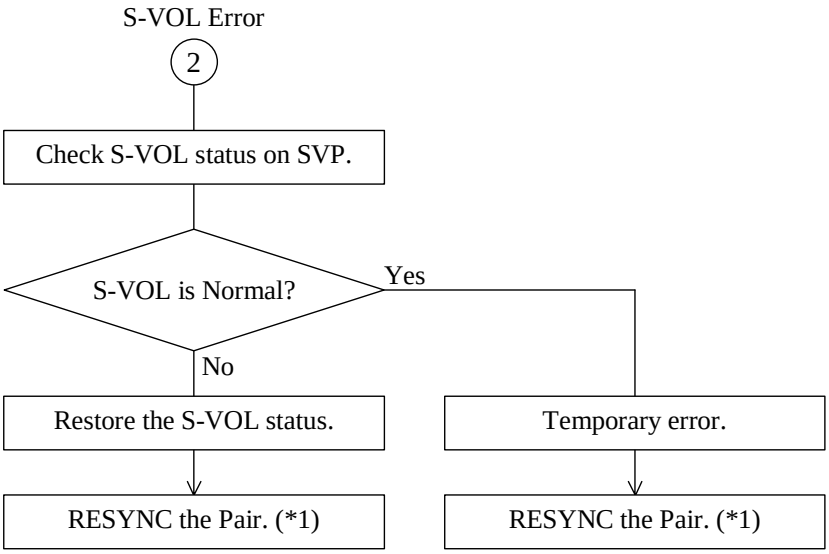
8.1 PIN Track recovery procedure

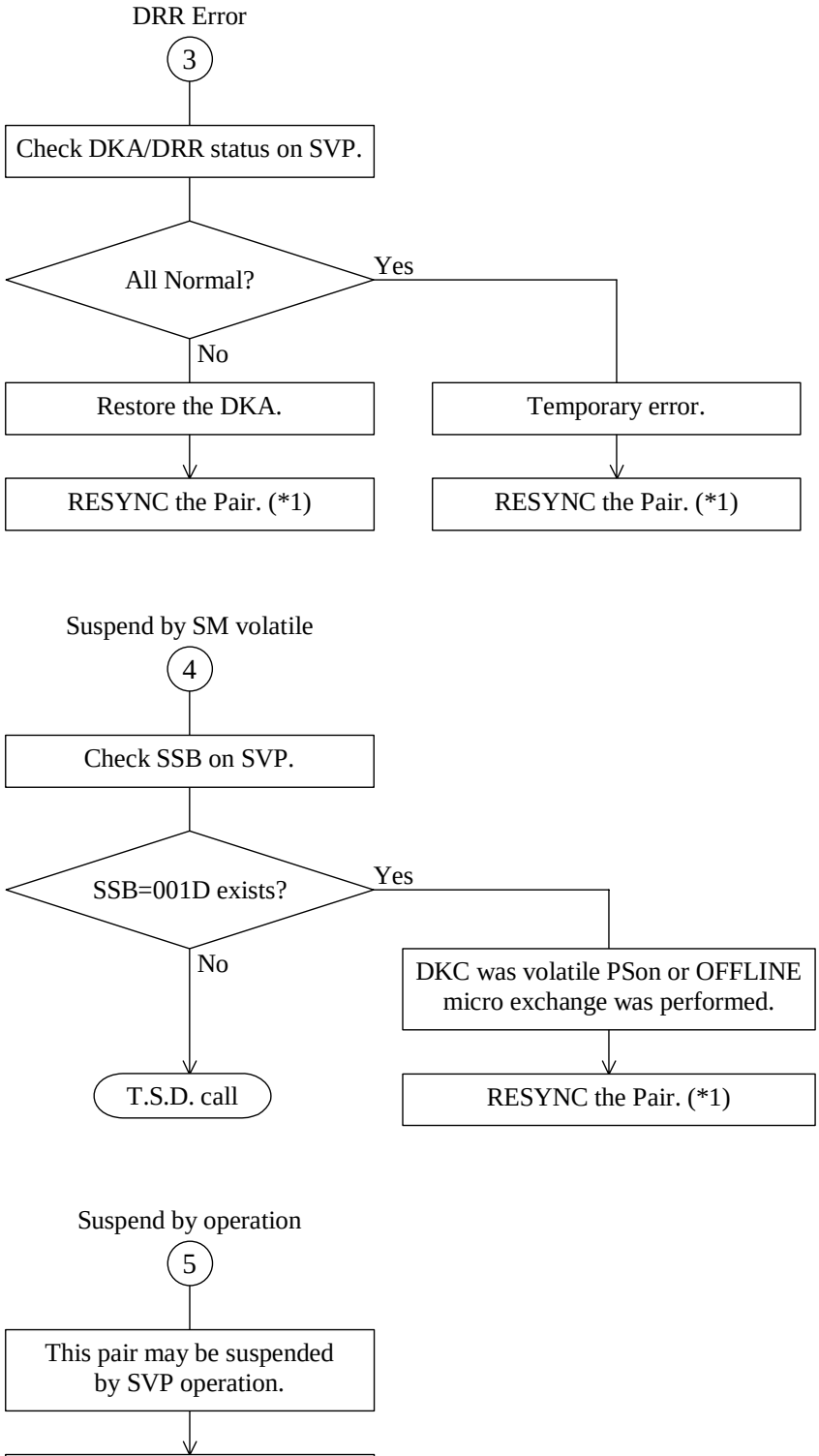


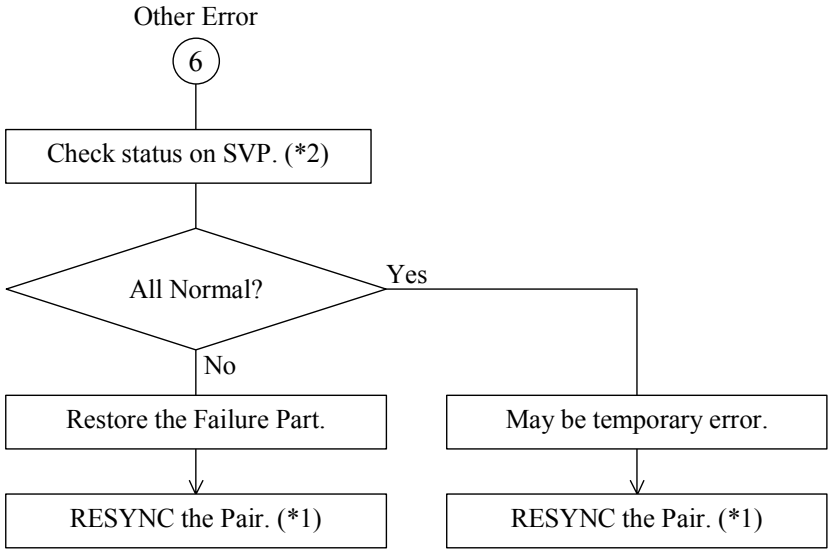
8.2 Recovery Procedure for HMRCF/HOMRCF/FICON DM Suspend Pair (SIM = 47DXYY, 7FF102, 47E700)

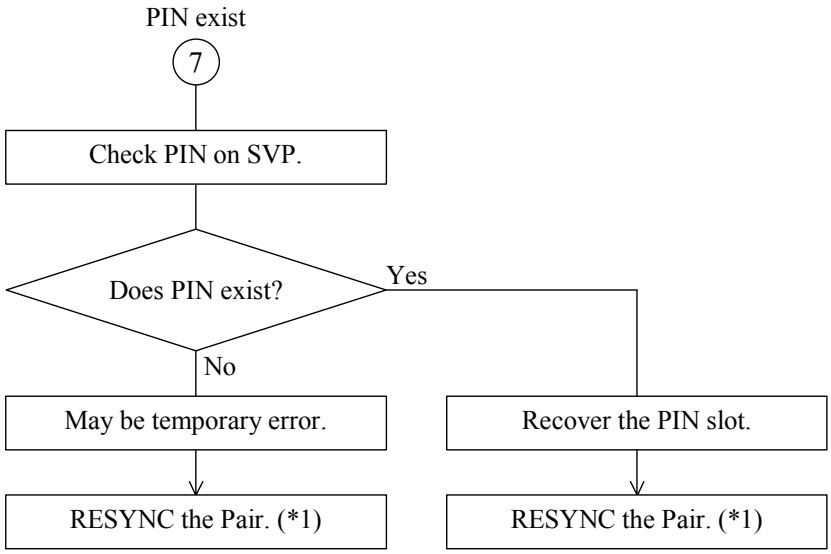










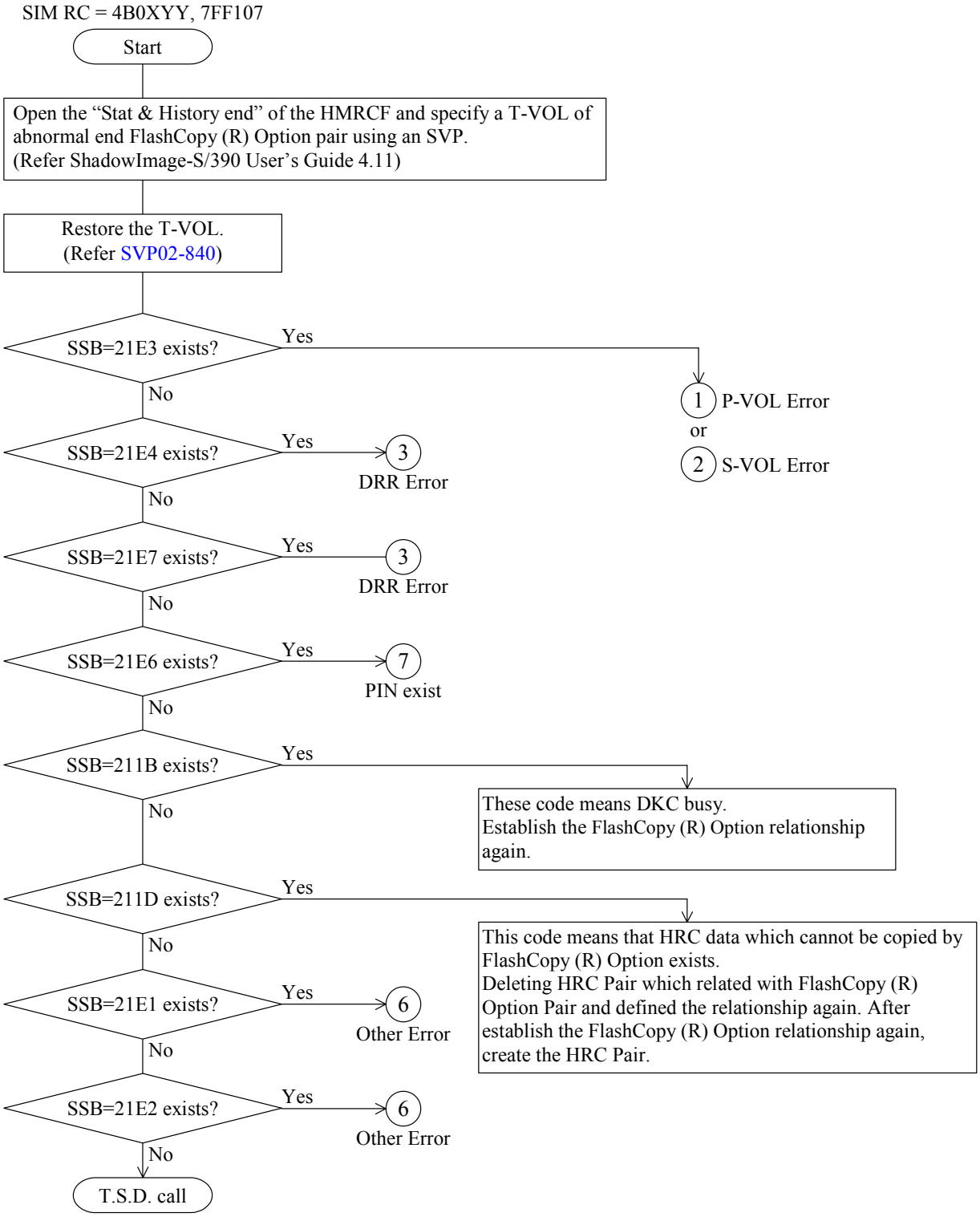


*1: In the case of FICON DM pair, resync the pair if pair status is Suspend (Mig) or create the pair again after deleting the pair if pair status is Suspend.

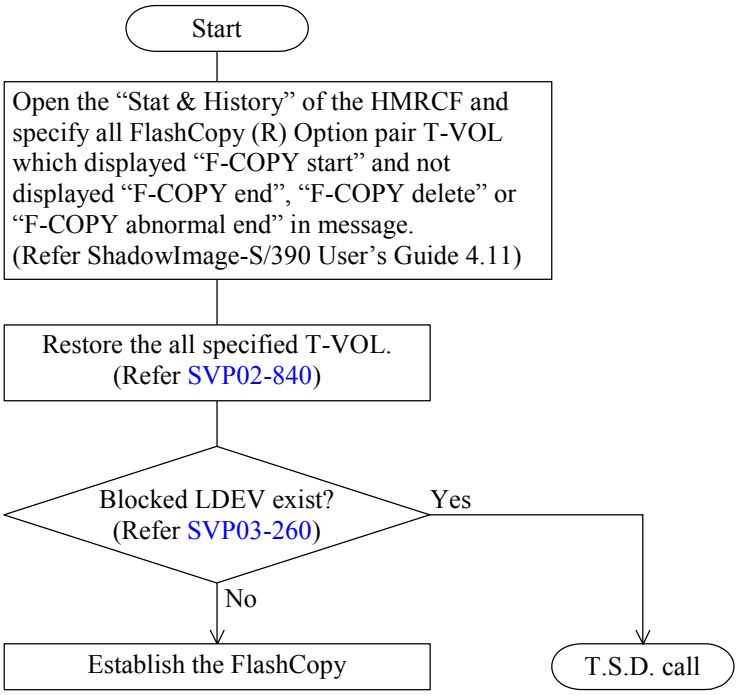
*2: In the case of FICON DM pair, follow the FICON DM recovery procedure. (See TRBL32-10.)

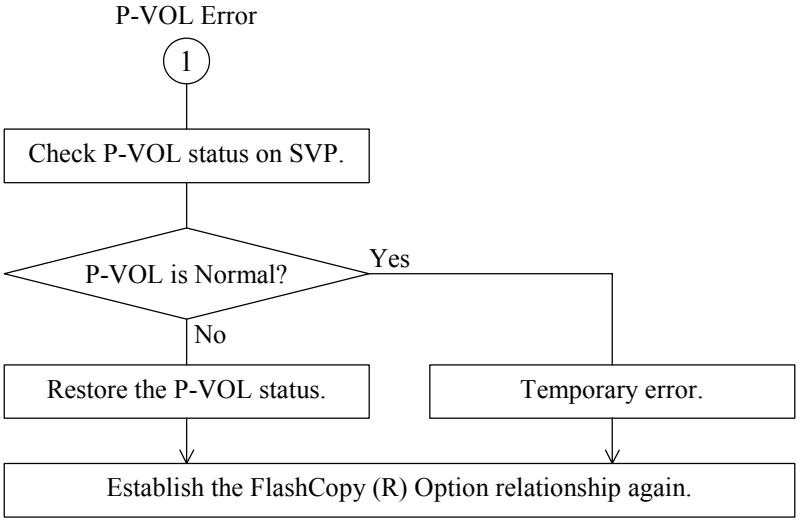
8.3 Procedure for recovery from FlashCopy (R) Option failure (SIM = 4B0XYY, 7FF107, 47E600)

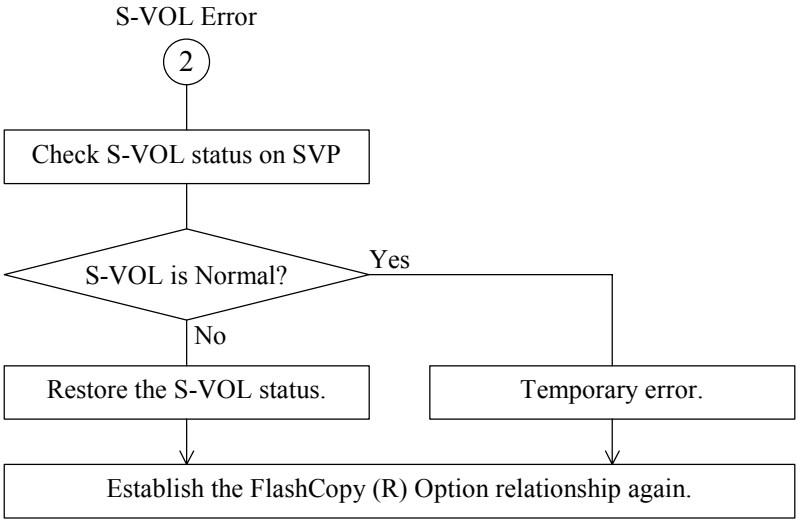
The procedure for recovery from an FlashCopy (R) Option failure is explained below.

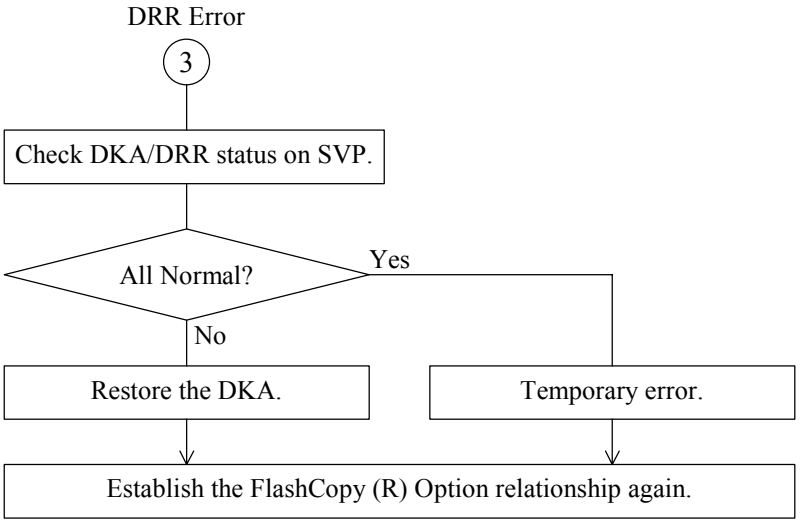


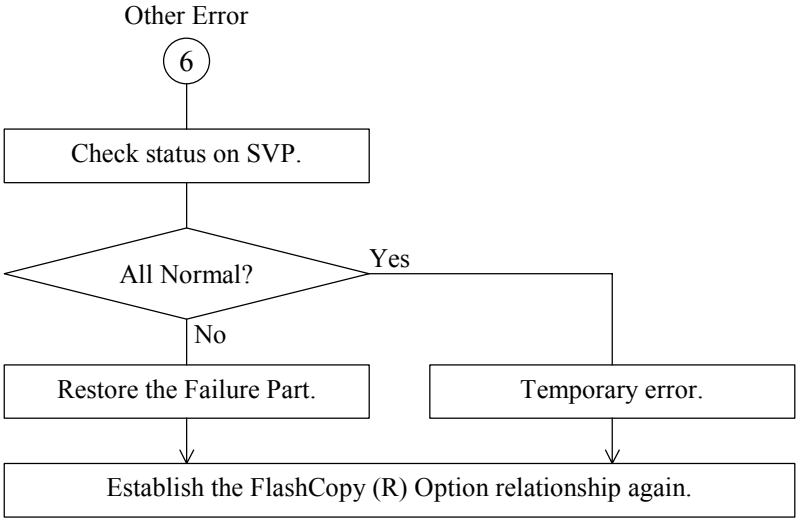
SIM RC = 47E600

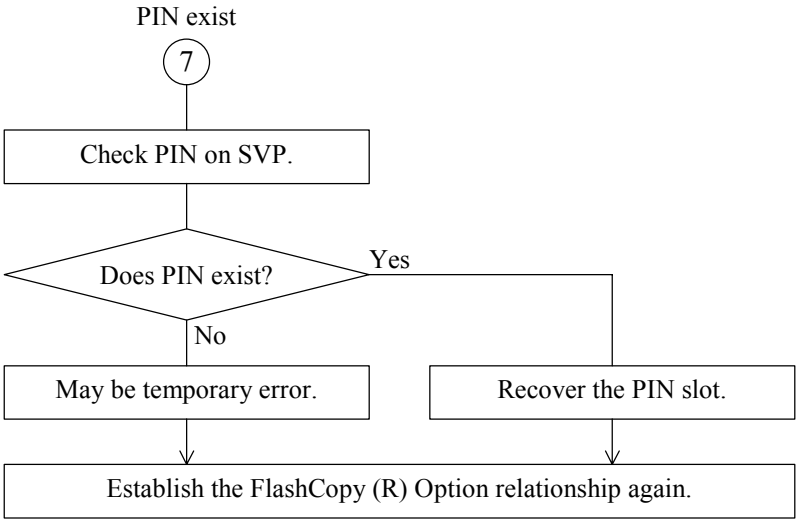






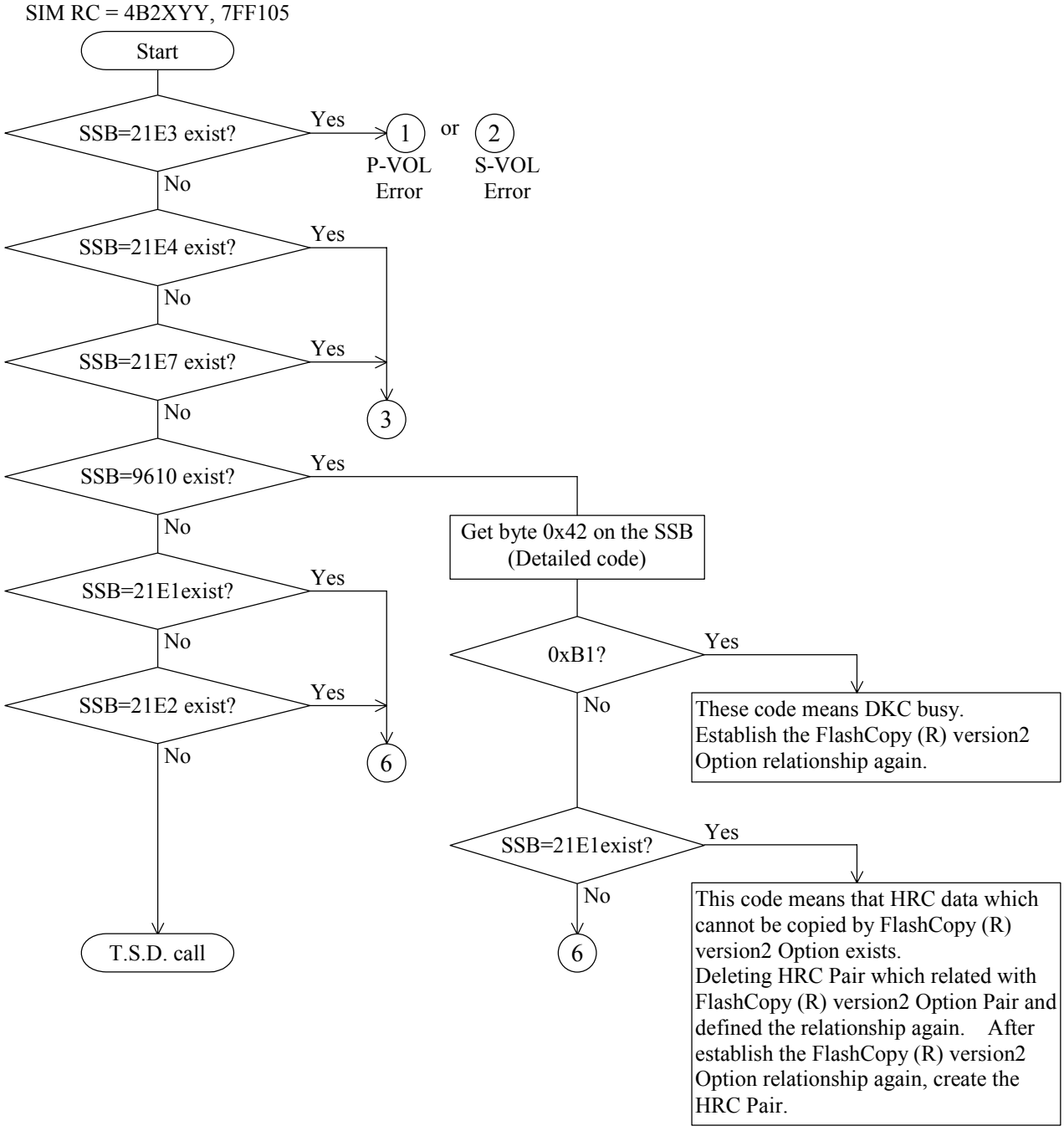


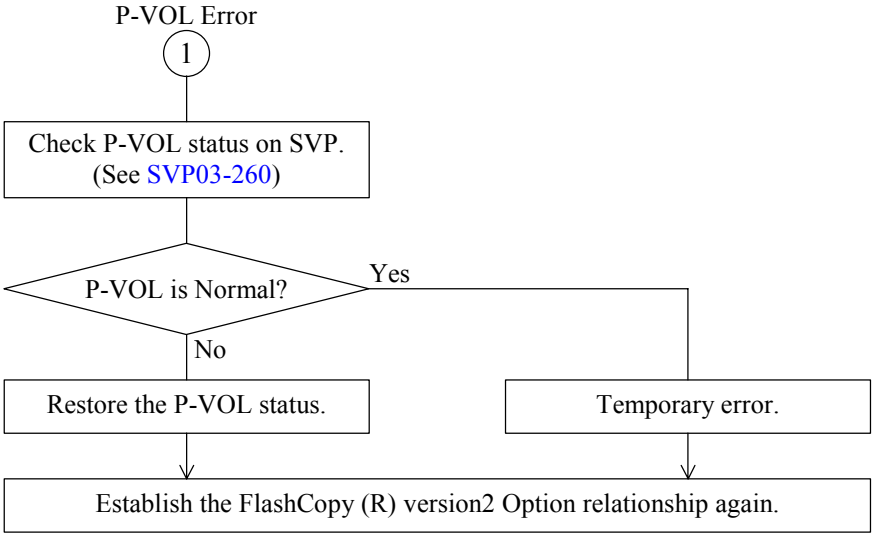


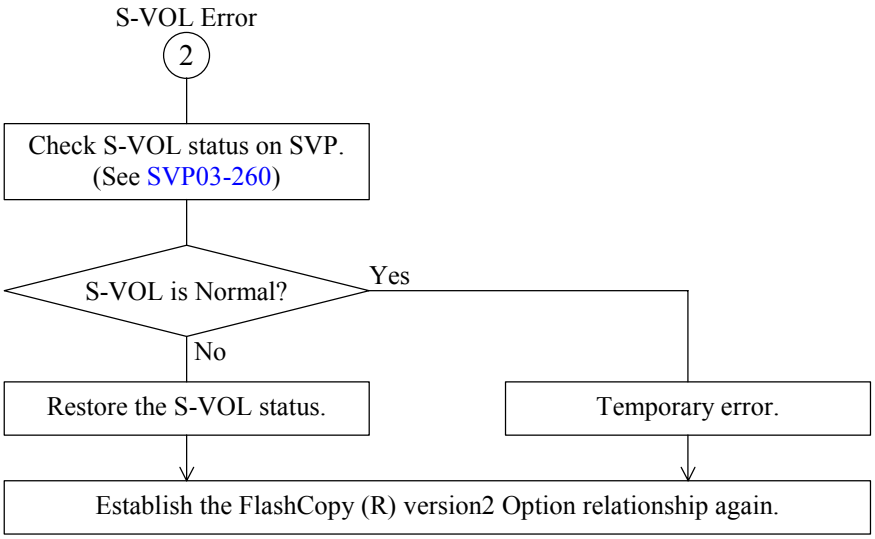


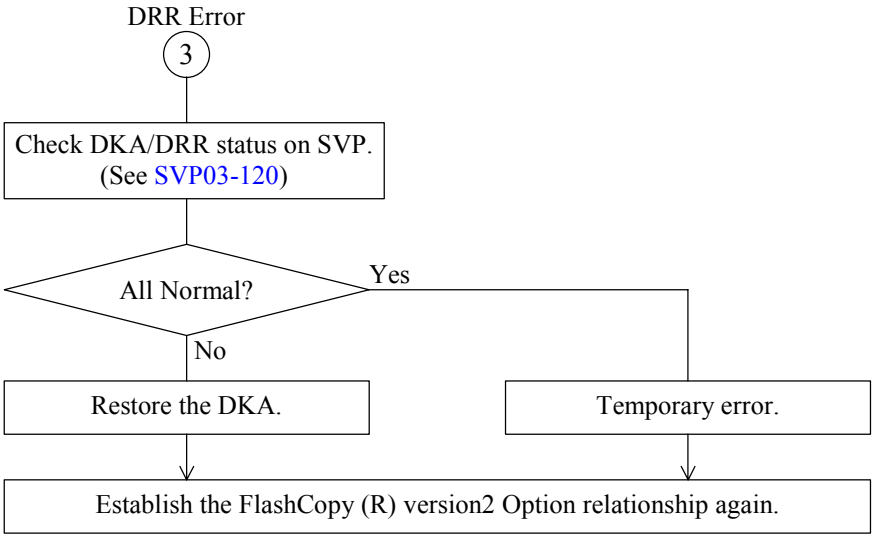
8.4 Procedure for Recovery from FlashCopy (R) version2 Option failure (SIM = 4B2XYY, 7FF105, 47E500)

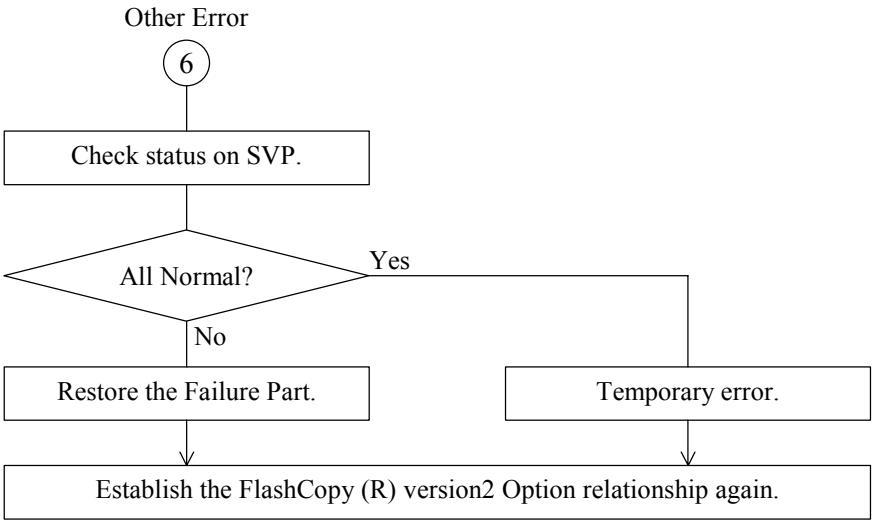
The procedure for recovery from a failure occurs in a pair of FlashCopy (R) version2 Option is explained below.



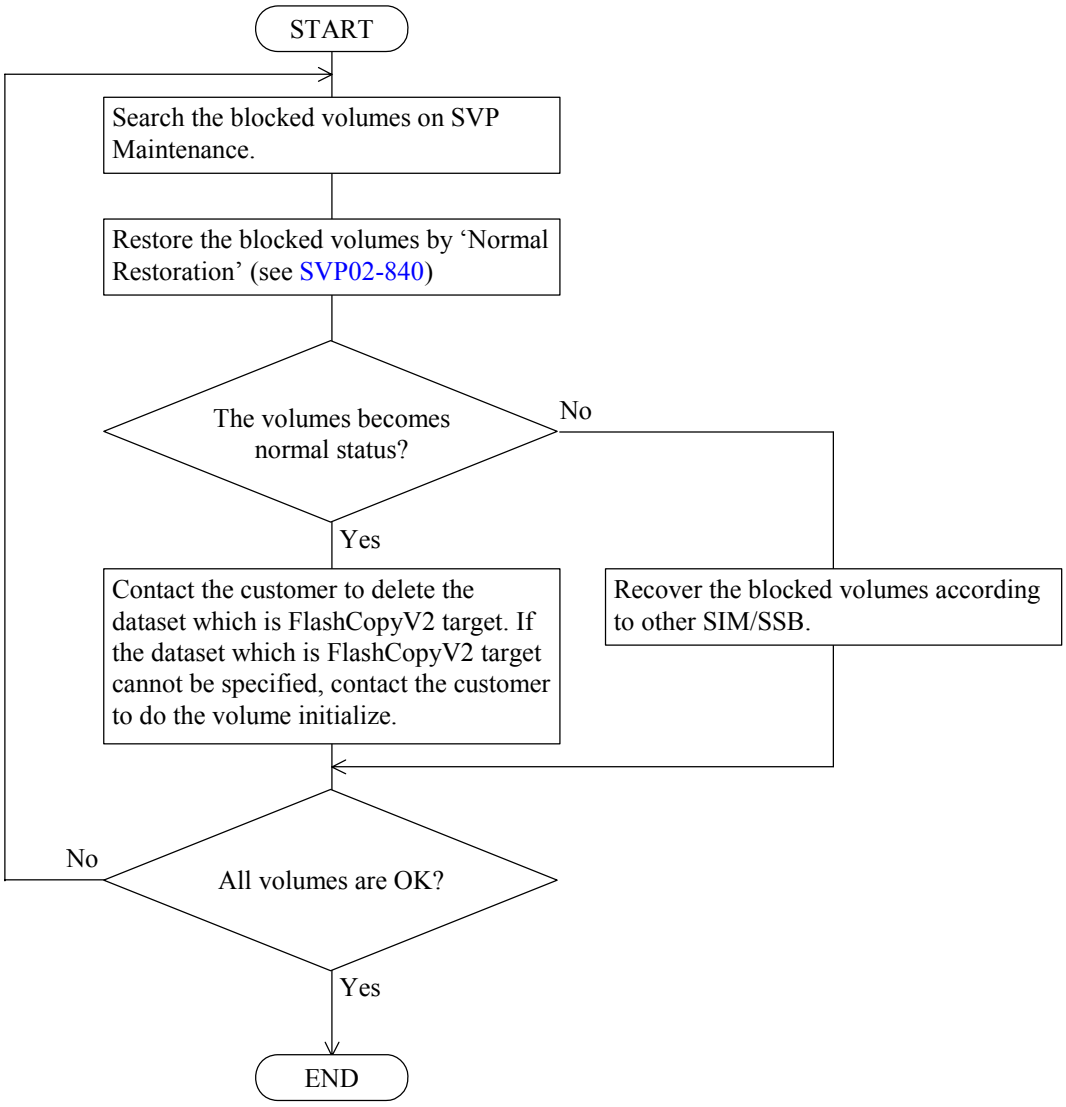




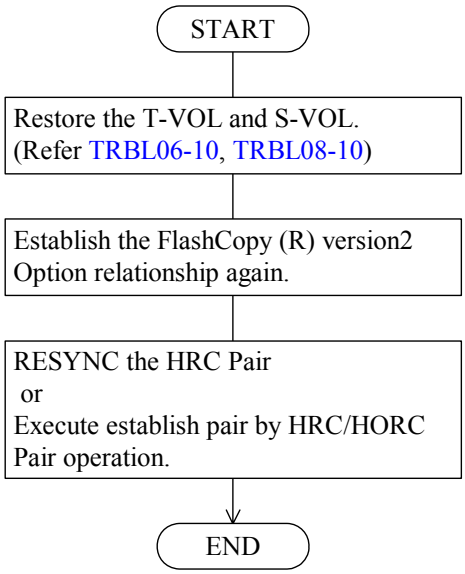




SIM RC = 47E500



8.4.1 Procedure for Recovery from FlashCopy (R) version2 and HRC cooperation (SIM = 4B2XYY, 47E500)



8.5 Recovery for inconsistency of System Option MODE80 and HMRCF/HOMRCF setting (SIM = 47E000)

(1) and (2) are inconsistent. Please call T.S.D, and off System Option MODE80 or off HMRCF/HOMRCF Swap&Freeze function.

(1) System Option MODE80 is on.
(2) HMRCF/HOMRCF Swap&Freeze function is on.

8.6 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, Flash Copy version 1, Flash Copy version 2

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 8 in ten seconds. Therefore, after taking paths offline by way of Figure 8.6.2-1, P.P. command operation might fail with SSB=2084 again. If this happens, repeat steps of Figure 8.6.2-1.

8.6.1 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 8.6.1-1 SSB=2084: Details of output information

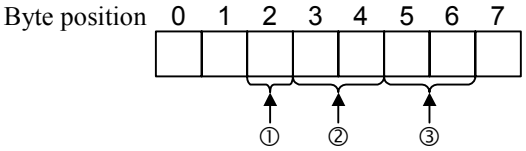
Byte	Contents	Remarks
0x40 ~ 0x43	Device number (CU: LDEV number) of which the online path check was performed	
0x44	The number (1 ~ 7) of effective PIDs output in SSB concerned	
0x45 ~ 0x46	The total number of online paths (1 ~ 2048) shown in the byte 0x40 ~ 0x43	
0x47	Preparation (0)	
0x48 ~ 0x4F	PID1	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 8.6.2-1.

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 8.6.1-1 SSB=2084: Position of output information



① LPAR number
② Last 4 digit of CPU serial number
③ Host type

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 8.6.1-2 Details of PID

8.6.2 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.

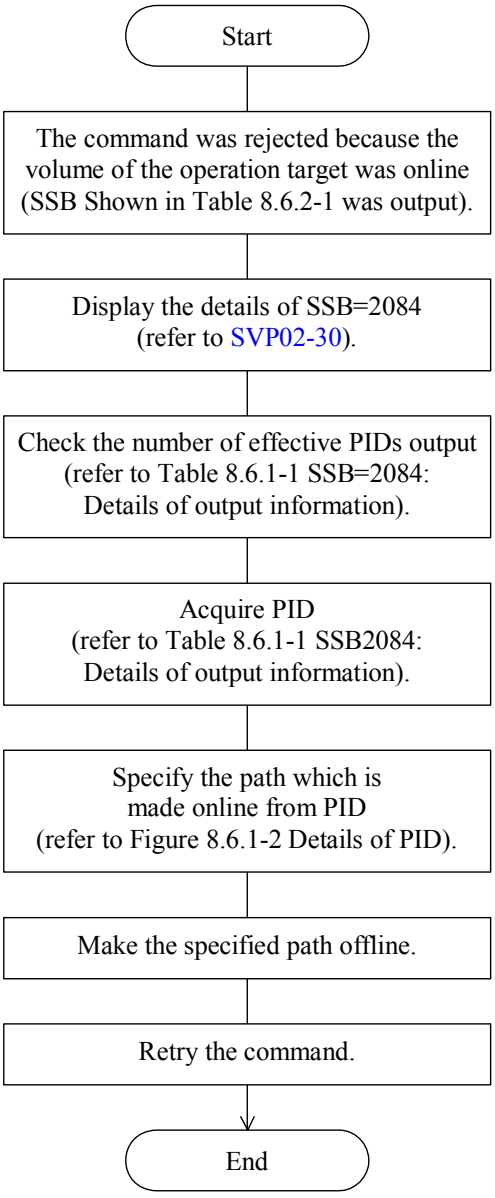


Table 8.6.2-1 SSB output by command operation

Output SSB	command	P.P.
2312	Pair create	ShadowImage ShadowImage for Mainframe
	Resync	
	Restore	
	Reserve setting	
	Pair create	Flash Copy version1
2352	Restore	ShadowImage ShadowImage for Mainframe
231f		
9655	Pair create	Flash Copy version2

Note: When the total number of online paths > effective PIDs output, SSB=2084 is output again (refer to Table 8.6.1-1 SSB=2084: Details of output information).

Figure 8.6.2-1 Procedure for continuing the operation

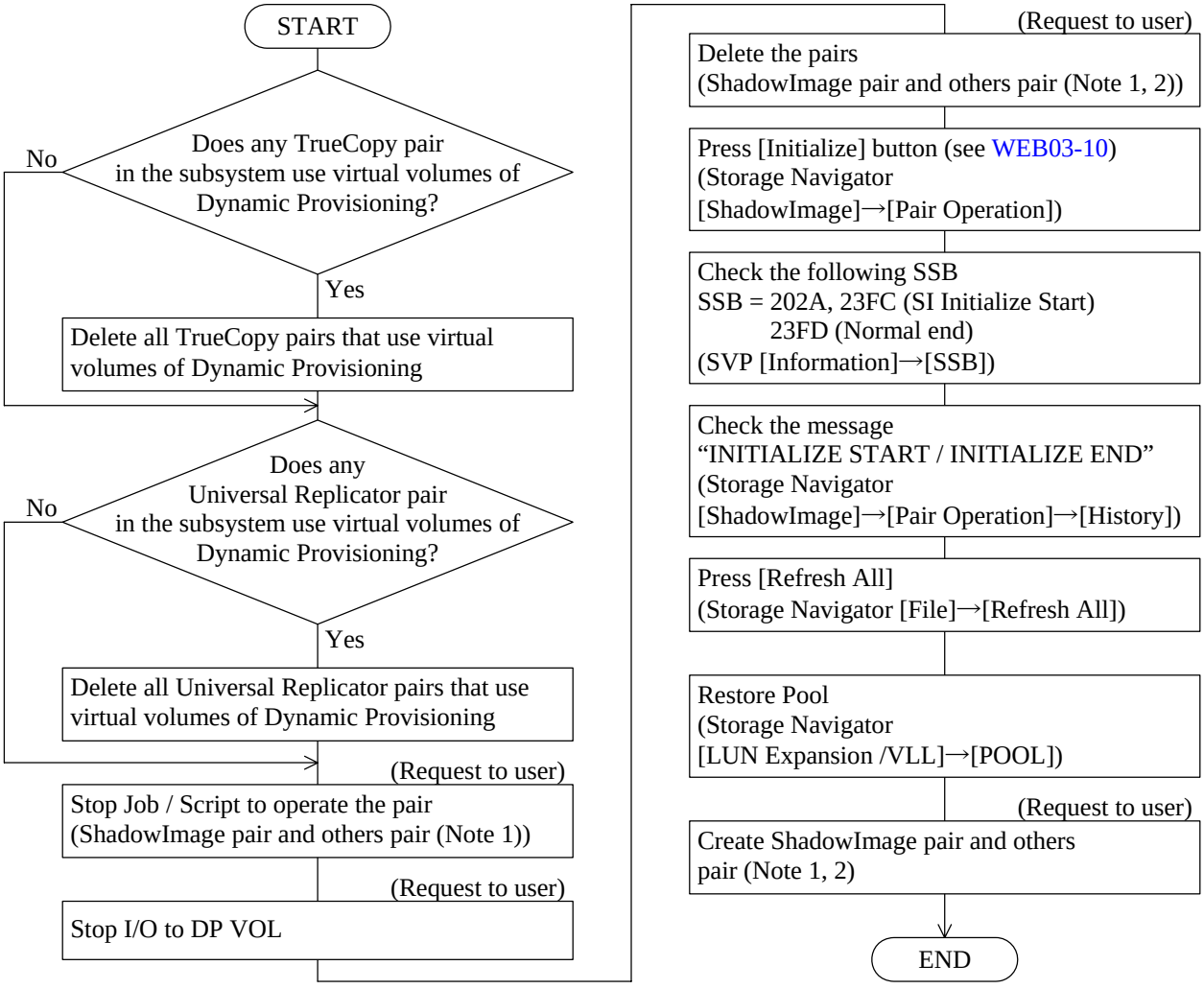
8.7 ShadowImage Initialize procedure

Note 1: When the [Initialize] button is pressed, pairs formed by the following PP are also deleted. And VOLs of reserve attribute are also deleted.
And the pool of [Copy-on-Write Snapshot /Dynamic Provisioning]is blockaded.
[ShadowImage ShadowImage z/OS(R) /Volume Migration / Flash Copy(R) Mirror version 1 / Flash Copy(R) Mirror version 2 /Copy-on-Write Snapshot]

Note 2: In the case TrueCopy and Universal Replicator use virtual volumes of Dynamic Provisioning, delete all TrueCopy and Universal Replicator pairs that use the virtual volumes before performing Initialize. If you didn't delete those pairs, Initialize fails. After Initialize completes, create TrueCopy and Universal Replicator pairs again. During Initialize, don't create [TrueCopy/UniversalReplicator] pairs with Virtual Volumes of Dynamic Provisioning. In the case create those pairs, Initialize and paircreate operation may fail.

Note 3: Perform the operation only when it is directed by the Technical Service Division.

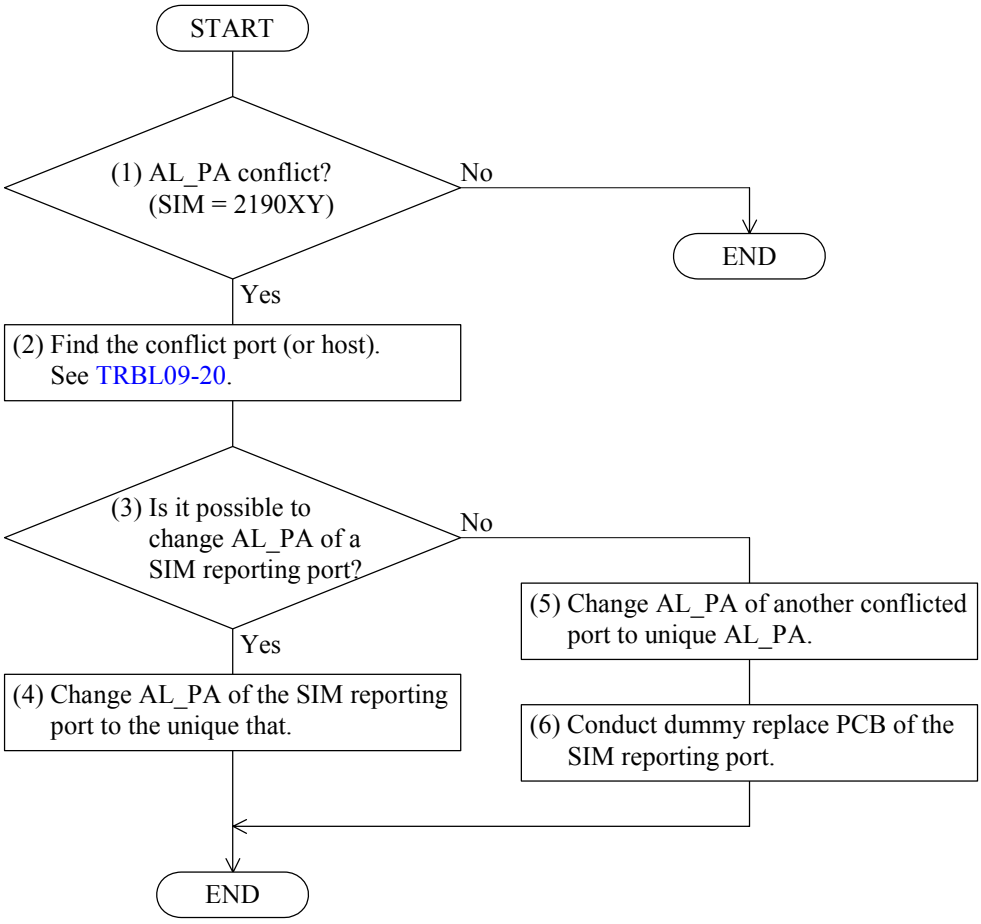
Note 4: For the password, refer to the Technical Service Division.



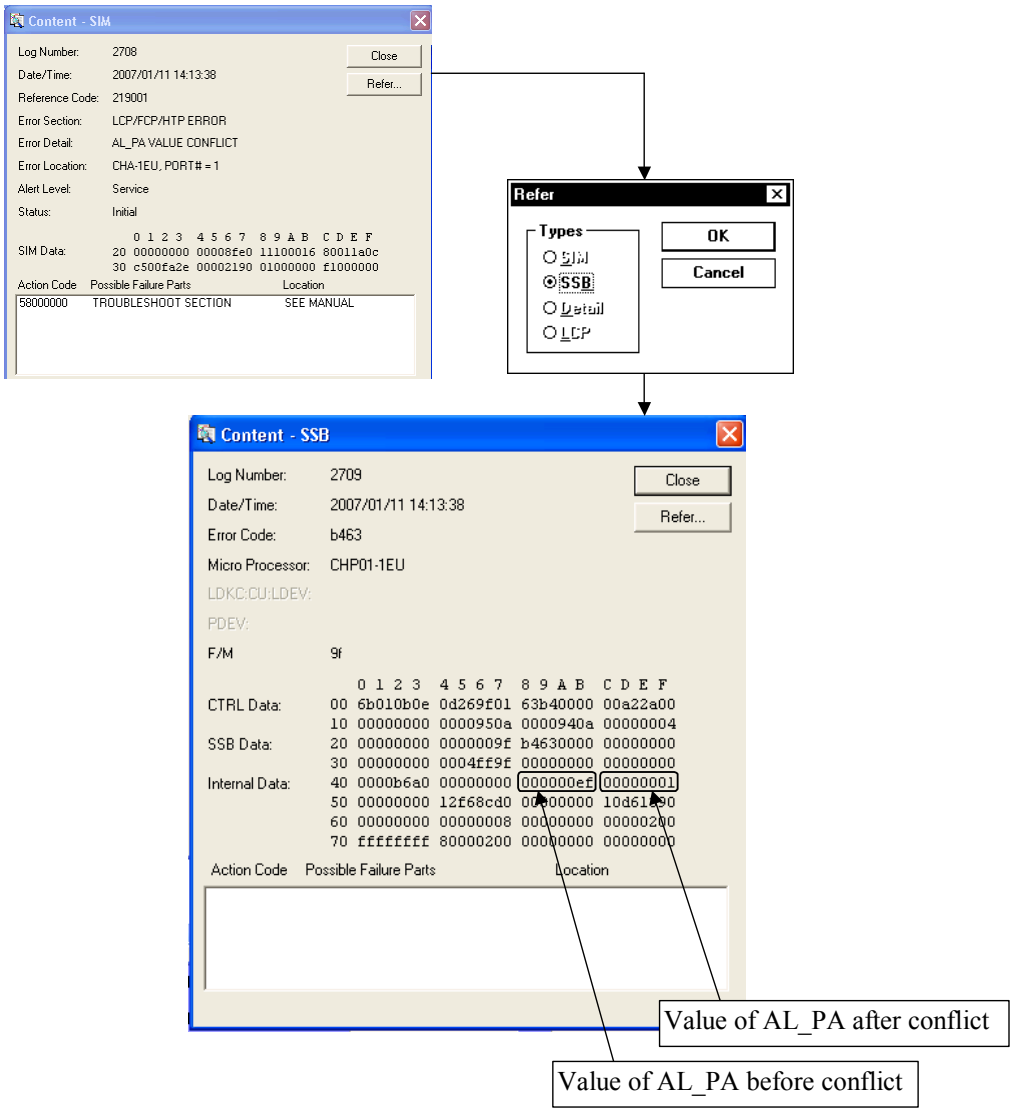
SSB LIST (After pressing [Initialize] button, the following SSB are of no matter)
9693, afb2, afb3

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 (CHT 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 RAID's port or host HBA's port whose AL_PA conflicts with this port.

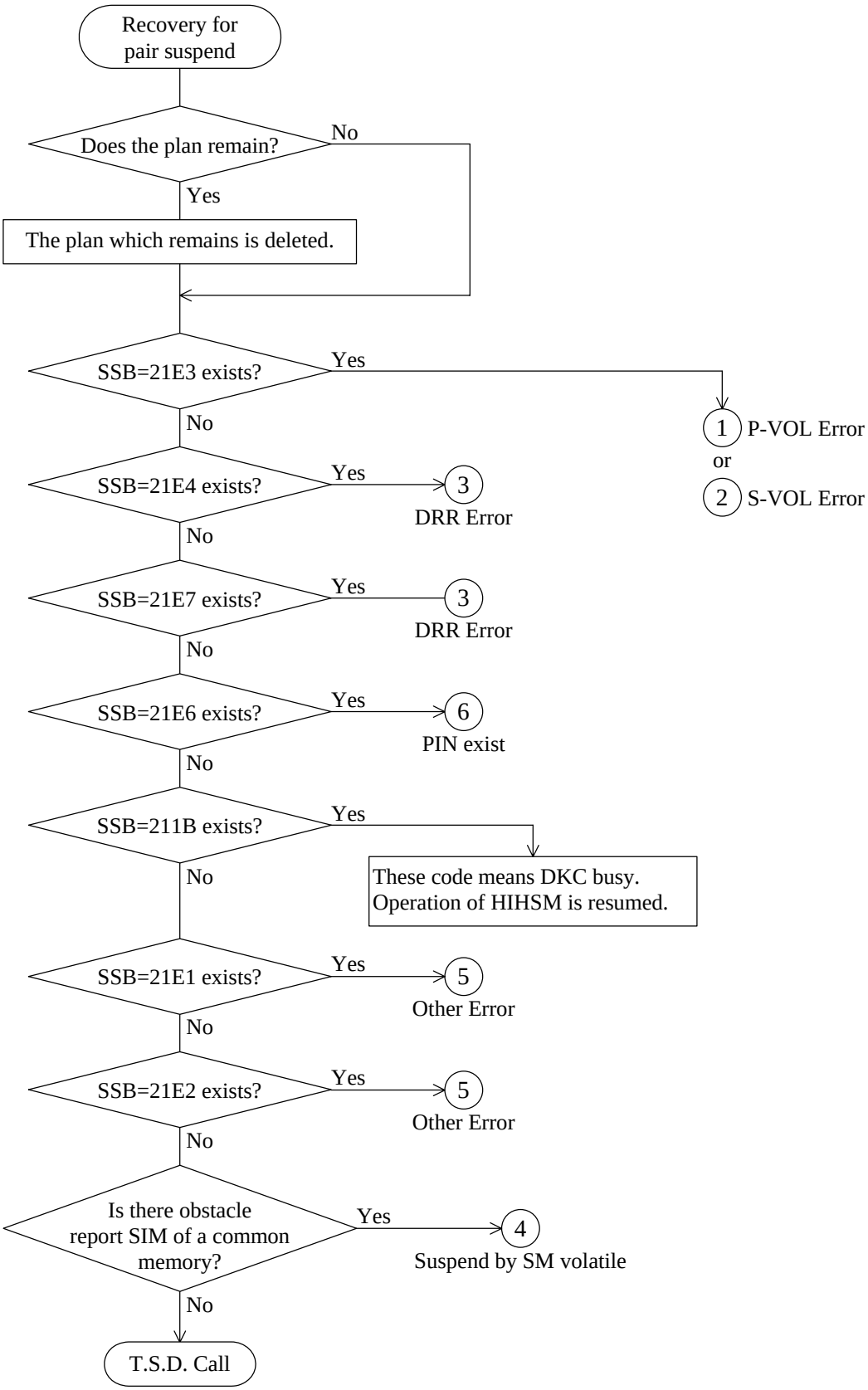
10. HIHSM Error Recovery

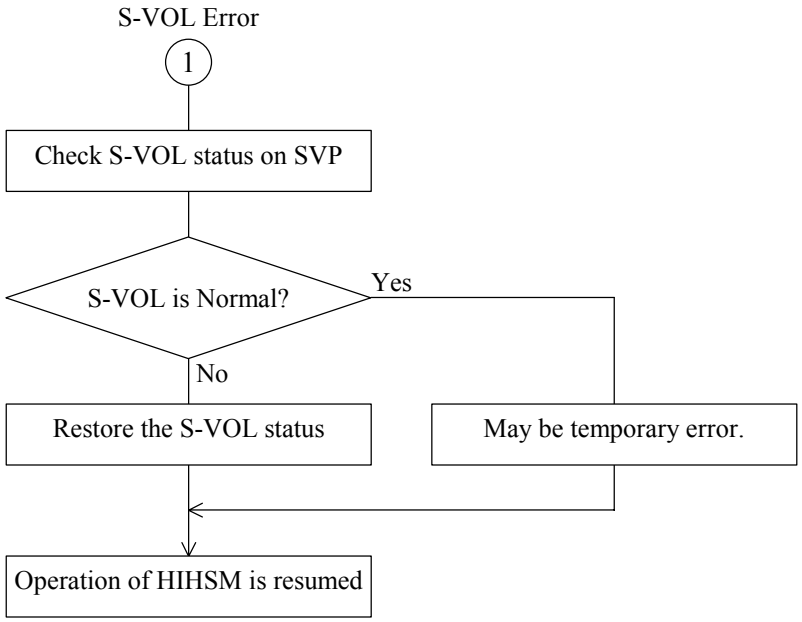
When it lapses into the state where a system does not expect, volume move processing of HIHSM sometimes carries out an unusual end. In this case, the state of S-VOL and T-VOL which was during movement is not changing from the state before movement. So, there is no necessity of daring carry out recovery 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.

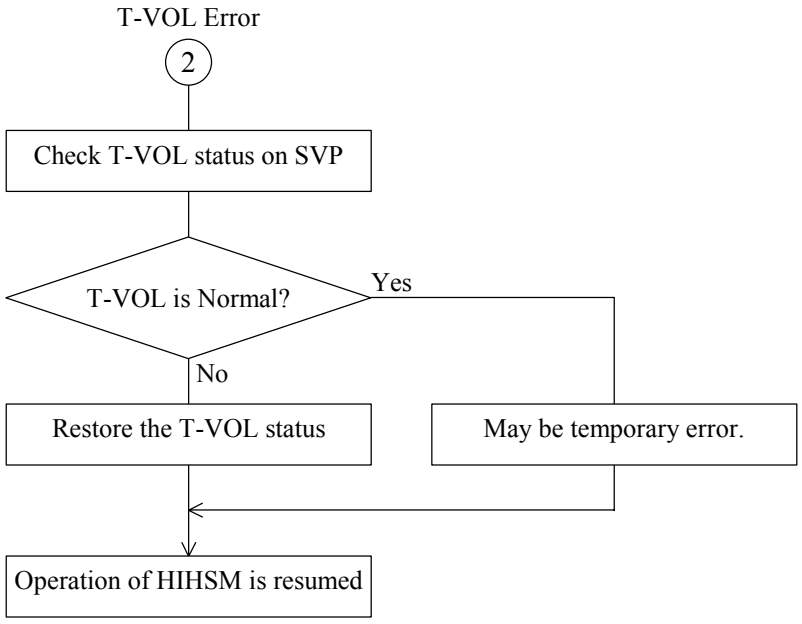
Table 10.1-1 HIHSM SIM REF.CODE

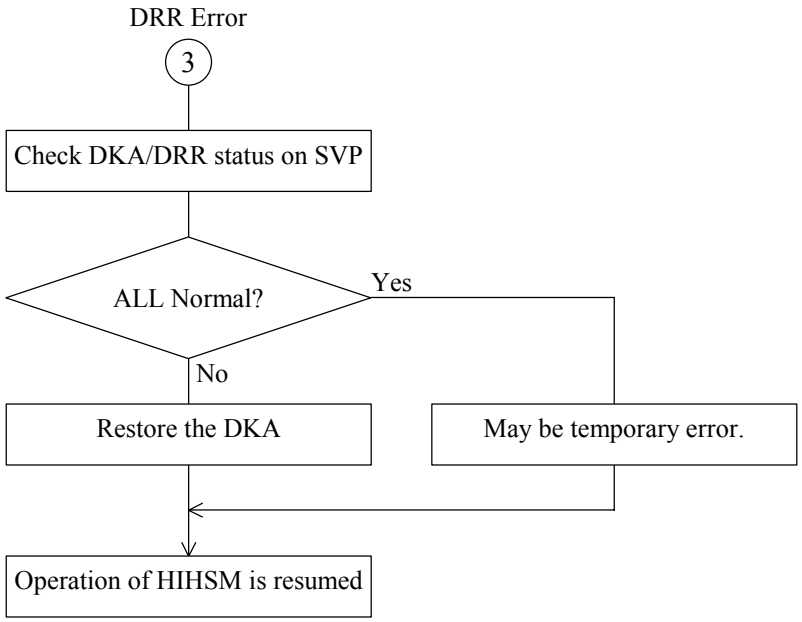
SIM REF. CODE	meaning	comment
47FYXX 7FF106	HIHSM VOL Move unusual end	YXX: The lower 12 bits of Secondary Volume #. Y = The lower 4 bits of CU# X = LDEV#

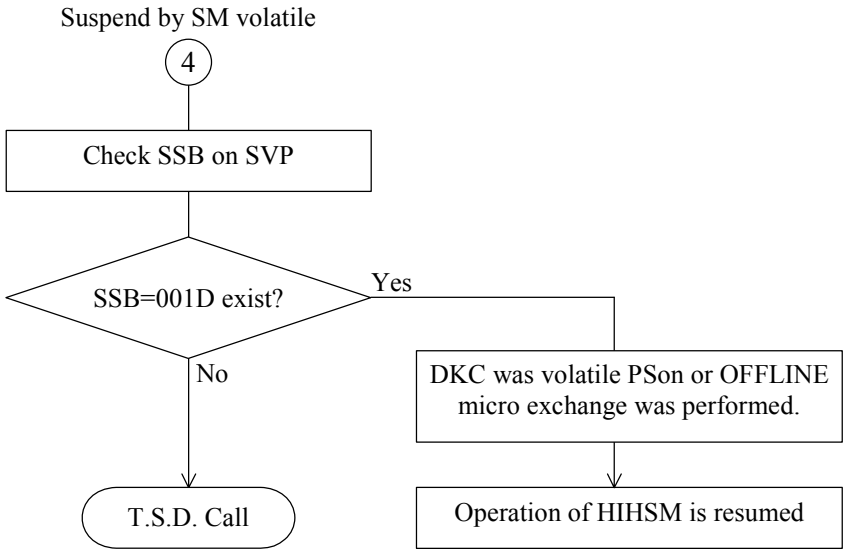
10.1 HIHSM Error Recovery Flowchart

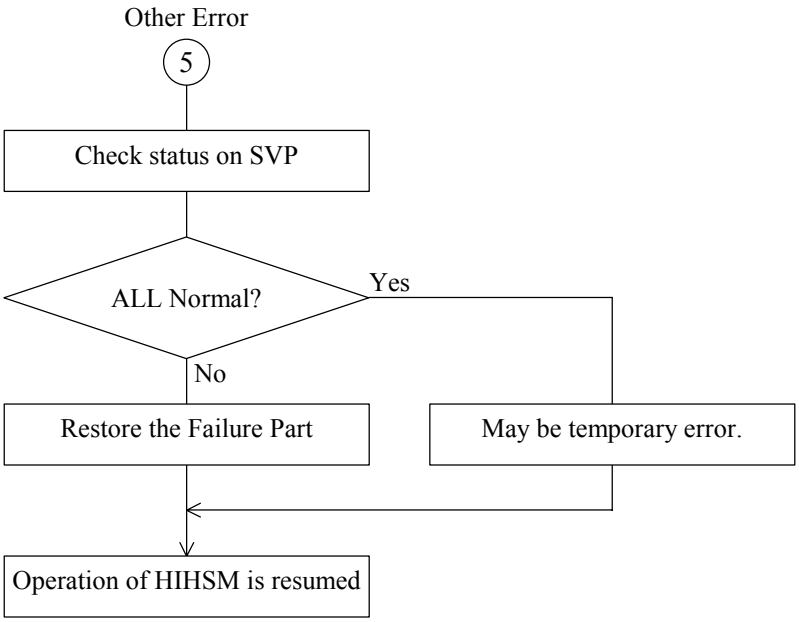


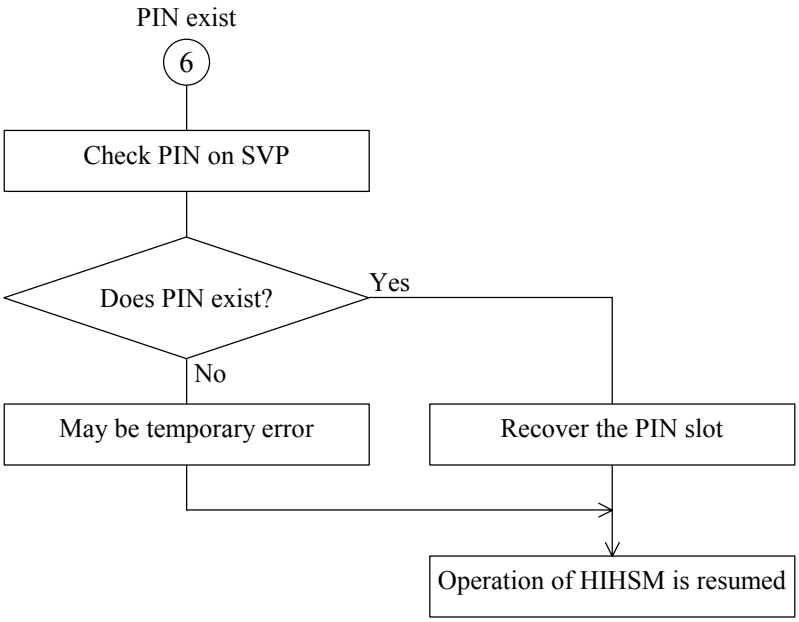












10.2 Output of the online path information (SSB = 2084)

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 8 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

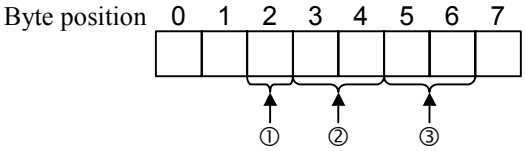
Byte	Contents	Remarks
0x40 ~ 0x43	Device number (CU: LDEV number) of which the online path check was performed	
0x44	The number (1 ~ 7) of effective PIDs output in SSB concerned	
0x45 ~ 0x46	The total number of online paths (1 ~ 2048) shown in the byte 0x40 ~ 0x43	
0x47	Preparation (0)	
0x48 ~ 0x4F	PID1	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

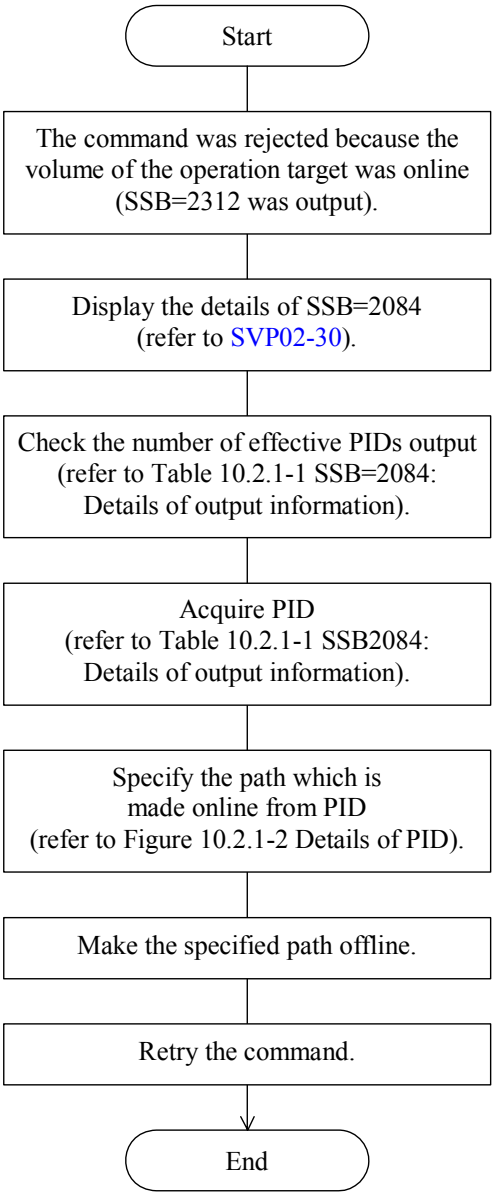


Note: This does not show All digits of CPU serial number. Therefore, you might not be able to determine the host that has an online path. If this is the case, it is necessary to confirm online paths from all the hosts that have the same 4 digit of CPU serial number. If you use a volume from two or more 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

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.



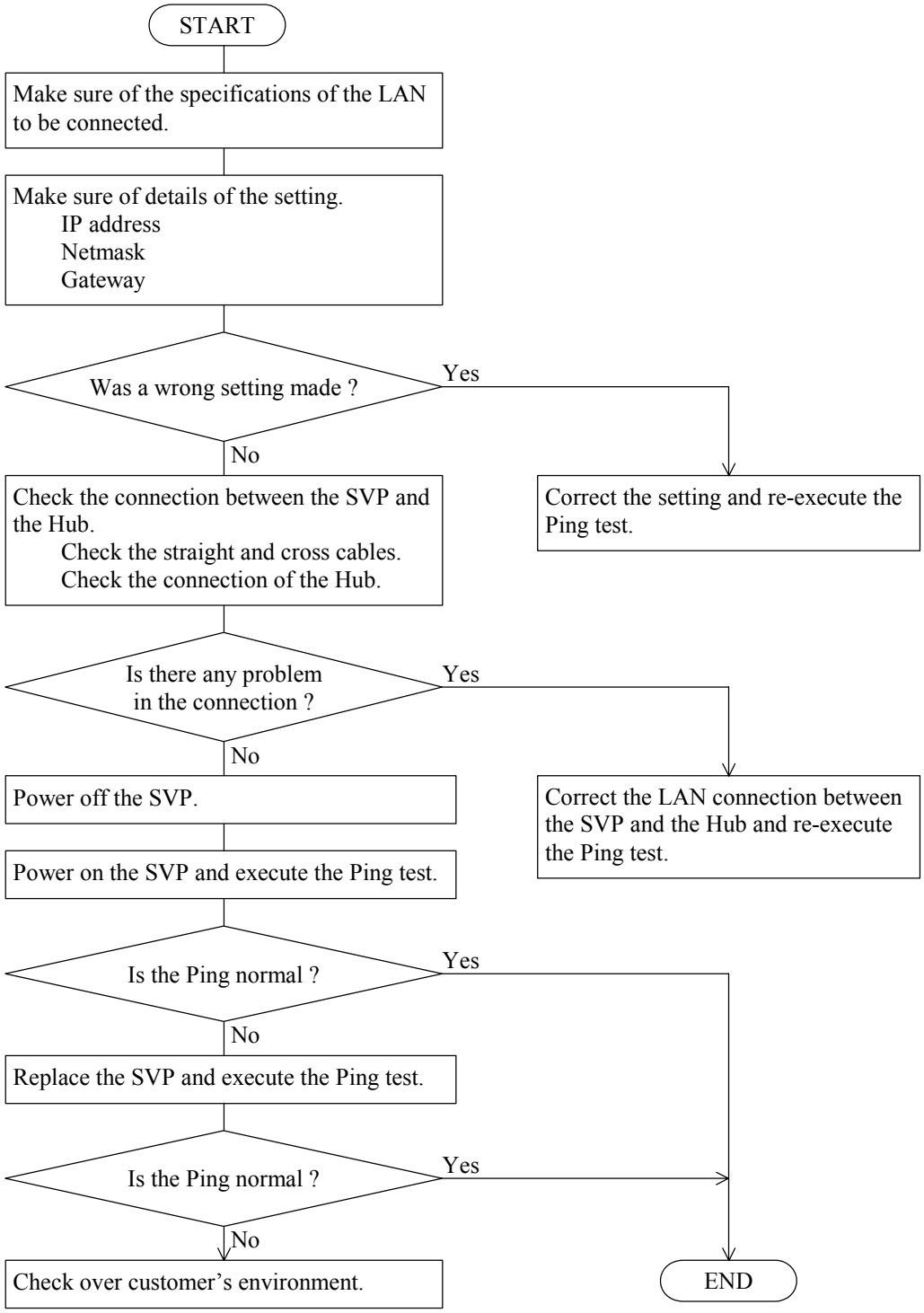
Note: When the total number of online paths > effective PIDs output, SSB=2084 is output again (refer to Table 10.2.1-1 SSB=2084: Details of output information).

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 Webconsole.)
   (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.

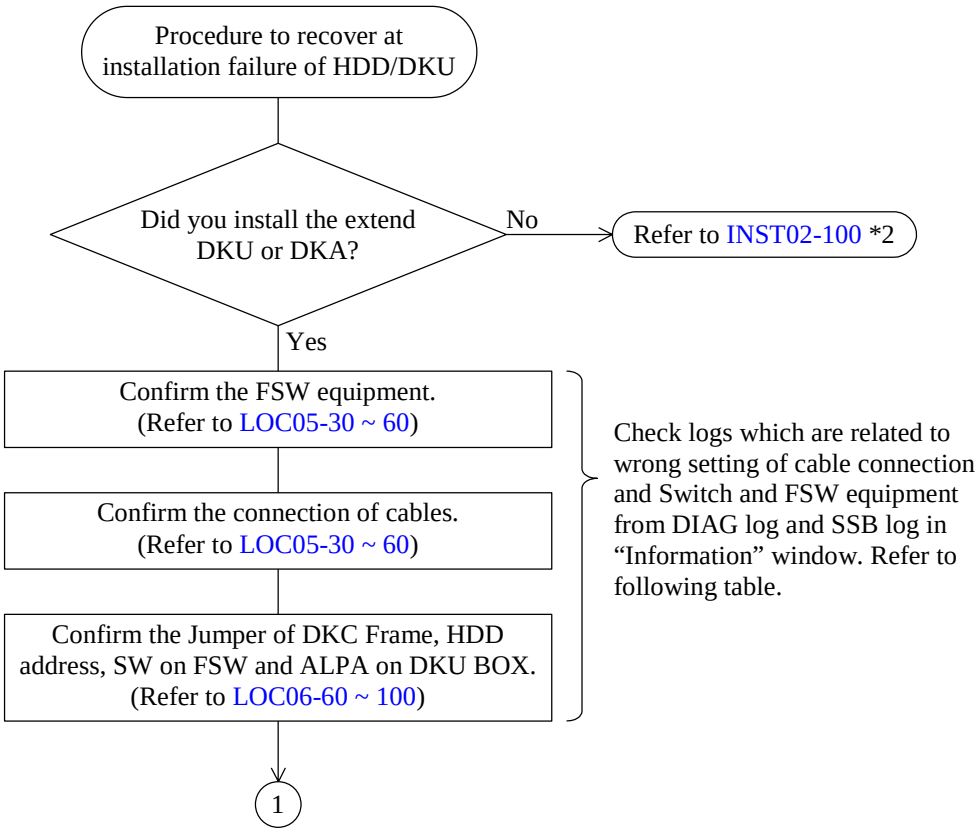
Name	Type	Description
EventTrapSerialNumber	Integer	Serial number of the DKC in which a failure occurred
EventTrapNickname	DisplayString	Nickname of the subsystem in which a failure occurred
EventTrapREFCODE	DisplayString	Reference code of a failure: See the following Table (4).
EventTrapPartsID	Object 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 DIAG06-140 ~ 190)	
Ax 05 (x = 0, 1, 5, 6)	Wrong Setting of Jumper of DKC Frame, HDD address or SW on FSW, Wrong Connection of the FC cable	*1, *2
Ax 07 Ax FC (x = 0, 1, 5, 6)	Wrong Connection of the FC cable.	*2
Ax AD (x = 0, 1, 5, 6)	Wrong Connection of the HBC BUS	*2, *3
Ax AE (x = 0, 1, 5, 6)	Wrong Connection of the HBC BUS	*2, *3
Ax 5E (x = 0, 1, 5, 6)	FSW that doesn't exist in configuration information is equipped.	*6
A9 01	FAN Warning has occurred.	*7
A9 04	FSW access error when platter revision is acquire.	*5
A9 05	FSW access error when FAN connection is checked.	*5
A9 06	FSW access error when equipping is checked.	*5
A9 08	Platter check error. (Error DKU specification.)	*8
A9 09	FSW that doesn't exist in configuration information is equipped.	*6, *8

SSB Error Code	Meaning	
A047	Access error of FSW	*4
A9FB	Link Failure occurred during installation	*4

*1: There is a possibility of wrong setting of Switch on FSW or ALPA on DKU BOX indicated by DiagLog.

*2: There is a possibility of wrong FC cable connection indicated by DiagLog.

*3: There is a possibility of wrong HBC BUS connection indicated by DiagLog.

*4: There is a possibility of wrong setting of SW on FSW or Jumper of DKC Frame, HDD address connected to the MP by reported the SSB (Refer to Fig 12-1).

*5: There is a possibility of wrong setting of Switch on FSW or not equipping indicated by DiagLog.

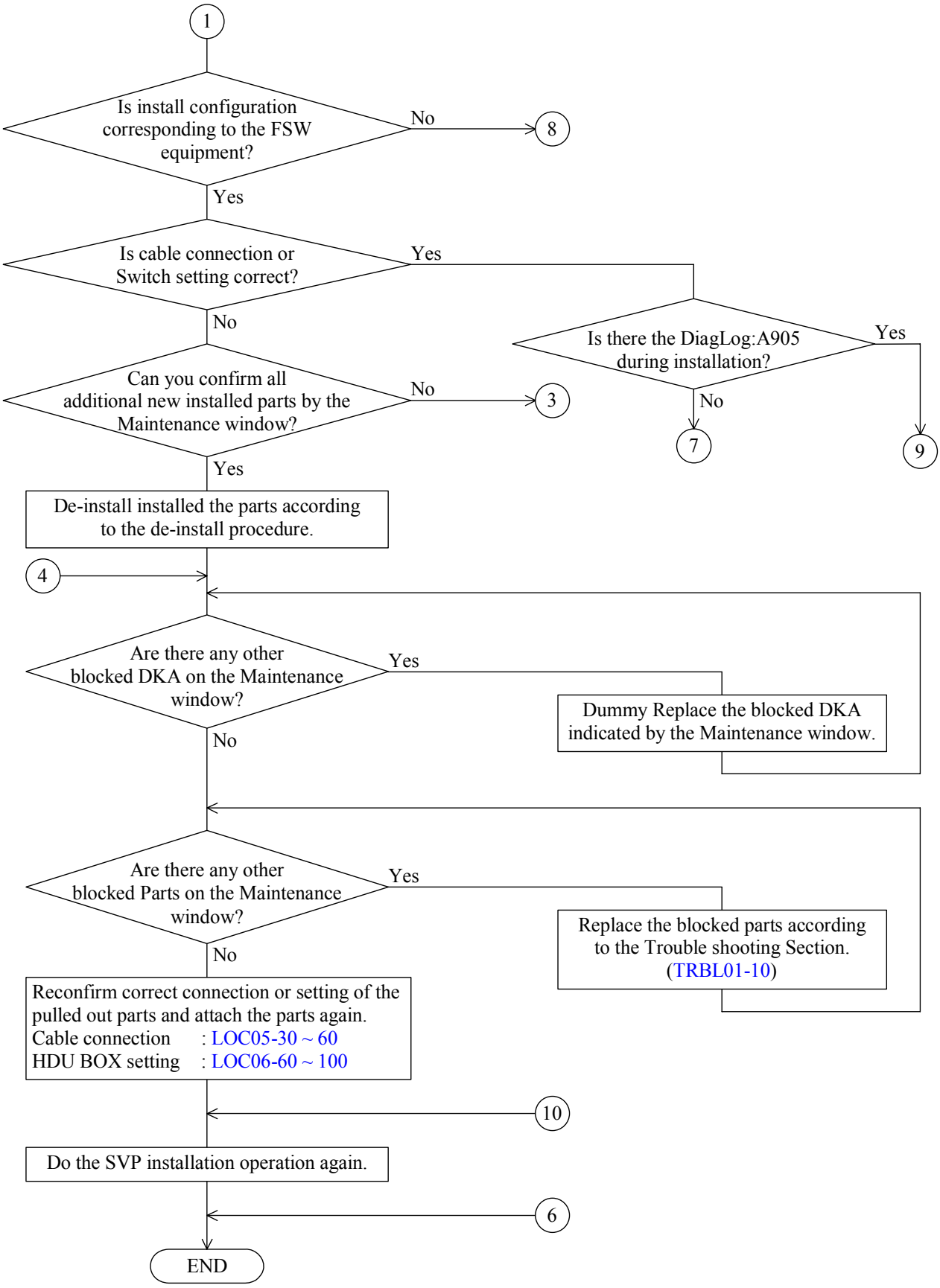
*6: There is a possibility being equipped for FSW that doesn't exist in configuration information.
Please confirm the configuration of DKU and equipping FSW.

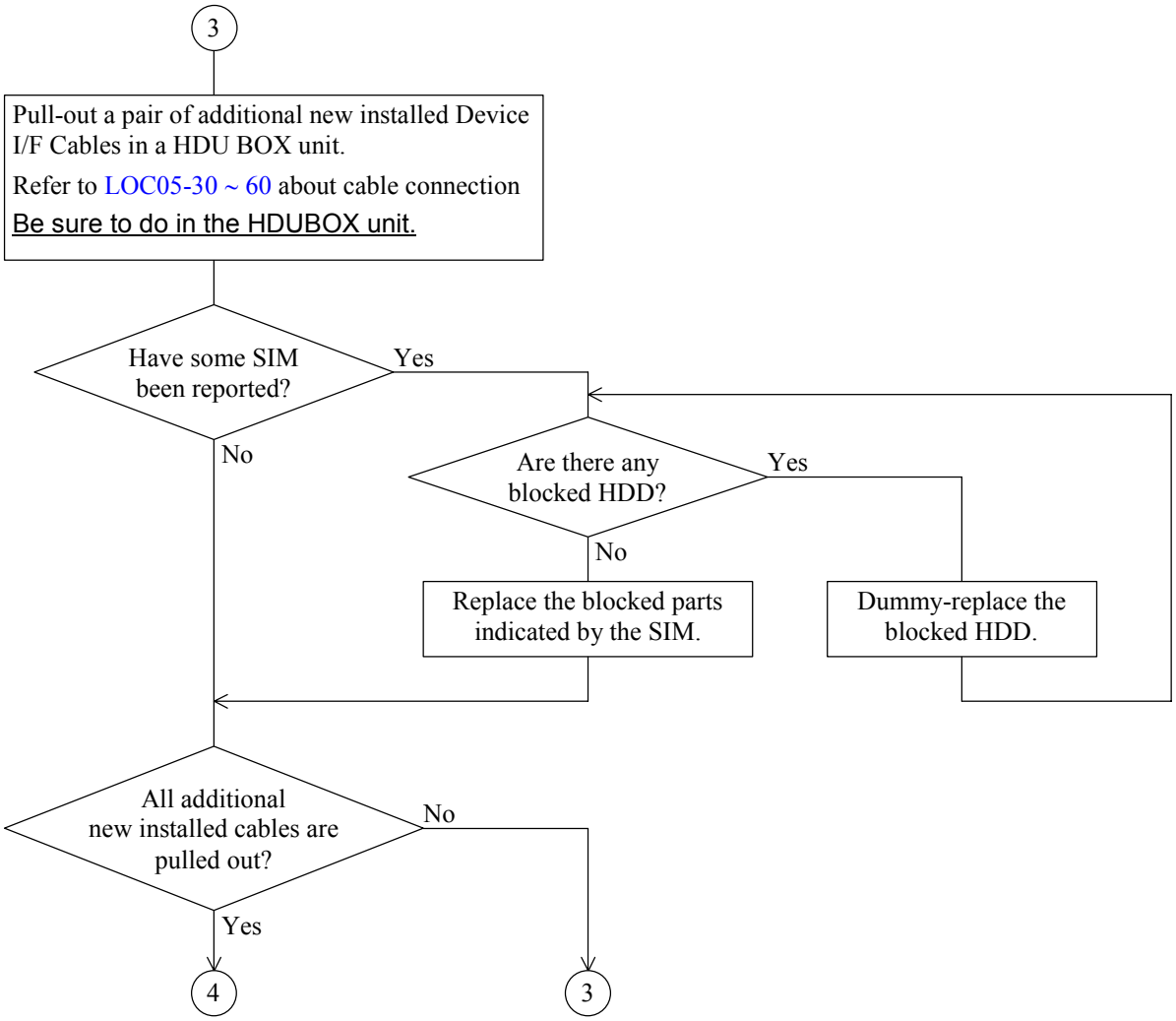
*7: There is a possibility that FAN indicated by DiagLog is broken.

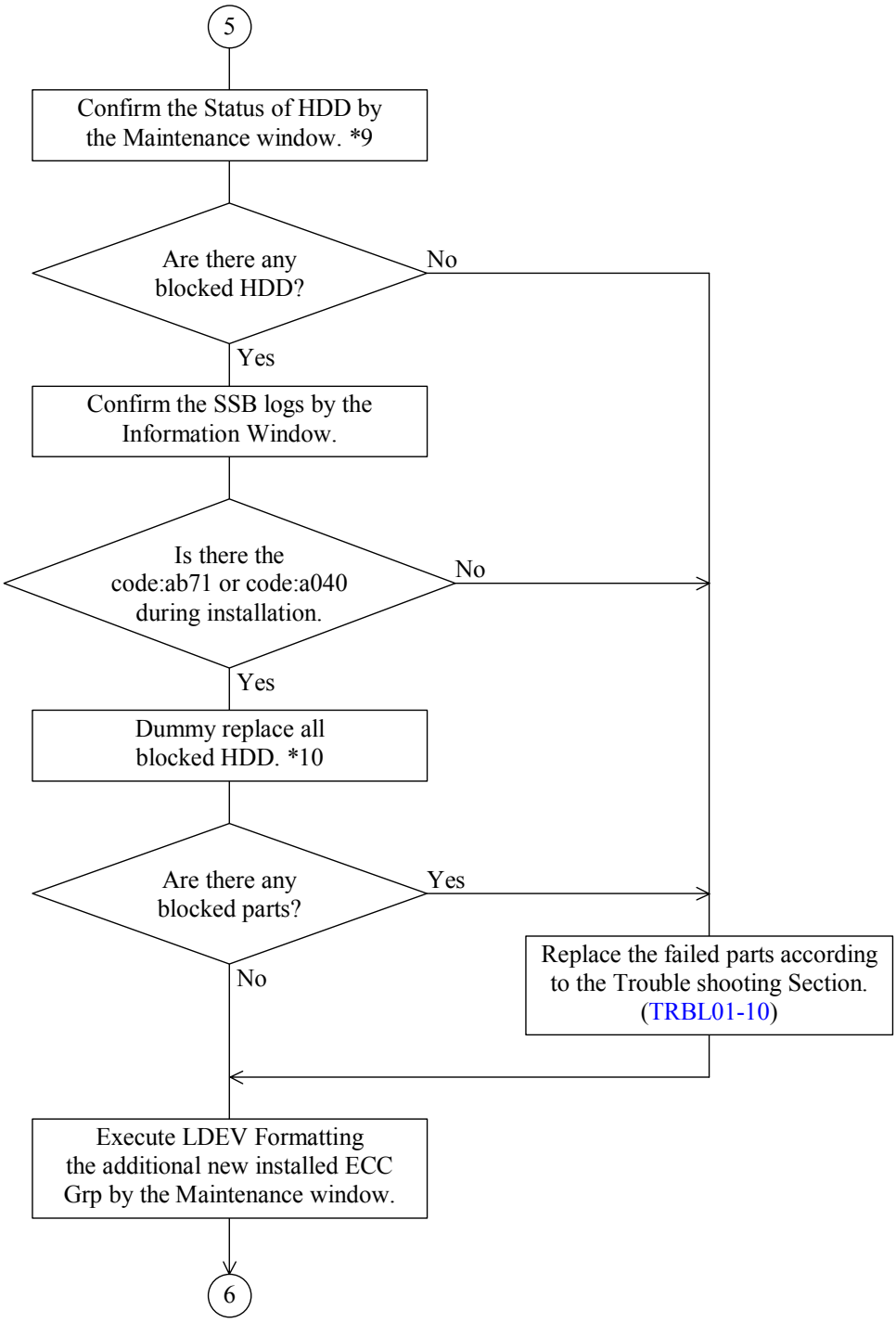
*8: Error DKU# is indicated in 0x0A bytes of Detail Information on DiagLog.
(DKU# = 00: RK0, 01: RK1, 02: RK2, 03: RK3)

Fig. 12-1 Standard Model

SSBMP#	PK#	FSW#
MP#80	DKA1A	FSW001L, FSW101L, FSW201L, FSW301L
MP#81		FSW023L, FSW123L, FSW223L, FSW323L
MP#82		FSW001L, FSW101L, FSW201L, FSW301L
MP#83		FSW023L, FSW123L, FSW223L, FSW323L
MP#A0	DKA2F	FSW001U, FSW101U, FSW201U, FSW301U
MP#A1		FSW023U, FSW123U, FSW223U, FSW323U
MP#A2		FSW001U, FSW101U, FSW201U, FSW301U
MP#A3		FSW023U, FSW123U, FSW223U, FSW323U

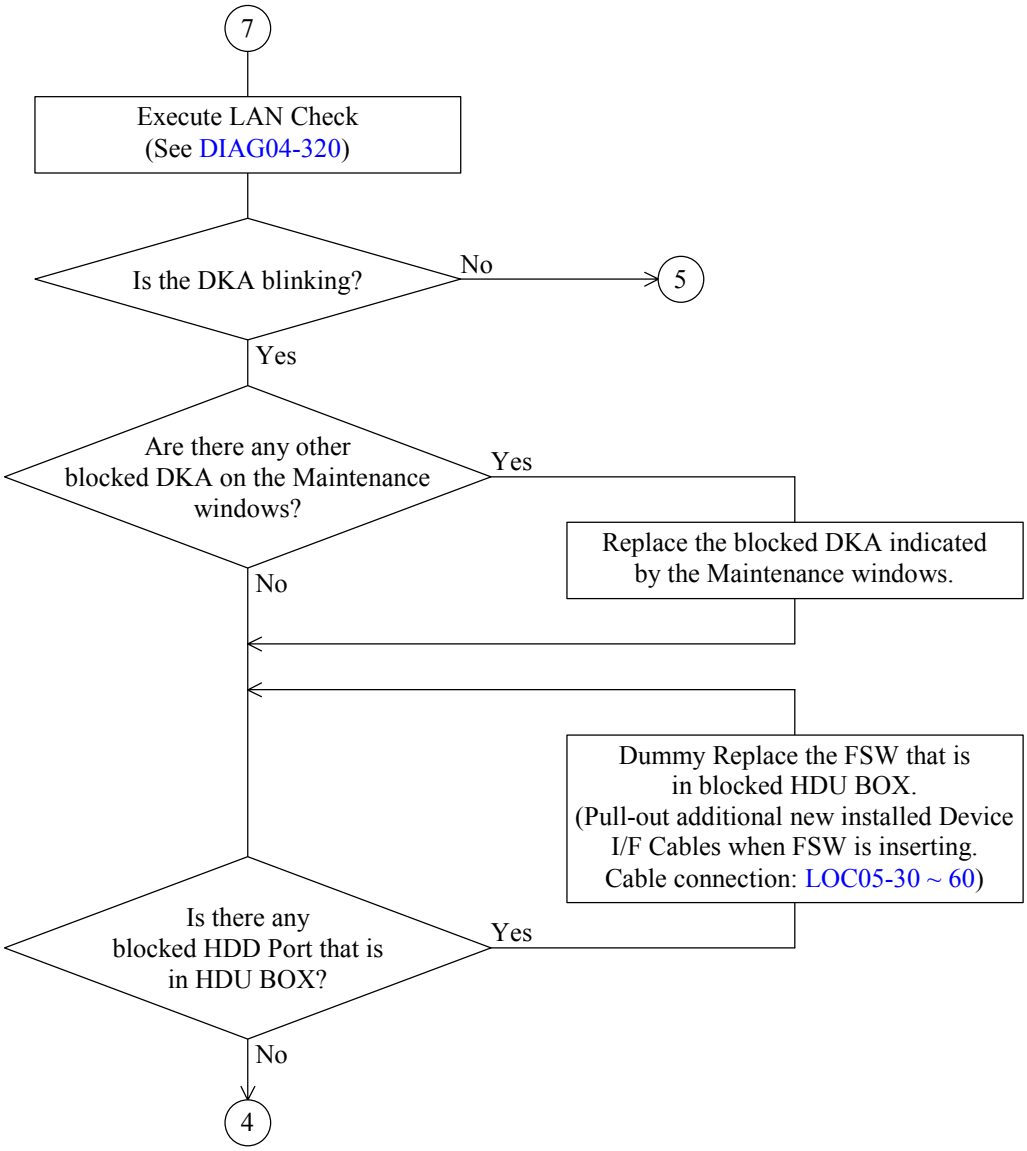


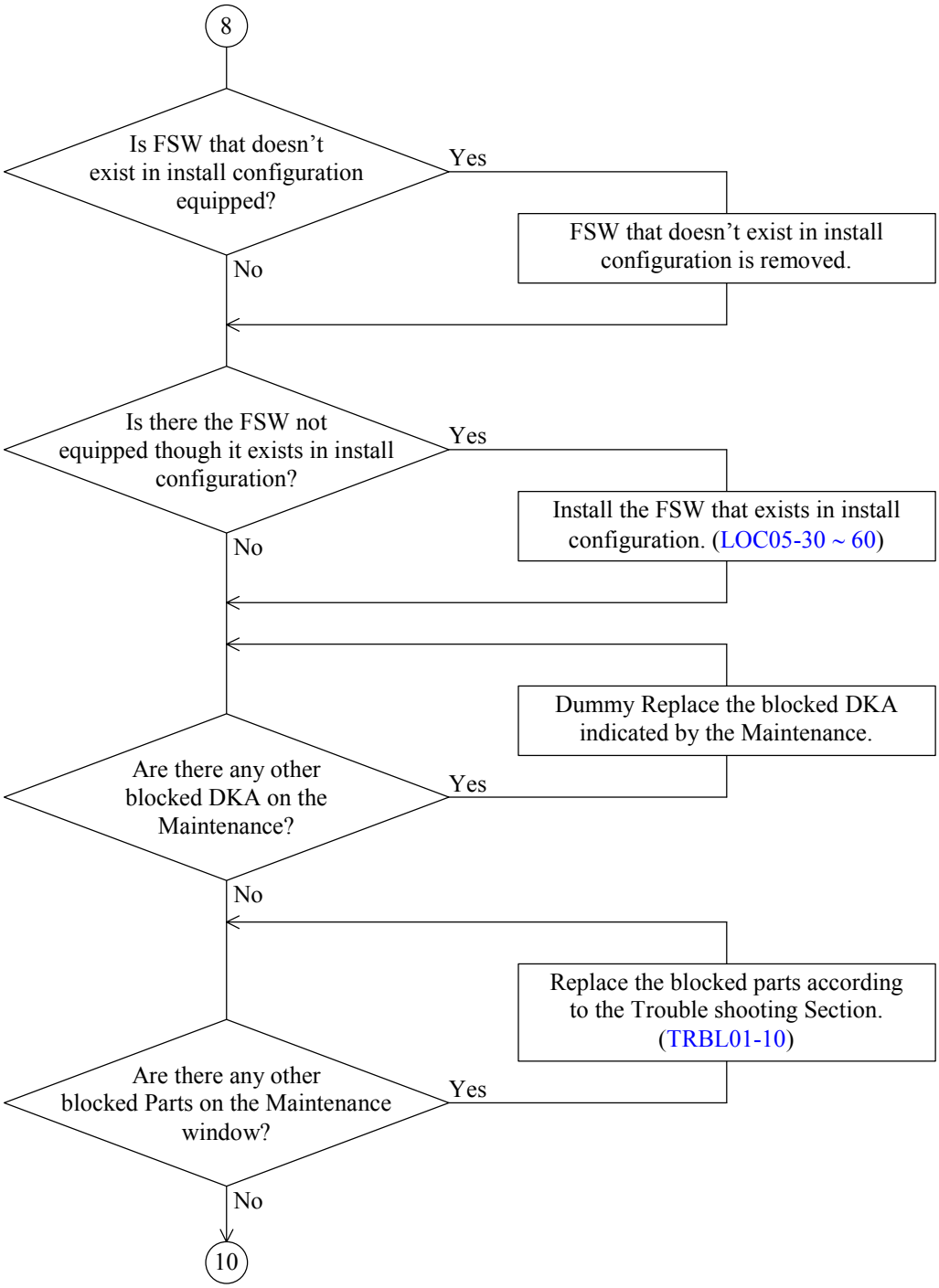


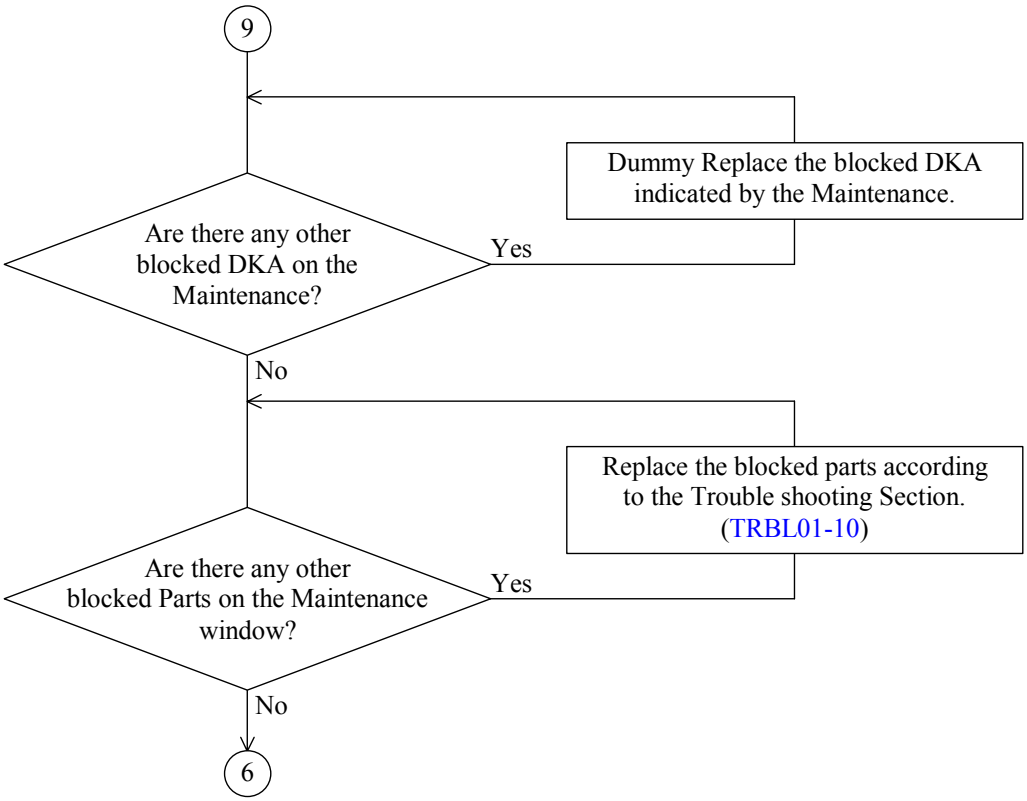


*9: Confirm whether HDD is mounted according to the Maintenance window.

*10: When dummy replacing fails 3 times, please replace with new HDD.







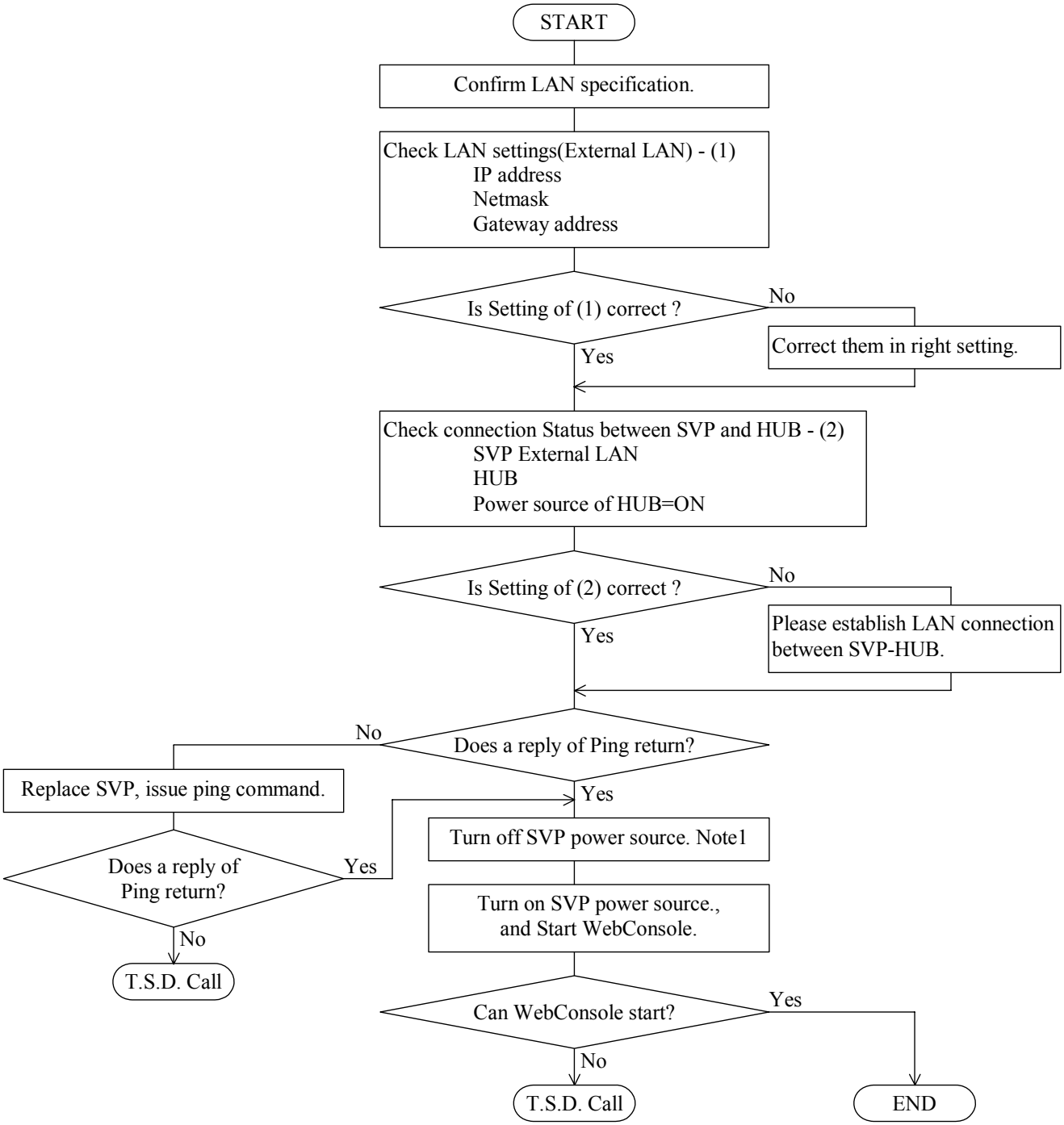
12.2 Case that LED of FSW is lighting after installation of DKA

Red LED of FSW 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 FSW.

13. WebConsole 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 WebConsole 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 WebConsole cannot start when connected outside LAN after that. Moreover, when you cannot start WebConsole, please reboot SVP.

14. Recovery Procedure for DCR Pre-Staging ABNORMAL END

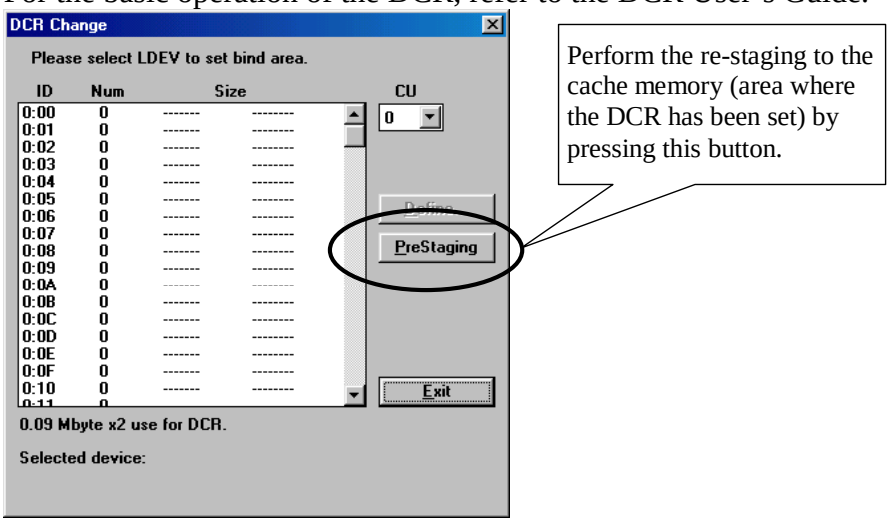
The recovery method for DCR Pre-Staging ABNORMAL END (SIM RC=4821-X0) factor is shown below.

Factor X0	Meaning	The recovery method
"10"	No DCR PP	Pre-staging re-execution from the DCR change window after DCR PP Install. (*1)
"20"	Subsystem Busy	Pre-staging re-execution from the DCR change window. (*1)
"40"	Staging Time Over	Pre-staging re-execution from the DCR change window. (*1)
"50"	Cache or SM Blockade	The cash or SM blockade occurs. Please recover the cash or SM referring to the maintenance manual. (troubleshooting section)
"60"	LDEV Warning	LDEV is Failure State. Pre-staging re-execution from the DCR change window after LDEV recovery. (*1)
"70"	Staging Failure	HDD is Failure State. Pre-staging re-execution from the DCR change window after HDD recovery. (*1)
"80"	P/S OFF	Pre-staging re-execution after P/S ON. (*1)
"90"	Pre-Staging Canceled	Pre-staging re-execution from the DCR change window. (*1)
"A0"	Cache Over Load	Pre-Staging Re-perform from the DCR change window at the time of low loading. (*1)

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.
"E2"	Subsystem Busy	Pre-staging re-execution from the DCR change window. (*1)
"E4"	Staging Time Over	Pre-staging re-execution from the DCR change window. (*1)
"E5"	Cache or SM Blockade	The cash or SM blockade occurs. Please recover the cash or SM referring to the maintenance manual. (troubleshooting section) 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). (*1)
"E6"	LDEV Warning	LDEV is Failure State. Pre-staging re-execution from the DCR change window after LDEV recovery. (*1)
"E7"	Staging Failure	HDD is Failure State. Pre-staging re-execution from the DCR change window after HDD recovery. (*1)
"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. (*1)
"EA"	Cache Over Load	Pre-Staging Re-perform from the DCR change window at the time of low loading. (*1)

*1: [PreStaging] button
For the basic operation of the DCR, refer to the DCR User's Guide.



15. External devices Error Recovery

The following is the recovery procedure when the External Devices Error (SIM = 21D0-XY, EFD000) is occurred.

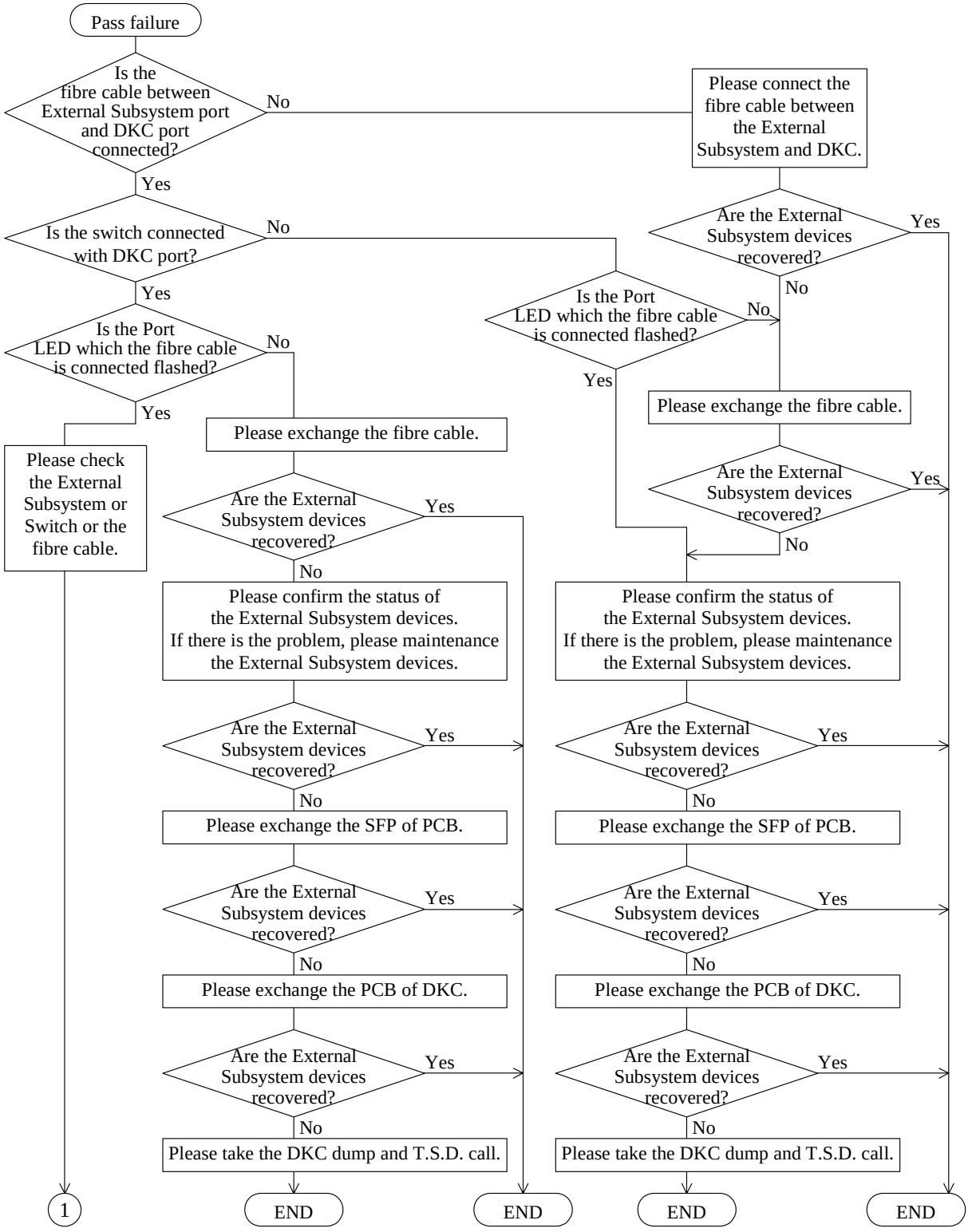
When external storage in the following matrix becomes the target of SIM, information of Model name of External Storage in the SIM is different from that of actual product name. When the external storage in the following matrix is connected and SIM is reported, check Model name of External Storage in the SIM against the actual product name to identify target external storage of the SIM.

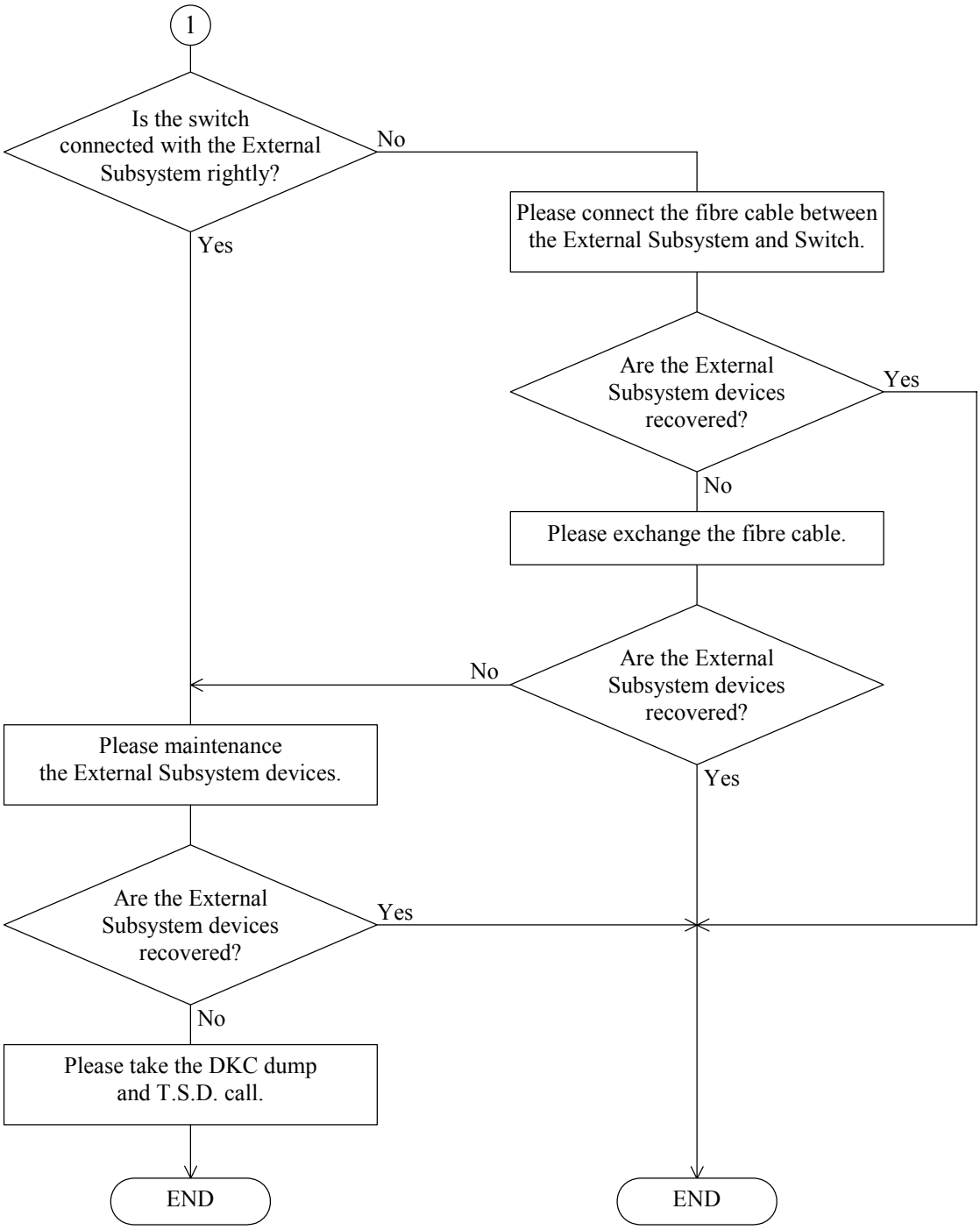
SIM			Actual product		
Vendor Name	Model Name of External Storage	Product Number of External Storage (*1)	Vendor	Product Name	Display in console
HITACHI	9500V	D600xxxx	HITACHI	9570V	9500V
HITACHI	9500V	D60Jxxxx	HITACHI	9530V	9500V
HITACHI	9500V	D60Hxxxx	HITACHI	9580V/9585V	9500V
HITACHI	9500V	71xxxxxx	HITACHI	WMS100	WMS
HITACHI	9500V	73xxxxxx	HITACHI	AMS200	AMS
HITACHI	9500V	75xxxxxx	HITACHI	AMS500	AMS
HITACHI	9500V	77xxxxxx	HITACHI	AMS1000	AMS
HITACHI	AMS	83xxxxxx	HITACHI	AMS2100	AMS
HITACHI	AMS	85xxxxxx	HITACHI	AMS2300	AMS
HITACHI	AMS	87xxxxxx	HITACHI	AMS2500	AMS

(*1) “xxxx” at Product Number of External Storage means arbitrary number or character.
When target product is 9500V series, “xxxx” means the last 4 digits of the serial number.

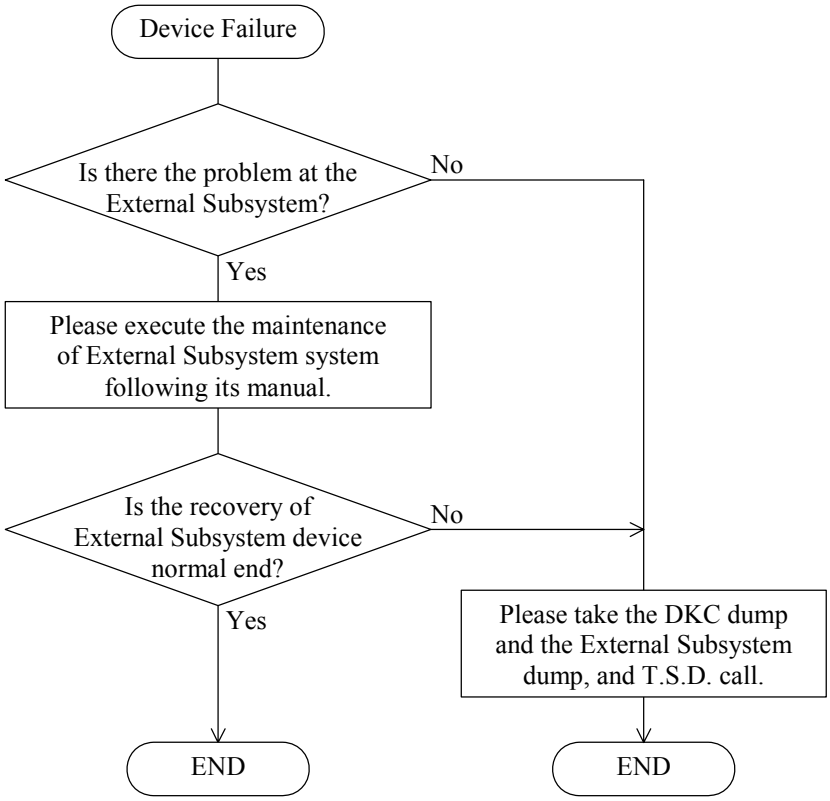
As for external storage other than those above, information of Model name of External Storage in SIM and that of actual product name is the same. Refer to FRS for detail.

15.1 Path failure recovery method (SIM = 21D0-XY)

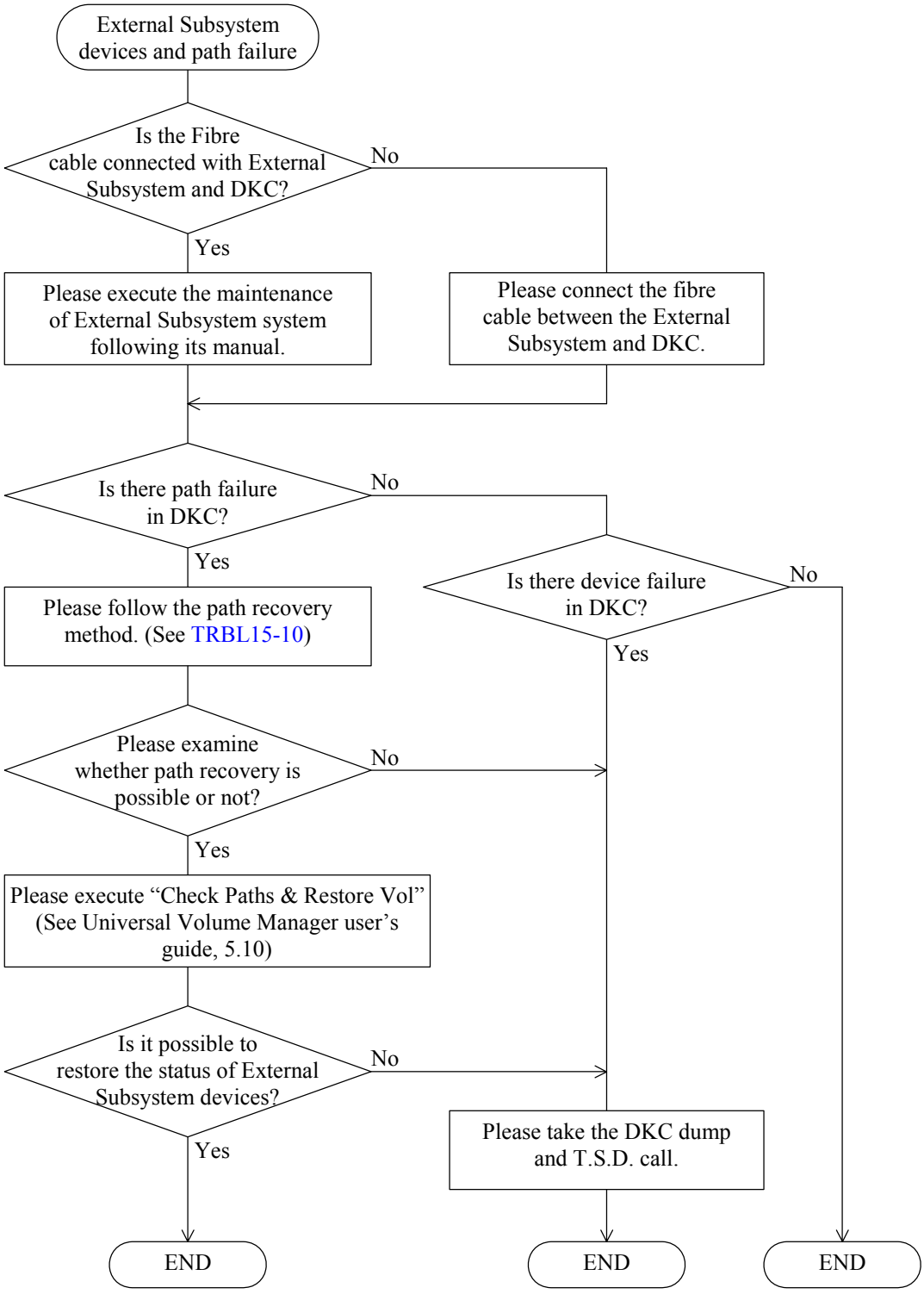




15.2 Device failure recovery method (SIM = EFD000)

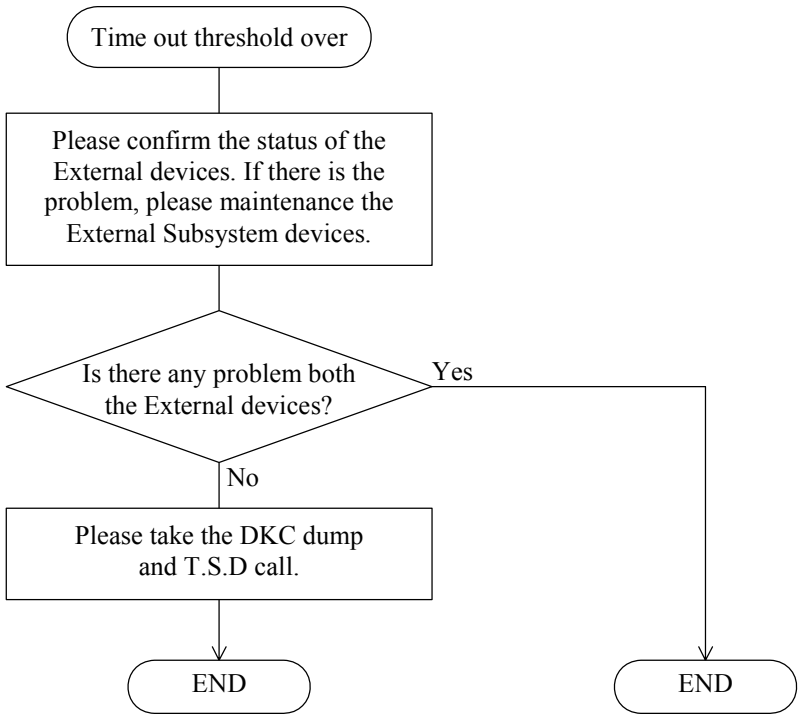


15.3 Path failure and Device failure recovery method (SIM = 21D0-XY, EFD000)



15.4 External Subsystem path response time out threshold over recovery method (SIM = 21D2-XY)

SIM = 21D2-XY



15.5 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																

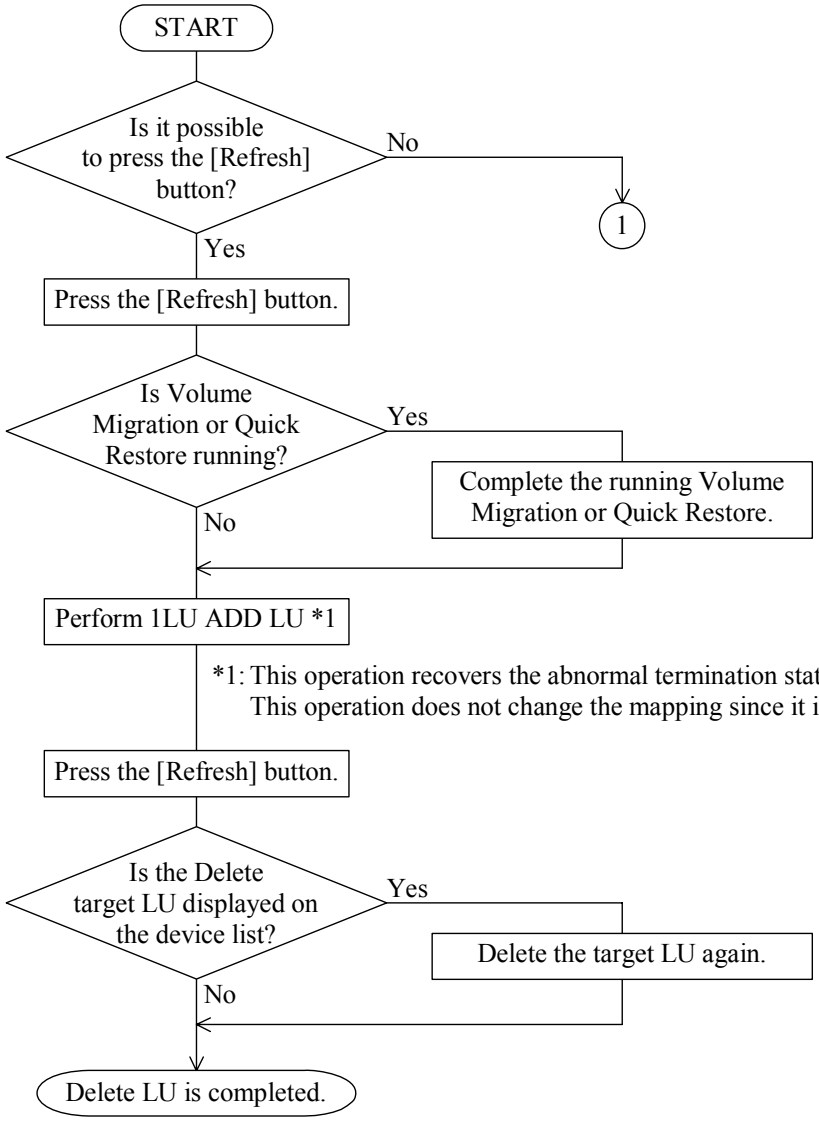
*: The information may not be stored depending on the factor.

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.
0x00000002	• Since External Port currently used is MIX (high-speed) Mode, a usual external device cannot be used. (An external VOL occurs other than the command device)	• Use External Port of the standard mode. • Cancel the MIX mode.
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 USP VM.

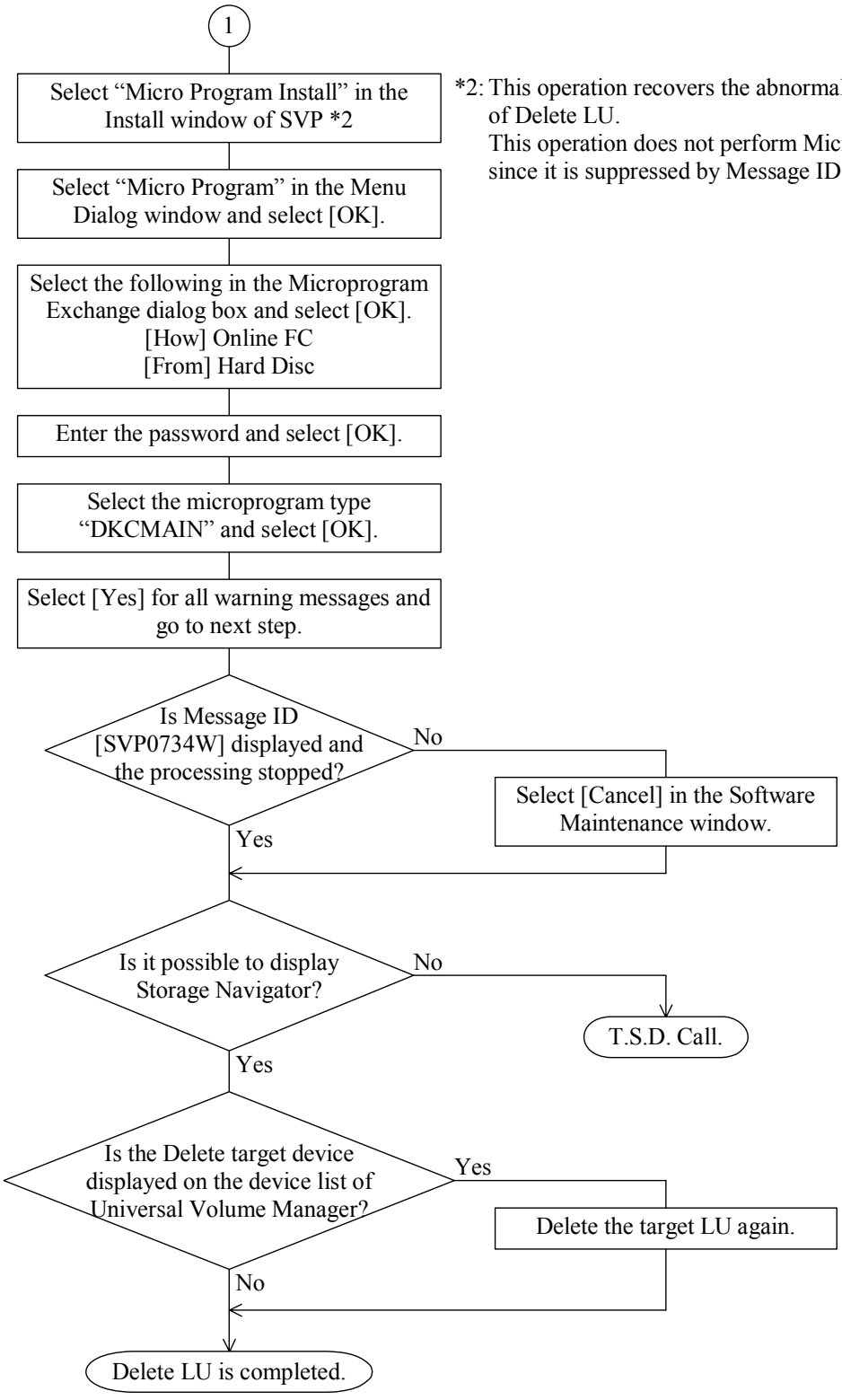
Factor code	Content	Coping Method
0x00000006	• The information of the external device acquired by the LDEV (LU) discovery is not in the profile information. • The external device is the LU for storage management.	• Connect the storage supported by UVM. • Apply the micro version of RAID which supported 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 USP VM.
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 USP VM 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 USP VM. • 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.

15.6 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].

16. Procedure for Forced Powering Off of DKC/DKU

When this operation is performed, power of the DKC and all the DKUs connected to the DKC is forced to be turned off immediately. However, data stored in the SM/CM are backed up by the auxiliary power supply and batteries after the powering off.

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 RSD because a system down may be caused if it is performed without due notice.

The LAN error SIM (73XX00) may occur during this work. Just complete them, when the work is finished.

a. Insert the maintenance jumpers in the connector (JP3) on the DKCPANEL.

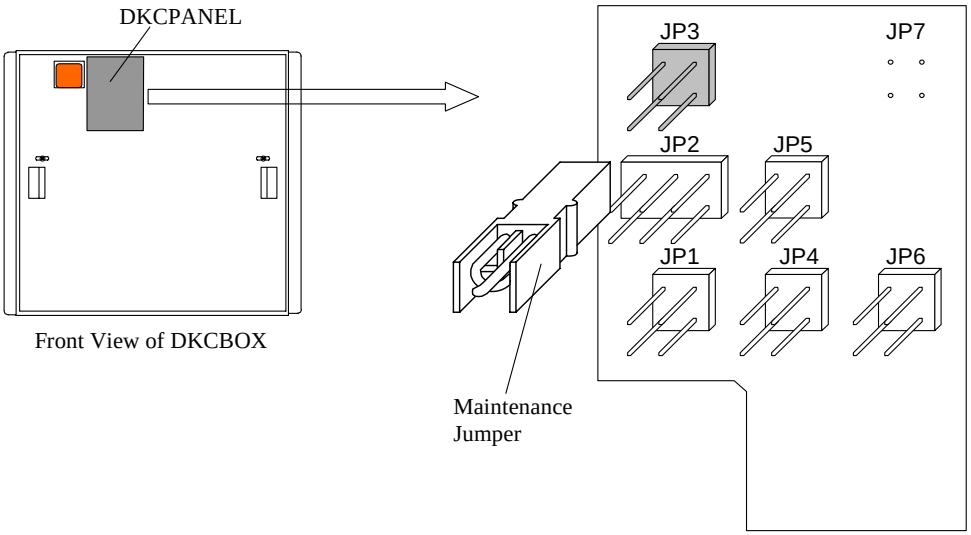


Fig.16-1 Insertion of Maintenance Jumper

b. Push the CHK RST switch on DKCPANEL to the upper position (opposite side of CHKRST) 1 second or more.
c. Remove the maintenance jumper after PS-ON LED is off. (Refer to Fig. 16-1)

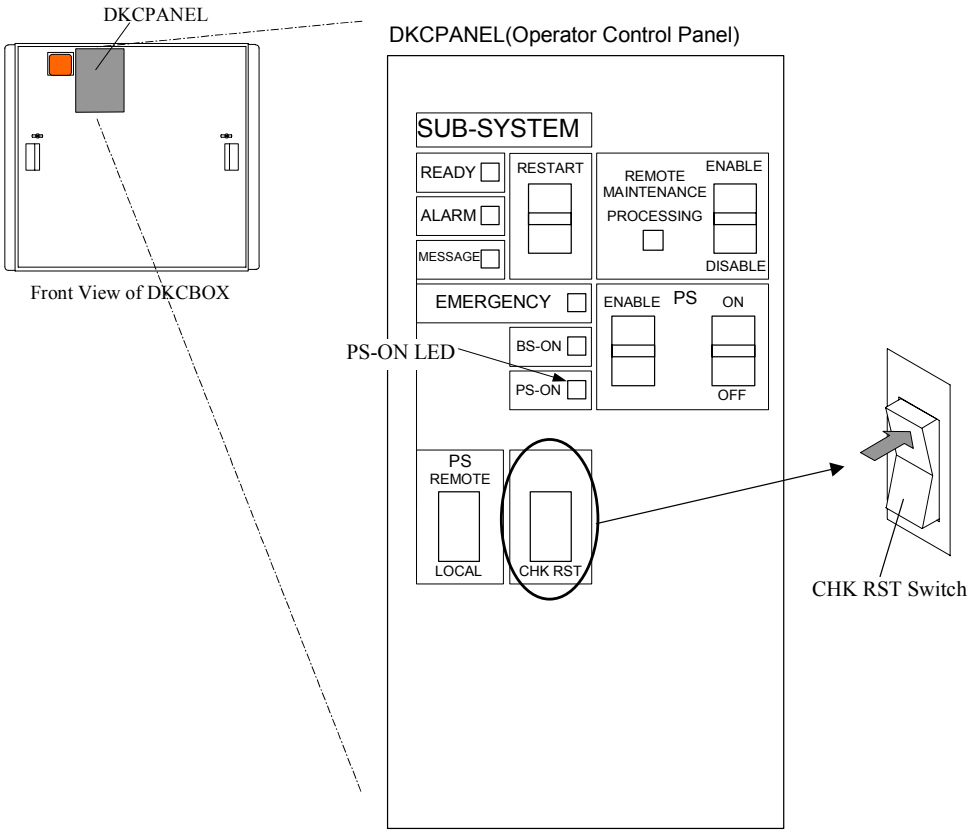


Fig.16-2 Location of Switch and LED

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 9, 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.

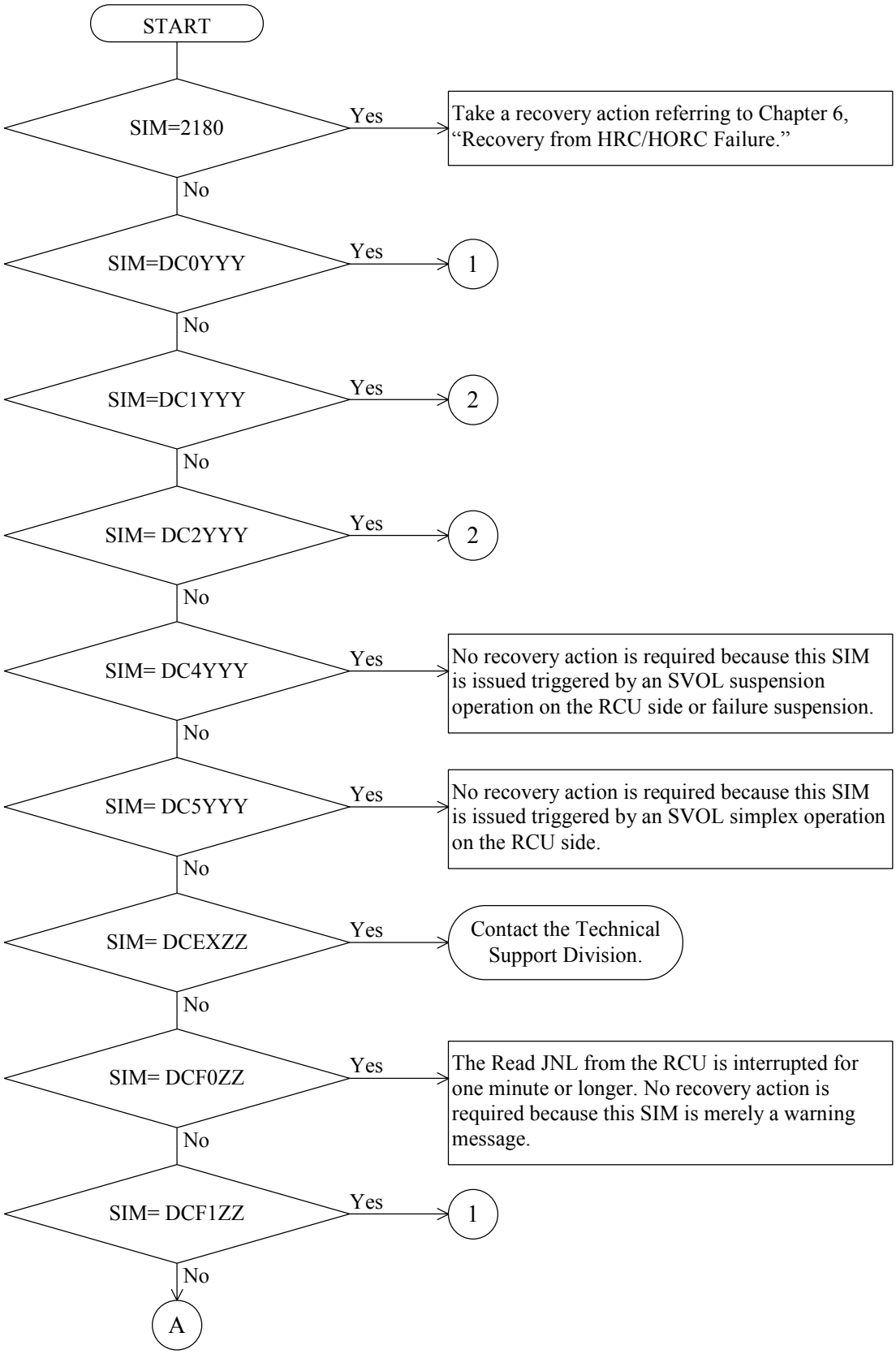
*1: When an UR pair is suspended, RAID Manager/UR or RAID Manager/TT displays the following message in the Syslog.

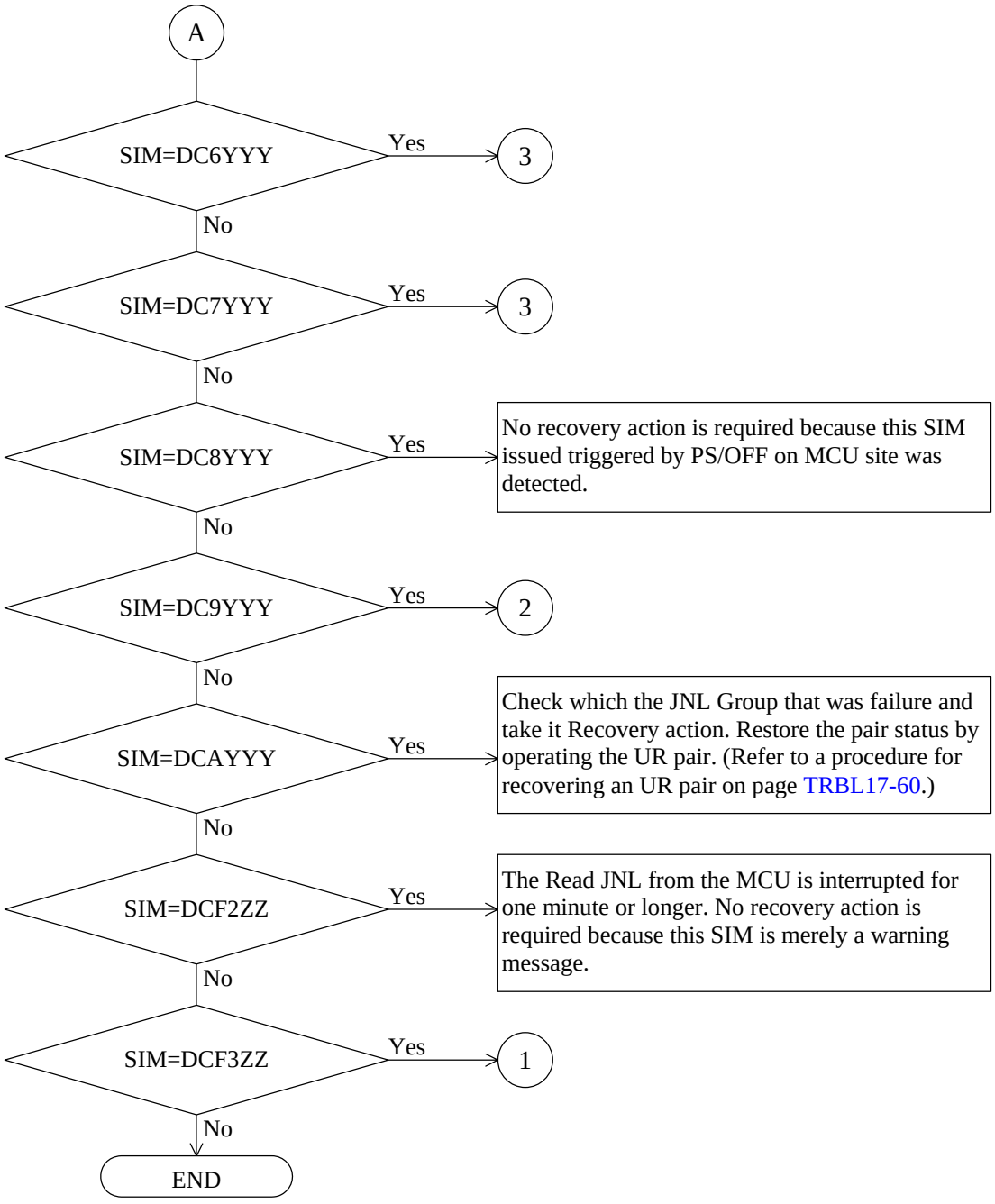
[HORCM_102] Deleted a suspending status on this paired volume
(Volume:○○○○, code:XXXX).

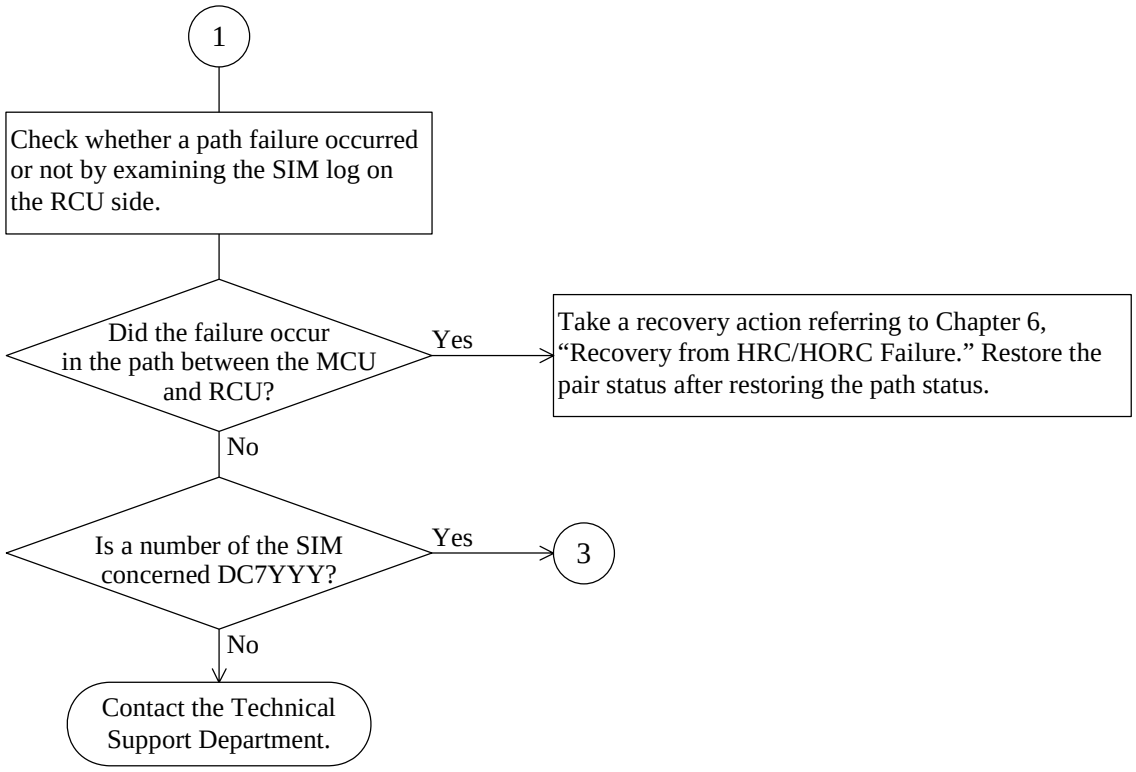
○○○○ : Volume name
XXXX : Factor code

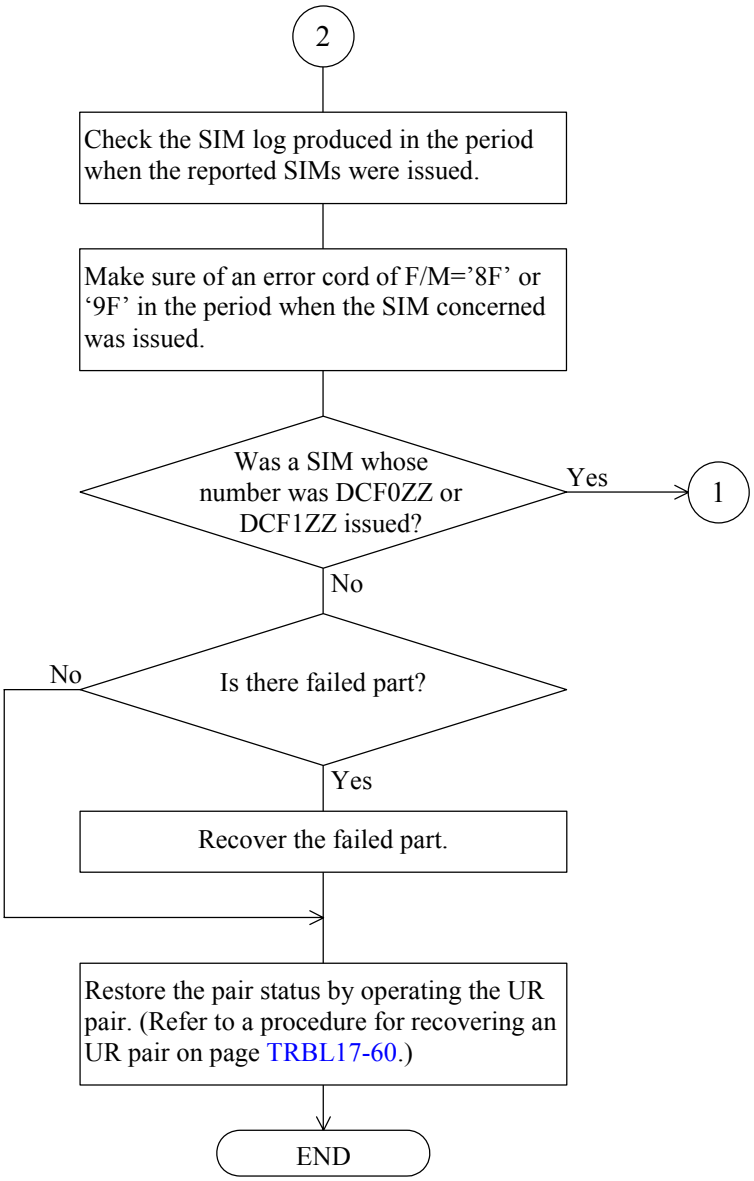
When a message that informs of occurrence of an UR pair failure is displayed in the Syslog, it is required to check the SIM(s) of the connected DKC and understand correspondence of messages in the Syslog to SIMs logged on the DKC side before starting the recovery action.

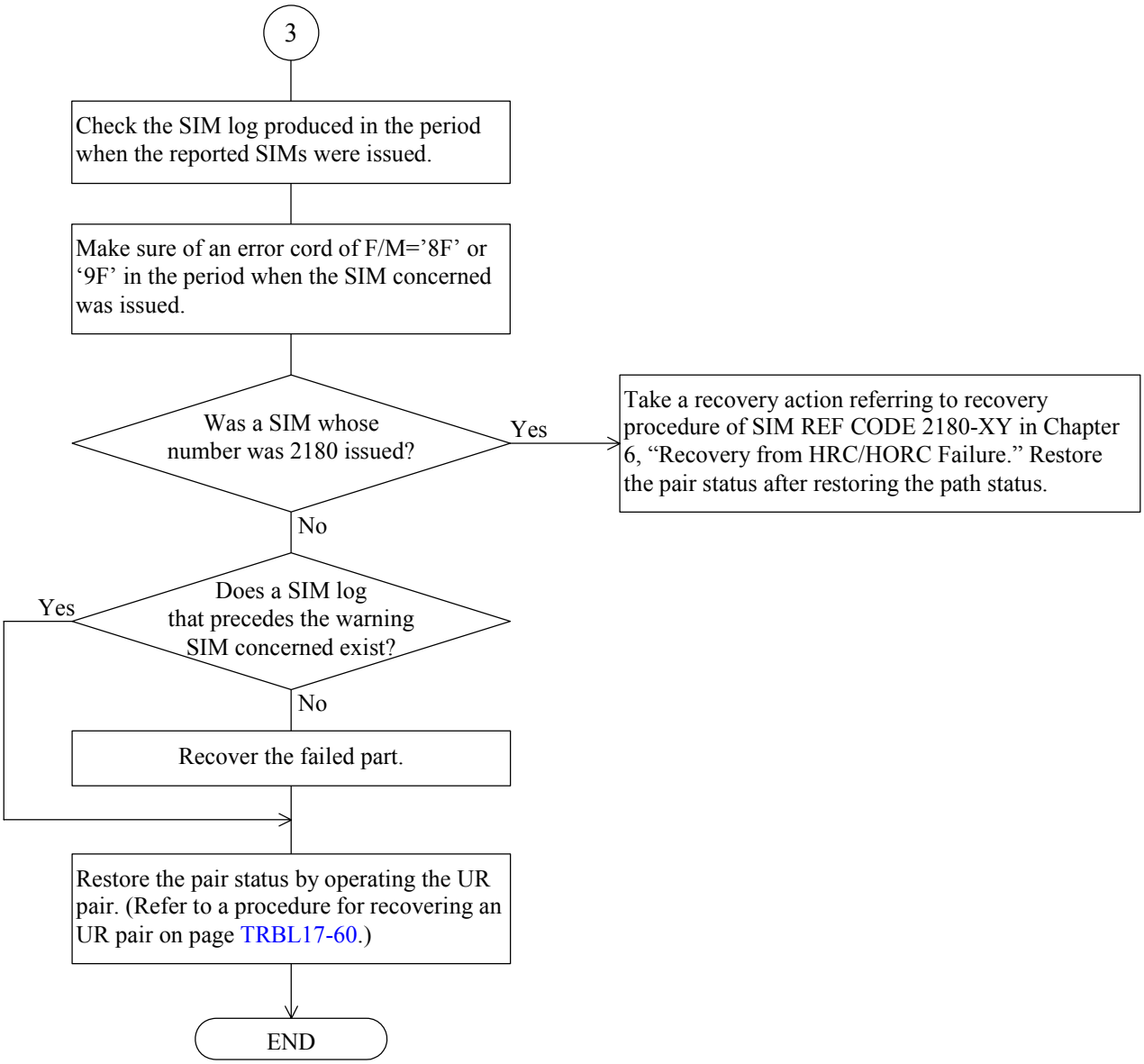
Recovery from the UR failure



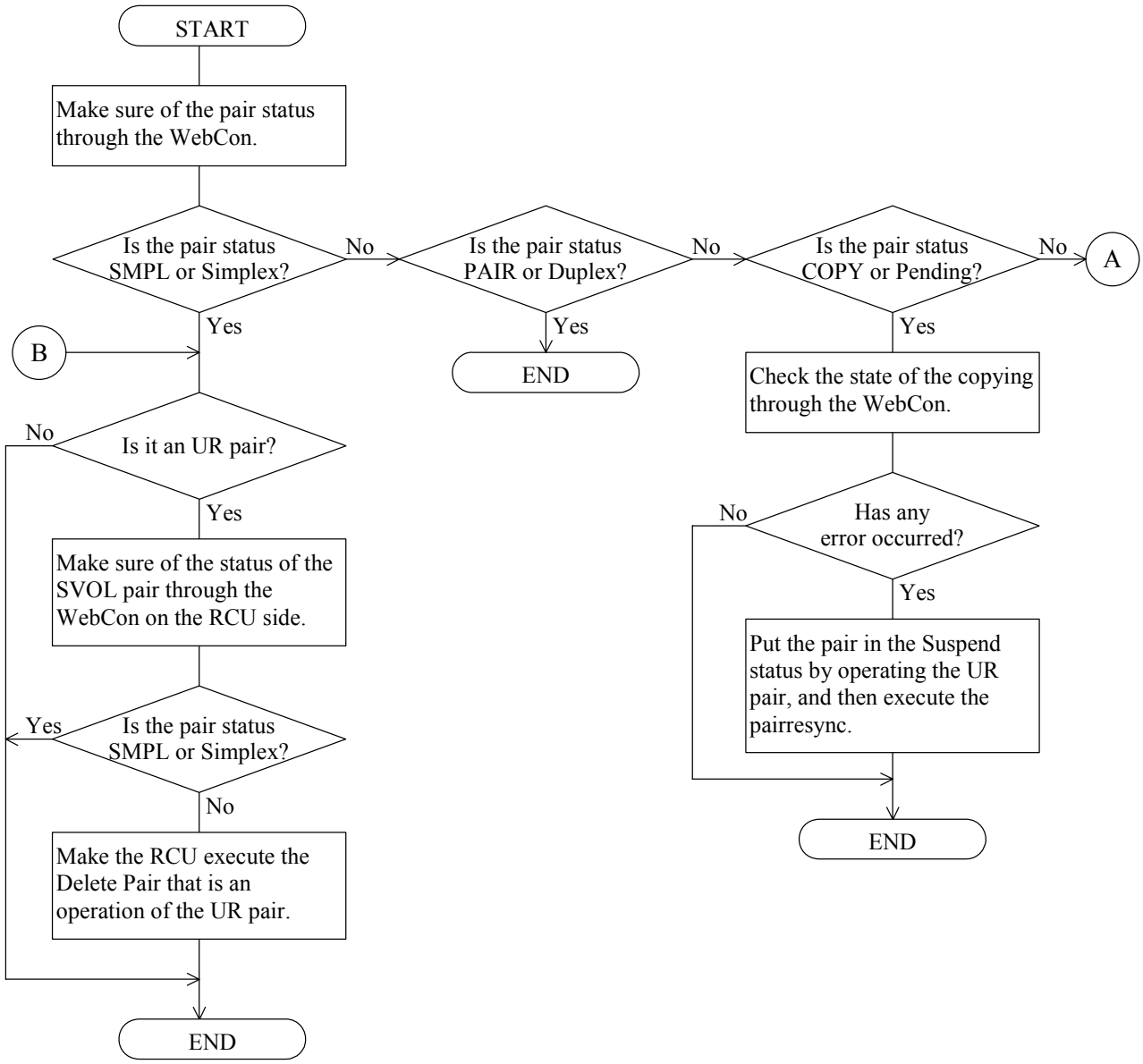








17.2 Procedure for Recovering UR Pair



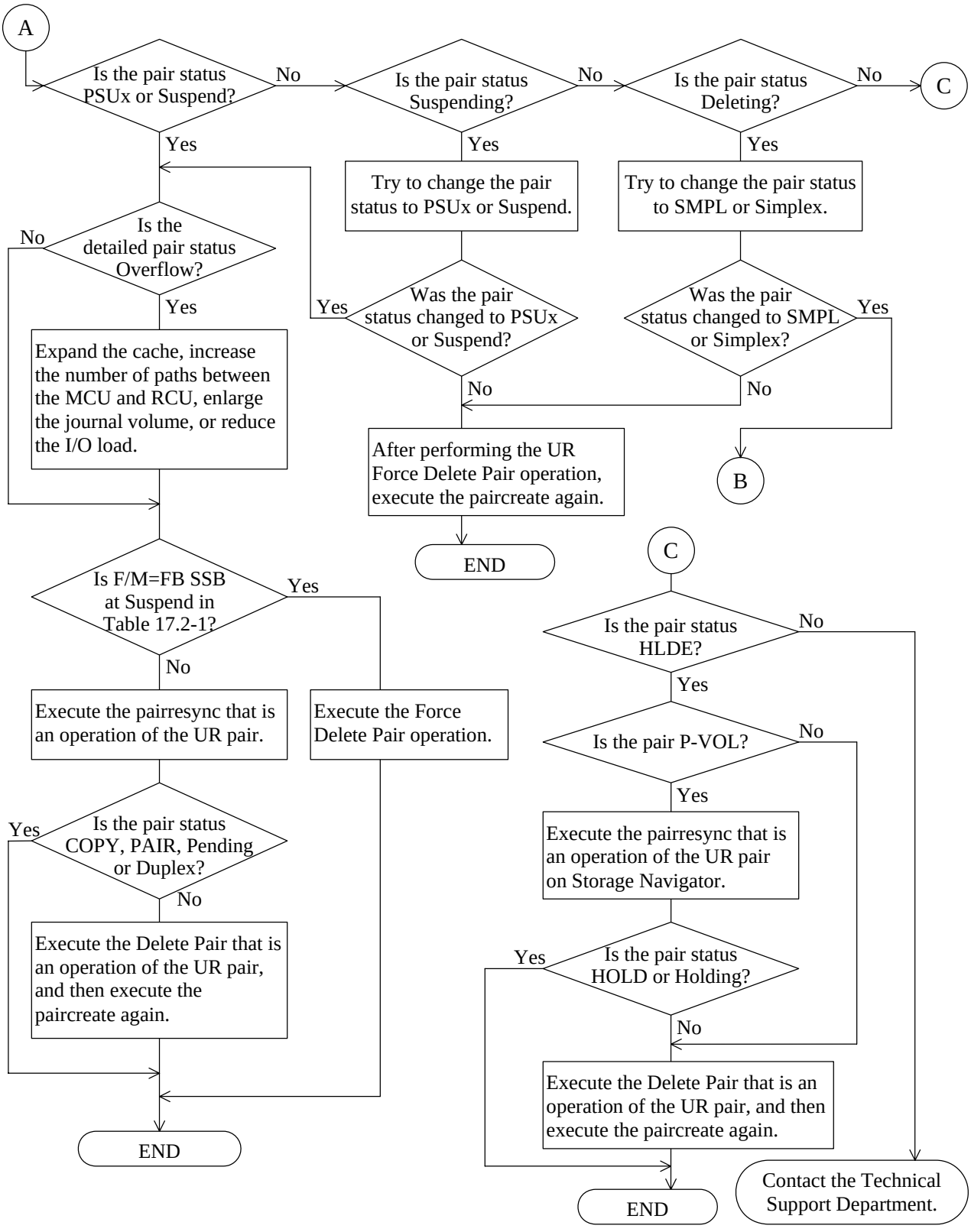


Table 17.2-1 Force Delete Pair Target F/M=FB SSB

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.
- A message was issued concerning the paircreate (Add Pair) or pairresync (Resume Pair) operation. (See Table 17.3-1)

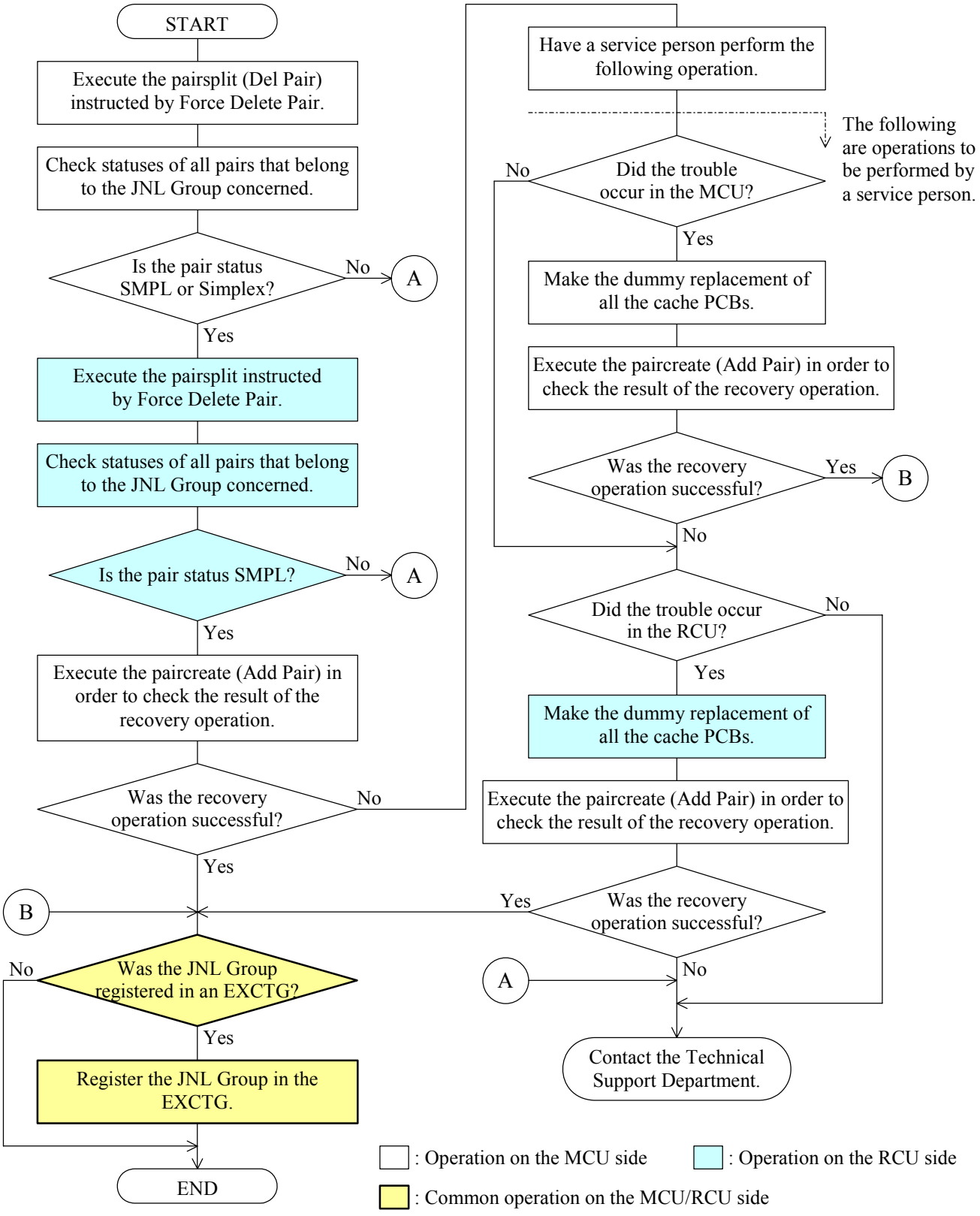
Notices
- All the data volumes that belong to the group (JNLG) concerned are placed in the Simplex status because Force Delete Pair operates in the Group mode.
- As a result of performance of Force Delete Pair operation on the MCU side, data that has not been transferred to the RCU is abandoned.
  As a result of performance of Force Delete Pair operation on the RCU side, data that has not been authorized is abandoned.

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.

Table 17.3-1 Force Delete Pair Target Message

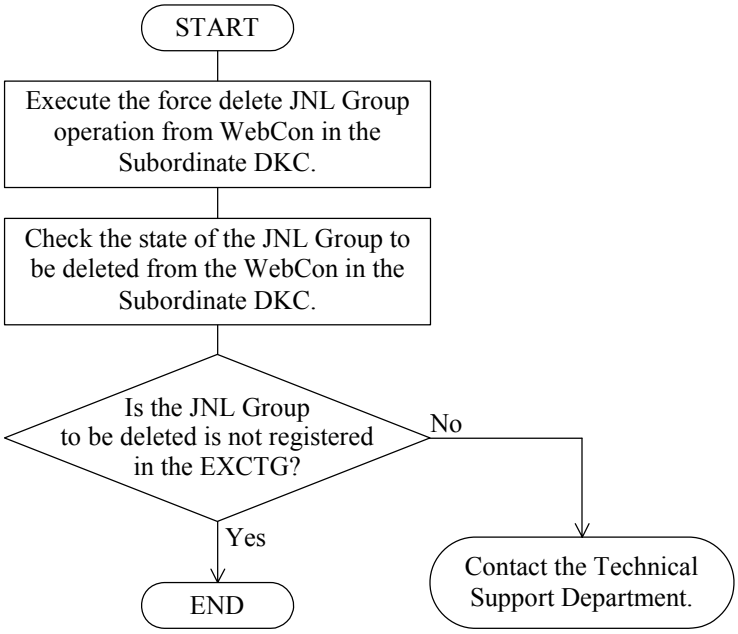
No.	F/M	Error Code (SSB)	JAVA Message Code
1	0F	8F6F	6505 58329
2	0F	EB7A	6505 58328



17.4 Force Delete JNL Group Operation

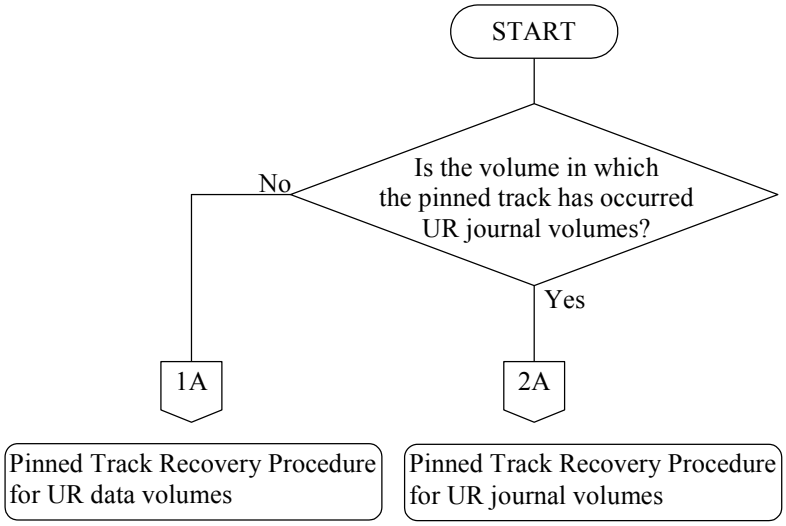
In the UR 4x4, the registration or deletion to Extended Consistency Group (EXCTG) of JNL Group in Subordinate DKC are operated from Supervisor DKC. The Force Delete JNL Group operation is a remedy function to delete JNL Group from EXCTG forcibly when deleting JNL Group of Subordinate DKC from EXCTG can 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.

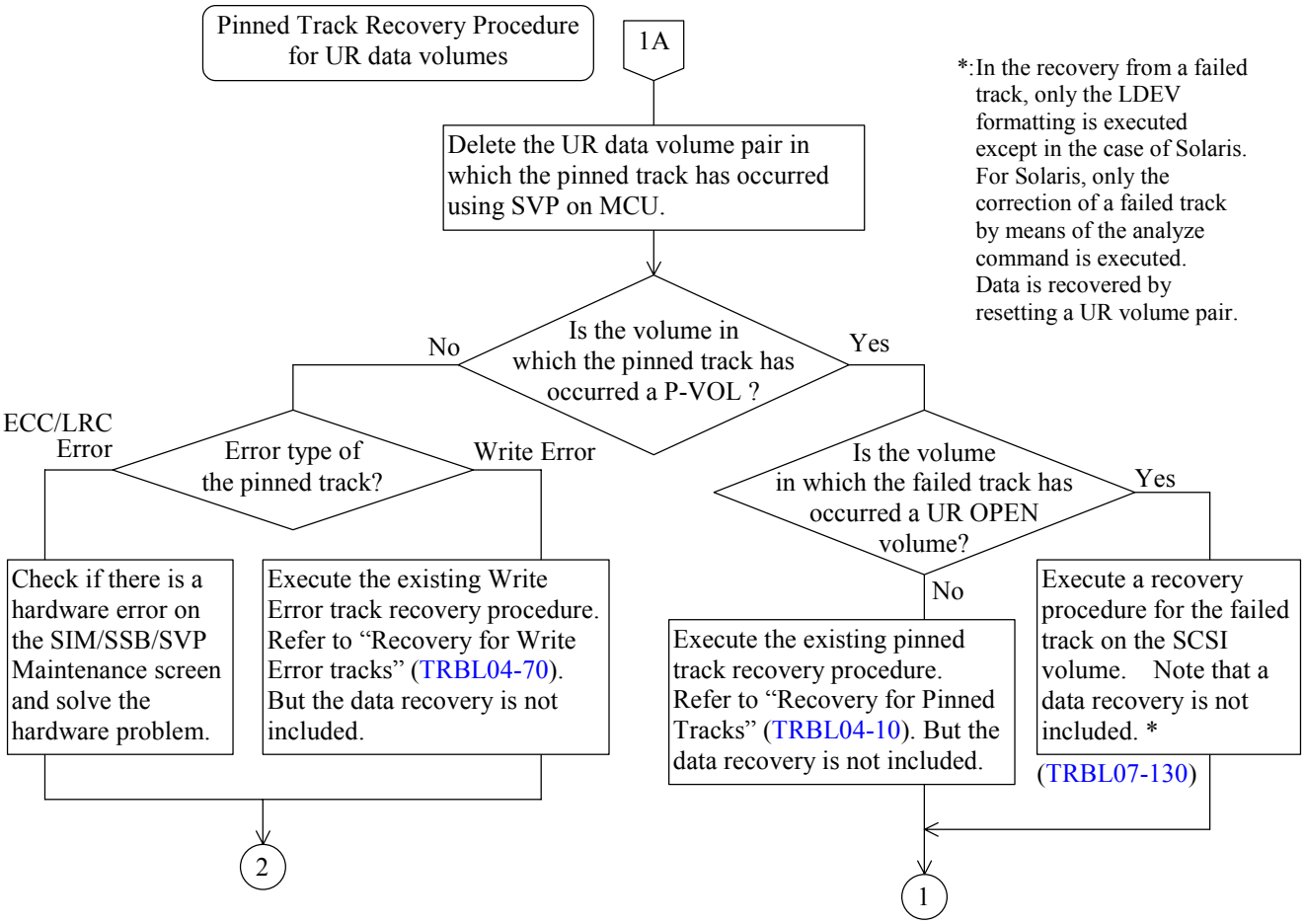


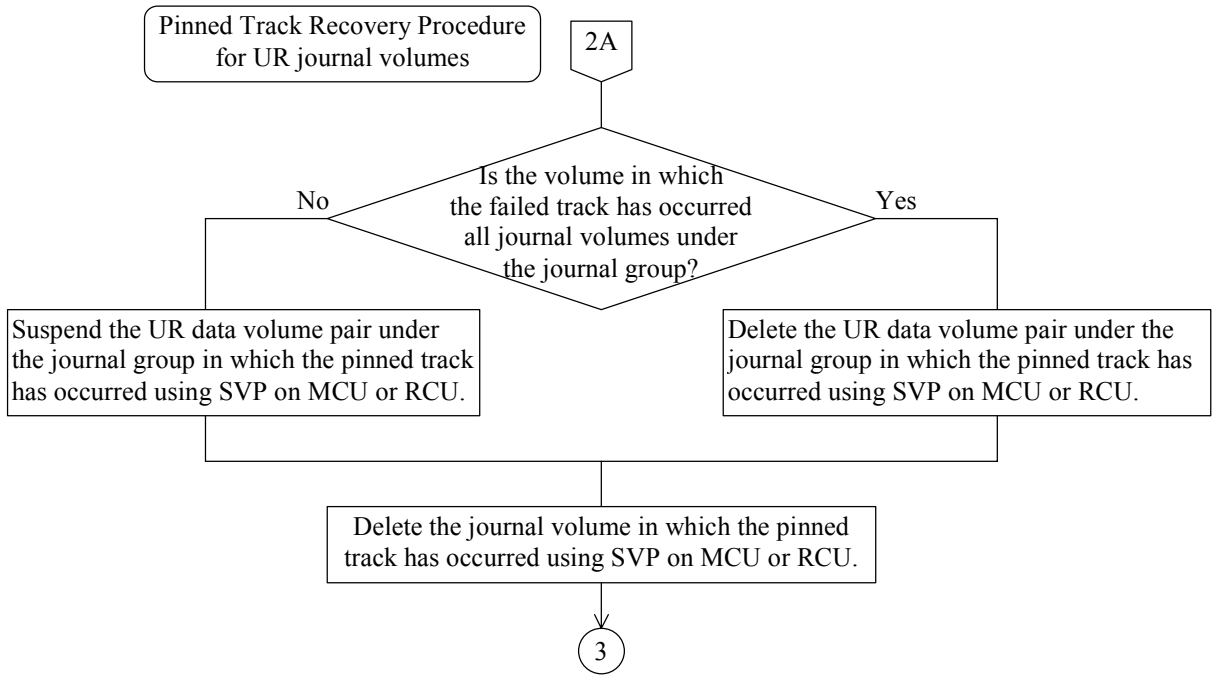
Note: If the pinned track has occurred in both P-VOL and S-VOL, recover the volumes according to the following sequence.

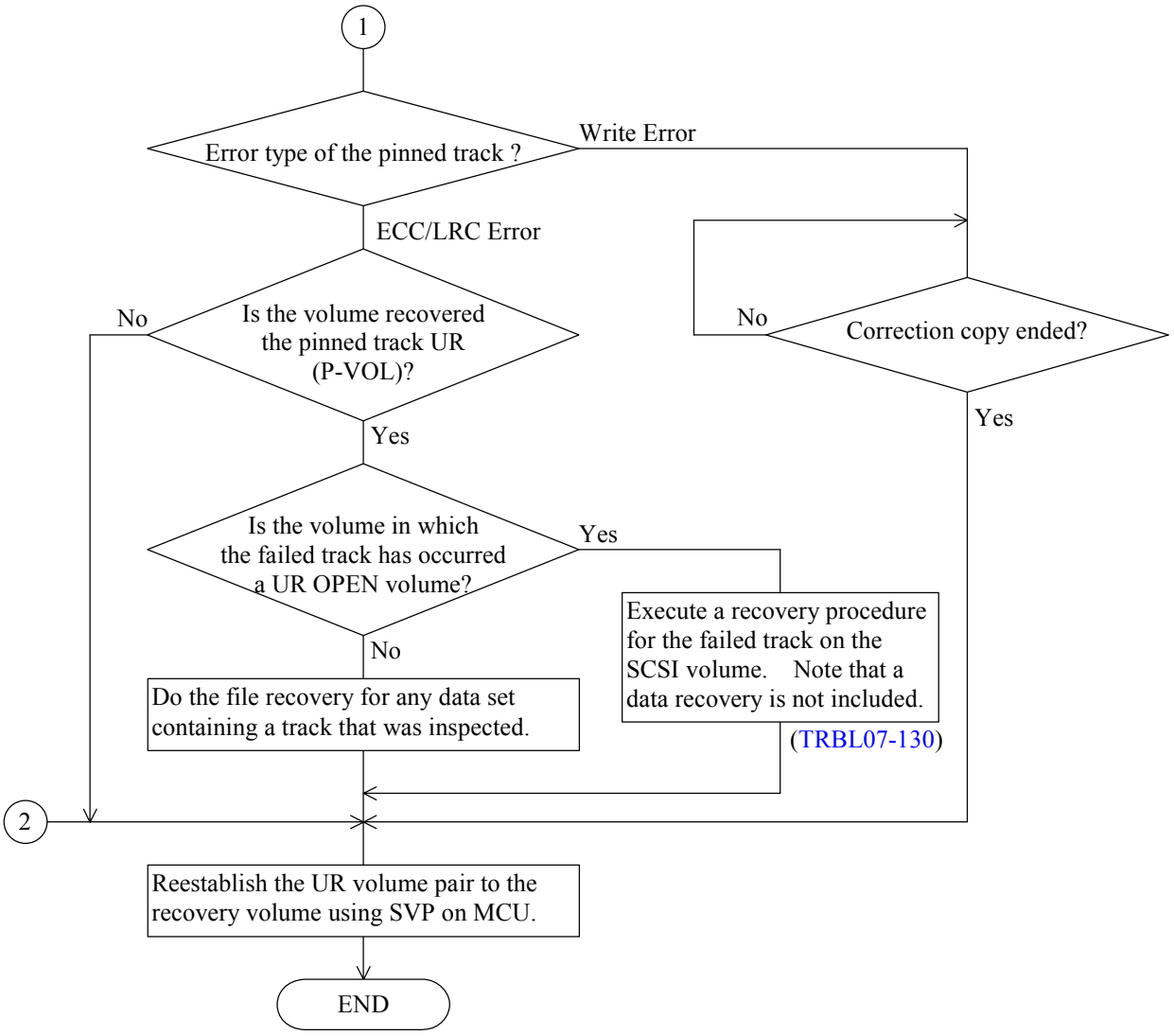
UR : ① P-VOL → ② S-VOL

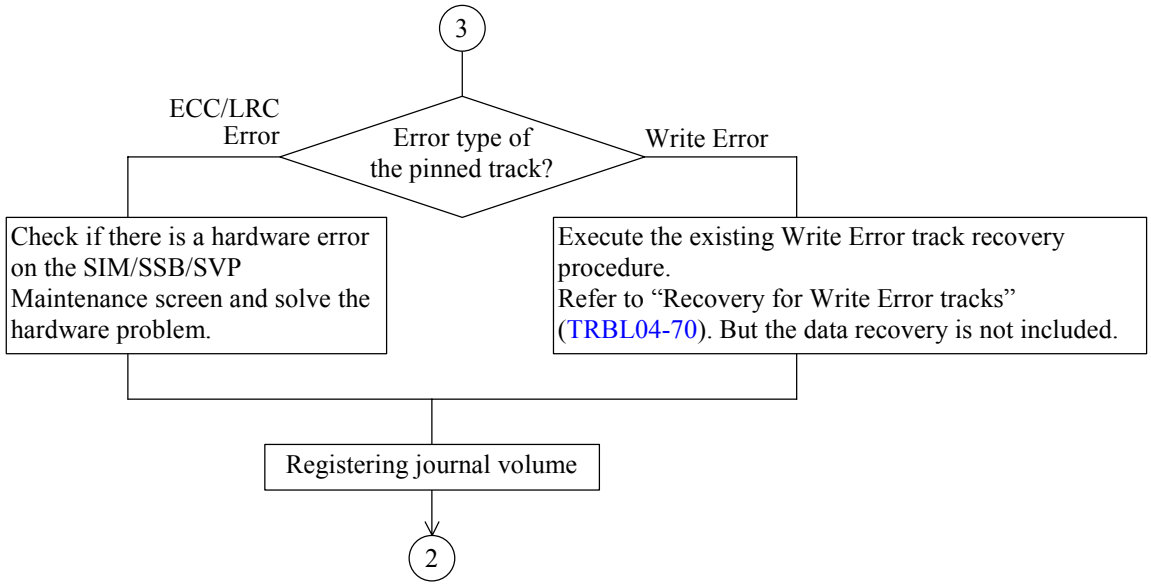
If the pinned track has occurred in both data volumes and journal volumes, recover the volumes according to the following sequence.

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 60-02-20 or later to the version before 60-02-20 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.

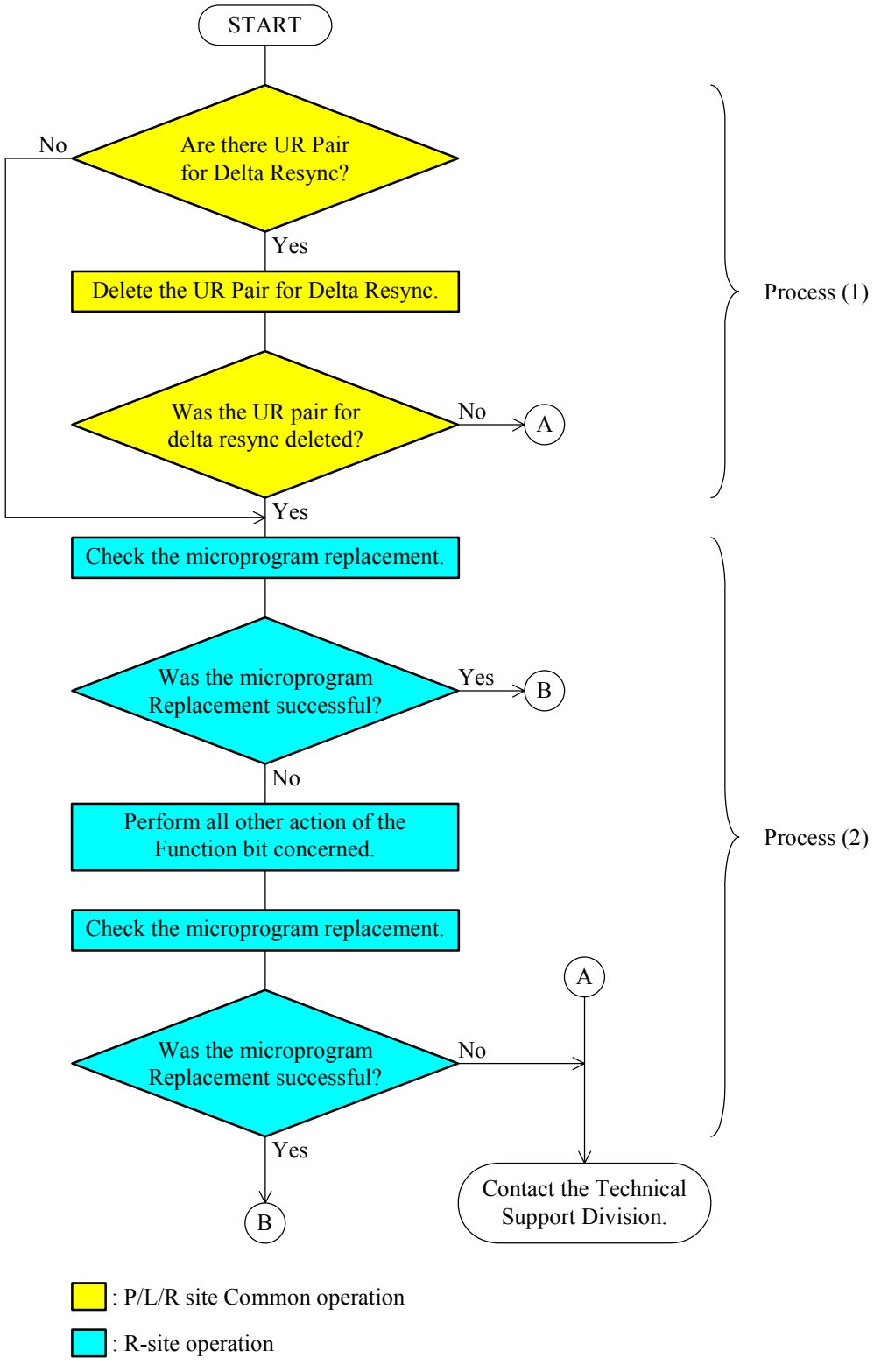
Note:

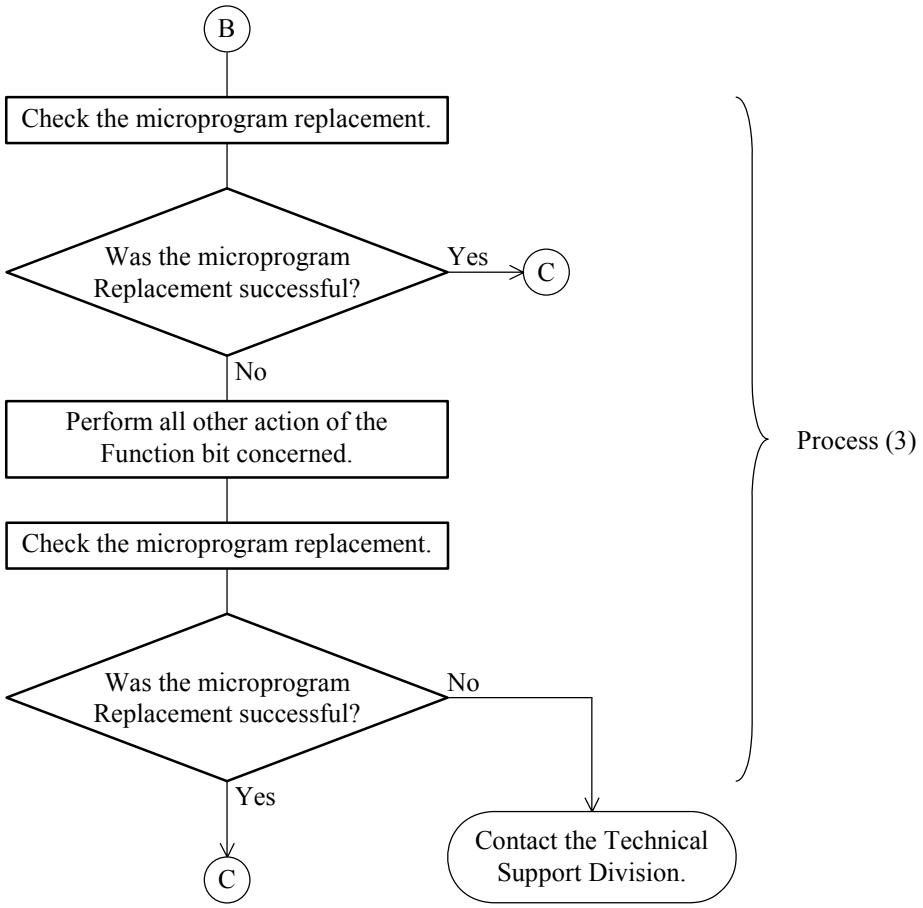
- Please make the micro version of each site the same when UR pair for the delta resync makes is Performed in 3DC Multi-target Configuration.
- Exchange the Microprogram versions from the order of Delta of R-Site (*1) and P-Site (*2) and L-Site (*3) in Microprogram Version-Down of the Microprogram Version replace order.

Procedure

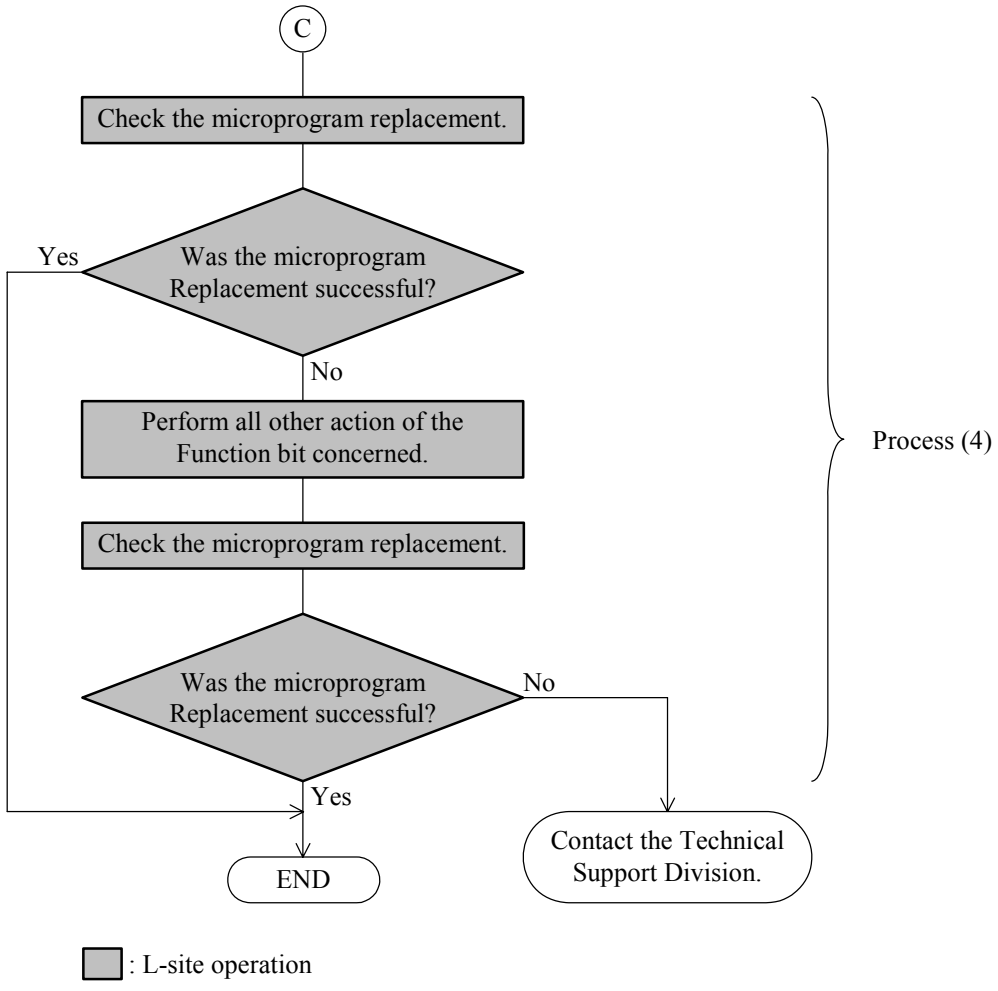
(1) It deletes it when it is confirmed whether there is P or L or R site, and there is UR pair for the delta resync.
(2) Execute microprogram Version-Down replacement at R-Site.
(3) Execute microprogram Version-Down replacement at P-Site
(4) Execute microprogram Version-Down replacement at L-Site.

*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.



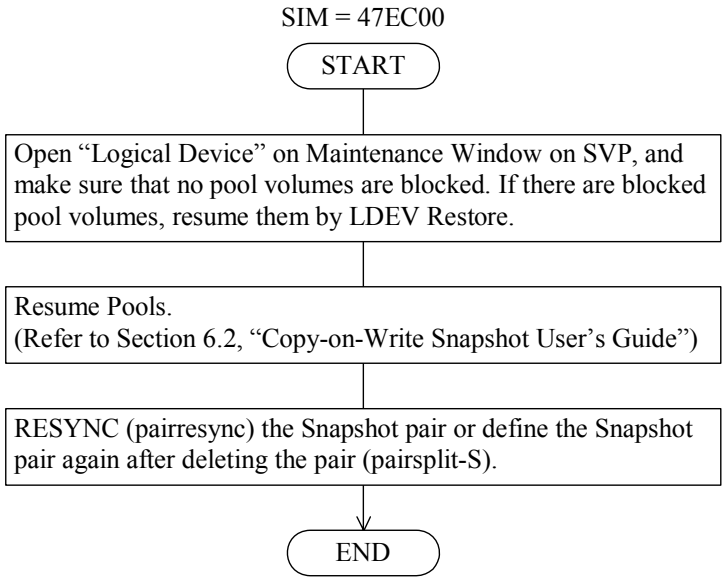


: P-site operation



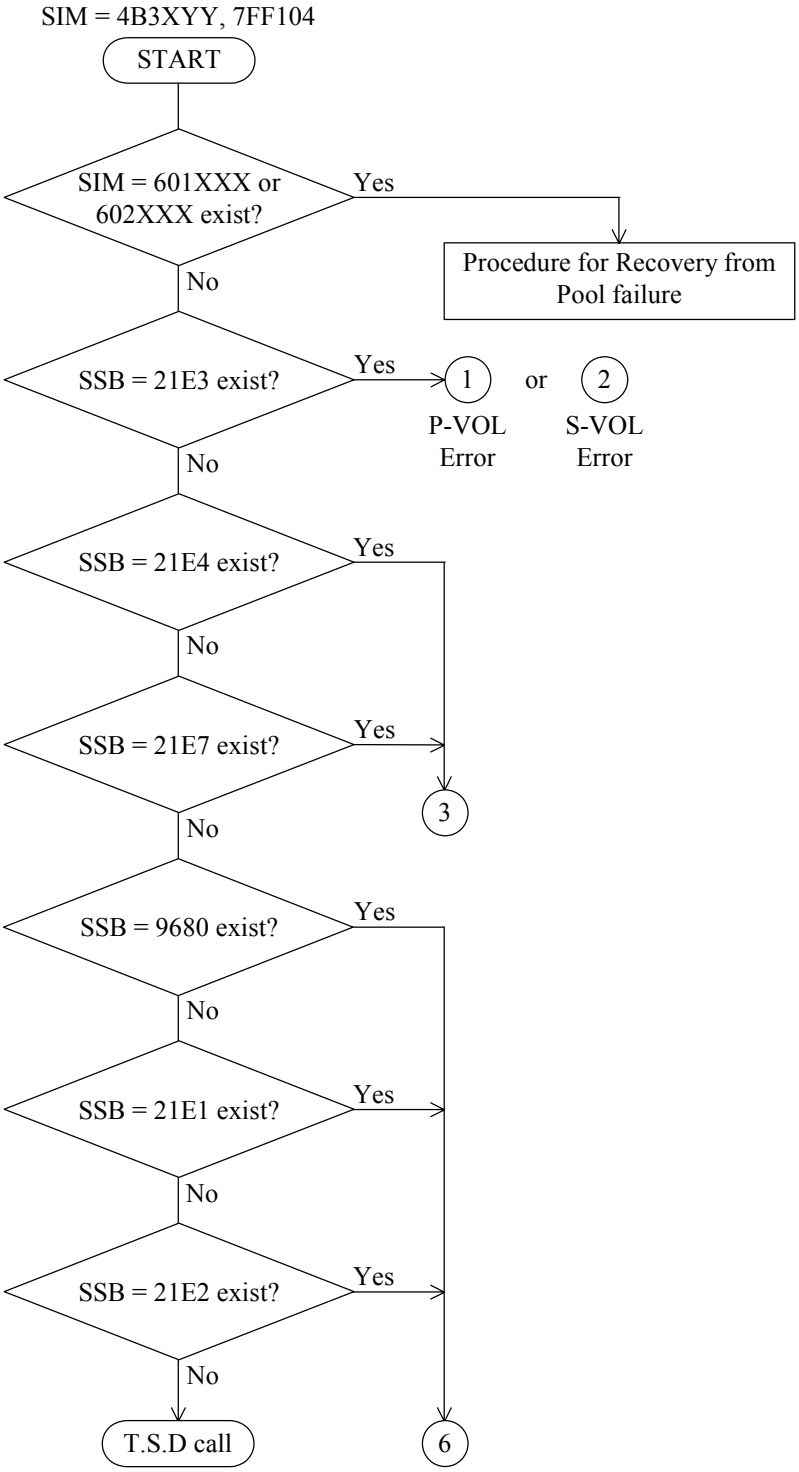
18. Recovery procedure for Copy-on-Write Snapshot

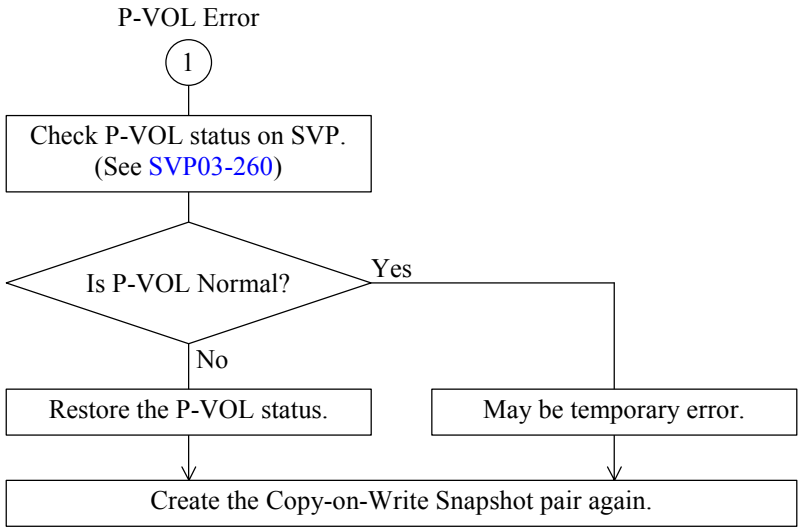
18.1 PS-ON with SM Volatilization (SIM = 47EC00)

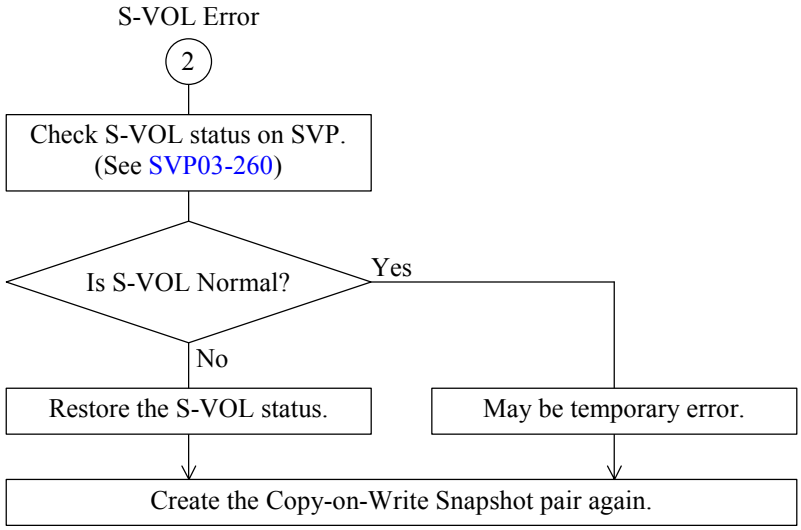


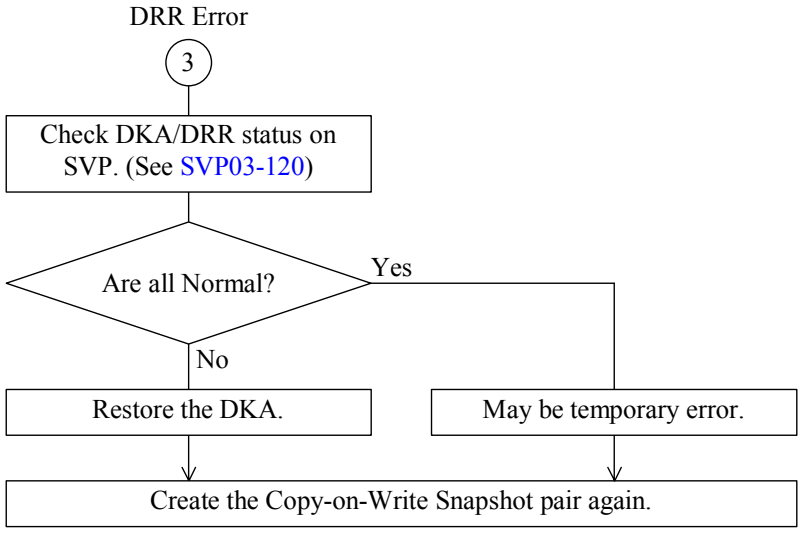
18.2 Procedure for Recovery from Copy-on-Write Snapshot failure (SIM = 4B3XYY, 7FF104)

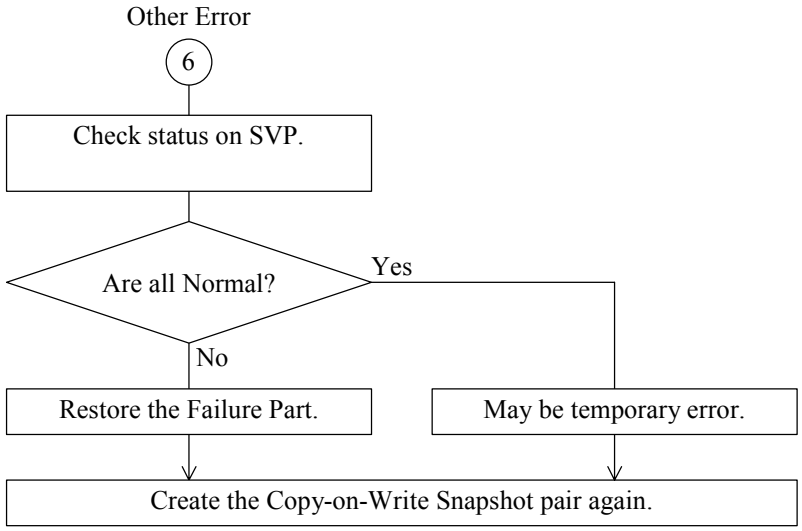
The procedure for recovery from a failure occurs in a pair of Copy-on-Write Snapshot is explained below.





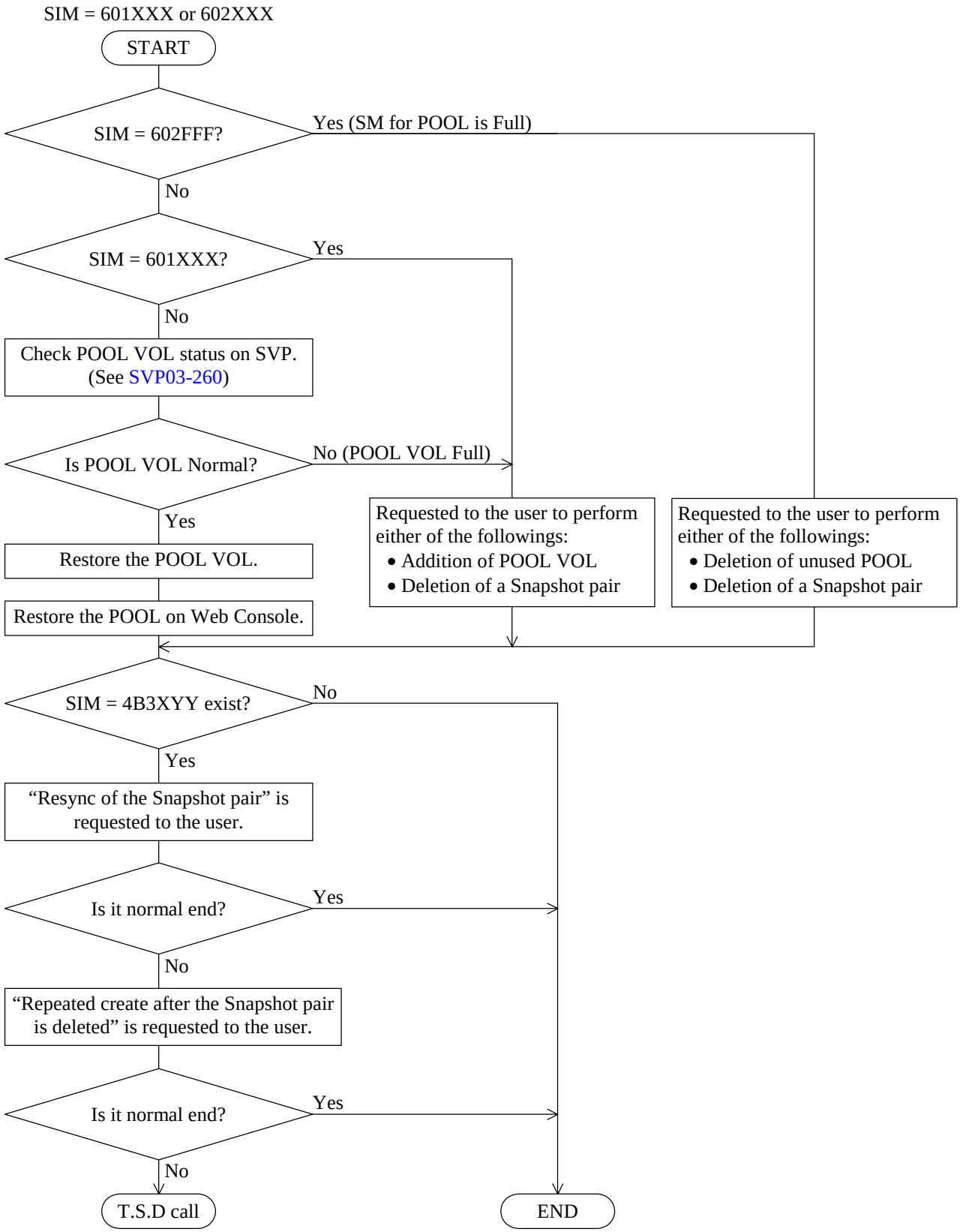






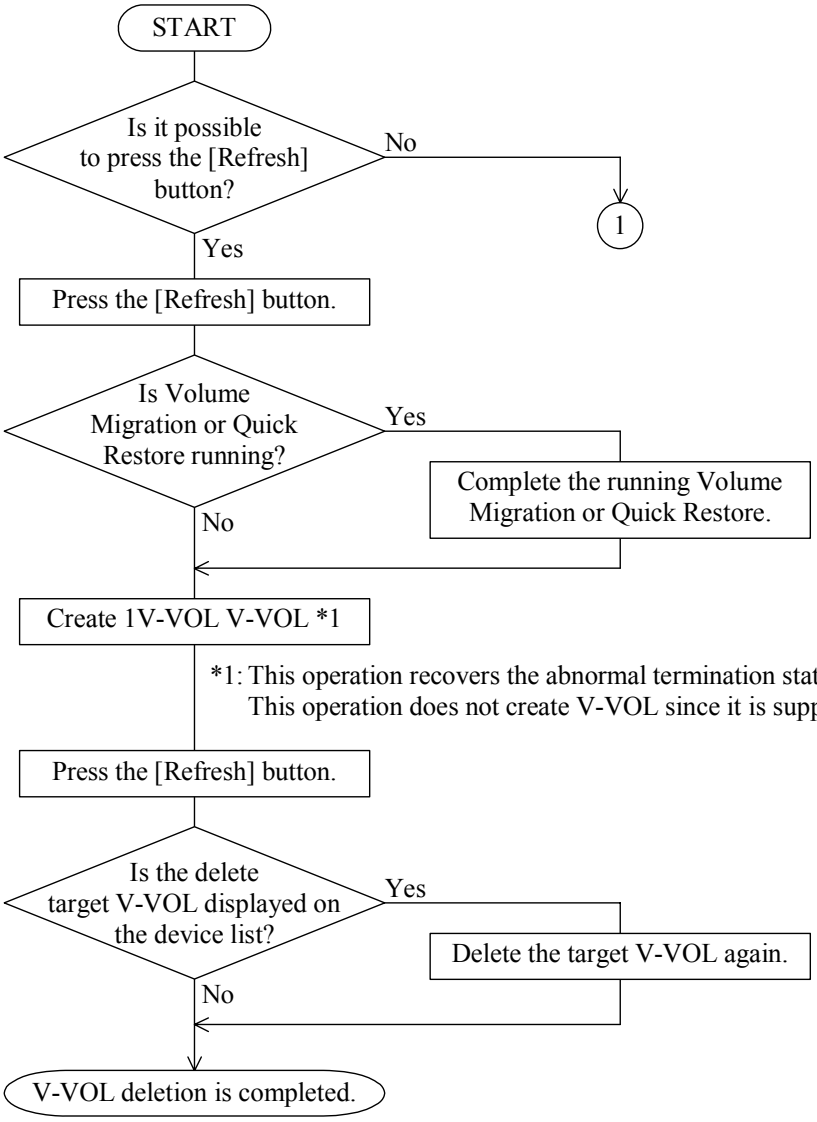
18.3 Procedure for Recovery from Pool failure (SIM = 601XXX, 602XXX)

The procedure for recovery from a failure occurs in the Pool is explained below.

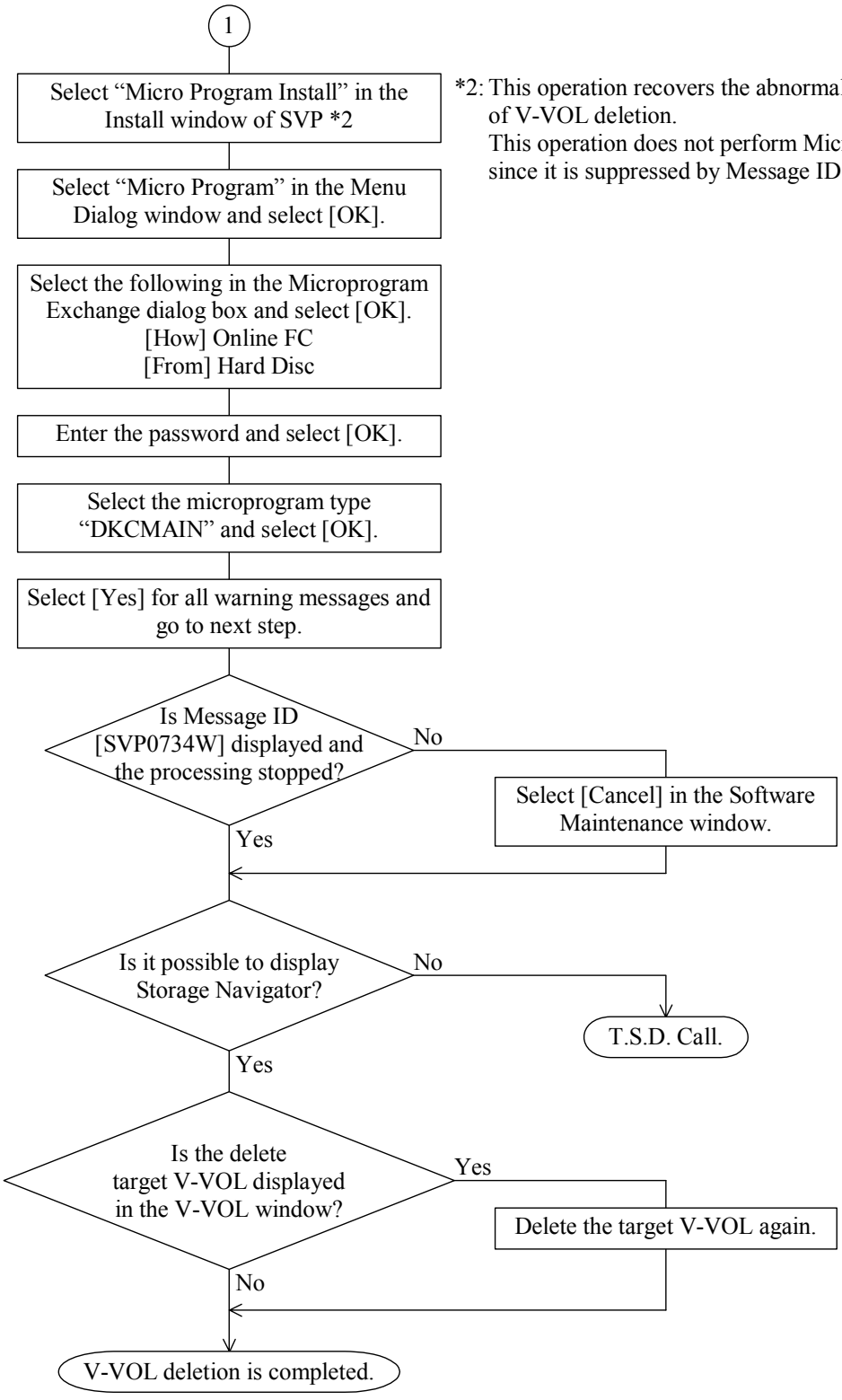


18.4 Recovery Procedure when V-VOL Deletion of Copy-on-Write Snapshot Fails (Storage Navigator Error Code = 3205 8966)

The recovery procedure when V-VOL deletion processing of Copy-on-Write Shapshot fails in Error Code [3205 8966] is shown below.



*1: This operation recovers the abnormal termination status of V-VOL deletion.
This operation does not create V-VOL since it is suppressed by Error Code [3205 2095].



*2: This operation recovers the abnormal termination status of V-VOL deletion.
This operation does not perform Micro Program Install since it is suppressed by Message ID [SVP0734W].

19. (Blank)

20. Actions to be Taken in the case where Save of the SM Control Information Fails (SIM = 6100XX)

SIM RC=6100-xx (xx=00, 01, 02) indicates that the SVP save or recovery of the SM control information failed.

(1) 6100-00
It indicates that the save processing failed by the LAN error. If this SIM is reported, power on DKC as promptly as possible, and then recover the LAN error according to TRBL05-90 "5.3 Recovery Procedure for LAN Error".

(2) 6100-01
It indicates that the save processing failed by the logical error. If this SIM is reported, power on DKC as promptly as possible, and then collect the dump and contact the TSD (Technical Support Division).

(3) 6100-02
It indicates that the recovery processing failed. If this SIM is reported, the SM information is not recovered. Therefore, ShadowImage, TrueCopy and UR pair are all differential or suspended. Also, the S-VOL of FlashCopy is blocked. Copy-on-Write Snapshot pair disappears. If this SIM is reported, collect the dump and contact the TSD.
When the area for Additional Configuration Backup on a system disk is effective (when System Option Mode727 is ON), if SIM RC=6500-02 is not reported, SM information of ShadowImage, FlashCopy, and Copy-on-Write Snapshot are recovered. In this case, ShadowImage pair is neither all differential nor suspended, the S-VOL of FlashCopy is not blocked, and Copy-on-Write Snapshot pair does not disappear.
Refer to the following users guide of each program product for the recovery method of each pair, etc.

ShadowImage : ShadowImage User's Guide,
ShadowImage for z/OS User's Guide

TrueCopy : TrueCopy User and Reference Guide,
TrueCopy for z/OS User and Reference Guide

UR : Universal Replicator User and Reference Guide,
Universal Replicator for z/OS User and Reference Guide

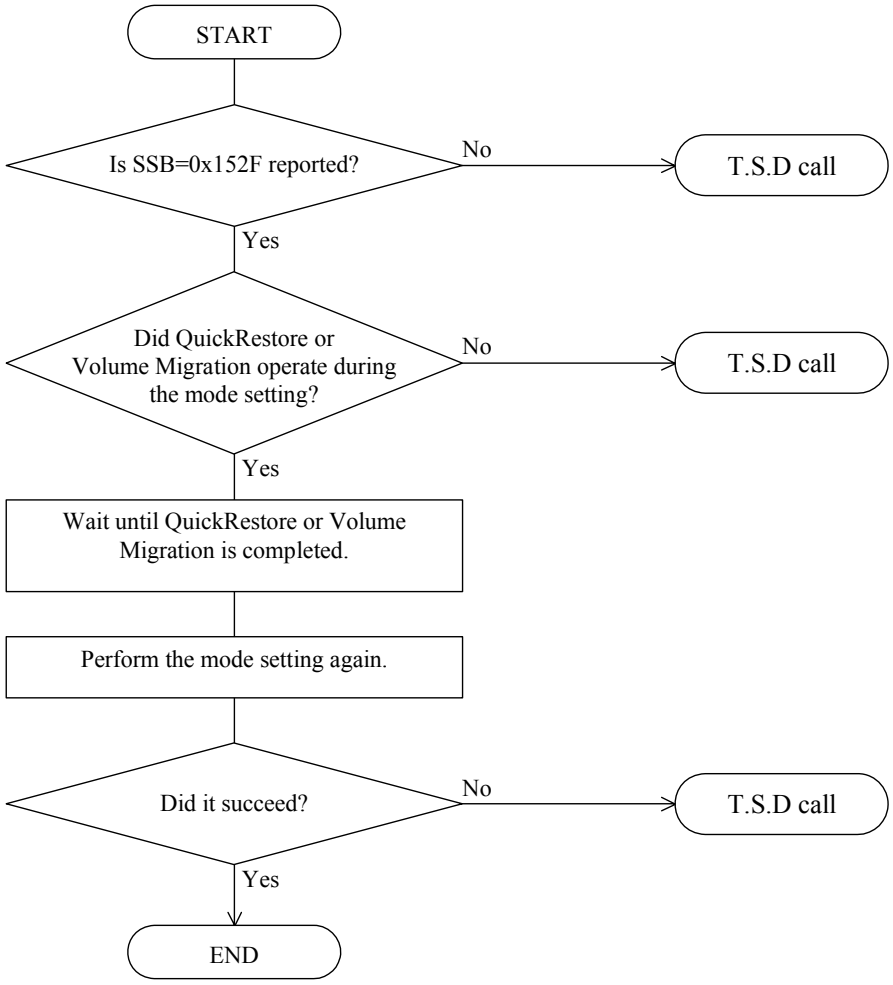
FlashCopy : ShadowImage for z/OS User's Guide

Copy-on-Write Snapshot : Copy-on-Write Snapshot User's Guide

If SIM RC=6100-00, 6100-01 is reported, the save processing fails.
If the power off status continues as it is and the SM information is lost, the recovery processing fails at the next power on because the save data does not exist.
To avoid such as situation, turn on DKC again, and maintain that status until the problem is solved.

21. 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.



22. Failure recovery of Dynamic Provisioning

22.1 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))

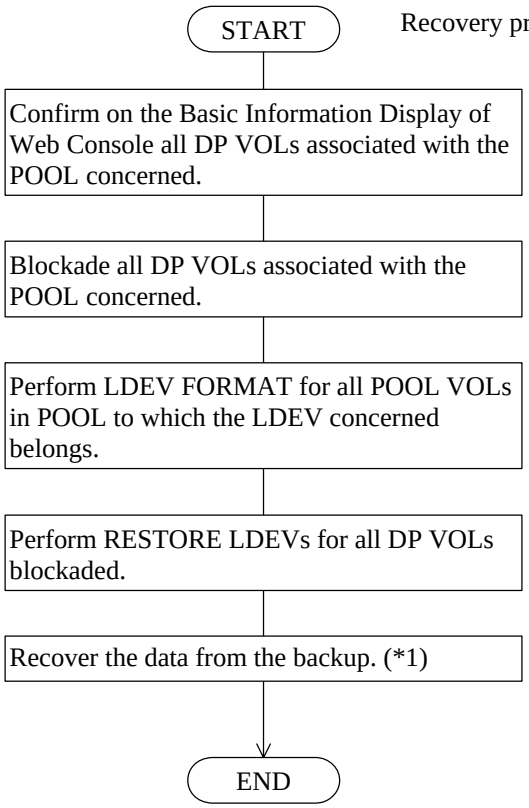
Dynamic Provisioning becomes as follows. In this case, data cannot be recovered.

Item	Status
DP-VOL status	Normal
POOL status	Normal
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.

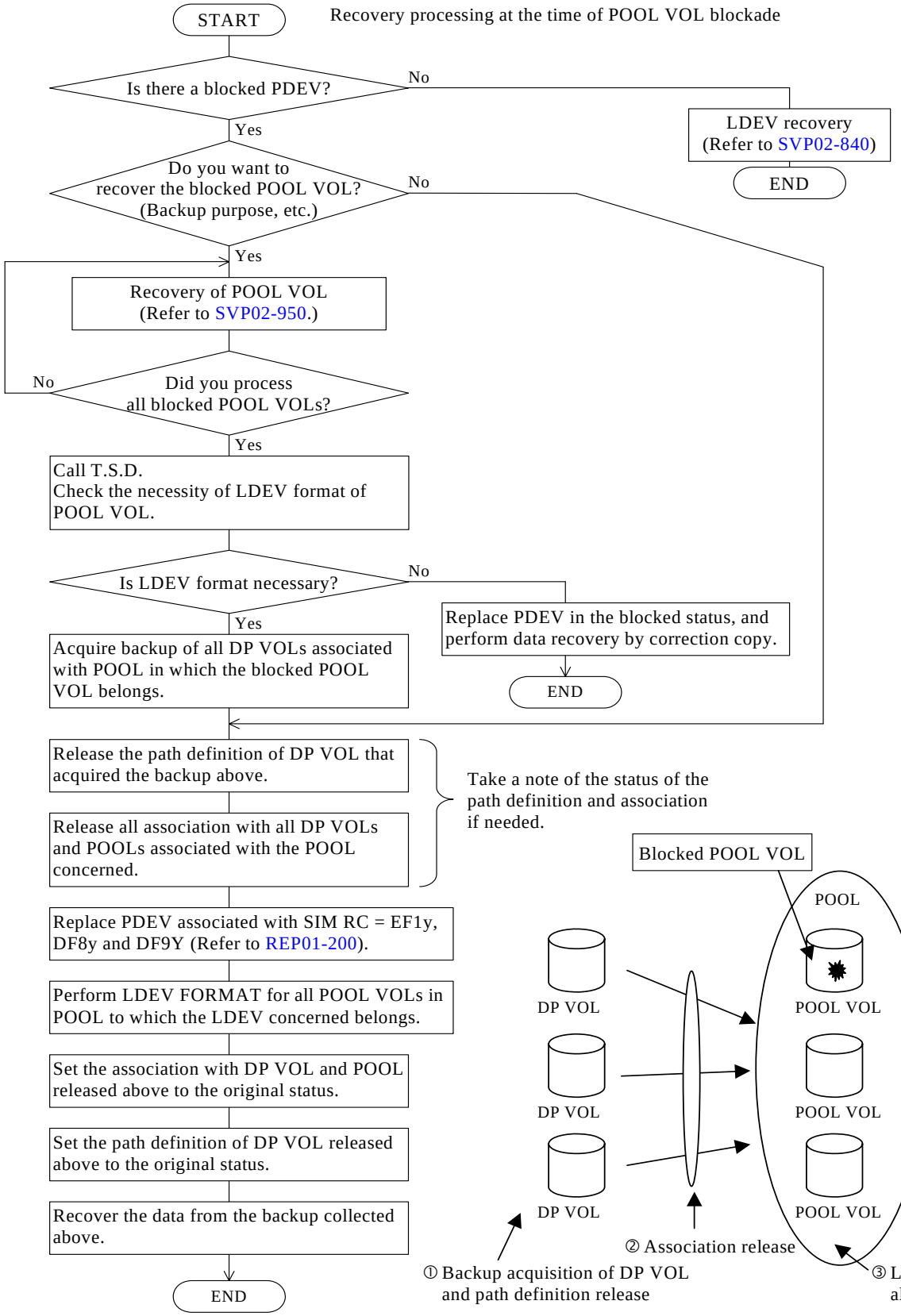
As for the following procedures, the microprogram version of DKCMAIN corresponds more than 60-06-27-XX/XX or 60-07-56-XX/XX. Please refer to TRBL22-21 for microprogram version before 60-06-26-XX/XX or 60-07-55-XX/XX.



*1: 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.

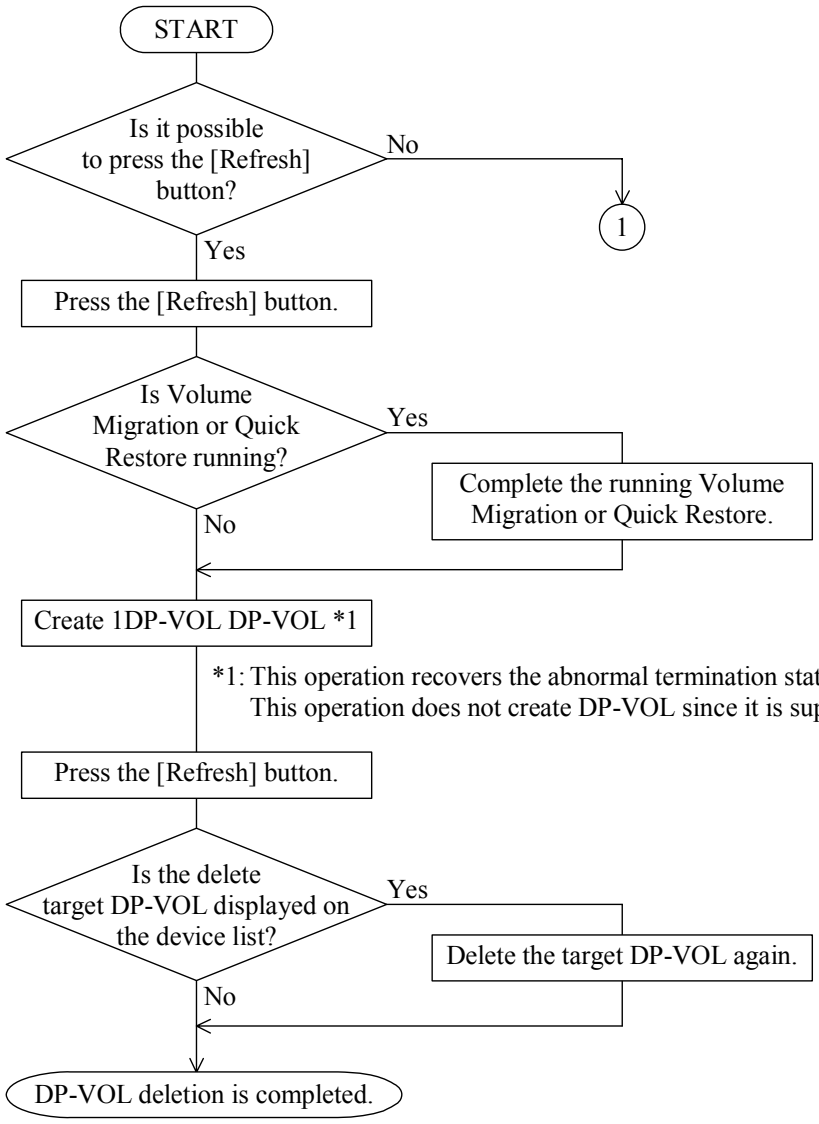
As for the following procedures, the microprogram version of DKCMAIN corresponds before 60-06-26-XX/XX or 60-07-55-XX/XX.
Please refer to TRBL22-20 for microprogram version more than 60-06-27-XX/XX or 60-07-56-XX/XX.

Recovery processing at the time of POOL VOL blockade

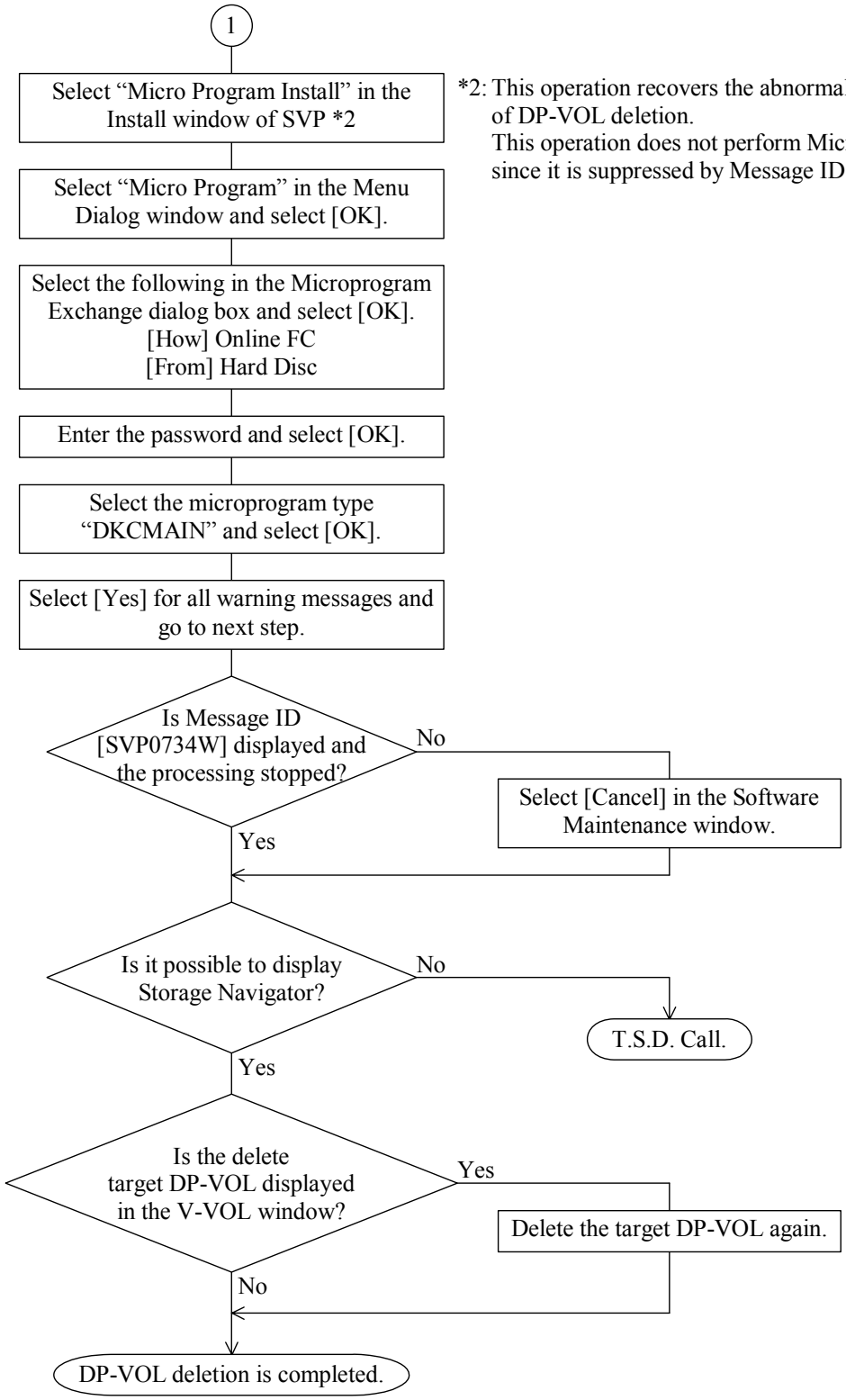


22.2 Recovery Procedure when DP-VOL Deletion of Dynamic Provisioning Fails (Storage Navigator Error Code = 3205 8966)

The recovery procedure when DP-VOL deletion processing of Dynamic Provisioning fails in Error Code [3205 8966] is shown below.



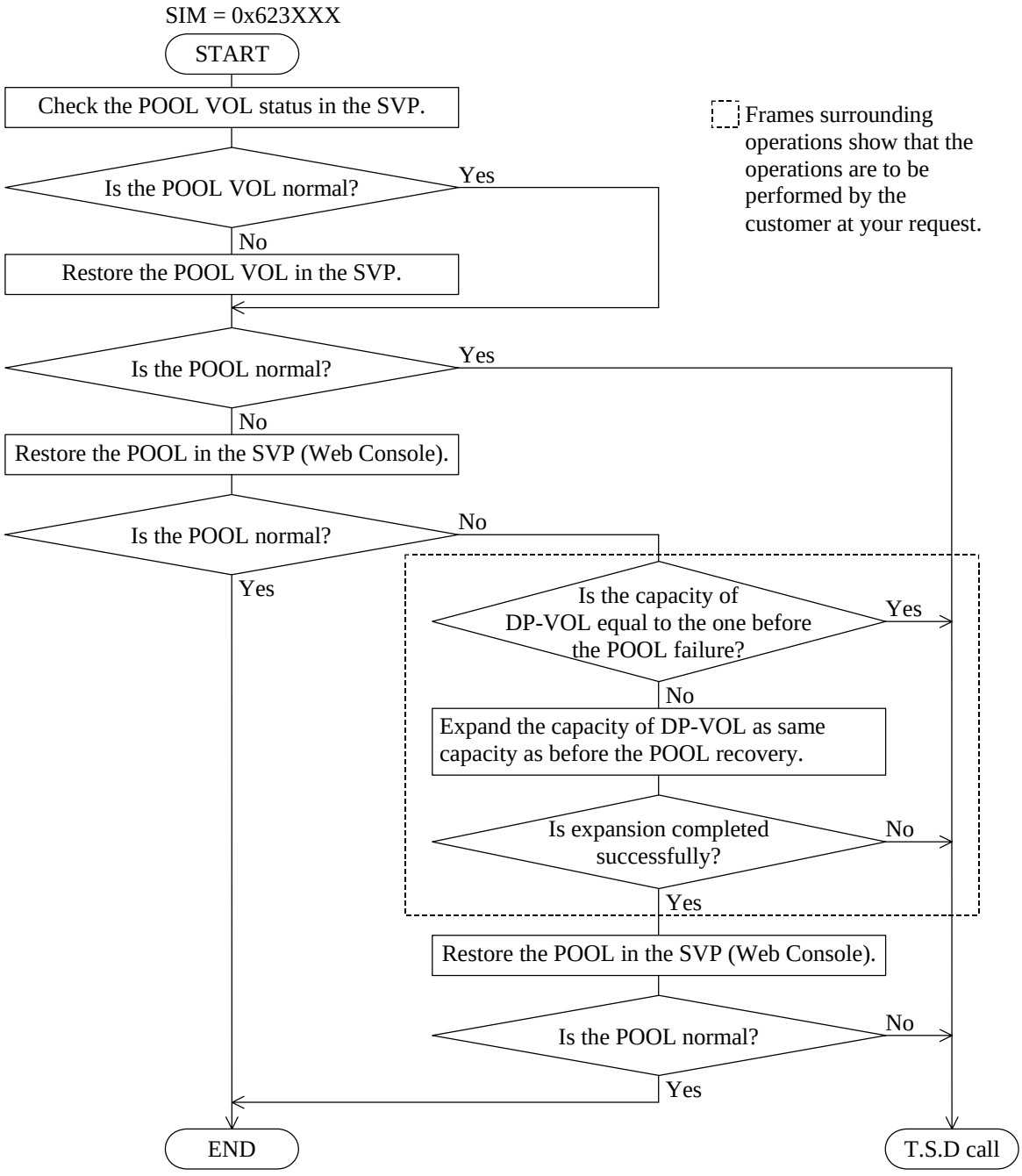
*1: This operation recovers the abnormal termination status of DP-VOL deletion.
This operation does not create DP-VOL since it is suppressed by Error Code [3205 2095].



*2: This operation recovers the abnormal termination status of DP-VOL deletion.
This operation does not perform Micro Program Install since it is suppressed by Message ID [SVP0734W].

22.3 Recovery procedure for the Pool failure (SIM = 623XXX)

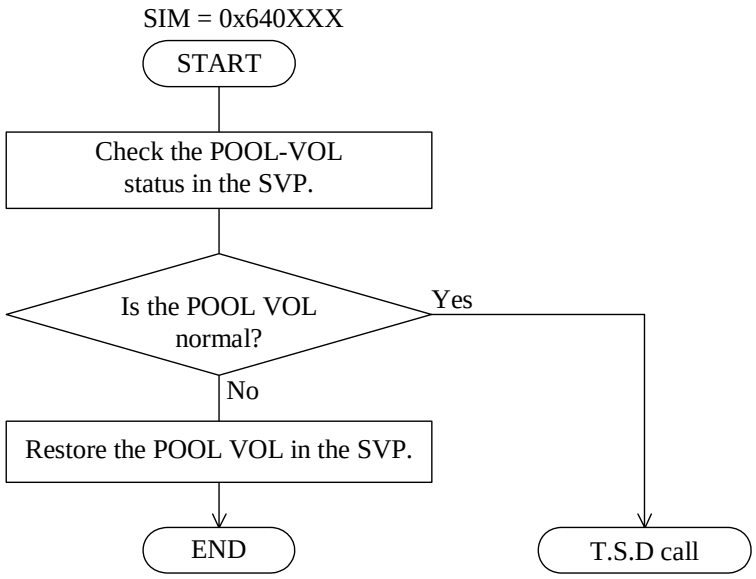
The recovery procedure for the failure of the pool used in the Dynamic Provisioning is shown here.



Note: Procedure to recover DP-VOL:
Please recover the pool of Dynamic Provisioning referring to Dynamic Provisioning User's Guide (MK-96RD641).
DP-VOL recovers by recovering the pool of Dynamic Provisioning.
Please confirm all the pool of Dynamic Provisioning 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 has recovered.

22.4 Recovery procedure for the Pool failure (SIM = 640XXX)

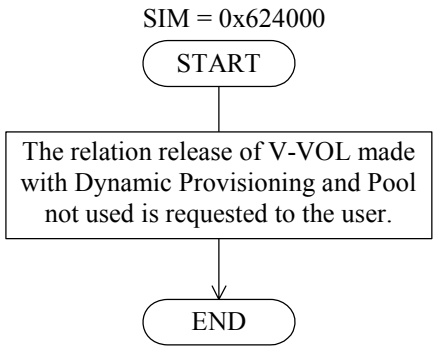
The recovery procedure for the failure of the pool used in the Dynamic Provisioning is shown here.



Note: Procedure to recover DP-VOL:
Please recover the pool of Dynamic Provisioning referring to Dynamic Provisioning User's Guide (MK-96RD641).
DP-VOL recovers by recovering the pool of Dynamic Provisioning.
Please confirm all the pool of Dynamic Provisioning 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 has recovered.

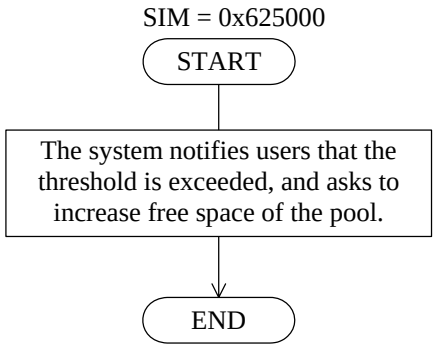
22.5 Recovery procedure for the Pool failure (SIM = 624000)

The recovery procedure for the failure of the pool used in the Dynamic Provisioning is shown here.



22.6 Recovery procedure for the Pool failure (SIM = 625000)

The recovery procedure for the failure of the pool used in the Dynamic Provisioning is shown here.



22.7 Deleting method at the time of POOL VOL blockade (When external volumes are removed to which POOL VOL belong)

Dynamic Provisioning becomes 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)

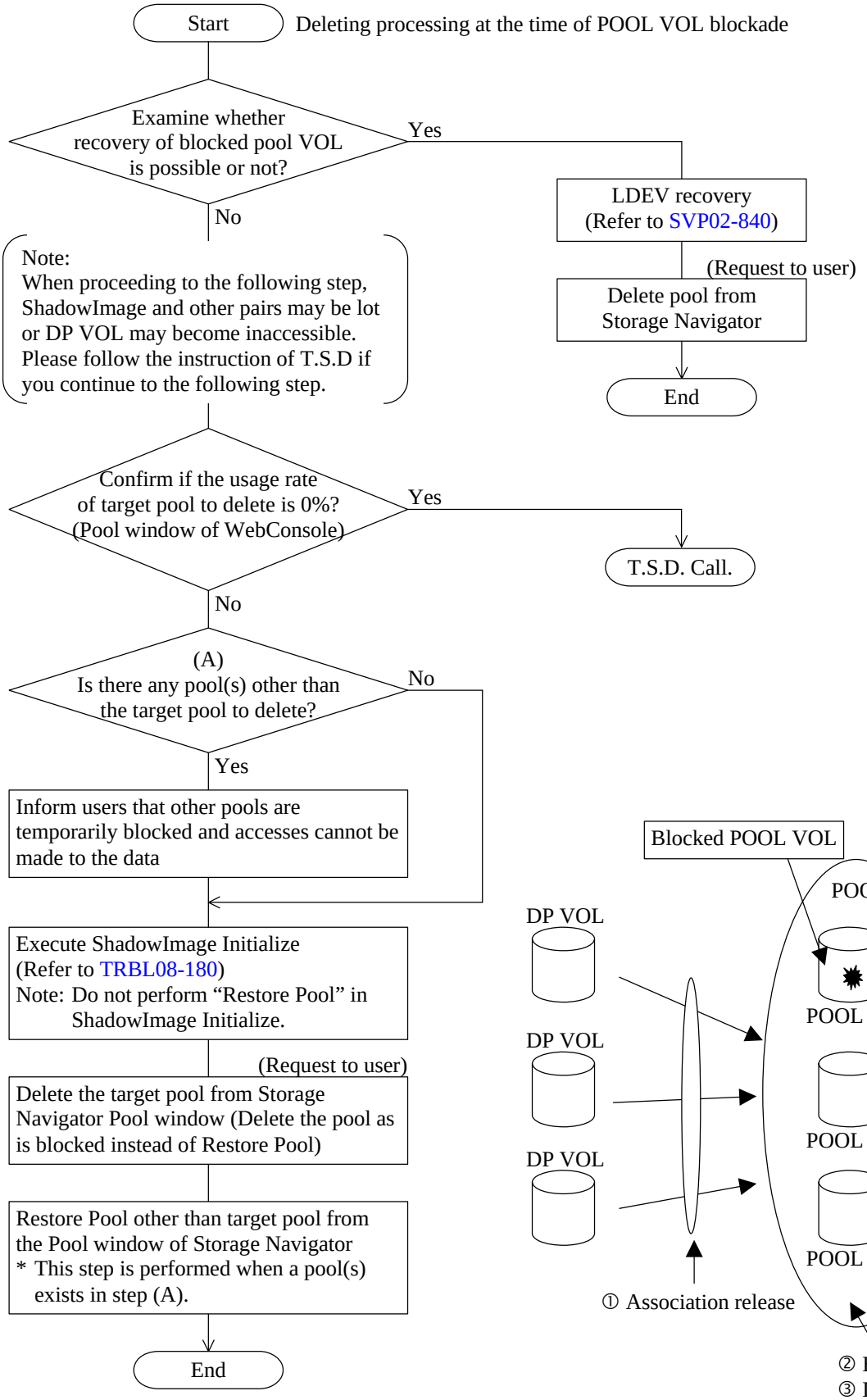
Note 1: The procedure includes ShadowImage Initialize. When the ShadowImage Initialize is executed, ShadowImage pairs may be lost or all the virtual volumes of Dynamic Provisioning may become temporarily inaccessible. (For detailed information, refer to TRBL08-180)

Note 2: Perform the operation only when it is directed by the Technical Service Division.

Recovery method

Perform the recovery by the following flow.

Deleting processing at the time of POOL VOL blockade



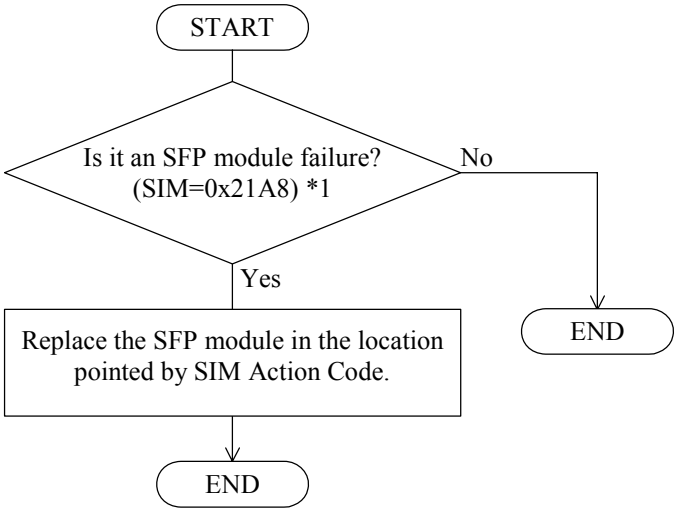
23. (Blank)

24. (Blank)

25. (Blank)

26. SFP Module Failure Detection (SIM = 0x21A8)

The recovery procedure when an SFP module failure occurs is indicated.

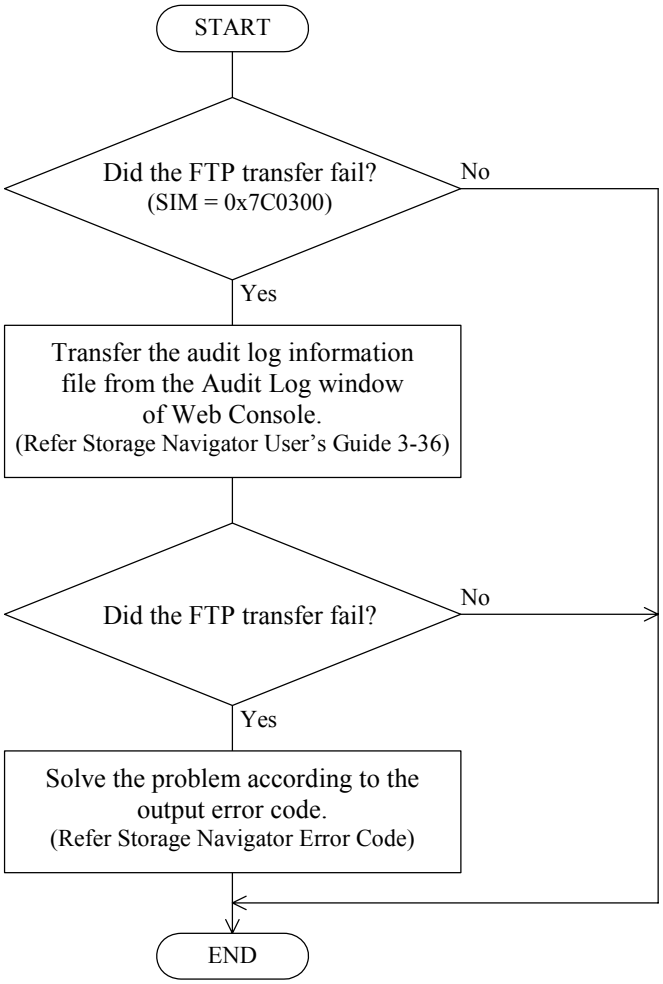


*1: SFP module failure factors

- 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

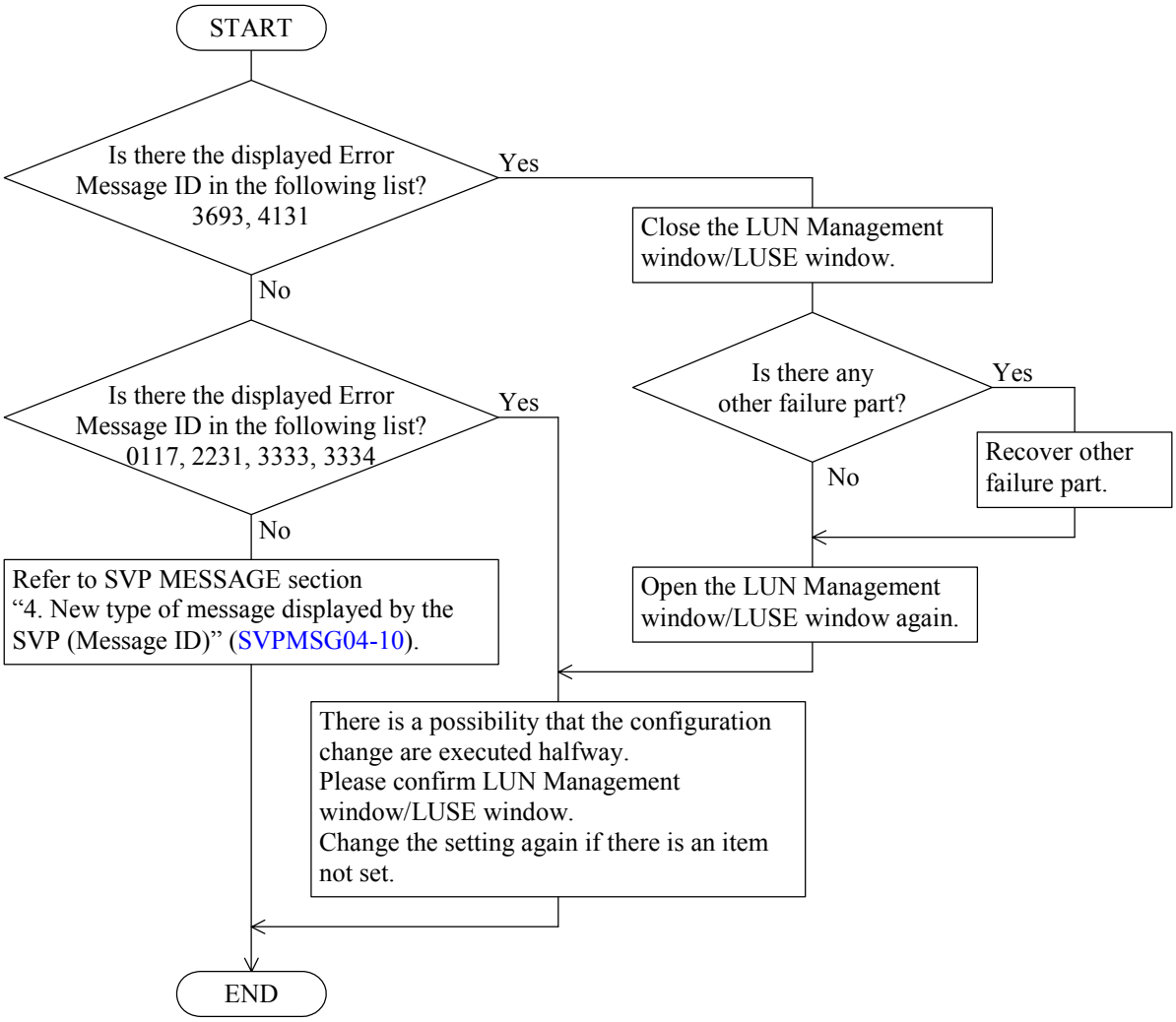
27. Correspondence when detecting the audit log FTP transfer failure (SIM = 0x7C0300)

The recover procedure when failing to the audit log FPT transfer is indicated.



28. 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.



29. 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 FSW 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.

30. Failure Recovery During Quick Format (SIM = 650001, 650002)

#	Failure	Recovery method
1	Failure of HDD that is in the parity group being Quick Formatted	Execute the same HDD recovery procedure with the ordinary HDD recovery.
2	P/K failure during Quick Format	Execute the same P/K recovery procedure with the ordinary P/K recovery.
3	SM volatilized after a power failure during Quick Format	By recovering the blocked LDEV forcibly, you can resume Quick Format. Note that when SM volatilized after a power failure, data consistency cannot be guaranteed regardless of whether a power failure occurred during Quick Format.
4	When performing power-off and SM volatilization during Quick Format	To guarantee that the write pending data on the Cache, the Quick Format control table on SM are the latest ones, follow the procedures described below when cutting the power off and volatilizing the SM. Note that perform this procedure only when the technical support organization instructs you to do so in order to confirm that the conditions of guaranteeing the above described item are met. ① Stop I/O ② Turn on System Option (Mode699) to stop the asynchronous format processing. (The default is OFF and the asynchronous format operates.) ③ When the Write Pending amount of SVP Monitor becomes zero (0), turn it off. ④ Execute power-off & SM volatilization. ⑤ Execute PS-ON (Move to the next step after the “Ready” indicator is lit by PS-ON). ⑥ Go to procedure No. 8 if SIM RC = 6500-02 is displayed. ⑦ Execute forcible restore for the LDEVs to which Quick Format was performed. ⑧ Turn off System Option (Mode699).

(To be continued)

(Continued from the preceding page)

#	Failure	Recovery method
5	Correspondence at the time of Define Conf & Install during Quick Format	Perform this procedure only when the technical support organization instructs you to do so. (1) Usually, the status during Quick Format is initialized at the time of Define conf & Install. (2) When performing dummy Define Conf & Install due to the failure recovery, etc., do the following procedures. ① Turn ON the System Option (Mode699 and Mode699) ② Execute PS-ON after executing Define Conf. ③ Complete SIM RC = 6500-02. ④ Execute forcible restore only for the LDEV of the system disk. ⑤ Execute PS-OFF ⑥ Volatilize the SM ⑦ Execute PS-ON (Move to the next step after the “Ready” indicator is lit by PS-ON). ⑧ Go to procedure No. 8 if SIM RC = 6500-02 is displayed again. ⑨ Execute forcible restore for the LDEVs to which Quick Format was performed. ⑩ Turn off System Option (Mode698 and Mode699). It is possible to retain the Quick Format status by the abovementioned procedures.
6	HDD failure of the system disk	Execute the recovery procedure same with the normal HDD recovery procedure for 1HDD failure. Execute the procedures described below for 2HDD failure (3HDD failure when RAID6). ① Recover the HDD failure by taking the maintenance action according to the action code instruction. ② To recover LDEV under the parity group for which the HDD failure was recovered, do not recovery the system disk to keep it blocked. ③ Contact the technical support organization and receive instructions on necessary actions.
7	When PIN is created in the system disk	• Execute the recovery procedure same with No.6 for ECC/LRC error PIN. • Execute the drive replacement same with the normal failure for Write error PIN.

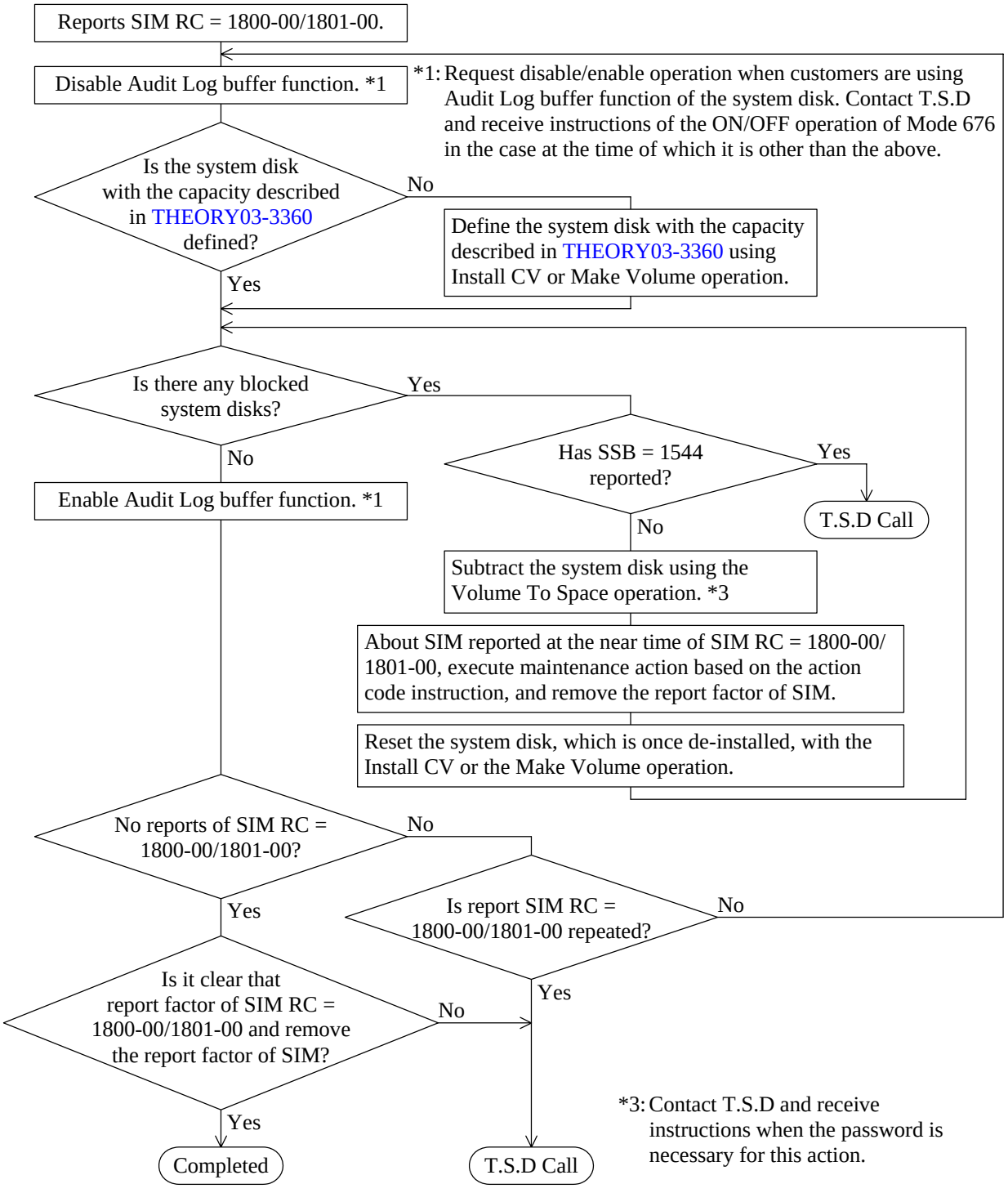
(To be continued)

(Continued from the preceding page)

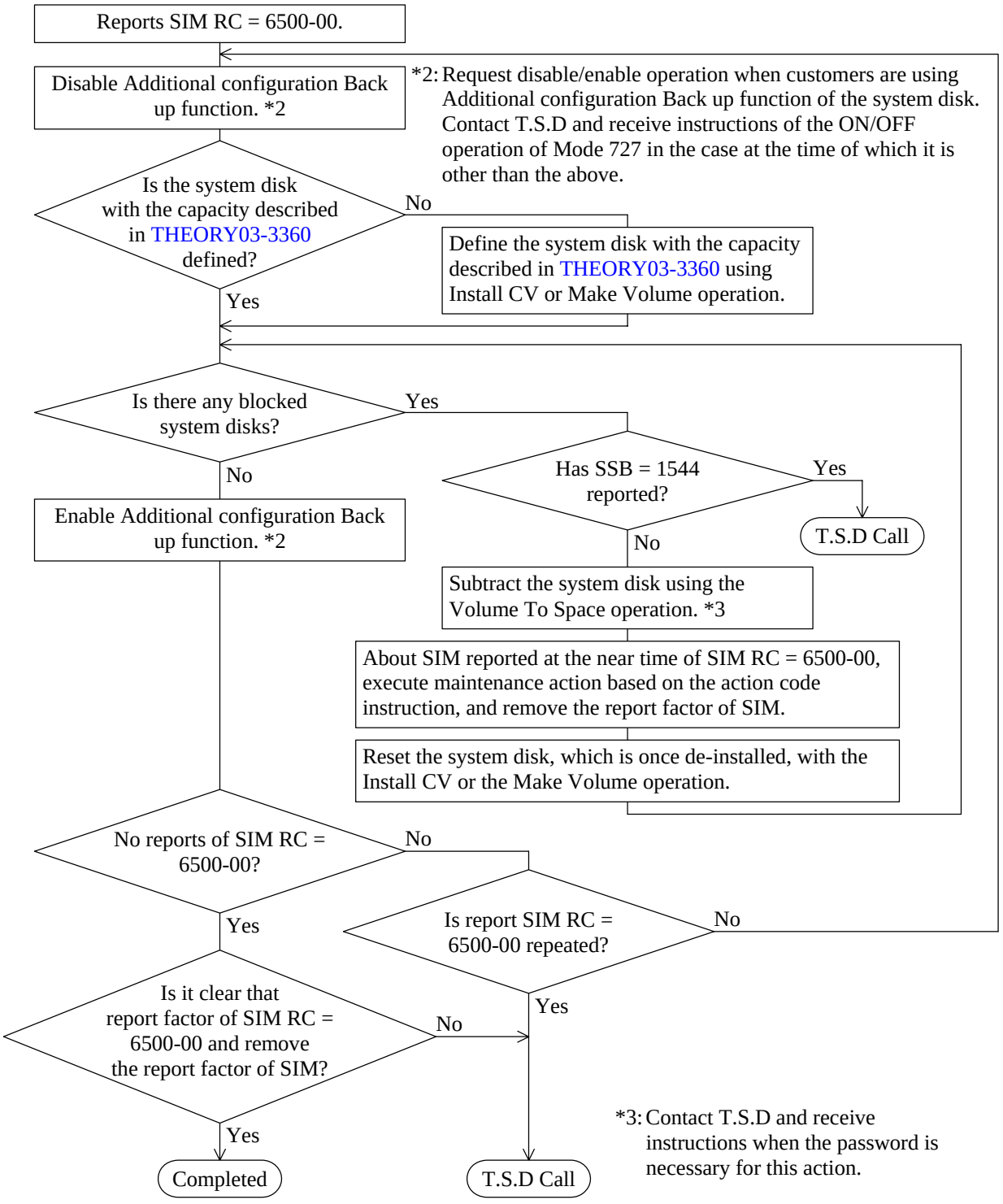
#	Failure	Recovery method
8	When SIM RC = 6500-02 occurred	Data in the LDEV in which Quick Format is in progress cannot be guaranteed. Contact the technical support organization and receive instructions on necessary actions. This SIM is reported in the start up after performing Define Configuration & Install, but no action is required.
9	When SIM-RC = 6500-01 occurred	When the system disk becomes impossible to access during PS-OFF, the PS-OFF sequence terminates abnormally and the electricity of the device will remain turned on. The failure recovery procedure is shown in the table below. ① Follow “16. Procedure for Forced Powering Off of DKC/DKU” in TRBL16-10 and, shutdown the power of the device. ② Start up the device immediately. ③ Contact the technical support organization and receive instructions on necessary actions.

31. Failure Recovery while Using the System Disk (SIM = 180000, 180100, 650000, 650001, 650002)

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 buffer is enable (when System Option Mode 676 is ON), and the actions when these logs have been reported is described as follows.



SIM RC = 6500-00 is a log which warns that Saving system disk area for Additional Configuration Backup was failed. This log is reported also when the system disk area for Additional Configuration Backup has disappeared after SM volatilization.
SIM RC = 6500-01/02 is a log which warns that Backup to/Restore from Additional Configuration Backup were failed.
Both logs are reported when system disk storage function of Additional Configuration Backup is enable (when System Option Mode 727 is ON), and the actions when these logs have been reported is described as follows.

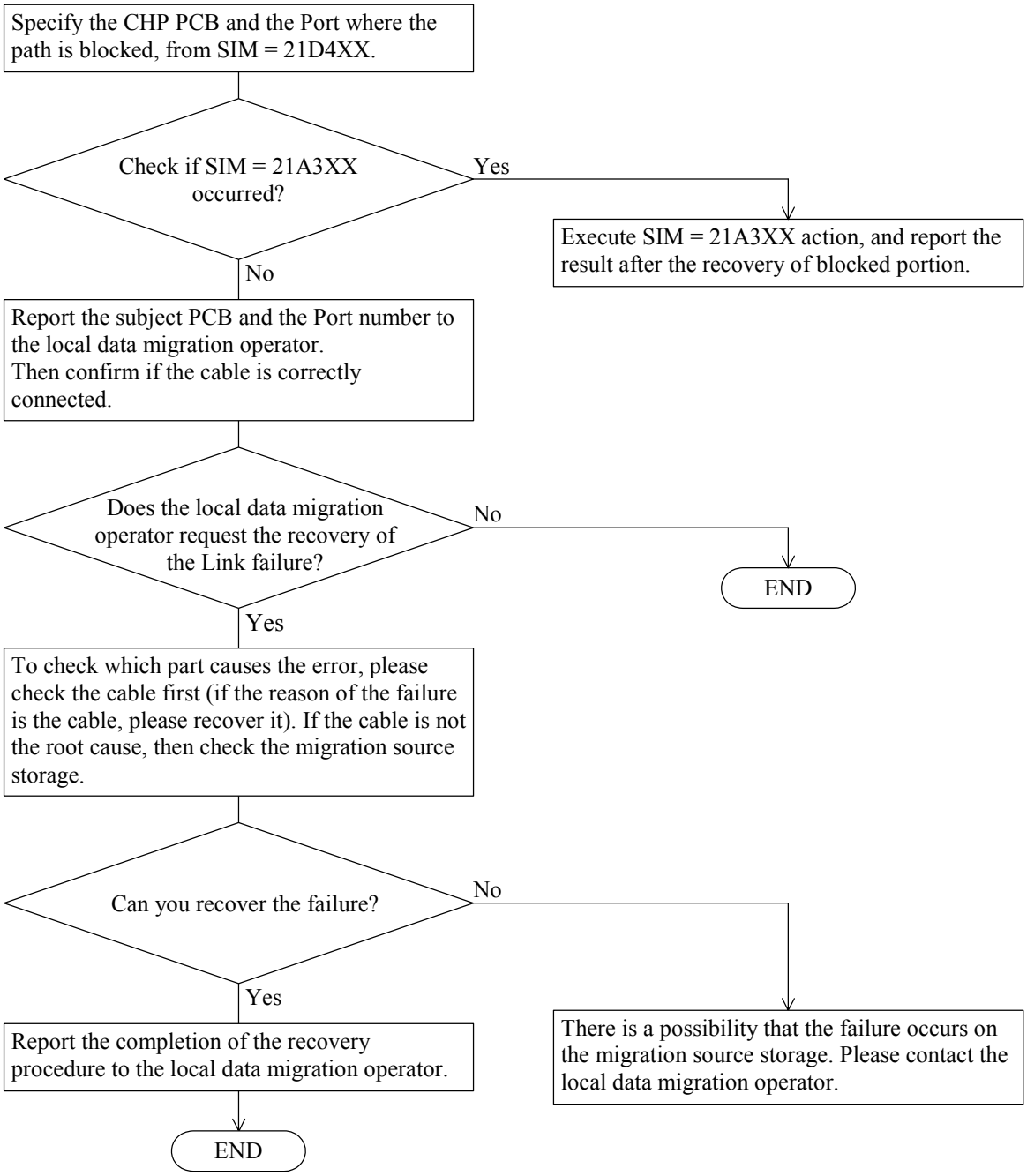


#	Failure	Recovery method
1	When SIM RC = 6500-02 occurred	It cannot be restored from Additional Configuration Backup. Contact the technical support organization and receive instructions on necessary actions. This SIM is reported that not depends on System Option Mode 727 ON or OFF in the start up after performing Define Configuration & Install, but no action is required.
2	When SIM-RC = 6500-01 occurred	When the system disk becomes impossible to access during PS-OFF, the PS-OFF sequence terminates abnormally and the electricity of the device will remain turned on. The failure recovery procedure is shown in the table below. ① Follow “16. Procedure for Forced Powering Off of DKC/DKU” in TRBL16-10 and shutdown the power of the device. ② Start up the device immediately. ③ Contact the technical support organization and receive instructions on necessary actions.

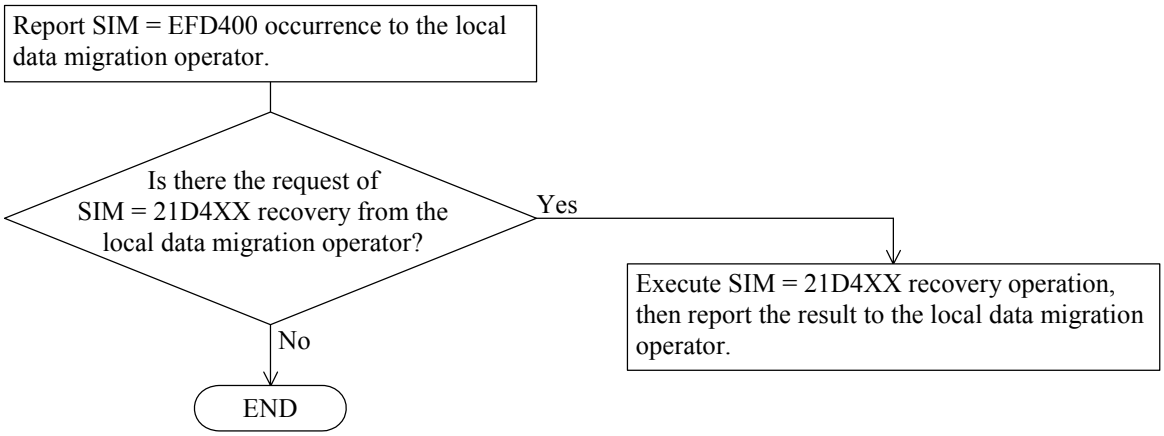
32. Recovery procedure of the FICON Data Migration in case of failure (SIM = 21D4XX, EFD400, 47DXYY, 47E700)

On the failure of the FICON Data Migration, the following shows the recovery procedures for the each of factors: SIM = 21D4XX (FICON DM Path blocked, SIM = EFD400 (FICON DM Source Device blocked), and SIM = 47DXYY/47E700 (Shadow Image pair of FICON DM is suspended).

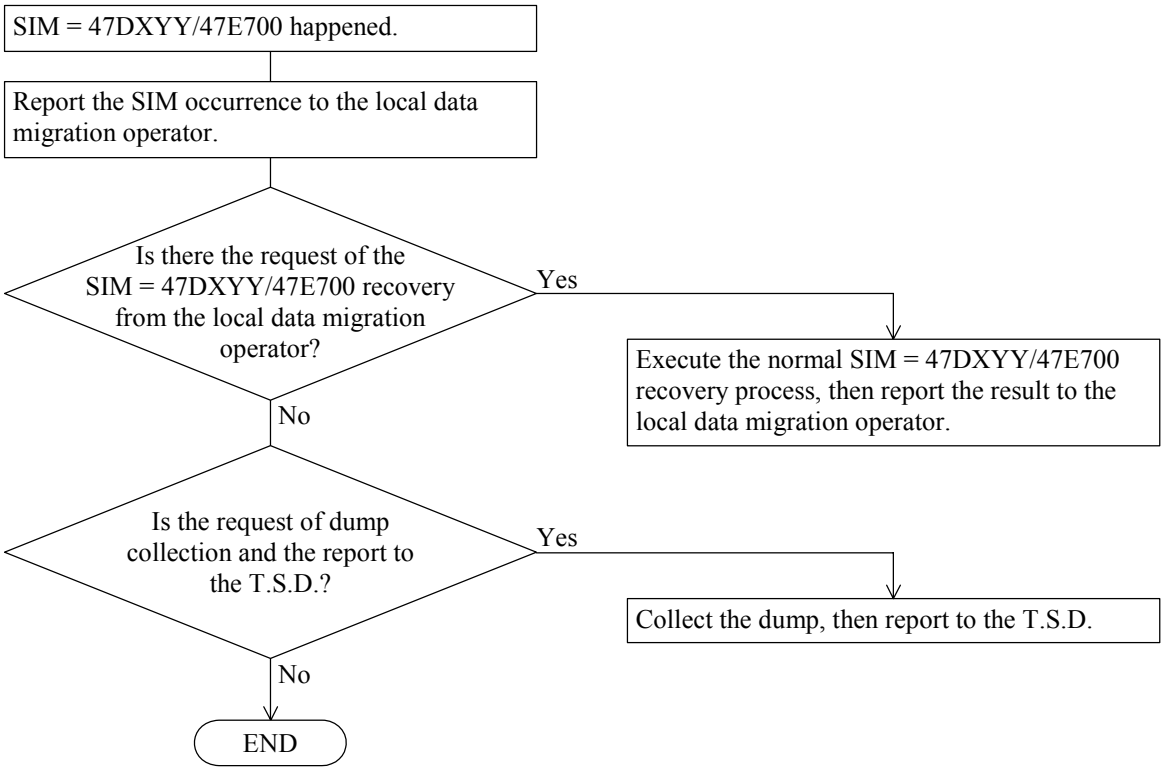
(1) SIM = 21D4XX



(2) SIM = EFD400



(3) SIM = 47DXYY/47E700



33. MP Blockade Reset Function

(1) Usage Guideline

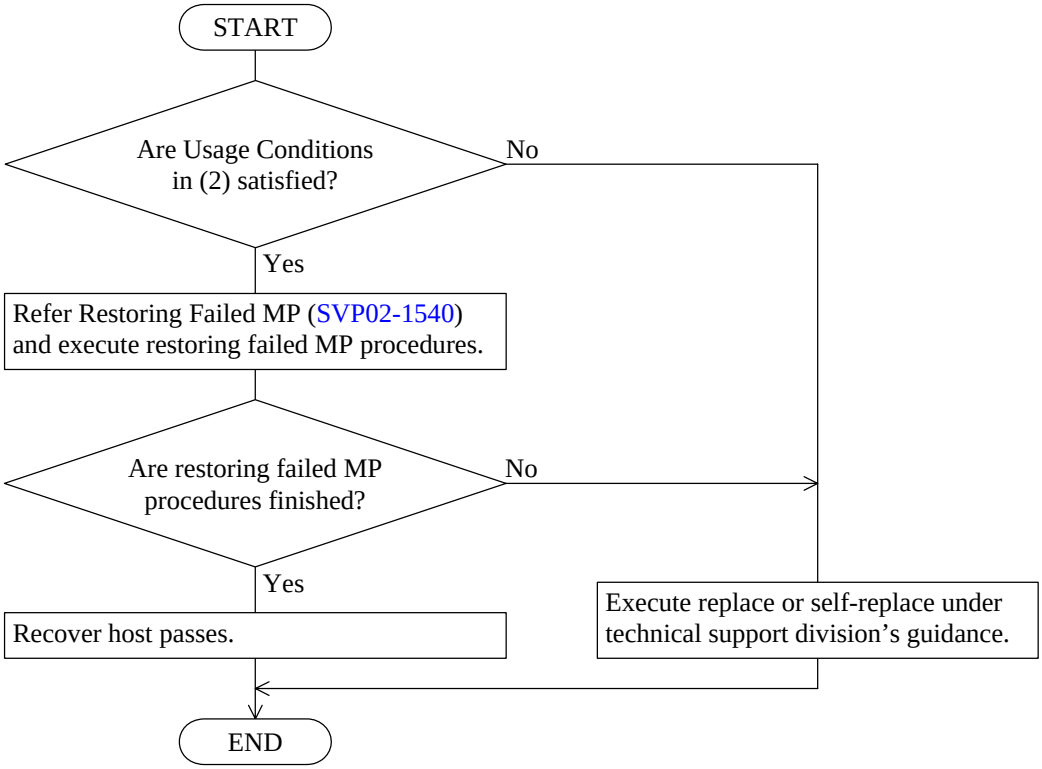
- This is a special function to recover a MP blockade operation without the need to self-replace the card under certain conditions specified below.
- To use this function, please open a case with your technical support center and proceed under their guidance. A one-time password from the division is needed for microcodes revisions prior to SVP Version 60-03-xx/xx.

(2) Usage Conditions

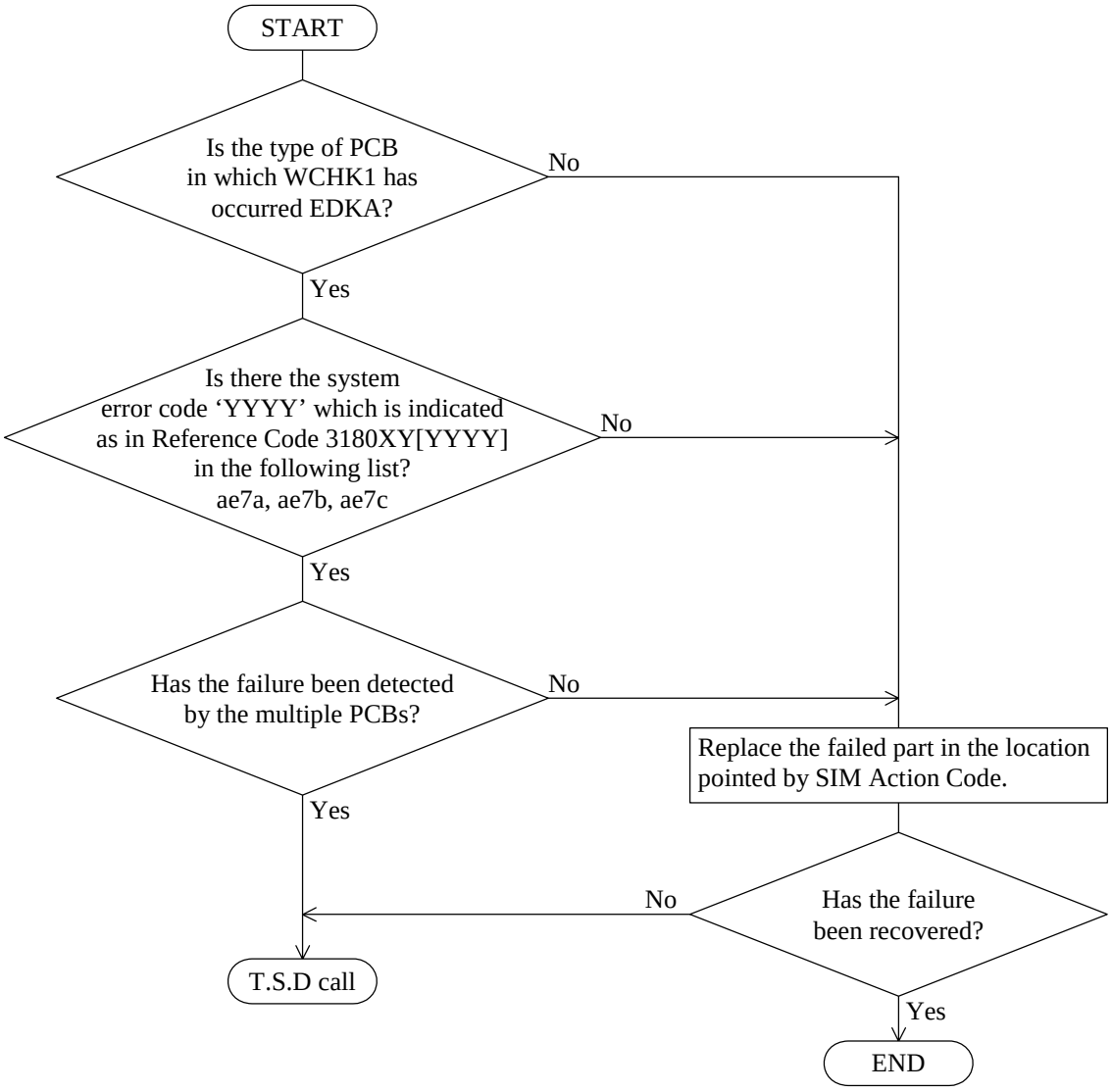
- To recover a MP in which WCHK1 occurred due to a microprogram problem.
  Eg.) Cache of WCHK1 is EC = 1644.
- To recover a MP in which WCHK1 occurred due to an issue outside the DKC (Host/SAN).
  Eg.) Cause of WCHK1 is EC = B405, and it is evident that it is caused by external factor. (Switch etc.)
- 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



34. Recovery Procedure for EDKA WCHK1 (SIM = 3180XY)



35. Quorum Disk Error Recovery

When you use HAM, Hardware error sometimes causes Quorum Disk error.

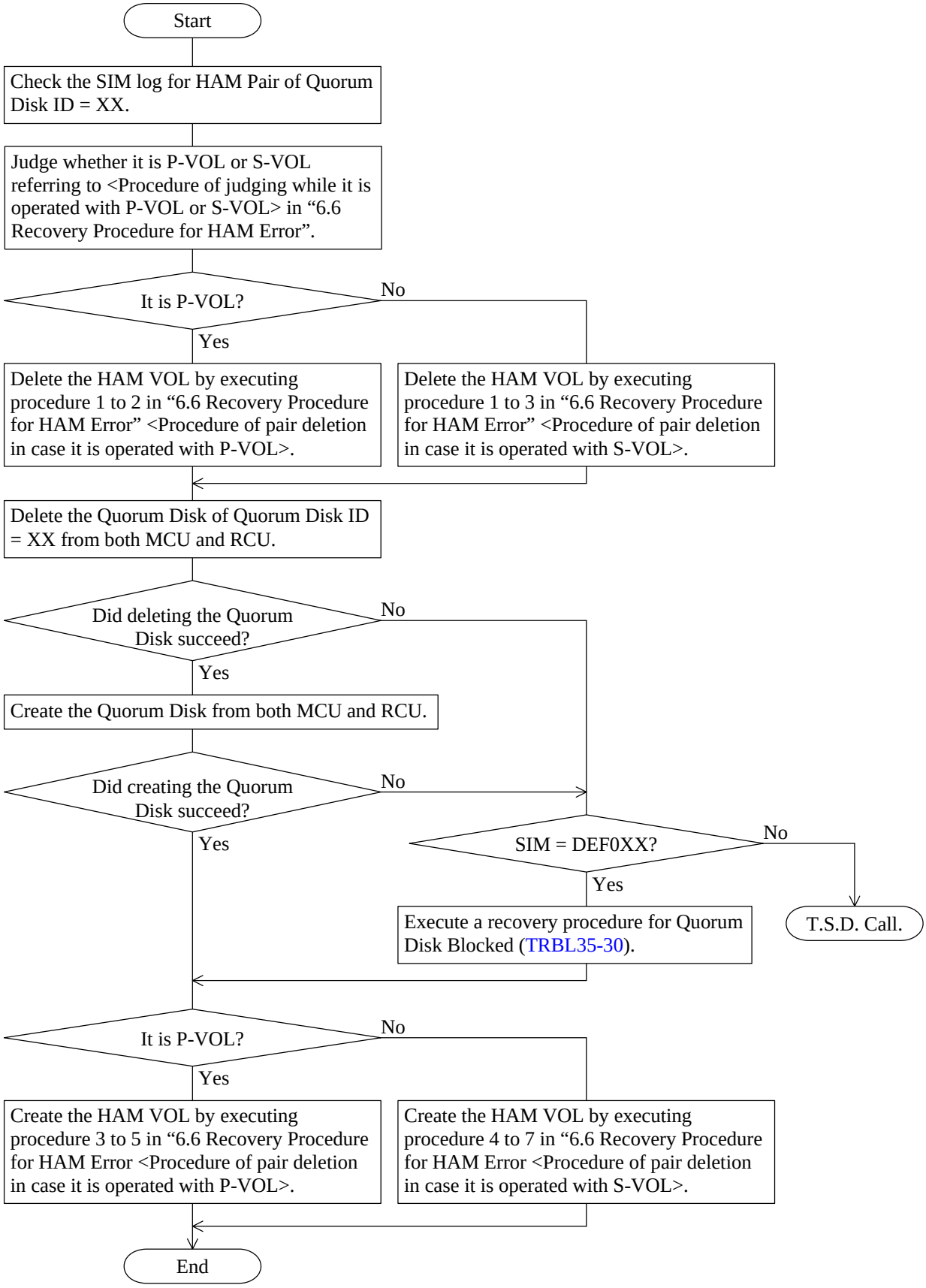
This document explain the Quorum Disk error and how to recover it.
Following reports indicate Quorum Disk error occurrence.

- SIM report of HAM VOL Blocked by Quorum Disk Information Error occurrence
- SIM report of Quorum Disk Blocked occurrence

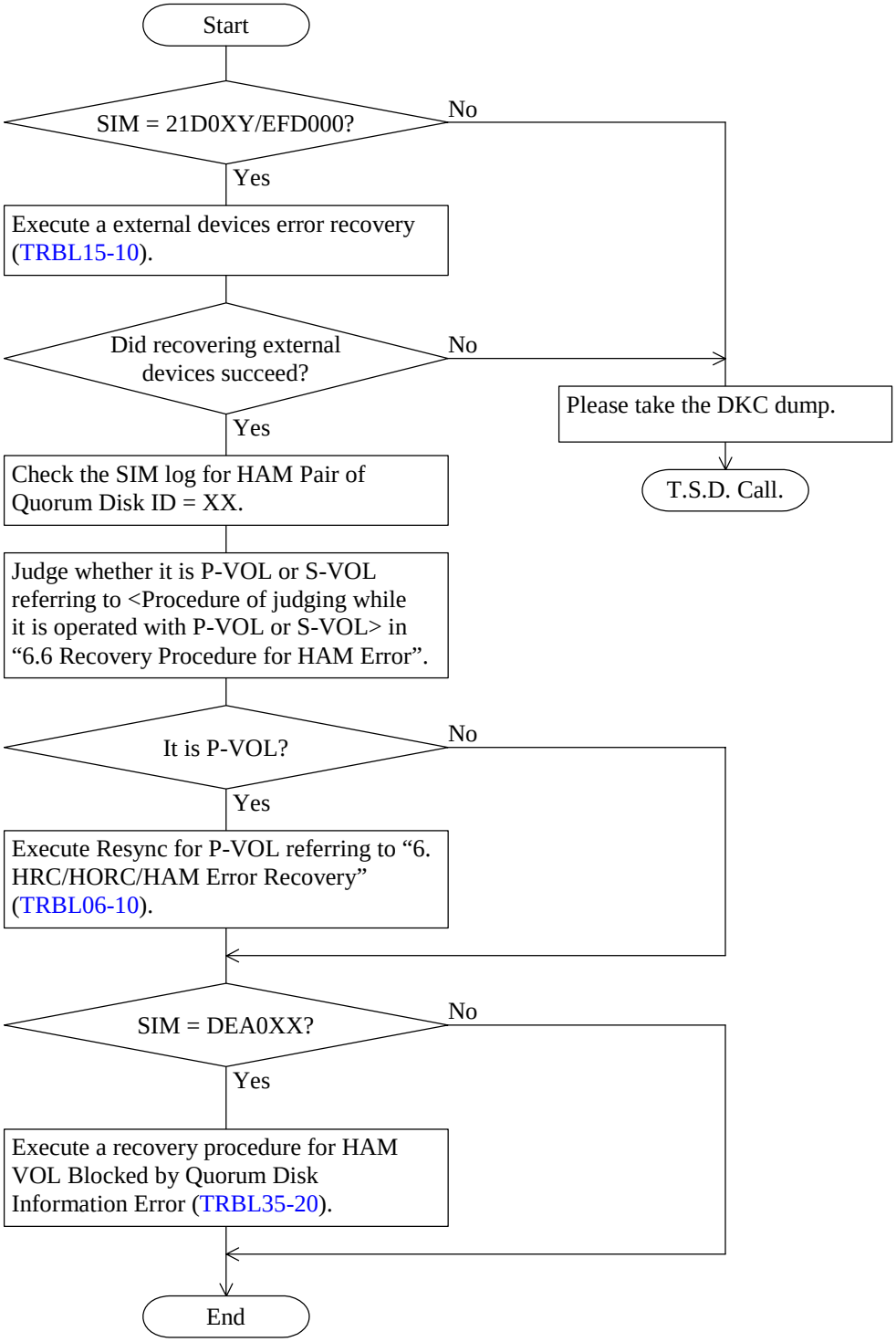
Table 35-1 Quorum Disk SIM REF. CODE

SIM REF. CODE	Meaning	Remarks
DEA0-XX	HAM VOL Blocked by Quorum Disk Information Error	XX : Quorum Disk ID
DEF0-XX	Quorum Disk Blocked	XX : Quorum Disk ID

35.1 Recovery Procedure for HAM VOL Blocked by Quorum Disk Information Error (SIM = DEA0XX)



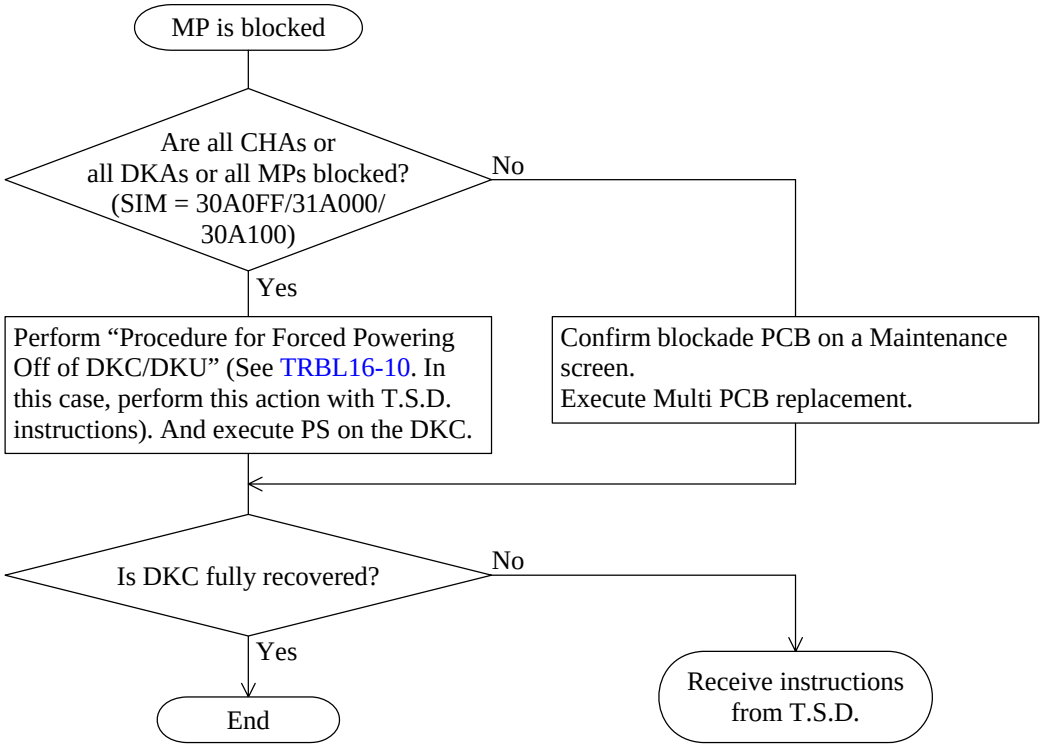
35.2 Recovery Procedure for Quorum Disk Blocked (SIM = DEF0XX)



36. Recovery procedure for DKC/MP PCB blocked (SIM = 30A0XX, 31A000, 30A100)

CAUTION

Perform this action that a special procedure is included in, by instructions of T.S.D.

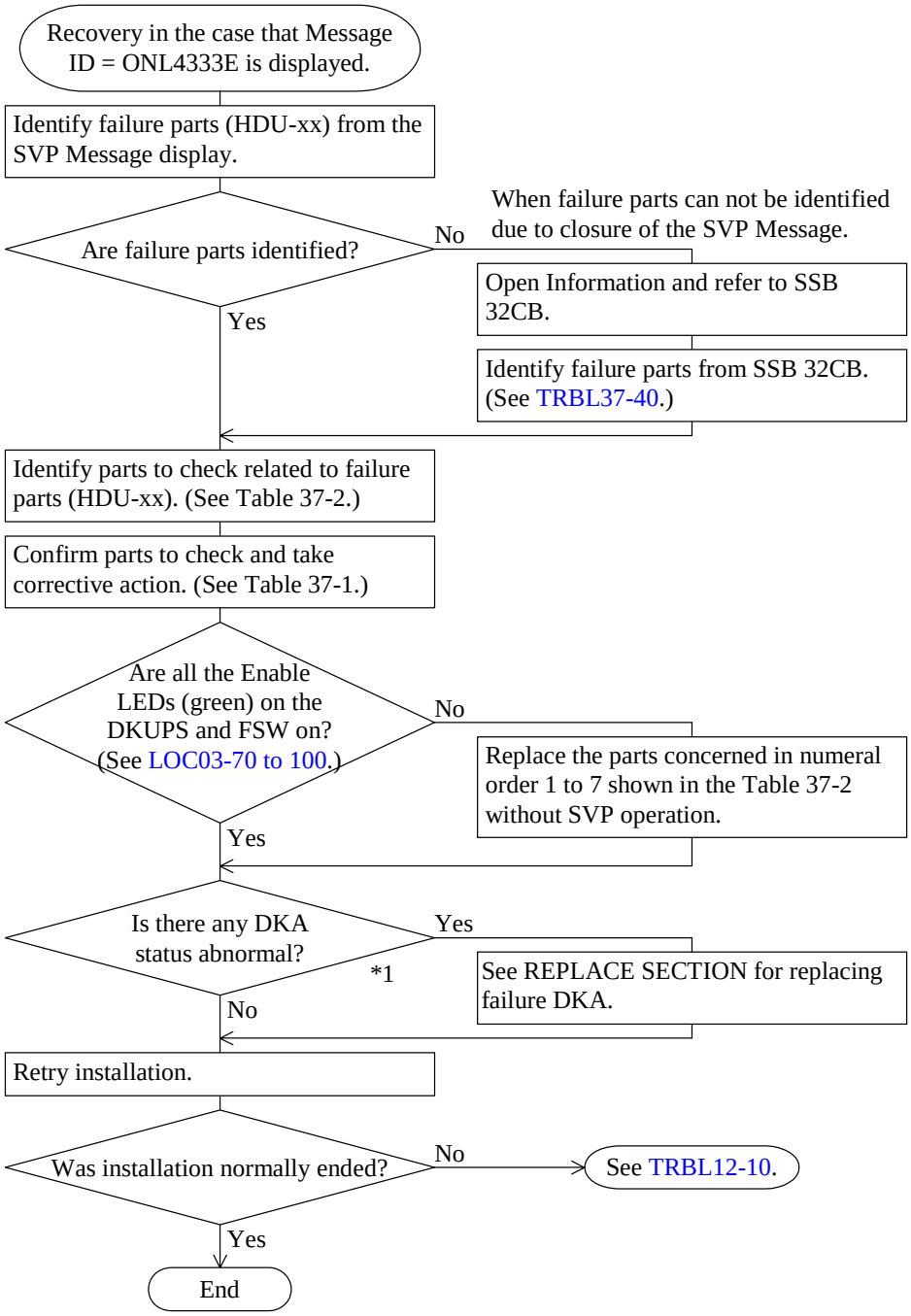


37. Recovery procedure in the case that Message ID = ONL4333E is displayed when installing HDD/DKU

In the case that the SVP Message (Message ID = ONL4333E, “A failure was detected in the installed part.”) is displayed when installing DKU, check and replace failure parts and retry installation according to the following procedure.

CAUTION

Perform the following procedure only on the failure parts indicated in the SVP Message.



*1: Select (CL) [Maintenance] in the ‘SVP’ Window.

Table 37-1 Checkpoint and corrective action of parts to check

Parts to Check	Checkpoint (*1)	Corrective Action
DKUPS-xxx	Is the AC Cable connected?	Connect the AC cable. (See REP03-1120)
	Is the PDU breaker on?	Turn the breaker on. (See INST03-15-30 to 40)
FSWxxx-U/L	Is the DEV I/F Cable connected? (See LOC05-30 to 60)	Connect the DEV I/F Cable.
DEV I/F Cable	Are both ends of the DEV I/F Cable are connected? (See LOC05-30 to 60)	Connect both ends of the DEV I/F Cable.

*1: Perform the checking procedure only on the failure parts indicated in the SVP Message. Do not perform the checking procedure on the other parts already installed.

Table 37-2 Correspondence table of failure parts (HDU-xx) and parts to check

When replacement is necessary, work on it in numeral order 1 to 7 without SVP operation.

DKU-RK0

HDU-00/HDU-01	
No.	Parts
1	DKUPS-000
2	DKUPS-001
3	DKUPS-010
4	DKUPS-011
5	FSW001-L
6	FSW001-U
7	DEV I/F CABLE

HDU-02/HDU-03	
No.	Parts
1	DKUPS-020
2	DKUPS-021
3	DKUPS-030
4	DKUPS-031
5	FSW023-L
6	FSW023-U
7	DEV I/F CABLE

(To be continued)

(Continued from the preceding page)

DKU-RK1

HDU-10/HDU-11	
No.	Parts
1	DKUPS-100
2	DKUPS-101
3	DKUPS-110
4	DKUPS-111
5	FSW101-L
6	FSW101-U
7	DEV I/F CABLE

HDU-12/HDU-13	
No.	Parts
1	DKUPS-120
2	DKUPS-121
3	DKUPS-130
4	DKUPS-131
5	FSW123-L
6	FSW123-U
7	DEV I/F CABLE

DKU-RK2

HDU-20/HDU-21	
No.	Parts
1	DKUPS-200
2	DKUPS-201
3	DKUPS-210
4	DKUPS-211
5	FSW201-L
6	FSW201-U
7	DEV I/F CABLE

HDU-22/HDU-23	
No.	Parts
1	DKUPS-220
2	DKUPS-221
3	DKUPS-230
4	DKUPS-231
5	FSW223-L
6	FSW223-U
7	DEV I/F CABLE

DKU-RK3

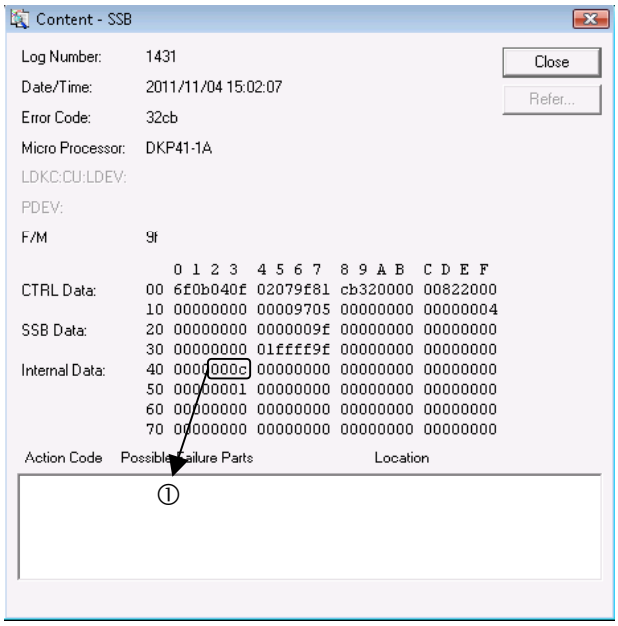
HDU-30/HDU-31	
No.	Parts
1	DKUPS-300
2	DKUPS-301
3	DKUPS-310
4	DKUPS-311
5	FSW301-L
6	FSW301-U
7	DEV I/F CABLE

HDU-32/HDU-33	
No.	Parts
1	DKUPS-320
2	DKUPS-321
3	DKUPS-330
4	DKUPS-331
5	FSW323-L
6	FSW323-U
7	DEV I/F CABLE

Procedure to identify failure parts from SSB 32CB

Identify failure parts from the values of Byte 40, 41 of SSB 32CB.

(1) Refer to SSB 32CB.



(2) See the correspondence table in Table 37-3 to identify failure parts.

	0	1	2	3	4	5	6	7
40	—	—	Byte 41	Byte 40	—	—	—	—

①

Table 37-3 Correspondence table of Byte and failure parts

#	Byte	Bit	Failure Parts
①	41	7	HDU-33
		6	HDU-32
		5	HDU-31
		4	HDU-30
		3	HDU-23
		2	HDU-22
		1	HDU-21
		0	HDU-20
	40	7	HDU-13
		6	HDU-12
		5	HDU-11
		4	HDU-10
		3	HDU-03
		2	HDU-02
		1	HDU-01
		0	HDU-00