

SSB SECTION

Contents

1. Sense Byte AnalysisSSB01-10

2. Procedure for Searching Sense Bytes, SIM Error Table and SSB TableSSB02-10

3. 24-Byte Compatibility SSB.....SSB03-10

 3.1 Basic Sense BytesSSB03-10

 3.2 Formats and messagesSSB03-70

 3.3 Details of Sense BytesSSB03-90

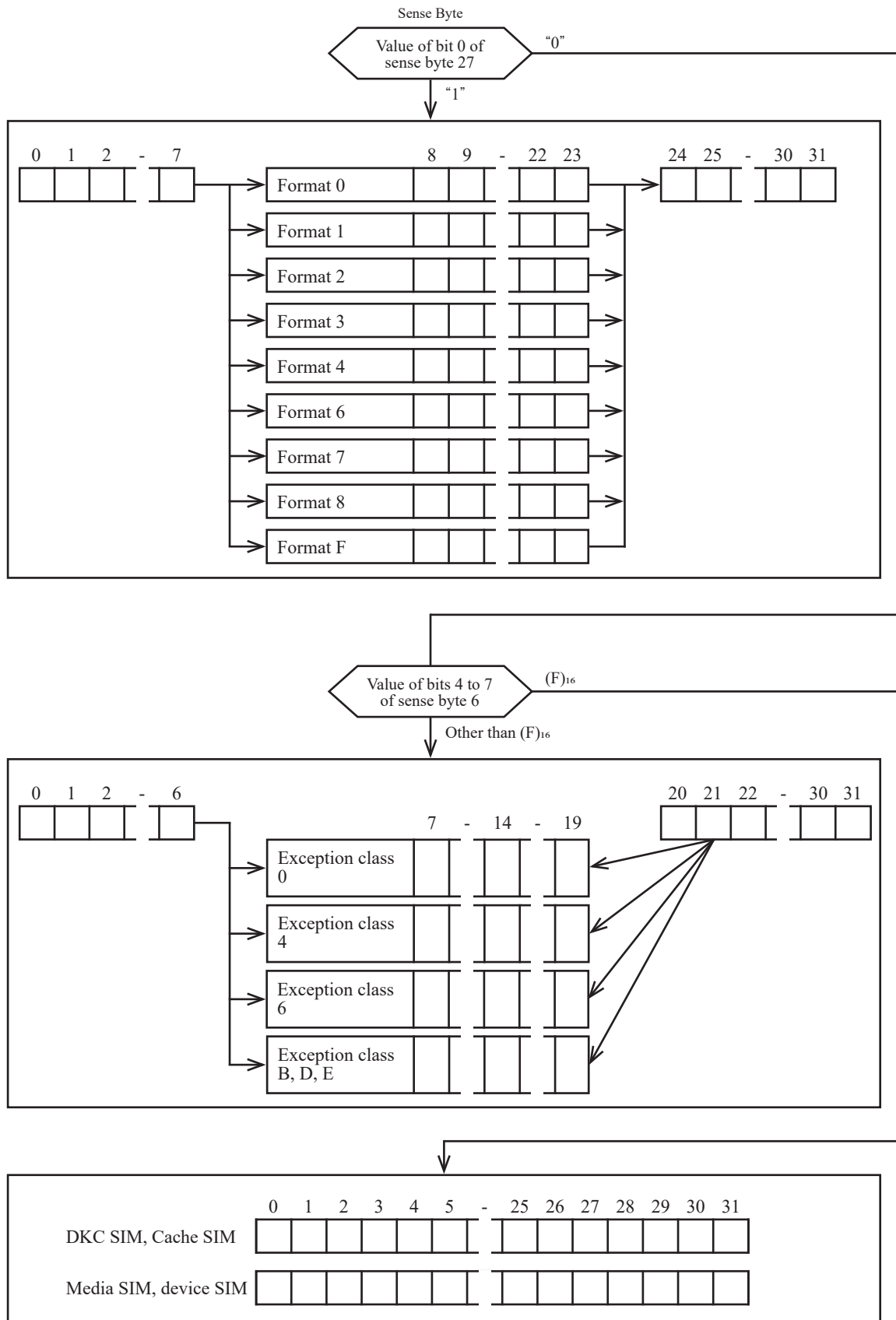
4. ECKD 32-BYTE SSBSSB04-10

 4.1 Basic Sense BytesSSB04-10

 4.2 Exception Classes and FormatsSSB04-60

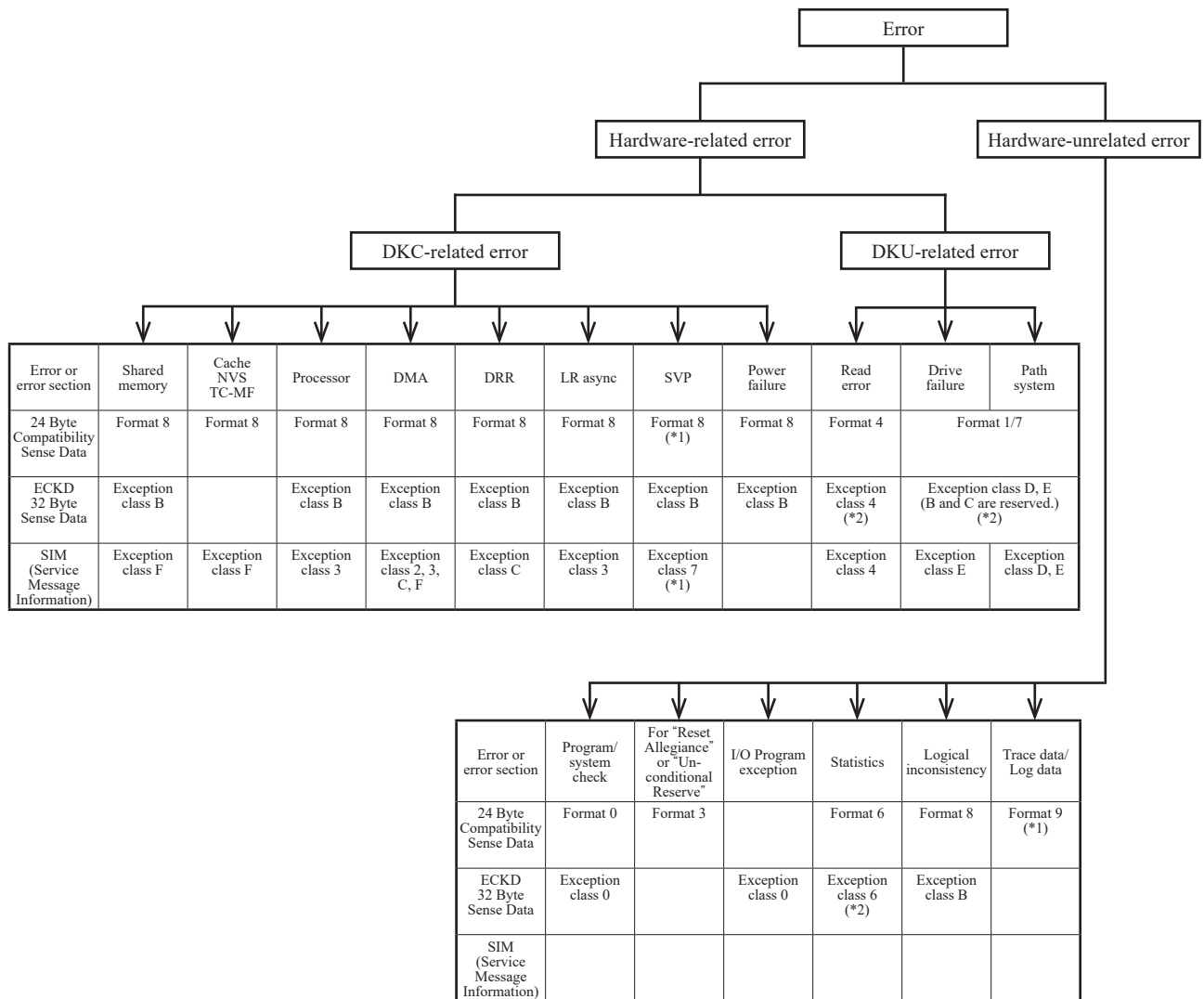
 4.3 Details of Sense BytesSSB04-70

1. Sense Byte Analysis



2. Procedure for Searching Sense Bytes, SIM Error Table and SSB Table

The following table shows the formats for trouble shooting in this disk.



*1: This error is not reported to host. (For SSB log only)

*2: For DKU87I (IBM 3390 emulation mode) only.

Table 1-1 Search method for SSB tables (1/5)

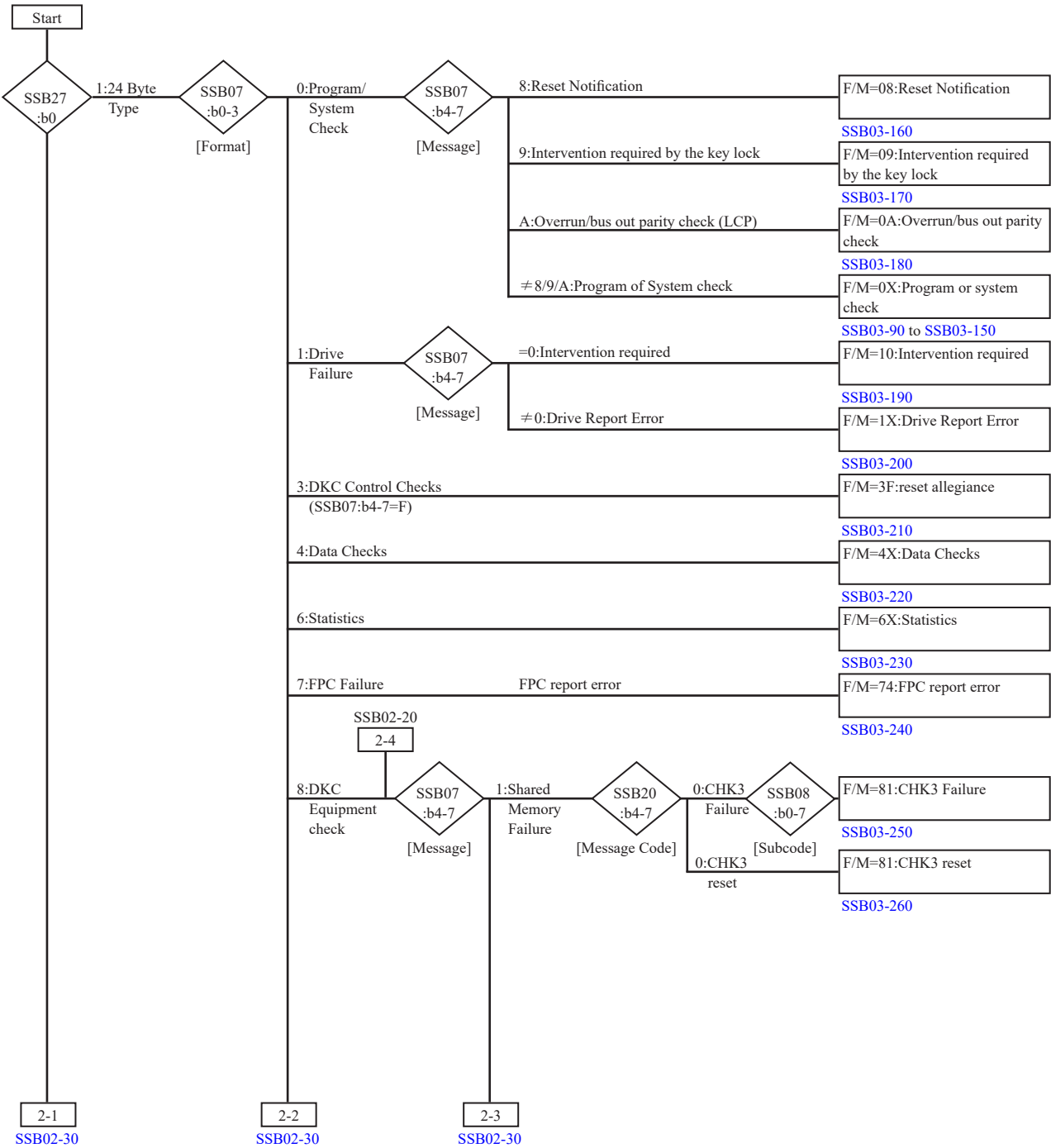


Table 1-2 Search method for SSB tables (2/5)

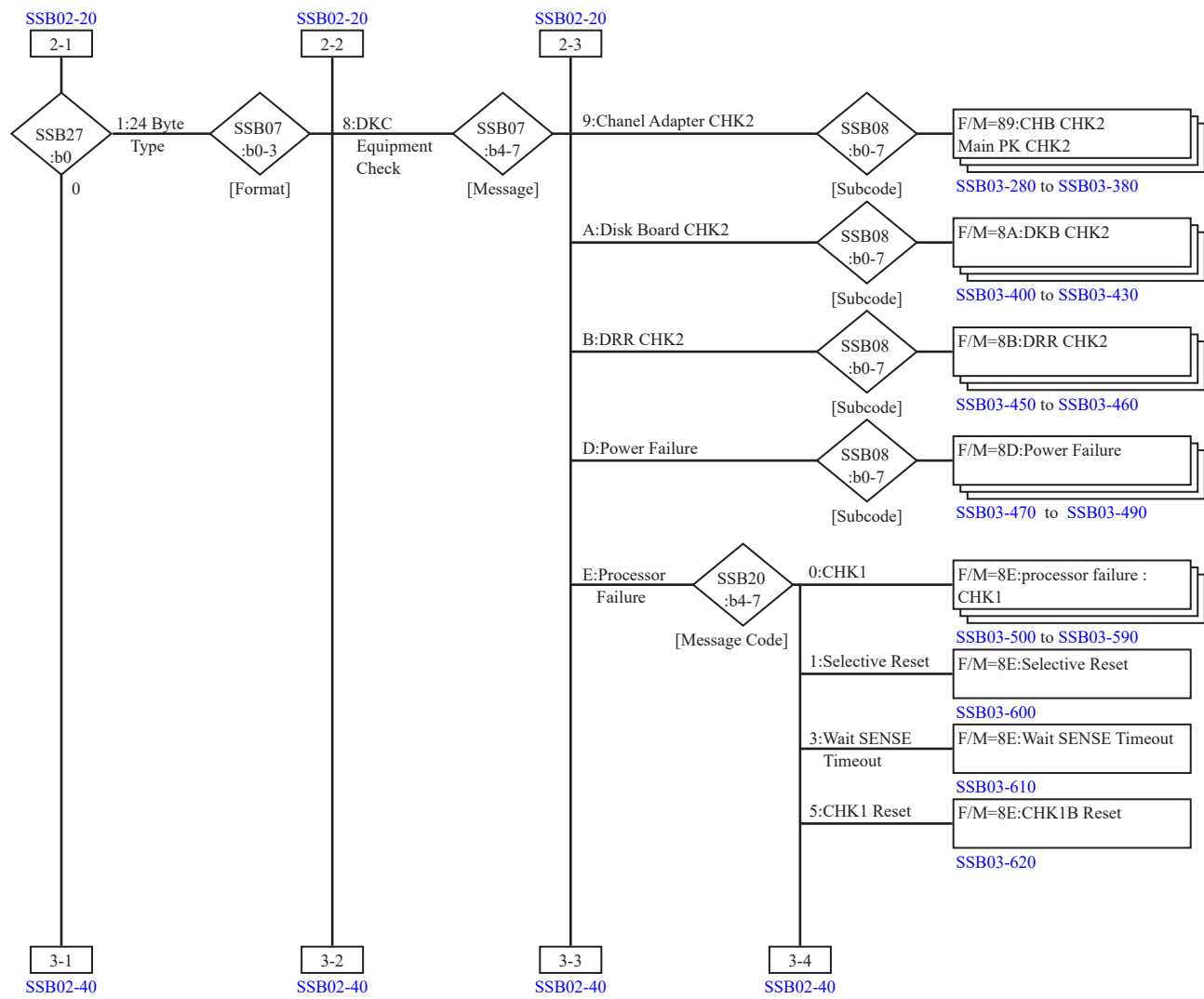


Table 1-3 Search method for SSB tables (3/5)

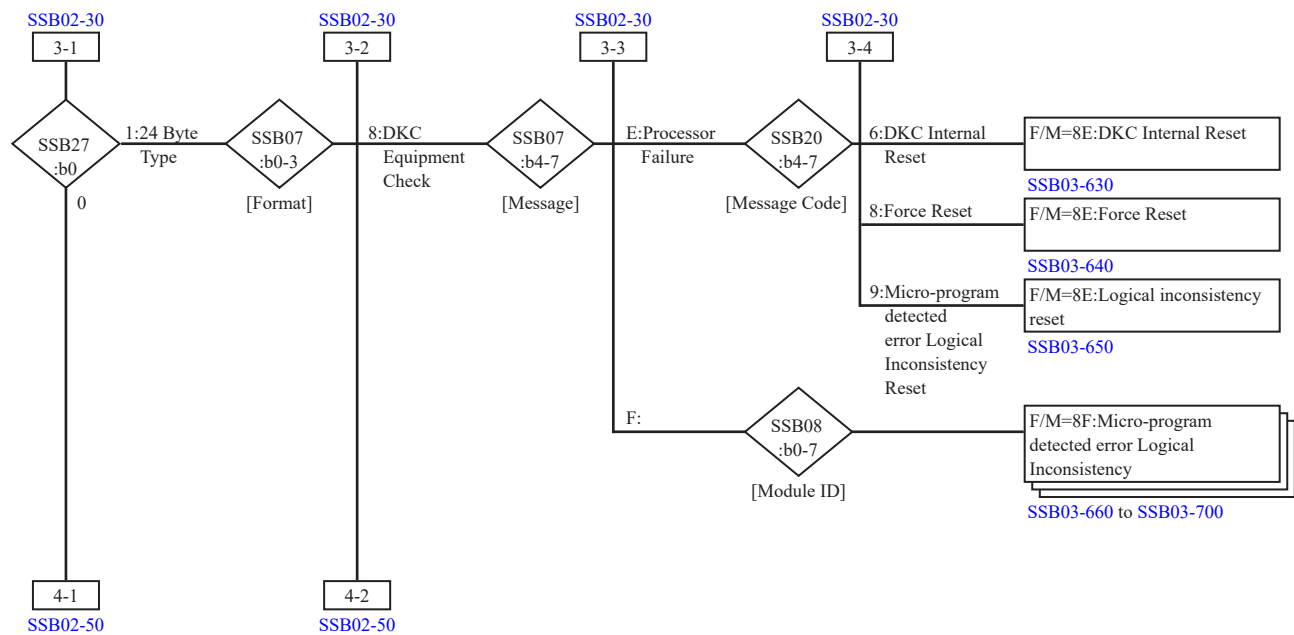


Table 1-4 Search method for SSB tables (4/5)

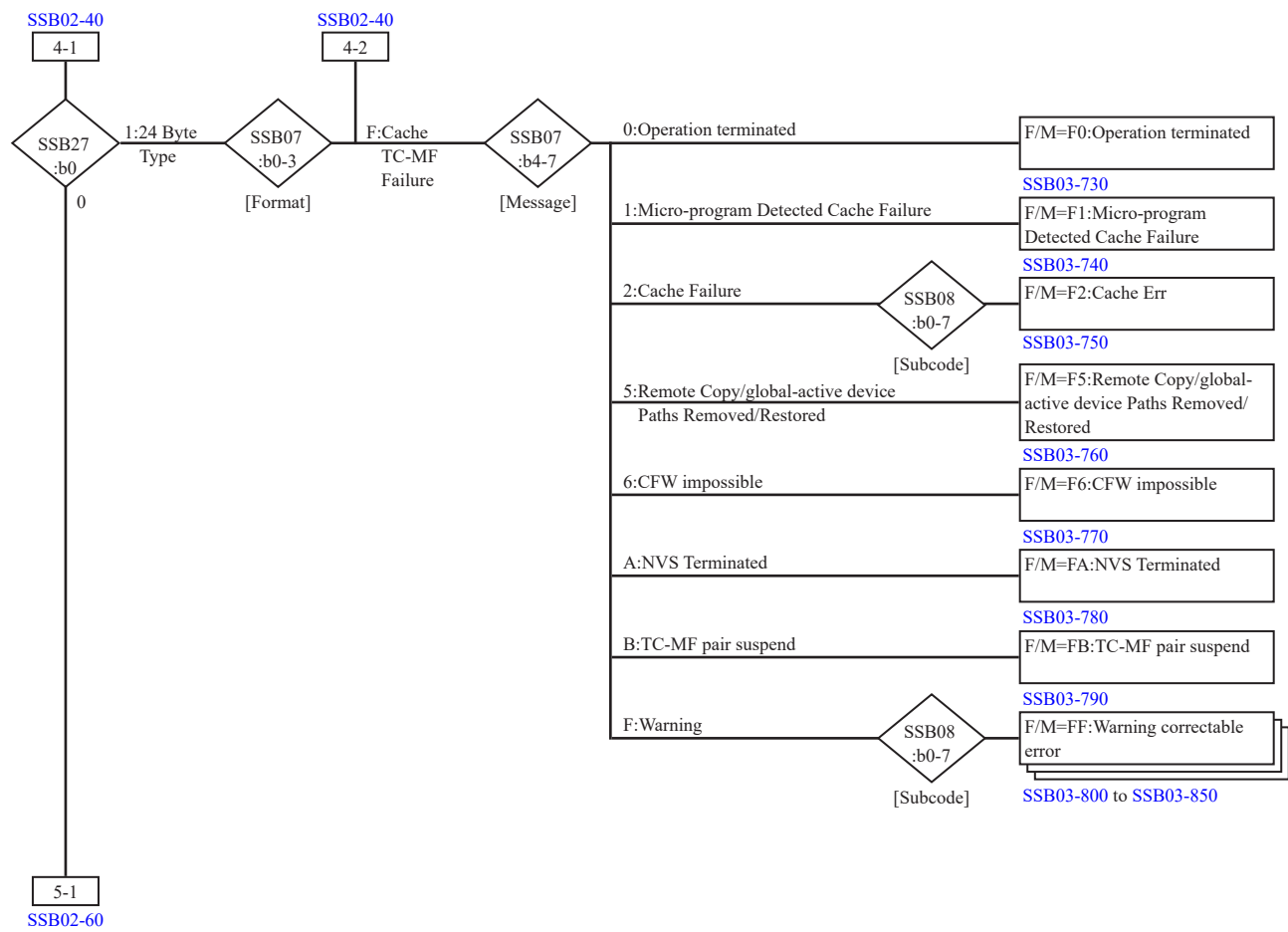
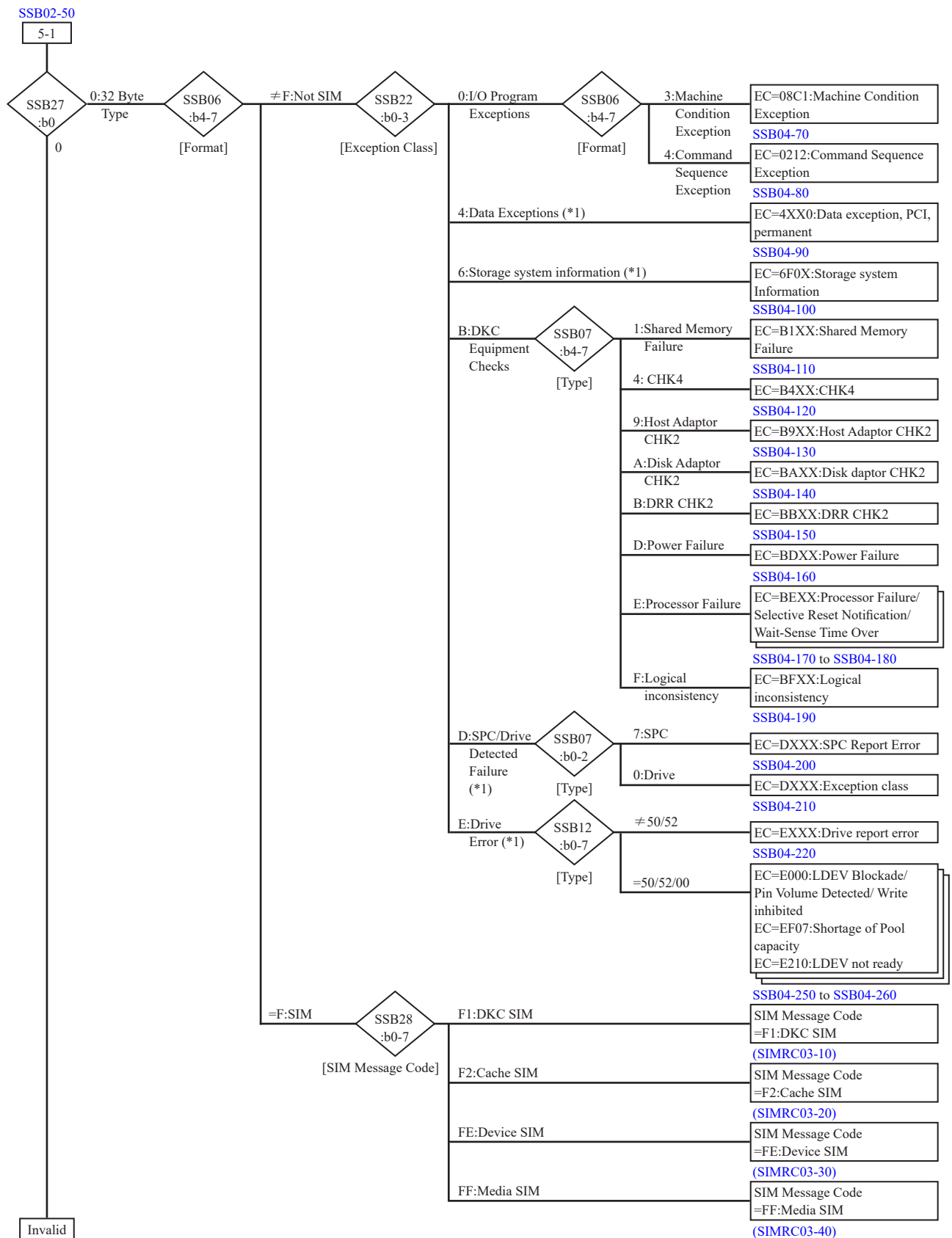


Table 1-5 Search method for SSB tables (5/5)



*1: For DKU87I (IBM 3390 emulation mode)

3. 24-Byte Compatibility SSB

3.1 Basic Sense Bytes

Bit Byte	0	1	2	3	4	5	6	7
0	Command reject	Intervention required	Busout parity check	Device check	Date check	Overrun	Not used	Incomplete domain
1	Permanent error	Invalid track format	End of cylinder	Operator message	No record found	File protection	Write inhibit	Imprecise ending
2	Request inhibit write	Correctable	First log mode error	Environmen- tal data present	Not used	Imprecise ending	Not used	Remote Copy Volume
3	Controller ID, number of retries, number of records							
4	Device address							
5	Low cylinder address, overflow flag of command overruns							
6	Head address and high cylinder address, overflow flag of data overruns							
7	Format				Message			
8 ~ 23	Bytes 8 to 23: Depends on the format and message.							
24	Logging and message control							
25	Duplex pair error	Program action code						
26	Dual frame	EDCC mode	Duplex pair	Sub-volume error	Non synchronous operation	Serial channel	Not used	Permanent path error
27	24byte SSB (1)	Device address valid	Track address valid	28 bit Cylinder	A-6586 track compatible mode	Not used	Path number	
28	Cylinder address							
29								
30								
31	Head address							

Byte	Bit	Name	Description
0	0	Command reject	- Invalid command was received. - The sequence of commands is invalid. - The number of bytes sent by a CONTROL command is insufficient or the value is invalid. - A WRITE command that violates the file mask and search conditions was received. - A WRITE command was received when the R/W switch was set to READ. (In this case, bit 6 of byte 1 (write inhibit) also becomes "1".) - The WRITE SPECIAL HA command does not permit a short byte. - An attempt to write an Rn record to a defective track was made. - No link is established for a defective or alternate track. - The command issued in the LOCATE domain does not match the operation specified by the LOCATE command. - The operation specified by the LOCATE command has violated the file mask. - An attempt was made to access an alternate track beyond the user cylinder during multi-track operation in the LOCATE domain. (File protected (bit 5 of byte 1) is set at the same time.) - The status of the cache/device does not meet the requirement of the SET SUB MD/PERF SUB FUNC command.
	1	Intervention required	- The addressed device is not READY. - The DKU is in the CE mode. - The addressed device is not physically connected.
	2	Busout check	The data or command transferred from the channel has a parity error.
	3	Device check	A malfunction was detected in the storage system. Details are indicated in Bytes 7 to 31.
	4	Data check	- A correctable read error was detected in the data read from the device. (Bit 1 of byte 2 ("correctable") is set at the same time. The information for correction is indicated in sense bytes 15 to 23.) - An uncorrectable read error was detected in the data read from the device. - The end by the PCI fetch mode is indicated. Bit 1 of byte 2 ("correctable") is set at the same time and restart displacement is guaranteed. Error displacement and error pattern are 0.
	5	Overrun	- A response to a data request or reconnection request could not be received within the predetermined time on the parallel channel. This error is reported with F/M=0A. - No response was made or an invalid frame was received when the serial channel was in a data transfer sequence; so, retry was impossible. - Command retry (overrun) was requested from the channel, but retry was impossible. This error is reported with F/M=0A. - Termination of overrun was requested from the channel. This error is reported with F/M=0A. NOTE: This bit is set on if ten overruns have occurred through command retry including the format write command. (Permanent error (bit 0 of byte 1) is not set.) If a data overrun has occurred with a WRITE command, data transfer is aborted immediately and (00H) is written till the end of that record.
	6	Not used	Always 0
	7	Incomplete domain	This bit is set if a short domain has been detected during a write in asynchronous transfer. Environmental data present (bit 3 of byte 2) is also set to '1'.

Byte	Bit	Name	Description
1	0	Permanent error	Command retry failed.
	1	Invalid track format	1. An index was encountered during a data write. (A data write beyond the track capacity was made.) 2. An index marker was detected in the key or data field when the READ or SEARCH command (except SCH ID) was handling a record. 3. An updating write was attempted for a record with a different size from the record size specified in TLF of the LOCATE command or the block length of the DEF EXT command. 4. The length of the data field of R0 was not 8 bytes during WRITE TRK operation.
	2	End of cylinder	An attempt was made to perform track switching from the last track of the logical cylinder by a READ or SEARCH command with multi-track specification. (End of cylinder is not reported in the LOCATE domain.)
	3	Message to operator	This bit is set to display an error to the operator.
	4	No record found	1. Two index markers were detected in the same command chain without intervention of a WRITE or SENSE command or a read operation that handles the HA or data field. 2. The target record searched for by a LOCATE command could not be detected. Imprecise ending (bit 7 of byte 1) is also set at the same time.
	5	File protected	3. A SEEK command has violated the file mask or extent range. 4. A READ or SEARCH command with multi-track specification has violated the file mask or extent range. 5. An attempt was made to access an alternate track beyond the user cylinder during multi-track operation in the LOCATE domain. (Command reject (bit 0 of byte 0) is also set at the same time.) 6. Multi-track operation was tried directly to an alternate track in the asynchronous mode. 7. The track set is out of the extent specified for WRITE ANY/READ ANY. 8. The LOCATE RECORD/LOCATE RECORD EXTENDED domain is out of extent.
	6	Write inhibit	1. A WRITE command was received when the R/W switch was set to READ. (Bit 0 of byte 0 (command rejection) also becomes "1".) 2. Indicates that the write prohibition status has been established by the DIAG CTL command. (Bit 3 of byte 0 (device check) is also set at the same time.)
	7	Imprecise ending	Indicates that the error indicated in the sense byte is due to a command before the command that reported the unit check. (abnormal end in the LOCATE domain) Bit 5 of byte 2 is also set at the same time.

Byte	Bit	Name	Description								
2	0	Request inhibit write	Requests issuance of a DIAG CTL command that instructs prohibition of a write through the path to avoid an error from which the path cannot recover. (At the same time, the faulty section is set in byte 25 “program action code”.)								
	1	Correctable	Indicates that bit 4 of sense byte 0 (data check) can be corrected. Restart displacement, error displacement, and error pattern are indicated in bytes 15 to 23.								
	2	First log mode error	The number of occurrences of seek/data errors exceeded the threshold. (Bit 3 of byte 2 (environmental data present) is also set at the same time.)								
	3	Environmental data present	Indicates that this SSB is not due to the current CCW chain but it is the statistics to be reported from the DKC to the host. The statistics include log information and reset notification.								
	4	Not used	Always 0								
	5	Imprecise ending	Same as bit 7 of byte 1								
	6	Not used	Always 0								
	7	Remote Copy Volume	This bit is set when the flash copy failed at the remote copy side.								
3	0 ~ 7	Controller ID, number of retries, number of records	1. Controller ID (Format 1, 6, 7, 8, or F, without imprecise ending) 2. Number of retries (Format 4 or 5, without imprecise ending, and environmental data present = 1) 3. Number of remaining records or tracks in the LOCATE domain (when indeterminate end or file protection is 1) 4. Zero (For other than 1 to 3 above)								
4	<table><tr><td>0</td><td>SP number 2¹</td></tr><tr><td>1</td><td>SP number 2⁰</td></tr><tr><td>2</td><td>Controller number</td></tr><tr><td>3 ~ 7</td><td>DKU physical number</td></tr></table>			0	SP number 2 ¹	1	SP number 2 ⁰	2	Controller number	3 ~ 7	DKU physical number
0	SP number 2 ¹										
1	SP number 2 ⁰										
2	Controller number										
3 ~ 7	DKU physical number										
5	0 ~ 7	Lower digits of cylinder address	Indicates the lower digits of the cylinder address of the seek address received from the last channel (2 ⁷ to 2 ⁰).								
		Overflow flag of command overruns	Set to x'01' when the command overrun threshold is exceeded. (For format 6 only)								

Byte	Bit	Name	Description
6	0 ~ 3	Upper digits of cylinder address	Indicates the upper digits of sense byte 5. Indicates the upper digits of the cylinder address of the last seek address received from the channel.
	4 ~ 7	Head address	Indicates the head address of the last seek address received from the channel. This address is updated in multi-track operation.
	0 ~ 7	Overflow flag of data overruns	Set to x'01' when the data overrun threshold is exceeded. (For format 6 only)
7	0 ~ 3	Format	The following indicate the meanings of sense bytes 8 to 23. 0000 Format 0 Program check or system check Intervention required by the key lock 0001 Format 1 Drive failure (*1) 0010 Format 2 DKC function check (Not used) 0011 Format 3 DKC control check 0100 Format 4 Data check without information for correction (*1) 0101 Format 5 Data check with information for correction (Not used) 0110 Format 6 Statistics (*1) 0111 Format 7 SPC Failure (*1) 1000 Format 8 Microprogram detected error or DKC/DKU failure 1001 Format 9 Microprogram detected error 1110 Format E Service information message (SIM) (Not used) 1111 Format F Cache system error
	4 ~ 7	Message	Indicates the determined characteristics of the error status for the above formats. Hexadecimal digits of 0 to F indicated in bits 4 to 7 correspond to 0 to F for messages.
24	0 ~ 2	Logging message control	Reserved
	3		Logging mode
	4 ~ 5		Logging action (only '01' used) 00: Not logged 01: Unconditionally logged 10: Only the first record logged at retry 11: Only the first record logged upon occurrence of a permanent error
	6 ~ 7		Operator message control (only '01' used) 00: No operator message 01: Message unconditionally output 10: Message output only for the first record at retry 11: Message output only for the first record upon occurrence of a permanent error.

*1: For DKU86I only.

Byte	Bit	Name	Description
25	0	Program action code	Duplex pair volume error (Not used) Indicates the error on a duplex pair (neither pending nor suspended). This bit is set to 1 for device check or intervention request. F/M=1/7/8
	1 ~ 7		Instructs the method of error recovery. (00)₁₆: No action (10)₁₆: SIM (Not used) (16)₁₆: Reset notification (17)₁₆ or (57)₁₆: Device check with FMT=7/8 during write operation. Prohibits write to the controller if a permanent error has occurred on that path. (18)₁₆ or (58)₁₆: Device check during write operation. Prohibits write to the channel path if a permanent error has occurred on that path. (19)₁₆ or (59)₁₆: Device check during write operation. Prohibits write to the storage path if a permanent error has occurred on that path. (70)₁₆: The command was rejected because the condition specified in the specific blocking condition setting order of the PERF SUB FUNC command was met. (71)₁₆: Attention was reported from the interface placed in the specific blocking status by the PERF SUB FUNC command. (1D)₁₆: The storage system or device is in the State Change Pending status (statistics send (bit 3 of byte 2) = 1, F/M = F0).
26	0	Configuration information	Dual-frame configuration 0: Single-frame configuration 1: Dual-frame configuration
	1		EDCC mode 0: DCC 1: EDCC
	2		Duplex pair indication (Not used) 0: Simplex 1: Duplex pair
	3		Sub-volume error indication (Not used) 0: Not a sub-volume error 1: Sub-volume error
	4		Nonsynchronous operation 0: Synchronous operation 1: Nonsynchronous operation
	5		Serial channel 0: Parallel channel 1: Serial channel
	6		Not used
	7		Permanent path error 0: Permanent error for all paths 1: Permanent error for this path

3.2 Formats and messages

Format	Message	Description	
0		Operator message (bit 3 of byte 1) = 0	Operator message (bit 3 of byte 1) = 1
	0	No message	Not used
	1	Invalid command	Log mode end (Not used)
	2	Invalid sequence	Not used
	3	Data count is fewer than the specified number.	Device was fenced. (Not used)
	4	Data value differs from the specified number.	Not used
	5	The file mask allows neither RD SP HA nor WR SP HA.	
	6	The channel isolated the retry.	
	7	The channel sent an incorrect retry command.	
	8	System reset was received (reset notification).	
	9	Intervention required by the key lock	
	A	Overrun	
	B	Improper instruction for a defective track or alternate track	
	C	Not used	
	D	ECM software error (Not used)	
	E	Invalid command for sub-volume (Not used)	
	F	Invalid status (reason code in byte 8)	
1	0	Intervention required	For DKU86I only
	1	Not used	
	2	Drive not ready	
	3	Not used	
	4	Drive report error	
	5 ~ F	Not used	
2	0 ~ E	Not used	
	F	One side of ECM is down	
3	0 ~ E	Not used	
	F	Reset allegiance	
4	0	Data check in HA field	For DKU86I only
	1	Data check in C field	
	2	Data check in K field	
	3	Data check in D field	
	4	Not used	
	5	PA error	
	6 ~ F	Not used	
6	0 ~ 7	Statistics	
	8 ~ F	Not used	

Format	Message	Description	
7	0 ~ 3	Not used	For DKU86I only
	4	SPC report error	
	5 ~ 8	Not used	
	9	SCSI bus parity error	
	A ~ F	Not used	
8	0	Reserved	
	1	Shared memory failure	
	2 ~ 3	Reserved	
	4	LR async failure	
	5 ~ 8	Reserved	
	9	Host adapter CHK-2	
	A	Disk board CHK-2	
	B	DRR CHK-2	
	C	Reserved	
	D	Power failure	
	E	Processor failure	
	F	Microprogram detected error (Logical inconsistency)	
E	0	Reserved	
	1 ~ F	Reserved	
F	0	Operation terminated	
	1	Microprogram detected cache failure	
	2	Cache failure	
	3	Reserved	
	4	Reserved	
	5	Remote Copy/global-active device Paths Removed/Restored	
	6	CFW impossible	
	7	Invalid track format (Does not occur with DKC210I.)	
	8 ~ 9	Reserved	
	A	NVS terminated	
	B	TrueCopy for Mainframe Pair suspend	
	C ~ E	Reserved	
	F	Cache/Shared memory/M-bus/F-bus/J-bus warning	

3.3 Details of Sense Bytes

Format 0, Message $\neq$ 8/9/A (Program or system check)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'0')				Message (x'X' : x ≠ 8, 9, A)			
8	Reason code when F/M = 0F Command code when F/M ≠ 0F							
9	Error detail information (*1)							
10								
11								
12								
13	SSID of mate storage system (x'0000' for EDCC)							
14								
15	Manufacturer code (x'000000')						Factory code (x'00')	
16	Module ID (*3)							
17	Routine ID (*3)							
18	PCB number				Error detail information (*2)			
19	SSID for Self Storage system							
20								
21	Symptom Code (x'0F0X' : X = message code) (*3)							
22								
23								

*1:

(1) Issued command information when F/M = 02

B/b	0	1	2	3	4	5	6	7
9	SCH ID	SCH KEY	Locate, LC EXT	SK, SK CYL	RD IPL	RECAL	SUSP MPR	RD C
10	DIAG CTL	DIAG CTL (LOC DOM)	DEF EXT	SET FM	SET SUB MODE	SP C	WR CKD	WR R0
11	SET INTF ID	DIAG CTL (PRE REM)	0	Other command	RD C chaining	All byte match	LC domain	Erase execute
12	Write through	0	0	Allow WR KD	Allow WR D	Allow WR CKD	Allow WR R0	Allow WR HA

(2) Short byte flag when F/M = 03

Byte 9 : x'00'

Byte 10 : x'40' (Short byte)

Byte 11 : x'00'

Byte 12 : x'00'

(3) Mask information when F/M = 05

Byte 9 : Mask for write control

x'00' : Allows all write operation except WR
HA, WR R0.

x'40' : Inhibits all write operation.

x'80' : Allows update write operation.

x'C0' : Allows all write operation.

Byte 10 : Mask for seek control

x'00' : Allows all seek commands and
RECAL.

x'08' : Allows SK CYL and SK HD only.

x'10' : Allows SK HD only.

x'18' : Inhibits all seek commands and multi
operation.

Byte 11 : Mask for access

x'00' : Allows normal access.

x'02' : Allows device support.

x'04' : Allows diagnostic access.

x'06' : Allows device support inhibit data
check correction and retry.

Byte 12 : Not used

(4) Record address when other F/M = other than 02, 03, and 05

Byte 9 : [In case of that the last access cylinder address is not 28 bit format]

Message code

[In case of that the last access cylinder address is 28 bit format]

Bit 12-19 of cylinder address

Byte 10 : [In case of that the last access cylinder address is not 28 bit format]

High side of cylinder address

[In case of that the last access cylinder address is 28 bit format]

Bit 20-27 of cylinder address

Byte 11 : [In case of that the last access cylinder address is not 28 bit format]

Low side of cylinder address

[In case of that the last access cylinder address is 28 bit format]

Bit 0-7 of cylinder address

Byte 12 : The last access of head address

(5) Record address when F/M = 0F and Byte 8 = 79 or 7D

Byte 8 Byte 9

79 01 : A device in the Soft Fence status is a channel connection device, a primary
device of TrueCopy for Mainframe, or a source device of FlashCopy.02 : A device in the Soft Fence status is a secondary device of TrueCopy for
Mainframe or a target device of FlashCopy.7D 01 : Inconsistent with the already registered host token when the status is set to
SPID Fence.02 : Inconsistent with the host token for the already set device when the status is
set to SPID Fence.03 : Inconsistent with the already registered host token when the SPID Fence
status is cancelled.

*2: Bit 4-7 of byte 18 : Type of byte 19

x'08' : Byte 19 is cylinder address (high).

x'09' : Byte 19 is cylinder address (low).

x'0A' : Byte 19 is head address (high).

x'0B' : Byte 19 is head address (low).

x'0C' : Byte 19 is record number.

Byte 19: 1 byte in CCHHR specified by a search parameter of the LOCATE command
(only when a search address is specified by the LOCATE command)

*3: Module ID/Routine ID: Byte 16-17 = x'7180', symptom code = x'2F00' for dummy SENSE (basic SSB: Byte 0-2 = x'000000', and F/M: Byte 7 = x'00')

Reason code list for Format 0, Message F (1/4)

Code	Reason
00	No messages
01	An attempt was made to make a cache usable but the cache was in the pending status.
02	Not used
03	An attempt was made to forcibly make a cache unusable but the cache was not holding destage completion.
04	An attempt was made to activate a CFW but the CFW was in the ending status.
05	An attempt was made to perform caching for a device but a cache was in the pending status.
06	An attempt was made to destage a track but an NVS was in the failed status.
07	An attempt was made to make an NVS unusable but the NVS was being initialized.
08	An attempt was made to halt or discarded caching/DFW for a device but the DFW of the device was in the failed status.
09	An attempt was made to forcibly halt a DFW of a device but the device was not in the following status. • The DFW was in the pending status. • The DFW was in the failed status. • An NVS was failed. The data was in the NVS but not in the cache.
0A	An attempt was made to make an NVS usable but a DFW of a device was in the pending or failed status.
0B	An attempt was made to make an NVS usable but the NVS was in the pending status.
0C	An attempt was made to halt caching/DFW of a device when an NVS was failed but the data of the device was in the NVS but not in the cache.
0D	An NVS was requested by a command but the NVS was unusable.
0E	A cache was requested by a command but the cache was unusable.
0F ~ 10	Not used
11	Pair state not valid for this operation. Resync not valid for SIMPLEX pair. Pair state already PENDING or DUPLEX. Unable to resync for pair suspended by secondary device.
12	Pair already defined.
13	Operation not valid when target device is ONLINE.
14 ~ 18	Not used
19	Pair already in suspended state.
1A	Not used
1B	Operation not valid for SIMPLEX device.
1C	Suspend not valid for secondary device in PENDING state.
1D	Pair already suspended.
1E ~ 24	Not used

Reason code list for Format 0, Message F (2/4)

Code	Reason
25	(TPF, RC) An SSM command (subcommand: Make Cache Unavailable to Subsystem) was received while a cache storage initialization procedure was underway.
26	Primary and Secondary volumes of different format, emulation type, or RAID level.
27	Not used
28	(TPF, RC) A PSF command (Order: Prepare for Read Subsystem Data, Suborder: x'05') was received when cache was not available or pending.
29	The PSF command of specific blocking status setting order was issued from an interface having no path group.
2A	An attempt was made to make a path group having parallel and serial channels intermixed.
2B	A message buffer is full.
2C ~ 2F	Not used
30	(TPF, RC) The cache partition indicated by PSF command (Order: Prepare for Read Subsystem Data) was not initialized.
31 ~ 32	Not used
33	Target is not secondary device and/or C/T ID mismatch.
34	Not used
35	SET GUARANTEED PATH sub-command was issued to a path in a fence.
36 ~ 39	Not used
3A	(TPF, RC) Read or Search or Write commands were received while 3380 Track Compatibility Mode.
38 ~ 3E	Not used
3F	An attempt was made to execute the MAKE NVS AVAIL FOR SUB sub-command but the NVS was disabled because the 'enable/disable NVS capability' has been set to 'disable' in a VPD.
40	Not used
41	An ordinary command was issued to a device being reserved for media maintenance.
42 ~ 51	Not used
52	No path link can support the requested operation.
53	C/T ID not enabled on RAID array. Identical CT/ID exists on RCU.
54	Primary/secondary device type mismatch.
55 ~ 56	Not used
57	In the device for which the address is specified, the TrueCopy pair is in the state of Suspend. All the Write commands where Normal Authorization is shown are rejected.

Reason code list for Format 0, Message F (3/4)

Code	Reason
58	Target storage system cannot receive the issued command. Report example of the error is shown below. Example: When the SI pair suspension is reserved, a command cannot be received due to the one of the following causes. • Specified C/T ID is not registered yet. • Specified C/T ID is invalid. • Suspension is already reserved. When the SI pair operation is performed, a command cannot be received due to the one of the following causes. • A path group is set in the target secondary device. • SI pair is not suspended. • When the Reverse Copy or the Quick Restore is operated, a path group is set in the target primary device.
59 ~ 78	Not used
79	The command operation was not allowed because the status was Soft Fence. The specific reason is indicated in sense byte 9.
7A ~ 7B	Not used
7C	The Path Group setting is not allowed because the status was SPID Fence.
7D	Inconsistency was detected in the operation of setting and cancelling the SPID Fence status. The specific reason is indicated in sense byte 9.
7E ~ 7F	Not used
80	A specific command was issued on an interface which has been in the specific command blocking status by the SET SPECIAL INTERCEPT CONDITION order of the PSF command.
81	An attention was reported to an interface which has been in the specific command blocking status by the SET SPECIAL INTERCEPT CONDITION order of the PSF command.
82	Not used
83	Pair not established as Consistency Group member.
84 ~ 8F	Not used

Reason code list for Format 0, Message F (4/4)

Code	Reason
90	(TPF, RC) 1. A PSF command (one of these orders: Establish Duplex Pair, Terminate Duplex Pair, Suspend Duplex Pair, or Direct I/O to One Device of the Duplex Pair) was received. 2. A PSF command (Order: Prepare for Read Subsystem Data, Suborder: x'04') was received. 3. A PSF command (one of these orders: Prepare for Read Subsystem Data, Set Lock State, Purge Lock, Unlock, Connect, or Disconnect) was received in the case of MPLF feature was not installed.
91	(TPF, MPLF) Specified MPLP had not been initialized and the cache was not in an available status.
92	(TPF, RC) An SSS command was rejected because additional pinned data still existed.
93	(TPF, MPLF) A cache storage control command was received when Disconnect order was in progress for any MPLP.
94	(TPF, RC) Destage Modified Tracks order was received while a scan of the cache for modified data is underway, which was initiated from the receipt of a prior Destage Modified Tracks order.
95	(TPF, MPLF) The attention message buffer was full when the order which has the potential of generating attention interrupt was received.
96 ~ E7	Not used
E8	Pair already defined.
E9 ~ FF	Not used

Format 0, Message 8 (reset notification)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'0')				Message (x'8')			
8	x'00'							
9	x'00'							
10	x'00'							
11	Hardware level (*1)							
12								
13	SSID of mate Storage system (x'0000' for EDCC)							
14								
15	Manufacturer code (x'000000')						Factory code (x'00')	
16	Module ID							
17	Routine ID							
18	PCB number.				Not used			
19	Not used							
20	SSID for Self Storage system							
21								
22	Symptom Code (x'2FFF')							
23								

***1: Hardware level**

Bit 0 : Serial channel hardware level

When the bit 0 = 0,

Bit 1-15: Not used

When the bit 0 = 1,

Bit 1: Not used

Bit 2-3: Failed storage path

Bit 4-7: Number of channels per cluster

0000 : Parallel channel = 4, serial channel = 0

0001 : Parallel channel = 8, serial channel = 0

0010 : Parallel channel = 4, serial channel = 2

0100 : Parallel channel = 4, serial channel = 4

0110 : Parallel channel = 0, serial channel = 2

1000 : Parallel channel = 0, serial channel = 4

1010 : Parallel channel = 0, serial channel = 8

1100 : Parallel channel = 0, serial channel = 6

Bit 8: Dual Frame

0 : Dual Frame

1 : Modular Power

Bit 9-11: Cache size

000 : Non cache

001 : 256 MB

010 : 512 MB

011 : 768 MB

100 : 1024 MB

101 : 1280 MB

110 : 1536 MB

111 : Over 1537 MB

Bit 12-13: Cluster hardware level

Bit 14-15: Cache/NVS hardware level

Format 0, Message 9 (Intervention required by the key lock)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'0')				Message (x'9')			
8	READY	ENABLE	SSB PEND	Not used ('0000')				
9	Not used (x'00')							
10	M.M.RSV	PIN VOL	Not used ('000000')					
11	HOST TYPE	DKC TYPE	Not used ('00')		DKU TYPE			
12	Module ID							
13	Routine ID							
14	Command code							
15	Not used (x'00')							
16	Not used (x'00')							
17	Not used (x'00')							
18	PCB number				Not used (x'0000')			
19	Not used (x'00')							
20	SSID for Self Storage system							
21								
22	Symptom Code (x'9F09')							
23								

Format 0, Message A (overrun)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'0')				Message (x'A')			
8	Command code							
9	Cylinder address							
10								
11	Head address							
12	Record No.							
13	SSID of mate Storage system (x'0000' for EDCC)							
14								
15	Manufacturer code ('000000')						Factory code ('00')	
16	Module ID							
17	Routine ID							
18	PCB number				BBF OVER (XR4B)	PND OVER (XR4B)	STOP (XR49)	OVER (XR4A)
19	Not used							
20	SSID for Self Storage system							
21								
22	Symptom Code (x'0F0A')							
23								

Format 1, Message 0 (Intervention required)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'1')				Message (x'0')			
8	READY	ENABLE	SSB PEND	Not used ('0000')				
9	Not used (x'00')							
10	M.M.RSV	PIN VOL	Not used ('000000')					
11	HOST TYPE	DKC TYPE	Not used ('00')		DKU TYPE			
12	Module ID							
13	Routine ID							
14	Command code							
15	Not used (x'00')							
16	Not used (x'00')							
17	Not used (x'00')							
18	PCB number				Not used (x'0000')			
19	Not used (x'00')							
20	SSID for Self Storage system							
21								
22	Symptom Code (x'9F10')							
23								

Format 1, Message X (Drive report error)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'1')				Message (x'2/4')			
8	Additional Sense Code + Additional Sense Code Qualifier (See EC = E SSB for detail)							
9								
10	SCSI Command code (See EC = E SSB for detail)							
11	Threshold type (See EC = E SSB for detail)							
12	Module ID							
13	Routine ID							
14	Not used (X'0')				DKB#			
15	CDEV#				RDEV#			
16	Type Code ('000')			0	Sense Key (See EC = E SSB for detail)			
17	Not used (x'00')							
18	Not used (x'00')							
19	Not used (x'00')							
20	SSID for Self Storage system							
21								
22	Symptom code (x'9F1X' X: Message)							
23								

Format 3, Message F (reset allegiance)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'3')				Message (x'F')			
8	Not used (x'00')							
9	Activated LPN							
10	DEVICE BUSY	ECI	COMMAND CHAINING	PATH RESERVE	STACK STATUS	WAIT SENSE	LONG BUSY	PROCESSOR CONNECT
11	SINGLE PATH MODE	GUARANT PATH MODE	MCB CHAINING	0	BLOCK SWITCH	0	0	0
12	Command code							
13	SSID of mate Storage system (x'0000' for EDCC)							
14								
15	Manufacturer code ('000000')						Factory code ('00')	
16	Module ID							
17	Routine ID							
18	PCB number				Not used			
19	Not used							
20	SSID for Self Storage system							
21								
22	Symptom Code (x'3F3F')							
23								

Format 4, Message X (Data check)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'4')				Message (x'X')			
8	Cylinder address							
9								
10	Head address							
11								
12	Record number							
13	Sector number							
14	Controller ID							
15	Not used (x'00')							
16	Not used (x'00')							
17	Not used (x'00')							
18	PCB number				Not used (x'0000')			
19	Not used (x'00')							
20	Command code							
21	SSID of Self Storage system (low order)							
22	Symptom Code (x'4XY' *1)							
23								

*1: Symptom code

X: x'0' : Data check in HA field

x'1' : Data check in C field

x'2' : Data check in K field

x'3' : Data check in D field

x'5' : PA error

YY: x'80' : Correctable (Recovered)

x'C0' : Uncorrectable

Format 6, Message X (Statistics)

Bit Byte	0	1	2	3	4	5	6	7		
7	Format (x'6')				Message (x'X') (*1)					
8	Number of read or searched bytes									
9										
10										
11										
12	Seek count									
13										
14	Not used (x'00')									
15	Manufacture code ('000000')						Factory code ('00')			
16	Not used (x'00')									
17	DKC serial number									
18										
19										
20	SSID of Self Storage system									
21										
22	Symptom Code (x'6FX' X: 0: Statistics / RRBL command, 2: Channel data overrun Y: CHL number (MCP connection) / Port number in cluster)									
23										

*1: X: Channel number for metal channel connection (MCP), or port number in cluster for optical channel connection

Format 7, Message 4 (FPC report error)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'7')				Message (x'4')			
8	Not used							
9	Not used							
10	Not used							
11	Not used							
12	Module ID							
13	Routine ID							
14	Not used							
15	Drive serial number (x'0D05') + (DKU sequence number) This information is not fixed until DKC reports SSB to HOST.							
16								
17								
18								
19								
20	SSID of Self Storage system							
21								
22	Symptom Code (x'DF74')							
23								

Format 8, Message 1 (MP function failure (CHK3))

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'1')			
8	Subcode ([x'00'] or [x'11' to x'17'] or [x'31' to x'38'] or [x'41'] or [x'42'] or [x'46' to x'48'])							
9	For the details of Byte 9 to 17, see Byte 29 to 31 in (SSBLOG05-370)							
10								
11								
12								
13								
14								
15								
16								
17								
18	Module ID							
19	Routine ID							
20	PKID				Message Code (x'0')			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF81')							
23								

Format 8, Message 1 (CHK3 Reset)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'1')			
8	Related failure internal SSB log No. (Error procedure aid)							
9								
10	Not used (x'00')							
11	Not used (x'00')							
12	OLD PSW (interruption source address)							
13								
14								
15								
16	Not used (x'00')							
17	Not used (x'00')							
18	Detail log number for RESET							
19								
20	PCB number				Message code (x'3') (*1)			
21	SSID (lower order) of Self Storage system							
22	Symptom Code							
23								

*1: Indicates the 'CHK3 Reset'.

Format 8, Message 9 (CHB CHK2 : Abnormal Cache Slot Status 1)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'9')			
8	SubCode (x'01' : ESCON I/F CHB - Abnormal Cache Slot Status1 (*1))							
9	Slot Status							
10								
11								
12								
13	WRITE in Progress	Make GAP	Execute ERASE	Update HA/ R0	Update BM	Not Used		
14	Sub Block Number for Ready Response to Transfer							
15	Start Sub Block Number for Incomplete Recode							
16	End Sub Block Number for Incomplete Recode							
17	Reserved							
18	Module ID (*2)							
19	Routine ID							
20	PCB number				Message code (Invalid)			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF89' : LDEV type = 6587 / x'EF89' : LDEV type = 6586)							
23								

*1: Cache ECC/LRC error has been detected in read side.

*2: Module ID = '55' :

After synchronous destage, cache slot with dirty attribute has been detected.

Module ID ≠ '55' :

In internal search or orientation process, incomplete sub block has been detected.

Format 8, Message 9 (CHB CHK2 : Abnormal Cache Slot Status 2)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'9')			
8	SubCode (x'02' : ESCON I/F CHB - Abnormal Cache Slot Status 2 (*1))							
9	Slot Status							
10								
11								
12								
13	WRITE in Progress	Make GAP	Execute ERASE	Update HA/ R0	Update BM	Not Used		
14	Sub Block Number for Ready Response to Transfer							
15	Start Sub Block Number for Incomplete Recode							
16	End Sub Block Number for Incomplete Recode							
17	Reserved							
18	Module ID							
19	Routine ID							
20	PCB number				Message code (Invalid)			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF89' LDEV type = 6587 / x'EF89' : LDEV type = 6586)							
23								

*1: Cache ECC/LRC error has been detected in read side.

Format 8, Message 9 (CHB CHK2) (1/8)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'9')			
8	SubCode (x'00' or x'01' or x'02' or x'03' : Fibre I/F CHB CHK2 – DMA Error) SubCode (x'10' or x'11' or x'12' or x'13' : Fibre I/F CHB CHK2 – DMA Timeout)							
9	LR: INT_STATUS (b31 – 24)							
	FOP1 ERR	FOP0 ERR	FOP1 STOP	FOP0 STOP	MBOX1 INT	MBOX0 INT	FDMA1 ERR	FDMA0 ERR
10	LR: INT_STATUS (b23 – 16)							
	HA1 ERR	HA0 ERR	PA1 ERR	PA0 ERR	BRG1 ERR	BRG0 ERR	LA1	LA0
11	LR: INT_STATUS (b15 – 08)							
	FIVE1 MCK	FIVE0 MCK	PPR1 MSG	PPR0 MSG	PA ERR	DA ERR	DRR ERR	PCDX ERR
12	LR: INT_STATUS (b07 – 00)							
	XREG ERR	XD/INT ERR	DMA ERR	SMBUS ERR	MF ERR	PPR ERR	CHK2	WARNING
13	CHK2_INT0 (b31 – 24)							
	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)
14	CHK2_INT0 (b23 – 16)							
	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)
15	CHK2_INT0 (b15 – 08)							
	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	DRR1 CHK2	DRR0 CHK2
16	CHK2_INT0 (b07 – 00)							
	(RSV)	(RSV)	(RSV)	DMAA CHK2	DMA3 CHK2	DMA2 CHK2	DMA1 CHK2	DMA0 CHK2
17	LR_STATUS (b28 – 21)							
	MODULE ID (0)	LSI NUM (6)	LSI NUM (5)	LSI NUM (4)	LSI NUM (3)	LSI NUM (2)	LSI NUM (1)	LR MODE
18	Module ID							
19	Routine ID							
20	PKID				Message Code (x'0')			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF89')							
23								

Format 8, Message 9 (CHB CHK2) (2/8)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'9')			
8	SubCode (x'04' : Fibre I/F CHB CHK2 – MDMA Error) SubCode (x'14' : Fibre I/F CHB CHK2 – MDMA Timeout)							
9	LR: INT_STATUS (b31 – 24)							
	FOP1 ERR	FOP0 ERR	FOP1 STOP	FOP0 STOP	MBOX1 INT	MBOX0 INT	FDMA1 ERR	FDMA0 ERR
10	LR: INT_STATUS (b23 – 16)							
	HA1 ERR	HA0 ERR	PA1 ERR	PA0 ERR	BRG1 ERR	BRG0 ERR	LA1	LA0
11	LR: INT_STATUS (b15 – 08)							
	FIVE1 MCK	FIVE0 MCK	PPR1 MSG	PPR0 MSG	PA ERR	DA ERR	DRR ERR	PCDX ERR
12	LR: INT_STATUS (b07 – 00)							
	XREG ERR	XD/INT ERR	DMA ERR	SMBUS ERR	MF ERR	PPR ERR	CHK2	WARNING
13	CHK2_INT0 (b31 – 24)							
	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)
14	CHK2_INT0 (b23 – 16)							
	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)
15	CHK2_INT0 (b15 – 08)							
	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	DRR1 CHK2	DRR0 CHK2
16	CHK2_INT0 (b07 – 00)							
	(RSV)	(RSV)	(RSV)	DMAA CHK2	DMA3 CHK2	DMA2 CHK2	DMA1 CHK2	DMA0 CHK2
17	LR_STATUS (b28 – 21)							
	MODULE ID (0)	LSI NUM (6)	LSI NUM (5)	LSI NUM (4)	LSI NUM (3)	LSI NUM (2)	LSI NUM (1)	LR MODE
18	Module ID							
19	Routine ID							
20	PKID				Message Code (x'0')			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF89')							
23								

Format 8, Message 9 (CHB CHK2) (3/8)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'9')			
8	SubCode (x'08' or x'0c' : Fibre I/F CHB CHK2 – DMA Path Error) SubCode (x'18' or x'1c' : Fibre I/F CHB CHK2 – DMA Timeout)							
9	LR: INT_STATUS (b31 – 24)							
	FOP1 ERR	FOP0 ERR	FOP1 STOP	FOP0 STOP	MBOX1 INT	MBOX0 INT	FDMA1 ERR	FDMA0 ERR
10	LR: INT_STATUS (b23 – 16)							
	HA1 ERR	HA0 ERR	PA1 ERR	PA0 ERR	BRG1 ERR	BRG0 ERR	LA1	LA0
11	LR: INT_STATUS (b15 – 08)							
	FIVE1 MCK	FIVE0 MCK	PPR1 MSG	PPR0 MSG	PA ERR	DA ERR	DRR ERR	PCDX ERR
12	LR: INT_STATUS (b07 – 00)							
	XREG ERR	XD/INT ERR	DMA ERR	SMBUS ERR	MF ERR	PPR ERR	CHK2	WARNING
13	CHK2_INT0 (b15 – 08)							
	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	DRR1 CHK2	DRR0 CHK2
14	CHK2_INT0 (b07 – 00)							
	(RSV)	(RSV)	(RSV)	DMAA CHK2	DMA3 CHK2	DMA2 CHK2	DMA1 CHK2	DMA0 CHK2
15	CHK4_INT1 (b23 – 16)							
	(RSV)	HAT1 CHK4	HAR1 CHK4	HA1 LINKDOWN	(RSV)	HAT0 CHK4	HAR0 CHK4	HA0 LINKDOWN
16	DMA Number							
	DMA0 = 0x00 DMA1 = 0x01 DMA2 = 0x02 DMA3 = 0x03							
17	LR_STATUS (b28 – 21)							
	MODULE ID (0)	LSI NUM (6)	LSI NUM (5)	LSI NUM (4)	LSI NUM (3)	LSI NUM (2)	LSI NUM (1)	LR MODE
18	Module ID							
19	Routine ID							
20	PKID				Message Code (x'0')			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF89')							
23								

Format 8, Message 9 (CHB CHK2) (4/8)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'9')			
8	SubCode (x'09' or x'0d' : Fibre I/F CHB CHK2 – MDMA Path Error) SubCode (x'19' or x'1d' : Fibre I/F CHB CHK2 – MDMA Timeout)							
9	LR: INT_STATUS (b31 – 24)							
	FOP1 ERR	FOP0 ERR	FOP1 STOP	FOP0 STOP	MBOX1 INT	MBOX0 INT	FDMA1 ERR	FDMA0 ERR
10	LR: INT_STATUS (b23 – 16)							
	HA1 ERR	HA0 ERR	PA1 ERR	PA0 ERR	BRG1 ERR	BRG0 ERR	LA1	LA0
11	LR: INT_STATUS (b15 – 08)							
	FIVE1 MCK	FIVE0 MCK	PPR1 MSG	PPR0 MSG	PA ERR	DA ERR	DRR ERR	PCDX ERR
12	LR: INT_STATUS (b07 – 00)							
	XREG ERR	XD/INT ERR	DMA ERR	SMBUS ERR	MF ERR	PPR ERR	CHK2	WARNING
13	CHK2_INT0 (b15 – 08)							
	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	DRR1 CHK2	DRR0 CHK2
14	CHK2_INT0 (b07 – 00)							
	(RSV)	(RSV)	(RSV)	DMAA CHK2	DMA3 CHK2	DMA2 CHK2	DMA1 CHK2	DMA0 CHK2
15	CHK4_INT1 (b23 – 16)							
	(RSV)	HAT1 CHK4	HAR1 CHK4	HA1 LINKDOWN	(RSV)	HAT0 CHK4	HAR0 CHK4	HA0 LINKDOWN
16	DMA Number							
	MDMA = 0x04							
17	LR_STATUS (b28 – 21)							
	MODULE ID (0)	LSI NUM (6)	LSI NUM (5)	LSI NUM (4)	LSI NUM (3)	LSI NUM (2)	LSI NUM (1)	LR MODE
18	Module ID							
19	Routine ID							
20	PKID				Message Code (x'0')			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF89')							
23								

Format 8, Message 9 (CHB CHK2) (5/8)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'9')			
8	SubCode (x'80' or x'81' : FICON I/F CHB CHK2 – DMA Error) SubCode (x'90' or x'91' : FICON I/F CHB CHK2 – DMA Timeout)							
9	LR: INT_STATUS (b31 – 24)							
	FOP1 ERR	FOP0 ERR	FOP1 STOP	FOP0 STOP	MBOX1 INT	MBOX0 INT	FDMA1 ERR	FDMA0 ERR
10	LR: INT_STATUS (b23 – 16)							
	HA1 ERR	HA0 ERR	PA1 ERR	PA0 ERR	BRG1 ERR	BRG0 ERR	LA1	LA0
11	LR: INT_STATUS (b15 – 08)							
	FIVE1 MCK	FIVE0 MCK	PPR1 MSG	PPR0 MSG	PA ERR	DA ERR	DRR ERR	PCDX ERR
12	LR: INT_STATUS (b07 – 00)							
	XREG ERR	XD/INT ERR	DMA ERR	SMBUS ERR	MF ERR	PPR ERR	CHK2	WARNING
13	CHK2_INT0 (b31 – 24)							
	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)
14	CHK2_INT0 (b23 – 16)							
	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)
15	CHK2_INT0 (b15 – 08)							
	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	DRR1 CHK2	DRR0 CHK2
16	CHK2_INT0 (b07 – 00)							
	(RSV)	(RSV)	(RSV)	DMAA CHK2	DMA3 CHK2	DMA2 CHK2	DMA1 CHK2	DMA0 CHK2
17	LR_STATUS (b28 – 21)							
	MODULE ID (0)	LSI NUM (6)	LSI NUM (5)	LSI NUM (4)	LSI NUM (3)	LSI NUM (2)	LSI NUM (1)	LR MODE
18	Module ID							
19	Routine ID							
20	PKID				Message Code (x'0')			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF89')							
23								

Format 8, Message 9 (CHB CHK2) (6/8)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'9')			
8	SubCode (x'85' : FICON I/F CHB CHK2 – MFDMA Error) SubCode (x'95' : FICON I/F CHB CHK2 – MFDMA Timeout)							
9	LR: INT_STATUS (b31 – 24)							
	FOP1 ERR	FOP0 ERR	FOP1 STOP	FOP0 STOP	MBOX1 INT	MBOX0 INT	FDMA1 ERR	FDMA0 ERR
10	LR: INT_STATUS (b23 – 16)							
	HA1 ERR	HA0 ERR	PA1 ERR	PA0 ERR	BRG1 ERR	BRG0 ERR	LA1	LA0
11	LR: INT_STATUS (b15 – 08)							
	FIVE1 MCK	FIVE0 MCK	PPR1 MSG	PPR0 MSG	PA ERR	DA ERR	DRR ERR	PCDX ERR
12	LR: INT_STATUS (b07 – 00)							
	XREG ERR	XD/INT ERR	DMA ERR	SMBUS ERR	MF ERR	PPR ERR	CHK2	WARNING
13	CHK2_INT1 (b31 – 24)							
	MFCCW CHK2 (15)	MFCCW CHK2 (14)	MFCCW CHK2 (13)	MFCCW CHK2 (12)	MFCCW CHK2 (11)	MFCCW CHK2 (10)	MFCCW CHK2 (9)	MFCCW CHK2 (8)
14	CHK2_INT1 (b23 – 16)							
	MFCCW CHK2 (7)	MFCCW CHK2 (6)	MFCCW CHK2 (5)	MFCCW CHK2 (4)	MFCCW CHK2 (3)	MFCCW CHK2 (2)	MFCCW CHK2 (1)	MFCCW CHK2 (0)
15	CHK2_INT1 (b15 – 08)							
	MFFLD CHK2 (15)	MFFLD CHK2 (14)	MFFLD CHK2 (13)	MFFLD CHK2 (12)	MFFLD CHK2 (11)	MFFLD CHK2 (10)	MFFLD CHK2 (9)	MFFLD CHK2 (8)
16	CHK2_INT1 (b07 – 00)							
	MFFLD CHK2 (7)	MFFLD CHK2 (6)	MFFLD CHK2 (5)	MFFLD CHK2 (4)	MFFLD CHK2 (3)	MFFLD CHK2 (2)	MFFLD CHK2 (1)	MFFLD CHK2 (0)
17	LR_STATUS (b28 – 21)							
	MODULE ID (0)	LSI NUM (6)	LSI NUM (5)	LSI NUM (4)	LSI NUM (3)	LSI NUM (2)	LSI NUM (1)	LR MODE
18	Module ID							
19	Routine ID							
20	PKID				Message Code (x'0')			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF89')							
23								

Format 8, Message 9 (CHB CHK2) (7/8)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'9')			
8	SubCode (x'88' or x'8c' : FICON I/F CHB CHK2 – DMA Path Error) SubCode (x'98' or x'9c' : FICON I/F CHB CHK2 – DMA Timeout)							
9	LR: INT_STATUS (b31 – 24)							
	FOP1 ERR	FOP0 ERR	FOP1 STOP	FOP0 STOP	MBOX1 INT	MBOX0 INT	FDMA1 ERR	FDMA0 ERR
10	LR: INT_STATUS (b23 – 16)							
	HA1 ERR	HA0 ERR	PA1 ERR	PA0 ERR	BRG1 ERR	BRG0 ERR	LA1	LA0
11	LR: INT_STATUS (b15 – 08)							
	FIVE1 MCK	FIVE0 MCK	PPR1 MSG	PPR0 MSG	PA ERR	DA ERR	DRR ERR	PCDX ERR
12	LR: INT_STATUS (b07 – 00)							
	XREG ERR	XD/INT ERR	DMA ERR	SMBUS ERR	MF ERR	PPR ERR	CHK2	WARNING
13	CHK2_INT0 (b15 – 08)							
	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	DRR1 CHK2	DRR0 CHK2
14	CHK2_INT0 (b07 – 00)							
	(RSV)	(RSV)	(RSV)	DMAA CHK2	DMA3 CHK2	DMA2 CHK2	DMA1 CHK2	DMA0 CHK2
15	CHK4_INT1 (b23 – 16)							
	(RSV)	HAT1 CHK4	HAR1 CHK4	HA1 LINKDOWN	(RSV)	HAT0 CHK4	HAR0 CHK4	HA0 LINKDOWN
16	DMA Number							
	DMA0 = 0x00 DMA1 = 0x01							
17	LR_STATUS (b28 – 21)							
	MODULE ID (0)	LSI NUM (6)	LSI NUM (5)	LSI NUM (4)	LSI NUM (3)	LSI NUM (2)	LSI NUM (1)	LR MODE
18	Module ID							
19	Routine ID							
20	PKID				Message Code (x'0')			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF89')							
23								

Format 8, Message 9 (CHB CHK2) (8/8)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'9')			
8	SubCode (x'8a' or x'8e' : FICON I/F CHB CHK2 – MFDMA Path Error) SubCode (x'9a' or x'9e' : FICON I/F CHB CHK2 – MFDMA Timeout)							
9	LR: INT_STATUS (b31 – 24)							
	FOP1 ERR	FOP0 ERR	FOP1 STOP	FOP0 STOP	MBOX1 INT	MBOX0 INT	FDMA1 ERR	FDMA0 ERR
10	LR: INT_STATUS (b23 – 16)							
	HA1 ERR	HA0 ERR	PA1 ERR	PA0 ERR	BRG1 ERR	BRG0 ERR	LA1	LA0
11	LR: INT_STATUS (b15 – 08)							
	FIVE1 MCK	FIVE0 MCK	PPR1 MSG	PPR0 MSG	PA ERR	DA ERR	DRR ERR	PCDX ERR
12	LR: INT_STATUS (b07 – 00)							
	XREG ERR	XD/INT ERR	DMA ERR	SMBUS ERR	MF ERR	PPR ERR	CHK2	WARNING
13	CHK2_INT1 (b15 – 08)							
	MFFLD CHK2 (15)	MFFLD CHK2 (14)	MFFLD CHK2 (13)	MFFLD CHK2 (12)	MFFLD CHK2 (11)	MFFLD CHK2 (10)	MFFLD CHK2 (9)	MFFLD CHK2 (8)
14	CHK2_INT1 (b07 – 00)							
	MFFLD CHK2 (7)	MFFLD CHK2 (6)	MFFLD CHK2 (5)	MFFLD CHK2 (4)	MFFLD CHK2 (3)	MFFLD CHK2 (2)	MFFLD CHK2 (1)	MFFLD CHK2 (0)
15	CHK4_INT1 (b23 – 16)							
	(RSV)	HAT1 CHK4	HAR1 CHK4	HA1 LINKDOWN	(RSV)	HAT0 CHK4	HAR0 CHK4	HA0 LINKDOWN
16	DMA Number							
	MFDMA0 = 0x10		MFDMA4 = 0x14		MFDMA8 = 0x18		MFDMA12 = 0x1c	
	MFDMA1 = 0x11		MFDMA5 = 0x15		MFDMA9 = 0x19		MFDMA13 = 0x1d	
	MFDMA2 = 0x12		MFDMA6 = 0x16		MFDMA10 = 0x1a		MFDMA14 = 0x1e	
	MFDMA3 = 0x13		MFDMA7 = 0x17		MFDMA11 = 0x1b		MFDMA15 = 0x1f	
17	LR_STATUS (b28 – 21)							
	MODULE ID (0)	LSI NUM (6)	LSI NUM (5)	LSI NUM (4)	LSI NUM (3)	LSI NUM (2)	LSI NUM (1)	LR MODE
18	Module ID							
19	Routine ID							
20	PKID				Message Code (x'0')			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF89')							
23								

Format 8, Message 9 (Main-PK CHK2) (1/2)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'9')			
8	PK_TYP0	PK_TYP1	PK_TYP2	MICRO_ TOV	SubCode (x'X0' : DMA0 Error) SubCode (x'X1' : DMA1 Error) SubCode (x'X2' : DMA2 Error) SubCode (x'X3' : DMA3 Error) SubCode (x'X4' : MFDMA0) SubCode (x'X5' : MFDMA1)			
9	For the details of Byte 9 to 17, see Byte 29 to 31 in (SSBLOG05-1070)							
10								
11								
12								
13								
14								
15								
16								
17								
18	Module ID							
19	Routine ID							
20	PKID				Message Code (x'0')			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF89')							
23								

Format 8, Message 9 (Main-PK CHK2) (2/2)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'9')			
8	PK_TYP0	PK_TYP1	PK_TYP2	MICRO_ TOV	SubCode (x'X8' : HSN Path Error at Async_DMA) SubCode (x'Xc' : HSN Path Error at MFDMA)			
9	For the details of Byte 9 to 17, see Byte 29 to 31 in (SSBLOG05-1050)							
10								
11								
12								
13								
14								
15								
16								
17								
18	Module ID							
19	Routine ID							
20	PKID				Message Code (x'0')			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF89')							
23								

Format 8, Message 9 (Data transfer failure CHK2)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'9')			
8	Subcode ([x'00'] or [x'11' to x'14'] or [x'20'] or [x'22' to x'26'] or [x'31' to x'38'])							
9	For the details of Byte 9 to 17, see Byte 29 to 31 in (SSBLOG05-1050)							
10								
11								
12								
13								
14								
15								
16								
17								
18	Module ID							
19	Routine ID							
20	PKID				Message Code (x'0')			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF81')							
23								

Blank Sheet

Blank Sheet

Blank Sheet

Blank Sheet

Blank Sheet

Blank Sheet

Blank Sheet

Format 8, Message D (Power Failure) (1/3)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'D')			
8	SubCode (x'40' : DKC/HDU Power Failure)							
9	Reserved							
	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
10	Power Failure Hardware Information							
	ACOFFDTCT value							
11	Micro Information							
	Power Failure Status Management Information							
12	Reserve							
	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
13	Reserve							
	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
14	Reserve							
	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
15	Reserve							
	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
16	Reserve							
	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
17	Reserve							
	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
18	Not used							
19								
20	Processor Number (x'00' ~ x'0F')							
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF8D')							
23								

Format 8, Message D (Power Failure) (2/3)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'D')			
8	SubCode (x'80' : DKU/DB Power Failure)							
9	DKU#							
10	Reserve							
	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
11	Reserve							
	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
12	Reserve							
	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
13	Reserve							
	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
14	Reserve							
	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
15	Reserve							
	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
16	Reserve							
	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
17	Reserve							
	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
18	Not used							
19								
20	PKID				Message Code			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF8D')							
23								

Format 8, Message D (Power Failure) (3/3)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'D')			
8	SubCode (x'90' : DKU/DB Power Failure Recover)							
9	DKU#							
10	Reserve							
	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
11	Reserve							
	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
12	Reserve							
	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
13	Reserve							
	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
14	Reserve							
	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
15	Reserve							
	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
16	Reserve							
	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
17	Reserve							
	Not used	Not used	Not used	Not used	Not used	Not used	Not used	Not used
18	Not used							
19								
20	PKID				Message Code			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF8D')							
23								

Format 8, Message E (processor failure : CHK1) (1/10)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'E')			
8	Subcode (x'20')							
9	For the details of Byte 9 to 17, see Byte 29 to 31 in (SSBLOG05-2920)							
10								
11								
12								
13								
14								
15								
16								
17								
18	Module ID							
19	Routine ID							
20	PKID				Message Code (x'0')			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF8E')							
23								

Format 8, Message E (processor failure : CHK1) (2/10)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'E')			
8	Subcode (x'21')							
9	For the details of Byte 9 to 17, see Byte 29 to 31 in (SSBLOG05-2920)							
10								
11								
12								
13								
14								
15								
16								
17								
18	Module ID							
19	Routine ID							
20	PKID				Message Code (x'0')			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF8E')							
23								

Format 8, Message E (processor failure : CHK1) (3/10)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'E')			
8	Subcode (x'22' or x'23' or x'24' or x'25')							
9	For the details of Byte 9 to 17, see Byte 29 to 31 in (SSBLOG05-2920)							
10								
11								
12								
13								
14								
15								
16								
17								
18	Module ID							
19	Routine ID							
20	PKID				Message Code (x'0')			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF8E')							
23								

Format 8, Message E (processor failure : CHK1) (4/10)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'E')			
8	Subcode (x'30')							
9	For the details of Byte 9 to 17, see Byte 29 to 31 in (SSBLOG05-2920)							
10								
11								
12								
13								
14								
15								
16								
17								
18	Module ID							
19	Routine ID							
20	PKID				Message Code (x'0')			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF8E')							
23								

Format 8, Message E (processor failure : CHK1) (5/10)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'E')			
8	Subcode (x'40')							
9	For the details of Byte 9 to 17, see Byte 29 to 31 in (SSBLOG05-2920)							
10								
11								
12								
13								
14								
15								
16								
17								
18	Module ID							
19	Routine ID							
20	PKID				Message Code (x'0')			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF8E')							
23								

Format 8, Message E (processor failure : CHK1) (6/10)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'E')			
8	Subcode (x'40' or x'42')							
9	For the details of Byte 9 to 17, see Byte 29 to 31 in (SSBLOG05-2920)							
10								
11								
12								
13								
14								
15								
16								
17								
18	Module ID							
19	Routine ID							
20	PKID				Message Code (x'0')			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF8E')							
23								

Format 8, Message E (processor failure : CHK1) (7/10)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'E')			
8	Subcode (x'45')							
9	For the details of Byte 9 to 17, see Byte 29 to 31 in (SSBLOG05-2920)							
10								
11								
12								
13								
14								
15								
16								
17								
18	Module ID							
19	Routine ID							
20	PKID				Message Code (x'0')			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF8E')							
23								

Format 8, Message E (processor failure : CHK1) (8/10)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'E')			
8	Subcode (x'47')							
9	For the details of Byte 9 to 17, see Byte 29 to 31 in (SSBLOG05-2920)							
10								
11								
12								
13								
14								
15								
16								
17								
18	Module ID							
19	Routine ID							
20	PKID				Message Code (x'0')			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF8E')							
23								

Format 8, Message E (processor failure : CHK1) (9/10)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'E')			
8	Subcode (x'50' or x'51' or x'52')							
9	For the details of Byte 9 to 17, see Byte 29 to 31 in (SSBLOG05-2920)							
10								
11								
12								
13								
14								
15								
16								
17								
18	Module ID							
19	Routine ID							
20	PKID				Message Code (x'0')			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF8E')							
23								

Format 8, Message E (processor failure : CHK1) (10/10)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'E')			
8	Subcode (x'80' or x'81')							
9	For the details of Byte 9 to 17, see Byte 29 to 31 in (SSBLOG05-2920)							
10								
11								
12								
13								
14								
15								
16								
17								
18	Module ID							
19	Routine ID							
20	PKID				Message Code (x'0')			
21	SSID for Self Storage system (Low)							
22	Symptom Code (x'FF8E')							
23								

Format 8, Message E (Selective Reset)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'E')			
8	Not used (x'00')							
9	DCN status							
	Force device busy	Channel connect request	Command chain execute	Path reserve	Stack status	Sense pending	Long Busy (Command process)	Processor connect
10	DCN status							
	Single path mode	Guarant path mode	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	Guarant path MP
11	DCN flag							
	RST NTF/ RST ALG SSB PNG	Pin Data pending	(RSV)	(RSV)	ODE pending	RSQ pending	SCI/SCE pending	PCH pending
12	LCT initiation cause							
	0: Ready 1: Not ready	0: Disable 1: Enable	0: No SNS 1: 64SNS pending	0: Mount 1: No mount	0: No RST ALG LPN 1: Exist	0: No SYS RST LPN 1: Exist	0: No Stack 1: Exist	0: No Wait SNS 1: Exist
13	LCT initiation cause							
	0: No Wait- RI 1: Exist	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	(RSV)	0: Others 1: DEV BSY JOB
14	Command interface flag							
	Pending exist	SCE (RSP) pending	(RSV)	(RSV)	ODE pending	RSG pending	SCI pending	PCH Pending
15	Command code							
16	Internal SSB log No.							
17								
18	Detail log number for RESET							
19								
20	PCB number				Message code (x'1') (*1)			
21	SSID (lower order) of Self Storage system							
22	Symptom Code (x'FF8E': LDEV type = DKU87I / x'EF8E': LDEV type = DKU86I)							
23								

*1: Indicates the 'Selective Reset'.

Format 8, Message E (Wait SENSE Timeout)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'E')			
8	Not used (x'00')							
9	LDEV#							
10	Basic sense byte (0)							
(*1)	Basic sense byte (0)							
11	Basic sense byte (1)							
(*1)	Basic sense byte (1)							
12	Basic sense byte (2)							
(*1)	Exception code (higher order)							
13	Format/Message							
(*1)	Exception code (lower order)							
14	System error code (higher order)							
(*1)	System error code (higher order)							
15	System error code (lower order)							
(*1)	System error code (lower order)							
16	Internal SSB number for RESET							
17								
18	Detail log number for RESET							
19								
20	PCB number				Message code (x'3') (*2)			
21	SSID (lower order) of Self Storage system							
22	Symptom Code (x'FF8E': LDEV type = DKU87I / x'EF8E': LDEV type = DKU86I)							
23								

*1: Timeout SSB information

Upper case: 24-byte format SSB

Lower case: 32-byte format SSB

*2: Indicates the 'Wait SENSE Timeout'.

Format 8, Message E (CHK1B Reset)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'E')			
8	Related failure internal SSB log No. (Error procedure aid)							
9								
10	Not used (x'00')							
11	Not used (x'00')							
12	OLD PSW (interruption source address)							
13								
14								
15								
16	Internal SSB log No. (reset)							
17								
18	Detail log number for RESET							
19								
20	PCB number				Message code (x'5') (*1)			
21	SSID (lower order) of Self Storage system							
22	Symptom Code (x'FF8E': LDEV type = DKU87I / x'EF8E': LDEV type = DKU86I)							
23								

*1: Indicates the 'CHK1B Reset'.

Format 8, Message E (DKC Internal Reset)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'E')			
8	Not used (x'00')							
9	Not used (x'00')							
10	Not used (x'00')							
11	Not used (x'00')							
12	OLD PSW (interruption source address)							
13								
14								
15								
16	Internal SSB log No. (reset)							
17								
18	Detail log number for RESET							
19								
20	PCB number				Message code (x'6') (*1)			
21	SSID (lower order) of Self Storage system							
22	Symptom Code (x'FF8E': LDEV type = DKU87I / x'EF8E': LDEV type = DKU86I)							
23								

*1: Indicates the 'DKC Internal Reset'.

Format 8, Message E (Force Reset)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'E')			
8	Not used (x'00')							
9	Not used (x'00')							
10	Not used (x'00')							
11	Not used (x'00')							
12	OLD PSW (interruption source address)							
13								
14								
15								
16	Internal SSB log No. (reset)							
17								
18	Detail log number for RESET							
19								
20	PCB number				Message code (x'8') (*1)			
21	SSID (lower order) of Self Storage system							
22	Symptom Code (x'FF8E': LDEV type = DKU87I / x'EF8E': LDEV type = DKU86I)							
23								

*1: Indicates the 'Force Reset'.

Format 8, Message E (Logical inconsistency reset)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'E')			
8	Not used (x'00')							
9	Not used (x'00')							
10	Not used (x'00')							
11	Not used (x'00')							
12	OLD PSW (interruption source address)							
13								
14								
15								
16	Internal SSB log No. (reset)							
17								
18	Detail log number for RESET							
19								
20	PCB number				Message code (x'9') (*1)			
21	SSID (lower order) of Self Storage system							
22	Symptom Code (x'FF8E': LDEV type = DKU87I / x'EF8E': LDEV type = DKU86I)							
23								

*1: Indicates the 'Logical inconsistency reset'.

Format 8, Message F (Micro-program detected error : Logical inconsistency)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'8')				Message (x'F')			
8	Module ID							
9	Routine ID							
10	Error information							
11								
12								
13								
14								
15								
16								
17								
18								
19								
20	PCB number				Message code (Invalid)			
21	SSID (lower order) of Self Storage system							
22	Symptom Code (high order) (x'FF': LDEV type = DKU87I / x'EF': LDEV type = DKU86I)							
23								

Module ID (SSB8) List (1/4)

No.	Module ID	Function name	Remarks
1	00	Initialization	
2	01	Power disconnection	
3	02	CUDG	
4	10	Job management	
5	11	Synchronous management	
6	12	Communication control between processors	
7	13	Cache control	
8	14	Resource management	
9	15	Configuration control	
10	16	Reset	
11	17	SVP management	
12	18	Configuration control (RAID provided)	
13	19	Configuration control (drive recovery provided)	
14	30	Standard function	
15	31	SVP-provided function	
16	32	Error procedure aid	
17	40	CHB monitor	
18	41	CHB initiator	
19	42	CHB terminator	
20	43	CHB kernel (common function)	
21	48	Remote copy command	
22	49	Remote copy command	
23	50	Command chain start	
24	51	Command chain termination	
25	52	Command execution status analysis	
26	53	Command execution CHL I/F control	
27	54	Channel server common process 1	
28	55	Channel server common process 2	
29	56	Channel server common process 3	
30	57	Channel server common process 4	
31	58	Channel server data transfer 1	
32	59	Channel server data transfer 2	

Module ID (SSB8) List (2/4)

No.	Module ID	Function name	Remarks
33	5A	Read/write common process	
34	5B	Storage system command common process	
35	5C	Channel server asynchronous control 1	
36	5D	Channel server asynchronous control 2	
37	5E	Channel server command queuing control	
38	5F	Channel server JOB FRR	
39	60	Read command process 1	
40	61	Read command process 2	
41	62	Read command process 3	
42	63	Read command process 4	
43	64	Read command process 5	
44	65	Read command process 6	
45	66	Write command process 1	
46	67	Write command process 2	
47	68	Write command process 3	
48	69	Write command process 4	
49	6A	Write command process 5	
50	6B	Write command process 6	
51	6D	Control command process 1	
52	6E	Control command process 2	
53	6F	Search command	
54	70	Path control command process	
55	71	Diagnostic command process	
56	72	DIAG command process	
57	73	Storage system command process 1	
58	74	Storage system command process 2	
59	75	Storage system command process 3	
60	78	CHL I/F link level frame control	
61	79	CHL I/F device frame control	
62	7A	CHL I/F common control	
63	7B	LDEV format	
64	7E	Concurrent Copy (CC) process	

Module ID (SSB8) List (3/4)

No.	Module ID	Function name	Remarks
65	7F	Channel server WDCP/differential (M specified)	
66	80	DKB monitor	
67	81	DKB initiator	
68	82	DKB terminator	
69	88	External I/O 1	
70	89	External I/O 2	
71	8A	External I/O 3	
72	8B	External I/O 4	
73	90	Staging	
74	91	LDEV destaging	
75	92	PDEV destaging	
76	93	Drive recovery	
77	94	Online monitor	
78	95	Physical drive maintenance	
79	98	RAID synchronous type	
80	99	RAID LDEV destaging	
81	9A	RAID PDEV destaging	
82	9B	RAID drive recovery	
83	9C	RAID external provided	
84	9F	RAID failed slot operation	
85	A0	SCSI control	
86	A1	DRR control	
87	A2	SVP command execution	
88	A3	Test activation	
89	A4	SCSI control	
90	A5	Offline monitor	
91	A6	Physical drive maintenance	
92	A7	SCSI control	
93	A8	DRR control	
94	AC	External path/device manager 1	
95	AD	External path/device manager 2	
96	AE	SCSI control	

Module ID (SSB8) List (4/4)

No.	Module ID	Function name	Remarks
97	C0	TC-MF CHL/SVP I/F	
98	C1	TC-MF Remote copy monitor	
99	C2	TC-MF Configuration control	
100	C3	TC-MF common copy procedure	
101	C4	TC-MF Remote copy procedure	
103	C6	TC-MF channel server procedure	(*1)
104	C7	TC-MF Remote I/O manager	
105	C8	TC-MF Remote I/O 1	(*1)
106	C9	TC-MF Remote I/O 2	
107	CA	TC-MF path control	
108	CB	TC-MF asynchronous remote copy procedure	
109	CC	TC-MF asynchronous CT manager	
110	CD	TC-MF asynchronous scheduler	
111	CE	TC-MF Configuration control	
112	CF	TC-MF Configuration control	

*1: No action is required for error codes, C60E, C870, C871 and C872. These error codes are reported only to have the host processor re-drive the failed CCW chain.

SSB03-710

Format E, Message C (Environment monitor detected failure: DKC environment failure / HSNBX environment failure)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'E')				Message (x'C')			
8	Reserved area (x'00')							
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20	PCB number (Invalid)				Message code (Invalid)			
21	SSID (lower order) of Self Storage system (Invalid)							
22	Symptom Code (x'FFEC')							
23								

Format E, Message E (Environment Monitor Detected DKU Failure)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'E')				Message (x'E')			
8	Reserved area (x'00')							
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20	PCB number (Invalid)				Message code (Invalid)			
21	SSID (lower order) of Self Storage system (Invalid)							
22	Symptom Code (x'FFFE')							
23								

Format F, Message 0 (Operation terminated)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'F')				Message (x'0')			
8	Not used (x'00')							
9								
10								
11	Hardware level (*1)							
12								
13	SSID of mate Storage system (x'0000' for EDCC)							
14								
15	Manufacturer code (x'000000')						Factory code (x'00')	
16	Not used (x'00')							
17	Module ID							
18	Routine ID							
19	PCB number				Error code (Invalid)			
20	SSID of Self Storage system							
21								
22	Symptom code (x'FFF0')							
23								

***1: Hardware level**

Bit 0 : Serial channel hardware level

When the bit 0 = 0,

Bit 1-15: Not used

When the bit 0 = 1,

Bit 1: Not used

Bit 2-3: Failed storage path

Bit 4-7: Number of channels per cluster

0000 : Parallel channel = 4, serial channel = 0

0001 : Parallel channel = 8, serial channel = 0

0010 : Parallel channel = 4, serial channel = 2

0100 : Parallel channel = 4, serial channel = 4

0110 : Parallel channel = 0, serial channel = 2

1000 : Parallel channel = 0, serial channel = 4

1010 : Parallel channel = 0, serial channel = 8

1100 : Parallel channel = 0, serial channel = 6

Bit 8: Dual Frame

0 : Dual Frame

1 : Modular Power

Bit 9-11: Cache size

000 : Non cache

001 : 256 MB

010 : 512 MB

011 : 768 MB

100 : 1024 MB

101 : 1280 MB

110 : 1536 MB

111 : Over 1537 MB

Bit 12-13: Cluster hardware level

Bit 14-15: Cache/NVS hardware level

Format F, Message 1 (Micro-program detected cache failure)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'F')					Message (x'1')		
8	Queue transition in progress (Side A)	Queue transition in progress (Side B)	Free SGCB queue operation in progress	Free SLCB queue operation in progress	Free GRPT queue operation in progress	'000'		
9	Not used (x'00')							
	VDEV number							
10 (*1)	Queue type							
	VDEV number		Slot number					
11 (*1)	Queue number							
	Slot number							
12 (*1)	Queue number							
	Slot number							
13	SSID of mate Storage system (x'0000' for EDCC)							
14								
15	Manufacture code ('000000')						Factory code ('00')	
16	Not used (x'00')							
17	Module ID							
18	Routine ID							
19	PCB number				Error code (Invalid)			
20	SSID of Self Storage system							
21								
22	Symptom Code (x'FFF1')							
23								

*1: When byte 8, bit 2-4 = 000, upper value is valid.
When byte 8, bit 2-4 ≠ 000, lower value is valid.

Format F, Message 2 (CACHE ERR)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'F')				Message (x'2')			
8	SubCode							
	x'1' = C30/C31/C32/C33/C70/C71/C72/C73 (CACHE error) (CHK2) x'2' = D (CHK3)				Not used '0'	Not used '0'	Not used '0'	MSW register LOG error
9	Transfer information							
	Transfer P/K Type x'1' = CHF x'2' = DKB x'4' = CHM x'5' = CMPK (MSW) x'6' = MP-PK				Act mode x'1' = Nomal write x'2' = Read x'3' = 2 Cache write x'5' = Atomic write			
10	Transfer Master P/K board number							
	CHF/CHM/DKB: x'00' ~ x'0B', x'10' ~ x'1B' MP-PK: x'00' ~ x'0F' CM-PK: x'00' ~ x'07'							
11	Using path code0 (CHK2)							
	Not used '0'				Command1 Access CACHE board number CM-PK: x'00' ~ x'07'			
12	Not used '0'							
13	SSID for Other Storage system ('0000')							
14								
15	Maker Code ('0')				Factory Code ('0')			
16	Transfer Master Path							
	x'0' = Not used '0' x'1' = MPA x'3' = DMA0 x'4' = DMA1 x'5' = DMA2 x'6' = DMA3 x'9' = DRR0 x'A' = DRR1 x'D' = MFDMA				Not used '0'			
17	Module ID							
18	Routine ID							
19	PKID				Error code (Invalid)			
20	SSID for Self Storage system							
21								
22	Symptom Code (x'FFF2')							
23								

Format F, Message 5 (Remote Copy/global-active device Paths Removed/Restored)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'F')				Message (x'5')			
8	Reason code (*1)							
9	RCU device address							
10	RCU Manufacture code/Factory code							
11								
12	RCU Sequence No.							
13								
14								
15	MCU Manufacture code/Factory code							
16								
17	MCU Sequence No.							
18								
19								
20	SSID of self Storage system							
21								
22	Symptom Code (x'3887')							
23								

*1: Reason code

x'01' : One or more remote copy/global-active device paths removed unexpectedly

x'02' : One or more remote copy/global-active device paths restored

x'03' : All remote copy/global-active device paths removed unexpectedly

Format F, Message 6 (CFW impossible)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'F')				Message (x'6')			
8	Reason code (*1)							
9	Not used (x'00')							
10								
11								
12								
13	SSID of mate Storage system (x'0000' for EDCC)							
14								
15	Manufacturer code ('000000')						Factory code ('00')	
16	Not used (x'00')							
17	Module ID							
18	Routine ID							
19	PCB number				Error code (Invalid)			
20	SSID of self Storage system							
21								
22	Symptom Code (x'FFF6')							
23								

*1: Reason code

x'00' : Reserved

x'01' : CFW ID inconsistent

x'02' ~ x'0F' : Reserved

Format F, Message A (NVS terminated)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'F')				Message (x'A')			
8	Reason code (*1)							
9	Not used (x'00')							
10								
11								
12								
13	SSID of mate Storage system (x'0000' for EDCC)							
14								
15	Manufacturer code ('000000')						Factory code ('00')	
16	Not used (x'00')							
17	Module ID							
18	Routine ID							
19	PCB number				Error code (Invalid)			
20	SSID of self Storage system							
21								
22	Symptom Code (x'FFFA')							
23								

*1: Reason code

x'00' ~ x'01' : Reserved

x'02' : NVS failure

x'03' ~ x'0F' : Reserved

Format F, Message B (TrueCopy for Mainframe Pair Suspend)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'F')				Message (x'B')			
8	R-Vol suspended	R-Vol failed	Reason code (*1)					
9	RCU device address							
10	RCU Manufacture code/Factory code							
11								
12								
13	RCU Sequence No.							
14								
15	RCU Manufacture code/Factory code							
16								
17								
18	MCU Sequence No.							
19								
20	SSID of self Storage system							
21								
22	Symptom Code (x'FFFA')							
23	Symptom Code (same byte #8)							

*1: Reason code

x'14' ~ x'2F': Reserved

x'30' : Pair suspended. MCU device write error.

x'31' : Pair suspended. RCU storage system error/or MCU storage system error.

x'32' : Pair suspended. RCU device communication error.

x'33' : Pair suspended (Critical device status). All write commands are rejected until pair re-established.

x'34' : Pair suspended. RCU device is not ready (intervention required).

Format F, Message F (Boot flash memory error)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'F')				Message (x'F')			
8	SubCode (x'70' : Boot flash memory error)							
9	MPID (Reported SSB)							
10	Not used							
11								
12								
13								
14								
15								
16								
17								
18								
19								
20	PCB number (Invalid)				Message code (Invalid)			
21	SSID (lower order) of Self Storage system (Invalid)							
22	Symptom Code (x'FFEC')							
23								

Format F, Message F (SFP_TxFault (FC))

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'F')				Message (x'F')			
8	SubCode (x'c0' : SFP_TxFault (FC))							
9	MPID (Reported SSB)							
10	Cluster number for TxFault							
11	Slot number for TxFault							
12	Port number for TxFault							
13								
14								
15								
16								
17								
18								
19								
20	PCB number (Invalid)				Message code (Invalid)			
21	SSID (lower order) of Self Storage system (Invalid)							
22	Symptom Code (x'FFEC')							
23								

Format F, Message F (SFP_TxFault (iSCSI))

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'F')				Message (x'F')			
8	SubCode (x'c1' : SFP_TxFault (iSCSI))							
9	MPID (Reported SSB)							
10	Cluster number for TxFault							
11	Slot number for TxFault							
12	Port number for TxFault							
13								
14								
15								
16								
17								
18								
19								
20	PCB number (Invalid)				Message code (Invalid)			
21	SSID (lower order) of Self Storage system (Invalid)							
22	Symptom Code (x'FFEC')							
23								

Format F, Message F (SFP_TxFault (FICON))

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'F')				Message (x'F')			
8	SubCode (x'c2' : SFP_TxFault (FICON))							
9	MPID (Reported SSB)							
10	Cluster number for TxFault							
11	Slot number for TxFault							
12	Port number for TxFault							
13								
14								
15								
16								
17								
18								
19								
20	PCB number (Invalid)				Message code (Invalid)			
21	SSID (lower order) of Self Storage system (Invalid)							
22	Symptom Code (x'FFEC')							
23								

Format F, Message F (Cache flash memory error)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'F')				Message (x'F')			
8	SubCode (x'71' : Cache flash memory error)							
9	MPID (Reported SSB)							
10	Not used							
11								
12								
13								
14								
15								
16								
17								
18								
19								
20	PCB number (Invalid)				Message code (Invalid)			
21	SSID (lower order) of Self Storage system (Invalid)							
22	Symptom Code (x'FFEC')							
23								

Format F, Message F (Cache flash memory type error)

Bit Byte	0	1	2	3	4	5	6	7
7	Format (x'F')				Message (x'F')			
8	SubCode (x'72' : Cache flash memory type error)							
9	MPID (Reported SSB)							
10	Not used							
11								
12								
13								
14								
15								
16								
17								
18								
19								
20	PCB number (Invalid)				Message code (Invalid)			
21	SSID (lower order) of Self Storage system (Invalid)							
22	Symptom Code (x'FFEC')							
23								

4. ECKD 32-BYTE SSB

4.1 Basic Sense Bytes

The following describes details of 32 ECKD basic sense bytes 0 to 6 and 22 to 31.

ECKD 32-Byte Sense Data

Bit Byte	0	1	2	3	4	5	6	7
0	Command rejection	Intervention required	Not used	Device check	Data check	Not used	Not used	Incomplete domain
1	Permanent error	Invalid track format	Not used	Operator message	No used	File protection	Write inhibit	Imprecise ending
2	Storage control type							
3	Remaining count; or, command overrun reached threshold (*1)							
4	Device address							
5	Device type							
6	Unit indication 0: SSB2 1: SSB5	SSB4	SSB28-31 valid	Not used	Format			
7 ~ 21	Bytes 7 to 21: Depend on the exception class and format. (For details, see “4.3 Details of Sense Bytes”.)							
22 ~ 23	Exception class • Exception code; or, CHL#, LPN, and Port# beyond the threshold (*2)							
24	Logging message control							
25	Program action code							
26	Dual frame	EDCC Mode	Duplex pair	Subvolume error	Nonsynchronous operation	Serial channel	Report output	Permanent path error
27	32 byte SSB (0)	Not used	Not used	28 bit Cylinder	DKU86I TRK compatible mode	Not used	Path number	
28	In case of being Byte27 Bit3=0 : Message Code / A number of Read, search bytes (*3) In case of being Byte27 Bit3=1 : Indicating Bit 12-19 of cylinder address / A number of Read, search bytes (*3)							
29	In case of being Byte27 Bit3=0 : High side of cylinder address / A number of Read, search bytes (*3) In case of being Byte27 Bit3=1 : Indicating Bit 20-27 of cylinder address / A number of Read, search bytes (*3)							
30	In case of being Byte27 Bit3=0 : Low side of cylinder address / A number of Read, search bytes (*3) In case of being Byte27 Bit3=1 : Indicating Bit 0-7 of cylinder address / A number of Read, search bytes (*3)							
31	In case of being Byte27 Bit3=0 : Head address / A number of Read, search bytes (*3) In case of being Byte27 Bit3=1 : High side (a half byte) of Byte31 is Bit 8-11 of cylinder address / A number of Read, search bytes (*3) Low side (a half byte) of Byte31 is head address (*3)							

■: Varies by the exception class and format.

*1: “Remaining count” is for exception class 0 and format 4; otherwise, “Command overrun threshold reached” applies.

*2: “CHL#, LPN, and Port# beyond the threshold” is for exception class 6; otherwise, “Exception code” is applied.

*3: "Number of read or searched bytes" is for exception class 6.

Otherwise:

Byte 28 = Byte27/Bit3=0 : "Message Code"

Byte27/Bit3=1 : "Bit 12-19 of cylinder address"

Byte 29 = Byte27/Bit3=0 : "Cylinder address (High side)"

Byte27/Bit3=1 : "Bit 20-27 of cylinder address"

Byte 30 = Byte27/Bit3=0 : "Cylinder address (Low side)"

Byte27/Bit3=1 : "Bit 0-7 of cylinder address"

Byte 31 = Byte27/Bit3=0 : "Head address"

Byte27/Bit3=1 : 4 bits of high side is "Bit 8-11 of cylinder address"

4 bits of low side is "Head address"

ECKD 32-Byte SSB Common Sense Bytes (1/3)

Byte	Bit	Name	Description
0	0	Command Rejection	A chain ended without receiving the expected number of data transfer commands in the LR/LRE domain. If no other error is detected, "incomplete domain" (byte 0, bit 7) is also set to 1.
	1	Intervention required	1. The drive is not physically connected. 2. The drive power is off. 3. The ENABLE/DISABLE switch is set to DISABLE.
	2	Not used	
	3	Device check	DKC or drive hardware is abnormal.
	4	Data check	Indicates that a data error has been detected in the information from the drive. This bit is set to 1 when the data error is uncorrectable or error correction is prohibited by the mask byte.
	5	Not used	
	6	Not used	
	7	Incomplete domain	Indicates that as many data transfer commands as defined in the LOCATE RECORD count parameter have not been received.
1	0	Permanent error	Indicates that an error occurred and recovery failed.
	1	Invalid track format	1. The record size parameter is inconsistent with the record to be updated. 2. Nonstandard R0 was detected during branching in Fast Write/Dual Copy operation.
	2	Not used	
	3	Operator message	Not used for other than DKC SIM. For DKC SIM, indicates that messages are output to the operator.
	4	Not used	
	5	File protection	An attempt was made to move to a track not defined in DEFINE EXTENT during execution of the LOCATE RECORD command (updating write in asynchronous mode).
	6	Write inhibit	A write command has been received that uses a resource write-prohibited by the DIAGNOSTIC CONTROL command. "Device check" (byte 0, bit 3) is also set to 1.
	7	Imprecise ending	Indicates that CCW has ended abnormally in the LR/LRE domain and the error is for a previously completed command (whose end status report is already finished).
2	Storage control type/ Environmental data present		1. For excluding DKC SIM and Cache SIM, this byte indicate DKC type (x'06') or 2107 type (x'1f'). 2. For DKC SIM and Cache SIM, this byte indicate environmental data present (x'10').
3	Remaining count; or, command overrun threshold reached	When the command overrun threshold is reached in exception class 6: x'01'	Exception class 0 In exception class 0 and format 4: "Remaining count" (number of records/tracks remaining in the LR/LRE domain being handled)
4	Device address	Bit 0-1 : Storage path number Bit 2 : Controller number Bit 3-7 : Device number	
5	Device type code	DKU type DKC type if DKC type is PCM and exception code is x'EF07'.	

ECKD 32-Byte SSB Common Sense Bytes (2/3)

Byte	Bit	Name	Description
6	0	Content and format	'0': SSB2 (storage control type) is valid '1': SSB5 (device type) is valid
	1	Device address valid	'0': SSB4 is invalid '1': SSB4 is valid
	2	CYL, HD address valid	'0': SSB28~31 is invalid '1': SSB28~31 is valid
	3	Not used	
	4 ~ 7	Format	When x'F', this SSB is SIM.
22	0 ~ 3	Exception class	0: File protection, invalid track format, status exception, command sequence exception 4: Data check, retry prohibition, PCI, subretry success 6: Storage system data B: Failure between DKC and DASD CTL C: Controller failure (reserved) D: Failure between controller and device E: Device failure
	4 ~ 7	Exception code;	For details, see "4.3 Details of Sense Bytes" .
23	0 ~ 7	or, CHL#, LPN, and Port# beyond the threshold	
24			Logging message control
	0 ~ 2	Not used	
	3	Logging mode	Forced log mode
	4 ~ 5	Logging action	00: Not logged 01: Unconditionally logged 10: Logged only once 11: Logged only for frequent occurrence on the path
	6 ~ 7	Operator message control	00: Message not output 01: Message output unconditionally 10: Message output only once 11: Message output only once only for frequent occurrence on the path
25	Program action code		BIT0 = '0'
			BIT0 = '1'
			BIT 1 ~ 7
			Single program action code
			BIT1
			BIT1
			2
			3
			4 ~ 5
			6 ~ 7
			00: Does not retry 01: Retry twice 10: Retry 10 times 11: Retry 255 times

ECKD 32-Byte SSB Common Sense Bytes (3/3)

Byte	Bit	Name	Description		
26			Configuration information		
	0	Dual frame	0: Single-frame configuration 1: Dual-frame configuration		
	1	EDCC mode	0: DCC mode 1: EDCC mode		
	2	Duplex pair	0: Simplex 1: Duplex pair		
	3	Sub-volume error	0: Not a sub-volume error 1: Sub-volume error		
	4	Non synchronous operation	0: Synchronous operation 1: Non synchronous operation		
	5	Serial channel	0: Parallel channel 1: Serial channel		
	6	Report output	0: Excluding environmental data present and SIM 1: Environmental data present and SIM		
	7	Permanent path error	0: Permanent error for all paths 1: Permanent error for this path		
27	0	32-byte SSB	ECKD 32-byte SSB = '0'		
	1 ~ 2	Not used			
	3	28 bit Cylinder	0: The highest bit of cylinder address is Bit0, and the lowest bit of it is Bit15. Byte 28 is not used. Byte 29 indicates Bit0-7 of cylinder address. Byte 30 indicates Bit8-15 of cylinder address. Byte 31 indicates the head address. 1: The highest bit of cylinder address is Bit0, and the lowest bit of it is Bit27. Byte 28 indicates Bit12-19 of cylinder address. Byte 29 indicates Bit20-27 of cylinder address. Byte 30 indicates Bit0-7 of cylinder address. Bit0-3 of Byte 31 indicates Bit8-11 of cylinder address. Bit4-7 of Byte 31 indicates the head address.		
	4	DKU86I TRK compatible mode	0: Not in DKU86I track compatible mode 1: In DKU86I track compatible mode or changing to DKU86I track compatible mode		
	5	Not used			
	6 ~ 7	Path number	Indicates the SSB creation path number.		
28	Message code		Case of Byte27 Bit3 = 0	Case of Byte27 Bit3 = 1	Case of exception class 6 "Number of read or searched bytes"
			Instructs the message status of the EREP log and operator console.	Indicates the cylinder address bit 12-19 with an error.	
29	Cylinder address		Indicates the cylinder address with an error.	Indicates the cylinder address bit 20-27 with an error.	
30				Indicates the cylinder address bit 0-7 with an error.	
31	0 ~ 3	Head address	0x'0'	Indicates the cylinder address bit 8-11 with an error.	
	4 ~ 7	Head address	Indicates the head address with an error.	Indicates the head address with an error.	

4.2 Exception Classes and Formats

Exception class	Format	Description
0	0 ~ 1	Reserved
	2	Reserved
	3	Machine condition exception
	4	Command sequence exception
	5 ~ F	Reserved
4	0	Reserved
	1	Data exception (PCI, permanent) (*1)
	2	Reserved
	3 ~ F	Reserved
6	0	Reserved
	1	Storage system information (*1)
	2 ~ F	Reserved
B	0	DKC and DASD CTL report error
	1 ~ F	Reserved
D	0	Drive report error (*1)
	1	FPC report error (*1)
	2 ~ F	Reserved
E	0	Drive failure, LDEV blockade/Pin volume detected/Write inhibited, LDEV not ready (*1), Shortage of Pool capacity
	1 ~ F	Reserved

*1: For DKU87I (IBM 3390 emulation mode) only.

4.3 Details of Sense Bytes

Exception 0, Format 3 (Machine condition exception)

Bit Byte	0	1	2	3	4	5	6	7
6	Unit indication	Byte4 valid	Byte29 to 31 valid	Not used	Format (x'3')			
7	LR/LRE command operation byte							
8	Extension operation byte (Byte 17) for LR/LRE command							
9	Byte 2 for LR/LRE command							
10	Reserved							
11	Search parameter of LR command (CCHHR) or Record ID of re-execution command (R)							
12								
13								
14								
15								
16	Sector number to re-execute the LR							
17	TLF for LR/LRE command							
18								
19	Operation byte = 0x3F :LR/LRE External operation byte Others :Reserved							
20	SSID of self Storage system							
21								
22	Exception code x'08C1'							
23								

Exception 0, Format 4 (Command sequence exception)

Bit Byte	0	1	2	3	4	5	6	7
6	Unit indication	Byte4 valid	Byte29 to 31 valid	Not used	Format (x'4')			
7	LR/LRE command operation byte							
8	Extension operation byte (Byte 17) for LR/LRE command							
9	Head address of extent (DX command parameter)							
10								
11								
12								
13	Path group ID (bytes 1 to 7 of the ID transferred by the newest SET PATH GROUP ID command)							
14								
15								
16								
17								
18								
19								
20	SSID of self Storage system							
21								
22	Exception code x'0212': incomplete domain							
23								

Exception 4, Format 1 (data exception, PCI, permanent)

Bit Byte	0	1	2	3	4	5	6	7
6	Unit indication	Byte4 valid	Byte29 to 31 valid	Not used	Format (x'1')			
7	Sector number (*1)							
8	Cylinder address (*1)							
9								
10								
11	Head address (*1)							
12	Record number (*1)							
13	Error displacement							
14								
15	Serial number (Manufacturer identifier + Manufacturing facility identifier + DKU sequence number)							
16								
17								
18								
19								
20	SSID of self Storage system							
21								
22	Exception class (x'4')				Message (*2)			
23	Correction flag (*3)							

*1: Not determined for occurrence in HA or R0.

*2: Contents of message

x'0': Data check in HA field

x'1': Data check in C field

x'2': Data check in K field

x'3': Data check in D field

x'4': Missing sink byte in HA field (PA error)

x'5': Missing sink byte in C field

x'6': Missing sink byte in K field

x'7': Missing sink byte in D field

x'8': Not used

x'9': Missing AM during retry

x'A' ~ x'F': Not used

*3: Contents of correction flag

Bits 0 and 1: CORRECTION BIT

10: Correctable (Recovered)

11: Uncorrectable

Bit 2: Offset active

Bits 3 to 7: Not used

Exception 6, Format 1 (Storage system information)

Bit Byte	0	1	2	3	4	5	6	7
3	Command overrun threshold exceeded							

6	Unit indication	Byte4 valid	Byte29 to 31 valid	Not used	Format (x'1')
7	Data overrun threshold exceeded				
8	Seek count				
9					
10					
11	Serial number (Manufacturer identifier + Manufacturing facility identifier + DKU sequence number)				
12					
13					
14					
15	Serial number (Manufacturer identifier + Manufacturing facility identifier + DKC sequence number)				
16					
17					
18					
19					
20	SSID of self Storage system				
21					
22	Exception code (x'6F0X')				
23					

X = For parallel/serial channel standard path: CHL#/LPN (0-7)
For serial channel extension path: Port number

28	Read / Search byte number
29	
30	
31	

Exception B, Format 0 Exception code 1 (Shared Memory Failure)

Bit Byte	0	1	2	3	4	5	6	7
6	Unit indication	Byte4 valid	Byte29 to 31 valid	Not used	Format (x'0')			
7	0x81							
8	Subcode (F/M = 81 SSB Byte 8)							
9	F/M = 81 SSB Byte 9							
10	Module ID (F/M = 81 SSB Byte 18)							
11	Routine ID (F/M = 81 SSB Byte 19)							
12	Internal SSB Serial number							
13								
14	F/M = 81 SSB Byte 10							
15	Serial number (Manufacturer identifier + Manufacturing facility identifier + DKU sequence number)							
16								
17								
18								
19								
20	SSID of self Storage system							
21								
22	Exception class (x'B')				Exception code (x'1')			
23	Exception code (F/M = 81 SSB Byte 20: Processor#/Message code)							

Exception B, Format 0 Exception code 4 (CHK4)

Bit Byte	0	1	2	3	4	5	6	7
6	Unit indication	Byte4 valid	Byte29 to 31 valid	Not used	Format (x'0')			
7	0x84							
8	Subcode (F/M = 84 SSB Byte 8)							
9	F/M = 84 SSB Byte 9							
10	Module ID (F/M = 84 SSB Byte 18)							
11	Routine ID (F/M = 84 SSB Byte 19)							
12	Internal SSB Serial number							
13								
14	Error ID Code							
15	Serial number (Manufacturer identifier + Manufacturing facility identifier + DKU sequence number)							
16								
17								
18								
19								
20	SSID of self Storage system							
21								
22	Exception class (x'B')				Exception code (x'4')			
23	Exception code (F/M = 84 SSB Byte 20: Processor#/Message code)							

Exception B, Format 0 Exception code 9 (CHB CHK2)

Bit Byte	0	1	2	3	4	5	6	7
6	Unit indication	Byte4 valid	Byte29 to 31 valid	Not used	Format (x'0')			
7	0x89							
8	Subcode (F/M = 89 SSB Byte 8)							
9	F/M = 89 SSB Byte 9							
10	Module ID (F/M = 89 SSB Byte 18)							
11	Routine ID (F/M = 89 SSB Byte 19)							
12	Internal SSB Serial number							
13								
14	Error ID Code							
15	Serial number (Manufacturer identifier + Manufacturing facility identifier + DKU sequence number)							
16								
17								
18								
19								
20	SSID of self Storage system							
21								
22	Exception class (x'B')				Exception code (x'9')			
23	Exception code (F/M = 89 SSB Byte 20: Processor#/Message code)							

Exception B, Format 0 Exception code A (DKB CHK2)

Bit Byte	0	1	2	3	4	5	6	7
6	Unit indication	Byte4 valid	Byte29 to 31 valid	Not used	Format (x'0')			
7	0x8A							
8	Subcode (F/M = 8A SSB Byte 8)							
9	F/M = 8A SSB Byte 9							
10	Module ID (F/M = 8A SSB Byte 18)							
11	Routine ID (F/M = 8A SSB Byte 19)							
12	Internal SSB Serial number							
13								
14	Error ID Code							
15	Serial number (Manufacturer identifier + Manufacturing facility identifier + DKU sequence number)							
16								
17								
18								
19								
20	SSID of self Storage system							
21								
22	Exception class (x'B')				Exception code (x'A')			
23	Exception code (F/M = 8A SSB Byte 20: Processor#/Message code)							

Exception B, Format 0 Exception code B (DRR CHK2)

Bit Byte	0	1	2	3	4	5	6	7
6	Unit indication	Byte4 valid	Byte29 to 31 valid	Not used	Format (x'0')			
7	0x8B							
8	Subcode (F/M = 8B SSB Byte 8)							
9	F/M = 8B SSB Byte 9							
10	Module ID (F/M = 8B SSB Byte 18)							
11	Routine ID (F/M = 8B SSB Byte 19)							
12	Internal SSB Serial number							
13								
14	Error ID Code							
15	Serial number (Manufacturer identifier + Manufacturing facility identifier + DKU sequence number)							
16								
17								
18								
19								
20	SSID of self Storage system							
21								
22	Exception class (x'B')				Exception code (x'B')			
23	Exception code (F/M = 8B SSB Byte 20: Processor#/Message code)							

Exception B, Format 0 Exception code D (Power Failure)

Bit Byte	0	1	2	3	4	5	6	7
6	Unit indication	Byte4 valid	Byte29 to 31 valid	Not used	Format (x'0')			
7	0x8D							
8	Subcode (F/M = 8D SSB Byte 8)							
9	F/M = 8D SSB Byte 9							
10	F/M = 8D SSB Byte 10							
11	F/M = 8D SSB Byte 11							
12	Internal SSB Serial number							
13								
14	Error ID Code							
15	Serial number (Manufacturer identifier + Manufacturing facility identifier + DKU sequence number)							
16								
17								
18								
19								
20	SSID of self Storage system							
21								
22	Exception class (x'B')				Exception code (x'D')			
23	Exception code (F/M = 8D SSB Byte 20: Processor#/Message code)							

Exception B, Format 0 Exception code E (Processor failure)

Bit Byte	0	1	2	3	4	5	6	7
6	Unit indication	Byte4 valid	Byte29 to 31 valid	Not used	Format (x'0')			
7	0x8E							
8	Subcode (F/M = 8E SSB Byte 8)							
9	F/M = 8E SSB Byte 9							
10	Module ID (F/M = 8E SSB Byte 18)							
11	Routine ID (F/M = 8E SSB Byte 19)							
12	Internal SSB Serial number							
13								
14	F/M = 8E SSB Byte 10							
15	Serial number (Manufacturer identifier + Manufacturing facility identifier + DKU sequence number)							
16								
17								
18								
19								
20	SSID of self Storage system							
21								
22	Exception class (x'B')				Exception code (x'E')			
23	Exception code (F/M = 8E SSB Byte 20: Processor#/Message code)							

Exception B, Format 0 Exception code E (Selective Reset Notification/Wait-Sense Time Over)

Bit Byte	0	1	2	3	4	5	6	7
6	Unit indication	Byte4 valid	Byte29 to 31 valid	Not used	Format (x'0')			
7	0x8E							
8	Subcode (F/M = 8E SSB Byte 8)							
9	F/M = 8E SSB Byte 9							
10	Lost SSB's Module ID (F/M = 8E SSB Byte 14)							
11	Lost SSB's Routine ID (F/M = 8E SSB Byte 15)							
12	Internal SSB Serial number							
13								
14	F/M = 8E SSB Byte 10							
15	Serial number (Manufacturer identifier + Manufacturing facility identifier + DKU sequence number)							
16								
17								
18								
19								
20	SSID of self Storage system							
21								
22	Exception class (x'B')				Exception code (x'E')			
23	Exception code (F/M = 8E SSB Byte 20: Processor#/Message code)							

Exception B, Format 0 Exception code F (Logical inconsistency)

Bit Byte	0	1	2	3	4	5	6	7
6	Unit indication	Byte4 valid	Byte29 to 31 valid	Not used	Format (x'0')			
7	0x8F							
8	Module ID (F/M = 8F SSB Byte 8)							
9	Routine ID (F/M = 8F SSB Byte 9)							
10	F/M = 8F SSB Byte 10							
11	F/M = 8F SSB Byte 11							
12	Internal SSB Serial number							
13								
14	F/M = 8F SSB Byte 12							
15	Serial number (Manufacturer identifier + Manufacturing facility identifier + DKU sequence number)							
16								
17								
18								
19								
20	SSID of self Storage system							
21								
22	Exception class (x'B')				Exception code (x'F')			
23	Exception code (F/M = 8F SSB Byte 20: Processor#/Message code)							

Exception D, Format 1 (SPC report error)

Bit Byte	0	1	2	3	4	5	6	7
6	Unit indication	Byte4 valid	Byte29 to 31 valid	Not used	Format (x'1')			
7	Type code (x'111') (SPC report error)			Not used	Reserved			
8								
9								
10	SCSI command code (See SSB04-210)							
11	Not used							
12	Module ID							
13	Routine ID							
14	CDEV number							
15	Serial number (Manufacturer identifier + Manufacturing facility identifier + DKU sequence number)							
16								
17								
18								
19								
20	SSID of self Storage system							
21								
22	Exception code (x'D0ZZ') [ZZ: RDEV No.]							
23								

Exception D, Format 0 (drive report error)

Bit Byte	0	1	2	3	4	5	6	7
6	Unit indication	Byte4 valid	Byte29 to 31 valid	Not used	Format (x'0')			
7	Type code (x'000') (drive report error)			Not used	Sense key (*1)			
8	Additional Sense Code + Additional Sense Code Qualifier							
9								
10	SCSI command code (*2)							
11	Not used							
12	Module ID							
13	Routine ID							
14	CDEV number							
15	Serial number (Manufacturer identifier + Manufacturing facility identifier + DKU sequence number)							
16								
17								
18								
19								
20	SSID of self Storage system							
21								
22	Exception code (x'D0ZZ') [ZZ: RDEV No.]							
23								

*1: Sense Key

x'0' : NO SENSE
 x'2' : NOT READY
 x'3' : MEDIUM ERROR
 x'4' : HARDWARE ERROR
 x'5' : ILLEGAL REQUEST
 x'6' : UNIT ATTENTION
 x'7' : DATA PROTECT
 x'8' : BLANK CHECK (Not used)
 x'9' : VENDOR UNIQUE (Not used)
 x'A' : COPY ABORTED (Not used)
 x'B' : ABORTED COMMAND
 x'C' : EQUAL (Not used)
 x'D' : VOLUME OVERFLOW (Not used)
 x'E' : MISCOMPARE
 x'F' : (RESERVED)

*2: SCSI Command Code

x'00' : TEST UNIT READY
 x'04' : FORMAT UNIT
 x'07' : REASSIGN BLOCKS
 x'12' : INQUIRY
 x'1B' : START/STOP UNIT
 x'1C' : RECEIVE DIAGNOSTIC RESULT
 x'1D' : SEND DIAGNOSTIC
 x'25' : READ CAPACITY (10)
 x'28' : READ (10)
 x'2A' : WRITE (10)
 x'2E' : WRITE AND VERIFY (10)
 x'3B' : WRITE BUFFER
 x'55' : MODE SELECT
 x'5A' : MODE SENSE
 x'88' : READ (16)
 x'8A' : WRITE (16)
 x'8E' : WRITE AND VERIFY (16)
 x'9E' : READ CAPACITY (16)
 x'FF' : Command is non-decision

Exception E, Format 0 (drive report error)

Bit Byte	0	1	2	3	4	5	6	7
6	Unit indication	Byte4 valid	Byte29 to 31 valid	Not used	Format (x'0')			
7	Type code (x'000') (drive report error)			Not used	Sense key (*1)			
8	Additional Sense Code + Additional Sense Code Qualifier							
9								
10	SCSI command code (*2)							
11	Not used							
12	Module ID (≠ x'5X/6X')							
13	Routine ID							
14	CDEV number							
15	Serial number (Manufacturer identifier + Manufacturing facility identifier + DKU sequence number)							
16								
17								
18								
19								
20	SSID of self Storage system							
21								
22	Exception code (x'E0ZZ') [ZZ: RDEV No.]							
23								

*1: Sense Key

x'0' : NO SENSE
 x'2' : NOT READY
 x'3' : MEDIUM ERROR
 x'4' : HARDWARE ERROR
 x'5' : ILLEGAL REQUEST
 x'6' : UNIT ATTENTION
 x'7' : DATA PROTECT
 x'8' : BLANK CHECK (Not used)
 x'9' : VENDOR UNIQUE (Not used)
 x'A' : COPY ABORTED (Not used)
 x'B' : ABORTED COMMAND
 x'C' : EQUAL (Not used)
 x'D' : VOLUME OVERFLOW (Not used)
 x'E' : MISCOMPARE
 x'F' : (RESERVED)

*2: SCSI Command Code

x'00' : TEST UNIT READY
 x'04' : FORMAT UNIT
 x'07' : REASSIGN BLOCKS
 x'12' : INQUIRY
 x'1B' : START/STOP UNIT
 x'1C' : RECEIVE DIAGNOSTIC RESULT
 x'1D' : SEND DIAGNOSTIC
 x'25' : READ CAPACITY (10)
 x'28' : READ (10)
 x'2A' : WRITE (10)
 x'2E' : WRITE AND VERIFY (10)
 x'3B' : WRITE BUFFER
 x'55' : MODE SELECT
 x'5A' : MODE SENSE
 x'88' : READ (16)
 x'8A' : WRITE (16)
 x'8E' : WRITE AND VERIFY (16)
 x'9E' : READ CAPACITY (16)
 x'FF' : Command is non-decision

SCSI Sense key

Sense key	Definition
0H	NO SENSE: Indicates that the key information reported from the specified logical unit is not for specific use. This indicates that the command has ended normally.
1H	RECOVERED ERROR: Indicates that the last command has ended normally after recovery operation by the controller. Details can be determined by checking the additional sense byte and information byte.
2H	NOT READY: Indicates that the addressed logical unit cannot be accessed. Recovery from this status may require operator's intervention.
3H	MEDIUM ERROR: Indicates that the command has ended in the irrecoverable error status due to damage to the medium or an error in recorded data.
4H	HARDWARE ERROR: Indicates that the controller has detected an irrecoverable hardware error (e.g., controller failure, device failure, parity error, etc.) during execution of a command or self-diagnostics.
5H	ILLEGAL REQUEST: Indicates that illegal data has been detected in the CDB or the additional parameter given as data for some commands (FORMAT UNIT, MODE SELECT, etc.). The controller terminates the command without changing the medium if an invalid parameter has been detected in the CDB. If an invalid parameter has been detected in the additional parameter given as data, the medium may already have been changed.
6H	UNIT ATTENTION: Indicates that the unit attention status has occurred because the MODE SELECT parameter has been changed or the controller has been reset.
7H	DATA PROTECT: Indicates that a write command has been received when write to media is prohibited. Write operation is not performed.
8H	BLANK CHECK. (Not used)
9H	Vendor Unique. (Not used)
AH	COPY ABORTED. (Not used)
BH	ABORTED COMMAND: Indicates that the controller has aborted the command. The host can retry the command for recovery.
CH	EQUAL. (Not used)
DH	VOLUME OVERFLOW. (Not used)
EH	MISCOMPARE: Data comparison failed during byte comparison and verification. Or, data in the WRITE BUFFER command from the same host was changed before execution of the READ BUFFER command.
FH	Reserved

Exception E, Format 0 (LDEV blockade/Pin volume detected/Write inhibited) (*1)

Bit Byte	0	1	2	3	4	5	6	7
6	Unit indication	Byte4 valid	Byte29 to 31 valid	Not used	Format (x'0')			
7	Type Code (x'000')			Not used	Not used			
8	READY	ENABLE	SSB PEND	Not used				
9	Not used							
10	Media maintenance RSV	PIN volume	WRITE inhibited	Not used				
11	Not used							
12	Module ID • Routine ID (x'5XXX / 6XXX') (*2)							
13								
14	Not used							
15	Serial number (Manufacturer identifier + Manufacturing facility identifier + DKU sequence number)							
16								
17								
18								
19								
20	SSID of self Storage system							
21								
22	Exception code (x'E000')							
23								

*1: Byte 0, Bit 3 (device check) is set to 1.

*2: Module ID • Routine ID

x'5011/501C/5202' : LDEV blockade

x'501A/501B' : PIN volume detected

x'6605/6697/6705/6784/

6805/6853/6909/6953' : WRITE inhibited

Exception E, Format 0 (Shortage of Pool capacity) (*1)

Bit Byte	0	1	2	3	4	5	6	7
6	Unit indication	Byte4 valid	Byte29 to 31 valid	Not used	Format (x'0')			
7	Not used							
8								
9								
10								
11								
12								
13								
14								
15	Serial number (Manufacturer identifier + Manufacturing facility identifier + DKU sequence number)							
16								
17								
18								
19								
20	SSID of self Storage system							
21								
22	Exception code (x'EF07')							
23								

*1: This SSB sets device check (Byte 0 Bit 3), permanent error (Byte 1 Bit 0) and write inhibit (Byte 1 Bit 6) of base sense byte.

Exception E, Format 0 (intervention required: LDEV NOT READY) (*1)

Bit Byte	0	1	2	3	4	5	6	7
6	Unit indication	Byte4 valid	Byte29 to 31 valid	Not used	Format (x'0')			
7	Type Code (x'000')			Not used	Not used			
8	READY	ENABLE	SSB PEND	0	0	0	0	0
9	Not used							
10	Media maintenance RSV	Pin volume	0	0	0	0	0	0
11	HOST TYPE	DKC TYPE	0	0	DKU TYPE			
12	Module ID • Routine ID (x'501C' / x'5202')							
13								
14	Command code							
15	Serial number (Manufacturer identifier + Manufacturing facility identifier + DKU sequence number)							
16								
17								
18								
19								
20	SSID of self Storage system							
21								
22	Exception code (x'E210')							
23								

*1: Byte 0, bit 1 (intervention required) is set to 1.