



# **Intel® RAID Controllers: SAS Software Stack**

## ***Decoding Unexpected Alert Codes***

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## Revision History

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# 1. Decoding Intel® RAID Sense Code Messages

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## 1.1 Purpose

This document reviews unexpected sense codes returned by SAS/SATA RAID devices attached to an Intel® RAID Controller using the SAS software stack. This document does not describe all error types or messages generated by these RAID Controllers.

## 1.2 RAID Logs

The RAID controller error events are logged as they occur. The type of RAID controller determines where and when the events are logged, and the RAID application determines what portion of the log entries can be viewed.

- Intel® SAS/SATA Hardware based RAID Controllers (solutions utilizing an I/O processor) persistently log error events in an NVRAM log. Events are logged from the point of power on, including out-of-band events (events that occur when the operating system is not yet loaded or is not operational). Text for these logged errors can be viewed in RAID BIOS Console or RAID Web Console2; or the text can be extracted using the command line utility.
- Intel® SAS/SATA Software based RAID Controllers (solutions that do not utilize an I/O processor) log error events only in the RAID Web Console2 log, and do not have NVRAM available to persistently save error messages. Events are only logged when the RAID Web Console2 application is running within the operating system. These error events can be viewed only in RAID Web Console2.

## 1.3 RAID Log Events

Logged events include status change events, informational messages and error messages. Unexpected Sense Codes are error messages that are generated when a device attached to a RAID controller encounters an error and responds with a device based error message. These messages are based on the industry standard T10 technical committee SCSI ASC/ASCQ assignments (refer to <http://www.t10.org/lists/asc-num.txt> for more information). A copy of this reference list is in Appendix A.

The sequence of events that can lead to an unexpected sense code error message is listed below.

1. The host adapter issues a command and receives a status update.
2. The RAID controller will issue a REQUEST SENSE command to the device if the status is other than GOOD (00h). Usually the error status inquiry is CHECK CONDITION (02h).
3. The REQUEST SENSE response from the device is the unexpected sense code and consists of the Command Data Block (CDB) issued by the host device and the Sense data from the target device.
4. The CDB contains the command sent to the device. The sense data contains the error message sent from the device and includes up to 255 bytes of information. The first 17 bytes are mandatory and all other bytes are optional additional sense bytes. The first 17 bytes contain the Error Code, Sense Key, the Additional Sense Code and the Additional

Sense Code Qualifier. These bytes can be decoded into an error message for more information.

5. The logged entry also includes the following:
  - Date and time of the event
  - Channel and target
  - SAS/SATA CDB
  - Returned Sense Code
6. Returned Sense Data includes:
  - Sense Key = byte 2
  - Additional Sense code = byte 12
  - Additional Sense Code Qualifier = byte 13

## 1.4 Unexpected Sense Code Event Format

The error message format may vary depending on the utility used to view or extract the message. The general format is shown below.

Date - Controller ID - Error type - Device Number - CDB in Hex - Sense in Hex.

Below is an example of a sense code based error message from an Intel® SAS RAID controller.

```
[Warning, 1] 2007-09-07, 09:57:17 Controller ID:0 Unexpected sense:PD=2:10,
CDB = 0x2a 0x00 0x00 0x02 0xf2 0x00 0x00 0x00 0x80 0x00, Sense = 0xf0
0x00 0x0b 0x00 0x02 0xf2 0x2d 0x0a 0x00 0x00 0x00 0x00 0x4b 0x05
0x00 0x00 0x00 0x00
```

CDB and Sense Code data is in hex. Each byte is represented by data in a “0x00” format, separated by a space and numbered on the left starting at 0. The CDB bytes above would be numbered as follows.

Byte	Byte	Byte	Byte	Byte	Byte	Byte	Byte	Byte	Byte
0	1	2	3	4	5	6	7	8	9
0x2a	0x00	0x00	0x02	0xf2	0x00	0x00	0x00	0x80	0x00

Tables in this document will not include the 0x portion of the byte.

## 1.5 SCSI CDB Command Decode

The SCSI CDB commands are defined as the data structure viewed through the SCSI interface. A single command will transfer one or more logical blocks of data. The CDB consists of the operation code, the logical unit number, the command parameters and the control byte. The length varies depending on the value of the group code in the operation code. Intel® RAID controllers addressed in this document support 4 kinds of the CDB length – 6-byte commands, 10-byte commands, 12-byte commands and 16-byte commands.

The table below describes the general content of the 6-byte CDB. The current SAS implementation of the CDB can be of variable length with some reserved portions indicating a target block on the target device. The table below is limited to 6 bytes and is used to highlight the Operational Code byte.

Table 1: CDB Content

bit→								
↓byte	7	6	5	4	3	2	1	0
0	Operation code							
1	LUN			Reserved				
2	Reserved							
3	Reserved							
4	Allocation length							
5	Control							

Byte 0 (green in the table above) is the operation code (command). SCSI Operation codes are listed in the table below: For example, the 2a operational code indicates that a WRITE command was issued.

Table 2: CDB SCSI Commands

Operation Code	Command Name	Type	Notes
00	TEST UNIT READY	Mandatory	
01	REZERO UNIT or REWIND	Optional	
03	REQUEST SENSE	Mandatory	
04	FORMAT UNIT	Mandatory	
05	READ BLOCK LIMITS	Manufacturer Specific	Tape drives only
06	Manufacturer Specific	Manufacturer Specific	
07	REASSIGN BLOCKS	Optional	
08	READ (06)	Optional	
09	Manufacturer Specific	Manufacturer Specific	
0A	WRITE (06), PRINT for printers	Optional	Tape drives only
0B	SEEK (06)	Optional	
0F	READ REVERSE	Manufacturer Specific	
10	WRITE FILEMARKS	Optional	Tape drives only
11	SPACE	Optional	
12	INQUIRY	Mandatory	
13	VERIFY (06)	Manufacturer Specific	
14	RECOVER BUFFERED DATA	Manufacturer Specific	
15	MODE SELECT (06)	Optional	
16	RESERVE or RESERVE UNIT	Mandatory	
17	RELEASE or RELEASE UNIT	Mandatory	
18	18 COPY	Optional	
19	ERASE	Optional	Tape drives mandatory
1A	MODE SENSE (06)	Optional	Tape drives mandatory
1B	START/STOP UNIT	Optional	
1C	RECEIVE DIAGNOSTIC RESULTS	Optional	
1D	SEND DIAGNOSTICS	Mandatory	
1E	PREVENT/ALLOW MEDIUM REMOVAL	Optional	



Operation Code	Command Name	Type	Notes
24	SET WINDOW	Manufacturer Specific	Scanners mandatory
25	READ CAPACITY	Mandatory	
28	READ (10)	Mandatory	
29	READ GENERATION	Manufacturer Specific	
2A	WRITE (10)	Mandatory	
2B	SEEK (10)	Optional	
2C	ERASE (10)	Manufacturer Specific	
2D	READ UPDATED BLOCK	Manufacturer Specific	
2E	WRITE AND VERIFY (10)	Optional	
2F	VERIFY (10)	Optional	
30	SEARCH DATA HIGH (10)	Optional	
31	SEARCH DATA EQUAL (10)	Optional	
32	SEARCH DATA LOW (10)	Optional	
33	SET LIMITS (10)	Optional	
34	PRE-FETCH	Optional	
35	SYNCHRONIZE CACHE	Optional	
36	LOCK UNLOCK CACHE	Optional	
37	READ DEFECT DATA (10)	Optional	
39	COMPARE	Optional	
3A	COPY and VERIFY	Optional	
3B	WRITE BUFFER	Optional	
3C	READ BUFFER	Optional	
3E	READ LONG	Optional	
3F	WRITE LONG	Optional	
40	CHANGE DEFINITION	Optional	
41	WRITE SAME	Optional	
42	READ SUB CHANNEL	CD-ROM only, optional	
43	READ TOC	CD-ROM only, optional	
44	READ HEADER	CD-ROM only, optional	
45	PLAY AUDIO	CD-ROM only, optional	
47	PLAY AUDIO MSF	CD-ROM only, optional	
48	PLAY AUDIO TRACK INDEX	CD-ROM only, optional	
49	PLAY TRACK RELATIVE (10)	CD-ROM only, optional	
4B	PAUSE / RESUME	CD-ROM only, optional	
4C	LOG SELECT	Optional	
4D	LOG SENSE	Optional	
55	MODE SELECT (10)	Optional	
5A	MODE SENSE (10)	Optional	
A5	PLAY AUDIO (12)	CD-ROM only, optional	
A8	READ (12)	CD-ROM only, optional	
A9	PLAY TRACK RELATIVE (12)	CD-ROM only, optional	
AF	VERIFY (12)	CD-ROM only, optional	
B0	SEARCH DATA HIGH (12)	CD-ROM only, optional	
B1	SEARCH DATA EQUAL (12)	CD-ROM only, optional	
B2	SEARCH DATA LOW (12)	CD-ROM only, optional	

Operation Code	Command Name	Type	Notes
B3	SET LIMITS (12)	CD-ROM only, optional	

## 1.6 Decoding Key SCSI CDB Commands

Some CDB Commands have an extended command set that can be used to qualify a command or provide additional command structure. For these commands the contents of Table 1 are extended to include the additional parameters shown in Table 3. These include the key CDB extended commands usage matrix, unexpected sense information, and additional debug information (i.e., the media location of a failed disk access).

Table 3: CDB Extended Commands Usage Matrix – Read (EXTENDED); (28H)

bit→	7	6	5	4	3	2	1	0
↓byte								
0	28							
1	LUN			Reserved				
2	Logical Block Address (Most Significant Bit -MSB)							
3	Logical Block Address							
4	Logical Block Address							
5	Logical Block Address (Least Significant Bit - LSB)							
6	Reserved							
7	Transfer Length (MSB)							
8	Transfer Length (LSB)							
9	Control							

The READ command sends a request to the target device to transfer the number of blocks in the Transfer Length field to the RAID controller starting with the address in the Logical Block Address field. This command causes the target device to transfer the latest data written on the specified blocks.

Table 4: CDB Commands Usage Matrix – Write (EXTENDED): (2AH)

bit→								
↓byte	7	6	5	4	3	2	1	0
0	2A							
1	LUN			Reserved				
2	Logical Block Address (MSB)							
3	Logical Block Address							
4	Logical Block Address							
5	Logical Block Address (LSB)							
6	Reserved							
7	Transfer Length (MSB)							
8	Transfer Length (LSB)							
9	Control							

The WRITE command writes the consecutive data blocks transferred from the RAID controller, as specified in the Transfer Length field, to the medium starting with the block address in the Logical Block Address field.

Table 5: CDB Commands Usage Matrix - Write and Verify (EXTENDED): (2EH)

bit→								
↓byte	7	6	5	4	3	2	1	0
0	2E							
1	LUN			Reserved			BytChk	0
2	Logical Block Address (MSB)							
3	Logical Block Address							
4	Logical Block Address							
5	Logical Block Address (LSB)							
6	Reserved							
7	Transfer Length (MSB)							
8	Transfer Length (LSB)							
9	Control							

The WRITE AND VERIFY command writes the number of consecutive data blocks from the RAID Controller specified in the Transfer Length field to the medium, starting with the block address in the Logical Block Address field and verifies that the data is written correctly.

When the Byte Check (BytChk) bit is set to 0, the target device verifies the written data in the medium using ECC. When the BytChk bit is set to 1, the target device performs a byte-by-byte

compare check between the data in the medium and the data transferred from the RAID Controller.

Table 6: CDB Commands Usage Matrix - Verify (EXTENDED): (2FH)

bit→	7	6	5	4	3	2	1	0
↓byte								
0	2F							
1	LUN			Reserved			BytChk	0
2	Logical Block Address (MSB)							
3	Logical Block Address							
4	Logical Block Address							
5	Logical Block Address (LSB)							
6	Reserved							
7	Transfer Length (MSB)							
8	Transfer Length (LSB)							
9	Control							

The VERIFY command verifies the data in the consecutive data blocks specified in the Transfer Length field, starting at the block address in the Logical Block Address field.

When the Byte Check (BytChk) bit is set to 0, the target device does not request the verification data but verifies the written data in the medium using ECC. When the BytChk bit is set to 1 the target device performs a byte-by-byte compare check between the written data in the medium and the data transferred from the RAID controller.

## 1.7 Sense Codes (SK, ASC, ASCQ)

The following table describes the format of the Sense Code message:

Table 7: Sense Code Content

bit→	7	6	5	4	3	2	1	0
↓byte								
0	Valid	Error Code						
1	Segment Number							
2	Filemark	EOM	ILI	Reserved	Sense Key			
3	Information (MSB) (LSB)							
Through								
6								
7	Additional Sense Length (n-7)							
8	Information (MSB) (LSB)							
Through								
11								

bit→	7	6	5	4	3	2	1	0							
↓byte															
12	Additional Sense Code														
13	Additional Sense Code Qualifier														
14	Field Replaceable Unit Code														
15	Sense Key Specific														
Through									SKSV						
17															
18	Additional Sense Bytes														
Through															
254															

The bytes required to decode an error message are **Error Code**, **Sense Key**, **Additional Sense Code**, and **Additional Sense Code Qualifier**.

## 1.8 The Error Code

The Error Code (Byte 0) for an unexpected sense code is usually 70. Sometimes this byte contains F0 instead because the 7<sup>th</sup> bit of the Byte 0 is valid, e.g., 0xF0 = 0x70 | 0x80, 0x70 indicates the current error on the target device and 0x80 indicates that the field contains valid information.

## 1.9 The Sense Key, Additional Sense Code, and Additional Sense Code Qualifier

The Sense Key (SK) (byte 2) is a basic error code and provides error category information. It is necessary to check the Additional Sense Code (ASC) (byte 12) and the Additional Sense Code Qualifier (ASCQ) (Byte 13) for additional information.

The information contained in the CDB, the SK, the ASC and the ASCQ provides information about the error and failure mode.

In the earlier error message example the CDB (CDB = 0x2a 0x00 0x00 0x02 0xf2 0x00 0x00 0x00 0x80 0x00) was decoded as a WRITE command. The sense code portion of this error message is shown below.

	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11	Byte 12	Byte 13	Byte 14	Byte 15	Byte 16	Byte
Sense=	0xf0	0x00	0x0b	0x00	0x02	0xf2	0x2d	0x0a	0x00	0x00	0x00	0x00	0x4b	0x05	0x00	0x00	0x00	0x00

Note the color code for **Error Code**, **Sense Key**, **Additional Sense Code**, and **Additional Sense Code Qualifier** bytes.

The Error Code at Byte0 indicates that an error occurred and the sense message contains usable information.

Sense Key at Byte2 is 0B and indicates that a command was aborted by the device.

ASC at Byte 12 is 4B and the ASCQ at Byte 13 is 05, which indicates that there was a Data Phase Error - DATA OFFSET ERROR.

The table below provides an easy reference for these codes. For more detail on the SCSI ASC/ASCQ Assignments refer to <http://www.t10.org/lists/asc-num.txt>.

Table 8: Sense Code Decode Matrix

Category	Sense Key	Additional Sense Code	Additional Sense Code Qualifier	Error Condition
	Byte 2	Byte 12	Byte 13	
No Sense	0	0	0	No error
	0	5D	0	No sense - PFA threshold reached
Soft Error	1	1	0	Recovered Write error - no index
	1	2	0	Recovered no seek completion
	1	3	0	Recovered Write error - write fault
	1	9	0	Track following error
	1	0B	1	Temperature warning
	1	0C	1	Recovered Write error with auto-realloc – reallocated
	1	0C	3	Recovered Write error - recommend reassign
	1	12	1	Recovered data without ECC using prev logical block ID
	1	12	2	Recovered data with ECC using prev logical block ID
	1	14	1	Recovered Record Not Found
	1	16	0	Recovered Write error - Data Sync Mark Error
	1	16	1	Recovered Write error - Data Sync Error - data rewritten
	1	16	2	Recovered Write error - Data Sync Error - recommend rewrite
	1	16	3	Recovered Write error - Data Sync Error - data auto-reallocated
	1	16	4	Recovered Write error - Data Sync Error - recommend reassignment
	1	17	0	Recovered data with no error correction applied
	1	17	1	Recovered Read error - with retries
	1	17	2	Recovered data using positive offset
	1	17	3	Recovered data using negative offset
	1	17	5	Recovered data using previous logical block ID
	1	17	6	Recovered Read error - without ECC, auto reallocated
	1	17	7	Recovered Read error - without ECC, recommend reassign
	1	17	8	Recovered Read error - without ECC, recommend rewrite
	1	17	9	Recovered Read error - without ECC, data rewritten
	1	18	0	Recovered Read error - with ECC
	1	18	1	Recovered data - with ECC and retries
1	18	2	Recovered Read error - with ECC, auto reallocated	
1	18	5	Recovered Read error - with ECC, recommend reassign	
1	18	6	Recovered data using ECC and offsets	

Category	Sense Key	Additional Sense Code	Additional Sense Code Qualifier	Error Condition
	Byte 2	Byte 12	Byte 13	
	1	18	7	Recovered Read error - with ECC, data rewritten
	1	1C	0	Defect list not found
	1	1C	1	Primary defect list not found
	1	1C	2	Grown defect list not found
	1	1F	0	Partial defect list transferred
	1	44	0	Internal target failure
	1	5D	0	PFA threshold reached
	1	5D	FF	PFA test warning
	1	81	0	Internal logic failure
Not Ready	2	4	0	Not Ready - start motor failed
	2	4	1	Not Ready - becoming ready
	2	4	2	Not Ready - need initialize command (start unit)
	2	4	3	Not Ready - manual intervention required
	2	4	4	Not Ready - format in progress
	2	4	9	Not Ready - self-test in progress
	2	31	0	Not Ready - medium format corrupted
	2	31	1	Not Ready - format command failed
	2	35	2	Not Ready - enclosure services unavailable
	2	40	80	Diagnostic Failure - bring-up fail or degraded mode
	2	40	81	Diagnostic Failure - Hard Disk Controller
	2	40	85	Diagnostic Failure - RAM microcode not loaded
	2	40	90	Diagnostic Failure - RRO Calibration
	2	40	91	Diagnostic Failure - Channel Calibration
	2	40	92	Diagnostic Failure - Head Load
	2	40	93	Diagnostic Failure - Write AE
	2	40	94	Diagnostic Failure - 12V over current
	2	40	95	Diagnostic Failure - Other spindle failure
	2	40	B0	Diagnostic Failure - self-reset
	2	4C	0	Diagnostic Failure - config not loaded
Medium Error	3	3	0	Medium Error - write fault
	3	0C	FF	Medium Error - write recovery time limit exceeded
	3	10	0	Medium Error - ID CRC error
	3	11	0	Medium Error - unrecovered read error
	3	11	1	Medium Error - read retries exhausted
	3	11	2	Medium Error - error too long to correct

Category	Sense Key	Additional Sense Code	Additional Sense Code Qualifier	Error Condition
	Byte 2	Byte 12	Byte 13	
	3	11	4	Medium Error - unrecovered read error - auto re-alloc failed
	3	11	0B	Medium Error - unrecovered read error - recommend reassign
	3	11	FF	Medium Error - read recovery time limit exceeded
	3	14	1	Medium Error - record not found
	3	16	0	Medium Error - Data Sync Mark error
	3	16	4	Medium Error - Data Sync Error - recommend reassign
	3	19	0	Medium Error - defect list error
	3	19	1	Medium Error - defect list not available
	3	19	2	Medium Error - defect list error in primary list
	3	19	3	Medium Error - defect list error in grown list
	3	19	0E	Medium Error - fewer than 50% defect list copies
	3	31	0	Medium Error – medium format corrupted
	3	31	1	Medium Error - format command failed
	3	80	0	Medium Error - data auto-reallocated
Hardware Error	4	1	0	Hardware Error - no index or sector
	4	2	0	Hardware Error - no seek complete
	4	3	0	Hardware Error - write fault
	4	9	0	Hardware Error - track following error
	4	11	0	Hardware Error - unrecovered read error in reserved area
	4	16	0	Hardware Error - Data Sync Mark error in reserved area
	4	19	0	Hardware Error – defect list error
	4	19	2	Hardware Error – defect list error in Primary List
	4	19	3	Hardware Error – defect list error in Grown List
	4	31	0	Hardware Error - reassign failed
	4	32	0	Hardware Error - no defect spare available
	4	35	1	Hardware Error - unsupported enclosure function
	4	35	2	Hardware Error - enclosure services unavailable
	4	35	3	Hardware Error - enclosure services transfer failure
	4	35	4	Hardware Error - enclosure services refused
	4	3E	3	Hardware Error - self-test failed
	4	3E	4	Hardware Error – unable to update self-test
	4	40	80	Hardware Error - Degrade Mode (Diagnostic Fail)
	4	40	81	Hardware Error - Degrade Mode. H/W Error
	4	40	85	Hardware Error - Degrade Mode. RAM microcode not loaded
	4	40	90	Hardware Error - seek test failure



Category	Sense Key	Additional Sense Code	Additional Sense Code Qualifier	Error Condition
	Byte 2	Byte 12	Byte 13	
	4	40	A0	Hardware Error - read/write test failure
	4	40	B0	Hardware Error – device self-reset
	4	40	D0	Hardware Error - component mismatch
	4	44	0	Hardware Error - internal target failure
	4	81	0	Hardware Error - internal logic error
	4	82	0	Hardware Error - command timeout
Illegal Request	5	1A	0	Illegal Request - parameter list length error
	5	20	0	Illegal Request - invalid/unsupported command code
	5	21	0	Illegal Request - LBA out of range
	5	24	0	Illegal Request - invalid field in CDB (Command Descriptor Block)
	5	25	0	Illegal Request - invalid LUN
	5	26	0	Illegal Request - invalid fields in parameter list
	5	26	1	Illegal Request - parameter not supported
	5	26	2	Illegal Request - invalid parameter value
	5	26	3	Illegal Request - invalid field parameter - threshold parameter
	5	26	4	Illegal Request - invalid release of persistent reservation
	5	26	97	Illegal Request - invalid field parameter - TMS firmware tag
	5	26	98	Illegal Request - invalid field parameter - check sum
	5	26	99	Illegal Request - invalid field parameter - firmware tag
	5	2C	0	Illegal Request - command sequence error
	5	35	1	Illegal Request - unsupported enclosure function
	5	49	0	Illegal Request - invalid message
	5	53	0	Illegal Request - media load or eject failed
	5	53	1	Illegal Request - unload tape failure
	5	53	2	Illegal Request - medium removal prevented
	5	55	0	Illegal Request - system resource failure
5	55	1	Illegal Request - system buffer full	
5	55	4	Illegal Request - Insufficient Registration Resources	
Unit Attention	6	28	0	Unit Attention - not-ready to ready transition (format complete)
	6	29	0	Unit Attention - POR or device reset occurred
	6	29	1	Unit Attention - POR occurred
	6	29	2	Unit Attention - SCSI bus reset occurred
	6	29	3	Unit Attention - TARGET RESET occurred
	6	29	4	Unit Attention - self-initiated-reset occurred
	6	29	5	Unit Attention - transceiver mode change to SE

Category	Sense Key	Additional Sense Code	Additional Sense Code Qualifier	Error Condition
	Byte 2	Byte 12	Byte 13	
	6	29	6	Unit Attention - transceiver mode change to LVD
	6	2A	0	Unit Attention - parameters changed
	6	2A	1	Unit Attention - mode parameters changed
	6	2A	2	Unit Attention - log select parameters changed
	6	2A	3	Unit Attention - Reservations pre-empted
	6	2A	4	Unit Attention - Reservations released
	6	2A	5	Unit Attention - Registrations pre-empted
	6	2F	0	Unit Attention - commands cleared by another initiator
	6	3F	0	Unit Attention - target operating conditions have changed
	6	3F	1	Unit Attention - microcode changed
	6	3F	2	Unit Attention - changed operating definition
	6	3F	3	Unit Attention - inquiry parameters changed
	6	3F	5	Unit Attention - device identifier changed
	6	3F	90	Unit Attention - invalid APM parameters
	6	3F	91	Unit Attention - world-wide name mismatch
	6	5D	0	Unit Attention - PFA threshold reached
	6	5D	FF	Unit Attention - PFA threshold exceeded
Write Protect	7	27	0	Write Protect - command not allowed
Aborted Command	B	0	0	Aborted Command - no additional sense code
	B	1B	0	Aborted Command - sync data transfer error (extra ACK)
	B	25	0	Aborted Command - unsupported LUN
	B	3F	0F	Aborted Command - echo buffer overwritten
	B	43	0	Aborted Command - message reject error
	B	44	0	Aborted Command - internal target failure
	B	45	0	Aborted Command - Selection/Reselection failure
	B	47	0	Aborted Command - SCSI parity error
	B	48	0	Aborted Command - initiator-detected error message received
	B	49	0	Aborted Command - inappropriate/illegal message
	B	4B	0	Aborted Command - data phase error
	B	4E	0	Aborted Command - overlapped commands attempted
	B	4F	0	Aborted Command - due to loop initialization
Other	E	1D	0	Miscompare - during verify byte check operation
	x	3	86	Write Fault Data Corruption
	x	5	0	Illegal request
	x	6	0	Unit attention

Category	Sense Key	Additional Sense Code	Additional Sense Code Qualifier	Error Condition
	Byte 2	Byte 12	Byte 13	
	x	7	0	Data protect
	x	8	0	LUN communication failure
	x	8	1	LUN communication timeout
	x	8	2	LUN communication parity error
	x	9	0	Vendor specific sense key
	x	9	1	Servo fault
	x	9	4	Head select fault
	x	0A	0	Error log overflow
	x	0B	0	Aborted command
	x	0C	0	Write error
	x	0C	2	Write error - auto-reallocation failed
	x	0E	0	Data miscompare
	x	12	0	Address mark not found for ID field
	x	14	0	Logical block not found
	x	15	0	Random positioning error
	x	15	1	Mechanical positioning error
	x	15	2	Positioning error detected by read of medium
	x	27	0	Write protected
	x	29	0	POR or bus reset occurred
	x	31	1	Format failed
	x	31	91	Format corrupted
	x	32	1	Defect list update error
	x	32	2	No spares available
	x	35	1	Unspecified enclosure services failure
	x	37	0	Parameter rounded
	x	3D	0	Invalid bits in identify message
	x	3E	0	LUN not self-configured yet
	x	40	1	DRAM parity error
	x	40	2	DRAM parity error
	x	42	0	Power-on or self-test failure
	x	4C	0	LUN failed self-configuration
	x	5C	0	RPL status change
	x	5C	1	Spindles synchronized
	x	5C	2	Spindles not synchronized

Category	Sense Key	Additional Sense Code	Additional Sense Code Qualifier	Error Condition
	Byte 2	Byte 12	Byte 13	
	x	65	0	Voltage fault
	x	80	0	General firmware error

## 1.10 Multiple Sense Codes

An error event in the log may be followed by a second error event that can provide additional information. For example a CDB is issued to VERIFY a data block is shown below.

CDB: **2f** 00 **13 8e 93 05** 00 80 00 00

The CDB indicates that the drive will verify the 0x8000 block written data on the medium using ECC starting from LBA 0x**138E9305**.

It is followed by the sense data, which indicates that the drive returned an unrecoverable read error on the LBA 0x**138EF588**.

Sense Code: f0 00 **03 13 8e f5 88** 0a 00 00 00 00 **11 00** 00 00 00 0

Next the Controller tries to fix the error using the WRITE and VERIFY command, which indicates that the drive will write 0x01 block data and then verify the written data in the medium using ECC starting from LAB 0x**138EF588**.

CDB: 2e 00 **13 8e f5 88** 00 00 01 00

It is followed by the sense data, which indicates that the drive failed the read command again.

Sense Code: f0 00 **03 13 8e f5 88** 0a 00 00 00 00 **11 00** 00 00 00 0

## Appendix A: SCSI ASC/ASCQ Assignments

SCSI ASC/ASCQ Assignments (ASC-NUM.TXT)  
 Numeric Sorted Listing as of 5/13/07

D	- DIRECT ACCESS DEVICE (SBC-2)	device column key
.T	- SEQUENTIAL ACCESS DEVICE (SSC)	-----
.L	- PRINTER DEVICE (SSC)	blank = reserved
.P	- PROCESSOR DEVICE (SPC)	not blank = allowed
.W	- WRITE ONCE READ MULTIPLE DEVICE (SBC-2)	
.R	- CD DEVICE (MMC)	
.O	- OPTICAL MEMORY DEVICE (SBC-2)	
.M	- MEDIA CHANGER DEVICE (SMC)	
.A	- STORAGE ARRAY DEVICE (SCC)	
.E	- ENCLOSURE SERVICES DEVICE (SES)	
.B	- SIMPLIFIED DIRECT-ACCESS DEVICE (RBC)	
.K	- OPTICAL CARD READER/WRIER DEVICE (OCRW)	
.V	- AUTOMATION/DRIVE INTERFACE (ADC)	
.F	- OBJECT-BASED STORAGE (OSD)	
ASC/ASCQ	DTLPWROMAEBKVF	Description
-----	-----	-----
00h/00h	DTLPWROMAEBKVF	NO ADDITIONAL SENSE INFORMATION
00h/01h	T	FILEMARK DETECTED
00h/02h	T	END-OF-PARTITION/MEDIUM DETECTED
00h/03h	T	SETMARK DETECTED
00h/04h	T	BEGINNING-OF-PARTITION/MEDIUM DETECTED
00h/05h	TL	END-OF-DATA DETECTED
00h/06h	DTLPWROMAEBKVF	I/O PROCESS TERMINATED
00h/11h	R	AUDIO PLAY OPERATION IN PROGRESS
00h/12h	R	AUDIO PLAY OPERATION PAUSED
00h/13h	R	AUDIO PLAY OPERATION SUCCESSFULLY COMPLETED
00h/14h	R	AUDIO PLAY OPERATION STOPPED DUE TO ERROR
00h/15h	R	NO CURRENT AUDIO STATUS TO RETURN
00h/16h	DTLPWROMAEBKVF	OPERATION IN PROGRESS
00h/17h	DTL WROMAEBKVF	CLEANING REQUESTED
00h/18h	T	ERASE OPERATION IN PROGRESS
00h/19h	T	LOCATE OPERATION IN PROGRESS
00h/1Ah	T	REWIND OPERATION IN PROGRESS
00h/1Bh	T	SET CAPACITY OPERATION IN PROGRESS
00h/1Ch	T	VERIFY OPERATION IN PROGRESS
00h/1Dh	DT B	ATA PASS THROUGH INFORMATION AVAILABLE
01h/00h	D W O BK	NO INDEX/SECTOR SIGNAL
02h/00h	D WROM BK	NO SEEK COMPLETE
03h/00h	DTL W O BK	PERIPHERAL DEVICE WRITE FAULT
03h/01h	T	NO WRITE CURRENT
03h/02h	T	EXCESSIVE WRITE ERRORS
04h/00h	DTLPWROMAEBKVF	LOGICAL UNIT NOT READY, CAUSE NOT REPORTABLE
04h/01h	DTLPWROMAEBKVF	LOGICAL UNIT IS IN PROCESS OF BECOMING READY
04h/02h	DTLPWROMAEBKVF	LOGICAL UNIT NOT READY, INITIALIZING COMMAND REQUIRED
04h/03h	DTLPWROMAEBKVF	LOGICAL UNIT NOT READY, MANUAL INTERVENTION REQUIRED
04h/04h	DTL RO B	LOGICAL UNIT NOT READY, FORMAT IN PROGRESS
04h/05h	DT W OMA BK	LOGICAL UNIT NOT READY, REBUILD IN PROGRESS
04h/06h	DT W OMA BK	LOGICAL UNIT NOT READY, RECALCULATION IN PROGRESS
04h/07h	DTLPWROMAEBKVF	LOGICAL UNIT NOT READY, OPERATION IN PROGRESS
04h/08h	R	LOGICAL UNIT NOT READY, LONG WRITE IN PROGRESS
04h/09h	DTLPWROMAEBKVF	LOGICAL UNIT NOT READY, SELF-TEST IN PROGRESS
04h/0Ah	DTLPWROMAEBKVF	LOGICAL UNIT NOT ACCESSIBLE, ASYMMETRIC ACCESS STATE TRANSITION

04h/0Bh	DTLPWROMAEBKVF			LOGICAL UNIT NOT ACCESSIBLE, TARGET PORT IN STANDBY STATE
04h/0Ch	DTLPWROMAEBKVF			LOGICAL UNIT NOT ACCESSIBLE, TARGET PORT IN UNAVAILABLE STATE
04h/10h	DT WROM B			LOGICAL UNIT NOT READY, AUXILIARY MEMORY NOT ACCESSIBLE
04h/11h	DT WROMAEB VF			LOGICAL UNIT NOT READY, NOTIFY (ENABLE SPINUP) REQUIRED
04h/12h		M	V	LOGICAL UNIT NOT READY, OFFLINE
05h/00h	DTL WROMAEBKVF			LOGICAL UNIT DOES NOT RESPOND TO SELECTION
06h/00h	D WROM BK			NO REFERENCE POSITION FOUND
07h/00h	DTL WROM BK			MULTIPLE PERIPHERAL DEVICES SELECTED
08h/00h	DTL WROMAEBKVF			LOGICAL UNIT COMMUNICATION FAILURE
08h/01h	DTL WROMAEBKVF			LOGICAL UNIT COMMUNICATION TIME-OUT
08h/02h	DTL WROMAEBKVF			LOGICAL UNIT COMMUNICATION PARITY ERROR
08h/03h	DT ROM BK			LOGICAL UNIT COMMUNICATION CRC ERROR (ULTRA-DMA/32)
08h/04h	DTLPWRO K			UNREACHABLE COPY TARGET
09h/00h	DT WRO B			TRACK FOLLOWING ERROR
09h/01h		WRO	K	TRACKING SERVO FAILURE
09h/02h		WRO	K	FOCUS SERVO FAILURE
09h/03h		WRO		SPINDLE SERVO FAILURE
09h/04h	DT WRO B			HEAD SELECT FAULT
0Ah/00h	DTLPWROMAEBKVF			ERROR LOG OVERFLOW
0Bh/00h	DTLPWROMAEBKVF			WARNING
0Bh/01h	DTLPWROMAEBKVF			WARNING - SPECIFIED TEMPERATURE EXCEEDED
0Bh/02h	DTLPWROMAEBKVF			WARNING - ENCLOSURE DEGRADED
0Bh/03h	DTLPWROMAEBKVF			WARNING - BACKGROUND SELF-TEST FAILED
0Bh/04h	DTLPWROMAEBKVF			WARNING - BACKGROUND PRE-SCAN DETECTED MEDIUM ERROR
0Bh/05h	DTLPWROMAEBKVF			WARNING - BACKGROUND MEDIUM SCAN DETECTED MEDIUM ERROR
0Ch/00h		T	R	WRITE ERROR
0Ch/01h			K	WRITE ERROR - RECOVERED WITH AUTO REALLOCATION
0Ch/02h	D W O BK			WRITE ERROR - AUTO REALLOCATION FAILED
0Ch/03h	D W O BK			WRITE ERROR - RECOMMEND REASSIGNMENT
0Ch/04h	DT W O B			COMPRESSION CHECK MISCOMPARE ERROR
0Ch/05h	DT W O B			DATA EXPANSION OCCURRED DURING COMPRESSION
0Ch/06h	DT W O B			BLOCK NOT COMPRESSIBLE
0Ch/07h		R		WRITE ERROR - RECOVERY NEEDED
0Ch/08h		R		WRITE ERROR - RECOVERY FAILED
0Ch/09h		R		WRITE ERROR - LOSS OF STREAMING
0Ch/0Ah		R		WRITE ERROR - PADDING BLOCKS ADDED
0Ch/0Bh	DT WROM B			AUXILIARY MEMORY WRITE ERROR
0Ch/0Ch	DTLPWROMAEBKVF			WRITE ERROR - UNEXPECTED UNSOLICITED DATA
0Ch/0Dh	DTLPWROMAEBKVF			WRITE ERROR - NOT ENOUGH UNSOLICITED DATA
0Ch/0Fh		R		DEFECTS IN ERROR WINDOW
0Dh/00h	DTLPWRO A K			ERROR DETECTED BY THIRD PARTY TEMPORARY INITIATOR
0Dh/01h	DTLPWRO A K			THIRD PARTY DEVICE FAILURE
0Dh/02h	DTLPWRO A K			COPY TARGET DEVICE NOT REACHABLE
0Dh/03h	DTLPWRO A K			INCORRECT COPY TARGET DEVICE TYPE
0Dh/04h	DTLPWRO A K			COPY TARGET DEVICE DATA UNDERRUN
0Dh/05h	DTLPWRO A K			COPY TARGET DEVICE DATA OVERRUN
0Eh/00h	DT PWROMAEBK F			INVALID INFORMATION UNIT
0Eh/01h	DT PWROMAEBK F			INFORMATION UNIT TOO SHORT
0Eh/02h	DT PWROMAEBK F			INFORMATION UNIT TOO LONG
0Eh/03h	DT P R MAEBK F			INVALID FIELD IN COMMAND INFORMATION UNIT
0Fh/00h				
10h/00h	D W O BK			ID CRC OR ECC ERROR
10h/01h	DT W O			LOGICAL BLOCK GUARD CHECK FAILED
10h/02h	DT W O			LOGICAL BLOCK APPLICATION TAG CHECK FAILED
10h/03h	DT W O			LOGICAL BLOCK REFERENCE TAG CHECK FAILED

11h/00h	DT	WRO	BK	UNRECOVERED READ ERROR
11h/01h	DT	WRO	BK	READ RETRIES EXHAUSTED
11h/02h	DT	WRO	BK	ERROR TOO LONG TO CORRECT
11h/03h	DT	W O	BK	MULTIPLE READ ERRORS
11h/04h	D	W O	BK	UNRECOVERED READ ERROR - AUTO REALLOCATE FAILED
11h/05h		WRO	B	L-EC UNCORRECTABLE ERROR
11h/06h		WRO	B	CIRC UNRECOVERED ERROR
11h/07h		W O	B	DATA RE-SYNCHRONIZATION ERROR
11h/08h	T			INCOMPLETE BLOCK READ
11h/09h	T			NO GAP FOUND
11h/0Ah	DT	O	BK	MISCORRECTED ERROR
11h/0Bh	D	W O	BK	UNRECOVERED READ ERROR - RECOMMEND REASSIGNMENT
11h/0Ch	D	W O	BK	UNRECOVERED READ ERROR - RECOMMEND REWRITE THE DATA
11h/0Dh	DT	WRO	B	DE-COMPRESSION CRC ERROR
11h/0Eh	DT	WRO	B	CANNOT DECOMPRESS USING DECLARED ALGORITHM
11h/0Fh		R		ERROR READING UPC/EAN NUMBER
11h/10h		R		ERROR READING ISRC NUMBER
11h/11h		R		READ ERROR - LOSS OF STREAMING
11h/12h	DT	WROM	B	AUXILIARY MEMORY READ ERROR
11h/13h	DTLPWROMAEBKV			READ ERROR - FAILED RETRANSMISSION REQUEST
11h/14h	D			READ ERROR - LBA MARKED BAD BY APPLICATION CLIENT
12h/00h	D	W O	BK	ADDRESS MARK NOT FOUND FOR ID FIELD
13h/00h	D	W O	BK	ADDRESS MARK NOT FOUND FOR DATA FIELD
14h/00h	DTL	WRO	BK	RECORDED ENTITY NOT FOUND
14h/01h	DT	WRO	BK	RECORD NOT FOUND
14h/02h	T			FILEMARK OR SETMARK NOT FOUND
14h/03h	T			END-OF-DATA NOT FOUND
14h/04h	T			BLOCK SEQUENCE ERROR
14h/05h	DT	W O	BK	RECORD NOT FOUND - RECOMMEND REASSIGNMENT
14h/06h	DT	W O	BK	RECORD NOT FOUND - DATA AUTO-REALLOCATED
14h/07h	T			LOCATE OPERATION FAILURE
15h/00h	DTL	WROM	BK	RANDOM POSITIONING ERROR
15h/01h	DTL	WROM	BK	MECHANICAL POSITIONING ERROR
15h/02h	DT	WRO	BK	POSITIONING ERROR DETECTED BY READ OF MEDIUM
16h/00h	D	W O	BK	DATA SYNCHRONIZATION MARK ERROR
16h/01h	D	W O	BK	DATA SYNC ERROR - DATA REWRITTEN
16h/02h	D	W O	BK	DATA SYNC ERROR - RECOMMEND REWRITE
16h/03h	D	W O	BK	DATA SYNC ERROR - DATA AUTO-REALLOCATED
16h/04h	D	W O	BK	DATA SYNC ERROR - RECOMMEND REASSIGNMENT
17h/00h	DT	WRO	BK	RECOVERED DATA WITH NO ERROR CORRECTION APPLIED
17h/01h	DT	WRO	BK	RECOVERED DATA WITH RETRIES
17h/02h	DT	WRO	BK	RECOVERED DATA WITH POSITIVE HEAD OFFSET
17h/03h	DT	WRO	BK	RECOVERED DATA WITH NEGATIVE HEAD OFFSET
17h/04h		WRO	B	RECOVERED DATA WITH RETRIES AND/OR CIRC APPLIED
17h/05h	D	WRO	BK	RECOVERED DATA USING PREVIOUS SECTOR ID
17h/06h	D	W O	BK	RECOVERED DATA WITHOUT ECC - DATA AUTO-REALLOCATED
17h/07h	D	WRO	BK	RECOVERED DATA WITHOUT ECC - RECOMMEND REASSIGNMENT
17h/08h	D	WRO	BK	RECOVERED DATA WITHOUT ECC - RECOMMEND REWRITE
17h/09h	D	WRO	BK	RECOVERED DATA WITHOUT ECC - DATA REWRITTEN
18h/00h	DT	WRO	BK	RECOVERED DATA WITH ERROR CORRECTION APPLIED
18h/01h	D	WRO	BK	RECOVERED DATA WITH ERROR CORR. & RETRIES APPLIED
18h/02h	D	WRO	BK	RECOVERED DATA - DATA AUTO-REALLOCATED
18h/03h		R		RECOVERED DATA WITH CIRC
18h/04h		R		RECOVERED DATA WITH L-EC
18h/05h	D	WRO	BK	RECOVERED DATA - RECOMMEND REASSIGNMENT
18h/06h	D	WRO	BK	RECOVERED DATA - RECOMMEND REWRITE
18h/07h	D	W O	BK	RECOVERED DATA WITH ECC - DATA REWRITTEN
18h/08h		R		RECOVERED DATA WITH LINKING
19h/00h	D	O	K	DEFECT LIST ERROR
19h/01h	D	O	K	DEFECT LIST NOT AVAILABLE

19h/02h	D	O	K	DEFECT LIST ERROR IN PRIMARY LIST
19h/03h	D	O	K	DEFECT LIST ERROR IN GROWN LIST
1Ah/00h	DTLPWROMAEBKVF			PARAMETER LIST LENGTH ERROR
1Bh/00h	DTLPWROMAEBKVF			SYNCHRONOUS DATA TRANSFER ERROR
1Ch/00h	D	O	BK	DEFECT LIST NOT FOUND
1Ch/01h	D	O	BK	PRIMARY DEFECT LIST NOT FOUND
1Ch/02h	D	O	BK	GROWN DEFECT LIST NOT FOUND
1Dh/00h	DT	WRO	BK	MISCOMPARE DURING VERIFY OPERATION
1Eh/00h	D	W O	BK	RECOVERED ID WITH ECC CORRECTION
1Fh/00h	D	O	K	PARTIAL DEFECT LIST TRANSFER
20h/00h	DTLPWROMAEBKVF			INVALID COMMAND OPERATION CODE
20h/01h	DT	PWROMAEBK		ACCESS DENIED - INITIATOR PENDING-ENROLLED
20h/02h	DT	PWROMAEBK		ACCESS DENIED - NO ACCESS RIGHTS
20h/03h	DT	PWROMAEBK		ACCESS DENIED - INVALID MGMT ID KEY
20h/04h	T			ILLEGAL COMMAND WHILE IN WRITE CAPABLE STATE
20h/05h	T			Obsolete
20h/06h	T			ILLEGAL COMMAND WHILE IN EXPLICIT ADDRESS MODE
20h/07h	T			ILLEGAL COMMAND WHILE IN IMPLICIT ADDRESS MODE
20h/08h	DT	PWROMAEBK		ACCESS DENIED - ENROLLMENT CONFLICT
20h/09h	DT	PWROMAEBK		ACCESS DENIED - INVALID LU IDENTIFIER
20h/0Ah	DT	PWROMAEBK		ACCESS DENIED - INVALID PROXY TOKEN
20h/0Bh	DT	PWROMAEBK		ACCESS DENIED - ACL LUN CONFLICT
21h/00h	DT	WROM	BK	LOGICAL BLOCK ADDRESS OUT OF RANGE
21h/01h	DT	WROM	BK	INVALID ELEMENT ADDRESS
21h/02h		R		INVALID ADDRESS FOR WRITE
21h/03h		R		INVALID WRITE CROSSING LAYER JUMP
22h/00h	D			ILLEGAL FUNCTION (USE 20 00, 24 00, OR 26 00)
23h/00h				
24h/00h	DTLPWROMAEBKVF			INVALID FIELD IN CDB
24h/01h	DTLPWROMAEBKVF			CDB DECRYPTION ERROR
24h/02h	T			Obsolete
24h/03h	T			Obsolete
24h/04h			F	SECURITY AUDIT VALUE FROZEN
24h/05h			F	SECURITY WORKING KEY FROZEN
24h/06h			F	NONCE NOT UNIQUE
24h/07h			F	NONCE TIMESTAMP OUT OF RANGE
25h/00h	DTLPWROMAEBKVF			LOGICAL UNIT NOT SUPPORTED
26h/00h	DTLPWROMAEBKVF			INVALID FIELD IN PARAMETER LIST
26h/01h	DTLPWROMAEBKVF			PARAMETER NOT SUPPORTED
26h/02h	DTLPWROMAEBKVF			PARAMETER VALUE INVALID
26h/03h	DTLPWROMAE	K		THRESHOLD PARAMETERS NOT SUPPORTED
26h/04h	DTLPWROMAEBKVF			INVALID RELEASE OF PERSISTENT RESERVATION
26h/05h	DTLPWROMA	BK		DATA DECRYPTION ERROR
26h/06h	DTLPWRO	K		TOO MANY TARGET DESCRIPTORS
26h/07h	DTLPWRO	K		UNSUPPORTED TARGET DESCRIPTOR TYPE CODE
26h/08h	DTLPWRO	K		TOO MANY SEGMENT DESCRIPTORS
26h/09h	DTLPWRO	K		UNSUPPORTED SEGMENT DESCRIPTOR TYPE CODE
26h/0Ah	DTLPWRO	K		UNEXPECTED INEXACT SEGMENT
26h/0Bh	DTLPWRO	K		INLINE DATA LENGTH EXCEEDED
26h/0Ch	DTLPWRO	K		INVALID OPERATION FOR COPY SOURCE OR DESTINATION
26h/0Dh	DTLPWRO	K		COPY SEGMENT GRANULARITY VIOLATION
26h/0Eh	DT	PWROMAEBK		INVALID PARAMETER WHILE PORT IS ENABLED
26h/0Fh			F	INVALID DATA-OUT BUFFER INTEGRITY CHECK VALUE
26h/10h	T			DATA DECRYPTION KEY FAIL LIMIT REACHED
26h/11h	T			INCOMPLETE KEY-ASSOCIATED DATA SET
26h/12h	T			VENDOR SPECIFIC KEY REFERENCE NOT FOUND
27h/00h	DT	WRO	BK	WRITE PROTECTED
27h/01h	DT	WRO	BK	HARDWARE WRITE PROTECTED
27h/02h	DT	WRO	BK	LOGICAL UNIT SOFTWARE WRITE PROTECTED
27h/03h	T	R		ASSOCIATED WRITE PROTECT



27h/04h	T	R	PERSISTENT WRITE PROTECT
27h/05h	T	R	PERMANENT WRITE PROTECT
27h/06h		R	CONDITIONAL WRITE PROTECT
28h/00h	DTLPWROMAEBKVF		NOT READY TO READY CHANGE, MEDIUM MAY HAVE CHANGED
28h/01h	DT	WROM B	IMPORT OR EXPORT ELEMENT ACCESSED
28h/02h		R	FORMAT-LAYER MAY HAVE CHANGED
29h/00h	DTLPWROMAEBKVF		POWER ON, RESET, OR BUS DEVICE RESET OCCURRED
29h/01h	DTLPWROMAEBKVF		POWER ON OCCURRED
29h/02h	DTLPWROMAEBKVF		SCSI BUS RESET OCCURRED
29h/03h	DTLPWROMAEBKVF		BUS DEVICE RESET FUNCTION OCCURRED
29h/04h	DTLPWROMAEBKVF		DEVICE INTERNAL RESET
29h/05h	DTLPWROMAEBKVF		TRANSCEIVER MODE CHANGED TO SINGLE-ENDED
29h/06h	DTLPWROMAEBKVF		TRANSCEIVER MODE CHANGED TO LVD
29h/07h	DTLPWROMAEBKVF		I_T NEXUS LOSS OCCURRED
2Ah/00h	DTL	WROMAEBKVF	PARAMETERS CHANGED
2Ah/01h	DTL	WROMAEBKVF	MODE PARAMETERS CHANGED
2Ah/02h	DTL	WROMAE K	LOG PARAMETERS CHANGED
2Ah/03h	DTLPWROMAE K		RESERVATIONS PREEMPTED
2Ah/04h	DTLPWROMAE		RESERVATIONS RELEASED
2Ah/05h	DTLPWROMAE		REGISTRATIONS PREEMPTED
2Ah/06h	DTLPWROMAEBKVF		ASYMMETRIC ACCESS STATE CHANGED
2Ah/07h	DTLPWROMAEBKVF		IMPLICIT ASYMMETRIC ACCESS STATE TRANSITION FAILED
2Ah/08h	DT	WROMAEBKVF	PRIORITY CHANGED
2Ah/09h	D		CAPACITY DATA HAS CHANGED
2Ah/10h	DT	M E V	TIMESTAMP CHANGED
2Ah/11h	T		DATA ENCRYPTION PARAMETERS CHANGED BY ANOTHER I_T NEXUS
2Ah/12h	T		DATA ENCRYPTION PARAMETERS CHANGED BY VENDOR SPECIFIC EVENT
2Ah/13h	T		DATA ENCRYPTION KEY INSTANCE COUNTER HAS CHANGED
2Bh/00h	DTLPWRO	K	COPY CANNOT EXECUTE SINCE HOST CANNOT DISCONNECT
2Ch/00h	DTLPWROMAEBKVF		COMMAND SEQUENCE ERROR
2Ch/01h			TOO MANY WINDOWS SPECIFIED
2Ch/02h			INVALID COMBINATION OF WINDOWS SPECIFIED
2Ch/03h		R	CURRENT PROGRAM AREA IS NOT EMPTY
2Ch/04h		R	CURRENT PROGRAM AREA IS EMPTY
2Ch/05h		B	ILLEGAL POWER CONDITION REQUEST
2Ch/06h		R	PERSISTENT PREVENT CONFLICT
2Ch/07h	DTLPWROMAEBKVF		PREVIOUS BUSY STATUS
2Ch/08h	DTLPWROMAEBKVF		PREVIOUS TASK SET FULL STATUS
2Ch/09h	DTLPWROM	EBKVF	PREVIOUS RESERVATION CONFLICT STATUS
2Ch/0Ah		F	PARTITION OR COLLECTION CONTAINS USER OBJECTS
2Ch/0Bh	T		NOT RESERVED
2Dh/00h	T		OVERWRITE ERROR ON UPDATE IN PLACE
2Eh/00h		R	INSUFFICIENT TIME FOR OPERATION
2Fh/00h	DTLPWROMAEBKVF		COMMANDS CLEARED BY ANOTHER INITIATOR
2Fh/01h	D		COMMANDS CLEARED BY POWER LOSS NOTIFICATION
2Fh/02h	DTLPWROMAEBKVF		COMMANDS CLEARED BY DEVICE SERVER
30h/00h	DT	WROM BK	INCOMPATIBLE MEDIUM INSTALLED
30h/01h	DT	WRO BK	CANNOT READ MEDIUM - UNKNOWN FORMAT
30h/02h	DT	WRO BK	CANNOT READ MEDIUM - INCOMPATIBLE FORMAT
30h/03h	DT	R K	CLEANING CARTRIDGE INSTALLED
30h/04h	DT	WRO BK	CANNOT WRITE MEDIUM - UNKNOWN FORMAT
30h/05h	DT	WRO BK	CANNOT WRITE MEDIUM - INCOMPATIBLE FORMAT
30h/06h	DT	WRO B	CANNOT FORMAT MEDIUM - INCOMPATIBLE MEDIUM
30h/07h	DTL	WROMAEBKVF	CLEANING FAILURE
30h/08h		R	CANNOT WRITE - APPLICATION CODE MISMATCH
30h/09h		R	CURRENT SESSION NOT FIXATED FOR APPEND
30h/0Ah	DT	WROMAEBK	CLEANING REQUEST REJECTED
30h/0Ch	T		WORM MEDIUM - OVERWRITE ATTEMPTED

30h/0Dh	T			WORM MEDIUM - INTEGRITY CHECK
30h/10h		R		MEDIUM NOT FORMATTED
31h/00h	DT	WRO	BK	MEDIUM FORMAT CORRUPTED
31h/01h	D L	RO	B	FORMAT COMMAND FAILED
31h/02h		R		ZONED FORMATTING FAILED DUE TO SPARE LINKING
32h/00h	D	W O	BK	NO DEFECT SPARE LOCATION AVAILABLE
32h/01h	D	W O	BK	DEFECT LIST UPDATE FAILURE
33h/00h		T		TAPE LENGTH ERROR
34h/00h	DTLPWROMAEBKVF			ENCLOSURE FAILURE
35h/00h	DTLPWROMAEBKVF			ENCLOSURE SERVICES FAILURE
35h/01h	DTLPWROMAEBKVF			UNSUPPORTED ENCLOSURE FUNCTION
35h/02h	DTLPWROMAEBKVF			ENCLOSURE SERVICES UNAVAILABLE
35h/03h	DTLPWROMAEBKVF			ENCLOSURE SERVICES TRANSFER FAILURE
35h/04h	DTLPWROMAEBKVF			ENCLOSURE SERVICES TRANSFER REFUSED
35h/05h	DTL	WROMAEBKVF		ENCLOSURE SERVICES CHECKSUM ERROR
36h/00h		L		RIBBON, INK, OR TONER FAILURE
37h/00h	DTL	WROMAEBKVF		ROUNDED PARAMETER
38h/00h			B	EVENT STATUS NOTIFICATION
38h/02h			B	ESN - POWER MANAGEMENT CLASS EVENT
38h/04h			B	ESN - MEDIA CLASS EVENT
38h/06h			B	ESN - DEVICE BUSY CLASS EVENT
39h/00h	DTL	WROMAE	K	SAVING PARAMETERS NOT SUPPORTED
3Ah/00h	DTL	WROM	BK	MEDIUM NOT PRESENT
3Ah/01h	DT	WROM	BK	MEDIUM NOT PRESENT - TRAY CLOSED
3Ah/02h	DT	WROM	BK	MEDIUM NOT PRESENT - TRAY OPEN
3Ah/03h	DT	WROM	B	MEDIUM NOT PRESENT - LOADABLE
3Ah/04h	DT	WROM	B	MEDIUM NOT PRESENT - MEDIUM AUXILIARY MEMORY ACCESSIBLE
3Bh/00h		TL		SEQUENTIAL POSITIONING ERROR
3Bh/01h		T		TAPE POSITION ERROR AT BEGINNING-OF-MEDIUM
3Bh/02h		T		TAPE POSITION ERROR AT END-OF-MEDIUM
3Bh/03h		L		TAPE OR ELECTRONIC VERTICAL FORMS UNIT NOT READY
3Bh/04h		L		SLEW FAILURE
3Bh/05h		L		PAPER JAM
3Bh/06h		L		FAILED TO SENSE TOP-OF-FORM
3Bh/07h		L		FAILED TO SENSE BOTTOM-OF-FORM
3Bh/08h		T		REPOSITION ERROR
3Bh/09h				READ PAST END OF MEDIUM
3Bh/0Ah				READ PAST BEGINNING OF MEDIUM
3Bh/0Bh				POSITION PAST END OF MEDIUM
3Bh/0Ch		T		POSITION PAST BEGINNING OF MEDIUM
3Bh/0Dh	DT	WROM	BK	MEDIUM DESTINATION ELEMENT FULL
3Bh/0Eh	DT	WROM	BK	MEDIUM SOURCE ELEMENT EMPTY
3Bh/0Fh		R		END OF MEDIUM REACHED
3Bh/11h	DT	WROM	BK	MEDIUM MAGAZINE NOT ACCESSIBLE
3Bh/12h	DT	WROM	BK	MEDIUM MAGAZINE REMOVED
3Bh/13h	DT	WROM	BK	MEDIUM MAGAZINE INSERTED
3Bh/14h	DT	WROM	BK	MEDIUM MAGAZINE LOCKED
3Bh/15h	DT	WROM	BK	MEDIUM MAGAZINE UNLOCKED
3Bh/16h		R		MECHANICAL POSITIONING OR CHANGER ERROR
3Bh/17h			F	READ PAST END OF USER OBJECT
3Ch/00h				
3Dh/00h	DTLPWROMAE	K		INVALID BITS IN IDENTIFY MESSAGE
3Eh/00h	DTLPWROMAEBKVF			LOGICAL UNIT HAS NOT SELF-CONFIGURED YET
3Eh/01h	DTLPWROMAEBKVF			LOGICAL UNIT FAILURE
3Eh/02h	DTLPWROMAEBKVF			TIMEOUT ON LOGICAL UNIT
3Eh/03h	DTLPWROMAEBKVF			LOGICAL UNIT FAILED SELF-TEST
3Eh/04h	DTLPWROMAEBKVF			LOGICAL UNIT UNABLE TO UPDATE SELF-TEST LOG
3Fh/00h	DTLPWROMAEBKVF			TARGET OPERATING CONDITIONS HAVE CHANGED
3Fh/01h	DTLPWROMAEBKVF			MICROCODE HAS BEEN CHANGED

3Fh/02h	DTLPWROM	BK	CHANGED OPERATING DEFINITION
3Fh/03h	DTLPWROMAEBKVF		INQUIRY DATA HAS CHANGED
3Fh/04h	DT	WROMAEBK	COMPONENT DEVICE ATTACHED
3Fh/05h	DT	WROMAEBK	DEVICE IDENTIFIER CHANGED
3Fh/06h	DT	WROMAEB	REDUNDANCY GROUP CREATED OR MODIFIED
3Fh/07h	DT	WROMAEB	REDUNDANCY GROUP DELETED
3Fh/08h	DT	WROMAEB	SPARE CREATED OR MODIFIED
3Fh/09h	DT	WROMAEB	SPARE DELETED
3Fh/0Ah	DT	WROMAEBK	VOLUME SET CREATED OR MODIFIED
3Fh/0Bh	DT	WROMAEBK	VOLUME SET DELETED
3Fh/0Ch	DT	WROMAEBK	VOLUME SET DEASSIGNED
3Fh/0Dh	DT	WROMAEBK	VOLUME SET REASSIGNED
3Fh/0Eh	DTLPWROMAE		REPORTED LUNS DATA HAS CHANGED
3Fh/0Fh	DTLPWROMAEBKVF		ECHO BUFFER OVERWRITTEN
3Fh/10h	DT	WROM	B MEDIUM LOADABLE
3Fh/11h	DT	WROM	B MEDIUM AUXILIARY MEMORY ACCESSIBLE
3Fh/12h	DTLPWR	MAEBK F	iSCSI IP ADDRESS ADDED
3Fh/13h	DTLPWR	MAEBK F	iSCSI IP ADDRESS REMOVED
3Fh/14h	DTLPWR	MAEBK F	iSCSI IP ADDRESS CHANGED
40h/00h	D		RAM FAILURE (SHOULD USE 40 NN)
40h/NNh	DTLPWROMAEBKVF		DIAGNOSTIC FAILURE ON COMPONENT NN (80h-FFh)
41h/00h	D		DATA PATH FAILURE (SHOULD USE 40 NN)
42h/00h	D		POWER-ON OR SELF-TEST FAILURE (SHOULD USE 40 NN)
43h/00h	DTLPWROMAEBKVF		MESSAGE ERROR
44h/00h	DTLPWROMAEBKVF		INTERNAL TARGET FAILURE
44h/71h	DT	B	ATA DEVICE FAILED SET FEATURES
45h/00h	DTLPWROMAEBKVF		SELECT OR RESELECT FAILURE
46h/00h	DTLPWROM	BK	UNSUCCESSFUL SOFT RESET
47h/00h	DTLPWROMAEBKVF		SCSI PARITY ERROR
47h/01h	DTLPWROMAEBKVF		DATA PHASE CRC ERROR DETECTED
47h/02h	DTLPWROMAEBKVF		SCSI PARITY ERROR DETECTED DURING ST DATA PHASE
47h/03h	DTLPWROMAEBKVF		INFORMATION UNIT iuCRC ERROR DETECTED
47h/04h	DTLPWROMAEBKVF		ASYNCHRONOUS INFORMATION PROTECTION ERROR DETECTED
47h/05h	DTLPWROMAEBKVF		PROTOCOL SERVICE CRC ERROR
47h/06h	DT	MAEBKVF	PHY TEST FUNCTION IN PROGRESS
47h/7Fh	DT	PWROMAEBK	SOME COMMANDS CLEARED BY ISCSI PROTOCOL EVENT
48h/00h	DTLPWROMAEBKVF		INITIATOR DETECTED ERROR MESSAGE RECEIVED
49h/00h	DTLPWROMAEBKVF		INVALID MESSAGE ERROR
4Ah/00h	DTLPWROMAEBKVF		COMMAND PHASE ERROR
4Bh/00h	DTLPWROMAEBKVF		DATA PHASE ERROR
4Bh/01h	DT	PWROMAEBK	INVALID TARGET PORT TRANSFER TAG RECEIVED
4Bh/02h	DT	PWROMAEBK	TOO MUCH WRITE DATA
4Bh/03h	DT	PWROMAEBK	ACK/NAK TIMEOUT
4Bh/04h	DT	PWROMAEBK	NAK RECEIVED
4Bh/05h	DT	PWROMAEBK	DATA OFFSET ERROR
4Bh/06h	DT	PWROMAEBK	INITIATOR RESPONSE TIMEOUT
4Ch/00h	DTLPWROMAEBKVF		LOGICAL UNIT FAILED SELF-CONFIGURATION
4Dh/NNh	DTLPWROMAEBKVF		TAGGED OVERLAPPED COMMANDS (NN = TASK TAG)
4Eh/00h	DTLPWROMAEBKVF		OVERLAPPED COMMANDS ATTEMPTED
4Fh/00h			
50h/00h	T		WRITE APPEND ERROR
50h/01h	T		WRITE APPEND POSITION ERROR
50h/02h	T		POSITION ERROR RELATED TO TIMING
51h/00h	T	RO	ERASE FAILURE
51h/01h		R	ERASE FAILURE - INCOMPLETE ERASE OPERATION DETECTED
52h/00h	T		CARTRIDGE FAULT
53h/00h	DTL	WROM	BK MEDIA LOAD OR EJECT FAILED
53h/01h	T		UNLOAD TAPE FAILURE
53h/02h	DT	WROM	BK MEDIUM REMOVAL PREVENTED
53h/03h		M	MEDIUM REMOVAL PREVENTED BY DATA TRANSFER ELEMENT

53h/04h	T		MEDIUM THREAD OR UNTHREAD FAILURE
54h/00h	P		SCSI TO HOST SYSTEM INTERFACE FAILURE
55h/00h	P		SYSTEM RESOURCE FAILURE
55h/01h	D	O BK	SYSTEM BUFFER FULL
55h/02h	DTLPWROMAE	K	INSUFFICIENT RESERVATION RESOURCES
55h/03h	DTLPWROMAE	K	INSUFFICIENT RESOURCES
55h/04h	DTLPWROMAE	K	INSUFFICIENT REGISTRATION RESOURCES
55h/05h	DT PWROMAEBK		INSUFFICIENT ACCESS CONTROL RESOURCES
55h/06h	DT WROM	B	AUXILIARY MEMORY OUT OF SPACE
55h/07h		F	QUOTA ERROR
55h/08h	T		MAXIMUM NUMBER OF SUPPLEMENTAL DECRYPTION KEYS EXCEEDED
56h/00h			
57h/00h	R		UNABLE TO RECOVER TABLE-OF-CONTENTS
58h/00h	O		GENERATION DOES NOT EXIST
59h/00h	O		UPDATED BLOCK READ
5Ah/00h	DTLPWROM	BK	OPERATOR REQUEST OR STATE CHANGE INPUT
5Ah/01h	DT WROM	BK	OPERATOR MEDIUM REMOVAL REQUEST
5Ah/02h	DT WRO A	BK	OPERATOR SELECTED WRITE PROTECT
5Ah/03h	DT WRO A	BK	OPERATOR SELECTED WRITE PERMIT
5Bh/00h	DTLPWROM	K	LOG EXCEPTION
5Bh/01h	DTLPWROM	K	THRESHOLD CONDITION MET
5Bh/02h	DTLPWROM	K	LOG COUNTER AT MAXIMUM
5Bh/03h	DTLPWROM	K	LOG LIST CODES EXHAUSTED
5Ch/00h	D	O	RPL STATUS CHANGE
5Ch/01h	D	O	SPINDLES SYNCHRONIZED
5Ch/02h	D	O	SPINDLES NOT SYNCHRONIZED
5Dh/00h	DTLPWROMAEBKVF		FAILURE PREDICTION THRESHOLD EXCEEDED
5Dh/01h	R	B	MEDIA FAILURE PREDICTION THRESHOLD EXCEEDED
5Dh/02h	R		LOGICAL UNIT FAILURE PREDICTION THRESHOLD EXCEEDED
5Dh/03h	R		SPARE AREA EXHAUSTION PREDICTION THRESHOLD EXCEEDED
5Dh/10h	D	B	HARDWARE IMPENDING FAILURE GENERAL HARD DRIVE FAILURE
5Dh/11h	D	B	HARDWARE IMPENDING FAILURE DRIVE ERROR RATE TOO HIGH
5Dh/12h	D	B	HARDWARE IMPENDING FAILURE DATA ERROR RATE TOO HIGH
5Dh/13h	D	B	HARDWARE IMPENDING FAILURE SEEK ERROR RATE TOO HIGH
5Dh/14h	D	B	HARDWARE IMPENDING FAILURE TOO MANY BLOCK REASSIGNS
5Dh/15h	D	B	HARDWARE IMPENDING FAILURE ACCESS TIMES TOO HIGH
5Dh/16h	D	B	HARDWARE IMPENDING FAILURE START UNIT TIMES TOO HIGH
5Dh/17h	D	B	HARDWARE IMPENDING FAILURE CHANNEL PARAMETRICS
5Dh/18h	D	B	HARDWARE IMPENDING FAILURE CONTROLLER DETECTED
5Dh/19h	D	B	HARDWARE IMPENDING FAILURE THROUGHPUT PERFORMANCE
5Dh/1Ah	D	B	HARDWARE IMPENDING FAILURE SEEK TIME PERFORMANCE
5Dh/1Bh	D	B	HARDWARE IMPENDING FAILURE SPIN-UP RETRY COUNT
5Dh/1Ch	D	B	HARDWARE IMPENDING FAILURE DRIVE CALIBRATION RETRY COUNT
5Dh/20h	D	B	CONTROLLER IMPENDING FAILURE GENERAL HARD DRIVE FAILURE
5Dh/21h	D	B	CONTROLLER IMPENDING FAILURE DRIVE ERROR RATE TOO HIGH
5Dh/22h	D	B	CONTROLLER IMPENDING FAILURE DATA ERROR RATE TOO HIGH
5Dh/23h	D	B	CONTROLLER IMPENDING FAILURE SEEK ERROR RATE TOO HIGH
5Dh/24h	D	B	CONTROLLER IMPENDING FAILURE TOO MANY BLOCK REASSIGNS
5Dh/25h	D	B	CONTROLLER IMPENDING FAILURE ACCESS TIMES TOO HIGH
5Dh/26h	D	B	CONTROLLER IMPENDING FAILURE START UNIT TIMES TOO HIGH
5Dh/27h	D	B	CONTROLLER IMPENDING FAILURE CHANNEL PARAMETRICS
5Dh/28h	D	B	CONTROLLER IMPENDING FAILURE CONTROLLER DETECTED
5Dh/29h	D	B	CONTROLLER IMPENDING FAILURE THROUGHPUT PERFORMANCE
5Dh/2Ah	D	B	CONTROLLER IMPENDING FAILURE SEEK TIME PERFORMANCE
5Dh/2Bh	D	B	CONTROLLER IMPENDING FAILURE SPIN-UP RETRY COUNT

5Dh/2Ch	D	B	CONTROLLER IMPENDING FAILURE DRIVE CALIBRATION RETRY COUNT
5Dh/30h	D	B	DATA CHANNEL IMPENDING FAILURE GENERAL HARD DRIVE FAILURE
5Dh/31h	D	B	DATA CHANNEL IMPENDING FAILURE DRIVE ERROR RATE TOO HIGH
5Dh/32h	D	B	DATA CHANNEL IMPENDING FAILURE DATA ERROR RATE TOO HIGH
5Dh/33h	D	B	DATA CHANNEL IMPENDING FAILURE SEEK ERROR RATE TOO HIGH
5Dh/34h	D	B	DATA CHANNEL IMPENDING FAILURE TOO MANY BLOCK REASSIGNS
5Dh/35h	D	B	DATA CHANNEL IMPENDING FAILURE ACCESS TIMES TOO HIGH
5Dh/36h	D	B	DATA CHANNEL IMPENDING FAILURE START UNIT TIMES TOO HIGH
5Dh/37h	D	B	DATA CHANNEL IMPENDING FAILURE CHANNEL PARAMETRICS
5Dh/38h	D	B	DATA CHANNEL IMPENDING FAILURE CONTROLLER DETECTED
5Dh/39h	D	B	DATA CHANNEL IMPENDING FAILURE THROUGHPUT PERFORMANCE
5Dh/3Ah	D	B	DATA CHANNEL IMPENDING FAILURE SEEK TIME PERFORMANCE
5Dh/3Bh	D	B	DATA CHANNEL IMPENDING FAILURE SPIN-UP RETRY COUNT
5Dh/3Ch	D	B	DATA CHANNEL IMPENDING FAILURE DRIVE CALIBRATION RETRY COUNT
5Dh/40h	D	B	SERVO IMPENDING FAILURE GENERAL HARD DRIVE FAILURE
5Dh/41h	D	B	SERVO IMPENDING FAILURE DRIVE ERROR RATE TOO HIGH
5Dh/42h	D	B	SERVO IMPENDING FAILURE DATA ERROR RATE TOO HIGH
5Dh/43h	D	B	SERVO IMPENDING FAILURE SEEK ERROR RATE TOO HIGH
5Dh/44h	D	B	SERVO IMPENDING FAILURE TOO MANY BLOCK REASSIGNS
5Dh/45h	D	B	SERVO IMPENDING FAILURE ACCESS TIMES TOO HIGH
5Dh/46h	D	B	SERVO IMPENDING FAILURE START UNIT TIMES TOO HIGH
5Dh/47h	D	B	SERVO IMPENDING FAILURE CHANNEL PARAMETRICS
5Dh/48h	D	B	SERVO IMPENDING FAILURE CONTROLLER DETECTED
5Dh/49h	D	B	SERVO IMPENDING FAILURE THROUGHPUT PERFORMANCE
5Dh/4Ah	D	B	SERVO IMPENDING FAILURE SEEK TIME PERFORMANCE
5Dh/4Bh	D	B	SERVO IMPENDING FAILURE SPIN-UP RETRY COUNT
5Dh/4Ch	D	B	SERVO IMPENDING FAILURE DRIVE CALIBRATION RETRY COUNT
5Dh/50h	D	B	SPINDLE IMPENDING FAILURE GENERAL HARD DRIVE FAILURE
5Dh/51h	D	B	SPINDLE IMPENDING FAILURE DRIVE ERROR RATE TOO HIGH
5Dh/52h	D	B	SPINDLE IMPENDING FAILURE DATA ERROR RATE TOO HIGH
5Dh/53h	D	B	SPINDLE IMPENDING FAILURE SEEK ERROR RATE TOO HIGH
5Dh/54h	D	B	SPINDLE IMPENDING FAILURE TOO MANY BLOCK REASSIGNS
5Dh/55h	D	B	SPINDLE IMPENDING FAILURE ACCESS TIMES TOO HIGH
5Dh/56h	D	B	SPINDLE IMPENDING FAILURE START UNIT TIMES TOO HIGH
5Dh/57h	D	B	SPINDLE IMPENDING FAILURE CHANNEL PARAMETRICS
5Dh/58h	D	B	SPINDLE IMPENDING FAILURE CONTROLLER DETECTED
5Dh/59h	D	B	SPINDLE IMPENDING FAILURE THROUGHPUT PERFORMANCE
5Dh/5Ah	D	B	SPINDLE IMPENDING FAILURE SEEK TIME PERFORMANCE
5Dh/5Bh	D	B	SPINDLE IMPENDING FAILURE SPIN-UP RETRY COUNT
5Dh/5Ch	D	B	SPINDLE IMPENDING FAILURE DRIVE CALIBRATION RETRY COUNT
5Dh/60h	D	B	FIRMWARE IMPENDING FAILURE GENERAL HARD DRIVE FAILURE
5Dh/61h	D	B	FIRMWARE IMPENDING FAILURE DRIVE ERROR RATE TOO HIGH
5Dh/62h	D	B	FIRMWARE IMPENDING FAILURE DATA ERROR RATE TOO HIGH
5Dh/63h	D	B	FIRMWARE IMPENDING FAILURE SEEK ERROR RATE TOO HIGH
5Dh/64h	D	B	FIRMWARE IMPENDING FAILURE TOO MANY BLOCK REASSIGNS
5Dh/65h	D	B	FIRMWARE IMPENDING FAILURE ACCESS TIMES TOO HIGH
5Dh/66h	D	B	FIRMWARE IMPENDING FAILURE START UNIT TIMES TOO HIGH
5Dh/67h	D	B	FIRMWARE IMPENDING FAILURE CHANNEL PARAMETRICS
5Dh/68h	D	B	FIRMWARE IMPENDING FAILURE CONTROLLER DETECTED
5Dh/69h	D	B	FIRMWARE IMPENDING FAILURE THROUGHPUT PERFORMANCE
5Dh/6Ah	D	B	FIRMWARE IMPENDING FAILURE SEEK TIME PERFORMANCE

5Dh/6Bh	D	B	FIRMWARE IMPENDING FAILURE SPIN-UP RETRY COUNT
5Dh/6Ch	D	B	FIRMWARE IMPENDING FAILURE DRIVE CALIBRATION RETRY COUNT
5Dh/FFh	DTLPWROMAEBKVF		FAILURE PREDICTION THRESHOLD EXCEEDED (FALSE)
5Eh/00h	DTLPWRO	A K	LOW POWER CONDITION ON
5Eh/01h	DTLPWRO	A K	IDLE CONDITION ACTIVATED BY TIMER
5Eh/02h	DTLPWRO	A K	STANDBY CONDITION ACTIVATED BY TIMER
5Eh/03h	DTLPWRO	A K	IDLE CONDITION ACTIVATED BY COMMAND
5Eh/04h	DTLPWRO	A K	STANDBY CONDITION ACTIVATED BY COMMAND
5Eh/41h		B	POWER STATE CHANGE TO ACTIVE
5Eh/42h		B	POWER STATE CHANGE TO IDLE
5Eh/43h		B	POWER STATE CHANGE TO STANDBY
5Eh/45h		B	POWER STATE CHANGE TO SLEEP
5Eh/47h		BK	POWER STATE CHANGE TO DEVICE CONTROL
5Fh/00h			LAMP FAILURE
61h/00h			VIDEO ACQUISITION ERROR
61h/01h			UNABLE TO ACQUIRE VIDEO
61h/02h			OUT OF FOCUS
62h/00h			SCAN HEAD POSITIONING ERROR
63h/00h		R	END OF USER AREA ENCOUNTERED ON THIS TRACK
63h/01h		R	PACKET DOES NOT FIT IN AVAILABLE SPACE
64h/00h		R	ILLEGAL MODE FOR THIS TRACK
64h/01h		R	INVALID PACKET SIZE
65h/00h	DTLPWROMAEBKVF		VOLTAGE FAULT
66h/00h			AUTOMATIC DOCUMENT FEEDER COVER UP
66h/01h			AUTOMATIC DOCUMENT FEEDER LIFT UP
66h/02h			DOCUMENT JAM IN AUTOMATIC DOCUMENT FEEDER
66h/03h			DOCUMENT MISS FEED AUTOMATIC IN DOCUMENT FEEDER
67h/00h		A	CONFIGURATION FAILURE
67h/01h		A	CONFIGURATION OF INCAPABLE LOGICAL UNITS FAILED
67h/02h		A	ADD LOGICAL UNIT FAILED
67h/03h		A	MODIFICATION OF LOGICAL UNIT FAILED
67h/04h		A	EXCHANGE OF LOGICAL UNIT FAILED
67h/05h		A	REMOVE OF LOGICAL UNIT FAILED
67h/06h		A	ATTACHMENT OF LOGICAL UNIT FAILED
67h/07h		A	CREATION OF LOGICAL UNIT FAILED
67h/08h		A	ASSIGN FAILURE OCCURRED
67h/09h		A	MULTIPLY ASSIGNED LOGICAL UNIT
67h/0Ah	DTLPWROMAEBKVF		SET TARGET PORT GROUPS COMMAND FAILED
67h/0Bh	DT	B	ATA DEVICE FEATURE NOT ENABLED
68h/00h		A	LOGICAL UNIT NOT CONFIGURED
69h/00h		A	DATA LOSS ON LOGICAL UNIT
69h/01h		A	MULTIPLE LOGICAL UNIT FAILURES
69h/02h		A	PARITY/DATA MISMATCH
6Ah/00h		A	INFORMATIONAL, REFER TO LOG
6Bh/00h		A	STATE CHANGE HAS OCCURRED
6Bh/01h		A	REDUNDANCY LEVEL GOT BETTER
6Bh/02h		A	REDUNDANCY LEVEL GOT WORSE
6Ch/00h		A	REBUILD FAILURE OCCURRED
6Dh/00h		A	RECALCULATE FAILURE OCCURRED
6Eh/00h		A	COMMAND TO LOGICAL UNIT FAILED
6Fh/00h		R	COPY PROTECTION KEY EXCHANGE FAILURE - AUTHENTICATION FAILURE
6Fh/01h		R	COPY PROTECTION KEY EXCHANGE FAILURE - KEY NOT PRESENT
6Fh/02h		R	COPY PROTECTION KEY EXCHANGE FAILURE - KEY NOT ESTABLISHED
6Fh/03h		R	READ OF SCRAMBLED SECTOR WITHOUT AUTHENTICATION

6Fh/04h		R			MEDIA REGION CODE IS MISMATCHED TO LOGICAL UNIT REGION	
6Fh/05h		R			DRIVE REGION MUST BE PERMANENT/REGION RESET COUNT ERROR	
6Fh/06h		R			INSUFFICIENT BLOCK COUNT FOR BINDING NONCE RECORDING	
6Fh/07h		R			CONFLICT IN BINDING NONCE RECORDING	
70h/NNh	T				DECOMPRESSION EXCEPTION SHORT ALGORITHM ID OF NN	
71h/00h	T				DECOMPRESSION EXCEPTION LONG ALGORITHM ID	
72h/00h		R			SESSION FIXATION ERROR	
72h/01h		R			SESSION FIXATION ERROR WRITING LEAD-IN	
72h/02h		R			SESSION FIXATION ERROR WRITING LEAD-OUT	
72h/03h		R			SESSION FIXATION ERROR - INCOMPLETE TRACK IN SESSION	
72h/04h		R			EMPTY OR PARTIALLY WRITTEN RESERVED TRACK	
72h/05h		R			NO MORE TRACK RESERVATIONS ALLOWED	
72h/06h		R			RMZ EXTENSION IS NOT ALLOWED	
72h/07h		R			NO MORE TEST ZONE EXTENSIONS ARE ALLOWED	
73h/00h		R			CD CONTROL ERROR	
73h/01h		R			POWER CALIBRATION AREA ALMOST FULL	
73h/02h		R			POWER CALIBRATION AREA IS FULL	
73h/03h		R			POWER CALIBRATION AREA ERROR	
73h/04h		R			PROGRAM MEMORY AREA UPDATE FAILURE	
73h/05h		R			PROGRAM MEMORY AREA IS FULL	
73h/06h		R			RMA/PMA IS ALMOST FULL	
73h/10h		R			CURRENT POWER CALIBRATION AREA ALMOST FULL	
73h/11h		R			CURRENT POWER CALIBRATION AREA IS FULL	
73h/17h		R			RDZ IS FULL	
74h/00h	T				SECURITY ERROR	
74h/01h	T				UNABLE TO DECRYPT DATA	
74h/02h	T				UNENCRYPTED DATA ENCOUNTERED WHILE DECRYPTING	
74h/03h	T				INCORRECT DATA ENCRYPTION KEY	
74h/04h	T				CRYPTOGRAPHIC INTEGRITY VALIDATION FAILED	
74h/05h	T				ERROR DECRYPTING DATA	
74h/06h	T				UNKNOWN SIGNATURE VERIFICATION KEY	
74h/07h	T				ENCRYPTION PARAMETERS NOT USEABLE	
74h/08h	DT	R	M	E	VF	DIGITAL SIGNATURE VALIDATION FAILURE
74h/09h	T					ENCRYPTION MODE MISMATCH ON READ
74h/0Ah	T					ENCRYPTED BLOCK NOT RAW READ ENABLED
74h/0Bh	T					INCORRECT ENCRYPTION PARAMETERS
74h/71h	DT	R	M	E	V	LOGICAL UNIT ACCESS NOT AUTHORIZED
75h/00h						
76h/00h						
77h/00h						
78h/00h						
79h/00h						
7Ah/00h						
7Bh/00h						
7Ch/00h						
7Dh/00h						
7Eh/00h						
7Fh/00h						