

# SCSI Sense Decode Information

Revision B.06.00

**Note:** This handbook is designed to serve as a reference for the most frequently used material of the trained HP Customer Engineer. The information found within is condensed from other sources, such as manuals and Product Support Plans, and is not intended to be a substitute for these documents

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<b>SYNCHRONOUS SCSI</b>					
Standard	ANSI Name	Marketing	Speed	Interface	Bus Length
SCSI-1	Synchronous	Synchronous	5 MB/Sec	SE	6m
				HVD	25m
SCSI-2	Fast	Fast	10 MB/Sec	SE	3m
				HVD	25m
	Fast & Wide	Fast & Wide	20 MB/Sec	SE	3m
				HVD	25m
SCSI-3 (SPI)	Fast-20	Ultra	20 MB/Sec	SE	1.5-3m
				HVD	25m
	Fast-20&Wide	UltraWide	40 MB/Sec	SE	1.5-3m
				HVD	25m
(SPI-2)	Fast-40	Ultra 2	40 MB/Sec	LVD	12m
	Fast-40&Wide	Ultra 2 Wide	80 MB/Sec	LVD	12m
(SPI-3)	Fast-80	Ultra 3 or Ultra 160/M	160MB/Sec (Wide only)	LVD	12m

## 1. SCSI SENSE CODE DESCRIPTION

Sense Key	Description	Indication
0h	NO SENSE	Indicates that there is no specific sense key information to be reported for the designated logical unit. This is the case for a successful command or a command that received CHECK CONDITION or COMMAND TERMINATED status because one of the filemark, EOM or ILI bits equals 1.
1h	RECOVERED ERROR	Indicates that the last command completed successfully with some recovery action performed by the target. Details may be determined by examining the additional sense bytes and the information field. When multiple recovered errors occur during one command, the choice of which error to report (first, last, most severe) is device specific.
2h	NOT READY	Indicates that the logical unit addressed can't be accessed. Operator intervention may be required to correct this condition.
3h	MEDIUM ERROR	Indicates that the command terminated with a non-recovered error condition that was probably caused by a flaw in the media or an error in the recorded data. This sense key may also be returned if the target is unable to distinguish a flaw in media or hardware failure.
4h	HARDWARE ERROR	Indicates that the target detected a non-recoverable hardware failure while performing the command or during a self test. (i.e., controller failure, device failure, parity error, etc.)
5h	ILLEGAL REQUEST	Indicates that there was an illegal parameter in the command descriptor block or in the additional parameters supplied as data for some commands (FORMAT UNIT, SEARCH DATA, etc.) If the target detects an invalid parameter in the command descriptor block, then it shall terminate the command without altering the medium. If the target detects an invalid parameter in the additional parameters supplied as data, then the target may have already altered the medium. This sense key may also indicate that an invalid IDENTIFY message was received.
6h	UNIT ATTENTION	Indicates that the media may have been changed or that the target has been reset.
7h	DATA PROTECT	Indicates that a command that reads or writes the media was attempted on a block that is protected from this operation. A read or write operation is not performed.
8h	BLANK CHECK	Indicates that a write-once device or a sequential-access device encountered blank media or format-defined EOD indication while reading or a write-once device encountered a non-blank media on a write.
9h	VENDOR SPECIFIC	This sense key is available for reporting vendor specific conditions.
Ah	COPY ABORTED	Indicates a COPY, COMPARE, or COPY and VERIFY command was aborted due to an error condition on the source device, the destination device, or both.
Bh	ABORTED COMMAND	Indicates that the target aborted the command. The initiator may be able to recover by trying the command again.
Ch	EQUAL	Indicates a SEARCH DATA command has satisfied an equal compare.
Dh	VOLUME OVERFLOW	Indicates that a buffered peripheral device has reached the end-of-partition, and data may remain in the buffer that has not been written to the medium. A RECOVERED BUFFERED DATA command(s) may be used to read the unwritten data from the buffer.
Eh	MISCOMPARE	Indicates that the source data did not match the data read from the media.
Fh	RESERVED	

## 2. ADDITIONAL SENSE CODES AND QUALIFIERS

**\* DEVICE TYPE KEY**

**D** - Direct Access Device  
**T** - Sequential Access Device  
**L** - Printer Device  
**P** - Processor Device  
**W** - Write Once Read Multiple Device

**R** - Read Only (CD ROM) Device  
**S** - Scanner Device  
**O** - Optical Memory Device  
**M** - Media Changer Device  
**C** - Communication Device Byte

ASC	ASCQ	*DEVICE TYPE DTLPWRSOMC	DESCRIPTION
00	00	DTLPWRSOMC	No additional sense information
00	01	T	Filemark detected
00	02	T S	End-of-partition/Medium detected
00	03	T	Setmark detected
00	04	T S	Beginning-of-partition/Medium detected
00	05	T S	End-of-data detected
00	06	DTLPWRSOMC	I/O process terminated
00	11	R	Audio play operation in progress
00	12	R	Audio play operation paused
00	13	R	Audio play operation successfully completed
00	14	R	Audio play operation stopped due to error
00	15	R	No current audio status to return
01	00	D W O	No Index/Sector signal
02	00	D WR OM	No seek complete
03	00	DTL W SO	Peripheral device write fault
03	01	T	No write current
03	02	T	Excessive write errors
04	00	DTLPWRSOMC	Logical unit not ready, cause not reportable
04	01	DTLPWRSOMC	Logical unit is in process of becoming ready
04	02	DTLPWRSOMC	Logical unit not ready, initializing command required
04	03	DTLPWRSOMC	Logical unit not ready, manual intervention required
04	04	DTL O	Logical unit not ready, format in progress
05	00	DTL WRSOMC	Logical unit does not respond to selection
06	00	D WR OM	No reference position found
07	00	DTL WRSOM	Multiple peripheral devices selected
08	00	DTL WRSOMC	Logical unit communication failure
08	01	DTL WRSOMC	Logical unit communication time-out
08	02	DTL WRSOM	Logical unit communication parity error
09	00	DT WR O	Track following error
09	01	WR O	Tracking servo failure

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ASC	ASCQ	*DEVICE TYPE DTLPWRSOMC	DESCRIPTION
09	02	WR O	Focus servo failure
09	03	WR O	Spindle servo failure
0A	00	DTLPWRSOMC	Error log overflow
0B	00		(Reserved)
0C	00	T S	Write error
0C	01	D W O	Write error recovered with auto reallocation
0C	02	D W O	Write error - auto reallocation failed
0D	00		(Reserved)
0E	00		(Reserved)
0F	00		(Reserved)
10	00	D W O	ID CRC or ECC error
11	00	DT WRSO	Unrecovered read error
11	01	DT W SO	Read retries exhausted
11	02	DT W SO	Error too long to correct
11	03	DT W SO	Multiple read errors
11	04	D W O	Unrecovered read error - auto reallocate failed
11	05	WR O	LEC uncorrectable error
11	06	WR O	CIRC unrecovered error
11	07	W O	Data resynchronization error
11	08	T	Incomplete block read
11	09	T	No gap found
11	0A	DT O	Miscorrected error
11	0B	D W O	Unrecovered read error - recommend reassignment
11	0C	D W O	Unrecovered read error -recommend rewrite the data
12	00	D W O	Address mark not found for ID field
13	00	D W O	Address not found for data field
14	00	DTL WRSO	Recorded entity not found
14	01	DT WR O	Record not found
14	02	T	Filemark or setmark not found

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ASC	ASCQ	*DEVICE TYPE DTLPWRSOMC	DESCRIPTION
14	03	T	End-of-data not found
14	04	T	Block sequence error
15	00	DTL WRSOM	Random positioning error
15	01	DTL WRSOM	Mechanical positioning error
15	02	DT WR O	Positioning error detected by read of medium
16	00	D W O	Data synchronization mark error
17	00	DT WRSO	Recovered data with no error correction applied
17	01	DT WRSO	Recovered data with retries
17	02	DT WR O	Recovered data with positive head offset
17	03	DT WR O	Recovered data with negative head offset
17	04	WR O	Recovered data with retries and/or CIRC applied
17	05	D WR O	Recovered data using previous sector ID
17	06	D W O	Recovered data without ECC - data auto-reallocated
17	07	D W O	Recovered data without ECC - recommend reassignment
18	00	DT WR O	Recovered data with error correction applied
18	01	D WR O	Recovered data with error correction and retries applied
18	02	D WR O	Recovered data - data reallocated
18	03	R	Recovered data with CIRC
18	04	R	Recovered data with LEC
18	05	D WR O	Recovered data - recommend reassignment
19	00	D O	Defect list error
19	01	D O	Defect list not available
19	02	D O	Defect list error in primary list
19	03	D O	Defect list error in grown list
1A	00	DTLPWRSOMC	Parameter list length error
1B	00	DTLPWRSOMC	Synchronous data transfer error
1C	00	D O	Defect list not found
1C	01	D O	Primary defect list not found
1C	02	D O	Grown defect list not found
1D	00	D W O	Miscompare during verify operation
1E	00	D W O	Recovered ID with ECC correction

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ASC	ASCQ	*DEVICE TYPE DTLPWRSOMC	DESCRIPTION
1F	00		(Reserved)
20	00	DTLPWRSOMC	Invalid command operation code
21	00	DT WR OM	Logical block address out of range
21	01	M	Invalid element address
22	00	D	Illegal function (Should use 20 00, 24 00 or 26 00)
23	00		(Reserved)
24	00	DTLPWRSOMC	Invalid field in CDB
25	00	DTLPWRSOMC	Logical unit not supported
26	00	DTLPWRSOMC	Invalid field in parameter list
26	01	DTLPWRSOMC	Parameter not supported
26	02	DTLPWRSOMC	Parameter value invalid
26	03	DTLPWRSOMC	Threshold parameters not supported
27	00	DT W O	Write protected
28	00	DTLPWRSOMC	Not ready to transition (Medium may have changed)
28	01	M	Import or export element accessed
29	00	DTLPWRSOMC	Power on, reset, or bus device reset occurred
2A	00	DTL WRSOMC	Parameters changed
2A	01	DTL WRSOMC	Mode parameters changed
2A	02	DTL WRSOMC	Log parameters changed
2B	00	DTLPWRSO C	Copy cannot execute since host cannot disconnect
2C	00	DTLPWRSOMC	Command sequence error
2C	01	S	Too many windows specified
2C	02	S	Invalid combination of windows specified
2D	00	T	Overwrite error on update in place
2E	00		(Reserved)
2F	00	DTLPWRSOMC	Commands cleared by another initiator
30	00	DT WR OM	Incompatible medium installed
30	01	DT WR O	Cannot read medium - unknown format
3	02	DT WR O	Cannot read medium - incompatible format

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ASC	ASCQ	*DEVICE TYPE DTLPWRSOMC	DESCRIPTION
30	03	DT	Cleaning cartridge installed
31	00	DT W O	Medium format corrupted
31	01	D L O	Format command failed
32	00	D W O	No defect spare location available
32	01	D W O	Defect list update failure
33	00	T	Tape length error
34	00		(Reserved)
35	00		(Reserved)
36	00	L	Ribbon, ink, or toner failure
37	00	DTL WRSOMC	Rounded parameter
38	00		(Reserved)
39	00	DTL WRSOMC	Saving parameters not supported
3A	00	DTL WRSOM	Medium not present
3B	00	TL	Sequential positioning error
3B	01	T	Tape position error at beginning-of-medium
3B	02	T	Tape position error at end-of-medium
3B	03	L	Tape or electronic vertical forms unit not ready
3B	04	L	Slew failure
3B	05	L	Paper jam
3B	06	L	Failed to sense top-of-form
3B	07	L	Failed to sense bottom-of-form
3B	08	T	Reposition error
3B	09	S	Read past end of medium
3B	0A	S	Read past beginning of medium
3B	0B	S	Position past end of medium
3B	0C	S	Position past beginning of medium
3B	0D	M	Medium destination element full
3B	0E	M	Medium source element empty
3C	00		(Reserved)
3D	00	DTLPWRSOMC	Invalid bits in identify message



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ASC	ASCQ	*DEVICE TYPE DTLPWRSOMC	DESCRIPTION
3E	00	DTLPWRSOMC	Logical unit has not self-configured yet
3F	00	DTLPWRSOMC	Target operating conditions have changed
3F	01	DTLPWRSOMC	Microcode has been changed
3F	02	DTLPWRSOMC	Changed operating definition
3F	03	DTLPWRSOMC	Inquiry data has changed
40	00	D	Ram failure (Should use 40 NN)
40	NN	DTLPWRSOMC	Diagnostic failure on component (80H-FFH)
41	00	D	Data path failure (Should use 40 NN)
42	00	D	Power-on or self-test failure (Should use 40 NN)
43	00	DTLPWRSOMC	Message error
44	00	DTLPWRSOMC	Internal target failure
45	00	DTLPWRSOMC	Select or reselect failure
46	00	DTLPWRSOMC	Unsuccessful soft reset
47	00	DTLPWRSOMC	SCSI parity error
48	00	DTLPWRSOMC	Initiator detected error message received
49	00	DTLPWRSOMC	Invalid message error
4A	00	DTLPWRSOMC	Command phase error
4B	00	DTLPWRSOMC	Data phase error
4C	00	DTLPWRSOMC	Logical unit failed self-configuration
4D	00		(Reserved)
4E	00	DTLPWRSOMC	Overlapped commands attempted
4F	00		(Reserved)
50	00	T	Write append error
50	01	T	Write append position error
50	02	T	Position error related to timing
51	00	T O	Erase failure
52	00	T	Cartridge fault
53	00	DT WRSOM	Media load or eject failed
53	01	T	Unload tape failure
53	02	DT WR OM	Medium removal prevented
54	00	P	SCSI to host system interface failure

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ASC	ASCQ	*DEVICE TYPE DTLPWRSOMC	DESCRIPTION
55	00	P	System resource failure
56	00		(Reserved)
57	00	R	Unable to recover table-of-contents
58	00	O	Generation does not exist
59	00	O	Updated block read
5A	00	DTLPWRSOM	Operator request or state change input (unspecified)
5A	01	DT WR OM	Operator medium removal request
5A	02	DT W O	Operator selected write protect
5A	03	DT W O	Operator selected write permit
5B	00	DTLPWRSOM	Log exception
5B	01	DTLPWRSOM	Threshold condition met
5B	02	DTLPWRSOM	Log counter at maximum
5B	03	DTLPWRSOM	Log list codes exhausted
5C	00	D O	RPL status change
5C	01	D O	Spindles synchronized
5C	02	D O	Spindles not synchronized
5D	00		(Reserved)
5E	00		(Reserved)
5F	00		(Reserved)
60	00	S	Lamp failure
61	00	S	Video acquisition error
61	01	S	Unable to acquire video
61	02	S	Out of focus
62	00	S	Scan head positioning error
63	00	R	End of user area encountered on this track
6	00	R	Illegal mode for this track
65 00 - 7F 00			(Reserved)
80 XX - FF XX		Vendor Specific	See product specific manual for additional information
XX 80 - XX FF		Vendor Specific	Qualification of Standard ASC. Same as above.

**NOTE: All codes not shown are reserved.**

### 3. SCSI Nomenclature

**A SCSI bus is defined by speed, width and signaling Technology.**

**SPEED** - All speeds are defined for a narrow (8-bit) bus. This means that if the bus width is wide (16-bits), the speed doubles.

**S=Slow=5Mb/sec** When no speed is defined (as is the case with most slow SCSI buses), the speed is assumed to be slow.

**F=Fast=10Mb/sec**

**U=Ultra=20Mb/sec**

**U2=Ultra2=40Mb/sec**

#### **WIDTH**

**N=Narrow=8-bit data bus**

**W=Wide=16-bit data bus**

#### **SIGNALING TECHNOLOGY**

**SE=Single Ended signaling**

**HVD=High Voltage Differential signaling** This technology was previously known as simply "differential signaling" and was noted a "D". The advent of low voltage differential signaling necessitated a change in notation, so high voltage differential is now referred to as "**HVD**"

**LVD=Low Voltage Differential signaling**

Type	Max Speed	Bus Width	Connector/ Cable Pin out
<b>NARROW</b>	5 Mbytes/sec	8 bits	50 pin
<b>WIDE</b>	10 Mbytes/sec	16 bits	68 pin
<b>FAST NARROW</b>	10 Mbytes/sec	8 bits	50 pin
<b>FAST/WIDE</b>	20 Mbytes/sec	16 bits	68 pin
<b>ULTRA NARROW</b>	20 Mbytes/sec	8 bits	50 pin
<b>ULTRA WIDE</b>	40 Mbytes/sec	16 bits	68 pin
<b>ULTRA2 NARROW</b>	40 Mbytes/sec	8 bits	50 pin
<b>ULTRA2 WIDE</b>	80 Mbytes/sec	16 bits	68 pin

	Maximum Cable Length in Meters			Maximum Devices
	Single Ended	Differential	LVD	
SCSI-1	6	25	12.5	7
Fast SCSI	3	25	12.5	7
Fast/Wide SCSI	3	25	12.5	15
Ultra SCSI	1.5	25	12.5	7
Ultra SCSI	3	-	-	3
Ultra Wide SCSI	-	25	12.5	16
Ultra Wide SCSI	1.5	-	-	7
Ultra Wide SCSI	3	-	-	3
Ultra2 SCSI			12.5	7
Ultra2 SCSI			12.5	15

## **CABLES**

.5m	50pin-50pin	C2955A
1.0m	50pin-50pin	C2908A
1.5m	50pin-50pin	C2956A
2.0m	50pin-50pin	C2957A
terminator	HD	A1658-63012

.9m	68HD-68HD	C2911B
2.5m	68HD-68HD	C2924B
10.0m	68HD-68HD	C2925A
20.0m	68HD-68HD	C2926A

### use with Ultra Wide

.5m	68HD-68HD	C2978A
1.5m	68HD-68HD	C2979A

## 4. MISCELLANEOUS ADDENDUM

### SENSE DATA RETURN

Sequential Devices

**Table 1: Magneto-Optical Autochangers**

Sense Data returned from unit as result of a "Request Sense" Command

Byte	7	6	5	4	3	2	1	0
0.	Valid (0)	Error Code (70H or 71H)						
1	Reserved (0)							
2	Reserved (0)				Sense Key			
3/6	Reserved (0)							
7	Additional Sense Length ( <i>See Table A</i> )							
8/11	Reserved (0)							
12	Additional Sense Code							
13	Additional Sense Code Qualifier							
14	Reserved (0)							
15	SKSV	Sense Key Specific Information ( <i>See Table B</i> )						
16/17	Sense Key Specific Information							
18/77	Additional Sense Bytes ( <i>See Table C</i> )							

<b>Error Code</b>	Either 70H (current error) or 71H (Deferred error).
<b>Sense Key and Additional Sense Length</b>	

**Table A.**

**Sense Key - Additional Sense Length Values**

<u>Sense Key</u>	<u>Description</u>	<u>Additional Sense Length</u>
0H	No Sense	10
1H	Recovered Error	70
2H	Not Ready	10
4H	Hardware Error	70
5H	Illegal Request	10
6H	Unit Attention	10
BH	Aborted Command	10

**Additional Sense Code**

The Additional Sense Code specifies detailed information related to the error reported in the Sense Key field

**Additional Sense Code Qualifier**

The Additional Sense Code Qualifier specifies detailed information related to the Additional Sense Code

**SKSV**

When set to 1, the Sense Key Specific bytes contains valid data. When set to 0, bytes 15, 16, and 17, are null.

**Sense Key Specific**

When the Sense Key field is set to Illegal Request (05H) and SKSV is 1, the Sense Key Specific fields are defined as shown in **Table B**.

**Additional Sense Bytes**

This field may contain information when the Additional Sense Length field contains a value greater than 10.

**TABLE B**

Byte	7	6	5	4	3	2	1	0
15	SKSV (1)	C/D	Reserved (0)		BPV (1)	Bit Pointer		
16	Field Pointer (MSByte)							
17	Field Pointer (LSByte)							

**C/D**                    1 = Illegal Parameter is in the Command Descriptor Block  
                             0 = Illegal Parameter is in Data Out Phase

**BPV**                    1 = Bit Pointer Field is Valid  
                             0 = Bit Pointer Field is invalid

**Bit Pointer**            Specifies which bit is in error

**Field Pointer**         Specifies which byte is in error.

**TABLE C**

Byte	7	6	5	4	3	2	1	0
18	Move Error Code (See Command Reference Manual P/N 5960-7606)							
19	Hardware Error Code (See Command Reference Manual P/N 5960-7606)							
20	First FRU (See Command Reference Manual P/N 5960-7606)							
21	Second FRU (See Command Reference Manual P/N 5960-7606)							
22	Third FRU (See Command Reference Manual P/N 5960-7606)							
23	MvCap	Last	Rsvd (0)	PosLost	CartIn	Reserved (0)		
24/25	Reserved (0)							
26	DInRty	DEjRty	PkrRec	CarAssy	Reserved (0)		BFHm	FHR
27	Retry Count							
28/29	Reserved (0)							
30	DInRty	DEjRty	PkrRec	CarAssy	Reserved (0)		BFHm	FHR
31	Recovery Count							
32/34	Reserved (0)							
35	Valid	ErrEn	CartIn	CartEl	UnexpMt	UnexpFl	CartInv	ElRty
36/37	Source Element Number							
38	Valid	ErrEn	CartIn	CartEl	UnexpMt	UnexpFl	CartInv	ElRty
39/40	Destination Element Number							
41	Valid	ErrEn	CartIn	CartEl	UnexpMt	UnexpFl	CartInv	ElRty
42/43	Secondary Source Element Number							
44	Valid	ErrEn	CartIn	CartEl	UnexpMt	UnexpFl	CartInv	ElRty
45/46	Secondary Destination Element Number							
47/49	Reserved (0)							
50/54	Micro-Move ID History (See Command Reference Manual P/N 5960-7606)							
55	Micro-Move ID History ID (See Command Reference Manual P/N 5960-7606)							
56	Micro-Move Error Code (See Command Reference Manual P/N 5960-7606)							
57/60	Vertical Motor Commanded Position							
61/64	Vertical Actual Position							
65/68	Horizontal Motor Commanded Position							
69/72	Horizontal Actual Position							
73/77	Reserved (0)							

**NOTE**

The description and values for the above table can be found in the Optical Drive and Library SCSI-2 Command Reference Manual P/N 5960-7606

**Table 2: Magneto-Optical Drives**

Sense Data returned from unit as result of a "Request Sense" Command

Byte	7	6	5	4	3	2	1	0
0	AV	Error Code (70H or 71H)						
1	Reserved (0)							
2	Reserved (0)		ILI	Rsvd(0)	Sense Key			
3	Information (MSByte)							
4	Information							
5	Information							
6	Information (LSByte)							
7	Additional Sense Length							
8	Command Specific Information (MSByte) (Reassign blocks only)							
9	Command Specific Information (Reassign blocks only)							
10	Command Specific Information (Reassign blocks only)							
11	Command Specific Information (LSByte) (Reassign blocks only)							
12	Additional Sense Code							
13	Additional Sense Code Qualifier							
14	Reserved (0)							
15	SKSV	Sense Key Specific Information (if Sense Key = 1,3,4,5)						
16	Sense Key Specific Information							
17	Sense Key Specific Information							
18	HP-Specific Error Code							
19	HP-Specific Error Code							
20	Reserved (0)							
21	HP-Specific DSP Error Information (MSByte)							
22	HP-Specific DSP Error Information (LSByte)							
23	HP-Specific DSP Status Byte							



Definitions/Description

<b>AV</b>	A Valid bit of 1 indicates the <b>information field</b> contains valid information A Valid bit of 0 indicates the <b>information field</b> does not contain valid info.
<b>ILI</b>	An Incorrect Length Indicator bit 1 usually indicates that the requested logical block length did not match the logical block length of data on the medium.
<b>Information</b>	(1) The logical block address associated with the sense key. (2) The difference (residue) of the requested length minus the actual in either bytes or blocks, as determined by the command, when ILI bit is set.
<b>Command Specific Information</b>	The logical block address of the first defect descriptor not reassigned is returned in this field
<b>SKSV</b>	A Sense Key Specific Valid bit of 1 indicates that the Sense Key Specific Information is valid. A Sense Key Specific Valid bit of 0 indicates that there is no Sense Key Specific Information
<b>Sense Key Specific Information</b>	When the Sense Key (Byte2, Bits 0-3) equals 5 - Illegal Request See Table <i>D</i> . If the Sense Key equals 1,3, or 4, see Table <i>E</i> . If the Sense Key Specific Information is set to 5 - Illegal Request and the SKSV bit is set to 1, the sense key specific field is defined in the table <i>D</i> . The Field Pointer field indicates which illegal parameter in command descriptor blocks or data parameters are in error.

**TABLE D**

Byte	7	6	5	4	3	2	1	0
15	SKSV (1)	C/D	Reserved (0)		BPV (1)	Bit Pointer		
16	Field Pointer (MSByte)							
17	Field Pointer (LSByte)							

<b>C/D</b>	A Command Data Bit of 1 indicates a bad command. A Command Data Bit of 0 indicates bad data
<b>Field Pointer</b>	The Field Pointer indicates which byte of the command descriptor block or the parameter data was in error. Bytes are numbered starting from 0. When a multiple-byte field is in error, the pointer points to the most-significant byte of the field.

**TABLE E**

<b><u>Byte</u></b>	7	6	5	4	3	2	1	0
15	SKSV (1)	Reserved (0)						
16	Actual Retry Count (MSByte)							
17	Actual Retry Count (LSByte)							

**Table 3: Tape Autochangers**

Sense Data returned from unit as result of a "Request Sense" Command

<b><i>Byte</i></b>	7	6	5	4	3	2	1	0
0	Valid (0)	Error Code (70H or 71H)						
1	Reserved (0)							
2	Reserved (0)				Sense Key			
3/6	Information							
7	Additional Sense Length ( <i>See Table F</i> )							
8/11	Reserved (0)							
12	Additional Sense Code							
13	Additional Sense Code Qualifier							
14	Reserved (0)							
15	SKSV (1)	C/D	Reserved (0)		BPV (1)	Bit Pointer		
16	Field Pointer (MSByte)							
17	Field Pointer (LSByte)							
18/77	Additional Sense Bytes ( <i>See Table G</i> )							

***Valid***                      A 1 indicates that the information field contains valid information

**Error Code**                Either 70H (current error) or 71H (Deferred error).

**Sense Key and  
Additional Sense  
Length**                      See Table F for details

***Table F***  
**Sense Key - Additional Sense Length Values**

<b><u>Sense Key</u></b>	<b><u>Description</u></b>	<b><u>Additional Sense Length</u></b>
0H	No Sense	10
1H	Recovered Error	70
2H	Not Ready	10
4H	Hardware Error	70
5H	Illegal Request	10
6H	Unit Attention	10
BH	Aborted Command	10

<b><u>Information</u></b>	Contains the Element address in question on a ILLEGAL REQUEST during 21H or 3BH sense code
<b>Additional Sense Code</b>	The Additional Sense Code specifies detailed information related to the error reported in the Sense Key field.(See Command Reference Manual P/N 5960-7674)
<b>Additional Sense Code Qualifier</b>	The Additional Sense Code Qualifier Specifies detailed information related to the Additional Sense Code. (See Command Reference Manual P/N 5960-7674)
<b>SKSV</b>	When set to 1, the Sense Key Specific bytes contains valid data. When set to 0, bytes 15, 16, and 17, are null.
<b>C/D</b>	1 = Illegal Parameter is in the Command Descriptor Block 0 = Illegal Parameter is in Data Out Phase
<b>BPV</b>	1 = Bit Pointer Field is valid 0 = Bit Pointer Field is invalid
<b>Bit Pointer</b>	Specifies which bit is in error. When a multiple bit field is in error, the pointer points to the most significant bit in the field.
<b>Field Pointer</b>	Specifies which byte is in error. Bytes are numbered starting from 0. When a multiple-byte field is in error, the pointer points to the most significant byte of the field.
<b>Additional Sense Bytes</b>	This field may contain information when the Additional Sense Length field contains a value greater than 10.

**TABLE G**

Byte	7	6	5	4	3	2	1	0
18	Reserved (0)							
19	Hardware Error Code (See Command Reference Manual P/N 5960-7674)							
20	First FRU (See Command Reference Manual P/N 5960-7674)							
21	Second FRU (See Command Reference Manual P/N 5960-7674)							
22	Third FRU (See Command Reference Manual P/N 5960-7674)							
23	Move Command Attempted (See Command Reference Manual P/N 5960-7674)							
24/25	Source Element Number							
26/27	Desination Element Number							
28/29	Secondary Desination Element Number							
30/34	Micro-Move ID History (See Command Reference Manual P/N 5960-7674)							
35	Failed Micro-Move ID (See Command Reference Manual P/N 5960-7674)							
36	Micro-Move Error Code (See Command Reference Manual P/N 5960-7674)							
37	Reserved (0)							
38/39	Vertical Motor Commanded Position							
40/41	Vertical Motor Actual Position							
42/43	Plunge Motor Commanded Position							
44/45	Plunge Motor Actual Position							
46/47	Translate Motor Commanded Position							
48/49	Translate Motor Actual Position							
50/53	Odometer							
54	Move Cap	Last SCSI	Reserved (0)		Cart 16	Cart 17		
55	Valid	Rsvd (0)	Cart Tran	Cart Elem	Reserved (0)			
56	Valid	Rsvd (0)	Cart Tran	Cart Elem	Reserved (0)			
57	Valid	Rsvd (0)	Cart Tran	Cart Elem	Reserved (0)			
58/78	Reserved (0)							

**NOTE**

The description and values for the above table can be found in the Optical Drive and Library SCSI-2 Command Reference Manual P/N 5960-7674

## Tape Drives

**Table 4: DDS (Digital DATA Storage)**

Sense Data returned from unit as result of a "Request Sense" Command

Byte	7	6	5	4	3	2	1	0
0	AV	Error Code (70H or 71H)						
1	Segment Number							
2	Mark	EOM	ILI	Rsvd(0)	Sense Key			
3	Information Bytes(MSByte)							
4	Information Bytes							
5	Information Bytes							
6	Information Bytes (LSByte)							
7	Additional Sense Length (Normal = 0BH, Up to 2CH if copy abort sense)							
8	Command Specific Information Bytes (MSByte)							
9	Command Specific Information Bytes							
10	Command Specific Information Bytes							
11	Command Specific Information Bytes (LSByte)							
12	Additional Sense Code							
13	Additional Sense Code Qualifier							
14	Field Replaceable Unit Code							
15	SKSV	C/D	Reserved (0)		BPV	Bit Pointer		
16	Field Pointer/Drive Error Code (MSByte)							
17	Field Pointer/Drive Error Code (LSByte)							
18	Reserved (0)							
19/51	Copy Target Status							

<b>Valid</b>	A Valid bit of 1 indicates that the information bytes contain valid information as defined in the SCSI specification
<b>Error Code</b>	Either 70H (current error) or 71H (Deferred error).
<b>Segment Number</b>	This should contain the number of the current segment descriptor when the request sense is in response to a <b>check conditioned</b> copy command. Otherwise this field shall be set to zero
<b>Filemark</b>	Bit indicates that the current command has read a Filemark or Setmark
<b>EOM</b>	This bit indicates that an End-of-Medium (End of Partition or Beginning of Partition) exists. The warning is also given by setting the Sense Key to NO SENSE and the Additional Sense Code Qualifier set to End of Partition (2H) or Beginning of Partition (04H).
<b>ILI</b>	The Incorrect Length Indicator bit indicates that the requested logical block length did not match the logical block length of the data on the tape. Only Read or Verify may cause this bit to be set.
<b>Information Bytes</b>	These bytes contain the differences of the requested length minus the actual length in bytes, blocks, or Filemarks, as determined by the command. Negative values are indicated by two's complement notation. The bytes are valid for all read, write, space, and verify tape commands for which a CHECK CONDITION status has been generated. The information bytes are zero for MODE SELECT/SENSE, INQUIRY, READ BLOCK LIMITS, and TEST UNIT READY.

<b>Additional Sense Length</b>	Specifies the number of additional sense bytes to follow. This is always set to 0BH. It is never truncated to reflect actual transfer length..
<b>Command Specific Information Bytes</b>	Command Specific Bytes are handled as device specific and can be logged by the operating system on error conditions. Usually set to zero.
<b>Additional Sense Code (ASC)</b>	Contains additional information about the Sense Key and cause of the CHECK CONDITION status.
<b>Add. Sense Code Qualifier (ASCQ)</b>	Contains additional information about the Sense Key and cause of the CHECK CONDITION status.
<b>FRU Code</b>	This will be set to a value to indicate a specific part which has failed. It may take one of the following values. 0 = No failing unit. 1 = Controller PCA failure 2 = Mechanism failure
<b>SKSV</b>	This is set if the sense <b>key specific bytes</b> (15 thru 17) are valid. The only time these bytes are valid is when they assume the role of field pointer bytes. This will occur when an <b>illegal field check</b> detects an error in a command descriptor block or a <b>parameter list check</b> detects an error in a command parameter list. If this bit is not set then the "C/D" , "BPV" and "Bit Pointer" fields will be zero, the top byte of the "Field Pointer will be zero, and the bottom byte of the "Field Pointer" will contain a product specific error code
<b>C/D</b>	If this bit is set then the field pointer information applies to the command descriptor block. If it is clear it indicates the field pointer information applies to the parameter list for the command. (This field is only valid if the "SKSV" flag is set).
<b>BPV</b>	This indicates that the <b>bit pointer</b> field is valid. If SKSV is set then this will be set.
<b>Bit Pointer</b>	This field identifies the bit position of the field in error (be it a command descriptor or a command parameter list field) ( This field is only valid if the "SKSV" flag is set).
<b>Field Pointer Bytes/ Drive Error Code:</b>	This field is dependant on the sense of the "SKSV" flag.  If "SKSV" is set then this field identifies in which byte of the command descriptor/parameter list an error was detected.  If "SKSV" is not set, then the top byte of this field will be zero. The bottom byte of this field contains the <b>drive error</b> code associated with the failure of the previous command, or zero in the case of no failure / no appropriate error code.
<b>Copy Target Status</b>	This field is returned only if the sense key = <b>copy aborted</b> .

**Table 5: DLT (Digital Linear Tape)**

Sense Data returned from unit as result of a "Request Sense" Command

Byte	7	6	5	4	3	2	1	0
0	AV	Error Code (70H or 71H)						
1	Segment Number							
2	Mark	EOM	ILI	Rsvd(0)	Sense Key			
3	Information Bytes(MSByte)							
4	Information Bytes							
5	Information Bytes							
6	Information Bytes (LSByte)							
7	Additional Sense Length							
8	Command Specific Information Bytes (MSByte)							
9	Command Specific Information Bytes							
10	Command Specific Information Bytes							
11	Command Specific Information Bytes (LSByte)							
12	Additional Sense Code							
13	Additional Sense Code Qualifier							
14	Sub-Assembly Code							
15	SKSV	C/D	Reserved (0)		BPV	Bit Pointer		
16	Field Pointer/Drive Error Code (MSByte)							
17	Field Pointer/Drive Error Code (LSByte)							
18	Internal Status Code							
19	Tape Motion Hours							
20	Tape Motion Hours							
21	Power On Hours							
22	Power On Hours							
23	Power On Hours							
24	Power On Hours							
25	Tape Remaining (MSByte)							
26	Tape Remaining							
27	Tape Remaining							
28	Tape Remaining (LSByte)							

<b>Valid</b>	A Valid bit of 1 indicates that the information bytes contain valid information as defined in the SCSI specification
<b>Error Code</b>	Either 70H (current error) or 71H (Deferred error).
<b>Segment Number</b>	Byte will always be 0
<b>Filemark</b>	This bit indicates that the current command has read a Filemark
<b>EOM</b>	This bit indicates that an End-of-Medium (End of Partition or Beginning of Partition) exists. The warning is also given by setting the Sense Key to NO SENSE and the Additional Sense Code Qualifier set to End of Partition or Beginning of Partition.  For write-type operations, the drive returns a CHECK CONDITION on any operation which occurs after detection of the Early Warning EOP marker. The EOM and Additional Sense Code fields will be set. For read-type operations, the drive does not return a CHECK CONDITION until the drive encounters the physical EOP.
<b>ILI</b>	The Incorrect Length Indicator bit indicates that the requested logical block length did not match the logical block length of the data on the tape. Only Read or Verify may cause this bit to be set.
<b>Information Bytes</b>	These bytes contain the differences of the requested length minus the actual length in bytes, blocks, or Filemarks, as determined by the command. Negative values are indicated by two's complement notation. The bytes are valid for all read, write, space, and verify tape commands for which a CHECK CONDITION status has been generated. The information bytes are zero for MODE SELECT/SENSE, INQUIRY, READ BLOCK LIMITS, and TEST UNIT READY.
<b>Additional Sense Length</b>	Specifies the number of additional sense bytes to follow. If the Allocation Length of the command descriptor block is too small to transfer all of the additional sense bytes, the Additional Sense Length is not adjusted to reflect the truncation.
<b>Command Specific Information Bytes</b>	Command Specific Bytes are handled as device specific and can be logged by the operating system on error conditions. On media errors, this usually contains the current SCSI Logical Block Address.
<b>Additional Sense Code (ASC)</b>	Contains additional information about the Sense Key and cause of the CHECK CONDITION status.
<b>Add. Sense Code Qualifier (ASCQ)</b>	Contains additional information about the Sense Key Code and cause of the CHECK CONDITION status.
<b>Sub-Assembly Code</b>	Unused at Present, returned as 0.
<b>Field Pointer Bytes</b>	C/D - When set, indicates that the illegal parameter is in the CDB. A C/D of zero indicates that the illegal parameter is in the Parameter List from the initiator.  BPV - When the Bit Pointer Valid bit is set, it indicates that the Bit Pointer field is valid and designates which bit of the byte designated by the field pointer is in error. For multi-bit field, it points to the most significant bit of the field.  Field Pointer - Indicates which byte of the CDB or Parameter List was in error. For a multi-byte field, the most significant byte is indicated.
<b>Internal Status Code</b>	For Complete definition (See Command Reference Manual P/N 5960-7674)



<b>Tape Motion Hours</b>	Report the number of tape motion hours, that is, the head wear hours. Format is represented in a hex-decimal word (2 bytes).
<b>Power On Hours</b>	Report the total hours the drive power has been on. Format is represented in a hex-decimal word (2 bytes).
<b>Tape Remaining</b>	Report the amount of tape remaining in 4096 blocks

**Table 6: 1/2" OPEN REEL (Reel to Reel Tape Drives)**

Sense Data returned from unit as result of a "Request Sense" Command

Byte	7	6	5	4	3	2	1	0
0	AV	Error Code (70H or 71H)						
1	Segment Number							
2	Mark	EOM	ILI	Rsvd(0)	Sense Key			
3	Information Bytes(MSByte)							
4	Information Bytes							
5	Information Bytes							
6	Information Bytes (LSByte)							
7	Additional Sense Length (Normal = 0BH, Up to 2CH if copy abort sense)							
8	Command Specific Information Bytes (MSByte)							
9	Command Specific Information Bytes							
10	Command Specific Information Bytes							
11	Command Specific Information Bytes (LSByte)							
12	Additional Sense Code							
13	Additional Sense Code Qualifier							
14	Field Replaceable Unit Code							
15/17	Sense Key Specific Bytes							
18	Report Flags (Vendor Unique)							
19	Error Code from Data Buffer (Vendor Unique)							
20	Tape Position Flags (Vendor Unique)							
21	Data Record Byte Count (MSByte) (Vendor Unique)							
22	Data Record Byte Count (Vendor Unique)							
23	Data Record Byte Count (LSByte) (Vendor Unique)							
24	Retry Count (Vendor Unique)							
25	Back Reference Count (MSByte) (Vendor Unique)							
26	Back Reference Count (LSByte) (Vendor Unique)							
27	Last Error Causing Retry (Vendor Unique)							

- Valid** A Valid bit of 1 indicates that the information bytes contain valid informatin as defined in the SCSI specification
- Error Code** Either 70H (current error) or 71H (Deferred error).
- Segment Number** Byte will always be 0
- Filemark** This bit indicates that the current command has read a Filemark
- EOM** This bit indicates that an End-of-Medium (End of Tape or Beginning of Tape) exists. The warining is also given by settingthe Sense Key to NO SENSE and the Additional Sense Code Qualifier set to End of Tape or Beginning of Tape.
- ILI** The Incorrect Length Indicator bit indicates that the requested logical block length did not match the logical block length of the data on the tape.
- Information Bytes** These bytes contain the differences of the requested length minus the actual length in bytes, blocks, or Filemarks, as determined by the command. Negative values are indicated by two's complement notation.

<b>Additional Sense Length</b>	Specifies the number of additional sense bytes to follow. If the Allocation Length of the command descriptor block is too small to transfer all of the additional sense bytes, the Additional Sense Length is not adjusted to reflect the truncation.
<b>Command Specific Information Bytes</b>	Command Specific Bytes are handled as device specific and can be logged by the operating system on error conditions. On media errors, this usually contains the current SCSI Logical Block Address.
<b>Additional Sense Code (ASC)</b>	Contains additional information about the Sense Key and cause of the CHECK CONDITION status.
<b>Add. Sense Code Qualifier (ASCQ)</b>	Contains additional information about the Sense Key and cause of the CHECK CONDITION status.
<b>FRU Code</b>	Non-zero returned values define a device-specific mech or unit has failed. A zero valid indicates no specific mech or unit has been identified.
<b>Sense Key Specific</b>	Unused at present (set to zero)

Error Decode Example:

**SYSTEM ERROR LOG REPORT**  
=====

Report Date/Time      MON, SEP 12, 1994 - 3:12 PM

```
=====
TUE,AUG 05, 1997 7:41PM LOG0930.PUB.SYS      SYSTEM (PIN0) I/O ERROR
I/O ERROR
PRODUCT NAME:    STK4791    PDEV:            10/4/12.3.2
LDEV                            DEVICE CLASS:    Mag Tape
I/O EVENT CLASS: Hardware      LLIO STATUS:    $03C000F3
```

```
HPUX I/O Status: Proc. Num. = 7 Error Num. = -44, Subsystem = 1044
RETRY SCHEME:    Log Each Retry    WILL RETRY:    NO
I/O RESULT:     I/O Failed            RUN AUTODIAG:  NO
RETRY COUNT:    0                    MGR PORT NUM.: $13
TRANS. NUM.:    $574C7            #HDWR BYTES:    0
HARDWARE STATUS:
```

```
      1  2  3  4  5  6  7  8  9 10 11 12
      == == == == == == == == == == == ==
01:   02 02 A0 02 70 00 06 00 00 00 00 56
13:   00 00 00 00 29 00 00 00 00 00 12 01
25:   00 00 00 00 07 07
```

```
DATA LEN:    0            MGR CODE:    0
=====
```

The above output is the result of running LOGTOOL and selecting type 111 files. Each entry into the system log is delineated by a row of equal signs (=). The initial (top) portion of the entry provides information as to the product name, pdev, ldev, time of failure and the like. Essentially the top portion indicates the general status of the subsystem. The portion after the HARDWARE STATUS is of interest in this discussion.

The raw hardware bytes contain both system and product information. This is usually in the form of 12 columns. However in some situations, the data is presented in 10 columns. Which ever is the case, the decoding procedures are the same.

1	Look for the 70H (71H, F0H, or F1H) on the first line. This is usually under column 05. This is the beginning of the returned <b>SCSI Sense</b> data as a result of the <i>Request Sense</i> command. This is "Byte 0" of the Sense Data.
2	Select the device type from the previous 6 Tables.
3	Considering the information under column 5 as "Byte 0" count to "Byte 2" this is the information under column 07. The right hand side of this byte, in the case of the above example a "6", is the <b>SCSI Sense Key</b> . Definition can be found in Section 8-2.
4	Again using the information under column 5 as "Byte 0" count to bytes 12 and 13. Ignore the column labeling, it will no longer be used. In the above example, the information contained in byte "12" is 29 and the information contained in byte "13" is 00. These bytes are considered the <b>ASC</b> (Additional Sense Code) and <b>ASCQ</b> (Additional Sense Code Qualifier). The definitions of these can be found in Section 8-3 of the PIG manual. This information is also available in the HP Common SCSI manual and the ANSI standards.

In some situations there will not be any Hardware status logged. In these situations, the print out from LogTool will appear as follows:

```
=====
WED, JUL30, 1997 11:09PM LOG0930.PUB.SYS SYSTEM (PIN74)
I/O ERROR
PRODUCT NAME: HP1504B PDEV: 0/32.0.0
LDEV DEVICE CLASS: Mag Tape
I/O EVENT CLASS: Hardware LLIO STATUS: $03C000F3
```

```
MPE/XL I/O Status: Proc. Num. =-64 Error Num. = -3 Subsystem = 243
RETRY SCHEME: Log Each Retry WILL RETRY: NO
I/O RESULT: I/O Successful RUN AUTODIAG: NO
RETRY COUNT: 0 MGR PORT NUM.: $FFFFFF5D
TRANS. NUM.: $574C7 #HDWR BYTES: 0
HARDWARE STATUS:
```

No hardware status was logged.

```
DATA LEN: 22 MGR CODE: 243
RECORD TYPE: I/O ERROR SCSI_TAPE_STATE BUSY
SCSI_TAPE_CLASS scsi_io_reply_msg SCSI_TAPE_ACTION scsi_io_rely
LOCKED false OPERATION STATE fixed
REQ MSG PTR VALID true MSG DESC -REQ MSG dm_io_req-msg
MSG FUNC -REQ MSG read_func TAPE CTRL -REQ MSG N/A
DIAG OPT -REQMSG N/A MSG DESC -INV MSG scsi_io_reply_msg
MSG FUNC -INV MSG N/A TAPE CTRL -INV MSG N/A
DIAG OPT -INV MSG N/A SCSI_STATUS busy
SENSE, MARK false SENSE, EOM false
SENSE KEY no_sense SENSE ASC $0
SENSE ASC/Q $0 SENSE, FRU $0
SENSE KEY SPECI BYTES$0
=====
```

In this situation, the above was the result of a Request Sense at the end of a successful completion of command. As you can see the SENSE KEY is no sense (00) and the remainder of the SENSE ASC and ASC/Q is equal to \$0. This entry into the system log is for status only and is not an error. If the application were able to translate the errors, the SENSE KEY and SENSE ASC and ASC/Q would have the appropriate information.