



SCSI Sense Key Error Guide

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Preface

This guide provides support and troubleshooting information for SCSI sense key errors on any Sun StorEdge™ T3, A3500, or A1000 storage array. This guide describes some common SCSI sense key errors for several different types of disk error and gives the recommended actions that should be taken when the sense key errors are observed.

For detailed information on SCSI standards, go to <http://www.T10.org>

Using UNIX Commands

This document might not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices. See the following for this information:

- Software documentation that you received with your system
- Solaris™ Operating System documentation, which is at <http://docs.sun.com>

Shell Prompts

Shell	Prompt
C shell	<i>machine-name%</i>
C shell superuser	<i>machine-name#</i>
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#

Typographic Conventions

Typeface*	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. % You have mail.
AaBbCc123	What you type, when contrasted with on-screen computer output	% su Password:
<i>AaBbCc123</i>	Book titles, new words or terms, words to be emphasized. Replace command-line variables with real names or values.	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be superuser to do this. To delete a file, type <code>rm filename</code> .

* The settings on your browser might differ from these settings.

Related Documentation

Application	Title	Part Number
System administration	<i>Sun StorEdge T3 and T3+ Array Administrator's Guide</i>	816-0776-10
Configuration	<i>Sun StorEdge T3 and T3+ Array Configuration Guide</i>	816-0777-10
Troubleshooting	<i>Sun StorEdge A1000 and A3x00/A3500FC Best Practices Guide</i>	806-6419-14

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SCSI Sense Key Error Guide

This guide contains the following topics:

- “Sense Key Error Format” on page 1
- “Sense Key = 0x1 Errors” on page 2
- “Sense Key = 0x2 Errors” on page 4
- “Sense Key = 0x3 Errors” on page 5
- “Sense Key = 0x4 Errors” on page 6
- “Sense Key = 0x5 Errors” on page 7
- “Sense Key = 0xb Errors” on page 8

Sense Key Error Format

A SCSI sense key error is formatted as follows:

Sense Key = 0x1, Asc = 0x18, Ascq = 0x2

Sense Data Description = Recovered Data - Data Auto-Reallocated

Asc stands for Additional Sense Code

Ascq stands for Additional Sense Code Qualifiers

Sense Key = 0x1 Errors

All 0x1 sense key errors indicate that the command was completed successfully, with some recovery action performed by the disk. When multiple recovered errors occur, the last error that occurred is reported by the additional sense bytes. All 0x1 sense keys are soft errors and proactive replacement is normally not required.

TABLE 1 Sense Key = 0x1 Errors

Asc	Ascq	Error Message	Description
0x3	0x0	Peripheral Device Write Fault	A soft recoverable error that is typically seen in transient environmental conditions, such as vibration or shock. This condition is corrected after another write to the same disk sector is completed (assuming that the environmental condition is not sustained).
0x9	0x0	Track Following Error	A result of the disk head not following the data track on the disk media. This condition is normally corrected during the next write operation on the track.
0x9	0x1	Write Fault Status During Read (Tracking Servo Failure)	Indicates that the disk servo failed to allocate the disk head to the correct data track before the write operation. The disk servo corrects this condition by reallocating the disk head to the correct data track.
0xc	0x1	Write Error - Recovered With Auto Reallocation	Indicates that a write error occurred on the drive, but it was recovered and data was reallocated. Normally, if the feedback signal from the drive write head is not strong, the drive reallocates the data to a spare sector.
0x15	0x1	Mechanical Positioning Error	A transient condition. The drive “knows” that the head is not where it is supposed to be, makes the proper adjustments, and reads or writes the data during the next rotation. The drive has logic to continuously resync itself.
0x17	0x1	Recovered Data With Retries	See 0x17/0x3.
0x17	0x2	Recovered Data With Positive Head Offset	See 0x17/0x3.

TABLE 1 Sense Key = 0x1 Errors (*Continued*)

Asc	Ascq	Error Message	Description
0x17	0x3	Recovered Data With Negative Head Offset	A result of a read exception condition. It indicates that the drive was able to recover the data using the normal number of retries.
0x17	0x8	Recovered Data w/o ECC-Recommend Rewrite	A result of a read exception condition. It indicates that the data was recovered but a rewrite is recommended.
0x18	0x1	Recovered Data Using ECC After Normal Retries	A read condition that indicates that the drive was able to recover the data using the normal number of retries.
0x18	0x2	Recovered Data - Data Auto-Reallocated	A read condition that indicates that the drive was able to recover the data by reallocating the sector.
0x5d	0x0	Failure Prediction Threshold Exceeded	Indicates that the drive reached its failure prediction threshold and it is necessary to replace the disk (after the data is transferred to a standby disk, if one is available).

Sense Key = 0x2 Errors

All 0x2 sense key errors indicate that the drive is not in a ready state and cannot be accessed.

TABLE 2 Sense Key = 0x2 Errors

Asc	Ascq	Error Message	Description
0x4	0x1	Logical Unit Not Ready, Becoming Ready	Indicates that the drive is OK— it is in the process of spinning up, but it is not yet ready.
0x4	0x2	Logical Unit Not Ready, Init. Cmd Required	Indicates that the drive is ready to go, but it is not spinning. Generally, the drive needs to be spun up.
0x4	0x3	Logical Unit Not Ready, Manual Intervention is Required	Requires manual intervention—the recommended action is to reseat the drive.

Sense Key = 0x3 Errors

All 0x3 sense key errors indicate that the command terminated with an unrecovered error condition.

TABLE 3 Sense Key = 0x3 Errors

Asc	Ascq	Error Message	Description
0x11	0x0	Unrecovered Read Error	The RAID controller firmware, during a normal read or volumes verification operation, corrects the bad sector on the drive by reconstructing the data (assuming a RAID 1+0 or RAID 5 configuration) and writing it back to the drive. The drive, in turn, writes the data to a spare sector. Ensure that the volume is scrubbed on a regular basis. If the volumes in the RAID device are configured as RAID 0, then the data is lost and drive replacement is required.
0x11	0x1	Read Retries Exhausted	
0x11	0x2	Unrecovered error was detected during Data Read (BCRC error detected by SCSI)	
0x11	0x4	Unrecovered Read Error, Auto Reallocation Failed	
0x16	0x0	Data Synchronization Mark Missing Or Incorrect	This error requires a disk replacement, regardless of the RAID level. This condition is fatal, where the track is lost and the RAID device will disable the disk.

Sense Key = 0x4 Errors

All 0x4 sense key errors indicate that the disk drive detected an unrecoverable hardware failure while performing the command or during a self-test. Replace a drive when this type of error occurs.

TABLE 4 Sense Key = 0x4 Errors

Asc	Ascq	Error Message
0x15	0x1	Mechanical Positioning Error
0x15	0x2	Positioning Error Detected by Read of Media
0x32	0x0	Not Defect Spare Sectors Available
0x32	0x1	Defect List (G) Update Failure
0x3E	0x3	Logic Unit Failed Self- Test
0x3E	0x4	Logic Unit Unable to update Self- Test Result Log

Sense Key = 0x5 Errors

All 0x5 sense key errors are information errors. The 0x5 sense key is a host/RAID controller interaction sense key. This key's errors indicate that the RAID controller received an illegal request from the host. In some cases, the host is sending out a command, asking an individual drive to perform a read or write operation. However, the problem is that *no* host can communicate directly to the individual drives in a hardware RAID device. The host can only communicate with the RAID controller. In this case, the RAID controller is returning an *illegal request* statement back to the host, stating that it doesn't understand what the host is asking.

For 0x5 sense key errors, no corrective action is required to the disk. When you see this error, send the sense key log to a specialist for help.

TABLE 5 Sense Key = 0x5 Errors

Asc	Ascq	Error Message
0x25	0x0	Logical Unit Number Not supported
0x26	0x97	Invalid Field Parameter - TMS Firmware Tag
0x26	0x99	Invalid Field Parameter - Firmware Tag

Sense Key = 0xb Errors

All 0xb sense key errors indicate that the disk drive aborted the command and that the initiator may be able to recover by trying the command again.

TABLE 6 Sense Key = 0xb Errors

Asc	Ascq	Error Message	Description
0x45	0x0	Select/Reselect failure	
0x47	0x0	SCSI Parity Error	<p>This error implies that a parity error condition occurred on the disk. This means that the disk has not received the FC packet correctly. The possible causes of a parity error condition include:</p> <ol style="list-style-type: none">1. The FC interface chip on one of the disks has gone bad, resulting in FC frames being corrupted (for example, a frame size error).2. An internal circuit on one of the drives has gone bad, resulting in the drive not being able to send or receive FC frames correctly. In this situation, the drive receives data that does not match the parity bit. The data is rejected and an error is generated.3. Some other component on the FC loop is contributing to the noise on the loop, resulting in this error. <p>It is difficult to identify the failing component when a 0x47/0x0 error is found, because any component on the FC loop might be the cause. Consult a specialist for help when this error is seen.</p> <p>Note also that a 0x47/0x0 error may occur on the host side of an array—that is, any component on the FC loop on the host side may be causing the problem. In this situation, consult a specialist for help in identifying the failing component.</p>