

TO: T10 Membership, SMC-3 Working Group
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 SUBJECT: SMC-3 Vendor Specific Sense Code Survey (document T10/06-109r1)

Rev1 – Incorporated additional data from another vendor
 Rev0 – Initial draft.

Introduction

I solicited media changer vendors to provide their vendor specific sense codes via an e-mail to the T10 reflector on January 3rd, 2006. Three companies responded, and this document presents a compilation of the results. I also included a few standard sense codes that were applied in a non-standard fashion.

Discussion

While this list represents vendor specific sense codes from only two vendors, I believe it does cover several different media changer products across a few product generations. The objective for conducting this survey was to identify common conditions that have typically been assigned vendor specific sense codes that would benefit from a standard definition.

Several of the sense codes appear to be applicable beyond media changers, and may be candidates for further consideration. This proposal will focus on those sense codes that are primarily applicable to media changers (as could best be determined).

Vendor Specific Sense Codes for Media Changers

The following tables present the vendor specific sense codes determined to be related to media changers. The tables are sorted by ASC/ASCQ ascending pair values, with the Sense Key provided to distinguish between the same values used under different circumstances. The various tables have been grouped according to general theme (as could best be determined).

Some general themes noted in Table 1 are: loss of robotics power, inability of robotics to move in specific axis; inability of robotics to find or reach a position.

Table 1 Vendor Specific Sense Codes Relating to Robotics

S/K	ASC	ASCQ	Description
4h	40h	A0h	The robotics could not move on the vertical (Y) axis
4h	40h	A1h	Could not home robotics on the vertical (Y) axis
4h	40h	B0h	The robotics could not move on the horizontal (X) axis
4h	40h	B1h	Could not home robotics on the horizontal (X) axis
4h	40h	C0h	The media changer could not move
4h	40h	E0h	The media changer lost power
4h	80h	11h	MOTOR POWER FAILURE Indicates motor power turned off for a reason not otherwise reported.
Bh	84h	01h	VERTICAL TIMEOUT Vertical axis did not reach desired position within the time limits.
4h	84h	03h	VERTICAL MECHANICAL POSITION ERROR Vertical axis did not reach desired position.
4h	84h	08h	VERTICAL HOME NOT FOUND Vertical axis did not reach the home position.

Bh	85h	01h	HORIZONTAL TIMEOUT Horizontal axis did not reach desired position within the time limits.
4h	85h	03h	HORIZONTAL MECHANICAL POSITION ERROR Horizontal axis did not reach desired position.
4h	85h	08h	HORIZONTAL HOME NOT FOUND Horizontal axis did not reach the home position.

Some general themes noted in Table 2 are: medium stuck in media transport element; lost medium.

Table 2 Vendor Specific Sense Codes Relating to Media Transport Elements

S/K	ASC	ASCQ	Description
4h	15h	80h	The media changer lost a cartridge
4h	15h	81h	The media changer could not pick a cartridge
4h	15h	83h	The media changer could not place a cartridge
5h	3Bh	80h	Illegal request, unable to carry out the requested operation due to a cartridge being in the Transport element.
5h	3Bh	85h	Destination of MOVE MEDIA command cannot be media changer
5h	3Bh	86h	Source of MOVE MEDIA command cannot be media changer
4h	40h	01h	Cartridge in picker at power-on
4h	40h	91h	Picker error
5h	80h	01h	TRANSFER FULL - COMMAND CAN NOT BE EXECUTED Gripper has cartridge in it. Move cartridge to empty storage element using Move Media command. Retry command.
Bh	80h	01h	TRANSFER FULL - AT END OF PLACE Gripper has cartridge in it at end of a place operation (Move Media with a target other than the Transfer).
Bh	80h	06h	TRANSFER EMPTY - COMMAND ABORTED Gripper does not contain cartridge at end of pick portion of Move Media command.
5h	81h	C0h	TRANSPORT FULL The gripper contains a cartridge.
4h	82h	01h	ROTARY TIMEOUT The rotary axis did not reach the desired position within the time limit.
4h	82h	08h	ROTARY HOME NOT FOUND The home flag was not found..

Some general themes noted in Table 3 are: media stuck in data transfer element; addition or removal of data transfer element; status of data transfer element.

Table 3 Vendor Specific Sense Codes Relating to Data Transfer Elements

S/K	ASC	ASCQ	Description
	22h	80h	Drive is not online. Drive is currently installed but is not enabled. The drive is either off or disabled.
	22h	81h	DRV to LIB interface communication error. An error occurred on the communication bus between the library controller and the drive controller.
	22h	82h	Drive is not present. The drive has been physically removed (drive may be present but not fully inserted)
5h	3Bh	87h	Cartridge stuck in tape drive
5h	3Bh	90h	Source cartridge loaded into tape drive and not accessible
6h	3Fh	00h	Data transfer elements may have been added or removed
4h	53h	00h	A drive did not load or unload a tape
5h	53h	01h	A drive did not unload a cartridge
-	80h	01h	DRIVE REQUIRES CLEANING Tape drive indicates that drive needs cleaning. Clean the tape drive. This is returned with element status data, which has no sense key.
	80h	0Dh	Download error, no drives found. No drives compatible with drive microcode image.
6h	80h	0Eh	DATA TRANSFER CHANGED A drive has been inserted/removed into the system. Use "Read Element Status" to determine status of drives.

Bh	80h	10h	LOAD RETRY FAILED Library was unable to successfully load and thread the drive, even after retries. Check drive alignment. If the problem continues, drive may need servicing.
5h	83h	04h	Data transfer element not installed
5h	83h	05h	Data transfer element is varied off and not accessible for library operations
	89h	0Eh	Download to drives failed. A download to the drives sent through a medium changer controller has failed.
5h	F3h	00h	COMMUNICATION INTERNAL FAILURE Internal drive communication port code or hardware failure.
4h	F3h	02h	DRIVE COMMUNICATION TIMEOUT The library is unable to communicate with a drive.
4h	F3h	20h	DRIVE UNLOAD FAILED OR TIMED OUT The command to the drive to unload the tape failed to complete or timed out.
4h	F3h	21h	DRIVE EJECT FAILED OR TIMED OUT The command to the drive to eject a tape failed to complete or time out.
4h	F3h	22h	DRIVE LOAD FAILED OR TIMED OUT The command to the drive to load a tape failed to complete or timed out.
4h	F3h	23h	DRIVE THREAD FAILED OR TIMED OUT The command to the drive to thread a tape failed or timed out.
-	F3h	31h	DRIVE COOLING WARNING The tape drive is indicating that it is has a cooling problem. This is only returned with the element status data, which has no sense key.
4h	F3h	32h	DRIVE POWER NOT OK The tape drive is indicating that it has a power problem.
4h	F3h	33h	DRIVE UCODE NOT OK The tape drive is indicating that it has a microcode problem.
4h	F3h	34h	DRIVE UCODE OR DRIVE NOT OK The tape drive is indicating that it has a microcode or internal problem.
4h	F3h	35h	DRIVE NOT OK The tape drive is indicating that it has detected a drive or media problem.
4h	F3h	36h	DRIVE OR MEDIA NOT OK The tape drive is indicating that it has detected a drive problem.
4h	F3h	38h	DRIVE OR SCSI BUS NOT OK The tape drive is indicating that it has detected a SCSI bus or internal drive problem.
4h	F3h	39h	DRIVE OR RS422 NOT OK The tape drive is indicating that it has detected an RS422 or internal drive problem.

Some general themes noted in Table 4 are: absence of magazines; inability to lock or unlock; door containing elements remaining open.

Table 4 Vendor Specific Sense Codes Relating to Import/Export Elements

S/K	ASC	ASCQ	Description
	3Ah	80h	An I/O door is open, medium not present. The import export element is open and no medium is in the I/E element.
5h	53h	80h	Cartridge rejected in the mailbox because it was not properly loaded.
5h	53h	81h	Mailbox magazine removed
5h	53h	81h	Mailbox is open
4h	53h	82h	Cannot lock the mailbox
4h	53h	83h	Cannot unlock the mailbox
2h	80h	02h	LOGICAL UNIT IS NOT READY, THE IMPORT/EXPORT DOOR IS OPEN
	80h	03h	Source magazine missing. Used instead of 3Bh/12h MEDIUM MAGAZINE REMOVED - to be more precise
	80h	04h	Destination magazine missing. Used instead of 3Bh/12h MEDIUM MAGAZINE REMOVED - to be more precise
5h	83h	02h	Cartridge magazine not installed

Bh	8Ch	01h	LOAD PORT LATCH FAILURE The load port door was unlocked, but did not leave its current position before time-out. This may be due to the door being stuck, or in the case of a close operation, the operator not moving the door.
4h	8Ch	06h	LOAD PORT DOOR OPEN Load port door unlocked but failed to open.

Some general themes noted in Table 5 are: missing barcode labels, invalid barcode labels; unable to determine status.

Table 5 Vendor Specific Sense Codes Relating to Volume Identifiers or Element Status

S/K	ASC	ASCQ	Description
	80h	05h	Bar code failure. Bar code reader failure or failed to read a barcode
5h	80h	22h	ELEMENT CONTENTS UNKNOWN The contents of an element address are unknown. Issue a Read Element Status for the element address. If contents are still unknown issue an Initialize Element Status command.
4h	80h	23h	BAR CODE SCANNER FAILURE Bar code scanner has failed. Reinitialize element status.
4h	83h	00h	The barcode label is questionable
4h	83h	00h	Barcode label too short, too long or duplicate
5h	83h	00h	The barcode label is questionable
4h	83h	01h	Barcode label too short, too long or duplicate
4h	83h	01h	Cannot read a barcode label due to scanner problem
5h	83h	01h	Barcode label too short, too long or duplicate
5h	83h	02h	Barcode label questionable
4h	83h	03h	Cell status and barcode label questionable
5h	83h	03h	Cell status and barcode label questionable
5h	83h	06h	Element is contained within an offline tower or mailbox and is not accessible for library operations
4h	83h	09h	The barcode label is missing
5h	83h	09h	The barcode label is missing

Some general themes noted in Table 6 are: system door open; system needing calibration or configuration; system status change.

Table 6 Vendor Specific Sense Codes Relating to Media Changer System

S/K	ASC	ASCQ	Description
2h	04h	83h	Media changer aisle power is disabled; a door could be open
	04h	83h	Access door is open. The bulk load door is open providing access to slots beyond the import/export elements.
2h	04h	8Dh	The media changer is not ready because it is offline
2h	04h	90h	The media changer needs teaching
5h	3Bh	A0h	Media type does not match destination media type
2h	80h	00h	LOGICAL UNIT IS NOT READY, A DOOR IS OPEN
6h	80h	00h	DOOR WAS OPENED INVENTORY MAY HAVE BEEN CORRUPTED Close door and retry command.
2h	80h	07h	SYSTEM IS STOPPED The STOP button on the control panel was pressed.
6h	80h	07h	SYSTEM STOP BUTTON WAS PRESSED (MAY CURRENTLY BE PRESSED) The STOP button on the control panel was pressed.
4h	80h	0Ah	CONFIGURATION SETTINGS CORRUPTED Reconfigure the library. If problem persists, call Technical Support.
4h	88h	00h	WARNING SAFE TEMPERATURE EXCEEDED This is only a warning that the temperature in the library exceeds the normal operational temperature.

4h	88h	01h	MAXIMUM TEMPERATURE EXCEEDED The robot in the cabinet that has overheated turns off and remains off until the temperature returns to an acceptable level.
4h	8Ah	02h	CALIBRATION FAILURE Check bins, cartridges, all internal elements
5h	8Ah	02h	UNCALIBRATED POSITION System requires calibration.

Other Vendor Specific Sense Codes

Table 7 is the other vendor specific sense codes that were collected in the survey. The table is sorted by ASC/ASCQ ascending pair values, with the Sense Key provided to distinguish between the same values used under different circumstances.

Table 7 General Vendor Specific Sense Codes

S/K	ASC	ASCQ	Description
	04h	88h	Download needed. Main firmware image must be downloaded before device is functional.
	04h	89h	Download checksum error. Checksum error on download of main firmware image.
5h	24h	80h	Attempt to write a read only buffer
5h	24h	86h	Invalid Offset
5h	24h	87h	Invalid Size
5h	24h	89h	Image Data Over Limit
5h	24h	8Bh	Image/Personality is Bad
5h	24h	8Ch	Not Immediate Command during Code Update
5h	24h	91h	Bad Image EDC
5h	26h	80h	Parameter data checksum failure
6h	29h	80h	Reset for permanent error occurred
6h	29h	81h	Reset into degraded mode of operation
4h	3Fh	80h	Could not erase EEPROM
4h	3Fh	84h	Could not program EEPROM
	40h	80h	Diagnostic failure. A diagnostic operation failed leaving the device in a failed state.
4h	40h	83h	Diagnostic Failure
4h	40h	84h	POST Soft Error
Bh	44h	80h	Unexpected Selection Interrupt
Bh	44h	82h	Command Complete Sequence Failure
	80h	07h	Download to Sub-Device 1 failed. Sub-Device 1 microcode image download failed.
	80h	08h	Download to Sub-Device 2 failed. Sub-Device 2 microcode image download failed
	80h	09h	Download to Sub-Device 3 failed. Sub-Device 3 microcode image download failed
	80h	0Ah	Need new library controller boot. Firmware bootstrap microcode download required.
Bh	80h	0Bh	COMMAND ABORTED BY USER Informational message. No action is necessary.
	80h	0Bh	Need new Sub-Device 1 boot. Sub-Device 1 firmware bootstrap microcode download required
	80h	0Ch	Sub-Device 1 incompatible firmware. Sub-Device 1 incompatible firmware
4h	80h	0Fh	LOW POWER ERROR Check power connections.
4h	84h	00h	Firmware error
4h	8Eh	02h	SCSI UPGRADE TRANSFER FAILED A data transfer error or a data storage error was received during the firmware upgrade.