To: INCITS Technical Committee T10

From: Kevin Butt

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Subject: SSC-3: Cleaning Model

# 1. Revisions

05-285r0. Initial version. Began from May 2005 SSC-3 Meeting Minutes (05-183r0) Item “6.4 Email: standard method of reporting sense during a cleaning cycle“ and SSC-3 Action Item 4.6 states “Kevin Butt: add cleaning bits from 05-213r0 to his proposal and find log page for them.“

07-219r0. Updated the best I could. If there were any notes from presentation of 05-285r0 I could not find them.

# 2. Introduction

There seems to be much confusion in the industry related to Cleaning a tape drive, the additional sense codes returned in various states of cleaning and so forth. The intent of this proposal is to create a model for the evidences returned to an application client of the states of the cleaning process that might be desired to trigger external events.

I have copied the pertinent information from the two proposals listed under Revision 0. The minutes of the discussion we had are not the most clear. I made assumptions and started with the best I could make of it.

In the process of doing this, I found that I needed to reference load and unload states as defined in ADC-2 clause 4.2.4. Since these definitions are needed in SSC-3 for log page 11 as well as generally I have brought this clause over as well.

I believe that the intent of the clean bits from 05-213r0 has been captured between this proposal and proposal 06-138r2 SSC-3: TapeAlert Delineation.

**From 05-213r0;**

A CLEAN NOW bit set to one indicates that the tape drive requires cleaning. A CLEAN NOW bit set to zero indicates that the tape drive does not require cleaning. The CLEAN NOW bit is equivalent to TapeAlert code 14h (see Table A.1).

A CLEAN PERIODIC bit set to one indicates that the tape drive is due for routine cleaning. A CLEAN PERIODIC bit set to zero indicates that the tape drive is not due for routine cleaning. The CLEAN PERIODIC bit is equivalent to TapeAlert code 15h (see Table A.1).

An EXPIRED CLEAN MEDIA bit set to one indicates that the last cleaning cartridge loaded into the tape drive has expired. An EXPIRED CLEAN MEDIA bit set to zero indicates that the last cleaning cartridge loaded into the tape drive has not expired. The EXPIRED CLEAN MEDIA bit is equivalent to TapeAlert code 16h (see Table A.1).

The CLEAN NOW bit, CLEAN PERIODIC bit and EXPIRED CLEAN MEDIA bit if set to one, shall remain set to one until a successful cleaning of the tape drive. The EXPIRED CLEAN MEDIA bit may be persistent across power cycles

**From 05-183r0:**

1) On detection of cleaning cartridge, if can detect but medium not threaded, report 3Ah/04h MEDIUM NOT PRESENT - MEDIUM AUXILIARY MEMORY ACCESSIBLE

2) On medium threaded through the unthreading process, report 30h/03h CLEANING CARTRIDGE INSTALLED.

3) On medium unthreaded but cartridge still detected and MAM accessible, report 3Ah/04h MEDIUM NOT PRESENT - MEDIUM AUXILIARY MEMORY ACCESSIBLE

4) On cartridge ejected and no longer detected, report 3Ah/00h MEDIUM NOT PRESENT

Notes:

Greg Wheeless: The interesting states are;

1. When detect cartridge,
2. cleaning cartridge inserted,
3. Cleaning in progress while cleaning and maintain throughout until unmounted.
4. When unmounted ascq that says cleaning is done.
5. When ejected, cleaning is done and media ejected.

Complete:

(do we need to eject and then movemedium)

(do we need to movemedium)

(cartridge has returned to home slot)

Failed:

3 conditions.

Load but not autoclean:

cleaning cart installed.

# 3. Proposal

Add new model clauses to SSC-3 covering load states and cleaning behavior.

### 4.2.a Load and unload states

Copy clause 4.4 from ADC-2r7e.

Update cross references to the tables

Where the DT Device Status log page is cross referenced, change the cross reference to ADC-2.

### 4.2.b Cleaning Behavior

#### *4.2.b.1 Cleaning overview*

The read/write mechanism for tape devices may periodically require cleaning to maintain the ability to reliably read and write data from the recording medium. Cleaning of the read/write mechanism typically consists of spooling a special medium out of one reel, passing it by the read/write mechanism and into the other reel. In some technologies there may be a brush that is physically passed over the read/write mechanism either before or after the spooling as part of this cleaning process. The special medium used in performing this process and its physical carrier is called a cleaning volume.

When a cleaning volume is placed in a drive (load state b or c), the drive may either wait for an external stimulas or automatically mount the volume. Once the volume is mounted (load state i) the drive performs the cleaning process. When the cleaning process is complete (unload state a or e) the drive may either wait for an external stimulas or automatically eject the volume (unload state g or h).

### *4.2.b.2 Cleaning reporting*

Table 1 lists the sense key and additional sense codes that shall be reported for different conditions.

**TABLE 1. Reporting by condition**

| Condition | Additional Sense Code<br>(Sense Key is NOT READY unless otherwise stated) |
|---|---|
| During the unload of a volume the drive detects that cleaning should be performed | The unload completes and the drive returns a CHECK CONDITION status with additional sense code set to CLEANING REQUESTED and Sense Key set to RECOVERED ERROR |
| Cleaning volume is in the drive but the drive does not know what type of volume it is. An external stimulas is required before the volume will transition to the next load state. | f) LOGICAL UNIT NOT READY, INITIALIZING CMD. REQUIRED,<br>g) LOGICAL UNIT NOT READY, AUXILIARY MEMORY NOT ACCESSIBLE,<br>h) LOGICAL UNIT NOT READY, CAUSE NOT REPORTABLE,<br>i) MEDIUM LOADABLE,<br>j) LOGICAL UNIT NOT READY, MANUAL INTERVENTION REQUIRED; or<br>k) MEDIUM NOT PRESENT - LOADABLE |
| Cleaning volume is in the drive and medium auxiliary memory is accessible. An external stimulas is required before the volume will be mounted and begin cleaning. | MEDIUM NOT PRESENT - MEDIUM AUXILIARY MEMORY ACCESSIBLE<br>TapeAlerts shall be generated. |
| An error occurred during the load of a cleaning volume | a) MEDIA LOAD OR EJECT FAILED, or<br>b) MEDIUM THREAD OR UNTHREAD FAILURE<br>with Sense Key MEDIUM ERROR, or HARDWARE ERROR |
| In the process of cleaning | CLEANING CARTRIDGE INSTALLED<br>If not done in a previous state, TapeAlerts shall be generated. |
| An error occurred during the cleaning. Cleaning was unsuccessful | CLEANING FAILURE with Sense Key MEDIUM ERROR, or HARDWARE ERROR |

**TABLE 1. Reporting by condition**

| Condition | Additional Sense Code<br>(Sense Key is NOT READY unless otherwise stated) |
|---|---|
| Cleaning is complete, volume is mounted (unload state a) and an external stimulas is required to transition to the next unload state. | LOGICAL UNIT NOT READY, UNLOAD CLEANING CARTRIDGE<br>New additional sense code |
| Cleaning is complete, volume is seated (unload state e or f) and an external stimulas is required to transition to the next unload state. | <<Same as above>><br>LOGICAL UNIT NOT READY, UNLOAD CLEANING CARTRIDGE |
| Cleaning is complete, volume is ejected (unload state g or h)<br>Report this until volume is no longer detected? - good for technologies that can detect a cartridge. | LOGICAL UNIT NOT READY, CLEANING IS COMPLETE<br>New additional sense code<br>Should the three successful cleaning rows be the same asc/ascq? |
| Cleaning is complete, an error occurred during unload | a) MEDIA LOAD OR EJECT FAILED, or<br>b) MEDIUM THREAD OR UNTHREAD FAILURE<br>with Sense Key MEDIUM ERROR, or HARDWARE ERROR |