

To: X3T9.2 Membership
From: LeRoy Leach - Maxtor
Telephone: (303) 678-2828 Email: LeRoy_Leach@maxtor.com
Subject: Format Track LBA Proposal
Date: 2/5/93

Attached is the revised Format Track command with LBA mode. Could an automatic write reallocation and automatic read reallocation enable/disable values be added to the Set Features command? The default would be enabled if the feature is implemented. It would be desirable also to set some values aside for Vendor Unique features in the Set Feature command.

Listed below are some of the advantages for the LBA mode of the Format Track command. You might wish to include them in the proposal you are making to the ANSI committee.

1. Compatible with existing auto-write hardware. Still transfers one sector of information with Format Track command code.
2. Doesn't require building ID table or converting to logical track mode from LBA mode.
3. Doesn't erase data on the logical track when reassigning as the Format Track command now does in logical track mode.

Format Track (50H)

The Sector Count Register contains the number of sectors per track.

The track address is specified in the Cylinder High, Cylinder Low, and Drive/Head Registers. When the command is accepted, the drive sets the DRQ bit and waits for the host to fill the sector buffer. When the sector buffer is full, the drive clears DRQ, sets BSY and begins command execution.

The content of the sector buffer is not written to the media. The format is defined in Table 1 when in translate mode and Table 2 when in LBA mode.

Word	Content						
0	Logical Sector Descriptor (zero): <table border="1"> <thead> <tr> <th>Bits</th> <th>Content</th> </tr> </thead> <tbody> <tr> <td>15:8</td> <td>Logical Sector Number</td> </tr> <tr> <td>7:0</td> <td>Descriptor Code (see Table 3)</td> </tr> </tbody> </table>	Bits	Content	15:8	Logical Sector Number	7:0	Descriptor Code (see Table 3)
Bits	Content						
15:8	Logical Sector Number						
7:0	Descriptor Code (see Table 3)						
.	.						
.	.						
.	.						
n	Logical Sector Descriptor (n)						
n+1	zero						
.	.						
.	.						
.	.						
255	zero						

Table 1: Sector buffer format and meaning for translate mode

Word	Content								
0	<table border="1"> <thead> <tr> <th>Bits</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>15-8</td> <td>First LBA (bits 15-8)</td> </tr> <tr> <td>7-0</td> <td>First LBA (bits 7-0)</td> </tr> </tbody> </table>	Bits	Meaning	15-8	First LBA (bits 15-8)	7-0	First LBA (bits 7-0)		
Bits	Meaning								
15-8	First LBA (bits 15-8)								
7-0	First LBA (bits 7-0)								
1	<table border="1"> <thead> <tr> <th>Bits</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>15-12</td> <td>Descriptor Code (See Table 4)</td> </tr> <tr> <td>11-8</td> <td>First LBA (bits 27-24)</td> </tr> <tr> <td>7-0</td> <td>First LBA (bits 23-16)</td> </tr> </tbody> </table>	Bits	Meaning	15-12	Descriptor Code (See Table 4)	11-8	First LBA (bits 27-24)	7-0	First LBA (bits 23-16)
Bits	Meaning								
15-12	Descriptor Code (See Table 4)								
11-8	First LBA (bits 27-24)								
7-0	First LBA (bits 23-16)								
.	.								
.	.								
.	.								
n	<table border="1"> <thead> <tr> <th>Bits</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>15-8</td> <td>Last LBA (bits 15-8)</td> </tr> <tr> <td>7-0</td> <td>Last LBA (bits 7-0)</td> </tr> </tbody> </table>	Bits	Meaning	15-8	Last LBA (bits 15-8)	7-0	Last LBA (bits 7-0)		
Bits	Meaning								
15-8	Last LBA (bits 15-8)								
7-0	Last LBA (bits 7-0)								
n+1	<table border="1"> <thead> <tr> <th>Bits</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>15-12</td> <td>Descriptor Code (See Table 4)</td> </tr> <tr> <td>11-8</td> <td>Last LBA (bits 27-24)</td> </tr> <tr> <td>7-0</td> <td>Last LBA (bits 23-16)</td> </tr> </tbody> </table>	Bits	Meaning	15-12	Descriptor Code (See Table 4)	11-8	Last LBA (bits 27-24)	7-0	Last LBA (bits 23-16)
Bits	Meaning								
15-12	Descriptor Code (See Table 4)								
11-8	Last LBA (bits 27-24)								
7-0	Last LBA (bits 23-16)								
n+2	zero								
.	.								
.	.								
.	.								
255	zero								

Table 2: Sector buffer format and meaning for LBA mode

Mapped Mode

In mapped mode, one word represents each sector, the words being contiguous from the start of a sector. Words appear in the same sequence as the logical track.

If the Descriptor codes in Table 3 are all set to format as good sectors, the drive will write a constant 00H pattern to the requested sectors rather than physically formatting the logical track. If any other codes are present in the buffer, the drive will format the logical track. In essence, the Format Track command acts as a reassign/un-reassign command for translate mode.

Descriptor Code	Meaning
00h	Format sector as good
20h	Un-reassigned the alternate location for this sector
40h	Assign this sector to an alternate location
80h	Format sector as bad

Table 3: Descriptor code definition for mapped mode

LBA mode

In LBA mode, each two-word entry contains one LBA value to be processed and a descriptor code to describe the desired function (see Table 4). Up to 128 LBAs may be reassigned with one command. The LBAs are in ascending order and the number of valid entries are stored in the Sector Count register. Following the last valid LBA, the remaining words of the sector buffer shall be filled with zeros. All LBA values should be valid and not repeated for each command. Invalid or repeated LBAs will cause this command to abort without reassigning / un-reassigning any locations. Attempting to un-reassign an LBA that was not previously reassigned with the reassign command will cause the command to abort.

If an error occurs while processing this command, the error location will be placed in the task file registers (in LBA form).

Descriptor Code	Meaning
2	Un-reassigned the alternate location for this sector
4	Assign this sector to an alternate location
8	Format sector as bad

Table 4: Descriptor code definition for LBA mode