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# Download Microcode Enhancements Proposal

To: T13 Technical committee  
From: Steve Livaccari  
IBM Corp.  
3039 Cornwallis Road.  
Research Triangle Park, NC 27709  
Phone: 919-543-7393  
Email: livaccar@us.ibm.com  
Date: August 23, 2004

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## 1 Introduction

The purpose of this proposal is to provide support for a Segmented Microcode Download command.

### Revision History

Revision	Date	Comments
<u>e04132r0</u>	<u>June 2, 2004</u>	Initial version
<u>e04132r1</u>	<u>August 23, 2005</u>	Removed modes 1 and 2, added restriction for interim commands, define reset behavior, added requirement for sequential transfer.

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## 2 Specification Changes

The DOWNLOAD MICROCODE command as currently defined will not work in some environments. The current version of this command will only transfer the firmware file in single transfer. For environments that have a limitation of transferring no more than 32KB of data at a time a segmented data transfer similar to the SCSI WRITE BUFFER command is required. A proposed method of doing this is described below. The concept is similar to the SCSI WRITE BUFFER Command, Mode 6 and Mode 7.

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## 2.1 Download Microcode Segmented (92h)

### 2.1.1 Inputs

Register	7	6	5	4	3	2	1	0
Features	Subcommand Code							
Sector Count	Sector count (low order)							
LBA Low	Sector count (high order)							
LBA Mid	Buffer offset (low order)							
LBA High	Buffer offset (high order)							
Device	Obs	Na	Obs	DEV	0	0	0	0
Command	92h							

Figure 1- ATA Command Block

	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	Features Subcommand Code								Command (92h)				C	R	R	Reserved (0)				FIS Type (27h)												
1	Device				LBA High Buffer offset (high order)				LBA Mid Buffer offset (low order)				LBA Low Sector count (high order)																			
2	Features (exp)				LBA High (exp)				LBA Mid (exp)				LBA Low (exp)																			
3	Control				Reserved (0)				Sector Count (exp)				Sector Count Sector count (low order)																			
4	Reserved (0)				Reserved (0)				Reserved (0)				Reserved (0)																			

Figure 2- SATA - Host to Device FIS

#### Field Definitions

##### Features Register -

03h – download microcode with offsets and save for immediate and future use.

07h – save downloaded code for immediate and future use. Microcode is transferred in a single command.

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02h – download microcode with offsets for immediate, temporary use.

##### LBA High Register –

High order starting location of the buffer offset

##### LBA Mid Register –

Low order starting location of the buffer offset

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All transfers shall be an integer multiple of the sector size. The size of the data transfer is determined by the contents of the LBA Low register and the Sector Count register. The LBA Low register shall be used to extend the Sector Count register to create a 16-bit sector count value. The LBA Low register shall be the most significant eight bits and the Sector Count register shall be the least significant eight bits. A value of zero in both the LBA Low register and the Sector Count register shall specify no data to be transferred. This allows transfer sizes from 0 bytes to 33,553,920 bytes, in 512 byte increments.

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A Features register value of 02h or 03h indicates that the microcode will be transferred in two or more DOWNLOAD MICROCODE commands using the offset transfer method.

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The download sector count value in the Sector Count and LBA Low registers will indicate how many sectors of the microcode file are being transferred in one segment.

**Deleted:** a zero byte transfer (00h in LBA low & 00h in the sector count registers).

The Buffer Offset value is defined by the value in the LBA Mid and LBA High registers (used as one 16-bit buffer offset value). The buffer offset value is the starting location in the microcode file that will be transferred. The buffer offset value will vary from 0 byte to 33,553,920 bytes, in 512 byte increments. The buffer offset value is the byte count divided by 512.

**Deleted:** setting the most significant bit (bit 7) of the feature register on the command than contains the last segment of data blocks to be transferred. In the case where all of the download will be done without need for segmentation, this bit will be set to indicate that it is the one and only download command. In cases where the download will be broken up into several command 92h's, only the last command will have the most significant bit set.

All microcode segments shall be sent to the device in sequence.

The device may abort the DOWNLOAD MICROCODE command and discard all previously downloaded microcode if the current buffer offset is not equal to the sum of the previous DOWNLOAD MICROCODE command buffer offset and the previous sector count. The first DOWNLOAD MICROCODE command shall have a buffer offset of zero.

**Inserted:** setting the most significant bit (bit 7) of the feature register on the command than contains the last segment of data blocks to be transferred. In the case where all of the download will be done without need for segmentation, this bit will be set to indicate that it is the one and only download command. In cases where the download will be broken up into several command 92h's, only the last command will have the most significant bit set.

The new firmware should become effective immediately after the transfer of the last data segment has completed.

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When the device detects the last download microcode command for the firmware download the device shall perform any device required verification and save the complete set of downloaded microcode. Device feature configuration (e.g. SET FEATURES settings) may be affected by the download microcode command.

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If the device receives a command other than download microcode prior to the receipt of the last segment the new command is executed and all previously downloaded microcode is discarded.

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If a software or hardware Reset is issued to the device before all of the microcode segments have be transferred to the device the device shall abandon all of the microcode segments received and process the Reset.

**Deleted:** a zero byte transfer 92h command with FFh in the LBA mid & High registers and 00h in LBA low & in the sector count registers is sent to the drive

**Deleted:** The host shall not issue any other commands to the device between the first Segmented Download Microcode command and the last Segmented Download Microcode command is issued to the device.

## 2.2 IDENTIFY DEVICE Information

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Word	O/M	F/V	Description
86	M	F	14 1 = SEGMENTED feature of DOWNLOAD MICROCODE command supported
86	M	F	15 <u>TBD</u>

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Figure 3- Identify Device Information

Note 1: The text highlighted in blue or red shows the additions to the current ATA DOWNLOAD MICROCODE command.

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