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_Subject: DMA Command Description Cleanup = 94-063r5

DMA Command Description Cleanup

Document 94-063r5

--- --- --- NOTE NOTE NOTE --- --- ---

All of the items discussed in this document are included in John Masiewicz's document 94-051r1. This will be the last revision of this document. This document is superceeded by document 94-051r1.

This document was prepared for the 14 March 94 ATA Extension WG meeting in Newport Beach, CA.

--- The Round #5 Updated Issues List ---

Here is the final/last round of the DMA Definition discussion. Please recall that round #4 was discussed at the X3T9.2 meetings in Colorado Springs in November 1993.

For rounds #1 - #4 I used the ATA-1 Rev 4 section numbers. For round #5 I have switched to the ATA-2 (X3T9.2 948D rev 2) section numbers.

Here is my update list of issues by ATA-2 section number:

* 5.2.9 DMARQ -- [See John Masiewicz's document 94-051r1.]

* 8 Command descriptions -- The following paragraphs should be moved to section 9:

  "If a new command is issued ... could have been completed."

  "There shall be no indication ... New Command was issued."

* 8.10.15 Word 52 -- [See John Masiewicz's document 94-051r1 and the SFF-8011 document.]

* 8.16 Read DMA -- I recommend that the second paragraph of this section be replaced with the following text:

  | During the execution of a Read DMA command, the drive shall
  | provide status of BSY or DRQ until the command is completed.
  |
  | At command completion, the Command Block Registers contain the
  | sector address of the last sector transferred.
  |
  | An unrecoverable error encountered during the execution of a
  | Read DMA command results in the termination of the command.
  | At command completion, the Command Block Registers contain the
  | sector address of the sector where the first error occurred.

* 8.23 Set Features -- [SFF-8011 has addressed this issue.]

* 8.29 Write DMA -- I recommend that the second paragraph of this
  section be replaced with the following text:

  | During the execution of a Write DMA command, the drive shall
  | provide status of BSY or DRQ until the command is completed.
  |
  | At command completion, the Command Block Registers contain the
  | sector address of the last sector transferred.
  |
  | An unrecoverable error encountered during the execution of a
  | Write DMA command results in the termination of the command.
  | At command completion, the Command Block Registers contain the
  | sector address of the sector where the first error occurred.

* 9 Protocol --

  This section describes what happens when one command is
  interrupted by another command.

  The following paragraphs should be moved here from section 8:

  | If a new command is issued ... could have been completed.
  |
  | There shall be no indication ... New Command was issued.

  It is not possible to interrupt a Read DMA or Write DMA
  command with another command. The only way to interrupt a DMA
  command is with a reset. I recommend the following be added
  to this section:

  | The only way to interrupt a Read DMA or Write DMA command is
  | with a reset. The result of interrupting a Read DMA or Write
  | DMA command by writing a new command into the Command register
  | is unpredictable.

* 9.5 DMA Data Transfer Command -- I recommend the that the text
  of this section be replaced by the following text:

  | 10.5 DMA data transfer commands (optional)
  |
  | This class comprises:
  |
  | - Read DMA
  | - Write DMA
  |
  | Data transfers using DMA commands differ in two ways from PIO
  | transfers:
  |
  | - data transfers are performed using the slave-DMA channel
  | - a single interrupt is issued at the completion of the command
  |
  | Initiation of the DMA transfer commands is identical to the
  | Read Sector or Write Sector commands except that the host
  | initializes the slave-DMA channel prior to issuing the
  | command.
  |
  | The interrupt handler for DMA transfer is different in that no
  | intermediate sector interrupts are issued on multi-sector
  | commands.

```
   |
   | a) The host writes any required parameters to the Features,
   |    Sector Count, Sector Number, Cylinder and Drive/Head
   |    registers.
   | b) The host initializes the slave-DMA channel.
   | c) The host writes the command code to the Command register.
   | d) The drive sets BSY.
   | e) When the drive is ready to transfer data, the drive
   |    asserts DMARQ.  The DMA data transfer may be split
   |    into several partial transfers at the discretion
   |    of the drive or slave-DMA channel.  The drive shall
   |    assert either BSY or DRQ during the entire DMA data
   |    transfer phase.
   | f) When the drive has completed processing, it clears both
   |    BSY and DRQ and asserts INTRQ.  The host reads the
   |    Status register.
   | g) The host resets the slave-DMA channel.
```

* 9.5.1 Normal DMA Transfer -- I recommend that the diagram be replaced with the following diagram:

```
   | +-a)---+-b)-------+-c)----+-d)---+-e)-----+-f)---+-g)--+
   | |Select|Initialize|Issue  |      |DMA data|Status|Reset|
   | |Drive |DMA       |Command|      |transfer|      |DMA  |
   | +------+----------+-------+------+--------+------+-----+
   | |      |BSY=0     |BSY=0  |BSY=1 |BSY=1   |BSY=0 |     |
   | |      |          |       |      |or      |DRQ=0 |     |
   | |      |          |       |      |DRQ=1   |Assert|     |
   | |      |          |       |      |        |INTRQ |     |
```

* 9.5.2 Aborted DMA transfer -- I recommend that this section be replaced by:

```
   | 9.5.2 DMA transfer terminated by an error during data
   |       transfer.

   | +-a)---+-b)-------+-c)----+-d)---+-e)-----+-f)---+-g)--+
   | |Setup |Initialize|Issue  |      |DMA data|Status|Reset|
   | |      |DMA       |Command|      |transfer|      |DMA  |
   | +------+----------+-------+------+--------+------+-----+
   | |      |BSY=0     |BSY=0  |BSY=1 |BSY=1   |BSY=0 |     |
   | |      |          |       |      |or      |DRQ=0 |     |
   | |      |          |       |      |DRQ=1   |Assert|     |
   | |      |          |       |      |        |INTRQ |     |
```

* 9.5.3 Aborted DMA command -- I recommend that this section be replaced by:

```
   | 9.5.3 DMA command terminated by an error before any data is
   |       transferred.

   | +-a)---+-b)-------+-c)----+-d)---+-f)---+-g)--+
   | |Setup |Initialize|Issue  |      |Status|Reset|
   | |      |DMA       |Command|      |      |DMA  |
   | +------+----------+-------+------+------+-----+
   | |      |BSY=0     |BSY=0  |BSY=1 |BSY=0 |     |
   | |      |          |       |      |DRQ=0 |     |
   | |      |          |       |      |Assert|     |
   | |      |          |       |      |INTRQ |     |
```