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Subject: Maxtor proposal for ANSI ESDI Specification

Hitachi (Odawara Works in Japan) has reviewed the attached memo from Lawrence Lamers of Maxtor dated May 5, 1990. The following represents Hitachi's position with respect to the items covered in the memo.

1) Initiate Diagnostic Command (1000)

Hitachi does not currently support this but would accept Maxtor's proposal

2) Request Status Command (0010)

Hitachi cannot support Maxtor's proposal as stipulated. We propose the following (see attached). The command modifier bits define a request for either standard or error status. The command subscript field defines a variant status word. Hitachi has already established this method as a standard on our ESDI products and has a large population of drives in the field with this implementation.

Thank you for giving us a chance to explain our stance on these issues.

Regards,
Jack Newman
Evaluation Engr.

5 Command and Responses
 5.1 Command Structure and Summary

MOST
SIGNIFICANT
BIT

LEAST
SIGNIFICANT
BIT

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	P
CMD FUNCTION			CMD MODIFIER			ALL ZEROS										P
CMD FUNCTION			CMD MODIFIER			CMD SUBSCRIPT										P
CMD FUNCTION			CMD PARAMETER													P

BIT P ; PARITY (ODD)

Fig. 5-1 Command Data Word Structure

Table 5-1 Command Data Definition

CMD FUNCTION 15 14 13 12	CMD FUNCTION Definition	CMD MODIFIER (Bit 11-8)	CMD SUBSCRIPT (Bit 7-0)	CMD PARAMETER (Bit 11-0)	STATUS / CONFIGURATION DATA
0 0 0 0	SEEK	NO	NO	YES	NO
0 0 0 1	RECALIBRATE	NO	NO	NO	NO
0 0 1 0	REQUEST STATUS	YES	YES	NO	YES
0 0 1 1	REQUEST CONFIGURATION	YES	YES	NO	YES
0 1 0 0	UNIMPLEMENTED	-	-	-	-
0 1 0 1	CONTROL	YES	NO	NO	NO
0 1 1 0	DATA STROBE OFFSET	YES	NO	NO	NO
0 1 1 1	TRACK OFFSET	YES	NO	NO	NO
1 0 0 0	UNIMPLEMENTED	-	-	-	-
1 0 0 1	SET BYTES PER SECTOR	NO	NO	YES	NO
1 0 1 0	SET HIGH ORDER VALUE	YES	NO	YES *3	NO
1 0 1 1	RESERVED *2	-	-	-	-
1 1 0 0	RESERVED *2	-	-	-	-
1 1 0 1	RESERVED *2	-	-	-	-
1 1 1 0	SET CONFIGURATION	NO	NO	YES	NO
1 1 1 1	RESERVED *2	-	-	-	-

Notes

1. All unused or not applicable lower order bits must be zero.
2. When receiving any "RESERVED" command, the drive will process it as an unimplemented command.
3. BIT 3-0 only.

5.2 Responses and Status

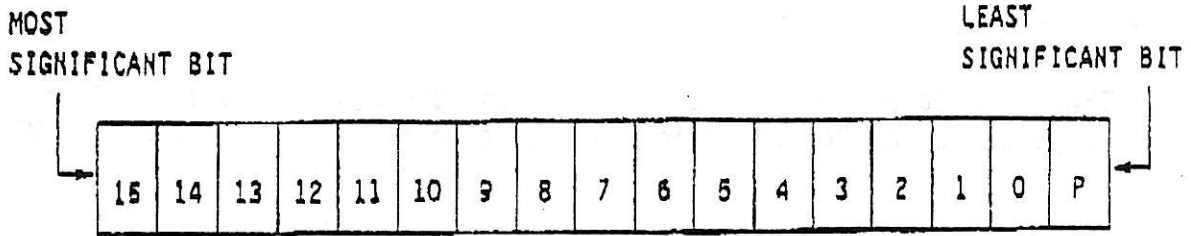


Fig. 5-2 Config./Status Structure

5.3 Command

(1) SEEK (0000)

This command requests the drive to seek to the cylinder specified with bits 0 through 11. When the specified value is 4095 or more, the drive will seek to the cylinder which has defect list. A SEEK command restores the track offset to zero.

(2) RECALIBRATE (0001)

This command causes the head to return to cylinder 0000. A RECALIBRATE command restores the track offset to zero.

(3) REQUEST STATUS (0010)

This command requests the drive to report a 16-bit standard or vendor unique status information to the controller as specified by the command modifier and command subscript.

Table 5-2 REQUEST STATUS Modifier Bit.

CMD MODIFIER				FUNCTION
11	10	9	8	
0	0	0	0	REQUEST STANDARD STATUS
0	0	0	1	REQUEST ERROR STATUS
0	0	1	0	RESERVED *1
1	1	1	1	

*1 The drive responds with "0000" to the controller

(a) REQUEST STANDARD STATUS

There are 16 bits of status information returned to the controller in response to the Request Standard Status command with CMD SUBSCRIPTOR of 0.

Table 5-3 lists the conditions under the Status Response bits shall be set when ATTENTION is asserted.

Table 5-3 STANDARD STATUS Response Bit

CMD SUBSCRIPT	BIT POSITION	FUNCTION	ATT
0	15	RESERVED *2	0
	14	REMOVABLE MEDIA NOT PRESENT	0
	13	WRITE PROTECTED-REMOVABLE MEDIA	0
	12	WRITE PROTECTED-FIXED MEDIA	0
	11	SPINDLE IS SYNCHRONIZED *1	1
	10	RESERVED *2	0
	9	SPINDLE MOTOR STOPPED *3	1
	8	POWER ON CONDITION	1
	7	COMMAND DATA PARITY FAULT	1
	6	INTERFACE FAULT	1
	5	INVALID OR UNIMPLEMENTED COMMAND FAULT	1
	4	SEEK FAULT	1
	3	WRITE GATE WITH TRACK OFFSET FAULT	1
	2	STATUS AVAILABLE FOR ERROR CONDITION	1
	1	WRITE FAULT *1	1
	0	REMOVABLE MEDIA CHANGED	1

*1 The detail status of WRITE FAULT or SPINDLE is not SYNCHRONIZED are reported on the WRITE I SYNCHRONIZED FAULT STATUS RESPONSE BIT shown in table 5.4.

*2 The drive responds with "0" to the controller.

*3 When the spindle motor is stopped by the Motor Stop command, no Attention signal responds.

(b) REQUEST ERROR STATUS

(1) WRITE FAULT STATUS

There are 16 bits of status information returned to the controller in response to the REQUEST ERROR STATUS command with command subscript of 0 or 1.

Table 5-4 WRITE FAULT STATUS Response Bit

CMD SUBSCRIPT	BIT POSITION	FUNCTION	DEFINITION	
0	15	RESERVED *1		
	14	RESERVED *1		
	13	RESERVED *1		
	12	RESERVED *1		
	11	RESERVED *1		
	10	RESERVED *1		
	9	RESERVED *1		
	8	RESERVED *1		
	7	NON HEAD SELECT		No head is selected while WRITE GATE is activated.
	6	WRITE INHIBIT		WRITE GATE is activated while write is inhibited. *2
	5	WRITE PROTECT		WRITE GATE is activated while WRITE is protected.
	4	NOT READY		WRITE GATE is activated while Not Ready
	3	READ GATE		WRITE GATE and READ GATE are activated simultaneously.
	2	DRIVE HARD ERROR *3		Abnormal 1-7 code is decoded while WRITE GATE is activated.
	1	DECODE ERROR		
	0	IN COMMAND		

*1 The drive responds with "0" to the controller.

*2 WRITE INHIBIT CONDITIONS

- Attention
- Off Track

*3 DRIVE HARD ERROR goes true when :

- No head selected or multiple heads selected while WRITE GATE is activated.
- Write current does not flow or bit inversion does not occur while WRITE GATE is activated.
- Write current flows or bit inversion occurs when WRITE GATE is inactive.

Table 5-5 SYNCHRONIZED FAULT STATUS

CMD SUBSCRIPT	BIT POSITION	FUNCTION
1	15	RESERVED *1
	14	RESERVED *1
	13	RESERVED *1
	12	RESERVED *1
	11	RESERVED *1
	10	RESERVED *1
	9	RESERVED *1
	8	RESERVED *1
	7	RESERVED *1
	6	RESERVED *1
	5	RESERVED *1
	4	RESERVED *1
	3	RESERVED *1
	2	SYNCHRONIZED ERROR
	1	SYNCHRONIZED FAILURE
	0	MASTER INDEX ERROR

*1 The drive responds with "0" to the controller.