
Operating Conditions

Temperature 5 to 55 degrees C*
Relative Humidity 8 to 90% non-condensing
Maximum Wet Bulb
Temperature 29.4 degrees C non-condensing
Maximum Temperature
Gradient 15 degrees C/Hour
Altitude -300 to 3,000 m

Shipping Conditions

Temperature -40 to 65 degrees C
Relative Humidity 5 to 95% non-condensing
Maximum Wet Bulb
Temperature 35 degrees C non-condensing
Altitude -300 to 12000 m

Storage Conditions

Temperature 0 to 65 degrees C
Relative Humidity 5 to 95% non-condensing
Maximum Wet Bulb
Temperature 35 degrees C non-condensing
Altitude -300 to 12000 m

Note*

The system is responsible to provide sufficient air movement to maintain surface temperature below 60 degrees C at the center of top cover of the drive.

Operating Shock

The hard disk drive meets IBM Standard C-S 1-9711-007 for the S5 product classification. The hard disk drive meets the following criteria while operating in respective conditions described below. The shock test consists of ten shocks inputs in each axis and direction for total of 60. There must be a delay between shock pulses, long enough to allow the drive to complete all necessary error recovery procedure.

No errors

5 G, 11 ms half-sine shock pulse

No data loss, seek errors or permanent damage

10 G, 11 ms half-sine shock pulse

No data loss or permanent damage

15 G, 5 ms half-sine shock pulse

30 G, 4 ms half-sine shock pulse

Operating Vibration

Due to the complexity of this subject we recommend that users contact the IBM technical support group representative to discuss how to perform the necessary measurements if they believe this to be an area which requires evaluation.

DC POWER REQUIREMENTS

The following voltage specifications apply at the file power connector. Damage to the file electronics may result if the power supply cable is connected or disconnected while power is being applied to the file (No hot plug/unplug is allowed). There are inductive loads in the file which could cause destructively high voltage spikes on the file if the

power connection is opened. There is no special power on/off sequencing required.

Nominal Supply Voltages	+5 Volts	+12 Volts
Maximum Ripple (0-10 MHz)	100 mV p-p	150 mV p-p
Voltage Supply Tolerance (incl ripple)	+/- 5%	+ 10% /-8%
Power Supply Current (Amps)	+5 Volts	+12 Volts
Start peak	0.5	1.10
Idle average	0.16	0.14
Random R/W	0.46	0.54

During the file start up and seeking, 12 volt ripple is generated by the file (referred to as dynamic loading). If several files have their power daisy chained together then the power supply ripple plus other file's dynamic loading must remain within the regulation tolerance of +10/-8%. A common supply with separate power leads to each file is a more desirable method of power distribution.

To prevent external electrical noise from interfering with the file's performance, the file must be held by four screws in a user system frame which has no electrical level deference at the four screws position, and has less than +/- 300 millivolts peak-to-peak level deference to the file power connector ground.

SIGNAL DEFINITION

The pin assignments of interface signals are listed as follows:

PIN	Signal	I/O	PIN	Signal	I/O
01	-HRESET	I	02	GND	
03	HD07	I/O	04	HD08	I/O
05	HD06	I/O	06	HD09	I/O
07	HD05	I/O	08	HD10	I/O
09	HD04	I/O	10	HD11	I/O
11	HD03	I/O	12	HD12	I/O
13	HD02	I/O	14	HD13	I/O
15	HD01	I/O	16	HD14	I/O
17	HD00	I/O	18	HD15	I/O
19	GND		(20) Key		
21	(Resv)		22	GND	
23	-HIOW	I	24	GND	
25	-HIOR	I	26	GND	
27	(Resv)		28	CSEL	

29	(Resv)		30	GND	
31	HIRQ	O	32	-HIOCS16	O
33	HAOI	I	34	-PDIAG	I/O
35	HA00	I	36	HA02	I
37	-HCSO	I	38	-HCSI	I
39	-DASP	I/O	40	GND	

Note:

"O" designates an output from the Drive.

"I" designates an input to the Drive.

"I/O" designates an input/output common.

"(Resv)" designates reserved pins and all of these have to be left unconnected.

CABLING

The maximum cable length from the Host system to the drive, plus the circuit pattern length inside the Host systems, must not exceed 18 inches (45.7 cm).

INTERFACE

This data sheet describes some aspects of the host interface to ATA drives. The interface conforms to the CAM draft proposal for an AT attachment with certain limitations described below.

Format Track Alternate Sectors

The drive does not support alternate sector locations, and will ignore any descriptors whose values are 20h (Unassign Alternate Sector) or 40h (Assign Alternate Sector), without returning an error.

Format Track Interleave Factor

The drive only supports an interleave factor of 1:1, and will ignore any other specified interleave, without returning an error.

Format Track Sector Count

The drive will return an Abort error if the specified sector count is not the same as the number of sectors per track designated by the drive in the Initialize Drive Parameters command, or default setting as reported by Identify Drive command.

Format Track Sector Number

The drive will return an Abort error if any sector number in the format table is zero or greater than the actual number of sectors per track, or the same sector number is used more than once in the format table. The drive always operates with sectors numbered consecutively between one and the number of sectors per track.

Initialize Drive Parameters

The parameters specified in the initialize Drive Parameters command are only in effect until the next power off, soft reset, or hard reset operation. Afterwards, the default parameters in the Identify Drive information will be in effect.

Seek Overlap

The drive will wait for the seek to complete before interrupting the host. Therefore, no seek overlap can occur. This will be transparent to the host except that performance may be degraded in certain environments where the host could perform other work while waiting for seek complete, such as multi-tasking operating systems.

The following Commands are supported by the Drive:

Data in Commands	(Hex)
Identify Drive	(EC)
Read Buffer	(E4)
Read Long (& retry)	(22)
Read Long (no retry)	(23)
Read Multiple	(C4)
Read Sectors (& retry)	(20)
Read Sectors (no retry)	(21)
Data Out Commands	(Hex)
Format Track	(50)
Write Buffer	(E8)
Write Long (& retry)	(32)
Write Long	(33)
Write Multiple	(C5)
Write Sectors (& retry)	(30)
Write Sectors	(31)

Execution includes the transfer of one or more 512 byte sectors of data (>512 bytes for Read Long) from the Drive to the Host for Data IN and from the Host to the Drive for Data Out commands.

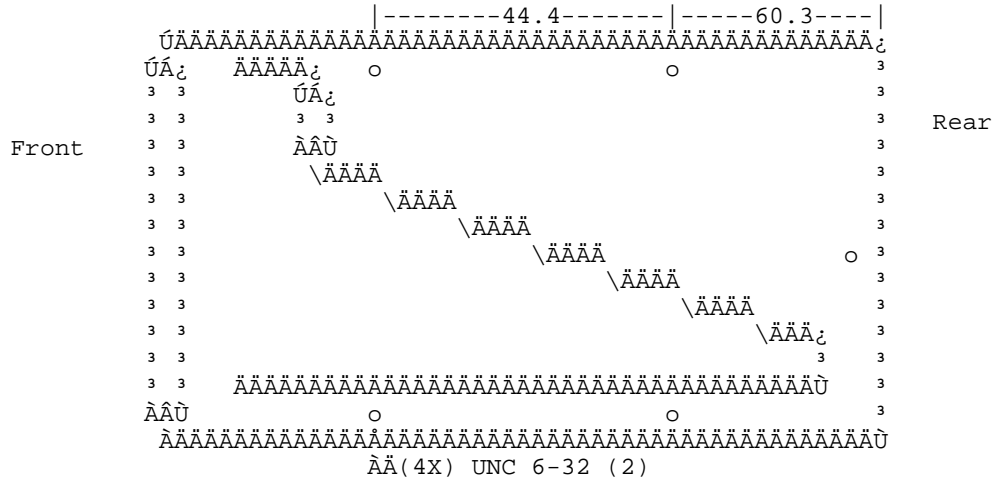
Data Out Commands	(Hex)
Read Verify Sectors (& retry)	(40)
Read Verify Sectors	(41)
Seek	(7X)
Set Multiple	(C6)
Execute Drive Diagnostics	(90)
Initialize Drive Parameters	(91)
Set Features	(EF)
Recalibrate	(IX)
Standby Immediate	(EO)
Idle Immediate	(EI)

Execution of these commands involves no data transfer.

Note: Read Multiple, Write Multiple and Set Multiple commands are not supported on drives with only 32K ROM.

REGISTERS

Address	Input Register	Out Register
1F0h	Data	Data
1F1h	Error	Features
1F2h	Sector Count	Sector Count
1F3h	Sector Number	Sector Number
1F4h	Cylinder Low	Cylinder Low



The maximum allowable penetration of the mounting screw is (1) 3.5 mm
 (2) 6 mm.

PACKAGING:

The drive must be protected against Electro-Static Discharge especially when being handled. The safest way to avoid damage is to put the drive in an anti static bag before ESD wrist straps, etc are removed.

Drives should only be shipped in approved containers, severe damage can be caused to the drive if the packaging does not adequately protect against the shock levels induced when a box is dropped. Consult your IBM marketing representative if you do not have an approved shipping container.

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