Deskstar
DJAA-31270 and DJAA-31700

IBM OEM has introduced a new range of disk drives for the desktop personal computer marketplace. Available in two popular capacity points with AT interface, the drives provide excellent performance and improved reliability.

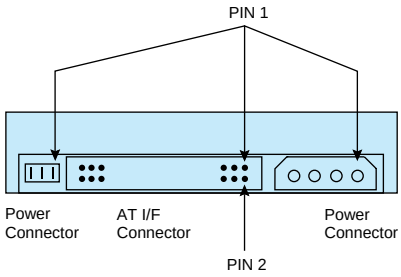
DJAA – 31270

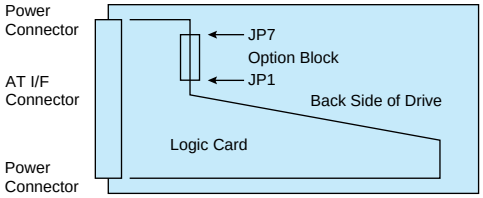
Applications

- Desktop personal computers

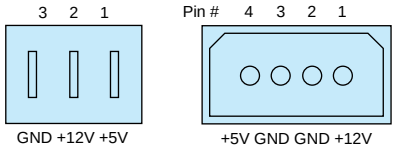
Features	Benefits
• 1270 and 1700MB formatted capacity (512 byte/sector)	• Generic range of popular storage capacities
• PIO data transfer-mode 4 (max 16.6MB/s)	• Fast interface data rate
• DMA data transfer – Single word: mode 2 (max 8.3 MB/s) – Multi word: mode 2 (max 16.6 MB/s)	• Excellent performance on long records
• Average seek time 12.0ms (Read). 13.0 (Write) • 4500 RPM	• Fast access to data
• 96 KB adaptive sector buffer • Read ahead of LFU cache algorithm	• Fast data retrieval in single and multi-tasking applications
• Industry standard mounting • The drive can be mounted with any of its six surfaces facing down	• Ease of installation
• Advanced ECC on the fly (EOF)	• Improved data throughput
• CHS and LBA addressing modes	• Flexibility to support most appropriate addressing
• Power saving modes	• Reduced power consumption
Robust design for EMC/RFI	• Easy integration across multiple platforms
• MR (Magneto Resistive) head technology	• High areal density, low component count
• No ID sector format	• More data stored per track, increased sustained data transfer rate
• MTBF 350,000 hours	• Assured reliability

Connectors



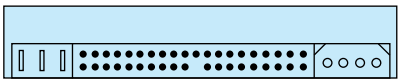


There is a choice of 2 power connections to this drive. One DC power connector is designed to mate with AMP part 1-480424 (using AMP pins P/N 350078-4). The other (3 pin) DC power connector is designed to mate with MOLEX 5480-03 (using MOLEX pins 5479). Equivalent connectors may be used. Pin assignments are shown below, as viewed from the end of the drive.



AT Signal Connector

The drive uses single-ended drivers and receivers. The connector is designed to mate with 3M part 3417-7000 or equivalent.



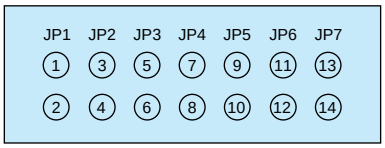
Note: It is intended that the hard disk should only be in electrical contact with the chassis of the PC at a designated set of mounting holes. Other electrical contact may degrade error rate performance. As a result of this it is recommended that there should be no metal contact to the hard disk drive except at the mounting holes or the side rails into which the mounting holes are tapped.

Option Block

Jumper Settings

Jumpers may be fitted to select the following options:

	Pin Numbers
MASTER active	1-2
SLAVE active	3-4
Cable sel	5-6
Reserved	7-8
Write cache	9-10 (Disabled with jumper)
Reserved	11-12
Reserved	13-14



Write Cache Jumper

Write cache jumper is checked during the initial POR check.

Write cache is disabled when a jumper is fitted and in this case a ‘Set features’ command to switch Write cache ‘on’ or ‘off’ will be aborted by the drive.

Shipping Default Settings

MASTER is set to on (ie jumper on pins 1-2)
No other jumpers are fitted

Note: The jumper positions JP1, JP2, JP3 must not be selected concurrently.

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.

Operating Environment

Operating Conditions

Temperature	5 to 55°C*
Relative Humidity	8 to 90% non-condensing
Maximum Wet Bulb Temperature	29.4°C non-condensing
Gradient Maximum Temperature	15°C/Hour
Altitude	– 300 to 3048m

Non Operating Conditions

Temperature	– 40 to 65°C
Relative Humidity	5 to 95% non-condensing
Maximum Wet Bulb Temperature	40°C non-condensing
Altitude	– 300 to 12,000m

Storage Conditions

Temperature	0 to 65°C
Relative Humidity	5 to 95% condensing
Maximum Wet Bulb Temperature	40°C non-condensing
Altitude	– 300 to 13,000m

Note*

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

Operating Shock

The hard disk drive meets the following criteria while operating in respective conditions described below. There must be a delay between shock pulses, long enough to allow the drive to complete all necessary error recovery procedure.

No errors 5G, 11ms half-sine shock pulse

No data loss, seek errors or permanent damage
10G, 11ms half-sine shock pulse

No data loss or permanent damage
15G, 5 ms half-sine shock pulse
30G, 4 ms half-sine shock pulse

Non-Operating Shock

The drive withstands without damage or degradation of performance, a 75G half-sine wave shock pulse of 11ms duration on six sides when heads are parked. (When power is not applied to the unit the heads are automatically located in the parked position).
Above specification is for shocks applied in each direction of the drives three mutually perpendicular axis, one axis at a time.

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 Requirement

The following voltage specification apply at the file power connector. Damage of 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 is no special power on/off sequencing required.

Input Voltage

+5 Volts Supply	5V (+/ 5% during run and spin up)[1]
+12 Volts Supply	12V (+10%, 8% during run and spin up)[2]

1: To avoid damage to the file electronics 5V, power supply voltage spikes must not exceed 7V.
2: To avoid damage to the file electronics 12V, power supply voltage spikes must not exceed 15V.

Power Supply Current

(All values in Amps.)	+5Volts Pop Mean	+12Volts Pop Mean
Idle average	0.32	0.17
Idle ripple (peak to peak)	0.15	0.20
Seek peak[1]	0.50	0.55
Seek average[1]	0.40	0.37
Start up (max)	0.55	1.20
Random R/W peak[2]	0.60	0.60
Random R/W average[2]	0.45	0.28
Standby/Sleep average	0.15	0.02

1: Random Seeks at 100% duty cycle.
2: Seek duty = 30%, W/R duty = 45%, Idle duty = 25%.

Power Supply Generated Ripple as seen at file power connector.

	Maximum	Notes
+5V DC	100mV pp	0 – 10 MHz
+12V DC	150mV pp	0 – 10 MHz

During 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 difference at the four screws position, and has less than +/– 300 millivolts peak to peak level difference to the file power connector ground.

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 (45.7cm).

For higher data transfer application (>8.3MB/sec the cable length should be shorter than 18 inches (45.7cm) since data transfer characteristics depends on the driver circuits of the system and hard drive, and or cabling.

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	DMARQ	O	22	GND	
23	–HIOW	I	24	GND	
25	–HIOR	I	26	GND	
27	HIORDY	O	28	CSEL	I
29	–DMACK	I	30	GND	
31	HIRQ	O	32	–HIOCS16	O
33	HA01	I	34	–PDIAG	I/O
35	HA00	I	36	HA02	I
37	–HCSO	I	38	–HCS1	I
39	–DASP	I/O	40	GND	

Note:

“O” designates an output from the Drive.
“I” designates an input from the Drive.
“I/O” designates an input/output common.

Interface

The interface conforms to the CAM draft proposal for an AT attachment Interface with Extensions (ATA–2) dated July 6 1994 with certain limitations described below.

Automatic Power Down Sequence

A hard reset will disable the automatic power down sequence.

Format Track

A drive will not perform a physical format. Instead it will simply write a data pattern of all zeros to the sectors which have been specified by the Format Track command. LBA mode for format track is not supported.

Format Track Interface Factor

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

Write long

Write long command should be executed for the same sector after Read long command execution. Otherwise, unexpected ECC correctable error may occur. Because of the limitation of the emulation technique to support 4 byte ECC mode which is implemented in the drive.

Seek Overlap

The drive 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 multitasking operating systems.

Sleep mode

During Sleep mode the drive will be activated by any command, including, but not limited to, a soft reset.

Drive/Head Register

Bits 4 and 7 of Drive/Head Register are not written to 0. (These 2 bits are always read as ‘1’ even after hosts writes to ‘0’...).

Data Organisation

Description	DJAA-31270	DJAA-31700
Physical Layout		
Label Capacity (MB)	1270	1700
Bytes per Sector	512	512
Sectors per Track	102-165	102-165
Number of heads	3	4
Number of disks	2	2
Logical Layout[1]		
Number of Heads	16	16
Number of Sectors/Track	63	63
Number of Cylinders[2]	2480	3308
# of Sectors	2499840	3334464
Total logical Data Bytes	1279918080	1707245568

Note

1: Logical layout is imaginable HDD parameter (ie. number of Heads) which is used to access HDD from system interface. Logical layout to Physical layout (ie. actual Head, Sector) translation is done automatically in the HDD. Default setting can be obtained by issuing IDENTIFY DRIVE command.

2: This number includes one cylinder which is to be used for diagnostic program use.

Command Description

The following Commands are supported by the Drive:

Commands	(Hex)
Check Power Mode	(E5)
Check Power Mode*	(98)
Execute Drive Diagnostics	(90)
Format Track	(50)
Identify Drive	(EC)
Idle	(E3)
Idle*	(97)
Idle Immediate	(E1)
Idle Immediate*	(95)
Initialise Drive Parameters	(91)
Read Buffer	(E4)
Read DMA (retry)	(C8)
Read DMA (no retry)	(C9)
Read Long (retry)	(22)
Read Long (no retry)	(23)
Read Multiple	(C4)
Read. Sectors (retry)	(20)
Read Sectors (no retry)	(21)
Read Verify Sectors (retry)	(40)
Read Verify Sectors (no retry)	(41)
Recalibrate	(1X)
Seek	(7X)
Set Features	(EF)
Set Multiple	(C6)
Sleep	(E6)
Sleep*	(99)
Standby	(E2)
Standby*	(96)
Standby Immediate	(EO)
Standby Immediate*	(94)
Write Buffer	(E8)
Write DMA (retry)	(CA)
Write DMA (no retry)	(CB)
Write Long (retry)	(32)
Write Long (no retry)	(33)
Write Multiple	(C5)
Write Sectors (retry)	(30)
Write Sectors (no retry)	(31)

* Alternate command codes for previous defined commands.

Electromagnetic Compatibility

The drive meets the following EMC requirements when installed in the user system and exercised with a random accessing routine at maximum data rate:

United States Federal Communication Commission (FCC) Rules and Regulations Part 15, subject J – Computer Devices “Class B Limits”.

European Economic Community (ECC) directive #76/889 related to the control of radio frequency interference and the Verband Deutscher Elektrotechniker (VDE) requirements of Germany (GOP).

Registers

Address	Input Register	Output Register
1F0h	Data	Data
1F1h	Error	Features
1F2h	Sector Count	Sector Count
1F3h	Sector Number *LBA bits 0-7	Sector Number *LBA bits 0-7
1F4h	Cylinder Low *LBA bits 8-15	Cylinder Low *LBA bits 8-15
1F5h	Cylinder High *LBA bits 16-23	Cylinder High *LBA bits 16-23
1F6h	Drive/Head *LBA bits 24-27	Drive/Head *LBA bits 24-27
1F7h	Status	Command
3F6h	Alternate Status	Device Control
3F7h	Drive Address	Not Used

The host uses the register interface to communicate to and from the drive. The registers are accessed through the host port addresses shown.

The host should not read or write any registers when the Status Register BSY bit = 1.

Note: * Meaning of Register contents when LBA addressing mode used.

Mechanical Data

Dimensions

Height	25.4 ± 0.4mm
Width	101.6 ± 0.4mm
Length	146.0 ± 0.6mm
Weight	530g maximum

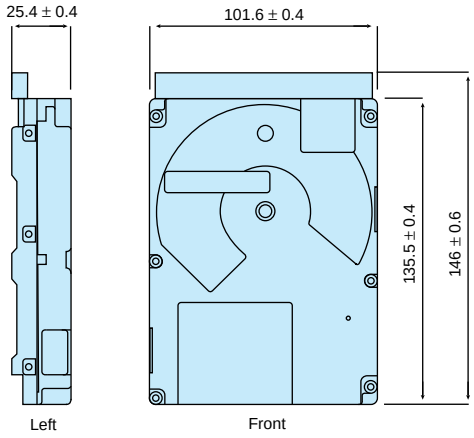
Mounting Orientation

The Drive can be mounted in any axis (6 directions).

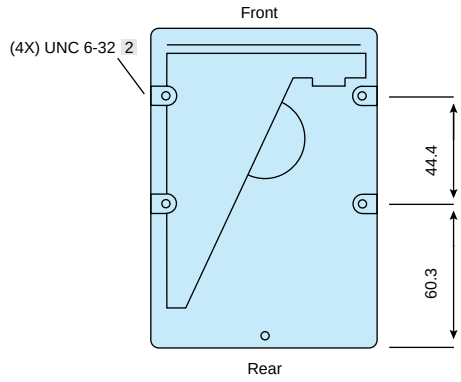
The maximum allowable penetration of the mounting screws is 1 3.5mm 2 6mm.

The recommended mounting screw torque is 3 ± 0.5 [KgF. cm]

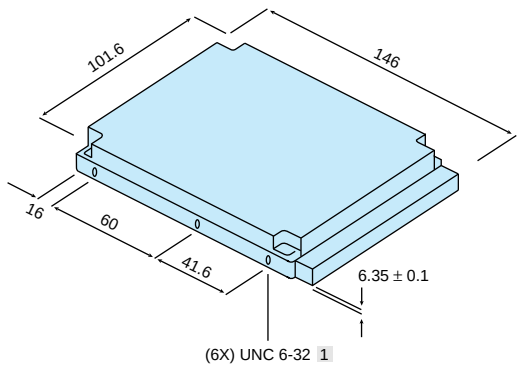
Outline Dimensions



Mounting Holes



Isometric View



IBM OEM Europe
PO Box 6
Langstone Road
Havant
Hampshire
PO9 1SA
United Kingdom
Telephone: (44) 1705 486363

Registered in England: No. 741598
Registered Office: PO Box 41, North Harbour, Portsmouth, Hampshire PO6 3AU.

UK company-wide registration to ISO9001. Certificate number FM12587.

Printed in England by Cedar Colour Limited

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