



Travelstar 3XP

DLGA-22690 and DLGA-23080

The latest 2.5" disk drives from IBM provide up to 3080MB in a 17mm high package. Using the latest MR head technology, IBM's patented No-ID sector formatting, PRML channel, S.M.A.R.T. function and advanced power saving modes, IBM offer high performance, high capacity drives, particularly suited to the mobile computing market, and its increasing application of multimedia.



Applications

- High performance portable computers
- Non-IT -process control/fax
- Removable/secure storage units.

Features

- **2690/3080 (at 512 bytes/sector)**
- **Enhanced IDE interface with DMA data transfer**
 - Single word: mode 2 (8.3MB/sec)
 - Multi word: mode 2 (16.6MB/sec)
- **PIO data transfer - mode 4 (16.6MB/sec)**
- **Shock 300G (2ms) non-operational**
- **Shock 100G (2ms) operational**
- **Media data rate 47-74 Mbits**
- **Rotational speed 4900 rpm**
- **Average seek 12 milliseconds (Read)**
- **Magneto resistive heads**
- **No-ID sector formatting**
- **PRML Data Channel**
- **96KB segmented buffer with write cache**
- **Enhanced ECC on the fly**
- **Advanced power saving modes**
- **Spin up 3.2 sec (typical)**
- **S.M.A.R.T. function**

Benefits

- High capacity in slim 2.5 inch form factor
- Popular interface with excellent performance
- Robust design for portable computing applications
- Excellent data rate across disk surface
- High areal density, low component count
- More data stored per track, increased sustained data transfer rate
- Fast access to data and improved throughput
- High reliability
- Low power for battery powered applications (1.1 watt at idle state)
- Fast recovery from standby
- Protection of user data

Electrical Connector Locations

Drive Address

Jumper positions are available at the interface connector to determine the drive address.

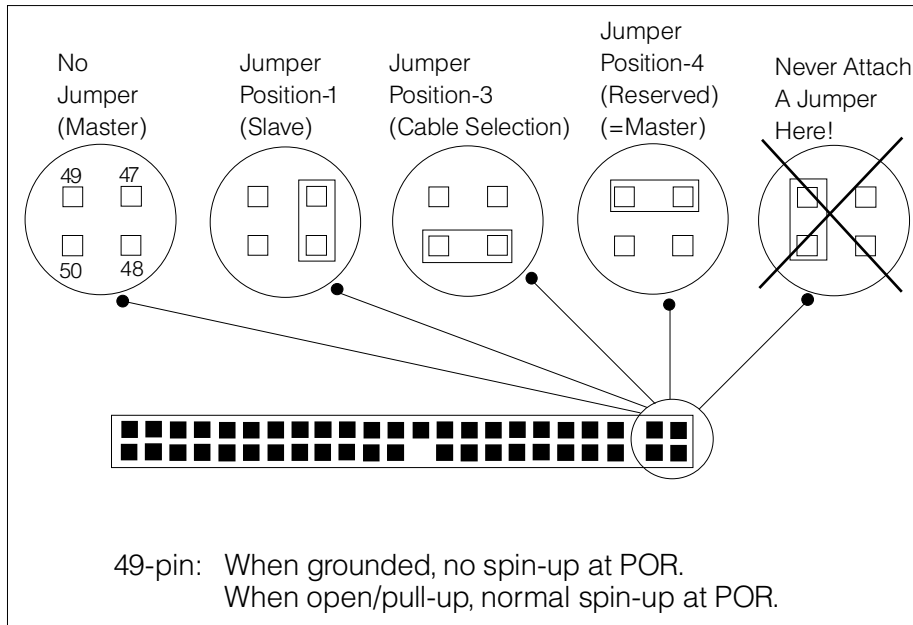
Using Cable Selection, the drive address depends on the condition of pin 28 of the AT interface cable. In the case when pin 28 is ground or low, the drive is a Master. If pin 28 is open or high level, the drive is a Slave.

Data Organisation (Logical)

| DLGA | 22690 | 23080 |
|------------------------------------|-----------|-----------|
| Head Number | 16 | 16 |
| Sectors/Track | 63 | 63 |
| Cylinder Number | 5216 | 5968 |
| Sector Size | 512 | 512 |
| Total Customer Usable Data Sectors | 5,257,728 | 6,015,744 |
| Total Customer Usable Data Bytes | 2690MB | 3080MB |

DC Power Requirements

| | |
|--|-------------------------------|
| Nominal Supply | + 5 volts |
| Power Supply Ripple (0-20Mhz) ¹ | 100mv p-p max |
| Tolerance ² | ±5% |
| Supply Current | Pop. Mean (Nominal Condition) |
| Low Power Idle ³ | 0.22A RMS Max (1.1W) |
| Performance Idle | 0.40A RMS Max (2.0W) |
| Read/Write ⁴ | 0.52A RMS Max (2.6W) |
| Seek average ⁵ | 0.52A RMS Max (2.6W) |
| Standby | 0.06A RMS Max (0.3W) |
| Sleep | 0.02A RMS Max (0.1W) |
| Start up (max) ⁶ (average from power on to ready) | 1.20A RMS Max (6.0W) |
| | 0.73A RMS Max (3.7W) |
| Supply Rise Time | 7 - 100 ms |

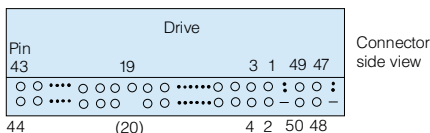


Cabling

The maximum cable length from the host system to the HDD plus circuit pattern in the host system shall not exceed 18 inches.

AT Signal Connector

The AT signal connector is designed to mate with Dupont part number 69764-044 or equivalent.



Note:

- Pin position 20 is left blank for secure connector insertion.



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.

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 | HDO7 | I/O | 04 | HDO8 | I/O |
| 05 | HDO6 | I/O | 06 | HDO9 | I/O |
| 07 | HDO5 | I/O | 08 | HD10 | I/O |
| 09 | HDO4 | I/O | 10 | HD11 | I/O |
| 11 | HDO3 | I/O | 12 | HD12 | I/O |
| 13 | HDO2 | I/O | 14 | HD13 | I/O |
| 15 | HDO1 | I/O | 16 | HD14 | I/O |
| 17 | HDO0 | 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 | HAO1 | I | 34 | -PDIAG | I/O |
| 35 | HAO0 | I | 36 | HAO2 | I |
| 37 | -HCSO | I | 38 | -HCS1 | I |
| 39 | -DASP | I/O | 40 | GND | |
| 41 | +5V Logic | PWR | 42 | +5V Motor | PWR |
| 43 | GND | | 44 | (Resv) | |

Note:

"O" designates an output from the drive.

"I" designates an input to the drive.

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

"PWR" designates a power supply to the drive.

"(Resv)" designates reserved pins which must be left unconnected.

Note: There are two input pins for +5V Volt power supply, "+5V LOGIC" and "+5V MOTOR". "+5V LOGIC" is connected to the internal logic circuits and "+5V MOTOR" is connected to the spindle motor and motor driver.

It is possible to turn on and off "+5V LOGIC" by an external switch circuit to reduce power consumption to the least possible. In this mode, a voltage drop out due to the motor spin up current can be

reduced by connecting "+5V MOTOR" line into the system power source directly. If the above power management option is used, all signal lines that will be electrically active in the host system while the HDD is disconnected from power line shall be isolated by Three-State line drivers. Internal leakage through ESD protection circuit may pull down LPUL (Least Positive Up Level) of logic signal below specification.

Command Description

The following Commands are supported by the drive:

| Commands | (Hex) | Protocol |
|--------------------------------|-------|----------|
| Check Power Mode | (E5) | 3 |
| Check Power Mode* | (98) | 3 |
| Execute Device Diagnostic | (90) | 3 |
| Format Track | (50) | 2 |
| Format Unit | (F7) | 3+ |
| Identify Device | (EC) | 1 |
| Identify Device DMA | (EE) | 4 |
| Idle | (E3) | 3 |
| Idle* | (97) | 3 |
| Idle Immediate | (E1) | 3 |
| Idle Immediate* | (95) | 3 |
| Initialize Device Parameters | (91) | 3 |
| Read Buffer | (E4) | 1 |
| Read DMA (retry) | (C8) | 4 |
| Read DMA (no retry) | (C9) | 4 |
| Read Long (retry) | (22) | 1 |
| Read Long (no retry) | (23) | 1 |
| Read Multiple | (C4) | 1 |
| Read Native Max LBA/CYL | (F8) | 3+ |
| Read Sectors (retry) | (20) | 1 |
| Read Sectors (no retry) | (21) | 1 |
| Read Verify Sectors (retry) | (40) | 3 |
| Read Verify Sectors (no retry) | (41) | 3 |
| Recalibrate | (1 X) | 3 |
| Security Disable Password | (F6) | 2 |
| Security Erase Prepare | (F3) | 3 |
| Security Erase Unit | (F4) | 2 |
| Security Freeze Lock | (F5) | 3 |

| | | |
|--|------|----|
| Security Set Password | (F1) | 2 |
| Security Unlock | (F2) | 2 |
| Seek | (7X) | 3 |
| Set Features | (EF) | 3 |
| Set Max LBA/CYL | (F9) | 3+ |
| Set Multiple Mode | (C6) | 3 |
| Sleep | (E6) | 3 |
| Sleep* | (99) | 3 |
| SMART Disable Operations | (B0) | 3 |
| SMART Enable/Disable Attribute Autosave | (B0) | 3 |
| SMART Enable Operations | (B0) | 3 |
| SMART Execute Off - line Data Collection | (B0) | 3 |
| SMART Read Attribute Values | (B0) | 1 |
| SMART Read Attribute Thresholds | (B0) | 1 |
| SMART Return Status | (B0) | 3 |
| SMART Save Attribute Values | (B0) | 3 |
| Standby | (E2) | 3 |
| Standby* | (96) | 3 |
| Standby Immediate | (E0) | 3 |
| Standby Immediate* | (94) | 3 |
| Write Buffer | (E8) | 2 |
| Write DMA (retry) | (CA) | 4 |
| Write DMA (no retry) | (CB) | 4 |
| Write Long (retry) | (32) | 2 |
| Write Long (no retry) | (33) | 2 |
| Write Multiple | (C5) | 2 |
| Write Sectors (retry) | (30) | 2 |
| Write Sectors (no retry) | (31) | 2 |
| Write Verify | (3C) | 2 |

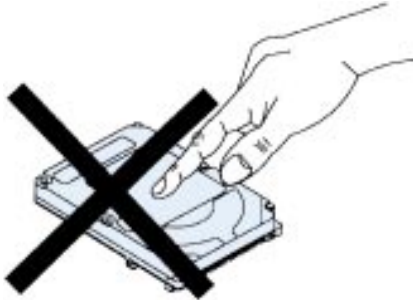
Protocol:

- 1 PIO data IN command
- 2 PIO data OUT command
- 3 Non data command
- 4 DMA command
- + Vendor specific command

*Alternate Command codes for previous defined commands

Caution

DO NOT PRESS!



- **Do not press when you take out the drive.**
- **Do not press when you carry the drive.**
- **Attach the drive free from pressing force.**
- **Do not cover the breather hole.**



Warning: This disk drive can be damaged by Electro-Static Discharge, please follow recommended ESD procedures before unpacking or handling the drive. Ask your Dealer for details if you need assistance.

Operating Modes

To provide the greatest flexibility of operation with optimum performance and power consumption the drive has a number of operating modes. These are defined below.

Active Mode

The drive is performing a command, writing cached data to disk or filling a read ahead buffer.

Performance Idle

The drive is spinning but is not performing a command. It can respond immediately if a new command is received. The transition from active mode to performance idle mode is controlled by the arrival and completion of commands from the host system.

Low Power Idle

The drive is spinning but is not performing a command. Additionally the drive had determined that the previous command sequence (group of associated commands) is complete. Some of the drive electronics have been powered down but it can still respond to a new command within about 40 milliseconds. The transition from performance idle to low power idle is controlled by IBM's patented Adaptive Battery Life Extender technology.

Standby

The drive is not spinning and is not performing a command. All electronics except for the command interface is turned off. The transition to standby is controlled by a programmable timer which is set by the host system using standard ATA commands. After receiving a new command, the drive will start spinning again and perform the command within 2 to 3 seconds (typically).

Sleep

The drive is not spinning and is not performing commands. All of the electronics is turned off. The transition to sleep mode is controlled by a command which is sent by the host system. The transition from sleep can only be triggered by a reset.

Adaptive Battery Life Extender

IBM Travelstar products incorporate software which automatically determines the correct time to start removing power from the drive electronics.

Most software and operating systems make use of a disk drive in bursts. The Travelstar drives monitor the commands which are sent from the host and detect patterns which indicate that a command sequence is active or has completed. The drive can then conserve power after each command sequence is finished by putting the drive into low power idle mode. The result is lower overall power consumption and longer battery life with no loss in performance. If the host system changes the number or frequency of commands which it sends then the disk drive will adapt automatically to this new pattern.

Electromagnetic Compatibility

The drive meets the following EMC requirements when installed in a host 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 (EEC) directive #76/889 related to the control of radio frequency interference and the Verband Deutscher Elektrotechniker (VDE) requirements of Germany (GOP).

The product is certified for compliance to EC directive 89/336/EEC.

Operating Environment

Relative Humidity:

| | |
|---------------|-----------------------------|
| Operating | 8% to 90% non-condensing |
| Non-Operating | 5% to 95% non-condensing |

Wet Bulb Temperature:

Maximum Wet Bulb:

| | |
|---------------|--------------------------|
| Operating | 29.4°C non-condensing |
| Non-Operating | 40°C non-condensing |

Elevation:

Operating Altitude - 300 to 3048m
Non Operating Altitude - 300 to 12000m

Temperature:

Operating 5° to 55°C
Non Operating - 40° to 65°C
Temperature Gradient 20°C per hour

Air Cooling Requirement

The host system must provide sufficient air flow across the drive to maintain the temperature at less than 60°C (measured at the centre of the files' top cover).

Operating Shock

The drive will withstand (with no hard error) a 100G half-sine wave shock pulse of 2ms duration or 10G for 11ms.

Non-Operating Shock

The drive will withstand (with no permanent damage or degradation in performance) a 120G half-sine wave shock pulse of 11ms duration or 300G for 2ms.

Operating and non Operating Vibration

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

S.M.A.R.T. Function

The intent of self - monitoring, analysis and reporting technology (S.M.A.R.T.) is to protect user data and prevent un-scheduled system downtime that may be caused by predictable degradation and/or fault of the device. By monitoring and storing critical performance and calibration parameters, S.M.A.R.T. devices employ sophisticated data analysis algorithms to predict the likelihood of near - term degradation or fault condition. By alerting the host system of a negative reliability status condition, the host system can warn the user of the impending risk of data loss and advise the user of appropriate action.

Since S.M.A.R.T. utilizes the internal device microprocessor and other devices resources, there may be some small overhead associated with its operation. However, special care has been taken in the design of the S.M.A.R.T. algorithms to minimize the impact to host system performance. Actual impact of S.M.A.R.T. overhead is dependent on the specific device design and the usage patterns of the host system. To further ensure minimal impact to the user, S.M.A.R.T. capable devices are shipped from the device manufacturer's factory with the S.M.A.R.T. feature disabled. S.M.A.R.T. capable devices can be enabled by the system OEMs at time of system integration or in the field by aftermarket products.

Note: For further details see drive specification.

Mechanical Data

| Dimensions | DLGA-22690/23080 |
|---------------|------------------|
| Height (mm) | 170 |
| Width (mm) | 6985 |
| Length (mm) | 1002 |
| Weight (gram) | 180 Typical |

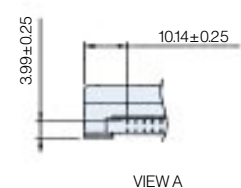
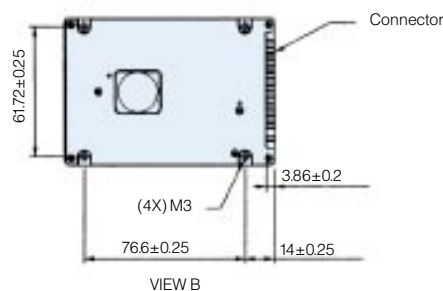
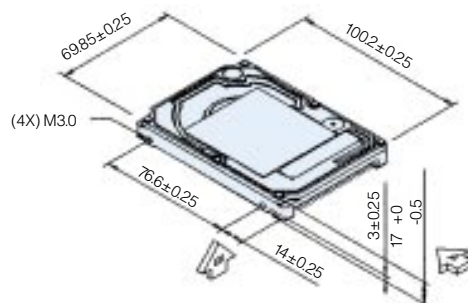
Mounting Orientation

The drive will operate in all axes (6 directions). The drive will operate within the specified error rates when tilted ± 5 degrees from these positions.

Performance and error rate will stay within specification limits if the drive is operated in the other permissible orientations from which it was formatted. Thus a drive formatted in a horizontal orientation will be able to run vertically and vice versa.

The recommended mounting screw torque is 3.0 ± 0.5 kgf.cm.

The recommended mounting screw depth is 3.0 ± 0.3 mm for bottom and 3.5 ± 0.5 mm for horizontal mounting.





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