

Hard Drive: QUANTUM: PRODRIVE LPS 52 AT 52MB 3.5"/SL IDE / AT



```

P R O D R I V E   L P S   5 2   A T   Q U A N T U M
NO MORE PRODUCED
Native| Translation
-----+-----+-----+-----
Form                3.5"/SLIMLINE      Cylinders  1219| 751|   |
Capacity form/uniform  52/      MB      Heads      2|  8|   |
Seek time / track    17.0/ 5.0 ms      Sector/track  | 17|   |
Controller           IDE / AT          Precompensation
Cache/Buffer         64 KB LOOK-AHEAD  Landing Zone
Data transfer rate   1.750 MB/S int      Bytes/Sector  512
                    4.000 MB/S ext
Recording method     RLL 2/7
                    operating | non-operating
-----+-----+-----+-----
Supply voltage       5/12 V      Temperature *C      4 50 | -40 65
Power: sleep        W      Humidity %          8 85 |  5 95
standby             W      Altitude km         -0.060 3.000| -0.060 12.000
idle                5.5 W      Shock g             6   |  60
seek                W      Rotation RPM         3662
read/write          6.5 W      Acoustic dBA        45
spin-up             W      ECC Bit            48,WITH 11BIT BURST COR
                    MTBF h            60000
                    Warranty Month      12
Lift/Lock/Park      YES      Certificates      CSA,FCC,IEC380,SDA,TUV,UL4...
    
```

Layout

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+-----+
|                * * * JP1 |XX
|                * * *   |XX
|                DM SP DS  |XX 40-pin
|                |         |XX J1
|++-+                 |XX
    
```

```

|| |                                |XX
|| |                                |.X
|| |HDA                             |XX
|++|                                |XX
|                                    |XX
|++|                                |XX
|| |                                |XX
|| |HDA                             |XX
|++|                                |
|                                    |XX Power
|                                    |XX J3
+-----+

```

Jumper Pin Location on the Adapter Board

```

+-----+
|0      +-+      +-+      QUANTUM CORP  0 |
|      | +-----+ |                                0 |
|      +-----+J1                               |
|      +---+J3                                       |
|      +---+                                       +---+J4 |
|                                       +---+       |
|                                       SECONDARY   |
|                                       INTERFACE     |
|                                       +---+       |
|                                       +---+J5       |
|      +-+E3                                       |
|      J2| |E4                                       |
|      +-+                                       0 |
|0                                       0 |
+-----+
+-----+ +-----+

```

Jumpers

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Jumper Setting

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x = Jumpers set at factory

CLOSED = Jumper installed

OPEN = Jumper not installed

The configuration of three jumpers controls the drive's mode operation.

DS - Drive Select
 SP - Slave Present
 DM - Drive Mode

DS	SP	DM	Description
OPEN	OPEN	OPEN	Slave Drive - Compatible with drives using the PDIAG- line to handle Master/Slave communications.
OPEN	OPEN	CLOSED	Slave Drive (in the ProDrive mode) to provide compatibility with a Pro Drive 40/80AT drive. The PDIAG- line is not used.
OPEN	CLOSED	OPEN	Self-Seek mode
OPEN	CLOSED	CLOSED	Self-Seek mode
CLOSED	OPEN	OPEN	Master drive, using DASP- to check for the presense of a slave
CLOSED	OPEN	CLOSED	Master Drive - in 40/80AT mode - using DASP- to check for the presense of a Slave.
CLOSED	CLOSED	OPEN	Master Drive (in PDIAG- mode) using the SP jumper to determine whether a Slave is present, without checking DASP-.
CLOSED	CLOSED	CLOSED	Master Drive - in 40/80AT mode using the SP jumper to determine whether a Slave is present, without checking DASP-.

Note: In the ProDrive 40/80AT mode, PDIAG- is not used; otherwise, it is always used.

DS Drive Select Jumper

x CLOSED Single drive or MASTER (Drive 0)
 OPEN SLAVE (Drive 1)

Note: The order in which drives are connected in a daisy chain has no significance.

You can daisy-chain two drives on the AT-bus interface by using their Drive Select (DS) jumpers to configure one drive as the Master and the other as the Slave.

SP Slave Present Jumper

In combination with the current DS jumper settings, the Slave Present jumper implements one of two possible configurations:

When the drive is configured as a Master - that is, with the DS jumper installed - the SP jumper should be installed on the Master drive only if the Slave drive does not use the Drive Active/Slave (DASP-) signal to indicate its presence.

When the drive is configured as a Slave - that is, without the DS jumper installed - the SP jumper enables the self-seek test. When power is applied to the drive with the self-seek test enabled, the drive executes seeks in a butterfly pattern.

During the self-seek test, the LED remains on while the test proceeds without error. If the test encounters a seek error, the test terminates and the LED flashes continuously until the SP jumper is removed.

DM Drive Mode Jumper

When the Drive Mode jumper is installed, the drive is in the ProDrive 40/80AT-compatible mode and can communicate with a ProDrive 40/80AT hard disk drive. In this mode, the drive does not use the PDIAG-signal to control Master/Slave communications. The configuration of the DS and SP jumpers determines whether the drive is the Master or the Slave.

J3 DC Power and pin connector assignments

```
-----+
          J3      |
-+  +-----+ | pin 1  +12 VDC
1|  | 4 3 2 1 | | pin 2  +12 Volts Return (Ground)
-+  +-----+ | pin 3  + 5 Volts Return (Ground)
```

-----+ pin 4 + 5 VDC

Note: Labels indicate the pin numbers on the connector. Pins 2 and 3 are connected on the drive.

Adapter Board Jumper Options

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Four jumper pins on the adapter board - labeled J2 through J5 - have the function described below.

J2 Enables the drive's interrupt logic to control IRQ14 (Interrupt Request 14). This option provides compatibility with systems in which the BIOS does not read the STATUS Register when the drive issues an interrupt. In such cases, the drive might fail to transmit the interrupt to the system.

- A jumper from the center pin J2 to E3 enables transmission of an interrupt every time the drives goes busy.

- A jumper from the center pin J2 to E4 gates the interrupt from the drive and transmits it directly to the AT bus. This is the default setting.

J3 These pins should always remain open, with no jumper installed.

J4 This jumper should generally remain open. A jumper should be installed here only when installing the adapter board in a system that uses the Chips & Technologies chip set. This chip set runs the I/O bus faster than the standard 12 Mhz, one wait state.

J5 Enables secondary interface selection on a second adapter board installed in a system. When a jumper is installed here, drives connected to the adapter board respond to commands transmitted via the secondary address, 170H-177H. Standard BIOS versions do not support secondary addresses. Therefore, you must

write a custom driver to implement a secondary interface.

Note: A second adapter board is supported only when both adapter boards are Quantum boards.

Install

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Notes on Installation

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Mounting

The mounting holes on the ProDrive LPS 52/105AT hard disk drive allow the drive to be mounted in any orientation. For mounting #6-32 UNC screws are recommended.

Caution: The PCB is very close to the mounting holes. Do not exceed the specified length for the mounting screws. The specified screw length allows full use of the mounting-hole threads, while avoiding damaging or placing unwanted stress on the PCB. To avoid stripping the mounting-hole threads, the maximum torque applied to the mounting screws must not exceed 8 inch-pounds.

Clearance

Clearance from the drive - except mounting surfaces - to any surface must be 0.10 inches minimum (2.6mm maximum).

Ventilation

The ProDrive LPS 52/105AT hard disk drives operates without a cooling fan, provided the ambient air temperature does not exceed 122°F (50°C). Any user-designed cabinet must provide adequate air circulation, to prevent the maximum temperature being exceeded.

J1 AT-Bus Interface Connector

On the ProDrive LPS 52/105AT hard disk drive, the AT-bus interface cable connector (J1) is a 40-pin Universal Header.

To prevent the possibility of incorrect installation, you should be keyed by removing pin 20. This will ensure that the connector cannot be installed upside down. All signal are relative to Pin 20.

For the mating J1 connector, recommended cable connectors include AMP receptacle P/N 1-499506-0, with strain relief; P/N 1-746193-0, without strain relief; or an equivalent. To key the cable connectors, you must plug the hole that corresponds to pin 20.

Other recommended part numbers for the mating connector include:

40-Pin Connector	3M 3417-7000 or equivalent
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Strain Relief	3M 3448-2040 or equivalent
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Flat Cable (Stranded 28 AWG)	3M 3365-40 or equivalent
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Flat Cable (Stranded 28 AWG)	3M 3517-40 (shielded) or equivalent
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Adapter Board Installation

The adapter board is a half-size board. You can install it in any available 16-bit slot in an IBM PC-AT or compatible personal computer. Before installing the adapter board, make sure that no other hard drive controller resides at the primary hard drive address, 1F0H-1F7H.

If a combination floppy and hard disk drive controller is present, its hard disk drive controller functions must be disabled. To disable the hard disk drive controller functions, follow these instructions:

On a Western Digital WD1002-WA2 or WD1003-WA2 floppy/hard disk drive controller card:

- Do not install jumpers on pins E5 and E6.
Install jumpers on pins E4 and E5 to ensure that the controller card resides at the secondary address, 170H-177H, rather than at the primary address, 1F0H-1F7H.

- Move the card from a 16-bit I/O slot to an 8-bit slot to disconnect the IRQ14 output driver.

On a Data Technology Corporation (DTC) floppy/hard disk drive controller card:

- Install a jumper on pins W3.

- Move the card from a 16-bit I/O slot to an 8-bit slot to disconnect the IRQ14 output driver,

Once you have disabled hard disk drive controller functions on the card, install the adapter board in a 16-pin slot.

Connecting the Adapter Board and the Drive

Use the ribbon cable supplied with the adapter board to connect the drive to the board. To ensure that the cable is plugged into the adapter board and the drive correctly, there is a red wire at one edge of the cable. To connect the drive to the board:

1. Note the number 1 printed on the board next to the header. When inserting the cable connector into the header on the adapter board, make sure the red wire on the cable is at the side of the header labeled 1.

2. When inserting the other end of the cable connector into the header on the drive, make sure the red wire on the cable is at the inside edge of the header, next to the J3 power connector.

To complete the installation of the drive, secure it to the system chassis by using the mounting screws.

J3 DC Power Connector

The drive's DC power connector is a 4-pin Ranoda Electronics Connector (06300010-04-1) or equivalent, mounted on the back edge of the Printed Circuit Board (PCB).

Recommended connectors and their numbers:

4-pin connector AMP P/N 1-480424-0 or equivalent

Loose-piece contacts AMP P/N 61173-4 or equivalent

Strip contacts AMP P/N 350078-4 or equivalent

Air Filtration

Low Profile Series hard drives are Winchester-type drives. The heads fly very close to the media surface, at a nominal flying height of 4 microinches. Therefore, it is essential that the air circulating within the drive be kept free of particles. Quantum assembles the drive in a Class-100, purified-air environment, sealing the drive mechanism under a metal cover. When the drive is in use, the rotation of the disks forces the air inside the drive through an internal filter.

Electrical Characteristics

All signals are TTL-compatible - with logic one greater than 2.0 volts and less than 5.25 volts; and logic zero, greater than 0.0 volts and less than 0.7 volts. Neither the adapter board nor the drives require terminating resistors.

AT-Bus Interface Characteristics

The AT-Bus interface supports one or two hard drives per adapter board and a maximum of two adapter boards - or a maximum of four drives. When more than one drive is present, a master/slave relationship exists between the two drives. The host always maintains control of the bus - no arbitration occurs.

Features

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General Description

Quantum's ProDrive Low Profile Series (LPS) 105AT and 52AT hard disk drives are a part of a family of high-performance, 1-inch-high hard disk drives manufactured to meet the highest product quality standards. ProDrive LPS hard disk drives use nonremovable, 3 -inch hard disks, and are available with a Small Computer System Interface (SCSI) or Advanced Technology (AT) interface.

The ProDrive LPS 105/52AT hard disk drives feature an embedded AT drive controller and use AT commands to optimize systems performance. Because the drive manages media defects and error recovery internally, these operations are fully transparent to the user.

Seek Times

Times msec.	Typical Nominal Condition	Maximum Nominal Condition	Maximum Worst-Case Condition
Single Track Seek	5	6	6ms
Average Seek	17ms	19ms	21ms
Third-Stroke Seek	18ms	21ms	23ms
Full-Stroke Seek	33ms	38ms	43ms
Average Rotational Latency	8.2ms	8.2ms	8.2ms
Sequential Head Switch	2.0ms	2.0ms	2.0ms
Power-Up Time	8.0ms	10.0ms	10.0ms

Preventive Maintenance

The ProDrive LPS 52/105AT hard disk drive requires no preventive maintenance.

Formatting

At the factory, the LPS 52/105AT receives a low-level format that creates the actual tracks and sectors on the drive.

Defect Detection

At the sector level, any discrepancy between recorded data and re-covered data constitutes a data error. In high-density digital recording systems, it is necessary to use an error-detection and correction scheme to increase the reliability of the system.

Data errors are either soft- not readily repeatable on retries - or hard - repeatable with high probability. The signal-to-noise ratio of the system affects the occurrence of soft errors, which present marginal conditions of the media, heads, or read/write circuitry. Hard errors occur due to defects, pits, scratches, or thin spot in the media. The drive can skip, or not use, defective sectors on the media for data storage.

Defect Management

Factory Found Defects

At the factory, Quantum scans the disks for defective sectors and de-allocates sectors containing defects prior to shipment. The drive records a primary defect list that contains the locations of all factory-found defective sectors in a reserved cylinder on the disk.

In-line sparing skips each factory-found defect and shifts subsequent sectors on the track to sequential sectors. One sector at the end of each cylinder is a spare, or replacement sector. The drive allocates spare sectors as required to maintain the proper number of blocks per cylinder.