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User manual MAXTOR MAXLINE PLUS II 250GB
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Maxtor[®]

MaxLine Plus II 250GB AT
Product Manual

October 30, 2003
Part Number: 1905



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Manual abstract:

@@@E78016 CSA standard C22.2-950 certification granted under File No. LR49896 TUV Rheinland EN 60 950 Tested to FCC Rules for Radiated and Conducted Emissions, Part 15, Sub Part J, for Class-B Equipment. PATENTS These products are covered by or licensed under one or more of the following U.S. Patents: 4,419,701; 4, 538,193 4,625,109; 4,639,798; 4,647,769; 4,647,997; 4,661,696; 4,669,004; 4,675,652; 4,703,176; 4,730,321; 4,772,974; 4,783,705; 4,819,153; 4,882,671; 4,920,442; 4,920,434; 4,982,296; 5,005,089; 5,027,241; 5,031,061; 5,084,791; 5,119,254; 5,160,865; 5,170,229; 5,177,771; Other U.S. and Foreign Patents Pending. Maxtor , MaxFax are registered trademarks of Maxtor Corporation, registered in the U.S. A. and other ® ® countries. Maxtor MaXLine Plus II 250GB AT, AutoTransfer, AutoRead, AutoWrite, DisCache, DiskWare, Defect Free Interface, and WriteCache are trademarks of Maxtor Corporation. All other brand names or trademarks are the property of their manufacturers. Maxtor reserves the right to make changes and improvements to its products, without incurring any obligation to incorporate such changes or improvements into units previously sold or shipped.

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Stand-alone drives are sensitive to ESD damage. 2 BEFORE removing drives from their packing material, allow them to reach room temperature. 3 4 During handling, NEVER drop, jar, or bump a drive. Once a drive is removed from the Maxtor shipping container, IMMEDIATELY secure the drive through its mounting holes within a chassis. Otherwise, store the drive on a padded, grounded, antistatic surface. 5 NEVER switch DC power onto the drive by plugging an electrically live DC source cable into the drive's connector. NEVER connect a live bus to the drive's interface connector. 6 ELECTRICAL GROUNDING - For proper operation, the drive must be securely fastened to a device bay that provides a suitable electrical ground to the drive baseplate. Please do not remove or cover up Maxtor factory-installed drive labels. They contain information required should the drive ever need repair.

Thank you for your interest in Maxtor hard disk drives. This manual provides technical information for OEM engineers and systems integrators regarding the installation and use of Maxtor hard drives. Drive repair should be performed only at an authorized repair center. For repair information, contact the Maxtor Customer Service Center at 800-2MAXTOR or 1-303-678-2015. Corporate Headquarters: 500 McCarthy Blvd. Milpitas, California 95035 Tel: 408-894-5000 Fax: 408-362-4740 Table of Content Chapter 1 INTRODUCTION 1.1 1.2 1.3 1.4 AUDIENCE .

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..A-4 Maxtor MaXLine Plus II 250GB AT iii List of Figures Mechanical Dimet; MB Application-Specific Integrated Circuit Advanced Technology Attachment bits per inch Double Amplitude(represents pk-pk shaker displacement) decibels decibels, A weighted Data Protection System Shock Protection System Error Correcting Code thousands of flux changes per inch Hertz Kilobytes Least Significant Bit milliamperes Megabytes (1 MB = 1,000,000 bytes when referring to disk transfer rates or storage capacities and 1,048,576 bytes in all other cases) Megabits per second Megabytes per second Megahertz milliseconds Most Significant Bit millivolts nanoseconds Serial ATA Interface tracks per inch microseconds Volts · Mb/s · MB/s · MHz · ms · MSB · mV · ns · SATA · tpi · μ s · V
1-2 Maxtor MaXLine Plus II 250GB AT Introduction The typographical and naming conventions used in this manual are listed below.



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Conventions that are unique to a specific table appear in the notes that follow that table. **Typographical Conventions:** · Names of Bits: Bit names are presented in initial capitals. An example is the Host Software Reset bit. · Commands: Interface commands are listed in all capitals. An example is WRITE LONG. · Register Names: Registers are given in this manual with initial capitals. An example is the Alternate Status Register. · Parameters: Parameters are given as initial capitals when spelled out, and are given as all capitals when abbreviated. Examples are Prefetch Enable (PE), and Cache Enable (CE). · Hexadecimal Notation: The hexadecimal notation is given in 9-point subscript form. An example is 30H. · Signal Negation: A signal name that is defined as active low is listed with a minus sign following the signal.

An example is RD. · Messages: A message that is sent from the drive to the host is listed in all capitals. An example is ILLEGAL COMMAND. **Naming Conventions:** · Host: In general, the system in which the drive resides is referred to as the host. · Computer Voice: This refers to items you type at the computer keyboard.

These items are listed in 10-point, all capitals, Courier font. An example is FORMAT C:/S. **1.4 REFERENCES** For additional information about the ATA interface, refer to the latest revision of the draft standard on the internet at <http://www.t13.org/> using the link under "1410D AT Attachment - 6 with Packet Interface (ATA/ATAPI - 6)." **Maxtor MaXLine Plus II 250GB AT 1-3 Chapter 2 GENERAL DESCRIPTION** This chapter summarizes the general functions and key features of the MaxLine Plus II 250GB hard disk drive, as well as the applicable standards and regulations. **2.1 PRODUCT OVERVIEW** Maxtor's MaxLine Plus II 250GB hard disk drive is part of a family of high performance, 1-inch-high hard disk drives manufactured to meet the highest product quality standards. These hard disk drives use nonremovable, 3 1/2-inch hard disks and are available with the ATA interface.

The MaxLine Plus II 250GB hard disk drive features an embedded hard disk drive controller, and use ATA commands to optimize system performance. Because the drive manages media defects and error recovery internally, these operations are fully transparent to the user. The innovative design of the MaxLine Plus II 250 GB hard disk drive incorporate leading edge technologies such as Ultra ATA/133, Serial ATA Option with transfer speeds up to 150 MB/second, Advanced Cache Management, Shock Protection System™ (SPS), Data Protection System (DPS) and Quiet Drive Technology (QDT). These enhanced technologies enable Maxtor to produce a family of highperformance, high-reliability drives. **2.2 KEY FEATURES** The MaxLine Plus II 250GB AT hard disk drive includes the following key features: General · Low profile, 1-inch height · Industry standard 3 1/2-inch form factor · Emulation of IBM® PC AT® task file register, and all AT fixed disk commands · Windows NT and 9X Certification Maxtor MaXLine Plus II 250GB AT 2-1 General Description Performance · Average seek time of <9.0 ms · Average rotational latency of 4.17 ms · New Ultra ATA interface with Maxtor-patented Ultra ATA/133 protocol supporting burst data transfer rates of 133MB/s · Serial ATA interface with transfer speeds up to 150MB per second · 8MB Cache buffer with 1.9MB (approximate) Advance Cache Management (ACM) · Look-ahead DisCache feature with continuous prefetch and WriteCache write-buffering capabilities · AutoTask Register update, Multi-block AutoRead, and Multi-block AutoWrite features in a custom ASIC · Read-on-arrival firmware · Quadruple-burst ECC, and double burst ECC on-the-fly · 1:1 interleave on read/write operations · Support of all standard ATA data transfer modes with PIO mode 4 and multiword DMA mode 2, and Ultra DMA modes 0, 1, 2, 3, 4, 5 and 6 · Adaptive cache segmentation · 100% FDB (Fluid Dynamic Bearing Motors) Reliability · Exceeds one million hours mean time expected until the first failure (MTTF) · Automatic retry on read errors · 320-bit, non-interleaved Reed-Solomon Error Correcting Code (ECC), with cross checking correction up to fifteen separate bursts of 10 bits each totalling up to 150 bits in length · S.M. A.R.T. 4 (Self-Monitoring, Analysis and Reporting Technology) · Transparent media defect mapping · High performance, in-line defective sector skipping · Reassignment of defective sectors discovered in the field, without reformatting · Shock Protection System to reduce handling induced failures · Data Protection System to verify drive integrity · Quiet Drive Technology (QDT) 2-2 Maxtor MaXLine Plus II 250GB AT General Description Versatility · Power saving modes · Downloadable firmware · Cable select feature · Ability to daisy-chain two drives on the interface **2.3 REGULATORY COMPLIANCE STANDARDS** Maxtor Corporation's disk drive products meet all domestic and international product safety regulatory compliance requirements. Maxtor's disk drive products conform to the following specifically marked Product Safety Standards: · Underwriters Laboratories (UL) Standard 1950. This certificate is a category certification pertaining to all 3.5-inch series drives models. · Canadian Standards Association (CSA) Standard C.22. 2 No. 1950. This certificate is a category certification pertaining to all 3.5-inch series drives models. · TUV Rheinland Standard EN60 950. This certificate is a category certification pertaining to all 3.5-inch series drives models. **Product EMI/EMS Qualifications:** · CE Mark authorization is granted by TUV Rheinland in compliance with our qualifying under EN 55022:1994 and EN 50082-1:1997. · C-Tick Mark is an Australian authorization marked noted on Maxtor's disk drive products. The mark proves conformity to the regulatory compliance document AS/NZS 3548: 1995 and BS EN 55022: 1995.

· Maxtor's disk drives are designed as a separate subassembly that conforms to the FCC Rules for Radiated and Conducted emissions, Part 15 Subpart J; Class B when installed in a given computer system. · Approval from Taiwan BSMI. Number: 3892A638 **2.4 HARDWARE REQUIREMENTS** The MaxLine Plus II 250GB AT hard disk drive is compatible with the IBM PC AT, and other computers that are compatible with the IBM PC AT. It connects to the PC either by means of a third-party IDE-compatible adapter board, or by plugging a cable from the drive directly into a PC motherboard that supplies an ATA interface. **Maxtor MaXLine Plus II 250GB AT 2-3 Chapter 3 INSTALLATION** This chapter explains how to unpack, configure, mount, and connect the Maxtor MaXLine Plus II 250 GB AT hard disk drive prior to operation.



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It also explains how to start up and operate the drive. 3.1 SPACE REQUIREMENTS The MaXLine Plus II 250GB AT hard disk drives are shipped without a faceplate. 25 ±0.

7 mm 147 mm (max) (5.75 inches) 101.6 ±0.25 mm (4.00 inches) Figure 3-1 shows the external dimensions of the MaXLine Plus II 250GB AT drives. Maxtor MaXLine Plus II 250GB AT 3-1 Installation Figure 3-1 Mechanical Dimensions of MaXLine Plus II 250GB AT Hard Disk Drive 3.2 UNPACKING INSTRUCTIONS CAUTION: The maximum limits for physical shock can be exceeded if the drive is not handled properly. Special care should be taken not to bump or drop the drive. It is highly recommended that MaXLine Plus II 250GB AT drives are not stacked or placed on any hard surface after they are unpacked. Such handling could cause media damage.

1. Open the shipping container and remove the packing assembly that contains the drive. 2. Remove the drive from the packing assembly. CAUTION: During shipment and handling, the antistatic electrostatic discharge (ESD) bag prevents electronic component damage due to electrostatic discharge. To avoid accidental damage to the drive, do not use a sharp instrument to open the ESD bag and do not touch PCB components. Save the packing materials for possible future use. 3. When you are ready to install the drive, remove it from the ESD bag. 3-2 Maxtor MaXLine Plus II 250GB AT Installation Figure 3-2 shows the packing assembly for a single Maxtor MaXLine Plus II 250GB AT hard disk drive.

A 20-pack shipping container is available for multiple drive shipments. Figure 3-2 Single-Pack Shipping Container Maxtor MaXLine Plus II 250GB AT 3-3 Installation Figure 3-3 20-Pack Shipping Container 3-4 Maxtor MaXLine Plus II 250GB AT Installation 3.3 3.3.1 HARDWARE OPTIONS ATA Interface Connector The configuration of a MaXLine Plus II 250GB AT hard disk drive depends on the host system in which it is to be installed. This section describes the hardware options that you must take into account prior to installation. +12VDC +12VDC return +5VDC return +5VDC Pin 1 ATA Interface Connector Power Connector Pin 40 CLJ CS DS Cable Select Setting (default) Note: this setting is identical for both drive 0 and drive 1 CLJ CS DS Master Setting CLJ CS DS Slave Setting CLJ CS DS Maxtor MaXLine Plus II 250GB AT 3-5 DS with CS for slaves not supporting DASP Figure 3-4 Jumper Locations on the ATA Interface Connector Installation The configuration of the following three jumpers controls the drive's five modes of operation: · CS Cable Select · DS Drive Select · CLJ Cylinder Limitation Jumper The AT PCB has two jumper locations provided to configure the drive in a system. The default configuration for the drive as shipped from the factory is with a jumper across the CS location, and open positions in the DS and CLJ positions. Table 3-1 defines the operation of the master/slave jumpers and their function relative to pin 28 on the interface. 1 indicates that the specified jumper is installed; 0 indicates that the jumper is not installed.

Table 3-1 CS 0 1 DS 0 0 PIN 28 X Gnd AT Jumper Options DESCRIPTION Drive is configured as a slave Drive is configured as Master (Device 0) when attached to the end of a 80 conductor Ultra ATA cable Drive is configured as a Master Drive is configured as a Slave (Device 1) when attached to the middle of a 80 conductor Ultra ATA cable Drive is configured as a Master with an attached slave that does not support DASP 0 1 1 0 X Open 1 1 X Note: In Table 3-1, a 0 indicates that the jumper is removed, a 1 indicates that the jumper is installed, and an X indicates that the jumper setting does not matter. 3.3.1.1 Cable Select (CS) Jumper When a MaXLine Plus II 250GB AT hard disk drive and another ATA hard disk drive are daisy-chained together, they can be configured as Master or Slave either by the CS or DS jumpers.

To configure the drive as a Master or Slave with the CS feature, the CS jumper is installed (1). The drive's position on the 80 conductor Ultra ATA data cable then determines whether the drive is a Master (Device 0) or a Slave (Device 1). If the drive is connected to the end of the Ultra (cable Select) data cable the drive is a Master. If the drive is connected to the middle connection it is set as a Slave. 3-6 Maxtor MaXLine Plus II 250GB AT Installation Once you install the CS jumper, the drive is configured as a Master or Slave by the state of the Cable Select signal: pin 28 of the ATA bus connector.

Please note that pin 28 is a vendor-specific pin that Maxtor is using for a specific purpose. More than one function is allocated to CS, according to the ATA CAM specification (see reference to this specification in Chapter 1). If pin 28 is a 0 (grounded), the drive is configured as a Master. If it is a 1 (high), the drive is configured as a Slave. In order to configure two drives in a Master/Slave relationship using the CS jumper, you need to use a cable that provides the proper signal level at pin 28 of the ATA bus connector. This allows two drives to operate in a Master/Slave relationship according to the drive cable placement. The MaXLine Plus II 250GB AT hard disk drives are shipped from the factory as a Master (Device 0 - CS jumper installed). To configure a drive as a Slave (Device 1DS scheme), the CS jumper must be removed. In this configuration, the spare jumper removed from the CS position may be stored on the PK jumper pins. 3.

3.1.2 Drive Select (DS) Jumper You can also daisy-chain two drives on the ATA bus interface by using their Drive Select (DS) jumpers. To use the DS feature, the CS jumper must not be installed. To configure a drive as the Master (Device 0), a jumper must be installed on the DS pins. Note: The order in which drives are connected in a daisy chain has no significance. 3.3.1.3 Master Jumper Configuration In combination with the current DS or CS jumper settings, the Slave Present (SP) jumper can be implemented if necessary as follows: Note: The CS position doubles as the Slave present on this drive.

When the drive is configured as a Master (DS jumper installed or CS jumper installed, and the Cable Select signal is set to (0), adding an additional jumper (both jumpers DS and CS now installed) will indicate to the drive that a Slave drive is present. This Master with Slave Present jumper configuration should be installed on the Master drive only if the Slave drive does not use the Drive Active/Slave Present (DASP) signal to indicate its presence. Maxtor MaXLine Plus II 250GB AT 3-7 Installation 3.3.1.

4 Cylinder Limitation Jumper (CLJ) For user capacities below 66,055,248 sectors (32GB), inserting the CLJ jumper limits the Number of Cylinders field 1 to a value of 16,383, as reported in IDENTIFY DEVICE data word. This allows software drivers to determine that the actual capacity is larger than indicated by the maximum CHS, requiring LBA addressing to use the full capacity.



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A summary of these effects for the Maxtor MaXLine Plus II 250GB AT drives is shown in the following table: CLJ JUMPER OUT 250GB C=16,383 H=16 S=63 LBA=490,234,752 Pin 1 Pin 1 of AT Connector C L 4.55±0.50 7.

22±0.50 (to pin center) 29.78±0.50 (to pin center) Connector Side Figure 3-5 AT Connector and Jumper Location 3-8 Maxtor MaXLine Plus II 250GB AT Installation 3.3.2 ATA BUS ADAPTER There are two ways you can configure a system to allow the MaXLine Plus II 250GB AT hard disk drives to communicate over the ATA bus of an IBM or IBMcompatible PC: 1. Connect the drive to a 40-pin ATA bus connector (if available) on the motherboard of the PC. 2. Install an IDE-compatible adapter board in the PC, and connect the drive to the adapter board. This board is available at Maxtor (p/n: K01PCAT133).

3.3.2.1 40-Pin ATA Bus Connector Most PC motherboards have a built-in 40-pin ATA bus connector that is compatible with the 40-pin ATA interface of the MaXLine Plus II 250GB AT hard disk drives. If the motherboard has an ATA connector, simply connect a 40-pin ribbon cable between the drive and the motherboard. You should also refer to the motherboard instruction manual to ensure signal compatibility. 3.3.2.2 Adapter Board If your PC motherboard does not contain a built-in 40-pin ATA bus interface connector, you must install an ATA bus adapter board and connecting cable to allow the drive to interface with the motherboard.

Maxtor does supply such an adapter board. Please carefully read the instruction manual that comes with your adapter board, as well as Chapter 6 of this manual to ensure signal compatibility between the adapter board and the drive. Also, make sure that the adapter board jumper settings are appropriate. 3.4 COMBINATION CONNECTOR (J1) J1 is a three-in-one combination connector.

The drive's DC power can be applied to section A. The ATA bus interface (40-pin) uses section C. The connector is mounted on the back edge of the printed-circuit board (PCB), as shown in Figure 3-6. Maxtor MaXLine Plus II 250GB AT 3-9 Installation Center Key Slot Pin 1 J1 IDE (40-Pin)/DC (4-Pin) Combination Connector 4-Pin DC Power (J1 Section A) 4 3 2 1 40-Pin IDE (J1 Section C) Pin 1 Figure 3-6 J1 DC Power and ATA Bus Combination Connector 3-10 Maxtor MaXLine Plus II 250GB AT Installation 3.4.

1 DC Power (J1, Section A) The recommended mating connectors for the +5 VDC and +12 VDC input power are listed in Table 3-2. Table 3-2 J1 Power Connector, Section A MATING CONNECTOR TYPE AND PART NUMBER (OR EQUIVALENT) PIN NUMBER VOLTAGE LEVEL J1 Section A (4-Pin): 1 2 +12 VDC Ground Return for +12 VDC Ground Return for +5 VDC +5 VDC 4-Pin Connector: AMP P/N 1-480424-0 Loose piece contacts: AMP P/N VS 60619-4 Strip contacts: AMP P/N VS 61117-4 3 4 Note: Labels indicate the pin numbers on the connector. Pins 2 and 3 of section A are the +5 and +12 volt returns and are connected together on the drive. 3.4.2 External Drive Activity LED An external drive activity LED may be connected to the DASP-I/O pin 39 on J1. For more details, see the pin description in Table 6-1. 3.4.3 ATA Bus Interface Connector (J1, Section C) On the MaXLine Plus II 250GB AT hard disk drives, the ATA bus interface cable connector (J1, section C) is a 40-pin Universal Header, as shown in Figure 3-6.

To prevent the possibility of incorrect installation, the connector has been keyed by removing Pin 20. This ensures that a connector cannot be installed upside down. See Chapter 5, "ATA Bus Interface and ATA Commands," for more detailed information about the required signals. Refer to Table 5-1 for the pin assignments of the ATA bus connector (J1, section C). Maxtor MaXLine Plus II 250GB AT 3-11 Installation 3.4.4 SATA (Serial ATA) Interface Connector The MaXLine Plus II 250GB AT hard disk drives also offer an optional Serial ATA interface. SATA has no user changeable configuration jumpers. All configurations are controlled in the SATA interface by the host. Figure 3-7 The SATA Interface Connector 3.

4.5 SATA BUS ADAPTER There are two ways you can configure a system to allow the MaXLine Plus II 250GB AT hard disk drives to communicate over the SATA bus of an IBM or IBMcompatible PC: 1. Connect the drive to a SATA bus connector (if available) on the motherboard of the PC. 2. Install an IDE-compatible adapter board in the PC, and connect the drive to the adapter board.

3-12 Maxtor MaXLine Plus II 250GB AT Installation 3.4.5.1 SATA Bus Connector Some PC motherboards have a built in SATA bus connector. These SATA bus connectors are compatible with Maxtor MaXLine Plus II 250GB AT hard disk drives.

If the motherboard has a SATA connector, simply connect a 7 pin SATA cable between the drive and the motherboard. 3.4.5.2 Adapter Board If your PC motherboard does not contain a built-in SATA bus interface connector, you must install an SATA bus adapter board and connecting cable to allow the drive to interface with the motherboard. Maxtor does not supply such an adapter board, but they are available from several third-party vendors. Please carefully read the instruction manual that comes with your adapter board to ensure signal compatibility between the adapter board and the drive. Also, make sure that the adapter board jumper settings are appropriate. 3.5 COMBINATION CONNECTOR (J1) J1 is a three-in-one combination connector.

The drive's DC power can be applied to section A or B. Do not connect both a and b to power at the same time. The SATA interface (7-pin) uses section C. The connector is mounted on the back edge of the printed-circuit board (PCB), as shown in Figure 3-6. CAUTION: Do not connect both a and b to power at the same time 002 1 M Figure 3-8 Serial ATA PCB Maxtor MaXLine Plus II 250GB AT 3-13 Installation There are total of 7 pins in the signal segment and 15 pins in the power segment. The pin definitions are shown in Table 3-3. Note that the pin is numbered from the pin furthest from the power segment. Table 3-3 Device plug connector pin definition Signal segment S1 S2 S3 S4 S5 S6 S7 Power segment P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 Ground A+ AGround BB+ Ground V33 V33 V33 Ground Ground Ground V5 V5 V5 Ground Reserved 2nd Mate Differential signal pair A from Phy 2nd Mate Differential signal pair B from Phy 2nd Mate 3.3V power 3.3V power 3.

3V power, pre-charge, 2nd mate 1st mate 2nd mate 2nd mate 5V power, pre-charge, 2nd mate 5V power 5V power 2nd mate 1. The pin corresponding to P11 in the backplane receptacle connector is also reserved 2. The corresponding pin to be mated with P11 in the power cable receptacle connector will always be grounded. 1st mate 12V power, pre-charge, 2nd mate 12V power 12V power Key and spacing separate signal and power segments P12 P13 P14 P15 Ground V12 V12 V12 3-14 Maxtor MaXLine Plus II 250GB AT Installation The following points should be noted: All pins are in a single row, with a 1.



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27 mm (.

050") pitch. · The comments on the mating sequence in Table 3-3 apply to the case of backplane blindmate connector only. In this case, the mating sequences are: (1) the ground pins P4 and P12; (2) the pre-charge power pins and the other ground pins; and (3) the signal pins and the rest of the power pins. · There are three power pins for each voltage. One pin from each voltage is used for precharge in the backplane blind-mate situation.

· If a device uses 3.3 V, then all V33 pins must be terminated. Otherwise, it is optional to terminate any of the V33 pins. If a device uses 5.0 V, then all V5 pins must be terminated. Otherwise, it is optional to terminate any of the V5 pins. · If a device uses 12.0 V, then all V12 pins must be terminated. Otherwise, it is optional to terminate any of the V12 pins. 3.

5.1 ATA Bus Interface Connector (J1, Section C) On the MaXLine Plus II 250GB AT hard disk drives, the SATA bus interface cable connector (J1, section C) is a standard 7-pin SATA. To prevent the possibility of incorrect installation, the connector has been keyed. This ensures that a connector cannot be installed upside down. 3.6 MOUNTING Drive mounting orientation, clearance, and ventilation requirements are described in the following subsections. 3.6.1

Orientation The mounting holes on the MaXLine Plus II 250GB AT hard disk drives allow the drive to be mounted in any orientation. Figure 3-9 and Figure 3-10 show the location of the three mounting holes on each side of the drive.

The drive can also be mounted using the four mounting hole locations on the PCB side of the drive. Note: It is highly recommended that the drive is hard mounted on to the chassis of the system being used for general operation, as well as for test purposes. Failure to hard mount the drive can result in erroneous errors during testing. Drives can be mounted in any orientation. Normal position is with the PCB facing down.

All dimensions are in millimeters. For mounting, #6-32 UNC screws are recommended. Maxtor MaXLine Plus II 250GB AT 3-15 Installation 6.35 ±0.25 101.60 ±0.25 147.0 Max. 41.60 ±0.25 44.45 ±0.25 28.50 ±0.50 41.

28 ±0.50 3.18 ±0.25 26.10 Max. 101.60 ±0.25 95.25 ±0.25 Figure 3-9 Mounting Dimensions for the MaXLine Plus II 250GB AT Hard Disk Drives 3-16 Maxtor MaXLine Plus II 250GB AT Installation 5.

0 mm Maximum (0.198 Inches) Drive Mounting Screw 6.35 mm Maximum (0.25 Inches) PrintedCircuit Board Head/Disk Assembly PrintedCircuit Board Figure 3-10 Mounting Screw Clearance for the Maxtor Hard Disk Drives 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. Figure 3-10 specifies the minimum clearance between the PCB and the screws in the mounting holes. To avoid stripping the mounting hole threads, the maximum torque applied to the screws must not exceed 8 inch-pounds. A maximum screw length of 0.25 inches may be used.

Maxtor MaXLine Plus II 250GB AT 3-17 Installation 3.6.2 Clearance Clearance from the drive to any other surface (except mounting surfaces) must be a minimum of 1.25 mm (0.05 inches). 3.6.3 Ventilation The MaXLine Plus II 250GB AT hard disk drives operate without a cooling fan, provided the ambient air temperature does not exceed 131°F (55°C) at any point along the drive form factor envelope. FOR SYSTEMS WITH A MOTHERBOARD ATA/SATA ADAPTER You can install the MaXLine Plus II 250GB AT hard disk drives in an AT-compatible system that contains a 40-pin ATA bus connector/SATA on the motherboard. To connect the drive to the motherboard, use a 40 conductor ribbon cable (80 conductor ribbon cable if using Ultra ATA/66/100 or /133 drive) 18 inches in length or shorter.

Ensure that pin 1 of the drive is connected to pin 1 of the motherboard connector. To connect the drive to the motherboard for the MaXLine Plus II 250GB AT SATA drives, use a SATA cable 1 meter long or shorter. Ensure that pin 1 of the drive is connected to pin 1 of the motherboard connector. 3.7 FOR SYSTEMS

WITH AN ATA ADAPTER BOARD To install the MaXLine Plus II 250GB AT hard disk drive in an AT-compatible system without a 40-pin ATA bus connector/SATA connector on its motherboard, you need a third-party IDE-compatible adapter board. 3.7.1 Adapter Board Installation Carefully read the manual that accompanies your adapter board before installing it. Make sure that all the jumpers are set properly and that there are no address or signal conflicts. You must also investigate to see if your AT-compatible system contains a combination floppy and hard disk controller board.

If it does, you must disable the hard disk drive controller functions on that controller board before proceeding. Once you have disabled the hard disk drive controller functions on the floppy/hard drive controller, install the adapter board. Again, make sure that you have set all jumper straps on the adapter board to avoid addressing and signal conflicts. Note: For Sections 3.3 and 3.

7, power should be turned off on the computer before installing the drive. 3.7.1.1 Connecting the Adapter Board and the Drive Use a 40-pin/SATA cable to connect the drive to the board.

See figure 3-11. 3-18 Maxtor MaXLine Plus II 250GB AT Installation To connect the drive to the board: 1. Insert the 40-pin cable/SATA connector into the mating connector of the adapter board. Make sure that pin 1 of the connector matches with pin 1 on the cable. 2. Insert the other end of the cable into the header on the drive. When inserting this end of the cable, make sure that pin 1 of the cable connects to pin 1 of the drive connector. 3. Secure the drive to the system chassis by using the mounting screws, as shown in Figure 3-12. ATA-Bus Interface Connector Key Slot Pin 1 40-Pin Header ATA-Bus Interface Cable Power Supply Cable (3-Pin or 4-Pin) DC Power Connector Bevel Figure 3-11 Drive Power Supply and ATA Bus Interface Cables Maxtor MaXLine Plus II 250GB AT 3-19 Installation Mounting Screws ATA-Bus Interface Cable Mounting Bracket Figure 3-12 Completing the Drive Installation 3-20 Maxtor MaXLine Plus II 250GB AT Installation 3.

8 3.8.1 TECHNIQUES IN DRIVE CONFIGURATION The 528-Megabytes Barrier Older BIOS that only support Int 13 commands for accessing ATA drives through DOS based operating systems will be limited to use only 1024 cylinders. This will reduce the effective capacity of the drive to 528Mbytes. Whenever possible the MaXLine Plus II 250GB AT drive should be used on systems that support LBA translation to ensure the use of the entire capacity of the disk drive. If that is not possible the following are some techniques that can be used to overcome this barrier. · Use a third party software program that translates the hard drive parameters to an acceptable configuration for MS-DOS.



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· Use a hard disk controller that translates the hard drive parameters to an appropriate setup for both MS-DOS and the computer system's ROMBIOS. · Insert the Cylinder Limitation Jumper (CLJ) on the drive (see Section 3.3.1.4). 3.8.2 The 8.

4-Gigabytes Barrier Newer BIOS's allow users to configure disk drives to go beyond the 528MB barrier by using several BIOS translation schemes. However, while using these translations the BIOS using Int 13 functions are limited to 24 bits of addressing which results in another barrier at the 8.4GB capacity. To overcome this barrier a new set of Int 13 extensions are being implemented by most BIOS manufacturers. The new Int 13 extension allows for four words of addressing space (64 bits) resulting in 9.

4 Terrabytes of accessible space. Whenever possible the MaxLine Plus II 250GB AT drive should be used on systems with BIOS that support Int 13 extensions. If that is not possible the following are some techniques that can be used to overcome this barrier: · Use a third party software that supplements the BIOS and adds Int 13 extension support. · Obtain a BIOS upgrade from the system board manufacturer. Many system board manufacturers allow their BIOS to be upgraded in the field using special download utilities. Information on BIOS upgrades can be obtained on the System Board Customer Service respective web sites on the Internet. · Insert the Cylinder Limitation Jumper (CLJ) on the drive (see Section 3.3.1.4).

Maxtor MaxLine Plus II 250GB AT 3-21 Installation 3.8.3 Operating system limitations Most popular operating systems available today have additional limitations which affect the use of large capacity drives. However, these limitations can not be corrected on the BIOS and it is up to the operating system manufacturers to release improved versions to address these problems. DOS and Windows 95 use a File Allocation Table (FAT) size of 16 bits which will only support partitions up to 2.1 GB. Windows 95 OSR2, Windows 98, and Windows ME use a FAT size of 32 bits, allowing partitions of up to 2.2 terrabytes.

Windows NT, 2000, and XP Use NTFS, which allows partition sizes up to 16 terrabytes. 3.

9 SYSTEM STARTUP AND OPERATION Once you have installed the MaxLine Plus II 250GB AT hard disk drive, and adapter board (if required) in the host system, you are ready to partition and format the drive for operation. To set up the drive correctly, follow these steps: 1. Power on the system. 2. Run the SETUP program.

This is generally on a Diagnostics or Utilities disk, or within the system's BIOS. Some system BIOS have an autodetecting feature making SETUP unnecessary. 3. Enter the appropriate parameters. The SETUP program allows you to enter the types of optional hardware installed-- such as the hard disk drive type, the floppy disk drive capacity, and the display adapter type.

The system's BIOS uses this information to initialize the system when the power is switched on. For instructions on how to use the SETUP program, refer to the system manual for your PC. During the AT system CMOS setup, you must enter the drive type for the MaxLine Plus II 250GB AT hard disk drives. The drive supports the translation of its physical drive geometry parameters such as cylinders, heads, and sectors per track to a logical addressing mode. The drive can work with different BIOS drive-type tables of the various host systems. You can choose any drive type that does not exceed the capacity of the drive.

Table 3-3 gives the logical parameters that provide the maximum capacity on the MaxLine Plus II 250GB AT family of hard disk drives. 3-22 Maxtor MaxLine Plus II 250GB AT Installation Table 3-4 Logical Addressing Format MODELS 7Y250M0 7Y250P0 INTERFACE SATA 150 8 MB Buffer PATA/133 8 MB Buffer CYL 486,344 486,344 HD 16 16 SPT 63 63 MAX LBA 490,234,752 490,234,752 CAPACITY 250GB 250GB Note: *Capacity may be restricted to 8.4GB (or less) due to system BIOS limitations. Check with your system manufacturer to determine if your BIOS supports LBA Mode for hard drives greater than 8.

4GB. Default logical cylinders is limited to 16,383 as per the ATA-4 specifications. To match the logical specifications of the drive to the drive type of a particular BIOS, consult the system's drive-type table. This table specifies the number of cylinders, heads, and sectors for a particular drive type. You must choose a drive type that meets the following requirements: For the MaxLine Plus II 250GB AT: Logical Cylinders x Logical Heads x Logical Sectors/Track x 512 = 8,455,200,768 4. Boot the system using the operating system installation disk--for example, MS-DOS--then follow the installation instructions in the operating system manual. Maxtor MaxLine Plus II 250GB AT 3-23 Chapter 4 PRODUCT SPECIFICATIONS 4.1 Models and Capacities MODELS 7Y250PO/7Y250MO 250GB Formatted Capacity (GB LBA Mode) GB means 1 billion bytes. Total accessible capacity varies depending on operating environment. 4.

2 Drive Configuration 490,234,752 Maxtor Ultra ATA/133 (ATA-5/ATA-6), SATA 150 MB 8 MB Buffer RLL EEP4 Embedded 192 16 610/1102 54.752 ID = 770 OD = 615 89 ktpi Sectors per Drive (max LBA) Integrated Interface Recording Method Servo Type Number of Servo Sectors Data Zones per Surface Data Sectors per Track (ID/OD) Areal Density (Gbits/in² max, ID/OD) Recording Density (kbp, ID/OD) Track Density (ktpi) Maxtor MaxLine Plus II 250GB AT 4-1 Product Specifications Performance Specifications Seek Times (typical read, ms) Track-to-Track Average (normal seek) Full Stroke (normal seek) Average Latency (ms) Controller Overhead (ms) Rotation Speed (RPM ±0.1%) Data Transfer Speed (MByte/sec max) To/From Interface (Maxtor Ultra ATA/133, up to) To/From Interface (SATA with 8 MB Buffer) To/From Media (ID/OD up to nn.n, where nn.n is the maximum transfer rate possible) Sustained (ID/OD up to nn.

n, where nn.n is the maximum transfer rate possible) Data Buffer Size (MB)/Type Drive Ready Time (typical sec) 133 150 ID = 460 OD = 803 ID = 37 OD = 67 8 MB < 8.0 0.8 9.0 17.

0 4.17 < 0.3 7200 4.3 Physical Dimensions PARAMETER VALUE 26.10 101.6 147 630 Height (maximum in mm) Width (typical mm) Depth (in. and mm) Weight (maximum in grams) 4-2 Maxtor MaxLine Plus II 250GB AT Product Specifications 4.4 Power Requirements MODE Spin-up (peak) Seek Read/Write Idle Standby Sleep 12V (MA) 1566.2 666.4 556.

4 456.3 37.2 37.2 5V (MA) 841.6 931.3 665.1 670.8 119.7 118.1 POWER (W) 23.
2 12.6 9.5 8.8 1.0 1.

0 4.5 Power Mode Definitions Spin-up The drive is spinning up following initial application of power and has not yet reached full speed. Seek A random access operation by the drive. Read/Write Data is being read from or written to the drive. Idle The drive is spinning, the actuator is parked and powered off and all other circuitry is powered on.

The drive is capable of responding to read commands within 40 ms.



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Standby The motor is not spinning. The drive will leave this mode upon receipt of a command that requires disk access. The time-out value for this mode is programmable. The buffer is active to accept write data. Sleep This is the lowest power state with the interface set to inactive. A software or hardware reset is required to return the drive to the Standby state. 4.6 EPA Energy Star Compliance Maxtor Corporation supports the goals of the U.S.

Environmental Protection Agency's Energy Star program to reduce the electrical power consumption of computer equipment. Maxtor MaxLine Plus II 250GB AT 4-3 Product Specifications 4.7 Environmental Limits PARAMETER OPERATING 5° C to 55° C (with no ARR impact) 0° C to 60° C (Margin Demonstrated) 1) NON-OPERATING/ STORAGE low temperature (-40° C) high temperature (71° C) per MIL-STD-810E, method 501.3, climatic category; hot-induced conditions. Temperature Thermal Gradient Relative Humidity Wet Bulb Altitude (relative to sea level) Acoustic Noise 25° C per hour (maximum) 5% to 95% (non-condensing) 30° C (maximum) -650 to 10,000 feet -650 to 40,000 feet IDLE MODE (Track Following at Speed) 2.9 bel average 3.4 bel maximum NORMAL SEEK MODE 4.0 bel average 4.2 bel maximum Fluid Bearing Notes: 1. Margin Demonstrated implies the product will operate at the stated conditions with an acceptable impact to the ARR specification for any OEM requiring those values in their purchase specification.

2. The testing performed by Maxtor is consistent with ISO 7779. Variation in acoustic levels from the idle specification may occur due to offline activity according to the SMART specification and/or atmospheric conditions. 4-4 Maxtor MaxLine Plus II 250GB AT Product Specifications 4.8 Shock and Vibration PARAMETER OPERATING R=0.

988/shock at 60 Gs; R= 0.999/shock at 30 Gs NON-OPERATING 2 msec, 1/2 sine R=0.90@>= 300G, 1 disk R=0.95@>= 250G, 1 disk R=0.99@>= 200G, 1 disk R=0.

95 @ 20K rad/sec2, 0.5ms to 1ms input R=0.99 @ 15K rad/sec2, 0.5ms to 1ms input 2 - 300 Hz 96.5 rad/sec2 RMS PSD: 7 - 800 Hz at 3.08 GRMS No Damage Mechanical Shock Rotational Shock R=0.988 @ 2000 rad/sec2 Rotational Random Vibration Random Vibration 5 - 2000 Hz 3.60 rad/sec2 RMS Overall 5 - 2000 Hz 0.44 GRMS Overall Swept Sine Vibration (1 octave/minute, peak amplitude) 10 to 300 Hz 301 to 400 Hz 401 to 500 Hz Operating Sine Vibration 0.25 octave/min.

, 51500 Hz 1.0 G (0 to peak) amplitude, 1 octave per minute 0.25 G (0 to peak) amplitude, 1 octave per minute 0.0625 G (0 to peak) amplitude, 1 octave per minute Frequency(Hz)/Acceleration(Gpk) 5=0.25" DA 8.8=0.25" DA 9=1.000 100=1.000 300=0.060 885=0.

060 890=0.100 895=0.070 1500=0.100 Maxtor MaxLine Plus II 250GB AT 4-5 Product Specifications 4.9 Reliability Specifications Annualized Return Rate <1.

0% Annualized Return Rate (ARR) indicates the average against products shipped. ARR includes all reasons for returns (failures, handling, damage, NDF) but does not include inventory credit returns. Start/Stop Cycles >50,000 This indicates the average minimum cycles for reliable start/stop function.

R=0.9998@ >4500, R=0.

9995 @ >7500, R=0.5 @ >= 50000 Data Reliability <1 per 10e15 bits read Data errors (non-recoverable). Average data error rate allowed with all error recovery features activated. Component Design Life 5 years (minimum) Component design life is defined as a.) the time period before identified wear-out mechanisms impact the failure rate, or b.) the time period up to the wear-out point when useful component life expires. 4.10 4.10.1 EMC/EMI Radiated Electromagnetic Field Emissions - EMC Compliance The hard disk drive mechanism is designed as a subassembly for installation into a suitable enclosure and is therefore not subject to Subpart J of Part 15 of FCC Rules (47CFR15) or the Canadian Department of Communications Radio Interference Regulations.

Although not required, the disk mechanism has been tested within a suitable end-use product and found to comply with Class B limits of the FCC Rules and Regulations of the Canadian Department of Communications. The CE Marking indicates conformity with the European Union Low Voltage Directive (73/23/EEC) when the disk mechanism is installed in a typical personal computer. Maxtor recommends that testing and analysis for EMC compliance be performed with the disk mechanism installed within the user's end-use application. 4.10.2 Canadian Emissions Statement This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian department of communications. Le present appareil numerique n'emet pas de bruit radioelectriques depassant les 4-6 Maxtor MaxLine Plus II 250GB AT Product Specifications limites applicables aux appareils numeriques de Class B prescrites dans le reglement sur le brouillage radioelectrique edicte pa le ministere des communications du Canada. 4.11 Safety Regulatory Compliance All Maxtor hard drives comply with relevant product safety standards such as CE, CUL, TUV and UL rules and regulations. @@@@ in the ATA/ATAPI standard.

@@@@@A in the ATA/ATAPI-6 standard for the 80 conductor cable assembly. @@@@@Hosts may assert the RESET- signal for longer than the minimum. @@@@@When the command is received, the drive: 1. Sets BSY 2. Stores the required parameter information in the sector buffer 3.

Sets the DRQ bit 4. @@@Parameter words in the buffer are shown in Table 5-2. @@@@1 = IORDY supported. @@@Retired Capabilities 15: 14: 13-2: 1: 0: Shall be cleared to zero. Shall be set to one.

Reserved. @@@@0 = Multiword DMA mode 2 is not selected 9: 1 = Multiword DMA mode 1 is selected. 0 = Multiword DMA mode 1 is not selected 8: 1 = Multiword DMA mode 0 is selected. 0 = Multiword DMA mode 0 is not selected 7-3: 2: 1: 0: 64 15-8: 7-0: 65 Reserved 1 = Multiword DMA mode 2 and below are supported 1 = Multiword DMA mode 1 and below are supported 1 = Multiword DMA mode 0 is supported Reserved PIO modes supported Minimum Multiword DMA transfer cycle time per word 15-0: Cycle time in nanoseconds 66 Manufacturer's recommended Multiword DMA transfer cycle time 15-0: Cycle time in nanoseconds Maxtor MaxLine Plus II 250GB AT 5-7 ATA Bus Interface and ATA Commands Table 5-2 Identify Drive Command Parameters Word 67 15-0: 68 CONTENT DESCRIPTION Minimum PIO transfer cycle time without flow control Cycle time in nanoseconds Minimum PIO transfer cycle time with IORDY flow control 15-0: Cycle time in nanoseconds 69-70 71-74 75 Reserved (for future command overlap and queuing) Reserved for IDENTIFY PACKET DEVICE command. Queue depth 15-5: 4-0: Reserved Maximum queue depth 1 76-79 80 Reserved for Serial ATA Major version number 0000h or FFFFh = device does not report version 15: 14: 13: 12: 11: 10: 9: 8: 7: 6: 5: 4: 3: 2: 1: 0: Reserved Reserved for ATA/ATAPI-14 Reserved for ATA/ATAPI-13 Reserved for ATA/ATAPI-12 Reserved for ATA/ATAPI-11 Reserved for ATA/ATAPI-10 Reserved for ATA/ATAPI-9 Reserved for ATA/ATAPI-8 Reserved for ATA/ATAPI-7 1 = supports ATA/ATAPI-6 1 = supports ATA/ATAPI-5 1 = supports ATA/ATAPI-4 1 = supports ATA-3 Obsolete Obsolete Reserved 5-8 Maxtor MaxLine Plus II 250GB AT ATA Bus Interface and ATA Commands Table 5-2 Identify Drive Command Parameters Word 81 Minor version number 0000h or FFFFh = device does not report version.



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0001h-FFFEh = see 6.16.41 of ATA/ATAPI-7 specification 82 Command set supported. 15: 14: 13: 12: 11: 10: 9: 8: 7: 6: 5: 4: 3: 2: 1: 0: 83 Obsolete 1 = NOP command supported 1 = READ BUFFER command supported 1 = WRITE BUFFER command supported Obsolete 1 = Host Protected Area feature set supported 1 = DEVICE RESET command supported 1 = SERVICE interrupt supported 1 = release interrupt supported 1 = look-ahead supported 1 = write cache supported Shall be cleared to zero to indicate that the PACKET Command feature set is not supported 1 = mandatory Power Management feature set supported 1 = Removable Media feature set supported 1 = Security Mode feature set supported 1 = SMART feature set supported CONTENT DESCRIPTION Command sets supported. 15: 14: 13: 12: 11: 10: 9: 8: Shall be cleared to zero Shall be set to on 1 = FLUSH CACHE EXT command supported 1 = mandatory FLUSH CACHE command supported 1 = Device Configuration Overlay feature set supported 1 = 48-bit Address feature set supported 1 = Automatic Acoustic Management feature set supported 1 = SET MAX security extension supported Maxtor MaxLine Plus II 250GB AT 5-9 ATA Bus Interface and ATA Commands Table 5-2 Identify Drive Command Parameters Word 83 7: 6: 5: 4: 3: 2: 1: 0: 84 CONTENT DESCRIPTION See Address Offset Reserved Area Boot, INCITS TR27:2001 1 = SET FEATURES subcommand required to spinup after power-up 1 = Power-Up In Standby feature set supported 1 = Removable Media Status Notification feature set supported 1 = Advanced Power Management feature set supported 1 = CFA feature set supported 1 = READ/WRITE DMA QUEUED supported 1 = DOWNLOAD MICROCODE command supported Command set/feature supported extension.

15: 14: 13-8: 7: 6: 5: 4: 3: 2: 1: 0: Shall be cleared to zero Shall be set to one Reserved 1 = WRITE DMA QUEUED FUA EXT command supported 1 = WRITE DMA FUA EXT and WRITE MULTIPLE FUA EXT commands supported 1 = General Purpose Logging feature set supported 1 = Streaming feature set supported 1 = Media Card Pass Through Command feature set supported 1 = Media serial number supported 1 = SMART self-test supported 1 = SMART error logging supported 85 Command set/feature enabled. 15: 14: 13: 12: 11: 10: 9: 8: Obsolete 1 = NOP command enabled 1 = READ BUFFER command enabled 1 = WRITE BUFFER command enabled Obsolete 1 = Host Protected Area feature set enabled 1 = DEVICE RESET command enabled 1 = SERVICE interrupt enabled 5-10 Maxtor MaxLine Plus II 250GB AT ATA Bus Interface and ATA Commands Table 5-2 Identify Drive Command Parameters Word 85 7: 6: 5: 4: 3: 2: 1: 0: 86 CONTENT DESCRIPTION 1 = release interrupt enabled 1 = look-ahead enabled 1 = write cache enabled Shall be cleared to zero to indicate that the PACKET Command feature set is not supported. 1 = Power Management feature set enabled 1 = Removable Media feature set enabled 1 = Security Mode feature set enabled 1 = SMART feature set enabled Command set/feature enabled. 15-14: 13: 12: 11: 10: 9: 8: 7: 6: 5: 4: 3: 2: 1: 0: Reserved 1 = FLUSH CACHE EXT command supported 1 = FLUSH CACHE command supported 1 = Device Configuration Overlay supported 1 = 48-bit Address features set supported 1 = Automatic Acoustic Management feature set enabled 1 = SET MAX security extension enabled by SET MAX SET PASSWORD See Address Offset Reserved Area Boot, INCITS TR27:2001 1 = SET FEATURES subcommand required to spin-up after power-up 1 = Power-Up In Standby feature set enabled 1 = Removable Media Status Notification feature set enabled 1 = Advanced Power Management feature set enabled 1 = CFA feature set enabled 1 = READ/WRITE DMA QUEUED command supported 1 = DOWNLOAD MICROCODE command supported 87 Command set/feature default. 15: 14: 13-8: 7: Shall be cleared to zero Shall be set to one Reserved 1 = WRITE DMA QUEUED FUA EXT command supported Maxtor MaxLine Plus II 250GB AT 5-11 ATA Bus Interface and ATA Commands Table 5-2 Identify Drive Command Parameters Word 87 6: 5: 4: 3: 2: 1: 0: 88 15: 14: 13: 12: 11: 10: 9: 8: 7: 6: 5: 4: 3: 2: 1: 0: 89 90 91 92 CONTENT DESCRIPTION 1 = WRITE DMA FUA EXT and WRITE MULTIPLE FUA EXT commands supported General Purpose Logging feature set supported 1 = Valid CONFIGURE STREAM command has been executed 1 = Media Card Pass Through Command feature set enabled 1 = Media serial number is valid 1 = SMART self-test supported 1 = SMART error logging supported Reserved 1 = Ultra DMA mode 6 is selected. 0 = Ultra DMA mode 6 is not selected 1 = Ultra DMA mode 5 is selected. 0 = Ultra DMA mode 5 is not selected 1 = Ultra DMA mode 4 is selected. 0 = Ultra DMA mode 4 is not selected 1 = Ultra DMA mode 3 is selected. 0 = Ultra DMA mode 3 is not selected 1 = Ultra DMA mode 2 is selected. 0 = Ultra DMA mode 2 is not selected 1 = Ultra DMA mode 1 is selected. 0 = Ultra DMA mode 1 is not selected 1 = Ultra DMA mode 0 is selected. 0 = Ultra DMA mode 0 is not selected Reserved 1 = Ultra DMA mode 6 and below are supported 1 = Ultra DMA mode 5 and below are supported 1 = Ultra DMA mode 4 and below are supported 1 = Ultra DMA mode 3 and below are supported 1 = Ultra DMA mode 2 and below are supported 1 = Ultra DMA mode 1 and below are supported 1 = Ultra DMA mode 0 is supported Time required for security erase unit completion Time required for Enhanced security erase completion Current advanced power management value Master Password Revision Code 5-12 Maxtor MaxLine Plus II 250GB AT ATA Bus Interface and ATA Commands Table 5-2 Identify Drive Command Parameters Word 93 CONTENT DESCRIPTION Hardware reset result. The contents of bits (12:0) of this word shall change only during the execution of a hardware reset 15: 14: 13: 12-8: 12: 11: 10-9: Shall be cleared to zero. Shall be set to one. 1 = device detected CBLID- above ViH. 0 = device detected CBLID- below ViL Device 1 hardware reset result. Device 0 shall clear these bits to zero. Device shall set these bits as follows: Reserved. 0 = Device 1 did not assert PDIAG-. 1 = Device 1 asserted PDIAG-. These bits indicate how Device 1 determined the device number: 00 = Reserved. 01 = a jumper was used. 10 = the CSEL signal was used. 11 = some other method was used or the method is unknown. 8: 7-0: 7: 6: 5: 4: 3: 2-1: Shall be set to one. Device 0 hardware reset result. Device 1 shall clear these bits to zero. Device shall set these bits as follows: Reserved. 0 = Device 0 does not respond when Device 1 is selected. 1 = Device 0 responds when Device 1 is selected.

0 = Device 0 did not detect the assertion of DASP-. 1 = Device 0 detected the assertion of DASP0 = Device 0 did not detect the assertion of PDIAG-. 1 = Device 0 detected the assertion of PDIAG-. 0 = Device 0 failed diagnostics. 1 = Device 0 passed diagnostics. These bits indicate how Device 0 determined the device number: 00 = Reserved. 01 = a jumper was used. 10 = the CSEL signal was used. 11 = some other method was used or the method is unknown. 0: Shall be set to one.

Maxtor MaxLine Plus II 250GB AT 5-13 ATA Bus Interface and ATA Commands Table 5-2 Identify Drive Command Parameters Word 94 15-8: 7-0: 95 96 97 98-99 100-103 104 105 106 CONTENT DESCRIPTION Vendor's recommended acoustic management value.



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Current automatic acoustic management value Stream Minimum Request Size Stream Transfer Time - DMA Stream Access Latency - DMA Streaming Performance Granularity Maximum user LBA for 48-bit Address feature set. Stream Transfer Time PIO Stream Access Latency PIO Physical sector size 15: 14: 13: 12-4: 3-0: Shall be cleared to zero Shall be set to one 1 = Device has multiple logical sectors per physical sector. Reserved 2X logical sectors per physical sector 107 108-126 127 Inter-seek delay for ISO-7779 acoustic testing in microseconds Reserved Removable Media Status Notification feature set support 15-2: 1-0: 00 = Removable Media Status Notification feature set not supported 01 = Removable Media Status Notification feature supported 10 = Reserved 11 = Reserved Reserved 5-14 Maxtor MaxLine Plus II 250GB AT ATA Bus Interface and ATA Commands Table 5-2 Identify Drive Command Parameters Word 128 Security status 15-9: 8: 7-6: 5: 4: 3: 2: 1: 0: 129-159 160-254 255 Reserved Security level 0 = High, 1 = Maximum Reserved 1 = Enhanced security erase supported 1 = Security count expired 1 = Security frozen 1 = Security locked 1 = Security enabled 1 = Security supported CONTENT DESCRIPTION Vendor specific Reserved Integrity word 15-8: 7-0: Checksum Signature Maxtor MaxLine Plus II 250GB AT 5-15 Chapter 6 SERVICE AND SUPPORT 6.1 Product Support/Technical Assistance/Customer Service For Product Service and Support Information please visit our site at:

www.

maxtor.com for warranty service or www.maxtorkb.com for technical support. Maxtor MaxLine Plus II 250GB AT 6-1 Appendix A BREAKING THE 137 GIGABYTE STORAGE BARRIER This appendix provides information about the 137GB storage barrier.

It discusses the history, cause and the solution to overcome this barrier. A.1 Breaking the 137 Gigabyte Storage Barrier Capacity barriers have been a fact of the personal computer world since its beginnings in the early 1980's. At least 10 different capacity barriers have occurred in the storage industry over the last 15 years. The most notable barriers seen previously have been at 528 megabytes and then at 8.4 gigabytes. The most recent barrier which will be surmounted in 2001, is the 137-gigabyte limit or a single ATA drive. The first ATA devices to exceed 137 gigabytes will be fourplatter hard disk drives with 40 gigabytes per platter, yielding 160 gigabytes per drive. These drives will be available in the second half of 2001. Later in the same year, capacity will continue to grow to 60 gigabytes per platter, and a three-disk, 180gigabyte device will be available and shipping.

The ANSI NCITS T13 Technical Committee (also known as the ANSI ATA committee) has broken this barrier by incorporating a proposal from Maxtor into the ATA/ATAPI-6 draft standard that defines a method for 48-bit addressing on a single drive, giving more than 144 petabytes (144,000 gigabytes) of storage.

In addition, the proposal from Maxtor that was incorporated into ATA/ATAPI-6 defines a method for extending the maximum amount of data that can be transferred per command for ATA devices from 256 sectors (about 131 kilobytes) to 65,536 sectors (about 33 megabytes). This new method is particularly useful for applications that use extremely large files, such as those for A/V or multimedia. The following sections will describe issues surrounding the 137-gigabyte barrier and the solution for breaking it. A.1.1 History Many of the "barriers" in the past resulted from BIOS and operating system issues caused by failure to anticipate the remarkable increases in device storage capacity by the people who designed hard disk structures, access routines, and operating systems many years ago. They thought, "Who will ever have xxx much storage?" In some cases, the barriers were caused by hardware or software bugs not found until hard disks had grown in size beyond a certain point where the bugs would occur. Maxtor MaxLine Plus II 250GB AT A-1 Breaking the 137GB Storage Barrier Past barriers often frustrated people trying to add a new hard disk to an older system when they discovered that not all of the designed capacity of the hard disk was accessible. This inability to access the entire drive is referred to as a "capacity barrier" and it has been seen and overcome many times in the computer and disk drive industry.

The 137-gigabyte barrier is the result of the original design specification for the ATA interface that provided only 28 bits of address for data. This specification means a hard disk can have a maximum of 268,435,456 sectors of 512 bytes of data which puts the ATA interface maximum at 137.4 gigabytes. 10,000,000 1,000,000 100,000 Win2000 WinME 137GB WinXP 10,000 Win98 33GB Win95(osr2) 8GB Win95A Win 3.x 128MB 32MB 16MB 4GB 2GB 1,000 DOS 5.

x 100 4.x 528MB 3.x 10 10MB 1980 10 megabytes:early 16 megabytes: 32 megabytes: 128 megabytes: 528 megabytes: 2.1 gigabytes: 4.2 gigabytes: 8.4 gigabytes: 32 gigabytes: 1985 1990 1995 2000 2005 PC/XT limit FAT 12 limit DOS 3.x limit DOS 4.x limit Early ATA BIOSs without BIOS extensions DOS file system partition limit CMOS extended CHS addressing limit (not widely experienced) BIOS/Int13 24-bit addressing limit BIOS limit A-2 Maxtor MaxLine Plus II 250GB AT Breaking the 137GB Storage Barrier A.1.2 Solving the 137 Gigabyte Capacity Barrier As described earlier, the issue causing the 137-gigabyte barrier is the 28-bit addressing method of the original ATA specification. A change to expand this method was required to provide more address bits for the interface, allowing significant growth for many years to come. A critical issue in expanding the addressing capability was maintaining compatibility with the existing installed base of products. A new ATA standard, ATA/ATAPI-6, has been in the works for some time, and the latest draft of this standard resolves this issue by increasing the maximum number of bits used for addressing from 28 to 48. This solution increases the maximum capacity of an ATA device to 144 petabytes while maintaining compatibility with current ATA products. A.

1.3 How is the Extension Implemented? The 48-bit Address feature set provides a method to address devices with capacities up to approximately 144 petabytes by increasing the number of bits used to specify logical block addresses (LBAs) from 28 to 48. The feature set also provides a method to increase the number of sectors that can be transferred by a single command from 256 to 65,536 by increasing the number of bits specifying sector count to 16 bits. New commands specific to this feature set have been defined so that devices can implement the new feature set in addition to previously defined commands. Devices implementing the 48-bit Address feature set commands will also implement commands that use 28-bit addressing in order to maintain interoperability with older system components.



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