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You can read the recommendations in the user guide, the technical guide or the installation guide for MAXTOR D540X-4K. You'll find the answers to all your questions on the MAXTOR D540X-4K in the user manual (information, specifications, safety advice, size, accessories, etc.). Detailed instructions for use are in the User's Guide.

User manual MAXTOR D540X-4K
User guide MAXTOR D540X-4K
Operating instructions MAXTOR D540X-4K
Instructions for use MAXTOR D540X-4K
Instruction manual MAXTOR D540X-4K

Maxtor®

Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT
Product Manual

November 1, 2001
81-126201-02



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Manual abstract:

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2 3 4 BEFORE removing drives from their packing material, allow them to reach room temperature. 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. 1.

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4/40.0/60.0/80.0 GB AT This chapter gives an overview of the contents of this manual, including the intended audience, how the manual is organized, terminology and conventions, and references. The Maxtor D540X-4K 20.

4/40.0/60.0/80.0 GB AT Product Manual is intended for several audiences. These audiences include: the end user, installer, developer, consumer electronics and personal computer original equipment manufacturer (CE/ PC OEM), and distributor.

The manual provides information about installation, principles of operation, interface command implementation, and maintenance. The Maxtor D540X-4K family of drives provide a high-quality, low-cost, market leading 40 GB per disk products to serve the consumer and mainstream commercial markets, as well as the consumer electronics market. This manual is organized into the following chapters: · Chapter 1 About This Manual · Chapter 2 General Description ·

Chapter 3 Installation · Chapter 4 Specifications · Chapter 5 Basic Principles of Operation · Chapter 6 ATA Bus Interface and ATA Commands In the Glossary at the back of this manual, you can find definitions for many of the terms used in this manual. In addition, the following abbreviations are used in this manual: · ASIC application-specific integrated circuit . # 7 0# / 5 + * 6 6 71 \$# TGVRC J% 501+60'801% &0# ;)1.10+/'4' 01+6#<+0#)41 .#70#/

'%0'+&7# Maxtor D540X-4K 20.4/40.0/60.0/80.

0 GB AT 1-1 About This Manual · ATA · bpi · dB · dBA · DPS · SPS · ECC · Kfci · Hz · KB · LSB · mA · MB advanced technology attachment bits per inch 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 tracks per inch microseconds volts · Mb/s · MB/s · MHz · ms · MSB · mV · ns · tpi · µs · V The typographical and naming conventions used in this manual are listed below. 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. 1-2 Maxtor D540X-4K 20.4/40.

0/60.0/80.0 GB AT · 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:/\$. 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 D540X-4K 20.4/40.0/60.

0/80.0 GB AT 1 a u n a M si hT t u o b A #"" 1-3 About This Manual 1-4 Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT This chapter summarizes the general functions and key features of the Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT hard disk drives, as well as the applicable standards and regulations.

Maxtor's D540X-4K hard disk drives are 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 Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT hard disk drives feature 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 Maxtor D540X-4K hard disk drives incorporate leading edge technologies such as UltraATA/100, Advanced Cache Management, Shock Protection SystemTMII (SPS II), and Data Protection System (DPS).



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These enhanced technologies enable Maxtor to produce a family of high-performance, high-reliability drives.

Additionally, the Maxtor D540X-4K family of drives are CE-class drives designed for the consumer electronics market. Acoustics is one of the most important features in the CE arena. These hard disk drives are available with very quiet seek codes resulting in very low acoustical emissions from the drive. This makes the Maxtor D540X-4K drives an attractive choice for most CE users. Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT 01 +62+ 4%5' & .#4 ' 0') TGVRC J% 9'+84'81 6%7&142 2-1 General Description 2-2 Maxtor D540X-4K 20.

4/40.0/60.0/80.0 GB AT 5'476#(;'- The Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT hard disk drives include the following key features: General · Formatted storage capacity of 20.4 GB (1 disk, 1 heads), 40.0 GB (1 disks, 2 heads), 60.

0 (2 disks, 3 heads) and 80.0 (2 disks, 4 heads) · Low profile, 1-inch height · Industry standard 3 1/2-inch form factor · Compliance with ANSI/NCITS interface standard for AT Attachment, revision 6 (ATA/ATAPI-6). · Windows NT and 9X Certification Performance · Average seek time of 12 ms · Average rotational latency of 5.56 ms · New Ultra ATA interface with Maxtor-patented UltraATA/100 protocol supporting burst data transfer rates of 100 MB/s. · Extra quiet seek code available (Maxtor Quiet Drive Technology) · 2 MB buffer · Look-ahead DisCache feature with continuous prefetch and WriteCache write-buffering capabilities · Read promotion and Write Reordering features · AutoTask Register update, Multi-block AutoRead, and Multi-block AutoWrite features in a custom ASIC · 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 and 5 Reliability · 800,000 hours mean time between failure (MTBF) in the field · Automatic retry on read errors · Error Correcting Code (ECC) with 15 symbols cross checking correction up to 142 bits in length · S.

M.A.R.T. 4 (Self-Monitoring, Analysis and Reporting Technology) · Patented Airlock® automatic shipping lock, magnetic actuator retract, and dedicated landing zone · Transparent media defect mapping General Description · High performance, in-line defective sector skipping · Reassignment of defective sectors discovered in the field, without reformatting · Shock Protection System II to enhance protection against both operating and non-operating shock · Data Protection System to verify drive integrity Versatility · Power saving modes · Downloadable firmware · Cable select feature · Ability to daisy-chain two drives on the interface Windows MS Logo Certification · Passed Windows Me, Windows 98, Windows 2000, and Windows NT Workstation 4.

0 Logo testing by Microsoft Windows Hardware Quality Labs (WHQL) · Master ID# 43395 UFTCFPCV5 GEPCKNROQ% [TQVCNWIW4 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 drive models in the U.S.A. and Canada. · TUV Rheinland Standard EN60 950. This certificate is a category certification pertaining to all 3.5-inch drive models.

UPQKVCEKHKNCW3 5'+/' VEFQT2 · 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. · Approval from Taiwan BSMI. Number: 3892A638 · Korea EMI certification approved.

MIC number: EH011-01-1977 Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT 2-3 General Description 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. 2-4 Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT 560/'4+73'4 '4#9&4#* The Maxtor D540X-4K hard disk drives are compatible with computers and other hosts that support the ATA interface.

It connects to the host either by means of a third-party ATA-compatible adapter board, or by plugging a cable from the drive directly into a PC motherboard that supplies an ATA interface. This chapter explains how to unpack, configure, mount, and connect the Maxtor D540X-4K 20.4/40.0/60.0/80.

0 GB AT hard disk drive prior to operation. It also explains how to start up and operate the drive. The Maxtor D540X-4K hard disk drives are shipped without a faceplate. Figure 31 shows the external dimensions of the Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT drives. Mechanical Dimensions of Maxtor D540X-4K Hard Disk Drive Maxtor D540X-4K 20.4/40.

0/60.0/80.0 GB AT 01 +6 #.# 65 0+ TGVRC J% 560/'4+73'4 '%#25 GTWIK (3-1 Installation 3-2 Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT 501+6%74650+)0+-%#207 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 Maxtor D540X-4K drives are not stacked or placed on any hard surface after they are unpacked. Such handling could cause media damage. Figure 3-2 shows the packing assembly for a single Maxtor D540X-4K hard disk drive. A 20-pack shipping container is available for multiple drive shipments. GT WIK(01 + 67 #% 01 + 67 #% 1.

Open the shipping container and remove the packing assembly that contains the drive. 2. Remove the drive from the packing assembly. 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. Drive Packing Assembly Installation Drive Packing Assembly of a Polypropylene 20-Pack Container GTWIK (Note: The 20-pack container should be shipped in the same way it was received from Maxtor. When individual drives are shipped from the 20-pack container then it should be appropriately packaged (not supplied with the 20-pack) to prevent damage. Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT 3-3 Installation 3-4 Maxtor D540X-4K 20.

4/40.0/60.0/80.0 GB AT 501+621 '4#9&4#* G TWIK(GT WIK(The configuration of a Maxtor D540X-4K 20.



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4/40.0/60.0/80.0 GB 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. Figure 34 shows the printed circuit board (PCB) assembly, indicating the jumpers that control some of these options. Jumper Locations for the Maxtor D540X-4K Hard Disk Drive Jumper Locations on the Interface Connector Installation The configuration of the following four jumpers controls the drive's modes of operation: · CS Cable Select · DS Drive Select · PK Jumper Parking Position (Slave mode) · AC Alternate Capacity 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, PK and AC 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. AT Jumper Options GND C6 0 1 0 0 X X X Gnd 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 X X Open 1 1 X 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.

When a Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB 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. Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT 01+62+4%5' & 3-5 TGROW, 5% VEGNG5 GNDC% 0+2 -2 5 & 5% 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 Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB 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 1 - DS 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. 3-6 Maxtor D540X-4K 20.4/40.0/60.

0/80.0 GB AT POKVKUQ2 -2 IPKMTC2 TGROW, POKVCTWIKHPQE TGROW, TGVUC/ TGROW, 5 & VEGNG5 GXKT & 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.

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. The PK position is used as a holding place for the jumper for a slave drive in systems that do not support Cable Select. The pins used for the parking position are vendor unique. Installation C=16,383 H=16 S=63 LBA=39,876,480 C=16,383 H=16 S=63 LBA=78,198,750 C=16,383 H=16 S=63 LBA=117,266,688 C=16,383 H=16 S=63 LBA=156,301,488 C=4,092 H=16 S=63 LBA=39,876,480 C=16,383 H=16 S=63 LBA=66,055,248 C=16,383 H=16 S=63 LBA=66,055,248 C=16,383 H=16 S=63 LBA=66,055,248 AT Connector and Jumper Location Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT 0+ 4'2/7, %# 671 4'2/7, %# %# [VKECRC% GVCPTGVN# For user capacities below 66,055,248 sectors (32 GB), inserting the AC jumper limits the Number of Cylinders field to a value of 4,092, as reported in IDENTIFY DEVICE data word 1.

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. For larger user capacities above 66,055,248 sectors (32 GB), inserting the AC jumper limits the Total Number of User Addressable Sectors field to a value of 66,055,248, as reported in IDENTIFY DEVICE data words 60 and 61. This protects hosts which are not able to address beyond this capacity. A summary of these effects for the Maxtor D540X-4K drives is shown in the following table: GTWIK(\$) \$) \$) 3-7 Installation Most PC motherboards have a built-in 40-pin ATA bus connector that is compatible with the 40-pin ATA interface of the Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB 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, and refer to Chapter 6 of this manual to ensure signal compatibility.

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 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, as well as Chapter 6 of this manual to ensure signal compatibility between the adapter board and the drive.



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Also, make sure that the adapter board jumper settings are appropriate. 3-8 Maxtor D540X-4K 20.

4/40.0/60.0/80.0 GB AT. CP eh tfo dr a o b r e h t o m e h t n o) e l b a l i a v a f i (r o t c e n n o c s u b A T A n i p - 0 4 a o t e v i r d e h t t c e n n o C .
1 TQVEGPPQ% UWS #6# PK2 4'62#&# 57\$ #6# There are two ways you can configure a system to allow the Maxtor D540X-4K hard disk drives to communicate over the ATA bus of an IBM or IBM-compatible PC: 2. Install an IDE-compatible adapter board in the PC, and connect the drive to the adapter board. FTCQ\$ TGVR CF# Installation 54'672/1% .#0154'2 01 '8+4& '6)0+6071/ Drive mounting orientation, clearance, and ventilation requirements are described in the following subsections. PQKVCVPGKT1 GTWIK (The mounting holes on the Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT hard disk drives allow the drive to be mounted in any orientation. Figure 3-6 and Figure 3-7 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. Mounting Dimensions for the Maxtor D540X-4K Hard Disk Drives Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT 3-9 Installation Mounting Screw Clearance for the Maxtor D540X-4K Hard Disk Drives 3-10 Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT 01+ 6 7 #6% GTWIK (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 3-8 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. Installation , 416%'001% 01+6#0+\$1% GTWIK(PQKVCNKVPG8 The Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB 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. 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 3-9. J1 DC Power and ATA Bus Combination Connector Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT 3-11 GEPCTCGN% Clearance from the drive to any other surface (except mounting surfaces) must be a minimum of 1.25 mm (0.05 inches). Installation 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 I-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. 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. On the Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT hard disk drives, the ATA bus interface cable connector (J1, section C) is a 40-pin Universal Header, as shown in Figure 3-9. 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 6, "ATA Bus Interface and ATA Commands," for more detailed information about the required signals.

Refer to Table 6-1 for the pin assignments of the ATA bus connector (J1, section C). 3-12 Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT 60'.#8+73' 41 4'\$/70 64#2 &0# '2;6 416%'001%)0+6#/ % PQKVEG5 , TQVEGPPQ% GECHTGVP+ UWS #6# &' [VKXKVE# GXKT& NCPTGVZ' # PQKVEG5 , TGYQ2 %& The recommended mating connectors for the +5 VDC and +12 VDC input power are listed in Table 3-2. J1 Power Connector, Section A GNDC 6 .8'.

)/#6.18 4'\$/70 0+2 Installation 4'62#&# #6# &4#1\$4'*61/ # *6+9 5'/65;5 41(You can install the Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT hard disk drives in an AT-compatible system that contains a 40-pin ATA bus connector on the motherboard. To connect the drive to the motherboard, use a 40 conductor ribbon cable (80 conductor ribbon cable if using UltraATA/66 drive) 18 inches in length or shorter. Ensure that pin 1 of the drive is connected to pin 1 of the motherboard connector. &4#1\$ 4'62#&# #6# 0# *6+9 5'/65;5 41(PQKVCNVCVUP+ FTCQ\$ TGVR CF# To install the Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT hard disk drive in an AT-compatible system without a 40-pin ATA bus connector on its motherboard, you need a third-party IDE-compatible adapter board. 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 3.7 and 3.8, power should be turned off on the computer before installing the drive. Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT 3-13 Installation 3-14 Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT. el b a c e h t n o l n i p h t i w s e h c t a m r o t c e n n o c e h t f o l n i p t a h t e r u s e k a M . d r a o b r e t p a d a e h t f o r o t c e n n o c n i t a m e h t o t n i r o t c e n n o c e l b a c n i p - 0 4 e h t t r e s n I . 1 G X K T & G J V F P C F T C Q \$ T G V R C F # G J V I P K V E G P P Q % G T W I K (Use a 40-pin ribbon cable to connect the drive to the board. See Figure 3-10. To connect the drive to the board: 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 3-11.

Drive Power Supply and ATA Bus Interface Cables Installation Completing the Drive Installation GT WIK(Maxtor D540X-4K 20.

0 GB AT. el b a c e h t n o l n i p h t i w s e h c t a m r o t c e n n o c e h t f o l n i p t a h t e r u s e k a M . d r a o b r e t p a d a e h t f o r o t c e n n o c n i t a m e h t o t n i r o t c e n n o c e l b a c n i p - 0 4 e h t t r e s n I . 1 G X K T & G J V F P C F T C Q \$ T G V R C F # G J V I P K V E G P P Q % G T W I K (Use a 40-pin ribbon cable to connect the drive to the board. See Figure 3-10. To connect the drive to the board: 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 3-11.

Drive Power Supply and ATA Bus Interface Cables Installation Completing the Drive Installation GT WIK(Maxtor D540X-4K 20.



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4/40.0/60.0/80.0 GB AT 3-15 Installation 3-16 Maxtor D540X-4K 20.

4/40.0/60.0/80.0 GB AT TGKTTCS UGV[DCIG/ GJ6 01+6#47)+(01% '8+4& 0+ 5'73+0*%'6 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 528 Mbytes.

Whenever possible the Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB 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. · 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 Alternate Capacity jumper on the drive (see Section 3.3).

5). TGKTTCS UGV[DCIK) GJ6 Newer BIOS's allow users to configure disk drives to go beyond the 528 MB 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 8.4 GB capacity. To overcome this barrier a new set of Int 13 extensions are being implemented by most BIOS manufacturers. The new Int 13 extensions use a 64-bit address field resulting in 9.4 terabytes of accessible space. Whenever possible the Maxtor D540X-4K 20.4/40.0/60.

0/80.0 GB 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 Alternate Capacity jumper on the drive (see Section 3.3.5). Installation 01+6#4'21 &0# 2764#65 /'65;5 UPQKVCVKOKN OGVUJU IPKVCTGR1 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. The most popular operating systems available today, DOS and Win 95, use a File Allocation Table (FAT) size of 16 bits which will only support partitions up to 2.1 GB. A newer release of Win 95 called OSR2 with a 32 bit FAT has been released to system manufacturers only. This new FAT size table will support partitions of up to 2.2 terabytes. The Windows NT file system (NTFS) does not have this limit. Once you have installed the Maxtor D540X-4K 20.4/40.0/60.

0/80.0 GB 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: 4. 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 Maxtor D540X-4K 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 Maxtor D540X-4K family of hard disk drives. . me ts ys eh t no r ewo P . I 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. Maxtor D540X-4K 20.

4/40.0/60.0/80.0 GB AT 3-17 Installation LBA Capacity CHS Capacity 20,416 MB 8,455 MB* (Default) 20,416 MB (Configurable) 16,383* 16 63 39,876,480 40,037 MB 8,455 MB* (Default) 40,037 MB (Configurable) 16,383* 16 63 78,198,750 60,040 MB 8,455 MB* (Default) 60,040 MB (Configurable) 16,383* 16 63 117,266,688 80,026 MB 8,455 MB* (Default) 80,026 MB (Configurable) 16,383* 16 63 156,301,488 LogicalCylinders Logical Heads Logical Sectors/

Track Total Number Logical Sectors Note: *Capacity may be restricted to 8.4 GB (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 8.4 GB. Default logical cylinders is limited to 16,383 by the ATA standard. 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.

5. Boot the system using the operating system installation disk--for example, MS-DOS--then follow the installation instructions in the operating system manual. 3-18 Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT tamroF gnisserdda lacigoL - : & 4 16 : # / GN DC 6 This chapter gives a detailed description of the physical, electrical, and environmental characteristics of the Maxtor D540X-4K hard disk drives. Table 4-1 gives a summary of the Maxtor D540X-4K hard disk drives. Specifications Capacity Nominal rotational speed (rpm) Number of Disks Number of R/W heads Data Organization: Zones per surface Tracks per surface Total tracks Sectors per track: Inside zone Outside zone Total User Sectors Bytes per sector Number of tracks per cylinder 20.41 GB 5388 1 1 40.

03 GB 5388 1 2 60.04 GB 80.02 GB 5388 2 4 5388 2 3 15 54,982 54,982 486 950 39,876,480 512 1 15 54,982 109,964 486 950 78,198,750 512 2 15 54,982 164,946 486 950 117,266,688 512 3 15 54,982 219,928 486 950 156,301,488 512 4 Maxtor D540X-4K 20.4/40.0/60.

0/80.0 GB AT 6# \$) 5 0 1 + 6 # % + (+ % ' 2 5 TGVR C J% 6# \$) 6# \$) - : & 416: # / GNDC 6 6# \$) 01+62+4%5' & ;4#//75 01+6#%+(+% '25 4-1 Specifications

1. Disk to read buffer transfer rate is zone-dependent, instantaneous Recording: Recording technology Maximum linear density Encoding method Interleave Track density Maximum effective areal density Performance: Seek times: Average Read Track-to-track Average write Full stroke Data transfer Rates: Disk to Read Once a Revolution2, 3 Multiple Zone 535,671 fci 24/25 NPRML 1:1 56,170 tpi 29.



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88 Gbits/in 2 Multiple Zone 535,671 fci 24/25 NPRML 1:1 56,170 tpi 29.88 Gbits/in 2 Multiple Zone 535,671 fci 24/25 NPRML 1:1 56,170 tpi 29.88 Gbits/in 2 12 ms typ. 15 ms max. 2 ms typical 15 ms typ. 18 ms max. 24 ms typ. 28 ms max. 175.39 Mb/ sec. min.

377.84 Mb/ sec. max. 230.77 Mb/ sec. min. 493.59 Mb/ sec. max. 16.7 MB/ sec. maximum 100 MB/sec. maximum 2 MB 12 ms typ. 15 ms max. 2 ms typical 15 ms typ. 18 ms max. 24 ms typ. 28 ms max. 175.39 Mb/ sec. min. 377.84 Mb/ sec. max. 230.77 Mb/ sec. min. 493.59 Mb/ sec. max.

16.7 MB/ sec. maximum 100 MB/sec. maximum 2 MB 12 ms typ. 15 ms max. 2 ms typical 15 ms typ. 18 ms max. 24 ms typ. 28 ms max. 175.39 Mb/ sec. min. 377.84 Mb/ sec. max. 230.77 Mb/ sec. min. 493.59 Mb/ sec. max.

175.39 Mb/ sec. min. 377.84 Mb/ sec. max. 230.77 Mb/ sec. min. 493.59 Mb/ sec. max. 16.7 MB/sec. maximum 100 MB/sec.

maximum 2 MB Disk to Read Instantaneously 2 Read Buffer to ATA Bus (PIO Mode with IORDY) Read Buffer to ATA Bus (Ultra ATA Mode) Buffer Size 4-2 Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT 6# \$) 2.

Refer to Section 4.14, "DISK ERRORS" for details on error rate definitions. 6# \$) 6# \$) - : & 416: #/ 6# \$) 01+62+4%5' & Specifications 360-bit Reed Solomon 800,000 hrs 50,000 min. 360-bit Reed Solomon 800,000 hrs 50,000 min. 360-bit Reed Solomon 800,000 hrs 50,000 min. 1. Spindle speed is 5388 RPM +/- 0.1%. 2. Disk to read buffer transfer rate is zone-dependent, instantaneous 3.

Refer to Section 4.14, "DISK ERRORS" for details on error rate definitions. 4. CSS specifications assumes a duty cycle of one power off operation for every one idle spin down. Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT 41 41 41 1 in 10 1 in 10 1 in 10 6 6 6 Reliability: Seek error rate 1 in 10 Unrecoverable error 1 in 10 rate Error correction 360-bit method Reed (with cross check) Solomon Projected MTBF 800,000 hrs Contact Start/Stop Cycles (Ambient 50,000 min. temperature) Auto head-park method 41 6 4 3 4 3 1 in 10 1 in 10 1 in 10 6# \$) 4-3 6# \$) 6# \$) - : & 416: #/ 6# \$) 01+62+4%5' & Specifications Capacity Number of 512byte sectors available 20.

41 GB 39,876,480 40.03 GB 78,198,750 60.04 GB 117,266,688 80.02 GB 156,301,488 Data is transferred from the disk to the read buffer at a rate of up to 283.20 Mb/s in bursts.

Data is transferred from the read buffer to the ATA bus at a rate of up to 16.7 MB/s using programmed I/O with IORDY, or at a rate of up to 66 MB/s using Ultra ATA/100. For more detailed information on interface timing, refer to Chapter 6. 4-4 Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT 6# \$) 6# \$) - : & 41 6 : #/ 6# \$) GND C6 5'6#4 4'(50#46 #6#& ;6+%#2#% & '66#/41(At the factory, the Maxtor D540X-4K

20.4/40.0/60.0/80.0 GB AT hard disk drives receive a low-level format that creates the actual tracks and sectors on the drive. Table 4-2 shows the capacity resulting from this process. Formatting done at the user level, for operation with DOS, UNIX, or other operating systems, may result in less capacity than the physical capacity shown in Table 4-2. Formatted Capacity 6# \$) Specifications 1.

Nominal conditions are as follows: ·Nominal temperature 77°F (25°C) ·Nominal supply voltages (12.0V, 5.0V) ·No applied shock or vibration 2. Worst case conditions are as follows: ·Worst case temperature extremes 41°F to 131°F (5°C to 55°C) ·Worst case supply voltages (12.0V ±10%, 5.0V ±5%) 3.

Sequential Cylinder Switch Time is the time from the conclusion of the last sector of a cylinder to the first logical sector on the next cylinder (no more than 6% of cylinder switches exceed this time). 4. Sequential Head Switch Time is the time from the last sector of a track to the beginning of the first logical sector of the next track of the same cylinder (no more than 6% of head switches exceed this time). 5.

Power On is the time from when the supply voltages reach operating range to when the drive is ready to accept any command. 6. Drive Ready is the condition in which the disks are rotating at the rated speed, and the drive is able to accept and execute commands requiring disk access without further delay at power or start up. Error recovery routines may extend the time to as long as 45 seconds for drive ready. Maxtor D540X-4K 20.

4/40.0/60.0/80.0 GB AT 8 12 seconds 30 seconds 8 3 9 Sequential Cylinder Switch Time Sequential Head Switch Time Random Average (Read or Seek) Random Average (Write) Full-Stroke Seek Average Rotational Latency Power On to Drive Ready Standby to Interface Ready Spindown Time, Standby Command Spindown Time, Power loss 4 6 9 5 7 2 ms 2 ms 12 ms 15 ms 24 ms 5.56 ms 7.

5 seconds 6 seconds 6 seconds 3 ms 3 ms 15 ms 18 ms 28 ms -- 12 seconds 12 seconds 15 seconds 2'5#% 65419 1.#0+/10 .#%+2;6 GND C6 501+6#%+(+% '25) 0+ /+6 Table 4-3 illustrates the timing specifications of the Maxtor D540X-4K hard disk drives. Timing Specifications 4'6'/#4#2 4-5 Specifications 7. Standby is the condition at which the microprocessor is powered, but not the HDA. When the host sends the drive a shutdown command, the drive parks the heads away from the data zone, and spins down to a complete stop. 8. After this time it is safe to move the disk drive 9. Average random seek is defined as the average seek time between random logical block addresses (LBAs). 4-6 Maxtor D540X-4K 20.

4/40.0/60.0/80.0 GB AT TH TL +12 V V = 9.30 V minimum V = 10.45 V maximum TH TL +5 V V = 4.10 V minimum V = 4.10 V maximum 75 mV (typical) 425 mV (typical) 5+ 5' 4'6 5; * & . 1 * 5'4 * 6 GND C6 UVKOK. VGUG4 TGYQ2 IPKEPGWSG5 TGYQ2 ') # 6. 1 8 % & 4'912 The Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT hard disk drives operate from two supply voltages: · +12V ±10% · +5V ±5% The allowable ripple and noise is 250 mV peak-to-peak for the +12 Volt supply and 150 mV peak-to-peak for the +5 Volt supply.

The allowable ripple noise for each voltage is measured at the power supply with the drive not attached to it. You may apply the power in any order, or open either the power or power return line with no loss of data or damage to the disk drive. The drive can withstand transient voltages of +10% to -100% from nominal when powering up or down. However, data may be lost in the sector being written at the time of power loss. Also if power voltage dwells in the range around reset (9).

2 - 9.7 V at 12 V or 3.4 - 4.0 at 5 V) for several seconds, the drive may disable itself. These voltages are outside expected operational limits. However, they will occur during testing. To avoid this event during the testing of reset limits, increase line voltages in 200 mV increments.



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When powering up, the drive remains reset (inactive) until both rising voltage thresholds reset limits are exceeded. When powering down, the drive becomes reset when any supply voltage drops below the falling voltage threshold. Power Reset Limits Specifications Maximum Seeking 5 Standby 6 Read/Write On Track Startup (peak) 3 20 6.

0 10 0.9 6.0 6.4 Idle Maximum Seeking 5 Standby Read/Write On Track 1. Current is rms except for startup. Startup current is the typical peak current measured an average (over 1 ms) from power-on till the drive is ready. 2. Power requirements reflect nominal for +12V and +5V power. Maxtor D540X-4K 20.4/40.0/60.

0/80.0 GB AT (\$) 566#9 24'912 ')#4'8# .#%+2;6 M UK& (\$) M UK& 01+6#4'21 (1 '&1/ 4'\$/70. '&1/ 1 4 3 Idle 1 Startup (peak) 1700 200 600 35 210 1700 250 570 35 250 700 580 590 100 630 20 6.0 10 0.

9 7.0 (\$) MUK & 8 FGVQ P G UKYTG JV Q UU GNPW 5/ 4 #O 260'447% (\$) MUK & ')#4'8# .#%+2;6 (\$) MUK & 8 GNDC6 (\$) UVPGOGTKWSG4 TGYQ2 MUK & 4' \$/ 7 0. ' &1/ 01+6#4'21 (1 '&1/ Table 4-5 lists the voltages and typical average corresponding currents for the various modes of operation of the Maxtor D540X-4K hard disk drives. Typical Power and Current Consumption 700 580 600 110 630 4-7 Specifications 3.

Idle mode is in effect when the drive is not reading, writing, seeking, or executing any commands. A portion of the R/W circuitry is powered down, the motor is up to speed and the Drive Ready condition exists. 4. Maximum seeking is defined as continuous random seek operations with typical host command overhead. 5. Standby mode is defined as when the motor is stopped, the actuator is parked, and all electronics except the interface control are in low power state. Standby occurs after a programmable time-out after the last host access. Drive ready and seek complete status exist. The drive leaves standby upon receipt of a command that requires disk access or upon receiving a spinup command. 6.

Read/Write On Track is defined as 50% read operations and 50% write operations on a single physical track. Idle On Track 20.4/40.0 GB AT (1-Disk) 60.0/80.0 GB GB AT (2-Disk) 2.8 Bels 2.9 Bels 3.4 Bels 3.5 Bels Seeking Random 20. 4/40.0 GB AT (1-Disk) 60.0/80.0 GB AT (2-Disk) 2.9 Bels 3. 1 Bels 3.4 Bels 3.6 Bels 4-8 Maxtor D540X-4K 20.4/40.0/60.

0/80.0 GB AT OWOKZC/ TGYQ2 FPWQ5 FGTWUCG/ NCEKR[6 TGYQ2 FPWQ5 FGTWUCG/ GNDC6 '&1/)0+6#4'21 5%+6571%# Table 4-6 specifies the acoustical characteristics of the Maxtor D540X-4K 20.4/40.0/ 60.0/80.0 GB AT hard disk drive. The acoustics are measured in an anechoic chamber with background noise at least <10dBA less than the expected sound pressure Lp(A). To distinguish between sound power and sound pressure standards, sound power Lw(A) is specified in Bels. The relationship between bels and dBA for sound power is 1 bel = 10dBA. Acoustical Characteristics--Sound Power Specifications Temperature (Non-condensing) Temperature Gradient (Non-condensing) Humidity (Non-condensing) Maximum Wet Bulb Temperature Humidity Gradient 4 ,3 2 1 5° to 55°C (41° to 131°F) 24°C/hr maximum (75.

2°F/hr) 5% to 85% RH 37°C (98.6°F) -40° to 65°C (-40° to 149°F) 48°C/hr maximum (118.4°F/hr) 5% to 95% RH 46°C (114.8°F) 30% / hour 200 m to 3,000 m (650 to 10,000 ft.) 1.5 kPa/min 30% / hour 200 m to 12, 000 m (650 to 40,000 ft.) 8 kPa/min Altitude Altitude Gradient 1. Maximum operating temperature must not exceed the drive at any point along the drive form factor envelope. Airflow or other means must be used as needed to meet this requirement. 2.

The humidity range shown is applicable for temperatures whose combination does not result in condensation in violation of the wet bulb specifications. 3. Altitude is relative to sea level. 4. The specified drive uncorrectable error rate will not be exceeded over these conditions. Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT)0+6#4'21 010)0+6#4'21 501+6+&01% . #60'/014+80' GND C6 .#%+0#%#/' Height: 1.0 in.(25.4 mm) Width: 4.0 in.(101.6 mm) Depth: 5.75 in.(146.

1 mm) Weight: Maxtor D540X-4K 40.0 GB AT (2-Disk) 1.3 lb Table 4-7 summarizes the environmental specifications of the Maxtor D540X-4K hard disk drives. Environmental Specifications 4'6'/#4#2 4-9 Specifications Translational 1/2 sine wave 2 ms duration 1 ms duration Rotational 2 ms applied at actuator pivot point Vibration Random Vibration (G /Hz) Sine wave (peak to peak) 1/2 octave per minute sweep 1. The specified drive unrecovered error rate will not be exceeded over these conditions. 2 20 Gs (write) 63 Gs (read) 2 300 Gs 110 Gs 2 2,000 rad/sec 20,000 rad/sec 0.004 (10500 Hz) 1.0 Gs P-P (5500 Hz) 0.05 (10300 Hz) 2 Gs P-P 5500 Hz 4-10 Maxtor D540X-4K 20.4/40.

0/60.0/80.0 GB AT IPKVCT GR 1 PQ 0 IPKVCT GR 1 GND C6 01+6#4\$+8 &0# -%1*5 The Maxtor D540X-4K 20.4/40.0/60.

0/80.0 GB AT hard disk drives can withstand levels of shock and vibration applied to any of its three mutually perpendicular axes, or principal base axis, as specified in Table 4-8. A functioning drive can be subjected to specified operating levels of shock and vibration. When a drive has been subjected to specified nonoperating levels of shock and vibration, with power to the drive off, there will be no loss of user data at power on. When packed in its 1-pack shipping container, the Maxtor D540X-4K drives can withstand a drop from 30 inches onto a concrete surface on any of its surfaces, six edges, or three corners. The 20-pack shipping container can withstand a drop from 30 inches onto a concrete surface on any of its surfaces, six edges, or three corners. Shock and Vibration Specifications 1MEQJ5 Specifications '8+4& GJV)0+ .&0#* Before handling the Maxtor hard disk drive some precautions must be taken to ensure that the drive is not damaged. Use both hands while handling the drive and hold the drive by its edges. Maxtor drives are designed to withstand normal handling, however, hard drives can be damaged by electrostatic discharge (ESD), dropping the drive, rough handling, and mishandling. Use of a properly grounded wrist strap to the earth is strongly recommended. Always keep the drive inside its special antistatic bag until ready to install. Note: To avoid causing any damage to the drive do not touch or remove the Printed Circuit Board (PCB) or any of its components when handling the drive. Doing so will cause ESD damage to the drive. ;6+.

+ \$#+. '4 Mean Time Between Failures (MTBF): The projected field MTBF is 800,000 hours. The Maxtor MTBF numbers represent Bell-Core TR-332 Issue #6, December 1997 MTBF predictions and represent the minimum MTBF that Maxtor or a customer would expect from the drive.



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5 years Not required 50,000 cycles @ ambient Component Life: Preventive Maintenance (PM): Start/Stop: Note: Drive reliability is closely related to the temperature the drive is exposed to. The operational design environment is 35°C at 71% utilization or 6240 POH/year. Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT 4-11 Specifications 1.

Retry recovered read errors are errors which require retries for data correction. Errors corrected by ECC on-the-fly are not considered recovered read errors. Read on arrival is disabled to meet this specification. Errors corrected by the thermal asperity correction are not considered recovered read errors. 2.

Unrecovered read errors are errors that are not correctable using ECC or retries. The drive terminates retry reads either when a repeating error pattern occurs, or after the programmed limit for unsuccessful retries and the application of quadruple-burst error correction. 3. Seek errors occur when the actuator fails to reach (or remain) over the requested cylinder and the drive requires the execution of a full recalibration routine to locate the requested cylinder. Note:

Error rates are for worst case temperature and voltage.

4-12 Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT 6 3 Seek errors 1 error per 10 seeks 41 2 Unrecovered data errors 1 event per 10 9 1 Retry recovered read errors 1 event per 10 bits read bits read 54144' (1 4'\$/70 /7/+ :# / ;6+ .+ \$+62'%575 % +6'0)#/146%'.' 5 Volts/meter over a range of 10 KHz to 1 GHz. GND C6 '%0#.#\$/+ '.&0+25 0.

5 g-mm maximum (This is approximately equivalent to 0.05 g emitted vibrations) '2;6 4144' 54144' -5+& Table 4-9 provides the error rates for the Maxtor D540X-4K hard disk drives. Error Rates 0 1 +6 #4'2 1 (1 5'.2+ %0 +42 % +5 # \$ TGVRC J% This chapter describes the operation of Maxtor D540X-4K AT hard disk drives' functional subsystems. It is intended as a guide to the operation of the drive, rather than a detailed theory of operation. /5+0#*%/' '8+4& - :& 416:#/ This section describes the drive mechanism. Section 5.2 describes the drive electronics. The Maxtor D540X-4K hard disk drives consist of a mechanical assembly and a PCB as shown in Figure 5-1. The head/disk assembly (HDA) contains the mechanical subassemblies of the drive, which are sealed under a metal cover.

The HDA consists of the following components: · Automatic actuator lock · Air filter The drive is assembled in a Class-100 clean room. yl b m e s s a r e n o i t i s o p y r a t o R ylbm essa kca ts dae H ylbm essa kca ts ks i D ylbmessa rotom CD g ni tsac es a B 0 1 +6 7 #% To ensure that the air in the HDA remains free of contamination, never remove or adjust its cover and seals. Tampering with the HDA will void your warranty. Maxtor D540X-4K 20.4/40.

0/60.0/80.0 GB AT 5-1 Basic Principles of Operation Hard Disk Drive Exploded View 5-2 Maxtor D540X-4K 20.4/40.0/60.

0/80.0 GB AT T A K 4- X 0 4 5 D r o t x a M G TWIK(Basic Principles of Operation 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 System Data 0 1. For user data, zone 15 is the innermost zone and zone 1 is the outermost zone. Maxtor D540X-4K 20.4/40.0/60.0/80.0 GB AT 5-3 5D/ 5D/ -%#46 4'2 -%#46 4'2 5-%#46 5-%#46 '6#4 #6#& 5416%'5 (1 4'\$/70 '6#4 #6#& 5416%'5 (1 4'\$/70 GND C 6 [DOGUU# IP VUC% GUC\$ [NNDOGUU# IPKKVUC% GUC\$ UG DOGUU# MECV5 MU & UGKKNNDOGUU# MECV5 MUKK& 1'01< [DOGUU# TQVQ/ %& [NNDOGUU# TQVQ/ %& 560'601% 560'601% 4'&0+.,% 4'&0+.,% A single-piece, e-coated, aluminum-alloy base casting provides a mounting surface for the drive mechanism and PCB.

The base casting also acts as the flange for the DC motor assembly. To provide a contamination-free environment for the HDA, a gasket provides a seal between the base casting, and the metal cover that encloses the drive mechanism. Integral with the base casting, the DC motor assembly is a fixed-shaft, brushless DC spindle motor that drives the counter-clockwise rotation of the disks. The disk stack assembly in the Maxtor D540X-4K hard disk drives consist of disks secured by a disk clamp. The aluminum-alloy disks have a sputtered thin-film magnetic coating. A carbon overcoat lubricates the disk surface. This prevents head and media wear due to head contact with the disk surface during head takeoff and landing. Head contact with the disk surface occurs only in the landing zone outside of the data area, when the disk is not rotating at full speed. The landing zone is located at the inner diameter of the disk, beyond the last cylinder of the data area. Cylinder Contents 3462 3562 3680 3680 3680 3680 486 487 520 525 560 600 628 633 666 671 700 709 738 742 771 800

804 805 836 860 857 900 883 920 907 950 925 243.

59 251.01 260.18 269.23 280.54 286.

54 291.86 298.64 315.93 325.44 332.

69 346.15 348.08 365.38 372.47 384.62 389.42 403.85 408.12 417.58 423.

08 432.69 437.50 445.05 452.66 459.13 467.31 472.85 481.78 269.23 197.

44 3680 3680 3680 3680 3680 3680 3680 3680 60 400 Basic Principles of Operation When DC power is applied to the motor and the disk stack rotates, the rotation generates an airflow on the surface of the disk. As the flow of air across the air vane increases with disk rotation, the locking arm pivots away from the actuator arm, enabling the headstack to move out of the landing zone. When DC power is removed from the motor, an electronic return mechanism automatically pulls the actuator into the landing zone, where the magnetic actuator retract force holds it until the Airlock closes and latches it in place. 5-4

Maxtor D540X-4K 20.4/40.

0/60.0/80.0 GB AT ® [NDOGUU# TGPQKVKUQ2 [TCVQ4 MEQ. TQVCWVE# EKVCOQVW# [NDOGUU# MECVUFCG* The headstack assembly consists of read/write heads, head arms, and a coil joined together by insertion molding to form a rotor subassembly, bearings, and a flex circuit. Read/write heads mounted to spring-steel flexures are swage mounted onto the rotary positioner assembly arms.

The flex circuit connects the headstack assembly to the PCB through a compression connector. The flex circuit contains a read preamplifier/write driver IC. The rotary positioner, or rotary voice-coil actuator, is a Maxtor-proprietary design that consists of upper and lower permanent magnet plates, a rotary single-phase coil molded around the headstack mounting hub, and a bearing shaft. The single bi-polar magnet consists of two alternating poles and is bonded to the magnet plate. A resilient crash stop prevents the heads from being driven into the spindle or off the disk surface. Current from the power amplifier induces a magnetic field in the voice coil. Fluctuations in the field around the permanent magnet cause the voice coil to move. The movement of the voice coil positions the heads over the requested cylinder.



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