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User manual MAXTOR MEDALIST 520XE
User guide MAXTOR MEDALIST 520XE
Operating instructions MAXTOR MEDALIST 520XE
Instructions for use MAXTOR MEDALIST 520XE
Instruction manual MAXTOR MEDALIST 520XE



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Medalist 630xe
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Medalist 850xe
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ATA Interface Drive
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Product Manual
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Manual abstract:

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..... ATA Interface Drive

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.. Product Manual ...

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... @@Medalist 850xe

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22 Medalist 630xe and 850xe ATA Product Manual, June 1996 1 Introduction This manual describes the functional, mechanical and interface specifications for the Medalist 630xe and the Medalist 850xe hard disc drives. The drives are referred to throughout this manual by their model numbers, ST3630A for the Medalist 630xe and ST3850A for the Medalist 850xe. The ST3630A and ST3850A are designed to meet the needs of entry level-to-midrange desktop computers. They are standard 3.5-inch formfactor drives that feature advance transfer modes, Multiple block read/write, segmented cache and power management.

Their respective 631.1-Mbyte and 850.5-Mbyte capacities provide ample space to store large software programs and for those programs to run efficiently. Fast-ATA performance is available in both drives. The ST3850A supports advanced PIO modes 3 and 4 and advanced multiword DMA modes 1 and 2 for burst transfer rates up to 16.6 Mbytes per second. The ST3630A supports advanced PIO mode 3 and advanced multiword DMA mode 1 for burst transfer rates up to 13.3 Mbytes per second. Both drives support Multiple block read/write, which allows them to store contiguous blocks of data in their 120-Mbyte segmented cache and to transfer the blocks in a single burst. The drives support power-management modes for energy-efficient operation.

Power dissipation falls to 0.725 W (typical) in Standby mode. The drives enter power-saving modes at the request of the host. They can also be programmed to automatically enter power-saving modes using the Idle timer or Standby timer commands. The power-management modes the drives support are discussed in subsection 1.7.1 on page 8. The power-management commands the drives support are listed in the ATA-command table on page 24. 2 Medalist 630xe and 850xe ATA Product Manual, June 1996 Quick specification chart The following table serves as a quick reference for the ST3630A and the ST3850A performance specifications. These and other specifications are discussed in the Specification summary section following the table.

Drive specification Guaranteed capacity (Mbytes) (x10 bytes) Guaranteed sectors Bytes per sector Sectors per track Logical Read/Write heads Logical cylinders Physical Read/Write heads Physical disc Recording density (Kbits/inch) Track density (tracks/inch) Spindle speed (RPM) Track-to-track seek time (msec typical) Average seek time (msec typical) Full-stroke seek time (msec typical) Average latency (msec) Internal data-transfer rate (Mbits per sec max) I

6	ST3630A	631.1	1,232,784	512	63	16	1,223	4	2	68	3,384	3,811	5	14	34	7.87	22.9	to 39.6	ST3850A	850.
5		1,661,184	512	63	16	1,648	4	2	70	4,300	3,811	5	14	34	7.87	23.1	to 42.3	16.6	(max)	16.

6 (max) 120 1.00 4.02 5.77 1.3 7 1.25A External transfer rate (Mbytes per sec) PIO mode 11.1 (max) External transfer rate (Mbytes per sec) DMA mode 13.3 (max) Cache buffer (Kbytes) Height (inches max) Width (inches max) Depth (inches max) Typical weight (lb) Power-on to ready (sec typical) Spinup current (typical) 120 1.00 4.02 5.

77 1.3 7 1.25A 1. One Mbyte equals one million bytes. Medalist 630xe and 850xe ATA Product Manual, June 1996 3 Drive specification Seek power (typical) Read/Write power (typical) Idle total power (typical) Standby(typical) Voltage tolerance (including noise): +5V Voltage tolerance (including noise): +12V Operating temperature (°C) Nonoperating temperature (°C) Operating temperature gradient (°C per hr. max) Relative humidity, operating gradient (max.) Altitude operating Altitude nonoperating Shock, normal operating (Gs max at 11 msec) Shock, nonoperating (Gs max at 11 msec) Vibration (Gs max at 22-300 nonrecoverable errors), operating Hz ST3630A 5.



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23 W 3.34W 1.985W 0.

725W ±5% ±5% 5 to 55°C 40 to 70°C 20°C 10% per hr ST3850A 5.23W 3.34W 1.985W 0.725W ±5% ±5% 5 to 55°C 40 to 70°C 20°C 10% per hr 1,000 - 1,000 to 10,000 ft.

to 10,000 ft. 1,000 1,000 to 40,000 ft. to 40,000 ft. 2.0 Gs 75.

0 Gs 2.0 Gs 75.0 Gs without 1.0 Gs 1.0 Gs Peak to Peak Peak to Peak Vibration (Gs max at 22-300 Hz with no physical 8.0 Gs 8.0 Gs damage incurred), Nonoperating Peak to Peak Peak to Peak Drive acoustics, Idle mode (dBA), typ Nonrecoverable read errors (per bits transferred) Mean time between failures (power-on hours) Contact start-stop cycles Service life (years) 29 dBA 10 13 29 dBA 1013 300,000 40,000 5 300,000 40,000 5 Medalist 630xe and 850xe ATA Product Manual, June 1996 5 1.0 Specification summary 1.1 Format configuration The drive is low-level formatted at the factory. You do not need to low-level format the drive.

You can operate the drive using many different address configurations, provided the number of sectors per track does not exceed 63. The following tables show the cylinder head sector (CHS) translation geometry for the drive. You can verify the parameters using the Identify Drive (ECH) command. ST3630A Cylinders Heads Sectors per track Guaranteed capacity (bytes) Guaranteed sectors ST3850A Cylinders Heads Sectors per track Guaranteed capacity (bytes) Guaranteed sectors CHS 1,223 16 63 631,185,408 631,185,408 1,232,784 CHS 1,648 16 63 850,526,208 850,526,208 1,661,184 1,661,184 1,232,784 LBA LBA 6 Medalist 630xe and 850xe ATA Product Manual, June 1996 1.2 Physical organization Model Heads Discs ST3630A 4 2 ST3850A 4 2 1.3 Functional specifications Model Interface Internal data-transfer rate (Mbits/sec) External data-transfer rate (Mbytes/sec) PIO Mode DMA Mode Spindle speed ± 0.5% (RPM) Segmented cache (Kbytes) Zone Bit Recording method Bytes per sector Recording density, max (BPI) Flux density, max (FCI) Track density, max (TPI) 11.1 (max) 13.3 (max) 3,811 120 RLL (1,7) 512 68K 51K 3,384 16.6 (max) 16.

6 (max) 3,811 120 RLL (1,7) 512 70K 52.5K 4,300 ST3630A ATA 22.9 to 39.6 ST3850A ATA 23.1 to 42.

3 1.4 Physical dimensions Height (max) Width (max) Depth (max) Weight (max) 1.00 inch (25.4 mm) 4.02 inches (102.

1 mm) 5.77 inches (146.6 mm) 1.3 lb (0.59 Kg) Medalist 630xe and 850xe ATA Product Manual, June 1996 7 1.5 Seek time All performance measurements are taken using a 25-MHz 486 AT computer (or faster) with an 8.3-MHz I/O bus. The measurements are taken using nominal power at sea level and at 25°C ambient temperature. The specifications in the table are defined as follows: · Track-to-track seek time is an average of all possible single-track seeks in both directions. · Average seek time is a true statistical random average of at least 10,000 measurements of seeks between random tracks, less overhead.

· Full-stroke seek time is one-half the time needed to seek from the first data cylinder to the maximum data cylinder and back to the first data cylinder. The full-stroke average is determined by measuring 100 full-stroke seeks in both directions. Track-to-track typ (msec) 5 Average typ (msec) 14 Full-stroke typ (msec) 34 Latency (msec) 7.87 1.6 Start and stop time The drive is ready within 10 seconds. Typical and maximum start and stop times are shown in the following table. Figure 1 on page 8 shows a typical startup current profile. Typical Start time Stop time 7 sec 6 sec Maximum 10 sec 9 sec 8 Medalist 630xe and 850xe ATA Product Manual, June 1996 Current mA 1,200 1,000 800 600 400 200 2.0 4.0 6.

0 8.0 10.0 12.0 14.0 16.

0 18.0 20.0 Time (seconds) Figure 1. Typical startup current profile 1.7 Power specifications Except during a write operation, you can apply power to the drive or remove power from the drive in any sequence without losing data or damaging the drive.

1.7.1 Power-management modes The drive supports the following power-management modes: · Active mode.s section are defined as follows: · Operating specifications assume that the drive is powered up. · Nonoperating specifications assume that the drive is packaged as it was shipped from the factory. 1.7.5 Ambient temperature 5° to 55°C (41° to 131°F) 40° to 70°C (104° to 158°F) Operating Nonoperating 1.7.6 Temperature gradient 20°C per hour (36°F per hour) 30°C per hour (54°F per hour) Operating (max) Nonoperating (max) 1.

7.7 Relative humidity 8% to 80% noncondensing Maximum wet bulb 29.4°C (85.0°F) 5% to 95% noncondensing Maximum wet bulb 40.0°C (104.0°F) Operating Nonoperating 1.7.8 Altitude 1,000 ft to 10,000 ft (305 m to 3,050 m) 1,000 ft to 40,000 ft (305 m to 12,200 m) Operating Nonoperating 12 Medalist 630xe and 850xe ATA Product Manual, June 1996 1.7.9 Shock and vibration Shock measurements are based on an 11 msec, half sine wave shock pulse that are not to be repeated more than twice per second.

The specifications in the table below are defined as follows: · Normal operating--the drive sustains no physical damage, and reads and writes data without errors · Abnormal operating--for a period of not more than 15 minutes duration at the major resonant frequency, the drive shall sustain no physical damage, but performance is adversely affected. · Nonoperating--no power is applied to the drive and the read/write heads are in the shipping zone; the drive shall sustain no physical damage. Normal operating Shock 522 Hz vibration 2.0 Gs 0.020-inch displacement peak-to-peak 1.

0 G peak-to-peak Abnormal operating 10.0 Gs 0.030-inch displacement peak-to-peak 1.5 Gs peak-to-peak Nonoperating 75.0 Gs 0.

160-inch displacement peak-to-peak 8.0 Gs peak-to-peak 22300 Hz vibration 1.8 Acoustics Sound pressure is measured at idle from 1 meter above the drive's top cover. Model Idle sound pressure, typ Idle sound pressure, max ST3630A 29 dBA 33 dBA ST3850A 29 dBA 33 dBA Medalist 630xe and 850xe ATA

Product Manual, June 1996 13 1.9 Reliability The MTBF and contact start-stop specifications assume nominal power at sea level with an ambient temperature of 25°C. Nonrecoverable errors MTBF Contact start-stop (CSS) MTTR Service life 1 per 1013 bits read 300,000 power-on hours 40,000 cycles 30 minutes 5 years 1.10 Auto-park Upon power-down, the read/write heads automatically move to the shipping zone. The heads park inside the maximum data cylinder. When power is applied, the heads recalibrate to track 0. 1.

11 Agency listings This drive is listed with agencies as follows: · UL 1950 · CSA C22.2 No. 0-M91 and CSA C22.2 No. 950-M89 · EN 60950/10.92 as tested by TUV-Rheinland, North America 1.12 EC compliance Hard drives that display the CE marking comply with European Union requirements specified in Electromagnetic Compatibility Directive 89/336/EEC as amended by Directive 92/31/EEC of 28 April 1992 and Directive 93/68/EEC of 22 July 1993.



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3.2 Format track command (50H) The drives accept a Format track command (50H) and the 512 bytes of the format data transferred by the host. However, the command does not mark bad sectors, reassign sectors or unreassign sectors.

The first sector data the host transfers is ignored. A 00 data pattern is written to the track specified in the command. 5. Cycle times less than 400 nsec require IORDY. 28 Medalist 630xe and 850xe ATA Product Manual, June 1996 3.3.3 Set Features command (EFH) The host uses the Set Features command (EFH) to establish parameters that affect the execution of certain drive features. To use the command: 1. Write the Feature value to the Features register. 2.

Write the Set Features command to the command register. Note. If the value in the Features register is not supported or is invalid, the drive posts an Aborted Command error. Some Set Feature values are enabled at the factory and have default status. The drives revert to these values at power-on or after a hard reset. Value 66H allows you to retain parameter modifications made to the Set Features command since power-on following a software reset. The following table shows the alterable features the drives support. The factory default features are indicated in the feature description. Value 02H 03H 44H 55H 66H 82H AAH BBH CCH Feature description Enable write cache (factory default). Set value for Set Transfer mode based on value in Sector Count register.

Use maximum length of ECC (16 bytes) on read long/write long commands (factory default). Disable read look-ahead feature. Use the current settings as default (until hard reset or power off). Disable write cache. Enable read look-ahead feature (factory default).

4 bytes of ECC apply on read long/write long commands. Enable reverting to power-on defaults (factory default). Medalist 630xe and 850xe ATA Product Manual, June 1996 29 3.3.3.

1 PIO and DMA Data Transfer Modes You can set the multiword DMA mode and identify the PIO data-transfer mechanism and transfer mode with the Set Features command. To set the multiword DMA mode: 1. Write Set Features command value 03H (Set Data Transfer mode) to the Features register. 2. Write a transfer types value to the Sector Count register. The upper 5 bits of this value define the type of data transfer, and the lower 3 bits encode the mode value.

This changes word 63 of the Identify Drive command to the mode you enter in the Sector Count register. The following table identifies allowable transfer types values: Data-Transfer Mechanism Mechanism name PIO Transfer Mode (default) PIO Transfer Mode: Set PIO Mode = 2 PIO Flow Control Transfer Mode: Set PIO Mode = 0 PIO Flow Control Transfer Mode: Set PIO Mode = 1 PIO Flow Control Transfer Mode: Set PIO Mode = 2 PIO Flow Control Transfer Mode: Set PIO Mode = 3 PIO Flow Control Transfer Mode: Set PIO Mode = 4 Multiword DMA Mode Multiword DMA Mode Multiword DMA Mode Reserved Mode value 2 2 0 1 2 3 4 0 1 2 -- Transfer Types value Data Lower 3 bits Upper 5 bits 00000 00000 00001 00001 00001 00001 00001 00100 00100 00100 01000 000 001 000 001 010 011 100 000 001 010 nnn If the drive does not support a commanded mode, the drive returns an Aborted Command error. 30 Medalist 630xe and 850xe ATA Product Manual, June 1996 If the drive receives a Set Features command with a Mechanism and mode value of 00000 001 and the drive supports disabling of IORDY, then the drive sets its default PIO transfer mode and disables IORDY. 3.

3.4 Set Multiple Mode command (C6H) The Set Multiple Mode command (C6H) establishes the number of sectors that make a transferable block and enables the drive to perform Read and Write Multiple operations. You do not have to issue this command before every Read Multiple or Write Multiple command. The Sector Count register is loaded with the number of sectors per block. Drives normally support block sizes of 2, 4, 8 and 16 sectors. However, other block-size values may also be supported, depending on the size of the drive's buffer. After receiving the Set Multiple Mode command, the drive sets BSY=1 and checks the Sector Count register. If the Sector Count register contains a valid value and the block count is supported, the Read Multiple or Write Multiple command is enabled, and the Sector Count register value is used for all subsequent Read Multiple and Write Multiple commands. If a block count is not supported, an Aborted Command error is posted and the Read Multiple or Write Multiple command is disabled. If the Sector Count register contains 0 when the command is issued, the Read Multiple or the Write Multiple command is disabled.

The drive reverts to Read Multiple disabled and Write Multiple disabled following a power-on or a hardware reset. If Disable Default (66H) is set in the Set Features command, the current mode is retained following a software reset. 3.3.5 Read Multiple command (C4H) The Read Multiple command (C4H) is similar to the Read Sectors command.

@@The Set Multiple Mode command is used to determine the number of sectors that constitute a transferable block. It must be executed before the Read Multiple command. Interrupts are generated when DRQ is set to 1 at the beginning of each block or partial block. When the Read Multiple command is issued, the Sector Count register contains the number of sectors (not the number of blocks or the block count) requested. If the number of requested sectors is not evenly divisible by the block count, as many full blocks as possible are transferred followed by the final, partial block.

The partial block transfer is for n sectors, where n = remainder (sector count / block count) If the Read Multiple command is attempted before the Set Multiple Mode is set or when the Read Multiple commands are disabled, the Read Multiple operation is rejected with an Aborted Command error. Disc errors encountered during Read Multiple commands are posted at the beginning of the block or partial block transfer. DRQ is set and the data transfer takes place as normal. The corrupted data, if any, is included in the transfer. The contents of the Command Block registers, following the transfer of a data block that had a sector in error, are undefined. @@@@The Set Multiple Mode command is used to determine the number of sectors that constitute a transferable block. It must be executed before the Write Multiple command. When the Write Multiple command is issued, the Sector Count register contains the number of sectors (not the number of blocks or the block count) requested. If the number of requested sectors is not evenly divisible by the block count, as many full blocks as possible are transferred followed by the final, partial block. The partial-block transfer is for n sectors, where n = remainder (sector count / block count) If the Write Multiple command is attempted before the Set Multiple Mode command is set or when Write Multiple commands are disabled, the Write Multiple operation is rejected with an aborted command error.



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Disc errors encountered during Write Multiple commands are posted after the attempted disc write of the block or partial block. The Write 32 Medalist 630xe and 850xe ATA Product Manual, June 1996 command ends with the sector in error, even if it was in the middle of a block. Subsequent blocks are not transferred in the event of an error. Interrupts are generated when DRQ is set at the beginning of each block or partial block. The contents of the Command Block registers are undefined when they follow the transfer of a data block that had a sector in error. 3.4 Onboard drive diagnostics During startup, the drive executes a series of diagnostic tests. If the diagnostic tests detect an error, the drive uses the LED to indicate the nature of the error by emitting a flash code. A subset of the error flash codes is contained in the following table: Number of flashes Irregular flashes 2 3 4 5 Error code description Microprocessor error ROM checksum error External RAM error I/O chip error Buffer RAM error 3.5 ECC performance tests The drive does not report ECC errors when it performs on-the-fly error correction.

This allows the drive to correct the data without sacrificing performance. Some older drive diagnostic utilities test the drive's ability to apply ECC by creating small data errors and then checking to see if these errors are reported. If you run one of these tests on a drive that is functioning properly, the test may report that the drive is failing to detect ECC errors. However, this does not mean that the drive is malfunctioning. Medalist 630xe and 850xe ATA Product Manual, June 1996 33 3.

6 Supported BIOS The drive uses 16 bytes of ECC with Read Long and Write Long commands. If the computer BIOS expects less than 16 bytes, some drive diagnostics may return false failures (typically time-out errors). If so, you must reconfigure the computer to receive 4 bytes of ECC. The BIOS revisions listed in the following table are fully compatible with the ATA interface the drive uses. Earlier BIOS revisions than those listed may not fully support the ATA interface as implemented on the drive.

BIOS manufacturer American Megatrends Award Quadtel Phoenix Phoenix BIOS Version supported Dated 4/9/90 or later 3.04 or higher Single drive, any version Dual drive, 3.04 or higher ROM BIOS Plus 286, 3.10 or higher ROM BIOS Plus 386, 1.10 or higher 1.00 or higher Seagate Technology, Inc. 920 Disc Drive, Scotts Valley, California 95066, USA Publication Number: 39301-201, June 1996, Printed in USA .



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