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You can read the recommendations in the user guide, the technical guide or the installation guide for MAXTOR ST310014ACE. You'll find the answers to all your questions on the MAXTOR ST310014ACE in the user manual (information, specifications, safety advice, size, accessories, etc.). Detailed instructions for use are in the User's Guide.

User manual MAXTOR ST310014ACE
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ST310014ACE
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Ultra ATA Interface Drive
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Product Manual
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Manual abstract:

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21 vi ST310014ACE Product Manual, Rev. D ST310014ACE Product Manual, Rev. D 1 Introduction This manual describes the functional, mechanical and interface specifications for the ST310014ACE. This drive provides the following key features: · Low power consumption · High instantaneous (burst) data-transfer rates (up to 100 Mbytes per second) using Ultra DMA mode 5 · Giant magnetoresistive (GMR) recording heads and GPRML technology, which provide the drives with increased areal density · State-of-the-art cache and on-the-fly error-correction algorithms · Full-track multiple-sector transfer capability without local processor intervention · Quiet operation · 350 Gs nonoperating shock · SeaTools diagnostic software performs a drive self-test that eliminates unnecessary drive returns. · Support for S.M.A.R.T. drive monitoring and reporting · Support for drive self-test (DST) with S.M.A.R.T.

Execute Off-line Immediate · Support for Read Multiple and Write Multiple commands · Support for autodetection of master/slave drives that use cable select (CSEL) 2 ST310014ACE Product Manual, Rev. D Specification summary table The specifications listed in this table are for quick reference. For details on specification measurement or definition, see the appropriate section of this manual. Drive Specification Formatted Gbytes (×106 bytes) ST310014ACE 10.0 20,005,650 512 63 16 16,383 1 1 376,200 58,000 21,800 5,400 366 100 PIO modes 04 Multiword DMA modes 02 Ultra DMA modes 05 2 19.99 101.9 147.0 455 grams (1.0 lb) 12.7 1.

2 (read) 2.0 (write) 18.0 (read) 24.9 (write) 36.8 (read); 42.

0 (write) 7 sec Guaranteed sectors Bytes per sector Default sectors per track Default read/write heads Default cylinders Physical read/write heads Discs Recording density BPI (bits/inch max) Track density TPI (tracks/inch) Areal density (Mbits/inch² max) Spindle speed (RPM) Internal data-transfer rate (Mbits/sec max) I/O data-transfer rate (Mbytes/sec max) ATA data-transfer modes supported Cache buffer (Mbytes) Height (mm max) Width (mm max) Length (mm max) Weight (typical) Average seek time (msec typical) Track-to-track seek time (msec typical) Read/write seek time (msec typical) Full-stroke seek time (msec typical) Power-on to ready (sec max) ST310014ACE Product Manual, Rev. D Drive Specification Standby to ready (sec typical) Spindown (sec typical) Startup current (typical) Seek power (typical) Read/Write power (typical) Idle mode power (typical) Standby mode power (typical) Sleep mode (typical) Voltage tolerance (including noise) Ambient temperature Temperature gradient (°C per hour max) Relative humidity (op. and nonop.) Relative humidity gradient Wet bulb temperature (°C max) Altitude, operating Altitude, nonoperating (meters relative to mean sea level) Shock, operating (Gs max at 2

msec) Shock, nonoperating (Gs max at 1 and 2 msec) Vibration, operating Vibration, nonoperating Drive acoustics Sound power in bels Nonrecoverable read errors Mean time between failures (power-on hours) Contact start-stop cycles (25°C, 40% relative humidity) SeaShield ST310014ACE 6.5 sec 10 sec 0.9 amps (5V), 1.9 amps (12V) 6.0 watts 5.5 watts 4.5 watts 1.2 watts 1.0 watts 5V ± 5%, 12V ± 10% 0° to 60°C (op.), 40° to 70°C (nonop.) 20°C 5% to 90% (op.) 5% to 95% (nonop.)

) 30% per hour max 29.4 (op.), 40.0 (nonop.) 60.96 m to 3,048 m (200 ft to 10,000+ ft) 3 121.92 m to 12,192 m (400 ft to 40,000+ ft) 63 Gs 350 Gs 0.5 Gs (0 to peak, 22350 Hz) 5 Gs (0 to peak, 22350 Hz) Idle: 2.6 (typical), 2.8 (max) Seek: 2.

7 (typical), 2.9 (max) 1 per 1013 bits read 600,000 50,000 No 4 ST310014ACE Product Manual, Rev.



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D 1.0 Drive specifications Unless otherwise noted, all specifications are measured under ambient conditions, at 25°C, and nominal power. For convenience, the phrases the drive and this drive are used throughout this manual to indicate the ST310014ACE.

1.1 Formatted capacity Drive Model ST310014ACE Formatted Gbytes 10.0 Guaranteed sectors 20,005,650 Bytes per sector 512 1.1.1 Default logical geometry CHS Mode ST310014ACE Cylinders 16,383 Read/Write heads 16 Sectors per track 63 LBA Mode When addressing drive in LBA mode, all blocks (sectors) are consecutively numbered from 0 to n-1, where n is the number of guaranteed sectors as defined above.

1.2 Physical organization Drive Model ST310014ACE Read/Write heads (GMR) 1 Number of discs 1 1.3 Recording and interface technology Interface Recording method Recording density BPI (bits/inch) Track density TPI (tracks/inch) Areal density (Mbits/inch² max) Spindle speed (RPM) (± 0.2%) Internal data-transfer rate (Mbits/sec max) ATA 96/102 GPRML 376,200 58,000 21,800 5,400 366 ST310014ACE Product Manual, Rev. D I/O data-transfer rate (Mbytes/sec max) Interleave Cache buffer (Mbytes) 16.6 (PIO mode 4) 100 (Ultra DMA mode 5) 1:1 2 5 1.4 Physical characteristics Drive Specification Maximum height Maximum width Maximum length Typical weight ST310014ACE mm (inches) mm (inches) mm (inches) grams (pounds) 19.99 (0.787) 101.9 (4).

01) 147.0 (5.78) 455 (1.0) 1.5 Start/stop times Power-on to Ready (sec) Standby to Ready (sec) Ready to spindle stop (sec) 6.5 (typical) 6.5 (typical) 10 (typical) 1.6 Seek times Average seek time (msec typical) Track-to-track seek time (msec typical) Read/write seek time (msec typical) Full-stroke seek time (msec typical) Power-on to ready (sec max) 12.7 1.2 (read) 2.

0 (write) 18.0 (read) 24.9 (write) 36.8 (read); 42.0 (write) 7 sec Seek measurements are taken with nominal power at 25°C ambient temperature.

All times are measured using drive diagnostics. Seek time specifications 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 5,000 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 typical value is determined by averaging 100 full-stroke seeks in both directions.

6 ST310014ACE Product Manual, Rev. D Note. These drives are designed to meet the seek times represented in this manual consistently. Physical seeks, regardless of mode (such as track-to-track and average), are expected to meet or exceed the noted values. However, due to the manner in which these drives are formatted, benchmark tests that include command overhead or measure logical seeks may produce results that vary from these specifications. 1.7 Power specifications The drive receives DC power (+5V or +12V) through a four-pin standard drive power connector. 1.7.1 Power consumption Power requirements for the drives are listed in the table on page 9.

Typical power measurements are based on an average of drives tested, under nominal conditions, using 5.0V input voltage at 25°C ambient temperature. · Spinup power Spinup power is measured from the time of power-on to the time that the drive spindle reaches operating speed. · Seek Mode The read/write actuator arm moves in a random seek mode, with 80% of the time spent seeking randomly among all the logical blocks, and 20% of the time idle. The current is measured over a 10-second period. No data is read or we and Standby mode, the drive accepts all commands and returns to Active mode when disc access is necessary. 1.8 Environmental tolerances 1.8.1 Ambient temperature Ambient temperature is defined as the temperature of the environment immediately surrounding the drive.

Actual drive case temperature should not exceed 65°C (149°F) within the operating ambient conditions. Recommended measurement locations are shown in Figure 4 on page 19. Above 1,000 feet (305 meters), the maximum temperature is derated linearly to 112°F (44°C) at 10,000 feet (3,048 meters). Operating Nonoperating 0° to 60°C (32° to 131°F) 40° to 70°C (40° to 158°F) 1.8.

2 Temperature gradient Operating/Nonoperating 20°C per hour (36°F per hour) max, without condensation 10 ST310014ACE Product Manual, Rev. D 1.8.3 Humidity 1.8.

3.1 Relative Humidity Operating Nonoperating 5% to 90% noncondensing (30% per hour max) 5% to 95% noncondensing (30% per hour max) 1.8.3.2 Wet bulb temperature Operating Nonoperating 29.4°C (84°F) max 40.0°C (104°F) max 1.8.4 Altitude Operating Nonoperating 60.96 m to 3,048 m (200 ft to 10,000+ ft) 121.

92 m to 12,192 m (400 ft to 40,000+ ft) 1.8.5 Shock All shock specifications assume that the drive is mounted securely with the input shock applied at the drive mounting screws. Shock may be applied in the X, Y or Z axis. 1.8.5.1 Operating shock These drives comply with the performance levels specified in this document when subjected to a maximum operating shock of 63 Gs (based on half-sine shock pulses of 2 msec). Shocks should not be repeated more than two times per second. 1.

8.5.2 Nonoperating shock The nonoperating shock level that the drive can experience without incurring physical damage or degradation in performance when subsequently put into operation is 350 Gs (based on nonrepetitive half-sine shock pulses of 1 and 2 msec duration). 1.8.

6 Vibration All vibration specifications assume that the drive is mounted securely with the input vibration applied at the drive mounting screws. Vibration may be applied in the X, Y or Z axis. ST310014ACE Product Manual, Rev. D 11 1.8.

6.1 Operating vibration The following table lists the maximum vibration levels that the drive may experience while meeting the performance standards specified in this document. 521 Hz 22350 Hz 351500 Hz 0.02-inch displacement (peak to peak) 0.5 Gs acceleration (zero to peak) 0.25 Gs acceleration (zero to peak) 1.8.6.2 Nonoperating vibration The following table lists the maximum nonoperating vibration that the drive may experience without incurring physical damage or degradation in performance when subsequently put into operation. 521 Hz 22350 Hz 351500 Hz 0.

2-inch displacement (peak to peak) 5.0 Gs acceleration (zero to peak) 1.0 Gs acceleration (zero to peak) 1.9 Drive acoustics Drive acoustics are measured as overall A-weighted acoustic sound power levels (no pure tones). All measurements are generally consistent with ISO document 7779. Sound power measurements were taken under essentially free-field conditions over a reflecting plane. For all tests, the drive was oriented with the cover facing upward.

Note. For seek mode tests, the drive was placed in seek mode only.



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Notes: 1.

The drive supports both host and drive cable detection. The host detects the 80-conductor cable by sampling pin 34, CBLID, on the interface bus. The drive detects the 80-conductor cable by sensing a capacitor at the host side through the CBLID signal. The result is reported in a Fast Rise Detected bit (bit 13 of word 93 in the Identify drive parameter block). 2. When using a 40-pin 80-conductor cable, attach the blue connector to the motherboard, the black connector to the master drive, and the grey connector to the slave. ST310014ACE Product Manual, Rev. D 19 2.1 Drive mounting You can mount the drive in any orientation using four screws in the sidemounting holes or four screws in the bottom-mounting holes. See Figure 3 for drive mounting dimensions.

Follow these important mounting precautions when mounting the drive: · Allow a minimum clearance of 0.030 inches (0.76 mm) around the entire perimeter of the drive for cooling. · Use only 6-32 UNC mounting screws. Insert the screws no more than 0.20 inch (5.08 mm) into the bottom mounting holes and no more than 0.14 inch (3.55 mm) into the side mounting holes. · Do not overtighten the mounting screws (maximum torque: 6 inch-lb).

· Do not use a drive interface cable that is more than 18 inches long. 4.000 in. (101.600 mm) Notes: 1.

Dimensions are shown in inches (mm) Dimensions are per SFF-8301 specification 0.787 in. max (19.99 mm) 0.250 in. max (6.350 mm) 1.140 +0.024 in. 0.015 (28.956 +0.635 mm) 0.381 0.226 in.

(5.750 mm) 2.229 in. (56.616 mm) 2.829 in. (71.856 mm) 3.717 ± 0.30 in.

(94.406 ± 0.762 mm) 0.176 ± 0.015 in.

(4.480 ± 0.381 mm) 1.683 +0.025 in.

0.015 (41.605 +0.635 mm) 0.381 5.770 +0.015 in. 0.005 (146.56 +0.

38 mm) 0.13 2X 1.645 +0.020 in. 0.010 (41.783 +0.508 mm) 0.254 4.000 +0.

025 in. 0.015 (101.60 +0.635 mm) 0.

381 2X 1.750 +0.020 in. 0.010 (44.

450 +0.508 mm) 0.254 4X 6-32 UNC-2B max. insertion depth 0.22 in. 3X 6-32 UNC-2B max. insertion depth 0.14 in. both sides 0.125 in.

(3.175 mm) 3.750 ± 0.10 in. (95.250 ± 0.254 mm) 4.000 +0.015 in. 0.

005 (101.60 +0.381 mm) 0.127 Figure 4. Mounting dimensions--top, side and end view 20 ST310014ACE Product Manual, Rev.

D 3.0 ATA interface These drives use the industry-standard ATA task file interface that supports 16-bit data transfers. It supports ATA programmed input/output (PIO) modes 04; multiword DMA modes 02, and Ultra DMA modes 05. The drive also supports the use of the IORDY signal to provide reliable high-speed data transfers. You can use a daisy-chain cable to connect two drives to a single AT host bus.

For detailed information about the ATA interface, refer to the draft of AT Attachment with Packet Interface Extension (ATA/ATAPI-Rev 6), NCITS T13 I153D, subsequently referred to as the Draft ATA-Rev 6 Standard. 3.1 ATA interface signals and connector pins Figure 5 on page 21 summarizes the signals on the ATA interface connector that the drive supports. For a detailed description of these signals, refer to the Draft ATA-Rev 6 Standard. ST310014ACE Product Manual, Rev. D Drive pin # 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 Host pin # and signal description 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 Hardware Reset Ground Host Data Bus Bit 7 Host Data Bus Bit 8 Host Data Bus Bit 6 Host Data Bus Bit 9 Host Data Bus Bit 5 Host Data Bus Bit 10 Host Data Bus Bit 4 Host Data Bus Bit 11 Host Data Bus Bit 3 Host Data Bus Bit 12 Host Data Bus Bit 2 Host Data Bus Bit 13 Host Data Bus Bit 1 Host Data Bus Bit 14 Host Data Bus Bit 0 Device Data (15:0) Ground (No Pin) DMA Request Ground Device I/O Write: Stop Ultra DMA Burst Ground Device I/O Read: Host Ultra DMA Ready: Host Ultra DMA Data Strobe Ground I/O Channel Ready Device Ultra DMA Ready Device Ultra DMA Data Strobe Cable Select DMA Acknowledge Ground Device Interrupt Reserved Host Address Bus Bit 1 Passed Diagnostics Cable Assembly Type Identifier Device Address (2:0) Device Address (2:0) Chip Select (1:0) Chip Select (1:0) Drive Active/Slave Present Ground 21 Signal name Reset Ground DD7 DD8 DD6 DD9 DD5 DD10 DD4 DD11 DD3 DD12 DD2 DD13 DD1 DD14 DD0 DD15 Ground (removed) DMARQ Ground DIOW STOP Ground DIOR HDMARDY HSTROBE Ground IORDY DDMARDY DSTROBE CSEL DMACK Ground INTRQ IOCS16 DA1 PDIAG CBLID DA0 DA2 CS0 CS1 DASP Ground Pins 28, 34 and 39 are used for master-slave communication (details shown below). Drive 1 (slave) 28 34 39 Drive 0 (master) 28 34 39 CSEL PDIAG DASP Host 28 34 39 Figure 5. I/O pins and supported ATA signals 22 ST310014ACE Product Manual, Rev. D 3.1.

1 Supported ATA commands The following table lists ATA-standard commands that the drive supports. For a detailed description of the ATA commands, refer to the Draft ATA-Rev 6 Standard. See Section 3.1.4 on page 30 for details and subcommands used in the S.M.A.R.T. implementation.

Command name Command code (in hex) ATA-standard commands Download Microcode Execute Device Diagnostics Flush Cache Format Track Identify Device Initialize Device Parameters Read Buffer Read DMA Read Multiple Read Sectors Read Verify Sectors Read Native Max Address Recalibrate Seek Set Features Set Multiple Mode Set Max Address S.M.A.R.T.

Write Buffer Write DMA 92H 90H E7H 50H ECH 91H E4H C8H, C9H C4H 20H, 21H 40H, 41H F8H 10H 70H EFH C6H F9H B0H E8H CAH, CBH ST310014ACE Product Manual, Rev. D Command name Write Multiple Write Sectors Command code (in hex) C5H 30H, 31H 23 ATA-standard power-management commands Check Power Mode Idle Idle Immediate Sleep Standby Standby Immediate 98H or E5H 97H or E3H 95H or E1H 99H or E6H 96H or E2H 94H or E0H ATA-standard security commands Security Set Password Security Unlock Security Erase Prepare Security Erase Unit Security Freeze Lock Security Disable Password F1H F2H F3H F4H F5H F6H 3.1.2 Identify Drive command The Identify Drive command (command code ECH) transfers information about the drive to the host following power up. @@All reserved bits or words should be set to zero.

@@See Section 1 of this manual for default parameter settings. @@@@D Word 50 51 52 53 54 55 56 57 58 59 Description Device-specific standby timer value PIO data-transfer cycle timing mode Retired Words 5458, 6470 and 88 are valid Number of current logical cylinders Number of current logical heads Number of current logical sectors per logical track Current capacity in sectors Number of sectors transferred during a Read Multiple or Write Multiple command Total number of user-addressable LBA sectors available (see Section 2.2.3 for related information) 62 63 Retired Multiword DMA active and modes supported (see note following this table) Advanced PIO modes supported (modes 3 and 4 supported) Minimum multiword DMA transfer cycle time per word (120 nsec) 1,314,312 25 Value 0000H 0200H 0200H 0007H xxxxH xxxxH xxxxH xxxxH 6061 0000H xx07H 64 0003H 65 0078H 26 Word 66 ST310014ACE Product Manual, Rev.



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D Description Recommended multiword DMA transfer cycle time per word (120 nsec) Minimum PIO cycle time without IORDY flow control (240 nsec) Minimum PIO cycle time with IORDY flow control (120 nsec) ATA-reserved Queue depth ATA-reserved Major version number Minor version number Command sets supported Command sets supported Command sets support extension Command sets enabled Command sets enable extension Ultra DMA support and current mode (see note following this table) Security erase time Enhanced security erase time Advanced Power Management value Value 0078H 67 00F0H 68 0078H 0000H 0000H 0000H 007EH 0000H 346BH 4B09H 4003H xxxxH xxxxH xxxxH xx3FH 6974 75 7679 80 81 82 83 84 85 86 87 88 89 90 91 0000H 0000H 0040H ST310014ACE Product Manual, Rev. D Word 92 93 Description Master Password Revision code Hardware Reset Value (see description following this table) Auto Acoustic Management Setting ATA-reserved Security Status Seagate-reserved ATA-reserved Integrity word Value FFFEH xxxxH 27 94 95127 128 129 159 160 254 255 xxxxH 0000H 0001H xxxxH 0000H xxA5H Note. See the bit descriptions below for words 63, 88 and 93 of the Identify Drive data: Description (if bit is set to 1) Bit 0 1 2 8 9 10 Bit 0 1 2 Word 63 Multiword DMA mode 0 is supported. Multiword DMA mode 1 is supported. Multiword DMA mode 2 is supported. Multiword DMA mode 0 is currently active.

Multiword DMA mode 1 is currently active. Multiword DMA mode 2 is currently active. Word 88 Ultra DMA mode 0 is supported. Ultra DMA mode 1 is supported. Ultra DMA mode 2 is supported. 28 3 4 5 8 9 10 11 12 13 Bit 13 Bit 07 815 ST310014ACE Product Manual, Rev. D Ultra DMA mode 3 is supported. Ultra DMA mode 4 is supported. Ultra DMA mode 5 is supported. Ultra DMA mode 0 is currently active. Ultra DMA mode 1 is currently active. Ultra DMA mode 2 is currently active. Ultra DMA mode 3 is currently active. Ultra DMA mode 4 is currently active. Ultra DMA mode 5 is currently active.

Word 93 1 = 80-conductor cable detected, CBLID above VIH 0 = 40-conductor cable detected, CBLID below VIL Word 94 Current AAM setting AAM Power on default 3.1.3 Set Features command This command controls the implementation of various features that the drive supports. When the drive receives this command, it sets BSY, checks the contents of the Features register, clears BSY and generates an interrupt. If the value in the register does not represent a feature that the drive supports, the command is aborted.

Power-on default has the read look-ahead and write caching features enabled. The acceptable values for the Features register are defined as follows: 02H 03H Enable write cache (default). Set transfer mode (based on value in Sector Count register). Sector Count register values: 00H Set PIO mode to default (PIO mode 2). 01H Set PIO mode to default and disable IORDY (PIO mode 2). 08H PIO mode 0 ST310014ACE Product Manual, Rev. D 09H PIO mode 1 0AH PIO mode 2 0BH PIO mode 3 0CH PIO mode 4 (default) 20H Multiword DMA mode 0 21H Multiword DMA mode 1 22H Multiword DMA mode 2 40H Ultra DMA mode 0 41H Ultra DMA mode 1 42H Ultra DMA mode 2 43H Ultra DMA mode 3 44H Ultra DMA mode 4 45H Ultra DMA mode 5 05H 42H Enable advanced power management. Auto Acoustic Management FEH Performance Seek 80H Quiet Acoustic Seek 55H 82H AAH Disable read look-ahead (read cache) feature. Disable write cache. Enable read look-ahead (read cache) feature (default).

29 Note. At power-on, or after a hardware or software reset, the default values of the features are as indicated above. 30 ST310014ACE Product Manual, Rev. D 3.1.4 S.M.A.R.T. commands S.M.A.R.T.

provides near-term failure prediction for disc drives. When S.M.A.R.T.

T. is enabled, the drive monitors predetermined drive attributes that are susceptible to degradation over time. If self-monitoring determines that a failure is likely, S.M.A.R.T. makes a status report available to the host. Not all failures are predictable. S.

M.A.R.T. predictability is limited to the attributes the drive can monitor. For more information on S.M.A.R.T. commands and implementation, see the Draft ATA-Rev 6 Standard. SeaTools diagnostic software activates a built-in drive self-test (DST) S.M.A.R.T. T. command for D4H that eliminates unnecessary drive returns. The diagnostic software ships with all new drives and is also available at: <http://seatools.seagate.com>.

This drive is shipped with S.M.A.R.T. features disabled. You must have a recent BIOS or software package that supports S.M.A.R.T.

T. to enable this feature. The table below shows the S.M.A.R.T. command codes that the drive uses. Code in Features Register D0H D1H D2H D3H D4H D5H D6H D7H D8H D9H DAH S.M.

A.R.T. Command S.M.

A.R.T. Read Data Obsolete S.M.

A.R.T. Enable/Disable Attribute Autosave S.M.A.R.T. Save Attribute Values S.M.

A.R.T. Execute Off-line Immediate (runs DST) S.M.A.R.T. Read Log Sector S.M.

A.R.T. Write Log Sector Obsolete S.M.

A.R.T. Enable Operations S.M.

A.R.T. Disable Operations S.M.A.R.T. Return Status Note. If an appropriate code is not written to the Features Register, the command is aborted and 0x04 (abort) is written to the Error register.

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