Using ASM1061R Chip to configure a RAID

The pictures in this guide are for reference only and may differ from the exact settings for the motherboard. The actual setup options will depend on the purchased motherboard. For information about supported RAID, please refer to the model specifications. Because the motherboard specifications might be updated, the content of this documentation will be subject to change without notice.

Building Raid

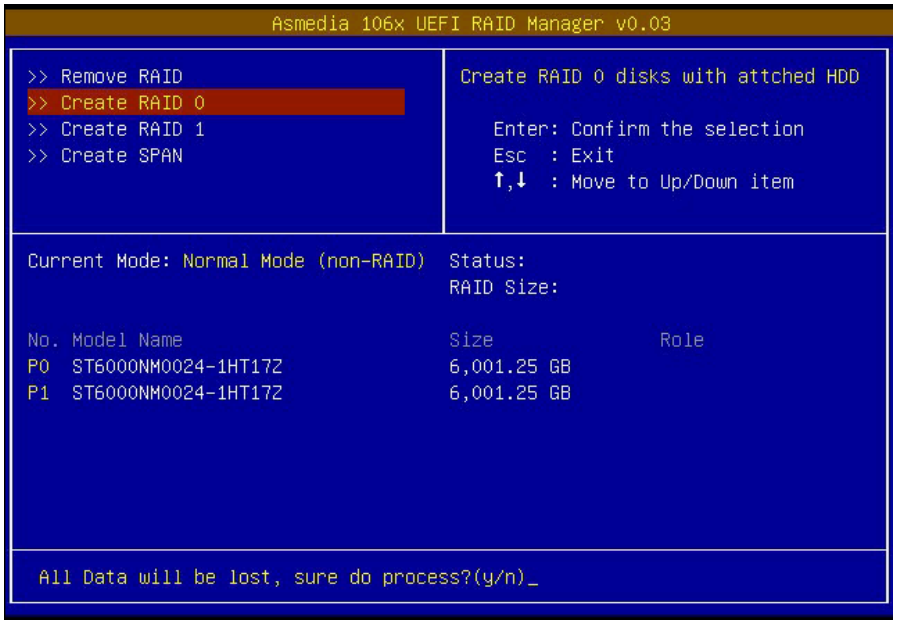
The ASM1061R chip supports three ways to build RAID.

1. Press ctrl + r while booting the system (under ASRR logo)
2. Under Windows
3. Under Linux

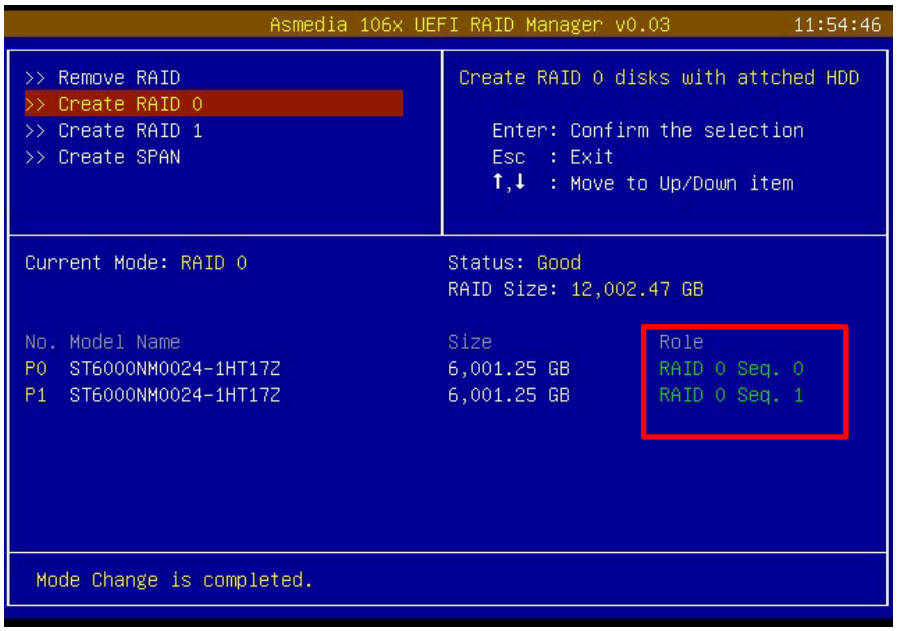
Under ASRR Logo

Press “ctrl + r” to enter the RAID Manager page when the ASRockRack logo appears.

Select the desired RAID mode and press <Enter>, then press y to process the selection.



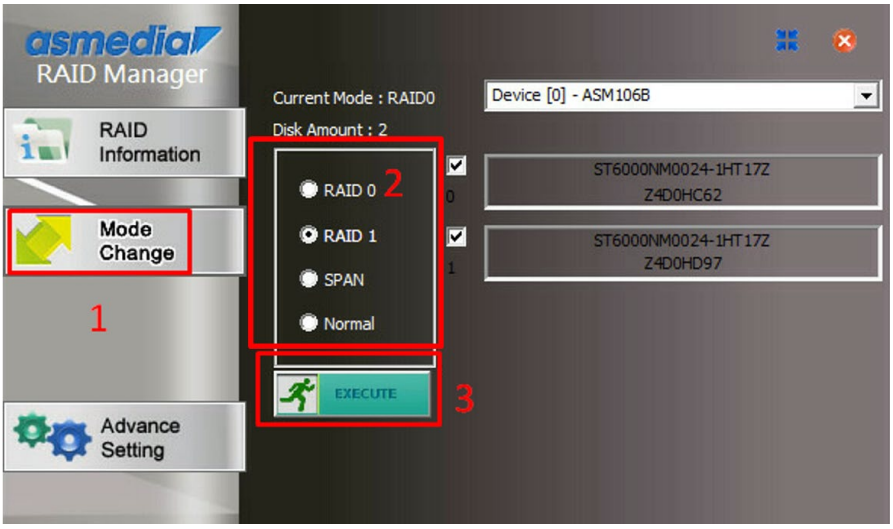
The Role area will show the RAID status after RAID creation is done. Press ESC to leave.



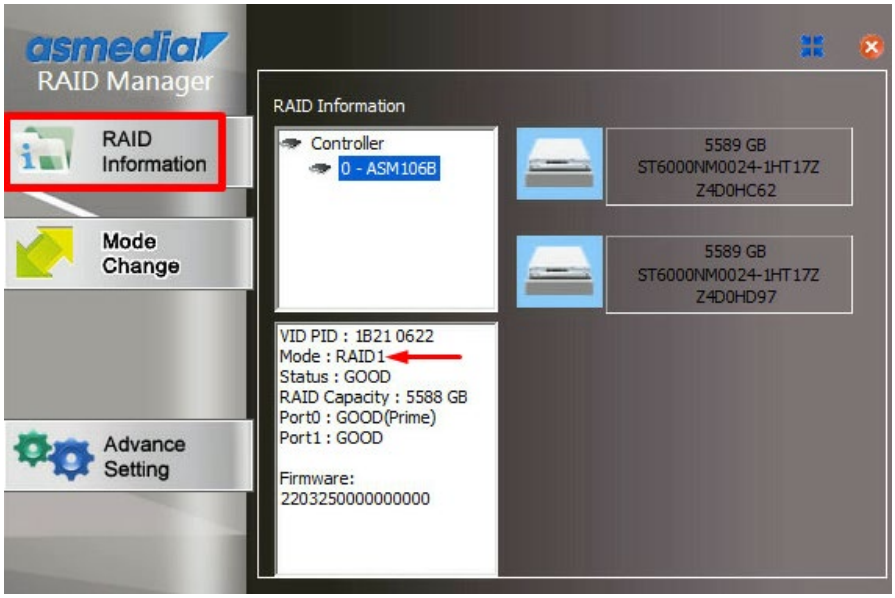
Under Windows

Install the RAID manager utility and enter it by clicking “launch RaidManager tool” icon.

1. Select "Mode Change".
2. Select the RAID mode.
3. Press "EXECUTE" button.



After the process is done, user can press “RAID information” button to check disk info. As the picture below, now is in RAID1 mode.



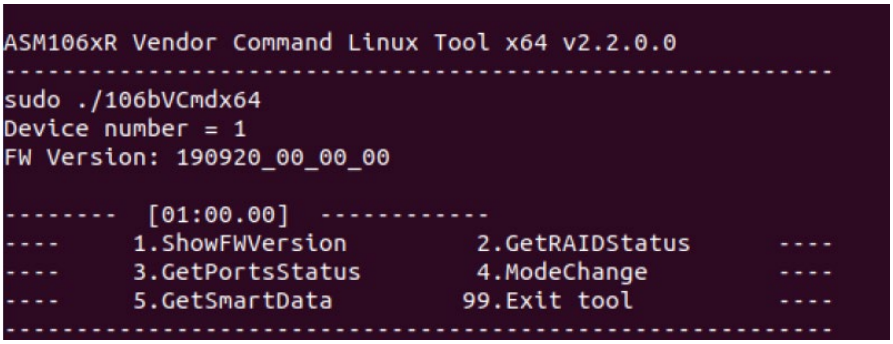
Under Linux

The command tool as below are only for ASM106xR reference and only do vendor command to ASM106xR devices.

(VendorId=1B21 DeviceId=0620, 0621, 0622, 0623 , 0624, 0625)

Use Linux terminal: "$sudo ./106 bVCmd to execute the tool.

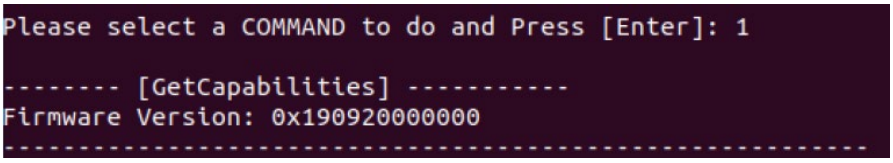
Command Line Tool Help Messages:



1. ShowFWVersion -> Show FW Version Command
2. GetRAIDStatus -> Get RAID Status Command
3. GetPortsStatus -> Get Port Status Command
4. ModeChange -> Mode Change Command
5. GetSmartData -> Get S.M.A.R.T. Data Command

1. Show FW Version Command

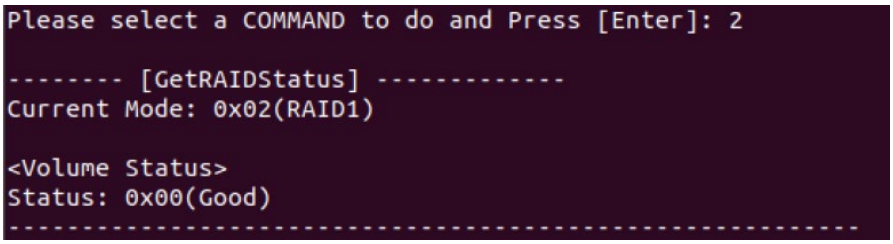
Get Capabilities from ASM106xR.



Show firmware version in 6 bytes.

2. Get RAID Status Command

Get RAID information and status.



--------[GetRAIDStatus]--------

CurrentMode: 0x00(Normal(Non-RAID))

If ASM106xR Current Running Mode is 0x00(Normal)

--------[GetRAIDStatus]--------

Current Mode: 0x02(RAID1)

If ASM106xR Current Running Mode is not 0x00(Normal)

ASM106xR Current Running Mode

0x00 –Normal Mode (Non-RAID)

0x01 –RAID 0

0x02 –RAID 1

0x03 –SPAN

0x10 –Unknown (include Conflicting Arrays)

Other values –Reserved

<Volume Status>

Status: 0x02(Rebuilding)

ASM106xR RAID Status

0x00 –Good. Volume set is healthy. The user's data is accessible.

0x01 –Degraded. Volume set has seen a problem but the user's data is still accessible by using the array's redundancy data.

0x02 –Rebuilding. Volume set is currently being rebuilt. The user's data is accessible.

0x03 -Rebuild Failed. The target of the rebuild operation failed, but the user's data is still available. Another rebuild can be attempted.

0x04 –Data Lost. Volume set has experience enough errors that the user's data has been corrupted, but the user's data is still accessible

0x05 –Migrating. Volume set is currently being migrated. The user's data is not accessible. If the migration result is failed, the RAID status becomes Broken.

0x06 –Verifying. Volume set is currently being verified.

0x07 –Verify Failed. The target of the verify operation failed, but the user's data is still available. Another rebuild or verify can be attempted.

0x08 –Rebuilding Paused. The target of the rebuild operation was paused. The user's data is accessible.

0x09 –Verifying Paused. The target of the verify operation was paused. The user's data is accessible.

0x10 -Not Configured. The array has not been created. The RAID mode can't be determined by firmware (include Conflicting Arrays).

0x11 –Broken. The user's data is no longer accessible.

Other values –Reserved

3. Get Port Status Command

Get physical SATA ports status.

--------[GetPortsStatus] --------

Current Mode: 0x00(Normal(NonRAID))

Number Of physical Ports: 2

ASM106xR Current Running Mode

0x00 –Normal Mode (Non-RAID)

0x01 –RAID 0

0x02 –RAID 1

0x03 –SPAN

0x10 –Unknown (include Conflicting Arrays)

Other values –Reserved

Number Of physical Ports is the Number of physical Sata ports.

<Port 0 Status>

Port Order: 0xFF

Sata Link Speed: SATA Gen 3

ASM106xR RAID Mode Port order

0x00 indicates the device of this port is the first disk of RAID Volume. 0x01 is the second disk and so on. Value 0xFF indicates that can't be determined or not configured.

<Port 1 Status>

Port Order: 0xFF

Sata Link Speed: SATA Gen 3

ASM106xR Current SATA Link Speed

0x00 –Device not present

0x01 –SATA Gen 1

0x02 –SATA Gen 2

0x03 –SATA Gen 3

Other values –Reserved

4. Mode Change Command

Change the RAID mode of ASM106xR.

```
Please select a COMMAND to do and Press [Enter]: 4

-------- [ModeChange] ----------------
Only support 1 volume mode change now.
Only support 2 device ports now. 2 HDDs must be connected to ASM106xR.
Not support VCD volume now.
The order of device port is fixed now.
Mode Change to 0:Normal, 1:RAID0, 2:RAID1, 3:JBOD(Span) : 2
Mode to be changed = RAID 1
Mode Change Success
```

--------[ModeChange] ----------

Only support 1 volume mode change now.

Onlysupport 2 device ports now. 2 HDDs must be connected to ASM106xR.

Not support VCD volume now.

The order of device port is fixed now.

Mode to be changed = RAID 1

Mode Change Success

Doing Mode change command, you need to select which RAID Mode wants to do.

Mode Change Success: The Raid Mode change done.

Mode Change Fail, error code: The Raid Mode change fail, error code list:

0xC0: Command is blocked and can't be executed

0xD0: Sub-command mismatched

0xE0: Command signature is not matched

0xF0: Command unsupported

0xFF: Command executed failed

5. SMART READ DATA Command

Get 512-bytes SMART DATA from specific physical port. This command only available when physical port is connected a HDD or SSD.

```
Please select a COMMAND to do and Press [Enter]: 5

-------- [GetSmartData] -------------
Select Physical Port and Press [Enter] (0~1,[Enter]=0): 1

Get SMART Data from Physical Port: 1
Smart Enable Success
Smart structure version: 0x0001
Index Attribute Name                    Att ID, CurrValue, WorstValue, RawValue(hex)
 0:   Reallocated Sector Count            0x05,      0x64,       0x64, 000000000000
 1:   Power-On Hours                      0x09,      0x63,       0x63, 0000000008D8
 2:   Power Cycle Count                   0x0C,      0x40,       0x40, 000000008CF7
 3:   Available Reserved Space            0xAA,      0x64,       0x64, 000000000000
 4:   SSD Program Fail Count              0xAB,      0x64,       0x64, 000000000000
 5:   SSD Erase Fail Count                0xAC,      0x64,       0x64, 000000000000
 6:   SSD Wear Leveling Count             0xAD,      0x59,       0x59, 000000000086
 7:   Unexpected power loss count         0xAE,      0x63,       0x63, 000000000331
 8:   unknow                             0xB2,      0x64,       0x64, 000000000000
 9:   Unused Reserved Block Count Total   0xB4,      0x64,       0x64, 000000000CC0
10:   End-to-End error                   0xB8,      0x64,       0x64, 000000000000
11:   Reported Uncorrectable Errors       0xBB,      0x64,       0x64, 000000000000
12:   Temperature                         0xC2,      0x4A,       0x2E, 00000000001A
13:   UltraDMA CRC Error Count           0xC7,      0x2D,       0x2D, 00000000D5FD
14:   Media Wearout Indicator             0xE9,      0x58,       0x58, 000000E369CF
15:   Total LBAs Written                  0xF1,      0x63,       0x63, 00000000B96B
16:   Total LBAs Read                     0xF2,      0x63,       0x63, 00000000B75E
17:   NAND Writes (1GiB)                  0xF9,      0x63,       0x63, 000000021820
-------------------------------------------------------------
```

ID	Attribute name	Description
01 0x01	Read Error Rate	(Vendor specific raw value.) Stores data related to the rate of hardware read errors that occurred when reading data from a disk surface. The raw value has different structure for different vendors and is often not meaningful as a decimal number.
02 0x02	Throughput Performance	Overall (general) throughput performance of a hard disk drive. If the value of this attribute is decreasing, there is a high probability that there is a problem with the disk.
03 0x03	Spin-Up Time	Average time of spindle spin up (from zero RPM to fully operational [milliseconds]).
04 0x04	Start/Stop Count	A tally of spindle start/stop cycles. The spindle turns on, and hence the count is increased, both when the hard disk is turned on after having before been turned entirely off (disconnected from power source) and when the hard disk returns from having previously been put to sleep mode.
05 0x05	Reallocated Sectors Count	Count of reallocated sectors. The raw value represents a count of the bad sectors that have been found and remapped. Thus, the higher the attribute value, the more sectors the drive has had to reallocate. This value is primarily used as a metric of the life expectancy of the drive; a drive which has had any reallocations at all is significantly more likely to fail in the immediate months.

06 0x06	Read Channel Margin	Margin of a channel while reading data. The function of this attribute is not specified.
07 0x07	Seek Error Rate	(Vendor specific raw value.) Rate of seek errors of the magnetic heads. If there is a partial failure in the mechanical positioning system, then seek errors will arise. Such a failure may be due to numerous factors, such as damage to a servo, or thermal widening of the hard disk. The raw value has different structure for different vendors and is often not meaningful as a decimal number.
08 0x08	Seek Time Performance	Average performance of seek operations of the magnetic heads. If this attribute is decreasing, it is a sign of problems in the mechanical subsystem.
09 0x09	Power-On Hours	Count of hours in power-on state. The raw value of this attribute shows total count of hours (or minutes, or seconds, depending on manufacturer) in power-on state. "By default, the total expected lifetime of a hard disk in perfect condition is defined as 5 years (running every day and night on all days). This is equal to 1825 days in 24/7 mode or 43800 hours." On some pre-2005 drives, this raw value may advance erratically and/or "wrap around" (reset to zero periodically).
10 0x0A	Spin Retry Count	Count of retry of spin start attempts. This attribute stores a total count of the spin start attempts to reach the fully operational speed (under the condition that the first attempt was unsuccessful). An increase of this attribute value is a sign of problems in the hard disk mechanical subsystem.
11 0x0B	Recalibration Retries or Calibration Retry Count	This attribute indicates the count that recalibration was requested (under the condition that the first attempt was unsuccessful). An increase of this attribute value is a sign of problems in the hard disk mechanical subsystem.
12 0x0C	Power Cycle Count	This attribute indicates the count of full hard disk power on/off cycles.
13 0x0D	Soft Read Error Rate	Uncorrected read errors reported to the operating system.
22 0x16	Current Helium Level	Specific to He8 drives from HGST. This value measures the helium inside of the drive specific to this manufacturer. It is a pre-fail attribute that trips once the drive detects that the internal environment is out of specification.
170 0xAA	Available Reserved Space	See attribute E8.

171 0xAB	SSD Program Fail Count	(Kingston) The total number of flash program operation failures since the drive was deployed. Identical to attribute 181.
172 0xAC	SSD Erase Fail Count	(Kingston) Counts the number of flash erase failures. This attribute returns the total number of Flash erase operation failures since the drive was deployed. This attribute is identical to attribute 182.
173 0xAD	SSD Wear Leveling Count	Counts the maximum worst erase count on any block.
174 0xAE	Unexpected power loss count	Also known as "Power-off Retract Count" per conventional HDD terminology. Raw value reports the number of unclean shutdowns, cumulative over the life of an SSD, where an "unclean shutdown" is the removal of power without STANDBY IMMEDIATE as the last command (regardless of PLI activity using capacitor power). Normalized value is always 100.
175 0xAF	Power Loss Protection Failure	Last test result as microseconds to discharge cap, saturated at its maximum value. Also logs minutes since last test and lifetime number of tests. Raw value contains the following data: ● Bytes 0-1: Last test result as microseconds to discharge cap, saturates at max value. Test result expected in range 25 <= result <= 5000000, lower indicates specific error code. ● Bytes 2-3: Minutes since last test, saturates at max value. ● Bytes 4-5: Lifetime number of tests, not incremented on power cycle, saturates at max value. Normalized value is set to one on test failure or 11 if the capacitor has been tested in an excessive temperature condition, otherwise 100.
176 0xB0	Erase Fail Count	S.M.A.R.T. parameter indicates a number of flash erase command failures.
177 0xB1	Wear Range Delta	Delta between most-worn and least-worn Flash blocks. It describes how good/bad the wearleveling of the SSD works on a more technical way.
179 0xB3	Used Reserved Block Count Total	"Pre-Fail" attribute used at least in Samsung devices.
180 0xB4	Unused Reserved Block Count Total	"Pre-Fail" attribute used at least in HP devices.
181 0xB5	Program Fail Count Total or Non-4K Aligned Access Count	Total number of Flash program operation failures since the drive was deployed. Number of user data accesses (both reads and writes) where LBAs are not 4 KiB aligned (LBA % 8 != 0) or where size is not modulus 4 KiB (block count != 8), assuming logical block size (LBS) = 512 B.

182 0xB6	Erase Fail Count	"Pre-Fail" Attribute used at least in Samsung devices.
183 0xB7	SATA Downshift Error Count or Runtime Bad Block	Western Digital, Samsung or Seagate attribute: Either the number of downshifts of link speed (e.g. from 6Gbps to 3Gbps) or the total number of data blocks with detected, uncorrectable errors encountered during normal operation. Although degradation of this parameter can be an indicator of drive aging and/or potential electromechanical problems, it does not directly indicate imminent drive failure.
184 0xB8	End-to-End error / IOEDC	This attribute is a part of Hewlett-Packard's SMART IV technology, as well as part of other vendors' IO Error Detection and Correction schemas, and it contains a count of parity errors which occur in the data path to the media via the drive's cache RAM.
185 0xB9	Head Stability	Western Digital attribute.
186 0xBA	Induced Op-Vibration Detection	Western Digital attribute.
187 0xBB	Reported Uncorrectable Errors	The count of errors that could not be recovered using hardware ECC (see attribute 195).
188 0xBC	Command Timeout	The count of aborted operations due to HDD timeout. Normally this attribute value should be equal to zero.
189 0xBD	High Fly Writes	HDD manufacturers implement a flying height sensor that attempts to provide additional protections for write operations by detecting when a recording head is flying outside its normal operating range. If an unsafe fly height condition is encountered, the write process is stopped, and the information is rewritten or reallocated to a safe region of the hard drive. This attribute indicates the count of these errors detected over the lifetime of the drive. This feature is implemented in most modern Seagate drives and some of Western Digital's drives, beginning with the WD Enterprise WDE18300 and WDE9180 Ultra2 SCSI hard drives, and will be included on all future WD Enterprise products.
190 0xBE	Temperature Difference or Airflow	Value is equal to (100-temp. °C), allowing manufacturer to set a minimum threshold which corresponds to a maximum temperature. This also follows the convention of 100 being a best-case value and lower values being

	Temperature	undesirable. However, some older drives may instead report raw Temperature (identical to 0xC2) or Temperature minus 50 here.
191 0xBF	G-sense Error Rate	The count of errors resulting from externally induced shock and vibration.
192 0xC0	Power-off Retract Count, Emergency Retract Cycle Count(Fujitsu), or Unsafe Shutdown Count	Number of power-off or emergency retract cycles.
193 0xC1	Load Cycle Count orLoad/Unload Cycle Count (Fujitsu)	Count of load/unload cycles into head landing zone position. Some drives use 225 (0xE1) for Load Cycle Count instead. Western Digital rates their VelociRaptor drives for 600,000 load/unload cycles, and WD Green drives for 300,000 cycles; the latter ones are designed to unload heads often to conserve power. On the other hand, the WD3000GLFS (a desktop drive) is specified for only 50,000 load/unload cycles. Some laptop drives and "green power" desktop drives are programmed to unload the heads whenever there has not been any activity for a short period, to save power. Operating systems often access the file system a few times a minute in the background, causing 100 or more load cycles per hour if the heads unload: the load cycle rating may be exceeded in less than a year. There are programs for most operating systems that disable the Advanced Power Management (APM) and Automatic acoustic management (AAM) features causing frequent load cycles.
194 0xC2	Temperature or Temperature Celsius	Indicates the device temperature, if the appropriate sensor is fitted. Lowest byte of the raw value contains the exact temperature value (Celsius degrees).
195 0xC3	Hardware ECC Recovered	(Vendor-specific raw value.) The raw value has different structure for different vendors and is often not meaningful as a decimal number.
196 0xC4	Reallocation Event Count	Count of remap operations. The raw value of this attribute shows the total count of attempts to transfer data from reallocated sectors to a spare area. Both successful and unsuccessful attempts are counted.

197 0xC5	Current Pending Sector Count	Count of "unstable" sectors (waiting to be remapped, because of unrecoverable read errors). If an unstable sector is subsequently read successfully, the sector is remapped and this value is decreased. Read errors on a sector will not remap the sector immediately (since the correct value cannot be read and so the value to remap is not known, and also it might become readable later); instead, the drive firmware remembers that the sector needs to be remapped, and will remap it the next time it's written. However, some drives will not immediately remap such sectors when written; instead the drive will first attempt to write to the problem sector and if the write operation is successful then the sector will be marked good (in this case, the "Reallocation Event Count" (0xC4) will not be increased). This is a serious shortcoming, for if such a drive contains marginal sectors that consistently fail only after some time has passed following a successful write operation, then the drive will never remap these problem sectors.
198 0xC6	(Offline) Uncorrectable Sector Count	The total count of uncorrectable errors when reading/writing a sector. A rise in the value of this attribute indicates defects of the disk surface and/or problems in the mechanical subsystem.
199 0xC7	UltraDMA CRC Error Count	The count of errors in data transfer via the interface cable as determined by ICRC (Interface Cyclic Redundancy Check).
200 0xC8	Multi-Zone Error Rate	The count of errors found when writing a sector. The higher the value, the worse the disk's mechanical condition is.
200 0xC8	Write Error Rate(Fujitsu)	The total count of errors when writing a sector.
201 0xC9	Soft Read Error Rateor TA Counter Detected	Count indicates the number of uncorrectable software read errors.
202 0xCA	Data Address Mark errors or TA Counter Increased	Count of Data Address Mark errors (or vendor-specific).
203 0xCB	Run Out Cancel	The number of errors caused by incorrect checksum during the error correction.
204 0xCC	Soft ECC Correction	Count of errors corrected by the internal error correction software.

205 0xCD	Thermal Asperity Rate	Count of errors due to high temperature.
206 0xCE	Flying Height	Height of heads above the disk surface. If too low, head crash is more likely; if too high, read/write errors are more likely.
207 0xCF	Spin High Current	Amount of surge current used to spin up the drive.
208 0xD0	Spin Buzz	Count of buzz routines needed to spin up the drive due to insufficient power.
209 0xD1	Offline Seek Performance	Drive's seek performance during its internal tests.
210 0xD2	Vibration During Write	Found in Maxtor 6B200M0 200GB and Maxtor 2R015H1 15GB disks.
211 0xD3	Vibration During Write	A recording of a vibration encountered during write operations.
212 0xD4	Shock During Write	A recording of shock encountered during write operations.
220 0xDC	Disk Shift	Distance the disk has shifted relative to the spindle (usually due to shock or temperature). Unit of measure is unknown.
221 0xDD	G-Sense Error Rate	The count of errors resulting from externally induced shock and vibration.
222 0xDE	Loaded Hours	Time spent operating under data load (movement of magnetic head armature).
223 0xDF	Load/Unload Retry Count	Count of times head changes position.
224 0xE0	Load Friction	Resistance caused by friction in mechanical parts while operating.
225 0xE1	Load/Unload Cycle Count	Total count of load cycles Some drives use 193 (0xC1) for Load Cycle Count instead. See Description for 193 for significance of this number.
226 0xE2	Load 'In'-time	Total time of loading on the magnetic heads actuator (time not spent in parking area).
227 0xE3	Torque Amplification Count	Count of attempts to compensate for platter speed variations.
228 0xE4	Power-Off Retract Cycle	The number of power-off cycles which are counted whenever there is a "retract event" and the heads are loaded off of the media such as when the machine is powered down, put to sleep, or is idle.

230 0xE6	GMR Head Amplitude (magnetic HDDs), Drive Life Protection Status(SSDs)	Amplitude of "thrashing" (repetitive head moving motions between operations). In solid-state drives, indicates whether usage trajectory is outpacing the expected life curve
231 0xE7	Life Left (SSDs) or Temperature	Indicates the approximate SSD life left, in terms of program/erase cycles or available reserved blocks. A normalized value of 100 represents a new drive, with a threshold value at 10 indicating a need for replacement. A value of 0 may mean that the drive is operating in read-only mode to allow data recovery. Previously (pre-2010) occasionally used for Drive Temperature (more typically reported at 0xC2).
232 0xE8	Endurance Remaining or Available Reserved Space	Number of physical erase cycles completed on the SSD as a percentage of the maximum physical erase cycles the drive is designed to endure. Intel SSDs report the available reserved space as a percentage of the initial reserved space.
233 0xE9	Media Wearout Indicator (SSDs) or Power-On Hours	Intel SSDs report a normalized value from 100, a new drive, to a minimum of 1. It decreases while the NAND erase cycles increase from 0 to the maximum-rated cycles. Previously (pre-2010) occasionally used for Power-On Hours (more typically reported in 0x09).
234 0xEA	Average erase count AND Maximum Erase Count	Decoded as: byte 0-1-2 = average erase count (big endian) and byte 3-4-5 = max erase count (big endian).
235 0xEB	Good Block Count AND System(Free) Block Count	Decoded as: byte 0-1-2 = good block count (big endian) and byte 3-4 = system (free) block count.
240 0xF0	Head Flying Hoursor 'Transfer Error Rate' (Fujitsu)	Time spent during the positioning of the drive heads. Some Fujitsu drives report the count of link resets during a data transfer.

241 0xF1	Total LBAs Written	Total count of LBAs written.
242 0xF2	Total LBAs Read	Total count of LBAs read. Some S.M.A.R.T. utilities will report a negative number for the raw value since in reality it has 48 bits rather than 32.
243 0xF3	Total LBAs Written Expanded	The upper 5 bytes of the 12-byte total number of LBAs written to the device. The lower 7 byte value is located at attribute 0xF1.
244 0xF4	Total LBAs Read Expanded	The upper 5 bytes of the 12-byte total number of LBAs read from the device. The lower 7 byte value is located at attribute 0xF2.
249 0xF9	NAND Writes (1GiB)	Total NAND Writes. Raw value reports the number of writes to NAND in 1 GB increments.
250 0xFA	Read Error Retry Rate	Count of errors while reading from a disk.
251 0xFB	Minimum Spares Remaining	The Minimum Spares Remaining attribute indicates the number of remaining spare blocks as a percentage of the total number of spare blocks available.
252 0xFC	Newly Added Bad Flash Block	The Newly Added Bad Flash Block attribute indicates the total number of bad flash blocks the drive detected since it was first initialized in manufacturing.
254 0xFE	Free Fall Protection	Count of "Free Fall Events" detected.