hdparm ATA drive tuning

START HERE

sudo hdparm -I /dev/sdX
Ask drive for identity

sudo hdparm -B /dev/sdX
Power management level

sudo hdparm -tT /dev/sdX
Quick read benchmark

sudo hdparm -S 241 /dev/sdX
Spin down after 30 min

sudo hdparm -C /dev/sdX
Spun up or down?

sudo hdparm -y /dev/sdX
Spin down now

sudo hdparm -W /dev/sdX
Write cache state

sudo hdparm -N /dev/sdX
Show HPA limit

CONCEPTS

hdparm talks ATA to SATA and IDE drives and needs root. Always name the whole device (/dev/sdX), not a partition.

Visible disk what the OS sees
- **HPA** -N hides the tail
  - **DCO** vendor-level limits
    - **Native drive** true capacity

Settings such as -B, -S and -W are lost at power-off. Re-apply them at boot via udev or a service.

Options marked dangerous in the man page can destroy data or the drive. Back up, and double-check the device name.

IDENTIFY AND INFO

hdparm -I *<dev>*
Query drive for full identify data

hdparm -i *<dev>*
Show identify data cached at boot
May be stale; -I asks the drive again.

hdparm *<dev>*
Show basic settings (same as -v)

hdparm -g *<dev>*
Show geometry and start offset

hdparm -V
Print hdparm version

hdparm -I *<dev>* **| grep -i model**
Pick out model, serial, firmware

hdparm -z *<dev>*
Re-read partition table

hdparm --fibmap *<file>*
Print physical extents of a file
Must be the only option.

BENCHMARKS

hdparm -t *<dev>*
Time buffered disk reads
Run 2-3 times on an idle system for a sensible figure.

hdparm -T *<dev>*
Time cache reads (CPU and RAM)

hdparm -tT *<dev>*
Run both timings

hdparm -t --direct *<dev>*
Read test bypassing page cache

BENCHMARKS (cont.)

hdparm -t --offset *<GiB>* *<dev>*
Read test at an offset into the disk

hdparm -f *<dev>*
Flush device buffer cache on exit

POWER MANAGEMENT

hdparm -C *<dev>*
Show power mode (active, standby, sleeping)

hdparm -B *<n>* *<dev>*
Set APM level (1-254)
1-127 allows spin-down, 128-254 does not; 255 turns APM off, if supported.

hdparm -B *<dev>*
Show current APM level

hdparm -S *<n>* *<dev>*
Set standby (spin-down) timeout
0 = never; 1-240 = n x 5 s; 241-251 = (n-240) x 30 min.

hdparm -S 0 *<dev>*
Disable the spin-down timer

hdparm -y *<dev>*
Put drive into standby now

hdparm -Y *<dev>*
Put drive to sleep now
Needs a reset before the drive can be used again.

hdparm --idle-immediate *<dev>*
Enter a lower power idle state

hdparm --idle-unload *<dev>*
Idle and park the heads

hdparm -M *<n>* *<dev>*
Set acoustic level (128 quiet, 254 fast)

hdparm -J *<n>* *<dev>*
Set WD idle3 park timer
Takes effect after a full power cycle; 0 disables the timer.

hdparm -K 1 *<dev>*
Keep -APSWXZ settings over soft reset

CACHING AND TUNING

hdparm -W *<dev>*
Show write-cache setting

hdparm -W 0 *<dev>*
Disable write cache
Safer on power loss, but slower writes.

hdparm -W 1 *<dev>*
Enable write cache

CACHING AND TUNING (cont.)

hdparm -A 1 *<dev>*
Enable drive read-lookahead

hdparm -a *<n>* *<dev>*
Set filesystem read-ahead (sectors)

hdparm -r 1 *<dev>*
Mark device read-only

hdparm -r 0 *<dev>*
Mark device read-write

hdparm -Q *<n>* *<dev>*
Set command queue depth

hdparm -R *<0|1>* *<dev>*
Set Write-Read-Verify
Can halve write speed or worse.

hdparm -d *<0|1>* *<dev>*
Set kernel DMA flag

HPA AND DCO

hdparm -N *<dev>*
Show current and native max sectors

hdparm -N *<n>* *<dev>*
Set visible sector count
DANGEROUS: data loss is very likely.

hdparm -N p*<n>* *<dev>*
Set the limit permanently
The p prefix makes it survive power-off.

hdparm --dco-identify *<dev>*
Show DCO-hidden features

hdparm --dco-freeze *<dev>*
Lock DCO until next power-on

hdparm --dco-restore *<dev>*
Reset to factory capacity
EXTREMELY DANGEROUS; man page says do not use.

SECURITY ERASE

hdparm -I *<dev>* **| grep -A8 Security**
Check lock and erase support
Must show 'not frozen' before any security command works.

hdparm --security-set-pass *<pwd>* *<dev>*
Set a user password on the drive
DANGEROUS: a forgotten password locks the drive.

hdparm --security-erase *<pwd>* *<dev>*
Erase the whole drive
Destroys all data.

hdparm --security-erase-enhanced *<pwd>* *<dev>*
Enhanced erase of the drive

SECURITY ERASE (cont.)

hdparm --security-unlock *<pwd>* *<dev>*
Unlock a locked drive

hdparm --security-disable *<pwd>* *<dev>*
Remove the drive password

hdparm --security-freeze *<dev>*
Freeze security until power-off

hdparm --user-master m --security-unlock *<pwd>* *<dev>*
Use the master password instead
--user-master u (user) is the default.

hdparm --security-prompt-for-password ...
Type the password at a prompt
Keeps it out of shell history and /proc.

SECTORS AND SSDS

hdparm --read-sector *<lba>* *<dev>*
Dump one sector in hex
Handy to confirm that a sector is really unreadable.

hdparm --write-sector *<lba>* *<dev>* **--yes-i-know-what-i-am-doing**
Zero a sector (repairs bad ones)
VERY DANGEROUS; destroys that sector.

hdparm --trim-sector-ranges *<lba>*:*<n>* *<dev>* **--yes-i-know-what-i-am-doing**
Discard sectors on an SSD
EXCEPTIONALLY DANGEROUS; data is gone.

RECIPES

Spin down idle disks after 20 minutes

```
sudo hdparm -B 127 /dev/sdX
sudo hdparm -S 240 /dev/sdX
sudo hdparm -C /dev/sdX
```

Compare disks

```
sudo hdparm -tT /dev/sda
sudo hdparm -t --direct /dev/sda
# repeat 2-3 times, idle system
```

Secure erase a SATA drive

```
sudo hdparm -I /dev/sdX | grep -A8 Security
# must say: not frozen
sudo hdparm --user-master u --security-set-pass p /dev/sdX
sudo hdparm --user-master u --security-erase p /dev/sdX
```

Check a suspect sector

```
sudo hdparm --read-sector 123456 /dev/sdX
# read error: confirm with smartctl -a /dev/sdX
```