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

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

BENCHMARKS (cont.)

`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

`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

CACHING AND TUNING (cont.)

`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

`hdparm -m <n> <dev>`
Set multiple-sector I/O count
Some drives corrupt data at certain values; test on a read-only filesystem.

`hdparm -q <option> <dev>`
Suppress output of the next option

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

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

SECURITY ERASE (cont.)

`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-mode m --security-set-pass <pwd> <dev>`
Set maximum security mode

`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
```