Diagnosing and Erasing Hard Drives

If you are evaluating a hard drive, this guide...

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INTRODUCTION

If you are evaluating a hard drive, this guide will show you how to do basic tests to detect common problems. **While these tests are not perfect, most issues can be detected.**

Common drive problems include:

- High hours (Wear and tear)
- Reallocated sectors
- Pending reallocated sectors
- Hidden problems

Why should used hard drives be checked?

Most failures are sudden and without warning, if not known in advance due to lack of symptoms. If the machine is having problems and the issue is caught early, this will give you time to move everything and replace the drive before it fails. While SMART can only do so much, it plays a major role in doing this since the data can give red flags.

IMPORTANT NOTE: Some hard drives have known problems (Ex: Seagate 7.01/7200.11), while others fail due to lower quality standards (Ex: WD Blue/Green). These even when working should be wiped and replaced!

Guide notes

- **While Parted Magic can be redistributed legally per the GPL, I will not point to these downloads as I cannot verify their authenticity.**
- **These tests are not 100% accurate. Some problems can (and do) slip past these tests.**

A word about bad sector remapping:

- **While [WD](WD), HGST, and Seagate offer diagnostic tools, they do not work on drives with serious problems or excessively bad high sectors. For SMALL amounts, this will work; but once you exceed ~100 (most common drive reserve) you will lose capacity and data in such a way it is unrecoverable.**
- **If you can do so before testing, backup your system's data. This can cause your drive to fail if it dies during testing. Drives with SMART errors SHOULD NOT BE FIXED; backup, replace, and wipe the bad drive.**

TOOLS:

External M.2 SSD NVMe Enclosure (1)
Universal Drive Adapter (1)
Parted Magic (1)
If your drive failed, this can be used for erasure.
Ubuntu ISO image (1)
ATA Secure Erase unsupported out of the box.
USB Flash Drive (1)
*Used to boot Parted Magic or Ubuntu.*

PARTS:

Hard Drive (1)

Step 1 — Mounting the hard drive for testing

- If the drive is not installed in a PC, a USB adapter can be used. **If you are using an M.2 SSD (NVMe or SATA) you will need a different enclosure than shown in these guide photos.**

- If the hard drive is not installed and you do not have a USB adapter, it can be plugged into a motherboard.

## Step 2 — (Ubuntu) POH/POC Check
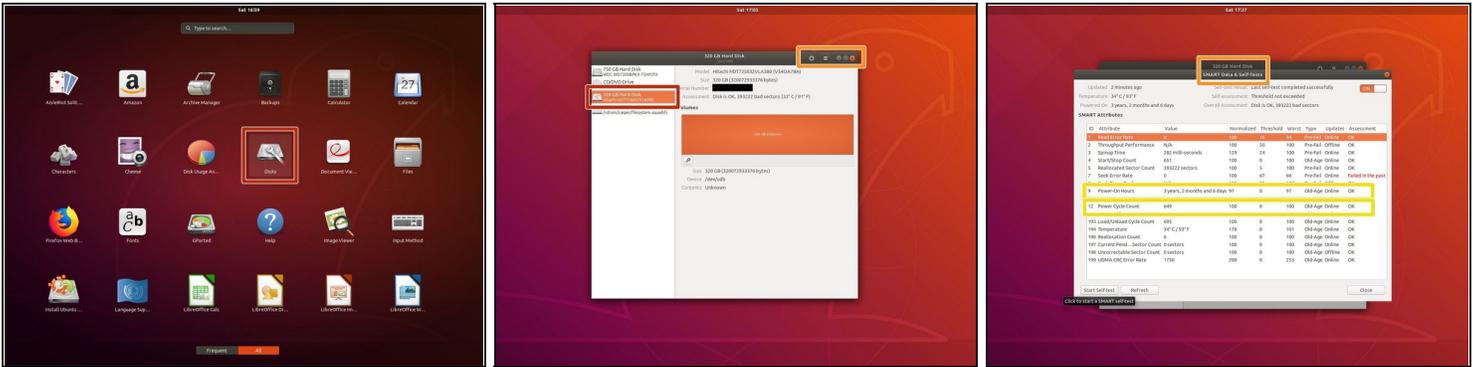
⚠ **While high hours are not an indication of failure, the odds of a failure are much higher.**

ⓘ GSmartControl can be used in Ubuntu if you cannot read the output from Disks.

- Boot your system into a live Ubuntu session. Locate the **Disks** application and select the suspicious hard drive.

- From the drop-down menu, select ***SMART Data and Self Tests***. This will pull up the SMART data.

- Locate the following SMART attributes: ***Power On Hours and Power Cycle Count***.

Step 3 — (Ubuntu) Reallocated sectors and SMART testing
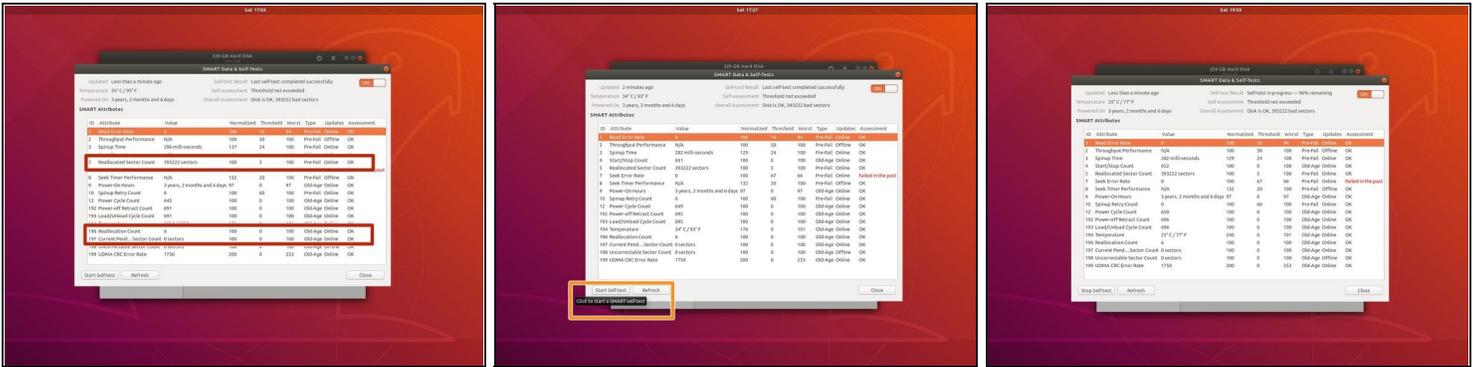
⚠️ **If the Reallocated Sector Count is highlighted with a high count, REPLACE THE DRIVE; they are prone to failure and unexpected capacity loss!** While SMART Extended is better, a quick test may be sufficient.

- Locate the following SMART attributes: ***Reallocated sector count; Current pending sector count.***

- To run a SMART Extended Self-Test, left click ***Start Self-Test***. Select ***Extended*** from the drop-down menu.

Step 4 — (Parted Magic) POH/POC check
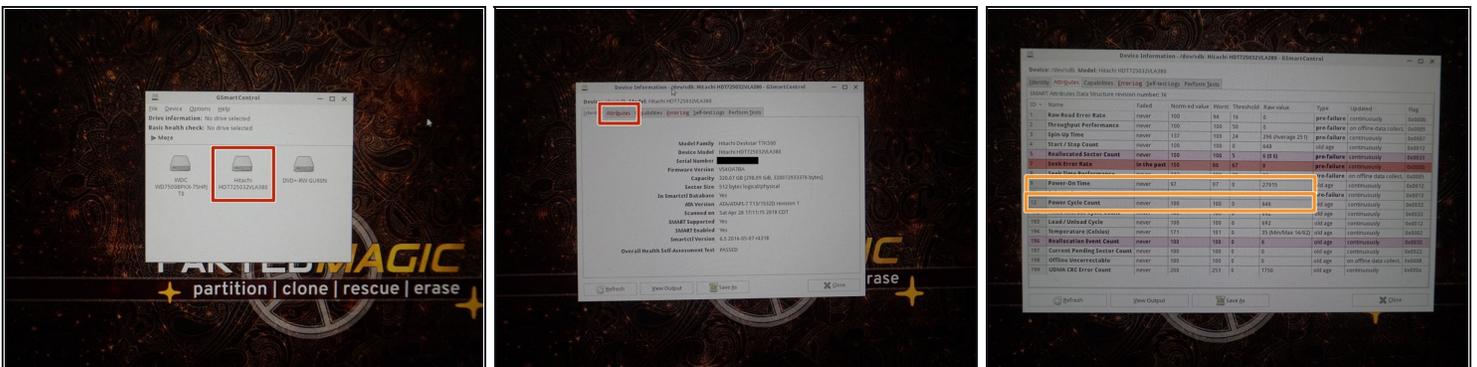
⚠️ **While high hours are not an indication of failure, the odds of a failure are much higher.**

- Select ***Disks*** from the desktop to open GSmartControl.

- Select the hard disk you want to test. Click ***Attributes*** to read the SMART data.

- Locate the following attributes: ***Power On Time and Power Cycle Count***.

Step 5 — (Parted Magic) Reallocated sectors and SMART testing
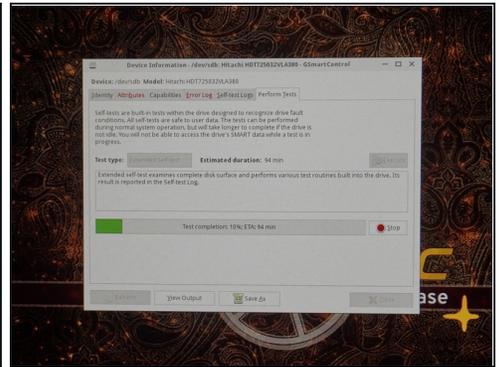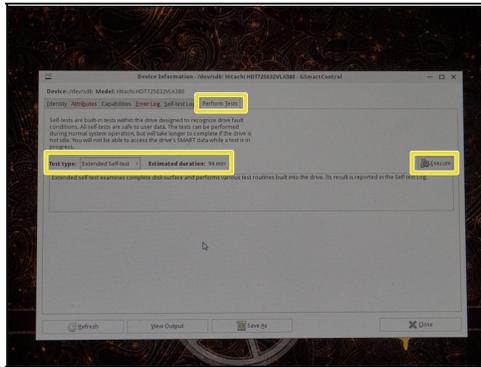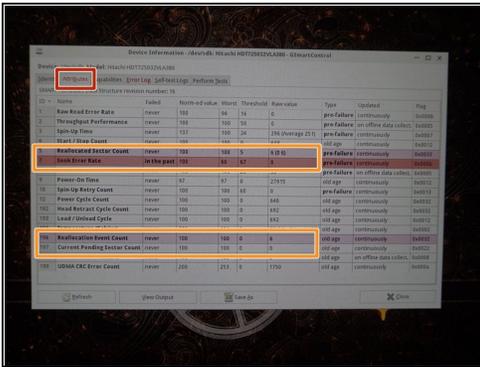
⚠️ **If the Reallocated Sector Count is highlighted with a high count, REPLACE THE DRIVE; they are prone to failure and unexpected capacity loss!** While SMART Extended is better, a quick test may be sufficient.

- In the ***Attributes*** tab, locate the following SMART attributes: ***Reallocated Sector Count; Reallocation Event Count; Current Pending Sector Count***.

- To test the drive, select ***Perform Tests***. Click ***Test type:*** and select ***Extended Self-Test***.

## Step 6 — (Parted Magic) Error log check
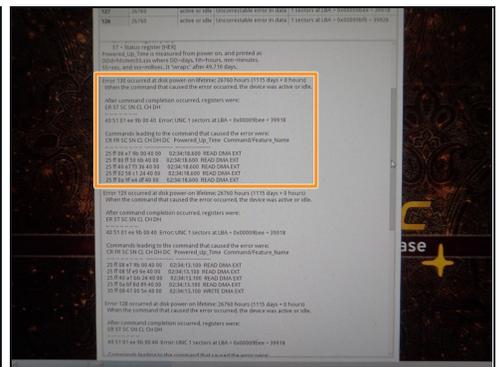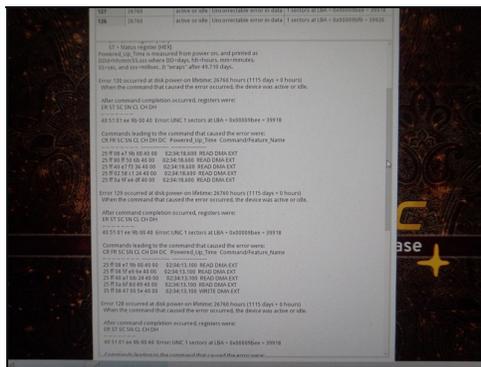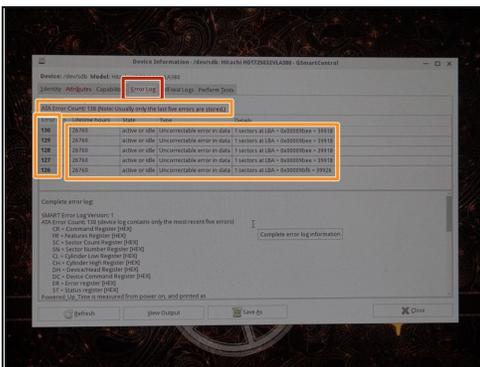
ⓘ ***Use the error log and SMART data together to diagnose drive problems.***

- Check the error log for drive errors. Click the ***Error log*** tab, and review the logs.

- In the Error log, review the available errors. Read these logs if any are found.

Step 7 — (Parted Magic) Erasing hard drives

⚠ **When possible, avoid sector-wiping SSDs. This will reduce the drive liftetime and can be drastic on older 75TBW SSDs.**

⚠ *Your erase options will be limited to the Security Set options supported in the drive firmware.*

📌 Drives without ATA Secure Erase will need to be erased externally. Select **External** and choose Nwipe. ***Run the DoD Short command (3 wipes+drive blanking).***

● *If your drive has a buggy ATA Secure Erase implementation, choose External and erase the drive with Nwipe. SSDs should only be erased with the Secure Erase command.*

● *For NVMe SSDs, the best option is to use NVMe Secure Erase.*