

# Advance Data Recovery

Demystifying Replacement Of read/write head assembly

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# INTRODUCTION

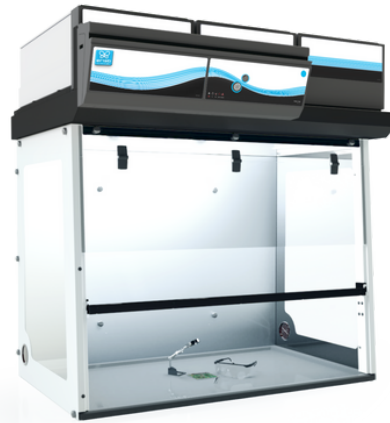
- In this project, I undertook the task of repairing a damaged hard drive by replacing its read/write head assembly with a compatible unit sourced from a donor drive. The primary objective was to restore the drive's functionality and secondary task was to recover deleted and lost data.
- I was able to effectively recover important data by using digital forensics tools and carefully carrying out the replacement procedure.
- This documentation aims to detail the steps involved in both the **hardware repair** and the data **recovery process**, providing a comprehensive guide for similar projects.

# THE ESSENTIALS

## **Step 1: Establishing a Clean Air Enclosure**

- To reduce the chance of contamination, it is essential to establish a clean air enclosure before starting any hard drive repairs. Due to their extreme sensitivity to dust and dirt, hard drives may sustain internal component damage while being repaired.

- Professional clean rooms are designed with advanced filtration systems that maintain ultra-low levels of airborne particles.



- You can replicate some of this environment at home with a few readily available materials like:
- Plastic Sheeting, Vacuum Cleaner, Lint-Free Cloths and Isopropyl Alcohol

- Even though a handmade clean air enclosure might not be as safe as a commercial clean room, it still has a lot of advantages over an uncontrolled setting.



## Step 2: Acquiring a Donor Drive

- A donor drive is a functional hard drive that will provide the replacement read/write head assembly. Look for a donor drive that matches the specifications of the damaged drive, including size, model, and connection type. This ensures compatibility and increases the chances of a successful repair.

## Step 3: [(Optional) Only for Laptop Users]

- As i'm doing this on my personal laptop, so i'll add this additional information where you need:

- SATA to USB Cable: Make sure to purchase a compatible cable that works with the Hard drive.



- 12 Volt Charger: A 12-volt charger is necessary to power the drive . Ensure that the charger is compatible with your drive's specifications. Having the right power source is crucial for testing the drive and confirming that it functions properly after the repair.



## Step 4: Proper Tools and Protective Gear

- **Precision Screwdrivers:** A set of small screwdrivers is essential for opening the hard drive casing and removing the header assembly.
- **Tweezers:** These will enable you to manage tiny parts without running the danger of breaking them.
- **Rubber Gloves:** Wearing rubber gloves is important to avoid transferring oils and dirt from your hands to the internal components of the hard drive. This helps maintain a clean environment and reduces the risk of contamination



# Procedure

- **Removing the Damaged Head Unit**

**Disassemble the Hard Drive:** Carefully remove the drive's cover using a Torx screwdriver, taking care not to damage the platters.

**Detach the Head Stack:** Unscrew and lift the head assembly, which may require special tools to avoid platter scratches.

**Place in a Safe Location:** Once removed, place the old head unit aside without touching its delicate components.

- **Installing the Donor Head Unit**

**Insert the Donor Head Assembly:** Align the donor head with the spindle and carefully secure it into place without touching the platter surface.

**Reconnect Components:** Reattach any connectors, securing them to ensure proper contact.

**It is highly recommended to use exact identical Drive as a donor drive to increase the chance of recovery.**



# Verification and Data Extraction

## Testing:

Reassemble the drive and connect it to a recovery system to verify that the heads are functioning.

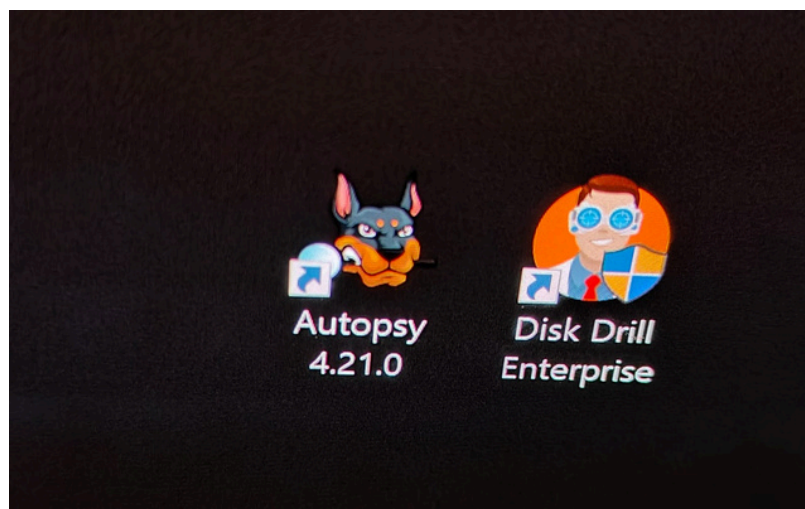
## Data Extraction:

- Begin the recovery process by **imaging** the drive using data recovery software like clonezilla to avoid stressing the hardware further.

### IMPORTANT NOTE

**Since repairing a read/write head outside of a laboratory can result in an unstable drive, it is not advised to use the repaired hard drive continuously. The drive should only be used momentarily for data recovery. Given the high likelihood of future mechanical failure, we strongly advise restoring important files as soon as feasible.**

- I prefer using Disk Drill(Enterprise version) or Autopsy in order to create proper report of the recovery process





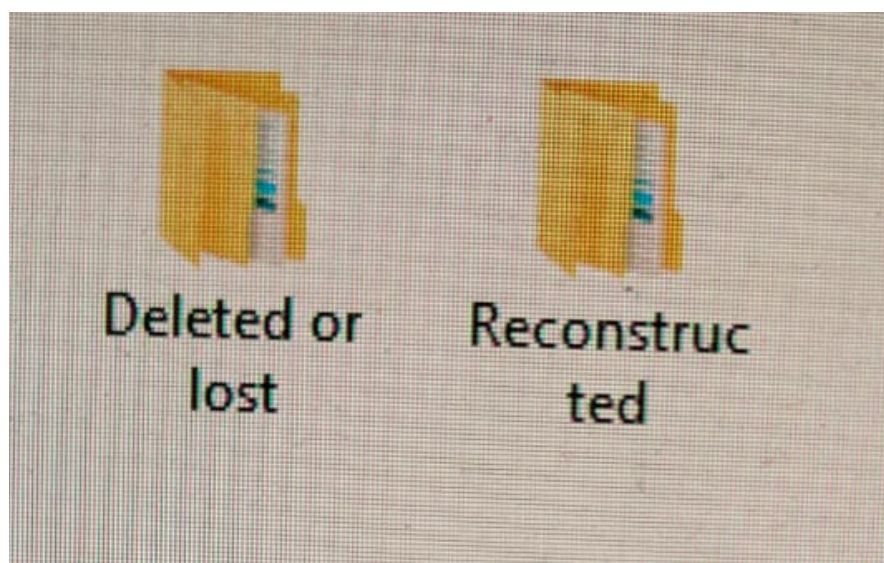
# Troubleshooting and Tips

- **Problem: Drive makes a clicking sound.**
- **Solution:** This may indicate improper alignment or that the head unit is faulty. Check compatibility and re-evaluate the donor head.
- **Problem: Corrupt or damaged and won't open properly (e.g image distortion, video playback issues, or document errors)**
- **Solution:** You may face this problem after recovering the data and will have to **Reconstruct** some files. Use file repair software to attempt reconstruction/recovery of these files. Specialized tools are available for various file types:

**For Images:** Tools like Stellar Repair for Photo or JPEG Repair can help fix issues with corrupted image files.

**For Videos:** Tools such as Wondershare Repairit or VLC Media Player (with repair options) can help repair video files that may be unreadable or exhibit playback errors.

**For Documents:** Tools like Stellar Repair for Word or Excel, or dedicated repair options in Microsoft Office, can help address issues in document files.





# **Conclusion**

This project demonstrates a attempt to recover data from a damaged hard drive through a highly technical head replacement procedure. By carefully sourcing a compatible donor drive and adhering to strict handling practices, it's possible to replace a failed read/write head unit and access data that would otherwise be lost. However, it is essential to note that such a procedure is temporary and the repaired drive should be viewed solely as a short-term means of recovery, not a reliable long-term storage solution.

This documentation serves as a guide for IT enthusiasts and people interested in data recovery , detailing both the complexity of mechanical drive repair and the precautions necessary to minimize risks. Although this process involves intricate technical skills and the right tools, it is a reminder of the importance of regular backups and preventive measures to safeguard critical data.

**P.S-** Some of the images are pulled from internet for reference purpose but i've tried to use original pictures clicked by myself during the process as much as possible. Thank you.

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