

THE PRINTED CIRCUIT BOARD

The Printed Circuit Board controls many functions to operate the hard disk drive, There are 5 main features of a the electronics that can be unique to each drive that is likely to fail, the first being:

POWER INPUT

The most problems we see here are mostly human era... forcing the power plug in the wrong way

Unfortunately apart from a few notebook PCB's the is no protection fuse to prevent PCB Damage

There is also risk of power surges making it through to the electronics as well

FIRMWARE

Firmware is unique to the PCB this controls calibration and track information so it is very rare to be able to interchange the same model PCB with one that has another firmware revision... so what this means, if your board shorts out the firmware unique to the drive, you will be in trouble. Of course a good main stream data recovery company will be able to replace this and manually reprogram this chip

SPINDLE IC

This controls the speed and rotation of the spindle rotating the platters internal to the hard drive assembly or HDA

These intend to get very hot at times and can often short out... The most famous of models to this was the good old quantum LCT, particularly the TDA5247HT Chip; this would go up in smoke and leave a pin hole or a very big mess on or over the IC



MICRO CONTROLLER

These rarely fail unless there has been an extreme hit by power such as a lightning strike that may cause voltage through the IDE Cable. If this does fail you would normally find visible damage

TRACKS

Internal track are the thin Copper ribbons that run through the board that connect each component these can be easily damaged by any of the above case scenarios, but one of the most common that I have seen is Corrosion

Below is a great Example of how quickly chemicals in the air from industrial workshops or even sulphur in the air from volcanic regions can cause havoc... but for most residential computer hard drives its condensation that damages a PCB

WARNING IF YOU CHANGE A PRINTED CIRCUIT BOARD WITH A NON MATCHING PCB... SUCH AS DIFFERENT FIRMWARE, LAYOUT, OR MICRO CONTROLLER NUMBERS, YOU WILL RUN A HIGH RISK OF FAILURE AND FURTHER DAMAGE!

Yes there's a high chance...

YOU WILL SEE SMOKE!!!!!!

If you have an exact match to the PCB you want to attempt swapping, the risk will be minimal but what a lot of people don't realize, is that code can change overtime even with exact matching parts.

What this means is... if you were to purchase two NEW exact hard drives at the same time from the same batch and then swapped their PCB's to each other, you would most likely be successful!

Try that same scenario 6 months after heavy use... and results will/could be very different There's a high chance that each PCB has made it self unique to each drive!

How can this be?

It's called SMART Technology where the hard drive is designed to reconfigure itself during operation to maximizing performance and protecting data. If a sector is read slow but functional the drive will remap this sector as bad and move this sector creating changes to track and sector information in firmware

Now this new reconfigured information is unique to the drive, and can cause this PCB to be incompatible with any other drive of matching numbers.