



Hard Disk Drive Construction.

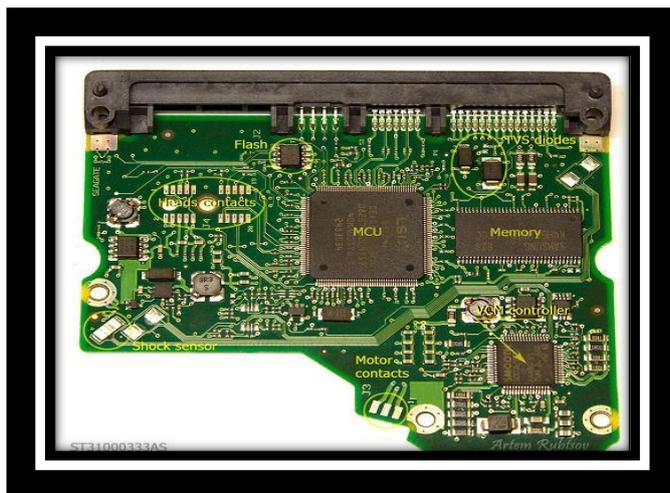
This document describes in a pictorial manner how a 3.5 inch format Hard Disk Drive is put together. Shown is a 1TB Seagate drive.



The green component shown above is called the Printed Circuit Board or PCB. The PCB holds the controlling electronics. The black case is called the Hard Disk Assembly.

The Printed Circuit Board.

At the heart of PCB is Micro Controller Unit or MCU or CPU. The Hard Disk Drive CPU contains the control program code and other functions such as the Read/Write channel that converts the signals from the read write head amplifier into structured digital information. The MCU IO port transfers data to and from the SATA interface to the computer mother board.



Hard Disk Memory or Cache.

The Memory chip is DDR SDRAM memory type chip, shown is a Samsung 32MB DDR memory chip

Voice Coil Motor Controller.

The Voice Coil Motor (VCM), controls the spindle motor that spins the disk platters and also controls the head actuator movement.



Flash Chip.

The flash chip stores part of the drive's firmware. When power is applied to the unit the MCU reads the contents of the flash chip into the memory this kick starts or boots the drive.

Shock Sensor

The Shock Sensor detects violent movement and will send an instruction to the VCM controller to park the read write heads. It is essentially a drop detector useful to external hard drive applications.

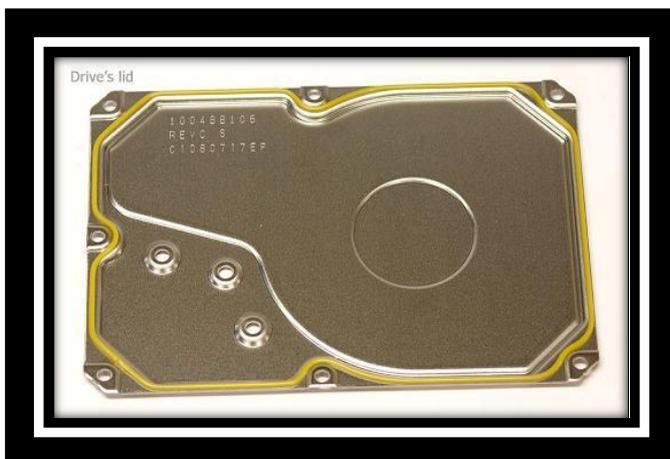
Transient Voltage Suppression.

The Transient Voltage Suppression diode protects the drive electronics against power surges and acts like a surge arrester.

Hard Drive Assembly.



The spindle motor is shrunk into the casing and electrical supply is made via contacts that mate with the PCB. Shown is a breath hole that equalizes the air pressure within the HAD. This hole feeds air into a duct channel that holds an air filter to prevent particulates entering the unit and damaging the read write heads.



The unit lid holds a gasket (shown in yellow) that seals the unit.



Data is stored on rotating disk platters. The platters are made of polished aluminium or glass and are covered with several layers of different compounds including ferromagnetic layer which actually stores all the data. Dampers or Separators located between platters reduce air fluctuations and acoustic noise.



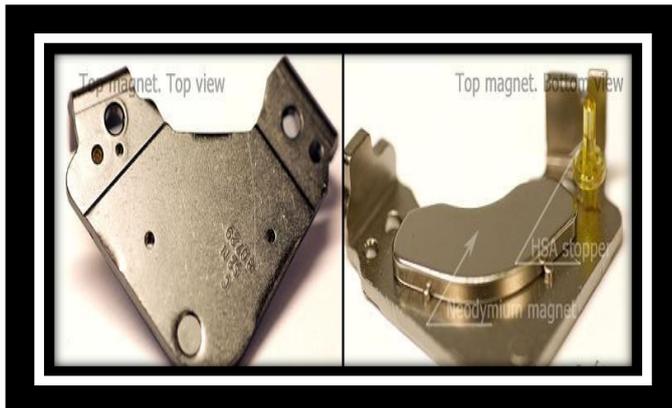
The Heads are mounted on the Head Stack Assembly and has a parking position.



The HDD must operate with a sealed and filtered clean air atmosphere. The filter removes and absorbs particulates of lubricant and other foreign matter created by the platters rotation.



Head Actuator Magnet.



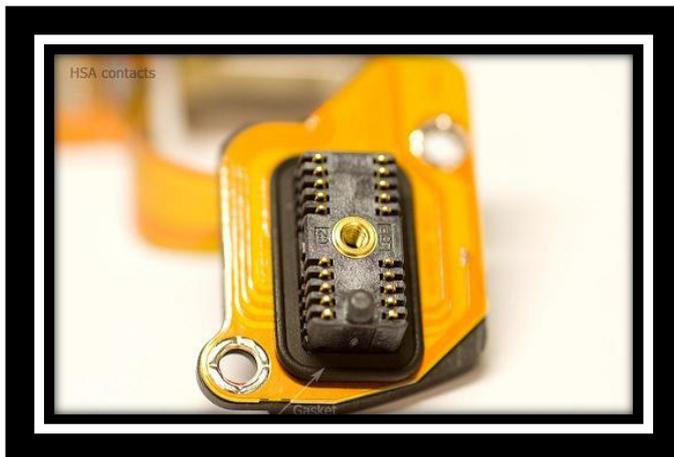
HDDs use Neodymium magnets capable of lifting 1500 times its own weight, Its purpose is to help the heads settle precisely over a data track channel on the surface of the platters without overshoot or variance.



The Voice coil is a part of HAS and moves the head assembly. The actuator latch holds the heads in a parking position to prevent them slopping about when the drive is moved.



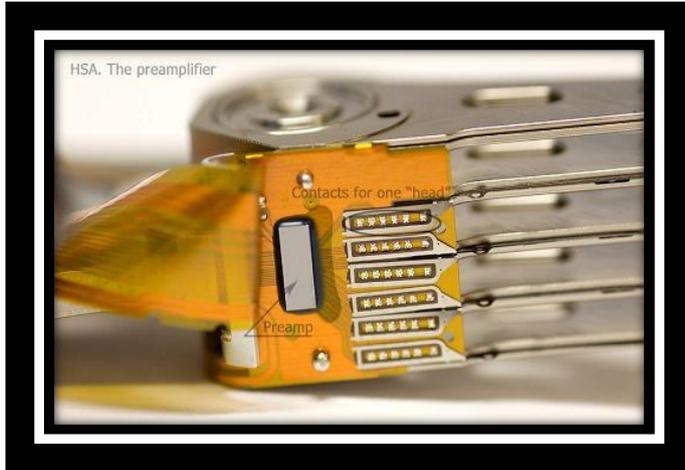
The HSA has a precision bearing with no play or movement. The connector to the PCB is airtight.



At the extremity of the HGA is a slider. The slider creates an air dam that allows the heads to float above the platter surfaces.



The slider is aerodynamically constructed to create an air bearing for the read heads.



The HDA contains an integral preamplifier to transmit the signals from the read write heads to the MCU. Six contacts per "head. One contact is earth, two are read/write connexions, two are to the actuator and the remaining contact is for a heater that adjusts the fly height of the heads using a bimetal gimbal.