STUDY OF HARD DISK DRIVE

Course No: ME371

Instructor: Dr. A. Mukerjee
Dr. M. K. Muju

Submitted By: Naveen Tewari
Amit Singh
Subhash
Rakesh Kumar

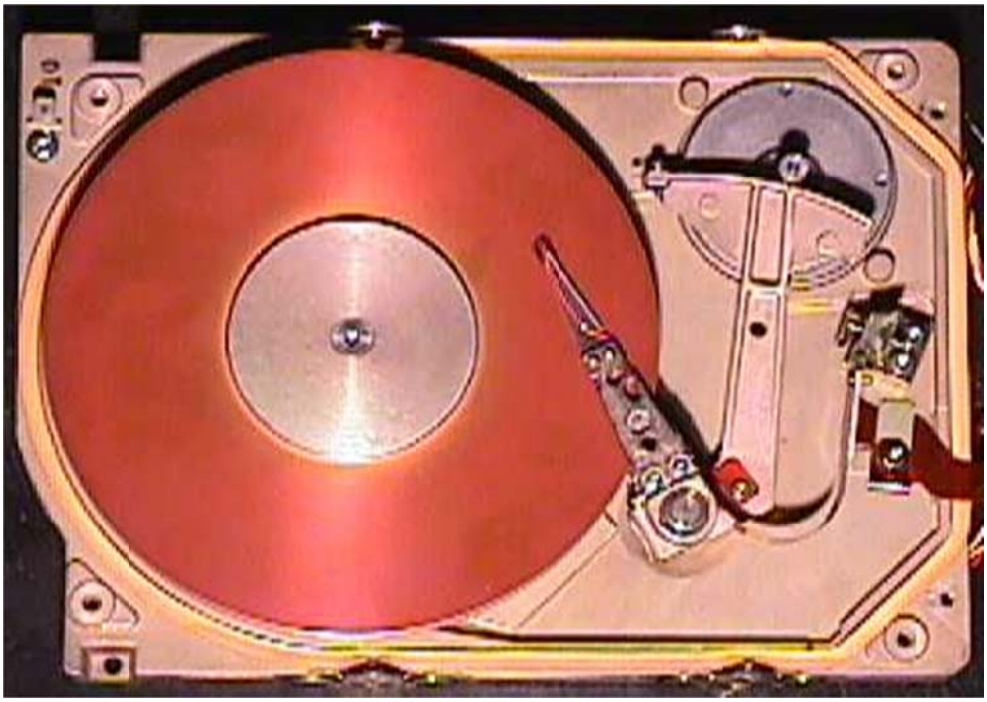
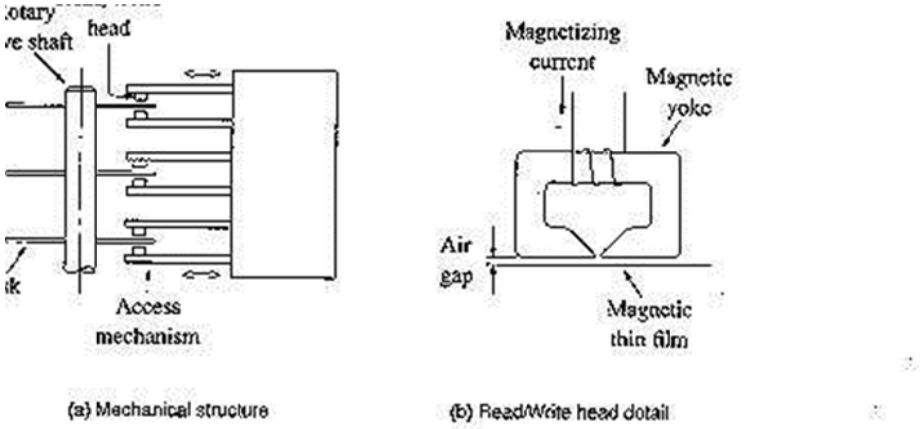


Fig 1: A Top view of an open HDD

Fig 2: This figure shows the HDD with 2 platters (or disks). The data can be stored on both sides of a disk. Thus there are four read/write heads. The mechanism for the movement of the head can also be seen here.



Storage medium in a magnetic-disk system consists of one or more disks stacked on top of one another. A thin magnetic film is deposited on each disk, usually on both sides. The disks are mounted on a rotary drive so that the magnetized surfaces move in close proximity to the head.

Digital Information can be stored on Magnetic film by applying current pulses of suitable polarity to the magnetizing coils. This causes the magnetization of the film in the area immediately underneath the head.

The same method is used for reading the information. The change in magnetic field in the vicinity of the head induces a voltage in the coil, which serves as a signal by the control circuit.

Several different techniques have been developed for encoding data on magnetic disks. One such common technique is known as **Manchester Encoding.** In this scheme, changes in magnetization occur for each data bit.

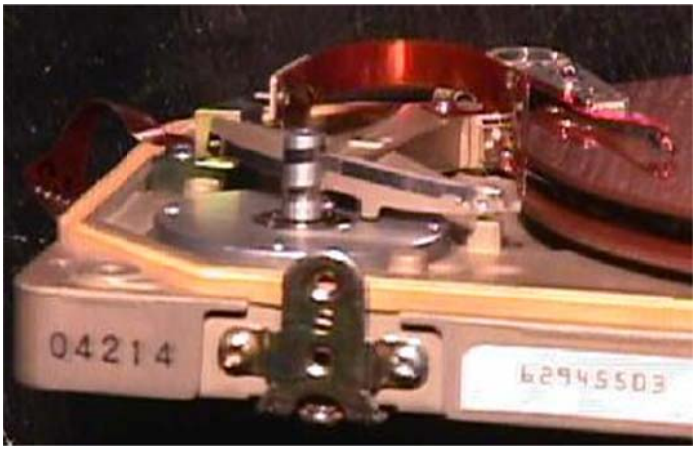
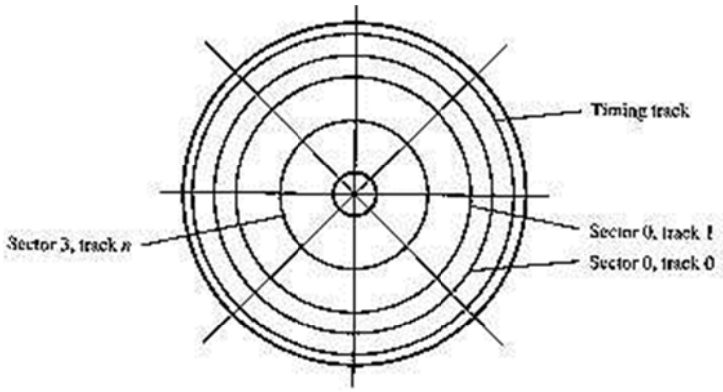


Fig 3: This figure shows the head in interaction with the platter and also the mechanism which moves these heads.

As can be seen in fig 3, the heads are maintained at a very-very small distance from the moving disk surface in order to achieve HIGH BIT DENSITIES. The distance between the disk and the head is of the order of few microns.

When the disks are moving at their steady rate, air pressure develops between the disks surface and the head & forces the head away from the surface. This force is counteracted by a spring loaded mounting arrangement for the head that allows it to be pressed toward the surface. This distance is extremely crucial. If by accident the head touches the surface of the disk, the hard disk is ruined.

The mechanism to move the Head over the disk surface has been very interestingly designed. It has two strips encircled around the rotary shaft and attached in opposite corners. This mechanism has a positive drive at all points of time. The use of friction mechanism has been avoided here as it would require more power and friction teeth will also wear off slowly. Organization and Accessing of data on Disk



(a) Organization of one surface of a disk

- Surface is divided into concentric TRACKS, each track is divided into SECTORS.
- Set of corresponding tracks on all surfaces of a stack of disks (platters) forms a logical CYLINDER
- Data on disks are addressed by specifying the surface number, track number, and the sector number.
- These disks rotate at a speed of around 5400 rev/min. That is one complete trak is read or written in 0.011 sec.
- Total time taken for actual data transfer(**Access time**) = **Seek time** + **Latency time**.
- Seek Time: Time required to move the head to the proper track.
- Latency time: Time elapsed until the starting position of the addressed sector passes under the head.

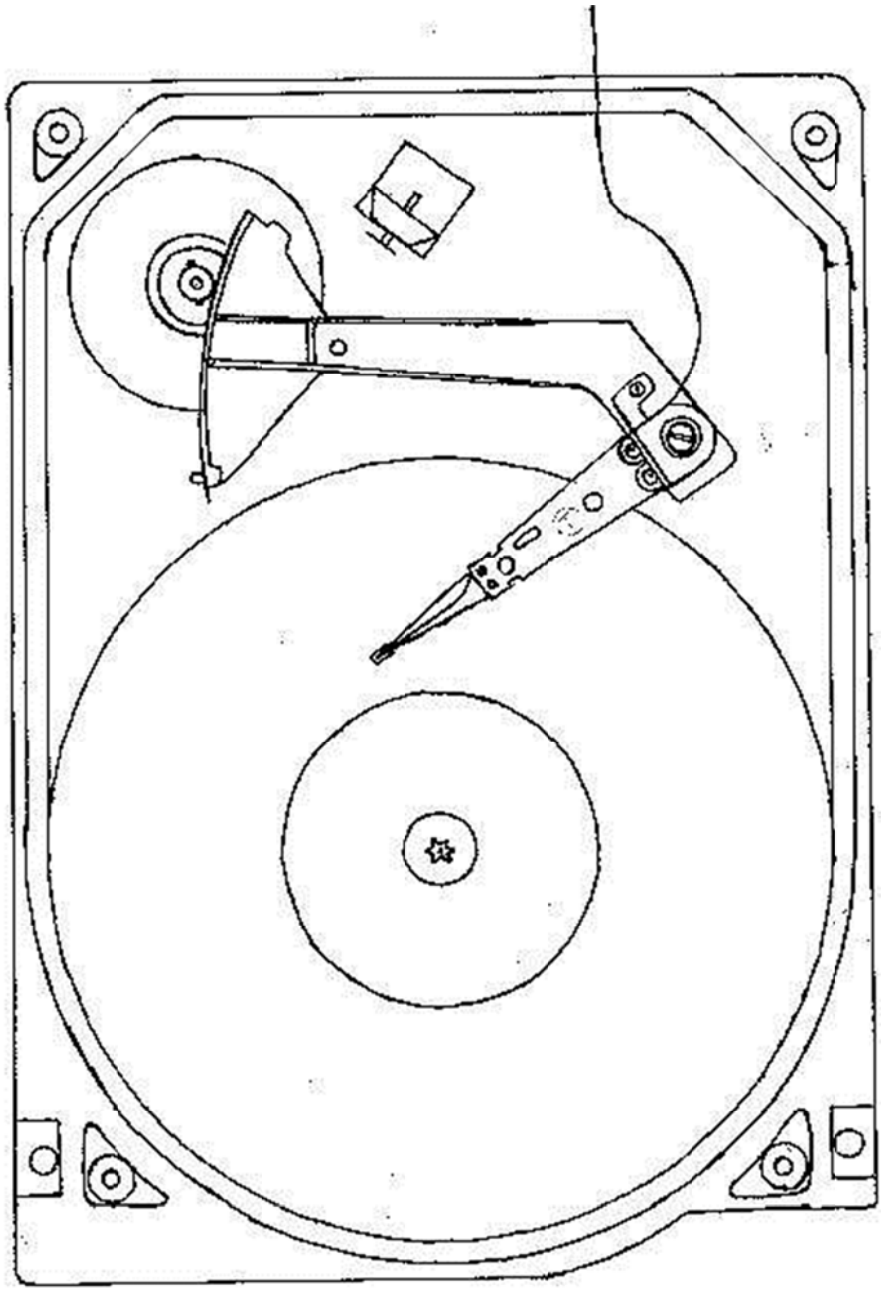


Fig 4: Schematic view of HDD