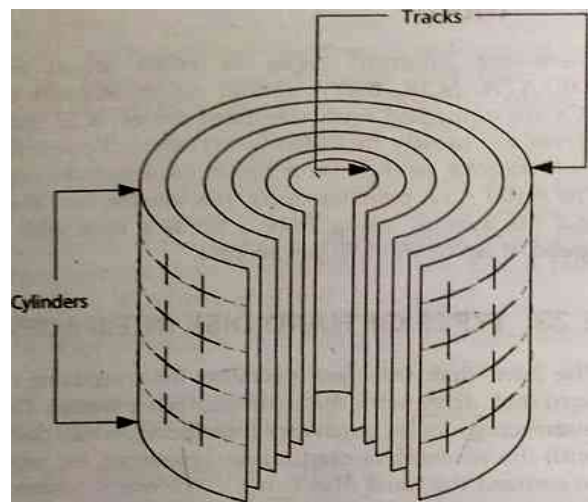


## Hard Disk Drive

### Hard Disk Drive

The hard disk drive is the main, and the largest, data storage device in a PC. The operating system, application software and many other files are stored in the hard disk drive. Hard disk drive is also known as hard drive, hard disk, fixed disk, fixed drive or fixed disk drive.

The computer stores information that is permanent on the hard disk platter. The hard disk is sealed in the hard disk drive. The disk is made from aluminum foils with coating of magnetic material such as ferric oxide or chromium oxide. In a disk pack, information is stored on both the surface of each disk plate, except the upper surface of the top plate and the lower surface of the bottom plate, which are not used. Each disk consists of a number of invisible concentric circle called tracks. A set of corresponding tracks in all the surfaces is known as the cylinder. Thus, a disk pack having 10 disk plates will have 18 recording surfaces and 18 tracks per cylinder. Each track is further subdivided into sectors.

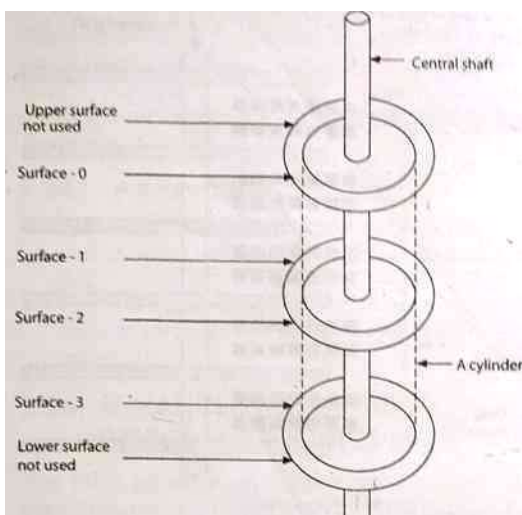


**Figure: A disk having three platters**

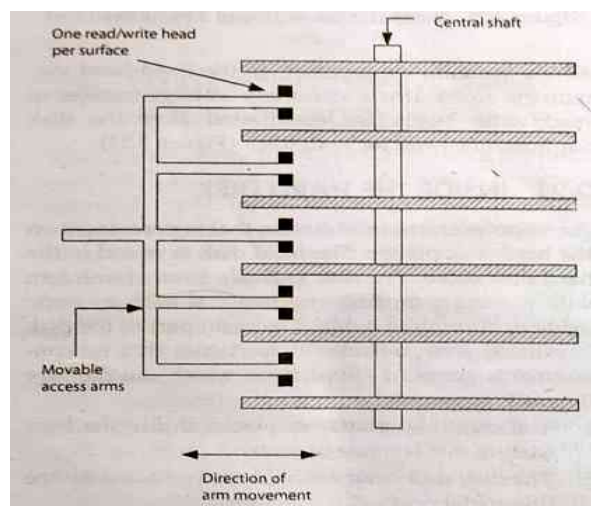
The storage capacity of disk systems also depends on the tracks per inch of surface and the bits per inch of track. Larger capacity disks have more tracks and hence they have a greater storage capacity. The total number of bytes that can be stored on a disk pack is calculated by:

**Number of cylinders X tracks per cylinder X sectors per track X bytes per sector**

**Figure: Sectors of a disk**



**Figure: Vertical cross-section of a moving-head disk system**



## Accessing Data

Data bits are recorded on the tracks of a spinning disk surface and read from the surface by one or more read/write heads. There are two basic types of disk systems-moving-head and fixed-head. The moving-head systems has one read /write head for each disk surface, each mounted on an access arm which can be moved in and out. So in this system, each read/write head moves horizontally across the surface of the disk and is able to access each track individually. Each usable surface of the disk pack has its own head and all the heads move together. In the fixed-head system, the access arm is stationary. A large number of read/write heads are distributed over the disk surfaces, one head for each track.

## Inside The Hard Disk

A computer stores information that is permanent on the hard disk platter. The hard disk is sealed in the hard disk drive. The disk is made from aluminum with a coating of magnetic material such as ferric oxide or chromium oxide. The main part of the disk is isolated from outside air to ensure that no contaminants get onto the platters, which can damage the read/write heads.

1. The disk-platter is placed inside the base casting that is made of metal.
2. The disk and head assembly is protected by the thin metal cover.
3. Getting power from the DC input of 12V, the spindle motor spins the disk and the head is placed over the location by the actuator to write to or read from the disk as per request.
4. While the disk is rotating, it generates shocks which can cause disk crash. So, the base casting is mounted on the frame using shock mount.
5. The heads are mounted on the end of the actuator arm or E Block, which actually performs the write/read operation. While writing or reading the heads does not touch the platter, but it flies over the disk. This renders long life to the disk and the risk of wear out of the magnetic material is completely eliminated.
6. The signals of write/read request are carried by the printed circuit cable to the actuator. The signals come from the I/O connector located on the printed circuit board inserted into the expansion slot or on the main board.

## Types of Hard Disk Drives (HDD)

There are different types of HDD, which are IDE/ATA, SCSI, ATA(Serial ATA). Majority of PCs are equipped with IDE hard drives. SCSI hard drives are mostly/included in servers and powerful workstations as they offer better data transfer rate. The serial ATA transfers data between the hard disk and the system using only 1 bit at a time with a speed of up to 600 MB per second.

### Exercise:

- 1: What is Hard Disk Drive?
- 2: How to calculate HDD size?
- 3: Explain Inside the HDD with Diagram?

