

## FLOPPY DISKS

A floppy disk is a thin circular plastic disk coated with magnetic material on the surface. The plastic material of the disk is "mylar". The magnetic coating material is iron-oxide and barium ferrite. It is a removable disk and it is used as back-up memory to store programs, data and other information. The standard size of a floppy disk is 3.5 inch diameter. It is a surface device, divided into concentric tracks. Further, each track is divided into sectors. It employs longitudinal or vertical magnetization technology. In longitudinal recording, magnetic regions are oriented parallel to the disk surface along the track. In vertical recording magnetic regions are oriented vertical to the surface of disk.

Floppy disk rotates at low speed, a typical value is 360 rpm. Its storage capacity is 1.44 MB.

In recent years, the attraction of floppy disks has been diminished due to the development of rewritable optical disks. Floppy disks have much smaller storage capacity, longer access time and higher failure rates compared to hard disks.

## OPTICAL DISKS

An optical disk is a flat, circular, plastic disk coated with material on which bits may be stored in the form of highly reflective areas and significantly less reflective areas, from which the stored data may be read when illuminated with a narrow beam source, such as laser diode.

The optical disk storage system consists of a rotating disk coated with thin layer of metal (aluminium, gold or silver) that acts as a reflective surface and a laser beam, which is used as a read/write head for recording the data onto the disk.

### Storage Organization of an optical disk :-

Unlike magnetic disk, an optical disk consist of single long track in the form of spiral shape. This track starts from the outer edge and spirals inward to the centre of the disk as shown below.



The spiral shape of the track makes the optical disk suitable for storing large blocks of sequential data onto it. It is usually slower than magnetic disk. The reason behind it is that in case of magnetic disk, it is easy to locate the tracks since they are located at a fixed distance from the centre. An optical disk has very high storage density and data integrity.

### Storage Capacity of an Optical Disk :

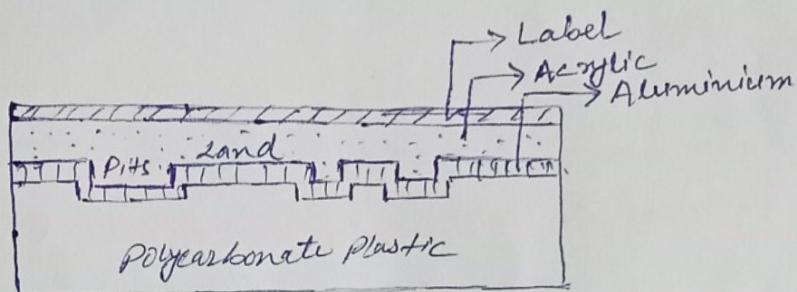
Optical disks are available in various sizes and capacities. A compact disk (CD) holding 600-700-MB of data having 12 cm diameter is the most popular means of optical storage. In a single track optical disk, storage capacity is calculated as  
$$\text{storage capacity of optical disks} = \text{No. of sectors/blocks} \times \text{No. of bytes per sector/block}$$

## Types of optical disks :-

The types of optical disks are :

- (i) CD-ROM, CD-R and CD-RW
- (ii) DVD-ROM, DVD-R and DVD-RW
- (iii) Blu-Ray-DISKS.

(i) Compact DISK (CD) :- Compact disk is the most popular and least expensive type of optical disk. A typical optical disk is made-up of three layers : a Polycarbonate plastic through which light can pass, a layer of aluminium and a protective layer of acrylic on top of that. The topmost layer can be printed with a label. A cross-section of CD looks like shown below



CD data is represented as tiny indentations known as pits, encoded in a spiral track moulded into the top of the Polycarbonate layer. The areas between the pits are known as land.

Compact disks are available in various formats:

CD-ROM (Compact DISK Read only memory), CD-R (Compact disk-recordable) and CD-RW (Compact disk-rewritable) disks.

CD-ROM :- A CD-ROM disk comes with pre-recorded data by the manufacturer and can be read but cannot be altered.

CD-R :- CD-R or WORM (Write Once Read ~~Many~~) disks are those in which user can write the data only once. The written data can be read as many times as desired.

**CD-RW** :- A CD-RW disk is rewritable version of CD-R, which means it allows writing, erasing and re-writing of data several times.

Reading Data from CD ROM :-

When reading a CD-ROM, a low power laser beam is focused on rotating CD-ROM and its reflection is viewed by the read head. When the beam reflects back from the CD-ROM, its intensity changes from "land" to "pits". These variations in the laser beam are decoded as data by the CD-ROM drive.

Writing Data to a CD :-

The surface of CD-ROM contains one long spiral track of data. Along the track, there are flat reflective areas (represent binary 1) and non-reflective bumps (represent binary 0). On a new CD-R disk, the entire surface of the disk is reflective. Hence, for a CD-R disk to work, there must be a way for laser to create non-reflective area on the disk. A CD-R disk, therefore, has an extra layer that the laser can modify. This extra layer is greenish dye. When we write data to a CD-R, the writing laser heats up the dye layer and changes its transparency. The change in the dye creates the equivalent of non-reflective bump. The decomposition of the dye in the pit area through the heat of the laser is irreversible (Permanent). Therefore, once a section of CD-R is written, it cannot be erased or re-written.

In CD-RW disk, the recording layer has polycrystalline structure initially. While writing to the disk, the laser heats up the selected areas to a very high temperature, which melts the crystal into noncrystalline amorphous phase.

These areas have lower reflectance than the remaining crystalline areas. This difference in reflectance helps in reading the recorded data as in case of CD-R disk.

To erase the data on a CD-RW disk, a process called annealing is used. During this process, area on the layer that has been changed to the amorphous phase (during writing) is converted back to its original crystalline state by heating it to a temperature slightly below the melting point of the phase changing material.