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## FLOPPY DISK and Drive

### Floppy Disk

The floppy disk is one of the oldest external storage devices. It is a magnetic round disk enclosed in a plastic jacket, which protects it against dust and other dangers .The plastic case has an opening which gives the read heads access to the magnetic surface. This opening is protected by a moveable metallic cover that itself has an opening when the floppy disk is inserted in the disk drive. The cover slides sideways so the opening in the cover matches the opening in the plastic case, giving the read heads access to the magnetic surface. When the floppy disk is ejected from the drive, a spring slides the cover back to its original position. The floppy disk is available in 3.5 inches, which can store 1.44 MB of data.
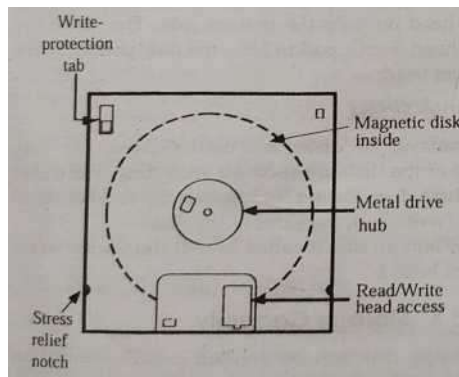


Figure:  A 3.5" Floppy Disk

The 3.5 inches floppy disk has two holes at the bottom of the disk. One enables the floppy disk drive to identify if the floppy disk has a low density or high density. The other is a write-protect switch of the floppy disk. The switch protects the data on the floppy disk from being erased or modified accidentally. When the opening is blocked, data can be read and written on the floppy disk. When it is open, the disk can be read but not written to, making it write-protected.

### Floppy Disk Drive (Fdd)

A floppy disk drive (FDD) is an electromechanical device that reads and writes floppy disks. A floppy disk drive has a front opening for inserting the floppy disk. When in position, the floppy disk locks in place automatically. When you insert the disk in the drive, the floppy disk compresses a spring. Pushing the eject button releases the spring and ejects the floppy disk. The faceplate of the drive also has an indicator light which is on when the drive is reading or writing data.

**Note:** Never eject the floppy disk or turn the system off when the light of FDD is on. If you do either, you can lose data arid also damage the drive.



Figure: Floppy disk drive

**Various Parts of FDD**

The FDD consists of various parts. These parts interact with each other and perform the functions of reading and writing data on the floppy disk. The major parts of a FDD include the following:

1. **Read/Write Heads**

    Floppy disks have read/write heads. These heads are used both to read information stored on the disk and to write information onto the disk. There are two read/write heads on a floppy disk, one on either side of the disk. Thus, a floppy disk is double-sided and is capable of storing information on both sides.

2. **Stepper Motor**

    The stepper motor is the head actuator of the floppy disk. It is used to move the read/write heads to the right track on the disk. Like a hard disk, a floppy disk is also divided into concentric circles called tracks. These tracks are further divided into pie-shaped wedges called sectors. The stepper motor positions the read/write head over the correct track.

3. **Spindle Motor**

    The spindle motor is a special motor that serves the purpose of spinning the disk. The spindle motor has a clamp that catches the floppy disk when the floppy disk enters the drive. The disk spins at about 300 revolutions per minute.

4. **Circuit Board**

    It controls the activities of various internal components of a floppy disk: It consists of the circuit that sends data signals to the*different parts of the floppy disk drive. In addition, the circuit board also serves as an interface between, the parts of a floppy disk and the floppy drive controller. This allows the computer to interact with a floppy disk and to use the information and data the disk contains.

5. **Connectors and Cables**

    A disk drive js connected to the main computer system using the power connector and the data control connector. The power connector supplies power to the floppy disk drive and the data cable connects the floppy disk drive to the motherboard.

6. **Faceplate**

    The faceplate is also called the "Bazel" which is a plastic front cover of a disk drive.

**Types of Floppy Disk**

The Floppy disk can differentiated based on
- ✓ Size
- ✓ Soft/Hard sector
- ✓ Number of sides
- ✓ Storage capacity

o **Size**

Based on size a floppy disk can be divided into the following categories:
- ➢ 5.25 inch disk
- ➢ 3.5 inch disk

o **Soft/Hard Sectored**

Based on the way a floppy is divided into different sectors, there are two types of floppy disks:
- ➢ Soft sectored

    A floppy disk with a single index hole is known as a soft-sectored disk. This hole marks the position of the first sector, i.e., sector zero.

➢ Hard sectored

Hard sectored floppy disks have a hole for each sector to mark the beginning of each new sector.

o **Number of Sides**

Based on the number of sides, a floppy disk can be divided into two types:

➢ Single-sided

The original IBM PC used single-sided floppy disks. These disks were used to record only on one side. The drive used to read/ write these diskettes, had r/w head on only the bottom side. The topside of r/w head used a pad td keep the disk pressed to the bottom head.

➢ Double-sided

Today, All disks are double-sided, i.e., both sides of the disk are used for recording. The drives for these disks have r/w head on top and bottom to read/write both the sides of the disk. The bottom side is called head 0 and the top side is called head 1.

o **Storage Capacity**

A floppy disk can be divided into different types based on the storage capacity of the disk.

➢ 5.25 inch floppy disk, 1.2 MB DSHD (Double-sided high-density)
➢ 3.5 inch disk, 1.44 MB DSHD   (Double-sided   high-density)

**Geometry of Floppy**

The term geometry refers to the organization of the disk's data structures. For floppy disks, the geometry refers to the number of disk surfaces (which is the same as the number of read/write heads), the number of tracks per surface and the number of sectors per track. All floppy disks use the same number of sectors for each track; despite the fact that the inner tracks on a disk are much smaller than the outer tracks.

Since floppy disks use both sides of the disk and always have two heads and surfaces, tile only important parameters are the number of tracks and the number of sectors.

Each floppy disk format (size) has a specific geometry. The following are the geometry specifications for the different disk formats:

| Geometry Specification | 360 KB 5.25" | 1.2 MB 5.25" | 720 KB 3.5" | 1.44 MB 3.5" | 2.88 MB 3.5" |
|---|---|---|---|---|---|
| Tracks(Cylinders) | 40 | 80 | | | |
| Sectors per Track/Cylinder | 9 | 15 | 9 | 18 | 36 |
| Total Sectors per Disk | 720 | 2400 | 1440 | 2880 | 5760 |

*Note: All floppy disks use 512 bytes per sector, which is the standard for both floppies and hard disks. Not all of the sectors indicated by the total above are usable for actual user data, because some are used by the file system structures (FAT, root directory, etc.).*

2.12     RECORDING FORMATS

Data is stored on a disk's surface in the form of digi¬tal signal. Digital signal can have only two values - a high or a low or a 1 and 0. To store these values of Is and Os, the magnetic particles on the disk surface are arranged in "NS" (North, South) or "SN" (South, North) orientation.

The magnetic recording on the disk surface is done by the read'/ write head, which is similar to the read/record head of an audio tape recorder.

**Floppy Drive Alignment Track**

When the computer system needs to access data on diskette, the read/write heads are stepped by signals generated by the computer system's floppy controller. These steps are invisible concentric cylinders, which are usually referred to as "tracks". When the computer's power is switched on, then the read/write heads of the drive are automatically set to track 0 (the first track and starting position). In most drives, this starting position is located by means of a sensor in the drive, which has been adjusted to tell the floppy controller when the heads have reached the first track. If this sensor is not in proper adjustment, then the initial starting calibration is also incorrect and the heads are not properly positioned over track 0. In order to move the heads from the first track to other tracks, the head, positioned simply moves in or out one track for each step pulse received from the computer's floppy controller.

The floppy drive blindly accepts these pulses and assumes that it is positioned directly over .the proper specified track. It has no accurate feedback mechanism from the disk concerning whether or not the heads are properly positioned.



Figure: Writing data on a track

It is possible for the head position to become out of alignment in such a way that the read /write head is only over a portion of a track. This reduces the strength of the data signal detected by the head and may also cause unwanted interference between adjacent tracks. The relative alignment of the drive that recorded the diskette's data and that of the drive reading the same diskette differ substantially, it will be difficult or impossible to read the recorded data. This undesirable condition is known as radial misalignment. A The radial head alignment determines the exact position of the diver's read/write head over a given track location.
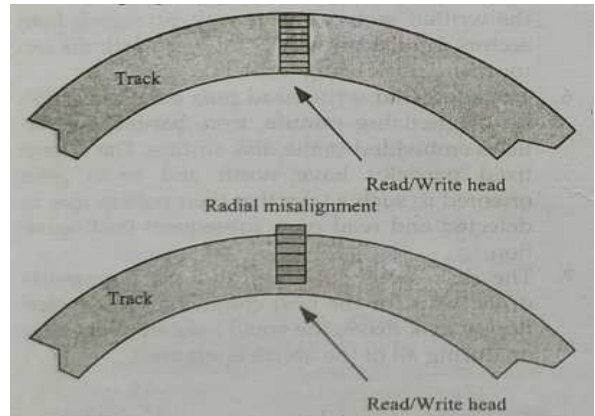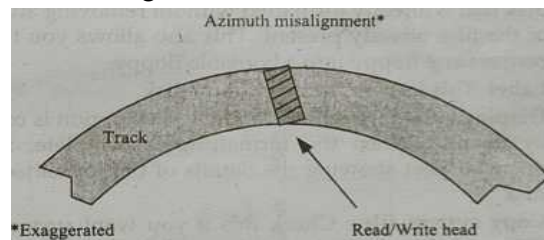


Figure: Misaligned Head writing data on a Track

**Alignment Adjustment**

This is the physical adjustment of the drive's track 0 sensor. In most drives, this is an optical sensor which must be adjusted such that when the system is first powered on, the drive's heads are placed accurately or the starting track 0. The computer's floppy controller relies on this sensor to establish a starting point from which all other tracks are referenced.

## Exercise:

**1: What is Floppy Disk?**
**2:  What is Floppy Disk Drive?**
**3: How many type of Floppy Disk?**
**4: How many main parts in Floppy Disk Drive?**