

Here is the second in the series of articles on computing and computers, always from the point of view of use by hams. This time, let's consider floppy disk magnetic properties. Currently, 4 basic types of floppy disks are in wide use (though a 5th type is on the horizon, we won't consider it now). These are all double sided, and include:

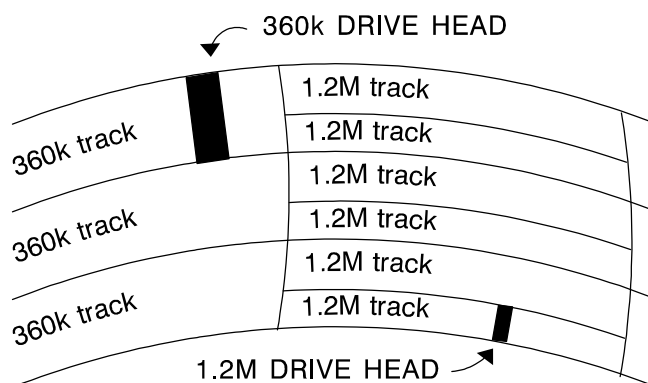
360 kilobyte (360k)	Double Density	5-1/4 inch
1.2 megabyte (1.2M)	High Density	5-1/4 inch
720 kilobyte (720k)	Double Density	3-1/2 inch
1.4 megabyte (1.4M)	High Density	3-1/2 inch

So basically there are two physical sizes, each of which has a double and a high-density version. Let's consider 5-1/4 inch floppies first.

Which is more sensitive - the floppy that holds 360k or the one that holds 1.2M of data? If your answer was the 1.2M version, you are **WRONG!** When considering the strength of the magnetic field needed to record data, the 360k version needs a 300 oersted (the oersted is a measure of the strength of a magnetic field, just like the henry is a measure of the strength of inductance). The 1.2M version needs double the field, 600 oersteds, to record a byte of data! Therefore, because it needs a higher strength field, it is **LESS** sensitive, and the plain old garden variety (360k) is **MORE** sensitive because it needs a lower strength field to write data on it. Now, this has some very important implications.

The second consideration is the drive that writes on the floppy. Once again, there are differences. The heads in a 1.2M drive write a very narrow (0.155mm, to be exact) but powerful (600 oersted) track, while the 360k drive heads write a less intense (300 oersted) but wide (0.300 mm) track. See the difference? Almost double. Furthermore, the 1.2M floppy has 80 tracks written by the drive, while the 360k has only 40 tracks. In summary, there are 3 major differences between these two floppy formats: 1) number of tracks; 2) width of each track; 3) amount of magnetic field needed to write a spot on the disk. Actually, there is also another difference - in the physical thickness of the disk.

Now let's consider compatibility. If you format a 360k disk in a 360k drive, then write data to it, can a 1.2M drive read it? Yes. No problem. The 1.2M read head is much narrower than the 360k track on the floppy, so it can respond properly to the magnetic domains that are present in the disk. An analogy is two differently formatted phonograph records, one whose tracks have been cut 0.3mm wide and one with tracks cut 0.155mm wide. If you play back the 0.3mm record with your phonograph that has a 0.155mm needle, there is no problem, because a 0.155mm needle will easily fit in a 0.3mm groove. The opposite is not true. A 360k drive head is much too wide to properly read a 1.2M disk, because of two factors. First, the track is much too narrow to transfer a signal to the 360k head. Second, the tracks are too close together (1/96 of an inch apart, versus 1/48 of an inch apart in a 360k floppy), so that more than a single track at a time may be under the head! Not good for accurately sensing the data! This is all easier to visualize if you look at the figure below.



Perhaps now you are getting a feel for why it is **DANGEROUS** to interchange different types of disks. The next article will make this more explicit, and will outline what you can get away with and what you cannot.