

The difference between double-density and high-density floppy discs 2DD/2HD

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There is a little-known fact about floppy disks that few people are aware of.

Contrary to popular belief, the misconception that taping over a hole can format a high-density disk as a double-density disk is not entirely accurate. While it may appear to work temporarily, the success of this method is quite unpredictable.

Taping over the hole only applies to internal PC drives that support double-density disks. Furthermore, this method can only be effective with brand new disks that have never been written to before.

If a high-density disk has been previously written to, it needs to be formatted as high-density first in order to completely erase all data from all tracks of the disk. Only then can it be reformatted as a double-density disk. However, even with this process, there is no guarantee of satisfactory results due to the difference in materials used for the disk itself.

For more information on this topic, you can read this page: viewtopic.php?t=12754

The disks themselves are composed of different recording materials, and their capacity is detected by a little reed switch inside the right-hand side of the drive.

Double-density disks utilize iron oxide, much like a common audio cassette.

On the other hand, high-density disks are coated with cobalt-coated iron oxide and require a higher electrical current from the heads to read and write data.

If the drive supports double-density disks, taping over the hole instructs the drive to use a lower current.

This explains why formatting a high-density disk as a double-density disk is prone to failure or eventual failure. A higher resolution media, which requires a stronger magnetic field, is being written with a magnetic field that is too weak to perform the job properly. Subsequently, it is expected to be read again with a magnetic field that is also too weak for proper reading. Often, if a high-density disk is formatted as a double-density disk in a synthesizer with a double-density drive, it will show up as a "bad disk" or "Disc unformatted" when attempting to read it from the same synth or in a PC.

While it may seem like taping over the hole works when formatted in a synthesizer with a double-density drive, it is merely going through the motions. The original equipment manufacturer (OEM) double-density drive does not have the little reed switch to detect the disk type (unless it has an after-market PC drive conversion). Additionally, the firmware for the synthesizer was not designed with any other disk types in mind. At that time, it was taken for granted that double-density disks were readily available, so the synthesizer automatically formats any disk as a double-density disk regardless of its actual type.

If a double-density disk does successfully format as shown on the synthesizer's screen, it will eventually fail afterward. Personally, I have witnessed brand new Verbatim Maxell and TDK high-density disks, fail ten minutes later when attempting to reread them in the same synthesizer they were formatted in (SY85 and SY77). On both double-density and PC drive conversions. Windows in turn reports these disks as unformatted.

For long-term use, formatting a high-density disk as a double-density disk is not recommended. In this regard, taping over the hole becomes redundant as it serves no purpose. Its only use is to enable reading the disk in a PC if the drive supports double-density disks. However, the only types of drives that can now support double-density disks are internal PC drives running operating systems of that era or the rare few USB floppy drives from the late 1990s or early 2000s.

To format a double-density disk on systems running Windows XP and above, you need to use the DOS command "format A: /FS:FAT /T:80 /N:9" without quotation marks. Since then, the use of double-density disks for common purposes has been considered redundant. (IBM format disks are FAT.) Windows XP still supported reading and writing to double-density disks, but this functionality was hidden from context menus. Double-density disks required manual commands at the command prompt to format them.

However, on systems up to Windows 98SE (uncertain about Windows 2000 as I never used it), the switch command /FS:FAT is not required as those systems fully support double-density disks, and the floppy drives are capable of automatically detecting the disk types.

Generally, USB floppy drives do not support double-density disks. If the box only indicates 1.44MB and nothing else, it is safe to assume that it will only support that capacity. Any items found on eBay displaying a stock image will not support double-density disks.

When searching for USB drives on various shopping sites, unless it is explicitly stated on the box or in the user manual that it supports double-density disks, it won't. The easiest way to check, if you have the opportunity to inspect it in person, is to open the front flap and look inside the right-hand side. If there is no little finger sticking up where the hole in a high-density disk would normally be, it means the drive does not support double-density disks. The image below for a illustrates this using an internal PC drive.



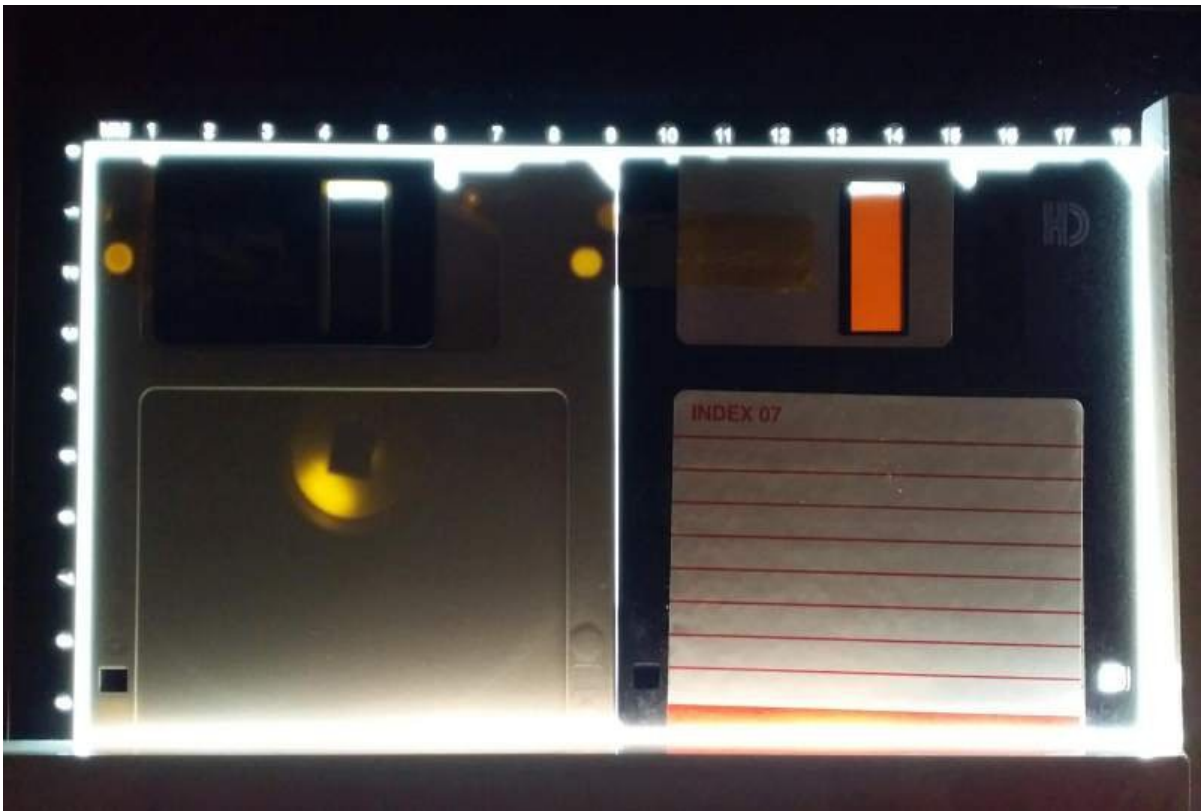
The little finger is connected to a reed switch. When a double-density disk is inserted, it pushes down on the little finger, closing the switch. This action informs the floppy drive and the operating system that a double-density disk has been inserted. Conversely, when a high-density disk is inserted, the switch remains open. If this cannot be observed by looking inside a drive, it means the drive supports high-density disks exclusively.

High-density disks were first commercially introduced in 1987 and were initially quite expensive, as is common with new technologies. However, they soon became more affordable. By the mid-1990s, double-density disks were being phased out, and high-density disks became the standard when IBM-compatible computers, such as the 386 and 486, dominated the market.

With the introduction of Windows XP, which provided stable native USB support and the availability of cheap thumb drives, most stores that still sold floppy disks were offering old stock. By that time, the primary users of double-density floppy disks were owners of Yamaha synthesizers (and possibly other brands), Ataris, Amiga computers, or those using them for industrial applications.

It has been discovered that some "refurbished" or brand-new generic or unbranded double-density disks sold online are actually re-shelled high-density disks placed inside a double-density shell. If you are uncertain, the easiest way to confirm whether a disk is double-density is by first opening the metal flap and examining its colour.

In general, double-density disks appear lighter in colour compared to high-density disks, which tend to be darker. It's similar to comparing the colours of a type I cassette to a type II cassette. Additionally, when held up to the light, a double-density disk is not opaque at all, and you can't see through it. If you can see through the disk, the light should be barely visible. In contrast, a high-density disk is transparent, and when held up to the light, you will observe a brownish hue.



Double-density (2DD) disk on the left, High-density (2HD) on the right, with light board.