

FLOPPY DISKS: CARE, HANDLING, AND PRESERVATION

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8", 5.25", and 3.5" disks. Photograph by George Chernilevsky. Public domain.

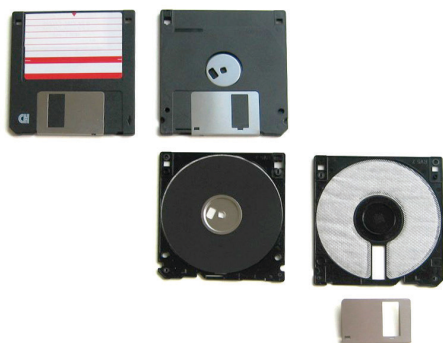
About floppy disks

Floppy disks—also known as “flexible” (as opposed to “hard”) disks, “diskettes,” or simply “floppies”—are a type of removable digital media, consisting of a thin, flexible magnetic disk, encased in a rigid plastic cartridge (3.5" disks, as well as Zip disks and some more obscure formats) or a semi-rigid plastic envelope (5.25" and 8" disks). Data is stored in the alignment of the magnetic particles on both sides of the disk; as with optical media and magnetic hard disks, the disk is rotated at high speed to present different parts of the surface to the drive's read/write head.

Floppy disks were a common medium for file storage, file transfer, and software distribution from the 1970s through the early 21st century, and are still in use today in a few government, military, and industrial applications, including aviation, textiles, and machining. Some materials librarians and archivists might encounter on floppy disk include writers' and scholars' drafts and correspondence, scientific data and data processing programs, teaching materials (on disks included with textbooks), software of historic value, and early digital art.

Know your floppies

The earliest floppies (now relatively rare) were the 8" disks used in mainframes and microcomputers of the 1970s. The first consumer format was the 5.25" disk, very similar in construction, notably used by the Apple II and Commodore 64 personal computers, as well as the first IBM PCs and compatibles; it was common from the late 1970s through the mid 1980s. Both 8" and 5.25" disks enclose the magnetic disk in a semi-rigid plastic envelope, with the read/write area exposed via a small window in the envelope. Apple and Commodore drives accessed only one side of the disk at a time, requiring the disk to be physically flipped to make use of the second side, while PC drives accessed both sides at once.



Parts of a 3.5" disk. Photograph by Priwo. CC-BY-SA 3.0.

The most common surviving floppy today is the 3.5" disk, first popularized in the 1980s by the Macintosh, Amiga, and Atari ST computers, which quickly became the standard for Windows PCs as well. Not only were they more compact and capable of holding more data, the rigid cartridge enclosing the 3.5" disk was sturdier than the plastic envelope of the older disks, and its sliding metal shutter provided better protection for the delicate magnetic medium inside.



5.25" disks. Photograph by Justin Hall. CC-BY 2.0.



3.5" disks. Photograph by Tetzemann. CC-BY 2.0.

Caring for your floppies

Floppy disks are relatively free from inherent vices. That said, like other magnetic media such as audiotape and videotape, floppies are vulnerable not only to physical deterioration, but to the need for specialized playback equipment—equipment that itself is delicate and in short supply, and that subjects the media it reads to wear and tear. The materials stored on floppies also present all the usual born-digital problems of format availability and software obsolescence—exacerbated as files on floppies tend to be older, and their formats often more obscure, than files that arrive by other means.

For long-term preservation—and for access—data on floppies should be imaged (copied to more modern storage) and transferred to a digital repository. This is, of course, easier said than done. But if you have more floppies than you can process immediately, don't despair; if handled carefully and stored in appropriate conditions, floppies have proven to be surprisingly long-lasting.

Preserving floppy disk data

Stations for processing floppy disk collections should use a dedicated, "clean" computer—one regularly scanned for malware, and not used for other work that could introduce malware. Depending on the age and condition of the disks, specialized hardware may be required, such as a KryoFlux, a device which can read and record the magnetic fluctuations on the disk directly at a low level, allowing even damaged disks to be imaged for later analysis. Specialized software such as Forensic Toolkit, FTK Imager, and BitCurator can also be useful.

Care and handling

When working with floppies, avoid touching the surface of the magnetic disk, or opening the casing and exposing the disk. Labels should be applied only in the label area. If possible, use a hardware write blocker; otherwise, use the write-protect switch on 3.5" disks, and on 5.25" disks, cover the write-protect notch.



Commodore 5.25" disk drive. Photograph by Phil Strahl. CC-BY-NC-ND 2.0.

Environmental conditions

Like most materials, floppy disks should be protected from direct sunlight, from UV light, from chemical and particulate pollution, and from fluctuations in temperature and humidity. While in the short term floppies can tolerate temperatures from 50° F to 125° F (10°C–51.5°C) and relative humidities from 20% to 80%, long-term storage facilities should maintain a much narrower range, from 64° F to 72° F (18°C–22°C) and 35%–45% relative humidity.

Care should also be taken to store floppy disks away from large electronic devices or other equipment that could generate strong magnetic fields—and, of course, away from magnets.

Conserving damaged floppies

Bent, creased, or badly scratched floppy disks may be beyond recovery, as are floppies that have been exposed to sufficient heat to cause them to warp, melt, or burn. Floppies exposed to water, however—even dirty floodwaters or saltwater—can often be cleaned and dried. Wet floppies should be removed from their casings, washed with distilled water, dried carefully at room temperature (heat-drying and freeze-drying should both be avoided) and placed in a clean casing salvaged from an unused disk. Stubborn dirt, and even mold, can be removed with a dry, non-abrasive polish.

Processing priorities

When deciding which floppies to prioritize for processing and upload to a digital repository, criteria to consider include the value of the collection, the volume of use (actual or anticipated), the uniqueness of the content on the floppies, and any particular value (such as interactivity) the content on the floppies may have over analog alternatives.

Living with floppies

Again, if stored properly and handled carefully, floppy disks are not at particular risk—at least physically. The more you know about the floppies you have, the better equipped you will be to understand the risks of damage, deterioration, and software and format obsolescence to your collections, and to make plans and gather resources to mitigate those risks.



"Death of the floppy disk." Photograph by Rob Hayes. CC-BY-NC-SA 2.0.



Floppy disk drives. Photograph by Wolfgang Stief. Public domain.

Resources

General preservation guidance

Brown, A. (2008). *Digital Preservation Guidance Note 3: Care, handling, and storage of removable media*. The National Archives (UK).

<https://cdn.nationalarchives.gov.uk/documents/information-management/removable-media-care.pdf>

Provides technological background on floppy disks and related media, as well as guidance on handling and storage for both short- and long-term preservation.

Patkus, B. (2003). *Assessing Preservation Needs: A Self-Survey Guide*. Northeast Document Conservation Center.

<https://www.nedcc.org/assets/media/documents/apnssg.pdf>

Guidelines for institutions to evaluate their preservation needs and preparedness in regard to a variety of media, including magnetic media.

Conservation and disaster recovery

Iraci, J. (2002). *Disaster recovery of modern information carriers: Compact discs, magnetic tapes, and magnetic discs*. Canadian Conservation Institute.

<https://publications.gc.ca/site/eng/9.810479/publication.html>

Detailed guidance on cleaning and repairing damaged floppy disks, as well as CDs, magnetic tapes, and other media.

Accession, processing, and preservation

Irway, R. (2012). *You've Got to Walk Before You Can Run: First Steps for Managing Born-Digital Content Received on Physical Media*. OCLC Research.

<https://www.oclc.org/content/dam/research/publications/library/2012/2012-06.pdf>

An excellent overview not only of floppy disk processing, but also of how to establish physical and intellectual control of content on floppy disks and other removable media.

Case studies

May, A. (2021). *Kilobytes of Cultural Heritage: Preserving Collections on Floppy Disks*. The Library of Congress. <https://blogs.loc.gov/preservation/2021/08/kilobytes-of-cultural-heritage-preserving-collections-on-floppy-disks>

An introduction to the processing of floppy disks and the uses and preservation of floppy disk data at the Library of Congress.

Imaging tools

KryoFlux Products & Services Ltd. (n.d.).

<https://www.kryoflux.com/>

The leading manufacturer of capable, but expensive, specialized hardware for low-level floppy disk imaging.

Greaseweazle Wiki: Home. (2023) *GitHub*.

<https://github.com/keirf/greaseweazle/wiki>

An emerging DIY / open-source alternative to the KryoFlux for low-level magnetic imaging of floppy disks.

Floppies in the wild

Mogg, T. (2022). Floppy disks are finally on the way out in Japan ... Maybe. *Digital Trends*.

<https://www.digitaltrends.com/computing/floppy-disks-taro-kono-japan/>

An interesting case of the persistence of floppy disks in Japanese government use long past their declared obsolescence.

Prisco, J. (2023). Why the Floppy Disk Just Won't Die. *Wired*.

<https://www.wired.com/story/why-the-floppy-disk-just-wont-die/>

An overview of the many surprising corners of technological society where floppy disks continue to be used, and interviews with the people who keep the floppy disk ecosystem alive.