Technology is a rapidly changing and evolving field. Computers continue to become more powerful and new devices are invented to help you track information. In the field of storage technology, we have moved from the 3.5 inch floppy disks as the storage medium of choice to the CD-ROM or DVD disk. In order to access and utilize your material at a later date, the Archives and Records Section thought the material below would be useful knowledge regarding the handling of your CD and DVD disks. It is taken directly from the **Florida Bureau of Archives and Records Management**, *Technical Bulletin* 17, no. 2 April-June 2003. A list of *Technical Bulletins* from the **Florida Bureau of Archives and Records Management** can be found at http://dlis.dos.state.fl.us/barm/.

Protect Your DVDs and CDs

DVDs and CDs are both optical discs that are very similar in structure. They are composed of several layers – a layer of injection molded polycarbonate plastic, a layer of reflective material, and a layer of acrylic or lacquer. Some CDs and DVDs have their labels silk screened directly on the disc, others have the labels printed on an adhesive backed paper and then glued to the disc. Some DVDs are playable on both sides (like old-fashioned record albums) and don't have any labels. Optical discs have a microscopic groove in them that runs counterclockwise from the inside of the discs. They are read from the inside of the disc (next to the hole) toward the outer edge.

Optical discs are read by a laser. The polycarbonate layer acts as a lens, focusing the laser beam, similar to a pair of reading glasses focusing the light so an eye can see clearly.

Both DVDs and CDs now have writeable and re-writeable versions available. These discs have a different reflective layer than the read-only versions. Read only versions (such as the movie DVDs bought in a store, or CD-ROMs) use gold or aluminum as their reflective layer. They have microscopic bumps in the spiral groove that the laser reads. These bumps are different sizes, equivalent to ones and zeros.

Most of the recent writeable and re-writeable discs have a dye that acts as the reflective layer. When one "burns" a CD or DVD, one is actually heating this reflective layer of dye using a heated laser to create dark spots in the dye. These dark spots serve the same function as the bumps on a read-only optical disc. Earlier versions of the re-writeable discs were magnetic; heat and magnetic fields were used to arrange the polarity of the
magnetic particles. Special readers are needed to read this type of disc.

Although the polycarbonate plastic used as the base for optical discs is a long lasting type of plastic, there are things that can damage an optical disc, rendering it non-operational. The polycarbonate layer itself can yellow or darken, making it hard for the laser to read through. Warping of the disc will cause the laser to fail. Scratches on
the polycarbonate side of a disc can sometimes cause the laser to skip or to lock up on a particular area. Scratches on the label side that go through the acrylic can remove or destroy data. Because optical discs are made from layers of materials, there is a chance that the layers will delaminate over time, making the disc impossible to read. Some optical discs suffer from oxidation on the reflective layer, while some of the dyes used
in the re-writeable discs fade drastically under ultraviolet lighting. In the case of some of the earliest music CDs, the ink used to silk screen the label onto the top of the CD was eating through the acrylic layer and into the reflective layer. Some of the earliest re-writeable discs were magnetic, rather than dye based, so

any strong magnetic fields can wipe them. Now, some optical discs are being made with a planned “shelf life,” so that after a short period of time, chemicals incorporated into the disc render it unplayable.

There are a few things that you can do to prolong the life of your favorite CDs and DVDs (except for those of planned obsolescence).

Protect Your DVDs and CDs, Continued

Environment
Avoid very high temperatures, such as those found inside a car parked in the bright summer Florida sun. High temperatures can quickly cause a disc to delaminate or warp. They can also affect the dyes in the re-writeable discs. Also, avoid very humid conditions, humidity can cause the reflective layer to oxidize, darkening it so the
laser is unable to read the data bumps. Avoid fluctuation in temperature and humidity – they can cause the different layers of optical discs to swell and contract, which they do at different rates. This can lead to delamination and warping of the disc. Warped discs are not readable.

Ultraviolet light, found in sunlight and florescent lighting, can cause the polycarbonate base to yellow, which makes it hard for the laser to penetrate correctly. It can also fade the dyes of the printed or silk-screened label along with the dyes used in re-writeable discs. Keep the discs out of direct sunlight.

Storage and Handling
Handle optical discs by their outside edges and by the center hole. Fingerprints on the disc may not necessarily harm it, but they may make it hard for the laser to penetrate through the polyester base. Scratches can cause permanent damage to the disc, especially on the top or label side. Scratches deep enough to penetrate through
the thin acrylic layer can damage the data bumps or eradicate areas of the re-writeable dyes.

When not using the disc, be sure to store it properly. Store optical discs in jewel cases that are able to “float” the disc. The center-supporting hub should keep the disc from touching either side of the jewel case when it is closed. If there is no center support hub, or if the tines of the hub are broken, replace the jewel case. Discs outside of their jewel cases or players are likely to pick up scratches.

Most travel cases for optical discs have thin, flexible sleeves. These are fine for short-term storage, but may not do for longer, more permanent storage. Also, be aware of any grit or dirt particles that might have wandered into the sleeves, they can cause damage to a disc when it is slid into or out of the sleeve.

Store discs upright, rather than on their sides, whenever possible. If the discs are stored on their sides, it is very important to make sure the jewel cases have working central support hubs to float the disc.

Don’t write directly on a disc. Hard tips of ballpoint pens can penetrate the acrylic, damaging the data. Alcohol based pens (such as Sharpies) have also been known to eat through the acrylic of discs when heated as they are when in use. A water based, felt tipped pen could be used to label a disc, if done very gently. As discs read
from the inside out, the best place to mark a disc is along the very outside edge.

If your disc is the type that has an adhesive label, as many of the writeable ones do, do not play it in a “slide-in” player, such as the type that comes in automobiles. These types of players tend to peel the adhesive labels off. Bits of label gum up the player, while the adhesive tearing off the top of the disc can take bits of acrylic (and data) with it. Do not attempt to tear off an adhesive label for the same reason – it can take the data with it.

Protect Your DVDs and CDs, Continued

If absolutely necessary, discs can be cleaned with a soft, clean cotton cloth. It is best to wipe directly away from the center hole – the laser has less trouble reading through scratches that cross the lines of the data grooves, than those that are aligned with the data grooves. Use the cloth very gently; do not rub on the disc. Blowing dust off with air is also an option.

If there is something more stubborn (such as spilt soda) on the disc, a bit of distilled water on a cotton ball might do the trick. Do not use any type of solvent, such as fingernail polish remover or glass cleaner, to attempt to clean optical discs.

Credit: **Florida Bureau of Archives and Records Management**, *Technical Bulletin* 17, no. 2 (April-June 2003): 4-5.