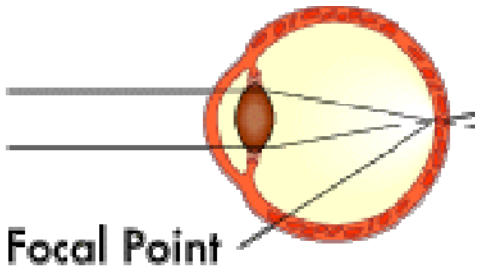
How can shining a laser in your eye help correct your vision?

LASIK (Laser-Assisted...) Eye Surgery

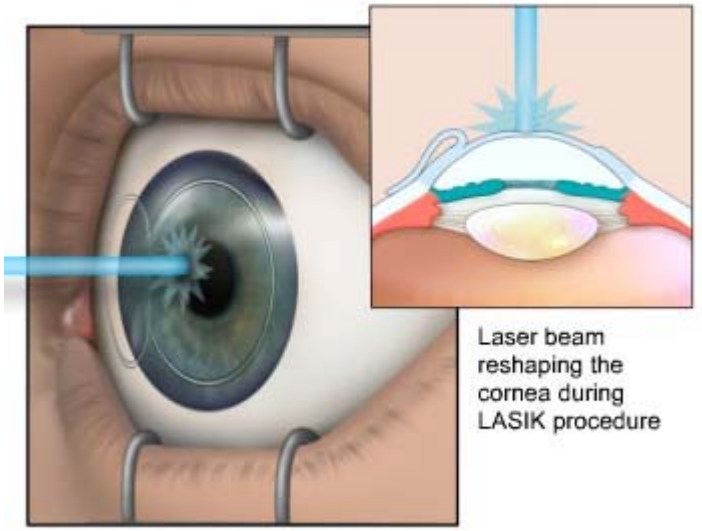


To see clearly, the lens and the cornea (located at the front of the eye) work together to focus the image onto the retina (located at the back of the eye). If the cornea is too curved (nearsightedness) or too flat (farsightedness), **laser eye surgery can be used to reshape the cornea** so that it focuses like a normal eye.

The laser used for this procedure uses reactive gases (such as chlorine and fluorine) mixed with inert gases (such as argon, krypton or xenon). When electrically stimulated, a pseudo molecule is produced that, when lased, produces **a very tightly-focused beam of ultraviolet light** on the order of 0.25 microns (or less than 1% the width of a human hair!).

The laser beam only **penetrates less than a nanometer** into the surface and since the cornea can't absorb all of the UV light, the molecular bonds breakdown.

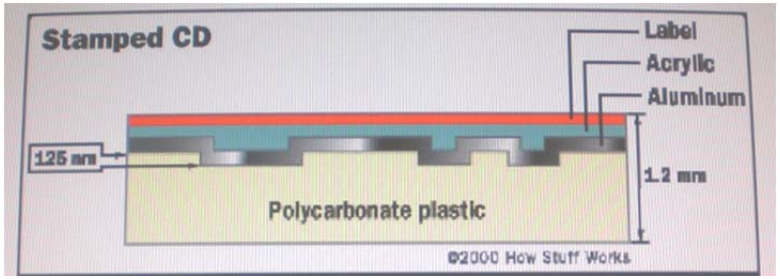
By controlling the size, position, and number of laser pulses, the surgeon can vaporize microscopic portions of the cornea. In this way, lasers help improve the eyesight of over one million people in the United States every year!

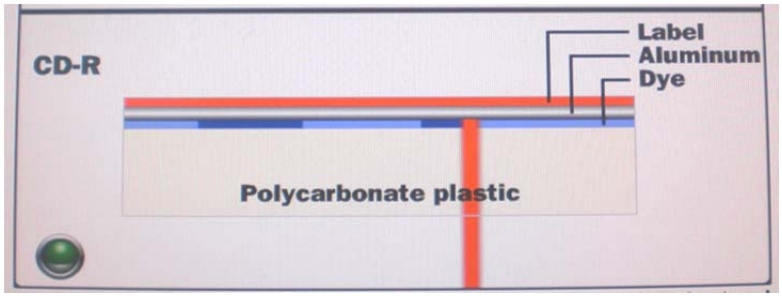


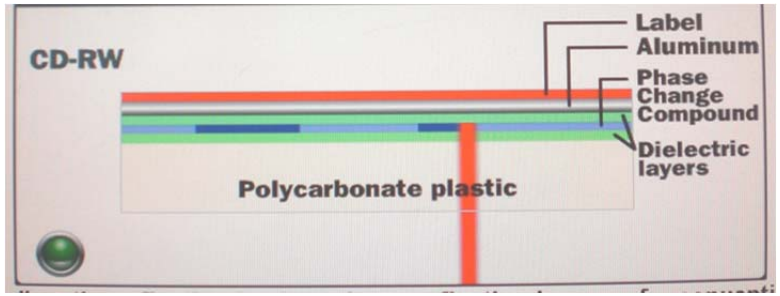
Laser beam reshaping the cornea during LASIK procedure

What's the difference between CD-ROM, CD-R, and CD-RW?

The bumps and flat areas on a CD-ROM are physically machined, hence it has "Read-Only-Memory."
The information is permanent, like on a store-bought music or movie disc.







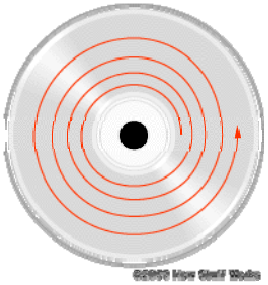
A CD-R doesn't have the same bumps and flats as a conventional CD. Instead, the disc has a dye layer underneath a smooth, reflective surface. On a blank CD-R disc, the dye layer is completely translucent, so all light reflects. **The write laser darkens the spots where the bumps would be in a conventional CD,** forming non-reflecting areas.

So it is "Recordable," even if it's only once.

In a CD-RW disc, a special compound is used. **The information is "burned" using a laser powerful enough to heat the compound to its melting temperature.** These "melted" spots serve the same purpose as the bumps on a conventional CD. If the compound is left in a crystalline state, light can shine through to the metal layer above and reflect back to the laser assembly.

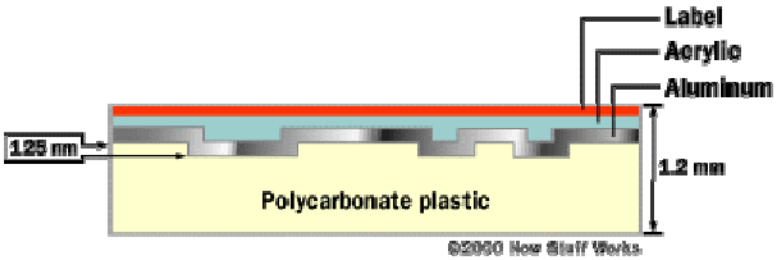
So it is "Re-Writable" using phase changes.

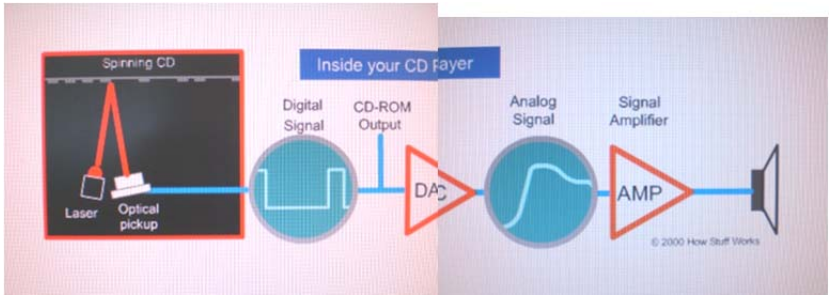
How do lasers store and retrieve information on a CD?



A digital disc stores information that is encoded in a long chain of 1s and 0s. These are represented by **millions of tiny bumps and flat areas.** The bumps and flats are arranged in a continuous track that measures about 0.5 microns (1/100 of a human hair!) across and 3.5 miles (5 km) long.

The CD fabrication machine uses a high-powered laser to etch the bump pattern into photo-resistant material coated onto a glass plate. This pattern is pressed onto acrylic discs. The discs are then coated with aluminum (or another metal) to create the readable reflective surface. Finally, the disc is coated with a transparent plastic layer that protects the reflective metal from scratches and debris.





To read the information, the CD player passes a laser beam over the track. **When the laser passes over a flat area in the track, the beam is reflected directly to an optical sensor on the laser assembly.** The CD player interprets this as a 1. When the beam passes over a bump, the light is bounced away from the optical sensor. The CD player recognizes this as a 0.