

Laser Pointer Facts

By ET1 Nuclear Toe-Knee Cooper, USN 1981-1989, CVN-70 1984-1989, Docent 241113

Since becoming a docent for CVS-12 USS Hornet, I've encountered some docents with genuine fear of laser pointers. One docent's reaction was so visceral that it actually struck me as PTSD. I decided to open a dialog and attempt to discover what the concern was for using the tool that I was blindly carrying in my pocket daily. Pun intended, hopefully not insensitive.

I started with the concerns of the docents. They seemed to be:

- These lasers are too powerful.
- They are dangerous.
- Green lasers are especially dangerous.
- Liability for the ship even if no one is injured.

I started interviewing other docents to see what they thought. Seemed they were like me. Although we all know not to look into the beam, we also did not consider it very dangerous. Let's start there, they're dangerous.

Power

Most lasers are rated in watts, or milliwatts. Some are rated in millijoules which conveniently seem to convert directly to milliwatts. A quick search of the internet revealed that laser pointers limited to 5mW were considered safe. A quick check of my own laser pointer revealed that it did not have a power rating written on it. Checking other docent lasers, they had 5mW models and a check of my Amazon account showed that my \$15 pointer was also a 5mW model. You can buy multi watt models, but they start at a few hundred dollars. I suspect that most docents buy the cheap green models that were recommended to me when I started a few months ago.

Danger

Lasers are rated in classifications divided into classes 1, 2, 3R, 3B and 4. They are classified according to the possible damage they could cause to living things. The important parameters are:

- Laser output power
- Wavelength/color
- Pulse duration
- Delivery system
- Open or Closed (is the beam exposed to people or enclosed)?

One interesting thing that was not covered in this is the beam diffraction, or how tight the beam was. Some laser beams disperse over a short distance whereas others hold a tight beam for more than a hundred feet. That diffraction tells how dangerous a laser is at long distances.

The details of the classes are:

- **Class 1:** Lasers are safe under all conditions of normal use and pose no more risk than ordinary light. CD-ROM readers and laser printers are class 1 lasers.
- **Class 2:** Lasers are safe because the blink reflex limits the exposure to no more than 0.25 seconds. It only applies to visible-light lasers in the 400-700 nm wavelength range.
- **Class 3R:** Lasers are considered safe if handled carefully, with restricted beam viewing. Visible continuous lasers in Class 3R are limited to 5mW. These are the lasers that docents are commonly using.
- **Class 3B:** Lasers are hazardous if the eye is exposed directly, but diffuse reflections, such as from paper or other matte surfaces, are not harmful. Continuous lasers in the wavelength range from 315 nm to far infrared (far below to far above visible light) are limited to 0.5 W or 500 milliwatts. For pulsed lasers between 400 and 700 nm, the limit is 30 millijoules (mJ) (converts to 30mW).
- **Class 4:** Lasers include all lasers with beam power greater than class 3B. These lasers pose significant eye hazards as direct beam viewing can cause potentially devastating and permanent eye damage. Class 4 lasers can also cut or burn skin. In some cases, these lasers may also ignite combustible materials and thus represent a fire risk.

Color

Are different color lasers more or less dangerous? Details are a bit murky, but in general lasers outside the visible spectrum are more dangerous than lasers inside the visible spectrum because the ability to see the light makes people move or blink. This actually makes green lasers safer because humans are particularly sensitive to green light making the green laser beams easy to see.

Safety

This is mostly my opinion and I welcome other opinions.

- The lasers that the docents commonly use are safe for use.
- Do not point the lasers at people, especially towards people's heads.
- When attempting to point out an object, aim high or low and walk the beam down or up to the object.
- Be alert to reflective objects. Most objects will disperse the beam, but some can reflect the beam still tightly focused. Plastic, glass and metal can reflect a tight beam.
- Don't let the kids play with your pointer. Nearly daily a child wants to use my pointer.

Flashlights

One side note, what about the flashlights? You might laugh, but when I became a docent, I did not have a small LED flashlight and my eldest child gave me one of their spare flashlights. I turned it on and was impressed with how bright it was. This could work, I remarked. I then casually pointed it at my couch, where nearly instantly my couch started smoking and burned a neat circular scar into my couch, leaving only the threads intact. This is a picture after repairing the couch. My child then told me that the flashlight cost \$130. I returned the flashlight to my child and purchased a saner \$15, 50,000 lumen flashlight. Beware, lasers are not the only dangerous tools we use.



FIGURE 1 FLASHLIGHT BURN MARK