

The Safety of Green Laser Pointers

By Phyllis K. Lang

Abstract

There has been a lot of discussion in the news regarding green laser pointers. The great concern recently has been that a terrorist might attempt to cause aircraft to crash by spotting one with a laser. This seemed ridiculous to me for a number of reasons, but because laser pointers are so commonly used by the amateur astronomy community (including myself), I wanted to understand the facts better. The following is what I found.

Laser Pointer Specification

The laser pointers commonly used by amateur astronomers are green, continuous wave lasers emitting light centered at 532nm wavelength. They are required by the FDA to have a warning or danger sticker on them that indicates the class of the device, which in turn depends on the maximum output of the device. The FDA regulates the devices because of their potential to cause eye injury. Most amateur laser pointers are either Class II (output ≤ 1 mW) or Class IIIA (output ≤ 5 mW) devices. Even though the industry is required to label their products as described, random tests have shown that some devices exceed their labeled output. Accordingly, studies described below apply to correct output levels.

Safety Studies

The FDA has studied and published reports on laser exposure to the human eye and associated injury. These studies show that tissue damage may occur when the eye is exposed to a Class IIIA 5mW green laser at a distance of 10 feet or less. This fact alone should cause astronomers to understand how carefully these lasers should be handled.

Even though eye tissue damage is a serious matter, it is not the critical issue with the FAA. Instead, they are concerned with glare, flash-blindness and after-images when an aircrew is exposed to laser light. The FAA has studied how much exposure affects aircrew and the degree to which exposure can be tolerated in relation to where the aircraft is in its takeoff or approach pattern.

Air Space

Generally, the airspace around an airport can be divided into 4 regions. The closest region is within 5 nautical miles (5.75 statute miles) of the runway and extends to 1000 feet altitude. A 5mW laser exposure within 2 statute miles of an aircraft in this region is declared harmful. Obviously this is the most critical portion of flight for the aircrew so a minimal amount of exposure can be detrimental. The next region is within 10 nautical

miles (11.5 statute miles) of the runway and extends to 10,000 feet altitude. A 5mW laser exposure within approximately 4 statute miles of an aircraft in this region is thought to be harmful. The regions further out from the runway are still being studied.

Conclusions

There has not been a documented aviation accident that was caused by the aircrew being blinded by a laser pointer. There have been accidents caused by other bright lights, but not by accidental illumination by a laser pointer. Governments have recognized safety issues and reacted. The FDA issued a warning in 1997 against children using laser pointers at school and the UK outlawed the sale of laser pointers with output greater than 1mW.

My own interpretation of this research is this:

- 1) I respect the potential harm that a green laser pointer can do to fellow astronomers, and must therefore be extremely careful not to shine the laser in anyone's face, or into any reflective optics. This is no child's toy.
- 2) When I use the laser to point out anything in the sky, I need to be aware of any air traffic and my proximity to an airport. 'Spotting' an aircraft is an absolutely stupid idea.
- 3) Some states have regulations governing the use of laser pointers, but North Carolina is not one of them. Many star parties have banned them. Schools don't permit children to use them. Before I use a laser pointer, I should find out whether they are welcome or not.
- 4) I should watch for a ruling by our FDA that may restrict the sale of 5mW lasers in the US. I hope that educating the amateur astronomy community with the facts about lasers will help to avoid this.

Sources:

DOT/FAA/AM-03/12 The Effects of Laser Illumination on Operational and Visual Performance of Pilots Conducting Terminal Operations (Aug 2003)

DOT/FAA/AM-04/9 The Effects of Laser Illumination on Operational and Visual Performance of Pilots Conducting Terminal Operations (Jun 2004)