

Green Laser Pointers

Light Fantastic or Light Saber

Green laser pointers are becoming more popular all the time. Their low price, availability and brilliant colour make these quite attractive, but they also have a dark side. This report will discuss the technology, uses and dangers of these devices. We will also examine some of the applicable laws which vary from jurisdiction to jurisdiction. Most of the material in this report is readily available on the internet. It was decided to capture this information from various sources, condense it and assemble it in an article for the Reflector. I hope the reader enjoys the report and learns from it.

The technology:

Green laser pointers operate at a wavelength of 532 nm making them much more complicated than standard red laser pointers because laser diodes are not commonly available at this wavelength. The process involves infrared laser diodes, special crystals, frequency doublers etc. to produce the green light. The exact technology gets a bit deep for this article but for those interested you can get a heap of info using “google” or “bing” and search for “green laser pointer”. Two distinct features make the green laser pointer attractive. The first is brilliance. At 532 nm the light is 60 times more powerful than a red laser pointer of the same power. This is due to the sensitivity of the human eye at this wavelength. The second, most noticeable, is that the beam itself can be seen in dark environments, not just the dot at the end. These features lead us to the next section on the uses of green laser pointers.

Uses:

The bright visible beam of a green laser pointer makes it a popular choice in the following disciplines:

- Professional presentations
- Astronomy
- Bird watching
- Tour guides
- Construction engineers
- Camping
- Hiking
- Search and rescue

Our interest is of course in astronomy. Here the pointer is very effective in pointing out constellations, stars, planets, nebulae etc. in the night sky. A red laser pointer just doesn't cut it here.

So far we've had an introduction to green laser pointers, a high level view of the technology, and some of the uses. With most technologies there are good and bad implementations. The example uses listed above represent the good, not listed is the bad.

Enter the dark side of the technology, the “light saber” if you wish. One of the areas of greatest concern is the deliberate or “accidental” pointing of these high power lasers at aircraft flying overhead. It is not well understood that even at 5 mw a green laser pointer has a range between 2900 and 3300 meters (9000 to 10000) feet. Pilots flying aircraft in this range can suffer temporary blindness when exposed to these light beams. I’ve heard people say that “commercial aircraft fly at 39000 feet, so what’s the problem?” Commercial aircraft **cruise** at 39000 feet. Have you ever noticed that the jets coming up out of Toronto or heading into Toronto have their landing lights on when they are over the Peterborough area? International aviation law states that all commercial aircraft must have landing lights on when at or below 10000 feet. All of a sudden our little hand held device has just become a weapon.

The preceding has addressed the risk to commercial flights but don’t forget that we have many private aircraft in our area that fly typically below 4500 feet. These are the Cessna’s and similar aircraft with and without floats that traverse our skies. The risk to the pilots of these aircraft is tremendous. There are also documented reports of these devices being used to “blind” law enforcement officers and even some athletes. This brings us to the final part of the report regarding applicable laws.

Applicable laws:

It is interesting to note that in the United States the allowable output power of a green laser pointer is controlled or regulated by the Food and Drug Administration (FDA). I found this rather strange but it stems from the health issue of using these devices. The FDA has determined that permanent damage to the eye can occur from exposure into the beam of a green laser pointer in .25 seconds. More recent studies show that the risk to the human eye from accidental exposure to light from commercially available laser pointers having powers up to 5 mw seems rather small, typically involving deliberate staring into the beam for 10 or more seconds. In Canada there are no laws (yet) restricting the power of green laser pointers and this is evident by the availability at most astronomy related stores and other sources of very high power devices. This could change as there have been charges laid in a couple of jurisdictions involving aircraft.

Summary:

I hope this limited report causes one to reflect on their use of green laser pointers. It is in no way intended to discourage the ownership and use, but to remind one of the responsibilities associated with their use. I do not own a green laser pointer at this time but I probably will acquire one if enough people visiting the Robinson Road Observatory keep asking “**what is that?**”

Rodger Forsyth

Footnote:

Approximately 1 month after writing this report, the following article appeared in the Peterborough Examiner on Friday, December 4th 2009,

“Laser Shined at Copter”

“Clarrington – A Clarrington man is charged with shooting a laser light at the Durham Regional Police Helicopter.

Between Nov. 10 and 25, the pilot of Air1 took evasive action to avoid being hit with the laser while flying over Clarrington, police said.

On Wednesday, the light beam was directed at the Air1 while on routine patrol. Officers on the ground were able to find where the laser originated and arrested a man.

Gerald Cote 25, of Concession Rd. 3 is charged with projected a directed bright light at an aircraft, engaging in behavior endangering an aircraft in flight, obstruct police and mischief.

If convicted under the Aeronautical Act, he faces a maximum fine of \$100,000 and/or five years in prison.

When directed into the human eye, laser lights can create temporary blindness that may affect the pilot’s ability to operate the aircraft safely. Air Support Unit Staff-Sgt. Alan Mack said.”

My own observation of the article is that although green isn’t mentioned, the fact that ground based police officers were able to find the location of the laser, it suggests that it had to be green.