

Emerging Hazard Posed by High Power Portable Hand-held Lasers



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Moore's Law for Lasers

- Trend: lasers continue to get smaller, more portable, less expensive, more powerful
- Exhibit A: mid 1980's Nd:YAG laser, flash tube pumped; required 240 Vac power and water cooling
- Exhibit B: Contemporary diode; 120 Vac, air cooled



News Item: Eye Injury to 15 year old

- More powerful hand held lasers now readily available
- Public can't tell difference between a <math><5\text{ mW}</math> "pointer" and identical appearing but more powerful device
- More incidents increasingly likely



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CORRESPONDENCE

Retinal Injuries from a Handheld Laser Pointer

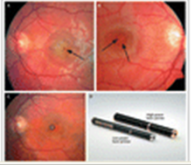
N Engl J Med 2010; 363:1089-1091 | September 9, 2010

Article

To the Editor:

Handheld laser pointers are commonly used in lecture halls and are considered to be harmless and safe.¹ However, laser pointers can cause severe eye injury, as demonstrated by the case of a 15-year-old boy. The boy had ordered a handheld laser pointer with green light on the Internet to use as a toy for popping balloons from a distance and burning holes into paper cards and his sister's sneakers. The boy's life changed when he was playing with his laser pointer in front of a mirror to create a "laser show," during which the laser beam hit his eyes several times. He noticed immediate blurred vision in both of his eyes. Hoping that the visual loss would be transient and afraid of telling his parents, he waited 2 weeks before seeking an ophthalmic assessment, when he could no longer disguise his bad vision. His visual acuity was so poor in his left eye that he was only able to count fingers at a distance of 3 ft, and it was 20/50 in his right eye. A fundusoscopic examination revealed a dense subretinal hemorrhage in his left macula (Figure 1A) and several tiny round scars in the pigment epithelium of the foveolar region of his right eye (Figure 1B). The clinical findings were consistent with severe bilateral retinal laser injury.¹ After 4 months, the boy's visual function remained impaired but improved to 20/32 in the right eye spontaneously and to 20/25 with a remaining scar just beside the center of the fovea in the left eye after one intravitreal injection of ranibizumab (Figure 1C).

FIGURE 1



Trend: Hand-Held 1W Blue Lasers

- Several manufacturers offer 1 W hand held completely portable lasers for >\$300 (e.g. Laserglow Technologies, Wicked Lasers, Dragon Lasers, Iveyilaser)
- 1 W: laser hazard Class 4 (immediate eye injury, skin hazard, ignition source)
- Conventional Class 4 lasers are designed to be bolted securely to an optical bench or inside equipment; hand held devices sold as recreational “toys”

LIA Press Release (Aug. 2010)

1 Watt Portable Blue Laser Poses a Hazard

As new lower-cost laser technology becomes more readily available to consumers, laser safety experts at the Laser Institute of America (LIA) are concerned for the public's safety.

Recently released to the public and promoted as the world's first 445 nm direct blue diode portable laser with output powers of up to 1 Watt, an internet retailer is selling this Class 4 laser product for under \$300. "Our concerns are for the consumers, uninformed of the hazards, who may operate the device placing themselves and others at risk of injury," stated Peter Baker, LIA's executive director.

Class 4 lasers emit enough energy to be hazardous to the eye or skin from a direct beam, or indirectly reflected laser light. Even exposure to reflections scattered off of a matte surface may cause an eye injury. They are considered a fire hazard. Visible wavelengths can produce levels of light that can produce visual interference at large distances away from the source. This is normally a concern for individuals operating vehicles, boats or aircraft. It is also important to note that laser illumination of any aircraft will be investigated by law enforcement and anyone caught illuminating aircraft will be prosecuted to the fullest extent of the law.

As laser technology continues to develop, more powerful portable (handheld) laser systems are being produced at lower costs. This means that Class 4 lasers systems that produce visible emissions are becoming more accessible. Various laser safety standards referenced by state and federal agencies provide guidance for the safe use of these types of lasers in the workplace. However, consumers who buy Class 4 lasers, or organizations that have not implemented a laser safety program may not be aware of the hazards or the proper methods used to contain and control the hazards. Improper use of a Class 4 lasers can result in the operator, spectators or people in the vicinity of the laser operation being injured.

"As the authorities in laser safety we feel we must warn the consumer about the inherent danger that exists," warns LIA's education director Gus Anibarro. "We urgently recommend not purchasing this or any other Class 4 laser device until you have had proper laser safety training and understand what is involved in securing what will be a Class 4 laser environment.

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<http://www.laserinstitute.org/news/2010/08/31/1-watt-portable-blue-laser-poses-a-hazard/>

Laser Strikes on Aircraft

MSNBC Story 20-Jan-11 [www.msnbc.msn.com/id/41156165/ns/travel-news/]

- Incidents rose from 1,527 in 2009 to 2,836 in 2010 (up from about 300 in 2005, when tracking began)
- Airports with most reports in 2010: LAX (108); O'Hare (98); Phoenix & San Jose (80 each); Los Vegas (72); Philadelphia (66); Oakland (55); Honolulu (47); San Francisco (39); Denver & Newark (38 each); Tucson (37)
- 2009: Calif. man gets 2 1/2 years in prison for aiming laser at 2 passenger jets landing at John Wayne Airport

4-Feb-11: Congress votes to make it a felony to strike aircraft with laser (already a federal offense)

8-Feb-11: 14-year old girl arrested for pointing laser at planes at LAX

Conclusions

- Lasers continue to get smaller, more portable, less expensive, more powerful
- Several manufacturers now sell high power (1+ W) hand held lasers
- Injuries have been reported
- Laser strikes on aircraft almost doubled in the past year, and increased by nearly a factor of ten since the FAA began tracking in 2006
- High power lasers now used as toys by untrained members of the general public; out of the lab/factory and into the bedroom