

Laser Pointers

During 2007, the CAA received 20 reports of aircraft being targeted by laser beams. One of these occurrences was in Sydney, 15 in the Wellington area, one near Auckland, and three in the vicinity of provincial airports. All were green beams and were probably from hand-held laser pointers of the type used for outdoor astronomy classes.

Harmless Devices?

The red laser pointers commonly seen in classrooms and conference venues are low-powered devices of less than one milliwatt (mW), emitting light in the wavelength range of 630 to 670 nanometres (nm, or 10^{-9} m). These are normally 'Class 2' laser devices (the higher the class number, the greater the hazard), with insufficient power to cause actual physical harm, although they still require care in operation.

Green pointers are readily available with a maximum power rating of 5 mW, and these are classified '3R' (more hazardous than Class 2). They emit light at a wavelength of 532 nm, perceived by the human eye as green. The eye's maximum sensitivity to visible light is around this wavelength, and the eye will interpret a green laser light of a given power as being up to 30 times brighter than a red laser of the same power.

Direct eye exposure to one of these laser beams can result in momentary 'flash blindness' with possible after-images, the duration of which will vary with the relative brightness. As all of the incidents occurred at night, the pilots' eyes would have been at least partially dark-adapted and thus more susceptible to dazzling. The human eye has a natural blinking reflex that activates after about 0.25 seconds' exposure, limiting the amount of light reaching the retina.

Nonetheless, the dazzling effect on the eye can be a major distraction, particularly in situations of high workload. Some of the reported incidents took place immediately after takeoff, and probably before the crew had fully transitioned onto instruments.

To inflict actual eye damage with a 5 mW green laser pointer would require some effort, as both the low power and the eye's natural defence would combine to limit potential damage. So, one would think, these devices can be written off as little more than a nuisance.

Not so. Some vendors advertise higher-powered (from 10 to 400 mW) green laser pointers – these are definitely harmful, and can cause permanent eye damage. Price may put these out of the reach of normal users, but not necessarily for someone with malicious intentions.

Criminal Acts

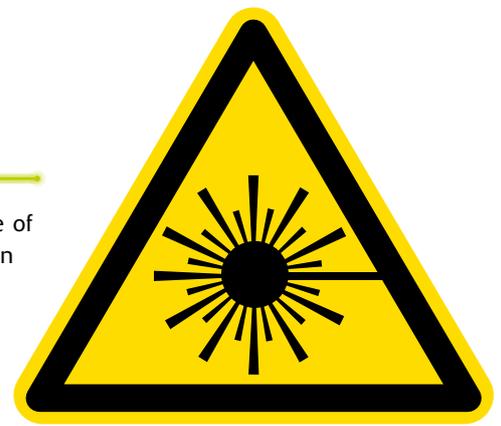
In the USA, the targeting of aircraft by lasers is taken very seriously, as some offenders have discovered. Cases can be taken under anti-terrorist legislation with its inherent severe penalties. Australia has introduced legislation under which laser misuse can be prosecuted, and some Australian states and the UK restrict the public sale of laser pointers to Class 2 or lower. In Victoria, pointers more powerful than 1 mW are classified as 'prohibited weapons'.

New Zealand has no specific legislation addressing laser misuse at present, but legal opinion is that charges could be brought under the Civil Aviation Act 1990, Section 44 *Dangerous activity involving aircraft ... if necessary*. The main difficulty would be in locating the culprit, as a pilot's natural reaction is to look away from the light source, making it difficult to pinpoint its actual origin.

A characteristic of the green laser beam, however, is its visibility even on a clear night. It shows up clearly as a shaft of green light, and this can make it easy for a ground-based observer to track it down without being exposed to its direct glare. Prompt reporting of any instances of aircraft being targeted by a laser beam will assist police in locating the source.

In the Event of Exposure

- Do not stare directly into the beam – avert or shield the eyes if possible.



- If your vision is affected, hand over control (assuming a two-pilot crew, and that the other pilot has not been affected).
- Turning up cockpit lighting may assist in overcoming the 'flash' after-effects (peripheral vision may still be effective).
- Do not rub your eyes after exposure.
- If any lingering effect is experienced, seek medical attention after landing.
- Report the occurrence (immediately to ATC, and as soon as possible through your normal reporting channel).

Laser Pointer Precautions

- Never aim a laser pointer at persons, vehicles or aircraft, no matter how far away they are.
- Keep these devices out of the reach of children.
- Never look directly into a laser beam, especially not through an optical instrument such as binoculars.
- Do not aim a laser beam at a mirror or similar surface.
- Do not use a pointer that lacks warning and/or explanatory labels.
- If you know somebody with a green 'astronomy' type pointer, caution them specifically against targeting aircraft. ■