



Guidelines for the Safe Use of Hand Held Laser Pointers in Astronomy

Notice – A large amount of the information for this Guideline has been taken from the Astronomical Society of Australia Fact Sheet number 22. This information is used with the kind permission of the ASA.

Background

Under the South Australian *Summary Offences Act 1953*, hand held laser pointers with an output greater than 1 milliwatt are prohibited weapons. This Guideline has been prepared to assist ASSA members using laser pointers to understand the changes to the use of laser pointers and is provided for information only and should not be regarded as legal advice.

Note: It is the responsibility of any person using a laser pointer to confirm that their use or possession is permitted by the relevant part of the Act. The Astronomical Society of South Australia makes no warrant as to the legality of any use of a laser pointer in South Australia. If using a laser pointer in other States, astronomers are recommended to seek local advice before operating a laser pointer.

The use of laser pointers in astronomy

Introduction

Green laser pointers are useful astronomical tools. On public astronomy nights, the narrow beam from the laser pointer can be used to unambiguously point to celestial objects. The beam is bright and clearly visible for several reasons:

- typical green laser pointers deliver at least 5 milliwatts (mW) of power,
- green light is scattered away from the beam direction by air molecules and dust particles (so you can see the beam from the side),
- the eye is particularly sensitive to the green colour of the laser pointer.

What kinds of laser pointer are now restricted?

On 1 July 2008, the Australian Federal government banned the **importation** of any handheld, battery operated, laser pointer with a power greater than 1 mW unless prior written permission has been granted. This applies to companies and also individuals ordering on the web. Information on obtaining an import permit is available at <http://www.customs.gov.au/webdata/resources/files/LaserPointers.pdf>.

The South Australian Government amended the *Summary Offences Act 1953* to include any hand held laser pointer with an output greater than 1 milliwatt as a prohibited weapon. Similar laws have been enacted in New South Wales, Victoria, the Northern Territory, Western Australia and Tasmania and Queensland will follow suit.

New South Australian legislation

The South Australian legislation is typical of the state based legislation dealing with laser pointers. It applies to any hand-held laser pointer >1mW regardless of the wavelength of the beam.

The legislation provides exemptions for:

- persons in the course of conducting his or her business;
- for the purpose of or in the course of his or her employment;
- members of listed societies engaged in astronomy – see Appendix A.

The legislation specifically recognises members of the Astronomical Society of South Australia as a class of people exempt from the prohibition but only when using a laser pointer for astronomy. The legislation deals harshly with people, including astronomers that misuse a laser pointer to endanger life or cause injury.

What are the dangers of Laser Pointers?

Laser light from laser pointers can potentially burn the retina of the human eye. The danger is obviously greatest if the beam is aimed directly into the eye, rather than merely scattered from the beam and seen from the side. The danger is dependent on the wavelength of the laser light, the power of the laser pointer, the divergence of the laser beam, the distance of the person from the pointer, whether the beam is seen directly or via a reflection, how long the beam is viewed and whether the human eye's natural 'blink response' to bright light occurs.

The risk from a laser pointer is often also expressed by the 'class' of the laser pointer, although the definition is a little complicated and class definitions have changed in recent years. At one end of the scale, Class 1 laser pointers are safe for normal viewing. Eye damage from directly viewing the beam of a Class 2 laser pointer is usually avoided by the blink response. Class 3 laser pointers can damage an eye before it has time to blink and have the potential to cause eye injury, especially in the hands of a careless or untrained operator. Class 4 lasers are even more dangerous, higher power devices.

The blink response should protect the human eye at any distance from any visible-light laser pointer beam with a power under 1 mW, typical of a Class 2 laser pointer. For laser pointers that are more powerful a greater distance is required to allow for blink response protection. For a given laser pointer beam, a quantity called the *Nominal Ocular Hazard Distance* (NOHD) can be calculated. Serious eye damage is probable within the NOHD and less likely at greater distances. The NOHD depends on the power, wavelength, divergence and diameter of the beam and the length of time the laser pointer beam will be viewed. For example, a 10 mW, collimated, continuous wave, green (532 nm) laser pointer beam with a diameter of 1 mm and divergence of 10^{-3} radian, being viewed directly for 10 seconds has a NOHD of 55 m. Clearly, this laser pointer, typical of many green laser pointers, is a potential hazard to someone close to it and should be used with care.

Damage to the eyesight of a pilot or driver is unlikely from medium power (5 mW to 20 mW) laser pointers given that the typical distances involved are considerably greater than the relevant NOHD. However, the dazzle caused by the beam scattering off dust or scratches on a windscreen, or the blink response itself could still lead to loss of control of a vehicle. A laser pointer beam could also potentially cause harm in other situations, for example by startling someone using a power tool.

Some amateur astronomers and small observatories have similar laser pointers permanently fixed to telescopes, although not always in use. While technically not hand held laser pointers, they should be used with similar safety guidelines in mind.

The potential danger of the lasers pointers increases with power. For astronomical purposes, even in heavily light polluted sites, a 60 mW laser pointer is considered sufficient. The ASSA Council has decided to limit its endorsement of lasers pointers to a maximum power of 60 mW and will not permit the use of higher powered laser pointers at its observatories or ASSA sanctioned events. ASSA identification cards will only be issued for laser pointers with a power of 60 mW or less.

Further details

If you have any information that could usefully be included in this document, please contact ASSA Secretary

Safety Guidelines

It is the view of the ASSA that the safe use of hand-held battery-operated laser pointers is possible in astronomy by following the guidelines presented below:

1. A laser pointer must only be used in accordance with the laws of the state or territory in which it is used.
2. A laser pointer should be carried between observing sites deactivated [batteries removed].
3. Laser pointer used for astronomy must require a button to be held continuously to activate the beam. If the laser pointer is dropped, the beam will automatically switch off.
4. Before activating any laser pointer, astronomers must always check where people are located and ensure the beam is never directed in those directions.
5. Always hold laser pointers overhead in an outstretched arm before activating the switch and release the switch before lowering the pointer.
6. Never use a laser pointer to point out terrestrial objects. **Aim the beam only at celestial objects. Do not aim the beam at any object on the ground, nor at aircraft, motor vehicles, any person or any animal.**
7. When the laser pointer is not being used to point at celestial objects return it to its case, place it in a pocket or cover the aperture from which the beam is emitted.
8. Always cease using a laser pointer if an aircraft is heard and do not switch back on until the aircraft is clearly located and its flight path is confirmed to be well away from the patch of sky being identified with the laser pointer.
9. Store the pointer deactivated in a secure place away from the reach of children and anyone with a potential to misuse the device.

To assist the police or other enforcement Agencies, astronomers must carry evidence of their current membership of an astronomical society at all times when the laser pointer is in their possession.

ASSA will provide members a suitable identification confirming their current membership of ASSA. Members requiring the identification should advise ASSA of their laser pointer ownership, agree to have their names listed on a register of ASSA members who own laser pointers, provide a signed copy of the notice below confirming they have read this guideline and agree to abide by it. The current costs of the ID will be adsorbed by ASSA but if more stringent requirements necessitate higher costing IDs, ASSA council will reassess the situation.

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To the Secretary of the Astronomical Society of South Australia			
I	[Name]		
of	[Street address]		
.....	[Suburb and Post code]		
confirm that I have read the ASSA Guidelines for the Safe Use of Hand Held Laser Pointers in Astronomy and agree to abide by Safety Guidelines.			
Signed			
Membership number			
Laser details			
#1	Power.....	Identification number	Colour.....
#2	Power.....	Identification number	Colour.....
#3	Power.....	Identification number	Colour.....

Appendix A - Legislation

Relevant clauses from the Summary Offences Act 1953 and Regulations

Schedule 3, clause 17 of the Summary Offences (Dangerous Articles and Prohibited Weapons) Regulations, below provides exemptions for astronomers using laser pointers for astronomy:

17—Laser pointers for astronomical use

(1) A person who has possession of, or uses, a laser pointer for the purpose or in the course of participating in astronomy is exempt from the offences of possession and use of a laser pointer under section 15(1c)(b) of the Act if the person—

(a) is a member of—

(i) the Astronomical Society of South Australia Incorporated; or

(ii) the Mars Society Australia Incorporated; or

(b) participates in astronomy under the supervision of a member of a body referred to in paragraph (a); or

(c) participates in astronomy at an observatory; or

(d) participates in astronomy as part of a course of study conducted by an educational institution.

(2) In this clause—

laser pointer means a device declared to be a prohibited weapon by clause 10A of Schedule 2.

Clause 10A of Schedule 2:

10A—Laser pointer

A hand-held device commonly known as a laser pointer designed or adapted to emit a laser beam with an accessible emission level of greater than 1 milliwatt.

Exemptions are also provided by section 15(2a) of the *Summary Offences Act 1953*.

(2a) The following persons are exempt persons for the purposes of subsection (1d) in the following circumstances:

(a) a person who has possession of, or uses, a prohibited weapon for the purpose or in the course of conducting his or her business or for the purpose or in the course of his or her employment, but—

(i) only if the possession and use of the weapon is reasonably required for that purpose; and

(ii) not if the possession or use of the weapon is in the course, or for the purpose of manufacturing, selling, distributing, supplying or otherwise dealing in the weapon;

(b) a police officer who has possession of, or uses, a prohibited weapon for the purpose or in the course of his or her duties as such an officer;

(c) a person who has possession of a prohibited weapon for the purposes of a museum or art gallery;

(d) a person who has possession of, or uses, a prohibited weapon for the purpose or in the course of providing a lawful form of entertainment of other persons that reasonably requires the possession or use of the prohibited weapon;

(e) a person who has possession of, or uses, a prohibited weapon for the purpose or in the course of participating in a lawful and recognised form of recreation or sport that reasonably requires the possession or use of the prohibited weapon;

(f) a person who has possession of, or uses, a prohibited weapon for the purpose or in the course of an official ceremony that reasonably requires the possession or use of the prohibited weapon;

(g) a person who has possession of, or uses, a dagger for a religious purpose.

The Act and Regulations are available at <http://www.legislation.sa.gov.au/>