

Appendix 'D'

Protection Against Laser

Introduction

- D1 The aim of this procedure and guidance is to educate officers in the potential effects of Lasers/Laser pointers and provide guidance on how to protect themselves when Lasers are used against them.
- D2 Light Amplification by the Stimulated Emission of Radiation, or 'Laser' is a word commonly applied to a device that produces a beam of radiation in the optical part of the electromagnetic spectrum. The misuse of laser pointers (sometimes referred to as 'laser pens') has generated public concern over the safety of these devices, particularly with respect to ocular dangers. There has also been widespread media reporting of their proliferation and use in a variety of criminal incidents throughout the UK. Although the lack of any injuries, as yet, to unprotected security service members is significant, there is concern as to the potential effect of lasers and how we might protect ourselves against them.

Legal Basis

- D3 Article 4(1) of the Health and Safety at Work (Northern Ireland) Order 1978 places a duty on the office of the Chief Constable to ensure, so far as is reasonably practicable, the health, safety and welfare of all his employees.

Background

- D4 The laser pointers that are currently sold should conform to industrial safety standards and have a power output that is less than 5 milliwatts. These are identified as Class 1, 2 or 3a lasers. Most are Class 2. The higher the Class number, the greater the laser radiation hazard posed by the laser. Laser pointers have been used as presentational aids by professional trainers for a number of years. They are usually portable hand held devices that are low powered and battery operated. However, there is a growing availability of foreign imports, which do not conform to these standards and are potentially more powerful. Additionally there are other lasers of varying types, which are commercially or industrially available for a wide variety of uses. Fortunately most of these require a significant power source and would be difficult to adapt for effective use as a weapon. However, terrorists and criminals have demonstrated considerable technical expertise and ingenuity in the past and the possibility of lasers being used for such purposes cannot be discounted. It is therefore important that supervisors assess the potential consequences of unanticipated dazzle and attempt to control the risk.

The Hazards

- D5 The user safety guidance for Class 2 and 3a lasers in laboratory and workshop installations is not to intentionally aim the beam at other persons. A Class 2 laser pointer, for example, can seriously dazzle and distract the recipient. The consequences

of such an occurrence during some activities such as driving, flying or operating machinery can be serious. Laser beams have the potential to cause eye or skin injury. However, this will be dependent upon the power and wavelength of the laser beam, the size of the beam, and the part of the body affected. The type of laser being considered in this document will not cause injury to the skin or any other organ of the body, and the only potential source of injury relates to the eye. It should be stressed that a retinal burn is an unlikely outcome from a laser pointer exposure. Laser pointers can be used in situations where effects such as temporary flash-blindness, afterimages, or glare can cause an officer to be distracted. These visual impairment concepts can be described as follows:

- **Afterimage** - The perception of light, dark or coloured spots after exposure to a bright light that may be distracting or disruptive. Afterimages may persist for several minutes.
- **Flash-blindness** - A temporary vision impairment that interferes with the ability to detect or resolve a visual target following exposure to a bright light. This is similar to the effect produced by flashbulbs, and can occur at exposure levels below those that cause eye damage. The impairment is transitory, lasting seconds to minutes depending upon the lasers light exposure level and time, the visual task, the ambient lighting, and the brightness of the visual target.
- **Glare** - A reduction or total loss of visibility, such as that produced by an intense light source e.g. oncoming headlight, in the central field of vision. Visible laser light can produce glare and can interfere with vision even at low energies well

below those that produce eye damage. There is also concern for glare when the beam strikes a highly reflective surface.

Procedure and Guidance

The following guidance is consistent with the current threat assessment:

Medical guidance

D6 It is extremely difficult for a laser pointer to be accurately directed at the eye for the length of time needed to damage it, from anything other than point blank range. Bright lights of any type shone into the eye are countered by the reflex action of blinking and turning the head away. Even if the individual consciously over rules this natural instinct and unwisely stares at the light source, it would have to be for several seconds before the eye is affected. The eye therefore, is unlikely to be vulnerable to laser attack unless the individual deliberately over rules the natural reflex action of the eye, in which case the effect is likely to be confined to dazzle only, with no long term effects. The best treatment for an officer who has been dazzled by a laser is reassurance.

Legal guidance - general

D7 Laser pointers can be bought over the counter and their possession and use in normal circumstances is lawful. Given that damage to the eye is unlikely (for the reasons outlined above), people who shine hand held lasers at security service personnel are

neither 'firing a weapon' nor can they be regarded as being 'likely to endanger life' and lethal force will not be justified against them. Possible offences that could be considered are:

- Possession of an offensive weapon (though evidence of intent would be necessary); and
- Common assault if minor injury is caused.

More serious charges could be considered if, for example, a laser pointer was used against the driver/controller of a vehicle with intent to cause a crash.

Legal guidance – lasering of aircraft

- D8 Due to the potential consequences of unanticipated dazzle to pilots, which can distract, disrupt or cause evasive measures to be taken, lasering of aircraft will be regarded as being 'likely to endanger life', both to the aircrew and members of the public.
- D9 Therefore, to prevent further proliferation and use of lasers in similar circumstances, police will adopt a zero tolerance approach to such incidents, and seek prosecution in all cases.

D10 An individual caught shining a laser at an aircraft in flight can be charged under the following:

- **Laser Misuse (Vehicles) Act 2018 - Section 1 - Shining or Directing a Laser Beam Towards a Vehicle:**

A person commits an offence if-

- the person shines or directs a laser beam towards a vehicle which is moving or ready to move, and
- the laser beam dazzles or distracts, or is likely to dazzle or distract, a person with control of the vehicle.

- **Air Navigation Order 2016 - Article 225 - Lights Which Dazzle or Distract:**

'A person must not in the United Kingdom direct or shine any light at any aircraft in flight so as to dazzle or distract the pilot of the aircraft'.

- **Air Navigation Order 2016 - Article 240 - Endangering the Safety of an Aircraft**

'A person must not recklessly or negligently act in a manner likely to endanger an aircraft, or any person in an aircraft'.

D11 The powers conferred by the Police and Criminal Evidence (NI) Order 1989 may be exercised as follows:

- Search before arrest – Article 3.

- Search upon arrest – Article 34.
- Power of entry – Article 19*. (Not for Article 225 Air Navigation Order)
- Power of seizure (where lawfully on premises) – Article 21.
- Power of arrest – Article 26.

D12 Officers should consider the following actions:

- **Safety** – beware of ‘come on’ situations;
- **Suspect** – if identified by the aircrew, speak to the suspect, arrest if necessary and search for offending item;
- **Seize** – The Laser for evidence and forensic examination;
- **Substantive** – Notebook entry, including replies for cautions, 3, 5 and 6 of the Criminal Evidence (NI) Order 1988.
- **Contact ASU** – Who may be able to provide a video imagery of the incident, and advice and guidance to assist the investigation at the time of incident and afterwards.

D13 Where applicable, the suspect should be charged/reported for the following:

If a **laser** is directed towards an aircraft - prosecute **ONLY** under Section 1(1) the Laser Misuse (Vehicles) Act 2018.

(NB - There is **NO** need to prove the aircraft was endangered.)

If a **torch** is directed towards an aircraft - prosecute under the Air Navigation Order 2016 - Art 225 (Lights Which Dazzle) or Art 240 (Endangering The Safety of an Aircraft).

(NB - There **IS** a need to prove the aircraft was endangered.)

PPS have provided the following guidance:

- It would be duplicitous to prosecute a defendant under both pieces of legislation for the same act therefore prosecution for directing a laser beam will be prosecuted under the Laser Misuse (Vehicles) Act 2018.
- The offence under Section 1(1) of the Laser Misuse (Vehicles) Act 2018 carries greater sentencing powers in the Magistrates Court and the same sentencing powers in the Crown Court as an offence contrary to Article 240 of the Air Navigation Order 2016.
- The definition of ‘vehicle’ (as of 31/12/19) in the Laser Misuse (Vehicles) Act 2018 is widely drawn and means any vehicle used for travel by land, water or air. It therefore includes not just planes, trains, ships and cars, but also bicycles, mobility scooters, horse-drawn carriages etc. *****In Northern Ireland the term vehicle will initially apply to aircraft, vessels, hovercraft and submarines only*****. Aviation and maritime matters are reserved to Westminster but a legislative consent motion will be required from the Northern Ireland Assembly for commencement of the provisions relating to all other vehicle types.

- If a torch is shone at an aircraft it would not fall within Section 1(1) of the Laser Misuse (Vehicles) Act 2018 as a laser beam means a “beam of coherent light produced by a device of any kind”. A torch is incoherent light and therefore the appropriate offence would be one of the two offences under the Air Navigation Order 2016.

Tactical advice

D14 The following is offered as tactical advice, if you believe that lasers are being used against you:

- Stay calm and reassure those with you.
- Report all suspected use of lasers against you using current accident/incident reporting procedures. Useful information will include;
 - ◆ The effect.
 - ◆ The distance involved.
 - ◆ The conditions (night, smoke etc).
 - ◆ The colour of the laser light.
 - ◆ A description of the device being used.

Tactical advice for Air Support Unit and officers using aircraft/helicopters

D15 The following tactical advice is offered to aircrew:

- Do not look directly at the light source. At night, turn to reduce possible dazzle effects.
- Do not look at the light source with NVG (Night Vision Goggles) – this may cause ‘shutdown’ of the goggles.
- Report any incident immediately.

Guidance for use of Laser Safety Eyewear for PSNI Officers driving the RCV9000 Water Cannon

D16 PSNI officers manning the RCV9000 water cannon have experienced aggressive attack with visible lasers (green and red) to distract them and disrupt their operational performance.

D17 The wavelength and radiant intensity of the lasers used against the PSNI during recent serious public disorder are unknown.

D18 In addition to the visual impairment concepts (afterimage, flash-blindness, and glare) associated with exposure to laser light, some officers have reported pain and discomfort to the eyes.

D19 Operational Support Department has purchased laser safety eyewear for use by officers driving water cannon in situations of serious public disorder.

Legal Basis

D20 Article 4(1) of the Health and Safety at Work (Northern Ireland) Order 1978 places a duty on the office of the Chief Constable to ensure, so far as is reasonably practicable, the health, safety and welfare of all his employees. See also PSNIGRA – 56: Deployment and Use of Water Cannon, available on PoliceNet.

Laser Safety Eyewear

D21 The protective eyewear supplied by ‘Lasernet’ conforms to the European Personal Protective Equipment (PPE) Directive, and is certified to withstand the power and energy densities indicated by the markings on the product. See Table 1 below.

Table 1: Luminous Transmittance and Colour Recognition for Lasernet Laser Eye Protectors.

Lasernet® Eye protector Code	EN207 Markings	Wavelength (nm)	Luminous Transmittance	Colours not transmitted
LM 2	D180-315L7 R180-315L4 D>315-532L4 IR>315-532L6	180-532	36%	Blue Green
LM 20	D180-315L6 D315-400L4 R180-400L4 IR666-715L5 DIR616-660L3 DIR660-665L4 D666-715L4 I694L7	180-400 626-715	34%	Orange Red

D22 The LM-B-2 eyewear provided is suitable to protect against all green and blue lasers at powers up to around 1-2 W.

D23 The LM-B-20 eyewear provided is suitable to protect against red lasers at powers up to around 1-2 W.

D24 It is not possible to protect against all laser types, and to be able to see at the same time, as eyewear works by cutting out a range of colours whilst allowing other colours through.

D25 It should be noted that the power output of a standard laser pointer is less than 5 Mw.

Procedure and Guidance for Drivers of RCV9000 Water Cannon - Wearing Laser Safety Eyewear

D26 The use of water cannon, as with any application of force, must be lawful, proportionate and necessary. To this end, water cannon must be authorised for deployment and for use by the relevant command levels. The provision of laser safety eyewear for officers engaged in driving the RCV9000 water cannon is intended to provide protection from the effects of laser light used against them, and to enable those officers to perform their duties in a manner which does not bring unnecessary risk to themselves, colleagues or members of the public. Where use of laser against water cannon is significant, targeted and protracted, other tactical options should be explored to eliminate the risk prior to resorting to laser safety eyewear, since use of PPE is always a last option in health and safety legislation.

D27 The eyewear is intended solely for use by drivers of water cannon in situations of serious public disorder where laser is used against them (see guidance on dynamic risk assessment at paragraph D31 below). The following non-exhaustive list of hazards are associated with the wearing of laser safety eyewear when performing driving duties:

- Visual impairment – the eyewear will block certain colours of the spectrum and may limit recognition of traffic lights, brake lights, hazard warning lights and emergency lights.
- Peripheral vision – the construction of the eyewear may limit visual identification of hazards during vehicle manoeuvres.
- Dazzle – whilst the eyewear is designed to offer protection to the eyes, the driver may still experience unanticipated dazzle and a level of distraction.
- The overall level of visual impairment and distortion associated with wearing laser safety eyewear renders them unsuitable for routine driving duties.
- The effects of heat, sweating and condensation may ‘steam up’ the inner surface of the eyewear, thereby distorting visibility further.

D28 In light of these hazards, wearing of the eyewear is subject to the following restrictions:

- Whilst the driver is ultimately responsible for a moving vehicle, the onus for this tactical use of water cannon does not rest solely with the driver. There is a supervisor and crew responsibility in carrying out such manoeuvres.

Records

D29 When water cannon has been deployed during a serious public order scenario, and the driver has worn laser safety eyewear during tactical manoeuvres, the Crew Commander will ensure that a notebook entry is completed by the driver to indicate why it was necessary to do so, and to describe the prevailing circumstances at the time i.e. police were actively targeted by laser. This record will provide a professional audit trail. The events should also be reported via the police radio to further provide live time evidence of the dangers faced, the action taken to avoid such danger and decision-making process in doing so.

Dynamic Risk Assessment

D30 The following mnemonic 'STOP & THINK' may help when considering Dynamic Risk Assessment situations with regard to Laser attacks:

- **S**ituation
 - What situation are you faced with?
 - What is the urgency?
 - What information do you have or need?
 - How stable is the event?
 - What is the nature and severity of hazards?
 - How can the situation be made safer for yourself and others?
- **T**actics
 - What is your plan to deal with incident?
 - Where and how do you use your resources?
 - What are your priorities?
- **O**thers
 - Other or additional resources required to assist in the incident?
 - Will others be adversely affected by you actions?
- **P**riorities
 - Priorities, are they changing during the incident?
 - Review the situation constantly. and
- **T**ake cognisance of all available information when making a decision.
- **H**elp - Seek additional help and guidance if you need it.
- **I**nform your colleagues, supervisor and/or Control about what you are doing or going to do.
- **N**ever commit to a course of action without analysing risks.
- **K**now your physical limitations - never take unnecessary risks.

Conclusion

D31 There is a great deal of myth surrounding the effectiveness and utility of lasers as weapons. As a result, and in light of the current threat assessment, the main effects on officers are likely to be psychological rather than physical. Although the potential for future terrorist or criminal use is evident, officers should be reassured that the threat from lasers is currently minimal. Should this situation change, the use of suitable and effective counter measures will be initiated to neutralize or defeat any emerging threat.