



Laser Safety Protocol # 003

TO: Laser users
FROM: Laser Safety Program
SUBJECT: Key Control
VERSION DATE: MAY 2008

Goal

Specification of the LBNL standard protocol for applicability of a laser master switch (commonly known as a key control) as a laser control measure at LBNL.

Protocol

The Laser Safety Officer at LBNL will not require the installation of a master-switch/key control mechanism on non-Center for Devices and Radiological Health (CDRH)-certified lasers or laser systems, or the removal of said key during periods of disuse. This includes circumstances where the users are the developers/builders of laser systems.

Applicable Standard and Policies

ANSI Z136.1-2000

The ANSI Z136.1 standard for the safe use of lasers is the Laser Safety Program's general guidance document.

LBNL PUB-3000, Chapter 16 (Lasers), also guides laser use at LBNL.

ANSI Z136.1-2000, Section 4.3.4, states: "A class 3B laser should be provided with a master switch. A class 4-laser system shall be provided with a master switch. This master switch shall

effect beam termination and/or system shutoff and shall be operated by a key, or by a coded access.

During periods of prolonged non-use (e.g. laser storage), the master switch shall be left in a disabled condition (key removal or equivalent). A single master switch on a main control unit shall be acceptable for multiple laser installations where the operational controls have been integrated.

All energy sources associated with Class-3B or Class-4 lasers shall be designed to permit lockout/tagout procedures required by OSHA." The ANSI Z136.1-2007 version states "should" for both Class-3B and Class-4 lasers or laser systems as a control, and during periods of disuse.

Key Removal as an Access Control Measure

(Note that "key removal" relates to the removal of the key from the power supply.) The laser will not function if the key is removed from the power supply, which is why some consider the key's entire purpose to be an access control measure.

CDRH Specification

The CDRH is the Food and Drug Administration's body tasked with developing laser-light-product performance safety standards for lasers sold in the United States.

The CDRH requires a key control or an equivalent device (such as a computer password) on Class-4 laser devices sold in the United States: "Each laser product classified as Class 3B or Class 4 shall incorporate a key actuated master control. The key shall be removable and the laser shall not be operable when the key is removed."

It should be noted that the CDRH allows variations from its laser product safety standard for a one-time set up where the users are the builders of the system.

Rationale

When deciding on the applicability of ANSI controls, the LBNL LSO considers its safety implications and engineering feasibility.

The over whelming number of class 4 laser used at LBNL are commercial certified lasers, hence they comply with this requirement. As a research facility the potential exists for home-made and non-certified laser to be used at LBNL. All laser Class 3B and Class 4 laser, certified or not are evaluated and authorized through the AHD process. Therefore safety steps are in place to keep the laser user and any personnel safe.

With home made and OEM power supplies a key control might not be present. It is impractical to replace these power supplies.

Laser use at LBNL falls into two main applications: first, our lasers are used as a tool or as components of a system, i.e., an analysis device or laser-scanning microscope, where the majority of laser devices are commercial products in compliance with CDRH requirements; secondly, our laser use is characterized by one-of-a-kind research devices that are not intended for commercial or consumer use but are instead built and used by small research groups. In addition, power supplies with a key control device may not be available at LBNL.

CDRH allows the use of "uncertified" laser products if the users are also the builders of the units, in particular if they are one of a kind. "Uncertified" in this case means that the LBNL user of the laser product does not have to submit a compliance document to CDRH, or that the laser product does not have to comply with all CDRH requirements.

An R&D custom-built laser system could consist of lasers such as fiber and diode lasers; they may or may not have a power supply with a built-in key control. A laser shutter can be used to terminate a laser beam at different points in the optical set up. This can be just as effective in preventing unintended laser exposure for these cases.

The issue of unauthorized individuals entering laser labs and running lasers has not been a problem in the history of LBNL. The LBNL Laser Safety Program does not insist on key removal during periods of disuse or at the end of the day. LBNL laser users have access to their laser equipment on a 24-hour basis. Many buildings have additional access controls during off-hours and weekends, such as card-key access at the front doors (where only employees with

authorized building access are allowed in). The loss or unavailability of the key would stop the laser from being used and could cause significant delays in conducting research while waiting for a new key from the manufacturer.

As for a lockout device for laser systems, it is easier and more effective to unplug devices, which is compatible with lockout/tagout (LOTO) procedures.

A good faith effort will be made to use commercial laser products and power supplies that are equipped with a key control. In those cases where such a power supply is not available or practicable for experimental needs, it will not be required. The key rationale for not requiring a build in key control is that the ANSI Standard and CDRH regulations only call for its presence not use. The instillation of a device that is not required to be used is impractical in the laboratories use setting. It is the position of the LBNL LSO that a key control (or LOTO device) does not significantly contribute to user safety nor access control for these systems.

Contact Information

In case of questions or comments, contact Ken Barat, Laser Safety Officer (LSO), at ext. 2544, kbarat@lbl.gov.