LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY
-LIGO-
CALIFORNIA INSTITUTE OF TECHNOLOGY
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Procedure	**LIGO-M1200295-v1**	**29 Aug 2012**

Standard Operating Procedure for OzOptics IR laser in the OSB Optics Lab at LHO

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1 PURPOSE AND SCOPE

This document is the Standard Operating Procedure governing the operation of OzOptics IR laser in the OSB optics lab at LIGO Hanford Observatory (LHO). This SOP is designed to ensure the safety of all personnel and equipment in and around the experiment while it is operating. Its role falls within the overall laser safety plan is described in LIGO-M960001, LIGO Laser Safety Plan.

2 LHO OSB Optics Laboratory Layout

The OzOptics IR lasers will be located in the OSB Optics Lab Laser Control Area. The lab layout is shown in Figure 1.

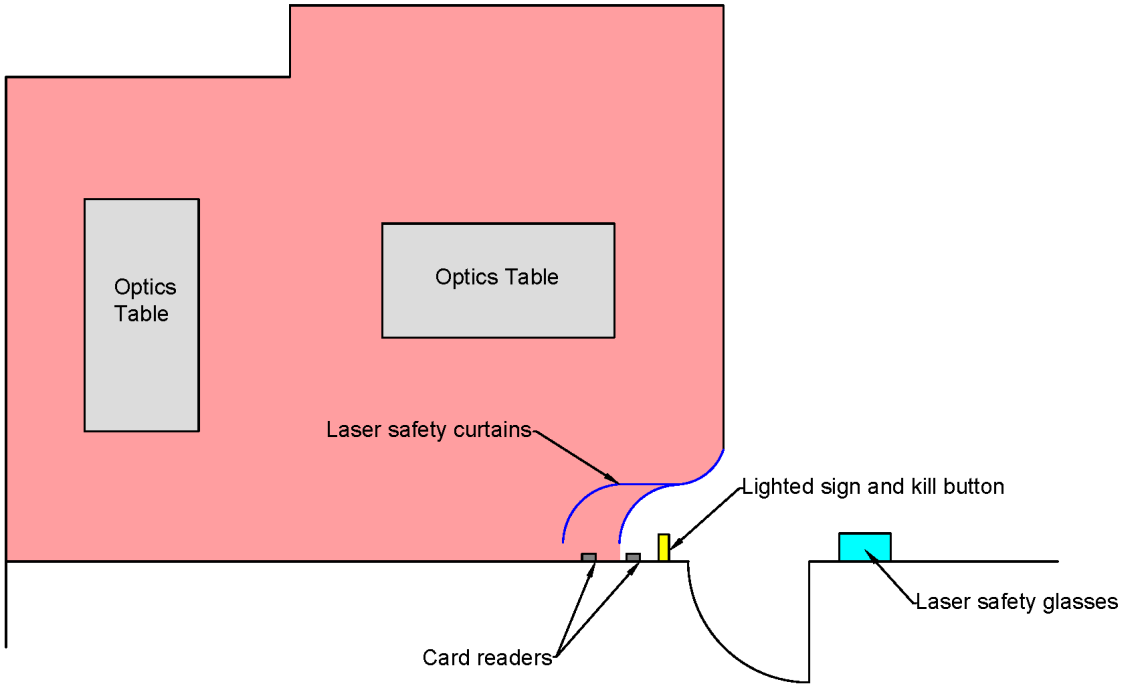

Figure 1: LHO OSB Optics Lab layout. Nominal Hazard Zone is shaded red.

The laser, its enclosure and ancillary optical components are mounted on one of the two optics tables. The designated Nominal Hazard Zone (NHZ) includes all of the area within the optics Lab.

3 LASER DESCRIPTIONS and LOCATIONS

The laser described in this document is OzOptics OZ-2000-1064-6/125-S-40-3A-3-1-10, which is a 1064 nm laser with 10 mW nominal output.
This is a fiber coupled class 3B laser comprising a laser head and a controller (Figure 2).

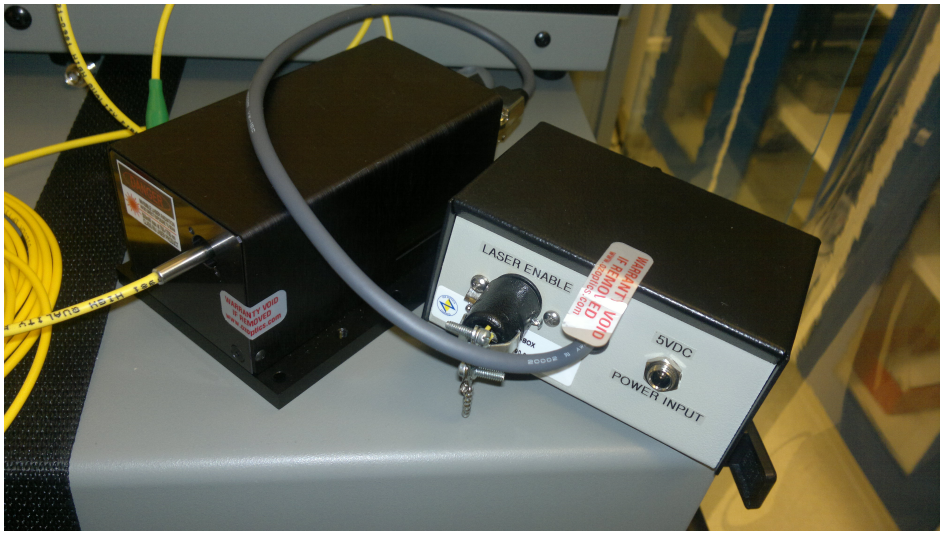

Figure 2: OzOptics IR laser head (left) and controller (right).

This is not to be confused with a green laser with up to 5 mW output power, i.e. OzOpticsOZ-2000-532-3.5/125-S-40-3A-3-1-5, which is a class 3R laser and doesn't require an SOP to operate in LIGO.

Figure 3: OZOptics OZ-2000-532-3.5/125-S-40-3A-3-1-5 is a class 3R green laser (product picture taken from OZOptics catalog). We don't require an SOP to operate this.

4 HAZARDS

Class 3B lasers are hazards to the eye via direct exposure and/or specular reflection. The 1064 nm light poses an additional hazard as it is infrared and not visible to the unaided human eye.

5 CONTROLS

5.1 Access Controls

- The Optics Lab has an Entry and Exit proximity reader installed and is part of the Access System. The Entry reader unlatches the first curtain to gain access to the NHZ. Access controls, alarms and all transactions for this area are recorded and monitored in the Control Room.
- Only those with an access card validated for this SOP will be allowed to enter the NHZ without an escort when the laser is capable of operating (Power supply energized).
- An illuminated Laser Safety Warning sign is mounted at the entrance to the Optics Lab Laser Control Area, outside the double entrance curtains.
- A schematic layout of the Optics Lab Laser Control Area showing the location of the optics tables used to hold the lasers.
- A notice identifying emergency contact people is posted near the laser safety warning sign.
- A copy of this SOP is also posted at the entrance to the Optics Lab Laser Control Area.
- If additional lasers are running simultaneously, Access Cards must be valid for these additional laser SOPs as well.
- Any authorized person escorting unauthorized personnel into the Optics Lab Laser Control (NHZ) shall assume responsibility for compliance with all governing laboratory laser safety procedures.

5.2 Electrical Controls

- All control and monitoring functions for the OzOptics laser is accessed via the laser power supplies. The laser is connected to dedicated power lines that are only energized when the warning sign is activated. The “Emergency Kill” button mounted below the laser warning sign will ‘Kill’ the power to all Class 3B and Class 4 lasers in the Optics Lab.
- The ‘Kill’ button when pulled out (ON) illuminates the Laser Warning Sign and energizes the curtain lock and the dedicated power lines.

5.3 Eye Protection

*Eyewear with an OD of **0.8 or greater at 1064nm***. This eyewear is ***never*** intended for intra-beam viewing. (OD is calculated for intra-beam exposure of 10s at laser aperture diameter.) Only approved aLIGO glasses may be used in this lab. Appropriate laser glasses are stored in the eyewear storage shown in Figure 1.

6 GENERAL OPERATING PROCEDURES

- When the laser is capable of being energized (power is being supplied), the laser warning sign must show that the lab is in laser hazard condition, and all persons entering the NHZ are required to wear protective eye wear as described in section 5.3 above.
- Prior to powering up the laser, the Responsible Laser Operator (RLO, the person actively in charge of the laser) shall ensure that all persons in the NHZ are aware

of his/her intent to power up the laser and that they are in compliance with all laser safety requirements, eye protection in particular.

- When work is required in the NHZ, the RLO is the person who activates the laser(s). If they are already activated on entering, those present should decide who will assume the role of RLO.
- The RLO shall coordinate activities on or in the vicinity of the laser optical table. Multiple independent activities involving manipulation of the laser beams shall only occur simultaneously when the RLO deems it safe to do so.
- If the laser will be run unattended a sign will be posted at the entrance to the door containing laser and contact information.
- All eyewear must be compatible for all laser systems running concurrently. When in doubt, check with the Laser Safety Officer. When multiple lasers are being used, the governing SOP must consider safety compatibility.
- Before and during insertion or removal of any optical component, the power of affected laser beams shall be reduced to the lowest working power setting or be blocked upstream by an appropriate device, such as a ceramic wand.
- All persons manipulating the laser beams, e.g. by placing objects such as mirrors, lenses, power meters, or beam dumps into or near the laser paths, must remove all jewelry such as wrist watches and rings.
- Scattering of laser light shall be kept to a minimum at all times by maintaining proper alignment of optics, utilization of beam dumps, and ensuring that optics are securely fastened.

It is the responsibility of each person with within and in the vicinity of the NHZ to ensure that LIGO standards for safe laser operation are being followed at all times.