

# LLO Laser Safety Interlock Walk-through

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The goal of the laser interlock is to provide a system of positive access controls that positively prevents exposure to harmful laser beams. It must also accommodate our required operations without unnecessarily impeding them.

## The plan is to:

- ›› Exercise full control over Laser Hazard areas, LVEA and VEAs.
- ›› Permit or deny entry to Laser Hazard areas with the use of access cards.
- ›› Restrict entry to PSL, ISC tables and End Transmission Monitors only to Registered Laser Users.
- ›› Use Activity logs to generate Time and Activity sheets.
- ›› Monitor alarms triggered by predefined events.
- ›› Track and record the activities of all Basic Laser Trained personnel in the Laser Hazard Areas.
- ›› Monitor every activity, every card transaction and maintain logs with complete statistics.



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**This will be accomplished by using the encoded information of an access card read by a reader**

Information is transmitted from the readers through the system wiring to an electronic control unit for evaluation. Access is then granted or denied after the electronic control unit has confirmed the information as valid and checked it against its authorization profile. Authorization profiles actually define the ability of the encoded card number to gain access throughout the Laser Hazard Areas based on one or more of the following criteria:

- ›› Access level
- ›› Door
- ›› Time of day
- ›› Day of week
- ›› Time schedule
- ›› Previous events (i.e., a table enclosure left open)
- ›› Alarm conditions

If the information has passed these checks, then access is granted by means of a signal or contact closure that allows passage through the entry way or access to a laser enclosure. If the information is not valid, the system response can be adjusted to range from denial of entry to dispatching guards.

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The system provides a central point of control using the monitoring computer in the Control Room, and will monitor all card reader transactions and alarm inputs. It incorporates an Anti-Passback feature, which prevents successive use of one card to pass through any door in the same direction. Anti-Passback is the term describing the act of passing a card back to another person for the purpose of unauthorized access. To attain this type of protection, a separate reader is located at each entry and exit point. The doors which personnel pass through are those entering our three VEAs (LVEA, X and Y end-stations) as well as the PSL enclosure in the vertex. Operationally, the system will view the laser table enclosures as passage doors. The logic of the system is straightforward. To enter a VEA, an authorized person will swipe their passcard through the cardreader located on the wall adjacent to the entrance/exit door. The LED indication will change from red to green, signaling that the person may enter the VEA without triggering an alarm. Imagine now that the same person intends to work on one of the ISC tables. Before opening the table enclosure's door, he will need to swipe his passcard through the cardreader at the table. If the authorization profile is met, the system will respond with a green LED and the table enclosure contacts will be disarmed permitting the doors to be opened without generating an alarm. Here is where the Anti-Passback feature comes into play. Suppose our user completes his task, and attempts to leave the LVEA without rearming the table enclosure by swiping their passcard through the exit reader

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At the LVEA exit door the system will **NOT** yield a green LED when the passcard is offered. This is a reminder that one must retrace their steps and rearm the laser table. Likewise, assume the user wants open the PSL table for a moment to change the laser power. If he has not rearmed the first enclosure, he will **NOT** receive a green LED when he attempts to open the second. Neither of these sequences will generate an alarm, unless the user ignores the lighted indication and exits the LVEA or opens a second enclosure.

The system does not prevent a second user from independently opening another table enclosure, but it will prevent a single user from opening multiple enclosures simultaneously. If an individual operator needs to open multiple laser table enclosures simultaneously, he will need to coordinate this through the Laser, or Site Safety Officer and the monitoring computer in the Control Room will be used to permit the required activities.

The cards are also known as embedded wire (Wiegand Effect) cards. They use a pulse generating phenomenon in a special alloy wire which is processed in such a way as to create two distinct magnetic regions in the same homogeneous piece of wire. When embedded into a card in distinct patterns, these wires are read as codes by the reader. Codes for these cards are unique, permanent, and unalterable.

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## WEIGAND READER USAGE

Swipe card from right to left

Access is authorized when **RED** LED changes to **GREEN**

The **green** indication will remain for 10s, but the door may be opened anytime within the following 20 seconds.

One exception to the 20s interval is the keysafe, which disarms for 10s.

If you change you mind and do not open the door, the system will reset after 20s and you must swipe again to enter.

If you open the door, you must enter, allow the door to close and exit using the exit reader.

If you swipe, open the door but do not enter, the system 'thinks' you did and notes you 'inside' the area.

Now if you swipe and try to enter, the LED will blink alternately **GREEN** and **RED**.

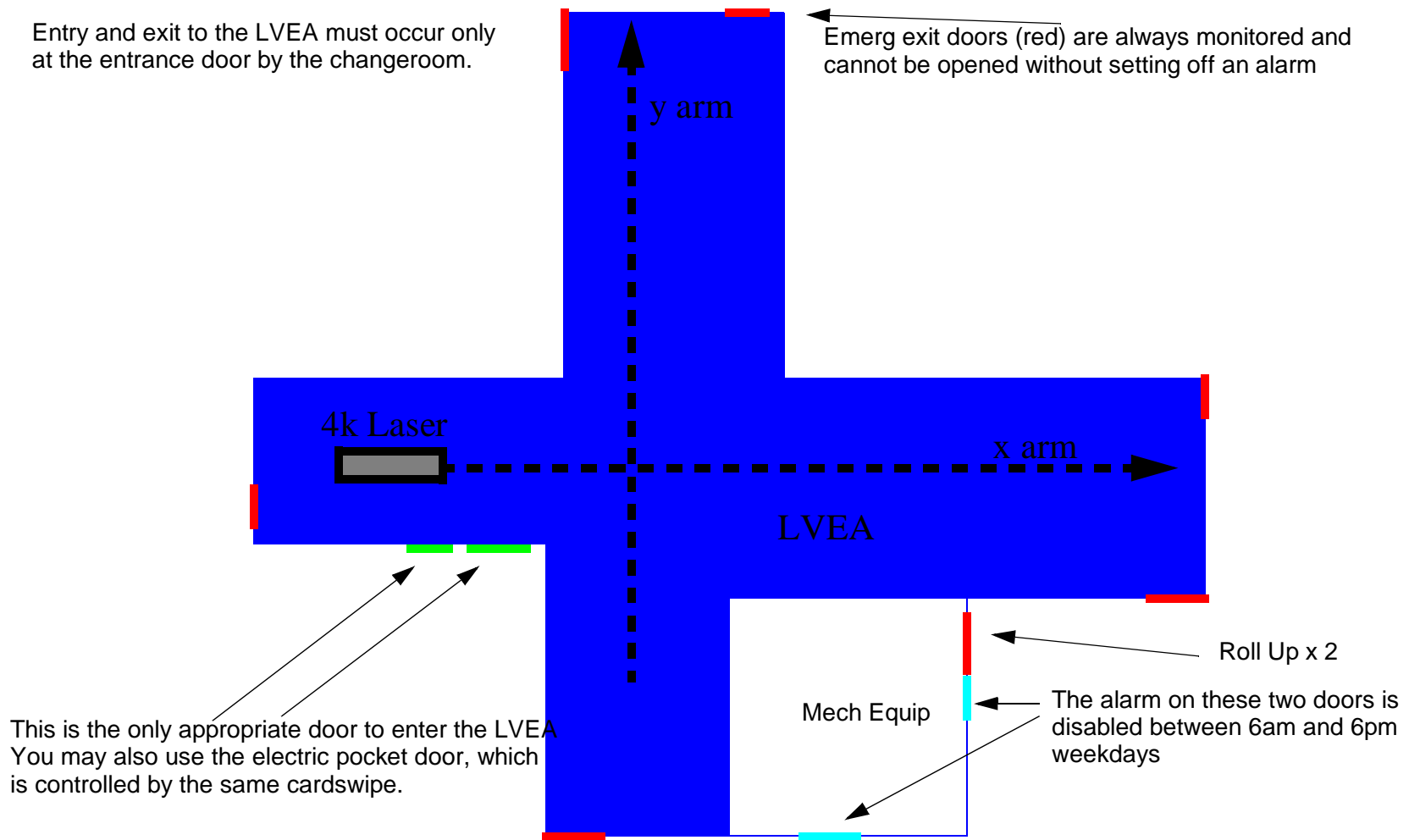
This is a warning that you are in a bad passback location.

If you are outside the area, this must be corrected by a manual override of the computer in the Control Room.

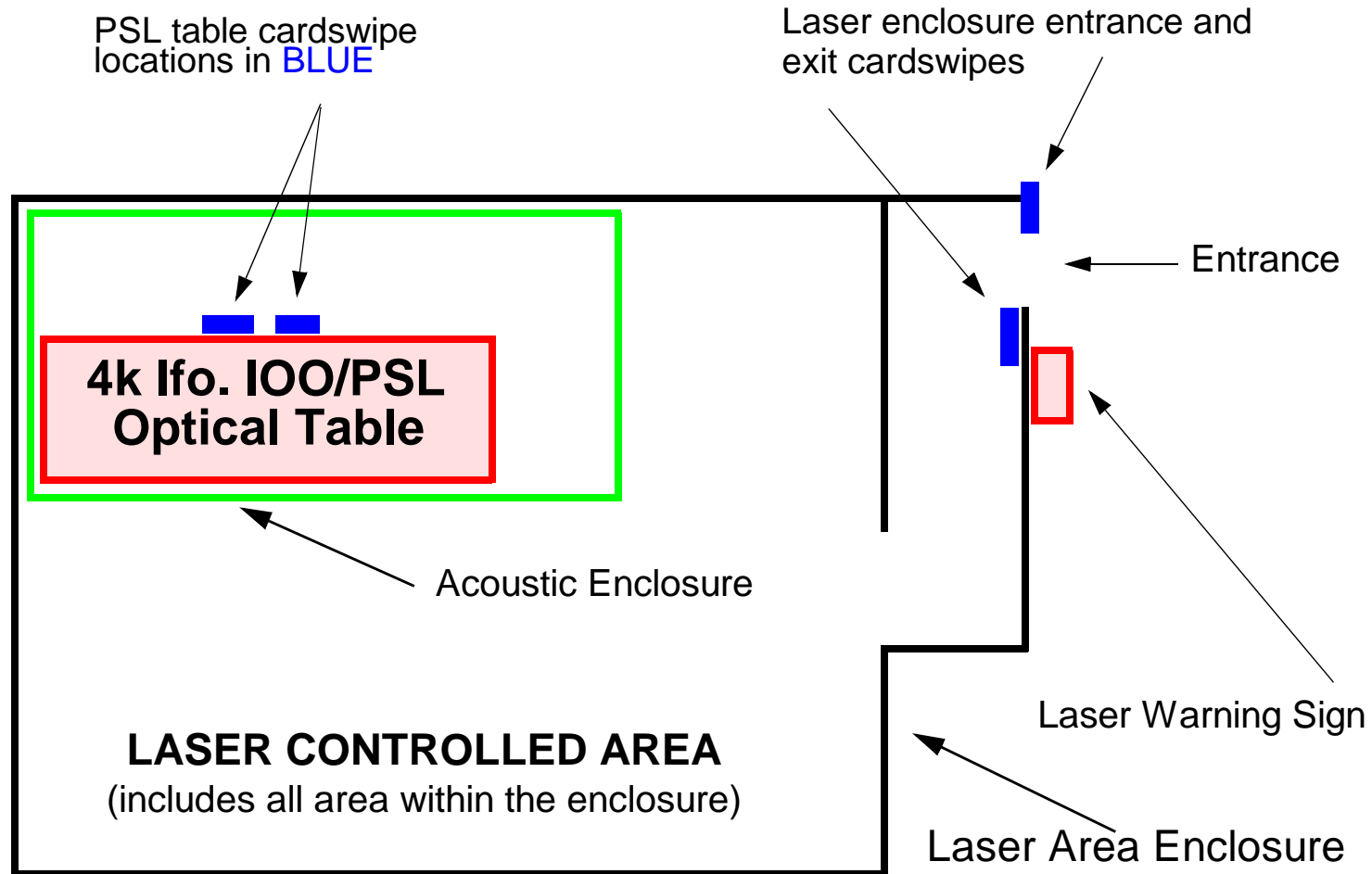
You can also receive a bad passback if you forgot to close a laser table before exiting a VEA.

This you can remedy by retracing your steps and properly closing the area.

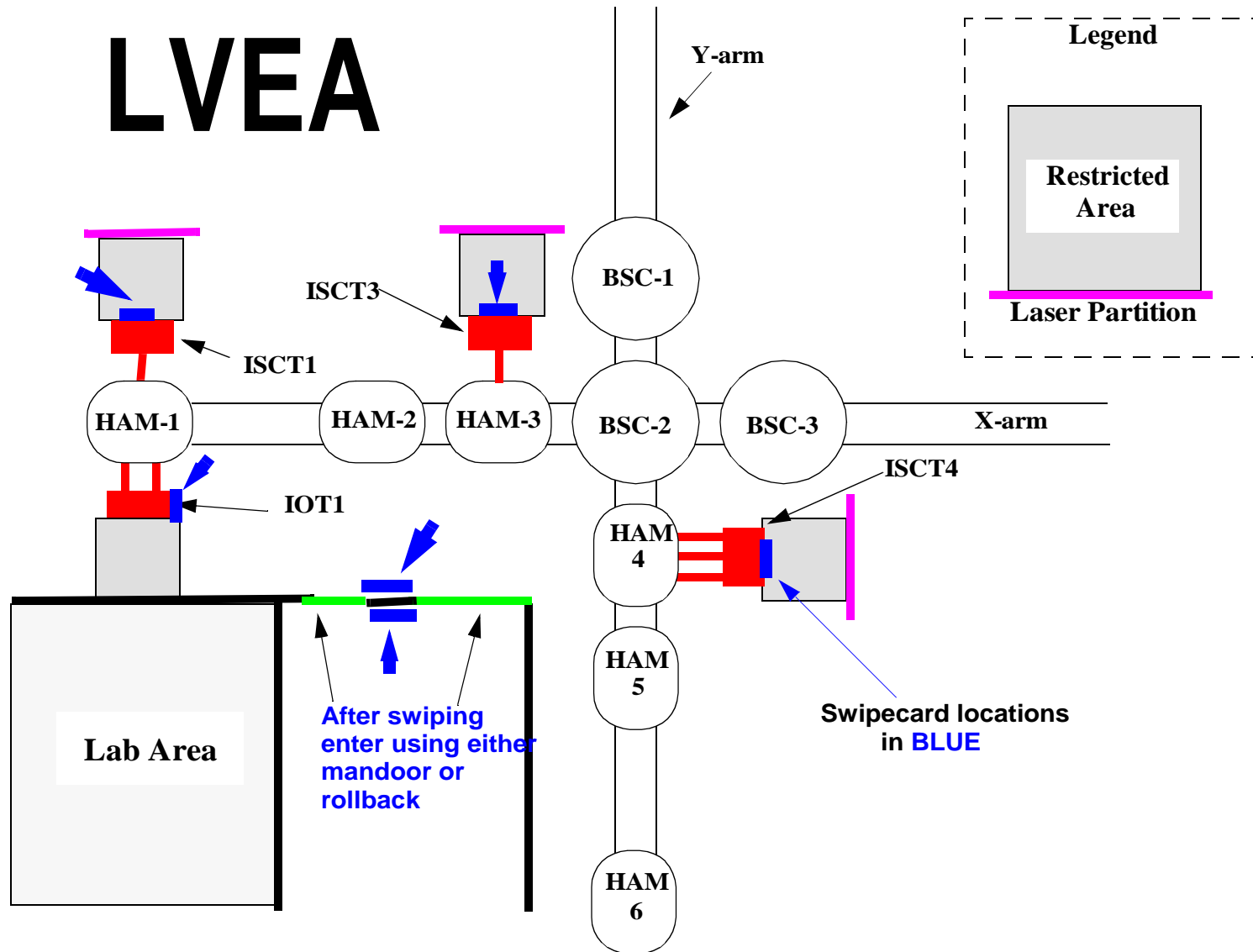
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