Laboratory Operating Procedures
for
CO_2 (Carbon Dioxide) Laser
Normal Operation

0. Unauthorized personnel are to leave the room.

1. Turn on the laser warning light. The laboratory door is to be locked for controlled access.

2. Check exhaust hose and hose connections such that exhaust leaves room properly.

3. Check that the safety lock on the door accessing the laboratory is secured.

4. Check that the safety lock on the laser hood is secure.

5. Appropriately install an absorbing background [i.e., masonite board, welder's curtain, large surface area detectors, etc.] near the laser outputs to prevent spectral reflection.

6. Supply power to laser electronics.
   a. Plug in laser.
   b. Turn the keyed key lock to ON position.
   c. **High voltage** to the **laser cavity** is **OFF**.

7. Fill laser cavity with gas mixture.
   a. Adjust the pressure to cavity at the mounted tanks.
   b. Adjust the flow rates from the external flow meters.
   c. Adjust the cavity pressure at the exhaust value on laser

8. Authorized personnel without CO_2 safety goggles are required to leave the shielded area containing the laser.

9. Authorized personnel in the shielded area containing the laser are instructed and required to appropriately wear safety goggles.

10. High voltage to the laser cavity is turned on.

11. The laser may be triggered manually on site or by remote control.

12. Mirror or experiment adjustments may require personnel to be in the local vicinity of the laser beam. Personnel are not to place any part of body in the beam's path and are not allowed to look into the laser. [When both ports of the cavity are terminated by transparent (non-reflected, non-focusing) windows, personnel are allowed to remove their goggles and are allowed to peer directly inside the laser

cavity. Under these conditions lasing does not occur. This may be necessary to determine suitable gas mixtures and cavity voltages.]

13. After the experiment is completed, the **high voltage power** is switched **OFF**. Safety goggles may now be removed. All authorized personnel are now allowed to enter laser area.

14. The keyed on/off switch is turned **OFF**.

15. The gas is turned off at the gas regulators on the gas tank. The gas input and output ports are closed. The gas tank valves are closed.

16. The laser safety light is turned off. Laboratory doors are unlocked.

Laboratory Operating Procedures
for
CO_2 (Carbon Dioxide) Laser
Mirror Alignments and Maintenance

0. Unauthorized personnel are required to leave the room.

1. Turn on the laser warning light. Doors to the laboratory are locked for controlled access.

2. Check the exhaust hoses and hose connections such that exhaust leaves room properly.

3. Check that the interlock on the door accessing the laboratory is secured.

4. Authorized personnel remaining in the room are informed on the possible generation of electromagnetic pulses in the advent that the laser hood is removed.

5. Authorized personnel without CO_2 safety goggles are required to leave the shielded area containing the laser.

6. Authorized personnel in the shielded area containing the laser are instructed on:
   a. The high voltage dangers in the laser electronics.
   b. The dangerous conditions due to gas leaks.

7. If necessary, the laser hood is removed and the hood interlocks are defeated.

8. High voltage capacitors are discharged.

9. Appropriately install an absorbing background [i.e., masonite board, welder's curtain, large surface area detectors, etc.] near the laser outputs to prevent spectral reflection.

10. Supply power to the laser electronics.
    a. Plug in the laser.
    b. Turn the keyed key lock to the ON position.
    c. **High voltage** to the **laser cavity** is **OFF**.

11. Fill the laser cavity with the gas mixture.
    a. Adjust the pressure to the cavity at the mounted tanks.
    b. Adjust the flow rates from the external flow meters.
    c. Adjust the cavity pressure at the exhaust value on the laser

12. Authorized personnel in the shielded area containing the laser are instructed and required to appropriately wear safety goggles.

13. High voltage to the laser is turned on.

14. The laser may be triggered manually on site or by remote control.

15. Mirror or experiment adjustments may require personnel to be in the local vicinity of the laser beam. Personnel are not to place any part of body in the beam's path and are not allowed to look into the laser. [When both ports of the cavity are terminated by transparent (non-reflected, non-focusing) windows, personnel are allowed to remove their goggles and are allowed to peer directly inside the laser cavity. Under these conditions lasing does not occur. This may be necessary to determine suitable gas mixtures and cavity voltages.]

16. After the experiment is completed, the **high voltage power** is switched **OFF**. Safety goggles may now be removed.

17. The **keyed on/off switch** is turned **OFF**.

18. The gas is turned off at the gas regulators on the gas tank. The gas input and output ports are closed. Gas tank valves are closed.

19. The laser safety light is turned off. Laboratory doors are unlocked.

Laboratory Operating Procedures
for
Ruby Laser
Normal Operation

0. Unauthorized personnel are required to leave the room.

1. Turn on the laser warning light. Doors to the laboratory are locked for controlled access.

2. Check that the safety lock on the door accessing the laboratory is secured and connected to high voltage power supplies.

3. Check that the laser hoods appropriately cover the laser beam path whenever possible.

4. Appropriately, install an absorbing background [i.e., masonite board, welder's curtain, large surface area detectors, etc.] near the laser outputs to prevent spectral reflection.

5. Supply power to the laser electronics. **High voltage** to the **laser cavity** is **OFF**.

6. All authorized personnel are required to stay within the radio frequency shielding room during the operation of the laser. Remote firing is required.

7. High voltage to the laser is turned on.

8. After the experiment is completed, the **high voltage power** is switched **OFF**.

9. All authorized personnel are now allowed to enter the laser area.

10. The laser safety light is turned off. Laboratory doors are unlocked.

Laboratory Operating Procedures
for
HeNe (Helium Neon) Laser (5-10 mW)
Normal Operation

0. Unauthorized personnel are required to leave the room.

1. Turn on the laser warning light. Doors to the laboratory are locked for controlled access.

2. Authorized personnel are required to wear safety goggles.

3. Authorized personnel are instructed not to look directly into the laser beam or its spectral reflection.

4. The laser head is connected to the key controlled power supply with key in the **OFF** position. Check that the connection is secured so to avoid high voltage hazards.

5. The power supply is plugged into the wall.

6. Keyed controlled power supply is turned on with laser safety window closed until the beam is needed.

7. When the experiment is completed or postponed to a later date, the **laser** is turned **OFF**.

8. Safety goggles may now be removed.

9. At the end of the experiment, the power supply is disconnected from the wall and the laser head is disconnected from the power supply.

10. The equipment is appropriately stored away in the equipment cabinets.

11. The laser warning light may be turned off and the laboratory door may be unlocked.