

SOP for the ABM/OAI Flood Source and Mask Aligner

Version: 23 June 2021

General Use Precautions:

- **Emergency Stop** — If something goes horribly wrong with the system, a large red button (above the right control panel) can be hit to stop the pneumatic system and minimize damage to the equipment.
- **Eye Protection** — UV light protective goggles should be worn while using the UV flood source. They are stored in black cases, and kept in the cabinet next to the tool.

General Use Procedure:

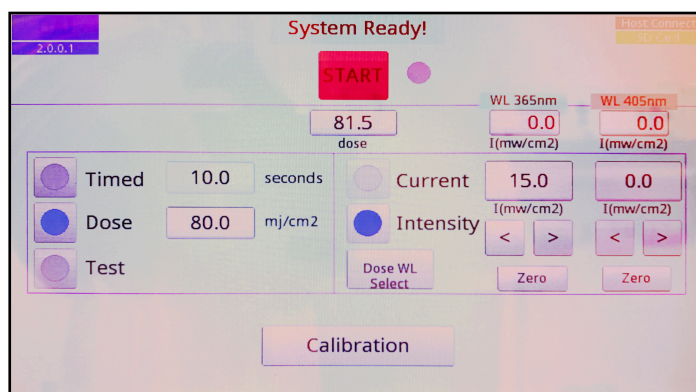
1. **Turn on the exposure system** by flipping the red rocker switch at the **lower left** of the table base to the **ON** position.
2. Check that the system air pressure is 50 psi and that the system vacuum is ~25 in.Hg. The system pressure and vacuum gauges are above the right control panel.
3. If you are working with a 6" substrate (7" mask), install the appropriate mask frame and chuck according to **Appendix A: Changing the ABM Mask Frame and Substrate Chuck**.
4. Lower the Substrate Chuck by turning the vertical, height adjustment knob (upper or lower half) **Clockwise** so that it is a few millimeters below the mask frame surface.



Do not force the adjustment knob. If you feel resistance, stop turning it!



5. Once the UV flood source controller (below the table) has finished booting up, set the control mode to **Intensity** (*not Current*). Set the "WL 365nm" (left) intensity to 15 mW/cm² using the < > buttons, or by tapping the numeric field and entering the value using the virtual keypad. See the image at right for reference. Select the **Timed** button, and set the exposure time to 10.0 seconds.



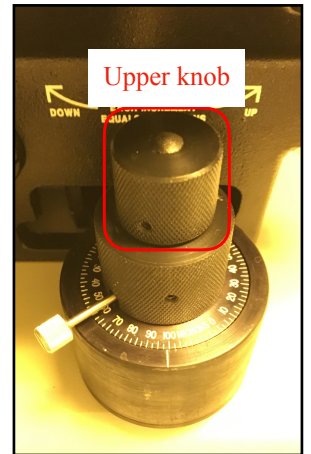
Do not set the output intensity higher than 15 mW/cm².
Setting a higher intensity will shorten the lifespan of the LEDs.



6. Retrieve the OAI 306 UV power meter and place the probe onto the center of the substrate chuck. Turn on the power meter, and make sure the right toggle switch is set to **NORM**.
7. Move the UV flood source over the probe by flipping the **LIGHT SOURCE** toggle (on the right control panel) to the **EXPOSE** position.

During the next step, note the value on the power meter while the UV light is on. If the output intensity is more than 3% out of the set output (< 14.55 mW/cm² or > 15.45 mW/cm²), then you will need to use the **Timed** exposure mode (see step X below). If it is more than 10% out of the set output (< 13.5 mW/cm² or > 16.5 mW/cm²), then you will need to recalibrate the flood source; see **Appendix B: OAI UV Flood Source Calibration**.
8. Press the red **START** button to turn on the light source. The round indicator to the right of the button will turn red. *Record the readout on the power meter.* The lamp will automatically power off after 10 seconds.
9. Move the UV flood source back by flipping the **LIGHT SOURCE** toggle to the **HOME** position.

10. Power off the OAI 306 UV power meter and return it to its case.
11. Place your substrate on the substrate chuck and flip the **SUB VAC** toggle switch to **ON**. The **SUB VAC** gauge should indicate ~25 in.Hg.
12. Place the mask on the mask frame. Clamp the mask in place using the aluminum clamps (there are 3 thumb screws per clamp). If you are using a film photoplot mask, place your mask over your substrate, then place a 5" x 5" glass blank on the mask frame.
13. Press *and hold* the **Chuck Leveling** button at the base of the mask frame support while raising the substrate chuck (next step).
14. Raise the substrate chuck by turning the **UPPER HALF** of the height adjustment knob **Counter-Clockwise**. The upper height adjustment knob will slip when the chuck cannot be raised further. Release the Chuck Leveling button. If no alignment is necessary, skip to **step 16**.
15. If mask alignment is necessary, refer to **Appendix C**.
16. Turn the **LOWER HALF** of the height adjustment knob **Counter-Clockwise** an *additional* 1/4 turn to bring the substrate into hard contact with the mask.
17. Move the UV flood source over the substrate by flipping the **LIGHT SOURCE** toggle (on the right control panel) to the **EXPOSE** position.
18. Set the exposure mode to either **Timed** or **Dose**.
 - a. If you are using **Timed** mode, you will need to calculate the exposure time using the output intensity (measured in **step 8** above) and the recommended exposure dose from the datasheet for the resist that you are using. Enter the value in the field using the virtual keypad.



$$\text{Exposure Time (s)} = \text{Exposure Dose (mJ/cm}^2\text{)} \div \text{Output Intensity (mW/cm}^2\text{)}$$

- b. If you are using **Dose** mode, consult the appropriate photoresist datasheet for the recommended exposure dose. Enter the value in the field using the virtual keypad. Note that the maximum dosage allowed by the flood source controller software is 900 mJ/cm². If you need to subject your resist to a higher dosage, you will need to make multiple exposures so that the total dosage is what you require.
19. Press **START** on the UV flood source controller touch screen to begin exposure. The lamp will automatically turn off when exposure is complete.
20. When the exposure is complete, flip the **LIGHT SOURCE** toggle back to the **HOME** position. If no more substrates will be exposed, skip to **step 22**.
21. To expose another substrate using the same mask:
 - a. Raise the **Mask Frame** by flipping its corresponding toggle switch to the **UP** position.
 - b. Lower the chuck by turning the **LOWER HALF** of the height adjustment knob **Clockwise**.
 - c. Break the substrate vacuum by flipping the **SUB VAC** toggle to the **OFF** position.
 - d. Remove the exposed substrate and replace it with a new substrate.
 - e. Reapply substrate vacuum and lower the mask frame. Repeat **steps 13 through 20**.
22. Remove the mask from the mask frame.
23. Flip the **SUB VAC** toggle to the **OFF** position, and remove the substrate from the chuck.
24. **Turn off the exposure system** by flipping the rocker switch at the **lower left** of the base.
25. If necessary, **turn off the alignment system** by flipping the rocker switch at the **lower right**.
26. If you installed the mask frame and chuck for 6" substrates, **reinstall the 4" chuck and frame**.