MASK ALIGNER MA6
Standard Operation Procedure

Nano Fabrication Unit

Turn On/Off instructions

Turn On

1. Switch On the cooling delay controlϒ

2a. Turn On power supply

2b. Press "CP" button.

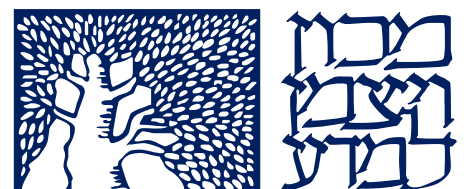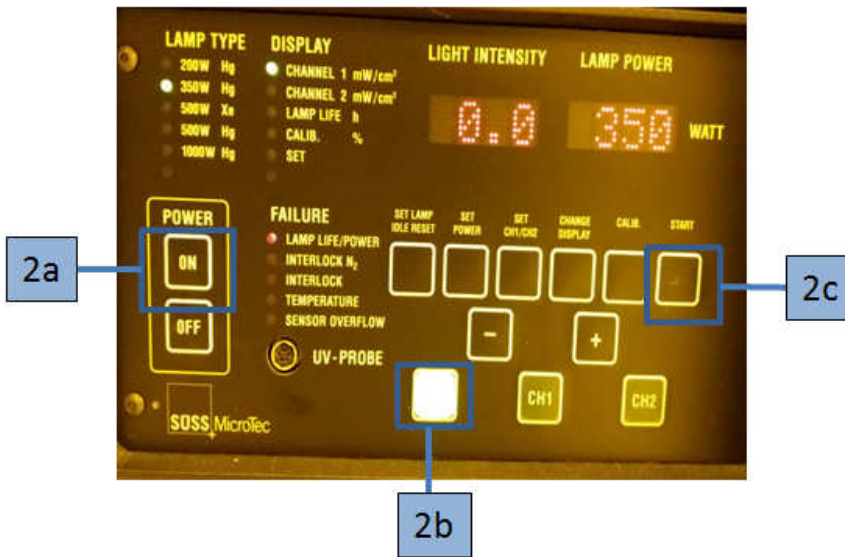2b. Press "Start".

3. Turn on switch on the Controller unit.
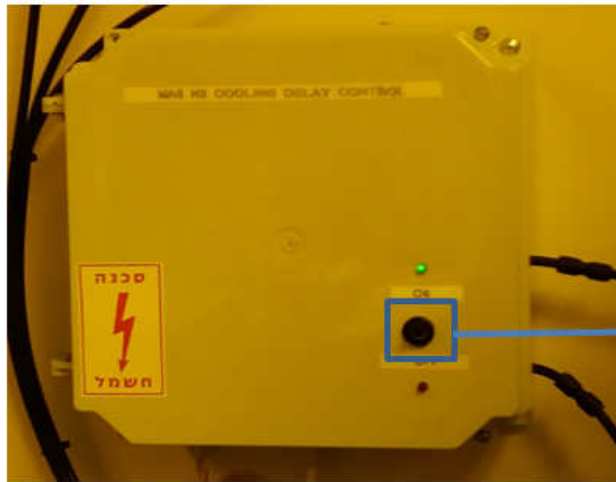
   In case of turn on error hit "Off" button and after 2 min delay repeat "ON" => "CP" => "Start"

Turn Off

Turn off the tool in the following sequence:

Controller => Power supply unit => Cooling delay control.

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LAMP TYPE
- 200W Hg
- 350W Hg
- 500W Xe
- 500W Hg
- 1000W Hg

DISPLAY
- CHANNEL 1 mW/cm²
- CHANNEL 2 mW/cm²
- LAMP LIFE h
- CALIB. %
- SET

LIGHT INTENSITY **0.0**

LAMP POWER **350** WATT

POWER
ON
OFF

FAILURE
- LAMP LIFE/POWER
- INTERLOCK N₂
- INTERLOCK
- TEMPERATURE
- SENSOR OVERFLOW

UV-PROBE

SET LAMP IDLE RESET | SET POWER | SET CH1/CH2 | CHANGE DISPLAY | CALIB. | START

− | + | CH1 | CH2

SÜSS MicroTec

2a **2b** **2c**

Karl Süss MA 6/BA 6

3

First Mask Print Mode

The first mask print of a wafer is done without alignment. This software sequence is started by the EXPOSURE key.

Starting from the initial state of the machine these steps have to be performed:

1. **Adjust Parameters**
    a. Press EDIT PARAMETER key to edit the parameter.
    b. Change exposure time to the desired value
    c. Press EDIT PARAMETER key again.
2. **Load Mask**
    a. Press CHANGE MASK key
    b. Place the mask onto the mask holder. Toggle the mask vacuum on by pressing the ENTER key.
    c. Flip the mask holder 180° back and move it into the machine. Lock the mask holder slide by pressing CHANGE MASK key again.
3. **Load Wafer**
    a. The machine instructs: "pull slide and load substrate onto chuck". Pull out the transport slide completely. Insert the proper chuck and place the wafer against the pre-alignment pins. Confirm with ENTER key. Now the wafer is hold by vacuum.
    b. The machine instructs: "move slide into machine and confirm with ENTER". Move slide in and press ENTER key.
    c. Wedge error compensation (WEC) starts automatically after the last action is completed. The wafer is adjusted parallel to the mask.
4. **Exposure**
    a. After WEC the wafer moves automatically in exposure position.
    b. Press EXPOSE key.
5. **Unload wafer**
6. **Unload Mask**
    a. Hit the CHANGE MASK key and the mask holder will be released. Pull the mask holder out, flip it by 180° and store it on the tray to your left. Hit ENTER to switch the mask vacuum off.

Top Side Alignment

In this mode the wafer is aligned to the mask using the top side alignment microscope (TSA).

1. **Adjust Parameters**
   a. Make secure that no mask is loaded before select mask loading manual.
   b. Deactivate BSA MICROSCOPE key (LED off).
   c. Press EDIT PARAMETER key to edit the parameter exposure time, alignment gap and WEC type. Change all necessary value and confirm by pressing EDIT PARAMETER key again
2. **Load Mask**
   a. Press CHANGE MASK key
   b. Place the mask onto the mask holder. Toggle the mask vacuum on by pressing ENTER key.
   c. Flip the mask holder 180° back and move it into the machine. Lock the mask holder slide by pressing CHANGE MASK key again.
3. **Load Wafer**
   a. The machine instructs: "pull slide and load substrate onto chuck". Pull out the transport slide completely. Insert the proper chuck and place the wafer against the pre-alignment pins. Confirm with ENTER key. Now the wafer is hold by vacuum.
   b. The machine instructs: "move slide into machine and confirm with ENTER". Move slide in and press ENTER key.
   c. Wedge error compensation (WEC) starts automatically after the last action is completed. The wafer is adjusted parallel to the mask.
4. **Microscope Alignment**
   a. Verify BSA MICROSCOPE key off.
   b. Set SPITFIELD switch to the required position.
   c. Adjust illumination with the aperture located at the left/right microscope front.
   d. Focus on the mask plane.

e. Set STG/TSA/BSA button to dark to activate microscope motors.
   f. Adjust microscope to the mask alignment marks. Move the left/right objective to the left/right mask alignment mark by the X-Y-JOYSTICK (joystick on the right).

5. **Wafer Alignment**
   a. Focus on the wafer plane.
   b. Change STG/TSA/BSA button to illuminated.
   c. Use joysticks to align the wafer alignment marks central symmetrical to the mask alignment marks.

6. **Exposure**
   a. Press Exposure key.

7. **Unload wafer**

8. **Unload Mask**
   a. Hit the CHANGE MASK key and the mask holder will be released. Pull the mask holder out, flip it by 180° and store it on the tray to your left.
   b. Hit ENTER to switch the mask vacuum off.

Bottom Side Alignment

The wafer is aligned to the mask using the bottom side alignment microscope (BSA).

1. **Adjust Parameters**
   a. Make secure that no mask is loaded before select mask loading manual.
   b. Deactivate BSA MICROSCOPE key (LED off).
   c. Press EDIT PARAMETER key to edit the parameter exposure time, alignment gap and WEC type. Change all necessary value and confirm by pressing EDIT PARAMETER key again.
2. **Load Mask**
   a. Press CHANGE MASK key
   b. Place the mask onto the mask holder.
   c. Toggle the mask vacuum on by pressing ENTER key.
   d. Flip the mask holder 180° back and move it into the machine. Lock the mask holder slide by pressing CHANGE MASK key again.
3. **Load Wafer Chuck for BSA**
   a. Insert a proper chuck without wafer onto the transport slide.
   b. Move the BSA-chuck placed onto the transport slide into the machine. Don't press a key.
4. **Microscope Alignment**
   a. Turn the SPLITFIELD switch to middle position and toggle BSA MICROSCOPE key on (LED on). This key enables the microscope manipulators accordingly.
   b. Turn the ILLUMINATION switch to BSA/IR and adjust the light intensity by the potentiometers labeled BSA/IR microscope illumination left/right.
   c. Make secure the TOP/BOTTOM key LED is on and adjust the fine focus separately with the TOP SUBSTRATE LEFT/RIGHT regulators.
   d. Select one of keys LEFT, BOTH, RIGHT to move the left/right objective with the ARROW keys. If necessary use fast speed (FAST key LED on).
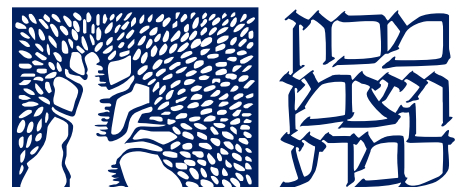
    e. GRAB IMAGE key (option). First keystroke grabs the mask image. The objectives move to the wafer focus plane (TOP/BOTTOM key LED off). The motor control of the microscope manipulator is disabled. Second keystroke GRAB IMAGE key deletes stored image and enables the manipulator again.

5. Load Wafer

    a. After grab image the machine informs you: "ready for load... BSA image stored". Press LOAD key to start this procedure. Load wafer onto chuck and push slide into the machine as prompted on the display.

    b. Press ENTER key.

    c. WEC starts automatically. After WEC the wafer will move to the alignment gap.

6. Wafer Alignment

    a. Adjust the left/right objective image with the BOTTOM SUBSTRATE LEFT/RIGHT regulators. Correct illumination if necessary.

    b. Use joysticks for STG-X-Y-Θ-MOVEMENT. Align the wafer alignment marks central symmetrical to the mask alignment marks.
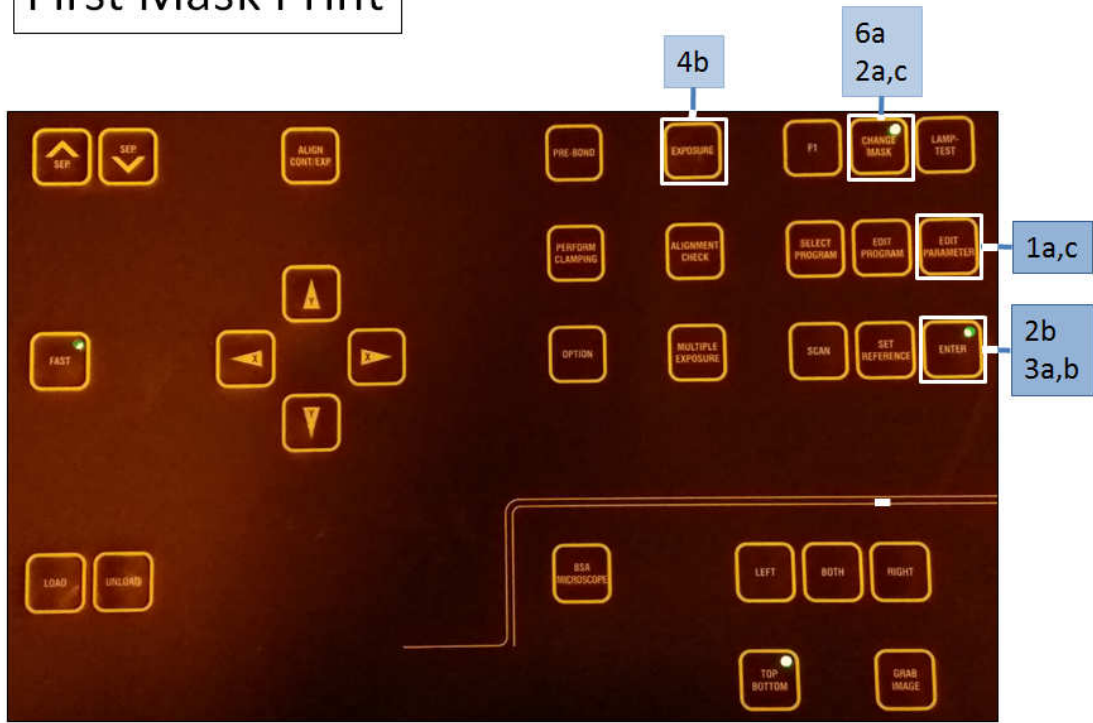
7. Exposure

    a. Hit EXPOSURE key.

    b. After finishing the wafer chuck moves down for unload the exposed wafer.
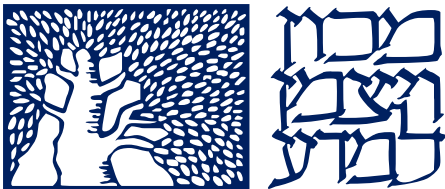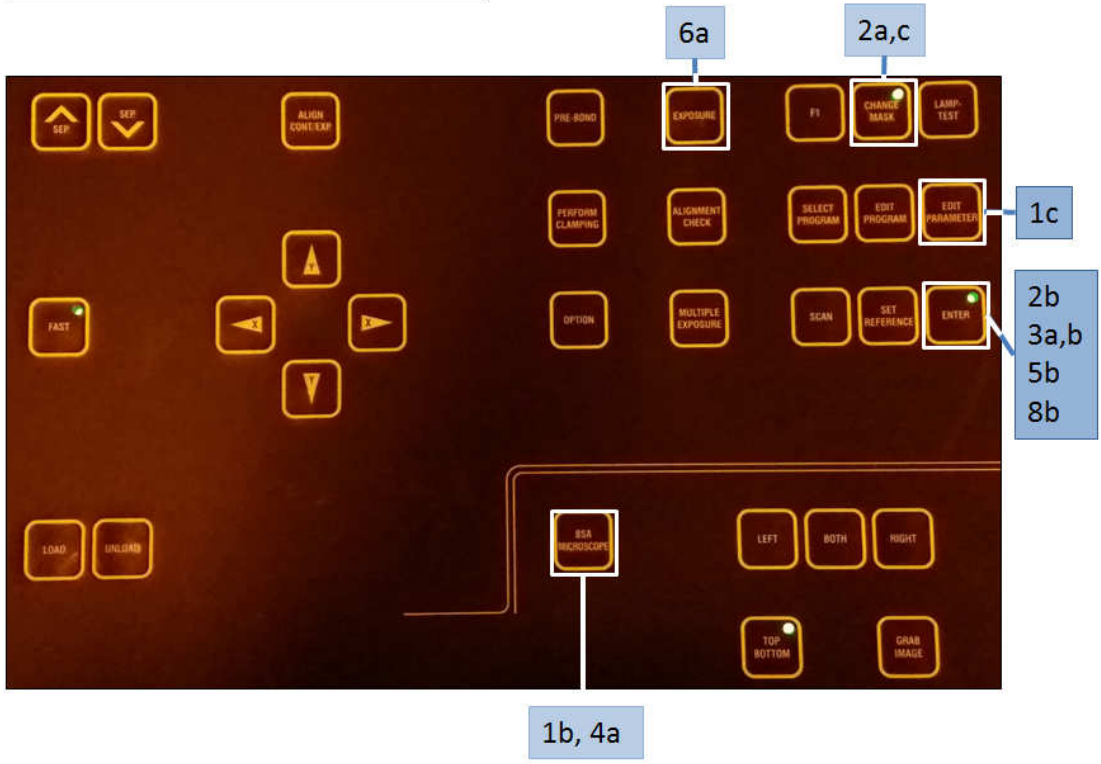
8. Unload Mask

    a. Hit the CHANGE MASK key and the mask holder will be released. Pull the mask holder out, flip it by 180° and store it on the tray to your left.

    b. Hit ENTER to switch the mask vacuum off.

First Mask Print

Top Side Alignment

Bottom Side Alignment

Control panel labels:
- 7a — EXPOSURE
- 2a,d 8a — CHANGE MASK
- 1c — EDIT PARAMETER
- 2c 5b 8b — ENTER
- 4d — arrow keys
- FAST
- 5a — LOAD
- 1b, 4a — BSA MICROSCOPE
- 4d — LEFT / BOTH / RIGHT
- 4c — TOP BOTTOM
- 4e — GRAB IMAGE

Karl Suss MA 6/BA 6
- 4a — SPLITFIELD
- 4c — TOP SUBSTRATE
- 6a — BOTTOM SUBSTRATE
- 4b — ILLUMINATION