

Check with Lab Technician or Manager to ensure vacuum pump is okay, enough nitrogen gas, cleanroom exhaust running, no maintenance going on in cleanroom, etc ...

Make sure the big vacuum pump in the North corridor (outside the cleanroom) is turned on.

Make sure the mask holder, substrate holder, machine keypad and machine working table are clean and dust free. Use a wipe with a bit of isopropyl alcohol.

Near the wall, **** slowly **** (1 cm every 2 seconds) open the “nitrogen gas” valve. Gauge near valve should more than 50 psi (black scale).

Near the wall, **** slowly **** open the “compressed air” valve. Gauge near the valve should read more than 70 psi and the air table should start to rise up and “float” in 40 seconds.

Near the wall, **** slowly **** open the “vacuum” valve. Gauge should read less than -90 kPa (red colored scale).

Note down Time and User name on the “Log Sheet” .

Turn on the mercury lamp controller by pressing the top black “Power” switch on the supply located under the table, right side. The controller will go through a check of the microprocessor and then will indicate it is ready “RDY”.

Press “Start” on the lamp controller to turn on the lamp. There will be a beep and hiss noise. The indicator will indicate the lamp is “cold” and will start to warm up. (After 4 minutes controller will indicate 900 (watts) meaning the lamp is hot.)

Turn on the main power by rotating green Start knob (located top left side of machine) clockwise. The machine will go through some internal checks and then eventually indicate on the LCD screen “Ready for Start. Press Load button”.

Turn on the TV monitor (if you wish to use it for aligning the substrate).

From this point on, do not press or lean on the floating metal table that the mask aligner is on.

Press the “Load” button and the LCD indicator will say “Watch out”, Machine starting” and after some checks will eventually will read “Ready to Load”.

Readings should be about -0.94 on Vac gauge, about 0.0 on Vacuum chamber, about 0.2 on Vacuum Seal and about 0.16 on WEC. If not, report to the Technician or Manager.

Select the type of exposure by pressing “Select Program” Choose Hard, Soft, Flood-E, Prox, Low Vac or Vac using arrow keys (see page four for explanation of Hard, Soft, ...)

Press “Select Program” once more to exit

Set the exposure time by pressing “Edit Parameter” and entering the numbers of seconds using the up/down arrow keys.

(The mercury lamp is 1000 Watts and with a setting of 900 on the lamp controller under the table, this outputs 35 mWatt per square cm at 365 nm and 57.7 mWatt per square cm at 405 nm)

(Using the left/right arrow keys will give the following options: WEC Type should be “contact”, Al(ignment) gap should be 100 microns, Exposure type: soft or hard or prox or what was chosen in “Select Program” step above

Press “Edit Parameter” button to save the exposure time.

Press “Change Mask” .

Slide the mask holder out and place it onto the special mask loading area.

(if the mask holder is stuck and does not slide out, press “Change Mask” to exit and then press “Edit Program” and use up arrow to set it to number “3”. Press “Edit Program “ to exit)

Be very careful handling mask. Avoid touching, scratching it.

Apply vacuum to the mask first (by pressing “Enter”).

Do not press or lean on the floating metal table that the mask aligner is on.

Then use the safety catch on the mask holder (prevents mask from dropping off should the vacuum fail to hold the mask).

Slide the mask holder very slowly back into place.
Press “Change Mask” button to lock Mask into place.

Make sure the X and Y micrometers are set around 10 mm.

Press Load button and follow on-screen instructions to load substrate.
Check the correct substrate holder is being used (plastic with large circles for small pieces or wafers or the one with a red square gasket for “vacuum” exposure of small pieces).

Slide the substrate holder very slowly out and place sample in position. Press “Enter” to apply vacuum to hold down sample.

Slowly slide the substrate holder back into place to avoiding jolting the substrate.

Press “Enter” and the machine will then do a WEC (“wedge error correction”, see page four for explanation) adjustment to the substrate holder.

Perform any necessary Alignment of the substrate relative to the mask using the TV monitor, the microscope and X/Y verniers for the substrate holder.

Do not press or lean on the floating metal table that the mask aligner is on.

(Pressing “F1” and then “Enter” lowers the microscope into place. But be careful the lamp housing is not in the extended position such that the microscope will crash into it).

**** For backside alignment (BSA), the microscope objectives can hit each other (software bug). If they hit too violently, the lead screws could pop off and major repair needed. Always use *** slow **** speed on BSA for a small substrate.

**** **Do not go beyond 20 mm on the X and Y micrometers. If 20 mm is exceeded, the micrometers will fall off their threads.**

Make sure lamp power supply under the table reads 900.

***** **Make sure microscope is in the up position so that the lamp housing will not crash into it Use “F1” and “Enter” to raise the microscope if it is the down/lowest position. *******

Press “Exposure” to expose the substrate. Do not look at blue light during exposure.

When machine says ready for next sample, slide the substrate holder out slowly.
Press “Enter” to release the sample vacuum.

Put next substrate on the holder.

Press “Enter” to apply vacuum to substrate.

Slide the substrate holder slowly back into place.

Do not press or lean on the floating metal table that the mask aligner is on.

Align(if required) and do the next exposure.

******* Make sure microscope is in the up position so that the lamp housing will not crash into it Use “F1” and “Enter” to raise the microscope if it is the down/lowest position. *******

***** No more substrates to expose *****

When there are no more exposures to do, slide the substrate holder out slowly.

Press “Enter” to release vacuum.

Take the samples off and slide the substrate holder back into place.

Press the “Change Mask” button and slide the mask holder out.

(if the mask holder is stuck and does not slide out, press “Change Mask” to exit and then press “Edit Program” and use up arrow to set it to number “3”. Press “Edit Program “ to exit)

Place mask holder on the mask holder change area (glass mask up)

Press “Enter” to release the vacuum on the mask.

Pull back the mask safety catch and carefully put the mask into its container.

Do not press or lean on the floating metal table that the mask aligner is on.

Slide the mask holder back into the machine.

Press “Unload”

Put the X and Y micrometers to around 10 mm.

Shut off the TV monitor.

Shut power by turning main power green knob counterclockwise.

Turn off the lamp power by pressing the “Power” switch under the table.

Wait 20 minutes for the lamp to cool down. If the nitrogen gas is turned off before 20 minutes are up, the lamp will cool rapidly and explode.

Record time on the “Log Sheet”, details on contact (hard, soft, prox, flood), exposure time (sec), photoresist type, number and types of samples, etc .

Shut off the vacuum valve.

Shut off the compressed air valve.

Shut off the nitrogen gas valve.

If you are the last person using the aligner or the spinner, turn off the big vacuum pump in the North corridor before you go home.

WEC (Wedge error compensation)

This procedure sets the top side of the wafer/sample parallel to the bottom side of the mask. The two methods are:

Contact - the wafer is slowly moved up against the mask and made parallel. Then the wafer is moved back down about 100 microns from the mask.

Spacer- proximity flags (arms with a little ball on the end) on the mask holder come out to set the parallelism. There is a minimum wafer size of 4 inch diameter that has to be used for this method (spacer).

Exposure Modes

Proximity

The gap is specified between the mask and substrate (wafer or sample). Large gaps give longer mask life and lower defect rates.

Soft

A slight pressure is used to provide contact between mask and substrate. This provides resolutions around 1-2 micron if the substrate surface conditions are flat.

Hard

This is like Soft (above) but the vacuum is replaced by nitrogen gas pressure under the substrate. This makes a very closer contact between mask and substrate even with large substrates. Can be harsh on the mask (leave photoresist marks, leave embedded particles on mask, etc.).

Vacuum

This uses a red colored rubber seal on the substrate chuck to form a mini-vacuum chamber between the mask and substrate. A vacuum is applied to make the mask and substrate contact hard together. This allows for the highest resolution compared to soft or hard contact. (Maximum sample size is 1 inch by 1 inch)

Soft Vacuum

A reduced vacuum is applied to the vacuum chamber. For delicate substrates.

Flood-E (flood exposure)

Exposes the substrate (wafer/sample) without needing a mask in the mask holder. Typically one puts an acetate sheet with a pattern on top of the substrate and then a glass palte to press the two together before doing a flood exposure.
