

Zeiss SEM Operating Instructions

(revision: J.C. Bean 5 October 2012)

LOADING

- 1) Glove up
- 2) Log into software by double clicking on Zeiss icon
- 3) Call up **SEM Control** window (if not already visible)

Click bar on right margin of left screen OR click Menu **Vacuum/Vacuum Status**

This window has all of the "tabs" referred to below

- 4) Tab **Guns**: If necessary, turn the EHT Off
- 5) Tab **Stage**: Make sure that stage is in its home position

	X = 65	
	Y = 65	
Home:	Z = 0.5	
	T = 0	(most critical parameter for safe loading/unloading)
	R = 200	(to simplify mounting of sample holder)

Set these values manually by using Go To boxes OR:

- 6) Menu **Stage Initialize** – should automatically go to home values above
- 7) Mount Sample:

Select sample plate with size similar to sample. If not already mounted:
Release set screw on side of holder
Hold so that set screw is down (so pin ahead of set screw drops out of center hole)
Remove old sample plate

Again with set screw down (so pin again drops clear of center hole)
Mount new plate with flat/red box toward set screw and tighten set screw

Position and tighten clip(s) on plate to hold sample

- 8) Tab **Vacuum**: Click **Vent** button
- 9) Recheck tab **Stage** to make sure stage is still in its home position

- 10) After 1.5-2 minutes, gently withdraw stage, monitoring clearance at far left
- 11) Slide sample holder onto stage so that its underside flat meets wall on stage
Keep fingers and glove clear of wire attached to front of stage!
- 12) Push stage back to close interlock, again monitoring clearance at left
- 13) Tab **Vacuum**: Click **Pump** button
- 14) Menu **Stage/Navigation**: Opens **Stage Navigation** window with cartoons of stage position
Center stage (if necessary) by double clicking on the center of its representation
- 15) Move **Stage Navigation** window to right screen
- 16) Click **Camera Icon** (of six view icons - with double swapping arrows - farthest to right): TV image of sample stage and lens cone
- 17) With *stage centered*, use **Left Joystick** to raise sample center to 2.5 cm below lens cone
(as measured on screen)
- 18) Tab **Vacuum**: Verify that "Column Chamber valve = Open" (5th text box)

OBTAINING AN INITIAL IMAGE

- 1) Tab **Gun**: Set **EHT Target** (bottom text box) - 1-3 kV for semiconductors
- 2) Tab **Gun**: **Turn on EHT** (5th text box)

Wait for chosen EHT value to appear in top text box (~ 30 second delay)
- 3) Tab **Apertures**:
Click Stigmation, zero by clicking "0" at map lower right
Click Apertures, zero by clicking "0" at map lower right
Click Beam Shift, zero by clicking "0" at map lower right
- 4) Click **Icon "1"** (goes to fastest scan)
- 5) **Knob Magnification**: Set to minimum magnification (~ 70X) – beeps when at min/max
- 6) Tab **Detector**:

Select **Signal A = In Lens** (should have been in Signal A = TV camera mode)

In **Signal Adjust** box:
Set **Auto BC = BC** (automatic routine to achieve preliminary focus)

Once image has stabilized (hopefully with some sign of image objects):
Set **Auto BC = Off** (to enable manual “hard panel” focus control knobs)

7) Identify point of interest on sample

Center with **Right Joystick** OR via Menu **Stage/Center Point** (then click desired center)

8) Increase magnification, adjusting **Focus, Stigmation X, Stigmation Y** knobs

When Focus knob becomes too insensitive, switch to fine focusing:

On bottom of left screen:

Click **Course (o)** text, will switch to switch to **Fine (o)** focus

When reach high magnification (~ 10 kX and above):

9) Click **Green icon** (4th from last): to narrow down scan area (screen within fixed screen)

Now adjust **Focus, Stigmation X, Stigmation Y** within this box

To minimize “burning” of sample, as soon as possible restore full scan:

10) Reclick **Green Icon**: To restore full screen scan

Use Icon “1” through Icon “6” to move from fast scan, to slower, to freeze

IMAGE RECORDING

When desired image is obtained:

1) Click **Icon “5”** to freeze screen

2) From **Tool Box**, annotate image as desired (red X to erase annotations)

3) Menu File/Save Image: Enter desired file name and save onto USB stick (plug below screen)

SHUT DOWN

1) Tab **Gun**: Click **EHT Off** (5th text box)

2) Click **Camera Icon** (of six view icons - with double swapping arrows - farthest to right): To monitor sample stage positions

3) Tab **Stage**: Make sure that stage is in its home position

Home: X = 65
Y = 65
Z = 0.5
T = 0 (most critical parameter for safe loading/unloading)
R = 200 (to simplify mounting of sample holder)

Set these values manually by using Go To boxes OR:

4) Menu **Stage Initialize** – should automatically go to home values above

5) Tab **Vacuum**: Click **Vent** button

Should see sample stage lower automatically

While venting, as a courtesy to next user, restore default Aperture settings:

6) Tab **Apertures**: Click Stigmation, zero by clicking “0” at map lower right
Click Apertures, zero by clicking “0” at map lower right
Click Beam Shift, zero by clicking “0” at map lower right

7) After 1.5-2 minutes, gently open sample interlock

8) Remove sample mount

9) Close interlock door

10) Tab **Vacuum**: Click **Pump** button

11) Dismount sample

12) Close software



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