JEOL 100CX II Startup and Alignment

Always

- Change samples or film with filament current **OFF.**
- Handle any parts that go into the column (film, film cassettes, film boxes, specimens, specimen holder) with gloved hands or tweezers.
- Call for help if you've lost the beam and you're not sure how to find it.
- Be gentle. No force is required to operate this TEM.

Inserting the Specimen

- Insert 3mm specimen into **Specimen Holder Rod**. Gently tap the holder near the specimen to demonstrate that it is held securely. Inspect holder o-ring for dirt
  – clean and regrease if nec.
- Set specimen position to 1 or 2 as appropriate.
- Insert specimen holder into goniometer, matching pin on holder to notch at 9 o'clock. Hold in with slight pressure until red vacuum indicator lights up. When light goes out, turn holder clockwise and guide it into position. **Do not release the holder until it is fully in position.**

Startup Procedure

- If the Ready, DP or High Vac lights are off, call for help.
- If necessary, fill the **Cold Trap** with liquid nitrogen.
- Make sure that the **Objective Aperture** and **SAD Aperture** are out.
- Select the Mag Function.
- Select a Magnification of ~2 kx.
- Bring up the High Tension (HT):
  - If the HT is off (HT button is unlit):
    - Select an Accelerating Voltage of 20 kV.
    - Push in the HT button.
    - When the Beam Current indicator stabilizes, (this make take a long time) select 40 kV.
    - Continue ramping up to the desired Accelerating Voltage. You may need to jump from 40kV directly to 100kV
  - If the HT is on, but at an accelerating voltage higher than desired:
    - Push in the desired HT. You need not ramp downwards.
  - If the HT is on, but at an accelerating voltage lower than desired:
    - Ramp the voltage up one step (+20kV) at a time, waiting at least 1 minute for the Beam Current meter to stabilize before each increase in HT. You may need to skip the 60 and 80 positions if the emission will not stabilize.
- Note the Beam Current reading (dark current). Turn the Filament Emission knob clockwise until the pointer meets the metal stop. **Do not adjust the position of the stopper.** If the Beam Current increases more than 20 ma above dark current, call for help

- **If you don't see the beam:**
  - Fully spread the beam by turning the Condenser knob clockwise.
  - Double check that the **Objective** and **SAD Apertures** are out
  - Switch to the Low Mag Function.
  - Using the map on the upper left panel, systematically search for the specimen perforation.
  - Remove the **Specimen Holder Rod,** or select a holder position that has no specimen
  - Call for help

Routine Alignment

Gun Alignment	With Magnification at ~5 kx, Spot Size at 1, Function at Mag, bring Condenser to cross-over. Desaturate the Filament and center the filament image with the Gun Align Tilt knobs (lower right panel). Resaturate Filament.
Condenser Alignment	With Magnification at ~5 kx, Spot Size at 3, bring Condenser to cross-over. Center beam with Alignment Trans knobs (upper right panel). Switch Spot Size to 1, bring Condenser to cross-over, center beam with Gun Align Trans knobs (lower right panel). Repeat until spots 1 and 3 coincide.
Condenser Aperture Centering	With Magnification at ~5 kx, insert desired **Condenser Aperture**. Bring Condenser to cross-over and center beam with Alignment Trans knobs. With Condenser, spread beam clockwise and center beam with **Condenser Aperture x** and **y** controls. Repeat until beam spreads concentrically.
Condenser Stigmation	With Magnification at ~10 kx, bring Condenser to cross-over. Desaturate Filament. Adjust Condenser Stigmator knobs (lower right panel) until you obtain a sharp filament image. Resaturate Filament.
Z Axis (height) Correction	With Magnification at ~10 kx, center a recognizable specimen feature. Rock the **Goniometer** back and forth. Adjust **Z Adjust** knob until the image motion is minimized. Refocus the image.
Deflector Coil Balancing	With Magnification at ~10 kx, bring Condenser to cross-over. On lower left panel, switch Wobbler Up to X, then converge the 2 spots with X Comp and X Corr knobs. Repeat for Y.
Image Wobbler Balancing	With the image focused, bring Condenser to cross-over and turn on the Image Wobbler switch (on upper left panel). Converge the 2 spots with the Image Wobbler A and B knobs (on lower right panel).
Objective Lens Alignment (Voltage Centering)	With Magnification > 30,000x, beam centered, center a recognizable specimen feature. Switch on HV Wobbler (on upper left panel) and engage the focusing binoculars. Minimize image movement with the Align Tilt knobs (on upper right and left). Recenter illlumination as necessary with Alignment Trans knobs uppper right and left).
Objective Aperture Centering	Insert an **SAD Aperture** and switch Function to SA Diff. Insert the desired **Objective Aperture** and focus the aperture image. Center the aperture around the forward scattered spot. Return Function to Mag.
Objective Lens Stigmation	Select Obj Stigmator set #1 or #2 with the switch on the lower left panel. For rough stigmation, underforcus or overfocus the image, then balance the Fresnel fringes around a specimen hole with Coarse and Fine X and Y controls (on lower left). Above 200 kx, find Focus of minimum contrast. Further minimize contrast with the Fine X and Y controls.