

## Summary of Alignment Procedure

### 1. Eucentric Focus

Bringing the sample to the Eucentric Plane using the Z height adjustment. Adjust the sample to find the minimum contrast point.

### 2. C2 Aperture Alignment

Centering the C2 Aperture in the center of the column. At a low magnification, condense beam to a point and center on screen. Then expand beam and ensure that the beam expands concentrically.

### 3. Condenser Astigmatism

Correcting for stigmatism caused by the condenser lenses. Increase magnification to approximately 125kx, turn on the Condenser Stigmator, and adjust the circularity of the beam using the multifunction knobs.

### 4. Gun Tilt

Making sure that the beams emission is symmetrical. This is done by forming the gun image, and then changing the angle of the beam using the gun deflection coils so that the gun image is centered *within the beam* (not centered in the screen)..

### 5. Gun Shift

Centering the beam on the optical axis of the C1 Lens. Done by significantly changing the strength, or Spot Size, of the C1 lens and correcting for any shift of the beam that results. Always make the adjustments with the multifunction knobs at the spot size you will be using. (Use the beam shifter at the reference spot size.)

### 6. Beam Tilt Pivot Point X

Calibration of the beam tilt deflection coils. Form the gun image, turn on the ppX wobbler, and adjust to find minimum shifting of the gun image.

### 7. Beam Tilt Pivot Point Y

Same for the X direction, but calibrates the perpendicular direction.

### 8. Beam Shift

Calibrates the zero point, or the center of the screen, for the beam shift deflection coils. Select the Beam Shift calibration, and bring the beam to the center of the screen using the multifunction knobs.

### 9. Rotation Center

Centers the beam on the Objective Lens. Done by wobbling the strength of the Objective Lens and minimizing translation of the image. This is the most crucial alignment for obtaining high resolution. Use the small flip screen to allow finer adjustment.

### 10. Objective Stigmatism

For this final alignment, you will use the CCD camera. First make sure that your pixel intensities don't go over 8000 counts. Find a amorphous piece of the specimen (ideally a piece of lacy carbon), and turn on the Live FFT to display the Fast Fourier Transform of the image. Then use the Objective Stigmator to make the rings in the FFT circular.