



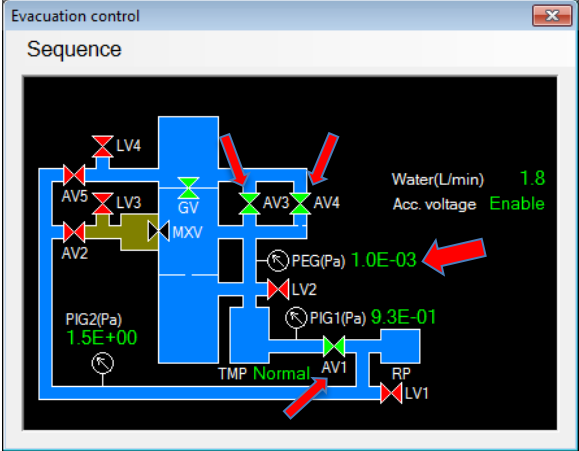


Microscope Usage HITACHI HT-7700
Instrument Location (Room E116 - Cherry Logan Emerson Hall)

Important

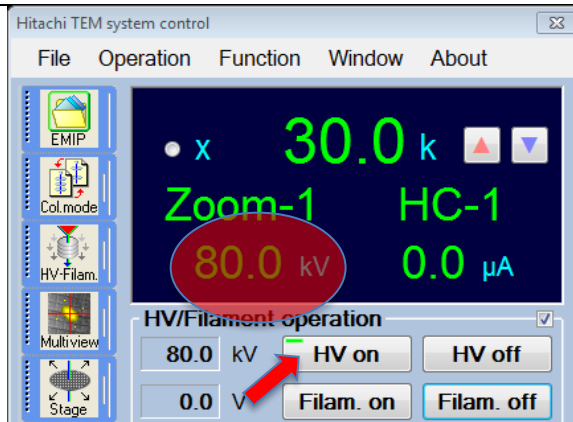
- This protocol is intended as instruction guidelines for users. It assumes previous user training and approval by **Robert P. Apkarian Integrated EM Core (IEMC)** staff.
- This protocol requires knowledge of the controls at the microscope.
- Microscope alignments will be carried out by **IEMC** staff unless the user has been properly trained and approved to do it.
- Please contact IEMC staff for assistance in case of any troubles.

Checklist before you start working on the Microscope:

<ul style="list-style-type: none"> • COL and EVAC lights under POWER (lower-right hand side) are green (On). • COL-EVAC and GUN lights (lower-left hand side) are green (On) 	
<ul style="list-style-type: none"> • Check that the vacuum level on the vacuum gauge next to the screen is in the 10^{-7} Torr range. • On the Evacuation control window, check that the color is blue (the specimen chamber may appear a different color) • Check that the PEG is $\sim 1 \times 10^{-3}$ • Check that valves AV1, AV3, and AV4 are green 	 



- High voltage is on: HV on light in the HV/Filament operation area of the Hitachi TEM system control window is green.
- High voltage is usually 80kv. If another voltage is needed contact IEMC personnel for assistance.



- There is liquid nitrogen in the cold finger







- Make a log book entry with the time indicated on the black hour meter





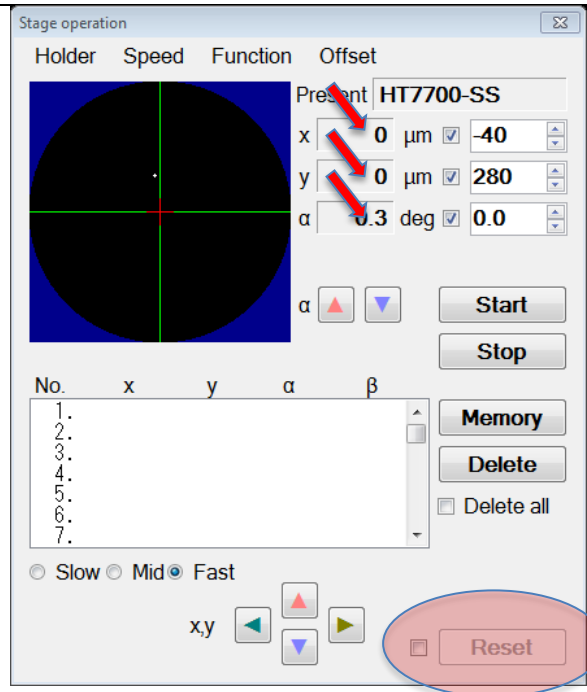
Load Grid onto Grid holder:

<ul style="list-style-type: none">• Use the closed tweezers to lift the grid cover of the grid holder.• There is a groove on one side to facilitate grid handling.	 
<ul style="list-style-type: none">• Place the grid in the center of the grid holder, making sure it is accommodated well within the space. There is a groove on one side to facilitate grid handling.	
<ul style="list-style-type: none">• Carefully close the grid cover of the sample holder using the closed tweezers. Make sure the cover is completely closed and in contact with the rest of the grid holder.	

Load grid holder into the microscope:



- Ensure that the stage position is at $X=0$, and $Y=0$ and that the stage is not tilted ($\alpha=0$ or close to 0)
- If necessary, activate the **Reset** button by checking the box next to it. Then, click on it to take all coordinates back to 0
- Failure to do this may cause damage to microscope components



- Set the grid holder in the specimen exchange chamber, carefully aligning the position of the pin.
- Make sure that the grid holder is fully inserted until you see the red light turn on



- Turn the specimen chamber evacuation switch to EVAC





- Once the vacuum level reaches the appropriate level for insertion (Evacuation completed), the green light will switch ON and a loud beeping noise will sound.



- Once the green light is on turn the grid holder clockwise 30 degrees. The holder inserts itself up to the retraction point due to the vacuum. Do not push the holder towards the microscope



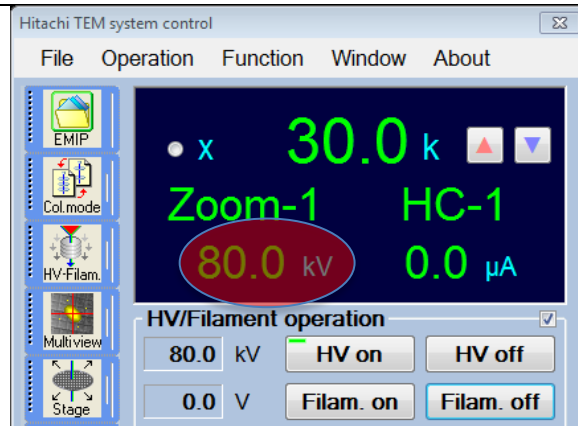
- Turn the grid holder counterclockwise 15 degrees. The holder inserts itself up to the specimen viewing position due to the vacuum. Do not push the holder towards the microscope.



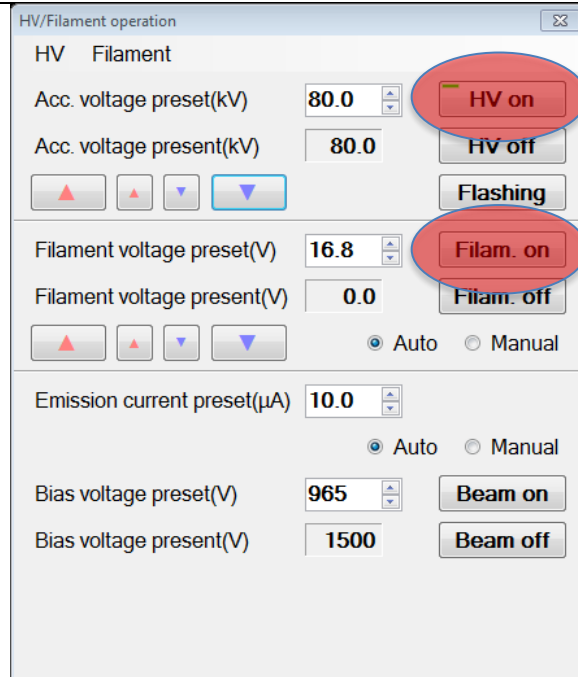
Imaging your sample:



- If the HV is not ON. Click the HV on button in the HV/Filament operation area of the Hitachi TEM system control window.






- Alternatively, the same HV on button is available on the HV/Filament operation window
- Click on Filam. on button in the HV/Filament Operation window to turn on the filament.
- Click on Beam on in the HV/Filament Operation window to turn on the beam.



- Press the Lens Reset button on the control panel





<ul style="list-style-type: none">Set the magnification to 10 K x using the Magnification knob on the control panel	
<ul style="list-style-type: none">Use the Brightness control knob to bring the beam to a crossover point or to its smallest diameter possible	
<ul style="list-style-type: none">Select BH on the alignment and center spot with the X and Y knobsThen turn Brightness control counterclockwise to bring the beam to the size of the full screen and see the image. Adjust to get the desired image brightness level	

Adjust Z height:

<ul style="list-style-type: none">Set the magnification to 20Kx, using the Magnification knob on the control panelPress the WOB (wobbler) button on the control box	
--	--



- Use the screw under the specimen holder to adjust the Z height until the image stops wobbling



Objective Aperture Stigmatism Correction:

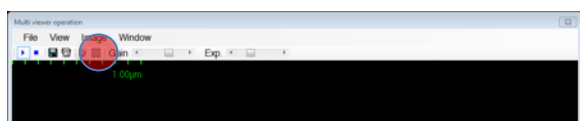
- Find a hole or other round object on your sample using the Stage Control Trackball on the left control panel
- Increase the magnification to 80 KX or higher, using the Magnification knob on the control panel
- Find a hole or other round object on your sample
- Slightly over focus the object using the Focus knob on the control panel to obtain a fringe around the hole



- Press the OS (Objective Stigmator) button on the control panel
- Use the X and Y knobs to correct stigmatism until the fringe is even all around the hole
- Press BH button on the control panel to get out of the OS mode.
- Focus on a hole to ensure that the image is sharp.



- Alternatively, using the FFT mode of the CCD camera (Multi viewer operation window), astigmatism can be corrected by making the center of the

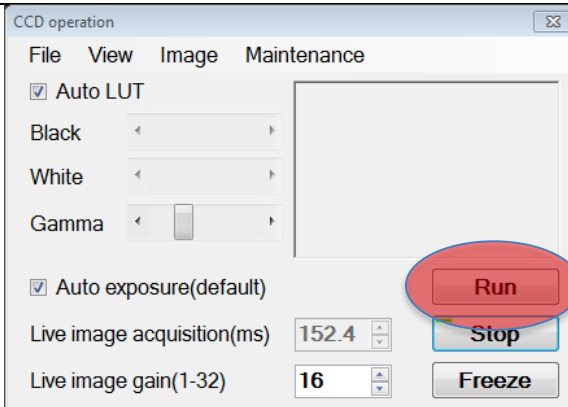




FFT as round as possible. Activate the OS mode and adjust the stigmatism X and Y while changing the focus on the image

Camera and image capture operation.

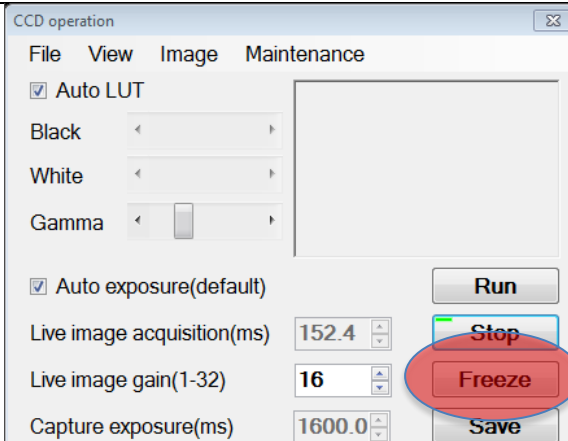
- Click on the **Run** button in the **CCD Operation** window to start the camera redout
- Adjust the histogram to center it in the window using the Brightness control knob in the control panel
-



- Center your area of interest using the **Stage Control** Trackball on the left side of the control panel
- Adjust focus using the **Focus** knob on the control panel



- Click freeze to capture your image, if you like it, click save
- Click run and search for another area or stop to return to the normal screen TEM image
- Always return to this mode when finished or lowering magnification to search another area of the grid



When you are done.



<ul style="list-style-type: none"> Click on the Filam. off button in the HV/Filament Operation window to turn off the filament. Click on Beam off in the HV/Filament Operation window to turn off the beam. Do not turn off the HT 	
<ul style="list-style-type: none"> Ensure that the stage position is at X=0, and Y=0 and that the stage is not tilted (alpha=0 or close to 0) If necessary, activate the Reset button by checking the box next to it. Then, click on it to return stage to the center position Failure to do this may cause damage to microscope components 	
<ul style="list-style-type: none"> Remove the holder from the microscope by inverting the instructions indicated for holder insertion 	
<ul style="list-style-type: none"> Remove your grid from the holder and reinsert the holder into the 	



microscope	
<ul style="list-style-type: none">• Make log book entry with the current finish time indicated on black hour meter	