

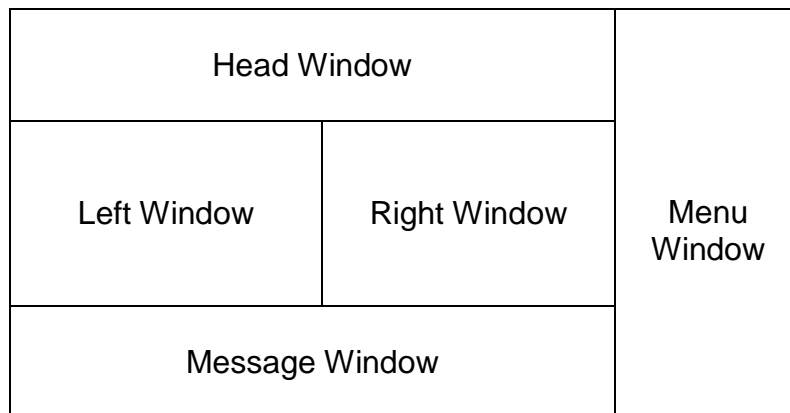
Instructions for JEM 1230 Electron Microscope

UCSB NRI

NOTE: In an emergency, immediately press the EM STOP button on the upper left-hand corner of the Function Box.

liyama Computer Windows

The CRT has five fixed windows and each window generally displays the standard screen:



When a menu item on the menu is selected, a corresponding screen appears in place of the standard screen. The displayed screen is closed by clicking on the window menu (☐) at the upper left corner of the screen. The standard screen, however, has no window menu.

Getting Started:

Turn on the 2 monitors, the (black) computer to the camera, and the camera box below the black computer.

Log In

1. Turn on the sodium vapor light in the side room. Turn on the liyama computer monitor using the switch low on the outer right-hand side.
2. Using the left button on the mouse, click on the [login...] button at the top of the right-hand most Menu window. A corresponding screen appears in the right standard screen where you can enter your user name and code.
 - a. User name: _____
 - b. User code: _____
3. Click on the Text Entry box to the right of [User Name:]. The box will turn green and any enclosed text, white. Using the Backspace key on the keyboard, erase the previous user's name, and with the keyboard, type in

- your user name (case sensitive). Your name will also appear in white letters.
4. Press the Enter key on the keyboard. The green color disappears and your name should be in black print.
 5. Click on the Text Entry Box to the right of the [Code No.]. The box will be highlighted in green. Using the keyboard, type in your personal 4-digit alphanumeric code. No numbers will appear; instead, you will see four white asterisks.
 6. Press the Enter key. The asterisks will turn black.
 7. Click on the [Apply] pushbutton. The dialog screen will read [Wait...] while you are being logged on. The screen will disappear once you are. Your name should now appear at the top of the left-hand window of the Standard screen.
 8. Close the [Login] window by clicking the [-] box on the upper left-hand corner of the center window. The standard "right-hand" screen reappears.

Preliminaries: Turning on the High-Voltage and Beam Current

1. Remove the cover from over the viewing port.
2. Click on the [HT...] option button in the lower left-hand corner of the Head Screen on the monitor. The "HT/Beam/Fila.Control" screen opens in the right standard screen.
3. Check to see if the [Function:HT] button is displayed: a green circle will appear to the left of the High Voltage value: [80.00kV]. Click on [HT: on]. Note that the "Beam Curr." Level shown in the top center of the Head Screen gradually increases to 46uA. Once the voltage has risen to that level, a beep will sound, the accelerating voltage on the head screen value changes from orange to black, and a [READY] indicator appears alongside the accelerating value.
4. To turn on the Beam Current, click on the circle to the left of [Beam] under the [Function] portion of the HT/Beam/Fila.Control screen. The word "Beam" should disappear the circle should turn green.
5. Click the [ON] switch. Note that the "Beam Curr." Level shown at the top center of the Head Screen will rise to about 59uA. No illumination should be seen yet.
6. Turning to the Right-hand Menu window, click on the [Personal File...] button. The "Personal File" window replaces the Menu window.
7. Click on the uppermost [Align File...] button. The "Align File..." window replaces the standard Right-Screen. The circle to the left of 80 kv (second from the bottom) should be highlighted in green. **BE SURE YOU SELECT THE FILE THAT MATCHES THE DATE ON THE WHITE BOARD FOR THE MOST RECENT DATE A NEW FILAMENT WAS INSTALLED. IF YOU DON'T SEE THE DATE IN THE MENU, THEN COPY THE INFORMATION FROM THE FLOPPY DISK (FD) TO THE HARD DRIVE (HD) USING THE ALIGN.....**

8. Click on the [Function: Load] button (not Save). A dialog screen appears asking: "Renew Current Conditions?" Click on [OK]. After a few seconds, the beam should illuminate the fluorescent screen.
9. Close both the "Align File" and the "Personal File" windows by clicking on the [-] box at the upper left of each window.
10. Using the Brightness knob on the Function Box, concentrate the beam in the center of the screen, though not necessarily all the way to cross-over.
11. Press the [Beam] Shift button on the Function Box. The button should light up. Now, when holding the right hand button on the mouse, you can center the beam by dragging the mouse in the appropriate direction.
12. Center the beam.
13. Insert the small viewing screen by depressing the small handle at the lower right-hand side base of the column.
14. Using the binoculars, focus the ocular for each eye by turning the focusing ring of each ocular while viewing the black circle on the small viewing screen.
15. With the [Brightness] knob on the Function Box, spread the beam out to illuminate the entire screen.
16. Returning to the HT/Beam/Fila.Control window, turn off the Beam Current by clicking on the illuminated green circle. The beam disappears.
17. Now, load the specimen.

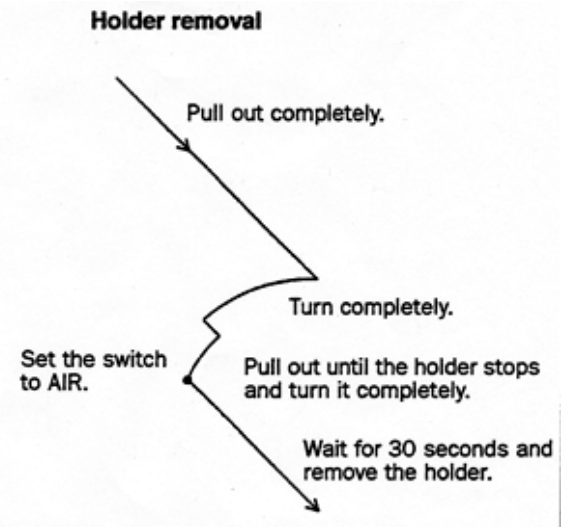
Specimen Insertion

NOTE: Use extreme care in loading and unloading the Specimen Holder. Pay close attention to the activation and deactivation of the pump. Any air leaks will cause a total loss of vacuum.

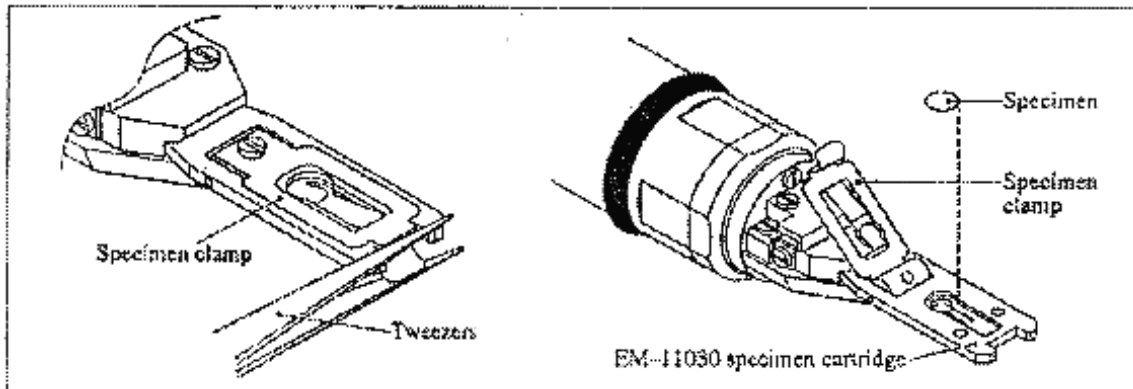
Removing the Specimen Holder from the column

1. Make sure that the [Beam Current] is OFF.
2. Go to the Menu Window and click on [Monitor...]. Then click on [Vacuum Cond...]. On the Left screen will appear a diagram of the vacuum system indicating the location of the parts of the column and the various vacuum valves (filled valves are open; empty valves are closed). On the Right screen is a list of the various column compartments and their current vacuum status. At the beginning of the specimen changing process, all compartments should say "Vac. Ready," and, with the exception of the RT compartment, should all have values under 40.
3. Following the diagram at right:
 - a. Pull the specimen holder straight out till it stops. **DO NOT LET GO OF IT**, or else it will pull back into the column and crack the tip (the green light will go out).

- b. Turn it counter clockwise until it stops. You can let go of the holder at this point.
- c. Pull the specimen holder out a bit more, but **BE CAREFUL** not to pull it too far or it will come out (the green and yellow lights will come on).
- d. Turn counter clockwise again until the Guide Rod (see below) is at the 12 o'clock position.
- e. Set the goniometer PUMP/AIR switch to AIR by pulling the switch out and down (the green and yellow lights will go out).
- f. Wait the few seconds until you hear the air rush into the airlock. The SPC (specimen chamber) pressure level will go to ~235; it will read "AIR" in orange.
- g. While supporting the holder, pull it straight out to avoid scratching the inside of the airlock tube. **DO NOT TOUCH THE SPECIMEN HOLDER DISTAL TO THE GASKET.**



Specimen Holder loading

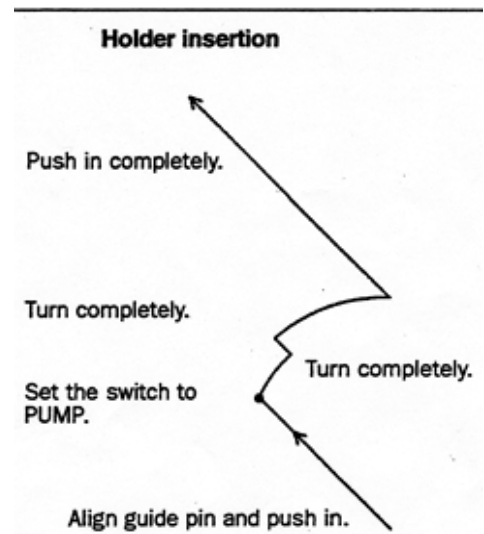


1. Place the Specimen Holder on the base stand.
2. Using tweezers, raise the specimen clamp.
3. Place the specimen grid, section-side up, into the circular well.
4. Using tweezers, secure the specimen by closing the specimen clamp. Be sure that the clamp end is tightly secured to the cartridge.

Inserting the Specimen Holder into the column

1. Make sure that there is no dust and/or lint on the specimen holder O-ring.
2. Align the specimen holder guide pin (see above) with the guide groove (at the 9 o'clock position) on the microscope column (goniometer). The guide rod is at the 12 o'clock position.
3. Push the holder in until it stops. **DO NOT TURN THE HOLDER OR AIR WILL BE ADMITTED TO THE COLUMN.**

4. Pull the goniometer PUMP/AIR switch out and up. The yellow light comes on, and pumping begins (the orange "Evac." Message is seen on the monitor).
5. Wait for vacuum levels to reach <40 when the green light comes on and the monitor reads "Vac. Ready." It may take more than one pumping cycle to achieve this.
6. Completely insert the holder in the column by turning the holder clockwise as shown in the diagram below (the green light goes out), pushing it in and turning a second time during which you must HOLD ON TO THE SPECIMEN HOLDER since it is under vacuum and will be pushed into the column and potentially damaged.
7. The green light comes back on, and remains lit.
8. Close the vacuum monitor windows.



Acquiring digital images

1. Click the AMT icon on the desktop of the camera computer.
2. Once prompted, switch the breaker from "OFF" to "1230". Click "OK" on the dialogue box.
3. Set the [Brightness] knob on the Function Box to an exposure time of 4-6sec.
4. Insert the camera with the lever on the underside of the Hamamatsu camera apparatus.
5. If need be, check the [Lens Condition] monitor from the [Monitor] menu to aid in focusing (should be 3.67).

Shut-Down procedure

1. Make sure the Beam Current is set to OFF. Beam current levels show the dark current (e.g., 45uA at 80kV). Remove any specimens from the column.
2. Reduce the magnification to x5,000. Remove the camera and disconnect it at the breaker switch.
3. Click on the [HT...] option button in the lower left-hand corner of the Head Screen on the monitor. The "HT/Beam/Fila.Control" screen opens on top of the right standard screen.
4. Make sure that the [Function: HT] button is displayed as green (**if you used an accelerating voltage other than 80kV, return the HV value to 80kV**). Click on the [HT: off]. A message screen pops up asking whether you truly want to exit HT. Click [OK]. The Beam Current rapidly falls to 0uA.

5. Click on the [Log in...] button at the top of the Menu window. The Log In page opens on top of the Right standard screen.
6. Click on [Log Out]. Replace the dust cover on the viewing port.
7. Remove any external HDs from the computer, and shut it down.
8. Turn off the Hamamatsu camera.
9. Turn off the Iiyama monitor.
10. Sign the log book before leaving, entering the approximate time you feel the filament was on.

Final Checks

1. Clean up after yourself.
2. Is the sodium vapor light unplugged in the darkroom?
3. Make sure the Specimen Holder is fully inserted into the column.
4. Make sure the camera is out of the column.

What to do if the computer locks up

1. Turn the HT switch off (on top of the function box, under the plastic cover)
2. Use a pen to press the reset button located under the counter beneath the AMT computer station, to the right of the floppy disk drive.
3. The illuminated buttons on the function box as well as the computer screen itself will blink on and off for a while.
4. There will be a sustained period where nothing appears to be happening, and then a dialog screen will appear.
5. Click on the [OK?]
6. Turn the HT switch (on the uppermost part of the function box) back on.
7. Click the "lenses" switch on and off.
8. Log in.
9. On the menu window go to [Set Up...]. Click on Set Up #4.
10. On the right hand pop up window, click "load" to load the HBP12_31 pole piece.
11. Turn on HT.
12. Turn on the Beam Current.
13. After resetting, one must reload the current alignment file.
14. Turning to the right-hand Menu window, click on the [Personal File...] button. The "Personal File" window replaces the Menu window.
15. Click on the uppermost [Align File...] button. The "Align File..." window replaces the standard Right Screen. The circle to the left of 80kV (next to lowest circle) should be highlighted in green.
16. Click on the [Function: Load] button. A dialog screen appears asking "Renew Current Conditions?" Click on [OK]. After a few seconds, the beam should illuminate the fluorescent screen.