JEOL 1010 TEM Operation

Sample Exchange

The sample holder is very expensive, $2000 when it was bought, and must be handled with great care. Damage to it is not covered by the maintenance contract. The two most delicate parts are the sapphire tip of the holder and the two grid clamps. **Be very careful** with these.

The sample holder is left in the column of the TEM except during specimen exchange. The high tension (HT) can be left on **but the filament (Fil button on right-hand knob set) must be turned off** during specimen insertion.

To remove the sample holder, first pull the holder straight out and away from the column. When the holder reaches the stop position (i.e., when the holder cannot be moved any farther), rotate the holder to the left (counterclockwise). Once the holder has rotated fully counterclockwise (i.e., until it will rotate no further), pull the holder the rest of the way out of the column. Be careful when you break the vacuum. This will occur suddenly and you could drop the sample holder at this point.

Bring the sample holder to the table and place it on the sample holder stand. Do not touch the sample holder in the area between the tip and the o-ring. This is the portion of the sample holder that will be in vacuum. Any contamination in this area will degrade the quality of the vacuum. Use forceps to lever the clamps open. Two grids can be placed into the holder. The sample side of the grid should face up. The number one position is closest to the tip of the holder. The clamps are swung back so as to clamp the grids into place. **Do not leave the clamps open when you insert the sample holder into the column.**

To place the sample holder into the column, trigger the airlock by lining up the pin on the sample rod with the groove in the airlock and inserting the holder as far as it will go (but do not rotate the holder at this time). This will start the pumping cycle of the airlock. During this period, the light on the airlock will be on. (On Pg-3 of the monitor screen the V8 valve will open at this point.) Pump down will take approximately a minute. During this time the inside of the airlock will be brought down to a low enough vacuum such that the TEM column will not become contaminated with air when you finish the process of putting your grids inside the column. Hold onto the end of the sample holder. Once the light goes out, the sample holder is rotated to the right (clockwise) and then allowed to be pushed into the column by the outside air pressure. It is important to hold on to the end of the holder and slow down its insertion into the column. This will keep the jeweled tip of the sample holder from being damaged.

To turn on the Beam

The high tension (HT) button on the right-hand knobset must be on (lighted) and the green ready light above the Fil button must be lit.

The filament (Fil) button on the right-hand knobset can now be pressed. The button will light up.

The beam will now come on. Check the grid position switch (to the left of the microscope column) to see if the desired grid is in position. It should be possible to see the sample on the large viewing screen. If not check to see that the magnification is low (2000x or less), that the beam is fully spread in the clockwise direction, and that there are no grid bars in the beam path. It may be necessary to move the grid with the specimen traverse knobs on either side of the column. The beam focus is adjusted with the large knob (labelled Brightness) on the left-hand knobset. The x16 button, when lit, increases the increment of each click on the beam focus knob. The beam position can be adjusted with the Shift x and y position knobs that are located on the left- and right-hand knobsets.

Specimen movement

There are two specimen traverse knobs for moving the sample. The position of the grid can be observed on Page 2 on the monitor. The button that changes the screens is just to the left of the monitor. Use the specimen select switch (SPC SEL) on the left side of the column (located behind the left hand specimen traverse knob) to toggle between the two grids in the sample holder. Position 1 on SPC SEL moves the grid into view that is closer to the sample holder tip and 2 moves the grid into view that is farthest from tip.

Focusing

The focus knob (on the right-hand knobset) has an outer ring for coarse focusing as well as a smaller, inner knob for fine focus. The x16 button to the right of the focus knob is turned on to increase the increment size of focusing.

Focusing can be done with the Image Wobble X or Y button (on the right-hand knobset). Unfocused images will be split when the Image Wobble is on.

At higher magnifications, it is necessary to correct for astigmatism in the image. This is done by pressing the objective stigmator (Obj Stig) button on the left-hand knobset. This allows for stigmation adjustment using the deflector x and y knobs on the left- and right-hand knobsets. These knobs are directly under the shift x and shift y knobs.

Shut down.

Before you leave, after you finish using the TEM, please do the following:

1. Turn off the filament (push the Fil button on the right-hand knobset).
2. Make sure that the sample holder is empty and is placed back in the TEM.
3. Retract the CCD camera if you have used it (In DigitalMicrograph, go to Camera in the menu across the top of the screen, and select “retract camera”).
4. Turn off the TEM monitor.
5. Sign out both the log book and the billing sheet.

If you are the last person here at the end of the day (check the calendar if you are not sure):

1. Turn off the CCD camera's computer.
2. Turn the Camera switch, on the right of the CCD camera control box, from Computer to Out.
3. Turn off the HT.