HITACHI S-2700 SEM

rev 1-08

The Hitachi 2700 is normally running 24 hours a day, 7 days a week. Users must be personally checked out on the machine by Dr. Steve Barlow before usage is allowed. Anyone who hasn't used the scope in the previous 6 months needs to be checked out again.

The default accelerating voltage is 10 kV. The scope will need to be aligned for decent images--learn how to do this or have it aligned before you arrive.

Before starting, set the following parameters:

Tilt to zero, Z counterclockwise to 30][EX] (set stage to its lowest possible position)
bias and filament counterclockwise to 0 (arrowheads)
Raster rotate, dynamic focus, and tilt compensate off
Backscatter detector in the 'OUT' position

Be sure filament has cooled a minimum of 3 minutes--use the egg timer!

-- Push **air/evac** button-(-should turn black). Turn on gas tank behind door. When you hear the hiss, open chamber, turn off the gas.

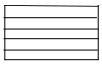
(Be sure gas pressure **to scope** is less than the first mark on gauge!)

Load samples--

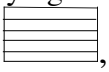
If your samples are not flat on the stubs or stick up several millimeters, check the stage position and be sure the sample will not hit the lens when you push in the stage. Remember which of your samples sticks up the highest--if you raise the stage up (smaller Z numbers) you don't want to hit the highest sample when you raise a lower sample closer to the lens.

--Close chamber and push in **air/evac** button (should look yellow). If display power is not on, turn on **Display** toggle switch to power the display. While waiting for the vacuum check display parameters (e.g., **data display, acc. volt**.) and adjust as needed. (Change acc.volt. ONLY with filament power OFF!)

When the green **HV** light comes on and stops flashing, **use egg timer to wait another 3 minutes for vacuum**. Push **'HV ON'** button (red light comes on)

-- Press image.  Turn the magnification down below 100x, set working distance (PF3) to 30.

-- Press waveform  and set contrast to 50, brightness to 50. Saturate the filament--slowly increase filament current until the curve rises (The filament power knob shouldn't be more than **3 o'clock** normally. (At saturation for 10 kV, you will see about 2 red lights on the emission current meter--at less than 10 kV, you may not see any lights and you may easily blow out the filament).

--Press image.  , then press **ABC** (auto brightness contrast). If no distinct image appears, press '**Search**', then **AFC** (autofocus control) if a distinct image doesn't appear. Once you have an image, use the reduced area box(box in a box) to focus using the small focus knob.

-- Press waveform  and finish saturation—slowly turn up the filament current until the curve stops rising after the first peak. Be careful, as too high a current will melt the filament…

--Push "**pf4**" and run through the alignment sequence (see below)

Once you finish those alignments, you are ready to view the image.

Disk storage is limited in the Facility. If you collect images, be prepared to download them to your own storage device so as to keep the Facility system clear

When you are finished, reset the stage parameters, cool filament 3 minutes with egg timer, press "**air/evac**"(gas tank on), remove samples, (gas tank off) pump down the chamber (leave it under vacuum), log off the computer, and turn off video printer.

Log in your time and film/video print usage

To align the Scope, first obtain a focused image at appropriate W.D.

1. Press "**pf4"**, then use the keyboard arrows(upper RH side) to turn "**ON**" gun tilt
   Select Waveform, then use the stigmator x,y controls to maximize the curve height
2. Press "**return**" twice, and you should see "gun horizon" on the screen
   Select Waveform, then use the stigmator x,y controls to maximize the curve height
3. Press "**return**" twice ("aperture, use x,y controls"), and you will see an image moving on the screen
   Select your aperture (1-4) on the column, then use the two knobs on the column to minimize the movement of the image
4. Press "**return**" twice ("AFC"), and focus the image. (I never use this).
   Minimize the image shift using the stigmator x,y controls
5. Press "**return**" twice, ("stigmator x"), and focus the image
   Minimize the image shift using the stigmator x,y controls
6. Press "**return**" twice, ("stigmator y"), and focus image
   Minimize the image shift using the stigmator x,y controls
7. Exit the alignment program, focus your image at higher magnification and **use the x and y image stigmator controls (green lights)** to obtain the best image

Points to remember

Focus and stigmate your image with the reduced area scan at high magnification.

Be careful raising the stage up toward the lens--if you hit the backscatter detector, it is $2500 down the drain.

If you change the aperture, you will need to check the alignment of the aperture and stigmators (pf4, #3-6)

Shut down the video printer when done(Set left hand lever to middle or up position, then push Power off).

To take a video print:

1. Obtain a focused, stigmated image.
2. Press **Power** switch to turn printer on. Set the lever to the **Print**(down) position
3. Set display characters you want to appear on your print
   Remember that on your video print, the magnification listed is not correct (turn it off on the SEM monitor). Only the scale bar is correct for determining the magnification/size of objects in your video image!
4. Set brightness/contrast using **ABC** button. If the image isn't to your liking: Use the "**monit**" button. Use "**brightness**" to set the waveform just below the second from bottom line. Adjust "**contrast**" so the maximum peaks are 2 lines above it.
5. Go to slow scan 4, let the picture refresh itself, then push **print** button.
6. When finished, set left hand lever to middle or up position, then push **Power** off

www.sci.sdsu.edu/emfacility for links to handouts and tutorials.