

# hitachi s4000 sem

## STARTING UP

- 1 Enter your complete name, starting clock time, and the starting beam time into the record book. You must have previously filled out a project information sheet.
- 2 Turn the "Display Power" toggle switch to the "on" position (off hours only).
- 3 Fill LN2 cold trap.
- 4 Set stage to specimen exchange position as diagrammed on specimen stage goniometer.
- 5 Make sure the S.C.-S.E.C. toggle switch is in the S.E.C. position (S.C.-S.E.C. toggle should always be on S.E.C.), then press the "Air" button.
- 6 Pull out the S.E.C. holding it at the bottom, and load stubs into the stub holder (always wear gloves while handling the stub holder).
- 7 Retract the exchange rod to the locked position and close the specimen exchange chamber.
- 8 Press the "EVAC" button. The S.E.C. vacuum lights should go from Air to Low to High. S.C. vacuum should always be on HIGH vacuum.
- 9 When the S.E.C. vacuum reaches "High," the door between the S.E.C. and the S.C. can be opened (rotate the lever labeled "O C" so the handle points up).
- 10 Carefully slide the stub holder stand into the specimen chamber stage (while looking through the window of the S.E.C.). Unscrew the exchange rod COMPLETELY (about 8-15 counterclockwise turns) and retract it completely until it is securely held by the lock clips.
- 11 Close the S.E.C. door (the "O C" lever should point down).
- 12 Move the S.C. Airlock Valve toggle to the "Open" position.

## TO BEGIN IMAGING

- 1 Select a high contrast area at low magnification and press "ABC."
- 2 Press PF3 to choose column adjustment menu.
- 3 Using the arrow keys, select #1-Beam Align. Turn the "Stigma/Align" X and Y knobs to center the spot on the screen. Press enter to move next item.
- 4 Increase magnification to about 10,000x. Press enter to select #2-Ap. Align. Use the X-Y knobs on the objective aperture until the image does not shift back and forth. When properly adjusted, it may still seem to move slightly cyclically.
- 5 Use arrow keys to select #6-Stig-Obj. Type 0.
- 6 Select #3-Stig. Align X. Use the "Stigma/Align" X knob and turn it until the image pulsates but does not move side to side.
- 7 Select #4-Stig. Align Y. Use the Y knob to do the same thing.
- 8 Press PF16 to exit menu.
- 9 Increase magnification to at least 20,000x and use "Stigma/Alignment" X and Y knobs to correct astigmatism.

## TAKING A PHOTOGRAPH

- 1 Focus at a higher magnification than the desired print magnification.
- 2 Return to print magnification. DO NOT TOUCH THE FOCUS.
- 3 Press PF8 Photo Cond. And make sure correct film speed is selected.
- 4 Press "ABC" button.
- 5 Load the film.
- 6 Press the direct photo button.
- 7 When the direct photo button light stops flashing, remove the film.

## ENDING A SESSION OR EXCHANGING SAMPLES

- 1 Press the "Off, Ready" key.
- 2 Close the S.C. Air Lock valve.
- 3 Make sure the "stage lock/free" toggle is in the free position.

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- 4 Move the specimen stage to specimen exchange positions indicated on top of the specimen stage goniometer.
- 5 Check that the S.C. and S.E.C. vacuums are on HIGH (green lights).
- 6 It is now safe to open the S.E.C. door ("O C" lever points up).
- 7 Insert the exchange rod and screw into the specimen holder. Pull it into the S.E.C. until the lock clips securely hold it.
- 8 Close the S.E.C. door.
- 9 Press the "Air" button.
- 10 Open the specimen exchange chamber, holding it at the bottom, and remove samples.
- 11 Close the S.E.C. and press "EVAC." If you are exchanging samples, go to step 12 of STARTING UP.
- 12 Sign out of the record book. Record number of thermals and Polaroids used.

## MANUAL ALIGNMENT

- 1 Insert alignment sample (TEM grid, prickly gold on stub or any conductive specimen.)
- 2 Pull beam monitor aperture and moveable objective lens aperture out to opening "0."
- 3 Turn off beam monitor.
- 4 Set condenser lens control knob to "0."
- 5 Set to lowest magnification.
- 6 Turn on the high voltage to 1Kv.
- 7 If no image or brightness appears, change high voltage to 2Kv.
- 8 Adjust the electron gun with the alignment screw to obtain the maximum brightness on the CRT.
- 9 If you had selected 2Kv, change to 1Kv and repeat step 8.
- 10 Change magnification to 2,000x.
- 11 Focus and stigmat as best you can.
- 12 Turn apt. align. On.
- 13 Adjust the electron gun alignment screws so that the image blurs concentrically.
- 14 Turn the apt. align. Off.
- 15 Set the condenser lens control to 11.
- 16 Change magnification to 400x.
- 17 Focus and stigmat the best you can.
- 18 Turn the apt. align On.
- 19 Adjust the condenser lens with the alignment screws so that the image blurs concentrically.
- 20 Turn apt. align. Off.
- 21 Insert the beam monitor aperture to 2.
- 22 Adjust the beam monitor's X and Y alignment knobs so that the image no longer moves.
- 23 Change the magnification to 3,000x.
- 24 Insert the movable objective lens aperture to 3 or 4.
- 25 Turn apt. align. On.
- 26 Adjust the moveable objective aperture's X and Y alignment knobs so that the image no longer moves.
- 27 Turn apt align. Switch off.
- 28 Focus and stigmat as best you can.
- 29 Turn on beam monitor.

The S4000 is now properly aligned and the operators can change the high voltage from 1 to 30Kv. If a shadow appears on the CRT when the operators go to higher voltage, this should be eliminated by turning off the beam monitor and moving the beam monitor's aperture's X and Y monitor back on. After doing this, the operator just needs to align the objective aperture, if necessary, then focus and stigmat.

## FUNCTION KEYS

- To change a value:
- a Press the function key desired.

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- b Use the direction arrow keys on the upper right corner of the keyboard to select the item from the menu. Those or the "data entry" key and the keyboard can be used to enter a value. The arrow keys in the center of the keyboard can also be used to change values. (If the data entry key is used, the cursor can be removed from the screen by pressing the button again).
- c To enter a new value, press Enter.
- d All functions can be exited by pressing Enter.

## OTHER

"ABC" key= Auto Brightness and Contrast

Basic rule of thumb: If a light for a key begins flashing...press it.

The objective aperture toggle switch should always be on "HEAT."

If the image does not change when the sample is moved or the CRT remains black when beam is initially turned on, press the "Run/Stop" button.