

# OPERATING INSTRUCTIONS FOR JEOL 100S

(June 1997 - Version 2.4)

## PRESTART CHECKLIST

- 1) Turn on **IN USE** light
- 2) Sign Log Book
- 3) Vacuum system operating and **HIGH VOLTAGE OFF** is illuminated
- 4) **FILAMENT** emission to 0 (Fully CCW)
- 5) Step up **HIGH VOLTAGE** to desired KeV
- 6) Fill specimen cold trap with LN<sub>2</sub>
- 7) **SPOT SIZE** on **2**
- 8) **HV/FOCUS WOBBLER** Off
- 9) Condenser aperture #2
- 10) Objective aperture out at **0** (i.e. no aperture).
- 11) **FUNCTION** knob to **MAG**
- 12) **MAGNIFICATION** set to 4K
- 13) Setup room lighting conditions

## BEAM GENERATION

- 1) **BRIGHTNESS** knob fully CW and back 1½ turns to 12:00
- 2) Slowly turn up **FILAMENT** emission knob until illumination appears on viewing screen
- 3) Adjust **BRIGHTNESS** knob until crossover / condensed spot is obtained
- 4) Use **FILAMENT** knob to obtain Wehnelt (filament) image
- 5) Center image with **COND ALIGNMENT** knobs
- 6) Using **GUN ALIGN TILT X/Y** knobs center Wehnelt image  
(It should look like the CBS "eye"; ☪☉☽ )
- 7) Using **COND STIG X/Y** knobs obtain sharpest Wehnelt image (Note: Correctly stigmated beam will not "twist" or "pull" when changing **BRIGHTNESS** knob)
- 8) Re-center image with **COND ALIGNMENT** knobs
- 9) Spread beam to just fill screen, center edges of beam on edges of screen with condenser aperture X & Y adjustment knobs
- 10) Converge beam with **BRIGHTNESS** knob
- 11) Increase **FILAMENT** emission until all traces of Wehnelt disappear (This is filament saturation point)
- 12) ☞ Spread beam ! ☜
- 13) Insert and center an Objective Aperture with Obj. Apt. X & Y adjustment controls.

## SPECIMEN INSERTION



**NOTE:** Never touch the specimen holder without wearing gloves

- 1) Place the specimen holder and rod on rod holder
- 2) Lift up securing plate with forceps.

- 3) Place a grid into holder with sections side up
- 4) Push down the securing plate to hold the grid in place
- 5) Align the rod guide pin with the specimen exchange Air lock guide groove and push rod into the air lock as far as it will go and hold. Air lock pumping begins automatically and the lamp lights up.

 **NEVER** leave the rod in this position after the light goes out. Proceed immediately to Step 6

- 6) When the lamp goes out, turn the specimen exchange rod fully CW (180°) until stop. SLOWLY ease rod into the column until it stops.
- 7) Depress the rod button and, while keeping it depressed, pull out the rod as far as it will go. Release the button, turn the rod fully CCW (180 degrees), pull rod out of vacuum and rotate rod 90° CW.

### **SPECIMEN REMOVAL**

- 1) Pump out specimen exchange air lock (pull rod out of chamber and reinsert according to *Specimen Insertion step #5*)
- 2) When the lamp goes out, turn the specimen exchange rod fully CW. Depress the button and, while keeping it depressed, SLOWLY ease rod into the rod into the column until it stops. Release the button and pull the rod out as far as it will go. Turn the rod fully CCW.
- 3) Remove the specimen rod from the column. Place the rod on rod holder and remove the grid

### **CENTERING THE OBJECTIVE APERTURE - ALTERNATE PROCEDURE**

- 1) With a specimen inserted into the beam path, set the **FUNCTION** knob to **SA DIFF 1** and spread the beam by turning the **BRIGHTNESS** knob
- 2) Obtain a caustic spot (focused diffraction point) with the **SA FOCUS-DIFF** knob
- 3) Select objective aperture 1, 2, 3, or 4. The objective lens aperture shadow should be visible
- 4) Obtain the sharpest aperture shadow with the **SA FOCUS-DIFF** knob
- 5) Adjust X & Y adjustment controls until the aperture shadow is centered around the caustic spot

### **PHOTOGRAPHY**

- 1) Bring the field of view to be photographed into the square frame of the screen. Focus. Adjust the screen so that it is flat.
- 2) Check that **EXPOSURE-SENS** knob in on **6**. Set the **EXPOSURE-TIME** knob to **AUTO** and the **FILM ADVANCE** toggle switch to **SINGLE**
- 3) Set the **AUTO EXP** knob to 3 seconds
- 4) Adjust the **BRIGHTNESS** knob so that the two green **AUTO EXP** lamps light up
- 5) Depress the **FILM ADVANCE** button. A film is now advanced and when it reaches the photographing position, the **FILM ADVANCE** button switch lamp lights up and the magnification and film number displayed on the **MAGNIFICATION** and **FILM COUNTER** indicators are printed on the film
- 6) Pull the screen lever forward. The red **AUTO EXP** lamp lights up and the shutter opens
- 7) When the red **AUTO EXP** lamp goes out, return the screen lever to its original position


## FILM CHANGE - UNLOADING CAMERA

- 1) Confirm that **FILAMENT** knob is at **0** and **HIGH VOLTAGE-OFF** is depressed
- 2) **CAUTION:** Safelights only! Room lights OFF, **PANEL** lights OFF.
- 3) Set the airlock knob to **C**
  - a) Turn the knob fully CW (towards you)
  - b) Push it in as far as it will go
  - c) Turn it fully CCW (away from you) to **C**
- 4) Turn the camera chamber handle a quarter turn CW (horizontal position). Air is admitted into the chamber
- 5) Pull film magazine stand bar out until stop
- 6) Remove the film receiving magazine (magazine toward the front with an arrow pointed toward the operator). Remove the film dispensing magazine (magazine furthest away from the operator: says **FILM** and has arrow pointing away from operator).
- 7) Admit air into the film desiccator by setting the lever CCW to **AIR** - ✓ Check O-ring!
- 8) When the chamber door opens, remove the dispensing magazine loaded with film
- 9) Place loaded **FILM** magazine and empty receiving magazine in the magazine drawer
- 10) Return the magazine drawer to the original position by pushing the bar
- 11) Wipe down camera chamber door O-ring and seat with ungloved finger
- 12) Close the camera chamber door, and while depressing it, give the handle a quarter turn in the CCW direction. Pumping of the chamber begins
- 13) After confirming that lamp **VG2** is lit (Only yellow light on vacuum panel, lower left)
  - a) Turn the airlock knob fully CW
  - b) Pull the knob out as far as it will go
  - c) Turn it fully CCW to **0**
- 14) Reset the **UNUSED FILM** counter to the number of unexposed films by depressing the **RESET** button
- 15) When the **HIGH VOLTAGE-OFF** lamp lights up, the microscope is again ready for beam generation

## RELOADING FILM CASSETTES

The exposed film can be removed from the receiving magazine and unexposed film loaded into the dispensing magazine while the camera chamber is being evacuated. **NOTE:** Film can be handled only under a safe light

- 1) Remove the lid from the receiving magazine and remove the film cassettes. Remove the film from each cassette, and store in a light tight container
- 2) Load a film in each cassette with the emulsion surface facing upwards (Right hand index notch)
- 3) Remove the lid from the dispensing magazine and push the cassette stand to the bottom of the magazine until it is locked
- 4) Place the cassettes in the dispensing magazine so that the notch lines up properly with the inside of the magazine. Replace the lid
- 5) ✓ Confirm that lamp **V3** is unlit and **VG2** (yellow) is lit.

 **V3 MUST** be unlit before proceeding to steps #6 and #7

- 6) Place the loaded dispensing magazine into the film desiccator and close the door
- 7) Set the lever to **PUMP**. The **V11** lamp lights up and chamber pumping begins

## SCOPE SHUTDOWN

### NORMAL SHUT DOWN

- 1) **FILAMENT** fully CCW
- 2) **HIGH VOLTAGE - OFF** (Button **illuminated**)
- 3) Beam spread, **BRIGHTNESS** fully CCW
- 4) **FUNCTION** knob to **MAG**; **MAGNIFICATION** set to 4K
- 5) Remove specimen
- 6) If photomicrographs have been taken proceed to **FILM CHANGE** (Above)
- 7) 🖱️ **SIGN OUT OF LOG BOOK** 🖱️
- 8) Lights off

### FULL SHUT DOWN

- 🖱️ Full shut down is to be done ONLY in case of:
- a. Interruption of building utility services (Electrical or Water)
  - b. Vacuum system failure
  - c. Instruction of EMF Staff

- 1) (If time permits) Proceed with **NORMAL SHUT DOWN**
- 2) Push red **SHUTDOWN** button lower left panel - Lights on scope panel will go out and scope will go quite
- 3) Wait **3 minutes**
- 4) Switch breaker box to **OFF**
- 5) Leave cooling water recirculator **ON**
- 6) Post message on scope describing reason for **FULL SHUTDOWN**

### TURNING SCOPE ON AFTER FULL SHUT DOWN

- 🖱️ To be done ONLY after correction of the reason for the full shut down

- 1) Breaker box to **ON**
- 2) ✓ Check that cooling water recirculator manual switch is **ON**
- 3) Push Black **START UP** button lower left panel - pumps will start, some lights will come on

- 🖱️ After 30-45 mins **HIGH VOLTAGE OFF** (Left upper panel) should be illuminated indicating the scope is ready for operation.