

Philips CM200T

Standby Condition

- HT and filament off, HT setting at 200kV.
- **RESET HOLDER**, center sample tilt knobs, and remove sample.
- Mag ~ 5-10kX
- Objective and SA apertures out, C2 aperture at #3
- Record filament time and negative numbers.
- Computer and Microscope monitors off.
- Room lights, panel lights, TV and camera off, pull out panel light knob.

If you step away from the microscope, **RESET AB**. You may store the stage coordinates first.

Startup

- Fill Dewar and let chill for 15 min.
- Load sample
- IGP < 20 before turning on HT. If cold trap has been warm, start at 160kV and condition HT. Warm up LaB6 cathode slowly.

Sample Loading

- Load sample in rod. (Be sure that the small end of the nut is against the sample.)
- **RESET HOLDER**; align pin and insert rod in airlock
- Select the appropriate holder (usu. Philips Compustage, double tilt), press **Ready**, connect goniometer plug, press **Ready**.
- Wait for red light to go out (V8 = closed), then immediately rotate the sample rod CCW. Watch IGP value while rotating the holder to the insert position.

Note: If you hear a beep when pressing **Ready** the 2nd time, wait for V8 to close, remove and reinsert the sample rod.

- Be careful on removing the sample. Do not keep pulling on the rod once you have reached the end of its travel.

Alignment

Note: Please do not use the alignment procedure on the left side of the Alignment page. This procedure sets the default values for all the alignments. You may really mess things up!

- **Gun alignment (Tilt, Trans)**
 - Select **Algn | Gun Tilt**. Adjust for max screen intensity.
 - Select **Algn | Gun Shift**. (For general use, use spots sizes 3 and 9.) Set **spotsize** 9, center beam with beam shift;

- Set **spotsize** 3, center beam with MF knobs.
- **Condenser alignment (C2 aperture, stigmation)**
 - Focus beam with C2; spread beam and center illumination with the C2 aperture.
 - Set beam to crossover and undersaturate. Select **Stig | Condenser** and adjust MF knobs for circular beam image.
 - **Eucentric height and focus.**
 - Set a recognizable feature in the center of the screen at ~10kX. (You may wish to mark with the beam stop.) Select **Compustage | A-wobble** and adjust the Joystick-Z for minimum movement. With care, you should be able to do better than $\pm 1\mu\text{m}$ in height.
 - Focus the image at higher magnification. Look for minimum contrast or for fresnel fringes. After focusing, **Rset Defocus** to zero the defocus display at the eucentric height.
 - **Pivot points and Rotation Center**
 - Focus the beam with C2 and select **Align | Pivot Point X**. Use the MF knobs to superimpose the spots.
 - Repeat with **Align | Pivot Point Y**.
 - Center the illumination, then select **Align | Rot Center** and use the MF knobs to set the wobble point to the center.
 - **Objective aperture and stigmation**
 - Insert SA aperture to limit field of view and press **D** to enter diffraction mode.
 - Insert Objective aperture and focus edge of aperture with Focus.
 - Release **D** and remove SA aperture.
 - Select **Stig | Obj.** and correct stigmation using amorphous grain or fresnel fringes.

Changing film.

- Verify that the P1 pressure is less than ~35. If not press **Vacuum ON** to pump the buffer tank.
- Vent the camera by pressing **VACUUM | CAM AIR**. (The vent process takes ~5 minutes.)
- Replace the film canister with one containing dried film. Note that the two metal plates (used to prevent light from entering the canister) must be removed before putting the canister into the TEM. The spring on the canister faces the rear of the microscope.
- Release **CAM AIR** to start pumping. Observe the P2 pressure and verify that it drops to 30. When P2 reaches 30, V4 will open and P1 will rise rapidly. If the mechanical pump shuts off, press **VACUUM ON** to repump the buffer tank. If P1 reaches 42, the vacuum system will shut down and display a “CBP error “message. Press **VACUUM ON** to restart.
- Select **TEM CAMERA | CAM INIT | RESET** to reset the film stock number to 56.

Notes

TV system.

- Turn TV monitor and signal processor
- Select update on the signal processor and **TV-system** = “off-axis” on the CM200 monitor.
- Averaging 4 – 8 images is a reasonable compromise between noise and ghosting.
- Lift the TEM screen to view the image on the monitor. (The detector alignment should be OK.) Note that the magnification on the TV screen is about 50X larger than the TEM screen.

EDS.

- Tilt the sample to $\alpha = +20^\circ$.
- Select “EDAX MX TEM” from the Apple menu on the 8600.
- Adjust the spotsize so as to achieve a count rate of ~1000 - 2000cps.
- To save the spectra, you may create a directory in the “public” folder. Please clean out your files after downloading.
- Be sure to manually add the extension “*.spc” to the files.

Appendix

Apertures (μm)

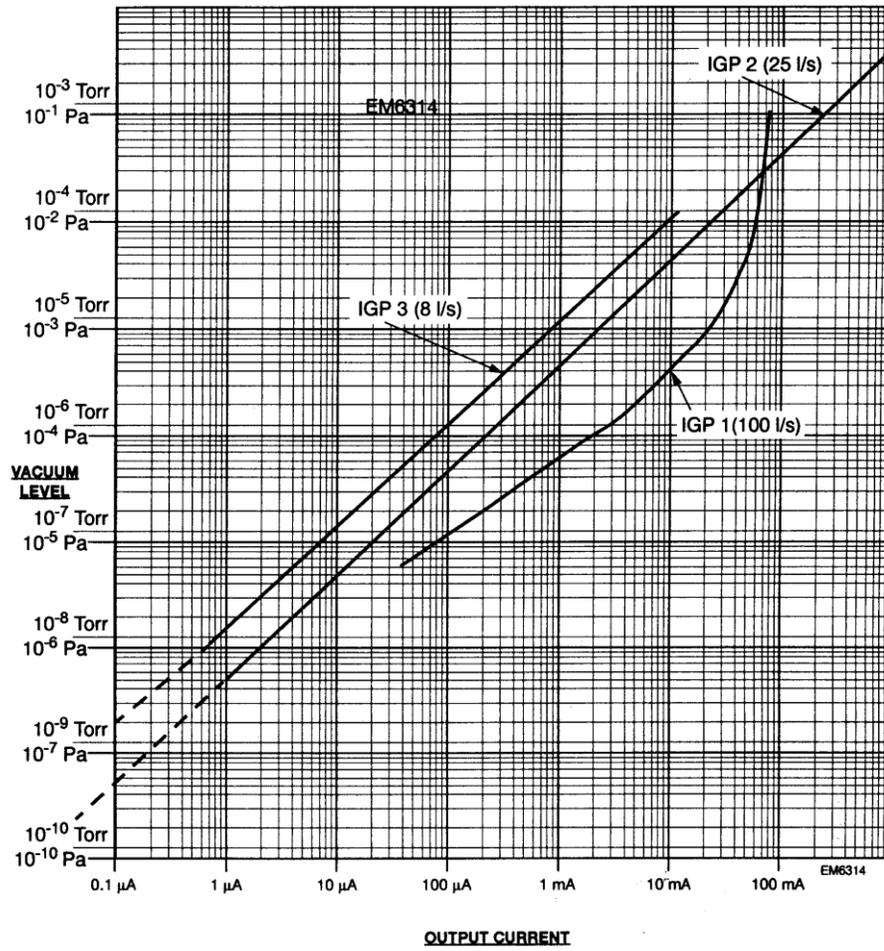
	4	3	2	1
C2	200	100	50	30
Obj	100	40	20	10
SA	800	200	40	10

Probe current

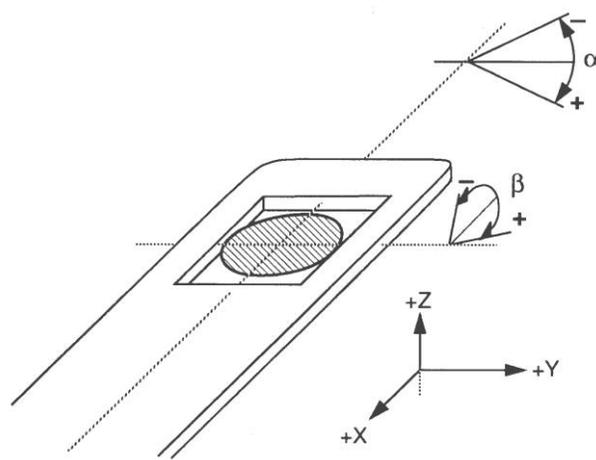
$$I_p = 2.44 S_c/t_c = 7.03/t_c$$

where S_c = film sensitivity (2.88)

Vacuum Readings



Compustage Goniometer Axes



1. Electron Microscope Identification

Manufacturer: Philips/FEI Company

Model: CM200

Serial Number: D719

Location (room and building): 138 CEMAS

Unit is **Operable**

2. Principal Investigator: H. Colijn

Telephone: 614/643-3458

E-mail: colijn.1@osu.edu

3. Additional Contact Person: Ashley Swartz

Telephone: 614/643-3467

E-mail: Swartz.202@osu.edu

4. Name of Electron Microscope Operator(s)

Cf. FOM scheduler list

5. General Radiation Safety Policies:

Only personnel trained and approved by the Principal Investigator may operate an electron microscope.

- a. Radiation Safety must be notified prior to any changes in location, disposal, transfer, or acquisition of any electron microscope. Radiation Safety must also be notified of any plans for modification made to the unit, including built-in shielding and viewing ports.
- b. Use interlocks, barriers, or administrative controls to ensure no one can gain access to the primary beam or high scatter radiation areas. Stop the primary beam by secured shielding that cannot be readily displaced. Secure unused ports to prevent accidental exposures.
- c. Secure electron microscopes against unauthorized use by using a unit key control or the room lock. d. Units must be labeled with a readily discernable sign that bears the radiation symbol and the words
“Caution – this equipment produces radiation when energized”.
- e. A readily visible warning light labeled “X-ray On” or symbols with a similar intent, must be located near the x-ray source and its controls and be illuminated when the x-ray source is energized for equipment installed after 2/10/06.

- f. An operating log should be maintained including the date, operator, beam voltage and current, and total exposure time.
- g. All locations should have a copy of the OSU Radiation Safety Procedures Manual of Radiation- Producing Devices (Non-human Use) which includes the applicable sections of the Ohio Administrative Code, including 3701:1-68-04.

6. ALARA Philosophy

ALARA is an acronym that stands for As Low As Reasonably Achievable. It is the policy of the University to maintain radiation exposure levels not only below applicable legal levels but to also keep the radiation exposure levels as far below the applicable levels as reasonable.

ALARA means making every reasonable effort to maintain radiation exposures as far below dose limits as is practical consistent with the purpose for which the activity is undertaken, taking into account the state of technology, the economics of improvements in relation to the benefits to the public health and safety, and other societal and socioeconomic considerations.

7. Emergency Contact Information

The 24-hour Emergency Response Number is 614-561-7969.

Any individuals have non-emergency questions, concerns, or inquiries pertaining to radiation safety may contact the Radiation Safety Section of Environmental Health and Safety during normal working hours at 292-1284.

8. The Radiation Safety Section of EHS shall be notified immediately of any radiation producing device that is stolen, lost, or missing.

9. Emergency Contact Information

The health physicist on-call can be paged at any time at 614-561-7969.

If any individuals have non-emergency questions, concerns, or inquiries pertaining to radiation safety, contact the Radiation Safety Section of Environmental Health and Safety during normal working hours at 292-1284.

10. Specific Standard Operating Procedures –

See notes above.