TEM FEI Tecnai 12 - Startup Guide

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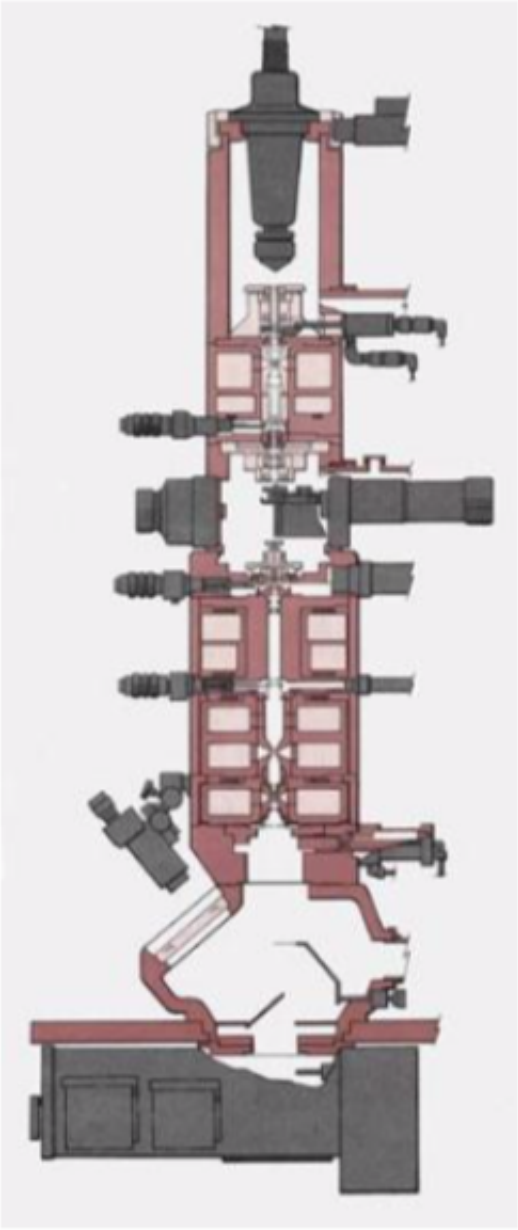
Contents

Chapter 1

(a brief) Introduction

This procotol was adapted from the notes I took during TEM training (Summer 2019). This is **not** all encompassing, but rather the bare minimum requirements I needed to initially start the T12, load the sample, find focus (or close to it), and take images.

Conventional TEM



FEI Technai T12

Before you start, make sure to **1)** reserve the T12 through UMass FOM ahead of time, and **2)** sign into the T12 on UMass FOM before arriving at the Microscopy Center to initilize startup of the T12 controls.

Chapter 2

Startup

During training (and being new to EM), I was instructed to first find and center the beam before loading any samples.

Take note of the IGP1. This is log(vacuum) and is never better than 6.

1) Login to computer (right monitor)
2) Click "Col. Valves Closed"

   If left monitor is black. Login to T12 through UMass FOM to turn it on.

3) High Tension 120V (energy of the electrons)
4) Turn Filament On (this takes ~5min)
5) Find Beam
   - Use the intensity knob (L-R) to find the beam (if the intensity knobs start to beep go the other way).
   - Left = under focus
   - Right = Over focus
   - You can also zoom out with focus if still having trouble.
6) Center beam and make sure beam remains center across a range of spot sizes.
   - To move beam use "Gun Shift" and "Beam Shift". Use "Gun Shift" for lower spot sizes (i.e. 3, which is actully a bigger spot) and "Beam Shift" for higher spot sizes (i.e. 7). There is also a "Gun Tilt" which tilts the gun to put the most electrons in the column. I didn't really use this during my training, only the "Gun Shift" and "Beam"Shift".
   - You can use the multifunction x, y knobs for these
7) Make the screen all beam

You are now set to load your sample.

Chapter 3

Load Sample

Once the beam is found and centered we can load the sample. We need to start by turning the T12 off so we can remove the sample holder. This process is the reverse of the "Startup".

1) Turn off filament
2) Col. Valves Closed

   wait until filament is off

3) Reset Holder (check to see x, y, and z are all close to "0, 0, 0")
4) Remove sample holder (this is a little tricky and is done in steps)
   - Pull out **gently** on sample holder until it resists *and don't pull any farther*
   - Rotate holder to ~11 o'clock and pull all the way out.

BE CAREFUL LOADING SAMPLE HOLDER IN & OUT. USE COMMON SENSE DON'T FORCE ANYTHING

5) Load Sample
   - Do not ever touch sample holder below rubber o-ring
6) Put sample holder back into T12
   - Line up the small pin (below the o-ring) with the "close" on the T12. The big notch should be around 11 o'clock.
   - Push in halfway until you feel it "catch". If done correctly the vacuum pump timer on the left monitor will jump down to 2 min.
   - Wait the 2 minutes for the vacuum pump to turn off, rotate sample holder 60 degrees so the big notch lines up with the slot in the T12, and place in the scape. Try to do this step in one smooth quick motion. **DO NOT LET GO**. There will be some pressure from the vacuum sucking the holder in.

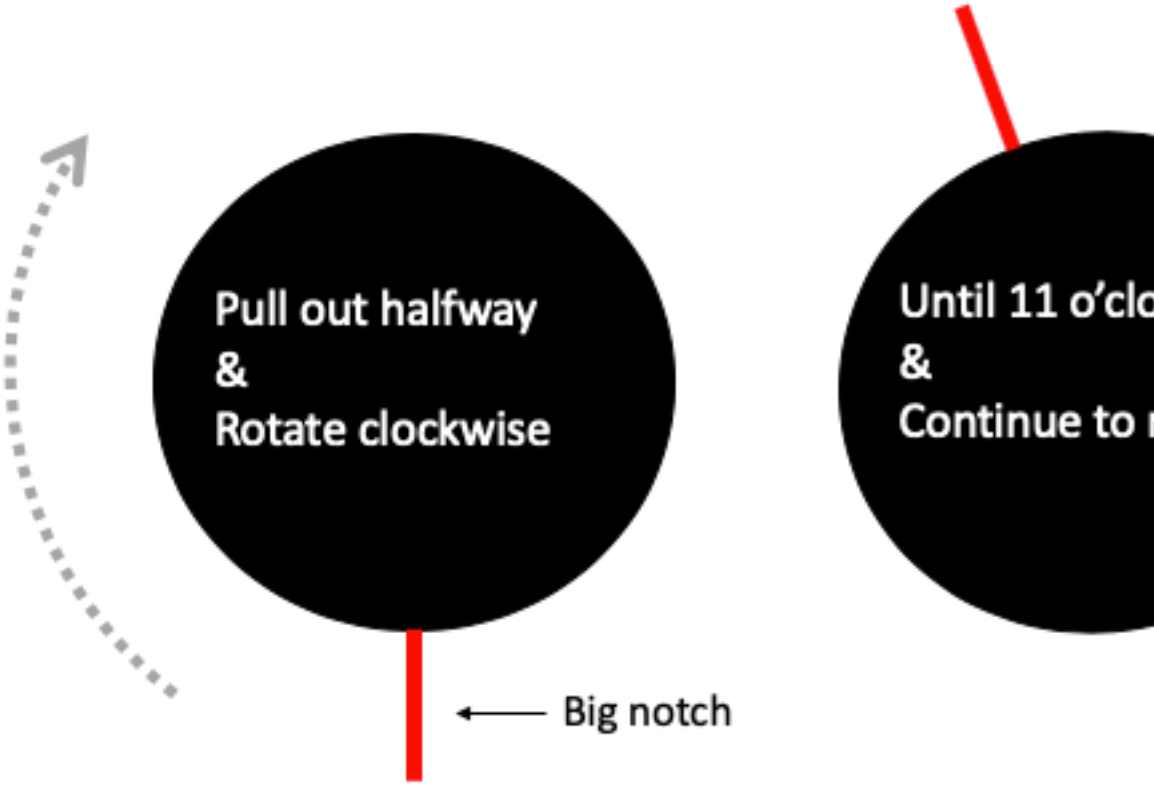


Figure 3.1: Schematic of removing sample holder

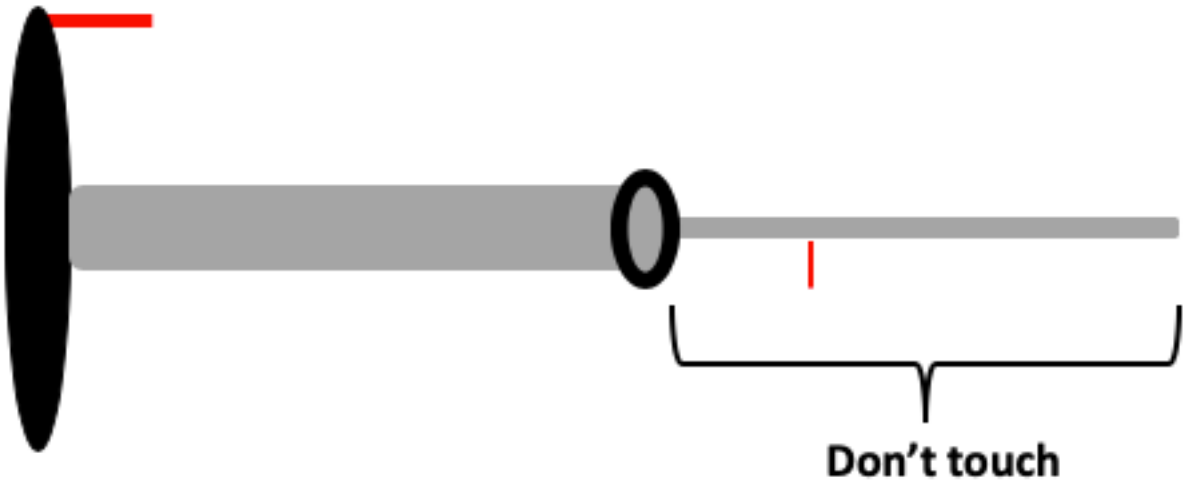


Figure 3.2: Side view of sample holder

The sample is now in the scope ready to be imaged.

Chapter 4

Imaging

This section is the most incomplete of my notes.

1) Find the surface
   - The beam should already be found and aligned. Use the screen image to try and find an area of sample on the grid. Note if all you see is black you might be over a grid bar. Move around to find a new spot.
   - Use the "Eucentric focus" to reset to standard height
   - Turn on alpha-wobble
   - Use the z-axis control to move the stage toward the surface.
   - You will be near focus once the movement of the sample is minimal with alpha wobbler on.
2) Take Pictures
   - The MCSL Server is the Camera (on right monitor).
   - To take picture:
     - Hit "STOP"
     - Select slot
     - Hit the camera icon. There are two camers modes. 1) for Live mode viewing and 2) for taking static images.

The files are saved to: Computer > Home > T12 > [The Day's Folder]