

EBeam 4 Operating Instructions



Loading the chamber:

1. Ensure that the previous user has completed processing and unloaded their parts from the system prior to venting the chamber.
Also check the logbook to see if the previous user had issues during operation.

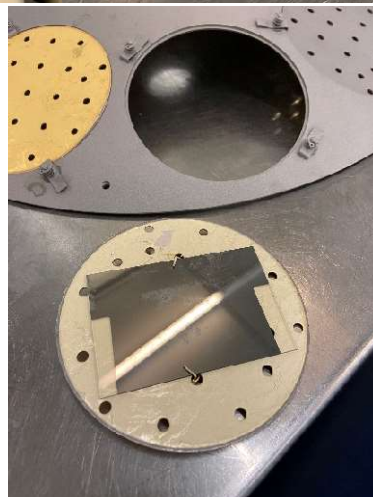
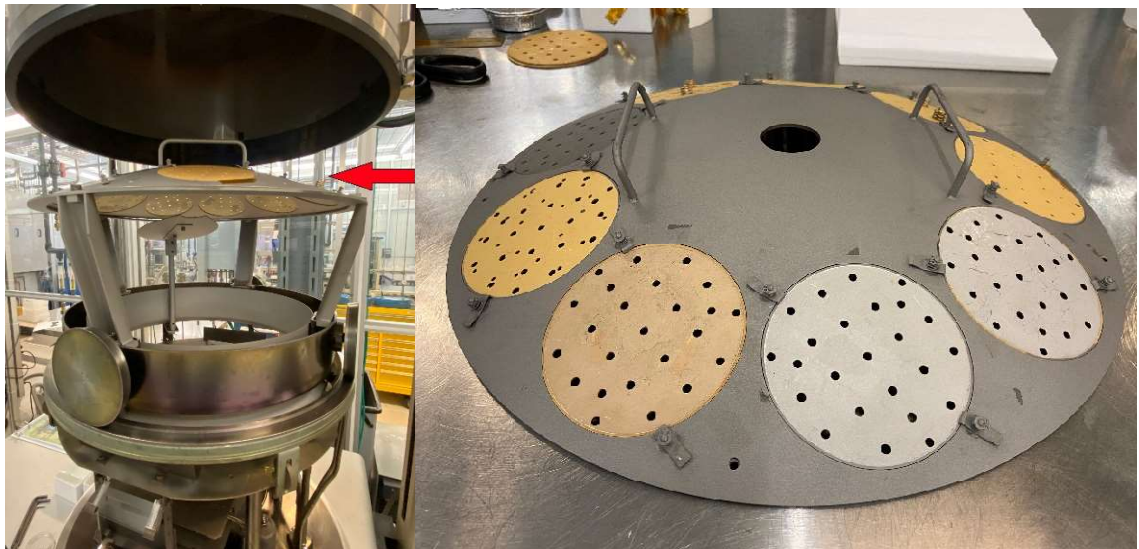


2. If on, turn off the Chamber Ion Gauge on the Vacuum Gauge Controller by pressing the IG2 button.
3. On the Inficon IC/5 controller, check that the state is "Ready", and if not press the "Stop", then "Reset" buttons. This will put the controller into the "Ready" state.

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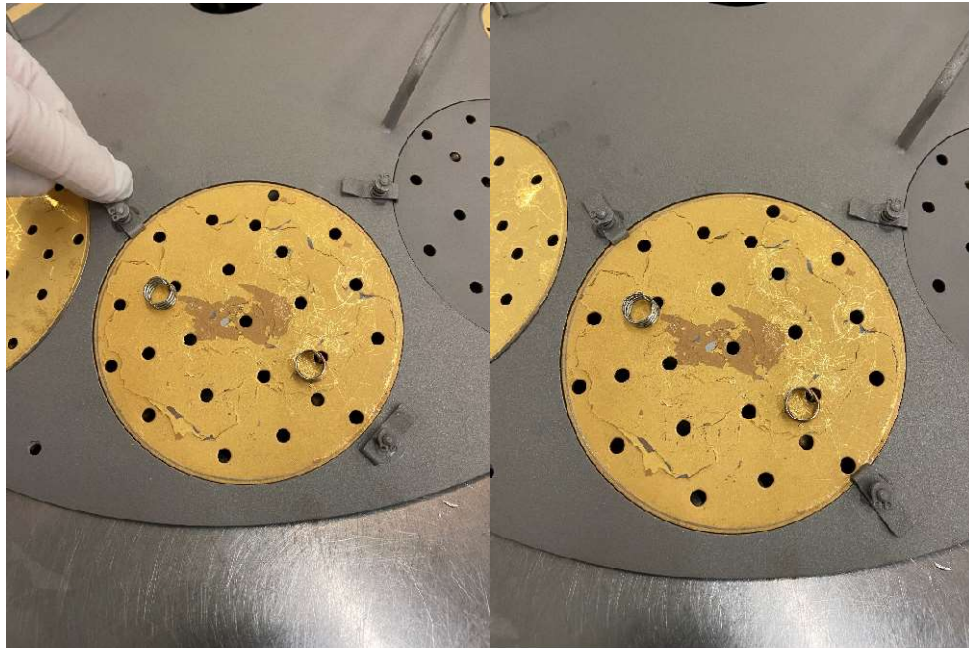


4. On the CHA Industries Auto-Tech II controller, locate the “Auto-Control” and switch it to “Standby”, then to “Vent-Raise”. This will vent then open the chamber bell jar.



5. Remove the fixture dome.
6. Remove needed fixtures from the fixture dome and install your parts/wafers/samples to the fixtures using either spring clips or Kapton tape.

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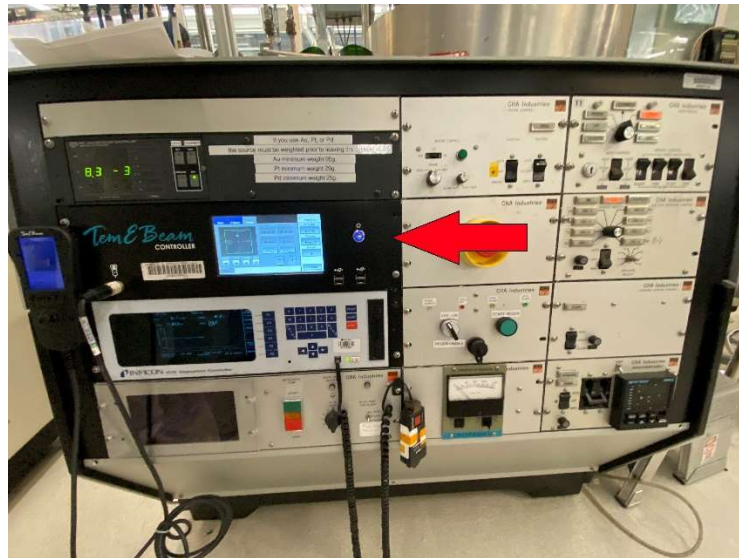
7. Reinstall the fixtures used into the fixture dome, securing them with the small end of the spring clamps.

****Note**** All fixture pockets must be populated in the fixture dome, even if not being used.



8. Open the source shutter to inspect source material used for your run.
To open the source shutter, locate the "Shutter" switch on the CHA Industries Fixture Control panel, and switch it to "Open".

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- To move the source pocket to the desired pocket, Locate the TemEBeam Controller, and change it to Manual by touching the “Mode Selection Button” in the upper right corner of the screen, and selecting “Manual”.
- You can change the Source Pocket to the very next Pocket by selecting the “Pocket” button, or if you want to select a specific Source Pocket, select the “Change” button followed by the “Pocket” button. You will then enter the pocket number desired and select “Enter”.
(Example to change to Au (pocket3): “Change” “Pocket” “3” “Enter”)



- If using precious metals, weigh the source(s) prior to use to ensure the proper amount is present, and report to staff if the sources are grossly out of weight.

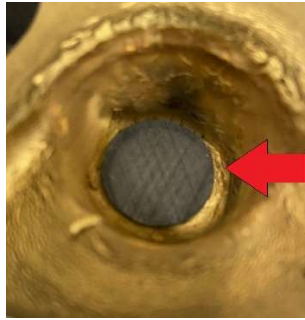
Precious metal Minimum Required Weights are:

Au = 95g.

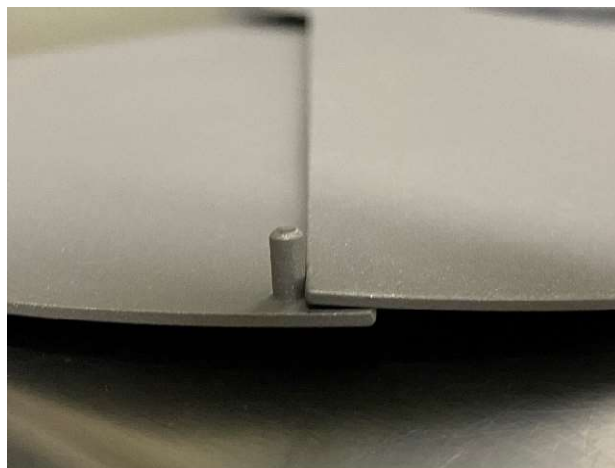
Pt = 29g.

Pd = 25g.

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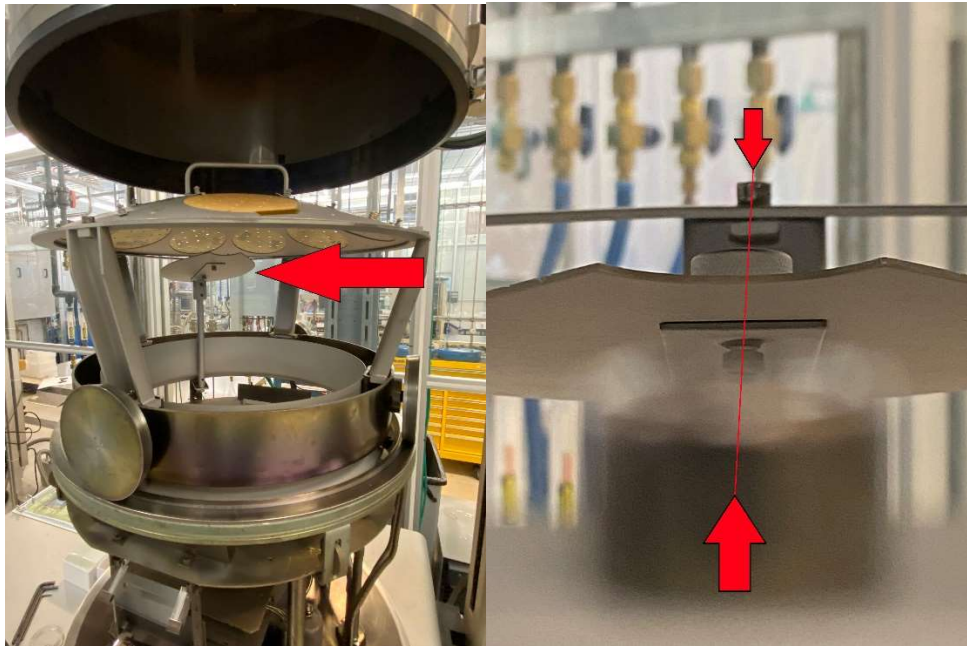


12. If using Au, ensure that there is a graphite disk in the source pocket, under the Au source. If the graphite disk is not present, one must be installed prior to use or evaporation and dep rate will be affected. If the graphite disk is missing, and there are none inside the source jar located on top of the tool, or inside the EBeam4 drawer across from EBeam3, please notify Staff if you are unable to locate one.
13. Non precious metals must have enough material in the pockets to fully cover the bottom of the pocket (no copper visible). Source material is in the Ebeam source material drawer across from EBeam3.
14. Once sources have been checked/filled as needed, change the TemEBeam Controller back to Operate by touching the “Mode Selection Button” in the upper right corner of the screen, and selecting “Operation”.
15. Once sources are satisfactory, close the Source Shutter by toggling the “Shutter” switch on the CHA Industries Fixture Control panel to “Auto”.



16. Make sure that the shutter closes properly, and the right shutter is contacting the stop pin on the left shutter. If the shutters are not making contact on the stop pin, the shutter will overextend and not be able to open during deposition.

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17. Verify that the Uniformity Shield is aligned properly.

Misalignment of the Uniformity Shield will result in over deposition of material on your parts.

To check alignment, align the Uniformity Shield post in the center of any 1 of the 4 posts of the Lift-Off Carousel.

Then visually align the 2 bolts on top of the Lift-Off Carousel and verify that the round cut out in the Uniformity Shield is centered in the virtual line between the 2 bolts. (See picture for reference)

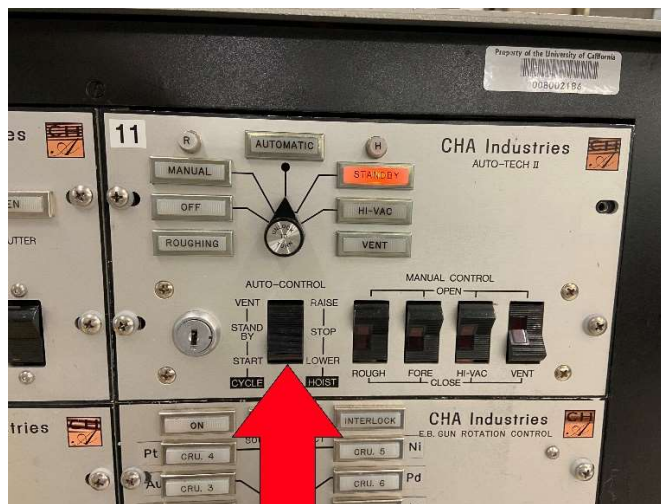


18. Load the Fixture Dome with your parts onto the Lift-Off Carousel, ensuring that it is sitting inside of the 4 bolts at the top of the Lift-Off Carousel.

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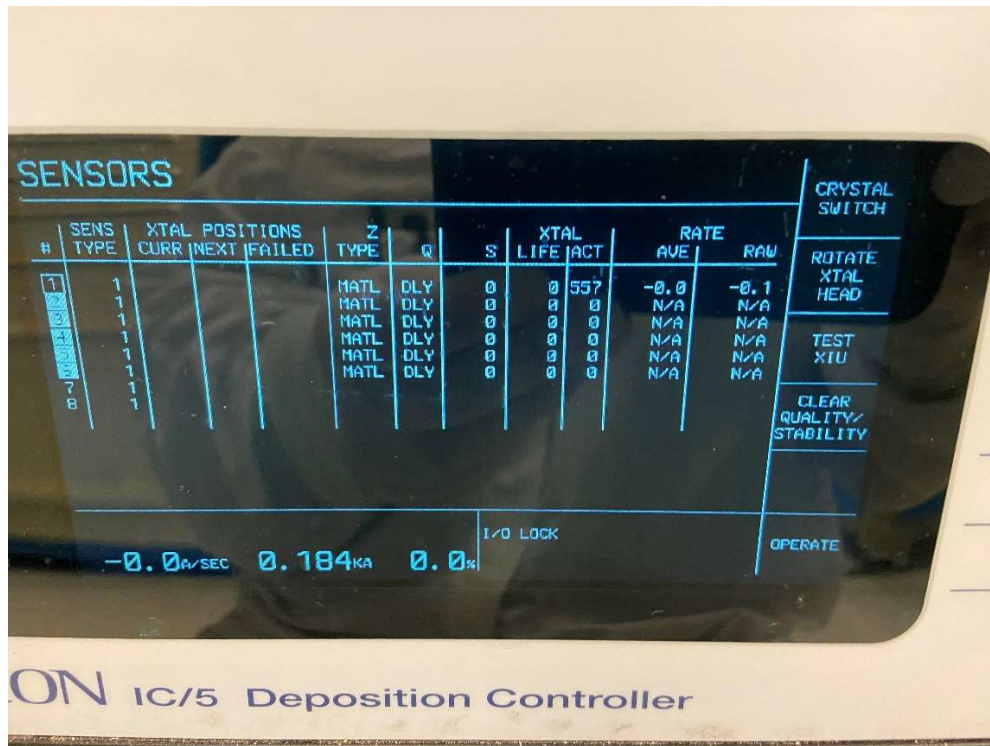
19. Verify that the rear mirror is in place and reflective, and the front glass slide is in place and clear. If the mirror is not reflective, replace with used glass slide that is reflective. If front glass slide is coated, replace with clear glass slide.



20. Locate the “Auto-Control” on the CHA Industries Auto-Tech II controller, and switch it to “Standby”, then to “Start-Lower”. This will lower the chamber bell jar.
21. Once the bell jar is finished lowering onto the chamber base plate, switch the “Auto-Control” on the CHA Industries Auto-Tech II controller, to “Standby”.

****NOTE**** You will only have 5 seconds to switch to “Standby” due to the delay between lowering the chamber and pumping.

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22. Check the Crystal Sensor and replace if needed:

On the Inficon IC/5 controller, enter the Sensors menu by pressing F2.

On the Sensors menu, check the XTAL Life and ACT. Life should be less than 15, and ACT should be more than 300.

If life is more than 15 and/or ACT is less than 300, change the Crystal Sensor.

If the sensor number is highlighted, there is an error with the Crystal Sensor and it should be changed

****If the Crystal Sensor needs to be changed continue to Step #23, If not skip to Step #28**

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Crystal Sensor:



23. On the top of the chamber, release the clamp holding the Crystal Sensor Assembly onto the top of the bell jar, and carefully lift the assembly straight up until the Crystal Sensor is clear of the bell jar opening.

**** Be very careful of the Crystal Sensor Wire on either side of the Crystal Sensor Assembly, as damage to either wire will result in incorrect thickness on your parts****



24. With the Crystal Sensor assembly removed, remove the Crystal Sensor by pulling the Sensor Holder straight out of the assembly.

25. With the “Crystal Snatcher” tool’s tapered end, remove the Sensor Holder Cover.

You can now dump the old Crystal Sensor out of the holder and discard, and install a new Crystal Sensor.

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- 26. Reinstall the Sensor Holder Cover and press it in place by flipping the “Crystal Snatcher” tool over and pressing on the Sensor Holder Cover.**

- 27. Press the Sensor Holder straight into the Crystal Sensor assembly and install the Crystal Sensor assembly back into the top of the Bell Jar, securing it with the clamp. Once the Crystal Sensor assembly has been installed and secured, you will proceed to Step #28**

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Check the Rotation:



28. To turn on the Rotation, locate the “Rotation” switch on the CHA Industries Fixture Control panel, and switch it to “Manual”.

29. Verify the Rotation Chain and Rotation Feedthrough Shaft are rotating smoothly without any clunking or grinding noises coming from inside the chamber.

***If there are any clunking or grinding noises from inside the chamber during Rotation, or the Rotation Chain, or Feedthrough Shaft are not rotating smoothly, open the chamber (Step#5) and inspect the chamber liner and dome for any obstructions or damage.**

****Report any obstructions or damage to Staff.**

*****DO NOT attempt to run until the system has been checked by Staff.**

30. After verifying the Rotation is working properly, Switch the Rotation to Auto by toggling the “Rotation” switch on the CHA Industries Fixture Control panel to “Auto”.

Pump Down the Chamber:

31. Switch the “Auto-Control” on the CHA Industries Auto-Tech II controller, to “Start-Lower”.

After a delay, the chamber will start pumping down.

*** You are required to stay with the tool while pumping down until the chamber crosses over into High Vacuum.**

This should only take a couple of minutes.

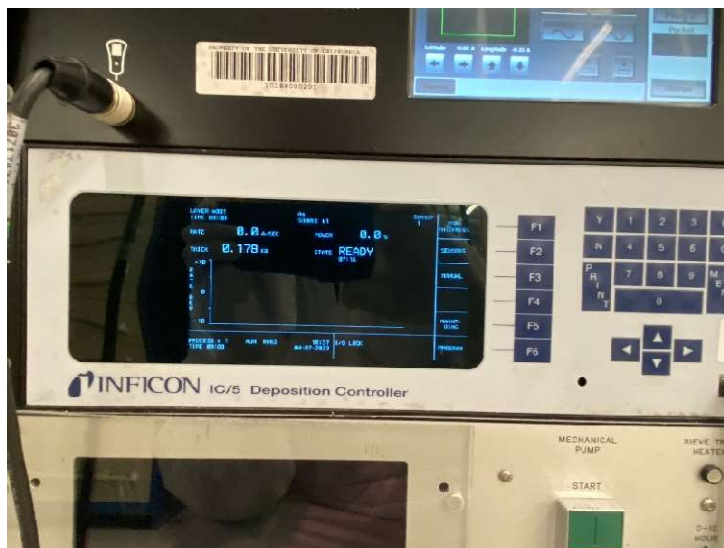
If the chamber does not cross over into High Vacuum within 5 minutes, notify Staff.

****Once the chamber has crossed over into High Vacuum, you are free to leave the tool and come back once it is at base pressure.**

*****Base Pressure is 3.0E-6*****

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Setting Up The Program:



32. Double check that the IC/5 Controller is in the “Ready” state, and if it is not press “Stop” then “Reset”.
33. Press F6 “Program”, then press F2 “Process Directory”.
34. Use the arrow keys to move the cursor to the material(s) you wish to deposit.
You can switch between pages of programs by pressing the F1 “Page Forward” and F2 “Page Back” buttons.
35. Once the cursor is on the desired process, press F4 “Select Active Process”, then press F5 “Process” to check and/or set the dep rate and thickness for each material in the program.
36. To set the thickness, move the cursor to Final Thickness, and enter the desired thickness with the keypad then press “E” for Enter.
Example: for 100A. you would enter “1” “0” “0” “E”.
37. The Final Thickness and Thickness Limit MUST be the same.
38. If your program has multiple materials, move the cursor to the rate and thickness of each material to make changes.
39. The only parameters that users are allowed to change are the dep rate and thickness.

** Always double check that the “Crucible” number is correct before proceeding. **
40. Once you are satisfied with the program parameters, Press F6 to go back to the “Process Directory” screen, then press F4 “Select Active Process”.
41. Finally, you will press F6 twice to get back to the “Main” screen.

** DO NOT make edits in the “Material Directory” **

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Running The Process:

42. Turn on the Ion Gauge by pressing the IG2 button on the Vacuum Gauge Controller.
43. Once the chamber is pumped down to base pressure ($3.0E-6$):
Verify that the TemEBeam Controller is set to “Operate” then press the “Sweep” button to turn the sweep on (Letters in button will be white when on).



Verify that the EBeam power supply, located behind the table to the right of the system, is on and all lights are on (no red lights).

44. You may now start your deposition by pressing the “Start” button on the Inficon IC/5 Controller.
This will run the program you selected and automatically switch sources if you are running multiple layers.

**** Once you start your deposition, you are required to stay with the tool. ****

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Process Completion and Unloading:

45. When the program has completed, the Inficon IC/5 controller will be in the "Idle" state.
** You MUST wait until the timer under "Idle" state reaches a minimum of 10 minutes before you are allowed to start the process of venting and opening the chamber.
This is to allow the EBeam and its components to cool down to a safe temperature.
46. On the Inficon IC/5 controller press the "Stop", then "Reset" buttons.
This will put the controller back into the "Ready" state.
47. Turn off Chamber Ion Gauge on the Vacuum Gauge Controller by pressing the IG2 button.
48. On the CHA Industries Auto-Tech II controller, switch the "Auto-Control" to "Standby", then to "Vent-Raise".
This will vent then raise the chamber bell jar so you can retrieve your parts.
49. Remove the Fixture Dome.
Remove the Fixtures
Remove your parts/wafers/samples from the Fixtures.
Reinstall the Fixtures in the Fixture Dome and reinstall the Fixture Dome onto the Lift-Off Carousel.
50. If using precious metals, weigh the source(s) after use and add your pellets as needed to achieve the Minimum Required Weight(s)
Precious metal Minimum Required Weights are:
Au = 95g.
Pt = 29g.
Pd = 25g.

** Ensure that the graphite disk is in the source pocket, under the Au source.**
51. On the CHA Industries Auto-Tech II controller, switch to "Standby", then to "Start-Lower". This will lower the Bell Jar and after a delay, the chamber will start pumping down.

*Again, you are required to stay with the tool while pumping down until the chamber crosses over into High Vacuum. This should only take a couple of minutes and if the chamber does not cross over into High Vacuum within 5 minutes, notify Staff.
Once the chamber has crossed over into High Vacuum, you are free to leave the tool.
52. Fill out the logbook including precious metal weights and if there were any issues during operation.