

MEMS Beamline Operation Manual

SYNCHROTRON RADIATION CENTER

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Switch On the Power to the X-Y Table Stage controller(NEAT 202) placed under the computer.
(Remember to switch off the power when you are all done and ready to leave)

1. To Vent the Exposure Station

MAKE SURE THE BEAM IS TURNED OFF AND VACUUM PUMP IS OFF.

- a) Open in-line valve connecting the nitrogen gas line slowly. Press the open side of the CHAMBER GATE switch on the panel for HALF gate to open. Read the pressure on the gauges.

NOTE: *The Baratron gauge pressure should increase whereas the beam line pressure should remain unchanged. If the beamline pressure goes up/down at very fast rate, possibly due to Be-window leak, press the V3 switch (to close) of the MEMS interface panel.*

- b) When the exposure station pressure reaches 200 Torr, Press open side of the CHAMBER GATE switch again to open the FULL gate. When ~~the pressure is 550 Torr~~^{Venting}, start opening the window door knob. It releases when the exposure station is up to atmospheric pressure. The CHAMBER GATE(both Full and Half) closes automatically when the chamber is at atmospheric pressure.

- c) Close the Nitrogen vent valve.

2. Pumping down the Exposure Station.

- a) Close the window door firmly. The DOOR CLOSED light turns on once the window is firmly tight. Make sure the CHAMBER GATE is CLOSED.

- b) Switch on the Vacuum pump (press green button).

- c) Open the in-line valve connecting the Helium tank. Make sure that the regulator valve is closed. Wait for couple of minutes until the needle gauge reads 30 in. Hg. Close the in-line valve again.(This is to rough the Helium gas line and you have to do this only the first time during whole night of work)

- d) Press the open side of the CHAMBER GATE switch on the panel for HALF gate to open. Read the pressure on the gauges. {See note 1(a)}

e) When the exposure station pressure reaches 200 Torr, Press open side of the CHAMBER GATE switch again to open the FULL gate.

Note: At this stage ($P < 100$ Torr), it is O.K. to setup the alignment for exposure table .i.e. See section 4c.

3. Filling the Exposure Station with 20 Torr Helium.

a) When the pressure reaches less than 3 Torr in the exposure station, Press the close side of the CHAMBER GATE switch on the panel for FULL gate to close and only HALF remains open.

b) Switch OFF the vacuum pump.

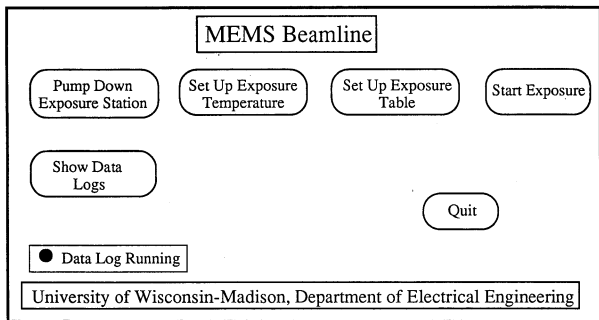
c) Pressurize the Helium line up to the in-line valve. Slowly release the valve such that the exposure station pressure reaches 20 Torr.

d) Close the CHAMBER GATE switch again for HALF gate to close. Turn off the in-line Helium valve. All set to do exposure.

Note : Do not run exposure with the two stage valve open.

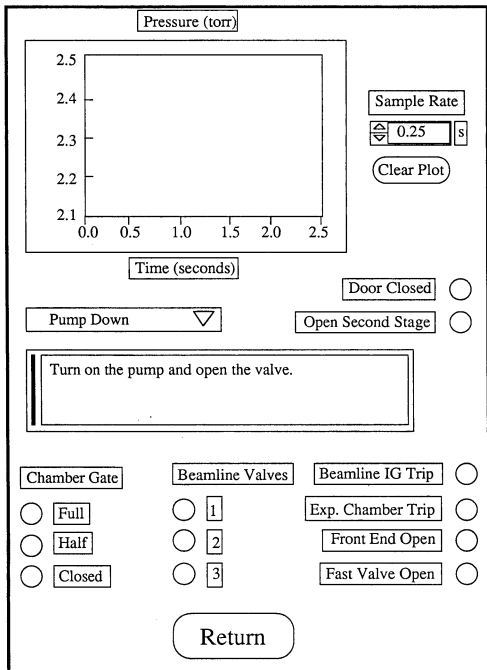
4. Setting up the Exposure.

The computer has the following Menu Screen



a. Pump Down Exposure Station

When you start venting or pump down, click on the Pump Down Exposure station. Graphically view your pump down or venting rate (approx. cycle time is 20 min.). Press RETURN after done. You can also see the status of different Beamline components.



b. Temperature Set Up

Use this menu when you use the sample heating or cooling.

There is an option to set up the post exposure temperature and time.

Press RETURN after done. Temp. set point is the desired temperature and Sensor temperature represents the Substrate temperature.

The interface is divided into three main sections within a large rectangular frame:

- Temp. Set Point:** A vertical thermometer scale ranging from -50.0 to 60.0. A digital display box to the right shows the value 0.0.
- Sensor Temp.:** A vertical thermometer scale ranging from -50.0 to 60.0. A digital display box to the right shows the value 0.0.
- Post Exposure Temperature:** A sub-section containing:
 - Post Exposure Time:** A vertical thermometer scale ranging from 0.0 to 24.0. A digital display box to the right shows the value 0.0.
 - Post Exposure Temp.:** A vertical thermometer scale ranging from -50.0 to 60.0. A digital display box to the right shows the value 0.0.
 - An **Enable** button located at the bottom left of this sub-section.

At the bottom center of the main frame is a large **Return** button.

c. Exposure Table Set Up

The interface is divided into two main sections. The top section contains a jog control with four directional arrows and a scale from 0.0 to 1.0 cm. The 'Jog Adjust' value is set to 0.50 cm. The X-axis and Y-axis positions are both set to 0.00 cm. The main control area includes a 'Sample 1' dropdown menu, 'X-Start' and 'Y-Start' fields both at 0.00, 'Speed' at 0.05 cm/sec, 'Distance' at -1.50 cm, and 'Exposure' at 100.00 mAhr/cm. There are buttons for 'Set Start Location', 'Load & Enable', 'Reset', 'Loaded' (with a green indicator light), 'Initialize Stage', and 'Return'.

You can JOG the sample up, down, left, or right at any desired steps. Once you select the starting position (X and Y) for the exposure, press the SET START LOCATION.

Next, Jog in the Y- direction to check the total distance to be scanned (which is mostly 1.5 cm) but will vary sample to sample. Fill in the RATE(cm/sec.), DISTANCE(cm.), EXPOSURE(mAhr). Upon finalizing all the parameter for exposure, Press LOAD AND ENABLE. At this time green light at LOADED should come on the screen. Press RETURN

NOTE: If you aligned at the top of the mask, the distance should be (-X.XX cm).

RESET button on the menu brings the stage at the same starting position where you started your previous sample (this saves some time for realignment)

INITIALIZE STAGE button resets the coordinates of the X-Y stage back to (0,0) and then you align the sample again. Do this if you turned on the motor when the program is running.

PLEASE TYPE IN YOUR NAME INITIALS (FML) AT THE PROMPT

d. Start Exposure

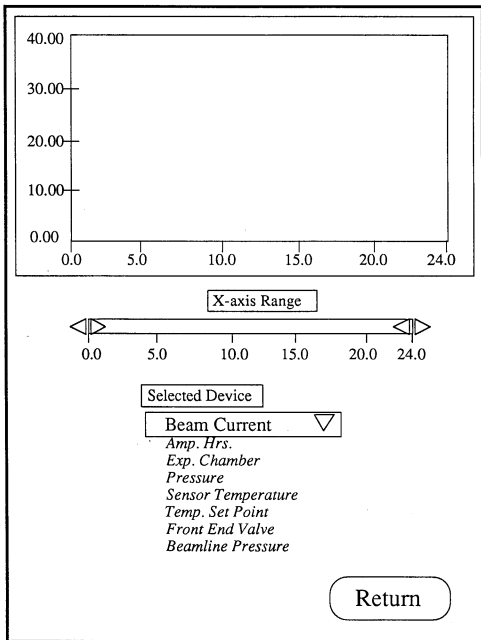
Exposing Sample			
Initial Conditions			
Sample	<input type="text" value="1"/>	Speed	<input type="text" value="0.00"/> cm/sec
X-Start	<input type="text" value="0.00"/> cm	Distance	<input type="text" value="0.00"/> cm
Y-Start	<input type="text" value="0.00"/> cm	Exposure	<input type="text" value="0.00"/> mAhr
Initial Beam Current	<input type="text" value="0.00"/> mA	Start Time	<input type="text" value="00:00"/>
Present State			
Elapsed Time	<input type="text" value="00:00"/>	AmpHour of Exposure	<input type="text" value="0.00"/> mAhr
Current Time	<input type="text" value="00:00"/>	Beam Current	<input type="text" value="0.00"/> mA
Sensor Temp	<input type="text" value="0.00"/> Deg. C	Y-Position	<input type="text" value="0.00"/> cm
<input type="button" value="Continue"/>			
<div style="border: 1px solid black; padding: 5px;">Warning: Stopping the exposure may ruin the sample</div>		<input type="button" value="STOP"/>	<input type="button" value="Return"/>

The exposure will only start if the FRONT END is open. In this menu, you can see the INITIAL STATE and the PRESENT STATE of the exposure.

All this information is also stored in C:\LOGFILES\EXPOSURE.LOG file which we can access from windows or over the network to see different parameter at later stage if desired.

Press STOP if you want to manually interrupt the scan. The computer will automatically stop the exposure when the desired mAhr of exposure is reached and relocates the exposure area out of the incident beam. Once you have all the parameters in the log book, press CONTINUE.

e. *Show DATA LOGS*



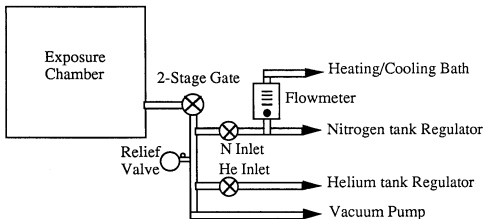
This is a view file only with options to see the status of different parameters for the last 24 hr's. Select different parameters to view the status. Press RETURN

f. NEVER PRESS QUIT

If it happens by mistake, Answer No to DO you really want to Quit. If for some reason you have to Quit, then Go to the LABVIEW folder in Windows and Double Click MEMS to restart the program.

SOME ADDITIONAL INFORMATION

***** GAS-LINE MANIFOLD LAYOUT



1. The 2-stage gate is controlled by electrical switches on the panel. One push to switch top opens Half Gate and second push again opens the Full Gate. One push at switch bottom closes Full Gate and second push closes the Half Gate.
2. Nitrogen and Helium valves are manual.
3. Flow of Nitrogen to the Heating and cooling bath is continuously supplied at the rate of 0.1 SCFH adjusted by the flowmeter controls. (Do not readjust the flow)

All DATA File stored in C:\LOGFILES*.*

EXPOSURE.LOG CONTENTS

Name || Date || EndTime || Start Time || Expose Time || Initial Beam || End Beam || mAhr Exposed || Sensor Temp.||

24-HOUR LOG FILE(mDDMMYY.LOG)

Time - BeamI - mAhr - Torr Barat. - Temp. Read. - Temp. Setpt.- Ion Gauge (nTorr) -FE Valve - Door Open - Press. O.K. - Ion. G O.K.

1. Please log in the Beam line and Front End pressure's **BEFORE** you do anything every night.
2. Please clean the work table before you leave the beamline.