1 SCOPE

The purpose of this document is to detail the use of the PE2400A. All users are expected to have read and understood this document. It is not a substitute for in-person training on the system and is not sufficient to qualify a user on the system. Failure to follow guidelines in this document may result in loss of privileges.

2 REFERENCE DOCUMENTS

- Material Safety Data Sheets for Argon, Oxygen, Nitrogen and metal targets.
- Appropriate Tool Manuals

3 DEFINITIONS

n/a

4 TOOLS AND MATERIALS

4.1 General Description- The PE2400A is an RF sputtering system that sputters down. Various sized substrates may be used.

5 SAFETY PRECAUTIONS

5.1 Hazards to the Operator

5.1.1 Voltage – The PE2400B employs AC, DC and RF energies that are dangerous and may be fatal to personnel. Do not attempt to defeat protective interlock systems.

5.1.2 Compressed Gases – The PE2400B is operated with compressed gases. Do not attempt to defeat protective interlock systems. Evacuate the area immediately if the presence of these gases is suspected and notify SMFL staff member.

5.1.3 Mechanical Hazards – Drive assemblies have sufficient power to cause injury. Keep hands, fingers, clothing and tools clear of moving parts.

5.2 Hazards to the Tool

5.2.1 Excessive power – Do not run above 1000W.

5.2.2 Tuning – Be sure to tune down the reflected power.
6 INSTRUCTIONS

6.1 Initial State Check

6.1.1 In Service Chase 2725

6.1.1.1 Open both of the PE2400A N2 valves.
6.1.1.2 The PE 2400 RF Power Supply should always be ON.
6.1.1.3 The CTI Cryogenic Compressor should always be ON.
6.1.1.4 The Neslab HX-75 Chiller should always be ON and the set to 20C.
6.1.1.5 Process gases are normally left on. Verify and make sure there is enough pressure in the bottle.

6.1.2 Panel 7 - Green LEDs lit and water flow wheels spinning briskly.

6.1.3 Look at 2 valve handles behind top part of machine. These valves should be in the “normal” position, which is arrow handles pointing towards each other.

6.1.4 Panel 9 - FUNCTION knob in the ST 1/Chamber position.

6.1.5 Panel 9 - MODE selector in the Argon/Auto position.

6.1.6 Panel 5 - Key switch in Auto position.

6.2 Resetting the System

6.2.1 If the tool needs resetting contact a staff member.

6.3 Operating the system

6.3.1 Venting the System

6.3.1.1 Turn off the Cold Cathode Gauge.
6.3.1.2 Panel 5 - Press START and VENT together to vent the system.
6.3.1.3 Wait about 3 minutes for the chamber to vent.
6.3.1.4 Wait for the head assembly (upper half of the process chamber) to separate from the table assembly. A slight gap between the two should be noticeable.
6.3.1.5 Panel 5 - Raise chamber using the Hoist UP switch.
6.3.2 Loading Wafers
6.3.2.1 It is possible to index a wafer to different positions in the chamber. See attachment “Using the Wafer Indexer.”
6.3.2.2 If you wish to use constant rotation, just load the wafers taking care not to place any under the target that will be used. (This will prevent deposition during the pre-sputter step)
6.3.2.3 Close the chamber. **Danger:** The head assembly does not have a cutoff switch and will crush whatever is in its path as long as the switch is depressed.
6.3.2.4 **Panel 5** - Press START and PUMP buttons simultaneously. This starts the pumping of the chamber.
6.3.2.5 **Panel 8** - Set table position to **Raise**. Raise position is normally used for depositing films. Spacing can be read on the meter. If the raised position is used for etching there is a danger of arcing occurring between the target and the substrates.
6.3.2.6 **Panel 9** - When the **Ultek Digital Gauge Control** reads near 00 mtorr it is safe to switch to the **Cold Cathode Gauge** to monitor the lower pressures.
6.3.2.7 Note the base pressure for the chamber.

6.3.3 Select Target
6.3.3.1 **Panel 1** - Set **Shutter Position** to **Open** for sputtering. (Usually left open since power cant be tuned with it closed)
6.3.3.2 Set **Mode** to **Sputter Deposit**. **Sputter Etch** is not working.
6.3.3.3 Set **Target Selector** arm to the desired position. Target 1 is at the 9 o’clock position (facing the system), Target 2 is at the 12 o’clock position and Target 3 is at the 3 o’clock position.

6.3.4 Set up Gas Flow
6.3.4.1 Turn on the Argon flow valve by flipping the switch up. It is located below **Panel 5**.
6.3.4.2 **Panel 5** - Push the START and GAS buttons.
6.3.4.3 Make sure the MKS gas controller is on.
6.3.4.4 Use the **Channel Selector** knob to select the appropriate gas channel to be displayed. **Channel 1** is Argon.
6.3.4.5 Press up on the **Read/ Set Point** switch to view the flow set point for that channel.
6.3.4.6 While holding the **Read/ Set Point** switch up, use the screwdriver to turn the **Set Point Control Screw** for that channel until the desired set point is obtained.
6.3.4.7 Switch the **Flow Control Switch** to the **On** position for the gas used. Make sure the **Flow** switch is also in the up position.
6.3.5 **Sputtering**

6.3.5.1 The power is set on the ENI supply with the dial. 1000W is the maximum sputter power for an 8” target.

6.3.5.2 To start the run, turn the power on. There is no timer so you will have to manually monitor.

6.3.5.3 If the plasma does not start, you may need to temporarily increase the pressure and then back it down after the plasma starts. If this does not work, turn it off and contact a staff member.

6.3.5.4 Monitor the forward and reflected power using the switch on the front of the ENI supply.

6.3.5.5 **Panel 1** – Use the Tune switch to reduce the reflected power to zero.

6.3.6 **Shutdown**

6.3.6.1 Reduce the power to zero on the ENI supply.

6.3.6.2 **Panel 8**- Table rotation off.

6.3.6.3 Turn off the Argon Flow Control Switch on the MKS gas controller and close the Argon Flow valves below **Panel 5**.

6.3.6.4 Press Start and Vent to vent the system. Pressing **Start** and **Pump** stops gas flow to the chamber without venting the chamber (useful if further processing needed).

6.3.6.5 When the chamber is fully vented, raise the head assembly and remove wafers.

6.3.6.6 Lower the head assembly, press **Start** and **Pump**. Make sure the system crosses over into high vacuum. If it does not, contact a staff member.

6.3.6.7 In the service chase, turn off the two nitrogen valves for the PE2400A on the Nitrogen supply panel.

7 **ATTACHMENTS**

7.1 **Using the Wafer Indexer**

7.1.1 **Panel 8** - Turn the table so that the bolt (on outer rim of table) is under target 1 by turning table rotation to 1 and turning on (switch up) the rotation, thus enabling the table to rotate (red light lights while the table is rotating).

7.1.2 See target/table drawing aid to assess the position of the table in relation to the targets.

7.1.3 **Panel 8** - On the table position knob a setting of 1,2,3 or 4 will rotate the table under that target position and stop.

7.1.4 The speed cannot exceed 2rpm in order for table to stop at the desired position.

7.1.5 **C** should be selected for continuous table rotation.
## REVISION RECORD

<table>
<thead>
<tr>
<th>Summary of Changes</th>
<th>Originator</th>
<th>Rev/Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reworked entire document to reflect current usage.</td>
<td>O’Brien</td>
<td>B-01/19/2007</td>
</tr>
<tr>
<td>Reworked section 6.3.4 to reflect MKS controller.</td>
<td>O’Brien</td>
<td>C-07/24/2007</td>
</tr>
<tr>
<td>Changed 6.3.5, 6.3.6 to reflect new ENI power supply.</td>
<td>O’Brien</td>
<td>D-08/24/2007</td>
</tr>
</tbody>
</table>