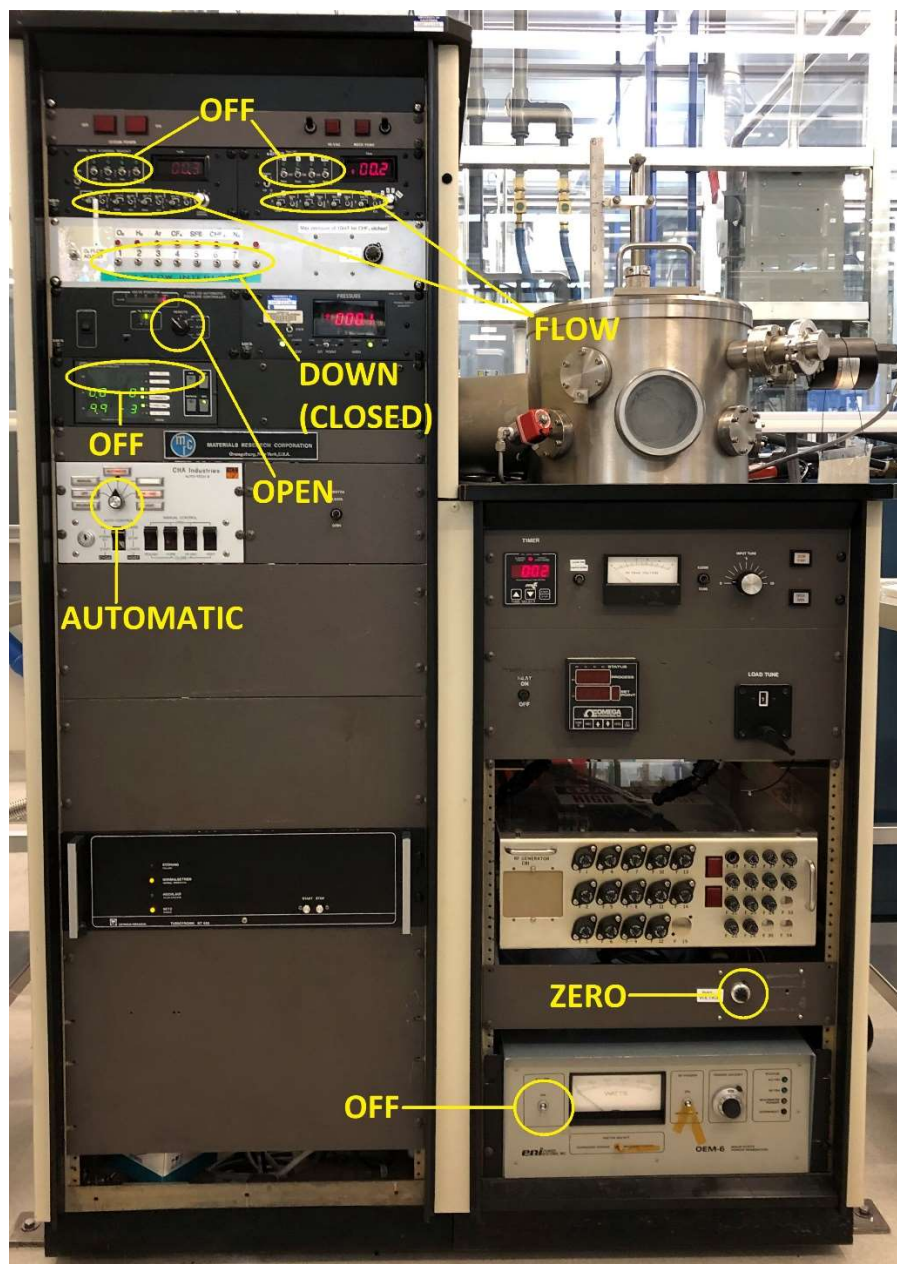


RIE #3 Operation

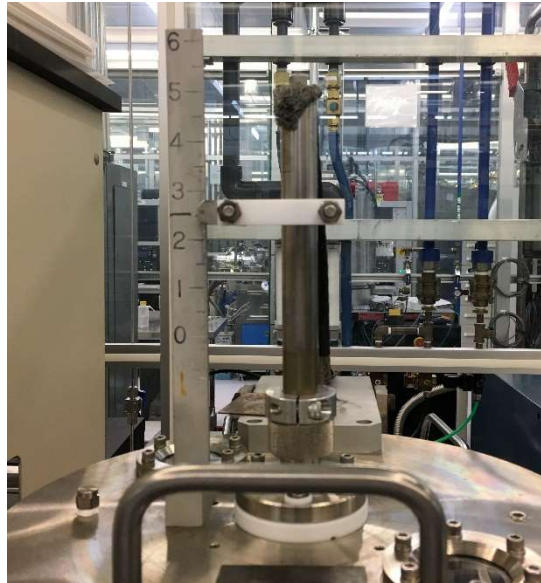
Pre-Operation Checks

- OEM-6 RF power supply is off.
- BIAS VOLTAGE dial is at zero (fully counterclockwise).
- All gas channel switches on the MKS Type 247 4 Channel Readouts are in the FLOW position.
- All gas flow switches on the MKS Type 247 4 Channel Readouts are in the OFF (middle) position.
- All gas flow interlock switches are in the down position (closed).
- Throttle valve key is set to OPEN (fully clockwise).
- The IG is off on the 307 VACUUM GAUGE CONTROLLER.
- The rotary switch on the CHA Industries AUTO-TECH II vacuum controller is in the AUTOMATIC position.
- The AUTO-CONTROL switch on the vacuum controller is in the START position.



RIE #3 Operation

- The notched plate on the anode plate feedthrough is in lined up with the black line in the scale.



Pre-Operation Chamber Conditioning

- Users must run an Initial O₂ Clean prior to running any samples. Refer to Steps 6 - 19 of the Operation Section for instructions. Run conditions are as follows:

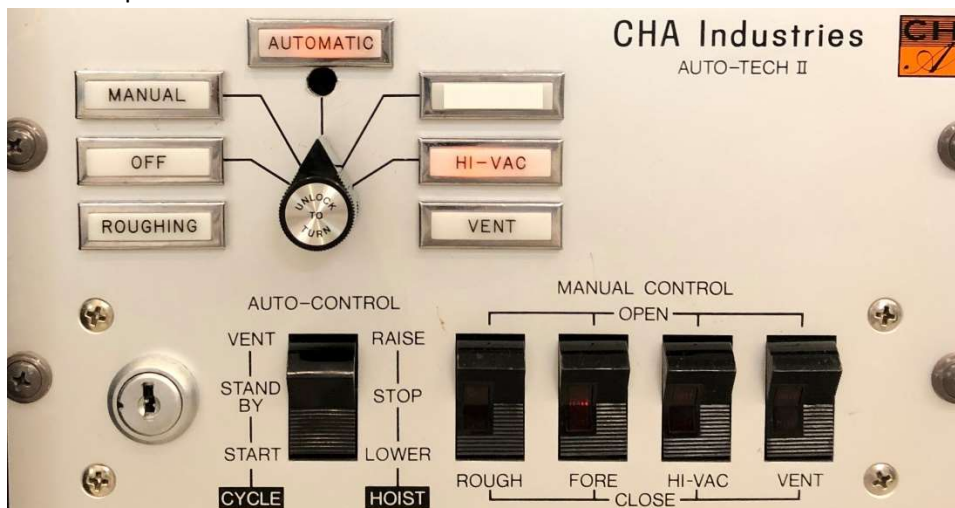
O₂ at 20 SCCM, Chamber Pressure= 50 mT, Bias Voltage= -450V, Time= 20 min

Processing Restrictions

- Maximum chamber pressure is 110 mT (Except CHF₃, see below)
- Maximum chamber pressure for CHF₃ etches is 10 mT
- Maximum flow rate for SF₆ is 15 sccm

Operation

- On the CHA Industries AUTO-TECH II vacuum controller, move the AUTO-CONTROL switch up to the VENT position.



NOTE: Be careful not to confuse this switch with the VENT switch under MANUAL CONTROL.

RIE #3 Operation

- Once the chamber is vented (you will hear air escaping from the chamber), move the AUTO-CONTROL switch down to the STANDBY (middle) position.
- Open the chamber lid, load your sample on the stage, and carefully close the chamber lid.
- Move the AUTO-CONTROL switch down to the START position. The system will rough out the chamber and cross over to Hi-Vac automatically.
- The reading for Channel A on the 307 VACUUM GAUGE CONTROLLER will eventually zero out. Once it does, turn on the ion gauge by pressing the IG1 button and wait for a pressure of $3.0\text{E-}5$ or below (next to IG) before proceeding.



NOTE: If the pressure is slow to drop, make sure the throttle valve key is turned to the OPEN position (fully clockwise).

- Using the MKS Type 247 4 Channel Readouts, select the required gas channel by using the Display Channel dial. Check the current gas flow rate setting (SCCM) by holding the Set Pt. switch up for the selected channel. If you need to adjust, turn the small set screw underneath the Set Pt. label (for the selected channel) and then verify the actual value in the following step. Repeat as needed for additional channels.

NOTE: The maximum flow rate for SF₆ is 15 sccm!



- Set the CHAMBER PRESSURE CONTROL dial to zero, fully counterclockwise.
- Turn off the ion gauge by pressing the IG1 button on the 307 VACUUM GAUGE CONTROLLER.
- Enable gas flow to the chamber by moving the appropriate labeled gas flow interlock switch(es) to the up position (open).

RIE #3 Operation

- Turn on the gas flow to the chamber by moving appropriate the switch(es) on the MKS Type 247 4 Channel Readout up to the On position (green LED should illuminate). Make sure the displayed flow rate is set at the correct set point for your process and adjust as needed.
- In order to see a correct chamber pressure, turn the throttle valve key counterclockwise to the REMOTE position. This chokes down the orifice valve between the chamber and HI-VAC pump and allows the chamber to build up pressure.



- Use the CHAMBER PRESSURE CONTROL dial to slowly adjust the chamber pressure (PRESSURE display) to the desired value.

NOTE: The maximum chamber pressure for CHF_3 etches is 10 mT!

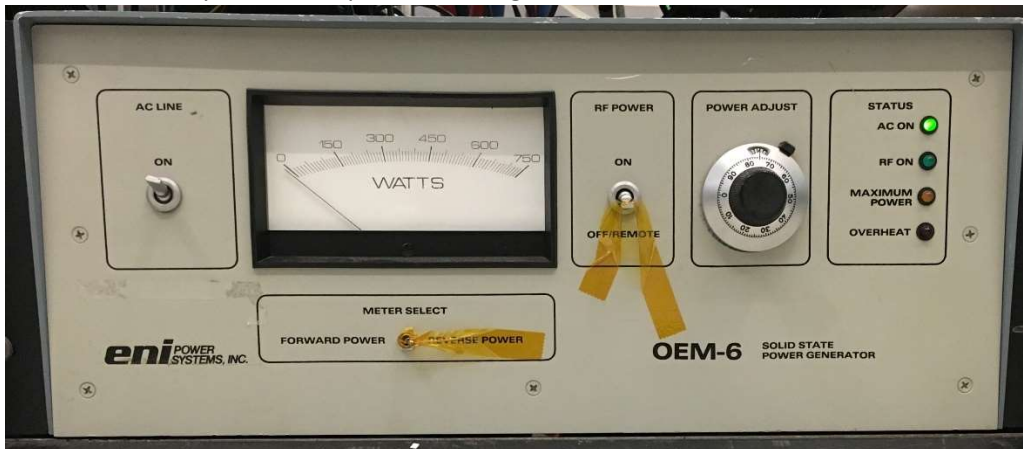


NOTE: If you adjust the chamber pressure up too fast, you may exceed the upper chamber pressure set point (110 mT) and cause the HI-VAC valve to close. Decreasing the chamber pressure at this point will do nothing as there is no pumping on the chamber occurring. To rectify this, do the following:

- Turn the throttle valve key fully clockwise from REMOTE to OPEN.
- Move all gas flow interlock switches in use to the down position.
- Turn off all the gas channels in use by moving the switches down to the Off (center) position.
- Move the AUTO-CONTROL switch up to the STANDBY position (middle).

RIE #3 Operation

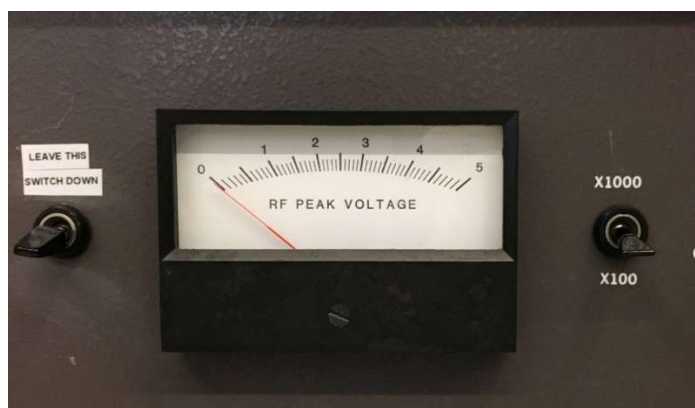
- e. Move the AUTO-CONTROL switch down to the START position.
 - f. Return to Step 5.
13. Once the chamber pressure has stabilized, turn on the OEM-6 RF power supply by moving the AC LINE switch up to the ON position. The green AC ON LED should illuminate.



14. Set your desired etch time in minutes using the TIME SELECT up and down arrows on the timer.



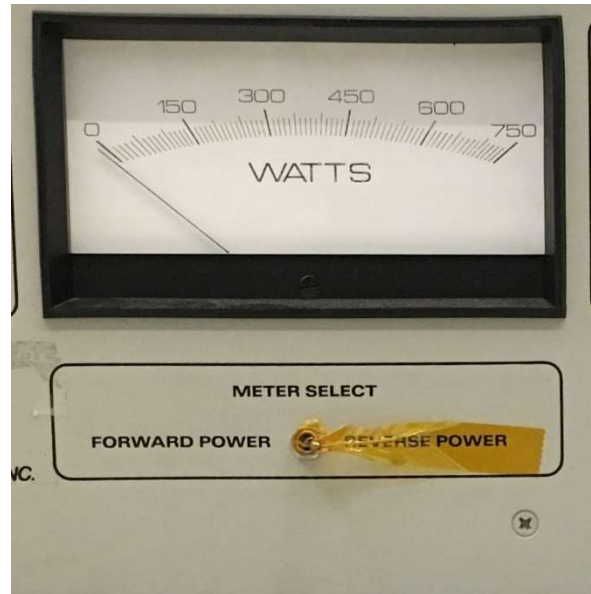
15. Press the START/STOP button to start the timer and turn on the RF power. The green RF ON LED on the RF power supply should illuminate.
16. Turn the BIAS VOLTAGE dial clockwise to your desired voltage. The RF PEAK VOLTAGE meter next to the timer is where this is displayed. A plasma should strike at ~100 V.



NOTE: The multiplier switch next to the meter adjusts the scale of the meter, in most cases X100 is adequate.

RIE #3 Operation

17. Using the LOAD TUNE and INPUT TUNE capacitor adjustment knobs, reduce the reverse power reading on the RF power supply to 0 Watts.

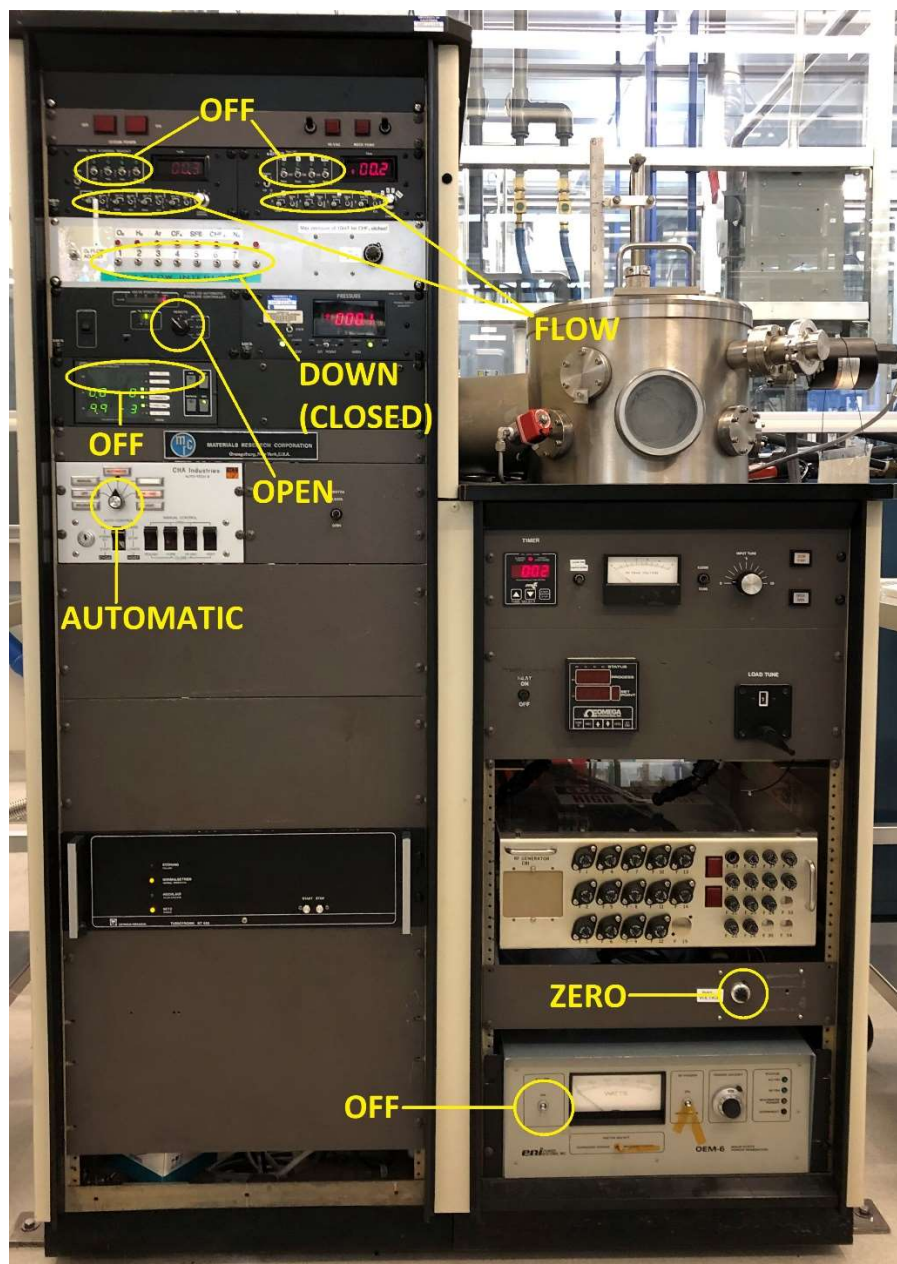


18. Your etch is finished when the timer reaches 0 minutes. The red LED on the timer will stay on indicated the cycle has ended.
19. Once your process is completed, perform the following:
- Move the AC LINE switch down on the RF power supply (off).
 - Turn the BIAS VOLTAGE dial to zero.
 - Turn the throttle valve key fully clockwise from REMOTE to OPEN.
 - Move all gas interlock switches in use to the down position (closed).
 - Turn off all the gas channels in use by moving the gas flow switches down to the OFF (middle) position.
20. Vent the chamber, remove your sample, and pump the system back down per Steps 1 – 4.

RIE #3 Operation

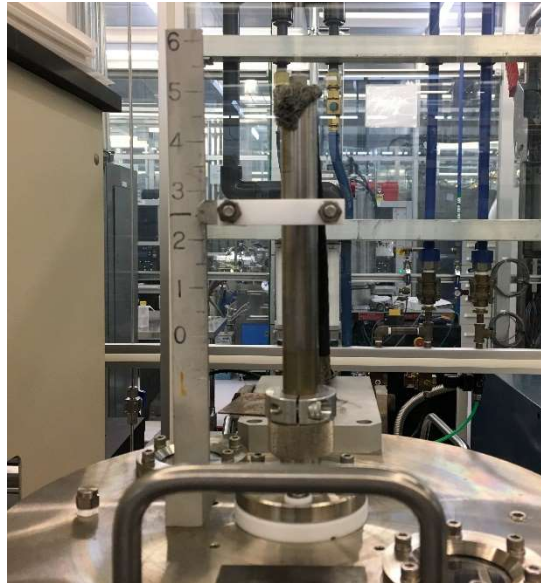
Pre-Operation Checks

- OEM-6 RF power supply is off.
- BIAS VOLTAGE dial is at zero (fully counterclockwise).
- All gas channel switches on the MKS Type 247 4 Channel Readouts are in the FLOW position.
- All gas flow switches on the MKS Type 247 4 Channel Readouts are in the OFF (middle) position.
- All gas flow interlock switches are in the down position (closed).
- Throttle valve key is set to OPEN (fully clockwise).
- The IG is off on the 307 VACUUM GAUGE CONTROLLER.
- The rotary switch on the CHA Industries AUTO-TECH II vacuum controller is in the AUTOMATIC position.
- The AUTO-CONTROL switch on the vacuum controller is in the START position.



RIE #3 Operation

- The notched plate on the anode plate feedthrough is in lined up with the black line in the scale.



Pre-Operation Chamber Conditioning

- Users must run an Initial O₂ Clean prior to running any samples. Refer to Steps 6 - 19 of the Operation Section for instructions. Run conditions are as follows:

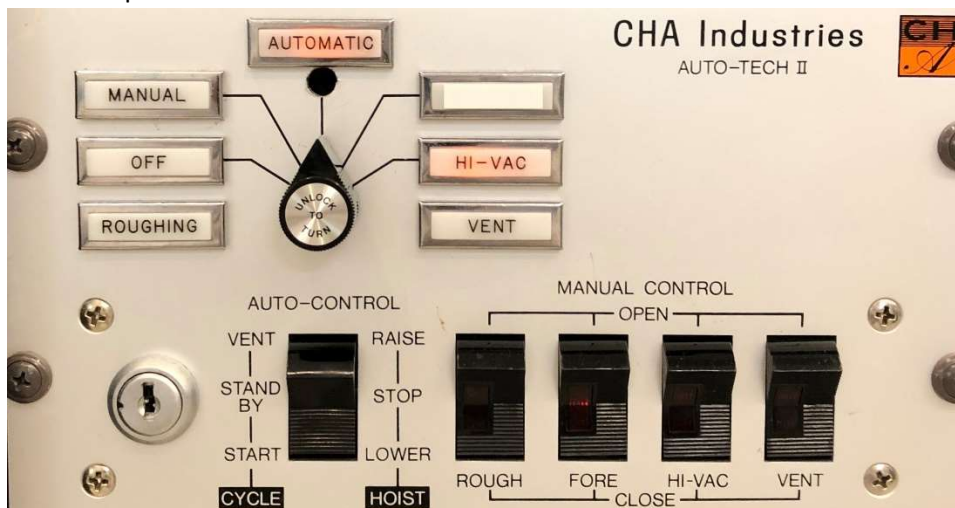
O₂ at 20 SCCM, Chamber Pressure= 50 mT, Bias Voltage= -450V, Time= 20 min

Processing Restrictions

- Maximum chamber pressure is 110 mT (Except CHF₃, see below)
- Maximum chamber pressure for CHF₃ etches is 10 mT
- Maximum flow rate for SF₆ is 15 sccm

Operation

- On the CHA Industries AUTO-TECH II vacuum controller, move the AUTO-CONTROL switch up to the VENT position.



NOTE: Be careful not to confuse this switch with the VENT switch under MANUAL CONTROL.

RIE #3 Operation

- Once the chamber is vented (you will hear air escaping from the chamber), move the AUTO-CONTROL switch down to the STANDBY (middle) position.
- Open the chamber lid, load your sample on the stage, and carefully close the chamber lid.
- Move the AUTO-CONTROL switch down to the START position. The system will rough out the chamber and cross over to Hi-Vac automatically.
- The reading for Channel A on the 307 VACUUM GAUGE CONTROLLER will eventually zero out. Once it does, turn on the ion gauge by pressing the IG1 button and wait for a pressure of $3.0\text{E-}5$ or below (next to IG) before proceeding.



NOTE: If the pressure is slow to drop, make sure the throttle valve key is turned to the OPEN position (fully clockwise).

- Using the MKS Type 247 4 Channel Readouts, select the required gas channel by using the Display Channel dial. Check the current gas flow rate setting (SCCM) by holding the Set Pt. switch up for the selected channel. If you need to adjust, turn the small set screw underneath the Set Pt. label (for the selected channel) and then verify the actual value in the following step. Repeat as needed for additional channels.

NOTE: The maximum flow rate for SF₆ is 15 sccm!



- Set the CHAMBER PRESSURE CONTROL dial to zero, fully counterclockwise.
- Turn off the ion gauge by pressing the IG1 button on the 307 VACUUM GAUGE CONTROLLER.
- Enable gas flow to the chamber by moving the appropriate labeled gas flow interlock switch(es) to the up position (open).

RIE #3 Operation

- Turn on the gas flow to the chamber by moving appropriate the switch(es) on the MKS Type 247 4 Channel Readout up to the On position (green LED should illuminate). Make sure the displayed flow rate is set at the correct set point for your process and adjust as needed.
- In order to see a correct chamber pressure, turn the throttle valve key counterclockwise to the REMOTE position. This chokes down the orifice valve between the chamber and HI-VAC pump and allows the chamber to build up pressure.



- Use the CHAMBER PRESSURE CONTROL dial to slowly adjust the chamber pressure (PRESSURE display) to the desired value.

NOTE: The maximum chamber pressure for CHF_3 etches is 10 mT!

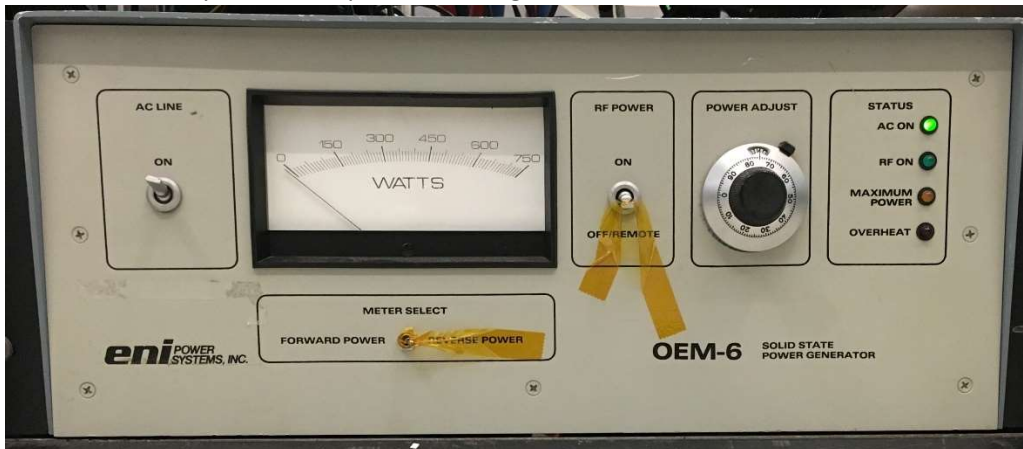


NOTE: If you adjust the chamber pressure up too fast, you may exceed the upper chamber pressure set point (110 mT) and cause the HI-VAC valve to close. Decreasing the chamber pressure at this point will do nothing as there is no pumping on the chamber occurring. To rectify this, do the following:

- Turn the throttle valve key fully clockwise from REMOTE to OPEN.
- Move all gas flow interlock switches in use to the down position.
- Turn off all the gas channels in use by moving the switches down to the Off (center) position.
- Move the AUTO-CONTROL switch up to the STANDBY position (middle).

RIE #3 Operation

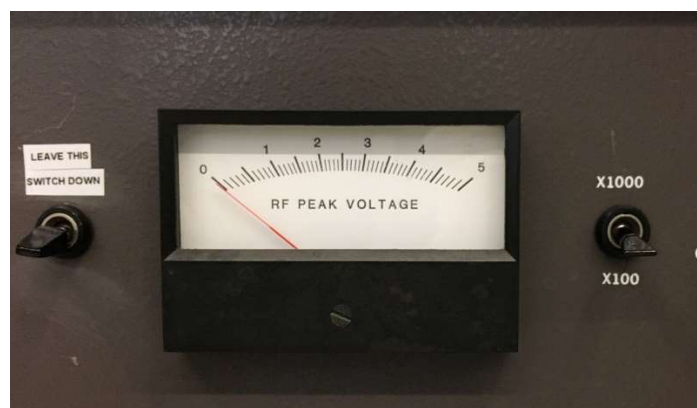
- e. Move the AUTO-CONTROL switch down to the START position.
 - f. Return to Step 5.
13. Once the chamber pressure has stabilized, turn on the OEM-6 RF power supply by moving the AC LINE switch up to the ON position. The green AC ON LED should illuminate.



14. Set your desired etch time in minutes using the TIME SELECT up and down arrows on the timer.



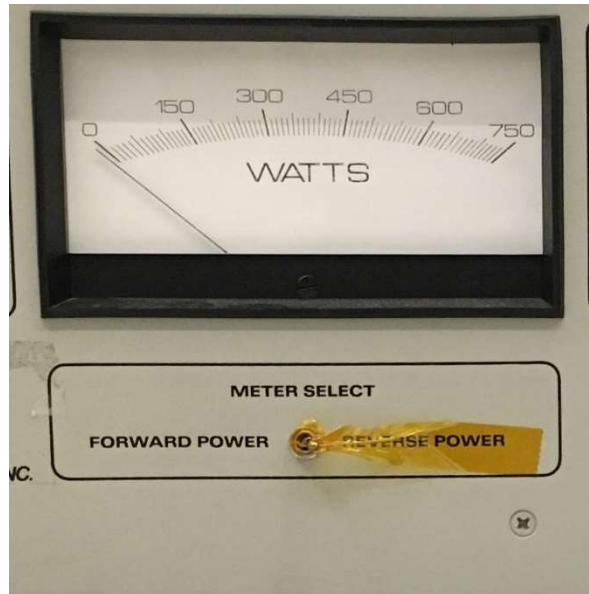
15. Press the START/STOP button to start the timer and turn on the RF power. The green RF ON LED on the RF power supply should illuminate.
16. Turn the BIAS VOLTAGE dial clockwise to your desired voltage. The RF PEAK VOLTAGE meter next to the timer is where this is displayed. A plasma should strike at ~100 V.



NOTE: The multiplier switch next to the meter adjusts the scale of the meter, in most cases X100 is adequate.

RIE #3 Operation

17. Using the LOAD TUNE and INPUT TUNE capacitor adjustment knobs, reduce the reverse power reading on the RF power supply to 0 Watts.



18. Your etch is finished when the timer reaches 0 minutes. The red LED on the timer will stay on indicated the cycle has ended.
19. Once your process is completed, perform the following:
- Move the AC LINE switch down on the RF power supply (off).
 - Turn the BIAS VOLTAGE dial to zero.
 - Turn the throttle valve key fully clockwise from REMOTE to OPEN.
 - Move all gas interlock switches in use to the down position (closed).
 - Turn off all the gas channels in use by moving the gas flow switches down to the OFF (middle) position.
20. Vent the chamber, remove your sample, and pump the system back down per Steps 1 – 4.