ICP #2 Operation

Restrictions/Precautions

- Only press the **STOP** button when your wafer is in the etch chamber! **NEVER AT ANY OTHER TIME, ESPECIALLY DURING A TRANSFER!!!**
- When running plasma-containing recipes in **TEST** mode, a wafer must be present in the etch chamber or damage to the tool will occur!!!
- Don't press the **OFF** button!
- You should only press the **EMERGENCY STOP** button if someone is getting hurt or the machine is getting damaged.

Notes/Tips

- Wafer colors:
  - **Green = unprocessed**
  - **Yellow Processed**
  - **Red = Error during run or run aborted**
- Menu selections should be made using the mouse, avoid using the keyboard's function keys.
- Always wait for the software to register changes (brief pop-up window) before closing a screen or selecting another screen. The PC is older and moving through the software too quickly can crash it.
- When inputting values in a cell, always select another cell before selecting **REGISTER(U)**.
- Do not select **MANUAL Mode** on the Main Control Panel unless you have been trained on its functions. If you accidentally select **MANUAL MODE**, you will not be able to select **AUTO** or **TEST MODE**. To fix this, select **PREP MODE**. You will now be able to select **AUTO** or **TEST MODE**.
- When mounting samples to a carrier wafer, we highly recommend you use the Santovac 5 diffusion pump oil at the system. Place a few drops on the backside of your sample and press the sample down on your carrier wafer with a Q-tip. This oil is completely dissolved in Acetone and is the preferred technique for sample mounting.

Operation in Auto Mode

1. Open the Transfer Stage lid and manually place a wafer on the Transfer Stage. Verify that the wafer icon in the software is green (unprocessed) and then close the lid.
   IMPORTANT: Verify the backside of the wafer is clean and free of any oil!
2. If not already selected, select **AUTO MODE** on the MAIN CONTROL PANEL.

3. Select **F1 RECIPE** on the software screen. If it is not available, select **F12 RETURN** and then select **F1 RECIPE.**
   NOTE: If you select **F11 PROCESS RECIPE**; recipes can only be selected to run, they cannot be edited.
4. Select **F4 PROCESS**.
5. Double click on the process recipe you want to run, then verify and/or edit the necessary parameter(s). You can also highlight the recipe and select **EDIT**.
   How to make changes to the recipe parameters:
   a. Using the mouse, click on the cell you wish to edit.
   b. Enter the new value and click on any other cell. For cells that set time intervals the format is mm:ss.s. Some examples:
      - For 2 minutes and 30 seconds, you would type 0230 and then click on any other cell.
      - For 2 minutes, you would just type 2 and then click on any other cell.

   RULE: You must get the Equipment Engineer's approval before deleting a recipe/taking over a recipe slot!

   IMPORTANT: When creating a new recipe or modifying an existing one, always refer to the Recipe Guidelines document or consult with Staff.
6. If you made any changes to the recipe parameters, you must click on **REGISTER(U)** to save.
7. Select **CLOSE(X).**
8. Make sure the recipe you want to run is highlighted in purple, then select **SELECT(S)**.
   NOTE: You can verify the recipe is selected by clicking (not double clicking) on any other recipe. The recipe you have selected to run should be highlighted in yellow.
9. Select **CLOSE(X)**.
10. Lift the button cover and press the **START** button on the Main Control Panel.
    IMPORTANT: If you started the wrong recipe, **DO NOT PANIC!!!** You must wait until the wafer is in the etch chamber. Once **HE PRESSURE** begins to build in the monitor screen, press the **STOP** button on the Main Control Panel. You will now need to perform a manual wafer transfer to unload your wafer.
   **NOTE:** If you are in **AUTO MODE** with an unprocessed wafer (green) in the Transport Station and you press the **START** button but the green LED does not come on and the machine status still shows **STOP**, that most likely means the machine is not prepared to run. Perform the following to rectify this:
    a. Select **PREP MODE** on the MAIN CONTROL PANEL.
    b. Look at the text boxes below both **L/L** and **P/C**. If they both read "complete the start up", there is an issue with the tool which should be reported.
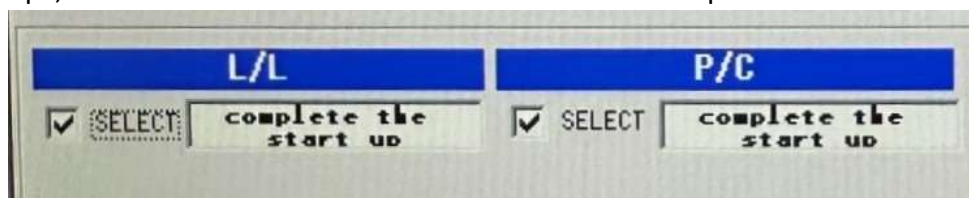
      c.   If either box reads anything else, verify the **SELECT** boxes are checked for both **L/L** and **P/C**. If they are not, click the two boxes to put a checkmark in them.

      d.   Select **START UP (U)**.

      e.   Select **REGISTER (E)**.

      f.   Press the **START** button on the MAIN CONTROL PANEL.

      g.   Machine preparation is complete once the text boxes below **L/L** and **P/C** read "complete the start up".

      h.   Select **AUTO MODE** on the MAIN CONTROL PANEL.

      i.   Lift the button cover and press the **START** button on the MAIN CONTROL PANEL.

11. A pop-up window with a message in Japanese will appear, select **OK** to close it.

12. If the monitor screen is not present, select **F12 RETURN**, **F2 MONITOR**, then **F1 P/C MONITOR**. **IMPORTANT:** For a cleaning run at the end of your tool use, <u>you are required to verify that the run has started before leaving the tool</u>. This means waiting for the plasma to ignite. This is also highly recommended for your own runs if you plan to leave the tool.

13. If at any time during the your etch you want to end the etch step and move to the discharge steps of the recipe, you must use the manual box mounted on the right side of the system:

      a.   Do not change the system's **MODE** on the MAIN CONTROL PANEL.

      b.   On the manual box, verify the **P/C1 SELECT** button's green LED is lit (top-left button on the manual box). If not press the **P/C1 SELECT** button.

      c.   Press and hold the two green buttons on the sides of the manual box.

      d.   Press the **PROCESS SKIP** button on the key pad.

      e.   Release the two green buttons on the sides of the manual box.
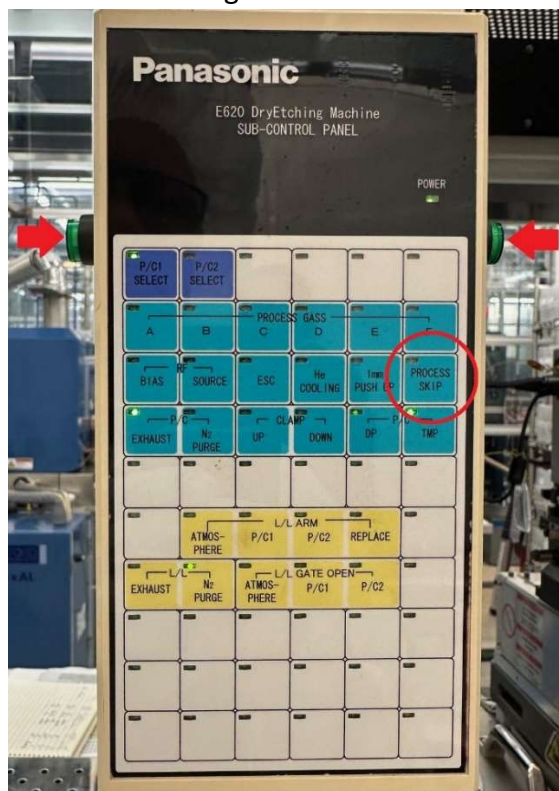
14. Your process is complete once the **MACHINE STATUS** changes to **STOP** and the green light on the **START** button goes out. **DO NOT REMOVE YOUR WAFER FROM THE TRANSPORT STAGE BEFORE THIS!**

Operation in Test Mode

1. Open the Transfer Stage lid and manually place a wafer on the Transfer Stage. Verify that the wafer icon in the software is green (unprocessed) and then close the lid.
   IMPORTANT: Verify the backside of the wafer is clean and free of any oil!
2. If not already selected, select **TEST MODE** on the MAIN CONTROL PANEL.
3. Select **F1 RECIPE** on the software screen. If it is not available, select **F12 RETURN** and then select **F1 RECIPE.**
   NOTE: If you select **F11 PROCESS RECIPE**; recipes can only be selected to run, they cannot be edited.
4. Select **F4 PROCESS**.
5. Double click on the process recipe you want to run, then verify and/or edit the necessary parameter(s). You can also highlight the recipe and select **EDIT**.
   How to make changes to the recipe parameters:
   a. Using the mouse, click on the cell you wish to edit.
   b. Enter the new value and click on any other cell. For cells that set time intervals the format is mm:ss.s. Some examples:
      - For 2 minutes and 30 seconds, you would type 0230 and then click on any other cell.
      - For 2 minutes, you would just type 2 and then click on any other cell.

   RULE: You must get the Equipment Engineer's approval before deleting a recipe/taking over a recipe slot!

   IMPORTANT: When creating a new recipe or modifying an existing one, always refer to the Recipe Guidelines document or consult with Staff.
6. If you made any changes to the recipe parameters, you must click on **REGISTER(U)** to save.
7. Select **CLOSE(X).**
8. Perform a Manual Wafer Transfer. Follow the directions at the tool and select **WAFER LOAD**.
9. Once the Manual Wafer transfer is completed, select **F4 TRANS/TEST**. If it is not available on the software screen, select **F12 RETURN** and then select **F4 TRANS/TEST.**

10. Select **F4 PROCESS TEST**.
11. Highlight the recipe you want to run and then select **REGISTER(E)**.
    NOTE: You can verify the recipe is selected by clicking (not double clicking) on any other recipe. The recipe you have selected to run should be highlighted in yellow.
12. Lift the button cover and press the **START** button on the MAIN CONTROL PANEL.
13. Select **F10 P/C MONITOR**, to bring up the monitor screen.
14. If at any time during the your etch you want to end the etch step and move to the discharge steps of the recipe, you must use the manual box mounted on the right side of the system:
    a. Do not change the system's **MODE** on the Main Control Panel.
    b. On the manual box, verify the **P/C1 SELECT** button's green LED is lit (1st button on the manual box). If not press the **P/C1 SELECT** button.
    c. Press and hold the two green buttons on the sides of the manual box.
    d. Press the **PROCESS SKIP** button on the key pad.
    e. Release the two green buttons on the sides of the manual box.
15. Your process is complete once the **MACHINE STATUS** changes to STOP and the green light on the **START** button goes out.
16. Perform a Manual Wafer Transfer. Follow the directions at the tool and select **WAFER UNLOAD**.

Common Errors and Solutions – UNDER CONSTRUCTION

- **0520 No response from MMI**
    - **Cause:** Performing a function with the tool in the wrong mode (AUTO/TEST).
    - **Solution:** Clear the error and place the tool in the correct mode. If the tool is unresponsive, run PREP (Operation in Auto Mode, Step 10).
- **1409 P/C1 reaction chamber pressure error**
    - **Cause:** Process pressure went out of tolerance (typically 20%). This could be due to sample outgassing or trying to run at too low of a pressure. Another cause would be that the switch on the gas box is in the VALVES CLOSED position.
    - **Solution:** Monitor the run to see how much the pressure is deviating and adjust the pressure tolerance accordingly. If this is with a standard recipe or if the deviation is >50%, contact Staff.
- **1410 P/C1 cooling He pressure error**
    - **Cause:** Backside cooling pressure was not achieved in time.
    - **Solution:** Manually unload your wafer and inspect the backside. If it is dirty (SHAME!), clean it and try again. If it is clean, try a different wafer. If you get this error on two clean, different wafers; report a tool issue.
- **1411 P/C1 RF (ICP) progressive wave error**
    - **Cause:**
    - **Solution:**
- **1412 P/C1 RF (BIAS) progressive wave error**
    - **Cause:**
    - **Solution:**
- **1417 P/C1 RF (BIAS) reflected wave error**
    - **Cause:**
    - **Solution:**
- **1416 P/C1 RF (ICP) reflected wave error**
    - **Cause:**
    - **Solution:**

Running a Recipe with Helium Chuck Discharge Steps Instead of Nitrogen (CONSULT WITH STAFF 1ST!)

1. Perform a gas change for Channel F (N_2 to He).
2. Select **AUTO MODE** on the MAIN CONTROL PANEL.
3. Select **F1 RECIPE**. If it is not available on the software screen, select **F12 RETURN** and then select **F1 RECIPE**.
4. Select **F6 NEUTRAL.**
5. From the NEUTRALIZATION RECIPE screen select (single click) recipe **No. 11 HeDeChrg**.
6. Select **SELECT(S)**.
   NOTE: You can verify the recipe is selected by clicking (not double clicking) on any other recipe. The recipe you have selected to run should be highlighted in yellow.
7. Select **CLOSE(X)**.
8. Run your recipe(s) per the steps in the Operation section.
   IMPORTANT: DO NOT MAKE YOUR FINAL CLEANING RUN until you perform the following steps! However, it is OK to make cleaning runs in between your etches if needed.
9. Select **F1 RECIPE**.
10. Select **F6 NEUTRAL.**
11. From the NEUTRALIZATION RECIPE screen select (single click) recipe **No. 10 JODEN**.
12. Select **SELECT(S)**.
    NOTE: You can verify the recipe is selected by clicking (not double clicking) on any other recipe. The recipe you have selected to run should be highlighted in yellow.
13. Select **CLOSE(X)**.
14. Perform a gas change for Channel F (He→N_2).
15. Make your final clean run.