UCD CSN Technical Information #402E

Instrument Startup and Shutdown

Chemical Speciation Network
Air Quality Research Center
University of California, Davis

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UCDAVIS
AIR QUALITY RESEARCH CENTER

DOCUMENT HISTORY

Date Modified	Initials	Section/s Modified	Brief Description of Modifications

TABLE OF CONTENTS

1. PURPOSE AND APPLICABILITY

The subject of this technical information document (TI) is initial startup and shutdown procedures in the carbon analysis laboratory.

2. SUMMARY OF THE METHOD

Procedures for initiating and shutting down operation of carbon analysis instrumentation in the carbon laboratory.

3. DEFINITIONS

Flame Ionization Detector (FID): The detector used in the carbon analyzer instruments.

4. HEALTH AND SAFETY WARNINGS

4.1 Laser safety

The Sunset Laboratory OCEC Carbon Aerosol Analyzers uses a 658 nm laser diode for the optical light source during the sample analysis. While the analyzer itself is classified as a Class 1 Laser Product, meaning that there is no harmful laser radiation exposure to the operator during normal operation and maintenance., the internal source laser diode is rated as a Class 3b product and emits sufficient optical power to constitute a possible hazard to the human eye if directly exposed to the laser beam. Therefore, all repair and service must be performed by a trained technician.

4.2 Gas cylinders

It is recommended that the lab technicians use caution when handling all support gas cylinders and regulators, and always have cylinders properly chained to a safety rack.

NOTE: Hydrogen is a flammable gas and extra precautions should be used with the hydrogen gas lines from the supply cylinder to ensure all fittings are connected and must be leak tested each time a new cylinder is installed. The pressure of the hydrogen gas line should be kept under 15 psi at all times.

5. CAUTIONS

Not applicable.

6. INTERFERENCES

Not applicable

7. PERSONNEL QUALIFICATIONS, DUTIES, AND TRAINING

Only trained lab personnel designated by the Laboratory Manager may operate instrumentation in the carbon laboratory.

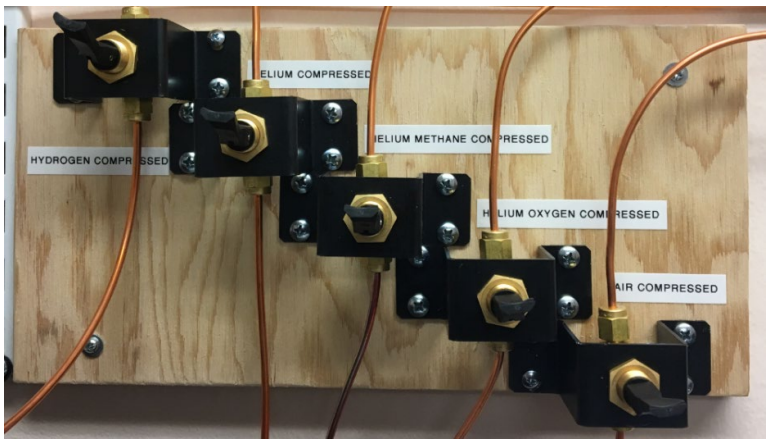
8. EQUIPMENT AND SUPPLIES

Not applicable.

9. PROCEDURAL STEPS

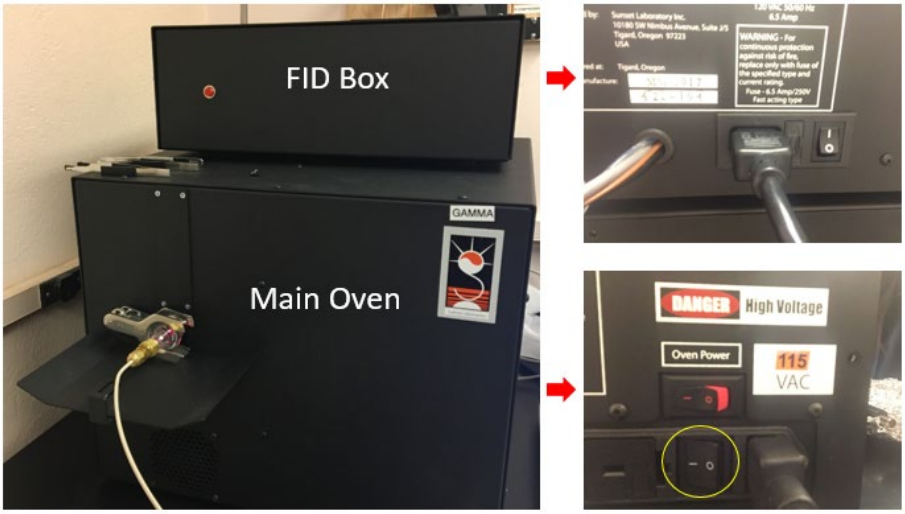
Start-up from full shutdown.

1. Open the gas tanks and gas valves to the instrument.

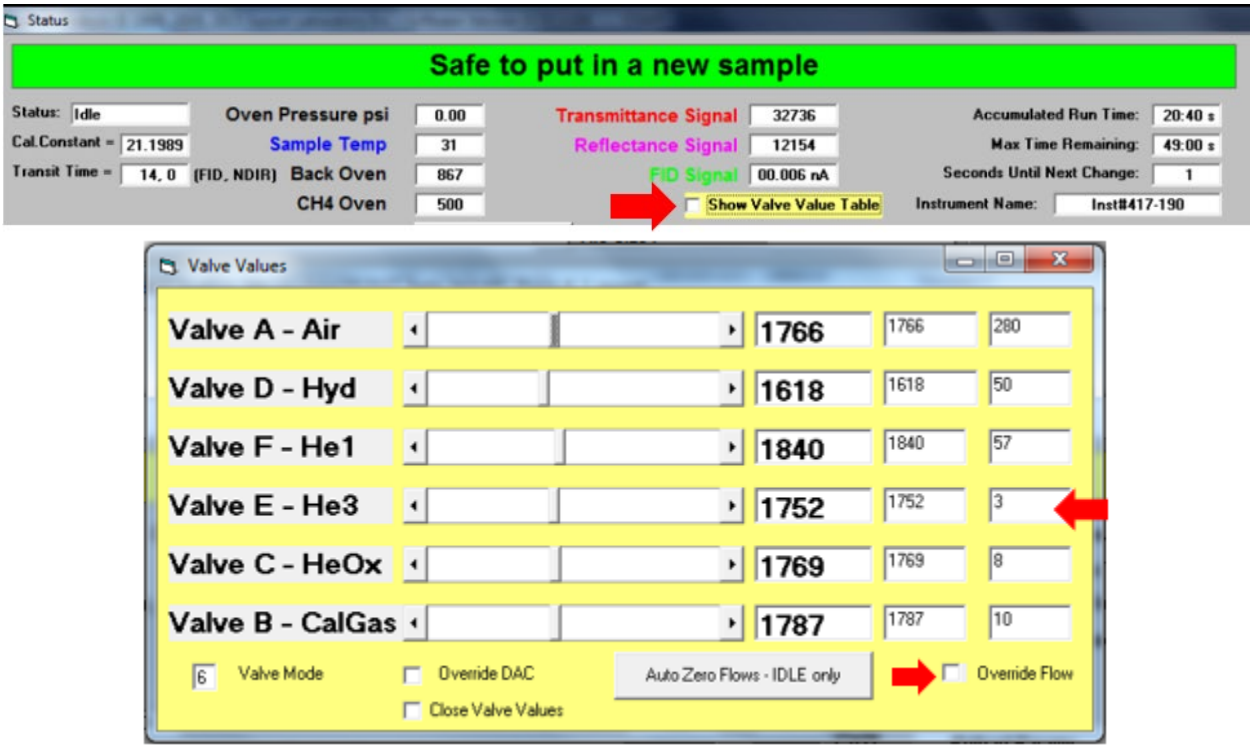


Open: switch is 180°, Closed: switch is 90°
Each carbon analyzer has own set of gas valves.

2. Check the pressures on the gas cylinders. Plot the pressures on the Monitoring Chart. Notify Supervisor if any leaks are detected.
3. Turn on the instrument, but do not turn on the ovens.

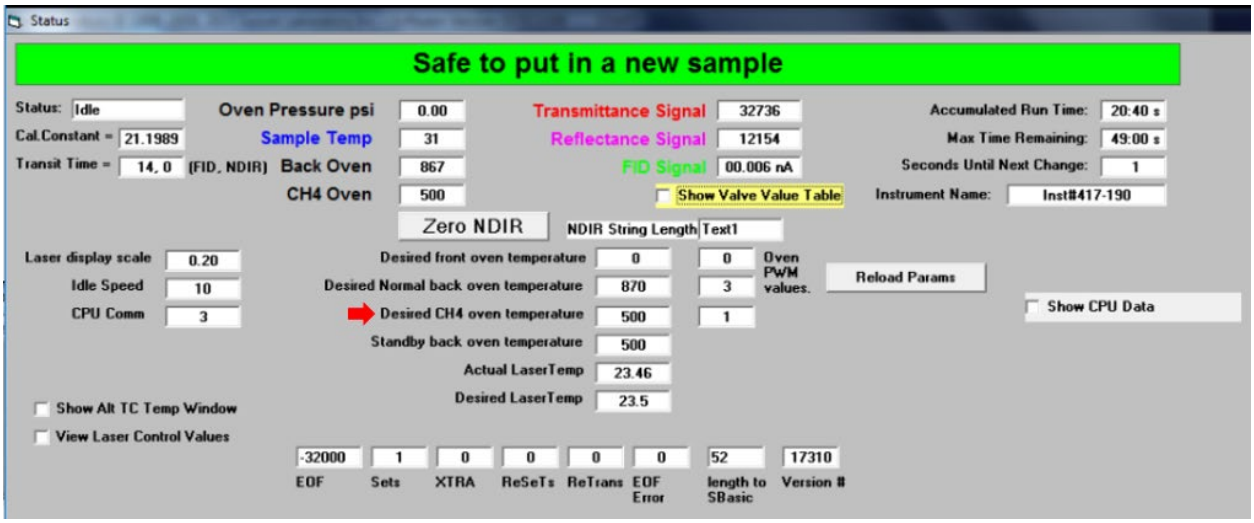


4. Open the OCEC software and place on "Standby" mode.  Note if the gases are not on, the software will close.[1]
5. Remove the FID chimney cap.
6. Open the valve values window. Click on "Override Flow" and set the He3 to 45 cc/min. Wait ~2 minutes to purge the system. All other gas flows can be left at standby levels.

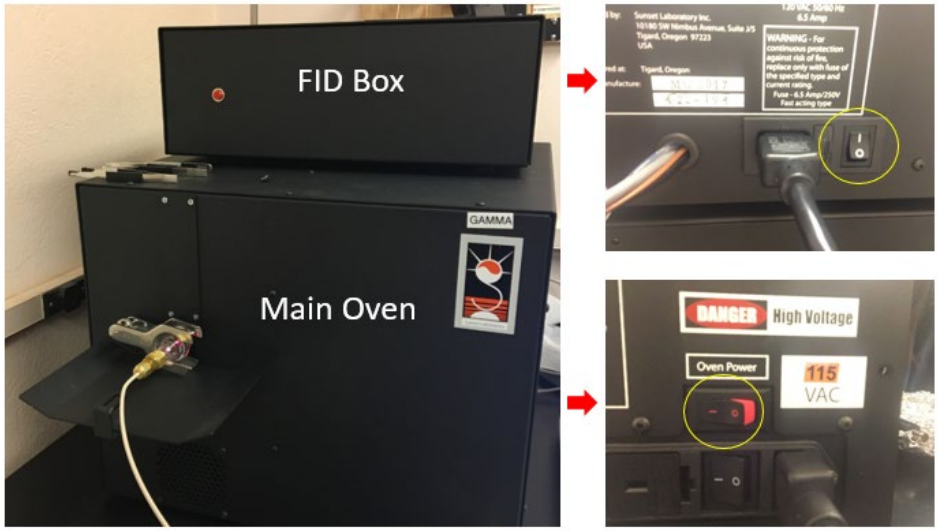


7. Use the "STATUS" window to set the "Desired CH_4 Oven Temperature" to be 100 °C. It will initially read "500" and slowly decrease.

[1] Error messages will appear if the software is opened without turning on the main power first.



8. Turn on the main oven and FID Box.

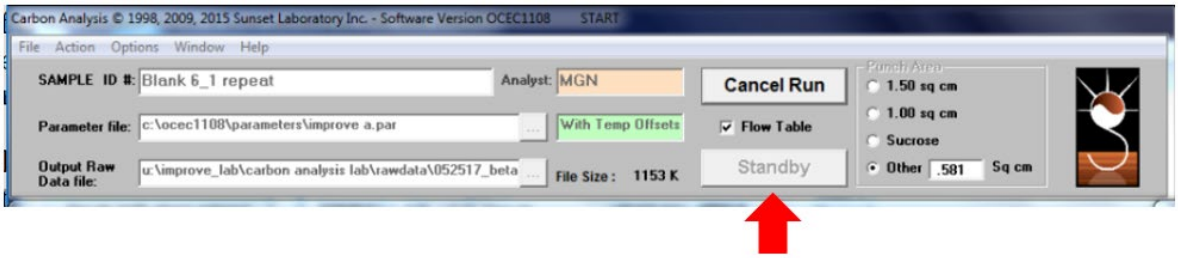


9. When the temperature is ~125 °C, change the desired temperature to 225 °C. Increase the temperature incrementally by 100 °C every 5 minutes until 500 °C.
10. When the instrument has stabilized at 500 °C, click the "Override Flow" in the Valve Values. This will allow the gases to stabilize at the operating pressures. Allow the gases to stabilize for 20 seconds. Minimize the "Valve Values" window and the "Status" window.
11. Carefully check the plastic methanator tubing for moisture. If necessary, wipe away the moisture with laboratory wipes.[2]
12. Take the instrument out of "Standby".
13. The instrument is now ready for analysis.
14. Make sure to apply the IMPROVE application on the software and update the "rawdata" file directory.

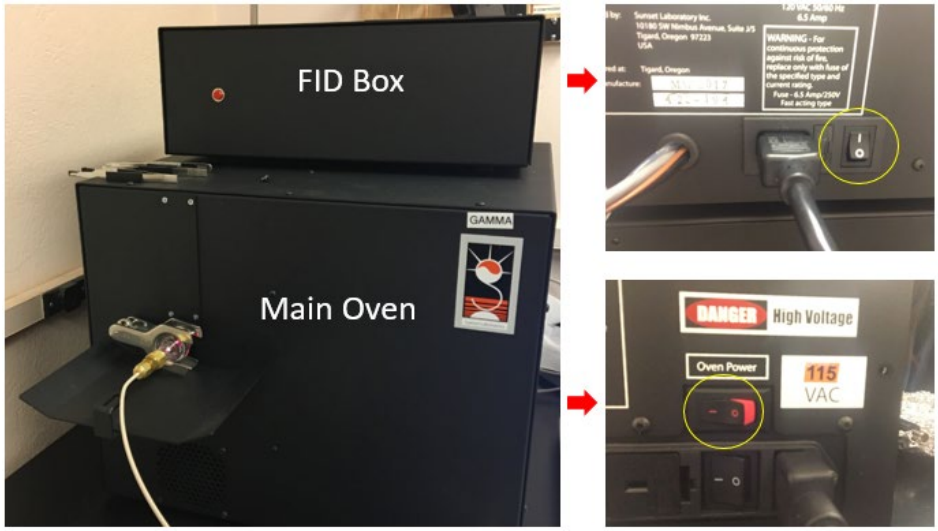
[2] Moisture can prevent the FID from igniting. If moisture is found during the heating up process, the fitting on the back end of the FID Box needs to be removed to dry the area.

Shutdown instructions:

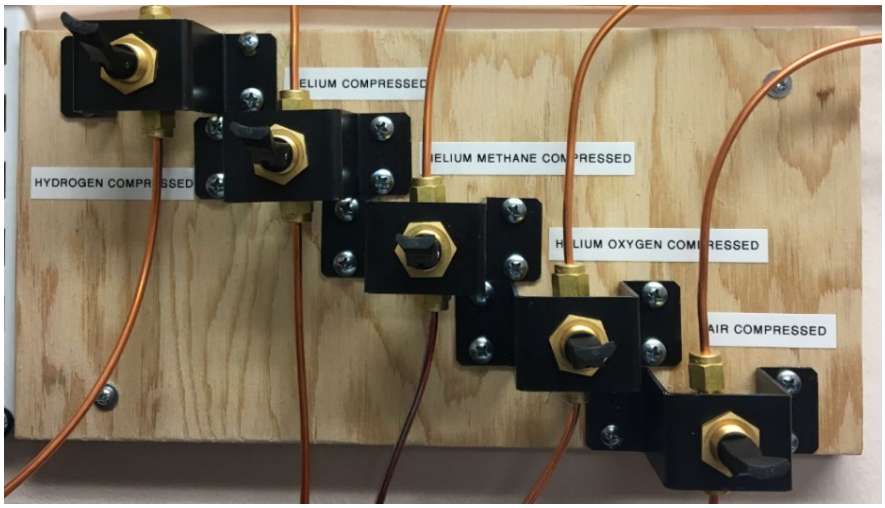
1. After the oven has cooled, remove the sample and put the instrument in "Standby" mode.



2. Turn off the power to the FID Box (methanator oven) and main oven.



3. Wait for the methanator oven to cool below 100 °C, which takes approximately 30-60 minutes.[3]
4. Once the ovens have cooled, shut off the gas flows at the valves and gas tanks.



[3] To speed up the cooling period, do not place instrument on standby. This will keep the air gas flow ~280 cc/min, which will cool the oven faster.

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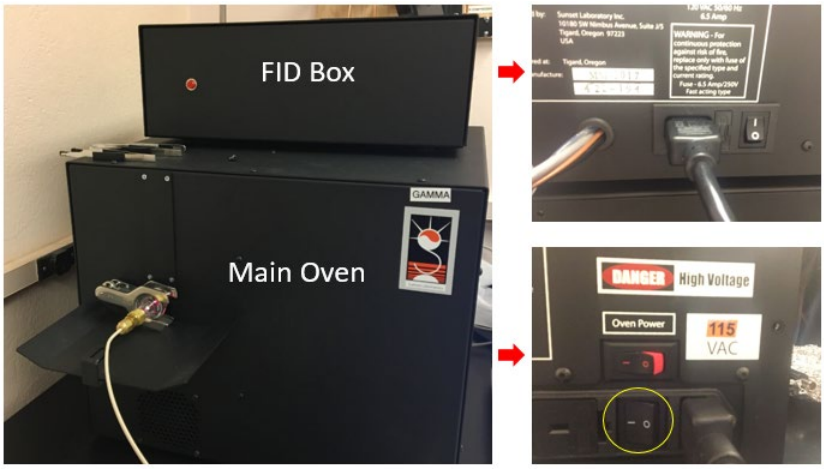
Each carbon analyzer has own set of gas valves

5. Cover the FID chimney with the provided black cap.
6. Select “Exit” and “all off” to close the OCEC software.
7. Turn off the power to the instrument, the second switch on the main oven.
8. Close the gas cylinders. Check the gas pressures and plot on the Monitoring Chart located on the wall in room 120A.



10. QUALITY ASSURANCE AND QUALTY CONTROL

Not Applicable.

11. REFERENCES

Not Applicable.