

EnviroDIY Sensor Station Troubleshooting Quick Guide



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Stroud Water Research Center Contacts

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Field Visit Supply List

Take the following to the site:

- EnviroDIY Field Visit Data Sheet
- Spare battery (if applicable)
- Spare micro SD card and adaptor
- Sensor cleaning brush
- Phone (for pictures)
- Waders or knee boots (if applicable)
- Clipboard
- Pencils
- Brush
- Other supplementary items: loppers/clippers; camera, first aid kit

Troubleshooting Basics

The first step to troubleshooting a problem is to understand the standard. Take time to familiarize yourself with the way your station functions properly:

- What are the light patterns?
- What do the sensor data look like during base flow, and during storm events?
- What does the battery voltage typically read on a sunny day versus a cloudy day? Is there seasonal variation?
- How often do your sensors need to be cleaned, on average?
- If you have cellular service, how much money is in your Hologram account? How often will funds need to be replenished?

Mayfly Data Logger Issues

PROBLEM: NO DATA LOGGING TO THE MICRO SD CARD

Things to check:

- Is the Mayfly Data Logger powered on? Cycle the power off and then on again; when turned back on you should see an alternating red/green light pattern flash.
- Is the light pattern on the Mayfly abnormal, e.g., are any lights stuck on? Lights on the Mayfly should only be on for about one minute during each 5-minute interval.
- Is the micro SD card correctly inserted in the slot? Does it seem to be sticking out? Is it in backwards? Is it crooked?
- What is the battery voltage? Check the data to see what the battery voltage was at last recording. If the voltage is below 3.5 the battery may have died.

Possible solution:

Cycle the power and switch micro SD cards.

- At your station:
 - Turn the Mayfly Data Logger off.
 - Remove the micro SD card.
 - Replace the micro SD card or insert a new micro SD card.
 - Turn the data logger back on.
 - Wait 5-10 minutes.
- Recheck micro SD card for new data. If data appears, the issue was most likely from improperly removing the SD card. If the problem persists, try inserting a different micro SD card.

Cellular Transmission Issues

PROBLEM: STATION HAS CELLULAR DATA TRANSMISSION (2G OR 4G) BUT THE DATA ARE NOT TRANSMITTING ONLINE

Things to check:

- Is the cellular plan from Hologram paid for and up to date? You can check the account balance at hologram.io. You will need your unique username and password; contact the station owner for this information.
- Are the lights on the cell modem lighting up, and if so, at what frequency? At your station, check the lights on the cellular board (2G or 4G modem). Light(s) on the cell modem should turn on every five minutes (about 10 seconds after the sensor sampling) and stay on for 30-60 seconds. If light(s) come on more frequently or less frequently, this indicates a problem with cell transmission. Does a light on the cell board come on at all? If not then the board may be dead. The solution is often to just replace the cell board and SIM card.
- Is the antenna attached properly to the cell board?
- Is the cellular board plugged in to the Mayfly correctly, with the pins lining up with the board properly?

Possible solutions:

- Check with station owner to make sure that Hologram account is paid for.
- Unplug and plug in the cell board making sure the pins line up correctly with the Mayfly Bee header.
- Unplug and plug in the cell board connector wire attached to the Mayfly.
- Make sure antenna is connected securely to cell board.
- 2G cell service is gone and station will need to be upgraded to 4G.

Battery Issues

PROBLEM: MAYFLY DATA LOGGER STOPS RECORDING CORRECT DATE/TIME

Things to check:

- Is there a clock battery in the Mayfly Data Logger?
- Is the clock battery positioned correctly?
- Is there corrosion around the battery or anywhere on the Mayfly Data Logger?

Possible solutions:

- If there is corrosion, you may need a new battery and/or a new Mayfly Data Logger.
- If everything seems normal on the Mayfly Data Logger, the clock battery may have died. The board will have to be reprogrammed. To set a clock battery, please see the following link : https://github.com/EnviroDIY/Sodaq_DS3231/tree/master/examples/PCsync

Sensor Issues

PROBLEM: DEPTH DRAMATICALLY INCREASES, DECREASES, OR BECOMES UNSTABLE

Things to check:

- Thoroughly check the red CTD wire for any damage, e.g., chewed or bent wires, anything that looks out of the ordinary.
- Are the sensors buried in sediment?
- Are there any large rocks or debris around the sensor?
- Are there particles stuck in the slot between the circuit board and pressure transducer?

Possible solutions:

- Thoroughly but gently clean the CTD sensor clearing all debris.
- If sensor is clean and there is no damage to wires, there may be damage to the sensor body and it will probably need to be replaced.
- If there is damage to the CTD wire cable, the sensor will need to be replaced.

PROBLEM: DEPTH DATA ARE NEGATIVE

Things to check:

- Are the sensors submerged?
- Is there damage to the CTD cable?
- Is the CTD sensor properly connected to the headphone jack and Grove cable?
- Is the Grove cable connected to the CTD sensor and plugged into the D6-7 jack on the Mayfly?

Possible solutions:

- If the sensors are not submerged for more than a couple of months at a time they may need to be repositioned to a deeper depth.
- If there is damage to the CTD cable the sensor will need to be replaced. Damage to the CTD sensor can cause negative values.
- If the depth reading on the CTD sensor is showing a -99999 number it typically indicates that the sensor is not connected properly.
 - Check to make sure the STDI channel on the sensor is set to “1.”
 - Replace the headphone jack.
 - Replace the Grove cable.

PROBLEM: CONDUCTIVITY IS DRAMATICALLY DRIFTING AND/OR NOT MATCHING THE HAND-HELD METER RESULT

Things to check:

- Can you see the four metal screws within the CTD slot near the bottom of the sensor?
- Are the screws blocked by algae or sediment?

Possible solution:

Thoroughly clean the metal screws being careful not to damage the pressure transducer.

PROBLEM: TURBIDITY READING IS NOT RESPONDING TO CHANGING WATER CONDITIONS (NTU VALUES STAY AT OR AROUND ZERO EVEN DURING STORMS)

Things to check:

- Are your sensors buried?
- Can you see the “eyeball” of the turbidity sensor?

Fouled turbidity sensor (left) and clean turbidity sensor (right).



Possible solutions:

- If the turbidity sensor is buried in dark sediment sometimes the sensor appears as if it stops responding. Dig out and clean your sensors and check to see if the issue has been resolved.
- If the issue is resolved, visit the site more frequently for maintenance, to be sure sediment does not bury the sensors again.
- If you cannot see the sensor “eyeball,” clean any bio-fouling off the window until you can see it.
- If there is a black material covering the eyeball that does not come off with regular cleaning tactics, it may need to be cleaned using a special solution. Contact the Stroud Center for more information.

Pelican Case Issues

PROBLEM: THERE IS MOISTURE IN THE LOGGER BOX OR ON THE LIPO BATTERY

Things to check:

- Is the logger box damaged?
- Is the logger box properly closed and latched?
- Is there vegetation, dirt, or anything else blocking the O-ring around the edge of the logger box door?
- Are the cable glands properly tightened on the sensor cables?

Possible solutions:

- Place a desiccant packet within the logger box.
- Replace the logger box if it seems to be so damaged to the point that it is no longer waterproof.

PROBLEM: BATTERY STOPS CHARGING/MAYFLY DATA LOGGER SHUTS OFF DUE TO DEAD BATTERY

Things to check:

- Is the solar panel still there? Solar panels can be vulnerable to vandalism or theft.
- Is the solar panel properly connected?
- Is the solar panel cable damaged between the panel and the logger box?
- Is the solar panel oriented correctly? Is it facing south (or to a gap in the trees), with no obstructions?
- Is the yellow charging LED light on the Mayfly lit?

- Is the LiPo battery plugged into the correct socket on the Mayfly (labeled LiPo Batt)?

Possible solutions:

- Make sure the solar panel is there, properly connected, and properly oriented.
- Turn off the Mayfly Data Logger, then unplug and plug in the solar panel connector and the LiPo battery connector making sure the connections are tight. Turn the Mayfly back on.

Additional Information

Main resource: EnviroDIY sensor station manual, <https://www.envirodiy.org/mayfly-sensor-station-manual/>

Additional resources:

- Wikiwatershed.org, <https://wikiwatershed.org/drwi/>, see “Quick Guides” and “Video Tutorials” sections.
- EnviroDIY Sensor Station Tutorial videos, <https://bit.ly/2yzcd9I>