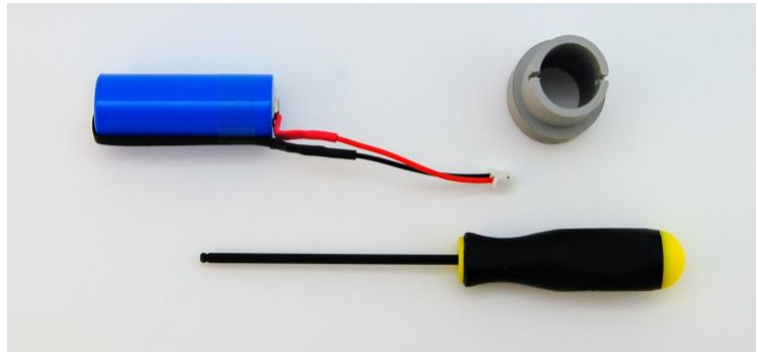


TCM & MAT Data Logger Battery Replacement Instructions

These instructions apply to the following products:

- MAT-1 Data Logger
- TCM-1 Current Meter
- TCM-2 Wave and Current Meter
- TCM-3 4500m Current Meter

The instructions assume that the user has purchased the *MAT-1 Battery Replacement Tool Kit*.



Materials:

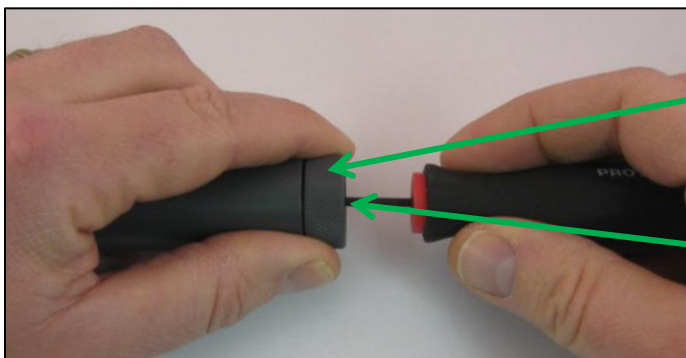
- Circuit Board Holding Tool
- 3/32" Hex Driver
- Replacement "A" size lithium battery
- Replacement desiccant packs (optional)

Caution: This logger is sensitive to static electricity when removed from the logger housing. Hold the circuit board by the edges and avoid working on indoor carpet or in other static prone environments.

Important: For loggers with serial numbers **not** between 2004043-2004058, and **lower than** 2006000, the lithium metal batteries should be tested and conditioned prior to deployment. Conditioning is necessary to ensure that the battery has not become passivated during storage. (Passivation is a temporary build-up of resistance in the battery that prolongs its storage life, but reduces peak currents.) Conditioning is performed by running the battery briefly prior to field deployment. See Steps 14-17. **If you are unsure whether this applies to your device, please go to Step 19: Identifying a Newer Model**, after you have completed steps 1-7.

General Instructions

1. Remove the end cap of the logger, connect a USB cable and use Domino to stop the logger. Failure to stop a running logger will result in data loss.
2. Slide the Circuit Board Holding Tool into the end of the logger. Aligning the slot in the tool with the circuit board.

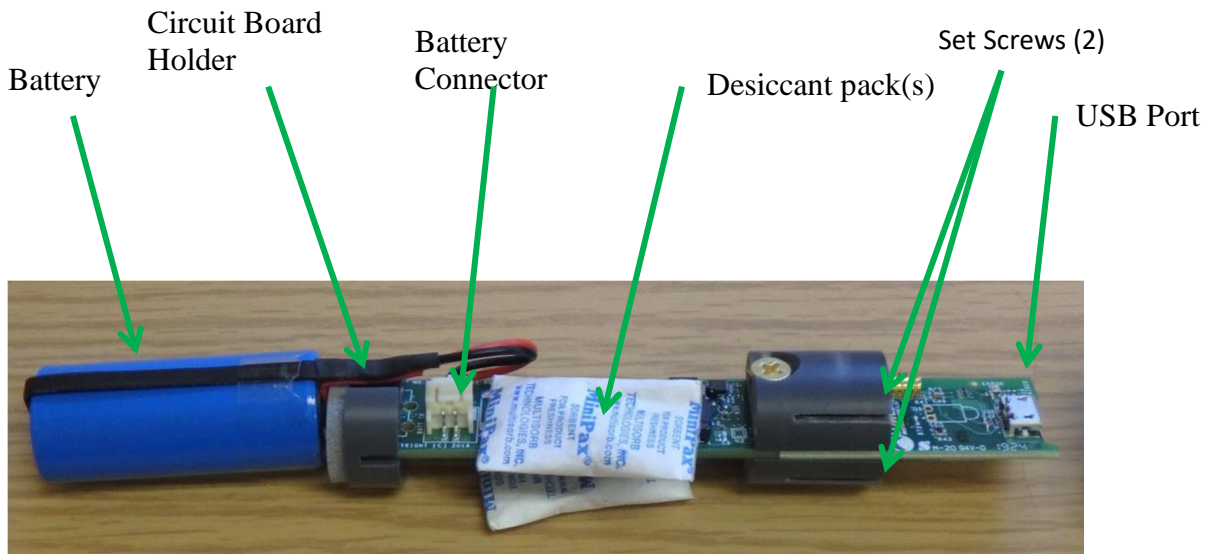


Align Circuit Board Holding Tool and insert fully into logger housing.

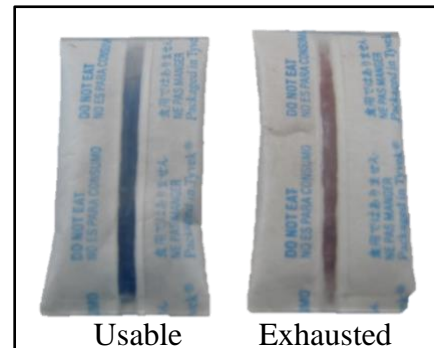
Carefully use the Hex Driver to loosen set screws located inside the logger (see next page).

3. Locate the two hex screws inside the logger and insert the hex driver into one of them.
4. Loosen, but do not remove the screw. Repeat on the other side.

- The board should now be loose within the housing. Gently tap the housing and slide the circuit board and battery out of the logger.



- Disconnect the old battery by gently pulling on the battery leads. You may need to use a pair of pliers to gently rock the plug back and forth.
- Inspect the desiccant. Replace or refresh the desiccant if not bright blue. To refresh desiccant, warm it with an electric toaster oven or hot plate at 100 C (210 F) for 20-30 minutes. Alternatively, microwave it for a few seconds at a time until it is bright blue.



*The following instructions apply only to loggers with serial numbers **not between 2004043-2004058**, and **lower than 2006000**. If your logger is a newer model, proceed to Step 19: Newer Models. **Note: you can identify a newer model visually as well**. Instead of two desiccant packs, it will have one, and it has a large blue capacitor on the opposite side of the circuit board (see step 19).*

- The logger must completely power down for a clean restart. Wait at least 3 minutes between disconnecting the old battery and reconnecting the new battery for the on-board capacitors to discharge.
- Connect the new battery by gently pushing the polarized connector into the battery socket. Verify that the green and red LED's flash three times. If not, disconnect the battery, wait 3 minutes and repeat.
- Carefully slide the battery, circuit board holder, desiccant and circuit board back into the logger housing. It may take a couple of attempts to get the hang of it. Do not use force. Gently push the board all the way into the housing using the Circuit Board Holding Tool.
- Use the hex driver to tighten the hex screws. Alternate sides and do not over torque. (Use four fingers, not your whole arm!)

12. Reconnect the USB cable and open the Device tab in Domino.
13. Verify that the “Logger Time” has reset to the year 2000, that the battery voltage is higher than 3.5V, and that the “Real-time Data” is updating. If any of these are not true, then the logger was not fully reset and the logger must be power-cycled again. Go back to step 2 and increase the time between disconnecting and reconnecting the battery. You should now reset the device time to your computer time by clicking “Set Device Clock.”

Verify that the logger’s clock has reset

Verify the battery voltage is greater than 3.5V

Spot check sensor readings

Lowell Instruments - Domino

Setup Device Convert

Connected on USB

Device stopped

File size 0.00 MB

SD card free space: 7.39 of 7.39 GB available

Device Time: 2000/01/01 12:00:13 Set Device Clock

Computer Time: 2020/09/03 11:33:31

Serial Number: 1910117

Firmware Version: 1.8.86

Model Number: MAT-1

Deployment Number: 23

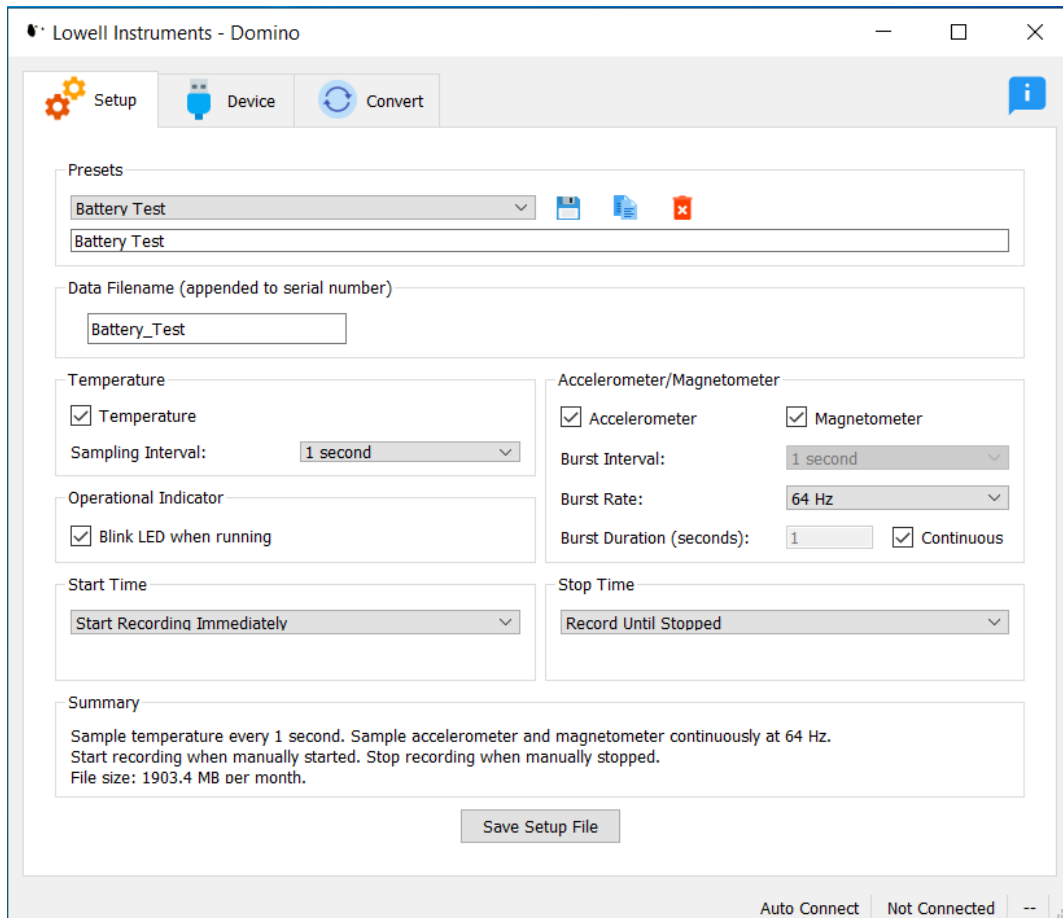
STOP Stop Running GO Start Running

Auto Connect Connected to 1910117 Stopped

Sensor	Enabled	Value
Accelerometer X (g)	Yes	0.352
Accelerometer Y (g)	Yes	-0.934
Accelerometer Z (g)	Yes	0.006
Magnetometer X (mG)	Yes	0
Magnetometer Y (mG)	Yes	-56
Magnetometer Z (mG)	Yes	75
Temperature (°C)	Yes	25.233
Battery (V)	n/a	3.71

IMPORTANT: You are not done yet. Perform a battery test run to test for, and to remove, passivation of the lithium metal battery before starting a field deployment (see below).

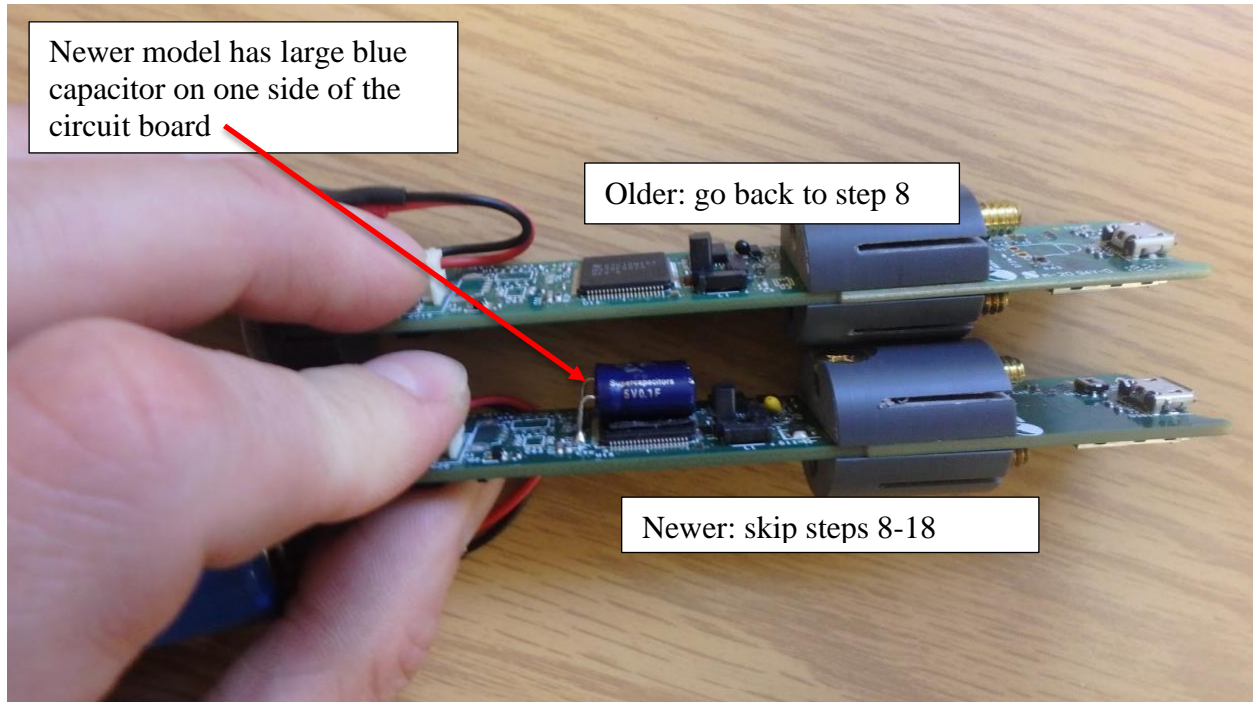
14. Perform a test run of the battery. An effective test will record at least 128 Kbytes of data with the USB cable disconnected. To perform this test quickly, set the logger to run at 64Hz as shown below and save the setup file:



15. Start the logger, disconnect the USB cable, wait 2.5 minutes and then check to see if the red LED is on (firmware version 1.0.xx) or is blinking (firmware version 1.8.xx).
16. If the red error LED is indicating, reconnect the USB cable, stop the logger, disconnect the USB cable and wait 5 minutes. Then repeat step 14-15. Repeat up to three times as necessary until the red LED does not come on after 2.5 minutes at 64Hz.
17. If only the green LED is blinking, reconnect the USB cable, **save a new setup file with your desired deployment settings** (MAT.cfg), and deploy your logger.
18. If after three attempts the red LED continues to indicate a problem, then something else is wrong. Contact technical support for advice.

Models with serial number between 2004043-2004058, or greater than 2006000. These newer models have a supercapacitor on the circuit board which makes battery testing unnecessary. Instead, you will perform a software reset.

19. Identifying a newer model:



20. Newer Models: there is no need to wait before connecting a new battery. Connect the battery now, and replace the logger in its housing according to steps 10-12. **Note:** these models only have one desiccant pack. Place the desiccant pack on the **opposite** side of the circuit board from the capacitor (above). This ensures that the device is centered in the housing.
21. Connect the logger to your computer and open the Device tab in Domino.
22. Perform a software reset: hold down **Control+Shift** and click on the USB icon directly to the left of "Connected on USB." The logger should temporarily disconnect, and then reconnect. The device time should then say that the year is 2000.

Hold **Control+Shift** and click here to perform a software reset:

Lowell Instruments - Domino

Setup Device Convert

Connected on USB

Device stopped

File size 0.00 MB

SD card free space: 7.39 of 7.39 GB available

Device Time: 2020/09/03 11:55:25 Set Device Clock

Computer Time: 2020/09/03 11:55:26

Serial Number: 1910117

Firmware Version: 1.8.86

Model Number: MAT-1

Deployment Number: 23

STOP Stop Running GO Start Running

Auto Connect Connected to 1910117 Stopped

Real-Time Data

Sensor	Enabled	Value
Accelerometer X (g)	Yes	0.287
Accelerometer Y (g)	Yes	-0.954
Accelerometer Z (g)	Yes	0.009
Magnetometer X (mG)	Yes	-16
Magnetometer Y (mG)	Yes	-40
Magnetometer Z (mG)	Yes	-31
Temperature (°C)	Yes	26.634
Battery (V)	n/a	3.71

23. Reset the clock to your computer time by clicking “Set Device Clock” and verify that the new battery voltage is greater than 3.5 volts by looking at the “Real-Time Data” box.
24. **Save a new setup file with your desired deployment settings** in the “Setup” tab. Your logger should now be ready for deployment!
25. Should you encounter any problems, please do not hesitate to contact technical support for advice.

Support

Additional information is available on the Lowell Instruments web site. Please see:
<http://www.lowellinstruments.com/support> for the most up-to-date support information.

Warning: *This logger contains a lithium battery. Do not cut open, incinerate, heat above 85°C (185°F), or recharge the lithium battery. The battery may explode if the logger is exposed to extreme heat or conditions that could damage or destroy the battery case. Do not dispose of loggers or batteries in fire. Do not expose the contents of the batteries to water. Dispose of the batteries according to local regulations for lithium batteries.*

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