

MicroDataLogger® Technical Bulletin

SUBJECT: BATTERY CARE AND RUNTIME

DATE: April 13, 1999

NOTICE!

Do not leave the MDL battery sitting in a discharged condition - always recharge promptly after each use! This will preserve battery capacity and prevent permanent damage. Loggers being stored for an extended period of time should have their batteries recharged every few months.

Introduction

The MicroDataLogger® Portable Data Acquisition System (MDL) is powered by a rechargeable 6 volt, 1.3 Ahr, sealed lead-acid battery. This type of battery will provide many years of reliable service if promptly recharged after each deployment. Each time the MDL wakes up, it checks its battery voltage and, if the voltage is **5.6 volts** or less, logging stops and the alarm message Low Bat Stopped appears on the LCD screen. This protects the battery from being damaged by excessive discharge. Once the MDL stops, it can not be used again until its battery is recharged to 6.2 volts or higher. After charging stored data can be retrieved and the logger reconfigured. The DataManager® program issues a Low Battery Warning if the battery voltage is **6.2 volts** or less. This is just a warning that the battery is not fully charged.

Checking Battery Voltage

Check battery voltage by pressing the MDL's LCD display button four times. The serial cable and battery charger must be disconnected before reading battery voltage. If the battery was recently connected to the charger, wait 24 hours before attempting to read the voltage. A fully charged battery should read about **6.4 volts**. Note that the full charge voltage of an older battery will appear to be about the same as a new one, but its capacity, the runtime, is usually much less.

Battery Charging

Plug a CHARGE-02 model charger into the wall outlet and plug the charger cable into the external power jack on the right side of the MDL. A fully discharged battery can be recharged in eight hours. The charger is designed to function at room temperature (65-75 °F) and will not charge properly in cold or hot environments. The red LED indicator lights brightly when first connected to a discharged battery. As the battery charges, the LED dims and then starts to flash which indicates that the charger is now in Float Charge mode. The charger can be left connected to the MDL continuously without damage to the battery.

Estimating Battery Runtime

A new battery's rated capacity of 1.3 amp-hours will slowly decrease with age, the number of charge/discharge cycles, the depth of discharge, and high temperatures. If the battery is promptly recharged after each deployment, it should maintain 80% of its new capacity after 200 charge/discharge cycles. The Sample Interval and sensor Warmup Time chosen during configuration will significantly affect the runtime of the MDL. Configuring a longer Sample Interval and shorter Warmup Time will increase the runtime. For maximum runtime, Samples To Average should be set to one. The battery's the condition and age will also affect the runtime of the MDL.

A fully charged battery, under typical conditions, using low power sensors, will power the MDL for more than 70,000 logged readings. The table below gives estimated runtimes for a typical MDL with a new battery.

| Sample Interval | Estimated Battery Life |
|------------------------|-------------------------------|
| 3 seconds | 2 days |
| 15 seconds | 10 days |
| 1 minute | 30 days |
| 5 minutes | 90 days |
| 15 minutes | 180 days |

The most accurate way to determine battery runtime is to test your logger using the actual configuration and sensors that you plan to use and see how long it runs sitting on your desk. Just set the Duration to 99 hours and check the Memory Overwrite Enable box. With this configuration, the MDL will run until its battery is empty.

Battery Runtime Test

In order to assure the reliability of the MDL's battery, it should be tested every three to six months and after any deployment in which the MDL fails to log for the configured duration or crashes. It's a good procedure to keep a log of test dates and runtimes for each MDL.

1. Disconnect all modules from the MDL and charge the battery for at least 8 hours.
2. Disconnect the charger from the MDL and check the battery voltage (four button press) – it should read about 6.5 to 7.2 volts shortly after being disconnected from the charger.
3. Connect the MDL to the host computer and configure the logger using the special battery test configuration file supplied with the DataManager® **version 3.0** or higher software. To load this configuration, go to File, Use Existing Config... and select **BATTEST2.CFG**.
4. Send the configuration to the MDL and then disconnect the serial cable and battery charger. Observe the LCD after logging begins. You should see SAMPLING flash on the screen every 6 seconds. If the MDL does not start on time, reconnect to the host computer and check the configuration.
5. Allow the MDL to continue running until it stops flashing SAMPLING. With new batteries, this may take 15 to 20 hours depending on the model year of the MDL. Logging will automatically stop when the battery voltage drops to 5.6 volts or less.
6. When logging has ended, reconnect the MDL to its charger and activate the LCD by pressing the button once. Look for the LOW BATTERY STOPPED warning message and note the Stop Date and Stop Time displayed. Pressing the button three times displays the configuration including the Start Date and Start Time. Subtract the Start Date and Start Time from the Stop Date and Stop Time to determine the number of hours of operation. If the MDL ran for less than ten hours or the battery is older than 5 years, the battery should be replaced.

After the test, remember to recharge the battery for eight or more hours before using or storing the MDL.