

STANDARD OPERATING PROCEDURE
**Instruction for Testing, Launching, Reading Out and Field Data Collection
for the Hobo®Temp Temperature Data Logger**

KEY WORDS

Storage temperature, quality assurance

APPROVALS

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1.0 INTRODUCTION

Some studies conducted by the Environmental Monitoring Branch require more stringent Quality Assurance (QA) procedures. One of the procedures is to verify that proper temperature was maintained during transport. For studies with this requirement written into the protocol or QAPP (Quality Assurance Project Plan), a temperature recording device such as a Hobo®Temp data logger should be placed in ice chests whenever carrying field samples or quality control samples. Data recorded by the data logger can then be downloaded to a personal computer (PC), examined, and stored with other QA information collected.

1.1 Purpose

This document will provide specific instructions for recording temperature and downloading data to a PC using a Hobo®Temp Data Logger. This SOP will also describe the procedure for documenting sample temperatures out of range and how to periodically test a Hobo to ensure accuracy.

2.0 MATERIALS

- 2.1 Hobo®Temp data logger.
- 2.2 Computer, Boxcar® software, serial cable
- 2.3 External sensor probe
- 2.4 Watch Battery size CR2032 3 volt lithium
- 2.5 Ice chest
- 2.6 Wet ice
- 2.7 Expanded Polystyrene (EPS) container or insulated container
- 2.8 Dry ice
- 2.9 Small plastic bag
- 2.10 Mason Jar with lid
- 2.11 Tape
- 2.12 Check-In sheet
- 2.13 Chain of Custody (COC)

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3.0 PROCEDURES

3.1 Launching the Hobo®Temp data logger

3.1.1 Connect the interface cable to the computer serial comm port (Figure 1). Then connect the other end of the cable to the data jack on the data logger.

3.1.2 Click on the **BoxCar® 3.7** icon on the desktop on the PC. Then click on **Logger** on the tool bar and select **Launch**.

3.1.3 Enter a study description for a file name, which could include a study number, a date or alphanumeric code. For example: for study 230, enter the study number followed by today's date 230_month_day. There is no need to add an extension since the extension will be .dtf.

3.1.3.1 Ex: 230_6_29

3.1.4 Next, select the time interval to be used between temperature readings. Choose the interval that will allow readings for the duration of the sampling trip. Five to six minutes should be adequate. Click on the blue triangle labeled **Advanced Options**, then remove the **X** in the wrap selection (to keep data from being overwritten), if it is present. Go to **Enable/Disable Channels** to turn on or off the desired channels. Channel 1 is the internal temperature of the logger and Channel 2 is the external probe. Check the battery level by looking at the battery level gauge. Change the battery if necessary. Now click **Start**. Unplug the logger.

3.1.4.1 Note: Not all Hobos have a jack for a probe, Channel 2 options or a battery level gauge.

3.1.5 When it is ready for use, the LED light on the logger will blink faintly (Figure 1).

3.2 Reading data from the Hobo®Temp data logger

3.2.1 Reconnect the cable to the logger's data jack.

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- 3.2.2 Click on the **BoxCar® 3.7** icon on the desktop on the PC, then click on **Logger** on the tool bar and select **Readout**. The logger will now download the temperature data to the computer. Do not unplug the logger from the serial cable until prompted. Unplugging while offloading will ruin the logger.
- 3.2.3 After the data is downloaded, the data will be plotted and **Save as** will appear. Save the file under the same file name given when launched. However, the default extension may be changed to a description as well. Click **OK**. Unplug the logger.
- 3.2.4 To print the plotted temperature recording, print in landscape, not portrait mode. Write the ice chest number on the printout and give it to the project leader.

3.3 Recording data in the field

Place the logger in the ice chest when leaving the West Sacramento warehouse. When using wet ice, keep the logger dry by using either a plastic bag or a mason jar. Place the logger in a plastic bag and tape it to the inside top of the ice chest or close the logger in a mason jar and put it along side the samples under the ice. If the logger becomes wet, open the plastic case, remove the battery and let the logger dry. When using dry ice, do not put the logger in the EPS. Choose a logger with a probe jack (Figure 1). Attach the probe (be sure to activate Channel 2 when launching) and tape the logger in a bag to the outside of the EPS box. Place the probe end in the EPS box next to the samples.

3.4 Note taking and record keeping when required in a protocol or QAPP

- 3.4.1 Note the identification number for the ice chest used to transport samples in the field notebook. If more than one logger is used during a sampling trip, label the loggers and note the ice chest numbers to avoid mix-ups.
- 3.4.2 Also record the ice chest number on the Check-In sheet in the remarks section, so that each sample can be matched to an ice chest and transit temperature. If several ice chests were used, indicate which samples were transported in which ice chest. The ice chest number will be recorded in the sample tracking database for each individual sample.

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3.5 Recording out-of-range sample temperatures

Examine the plotted temperature printout. If the recorded maximum temperature as outlined in SOP QAQC004.01 after initial cooling in the ice chest exceeded 5°C for samples on wet ice or 0°C for samples on dry ice, mark the maximum temperature on the Check-In sheet in the remarks section and on the notes or comments section of the COCs for each sample stored in that ice chest. Also check the ice chest or EPS box for cracks or damage that could cause the temperature to exceed maximums. Give the plotted temperature printout to the project leader.

3.6 Testing the logger for accurate calibration

3.6.1 Launch the logger to be tested as described in section 3.1 but name the file TestMonth-Day.

3.6.1.1 Ex: Test6-29.

3.6.2 Choose a short interval duration that will last about 3 hours. A 1.5 second interval will work. Click on **Start**.

3.6.3 Place logger in the West Sac walk-in refrigerator for 30 minutes. Then move the logger to the walk-in freezer for another 30 minutes. Last place the logger in the chest freezer for 30 minutes.

3.6.4 Readout the logger as described in section 3.2. Cancel the **Save As** window to examine the plotted temperature graph. Also, look at the smaller window to the right of the main BoxCar window. Click on the **Show Data** triangle and the window will drop down. Scroll through the entries for exact temperature logs. The logger should record temperatures for the 30 minute intervals as follows:

Walk-in refrigerator between 32 and 42°F or 1 and 8°C

Walk-in freezer below 32°F or 0°C

Chest freezer below 32°F or 0°C

3.6.5 After examining the graph and data label the inaccurate or nonfunctioning loggers and put aside. Close the graph and do not save. When needed, the loggers that passed the test can be re-launched as described in section 3.1.

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3.6.6 The best way to conduct the testing is to test several Hobo data loggers at once and compare the temperatures. Any loggers that are significantly different should be investigated further.

3.6.7 Record the results (pass or fail) on the log sheet kept in the logger storage area.

4.0 TROUBLE SHOOTING

If an error window appears when trying to Launch or Readout a logger reading, "Check logger's connection or battery," open the logger's plastic case and replace the battery. Click on **Retry** after changing the battery. This error message can also mean the serial cable is not inserted completely into the data jack. Click on **Retry** after pushing the serial cable in snugly. If an error window appears saying "Either the logger or the data file has been damaged," the logger is unusable. Do not use the logger.

5.0 REFERENCES

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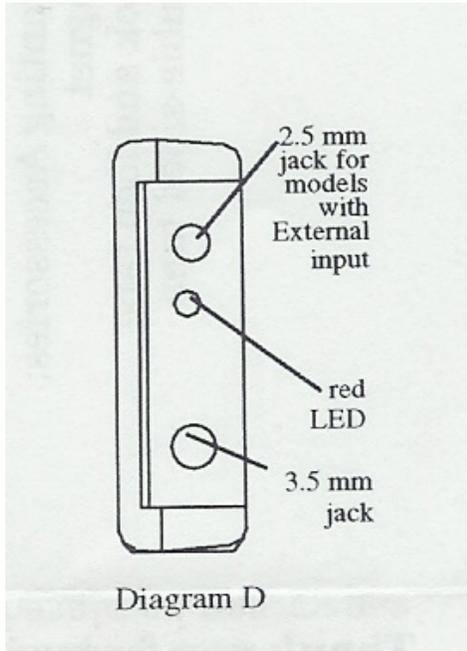


Figure 1. Side view of probe and serial cable jacks and LED light