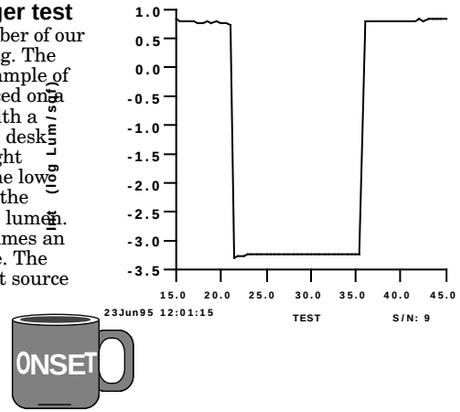
The coffee mug logger test

You can test a great number of our loggers using a coffee mug. The plot at the right is an example of when the logger was placed on a desk and then covered with a coffee mug. The mug and desk combination allows no light through so we see that the low limit of light intensity of the logger is less than 1 milli lumen. Remember that this assumes an incandescent light source. The intensity for a fluorescent source would be about a factor of twelve lower.



Battery instructions

In normal usage the 3.6 volt StowAway battery is expected to last two years, although it is suggested that you change the battery every year. To change the battery, remove the logger's cover. Remove the old battery by pulling it straight away from the board. To remove the high internal resistance which builds up when this kind of battery is not in use, short the new battery for one second by touching the leads with a paper clip before installing it. When the battery first makes contact the status LED on the board should blink brightly five times. If it does not, remove the battery, wait ten seconds and try again. Finally, place the cover back on the StowAway LI logger, lining it up so that the LED shows through the intended spot on the label.

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D-1583-D MAN-SLI

StowAway® LI

User's Manual

Thank you for purchasing a StowAway® Light Intensity logger. The StowAway LI was designed as a general purpose light intensity logger. It has a dynamic range of approximately 100,000. The recording intensities are from approximately 0.001 lumens/sq ft to approximately 1,000 lumens/sq ft.

Calibration

The StowAway LI logger is calibrated for incandescent sources. For your reference, full sunlight is about 10,000 lumens/sq ft, office lighting is about 50 lumens/sq ft, and full moonlight is about 0.03 lumens/sq ft. The StowAway LI's range goes from less than 0.01 lumens/sq ft to about 1,000 lumens/sq ft.

Angle and temperature dependance

The StowAway LI logger has a Cosine angular dependance from 0 to 45° from vertical, falling off much more rapidly than Cosine for angles larger than 45°. The StowAway LI logger is calibrated at room temperature. The logger will read high for temperatures below room temperature, and low for temperatures above room temperature. The error is approximately a factor of two for every 25°C change (a factor of two high at 0°C and a factor of two low at 50°C).

Launch and recovery

Connect the StowAway LI logger to the host computer using the appropriate interface cable (CABLE-PC-3.5 for a PC and CABLE-MAC-HOBO for a Macintosh). When connecting the 3.5 mm communications cable to your logger make sure that it is pushed completely into the connector! You will now be able to communicate with the logger using the logger software. (See the software user's manual for launch details). Recommended software: BoxCar® 3.6+ or any version of BoxCar® Pro. At the end of the deployment, reconnect your StowAway LI logger to the host computer for readout. The logger communicates at 1200 baud. Its cleverly optimized software allows a full 2K offload in only twenty seconds.

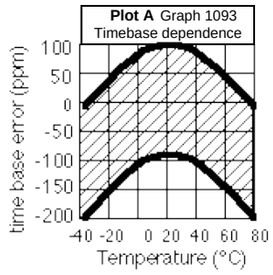
The pushbutton and LED

The StowAway LI logger has an optional triggered launch. It has a pushbutton which is activated by pressing on the marked spot on the logger. You can test the alarm state by pressing on the trigger button. If the logger has not recorded out-of-range conditions, the LED will blink weakly every half second. If the alarm conditions have been met it will shine almost continuously when the button is pressed. The StowAway LI will stop blinking when it has finished logging.

The logger's LED tells you exactly what the StowAway LI is doing. **Waiting for trigger**: weak blink every six seconds; **waiting out delay**: weak blink every four seconds; **logging**: bright blink every measurement, and weakly every two seconds between measurements. If the logger is in multiple sampling mode it will blink each measurement, not just each time data is recorded.

Time accuracy

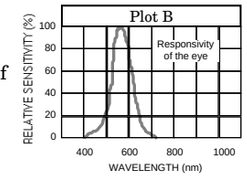
At room temperature, the logger's idea of time can vary from the actual time by as much as one hour per year (100 ppm). There is an additional temperature effect shown in Plot A.



Operating range -25°C to +75°C

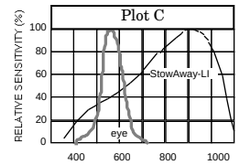
Your StowAway LI logger will operate correctly over the temperature range -25°C to +75°C, although at high temperatures the logger will not be as sensitive to low light levels. Do not expose to an environment where condensation will form on the logger. Condensation will cause corrosion. Continuous exposure to temperatures above +45°C will reduce the logger's battery life.

What is light intensity?



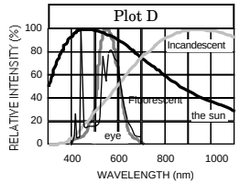
Light intensity is usually measured in lumens per square foot (lumens/sq ft) or lumens per square meter (lumens/sq meter). The lumen is a measure of power, weighted by the responsivity of the eye. At 555 nm (yellow-green) one watt corresponds to 621 lumens. Moving away from this peak, the responsivity drops, and by 400 nm (violet) and 700 nm (infrared) the responsivity is down by about a factor of 100 shown in Plot B.

What does the StowAway LI measure?



The light sensor in the StowAway LI logger measures a substantially broader spectrum than the visible, extending farther into the ultraviolet and into the infrared. This allows the logger to be used in applications that require sensitivity at these wavelengths, but means that they do not measure in true lumens/sq ft or lumens/sq meter. The sensitivity verses wavelength is shown in Plot C.

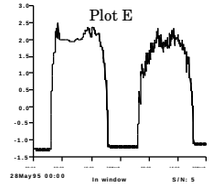
It disagrees with my light meter!



Your light meter's sensor has a filter that mimics the response of the eye, the StowAway LI logger responds to a substantially wider range of wavelengths. The sensitivity of the logger will be a strong function of the output spectrum of the source. As shown in Plot D, the incandescent source emits more brightly in the infrared than in the visible. The StowAway LI's sensor is sensitive to this radiation and would respond even if the visible were removed. Fluorescent lights and halide lamps have more complex spectra, peaking strongly in the visible.

The StowAway LI logger is calibrated on an incandescent source, and will read about a factor of twelve low for flourescent lighting, and about a factor of six low when measuring indirect sunlight.

An example:



The logger was placed in a north-facing window and the light intensity was recorded for two days. The first day was cloudy and the second day was rainy. Plot E shows intensities ranging from about .005 lumens to about 500 lumens, covering almost the full range of the logger. A linear plot would not allow you to see this huge dynamic range, but would be a lot easier to read values from.