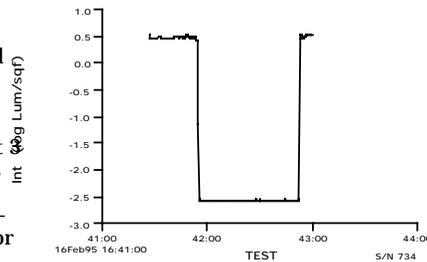


The coffee mug logger test

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

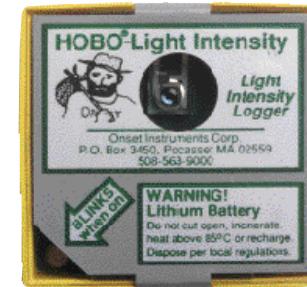


The plot at the right shows what happened when we did it.



Battery Instructions

In normal usage the 3.6 volt HOBO 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 that 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 HOBO, lining it up so that the LED shows through the intended spot on the label.



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D-1587-F MAN-HLI

HOBO® LI

User's Manual

onset
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Thank you for purchasing a HOBO® LI logger. The HOBO LI was designed as a general purpose light intensity logger. It has a dynamic range of about 1,000,000 intensities, recording intensities from about 0.01 lumens/sq ft to 10,000 lumens/sq ft. It has a much wider spectral response than the visible so the calibration is dependant on the spectral content of the light received.

Calibration

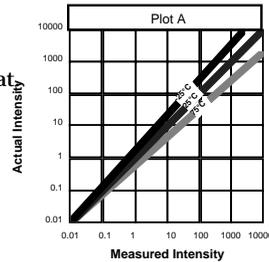
The HOBO LI logger is calibrated for incandescent sources. For your reference, full sunlight is about 10,000 lumens/sq ft, office lighting is about 50 lumens/sq ft, and full moonlight is about 0.03 lumens/sq ft. The HOBO LI's range goes from less than 0.01 lumens/sq ft to over 15,000 lumens/sq ft.

Angular dependance

The HOBO LI logger has a Cosine angular dependance from 0 to 45° from vertical, falling off much more rapidly than Cosine for angles larger than that.

Temperature dependance

The HOBO LI logger uses a very simple log amplifier to give it its wide dynamic range. This log amplifier has a very substantial temperature dependance as shown in Plot A.

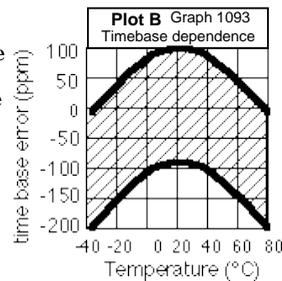


Launch and recovery

Connect the HOBO 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 HOBO LI logger make sure that it is pushed completely into the connector! You will now be able to communicate with the HOBO LI 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 logger to the host computer for readout. The HOBO LI communicates at 1200 baud. Its cleverly optimized software allows a full 2K offload in only twenty seconds.

Operating environment

Your HOBO LI logger will operate correctly over the temperature range -25°C to +75°C. Do not expose to an environment where condensation will form on the logger. Condensation will cause corrosion. Operation at temperatures substantially above or below room temperature will cause substantial calibration shifts. Continuous exposure to temperatures above +45°C will reduce the HOBO LI logger's battery life.

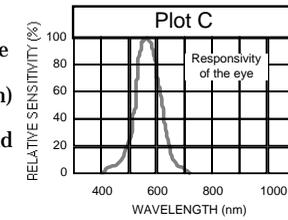


Time accuracy

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 B.

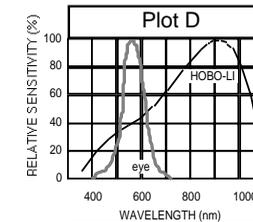
What is light intensity?

Light intensity is usually measured in lumens per square foot or lumens per square 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 as shown in Plot C.



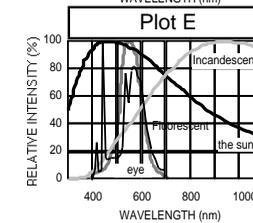
What does the HOBO LI measure?

The light sensor in the HOBO LI logger measures a much 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 D.



It disagrees with my light meter!

Your light meter's sensor has a filter that mimics the response of the eye, the HOBO LI logger responds to a much 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 E, the incandescent source emits more brightly in the infrared than in the visible. The HOBO LI logger's sensor is sensitive to this radiation and would respond strongly even if the visible were removed. Fluorescent lights and halide lamps have more complex spectra, peaking strongly in the visible.



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

An example: The sun and moon

Plot F shows the advantage of the wide dynamic range of the HOBO LI logger. In order to show the range, the log scale is shown. These measurements were made on an amazing series of spring days. The HOBO LI logger was placed in a south facing window and could see both sunrise and moonrise. The abrupt rises in the light intensity a few hours after sunrise came when the window was no longer shadowing the logger. You can also see that April 6th was not a completely cloudless day, and that the moon rises about an hour later each day.

