## Application Notes:

### 1) Using the magnet

You must orient the magnet to the case correctly for the HOBO State data logger to detect it. When the HOBO State sees the magnet it will blink its green LED light. When it cannot see the magnet it will blink its red LED light. The recommended orientation (Diagram A), along with some that will not work (Diagram B) are shown in the drawings at the right.

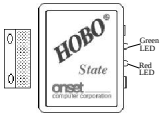


Diagram A

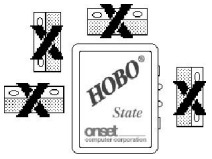
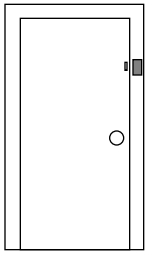


Diagram B

### A simple application: door monitor

Mount the magnet on the door using its two-sided foam tape. Use Onset's software to launch the logger, then mount the HOBO State data logger on the door jam using the hook and loop strip. The magnet will need to be less than 1/4 inch from the logger case when the door is closed, and over 3/4 inch away when the door is open. Make sure that the logger blinks green when the door is closed, and red after it has been opened. The logger will record the times when the door is either closed or opened. The hook and loop tape allows you to conveniently remove and replace the logger for readout.



*A door in a house, with small children living in it, recorded over one thousand state changes during a one week period in the summer!*

### 2) Measuring contact closures

The HOBO State can be used to measure contact closures. Connect the contacts to the black and white wires on the contact closure cable. The polarity of this connection does not matter. The red wire is not connected on the HOBO State data logger. Using the external contact closure input allows the logger to be mounted remotely from the contact. Make sure that no external voltage is applied to the contacts! *When measuring contact closures, the contacts should not be connected to anything else, even ground.*

### 3) Measuring the presence of positive DC voltages

Put a diode in series with the white wire on the external contact closure cable. The diode will block the positive input. *Note: it is critical that you connect the diode with the polarity shown in Diagram C.* This will only work if the input voltage is ground when the positive voltage is not applied. Never apply a negative voltage to this input, the diode will not block it! Make sure you use a diode that has a breakdown voltage high enough to block the positive voltage you intend to apply. In no case should you use this technique to connect the logger to any AC voltage, or a DC voltage above 15 volts.

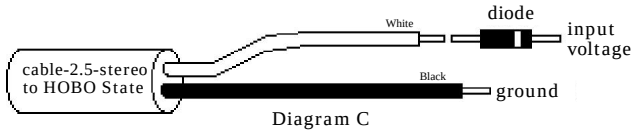
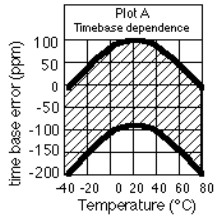


Diagram C

## Detailed Specifications:

Minimum state duration: 1/2 second
Time Accuracy: ±100 ppm at 20°C, full dependence shown in Plot A
Capacity: 2,000 state changes (requires 8K of memory in HOBO Shuttle to fully offload)
External contact input: relay switch or contact closure
Length of included external contact cable: 6'
Operating temperature: -20°C to +70°C (-4°F to +158°F)
Relative humidity range 0 to 95%, non-condensing
Size/weight: 2.375" x 1.875" x 0.75"/approximately 1 oz.
Battery: CR-2032 (lithium); provides one year of continuous use
Storage temperature: -40°C to +75°C (-40°F to +167°F)




### Connecting the communications cable

The HOBO State data logger requires Onset's software and a PC interface cable. Connect the cable into the 3.5 mm jack on the logger (See diagram D) and into a working serial port of your computer. If the serial port was recently used for a network, modem, or printer, the port may still be configured as such and the computer should be restarted first. When attaching the PC interface cable to your logger, make sure that the interface cable is inserted completely into the jack on the logger.

### Internal magnetic reed switch, external contact opening

The HOBO State data logger records contact closures/openings of its internal magnetic reed switch (a glass reed switch located inside the box on the edge opposite the connectors, see Diagram E) and contact closures (open/shorted) in a cable connected to its 2.5 mm jack (Diagram D). The HOBO State data logger detects the cable's open/shorted condition by applying a positive voltage pulse to the tip (white wire in cable). The black wire is ground and the red wire is not connected. *Pairs of state changes that occur in less than half a second may not be recorded.* In applications where state changes always appear in closely spaced pairs, a HOBO® Event data logger should be used.

### Operation indication

The HOBO State data logger has two LED lights: red and green (Diagram D). One of these LEDs will blink every two seconds; if the contact is open the red LED will blink, if the contact is closed the green LED will blink. Although the LEDs blink every other second, the state is checked every half second, with state changes recorded as detected. If the battery voltage is low, both LEDs will blink every other second regardless of the state.

### Changing the battery

To change the battery, open the case as shown in Diagram E. Lift the circuit board and remove the battery by carefully pushing it out with a cotton swab with the tip removed or other small, blunt instrument. Be sure to install the battery with the printed side away from the HOBO's circuit board (Diagram F). The logger's LEDs will blink several times after the battery has been installed.

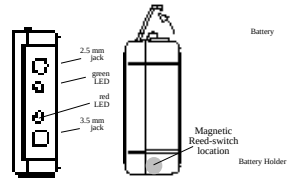


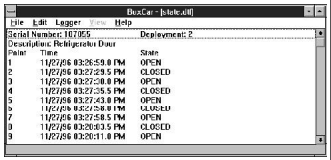
Diagram D Diagram E Diagram F

### Keep it dry

Your HOBO State data logger can be permanently damaged by corrosion if it gets wet. Protect it from rain or condensation. Should it get wet, remove the battery immediately and dry the board completely with a hair dryer before reinstalling the battery.

### Data Format

The HOBO State records the exact moment of each change of state. Current versions of BoxCar® and BoxCar® Pro allow you to display this data in graphical or tabular format, while earlier versions display data in tabular format only as shown at right.



## Service and Support

HOBO® products are easy to use and reliable. In the unlikely event that you have a problem with the hardware or software, please read the following.

### Who do I contact?

Contact the company that you bought the loggers from: Onset Computer Corporation or an Onset Authorized Dealer.

**Before calling**, you can evaluate and often solve your problem if you try the following:

1. Read this manual and the ReadMe file on the disk. It may only take a few moments to get the answers you need.

2. Write down the events that led to the problem. Have you changed anything in your computer recently? Are you doing anything differently?

**When contacting Onset Computer Corporation,** please indicate that you need Technical Support for HOBO® products.
Be prepared to:

1. Provide the product number which is found on the bottom of the logger, the software version and serial number if present on the diskette.

2. Provide details on the hardware and software configuration of your computer including: manufacturer, model number, peripherals, and version of operating system.

3. Completely describe the problem or question. The more information you provide, the faster and more accurately we will be able to respond.

NOTE: Onset allows one technical support contact for each software license.


**Onset Technical Support**
Onset Computer Corporation
470 MacArthur Blvd., Bourne, MA 02532
Mailing: PO Box 3450, Pocasset, MA 02559-3450
1-800-LOGGERS (1-800-564-4377)
Phone: 508-759-9500
Fax: 508-759-9100
e-mail: loggerhelp@onsetcomp.com


## HOBO® Warranty

The HOBO® products are warranted to be free from defects in material and workmanship for a period of one year from the date of original purchase. During the warranty period Onset will, at its option, either repair or replace products that prove to be defective. This warranty is void if the Onset products have been damaged by customer error or negligence or if there has been an unauthorized modification.

***Direct all warranty claims to place of purchase.***

### Returning Products to Onset

Before returning a failed unit, you must obtain a Return Merchandise Authorization (RMA) number from Onset. You must provide proof that you purchased the Onset product(s) directly from Onset (purchase order number or Onset invoice number). Onset will issue an RMA number that is valid for 30 days. You must ship the product(s), properly packaged to protect against further damage, to Onset (at your expense) with the RMA number marked clearly on the outside of the package. Onset is not responsible for any package that is returned without a valid RMA number or for the loss of the package by any shipping company. Loggers must be clean and free of any toxins before they are sent back to Onset or they may be returned to you.

### Repair Policy

Products that are returned after the warranty period or that are damaged by the customer as specified in the warranty provisions can be returned to Onset with a valid RMA number for evaluation.

Please contact Onset for more information and prices on:

### ASAP Repair Policy

Onset will expedite the repair of a returned product.

### Data-back™ Service

HOBO® data loggers store data in nonvolatile EEPROM memory. Onset will, if possible, recover your data to a disk.

### Tune Up™ Service

Onset will examine and retest any HOBO® data logger.



The CE mark identifies this product as complying with all relevant directives in the European Union (EU).


13233-F-MAN-H06-001-02


# HOBO® State User's Manual


The HOBO State data logger requires Onset Computer Corporation's logger software for Windows and PC interface cable for operation. Recommended software: BoxCar® 3.0+ or any version of BoxCar® Pro. The HOBO State is compatible with the HOBO Shuttle allowing for convenient data retrieval.

## Inside this package:

The HOBO State (Onset #H06-001-02) is shipped with:

1. HOBO State data logger
2. Contact closure cable
   (Onset #CABLE-2.5-STEREO)
3. Magnet
   (Onset #08-MAGNET-FM)
4. Mounting Accessories:
   Magnet
   Hook and loop tape
   Double-sided tape
5. This User's Manual
   (Onset #MAN-H06-001-02)

## Mounting options

Included with your HOBO H6 data logger are three options for mounting it on location: a magnet, hook and loop tape, and double-sided tape. These can be stuck on the back of your HOBO. When using the magnet, note that it works best on flat surfaces.

## Introduction

**Thank you** for buying the HOBO® State data logger. With proper care it will give you years of reliable readings. The HOBO State data logger has two inputs, a magnetic reed switch located in the middle of the hinge of the case (opposite the connectors), and an external contact closure input. The logger will indicate a closed state if either a magnet is present, or the external contact is closed.

## A different kind of logger

All previous HOBO loggers have recorded measurements with their sensors at regular preset intervals. These loggers record the time evolution of a physical property (temperature, RH, etc.). Usually the physical property has a long time-constant associated with it (water and air temperatures usually change slowly), so measuring at an interval that is shorter than this time-constant will give a realistic representation of what has happened. The HOBO State does not have a preset interval. It will always be monitoring and will only record when a change of state occurs.

## HOBO State data loggers in detail

HOBO State data loggers work well when there are only two values to measure (i.e. open or closed; on or off). The HOBO State data logger records the time at which a state change occurs (with a resolution of half a second), and records nothing between these changes. If you wanted to do this with a logger that uses preset intervals, you would have to set it to 1/2 second intervals, and an 8K logger would run out of memory in about an hour. The HOBO State data logger checks for the contact closure every half of a second, and can record 2000 state changes. Its time out in the field is limited by the battery (about one year).

## No data is information, too

The HOBO State logger records the initial state and a final state at readout, even if the state has not changed. This allows you to determine the entire period during which the HOBO State was watching for state changes.