Operating Instructions for the InSight Laser Rangefinder/Hypsometer

InSight™ 100LHA, 400LH/LHA, 800LH, 1000LH

The Opti-Logic LH & LHA series Insight Laser Rangefinder/Hypsometer height measurement system combines a pulsed Laser Rangefinder and a vertical angle sensor in a lightweight, easy-to-use package capable of measuring distances to non-cooperative targets up to 1000 yards, (depending on target size and reflectivity). Incorporating an internal electronic angle sensor, the Laser Rangefinder/Hypsometer makes vertical angle measurements to remotely determine object heights and horizontal distances with better than 1 degree resolution. This product is designed for years of trouble-free operation and is proudly **Made in the USA**.

InSight™ Version with LED Display In addition to the external LCD display for which Opti-Logic is so well known, an internal LED display is now incorporated into the view finder to increase the "usability" of the instrument.

Distance Measuring w/ Time-of-Flight Rangefinders The Opti-Logic Laser Rangefinder/Hypsometer emits invisible, eye-safe pulses of infrared light. Distances are determined by reflecting the Laser beam off an object and measuring the roundtrip time-of-flight of the Laser beam to and from the object. The Laser beam is emitted as a vertical stripe of light, with dimensions of approximately 10" x 4" every 100 yards, enhancing the Rangefinder's ability to hit thin vertical targets. The instrument incorporates a unique "Lock and Load" feature that simplifies the task of hitting targets in the presence of background objects. Simply depress the "Range" button and aim the Rangefinder using the Red LED Dot seen in the viewfinder. The Laser is fired **AFTER** the button is **RELEASED.** This provides time to place the Red Dot on the target and minimizes the chance of hitting unintended objects. To improve the accuracy of the instrument, an onboard computer averages multiple readings from the object. After the Rangefinder has received enough information, the Red Dot turns off and the distance is shown in external LCD displays. A tone or "chirp" will sound when the distance is displayed.

The maximum distance measurable by any Laser Rangefinder is determined by several factors including the size, shape, reflectivity, and orientation of the object, as well as atmospheric conditions. Color and surface finish of the target also affect the reflectivity and therefore can influence the range as well. A good quality target consists of a non-gloss object that is light in color and has enough surface area for the Laser beam to efficiently reflect back to the Rangefinder. Vertical objects tend to make better targets than horizontal ones, although horizontal objects can be ranged effectively by holding the instrument sideways. White objects tend to range farther than black objects. Target surfaces that are perpendicular to the Laser beam are better than surfaces tilted away from the Rangefinder. Targets made of "retro reflectors" provide the greatest range capability. Retroreflectors are materials designed to reflect light back toward the light source, e.g., stop signs, street signs, license plates, and specially made Opti-Logic reflectors. Contrary to expectation, extremely glossy surfaces like windows and mirrors do not make good targets, because they tend to reflect light away from the instrument.

Any object large enough or close enough to provide an adequate reflected signal will be measured by the instrument. Accordingly, when operated in dense brush, tall grass, or through tree branches, for example, the instrument may pick up unwanted targets. The LHA Models minimize this problem by using a low divergence Laser. However, to further minimize this effect, make sure that the instrument has a relatively unobstructed view of the intended target, taking into account the vertical shape of the outgoing Laser beam.

Product Description and Features
Viewfinder: Look through the viewfinder window, press the "Fire" button, and aim the Red-Dot at an object.
Fire Button: RELEASE the "Fire" button to take distance measurements, or to select modes.
Low Battery: Replace the battery when the Low Battery symbol is displayed constantly.
Automatic Rain Mode: For range accuracy in light rain conditions.
Automatic Timeout: To save batteries, the instrument will automatically "time out" after about 7 seconds of inactivity.

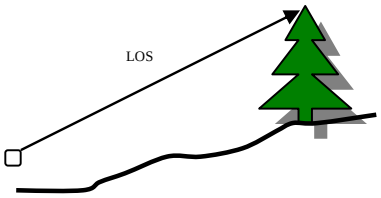
Mode Selection and Description The Opti-Logic Rangefinder/Hypsometer provides user-selectable display units and operational Modes allowing the user to determine either the **range**, **horizontal distance**, **height**, or **vertical angle** to a target, even when the desired target is uphill or downhill.

TO SELECT OPERATIONAL MODES, activate the **MENU FUNCTION** by holding the firing button down for approximately 6-8 seconds until a tone or chirp is heard and the display changes. Immediately release the button, then repeatedly press and release the button roughly one time per second to scroll through the **MENU OPTIONS (below)**:

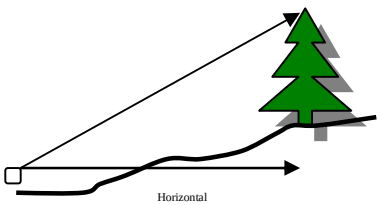
	Meters	Meters **Reflective**	Feet	Feet **Reflective**	Yards	Yards **Reflective**	Degrees	Percent Grade
Mode 0 (Line-Of-Sight Distance):	X	X	X	X	X	X		
Mode 1 (Horizontal Distance): (displays "HOR")	X		X		X			
Mode 2 (2-Point Height Measurement):	X		X		X			
Mode 3 (3-Point Height Measurement):	X		X		X			
Mode 4 (Vertical Angle): (displays ["°"] degree sign on external LCD)							X	
Mode 4 (Vertical Angle): (No icon displayed)								X

STOP TAPPING THE BUTTON WHEN YOU HAVE REACHED THE DESIRED OPERATIONAL MODE AND UNITS OF MEASURE. About 5 seconds after the desired menu option is selected, the instrument will chirp and turn off. Press the firing button to proceed with the measurement.

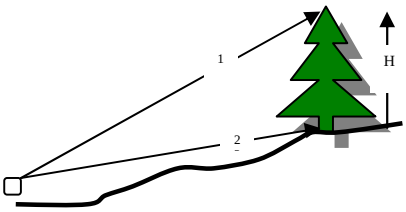
Mode 0: Basic Operational Mode (Line-of-Sight Distance). When the Mode 0 indicator is displayed on the external display, the unit measures the distance along a line extending directly from your eye to the object or target being measured. Press the range button to activate the Red Dot aiming device and place the Red Dot on your target. Release the button and wait for the chirp. When the chirp sounds, read the distance in the internal LED and/or the external LCD display. In Mode 0, the user has the option of specifying "Reflector" Mode, which increases the accuracy of measurements made to extremely bright or retro-reflective targets. For best results, **DO NOT USE REFLECTOR MODE ON NATURAL, OR NON-RETROREFLECTIVE TARGETS**, as this will over-correct the reading and cause the unit to read anywhere from 1-3 yards long. Reflective Mode is not available in Modes 1, 2, 3, or 4, so it is not an issue with horizontal, height or vertical angle readings.



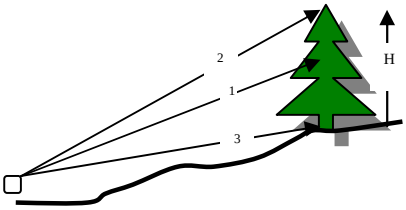
Mode 1: Horizontal Distance. In Mode 1, the instrument simultaneously takes a line-of-sight distance reading and a vertical angle reading, then uses a microprocessor to calculate and display the horizontal distance below (for uphill shots) or above (for downhill shots) the target point, as shown in the adjacent figure. Because the instrument is measuring distance in this Mode, the user must have a relatively unobstructed view of the target point. To make a measurement in Mode 1, press the range button to activate the Red Dot aiming device. Put the Red Dot on your target. Release the button and wait for the distance to display on the internal LED display and/or the external LCD display. *It should be noted that the instrument will measure the correct horizontal distance regardless of the orientation of the instrument, although for best results it is recommended that the instrument be held in the normal position, with the firing button on top.*



Mode 2: (2-Point) Height Measurement. This Mode requires **2** measurements: 1) Top and 2) Bottom **IN THAT ORDER**. During each measurement process, the instrument makes simultaneous distance and vertical angle measurements and calculates the height of the target. As with Modes 0 and 1, each reading requires a relatively unobstructed view of the aiming point. To make a height measurement in Mode 2, first press the fire button. A " ⌜ " appears in the internal LED display and "top" appears in the external LCD display. Aim the Red Dot at the target, release the button and wait for a chirp. The LED will display a " ⌞ " and the external LCD will then display "bot". Then aim the unit at the bottom of the object to be measured; press and release the button; wait for a double chirp. The internal LED and the external LCD will then display the calculated height measurement. *It should be noted that the instrument will measure the correct height regardless of the orientation of the instrument, although for best results it is recommended that the instrument be held in the normal position, with the firing button on top.*



Mode 3: (3-Point) Height Measurement. This Mode requires **3** measurements: 1) Center, 2) Top, and 3) Bottom in that order. During the "center" reading, the instrument makes simultaneous distance and vertical angle measurements and calculates the effective horizontal distance to the target point. As with Modes 0, 1 and Mode 2 (2 point), the center reading of Mode 3 requires a relatively unobstructed view of the aiming point. **On each of the "top" and "bottom" readings, the instrument measures angle only, eliminating the requirement to have a clear, unobstructed view of the top and bottom of the target.** To make a 3 point height measurement in Mode 3, first press the button; a center symbol - " ┼ " will appear in the internal LED display and "cen" will appear in the external LCD display. Aim the Red Dot at the target, release the button and wait for a chirp. (For best results, **the first, or "center" measurement to the object can be to any point presenting a clear line-of-sight to the axis of symmetry of the target. This can include either the top or bottom of the object being measured!** For example, this could be either the trunk of a tree or the top of the tree.) The instrument will then display " ⌜ " in the internal LED display and "top" in the external LCD display. Aim the unit at the top of the object to be measured, press and release the button, and wait for a chirp. The internal LED display will indicate " ⌞ " and the external LCD will display "bot". Aim the unit at the bottom of the object to be measured; press and release the button and wait for a double chirp. The internal LED and external LCD will then display the height of the object. It is not necessary to be able to see either the top or the bottom of the object being measured, since the top and bottom measurements are angle measurements only, and do not include distance measurements. *It should be noted that the instrument will measure the correct height regardless of the orientation of the instrument, although for best results it is recommended that the instrument be held in the normal position, with the firing button on top.*



Mode 4: Angle Measurement. To determine the angle (or percent grade if so selected), press and hold the range button, place the Red Dot on the point to be measured, **release** the button, and wait for a chirp to sound before lowering the unit. The angle (or percent grade if so selected) is displayed simultaneously in the internal LED display as well as in the external LCD display.

General Care

The Opti-Logic Laser Rangefinder is a sophisticated electronic and optical instrument, built to withstand a reasonable amount of handling with the same amount of care as any other optical or electronic device, such as a camera, binoculars, riflescope, telescope, etc. Keeping the lens clean will insure optimum operation and performance. Use a soft, clean non-abrasive cloth to clean the lenses. Cotton swabs work well. Never use paper or other abrasive materials. Dampen a cloth with either a very mild soap solution or clean water. Gently rub the lenses with a dampened cloth. **DO NOT SCRUB THE LENSES.** After cleaning the lenses, gently wipe the lenses off with a soft dry cloth. **NEVER** use petroleum products or chemicals to clean the lenses or any parts. Use the same procedure to clean the exterior. Although the Opti-Logic Laser Rangefinder has been designed to withstand normal outdoor use, some common sense precautions should be observed. **NEVER** subject your laser rangefinder to shock, high temperature, or harmful chemicals or gases. If the Rangefinder is not going to be used for long periods of time, remove the battery and store in a cool, dry place. **DO NOT** use chemicals or solvents to clean the Rangefinder. Chemicals, insect repellents and solvents can damage the plastic housing and lenses of the Rangefinder.

Low Battery Indicator

When the battery voltage becomes too low, the instrument may act erratically or cease to function. The low battery indicator will appear in the display before this occurs. The battery should be replaced as soon as possible after the indicator is displayed.

Changing the 9 Volt Battery

A. Locate the battery compartment door on the right side of the instrument (looking from the back). Using your thumbnail, slide the locking tab on the compartment door toward you.
B. Using your thumbnail, gently pry the battery door away from the instrument body, using the locking tab.
C. Pull on the cloth ribbon and the battery will pop out.
D. Replace battery. Battery direction is shown in the battery compartment. Replace and lock battery door using slide lock.

Technical Support and Maintenance

For questions regarding the Opti-Logic Laser Rangefinder or if problems persist, make a note of the instrument serial number and date of manufacture and call Opti-Logic Customer Service at **(1) 931-454-0897**, 8am to 5pm Monday thru Friday Central Time. If your rangefinder requires maintenance, your Customer Service Representative will assign you a Return Merchandise Authorization Number (RMA) and provide instructions for returning the instrument for repair. When returning merchandise for maintenance or repair, please be sure to include a brief written description of the problem with the unit. Return to:

US Mail:
Opti-Logic Corporation
P.O. Box 2002
Tullahoma, TN 37388

Commercial Carrier:
Opti-Logic Corporation
201 Montclair Street
Tullahoma, TN 37388

Warranty

Your Opti-Logic Laser Rangefinder is warranted to be free of defects for a period of two years from the date of purchase **(Proof of Purchase IS REQUIRED)**. This warranty does not cover defects caused by misuse or improper handling, installation or maintenance of the product. In the event of a defect under this warranty we will, at our option, repair or replace the product, provided that you return the product postage prepaid to your authorized Opti-Logic Technical Service Center **including a check in the amount of $15.00** to help cover the cost of handling. (This fee is waived if you discover a defect within the first 30 days after purchase.) We strongly recommend that you insure the instrument and use a carrier that has tracking capabilities. Opti-Logic Corporation is not responsible for lost or damaged shipments. Non-warranty repairs will be made at a cost of $25.00 plus the cost of any plastic replacement parts.

Specifications

Approx. Size:	1.7" x 4" x 5.1"		
Weight:	<11 oz		
Operational Range:	100LHA:	4-100 yd	Up to 999 yd (reflective targets)
	400LH/400LHA:	4-400 yd	Up to 999 yd (reflective targets)
	800LH	4-800 yd	Up to 999 yd (reflective targets)
	1000LH	4-1000 yd	Up to 1500 yd (reflective targets)
Range Accuracy:	+/- 1 yard (+/- 2 yards for very dark or very bright targets).		
Height Accuracy:	+/- 18 inches + 0.5% of height		
Range Resolution:	0.1 meter / 1 foot / 0.5 yard (1 meter/yard over 200 meters/yards)		
Angle Resolution:	0.1 degrees.		
Readout:	Easy to read (InSight) internal LED and external LCD display.		
Units of Measure:	User Selectable in either meters, feet or yards.		
Viewfinder:	Monocular viewing port. Red LED aiming sight, +/- 0.1 degrees		
Battery:	Single 9 volt battery. Operates for approximately 1000 readings.		
Operational Temp:	0° - 40°C, 32°-104°F. Relative Humidity 5-95% non-condensing.		
Laser Type:	Infrared Class 1, eye safe 905nm Laser.		

Opti-Logic Laser Rangefinders are covered by one or more of the following U.S. Patents: # 5,898,484, #5,933,224, #6,873,406