



USER'S GUIDE

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P/N 40150-H
(FOR Version 4.96 AND ABOVE)

Chapter 3

Speed Measurement

When the SpeedLaser® is first turned ON, it automatically and quickly runs the self-test function. To capture a speed, simply follow the procedure below when the self-test is complete.

MEASURING SPEED

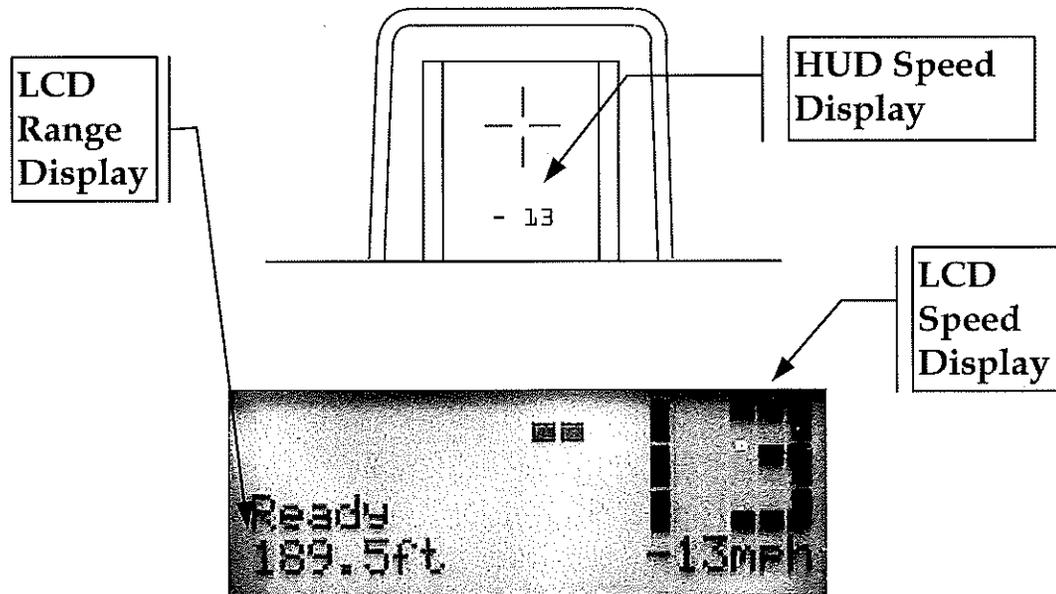
NOTE: Always verify operational procedures for Alignment Check.

1. Align the HUD Sighting Reticule (+ symbol in the HUD) on the target you wish to measure the speed of.
2. Squeeze and hold the Handle Trigger until the speed is displayed.
3. Release the Handle Trigger to stop measurement and lock information in the HUD and on the LCD.

The speed will be shown in three places...twice on the rear right of the LCD and also in the HUD (when selected) character display. Notice that two of the speed displays are truncated to the nearest mph.

The distance to the target will be shown on the left side of the LCD.

NOTE: Pressing the trigger will take you to the *Speed Display Page* regardless of any other mode the SpeedLaser® may be in. (The exception is when in the TEST mode.)

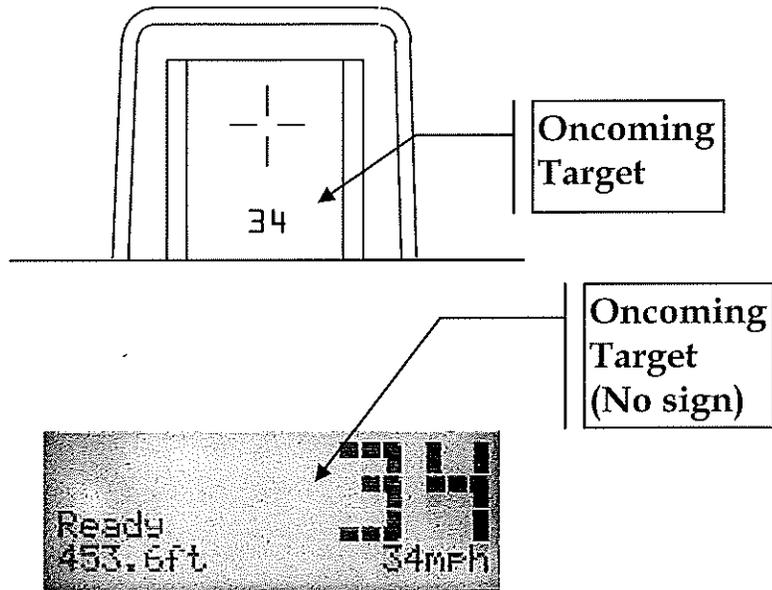


APPROACHING AND RECEDING TARGETS:

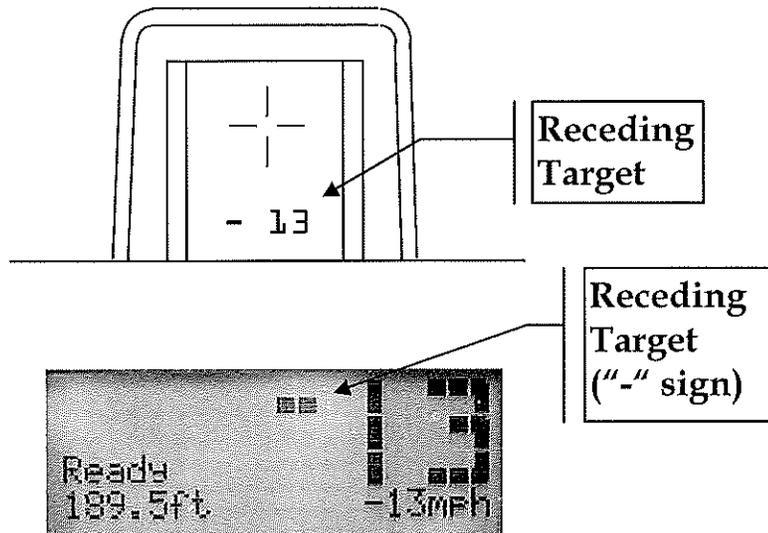
The SpeedLaser® can measure the speeds of both approaching (oncoming) and receding targets.

When the target is receding, a “-“ sign will precede the speed displayed in the HUD and on the LCD.

Example of an Approaching target



Example of a Receding target



Manufacturer's Recommended Daily Test

In keeping with NHTSA (National Highway Traffic Safety Administration) and IADLEST (The International Association of Directors of Law Enforcement Standards and Training) guidelines general operational considerations for LIDAR Speed Measurement devices, the operator must perform the following accuracy checks prior to beginning enforcement operations:

- 1) Internal Circuit Check
- 2) LED Segment Test
- 3) Range (Chronometer) Accuracy Test
- 4) Horizontal Sight Alignment Test
- 5) Vertical Sight Alignment Test

WHAT THE DAILY TEST ACCOMPLISHES:

To ensure that the SpeedLaser® is in good working order, the SpeedLaser® should be tested using the Manufacture's daily test described later in this chapter. This test restores the factory default settings, checks the LIDAR hardware (including the program and dynamic memories), tests the displays and timing circuits, and then allows the operator to verify that the HUD aiming crosshairs are correctly aligned with the laser beam.

NOTE: The alignment crosshairs in the HUD are set at the factory and generally do not need realignment over the life of the SpeedLaser®.

1) Internal Circuit Check

When the operator presses Menu followed by Test (button A on the keypad), the SpeedLaser® runs a BIT (Built-In-Test) program. The BIT program tests the hardware and verifies that the SpeedLaser® firmware is loaded correctly. It then checks that the processor is executing the data gathering, storing (memory), sorting, filtering, conversion and linear regression algorithms correctly.

2) LED Segment Test

This test allows the operator to verify that the seven-segment display, used to show speed of the target vehicle, is in good working order by displaying a simple known pattern. The operator can then confirm that each segment operates correctly.

3) Range (Chronometer) Accuracy Test

The SpeedLaser® hardware ONLY measures Time. Range and Speed are computed values derived from multiple time measurements by the firmware, which was checked for proper operation during BIT. The design of the firmware was verified as part of the IACP certification process.

This test uses the SpeedLaser®'s high-speed chronometer (timer) to measure the time it takes a light pulse to travel a known distance (i.e.; from the SpeedLaser® to a target at a known distance and back). Since the speed of light in air is known, the SpeedLaser® can calculate the range that the light pulse traveled. The operator then compares the reported range to the known distance to the target. To verify that the timing hardware is working correctly the computed range must match the known distance to within ± 1 foot (25 cm). At least two such comparisons using targets at least twenty (20) feet apart must be made.

In normal operation, the SpeedLaser® measures the time it takes for a light pulse to travel from the SpeedLaser® to a moving vehicle and back. The SpeedLaser® makes hundreds of such round trip time measurements each second, each time measurement is converted to a range and stored. When the SpeedLaser® has sufficient stored ranges, it performs a linear regression calculation that yields the speed of the vehicle. Numerous firmware filters are used to confirm the computed speed before it is displayed.

4) Horizontal Sight Alignment Test

This is a test to confirm that the sighting system and the invisible light pulse emitted by the SpeedLaser® are aligned horizontally. The operator uses the sighting system to aim at an object and then confirms that the light pulses of the SpeedLaser® are hitting that object by observing that the SpeedLaser® is reporting the range to that object. The operator then moves the sighting system off of the object and observes that the reported range changes, just as the sighting system is no longer on the object and indeed should change.

5) Vertical Sight Alignment Test

Same as Horizontal alignment test but in the vertical axis

Running the Manufacturer's Recommended Daily Tests

1) Internal Circuit Check

Press MENU followed by "A" on the keypad, which selects Test.

The LIDAR will then automatically:

- a) Enter the TEST/RESET Mode
- b) Restore factory default settings
- c) Run the internal circuit check
- d) Run the program and dynamic memory test
- e) Runs an LED count test (1111, 2222, ..., 9999)
- f) Defaults the HUD display to 8888

Wait for when "Memory-OK" is displayed, which indicates that the test is complete.

2) Light Segment Test

Confirm that the HUD is displaying the aiming "+" with the data "8888".

3) Range (Chronometer) Accuracy Test

Confirm that the LIDAR can correctly compute two or more known ranges using any **one of the following methods:**

- a) From one location, range to two targets at known distances.
- b) From two locations, range to one target at a known distance.
- c) Range to a random target, back up a known 'delta' distance, and confirm that LIDAR computes a new range with the same delta distance. Then back up a second, but different delta distance and confirm that LIDAR computes a new range that matches the new delta range.
- d) Combine method a) with the horizontal and vertical alignment tests (4 and 5) on next page. This requires that the targets used for the Horizontal and Vertical alignment are at different known ranges.

Using your preferred method from above:

- a) Stand at the selected position.
- b) Aim at selected target.
- c) Squeeze and hold trigger until tone sounds (range is computed).
- d) Confirm that reported range is within ± 1 foot of expected.
- e) Repeat steps a) thru d) using a know distance that is at least 20 feet different then the first known distance.

Continued on next page

4) Horizontal Sight Alignment Test

- a) Locate a tall, vertical object (such as a utility pole) with clear sky behind it (and preferably greater than 150 feet away.)
- b) Aim to the right of the object, and pull the trigger.
- c) While keeping the trigger pulled, slowly sweep the crosshair sight to the left. Press D (Done) when completed.
- d) The distance should be displayed in the HUD, **only** when the target edge is in view of the crosshair.

5) Vertical Sight Alignment Test

- a) Turn the unit 90 degrees sideways and repeat steps 4) a – d.
- b) Press MENU or DONE to exit Test Mode.

