SpeedLaser ®

User's Manual

LASER ATLANTA ™

®

SPEED **L**ASER

USER'S MANUAL

PLEASE SEE BACK COVER FOR CONTACT
INFORMATION REGARDING REPAIRS AND
SALES

P/N 40150-X
(For Version 4.66 and above)

Chapter 3
Speed Measurement

When the SpeedLaser® is first turned ON, it automatically and quickly runs the Built In Test (BIT) functions. To capture a speed, simply follow the procedure below when the BIT is complete.

SPEED DETECTION

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, momentarily display the information in the HUD and lock information on the LCD. The LCD displays the information until one of the following occurs:
   - a.) The laser is fired.
   - b.) The unit is powered down (by the operator or typically after about 10 minutes of inactivity) or
   - c.) The menu button is pressed.

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

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.)

LCD Range Display

HUD Speed Display

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LCD Speed Display

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Ready
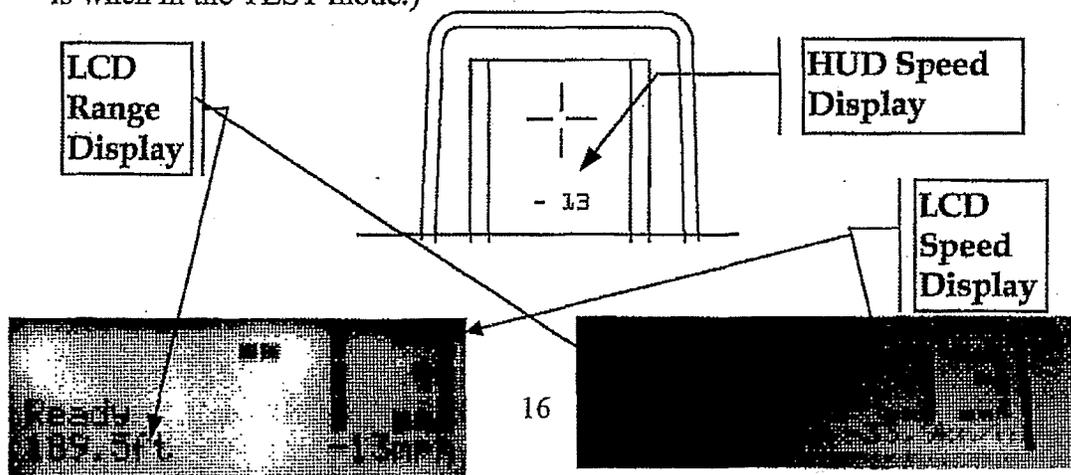
APPROACHING AND RECEDING TARGETS:

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

Oncoming Target

Oncoming Target (No "-" sign)
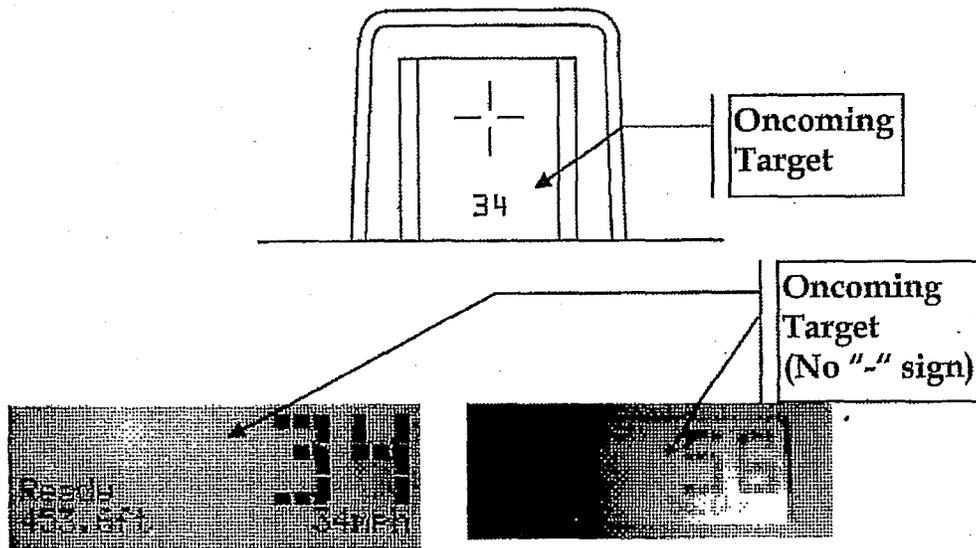
Example of a Receding target

Receding Target

Receding Target ("-" sign)
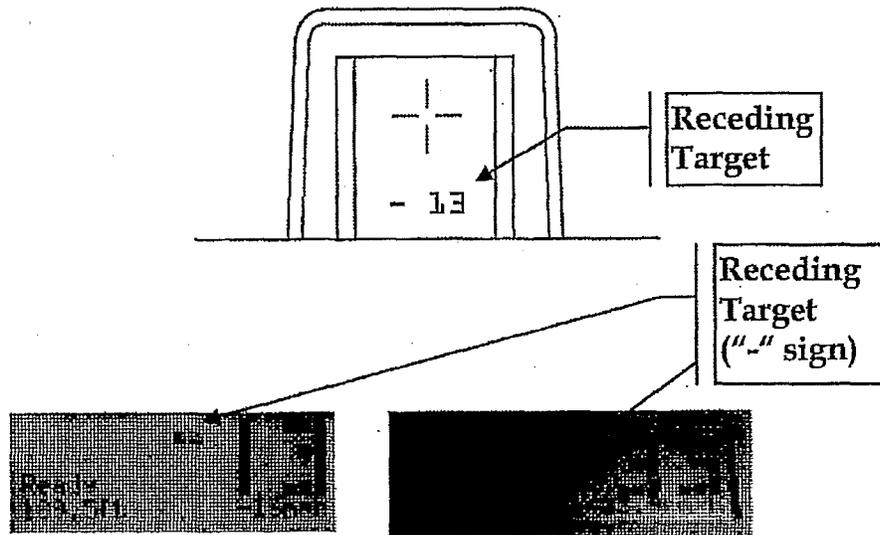
Manufacturer's Recommended Daily Test

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 software by verifying that the SpeedLaser® firmware is loaded correctly and then checking 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 and verify the presence of the aiming reticle.

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 and accuracy of the firmware was verified as part of the IACP certification and subsequent testing processes.

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 (30 cm). At least two such comparisons using targets at least twenty (20) feet (6 meters) 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

When the SpeedLaser is initially powered ON, it automatically and very quickly runs a hardware and software Built In Test (BIT). When successfully completed, the LCD screen will display "SYSTEM READY" or "Self Test Passed". You are now ready to complete the following recommended daily tests, listed as #1 through #5, prior to conducting any enforcement activity.

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 RESET & TEST Mode
- b) Restore factory default settings
- c) Run the hardware Built In Test (BIT)
- d) Run the software BIT including dynamic memory test
- e) Runs an LED count test (1111, 2222, ..., 9999)
- f) Defaults the HUD display to .8.8.8.8

Wait for "TEST PASS" or "Memory-OK" to be displayed. Either indicates that steps a to d have been completed successfully.

2) Light Segment Test
Confirm e or f, the HUD is displaying aiming "+" with the data ".8.8.8.8".

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 <u>one</u> location, range to <u>two</u> targets at known distances.
- b) From <u>two</u> 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 (30 cm) of expected.
- e) Repeat steps a) thru d) using a known distance that is at least 20 feet (6 meters) different than the first known distance.

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4) Horizontal Sight Alignment Test

    a) Locate a vertical object (such as a utility pole) with open sky behind, preferably at a distance greater then 150 feet/45 meters.

    b) Aim to the left or right of the object, pull and hold the trigger.

    c) While keeping the trigger pulled, slowly sweep the crosshair sight across the vertical object.

    d) The distance to the pole should be displayed once the target edge is inside the HUD crosshair.

    e) Press D (Done/Next) to display next step.

5) Vertical Sight Alignment Test

    a) Turn the unit 90 degrees sideways and repeat steps 4) a – e.

    b) Press MENU or DONE to exit **Test** Mode.

Note: If desirable, the horizontal and vertical alignment tests may be conducted using an horizontal object, such as a utility wire, with open sky. However, it will be necessary to turn the Lidar unit 90 degrees to conduct the horizontal test and return it to the upright position when testing the vertical axis or plane.

Sweep from the LEFT

Sweep from the RIGHT