LTI 20/20

TruSpeed® Sxb

Metric User's Manual

3rd Edition

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Table of Contents

Section #1 - Getting Started

Unpacking Your TruSpeed Sxb

When you receive your TruSpeed Sxb, check to make sure that you have received everything that you ordered, and that it all arrived undamaged.

TruSpeed Sxb Basic Package

- ☐ TruSpeed Sxb instrument with polarizing filter
- ☐ Carrying Case
- ☐ Neck Strap
- ☐ Connector Straps (quantity 2)
- ☐ Eyepiece Cover
- ☐ CR123A Battery (quantity 2)
- ☐ User's Manual

Available Accessories

- ☐ Receive Lens Filter
- ☐ Data Download Cable
- ☐ Tripod / Monopod
- ☐ TruSpeed Sxb / Monopod Bracket
- ☐ TruSpeed Sxb / TruAngle Bracket
- ☐ TruAngle
- ☐ Data Collector
- ☐ Complete QuickMap 3D TruAngle Package
- ☐ LTI LaserSoft® SpeedCapture for iOS
- ☐ LTI LaserSoft® SpeedCapture for Android

Important Safety Information

Avoid staring directly at the laser beam for prolonged periods.

- The TruSpeed Sxb is designed to meet FDA eye safety requirements and is classified as eye-safe to Class 1 limits, which means that virtually no hazard is associated with directly viewing the laser output under normal conditions. As with any laser device, reasonable precautions should be taken in its operation. It is recommended that you avoid staring into the transmit lens while firing the laser. The use of optical instruments with this product may increase eye hazard.

Never attempt to view the sun through the scope.

- Looking at sun through the scope may permanently damage your eyes.

Never point the instrument directly at the sun.

- Exposing the lens system to direct sunlight, even for a brief period, may permanently damage the laser transmitter.

Avoid Direct Exposure on the Eyepiece

- Exposing the lens system to direct sunlight even for a brief period, may permanently damage the internal components.

Do not operate the instrument in extreme temperatures.

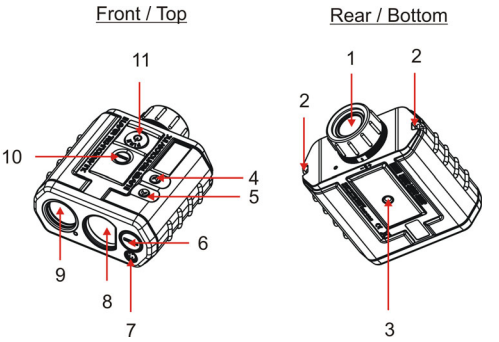
- TruSpeed Sxb components are rated for a temperature range of -30° to 60° C. Do not operate the instrument in temperatures outside that range.

About the TruSpeed Sxb

Laser Technology's LTI 20/20 TruSpeed Sxb is part of the Laser Technology family of handheld laser speed and ranging devices. Compared to our other laser speed measurement products, the TruSpeed Sxb includes:

- Survey Mode and the built-in tilt sensor allow the unit to measure vertical angles, which the Sxb uses to calculate height and elevation and to determine slope-reduced horizontal distances.
- When the Survey Mode is active, the Electronic Filter reduces the laser's sensitivity so the laser only detects pulses returned from a reflective target.
- Simple 4 button operation for quick and easy access to speed measurements, survey measurements and options.
- Reduced size and weight.
- Ergonomic handheld design.
- Adjustable monocular to reduce eye fatigue.
- 7x magnification for superior targeting.
- In-scope LCD with aiming reticle for instantaneous access to speed/survey measurements and options.
- Built-in Weather Mode that is an alternate speed measurement mode. It is a simplified gating option. This factory-defined gate ensures that targets are beyond the range where rain and snow can affect the laser's ability to capture a speed reading.
- Continuous Mode that is an alternate speed measurement mode. It displays one speed reading after another until you release the FIRE button.
- Sounds and visual indicators that ensure confidence of positive target acquisition.
- Serial data output port for easy connection to a PC device such as a laptop PC, data collector, etc. Or us Bluetooth wireless technology to replace the cable connection between devices.

Figure 1shows the TruSpeed Sxb front/top and rear/bottom panels.



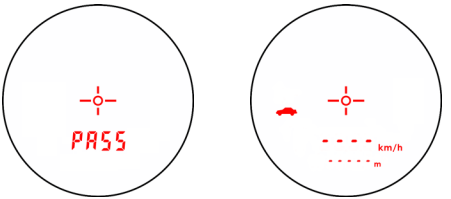
1. Adjustable Eyepiece
2. Attachment Point (For NeckStrap and Eyepiece cover)
3. 1/4 -20 Mounting Point
4. Forward button
5. Back button
6. Battery Compartment Cover
7. Serial Port
8. Receive Lens
9. Transmit Lens
10. MODE button
11. FIRE button

Figure 1

Take a Sample Measurement

This section demonstrates a basic speed measurement. For information about speed measurements, see Page 18. If necessary, install the batteries (Page 9).

1. Press the button to Power ON the TruSpeed Sxb. Figure 2A shows successful completion of the Self Test. The Speed Measurement Screen is automatically displayed (Figure 2B).



A B

Figure 2

2. Use the sighting scope and aiming reticle to aim the instrument to a convenient target that is at least 15 meters - an interior wall will do.
3. To fire the laser:
   - Press and hold the button. The laser will fire after a short delay (about one-half of a second). The indicator will appear while the laser is firing.
   - The 1st press initiates the self test function then turns on the in-scope aiming reticle. Once the reticle is seen, the 2nd press takes the measurement.
4. Continue to press the button and keep the instrument sighted on the Target:
   - A low-pitched growl means that the instrument is attempting to lock onto the target.
   - 1 Low-Pitched and 2 High-Pitched Beeps mean that a measurement error occurred. An error code will be displayed (Page 17).
   - 2 high-pitched beeps mean that a speed was captured. The measured speed will be displayed on the in-scope LCD screen, just below the aiming reticle.

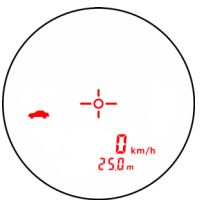


Figure 3

After you release the button, the instrument will display the speed reading and the distance at which it was captured. The display screen should look similar to Figure 3. If you did not capture a speed, an error code will be displayed (Page 17).

External Power Option

The TruSpeed Sxb supports external power input on the serial connector. With external power input, the battery is not required for operation.

Eyepiece

The eyepiece is located at the back of the TruSpeed Sxb. It includes a 7X magnification scope that features an integrated polarizing light filter to optimize viewing contrast in any given environmental condition.

Eyepiece Cover:
The eyepiece cover protects the internal components from sunlight exposure. The eyepiece cover should be in place whenever the TruSpeed Sxb is not in use.

To attach the eyepiece cover:
Feed the thin cord under the metal bar and flare the loop open.
Pull the eyepiece cover through the loop and cinch tight.

Focus Adjustment Ring

The Focus Adjustment Ring allows you to focus the LCD in-scope display relative to the target for your eye. During assembly, optimum focus is set to infinity. To adjust the LCD focus, turn the Focus Adjustment Ring to suit your personal preference. See Figure 4.

Monocular adjustment reduces eye fatigue.

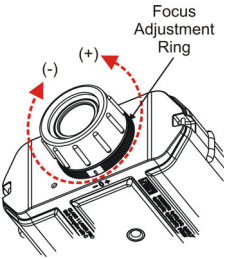


Figure 4

In-scope LCD

- The In-scope LCD displays menu items, option indicators, error codes, and speed measurement results.
- The aiming reticle helps you aim accurately to the target. Figure 5 shows the reticle which is located at the center of the in-scope LCD and represents the size of the laser beam.
- You can vary the intensity of the aiming reticle to account for different lighting conditions. For more information, see Page 15.

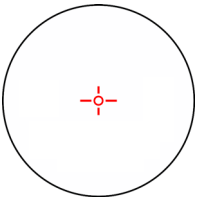


Figure 5

Receive Lens Filter

When using Survey Mode, activating the Electronic Filter reduces the laser's sensitivity so the laser only detects pulses returned from a reflective target. The optional Receive Lens Filter is required for measurements taken while the Electronic Filter is active. See Page 28 for information about using the Survey Mode and the Electronic Filter.

1. Attach the Receive Lens Filter to the TruSpeed Sxb:
   - Feed the loop of the Tether around the metal post of either attachment point.
   - Feed the Receive Lens Filter through the loop.
   - Gently tighten to secure.
2. Place the Receive Lens Filter over the TruSpeed Sxb's Receive Lens. Figure 6 shows the Receive Lens.
3. Align the Receive Lens Filter. To fit properly, align the straight edge of the filter with the straight edge of the lens.
4. Press the Receive Lens Filter all the way into the lens cavity.

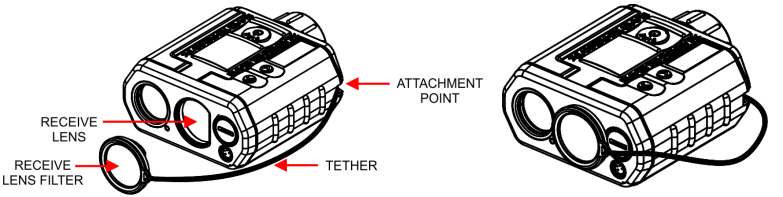


Figure 6

Serial Port

The TruSpeed Sxb includes a Serial Port located on the front panel and allows the instrument to download measurement data.

Tilt Sensor

The built-in tilt sensor measures inclination angles, which allows the instrument to compute horizontal and vertical distance measurements for more complex survey tasks such as crash scene mapping. The instrument held level is at 0°, and is rotated up through +90° and down through -90°.

Buttons

The TruSpeed Sxb has a 4-button keypad located on the top panel of the instrument. The buttons provide easy access to the instrument functions.

This manual refers to the buttons while the laser is oriented as shown in Figure 7. The table below lists the buttons and the functions of each.

Figure 7

FIRE	Initiate power ON Self Test.
	Initiate speed or survey measurement.
	Local Speed Limit Edit: Initiates the edit process. While editing, stores the set value.

MODE	Toggle through menu options.
	Toggle through Survey Measurement results.
	Confirm/set selection.
	Local Speed Limit Edit: Resets the value to zero.

^	Change the LCD backlight level.
	Local Speed Limit Edit: Sets the right-most digit and then prompts you to edit the next digit to the left.

v	Toggle Continuous Mode and Weather Mode On/Off.
	Exit Test Mode and return to Speed Mode.
	Local Speed Limit Edit: Edits the right-most value.

- Simultaneously pressing the FIRE and MODE buttons turns the instrument off.
- While in a menu, simultaneously pressing the ^ and v buttons starts the Speed Measurement mode.

Installing / Removing the Battery

A CR 123A 3V Lithium battery is required to power the TruSpeed Sxb. The battery is located in the Battery Compartment at the front of the instrument.

Installing the Battery

1. Remove the Battery Compartment Cover by lifting up the Hinged Tab and turning counter clockwise,
2. Insert the battery negative end (-) first.
3. Re-insert the Battery Compartment Cover and use the Hinged Tab to turn clockwise.
4. Press down on the Hinged Tab to secure.

ⓘ To remove the battery, just reverse the above instructions.

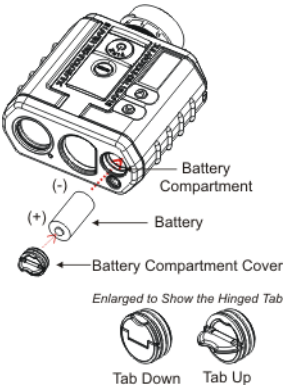


Figure 8

Battery Voltage Level

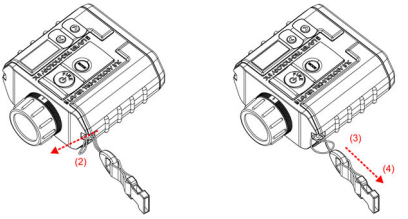
The TruSpeed Sxb continuously monitors its power source. LTI has defined an acceptable battery voltage range to ensure that the instrument has sufficient battery voltage to guarantee correct operation.

Battery Icon Appearance	Explanation
Battery Icon Not Displayed	The estimated battery life is between 100% and 10%.
	The estimated battery life is between 10% and 5%.
	The estimated battery life is approximately 5% to 0%.

Attaching the Neckstrap

Single point attachment:

1. Disconnect anchor end of the strap using the buckle.
2. Feed loop around metal bar.
3. Thread the neck strap through the loop.
4. Gently tighten to secure.
5. Reconnect anchor end of the strap using the buckle.



A B

Figure 9

Two point attachment:

1. Find the two Attachment Points located on the rear panel of the TruSpeed Sxb.
2. Insert the end of one of the connector straps into one side of the eyelet opening and feed it through to the other side.
3. Feed the strap up from the bottom of the buckle, then over the center of the buckle and back down through the other side.
4. Pull the strap to take up any slack and tighten the strap to simply have a loop that is fed through the eyelet.
5. Repeat steps 2-4 to attach the other connector strap to the other side of the TruSpeed Sxb.
6. Attach one end of the neckstrap into the side release buckle of one of the connector straps.
7. Attach the other end of the neckstrap to the side release buckle of the other connector strap.

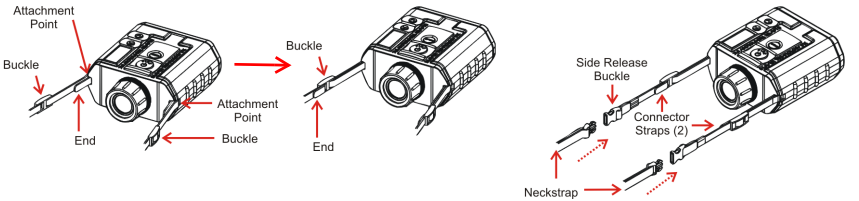


Figure 10

- Make sure the strap is straight when attaching it to the TruSpeed Sxb. This will help you avoid uncomfortable twists in the strap that will rub your neck.
- Before use, check to make sure the neckstrap is secure. Failure to do so may result in the TruSpeed Sxb hitting the ground or other object. If you drop the instrument, check the scope alignment (Page 30) before using the instrument for speed measurement.
- The neckstrap may also be attached to the carrying case.

Powering ON the TruSpeed Sxb

1. Press the AIM button. Briefly, the instrument will perform the Self Test.

- If all tests prove positive, "PASS" appears briefly in the in-scope LCD. Then the Speed Mode will be active and the Speed Measurement Screen will be displayed.
- If all tests do not prove positive, the appropriate error code will appear in the in-scope LCD (Page 17).

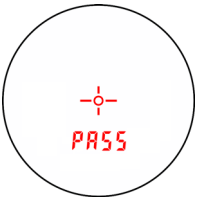


Figure 11

If the instrument fails the self test:

1. Press the AIM button and the MODE button simultaneously for one second to power off the instrument.
2. Press AIM button again to initiate another self test to see if it passes.
   - If the error persists, contact LTI Service. See the inside front cover for LTI contact information.

Powering OFF the TruSpeed Sxb

1. Simultaneously press and hold the AIM and MODE buttons for one second.

To help save its battery:

- If there is no measurement data, the unit powers off after 30 seconds of inactivity.
- If there is measurement data, the unit dims the display to the lowest level after 30 seconds, and then powers off if there is no activity after 15 minutes. Note: Instrument activity includes any button presses.

Understanding the Display Indicators

Figure 12 shows the LCD Screen when all indicators are active. The table below lists the display indicators and the function of each.

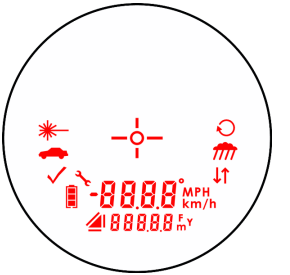


Figure 12

Display Indicator	Function	Explanation
	Aiming	Serves as the aiming point reference, both horizontally and vertically.
	Laser Fire	The instrument's laser is firing.
	Speed Mode	The instrument's Speed Mode is active (Page 18).
	Test Mode	The instrument's Test Mode is active (Page 25).
	Device Information	• The instrument's model and firmware version number are displayed (Page 36). • Bluetooth status is displayed (Page 39). • The instrument's serial number is displayed (Page 40).
	Battery	Identifies the approximate current battery voltage. The indicator shown here represents 10% - 5% battery life (Page 11).
	Survey Mode	The instrument's Survey Mode is active (Page 26). This indicator's appearance varies based upon measurement type (Page 25).
	Upper Display	Provides access to speed measurements and messages.

Display Indicator	Function	Explanation
888.8.8	Lower Display	Provides access to range measurements and messages.
o	Inclination Units	Degrees.
F m Y	Range Units	F: feet m: meters Y: yards
km/h MPH	Speed Units	km/h: Kilometers per Hour MPH: Miles per Hour
↓↑	Electronic Filter	The instrument's Electronic Filter is active (Page 28).
	Weather Mode	The instrument's Weather Mode is active (Page 20).
	Continuous Mode	The instrument's Continuous Mode is active (Page 22).

Miscellaneous Display Features

The upper and lower displays of the in-scope LCD are used to convey messages and measurement results.

- Upper Display (all segments active): -888.8
- Lower Display (all segments active): 888.8.8
- Numbers 0-9: 0 1 2 3 4 5 6 7 8 9

Display Feature	Explanation	Refer to Pages
br--	Aiming reticle brightness. Where "--" is 01 to 05.	15
bt	Bluetooth	39

Display Feature	Explanation	Refer to Pages
-d1-	Distance 1 of the Delta Distance Test.	33
-d2-	Distance 2 of the Delta Distance Test.	34
E --	Speed Mode: Error message. Where "--" is the error code.	17
EnCd	Bluetooth Copy Mode. Reserved for future use with the MapStar TruAngle.	39
FILtr	Electronic Filter.	28
on	Toggles the option on. Appears in the Lower Display for Bluetooth and in the Upper Display for Electronic Filter.	28, 39
oFF	Toggles the option off. Appears in the Lower Display for Bluetooth and in the Upper Display for Electronic Filter.	28, 39
PASS	During the Self Test, all tests proved positive.	11, 35
SELF	Self Test.	11, 35
Sn	Instrument serial number.	40
SPdLt	Speed Limit Edit.	24, 36
-tt-	Scope Alignment Test.	30

Adjusting the Aiming Reticle's Intensity

The in-scope aiming reticle has five intensity settings from DIM (1) to BRIGHT (5).

1. Looking through the eyepiece, press the button. The display should look similar to Figure 13.
2. Press the button until the desired setting is achieved. It's easy to get the desired setting if you look through the eyepiece while making the adjustment.
   - Each time you press the button, the "brxx" value increases by 1.
   - If you press the button while "br05" is displayed, you will see "br01" next.
3. Press the button to return to the measurement mode that was most recently active.

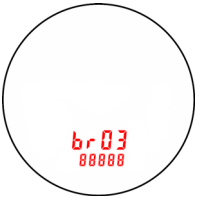


Figure 13

Powering OFF the instrument does not change this setting. The next time the instrument is powered ON, the setting will be the same.

Listening to the TruSpeed Sxb

The TruSpeed Sxb emits a variety of beeps and tones during use. The sounds vary and depend on what the instrument is doing. The table below lists and explains each of the sounds.

Sound	Explanation
3 Low Pitched and 1 High-Pitched Beeps	At power ON after successful completion of the Self Test.
Low-Pitched Growl	The instrument is attempting to lock onto a target.
1 Low Pitched and 2 High-Pitched Beeps	The instrument was not able to complete the intended speed or survey measurement due to an error. An error code will be displayed to indicate the nature of the error (Page 17).
High-Pitched Single Beep	The instrument successfully completed the intended speed measurement.
	Speed Limit Edit Feature is active: (1) When editing the speed limit, the speed limit was stored. (2) During a speed measurement, the instrument successfully completed the intended measurement and it was below the speed limit.
Low-Pitched Double Beep	Speed Limit Edit Feature is active: when editing the speed limit, you entered an invalid speed limit (Page 24).
High-Pitched Double Beep	Speed Limit Edit Feature is active: During a speed measurement, the instrument successfully completed the intended measurement and it was above the speed limit.
High-Pitched Double Beep followed by a Single Beep	The instrument successfully completed the intended survey measurement.

Understanding Error Conditions

Although it's rare, error conditions can occur during a measurement attempt or in the system hardware. To make sure that you never get an erroneous speed reading, the TruSpeed Sxb monitors both the system hardware and the measurement. When the instrument detects an error condition, it displays an error code instead of a measurement.

Figure 14 shows an example of an error code "E 01".

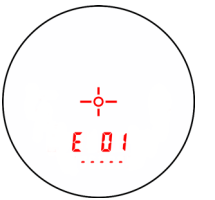


Figure 14

Error Codes

The table below lists and explains each of the possible error codes.

Code	Explanation
E 01	The target was out of range or was too close.
E 03	Unstable targeting. Data is not stable enough to measure speed. *Possible Causes:* poor aiming or panning off the target.
E 03 E 07	Low level of interference from a light source such as a xenon headlight.
	Jam Detect - high level of interference from a light source such as a xenon headlight.
E 52	Temperature too cold. Stop operation.
E 53	Temperature too hot. Stop operation.
E 54	Low battery.
E 55 E 56 E 57 E 58	Calibration Errors. E57: Tilt Error. Please turn OFF unit and try again. For all calibration errors, please turn OFF unit and try again. If the same error is continuously repeated, please contact LTI Service.**
E 59	Receive circuit calibration failure. Please turn OFF unit and try again. If the same error is continuously repeated, please contact LTI. **
E 60	Memory failure. Please turn OFF unit and try again. If the same error is continuously repeated, please contact LTI Service.**
E 62	Receiver Failure. Please turn OFF unit and try again. If the same error is continuously repeated, please contact LTI Service.**
E 63 E 65 E 64 E 66 E 67	Code checksum failure. Please turn OFF unit and try again. If the same error is continuously repeated, please contact LTI. **
E 68	Power supply high voltage failure. Please turn OFF unit and try again. If the same error is continuously repeated, please contact LTI. **
E 71	System error. Please turn OFF unit and try again. If the same error is continuously repeated, please contact LTI. **
E 99	General System Failure. Please contact LTI Service.**

**See inside front cover for LTI contact information.

RFI Considerations

The TruSpeed Sxb does not display a specific error message indicating the presence of radio frequency interference (RFI). The instrument's electronics have been designed for optimum RFI immunity. If RFI is present, the instrument displays an error code. The exact code depends on the level and nature of the RFI.

Section #2 - Speed Measurements

When you power ON the TruSpeed Sxb the instrument will perform the Self Test. Figure 15A shows successful completion of the Self Test. See Page 11 for more information about the Self Test that occurs when the instrument is powered ON.

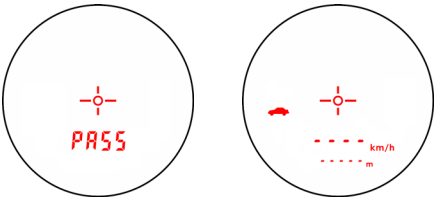


Figure 15

Using Figure 15B as an example:

- The dashes that appear in the upper display indicate where the speed measurement will appear.

- The  indicator means that the Speed Mode is active.
- "km/h" means the speed will be measured in kilometers per hour.
- The dashes that appear in the lower display indicate where the distance to the target vehicle will appear.
- "m" means the distance will be measured in meters.
- The Battery Icon indicates the approximate battery voltage level (Page 9).

Choosing a Roadside Location

When choosing a spot on the side of the road for measuring moving vehicles, you will need to consider:

- Is the location safe?
- Do you have a clear line of sight?
- What is the approximate angle between the instrument's position and the target vehicle's direction of travel?
- What is the approximate distance to the target vehicles?
- How is the weather? Will you need to use the Weather Mode?

Line of Sight

Ideally, you should have a clear line of sight to the target vehicle.

- If there is a momentary break in the beam, the instrument may be able to capture the target vehicle's speed with the accumulated data. The instrument will display an error code if it cannot capture the target vehicle's speed.
- If there is an extended break in the beam, the instrument will display an error code.

Measuring a Moving Vehicle

1. Ensure that the TruSpeed Sxb is powered ON and that the Speed Mode is active as indicated by the icon.
2. Look through the eyepiece and use the aiming reticle to aim the instrument at the target vehicle's license plate area and press the button. The indicator will appear while the laser is firing.
3. Continue to press the button and keep the instrument sighted on the target
   - A low-pitched growl means that the instrument is attempting to lock onto the target.
   - 1 Low-Pitched and 2 High-Pitched Beeps mean that a measurement error occurred. An error code will be displayed.
   - 2 high-pitched beeps mean that a speed was captured. The measured speed will be displayed on the in-scope LCD screen, just below the aiming reticle.

While the instrument is attempting to lock onto the target, as long as the button is kept pressed, it will retry the speed measurement.

- In this mode, the instrument will attempt to lock onto the target for up to 9.5 seconds. Information is accumulated until it gets a good measurement.
- Consequently, it is very important that the aiming point on the target remain constant for the entire measurement time. If you move the instrument off the aiming point, it will not capture a speed reading.

After you release the button the instrument will display the most recent speed reading and the distance at which it was captured or an error code. When the most recent speed reading is displayed, the display screen will look similar to Figure 16.

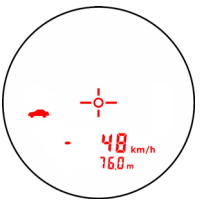


Figure 16

- The speed displays as a negative number if the target was going away from you when it was measured.
- The speed displays as a positive number if the target was approaching you when it was measured.

At this point, after the speed measurement is taken, the unit will dim the display to the lowest level after 30 seconds, and then power off if there is no activity after 15 minutes.

Press the button once to retrieve the speed measurement or twice to return to the active Speed Measurement Mode.

Using the Weather Mode

Moisture is reflective. Weather such as rain, snow, or fog can make it difficult for the laser to receive signals back from the target. This is especially true when you are trying to capture speeds at close range. The TruSpeed Sxb includes a built-in Weather Mode that is an alternate speed measurement mode. When the Weather Mode is active, the factory-defined gate setting increases the instrument's minimum range from 15 meters to 60 meters. Increasing the minimum range ensures that the laser only acquires targets beyond the range where weather affects the laser's ability to capture a speed reading.

When the Weather Mode is active:

- The Weather Mode indicator appears in the upper right corner of the in-scope display.
- Targets must be a distance greater than 60 meters.
- The instrument's maximum range is not changed.
- Other than the above items, the TruSpeed Sxb operates the same as when the Speed Mode is active and the Weather Mode is not active.

To activate the Weather Mode:

1. Ensure that the TruSpeed Sxb is powered ON and that the Speed Mode is active.
2. Press the button until the Weather Mode indicator appears. The display should look similar to Figure 17.
3. Look through the eyepeice and use the reticle to aim the instrument at the target vehicle's license plate area and press the FIRE button.
4. Continue to press the FIRE button, and keep the instrument sighted on the target. The indicator will appear while the laser is firing.

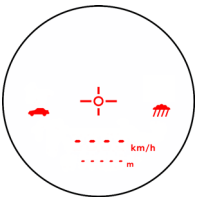


Figure 17

- A low-pitched growl means that the instrument is attempting to lock onto the target.
- 1 Low-Pitched and 2 High-Pitched Beeps mean that a measurement error occurred. An error code will be displayed.
- 2 high-pitched beeps mean that a speed was captured. The measured speed will be displayed on the in-scope LCD screen, just below the aiming reticle.

While the instrument is attempting to lock onto the target, as long as the FIRE button is kept pressed, it will retry the speed measurement.

- In this mode, the instrument will try up to 9.5 seconds. Information is accumulated until it gets a good measurement.
- Consequently, it is very important that the aiming point on the target remain constant for the entire measurement time. If you move the instrument off the aiming point, it will not capture a speed reading.

After you release the FIRE button the instrument will display the most recent speed reading and the distance at which it was captured. When the most recent speed reading is displayed, the display screen will look similar to Figure 18.

Figure 18

At this point, after the speed measurement is taken, the unit will dim the display to the lowest level after 30 seconds, and then power off if there is no activity after 15 minutes.

Press the FIRE button once to retrieve the speed measurement or twice to return to the active Speed Measurement Mode.

Using the Continuous Mode

Continuous Mode is an alternate speed measurement mode. If you wish to take several successive readings on a target, you can put the instrument in Continuous Mode. In this mode, the instrument takes and displays one reading after another, and continues to take and display readings as long as you hold down the FIRE button. When you release the FIRE button, and the instrument finishes its latest reading and stops. If an error code is shown when you release the FIRE button, the instrument will display either the most recent speed reading, or, if the error code has persisted for several tries, the error code will remain.

When the Continuous Mode is active:

- The Continuous Mode indicator appears in the upper right side of the in-scope display.
- When you wish to change targets, release the FIRE button, aim to the new target, and refire.

To activate the Continuous Mode:

1. Ensure that the TruSpeed Sxb is powered ON and that the Speed Mode is active.
2. Press the down button until the Continuous Mode indicator appears. The display should look similar to Figure 19.
3. Look through the eyepiece and use the reticle to aim the instrument at the target vehicle's license plate area and press the FIRE button. The indicator will appear while the laser is firing.
4. Continue to press the FIRE button and keep the instrument sighted on the target:

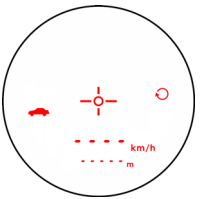


Figure 19

- A low-pitched growl means that the instrument is attempting to lock onto the target.
- A continuous beep means the laser is locked and tracking a target.
- 1 Low-Pitched and 2 High-Pitched Beeps mean that a measurement error occurred. An error code will be displayed.
- 2 high-pitched beeps mean that a speed was captured. The measured speed will be displayed on the in-scope LCD screen, just below the aiming reticle.

While the instrument is attempting to lock onto the target, as long as the FIRE button is kept pressed, it will retry the speed measurement.

- In this mode, the instrument will try up to 9.5 seconds. Information is accumulated until it gets a good measurement.
- Consequently, it is very important that the aiming point on the target remain constant for the entire measurement time. If you move the instrument off the aiming point, it will not capture a speed reading.
- The instrument will take and display one reading after another as long as you hold down the FIRE button.

After you release the FIRE button the instrument will display the most recent speed reading and the distance at which it was captured. When the most recent speed reading is displayed, the display screen will look similar to Figure 20.

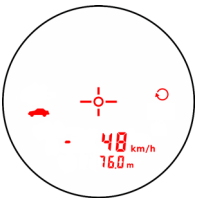


Figure 20

At this point, after the speed measurement is taken, the unit will dim the display to the lowest level after 30 seconds, and then power off if there is no activity after 15 minutes.

Press the FIRE button once to retrieve the speed measurement or twice to return to the active Speed Measurement Mode.

Optional Local Speed Limit Edit

Your TruSpeed Sxb may not include the Local Speed Limit Edit feature. It is a factory-defined option that is set when the instrument is shipped.

The Local Speed Limit Edit feature allows you to enter the local speed limit into the TruSpeed Sxb. For information about entering the local speed limit, see Page 36. Once you have entered the local speed limit:

- "SPdLt" will appear in the lower display on the initial Speed Measurement Screen as Figure 21 shows.
- The instrument will emit a high-pitched single beep when it successfully completes a speed measurement that is less than the local speed limit.
- The instrument will emit a high-pitched double beep when it successfully completes a speed measurement that is equal to or above the local speed limit.

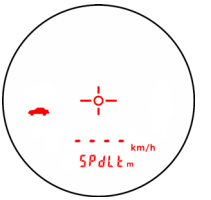
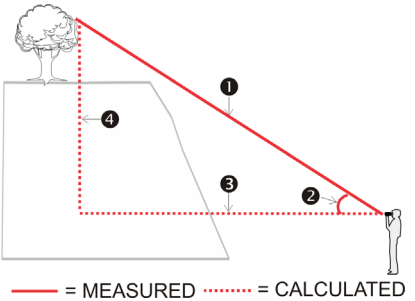


Figure 21

Section #3 - Survey Measurements

In any survey, there are four measurements to be taken: slope distance, inclination, horizontal distance, and vertical distance. Figure 22 defines the four measurements and shows the relationships among them. The tilt sensor allows the TruSpeed Sxb to measure inclination as well as slope distance. From those two measurements, horizontal and vertical distances can be calculated.



❶ = Slope Distance
❷ = Inclination
❸ = Horizontal Distance
❹ = Vertical Distance

Figure 22

The triangle display indicator located in the lower left corner of the LCD indicates the measurement type. The table below summarizes the icons.

Icon	Measurement Type
	Horizontal Distance (HD)
	Vertical Distance (VD)
	Slope Distance (SD)

Refer to the instructions below to activate the Survey Mode and take a range measurement.

1. Ensure that the TruSpeed Sxb is powered ON and that the Speed Mode is active as indicated by the icon.

2. Press the MODE button to start the Survey Mode.
The display should look like Figure 23.
   - The dashes that appear in the upper display indicate where the inclination measurement will appear.
   - The indicator means that the Survey Mode is active.
   - " " means the inclination will be measured in degrees.
   - The dashes that appear in the lower display indicate where the distance to the target will appear.
   - "m" means the distance will be measured in meters.
   - The Battery Icon indicates the approximate battery voltage level (Page 9).

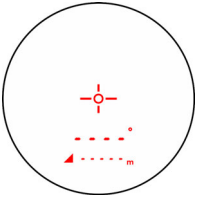


Figure 23

3. For this example, select a target that is 10-20 meters from you. The target can be as simple as a wall or a gate.
4. Look through the eyepiece and use the aiming reticle to aim the instrument at the target and press the FIRE button.

   The indicator will appear while the laser is firing. You will hear a high-pitched double beep when you press the FIRE button and then a single beep when the target is acquired. The display screen will look similar to Figure 24.

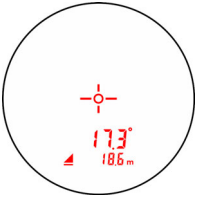


Figure 24

5. Press the MODE button to toggle through the various measurement types. Using Figure 25 as an example, Inclination = 17.3°, HD = 18.6 m, VD = 5.8 m and SD = 19.5 m.

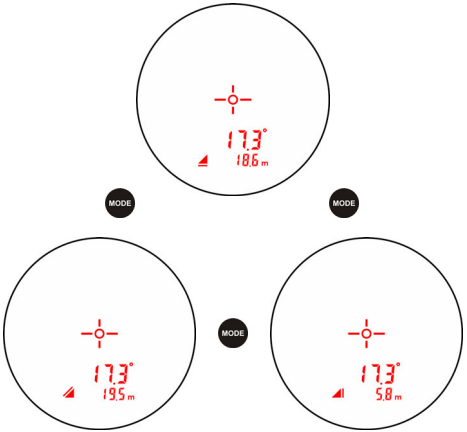


Figure 25

- At this point, after the speed measurement is taken, the unit will dim the display to the lowest level after 30 seconds, and then power off if there is no activity after 15 minutes.
- The last measurement does not need to be cleared before acquiring your next target.
- The last measurement type displayed will be the default type when the next survey measurement is taken.
- Each time the TruSpeed Sxb is powered ON, it returns to the same survey measurement type that was last used.
- The measuring point of the TruSpeed Sxb is located at the center point of the instrument, in line with the ¼-20 thread.

Electronic Filter

When you are working in an area that is crowded with potential targets, you need to make certain the instrument is detecting the correct target. The best way to do this is to use a reflector as the target and filter out all others. To help accomplish that, the TruSpeed Sxb's Electronic Filter reduces the laser's sensitivity so the laser only detects pulses returned from a reflective target. The optional Receive Lens Filter is required for survey measurements taken while the Electronic Filter is active. See Page 7 for information about attaching the Receive Lens Filter.

To activate the Electronic Filter:

1. Ensure the TruSpeed Sxb is powered ON and that the Survey Mode is active.
2. Press the MODE button to display the Electronic Filter option.
3. Press the PWR button to turn the Electronic Filter ON or OFF.

   The ↓↑ indicator will appear whenever the filter is ON.

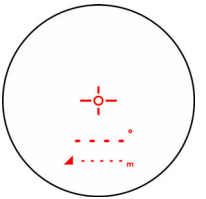


Figure 26

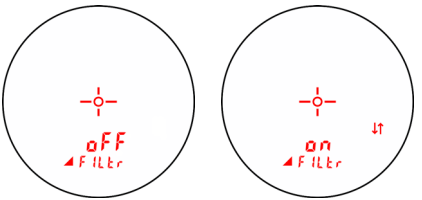


Figure 27

4. Press the ▼ button to return to the Speed Mode.
5. Press the MODE button to return to the Survey Mode.

   The ↓↑ indicator should be displayed.
6. Press the PWR button. The ✳ indicator will appear while the laser is firing. You will hear a high-pitched double beep when you press the PWR button and then a single beep when the target is acquired. The display screen should look similar to Figure 28.

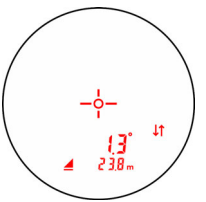


Figure 28

Section #4 - Test Mode

The Test Mode allows you to verify the instrument's mechanics. The options include:

- Display Integrity Test
- Scope Alignment Test
- Delta Distance Test
- Fixed Distance Test
- Self Test
- Local Speed Limit Edit
- Model and Firmware Version Number Display
- Bluetooth Status
- Device Information: Serial Number Display

Display Integrity Test

The Display Integrity Test allows you to verify that all display segments are operating. LTI suggests that you do this test periodically.

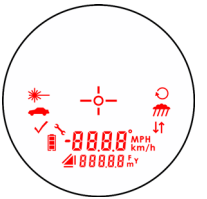


Figure 29

1. Ensure that the TruSpeed Sxb is powered ON.
2. Press the MODE button. The display should look like Figure 29.
3. Compare the instrument's display to Figure 29. If any segment fails to display, contact LTI Service to arrange for repair. See the inside front cover for LTI contact information.
4. Press the:
   - MODE button to display the Scope Alignment Test.
   - button to adjust the Aiming Reticle intensity.
   - button to return to the Speed Measurement Mode.

The display integrity is also tested each time the unit is powered ON. However, the results are only briefly displayed before the results of the Self Test are displayed.

Scope Alignment Test

Scope alignment is set at the factory when the instrument is shipped. A heavy blow is the only reason that the scope might ever go out of alignment. LTI suggests that you do this test periodically.

The Scope Alignment Test uses sound to indicate when the scope is on-target.

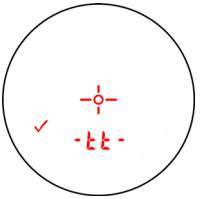


Figure 30

1. Select a target. Choose a prominent target with well-defined horizontal and vertical edges. A telephone pole is an excellent choice.
   - The target's reflective qualities and distance should be such that you can clearly hear a change in pitch of the test tone as you pan the instrument over the edges of the target.
   - Make sure there is nothing behind the target that the instrument might detect, so you know without a doubt that any change in pitch is due strictly to the target.
2. Ensure that the TruSpeed Sxb is powered ON.
3. Press the MODE button repeatedly until the Test Tone display screen appears (Figure 30).
4. Scan the target. Press and hold the ON button while panning the instrument across the target. The tone changes pitch when the instrument acquires the target. The highest pitch - the on-target tone - should occur when the in-scope aiming reticle is centered on the target. Scan the target both horizontally and vertically.
   - If the frequency drops off at equal distances from the center of the aiming reticle, the instrument needs no adjustment.
   - Otherwise, contact LTI Service for assistance with re-aligning the scope. See the inside front cover for LTI contact information.
5. Press the:
   - MODE button to display the Delta Distance Test.
   - ^ button to adjust the Aiming Reticle intensity.
   - v button to return to the Speed Measurement Mode.

Instrument Confidence Checks

There are several ways to verify the measurement accuracy of a lidar instrument. You can verify it directly by measuring the speed of an object traveling at a known speed, but this is seldom practical. The nature of Lidar is such that it cannot be tricked by a vibrating object, such as a tuning fork, into displaying a velocity. For these reasons, LTI has designed the Fixed Distance Test and the Delta Distance Test. LTI suggests that you do one of these tests each time the instrument is taken on duty.

These tests verify the accuracy of the two key elements of Lidar speed measurement:

- Precise time measurements
- Ability to make mathematical calculations

When setting up an area for these tests, LTI recommends:

- Permanently installing the test area in a convenient location. The test area must establish a permanent, known distance between a shooting mark and a target (Fixed Distance Test) or between a shooting mark and two targets (Delta Distance Test).
- Using metal tape to measure the distance; this will ensure that the measurement is accurate.

Other considerations:

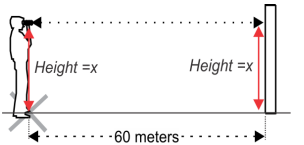
- The shooting mark is where you stand to do the test, and can be an “X” painted on the pavement.
- A target can be any flat, permanent structure-a sign or wall, for example-painted with a bull's eye or other aiming point.
- The shooting mark and the target must form a straight line.
- The distance specified is horizontal distance. Horizontal distance is measured along a straight, level path from the shooting mark to the center of the aiming point.
- The manner in which you stand and hold the instrument both affect the test measurements. For exact readings, carefully hold the instrument so it is directly over the middle of the shooting mark.

Fixed Distance Test

The Fixed Distance Test is not one of the options included in the Test Mode. In order to perform the Fixed Distance Test, the Speed Mode must be active.

The Fixed Distance Test requires one target:

- LTI recommends using a target distance which is a whole meter for ease of use. However, if a distance of a whole meter is not available, a tenth of a meter will work. Please note, the distance to the target must be accurately measured with a certified measuring device, and the distance to the target must be greater than the minimum distance of the instrument, which is 15 meters. This example uses a distance of 60 meters.



Note: For absolute accuracy, the instrument should be directly over the shooting mark and aimed parallel to the measured marks on the ground.

Figure 31

Hold the center of the TruSpeed Sxb directly over the center of the shooting mark. If the surveyed distance is from the center of the shooting mark on the ground to the base of a wall, the operator should hold and aim the instrument parallel to the ground to achieve a straight and level path from the instrument to the target.

1. Stand over the shooting mark.
2. Ensure the TruSpeed Sxb is powered ON and that the Speed Mode is active.
3. Look through the eyepiece and use the aiming reticle to aim to the target.
4. Press the button.
5. Check the display.
   - The speed reading should be 0 km/h. A measurement of 0km/h verifies the timing accuracy of the instrument and is identical in nature to an accurate velocity reading of a vehicle moving at any speed.
   - The displayed distance should read from 59.8 to 60.2 meters if your fixed distance was 60 meters.

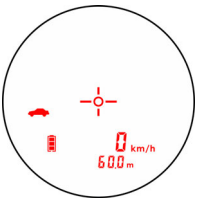


Figure 32

- Speed accuracy: ±2 km/h.
- Distance accuracy: ±15 cm or 0.2 meters (rounded).
- If you need assistance, contact Laser Technology, Inc. See the inside front cover for LTI contact information.

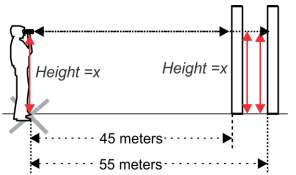
Delta Distance Test

Your TruSpeed Sxb may not include the Delta Distance Test. It is a factory-defined option that is set when the instrument is shipped.

The Delta Distance Test requires two targets. The distance to each target is not crucial. However, LTI recommends that the distance between the targets be to a whole meter for ease of use. The minimum distance to the first target must be greater than the minimum distance of the instrument which is 15 meters.

Refer to Figure 33 as a guide for positioning the targets and the shooting mark.
This example uses 45 meters and 55 meters as the target distances.

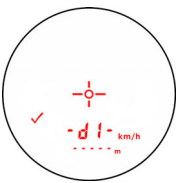
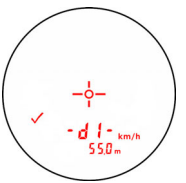
1. Install the farthest target.
2. Measure 55 meters to the shooting mark and mark the shooting mark.
3. Measure from the shooting mark to the closer target at 45 meters.
4. Install the closer target at 45 meters.

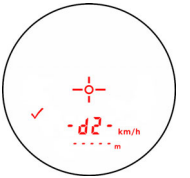
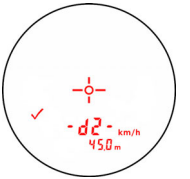
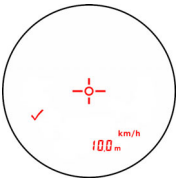


Note: For absolute accuracy, the instrument should be directly over the shooting mark and aimed parallel to the measured marks on the ground.

Figure 33

To conduct the test, refer to the table below.

Action	Results
1. Stand on the shooting mark. 2. Power ON the TruSpeed Sxb and press the MODE button repeatedly until the message -d1- appears in the upper display.	
3. Look through the eyepiece and aim to the far target and press the ENTER button. 4. Check the display. If necessary, you may repeat step #3.	

Action	Results
5. Press the MODE button. The message -d2- appears in the upper display.	
6. Look through the eyepiece and aim to the near target and press the FIRE button. 7. Check the display.If necessary, you may repeat step #6.	
8. Press the MODE button. The screen displays the difference between the two distances (10.0 m) ±15 cm.	
If the difference is 10 meters, the displayed distance should be 9.8 to 10.2 meters (±15 cm displayed to ±0.2 meters)	

If you need assistance, contact Laser Technology, Inc.
See the inside front cover for LTI contact information.

To Exit, press the:

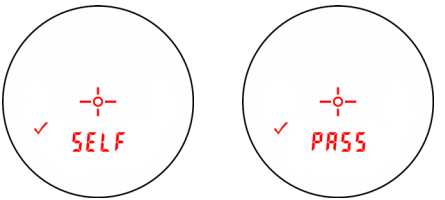
- MODE button to display the Self Test.
- button to adjust the Aiming Reticle intensity.
- button to return to the Speed Measurement Mode.

Self Test

Just like when the instrument is powered ON, during the Self Test the microcontroller interrogates the system electronics.

To display the Self Test:

1. From speed measurement screen, press the MODE button until the Self Test is displayed. Figure 34A shows the initial display.
2. Press the FIRE button.
   - If all tests prove positive, 3 Low Pitched and 1 High-Pitched beeps will sound. Figure 34B shows an example of all test proving positive.
   - If all tests do not prove positive, the appropriate error code will appear in the upper display (Page 17).



A B

Figure 34

If the instrument fails the self test:

1. Press the FIRE button and the MODE button simultaneously for one second to power off the instrument.
2. Press FIRE button again to initiate another self test to see if it passes. If the error persists, contact LTI Service. See the inside front cover for LTI contact information.

To Exit, press the:

- MODE button to display the Model and Firmware Version Number.
- ^ button to adjust the Aiming Reticle intensity.
- v button to return to the Speed Measurement Mode.

Optional Speed Limit Edit

Your TruSpeed Sxb may not include the Local Speed Limit Edit feature. It is a factory-defined option that is set when the instrument is shipped.

To edit the Local Speed Limit:

1. Press the MODE button until the Speed Limit Edit Screen is displayed. It should look similar to Figure 35. The current value of the local speed limit appears in the upper display. In this example the local speed limit is 0 km/h.

   Valid Values: 0 to 300 km/h.

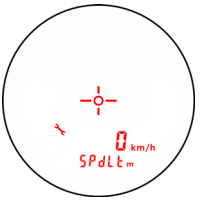


Figure 35

2. Press the FIRE button to edit the local speed limit. The word Edit is displayed at the bottom of the screen. It should look similar to Figure 36.

   - Press the ▼ button to increase the value of the right most digit. Each press will increase this value by 1.
   - If the value goes too high, press the MODE button once to clear the selection and start over from zero.

3. Once the correct value is set for that digit, press the ▲ button to move one digit to the left.

   - Each press of the ▲ button will increase that digit by 10 units of value.
   - If the value goes too high, press the MODE button once to clear the selection and start over from zero.

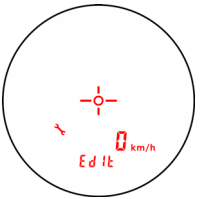
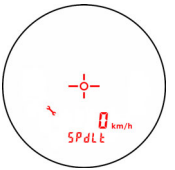
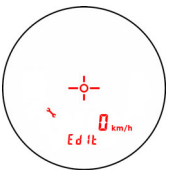
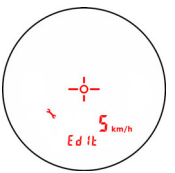
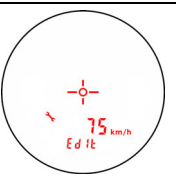
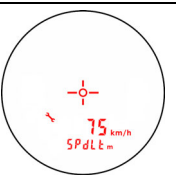


Figure 36

4. Once the speed limit has been set correctly, press the FIRE button one time. You should hear a high pitched beep. The audible tone signifies that the speed limit you set has been saved.

5. Press the ▲ button to return to the Speed Measurement Screen.

As an example, the table below shows how to set the Local Speed Limit to 75 km/h.

Action	Result
1. From the speed measurement screen, press the MODE button until the local speed limit edit screen is displayed. It will look similar to the figure shown to the right.	
2. Press the FIRE button. "Edit" will appear at the bottom of the screen.	
3. Press the ▼ button 5 times.	
4. Press the ▲ button 7 times.	
5. Press the FIRE button once. You should hear one high pitched beep. "SPdLt" will appear at the bottom of the screen. 6. Press the ▲ button to display the Speed Measurement Screen (Page 24).	

Model and Firmware Version Number Display

To display the model number and firmware version number of your TruSpeed Sxb:

1. Press the MODE button repeatedly until the display looks similar to Figure 37. The model number appears in the upper display and the firmware version number appears in the lower display. In this example, the model number is "200" and the firmware version number is "12.47".

   Figure 37 uses firmware version 12.47 for the purpose of an example. Your TruSpeed Sxb may include a different firmware version number.

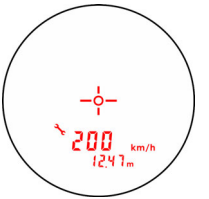


Figure 37

2. Press the:
   - MODE button to display the Instrument Serial Number.
   - ^ button to adjust the Aiming Reticle intensity.
   - v button to return to the Speed Measurement Mode.

Bluetooth Status

Bluetooth wireless technology is an industry standard specification for short-range wireless connectivity. As a short-range radio link, Bluetooth replaces cable connections between devices allowing you to download measurement data to any Bluetooth enabled PC device such as a laptop PC, data collector, etc.

- TruSpeed Sxb Bluetooth offers serial port service to connect to an RS-232 style serial connection. It replaces the download cable from the TruSpeed Sxb to any Bluetooth enabled PC device.
- TruSpeed Sxb Bluetooth is an SPP device. Bluetooth master host devices can detect the TruSpeed Sxb when the instrument is powered ON and the Bluetooth option is enabled.

1. Short press the MODE button until the bt option is displayed.
2. Press the ▲ or ▼ button to display the previous or next bt option.
3. Press the ARC button to accept the Bluetooth option and r eturn to the Speed Measurement Mode display.

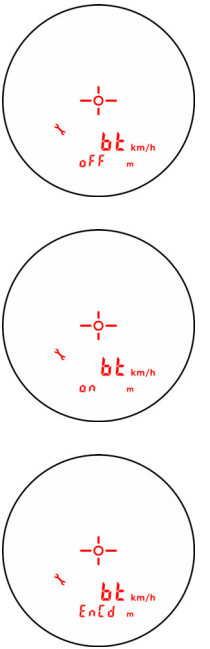


Figure 38

- **oFF**: Turns the Bluetooth communications off.
- **on**: Turns the Bluetooth communications on; serial string is outputted through the Bluetooth and serial port.
- **EnCd**: Bluetooth Copy Mode.
  Reserved for future use with the MapStar TruAngle.

  NOTE: Not all TruAngle units have this functionality. Please check your model and version number for compatibility. When connected together, the TruSpeed Sxb sends distance and inclination values to the TruAngle. Then the TruAngle captures the horizontal angle, inputs that value into the serial string and sends it back to the TruSpeed Sxb. The serial string is then transmitted out via Bluetooth.

- Each time the TruSpeed Sxb is powered on, it will return to the same Bluetooth setting that was last used.
- Bluetooth Version 2.0 Class 2.1 + EDR module.

Refer to the instructions below when connecting your TruSpeed Sxb to another Bluetooth device. This information is provided as a general guideline.

Refer to the third party product documentation for your specific Bluetooth device.

1. Toggle the TruSpeed Sxb Bluetooth option ON and return to the measurement mode. A host device can now detect the Bluetooth communication from the TruSpeed Sxb.
   - Refer to the host device documentation for connecting to Bluetooth devices.
2. Use the Bluetooth Manager to scan for the TruSpeed Sxb Bluetooth module. The TruSpeed Sxb Bluetooth will be named TSSX -"serial number of unit"; ie TSSX-001489.
3. You may be prompted to enter:
   - Passkey = 6912
   - Service Selection = SPP Device
   - Select (long press) "Connect". The Bluetooth Manager on the host device should find and display the active connection status.

Bluetooth troubleshooting tips:

- TruSpeed Sxb: Verify that the TruSpeed Sxb Bluetooth option is toggled ON (or ENC).
- Bluetooth enabled PC device: Verify that the Bluetooth connection is active.
- Verify that the Bluetooth device is physically located within the wireless transmission range of the TruSpeed Sxb.
- Transmission range can vary depending upon (1) position relative to the TruSpeed Sxb or (2) type of Bluetooth® connection.

Serial Number Display

To display the serial number of your TruSpeed Sxb:

1. Press the MODE button repeatedly until the display looks similar to Figure 39. The serial number has 5 digits and appears in the upper and lower display. In this example, the serial number is "00001".

   Figure 39 uses serial number 00001 for the purpose of an example. Your TruSpeed Sxb may have a different serial number.

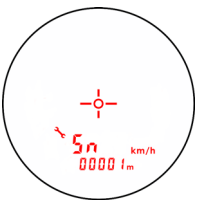


Figure 39

2. Press the:
   - MODE button to return to the Display Integrity Test.
   - ^ button to adjust the Aiming Reticle intensity.
   - v button to return to the Speed Measurement Mode.

Section #5 - Serial Data Interface

The TruSpeed Sxb includes a hard-wired serial (RS-232) communication port and wireless Bluetooth communication is also available. The serial interface uses RS-232 +/-12V signal levels and data format. Figure 40 shows the pin-out assignments for the TruSpeed Sxb's serial port.

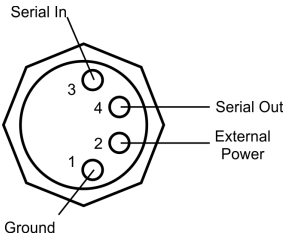


Figure 40

Data Format

TruSpeed Sxb serial data format is similar to that of the Laser Technology Marksman 20/20 and UltraLyte speed detection instruments. All data values are available at the serial port after each measurement.

Format Parameters

- 4800 BPS
- 1 start bit
- 8 data bits
- 1 stop bit
- no parity

Download Instructions

The instructions below are provided for general information only. Specific steps may vary, depending upon your data collection program.

1. Connect the TruSpeed Sxb to the PC, Pocket PC, etc.
2. Start the data collection program on the PC and adjust settings to match format parameters (4800 baud rate, 8 data bits no parity, 1 stop bit).
3. Power ON the TruSpeed Sxb. The Speed Mode should be active.
4. Press the MODE button to start the Survey Mode.
5. Take the desired measurement.

Remote Trigger

It is possible to remotely trigger the TruSpeed Sxb and take measurements using an external computer or data collector. Remote triggering can be accomplished only by command and is explained in the Requests section (see next page).

Requests

Firmware Version ID Request (1)

$ID<CR><LF>

$ID	The request identifier.
<CR>	A carriage return.
<LF>	An optional line feed character.

Instrument response:

$ID,*TJmodel-versionid,date,csum**csum***<CR><LF>**

$ID	Message identifier.
TJmodel	The TruSpeed Sxb model (TJ200).
-versionid	The version ID of the internal firmware (preceded by a hyphen).
date	The effective date of the firmware version (MMM DD YYYY format).
csum	32-bit firmware checksum.
**csum*	CRC16 checksum of the data string up to the asterisk.

Example Version ID Messages

Request: $ID<CR><LF>
Response: $ID,TJ-200,TruSpeed S-1.12-47,SEP 20 2012,B1366B34*3AD6

Firmware Version ID Request (2)

$PLTIT,RQ,ID<CR><LF>

$PLTIT,	Criterion 400 message identifier.
RQ,	Indicates a request message.
ID	Indicates the request type.
<CR>	A carriage return.
<LF>	An optional line feed character.

Instrument response:

$ID,*TJmodel-versionid,date,csum**csum***<CR><LF>**

$ID	Message identifier.
TJmodel	The TruSpeed Sxb model (TJ200).
-versionid	The version ID of the internal firmware (preceded by a hyphen).
date	The effective date of the firmware version (MMM DD YYYY format).
csum	32-bit firmware checksum.
**csum*	CRC16 checksum of the data string up to the asterisk.

Example Version ID Messages

Request: $PLTIT,RQ,ID<CR><LF>
Response: $ID,TJ-200,TruSpeed S-1.12-47,SEP 20 2012,B1366B34*3AD6

Serial Number Request

$SN<CR><LF>

$SN	The request identifier.
<CR>	A carriage return.
<LF>	An optional line feed character.

Instrument Response:

$SN,*SerialNum***csum***<CR><LF>**

$SN	Message identifier.
SerialNum	TJ followed by 6 digit serial number.
**csum*	CRC16 checksum.

Example Version ID Messages

Request:	$SN<CR><LF>
Response:	$SN,TJ000092*D097

Remote Trigger (RUN) Request

$GO<CR><LF>

$GO	The request identifier.
<CR>	A carriage return.
<LF>	An optional line feed character.

Instrument Response:

$OK**csum***<CR><LF>**

$OK	Message identifier.
**csum*	CRC16 checksum of data string up to the asterisk.

Example Remote Trigger (RUN) Request

Request:	$GO<CR><LF>
Response:	$OK*0744<CR><LF>

If the unit is in Continuous Mode, you will need to issue the Remote Trigger (STOP) Request.

Remote Trigger (STOP) Request

$ST<CR><LF>

$ST	The request identifier.
<CR>	A carriage return.
<LF>	An optional line feed character.

Instrument Response:

$OK*csum***<CR><LF>**

$OK	Message identifier.
**csum*	CRC16 checksum of data string up to the asterisk.

Example Remote Trigger (STOP) Request

Request:	$ST<CR><LF>
Response:	$OK*0744

Enter User Password

Once entered, the user password will remain active until the instrument is powered off.

$PW,*password***<CR><LF>**

$PW	= message identifier
password	= the default password is admin
<CR>	= carriage return
<LF>	= line feed

Example Response:

Correct Password:	$PW,1*C47D
Incorrect Password:	$ER,24*0908

Powerdown Request

$PD<CR><LF>

$PD	The request identifier.
<CR>	A carriage return.
<LF>	An optional line feed character.

Bluetooth On/Off/EnCd Request

To change the Bluetooth Mode, the User Password must be active (Page 44).

After issuing the request command, press the  button to update the LCD.

Request Current Status: **$BP<CR><LF>**
Response: **$BP,***n*******csum***<CR><LF>**

Request Change Status: **$BP,***n***<CR><LF>**
Response: **$BP,***n*******csum***<CR><LF>**

$**BP** = The request identifier.
n = Bluetooth status
0 = Off
1 = On
2 = EnCd Reserved for future use with the MapStar TruAngle.
******csum* = CRC16 checksum of data string up to the asterisk.
<CR> = A carriage return.
<LF> = An optional line feed character.

Example: $BP,1<CR><LF> Sets Bluetooth to on.

Electronic Filter On / Off Request

To enter the Electronic Filter On / Off Request, the User Password must be active (Page 44).

After issuing the request command, press the  button to update the LCD.

Request Current Status: **$FI<CR><LF>**
Response: **$FI,***n*******csum***<CR><LF>**

Request Change Status: **$FI,***n***<CR><LF>**
Response: **$FI,***n*******csum***<CR><LF>**

where:
$**FI** = message identifier
n = filter status
0 = Off
1 = On
******csum* = CRC16 checksum of data string up to the asterisk.
<CR> = carriage return
<LF> = line feed

Example: $FI,1<CR><LF> Sets Electronic Filter to On.

Survey Mode Serial Data Format

To change the Survey Mode Serial Data Format, the User Password must be active (Page 44).

Request Current Status: **$CR<CR><LF>**
Response: **$CR,***n***csum***<CR><LF>**

Request Change Status: **$CR,***n***<CR><LF>**
Response: **$CR,***n***csum***<CR><LF>**

where:

$CR	= message identifier
n	= Survey Mode Serial Data Format 0 = TruSpeed 1 = Criterion 400 (CR400)
**csum*	= CRC16 checksum of data string up to the asterisk.
<CR>	= carriage return
<LF>	= line feed

Example: $CR,1<CR><LF> Sets the Survey Mode Serial Data Format to CR400.

Speed / Range Data Message Format

$SP,*Speed,Range,Sunits,Runits***csum***<CR><LF>**

$SP	Message identifier.
Speed	The speed measurement. Legal values are 000 to 322 km/h. If the target was departing when the measurement was taken, the number will be preceded by a minus sign.
Range	The range measurement. Standard legal values: 0000.0 to 650.0 (unsigned).
Sunits	Speed units (K = km/h).
Runits	Range units (M = meters)
**csum*	CRC16 checksum.
<CR>	Carriage return.
<LF>	An optional line feed character.

Example Speed/Range Messages
$SP,80,595.0,K,M*1E9D

If a measurement error occurs, the speed and range values are replaced by an error code in the form *$Er,xx*csum,* where *xx* is the error code. For more information about Error Codes, see Page 17.

Survey Data Message Format

TruSpeed Serial Data Format

$DM,*Target***T**,*SD,HD,VD,INC,distanceUnit,Code,Type-Index***csum*

$DM,	TruSpeed message identifier
*Target***T**,	FT = First Target (Electronic Filter Off) and Tilt Sensor ST = Strongest Target (Electronic Filter On) and Tilt Sensor
SD,	Slope Distance
HD,	Horizontal Distance
VD,	Vertical Distance
INC,	Vertical Distance
distanceUnit,	M = meters
Code,	*LTI Internal Use Only*
Type-Index	*LTI Internal Use Only*
**csum*	CRC16 checksum.

Example:$DM,FT,10.5,10.4,1.5,8.36,M,0,4-942*96CC

Criterion 400 (CR400) Serial Data Format

$PLTIT,HV,*HD*,**F**,,,*INC*,**D**,*SD*,**F****csum*

$PLTIT,	CR400 message identifier
HV,	Horizontal Vector message type
HD,	Horizontal Distance
F,	HD units M = meters
,,	2 empty fields (Azimuth Value and Azimuth Units)
INC,	Inclination
D,	INC units D = degrees
SD,	Slope Distance
F	SD units M = meters
**csum*	An asterisk followed by a hexadecimal checksum. The checksum is calculated by XORing all the characters between the dollar sign and the asterisk.

Example: $PLTIT,HV,5.2,M,,,3.12,D,5.2,M*3D

Section #6 - Maintenance

Operating Temperature

The instrument is rated for a temperature range of -30° C to +60° C.
Do not operate the instrument in temperatures outside that range.

Moisture and Dust Protection

The TruSpeed Sxb is sealed to provide protection from normally encountered field conditions. It is protected from dust and light moisture.

Shock Protection

The TruSpeed Sxb is a precision instrument and should be handled with care. It will withstand a reasonable drop shock. If you drop the instrument, check the scope alignment (Page 30) before using the instrument for speed measurement.

Cleaning and Storage

Clean the instrument after each use. Check for the following:

- Excess moisture. Towel off excess moisture and air dry the instrument at room temperature.
- Exterior dirt. Wipe exterior surfaces clean. Use isopropyl alcohol to remove dirt and fingerprints from the scope exterior.
- Dirty lenses. Use a lens brush to remove surface dust and loose particles from the front panel lenses. To clean a lens, moisten it with lens cleaning solution and wipe it with a clean cloth or lens tissue.
- Battery. If you won't be using the instrument again soon, remove the battery before storing it.

Caring for the Scope

Do not attempt to lubricate the scope. It is sealed from within using o-rings and special compounds. All seals are permanent and require no maintenance.

Use a lens brush to remove surface dust and loose particles. To clean a lens, moisten it with lens cleaning solution and wipe it with a clean cloth or lens tissue.

Checking the In-scope LCD

The instrument provides a method of verifying the display integrity.
For more information, see Page 29.

Aligning the Tilt Sensor

The TruSpeed Sxb tilt sensor cannot be realigned in the field. If you have problems with inclination measurements, contact Laser Technology, Inc. to arrange to return the instrument to the factory for realignment.

Section #7 - Specifications

Weight:	.41 kg with battery
Size:	13.2 L x 11.4 W x 5.3 H cm
Measurement Time:	0.33 sec
Speed Range:	±320 km/h
Speed Accuracy:	±2 km/h
Minimum Range	
Speed Mode:	15 m
Weather Mode:	60 m
Continuous Mode:	15 m
Survey Mode:	0 m
Maximum Range:	610 m
Range Accuracy	
Speed:	± 15 cm
Survey Mode	
Typical:	±4 cm
Maximum:	±15 cm
Inclination Limits:	±90 degrees
Inclination Accuracy:	±0.1 degree typical
Display Resolution:	
Speed:	± 2 km/h
Range:	± 0.1 unit of measure
Temperature Range:	
operating:	-30° to 60° C
Storage:	-35° to 70° C
Power:	One CR 123A battery providing 12 hours of operation time
Environment:	Water-resistant; NEMA 4 and IP 55
Construction:	Glass filled polycarbonate composite

Eye Safety:	Class 1; FDA CFR 21 Europe IEC 50825-1
External Power:	
typical:	8 to 12 volts dc
maximum:	5 to 20 volts dc
Bluetooth Module FCC ID:	T9J-RN42

All specifications are subject to change without notice.

Section #8 - Troubleshooting Tips

**See Page 40 for Bluetooth troubleshooting information.

What You Will See	Required Action
Unit powers OFF by itself. -or- No power at all.	• Verify that the battery is installed correctly. • Replace the battery. • Keep in mind that the instrument automatically powers OFF if there is no instrument activity for a period of 30 seconds.
The in-scope aiming reticle is not visible.	• Press the FIRE to activate the aiming reticle. • Press the ^ button to increase the intensity of the aiming reticle.
Speed Mode	
E01 error code. No range or speed readings.	• Can you measure to a wall that is about 15 meters away? • Check the scope alignment. • When measuring a short range to a small target, aim slightly above the target.
Measurements not repeatable.	• Do you have a clear line of sight? • Check the scope alignment. • Is it raining or foggy. If yes, is the Weather Mode active? If not, turn it ON. Keep in mind that the minimum range will be 60 meters.
Limited Range.	• Do you have a clear line of sight? • Rain or fog will reduce the unit's maximum range. • Is the Weather Mode active? If not, turn it ON. Keep in mind that the minimum range will be 60 meters. • Keep in mind that acquiring a target through glass will reduce the unit's maximum range. • Make sure the lenses are clean.
Difficult to acquire target while aiming through windshield.	• Is the Weather Mode active? If not, turn it ON. Keep in mind that the minimum range will be 60 meters. • If the windshield is bubble-shaped, shoot through the center of the windshield.
Difficult to acquire target while aiming through rain or snow.	• Is the Weather Mode active? If not, turn it ON. Keep in mind that the minimum range will be 60 meters.
Survey Mode	
The in-scope display only displays one measurement type.	• Press the MODE button to toggle through the various measurement types after shot is taken.

Section #9 - Glossary

Continuous Mode:	Alternate speed measurement mode. Allows you to take several successive readings of a target vehicle. Re-fire for each new target. See Page 22.
Delta Distance Test:	Uses two measurements each to a known distance to verify the measurement accuracy of the TruSpeed Sxb. See Page 33.
Display Integrity Test:	Allows you to verify that all segments of the in-scope LCD are operating. See Page 29.
Electronic Filter:	Internal filter that when activated reduces the laser's sensitivity so that the laser only detects pulses returned from a reflective target. See Page 28.
Fixed Distance Test:	Uses one measurement to a known distance to verify the measurement accuracy of the TruSpeed Sxb. See Page 32.
Receive Lens:	Located on the front panel of the TruSpeed Sxb. It receives the signals back from the target. See Page 4.
Receive Lens Filter:	Filter required for measurements taken while the Electronic Filter is active. See Page 7.
Reticle:	A scale located in the sighting scope that helps you aim to your target. It is visible when the TruSpeed Sxb is powered ON. You may need to press the FIRE button to see the reticle. See Page 6.
Transmit Lens:	Located on the front panel of the TruSpeed Sxb. It transmits the infrared laser signals. See Page 7.
Weather Mode:	Alternate speed measurement mode. The laser only acquires targets that are beyond the range where weather affects the laser's ability to capture a speed reading. Targets must be at a distance greater than 60 meters. See Page 20.

Index

N

O

P

R

S

T

U

V

W