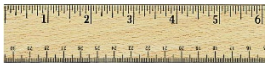
Slanted Lidar Calibration – Non-Adjustable Bracket

Tools needed:

A. Calibration kit



B. Ruler or straight edge

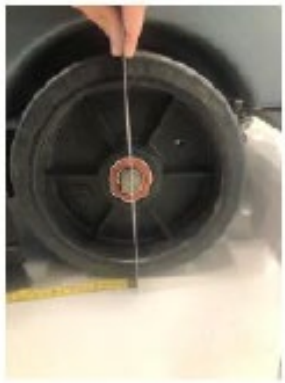
C. Painter tape, electrical tape or similar

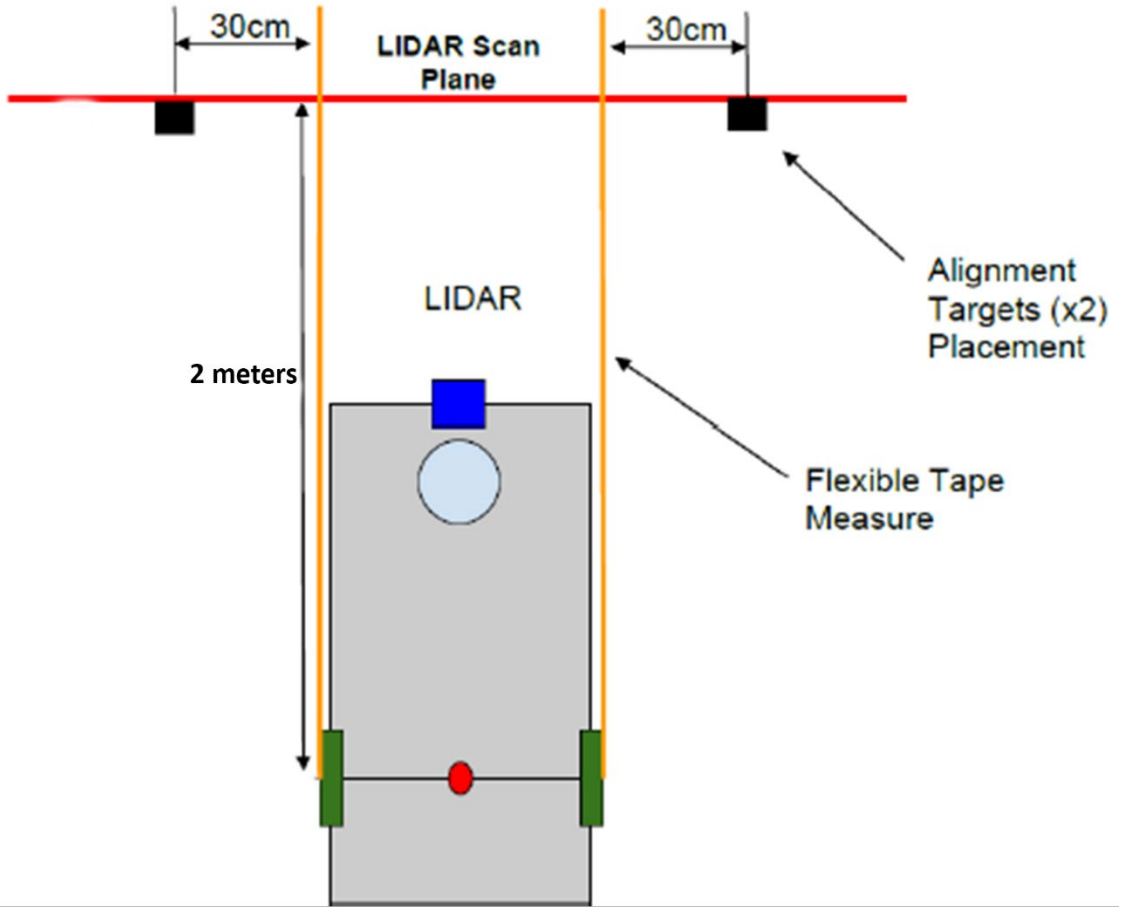
1. Park the machine in an open space with at least 1.5 meters of distance straight ahead from any wall or objects and 1 meter on either side. The floor must be level throughout this area. Avoid floor areas with visible damage, holes, slopes, steps, etc.
2. Remove the protective shield from around the slanted (upper) LIDAR sensor.

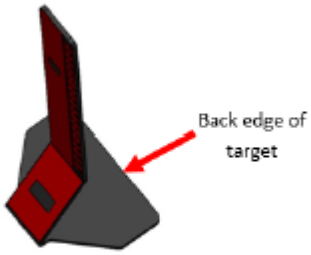
4. Lay the flexible measuring tape at the rear wheel of the machine.

5. Using a ruler or straight edge, align the beginning of the tape measure with the center of each wheel. (shown to the left)

6. Place a piece of painter's tape on the floor to hold the tape measure in place.

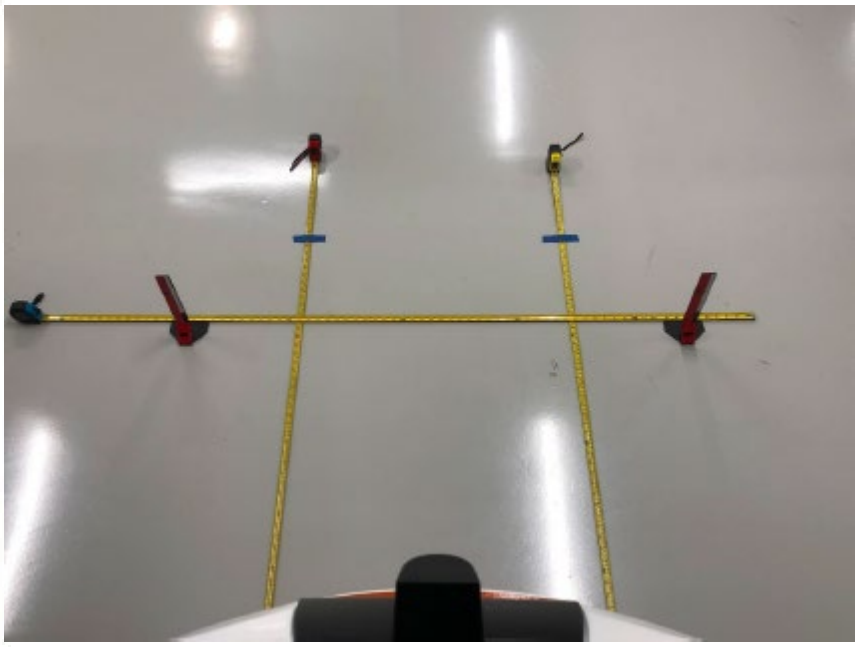




7. From the center axle of the rear wheels, measure 2 Meters out on each side. Make sure to keep the measuring tape straight. Use another piece of tape to hold the measuring tape in place. (shown to the left)

8. Extend the measuring tape 30 cm to each side and place the back edge of the target against the measuring tape. (shown to the right)



9. Cover the front 2D camera with electrical tape or a box. (shown to the left)
10. Cover the lower lidar with an object such as a box to block the lower LIDAR beam. (shown to the right)


11. Kneel next to the machine and get level with the targets, so you can view the beam.

NOTE: It is best to turn the lights out to see it. If you are unable to turn the lights out you can use a large piece of cardboard to block the overhead lights.

12. Turn on the IR goggles and press the button on top IR+

13. Look and see where the Beam is in relation to the bottom black rectangles. The beams must be within less than 5mm of each other.

NOTE: If the beam is not properly aligned within the target range, inspect the LIDAR bracket for damage and make sure it is at a 90-degree angle and not bent. If it is bent, it will cause the beam to not be properly aligned. Sometimes it is possible to bend it back to proper position.

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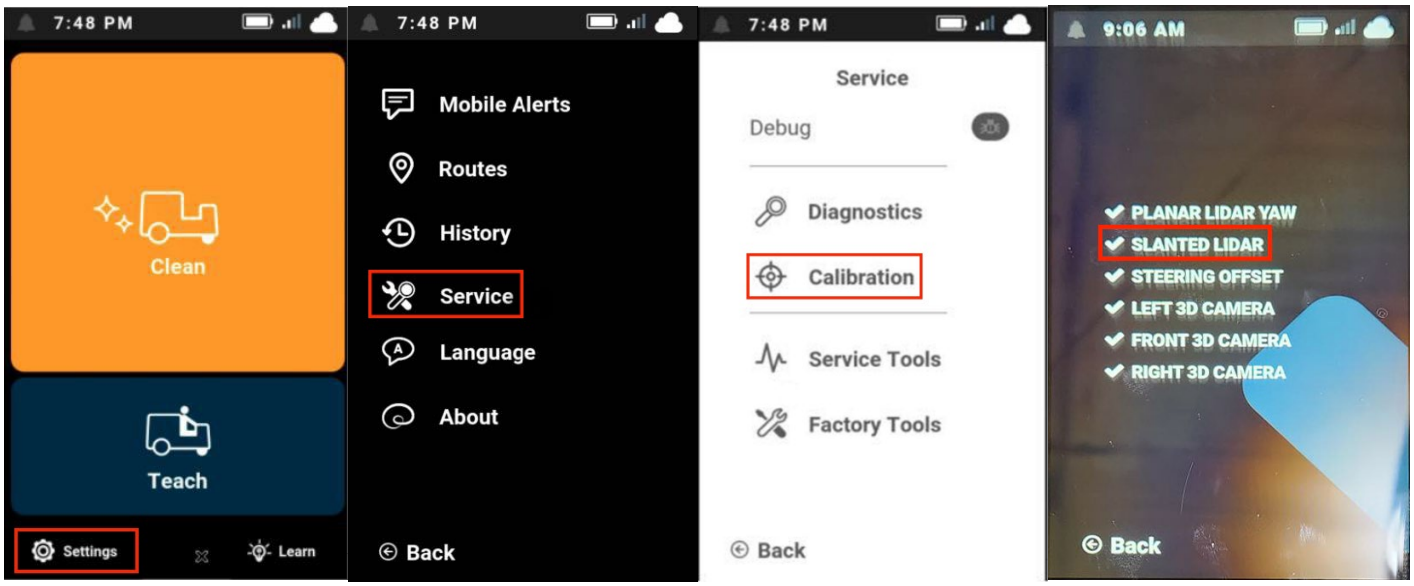
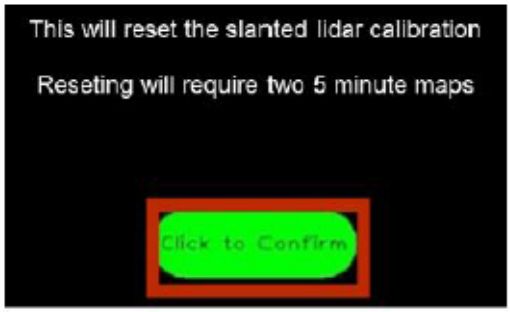
To perform the slanted LIDAR calibration on the machine, follow these steps on the touchscreen.

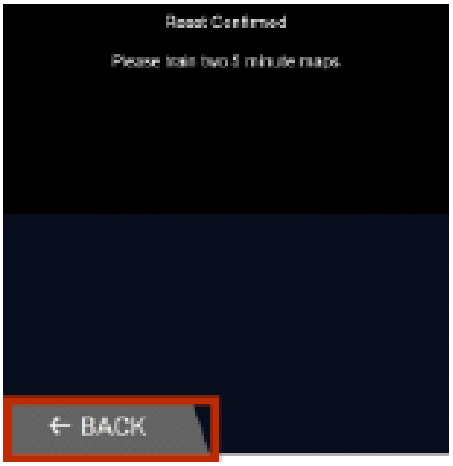
1. From the Main Menu, select **Settings.**
2. From the Settings Menu, select **Service**.
3. Enter the service **PIN**.
4. Select **Calibration**.
5. Select **Slanted LIDAR**.




6. When the screen request confirmation to reset the slanted LIDAR, Select **Click to Confirm**.




7. To return to the Main Menu, select **Back** several times.



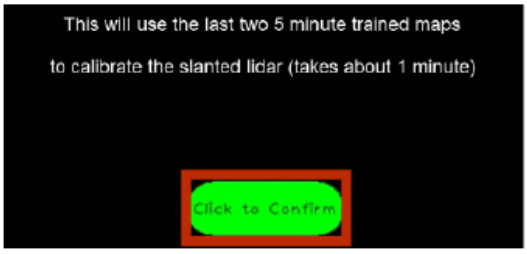

8. From the Main Menu, select **Teach.**

9. Train (2) 5-minute routes and save.

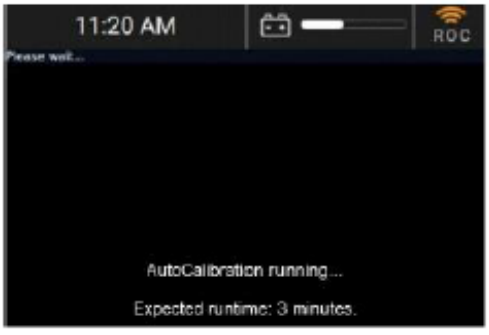
**NOTE**: Routes should be ran close to walls and corners (1-4 feet away) in both directions. Avoid open spaces and areas with foot traffic. When saving a route use a new route to avoid overwriting another trained route already saved.

10. When done training routes, Select **Settings** > **Service** > **Calibration** > **Slanted LIDAR**.

11. When the screen requests confirmation to use the last maps made after a reset, select Click to Confirm.




12. The auto calibration will run (shown below)



13. When done, you will see Calibration Complete (shown below)


14. Return to the Main Menu and then turn off the machine.
    NOTE: wait until you don't hear the BCM fan running to turn the machine back on.
15. Turn the machine back on
16. Select **Settings**> **Service**> **Calibration**> **Slanted LIDAR**.
17. When prompted with the question "Do you want to swap values?" select **Apply**.


18. After the calibration completes, return to the Main Menu and turn off the machine.

    **NOTE**: wait until you don't hear the BCM fan running to turn the machine back on.
19. Turn the machine back on.
20. Select **Settings** > **Service** > **PIN** > **Print Calibration**

21. Press the left or right side of the screen until the slanted_lidar_config.yaml is shown. NOTE: There are invisible buttons on the sides of the screen. Keep pressing different parts to the left and right of the screen until it changes to show the applicable LIDAR configuration. Take a photo of this screen.


**Run one of the routes that you created during the calibration**.

- Position yourself in front of the machine with no room to navigate around you. Ensure that it slows down when approaching then stops. Remain in front of it until it calls for an assist. Hit the Start/Pause button after the assist to resume the route.
- Approach the front of the machine from each side and ensure that the machine stops when you step in front of it.
- Place a stationary obstacle with a height of 5” and a diameter of 2.5” (such as a standard 12-ounce soda can or a 14 oz canned food item) at least two meters in front the path of the machine and verify that the machine drives around the obstacle.