

2D RGB Camera Troubleshooting Guide for OEM

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Revision History

Revision	Date	Description
Draft	4/9/2021	Submitted for Peer Review
01		Initial Release

Definitions, Acronyms, and Abbreviations

Term	Definition
BCM	Brain Control Module
DMM	Digital Multimeter
OEM	Original Equipment Manufacturer
	Examples of commands
	Caution, this might cause serious system problems. Stop and ensure you understand what is being asked.

Required Tool List

The following is the list of tools needed to service 2D RGB Camera related issues for any autonomous floor scrubbers powered by BrainOS.

Item	Image Details
Hex Drivers • 2 mm • 2.5 mm • 3 mm	
7 mm socket wrench	
Digital Multimeter (DMM, Fluke 101 Model or equivalent)	
Fine test leads https://shop.usaclean.com/breadboard-jumper-wires-992-0732/	
Cable Tie Cutter	

Tech Diagnostics



The 2D RGB Camera for the right side is most important, then the front and the left is least important.



If the machine doesn't boot up/freezes during start up the most likely cause is the right 2D camera. This camera has to be working for the software to boot up.

UI based diagnostics (OS version 3.1.x +)

Tech will need to click the following path to get to the sensor tests

Settings → Service → Service Tools → Confirm to Launch Service tools

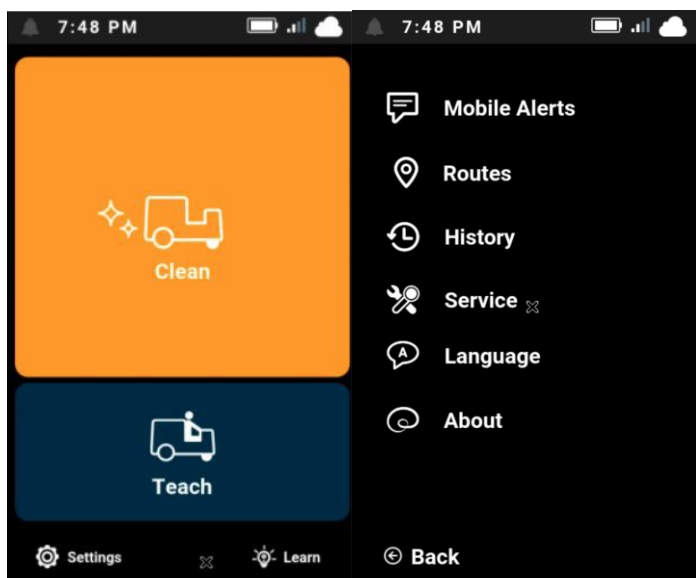


Figure 1: Menu

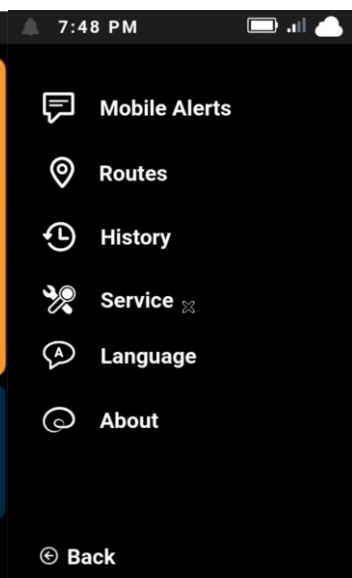


Figure 2: Settings Menu

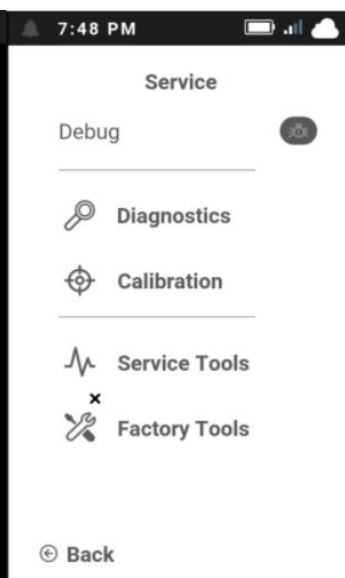


Figure 3: Service Menu

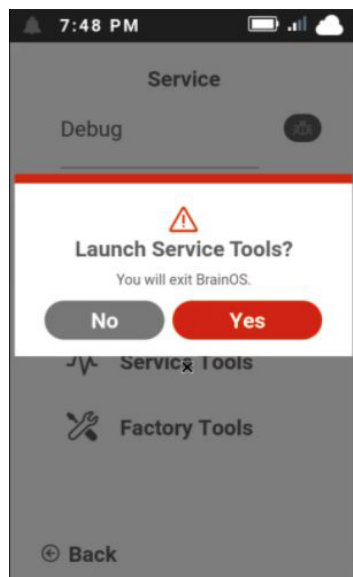


Figure 4: Confirm Y/N

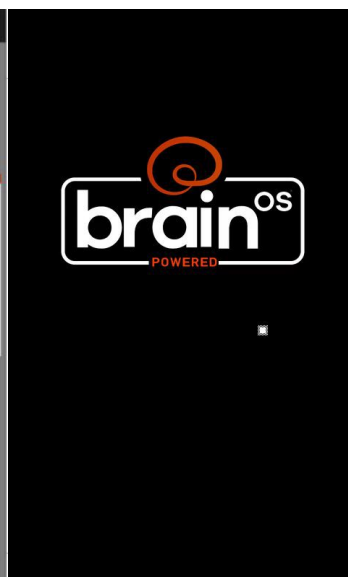


Figure 5: Brain Screen

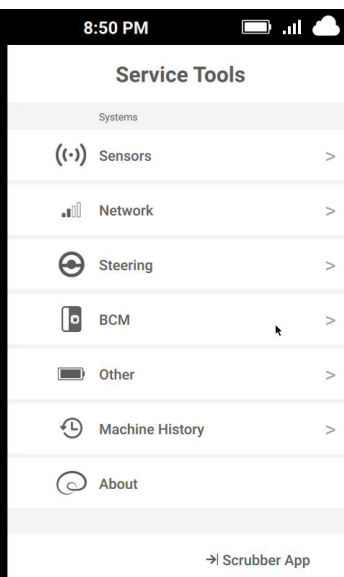
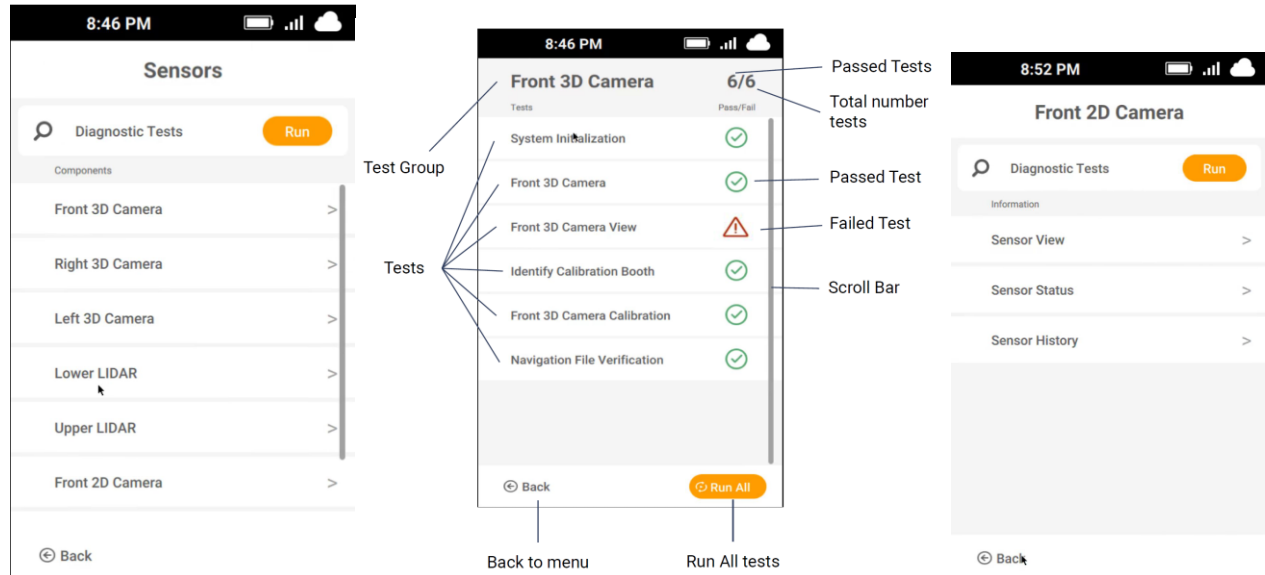


Figure 6: Service Tools

Click Sensors → You will now see all the SENSORS.

Tech can choose RUN on the main Sensors menu which will run all tests for all the sensors. Or the tech can choose the specific sensor he wants to test and run the tests for that Sensor only. Shown below is the front 2D RGB Camera.

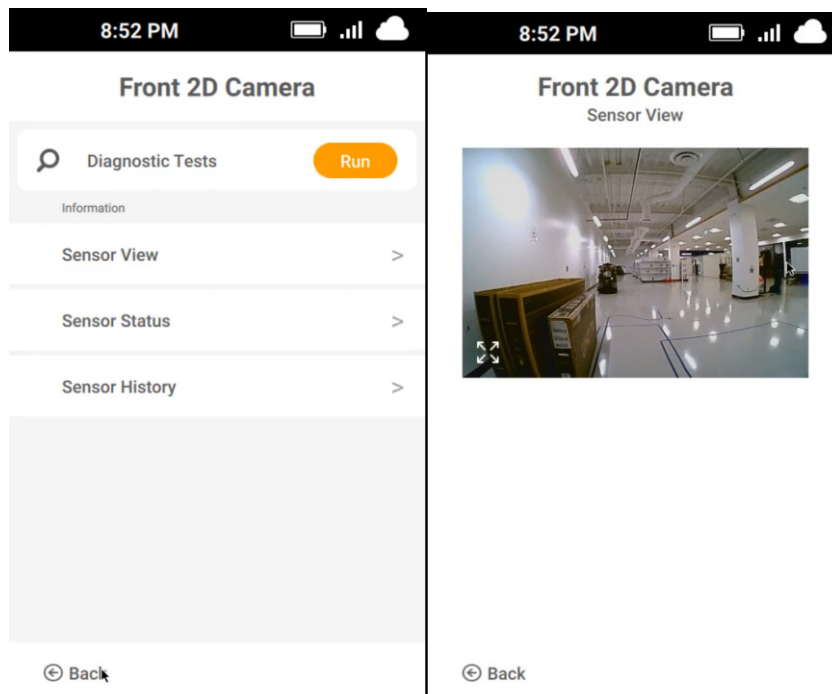
Choose the Sensor and click run. This will give us a pass/fail on tests. You will be able to interact with the error messages.



Sensor View

This will show you what the camera is seeing or isn't seeing. If the picture is blank, check for loose cabling. Reseat cable.

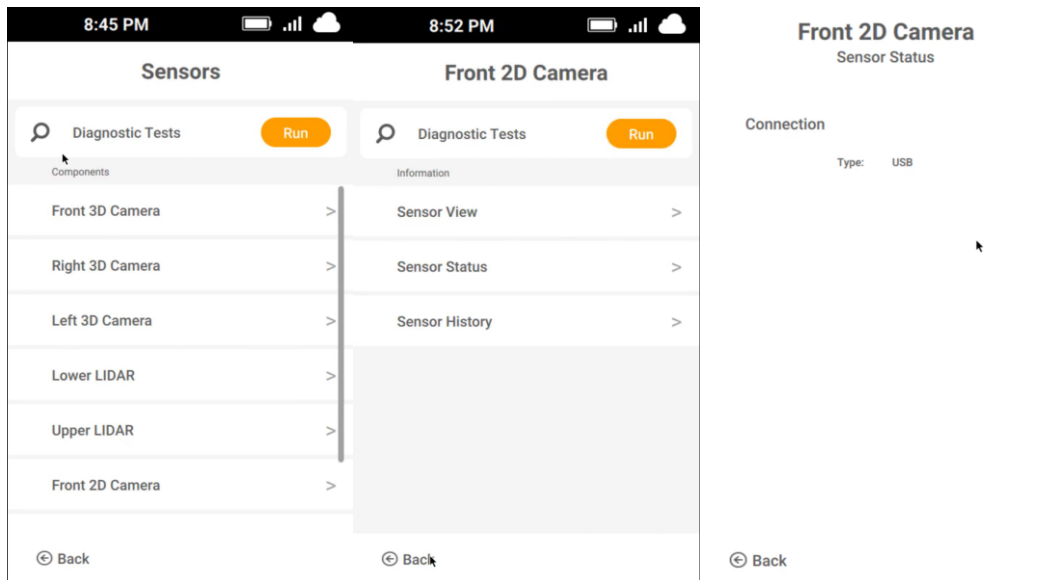
Settings → Service → Service Tools → Confirm to Launch Service tools → Sensors → Select the SENSOR → Sensor View



Sensor Status

Provides an overview of the sensor in question

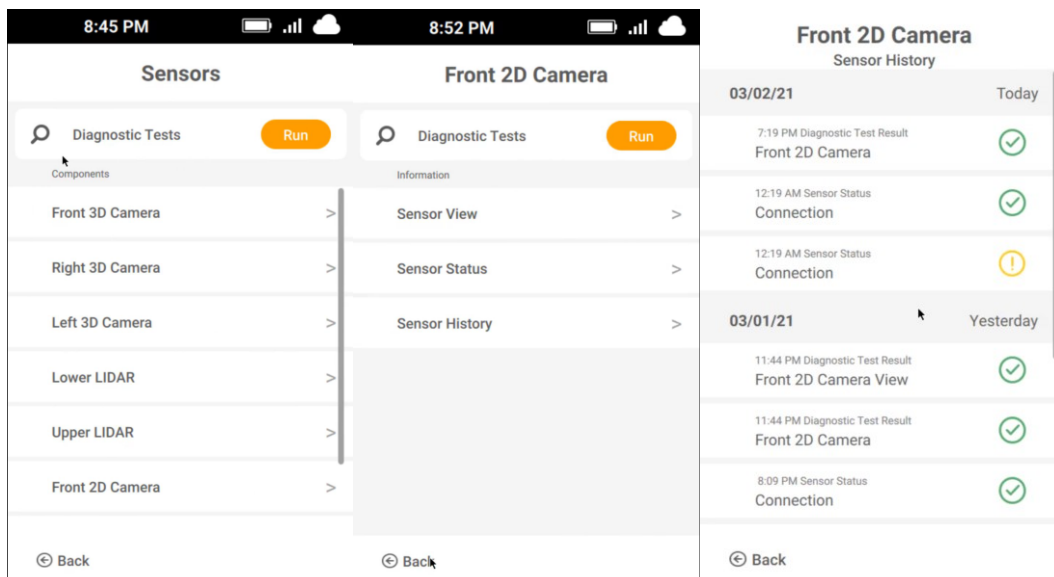
Settings → Service → Service Tools → Confirm to Launch Service tools → Sensors → Select the SENSOR → Sensor Status



Sensor History

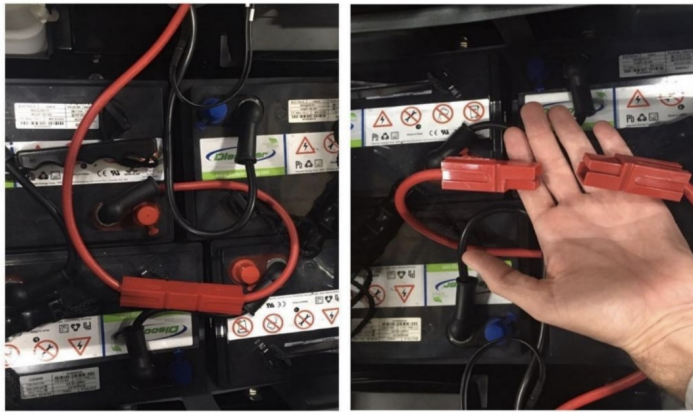
Provides a history of the sensor, including replacements, disconnects, other issues and normal events.

Settings → Service → Service Tools → Confirm to Launch Service tools → Sensors → Select the SENSOR → Sensor History

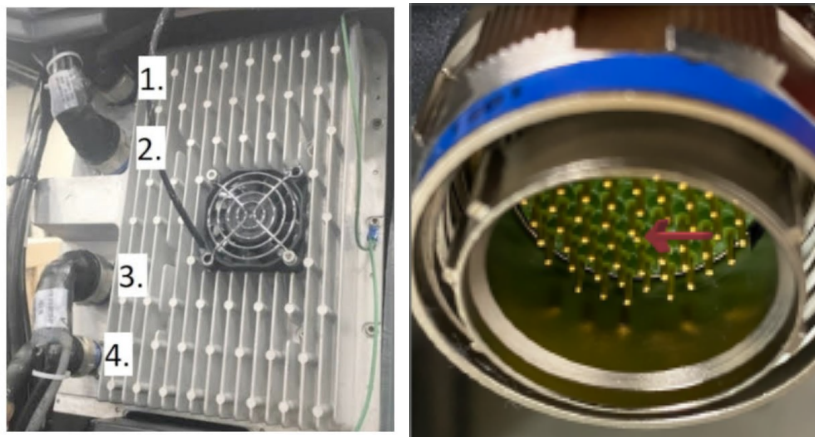


Hardware Inspection

1. Turn off the machine.
2. Raise the seat and decouple the red Anderson connector.



3. Check the connections to see if the cable is loose or unplugged.
4. Unscrew the up trunk (connection #2) check pins, and rescrew. inspect wiring for physical issues.

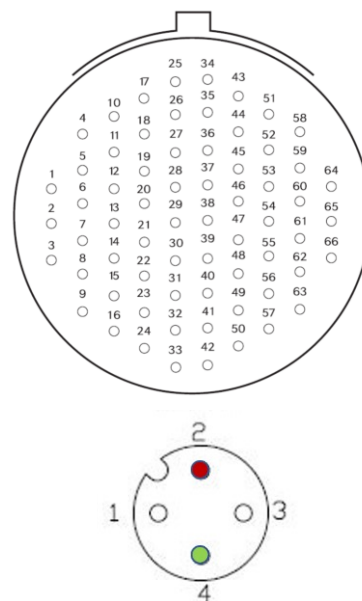


- a. If the up trunk cable has an pins or wiring damaged (bent, missing pins)
Use Solution Code [UPTRUNK-01](#)
- b. Take pictures of the up trunk male connector on the BCM side and the condition of the pins on the cable side.
- c. If no issue found try reseating the connection and check to see if the issue is resolved.
- d. If the issue is not resolved, please continue to the Voltage / Continuity Testing section below.

Voltage / Continuity Testing/Swap

- Have tech disconnect the 2D RGB Camera affected.
- Check the Voltage on Pin 2 and 4. Should be 5V
- If this is the right or front camera and voltage is present, please swap it with the left camera and test to ensure that the issue follows the camera. If issue follows camera or was the left camera to begin with, then use the Solution code 2D-Camera to order and replace the Left 2D RGB Camera
- If voltage is not present, test the following for continuity for the suspect camera.
 - Power off the Scrubber and disconnect the batteries
 - Identify the Up Trunk harness on the BCM

Cable Pairs to check			
Camera	M12 Connector	Description	D38999 Up Trunk
Right 2D RGB	1	USB1P	5
	2	P5V	4
	3	USB1N	6
	4	GND	12
Center 2D RGB	1	USB1P	2
	2	P5V	1
	3	USB1N	3
	4	GND	7
Left 2D RGB	1	USB1P	8
	2	P5V	15
	3	USB1N	9
	4	GND	21



- If continuity testing **fails** please Use Solution Code [UPTRUNK-01](#)
- If continuity testing **passes** please see BCM troubleshooting guide.

Appendix A - Tech Solution Codes

The following tables are provided as individual solutions for issues that were identified in the preceding document.

Tech Solution Codes

Solution Code	Recommended Actions
UPTRUNK-01	If the up trunk cable has no voltage measured or wiring is damaged (bent, missing pins), please perform the following steps: 1) Send any photos, notes, and/or a filled out Troubleshooting Checklist to Brain Corp using the e-mail address specified in the work order. 2) Place an order for a new up trunk. 3) Please schedule the next site visit based on the tracking information for the part. 4) Replace the up trunk (ICE part number: 8350263)
2D-CAMERA	• Please order 2D RGB Camera • 8350242 110 2D RGB Camera Module • Replace 2D RGB Camera -- No calibration needed.

Appendix B - How to Replace the Front 2D RGB Camera

Power down the machine and disconnect the red battery coupling.
Remove the six 2.5 mm hex screws that secure the top black cover.
Remove the top black cover.



Unscrew the M12 connector and remove the two 2.5mm hex screws to free the front camera.



Reverse your steps to install new front 2D camera.

Appendix C - How to Replace the Side 2D RGB Camera

Power down the unit and disconnect the red battery coupling beneath the seat.

Use a 2.5 mm hex key to remove the screws that secure the control panel or touchscreen depending on if your replacing the Right or Left 3D Camera.



Unscrew the M12 connector labeled CAM_LEFT for the left 2D Camera or CAM_RIGHT for the right 2D Camera.



Reverse your steps to install new 2D Camera.