# Camera - Forward Facing (Pitch Verification)

**Correction code** 17221000 FRT 0.18

**NOTE:** Unless otherwise explicitly stated in the procedure, the above correction code and FRT reflect all of the work required to perform this procedure, including the linked procedures. **Do not stack correction codes unless explicitly told to do so.**

**NOTE:** See Flat Rate Times to learn more about FRTs and how they are created. To provide feedback on FRT values, email ServiceManualFeedback@tesla.com.

**NOTE:** See Personal Protection to make sure wearing proper PPE when performing the below procedure. See Ergonomic Precautions for safe and healthy working practices.

**Revision History:**

- 2025-09-10: Updated adjustment instructions for different HW versions.
- 2023-08-07: Updated the procedure.
- 2023-08-03: Added section for adjustment using Service Mode.
- 2023-06-19: Updated images and added note to measure each time during setup.
- 2023-06-07: Updated removal of camera cover to removal of rear view mirror, updated Toolbox steps, and reordered steps for efficiency.

### Equipment:

- 1053066-00-A Camera Calibration Target
- 1448868-00-A Pitch Adjustment Wrench

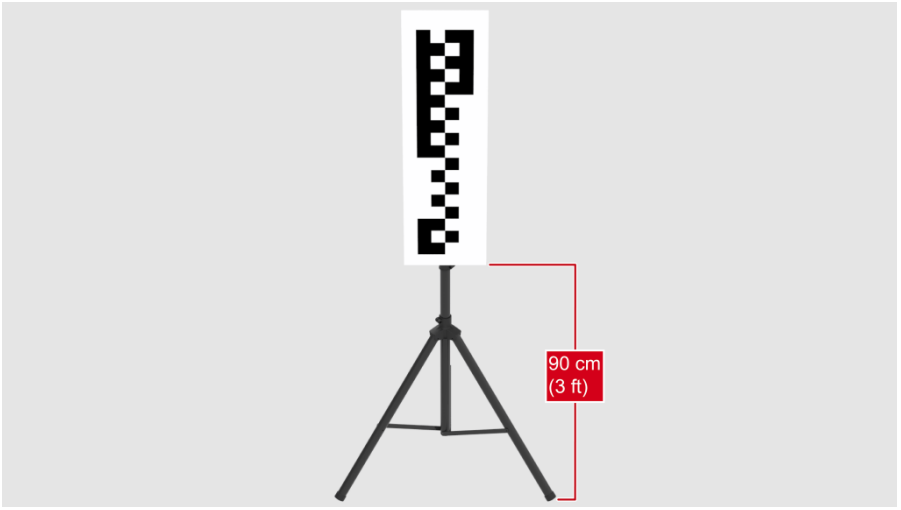
**NOTE**
Note: This procedure describes how to verify forward facing camera pitch. It does not apply to the rear facing camera.

**NOTE**
This procedure was designed for vehicles with factory suspension components. Check if the vehicle has modified suspension components, as this might affect whether calibration can be completed.

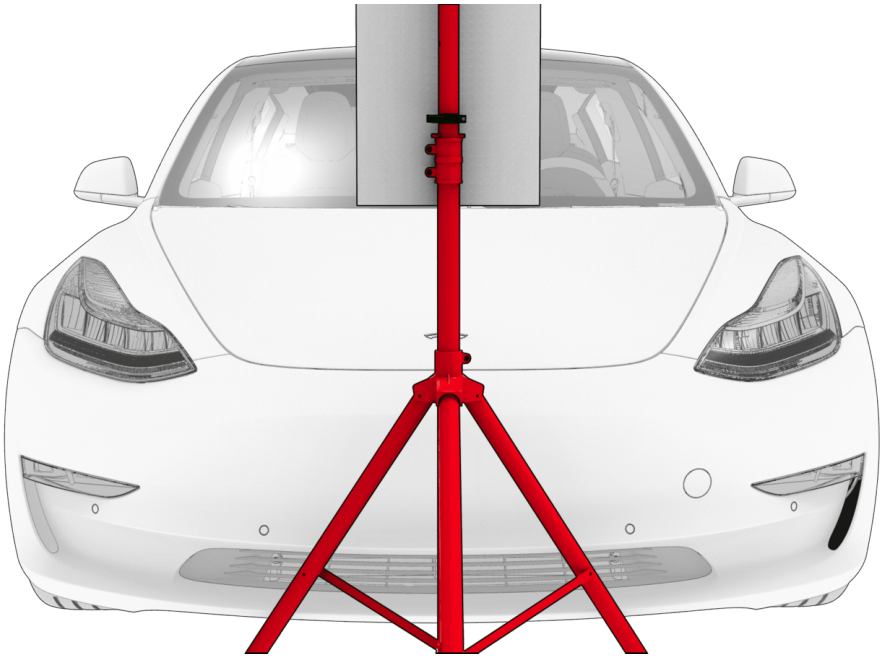
## Setup

1. Park the vehicle on a flat surface with at least 106 cm (3.5 ft) of space in front of the front fascia.
2. Set up the target so that the bottom of the rectangle is 90 cm (3 ft) from the ground.

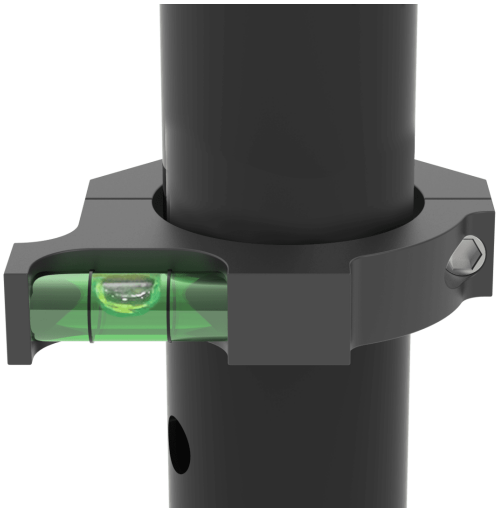
**CAUTION**
Do not assume the tripod is at the correct height from previous verifications. The tripod may have shifted when moved. Measure the height before each setup.




3. Place the target in the appropriate starting position:
   - The checkered portion of the target is facing towards the vehicle.
   - The target is centered with the Tesla "T" on the hood.
   - The target is placed as close to the front fascia as possible.



4. Make sure that the target is on flat ground by examining the bubble level on the back of the target.

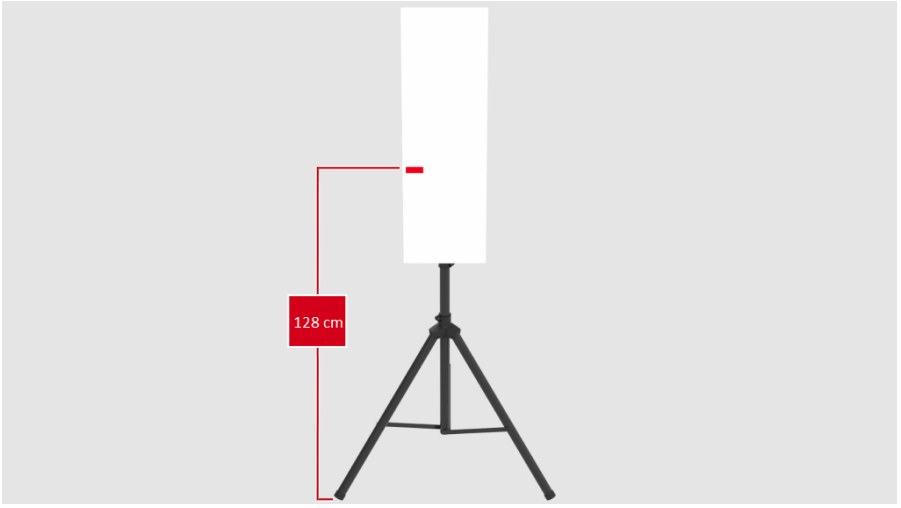


5. Apply a piece of red tape on the target so that the top of the tape is 128 cm from the ground.

**CAUTION**
Do not use existing marks from previous verifications. Remove any existing tape. Measure and reapply new tape to ensure the tape is in the correct location.

**NOTE**
The checker pattern on the target is used for vehicles with 1st generation Autopilot. Ignore the checker pattern when affixing the tape.

**NOTE**
If the vehicle is equipped with aftermarket suspension components that alter the vehicle ride height, the red tape might have to be adjusted to ensure accurate pitch verification.




6. For HW3 and HW4 vehicles, continue to Adjust (Service Mode). For HW2.5 vehicles, continue to Adjust (Toolbox 3).

## Adjust (Service Mode)

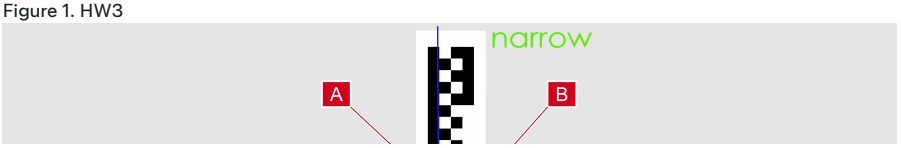
Expand All | Collapse All

1. Enable Service Mode through the touchscreen. See Service Mode + .
2. Unlock the vehicle gateway for diagnostic communication. See Gateway (Unlock) + .
3. Touch **Driver Assist** (steering wheel icon) and then touch **Cameras**.
4. Touch **Clear Camera Calibration**, select **ForwardFacing**, and then touch **Run**.
5. Touch **Close** when the routine has passed.
6. Touch **Reset DAS**, and then touch **Run**.
7. Touch **Close** when the routine has passed.
8. Touch **Camera Preview** and then touch **Main**.
9. Touch **Pitch Verification** to add the verification lines on the display.
10. Review the image on the touchscreen:

**NOTE**
The top of the red tape (A) should coincide with the blue horizontal line. However, if the top of the red tape is between the green lines, that is sufficient.

- If the top of the red tape (A) is between the two green lines (B and C), the forward facing camera is within calibration pitch specifications. Go to step 15.
- If the top of the red tape (A) is not between the two green lines (B and C), the forward facing camera needs adjustment. Continue to the next step to adjust the camera.

Figure 1. HW3



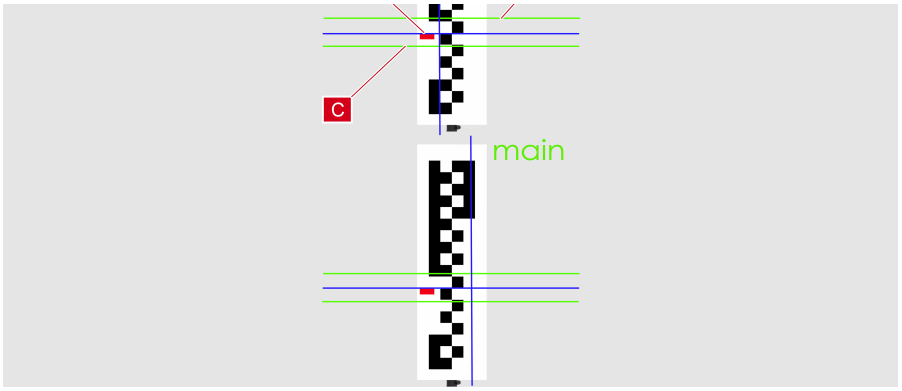
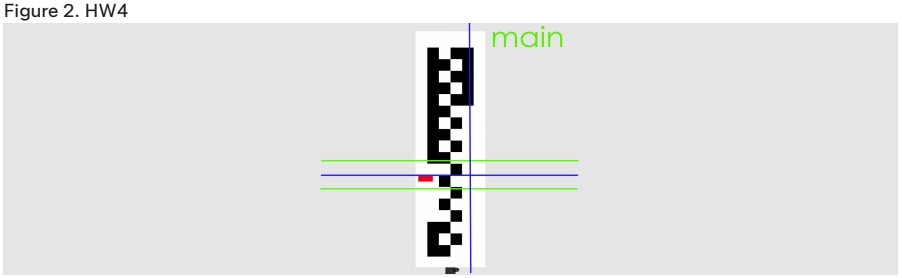
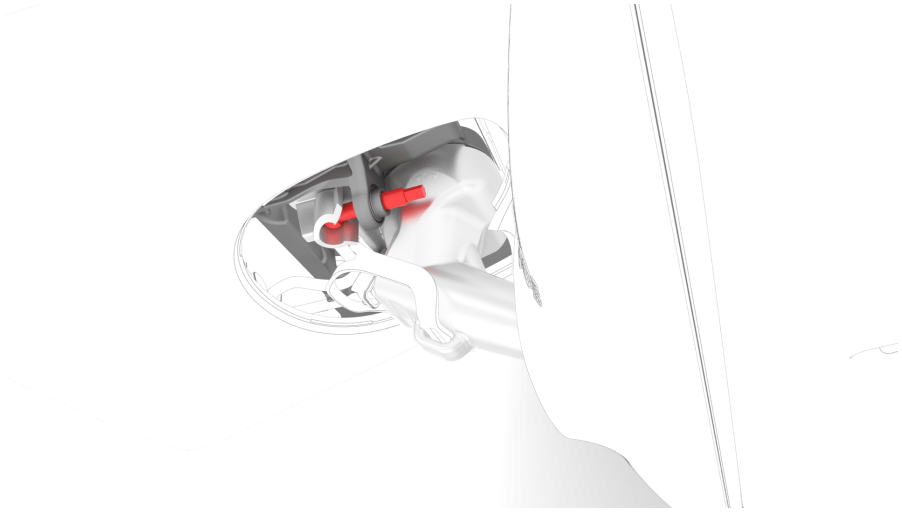



Figure 2. HW4




11. **HW3 only:** Repeat steps 8 through 10 for Narrow camera.
12. Remove the rear view mirror. See Mirror - Rear View (Remove and Replace) + .
13. Use a pitch adjustment wrench to adjust the camera pitch so that the top of the red tape will be between the 2 green lines.

> **NOTE**
> Rotating the wrench clockwise pitches the camera up, and counterclockwise pitches the camera down conversely. 1 full rotation of the wrench can adjust the pitch 0.5 - 1.5 degrees.



14. Install the rear view mirror. See Mirror - Rear View (Remove and Replace) + .
15. Touch **Controls** (vehicle icon), **Service Mode** and then touch **Exit Service Mode**.
16. Remove the target from the front of the vehicle.
17. The vehicle needs to be driven by the customer to complete the calibration procedure.

> **NOTE**
> Self-calibration can take up to 100 miles (160 km) of manual driving, depending upon the road type and condition. Until self-calibration is complete, the message "Autopilot Features Currently Unavailable: Manual Driving Required While Camera Is Calibrating" is displayed if an attempt is made to engage an Autopilot feature.

## Adjust (Toolbox 3)

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**NOTE**
Adjustment of the forward facing camera is an iterative process. That is, check the narrow and main images, adjust accordingly, check the narrow and main images, adjust accordingly, etc.

**NOTE**
The actions of entering the vehicle, inserting the wrench, turning the wrench, and then exiting the vehicle affect the camera alignment during those actions, therefore you cannot adjust the camera in real time.

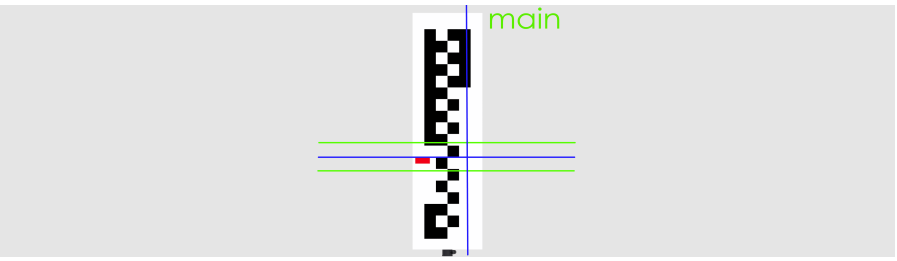
1. Connect a laptop with Toolbox 3 to the vehicle.
2. Exit the vehicle and select **Dashboards > DAS Tools > Display DAS Images > Clear Calibration and Capture Image**.

**CAUTION**
Freeze-frame camera images are captured, and the vehicle needs to be unoccupied at this time in order for the ride height to maintain specification

3. Review the freeze-frame main image:

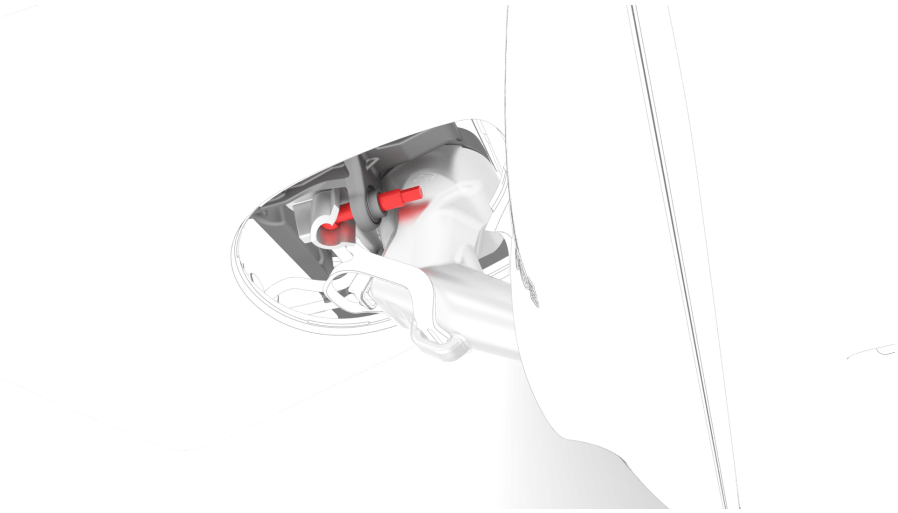
**NOTE**
The top of the red tape should coincide with the blue horizontal line.

- If the top of the red tape is not coinciding with the blue horizontal line, the forward facing camera needs adjustment. Continue to the next step to adjust the camera.




4. Remove the rear view mirror. See Mirror - Rear View (Remove and Replace) + .
5. Use a pitch adjustment wrench to adjust the camera pitch so that the top of the red tape coincides with the horizontal blue line.

**NOTE**
Rotating the wrench clockwise pitches the camera up, and counterclockwise pitches the camera down conversely. 1 full rotation of the wrench can adjust the pitch 0.5 - 1.5 degrees.



6. Exit the vehicle, and in Toolbox, select **Capture Image** to capture updated freeze-frame main images.

   NOTE
   Make sure that the vehicle remains unoccupied as the image capture is performed.

7. Repeat the procedure from step 3.
8. Install the rear view mirror. See Mirror - Rear View (Remove and Replace) + .
9. Disconnect the laptop from the vehicle.
10. Remove the target from the front of the vehicle.
11. The vehicle needs to be driven by the customer to complete the calibration procedure.

    NOTE
    Self-calibration can take up to 100 miles (160 km) of manual driving, depending upon the road type and condition. Until self-calibration is complete, the message "Autopilot Features Currently Unavailable: Manual Driving Required While Camera Is Calibrating" is displayed if an attempt is made to engage an Autopilot feature.