Last Modified: 01-14-2019	6.8:8.0.48	**Doc ID:** RM100000000SQ40
Model Year Start: 2016	**Model:** Prius	**Prod Date Range:** [11/2015 - 12/2018]
Title: PARK ASSIST / MONITORING: INTELLIGENT CLEARANCE SONAR SYSTEM: CALIBRATION; 2016 - 2018 MY Prius [11/2015 - 12/2018]		

CALIBRATION

NOTICE:

When any of the following parts have been replaced, perform adjustment shown in the following table. If not, the intelligent clearance sonar system may not operate correctly.

PRECAUTION (PROCEDURE 1)

(a) The necessary procedures (adjustment, calibration, initialization or registration) that must be performed after parts are removed and installed, or replaced during intelligent clearance sonar system removal/installation are shown below.

For the installation location of the ultrasonic sensors, refer to Parts Location.

Click here INFO

PART NAME	OPERATION	ADJUSTMENT ITEM	PROCEED TO
Steering sensor	• Removal and installation of the steering sensor • Removal and installation of the connector of the steering sensor • Replacement	Steering angle neutral point (Initialize intelligent clearance sonar system)*3	Procedure 4
Suspension, tires, etc.	The vehicle height changes because of suspension or tire replacement	Ultrasonic sensor detection angle	Procedure 2, 3
		Ultrasonic sensor detection angle registration	Procedure 4
Front bumper assembly	• Replacement • Installation position of the front bumper assembly changes because of the removal and installation of the front bumper assembly	Ultrasonic sensor detection angle	Procedure 2, 3
		Ultrasonic sensor detection angle registration	Procedure 4
Rear bumper assembly	• Replacement • Installation position of the rear bumper assembly changes because of the removal and installation of the rear bumper assembly	Ultrasonic sensor detection angle	Procedure 2, 3
		Ultrasonic sensor detection angle registration	Procedure 4
Clearance warning ECU assembly	Replacement	Ultrasonic sensor detection angle	Procedure 2, 3
		Steering angle neutral point	Procedure 4
		Bumper type registration	
		Ultrasonic sensor detection angle registration	
	• Removal and installation	Ultrasonic sensor detection angle	Procedure 2, 3

Ultrasonic sensor*1*2	• Replacement	Ultrasonic sensor detection angle registration	Procedure 4
	An ultrasonic sensor becomes misaligned	Ultrasonic sensor detection angle	Procedure 2, 3
		Ultrasonic sensor detection angle registration	Procedure 4
	An ultrasonic sensor is subjected to impact	Ultrasonic sensor detection angle	Procedure 2, 3
		Ultrasonic sensor detection angle registration	Procedure 4
Auxiliary battery	Cable is disconnected from the negative (-) auxiliary battery terminal	Steering angle neutral point*3	Procedure 4

*1: If a front side ultrasonic sensor (LH, RH) is removed and installed or replaced, it is necessary to perform Registration.
*2: If a rear side ultrasonic sensor (LH, RH) is removed and installed or replaced, it is necessary to perform Registration.
*3: The steering sensor zero point can also be calibrated by driving the vehicle.

Click here INFO

PREPARATION (PROCEDURE 2)

(a) Preparation

- Digital angle gauge
- Digital angle gauge attachment
- Masking tape (To prevent damage)
- A level

SST: 09989-00020

(b) Confirm levelness of floor surface.

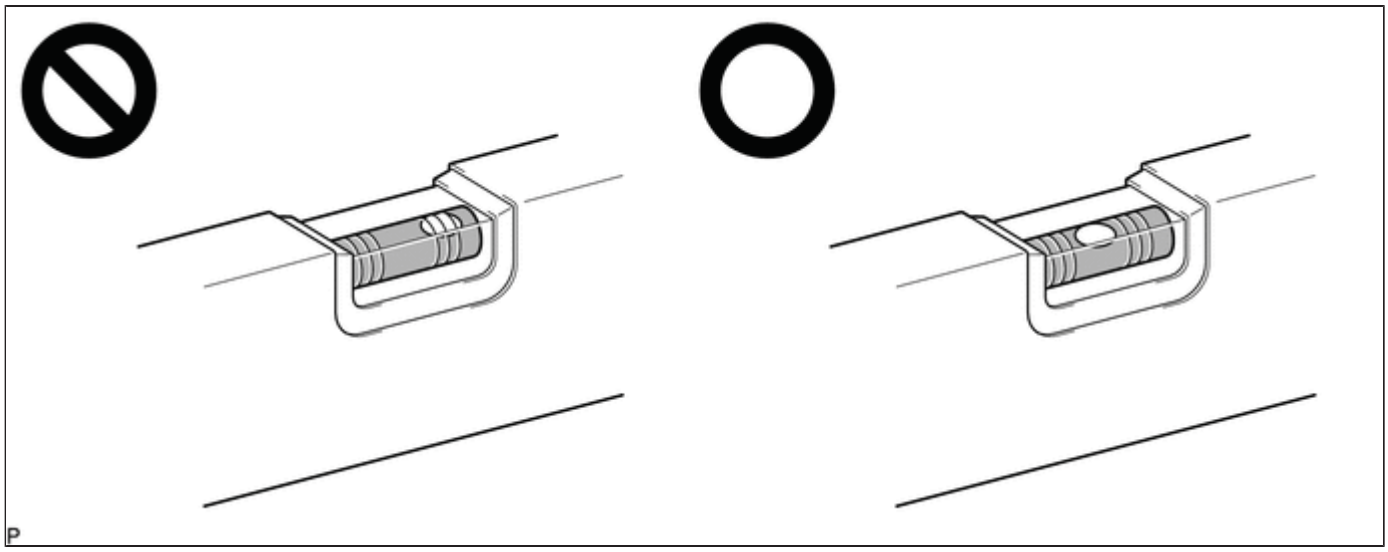
(1) Place a bubble level on a level surface and confirm that the bubble is centered.

NOTICE:

Make sure that there is no gravel, sand, etc., and that the surface is not undulating.

HINT:

By adjusting the direction of the bubble level, it is possible to find a position where the bubble is centered.

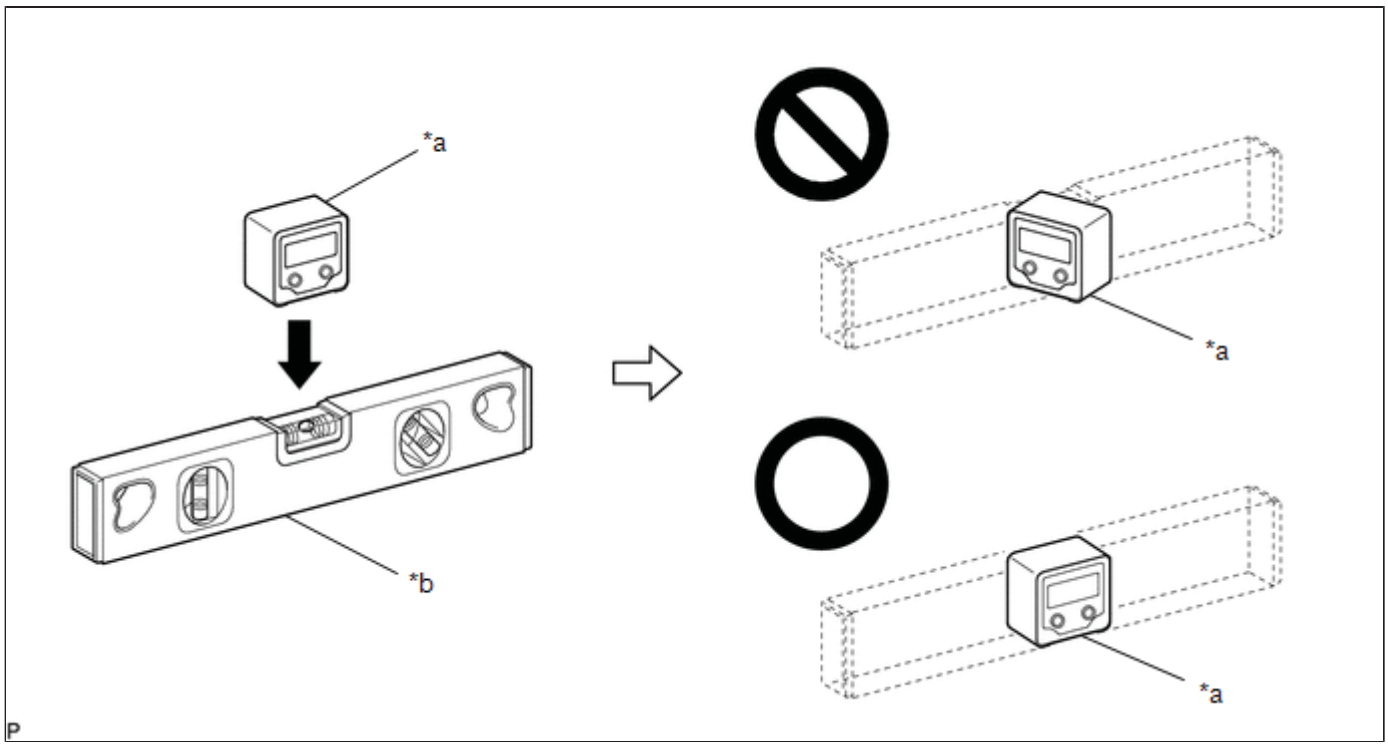


(2) Turn on the digital angle gauge.

(3) Place the digital angle gauge in the same location and direction as that of the bubble level where the levelness of the surface was confirmed.

NOTICE:

Confirm that the location and direction of the digital angle gauge is exactly the same as that of the bubble level.



*a	Digital Angle Gauge	*b	Level

(4) Press the "ZERO" switch to memorize the zero point (perfectly level).

NOTICE:

Make sure that the digital angle gauge does not move when pressing the switch. If the digital angle gauge moves when the switch is pressed, an incorrect zero point may be memorized and it will not be possible to accurately check for levelness.

(5) Using the digital angle meter in which the zero point (perfectly level) has been memorized, measure the angle of the floor surface at the 4 positions at the front of the vehicle and the 4 positions at the rear of the vehicle as

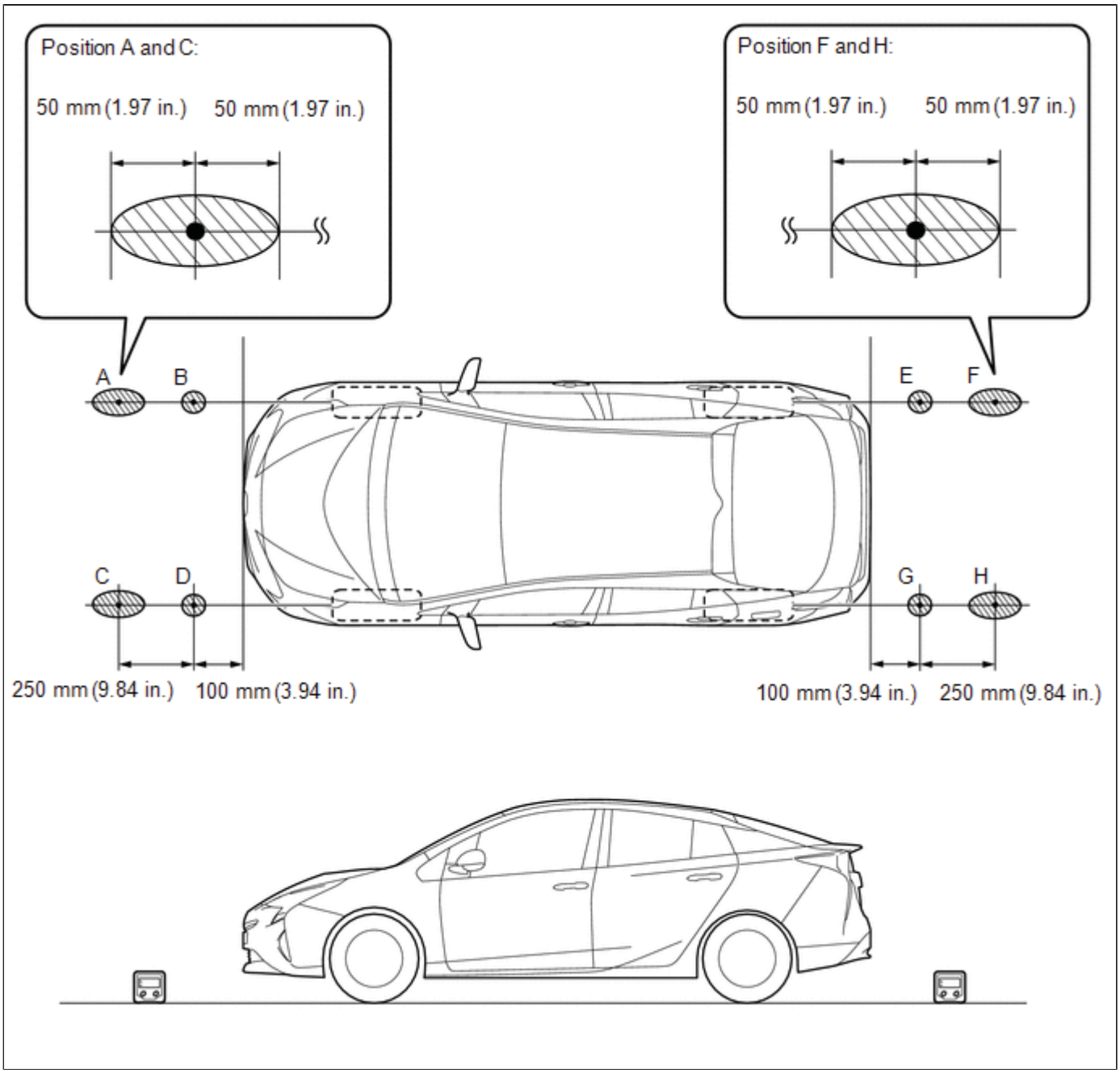
shown in the illustration. Write the measured values into the following worksheet.

NOTICE:

- Always position the digital angle gauge in the direction shown in the illustration.
- Make sure that there is no gravel, sand, etc., and that the floor surface is not undulating.
- When measuring the angle of the floor surface, avoid uneven areas such as joints between tiles.

HINT:

If necessary, the digital angle gauge can be placed anywhere within the specified area when measuring the angle of the floor surface for positions A, C, F and H.



	Confirmation Area	-	-

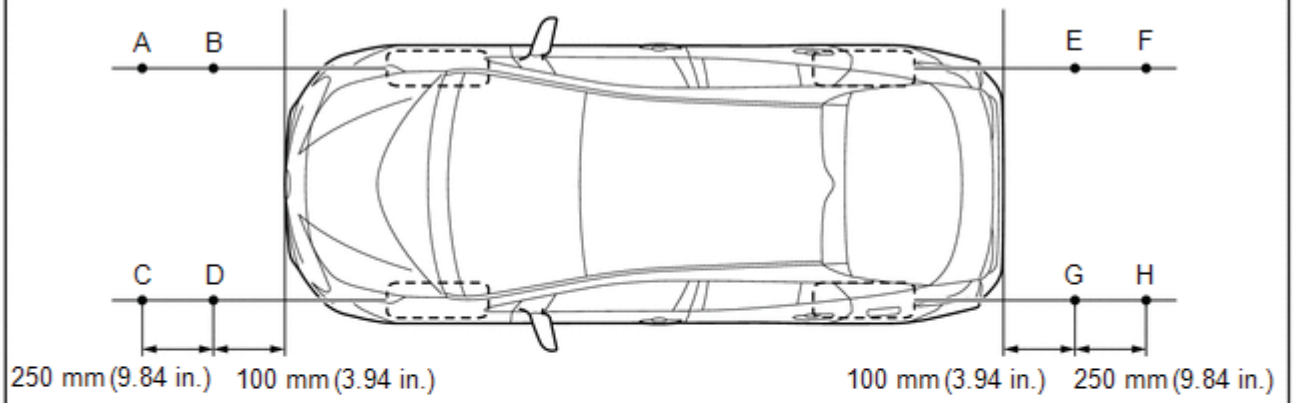
(6) Using the following worksheet, calculate the average of the measurements taken at the 4 positions in front of the vehicle, and calculate the average of the measurements taken at the 4 positions behind the vehicle. Confirm that

the front measurement average and the rear measurement average are not more than approximately 0.37 degrees. Also, confirm that the front measurement average and the rear measurement average is less than 0.2 degrees.

NOTICE:

If the front measurement average and the rear measurement average are more than approximately 0.37 degrees or the difference between the front measurement average and the rear measurement average is 0.2 degrees or more, choose another work area as it is not possible to accurately check the installation angle of the sensors.

Worksheet:



Front side				Rear side			
A		B		E		F	
+		+		+		+	
−		−		−		−	
C		D		G		H	
+		+		+		+	
−		−		−		−	
(A + B + C + D)/ 4 = front measurement average				(E + F + G + H)/ 4 = rear measurement average			
+				+			
−				−			

Both of the following conditions are met:

- The difference between the front measurement average and the rear measurement average is less than 0.2 degrees.

- The front measurement average and the rear measurement average are not more than approximately 0.37 degrees.

OK: Proceed to the next step. NG: Choose another work area.

(Front measurement average + Rear measurement average)/ 2 = Floor surface inclination

After calculating the floor surface inclination, proceed to "Calibrate the digital angle gauge".

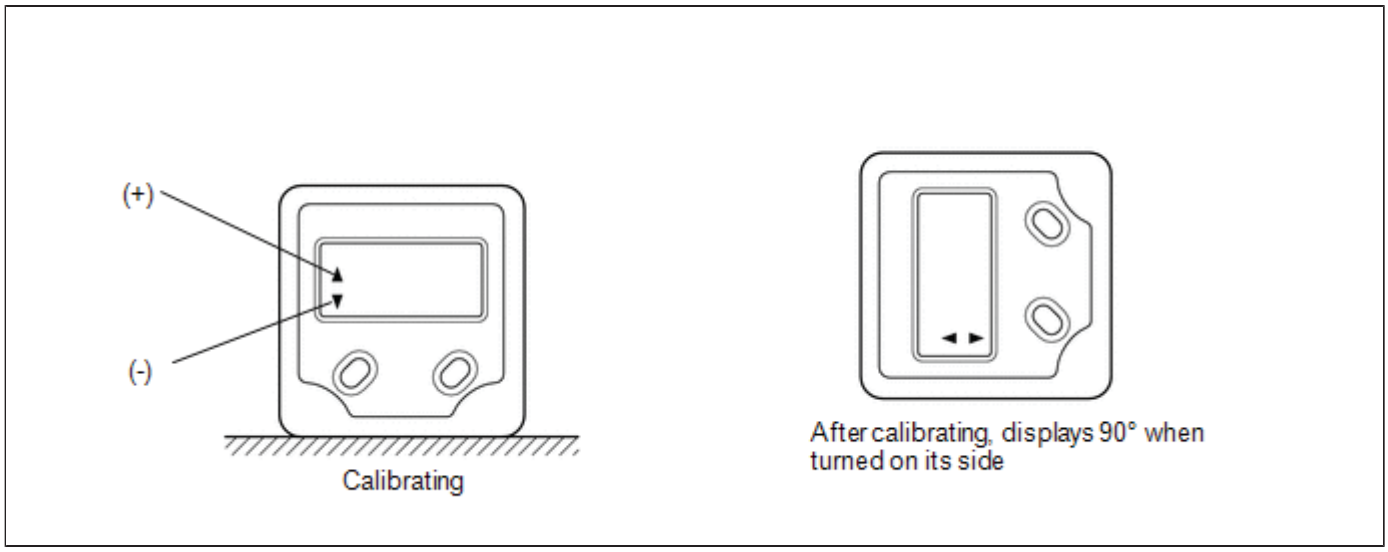
(7) Average the front measurement average and the rear measurement average, then round the answer to 1 decimal place (E.g. 0.0927 degrees is rounded to 0.1 degrees) to obtain the floor surface inclination value.

(8) Calibrate the digital angle gauge

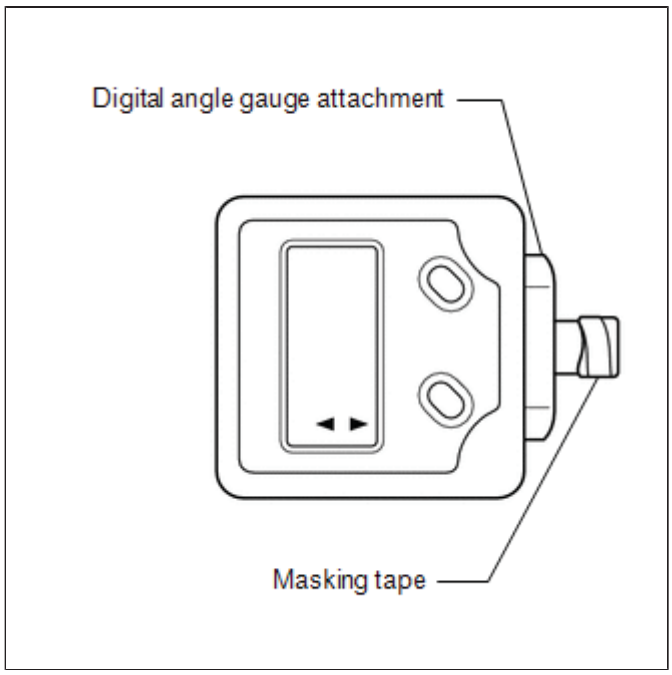
Adjust the angle of the digital angle gauge until it reads the same value of floor surface inclination, then press the "ZERO" switch to memorize the zero point (level with floor surface).

NOTICE:

Before pressing the "ZERO" switch, confirm that the digital angle gauge reading is positive if the floor angle inclination is positive, and negative if the floor angle inclination is negative.



(c) Prepare the digital angle gauge



(1) Attach the digital angle gauge attachment to the digital angle gauge.

SST: 09989-00020

(2) Attach masking tape to the digital angle gauge attachment.

(d) Remove all luggage from the vehicle.

(e) Adjust the tire inflation pressure to the specified pressure.

Click here INFO INFO

(f) Check the height of the vehicle.

Click here INFO

SENSOR HEIGHT AND ALIGNMENT INSPECTION (PROCEDURE 3)

HINT:

Check if the installation angle of each ultrasonic sensor is appropriate.

(a) Preparation

(1) Visually check that the bumper, grill and ultrasonic sensors are installed properly and are not damaged.

NOTICE:

If the bumper, grill or any ultrasonic sensor is not installed correctly, the calibration may not be able to be completed.

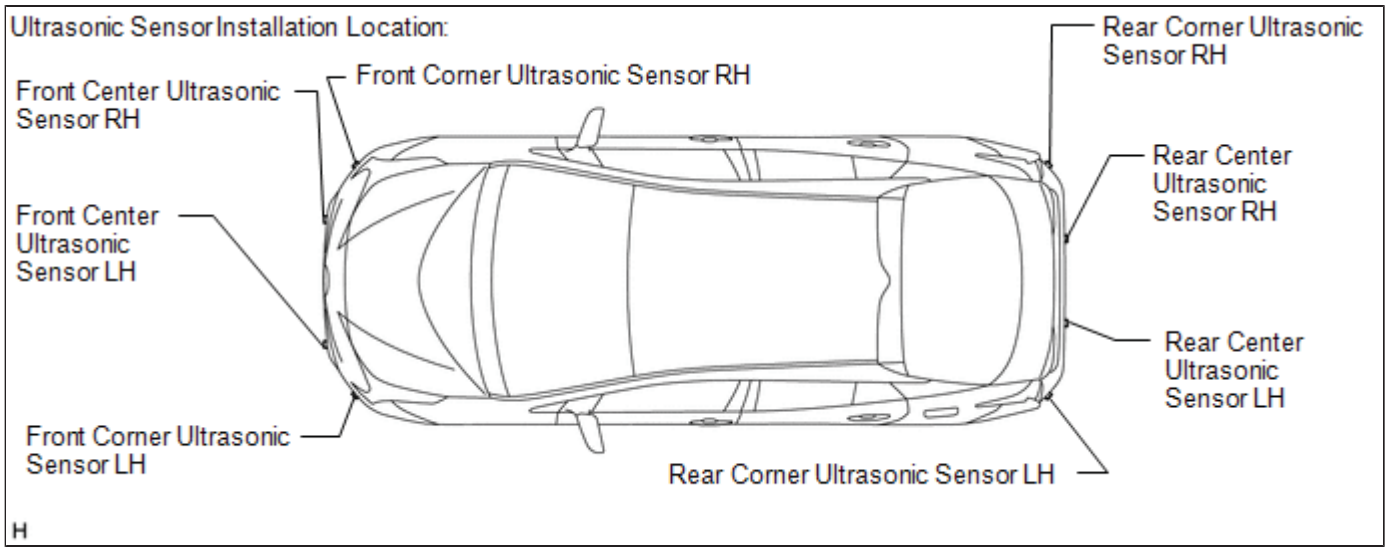
(2) Check the tire pressures and adjust them if necessary.

Click here INFO INFO

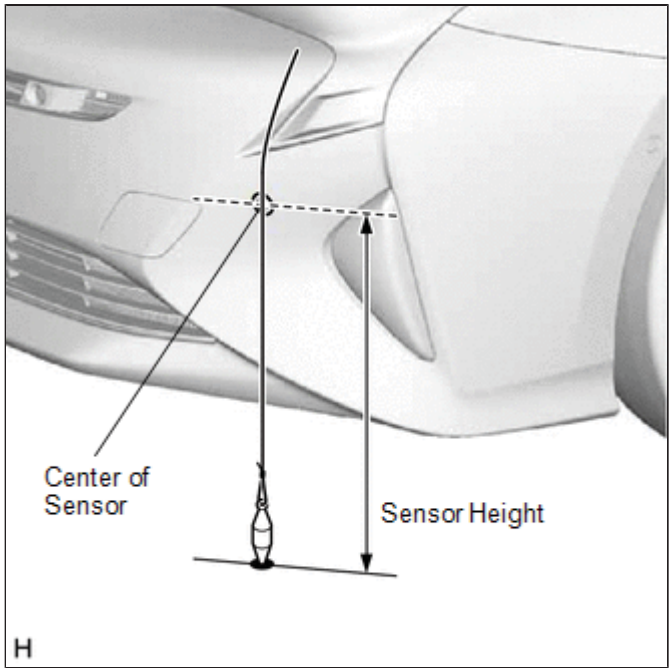
NOTICE:

- Ensure that the vehicle is level in an area with no wind.
- Do not lean on the vehicle.
- Do not do anything that may affect the level of the vehicle during the calibration, such as getting in or out of the vehicle, or adding or removing luggage.

(b) Sensor height and alignment inspection



(c) Measure the installation height of the sensors.



Standard Height (Front Bumper):

SENSOR LOCATION	SENSOR HEIGHT
Front Center Ultrasonic Sensor	512.5 to 582 mm (20.2 to 23.0 in.)
Front Corner Ultrasonic Sensor	441.7 to 513.7 mm (17.4 to 20.2 in.)

Standard Height (Rear Bumper):

SENSOR LOCATION	SENSOR HEIGHT
Rear Center Ultrasonic Sensor	541.6 to 613.6 mm (21.3 to 24.2 in.)
Rear Corner Ultrasonic Sensor	456.6 to 528.6 mm (18.0 to 20.8 in.)

NOTICE:

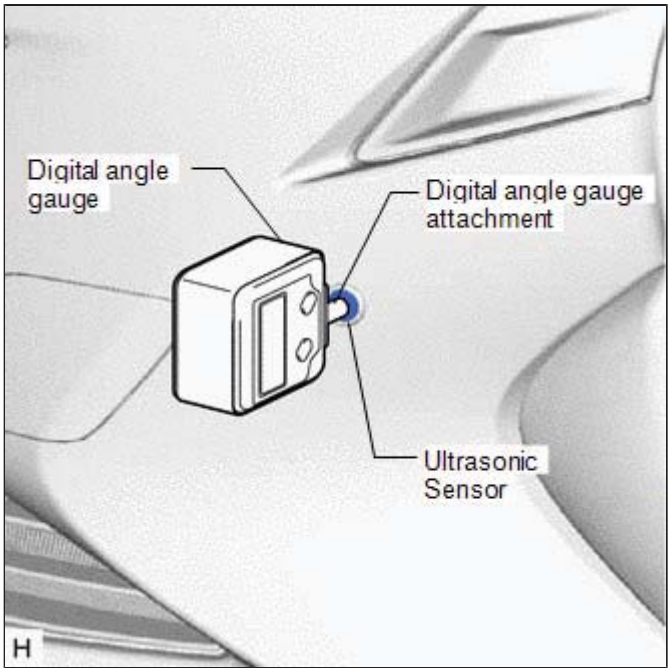
If the installation height of a sensor is not as specified, it may not be possible to measure the sensor angles correctly. If so, unload the vehicle and measure the installation height of the sensors again.

HINT:

Use the center of the sensor as the measuring point.

(d) Using the digital angle gauge, measure the angles of each sensor. Write down the measured values.

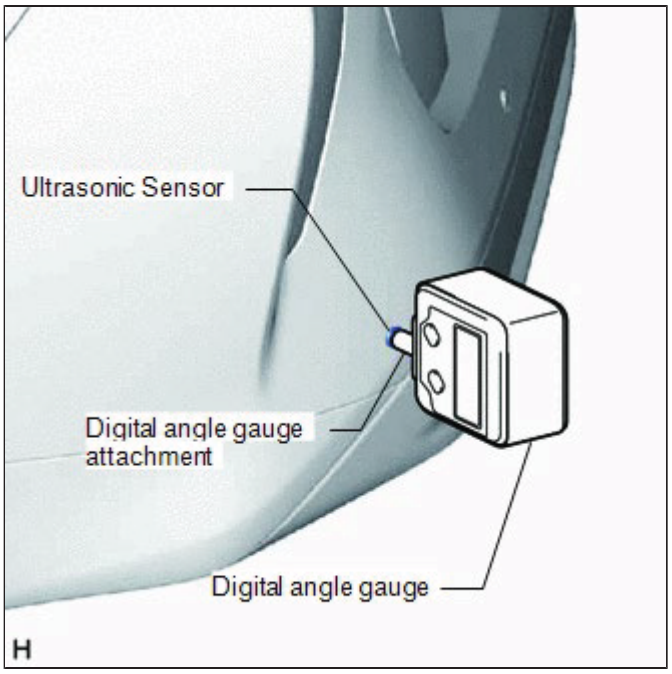
(1) Measure the angle of the front sensors as shown in the illustration.



NOTICE:

Ensure that the digital angle gauge is flush with the face of the sensor.

(2) Measure the angle of the rear sensors as shown in the illustration.



NOTICE:

Ensure that the digital angle gauge is flush with the face of the sensor.

(3) Confirm that the angles of the sensors are as specified.

NOTICE:

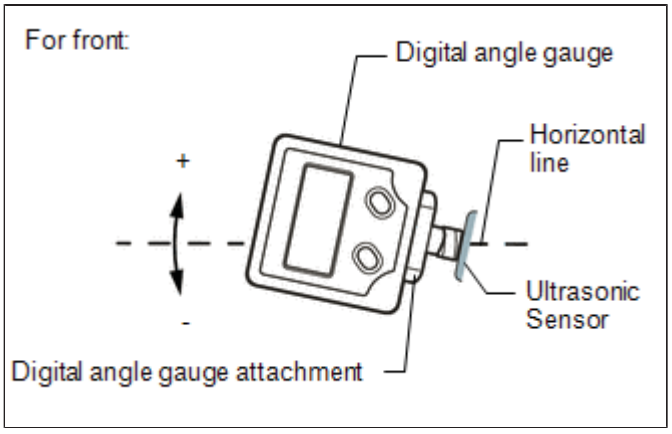
The sensor angle is the measured sensor angle subtracted from 90°.

HINT:

- The digital angle gauge should indicate 90° when turned on its side.
- If the face of the sensor is tilted upwards, the sensor angle will be positive.

Standard Height (Front Bumper):

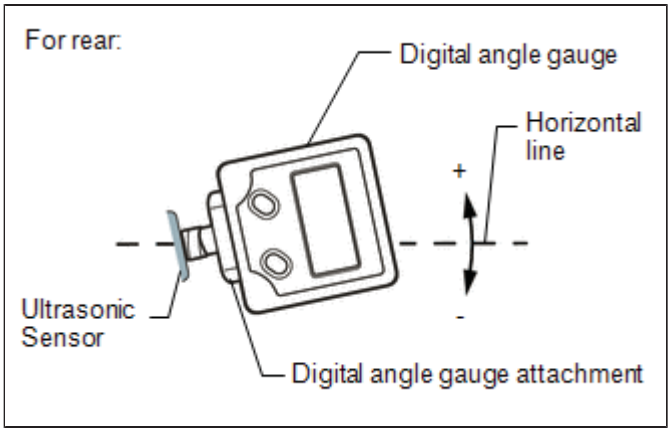
SENSOR LOCATION	INSTALLATION ANGLE
Front Center Ultrasonic Sensor	-3.8 to 6.1°
Front Corner Ultrasonic Sensor	-3.0 to 6.9°



Standard Height (Rear Bumper):

SENSOR LOCATION	INSTALLATION ANGLE

Rear Center Ultrasonic Sensor	-3.2 to 6.7°
Rear Corner Ultrasonic Sensor	-2.2 to 7.7°



(4) If the angle or height of the sensors is not as specified, confirm that the installation is correct and then perform the inspection again.

REGISTRATION (PROCEDURE 4)

(a) Preparation

(1) Confirm that the following DTCs are not output.

SYSTEM	PROCEED TO
Intelligent Clearance Sonar System	INFO
Simple Advanced Parking Guidance System	INFO

NOTICE:

If DTC C1AEC, C1AED, C1AEE, C1AF0, C1AF3, C1AF4, C1AF5, C1AF6, C1AF8, C1AEA or C168D are output at this point, it is not a malfunction. Proceed with the calibration.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Body Electrical / Advanced Parking Guidance/ICS/Intuitive P/A / Utility.

Body Electrical > Advanced Parking Guidance / ICS / Intuitive P / A > Utility

TESTER DISPLAY
Intuitive P/A Detection/Steering Adjustment

(f) According to the display on the Techstream, perform calibration.

HINT:

If "Battery or Steering Sensor" is selected, further calibration is not required. (Bumper type registration is not required.)

(g) Enter the bumper type using the Techstream.

BUMPER TYPE	VALUE

Standard	1

HINT:

If the clearance warning ECU assembly is replaced or removed and installed, it is necessary to perform bumper type registration.

(h) Using the Techstream, enter the measured sensor values.

NOTICE:

The sensor angle is the measured sensor angle subtracted from 90°.

HINT:

The digital angle gauge should indicate 90° when turned on its side.

(i) Disconnect the Techstream from the DLC3.