

Camera Adjustment, Inspection

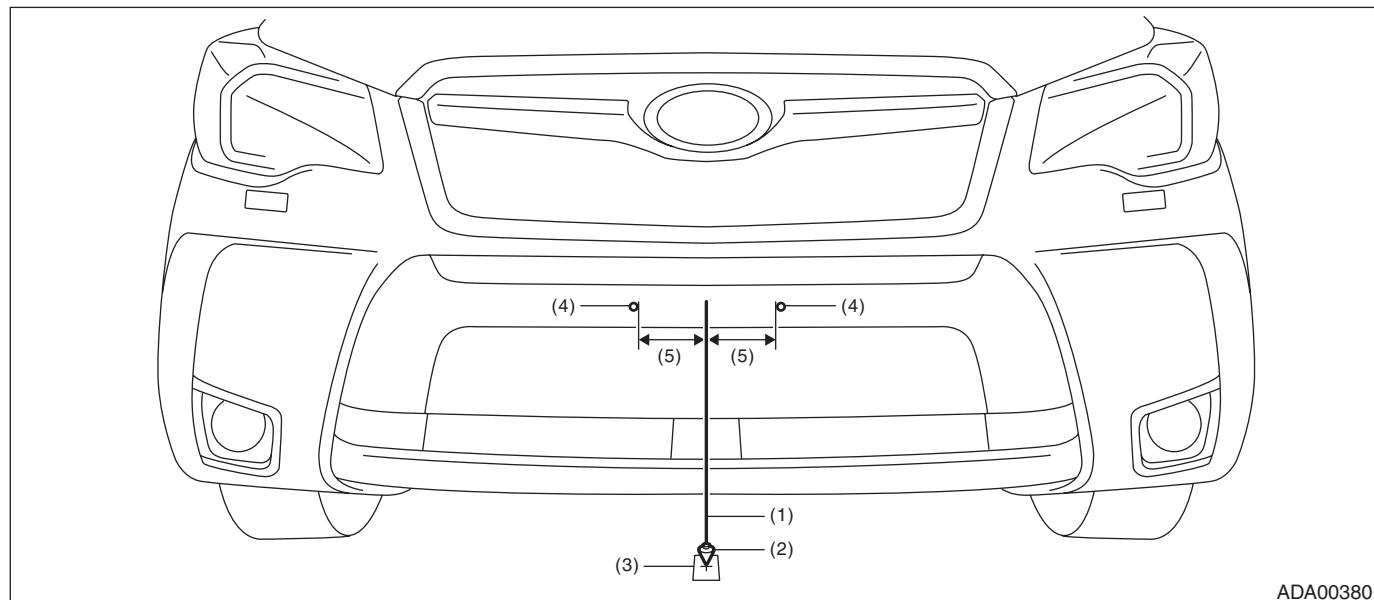
EyeSight (DIAGNOSTICS)

1. PREPARATIONS

Perform the preparation of the adjustment and inspection for the stereo camera.

- When performing adjustment or inspection by affixing RANDOM CHART onto partition

- 1) Adjust the tire pressure.
- 2) Prepare the Subaru Select Monitor, measure, plumb bob, weight, leveling line and RANDOM CHART (ST: 87599YC001).
- 3) Place the vehicle on a level surface where approximately 5 m (16.4 ft) space can be secured in front of the vehicle.
- 4) Suspend the plumb bob with leveling line from front center position of vehicle (center of license plate base), and mark the position where the plumb bob touches the ground. (Point A)



(1) Leveling line
(2) Plumb bob

(3) Point A
(4) License plate base

(5) Same distance

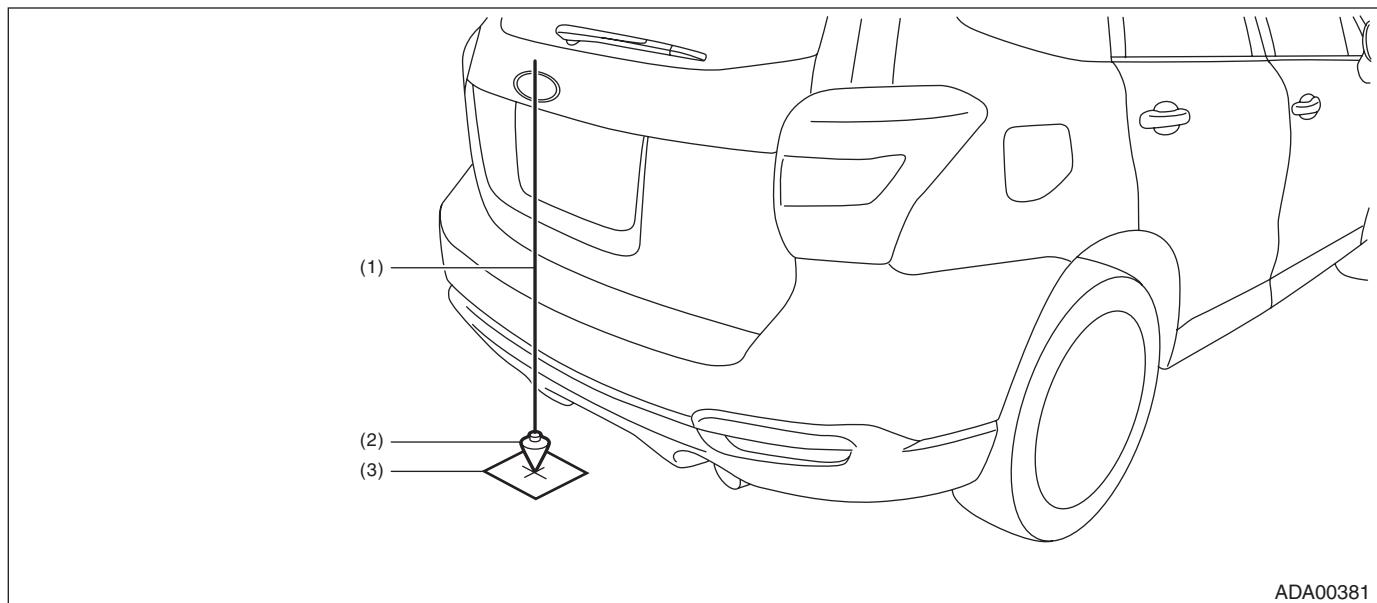
NOTE:

Stick the packing tape etc. on the floor, then make a marking on it.

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5) Suspend the plumb bob with leveling line from rear center position of vehicle (center of rear ornament), and mark the position where the plumb bob touches the ground. (Point B)



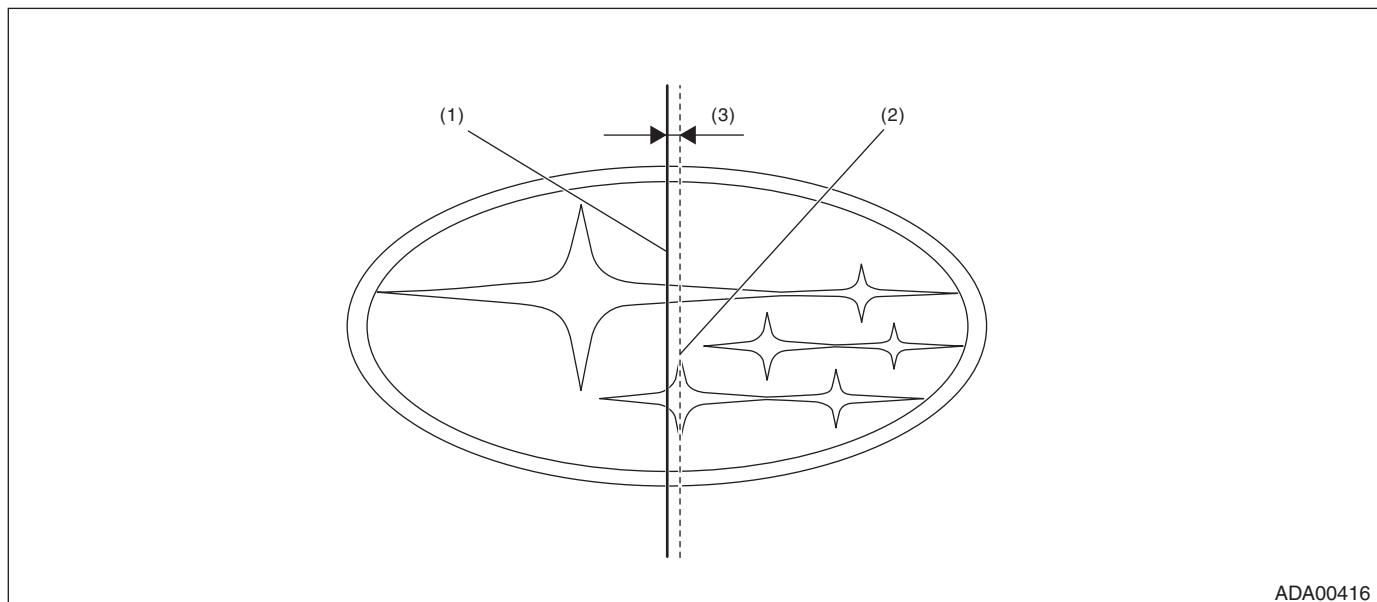
(1) Leveling line

(2) Plumb bob

(3) Point B

NOTE:

The center of the ornament is located 2 mm (0.08 in) to the left from the top of the second left star.



(1) Center of ornament

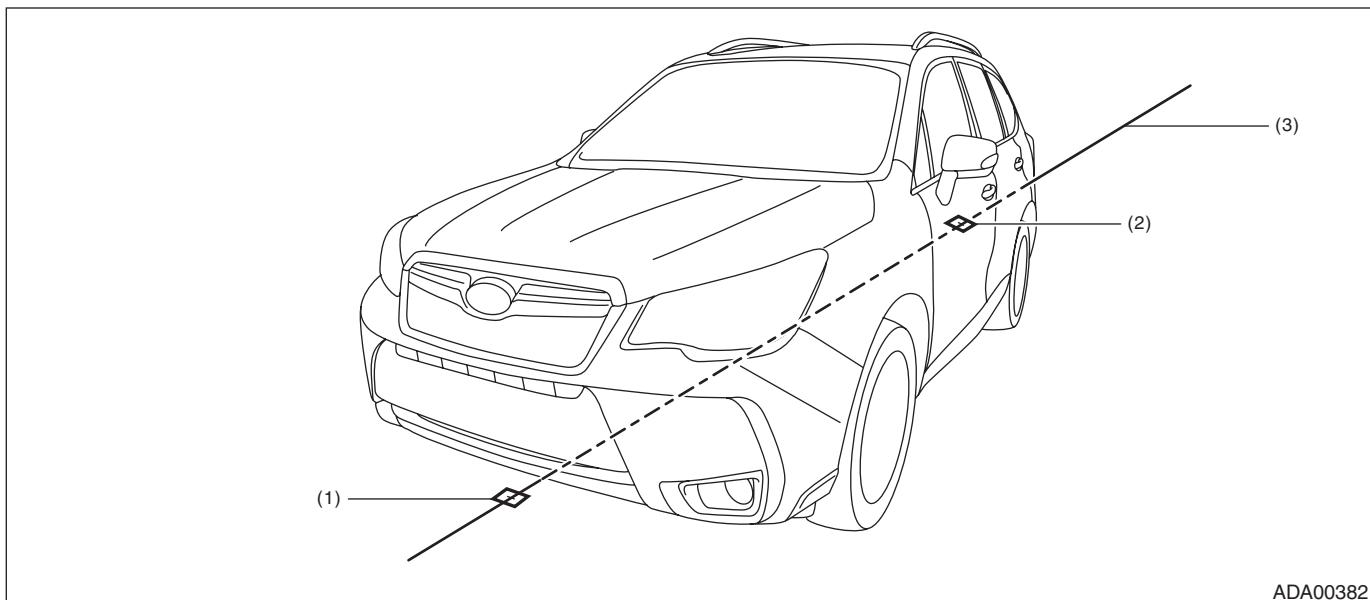
(2) Top of star

(3) 2.0 mm (0.08 in)

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6) Strain approximately 5 m (16.4 ft) of the leveling line from the marking point B through the marking point A toward the front side of the vehicle, and fix it with packing tape. (A-B line)



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(1) Point A

(2) Point B

(3) Leveling line

NOTE:

Confirm that there is no wet condition or unevenness on the floor, to strain the leveling line correctly.

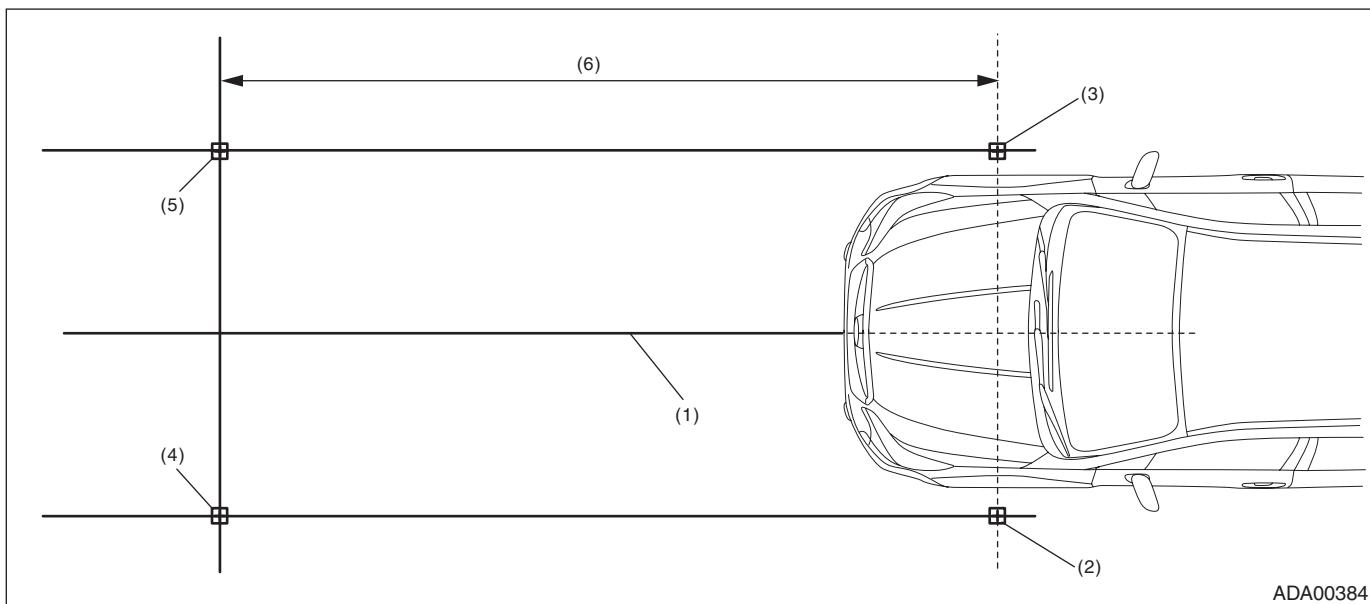
7) Mark the installation position of the partition.

(1) Suspend the plumb bob from the center of the front tire, and mark the point C and point D.

(2) Strain the leveling line from the point C and point D toward the front of vehicle parallel to the vehicle body center line (A-B line), and fix the leveling line with packing tape.

(3) Make a marking on the point 4,070 mm (13.4 ft) ahead of the vehicle from the point C and point D. (Point E and point F)

(4) Strain the leveling line so that it passes through the point E and point F. (E-F line)



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(1) Vehicle body center line (A-B line)

(3) Point D

(5) Point F

(2) Point C

(4) Point E

(6) 4070 mm (13.4 ft)

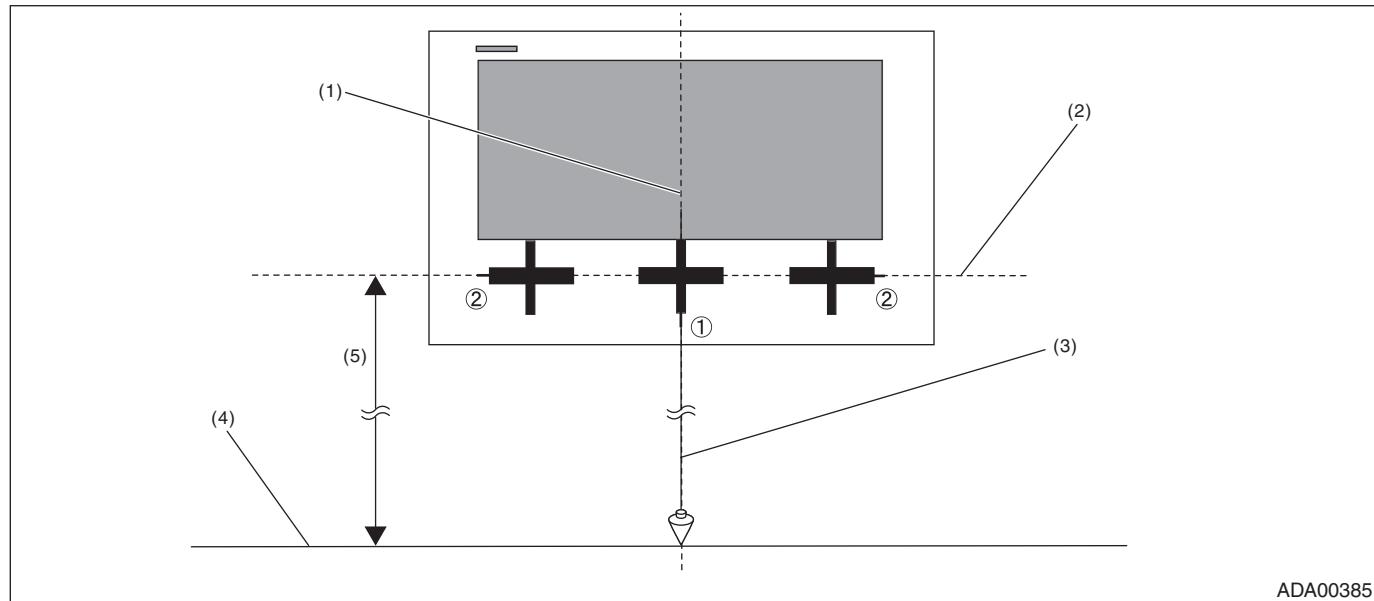
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8) Place the partition and RANDOM CHART.

(1) Using the plumb bob, attach the RANDOM CHART on the wall (or partition), so that the height from the floor to the cross mark (left and right) setting reference (horizontal line) is 1,004 mm (3.3 ft) while aligning the RANDOM CHART cross mark (center) setting reference (vertical line) to the vehicle body center line (leveling line).

(2) Adjust the partition so that it is parallel to E-F line.



(1) ① = Setting reference (vertical line) and vehicle body center line (A-B line)

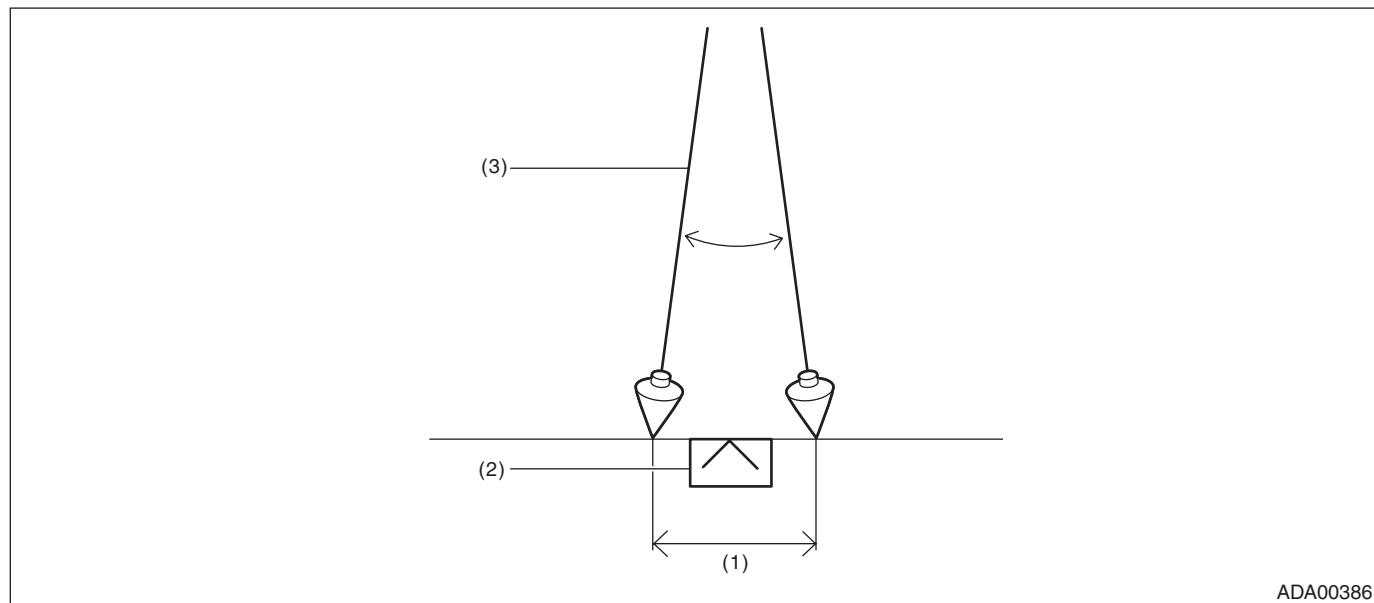
(2) ② = Setting reference (horizontal line) (4) E-F line

(3) Plumb bob

(5) 1,004 mm (3.3 ft)

CAUTION:

- Centering accuracy of the plumb bob shall be ± 4.0 mm (± 0.16 in) or less.



(1) ± 4.0 mm (± 0.16 in)

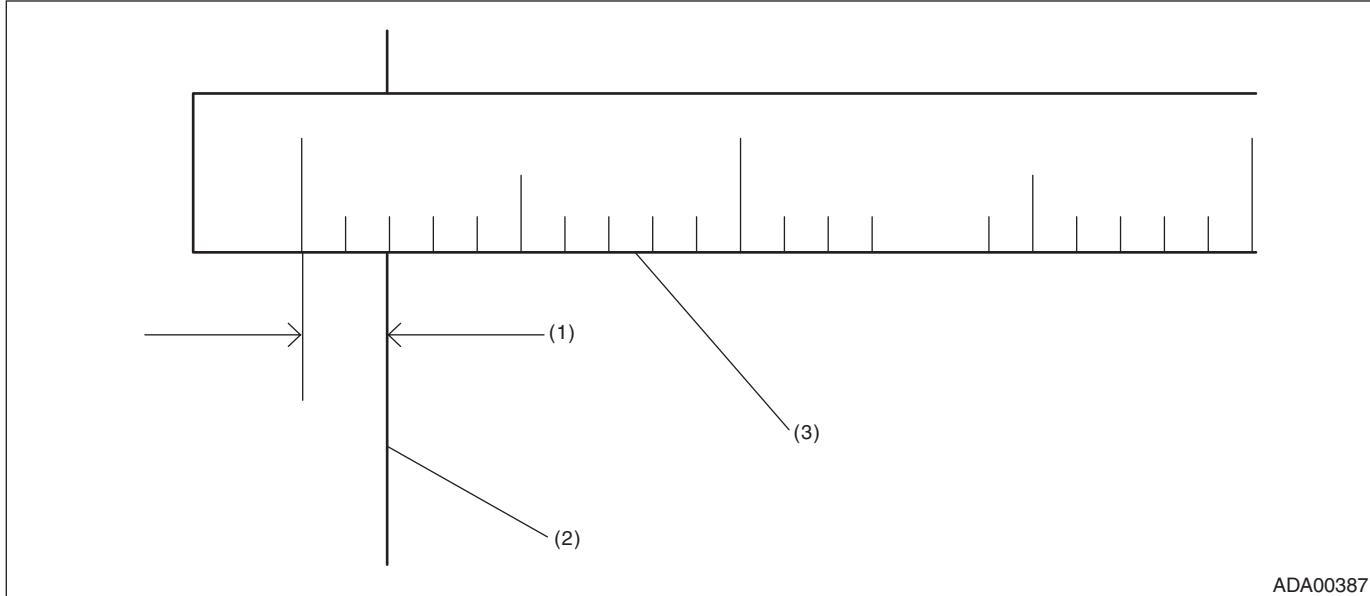
(2) Marking

(3) Plumb bob

Camera Adjustment, Inspection

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- Positioning accuracy of the measure shall be ± 2.0 mm (± 0.08 in) or less.

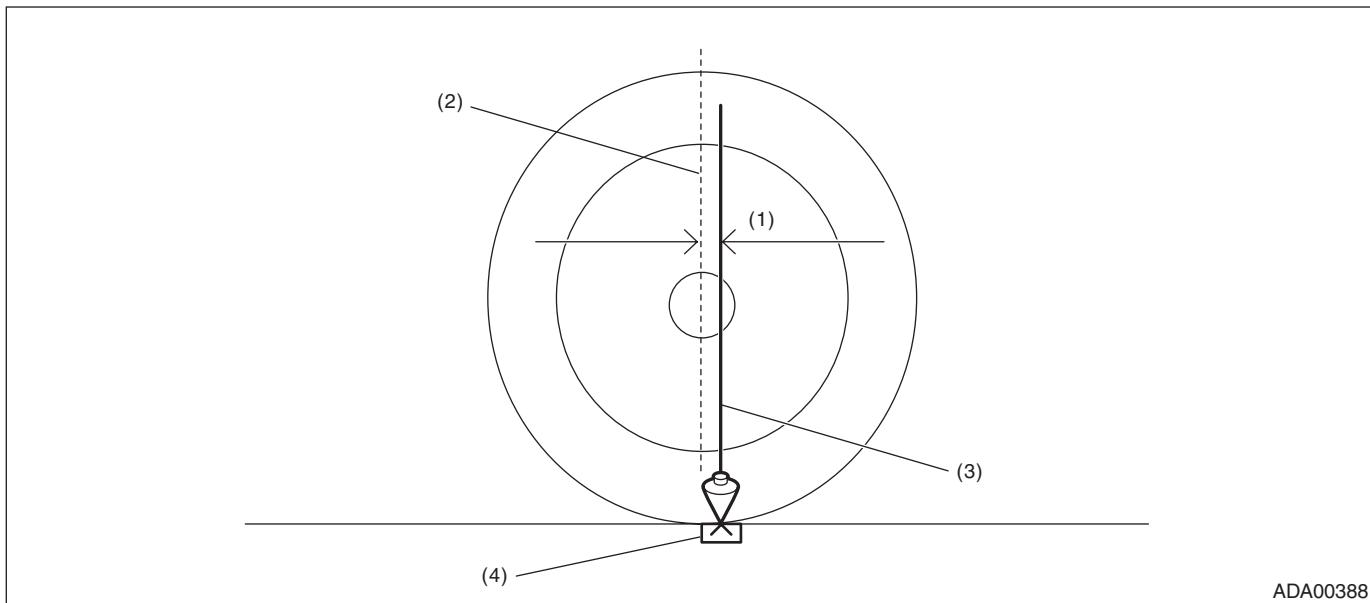


(1) ± 2.0 mm (± 0.08 in)

(2) Marking

(3) Measure

- Centering accuracy of the tire shall be ± 4.0 mm (± 0.16 in) or less.



(1) ± 4.0 mm (± 0.16 in)

(2) Tire center line

(3) Plumb bob

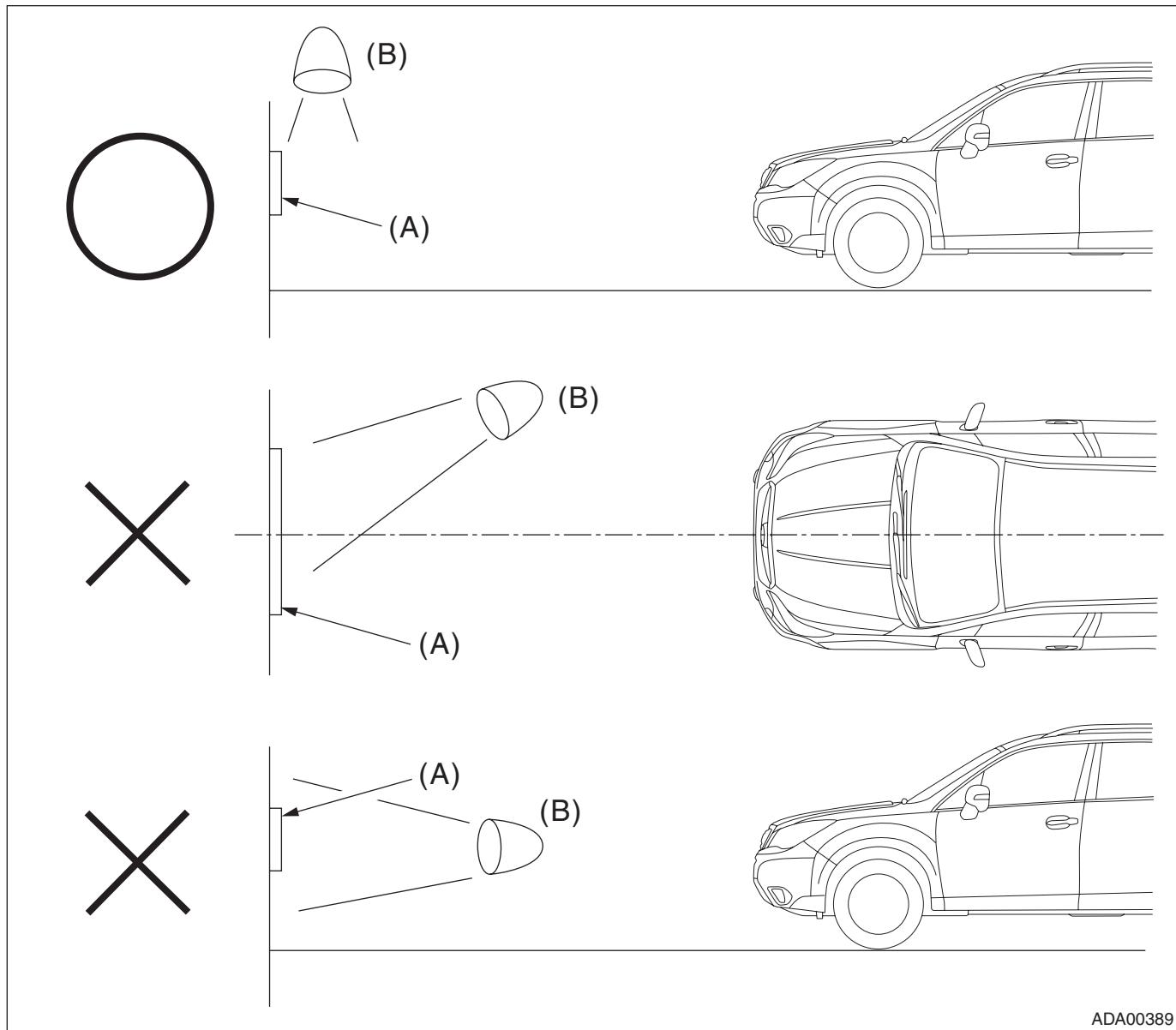
(4) Marking

- Affix the RANDOM CHART onto the vertical partition with flat surface.
- Turn off the headlight.
- Remove the luggage from the vehicle.
- Perform the adjustment work at the level floor.
- Perform the adjustment work at lighted places. If the lighting is not enough, adjustment can not be done, and accuracy rate may not be acquired.

Camera Adjustment, Inspection

EyeSight (DIAGNOSTICS)

- **Apply the lighting from the upper side of RANDOM CHART. (If the lighting is applied from the position where light reflects at RANDOM CHART, the adjustment can not be done, because the reflected light enters the camera.)**



(A) RANDOM CHART

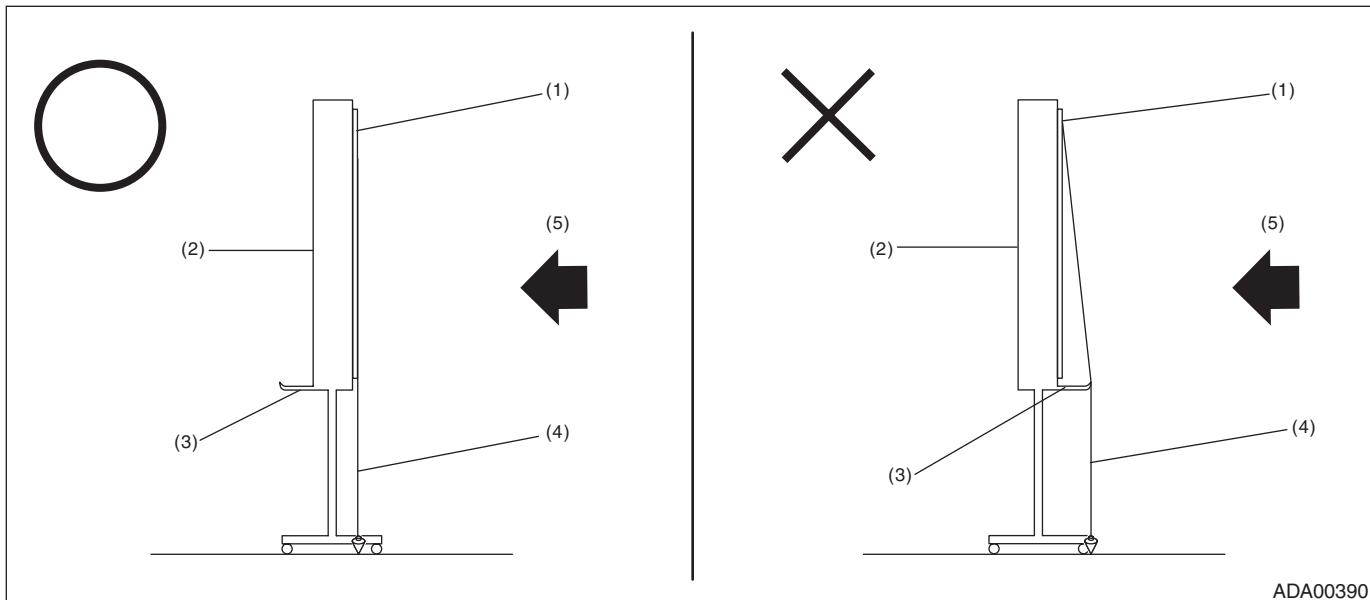
(B) Lighting

ADA00389

- **The adjustment in the outdoors cannot be recommended. Note the sun position, when adjusting it in outdoor by necessity. (It is not acceptable when the sunlight comes from front or rear of the vehicle)**
- **Do not affix RANDOM CHART with lustrous tapes which may reflect the light.**
- **When the front tires are not directed to the straight ahead position even if the steering wheel is set to the center position, adjust the alignment.**
- **When using the white board as a partition, affix the RANDOM CHART on the flat surface without protrusion such as penholder. When suspending the plumb bob, suspend it vertically from the RANDOM CHART by avoiding protrusion.**

Camera Adjustment, Inspection

EyeSight (DIAGNOSTICS)



ADA00390

(1) RANDOM CHART

(2) White board

(3) Protrusion (penholder, etc.)

(4) Plumb bob

(5) Vehicle travel direction

9) Turn the ignition switch to OFF.

10) Check the windshield glass and the dashboard. <Ref. to ES(diag)-8, WINDSHIELD GLASS AND DASHBOARD, INSPECTION, General Description.>

CAUTION:

If there are any dirt, object or reflection from dashboard within the visibility of stereo camera, the correct adjustment and inspection can not be performed. Especially, do not put paper etc. on the dashboard.

11) Connect the Subaru Select Monitor.

NOTE:

Use the Subaru Select Monitor equipped with the latest version of the software.

12) Turn the ignition switch to ON.

13) Wait for 10 seconds.

14) On «Main Menu» display, select {Each System Check}.

15) On «System Selection Menu» display, select {ADA adaptive cruise control system}.

16) Select {EyeSight (from 2009MY)} while pressing the camera cover mounted pre-collision brake OFF switch and lane departure warning OFF switch at the same time.

NOTE:

If {EyeSight (from 2009MY)} is selected without pressing two switches at the same time, {Camera adjustment, inspection} is not displayed. (for preventing misoperation)

Also, the message is not displayed, when the camera does not finish the start-up (approx. 10 seconds after ignition switch ON). In that case, repeat from the selection of {EyeSight (from 2009MY)}.

17) On «EyeSight (from 2009MY)» display, select {Camera adjustment, inspection}, to perform the camera adjustment or inspection.

NOTE:

- When performing {Camera adjustment, inspection}, pre-collision brake OFF indicator light, lane departure warning OFF indicator light in the meter will illuminate, and the normal function will be disabled.

- After camera adjustment, the function will be enabled, when the ignition switch is turned to OFF and system is restarted.

Camera Adjustment, Inspection

EyeSight (DIAGNOSTICS)

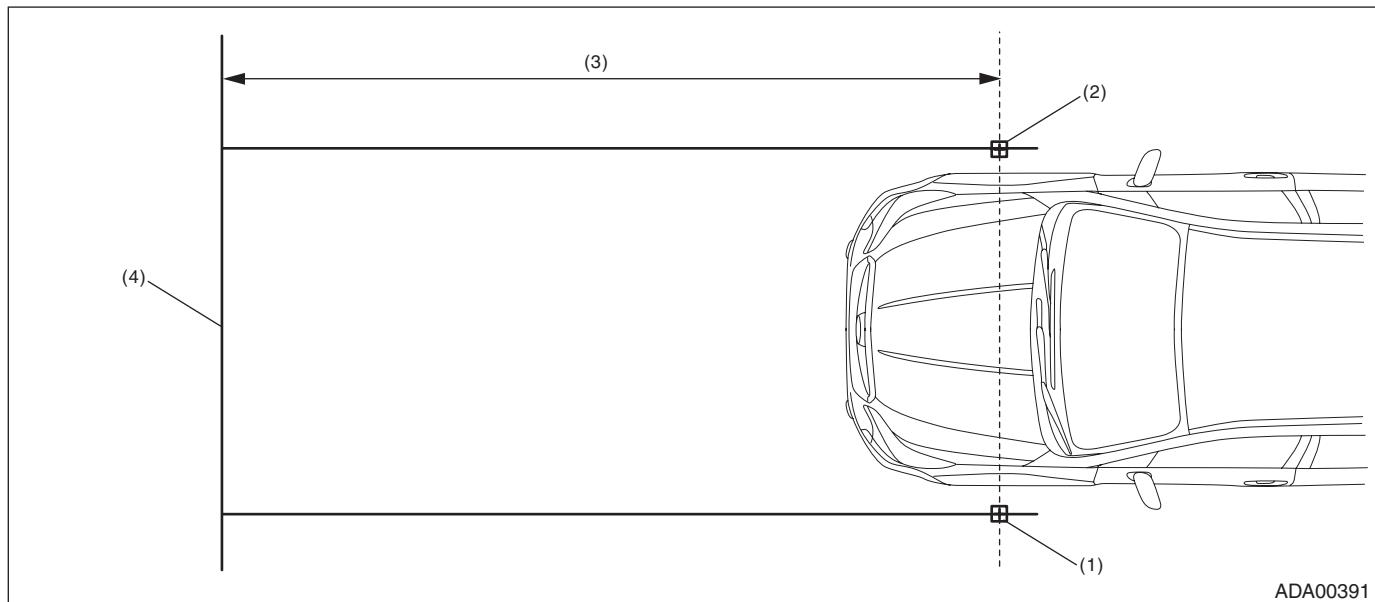
- When performing adjustment or inspection by affixing RANDOM CHART onto wall.

- 1) Adjust the tire pressure.
- 2) Prepare the Subaru Select Monitor, measure, plumb bob, weight, leveling line and RANDOM CHART (ST: 87599YC001).
- 3) Mark the setting position of the vehicle.
 - (1) Strain the leveling line so that it is at right angles to wall on which the RANDOM CHART is affixed, and fix the leveling line with packing tape.
 - (2) Make a marking 4,070 mm (13.4 ft) away from the wall where the leveling line is fixed. (Point A and point B)

NOTE:

Stick the packing tape etc. on the floor, then make a marking on it.

(3) Strain the leveling line so that it passes through the point A and point B. (A-B line)



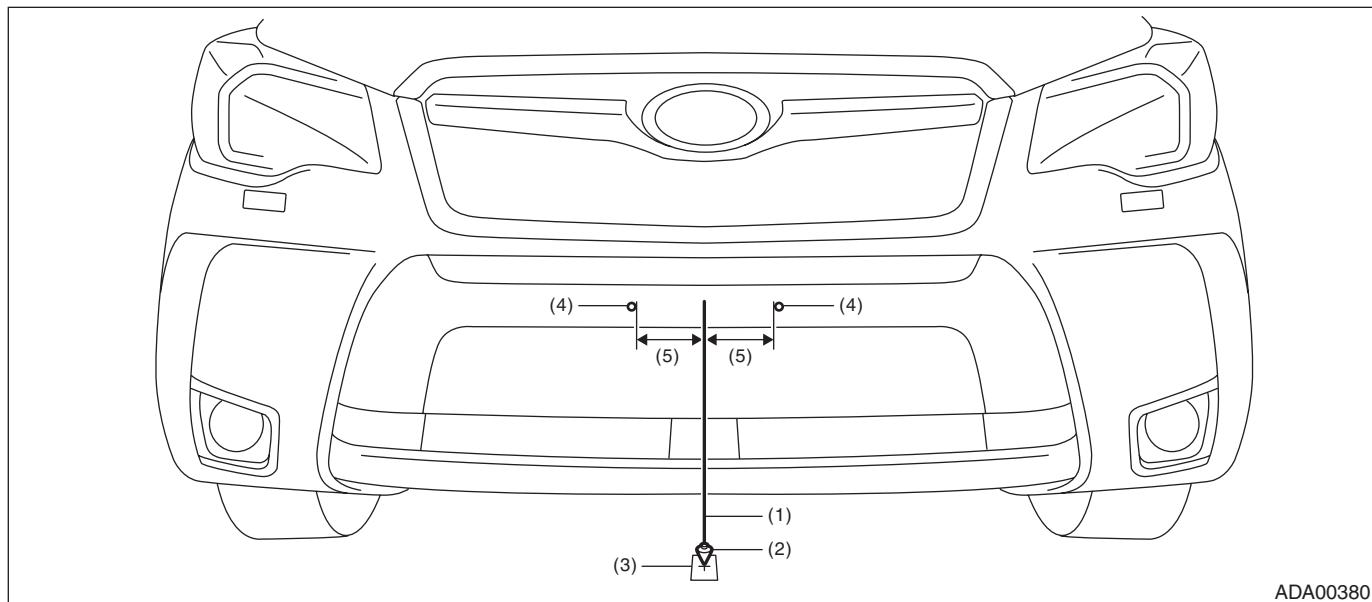
(1) Point A	(3) 4070 mm (13.4 ft)
(2) Point B	(4) Wall

- 4) Suspend the plumb bob from the center of the front tire of the vehicle, and place the vehicle so that it is aligned with the leveling line (A-B line).

Camera Adjustment, Inspection

EyeSight (DIAGNOSTICS)

5) Suspend the plumb bob with leveling line from front center position of vehicle (center of license plate base), and mark the position where the plumb bob touches the ground. (Point C)



(1) Leveling line
(2) Plumb bob

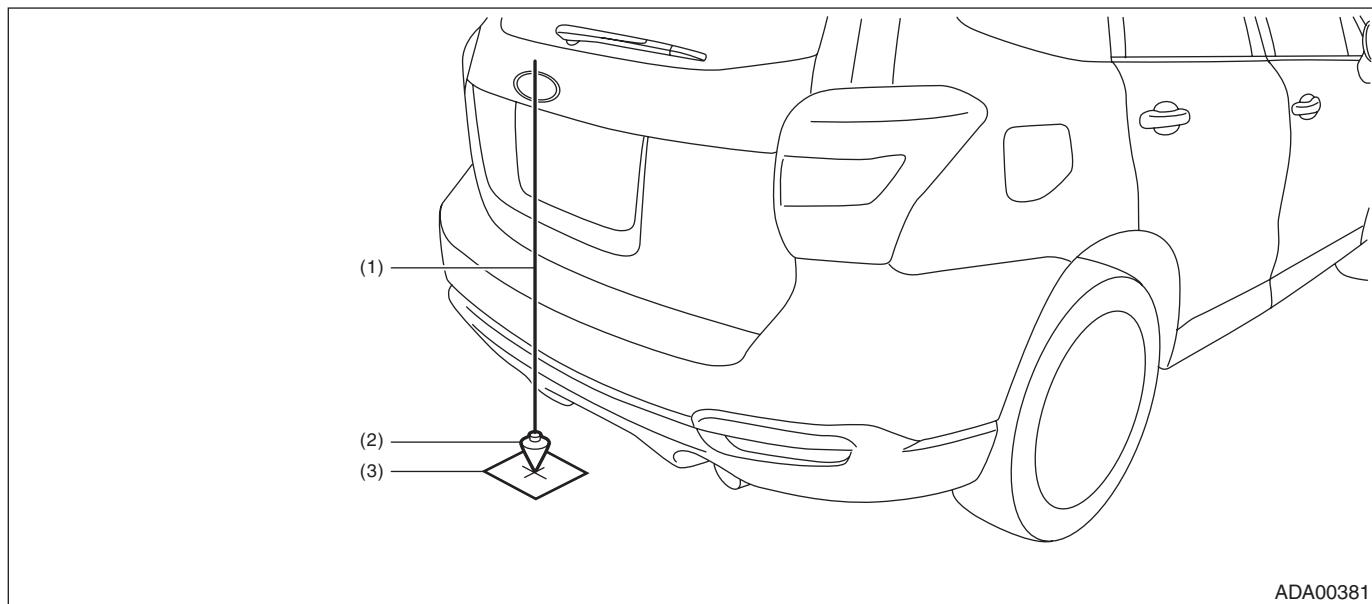
(3) Point C
(4) License plate base

(5) Same distance

NOTE:

Stick the packing tape etc. on the floor, then make a marking on it.

6) Suspend the plumb bob with leveling line from rear center position of vehicle (center of rear ornament), and mark the position where the plumb bob touches the ground. (Point D)



(1) Leveling line

(2) Plumb bob

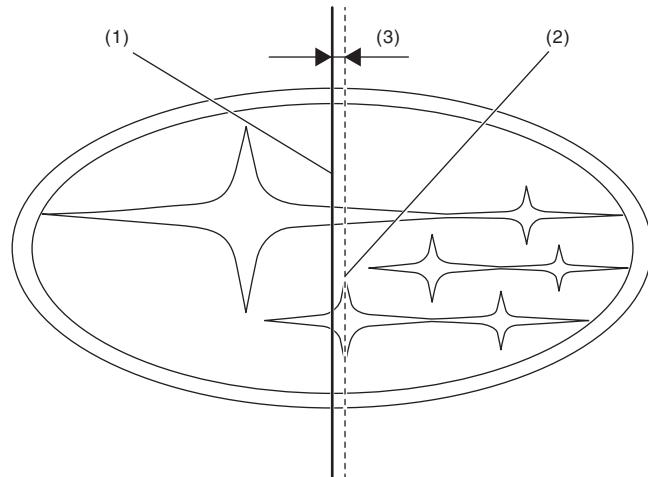
(3) Point D

Camera Adjustment, Inspection

EyeSight (DIAGNOSTICS)

NOTE:

The center of the ornament is located 2 mm (0.08 in) to the left from the top of the second left star.



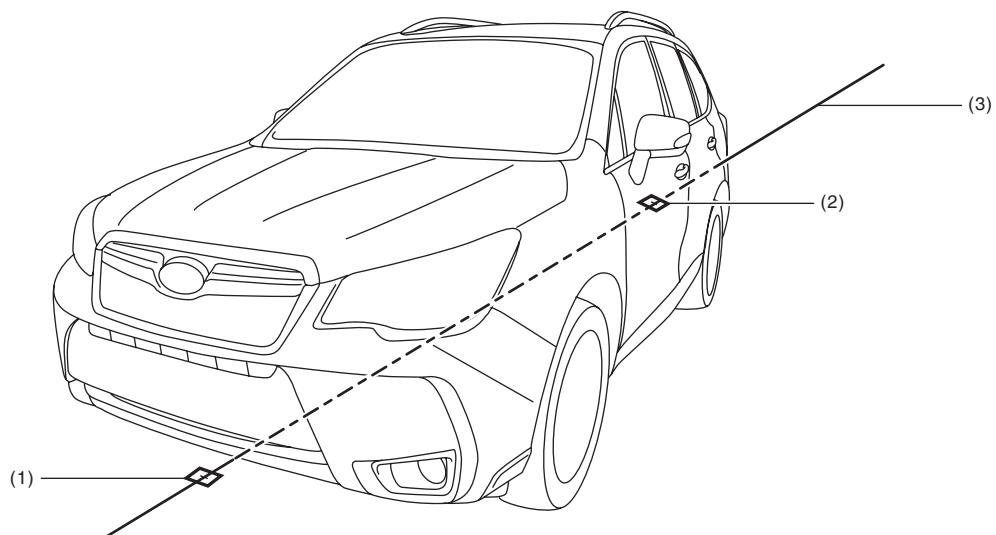
ADA00416

(1) Center of ornament

(2) Top of star

(3) 2.0 mm (0.08 in)

7) Strain the leveling line from the making point D through the marking point C to the wall, and fix it with packing tape. (C-D line)



ADA00382

(1) Point C

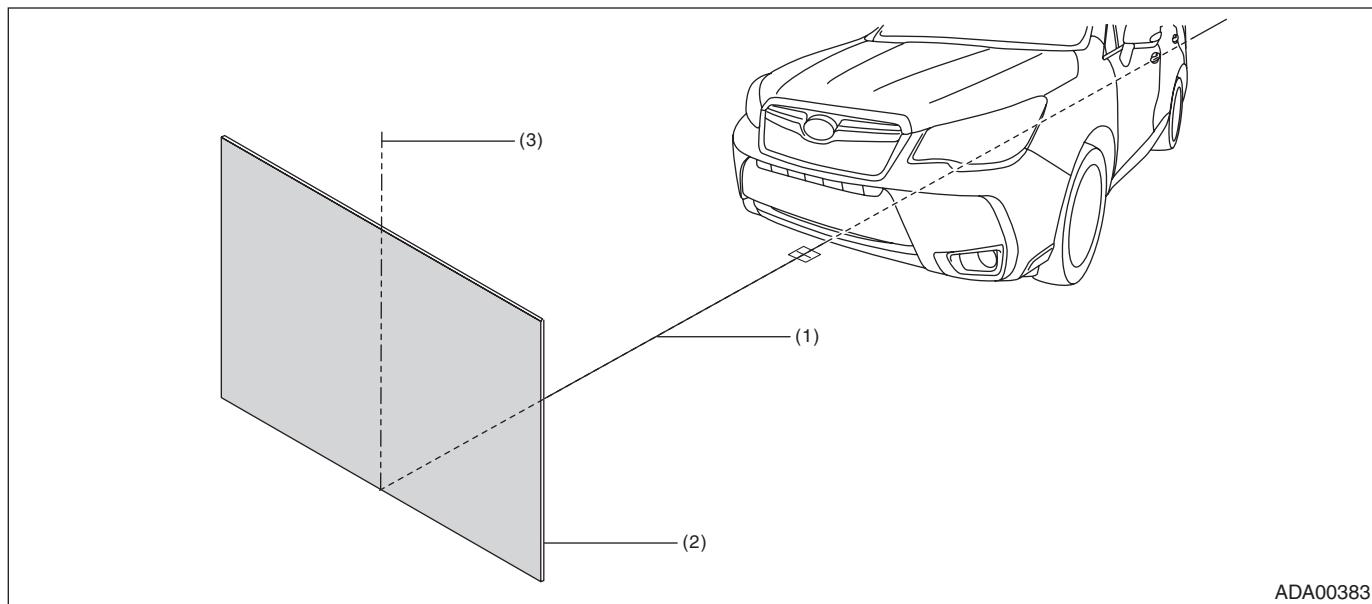
(2) Point D

(3) Leveling line

Camera Adjustment, Inspection

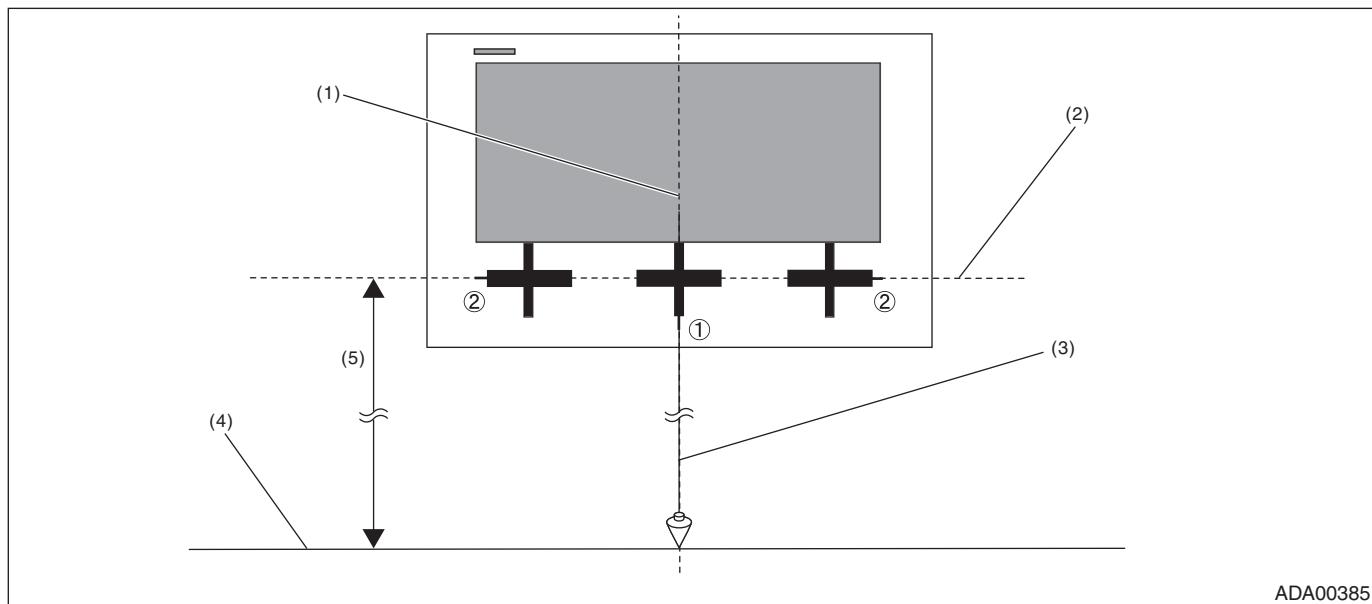
EyeSight (DIAGNOSTICS)

8) Using the plumb bob, attach the RANDOM CHART on the wall, so that the height from the floor to the cross mark (left and right) setting reference (horizontal line) is 1,004 mm (3.3 ft) while aligning the RANDOM CHART cross mark (center) setting reference (vertical line) to the vehicle body center line (leveling line).



(1) Vehicle body center line (C-D line) (2) Wall

(3) Setting reference (vertical line)



(1) ① = Setting reference (vertical line) and vehicle body center line (C-D line)

(3) Plumb bob

(5) 1,004 mm (3.3 ft)

(2) ② = Setting reference (horizontal line)

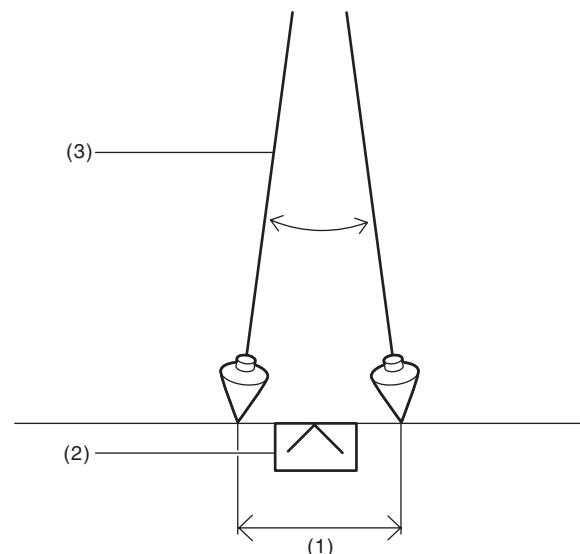
(4) Floor

Camera Adjustment, Inspection

EyeSight (DIAGNOSTICS)

CAUTION:

- Centering accuracy of the plumb bob shall be ± 4.0 mm (± 0.16 in) or less.



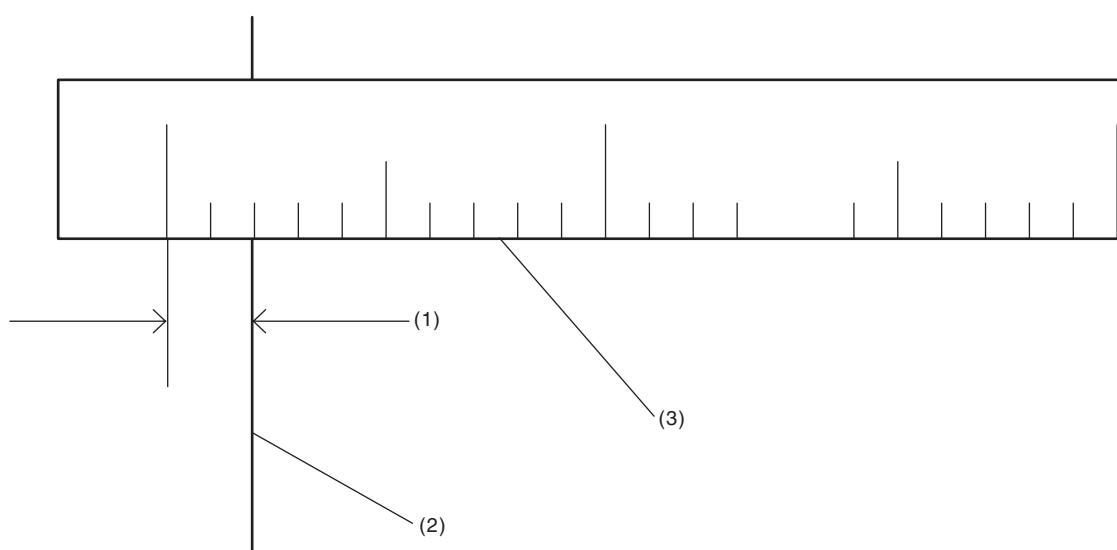
ADA00386

(1) ± 4.0 mm (± 0.16 in)

(2) Marking

(3) Plumb bob

- Positioning accuracy of the measure shall be ± 2.0 mm (± 0.08 in) or less.



ADA00387

(1) ± 2.0 mm (± 0.08 in)

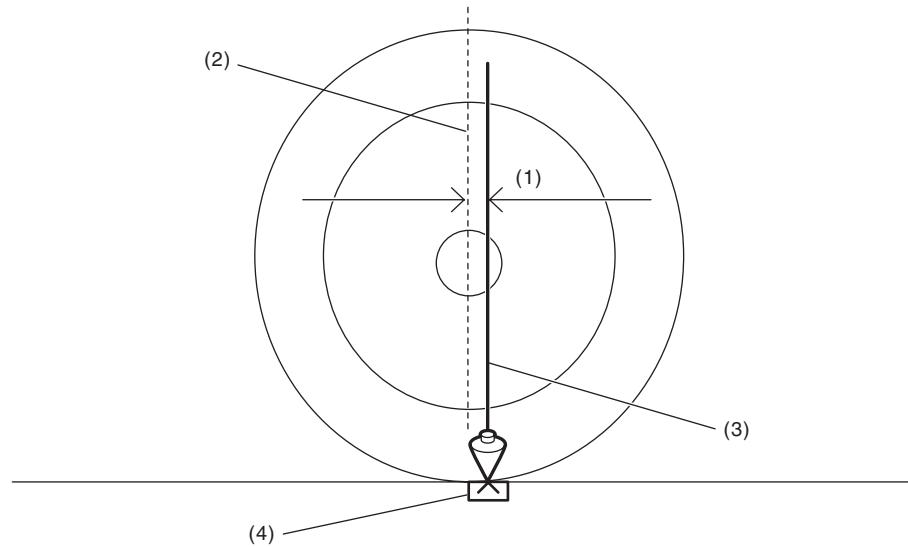
(2) Marking

(3) Measure

Camera Adjustment, Inspection

EyeSight (DIAGNOSTICS)

- **Centering accuracy of the tire shall be ± 4.0 mm (± 0.16 in) or less.**



ADA00388

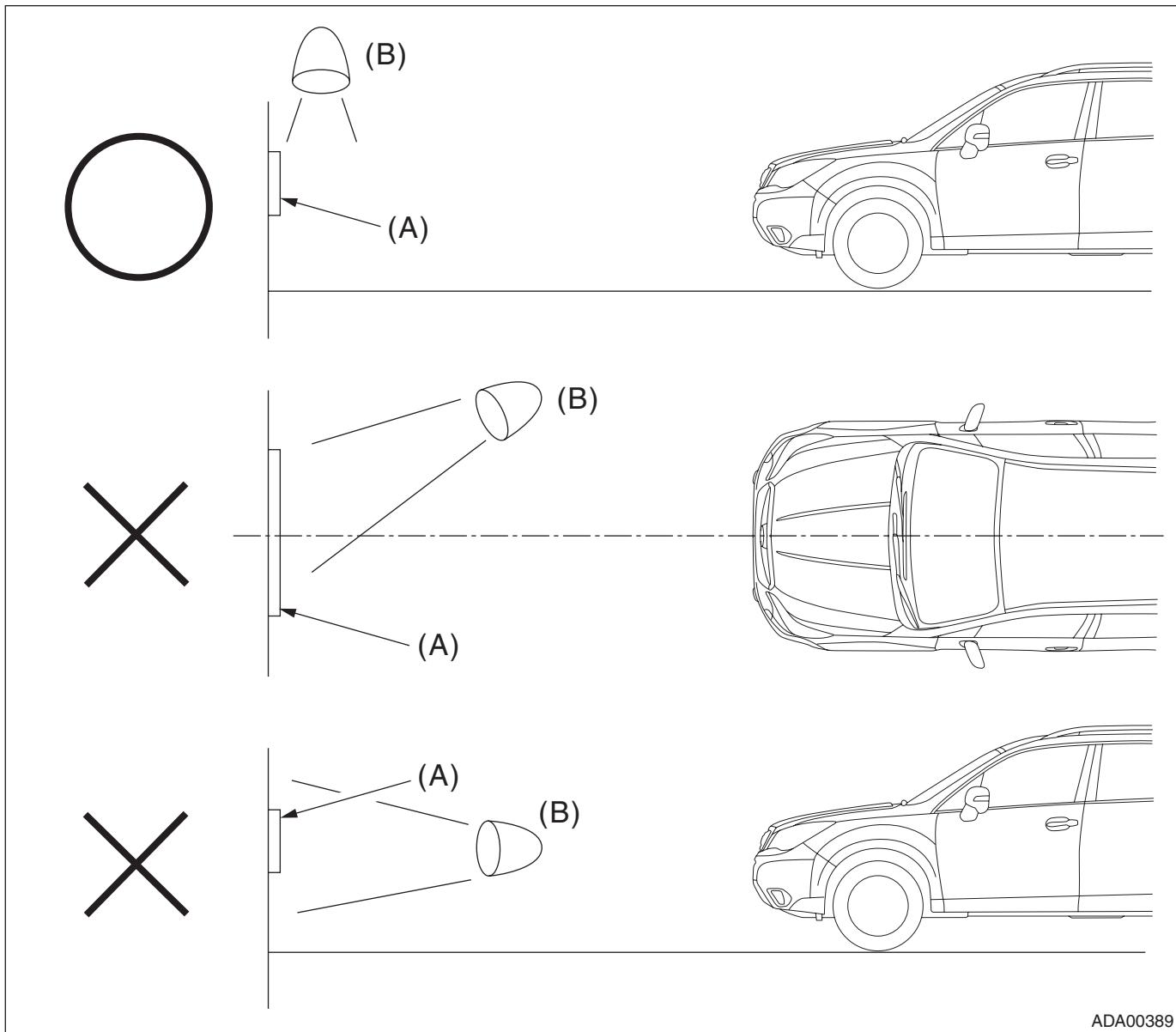
(1) ± 4.0 mm (± 0.16 in) (3) Plumb bob
(2) Tire center line (4) Marking

- **Affix the RANDOM CHART onto the vertical wall with flat surface.**
- **Turn off the headlight.**
- **Remove the luggage from the vehicle.**
- **Perform the adjustment work at the level floor.**
- **Perform the adjustment work at lighted places. If the lighting is not enough, adjustment can not be done, and accuracy rate may not be acquired.**

Camera Adjustment, Inspection

EyeSight (DIAGNOSTICS)

- **Apply the lighting from the upper side of RANDOM CHART. (If the lighting is applied from the position where light reflects at RANDOM CHART, the adjustment can not be done, because the reflected light enters the camera.)**



(A) RANDOM CHART

(B) Lighting

- **The adjustment in the outdoors cannot be recommended. Note the sun position, when adjusting it in outdoor by necessity. (It is not acceptable when the sunlight comes from front or rear of the vehicle)**

- **Do not affix RANDOM CHART with lustrous tapes which may reflect the light.**
- **When the front tires are not directed to the straight ahead position even if the steering wheel is set to the center position, adjust the alignment.**

9) Turn the ignition switch to OFF.

10) Check the windshield glass and the dashboard. <Ref. to ES(diag)-8, WINDSHIELD GLASS AND DASHBOARD, INSPECTION, General Description.>

CAUTION:

If there are any dirt, object or reflection from dashboard within the visibility of stereo camera, or if the inner mirror is excessively moved and the object enters the visibility of the camera, the correct adjustment and inspection can not be performed. Especially, do not put paper etc. on the dashboard.

11) Connect the Subaru Select Monitor.

NOTE:

Use the Subaru Select Monitor equipped with the latest version of the software.

12) Turn the ignition switch to ON.

13) Wait for 10 seconds.

14) On «Main Menu» display, select {Each System Check}.

15) On «System Selection Menu» display, select {ADA adaptive cruise control system}.

16) Select {EyeSight (from 2009MY)} while pressing the camera cover mounted pre-collision brake OFF switch and lane departure warning OFF switch at the same time.

NOTE:

If {EyeSight (from 2009MY)} is selected without pressing two switches at the same time, {Camera adjustment, inspection} is not displayed. (for preventing misoperation)

Also, the message is not displayed, when the camera does not finish the start-up (approx. 10 seconds after ignition switch ON). In that case, repeat from the selection of {EyeSight (from 2009MY)}.

17) On «EyeSight (from 2009MY)» display, select {Camera adjustment, inspection}, to perform the camera adjustment or inspection.

NOTE:

- When performing {Camera adjustment, inspection}, pre-collision brake OFF indicator light, lane departure warning OFF indicator light in the meter will illuminate, and the normal function will be disabled.
- After camera adjustment, the function will be enabled, when the ignition switch is turned to OFF and system is restarted.

2. ADJUSTMENT VALUE CLEAR

Perform when replacing stereo camera. (Do not perform when performing stereo camera re-adjustment and inspection)

1) On «Camera adjustment, inspection» display, select {Camera individual adjustment mode}.

2) On «Camera individual adjustment mode» display, select {Clear adjustment value}.

3) When «Perform camera adjustment/inspection. Press OK when the preparations have been made.» is displayed, if preparation is ready, select {OK}.

4) When «Clear the adjustment value.» is displayed, select {OK}.

5) When «Clearing adjustment value...» is displayed, wait until process finishes.

6) When the adjustment value clear is finished correctly, and «Adjustment value cleared OK!» is displayed, select {OK} to finish.

7) Turn the ignition switch to OFF and wait for approx. 5 seconds or more.

CAUTION:

If the ignition switch OFF period is short, the adjustment value clear can not be performed correctly.

8) Next, perform the camera all adjustment mode (replacement/removal). <Ref. to ES(diag)-58, CAMERA ALL ADJUSTMENT MODE (REPLACEMENT/REMOVAL), PROCEDURE, Camera Adjustment, Inspection.>

Camera Adjustment, Inspection

EyeSight (DIAGNOSTICS)

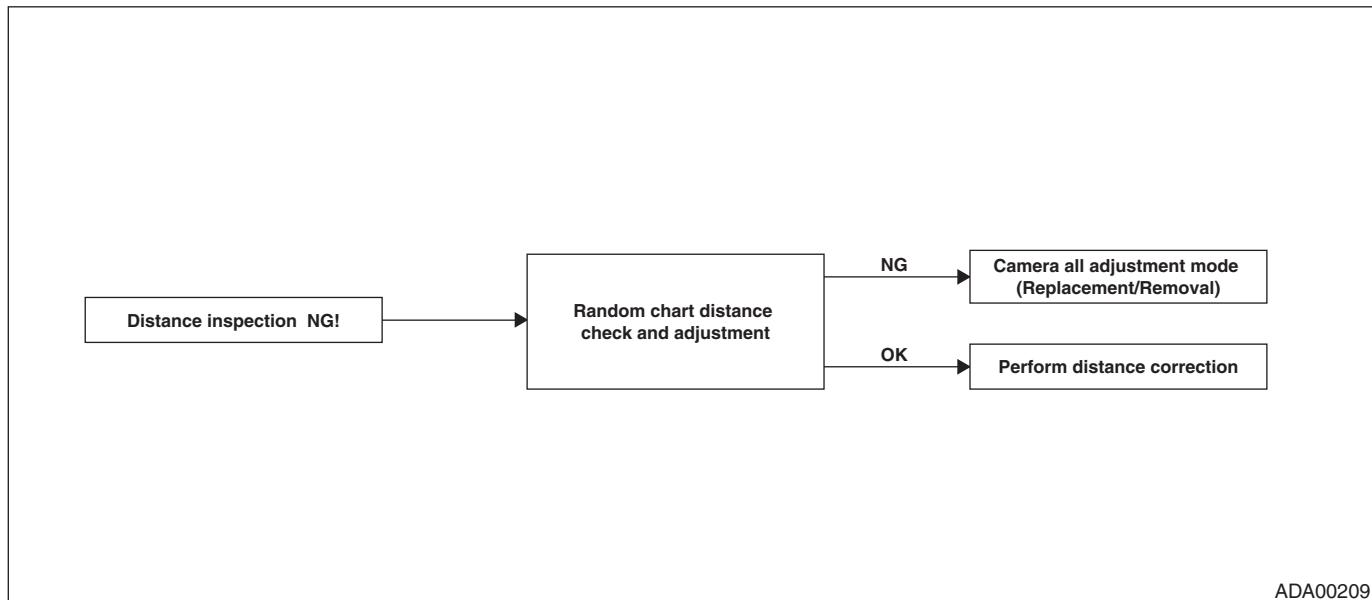
3. CAMERA ALL ADJUSTMENT MODE (REPLACEMENT/REMOVAL)

Perform this procedure when the stereo camera is replaced or re-adjustment is necessary (when stereo camera malfunctioning, when stereo camera reinstalled, when windshield glass replaced).

CAUTION:

- When the stereo camera is replaced, be sure to perform the {Clear adjustment value} first. When {Clear adjustment value} was skipped, restart the procedure from {Clear adjustment value} again.
<Ref. to ES(diag)-57, ADJUSTMENT VALUE CLEAR, PROCEDURE, Camera Adjustment, Inspection.>
- Perform the camera adjustment and inspection at curb weight without passengers.
- When the camera all adjustment mode is performed, if the procedures are not completed correctly to the end, the warning light may illuminate, when the vehicle moves.

- 1) On «Camera adjustment, inspection» display, select {Camera all adjustment mode (replacement/removal)}.
- 2) «Perform camera adjustment/inspection. Press OK when the preparations have been made.» will be displayed, if preparation is ready, select {OK}.
- 3) When «In process...» is displayed, wait until inspection finishes.
- 4) When the accuracy rate inspection is finished correctly, and «Accuracy rate ○○ % OK!» is displayed, select {OK} to go to step 9).
- 5) When «Distance inspection NG!» is displayed, refer to the NOTE below.



ADA00209

NOTE:

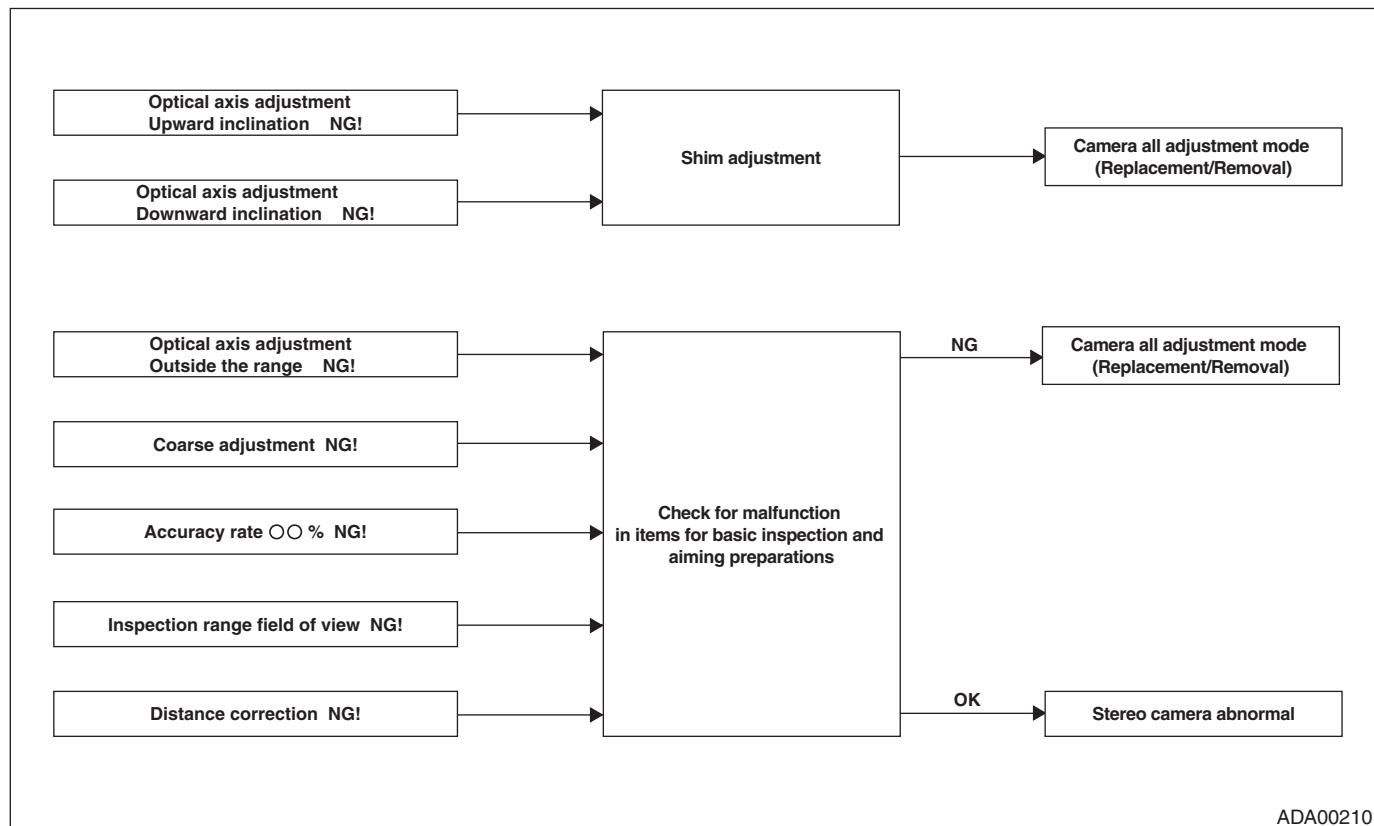
Distance check and adjustment of RANDOM CHART <Ref. to ES(diag)-43, PREPARATIONS, PROCEDURE, Camera Adjustment, Inspection.>

- 6) When «Perform distance correction.» is displayed, select {OK}. When the distance correction is finished correctly, and «Distance correction OK!» is displayed, select {OK} and go to the accuracy rate inspection.
- 7) When «Perform accuracy rate inspection.» is displayed, select {OK}. When the accuracy rate inspection is finished correctly, and «Accuracy rate ○○ % OK!» is displayed, select {OK} to go to the next step.

Camera Adjustment, Inspection

EyeSight (DIAGNOSTICS)

8) When «○○ NG!» is displayed during adjustment, refer to the NOTE below.



NOTE:

- Shim adjustment <Ref. to ES(diag)-60, SHIM ADJUSTMENT, PROCEDURE, Camera Adjustment, Inspection.>
- Basic inspection items <Ref. to ES(diag)-8, INSPECTION, General Description.>
- Aiming preparation items <Ref. to ES(diag)-43, PREPARATIONS, PROCEDURE, Camera Adjustment, Inspection.>

9) Turn the ignition switch to OFF and wait for 5 seconds. (time necessary to save adjustment and inspection result)

CAUTION:

If the ignition switch OFF period after adjustment and inspection finished is short, the adjustment and inspection result can not be saved correctly. The warning light may illuminate, when the vehicle moves.

10) Turn the ignition switch to ON, and confirm that [Aiming completion flag] of “Current Data Display & Save” is [Aiming completed] using the Subaru Select Monitor. (Note that it is different from [Initial aiming completion flag]) Or confirm that the [Model registration information] corresponds to the vehicle.

11) Perform the {Clear Memory}, and turn the ignition switch to OFF.

NOTE:

Even if [Aiming completion flag] is [Aiming completed], when no record is registered in [Model registration information], turn the ignition switch to off again, and wait for five seconds.

Camera Adjustment, Inspection

EyeSight (DIAGNOSTICS)

12) Next, perform the automatic adjustment and function check by driving. <Ref. to ES(diag)-60, AUTOMATIC ADJUSTMENT AND FUNCTION CHECK BY DRIVING, PROCEDURE, Camera Adjustment, Inspection.>

4. AUTOMATIC ADJUSTMENT AND FUNCTION CHECK BY DRIVING

NOTE:

- Perform the automatic adjustment and function check by driving to improve the recognition accuracy of stereo camera, when the stereo camera is replaced or re-adjusted, or the EyeSight function does not operate correctly.
- The automatic adjustment and function check by driving adjust the stereo camera more in detail, based on the stereo camera adjustment using RANDOM CHART.

- 1) Perform this procedure after finishing stereo camera adjustment and inspection.
- 2) On «ADA adaptive cruise control system» display, select {EyeSight (from 2009MY)}.
- 3) On «EyeSight (from 2009MY)» display, select {Current Data Display & Save}.
- 4) On «Current Data Display & Save» display, display the {Automatic adjustment status}. <Ref. to ES(diag)-22, OPERATION, Read Current Data.>
- 5) Drive the vehicle until [Automatic adjustment status] displays {1F}.

Drive the vehicle so that the distance from the preceding vehicle is 40 m or more.

Display	Content	Unit of measure	Note (at idling)
Automatic adjustment status	Index for automatic adjustment operation performed by the driving test after the completion of the optical axis adjustment	—	{1F} is displayed when completed.

NOTE:

- The time required until {1F} is displayed may be longer depending on the road condition etc.
- For new vehicles, {00} may be displayed. It is not necessary to drive the vehicle before delivery because high-accuracy aiming has been performed at vehicle shipment.

- 6) On {Current Data Display & Save} display, display [Lane recognition status] to check if any of the following appears.
 - Right lane is recognized: 01
 - Left lane is recognized: 10
 - Right and left lane are recognized: 11

Display	Content	Unit of measure	Note (at idling)
Lane recognition status	Display of lane recognition status	—	Recognized when vehicle lane can be seen by 20 m or more.

- 7) On {Current Data Display & Save} display, display [Distance from leading vehicle] to check if the distance from the preceding vehicle is approximately the same.

5. SHIM ADJUSTMENT

- 1) Turn the ignition switch to OFF.
- 2) Detach the stereo camera cover, and remove the stereo camera. <Ref. to ES-11, REMOVAL, Stereo Camera.>
- 3) Remove the stereo camera spacer, and insert the shim into the body and camera spacer.

NOTE:

- Inserting the shim (031105000) into the vehicle front side makes camera downward.
- Inserting the shim (031105000) into the vehicle rear side makes camera upward.
- There is a case that the shim may be inserted at the production line, but it is not abnormal.

- 4) Install the stereo camera spacer.

Tightening torque:

5.5±1.0 N·m (0.56±0.10 kgf·m, 4.1±0.7 ft-lb)

- 5) Install the stereo camera. <Ref. to ES-11, REMOVAL, Stereo Camera.>
- 6) Perform the camera all adjustment mode (replacement/removal). <Ref. to ES(diag)-58, CAMERA ALL ADJUSTMENT MODE (REPLACEMENT/REMOVAL), PROCEDURE, Camera Adjustment, Inspection.>

6. CAMERA INITIALIZATION

This is a recovery measures prepared for the data failure caused by the low battery voltage during data storage to inside the stereo camera.

CAUTION:

Do not usually perform camera initialization because it will clear the aiming data and/or DTCs.

Perform the camera initialization only when the aiming result is NG even if the vehicle is placed correctly in the flowchart described in "A: Procedure".

- 1) Turn the ignition switch to ON.
- 2) Wait for 10 seconds.
- 3) On Main Menu display, select {Each System Check}.
- 4) On «System Selection Menu», select {ADA adaptive cruise control system}.
- 5) Select «EyeSight (from 2009MY)».
- 6) Select {Clear Memory} while pressing the camera cover mounted pre-collision brake OFF switch and lane departure warning OFF switch at the same time.
- 7) Turn the ignition switch to OFF.
- 8) Wait for 5 seconds.
- 9) Next, perform the clear adjustment value. <Ref. to ES(diag)-57, ADJUSTMENT VALUE CLEAR, PROCEDURE, Camera Adjustment, Inspection.>