



<b>Subject:</b>  <b>CUSTOMER SUPPORT OF UNINTENDED SBS OPERATION</b>	<b>Service Alert No.: SA-054/22</b>
	<b>Last Issued : 08/11/2022</b>

**BULLETIN NOTES**

**APPLICABLE MODEL(S)/VINS**

- 2019-2022 Mazda3
- 2020-2022 CX-30
- 2022 MX-30

**NOTE:** Before proceeding, perform [MGSS Vehicle Inquiry](#) (MGSS -> Other Applications -> Warranty Veh. Inq. -> RECALLS / SPECIAL SERVICE PROGRAMS

-> Status) and check for Open campaigns. If any of the following campaigns are open, complete the campaign before proceeding with this service information.

- SSPC5 - 2019-2021 MAZDA3 AND 2020-2021 CX-30 - CONTROL UNITS REPROGRAMMING
- 4219L - 2019MY MAZDA3 SUDDEN DECELERATION FROM FALSE BRAKE ACTIVATION

**DESCRIPTION**

This information will give you the necessary knowledge to respond to customers concerns of Smart Brake Support (SBS) unintended braking. By educating the customer on the system operation, it should reduce their anxiety or distrust of the vehicle.

**Important:**

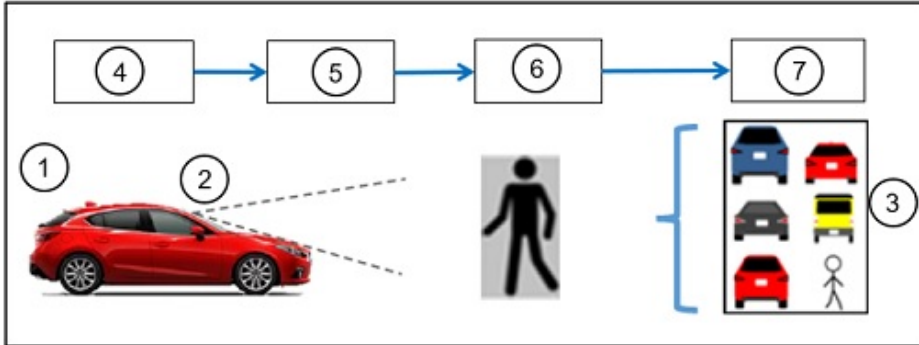
Humans recognize an object with their eyes and decide whether or not to apply the brakes using their brain. The vehicle recognizes objects using the Forward Sensing Camera (FSC) and Front Radar sensor (FR), to determine brake application. Therefore, drivers may feel that the operation does not match the human feeling.

Human	<ul style="list-style-type: none"> <li>• Eyes - Identify object</li> <li>• Brain - Determine brake application</li> </ul>	Vehicle system operation may not match human feeling
Vehicle	<ul style="list-style-type: none"> <li>• FSC and FR - Identify object</li> <li>• Vehicle Control Module (VCM) - Determine brake application</li> </ul>	

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### Operating mechanisms of SBS

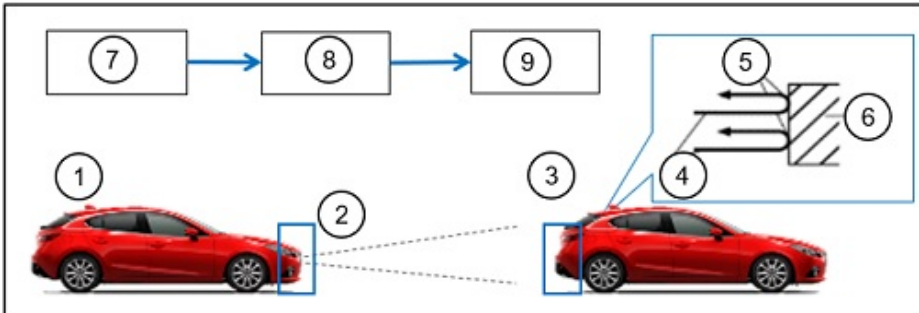
1. FSC: Feature points extracted from images captured by the FSC are compared to pre-machine-learned data (vehicles, pedestrians, etc.) to find a similar object and identify the object.



The FSC plays the role of the human eyes. It can monitor extensively, but unlike the human eyes. It sometimes recognizes trees and shadows as pedestrians, bikes, etc., as a target.

- (1) Own vehicle
- (2) Forward Sensing Camera
- (3) Pre-learned data
- (4) Shooting
- (5) Data processing
- (6) Extracting targets
- (7) Matching

2) FR: Detects the distance to the object by receiving the reflected wave of the radar.

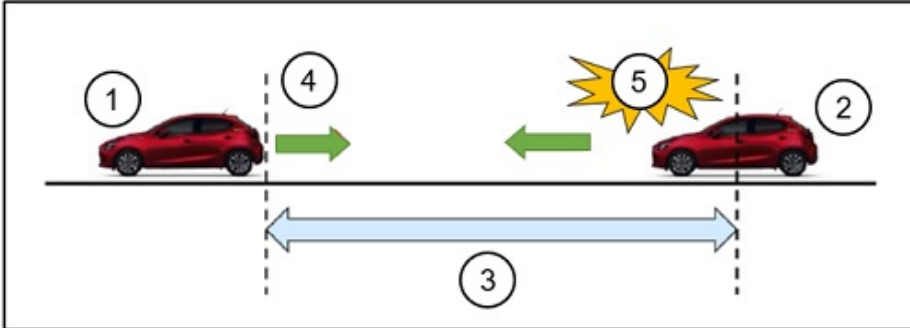


The FR also plays the role of the human eyes. It can monitor extensively, but unlike the human eyes. It sometimes recognizes trees and shadows as pedestrians, bikes, etc., as a target.

- (1) Own vehicle
- (2) FR
- (3) Vehicle ahead
- (4) Millimeter-wave
- (5) Reflection
- (6) Target (e.g., vehicle ahead)
- (7) Sending/Receiving millimeter-wave
- (8) Data processing
- (9) Distance measurement

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- 3) Control: The Vehicle Control Module (VCM) determines and activates the SBS in the following order.
- The VCM recognizes objects and distance by combining information from FSC and the FR.
  - Calculate the time to collision from the distance to the object and the vehicle speed.
  - Compare the remaining time to the collision with the stoppable time to determine whether alert or apply to brake.



The VCM is equivalent to the "brain" in humans. It can make stable decisions and operations but cannot make decisions based on an experience like a human.

- Vehicle ahead
- Own vehicle
- Distance to the object XX m
- Relative vehicle speed:  $v$  km/h, Time to collision:  $t$  sec
- Apply brake

## 2. Examples of Unintended SBS operation

Analyzing the occurrence scenes of unintended SBS activation, most correspond to the following patterns (1) to (7). Some of these scenes were not described in the owner's manual.

[A: Operating scene described in the owner's manual]

- There is an object in the road at the entrance to a curve (including guardrails and snowbanks).
- Passing an approaching vehicle while rounding a curve.
- When crossing a narrow bridge, going under a low overhang, or passing through a narrow gate, a car washing machine, or tunnel.
- When passing through a toll gate.
- When entering an underground parking area.
- There is a metal object, bump, or a protruding object on the road.
- If you suddenly come close to a vehicle ahead.
- An animal, wall, or standing tree is detected.

[B: Operating scene NOT described in the owner's manual (Additional operating scenes)]

- When going on a street with trees on the side of the road.
- When approaching a bicycle or motorcycle from the side.
- When turning in the presence of roadside objects
- When passing next to a vehicle in the adjacent lane

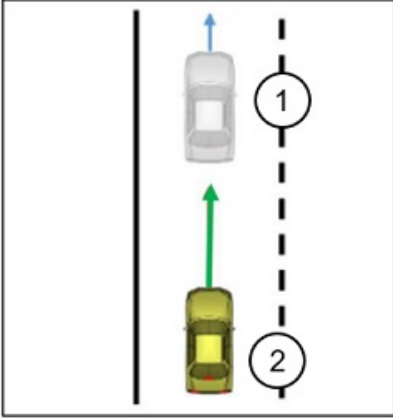
If a customer complains about unintended SBS activation, confirm the situation with the customer, having knowledge described in (1) to (7) below, explain the reason for activation if any of the activation scenes can be presumed.

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1) When approaching a vehicle in front

*Example of customer complaint*

While driving, the brakes were suddenly applied. There was a vehicle in front of the own vehicle, but at a distance.



(1) Vehicle ahead

(2) Own vehicle

*Things to confirm*

To confirm customer whether the event occurred when the vehicle in front slowed down or own vehicle accelerated, and the distance between the vehicles has been reduced.

*Reason for system activation*

SBS activated due to the closing distance to the vehicle ahead.

*Example of customer explanation*

SBS activates when the distance between the vehicle and the vehicle ahead becomes too close, and the risk of collision increases. Please keep a sufficient distance from the vehicle ahead.

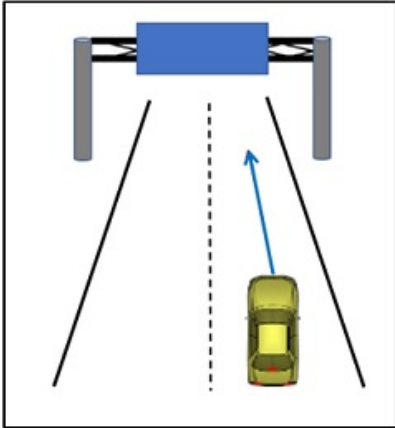
This phenomenon can occur because the system is different from the human eye.

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2) When there is an object above the road

*Example of customer complaint*

While driving at high speed, "Brake!" is displayed suddenly even though there is nothing in front of the vehicle.



*Things to confirm*

To confirm customer whether there was an object such as a sign above the place of occurrence.

*Reason for system activation*

The FR mistakenly recognized an object such as a sign on the road as a vehicle ahead.

*Example of customer explanation*

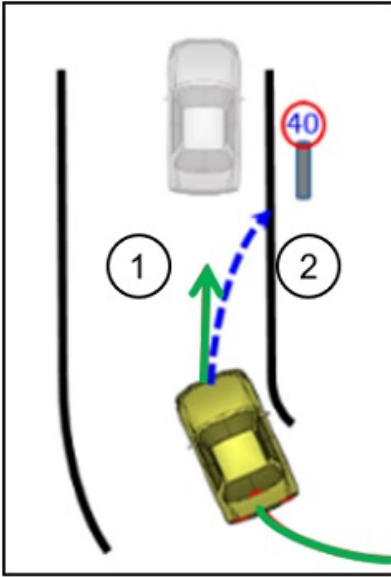
In such locations, the FR may misidentify objects such as signs above the road as the vehicle ahead and activate SBS. This phenomenon can occur because the system is different from the human eye.

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3) When turning in an area where an object in the surroundings

*Example of customer complaint*

The brakes were applied when passing the side of the sign while driving at low speed following the vehicle ahead.



(1) Actual path (Green)

(2) Predicted route by the system (Blue)

*Things to confirm*

To confirm customer whether the event has occurred during or immediately after a turn at a location where there is a roadside sign or other roadside object.

*Reason for system activation*

The FR recognized the vehicle in front and the roadside sign as one obstacle, and SBS activated. The system temporarily captured a sign in the predicted path of a turning vehicle as a detection target. At the same time, the FR recognizes them as one obstacle because the FR is good at measuring distances in the front/rear direction but not so good at detecting coordinates in the left/right direction.

*Example of customer explanation*

When returning from a turn to a straight or starting a turn from a straight, a difference between the vehicle's actual path and the path predicted by the vehicle may occur, or roadside objects may be detected as "objects with the lateral speed," which may trigger the system.

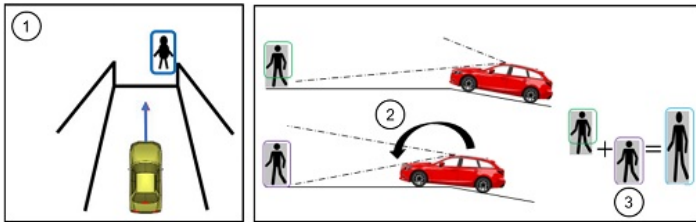
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4) When a sudden change in vehicle attitude at underground parking lot entrances/exits

*Example of customer complaint*

The brakes were suddenly applied when the vehicle exited an underground parking garage. A pedestrian was in front of the vehicle but at a distance.



(1) The exit of the underground parking

(2) Rapid change of the vehicle attitude

(3) Camera's visual performance

*Things to confirm*

- To confirm customer whether there is a gradient that causes the vehicle to change its attitude.

- To confirm customer whether there was a pedestrian, bicycle, or vehicle in front of the vehicle when the vehicle attitude changed.

*Reason for system activation*

Due to the change in the vehicle attitude by the gradient, FSC combined the images before and after the climb, then temporarily judged as that a pedestrian was approaching, and SBS activated.

*Example of customer explanation*

When the vehicle attitude changes due to a gradient, a pedestrian in front of the vehicle temporarily appears larger, and the system judges that a far-away pedestrian is approaching, which may trigger the SBS.

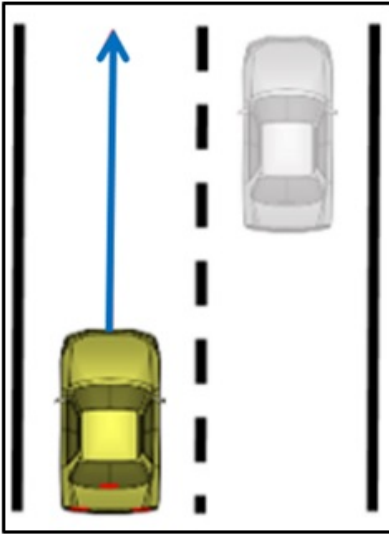
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## 5) When overtaking neighboring cars

*Example of customer complaint*

While traveling on the road with multiple lanes on one side, there was no vehicle in front, and the brakes were suddenly applied when passing the side of the neighboring car.

*Things to confirm*

To confirm customer whether the event occurred when a vehicle passed next to an adjacent vehicle on the road with multiple lanes on one side.

*Reason for system activation*

The FR mistakenly detected the lateral position of an adjacent vehicle closer to its own vehicle. This false detection may occur because the accuracy is reduced near the edge of the radar angle of view. (Detection ability of the radar)

*Example of customer explanation*

When passing adjacent vehicles on the road with multiple lanes on one side, the FR may detect an adjacent vehicle toward the front of the own vehicle and activate the SBS depending on the situation.

This phenomenon can occur because the system is different from the human eye.

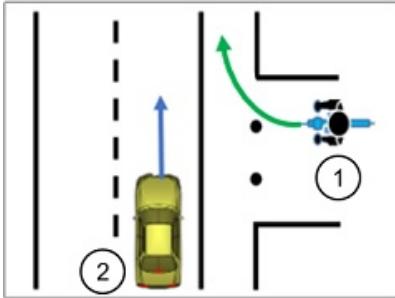
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6) When a bicycle or motorcycle approaches the own vehicle from the side

*Example of customer complaint*

While driving on an ordinary road, the brakes were suddenly applied. A bicycle came out from the right front. The bicycle swerved their direction in front of the own vehicle.



(1) Bicycle

(2) Own vehicle

*Things to confirm*

To confirm customer whether a bicycle or motorcycle was approaching from the left or right in front of the vehicle.

*Reason for system activation*

The FSC detects a bicycle from the right side of the road and determines that it is dangerous (the bicycle jumps in front of the vehicle), and the SBS is activated.

(In fact, the bicycle turned around just before the vehicle, so it did not jump into the vehicle path.)

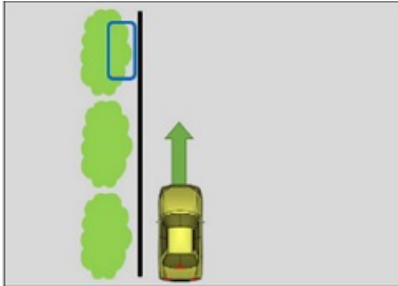
*Example of customer explanation*

When the FSC detects a bicycle or motorcycle approaching the vehicle, the VCM determines that the sudden jump of the bicycle or motorcycle is dangerous and activates SBS for safety

7) Driving a street with street trees

*Example of customer complaint*

While driving on the road with street trees, the brakes were suddenly applied even though nothing was ahead.



*Things to confirm*

To confirm customer whether the event occurred on the road with trees along the road.

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*Reason for system activation*

FSC recognized the shape, shadow, or pattern of the tree as a pedestrian or a bicycle when the street tree moves due to wind or other factors. FSC determines that a pedestrian or a bicycle had jumped in front of the vehicle, and activates the SBS.

*Example of customer explanation*

FSC may recognize the shadow of a street tree as a pedestrian or a bicycle and may judge that a person or bicycle ran out into the road depending on conditions such as vehicle movement or wind, and SBS may activate.

This phenomenon can occur because the system is different from the human eye.

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