

Service Alert

Mazda North American Operations
Irvine, CA 92618-2922



Subject: CUSTOMER SUPPORT OF UNINTENDED SBS OPERATION	Service Alert No.: SA-077/23
	Last Issued : 11/15/2023

BULLETIN NOTES

This SA supersedes the previously issued SA(s) listed below. The changes are noted in Red.

Previous SAs:	Date(s) Issued:
SA-054/22	08/11/22

APPLICABLE MODEL(S)/VINS

2019-2024 Mazda3	2022-2023 MX-30	2024 CX-90
2020-2024 CX-30	2023-2024 CX-50	

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.

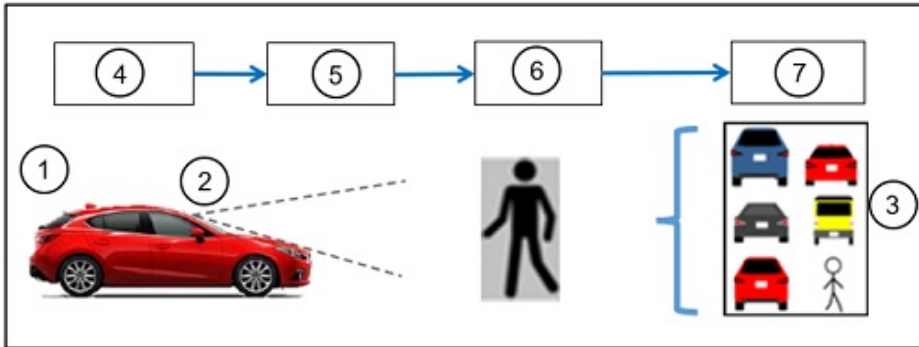
IMPORTANT: Humans recognize an object with their eyes and decide whether or not to apply the brakes using their brain. The vehicle recognizes objects using the Forward Sensing Camera (FSC) and Front Radar sensor (FR), to determine brake application. Therefore, drivers may feel that the operation does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

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

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Operating mechanisms of SBS

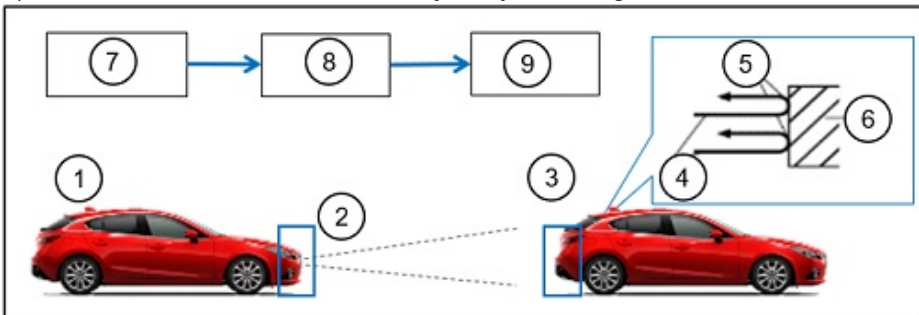
1. FSC: Feature points extracted from images captured by the FSC are compared to pre-machine-learned data (vehicles, pedestrians, etc.) to find a similar object and identify the object.



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) Customer 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.

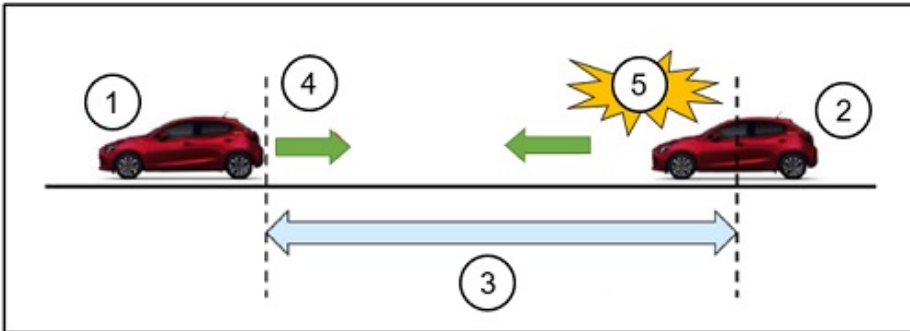


The FR also plays the role of the human eyes. It can monitor extensively, but unlike the human eyes. It sometimes recognizes trees and shadows as pedestrians, bikes, etc., as a target.

- (1) Customer 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
- Customer vehicle
- Distance to the object XX m
- Relative vehicle speed: v mph (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.

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.

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

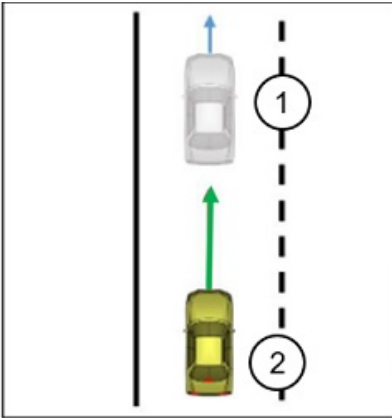
If a customer complains about unintended SBS activation, confirm the situation with the customer, having knowledge described in (1) to (7) below, explain the reason for activation if any of the activation scenes can be presumed.

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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 customer vehicle, but at a distance.



(1) Vehicle ahead

(2) Customer vehicle

Things to confirm

Did the event occur when the vehicle in front slowed down or customer vehicle accelerated, and the distance between the vehicles was 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. Keep a sufficient distance from the vehicle ahead.

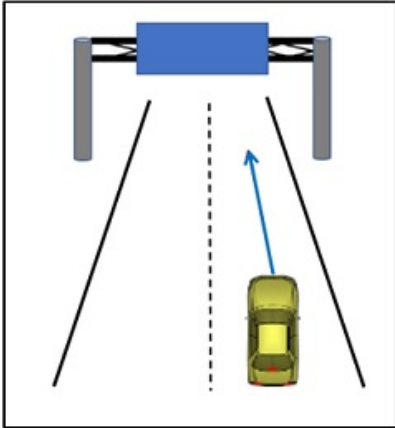
This phenomenon can occur because the system is different from the human eye.

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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

Was there 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

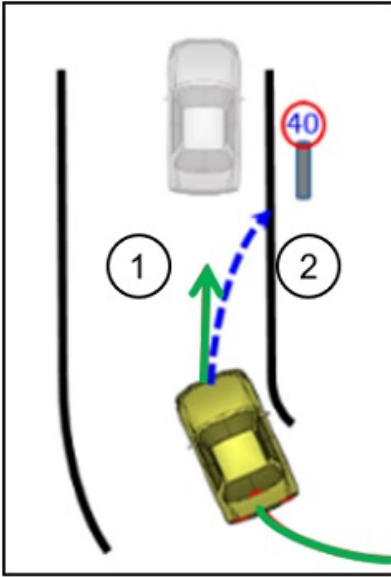
In such locations, the FR may misidentify objects such as signs above the road as the vehicle ahead and activate SBS. This phenomenon can occur because the system is different from the human eye.

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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

Did the event occur 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.

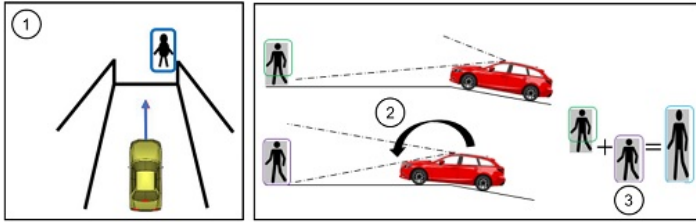
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4) When a sudden change in vehicle attitude at underground parking lot entrances/exits

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

- Was there is a gradient that causes the vehicle to change its attitude?
- Was there 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.

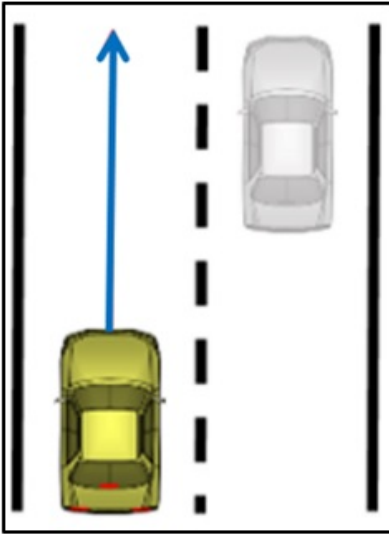
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5) When overtaking neighboring cars

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*

Did the event occur 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.

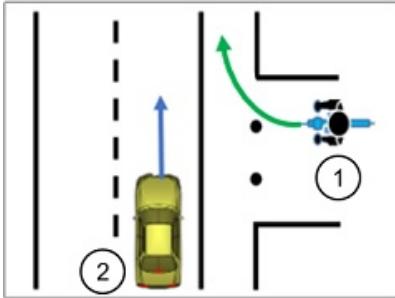
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6) When a bicycle or motorcycle approaches the own vehicle from the side

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) Customer vehicle

Things to confirm

Was there a bicycle or motorcycle 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

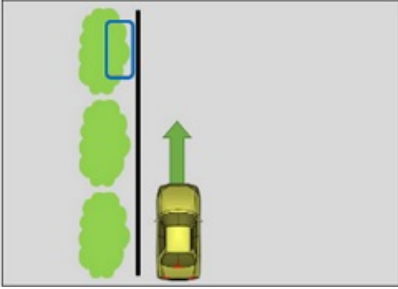
When the FSC detects a bicycle or motorcycle approaching the vehicle, the VCM determines that the sudden jump of the bicycle or motorcycle is dangerous and activates SBS for safety

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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*

Did the event occur on a road with trees along the road?

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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8) When approaching a right/left-turning vehicle that has slowed down.

Example of customer complaint

The brakes on the vehicle (1) are suddenly activated when passing a vehicle ahead turning right/left (2).

Things to confirm

Did this occur when the vehicle attempted to pass a vehicle ahead that was slowing down to turn right/left?

Reason for system activation

The close distance between the own vehicle and the turning vehicle ahead activated the SBS.

Example of customer explanation

When the vehicle detects collision risks due to close distance to the vehicle ahead slowing down, the SBS is activated for safety. In such cases, please keep sufficient distance from the vehicle ahead.

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