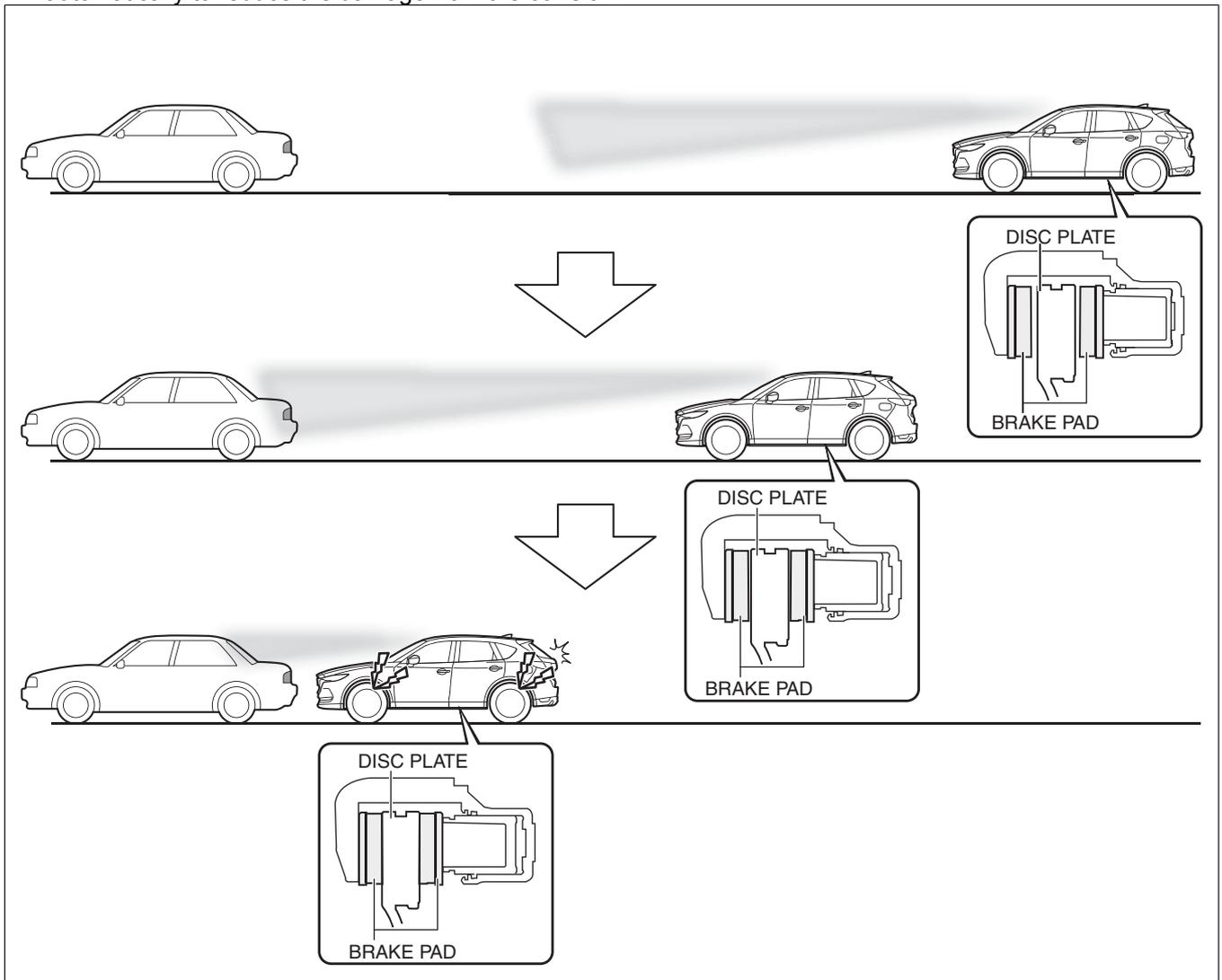


ADVANCED SMART CITY BRAKE SUPPORT (ADVANCED SCBS)

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Purpose

- With the Advanced Smart City Brake Support (Advanced SCBS) system, if a possible collision with a vehicle ahead or pedestrian is detected while the vehicle is traveling at low speed, the system applies the brakes automatically to reduce the damage from the collision.



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Caution

- Tires for all four wheels must always be of the specified type and size. If tires other than the specified type and size are used, the Advanced Smart City Brake Support (Advanced SCBS) system may not operate normally.
- Do not mix tire types or use tires with significantly different wear patterns on the same vehicle. Use of inappropriate tires could result in the DSC and Advanced Smart City Brake Support (Advanced SCBS) system not operating normally.

Note

- The Advanced Smart City Brake Support (Advanced SCBS) system is designed to assist the driver. The driver's driving operation always takes priority even while the Advanced Smart City Brake Support (Advanced SCBS) system is operating. For this reason, if the driver operates the steering wheel, accelerator pedal or brakes to avoid danger, the Advanced Smart City Brake Support (Advanced SCBS) system operation is canceled.
- In the following cases, turn off the Advanced Smart City Brake Support (Advanced SCBS) system using the center display*¹ or Smart City Brake Support (SCBS) OFF switch*² to prevent a mistaken operation of the Advanced Smart City Brake Support (Advanced SCBS) system.
 - The vehicle is on a chassis roller.
 - The vehicle is being towed or when towing another vehicle.
 - When driving on rough roads such as in areas of dense grass or off-road.

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- The Advanced Smart City Brake Support (Advanced SCBS) is not available in the Indonesia and Taiwan.

*1 : With center display

*2 : Without center display

Functions

Collision warning/brake prefill/brake control (SCBS brake)

- When the forward sensing camera (FSC) detects that the vehicle is approaching a vehicle ahead or pedestrian, a collision warning request signal is output to the instrument cluster and, at the same time, a brake prefill request signal is output to the DSC HU/CM to implement the brake prefill. After this, if the system detects that the driver is not performing evasive maneuvering and there is the danger of a collision, a brake control (SCBS brake) request signal is output to the DSC HU/CM, and brake control (SCBS brake) is activated.
 - Collision warning
 - If there is the possibility of a collision with a vehicle ahead or pedestrian, the beep sounds continuously and a warning is indicated in the multi-information display*³ or the active driving display.*⁴
 - Brake prefill
 - If the forward sensing camera (FSC) determines that the vehicle is approaching a vehicle ahead or pedestrian, the DSC HU/CM implements brake prefill by pressurizing the brake fluid and eliminating the play between the brake pads and disc plates. As a result, if the driver becomes aware of the situation ahead and depresses the brake pedal, immediate brake force can be obtained.
 - Brake control (SCBS brake)
 - If the forward sensing camera (FSC) determines that the vehicle is in danger of colliding with a vehicle ahead or pedestrian, the DSC HU/CM activates the brake control by applying the brakes on all four wheels automatically.

Warning

- **The Advanced Smart City Brake Support (Advanced SCBS) system operates in response to a vehicle ahead or a pedestrian. The system does not operate in response to obstructions such as a wall, 2-wheeled vehicles, or animals.**
- **The Advanced Smart City Brake Support (Advanced SCBS) system operates when a certain number of conditions is met, however, it is not a system which guarantees collision prevention.**
- **There are limitations to the deceleration ability by the brake control (SCBS brake), and the system may be unable to decelerate sufficiently to avoid hitting the vehicle ahead or pedestrian if the vehicle ahead applies the brakes suddenly or another vehicle/pedestrian cuts into the driving lane, which could result in an accident. Always verify the safety of the surrounding area and depress the brake pedal while keeping a safe distance from the vehicle ahead and pedestrian.**
- **Object is vehicle ahead:**
 - **The brake prefill and brake control (SCBS brake) does not operate at a vehicle speed of less than approx. 4 km/h {2 mph}, a vehicle speed of approx. 80 km/h {50 mph} or more, and while the vehicle is reversing.**
- **Object is a pedestrian:**
 - **The brake prefill and brake control (SCBS brake) does not operate at a vehicle speed of less than approx. 10 km/h {6.2 mph}, a vehicle speed of approx. 80 km/h {50 mph} or more, and while the vehicle is reversing.**
- **Do not apply stickers to the windshield surface around the forward sensing camera (FSC). Application of even transparent stickers will cause the Advanced Smart City Brake Support (Advanced SCBS) system to operate incorrectly, which could result in an accident.**

Advanced Smart City Brake Support (Advanced SCBS) display function

- The Advanced Smart City Brake Support (Advanced SCBS) notifies the driver of the system status using the Smart City Brake Support (SCBS) indicator light (red), the Smart City Brake Support (SCBS) warning light (amber), the Smart City Brake Support (SCBS) OFF indicator light and the multi-information display*³/active driving display*³.

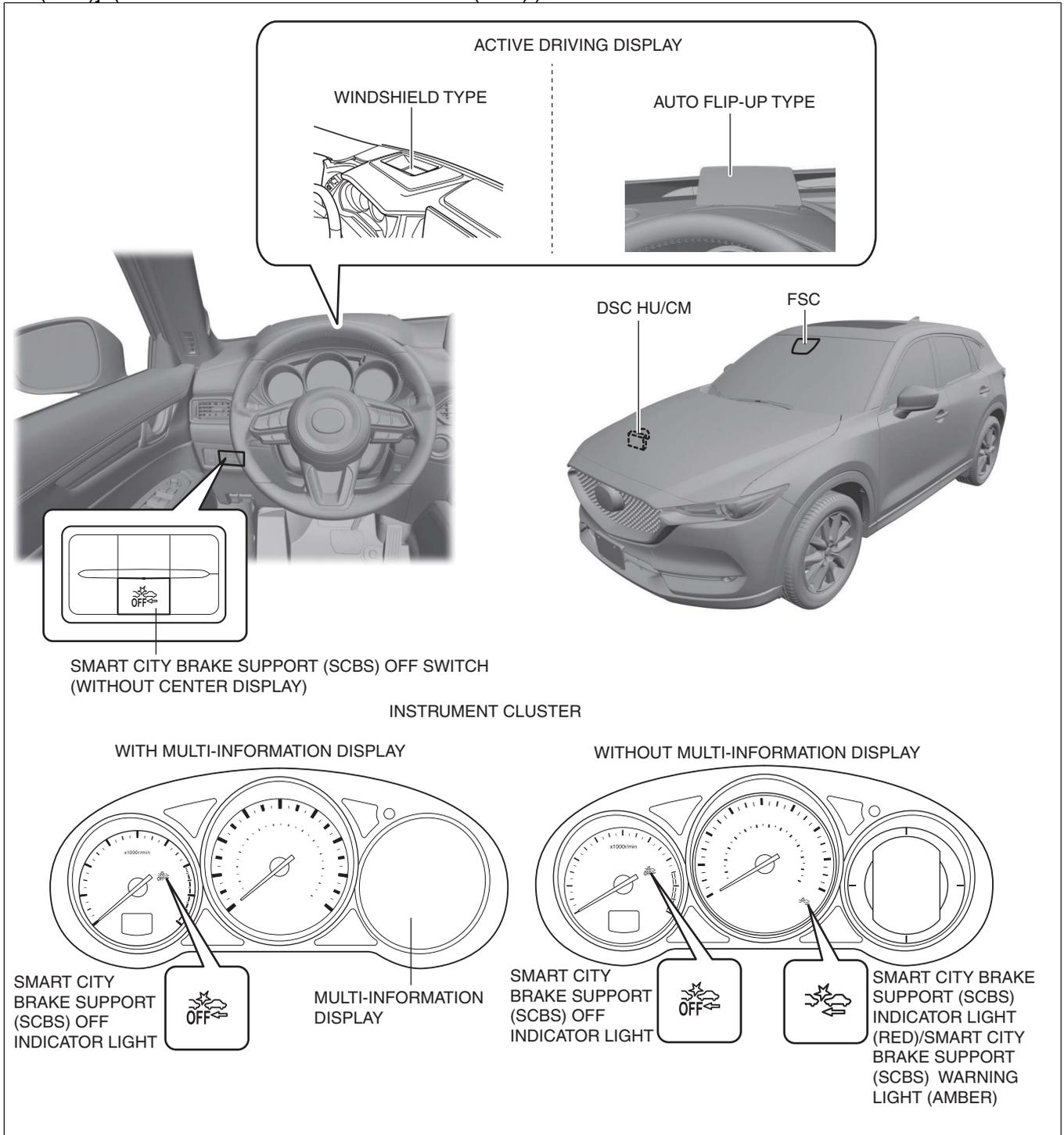
Note

- If a malfunction occurs in the Smart City Brake Support [Forward] (SCBS F) system, a warning message is indicated in the center display. For the message content and verification method, refer to the [CENTER DISPLAY]. (See CENTER DISPLAY [WITH CENTER DISPLAY].)

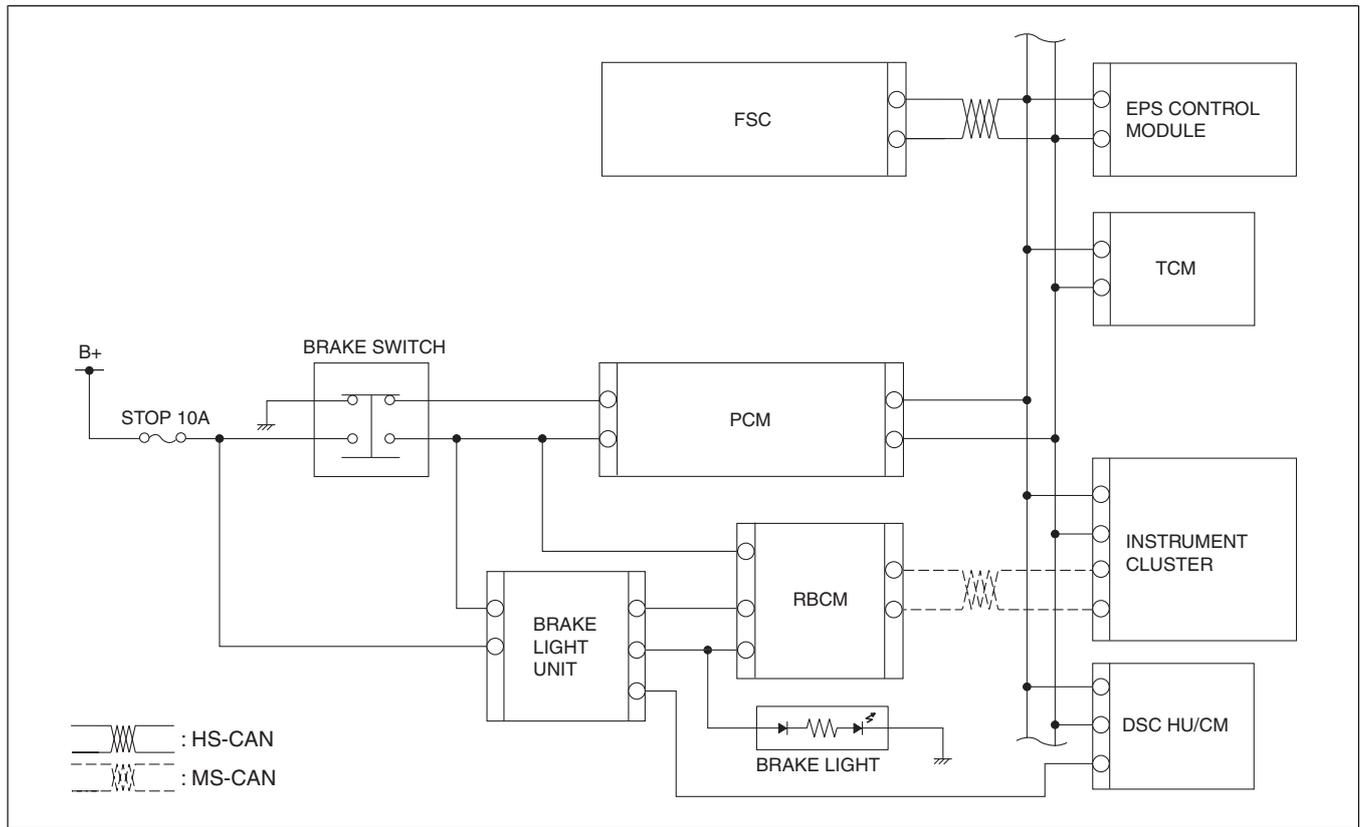
*3 : With multi-information display

Construction/Operation

- The forward sensing camera (FSC) is located at the top of the windshield and it detects a vehicle ahead and pedestrian. For details on the forward sensing camera (FSC), refer to the [FORWARD SENSING CAMERA (FSC)]. (See FORWARD SENSING CAMERA (FSC).)



System wiring diagram



- When all of the following conditions are met, the collision warning/brake prefill/brake control (SCBS brake) operates when the distance to a vehicle or an obstruction ahead is the specified value or less.
 - While engine is running
 - Object is vehicle ahead:
 - Vehicle speed is **approx. 4 km/h {2 mph} or more and approx. 80 km/h {50 mph} or less**
 - Object is pedestrian:
 - Vehicle speed is **approx. 10 km/h {6.2 mph} or more and approx. 80 km/h {50 mph} or less**
 - No malfunction occurring in the Advanced Smart City Brake Support (Advanced SCBS) system
 - Advanced Smart City Brake Support (Advanced SCBS) has not been disabled using personalization feature
 - No malfunction occurring in DSC system
 - Evasive maneuvering (steering, accelerator pedal, or brake pedal operation) is not performed even though distance to vehicle or pedestrian is specified value or less

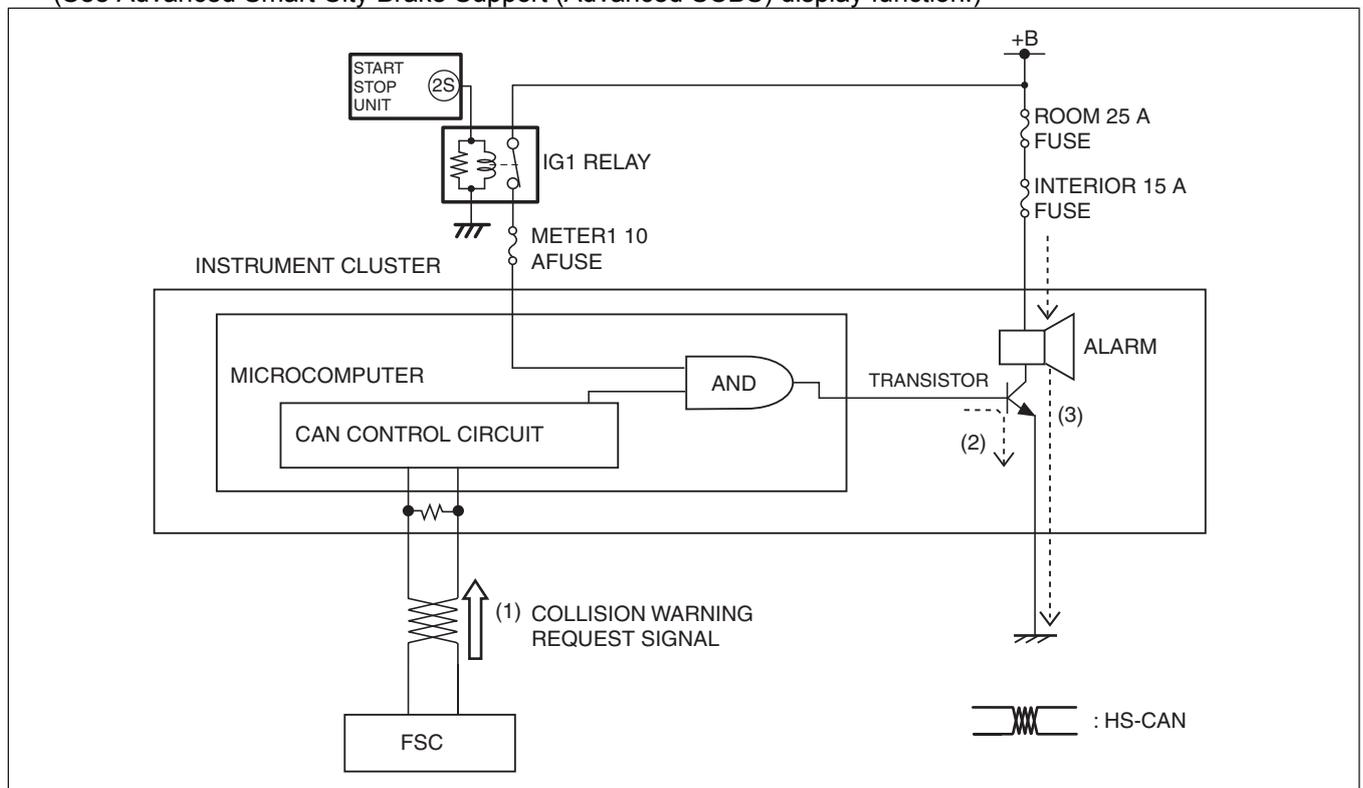
Note

- The Advanced Smart City Brake Support (Advanced SCBS) system will operate even if the TCS is switched off (TCS OFF indicator light illuminated) by operating the TCS OFF switch.
- The Advanced Smart City Brake Support (Advanced SCBS) detects a vehicle ahead and pedestrian by the forward sensing camera (FSC). Consequently, the Advanced Smart City Brake Support (Advanced SCBS) may not operate under the following conditions:
 - Under bad weather condition such as rain, fog, and snow
 - When the window washer is being used or the windshield wipers are not used when it is raining
 - The windshield is dirty
 - Trucks with low loading platforms, and vehicles with extremely high profile
 - Vehicles with certain shapes such as a vehicle carrier
- Under the following conditions, the Advanced Smart City Brake Support (Advanced SCBS) may not operate normally.
 - Heavy luggage is loaded in the luggage compartment or on the rear seat
 - If there is the possibility of partial contact with a vehicle ahead
 - When driving on continuously curving roads, entering and existing curves, and unstable driving due to a vehicle accident or breakdown in a driving lane
 - Elongated luggage or cargo is loaded onto installed roof rails and covers the forward sensing camera (FSC)
 - Exhaust gas from the vehicle ahead, sand, snow, and water vapor rising from manholes and grating, and water splashed into the air
 - The vehicle is driven on a slippery road surface such as wet roads or icy or snow-bound roads

- The braking performance is adversely affected due to cold temperatures or wet brakes
- The vehicle is driven at the same speed as the vehicle ahead
- The accelerator pedal is depressed
- The brake pedal is depressed
- The steering wheel is being operated
- The selector lever is being operated (ATX)
- The forward sensing camera (FSC) may regard the following vehicles or objects as a vehicle ahead or pedestrian, and the Advanced Smart City Brake Support (Advanced SCBS) system may be activated.
 - Objects on the road at the entrance to a curve
 - Vehicles passing in the opposite lane while making a curve
 - When passing through low gates, narrow gates, car washing machines, or tunnels
 - When passing through a toll gate
 - Vehicle or obstruction approaches detecting vehicle suddenly
 - 2-wheeled vehicles, animals, or standing trees

Collision warning operation

- When the forward sensing camera (FSC) detects that the vehicle is approaching a vehicle ahead or pedestrian, it outputs a collision warning request signal (1) to the instrument cluster.
- The instrument cluster turns the transistor on (2) based on the collision warning request signal.
- When the transistor turns on, a ground circuit with the alarm is established and the alarm sounds (3) and, in the same time, a warning message is indicated in the active driving display (if equipped the active driving display). (See Advanced Smart City Brake Support (Advanced SCBS) display function.)



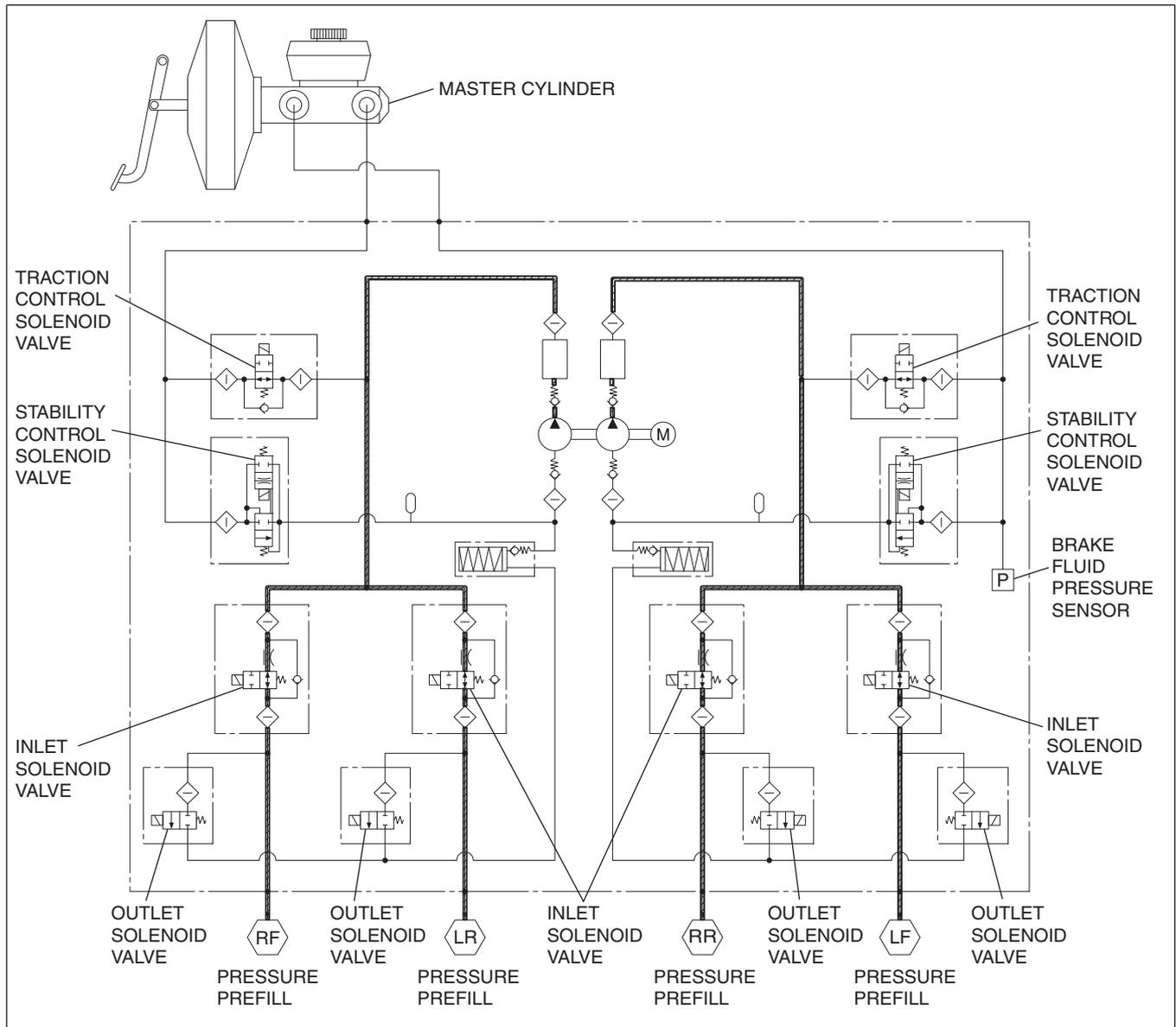
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Brake prefill operation

Solenoid valve operation table

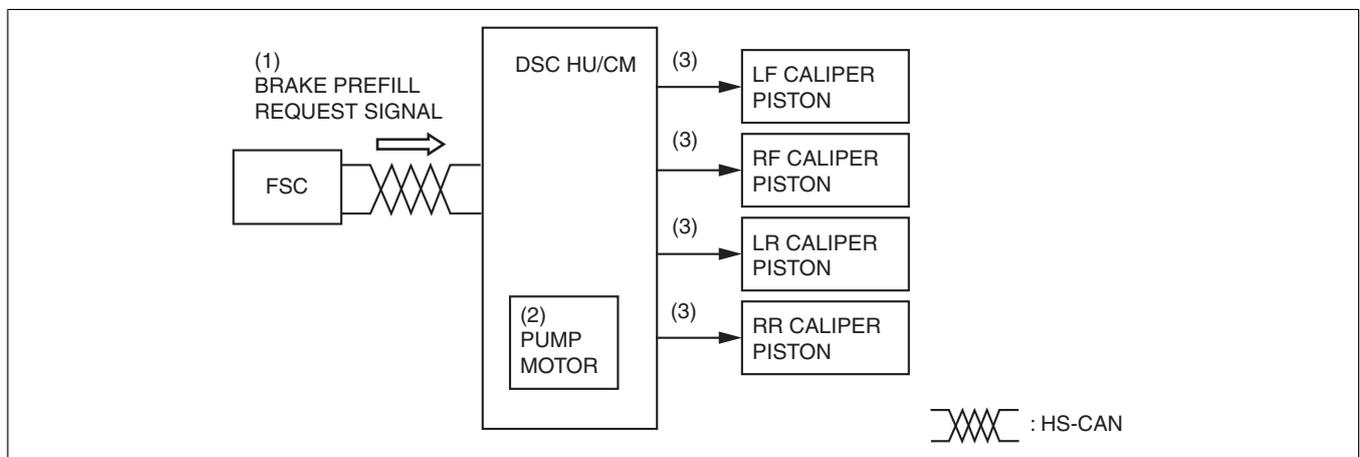
Traction control solenoid valve		Stability control solenoid valve		Inlet solenoid valve				Outlet solenoid valve				Pump motor, pump
LF-RR	RF-LR	LF-RR	RF-LR	LF	RF	LR	RR	LF	RF	LR	RR	
OFF (open)		OFF (close)		OFF (open)				OFF (close)				Operating

Hydraulic circuit diagram



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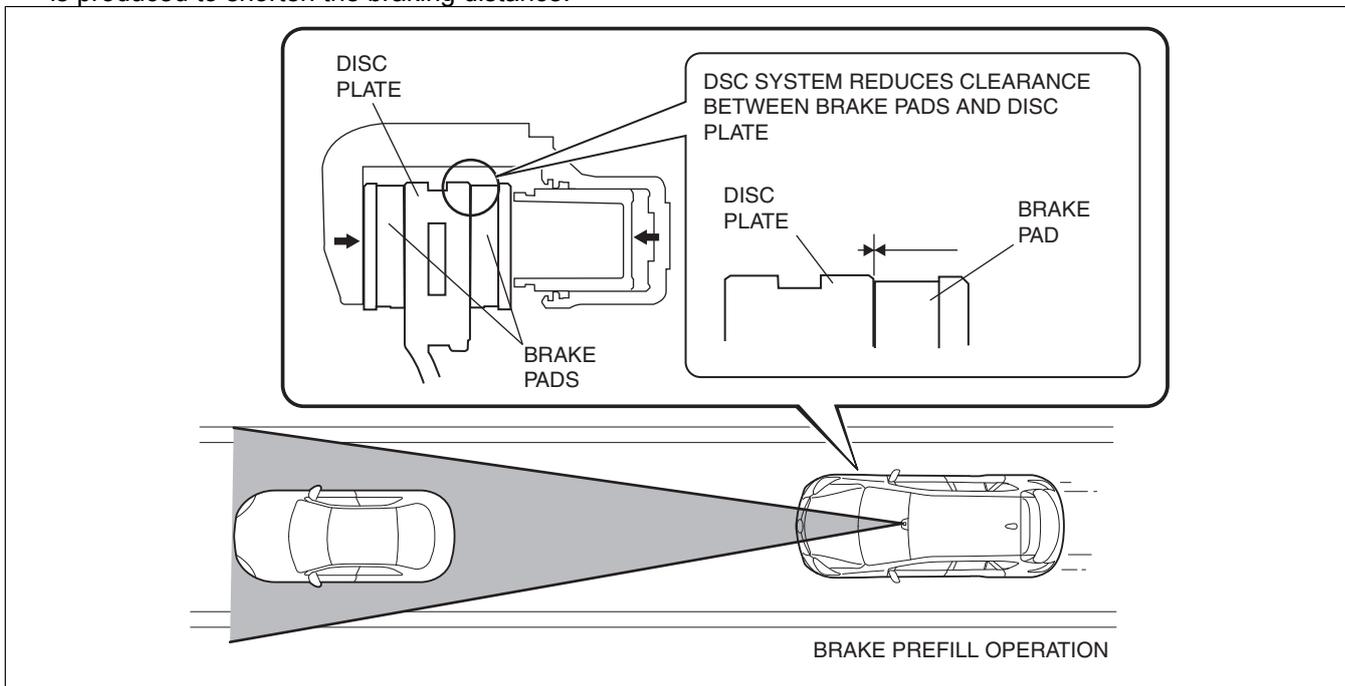
Block Diagram



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- When the forward sensing camera (FSC) detects that the vehicle is approaching a vehicle ahead or pedestrian, it outputs a brake prefill request signal (1) to the DSC HU/CM.
- When the DSC HU/CM receives the brake prefill request signal, it activates (2) the pump motor. At this time, all of the solenoid valves are off and the brake fluid pressure generated by the pump motor is conducted (3) to the caliper pistons on each wheel.

- By conducting the brake fluid pressure generated by the pump motor to the caliper pistons, the clearance between the brake pads and disc plates is maintained in a narrowed condition.
- As a result, if the driver recognizes a vehicle or obstruction ahead and depresses the brake pedal, or the driver does not perform evasive maneuvering and the brake control (SCBS brake) is activated, immediate brake force is produced to shorten the braking distance.



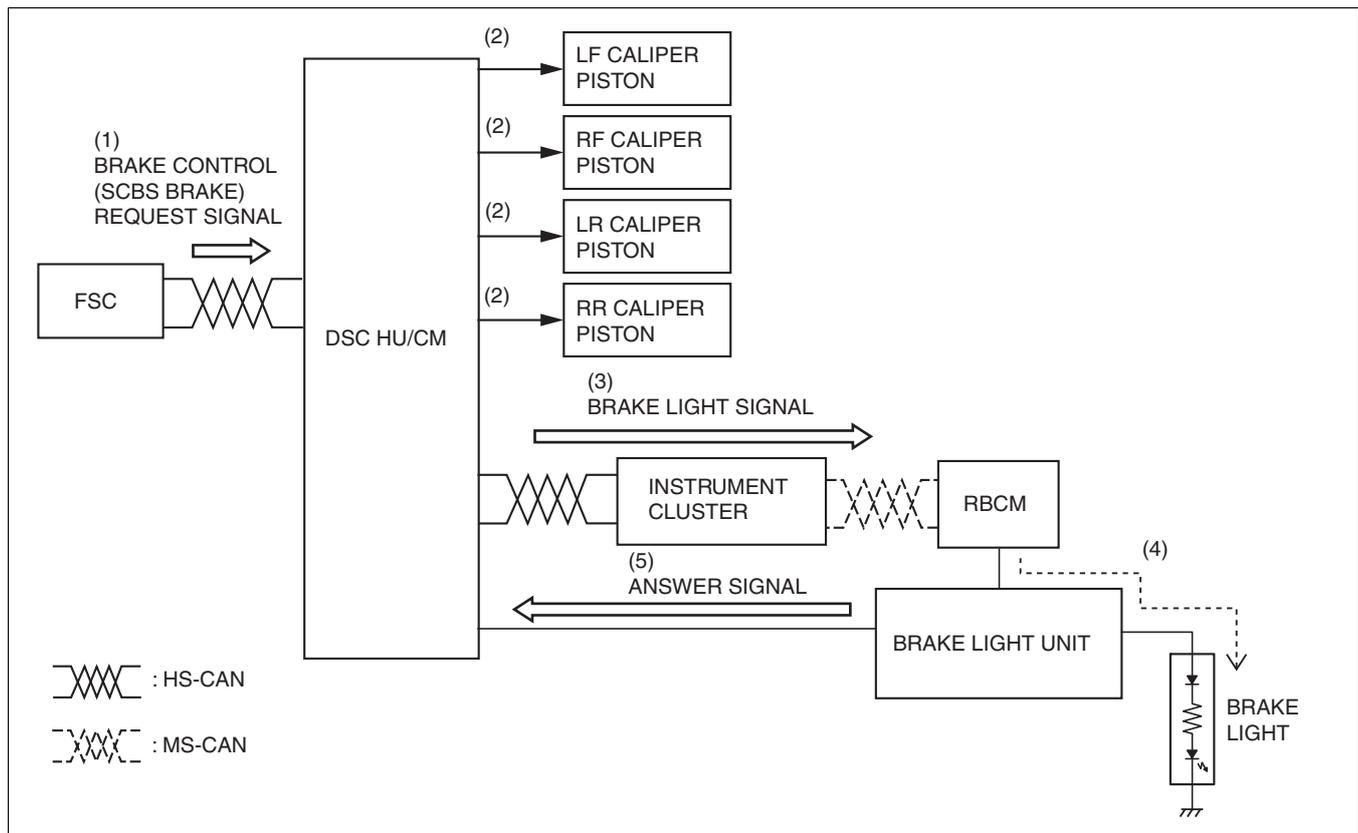
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Brake control (SCBS brake) operation

Solenoid valve operation table

Traction control solenoid valve		Stability control solenoid valve		Inlet solenoid valve				Outlet solenoid valve				Pump motor, pump
LF—RR	RF—LR	LF—RR	RF—LR	LF	RF	LR	RR	LF	RF	LR	RR	
ON (close)		ON (open)		OFF (open)				OFF (close)				Operating

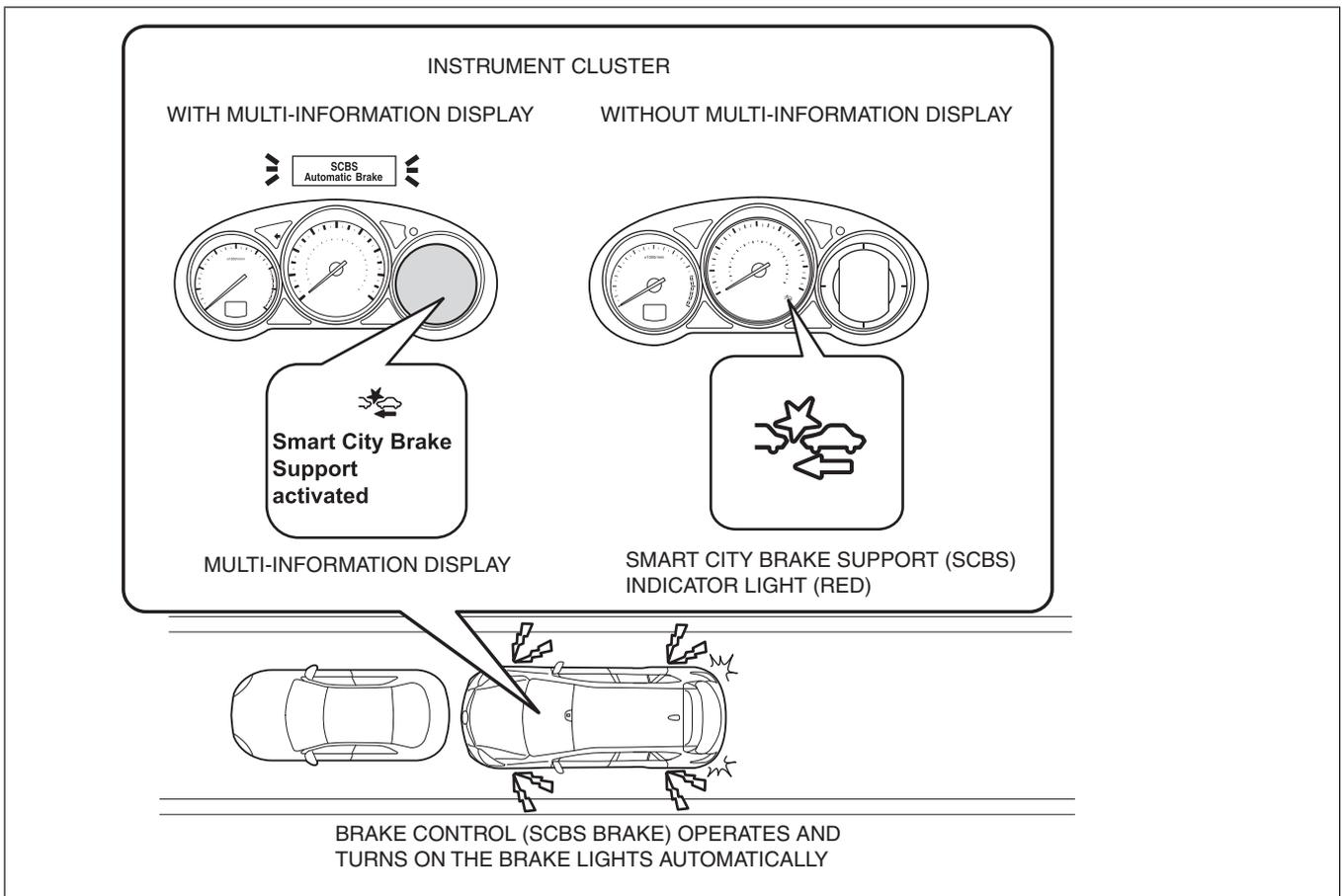
Block Diagram



- If the driver does not perform evasive maneuvering after the brake prefill operation and the forward sensing camera (FSC) determines that there is the danger of a collision, a brake control (SCBS brake) request signal (1) is output from the Forward Sensing Camera (FSC) to the DSC HU/CM.
- When the DSC HU/CM receives the brake control (SCBS brake) request signal, it energizes the traction control and the stability control solenoid valves to switch the hydraulic pressure circuit and increase the brake fluid pressure. As a result, the brake control (SCBS brake) is activated (2).
- While the brake control (SCBS brake) is operating, a brake light signal (3) is output from the DSC HU/CM to the rear body control module (RBCM) at the same time. When the rear body control module (RBCM) receives the signal, it sends the signal to the brake light unit and turns on the brake lights (4).
- An answer signal (5) is output to the DSC HU/CM from the brake light unit at the same time the brake lights are illuminated.
- While the brake control (SCBS brake) is operating, a message is displayed in the multi-information display.
- The brake control (SCBS brake) is maintained in this condition for **approx. 2 s** after the vehicle is stopped. Thereafter, the driver needs to depress the brake pedal to maintain the vehicle in a stopped condition.

Note

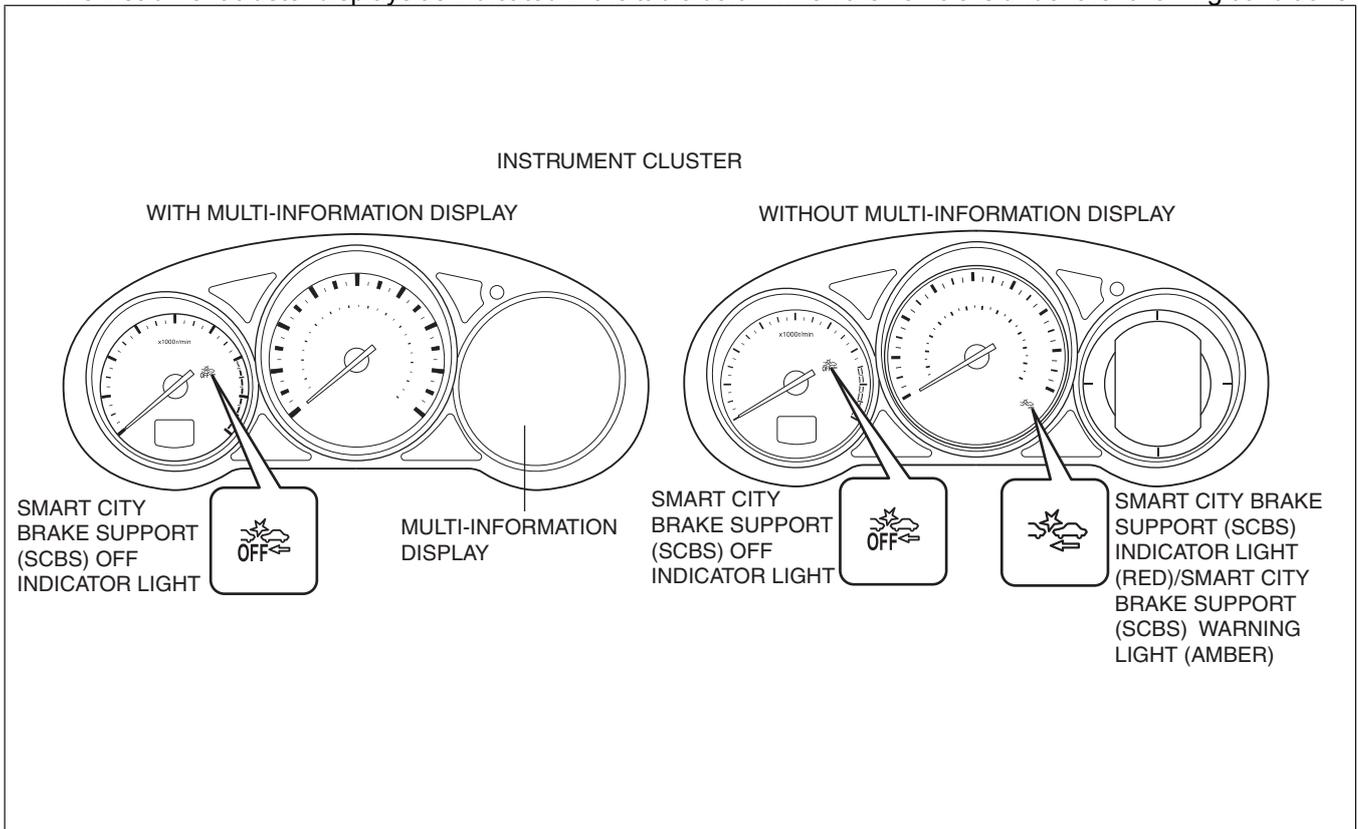
- If the MTX vehicle is stopped by the SCBS operation and the clutch pedal is not depressed, the engine stops.



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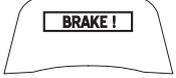
Advanced Smart City Brake Support (Advanced SCBS) display function

- The instrument cluster displays as indicated in the table below when the vehicle is under the following conditions.



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Advanced Smart City Brake Support (Advanced SCBS) display function table

Condition	Display content	Smart City Brake Support (SCBS) indicator light (red)	Smart City Brake Support (SCBS) warning light (amber)	Smart City Brake Support (SCBS) OFF indicator light	Active Driving Display*4 (With auto flip-up type)	Active Driving Display*4 (With windshield type)	Multi-information display*5
Advanced Smart City Brake Support (Advanced SCBS) is off Ignition is switched ON (engine off or on)	Advanced Smart City Brake Support (Advanced SCBS) system is canceled	Off	Off	On	No display	No display	No display
Advanced Smart City Brake Support (Advanced SCBS) is on	Danger of collision with vehicle or obstruction ahead	Off	Off	Off			BRAKE !
	Brake control (SCBS brake) operating	Flash	Off	Off	No display	No display	 SCBS Automatic Brake
	Malfunction occurred in Advanced Smart City Brake Support (Advanced SCBS) system	Off	On	Off	No display	No display	Smart City Brake Support Forward Malfunction Smart City Brake Support Forward Disabled
	Forward Sensing Camera (FSC) is not operating normally due to effects such as rain, snowfall, dirty windshield	Off	On	Off	No display	No display	 Clear outside of windshield completely

*5 : With multi-information display

Caution

- If the DTCs stored in the Forward Sensing Camera (FSC), the Advanced Smart City Brake Support (Advanced SCBS) function is inhibited depending on the cause or the malfunction.
- If DTCs are stored in the DSC HU/CM, PCM or instrument cluster, the Advanced Smart City Brake Support (Advanced SCBS) function is inhibited depending on the cause of the malfunction.

Note

- If the Smart Brake Support (SBS) system operation is turned off, the Smart City Brake Support (SCBS) system operation is turned off simultaneously.