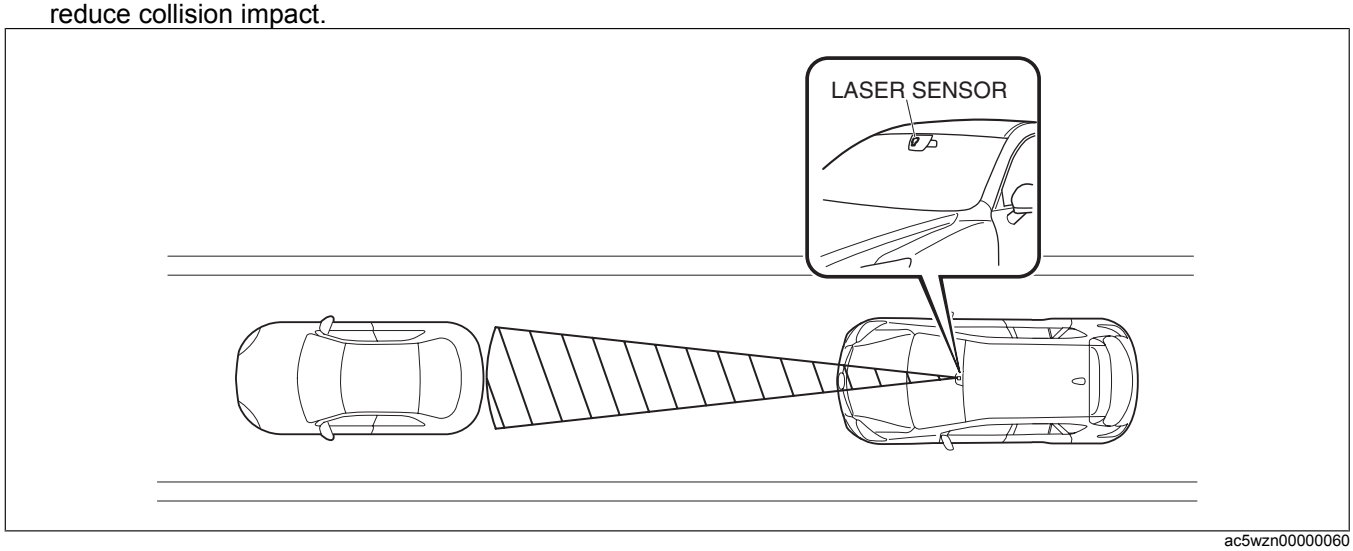
SMART CITY BRAKE SUPPORT (SCBS)

id041500200000

Purpose

- The Smart City Brake Support (SCBS) operates the automatic brakes (brake control (SCBS brake)) when the vehicle approaches a vehicle ahead at a vehicle speed between approx. 4 km/h {2 mph} to 30 km/h {19 mph} to reduce collision impact.



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Warning

- **The smart city brake support (SCBS) performs the brake control (SCBS brake), however, it is not a system which guarantees collision prevention under all conditions. Because deceleration by the brake control (SCBS brake) is limited, always verify the safety of the surrounding area and keep a safe distance from a vehicle ahead.**
- **The smart city brake support (SCBS) does not operate when the vehicle speed is less than approx. 4 km {2 mph} or approx. 30 km/h {19 mph} or more. It also does not operate when the vehicle is in reverse.**
- **Do not apply stickers to the surface of the windshield near the laser sensor (including transparent stickers). Otherwise, the laser sensor may not be able to detect vehicles or obstructions in front which could result in an accident.**

Caution

- **Always use tires for all wheels that are of the specified size, and the same manufacture, brand, and tread pattern. In addition, do not use tires with significantly different wear patterns on the same vehicle. If such improper tires are used, the smart city brake support (SCBS) system may not operate normally.**

Note

- The smart city brake support (SCBS) is a system for assisting driver operations. Accordingly, if the conditions for the smart city brake support (SCBS) are met, or even when the smart city brake support (SCBS) is operating, if the driver operates the steering wheel, accelerator pedal, and the brake pedal, the driver's operations take precedence and the smart city brake support (SCBS) operation is canceled.
- Turn off the smart city brake support (SCBS) system to prevent mistaken operation when the vehicle is running on a chassis roller.

Function

- The smart city brake support (SCBS) functions are categorized as follows:
  - — Brake prefill which reduces the clearance between the brake pads and the disc plate when the laser sensor detects the vehicle approaching a vehicle ahead to enable brake force generation immediately when the brake is operated.
  - — Brake control (SCBS brake) which operates the automatic brakes when the laser sensor detects the risk of a collision.
- When the laser sensor detects that the vehicle is approaching a vehicle ahead, the system operates the brake prefill. When the driver depresses the brake pedal, the brakes are applied firmly and quickly to assist, and if the driver does not perform an avoidance maneuver, it operates the brake control (SCBS brake).
- The laser sensor installed on the upper area of the windshield detects a vehicle running ahead within approx. 6 m {20 ft} from the laser sensor.

Construction/Operation

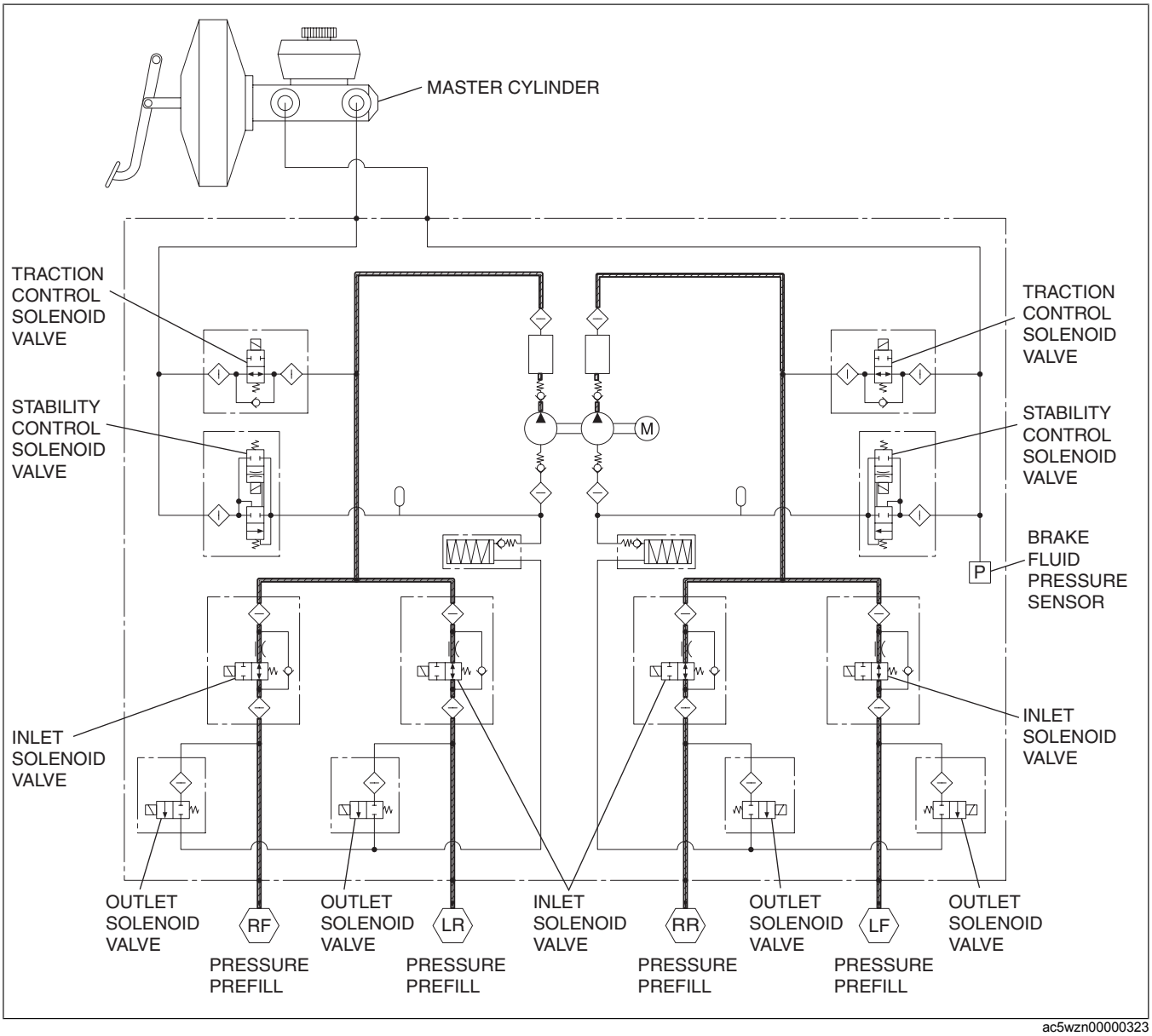
- The smart city brake support (SCBS) system will operate under the following conditions:
  - — The engine running.
  - — The LCD TFT display in the instrument cluster does not indicate that the system requires inspection or it cannot be used.
  - — The vehicle speed is between approx. 4 km/h {2 mph} to 30 km/h {19 mph}.
  - — The relative speed between your vehicle and the vehicle in front is under 15 km/h {9.3 mph}.
  - — The smart city brake support (SCBS) system is not turned off.
  - — The TCS operation is not turned off using the TCS OFF switch.
  - — The DSC is not malfunctioning.
  - — The driver is not deliberately performing driving operations (accelerator pedal, steering wheel, and braking operations).

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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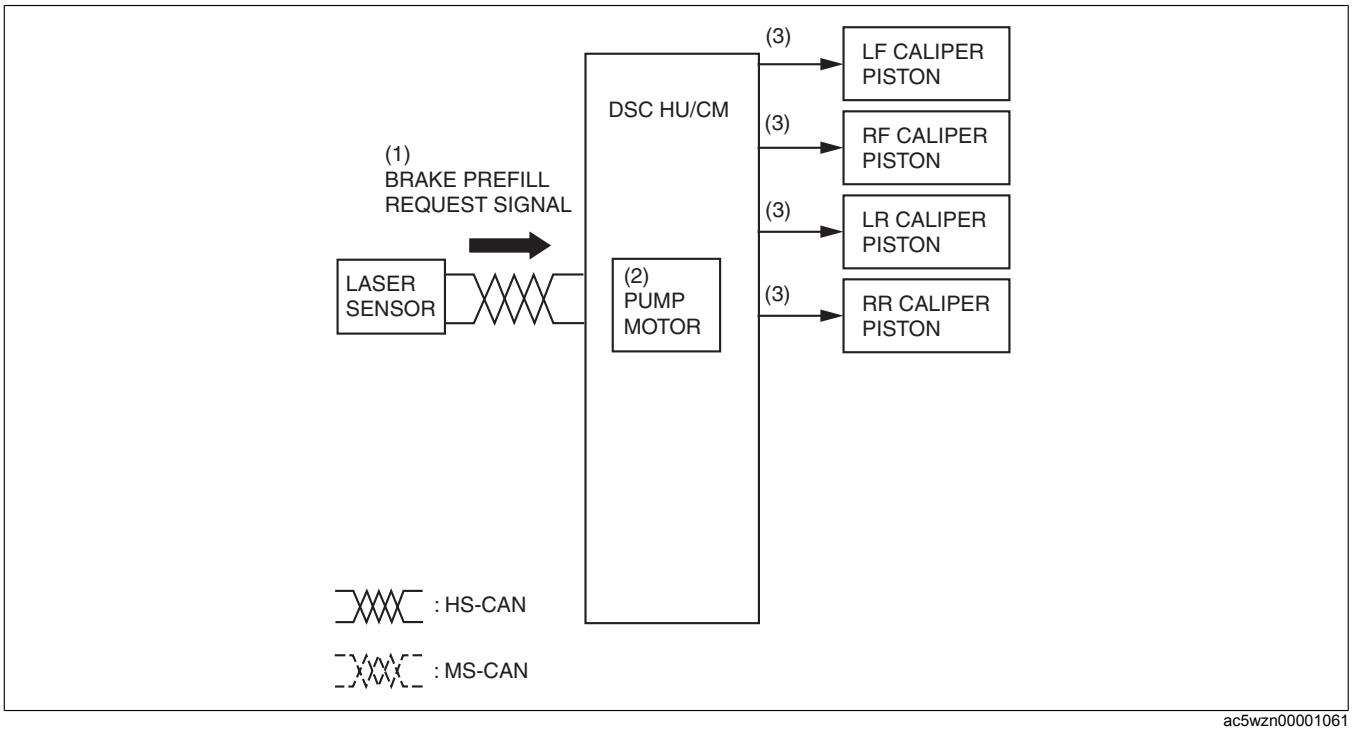
Block diagram



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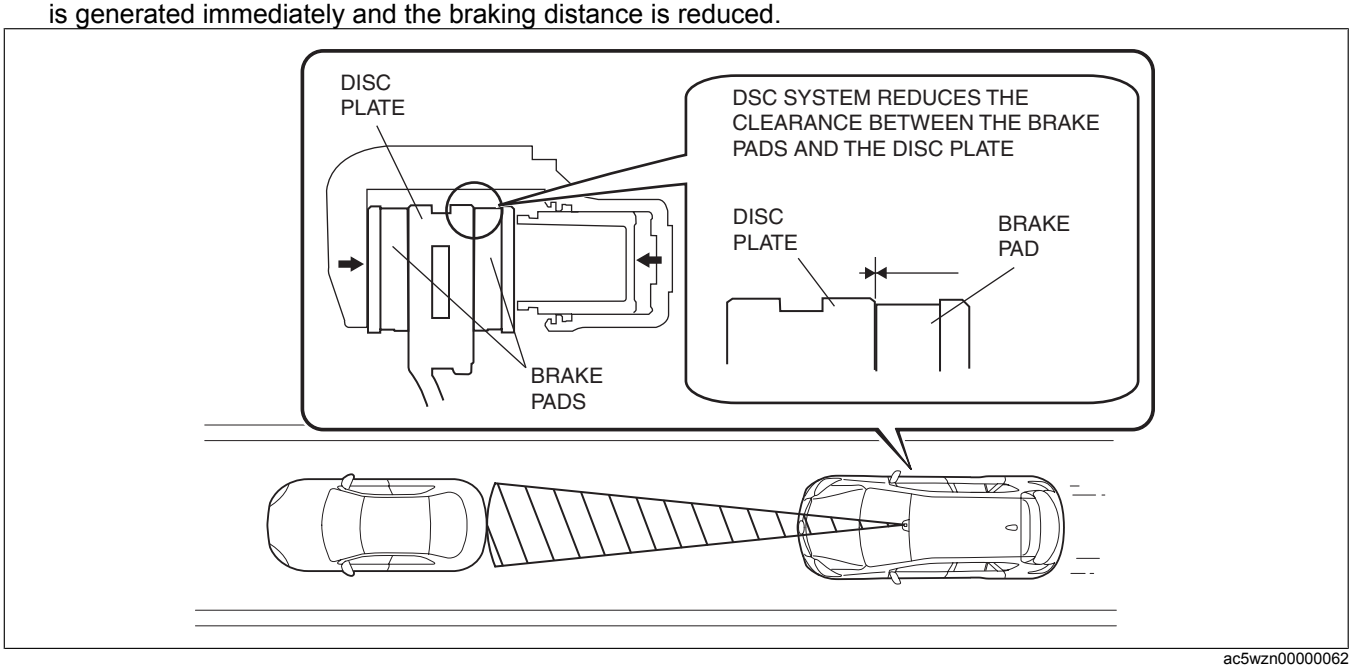
- When the laser sensor detects that the vehicle is approaching a vehicle ahead, it outputs a brake prefill request signal (1) to the DSC HU/CM.
- The DSC HU/CM operates the pump motor (2) to activate the pump so that the brake fluid pressure is lead to the caliper piston (3) and the brake pads are kept near the disc plate.
- As a result, if the driver realizes that he/she is approaching a vehicle ahead and depresses the brake pedal, or if the driver does not perform an avoidance maneuver and the automatic brakes are operated, the brake force is generated immediately and the braking distance is reduced.



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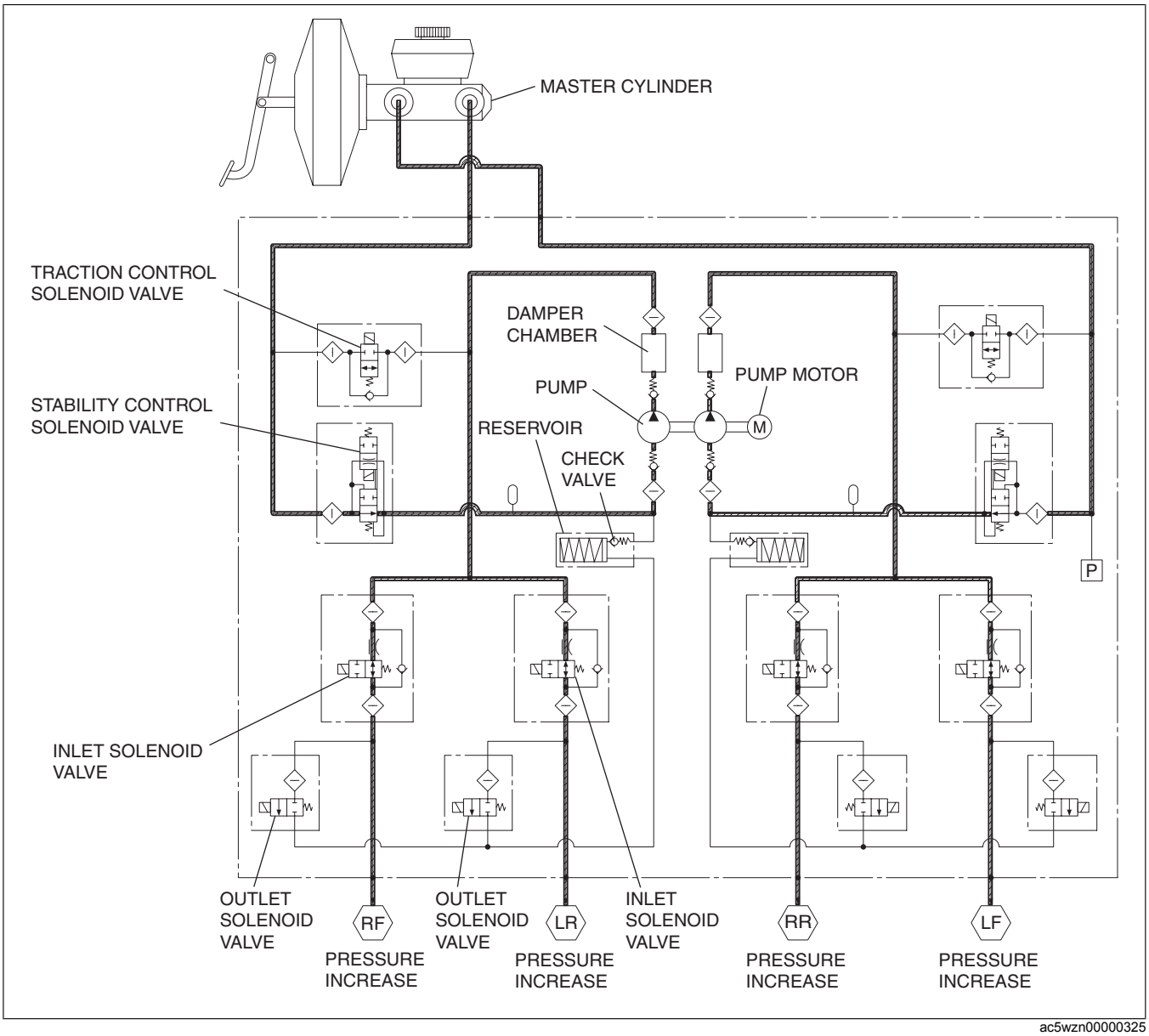
Brake control (SCBS brake) operation

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

Hydraulic circuit



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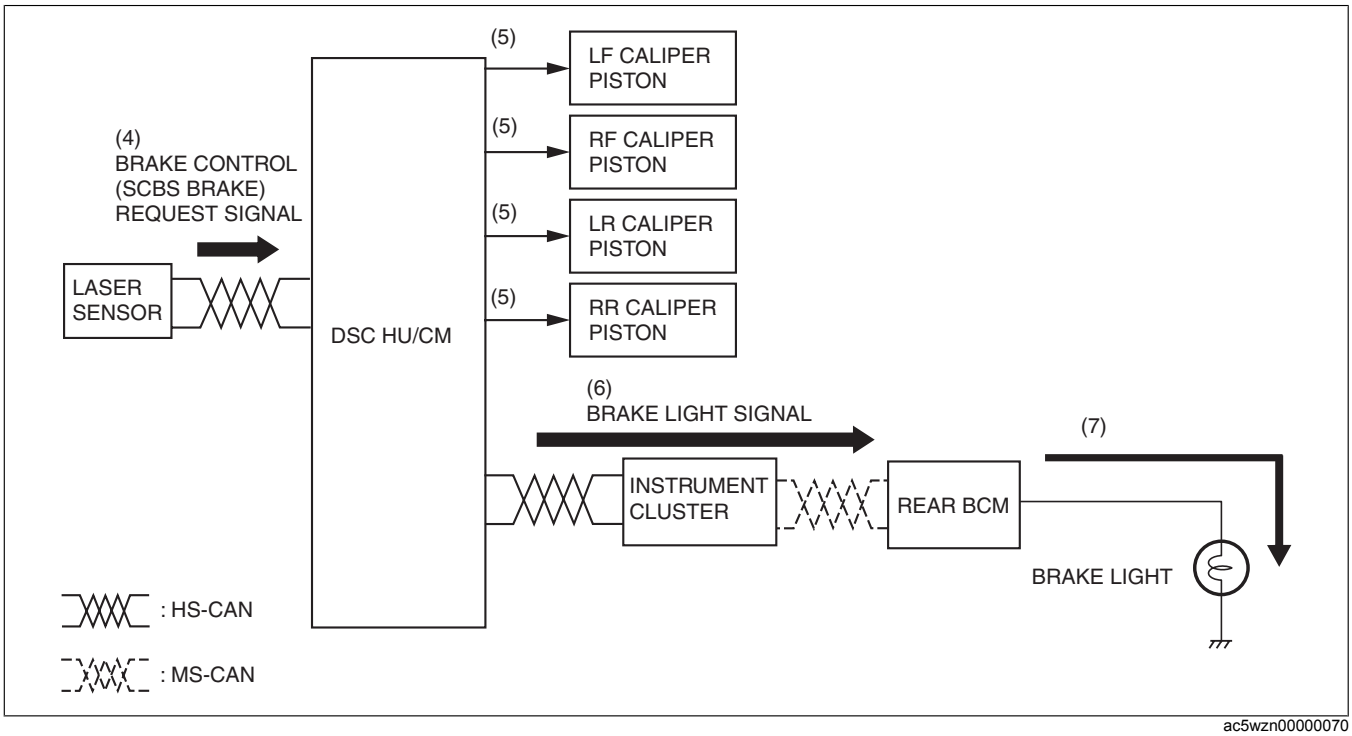
Block diagram



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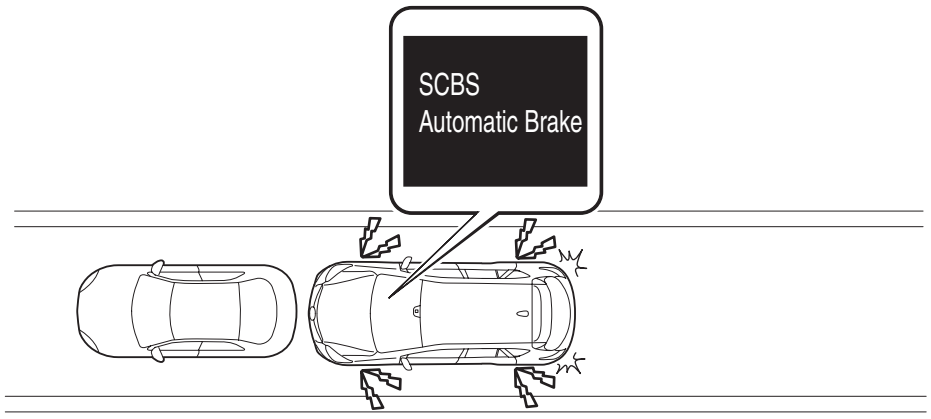
- After the brake prefill operates, if the driver does not perform an avoidance maneuver and the laser sensor determines that a collision may occur, it outputs a brake control (SCBS brake) request signal (4) to the DSC HU/CM.
- The DSC HU/CM energizes the traction control and the stability control solenoid valves to switch the hydraulic circuits and to increase the brake fluid pressure. Therefore the brake is operated automatically (5). At this time, the DSC HU/CM outputs a brake light signal to the rear body control module (RBCM) (6). While the brake control (SCR brake) is operating, turns on the brake lights automatically (7).
- When the Smart City Brake Support (SCBS) operates and the brakes are applied, the message “ SCBS Automatic Brake” is indicated in the TFT LCD display.
- The brake control (SCBS brake) is kept operated for 2 s. To keep the vehicle stopped after the brake control (SCBS brake) operation ends, the brake pedal has to be depressed to operate the brake.



BRAKE CONTROL (SCBS BRAKE) OPERATES AND TURNS ON THE BRAKE LIGHTS AUTOMATICALLY

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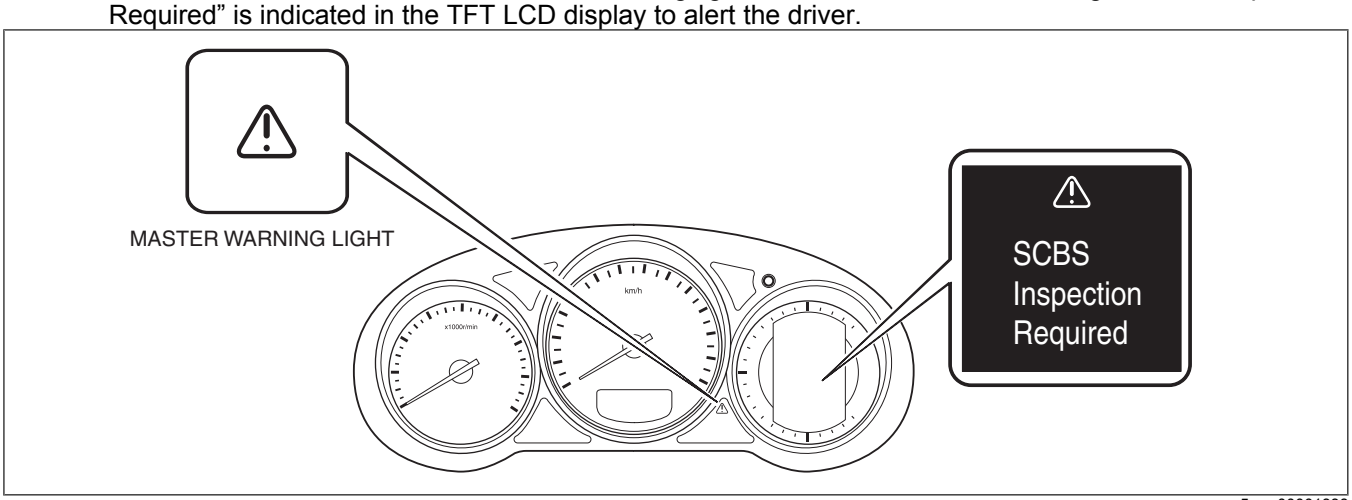
Caution

- **If the DSC system has a malfunction and the DSC control is inhibited, or if the TCS OFF switch is operated and the DSC control is disabled, the smart city brake support (SCBS) does not operate.**
- **When the laser sensor malfunction is determined as a result of the on-board diagnostic test, the smart city brake support (SCBS) is suspended while driving.**
- **When the DTC is stored in the PCM, DSC HU/CM, and/or instrument cluster, the smart city brake support (SCBS) is suspended depending on the malfunctioning situation.**
- **Under the following conditions, the smart city brake support (SCBS) system may not operate normally:**
  - **— Heavy luggage is loaded in the luggage compartment or on the rear seat.**
  - **— When there is the possibility of a partial contact with a vehicle or obstruction in front.**
  - **— When driving on continuously curving roads, entering and existing curves, driving on narrow roads due to construction and lane closures, and driving under erratic conditions in which there is a surrounding accident, vehicle breakdown or your position in the traffic lane changes.**
- **The detection ability of the laser sensor is limited. In the following cases, the smart city brake support (SCBS) may not operate:**
  - **— Exhaust gas from the vehicle in front, sand, snow, and water vapor rising from manholes and grating, and water splashed into the air.**
  - **— The vehicle in front of you is significantly dirty.**
  - **— 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.**
  - **— When the vehicle is accelerated rapidly and comes close to the vehicle in front.**
- **The smart city brake support (SCBS) may not operate with the following objects:**
  - **— Fences, glass.**
  - **— Trucks with low loading platforms, vehicles traveling at extremely low speeds, and high vehicles.**
  - **— A vehicle in front is significantly dirty.**
  - **— Vehicles with certain shapes such as a vehicle carrier.**

Note

- In the following cases, if the laser sensor detects an obstruction, the smart city brake support (SCBS) system may operate:
  - — There is an object in the road at the entrance to a curve.
  - — There is a vehicle passing in the opposite lane while making a curve.
  - — When crossing a narrow bridge.
  - — When passing through a low gate or a narrow gate.
  - — There is a metal object, bump, or a protruding object in the road.
  - — Suddenly come close to the vehicle in front.
  - — When passing through a toll gate.
  - — When passing under a vinyl curtain or flag.
  - — Two-wheeled vehicles.
  - — There are plastic objects such as pylons.
  - — There are pedestrians, animals, or standing trees.
- In case a malfunction occurs, the master warning light is illuminated and the message “SCBS Inspection Required” is indicated in the TFT LCD display to alert the driver.



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