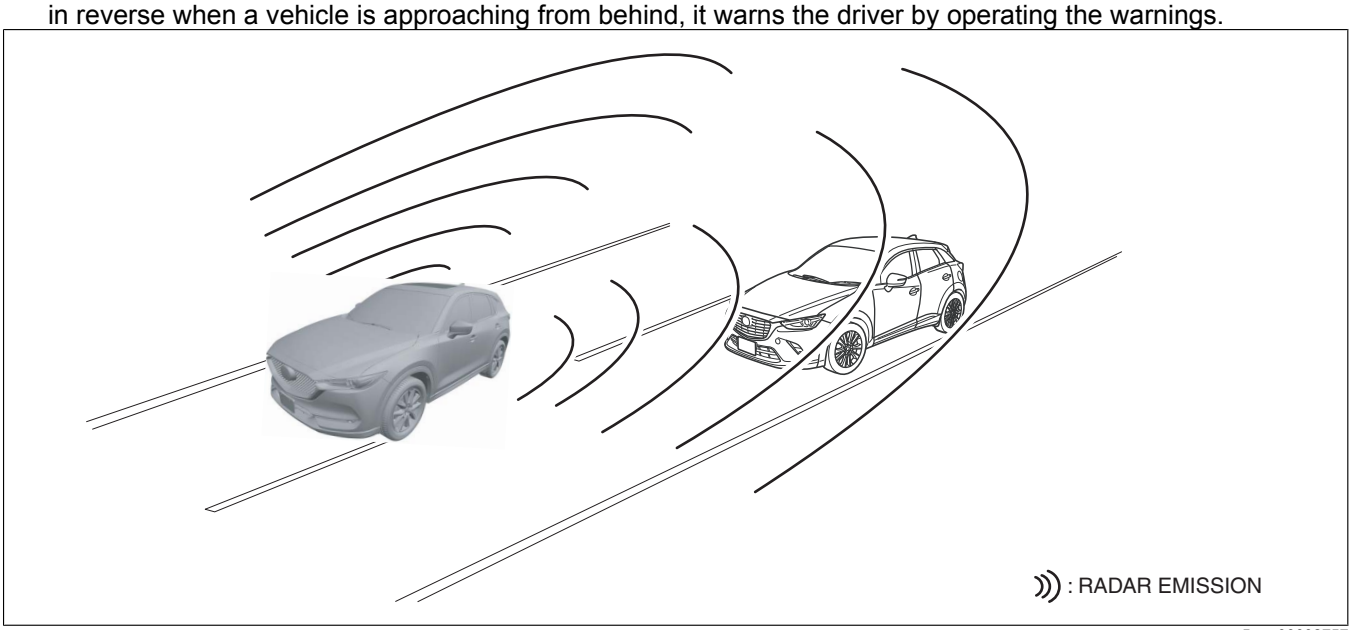
BLIND SPOT MONITORING (BSM) SYSTEM

id151000002800

Outline

- The blind spot monitoring (BSM) system detects vehicles approaching from behind using radar and alerts the driver of the presence of an approaching vehicle. In addition, if the turn switch is operated or the vehicle is driven in reverse when a vehicle is approaching from behind, it warns the driver by operating the warnings.



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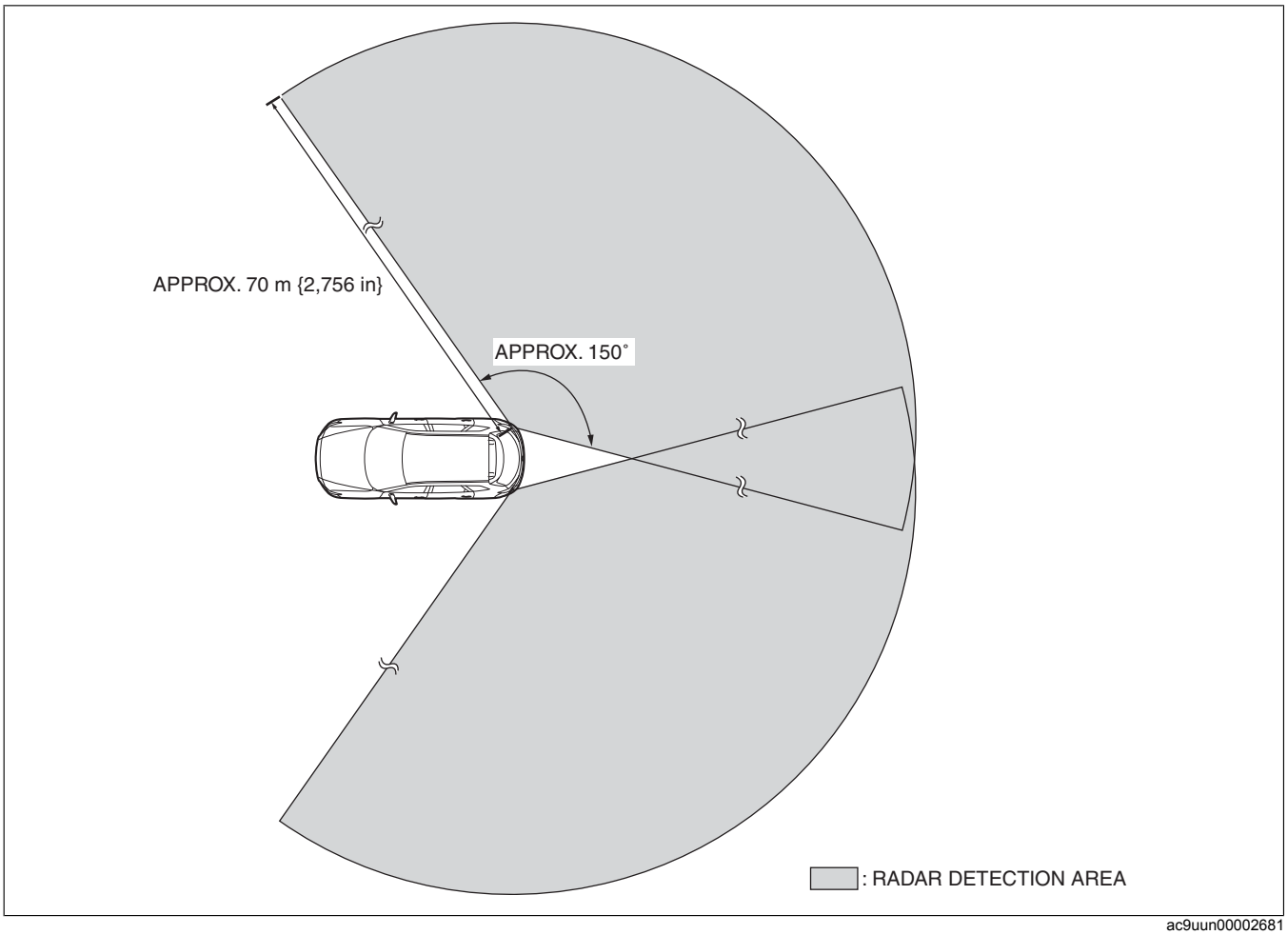
Functions

- The blind spot monitoring (BSM) system detects vehicles approaching from behind using the obstruction detection function of the blind spot monitoring (BSM) control module. For details on the obstruction detection function, refer to the [BLIND SPOT MONITORING (BSM) CONTROL MODULE]. (See BLIND SPOT MONITORING (BSM) CONTROL MODULE.)
- The blind spot monitoring (BSM) system has a blind spot monitoring (BSM) function, which warns the driver of a vehicle in the next lane when changing lanes, and a rear crossing traffic alert (RCTA) function, which warns the driver of approaching vehicles when reversing.

Blind spot monitoring (BSM) function

- When the vehicle speed is more than **10 km/h {6.2 mph}** (Australian specs.)/more than **30 km/h {19 mph}** (except Australian specs.), the blind spot monitoring (BSM) function launches and starts detecting approaching vehicles.



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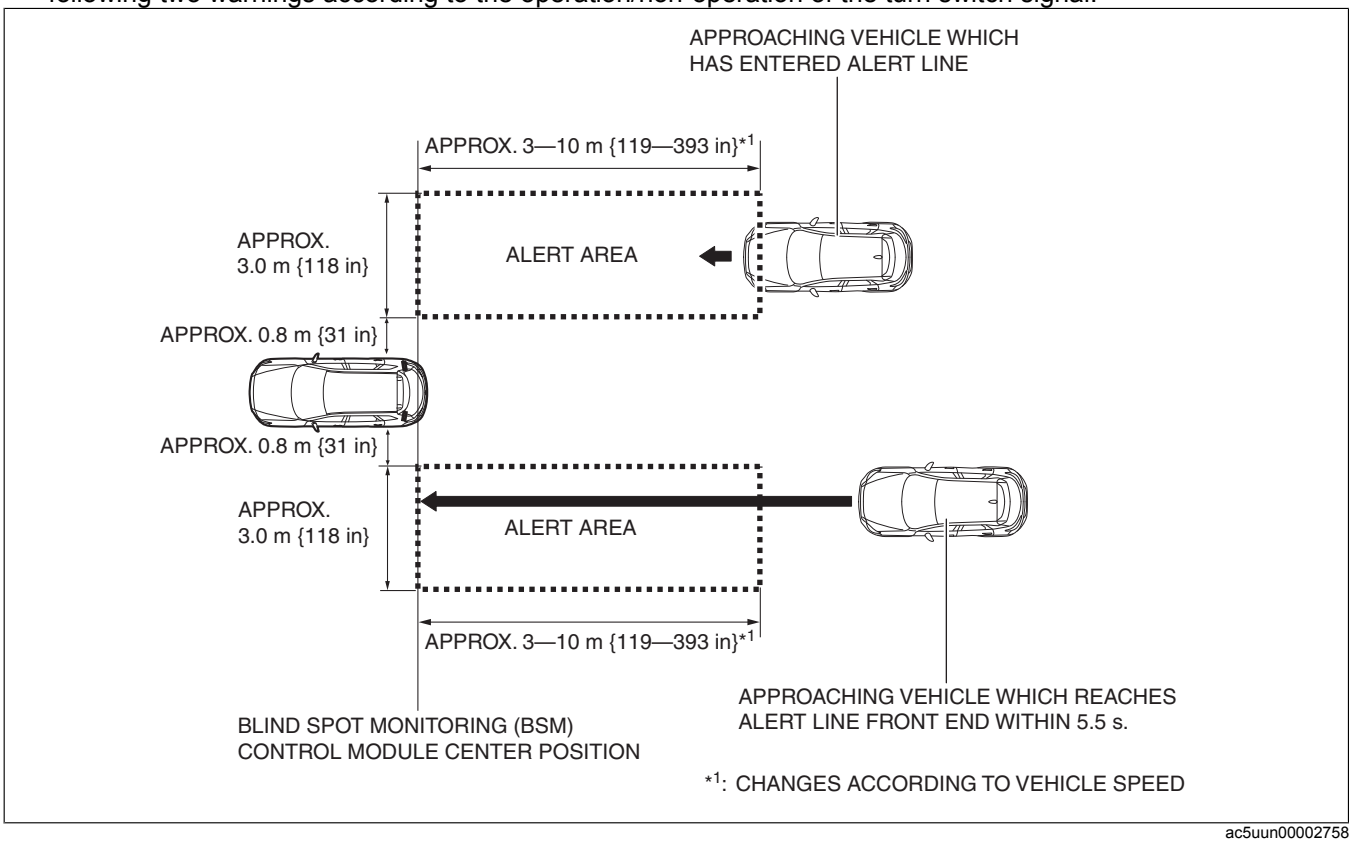
- If an approaching vehicle is detected and enters the alert area or if an approaching vehicle is detected which will reach the front end of the alert area **within 5.5 s**, the blind sport monitoring (BSM) control module operates the following two warnings according to the operation/non-operation of the turn switch signal.



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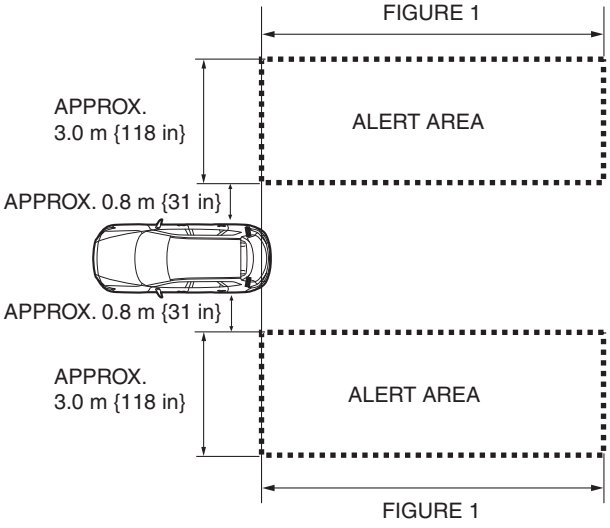
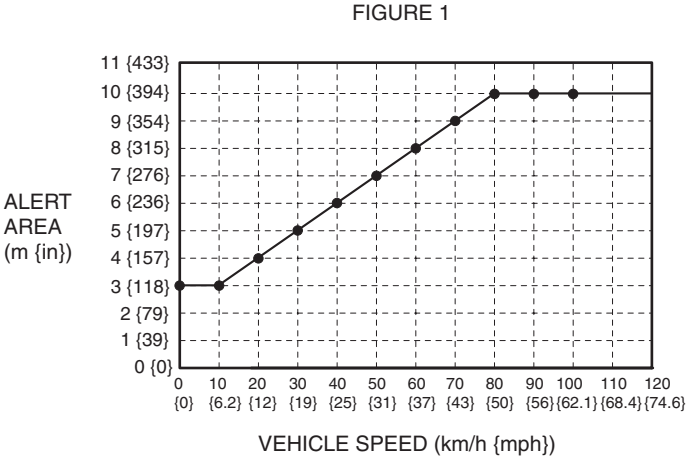
Note

- The blind spot monitoring (BSM) control module changes the alert area according to the vehicle speed.





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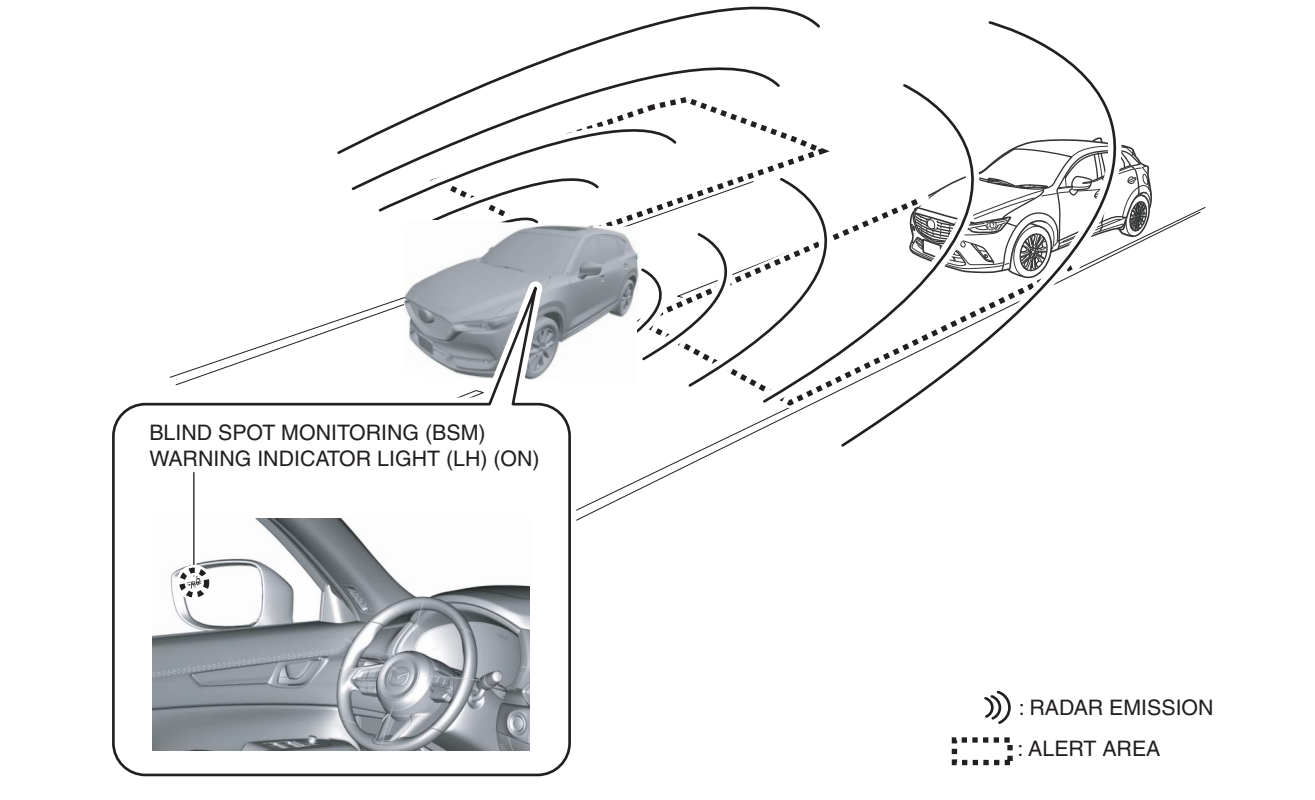
Warning 1

— If the blind spot monitoring (BSM) control module detects an approaching vehicle, it alerts the driver of the approaching vehicle by turning the blind spot monitoring (BSM) warning indicator light on.



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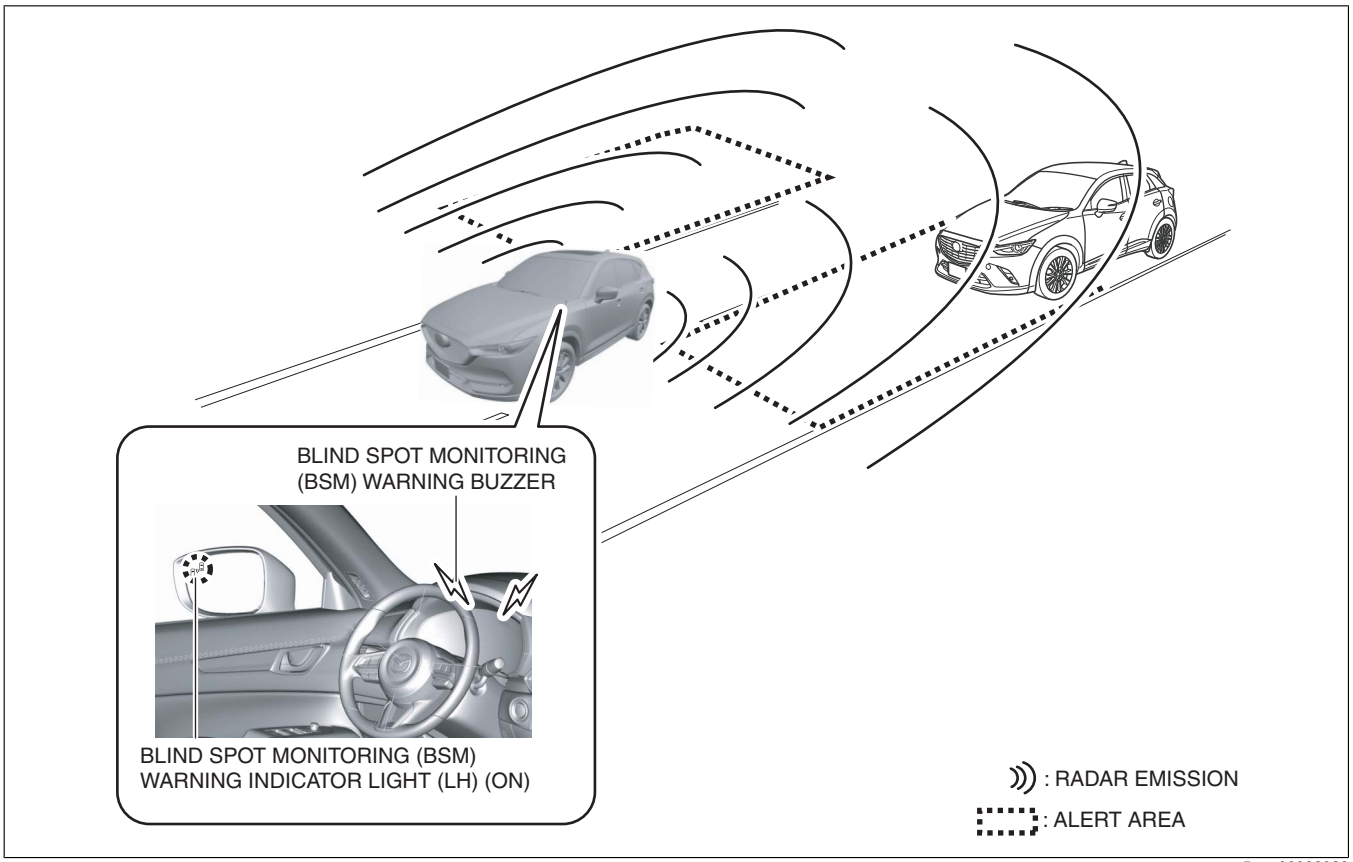
Warning 2

— If the blind spot monitoring (BSM) control module detects a turn switch signal on the side where an approaching vehicle exists while warning 1 is operated, it warns the driver by flashing the blind spot monitoring (BSM) warning indicator light and activating the blind spot monitoring (BSM) warning buzzer.



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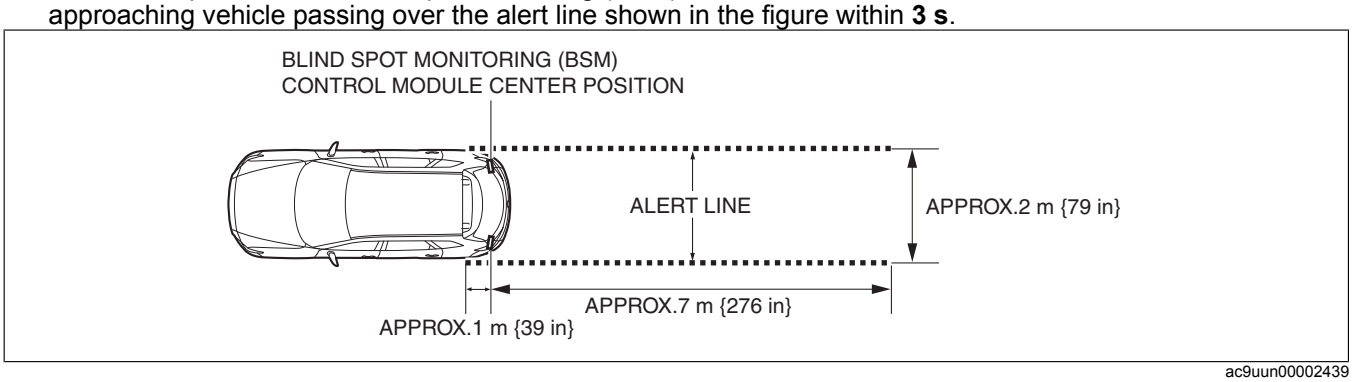
Rear cross traffic alert (RCTA) function

- The rear cross traffic alert (RCTA) function starts detecting approaching vehicles when the selector lever is in the reverse position. The blind spot monitoring (BSM) control module warns the driver when it detects an approaching vehicle passing over the alert line shown in the figure within **3 s**.



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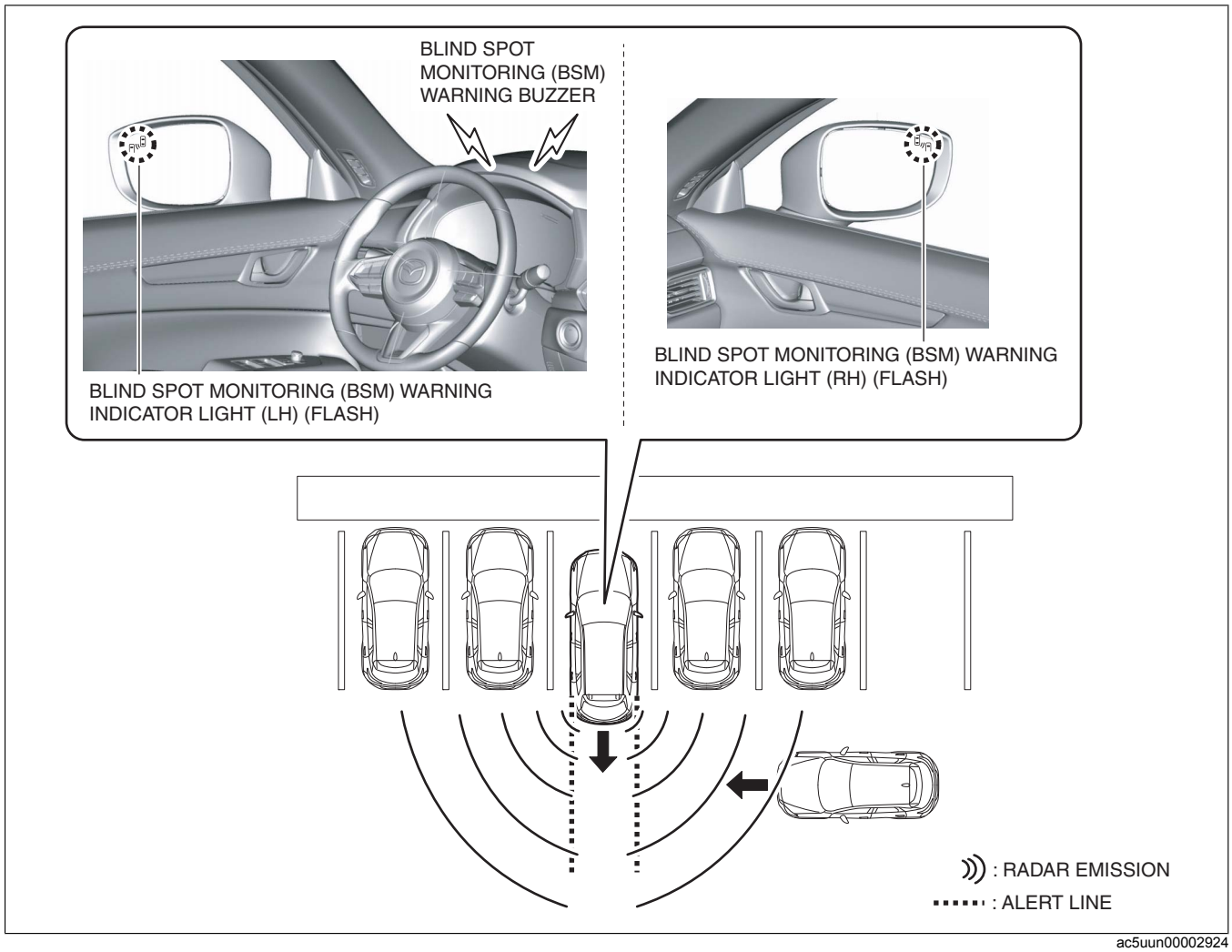
- When the blind spot monitoring (BSM) control module detects an approaching vehicle, it warns the driver by flashing the blind spot monitoring (BSM) warning indicator light and activating the blind spot monitoring (BSM) warning buzzer.



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System check function

- When the ignition is switched ON (engine off or on), the blind spot monitoring (BSM) control module checks the system conditions for **approx. 3 s**. The blind spot monitoring (BSM) control module turns on the blind spot monitoring (BSM) warning indicator light and the blind spot monitoring (BSM) warning light (without multi-information display) during the system check, and turns them off when the system check is finished. If a system malfunction is found, the blind spot monitoring (BSM) warning light remains turned on.

System conditions display function

- The blind spot monitoring (BSM) control module displays the system conditions using the warning light (without multi-information display), the warning indicator light, the warning buzzer, the active driving display (with active driving display), the multi-information display (with multi-information display) and the center display. For the warning display content on the center display, refer to the [CENTER DISPLAY]. (See CENTER DISPLAY [WITH CENTER DISPLAY].)

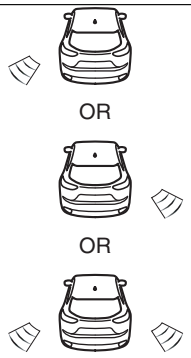
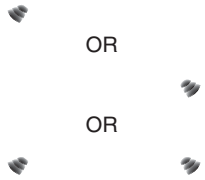
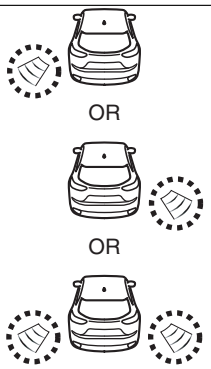
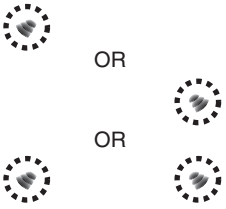
Blind spot monitoring (BSM) warning indicator light, blind spot monitoring (BSM) warning buzzer, center display

System condition	Blind spot monitoring (BSM) warning indicator light	Blind spot monitoring (BSM) warning buzzer	Center display
Right after ignition is switched ON (engine off or on) (System check)	On (**Approx. 3 s**)	Off	No display

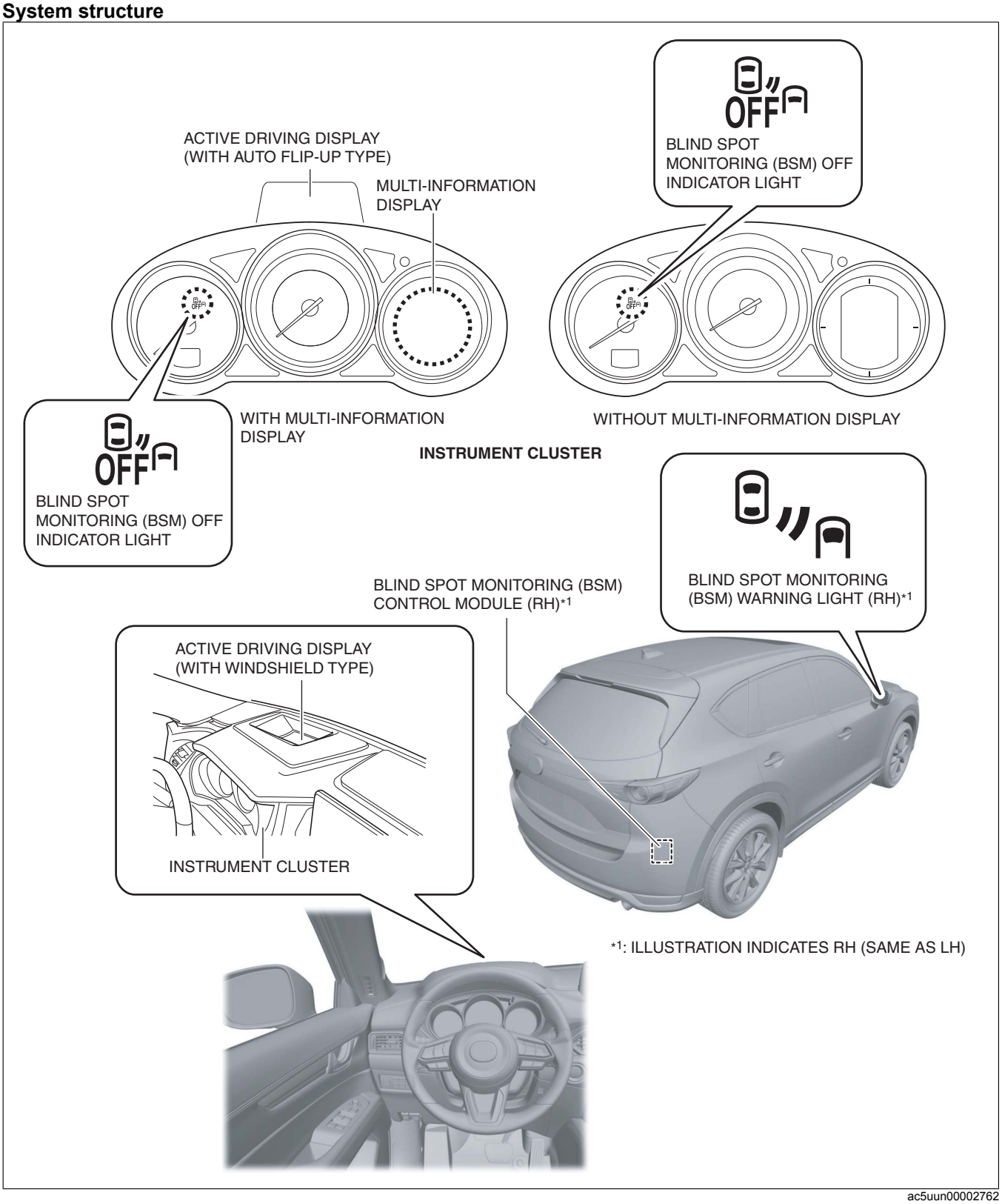
System condition		Blind spot monitoring (BSM) warning indicator light	Blind spot monitoring (BSM) warning buzzer	Center display
Driving at vehicle speed of more than **10 km/h {6.2 mph}** (Australian specs.)/ more than **30 km/h {19 mph}** (except Australian specs.)	No vehicle in alert area or vehicle speed decreased to **10 km/h {6.2 mph} or less (Australian specs.)/25 km/h {16 mph} or less (except Australian specs.)**	Off	Off	No display
	Detected approaching vehicle in alert area, or detected vehicle which will reach alert area front end **within 5.5 s**	On (Approaching vehicle detected side)	Off	No display
	Detected approaching vehicle in alert area, or detected turn switch signal and vehicle which will reach alert area front end **within 5.5 s**	Flash (Approaching vehicle detected side)	On	No display
Vehicle is driven in reverse	No approaching vehicle which will pass over alert line **within 3 s**	Off	Off	No display
	Detected vehicle which will pass over alert line **within 3 s**	Flash (Both sides)	On	With rear mount camera: Warning display
				Without rear mount camera: No display
Blind spot monitoring (BSM) system malfunction occurred		Off	Off	Warning display
Blind spot monitoring (BSM) control module front surface (rear bumper side) is blocked		Off	Off	Warning display
System stopped		Off	Off	No display

Blind spot monitoring (BSM) warning light (without multi-information display), multi-information display (with multi-information display), active driving display (with active driving display)

System condition	Blind spot monitoring (BSM) warning light (without multi-information display)	Multi-information display (with multi-information display)	Active driving display (with active driving display)
Right after ignition is switched ON (engine off or on) (System check)	On (**Approx. 3 s**)	No display	No display

System condition		Blind spot monitoring (BSM) warning light (without multi-information display)	Multi-information display (with multi-information display)	Active driving display (with active driving display)
Driving at vehicle speed of **more than 10 km/h {6.2 mph} (Australian specs.)/more than 30 km/h {19 mph} (except Australian specs.)**	No vehicle in alert area or vehicle speed decreased to **10 km/h {6.2 mph} or less (Australian specs.)/25 km/h {16 mph} or less (except Australian specs.)**	Off	No display	No display
	Detected approaching vehicle in alert area, or detected vehicle which will reach alert area front end **within 5.5 s**	Off	 OR OR OR	 OR OR
	Detected approaching vehicle in alert area, or detected turn switch signal and vehicle which will reach alert area front end **within 5.5 s**	Off	 OR OR OR :ILLUMINATED IN AMBER	 OR OR :ILLUMINATED IN AMBER
Vehicle is driven in reverse	No approaching vehicle which will pass over alert line **within 3 s**	Off	No display	No display
	Detected vehicle which will pass over alert line **within 3 s**	Off	No display	No display
Blind spot monitoring (BSM) system malfunction occurred		On	**Blind Spot Monitoring Sensor(s) Malfunction**	No display
Blind spot monitoring (BSM) control module front surface (rear bumper side) is blocked		On	**Blind Spot Monitoring Sensor(s) Blocked**	No display
System stopped		Off	No display	No display

Structure/Construction
System structure



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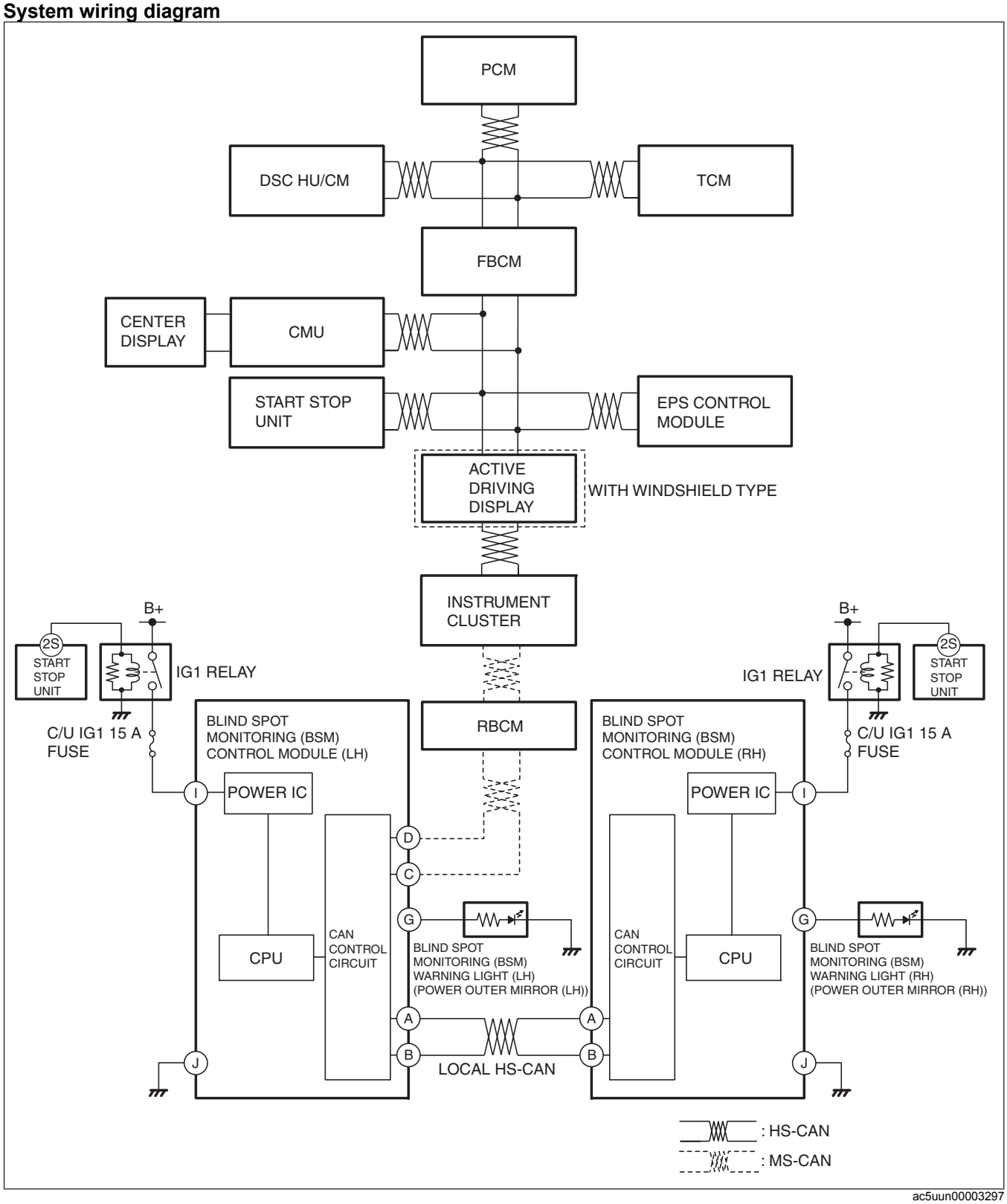
System wiring diagram



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Operation

Warning

- **The blind spot monitoring (BSM) system assists the driver in confirming the area behind the vehicle when changing lanes or backing up. Because of the various restrictions in the system operations, a warning may not occur or it may be delayed even if there is a vehicle in an adjacent lane or at the vehicle rear. Do not rely completely on the system and always take responsibility as the driver in confirming the area behind the vehicle.**

Caution

- **The vehicle detection performance of the blind spot monitoring (BSM) system has limitations. Under the following conditions, the detection performance of the approaching vehicle may be lowered and the system may not operate normally.**
  - **— A part of the rear bumper near the blind spot monitoring (BSM) control module is deformed.**
  - **— The blind spot monitoring (BSM) control module installation position is largely deviated.**
  - **— Ice, snow or dirt is adhering to a part of the rear bumper near the blind spot monitoring (BSM) control module.**
  - **— The vehicle is driven in rain, snow, or fog.**
  - **— The temperature near the blind spot monitoring (BSM) control module is excessively high such as when climbing an uphill road for a long period on a hot day.**
  - **— The battery voltage is low**
  - **— The vehicle is driven on a steep road.**
  - **— The turning radius is small such as when making a sharp turn or turning at an intersection.**
  - **— The height of the driving lane and the adjacent lane are different.**
- **When towing a trailer or if something is equipped to the rear part of the vehicle such as a bicycle carrier, the radar may be interrupted and the system may not operate normally. When towing a trailer, or if something is equipped to the rear part of the vehicle such as a bicycle carrier, do not use the blind spot monitoring (BSM) system.**
- **The warning may not be activated or delayed for the following vehicles:**
  - **— Vehicles which are traveling at nearly the same speed as the detecting vehicle for long periods**
  - **— Vehicles in an adjacent lane where the detecting vehicle is trying to pass**
  - **— Vehicles in an excessively wide adjacent lane**
  - **— Vehicles changing lanes from a distant lane to an adjacent lane**
  - **— Vehicles with low body height such as sports cars, or vehicles with body shapes from which radar may not be reflected such as unloaded trailers**
  - **— Small motorbikes or bicycles**
- **The blind spot monitoring (BSM) system may trigger the warning accidentally for the following objects:**
  - **— Vehicles in a distant lane if the lane width is excessively narrow**
  - **— Objects on a road or road shoulder (such as guard rail, tunnel wall, street lights, and roadside trees)**

Blind spot monitoring (BSM) operation

- When all of the following conditions are met, the blind spot monitoring (BSM) function goes on stand-by.
  Preconditions
  - — Blind spot monitoring (BSM) system is on (system is operating)
  - — Blind spot monitoring (BSM) system is normal
  - — Vehicle speed signal of more than 10 km/h {6.2 mph} (Australian specs.)/more than 30 km/h {19 mph} (except Australian specs.) is received
- The warning is activated when any of the following conditions is met.
  Operation condition
  Warning 1
  - — The approaching vehicle being detected enters the alert area.
  - — An approaching vehicle is detected which will reach the alert area front end **within 5.5 s**.

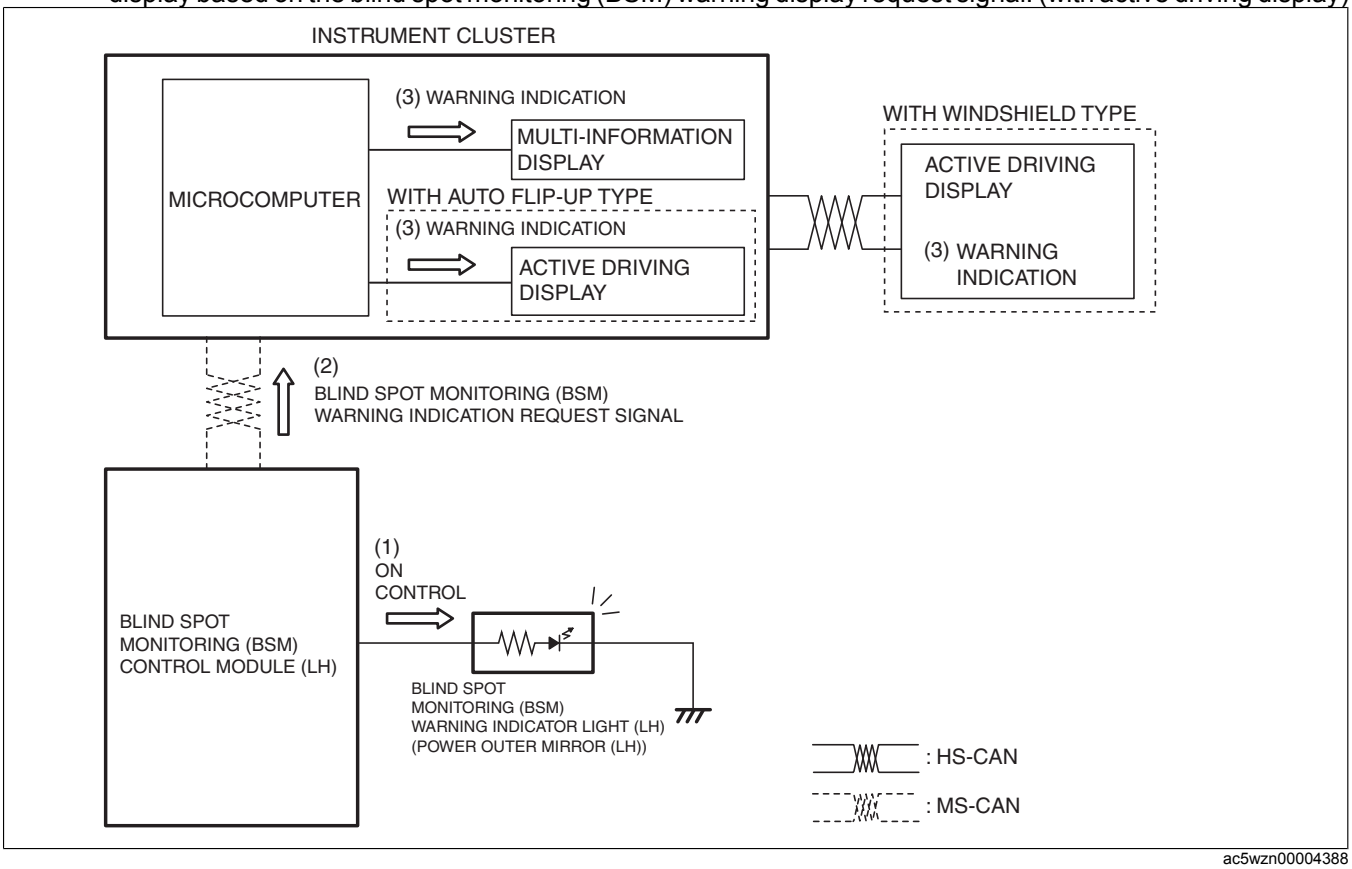
  Warning 2
  - — With the warning 1 conditions met, a turn switch signal is received on the side the approaching vehicle is detected.
- The blind spot monitoring (BSM) function stops when any of the following conditions is met.
  Stop conditions
  - — Blind spot monitoring (BSM) system is off (system is stopped)
  - — Blind spot monitoring (BSM) system has a malfunction
  - — Vehicle speed signal of **10 km/h {6.2 mph} or less (Australian specs.)/25 km/h {16 mph} or less (except Australian specs.)**

— Warning 1

If a vehicle is approaching on the left side

1. When the preconditions are met, the blind spot monitoring (BSM) control module emits radar and starts detecting approaching vehicles.
2. When the operation condition is met, the blind spot monitoring (BSM) control module (LH) controls the following.
   - — Turns the blind spot monitoring (BSM) warning indicator light (LH) on (1)
   - — Sends (2) a blind spot monitoring (BSM) warning indication request signal to the instrument cluster. (with active driving display)

3. The instrument cluster displays the warning indication (3) in the active driving display and multi-information display based on the blind spot monitoring (BSM) warning display request signal. (with active driving display)



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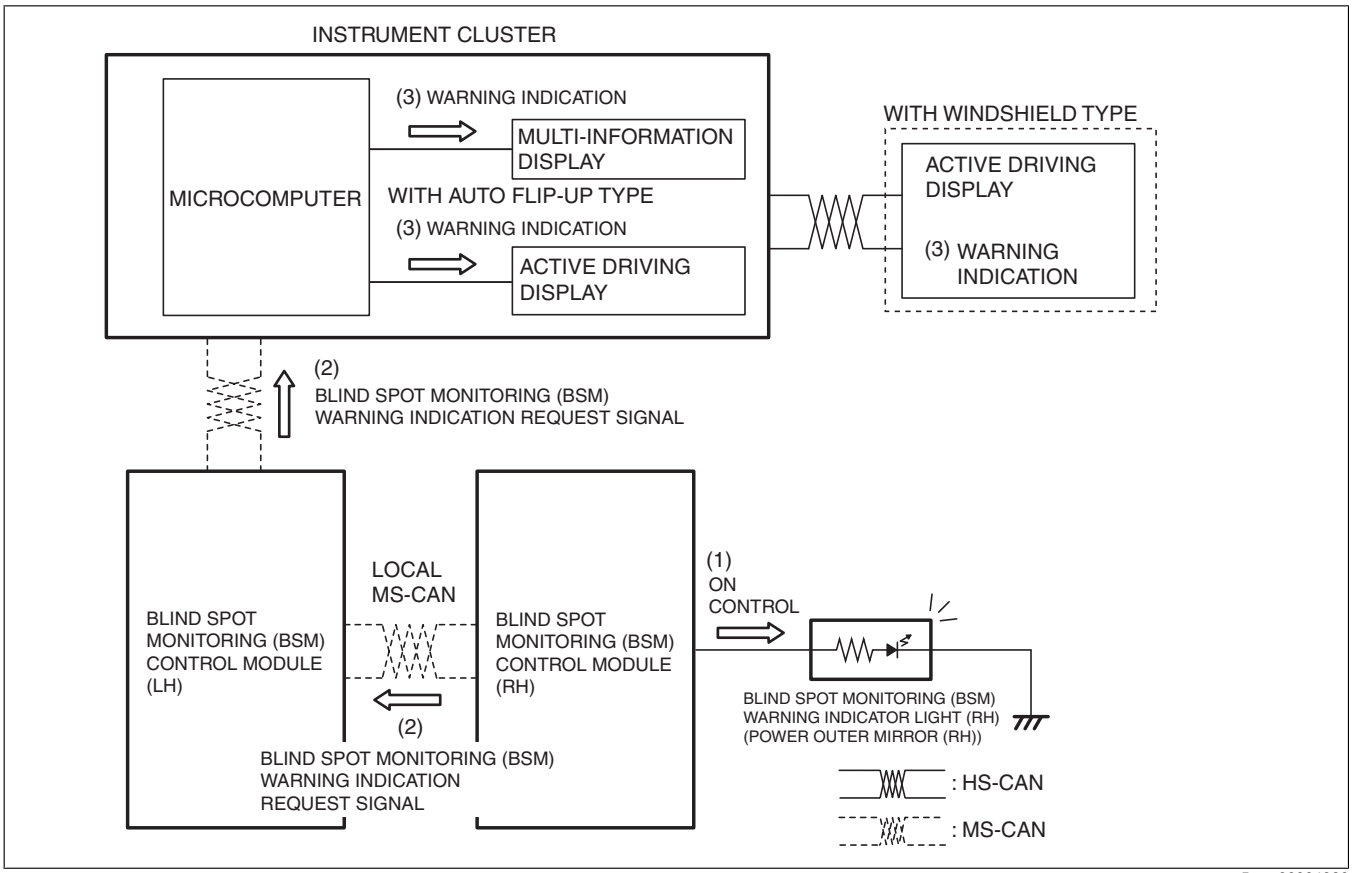
If a vehicle is approaching on the right side

1. When the preconditions are met, the blind spot monitoring (BSM) control module emits radar and starts detecting approaching vehicles.
2. When the operation condition is met, the blind spot monitoring (BSM) control module (RH) controls the following.
   - — Turns the blind spot monitoring (BSM) warning indicator light (RH) on (1)
   - — Sends (2) a blind spot monitoring (BSM) warning indication request signal to the instrument cluster via the blind spot monitoring (BSM) control module (LH). (with active driving display)
3. The instrument cluster displays the warning indication (3) in the active driving display and multi-information display based on the blind spot monitoring (BSM) warning display request signal. (with active driving display).



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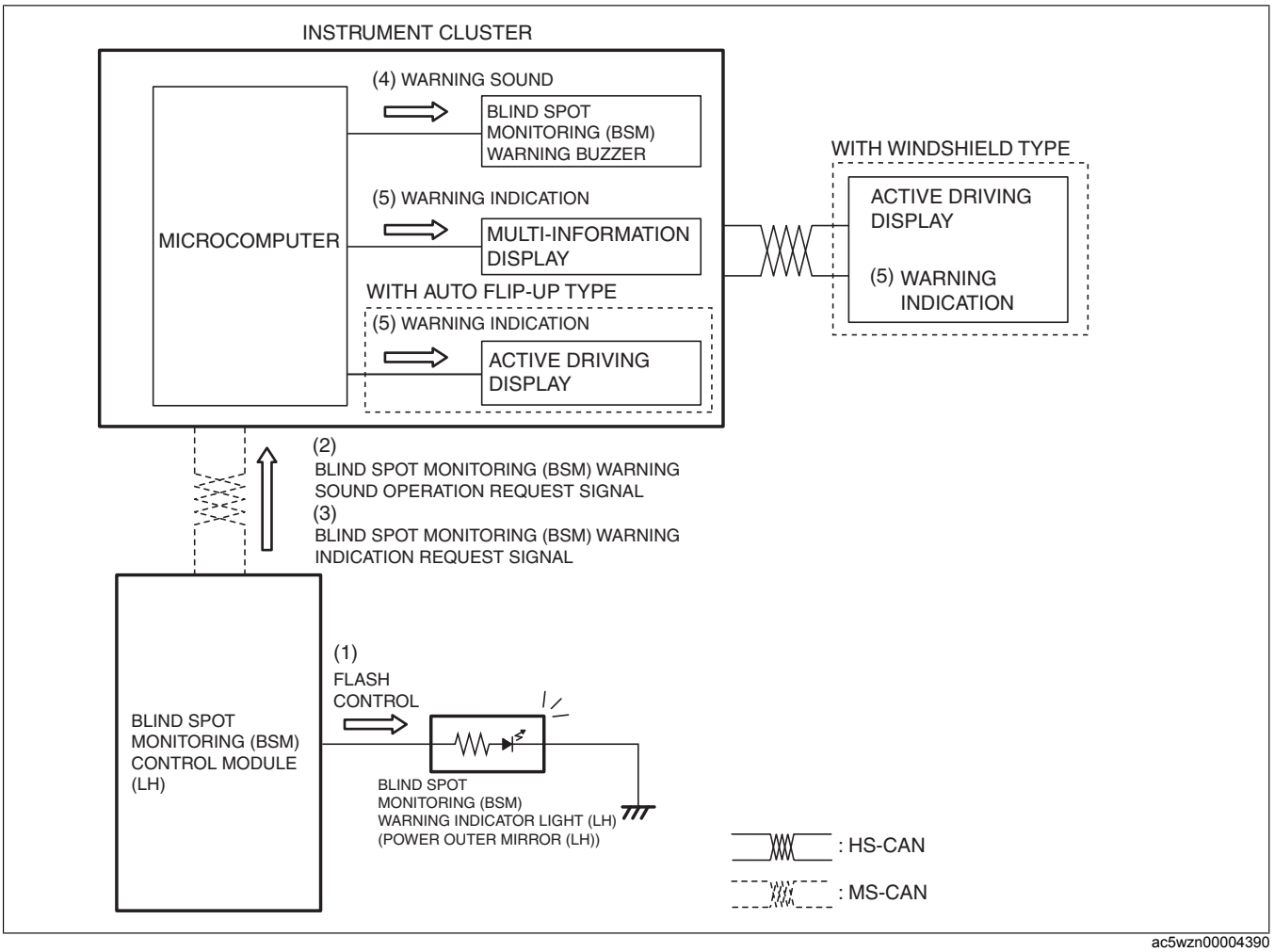
— Warning 2

If a vehicle is approaching on the left side

1. When the operation condition is met, the blind spot monitoring (BSM) control module (LH) controls the following.
   — Flashes (1) the blind spot monitoring (BSM) warning indicator light (LH).
   — Sends (2) a blind spot monitoring (BSM) warning sound operation request signal to the instrument cluster.
   — Sends (3) a blind spot monitoring (BSM) warning indication request signal to the instrument cluster. (with active driving display)
2. Based on the blind spot monitoring (BSM) warning sound operation request signal, the instrument cluster activates (4) the blind spot monitoring (BSM) warning sound.
3. The instrument cluster displays the warning indication (5) in the active driving display and multi-information display based on the blind spot monitoring (BSM) warning display request signal. (with active driving display)



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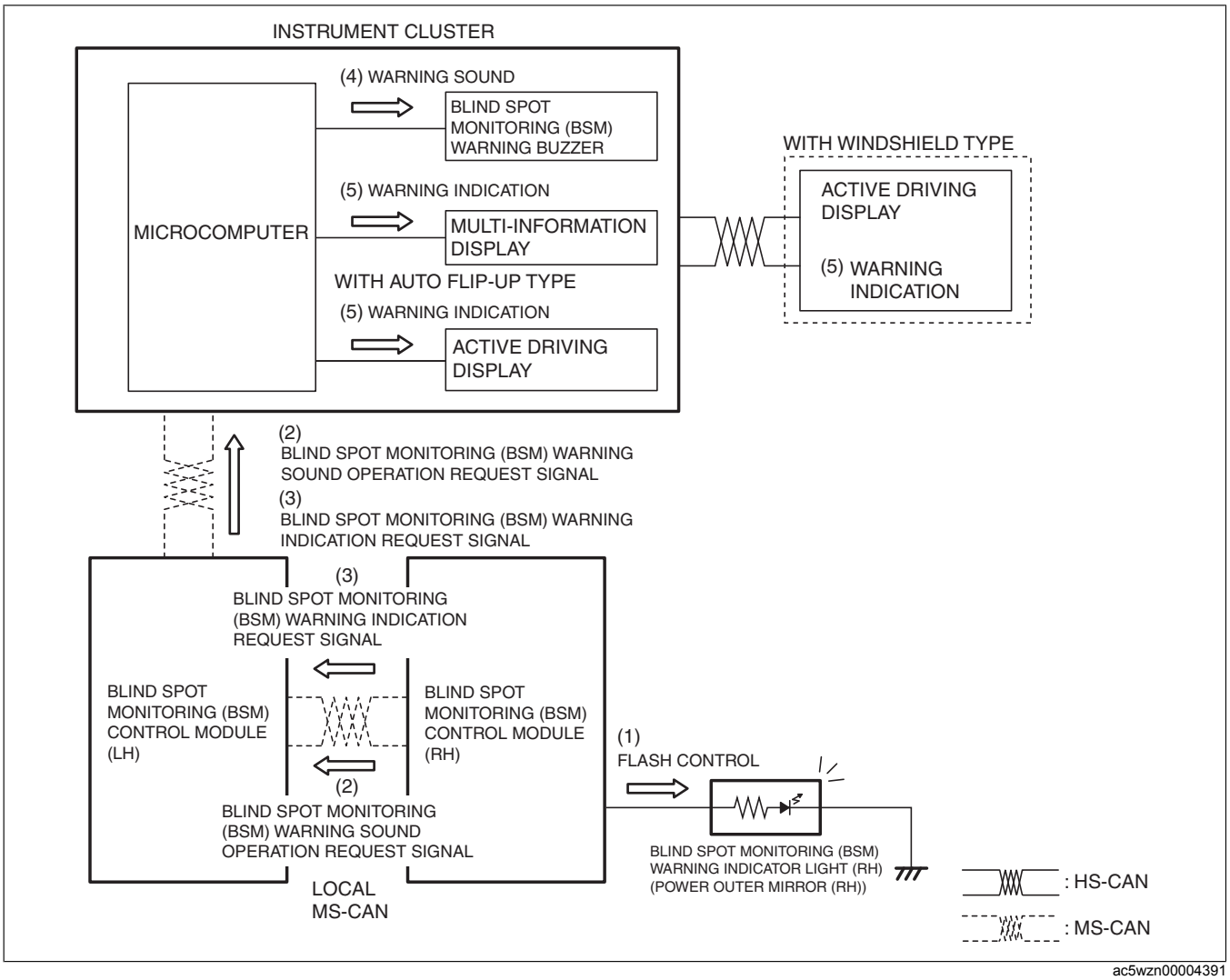
If a vehicle is approaching on the right side

1. When the operation condition is met, the blind spot monitoring (BSM) control module (RH) controls the following.
   - — Flashes (1) the blind spot monitoring (BSM) warning indicator light (RH).
   - — Sends (2) a blind spot monitoring (BSM) warning sound operation request signal to the instrument cluster via the blind spot monitoring (BSM) control module (LH).
   - — Sends (3) a blind spot monitoring (BSM) warning indication request signal to the instrument cluster via the blind spot monitoring (BSM) control module (LH). (with active driving display)
2. Based on the blind spot monitoring (BSM) warning sound operation request signal, the instrument cluster activates (4) the blind spot monitoring (BSM) warning sound.
3. The instrument cluster displays the warning indication (5) in the active driving display and multi-information display based on the blind spot monitoring (BSM) warning display request signal. (with active driving display)



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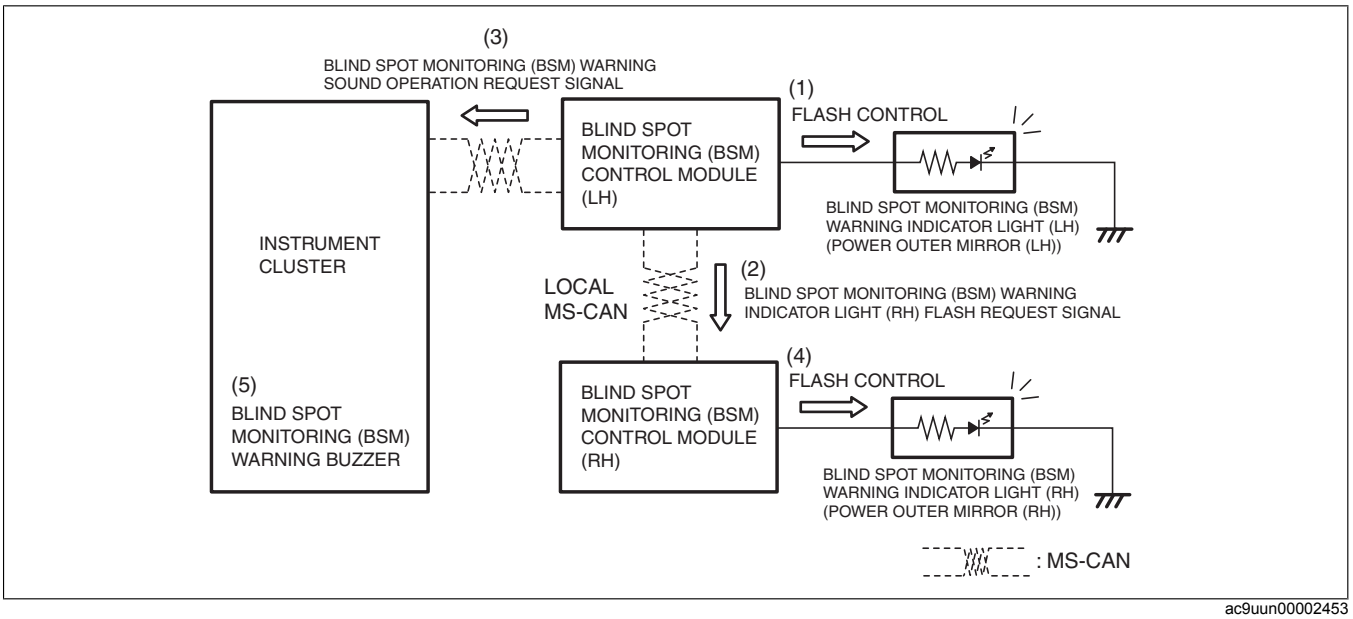
Rear cross traffic alert (RCTA) operation

- When all of the following conditions are met, the rear cross traffic alert (RCTA) function goes on stand-by.
  Preconditions
  — Blind spot monitoring (BSM) system is on (system is operating)
  — Blind spot monitoring (BSM) system is normal
  — Selector lever R position signal is received
- The warning is activated if the following condition is met.
  Operation condition
  — An approaching vehicle is detected which will pass over the alert line within **3 s**.
- If any of the following conditions is met, the rear cross traffic alert (RCTA) function stops.
  Stop conditions
  — Blind spot monitoring (BSM) system is off (system is stopped)
  — Blind spot monitoring (BSM) system has a malfunction
  — Selector lever R position signal is not received

If an approaching vehicle is on the left side

1. When the preconditions are met, the blind spot monitoring (BSM) control module emits radar and starts detecting approaching vehicles.
2. When the operation condition is met, the blind spot monitoring (BSM) control module (LH) controls the following.
   — Flashes (1) the blind spot monitoring (BSM) warning indicator light (LH).
   — Sends (2) a blind spot monitoring (BSM) warning indicator light (RH) flash request signal to the blind spot monitoring (BSM) control module (RH).
   — Sends (3) a blind spot monitoring (BSM) warning sound operation request signal to the instrument cluster.
3. Based on the blind spot monitoring (BSM) warning indicator light (RH) flash request signal, the blind spot monitoring (BSM) control module (RH) flashes (4) the blind spot monitoring (BSM) warning indicator light (RH).
4. Based on the blind spot monitoring (BSM) warning sound operation request signal, the instrument cluster activates the blind spot monitoring (BSM) warning buzzer (5).



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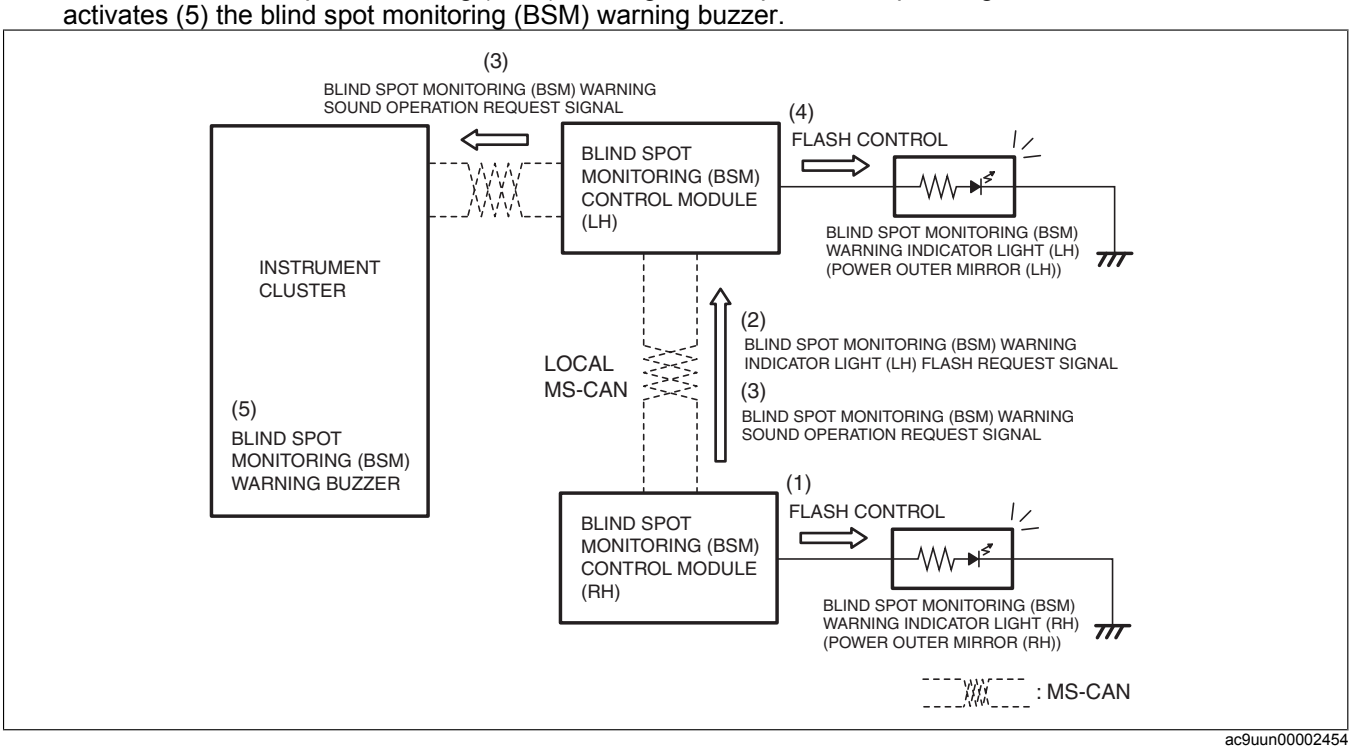
If an approaching vehicle is on the right side

1. When the preconditions are met, the blind spot monitoring (BSM) control module emits radar and starts detecting approaching vehicles.
2. When the operation condition is met, the blind spot monitoring (BSM) control module (RH) controls the following.
   — Flashes (1) the blind spot monitoring (BSM) warning indicator lights (RH).
   — Sends (2) a blind spot monitoring (BSM) warning indicator light (LH) flash request signal to the blind spot monitoring (BSM) control module (LH).
   — Sends (3) a blind spot monitoring (BSM) warning sound operation request signal to the instrument cluster via the blind spot monitoring (BSM) control module (LH).
3. Based on the blind spot monitoring (BSM) warning indicator light (LH) flash request signal, the blind spot monitoring (BSM) control module (LH) flashes (4) the blind spot monitoring (BSM) warning indicator light (LH).
4. Based on the blind spot monitoring (BSM) warning sound operation request signal, the instrument cluster activates (5) the blind spot monitoring (BSM) warning buzzer.



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