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## MAZDA RADAR CRUISE CONTROL WITH STOP & GO FUNCTION (MRCC WITH STOP & GO FUNCTION)

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### Outline

- The Mazda Radar Cruise Control with Stop & Go function (MRCC with Stop & Go function) uses a radar unit to detect a vehicle ahead, and performs headway control to maintain a constant distance from a vehicle ahead without the driver having to depress the accelerator or brake pedal. In addition, the detecting vehicle stops when the vehicle ahead stops, and headway control resumes by operating the RES switch/accelerator pedal after the vehicle ahead moves again. This reduces the strain of operating the vehicle such as during long-distance driving, driving at high speeds, and while in heavy traffic. If the detecting vehicle approaches the vehicle ahead too closely such as when the vehicle ahead is braking suddenly, the system alerts the driver using a warning sound and warning indication.

### Warning

- **Do not rely completely on the Mazda Radar Cruise Control with Stop & Go function (MRCC with Stop & Go function) and always drive carefully. There are limitations for the Mazda Radar Cruise Control with Stop & Go function (MRCC with Stop & Go function) to control the distance between the vehicles, and if the accelerator pedal or brake pedal is mistakenly operated it could result in an accident. Always keep a safe distance from the vehicle ahead by depressing the brake pedal if necessary while verifying the safety of the surrounding area.**
- **The Mazda Radar Cruise Control with Stop & Go function (MRCC with Stop & Go function) performs brake control, however, there are limitations to the deceleration, and the system may be unable to decelerate sufficiently if the vehicle ahead applies the brakes suddenly or another vehicle cuts into the driving lane, which could result in an accident. Always keep a safe distance from the vehicle ahead by depressing the brake pedal if necessary while verifying the safety of the surrounding area.**

### Functions

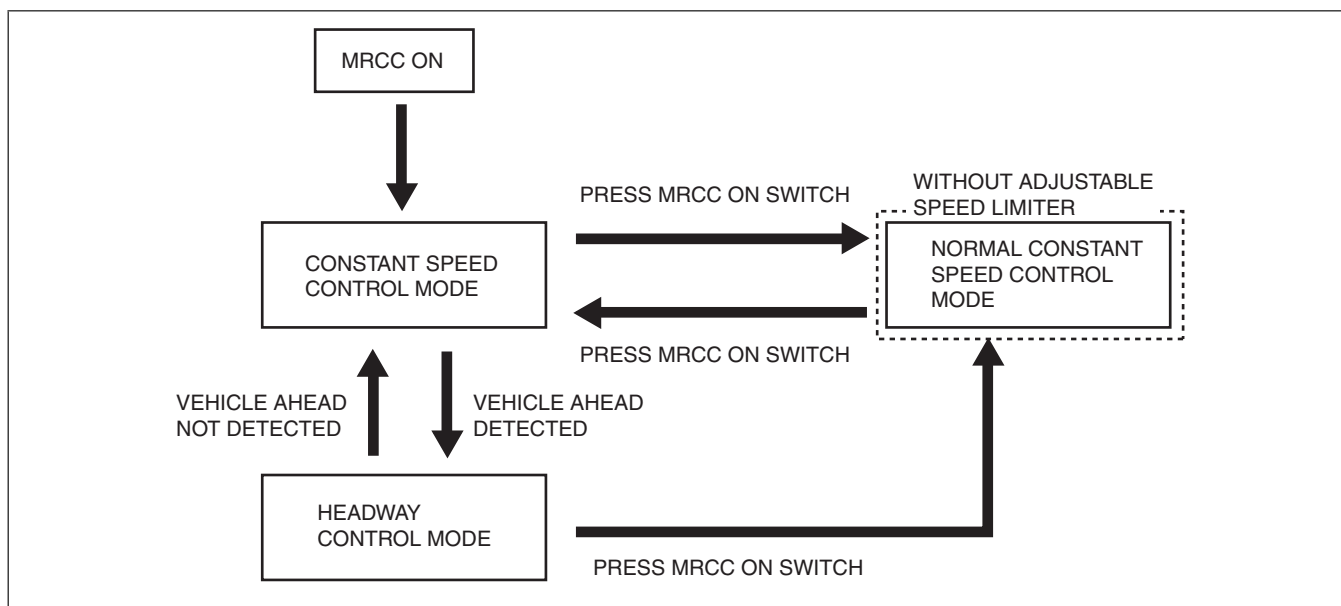
- The Mazda Radar Cruise Control with Stop & Go function (MRCC with Stop & Go function) has the following modes.
  - Continuous constant speed control mode: Drives the vehicle at the set vehicle speed set by the driver based on the cruise control switch operation signal.
  - Constant speed control mode: Drives the vehicle at the set vehicle speed set by the driver based on the cruise control switch operation signal. In addition, the system switches to headway control mode when a vehicle ahead is detected.
  - Headway control mode: When a vehicle ahead is detected while the vehicle is traveling in constant speed control mode, headway control with the vehicle ahead is performed while maintaining the set vehicle speed set by the driver and a constant distance between the vehicles. In addition, the detecting vehicle stops when the vehicle ahead stops, and headway control mode/constant speed control mode resumes by operating the RES switch/accelerator pedal after the vehicle ahead moves again.

### Mode switching function

- The Mazda Radar Cruise Control with Stop & Go function (MRCC with Stop & Go function) can be switched as follows.

### Note

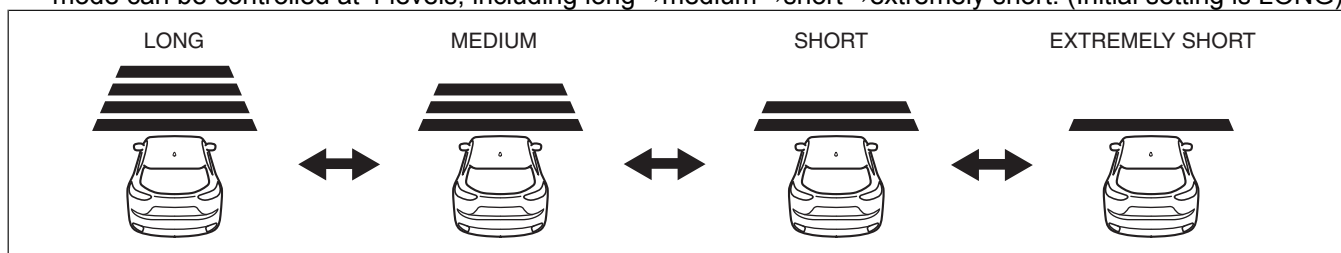
- When switching from constant speed control mode/headway control mode to continuous constant speed control mode, the set vehicle speed must be reset.



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### Distance between vehicles setting function

- Using the DISTANCE switch on the cruise control switch, the distance between vehicles during headway control mode can be controlled at 4 levels, including long→medium→short→extremely short. (Initial setting is LONG)



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### Caution

- The distances between vehicles indicated below are average values during travel on flat roads and differ depending on the driving and road conditions.

### Distance between vehicles table (reference)

Set distance between vehicles	Detecting vehicle speed											
	0 km/h {0 mph}	10 km/h {6.2 mph}	20 km/h {12 mph}	30 km/h {19 mph}	40 km/h {25 mph}	50 km/h {31 mph}	60 km/h {37 mph}	70 km/h {43 mph}	80 km/h {50 mph}	90 km/h {56 mph}	100 km/h {62 mph}	110 km/h {68 mph}
Long	4 m {13 ft}	10 m {32 ft}	17 m {56 ft}	23 m {75 ft}	29 m {95 ft}	36 m {118 ft}	42 m {138 ft}	48 m {157 ft}	55 m {180 ft}	61 m {200 ft}	67 m {220 ft}	74 m {243 ft}
Medium	4 m {13 ft}	10 m {32 ft}	15 m {49 ft}	19 m {62 ft}	24 m {79 ft}	29 m {95 ft}	34 m {112 ft}	39 m {128 ft}	44 m {144 ft}	49 m {161 ft}	53 m {174 ft}	58 m {190 ft}
Short	4 m {13 ft}	10 m {32 ft}	13 m {43 ft}	16 m {52 ft}	19 m {62 ft}	22 m {72 ft}	25 m {82 ft}	29 m {95 ft}	32 m {105 ft}	36 m {118 ft}	40 m {131 ft}	43 m {141 ft}
Extremely short	4 m {13 ft}	10 m {32 ft}	12 m {39 ft}	13 m {43 ft}	15 m {49 ft}	17 m {56 ft}	20 m {66 ft}	22 m {72 ft}	25 m {82 ft}	27 m {89 ft}	30 m {98 ft}	32 m {105 ft}

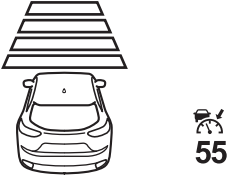
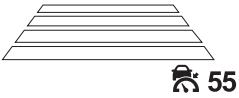
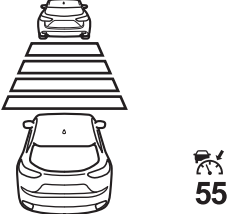
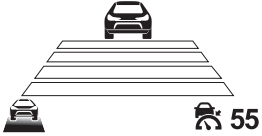


Set distance between vehicles	Detecting vehicle speed								
	120 km/h {75 mph}	130 km/h {81 mph}	140 km/h {87 mph}	150 km/h {93 mph}	160 km/h {99 mph}	170 km/h {106 mph}	180 km/h {112 mph}	190 km/h {118 mph}	200 km/h {124 mph}
Long	80 m {262 ft}	86 m {282 ft}	93 m {305 ft}	99 m {324 ft}	105 m {344 ft}	105 m {344 ft}	105 m {344 ft}	105 m {344 ft}	105 m {344 ft}
Medium	63 m {207 ft}	68 m {223 ft}	73 m {240 ft}	78 m {255 ft}	83 m {272 ft}	88 m {288 ft}	93 m {305 ft}	98 m {321 ft}	103 m {337 ft}
Short	47 m {154 ft}	50 m {164 ft}	54 m {177 ft}	57 m {187 ft}	61 m {200 ft}	64 m {210 ft}	68 m {223 ft}	72 m {236 ft}	75 m {246 ft}
Extremely short	35 m {115 ft}	38 m {125 ft}	40 m {131 ft}	43 m {141 ft}	45 m {147 ft}	48 m {157 ft}	51 m {167 ft}	53 m {173 ft}	56 m {183 ft}

### System conditions display function

- The radar unit displays the system status using the Mazda radar cruise control (MRCC) warning indication/Mazda radar cruise control (MRCC) main indication/Mazda radar cruise control (MRCC) set indication, active driving display, multi-information display, and center display.

Condition	MRCC main indication	MRCC set indication	MRCC warning indication	*1	Multi-information display indication	Active driving display indication	Center display
MRCC system is OFF	OFF	OFF	OFF	OFF	No display	No display	No display

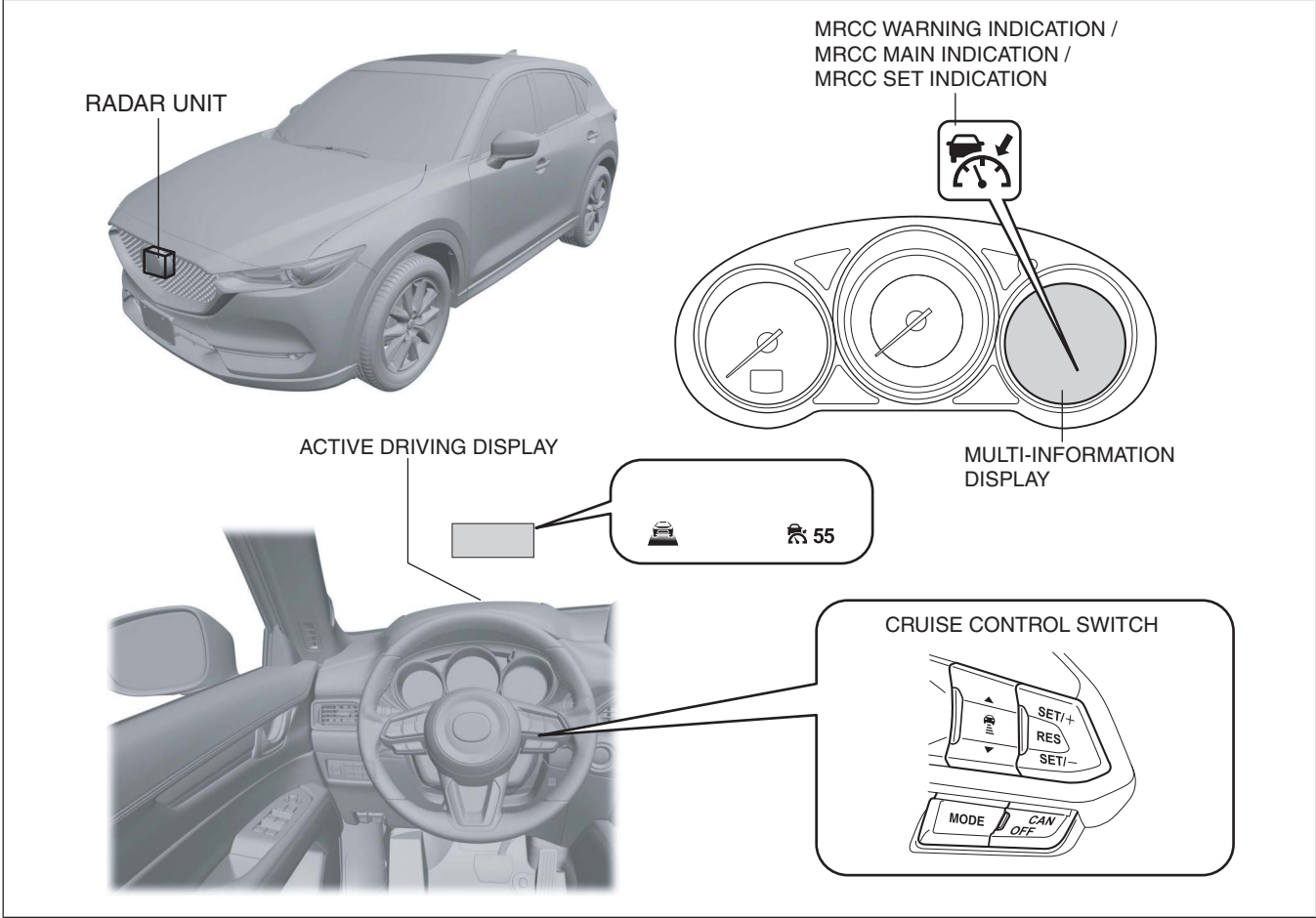
Condition		MRCC main indica tion	MRCC set indica tion	MRCC warni ng indica tion	*1	Multi-information display indication	Active driving display indication	Center display
MRCC system is ON	MRCC system is on standby	ON	OFF	OFF	OFF			No display
	Vehicle speed is set	OFF	ON	OFF	OFF			No display
	Vehicle ahead is detected	OFF	ON	OFF	OFF			No display
	Dista nce betwe en vehicl es is set	Long	OFF	ON	OFF			No display
		Medi um	OFF	ON	OFF			No display
		Sho rt	OFF	ON	OFF			No display
		Extr emely sho rt	OFF	ON	OFF			No display

Condition		MRCC main indica tion	MRCC set indica tion	MRCC warni ng indica tion	*1	Multi-information display indication	Active driving display indication	Center display
MRCC system is ON	Accelerator pedal is depressed	OFF	ON	OFF	OFF			No display
	During stop hold control	OFF	ON	OFF	ON			No display
	Deceleratio n exceeding system limits is required	OFF	OFF	OFF	OFF	<b>BRAKE!</b>	<b>BRAKE!</b>	No display
	MRCC system is automatica ly canceled due to low vehicle speed	ON	OFF	OFF	OFF	<b>MRCC cancelled</b>	<b>MRCCcancelled</b>	No display
	Dirty radar unit is detected	OFF	OFF	ON	OFF	 <b>Front radar blocked</b>	No display	Warning display* 2
	Malfunction occurred in MRCC system	OFF	OFF	ON	OFF	 <b>Front radar sensor system malfunction</b>	No display	Warning display* 2

\*1 : Mazda Radar Cruise Control with Stop & Go function (MRCC with Stop & Go function) indicator light

\*2 : For the warning display content on the center display, refer to the [CENTER DISPLAY]. (See CENTER DISPLAY [WITH CENTER DISPLAY].)

Structural View



The diagram illustrates the electrical connections for the vehicle's CAN network. It features two main buses: HS-CAN (High-Speed CAN) and MS-CAN (Medium-Speed CAN). Components are connected to these buses via resistors, indicating termination points.

**Components and Connections:**

- Brake System:** BRAKE SWITCH 1 and BRAKE SWITCH 2 are connected to the PCM. The BRAKE LIGHT UNIT controls two BRAKE LIGHTS and a HIGH-MOUNT BRAKE LIGHT. The RBCM (Rear Brake Control Module) is also connected to the BRAKE LIGHT UNIT.
- Control Modules:** PCM, DSC HU/CM, TCM, FBCM, SAS CONTROL MODULE, LASER SENSOR, EPS CONTROL MODULE, and CONNECTIVITY MASTER UNIT (CMU) are connected to the HS-CAN bus.
- Driver Interface:** CRUISE CONTROL SWITCH, CLOCK SPRING, and START STOP UNIT are connected to the MS-CAN bus. The CENTER DISPLAY is connected to the HS-CAN bus.
- Other Components:** The RADAR UNIT is connected to the HS-CAN bus via terminals E, B, C, and D. The ACTIVE DRIVING DISPLAY is connected to the HS-CAN bus. The INSTRUMENT CLUSTER is connected to the MS-CAN bus.
- Power and Grounding:** B+ (Battery Positive) is connected to the BRAKE SWITCHES and the IG1 RELAY. Grounding points are indicated by the ground symbol (three parallel lines).

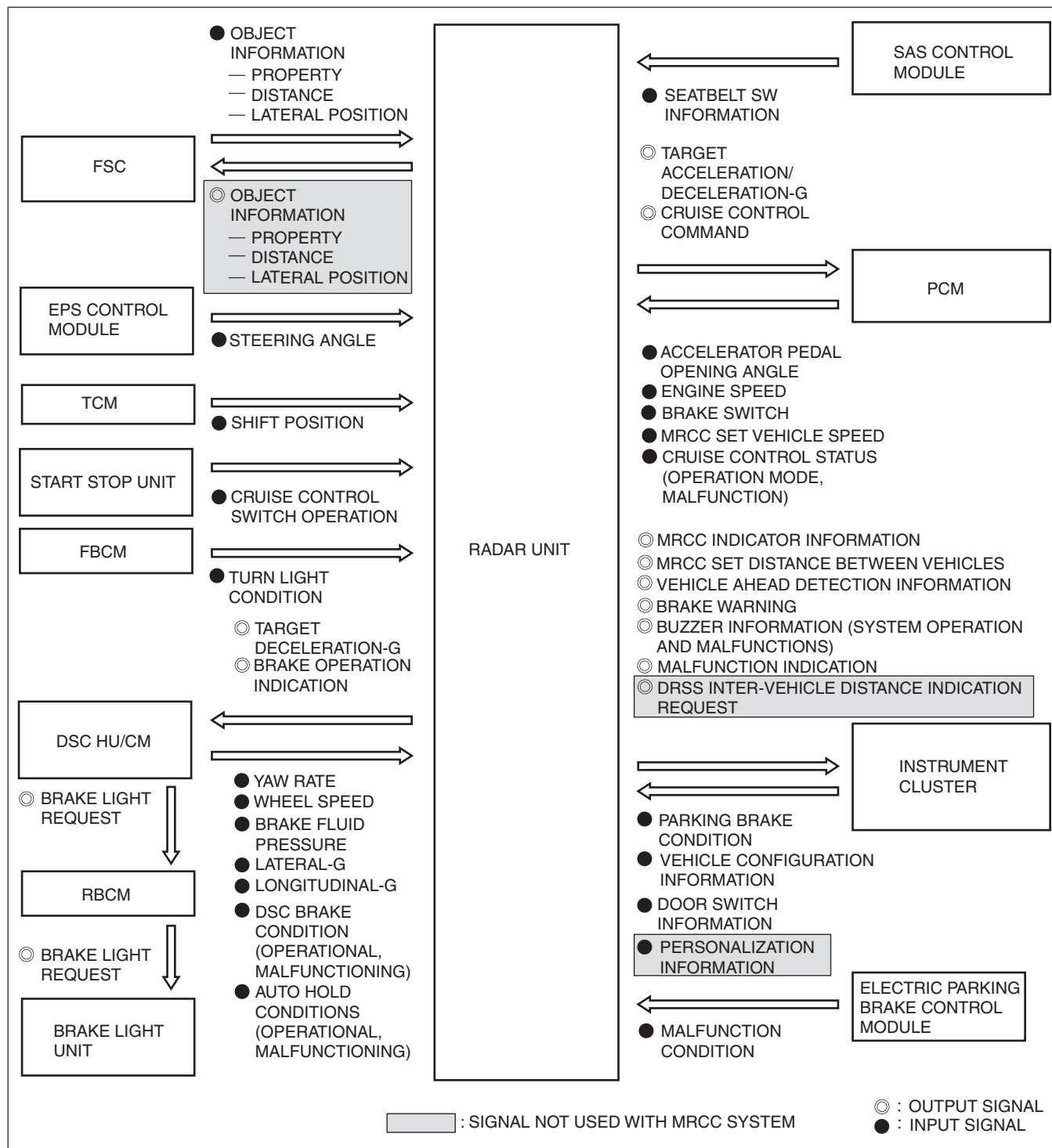
**Legend:**

- HS-CAN: Represented by a solid line with a resistor symbol.
- MS-CAN: Represented by a dashed line with a resistor symbol.

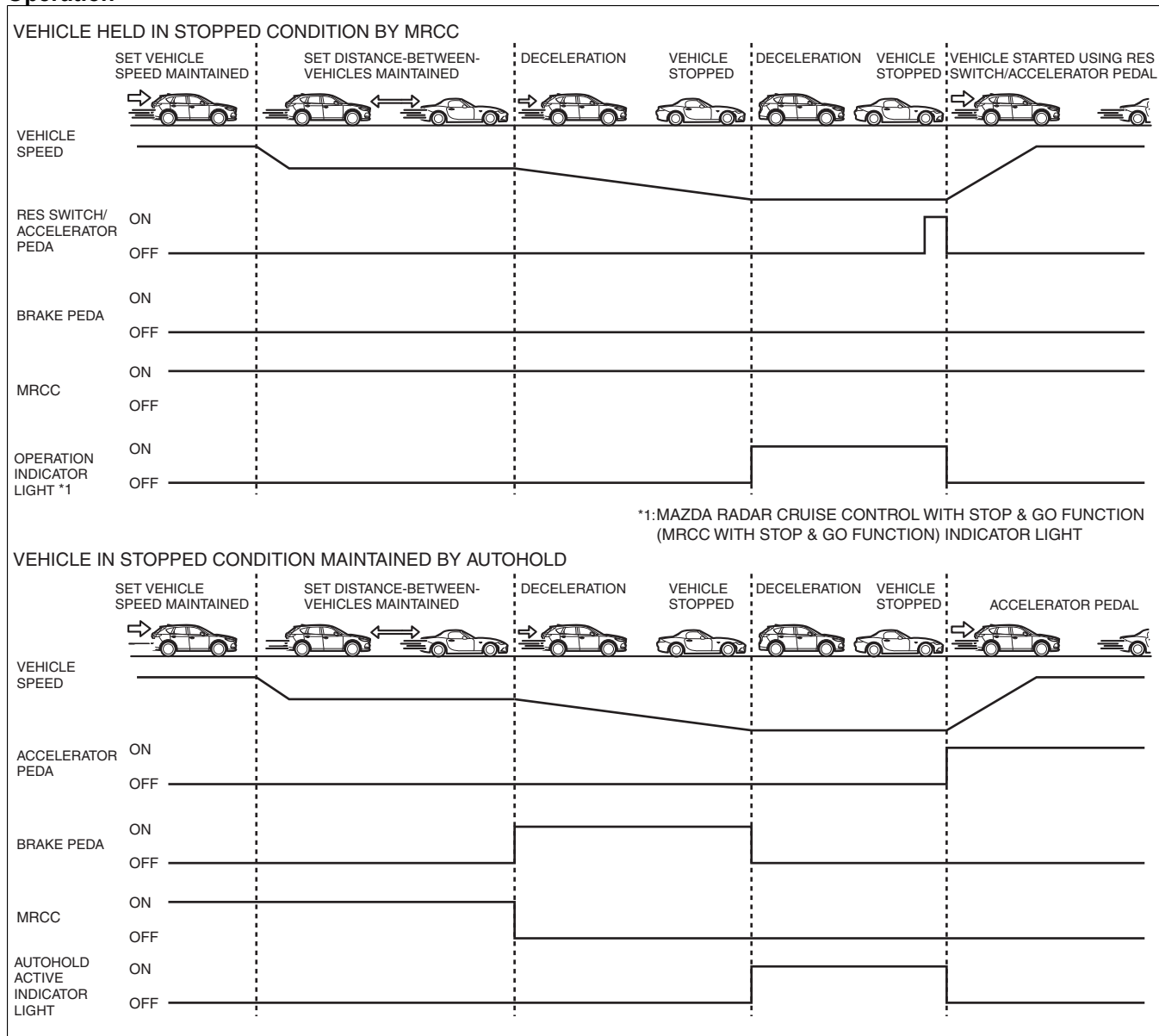
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## Block Diagram

### Block diagram (MRCC/SBS/DRSS)



## Operation



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- For details on AUTOHOLD, refer to [AUTOHOLD]. (See AUTOHOLD.)
- When all of the following conditions are met, the Mazda Radar Cruise Control with Stop & Go function (MRCC with Stop & Go function) goes on operation stand-by.

### Operation condition

- Selector lever is in D or M position
- Vehicle speed is within range of approx. 0—200 km/h {0—124 mph} (European (L.H.D. U.K.) specs.)
- Vehicle speed is within range of approx. 0—145 km/h {0—90 mph} (Australian, General (L.H.D.) specs.)
- Mazda Radar Cruise Control with Stop & Go function (MRCC with Stop & Go function) is turned on
- Brake pedal is not depressed
- DSC is not operating
- Smart city brake support (SCBS) is not operating
- Smart brake support (SBS) is not operating
- Electric parking brake is released
- Driver seat belt is fastened
- All doors are closed

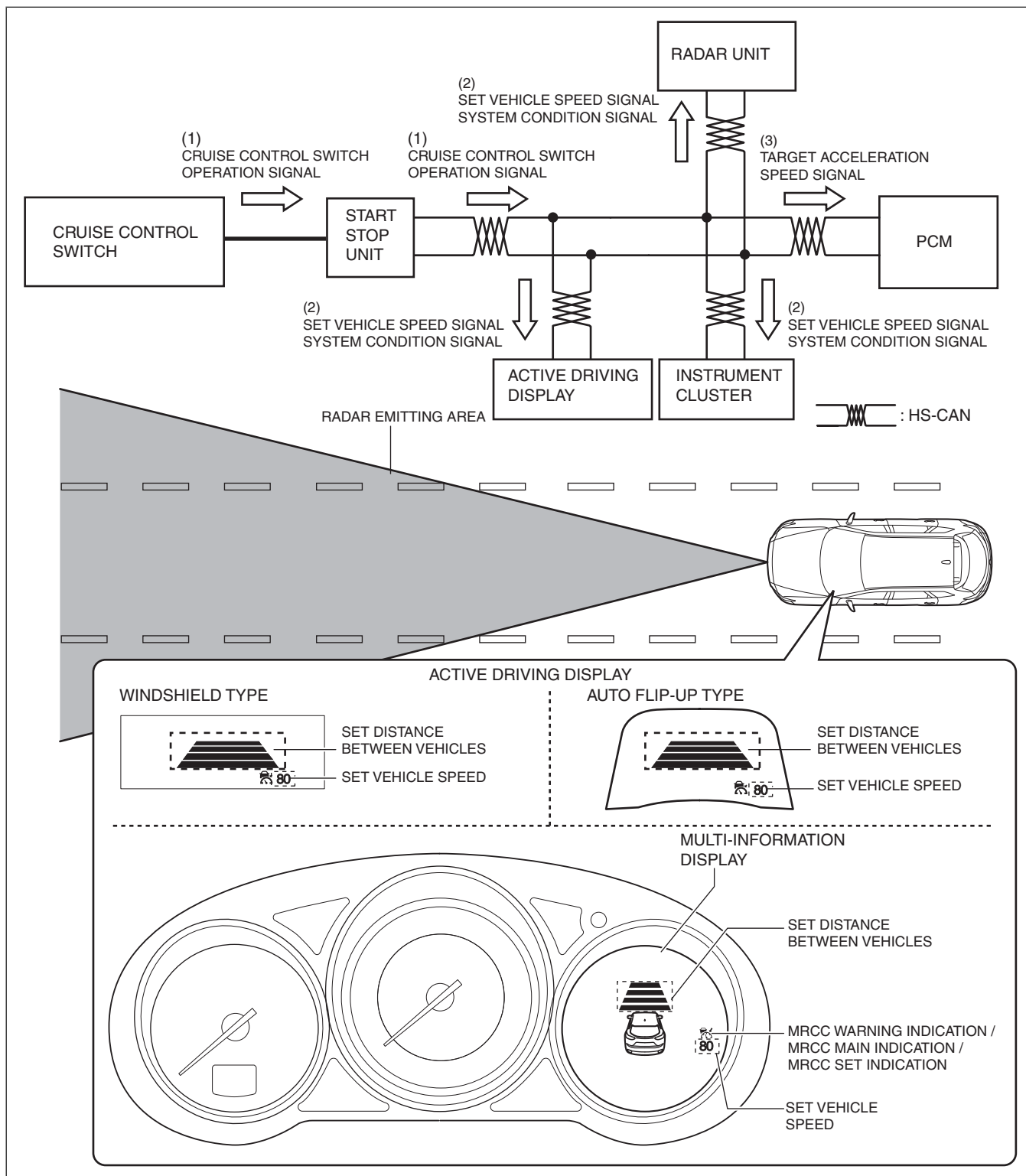
### Constant speed control mode

1. The PCM recognizes the set vehicle speed set by the driver based on the cruise control switch operation signal sent from the start stop unit when the operation conditions are met.
2. When the PCM recognizes the set vehicle speed, it sends a set vehicle speed signal and system condition signal to the radar unit, instrument cluster, and active driving display.

3. The radar unit sends a target acceleration speed signal to the PCM based on the set vehicle speed signal and system condition signal.
4. The PCM performs engine control to maintain the set vehicle speed based on the signal from the radar unit.
5. The instrument cluster and active driving display display the system operation screen based on the set vehicle speed signal and system condition signal from the PCM.

#### Note

- When the radar unit detects the target information while in constant speed control mode, it switches the mode to headway control mode.



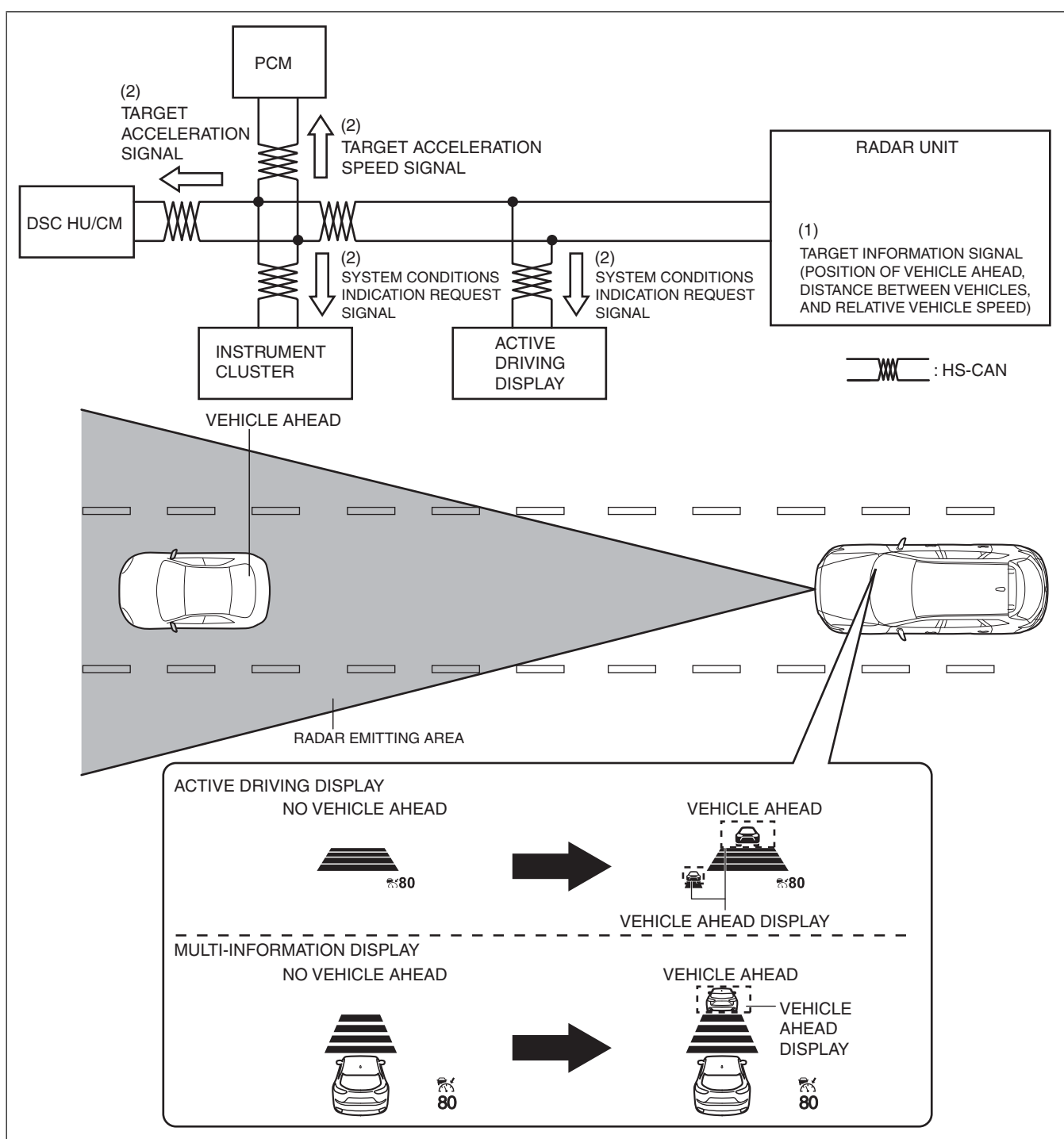
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### Headway control mode

1. When the radar unit detects the target information while the vehicle is traveling in constant speed control mode, it switches the mode to headway control mode.
2. The radar unit calculates the target acceleration speed based on the following, and sends the target acceleration speed signal to the PCM and DSC HU/CM. Additionally, it sends the system status display request signal to the instrument cluster.
  - Distance between vehicles set by driver
  - Target information (position of vehicle ahead, distance between vehicles, relative vehicle speed)
  - Detecting vehicle speed
3. The PCM performs engine control to maintain distance between vehicles based on the signal from the radar unit.
4. The DSC HU/CM controls braking to maintain distance between vehicles based on the signal from the radar unit.
5. The instrument cluster displays the vehicle ahead screen based on the signal from the radar unit.

### Note

- In the following cases, the system transitions from headway control mode to constant speed mode.
  - Vehicle ahead accelerates over set vehicle speed of detecting vehicle
  - Vehicle ahead or detecting vehicle switches driving lanes, and vehicle ahead of detecting vehicle no longer exists



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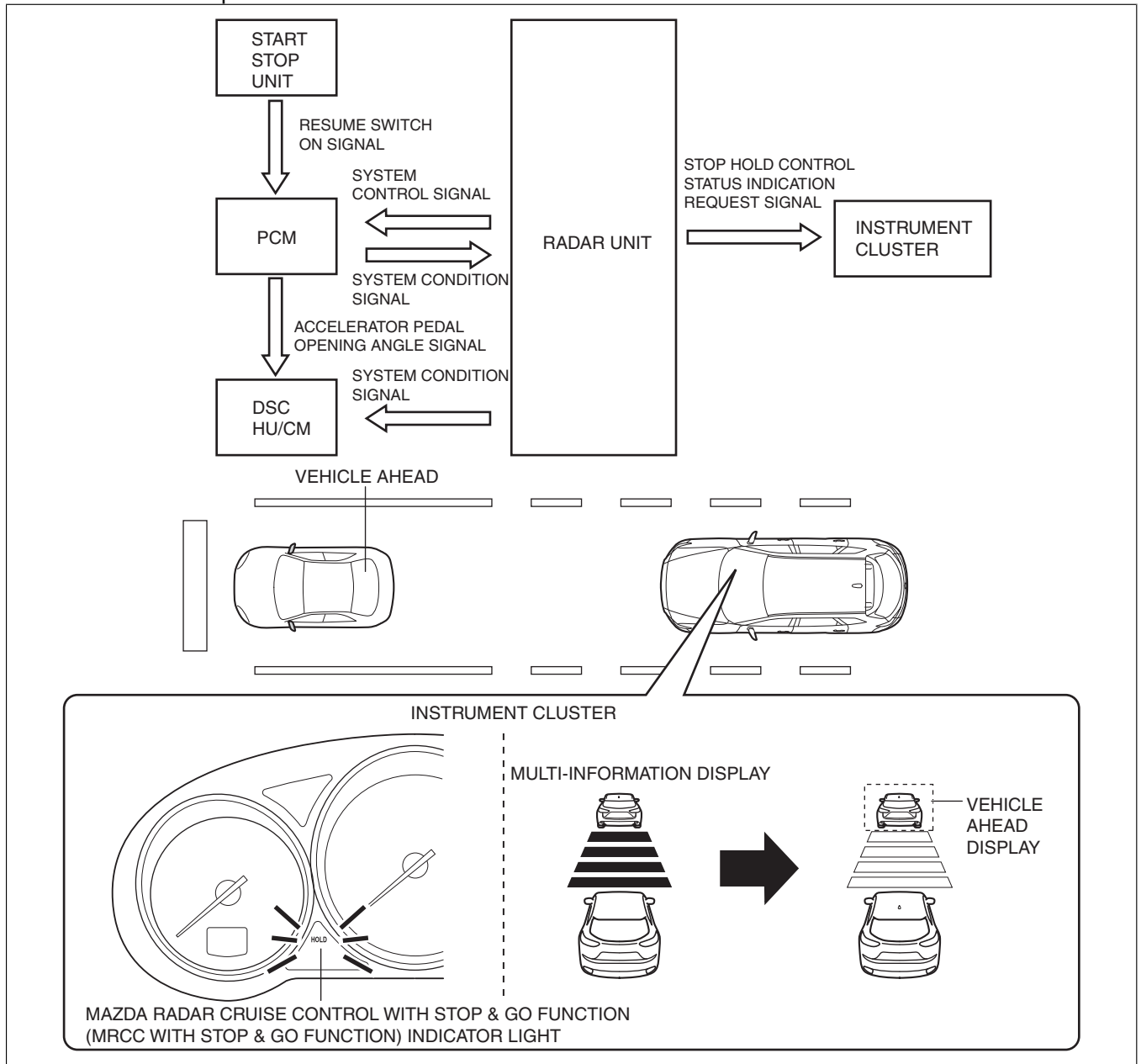
## Stop hold control

1. If the vehicle ahead stops during headway control mode, the radar unit sends a system control signal to the PCM and DSC HU/CM so that the vehicle stops at the previously set distance-between-vehicles.
2. The PCM performs engine control and stops the vehicle based on the system control signal from the radar unit.
3. The DSC HU/CM performs brake control, stops the vehicle, and maintains a stopped condition based on the system control signal from the radar unit.
4. The radar unit sends the stop hold control status indication request signal to the instrument cluster after the vehicle was stopped.
5. The instrument cluster displays the stop hold control indication in the multi-information display and turns the Mazda Radar Cruise Control with Stop & Go function (MRCC with Stop & Go function) indicator light on based on the stop hold control status indication request signal from the radar unit.
6. After the radar unit recognizes that the vehicle ahead has accelerated forward during stop hold control, the PCM and DSC HU/CM cancels stop hold control when it receives the following signals.
  - Accelerator pedal opening angle signal (accelerator pedal depressed) from PCM
  - RESUME switch ON signal (RESUME switch pressed) from start stop unit

#### Note

- After the vehicle ahead accelerates forward and a certain period of time has elapsed, the vehicle ahead indication in the multi-information display flashes to promote the driver to accelerate the vehicle.
- When 10 min or more have elapsed since stop hold control was operated, the electric parking brake automatically operates and the Mazda Radar Cruise Control with Stop & Go function (MRCC with Stop & Go function) goes on stand-by.

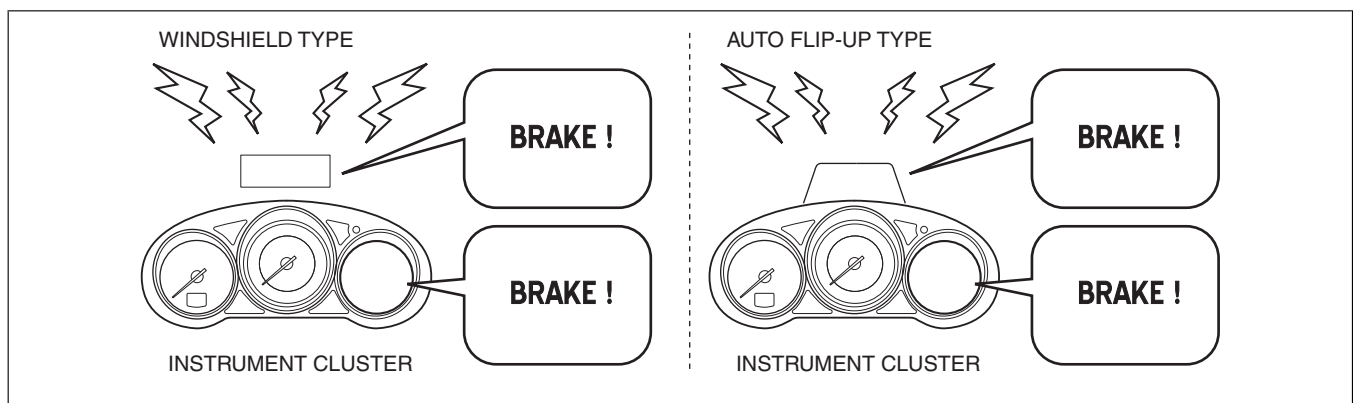
7. The radar unit sends the system control signal to the PCM and DSC HU/CM and resumes headway control mode/constant speed control mode.



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#### Inter-vehicle distance limit warning

- If any of the following condition is met, the warning alarm in the instrument cluster is activated and the brake warning in the display is indicated to urge the driver to take action such as braking.



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- Radar unit determines that crash is unavoidable even if automatic braking is performed at maximum possible deceleration rate such as vehicle ahead performs emergency braking