LANE DEPARTURE WARNING SYSTEM (LDWS)

id092200029200

Outline

- The Lane Departure Warning System (LDWS) recognizes vehicle lane lines on a road using the forward sensing camera (FSC) installed to the windshield, and if the vehicle departs from its lane unbeknownst to the driver, the system alerts the driver of the lane departure using warning indication and warning sound.

Warning

- **LDWS is only a supplementary system for the prevention of a lane departure, however the LDWS functions have limitations. Relying solely on the LDWS and neglecting prudent steering wheel operation could cause an unexpected accident resulting in death or serious injury. Do not rely solely on the LDWS. Always make lane corrections using the steering wheel and drive safely.**
- **The LDWS may not operate normally under the following conditions:**
  - **— Poor vehicle lane line visibility due to adverse weather (rain, snow, fog)**
  - **— Poor vehicle lane line visibility due to backlight, snow on the road, water puddles, road ruts**
  - **— Poor vehicle lane line visibility due to cracks and fissures in the vehicle lane**
  - **— Vehicle lane lines intersect with complexity due to additions or reductions of travel lanes**
  - **— Vehicle lane marking is not completely erased after road maintenance, two or more lane lines next to each other**
  - **— Vehicle lane lines not recognized due to vehicle ahead**

Caution

- **If the FSC aiming for the LDWS is not completed, the camera shot angle for the FSC cannot be recorded and the LDWS may not operate. When performing the following servicing, always perform the FSC aiming. Refer to the FSC aiming procedure in the workshop manual.**
  - **— FSC replacement**
  - **— FSC clip replacement**
  - **— Windshield replacement**

Function

- The FSC sets warning-trigger lines based on the vehicle lane lines recognized by the camera, and if the vehicle contacts one of these warning-trigger lines it activates the warning indicator and warning sound. Refer to FORWARD SENSING CAMERA (FSC) for FSC and warning-trigger line details.

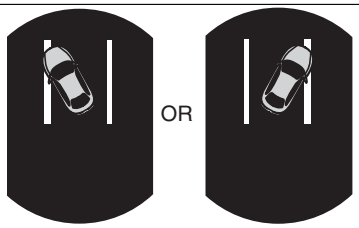
Driver operation determination function

- The FSC determines the driver's intentions according to the following driving operations, and controls the warning-trigger operation.
  - — After the turn switch is operated and the vehicle lane is changed within 6 s.
  - — The steering wheel is turned at a certain angle or more, and the vehicle lane is changed.
  - — The accelerator pedal is depressed a certain amount or more, and the vehicle lane is changed.
  - — The brake pedal is depressed a certain amount or more and the vehicle departs from its lane.

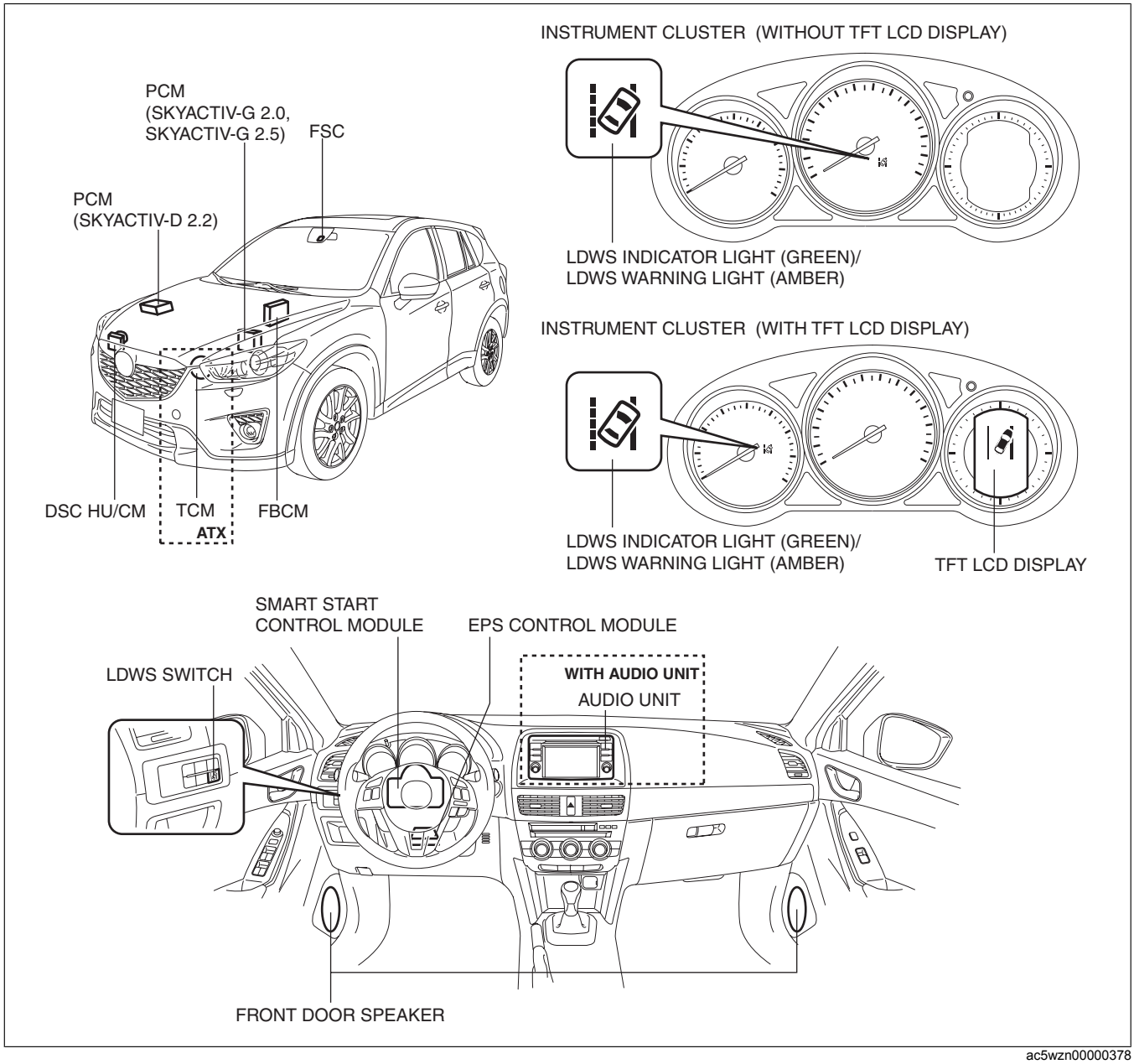
System conditions display function

- The FSC displays the system conditions using the LDWS indicator light (green), LDWS warning light (amber), and the TFT LCD display (with TFT LCD display) in the instrument cluster.

LDWS Switch	Condition	LDWS indicator light (green)	LDWS warning light (amber)	TFT LCD display
OFF	System is off	Illumination off	Illumination off	No display

LDWS Switch	Condition	LDWS indicator light (green)	LDWS warning light (amber)	TFT LCD display
ON	Vehicle lane lines recognized at vehicle speed of 65 km/h {40 mph} or more	Illumination on	Illumination off	
	While warning is triggered	Flashes	Illumination off	
	Vehicle speed 60 km/h {37 mph} or less	Illumination off	Illumination on	
	Vehicle lanes not recognized			
	FSC detects camera fogging			
	FSC detects camera soiling			
	Malfunction in LDWS occurs		Flashes	
	Malfunction in FSC occurs			

Structural view



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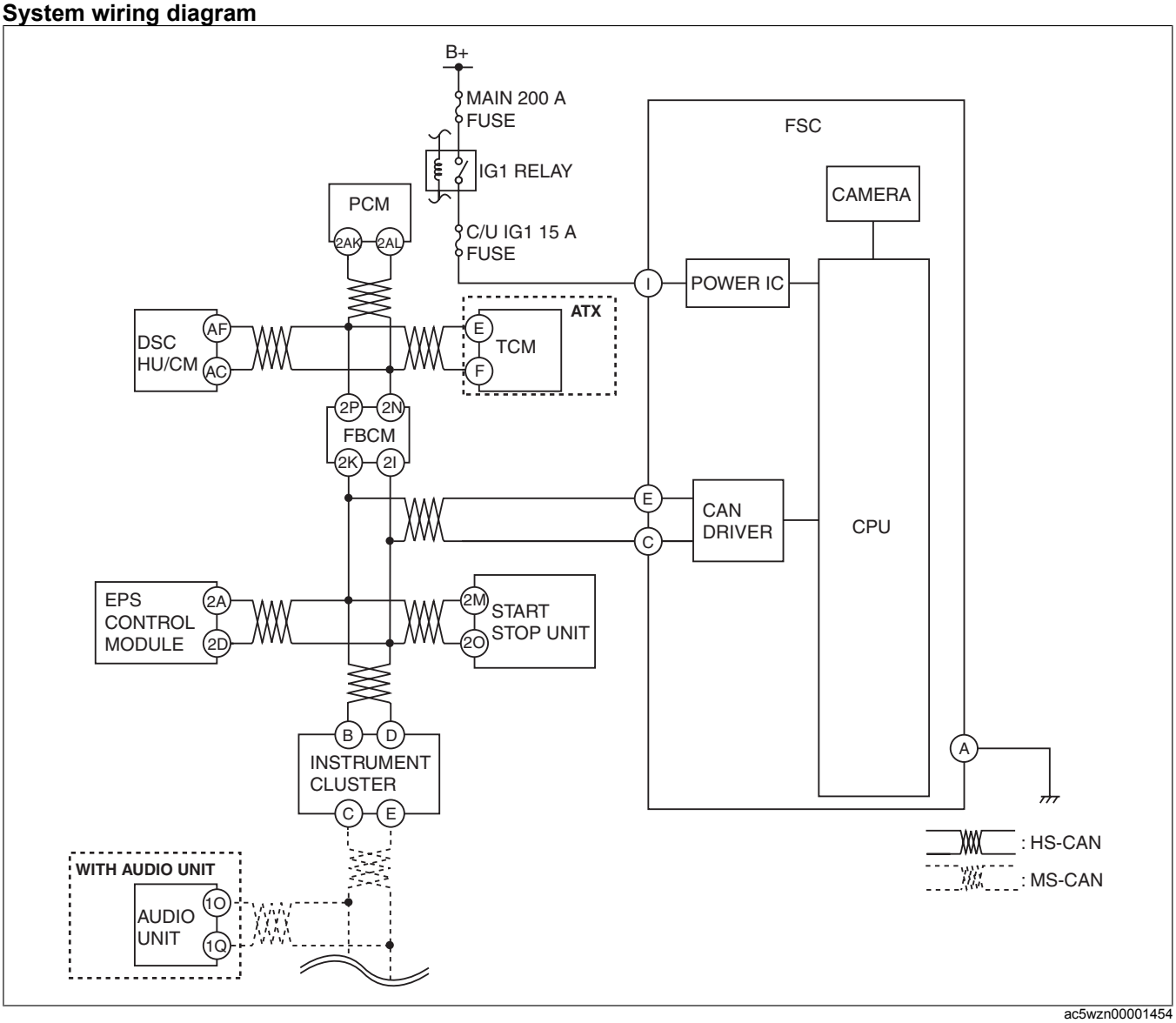
System wiring diagram



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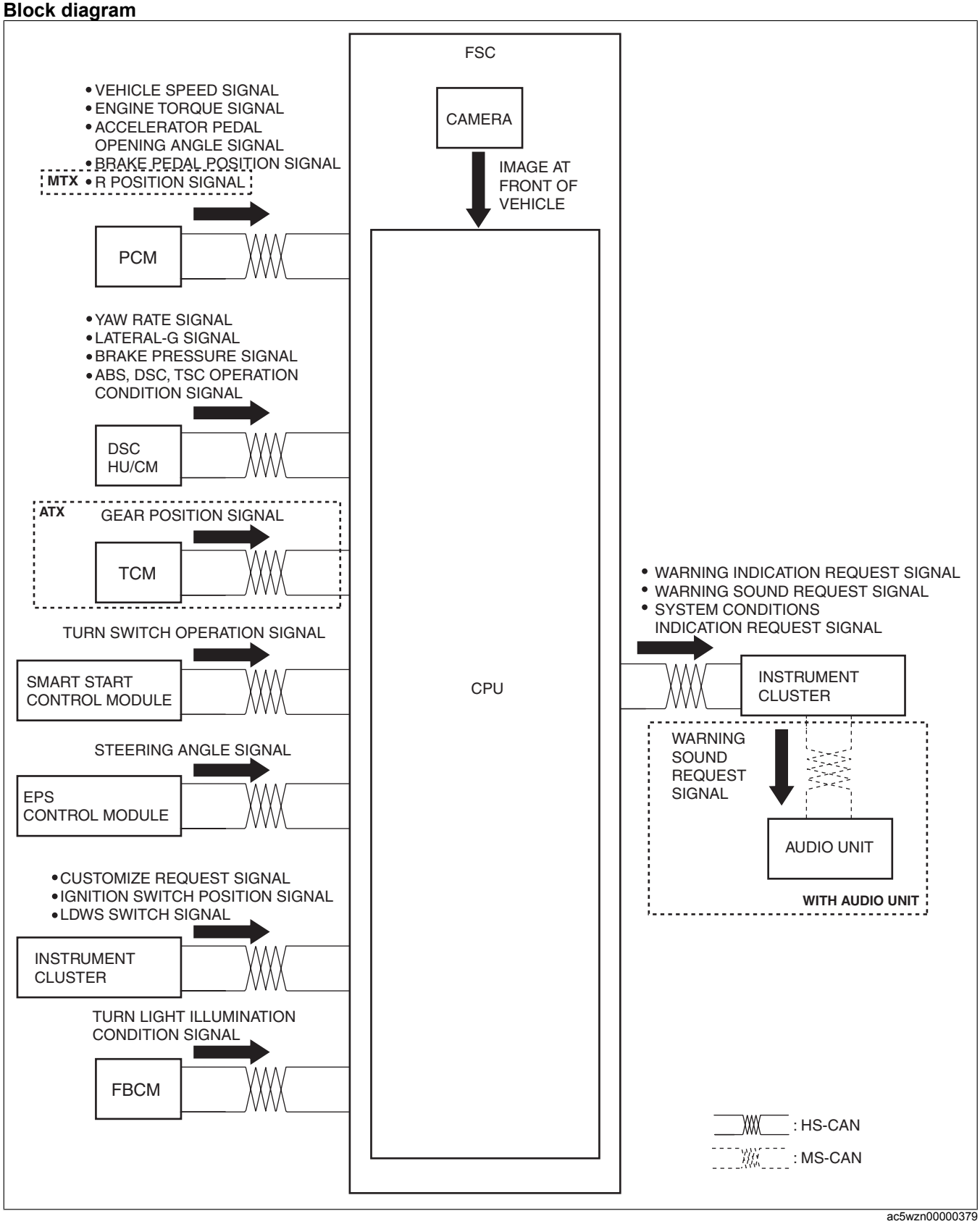
Block diagram



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Operation

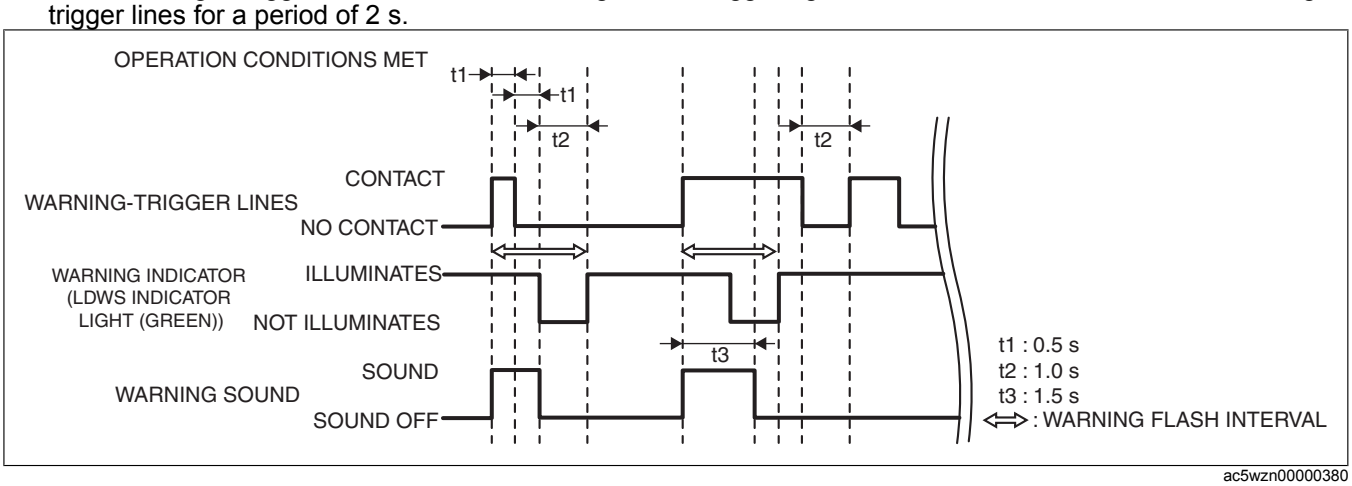
Operation condition

- The warning is triggered when all of the following conditions are met:
  - — LDWS switch is on (system on)
  - — Vehicle speed is 65 km/h {40 mph} or more

— Vehicle contacts warning-trigger line unbeknownst to driver

Operation

- The period of time in which the warning is triggered differs by the period of time in which the vehicle is contacting the warning-trigger line.
  — Vehicle contacts warning-trigger line for less than 1 s: Warning triggers for 1 s
  — Vehicle contacts warning-trigger line for 1 s or more: Warning triggers for 1.5 s
- If the warning is triggered one time, the warning will not trigger again if the vehicle travels within the warning-trigger lines for a period of 2 s.



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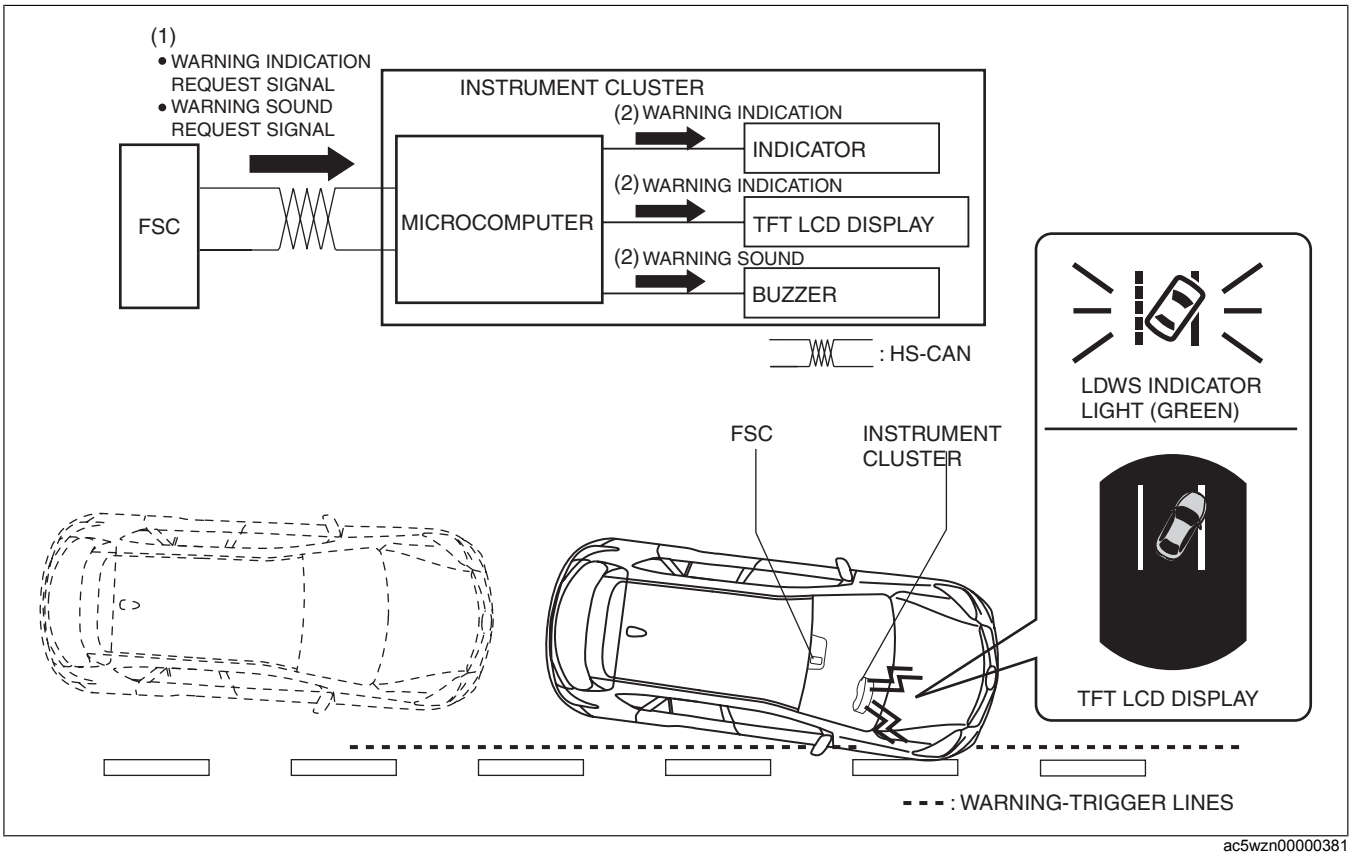
- If the vehicle is not equipped with an audio unit, the warning activation sound is output from the instrument cluster, for vehicles with an audio unit, the sound is output through the audio unit.

Without audio unit

1. If the FSC determines that the vehicle has contacted an warning-trigger line, it sends warning sound request signal and an warning indication signal to the instrument cluster.
2. When the instrument cluster receives the warning sound request signal and the warning indication request signal from the FSC, it flashes the LDWS indicator light (green) and displays the warning screen in the TFT LCD display (with TFT LCD display). In addition, the warning is sounded using the buzzer in the instrument cluster.



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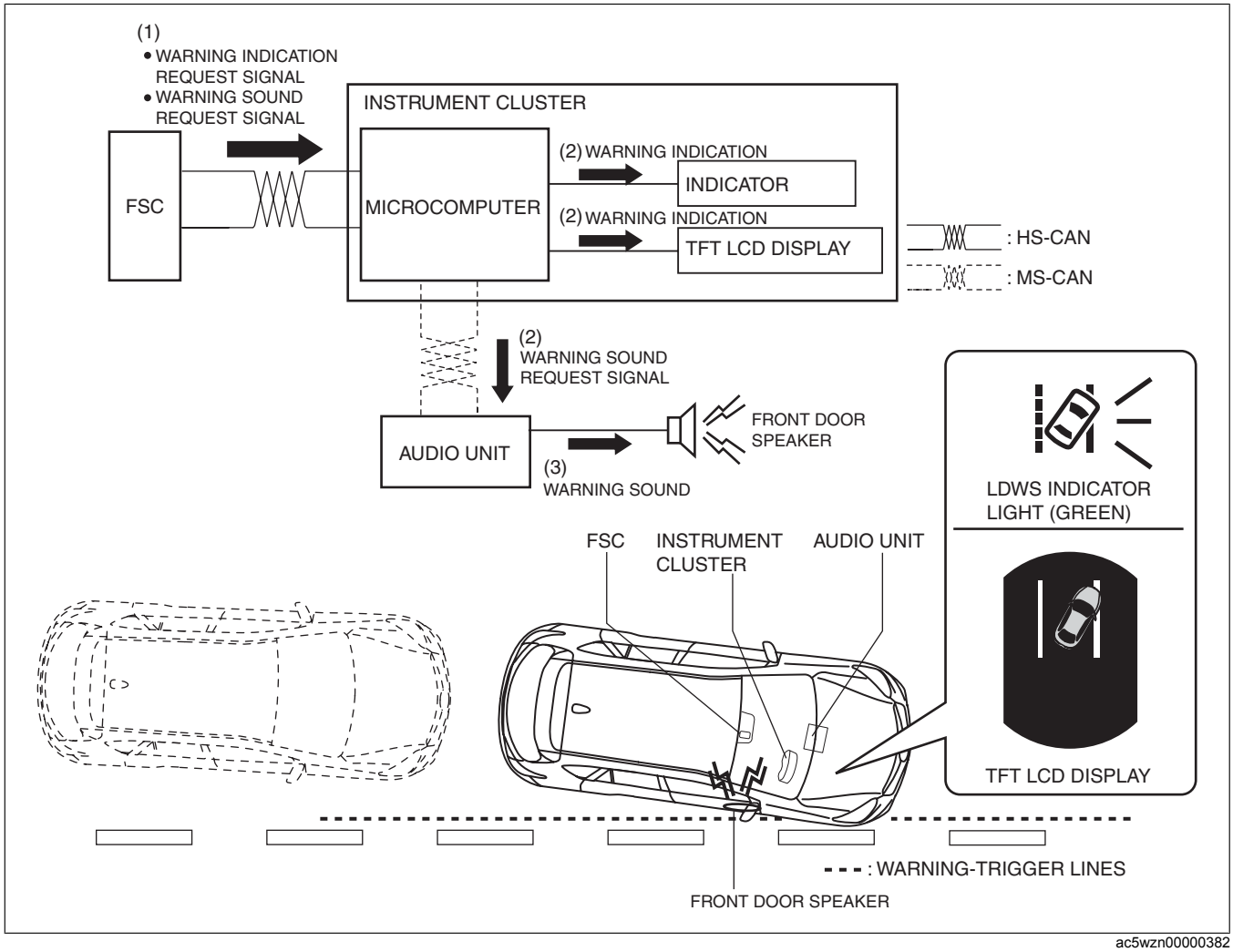
With audio unit

1. If the FSC determines that the vehicle has contacted a warning-trigger line, it sends an warning sound request signal and an warning indication request signal to the instrument cluster.

2. When the instrument cluster receives the warning sound request signal and the warning indication request signal from the FSC, it flashes the LDWS indicator light (green) and displays the warning screen in the TFT LCD display (with TFT LCD display). In addition, the warning sound request signal is sent to the audio unit.
3. When the audio unit receives the warning sound request signal from the instrument cluster, it stops sound output from either the front left or right door speaker according to the request signal and outputs a rumble strip sound *1.

Note
- If the user is conversing using the HF/TEL, or the voice recognition function is outputting voice, the rumble strip sound is not output.



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*1 : Refer to AUDIO UNIT (WITH COLOR LCD) for rumble strip sound details.