ADAPTIVE FRONT LIGHTING SYSTEM (AFS)

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Outline

- The adaptive front lighting system (AFS) is a system which enhances the range of visibility when the headlights are turned on. It does this by pointing the optical axis of the headlights in the direction in which the steering wheel is operated according to the steering operation.

Functions

- The adaptive front lighting system (AFS) control module controls the adaptive front lighting system (AFS).
- The adaptive front lighting system (AFS) control module also controls the headlight auto leveling system in which the headlight optical axis is adjusted up and down in response to changes in load and passenger conditions. (See HEADLIGHT AUTO LEVELING SYSTEM.)

Swivel function

- When the headlights are on, the adaptive front lighting system (AFS) control module changes the optical axis of the headlights to the direction in which the steering wheel is operated according to the steering operation amount and the vehicle speed.
- The adaptive front lighting system (AFS) control module controls the swivel function based on the following CAN signals.

Signal name	Sending module/part name	Communication method
Steering angle (absolute steering angle) signal	EPS control module	HS-CAN
Steering angle (estimated absolute steering angle) signal		
Vehicle speed signal	PCM	
Ignition switch status signal	Instrument cluster	
Back-up light on request signal		
Headlight illumination status signal	Front body control module (FBCM)	

Initial position learning function

- When the ignition is switched ON (engine on) at a vehicle speed of **0 km/h {0 mph}**, the adaptive front lighting system (AFS) control module calculates the initial position of the swivel actuator for left/right operation, and the headlight optical axis stops at the front position.
- The adaptive front lighting system (AFS) control module controls the initial position learning function based on the following CAN signals.

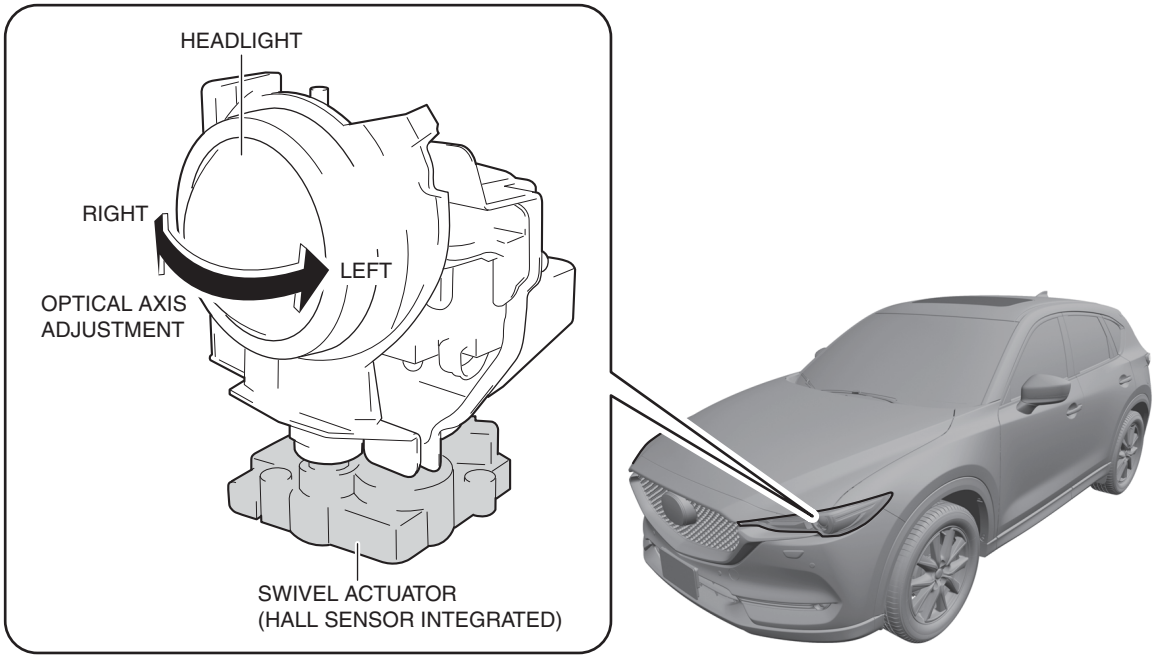
Signal name	Sending module/part name	Communication method
Vehicle speed signal	PCM	HS-CAN
Ignition switch status signal	Instrument cluster	

Personalization feature

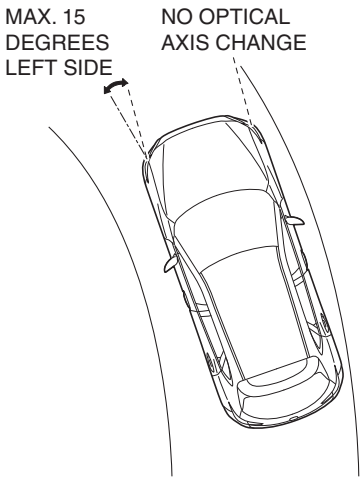
- The adaptive front lighting system (AFS) can be set to ON (operational)/OFF (non-operational). Initial setting is [ON (operational)]/[On]. For details on the personalization features, refer to the [i-ACTIVSENSE PERSONALIZATION]. (See i-ACTIVSENSE PERSONALIZATION.)

Structure/Construction

- The swivel actuator for adjusting the optical axis is built into the front combination light, and is integrated with the headlight assembly.
- The swivel actuator has an internal Hall sensor and inputs the current position of the headlight to the adaptive front lighting system (AFS) control module.
- The variation (swivel angle) of the optical axis of the headlights is **15 degrees** for the right and left.
- Changes in the headlight optical axis (swivel angle) are controlled freely (non-step) based on the vehicle speed and the steering angle, and the swivel angle differs for each of the conditions.
- The steering wheel angle amount changes according to the vehicle speed until reaching the maximum value of the swivel angle (**15 degrees**).



CORNERING TO LEFT



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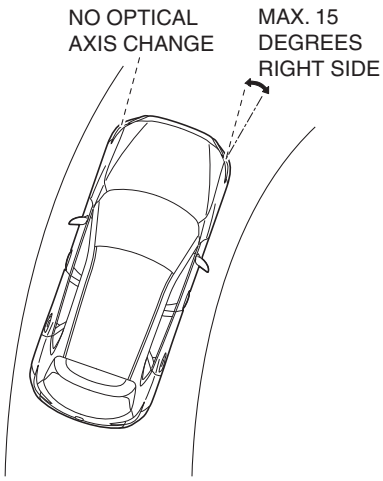

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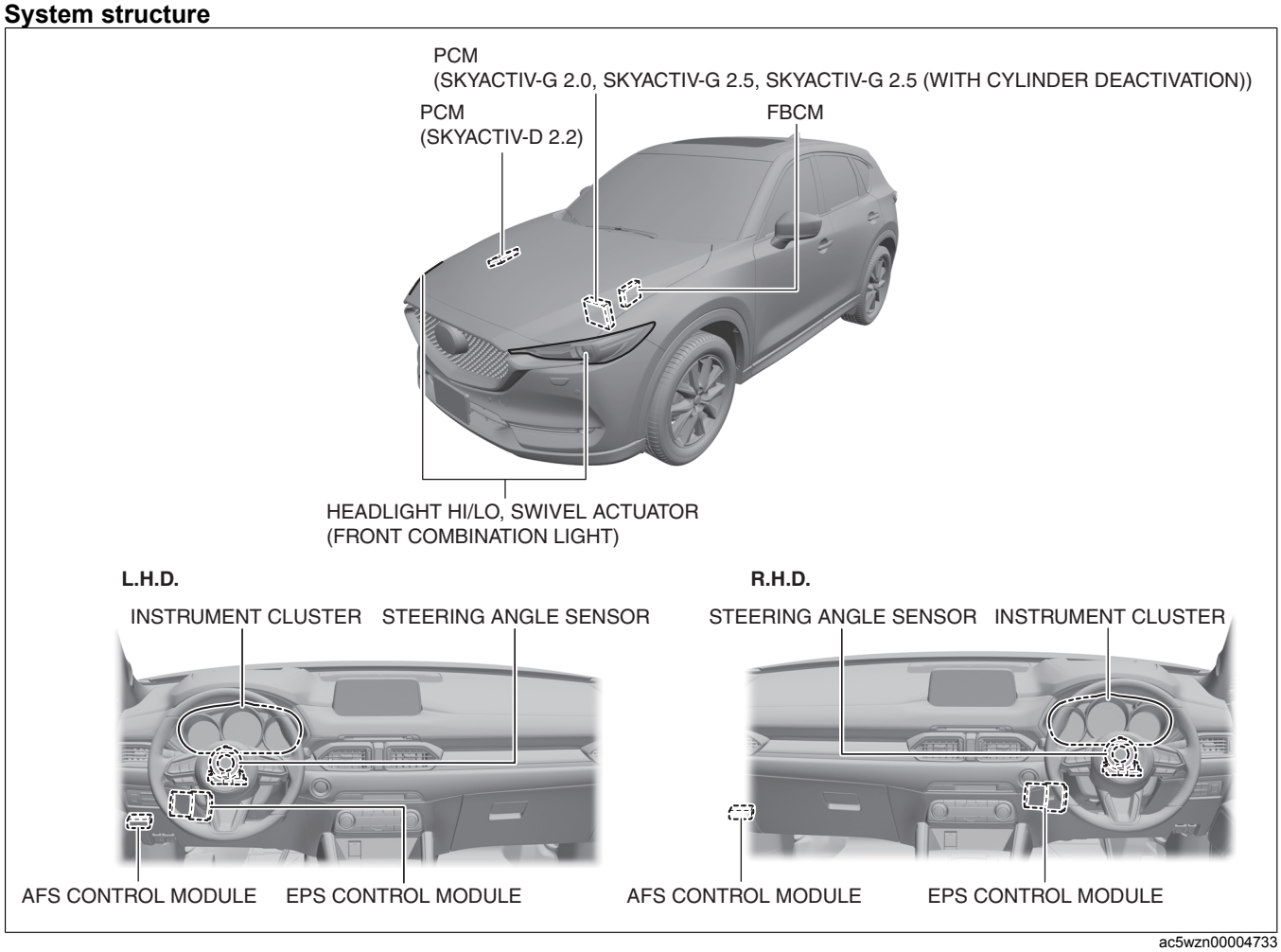
System structure



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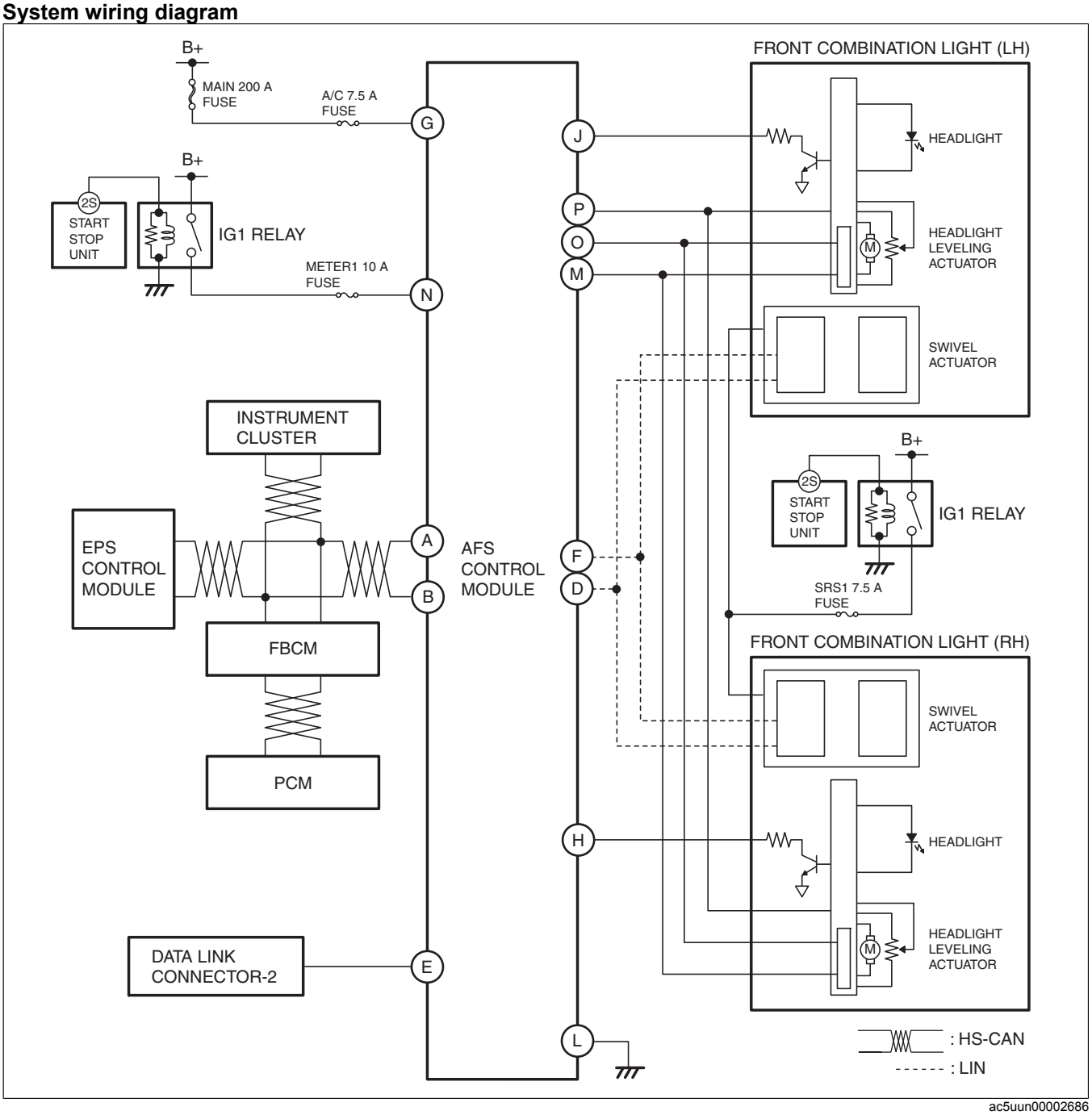
System wiring diagram



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Operation

Swivel function

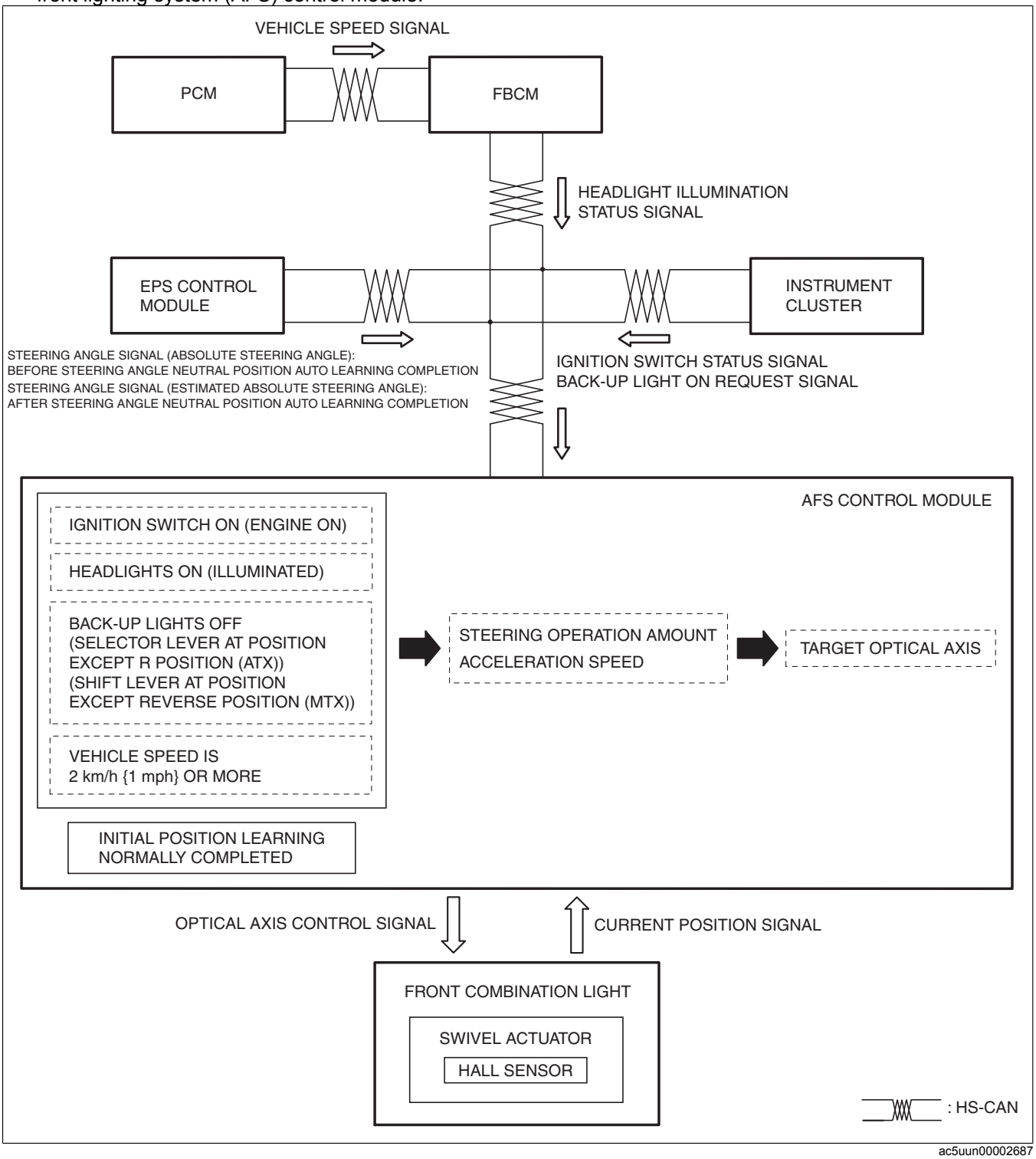
- When the ignition is switched ON (engine off or on), the adaptive front lighting system (AFS) control module constantly calculates the swivel actuator control amount based on the steering angle signal and vehicle speed signal.
- If the following operation conditions are met, the adaptive front lighting system (AFS) control module controls the swivel actuator based on the calculated amount of control, and adjusts the headlight optical axis.

Operation condition

Item	Condition
Initial position learning	After normal completion
Headlight	ON (illumination)
Gear position signal	Except R position (ATX)/Except reverse position (MTX)
Vehicle speed	Control start: **2 km/h {1 mph} or more**

- The swivel actuator drives the motor based on the signal from the adaptive front lighting system (AFS) control module.

- Changes in the swivel angle of the headlights are always detected by the Hall sensor and input to the adaptive front lighting system (AFS) control module.



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