
AFS (ADAPTIVE FRONT LIGHTING SYSTEM)

id091800012800

Outline

- The AFS is a system which enhances the range of visibility when the headlights are turned on by pointing the optical axis of the headlights in the direction in which the vehicle is advancing according to the steering operation.

Function

- The AFS is controlled by the AFS control module.
- The AFS control module controls the auto leveling function to adjust the headlight optical axis up or down in response to changes in load and passenger conditions. (See HEADLIGHT AUTO LEVELING SYSTEM.)

Swivel function

- The AFS control module changes the optical axis to the direction in which the vehicle is travelling according to the steering wheel operation and vehicle speed while the headlights are turned on.
- The AFS control module controls the swivel function based on the following CAN signals.

CAN signal sending module	Signal name
EPS control module	Steering angle (absolute angle) signal
	Steering angle (estimated absolute angle) signal
PCM	Vehicle speed signal
Instrument cluster	Ignition switch status signal
	Back-up light illumination request signal
	AFS OFF switch status signal
Front body control module (FBCM)	Headlight illumination status signal

Initial position learning function

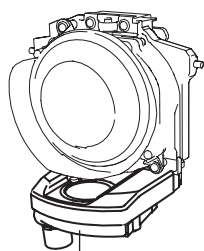
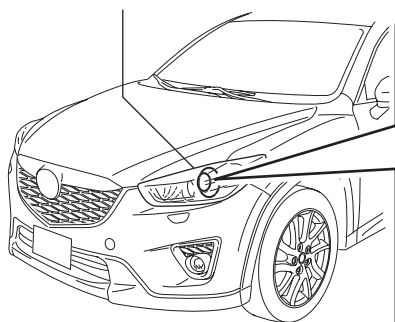
- When the ignition is switched ON (engine on) at a vehicle speed of 0 km/h {0 mph}, the AFS control module calculates the initial position of the swivel actuator for left/right operation, and the headlight optical axis stops at the front position.
- The AFS control module controls the initial position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

CAN signal sending module	Signal name
PCM	Vehicle speed signal
Instrument cluster	Ignition switch status signal

Structural view

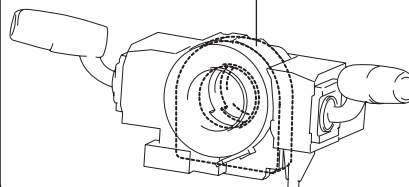
- The AFS consists of the following parts:

FRONT COMBINATION LIGHT

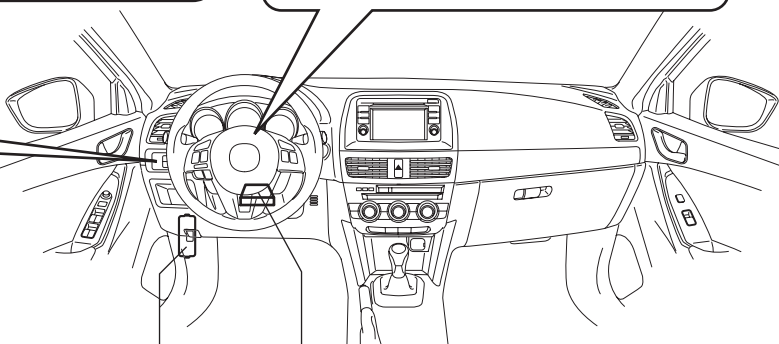


SWIVEL ACTUATOR
(HALL SENSOR
INTEGRATED)

STEERING ANGLE SENSOR



AFS OFF SWITCH



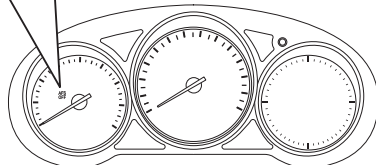
AFS CONTROL
MODULE

EPS CONTROL
MODULE

WITH TFT LCD DISPLAY

AFS OFF INDICATOR LIGHT

**AFS
OFF**

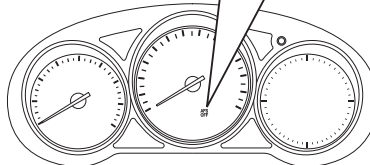


INSTRUMENT CLUSTER

WITHOUT TFT LCD DISPLAY

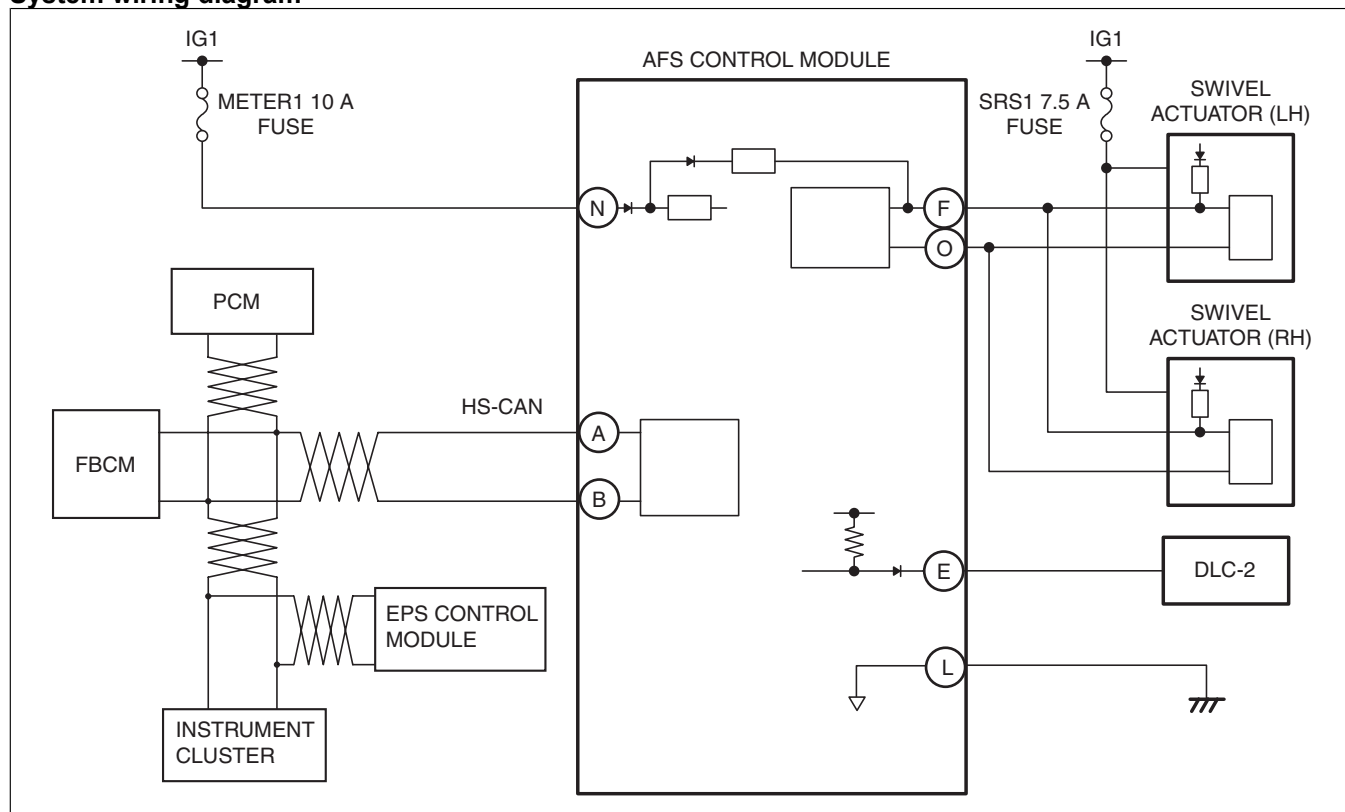
AFS OFF INDICATOR LIGHT

**AFS
OFF**



INSTRUMENT CLUSTER

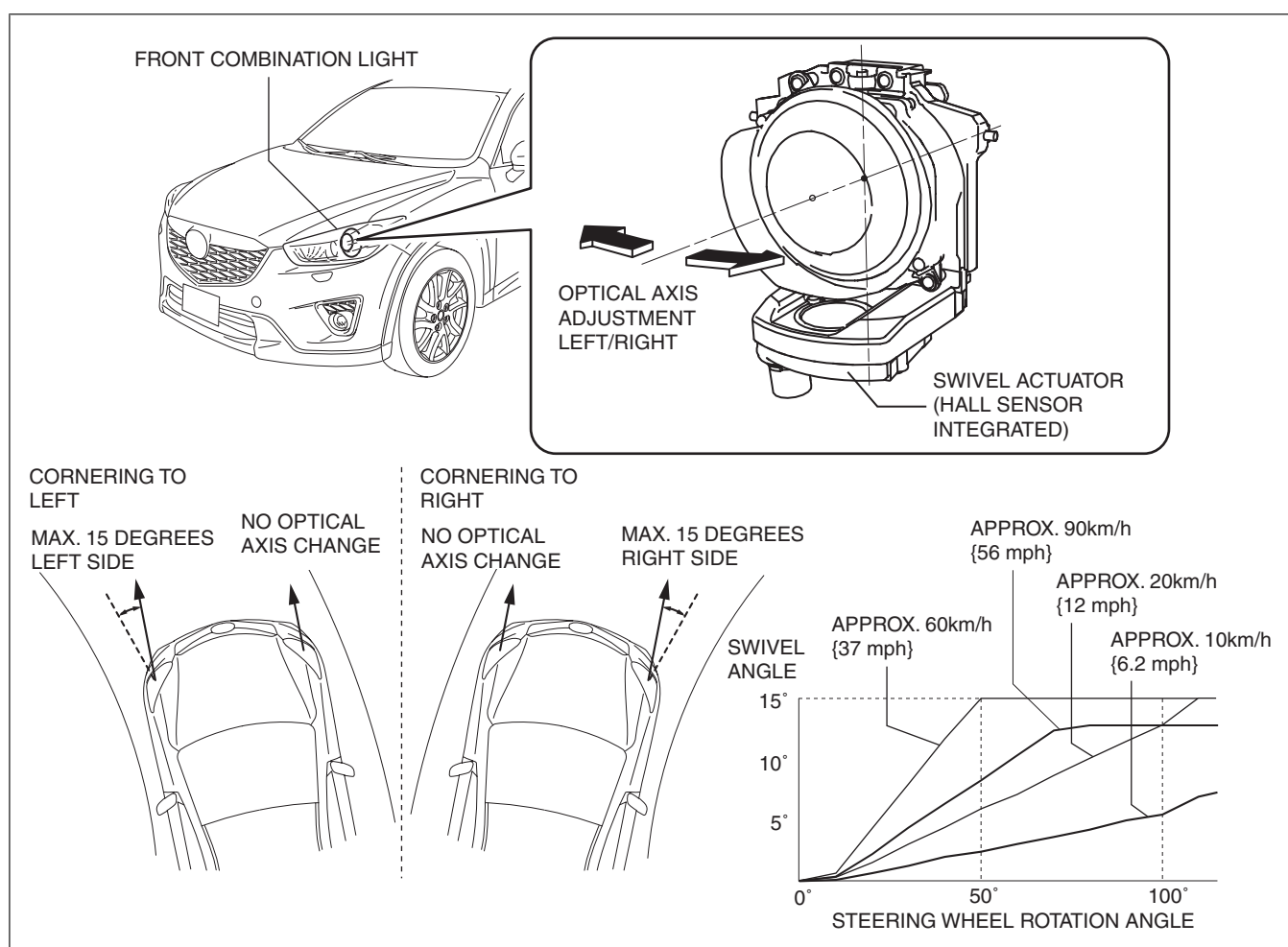
System wiring diagram



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Construction

- The swivel actuator for adjusting the optical axis is built into the front combination light, and it is an integrated construction with the headlights.
- The swivel actuator has an internal Hall sensor and inputs the current position of the headlight to the 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).



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Operation

Swivel function

- When the ignition is switched ON (engine off or on), the 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 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)
AFS OFF switch	OFF (control status)
Gear position signal	Except reverse position
Vehicle speed	Control start: 2 km/h {1 mph} or more

- The swivel actuator drives the motor based on the signal from the AFS control module.
- Changes in the swivel angle of the headlights are detected by the Hall sensor and input to the AFS control module.

