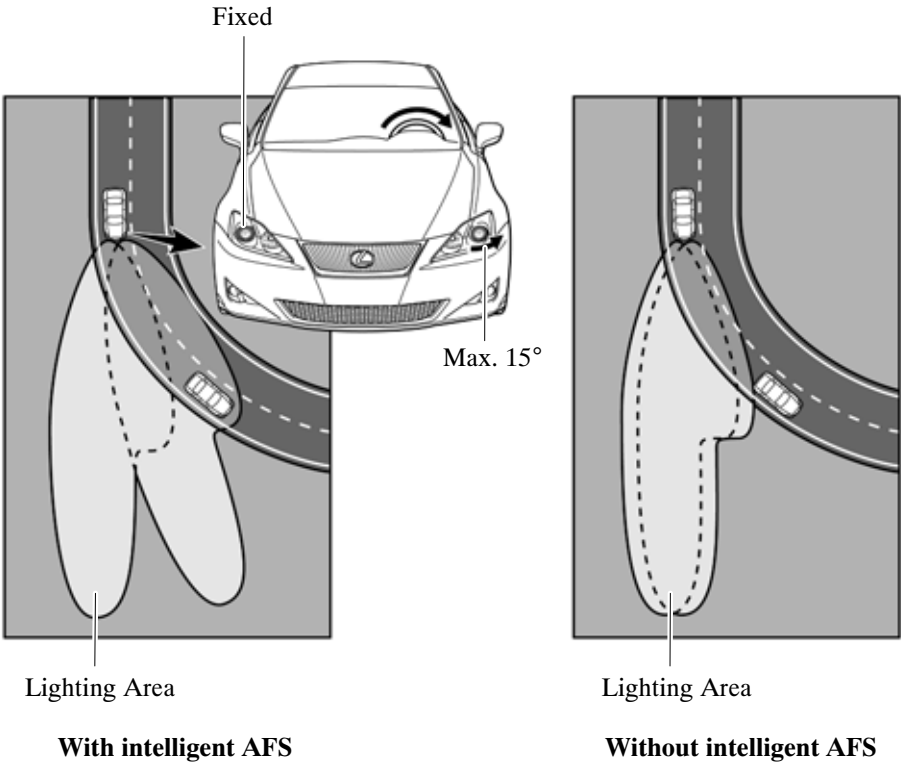


■ INTELLIGENT AFS (ADAPTIVE FRONT-LIGHTING SYSTEM)

1. General

An intelligent AFS (Adaptive Front-lighting System) is used in order to ensure a wide range of Lo/Hi beam (discharge bulb) lighting area and realize excellent visibility during turning by moving the Lo/Hi beam to the inside of the cornering direction.



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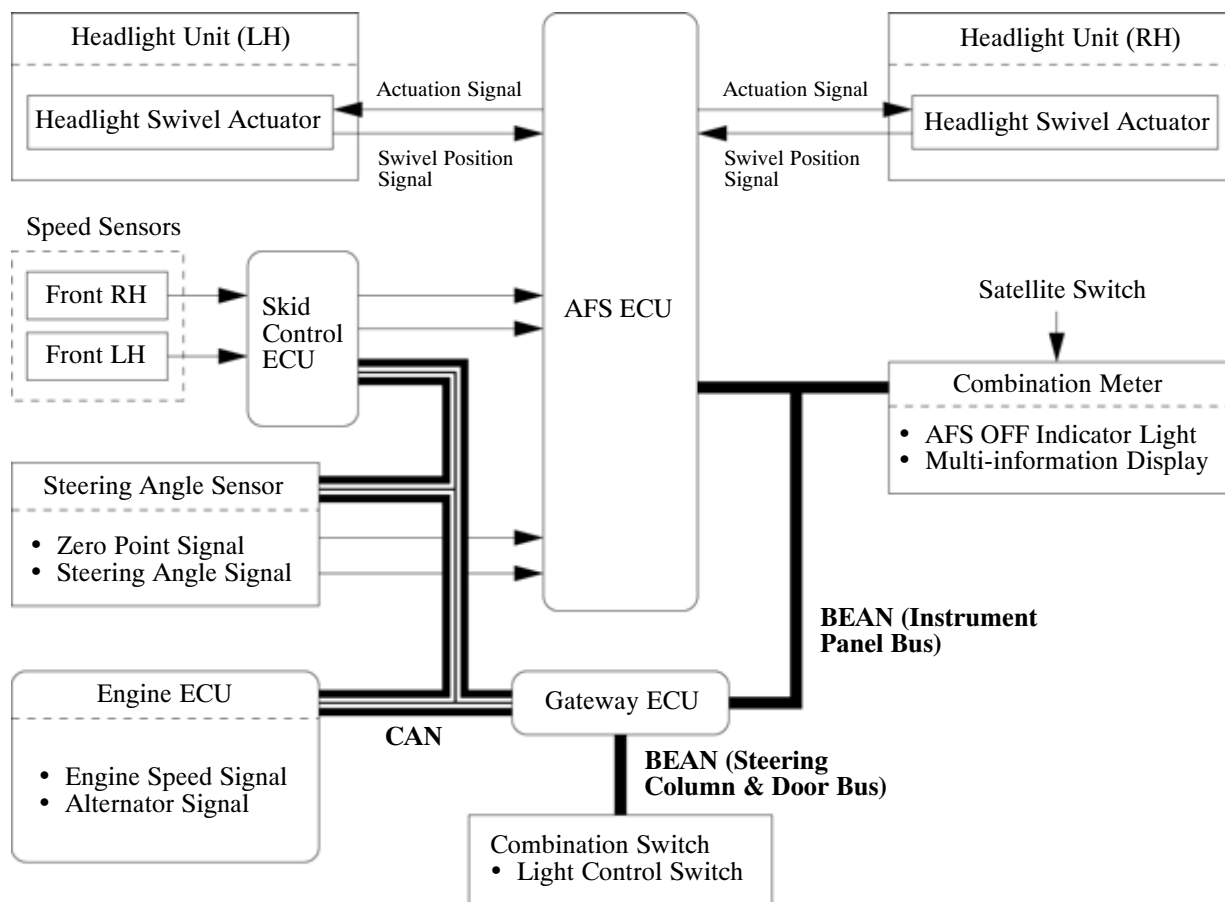
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► Swivel Angle Range ◀

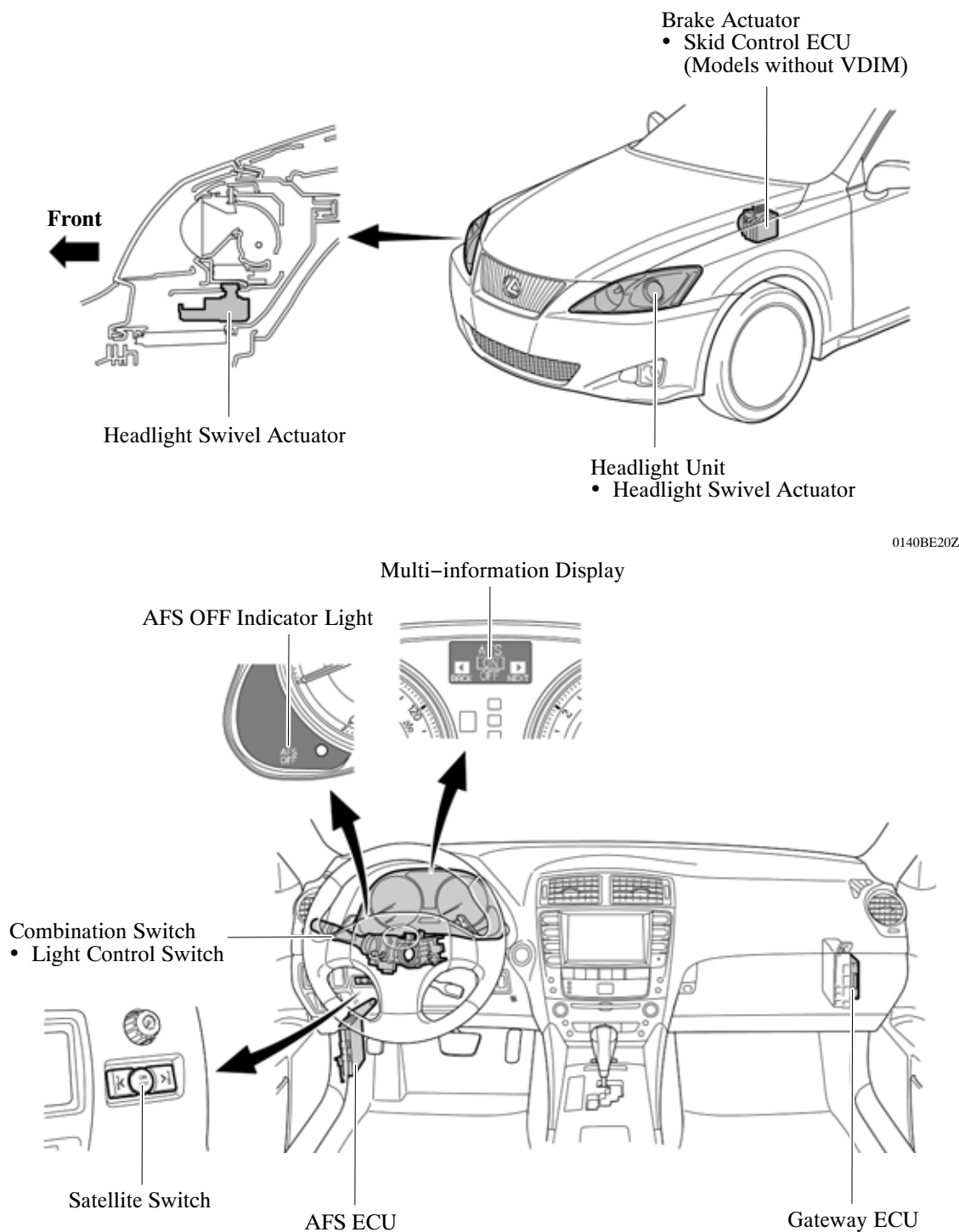
Driving Condition	RHD Models		LHD Models	
	Headlight Unit		Headlight Unit	
	Left	Right	Left	Right
Right Turn	0° Fixed	0 to 5° (to Right)	0° Fixed	0 to 5° (to Right)
Left Turn	0 to 15° (to Left)	0° Fixed	0 to 15° (to Left)	0° Fixed

2. System Diagram

- This system consists of two headlight units (for Lo/Hi beam), the AFS ECU, two headlight swivel actuators, steering angle sensor and front speed sensors. The AFS ECU controls this system.
- The AFS ECU also controls the automatic headlight beam level control system.



3. Layout of Main Component



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4. Function of Main Component

Component		Outline
Combination Meter		Transmits the vehicle speed signal to the AFS ECU for correction.
	AFS OFF Indicator Light	- When AFS control is stopped by the satellite switch and multi-information display, it is indicated by the AFS OFF indicator light lighting up. - When the AFS ECU detects a malfunction, the AFS OFF indicator light flashes.
	Multi-information Display	Changes to the multi-switch mode to display the AFS ON/OFF condition by operating the satellite switch. For details, see page BE-62 .
Satellite Switch (See page BE-62)		Operating this switch can enable or disables the operation of the AFS.
Steering Angle Sensor		- Detects the steering angle and direction and outputs this signal to the AFS ECU and the Skid Control ECU. - Outputs a zero point signal to the Skid Control ECU.
Speed Sensors (Front RH and LH)		Detect wheel speed and output signals to the Skid Control ECU.
Headlight Unit	Lo/Hi Beam	Is moved by the headlight swivel actuator.
	Headlight Swivel Actuator	Driven by the AFS ECU, the actuator moves the Lo beam to the left or right to the angle calculated by the AFS ECU. A stepper motor is used for the headlight swivel actuator. The AFS ECU determines the Lo/Hi beam angle based on the number of steps (position) of the stepper motor.
Skid Control ECU		- Transmits the signals of the front RH and LH speed sensors to the AFS ECU. - Receives the zero point signal from the steering angle sensor and transmits it to the AFS ECU via Gateway ECU.
Light Control Switch		Transmits the light control switch signal to the AFS ECU.
AFS ECU		- The AFS ECU receives various signals, calculates the target lighting angle, and actuates the headlight swivel actuator. - When the AFS ECU detects a malfunction, the AFS ECU flashes the AFS OFF indicator light.

5. System Control

General

The system control consists of the initial set control, basic control, fail-safe, and diagnosis. The AFS ECU performs intelligent AFS control when all the following conditions are fulfilled.

- Engine is running.
- Vehicle speed is 6 mph (10 km/h) or more.
- Steering angle is $\geq 7.5^\circ$ or more.
- Headlight Lo/Hi beam operates (except when the daytime running light system is operating).
- AFS ON/OFF condition is ON.

*: Swivel angle change is accordance with the vehicle speed and steering angle.

- The minimum vehicle speed to change the swivel is 6 mph (10 km/h) if the steering angle is large.
- The minimum steering angle to change the swivel is 7.5° if the vehicle speed is high.

Initial Set Control

When the engine is started, the AFS ECU drives the headlight swivel actuator and moves the projector headlight to the left and right operation limit. Then it returns to the proper position. The AFS ECU thus assesses the position of the headlight for reference control.

Basic Operation

- The AFS ECU calculates the target lighting angle of the Lo/Hi beam by receiving the steering angle and the vehicle speed. Then, it actuates the headlight swivel actuator in order to attain the target lighting angle.
- The operation angle of the headlights is detected by the position (number of steps) of the stepper motor in the headlight swivel actuator.

Fail-Safe

If the AFS ECU detects a malfunction in the automatic headlight beam level control system or intelligent AFS, it will take the actions indicated in the table below.

Trouble Area	Operation		AFS OFF Indicator Light
	Automatic Headlight Beam Control System	Intelligent AFS	
AFS ECU Malfunction	Stops at current condition.	Stops operating at the position when fail-safe is judged.	–
Speed Sensor Signal Malfunction	Control continues only when the vehicle is stopped.	Stops the operating after returning to the initial setting.	Flash
Height Control Sensor Signal Malfunction	- Stops the operation after returning to initial position (Fail at higher than initial position). - Stops the operation at current condition (Fail at lower than initial position).	Stops operating after returning to the initial position.	Flash
Steering Angle Sensor Signal Malfunction	Continues to control until a position of 0.7° less than the current position is reached, and resumes normal operation after returning to the initial position.	Stops operating after returning to the initial position.	Flash
Headlight Swivel Actuator Malfunction	Continues to control until a position of 0.7° less than the current position is reached.	The normal side swivel actuator comes to the initial position and the abnormal side swivel actuator stops in its current position.	Flash
Headlight Level Actuator Malfunction	- Stops the operation after returning to initial position (Fail at higher than initial position). - Stops at current condition (Fail at lower than initial position).	Stops the operation after returning to initial position.	Flash
Communication Signal Malfunction - Vehicle Speed Signal - Alternator Signal	Control is continued.	Stops the operation after returning to initial position.	Flash
Communication Signal Malfunction Others Signal	Control is continued.	Stops the operation after returning to initial position.	Flash

Diagnosis

If the AFS ECU detects a malfunction in the intelligent AFS, the AFS ECU blinks the AFS OFF indicator light in order to alert the driver. At the same time, the DTC (Diagnostic Trouble Codes) are stored in memory. The DTC can be read by the use of the intelligent tester II. For details, see the LEXUS IS250 Repair Manual (Pub. No. RM0150E).