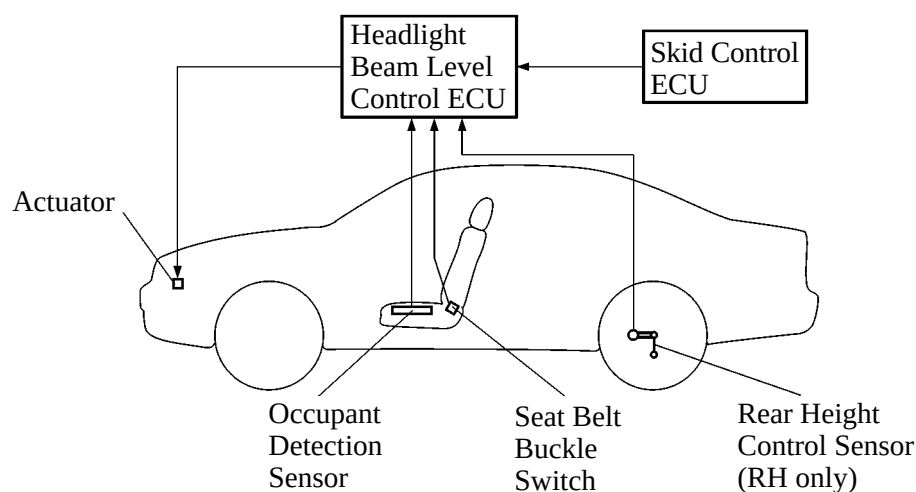


■ AUTOMATIC HEADLIGHT BEAM LEVEL CONTROL SYSTEM

1. General

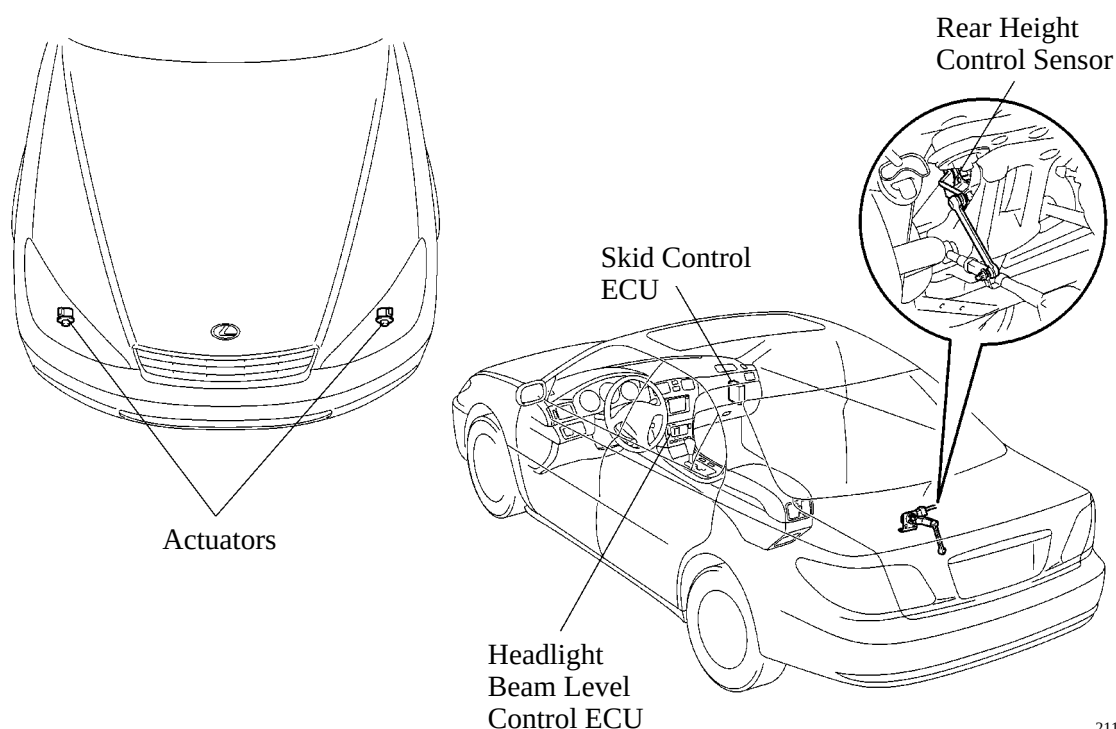
- The automatic headlight beam level control system regulates the orientation of the reflectors of the headlights in relation to the posture of the vehicle that has been detected by sensors. Thus, it is a system that maintains the headlight beams to a constant level while the vehicle is being driven.
- On the '01 ES300, the headlight beam level control ECU assessed the vehicle's posture through the signals from the rear height control sensor. On the '02 ES300, however, another piece of information has been added to the information that is used for assessing the vehicle's posture. The additional information determines whether or not the front passenger seat is occupied. This is accomplished by way of the ON/OFF signal of the occupant detection sensor, which is built into the front passenger seat, and the seat belt buckle switch. As a result, the precision of this system has been improved.

► System Diagram ◀



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2. Layout of Main Component



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3. Construction

Headlight Beam Level control ECU

Based on the signals that are transmitted by height control sensors, the occupant detection sensor and the skid control ECU, this ECU detects the amount of variance of the vehicle posture.

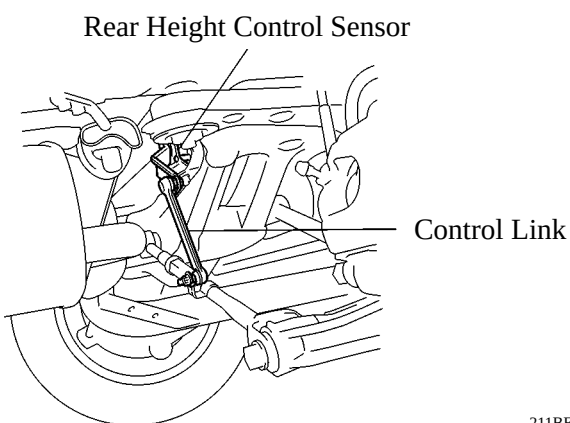
Based on the detected value, this ECU outputs control signal to the actuator.

The headlight beam level control ECU provides initial set control and fail-safe function.

Rear Height Control Sensor

The rear height control sensor detects the amount of variance of the vehicle height while the vehicle is being driven, and output this amount in the form of signal to the headlight beam level control ECU.

This sensor is located in the rear right suspension.



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Service Tip

The headlight beam level control ECU has the initial value of the rear height control sensor stored in its memory. Therefore, if a repair that alters the output value of the rear height control sensor has been performed (such as the removal and reinstallation of the rear height control sensor or the suspension), it is necessary to initialize the sensor and adjust the beams. For details, refer to the 2002 LEXUS ES300 Repair Manual (Pub. No. RM911U).

Occupant Detection Sensor and Seat Belt Buckle Switch

The ON/OFF signals of the occupant detection sensor that is built into the front passenger seat and the seat belt buckle switch determine whether the front passenger seat is occupied. The signals are then transmitted to the headlight beam level control ECU. The occupant detection sensor is shared with the seat belt warning system.

Skid control ECU

The skid control ECU outputs the wheel speeds to the headlight beam level control ECU. The wheel speeds are calculated based on the signals which are received from the speed sensors which are part of the ABS.

Actuator

Based on the signals received from the headlight beam level control ECU, each actuator moves the reflector in the headlight to vary its beam. This actuator uses a step motor to precisely regulate the angle of the reflector.

4. Operation

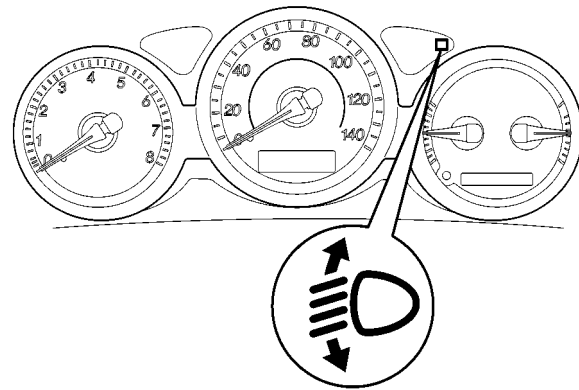
While the vehicle is being driven, the rear height control sensor detects the vehicle's posture that varies in accordance with the road conditions or driving conditions. The resultant signals are then output to the headlight beam level control ECU. Based on these signals from the sensor, the ECU assesses the vehicle's posture. If the front passenger seat is occupied, as determined by the ON/OFF signals from the occupant detection sensor that is built into the front passenger seat and the seat belt buckle switch, control is effected by making a correction to the vehicle posture information provided by the rear height control sensor.

In addition, the Skid Control ECU sends the vehicle speed signal to the headlight beam level control ECU, allowing the this ECU to determine the vehicle's driving conditions.

This ECU controls the actuator so as to cancel out the changes in the light beams that are caused by these changes in the vehicle's posture and speed.

5. Fail-Safe Function

The headlight beam level control ECU operates in the fail-safe mode if an abnormal condition such as those listed below has been detected, and illuminates the automatic headlight leveling system warning light in the combination meter.



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Item	Abnormality Detection Condition	Description of Control
Actuator	Open or Short	Holds the beam at the position of the actuator when the abnormality has been detected.
Rear Height Control Sensor	Signal Level Abnormality	Returns the beam to the actuator's initial set position if an abnormality has been detected higher than the initial set position.
		Holds the beam at the position of the actuator when an abnormality has been detected, if the abnormality has been detected lower than the initial set position.
Headlight Beam Level Control ECU	When an abnormal processing of the CPU has been detected.	Holds the beam at position of the actuator when the abnormality has been detected.