

■AUTOMATIC HEADLIGHT BEAM LEVEL CONTROL SYSTEM

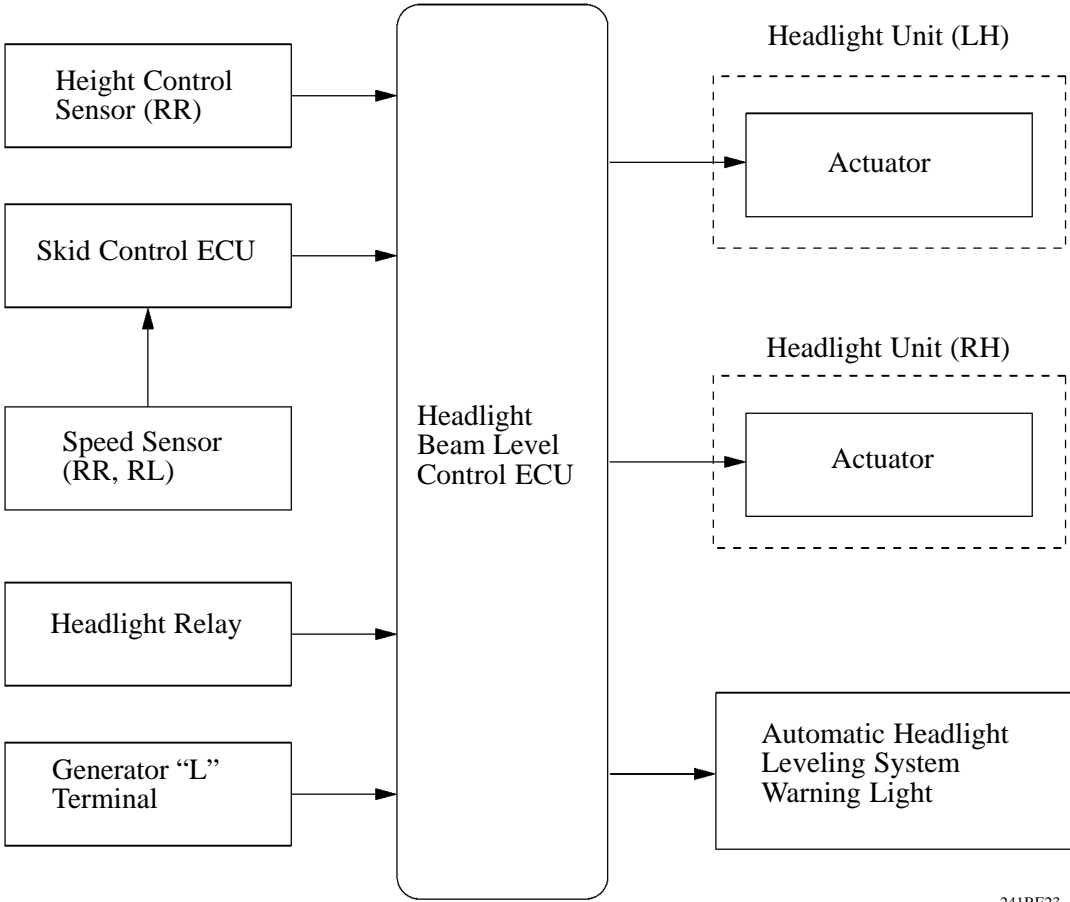
1. General

- 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 sensor. Thus, it is a system that maintains the headlight beams to a constant level while the vehicle is being driven.
This system is optional equipment.
- This system has the differences shown in the table below for models with AFS (air suspension model) and without AFS (coil suspension model). However, basic operation is the same for both models.

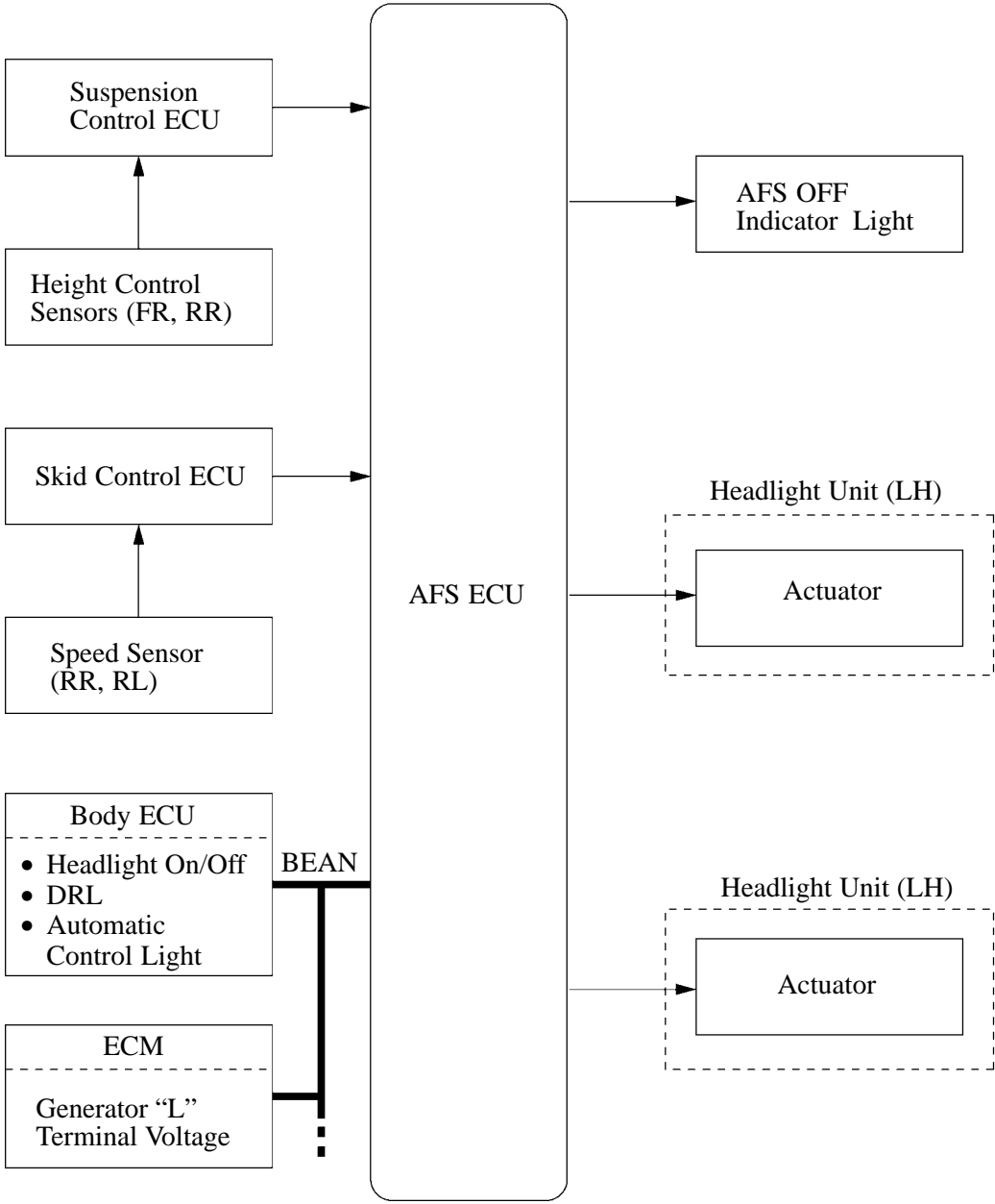
| | without AFS (with coil spring suspension) | with AFS (with air suspension) |
|------------------------------|--|--|
| Headlight Beam Level Control | Reflector is driven up and down by 1 actuator (step motor type) | ← |
| Vehicle Height Detection | 1 Height Control Sensor | 2 Height Control Sensors |
| System Control | Headlight Beam Level Control ECU | AFS ECU |
| Operation in System abnormal | <ul style="list-style-type: none">• Lights up the automatic headlight leveling system warning light• System control in fail-safe mode | <ul style="list-style-type: none">• AFS OFF indicator light Flashing• System control in fail-safe mode• DTC (Diagnostic Trouble Code) output |

2. System Diagram

► Models without AFS ◀

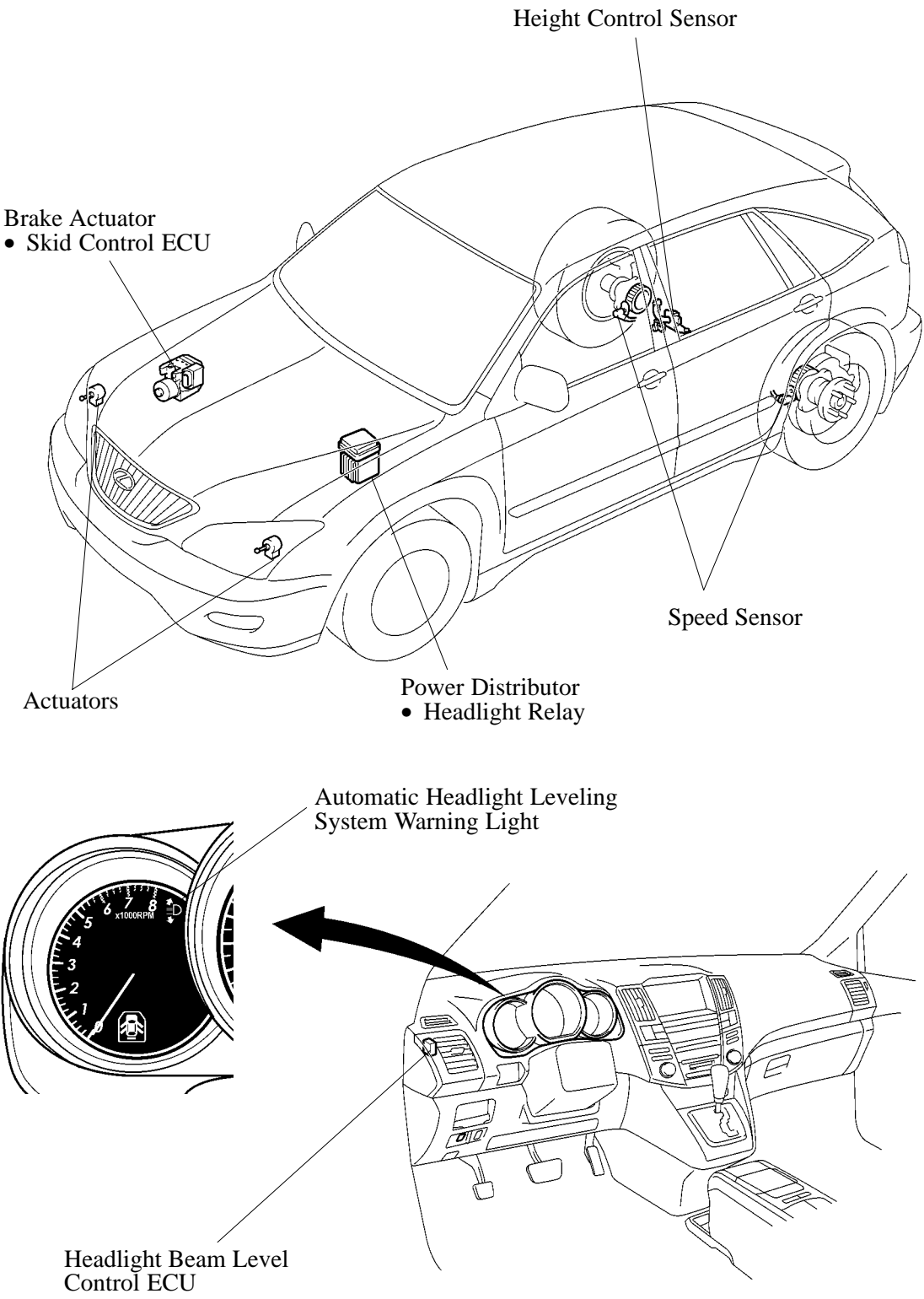


► Models with AFS ◀

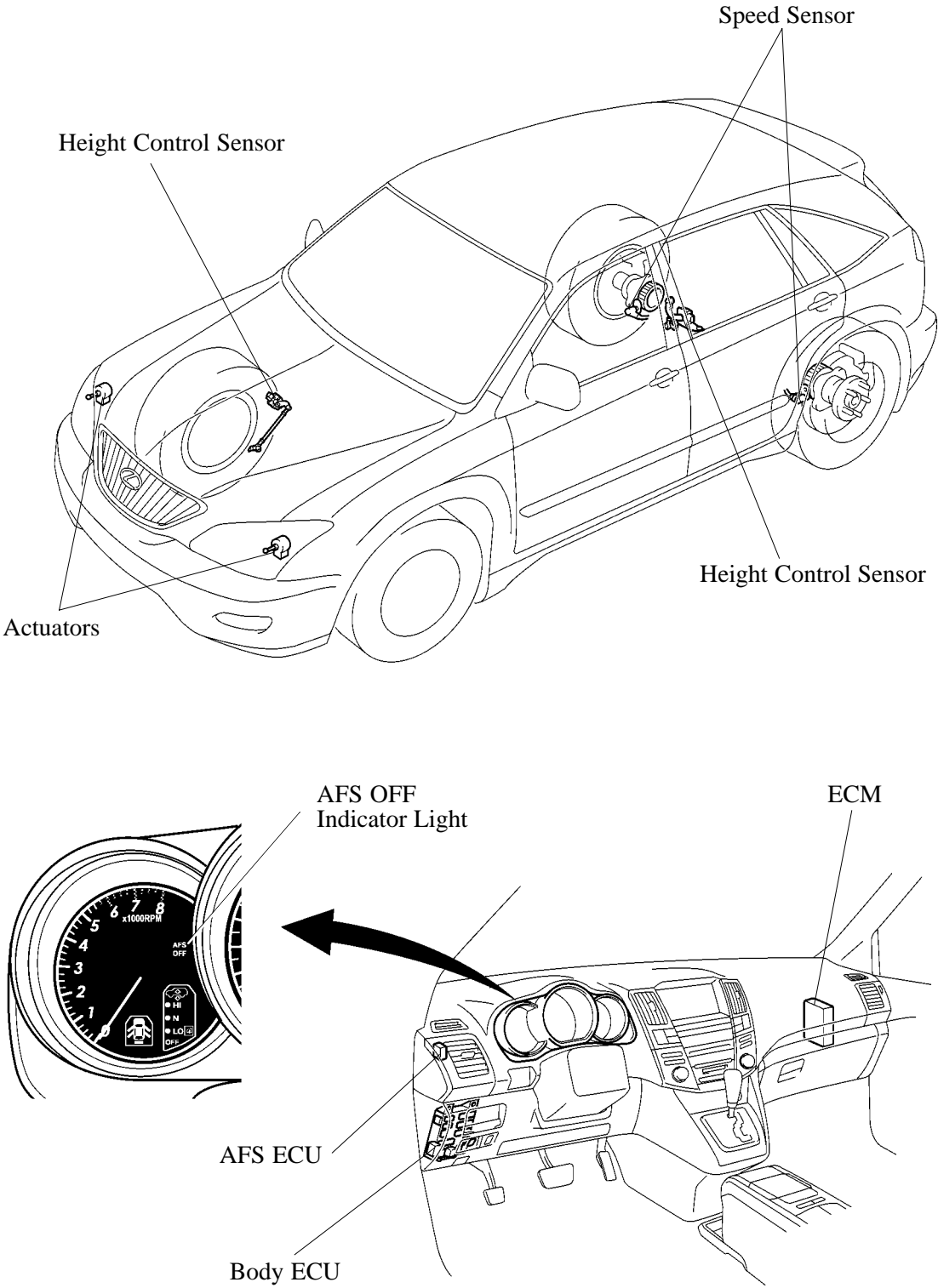


3. Layout of Main Components

► Models without AFS ◀



► Models with AFS ◀



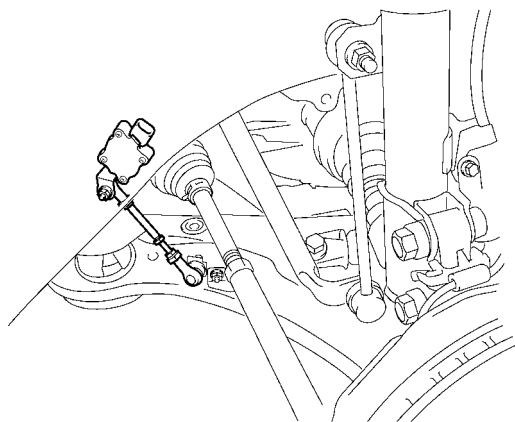
4. Construction

AFS ECU (models with AFS)/Headlight Beam Level Control ECU (models without AFS)

- This system is controlled by the AFS ECU in models with AFS. In models without AFS, this system is controlled by the headlight beam level control ECU, the same as in the '03 RX300. However, basic operation of both ECUs is the same.
- Based on the signals that are transmitted by the front height control sensor (only for models with AFS), rear height control sensor (for both models) 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 signals to the actuator.
- The headlight beam level control ECU provides initial set control and a fail-safe function. In addition to this function, the AFS ECU also outputs the DTC for malfunction locations.

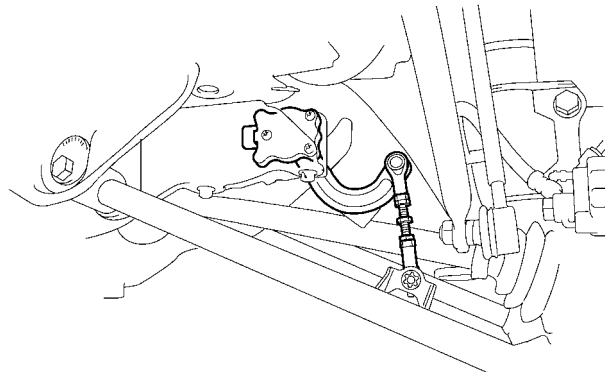
Height Control Sensor

The front height control sensor (only for models with AFS) and the rear height control sensor (for both models) detects the amount of variance of the vehicle height while the vehicle is being driven, and output this amount in the form of signals to the AFS ECU/headlight beam level control ECU.



241BE26

Front



241BE27

Rear

For Models with AFS

Service Tip

After removal and installation of the height control sensor and height control sensor link on models with air suspension system is completed, it is necessary to check that the vehicle height is at the standard vehicle height (normal vehicle height). If removing and installing the sensor or link of some of the wheels is performed, check the vehicle height on the applicable wheels. For details, see page CH-58.

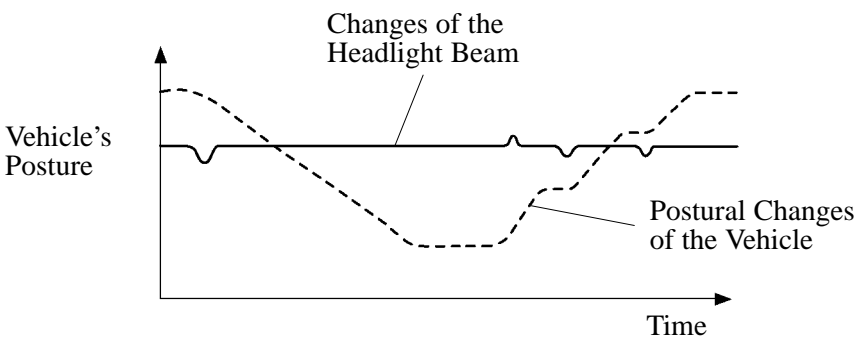
Actuator

Based on the signals received from the AFS ECU (models with AFS)/headlight beam level control ECU (models without AFS), 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.

5. Operation

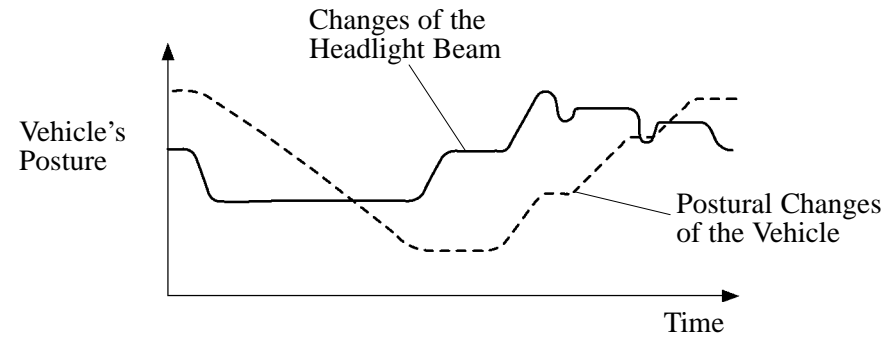
The AFS ECU (models with AFS)/the headlight beam level control ECU (models without AFS) is input the vehicle speed signal from the skid control ECU and the posture change signal of the vehicle from the height control sensor.

Based on these signals, the AFS ECU (models with AFS)/the headlight beam level control ECU (models without AFS) calculates the vehicle's pitch angle change and controls the actuator in accordance with that change amount, and then operates the reflector of the headlight.



151LBE21

with Automatic Headlight Beam Level Control



151LBE20

without Automatic Headlight Beam Level Control

6. Initial Set Control

When the ignition switch is turned ON, the AFS ECU (models with AFS)/the headlight beam level control ECU (models without AFS) operates the actuator to lower the light beams to the lowest end. Then, it returns to the proper position. Thus, AFS ECU (models with AFS)/the headlight beam level control ECU (models without AFS) assesses the position of the light beam that forms the reference for control.

7. Fail-Safe Function

The AFS ECU (models with AFS)/the headlight beam level control ECU (models without AFS) operates in the fail-safe mode if an abnormal condition such as those listed below has been detected, and blinks the AFS OFF indicator light (models with AFS)/illuminates the automatic headlight leveling system warning light (models without AFS).

► Models with AFS ◀

| Trouble Area | Headlight Leveling Actuator | Headlight Swivel Actuator | AFS OFF Indicator Light |
|--|--|---|-------------------------|
| Vehicle signal malfunction | Controlling continues | Stops operation after returning to initial position | Blinks |
| Vehicle height signal malfunction | Stops operation after returning to initial position (Fail at higher than initial position) Stops at current condition (Fail at lower than initial position) | Stops operation after returning to initial position | Blinks |
| Leveling actuator malfunction | Stops at current condition | Stops operation after returning to initial position | Blinks |
| Steering sensor malfunction | Lowers by 0.8° than current position and then re-starts controlling | Stops at current condition and then returning to initial position | Blinks |
| Communication signal malfunction | Controlling continues | Stops operation after returning to initial position | Blinks |
| Swivel actuator voltage malfunction | Controlling continues | Stops operation after returning to initial position | Goes off |
| Swivel actuator operation malfunction | Lowers by 0.8° than current position | Stops operation after returning to initial position (Stops at current condition when unable to operate) | Blinks |
| Swivel actuator communication signal malfunction | Lowers by 0.8° than current position | Stops operation after returning to initial position (Stops at current condition when unable to operate) | Blinks |
| AFS ECU malfunction | Stops at current condition | Stops at current condition and then returning to initial position | Goes off |

► Models without AFS ◀

| Item | Abnormality Detection Condition | Description of Control |
|-----------------------|---------------------------------|---|
| Actuator | Open Short | Holds the beam at the position of the actuator when the abnormality has been detected. |
| Speed Sensor | Open Short | Control using normal speed sensor signal. |
| 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. |

8. Diagnosis (models with AFS)

- When the AFS ECU detected a malfunction in the automatic headlight beam level control system, the AFS ECU makes a DTC (Diagnostic Trouble Code) of that malfunction is stored in memory.
- The DTC can be accessed the use of the hand-held tester. For details, see the 2004 LEXUS RX330 Repair Manual (Pub. No. RM1027U).
- The table below indicates the DTCs that are associated with this system.

| DTC No. | Detection Item | DTC No. | Detection Item |
|---------|---|---------|---|
| B2410 | Headlight swivel ECU LH communication malfunction | B2416 | Height Control Sensor malfunction |
| B2411 | Headlight swivel ECU RH communication malfunction | B2417 | Headlight beam level control motor LH malfunction |
| B2412 | Headlight swivel motor LH malfunction | B2418 | Headlight beam level control motor RH malfunction |
| B2413 | Headlight swivel motor RH malfunction | B2419 | BEAN communication malfunction |
| B2414 | Steering position sensor malfunction | B2420 | AFS ECU malfunction |
| B2415 | Vehicle speed sensor malfunction | — | — |