

ADAPTIVE VARIABLE SUSPENSION SYSTEM > DETAILS

FUNCTION OF MAIN COMPONENTS

Component	Function
Absorber Control Actuator	Changes the damping force of the shock absorbers.
Shock Absorber Assembly	Changes the oil flow passage by rotating the rotary valve, and switches the damping force.
Front and Rear Acceleration Sensor	Detects the vertical acceleration rate of the body.
Steering Angle Sensor	Detects the steering direction and the angle of the steering wheel.
Yaw Rate Sensor Assembly	<ul style="list-style-type: none"> • Detects the vehicle's yaw rate. • Detects the vehicle's longitudinal and lateral acceleration and deceleration.
Absorber Control Switch	Switches the damping force control mode.
Suspension Control ECU (with Built-in Front Acceleration Sensor LH)	<ul style="list-style-type: none"> • Estimates the condition of the vehicle in accordance with the signals provided by the sensors and switches, and outputs control signals to the absorber control actuators. • Detects the vertical acceleration rate of the body.
Skid Control ECU	<ul style="list-style-type: none"> • Sends the vehicle speed signal to the suspension control ECU. • Sends the brake pedal depressing signal to the suspension control ECU.
4WD Control ECU	Sends the transfer drive mode to the suspension control ECU.
Driving Support ECU Assembly (Models with Dynamic Radar Cruise Control System)	Makes a request for damping force control to the suspension control ECU.
ECM	Sends the drive torque signal to the suspension control ECU.

SYSTEM CONTROL

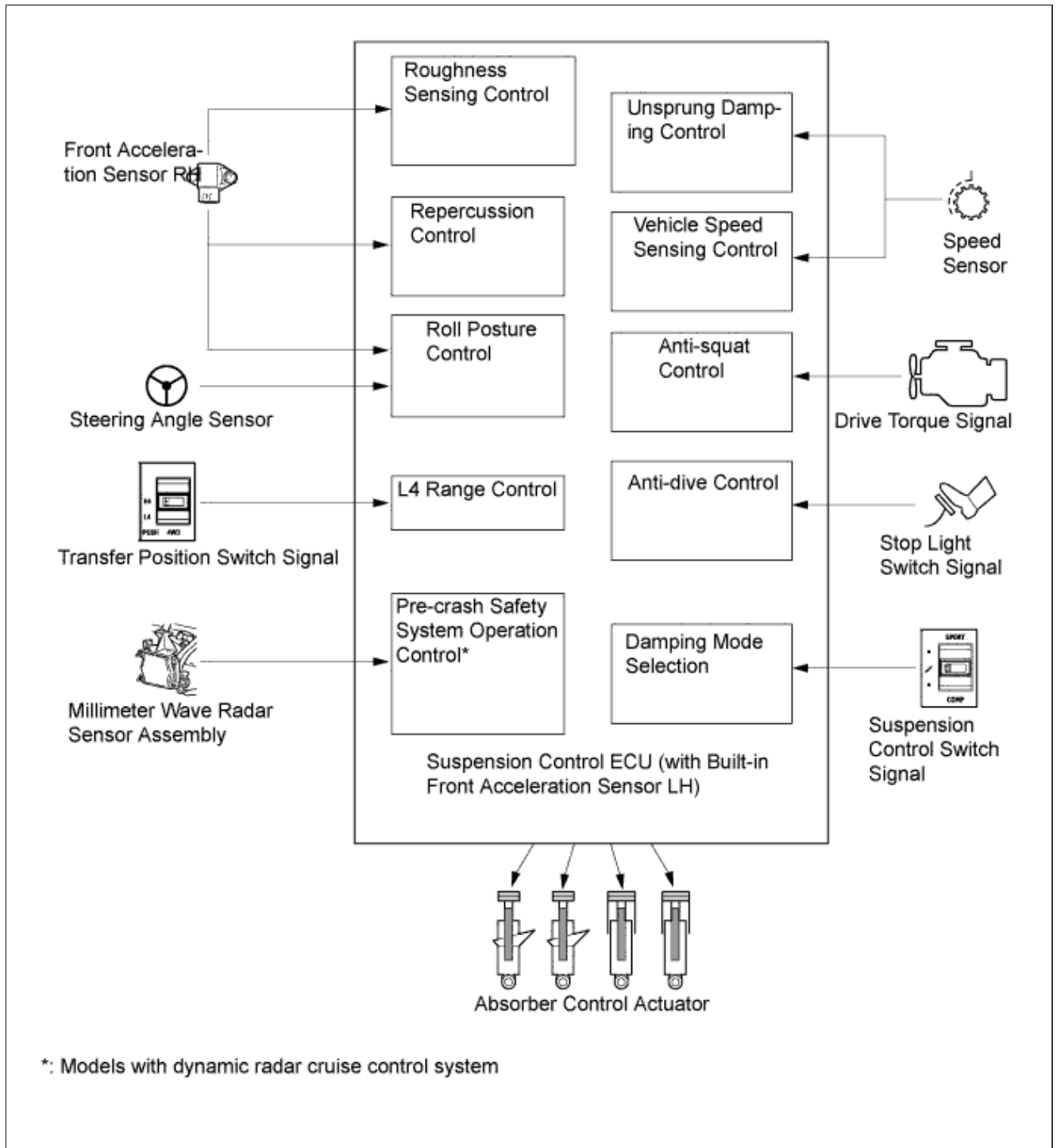
a. The AVS effects the following controls:

Control	Outline
Repercussion Control (Non-linear H_{∞} Control)	Smoothly changes the damping force to a target value in accordance with the changes in the road surface or driving conditions. In this way, excellent ride comfort is achieved while ensuring a high level of vibration damping performance.
Roughness Sensing Control	When the road surface condition does not require a damping force, this function controls the shock absorbers so that their damping force will not increase.
Unsprung Damping Control	If unsprung resonance is detected, this function controls so that the damping force will not decrease below a certain level, in order to reduce the unsprung resonance.
Roll Posture Control	Regulates the damping force to reduce the phase difference between the vehicle roll and pitch angles

	during steering, thus providing smooth superior maneuverability.
Anti-dive Control	During braking, this function makes the damping force firmer to restrain the body dive, thus ensuring excellent stability and controllability.
Anti-squat Control	During acceleration, this function makes the damping force firmer to minimize the changes in the vehicle body posture.
Vehicle Speed Sensing Control	This function varies the variable range of the damping force in accordance with vehicle speed in order to achieve a soft and comfortable ride and a stable driving condition. The damping force is controlled at a softer variable range at low speeds, and at a firmer variable range at high speeds.
Damping Mode Selection	The absorber control switch enables the driver to select a desired damping force from the 3 modes.
Pre-crash Safety System Operation Control*	Switches damping force to the hard side in accordance with damping force control request signals from the driving support ECU assembly, and suppresses dive during braking.
L4 Range Control	The suspension control ECU controls damping force to a level that is optimal for driving on rough roads in the low speed range and for normal driving in the intermediate speed range, when the transfer drive mode is in L4F or L4L. This ensures ride comfort and driveability in off-road driving.

*: Models with dynamic radar cruise control system

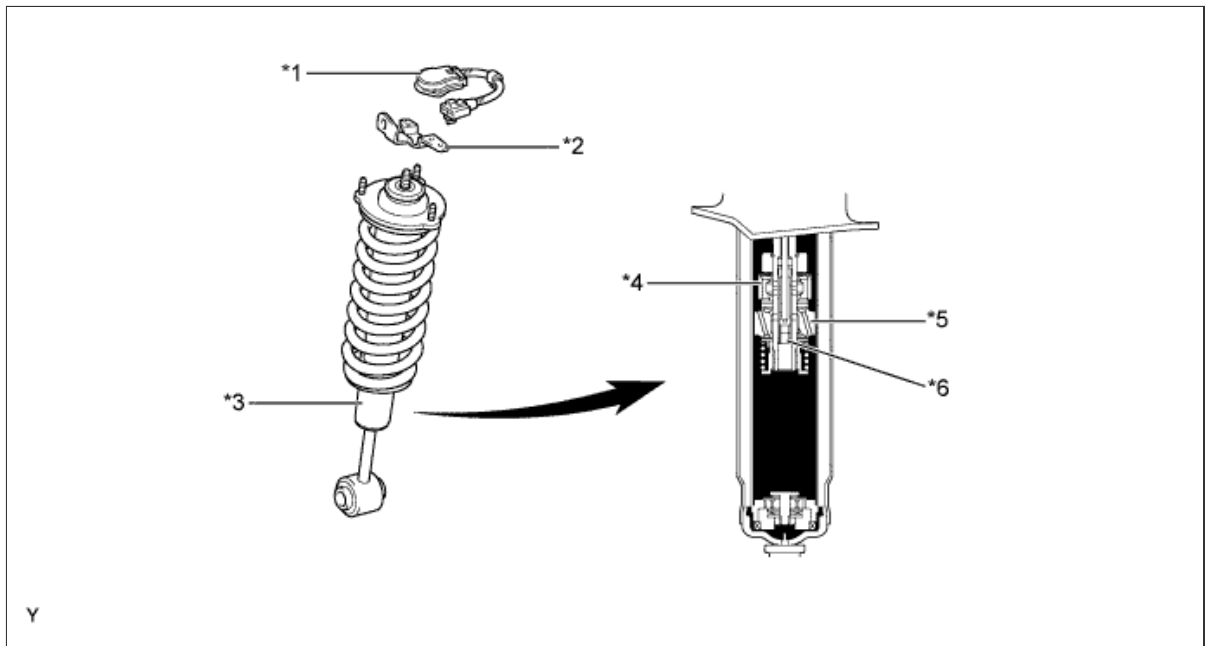
- b.** The suspension control ECU receives signals from the sensors and switches to control the absorber control actuators. It uses these signals to optimally control the damping force in accordance with the driving conditions and road conditions.



CONSTRUCTION

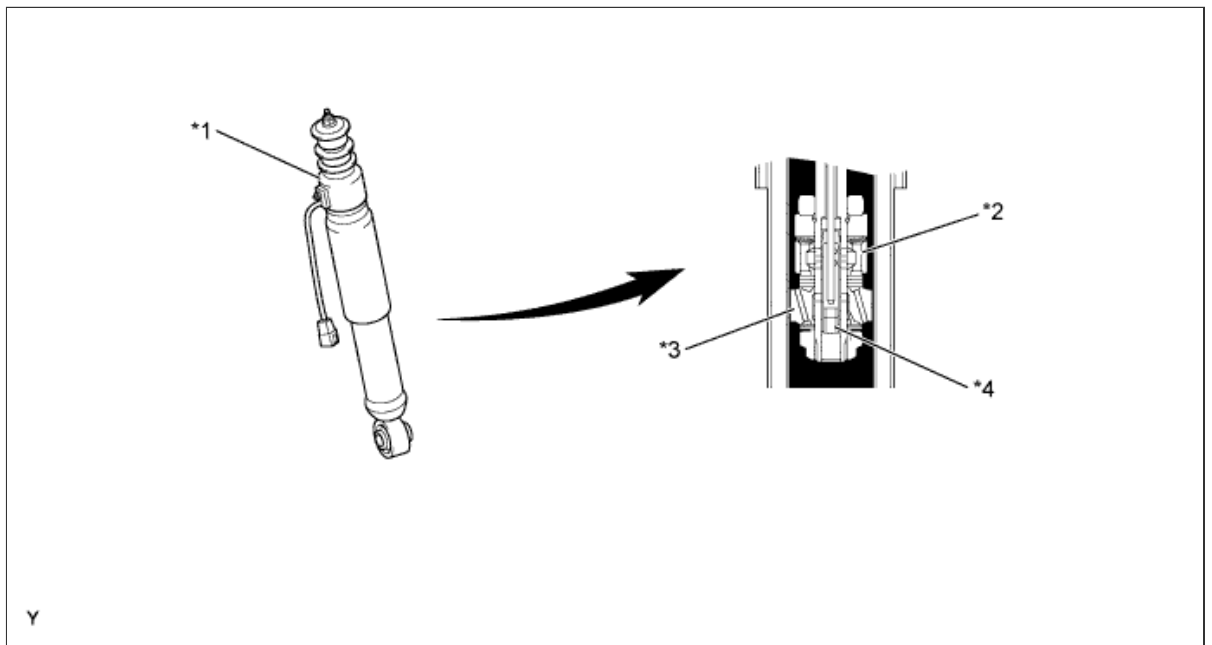
- a.** Shock Absorber Assembly and Absorber Control Actuator
 - i.** The front shock absorber assembly is equipped with an external actuator.
 - ii.** The rear shock absorber assembly is equipped with an internal actuator.

- iii. The piston rod is equipped with a rotary valve, a soft damping force valve and a hard damping force valve.



Text in Illustration (Front Shock Absorber)

*1	Front Absorber Control Actuator	*2	Actuator Bracket
*3	Front Shock Absorber Assembly	*4	Soft Damping Force Valve
*5	Hard Damping Force Valve	*6	Rotary Valve

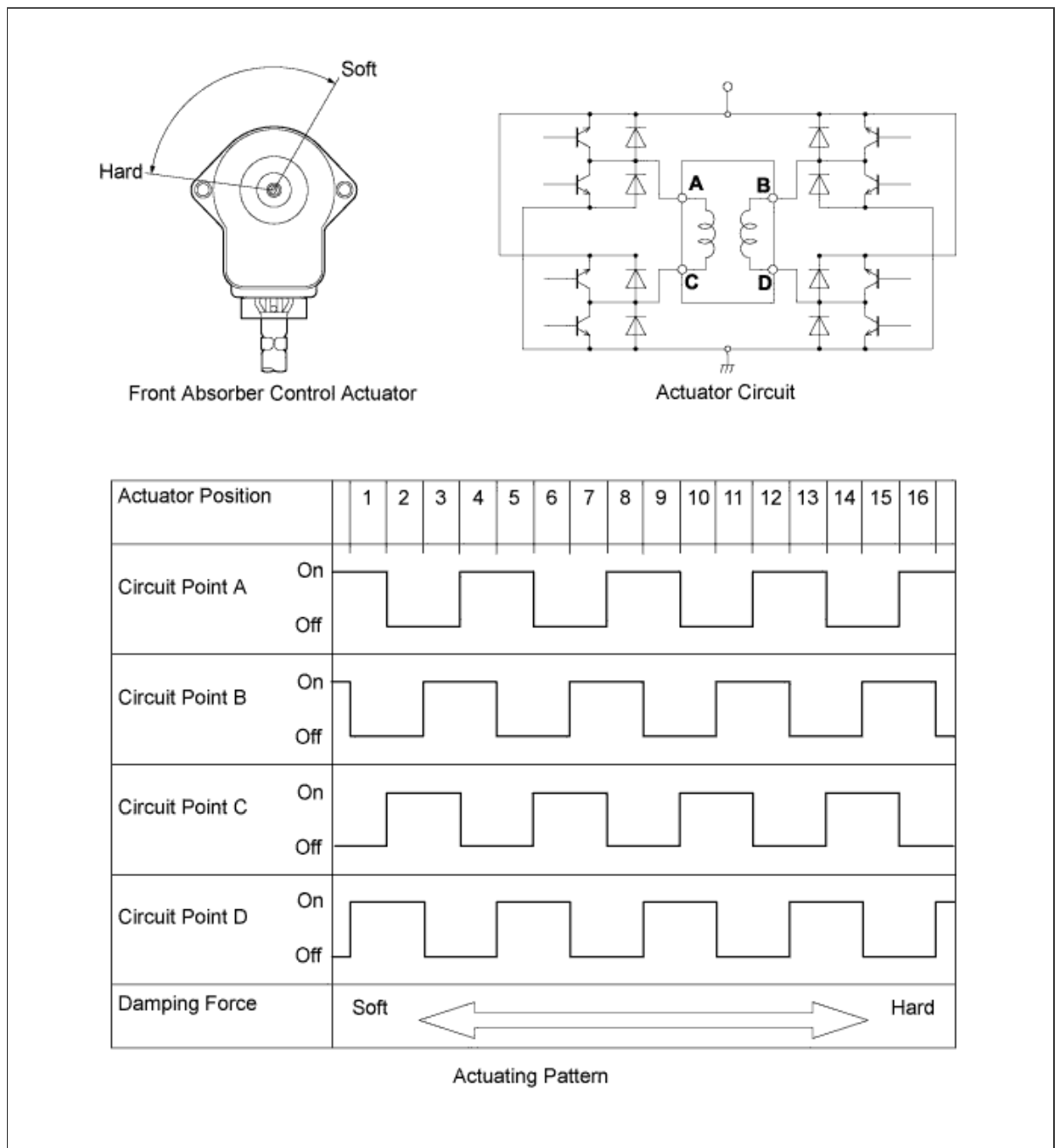


Text in Illustration (Rear Shock Absorber)

*1	Rear Shock Absorber Assembly - Absorber Control Actuator	*2	Soft Damping Force Valve
*3	Hard Damping Force Valve	*4	Rotary Valve

iv. An absorber control actuator changes the damping force in accordance with the signals received from the suspension control ECU.

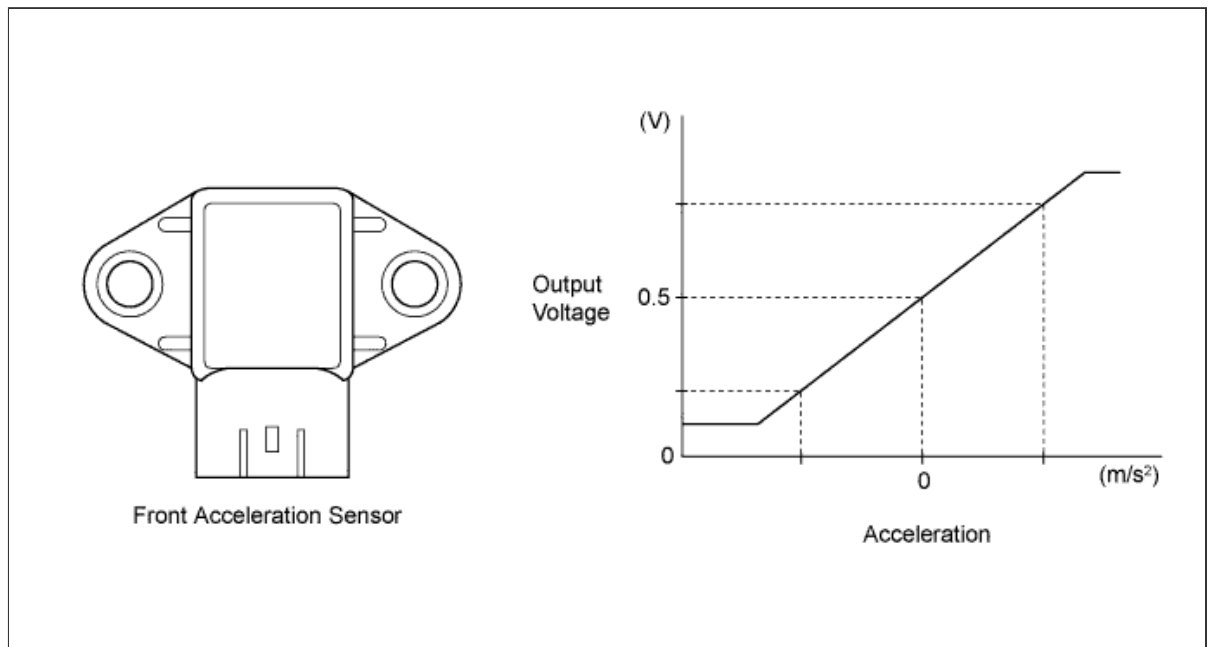
v. A 16-step step motor turns the rotary valve in the shock absorber assembly to vary the opening of the oil passage. This enables the damping force to be changed smoothly.



b. Front Acceleration Sensor

- i.** The front acceleration sensors detect the vertical movement of the body.

- ii.** The front acceleration sensors are placed on the right and left caul sides. The acceleration sensors independently detect the vertical acceleration rate.



FAIL-SAFE

- a.** If a malfunction occurs in the AVS, the suspension control ECU prohibits the damping force control.

DIAGNOSIS

- a.** The suspension control ECU will also store a Diagnostic Trouble Code (DTC). The DTC can be accessed through the use of an intelligent tester II. For details, refer to the corresponding Repair Manual for this model.

