■ BRAKE CONTROL SYSTEM (ABS)

1. General

The brake control system (ABS) of the new Hilux has the following function:

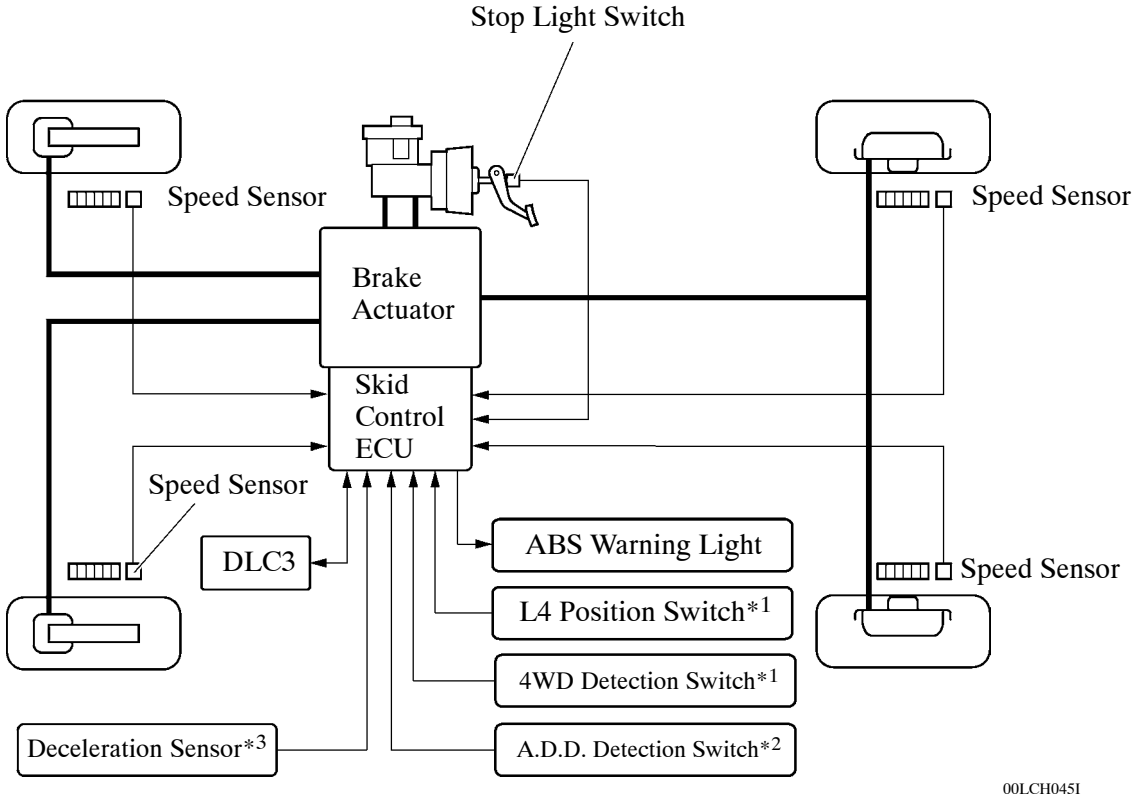
Function	Outline
ABS (Anti-lock Brake System)	The ABS helps prevent the wheels from locking when the brakes are applied firmly or when braking on a slippery surface.

Service Tip

When the brake control system is activated, the brake pedal may shudder. This is a normal occurrence of the system in operation and should not be considered a malfunction.

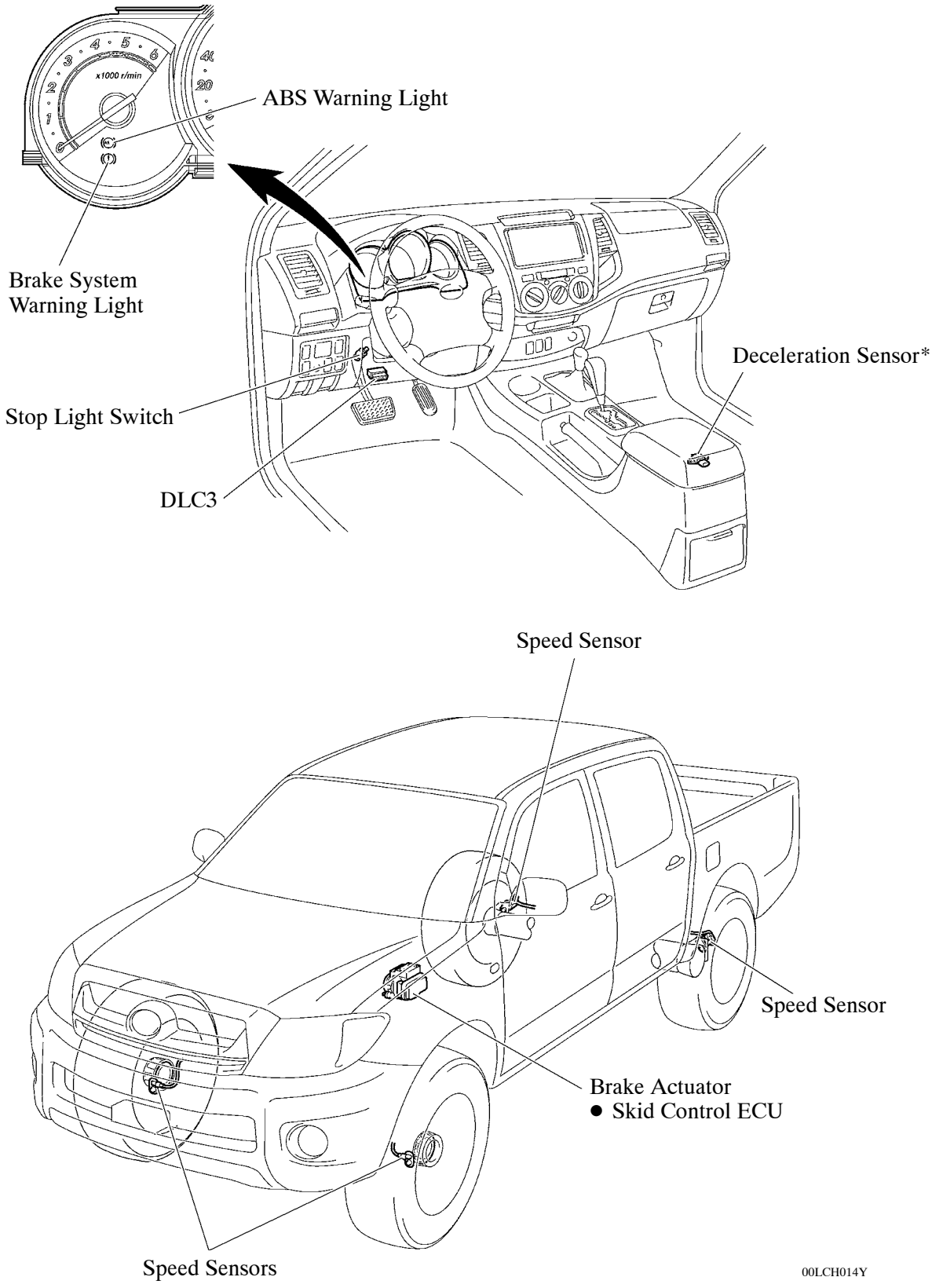
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▶ System Diagram ◀



*1: 4WD models
*2: 4WD models with A.D.D. shift actuator
*3: 2WD PreRunner and 4WD models

2. Layout of Main Components



*: 2WD PreRunner and 4WD models

3. Function of Main Components

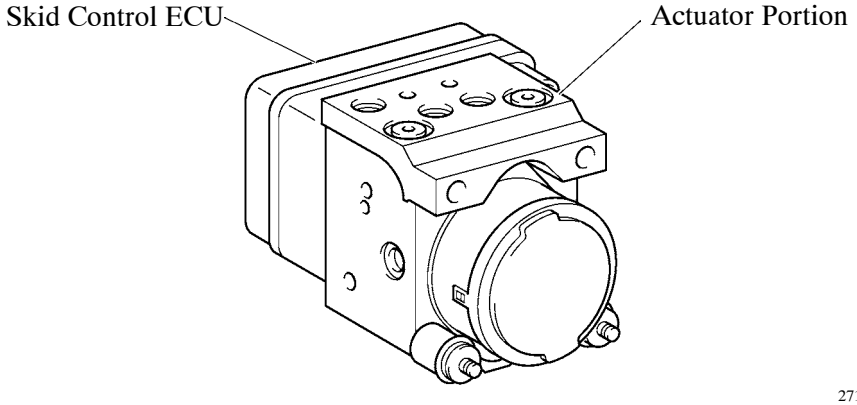
Components		Function
Brake Actuator		Changes the fluid path based on the signals from the skid control ECU during the operation of the ABS, in order to control the fluid pressure that is applied to the wheel cylinders.
	Skid Control ECU	Judges the vehicle driving condition based on signals from each sensor, and sends brake control signals to the brake actuator.
Combination Meter	ABS Warning Light	Lights up to alert the driver when the skid control ECU detects a malfunction in the ABS.
Speed Sensor		Detects the wheel speed of each wheel.
Deceleration Sensor*1		Detects the vehicle's acceleration in forward and reverse.
Stop Light Switch		Detects the brake pedal depression condition.
L4 Position Switch*2		Detects the L4 position condition.
A.D.D. Detection Switch*3		Detects the A.D.D. shift actuator operating condition.
4WD Position Switch*2		Detects the 4WD position condition.

*1: 2WD PreRunner and 4WD models
*2: 4WD models
*3: Models with A.D.D. shift actuator

4. Brake Actuator

General

A brake actuator with an integrated skid control ECU is used.



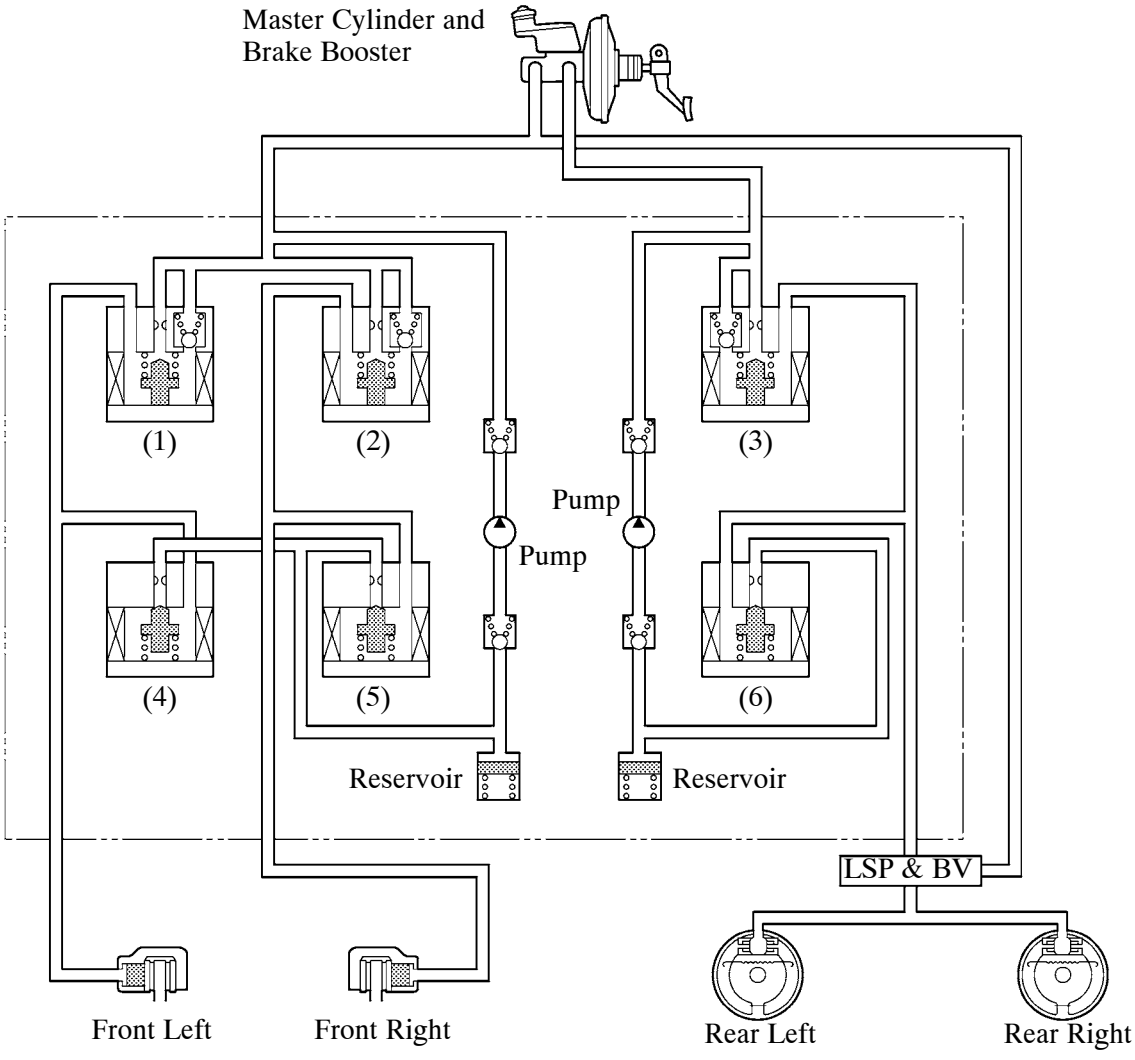
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Actuator Portion

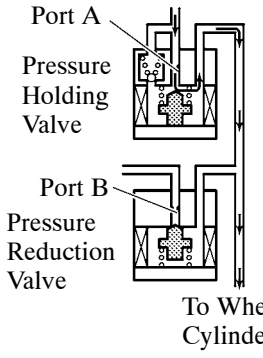
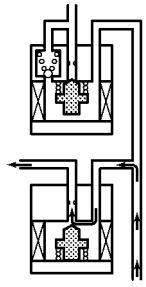
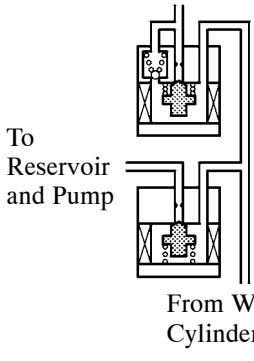
The brake actuator consists of 6 two-position solenoid valves, 1 motor, 2 pumps and 2 reservoirs. The 6 two-position solenoid valves consist of 3 pressure holding valves [(1), (2), (3)] and 3 pressure reduction valves [(4), (5), (6)].

▶ Hydraulic Circuit ◀



5. System Operation

Based on the signals received from the 4 wheel speed sensors, the skid control ECU calculates each wheel's speed and deceleration, and checks the wheel slipping condition. According to the slipping condition, the skid control ECU controls the pressure holding valve and pressure reduction valve in order to adjust the fluid pressure of each wheel cylinder in the following 3 modes: pressure reduction, pressure holding, and pressure increase modes.

Not Activated	Normal Braking	—	—
Activated	Increase Mode	Holding Mode	Reduction Mode
Hydraulic Circuit			
Pressure Holding Valve (Port A)	OFF (Open)	ON (Closed)	ON (Closed)
Pressure Reduction Valve (Port B)	OFF (Closed)	OFF (Closed)	ON (Open)
Wheel Cylinder Pressure	Increases	Holds	Reductions

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6. Skid Control ECU

Initial Check

The first time the ignition switch is turned ON, and the vehicle attains an approximate speed of 6 km/h (4 mph) or more, the skid control ECU performs the initial check.
The function of each solenoid valve and pump motor in the brake actuator are checked in order.

Self-diagnosis

- If the skid control ECU detects a malfunction in the ABS system, the ABS warning light that corresponds to the function in which the malfunction has been detected indicates or lights up to alert the driver of the malfunction.
- At the same time, the DTCs (Diagnostic Trouble Codes) are stored in memory. The DTCs can be read by connecting the SST (09843-18040) between the TC and CG terminals of DLC3 and observing the blinking of the ABS warning light (2-digit code), or by connecting an intelligent tester II (5-digit code).
- This system has a sensor signal check (test mode) function. This check function performs a speed sensor and a deceleration sensor checks. This function is activated by connecting an intelligent tester II.
- If the skid control ECU detects a malfunction during a sensor check, it stores the DTC in its memory. This DTC can be read during a sensor signal check operation by connecting the TC and CG terminals of the DLC3 and observing the blinking of the ABS warning light, or on an intelligent tester II.
- For details, refer to the Hilux Repair Manual.

Fail-safe

If a malfunction occurs in the signal system of the ABS system, the skid control ECU disables the ABS control.