

■ BRAKE CONTROL SYSTEM (ABS)

1. General

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

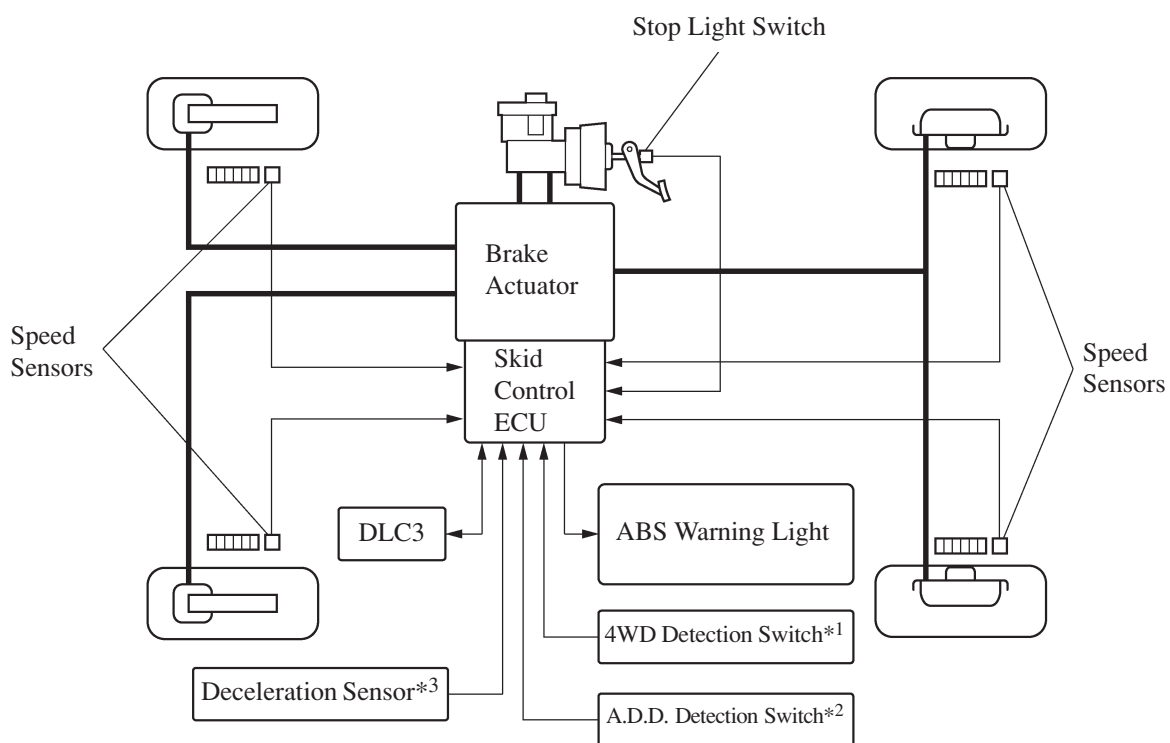
Function	Outline
ABS (Anti-lock Brake System)	The ABS helps prevent the wheels from locking when the brakes are applied firmly or when braking on a slippery surface.

Service Tip

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

► System Diagram ◀

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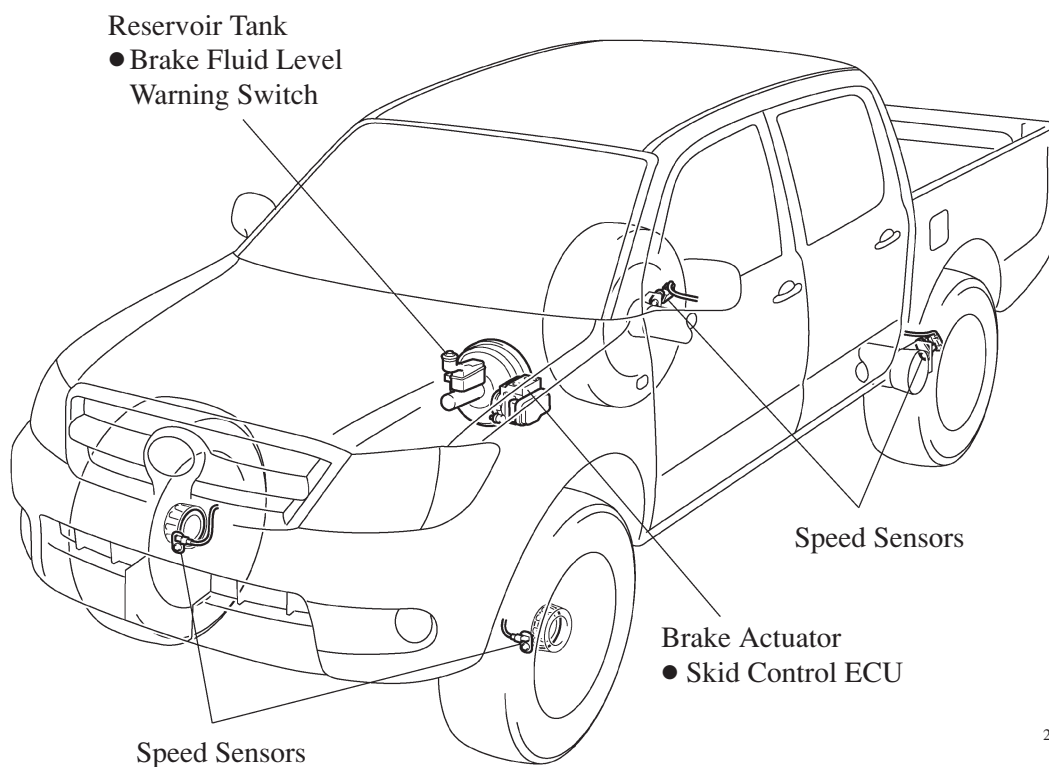
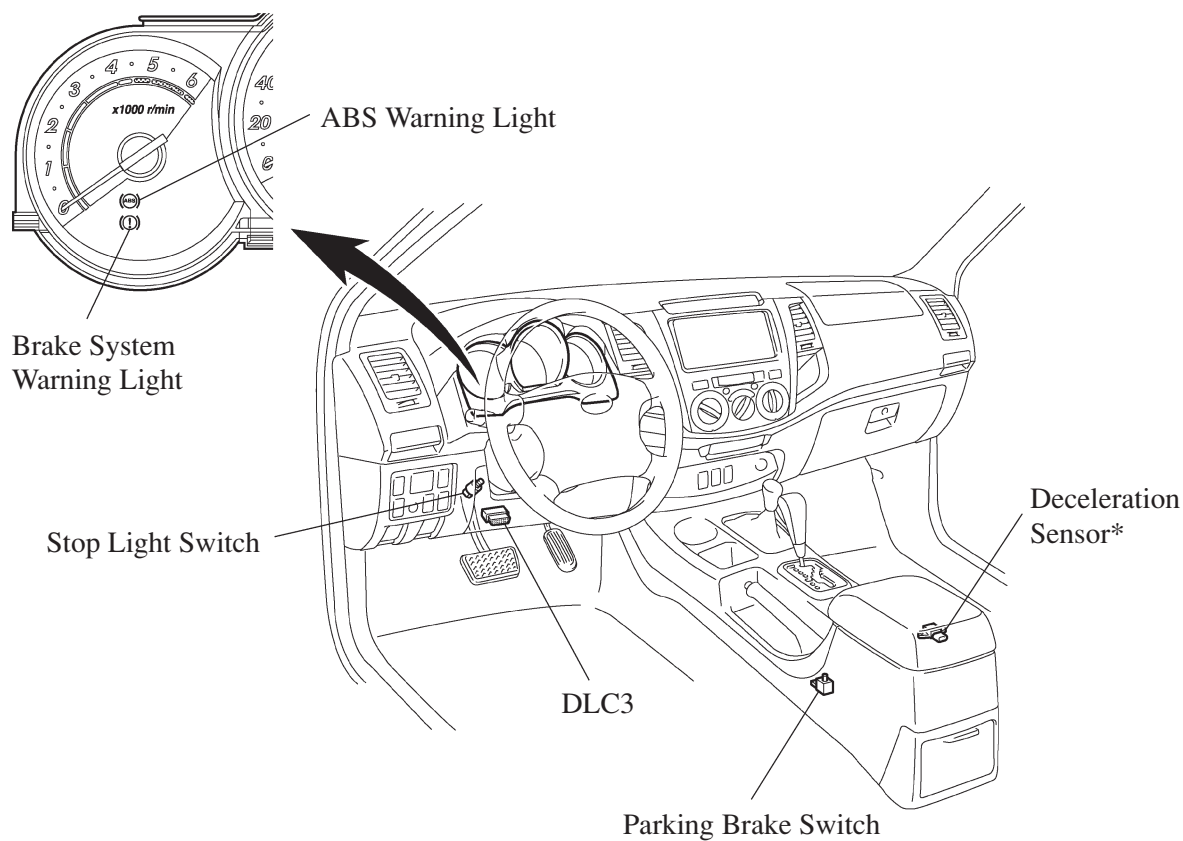


*1: 4WD model

*2: 4WD with A.D.D. model

*3: 4WD and PreRunner model

2. Layout of Main Components



LHD Model

*: Only for the 4WD and 2WD PreRunner models.

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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 (FL, FR, RL, RR)		Detects the wheel speed of each wheels.
Deceleration Sensor* ¹		Detects the vehicle's acceleration in the forward, and reward.
Stop Light Switch		Detects the brake pedal depressing condition.
Parking Brake Switch		Detects when the parking brake lever is pulled up.
4WD Model	L4 Position Switch	Detects the L4 position condition.
	A.D.D. Detection Switch* ²	Detects the A.D.D. shift actuator operating condition.
	4WD Position Switch* ³	Detects the 4WD position condition.

*¹: Only for the 4WD and 2WD PreRunner models.

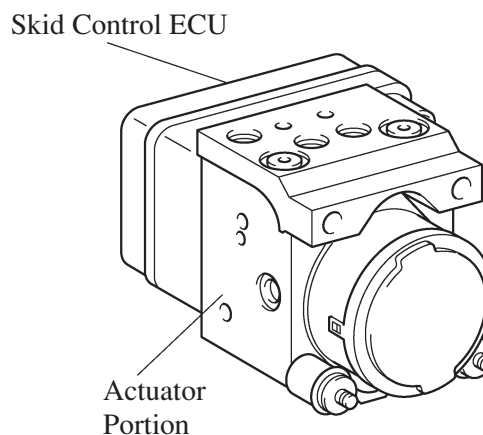
*²: with A.D.D. (Automatic Disconnection Differential) models.

*³: without A.D.D. models.

4. Brake Actuator

General

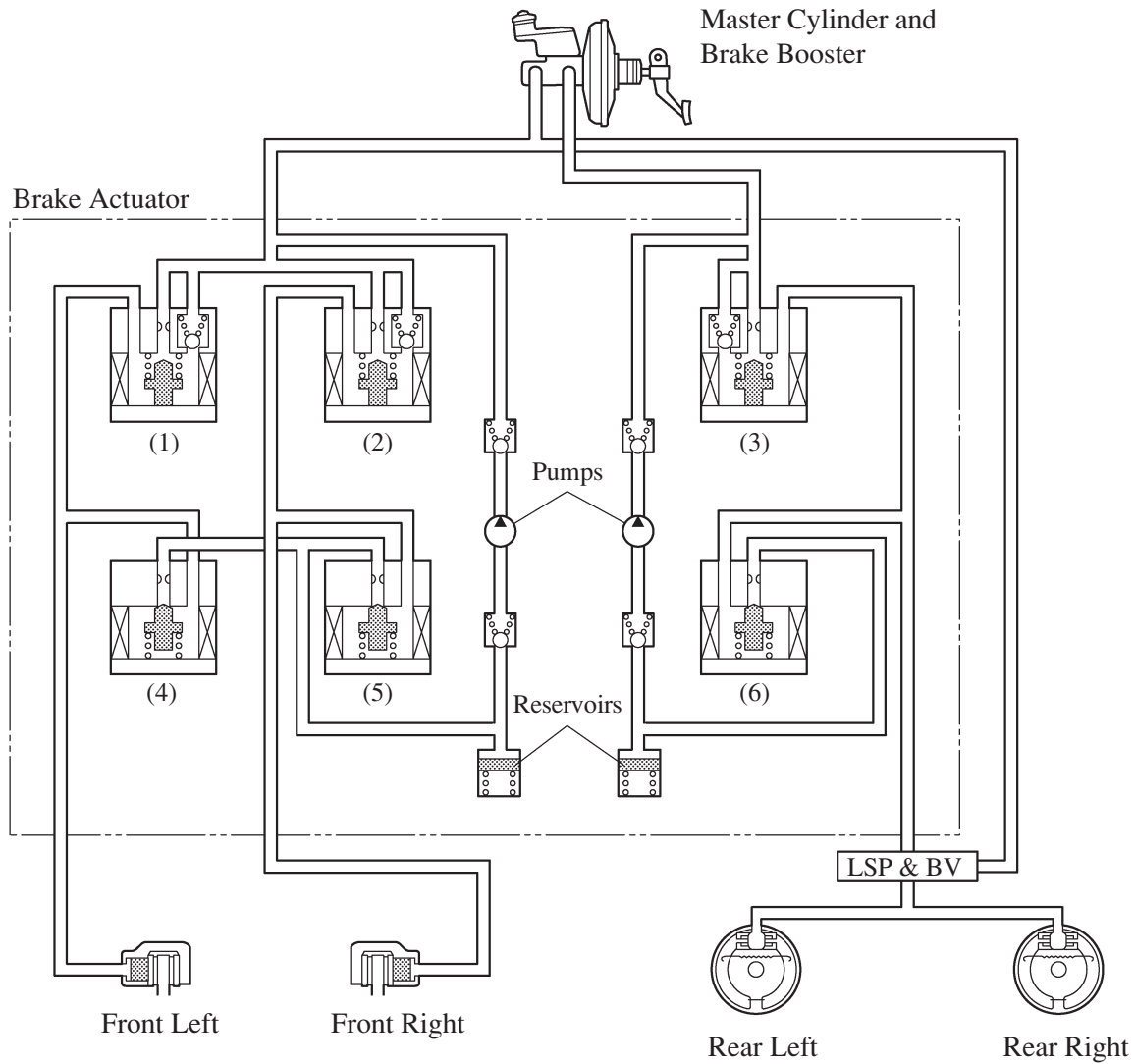
A brake actuator with an integrated skid control ECU has been adopted.



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 consists of 3 pressure holding valves [(1), (2), (3)] and 3 pressure reduction valves [(4), (5), (6)].

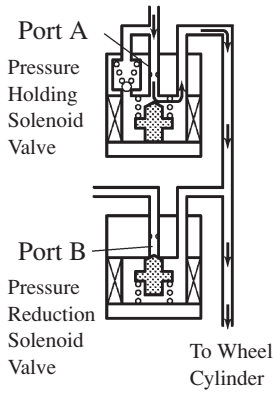
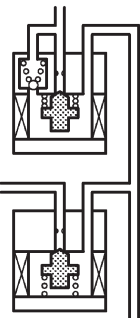
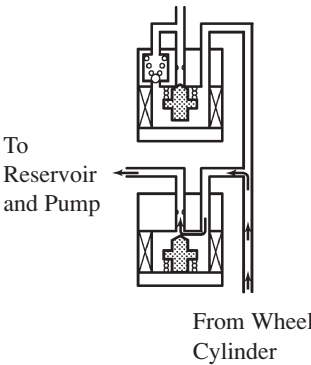
► Hydraulic Circuit ◀



5. System Operation

ABS Operation

Based on the signals received from the 4 wheel speed sensors, the skid control ECU calculates each wheel speed and deceleration, and checks wheel slipping condition. According to the slipping condition, the 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	 169CH54	 169CH55	 169CH56
	Pressure Holding Valve (Port A)	OFF (Open)	ON (Close)
	Pressure Reduction Valve (Port B)	OFF (Close)	ON (Open)
	Wheel Cylinder Pressure	Increase	Hold
			Reduction

6. Skid Control ECU

Initial Check

After the ignition switch is turned ON, and the vehicle attains an approximate speed of 6 km/h (4 mph) or more only at first time, the skid control ECU performs the initial check.

The function of each solenoid valve and pump motor in the brake actuator are check 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, indicated in the table below, to alert the driver of the malfunction.

○: Light ON —: Light OFF

Item	ABS	Skid Control ECU
ABS Warning Light	○	○

- 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 blinks 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 speed sensor check. 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 concerning the above, see 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.