

BRAKE**DESCRIPTION**

The '03 Corolla Matrix has a brake system with the following specifications:

Engine	1ZZ-FE		2ZZ-GE
Drive Type	2WD	4WD	2WD
Front Brake	Ventilated Disc	←	←
Rear Brake	Leading-Trailing Drum	←	Solid Disc
ABS with EBD	OPT	STD	←
Brake Control Valve	P Valve*1, EBD*2	EBD	←
Parking Brake	Lever Type	←	←

*1: Models without ABS with EBD

*2: Models with ABS with EBD

► Specification ◀

Master Cylinder	Type	Tandem (Lockheed + Lockheed)	
	Diameter	mm (in.)	20.64 (0.81)
Brake Booster	Type	Single	
	Size	in.	9
Front Disc Brake	Pad Area	cm ² (in. ²)	35.9 (5.56)* ² 34.5 (5.35)* ³
	Wheel Cylinder Dia.	mm (in.)	57 (2.24)
	Rotor Size (D x T)* ¹	mm (in.)	275 x 25 (10.82 x 0.98)
	Pad Material		PN529AH* ² PA533-EE* ³
Rear Drum Brake	Lining Area	cm ² (in. ²)	77 x 2 (11.94 x 2)
	Wheel Cylinder Dia.	mm (in.)	19.05 (0.75)
	Drum Inner Dia.	mm (in.)	228.6 (9.0)
	Lining Material		LN521-FF* ⁴ LA509A-EE* ⁵
Rear Disc Brake	Pad Area	cm ² (in. ²)	20 (7.87)
	Wheel Cylinder Dia.	mm (in.)	34 (1.34)
	Rotor Size (D x T)* ¹	mm (in.)	269 x 9 (10.59 x 0.35)
	Pad Material		PA544-EE
P Valve	Type	Dual P valve* ⁶ —* ⁷	
Parking Brake	Type	Drum	
	Drum Inner Dia.	mm (in.)	228.6 (9.0)* ⁸ 173.0 (6.8)* ⁹

*1: D: Outer Diameter, T: Thickness

*2: 1ZZ-FE Engine 2WD Model

*3: 1ZZ-FE Engine 4WD Model
and 2ZZ-GE Engine Model

*4: 2WD Model

*5: 4WD Model

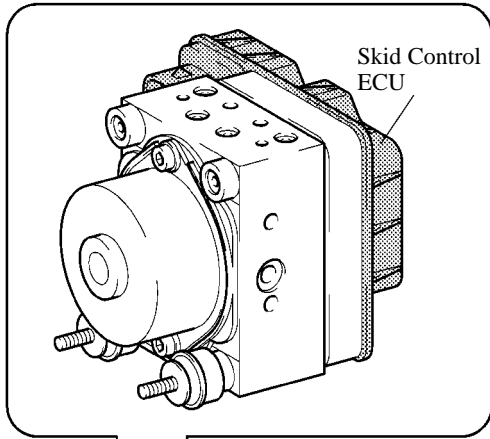
*6: Models without ABS with EBD

*7: Models with ABS with EBD

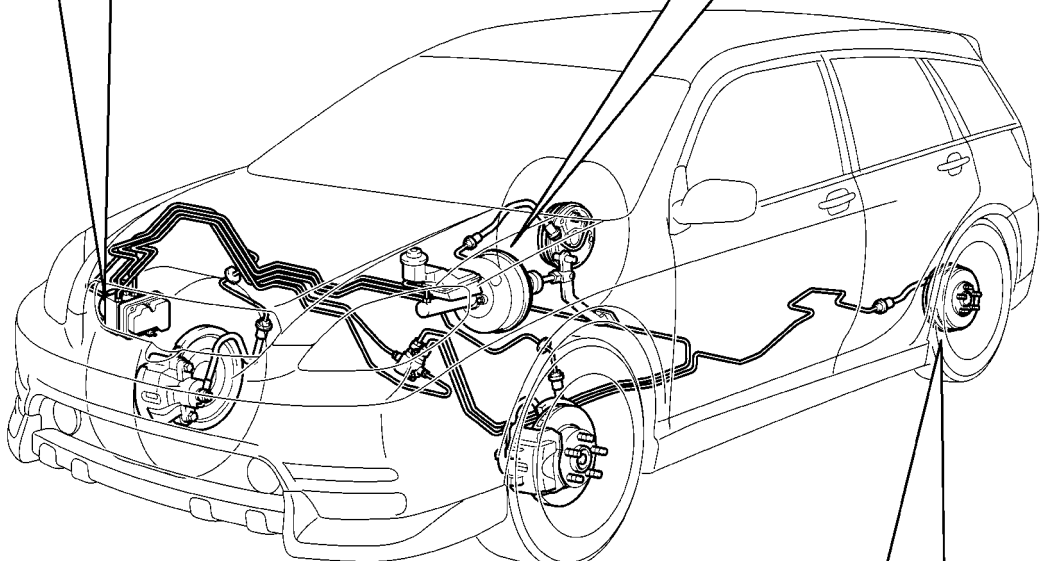
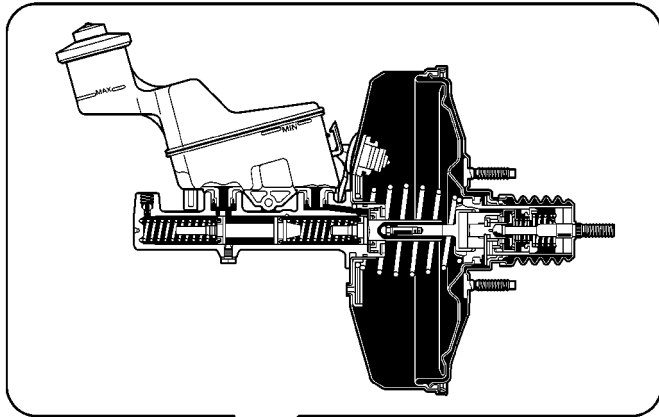
*8: Rear Drum Brake

*9: Rear Disc Brake

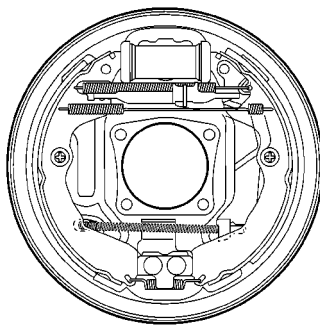
Brake Actuator



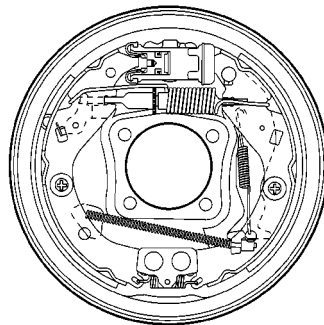
Master Cylinder and Brake Booster



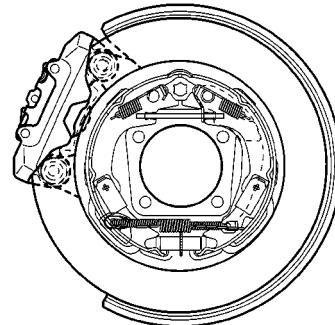
Rear Brake



1ZZ-FE Engine 2WD Model



1ZZ-FE Engine 4WD Model



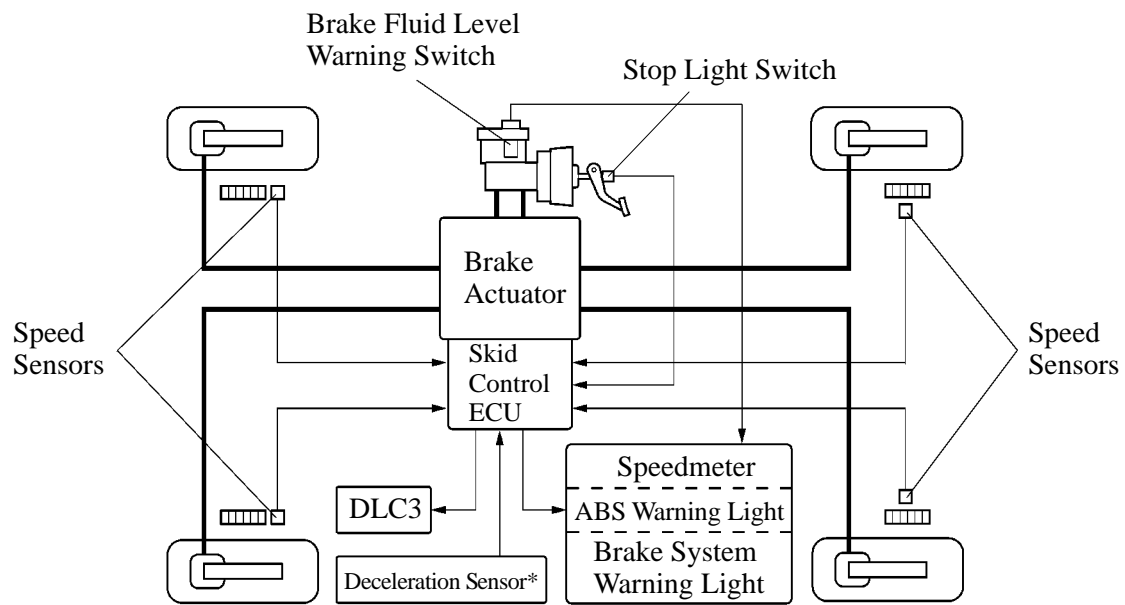
2ZZ-GE Engine Model

■ ABS with EBD SYSTEM

1. General

- The primary purpose of the ABS has been to help the vehicle's behavior during braking.
- The EBD control utilizes ABS, realizing the proper brake force distribution between front and rear wheels in accordance with the driving conditions. In addition, during cornering braking, it also controls the brake forces of right and left wheels, helping to maintain the vehicle behavior.
- A brake actuator integrated with the skid control ECU has been adopted.

2. System Diagram



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*: Only for 4WD Model

3. Outline of EBD Control

General

The distribution of the brake force, which was performed mechanically in the past, is now performed under electrical control of the skid control ECU, which precisely controls the braking force in accordance with the vehicle's driving conditions.

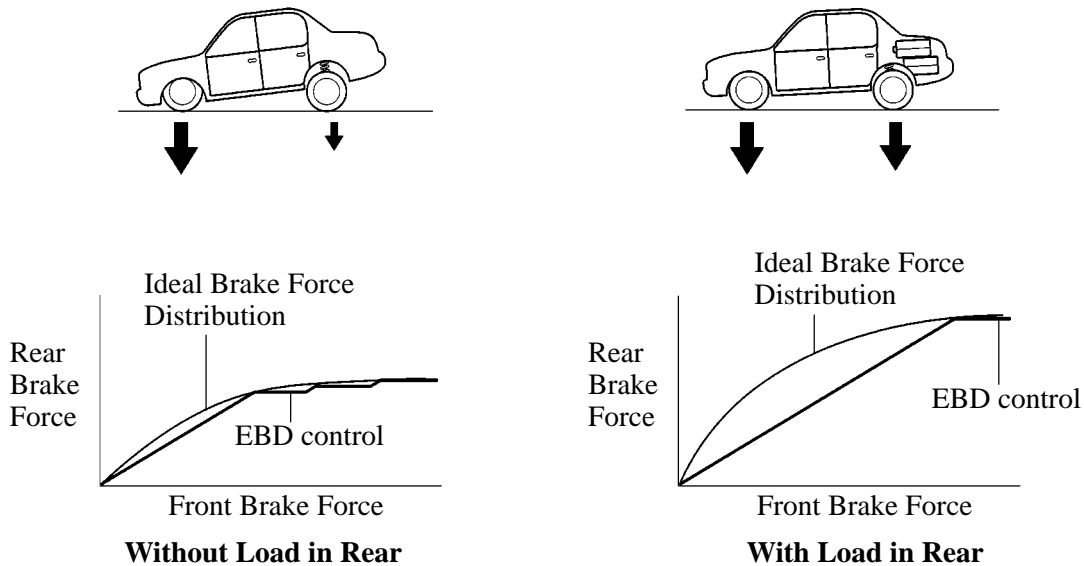
Front/Rear Wheels Brake Force Distribution

If the brakes are applied while the vehicle is moving straight forward, the transfer of the road reduces the load that is applied to the rear wheels. The skid control ECU determines this condition by way of the signals from the speed sensor, and the brake actuator regulates the distribution of the brake force of the rear wheels to optimally control.

For example, the amount of the brake force that is applied to the rear wheels during braking varies whether or not the vehicle is carrying a load. The amount of the brake force that is applied to the rear wheels also varies in accordance with the extent of the deceleration.

Thus, the distribution of the brake force to the rear is optimally controlled in order to effectively utilize the braking force of the rear wheels under these conditions.

► EBD Control Concept ◀

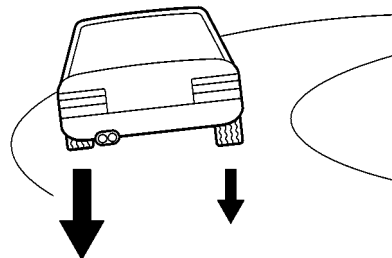


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Right/Left Wheels Brake Force Distribution (During Cornering Braking)

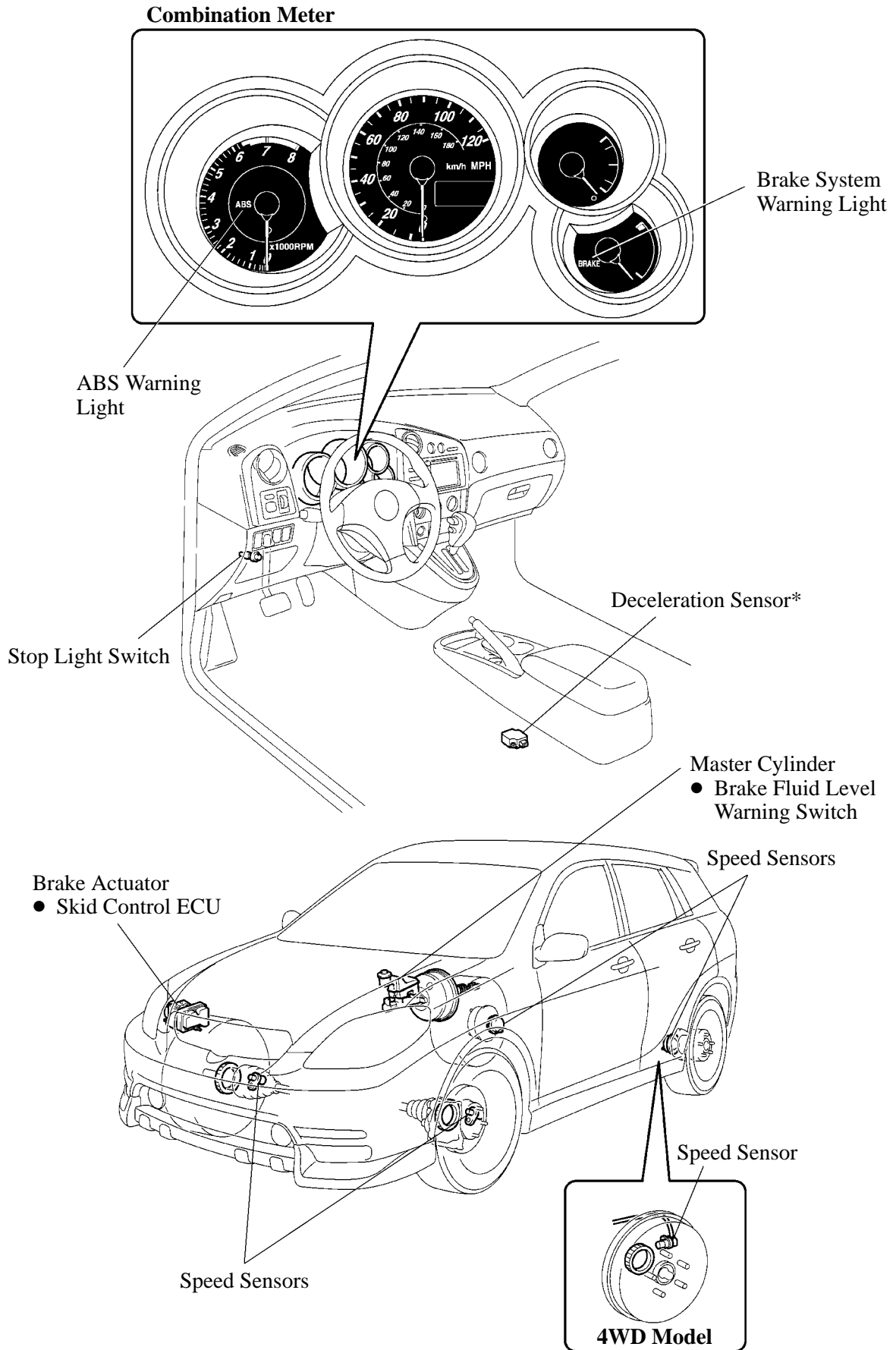
When the brakes are applied while the vehicle is cornering, the load that applied to the inner wheel decreases to the outer wheel increases.

The skid control ECU determines this condition by way of the signals from the speed sensor, and the brake actuator regulates the brake force in order to optimally control the distribution of the brake force to the inner wheel and outer wheel



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4. Layout of Component



*: Only for 4WD Model

5. Function of Components

Components		Function
Combination Meter	ABS Warning Light	Lights up to alert the driver when the skid control ECU detects the malfunction in the ABS.
	Brake System Warning Light	Light up together with the ABS warning light to alert the driver when the skid control ECU detects the malfunction in the EBD control.
Brake Fluid Level Warning Switch		Detects the brake fluid level.
Stop Light Switch		Detects the brake pedal depressing signal.
Speed Sensors		Detects the wheel speed of each of four wheels.
Deceleration Sensor*		Detects the vehicle's acceleration in the forward and rearward.
Brake Actuator	Actuator Portion	Changes the fluid path based on the signals from the skid control ECU during the operation of the ABS with EBD system, 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 signal to the brake actuator.

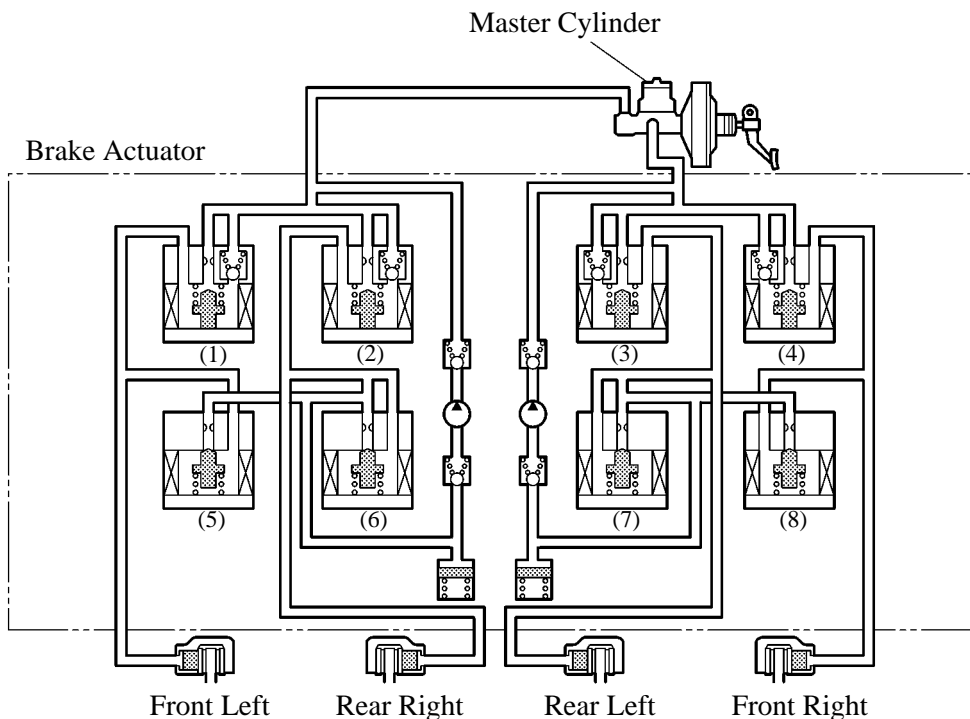
*: Only for 4WD Model

6. Brake Actuator

Construction

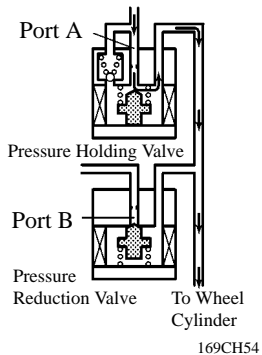
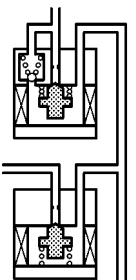
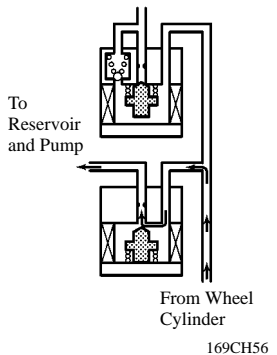
The brake actuator consists of 8 two-position solenoid valves, 1 motor, 2 pumps and 2 reservoirs. The 8 position solenoid valves consists of 4 pressure holding valves [(1), (2), (3), (4)], and 4 pressure reduction valves [(5), (6), (7), (8)].

► **Hydraulic Circuit** ◀



ABS with EBD 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. And 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	 <p>Port A Pressure Holding Valve Port B Pressure Reduction Valve To Wheel Cylinder 169CH54</p>	 <p>169CH55</p>	 <p>To Reservoir and Pump From Wheel Cylinder 169CH56</p>
Pressure Holding Valve (Port A)	OFF (Open)	ON (Close)	ON (Close)
Pressure Reduction Valve (Port B)	OFF (Close)	OFF (Close)	ON (Open)
Wheel Cylinder Pressure	Increase	Hold	Reduction

Skid Control ECU

1) Initial Check

After the ignition 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 functions of each solenoid valve and pump motor in the brake actuator are checked in order.

2) Self-Diagnosis

- If the skid control ECU detects a malfunction in the ABS with EBD system, the ABS and brake system warning lights 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	EBD	Skid Control ECU
ABS Warning Light	○	○	○
Brake System Warning Light	—	○	○

- At the same time, the DTCs (Diagnosis 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, or by connecting a hand-held tester.
- This system has a sensor signal check function. The DTCs can be read by connecting the SST (09843-18040) between the Ts and CG terminals of DLC3 and observing the blinking of the ABS warning light or by connecting a hand-held tester.
- For details on the DTCs that are stored in skid control ECU memory and the DTCs that are output through the sensor check function, see the 2003 Corolla Matrix Repair Manual (Pub. No. RM940U).

3) Fail-Safe

- In the event of a malfunction in the ABS, the skid control ECU prohibits the ABS control.
- In the event of a malfunction in EBD control, skid control ECU prohibits the EBD control. Thus, the brake will be operated in the same condition as in the condition without the ABS control.