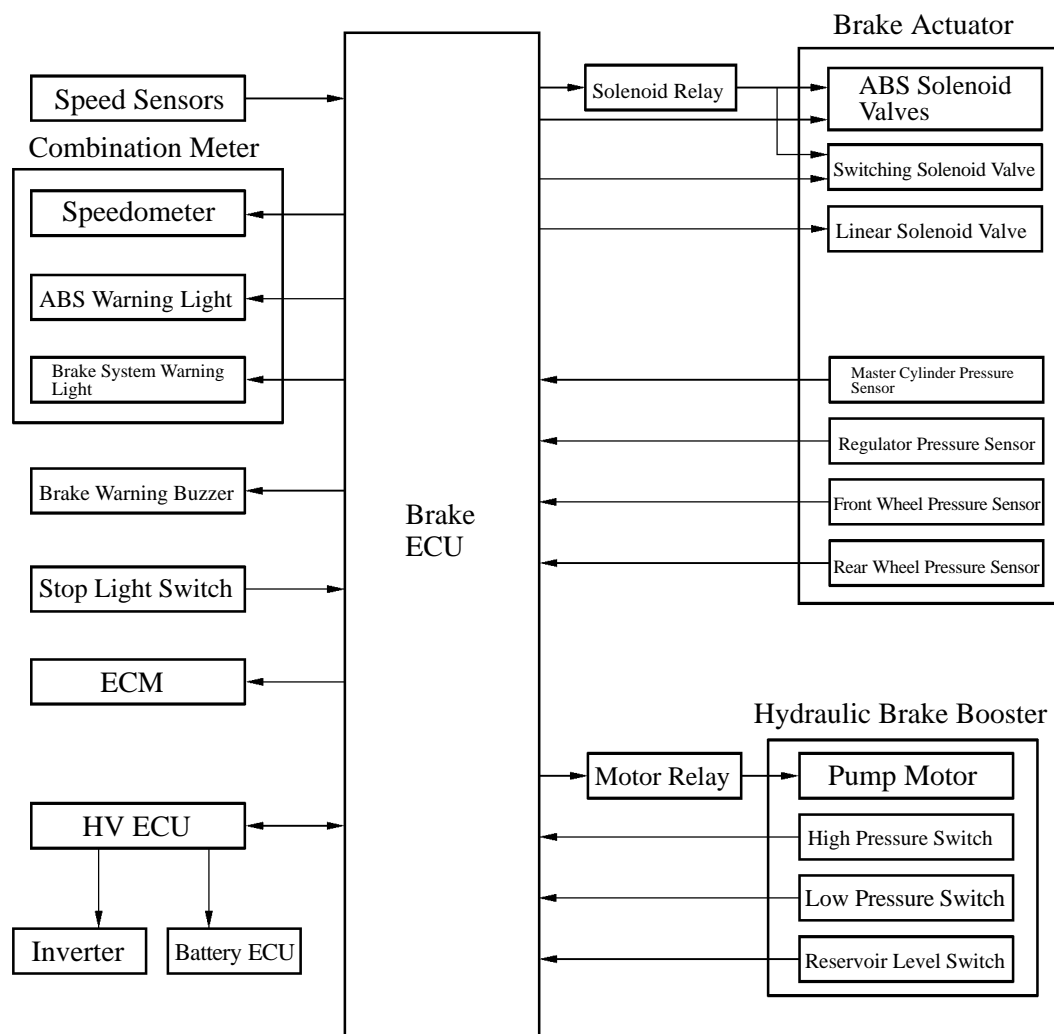


Brake ECU

1) General

Based on the signals received from the sensors the communication it maintains with the HV ECU, the brake ECU effects conventional brake control, ABS with EBD control, and regenerative brake cooperative control.



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2) Fail Safe

If a malfunction occurs in the brake ECU, in the input signals from the sensors, or in actuator system, this function prohibits the current from flowing to the brake actuator.

As a result, the solenoids in the brake actuator turn off, enabling the braking force of the hydraulic brake to take effect. Furthermore, by illuminating the ABS warning light or the brake system warning light, this function alerts the driver that a malfunction exists in the system.

Only if the regenerative brake system cannot be used, such as in the case of a malfunction in the communication with the HV ECU, this function switches controls to enable the hydraulic brake to generate the entire brake force.

3) Warning Light Check Function

The ABS warning light and brake system warning light turns on for about 3 seconds after the ignition switch is turned on to check the circuit.

4) Self-Diagnosis

If the brake ECU detects a malfunction in the brake system, the ABS warning light and brake system warning light will light up and alert the driver that a malfunction has occurred. The ECU will also store the codes of malfunctions. See the 2001 Prius Repair Manual (Pub. No. RM778U) for the DTC (Diagnostic Trouble Code) check method, DTC and DTC clearance.

Brake System Control

1) ABS with EBD control

a. General

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 front wheels, helping to maintain the vehicle stability.

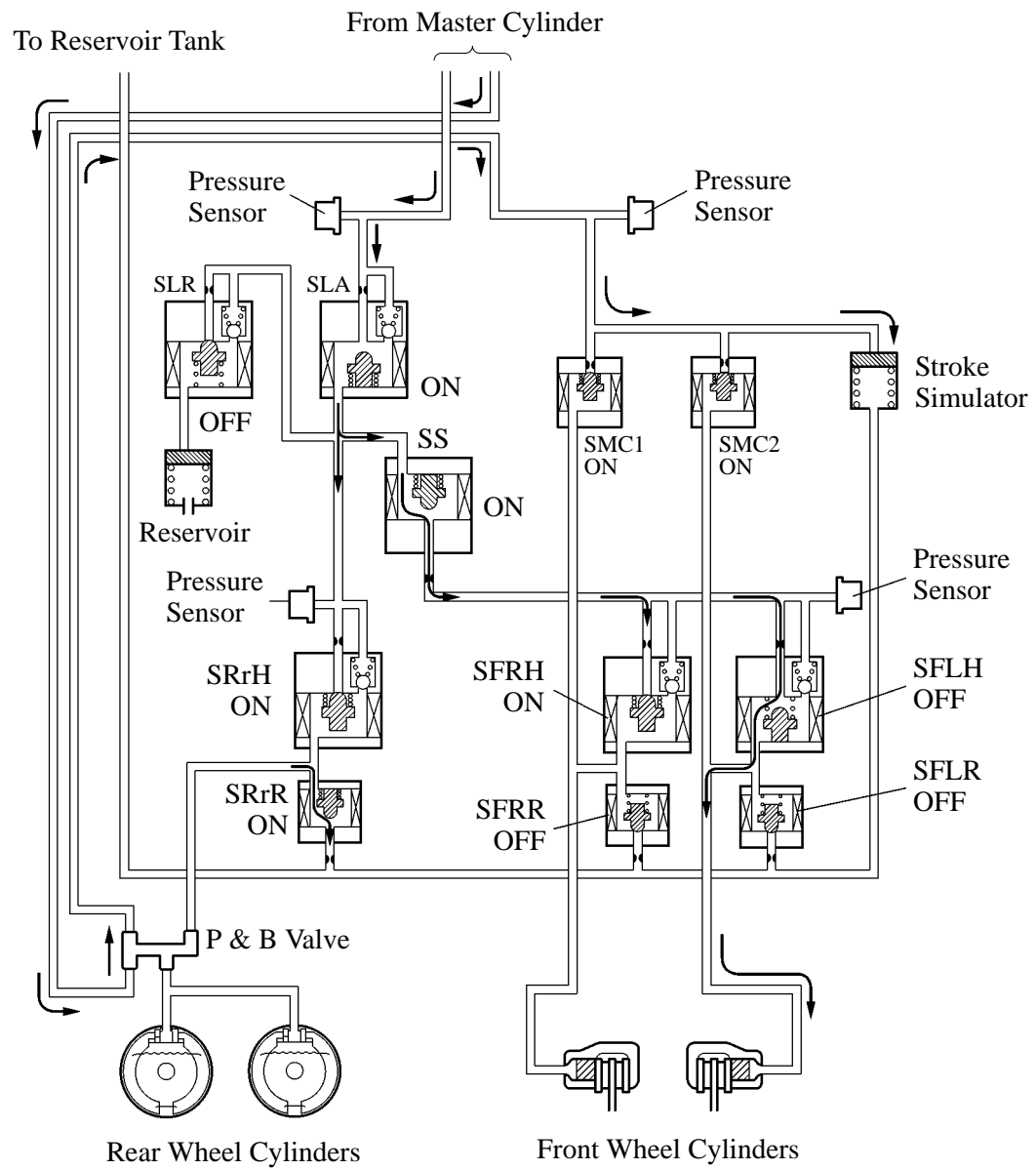
The distribution of the brake force is performed under electrical control of the brake ECU, which precisely controls the brake force in accordance with the vehicle's driving conditions.

b. Operation

Based on the signals received from the 4 wheel speed sensors, the brake ECU calculates each wheel speed and deceleration, and checks wheel slipping condition. And according to the slipping condition, the ECU controls the solenoid valves in order to adjust the fluid pressure of each wheel cylinder in the following three modes: pressure reduction, pressure holding and pressure increase modes.

Not Activated	Normal Braking	-	-
Activated	Pressure Increase Mode	Pressure Holding Mode	Pressure Reduction Mode
Hydraulic Circuit	 182CH79	 182CH80	 182CH81
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

► Sample of ABS control ◀



2) Regenerative Brake Cooperative Control

a. General

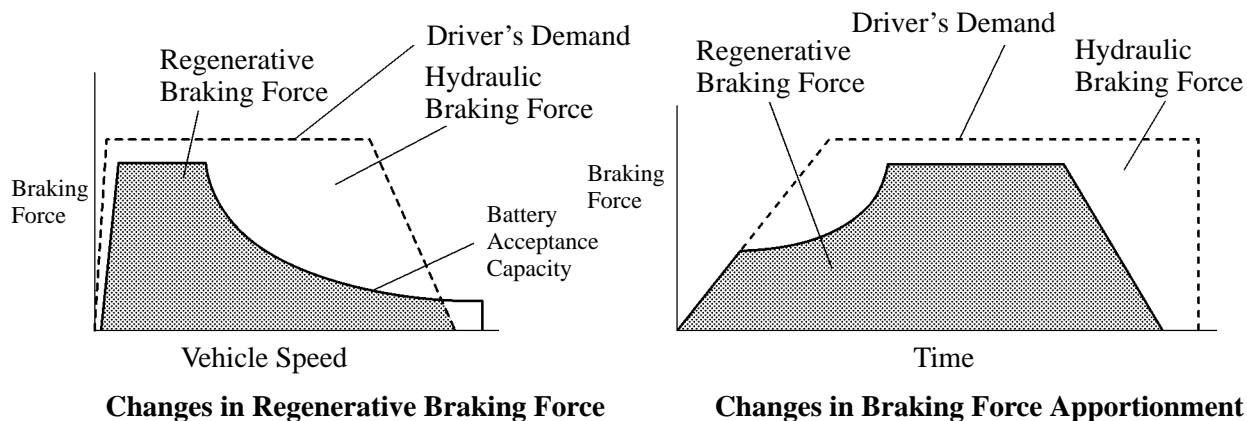
The regenerative brake cooperative control uses the switching valves and linear solenoid valves to regulate the hydraulic pressure that is supplied to the wheel cylinders. It also operates cooperatively with the regenerative braking force that is generated in the MG2 in accordance with the master cylinder pressure.

b. Apportioning of the Brake Force

The apportioning of the brake force between the hydraulic brake and the regenerative brake varies by the vehicle speed and time.

The apportioning of the brake force between the hydraulic brake and the regenerative brake is controlled so that the total brake force of the hydraulic brake and the regenerative brake matches the brake force that the driver requires.

► Imagery Drawing ◀



182CH58

c. Operation

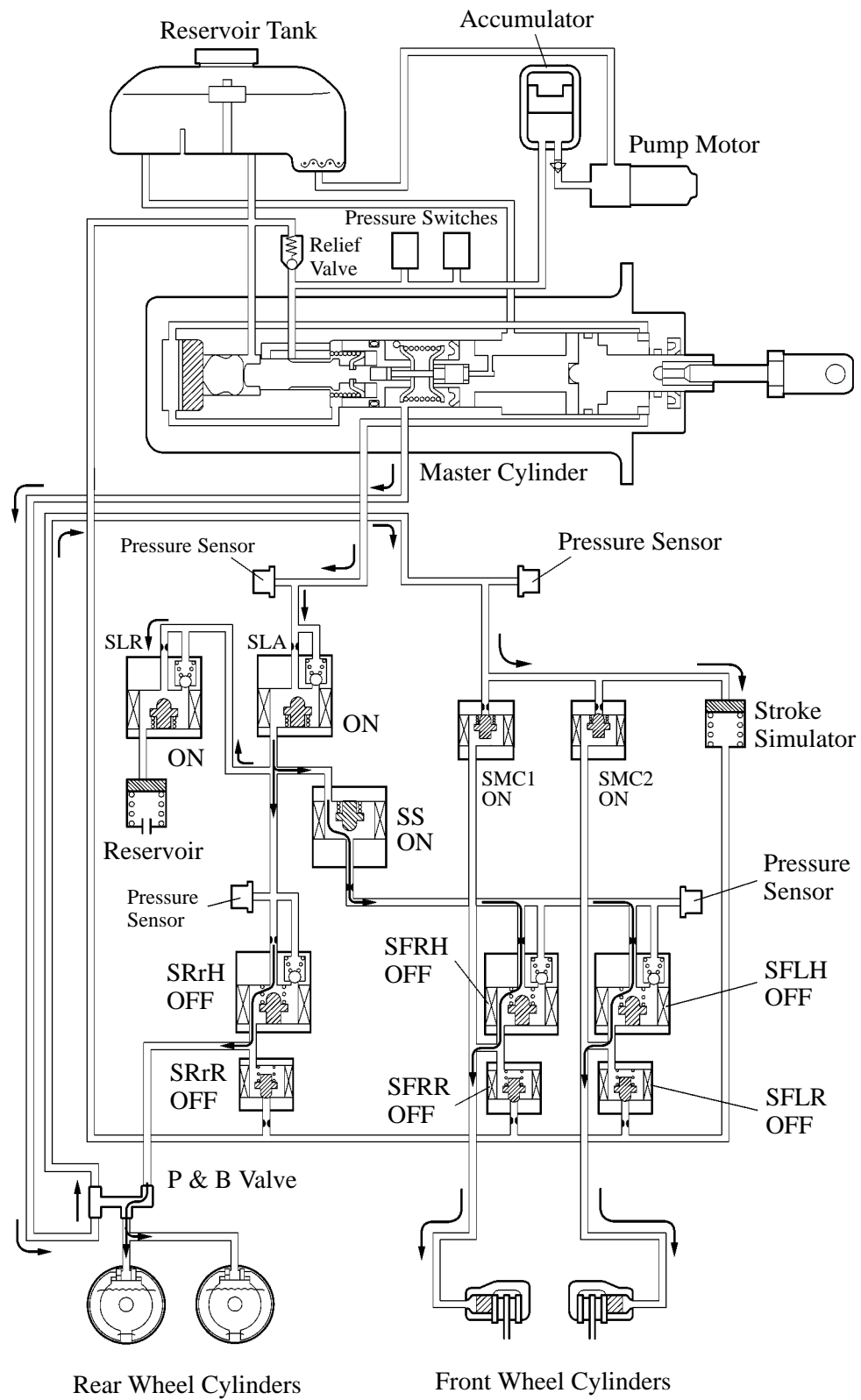
Regenerative brake cooperative control is executed when the vehicle is driven in the shift position “D” or “B”.

The master cylinder pressure that is generated when the driver presses on the brake pedal is detected by the pressure sensor, and the brake ECU calculates the brake force request factor. A portion of the brake force request factor is transmitted to the HV ECU in the form of a regenerative brake activation request factor. The HV ECU executes regenerative braking by commanding the electric motor to generate negative torque.

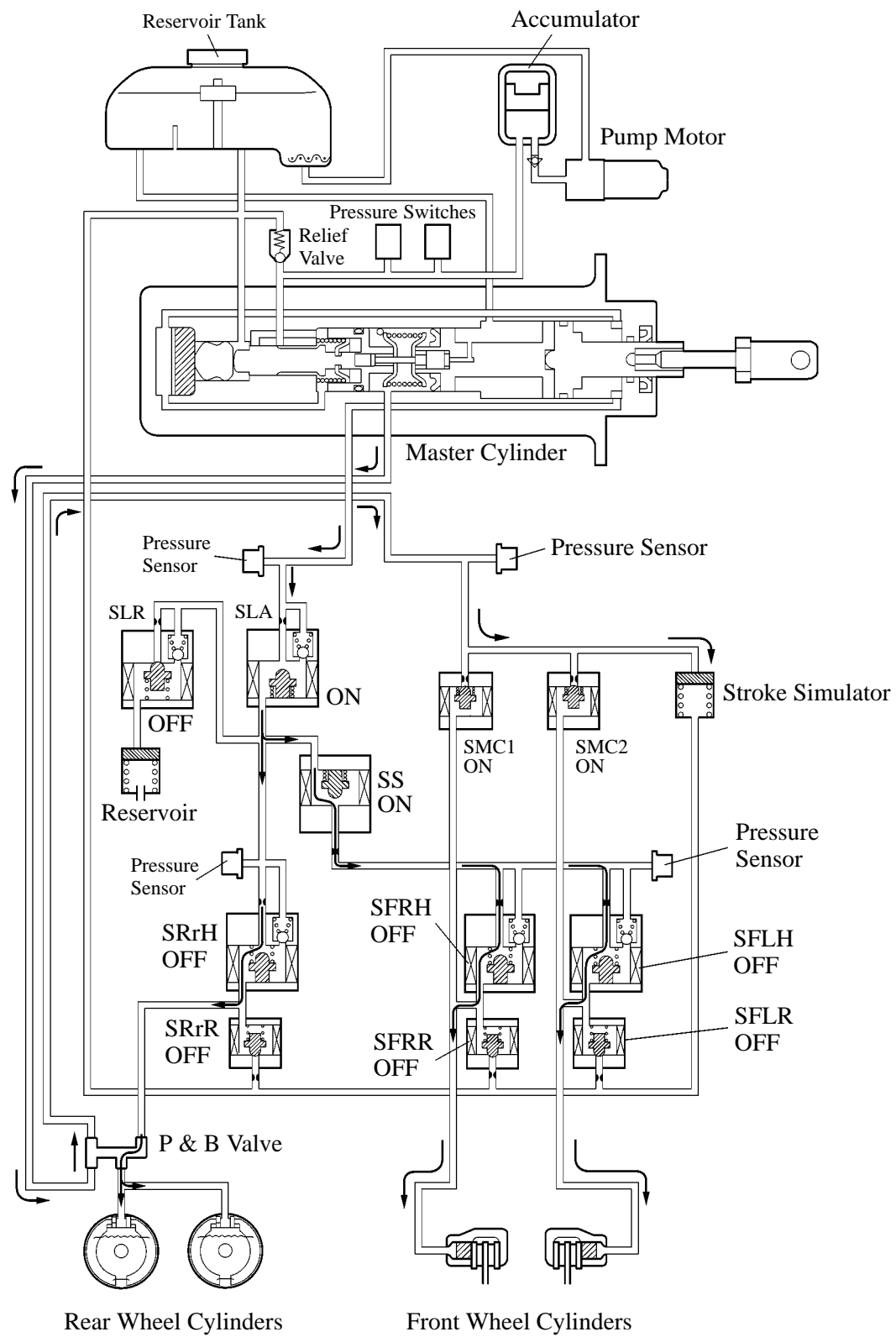
The brake ECU controls the opening of the linear solenoid valves, which are used for increasing/decreasing the hydraulic pressure, to regulate the wheel cylinder hydraulic pressure in relation to the master cylinder hydraulic pressure, thus compensating for the brake force that is not provided sufficiently by the regenerative brake.

While the regenerative brake cooperative control is being prohibited due to an abnormality in the system, or when the shift lever is in a position other than D or B, the regenerative braking force is not generated. At this time, only the hydraulic braking force is applied by turning ON (opening) the linear solenoid valve SLA and turning OFF (closing) the SLR.

i) Regenerative Brake Cooperative Control



ii) Without Regenerative Brake Cooperative Control (Hydraulic Brake Only)



3) Fail-Safe Control

If a malfunction occurs in the brake ECU, in the input signals from the sensors, or in the actuator system, this function prohibits the current from flowing to the brake actuator.

As a result, the solenoids in the brake actuator turn off, enabling the braking force of the hydraulic brake to take effect. The relief function is provided in order to ensure the proper wheel cylinder hydraulic pressure even if the linear solenoid valve SLA is OFF (closed). Only if the regenerative brake system cannot be used, such as in the case of a malfunction in the communication with the HV ECU, this function switches controls to enable the hydraulic brake to generate the entire brake force.

