

DSC HU PART CONSTRUCTION/OPERATION

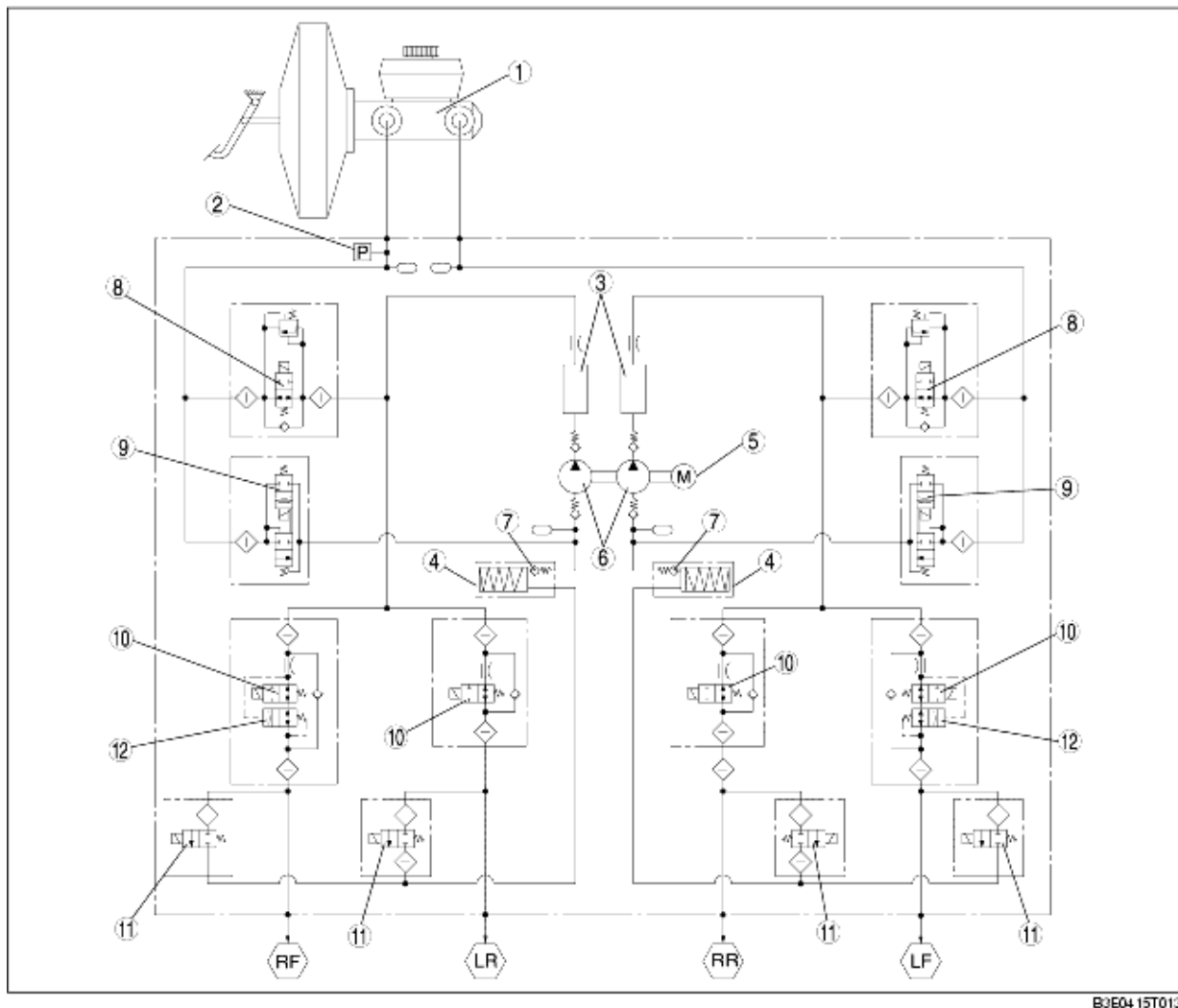
B3E041543750T03

Construction

- The ABS HU mainly consists of the inlet/outlet solenoid valves, pump motor (pump), traction control solenoid valves and stability control solenoid valves.

Function Of Main Component Parts

Part name	Function
Inlet solenoid valve	• Adjusts the fluid pressure in each brake system according to DSC HU/CM signals.
Outlet solenoid valve	• Adjusts the fluid pressure in each brake system according to DSC HU/CM signals.
Stability control solenoid valve	• Switches the brake hydraulic circuits during and according to normal braking, ABS and EBD control, TCS control and DSC control.
Traction control solenoid valve	• Switches the brake hydraulic circuits during and according to normal braking, ABS and EBD control, TCS control and DSC control.
Reservoir	• Temporarily stores brake fluid from the caliper piston to ensure smooth pressure reduction during ABS and EBD control, TCS control and DSC control.
Pump	• Returns the brake fluid stored in the reservoir to the master cylinder during ABS and DSC control. • Increases brake fluid pressure and sends brake fluid to each caliper piston during TCS control and DSC control.
Pump motor	• Operates the pump according to DSC HU/CM signals.
Flow control valve	• Shifts fluid flow from constricted paths during pressure reduce mode to suppress noise. (Only installed on the front system.)



B3E04 15T013

1	Master cylinder
2	Brake fluid pressure sensor
3	Damper chamber
4	Reservoir
5	Pump motor
6	Pump
7	Check valve
8	Traction control solenoid valve
9	Stability control solenoid valve
10	Inlet solenoid valve
11	Outlet solenoid valve
12	Flow control valve

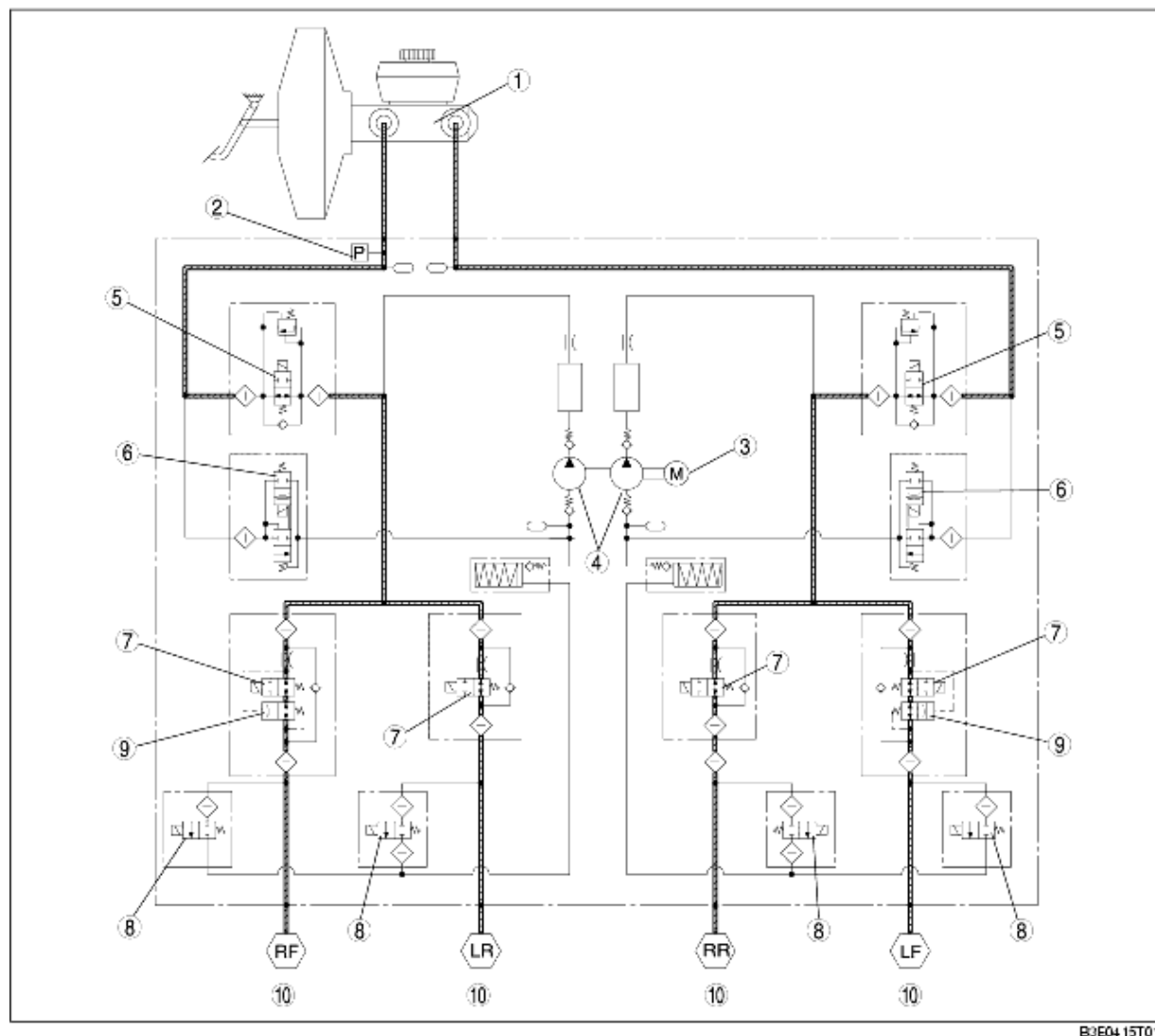
Operation

During normal braking

- During normal braking, the solenoid valves are not energized and all of them are off. When the brake pedal is depressed, brake fluid pressure is transmitted from the master cylinder, through the traction control solenoid and inlet solenoid valves, and then to the caliper piston.

Solenoid valve operation table

Traction control solenoid valve		Stability control solenoid valve		Inlet side Solenoid valve				Outlet side Solenoid valve				Pump motor, pump
LFRR	RFLR	LFRR	RFLR	LF	RF	LR	RR	LF	RF	LR	RR	
OFF (open)		OFF (closed)		OFF (open)				OFF (closed)				Stopped

Hydraulic Circuit Diagram

B3E04 15T014

1	Master cylinder
2	Brake fluid pressure sensor
3	Pump motor
4	Pump
5	Traction control solenoid valve
6	Stability control solenoid valve
7	Inlet solenoid valve
8	Outlet solenoid valve
9	Flow control valve
10	Wheel cylinder

10	Pressure increase
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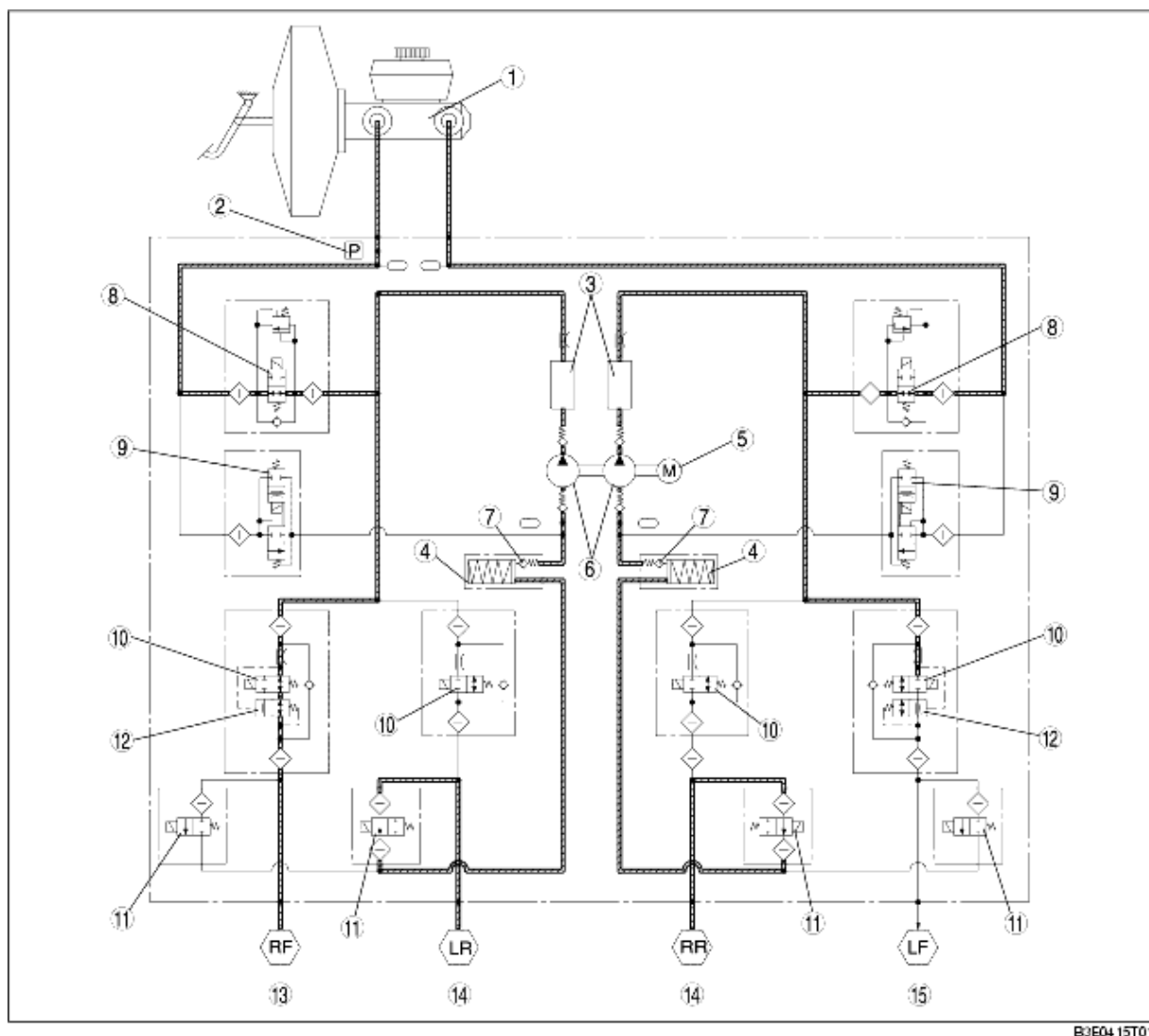
During ABS and EBD control

- During ABS and EBD control, when wheel lock-up is about to occur, the traction control solenoid and stability control solenoid valves are not energized, and the inlet and outlet solenoid valves are energized and controlled in three pressure modes (increase, reduction or maintain), thereby adjusting brake fluid pressure. Brake fluid during pressure reduction is temporarily stored in the reservoir and afterwards the pump motor operates the pump to return the fluid to the master cylinder. (The following figure shows these conditions: right front wheel pressure increased, left front wheel pressure maintained, and both rear wheels pressure decreased.)

Solenoid valve operation table

	Traction control solenoid valve		Stability control solenoid valve		Inlet side Solenoid valve				Outlet side solenoid valve				Pump motor, pump
	LFRR	RFLR	LFRR	RFLR	LF	RF	LR	RR	LF	RF	LR	RR	
During pressure increase mode	OFF (open)		OFF (closed)		OFF (open)				OFF (closed)				Stopped
During pressure maintain mode	OFF (open)		OFF (closed)		ON (closed)				OFF (closed)				Stopped
During pressure reduction mode	OFF (open)		OFF (closed)		ON (closed)				ON (open)				Operating

Hydraulic Circuit Diagram



B3E04 15T015

1	Master cylinder
2	Brake fluid pressure sensor
3	Damper chamber
4	Reservoir
5	Pump motor
6	Pump
7	Check valve
8	Traction control solenoid valve
9	Stability control solenoid valve
10	Inlet solenoid valve
11	Outlet solenoid valve
12	Flow control valve
13	Pressure increase
14	Pressure reduction
15	Pressure maintained

During DSC control (to suppress oversteer tendency) and TCS control

- When a large oversteer tendency or driving wheel spin is determined, the traction control solenoid and

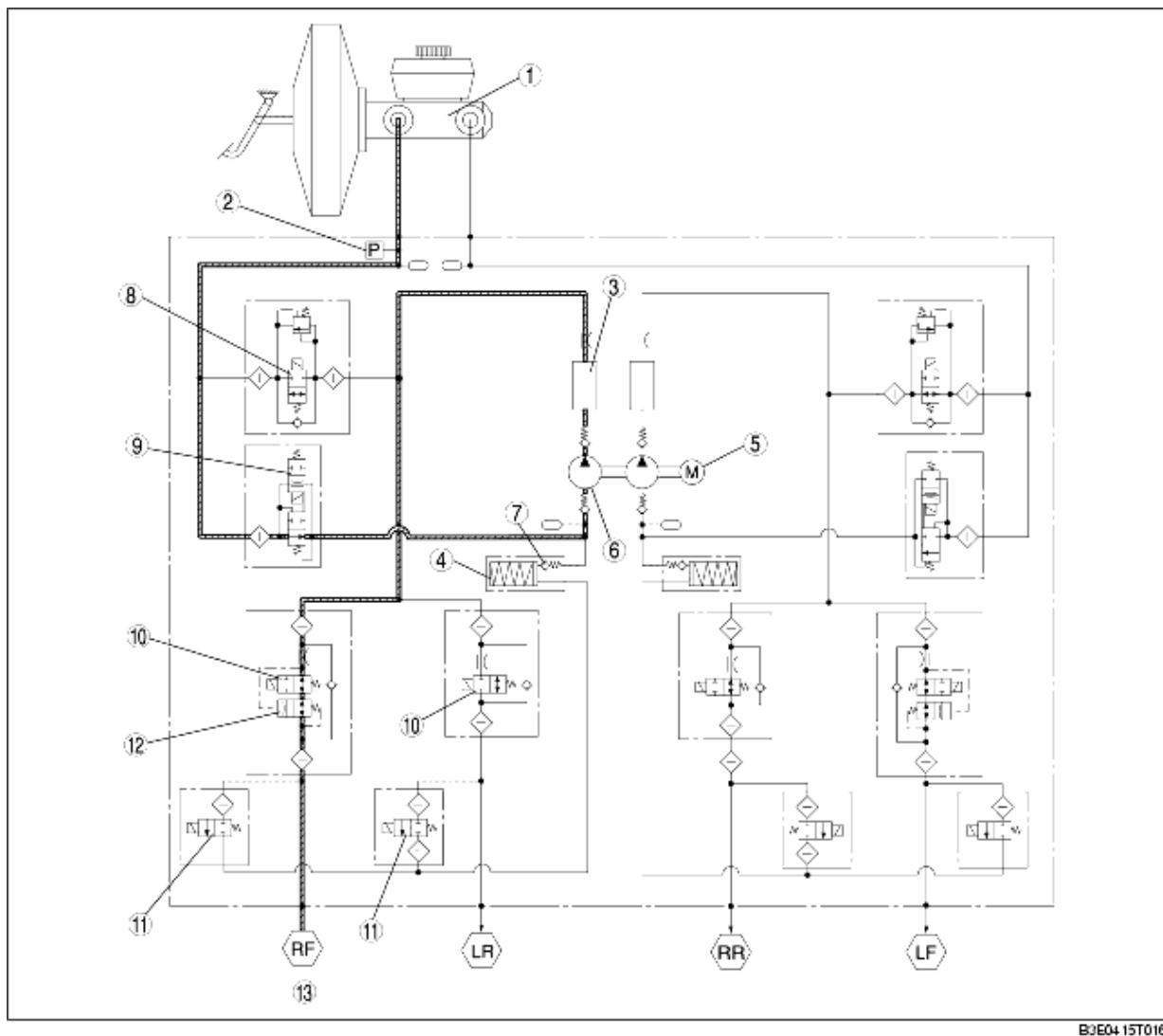
stability control solenoid valves are energized, switching the hydraulic circuits. At the same time, the pump motor is actuated to operate the pump, thereby increasing pressure by supplying brake fluid pressure to the caliper piston of the outer front wheel or the slipping driving wheel. Also at this time, the inlet solenoid valve of the inner rear wheel is energized and the hydraulic circuit of this wheel is closed.

- After a pressure increase, brake fluid pressure is adjusted using the three pressure modes (reduction, maintain, increase) so that the target wheel speed is obtained. (The following figure shows a left turn, or control of right front wheel spin (during pressure increase mode).)

Solenoid valve operation table

	Traction control solenoid valve		Stability control solenoid valve		Inlet solenoid valve				Outlet solenoid valve				Pump motor, pump
	LFRR	RFLR	LFRR	RFLR	LF	RF	LR	RR	LF	RF	LR	RR	
During pressure increase mode	OFF (open)	ON (closed)	OFF (closed)	ON (open)	OFF (open)	ON (closed)	OFF (open)		OFF (closed)				Operating
During pressure maintain mode	OFF (open)	ON (closed)	OFF (closed)		OFF (open)	ON (closed)	OFF (open)		OFF (closed)				Stopped
During pressure reduction mode	OFF (open)	ON (closed)	OFF (closed)		OFF (open)	ON (closed)	OFF (open)		OFF (closed)	ON (open)	OFF (closed)		Operating

Hydraulic Circuit Diagram



B3E04 15T016

1	Master cylinder
2	Brake fluid pressure sensor
3	Damper chamber
4	Reservoir
5	Pump motor
6	Pump
7	Check valve
8	Traction control solenoid valve
9	Stability control solenoid valve
10	Inlet solenoid valve
11	Outlet solenoid valve
12	Flow control valve
13	Pressure increase

During DSC control (to suppress understeer tendency)

- When a large understeer tendency is determined, the traction control solenoid and stability control solenoid valves are energized, switching the hydraulic circuits. At the same time, the pump motor is actuated to operate the pump, supplying brake fluid pressure from the reservoir to the inner rear wheel cylinder. Also at this time, the inlet solenoid valve of the outer front wheel is energized and the hydraulic circuit of this wheel is

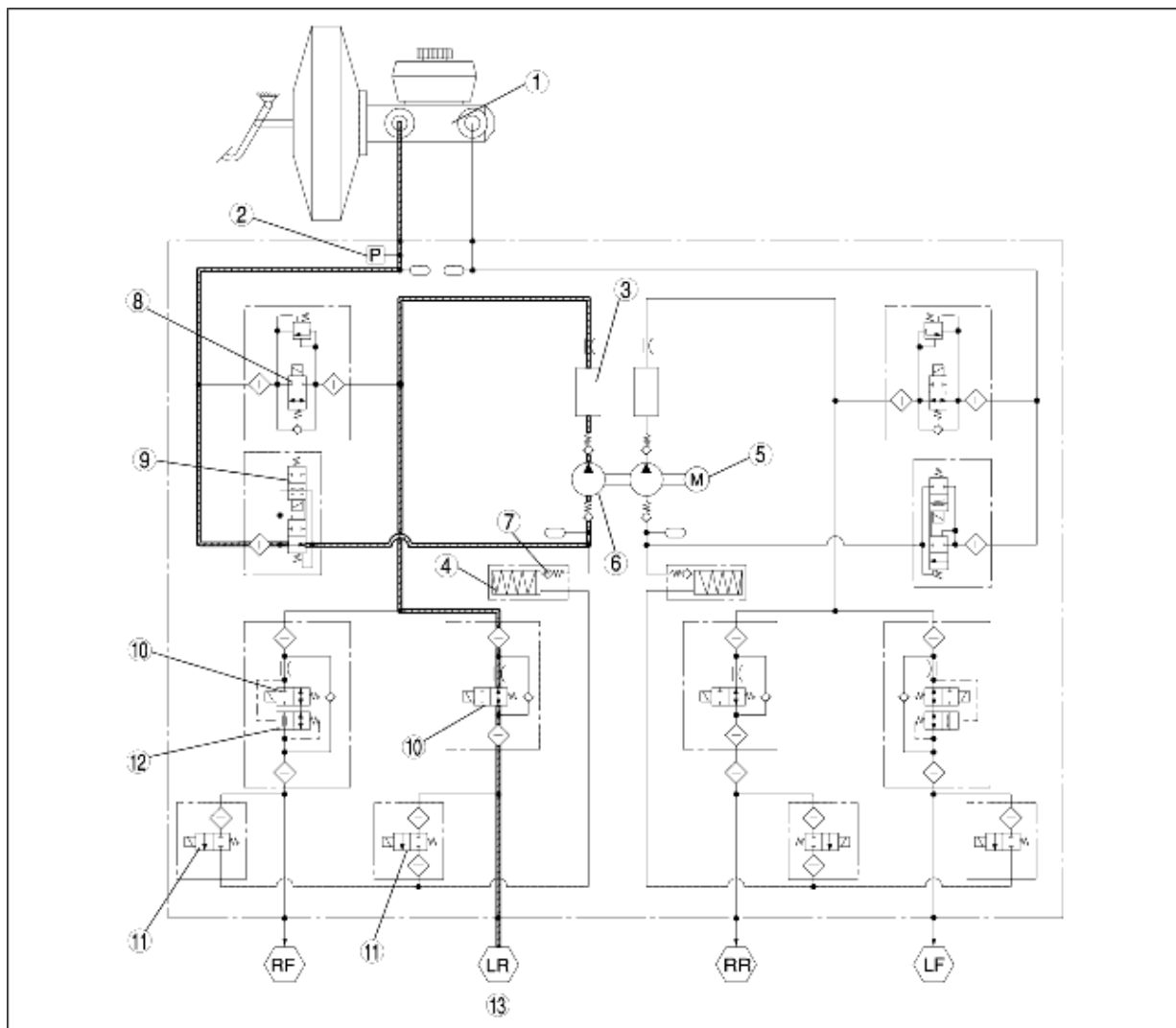
closed.

- After a pressure increase, brake fluid pressure is adjusted using the three pressure modes (reduction, maintain, increase) so that the target wheel speed is obtained. (The following figure shows control during a left turn during pressure increase mode.)

Solenoid valve operation table

	Traction control solenoid valve		Stability control solenoid valve		Inlet solenoid valve				Outlet solenoid valve				Pump motor, pump,
	LFRR	RFLR	LFRR	RFLR	LF	RF	LR	RR	LF	RF	LR	RR	
During pressure increase mode	OFF (open)	ON (closed)	OFF (closed)	ON (open)	OFF (open)	ON (closed)	OFF (open)		OFF (closed)				Operating
During pressure maintain mode	OFF (open)	ON (closed)	OFF (closed)		OFF (open)	ON (closed)	OFF (open)		OFF (closed)				Stopped
During pressure reduction mode	OFF (open)	ON (closed)	OFF (closed)		OFF (open)	ON (closed)	OFF (open)		OFF (closed)		ON (open)	OFF (closed)	Operating

Hydraulic Circuit Diagram



B3E04 15T017

1	Master cylinder
2	Brake fluid pressure sensor
3	Damper chamber
4	Reservoir
5	Pump motor
6	Pump
7	Check valve
8	Traction control solenoid valve
9	Stability control solenoid valve
10	Inlet solenoid valve
11	Outlet solenoid valve
12	Flow control valve
13	Pressure increase