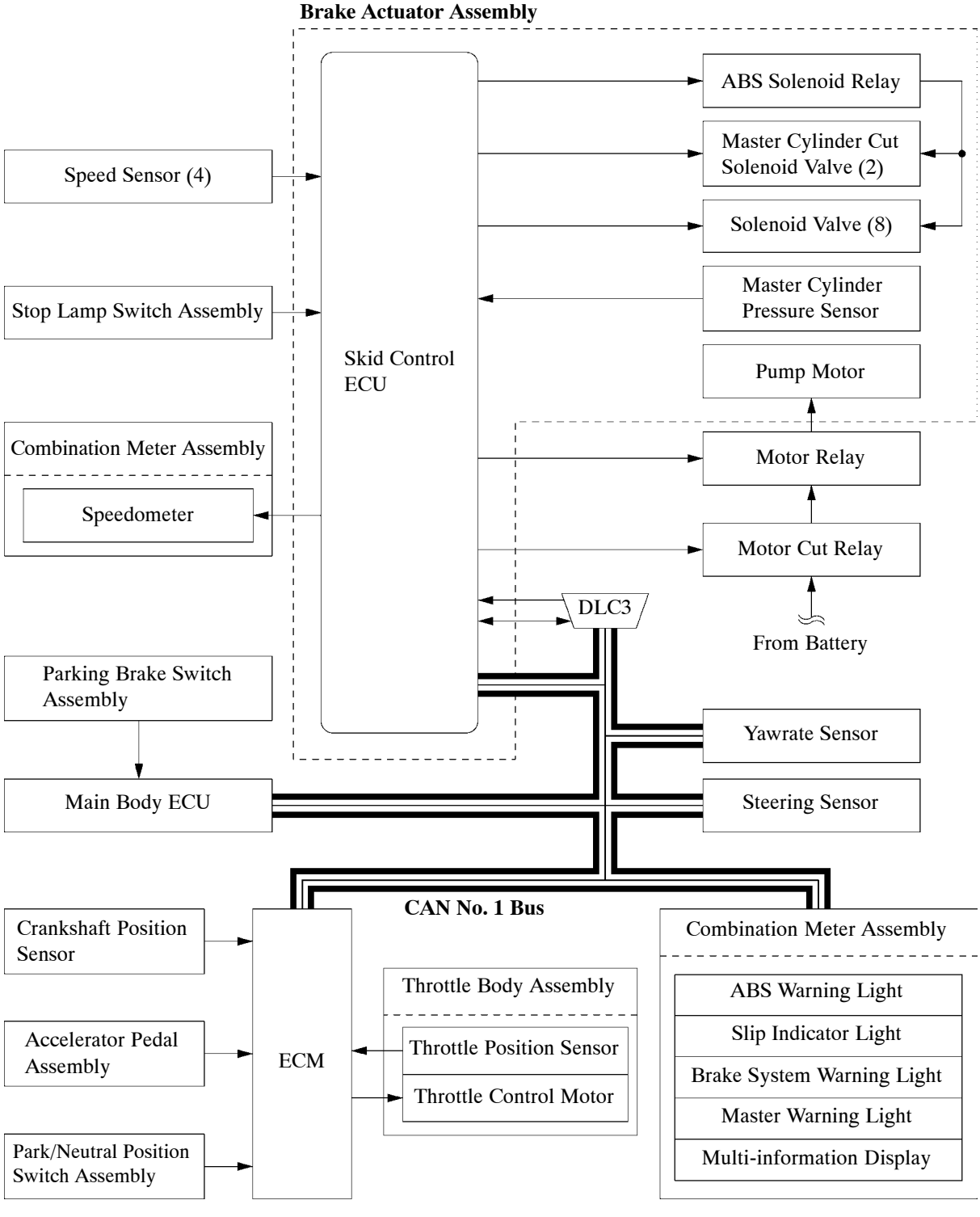
NEW FEATURES

■ BRAKE CONTROL SYSTEM

1. Major Difference

The warning sound for VSC operation and the VSC warning buzzer have been discontinued.

2. System Diagram



0264NF01C

3. Function of Main Components

Component		Function
Combination Meter Assembly	ABS Warning Light	Lights up to alert the driver when the skid control ECU detects a malfunction in the ABS, EBD or Brake Assist system.
	Slip Indicator Light	● Blinks to inform the driver when the TRC system or the VSC system operates. ● Lights up to alert the driver when the skid control ECU detects a malfunction in the TRC or VSC system.
	Brake System Warning Light	● Lights up together with ABS warning light to alert the driver when the skid control ECU detects a malfunction in EBD control. ● Lights up to inform the driver when the parking brake is ON or the brake fluid level is low.
	Master Warning Light	Lights up to alert the driver when the skid control ECU detects a malfunction in the TRC or VSC system.
	Multi-information Display	Displays a warning message "CHECK VSC" to alert the driver when the skid control ECU detects a malfunction in the TRC or VSC system.
ECM		● Sends the throttle valve angle signal, accelerator pedal position signal, engine speed signal, and shift lever position signal to the skid control ECU. ● Receives throttle control request signals from the skid control ECU.
Parking Brake Switch Assembly		Detects when the parking brake is applied.
Speed Sensors		Detects the wheel speed of the 4 wheels.
Stop Lamp Switch Assembly		Detects whether or not the brake pedal has been depressed.
Brake Actuator Assembly		Changes the fluid path based on the signals from the skid control ECU during the operation of the ABS with EBD, Brake Assist, TRC and VSC system, in order to control the fluid pressure that is applied to the wheel cylinders.
	Master Cylinder Pressure Sensor	Located in the brake actuator assembly and detects the master cylinder pressure.
	Skid Control ECU	Judges the vehicle driving condition based on signals from sensors, and sends brake control signals to the brake actuator assembly.
	ABS Solenoid Relay	Supplies power to the solenoid valves.
Yawrate Sensor		● Detects the vehicle's yawrate. ● Detects the vehicle's longitudinal and lateral acceleration.
Steering Sensor		Detects the steering direction and angle of the steering wheel.
Motor Relay		Supplies power to the pump motor in the brake actuator assembly.
Motor Cut Relay		Cuts the power to the pump motor in the brake actuator assembly.

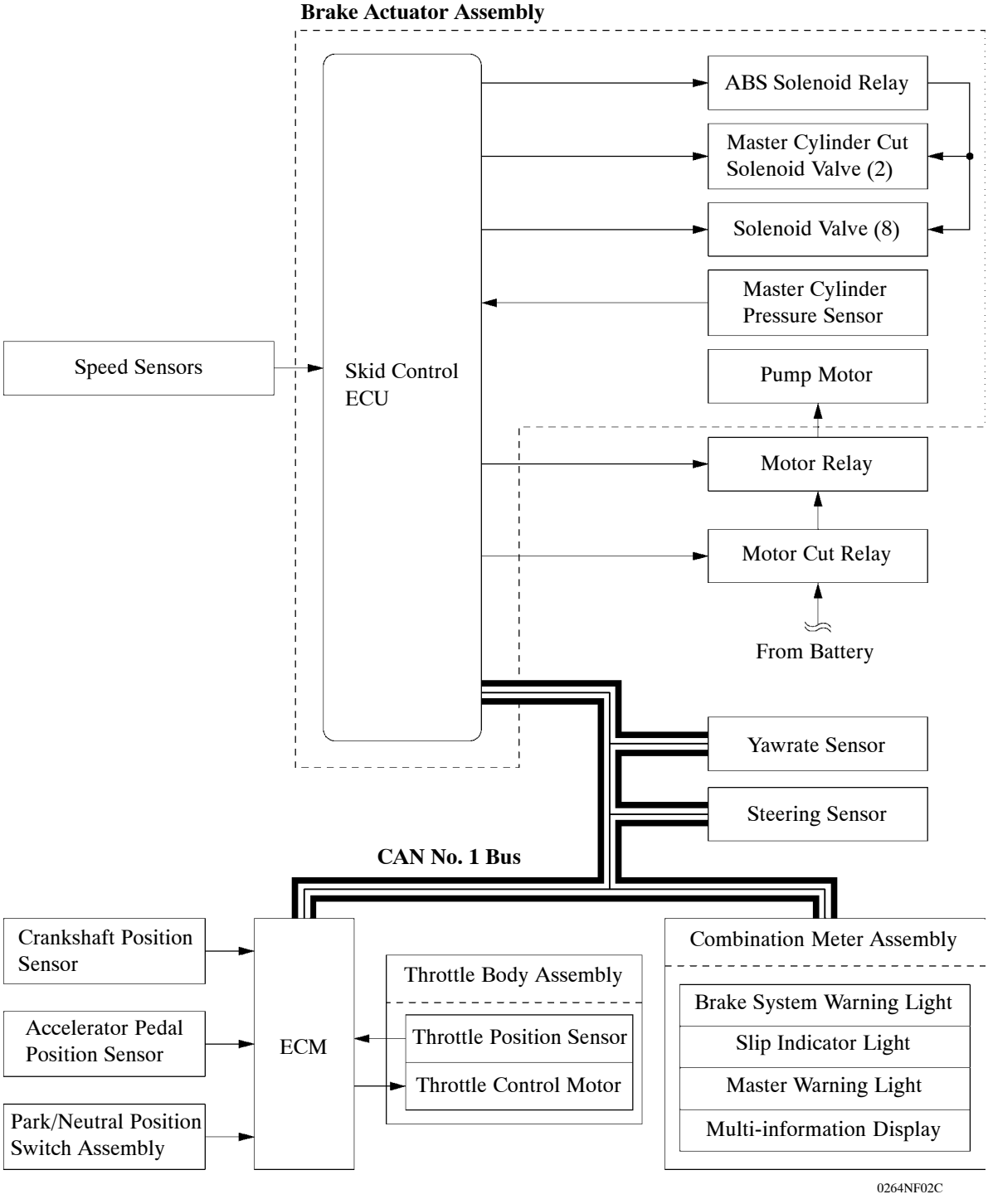
4. System Operation

VSC Operation

1) General

VSC operation, by way of the solenoid valves, controls the fluid pressure that is generated by the pump and applies it to the brake wheel cylinder of each wheel in the following 3 modes: pressure reduction, pressure holding, and pressure increase modes. As a result, the tendency of a front wheel skid or rear wheel skid is controlled.

▶ System Diagram ◀

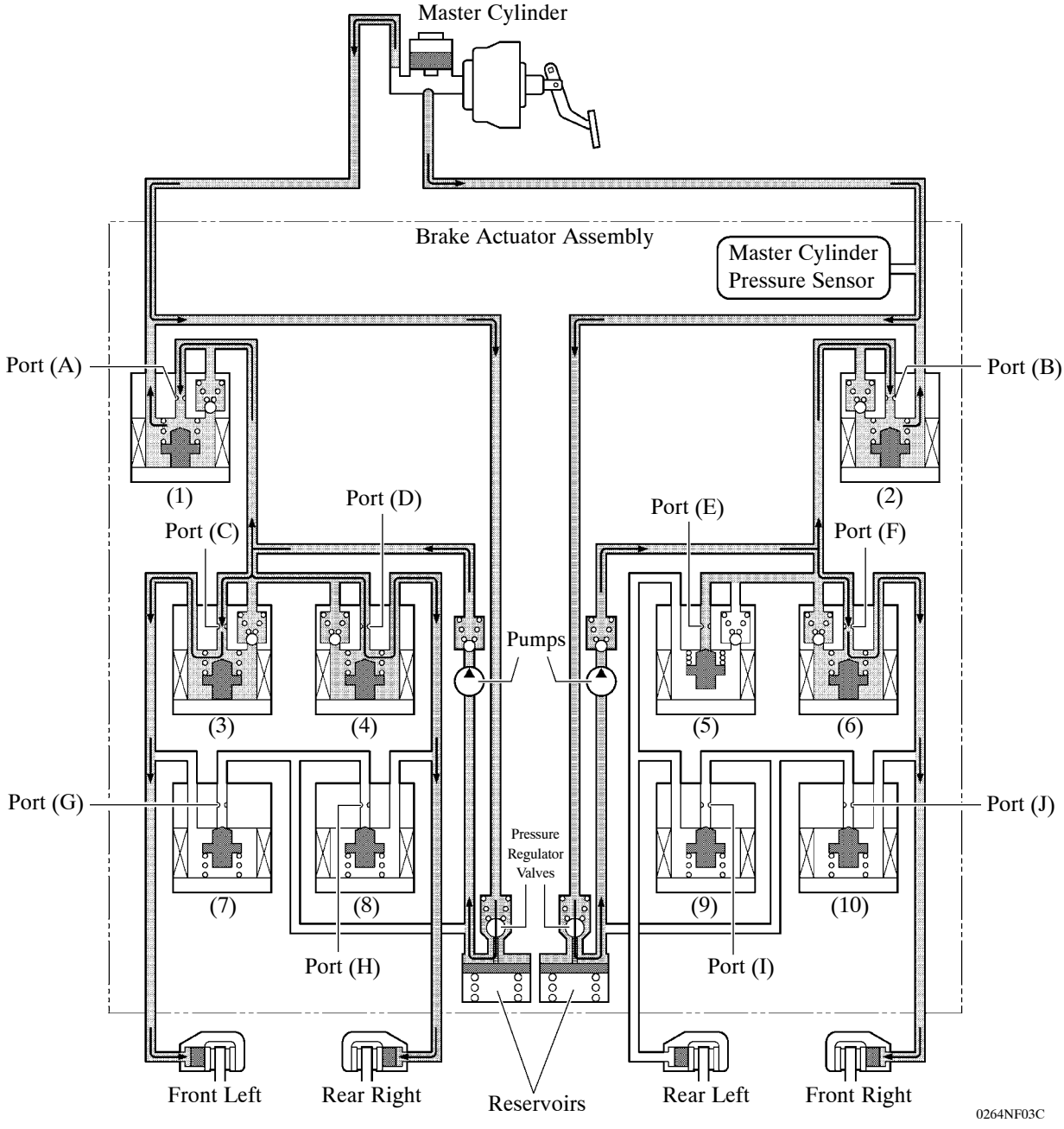


2) Front Wheel Skid Restraining Control (Turning Right)

For front wheel skid restraining control, the brakes of the front wheels and the rear wheel of the inner circle of the turn are applied. Also, depending on whether the brake is ON or OFF and the condition of the vehicle, there are circumstances in which the brake might not be applied to the wheels even if those wheels are targeted for braking.

- The diagram below shows the hydraulic circuit in the pressure increase mode, as it controls the front wheel skid condition while the vehicle makes a right turn.
- In other operating modes, the pressure holding valve and the pressure reduction valve are turned ON/OFF according to the ABS with EBD operation pattern.
- When front wheel skid restraining control is activated, each solenoid operates as shown in the following table.

▶ Pressure Increase Mode ◀



Item			VSC not Activated	VSC Activated		
				Mode		
				Increase Mode	Holding Mode	Reduction Mode
(1), (2)	Master Cylinder Cut Solenoid Valve Port: (A), (B)		OFF/ Open	ON*	←	←
Front Brakes	(3)	Pressure Holding Solenoid Valve Port: (C)	OFF/ Open	←	ON/ Closed	←
	(6)	Pressure Holding Solenoid Valve Port: (F)	OFF/ Open	←	ON/ Closed	←
	(7)	Pressure Reduction Solenoid Valve Port: (G)	OFF/ Closed	←	←	ON/Open
	(10)	Pressure Reduction Solenoid Valve Port: (J)	OFF/ Closed	←	←	ON/Open
	Wheel Cylinder Pressure	Right	—	Increase	Holding	Reduce
		Left	—	Increase	Holding	Reduce
Rear Brakes	(4)	Pressure Holding Solenoid Valve Port: (D)	OFF/ Open	←	ON/ Closed	←
	(5)	Pressure Holding Solenoid Valve Port: (E)	OFF/ Open	ON/ Closed	←	←
	(8)	Pressure Reduction Solenoid Valve Port: (H)	OFF/ Closed	←	←	ON/Open
	(9)	Pressure Reduction Solenoid Valve Port: (I)	OFF/ Closed	←	←	←
	Wheel Cylinder Pressure	Right	—	Increase	Holding	Reduce
		Left	—	—	—	—

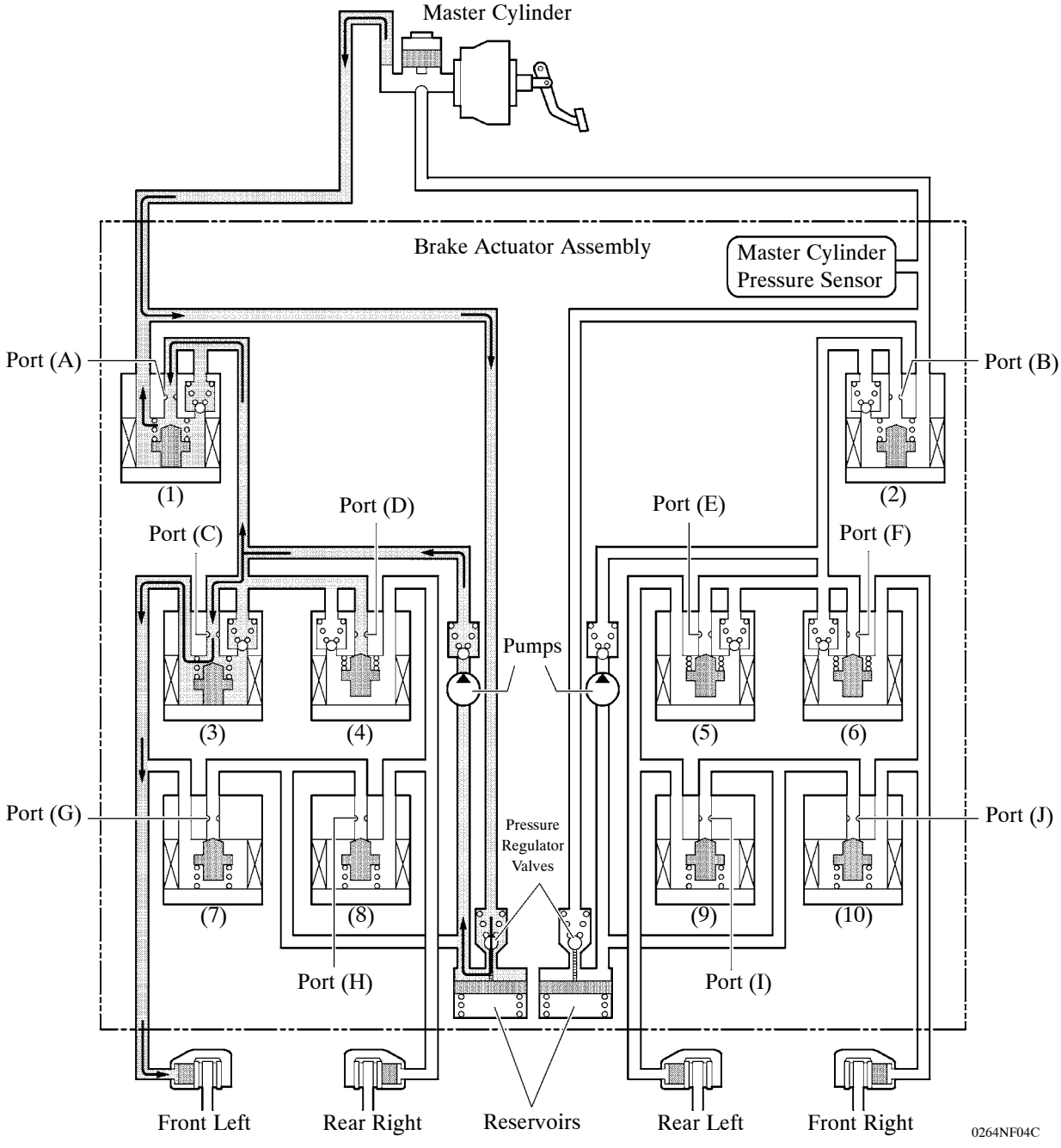
*: The solenoid valves control the hydraulic pressure by continually cycling between “open” and “closed” according to the operating conditions.

3) Rear Wheel Skid Restraining Control (Turning Right)

For rear wheel skid restraining control, the brake of the front wheel of the outer circle of the turn is applied. Also, depending on whether the brake is ON or OFF and the condition of the vehicle, there are circumstances in which the brake might not be applied to the wheels even if those wheels are targeted for braking.

- The diagram below shows the hydraulic circuit in the pressure increase mode, as it controls the rear wheel skid condition while the vehicle makes a right turn.
- In other operating modes, the pressure holding valve and the pressure reduction valve are turned ON/OFF according to the ABS with EBD operation pattern.
- When rear wheel skid restraining control is activated, each solenoid operates as shown in the following table.

▶ Pressure Increase Mode ◀



Item			VSC not Activated	VSC Activated		
				Mode		
				Increase Mode	Holding Mode	Reduction Mode
(1)	Master Cylinder Cut Solenoid Valve Port: (A)		OFF/ Open	ON*	←	←
(2)	Master Cylinder Cut Solenoid Valve Port: (B)		OFF/ Open	←	←	←
Front Brakes	(3)	Pressure Holding Solenoid Valve Port: (C)	OFF/ Open	←	ON/ Closed	←
	(6)	Pressure Holding Solenoid Valve Port: (F)	OFF/ Open	ON/ Closed	←	←
	(7)	Pressure Reduction Solenoid Valve Port: (G)	OFF/ Closed	←	←	ON/Open
	(10)	Pressure Reduction Solenoid Valve Port: (J)	OFF/ Closed	←	←	←
	Wheel Cylinder Pressure	Right	—	—	—	—
		Left	—	Increase	Holding	Reduce
Rear Brakes	(4)	Pressure Holding Solenoid Valve Port: (D)	OFF/ Open	ON/ Closed	←	←
	(5)	Pressure Holding Solenoid Valve Port: (E)	OFF/ Open	ON/ Closed	←	←
	(8)	Pressure Reduction Solenoid Valve Port: (H)	OFF/ Closed	←	←	←
	(9)	Pressure Reduction Solenoid Valve Port: (I)	OFF/ Closed	←	←	←
	Wheel Cylinder Pressure	Right	—	—	—	—
		Left	—	—	—	—

*: The solenoid valves control the hydraulic pressure by continually cycling between “open” and “closed” according to the operating conditions.