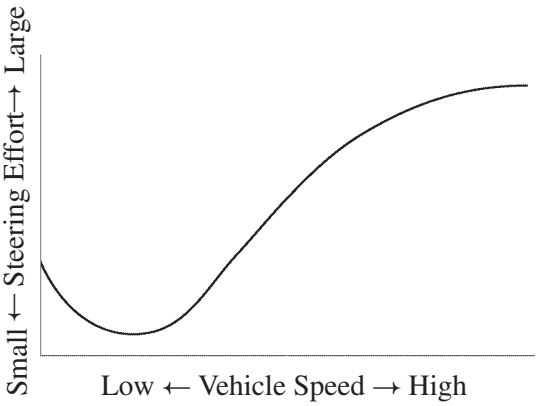
■ HYDRAULIC REACTION PROGRESSIVE POWER STEERING

1. General

The PPS (Progressive Power Steering) controls hydraulic pressure acting on the hydraulic reaction chamber and changing the power steering characteristics according to the vehicle speed. As a result, the wheels can be turned easily at rest or at low speed while a heavier steering feeling is provided at medium to high speeds.

▶ Steering Effort Characteristic ◀



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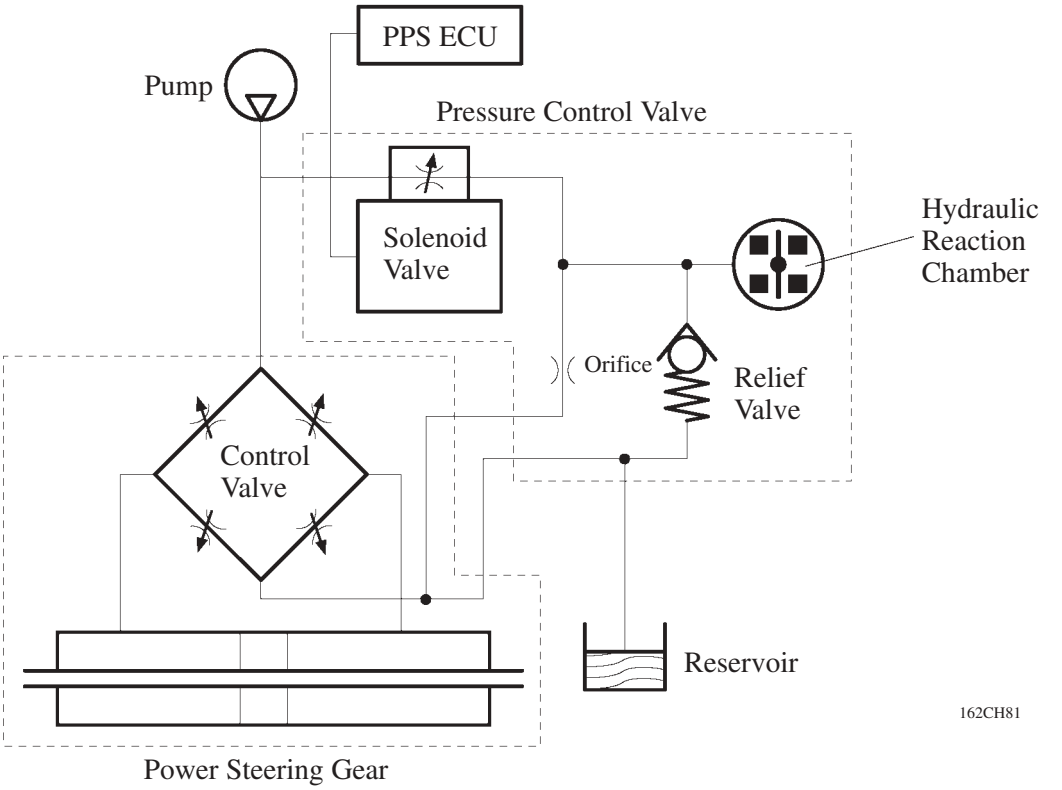
2. System Diagram



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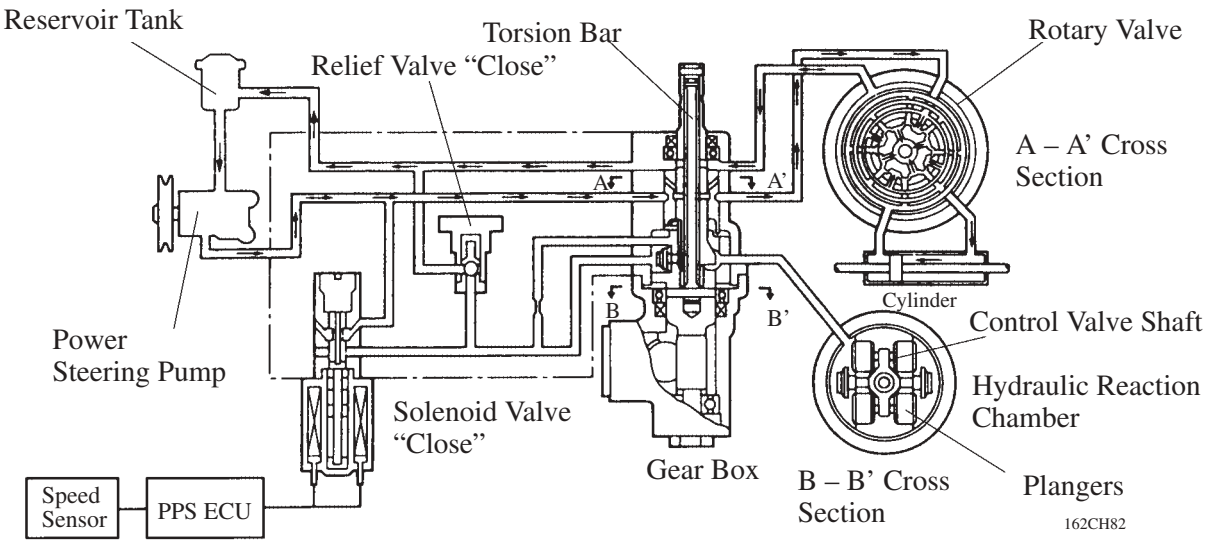
3. Operation

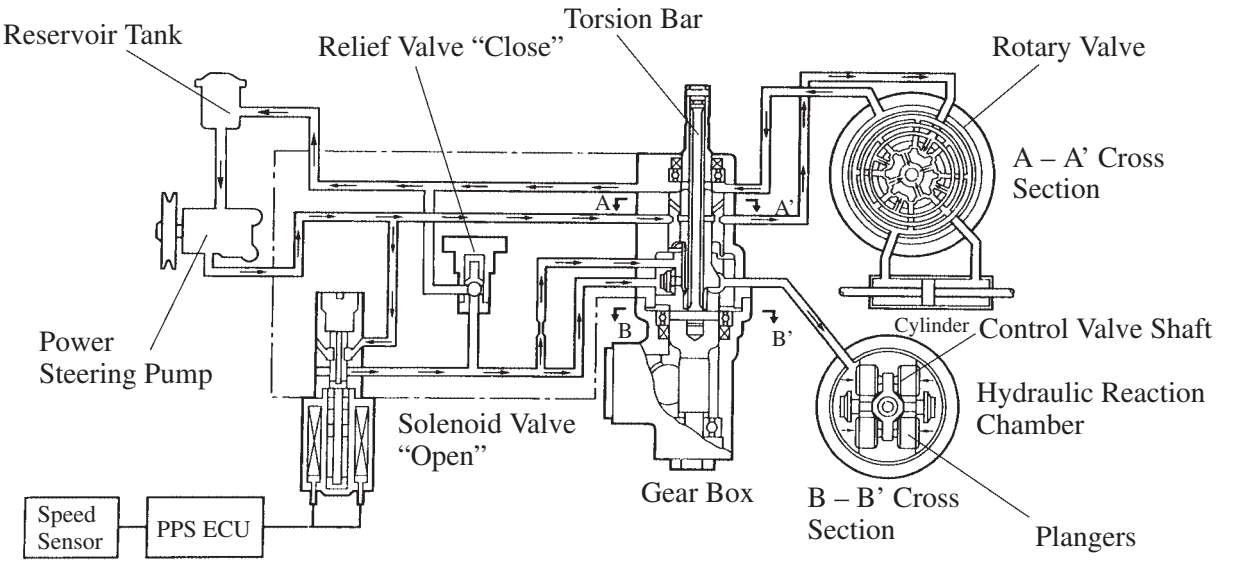
Steering when Vehicle Stopped or Running at Low Speed

At low vehicle speeds, the signal from the PPS ECU (Progressive Power Steering ECU) causes the opening of the solenoid valve to remain small, allowing most of the fluid to flow to the rotary valve.
Therefore, only a low pressure acts on the hydraulic reaction chamber and the plunger pushes the control valve shaft with a very small reaction force.
Fluid flowed to the rotary valve is switched and controlled by the rotary valve. It acts on the power cylinder piston to assist the steering effort. The driver only needs to apply a small steering effort which is equal to the torsional torque of the torsion bar. A high hydraulic pressure is generated by a small steering effort and gives the driver a light steering feeling at low speed.



Straightline Driving at Medium to High Speeds

Along with the increase in the vehicle speed, the signal from the PPS ECU causes the opening of the solenoid valve to increase gradually.
Thus, the fluid pressure that is applied to the hydraulic reaction chamber increases, causing the reaction force of the plunger to increase.
In addition to the torsional torque of the torsion bar, the reaction force of the plunger is applied to the steering effort. Thus, the steering wheel response increases during straightline driving, enabling the driver to experience a stable and direct steering feeling.



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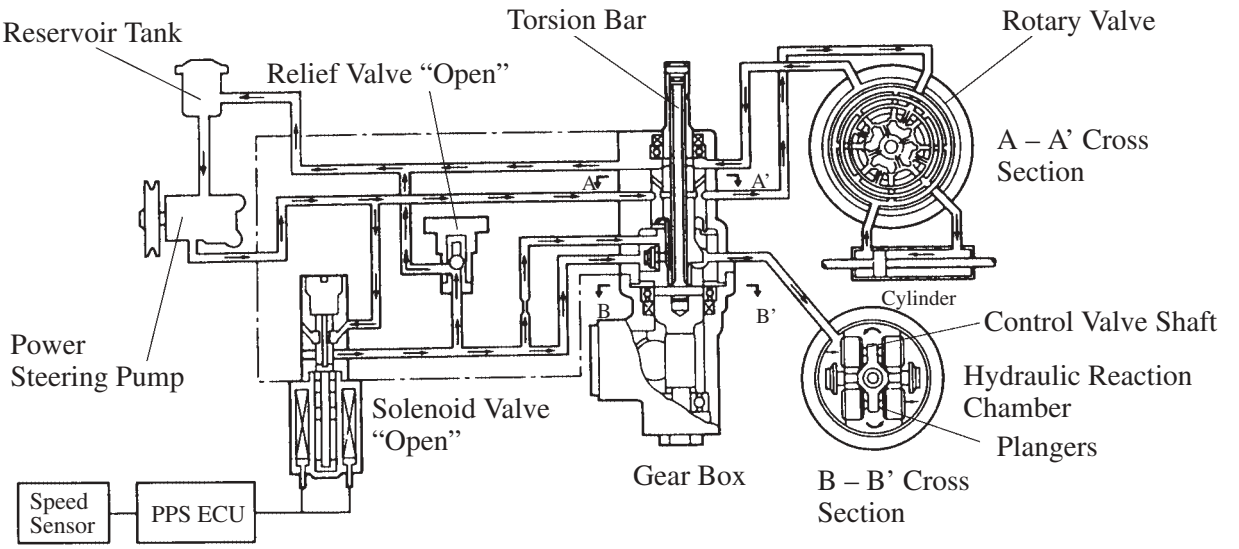
Steering at Medium to High Speeds

If the steering wheel is turned from a medium to high-speed straightline driving condition, the opening of the rotary valve decreases and the fluid pressure on the rotary valve side increases according to the spiral angle of the torsion bar.

Then, the amount of fluid that flows into the hydraulic reaction chamber increases, causing the fluid pressure in the hydraulic reaction chamber to increase.

If the steering wheel is turned further, causing the fluid pressure in the hydraulic reaction chamber to exceed a predetermined value, the relief valve opens to enable the driver to achieve an optimal steering effort.



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