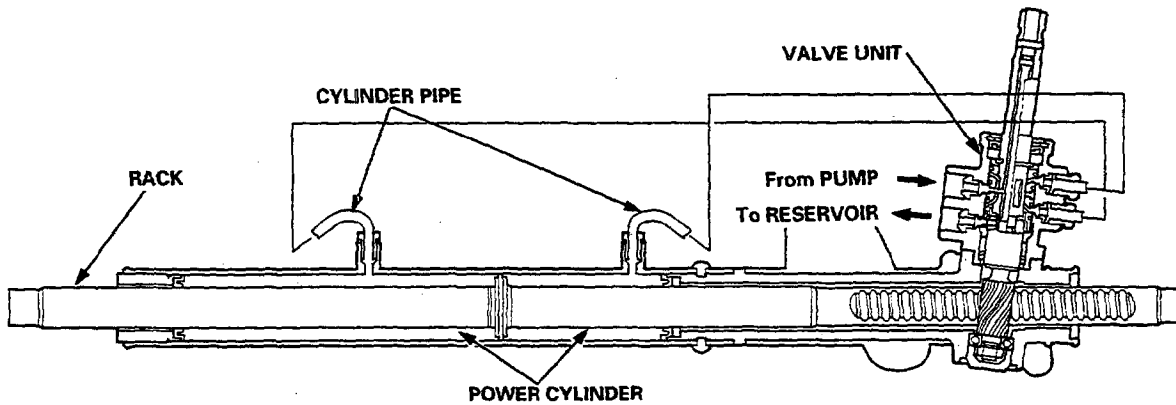


System Description

Steering Gearbox

The rack-and-pinion type steering gearbox has a valve unit incorporated with the pinion to control the steering fluid pressure. Steering fluid from the pump is regulated by a rotary valve in the valve unit and is sent through the cylinder pipe to the power cylinder, where hydraulic pressure is applied. The steering fluid in the other side of the power cylinder returns through the cylinder pipe and valve unit to the reservoir.



Valve Unit

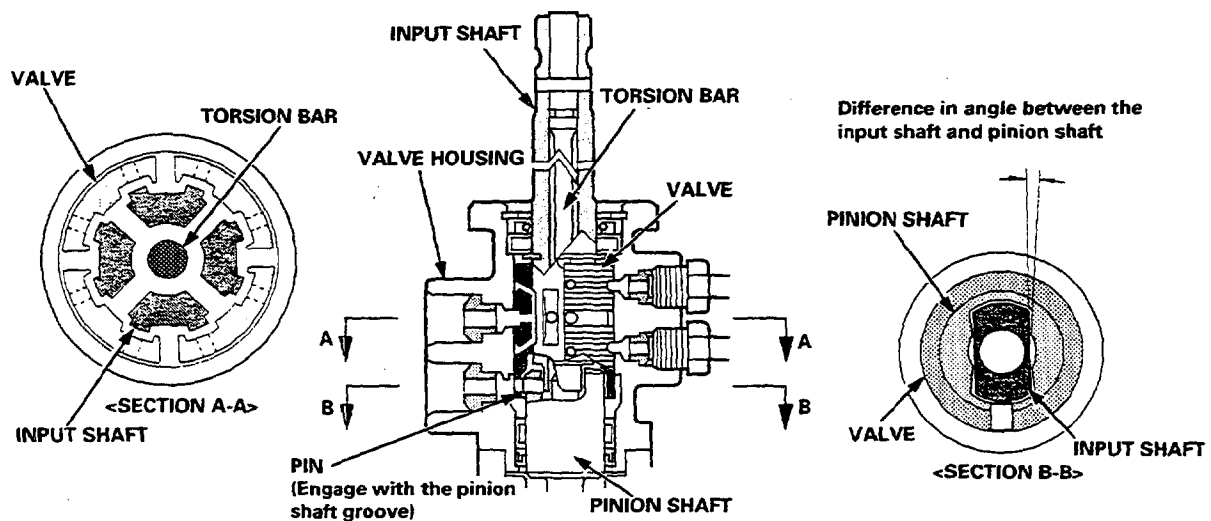
Inside the valve unit is the valve, which is coaxial with the pinion shaft, and controls the steering fluid pressure. The valve housing is connected with the fluid pipe from the pump, return pipe to the pump, and the two cylinder pipes from the respective power cylinder.

The pinion shaft is double - structured with the input shaft connected to the pinion gear, both of which are interconnected with the torsion bar.

The pin inserted in the valve and the pinion shaft groove engage; this allows the pinion shaft to rotate together with the valve.

Because of this construction, the difference in angle in the circumferential direction between the input shaft and the valve becomes larger according to the torsional strength of the pinion or steering resistance. However, maximum torsion between the shafts is regulated by the engaged splines of the shafts at the pin engagement section to hold the torsion bar within the set value.

This allows the steering system to function as an ordinary rack-and-pinion type steering if the steering fluid is not pressurized because of a faulty pump.

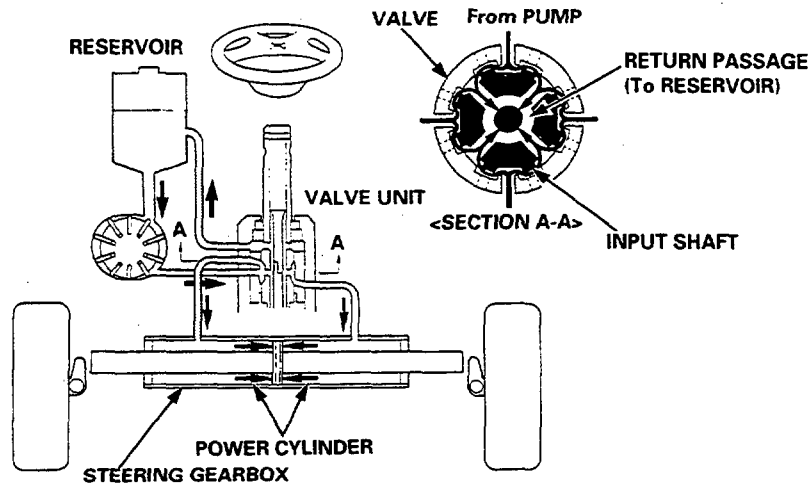




Pressure Control

Low assist at higher speeds:

When steering resistance is low, such as when driving at high speeds, or when driving straight ahead, the input shaft is near or in the neutral position, so there is little or no flow to any of the power cylinder orifices. Most of the feed pressure from the pump is bypassed to the reservoir. Because of this, the pressure stays the same in both sides of the power cylinder, resulting in low or no assist.



High assist at lower speeds:

When steering resistance is high, such as when driving at low speed, or when turning the wheel with the car stopped, the difference in angle created between the input shaft and the valve opens the fluid passage on one side, and closes the fluid passage on the other side, at each pair of orifices. The fluid pressure increases in the side of the power cylinder fed by the larger fluid passage. This increased pressure pushes on the rack piston, allowing the steering wheel to be turned with light effort. On the other side of the power cylinder, the return passage opens allowing the steering fluid to return through the input shaft to the reservoir. The fluid passages to the power cylinder automatically change in size, increasing as the steering resistance increases. In other words, the passages become larger and power assist increases when the steering effort would normally be high, (for example, when parking or making low speed turns), and the passages become smaller and power assist decreases when the steering effort would normally be low, (for example, when driving at high speeds or straight ahead).

