1.2 GENERAL DESCRIPTION - SPEED SENSITIVE ROTARY VALVE

Sectioned views of the rotary control valve and pinion assembly are illustrated in Figures 9B-1, 9B-2 and 9B-3, and it can be seen that the assembly is a modular design which provides some interchangeability between the two different power steering systems.

The vehicle speed related boost characteristic, is caused by the outer sleeve member moving along the inner input shaft member by approximately 4 mm. This outer sleeve movement alters the quantity of fluid that is diverted to the rack piston, varying the power assistance required. The outer sleeve movement is controlled by a solenoid operated 'flapper' valve, located in the fluid return side of the valve. The solenoid operation is controlled by the Body Control Module which supplies a variable width, pulsed signal, providing a variable pulse width (or "ON" time), which is inversely proportional to road speed.

The outer sleeve's 'back and forth' movement causes the slots in the internal bore of the sleeve to mask off pocketed regions machined in the inner valve member of the input shaft, indicated in Figures 9B-1 and 9B-2 as the 'High Speed Edge'. The relative position of the inner valve and outer sleeve has the effect of changing the fluid flow characteristic and system pressure, inversely with vehicle speed.

At low vehicle speeds, solenoid valve activity raises hydraulic pressure on the return side of the valve, moving the sleeve against a reaction force provided by a 'balancing' or reaction spring. Having raised the system pressure, the volume of fluid diverted to the steering rack will now be dependent upon the twisting of the inner valve member, relative to the outer sleeve.

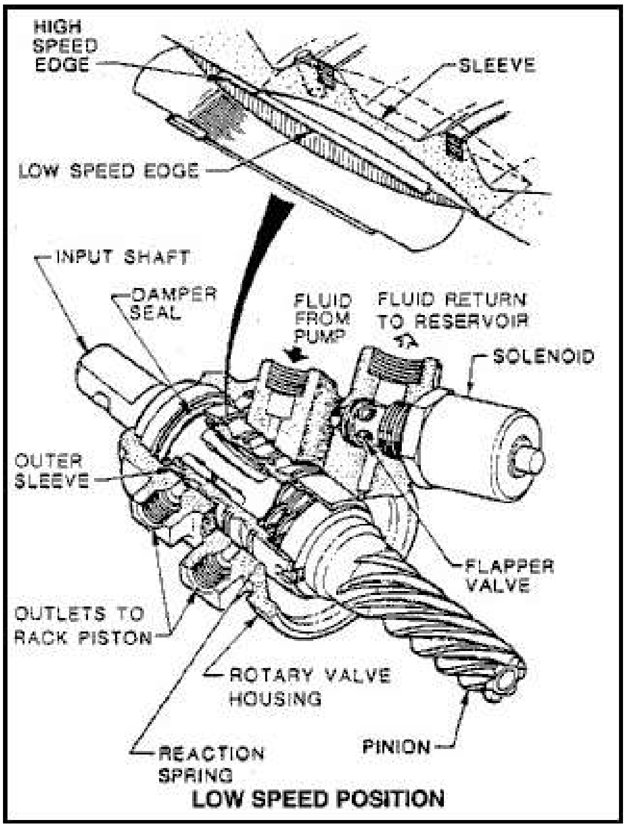

Figure 9B-1

During high speed driving, when minimum boost is required, the solenoid is not activated (above approximately 80 km/h) and the reaction spring moves the sleeve to its maximum point of travel. This action effectively reduces the hydraulic assistance provided to the steering rack. As vehicle speed reduces, the solenoid is progressively activated by the Body Control Module (BCM) and the sleeve position is determined by the relative balance between the return fluid pressure and the reaction spring.

During slow speed parking manoeuvres, the solenoid is fully activated, allowing the increased return fluid pressure to move the sleeve against the reaction spring, providing maximum boost pressure to the steering rack assembly, thereby requiring minimum driver steering effort to turn the steering wheel.

In the unlikely event of an electronic/electrical failure, the control spring will move the sleeve to the 'high speed' (or high effort) mode.

When the engine is stopped, the outer sleeve member is pushed to the high speed (minimum boost) position by the reaction spring. If this situation continues for a lengthy period of time (e.g. overnight), cold, viscous fluid will have collected behind the sleeve, at the reaction spring end. To avoid a time delay on start up for the sleeve to be positioned into the maximum boost position, an orifice or bleed hole (Refer to Figure 9B-3) is provided, that allows the collected fluid to by-pass the solenoid flapper valve and be exhausted to the fluid reservoir.

A damper seal located at the fluid end of the sleeve, is used to reduce sleeve oscillation that could occur under some engine and vehicle operating conditions. With these changing fluid pressure levels, fluid is able to force past the seal lip and, with a controlled leakage

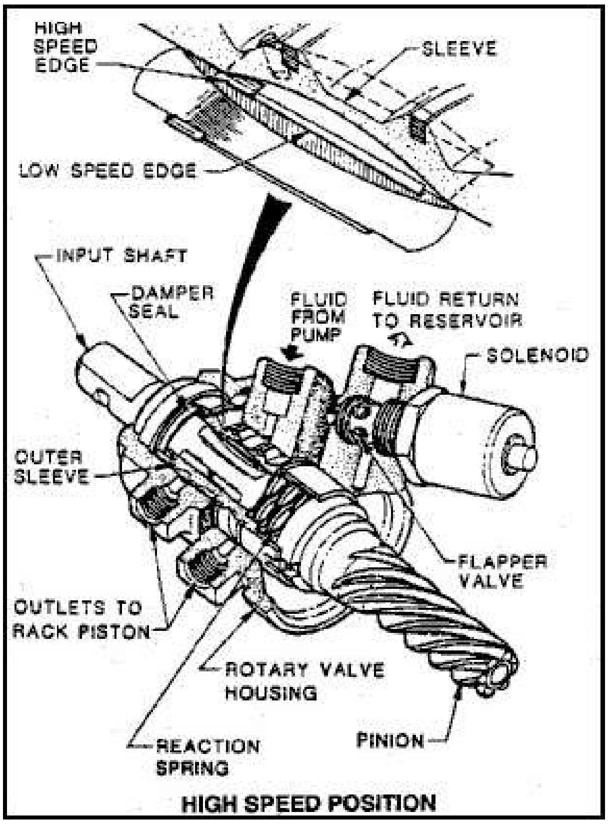

Figure 9B-2

force past the seal lip and, with a controlled leakage factor incorporated into the seal design, effective damping of the sleeve is achieved.

Figure 9B-2