Chapter 51
Power-Assisted Steering Operation and Service

FIGURE 51.1 A typical integral power steering pump when the pump is mounted inside the reservoir.

FIGURE 51.2 Typical remote reservoir.
FIGURE 51.3 Typical power steering pump assemblies.

FIGURE 51.4 General Motors vane-type pump.

The power steering fluid cooler, if used, is located in the return hose. Often the cooler is simply a length of return metal line that is arranged in a loop and routed near the front of the vehicle. The airflow past the return line helps reduce the temperature of the fluid.
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FIGURE 51.6 Forces acting on the rack piston of an integral power steering gear.

FIGURE 51.7 During a left turn, the control valve directs pressure into the left-turn fluid line and the rack moves left. (See inset.) Fluid pushed out of the right-turn fluid chamber travels back through the right-turn fluid line and control valve to the return circuit.

FIGURE 51.8 The control valve routes high-pressure fluid to the left-hand side of the power piston, which pushes the piston and assists in moving the rack toward the right when the steering wheel is turned right.
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FIGURE 51.9 Low-speed flow control.

FIGURE 51.10 High-speed flow control operation.

FIGURE 51.11 Pressure-relief mode. In this mode, the steering gear has blocked the flow of fluid from the pump and the pressure rises, which unseats the pressure-relief valve. Now, the fluid flows back to the inlet through the pressure-relief orifice and passage.
The power steering pressure switch is often attached to the steering gear assembly.

FIGURE 51.13 EVO actuator assembly.

FIGURE 51.14 A Toyota Prius EPS assembly.
FIGURE 51.15 The torque sensor converts the torque the driver is applying to the steering wheel into a voltage signal.

FIGURE 51.16 The electric power steering in Toyota/Lexus SUVs uses a brushless DC motor around the rack of the unit and operates on 42 volts.

FIGURE 51.17 A Ford Fusion electric power steering system that uses a mini toothed belt drive from the motor to drive the rack.
FIGURE 51.18 A cross-sectional view of a Honda electric power steering gear.

FIGURE 51.19 Honda electric power steering unit cutaway.

FIGURE 51.20 The power steering control module is attached to the motor of the electric power steering assembly.
FIGURE 51.21 Schematic showing the electric power steering and the torque/position sensor.

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FIGURE 51.22 A typical service manual illustration showing the method to use to properly tension the accessory drive belt.
FIGURE 51.23 A check of the power steering fluid should include inspecting not only the level but the condition and color of the fluid, which could indicate a possible problem with other components in the steering system.

FIGURE 51.24 Some power steering fluid is unique to the climate, such as this cold climate fluid, recommended for use in General Motors vehicles when temperatures are low.

FIGURE 51.25 Inspect both high-pressure and return power steering hoses. Make sure the hoses are routed correctly and not touching sections of the body to prevent noise, steering valve, fluid leaks, and transmitted to the passenger compartment.