Diesel Engine Operation

FIGURE 15.1 Diesel combustion occurs when fuel is injected into the hot, highly compressed air in the cylinder.

FIGURE 15.2 A typical injector pump type of automotive diesel fuel-injection system.
FIGURE 15.3 A Cummins diesel engine as found in a Dodge pickup truck. A high-pressure pump (up to 30,000 PSI) is used to supply diesel fuel to the common rail, which has tubes running to each injector. Note the thick cylinder walls and heavy-duty construction.

FIGURE 15.4 A rod/piston assembly from a 5.9-liter Cummins diesel engine used in a Dodge pickup truck.

FIGURE 15.5 An indirect injection diesel engine uses a pre-chamber and a glow plug.
FIGURE 15.6 A direct injection diesel engine injects the fuel directly into the combustion chamber. Many designs do not use a glow plug.

FIGURE 15.7 A fuel filter attached to the frame rail on a Ford pickup truck equipped with a diesel engine. When the “water in fuel” warning lamp comes on, the water that is trapped in the filter-water separator assembly can be drained from the unit.

FIGURE 15.8 A typical distributor-type diesel injection pump showing the pump, lines, and fuel filter.
FIGURE 15.9: A schematic of Stanadyne diesel fuel-injection pump assembly showing all of the related components.

FIGURE 15.10: Overview of a computer-controlled high-pressure common rail V-8 diesel engine.

FIGURE 15.11: A HEUI injector from a Ford Power Stroke diesel engine. The O-ring grooves indicate the location of the O-rings that seal the fuel section of the injector from coolant and from the engine oil.
FIGURE 15.15: A Cummins diesel turbocharger is used to increase the power and torque of the engine.

FIGURE 15.16: An air charge cooler is used to cool the compressed air.

FIGURE 15.17: Aftertreatment of diesel exhaust is handled by the DOC and DPF.
FIGURE 15.18 The soot is trapped in the passages of the DPF. The exhaust has to flow through the sides of the trap and exit.

FIGURE 15.19 Diesel exhaust fluid costs $3 to $4 a gallon and is housed in a separate container that holds from 5 to 10 gallons, or enough to last until the next scheduled oil change in most diesel vehicles that use SCR.

FIGURE 15.20 Urea (diesel exhaust fluid) injection is used to reduce NOx exhaust emissions. It is injected after the diesel oxidation catalyst (DOC) and before the diesel particulate filter (DPF) on this 6.7 liter Ford diesel engine.