

chapter 15
Gasoline Engine Operation

FIGURE 15.3 A cylinder head with four valves per cylinder, two intake valves (larger) and two exhaust valves (smaller).



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FIGURE 15.4 The coolant temperature is controlled by the thermostat, which opens and allows coolant to flow to the radiator when the temperature reaches the rated temperature of the thermostat.

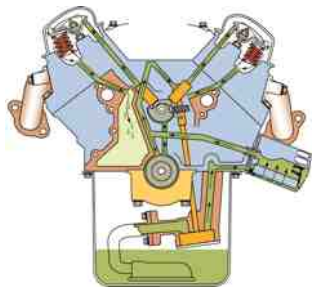


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FIGURE 15.5 A typical lubrication system, showing the oil pan, oil pump, oil filter, and oil passages.

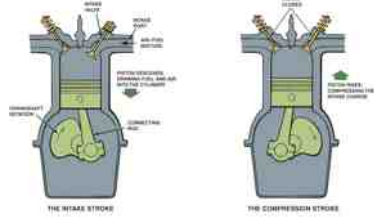


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FIGURE 15.6 The downward movement of the piston draws the air-fuel mixture into the cylinder through the intake valve on the intake stroke. On the compression stroke, the mixture is compressed by the upward movement of the piston with both valves closed. Ignition occurs at the beginning of the power stroke, and combustion drives the piston downward to produce power. On the exhaust stroke, the upward-moving piston forces the burned gases out the open exhaust valve.

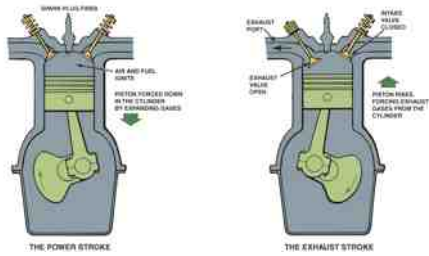


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FIGURE 15.6 (continued).



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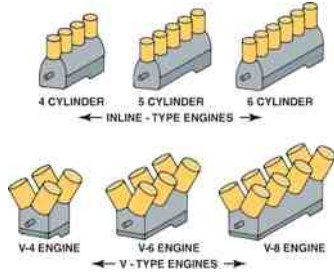
FIGURE 15.7 Cutaway of an engine showing the cylinder, piston, connecting rod, and crankshaft.



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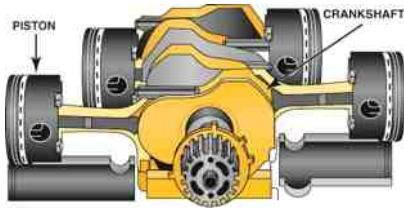
FIGURE 15.8 Automotive engine cylinder arrangements.



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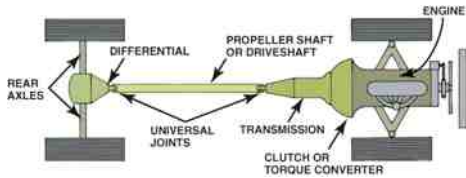
FIGURE 15.9 A horizontally opposed engine design helps lower the vehicle's center of gravity.



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FIGURE 15.10 A longitudinally mounted engine drives the rear wheels through a transmission, driveshaft, and differential assembly.



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FIGURE 15.11 Two types of front-engine, front-wheel drive mountings.

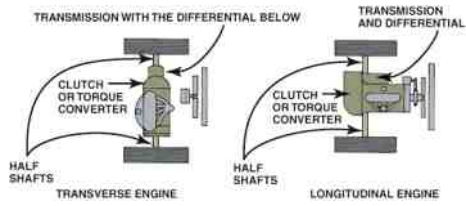


FIGURE 15.12 Cutaway of an overhead valve (OHV) V-8 engine showing the lifters, pushrods, roller rocker arms, and valves.



FIGURE 15.13 SOHC engines usually require additional components, such as a rocker arm, to operate all of the valves. DOHC engines often operate the valves directly.

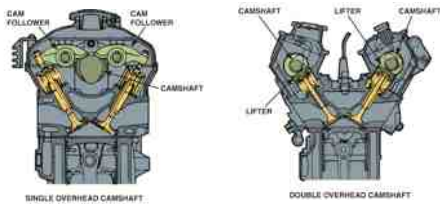


FIGURE 15.14 A DOHC engine uses a camshaft for the intake valve and a separate camshaft for the exhaust valves in each cylinder head.



FIGURE 15.15 A supercharger on a Ford V-8.



FIGURE 15.16 A turbine wheel is turned by the expanding exhaust gases.

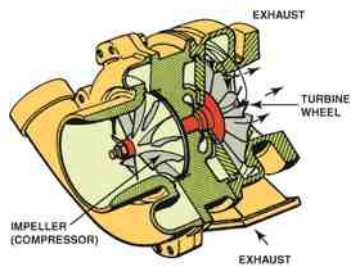


FIGURE 15.17 A rotary engine operates on the four-stroke cycle but uses a rotor instead of a piston and crankshaft to achieve intake, compression, power, and exhaust stroke.

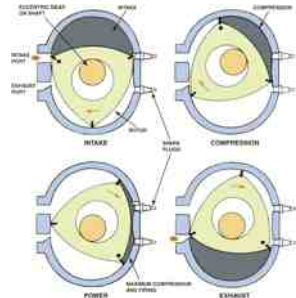


FIGURE 15.18 The bore and stroke of pistons are used to calculate an engine's displacement.

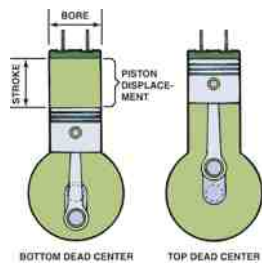
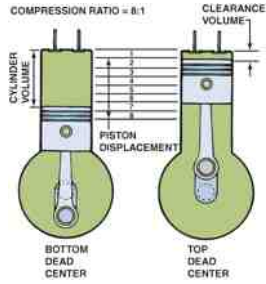


FIGURE 15.19 The distance between the centerline of the main bearing journal and the centerline of the connecting rod journal determines the stroke of the engine. This photo is a little unusual because it shows a V-6 with a splayed crankshaft used to even out the impulses on a 90° V-6 engine design.



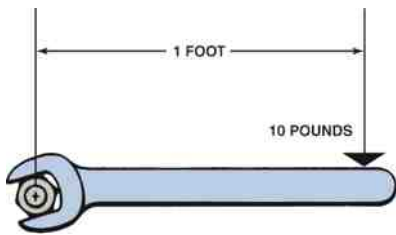
FIGURE 15.20 Compression ratio is the ratio of the total cylinder volume (when the piston is at the bottom of its stroke) to the clearance volume (when the piston is at the top of its stroke).



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FIGURE 15.21 Torque is a twisting force equal to the distance from the pivot point times the force applied expressed in units called pound-feet (lb-ft) or Newton-meters (N-m).



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