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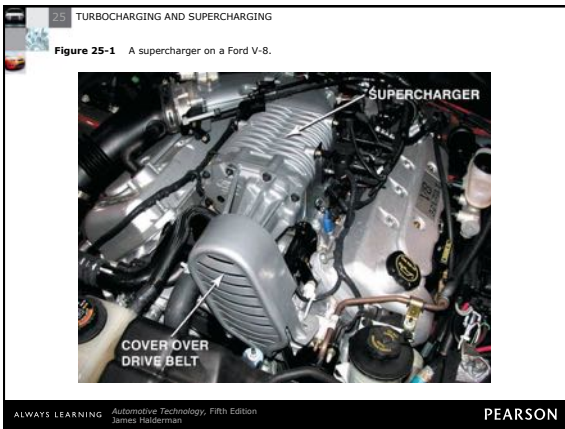
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25 TURBOCHARGING AND SUPERCHARGING

**Figure 25-3** The more air and fuel that can be packed in a cylinder, the greater the density of the air-fuel charge.

LOW DENSITY                      HIGH DENSITY

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25 TURBOCHARGING AND SUPERCHARGING

**Figure 25-4** Atmospheric pressure decreases with increases in altitude.

PIKES PEAK  
(14,000 FT.)  
8.6 PSI

DENVER  
(5000 FT.)  
13.0 PSI

ST. LOUIS  
(600 FT.)  
14.4 PSI

NEW YORK CITY  
14.7 PSI

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25 TURBOCHARGING AND SUPERCHARGING

**Chart 25-1** The effective compression ratio compared to the boost pressure.

COMP RATIO	SEVER BOOST (PSI)									
	2	4	6	8	10	12	14	16	18	20
6.5	7.4	8.3	9.2	10	10.9	11.8	12.7	13.6	14.5	15.3
7	8	8.9	9.9	10.8	11.8	12.7	13.6	14.5	15.3	16.2
7.5	8.5	9.5	10.6	11.6	12.6	13.6	14.6	15.7	16.7	17.8
8	9.1	10.2	11.3	12.4	13.4	14.5	15.6	16.7	17.8	18.9
8.5	9.7	10.8	12	13.1	14.3	15.4	16.6	17.8	18.9	19.8
9	10.2	11.4	12.7	13.9	15.1	16.3	17.6	18.8	20	21.2
9.5	10.8	12.1	13.4	14.7	16	17.3	18.5	19.8	21.1	22.4
10	11.4	12.7	14.1	15.4	16.8	18.2	19.5	20.9	22.2	23.6

CHART 25-1

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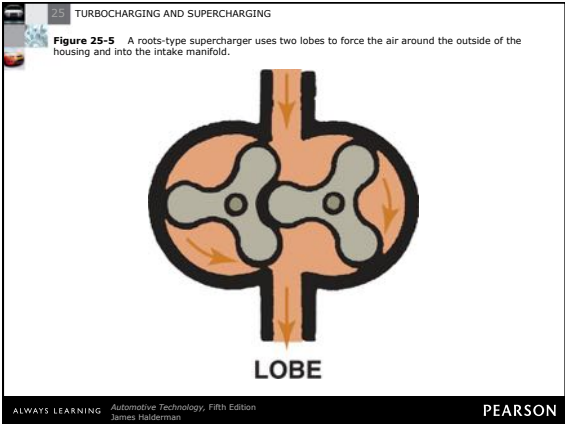
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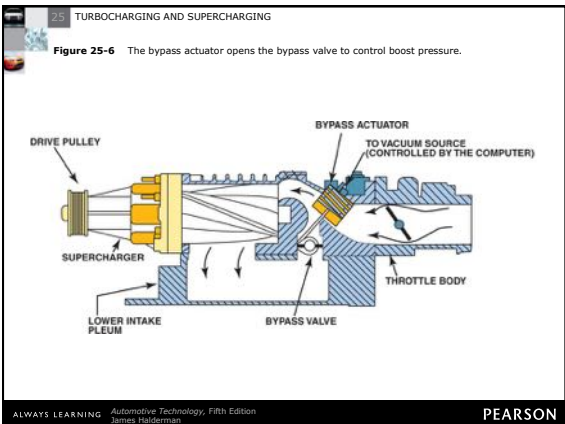
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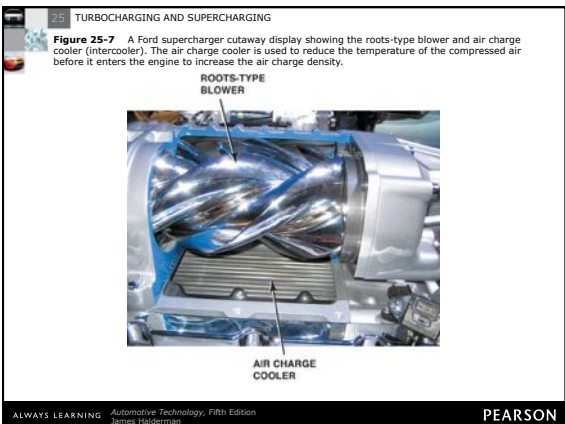
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25 TURBOCHARGING AND SUPERCHARGING

**TECH TIP**

**Faster Moves More Air**

One of the high-performance measures that can be used to increase horsepower on a supercharged engine is to install a smaller diameter pulley. The smaller the pulley diameter, the faster the supercharger will rotate and the higher the potential boost pressure will be. The change will require a shorter belt, and the extra boost could cause serious engine damage.

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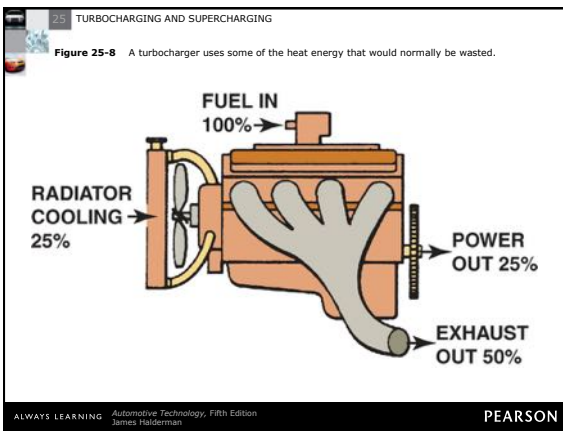
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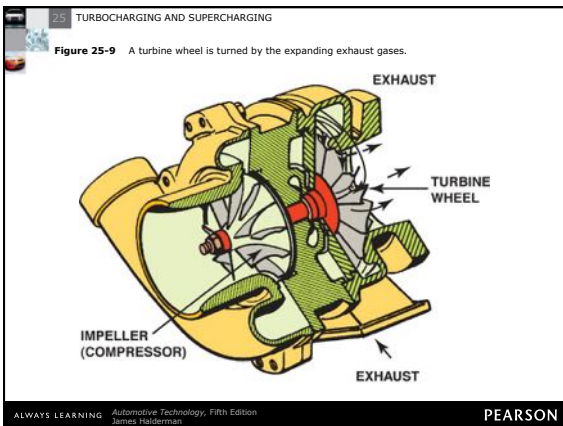
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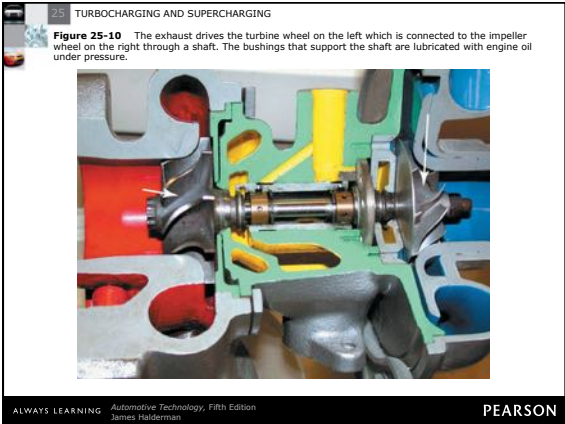
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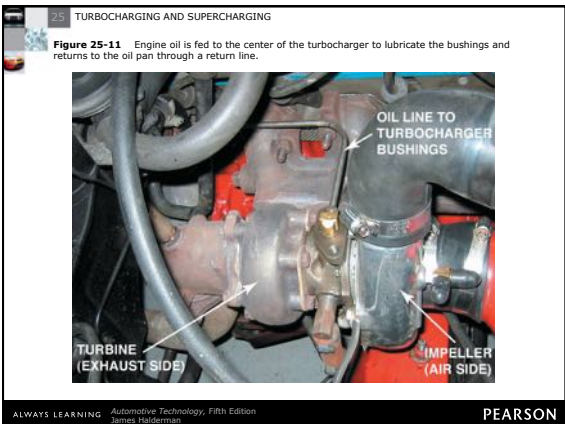
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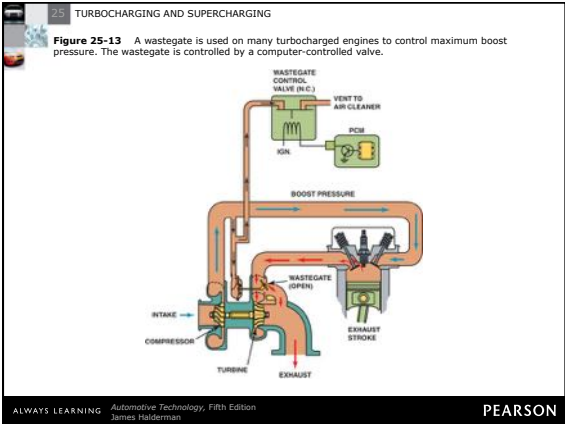
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25 TURBOCHARGING AND SUPERCHARGING

**TECH TIP**

**Boost Is the Result of Restriction**

The boost pressure of a turbocharger (or supercharger) is commonly measured in pounds per square inch. If a cylinder head is restricted because of small valves and ports, the turbocharger will quickly provide boost. Boost results when the air being forced into the cylinder heads cannot flow into the cylinders fast enough and "piles up" in the intake manifold, increasing boost pressure. If an engine had large valves and ports, the turbocharger could provide a much greater amount of air into the engine at the same boost pressure as an identical engine with smaller valves and ports. Therefore, by increasing the size of the valves, a turbocharged or supercharged engine will be capable of producing much greater power.

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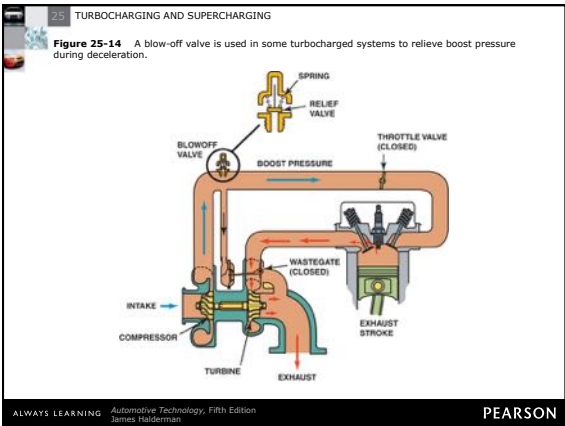
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25 TURBOCHARGING AND SUPERCHARGING

**TECH TIP**

**If One Is Good, Two Are Better**

A turbocharger uses the exhaust from the engine to spin a turbine, which is connected to an impeller inside a turbocharger. This impeller then forces air into the engine under pressure, higher than is normally achieved without a turbocharger. The more air that can be forced into an engine, the greater the power potential. A V-type engine has two exhaust manifolds and so two small turbochargers can be used to help force greater quantities of air into an engine, as shown in ● FIGURE 25-15.

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25 TURBOCHARGING AND SUPERCHARGING

**Figure 25-15** A dual turbocharger system installed on a small block Chevrolet V-8 engine.



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25 TURBOCHARGING AND SUPERCHARGING

**Chart 25-2** Temperature/pressure relation for nitrous oxide: The higher the temperature, the higher the pressure.

TEMPERATURE (°F/°C)	PRESSURE (PSI/KPA)
-30°F / -34°C	67 PSI/466 kPa
-20°F / -29°C	203 PSI/1,400 kPa
-10°F / -23°C	240 PSI/1,655 kPa
0°F / -18°C	283 PSI/1,950 kPa
10°F / -12°C	335 PSI/2,310 kPa
20°F / -7°C	387 PSI/2,668 kPa
30°F / -1°C	460 PSI/3,172 kPa
40°F / 4°C	520 PSI/3,585 kPa
50°F / 10°C	590 PSI/4,068 kPa
60°F / 16°C	675 PSI/4,654 kPa
70°F / 21°C	760 PSI/5,240 kPa
80°F / 27°C	865 PSI/5,964 kPa
90°F / 32°C	985 PSI/6,792 kPa
100°F / 38°C	1,120 PSI/7,722 kPa

CHART 25-2

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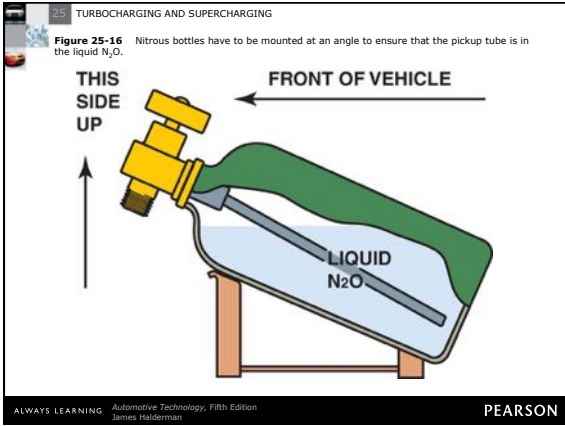
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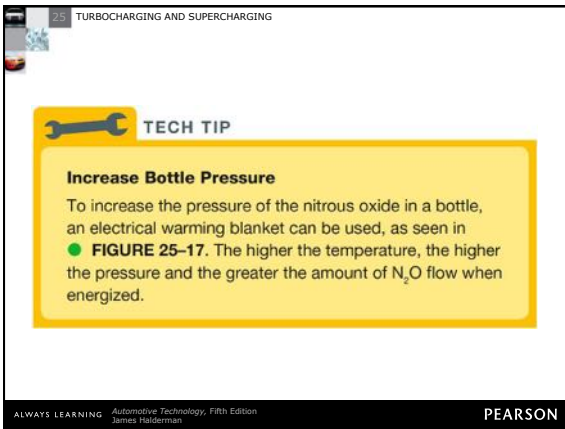
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