

CHAPTER 20

CONVERTING TO HIGH COMPRESSION

You can convert your car more closely to an ideal alcohol engine by increasing its compression ratio to take advantage of alcohol's high octane rating. With its practical rating of 105, you should be able to run alcohol in an engine with a compression ratio from 12:1 to 18:1, and sometimes a little higher, without experiencing pinging or preignition. Your present engine's compression is probably somewhere between 7:1 and 9:1—higher ratios cause pinging using modern gasoline.

To some degree, the upper limit of the compression ratio depends on the design and shape of the combustion chamber. The practical limit on how high you can go depends on how strong the connecting rods, bearings, and crankshaft are. Sometimes, you are limited by the number of bolts that hold down the head; some cheap engines have too few bolts and can't stay sealed, no matter how tightly you turn the bolts.

An increase in compression ratio commonly raises horsepower from 15 to 40%. Increases of up to 30% don't reduce engine life at all, while increases of 30 to 40% may reduce it slightly, in certain cases. Added compression also helps speed the initial flame front, letting alcohol deliver more power before the exhaust valve opens.

A higher compression ratio can also increase alcohol mileage by up to 22%, depending on several engine design factors. In general, higher-compression engines are more efficient than lower-compression ones. The highest efficiency is attained by the difference in the highest and lowest pressure in an engine cycle. High-compression alcohol engines and diesel engines turn more of the fuel into work than gasoline engines.

Synthetic oil is a necessity in high-compression conversion, since petroleum oils aren't rated for engines with a decent amount of compression. The **film strength** and flashpoint of synthetic oil are much higher than petroleum's. This contributes to

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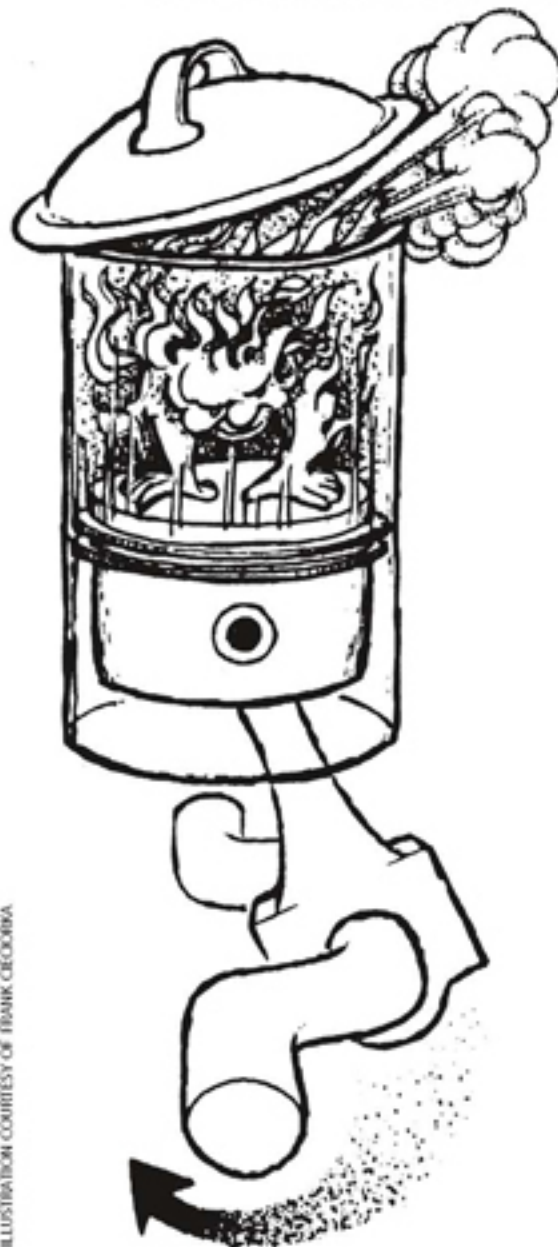


ILLUSTRATION COURTESY OF FRANK CECOROVA

Fig. 20-1 A piston. Burning fuel expands, pushing the piston down.