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MOTORING

Premium Required? Not Necessarily

By DEXTER FORD

AT today's prices, it's understandable that drivers accustomed to filling their gas tanks with premium would be looking for ways to ease the financial pain.

Some relief may be as close as their next fill-up. Switching from premium-grade to regular unleaded can save several dollars on each tankful, given an average price difference of about 30 cents a gallon, according to end-of-July figures compiled by AAA.

While using gasoline that carried a lower octane rating than the engine required was once a sure path to disaster, that is no longer the case. Nearly all automobiles sold in the United States since the 1990s will happily run on regular-grade 87-octane gasoline without causing engine damage, a benefit of the electronic controls that now manage all engine functions.



The octane number posted on the pump is a measure of a gasoline blend's resistance to a condition called knocking. The knocking sound — a rattling noise made by an engine under load, familiar to drivers of older cars — is a result of out-of-control combustion, the mixture of air and fuel burning erratically. The explosion rings the metal of the engine block like a bell.

The higher the octane rating, the more temperature and pressure the gasoline can withstand before it ignites on its own, rather than when it is set off by the spark plug. An engine that calls for premium gas typically has a higher compression ratio — it squeezes the air and fuel mixture to higher pressures — which can improve both fuel economy and power output. But such an engine requires the higher octane rating to run properly.

Before the switch to fuel injection and computerized controls, engines were subject to damage from prolonged knocking. But today's engine management systems incorporate electronic knock sensors, which detect the condition and adjust the ignition to stop the problem. As a result, it is almost impossible to hurt a current engine by using 87-octane fuel, industry experts say.

"Modern engines prevent the damage from happening before it starts," said Patrick Kelly, a fuels analyst with the [American Petroleum Institute](#). "It wouldn't impact fuel economy. And it wouldn't impact the emissions. What it would impact is the performance."

Of course, owners who do not heed the automakers' recommendations may face consequences — the potential voiding of warranties, for instance. But for the most part, manufacturers' fuel recommendations include some wiggle room.

Porsche, for example, acknowledges that any of its modern production cars can be run on regular fuel without the risk of damage.

A spokesman for Porsche North America, Tony Fouladpour, added a caveat. "If you want the car to perform at its maximum capability, the best choice would not be 87," he said. "But we do not forbid it."

Specifying premium fuel lets a car manufacturer squeeze out more horsepower. [BMW](#), for example, recommends that all the cars it sells in the United States use premium fuel, but they will run on regular.

"There generally isn't any harm done to the engine by using lower-octane fuel," said a BMW spokesman, Thomas Plucinsky. "Because our engines do have very good forms of knock sensing and are able to deal with lower-octane fuels, you will not have any drivability issues. You will, however, lose some of the performance."

How much of a loss? Some indication can be found in the peak horsepower numbers Hyundai recently released for its new Genesis sedan. On premium, the 4.6-liter V-8 engine is rated at 375 horsepower. On 87-octane regular, it is 368.

That seven-horsepower difference — less than 2 percent — seems a small penalty for saving 30 cents a gallon, especially when you can regain that performance simply by filling up with premium.

Does using lower-octane fuel reduce mileage or increase emissions, as some drivers believe? Not according to the [Environmental Protection Agency](#). "E.P.A. fuels engineers say that there isn't a meaningful difference between regular and premium gasoline," said Dale Kemery, a spokesman for the agency.

Still, the warning from some automakers can give an owner pause at the pump. The manual for the Smart Fortwo repeats the warning issued for other vehicles sold by Mercedes-Benz: "To maintain the engine's durability and performance, premium unleaded gasoline must be used."

But even those stern words may have some room for interpretation. Dave Schembri, president of Smart USA, told John Schwartz, a reporter who was writing for this section's blog about his experiences in buying a Smart, that he should not worry.

"You could use regular gas — there's no damage to the car," Mr. Schembri said.