

Wheels: Rufus writes by e-mail, "I have a 2004 Buick Park Avenue Ultra supercharged. The book says to use premium 93 octane gas, however, the dealer says it will run on 87 or 89 octane.

I use 89 or 93 octane and get 30 plus mpg on the road consistently and on occasions 33+ mpg.

My question is, how much better gas miles will I get using 93 octane versus using 87 octane? I am unable to do this myself as there are too many variables involved in trying to do this on the road. I am attempting to justify the extra 25 to 35 cents per gallon for 93 octane. I realize I will have less performance using 87, but is there any damage one could do to the engine as the computer retards the spark to prevent spark knock?

I find it hard to believe that GM has never checked the horsepower and fuel used with different octane ratings."

Halderman: This is a good question and I, too, have found it difficult to test the results under real world conditions. I own a vehicle that "requires" premium grade gasoline and like you, I did not like paying the extra \$0.20 per gallon so I tried 87 octane. The engine seemed to operate okay, but my fuel economy dropped that week. I tried again to use 87 when driving on a long trip and the mileage dropped from 29 mpg to 26 mpg or about 10%. I figure that the \$0.20 per gallon price difference (\$3.00 per gallon gas) was less than 10% so for me and my vehicle, and I will just continue to use premium.

Again, this is in a vehicle that requires premium, not a vehicle that can use regular grade gasoline. Now I have heard from others that have the supercharged 3800 GM engine and they have reported to me that they could not detect any difference at all when using 87 octane compared to using premium (91+). In some cases, those same drivers decided to use 89 (mid-grade) as their solution to the concern.

Here are observations and information about how the computer adjusts:

1. The knock sensor detects if a lower grade fuel is being used by detecting spark knock. Spark knock is most likely to occur during acceleration and when the engine and air are warm. Therefore, slow acceleration will less likely cause the timing to be retarded.
2. The computer will retard the ignition timing about 4 degrees. If knock is not detected, the spark timing is just retarded that four degrees. If no knock is detected, the computer will advance the timing back to the original setting.
3. If knock is detected after the timing has been retarded 4 degrees, it will retard another 4 degrees and check again. If knock is still detected, another 4 degrees will be taken away from the spark advance curve.
4. Therefore, it is possible for you to use lower octane fuel and not feel any difference as long as it is during cold weather and/or you do not accelerate rapidly.

I hope this explanation has helped.

