



Knock Sensors

Summary: Knock sensors can prevent severe damage to your engine by electronically retarding spark timing to reduce or prevent mechanical damage when octane appetite exceeds gasoline octane quality.

Does my engine really knock? Why do I care? Approximately 50% of the cars sold in the US in the past 10 years have knock sensors on their engines. These are usually not the engines designed to run on 87 octane gasoline, but the ones found to need a higher octane gasoline because they have higher compression ratios, or have a supercharger or a turbocharger.

Knock sensors are great devices put on our cars by the manufacturer to reduce or eliminate the possibility of engine damage due to detonation. Their job is to sense detonation, then send an electronic signal to the ECM (electronic control module, also known as the computer). The ECM then retards spark timing rapidly in small increments. If detonation continues, spark timing is additionally retarded until it is no longer detected. Some scan tools can tell you when the knock sensor is activated if you feel your engine may be detonating.

By now you are probably asking, "Why do I care about all of this since it is something I cannot see or hear?". What you cannot see or hear does have an effect on the performance and fuel economy. When the spark timing is reduced or retarded, acceleration performance is reduced. Don't compromise by buying low octane gasoline if it puts your engine in to detonation. If you do, you may lose both performance and fuel economy.

The Octane Requirement (OR) of an engine is defined as the octane number of the gasoline necessary to keep the engine operating under the most severe conditions without detonation. Engine OR increases as ambient temperature increases, as barometric pressure increases, and as humidity decreases. If you use a good octane quality gasoline, your problems should be rare.

On the other hand, if you use a gasoline that is lower in octane than the OR of your engine, performance will be reduced because the knock sensor will have given the signal to retard the spark timing. It is very important to use satisfactory octane quality gasoline to achieve maximum vehicle performance. Other factors that increase engine octane requirement are: increased compression ratio, increased cylinder bore, cast iron heads, increased intake air temperature, increased coolant temperature, and lean air-fuel mixtures.

Here are a few general rules about octane requirement in relation to temperature, humidity, and barometric pressure.

- 1) An increase of 25° F. in engine air inlet temperature raises the engine octane requirement by one octane number.
- 2) An increase of one inch of mercury on the barometer raises the octane requirement of an engine by one octane number.
- 3) A decrease in relative humidity by 30% raises the engine octane requirement by one octane number.

Based on this, the octane requirement of your engine could be considerably different from early morning to late afternoon especially during the summer in the southwestern US. When the conditions get severe, the octane requirement of your engine could increase by two or three octane numbers. If your engine is not being satisfied with 92 or 93 octane gasoline, you may occasionally want to give it a drink of 100 octane unleaded gasoline. You will "enjoy the drive"

An important item to remember, octane number is not horsepower. If your engine is not detonating, performance will not be improved with higher octane gasoline. On the other hand, if your engine is detonating, performance will definitely be improved by increasing the octane quality of the gasoline in the tank. Using a gasoline with more octane quality than the engine needs is not a benefit, but it is certainly worth working with some safety factor. Remember, big octane numbers do not mean more horsepower.

If you do need more than 91, 92, or 93 octane for your performance vehicle, we have the solution: ***Rockett Brand 100 Octane Unleaded Gasoline***. This gasoline is street legal in all 50 states and is compatible with oxygen sensors and catalytic converters. It can be blended with lower octane gasolines or can be used in its pure form. We can provide blending charts for blending to specific octane numbers.

If you want to retain the best performance possible, don't short yourself on octane. What you may consider to be satisfactory octane quality for your engine may be unsatisfactory under certain atmospheric conditions. You paid plenty for your performance car, don't feed it hot dogs when it wants steak.

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