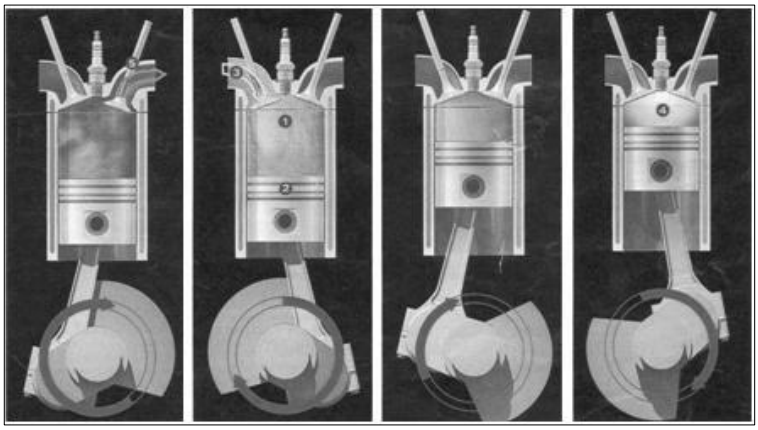
It's All About the NUMBERS……
By Judy Badgley

Let's talk engines. An engine is a mechanical device that converts force into motion. In the context of propulsion systems, an air-breathing engine is one that uses atmospheric air to oxidize the fuel provided. Now for the purpose of this article, let's see how engines and "NUMBERS" relate.

We have all heard about the size of the engine in our H/O's. The 1968, 1969, 1972 and 1973 all had a 455. The 1974 and 1975 models could have had either a 455 or 350. The 1979's all came with a 350. The 1983, 1984 and 1988's all had a 307. But what does that mean. The part that is missing is "cid". This abbreviation follows each of those engine sizes.

The "cid" stands for cubic inch displacement. This is a way to measure the volume swept by all the pistons of an engine in a single movement from top dead center to bottom dead center. It is specified in cubic inches. Power output of a combustion engine is effected directly by the engine displacement. The more "cid" the more power.

Several items contribute to calculating the cid. To start with you have the bore of the cylinder the piston moves in. Next is the length of the stroke created by grind of the crankshaft and the connecting rod attached to the piston. The design of the piston top affects cid. Some are flat top while others are "dished". (Dished creates more cid.) Next is the thickness of the head gasket that mounts the cylinder head to the engine block. The last item is the valves in the cylinder head. All of these contribute to the calculation for the **c**ubic **i**nch **d**isplacement. If any of these items are changed, it changes the "cid".



Piston action in the cylinder

Next is the RPM. This stands for Revolutions Per Minute. An automobile's engine typically varies between 700 and 7000 RPM's though some cars' engines can spin as quickly as 11,000 RPM's. The tachometer on our cars (tach) is the gauge that measures RPM's. Most are marked with a note to "x100". This means that if the tach is reading 70 you need to multiply that number by 100 thereby getting a reading of 7000.

What this means is the parts inside your engine are making 7000 complete revolutions every singe minute! The higher RPM's the engine is running the more stress on your engine.

Finally we have horsepower. The engineer James Watt invented the term horsepower. He lived from 1736-1819. The story goes that Watt was working with ponies lifting coal at a coal mine, and he wanted a way to talk about the power available from one of these animals. He found that, on average, a mine pony could do 22,000 foot-pounds of work in a minute. He then increased that number by 50 percent and pegged the measurement of horsepower at 33,000 foot-pounds of work in one minute. It is that arbitrary unit of measure that has made its way down through the centuries and now appears on your car.

What horsepower means is this: In Watt's judgement, one horse can do 33,000 foot-pounds of work every minute. So, imagine a horse raising coal out of a coal mine. A horse exerting 1 horsepower can raise 330 pounds of coal 100 feet in a minute.

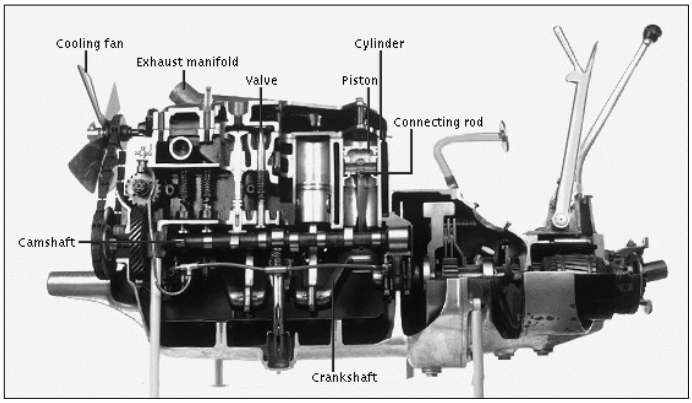
If you want to know the horsepower of an engine, you attach the engine to a dynamometer. A dynamometer places a load on the engine and measures the amount of power

that the engine can produce against the load. You can get an idea of how a dynamometer works in the following way: Imagine that you turn on a car engine, put it in neutral and floor it. The engine would run so fast that it would explode. That's no good, so on a dynamometer you apply a load to the floored engine and measure the load the engine can handle at different engine speeds.

The way horsepower is rated has changed over the years. Gross horsepower rating changes were directly related to insurance companies. In the late 60's cars had higher horsepower ratings and were going faster. This was a big selling point. However, by 1970 the insurance companies were having fits. They went to Congress and the car companies had to respond.

The response from the car companies, Oldsmobile in particular, in 1972 was to change the way they rated horsepower. Instead of rating engines by Gross Horsepower they changed the rating to Net Horsepower, the procedure which is specified by the Society of Automotive Engineers (SAE). The final rating is also corrected to an "unrealistic atmospheric condition". This means the rating had to take into account extreme weather conditions and create an average.

Gross horsepower is measured on an engine with no accessories attached. Net horsepower is measured with the alternator, power steering pump, air conditioning compressor, belts, flywheel, starter, etc. This made the numbers lower so the insurance companies were happy, but didn't do much to change the actual performance. Everybody was happy.



Engine measuring Net Horsepower

Of course by 1973 all of the emission regulations came into play and that changed everything. Engines were basically "de-tuned" to meet the Federal regulations. The devices used to clean our air also reduced horsepower.

Every year the advertised horsepower ratings were getting lower. Rating for all muscle cars suffered. What you have to remember is to compare all vehicle ratings for that particular year. The Hurst/Olds continued to lead the field in horsepower ratings for each particular year. They continued to be the ultimate muscle car for Oldsmobile, and most other car manufacturers.

There you have it! Engine Basics 101. NOTE- it takes more than the engine cid, RPM and horsepower to make speed. But that will have to be another article!

HORSEPOWER RATINGS IN HURST/OLDS

YEAR	ENGINE	hp	RPM
1968	455	390@	5000
1969	455	390@	5000
1972	455W45	270@	4200
	455W46	300@	4700
1973	455 L75	250@	4000
	455 L77	270@	4200
1974	350W25	200@	4200
	455W30	275@	4200
1975	350W25	170@	3800
	455W30	190@	3600
1979	350W30	160@	3600
1983	307W40	180@	4000
1984	307W40	180@	4000
1988	307	140@	3200

Can you picture 390 horses to power a 1969 Hurst/Olds? Thanks to Jeff Meister for creating the photo.