Measuring and Estimating Engine Power

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Corrected vs. Uncorrected Engine Dyno Results

The above topic would require an entire book to thoroughly explain the differences in quoted horsepower readings. **Dyno Testing and Tuning** by Bettes and Hancock is recommended. The short version follows.

On an engine dynamometer, measuring the torque, TQ in ft-lbs, and engine rotational speed, RPM, allows us to calculate the "observed" horsepower using the equation:

$$HP = (TQ \times RPM)/5250$$

That may be all we want to know. However if we want to compare our results with measurements made on a different day under different atmospheric conditions (assuming the dyno and engine are identical) then we have to "correct" our "observed" numbers to some "standard" conditions using accepted standard techniques. The Society of Automotive Engineers (SAE) has provided several specifications to do this. One of the oldest and most commonly used SAE specifications is J607. J607 provides formulas to correct our observed readings to what we would have observed if out tests were conducted at a temperature of 60F, a pressure of 29.92 in.Hg and dry air.

As an example, suppose we observed 100 HP on our dyno when the ambient temperature was 75F, the pressure was 29.4 in.Hg and the relative humidity was 40%. Using the formulas in J607, we would find that the atmospheric correction factor is about 1.05 . The corrected HP is then the observed number times the correction factor or 100 x 1.05 = 105 HP. This is a reasonable estimate of what we might have observed if we had conducted our test at the standard conditions.

To compare dyno results we must know the test conditions and correct the readings to the same standard conditions. Also, because different dyno manufacturers have different ways of correcting for dyno internal losses and inertia, really comparable tests should be run on the same dyno.

Engine Dyno Results vs. Chassis Dyno Results

If we install our engine above in a vehicle and test on a chassis dyno we find that not all the power measured at the engine flywheel or the flexplate gets to the chassis dyno roller. This is due to driveline and traction losses. These losses are often substantial with numbers of 15-20% being common for street cars. Thus our engine that produced 100 HP on our engine dyno at 75F, etc above may only deliver 80-85 HP to the chassis dyno roller. Nature is a bitch. **Estimating flywheel horsepower from chassis dyno or drag strip results requires us to know or estimate dyno, driveline and traction losses.**

Drag Strip Performance Correlations

If we install our engine above in a vehicle and test on the drag strip we again find that not all the power measured at the engine flywheel gets to the track. This is again due to driveline and traction losses. These losses are often similar to the numbers experienced on the chassis dyno (15-20%). Thus our engine that produced 100 HP on our engine dyno at 75F, etc above may only deliver 80-85 HP to the drag strip. **Estimating flywheel horsepower from drag strip results requires us to know or estimate traction losses, weather conditions, vehicle characteristics, engine and driveline characteristics, and driver inputs.** Examples of some of these variables are horsepower-torque characteristics of the engine, starting line track preparation, temperature, pressure, humidity, wind speed and direction, vehicle weight, vehicle drag characteristics, transmission type and efficiency, converter or clutch type and efficiency, tire characteristics, launch and shift RPM, shift speed, etc. There are several software packages that can account for all of these variables and more with reasonable accuracy. One is **Drag Racing Analyzer Pro** or the standard version. This software can also simulate Bonneville type racing.

There are also common "pocket dyno" tables, calculators and slide rules for estimating horsepower from drag strip results. The only variable these calculators include is vehicle weight. They are really only useful for comparing run to run horsepower **differences** on the same vehicle**.**