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TECH STOP

HORSEPOWER FROM RACECAR WEIGHT & ELAPSE TIME

by Robert Szabo

In the mid 1960's, some new equations appeared in drag racing. I believe that they were generated from the Mopar racing group. One of them derives horsepower with the racecar weight and quarter mile elapse time.

HP = (vehicle weight x 200) / (ET x ET x ET)

This equation is a mathematical derivation from data. That data from dynomometer horsepower measurements and the quarter mile elapse times from vehicles with those engines were used to generate the equation. I have used this equation ever since and found it to be amazingly accurate. Lets examine some IHRA drag race examples. I do not have exact weights from the various vehicles that follow and apologize for any differences. However, the vehicle weights that are shown should be close for illustrative purposes. Most are based on the minimum weight requirement for the class plus some extra weight for fuel and lubricants. In Pro Modified, Harold Martin's AC Delco Pontiac ran 6.20 in the hot humid air at Norwalk. With an approximate weight of about 2,450 pounds with fuel and lubricants, the horsepower is determined in the following:

HP = (2,450 x 200) / (6.2 x 6.2 x 6.2) = 2,056 HP

I believe that is horsepower at the rear wheels from the equation. That is also the power for that car competing in that air density. Add a couple hundred horsepower for drive line loss together with adjustment for the reduced air density and you have a 2,400+ horsepower nitrous assisted mountain motor requirement. Lets examine other classes and their class records from Norwalk or eMax:

class	driver	ET record	approx	weight	HP required
Top Fuel	Cory McClenathan	4.568	2,300	4,826	
Nitro FC	Gary Densham*	4.844	2,500	4,400	
Pro Mod	Steve Bareman	6.165	2,800	2,390	
Alc. FC	Jeff Craig	5.769	2,300	2,396	
Pro Stock	Steve Spiess	6.456	2,450	1,821	

*eMax Drag Racing Series Prof. World Record

LEARNING FROM ANALYSIS: Notice that the Nitro power is just under 5,000 horsepower. Don Jackson of DJE made measurements with special load cells on several Top Fuel dragsters and funnycars. The instrument measured over 5,000 horsepower at launch with power going up by several thousand through the run. There is a difference between the higher measured amounts and the computed amounts from the equation. That difference is an indication of the amount of power that is absorbed by the clutch to keep the tires from breaking loose as well as other losses. The horsepower from the equation is an average power. It is a lower value than peak power levels that may occur in the racecar. In addition, racecars such as Top Fuel, Nitro FC, Alcohol Funny Car, and others have body aerodynamics for excessive downloading. These features absorb a lot of the engine horsepower getting pushed through the air. That amount is not considered in the equation. The differences are dramatic in the nitro classes. One can only imagine the crew chief task to modulate that amount of power from over 7,000 down to less than 5,000 average horsepower on a run.

COST OF POWER & IHRA TRACTION: Nitro racers are reporting clutch disk life of one or two race laps. They report rear tire life of as little as one race lap. And recently, they are reporting front tire deterioration in as little as one run to only a few runs from all of that power and aerodynamic loading put down onto a sticky IHRA racetrack surface demanded by the racers.

SANDBAGGING: Some classes such as Quick Rod require power levels a lot lower than the engines that are commonly used in the class. Mike Manners, for example, competes at 8.90 seconds. However, a speed of over 203 MPH was recorded in Norwalk Qualifying. That speed requires an engine power level over twice the power for the ET. Speed and horsepower will be featured in a future article.

NOW YOU WILL SEE THIS FIRST IN IHRA DRM! Regarding the 1/8th mile, the above relationship was combined with a previous relationship for 1/4 vs. 1/8th mile ET. The latter was reviewed in DRM issue #15. The following is the result derived for the 1/8th mile ET:

HP = (vehicle weight x 200 x 0.64 x 0.64 x 0.64) / (ET x ET x ET)

HP = vehicle weight x 52 / ET x ET x ET)

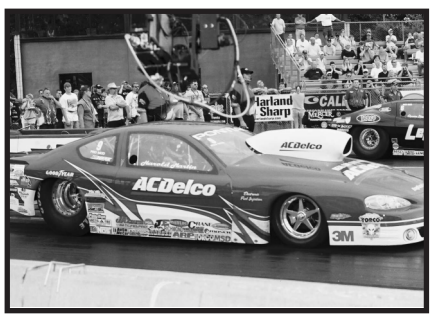
IHRA RACECAR EXAMPLE: An example from the DRM record page for Hays Stock Eliminator H/Crate Motor class is Mike Petrie's 68 Camaro with a 350. The approximate weight for vehicles in this category: 3,000 pounds; 1/8th mile ET record – 6.76 sec. @ Carolina on 3/05; 1/4 mile ET record – 10.693 sec. @ Rockingham on 2/05 (Ref. DRM issue #15)

HP (1/8th mile) = 3,000 x 52 / (6.76 x 6.76 x 6.76) = 504 HP. For comparison:
HP (1/4 mile) = 3,000 x 200 / (10.693 x 10.693 x 10.693) = 494 HP (close)

SPECIAL THANKS:
Don Jackson Engineering, source for nitro & methanol racing fuel systems & components, 1225 West Barkley Ave., Orange, CA 92868 (714) 269 9645

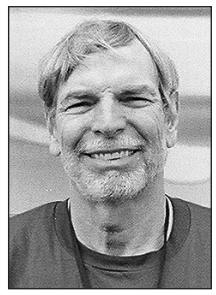
Joe Martens' B/S Hays Stock Eliminator Camaro lining up against Steve McGrath's H/SA Mopar; Martens dials in at 10.60; IHRA Stock Eliminator racecars such as Martens' weigh 3,200+ pounds; and need over 540 horsepower from the original 375 horsepower engine to run that level of performance; McGrath dials in at 11.83; racecars such as this with weight in the low 3,000 pound range must make close to 400 horsepower from the original 340 engine to run the number.

Kathy Fisher's Quick Rod 8.90 Dragster lines up against the Hillcraft Dragster; typical dragster weights are 1,800 to 2,100 pounds; power to run an 8.90 elapse time computes to 510 to 596 horsepower; however most competitors run several hundred horsepower more; then use approved delay boxes and / or throttle stops to slow the racecar down.



Harold Martin's Pro Mod. Pontiac lining up with Quain Stott's Corvette for a 4,000+ horsepower dual; how many racecars did it take to total 4,000+ horsepower in the '50's and '60's?

Dan Perrine's ET classic Gremlin dials in at 10.74 with an owner estimated 500 horsepower; ET bracket vehicles in this class of power weigh around 3,200 pounds or less to make that performance level.



Bob Szabo is an owner / driver of a blown alcohol drag racecar and author of the technical book: "Fuel Injection Racing Secrets." The author's next book is on methanol racing fuel that will be out shortly. Check the DRM Yellow Pages for Szabo Publishing or look on the Internet at http://www.racecarbook.com or call (707) 446 2917. If you have any comments about this article or any previous articles by the author, feel free to e-mail directly to the author at bob@racecarbook.com or to the DRM staff: pamelamarchyshyn@livenation.com or michaelperry@livenation.com NOTE: If you have spam controls and you Email any of us & want a response, please enter our Email address to clear your spam blocker. Time may not permit us to register to your spam blocker.