MPH IN THE QUARTER VS. THE EIGHTH

by Robert Szabo

REVIEW: Recall the relationship for elapse time in the quarter vs. the eighth mile that was discussed in DRM Issue #15:

ET (1/4 mi.) x 0.64 = approx. ET (1/8th mi.)

SPEED: There is a relationship for speed (MPH) in the quarter vs. the eighth mile.

MPH (1.4 mi.) x 0.8 = approx. MPH (1/8th mi.)

For example, in SS/PBA, the quarter mile speed record, set by Jim Reynolds, is 147.62. Note the following: 147.62 x 0.8 = 118 MPH for the 1/8th. DRM Issue #14 shows the eighth mile speed record, set by Reynolds, at 117.72 or approximately 118.

The relationship for speed for the two distances is not the same as the relationship for elapse time for the two distances. In addition, the quarter mile speed is not two times the eighth mile speed. The relationship is a result of the fact that the first eighth mile race is started at zero MPH. Acceleration is rapid from steep gearing, racing slicks, and a well prepared IHRA racetrack surface. The second 1/8th mile of a quarter mile race is begun at the speed from the end of the first 1/8th of the race. This is typically over 80 MPH in a highway Stocker; over 180 MPH for an IHRA Top Alcohol Funnycar. At that speed, the vehicle has less time to accelerate the second half than the first half of the race. In addition, for the second half of the race, the vehicle is in high gear. Less torque is put to the ground. As a result, the vehicle accelerates slower for the second half of the race. Various classes and records were used to make the 80% rule. That conclusion was made from the average of the results.

Different IHRA classes are examined next:

IHRA class	*3rd 1/4 mi record*	*4th 80% amt.*	*1/8 mi. record*	*record holder*	*record date*	*record location*
SS/PGA	140.94	112.75		Steve Johnson	2/05	Rock
SS/PGA			114.25	Steve Johnson	3/05	Caroline
SS/PFA	124.13	99.30		Gil Homer Carte	9/05	Virginia
SS/PFA			107.00	Mark Young	4/06	Mooresville
SS/AM	166.21	132.97		Scott Gove	9/05	Epping
SS/AM			121.80	Michael Lyons	4/05	Tri-State
SS/GTGA	127.50	102.00		Par Aubin	9/05	Epping
SS/GTGA			99.39	Monte Bogan Jr.	9/05	Carolina
U/SA	91.65	73.32		DannyWatersSr.	9/04	Virginia
U/SA			75.06	DonnaKoopman	7/06	Mt. Park

Results of the 80% rule are in the 3rd column. The 4th column shows the 1/8th mi. records for comparison. If you compare the two, you see that some are greater, some are less, but they are all close. This information can help to analyze the class and competition. All of the information is important. The record holder, date, and location are significant. Remember the effect of weather on air density that was covered in previous articles. Outstanding weather may result in a low record at one track. That record may be out of reach at other tracks or more common weather. Some competitors may "leave a trail of blood." Their good setup may bomb the record.

GEARING: One of the changes that can be done in lower powered classes is to reduce differential gearing (increase the numerical ratio). For example, in L/CM, Raymond Roland has the 1/4 mi. record at 111. 23. Eighty percent of that is 88.98 MPH. He also has the 1/8th mile record at 88.73 MPH that is in line with the relationship. Using some simple math, a tuner could change the rear end gear for the expected reduction in speed for the 1/8th. The tuner could lower the gear by 80%. That would be an increase in ratio of 80%. The equation is:

differential gear ratio (1/8th mi.) ÷ 80% = differential gear ratio (1/4 mi.)

If you determined the optimum gear for the 1/4 mi., this equation can be used to determine the optimum gear for the 1/8th mile. The following is a table of gear ratio changes from 1/4 to 1/8th mile maximum performance:

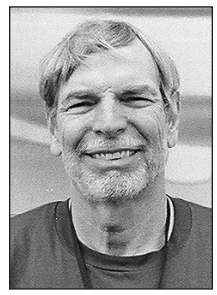
1/4 mi diff. ratio	*1/8th diff. ratio*
3.50	4.38
3.70	4.63
3.90	4.88
4.11	5.14
4.30	5.38
4.56	5.70
4.88	6.10
5.12	6.40
5.38	6.73

Some of the ratios are not available in various differential designs. In that case, gear ratios are selected that are simply close. Some racers go less steep to be conservative. Some may go for it and gear it steeper for the 1/8th.

OVERPOWER PROBLEM: Some vehicles are overpowered in low gear. In that case, a reduction of first gear ratio would be a benefit with the gear reduction for the 1/8th mi. For two speed automatic racecars, going from a 2.0 to 1.8 may be the move. In three speed automatics, reducing a first gear from 2.48 to 2.2 is a possibility from some of the suppliers. The benefit is that the gearshift changes are closer. The engine speed drops less between gear changes. Vehicle performance for the 1/8th mile will increase as a result. These changes can get expensive. However, some racers develop an ideal combination for 1/4 mi. and another for 1/8th mi. competition.

EFFECT OF SPEED & ET: Recall the ET bracket strategy that was discussed a couple articles ago. Setting up a vehicle for slower low end with maximum high end is a strategy by many competitors. It puts one vehicle behind the other at mid track with a "Bonzi" high-end charge. The outcome is literally unknown until the finish line. With gearing, the same can be done by race tuners for 1/8th mile setup. A steeper high gear can contribute to a high-end charge to the 1/8th mile finish line.

EFFECT OF TIRES: For the same gear ratio, a change in tire size has an effect on the final engine speed. The amount of change is a function of the amount of tire roll out (circumference). If you change gearing but can only get close with gear ratio selection, a change in tire diameter may be used to fine-tune the setup. If you are unable to get the engine speed low enough in the 1/8th with a change of differential ratio, go to a slightly bigger tire (if your wheel tubs have room). If you are unable to get the engine speed high enough in the 1/8th with a change of differential ratio, go to a slightly smaller diameter tire if one is available. The tire size change may change the low-end launch however. Tuning decisions seem to be endless.•



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