Dyno rules in other classes

Posted by Sterling Doc - 21 Oct 2013 04:47

I thought it would be helpful to look at rules on dyno compliance in other classes in comparison to ours. While discussing dyno rules is somewhat like politics and religion on Facebook, if we can pick out some things that other classes have found to work, that can be constructive. It's also illuminating of how simple some of the other rules are (for better and worse).

Our current rule:

11.3 Dyno Testing Procedure

11.3.1 No adjustments affecting the car's power output may be made during the race, or at any time between the race and dyno testing is completed.

11.3.2 Cars will be operated by a dyno operator or NASA official. NASA is not responsible for any failures during this operation.

11.3.3 Only Dynojet brand Dynos shall be used.

11.3.4 All dyno readings must be corrected to SAE J1349 Rev JUN90 (29.23 in/hg, 77F, zero Humidity) and the dyno's smoothing function must be set to 5.

11.3.5 Drive wheels shall have tire pressures set to 30PSI prior to dyno testing.

11.3.6 Electric engine fans may be used, as well as external fans.

11.3.7 Hoods shall be open during the dyno runs.

11.3.8 Engines should be warmed up, and show a minimum oil temperature of 160 degrees F before compliance runs are initiated. This may be verified by external means. "Practice pulls" are highly recommended to ensure proper drivetrain temperatures and stable power outputs.

11.3.9 The average power output of 3 consecutive dyno runs will be used to determine a car's maximum power output. Starting RPM shall be no higher than 3000. Ending RPM shall be at least 6,400 RPM, or when the cars' RPM limiter is engaged. The rev limiter must be engaged during at least one run, unless RPM exceeds 6750 RPM without engaging the RPM limiter.

11.3.10 Any motor reaching 6750 RPM or more without engaging the RPM limit will be disqualified, regardless of engine power output.

11.3.11 Any test that does not comply with this rule shall have the following written in the logbook: "May not compete until proof of compliance with all aspects of the power cap rule is presented to the series director"

ST:

For compliance testing, the dynamometer operator and the Super Touring Director or NASA Official will determine the dynamometer testing procedures and how many test runs will be performed for any given car being tested in order to obtain accurate test data. Prior to the dynamometer inspection the competitor may top off any fluids needed to ensure the engine and drivetrain are not damaged during testing. The fluids must be added with a NASA Official present. No other modifications or adjustments may be made to the car. To ensure fairness, a NASA Official, or an individual appointed by a NASA Official, will operate any cars being inspected on the dynamometer. SAE correction with a smoothing factor of five (5) will be used. Any run that results in an erratic or non-reproducible result may be dismissed by Super Touring officials.

GTS:

Competitors must use a Dynojet brand dyno, and all compliance runs at events will be made on a Dynojet Model 248, 224, or 424 in SAE mode with a smoothing factor of 4 so it is highly recommended to use one of those dynos with those settings for certification to avoid any errors in classification.

To allow a small safety margin for dyno variance, a forgiveness of 4WHP will be given to cars

with WHP greater than WTQ and a -4 factor will be applied to the formula for cars using the averaging method for WTQ greater than WHP. However, if a car does not meet the minimum weight listed on the certification sheet, the forgiveness cannot be used to arrive at a compliant number.

Protest procedures will be handled per the NASA CCR with the exception that a protest requiring a dyno run must be accompanied by a bond from the protestor in the amount of the cost of a dyno run. The losing party of the protest will be required to pay for the run, so if the protest is upheld the protestor shall have their funds returned and the protestee will be required to pay for the run.

PT:

For compliance testing, the dynamometer operator and the PT Director or NASA Official will determine the dynamometer testing procedures and how many test runs will be performed for 29 any given car being tested in order to obtain accurate test data. Prior to the dynamometer inspection the competitor may top off any fluids needed to ensure the engine and drivetrain are not damaged during testing. The fluids must be added with a NASA Official present. No other modifications or adjustments may be made to the car. To ensure fairness, a NASA Official, or an individual appointed by a NASA Official, will operate any cars being inspected on the dynamometer. SAE correction with a smoothing factor of five (5) will be used. Any run that results in an erratic or non-reproducible result may be dismissed by NASA officials.

CMC:

1. Only dyno runs on DynoJet brand dynamometers are acceptable.

2. One dyno report may be performed and used for the entire season provided that:

a. It is performed after the last event of the prior season and before the first race entered for the season.

b. No performance modifications are made to the car.

3. All dyno readings must be corrected to SAE J1349 Rev JUN90 (29.23 in/hg, 77F, zero humidity) and the dyno's smoothing

function must be set to 5

4. Car must be in "ready to race" configuration with regards to engine and drivetrain.

a. American Iron Class: All engine or drivetrain components that are adjustable and affect power (carb jets, timing,

restrictors, etc.) must be explicitly allowed by the vehicle's class rules, must be written down in section 1 - 6 of the

inspection sheet, and must match at all times.

b. Camaro Mustang Challenge Class: All engine or drivetrain components that are not stock and affect power or are

adjustable (restrictors, air intakes, timing, etc.) must be explicitly allowed by the vehicle's class rules, must be

written down in section 1 - 6 of the inspection sheet, and must match at all times.

5. Rear tires must be set to 30psi.

6. Hood shall be open during dyno test runs.

7. Electric engine fans and or external cooling fans may be used.

8. Dyno pulls will be made in 4th

gear or at a 1:1 ratio.

9. Altitude of the dyno shop must be recorded. Dyno runs made at locations with elevation greater than 1,500 feet higher than the

track will not count as being valid at that track. Class Officials may decide to waive this requirement for certain

circumstances. Check with your local class director ahead of time.

10. Three consecutive runs shall be made under full power. The RPM range shall be consistent for all three runs. Starting RPM

shall be no higher than 2000. Ending RPM shall be clearly beyond max horsepower.

11. Dyno runs shall be made with water temperature in the normal operating range of 165F-210F and drivetrain fluids up to a

normal running temperature. (A “practice pull” is highly recommended prior to 3 consecutive runs to ensure proper drivetrain

temperatures.) Water temperature may be verified using external temperature measurements such as an infrared temp gun at a

thermostat housing or a metal tube section of the line returning water to the radiator.

12. The peak horsepower and torque of each run will be noted on the inspection sheet.

13. The average of the three consecutive runs will be calculated and noted on the inspection sheet. This average horsepower and

torque number is what must be used to determine the vehicle’s required minimum weight, using the car’s specific class weight

rules.

14. One dyno certification may be valid for an entire race season as long as no performance modifications are made to the car.

15. All HP & TQ results will be rounded to whole numbers. In the case where the measurement falls exactly on the halfway point

(.50), it shall be rounded down in favor of the competitor i.e.- 260.50 = 260 and 260.51 = 261

AI:

All official American Iron dynamometer tests will be open. All American Iron Series competitors have the

option to be present for official chassis dynamometer testing.

Prior to the chassis dynamometer inspection the competitor may top off any fluids needed to ensure the

engine and drivetrain are not damaged during testing. The fluids must be added with a NASA Technical

Inspector present and no other modifications or adjustments may be made to the car.

To ensure fairness, an American Iron Series appointed official or an approved technician will operate

any cars being inspected on the chassis dynamometer. 3 consecutive "official" dyno pulls must be performed and

the average horsepower and torque value from the 3 measured runsshall be used for power to weight and

torque to weight compliance. Should any run result in an erratic or non-repetitive result, series officials may

dismiss the result or request another dyno pull. The dyno shall use the SAE correction factor for the

compliance pulls with a smoothing factor of “5”.

Any car exceeding the maximum power to weight ratio for their declared class shall be penalized in

accordance with the NASA CCR and these rules.

SE30:

Engine Dynamometer Testing Procedure

To ensure fairness, a SpecE30 Series official, an appointed official, or an approved technician will operate any

cars being inspected on the chassis dynamometer. Three consecutive "official" dyno pulls must be performed

and the highest run of the 3 three will be used for compliance. NASA, its officers, officials, and assigns are not

responsible for any mechanical failures or damage otherwise while the dyno runs are being performed.

1. The DynoJet brand is the required type of dyno for testing and inspection. All dyno readings must be

corrected to SAE J1349 Rev JUN901

and the dyno’s smoothing function set to 5. Location of the dyno

shop should be recorded.

2. Prior to the chassis dynamometer inspection the competitor may top off any fluids needed to ensure the

engine and drive train are not damaged during testing. The fluids must be added with a NASA

Technical Inspector present and no other modifications or adjustments may be made to the car.

3. All dyno pulls will be made with the hood opened.

4. Prior to the first official run, an official or technician will confirm that the accelerator pedal opens the

throttle completely and that the wide open throttle switch is properly connected.

5. Dyno pulls will be made in 4th gear or at a 1:1 ratio.

6. During an official dyno test, the car must be fitted with the tires used on the car in the previous session

with the rear tire pressures set at 36 psi.

7. Electric engine fans and or external cooling fans may be used.

8. Dyno runs shall be made with water temperature in the normal operating range of 165F-210F and drive

train fluids up to a normal running temperature. Water temperature may be verified using external

temperature measurements such as an infrared temp gun at the thermostat housing.

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Re: Dyno rules in other classes

Posted by Sterling Doc - 22 Oct 2013 20:48

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Jim & I had a good conversation last night, which brought up a few good suggestions. Comments on these are encouraged:

1. Run 5 compliance runs, instead of 3, and discard the lowest & highest run, then average the middle 3.

2. Adopt GTS's language on adding fluids before runs (copied below)

Prior to the chassis dynamometer inspection the competitor may top off any fluids needed to ensure the engine and drivetrain are not damaged during testing. The fluids must be added with a NASA Technical Inspector present and no other modifications or adjustments may be made to the car.

3. Lower ending RPM to 6,200, or 6,300 RPM to leave more headroom to rev limiter, but still get past the power peak on a 944 motor. One run would still be taken to the rev limiter to demonstrate it's function

4. Leave the oil temp rule alone, and use a pyrometer at the oil filter to verify oil temp if no gauge is present in the car. A tire pyrometer was suggested to use in a pinch.

We also talked about the squiggly lines the 944 dynos that Jim brought up on the other thread. I picked a representative dyno set of a healthy 944 below to show the effect. These squiggles represent about 2-3 HP variation from top to bottom, or about 1- 1.5 HP above, and below the mean. As the HP peak is pretty broad, several of these happen around the peak.

Unlike GTS, SE30, and many other classes, we average 3 runs, which attenuates this effect. This would seem to mean that the end effect would artificially raise the HP by 1 HP or less in the final, averaged results. As the cars are all equally affected by this, and each will see several of these little peaks around the top of their HP curve, it would not seem to have a large variance in and of itself between cars or runs, though it clearly exists. Jim's thought was to add more pulls to minimize this effect further (and general variance) - hence the proposal above.