Dyno Cap for 2013 944 Spec

Posted by Sterling Doc - 30 Oct 2012 08:14

Guys, for 2013 will be moving to a dyno cap of (HP + TQ)/2 = 138, with a 2 HP allowance for dyno variation. I know there will be many questions on the whys and how's of this, so I'll go through many of the ones I expect below. Please pull up a chair, and read all of the following before commenting on this thread.

Why is this necessary?

It is important to go back to the foundation of our rules,- the purpose and claim that have defined our rules form the beginning to understand this, so I've copied it below:

1 Definition and Claim

The Porsche 944™-924S™ spec class is a class for those individuals that wish to race a Porsche in a competitive series with limited expense and low cost of operation. These rules are intended to control costs and reduce any performance advantage from the cars so that driving ability and

race setup are the greatest factors in determining winners. The following are approved and disapproved items for the class. ***The spirit of the class is for all cars to be equal in weight and horsepower and be competitive with one another. The focus will be on driver ability and not dollar ability. This class is not intended to be an engine builder or innovator s class.***

When the class started 10 years ago, a good motor was in the low 130's. As the class has grown, become more competitive, and talented engine builders have become involved, we now have reliable dyno data to show legal motors reaching into the mid 140's in HP & TQ. It is has come time to codify the spirit of the rules to allow standard, well built motors to remain competitive, at the highest levels. Over the last two years of testing and data collection (nearly 100 dyno tests), we have found a very good standard rebuild produces around 134-5 HP, give or take a couple. This rule is built around those cars - the meat of the class.

This 138 HP cap can be approached by any solid motor build, low or high compression, with a bit of tuning. This cap can also be met by higher output motors through simple, cheap, and reliable means of detuning. Both of these things have been tested extensively through NASA's support, and we will provide a clear path to tuning up lower HP cars, and detuning cars that fall over the cap (details to follow). The result will be a tighter spread of horsepower throughout the class, better racing, and it will make the class more accessible to new drivers/builders for less build cost. This is the spirit of 944 Spec rules, as carefully laid out by the class founders.

What are the specifics?

The rule will be (HP + TQ)/2 = 138, +2 to account for dyno variation. While the intent is for cars to approach an average of 138 HP and TQ, disqualification will not occur until a car reaches (HP + TQ)/2 = 140 or greater. This number will be determined by the average or 3 dyno pulls, with a very tight dyno procedure, including a spec for tire pressure (30 PSI), and oil temperature (>160 degrees), using SAE correction, smoothing factor 5. This procedure dramatically reduces dyno variations when followed correctly.

Will a dyno be required to start the season?

No. At this time, this rule will be used for enforcement, but will not require a dyno test before competing in 2013. The cap is set at a level that most standard built motors will not fall out. However, not having a dyno done will not excuse a violation of this rule if tested.

It is *highly recommended* that competitors put their car on the dyno once, and not just for rules compliance. As we have sought out previously untested cars for reference, we have found many of them running dangerously lean in Spec configuration. We have also found many issues on the dyno that would have resulted in a DNF, or motor failure in the future. It is far cheaper to find this on the dyno, than to waste a race weekend. Additionally, we have found HP gains of 2-5 HP through correcting air fuel ratios, on most all cars tested. If there was a part that would add 2-5 HP for $100, there would be a long waiting list for this part! A dyno test session will do that for you. Local series directors can work on organizing group dyno days to help each region do this in a cost effective manner. This will also help enhance transparency in the class. Locally, it cost me $100/hour to rent the dyno for my car. In recent testing, it took me less than 1/2 that time to dial in my motors air fuel ratios, and gain 2 HP. The other test car gained 5 HP (was running dangerously lean to start with!).

It is possible that a baseline/pre-competition dyno may be required in the future, but the intent now is not to require it by force of rule.

Will I have to pay for a compliance dyno?

No. Cars selected for verification at an event will not have to pay for a dyno. These costs are borne by NASA. The results are then the property of NASA, and not the racer. Air/fuel ratios are not assessed.

How do I detune my car if needed?

Our testing has shown several effective paths to detuning:

-The cheapest is to turn the fuel quality switch to position 4, which retards timing. This was a factory allowance to deal with lower octance gas. Our testing has shown it lowers removes about 4 HP. This lowers power throughout the HP curve, and nicely mimics a lower performance motor

-Our throttle bodies are 55mm in diameter. Placing a 52mm diameter restrictor between the throttle body, and intake manifold, removes about 2 HP, and slightly less torque, though it does seem to affect power through the rev range as well. A 50mm restrictor takes away 3-3.5 HP. Smaller restrictors should see similar incremental losses in HP. These plates can be made with simple sheet aluminum for nominal cost. There is no regulation on the restrictor itself, only its effect on horsepower.

-A more restrictive muffler is effective as well. For reference, a Dynomax Hushpower muffler removed 3-5 HP over the rev range versus a short staight pipe.

-We found no modifications that significantly manipulated the area under the curve, while chopping off the peak HP, within Spec rules. It would seem to require custom chip tuning to accomplish this, which is not legal in Spec rules. Our cars have very flat TQ curves as is, which would be hard to improve on significantly.

How do I tune up my lower performing motor to come closer to the cap?

-First it is critical that the cars ignition, fuel, and air intake systems are in top shape. We have found an amazing amount of pathology here. In particular, make sure you AFM is in good repair. A testing procedure is here: http://www.clarks-garage.com/pdf-manual/elect-22.pdf . You can also see how it performs on the dyno. A good AFM will give you a nice flat air fuel ratio thoughout the rev range.

-The next critical step is to tune the air fuel ratios on the dyno - significant gains are often found here. Look here for tips: http://wwww.944spec.org/944SPEC/forum/general/11260-tuning-afm?limit=6&start=18

-Head shaving is worthwhile, especially for low compression cars. Personally, I would stay a good 10 thousandths above the stated minimums in the rules for low, and high compression pistons.

-Beyond that is small potatoes. Opening the internal restriction on the factory collector (Y-pipe just beyond the headers) seems to be worth about 1.5 to 2 HP. Hanksville Hotrods has an elegant bolt on solution, or the merge area can be modified by an exhaust shop. David Dirks has an effective method that he can share.

-Some cars seem to like certain computers better than others, but we could not find any pattern. The '88 computer was not found to be universally better. Engine hardware (early vs. late) is less important than the state of tune, for the average builder.

-We tested aftermarket chips, and found them *not* to be an effective bolt on solution. They will remain

not legal for this class

Was this rule driven by cheating, or junkyard motors?

No. I am proud of the level of integrity this class has shown. I do not expect that junkyard motors will be nationally competitive with this rule, and that is not its intent. It was driven the spirit of the rules, the progression of motor builds, and my conversation with racers and series directors across the country. Many of these conversations were in person through my efforts to visit the different regions, others by phone and email. The regional directors have been in the loop, and are in agreement, even the ones who will have to detune as a result of this. I understand not everyone is on board with this, and that I have not talked to all of you. My overall impression remains firm.

Can't racers cheat around this rule?

Yes. However, I expect we will continue to maintain our high level of integrity. Keep in mind, that a disqualification for being over HP, like being under weight, must be taken as a "0" in points (i.e cannot be dropped). Push the limit at your peril. Dynos are not frequently available outside of nationals, but it does happen. Many other classes deal with this same issue. As all the current Spec rules remain in place, the situation cannot be worse than it is as far as the spread of power.

Why not just add weight?

The spirit of the class is for all cars to be ***equal*** *in weight and*

horsepower and be competitive with one another..

Adding weight adds complexity, wear and tear, and creates the opportunity to create "horses for different courses" - high/HP weight for one track, and lower HP/weight for another track. Balanced is not the same as equal.

Sorry this is so long, but it is important!

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Re: Dyno Cap for 2013 944 Spec

Posted by joecycles - 01 Nov 2012 06:01

I have not read this enough to see if anyone has stated this remark but one thing to consider is that a dyno technically only measures TQ and RPM and not actual Hp. Hp is derived by a formula after Tq and RPm are measured (it is like tq x rpm/ 5252 or something close to this, I am not a math guy sorry).

That said, some of these guys (a few years ago) running in 944 cup figured out a way to increase Tq and lower Hp. Not sure how they did it but they had to change the rules to reflect a variance between the 2 numbers so people could not manipulate the HP and Tq numbers. The kicker is that these items can generally be manipulated by fuel mapping and cam and other factors but they still found a way to do it and it made life hell for those of us running a stock set up.

My point, if you are going to have a rule for HP then you need to have a variance in place so people are not able to do what occurred by others before (same happened in the GTA series a few years ago, people were changing out the cams to get lower end tq).

I know some people will argue this but I have seen it first hand and can tell you that you are opening a door for people to cheat in a different direction (in some regions you have little in the way of scrutineering going on so people are cheating anyways, at nationals it is obviously different).

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Re: Dyno Cap for 2013 944 Spec

Posted by cbuzzetti - 01 Nov 2012 06:31

Good point Joe, we do have two legal cams to run and someone is undoubtedly looking at that to see what benefit can be had. As long as the cam is legal there is nothing we dan do.

It may require teching the cams at Nats if a car dynoes with high tq numbers.

Thanks for bringing up a valid point.

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Re: Dyno Cap for 2013 944 Spec

Posted by cbuzzetti - 01 Nov 2012 06:34

Looks to me like this is a done deal, bring it!

SvoChuck wrote:

cbuzzetti wrote:

It would be awesome to see 25+ cars at Miller again.

with a power cap you should expect to see 20+ RMR cars at Nationals. We had 20 +3 at a non crossover event in 2012.

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Re: Dyno Cap for 2013 944 Spec

Posted by Sterling Doc - 01 Nov 2012 07:56

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We are aware of that potential, and I did talk to Bill Comat, among others about their current experience in Cup. One thing that is different between us, and the other series referenced, is that we still have a very strict Spec ruleset in place. This tightly limits what can be manipulated to change the TQ curve. This was not the place with Cup. Custom headers and chip tuning are effective for these things, and are not legal in spec. People will have to cheat on the existing Spec rules to manipulate the HP and TQ curves to any significant degree. If they are going to go that, that can do that now, with even more benefit (i.e. make HP *and* TQ).

Again we have not seen cheating, and we tore motors (including my own, ugh) down to taking heads off, cams out, and oil pans off, at Nationals over the last two years. I am not specifically trying to reign in cheating here, and I don't expect it will start now. There is more to be gained under cheating on the existing rules, than with a dyno cap.

We already have, and will check cam specs at Nationals with the "Cam Doctor" As an aside, what what interesting is not only that the cams we checked were legal, but had essentially no measurable wear - impressive for 100,000 mile + harware! The early cams vary by 1mm in one spec. I don't have data to say was this means in output, but it is a very small difference in the cam spec, and would not seem to have a lot of potential for manipulation.

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Re: Dyno Cap for 2013 944 Spec

Posted by Sterling Doc - 01 Nov 2012 08:29

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One other thing, 944 Cup initially did not have a TQ cap at all, just HP. Between that and all the options available - chips, headers, custom pistons, 2.7L motors, etc. there was an open door to make big TQ numbers.

Also, 944 Cup did have more cheating going on to begin with.

Finally, they used a variety of dyno types, which does make for a lot of variation - Dynapac, Dynojet, and Mustang dynos are all different. We are limiting this to the more common, and consistent Dynojet inertial dyno.

We have worked hard to take lessons from all over on making this the best rule we can.

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