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June 16, 2014

Phoenix Performance

A discussion on the impact of muffling devices to high performance engines

High Performance Drivers Education
Adding a muffler to lower sound levels is not as easy or simple as one might think on a racing car or HPDE track car

1. Backpressure: The increased exhaust backpressure that a muffling device will create may cause a rise in Exhaust Gas Temperatures (EGT's). On turbocharged or supercharged cars especially, keeping EGT's low is very critical. If the exhaust is not allowed to freely flow from the turbocharger it can put a strain on this part and cause an early failure. This backpressure is also something that can lower overall horsepower and torque. Street cars are not running at redline like a racing car so the stresses on the engine are higher. Having a free flowing exhaust will cause engine components to last longer.
2. Weight and Space: Some cars just don't have the room for them and others are not designed for them. The added weight can dramatically alter the handling of the vehicle and can be a safety concern.
3. Costs: Designing a proper race exhaust can be very costly and often simplicity is the goal. You do not want or need an overly complex exhaust that could now be a possible failure point!
4. Safety: If a muffler were to fail and explode, that shrapnel may come in contact with an oil or fuel line. If that were to happen, fire is now an issue. A simple straight through exhaust with a single pipe or dual pipe is also done for safety



Mike,

The issue of sound relative to performance cars and the car hobby is an interesting one. My experience spans stock and performance street cars for normal use, plus 25 years of grand prix style racing and car preparation, and as an instructor for all levels of street safety and road course performance driver training.

On factory stock street vehicles, exhaust and sound are a huge engineering expense and effort balancing a variety of factors: efficiency, performance, aesthetics to the intended audience, and safety (in some cases, louder is deliberately engineered in as better so that other drivers know a vehicle is nearby – the extreme example of this is in motorcycle engineering where ‘loud pipes save lives’ is definitely a big component of safety).

Similarly, on performance cars or race cars intended for the track, exhaust and sound is an integral part of the overall engineering and it is not easily, safely, or cheaply changed.

Performance and safety are significantly impacted by changes to exhaust and sound. I did a back to back comparison in March 2014 with a race car I own, and simply bolting a stock muffler on the car made a big enough difference that the car was slowed to the point where it would be unsuitable (if not outright unsafe) for competition, and certainly undesirable from a performance perspective.

Cost is a big factor as well. Whether built for street or track purposes, every car made in the past 25 years has to be carefully programmed and tuned, and the exhaust is an integral part of the overall system. To change a single component, such as a muffler, without investing in a full re-tune and recalibration of the entire driveline, is not only illegal in some cases, it is unsafe, unreliable, and potentially catastrophic to the owner. A simple muffler change can destroy an engine if the rest of the systems are not recalibrated accordingly. I actually had an small explosion occur destroying the exhaust system of a race car I own because of installing a different muffler without having the engine’s computer re-mapped to account for the change. We’re talking about several thousand dollars of re-engineering and re-turning work, not simply the cost of a muffler.

Lastly, let me dwell on safety for a moment. Inside a car, in a track environment, you have to be able to hear your car and the cars around you. I dislike loud noises as much as anyone. Inside a track car, within the helmet, surrounded by other cars, you need to at least be able to hear your engine note to operate the vehicle properly and safely. And if you cannot hear the vehicles around you, incidents can occur due to reduced situational awareness. Finally, in the case of open wheel/open cockpit purpose-built race cars, the location and type of the exhaust is controlled by the rules to ensure there is no physical hazard to other drivers in the case of an incident.

Thank you for all you do for our sport and hobby, and for your role in operating a great facility enjoyed by many.

Thomas G. Smith
NJMP Driver Club Member #154
SCCA National License Driver #161521

Mike,

As you know I compete in SCCA Club Racing at multiple events each year up and down the eastern United States, including at New Jersey Motorsports Park. You asked my opinion as to a requirement for mufflers at NJMP. Specifically, you wanted my input on the reaction of Club Racers like myself to having muffler requirements at the track.

The majority of Club Racers are much like myself. They are not necessarily skilled mechanics nor can they afford to hire a crew to service their cars. Often, it is difficult just to have the car ready for an event. Adding the complexity of installing a muffler for a specific event is a significant increase in the work that would be needed to make an event.

Placing a muffler on a car is often not a simply process. Many cars that run within the SCCA cannot just have a muffler placed on the car. In many instances, modifications or even component redesign/replacement is needed to install a muffler. Many competitors have neither the ability nor time to do this to prepare for a specific event.

Also, there is a significant safety concern. The muffler is under a great deal stress. If not installed properly it could come loose, dislodge and place other drivers at risk.

Simply put, if a track has a muffler requirement many competitors may decide simply not to do the work to install the unit. If a track has such a requirement, many competitors will in all probability decide to avoid the work, not install the muffler and simply decide to go elsewhere.

In summation, I am concerned that muffler requirement will convince many of my fellow competitors to simply avoid the work needed and go to the multitude of tracks that do not have such a requirement. Also, hastily and improperly installed mufflers could present a risk.

This is not a question of "just putting a muffler on a car ". There is significant work that may force many people to avoid NJMP and go to other venues and may create safety risks.

Valerie Heun



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AWE Tuning PA.

June 1, 2014

Briefing on muffling devices as related to engine performance

In considering various aspects and facets of sound control, the following is suggested for review as related to engine performance:

1. **Safety.** One of the prime reasons for opening up exhaust flow is safety. A muffled system serves as a strong heat sink and will become extremely hot after being run for long periods at high RPMs. Opening up the exhaust flow allows the heat to exit quickly.
2. **Weight.** An open exhaust is lighter and more efficient. Lower exhaust back pressures allow the engines to breath in a more efficient manner
3. **Tunability.** Today's modern computer controlled engines can be tuned to be more efficient and burn cleaner with purpose designed open exhaust configurations.
4. **Economics.** Many tracks have no sound limitations and the business of motorsport will tend to gravitate to them, depriving the local business environment of the added business and jobs that motorsports creates.



Interview with a Porsche Technician

I spoke with a technician who is employed by Provost Motorsports, a tuning shop in Bordentown, NJ that specializes in Porsche automobiles. I posed the question to him “how difficult would it be to simply bolt on a muffler at NJMP events to help with noise reduction while at our facility?” He replied with the following:

First of all, most Porsche automobiles are rear-engine vehicles. Simply bolting on a muffler for specific events is not really an option due to design and space constraints. To even access the exhaust components of most rear engine Porsches actually requires removing the engine from the car. The technician went on to estimate that redesigning and engineering a new exhaust system for one of these cars would likely cost between \$1000 - \$3000 in parts, between \$1000 - \$2000 to retune the engine to properly run with the new exhaust, and another \$1000 - \$2000 in labor cost.

Michael Allenbaugh