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TRACKING YOUR CAR AND THE M96 ENGINE



The M96 engine was first introduced with the 1997 Porsche® Boxster® and provides exceptional performance for the price. The M96 (and later M97) platform was used successfully through the 2008 model year and was featured in all Boxster®, Cayman® and 911® models, with exception of the GT3, Turbo, and GT2.

With solid 986® and 996® models being available for less than \$20,000, the 986® and 996® and later 987® and 997® vehicles are a great value and can make for great daily drivers that also can be taken to the track on weekends.

Beyond regular preventative maintenance, there are steps to be taken to protect your investment and reduce operating expenses. One mistake can cost thousands.

Before going to track, there are a few things to go over beyond normal safety gear like helmet, HANS, and harnesses. Mechanically, there are certain things to check for related to the engine and the rest of the vehicle that can be done by a do-it-yourselfer. The Chicago PCA has a great DE Tech Sheet. Your local PCA Region should have their own version of a tech inspection for its local autocross and DE events.

 [LINK: PCA Chicago Tech Sheet \(PDF\)](#)

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- Check that **brake lights** are functional.
- Change your oil** before going to the track and set the oil level between the lowest mark and middle – do not overfill. Make sure to use a 5w40 rather than 0w40 and if under warranty, use of a Porsche approved A40 oil is advised.
- Check for leaks.** Oil, fuel, power steering, brake fluid, or coolant leaks are a big no-no. A leaky water pump is a bad water pump.
- Check drive belt.** A cracked belt could go on the track can quickly cause an engine to overheat.
- Check power steering** for signs of leaking or damage from overheating.
- Battery** should be properly secured and battery terminals covered with no signs of leaks or corrosion.
- Brake fluid** should be flushed before every event with fresh DOT 4 rated brake fluid with higher than factory boiling point (both wet and dry). Your pedal feel will be greatly improved. If your brake pedal is not firm, it is time to flush the brakes or replace your master cylinder.
- Brake pads** should have at least 50% pad thickness. Check for cracks and especially cross linking of holes or cracks that appear around the hub or bridge cooling vanes. Consider track day pads for better braking performance.
- Suspension and wheel bearings.** These items should be inspected regularly by a professional. Even if you like to do your own maintenance, it's good to have someone check over your work for your safety and that of others you are on the track with. Many components can be upgraded with factory GT3 parts or aftermarket components from companies like Tarett Engineering.
- Tires.** Check for cracks, cuts, cords, or blisters. N-spec tires that are ZR rated are recommended.



TIP: Print this page and use as a checklist during your track event.

So what can one do to prevent problems with the M96 and M97 engine?

Preventative maintenance is key. There are several items that need to be addressed to ensure longevity of your engine. Before carrying out these repairs, it is a good idea to pre-qualify any engine before investing thousands of dollars in preventative maintenance.



[LINK: IMS Retrofit & Solution Pre-Qualification Procedure \(PDF\)](#)

Of most concern to owners is the IMS (Intermediate Shaft) bearing.

Porsche has never offered a replacement IMS bearing nor supplied tools or a specified service interval for changing the IMS bearing, so you have to make the decision when and which kit you want to use. LN Engineering's IMS Retrofit or IMS Solution are the two most popular choices. Servicing the IMS bearing typically involves 10-14 hours of labor and a handful of parts. Typically, when changing the IMS bearing, it is best to install a new water pump, low temperature thermostat, clutch and dual mass flywheel, RMS (Rear Main Seal), and an AOS (Air/Oil Separator). Avoid the temptation to install a lightweight or single mass flywheel. Only use stock dual mass and factory clutch discs.



[LINK: IMS Retrofit website](#)



[LINK: IMS Solution website](#)

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Oil System Considerations.

All model year 1997 through 2008 M96 and M97 engines as found in Boxster, Cayman, and 911 models are susceptible to oil starvation when driven on the track or autocrossed. The “integrated dry sump” is in essence a wet sump with two scavenge pumps for the heads.

The M96 and M97 engine is NOT A DRY SUMP engine. Under high G-forces, the oil scavenge pumps in the heads cannot pump the oil back to the sump fast enough. Coupled with poor oil handling in the sump and reduced oil system capacity, the engine starves for oil. The use of Porsche recommended N-spec rated tires, which carries approximately a 280 treadwear rating or higher, limits the g-forces that can be acted upon the engine.

When using tires with treadwear ratings lower than 280, it is possible to overcome the oiling system and have oil starvation. The scavenge pumps at the heads collect oil and return it to the sump via oil return tubes or oil swirl pots in the sump, which de-foam the oil. An air/oil separator further removes oil vapor from air. As a result, oil foaming is a big problem and choice of engine oil can greatly affect foaming. Elevated engine temperatures as a result of performance driving negatively affects AOS performance and reduces oil pressure, and can lead to engine damage.

The symptoms of an oiling system not operating properly include:

- ▶ White smoke - it is indicative of oil in the intake. Typical causes can include an air/oil separator that is overloaded or not performing properly. The condition of the engine and AOS can be verified with a manometer. Results should be between 4-6 inches of H2O for a healthy engine.
- ▶ Low oil pressure or fluctuating oil pressure. Low oil pressure is less than 10 psi per 1000 rpm. Typically experienced during extended high g-force.
- ▶ Worst-case scenario - rod knock, due to inadequate oil pressure. Rod bearing material will be present in the oil at this point and continued operation will result in a spun bearing and connecting rod failure.

The Porsche “Motorsport” air/oil separator is recommended for track use on MY02 and later 911, MY03 and later Boxster, and all Cayman models and is better suited to track duty than the standard AOS.

Oil System Considerations - continued.

There are several options for addressing oil starvation and oil aeration. As it's recommended to run the oil fill approximately ½ a quart low to reduce the load on the AOS, for those autocrossing, the addition of a ½ quart deep sump and X51 baffle is typically enough protection for the M96 engine.

For track use, the addition of a 2 quart deep sump with X51 baffle is the most cost effective solution. The addition of 2 quarts of oil along with improved baffling and M97 oil returns improves oil system performance even under sustained G forces. To improve scavenging from the cylinder heads, Porsche once offered an extra oil pump for the cylinder head to help return the oil to the sump faster. Although no longer available, LN Engineering offers two versions of this tandem scavenge pump for those wanting additional insurance.

But most important are “the 4 R’s”, as Lake Speed Jr. from Joe Gibbs Driven says: the Right oil, at the Right time, Right place, and Right amount is key to keeping the M96 and M97 engine happy at the track. Even if you are only taking your street car to a DE and not racing your car, you are still putting extreme demands on your engine’s internals. Use of a race oil is cheap insurance, however be aware a race oil is only good for about 500 miles and should be changed out after every event to a street oil that has the proper detergents and corrosion inhibitors. Bilt Racing Service uses Joe Gibbs Driven XP9 exclusively in track cars. Street oils, like the factory fill, is not up to the task of protecting your M96 engine on the track!



 [LINK: 2qt Deep Sump](#)



 [LINK: 0.5qt Deep Sump](#)



 [LINK: DRIVEN XP9](#)

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Elevated Temperatures.

Elevated engine temperatures can be easily rectified by installing a low temperature thermostat and center radiator. Added cooling will help reduce oil temperatures and reduce the load on the AOS.

When fitting a low temperature thermostat and new Genuine Porsche water pump, if running water rather than coolant, the addition of a product like Driven CSP (Coolant System Protector) will keep control corrosion in the engine and radiators. Be sure to only use distilled water, too. Otherwise, use Genuine Porsche coolant or a suitable European alternative such as Pentofrost.

Another common issue is overheating of the M96 and M97 power steering pump. Consider installing a Bilt Racing Power Steering Cooler or 5" underdrive pulley to reduce speed of power steering pump and Driven PSF.

For those wanting improved shifter feel, the 997 factory shifter provides a welcome improvement over the original 986/996 shifter while replacing many wear components. Notchy shifting can also indicate it's time to change your gear oil.

Lastly, over-revs and missed shifts can be attributed to engine failures as well. Stay away from aftermarket short shift kits and ECU flashes that raise the rev limiter!



[LINK: Low Temp Thermostat](#)



[LINK: DRIVEN PSF](#)



[LINK: DRIVEN Gear Oil](#)

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Now that you know more about your Boxster®, Cayman® and 911®, you are ready to take it to the next level and attend an Autocross or DE event with confidence.

For questions pertaining to maintenance or tracking your car, feel free to contact LN Engineering or Bilt Racing Service at 815-472-2939 or visit www.lnbrs.com



PHONE: 815-472-2939



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