



Paradise Porsche Gruppe

Gain Low Cost Horsepower
For: 1999-2008 911 Pre 2009 Boxster and Cayman
by
Underdriving!

Underdriving (or spinning at a slower rate) the secondary systems in your car, such as the Alternator, the Air Conditioning Compressor, the Water Pump and the Power Steering Pump by using a smaller than OEM crankcase pulley has been successfully used for decades by drag and road racers.

Underdriving the accessories does not **add** power to the engine, it **frees up** power that is normally wasted on overdriven accessories.



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In the following photo you can see the parts that make up the subsystems in a modern Porsche engine:

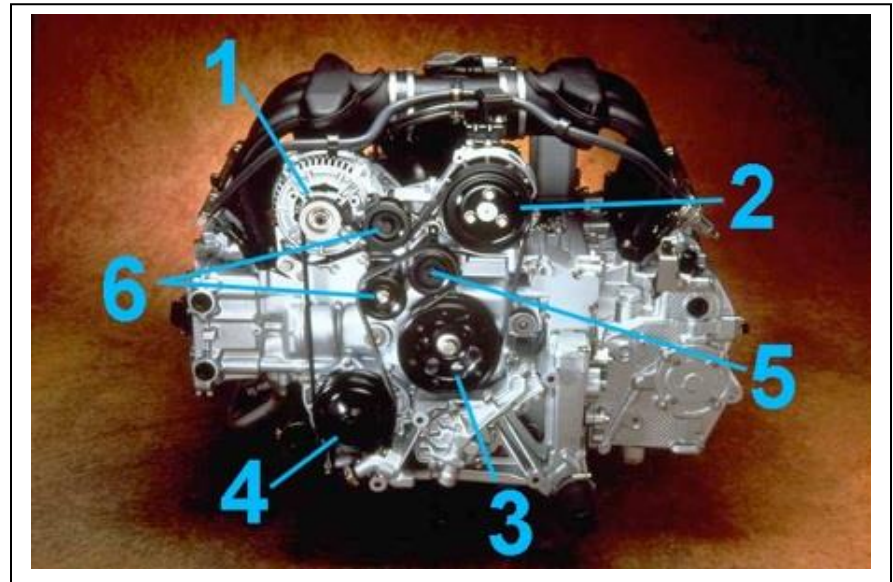
1.- Alternator

2.- A/C Compressor

3.- Crankcase Pulley

4.- Water Pump

5.- Tensioner Pulley



6.- Idler Pulleys

All of these sub-systems are driven by the main crankshaft pulley (#3 above) via one serpentine belt that snakes around each one of the subsystem's pulleys and the main pulley. Obviously, it takes power to spin each one of those subsystems and that power comes from the engine.

It all started with the earlier Boxsters and Caymans that would seriously Autocross; and I mean seriously, with dedicated AX tires, etc. These cars worked the Power Steering Pump so hard that they would literally melt the plastic power steering oil lines. Autocrossers started replacing the plastic lines with aluminum ones and started installing heat dissipators, but they would still boil the fluid, so the idea of under-driving the pump was put to the test and ... it worked!



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But... there are always people that have their doubts, so here is a Q&A to take care of those doubts:

Q: “Do underdrive pulleys really give me more power?”

A: Yes. Underdrive pulleys free up power lost to “parasitic drag”, so they do deliver more HP. They are also generally lighter in weight than the OEM which allows the engine to spin less rotational mass. In fact, underdrive pulleys are one of the cheapest forms of making HP.

Q: “How much HP can I get by installing an underdrive pulley”

A: In a wasserboxer (water-cooled Carrera, Cayman or Boxster) you can expect to get back 7-10 HP.

Q: “Don’t underdrive pulleys cause charging problems?”

A: Porsche builds into their electrical systems quite a bit of extra capacity for situations of very high electrical demand, such as driving on a frigid winter night with the high beams on, wipers and defrosters going, as well as seats and steering wheel heaters all while listening to your favorite tunes on the hi-fi Bose audio system. In other words, a very powerful electrical system is built into our cars with quite a bit to spare.

An older Porsche with a less than optimum charging system and a small weak battery may have a problem with an underdrive pulley as could some cars with monster audio installations that need more wattage than what’s required to power a small city, but the vast majority of modern Porsches will never notice a difference with their electrical, A/C, power steering or cooling systems when they install an underdrive pulley.



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Q: “*Won’t underdrive pulleys cause the engine to overheat?*”

A: Again, in the vast majority of modern Porsches there is enough reserve cooling capacity to use an underdrive pulley safely. It is true that underdriving the water pump causes the coolant to spend more time in the engine where it will absorb more heat, but by the same token, the same coolant will also spend more time in the radiators which will allow for the extra heat to dissipate making it a wash.

Q: “*Are there any additional benefits to using an underdrive pulley?*”

A: In high RPM situations such as racing or DE events at the track, an underdrive pulley can prevent cavitation by the water pump. When the impeller of the water pump cavitates, it actually spins too fast to push coolant. Coolant needs dwell time in the radiators to lose enough heat before returning to the engine to do it all over again.



Here you can see a comparison of the OEM (6” diameter - aluminum) main pulley with one of the most popular underdrive pulleys (4” diameter - gold anodized) on the market.



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Q: “***How hard is it to install?***”

A: It's actually quite simple:

For most Porsche's you'll first have to gain access to the pulley side of the engine.

- In the Carreras it will be towards the rear of the car. You'll have to remove the air filter box.
 - In the Boxsters and Caymans it will be towards the front of the car and can be accessed through the removable firewall behind the seats.
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- Remove the belt by loosening the tensioner pulley
 - Remove the lower idler pulley (one bolt)
 - Remove the main pulley (one bolt)
 - Grind or cut off 1/2" of the TDC marking boss on the engine
 - Install the new underdrive pulley (one bolt)
 - Install the idler roller removed before (one bolt)
 - Install the (smaller) belt (most likely supplied with the underdrive pulley kit)



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A word of caution:

When purchasing an underdrive pulley, make sure that it is a quality-made product. There are some cheap ones on the market and you generally get what you pay for.

An underdrive pulley needs to be made from lightweight but very strong material. It needs to be precisely machined so that it perfectly aligns with the other pulleys in the engine and it needs to allow the belt to seat properly, especially poly-ribbed belts, such as the ones in our Porsches.

Generally, these pulleys are sold as a kit containing the underdrive pulley, a new fastening crankshaft bolt, threadlocker and a new (slightly shorter than OEM) belt.



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Q: ***“How much do they cost”***

A: A high-quality underdrive pulley kit for most Porsches costs approximately \$350, installed. Or, simply buy a kit and do your own installation.

Racers have been using underdrive pulleys for years without any issues whatsoever - even in the South Florida heat and humidity.



Techno Pulley Kit for Porsche is available from Superior Autohaus for \$299.99.

This is a precision-engineered pulley which aligns correctly with the other sub systems' pulleys to eliminate excessive belt wear.

This kit includes the precision 4" diameter, aluminum under-drive pulley, gold anodized, new bolt and poly-ribbed belt.

There are no negative issues with cooling, charging or steering, and there's an upside: the engine will get back about 5-7 HP!

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