

## **Electronics in the new Porsches**

On Monday August 19, we attended a PCNA session at NJMP Lightning. The event was organized by Pete Tremper, DE chair for PCA national, and piggybacked on the PCNA road show that the marketing guys put on at various location around the country to entice new customers. About 20 PCA instructors and chief instructors attended. The objective of the session was to teach us the ins and outs of the new electronic systems on 991s and Boxsters/Caymans, particularly with regard to track performance. the session lasted about 3.5 hours and involved about an hour of classroom time, with the remaining time divided between skid pad and laps around Lightning. Training us were instructors from the Porsche Driving School, supported by PCNA marketing and tech support people.

These new cars have a complex set of electronic driver aids on them - some standard, some optional. We understand that all of these systems, with the exception of those unique to the 991 4S, Turbo, and GT3, are standard or available in both the 991 and the Boxster/Cayman. Note that the limited information available to us makes it impossible to completely characterize the way these various systems work and interact with one other. Please consider this to be an overview and subject to error.

Here is a summary of what we learned.

### **The Systems**

**ABS:** Anti-lock braking. Some of the other systems may influence how the ABS system works. However, it is never shut off. No controls.

**PSM:** Porsche stability management. Monitors multiple dynamic parameters (individual wheel speed, acceleration along and around various axes, throttle, steering and brake inputs, ...). Actively intervenes with various systems including brakes, throttle, electric steering, and PDK. Has links to operate in conjunction with other systems such as PTV. Can be controlled by driver.

**PASM:** Porsche Active Suspension Management. Provides computerized active, continuous adjustment of damping levels. Can be controlled by driver.

**PTV/PTV+:** Porsche Torque Vectoring. Uses the rear brakes to apply slight braking forces in turns to transfer more torque to the outside tire. PTV plus, for cars with PDK, also has an electronic rear differential lock. No controls.

**PDCC:** Porsche Dynamic Chassis Control. Active, continuously adjusting anti roll system. No controls

PADM: Porsche Active Dynamic Engine Mounts. System of electronic engine mounts, included in Sport Chrono package and in the GT3, which stiffen or relax the engine mounts depending on driving conditions. No controls.

Power Steering/ Power Steering Plus: Electric assist is standard, and is variable ratio (changes with degree of lock). Steering torque pulse "assists" the driver in maintaining stability when braking on a road with a rough surface and hence different levels of friction between wheels. Power Steering Plus also changes ratios based on vehicle speed. No controls

Rear axle steering: Standard on the new GT3. Electrohydraulic system steers the rear wheels opposite to the fronts below something like 50 KPH and with the fronts above. This has the effect of shortening the wheel base at low speed, reducing the turning radius, and increasing the wheelbase at high speed, improving stability in high speed turns. No controls.

PTM: Porsche Traction Management. Standard in the 4S and the turbo. Uses an electronic clutch to vary the amount of torque applied to the front wheels (the back wheels are always driven). No controls

ASR: Anti slip regulation. Traction control. Senses loss of traction and adjusts throttle. No controls

ABD: Automatic brake differential. Traction control. Senses loss of traction on one wheel and applies brake to transfer torque to the wheel with higher traction. No controls

MSR: Engine drag torque control: Prevents engine torque from locking up the driven wheels (for example, during a downshift on a slippery surface). No controls.

## **The Controls**

There are control buttons on the center console along the left edge that enable the driver to adjust the performance of the car. All cars have Sport and PSM buttons. Sport Plus and PASM buttons come with optional systems.

Sport: Reduces level of intervention by PSM, allowing for more aggressive driving. More aggressive throttle map. Lights up when engaged.

Sport Plus: PSM set to least intrusive mode. PASM I think sets to sport, but this can be independently controlled. PDK set to most aggressive shift response and will keep engine RPMs higher when set in auto mode. Most aggressive throttle map. PADM set to most rigid damping. Changes steering ratio. Lights up when engaged.

PASM: Control switch on console shows a shock absorber. Two settings: normal and sport. Lights up when in sport mode.

PSM: A switch on the console allows it to be switched off, in which case a warning light (car with skid marks underneath) is lit on the dash.

## **The Advice from the Porsche Driving School Instructors**

1. For a novice driver, set the car so that the electronics are the most restrictive. That means auto gear select for PDK cars, Sport button off, Sport Plus button off for cars with the Sport Chrono option, PASM in normal, PSM on.

2. For the advanced driver, set the car electronics to their most aggressive modes: PDK in manual mode, Sport or Sport Plus button on, PASM in sport, PSM on. Note PSM on. The chief of the Porsche Driving School instructors told us that they cannot achieve higher lap times with the PSM turned off. Apparently, the new PSM is sophisticated enough to allow the car to be driven around a road course as fast as possible by the most highly skilled driver. He said that, with the systems set in their most aggressive mode, if the PSM warning light is flashing (and hence PSM is intervening), the car is being "overdriven." This is interesting, as it gives the instructor an indication of the quality of the student's driving beyond his own sensory inputs, experience, and instincts.

## **Other Observations**

3. On the skid pad, making a 90 degree turn at modest speed on a very low friction surface, the PSM system on the 991 throttles down and brakes the car so much that you end up staying on line even with the throttle to the floor. This is not true for the 4S. In the 4S, PTM transfers torque to the front wheels when the rear wheels begin to slip. At this point, the car is beginning to rotate, and an experienced driver will automatically counter steer. However, counter steering will cause the front wheels to pull you off line. So, the best approach is not to correct but to let the front wheels pull you out of the rotation. This we found hard to do as it is contrary to years of training in what to do when the rear end of your 911 starts trying to pass you.

4. With all these complex electronic systems, it seems that it will get harder and harder to modify the car for better track performance without potentially running afoul of some system, but this was beyond the scope of our session.

As a final note, we feel that the session could have been more valuable if it had been a bit longer and the on track experience more targeted at experienced drivers.

Tom and Knute