The Alternative Line

by Joe Holzer for Publication in CNY-PCA Redline Report http://www.holzerent.com

Before and After – Reviewing PDK

I am hopeful that your dear sweet editor will humor me on this one, as it will be a two-part written as a single article. Now that you are confused, welcome to my world. Normally an article which is done in parts has most of the intended subject, if not the actual text, thought through pretty well. Generally all that is needed is to FINISH the writing, which itself can often seem an insurmountable issue.

But that is not the case here, and you will soon understand why. First; a little history. Most of you know I have been active (what an inadequate word ;-) in PCA, and especially Driver Education on Track, since buying my first Porsche in 1981. In fact, driving on the track was my primary objective in doing so. Most of you dear READERS have not been doing so long enough to remember that my logo at the end of these articles is John Hajny's artwork based on that original Porsche, and his characterization of me driving the '77 Targa around curves (notice the tires especially, a nod to their extra workload in carrying ME around corners ;-)

For the youngsters among you who never saw me in that car, since you have joined the club after I obtained my '95 993 Cab Tip in 1999, you have no frame of reference for the "Silver Bullet", as I called the Targa, now primarily owned, though still licensed in my name for a variety of reasons, by my daughter Jess, currently working on her PhD at Johns - Hopkins in Baltimore (PARKING not being the least of the reasons). The Targa has a 5 Speed 915 type gearbox, an all manual transmission with long throws, and a sloppy linkage which has long since had its reverse lockout fail. For those who witnessed me using it at the Cherry Valley Autocross in September, I did so with trepidation and respect – I left it in first gear, except for the short blast past the timing booth, allowing the rev limiter to slow my potentially faster but much more risky times had I shifted a lot.

Those who have read my diatribes here know that Tech is part of my mantra, so please bear with me as I explain the unique circumstances of this article. I have avoided Autocrosses for pretty much three reasons; the actual time on track vs the total time commitment to travel there and stand around waiting my turn cannot possibly compete with the DE events; I'm getting old and that stuff is more physical work than it looks, as exemplified at Cherry Valley; and lastly that the 993, with its Tiptronic, is positively the WORST possible autocross setup you can imagine. Not least because the car IS a Cab, and therefore softly sprung, but because the Tip is a conventional automatic transmission insofar as starting; ie the torque converter must spool up before any real locomotion can occur, and it defaults into second gear (of four) to start, simply exacerbating the problem.

But you ALSO know that I have been, and actually was one of the very first, outspoken proponents of the Tiptronic as a track setup, which was seriously out of the mainstream thought at the time. For those who have paid attention, no less an expert than Hurley Haywood has come out subsequently with similar sentiments, and likewise prefers to simply let it do all the shifting rather than use the manual mode except in specific circumstances. And it is a funny paradox that, in the country which originated the automatic gearbox, and made it ubiquitous, we now are unusual in still buying more Porsches with manual gearboxes than automatics where there is a choice, when compared with the rest of the world.

I predict that will soon change because of a further refinement of the "Tiptronic" concept which has the potential of providing all the performance and mileage benefits of a manual, with the idiot-proofing and convenience of a full automatic, while providing the manual "boy racer" shifting which is so critical to feeling at one with the machine, especially a Porsche, when you want it. The refinement is called "PDK", and it has the potential to be fabulous.

What I know of PDK could fill volumes. But what I DON'T KNOW could fill even more. So while I was last at Burdick to get a $250 drive cable for my 993 Roof (don't get me started...) and have my wife's A8L looked after, I spoke with Lee Smith, who promised me a unique test drive in a PDK equipped 997 when they arrived this month. I think what I told him I wanted to learn was unlikely to be high in the minds of the vast majority of potential buyers. But then, as I told him, I don't expect to actually BE a buyer anytime soon, but I believe there are a LOT of people who currently are in the club, and a slew who aren't, who have taken my input as basis for deciding to buy a Porsche. So the drive will not be a waste of his time in any way.

I have NO DOUBT that the PDK will be faster than my 993 Tip, even in the smaller engine base 997 instead of the "S". It has seven speeds vs my four, and engages upshifts almost ten times as quickly. And while the Tip has a lockup clutch, you have to move a lot of ATF around that torque converter at every gear before it actually does lock. For those who don't know, the PDK can be thought of as two simultaneous transmissions wrapped about the same centerline shaft. The gearbox is otherwise pretty conventional in using parallel input and output shafts, with the output shaft driving the differential via a ring gear to the rear, and having a power take-off splined shaft out the front for use with the AWD setup on C4 and Turbo models. For that reason, I cringe every time I hear of some automotive writer, who ought to know better, when they say that the "center diff" can direct "from 0 to 100% of the torque" to whichever axle is needed. WRONG!!! Unless the fronts would run MUCH faster at the surface of the tire than the rears, in which case at full lockup the fronts could conceivably have about 90% of the torque. For about two yards. Then it would simply burn out the clutches. If you doubt it, try engaging or disengaging a quattro center diff while turning a pre-89 Audi. Lots of luck. Full disengage of the center diff allows 100% to the REAR, while full engage puts roughly 50% at each axle. Jeez! But back to the PDK.

What IS different is the fact that the clutch, like the input shaft, has an inner and an outer assembly, and that it alone runs in ATF – the gearbox has conventional gear oil. The clutch is actually two concentrically operating wet multi-plate assemblies, splined from the cup between them driven by the engine crankshaft; radially outward to a splined cup driving the outer input shaft for the gearbox, and radially inward to a splined inner shaft which runs forward past the end of the outer shaft, and on which are one set of the gears, while the outer shaft has the other. Which are the odd number gears and which the even I do not really know (I will sometime soon, but it would make sense for the longer inner shaft to have the odd number gears since there are more of them), but all have conventional synchronizer rings. They are simply driven by hydraulic push rods instead of leveraged mechanical pushrods like a conventional gearbox. And what makes it work is electronics, which control the hydraulics. A surprisingly simple CONCEPT, but not so easy to make in the real world. Porsche actually first used it twenty years ago in racers, but street demands are actually a LOT more complex, and the control systems were simply never up to the task. Until now. I hope ;-)

As I noted, my take on this is probably unlike most, but it is based on understanding the physics. Conceptually, if you keep your foot into the accelerator and you are in second gear and approaching redline, an idiot could predict that you will soon want third gear. So it gets pre-selected. Then, about 100 rpm under redline or so, the compressive force on the one set of clutch plates (much as in every automatic gearbox) is released simultaneously with putting compressive force on the other set of clutch plates, thereby removing driving torque from one of the shafts and putting it into the other. Simple. And faster than ANY person could shift a normal gearbox/clutch assembly. Downshifts under braking should also seem logically simple. Interestingly, by using wet clutches, a small slippage is actually created in all but the last microsecond of engagement, thereby smoothing the shift "feel" for the occupants (see; like the simple $10 safety belt, basic physics, properly applied, can perform miracles of beneficial actions without a lot of complexity).

But what happens when all I really want to do is move forward the 13 feet between me and the next car in the gridlock? Or I want to parallel park the thing? As you can see, starting and stopping in the pits for a race is a piece of cake by comparison. So that is my "Test Drive" plan; to find out how SLOWLY the PDK can actually be driven. And I also want to know what happens if I actually DID autocross the thing, since conceptually all that Tip torque converter spoolup time is gone, along with the wasted gas, etc. But the rapid on-off of gas and brake at a solo autocross is punishing enough on a driver, whose control system makes ANY computer seem archaic. What will the PDK computer do? And what will the clutches do in normal light traffic as I try to drive from the local supermarket with my strawberry filled whipped-cream sheet cake for my daughter's graduation party? Or merely the dozen eggs for tomorrow's breakfast? I KNOW it will be fast on the track. Why would Porsche bother if it couldn't at LEAST equal the Tip in that respect? But the Tip is SO good, like every automatic, at doing the mundane without upsetting the applecart. I'm looking forward to the second part of this. And I hope Skip will indulge me by acknowledging that this part is written before I have been anywhere NEAR an actual PDK.

Coming Soon to a Redline Near You – Part Two on PDK – The ACTUAL Drive ;-)