The Last Porsche 944 in E-Street Autocross - Part 1
by Ed Fisher

I'm autocrossing the last base 944 that will ever run in Street class in national competition with the Sports Car Club of America (SCCA). I know this because the SCCA has a 30-year sunset rule in Street. 1989 was thirty years ago and was also the last year of 8-valve-engine 944 production. So, all the other years of the base 944s have sunsetted out except the 1989 model.

Autocross is sometimes called parking lot racing because we're timed from start to finish, one car at a time, around a twisty course designated with traffic cones in, you guessed it, big parking lots. We race anywhere we can find a big and open section of asphalt or concrete such as airport aprons and old Air Force bomber bases. There are myriad regional events (we run them at Milton Frank stadium in Huntsville about once a month) and then there's the National Tour, a series of events around the country which culminates each September in the Solo Nationals at a former bomber base in Lincoln, Nebraska.

Nats (for short) is the biggest motorsport event in the world as measured by the number of competitors, drawing over 1300 of your closest autocross friends each year. For some, it's a week-long party with a little racing thrown in. I've been doing National Tour events for several years, won my class on occasion, and been to Nats three times, taking home two trophies. (The top 30% in each class get a trophy.)

Street category is the lowest SCCA autocross preparation level, meaning the car has to be almost entirely configured as it left the factory. The sunset rule was implemented because after 30 years, memories fade and documentation gets scarce, so it can be difficult to agree on what is or is not a legal configuration. The Porsche Club of America has a similar class within the Parade Competition rules called Showroom Stock.

My 944, ready for its first National Tour event.

In both PCA and SCCA autocross, the cars are separated into classes within preparation levels. The base 944 is classed by the SCCA in E-Street. E-Street is dominated by two cars: the 1999 Sport Edition Miata and the 2003 Toyota MR2 Spyder. No one seriously runs anything else in national competition. Both are 2200lb-ish cars. The 1989 Porsche 944 is, well, nowhere near that figure what with a heavy, balance-shafted 2.7-liter motor, a back seat, a huge glass hatch, a/c, cruise control, and power everything. It doesn't have enough additional wheel and tire width to make up for the heft, so no one thinks it can be even remotely competitive. None have been run seriously in national competition in the 10 years since I started in the sport.

In my feverishly foolish imagination, I hypothesized that the 944 has two quirks that might possibly allow it to be competitive in E-Street today, where handling and cornering ability are king. The first is big negative tire camber made possible by the adjustability of the M030 sport suspension option. The second was Porsche's use of tall bumpstops. While the M030 sport suspension option is well-known, no one ever took advantage of the tall bumpstops as far as I can tell. Please allow me to explain, but I'll have to get a little technical.

Camber is the angle of the tires as compared to the road. If the tires are perfectly vertical the camber angle is zero. If the top of the tire leans in toward the center of the car, like in the picture below, then that's a negative camber angle. Most cars come from the factory with a slight amount of negative camber, like ½ degree or maybe as much as one degree. This allows the tires to wear evenly as long as miles spent in hard cornering are limited. Generally, more negative camber, up to as much as 4 degrees, is better for hard cornering, which is about all we do when autocrossing.

Rear tire slanting inward at top = negative camber.

The rear of the 944 is sprung by torsion bars, almost exactly the same design as on the 911, and always allowed for infinite adjustment of rear ride height. Not an easy adjustment, but it can be done. The M030 option adds ride-height adjustability to the front struts. With that you can lower the front and rear evenly while still using the stock springs required by the rules. Significant lowering of the car is what allows a big negative camber angle at the tires.

So, I gathered up the various parts that make up the M030 option and installed them. Some parts were still available new, but many were not and I had to find them used. Now the car has three degrees of negative camber all around and is about 3/4" below the standard M030 ride height which, in turn, is somewhere below the stock suspension ride height. The car is now quite low, as in I'm-

getting-too-old-for-this low, especially with the thin modern tires on small, 15” diameter wheels.

Three degrees is a serious camber number for an unmodified street car. You can’t get three degrees in any standard Boxster, Cayman or Carrera. Only the GT cars now allow that much adjustability. Tires like that much camber in the corners. It makes them happy. When they’re happy they deliver more grip and the car corners faster.

A fly just flew into the ointment, however. The low ride height has a negative side effect on the 944: it makes the front of the car roll more easily while making the rear roll less. Why it does this is very technical so I won’t bore you with it. The upshot is that the more the car is lowered the more the famous handling balance that Porsche gave the 944 gets upset. This roll balance problem can, in theory, be overcome by tuning the tall bumpstops.

Bumpstops are generally pieces of rubber that keep the shock absorbers from internally crashing metal into metal when fully compressed during a big bump, say, when you hit a deep pot hole on I-565 at 70mph like I did once. They are often only about 1/2” thick.

What many people don’t know is that by the 1980’s, Porsche was doing an innovative thing with bumpstops: they were using tall elastic bumpstops as auxiliary suspension springs. The stock bumpstop, shown below, is 3-5/8” tall. It occupies almost all of the free shaft length at normal ride height. Notice the complex shape.

Porsche-Koni tall front bumpstop

The idea was that while cruising down the highway, the soft primary springs give a comfortable ride. When you crank the car over into a corner the bumpstops come into play and progressively stiffen the suspension for responsive handling. This design philosophy was still in use when the 986 Boxster and 996 Carrera began production in the late 1990's.

The tall bumpstop design method is important in Street-class because one of the few allowances is that bumpstops are FREE!!! along with the shock absorbers. Some have called this a loophole in the rules but it's a well-recognized and legal loophole.

Well, bumpstops are almost free. You can make them from anything you want, including jello (not recommended) or solid steel (also not recommended) or get them in various rubber stiffnesses, which is what I've done. What you cannot do is make the bumpstops any taller than they were before.

So, you must be very careful because if you take a trophy from a Miata driver at a National Tour event while driving a 30-year old Porsche that everyone knows is slow, you'd better be able to prove that you're legal. I carry a notebook with relevant information for my competitors (or a protest committee) to peruse at their leisure.

This means that I'm free to install stiffer bumpstops to stop the car from rolling over like a drunken sailor, which is the stock behavior of most 1980's sports cars,

including the 944, and especially a 944 that's been lowered, as previously explained. Bumpstops allow the roll stiffness of the front and rear to be tuned separately and keep the negative camber we obtained from totally disappearing in the corners due to body roll. The stiffness of the bumpstops, if chosen to be stiffer than the stock springs, should also make the car transition from turning one way to turning the other way much faster. Almost Miata fast. Transitioning quickly (nimbleness) is another thing that's very important in autocross.

The picture below shows what the new bumpstops look like on one of the front struts. The three, yellow donut-like things are the bumpstops sitting on top of the shock body and riding on the strut shaft. In a corner they will slide up the shaft and get squeezed against the top hat which is out of the picture.

New front bumpstops

The next picture shows the rear shocks with their new bumpstops.

New rear shocks and bumpstops

All is not quite so simple, however. I found out that some autocrossers have tried to use stiff bumpstops before, if not on a Porsche. Apparently, they all gave up. At least the ones that are talking gave up.

The problem they encountered is the transition from the stock soft suspension spring to the stiffer bumpstop. Porsche solved this problem by using a tall tapered bumpstop shape that very gradually adds stiffness. I can't do that. I need to stop the car from rolling right now, or at least almost right now. To explain this problem, I have to tell you a super-secret engineering secret not normally revealed to those not initiated into the secret engineering lore known only by those who actually read and understand the textbooks: load is preferentially and proportionally attracted to the stiffer path.

Let's imagine we brake the car and turn left. The right front spring and shock absorber will compress the most. The load into the tire increases gradually and proportionately as the spring compresses. The back of the car is following along, but later. When the stiff front bumpstop is encountered there will be an immediate increase in the tire load. It's as if weight from all around the car suddenly jumps into the front right tire. If this increase happens too fast the tire contact patch

becomes overloaded and gives up grip. The right front tire begins to slide. Massive understeer is the result and the driver has to make a big correction which costs time.

In other situations, it may be a rear tire that gets shock-loaded and calls in sick. The result in that case is oversteer. A car that oversteers one second and understeers the next is not fun. It is not fast. It can be, essentially, undriveable. This is the big fear, the big problem others have run into. I have only a few weeks and a handful of events to work the bugs out.

So how has it been working, you ask? Find out in Part 2. Here's a hint: multi-time Nats champion Alan McCrispen remarked, after watching me take a run in the car at its first local autocross, "I've never seen a 944 corner so flat or change direction in a slalom so fast." That was the good news.

The bad news was that I found it a difficult beast to drive and it didn't seem to have all that much cornering grip. Alan, a much more accomplished driver, was having fun with it and we both placed highly. But we were beaten by a well-driven Miata that took first place overall. Not a good omen, since I know that at a national event the drivers will be even faster.

I think I've figured out the big issue and have a plan to fix it. Stay tuned.