

The Last Porsche 944 in E-Street Autocross - Part 2

by Ed Fisher

At the end of Part 1, I mentioned doing well at this year's first regional autocross event at Milton Frank stadium in Huntsville. After Alan McCrispen drove the car to 2nd in ES and 3rd overall and I took 3rd in ES and 5th overall, another driver, a national champion, came up to me and said, "I think you may have something with this car, especially on big national courses." This was encouraging since the next week I'd be taking the car to its first national event, Dixie Tour (near Valdosta) and then to another one, the Charlotte Tour, the very next weekend.

But all was not perfect. For one, the car was difficult to drive, at least for me. I had an idea as to why but there was no time to make big changes. For another, the winner of ES (who was also 1st overall) was a Miata driven by Goofy Gomer #1, who I knew I would probably have to beat to ever win a national event trophy.

The Goofy Gomers are two brothers that co-drive a Miata named Scarlett (painted red, of course) in ES. We often attend the same national events. They're good friends and named themselves by calling their enterprise Goofy Gomer Racing. Friends refer to them collectively as the Gomers. Both have PhDs, by the way. They're very smart and, yes, perhaps a little goofy, especially when together with brother number 3.

Winning a trophy at a national event was The Goal I set for myself and the Last 944. As PedalFaster, an accomplished autocrosser who's run both a 968 and a Boxster, wrote to me on Rennlist, "If you win, or even place well, the sound of minds being blown across the country will be deafening." I thought that if I could get the car competitive and learn how to drive it then I stood a chance at snagging a trophy. Coming from a high-power class, I knew I had much to learn about racing a low-power car. The driver and the car would both have to get faster to claim a trophy at a national event.

Dixie Tour on March 16th and 17th was the first SCCA national autocross event of the year. I ran into one of the top drivers at breakfast the morning of the first day and he asked me, "What are you driving now, something weird I saw...?"

"I'm driving a 944 in E-Street so I can learn momentum-maintenance," I told him. "Well, you sure picked the right car!" he said, looking away and shaking his head.

The event was a disaster. ES had 20 racers, including the Gomers, with six trophies to be awarded. The others didn't know me and were probably a little suspicious of my odd car. I promptly allayed any concern by spinning on two of three runs the first day, landing myself in 14th and long out of the trophies time-wise.

I mentioned that the car was difficult to drive. One of the spins, right before the finish, was such a spectacular fail that it received an ovation from the crowd. The best I could hope for on the second day, when we would run the same course in reverse, would be to climb a couple of places. That didn't happen. It rained. I didn't have rain tires. I dropped to 16th.

The necessity to have two sets of tires in Street classes, one set for dry and damp conditions the other set for heavy rain, is a new thing. What's happened is that the tire makers have created specialized tires that have huge grip on dry pavement. You must use one of these specific types to be competitive. They're about as good in the dry as race slicks of 20 years ago yet they have treadwear ratings of 200 and are perfectly legal for use on public streets. Unfortunately, they gave up some wet traction and hydroplaning resistance when they optimized these tires for warm (non-freezing) and dry conditions. Then they created different tires that work really well in standing water. I don't have a set of those or a second set of rims to mount them on.

I watched the car in front of me in grid switch from dry to rain tires as it really began pouring. The driver went from last place, after three spins in a single run, to first. The Gomers had a set of rains and placed 7th (one place out of the trophies) and 10th.

On to Charlotte, but only after a week on St. Simon's Island licking my wounds. Charlotte was hot and dry and I ended mid-pack in 10th place out of 15. The Gomers were close behind in 11th and 12th. I managed to not spin and not hit cones but was discouraged by the result. The course should have been good for the 944 but I was still one second per run behind 5th, the last trophy position. In autocross a second is a loooong time. I had driven well but it wasn't nearly fast enough.

The 5th place trophy winner told me he was impressed by my times in the 944, beating some good Miata and MR2 Spyder drivers. (Racers from Pennsylvania to Florida were there.) He had autocrossed a 924S-SE back when they were

competitive against the first-generation Miata, but no one had ever been competitive in the heavier 944, much less later against the second-generation Miata. This was nice to hear but it was clear that being able to compete for a trophy, which was my definition of competitive, was not yet in the cards. I'd come to a tentative conclusion that the car was lacking steady-state front grip but I didn't know why.

Back in Huntsville, I got together with the Gomers to compare data and it showed what was happening. I had a slight acceleration advantage over the Miata, but this was being equalized by a need to shift to 3rd gear when they could stay in 2nd. Shifting to 3rd usually means a downshift back to 2nd, sometimes twice per run, and extra shifts cost time even when done perfectly. Downshifting is especially tricky. Autocross requires ten times the number of driver inputs per time interval as compared to racing on a track and we don't get to downshift while braking at the end of a straight. There are no straights, only curves where you are either accelerating or braking while turning. (If you try to "create" straights You. Will. Beeeeee. Slooooooow.)

Typically, the downshift must happen while simultaneously trail-braking into a corner that's either an increasing or decreasing radius but almost never a constant radius. It requires a high level of car control and coordination to: a) not lose the rear end of the car when letting out the clutch in the middle of the corner, properly rev-matching while continuing to trail-brake perfectly; b) keep the car within a foot or two of the correct line and hit your apex at just the right angle; and c) be back to full power at the apex not a moment late. A PDK transmission would make things so much simpler!

In transitions, like in a slalom, the data showed that the best I can hope for is to limit the time lost to my narrower, lighter, more nimble competition. When Goofy Gomer #1 remarked, after driving an autocross run in the Last 944, "You should never be able to beat me in this car," I think he was mostly reacting to a lack of agility. When I explained to him that Porsche had intentionally put the engine at the front and the transaxle at the rear to increase the polar moment of inertia and force the car to react more slowly than, say, a mid-engined car like the 914 or the Boxster/Cayman or every purpose-built Porsche race car in history, he just looked at me like I was, uh, goofy. "Why the heck would they do that?" he asked. "I

think it was so magazine testers who couldn't drive could go fast without crashing and then they would write about how great it handled," I said.

It was in the sweepers where I thought the car should be a match for the others or perhaps even have an advantage. Unfortunately, the data showed the Miata walking away from me in every long corner. It was simply generating more lateral grip.

This was really bad. It meant that even if I was a better driver than many, I was unlikely to ever beat enough Miatas and MR2 Spyders to get up to the trophies.

Now I did something I should have done long before: I calculated the stiffness of the front and rear suspension of the car with the steel springs, torsion bars, and bump stops all acting together. The results were surprising.

You may remember from Part 1 that a key advantage for the Last 944 is the ability to use the bump stops to stiffen the car in roll. How stiff should the suspension be for an autocross car that competes on surfaces that, unlike a real racetrack, are often various levels of bumpy even at relatively low speeds? And how stiff was my car, anyway? The answers will require me to get a little bit technical, so brace yourself.

Turns out that a Canadian autocrosser and engineer named Dennis Grant (see his website [Autocross To Win](#)) did some testing and decided that the front end of an autocross car works best with a natural frequency of 2.2Hz, and with the rear end a little stiffer at 2.5Hz. (Grant became an SCCA national champion in the car he developed.) Natural frequency is a measure of the stiffness of a spring-mass system, like the mass of one corner of a car sitting on top of a suspension spring. These numbers are lower than a typical road-race car, which might be 3 Hz, and many autocrossers were then using and continue even now to use setups even stiffer. For reference, a modern sports car might be as much as 1.5Hz. The stock springs on the non-modern 944 give a stiffness of only about 1Hz.

Rubber bump stops don't really work like coiled steel springs (or torsion bars) but I was able to squint a little and derive an estimate for their effective spring rate over the distance they were probably being compressed. I made a spreadsheet and put these values in parallel with the steel, along with estimated weights of the sprung mass at each corner. The calculated rear stiffness was 2.5Hz. Perfect.

Perfectly dumb luck. The calculated front stiffness was 3.5Hz. OMG! as the kids text these days.

The overly stiff front bump stops and the heavy shock damping they require for control are almost certainly what's been impairing the grip. If the spring rate is too high then when the car hits a bump the impact energy is not well absorbed and it accelerates the car upward. This actually pulls the weight of the car off the tires (until it comes back down) so the tires lose grip. This not only happens on big bumps but also smaller irregularities where the pressure at the contact patch will vary so much that the grip is uneven. This lowers the effective grip and makes the car hard to drive. In a sweeper, you only have as much grip as the lowest end of the car.

To fix this, I calculated what spring rates the bump stops needed to be for the front struts and ordered new ones. At the next event with the new bump stops, TAC/TVR #2 on April 6th at Milton Frank, I won ES. I beat both Gomers by a second. The car had more grip and it was easier to drive. One event, though, especially at Milton Frank which has a weird surface, doesn't mean much. I missed TAC/TVR #3. At TAC/TVR #4 I lost to both Gomers by a second, which muddied the waters.

What you need to realize is that I'm making constant changes to alignment, shock absorber values and front sway bar stiffness in between and even during the events. Changing the front bump stops necessitated a cascade of other changes. To get to the top in autocross we treat all events, especially local events, as tests. If you're not testing, making changes and evaluating the effects, you can't develop the car. (The same goes for the driver.) So, results with a new car are often inconsistent. Add to this the natural inconsistency of human performance and the varying character of different courses and surface conditions and... well, you get the point. I'm making excuses.

I made another major change before what might be my last and best chance at a trophy, the Bristol Match tour at Bristol Motor Speedway upcoming on July 5th and 6th. (In the parking lot, of course!) I mounted new front tires in 245mm width, up from 225mm. This is way "over-tired" for a 7"-wide wheel and the same tire I have on the 8" rear wheels, but it worked. With all the other changes I now had so much more grip from the front than the rear when I ran at our local Test and Tune

event the week before Bristol that the car was seriously unbalanced. Though I'd increased overall grip by improving the weak end of the car I was forcing the poor driver to adapt quickly or die.

Bristol was really hot. This is good for me because I'm using a tire that likes heat but takes a run to warm up. Without a co-driver to warm the tires, you know going in that your first run better not be your best. The driver needs to be consistent over the span of three runs, recognize and fix the inevitable mistakes, and rarely throw runs away by coning. You must be confident you can lay down your fastest run on the last one.



In Line for The Start at Bristol

At a Match tour, you get three runs in the morning then three more that same afternoon. In this case, the course was changed somewhat at midday, I think for reasons of safety, and the course got faster. The fastest times from each set of three are added together for your total time and that decides the class results. After the morning set, I was 6th of 9 drivers. Trophies would be awarded only for 1st, 2nd and 3rd.

I was way behind 1st (a Miata) and 2nd (an MR2 Spyder), but from 3rd on down was very tight, so I had a realistic chance at the last trophy. I had an equally good shot at last.

My first run in the afternoon is faaaast, baby, and I vault into 2nd place. The MR2 that started out in 2nd cones his first run but I knew he'll probably clean it up, so to be honest I'm still racing for 3rd. My real competition for 3rd place is now an older guy (like me) in a Miata. We're gridded with our cars right next to each

other. He's only 0.1 seconds slower so far. It's clear that the one who improves more on the subsequent runs will likely snag the 3rd place trophy. We wish each other luck as we adjust tire pressures.



Negotiating the Showcase Turn at Bristol

My second run is almost a half-second faster. I'm very pleased. Once all second runs are complete, I'm still in 2nd place! The Miata next to me in grid spins and knocks a wall of four cones into the next county. The MR2 that started the afternoon in 2nd lays down a clean but slow run. He needs to get a lot faster or he won't even trophy. Each of these two guys has one more chance to take 2nd and 3rd and drop me to 4th. The pressure is really on them to find some speed and finish off this pesky 944. Meanwhile, the Gomers are down in 8th and 9th but giving me encouragement.

I make a significant driving mistake on my third run (while downshifting) and go slightly slower, so I must stand on my second run. The MR2 finds his speed and goes 0.004 seconds faster than me to take back 2nd place. My competition for 3rd place in the Miata gets faster and runs clean but is still a tenth off my 2nd run. I win 3rd place by 0.054 seconds and take the last trophy.

Goal achieved!



With 3rd Place Trophy at the Bristol Match Tour



Results
2019 Tire Rack SCCA Bristol Match Tour
07/08/2019 - 07/09/2019



Pos	Nbr	Driver's name, Team	Car, Sponsor	Tire Mfg	Hgn.Dr.	Course 1, Course 2	Score
E-Street							
				Division 9		Trophies: 3	
				East: 54.433		53.156	
				South: 52.717		52.573	
						52.025	
T	33	Kevin Lashley Bishop, SC	2003 Toyota MR2 Spyder	BFGoodrich	North: 54.711	55.921	54.242 (100.048)
				South: 57.114(1)		54.930	
						53.802 (7.852)	
T	36	Edward Fisher Huntsville, AL	1989 Porsche 944	BFGoodrich	Tennessee/DNF	56.034	55.172 (100.673)
				South: 54.279		53.806	
						53.593 (10.934)	
M	35	George Schmitt Elkhart, IN	1999 Mazda Miata	Hoegaarden	South: 54.279	55.187	56.65(53) (100.032)
				East: 54.433		70.997(4)	
						54.925 (0.054)	
M	5	Cameron Alton Tulsa, OK	1999 Mazda Miata	BFGoodrich	Central: 54.538	54.897	DNF (100.512)
				South: 57.142(1)		54.587	
						54.525 (0.490)	
M	16	Laura Hyakell Shawnee, PA	2003 Toyota MR2 Spyder 200-000 Motorsports	BFGoodrich	Michigan/77.718(1)	54.886	56.038(1) (100.686)
				South: 54.928		59.037	
						55.728(1) (0.374)	
T	57	Jason Crump Wilkeson, NC	1999 Mazda Miata	BFGoodrich	Central: C DNF	55.538	55.750(2) (100.935)
				South: 09.119(3)		56.261(1)	
						54.397 (0.039)	
M	33	David Robinson 14102, Tenn, AL	1999 Mazda Miata	Hoegaarden	Tennessee/55.548	DNF	57.468(1) (100.948)
				South: 54.338(1)		54.478	
						54.372 (0.011)	
M	153	Jack Robinson	1999 Mazda Miata	Hoegaarden	Immunized/DNF	56.147	55.943 (100.653)
				(000) Omni Racing		South: 54.177	
						54.315	
						54.083 (0.080)	

Bristol Match Tour E-Street Results

I think I'm finally getting the hang of this momentum-maintenance driving. It's a complex equation, trying to figure out when going a few extra feet here will save time through there, or not, within the complex set of connected corners that constitute a modern autocross course. It's a mental skill necessary to reach the highest levels of the sport. With a more stable car configuration I hope to focus harder on the driving going forward. That's probably where the real time is to be found in the future.

I've continued to make changes to the car. At Bristol, the grip was unbalanced with a tendency for wicked lift-throttle oversteer that could be disconcerting. Pictures also show that it rolls too much thanks to the softer front bump stops. I've reduced the rear shock damping and added more front roll bar stiffness. These changes get tested this weekend at Milton Frank.

I have one more national event, the Peru Tour in Indiana, before Nationals themselves the first week of September. The Gomers won't be at Peru but 13 other racers in Miatas and MR2 Spyders are registered who represent the best in E-Street from the Midwest.

The National Championships will be held in Lincoln, Nebraska. I'm registered in the 944 and the Goofy Gomers and my wife and I will be sharing an Airbnb rental. If anything interesting happens, maybe there will be a Part 3 to this story.