

Tips for a Novice Autocrosser



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Welcome

I remember my first autocross. It happened many years ago on a typical winter day in February in New Jersey. The parking lot had been plowed but piles of snow populated the course. It was cold and the tires were like hockey pucks sliding on the pavement. But it didn't matter to me. I was excited to be there. Even today I experience some of the same emotions at the starting line as I wait for the green flag to drop. The flag drops and I take my run. As I finish, I often realize that I stopped breathing during the run.

The Martin Sports Car Club offers a family friendly driving experience. Our members include novices and experts ranging in age from 8 year olds to an 88 year old tire smoking veteran. Even our experts had their first autocross and I can guarantee that each one of them on that first day discovered some driver in a very underpowered car was faster by 10 seconds. For me, on that day in February, it was a front wheel drive Pontiac sedan.

Instruction and practice, as in every endeavor, leads to improvement. Autocrossing is no exception. It is as true for novices as it is for experienced drivers. Visit with us no matter what your level of competence. You'll have fun learning the sport and learning to keep the car in control as you get faster and better with more seat-time.

Introduction

Before we move on to discussing tips on how to improve finishing times, it is important to remember, above all, to be SAFE. Being SAFE means being in control and following procedures. Some important considerations are:

- a) No drugs, prescription or otherwise, that will impair your driving.
- b) Do not enter the course without the starter's permission.
- c) Stop immediately on a Red Flag.
- d) In a spin, both feet in.
- e) Slow down in staging.
- f) Be aware of your surroundings.

There are several aspects to becoming a faster driver. Learning to recognize the proper line is one part. Improving driving technique to increase speed is another. Also, it's important to learn car control to keep the car from getting out of shape and unstable as

the speed increases. Autocrossing is competitive and challenges us to reduce our time through the course. But there is no secret in how to accomplish this.

Simply stay off the brake and on the throttle.

Analysis of autocross runs using data recordings have shown that the highest average throttle input through the course will result in the fastest time. It seems that this is an obvious fact. Distance divided by Speed equals Time. Minimize the distance, increase the speed and the result is a faster time. Improving your time on an autocross run is about managing speed, tire traction, balance and driving the line.

The real question then is how do we do this. The following paragraphs contain driving tips that address these issues.

Get to know the course

Walk the course

Before getting to the starting line, be familiar with where you will take the car. Walk the course and learn the elements making up the course. Walk it several times. Try formulating a plan to drive the course by identifying key cones, braking areas, turn in points and turn exit points. With the course layout in your mind, you can go to the starting line with confidence and the resources to mentally prepare yourself for the first and following gates.

Look Ahead

This is, by far, the most important strategy one can adopt to become a faster driver. Walking the optimum line and becoming familiar with the course is preparation for looking ahead when driving. As you drive, look far enough ahead to take advantage of the feedback. Looking ahead does not mean staring ahead. Your eyes must be constantly moving forward and back and sometimes left and right. And don't ignore the area in between the marked maneuvers. Driving it correctly is usually not a straight line. Try connecting the elements with smooth arcs.

You can't change anything about your performance in the element that you are in. Focusing on the gate you are passing through does not help your driving in any way. Also, if you're looking at that outside cone that you're afraid you'll hit, well, you'll hit it. If you're looking ten feet in front of the bumper, the turns will keep surprising you. So focusing on your bumper won't help your driving in the gates coming up. Your driving turns into a "point and shoot" event as you stumble through the course searching for the next gate and flooring the throttle when you find the gate.

Seeing the elements well in front of you allows you to connect them into a smooth run and minimize mistakes. Each of which costs fractions of a second if not more. It is possible to plan ahead even at speed. Looking ahead provides the correct timing as to when and where to brake and accelerate and where to place the car for optimum turn entry and exit. Too often we think of a course as series of discrete maneuvers. There is typically more to be gained or lost in the areas that are in between.

The lesson is “Heads up” and “Look Ahead”. This is by far the #1 piece of advice heard from every teacher of the sport. Because it is heard so often, it is the easiest piece of advice to forget, or take for granted. Without a doubt, how well you drive depends on what you see ahead of you.

Position the car correctly

Positioning the car perfectly is more important than trying to attain the highest potential speed. For example, you will drop more time by correctly positioning the car nearer to slalom cones than you will by adding 1 or 2 MPH in speed. The same is true with sweepers. Position the car close to the inside cones as you drive through.

With 90-degree turns use all of the track. Position the car so that the turning radius is as large as possible with the apex close to the inside cone. To go faster, the arc you are running must be bigger. A bigger arc requires less steering.

Position is a prerequisite for speed. Placing the car in the correct location will enable you to go faster. The wrong place will be awkward and uncomfortable.

Know when to shift

As usual, the starting gear is first gear and at the appropriate time a shift is made to second. Generally speaking, in most autocrosses, the transmission remains in second gear throughout the course.

So, when do you shift? Typically, power will increase as the engine RPMs increase, but only up to the point where power begins to taper off. That is the ideal time to shift. This point is typically near the redline. Most drag racers use a tachometer to judge shift points. In autocross, you don't have the time to look at the tachometer. You'll learn to hear the motor as you drive and recognize the sound of an approaching redline RPM. Shift near the redline.

The next question is where do you shift. I try to avoid shifting before the first turn. But whether you shift before or after the turn, though, depends on your car and the layout of the course. With a straight section after the first turn, you can take advantage of first gear acceleration by delaying the shift to after the first turn. However, playing with the

gears always takes time and it's usually best to get the shift done as soon as practical and focus on the rest of the course.

Steering, Throttle, and Braking

Excluding the clutch and transmission which are used primarily at the start, the steering wheel, throttle, and brake are the 3 driving control inputs to the car. On a recent 40 second autocross, I counted at least 15 steering inputs, 5 or 6 full throttle inputs with 6 or 7 modulated throttle inputs, and 5 brake inputs including taps and hard braking. The total is about 35 inputs in 40 seconds or nearly 1 input per second at an average speed of about 35 to 40 mph. Focus and preparation is required to execute these maneuvers efficiently and in a timely manner.

Inputs need to be smooth. Appropriate phrases are: "squeeze the brakes" and "ease in the throttle". Your car will respond better by squeezing the brakes hard instead of jamming on them. Roll on the throttle rapidly instead of stomping on the gas. Turn the wheel quickly instead of cranking it around. The driving difference is subtle. But improvements will show up. For example, your car will be in control instead of scrubbing off speed pushing around a corner. It will take a lot of practice for these habits to become second nature

Inputs affect tire traction and balance. If you step on the brake or lift, the weight of the car goes forward and the forward tires' contact patch to the ground gets bigger, giving more traction to turn. If you step on the accelerator the weight moves towards the rear and the contact patches of the rear tires get bigger meaning you have more grip for acceleration on rear wheel drive car but less on a front wheel drive..

Steering

Hands on the wheel

We have our own habits in regard to handling the steering wheel. But keep both hands on the wheel not one on the gear lever in preparation for a shift that will never happen. Don't grab the wheel from the inside. It just takes too much time. Don't move your hands too much. In fact don't move the wheel more than necessary because every input requires traction that could be spent on braking or accelerating.

Unwind and Squeeze

When exiting a turn, unwind the wheel as you add power. If the car is using all of the tire's tractive capacity to corner, there is none left for additional acceleration. As you unwind the wheel, some tire grip becomes available. So use it by adding throttle. Straighten the front wheels quickly to get on the power as soon as possible. A hesitation

to add power at this point in the turn will cost time. Add power before unwinding and the tire will start to slide and the car will push out and under steer also costing time.

Throttle

The throttle is not an on-off switch. Be smooth in its use. Use full throttle in a straight line with the proviso that your wheels don't break loose and spin. All wheel spins cost time.

Use your right foot to modulate car position in constant radius turns, not the steering wheel. In a steady state turn, once you have established the correct steering input to maintain that arc, lifting the throttle slightly will let the car tuck in closer to the inside cones. Conversely, slightly increasing the throttle will push the car out a bit farther to avoid inside cones. See the section on car control.

Braking

Until you become comfortable with your car control skills, brake in a straight line. However, waiting until the last possible second approaching a turn and then dropping anchor at precisely the correct place is quite difficult to execute consistently. Instead, lift early then brake. This is less upsetting to the car, is easier to do, produces a more consistent turn-in speed and allows for more precise placement entering the turn. Also, remember as you get faster the brake zone has to be moved back.

And by braking less you can either add or subtract braking effort as you close in on the turn-in point. This will make you consistent and smooth. But brake hard for corners. Don't be timid. Late model cars have ABS and you won't lock them up.

Once you are in the turn, it is easier to add speed than to get rid of it. If you are under the limit, a slight push on the throttle gets you more speed with no additional side effects. However, if you are too fast and the front tires have begun to slip and push out, you can only reduce throttle and wait until the tire grip returns to resume driving.

The question of left foot or right foot braking comes up in many conversations. The trouble with left foot braking is when you get nervous you will drag your brake with your left foot. Furthermore, if you don't have good control modulating the brake with your left you begin to have problems modulating the gas pedal with your right foot and it becomes an on off switch just like the brake.

One of the goals of left foot braking is to put weight on the front of the car but it also slows the car whereas a lift does almost the same thing without slowing the car down.

If you have a turbo, left foot braking may help to keep the RPM's up to avoid the lag.

Turns

Late Apex Turns

The most important turns are the ones preceding the longest straights. The object in these turns is to exit at the highest speed possible so that the straight takes the least amount of time. A late apex turn meets this goal. The apex is the point where the car touches the inside of the turn. A late apex occurs after the geometric center. Normally about $\frac{2}{3}$'s of the way around. The apex is also the point where you stop entering the turn and start coming out of the turn.

In this type of turn, brake early, get on the throttle as early as possible, make a late apex, and accelerate onto the straight as fast as possible. The transition from brake to throttle is a critical point. Throttle too early and you will have to lift to prevent hitting the exit cone. Throttle too late and you won't gain maximum speed as you enter the straight. At the apex you should be at close to full throttle. Apexing too early will also cause a lift. Get it right and you are rewarded with a significant improvement in your time.

Early Apex turns

An early apex occurs before the geometric center of the turn. This type of turn is used at the end of a straight to maximize the time spent at high speed as you finish a long straight. To take advantage of the speed, brake late and go as deep as possible into the turn without sliding tires and pushing into the cones. It is possible to continue braking as you steer into the turn but pressure on the brake pedal has to be decreased to provide traction for steering. As steering input is increased there is a corresponding decrease in braking pressure. The technique is called "trail braking".

It would not be appropriate to use this type of turn if there is another long straight following because the exit speed is not optimum.

Slaloms

A slalom is a series of cones set up in a straight line. The simplest setup is one in which the gap between two cones is the same distance, normally a minimum of 45 feet. The car must weave back and forth between the cones to go through the slalom. Imagine a straight line connecting each pair of cones. To be quick, the car must cut across this line, at an angle, as close as possible to the back side of the first of the pair. Then immediately, rotate the car to initiate an arc to the back side of the next cone. Establish and maintain a constant speed through the

slalom. Getting close to the cones is critical for quick times. To get close means bigger arcs. Bigger arcs bring higher speeds. But bigger arcs require earlier turning. At 30 mph it takes 1 second to travel between cones. How much of that second is spent rotating the car? As little as possible. The saying goes "Attack the back!" (meaning the back of the cone).

If you hit the brakes in a slalom you will never get the speed back. Go in a little slower and then find your maximum speed.

Some elements of car control

Under Steer during braking

There is a limit to how much grip a tire can provide. For the front wheels, in both rear and front wheel drive cars, traction is required during steering and traction is required during braking. If the tire is at the limit of its traction during braking, the tire will not respond to a steering input. This condition is called "under steer" or a "push". And the car slides to the outside of the turn. No amount of steering input will turn the car. If you want the car to turn. Lift off the brake thereby providing more traction for the steering input. This condition often arises during corner entries at a speed which is too high for the turn. Braking to reduce the speed often results in a push with a significant loss of time.

Under Steer during acceleration

Entering a turn at a slower than optimum speed can be corrected with additional throttle. But an over correction, i.e., too much throttle, will cause the front wheels to reach their traction limit causing them to slide to the outside. This "push" condition is quickly corrected by relaxing the throttle. The tires recover traction and will respond to the steering input. Gently adding and reducing throttle will provide steering capability without input from the steering wheel. This behavior is known as "throttle steering". When done correctly, it will maintain the car at optimum speed during long sweeping turns.

Oversteer during braking

Straight line braking is a conservative strategy that works. But for exiting a long straight, the best strategy is to maintain the car at high speed as long as possible thereby gaining time. Fast drivers brake late and enter the turn while braking. To provide traction for the turn, brake pedal pressure is reduced as the car enters the turn. The condition is known as "trail braking", i.e., the foot trails off the brake as the turn is entered. In the extreme, too much braking will move the weight of the car forward, the rear wheels will begin to lose traction and begin to move to the outside of the turn pointing the nose toward the inside of the turn or "oversteering". NASCAR drivers call this car condition

“loose”. The loss of control will eat up time as badly as a push and may result in a total rotation or a spin.

Throttle oversteer

In many high horsepower cars, it is very easy to overpower the rear wheel drive tires causing them to break loose. If you are inside a turn, the car begins to rotate and oversteer. The throttle in these cars has to be modulated to maintain control. Otherwise, the car begins to be hard to control with lots of spins. It is tempting to use the throttle to turn the car. But if the car is too loose, you won't catch it all the time so the risk reward ratio is not good. You won't be able to focus out in front of the car like you should be if you're trying to catch the car all the time. And besides, it wastes a lot of time. Don't use the throttle to turn.

Spin Control

The cure for a spin is CPR, in other words, Correct, Pause, and Recover. As the rear wheels begin to oversteer the car, Correct by counter steering to bring the car back to its correct heading. Pause for a very brief moment as the suspension begins to load up. Recover, or straighten, just before the suspension kicks you back. If the recovery is too late, the car will “fish tail” causing you to spin in the other direction.

At some point in the spin it becomes impossible to recover. At that point the adage is “if in a spin, both feet in” and stop the car.

Wrapping up

This overview is meant as an introduction to the art of autocrossing. Hopefully it will spark your interest in exploring a little further. Hop a ride with a more experienced driver to discover his driving envelop. The ride will expand your reach for faster times, a better line, a smoother run and a SAFER experience.