

Driver Education



Handbook



Porsche Club of America
Upper Canada Region
Driver Education Programme

Driver Education Programme

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Welcome to Upper Canada Region's Driver Education Programme.

We hope you will find this handbook informative. If you should have any questions regarding any part of this programme please contact any of the driver education officials listed at the back of the book.

Why “Driver Ed”?

The purpose for Driver Education is to make each of us a skilled and safe driver and to provide us with the opportunity to learn about our Porsches and to experience "driving in its purest form".

Driver Education is a driving programme sponsored by Porsche Club of America Regions to enable members to develop their driving skills. The program provides a safe and controlled environment to learn and develop advanced driving skills.

First and foremost, Driver Education will make you a safer driver by teaching driving skills and techniques, which enhance accident avoidance capabilities through improved situational awareness and car control.

Second, Driver Education provides an excellent opportunity to learn about your car and enjoy its performance potential.

Lastly, Driver Education will allow you to socialize and have fun with other individuals of diverse backgrounds who share a common interest and passion - Porsches.

Driver Education events are non-competitive events. Driver Education is not a racing venue. This means there is no timing and scoring and no one charges admission to watch. Driver Education events are closely regulated and impose strict non-racing rules on the participants to ensure the safety of the cars and drivers.

The universal philosophy of Driver Education is to be safe, learn and have fun.

Objectives

- Establish and maintain proper seating, steering wheel control and use of mirrors.

- Use vision to establish and maintain situational awareness.

- Use proper braking, shifting, accelerating and cornering techniques.

- Understand basic vehicle dynamics and car control.

HAVE FUN!!!

How Does The Programme Work?

All novice UCR drivers must attend our preliminary "Introductory Driving School". These schools are held several times throughout the year. The school teaches you basic driving theory and gives you some practical experience developing car control through a series of demonstrations and exercises. The schools are valuable for everyone, whether or not you ever participate in a Driver Education event.

Each new participant begins in the novice run group. Novice (for our purposes) drivers have an experienced instructor in their car and drive at moderate speeds. Students are encouraged to drive at speeds at which they are comfortable. The goal is to teach better car control. Students are discouraged from traveling at speeds, which could place them or their cars in jeopardy.

As your skill level develops you will progress from the novice group to more experienced run groups. You will be "*signed off*" as you progress. Being "*signed off*" means that your instructor feels confident that you can drive "*solo*", without an instructor in the car.

Be patient. There is no need to rush driving "*solo*". In fact all drivers from "signed off" to instructor will be "checked out" periodically. It is one way for us to help you become a better and safer driver and it allows us to measure your progress and the success of our programme.

Out of Region drivers will be assessed based on experience and will have a "check out" instructor if they have not driven Mosport previously.

It is important to note that UCR Driver Education is not racing, nor any form of competition. There are plenty of other venues if you wish to drive competitively. Our program is not one of them. No timing devices are permitted.

What To Do One Month Or More Before

Register

Anyone over the age of 18 with a valid driver's license and driving a Porsche is eligible. Two drivers may register in the same car but in different run groups.

To register, simply fill out our Registration Form on-line. This can be obtained from the UCR website (www.pcaucr.org). If you are from out of Region, please include the level of experience you have had at various tracks and specifically at Mosport.

Registration opens 8 weeks prior to each event for instructed run groups, White, Black and Red drivers may register as of February for the entire season.

Please note that no registrations will be accepted one week prior to an event. However, a full refund will be given should you have to cancel up to two weeks before the event.

After your registration is received, you will be sent a confirmation, with your car number.

What To Do 1 To 4 Weeks Before

Safety Inspection

Go to our web site, www.pcaucr.org and download a copy of the tech inspection form. You will be required to have your car inspected at an approved Tech Center. This tech inspection must be done less than two weeks before a driver education event. The form must be stamped and signed by the inspector and the driver and brought to the event. You will not be allowed to participate if this form is not completed and signed.

This is a good time to go through your car and remove any articles which will not be required while driving and to secure or remove items like telephones, radar detectors etc. Also make sure your battery, spare tire and jack are secured.

Helmets Are Mandatory

You are responsible for providing your own approved helmet. Check that your helmet is within specs. You will find the updated helmet specifications on our web site.

The Day Before

There are a number of things you must do to be physically and psychologically ready to participate. First and foremost is to be well rested. Try and get a good night's sleep and minimize the partying the night prior to your event. If you are taking any medication, be sure and discuss whether this medication will effect your driving. If so, you cannot be an active participant in the event.

Be sure and dress comfortably and appropriately for the weather conditions and driving requirements. You will spend a great deal of time outside and subject to the sun, wind and rain. It is very easy to get windburn, sunburn and even chills on cold rainy days. Dehydration will be an issue regardless of weather, so be sure to bring plenty of liquids.

Porsche Club events have specific requirements for acceptable driver dress and equipment. Synthetic materials like nylon for clothes and shoes are not permitted. Long sleeve shirts of natural fibers are required. Long legged pants can be of any natural material. Thin soled laced shoes, which permit pedal feel, are recommended. Boots, sandals and loose fitting shoes are not permitted.

Drivers Check List

- Directions to track
- Completed technical form
- Driver's license
- PCA membership card
- Driver Log Book (this is issued to you at your first event)
- Folding chair
- Helmet, hat
- Watch
- Car numbers (minimum 6" high)
- Fire Extinguisher installed as per UCR requirements
- Sunscreen, insect repellent, chap stick
- Umbrella, rain coat or slicker (not red or yellow)
- Long sleeve cotton shirt, long pants
- Extra clothes (T-shirt, shorts, sweatshirt, jacket)
- Cooler with ice and drinks (lots of bottled water)
- Lunch, snacks
- Tarp

It is always a good idea to prepare early and give yourself time to think about what you are taking and how and when to get there. Review directions and times the day prior to the event.

When You Arrive At The Track

Arrive by 7:00 am. You and any other persons in your car must read and sign the waiver forms before being allowed to proceed. You will need to show a valid drivers license and PCA membership card Log Book and Tech Form. You will be issued a wristband, which is to be worn at all times during the event to indicate that you have signed the waiver. Once this is done, proceed to the parking area and prepare the car for tech inspection.

Remove all loose objects from the compartments of the car (this includes loose floor mats, radar detectors and car handsets).

It is not necessary to remove the spare tire.

Glove box must either be empty or locked.

Removing hubcaps if applicable.

Check wheel nut torque and tire pressures.

Apply numbers, both sides of car on windows or doors at least 6" in height.

Place your helmet in the car.

Proceed to tech line @ 7:30

Stay with your car.

Your car will be inspected for loose items, brake fluid, lug nut tightness, brake lights, tight gas cap, fire extinguisher and its mounting bracket. Your helmet will be examined for its appropriate dating.

NOTE: If your car failed the previous tech inspection, it will be reinspected for that item plus those listed above.

At the end of the tech line you will receive an inspection sticker.

Your car will be subjected to a tech inspection each day of the event to ensure it complies with PCA regulations. Remember, it is the responsibility of the driver to have a safe car. Also, please keep in mind that the tech line assures that your car has been inspected by an approved shop, collects your tech inspection form and checks for loose articles but does not perform a full tech inspection.

After the Tech Inspection, you should have a few minutes to get a drink and snack, relax a couple of minutes and meet other participants prior to the drivers' meeting.

Proceed to driver's meeting at base of the tower. The schedule will tell you when it starts.

Drivers' Meeting

A mandatory drivers' meeting will be held prior to the first run at which announcements will be made regarding that day's event, including track condition and any announcements about the schedule that may be necessary. Drivers' meeting attendance is mandatory.

After the drivers meeting your instructor will be looking for you. Generally the instructor will find your car in the staging area before your first session.

Try to be patient with your instructor. They are also attempting to drive, take care of their car and, at times, teach multiple students.

"Hot Track"

This is an explanation of the "Hot Track" process we employ for Driver Education events .

To ensure that we all have plenty of track time we change run groups while the track is "Hot" or in use by the preceding group. The cars will grid, one behind the other, in the left-hand lane of the Pits leaving the centre lane open for cars entering the Pit Lane off Track. The right-hand Pit Lane will be reserved for "*Instructors Cars Only*". At the end of the current run group we will monitor the last car on track, when that car clears corner three, we will release the new run group on to the Yellow Flag "Hot Track".

The lead car will act as a pace car and lap at reduced speed as not to catch the group ahead on their cool down lap. When the lead car completes it's initial lap the track will go Green.

Work Assignments

Operating a driving event takes a lot of co-ordination, planning and manpower to ensure we operate safely and fairly for all of our participants. It is our event, and as members we all share responsibility to contribute to our events success. To this end all participants are required to perform duties during the weekend. Some work full time in the tower, at tech and instructing, the rest of us contribute by attending work assignments during the weekend.

You will be given a schedule for the day and we remind you to be on time for your work assignments. This is essential to running an event on time. Work assignments consist of working in the tower, security, staging or pit out areas to help the event run smoothly. No experience is necessary. You will be teamed with a seasoned veteran. On occasion we may have to do some flagging. Generally speaking, this is not the case as we employ professional flaggers at Mosport. Please note that if you don't attend your work assignment you will lose your run group privileges.

A brief description of the three worker assignments can be found on the next page.

Work Assignment Description and Location

Security

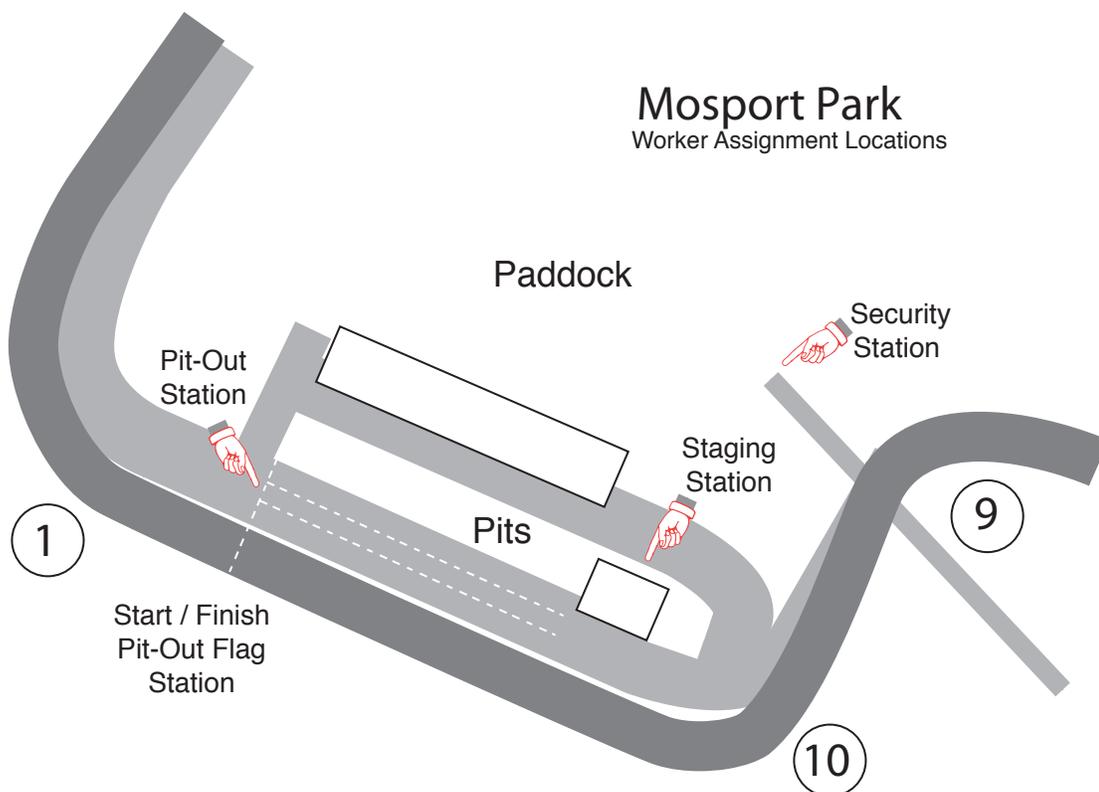
Located at the gate to the paddock area just below the tower, this station is responsible for ensuring that people entering the facility are registered for the event or invited guests.

Staging

Located at the base of the tower, this station is responsible for ensuring that all of the cars meet our safety standards, and are released to pit-out in an orderly manner.

Pit-Out

Located at the end of the pits, this station is responsible for the safe release of cars to the track.



You And Your Instructor

The instructor's job is to help you learn how to drive safely and at the same time have fun and explore your limits and the limits of your automobile in an educational and controlled environment. PCA instructors are very experienced but nevertheless they need to know about you and your car if you are going to get the most out of the PCA driving experience.

Be sure and communicate to your instructor your driving background and experience. Also, tell him your driving objectives and concerns. What do you specifically want to accomplish, such as learn to brake better. Your instructor also needs to know the condition of your car and any modifications, such as tires, brakes etc. you have made.

If this is your first event, or you are a novice or beginner at a new track, You may consider requesting your instructor to drive your car a minimum of two laps while you observe from the right seat. This allows you to concentrate on the proper line around the track as well as identify flag stations. This also allows the instructor to better understand the handling characteristics of your car. These instructor laps will be driven conservatively by your instructor as a teaching aid so as not to either damage your car or scare you.

The success of your PCA driving experience is directly related to the enjoyment and quality of the instruction received. Unfortunately, not all students and instructors have good communications and compatibility. If you and your instructor are struggling for multiple sessions to communicate and get along, talk to the Chief Instructor and request a different instructor. Prior to this, however, you should give it your best to listen and be responsive to instruction.

It is critically important that as a student you have a good attitude. Leave your ego at home. Proficiency in high performance driving is only accomplished by acquiring knowledge, developing skills, practicing to proficiency and applying good judgment in challenging situations. All of this takes time and that equates to many hours of seat time. In most cases this is a three to five year process.

When you are on the track your instructor will evaluate your driving by a number of factors. These include smoothness, accuracy and consistency driving the line, car control, shifting, turning, accelerating, braking, aggressiveness, awareness, judgment and speed around the track. Your instructor will be happy to discuss his evaluation and recommendations for improvement. You will be evaluated in comparison to the expectations of those in your run group.

You will be able to run solo when and if the instructor(s) believes you can drive under control and you demonstrate situational awareness and reasonable judgment. You will be promoted when and if your instructor and the Chief Instructor believe your skill, proficiency and judgment have matured to the next performance level.

On the Track

Entering the track for the first time as a driver with an instructor in the right seat is no doubt a new and exciting experience.

You as a driver are ultimately in control of your vehicle. Unless your car has dual steering, accelerator and braking controls the instructor must influence car control through the driver by a combination of concurrent hand gestures and voice instructions. Generally, these hand and voice signals will be demonstrative and abbreviated. Your instructor will use terms such as “gas, brake, turn-in and unwind”. Please review the use of terminology and hand signals with your instructor prior to entering the track for the first time.

High performance driving is both a physically and mentally demanding activity. A typical pattern for a novice driver is that driving skills improve with every run session and then seemingly deteriorate near the end of the day. In most cases this is simply a result of fatigue. A good overnight rest and performance improves. If at any time you feel tired or lose concentration, come in if you are on the track or even sit out a run session.

In a high performance driving environment you must be particularly attentive to changes in the way your car feels or sounds while you are on the track. If you notice any change from normal in your car’s behavior, safely reduce your speed, advise your instructor, and be prepared to drive off the track and stop or go immediately into the pit area.

Instructors are not permitted to give rides to students in the experienced run groups. Instructors may however take students in instructor cars in other run groups for the purpose of demonstrating selected driving techniques at speeds compatible with those of that particular run group. As a student you should be aware that the circumstances of riding with instructors are closely controlled by the Chief Instructor.

Procedures for coming out of the pits and onto the track, passing and being passed, flag meaning and flag station locations, driving the line and a myriad of other topics enabling you to knowledgeably and confidently drive on the track with others will be introduced and discussed in classroom sessions and drivers’ meetings. It is to everyone’s advantage that you study the flags and passing procedures prior to coming to the event and review them with your instructor to ensure you have them right. The flags are our traffic signals on the track and we all need to be aware of them, proper passing etiquette ensures all of our members have an enjoyable session.

At the end of your session you will see the chequered flag displayed near the end of the front straight. This is the time to slowly allow you and your car to cool down. Do this by gradually reducing your engine RPM and braking progressively earlier and lighter as you make your final lap. This will allow your car to begin to cool down gradually. “*Drive The Line*” and avoid slowing too quickly, your goal here is to reduce the use of your brakes and engine while letting the air flow begin to cool them down. Enjoy your last lap, just drive the car easier and don’t forget to signal before coming into the pits.

Flags And Their Meaning

Flags are used to communicate to the drivers. Flags may be used to warn drivers of changing conditions, a problem ahead, a faster car behind or the end of a session. It is imperative that all drivers commit the meanings of all flags to memory. A simple rule of thumb is that a waved flag indicates a more serious problem than a stationary one. Two waved flags indicate an increased level of seriousness.



GREEN FLAG

The track is open and clear for use. This flag will be displayed for one lap after the caution flag has been shown.



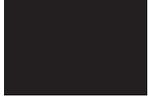
YELLOW FLAG

The caution flag will be displayed when there is a problem on track. No passing is allowed when the yellow is displayed. If the flag is waved it indicates that the problem is immediately ahead. Slow down! The first lap of each run group will be under Yellow.



RED FLAG

This flag means a serious situation is ahead. When red is displayed you must come to a complete controlled stop at the side of the track, then proceed at a "walking" speed to the nearest flagging station, being careful all vehicles ahead and behind you. The session has been suspended you will be advised by the flagger when you may proceed.



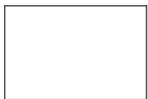
BLACK FLAG

This flag means there is a problem with your driving and/or car. Slow down and come into the pits and stop at the base of the tower. If you are not sure if the black flag is meant for you, it is prudent to come in and check with the pits. If a black flag is shown at all corners slow down and come into the pits.



BLUE FLAG

This flag means that you are being approached by faster drivers. Check your mirrors and prepare to signal them past. (See passing procedures.)



WHITE FLAG

This flag indicates that there is a slow moving vehicle on the track. Please be on the lookout for it. If the flag is waved this vehicle is immediately ahead, slow down.



YELLOW FLAG with RED STRIPES

Referred to as the "debris Flag", this flag indicates debris or fluid on the track or slippery conditions. Flag will be waved at the location of the problem. Caution recommended.



CHECKERED FLAG

This flag means the driving session is over. Slow down and allow your car to cool down. Exit track at the end of the lap. You will be advised where this flag will be displayed at the drivers' meeting. No passing after the checkered flag.

Event Regulations

Safety is first and foremost. Both you and your car must comply with the following regulations. Failure to do so will result in your disqualification from the event.

1. This is not a competitive event. Racing will not be tolerated.
2. Know and obey all flags.
3. Passing is permitted only in designated zones and only after the passing signal is received. One signal per car passing. The car being passed must slow to allow the passing car by. REMEMBER, IF YOU DON'T GET A SIGNAL, YOU DON'T PASS. (See passing procedures).
4. Pass must be completed safely and in time. No late passing please.
5. Slower drivers must let faster drivers by at the next passing zone.
6. If you spin or have two or more wheels off the track you must report immediately to the Attitude Adjuster to have you and your car checked and to discuss your driving error.
7. No passengers, other than instructors with students, in student's cars.
8. This is not a timed event. Therefore in car timing devices (i.e. keeping track of lap times) are not permissible.
9. No alcoholic beverages of any kind may be consumed by ANY person until the track is closed down for the day. The use of drugs is strictly prohibited. Prescription drugs that may cause drowsiness must not be taken. You are responsible for determining whether you are fit and healthy enough to participate in the rigors of a track event.
10. No smoking in the pits.
11. When driving, the driver's side window must be all the way down; the passenger side window must be all the way down or all the way up. Sunroofs must be closed.
12. All participants and guests must read, comprehend and sign the Release and Waiver of Liability and Indemnity Agreement.
13. Cars must have equal seat belt restraints for both driver and passenger.
14. Cabriolets require a roll bar. In a Boxster, your helmet must be below the roll bar – same goes for the instructor's helmet.

Penalties

Safety is our number one concern. The regulations reflect this concern. The event officials reserve the right to disqualify any participant who fails to abide by these regulations.

UCR also follows the "two spin rule" which means that any driver will automatically be disqualified from further participation in the event if he or she spins twice or has two or more wheels off the track twice during the event. In addition, if you are observed to be driving in an irresponsible manner you will be disqualified from the event.

Passing Procedures

Upper Canada Region allows passing at certain specific "passing zones". These will be explained at the drivers' meeting the morning of the event. Passing may only occur when the overtaken vehicle clearly signals the following car to pass.

The driver of the car being passed indicates which side to pass by putting his/her arm straight out the window to pass on the left or up and over to the right if the car should pass on the right side. These must be clear signals in all cases. After signaling a pass, you should slow down to allow the passing car a safety margin. Please be courteous and let the faster cars pass safely. One signal must be given for each car passing.

Safety Note

In the event that your car is disabled, pull off the track as close to a flagging station as possible and climb over the Armco barrier. Do not attempt to make repairs.

In the event that another vehicle is stopped, do not stop to offer assistance yourself. The track officials will deal with the situation.

Run Group Schedule

This season we will run five run groups in four sessions per day, the session order will be as follows;

White	20 Minutes
Green	20 Minutes
Black	20 Minutes
Yellow	20 Minutes
Red	25 Minutes
Session Total	1 Hr. 45 Minutes

This revised session order has been devised to allow Instructors more time with Green and Yellow students prior to taking to the track. Green and Yellow students should report to staging fifteen minutes prior to run time. This will give you valuable time with your Instructor prior to driving on track.

Advanced Driving



Techniques

Driver Education Philosophy

Everyone is at the track to have fun. You should not be trying to prove anything to the other drivers or yourself. Successful track driving is 85% technique and 15% talent. If you have average driving ability, listen to what your instructor has to say and follow his or her directions; and if you practice, ultimately you will become a very good driver, on the track and a safer driver on the street. On behalf of all of the UCR “trackies” welcome to our programme, we hope you have as much fun as we do.

Lesson 1 - Before Entering Your Porsche

Be Prepared to Drive!

Clothing is important. Be comfortable. Do not wear clothes that restrict movement. In cold weather, remove bulky coats and drive with lighter wear. Use your car’s heating system if necessary.

Footwear is very important. Ideal wear are light, comfortable, snug-fitting shoes with thin, flat soles (for pedal feel): for example, running shoes. By all means avoid heavy boots and overshoes.

As far as your Porsche is concerned, even the best kept car can become hazardous with one simple oversight: for example, incorrect tire pressures. Make regular tire pressure inspections. Include also frequent checks for nails etc. picked up by the tires. For the purpose of this school, a good starting point, subject to modification, is about 36lb. front and rear (cold) or manufacturers recommendation.

Do not store articles loosely in your car. They may shift or fall and distract you, possibly even hinder you. For the school, you will be required to remove all loose articles from the car.

For the purposes of the school, helmets are mandatory.

Proper Set-Up of Mirrors

Adjust your passing mirrors so that the side of the car just disappears from the inside edge of the mirror. You should be able to see the side of the car if you lean a bit towards that passing mirror, but the side of the car should not be in view when you are in your regular sitting position. Adjust the rear-view mirror so that it is slightly to the right.

Lesson 2 - Vision, Balance, Awareness.

Well over 90% of all driving decisions are made based on visual inputs. Your eyes should be constantly searching for additional inputs increasing total awareness of your driving situation.

Never drive with any sort of vision impairment! If you require eyeglasses or contacts, wear them.

Never drive if overtired, either from lack of sleep or from too long a drive. You become visually and mentally impaired.

Do not drink and drive! One cannot stress this enough. Remember, also, that the effects of alcoholic consumption can last up to 24 hours.

While driving, do not concentrate on any one object in front of you, such as a car you may be following. Look down the road, and be prepared to act upon anything entering your “over-all” vision. Sight should always be on the horizon level, not looking at the road or skyward. Remember that the steering path of the car tends to follow the visual path. This establishes a reference point for “balance”. Avoid head lean in cornering.

Mirrors are very useful tools, but only when adjusted properly. After ensuring the side mirrors convey the optimum information i.e. with your Porsche body work just barely visible as a reference point, adjust your rearview mirror to view somewhat off center to the right. This way you may see in a direct line behind you and also cut down on the “blind spot” to your right-rear corner.

Be aware of everything and everyone around you, especially in high traffic situations. Keep constant tabs on what’s happening in front and beside you, also taking a brief but regular look in the rearview mirrors to observe conditions behind you. “Experience and awareness” can help you avoid possibly dangerous situations by means of “anticipation”, or a most correct rapid reaction if required.

Last, but not least, a superior driver is one who practices patience and courtesy on the roads, and in this instance on the track. Save your Porsche Performance for more appropriate times than side streets, busy roads, and slippery conditions.

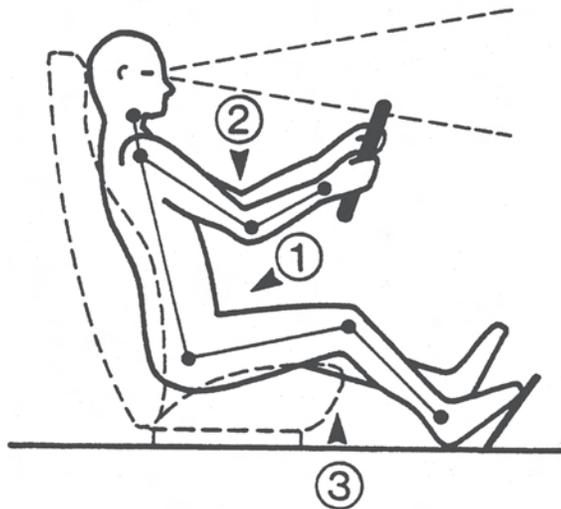
Lesson 3 - Seating Position

Correct seating is very important; you must become “one” with the car. Excellent Porsche seats facilitate this. You must learn to interpret “feedback” from the car, vibrations transmitted by the steering wheel, brake pedal, throttle, through the seat, as well as sights and sounds. Good sensitivity is only possible through proper seating.

Do not sit too close! This restricts arm movement and does not allow proper steering wheel hand positioning. If the legs and knees are restricted it will interfere with the steering.

Do not sit too far back! You cannot have the leverage required to turn the wheel easily. You will not be able to brace your body with your left foot.

Proper Seating Procedure



1. Do not sit on the seat. *Sit In It*. Push the small of your back into the seat.
2. Adjust the seat so that the hands reach the most distant point on the wheel without leaning forward. Your elbows should be slightly bent. Check the reach to your shift lever the same way.
3. Check your feet. You should be able to fully depress the pedals easily with no interference to the wheel. A good check is to depress the clutch fully with the right foot. You should use the “dead pedal” area with your left foot as a brace. Do not ride the clutch! Adjust the seat back and tilt until all the above are achievable. Keep the seat tilt to a minimum. You should sit as vertically as possible, but do not compromise the relative position of the arms. Wear seat belts at all times!

Steering Position of Hands

Use both hands! The hands should be placed at 3 and 9 o'clock positions. (See Fig. 2). Place your thumbs near the spoke if the wheel allows it;

Correct hand position also aids in location of the wheel position without looking, and gives you ultimate control for all driving situations.

This allows you to use your thumbs to pull the steering wheel down to the left or right as opposed to pushing it.

Do not grip tightly! Curl your fingers around the wheel and feel it.

Do not hold the wheel with the palm; it is far less sensitive than the fingers. Make small steering corrections with the wrist, not the arms. Proper seating will aid in all of the above.



Turning the Wheel

Correct hand positioning will allow a full half turn of the steering wheel without moving the hands or crossing the arms. This will be adequate for most corners in a Porsche.

For a sharp turn, move the hands on the rim before the corner, to allow for the larger arc. You must avoid excess hand movement in a corner if steering input requires more lock, unless the corner is very sharp, i.e. hairpin. Pulling the steering wheel provides more accurate steering.

Turning Into a Corner

Be ready for the turn-in point.

Turn the wheel deliberately but smoothly.

Exiting requires a smooth return.

Do Not Release the Wheel! The car will become unstable.

Shifting

Shifting is a precise skill. Each shift must be accomplished in three steps.

1. Remove from existing gear.
2. Pause in neutral.
3. Engage next gear.

Be sure the clutch is all the way in.

Hold the shift lever gently. No speed shifting or smashing the shift lever into place. "Feel it into and out of the gear." *Practise!!* Until the shifts are smooth and effortless.

If the right hand is not shifting, it should be steering. Do not ride the shift lever.

Lesson 4 - Throttle Control

When the optimum speed has been set in a straight line, to negotiate any particular corner, speed is consistently maintained with throttle control. This is also known as balancing or feathering the throttle.

Good throttle control is achieved by using gentle throttle input as cornering speed is reduced by tire friction. If a corner is approached too quickly throttle control also allows the car's speed to be reduced slightly. If the throttle is jerked, the car will become unsettled and unmanageable.

Acceleration

When starting out from 0 KPH, gently engage the clutch and increase engine RPM. As soon as the car is rolling, engage the clutch fully before applying any serious power. This will greatly reduce the strain on drivetrain components. Porsches have enough power and torque to exclude the need for "slipping the clutch" to achieve quick acceleration.

Always accelerate smoothly. Do not stomp on the pedal! Squeeze it. Shift to the next gear before maximum RPM is reached. The reaction times of the car and yourself require this cushion so as to prevent over-revving the engine.

Red line shifts are not necessary for maximum acceleration as you are above the maximum torque point for the engine in the new gear.

Find out where the maximum torque point is in your particular engine from your manual or from a Porsche technical representative.

Traction Limit

This is the limit of acceleration, cornering, and braking. Maximum acceleration occurs when there is 15% to 20% wheel spin. There will be a faint squealing of tires, and a faint grey line on the road. Exceeding these limits results in a loud screeching and black stripes on the road. If this happens, back off until the traction is controllable again.

This can easily occur in the most powerful models, especially in the low gears.

Lesson 5 - Braking

Braking

The brakes are the most powerful part of the Porsche. Most people use only 20% to 40% of the brake capacity, and often improperly.

Traction limit - maximum braking occurs with 15% to 20% wheel slippage (14% optimum). The wheels are turning slightly slower than they should be for a given speed. Do not pump the brakes. *Do not lock any wheels* - loss of braking efficiency; traction, steering, and *control* will result. If lockup occurs, release pressure and reapply. Again, as in acceleration, only a faint squeal should be heard. Braking at the traction limit is called “*Threshold Braking*”, and will be practiced at one of the Driving Exercises. Do not jab the brakes hard or “jump” on them. Squeeze them on smoothly but firmly - listen and feel for reaction. Sudden hard braking transfers too much weight to the front putting almost all the effort on the front brakes. The car will then be out of *balance*.

Develop a feel, for the brakes through various amounts of braking effort. Use the feel of the pedal, the G-force of deceleration, the sound of the brakes and tires. A sensitive brake touch is very important, especially in poor traction conditions.

Loss of Control

The best way to stop a car once all control is lost is to *lock up* all four wheels. This is done by declutching, and coming down very hard on the brake pedal until the car is absolutely stopped. The car will continue in a relatively straight line in its original direction of travel, even though it may possibly spin. Once stopped, presumably safely and hopefully without collision, carefully re-enter the traffic flow when it is safe to do so.

A.B.S. Equipped Cars

Certain models of Porsches are equipped with ABS (Anti-lock Brake System). This important safety system is designed to give maximum braking power without ever allowing tire lock-up. ABS also allows steering control under heavy braking conditions.

Under threshold braking conditions ABS operation can be felt by a gentle, rapid pulsing response through the brake pedal.

Lesson 6 - Traction

For a given tire on a given surface there is a finite amount of adhesion available. That adhesion can be utilized for directional control, braking or acceleration. If you use 100% adhesion in any one of the above functions there is none left for the other. e.g. a locked wheel will not steer.

The Tire Contact Patch

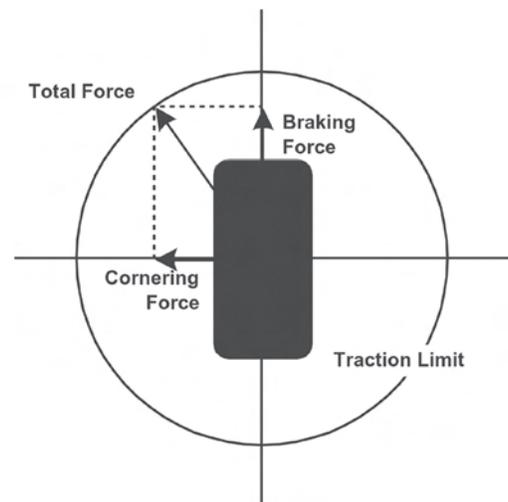
The most important aspect of a tire is contact patch. The traction of a tire on any given surface is basically determined by the size of the Tire Contact Patch and the weight and/or downward force placed on that tire. All interaction between the car and the road surface passes through the tire patch. Each contact patch is approximately the area of a hand print.

Traction Circle

The traction limit is the maximum traction that a tire has, and it is the same in all directions. ie: It requires the same force to pull a locked wheel forward, backwards, or sideways and can be explained using the Traction Circle.

Regardless of the direction of a given applied force, the total amount of travel will not exceed the radius of the traction circle. A combination of loads on a tire cannot use up more than the total available traction.

A force greater than the radius of the circle=slide. For example, a car cornering at the limit on a slippery road at a constant speed will slide out if the throttle is increased or the brakes are applied (additional force added). There are many changes to contend with when dealing with a wet or slippery road.



On average, the traction decrease on wet roads is as follows, expressed as a percentage:

Acceleration (straight line, level): about 30% less.

Braking (straight line, level): about 50% less.

Cornering (level): about 80% less.

Tire design and performance can change these figures significantly, but the proportions stay about the same.

Slip Angles

A rolling wheel and tire with no side forces acting on it will naturally roll in a straight line. An applied side force, such as the centrifugal force of cornering, will deflect the tire in the direction of the force. If the total does not exceed the traction limit, this is called *Slip*. If it does exceed the traction limit, a slide results (that definite oh-oh feeling!) More about slide later.

The tires on a car negotiating a corner will not exactly follow the path in which they are pointed, even at low speeds. The difference between the path a tire follows and the direction the tire is pointed is called the *Slip Angle*, and it applies to all wheels on the car.

Four factors govern the slip angle on a given tire, to summarize;

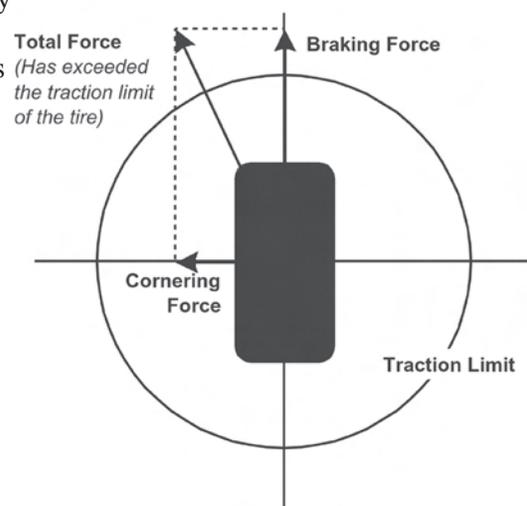
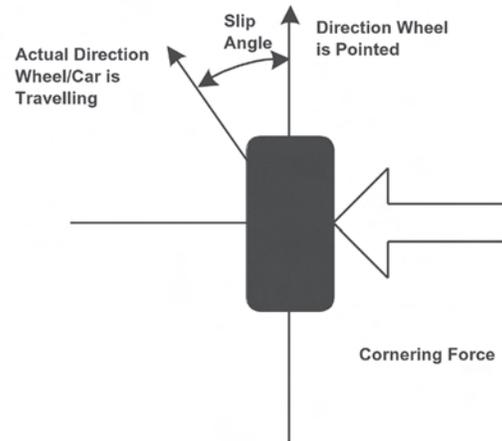
- 1) The side force acting on the wheel. (A tighter corner will increase the slip angle.)
- 2) Increased tire pressure will reduce the slip angle. Less will increase it.
- 3) Slip angle is reduced if weight on that wheel is increased, such as the front wheels during braking.
- 4) Any tilt, or positive *camber*, of the wheel during cornering increases the slip angle.

A car is deemed to have good road holding abilities if it has low or small slip angles.

Any increase or decrease of the slip angle will modify the path followed by that vehicle, especially differences between the front and rear wheels. The result is *oversteer* or *understeer* (more about that to follow).

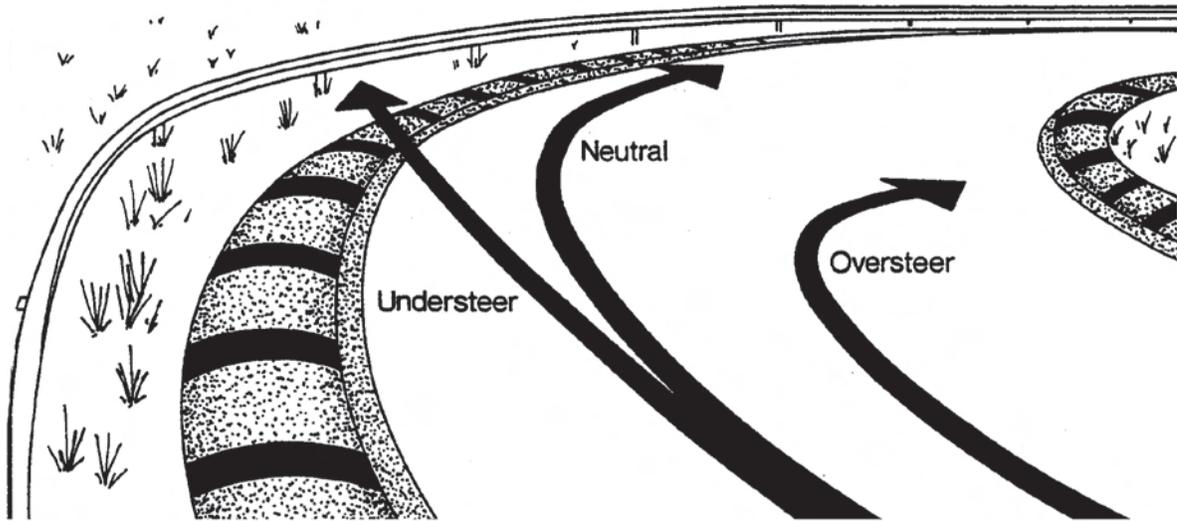
Maximum slip angle is reached when the cornering force approaches the tire's traction limit, a point at which you can hear a faint squeal from the tires.

When the traction limit is exceeded, slip turns into slide, and the tire scrubs the road sideways with a loud screech.



Oversteer and Understeer

When the slip angle of the front wheels is smaller than that of the rear, the car will tend to *Oversteer*, or turn into the corner more than usual. When the Slip Angle of the front wheels is larger than that of the rear, the car will tend to *Understeer*, or take a wider turn than usual. Equal slip angles front and rear will result in a theoretically neutral steering car.



Most cars will handle neutrally at a moderate speed upon cornering. Low speed corners tend to promote understeer, while oversteer prevails in high speed corners. Cars that understeer slightly tend to become neutral at higher speeds.

What does this all mean when you drive into a corner?

If your car begins to understeer, the front tires are losing traction and the car is not turning into the corner as much as it should. There are two things you can do:

1. Increase the amount of steering input.
2. Gently reduce throttle input until understeer diminishes (front tires will regain control).

If your car oversteers, the rear wheels are losing their traction. The rear of the car is beginning to slide out and is causing the front to turn into the corner excessively. If this continues, you will soon be facing the traffic that was following you. There is only one course to follow:

3. Turn the steering wheel in the direction the car should travel and thereby increase the radius of the turn, reducing the slippage at the rear wheels. This is further assisted by maintaining balanced throttle.

Weight Transfer

The springs of the car, being elastic and compressible, allow the cars weight to shift under certain conditions. This weight transfers forward during braking (front end dip or dive), rearward during acceleration, and sideways during cornering (body lean). Additional weight transferred to a tire this way increases its traction limit.

In an understeering condition easing the throttle lightly will cause a weight transfer to the front, increasing the traction limit of the front wheels to counteract the effect of understeer.

In an oversteering condition gentle acceleration transfers the weight to the rear, increasing the Traction Limit of the rear tires and thereby decreasing the effect of oversteer.

Remember that weight transfer not only increases the traction limit of certain tires, it decreases traction of the tires being unweighted! If weight transfer is not done "*smoothly*", you'll be in for an unpleasant battle for control.

Balance And Smoothness

Proper car balance is achieved and maintained only when a car is driven *smoothly*. No sudden jumping on the brakes, just a firm squeeze on the pedal. No jerky, sudden movements of the steering wheel. A turn into a corner should be a smooth, one motion turn to desired steering input. Some drivers may be observed moving the wheel back and forth while quickly entering a corner. This is called *sawing* and must be avoided as it can produce jerky movements in the car, destroying its *balance*.

A sensitive driver can make these slight steering corrections and using the throttle, still remain smooth. If you have erred in your approach to a corner, it is far better to go through a bit off line but as smoothly as possible, than to try and make a last second correction that might get you into a lot of trouble.

Skid Control - Some Basic Pointers

A skid can happen to anyone. It very often begins as a wrong braking application, or by simply driving a little beyond the limit in a corner. It almost always involves the rear end breaking loose and starting to slide around to the front.

A skid can be caught and corrected, if it is done gently, smoothly and carefully. Consider the following.

1. Keep a cool head. *Do Not Panic !*
2. Gently turn the steering wheel into the direction you want to go.
3. A mild skid can easily be corrected this way. After doing this, be alert for a counter-skid (fish tale) which occurs often. A skid in the other direction is controllable in the same way.
4. A more severe skid can be corrected by the power oversteer method previously described. This takes a sensitive touch on the throttle and practice.
5. If you have completely lost control, *Lock Up!* (as previously described).

Reaction Time

It is well known that drivers have different reaction times, the time it takes a driver to respond or react to a given situation. It may range anywhere from 1/4 to 1/2 a second. Cars also have a reaction time, depending on the type of input. Porsches excel in this facet of car design. It is up to you to take advantage of it.

In order to brake, corner or shift with smoothness and precision, it is necessary to learn and anticipate your car's reaction time. This means turning into a corner slightly earlier at higher speeds or shifting slightly earlier.

This ability to anticipate is very important to become a competent driver. High speeds can only be driven in safety if the driver has mastered the basics of driving with excellence and has adequate foresight and anticipation through lots of practice and experience.

Porsche has given you an excellent tool. It is up to you to learn how to properly use it.

Lesson 7 - Cornering

The Essence Of Advanced Driving

Now begin the actual steps in approaching, negotiating, and exiting a corner. For simplicity at this time, we will concentrate on cornering as it pertains to the school at the track.

Advanced Driving consists of Smoothness, Accuracy, and Excellence of Execution.

Explanation of Cornering

Each corner is divided into three components:

- A; The Turn In Point (where the turn is initiated from)
- B: The Apex (the mid-point of the turn - the closest to the inside edge of the track on the line of the turn that your car is taking - do not confuse this with the geometric apex of the corner)
- C: The Track-Out Point (the furthest point that the car should go to the outside of the track at the exit of the corner)

For high speed driving, typically a constant radius turn is not employed. Rather, the driver will flatten the line of the exit of the turn so that he or she can get on the throttle earlier. There is a sacrifice of speed from Turn-In to Apex to gain speed from Apex to Track-Out and all the way down the following straight.

Remember "Slow In Equals Fast Out"

The Approach To A Corner - Brake Points

Ideally, braking is done in a straight line before you reach the turn in point. At this point, turn in to the corner so that the car follows the ideal line under balanced throttle. This takes lots of practice. Begin by using a very conservative brake point, well before the turn-in point. Gradually move the brake point closer to the turn-in point, at a given approach speed, always staying in control and not locking any wheels. Feel free to use permanently fixed "reference points" on the side of the road: clumps of grass, signs, curb markings, etc., but remember not to stare at these marks! *Look Ahead!* Do not listen to others tell you about their brake points. Find what is comfortable for you and your car. Let your instructor guide you. Corner approaches are usually made very close to the outside edge of the track. Try to stay about a foot away from the edge. *"Be Smooth"!*

Remember: Braking should be finished before you turn in.

Down Shifting

To maintain balance, the car should be in the correct gear prior to entering the corner. Big sweeping corners, and even fast, tighter corners can usually be taken in the existing approach gear. However, corners with a tight radius will require the selection of an appropriately lower gear before you turn in. Naturally, this should be done at the same time that braking is taking place.

This presents a not-so-small problem. If you are *braking and shifting*, your right foot is on the brake and the left on the clutch. Engine RPM's drop, and when the clutch is re-engaged a big braking effort is caused by the drive wheels trying to *re-accelerate* the engine. This usually causes the rear wheels to exceed their traction limit, and precipitates a skid.

To this there is a simple solution, Heel and Toe. During braking, the ball of the right foot remains on the brake pedal and, with a turn of that foot, the heel can be used to depress the edge of the accelerator pedal to a point at which the engine RPM increases enough to "match" that of the drive train. This is often called a "*blip*" of the throttle just before the clutch is re-engaged

Done perfectly, there should be no sudden drag or forward jump of the car. If there is drag, you may not have "*blipped*" enough. If the car jumps forward, you applied too much gas, and the RPM is too high. This whole process is called "*Heel and Toe*". It should be very thoroughly practiced until it becomes second nature.

Remember during "*Heel and Toe*" it is essential to maintain a constant pressure on the brake pedal.

Understandably, this is a crucial skill for smooth driving, and will be very useful for your everyday driving as well. The greatly reduced stress on your drivetrain will add to its longevity.

After a long straight you may require a gear much lower than the gear you are in, downshift through each gear while using your brakes to slow the car. Be sure the speed is down before engaging a lower gear or else you may over-rev the engine and cause unwanted additional engine braking.

A final point to keep in mind, *Do not ride the clutch* with your left foot. Keep it on the dead pedal area unless you are actually using the clutch.

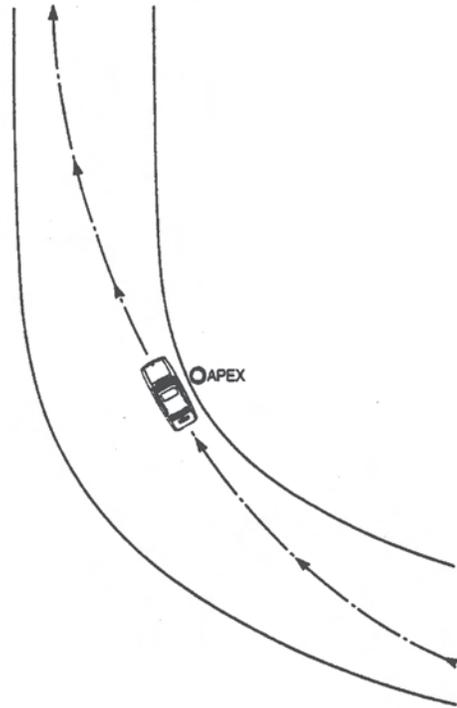
Driving an Automatic Transmission

Advanced Driving Techniques can be applied equally in a Porsche equipped with an automatic transmission. The key is *Smoothness, Anticipation and Practice!*

Lesson 8 - Types of Corners

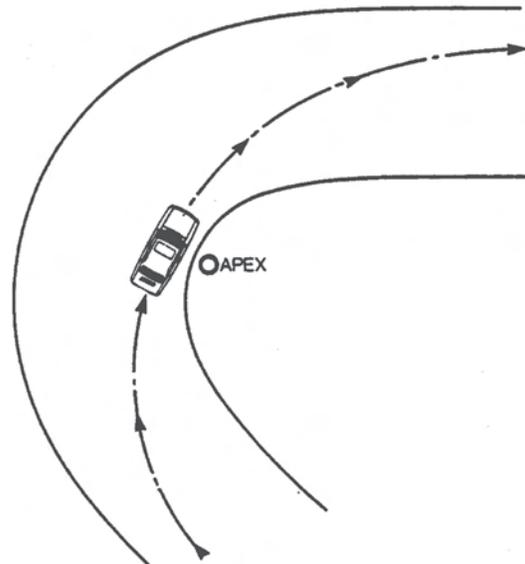
Long Curves (Sweepers)

- Can usually be driven very quickly
- Use as much of the road as possible
- Always look ahead through the corner



Increasing Radius

- Widens at the exit
- Somewhat early apex
- High acceleration rate at the exit



Decreasing Radius

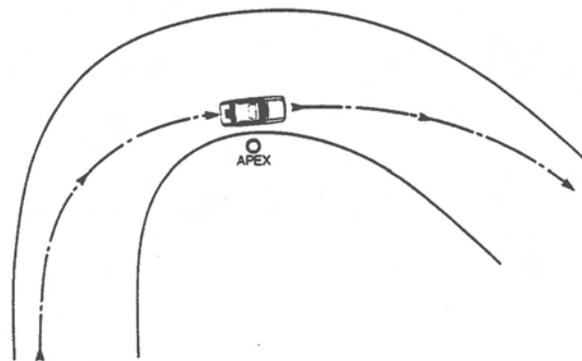
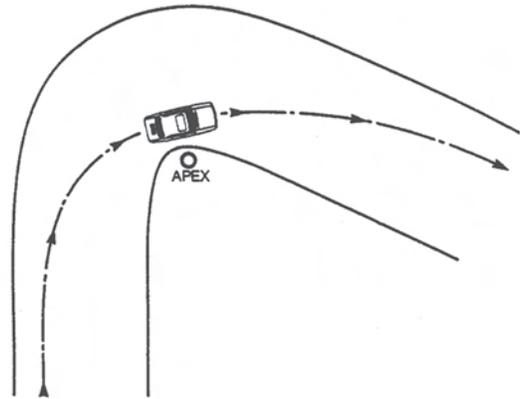
A very deceptive turn, as it keeps getting tighter

A very late apex; with an early apex you would run out of road at the exit

One must be patient and stay wide at the entrance, even though it does not “look” right

Be very careful with this type

If in doubt, stay wide until you actually see the late apex, then turn in

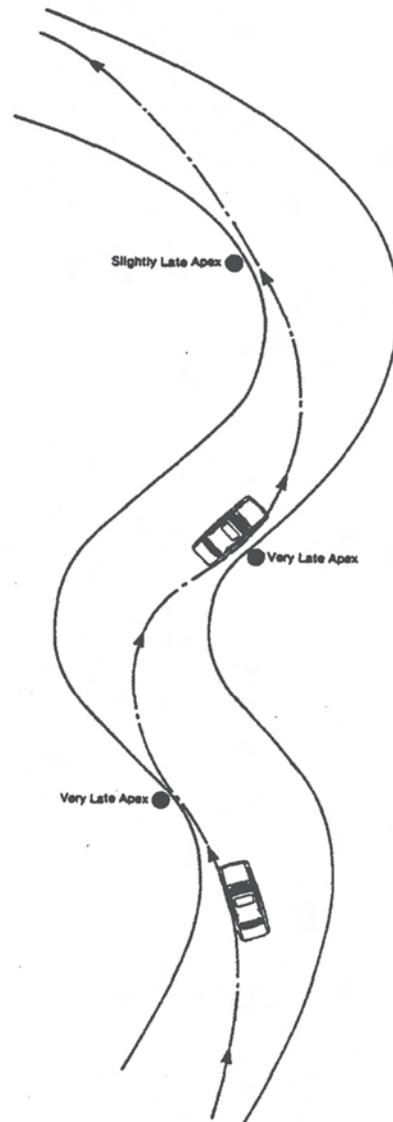


Compound Curves

Two or more turns which cannot be driven as one curve

The last turn is the most important; all the other have their lines modified to accommodate the best entry into the next turn in the series

Keep in mind weight transfer from side to side

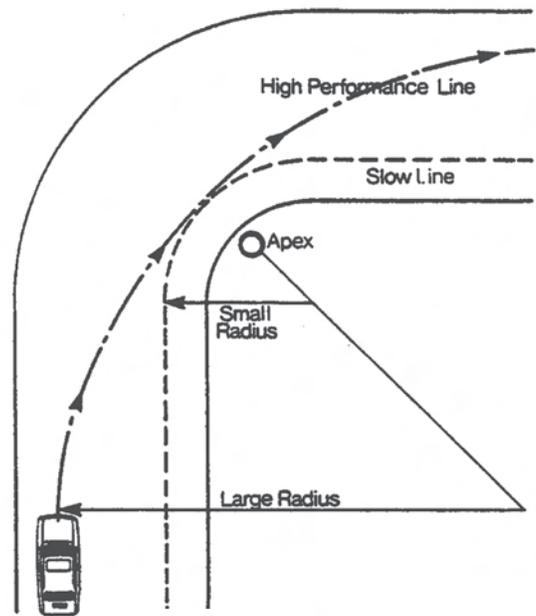


The Dynamics of a Corner

Negotiating The Corner -
Largest Possible Radius

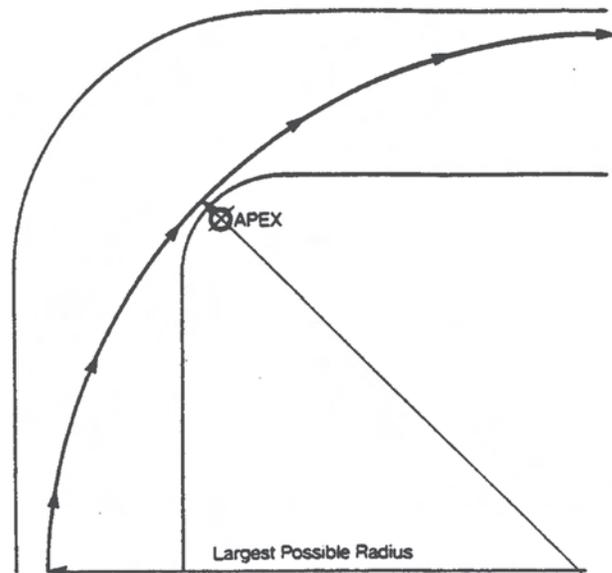
Cornering speed depends on the “Radius” of the curve: the smaller the radius, the lower the attainable speed.

The principle of safe cornering is to strive for the maximum possible radius that can be followed within the allowable traveled surface of a corner.



The Apex

The “Apex” is that point where the largest possible radius touches the inside midpoint of the turn.



The Corner and Ideal Line

As previously stated, the safest possible speed around a corner is obtained by driving the curved line formed by the largest possible radius. *Advanced Driving* is not concerned with any one corner on the road, but rather with linking all encountered corners in a smooth fashion.

Consider not only the corners themselves, but also the straights leading into, or out of the various corners encountered

Keeping this in mind and the fact that a car's brakes are substantially more powerful than the acceleration capability, the best exit speed out of a corner is more important than entrance speed.

Late Apex

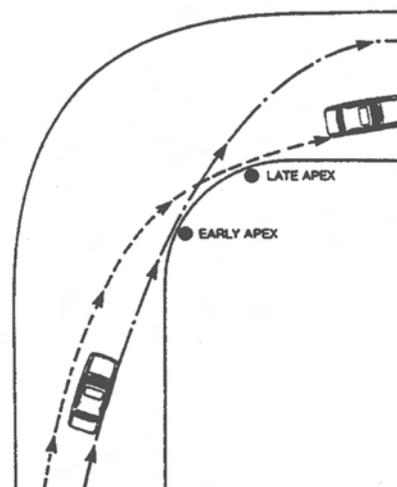
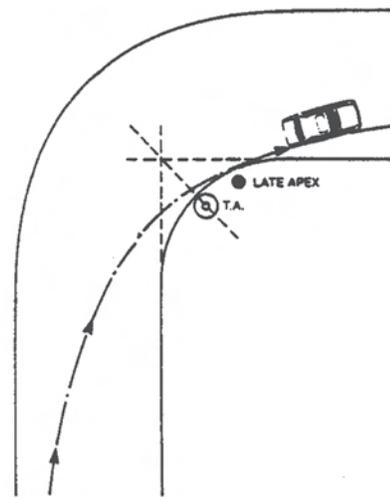
A faster exit speed produces a higher final speed on the ensuing straight, such as a highway on-ramp merge. This is a "*Late Apex*" situation which is used if a straight follows a curve. This, then, is the "*Ideal Line*" for this corner. Apparent is the fact that this exit line creates a later brake point on the approach, and also a sharper turn into the corner which must be driven quite a bit slower. One sacrifices entrance speed to achieve the best exit line and speed.

We should note at this point that during the course of the School, there will be pylons around the course indicating Turn-In Points and Apexes. These are meant to be helpful, but should not be used as a crutch! They will be removed at some point, leaving you on your own.

Early and Late Apex

It is a natural tendency for drivers to use an early apex. This frequently results in running out of road before the exit.

A late apex (further around a corner) is safer and allows for earlier acceleration out of a corner. On an open road it is always wise to use a late apex, as this will not leave you with a sudden shortness of pavement.

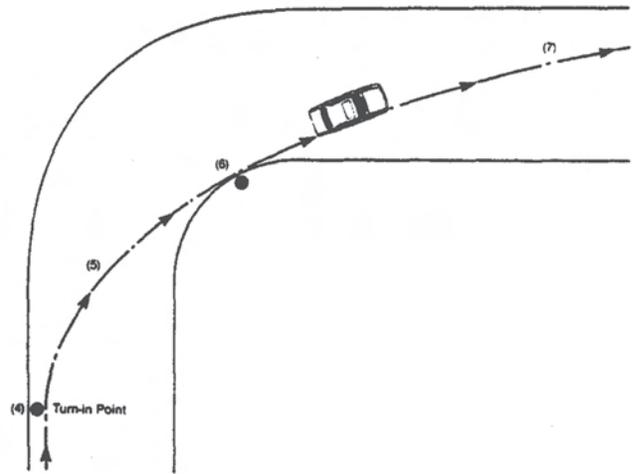


Putting It All Together

The correct sequence of events for your typical corner is as follows:

1. Approach on the outside edge of the straight leading to the corner.
2. When at your *Brake Point*, squeeze on the brakes very firmly. Brake in a straight line!
3. If a lower gear is required for the corner, use the "*Heel and Toe*" technique to smoothly engage the new gear. All braking and down-shifting should be complete before you reach the *Turn-In Point*.

Ideally, you should reach the *Turn-In Point* just as you have finished braking. If you find yourself coasting to this point after braking, try a somewhat later braking point. This is the best way to learn. If you find yourself too deep and end up fighting the corner, you have probably braked too late, or not hard enough.



4. When the car has reached the *Turn-In Point*, turn the steering wheel into the corner in one smooth motion.
5. Use a *Balanced Throttle* to the *Apex*. Be sure to stay within the "*Traction Limit*" for the entire corner.
6. A few meters before the *Apex*, gently begin to accelerate out of the corner.
7. On exiting use as much of the track as practical within safe limits.
8. We cannot emphasize enough the need for *Smoothness*, *Accuracy* and *Practice*. It's all a matter of executing the basics of driving with "*Excellence*".

A Word On Speed

You will become a far better driver if you do not try to drive quickly. "*To go fast on the track you must drive slow in the cockpit.*" Concentrate on driving smoothly and "*drive the line*" you will get around the track much quicker than if you ignore that and simply try to drive fast.

What To Do When You Have Driven Off The Track

If the car goes off the track, initially keep it off the track. Do not jerk the wheel to get the car back on track. If you do that, there is a good chance that the car will spin out of control.

Typically, if you drive off the track it will be the two outside wheels and not all four wheels which will be off. In this case, “*ease off*” the throttle to balance the car and continue with two wheels on and two wheels off the track. When the car has slowed down and settled, “*gently ease*” the car back on track. Remember, the wheels that were off the track will have picked up some dirt and gravel and won’t have much adhesion, so drive with caution until the tires have scrubbed free of dirt.

Driving In The Rain

All drivers hate the rain, but the good ones can handle it with aplomb. The tires have far less adhesion. Your Line must be modified. You should go in as straight a line as possible, and get traction for the corners where you can. Typically, that will be at the outside edge of the track. Your instructor will show you where the rain line is, believe them, they are not kidding you.

The best way to learn to drive in the rain is the same way you learn to drive in the dry, competent instruction and seat time. If you have been signed off, don’t duck out just because it is raining. A wet track is the best way to learn to drive smoothly. By the way, we lied, the best track drivers love to drive in the rain.

Circuit Analysis

It is of utmost importance to thoroughly learn the intricacies of a given road before it can be driven with any sort of accuracy (precision). At the start of the School, your instructor will show you the correct lines through the corners, remarking on pertinent features and cautioning you about potentially dangerous areas. You will learn that your Porsche is capable of doing a lot more than you ever thought it could, and doing it with ease. You will begin to realize just what you have invested in, and be much happier with it.

Be patient. It takes many, many hours on a particular course in order to master it.

This is not a racing school, although many of the same techniques apply. Consider this as Advanced Driving on a closed road situation.

Conclusion

Identify and learn the types of corners encountered. Remember “*Early Apex*” and “*Late Apex*” corners, and apply this to the course. If traveling on an unknown road, treat all “*blind*” corners as a “*Late Apex*”.

Driving The Line



Mosport
Calabogie
Shannonville

One Lap Of Mosport

Mosport is a world renowned race track that was designed to challenge a driver's control over his car. Unlike purely technical tracks, high speed is a major feature of this road course. The unique challenge of Mosport is inherent in its abrupt elevation changes, combined with camber changes. These elements, added to the high speed of open corners make some sections of the track intimidating. Nowhere is the proven approach of "*in slow, out fast*" more appropriate, or indeed necessary to the survival rather than mere enjoyment of the more difficult sections.

Following is a brief description of the ten corners that make up this historic race track. We hope this helps you with learning some of the aspects of driving at Mosport. Enjoy as we take you on a lap of this fabulous track.

Corner One

A high speed right hand downhill decreasing radius sweeper with a late apex.

Enter from the left side of the track and maintain smooth throttle as you tighten the arc while descending the hill. It is easy to be late for the turn in point if you do not take full and timely advantage of the braking zone. Early throttle input is the key to controlling this corner after turn-in.

After you have apexed at the bottom you will proceed to the crest of the next hill before entering the next corner. Bring the car from its track out position back to about three feet off the right edge of the road and complete your braking well before the crest. As you pass over this rise start to bring the car away from the right edge of the track toward the middle to line up for Corner 2. At this point get back on the throttle gently to settle the car. Newcomers to the track may consider third gear for this section through Corner 2.



Corner Two

Corner 2 is a double apex downhill left hander with the road surface falling away to the right (i.e. negative camber).

Clip the first apex early and tight. (Some drivers prefer to place their left wheels over the white line). Continue diagonally across two thirds of the track. Instead of fighting the negative camber of the corner you should allow the camber to pull you downhill across the track surface. After this descent you should find yourself beyond the middle of the track and without additional steering input the line will tighten to the second apex.



The key to this corner is the second apex. If driven in control, the throttle may be increased before you approach this second apex clipping the end of the white hatch lines on the left side of the track as your second apex. Throttle may be applied smoothly as you exit the corner to the right side of the track. Proceed to-ward the left side of the track and complete the brake/downshift, if necessary.

Corner Three

Corner 3 is a sweeping uphill right hand turn with a late apex.

Enter from the outer (left) portion of the track and do not turn in early. The geography of this corner tends to pull you away from clipping the apex precisely. Since the apex is blind there is also a tendency to look for it too early. If you apex too early then instead of having a long track out section leading out of this corner you will run out of track very quickly. If you have turned in too early then stay to the inner side of the track until you reach the apex before exiting.



Corner Four

Corner 4 is a sweeping downhill left hand turn, with a very late apex.

Having tracked from Corner 3, steer back toward the right side and complete braking before the turn in to this corner. Throttle input is required to maximize adhesion. Apex so that the car is lined up at the left side of the track to set up for the braking zone before Corner 5A. Try to be as straight as possible for the braking zone as the compression at the bottom of the hill will accentuate your steering input as the suspension becomes fully loaded at the end of this steep downhill section. Many drivers will downshift at this point.

Corner Five "A"

Corner 5 is a hairpin made up of two tight right hand turns (5A & 5B) connected by a very short straight.

5A is an uphill right hand turn with the apex clearly visible. Turn in decisively then traverse diagonally across the straight section to the left side of the track in preparation for the second right hander.

Corner Five "B"

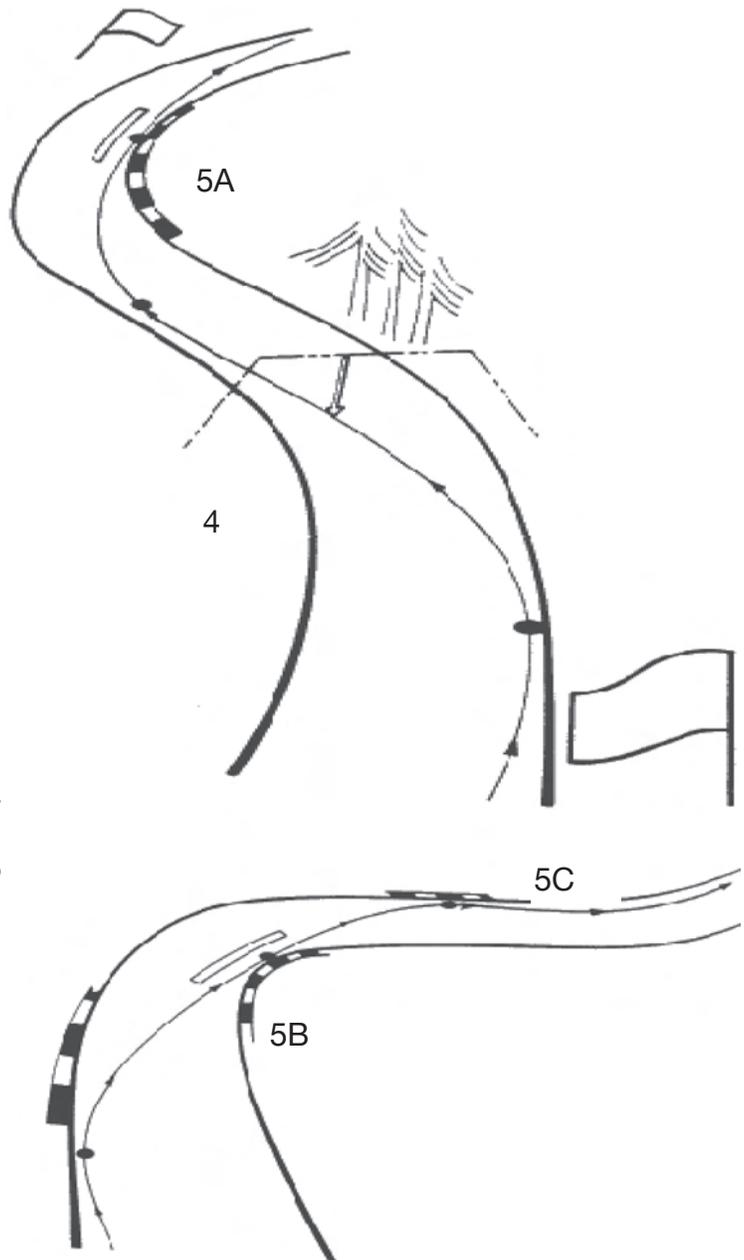
(Moss Corner)

A right-hander with a late turn-in

The line into 5B is deep with a relatively late turn-in. Set-up by completing your braking in time so that the car is balanced before this turn in. Do so crisply, on the throttle, to an apex that is again clearly visible at the inside of the corner.

The braking zone before 5B must not be ignored. A shift from third to second gear is common here, but simply throwing a down shift prior to the turn in will unsettle the car.

Please note that 5C is treacherous in the wet.



Corner Six

Corner 6 is a slight dog-leg left hander.

This left hander leads to the uphill straight. Acceleration with an up shift, often in passing traffic, requires continued concentration. Care must be taken not to apply too much power here in the wet.

The Andretti Straight

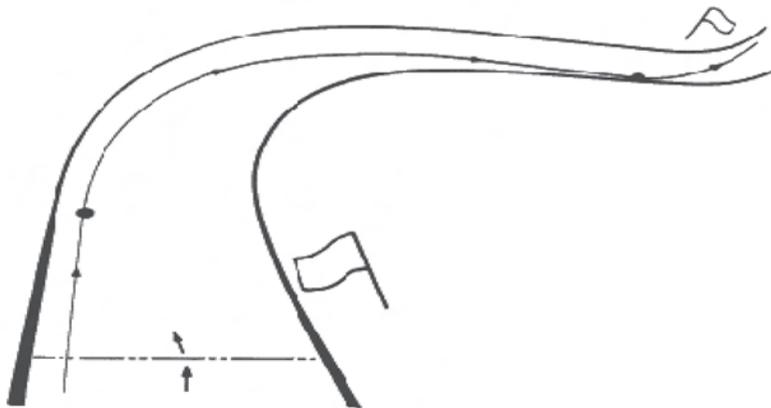
The Andretti Straight is a long uphill climb rising to a summit.

The speed over the former hump is your top speed for the track and the car must be straight through this section. Brake before the summit. Position the car near the left side of the track as you approach the summit. Passing must be completed before the summit.

Corner Eight

Corner 8 is a high speed right hand turn with a late apex.

Traveling along the left edge of the track, brake early, and maintain steady throttle into the turn starting from the outside of the track. Throughout most of the corner stay in the middle third. Tighten the radius to the apex precisely and have your car straight for the very short brake/downshift zone before the next corner. If you find you have turned in too early, stay in until you have passed the apex. If you let the car drift out again you will never make it back to the apex. If you have entered the turn with too much speed, keep concentrating on the line.

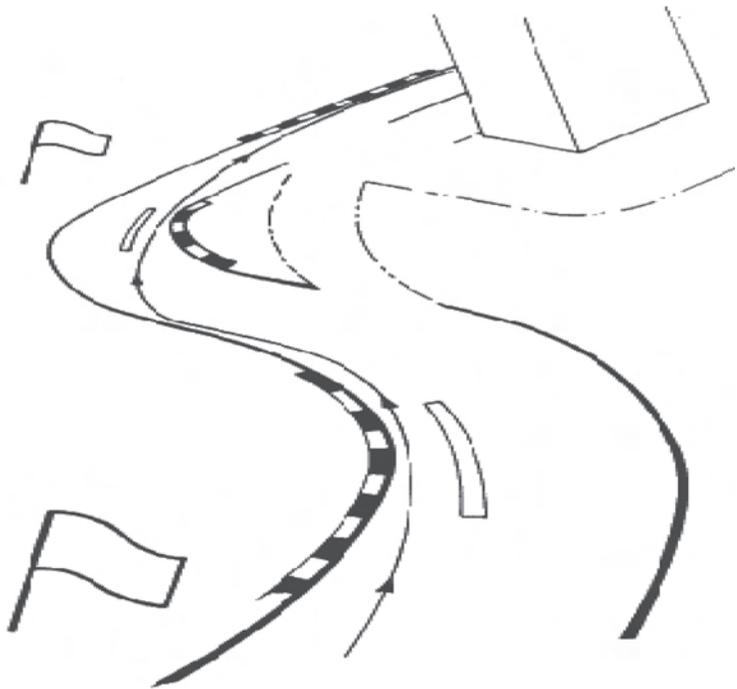


Corners Nine & Ten

The Esses. A quick left hand turn followed by a right hander.

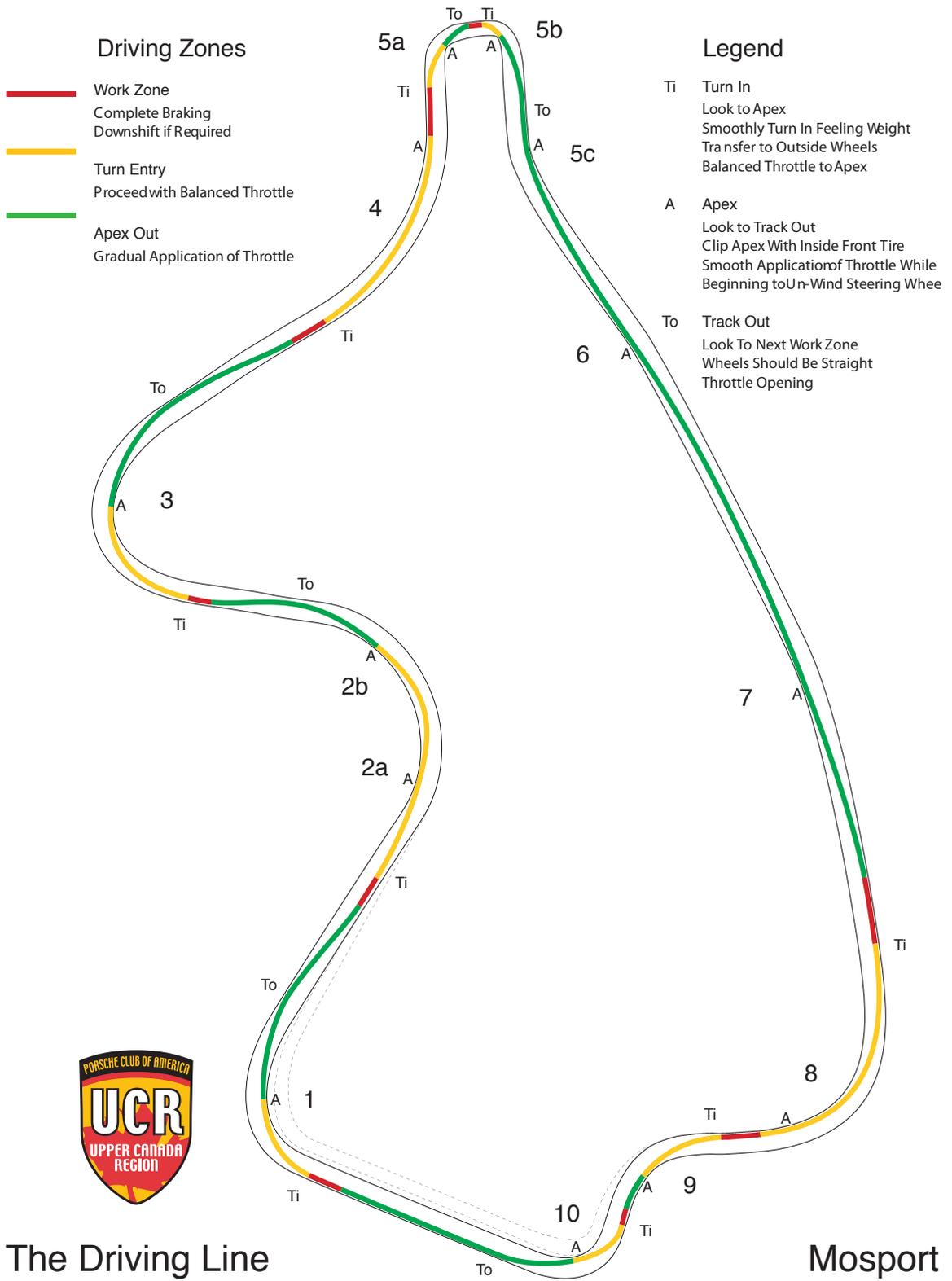
Having completed a quick brake and downshift, turn in sharply to a slightly late apex on the left side of the track. A short straight allows brief acceleration and takes you to the right hand 90 degree corner 10. A sharp brake application before the turn in from the left edge of the track with a fair amount of throttle, and apexing as close as possible at the inside curb, leads onto the pit straight.

Corners 9 and 10 are quick left hand, right hand corners that can unsettle the car if transitions are not smooth.



This completes our one lap of Mosport.

“Enjoy and be safe”



The Driving Line

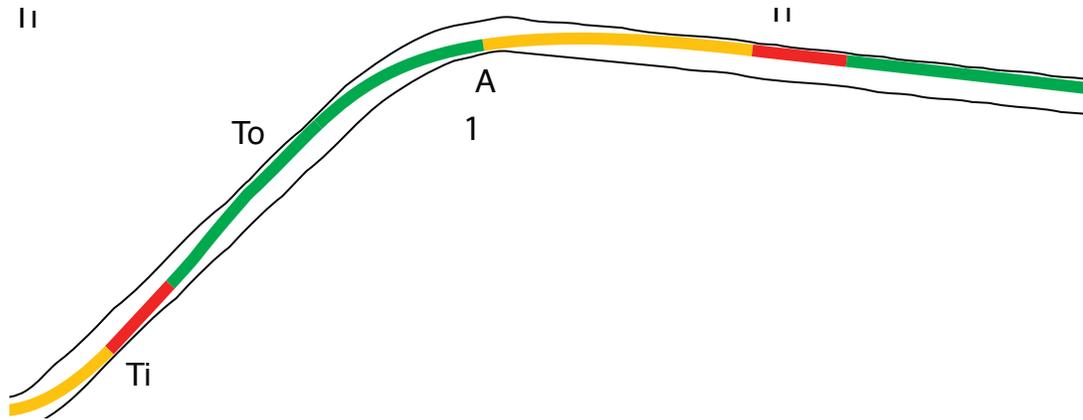
Mosport

One Lap of Calabogie

Calabogie combines high speed sections with tricky technical sections that are crucial for good lap times. Be patient learning this track, there is a lot to learn. Many of the technical sections link three or four corners together, you have to get the last one right to maximize your performance here.

Corner 1 – The Kink

High Speed left-hander at the end of the front straight. Set-up on the right side of the track, braking smoothly before turning in under balanced throttle. Executed correctly, throttle can be applied while track-out to the right near the end of the turtles. Allow the car to continue to the left to set up for the next corner.



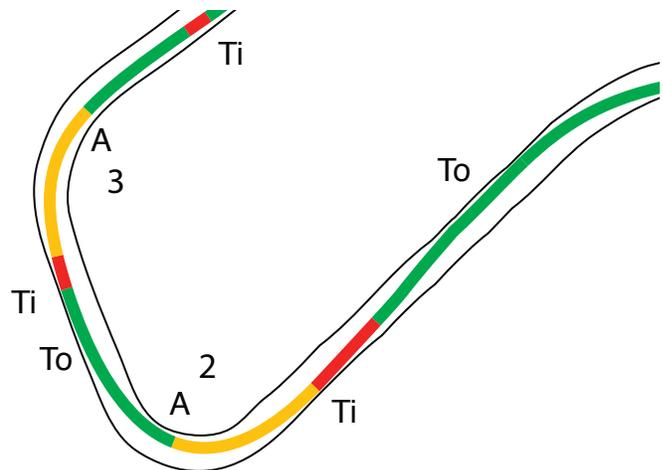
Corner 2 – Jacques

This right-hander follows a downhill brake zone and requires hard braking before turn-in under balanced throttle. Once you reach the apex, begin to apply increased throttle to power up the hill to the left side in preparation for the next corner.

Corner 3 – Gilles

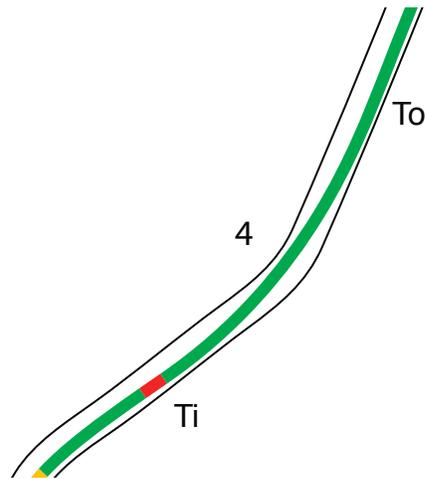
Brake on the up-slope and begin to turn-in to this right-hander smoothly.

The car will feel a little un-settled as you crest the hill. The apex is not visible at turn-in. A relatively late apex is advantageous. Apply the power early while keeping the car as far right as possible in preparation for the next corner.



Corner 4 – Easy

High horsepower cars may be challenged to take this slight left-hander without lifting. A smooth exit from Gilles and smooth turn-in for this corner will set you up to for the long straight named Rocky Road. Exit Easy fully to the right and keep the car to right of centre up the straight.

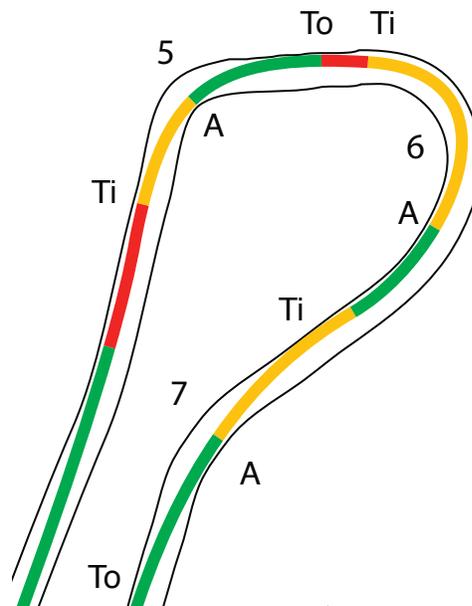


Corner 5 – Mulligans

This straight kinks at the top, just before the brake zone for Mulligans. Set the car up to barely miss the left curb at the top which is the entrance to the downhill brake zone for Mulligans. Hard braking will be required before turn-in. Clip the apex on the right and allow the car to exit at the brake zone for the next corner.

Corner 6 – Big Rock

Big Rock is another right-hander that will require smooth braking to settle the car before turn-in. Apex this corner later than you think and keep the car approximately centre track on exit in preparation for the next left-hander. This will lead to a short straight.

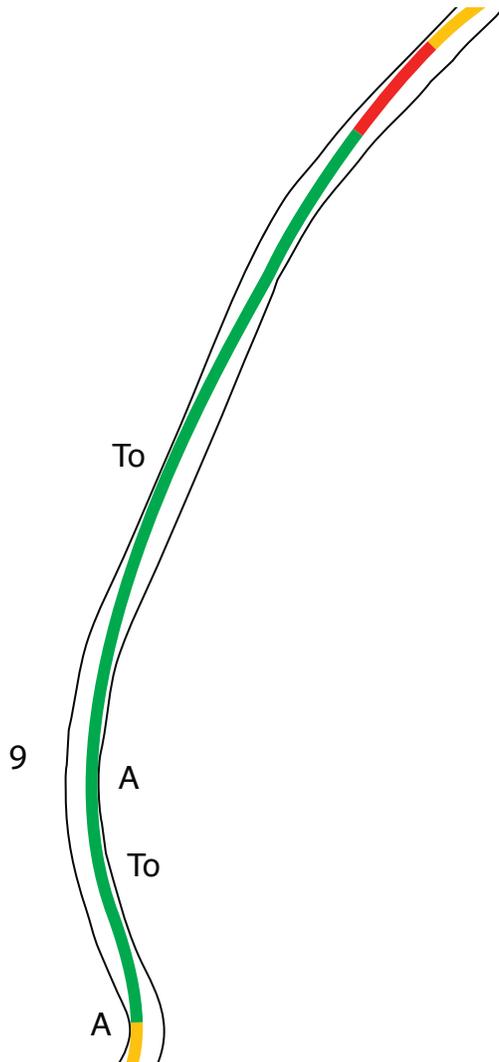
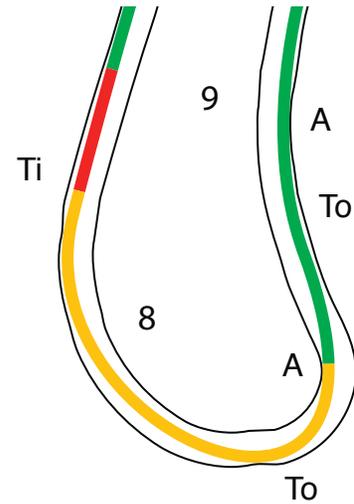


Corner 7 – Candy Mountain

Candy Mountain is a left-hander that leads to a short straight. Set the car up track right and settle the car with light braking or a lift depending on the speed you carry out of Big Rock. A smooth entry will reward you with the ability to apply throttle earl. Track out to the right and keep the car to the right side of this straight in preparation for the next corner.

Corner 8 – Temptation

This long, decreasing radius left-hander is appropriately named as it will tempt you to carry too much speed into the corner and tempt you to apply power too early on exit. Both of these situations will prove less than desirable. After initial braking, turn-in smoothly and keep the car about 2/3 track right through the first stage of the corner. Slow the car as you approach the right, the corner tightens for the final stage. Brake before tightening the arc to very late apex before exiting. Allow the car to track out to the right and stay right as you power up the hill. If you apex too early avoid applying the throttle as you will run out of room at the exit.



Corner 9 A&B – Deliverance

These two right-handers are fast, full throttle sweepers. When taken correctly create a double apex corner. From Temptation, the first part of corner 9 is blind. You turn in while on the up-slope of the hill to find the apex on the right. The car will feel a little unsettled here so be smooth and allow the car to track-out left. You should be able to hold the steering angle and drive the car to the second apex on the right at the crest of the hill.

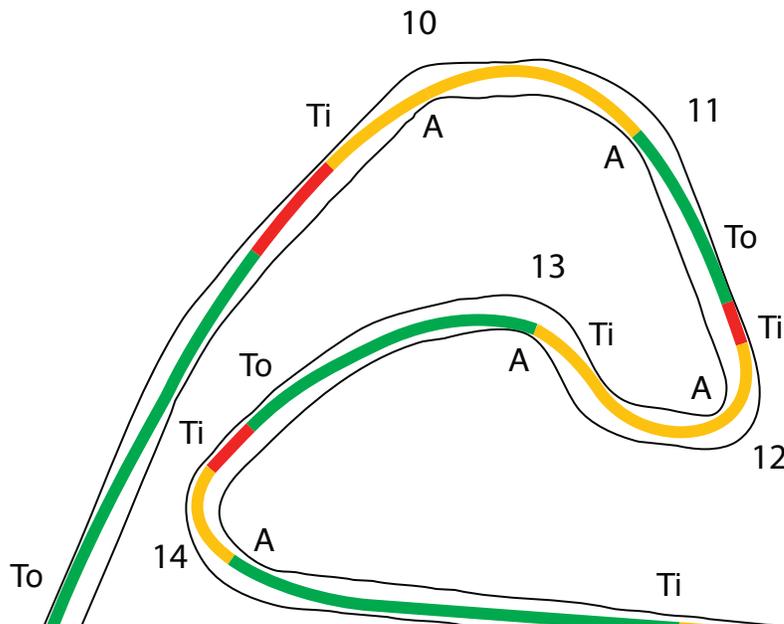
The Ducks Head

Corner 10 – Crown

The downhill entrance to corner 10, the first of two connected right-handers, requires early braking and smooth turn-in to carry speed through this complex. You need not track out fully to the left on exit to negotiate corner 11.

Corner 11 – Brow

On exit of corner 10 maintain steering angle into corner 11. The apex is mid to early and throttle can be applied as you drive up hill and to track left for Corner 12.



Corner 12 A&B – Beak

The next two right-handers require firm braking and a relatively late turn in to a late first apex. Once you have clipped the first apex, maintain balanced throttle and look for the second apex. This is an important part of these corners as it sets up your entrance to the next left-hander.

Corner 13 – Throat

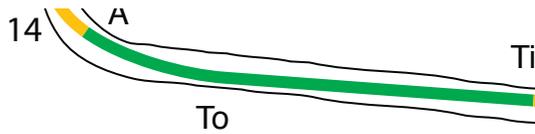
Corner 13 is a left-hander that completes the Ducks Head complex. Maintain balanced throttle and turn in smoothly from the right side of the track. Apply throttle at the apex and allow the car to track out right. The next brake zone is at the crest of the hill.

Corner 14 – Hook

This tight left-hander will lead to a fast uphill section and requires early braking and smooth application of the throttle to maintain speed. The turn in for this corner arrives quickly and requires a late turn-in with plenty of luck to a late apex! Done correctly, you can get on the throttle earlier than you expect. Allow the car to track out fully to the right and point it mid to left track as you ascend up the steep hill.

Corner 15 – Spoon

Spoon is a very fast downhill right-hander that requires a smooth turn-in just before the crest of the hill. A slight lift will help the car turn in. Apply smooth throttle and steering to a late apex while keeping the car to the right side of the track for the next corner.



Corner 16 – 4 Left

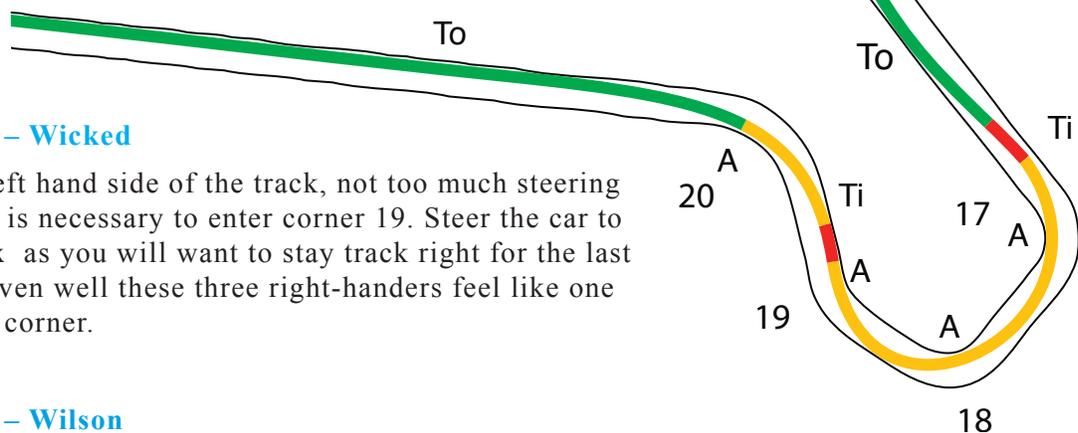
As you exit corner 15 the track will begin to climb uphill. The entry is somewhat blind and requires hard braking on the upslope before initiating a smooth turn in to the left. When done correctly, you can carry good speed through this corner exiting full track right in preparation for the final sequence of corners.

Corner 17 – Quarry One

On exit of corner 16, bring the car left to mid track and brake early for this first of three right-handers. Turn in early and with a balanced throttle and smoothly steer the car into the next corner.

Corner 18 – Watts Up

The second corner in this sequence continues under balanced throttle and will exit full track left in preparation for the final right-left esses that lead to the front straight.



Corner 19 – Wicked

From the left hand side of the track, not too much steering adjustment is necessary to enter corner 19. Steer the car to a Late apex as you will want to stay track right for the last corner. Driven well these three right-handers feel like one triple apex corner.

Corner 20 – Wilson

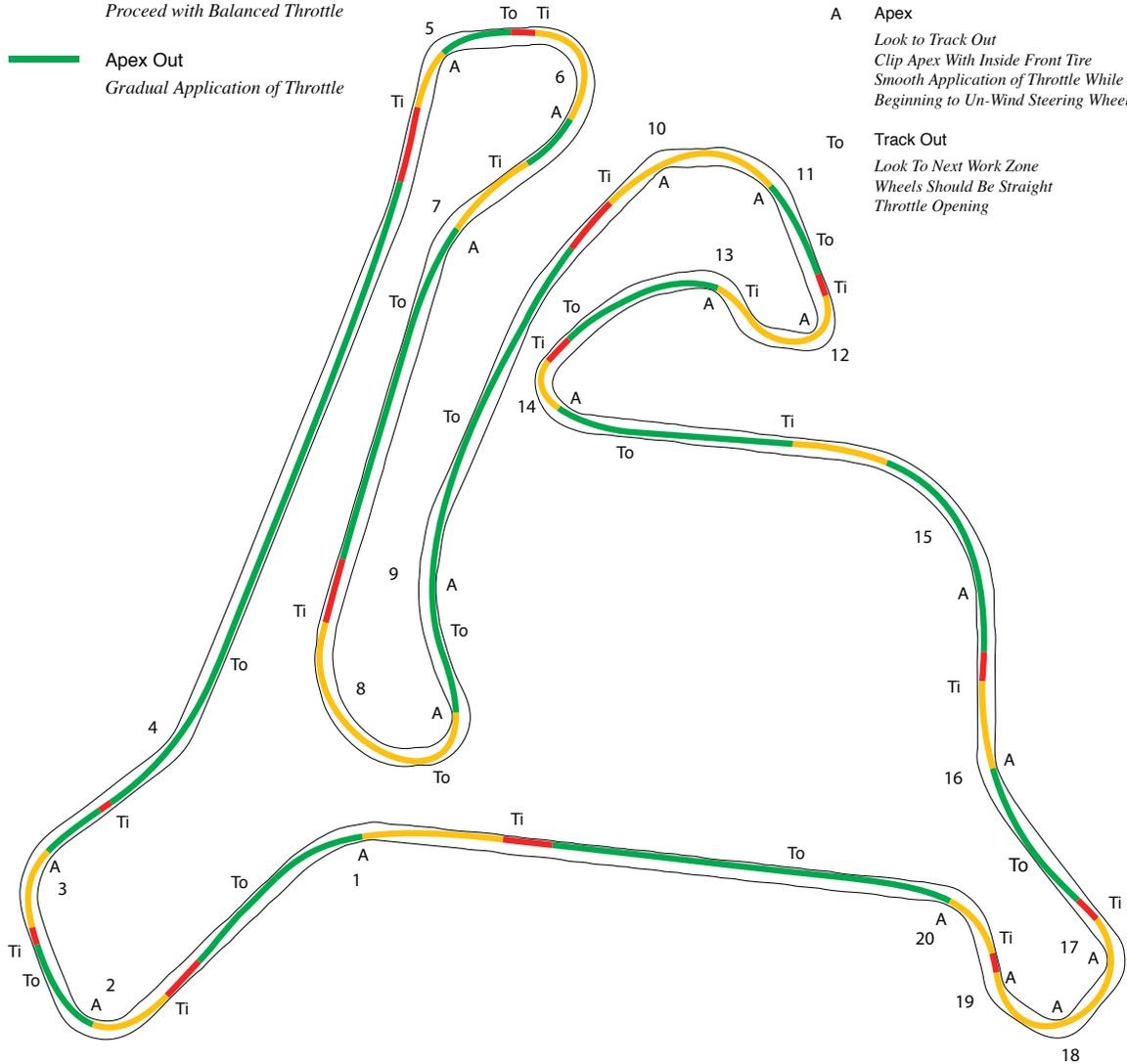
At exit of corner 19 smoothly turn-in to the left under balanced throttle. Settle the car before turning in. Once you have clipped the apex on the left, apply the throttle smoothly to exit full track right onto the front straightaway.

Driving Zones

- **Work Zone**
Complete Braking
Downshift if Required
- **Turn Entry**
Proceed with Balanced Throttle
- **Apex Out**
Gradual Application of Throttle

Legend

- Ti** Turn In
Look to Apex
Smoothly Turn In Feeling Weight
Transfer to Outside Wheels
Balanced Throttle to Apex
- A** Apex
Look to Track Out
Clip Apex With Inside Front Tire
Smooth Application of Throttle While
Beginning to Un-Wind Steering Wheel
- To** Track Out
Look To Next Work Zone
Wheels Should Be Straight
Throttle Opening



The Driving Line

Calabogie Motorsports Park

One Lap Of Shannonville

Corner One

Corner One Is A High Speed Right Hand Turn, With An Early Turn-In Point And Early Apex.

Enter from the left side on the track. A short shift necessary just before a light application of the brakes to settle the front end for an early turn in. The reference point for turn-in is the tower. At which point the throttle should be slowly and evenly applied. The car will move around a fair amount through the first half of the corner. The apex starts just after the turtles begin. Hold the car in against the curbing until the mid point of the turtles. The exit point will be fully to the left, slightly before the end of the curbing. Stay tight to the left side of the track, accelerating toward corner two. The work zone for corner two will require some heavy braking and a downshift.

Corner Two

Corner Two Is A Right-Hander, With An Early Turn-In Immediately Followed By Corner 3.

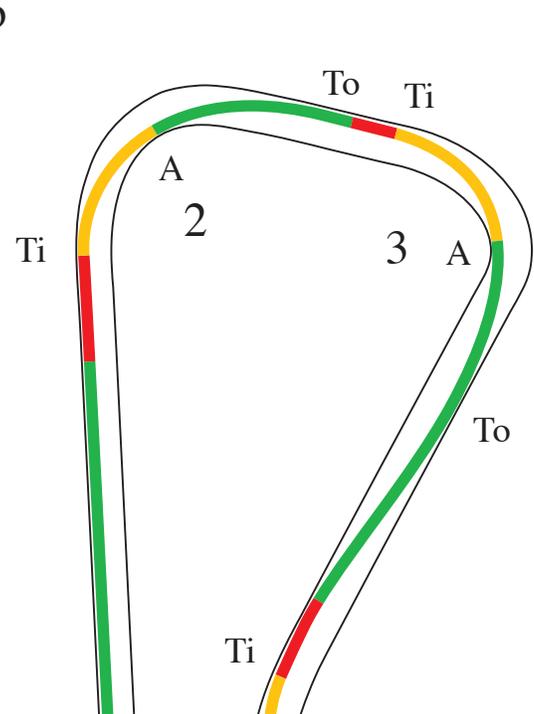
The transition from brakes to throttle should be performed very smoothly as it is necessary to maintain as much weight transfer as possible as most cars will understeer through this section of the track. This is why an early turn-in is necessary to clip the apex. A progressive throttle application will push the car to the exit towards the end of the turtles at the left. As in corner one, the car, if heavily loaded, will move about some through this corner. Accelerate and stay to the left, as corner three is a heartbeat away. A slight tap on the brakes will set you up for the next corner.

Corner Three

Corner Three Is A Late Turn-In, With A Blind Apex.

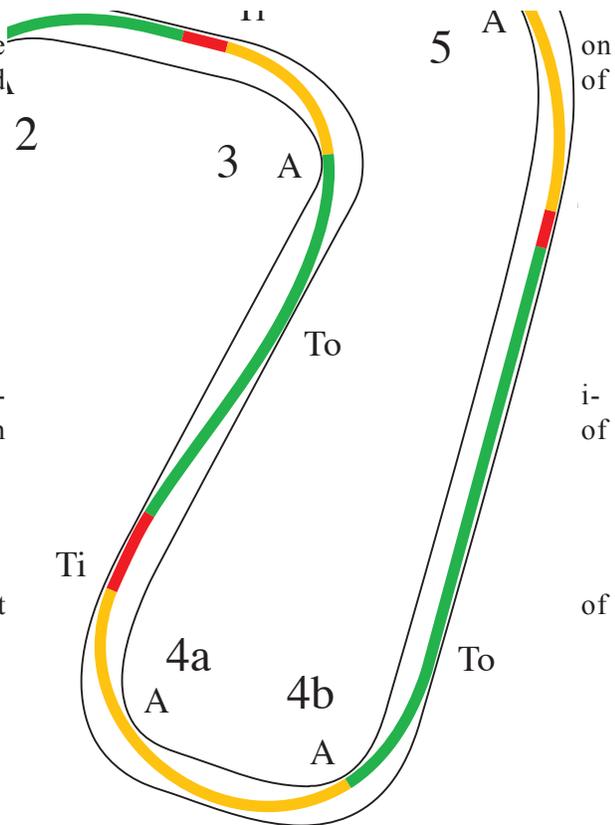
Turning in fully from the left side of the track, and pointing the car slightly inside of where you believe the apex to be, is the task at hand in this corner. As the car settles leaving the turn-in point, begin squeezing the throttle. It is necessary to point the car slightly inside of the apex to the right, because you will experience a little understeer as you leave the turn-in point. The car will continue to understeer to the exit at the end of the curbing to the left. As the car becomes unloaded at the exit, you must traverse diagonally across the straight section to the right side of the track to set-up for the next corner.

Corner Four



Corner Four Is A Left Handed Double Apex, With The Second Apex Being Of More Importance.

The braking zone is short, yet heavy. While braking you will notice the asphalt falling away, slightly downhill. Therefore, you must progressively increase your pressure on the brake pedal. Slightly before the end of the braking zone, turn the steering wheel gently to the left to align the car parallel to the apex. As the car approaches the edge of the track to the right, turn-in for the apex. When leaving the apex, allow the car to drift fully to the edge of the track at the right. Begin applying the throttle at the midpoint between apex A and B. It is important to use all of the track here, in order to carry maximum speed through the second section of this corner. The car will understeer from the first apex, all the way through to the second apex and exit. Align the car to touch the curbing to the right at the exit. Done properly, this corner requires only one input from the steering wheel.



Corner Five

Corner Five Is A Sweeping Left-Hander.

Having tracked out from corner four, stay to the right side of the track and shift-up one gear just before turn-in. The turn in point is a little earlier than one would expect. However, it is critical not to apex early, thus running out of road at the exit. Follow the gray section of pavement though to the apex at the left and exit fully to the right, a few car lengths before the end of the curbing. The work zone for corner six requires some braking and a downshift.

Corner Six

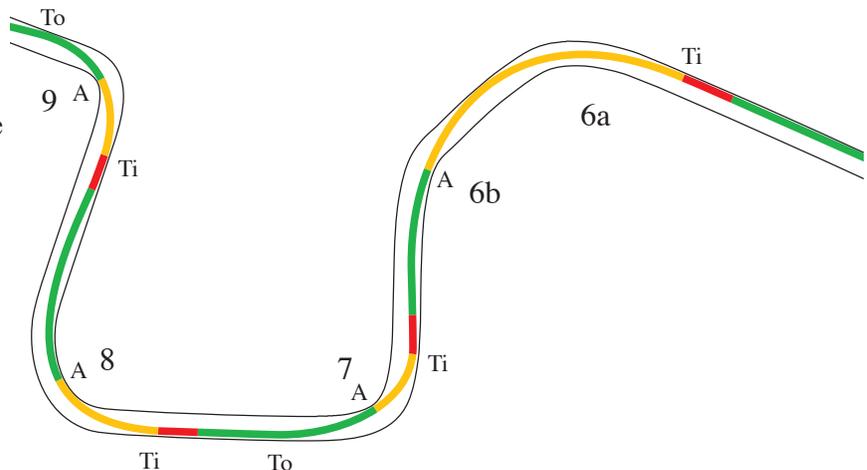
Corner Six Is A Double Apex, Sweeping Left-Hander.

A turn-in reference point is a white square and the car should be positioned a few feet left of the right side of the track. The first apex should be missed by a car width. After turning in look for a white cement stain on the pavement and place your right front wheel over it. This will keep you the proper distance away from the first apex. Once you have turned in for the first apex, if on the proper line, the car will travel to within four to five feet, of the right side edge of the track, between A and B, just inside the change in pavement colour. At this point, if you are able to accelerate abruptly, you have entered 6A too slowly. You should only be able to gingerly squeeze the throttle. If you enter 6A properly, you will end up right at the apex of 6B without any steering inputs beyond the first apex. Your left front wheel should be between the white line and the red and white curbing at the midpoint of its length. As you pass the apex of 6B you may come away from the edge of the road by about four to five feet. But not more, because the turn-in point for corner seven comes up very quickly.

Corner Seven

Corner Seven is a 90-Degree Right-Hander.

The turn-in point is three feet before the change in pavement colour - sooner if your car understeers. It is important to load the front end as you turn-in, to reduce the understeer in this corner. If your line is tight enough, your left wheels will follow the washboard pavement through the apex. If you are unable to reach the apex, slow down the entry some more and turn-in earlier, squeeze the throttle at the apex. Use all the road at the exit, brushing against the curbing.



Corner Eight

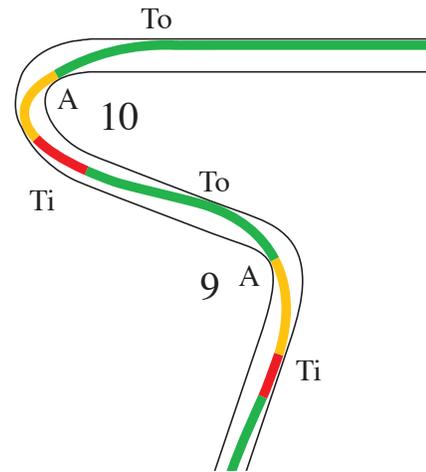
Corner Eight Is A Right-Hander, With A Slow, Gradual Constant Turn-in.

Trail brake into this corner, with a slow, gradual continual turn-in. Stay out about three-quarters of the track. On entry, keep winding up the steering wheel more and more. Look early for the apex located one-quarter of the way down the turtles. Stay right about three to four feet from the edge. After the apex, the curbing comes to a point again, approximately three-quarters of the way through. It is important to clip it there as well, keeping the car fully to the right to set-up for corner nine.

Corner Nine

Corner Nine Is A Left-Hander, With An Early Turn-In And Early Apex.

Constant brake pressure is required on entry to this corner. This is a easy corner, if the previous corner was completed properly. Most importantly, you must exit all the way to within six inches of the track surface to the right. The turn-in point is right at the change in pavement colour. It is obvious and easy to see. As you exit corner nine, come back diagonally across the track, aiming at the end of the red and white curbing.



Corner Ten

Corner Ten Is A Tight, Slow Hairpin With A Late Apex, Leading Onto The Back Straight.

The turn-in point is beyond the curbing by four feet. You will need to downshift while braking.

Slow the car way down. No, even more than that. If it feels too slow, you've got it right! Wait, wait, wait, for the turn-in point. You should now be approaching the grass and dirt. Look for a black section, groove and line after the turn-in point. Put your left front wheel in this and follow it for about ten to twelve feet. Now look for the apex, as you approach it, slowly start to accelerate. Your left front wheel should cross over the new piece of inlaid pavement by the apex at about the two-thirds point in the curbing. Accelerate as you unwind the steering wheel. Use all the track to the left as you exit on to the straightaway.

Corner Eleven

Corner Eleven Is A High Speed Right Hand Turn.

The turn-in point is just before the change in pavement colour, from black to gray. Likely, one downshift and back on the throttle to stabilize the car. The apex being at the midpoint of the curbing to the right. At the exit, allow the left side wheel to graze against the curbing for the last couple of car lengths. Keep the car within a few feet of the left side of the track to set it up for corner twelve.

Corner Twelve/Thirteen

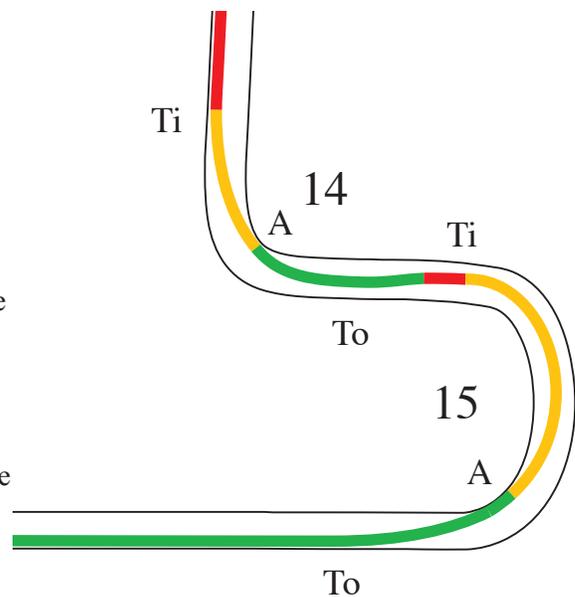
Corner Twelve/Thirteen Is A Quick Right / Left Kink.

Set-up for corner twelve with a light brush of the brakes as necessary, just before the turn-in point. Look for the access road, interrupting the left side of the track. This is your turn-in point. The first apex is just a few feet before the midpoint of the curbing on the right. A slightly early apex requires less steering input to reach the second apex. The more important apex, arrives as the midpoint of the curbing to the right, you must clip it, in order to remain on the track at the exit. The braking point for corner Fourteen arrives earlier than you would think, primarily because the car becomes unweighted as it passes over the short track access road. Braking should be done before and after this unsettling bump. Braking through this bump may result in locking a front wheel.

Corner Fourteen

Corner Fourteen Is A Tight Left Hand Corner, Preceded By An Uneven Road Surface.

A down shift is required during the later half of the braking zone while paying attention to keeping the car positioned to the right edge of the track. The turn-in point for corner fourteen starts just after the curbing on the right hand side ends. The apex is found in the traditional spot, halfway along the curbing on the left. Allow the car to track out to the right at the exit. You must now drive diagonally across the track toward the left side enabling you to quickly brake and turn-in.



Corner Fifteen

Corner Fifteen Is A Late Apex, Large Hairpin, Leading Onto The Front Straight.

After braking to reduce your entry speed (remember in slow, out fast), turn the steering wheel only slightly, allowing the car to head toward pit entrance. This will open up the corner for you. As you reach two-thirds track out to the left, gradually tighten the radius to a late apex. The apex is at the three-quarter point of the curbing on the right. With each lap of the track, you can slowly and carefully move your apex back (earlier) to the point where the car exits very near the pit wall on the left.

This Completes Our Lap of Shannonville

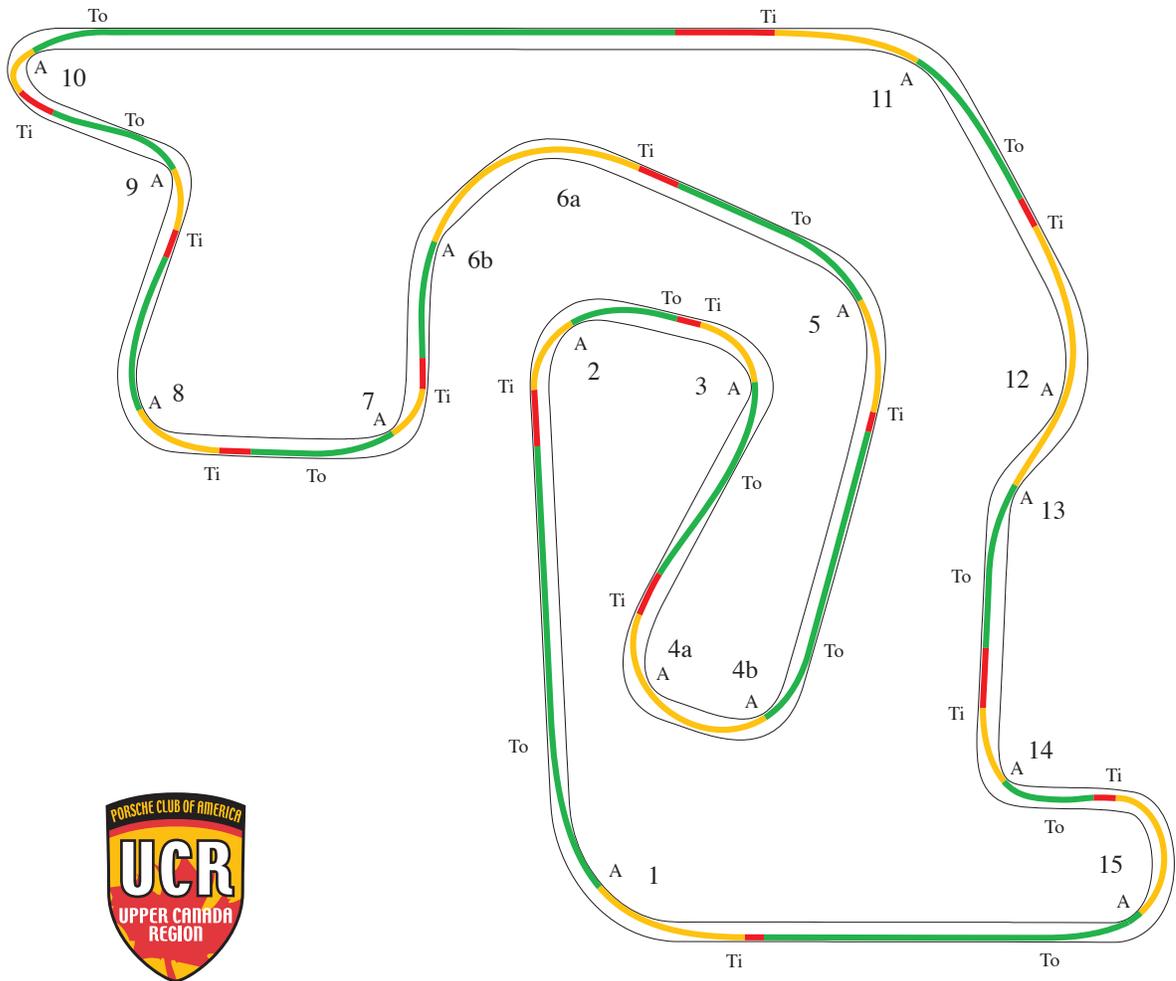
“Smooth is Fast at Shannonville”

Driving Zones

- Work Zone
Complete Braking
Downshift if Required
- Turn Entry
Proceed with Balanced Throttle
- Apex Out
Gradual Application of Throttle

Legend

- Ti Turn In Look to Apex
Smoothly Turn In Feeling Weight
Transfer to Outside Wheels
Balanced Throttle to Apex
- A Apex Look to Track Out
Clip Apex With Inside Front Tire
Smooth Application of Throttle While
Beginning to Unwind Steering Wheel
- To Track Out Look To Next Work Zone
Wheels Should Be Straight
Throttle Opening



The Driving Line

Shannonville

Appendices



Glossary of Terms - Steering & Handling

Reaction Time	The time it takes for something to occur. Usually the time it takes a driver to respond after some indication requiring a response (about 0.25 to 0.50 seconds). Cars also have a reaction time to inputs from the driver and are approximately 0.25 to 2 seconds.
Center of Gravity	The point within the car where it is exactly balanced in all directions.
Weight Transfer	The transfer of weight from one side of the car to the other or front to back due to acceleration or deceleration.
Lateral Resistance	The side force generated by a tire when cornering.
Slip Angle	The angle between the direction a tire is pointing and the direction it is rolling while negotiating a turn.
Sawing	Rapid oscillations of the steering wheel by the driver while turning into a turn. It is incorrect procedure.
Understeer	A condition during cornering when the car does not react to steering input.
Oversteer	A condition during cornering when the car wants to turn into the corner and the back end tries to break loose. An over-reactive car.
Neutral Steering	When the car neither oversteers nor understeers so that all four wheels begin to and maintain the same sliding characteristics.
Pushing	A slang expression for understeer in turns.
Dead Pedal	The area immediately to the left of the clutch pedal. It is used as a rest spot for the left foot when not depressing the clutch. It is also used as a bracing point for the left foot and leg during hard cornering, to keep the body firmly in the seat.
Power Slide	Driving with oversteer induced by applying the gas (throttle oversteer).
Spin	An uncontrolled slide or skid
Scrubbing	Causing the wheels to skid rather than roll which greatly decreases the vehicle speed.
Throttle Steer	Applying the gas to introduce a steering action. Usually while exiting from a turn. Also known as Power Oversteer.
Feathering	To apply accelerator pedal pressure gently.
Heel & Toe	To use the ball of the foot on the brake pedal while the heel is used to control the gas pedal.
Balanced Throttle	A gentle application of pressure on or off the gas pedal to maintain a constant speed

Glossary of Terms - Engine & Transmission

Power Curve	The relationship between the horsepower available from the engine at each and every engine speed.
RPM	Revolutions per minute or how fast the engine is turning.
Over-Rev	To run the engine at more revolutions per minute (RPM's or REV's) than is desirable or good for the engine.
Lug	To require larger power outputs (step on the gas hard) at too low an engine speed (RPM) than is good for the engine (as full throttle in 4th gear at 2000 RPM).
Torque	The ability of the engine to produce twisting force.
Max Torque	(at some RPM) The maximum volume of the torque value and the RPM at which it occurs.
Shift Point	The RPM at which one shifts to another gear, either as an upshift or down shift.
Red Line	A designated range of RPM (usually at high value) where possible engine damage or power loss occurs. It is not recommended to drive in this range.
Upshift	To go from a lower to a higher gear as from first to second or second to third.
Downshift	To go from a higher to lower gear as from fourth to third, etc.
Double Clutch	(should be double de-clutch) To release the clutch in the middle of a gear shift as the shift lever passes through the neutral position. It is used to help extend the life of the transmission synchro rings.
Gear Chart	A chart showing the speed in each gear for various engine speeds (RPM's).
Riding the Clutch	Driving with the clutch partially disengaged or with excessive clutch slip in making shifts.
Slip (as in clutch)	When one allows the engine to run fast while the car proceeds slowly (as in holding a car on a slope by holding the clutch slightly)..

Glossary of Terms - Tires & Brakes

Contact Patch	The small area (about 20 to 30 square inches) of the tire actually on the ground at any instant.
Coefficient of Friction	The ratio of the force a tire can generate to its load. Typically values range from a near zero (as on ice) to approximately one (as on concrete).
Traction	The ability of a tire to adhere to a road surface.
Traction Limit	The maximum forward, rearward or sideward force at the tires while accelerating, braking or cornering.
Pumping Brakes	Modulating the brake pedal to raise the fluid level. It is not a braking technique.
Threshold Braking	Actually modulating the brake pedal pressure to maintain maximum braking.
Lifting	To let up on the gas pedal to allow the engine to slow the vehicle.
Trail Braking	Maintain a low and decreasing level of brake application into a turn in contrast to complete release of the brakes before beginning the turn.
Braking Point	A designated point at which you begin to apply the brakes, usually a fixed distance from a turn or other location which requires lower speed.
Balance	The relationship between the load on the individual wheels and their ability to turn, brake, or apply power. If they are near equal, the balance is good.

Glossary of Terms - Roads & Curves

Radius	The distance from the center of the circle to the arc path the car is maintaining.
Largest Possible Radius	The largest radius which can be drawn and still stay on the road surface at the start, apex, and end. Fastest line through a given corner.
Theoretical Apex of the turn.	A point along a curve where the largest possible radius touches the inside edge of the turn.
Practical Apex	A point along a curve where the path of a car should touch the inside edge of the turn.
Clipping Point	A point along a curve where a car actually touches the inside edge of the road.
Early Apex	When the practical apex occurs before the theoretical one.
Late Apex	The counterpart of the above, when the practical apex occurs after the theoretical one.
Ideal Line	The best possible path through a turn considering all factors.
Entry Point	The point at which one begins the turning maneuver.
Track Out	The desired point of exit from a cornering maneuver.
Off Camber	When the road slopes away from the inside (the side about which the car is turning) of the turn.
Constant Arc	When the radius of the turn is constant.
Decreasing Radius Turn	A turn which gets sharper and sharper and sharper and
Increasing Radius Turn	A turn that gets wider and wider and wider and
S Curve	A curve shaped like an S: two or more connected turns which alternate direction.
Slalom	To weave between a series of designated markers or obstacles.
Hairpin	A very sharp turn which causes the road to exactly reverse its direction a little over two widths of the road.

Driver Education Check List

Brake Fluid	Changed this year.
Battery	Secure with no leaks or acid damage.
Drive Belts	Not frayed.
Throttle Return	Pedal motion not restricted.
Pedals	Free range of motion and firm brake pedal.
Brakes	50% minimum pad thickness. No damaged brake lines. No scored or cracked rotors.
Brake Lights	Working.
Front Suspension	Half shafts in good condition. Ball joints and tie rods secure and tight.
Rear Suspension	Half shafts in good condition. No leakage of CV joint grease.
Wheel Bearings	No excessive looseness or evidence of incipient failure.
Engine	No unusual noise.
Tires	No cuts or repairs. 3/32" depth in contact area.
Windshield	Free of cracks or other aberrations.
Mirrors	Firmly attached.
Seat Belts	In good condition. Equal restraints both driver and passenger.
Leaks	No appreciable leaks of any fluid.
Rust	None that affects body integrity.
Fire Extinguisher	2.5 lb. Dry Chemical or equivalent. Must be a metal bracket mounted metal to metal within reach of the belted driver.
Roll Bar	Required for cabriolet.
Loose Objects	Removed at the track, including driver floor mat. Get a plastic box for the small stuff.
Numbers	Minimum 6" in height, one for each side of car.
Personal Effects . . .	
Clothing	Long sleeve shirt and long pants. Natural fibers. (No Micro-Fibre)
Shoes	Full coverage shoe with pliable sole.
Helmet	Check our web site for current specifications.

