

DRIVERS TRAINING MANUAL



CLUB RACING
AT ITS BEST™

WELCOME TO THE PORSCHE OWNERS CLUB!

Our objective is to instruct you in the basic techniques of car control. This manual along with proper instruction should answer why certain things occur under certain conditions and give you an understanding of the proper procedures to use in order to maintain control of your vehicle.

You are about to learn a great deal about car control and yourself.

**MOST OF ALL, HAVE FUN,
AND GOOD LUCK!**

Photos courtesy of Cathy Robson/Virtual Access Photo



Preparation

Car Preparation

Thorough vehicle preparation gives a driver the confidence to develop the skills we all enjoy practicing at our events. This preparation not only includes familiarity with the applicable rules and allowances for your class, but, more importantly, a complete inspection to assure that all systems are performing correctly.

P.O.C. tech inspection (prior to every event) is primarily a safety inspection which will uncover gross discrepancies, but should not be substituted for your own preparation inspection. You must take the time to thoroughly examine your vehicle in order to assure yourself of optimum performance and safety.

Please review the check list at the end of this manual to help you prepare your car for the track.

Equipment

Ensure that your safety equipment is in good condition and capable of keeping you safe. Your helmet needs to meet the requirements for approved SA rating and year. It also needs to be in good condition. If you have had an accident you need to have your helmet checked by the manufacturer to ensure it is safe for use otherwise replace it. Your driving suit needs to be in good condition, no holes or oil stains. Your gloves and shoes also need to be in good condition, no holes or oil stains. If you have a HANS device make sure it is in good condition. If you have any doubts about your equipment have it checked by a certified vendor.

Driver

Make sure that you are in good physical and mental health before going to an event. If you are ill or have any physical ailments that may hinder your driving, DO NOT DRIVE. If you are having distractions in your life that may effect your focus while driving, we all do, DO NOT DRIVE. Be sure that you are physically and mentally prepared to perform at your best when on track.



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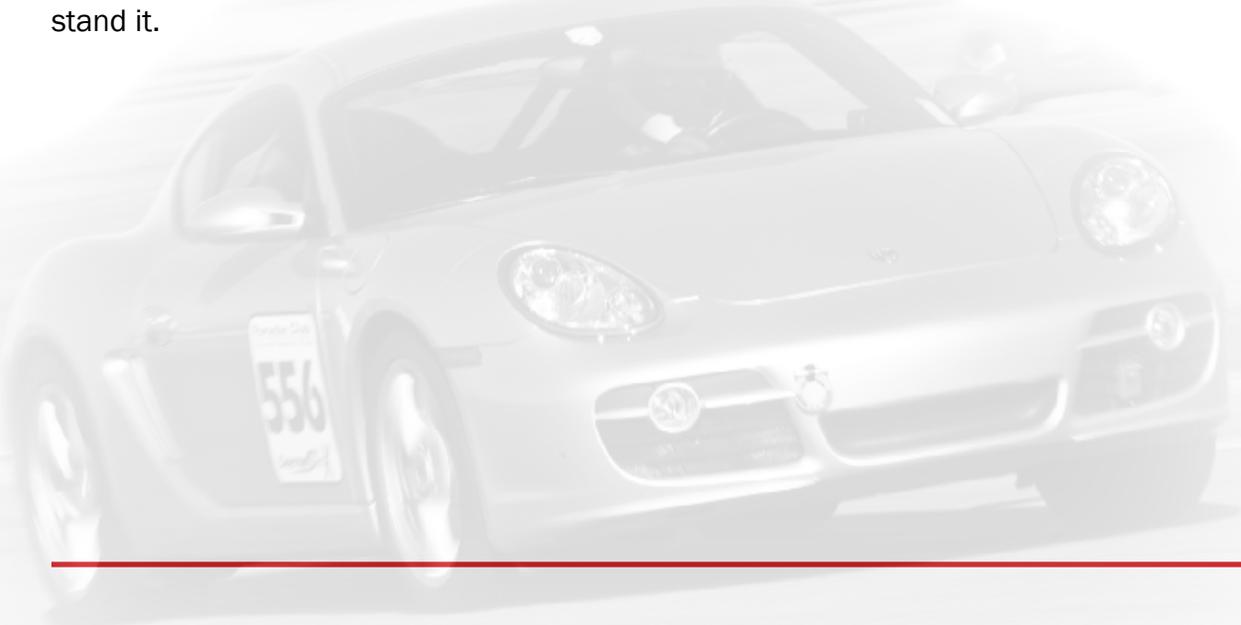
Driver Position

Seating Position

Be comfortable! Your seat position should be such that you can reach all the controls (i.e. steering wheel, gear shift lever, all pedals). If you have height adjustable seats, lower them as low as you can and still see over the steering wheel. A low seating position is better for vehicle dynamics as well as gives you a better seat of the pants feel. You want to sit in an upright position, close enough to the wheel to be able to place your wrists comfortably on the top of the steering wheel as well as be able to fully depress the pedals while maintaining a slight bend in your legs.

Safety Belts

Safety belts should be snug. If you have factory 3 point belts get them as tight as you can. One trick if you have power seats is you put the seat back and put on your belt. Pull it as tight as you can and move you seat forward into your normal driving position. This will sometimes help keep the belts tight. If you have 5 or 6 point belts make sure that the submarine belt comes up between your legs and not from the front of the seat back to you. If the submarine belt is positioned in front of you it will not prevent you from sliding forward under hard braking or an impact. Lap belts should come over your hips and be tight holding you in place. Shoulder belts should come over your shoulders near your neck. If you have a HANS device the belts should come over the HANS device and hold it snugly in place. Always pull your belts as tight as you can stand it.



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Steering Wheel/Hand Position

With the spokes of your steering wheel centered so that when it is pointed straight ahead, the car is doing the same. This will give you the proper reference upon straightening out your car. Place your hands on the steering wheel at the 9 o'clock and 3 o'clock positions. Your arms should be bent.

A “white knuckle” grip will cause your hands and arms to cramp and tire. When that happens you will lose sensitivity to the “road feel” coming through the steering wheel. You want a loose and relaxed grip on the steering wheel.

If you have a heights and or telescoping steering column, now is the time to play around with to better match your new seating position.

Mirrors

Your mirrors should be adjusted so you can see clearly behind you. Your windshield mirror should give you clear vision directly behind you and allow you see well behind your car. Side view mirrors should be set so that you just see the very edge of your car. You need to see what's around you more than how nice your fender looks.



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SHIFTING

If you are driving a manual car, treat the shift lever as if it were an egg. Try not to shift too quickly or forcefully, doing so causes undue wear and tear on the drive train for minimal gains in lap times. Don't grip the lever as if it were the head of a snake, cup it gently in the palm of your hand. Depress the clutch fully, match the revs with a quick "blip" of the throttle if necessary on down shifts, and move the lever smoothly, precisely and gently.

PRACTICE, PRACTICE, PRACTICE! DON'T RIDE THE SHIFT LEVER! IF THE RIGHT HAND IS NOT SHIFTING, IT SHOULD BE STEERING!!

If you are in a newer Tiptronic or PDK equipped Porsche, you have a choice to make. The programming of the automatic modes of both transmissions are more than adequate for a novice driver but as you progress in your driving skill, being able to control when you shift will become increasingly important in controlling the car.



Cornering

Every corner on a track has a maximum speed or limit at which it can be driven. Your ability to find the limits of your car and yourself will determine the speed at which you will be able to negotiate each turn.

We will always be able to go fastest with our foot to the floor and the steering wheel pointed straight ahead. But, as we approach a turn and start turning the steering wheel, we slow down even if we have our foot to the floor! By turning, we have created a side load on the car. If we exceed the limit of adhesion (or grip) of the tires, they will begin to travel sideways, “scrubbing” off speed or slowing the car. Our objective should be to minimize the turning of the steering wheel and second, to straighten the wheel as soon as we exit the turn and apply maximum power as soon as possible. The basic idea of taking a turn is to go in slow and come out fast.

YOUR EXIT SPEED OUT OF A TURN IS PROBABLY THE SINGLE MOST IMPORTANT FACTOR IN GOING FASTER AND REDUCING YOUR LAP TIMES.

The proper sequence of events in negotiating a turn are as follows:

1. At your braking point, apply the brakes with the ball of your right foot.
2. Downshift if necessary.
3. Finish braking at the turn-in point of a turn.
4. Now, in the corner itself are three basic parts:
 - A. With proper hand position on the wheel, turn in to the clipping point of the turn and smoothly apply the throttle. (ENTRY)
 - B. As the car turns in, apply more throttle without upsetting the balance of the car and clip the APEX or clipping point (innermost part of a turn).
 - C. Unsteer the car from the apex and apply full power as soon as possible. Straighten out the steering wheel as quickly as you can as you EXIT the turn.

Remember: The fastest line is a STRAIGHT LINE. Everything being equal, the fastest driver is the first to straighten out the wheel and the first to apply maximum power.



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Proper Entry, Apex and Exit of Corner

The Early Apex is the usual line through a corner that most people take. It is the shortest way through a corner but not the fastest or most stable.

Proper Late Apex is the fastest way out of a corner and the most stable. The car will get most of its cornering done during the first third of the corner under trailing brake, and therefore you will be able to give it full throttle much earlier and will allow you maximum exit speed. In most cases, you will be able to achieve full throttle around the apex area rather than waiting for the exit area.



Understeer and Oversteer

(Cause and Correction)

Understeer - a front wheel skid

Cause: 1. Too much speed in a corner in inherently understeering car (front engine).

Correction: 1a. Correct by easing off throttle half a throttle setting to transfer weight to front wheels, add steering to get proper line back.

Cause: 2. Too much braking causing front wheels to lock.

Correction: 2a. Ease off brakes to get front wheels unlocked (or rolling), add steering to get proper line back.

Cause: 3. Violently spinning front wheels (front wheel drive car).

Correction: 3a. Ease off throttle to stop front wheels from spinning and to transfer weight to front tires, add steering to get proper line back. Then get back on throttle immediately, 1/2 to 3/4 throttle, (adjust as necessary).

Oversteer - a rear wheel skid or slide

Cause: 1. Too much speed in a corner in inherently oversteering car (rear engine).

Correction: 1a. First add steering quickly into direction rear end is sliding. On dry pavement, add some throttle to transfer weight to rear wheels. When rear end starts coming back, correct steering quickly into opposite direction to counteract second skid. As car comes out of second skid, bring wheel smoothly back to straight and continue on proper line.

Cause: 2. Too much braking causing rear wheels to lock.

Correction: 2a. Come off brakes quickly and add steering quickly into the direction the rear end is sliding. When rear end starts coming back, correct steering quickly again to gain proper line back.



Understeer



Oversteer



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Cause: 3. Violently spinning rear wheels (rear wheel drive car).

Correction: 3a. Ease off throttle to stop rear wheels from spinning, and quickly add steering in the direction the rear end is sliding. When rear end starts coming back, quickly add steering again to gain proper line back. If on wet pavement, correct steering very quickly with full lock (as far as the wheel will turn) into the direction the rear end is sliding, ease off throttle and stay off brakes altogether, letting the sidewalls scrub off speed and gain adhesion. Keep correcting steering wheel until slide is caught and you can gain proper line back.



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The Contact Patch

The contact patch is the portion of your tire that is actually in contact with the track. It is relatively a small portion of your tire tread.

Standing Still

When your car is standing still or at a constant speed, neither accelerating nor decelerating, it has an even weight distribution and relatively equal contact patch on all four corners of the car. This is very stable especially if your not moving.

Acceleration

Under acceleration the contact patch weight distribution shifts to the rear of the car. The contact patch on the rear tires increases while

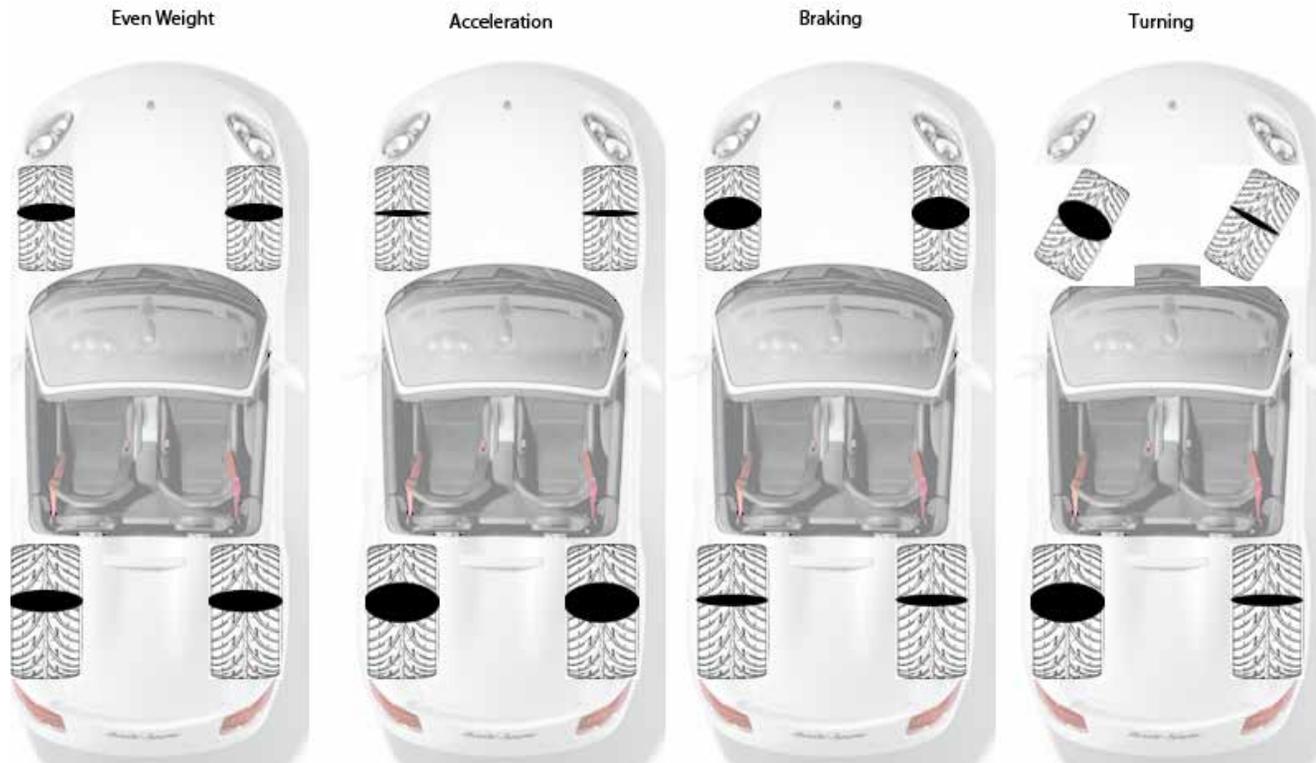
the contact patch on the front tires decreases. This give the rear tires more traction than the front tires.

Braking

Under braking the contact patch weight distribution shifts to the front of the car. The contact patch on the front tires increases while the contact patch on the rear tires decreases. The front tires have more traction or grip than the rear tires while braking.

Turning

When in a turn the contact patch weight distribution shifts to the outside tires. If you are making a right turn, the weight, contact patch and traction are shifted to the left side tires. The right side tires contact patch decreases as does the weight on those tires.



Track Awareness

Who's Around You?

It is very important that you are always aware of who is around you. Who is in front of you? Are you faster than them? Are they at full speed? Is there more than one car ahead of you? Is there a car behind you? Are they faster than you? Are there others car behind that car? Are you coming to a passing zone? Last but not least, is the corner working showing a flag?

Giving a Point By

1. If you are the car being passed:
 - A. As you approach a turn and you wish to let a faster car by, signal the driver to pass to your left and make sure you give him enough room to make the pass safely. Never signal a pass and then race the passing car to the corner! Check your mirrors before turning in to the turn to make certain there are no other cars also attempting a pass.
 - B. If you want to let a faster car by on the exit of a turn, ideally you should move to the right and allow the overtaking car to pass to the left. Signal if you can but maintain control of your vehicle.
 - C. It is always advisable to communicate with the other driver through the use of hand signals, but your first concern should be to maintain control of your car and if you need both of your hands on the steering wheel to maintain that control, then don't signal.
 - D. When in doubt, maintain your line! The overtaking driver will get by safely if you maintain a predictable line.

Receiving a Point By

2. If you are the overtaking car, you have the responsibility of making a safe pass. However, good sportsmanship dictates that all drivers in a passing situation have the responsibility of giving each other "racing room" to complete a safe pass. When in doubt error on the side of safety and back out of the pass. You will have another opportunity at the next passing zone.



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Safe Passing

If you see a car come up behind you, let them past. If you are truly faster they will return the favor in the next passing zone but don't let the type of car behind you dictate if you give a point by or not. There are many ways to a quick lap time and just because a particular car is very slow down the straightaways, does not mean that you are not holding them up in the corners. There is nothing more frustrating than being held up in the corners so if in doubt get well out of the throttle and let any car close behind by. If you might learn something following them and if you stay glued to their tail, they will return the point by in the next passing zone thus starting the entertaining of Cat and Mouse that is what racing is all about.



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General Information

Before going out onto the course, have a checklist for you and your car:

1. Empty your pockets of tools, pens, pencils or anything that might cause discomfort.
2. Use the restroom! A full bladder can become painful and dangerous.
3. Remove dentures, chewing gum or anything that could become lodged in your throat in case of an accident.
4. Check your car: lug nuts, tire pressures, gas, all fluids, etc. Make a check list!
5. Adjust your mirrors before you start onto the course. Know your blind spots. Adjust for a minimal amount of head movement. Being able to see and know what is going on behind and on each side of you can help you make the proper decisions that could be necessary.
6. If so equipped, decided before you head out on track if you want to turn the traction control off. As a beginner driver, it can provide a nice safety net but as you begin to go faster, the traction control can start to hold you back and severely limits the ability to learn car control beyond the limit of grip.

AS A RULE OF THUMB: ALWAYS CHECK YOUR MIRRORS BEFORE COMMITTING YOURSELF TO A TURN AND AFTER YOU EXIT EACH TURN.



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Out On The Course

Course Entry

1. When entering the course, wait for instructions from the entry/re-entry person. If they have their hand up holding you for a moment, don't look back up the course, watch the re-entry person until you get the permission to go. Once on the track surface, stay to the same side of the course you entered on, even if it's the slower part of the track, until you have built enough speed and checked your mirrors for a clear track. Then you can move over to the faster part of the course.
2. For the first lap or two, take it easy. Warm up your tires, brakes, engine, gearbox, etc., especially you.
3. Check out the course and the off-course conditions for ruts, embankments, fences, etc. Look for possible safe escape routes.
4. Know the meaning of all the flags. Know where the flag stations and corner workers are located.
5. Always be alert for changes in track conditions. It is sometimes very difficult for the corner workers to see an oil spill or such on the track.
6. Concentrate on the proper "line" into turns, proper apex and proper exit for maximum speed. Take it a step at a time. Speed comes with smoothness and consistency.

Course Exit

1. At the end of a session or whenever you have made a decision to come in off the course, as you enter the last turn preceding the pit lane or course exit, put your hand out the car window and up in the air to indicate that you are leaving the course and are no longer at high speed. Reduce your speed and come in off the course safely.
2. If possible, stay out of the "racing" line.



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Track Safety:

Flags: They signal what is going on on the track

WAVING YELLOW FLAG - Signals an immediate hazard on course
DRIVER: slow down now, change line, be prepared to stop NO PASSING

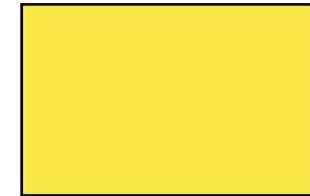
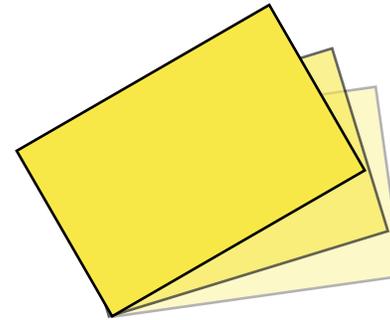
STANDING YELLOW - Signals cautions for potential hazard
DRIVER: slow down, be alert, NO PASSING

SLIPPERY CONDITIONS (OIL) - Signals oil, water, etc. on track
DRIVER: slippery conditions require caution, reduce speed

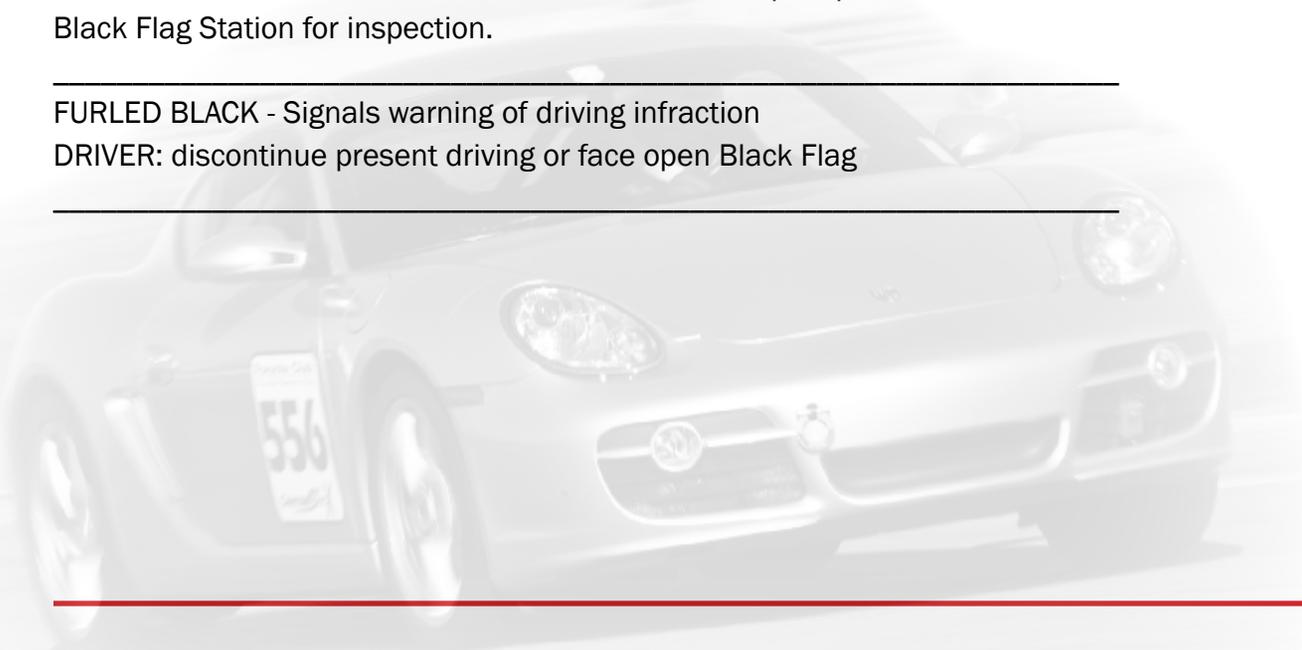
PASSING - Signals a potential passing situation
DRIVER: check rear view mirror for overtaking car; give hand signal and prepare to be passed

MECHANICAL PROBLEM - Signals a possible malfunction of a car
DRIVER: slow down, drive off line and exit course into pits, proceed to Black Flag Station for inspection.

FURLED BLACK - Signals warning of driving infraction
DRIVER: discontinue present driving or face open Black Flag



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OPEN BLACK - Signals a driving infraction

DRIVER: proceed immediately to the pits via designated course exit and report to the Track Steward at Black Flag Station

WHITE-RED CROSS - Signals a service or emergency vehicle is on track

DRIVER: use caution and prepare to avoid vehicle when observed, look for Waving Yellow at turn previous to vehicle

RED - Signals an On-Track Emergency

DRIVER: slow down smoothly after checking rear view mirror, pull over and stop. Remain belted-in, ready to drive

CHECKER - Signals the end of last lap and begins Cool Off Lap

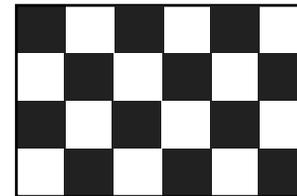
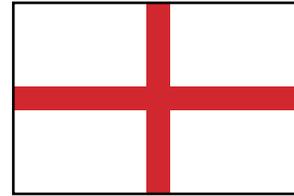
DRIVER: proceed to the pits via the designated exit at reduced speed

GREEN - Signals the course is clear

DRIVER: GO! Course is clear

DRIVERS SHOULD ACKNOWLEDGE FLAGS BY A

HEAD NOD OR HAND WAVE TO THE WORKER DISPLAYING IT



Corner Workers

Corner workers are your life line. They are your communication as to what is happening on the track..

It is important for you and the safety of your fellow drivers that you know where every corner worker is and that you are constantly watching for signals from the corner workers. It is imperative that you know the meaning of all flags and know how to respond to each flag. Certain flags such as a checkered flag or black flag should be acknowledged by you with a wave so the corner workers know you have seen the flag. Communication goes both ways.



If You Go Off Course

1. With an off course mechanical, pull off the track surface as far as possible and away from any oncoming traffic. Do not get out of the car. Do not work on your car! Signal a corner worker as to your need of a tow truck. Extend your arm and pull your hands towards your chest indicating you need a tow.
2. If you lose control of your car and merely go off course, once you regain control proceed toward the track surface, place your arm in the air to inform the corner worker that you are ready to enter the track. Wait for instruction from the corner worker. As you enter the track stay on the same side you entered from so as to not cut in front of other traffic. If there is no corner worker to assist you in re-entry to the track, then check for oncoming traffic and enter on your own. Use good judgment! Even if you get the go ahead from a corner make sure the track is clear. You will receive a black flag, head to the flag station in the hot pits.
3. **STAY IN THE CAR**, it is the safest place to be unless it is on fire or you are instructed to leave the car by a corner worker.



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PDS Instruction

Understanding Your Instructor

Be sure that you understand your instructor. If you do not understand any terms your instructor uses ask him to explain. Make sure you do what the instructor tells you to do, this is for your safety, the instructors safety and the safety of the other drivers. Ask questions and make sure you are absolutely sure what the instructor is saying and what you are supposed to be doing. If you have a difficult time understanding your instructor or you just don't seem to click with them, contact the CDI and they will assign you another instructor. Sometimes people just don't work well together. It is better to ask for another instructor than have a bad experience and waste a track day in frustration.

Yellow Card

If this is your first event pick up a yellow card from the registration desk. You will need 4 days signed off by an instructor to receive your PDs license. Keep the yellow card in your car and make sure you have it with you at each PDS event you drive in. Once you have 4 signatures turn it in to the CDI who will sign you off and you will be able to complete a form for your PDS license. At that point you can drive in PDS events without an instructor. You may also be eligible to drive in Time Trial events with an instructor.



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Advanced Techniques

Toe-Heel Shifting

The Heel and Toe technique is the ability to use three pedals (clutch, brake, accelerator) with two feet. It really should be called “Ball of the Foot/Side of the Foot”. Let’s see why:

1. The objective of “heel and toe” is to be able to brake for a turn, select the proper gear for that turn, do it while braking, and then apply the throttle through the turn for maximum control of your car. While this is a “racing” technique that allows you to downshift while under braking and then go back on power, it is very effective on the street especially in situations where you must be in the proper gear at the proper time in order to perform an evasive maneuver.
2. In a situation that requires braking and a gear change, remove your foot from the accelerator and step on the brake pedal with the ball of your right foot. The ball of your foot gives you the most “feel” and allows you to control the amount of pressure you are applying to the brakes.
3. The brakes should be applied smoothly while increasing the pressure as is needed. Do not jam on the brakes suddenly as this may cause one or more of the wheels to lock up causing a loss of car control.
4. When the speed of your car has been reduced sufficiently to select the next lower gear, depress the clutch with your left foot while applying the brakes with the ball of your right foot.
5. At the moment the clutch disengages, the engine speed will drop to an idle. If you were to change gears now and let the clutch out, the engine may be at 1000 RPM’s while the transmission is turning at 4,000 RPM’s. When the clutch engages something has to give; either you will slip the clutch and cause your car to jerk or you may lose traction to the rear wheels. In either case, you will upset the balance of your car and could lose control.
6. Therefore, just a split second after depressing the clutch and before the engine speed drops too much, roll your right foot over onto the accelerator pedal using the right side of your foot, and while maintaining pressure on the brake pedal, “blip” the throttle.
7. The “blip” will get the engine RPM’s up so that as you change gears and let the clutch out, the engine and transmission will be going the same speed and the gear change will be smooth.

Here is a link to a video on toe-heel down shifting. <http://www.youtube.com/watch?v=VsDKKKchALO>

Here is another video with Ayrton Senna driving in street closes and loafers. His foot work is worth watching the video. <http://www.youtube.com/watch?v=96ekbvjyr0g>



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Trailing Brake Technique

This is the technique of controlling abrupt weight transfer while cornering.

Before you enter a corner, you squeeze on brakes gently increase brake pressure, continue trailing brake with progressively less pressure into the first

third of the corner, release brake smoothly, apply throttle gently, then progressively harder to accelerate out of the corner.

Left Foot Braking

Left braking is useful when you need to brake but not down shift for a corner. You simply use your left foot to apply the brake. This allows you to get on the gas faster or even be on the gas and brake at the same time to control the car through the turn. When you are first learning this technique it may slow your lap times down a little. Once you master the technique you'll be faster than you competitors who don't use left foot braking.



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Preparation Check List

The following is a checklist of some of the areas you might wish to cover in your inspection. Please feel free to add any other important areas you may discover.

Engine

- Fresh oil and check level
- Clean air filter
- Check battery level & connections
- Check motor mounts
- Check for loose bolts & wires
- Check all hoses and lines
- Check brake fluid
- Check coolant level
- Check exhaust system mounts

Front Suspension

- Check all mounts and bushings
- Check sway bar mounts and adjusters
- Check shock mounts, seals and adjustments
- Check brake pads, rotors & lines
- Check bearings, steering play and mounts
- Re-torque lug nuts, tape wheel weights, remove hub caps
- Inspect tire tread and sidewalls
- Check alignment settings

Rear Suspension

- Check bolts and bushings
- Check swaybar mounts and adjusters
- Check shock mounts, seals, adjustment
- Inspect brake pads, rotors and lines
- Re-torque lug nuts, tape wheel weights, remove hubcaps



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Interior

- Check fire extinguisher
- Inspect safety harness and cotter pins
- Check seat brackets
- Check pedal travels
- Remove loose objects

Exterior

- Check all trim attachments
- Check hood and deck closing mechanism
- Apply proper numbers and classification ID



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An Explanation Of Some General Terms In Racing and High Performance Driving

Apex: That point in a corner when the inside wheels are at the inside edge of the turn. It may be a long or short distance.

- a. If apex is too early, the road will be used up too soon as you exit the corner and/or the throttle cannot be applied as soon as it might for better exit speed out of corner.
- b. If the apex is too late, all of the road will not be used and/or maximum power will not compensate for excessively slow entry.
- c. The proper late apex is illustrated and discussed on the following page. Line of Road Course: Imaginary path of a car as it maneuvers around a track finding the proper apexes and using the entire width of the road to your best advantage and maximum speed.

Drifting: Car has lost traction and is gaining speed, while running out of road.

Sliding: Car has lost traction and is losing ground or running out of road.

Drafting: Following another car very closely, in the “bubble of air” he creates, making it possible for you to achieve a higher rate of speed, lowering your wind resistance. It will also save some fuel. This is also referred to as “slipstreaming”. **Power Slide:** Controlled slide with throttle, maintaining proper line through corner (used mainly on hairpins or slow turns).

Camber of Road

Positive Camber: (a banked corner): Outside tires maintain excellent traction. In the event of loss of traction due to locked wheels or a spin, the car will go downhill.

Off Camber: The road is going away from you, thus causing loss of traction. This may cause a front or rear wheel slide.

Understeer: A car understeers or (“pushes”) when you turn the steering wheel and the car doesn’t turn in as much as you have turned the wheel. It has a tendency to go straight due to lack of traction on the front tires. Understeer can be caused by entering a turn too fast and/or turning in too late or too suddenly. To correct for understeer, gently let off on the accelerator. This move transfers the weight of the vehicle forward onto the front wheels thereby increasing front traction.

Under more extreme conditions, you may even have to apply the brakes in order to transfer a greater amount of weight to the front tires. **DO IT SMOOTHLY!** If you get the front wheels locked up you will lose control of your steering and you will go straight or in the direction of your vehicle’s momentum.

Oversteer: A car oversteers (or is “loose”) when, as you turn the steering wheel, the car wants to turn more than what your input calls for. The rear of the car starts to slide out due to loss of traction.



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Oversteer may be caused by lifting from the accelerator while turning and/or braking into a turn, especially if either are done too severely. Severe braking while turning, causing the rear wheels to lock up, will create a strong oversteer condition usually ending in a spin.

To correct for oversteer, turn the steering wheel in the same direction that the rear of the car is headed. This is called “opposite lock”. Then gently press on the accelerator to transfer weight to the rear of the vehicle. As the rear of the car comes back into line, straighten the steering wheel and accelerate. It is very easy to “over correct” an oversteer condition with the end result being that the car will straighten out and then spin the other way. Once you gain traction on all four tires, you will end up going where the front wheels are pointed.

Neutral Steering: Our goal is to keep our car in a neutral steering condition at all times so that it is doing exactly what we tell it to do. By having a basic understanding of over/understeer and weight transfer, we can balance our car through proper use of the brake and accelerator.

ABOVE ALL ELSE BE SMOOTH. IT PAYS!



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NOTES



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