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This article will take you through one of the more challenging road courses in the western United States, a lap of the 2.8 mile, 21 turn auto competition course configuration at California Speedway in Fontana, California, and links to a video for a visual sharing of the lapping experience.

Overview: Added to the inventory of road racing courses in the United States in 1997, the distinguishing features of California Speedway are not to be found in dramatic elevation changes or off camber turns, but rather in the 75 foot wide, 11 degree banked front straight of 3100 feet feeding into the 14 degree banked oval NASCAR Turns 1 and 2 (the “Roval”), sustained braking and multiple gear downshifts, high speed lateral weight transfers, and the comparatively high speeds attained for road cars. Exiting the Roval the driver carries down the 3 degree banked back straight not quite half way, about 1,100 feet, then turns into the infield course section, then winds back and forth through 130.7 acres, eventually connecting into the front straight at the exit of the NASCAR Turn 4. While the course guide says the configuration is 21 turns, my perspective is that a chicane or horseshoe hairpin should be counted as 1, and not 2 corners, that the Roval is one big beast...but not two corners....and thus while reasonable minds can and do differ, for a driver it really presents as closer to 13 or 14 corners, and eight to ten segments.

The 1121 foot base elevation does not vary on this flat course by more than a few feet, and most of that is encountered on the banked track surface of the front straight and the Roval. The course alternates hard accelerating high speed runs with sharp double 90 degree compound corners, and hairpin corners, at the end of long straights that place importance on sustained extreme braking, suspension, and cooling of engine, steering and brakes. A groomed and modern facility, the track is well designed and as “safe” as a road racing circuit may inherently be...but it still presents risks associated with concrete k-rails, perimeter walls, and stacks of tires, coupled with some of the highest speeds to be experienced on any circuit in the US, especially for the powerful cars. A normally aspirated Miata is going to give giddy up fits to the driver on this track configuration, not to mention cramps in the right foot and calf from holding the throttle pedal to the floor for extended periods. A high horsepower car will have the driver experiencing circulatory challenges from the waist down due to excessive cheek clench the first few times though the banked turns. The “Roval” run down that long front straight and through the banked Turns 1 & 2 is an experience like no other for most road racers, and demands serious attention to safety, both mechanical and mental. Many high performance cars off the showroom floor have the capacity to reach velocities in excess of 160mph on that front straight, and modified street cars to 180mph or more....and this makes preparation of suspension, aerodynamics and handling, and driver skill, a much greater matter of concern compared to many tracks where brief attainment of 130mph is likely to be the best one can coax out of their machine. A comparatively minor glitch at 80mph can be catastrophic at 150mph, and when you confront that challenge at such high speeds once or twice per lap, ten laps per session, five sessions in a day....both you and your equipment are in harm’s way fifty to one hundred times...and had best be properly prepared. That does not make the preparation any different than what you should do for any track day experience...just perhaps a bit deeper. Understand the limits of your equipment and yourself before you hit the grid. For the stock set up, and intermediate to

advanced driver at the wheel experiencing the Roval on his or her own for the first time, (and no matter what your experience level, you should take a right seat ride a few times around before you take this circuit behind the wheel on your own, and do it at the wheel with an instructor by your side), a corner entry velocity of the lesser of what you think you are comfortable with based on your driving experience and skills, and certainly no more than 125mph, is what you should consider. As with all corners, take it slowly and work your way up in speed. The difference with the Roval is that if you spin you don't necessarily wind up backwards in a cloud of tire smoke, or ten feet off the asphalt in the grass and dirt, like one does on many road courses...but caroming off a concrete wall at triple digit speed. So use your head to think through your set up and approach before you climb into the car. Leave the ego home when you go to Cal Speedway for the Roval. (Beginner's note: The Roval is probably the safest turn on the course for the novice who is with an instructor. It is wide, banked and smoothly paved, and you just keep the speed down. The challenge for you will be to focus on the infield corners and work on your driving line, braking points, turn in points and other skills. Just cruise through the Roval and enjoy the thrill of driving where the NASCAR legends drive.)

The Roval of Turns 1 and 2. As you exit Turn 21 you merge into the lower section of the front straight of the NASCAR oval at the exit of that circuit's Turn 4. Up shift to fourth gear at or slightly before entering the front straight and gradually track out to the high speed line at about center track or perhaps one car width above. There is no advantage to going higher and closer to the wall, and indeed the accumulation of dust and "marbles" (those clumps of melted tire rubber that are sloughed off with higher wheel speeds and thrown upon the track and the cars behind) reduce the adhesion of your car, so it is best to keep at least two car widths away from the wall. (Beginner's note: With 75 feet of track width you may have some indecision about where to take your line. You can experiment, but don't wobble once you set your line at the beginning of the straight, hold steadfastly to the line you picked. Change it the next time around, as you may have faster cars coming up behind you, and it can be dangerous to be unpredictably "lane changing"). As you smoothly drift up to your line and towards the wall, holding the accelerator to the floor, up shift at just before redline to fifth gear and then again around the start finish line to sixth gear. It is a rare course that puts the G35, or any car for that matter, into top gear and holding the accelerator down to the floor for any period of time, but this track section is one of them. You will notice from the track map that the "straight" is really the curved part of the letter "D", as this track is described as a D shaped oval, and while not as dramatic a curve as the type face in this article, you will definitely see and feel the track curvature as you literally scream down the segment at what for most of you is the fastest speed, legal or otherwise, you have experienced in a car. Hold the accelerator down and concentrate your vision far ahead into the Roval corner to set your entry line properly. All that talk and reading you have experienced about taking the most efficient driving line suddenly becomes one of the more fascinating and importantly relevant parts of your personal knowledge base, as the concrete wall and barrier fence at the top of the track looms before you; indeed it almost feels as though the wall is coming to you rather than the other way around...and coming fast. Most cars will be at their absolute maximum velocity, or very close to it, at this time. This will be due to a speed governor programmed into the ECU, or the horsepower and torque of the car is no longer able to

overcome the resistance of the air. The G35/350Z will be at over 150mph, and boosted versions with a reprogrammed ECU chip can be at 175 mph or higher as the entry to Turn 1 presents itself. Aerodynamic stability is a major consideration and inputs to steering and braking, even lifting throttle, are of critical import relative to the same inputs at 50mph lower speed, and control can be a matter of thin margins. Suspension capability and tire grip is also critical, as the springs will compress more at high speed against the banked surface in the corner, and lateral force will be pushing you towards the wall on the high side. Be steady, be smooth, be firm, but be gentle, and above all be “aware” of what the car is doing and why it is doing it, so you do not feed an incorrect input into the dynamics with either your hands or your feet. If you feel the need to hiccup, belch, whimper or otherwise squirm, stretch, twitch or scratch, get it over with prior to turn in. Once you commit to the corner at the limits, there are few options for significant alteration to your plan of attack. You should not be hearing your tires squeal in this corner, and if you do, take it slower. (Beginner’s note: The operative concern here is “the limits” of you and your car. Stay well below them and this corner is just a cool slingshot run and comparatively safe.)

As you begin your set up to corner entry for the Roval, mark your velocity, your turn in point, and smoothly bleed speed to what you want for corner entry velocity. At high speed a braking for entry to this corner is not necessary, as the sheer resistance of the air will act like a brake when you lift throttle. But if you do feel the need to brake, or lift throttle, do it smoothly and gradually, don’t stab the brake or lift throttle totally or abruptly. Otherwise you will find the nose of the car pushing down as if from a giant invisible hand from the aerodynamic force, and the rear lifting up as you begin turning, and that forward weight transfer is conducive to losing rear wheel traction and sliding the rear of the car. Instead, you want to slough speed gradually (it will not take long with the air resistance at that velocity!) and then ease into the throttle to settle the rear of the car as you turn into the first corner. Mark the driving line (you can make it anywhere you are comfortable getting around, but initially consider keeping it at not more than 1 and a half car widths above the center line), and keep your eyes up looking through the corner. Otherwise if you look down the nose of the car at the track surface and then raise your head you will be looking right at the wall and it can promote a moment of indecision, hesitation, or hypnosis, leading you in just an instant to drive up the bank towards the wall, and perhaps over input right to left steering in response, putting greater demands on the adhesion of the tires. Sliding butt first into the wall is not and should not be part of anyone’s plan for the day, so understanding what leads to it helps you to understand what you need to NOT do, which can be just as important as understanding what you SHOULD do. Hold the steering input steady on the line, keep the throttle steady, keep your head and eyes up throughout, and mark the exit apex point low on the left. Unless you start to under steer or “push” the front tires through the turning input, do not lift off your maintenance throttle, indeed if anything be breathing on just a touch more. The sensation of speed, lateral push to the outside wall, roar of the engine reverberating off the wall and back into the passenger side open window, g-force pressure and compression of the suspension against the banking is unique, like nothing else you have ever experienced on a sustained basis at most other track layouts. Stay steady, keep your

breathing controlled against the g-force and do not become fixated on the wall. Smoothly maintain your driving line and sweep down off the banking low and into the apex point, and be squeezing back on to full throttle as you roar down the high banking into the back straight. The track out lateral momentum of the corner pushes you towards the concrete wall on the right. You may be going about 135 to 140mph at this point, and in a boosted car 165mph or more (the acceleration coupled with a bit of gravity assist coming down off the banking gives the car a noticeable “goose” even with the high speed resistance of the air.) Don’t fight the drift momentum taking you to the wall, but don’t get closer than three to five feet either. There is a hard braking segment before Turn 3 requiring you to shed 80 to 110mph before the infield section, and you don’t want to waggle your nose or tail into the wall, a risk that is increased by the “marbles” and grit we talked about earlier. (Beginner’s note: Take this section with an instructor several times, indeed as many times as you need. If possible, take it riding in the passenger seat with an instructor driving a few times as well, before you go solo. This is no place to feel embarrassed about going slower than you think others may be going. The “pucker factor” of the Roval is unique, and while we don’t need to debate whether it is surpassed by other track challenges around the world, it certainly ranks high up the scale. So respect it and yourself, and understand both it and yourself well, before you challenge it.). As you gain more experience with this corner it will become one of your absolute favorite experiences in track running. There are certain corners that require great respect and appreciation for what is going on, and which have a tendency to collect the high intermediate to advanced driver whose concentration or respect wanes ever so slightly, or whose skill sets are not developed sufficiently to recover car control instantly. Turn 9 at Willow Springs, Turn 6 at Laguna Seca, and the Kink at Road America are among this category of hard consequences for a high speed mistake type turns, and the Roval at California Speedway deserves a place among them.

Turns 3 and 4. These are a pair of linked 90 degree corners leading to a medium-short straight. Therefore, maximum corner exit speed from Turn 4 has priority over maximum velocity into and through Turn 3. Sacrificing maximum corner speed in Turn 3 to set up Turn 4 is conceptually simple as a conclusion, but smooth execution is quite challenging for two reasons. One is the temptation to carry the high speed from the straight following the Roval as long and deep as possible, contributing to a corner entry speed to Turn 3 that is too high. At best this will push the car too far to the right exiting Turn 3 and out of position to follow the widest and optimal arc for Turn 4. That may then require another stab on the brakes between Turn 3 and 4, and at a minimum later application of throttle. (Beginner’s note: If you have any doubt that you cannot control the car safely through the corner due to excessive speed, the smart and safe option is to not initiate turn in, and to just straight brake and run through the cones that cross the long back straight, turn around and wait for the corner worker to direct you back on to the circuit.) The second challenge is accurately hitting your initial braking point to begin the attack on the corner, due to the high velocity of the car, and efficiently applying the sustained maximum threshold braking to drop between 80 and 110 mph, the three or even four gear downshift during the braking run, and hitting the turn in point precisely when you have reached the velocity you want as you squirt through the stacks of tires on the left and right sides of the entry and exit to Turn 3. (Did I mention the concrete wall just a couple of feet off to

the right side while all this is going on?) If you do not heel/toe downshift yet, this is a corner that really benefits from that technique. Trying to brake, then lift brake pedal to blip the throttle and downshift and re-brake, and repeat two times or even three, will unsettle the balance of the car, pitching it forward and backward. An option can be to apply sustained braking and wait until you are slowed to just before corner entry and make one direct downshift from sixth gear to third or second gear, with proper attention to grabbing third and not first or fourth gear by mistake! Set this corner entry from the far right edge of the wide back straight (with a safe distance between you and the wall), plan for a very late entry and apex point to Turn 3 to allow entry to Turn 4 from the left side of the short straight section linking Turn 3 to Turn 4. As you complete your braking and begin turn in to Turn 3 you will be squeezing back on throttle smoothly to begin accelerating through the corner and the transition from the left edge entry to Turn 4. The objective is to be at wide open throttle at the apex of Turn 4 simultaneously with having the tires close to the limits of adhesion through the widest possible radius arc in the mid corner section of Turn 4. The car will track out to the left side of the surface, then proceed to up shift to fourth gear and immediately apply a touch of steering to glide smoothly back to the right edge to set up for the right to left horseshoe hairpin corner of Turns 5 and 6. The demands on your braking equipment are intense here, and also before the compound Turns 9 and 10, and again at Turns 13 and 14, so you should be alert to the possibility of brake fade. For intermediate and advanced drivers, be aware that the heavy G35/350Z can overtax your braking system in just a few laps on this circuit. You may need to upgrade to a larger rotor and caliper brake kit, install braided stainless brake lines and use a top rated racing brake fluid if you are going to run hard for ten consecutive laps during a session. (Beginner's note: Negotiating this corner, indeed all corners, should focus on safety and smoothness before speed. A lot is happening for this corner that happens in every corner, there is just "more" of it. More speed, more braking, more gear downshifting. Give yourself the room and time you need to manage this corner smoothly, concentrating on keeping the balance of the car stable. Steady brake pressure while downshifting three or four times in a straight line and arriving at your corner entry turn in point at the desired speed, with a slight margin for safety, is a good initial challenge, together with picking a precise initial braking and turn in point.)

Turns 5 and 6. This hairpin presents a widened 180 degree corner that can be taken as a single very late apex corner, with some extra paved track out room on the right edge at corner exit to exploit. Straight brake before corner entry, downshift to third gear, and look over your left shoulder to spot your exit apex. Keep your focus on the corner apex and bring the front of the car around, squeezing throttle and feeling and listening to the tire adhesion all the way through the corner. This is an excellent corner to learn the language of how the tires "talk" to you about what they are doing and how much adhesion they have left to give you. The camber is flat, so be careful that you do not induce throttle on over steer in your exuberance to get as much corner exit speed as possible. There is some room to counter steer and catch a slide, and a bit of deliberate rotation is fine, but you need to be ready with quick hands to do it, and loss of rear wheel adhesion is common here. On exit hug the right side of the track and up shift to fourth and then fifth gear as you proceed easterly towards the high speed chicane of Turns 7 and 8. (Beginner's note: This corner has a lot of run off room and a relatively slower speed,

so you can work a bit more aggressively here at learning the limits of your tires and counter steering to catch rear rotation from over steer, or experiencing under steer and how to breathe (not lift) throttle and straighten steering a bit to regain front traction. You may also experience “lift throttle” over steer in this turn by too rapidly lifting off the gas and with the combination of weight transfer pitching forward and the lateral g forces of the corner.....exchange in a very short instant the experience of under steer for over steer. This is a good corner that can teach you a lot about commanding a car through without too many serious consequences if you lose control, as long as you immediately put both feet in should you spin.)

Turns 7 and 8. The Chicane is an exercise in transitioning weight from left to right and back to left as smoothly yet briskly as you can while maintaining maximum velocity through the corner. You have a reasonable amount of room on corner exit from Turn 8 to collect your balance, so the key is to be patient and wait on your turn in to Turn 7, and resist the temptation to “crab” early into the corner entry. Done properly you can maintain throttle, or just lift a little before turn entry and then ease back on to keep the rear settled, and “thread the needle” through this corner at over 100mph. (Beginner’s note: Concentrate on learning to induce the transfer of weight from side to side gently, not on going as fast as you can. You want to be able to make the car “take a set” predictably before you start increasing velocity here, or else you can find yourself going off track to the left on exit from Turn 8 at high speed.)

Turn 9. As you squirt through the chicane, it then transitions into a gentle but diminishing radius arc of Turn 9, whose primary purpose is to provide a braking zone and set up for the sharp button hook corner of turn 10 which leads to a long infield straight section. Therefore you want to maintain velocity out of Turn 8, accelerating further into Turn 9, and then downshift from fifth to second gear under hard braking to the slowest corner on the course. Because the corner is a gradual curve leading to a very slow and sharp hairpin corner, you must be mindful of the instability perils of downshifting and braking while asking your tires to manage any kind of lateral grip challenge from turning. One approach is to be far left on the surface, make an initial turn in and straighten steering to a target point for making a second turn in to the button hook hairpin of Turn 10, and then brake and down shift in a straight line to the target turn in point for your corner entry. (Beginner’s note: This is a deceptive corner due to its shape, and you can easily find yourself running out of track surface, braking force, foot speed/coordination for gear changes and directional options, all at the same time. Approach this corner slowly at first until you become settled into the optimal driving line.)

Turn 10. This corner is slow, but leads to a medium short straight, through a challenging acceleration chicane of Turns 11 and 12, and then continues to a medium infield straight. Therefore, a fast corner exit from Turn 10 carries benefits far down the infield and is to be prioritized. A bit of trail braking at the end of Turn 9 can rotate the rear of the car and get the nose pointed across the corner apex just a bit earlier and help you be on throttle sooner. As you track out on corner exit to the left edge of the pavement, you will up shift to third and then fourth gear, and prepare to engage the combination of Turns 11 and 12. (Beginner’s note: This corner easily lures a driver into a much too early apex, which will

take you off the surface on the left side, albeit at very low speed, unless you slow even more. The key here is to wait on the turn in until very late.)

Turns 11 and 12. The ideal of taking this compound corner is to be WOT in fourth gear. The reality is that it is very hard to keep the pedal down to the floor at corner entry to Turn 11 as the turn in is abrupt and if you cannot keep the adhesion you will clip the cones across the apex of Turn 12 on your left. Avoiding early turn in on the corner entry to Turn 11 is the challenge....you must "wait" on the turn in to get a clear space through the gap. You have to transfer the weight to the left side smoothly, but make the transition of weight quickly. There is plenty of track-out space on the right side after Turn 12 corner exit, so plan to use that space for a wide arc under acceleration into, through, and exiting the corner. Work up your speed into this corner gradually so that you can feel the adhesion of the tires and find out how much speed you can manage to throw into the entry to Turn 11 and then smoothly transfer from left to right without running out of track surface on the right edge as you exit Turn 12. If necessary, you can "breathe" throttle lightly before Turn 11, but it is unlikely that will be necessary unless you are in a car with very high horsepower or a too soft suspension. Done properly, you will have a full running acceleration from the very exit of Turn 10 all the way down the infield to the entry to Turn 13. (Beginner's note: This corner, like many, will not seem too difficult at first because you are not likely to be going fast enough at turn entry to test the limits of adhesion to your tires and suspension, unless you enter the corner too early. Work on the balance transfer element, and as your corner exit speed from Turn 10 improves, you will find this corner holds increasing challenge and reward.)

Turn segments 13, 14 and 15, 16. As you finish your track out from Turn 12, smoothly work your way across to the left edge of the track surface, up shift to fifth gear, and prepare for a very hard straight braking run from over 120 mph before entry to a "double" compound corner series, starting with a 90 degree left to right corner, which is complicated by the next corner that is right to left and about 90 degrees and slightly off camber, connecting immediately to another right to left corner of about 40 degrees, that itself immediately blends into a larger radius left to right corner of about 40 degrees. This is not a series of corners that is going to gain the driver a lot of time, as much as it can cost a lot of time. A slower entry to Turn 13, followed by a smooth acceleration into and out of Turn 14, increasing gradually through the curvature of Turn 15, and then transferring weight from right to left under continuing acceleration through Turn 16 is the objective. If you hammer the throttle too aggressively you will break traction through here easily. The corners of Turns 13 and 14 are marked with raised curbs, and handled imprudently you can be bouncing over them most unceremoniously, ruining your chance to slip through this section efficiently, and possibly mangling important pieces that are attached to your under carriage. While controlled brute force just moments before in Turns 11 and 12 may characterize that segment, this one is a more refined and delicate tip toe or dance, still at the limits, but all for the purpose of setting up the segment commencing with Turn 17 that precedes the long front straight. Smooth the weight transfer from side to side to help the car take a "set" and grip, especially in Turn 14 and as you accelerate and hold steering input into and through Turn 15, then up shift and transition back to a left to right corner while holding and squeezing on the throttle

through Turn 16, with your objective to come across the very right edge of the surface at corner exit (rather than being over to the classic left side and out of position) for a short straight brake and downshift, leading to a sharp 110 degree right to left corner at Turn 17. (Beginners note: Here you want to manage your car at the limits at moderate speed. There is a wall on exit from Turn 14, so don't get frisky early in that corner. The most common mistake here is to enter Turn 13 with too much speed, putting the car on the extreme left of the track surface at entry to Turn 14. Slow down, take a very late apex into Turn 13, and then attack Turns 14 and 15 as a single element.)

Turn 17. This is not a particularly daunting corner, but for the stacks and stacks of tires making up a wall on the right side and immediately behind. It is a narrow squeeze with no run off area and not a place to be heroic. Safety and strategy both compel a slower corner entry and faster corner exit, because the segment it leads to is all acceleration for fast entry to the front straight. You must be on the far right edge of the track surface on corner entry if you are to have any chance of getting around this turn quickly. Incorrect management of your driving line out of Turn 16 will ruin entry to Turn 17. (Beginner's note: If you early apex or force too much speed into the corner, you can go nose first into the tire wall. With so little reward for aggressive driving, and so much risk, this turn is not to be taken lightly. Do not try to make a fast pass through here, just slow down and slip through it.)

The next series of several right to left corners, which really are just slight steering inputs, is simply a flat open paved area of the infield described by cones and stacks of tires on the left and right sides. Although curved, this is an acceleration run to the entry for the front straight. Determine the best and fastest arc from right to left through it so that you will be at WOT well before you hit the entry apron to the banked front straight, preferably in fourth gear before you meld back onto the main straight, and carry that advantage for better than a mile all the way down and through the Roval. (Beginner's note: After all of the clearly marked corners, this section presents itself oddly, with a wide open expanse of concrete and asphalt, widely spaced single stacks of tires, and a few orange cones between them, in a herky jerky angular set up. Visualize a smooth arc taking advantage of all of the surface between the row of tires and cones, rather than trying to clip closely to the inside tire stacks.)

And there you have a very interesting track experience, combining brute power with some very sophisticated braking and weight transfer challenges. This is a circuit that is brutally demanding on brakes and cooling systems, especially in the summer months, and can be one of the most technically challenging for car control when combined with high speeds. California Speedway is a "must do" for the experienced track enthusiast.