

A Guide to Build and Set-up a Velodrome Car for Encino

By Nic Case

I'm going to attempt to describe how to build, set-up and drive a traditional Velodrome car. It is intended for racers New to the Velodrome, yet have an understanding of R/C. Other classes such as Touring car, Off road vehicles and such are mostly excluded in the information below. Keep in mind, that there are people far smarter than me with better ideas than I have, but this should point you in the right direction. My advice is really only good for about a 90% dialed set-up, the rest = is up to you.

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1-Big Picture Basics:

Use a **2wd "Pan car"**. Examples (but not limited to) – Associated L3, L4 – KSG 2 – Styker – this architecture is very efficient and allows the use of full suspension. My preference is a "T" plate car.



Use **BSR EHW** (extra hot weather) **Cap tires** – special tire made specially designed for the Velo, they are hard, with very low rolling resistance -- Yet, when they get hot, they get sticky for added traction. They are expensive and you should invest time in them. It's worth it. Also, I have yet to see someone wear one out.

Use a **Velodrome specific body**, To my knowledge, there are only 3 currently available. WT2249H Windtunnel "XHS" VELO Oval Stock Car Body, the McAllister Nationwide HS 197 & the PSE Monte Carlo. Older (out of production) bodies can be used as well, Protoform T-bird, etc. I have run all of these and like everyone. For Truck; Protoform OTR truck body & Windtunnel "FST" 1/10th Super Truck Body

Pretty much, you will need **shocks on the front end**. I'm not saying that someone can't make a regular pan-style front suspension work at Encino. I'm just pointing out that the bumps are big enough that having shocks allows more travel, more damping options - etc.

2-Part Lists/info with Hyper-Links

(Incomplete list)

PARTS (pretty much – must haves)

Front End (currently working on a new source)

<http://www.speedyracingparts.com/VelodromeL3PanCar.htm>

Dual Sport A-arm

<http://dynotech-racing.com/partDetail.php?RefNum=2161>

Pod plates .063 fiberglass [http://www.lefthander-](http://www.lefthander-rc.com/catalog/product_info.php?cPath=30&products_id=1914)

[rc.com/catalog/product_info.php?cPath=30&products_id=1914](http://www.lefthander-rc.com/catalog/product_info.php?cPath=30&products_id=1914)

Shocks http://www.lefthander-rc.com/catalog/product_info.php?cPath=70&products_id=1974

McAlister 197 <http://www.stormerhobbies.com/cgi-bin/seekpart.pl?src=ns&pn=MCA197>

XHS http://www.windtunnelracingproducts.com/product_info.php?products_id=41

PSE Velo Body– contact Frank Valentino at fsv@earthlink.net

Protoform OTR truck body

<http://racepf.com/oval/ort-truck-clear-body/>

Windtunnel "FST" 1/10th Super Truck Body

http://www.windtunnelracingproducts.com/product_info.php?cPath=42_27_32&products_id=142

Tires <http://johnsbsrracing.com/cap-tires/ehw-extremely-hot-weather>

Email John at BSR : teambsr@att.net

Ride height blocks

http://www.lefthander-rc.com/catalog/product_info.php?cPath=30&products_id=640

Associated Inline Steering Blocks ASC8441 [http://www.lefthander-](http://www.lefthander-rc.com/catalog/product_info.php?cPath=27&products_id=66)

[rc.com/catalog/product_info.php?cPath=27&products_id=66](http://www.lefthander-rc.com/catalog/product_info.php?cPath=27&products_id=66)

Futaba S9551 Low Profile High Speed Metal Gear Digital Servo

http://www.lefthander-rc.com/catalog/product_info.php?cPath=53&products_id=652

Savox SC-1251MG Low Profile High Speed Metal Gear Digital Servo

<http://www.stormerhobbies.com/cgi-bin/seekpart.pl?src=ns&pn=SAVSC1251MG>

2 wire Transponder

http://www.lefthander-rc.com/catalog/product_info.php?cPath=53&products_id=2295

Kimbrough large servo saver #124

http://kimbroughracingproducts.com/store/index.php?dispatch=products.view&product_id=29909

Hyperdrive 1/8 Inline Axles w/ Shims and 4-40 Nuts

http://www.lefthander-rc.com/catalog/product_info.php?cPath=27&products_id=1291

IRS VCS Micro Shock O-Rings (as bump-stops)

http://www.lefthander-rc.com/catalog/product_info.php?cPath=29&products_id=1061

Associated VCS Micro Shock Spring - BLUE (10lb) side

http://www.lefthander-rc.com/catalog/product_info.php?cPath=29&products_id=301

Associated VCS Micro Shock Spring - SILVER (8lb)front

http://www.lefthander-rc.com/catalog/product_info.php?cPath=29&products_id=358

GFRP 1.100 Short Red Springs (5lb) center

http://www.lefthander-rc.com/catalog/product_info.php?cPath=29&products_id=2810

MurfDogg Synergy 17.5 Motor

http://www.tqrcracing.com/shop/product_view.asp?p_id=7457

Reedy Sonic 540-M3 Motor 17.5 1S Spec

http://www.tqrcracing.com/shop/product_view.asp?p_id=10566

XR10 Justock ESC - 60A

http://www.tqrcracing.com/shop/product_view.asp?p_id=10496

R1 Battery 7200 mah 7.4v 90C 2S (Roar Approved)

http://www.tqrcracing.com/shop/product_view.asp?p_id=6352

OPTIONAL STUFF

Wheel Balancing Lead Tape - 2 ft.

http://www.lefthander-rc.com/catalog/product_info.php?cPath=39&products_id=539

Direct Steer Servo Adapter

http://www.pembertonraceworks.com/index.php?route=product/product&product_id=273&search=servo

Hyperdrive Aluminum Servo Mounts - BLUE

http://www.lefthander-rc.com/catalog/product_info.php?cPath=27&products_id=2125

GFRP Body Posts-Aluminum Base/ Delrin Post (5 posts) http://www.lefthander-rc.com/catalog/product_info.php?cPath=21&products_id=1221

Lefthander-RC 1/10th Scale Wing Standard- .030 lexan

http://www.lefthander-rc.com/catalog/product_info.php?cPath=21&products_id=1561

Raceway Aluminum Wing Buttons

http://www.lefthander-rc.com/catalog/product_info.php?cPath=21&products_id=100

Clear Mounting (servo)Tape

<http://www.homedepot.com/p/3M-Scotch-1-in-x-1-60-yds-Clear-Mounting-Tape-410DC-SF/203936785?fbtLinkClicked=1467380853602|203405976>

TOOLS

Silver sharpie

<http://www.homedepot.com/p/Sharpie-Metallic-Silver-Medium-Point-Oil-Based-Paint-Marker-35560/203686565>

Sanding Sleeve (for tire truer)

<http://www.mcmaster.com/#4756a189/=133dy16>

Hobbico Circle Cutter

http://www.tqrcracing.com/shop/product_view.asp?p_id=2190

Du-Bro Body Reamer & Scissors Set

<https://www.amainhobbies.com/dubro-body-reamer-scissors-set-dub2330/p74666>

Magnetic Prop Balancer

<http://www.ebay.com/itm/Magnetic-Suspension-Propeller-Prop-Balancer-for-Multi-Rotor-Copter-/221795540358?hash=item33a40b5d86:g:nL0AAOSw8cNUT1Gy>

Dust-Off Electronics Duster

<http://www.walmart.com/ip/Dust-Off-Electronics-Duster/25596750>

Top Flite Powerpoint Balancer <https://www.amazon.com/Top-Flite-TOPQ5700-Powerpoint-Balancer/dp/B0015H1FAG>

MurfDogg Dirt Oval Ride Height Gauge 7.5mm-23.5mm

http://www.lefthander-rc.com/catalog/product_info.php?cPath=48&products_id=3029

Du-Bro Body Reamer & Scissors Set

<https://www.amainhobbies.com/dubro-body-reamer-scissors-set-dub2330/p74666>

INFORMATION

Spring rates Mudslide

<http://www.muddslidemotorsports.com/springrates.html>

Spring rates Team Associated

https://www.teamassociated.com/pdf/cars_and_trucks/shared/spring_rates.pdf

RC10 L4 Manual

https://www.teamassociated.com/pdf/cars_and_trucks/RC10L4O/Team/1014o_manual.pdf

MurfDogg's Chassis Tuning 101 (Mostly look at camber, caster, tow-in, droop, spring rates and damping)

<http://www.dirtoval.com/forums/showthread.php?t=86597>

3-Preparing your tires (optional)

This part is hard for most R/C racers to accept. You've just purchased (likely) the most expensive tire in your life – and now you have to work on it? *Are you kidding me?* Your car will benefit - in speed and stability if you go the extra mile with these steps. Remember, These tires last a long time.

The *basic* steps are;

Trueing *** ***Wheel covers ***Balancing *** ***Placement checking ***

Trueing;

You need to slowly cut small shallow increments to insure that all tires are perfectly round. It is paramount, that if you chose to do this you **MUST** use a carbide cutter. If you use a “gator-skin” cutter you will destroy the tire and your cutter. But you are **NOT** done – the tire must be cooled off after every cut! Do this by using Electronics Duster spray, holding the can upside-down. Be careful **NOT** to over-freeze, just cool the tire-off. Also, do not spray your fingers! Continue to make passes until there are no more low spots.

Wheel covers;

I think this is mostly for looks – but there may be a small aerodynamic affect. Cut donut shapes out of .030 Lexan that snap into the rim. I also add 3 small dollops of shoe-goo for adhesion.

Balancing;

I use a magnetic prop balancer with Lead tape. Here is an example – not exactly the same thing – but you'll get the idea. <https://www.youtube.com/watch?v=qkvza50d9IY>

Placement checking;

Is covered in the next chapter

4-Focusing on parts of the car:

Body Mounting;

This is the most important and unique part of a Velodrome car. It's so important, it has its own section. I can't stress this enough.

T-Plate;

Take special care to insure that the pivot balls are 100% free with 0 bind and 0 play. Polishing the ball and or not tightening the 2-56 screws all-the-way, are ways to achieve this.

Bearings;

I clean my bearings by spraying motor spray on the race held by needle-nose pliers. If it does not spin completely free – I replace the bearing. Even with a new bearing, I spray the same way to remove any factory grease. Then, I use 1 to 2 drops of light bearing oil per bearing.

Differential;

I use ceramic diff balls on the spur gear with Associated silicon diff lube. I fill every hole available the spur gear with a diff ball. Once assembled check tightness and break-in. Here is an example – not exactly the same thing – but you’ll get the idea. <https://www.youtube.com/watch?v=AB7-qCq3k-I>

Shocks;

Make sure your shocks are built properly with no air inside with smooth operation. Here is an example – not exactly the same thing – but you’ll get the idea. <https://www.youtube.com/watch?v=-hU6B9Z62hw>

Front end;

It’s very important that all hinge-pins and ball-cups are completely free. This can be checked by removing the shock and lifting the suspension arm – then let go. It should be completely free without any hesitation.

Reaming out the Hinge pin holes, polishing the pin and proper shimming are some techniques to achieve this. Also if your ball cup/Himes joint is binding, squeezing the plastic while it is attached to ball, often, this will free it up.

Servo savers;

On the surface this may seem unimportant. It is very important to follow this advice.

The #124 is the best servo saver that Kimbrough offers. If you elect to install the # 201, Keep several extras in your tool box, because – if you get into a crash = it distorts the internal spring and will make your car fell very strange when you drive it. Another option is eliminate the servo saver completely.

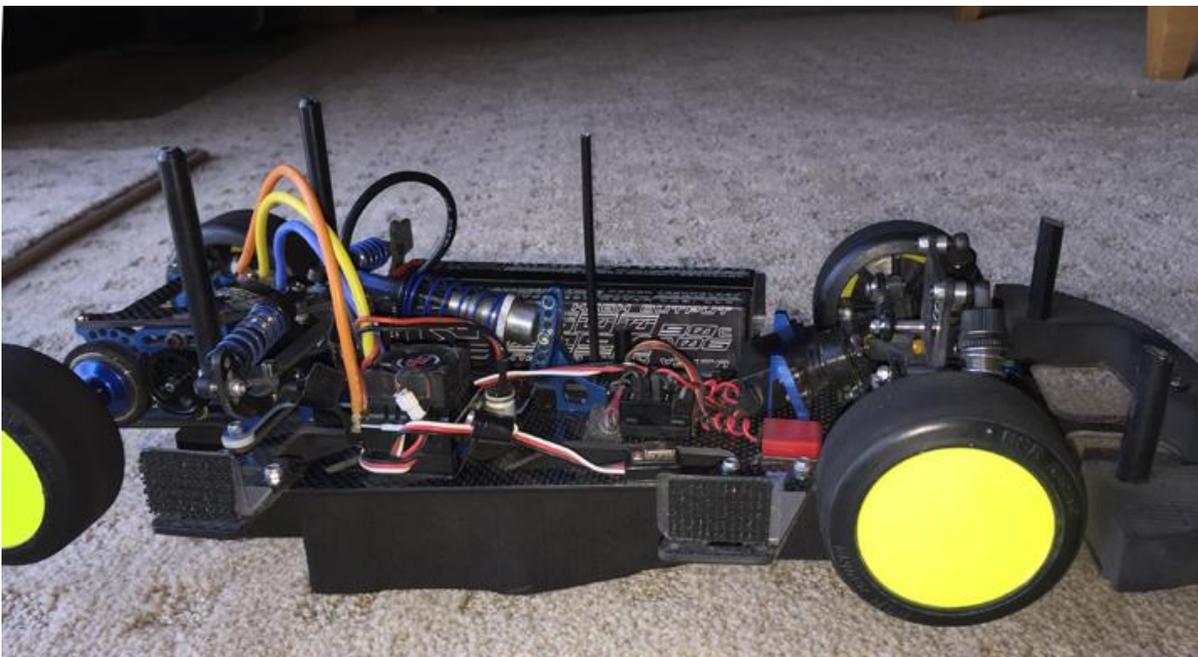
With metal gear servo now-a-days, I elect to use a servo saver eliminator - Pemberton part DNY-100.

Wire placement;

All wires should be firmly secured yet allow the pod to move freely.

Receiver antenna;

2.4 ghz receiver antennas have a small section that is semi-exposed at the end (about an 1 ½”). Keep in mind this is the only part of the antenna that “listens” to the transmitter. Also, the Best position for this part of the antenna is Perpendicular to the ground. The rest of the antenna can be bundled up. As a result, I mount my antennas just under the highest point of the body, straight up.



Tire Mounting (Placement checking);

Rear-----

This next bit is going to sound hard to believe, however, I suggest you try this for yourself before you judge. When mounting the rear wheels to the hubs, there are 4 possible positions that the wheel can be mounted. One of these 4 will produce the most true (roundness) compared the other 3. This is how I test this = Using a silver sharpie, I mark one “quadrant” of the hub. Then I put a light dot on one of the wheel mounting holes. Align these and mount (I consider this my 12 o’clock position). After tightening down all the screws, I spin the axle freely and focus on how close the tire is to spinning perfectly true and round. Repeat this 3 more times, un-mounting and re-mounting the wheel on the hub – rotating it 90° each time. You should notice that there is best-case position. Re-mount the wheel to the optimum position and mark the wheel to the corresponding sector for the hub.

Front -----

With the front wheel mounted on the axle, spin it. Pay close attention to any point of the steering geometry that is rubbing in Any way. If it is, you must take steps to prevent this. Sometimes a bit of Dremel work – sometimes it’s just shimming the axle or hinge pins better will take care of it.

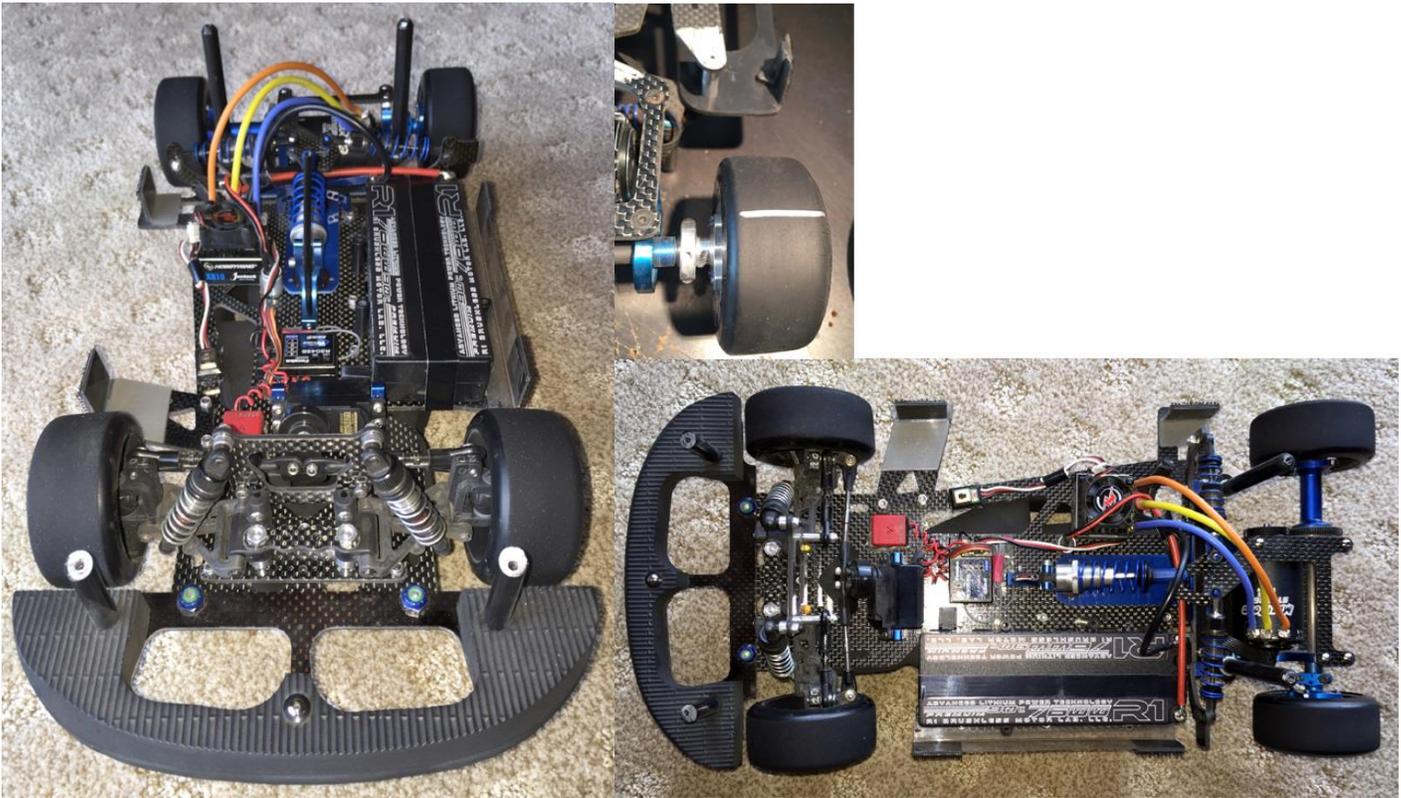


5-Chassis -- Set-up

One of the most important things to take into consideration is to have you chassis **ride height as high as possible**. If your chassis hits the track, it lifts the tires off of the track = Is something we want to avoid. It is also a best practice to mark the bottom of your chassis with a silver sharpie – to monitor if the chassis is hitting the track. Another use for that Silver Sharpie – mark a line on tire to monitor if your camber is properly set.

A Special message to my Japanese friends ☺

地面とシャーシとの間の距離はできるだけ大きくあるべきです。



The rest, I'm just going to list what I am currently running (Courtesy of Gary Hamilton);

Symmetrical .063' fiberglass T plate – set off-set on rear pod.

Off-set right side hub

Center shock – 80 weight oil 5lb spring

Side shocks – 40 weight oil 10lb springs

Front shocks – 100 weight oil 8lb springs with 3 O-ring bump-stops on each shock

Very small amount of tow-out

-1°Camber left front, +1°Camber right front

Chassis ride Height – 14mm in the rear 13mm in the front

10° caster

Silver or Orange tires on all 4 corners

Battery slightly off-set to the left

Gearing 76 spur X 57 pinion

“Tweak” – On a level, flat surface, lift up on the center of the front of the chassis = the right front comes off the ground 3mm before the left side does.

6-Building and Mounting the wing

This can be done several ways, Just going to discuss the way I do it. The idea is to stabilize the car and possibly to reconnect the air in the back of the car. (Just Imagining for less aerodynamic drag).

Use .078 piano wire. You can buy or make your own wing, I make mine.

Mark a center-line on the rear of the body and on the wing (I put tape down first, to mark)

Bend the wire into a “U” shape and drill 2 holes then slide on the wing with wing buttons.

Now bend a Z shape into the wing wire (approx. ½”)

Drill 4 holes in the deck for the buttons, and 2 in the rear for wire.

After painting, reinforce the bottom of the deck with Lexan and servo tape. And re-drill the 4 holes. And slide the assembly through the buttons on the deck of the body. Or use hex tubes, like the left pic.



7-Mounting the Body

This is the most important part of a Velodrome car. The goal is to mount it perfectly centered and super solid. The last thing you want – is for your body to deform at speed. If done correctly, your car will be predictable and stable. This philosophy also counts for the rear wing. During this process, you will partially mount/place then re-mount/place the body up to 20 different times, so be prepared. These directions are for a car that has never had a body on it before. If the bumper and side braces have been done before – some of the following steps can be skipped.

Always mount your body Before you paint it.

Always mount your body after your car is 100% built. This means, all adjustment IE; camber, tow-in, axle shims, spring tensions, and componentry mounted in the car.

Always mount your body at a slow patient pace. (**Don't rush it**)

I recommend mounting your Wing before painting

The bumper and side braces are very important, however –do this last, after paint.

I prefer to mount my Velodrome bodies with screws on adjustable posts, rather than body clips.

So----

Let's assume we have a car ready to go – shimmed properly, etc.;

A “trick” that I use to ensure that I get the body mounted perfectly in the center, is to add pieces of temporary Velcro directly on edge of each rim. This way, when you slip the un-mounted body onto the car - there will be natural pressure from each corner to align the “now floating” body to center with equal fender gaps at each tire.

Next-----

With the chassis on a car stand, slip the clear body over the car aligning the center of the front wheel to the body (I mark it with a “+” at this point). Now, take note of the height of your 4 body posts, and their relation to the body. I align the bottom “cut-line/flat-line” of the body to the chassis plate. I imagine these as two different planes and I’m trying to align the body-plane to the chassis-plane. Once I get the posts at their proper height and the body is held in the center by pressure from the Velcro. I move on to the next step.

The first hole -----

I pick one of the posts (usually one of the rear) to make my first hole. Being very careful and double checking the position of the body. I carefully mark the center of this hole with a “+”. Using a body reamer, I twist a hole just large enough to fit a 4-40 screw through it. You can use a sharp drill, but I like a reamer.

Mount the body with that one screw-----

Check to make sure that it is where you intended it to be. If not, slightly elongate the hole to accomplish the adjustment.

Repeat this process for hole 2 -----

Repeat this process for hole 3 -----

Repeat this process for hole 4 -----

With the body mounted on all 4 posts -----

Cut slightly below the bottom cut-lines (**leave the bottom a bit long**). Mark the center of each wheel with a “+”.

Mount the rear wing (again, before painting). Then, un-mount the wing from body (to get it out of the way).

At this point I look very close at the bumper and the body side braces. -----

This is good time to get both of these as close as you can before painting. The bumpers that I use are made of a \$.99 Flip-flop. They can be cut with an X-acto knife and or a serrated knife. The fit to the entire front of the **bumper should be tight – but not distorting the body**. This is somewhat difficult, but don’t worry = if you end up with an air gap – that can be fixed later after painting. As far as the side braces go, leave approximately 1/4” spacing for Velcro –servo tape and Lexan – in between the body and side braces.

Finally – time to Paint-----

I only have 2 recommendations for painting. 1- Avoid silver or white as your main color (hard to see)

And B, - mask off small dots around the body mounting screw holes (way easier to mount after it’s painted)



After paint has toughly dried, Re-mount the wing.

Time to attach the body side mounts. I servo tape a strip of Lexan to body-side first. Then start adding Velcro. It's ok to use double layers of servo tape (if needed). The idea is to keep the body-side from moving significantly.



Final support touches

If there is a gap between the bumper and the body, Feel free to add a layer of the fuzzy-side of Velcro – or a layer servo tape (with the backing still on it) to fill in any gaps. Also – instead of a 5th body post, I servo tape some foam on the bottom side of the hood to brace against the top of the front shock tower for extra support. Again – careful not to distort.



Now for the final cuts

Set the car on a flat surface. Compress the suspension down and mark a parallel line from the table to the body. Cut on that line. The idea is for the body to be low to the ground, without scraping the ground. If the body hits the ground when it's going around the track – it is possibly upsetting the traction of the car. Cut the rear end of the body completely out – with the exception of a ridge that stiffens the structure. Now, the last thing is the wheel openings. I cut them out roughly with scissors, then, using a cordless drill and a 2" sanding drum – to finish the openings.



8-Radio – Set-up

Make sure you are competent with your radios setting. I use a Futaba 4PX. Adjustments are individual for each car, person, style and set-up. So these are just suggestions for a starting point.

The big adjustments for the Velodrome are;

Trim----- for me, 0 and fine tune while on the track

Sub-trim----- for me, 0

EPA Steering (end point adjustment) ----- for me, 40% right and 40% left

EPA throttle (end point adjustment) ----- for me, 100% forward and 80% brake

Steering Dual Rate-----for me, 50% and fine tune while on the track

(If I drive it slow in the street, Locked left = it makes about a 25' diameter circle)

Exponential steering ----- for me, -20

Steering speed -----for me, 65%

Exponential throttle -----for me, -15

9-Motor, Selection and Gearing

Depending on what class you are racing, motor preference / availability, this is not an exact science every combination is a bit different. The idea here is not to fade more than 1 second from the beginning of the run compared to you last lap. AND be below 180°F on the motor. Take into account that some motors come with timing built in at 0. Seems like most guys are running as much timing as they can without getting too hot. Also – the use of a motor fan is highly recommended. This is the part where you have to adapt your specific motor to the track. I wish I had more to offer in this section, but I have a lot to learn.

At the Fun Run I ran 17.5 2 cell –it was fairly fast with this set-up;

Murf Dogg 17.5 motor with a 12.5mm rotor at 12° of timing, geared 76x57

Ballpark ~13.5 single cell; 72x60

Ballpark ~21.5 2 cell truck; 72x58

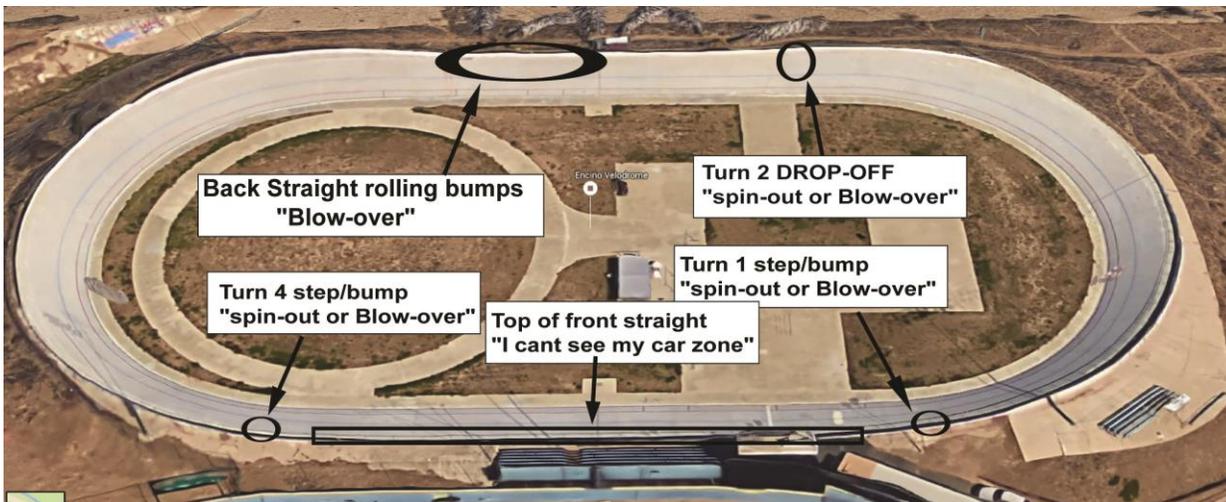
10-Driving and Racing the Encino Velodrome

During practice = be conservative. Feel what the car is doing and take note. You must make the car stable first – then try to make it fast. You will find yourself working harder in the straightaways than the corners. This is normal. Be ready for it. If you stay between the black and red line, all the way around the track = that is the best /fastest line. After you are comfortable with the car, intentionally drive it high around the whole track (blue line). BUT be vigilant to back off and avoid the wall. The purpose is to find out how your car will handle through the crappy parts of the track. Blow-overs and spin-out are unacceptable. Do not continue in practice if this happens. You must adjust your car.

Starts are tricky, yet important on the Encino Velodrome. Spinning out or getting tangled up with someone else, must be avoided. The goal should be to be full throttle in the middle of turn 1 and 2. This is where you have the benefit of centrifugal force - giving the car more traction when you need it most.

Avoid contact, this sounds easy – but it is not. A stationary car on the track is THEE most dangerous thing on the track. If you are side by side with someone, don't back-off the throttle. If you do crash – try to stay out of “the preferred line” - be courteous and verbalize where you are, to warn the other drivers.

Racing Etiquette – There is qualifying and there is racing. Know the difference. It is respectable to block in racing – but Not in qualifying. Even during a race, if it's 1 minute to go, and I'm a lap down = I will go high in a corner to let the leader pass cleanly without a battle. Also, keep in mind, that passing on the front straight and



going into turn one = is the hardest place to pass – for both parties. Most of all, Have Fun!
☺