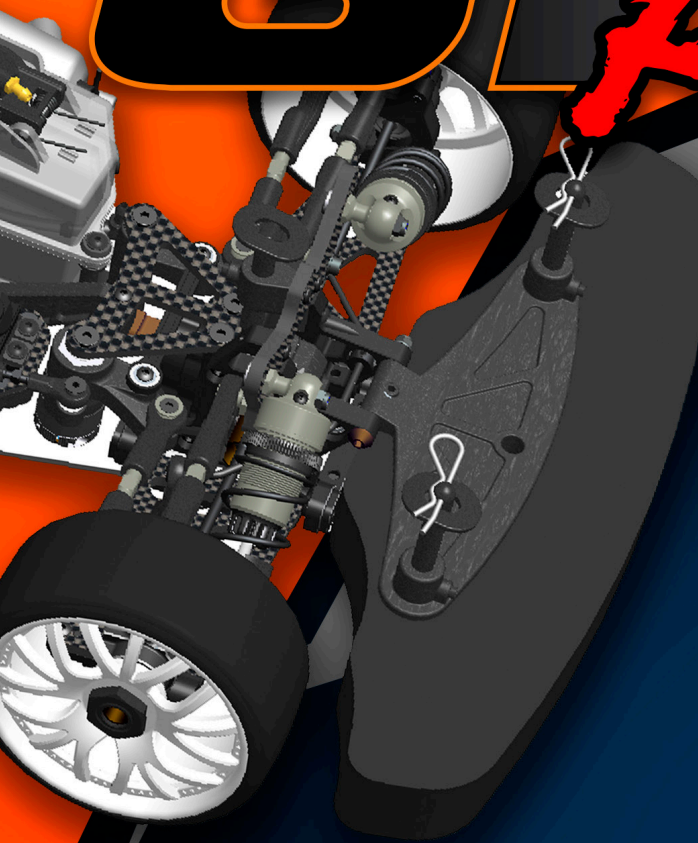
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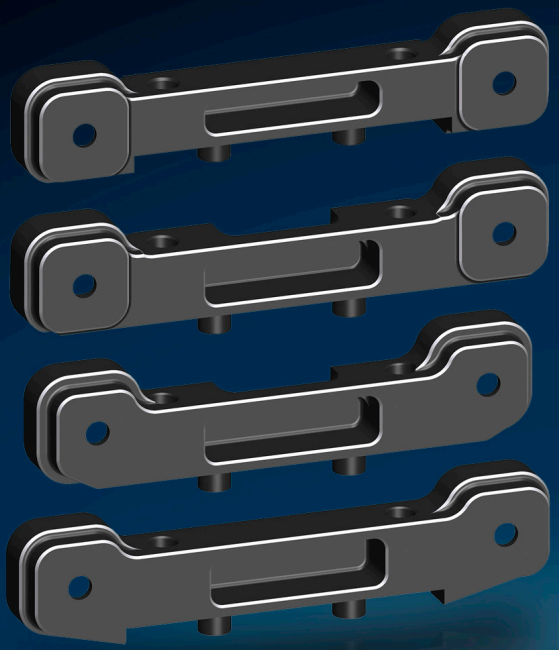
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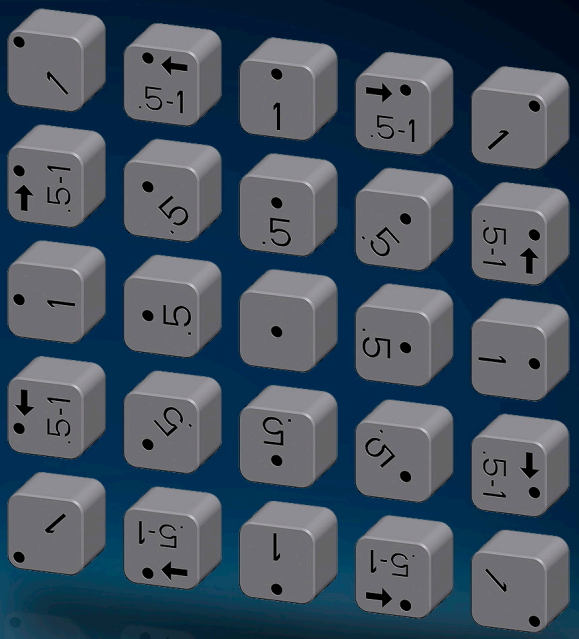
GEO-MATRIX

SUSPENSION GEOMETRY SYSTEM

INSERTS MANUAL







25- POSITION INDEXED SYSTEM

PRECISION SQARE INSERTS

REPEATABLE GEOMETRY

RACE PROVEN PERFOMANCE

SERPENT

25-POSITION INDEXED GEOMETRY SYSTEM

INTRODUCTION

The SRX8GT-R is now fully equipped with the all new Serpent Geometry Matrix™, a indexed suspension geometry platform that delivers 25 precise, repeatable setup positions using rotating square inserts. The insert's can be rotated in 90 degrees increments, creating an orientation-based indexing system that will give you a defined suspension geometry position. Using the standard settings as a starting point you will be able to fine tune the cars handling for virtually every track condition you will ever face.

With this system, adjustments to anti-squat, toe-in, roll center, kick up, and track width can be made easily and accurately. When winning matters, the Serpent Geo-Matrix™ Insert System delivers precision, repeatability, and confidence in every setup change.

INSERT TYPES AND POSITION LOGIC

There are seven inserts used in this system. Each insert is clearly identified by markings and a directional dot.

- The centered insert has no text making and only uses a dot.
- All other inserts are marked with 0.5, 1, or a combination of numbers and letters, along with a dot.
- These numbers indicate how much the geometry is altered in 0.5 or 1 degree increments.
- The dot indicates orientation and shows the direction the hinge pin will move when the inserts is installed.

For clarity, the inserts shown in the following diagram are color-coded and labeled with black text and a white orientation dot (the actual parts are all gray color).

INSERT BREAKDOWN:

Please find attached below the complete list and description of each pill supplied in the kit:



0° CENTERED Offset: 0/0



0.5° CENTERED OFFSET Offset: 0.5 used horizontally or vertically.



1° CENTERED OFFSET Offset: 1.0 used horizontally or vertically.



0.5° DIAGONAL OFFSET Offset: 0.5 used diagonally.



1° DIAGONAL OFFSET Offset: 1.0 used diagonally.



0.5° LEFT X 1° DIAGONAL OFFSET Offset: 1.0 Diagonal + 0.5 Diagonal Right used asymmetrically.



0.5° RIGHT X 1° DIAGONAL OFFSET Offset: 1.0 Diagonal + 0.5 Diagonal Left used asymmetrically.

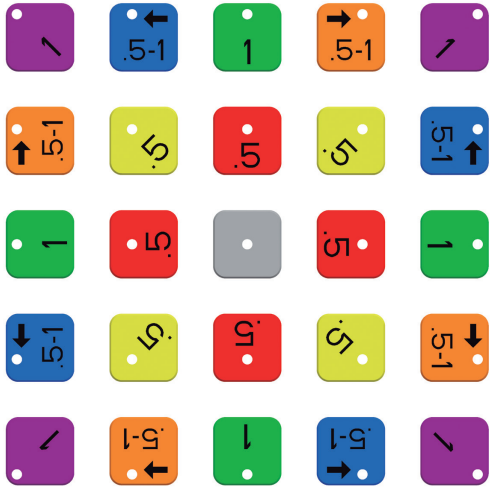
25-POSITION INDEXED GEOMETRY SYSTEM

POSITION CHART

The chart below illustrates all 25 possible hinge-pin locations and shows which insert and orientation are required to achieve each position. It is important to note, the chart is color co-coordinated to help you fully visualize each inserts position and orientation.

- The centered insert, identified by a single dot, can only be used in 1 position
- The remaining six inserts can each be used in four orientations, resulting in 25 total positions.
- Each inserts position moves outward from the centered insert. The degree of change and what setting is being changed is based on the insert type and the dots orientation.

The chart uses a color-coding system so that way you can locate the insert you are currently using and easily select the correct insert that would give you the desired geometry change.



HOW TO USE SYSTEM:

1) Select an insert based on what you wish to change, how much and in which direction you want to change the geometry.

2) Locate the dot on the insert.

3) Rotate the insert so the dot points in the direction you want the hinge pin to move.

4) Verify the position using the chart.

5) Mirror the inserts left to right in the suspension brackets to retain proper suspension geometry symmetry.

REAR 25-POSITION INDEXED GEOMETRY SYSTEM

REAR SUSPENSION GEOMETRY

In the rear of the SRX8 GT-R, there are 4 key adjustments you can make to fine tune your suspension. You can achieve all of these adjustments using the insert system.

- Toe-in Angle
- Anti-squat
- Roll-Center
- Track Width

To visualize how to use the system, remember that there are 25 positions and on the rear you are starting at the 1 centered down position on the Front/Rear and 1 centered out position on the Rear/Rear suspension brackets.
It is important to note that you can change one or both suspension bracket inserts to achieve different or similar results. It is recommended to only make a change to the inserts in one suspension bracket at a time.

DEFAUYLT REAR SUSPENSION SETUP:

Before we begin it's very important to note what the standard rear suspension geometry of the SRX8GT-R is using the manual setup.

- Toe-in Angle: 3º
- Anti-squat: 0º
- Roll-Center: +/-0mm
- Track Width: +/-0mm



CHANGING REAR TOE-IN ANGLE:

In order to increase **ONLY** the rear Toe-in angle of the vehicle by 1 degree per side, let's take a look at one way to achieve that.

In the illustration below you can see that we chose the Diagonal 1 insert. After checking the insert diagram, starting with 1 centered down, then moving 2 inserts left or right we arrived at insert diagonal 1. When adjusting Toe-in, we must orient the dot in or out and since we were adding Toe-in to the Front/Rear suspension bracket the dot must orient to the inside (If we wanted to decrease the Toe-in in the Front/Rear bracket, the dot would need to be oriented outward). In this scenario it is not possible to add more Toe-In to the Rear/Rear suspension bracket due to it already using a centered 1 insert oriented outward.

- Toe-in Angle: 4º
- Anti-squat: 0º
- Roll-Center: +/-0mm
- Track Width: +/-0mm



REAR 25-POSITION INDEXED GEOMETRY SYSTEM

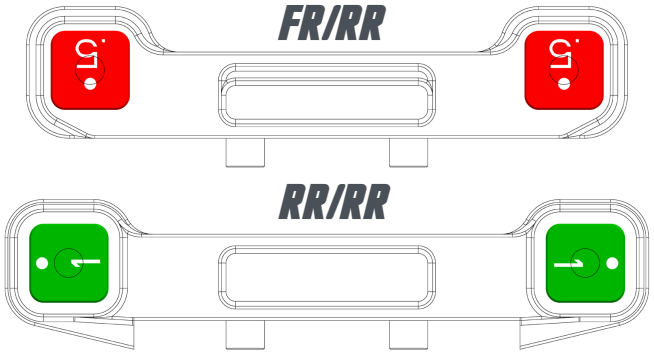
CHANGING REAR ANTI-SQUAT ANGLE:

If you wanted to increase ONLY the Anti-squat of vehicle by 0.5 degree, let's take a look at one of the ways you can achieve this.

IIn the illustration below, you can see that we chose the 0.5 centered insert, which can be used in the horizontal or vertical orientations determined by the dot on the insert. We chose to adjust the Anti-squat in the Front/Rear suspension bracket. In this case we wanted to add 0.5 degree more Anti-squat and the dot must orient down to do so. (In the case you wanted to add more Anti-squat in the Rear/Rear suspension bracket the dot on the insert would need to shift downward.) If you reference the Insert diagram, you can see that just above 1 centered down, would indeed be the 0.5 centered down.

**It is very important to always reference the diagram for confirmation if you become confused.

- Toe-in Angle: 3º
- Anti-squat: +0.5º
- Roll-Center: +/-0mm
- Track Width: +/-0mm

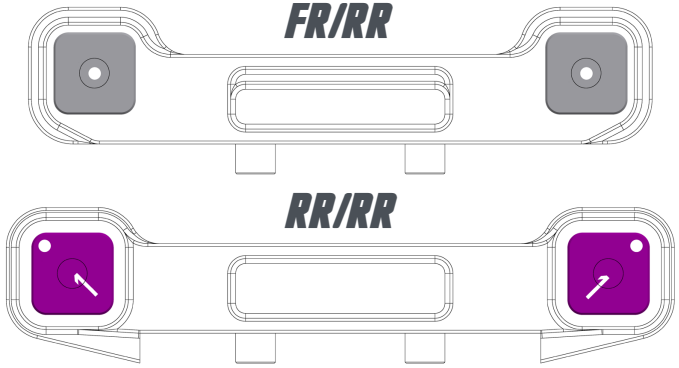


CHANGING THE REAR ROLL CENTER:

Let's assume that your car might be too stiff when it rolls, or maybe too soft. You have determined that your car feels too soft, you want to raise ONLY the rear roll center using the inserts to reduce chassis roll. Let's take a look at how to achieve this. We will adjust this from the Standard Geometry.

In the illustration below, we wanted to raise the rear roll center 1mm. We chose the centered insert in the Front/Rear suspension bracket and placed the 1 diagonal up/out in the Rear/Rear suspension bracket. (Had we wanted to lower only the RC, it would not have been possible on the Front/Front suspension bracket using the Geomatix inserts, due to the front inserts starting position being all the way down. If you wanted to lower the roll center from default, you would need to change the axle height by altering the rear upright inserts). It is possible that sometimes, you will need to utilize other adjustments on the car, to achieve your goals.

- Toe-in Angle: 3º
- Anti-squat: 0º
- Roll-Center: +/-0mm
- Track Width: +1mm



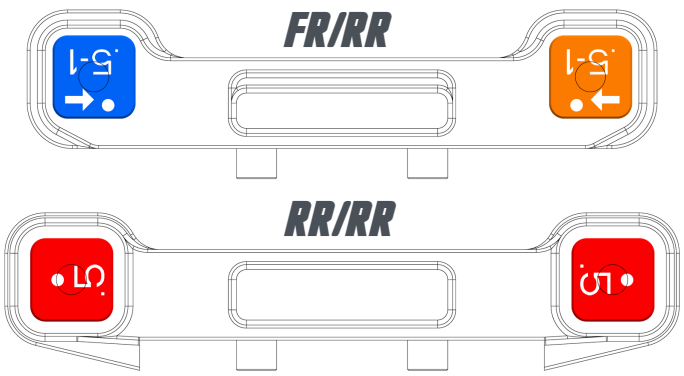
REAR 25-POSITION INDEXED GEOMETRY SYSTEM

CHANGING THE REAR TRACK WIDTH:

Now, let's talk about track width. There are many reasons why you might want to adjust the track width of the vehicle, using the pivots. Maybe you want it to lean more/less, or the car with specific tires on it is too wide and does not fit in the Technical inspection box. As always we will start with the standard geometry and try in this instance to narrow ONLY the track width.

In the illustration below, the vehicle was too wide and we needed to narrow the rear track width by 1mm total. In order to do this we need to use the 0.5 centered insert on the Rear/Rear suspension bracket (-0.5 + -0.5 = -1mm) and orient the dot's inward. Then on the Front/Rear suspension bracket we had to consult the chart and determined that we needed the 1/0.5 Mixed offset left/right biased inserts in the Front/Rear bracket. In the case of the mixed offset inserts, you must pay close attention to the arrow, which will help you determine which direction the pin will move. As mentioned many times, it is always a good idea to consult the insert diagram to confirm the correct insert for the change you intend to make, and how to install it.

- Toe-in Angle: 3º
- Anti-squat: 0º
- Roll-Center: +/-0mm
- Track Width: -1mm



REAR GEOMETRY COMBINATION CHANGES:

It is possible to do a combination of changes all in one go. Let's assume that you feel you need more Toe-in, more Anti-squat, and you also want to narrow the cars track width. In this case, we will increase the Toe-in 0.5 degree per side, and increase the Anti-squat by 1 degree, and then also narrow the car by -1mm/-0.5mm per side.

In the illustration below, we will need to approach this systematically, so we do not get lost. It will be paramount to use the position chart to get a visual on how to achieve this.

In order to change all 3 of these adjustments at once, we chose to adjust the Toe-In and Anti-squat first in the Front/Rear suspension bracket, and then adjust the track width for both brackets next.

Let's tackle this more difficult Combination adjustment together:

Here we can find the Standard Default Insert Geometry:

- Toe-in Angle: 3º
- Anti-squat: 0º
- Roll-Center: +/-0mm
- Track Width: +/-0mm



REAR 25-POSITION INDEXED GEOMETRY SYSTEM

STEP1:

In this step we want to add the 0.5 degree of Toe-In and the 1.0 degree of Anti-Squat. To do this on the Front/Rear bracket we have to move inward 0.5 degree and up 1 degree from the default centered 1 down position. To Achieve this we can see on the insert position chart we need to move over 1 insert and up 2 inserts. In this case we land on the centered 0.5 insert oriented inward.

- Toe-in Angle: 3.5º
- Anti-squat: 1º
- Roll-Center: +/-0mm
- Track Width: +/-0mm



STEP2:

Now, in order to complete this combination change we simply need to narrow the rear track width -1mm total (-0.5mm per side). In order to do that we need to shift each insert in 0.5 on both the Front/Rear and Rear/Rear brackets inward 1 insert.

Complicated adjustments can be made quite easy, if you simply follow the path of the inserts on the insert position chart.

- Toe-in Angle: 3.5º
- Anti-squat: 1º
- Roll-Center: -1mm
- Track Width: +/-0mm



REAR INSERT POSITIONS WITH CLEARANCE ISSUES:

If you take a look at the Position chart you can see its 5 rows of 5 inserts.

In this Illustration below each insert and its orientation is represented by a dot. The dots that are green are useable positions; the dots that are red have suspension arm interference issues.

On the Front/Rear suspension bracket, the red dots represent positions that can be used, but you must modify the suspension arm or slightly trim the plastic bulkheads to make the needed clearance.

On the Rear/Rear suspension bracket, the green dots can be used without any interference issues.



FRONT 25-POSITION INDEXED GEOMETRY SYSTEM

FRONT SUSPENSION GEOMETRY

In the front of the SRX8GT-R, there are 3 key adjustments you can make to fine tune your suspension geometry. You can achieve all of these adjustments using the insert system.

- Kick-up
- Roll-Center
- Track Width

To visualize how to use the system, remember that there are 25 positions and on the front you are starting at the center most position on the Front/Front suspension block and 1 centered down on the Rear/Front suspension bracket. It is important to note that you can change one or both suspension bracket inserts to achieve different or similar results. It is recommended to only make a change to the inserts in one suspension bracket at a time.

FRONT SUSPENSION CONFIGURATIONS: DEF. SETUP L=R

Here we will explain the standard front geometry of the SRX8GT-R that you will find in the instruction manual as the noted as the standard setup.

IMPORTANT NOTE: In the front of the car, we do not recommend, using any angle horizontally, toe-in/out on the hinge pin, due to clearance issues with the steering geometry, or drive shafts.

In the illustration below, you can see that the Front/Front suspension bracket is fitted using the centered Insert, and the Rear/Front suspension bracket is fitted with a 1 centered with the dot oriented down.

- Kick-up: 2.5º
- Roll-Center: +/-0mm
- Track Width: +/-0mm

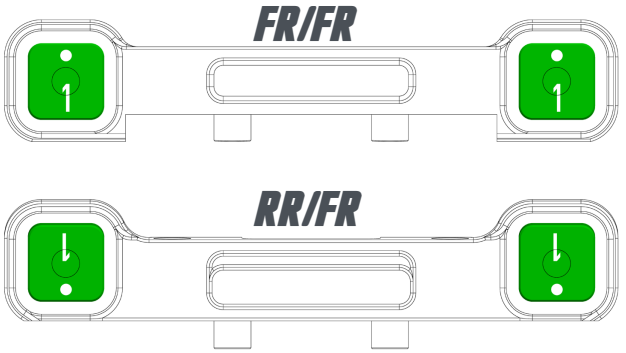


CHANGING FRONT KICK-UP ANGLE:

There are lots of times changing the Kick-up of the front end can improve the handling of the car. It can improve on/off power steering, how the car reacts to uneven track and how the front rolls overall. Let's assume you want more on power steering, in this case we will increase the front Kick-up by 1 degree.

In the illustration below, we cannot add more angle to the Rear/Front suspension block, so we must add more kick-up to the Front/Front suspension block. In this case we can take a look at the position chart and easily see that if we want to increase the Kick-up 1 degree up from the centered insert we would have to use a 1 centered insert oriented up.

- Kick-up: 3.5º
- Roll-Center: +/-0mm
- Track Width: +/-0mm



FRONT 25-POSITION INDEXED GEOMETRY SYSTEM

CHANGING FRONT ROLL CENTER:

Sometimes a Roll Center adjustment is all you need to succeed. The track is a bit higher grip and the front end is gripping a little more than you want. It is possible the roll center is a little too low. You can decrease front roll by raising the front roll center.

In the illustration below, we wanted to keep the same Kick-up angle, but raise ONLY the roll center 0.5mm. In order to do this we can take a look at the position chart and see that the Front/Front block insert will need to go from centered to 0.5 Centered with the dot oriented up and the Front/Rear block insert will need to go from 1 centered oriented down to 0.5 centered oriented down. We are simply moving the pin up 1 insert on both brackets.

- Kick-up: 2.5º
- Roll-Center: +0.5mm
- Track Width: +/-0mm



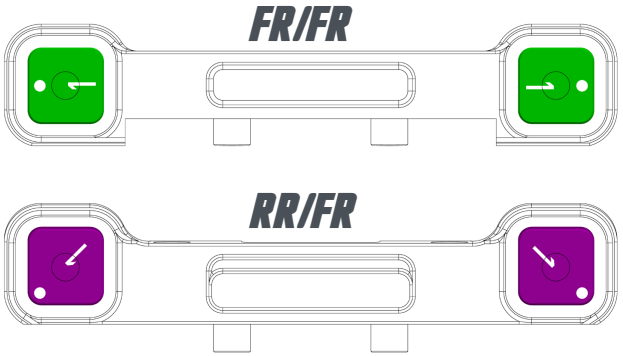
CHANGING THE FRONT TRACK WIDTH:

In some case you might want to narrow or widen the track width. If you run a lot of static toe-out you might run into issues being illegal in the technical inspection box, therefore narrowing the front pivot can help. You can also use it as a way to tune how much the car will roll at the apex of the corner. If you want the car to roll less you can widen the pivot.

In the illustration below, we wanted to widen the front of the car a total of 2mm. In order to do this we will need to use the 1 centered offset inserts oriented with the dot outward in the Front/Front suspension block and a 1 diagonal oriented with the dot down and out.. Using the position chart we were able to easily identify that we had to move 2 inserts horizontally to get to 1mm per side. We would have to do this evenly on both the front/front and front/rear brackets.

This combinations of inserts will widen the car (1mm + 1mm per side= +2mm), over the standard default configuration.

- Kick-up: 2.5º
- Roll-Center: +2mm
- Track Width: +/-0mm



FRONT 25-POSITION INDEXED GEOMETRY SYSTEM

FRONT COMBINATION CHANGES:

It is possible also on the front to do a combination change all in one go. We will assume you want to reduce the Kick-up 0.5 degree, raise the RC +0.5mm and then widen the Track Width by 2mm total (1 mm per side). We will start with the default location as our starting point. It is still very important to use the position chart to identify what inserts you need, to solve this easily and effectively. The chart will be even more useful when you are working out complex setups similar to this one.

In this illustration below, you can find the standard default Geometry, This is our starting point for this exercise.

- Kick-up: 2.5°
- Roll-Center: +/-0mm
- Track Width: +/-0mm



Let's work out this combination of changes together:

STEP1:

In this first Illustration, here we will tackle 2 things at one time. If we only change the rear insert alone, it will not quite get us a real +0.5mm RC adjustment, although it would reduce the Kick-up 0.5 degree. It is probably better to just raise both the front 0.5mm and then raise the rear 1mm. This would give us a touch over 0.5mm higher RC and 0.5 degree less Kick-up. So, we will go from a Centered insert in the Front/Front bracket to a 0.5 centered up, and then from a 1 centered down to a centered insert in the Rear/Front bracket.

- Kick-up: 2°
- Higher RC: +0.5
- Roll-Center: +/-0mm
- Track Width: +/-0mm



FRONT 25-POSITION INDEXED GEOMETRY SYSTEM

STEPZ:

In the illustration below, we will now tackle just the +2mm track width. As we learned in the Track Width section of this manual, you must move +1mm each side on the inserts to get to +2mm total. So, we will take the positions from Step 1 and make the final adjustment needed to get to exactly where we want to go, of +2mm track width.

In this case it's very important to look at the insert position chart. As our front bracket has a 0.5 centered up.. We now need to move outward 1mm. So, this will put us at the 1/0.5 Mixed diagonal Left/Right biased inserts. The dots must continue to face above center, so you have to be very mindful of the arrows. In the Rear/Front bracket, it's a bit straighter forward as we can use the 1 centered insert with the dot facing outward. Always remember, the insert position chart is the easiest way to visualize your changes.

- Kick-up: 2°
- Roll-Center: +0.5mm
- Track Width: +2mm

FR/FR



RR/FR



FRONT INSERT POSITIONS WITH CLEARANCE ISSUES:

If you take a look at the Position chart you can see its 5 rows of 5 inserts.

In this Illustration below each insert and its orientation is represented by a dot. The dots that are green are useable positions; the dots that are red have suspension arm interference issues.

On the Front/Front and Rear/Front suspension brackets, the red dots represent positions that can be used, but you must modify the suspension arm or slightly trim the plastic bulkheads to create the needed clearance.

FR/FR



RR/FR



CONCLUSION:

Congratulations you have made it to the end of the Serpent Geo-Matrix™ user's guide. Now that you have a clear understanding of the Geo-Matrix, you can fully tune your SRX8GT-R race car. No matter what race conditions you may face, low bit, no bite, high bite, rough or smooth, you can tune for it all. As a final thought, memorize the position chart to help determine all changes no matter large or small, it will help we promise. Now, it's time to hit the track and collect the trophies!

Sincerely,

Serpent Racing Development