

Instruction Manual





Introduction

Overview

Congratulations with your newly acquired Serpent 705. You have chosen for the highest quality and ultimate performance combined with ease of use in assembling and set-up as well as superior technical support.

Serpent has a tradition with instruction manuals, and with the new Serpent 705 manual we have yet again gone a step further. The new lay-out has easy to follow step-by-step assembly instructions and building tips, richly illustrated with 3-D rendered images and printed in full color. Following the steps in the manual will result in a well built high performance racing car that will soon be able to unleash its full potential on the racing track.

Instructions

This manual has 10 sections that will lead you through the assembly process of each of the sections of your Serpent 705. Following this order will ensure that no problems occur during assembly.

Each of the steps includes an area where all the screws, fasteners and ball bearings are shown which are used in that particular step. When a bag number is shown at the top of the left box, you will need to open the bag that is labeled with that number.

Set-up

In certain assembly steps you need to make basic adjustments. These basic adjustments will give you a

good rough set-up for your Serpent 705 once the car is completed. Fine-tuning the basic set-up is necessary however, this is an essential part of the process of building a high performance mode racing car like the Serpent 705.

The Set-up Guidelines in section 10 of this manual help you to adjust your Serpent 705. It is very important to follow this procedure and to be accurate with your adjustments, not only now, but every time you are preparing the car to go practicing or racing. This is how the best drivers in the world do it, simple, straight forward and accurate!

Exploded views and parts list

The parts list and the exploded views for the Serpent 705 are separate from the Instruction manual. The exploded views show all the parts for a particular assembly step, together with the Serpent part number. In the parts list at the back of the Reference Guide you will find, with the part number, the name of the part for easy reference when re-ordering.

Safety precautions

We have enclosed a document with safety precautions concerning the assembly and use of this product, named 'Read this first'. In your own interest, read this document and follow the precautions.

Contents

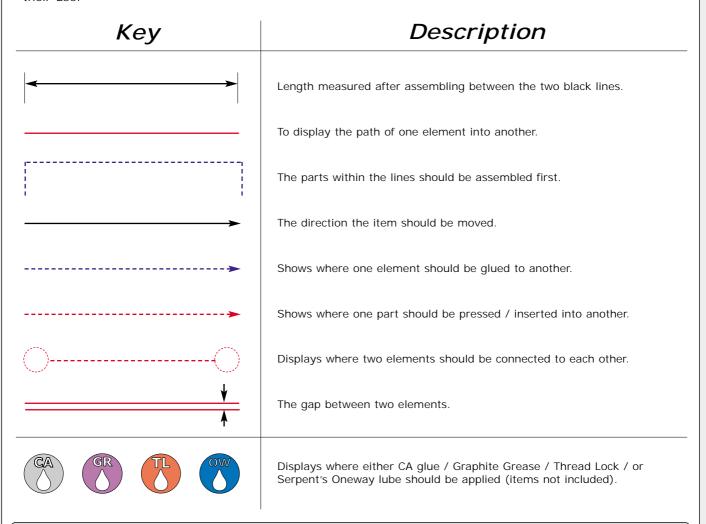
	Description	Page
1.0	Shock Assembly	4
2.0	Front Assembly	7
3.0	Differential Assembly	10
4.0	Rear Assembly	12
5.0	Radio Plate Assembly	16
6.0	Radio Plate Mounting	18
7.0	Gearbox Assembly	20
8.0	Centax Assembly	22
9.0	Final Assembly	25
10.0	Setup Guidelines	29

PERFORMANCE THROUGH EVOLUTION



How to use

In every step you will see a selection of lines and numbers. The numbers represent the order in which the step should be assembled. The lines and symbols are listed below each with their own explanation as to their use.



myTSN.com

The manual that comes with your Serpent 705 is very complete. However, as development is a continuous process, up-to-date information about the Serpent 705 is provided on our web portal: myTSN.com, the state-of-the-art r/c technology portal where Serpent racers from all over the world meet and exchange their ideas and share useful information about, and experiences with, their Serpent cars.

All information about the Serpent 705 is grouped around the product page on myTSN.com. This page can be accessed directly by going to the Products section and type Serpent 705 in the product search box.

Here you will find the very latest information about your Serpent 705: reports by Team racers and other experts with the latest tips and tricks, FAQ,

forums, set-ups, image gallery, downloadable files, and even streaming video about the Serpent 705 on how to further improve the car. The latest version of the manual including team and racer tips, as well as part lists and option lists will be made available as both downloadable PDF-files and viewable online under **i-Manual** in the Serpent 705 product page.

So make sure to visit myTSN and the Serpent 705 page. There is a world of up-to-date information about your 705 waiting for you, and it is just a few mouse clicks away... If not yet a member of myTSN, we strongly suggest to sign up as a member immediately so you can experience and enjoy an even wider range of services from Serpent and other myTSN partners.

www.myTSN.com/Serpent705

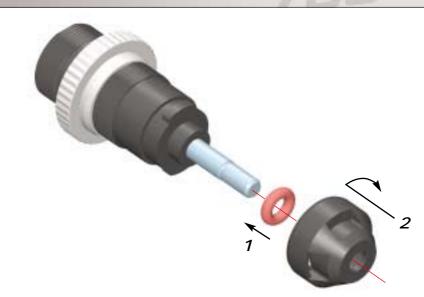


1.0 Shock Assembly

Step 1.1 Bag A **N3** 3x6x0.3mm Remove plastic flashing for smooth movement of pistons **R 1** 1.9mm Long shock shaft goes into long shock body (rear) Step 1.2 Step 1.3 Shock Assembly



Y4 3.1x1.6mm



Step 1.5

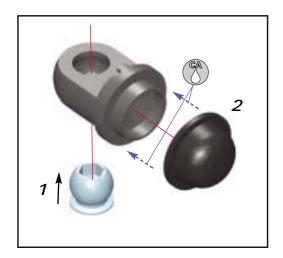


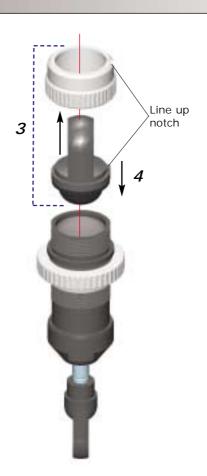
Step 1.6

Fill the cylinder with shock oil, with the piston in the bottom position.

Bleeding sequence: Let the oil settle and allow the air to escape. Slowly move the piston up and down until no more bubbles appear.







Shock length adjustment

Check the length of the shocks, adjust with the ball-joint.

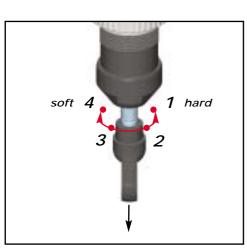
Shock Front: 67,5mm Shock Rear: 76,5mm

In full extended, locked position.



Step 1.8

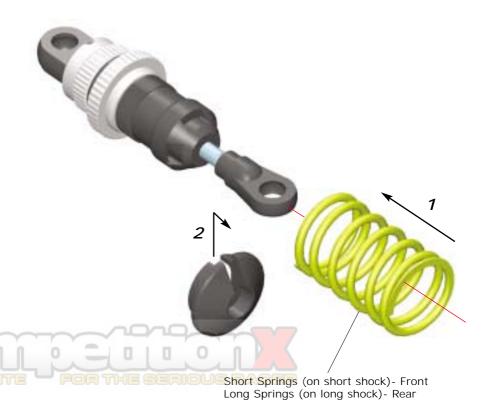
Shock Assembly



Dampening adjustment

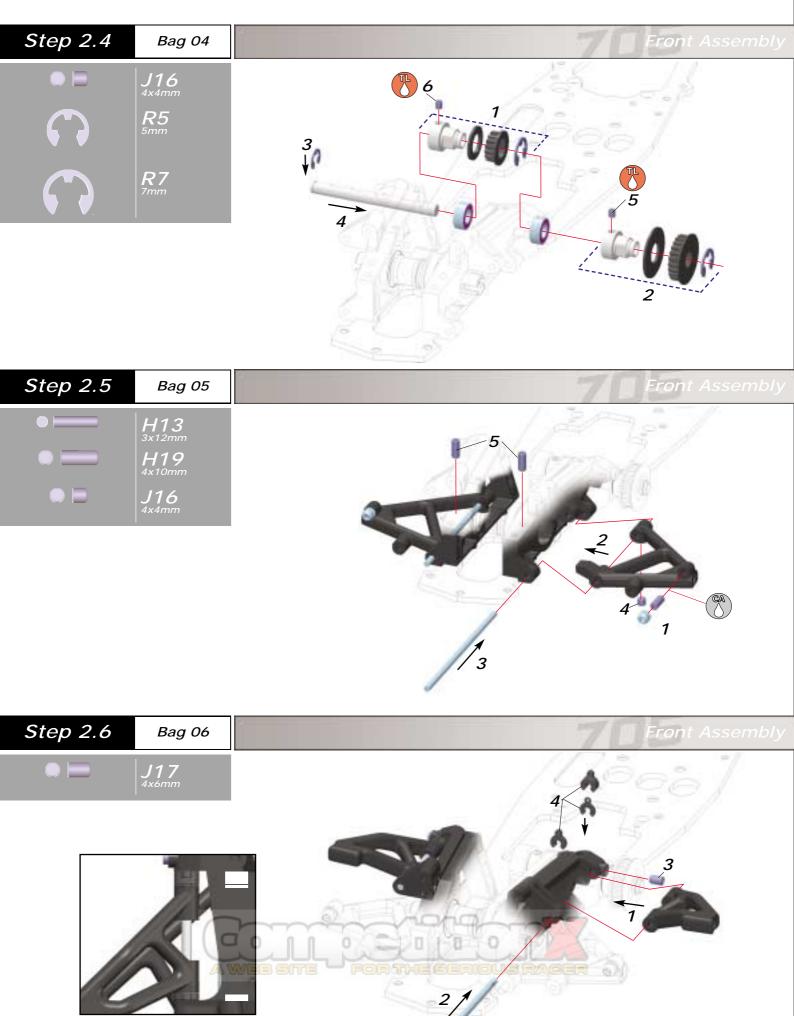
Pull the piston rod all the way down, turn slightly to lock the position of the cylinder.

You can then adjust the shocks by rotating the shaft in clockwise and counter clockwise clicks from position 1-4.



2.0 Front Assembly

Step 2.1 Front Assembly Bag 02 **Y12** 10.3x1.8mm Step 2.2 Bag 03,B13 (4) Dannin Step 2.3 (4) Dunnin **B13** 3.5x13mm **U6** 6x13mm





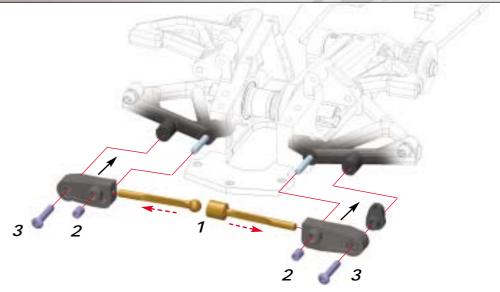
Bag 07





E13 3x12mm





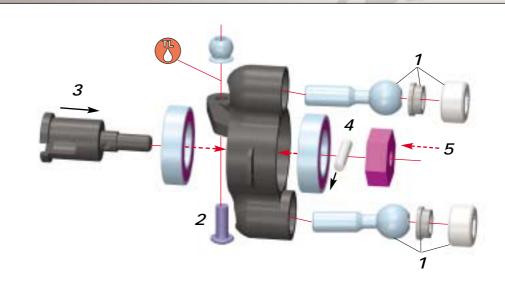
Step 2.8

Bag 08,09

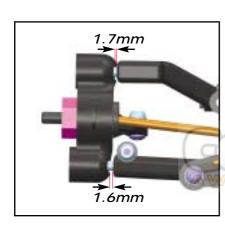
Front Assembly

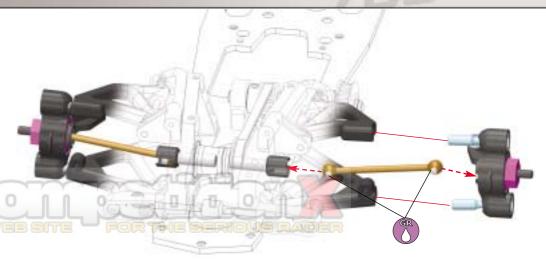


E10 3x6mm



Step 2.9



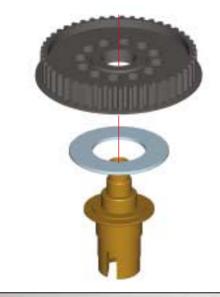


3.0 Differential Assembly

Step 3.1

Bag 10

Differential Assembly



Step 3.2

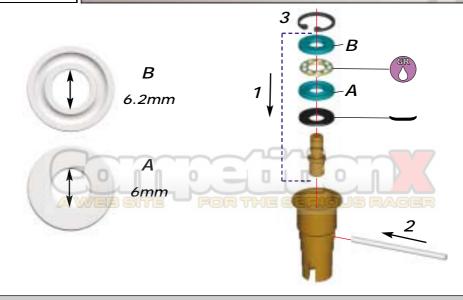
Differential Assembly



Step 3.3

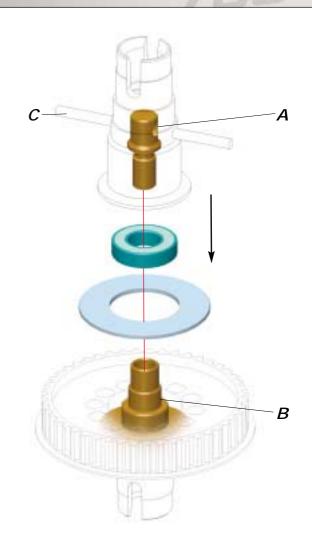
Bag 11

Differential Assembly



Diff setting

- 1. First screw both parts of the diff A & B together while still keeping the steel shaft C in position.
- 2. Using the steel shaft C and holding, by placing a screwdriver in the drive slot, part B tighten.
- 3. To check that you have achieved the correct tightness / setting, place a screwdriver in the drive slot of both part A & B and attempt to turn the drive pulley. When this is very tight and difficult to do, the correct setting has been obtained.

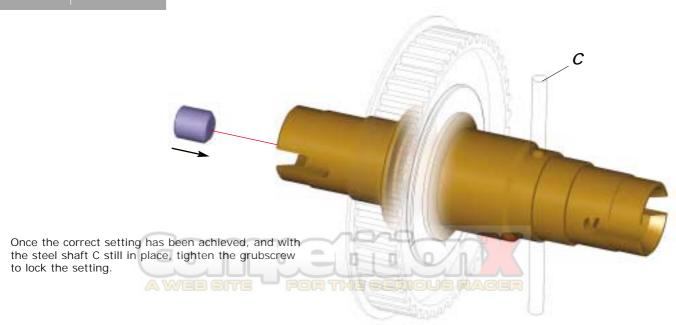


Step 3.5

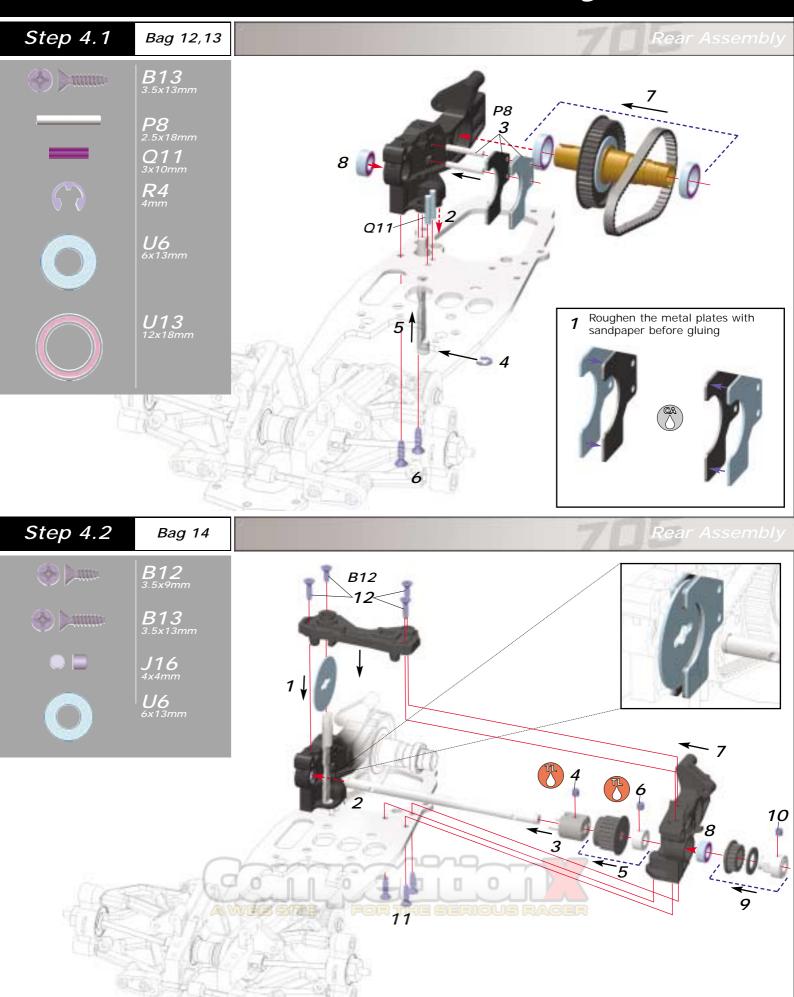
Differential Assembly



J24

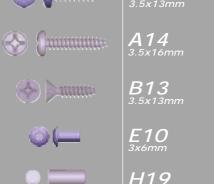


4.0 Rear Assembly





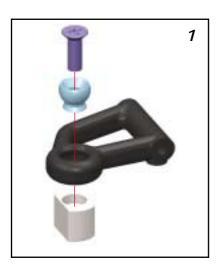


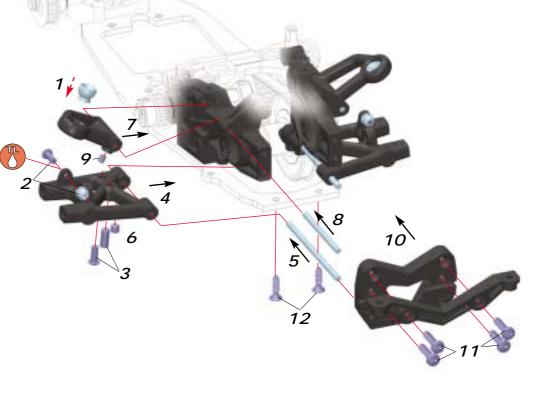


4x10mm

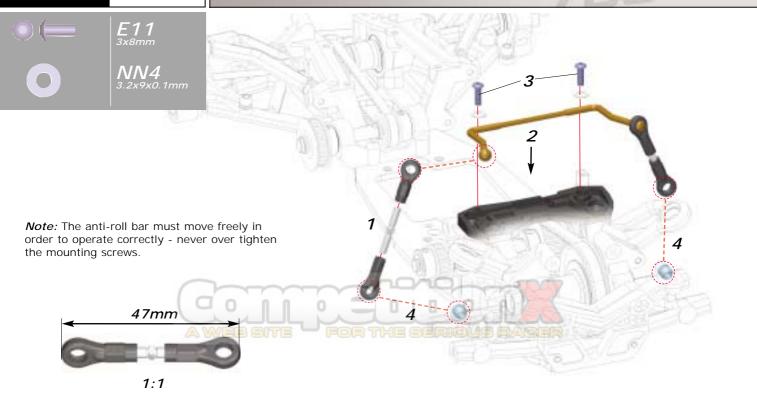
J16

4x4mm





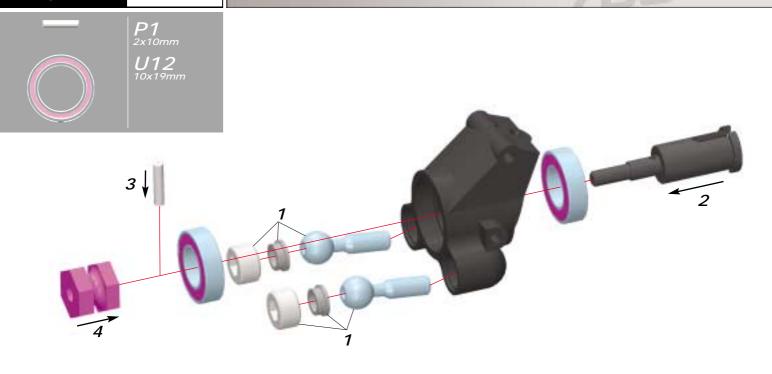






Bag 18

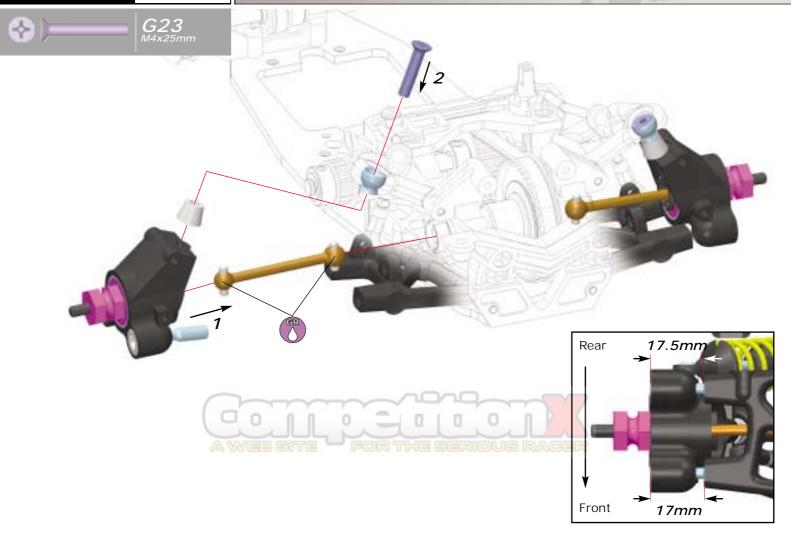
Rear Assembly



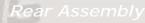


Bag 19

Rear Assembly

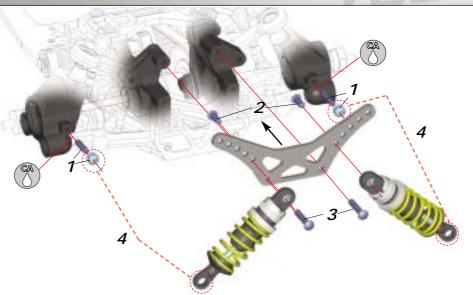








H13 3x12mm



Step 4.8A

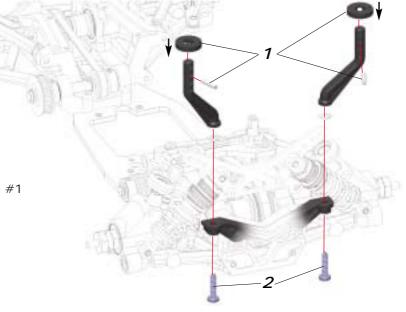
Bag 20

Rear Assembly



P5 2.5x12mm

Rear Bodymount Choice #1



Step 4.8B

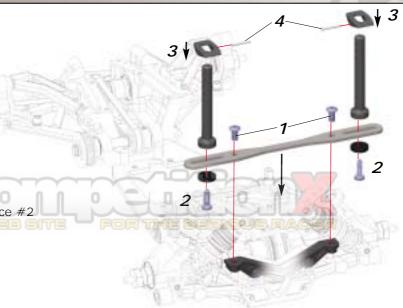






P3 2x14mm

Rear Bodymount Choice #2



5.0 Radio Plate Assembly

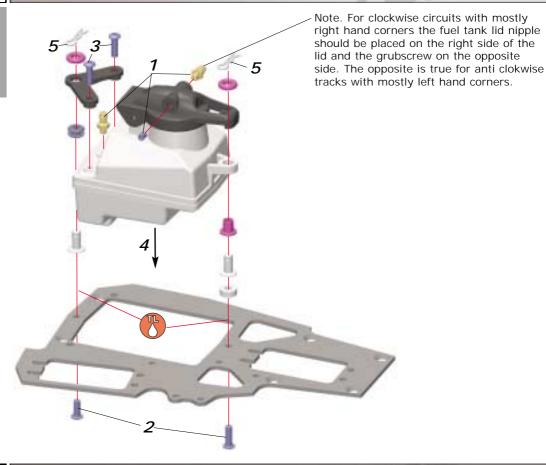
Step 5.1

Bag 21,22

Radio Plate Assembl



E11 3x8mm



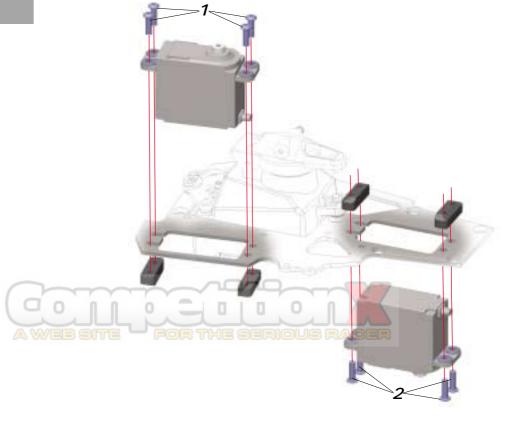
Step 5.2

Bag 23

Radio Plate Assembly

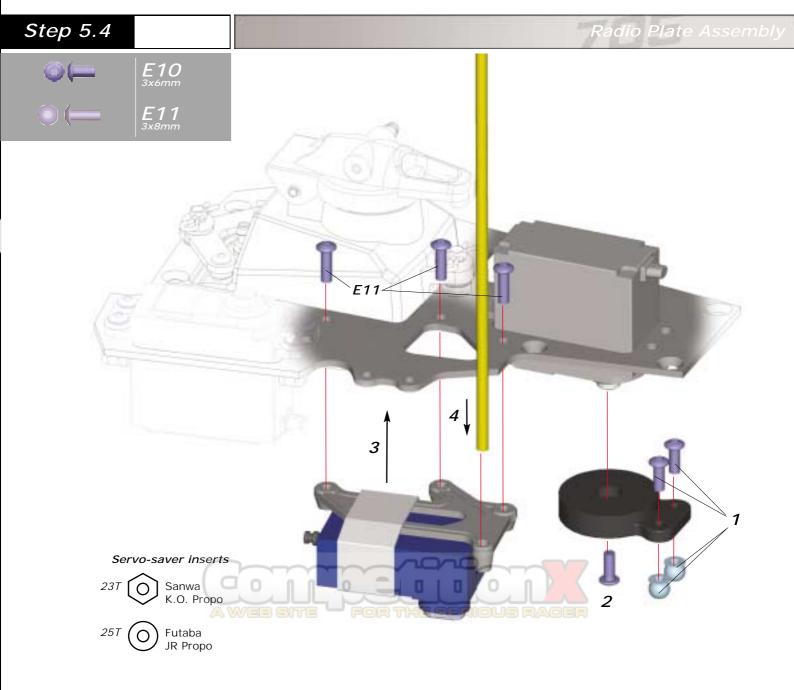


E135
3x14mm

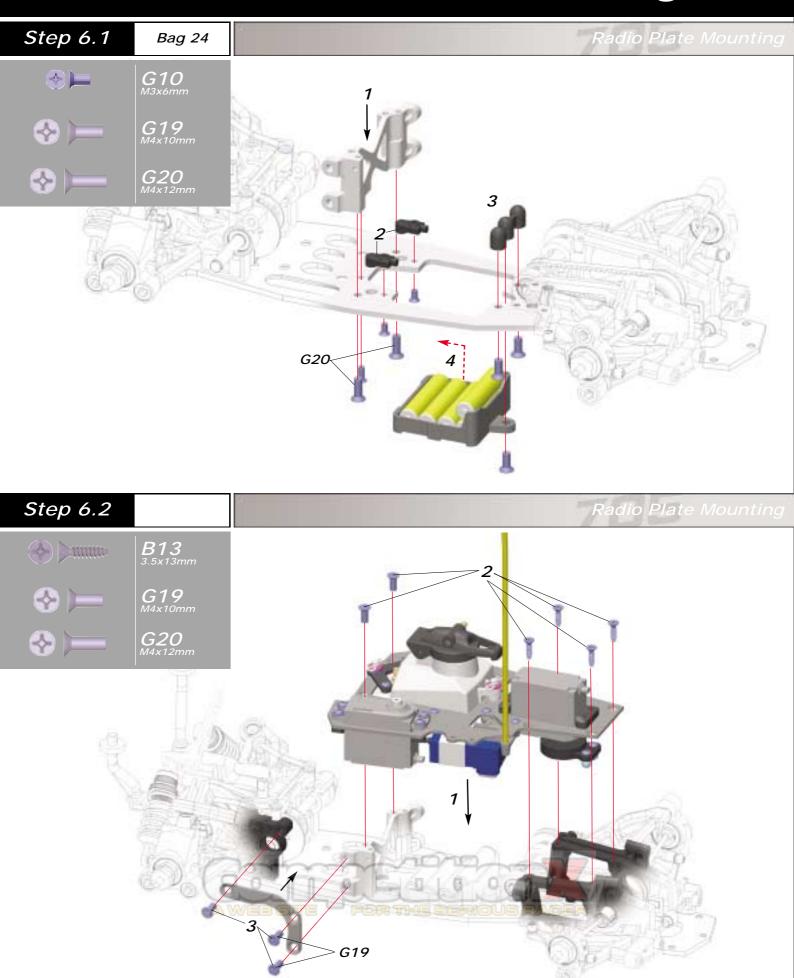


Attach the receiver to the receiver mount using tape and some two sided tape between mount and receiver.

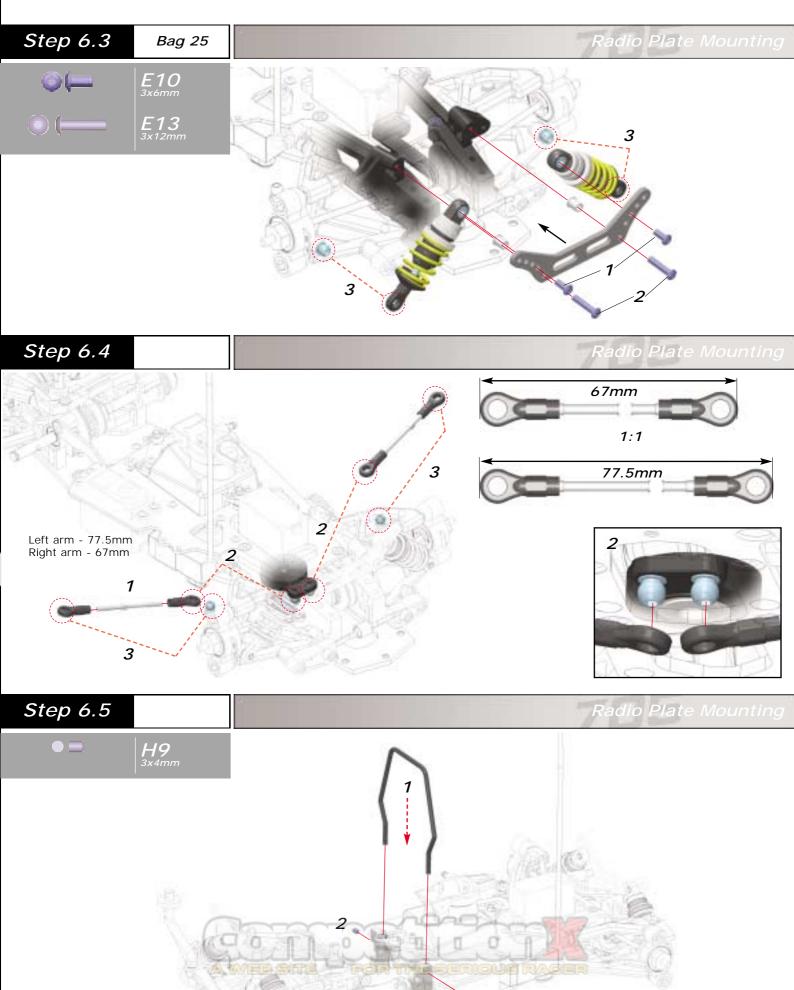




6.0 Radio Plate Mounting







7.0 Gearbox Assembly

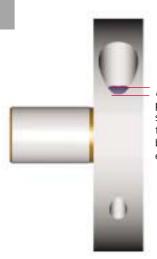
Step 7.1

Bag 26

Gearbox Assembly



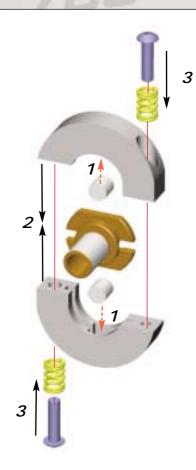
E13 3x12mm



Note: A good starting point is to have the screw head flush with the shoe. Ensure that both sides are set equally.







Step 7.2

to shift LATER.

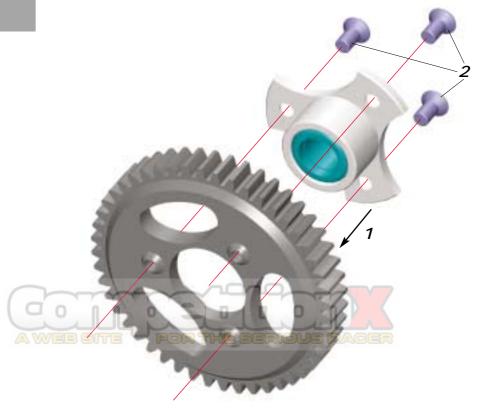
Screw IN both adjusting screws

Bag 27

Gearbox Assembly



G10 M3x6mm





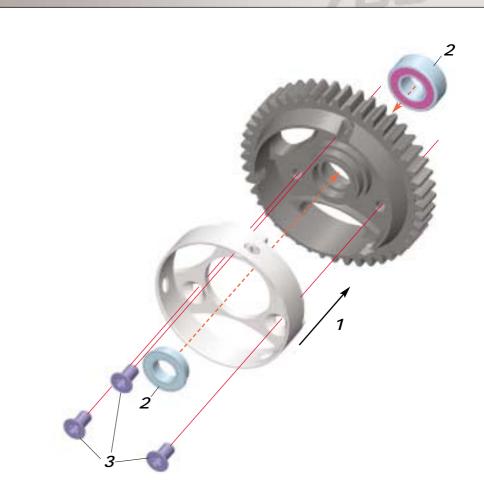
G10 M3x6mm



U6 6x13mm



V5 6x10mm



Step 7.4

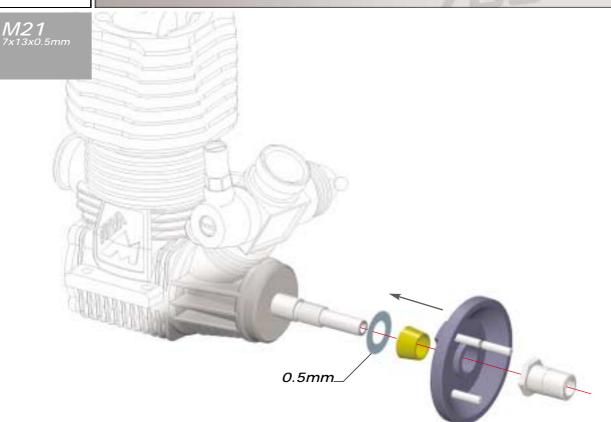
P12
3x11.5mm
R5
5mm

8.0 Centax Assembly

Step 8.1

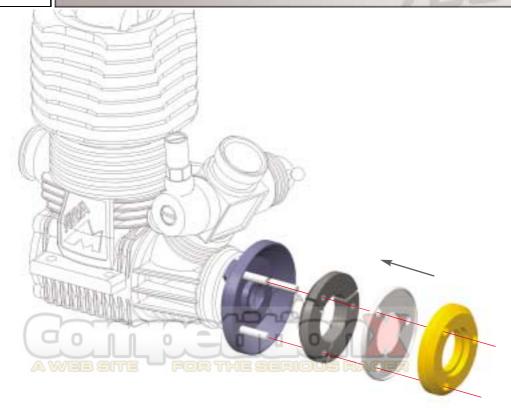
Bag 28

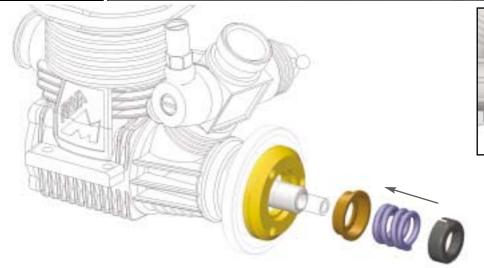
Centax Assembly

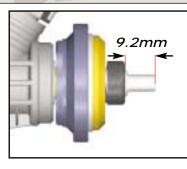


Step 8.2

Centax Assembly

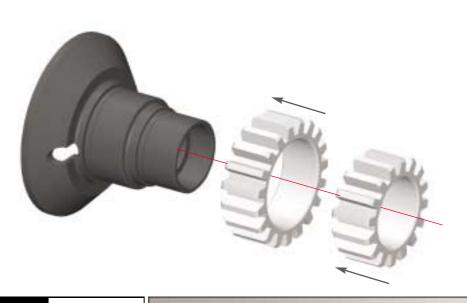


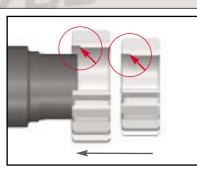




Step 8.4

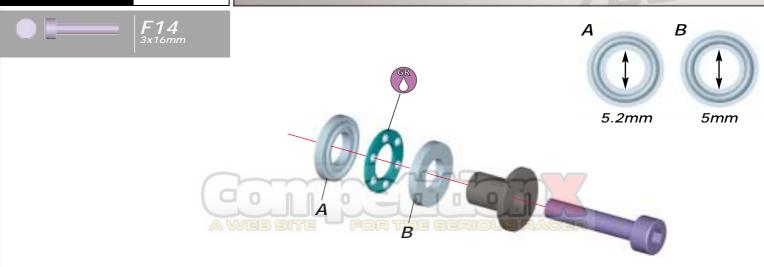
Centax Assembly

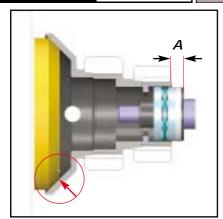




Step 8.5

Centax Assembly

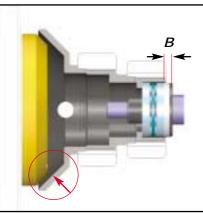




Adjusting the Clutch Gap

With only the thrust bearing installed push the bell housing in, and on to the clutch shoe and measure the distance between the outer edge of the black thrust bearing carrier and the top of the bell housing.

This is measurement A



Now pull the clutch housing away from the clutch shoe and against the thrust bearing. Measure the distance between the outer edge of the black thrust bearing carrier and the top of the bell housing again.

This is measurement B

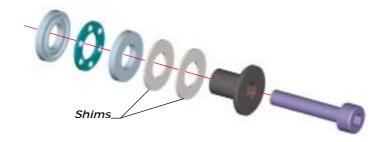
The correct clutch spacing is 0.7mm

Calculate the thickness of the required shims as follows: A - B - 0.7mm = Thickness of shims required

For example: A = 1.3mm and B = 0.3mm

Shim thickness = 1.3 - 0.3 - 0.7 = 0.3mm

These shims should be placed before the thrust bearing on the thrust bearing carrier as shown.

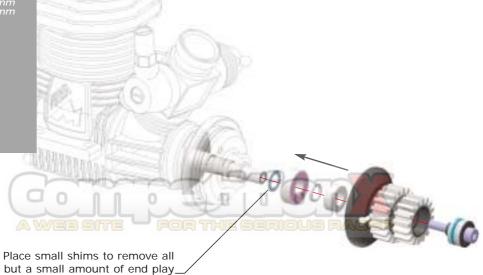




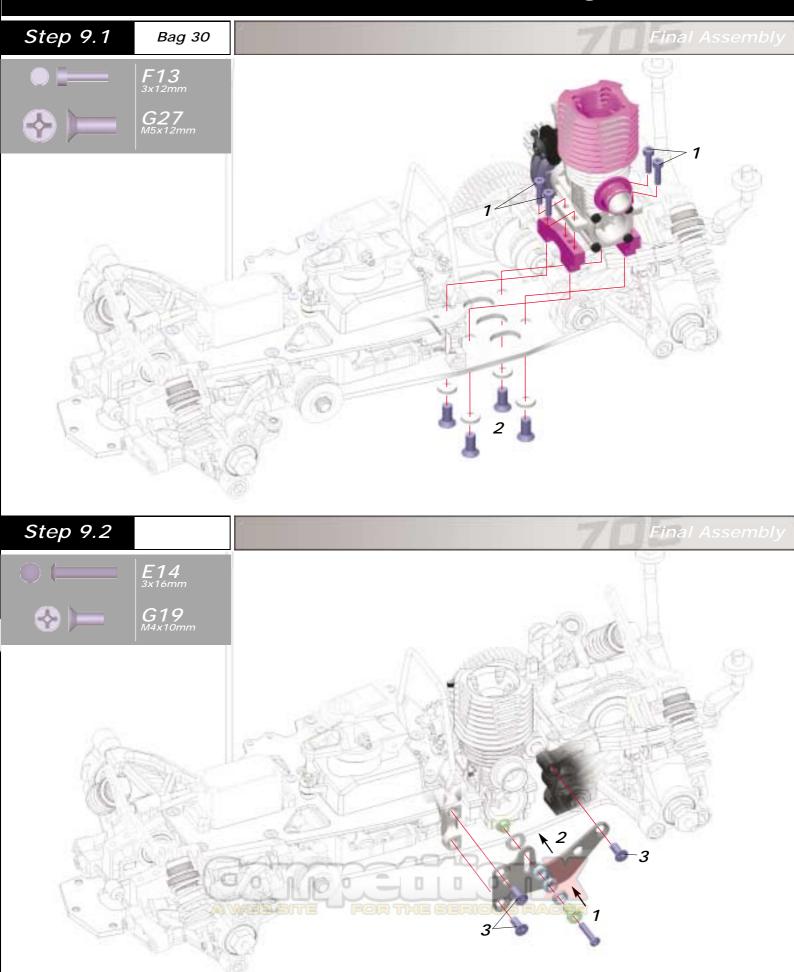
entax Assembly



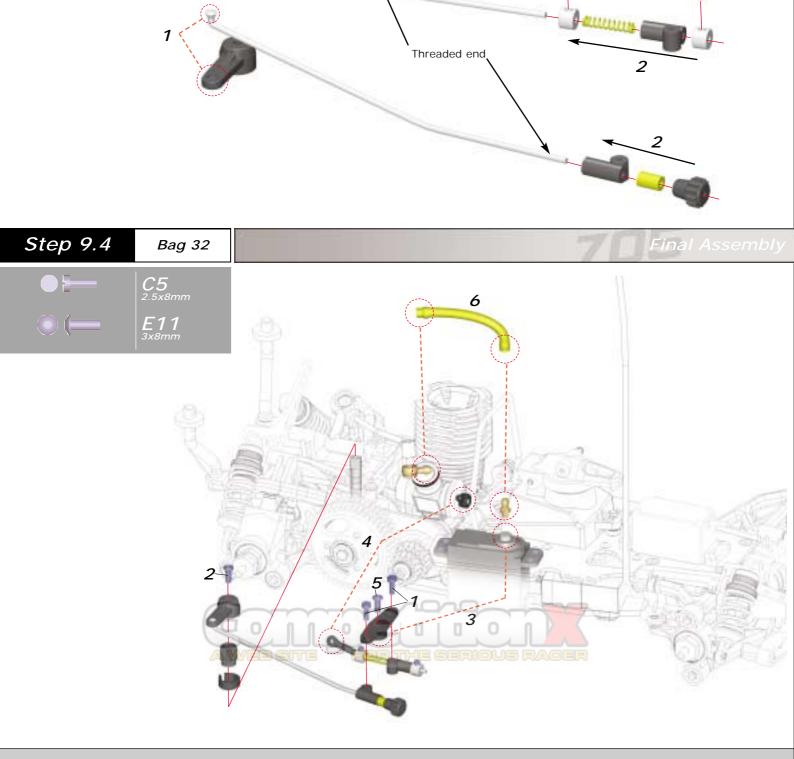
U45 5x13mm



9.0 Final Assembly





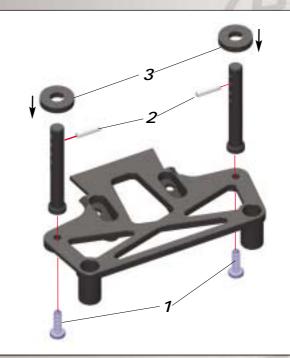




Cut the throttle rod to your desired length. Bend both rods to best suit your requirements.



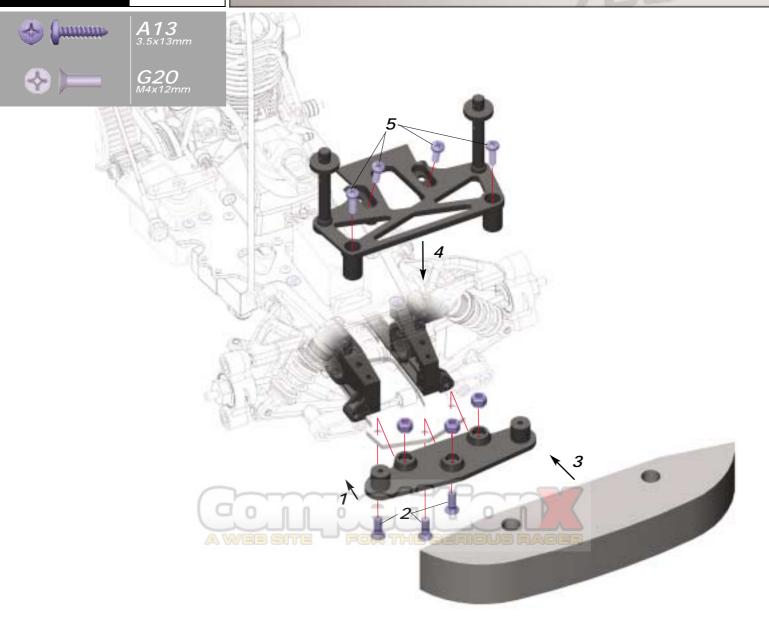
A13 3.5x13mm

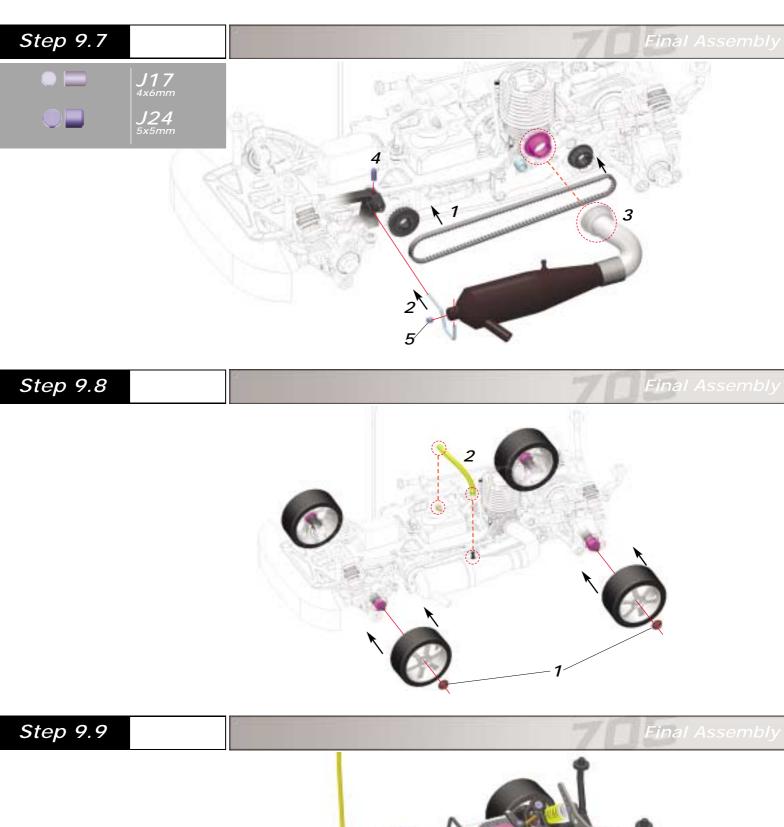


Step 9.6

Bag 34

Front Assembly







9.0 Setup Guidelines

Setting up a racecar with fully independent suspension, like your Serpent 705, is necessary to make the car perform well. We have developed these straightforward procedures to help you set up your car properly and easily. Always follow these procedures step-by-step, in the order presented, and always make sure that you make equal adjustments on both left and right sides of the car.

The set-up described here is a good starting point, but you may adjust the settings to better suit different track conditions. Make only small adjustments at a time, and see if you find any improvement in handling with each adjustment. We advise you to keep track of your set-up changes, and record which set-ups work best at different racetracks under various conditions. After rebuilding the chassis, or in case you are lost with your set-up, always return to the set-up described here.

1 Shock absorbers

Shock absorber dampening influences the responsiveness of the chassis during cornering (chassis roll), and helps to maintain proper contact between the tire and the road surface during vertical movement. Setting the right dampening is therefore always a compromise and requires a lot of "hands on" experience.

No dampening means that the spring rate determines how long it takes for the spring to compress and the suspension to reach a stable position. Dampening only comes into play when the suspension is moving (either vertical chassis movement or because of chassis roll), and loses its effect when the suspension has reached a stable position. When the spring is compressed or decompressed, the shock absorber oil resists this movement. How much it resists depends on the thickness of the oil and how much the flow is restricted (the number of holes in the shock piston) and of the velocity of the piston.

How to measure and adjust

The Serpent shock absorbers are adjustable from the outside. Pull out the pistonrod and turn it slightly until it locks in the shock-cylinder. By Turning the pistonrod clockwise until the end you reach the hardest position (1 hole). Turning it from here anti-clockwise means opening more holes. By feeling the "clicks" you can determine the number of holes in the piston.



1.1 Front shock absorber setting

Adjust the front shocks to 2 holes ($\bar{\text{complete}}$ turn clockwise, then 1 click back)

1.2 Rear shock absorber setting

Adjust the rear shocks to 3 holes (complete turn clockwise, then 2 clicks back)

2 Track-width

Track-width affects the car's handling and steering response. Increasing front track-width will result in more understeer, while decreasing it will result in less understeer and faster steering response.



2.1 Front track-width - Setting

Front track-width is measured on the outside of the wheels. It is important that the front track-width is adjusted symmetrically, meaning that the right and left wheels must be the same distance

from the center-line of the chassis. Set the front track-width to 198mm. Turn both pivot balls IN equally to reduce track-width, turn them both OUT equally to increase track-width.



3 Downstops

Downstops limit how far the suspension arms travel downward (which determines how far upwards the chassis travels). The amount of downward suspension travel affects the car's handling, and the effect may change with the type of track and/or amount of grip available. In general, more suspension travel (less downstop) makes the car more responsive but less stable. It is also better on a bumpy track.

It is very important to adjust the downstops such that left and right sides are equal.

How to measure

You check the downstops with the chassis elevated above a reference surface. A special, flat reference board is available from HUDY (#108200 Flat Set-up Board). We also advise you to use the downstop measuring set from HUDY.



Using the measuring gauge, measure the distance from the reference surface to the bottoms of the rear uprights / front steering blocks. Positive numbers indicate the distance (in mm) ABOVE the level of the elevating blocks (or, above the bottom of the chassis). Negative numbers indicate the distance (in mm) BELOW the level of the elevating blocks (or, below the bottom of the chassis).

Perform these initial steps

A Remove the wheels from the car.

B Front anti-roll bar: Remove screw from the right front anti-roll bar mount to disconnect it.

C Rear anti-roll bar: Disconnect one balljoint from rear anti-roll bar.



Remark: it is not necessary to remove the shocks, however you must be sure that they are long enough not to limit the suspension. Be sure the suspension is reaching the downstop limits, before the shocks do.

3.1 Downstops front

Adjust the front downstop screws so that the bottoms of the steering blocks are at 0mm on the gauge. (Actual measurement = 0 mm above level of elevating blocks, or level with the bottom of the chassis).



3.2 Downstops rear

Adjust the rear downstop screws so that the bottoms of the rear uprights are at +7mm on the gauge. (Actual measurement = 7mm above level of elevating blocks, or above the bottom of the chassis).



4 Ride Height

Ride-height also affects the car's traction as it moves the center of gravity and the roll-center of the car. Decreasing the ride-height (lowering the car) gives you more grip. However, because of changes in suspension geometry and decreasing ground clearance, there are also negative consequences to doing this.

How to measure

The cars ride height is measured when mounted on the HUDY setup system or using a set of 66mm rear / 66mm front tires. Measure using a HUDY ride height gauge or calipers from the very end point at both the front and rear of the car.



4.1 Front ride height - Setting

Set the front ride height to 7mm. This is done by adding or removing pressure on both front springs pre-tension and therefore raising or lowering the ride height.



4.2 Rear ride height - Setting

Set the rear ride height to 7mm. This is done by adding or removing pressure on both rear springs pre-tension and therefore raising or lowering the rider height.



5.0 Camber

Camber is the angle of a wheel to the surface when the car is resting on the surface (with wheels and shock absorbers mounted). Zero degrees (0°) of driving camber means that the wheel is perpendicular to the reference surface; negative degrees means that the top of the wheel is leaning inwards; positive degrees means that the top of the wheel is leaning outwards.

Camber affects the car's traction. In general, more negative camber means increased grip. Nevertheless, it should always be adjusted such that the front tires wear flat, while the rear tires should wear slightly conical to the inside.

5.1 Front driving camber - Setting

Adjust the front driving camber to -1.5 degrees (tops of front wheels leaning inwards).

How to measure

Before measuring front driving camber, lift and drop the front end of the car a few cm's to let the suspension settle. Measure the camber using the Hudy setup system which you already used to adjust ride height.



Notice: using wheels together with a camber gauge may result in noticeable different camber readings. The reason is

that especially the rear tire has a tendency to lay flat on the surface. If then i.e. the tire is not pre-coned, the camber reading may differ up to 1 degree less camber to the reading you get with the Hudy system.

How to adjust

Camber is adjusted by turning the pivotballs in or out. Turning the upper pivotball in while turning the lower one out gives more negative camber. Always turn one pivotball in and the other one out, otherwise you will change toe-in.



5.2 Rear driving camber - Setting

Adjust the rear driving camber to -3 degrees (tops of rear wheels leaning inwards).



How to measure

The measuring is similar to the front camber.

How to adjust

Camber is adjusted by turning the pivotballs in or out. Turning the (lower) pivotballs out gives more negative camber. Always turn both pivotballs in or out, otherwise you will change toe-in.



6 Toe-in

Toe-in is the angle of the wheels when looked at from above. When the wheels are parallel, the toe-in is 0 degrees. When the wheels are open towards the front, this is called toe-out (or negative toe-in). When the wheels are closed towards the front, this is called (positive) toe-in.

Toe-in is used to stabilize the car. In the case of oversteer (the rear end losing traction before the front), adding extra rear toe-in may help, but this makes on-power cornering a little more difficult. If the car is too stable and pushing (understeering), removing some front toe-in will remedy this.

How to adjust

Front toe-in is adjusted with the track-rods that connect the servosavers to the steering blocks. Making the track-rods longer will create more toe-in, while making them shorter will create less toe-in.

To create more rear toe-in, turn in the front pivot ball and turn out the rear pivot ball. To create less rear toe-in, turn out the front pivot ball and turn in the rear pivot ball. Remember to make equal (but opposite) adjustments to the pivot balls.



How to measure

Measure both the front and rear toe-in using the set-up tool from HUDY

6.1 Front Toe-in - Setting Adjust the front toe-in to -0.5 dea

Adjust the front toe-in to -0.5 degrees (fronts of front wheels pointing slightly outwards).



6.2 Rear Toe-in - Setting

Adjust the rear toe-in to +2.0 degrees (fronts of rear wheels pointing inwards).



7 Caster angle

Caster angle is the angle of an imaginary line between the top pivot ball and the bottom pivot ball of the steering block, with respect to a line perpendicular to the ground. Caster angle affects on- and off-power steering, as it will tilt the chassis more or less depending on how much caster is applied.

In general changing caster has an effect on on-throttle handling. Giving more caster results in more on throttle oversteer (or less understeer). Effects on off-throttle balance is quite little and difficult to predict.

How to adjust

The caster angle is adjusted with nylon spacers which are inserted either in front of or behind the upper front suspension arm. More spacers in front of the arm will increase the caster angle. More spacers behind the arm will decrease the caster angle.

7.1 Caster - Setting

Set the front caster gap to 2mm (2mm shim in front of the upper arm, 1+4mm shims behind).



8 Checking for suspension tweak

A "tweaked" car is an unbalanced car, and has a tendency to pull to one side under acceleration or braking. Tweak is caused by an uneven wheel-load on one particular axle. Now that the suspension geometry set-up has been completed, you must check for suspension tweak before you reconnect the anti-roll bars.



Perform these initial steps:

A Place the car on a flat reference surface.

B Make sure that both front and rear anti-roll bars are disconnected.

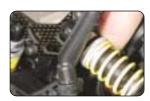
 ${\bf C}$ Put a set of good tires on the car, important is that the left wheels have the same size than the right ones

8.1 Checking for tweak from the front of the car. Lift and drop the front end of the car a few cm's to let the suspension settle. Place a sharp tool underneath the chassis at its middle point, and lift the front end. If one front wheel lifts before the other, the rear of the car is tweaked.





8.2 Adjust the preload on the rear springs until both front wheels lift at the same time. If, for example, the front right wheel lifts earlier, you must increase the preload on the rear left spring, and decrease the preload on the rear right spring. You must adjust both rear springs, otherwise you will change the ride height.



8.3 Reconnect the rear anti-roll bar, and check for tweak again by lifting the front end of the car. If again one front wheel lifts before the other, the rear anti-roll bar is tweaked. Adjust the length of one or both rear anti-roll bar pushrods until both front wheels lift at the same time.



8.4 Checking for tweak from the rear of the car. Lift and drop the rear end of the car a few cm's to let the suspension settle. Place a sharp tool underneath the chassis at its middle point, and lift the rear end. If one rear wheel lifts before the other, the front of the car is tweaked.



8.5 Adjust the preload on the front springs until both rear wheels lift at the same time. If, for example, the rear right wheel lifts earlier, you must increase the preload on the front left spring, and decrease the preload on the front right spring. You must adjust both front springs, otherwise you will change the ride height.



8.6 Reconnect the front anti-roll bar, and check for tweak again by lifting the rear end of the car. If again one rear wheel lifts before the other, the front anti-roll bar is tweaked. Loosen the screw on the left front anti-roll bar mount. Adjust the eccentric cam until both rear wheels lift from the ground at the same time. Tighten the screw to secure the adjusting cam.





9 Anti-roll bars

Anti-roll bars are used to adjust the car's side-traction. In general, increasing the hardness of an anti-roll bar on one particular axle decreases the side-traction of that axle and increases the side-traction of the other axle. For example, if you make the front anti-roll bar harder, you decrease the side-traction of the front and increase

the side-traction of the rear. This will result in less steering (more understeer).

Changing the front anti-roll bar has more effect on turning-in (entering a turn, decelerating, off-power).

Changing the rear anti-roll bar has more effect on powering-out (exiting a turn, accelerating, on-power).



How to adjust

You adjust the front anti-roll bar by turning both blades to an equal angle. The flat of the blade in a horizontal position is the softest position; the vertical position is the hardest position.

9.1 Front anti-roll bar - Setting

Adjust the front anti-roll bar to the (softest) horizontal position (0 degrees).

9.2 The rear anti-roll bar is non adjustable but you can obtain a 3 mm version (#909330).



myTSN.com ===

www.myTSN.com/Serpent705

SERPENT MOTORSPORT

P.O. Box 180, 2100 AD Heemstede The Netherlands, Europe. Tel: (31) 23 529 2068 Fax: (31) 23 528 4950 E-mail: info@serpent.com

Serpent USA, Inc. West Park Center,

West Park Center,
2830 NW 79th Avenue,
Miami, Florida 33122, USA.
Tel: (305) 639 9665
Fax: (305) 639 9658
E-mail: info@serpent-usa.com

