# SERPENT

# 950R

1:8 SCALE 4WD GAS ON-ROAD COMPETITION

# Instruction Manual

SERPENT 950R

# Introduction

Congratulations on your newly-acquired Serpent 950R. You have chosen the highest quality, ultimate-performance racecar that is easy to use, assemble, and set up. As part of the worldwide team of Serpent drivers, you will also get superior technical support. Serpent has a tradition of excellence with instruction manuals, and with the new Serpent 950R manual we have yet again gone a step further. The new layout has easy to follow step-by-step assembly instructions and building tips, richly illustrated with 3D rendered full-color images. Following the instructions will result in a well-built, high-performance racecar that will soon be able to unleash its full potential at the racetrack.

**Instructions**

This instruction manual has nine sections that will lead you through the assembly process of your Serpent 950R. Follow the assembly steps in the order presented to ensure that no problems occur during assembly. Each step indicates all the fasteners and small parts used. Bag numbers are also shown to identify the kit bag that contains the appropriate parts for the step.

**Set-up**

In certain assembly steps you need to make basic adjustments, which will give you a good initial set-up for your Serpent 950R. Note that fine-tuning the initial set-up is an essential part of building a high-performance racecar like your Serpent 950R.

The Set-up Guidelines in Section 9 of this instruction manual will help you to adjust your Serpent 950R. It is very important to follow these procedures, and be accurate with your adjustments not only now, but every time you prepare the car for 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 exploded views and parts lists for the Serpent 950R are contained in a separate Reference Guide. The exploded views show all the parts of a particular assembly step, together with the Serpent part number. The parts lists at the end of the Reference Guide indicate the part number and name of each part for easy reference when re-ordering.

**Safety precautions**

Included with your Serpent 950R kit is a document entitled "Read This First" that covers safety precautions for the assembly and use of this product. We strongly recommend that you thoroughly read and understand that document, and follow all the precautions.

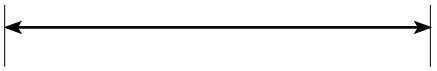
# Contents



PERFORMANCE THROUGH EVOLUTION

# Using the manual

Each step contains a variety of numbers, lines, and symbols. The numbers represent the order in which the parts should be assembled. The lines and symbols are described below.

| Line/Symbol | Description |
|---|---|
|  | Length after assembly. |
|  | Assembly path of one item into another. |
|  | Group of items (within lines) should be assembled first. |
|  | Direction the item should be moved. |
|  | Glue one item to another. |
|  | Press/Insert one item into another. |
|  | Connect one item to another. |
|  | Gap between two items. |
|  | Apply graphite grease (GR), threadlock (TL) or Serpent's One-way Lube (OW). (items not included). |

# myTSN.com

The printed instruction manual included with your Serpent 950R kit is very complete, though due to continuous product development, more up-to-date information is provided at our **myTSN.com** web portal. This state-of-the-art R/C technology portal is where Serpent racers from all over the world meet and exchange their ideas, and share useful information and experiences about their Serpent cars.

All information about the Serpent 950R is accessible from the Serpent 950R product page on **myTSN.com**. You can access this page by going to the Products section, then search for the 'Serpent 950R' product name.

From the Serpent 950R product page you will find the very latest information about your Serpent 950R: reports by team drivers and other experts, tips and tricks, FAQ, forums, setups, image gallery, downloadable files, and even streaming video of the Serpent 950R on how to further improve the car. The latest version of the instruction manual (including team and racer tips, and part lists and option lists) will be made available as downloadable PDF-files and online viewable pages under '**i-Manual**'.

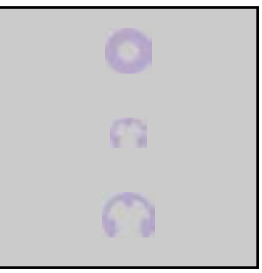
So be sure to visit **myTSN.com** and the Serpent 950R page. There is a world of up-to-date information about your Serpent 950R waiting for you, and it is just a few mouse clicks away! If you are not yet a member of myTSN, we strongly recommend that you sign up immediately so you can experience and enjoy an even wider range of services from Serpent and other myTSN partners.

***www.myTSN.com/Serpent950R***

# 1.0 Shock Assembly

## Step 1.1

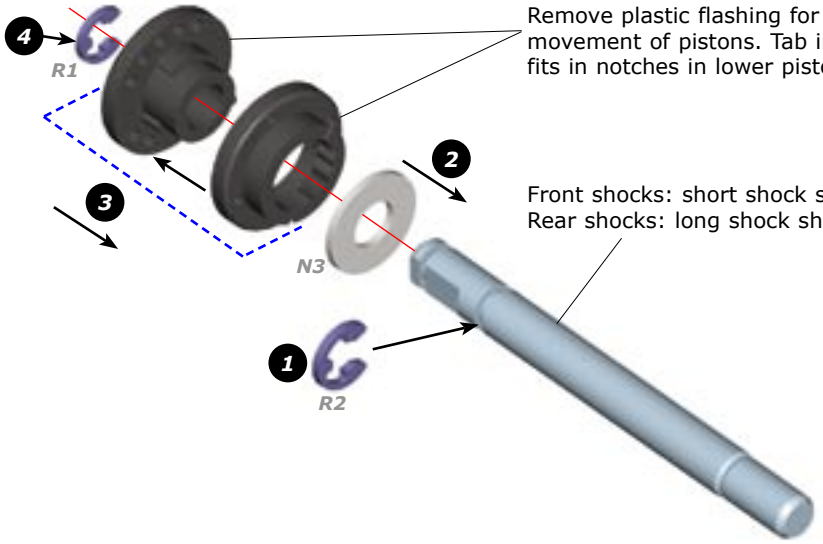
**Bag 01**



**N3**
3x6x0.3mm

**R1**
1.9mm

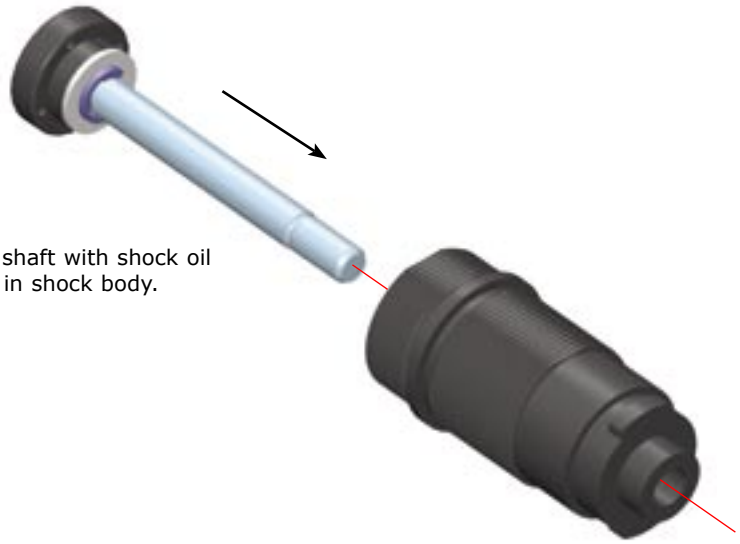
**R2**
2.3mm




Remove plastic flashing for smooth movement of pistons. Tab in upper piston fits in notches in lower piston

Front shocks: short shock shaft and body
Rear shocks: long shock shaft and body

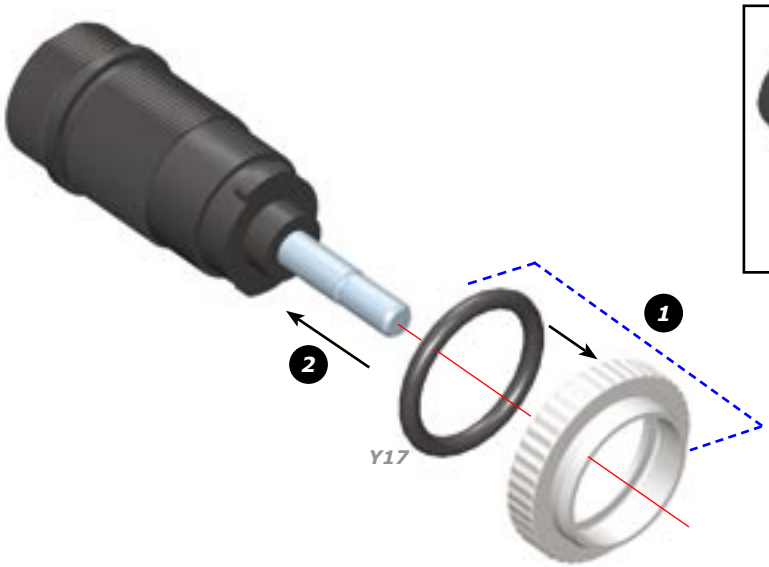
## Step 1.2



Lubricate shock shaft with shock oil before inserting in shock body.

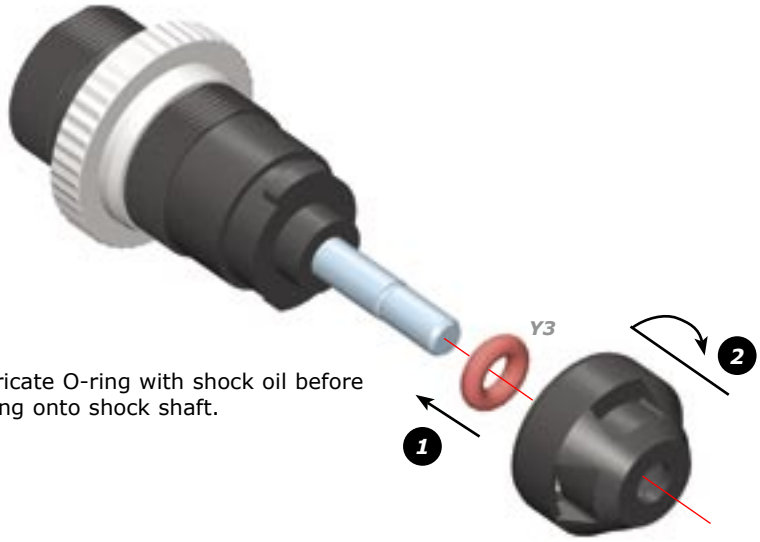
## Step 1.3

**Y17**
12.1x1.6mm



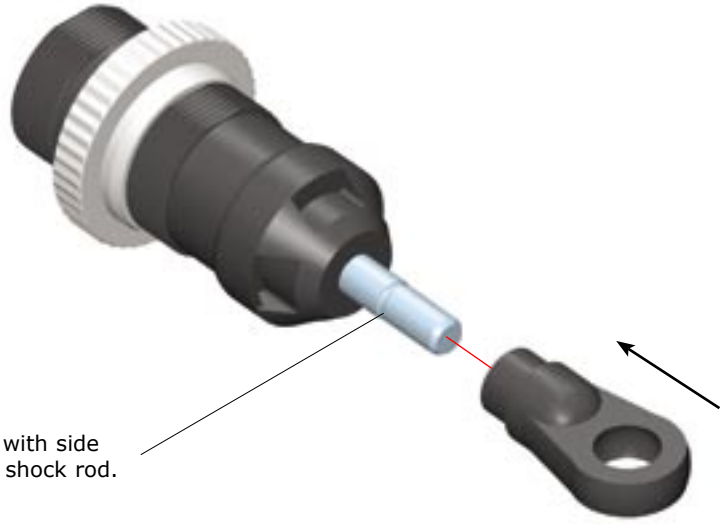

## Step 1.4

**Y3**
3x1.5mm




Lubricate O-ring with shock oil before sliding onto shock shaft.

## Step 1.5



**Hint:** Pre-thread ball-joint with M3 screw for easy assembly

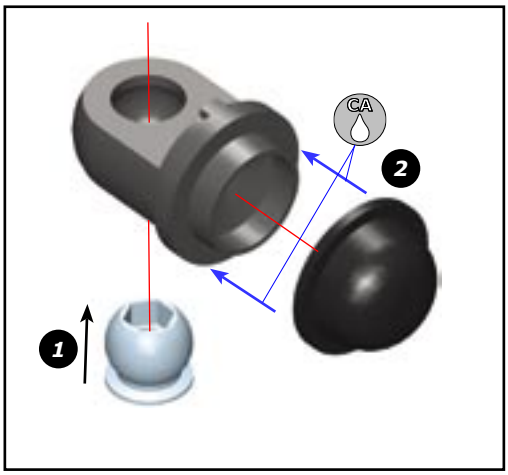
Grip shock rod at top of exposed threads with side cutting pliers. Be sure not to damage the shock rod.

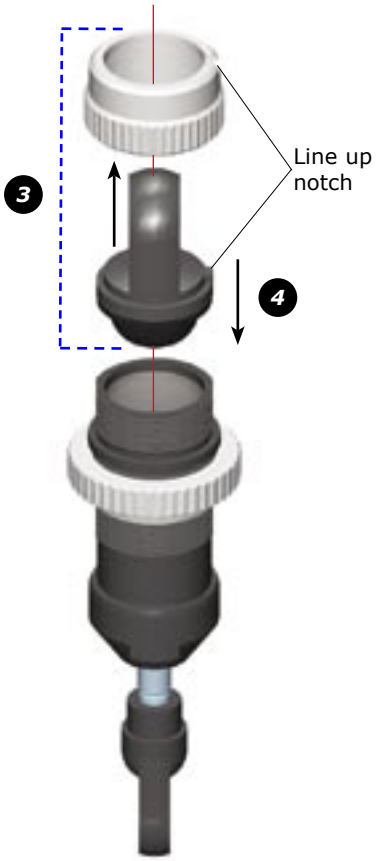
## Step 1.6

Fill the shock body with shock oil, with the piston at the bottom.

**Bleeding**
Let the oil settle and allow the air to escape. Slowly move the piston up and down to release any trapped air bubbles. Repeat as necessary until no bubbles appear.

## Step 1.7



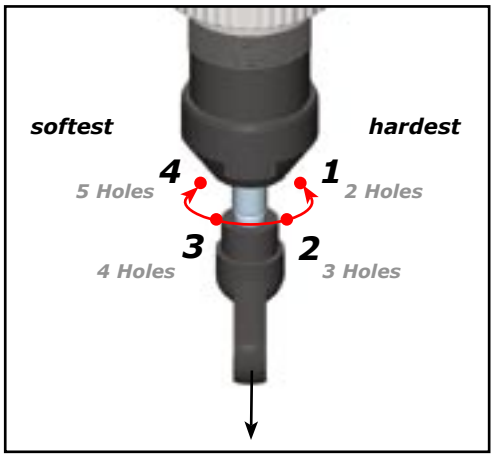

***Shock length adjustment***
Check the length of the shocks in the extended, fully locked position.

Front shocks: 67.5mm
Rear shocks: 76.5mm

Adjust shock length with the ball-joint.

**IMPORTANT!** Each pair of front and rear shocks must be the same length.

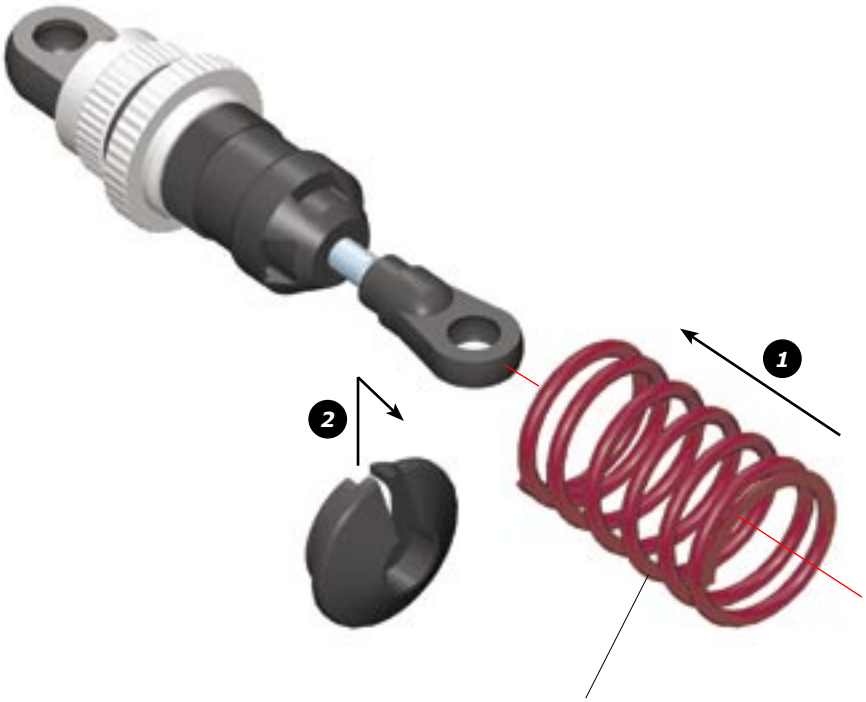
## Step 1.8




***Damping adjustment***
Pull the shock shaft all the way out, turn slightly to lock it in the shock body.

Adjust the shock damping by rotating the shock shaft CW or CCW to positions 1-4. Each setting can be felt by a slight "click".

**IMPORTANT!** Each pair of front and rear shocks must have the same damping setting.

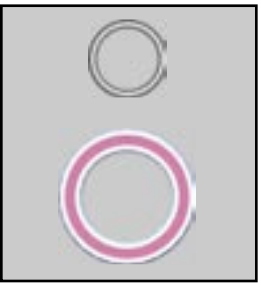



Front Shocks: short shocks and springs
Rear Shocks: long shocks and springs

# 2.0 Front Assembly

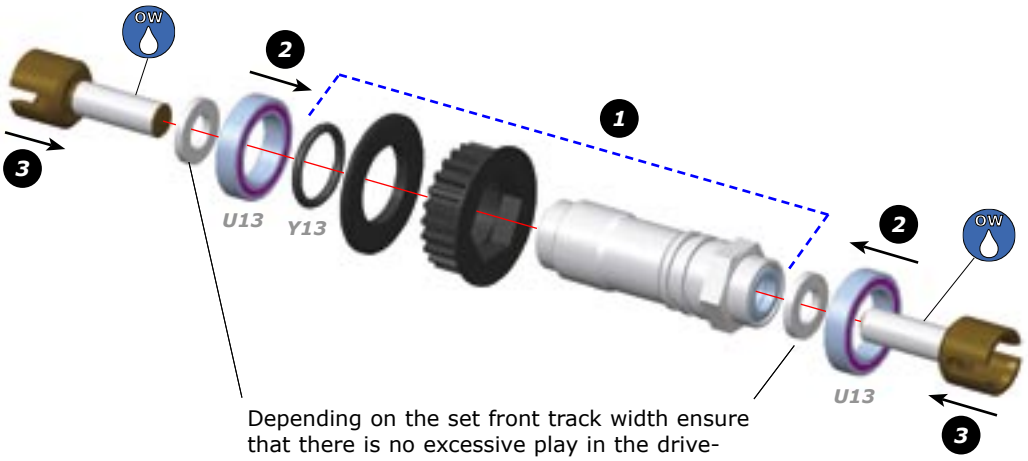
## Step 2.1

Bag 02, UI, Tools D938



**Y13**
10.3x1.8mm

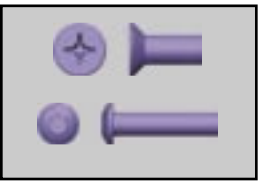
**U13**
12x18mm




Depending on the set front track width ensure that there is no excessive play in the drive-shafts by placing these spacers.

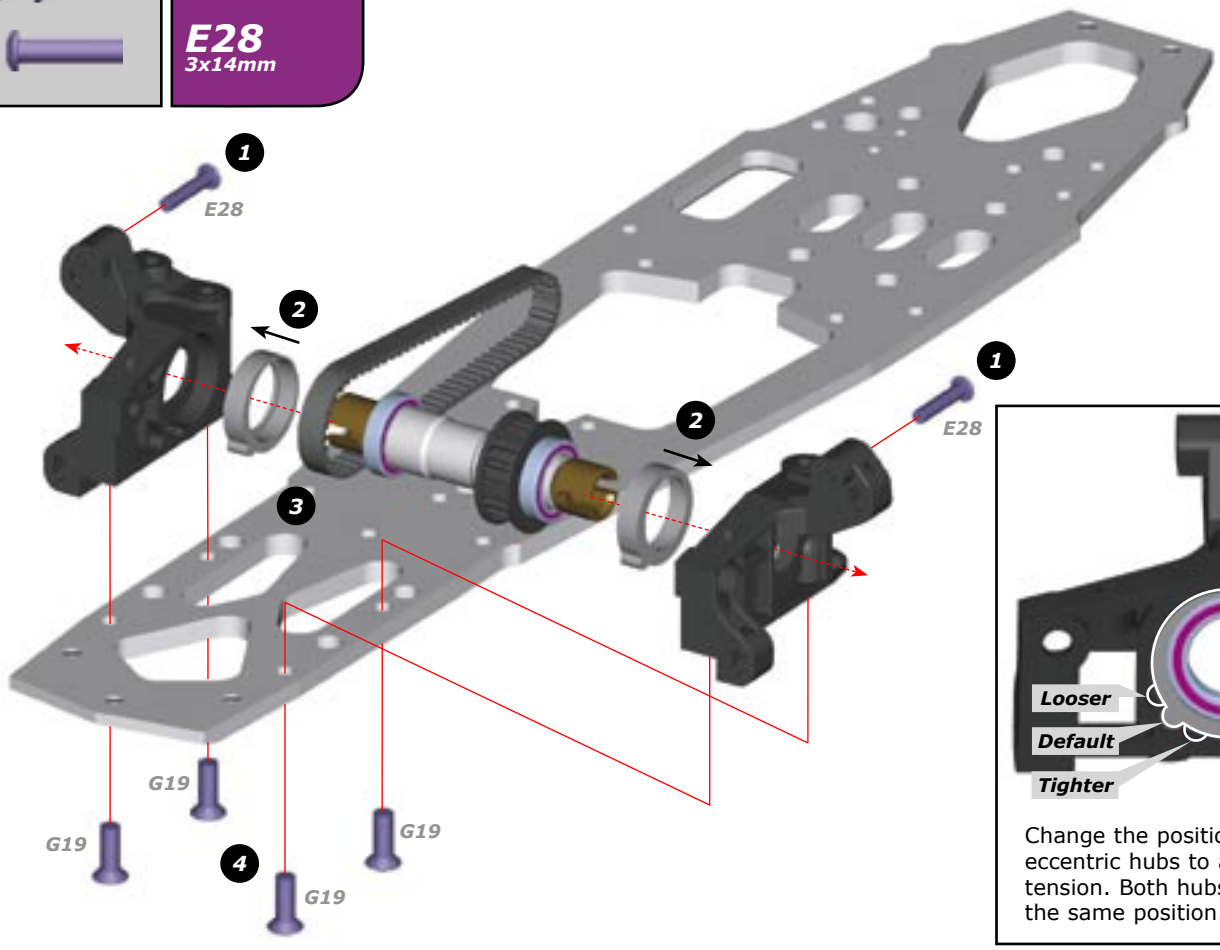
## Step 2.2

Bag 03



**G19**
M4x10mm

**E28**
3x14mm







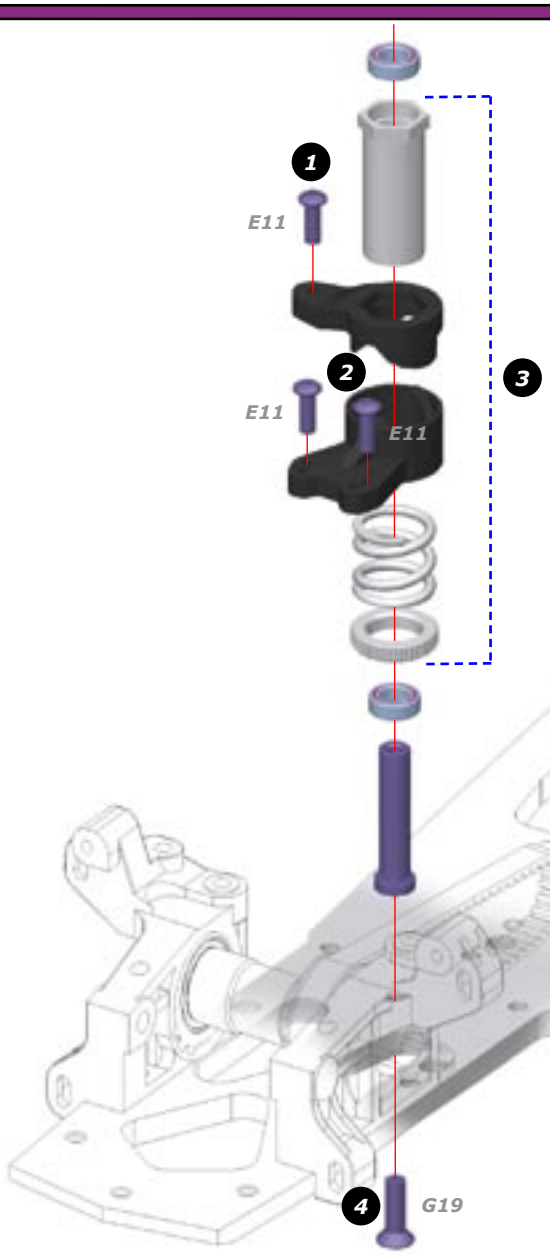
Change the position of BOTH eccentric hubs to adjust front belt tension. Both hubs should have the same position.

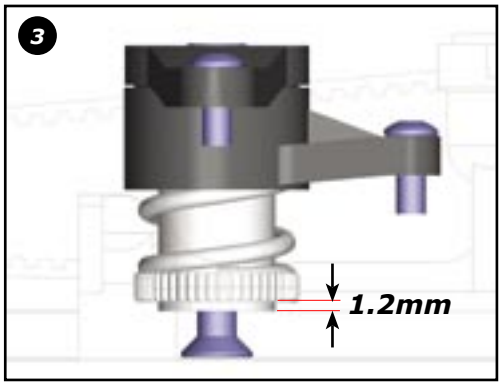
## Step 2.3

Bag 04

**G19**
M4x10mm

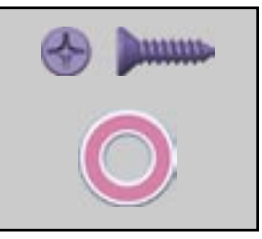
**E11**
M3x8mm



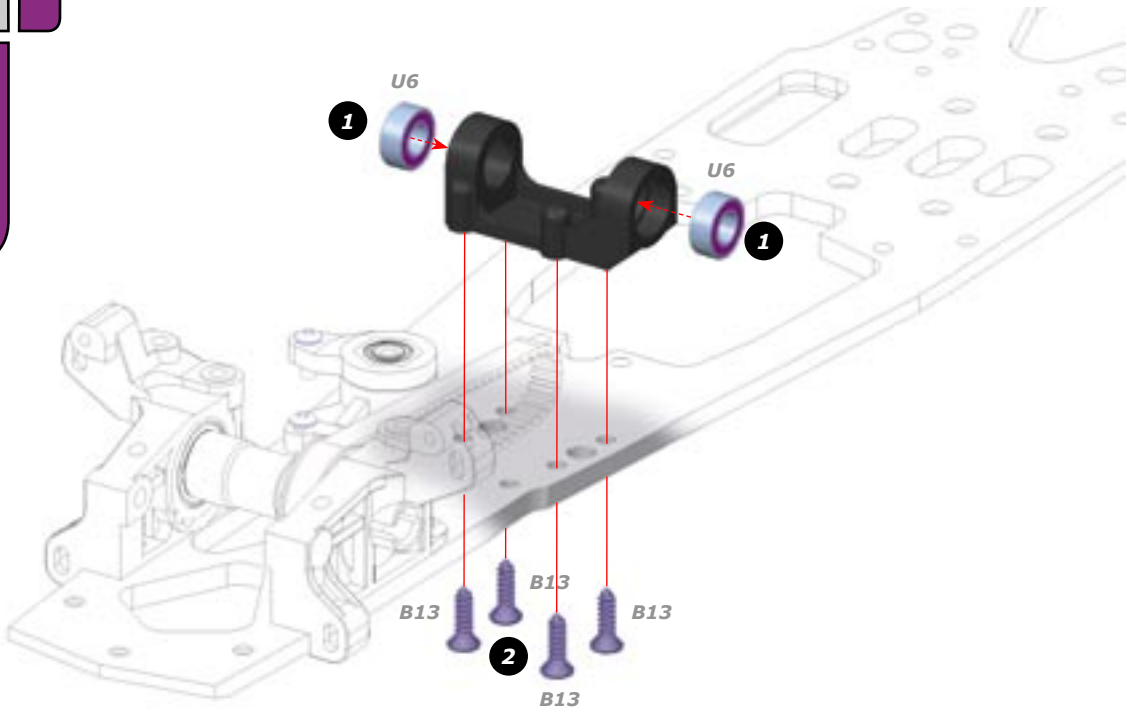

## Step 2.4

Bag 05



**B13**
3.5x13mm

**U6**
6x13mm

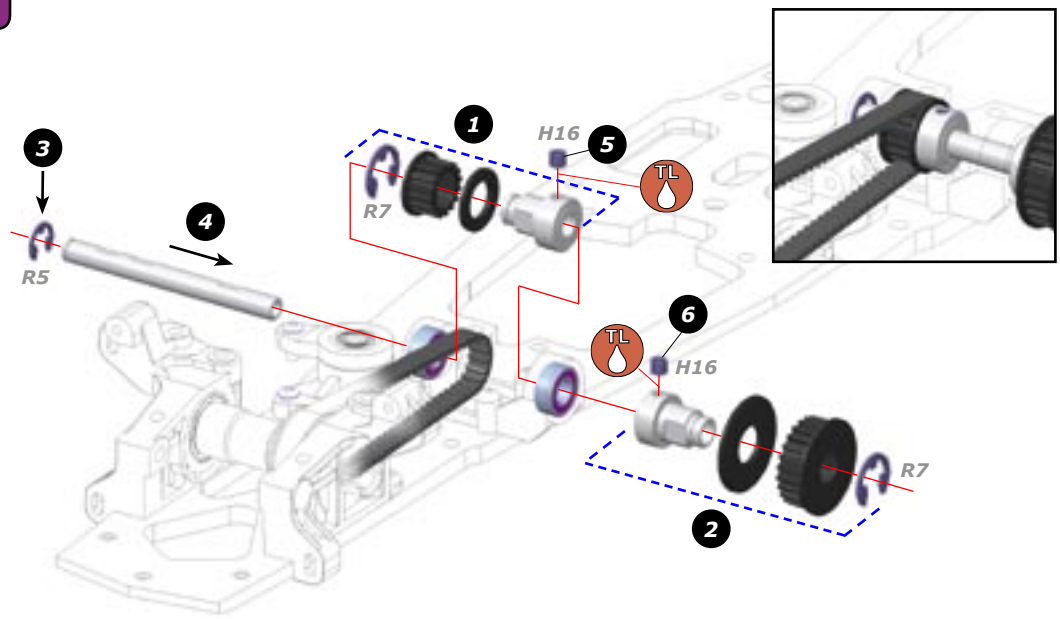


## Step 2.5

**H16**
4x4mm

**R5**
5mm

**R7**
7mm



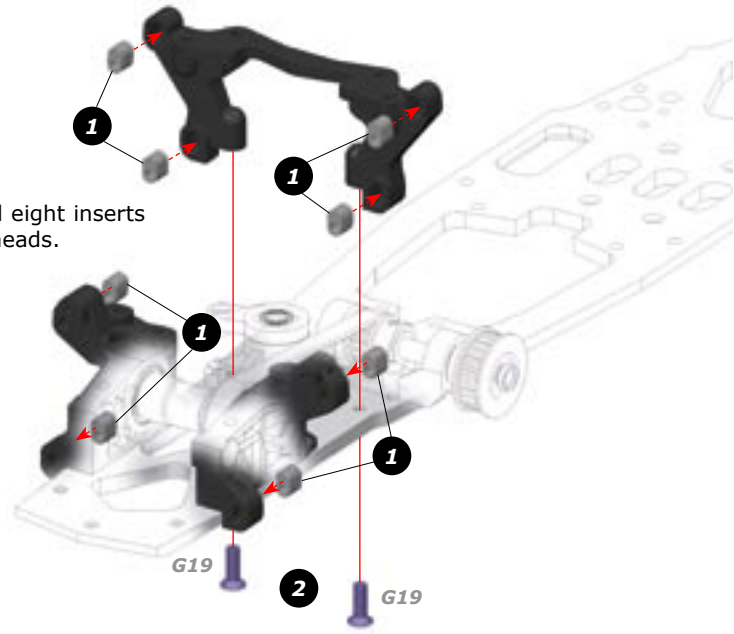

## Step 2.6

**Bag 06**

**G19**
M4x10mm

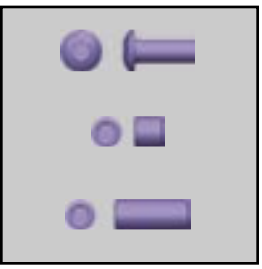
Note the orientation of the inserts, ensure that the front and back are the same top and bottom.

Firmly press all eight inserts into both bulkheads.




## Step 2.7

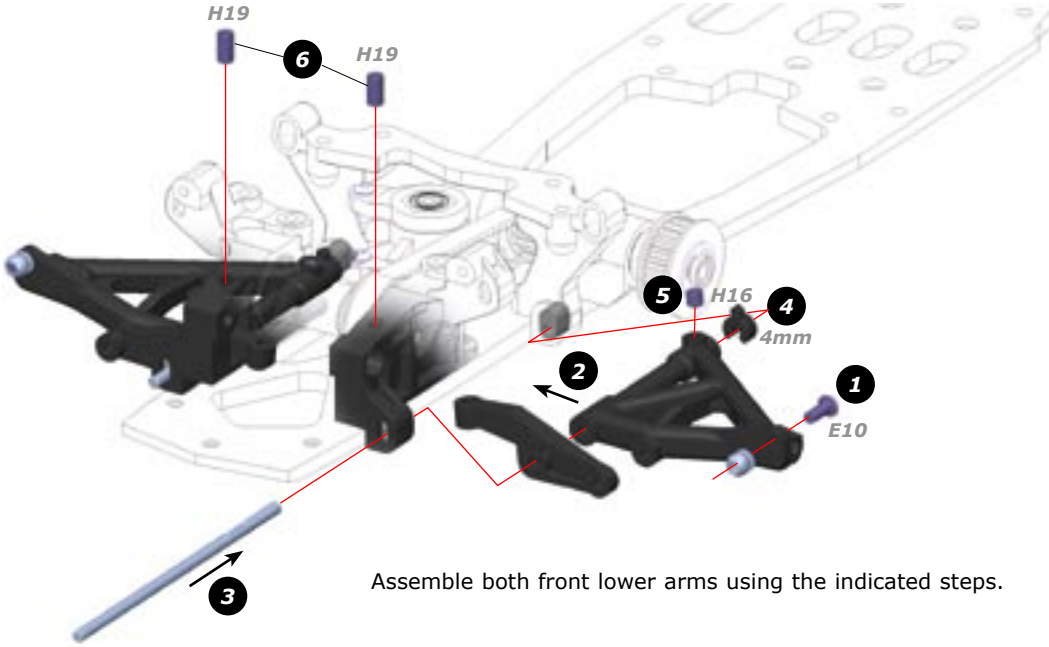
**Bag 07**



**E10**
3x6mm

**H16**
4x4mm

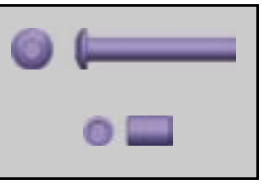
**H19**
4x10mm




Assemble both front lower arms using the indicated steps.

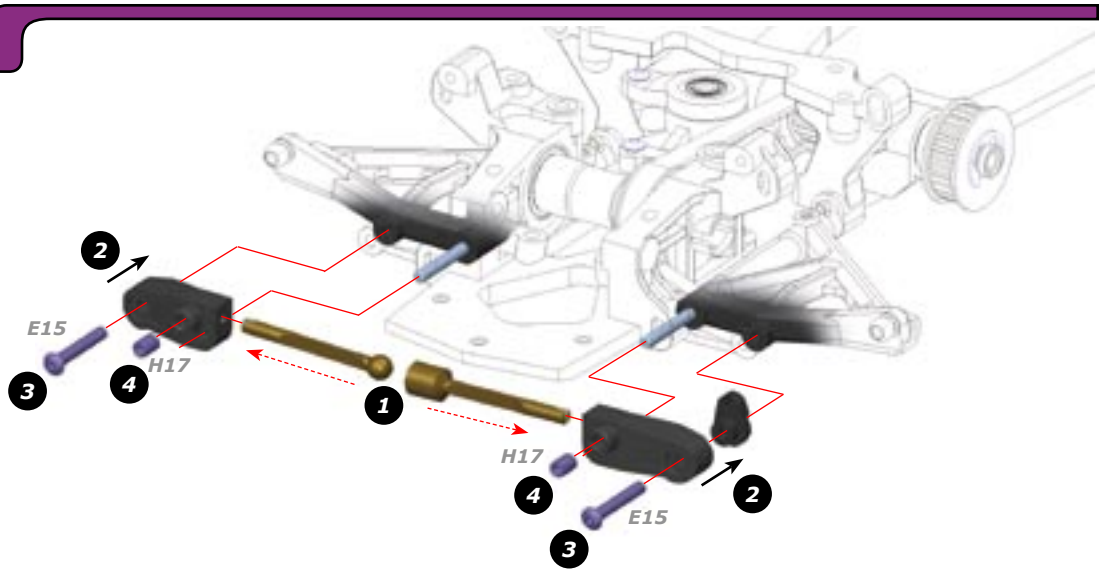
## Step 2.8

**Bag 08**

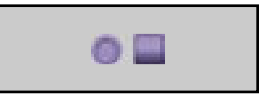


**E15**
3x20mm

**H17**
4x6mm

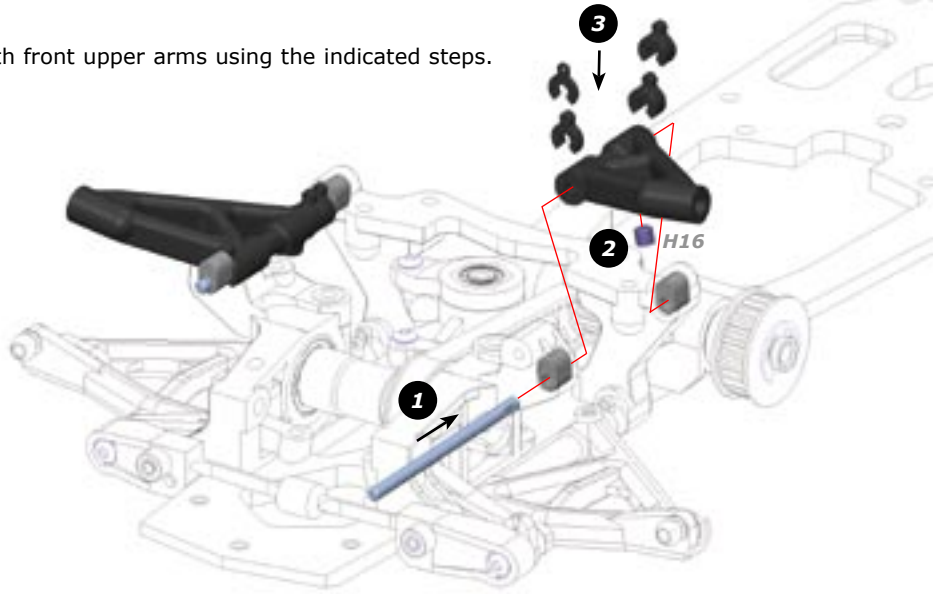



## Step 2.9

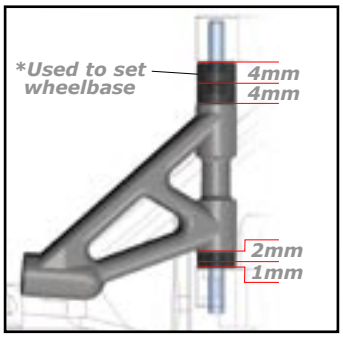


**H16**
4x4mm

Assemble both front upper arms using the indicated steps.




Caster Spacer placement




## Step 2.10

**Bag 09,10**

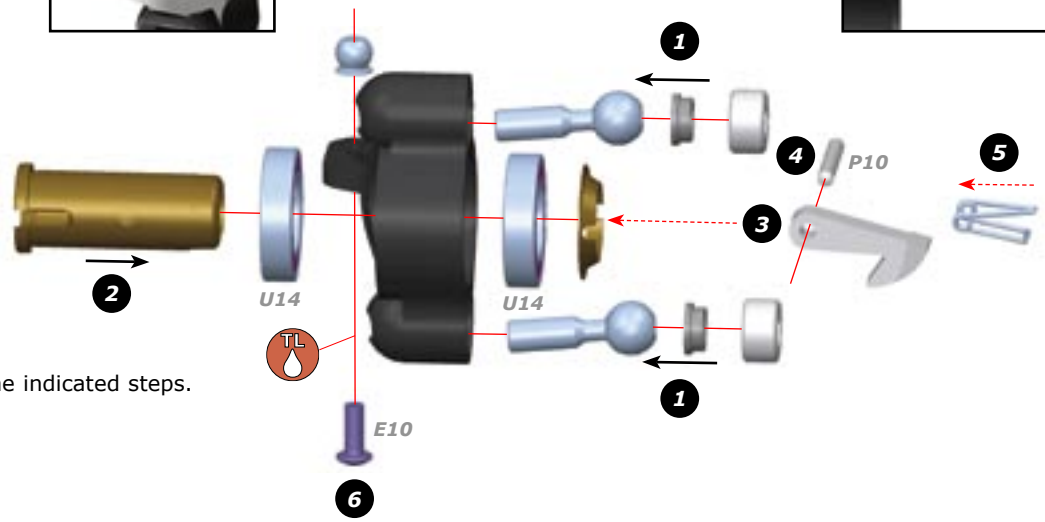
**E10**
3x6mm

**P10**
2.5x22mm

**U14**
12x21

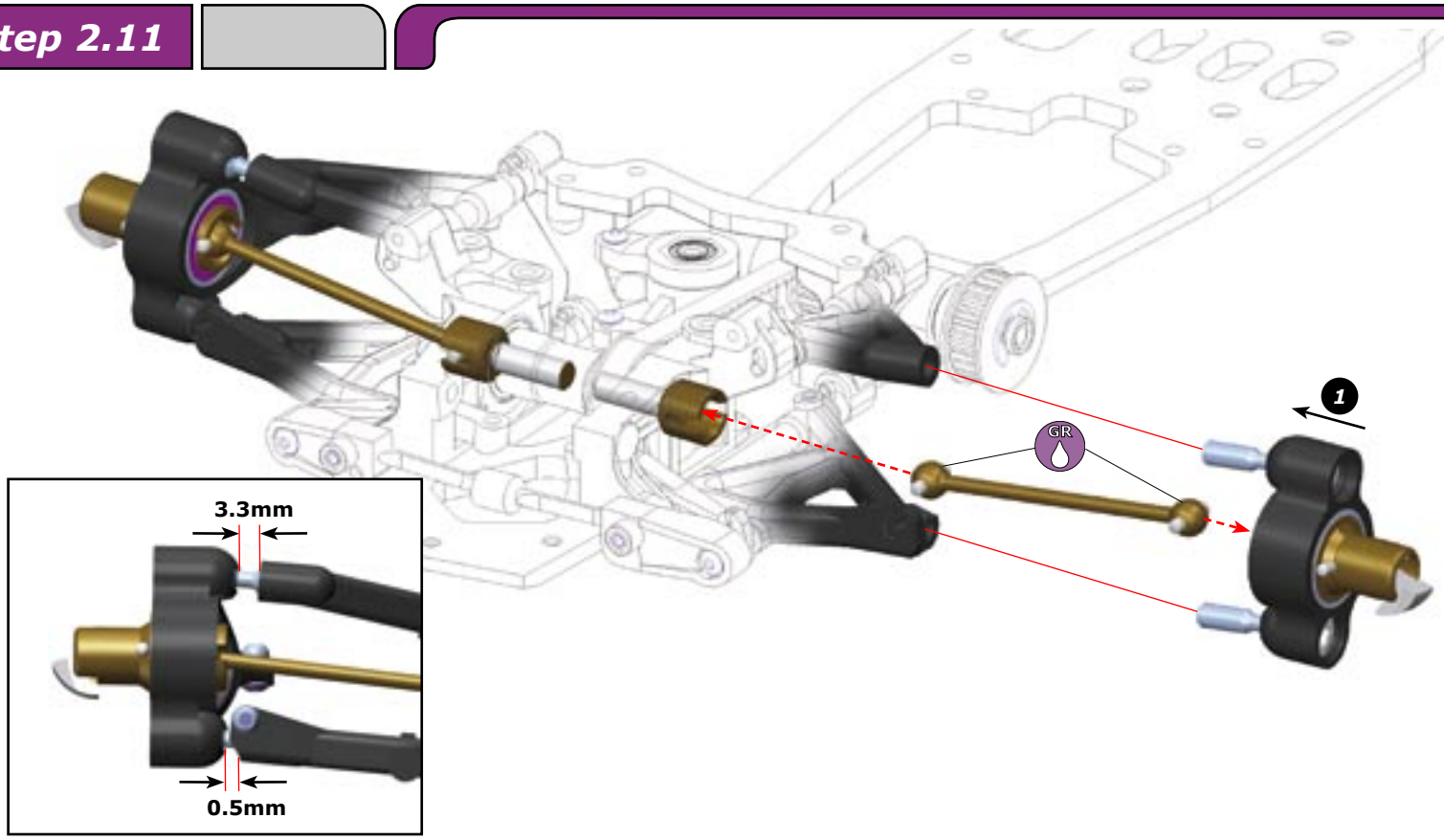
The left steering block can be distinguished by 4 dots.

Press spring into end of front axle until it snaps into place.

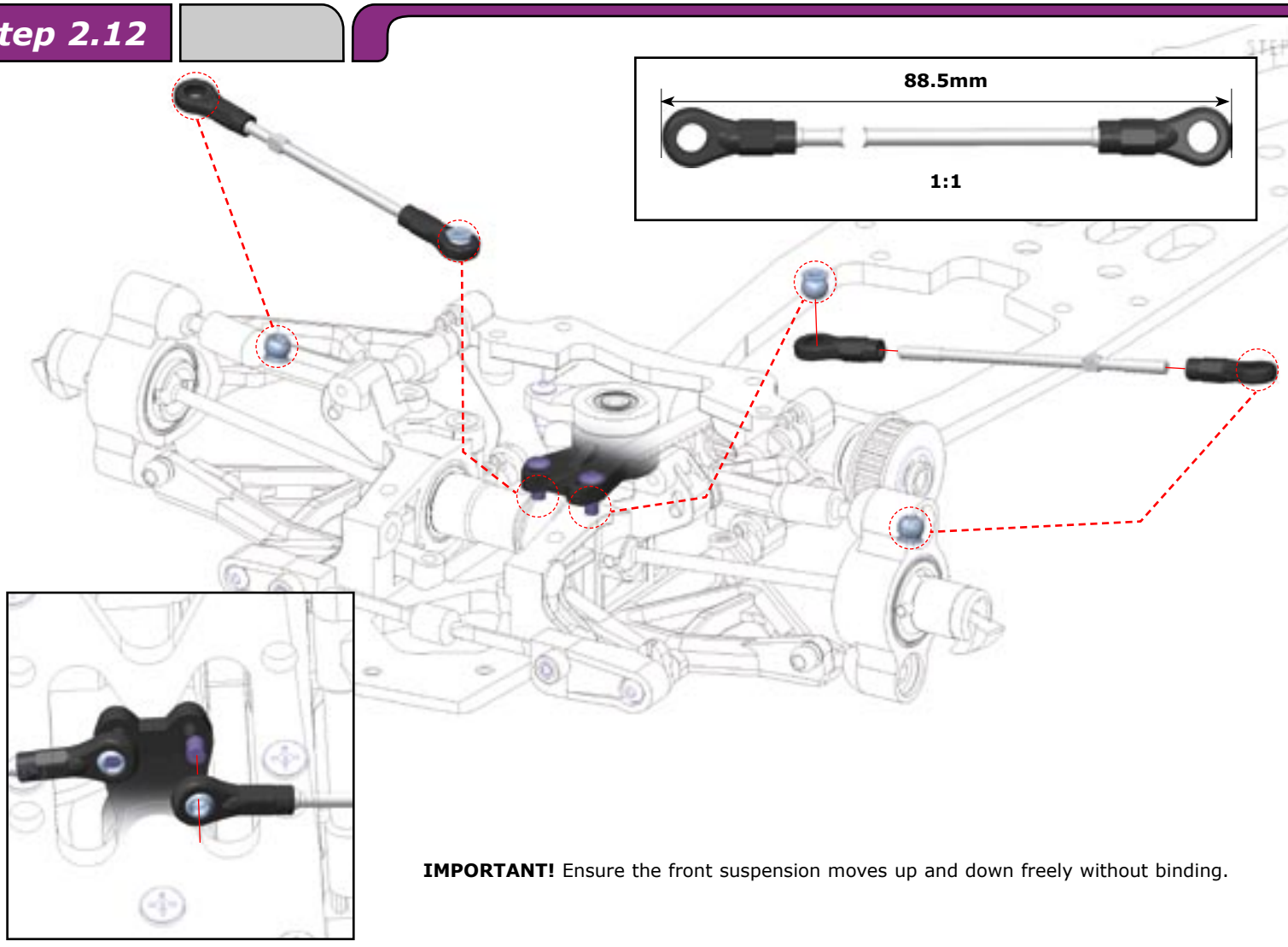



Assemble both steering blocks using the indicated steps.

## Step 2.11




## Step 2.12

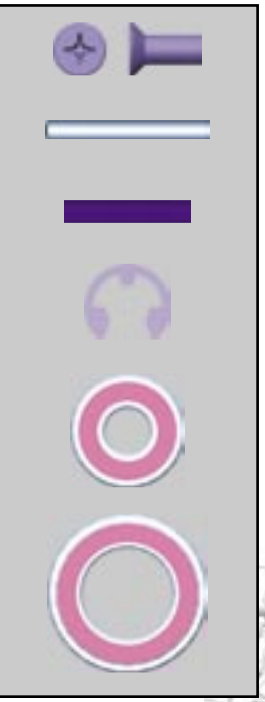



**IMPORTANT!** Ensure the front suspension moves up and down freely without binding.

# 3.0 Rear Assembly

## Step 3.1

**Bag 11,12**



**G19**
M4x10mm

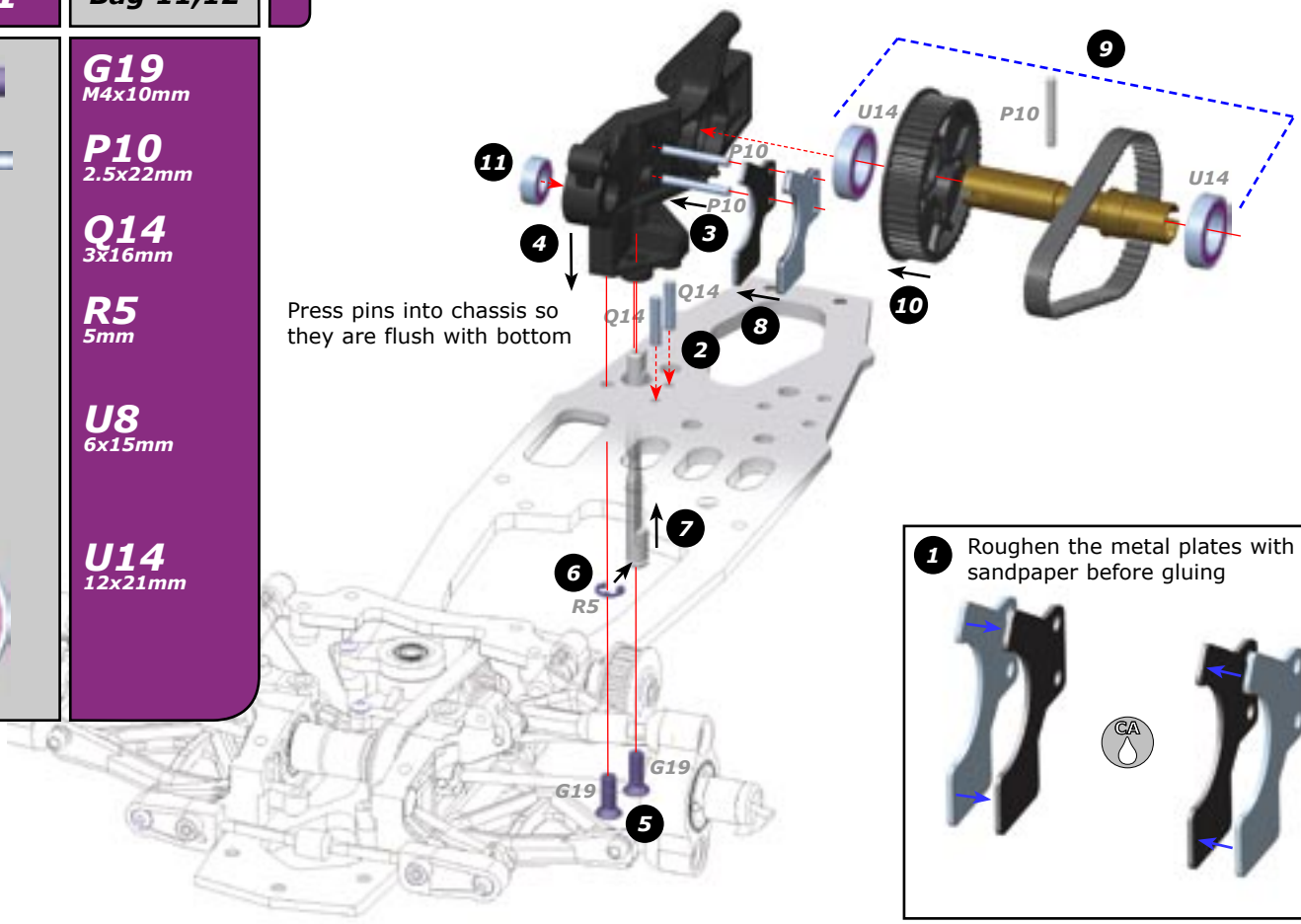
**P10**
2.5x22mm

**Q14**
3x16mm

**R5**
5mm

**U8**
6x15mm

**U14**
12x21mm



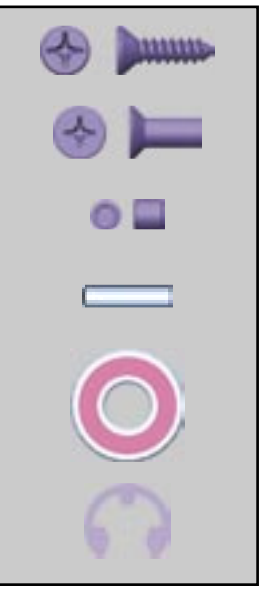

Press pins into chassis so they are flush with bottom

1 Roughen the metal plates with sandpaper before gluing




## Step 3.2

**Bag 13,14**



**B13**
3.5x13mm

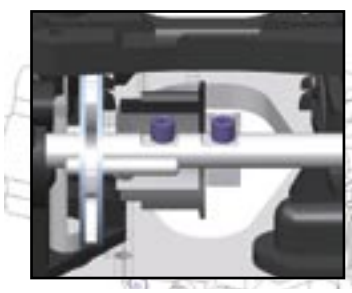
**G19**
M4x10mm

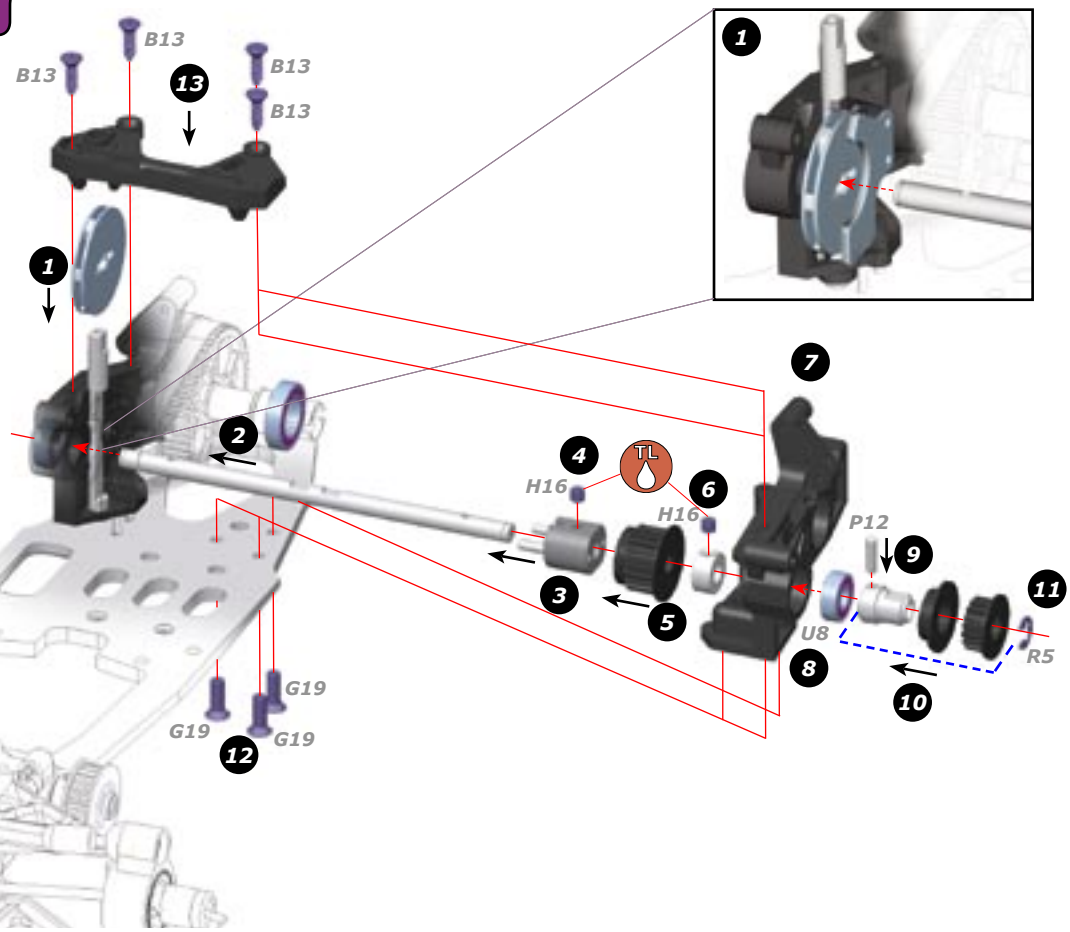
**H16**
4x4mm

**P12**
3x12mm

**U8**
6x15mm

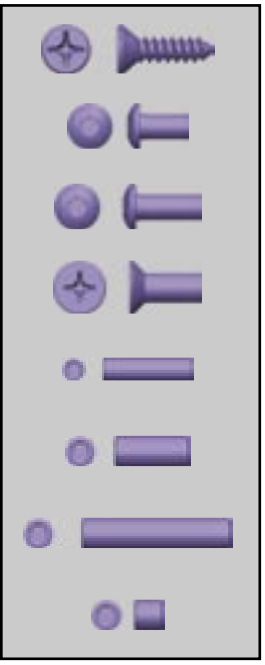
**R5**
5mm



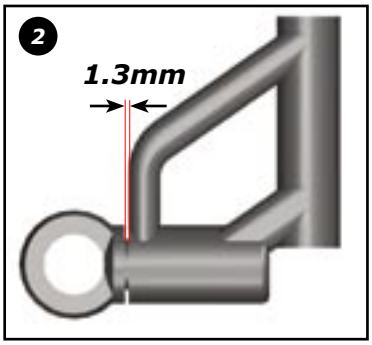


## Step 3.3

**Bag 15,16**



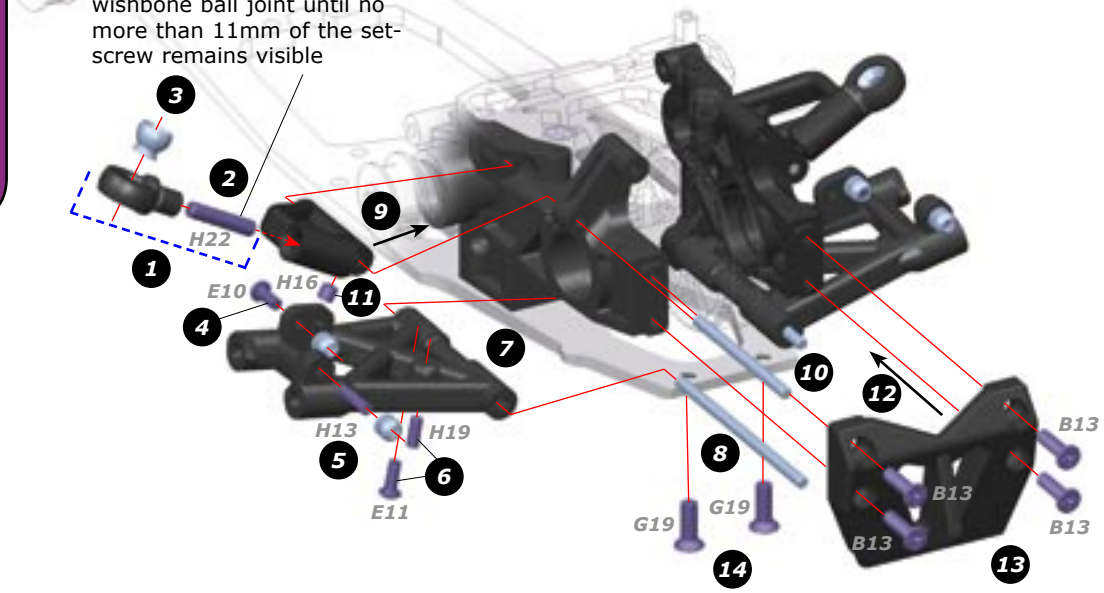
- **B13** 3.5x13mm
- **E10** 3x6mm
- **E11** 3x8mm
- **G19** M4x10mm
- **H13** 3x12mm
- **H19** 4x10mm
- **H22** 4x20mm
- **H16** 4x4mm





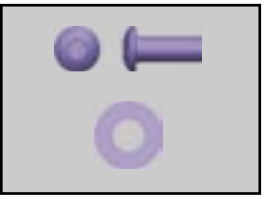
Use the special tool supplied to install the alu pivot ball into the wishbone ball-point.

Screw setscrew H22 into the wishbone ball joint until no more than 11mm of the set-screw remains visible

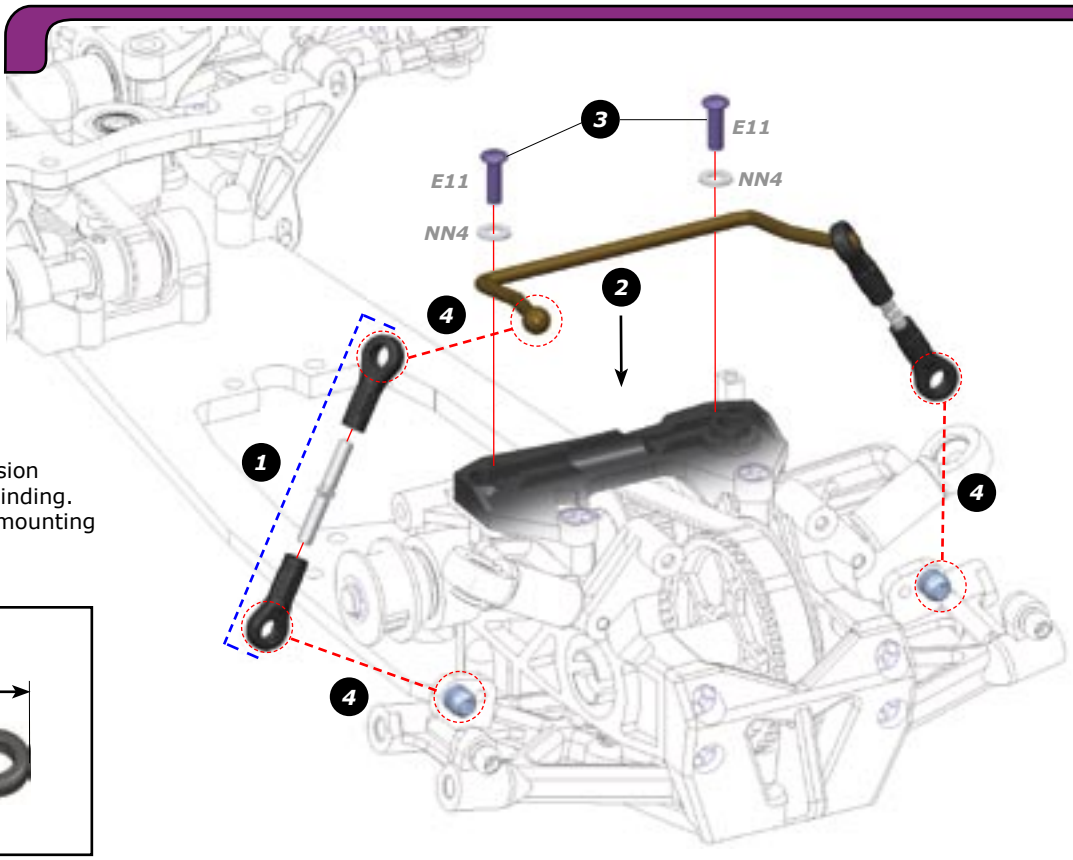



## Step 3.4

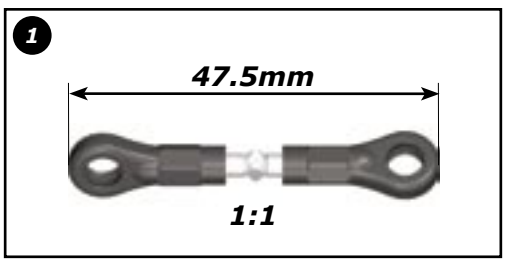
**Bag 17**



- **E11** 3x8mm
- **NN4** 3.2x9x0.1mm




**Important!** Ensure the rear suspension moves up and down freely without binding. Do not overtighten the anti-roll bar mounting screws.



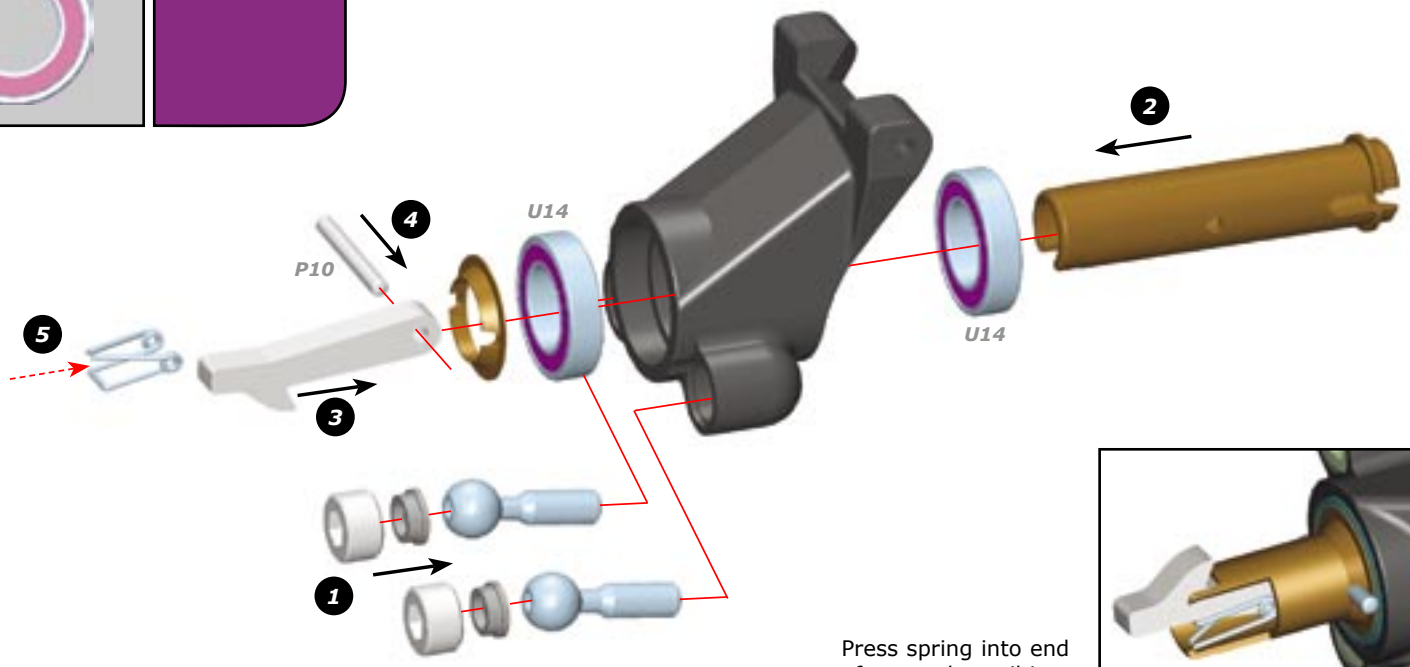
## Step 3.5

**Bag 18,19**

**P10**
2.5x22mm

**U14**
12x21mm

Assemble both rear hubs using the indicated steps.

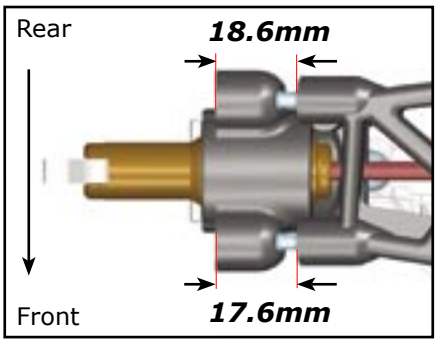





Press spring into end of rear axle until it snaps into place.

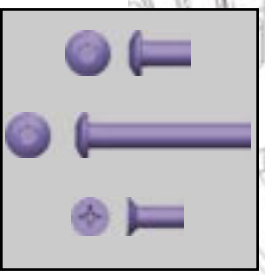
## Step 3.6

**G21**
M4x16mm



## Step 3.7

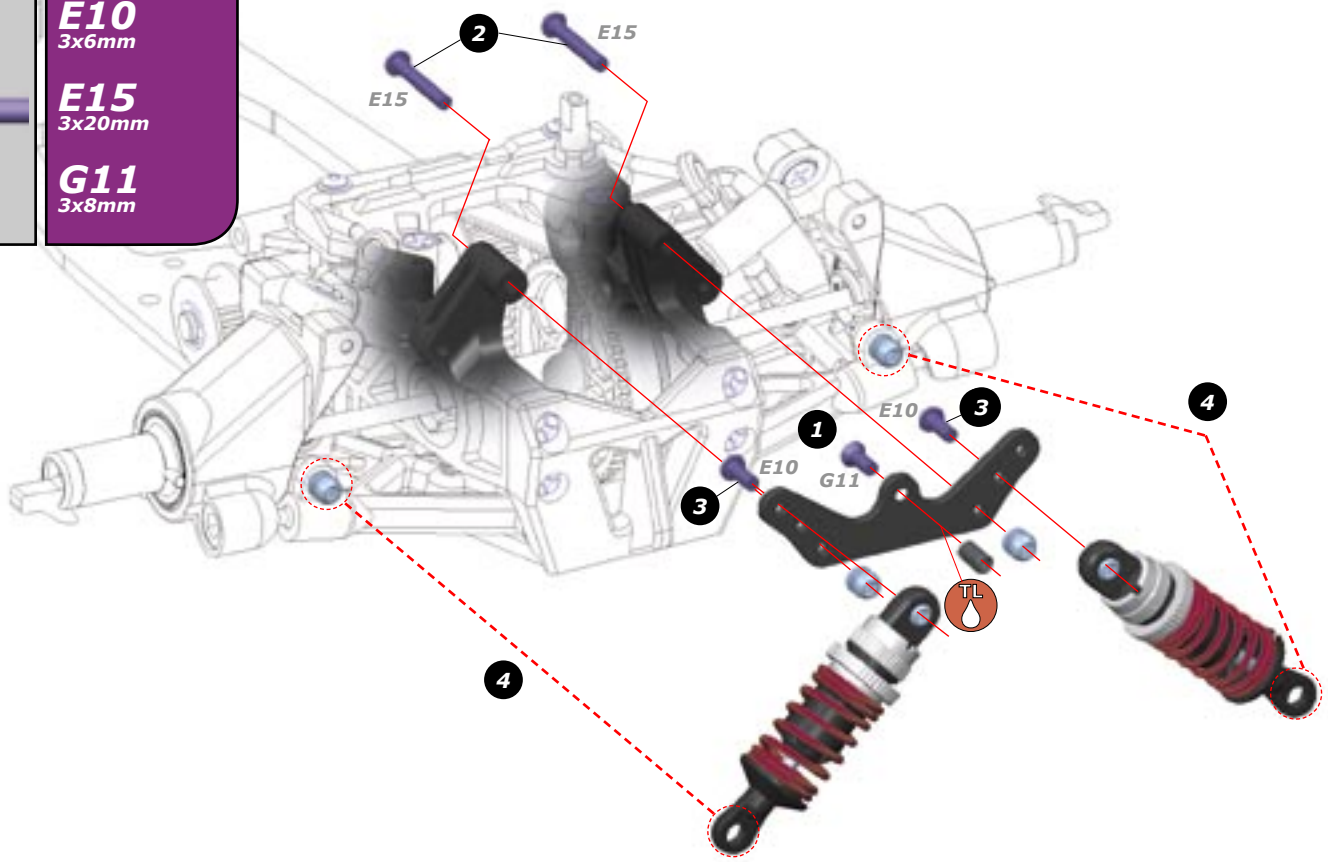
**Bag 20**



**E10**
3x6mm

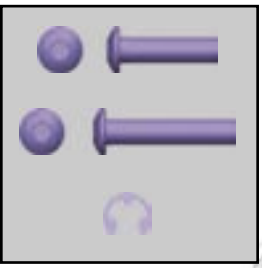
**E15**
3x20mm

**G11**
3x8mm




## Step 3.8

**Bag 21**



**E13**
3x12mm

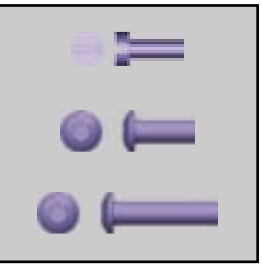
**E14**
3x16mm

**R2**
2.3mm

# 4.0 Radio Plate Assembly

## Step 4.1

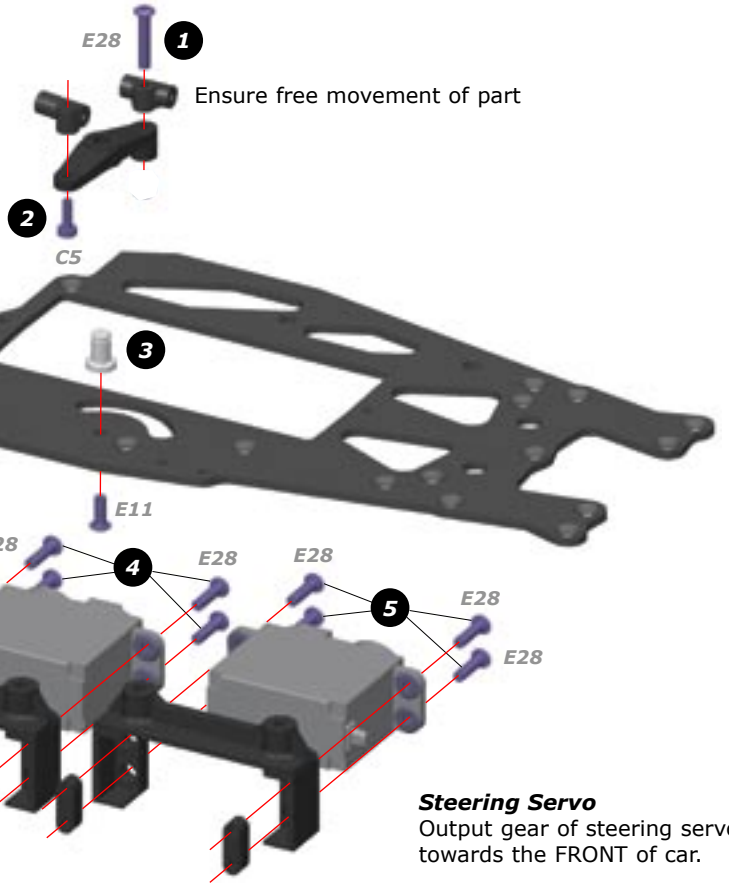
**Bag 22,23,24**



**C5**
2.5x8mm

**E11**
3x8mm

**E28**
3x14mm

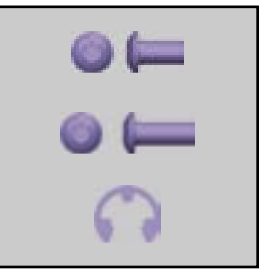



***Throttle Servo***
Output gear of throttle servo must be towards the REAR of car.

***Steering Servo***
Output gear of steering servo must be towards the FRONT of car.

## Step 4.2

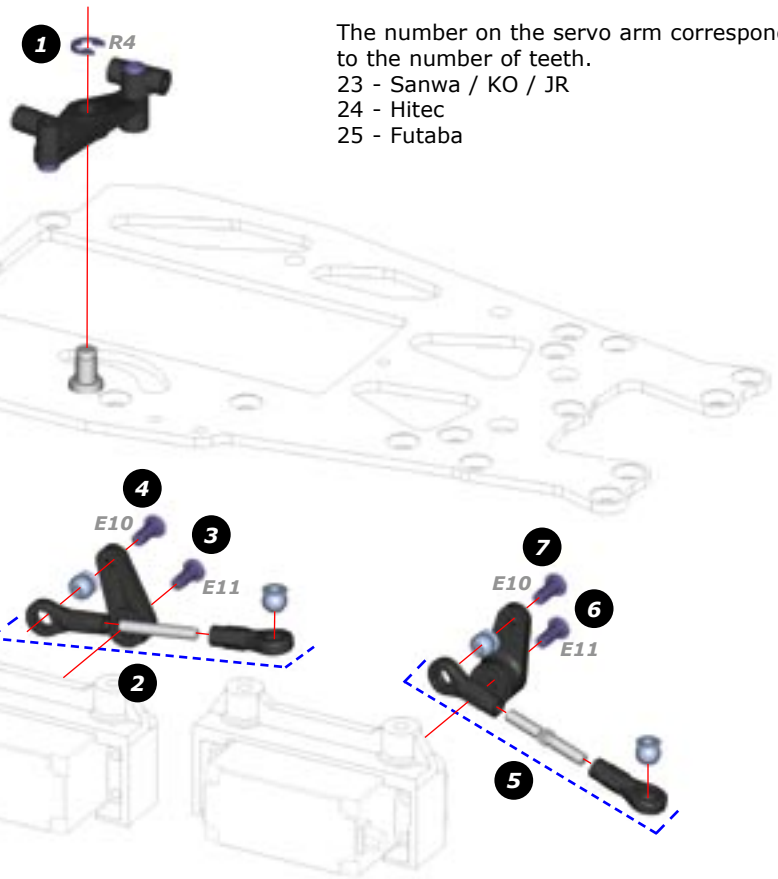
**Bag 25**



**E10**
3x6mm

**E11**
3x8mm

**R4**
4mm




The number on the servo arm corresponds to the number of teeth.
23 - Sanwa / KO / JR
24 - Hitec
25 - Futaba

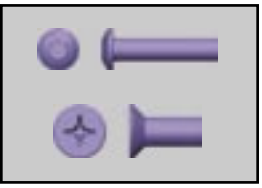
Throttle Linkage
**42.4mm**

**1:1**

Steering Linkage
**46.5mm**

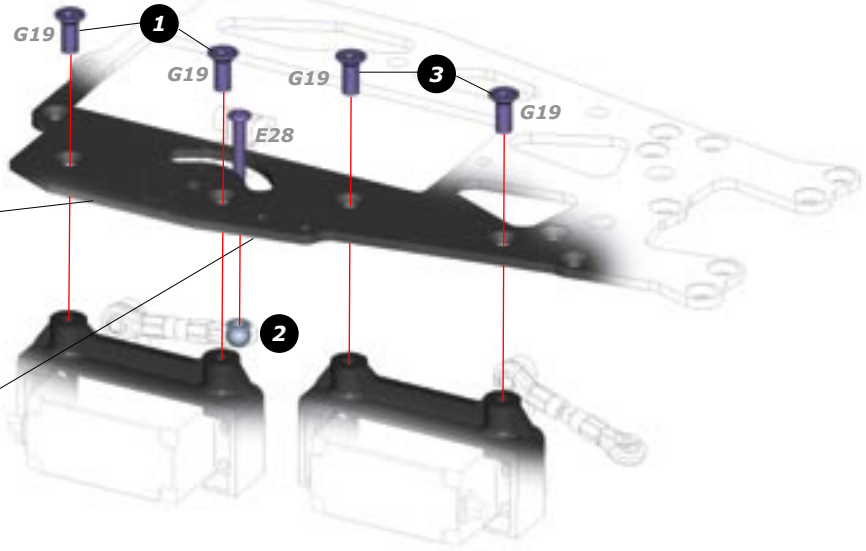
**1:1**

## Step 4.3

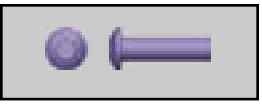


**E28**
3x14mm

**G19**
M4x10mm

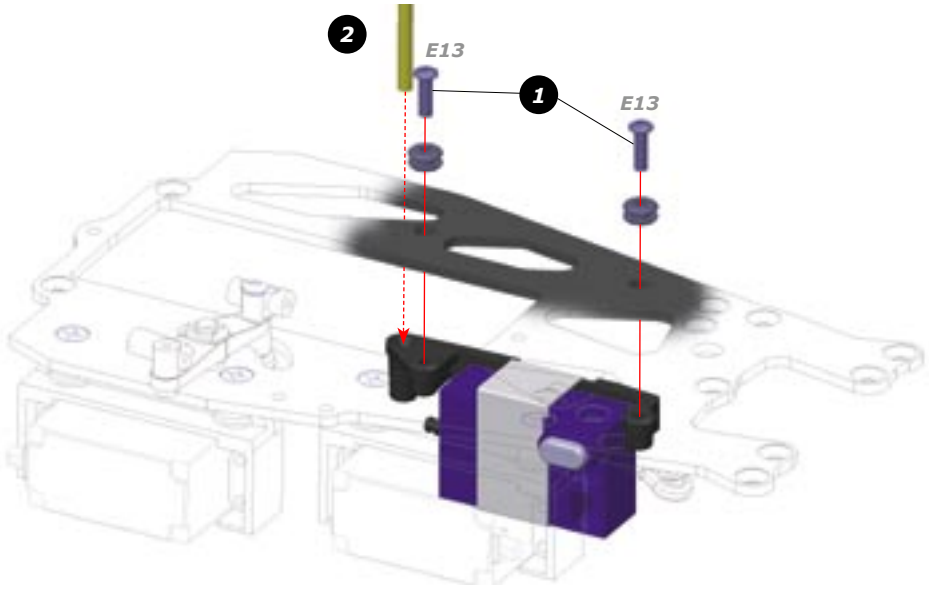



## Step 4.4



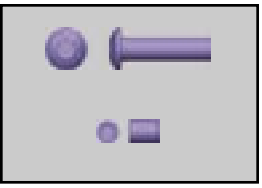
**E13**
3x12mm

Securely attach receiver to mounting plate.



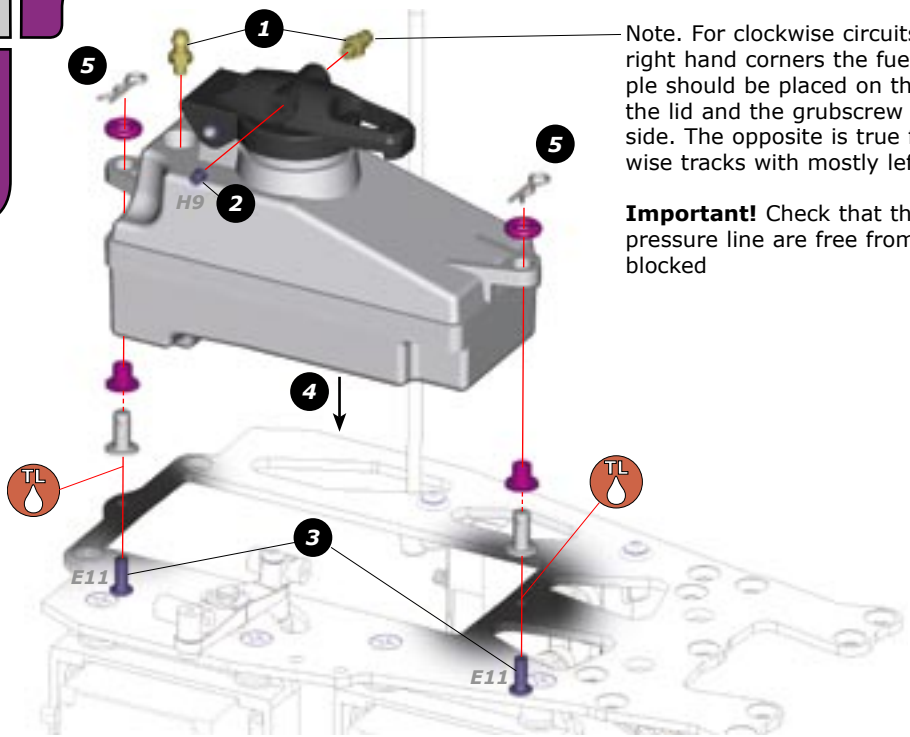

## Step 4.5

**Bag 26**



**E11**
3x8mm

**H9**
3x4mm




Note. For clockwise circuits with mostly right hand corners the fuel tank lid nipple should be placed on the right side of the lid and the grubscrew on the opposite side. The opposite is true for anti clockwise tracks with mostly left hand corners.

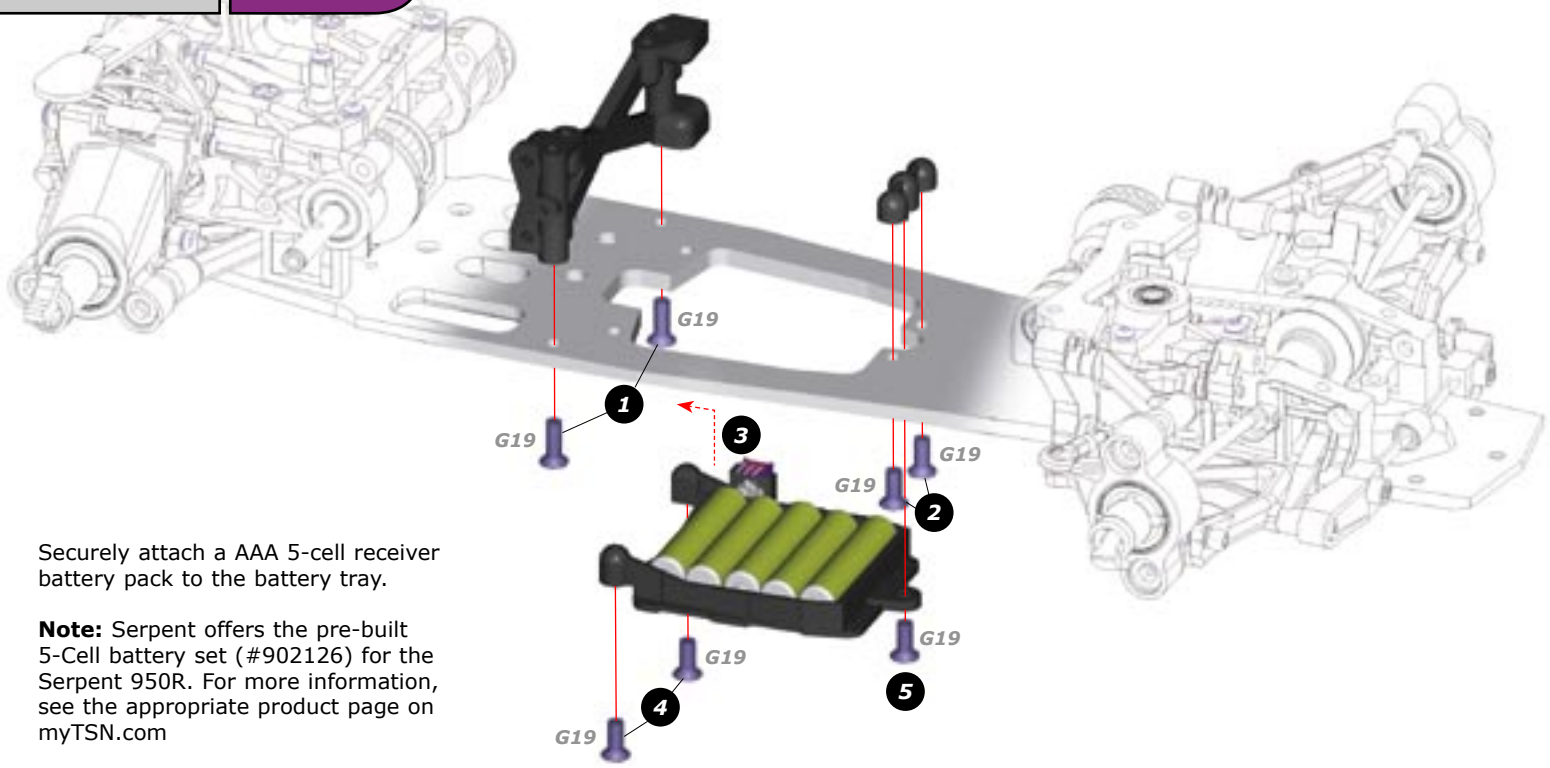
**Important!** Check that the fuel line and pressure line are free from debris and not blocked

# 5.0 Radio Plate Mounting

## Step 5.1

Bag 27

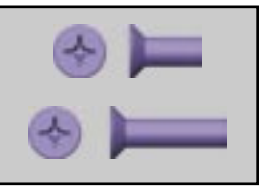
**G19**
M4x10mm




Securely attach a AAA 5-cell receiver battery pack to the battery tray.

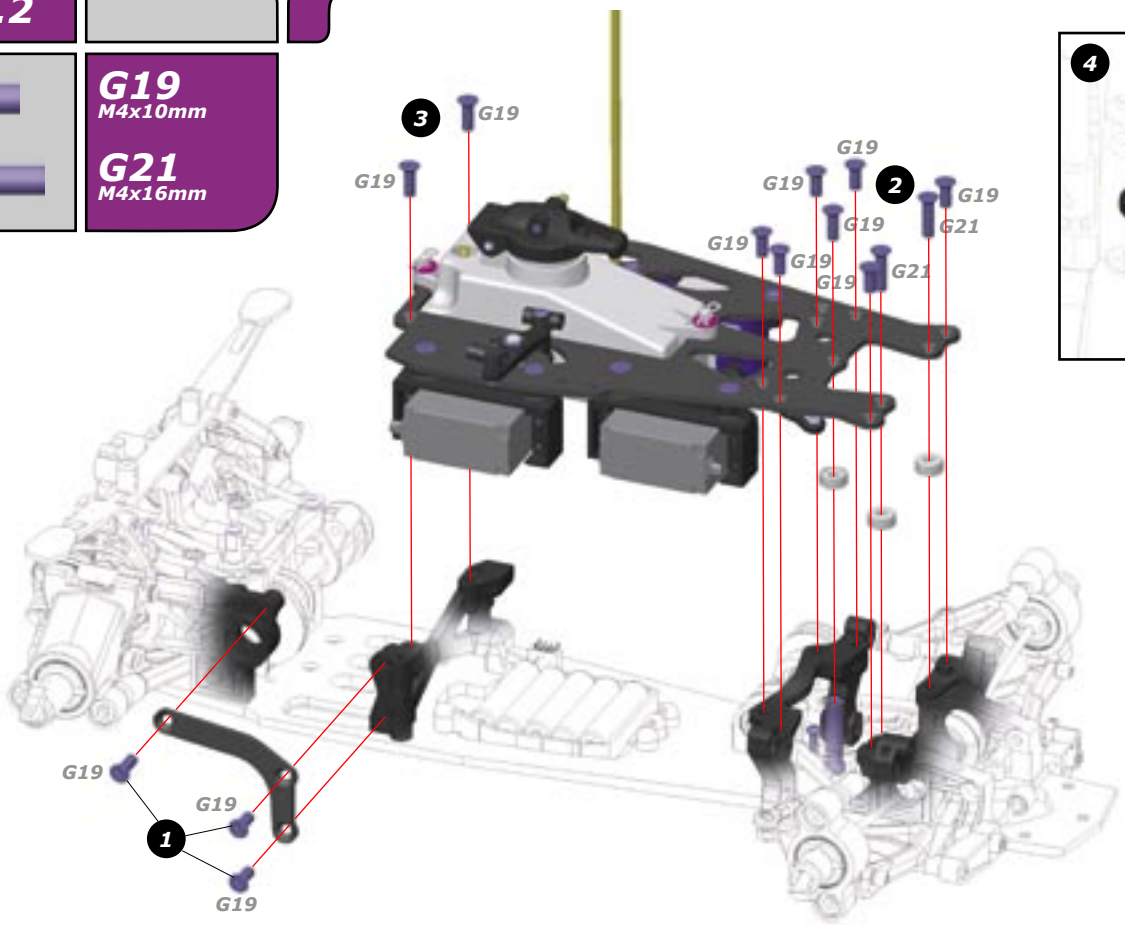
**Note:** Serpent offers the pre-built 5-Cell battery set (#902126) for the Serpent 950R. For more information, see the appropriate product page on myTSN.com

## Step 5.2



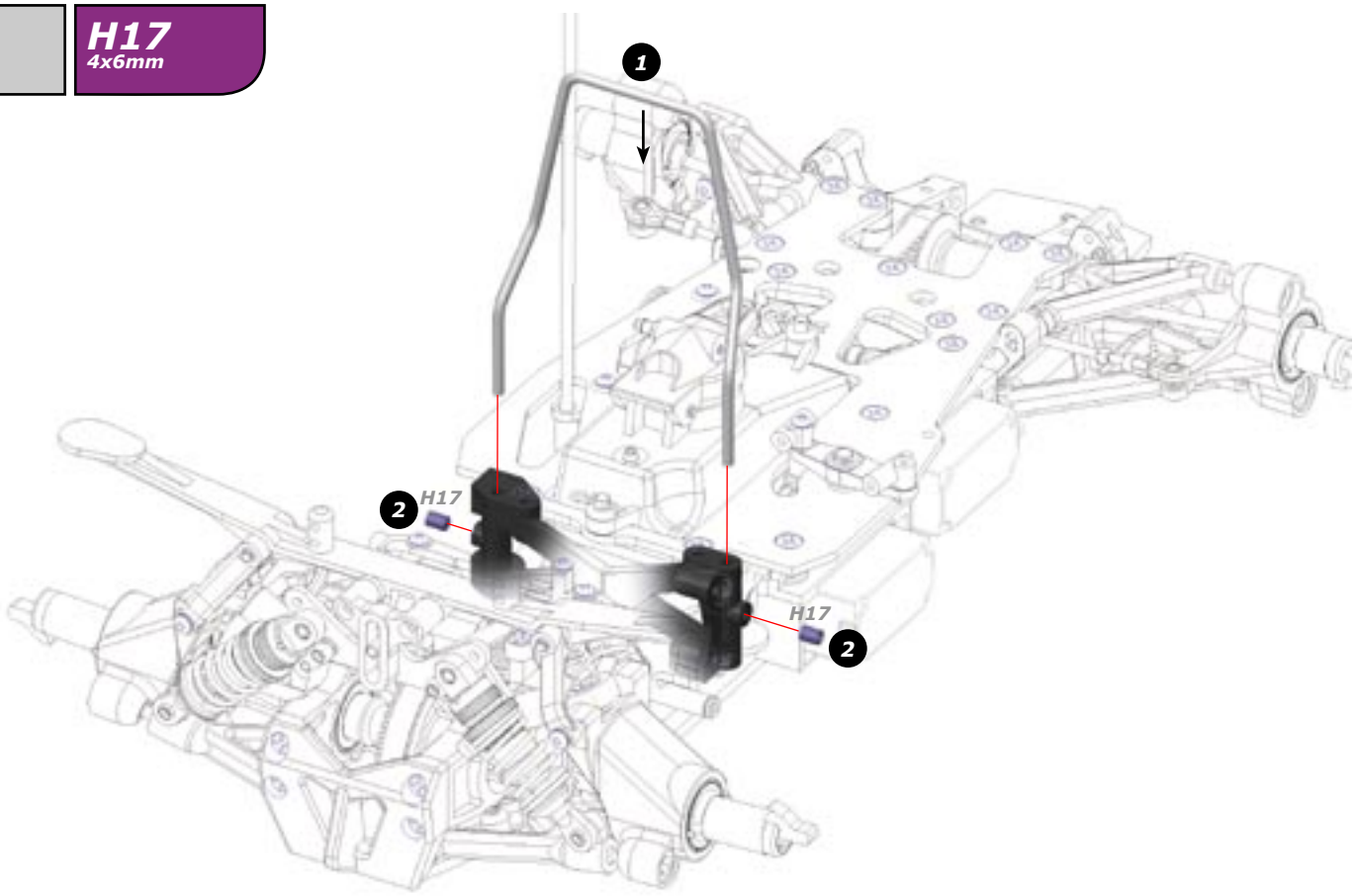
**G19**
M4x10mm

**G21**
M4x16mm



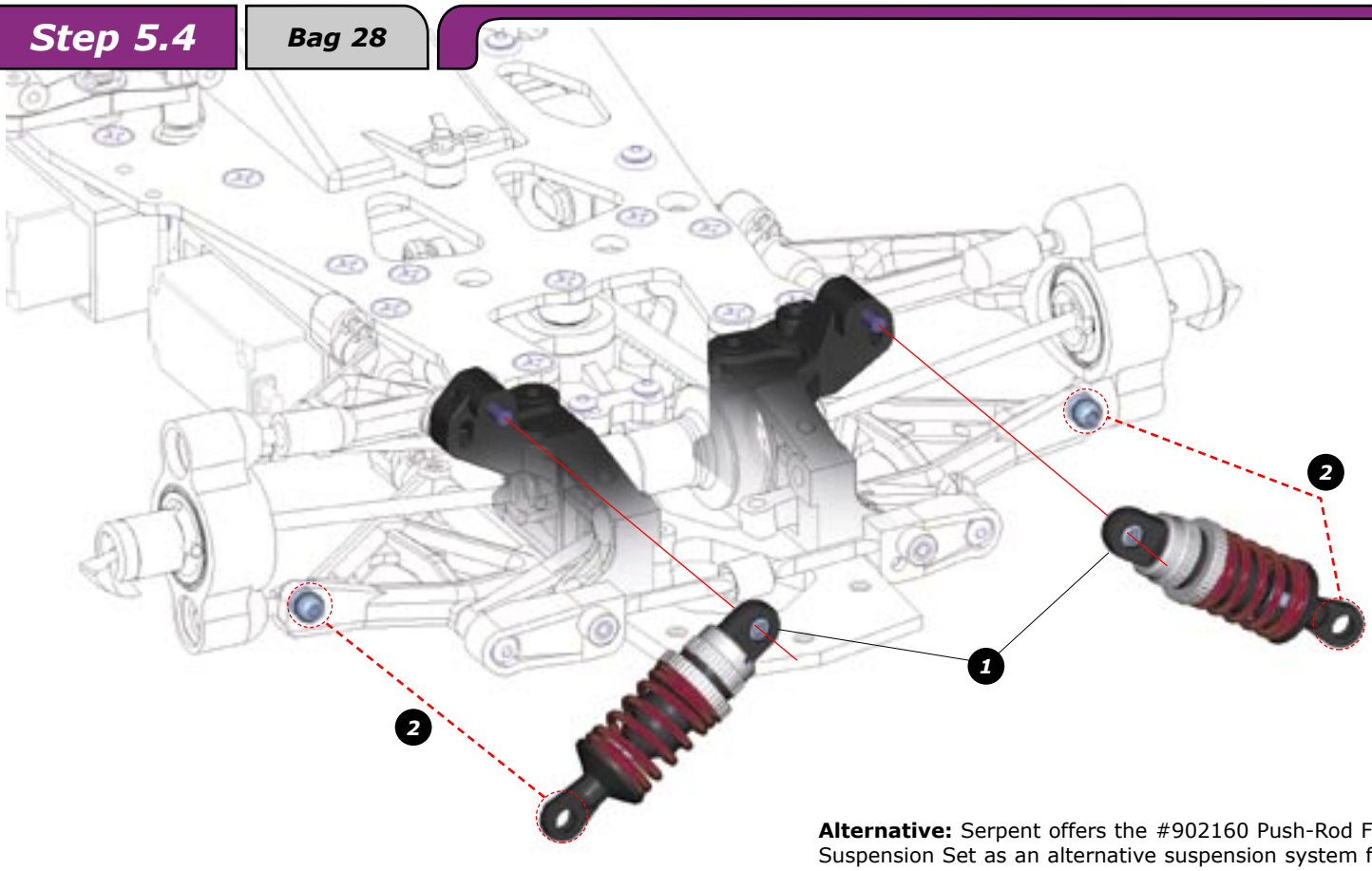

## Step 5.3

**H17**
4x6mm




## Step 5.4

**Bag 28**




**Alternative:** Serpent offers the #902160 Push-Rod Front Suspension Set as an alternative suspension system for the 950R. For more information, see the appropriate product page on myTSN.com.

## Step 5.5

**G19**
M4x10mm

**LM4**
M4




## Step 5.6

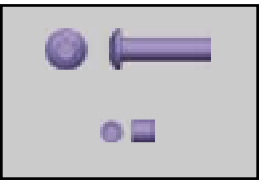
**G19**
M4x10mm

**A13**
3.5x13mm

# 6.0 Gearbox Assembly

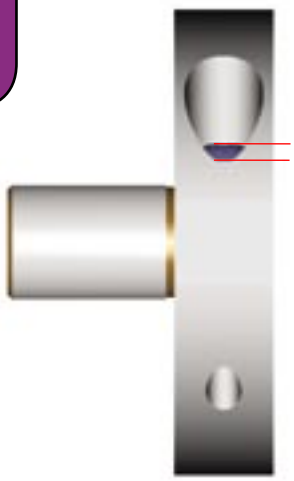
## Step 6.1

**Bag 29**

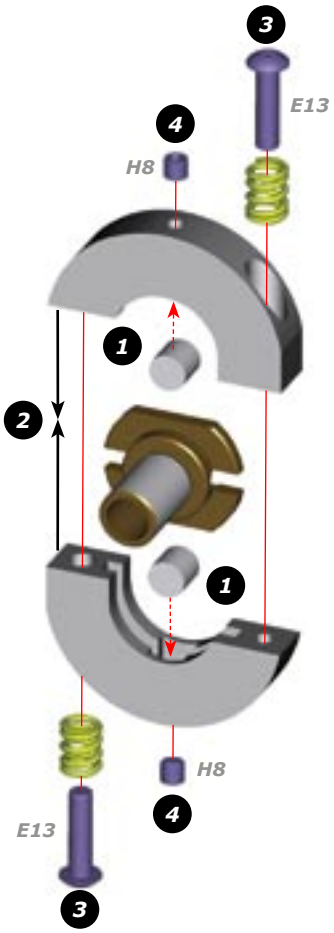


**E13**
3x12mm

**H8**
3x3mm



***Note:*** A good starting point is to have the screw head flush with the bottom edge of the hole. Make sure both screws are set equally.



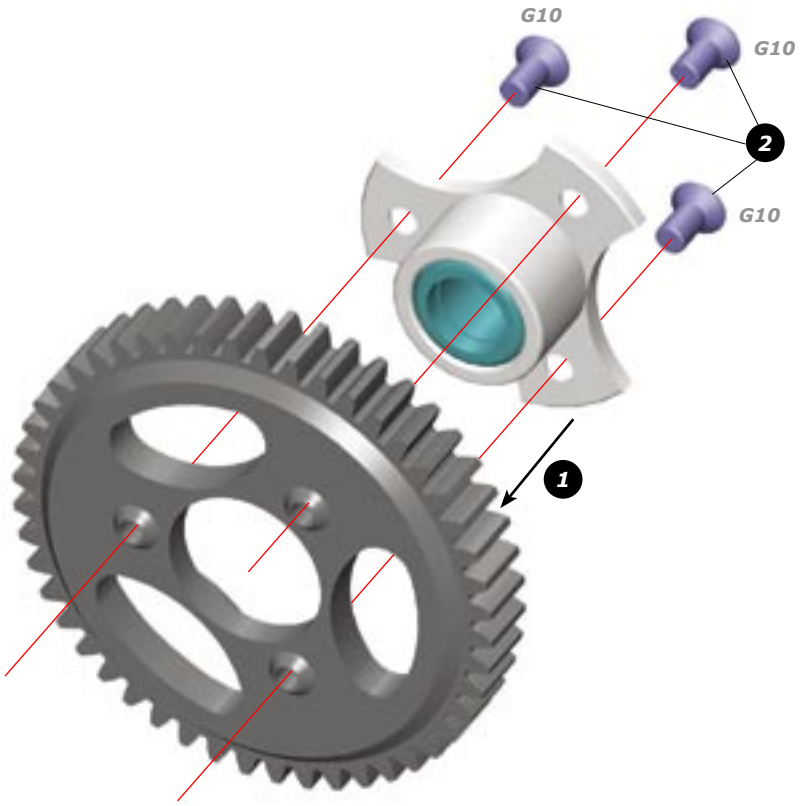

3 Screw IN both adjusting screws to shift LATER.

Screw OUT both adjusting screws to shift EARLIER.

## Step 6.2

**Bag 30**

**G10**
M3x6mm

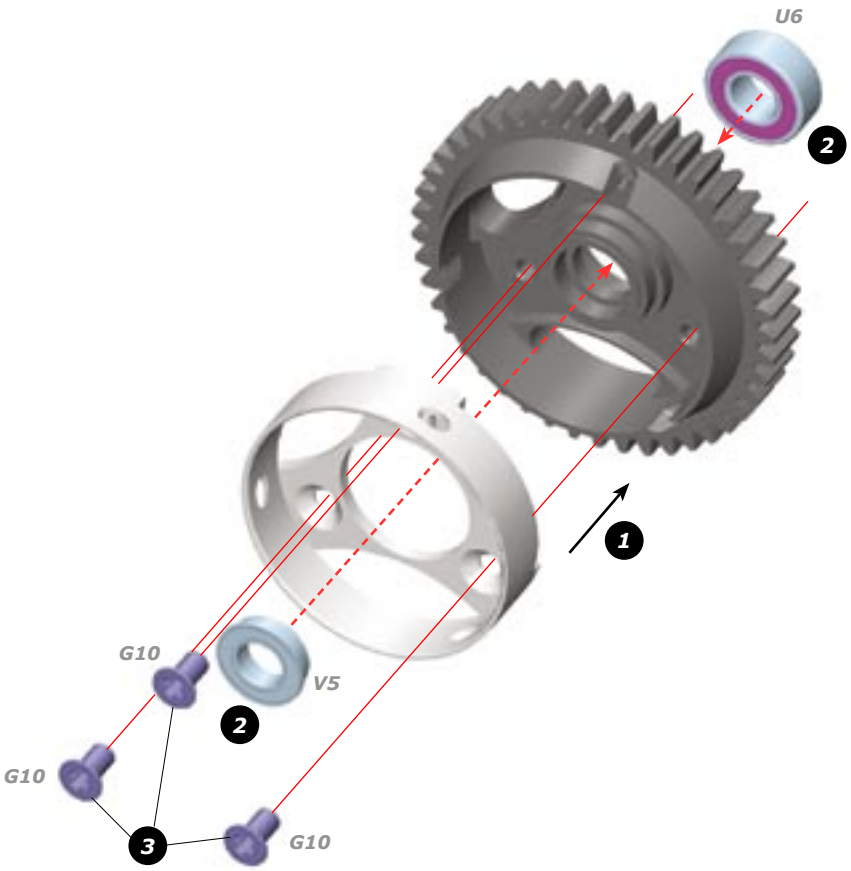


## Step 6.3

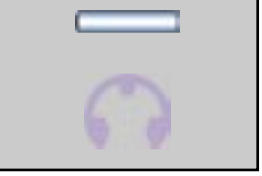
**G10**
M3x6mm

**U6**
6x13mm

**V5**
6x10mm




## Step 6.4



**P13**
3x13.8mm

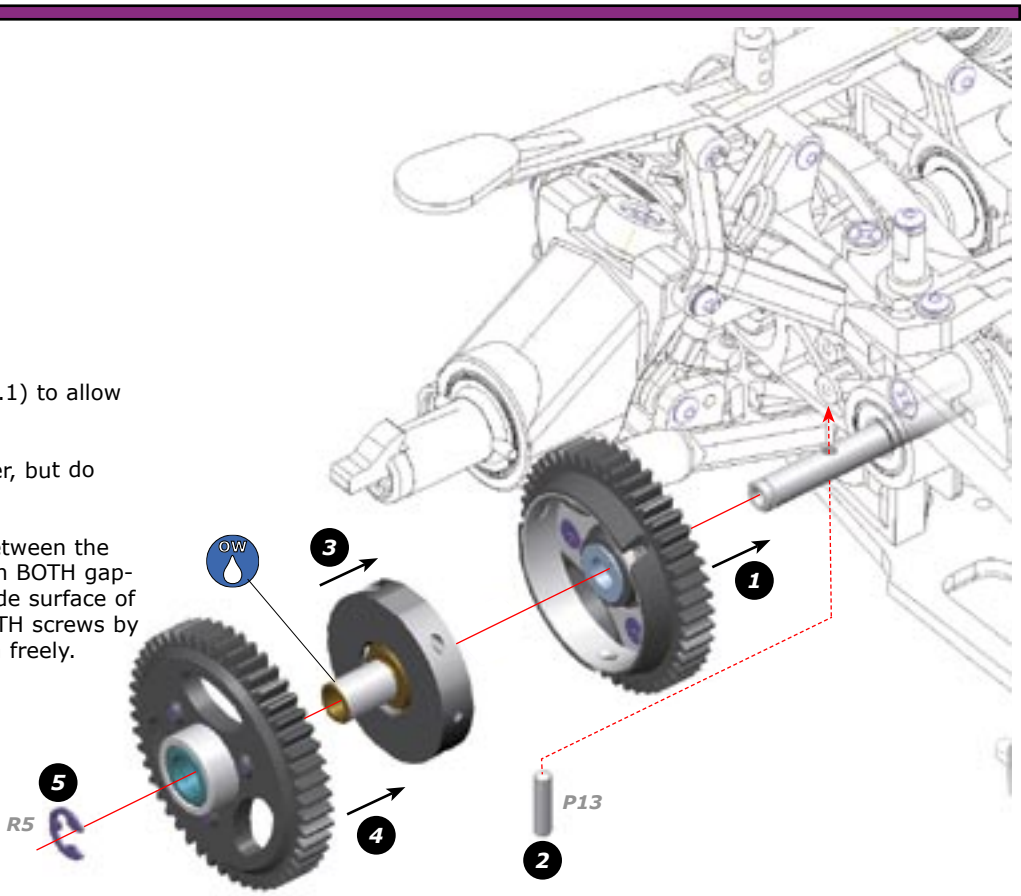
**R5**
5mm

**Adjusting the 2-speed shoe gap**
Loosen the gap-setting setscrews (H8 in step 6.1) to allow the shoes to rest on the drive adaptor.

Install the 2-speed shoes in the 2nd gear carrier, but do NOT install the 1st gear.

There should be equal but minimum spacing between the 2-speed shoes and the 2nd gear carrier. Tighten BOTH gap-setting setscrews until the shoes touch the inside surface of the aluminum 2nd gear carrier, then loosen BOTH screws by 1/2 turn each. The 2nd gear carrier should spin freely.

Install the 1st gear.

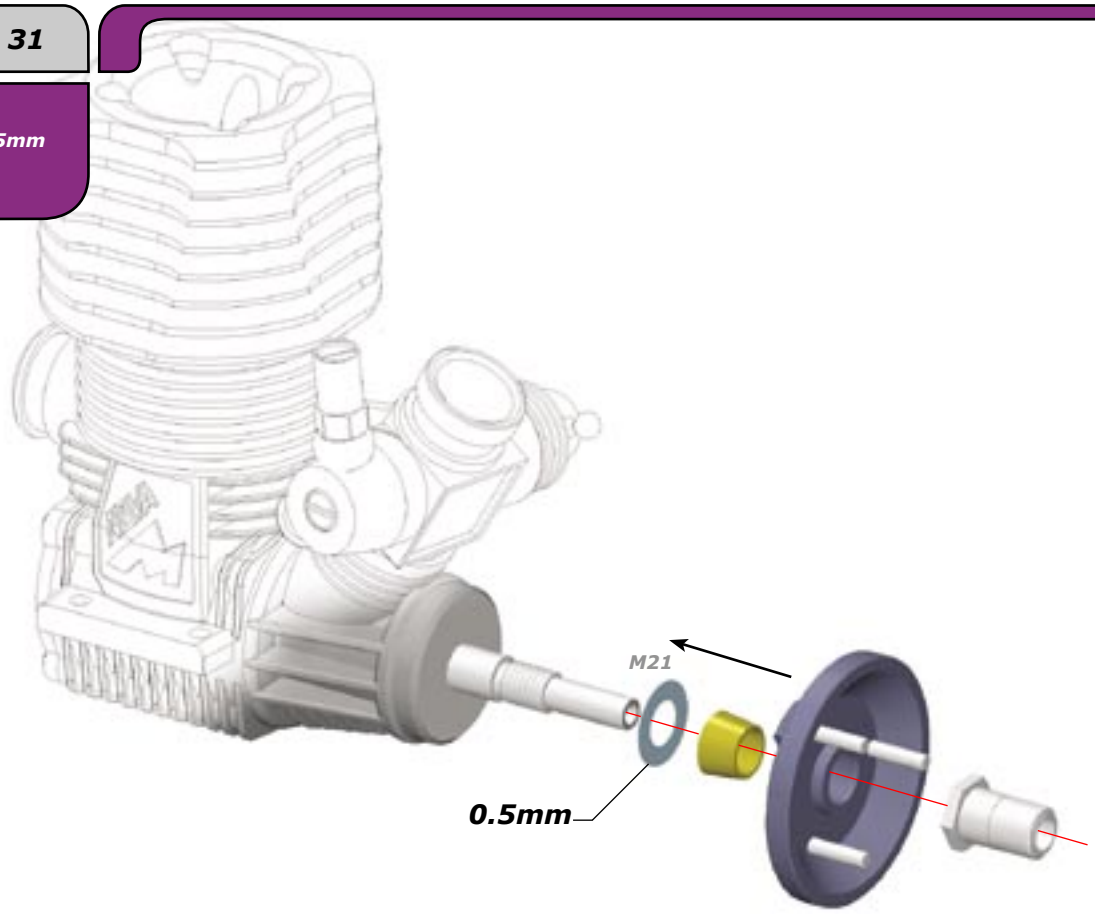


# 7.0 Centax Assembly

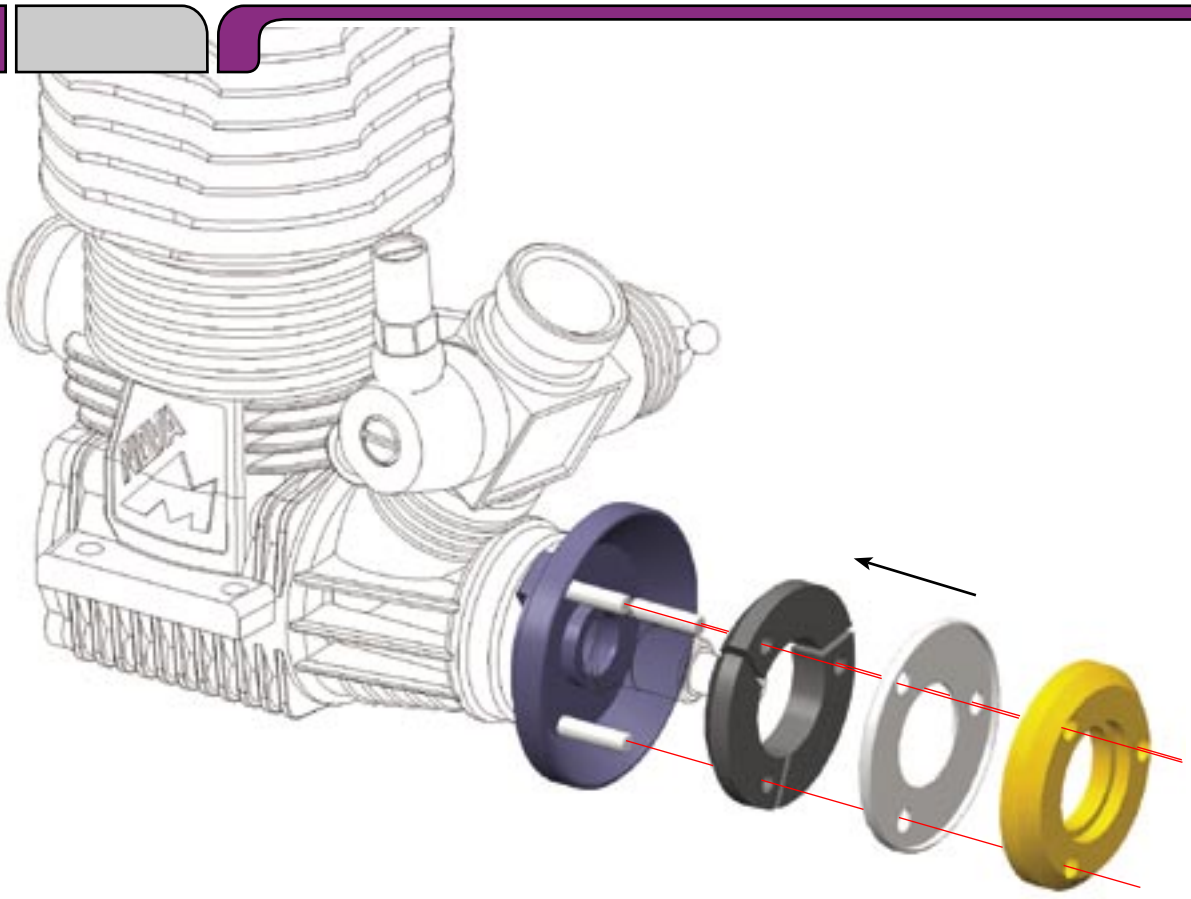
## Step 7.1

Bag 31

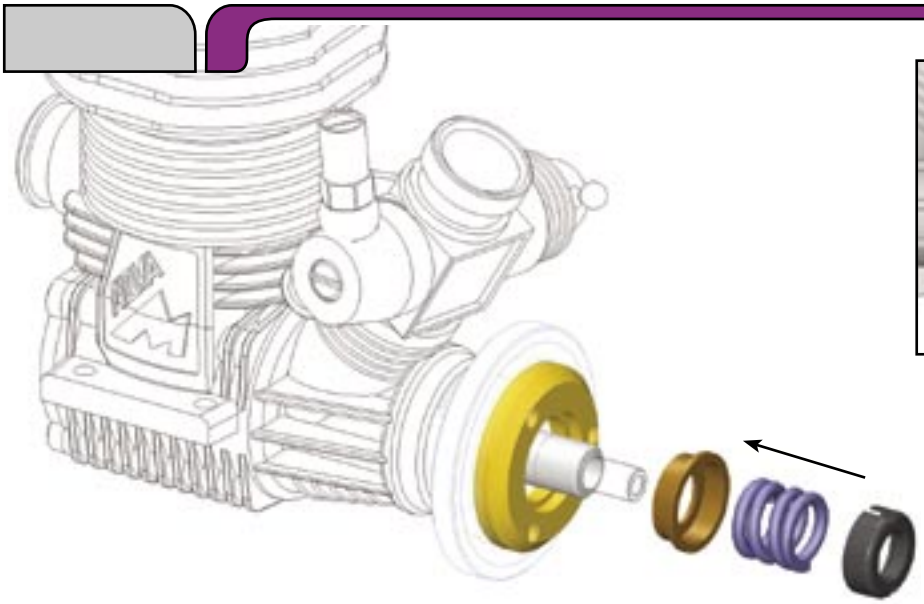
**M21**
7x13x0.5mm

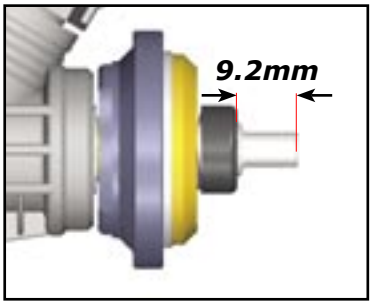



## Step 7.2



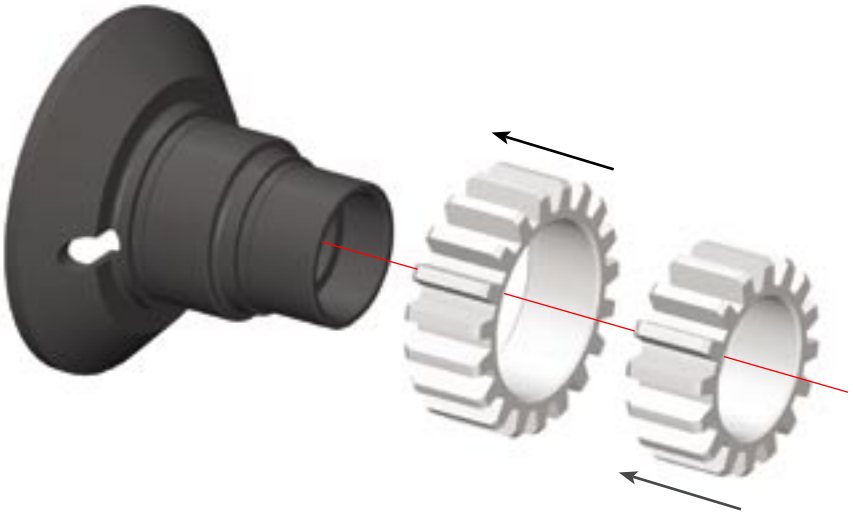
## Step 7.3

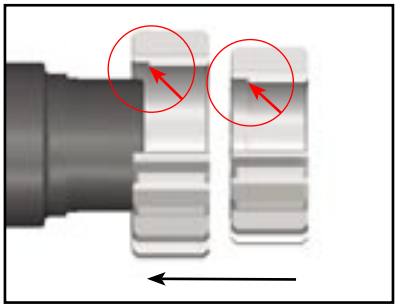




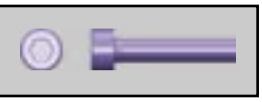

## Step 7.4

**Bag 32**

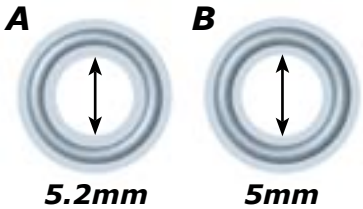


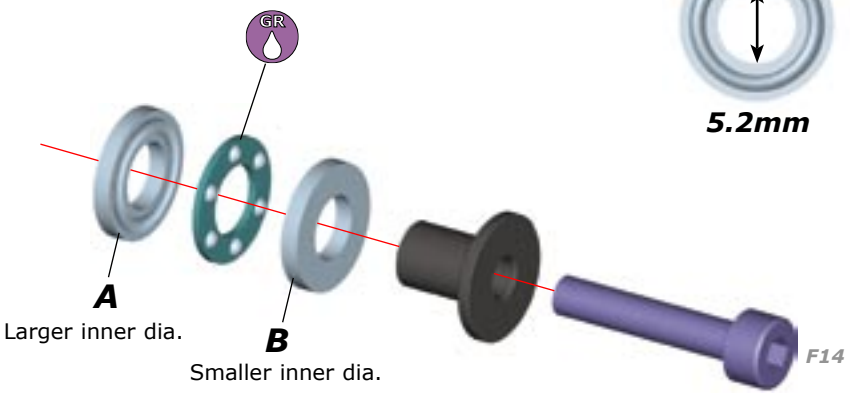


## Step 7.5

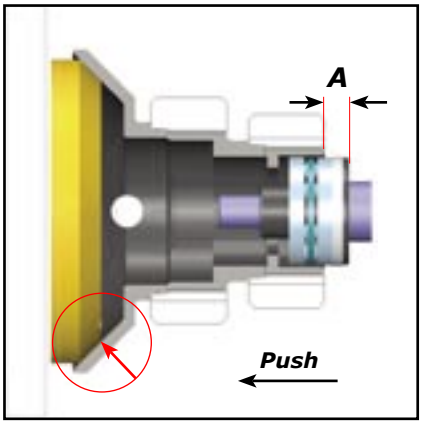


**F14**
3x16mm



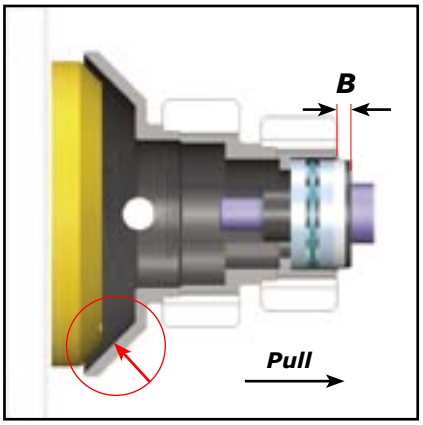



## Step 7.6




***Adjusting the clutch gap***

Install only the clutchbell and the thrustbearing assembly on the engine crankshaft.
Push the clutchbell onto the clutch shoe, and then measure the distance **A** as indicated.

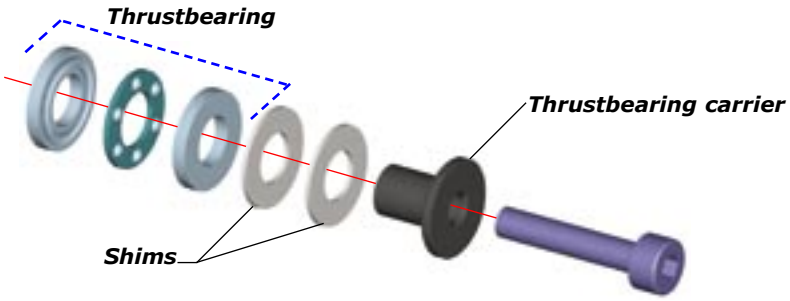



Pull the clutchbell away from the clutch shoe, and then measure the distance **B** as indicated.

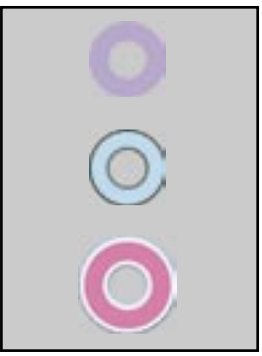
The clutch gap is **A** – **B**; the correct gap is 0.7mm.
If the clutch gap is greater than 0.7mm, you can easily calculate the thickness of shims required to set the correct gap:
Thickness of shims required (in mm) = **A** – **B** – 0.7

For example, using the values A=1.3mm, B=0.3mm
Shim thickness = 1.3 – 0.3 – 0.7 = 0.3mm

Place shims between the outer thrustbearing plate and the rim of the thrustbearing carrier as shown.



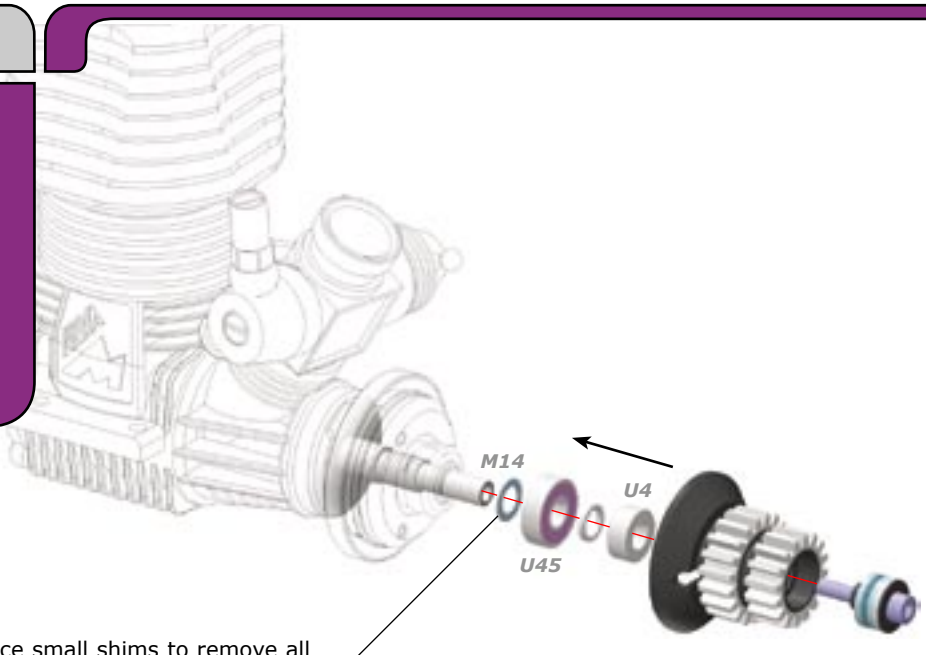

## Step 7.7



***M14***
***5x10x0.1mm***
***5x10x0.3mm***

***U4***
***5x10mm***

***U45***
***5x13mm***

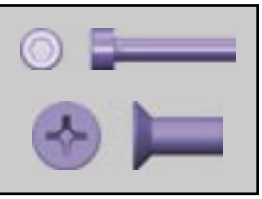



Place small shims to remove all but a small amount of end play

# 8.0 Final Assembly

## Step 8.1

Bag 33



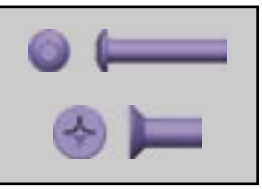
**F13**
3x12mm

**G27**
M5x12mm




## Step 8.2

Bag 34



**E14**
3x16mm

**G19**
M4x10mm






Orientation of belt tensioner bearings

## Step 8.3

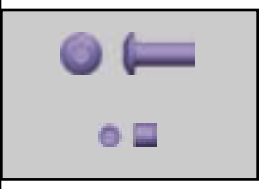
Bag 35

**H9**
3x4mm



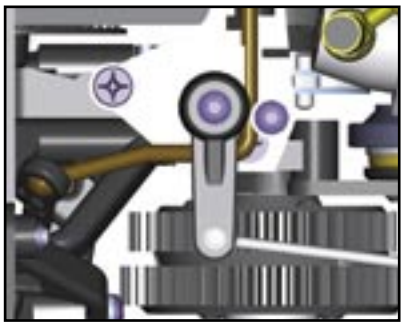

## Step 8.4

Bag 36



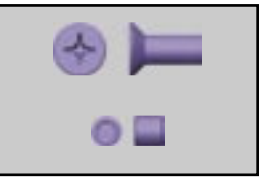
**E11**
3x8mm

**H9**
3x4mm



Proper position of brake linkage arm

## Step 8.5



**G19**
M4x10mm

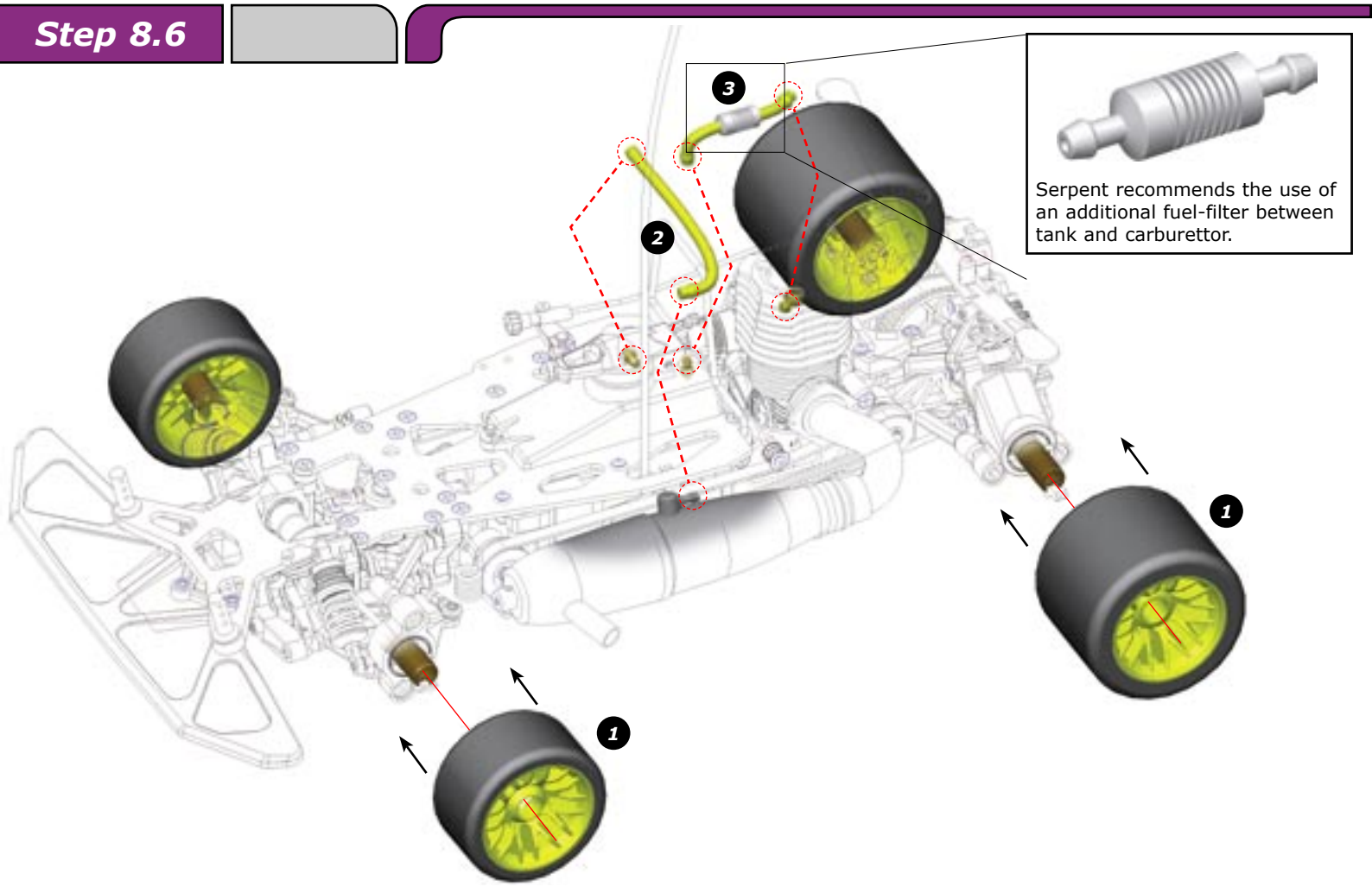
**H16**
4x4mm







## Step 8.6



# 9.0 Set-up Guidelines

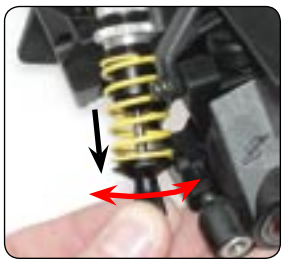
Setting up a racecar with fully independent suspension, like your Serpent 950R, is necessary to make the car perform well. We have developed these straight-forward procedures to help you set up your car properly and easily. Always follow these procedures step-by-step, in the order presented, and always 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 damping influences the responsiveness of the chassis during cornering (chassis roll), and helps to maintain proper contact between the tire and the road surface. Setting the right damping is therefore always a compromise and requires a lot of "hands on" experience.

No damping means that the spring rate determines how long it takes for the spring to compress and the suspension to reach a stable position. Damping only comes into play when the suspension is moving (either vertical chassis movement or due to 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, how much the flow is restricted (affected by the number of holes in the shock piston), and the velocity of the piston.

**Adjusting the shock absorbers**
Serpent shock absorbers are externally adjustable, meaning you can change the damping setting without disassembling the shock absorber. Pull out the piston rod and turn it slightly until it locks in the shock body. Turning the piston rod fully CW aligns 2 piston holes (hardest setting). Turning it CCW from here opens more piston holes and gives softer settings. There are 4 positions (2-3-4-5 holes), each of which can be felt by a soft "click" when you turn the piston rod.



**1.1 Front shock absorber - Setting**
Adjust the front shocks to 3 holes open (turn completely CW, then turn 1 click CCW)

**1.2 Rear shock absorber - Setting**
Adjust the rear shocks to 3 holes open (turn completely CW, then turn 1 click CCW)

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

Increasing rear track-width results in more rear traction (when the car is using the solid rear axle as in the 950R). It may also help if the car is traction rolling.

**Measuring track-width**
Measure front track-width on the outside edges of the front wheels. It is important that front track-width is adjusted symmetrically, meaning that the left and right wheels must be the same distance from the centerline of the chassis.

Measure rear track-width on the outside edges of the rear wheels. As with front track-width, it is important that rear track-width is adjusted symmetrically, meaning that the left and right wheels must be the same distance from the centerline of the chassis.

**2.1 Front track-width - Setting**
Set the front track-width to 254mm; the outer edge of each front wheel should be 127mm from the centerline of the chassis.
To increase front track-width, turn OUT both upper and lower pivotballs equally. To decrease front track-width, turn IN both pivotballs equally.
Make sure you make equal adjustments for each side or the track-width will not be symmetrical.

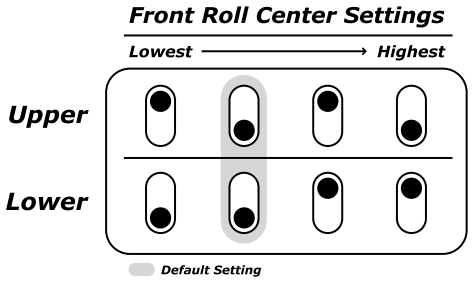
**2.2 Rear track-width - Setting**
Set the rear track-width to 262mm; the outer edge of each rear wheel should be 131mm from the centerline of the chassis.

Begin by removing both rear upper wishbone pivot pins from the rear bearing blocks. To increase rear track-width, turn OUT the rear upper wishbone mounting point AND both lower pivotballs. To decrease rear track-width, turn IN the rear upper wishbone mounting point AND both lower pivotballs; do this equally for both right and left sides.
Make sure you make equal adjustments for each side or the track-width will not be symmetrical.

**3 Roll Center**
A "roll center" is a theoretical point around which the chassis rolls, and is determined by the design of the suspension. Front and rear suspensions normally have different roll centers. The "roll axis" is the imaginary line between the front and rear roll centers. The amount that a chassis rolls in a corner depends on the position of the roll axis relative to the car's center of gravity (CG). The closer the center of gravity is to the roll axis, the less the chassis will roll and the less camber change there will be as a result of chassis roll.

**3.1 Front roll center - Setting**
Set the front roll center to its default setting, with all inserts in the lower hole positions.

Adjust the front roll center by changing the positions of the composite inserts with offset holes. To change the inserts, remove the front suspension pivot pins and wishbones, remove the inserts from the front blocks, and orient the inserts to the proper position.

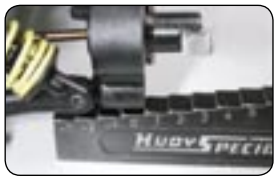



**3.2 Rear roll center - Setting**
Set the rear roll center to 0mm (no spacer on top of the rear upright).

Adjust the rear roll center by inserting spacers as appropriate. To raise the rear roll center, place spacers on top of the rear upright (beneath the rear upper wishbone). To lower the rear roll center, remove spacers from on top of the rear upright.

**4 Downstops**
Downstops limit how far the wishbones 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 typically better on a bumpy track. Less suspension travel (more downstop) makes the car more stable; it is typically better on a smooth track.
Make sure you adjust downstops so they are equal on both left and right sides.

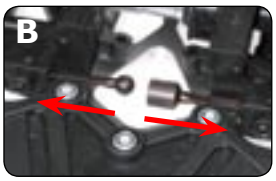
**Measuring downstops**
Check downstops with the chassis elevated above a reference surface. A special, flat reference board is available from HUDY (#108200 Flat Set-up Board). We also advise you to use the downstop measuring set from HUDY.



Using the measuring gauge, measure the dis-

tance from the reference surface to the bottoms of the front steering blocks / rear uprights. 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: Loosen the set screw from the front anti-roll bar mounts and push the blades apart so that they are not touching.
**C** Rear anti-roll bar: Disconnect one ball-joint from the rear anti-roll bar.




*Note:* It is not necessary to remove the shocks, however you must be sure that they are long enough not to limit the suspension travel. Be sure the suspension is reaching the downstop limits before the shocks are fully extended.

**4.1 Front downstops - Setting**
Set the front downstops 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).

Adjust front downstops by turning the front downstop setscrews in or out. Turn the setscrews IN to increase the downstop value. Turn the setscrews OUT to decrease the downstop value. Make sure you adjust downstops so they are equal on both left and right sides.

**4.2 Rear downstops - Setting**
Set the rear downstop screws so that the bottoms of the rear uprights are at +9mm on the gauge. (Actual measurement = 9mm above level of elevating blocks, or above the bottom of the chassis).

Adjust rear downstops by turning the rear downstop screws in or out. Turn the screws OUT to increase the downstop value. Turn the screws IN to decrease the downstop value. Make sure you adjust downstops so they are equal on both left and right sides.

**5 Ride Height**
Ride height affects the car's traction since it alters the car's center of gravity and roll center. Decreasing the ride height (lowering the car) gives more grip. However, because of changes in suspension geometry and decreasing ground clearance, there are also negative consequences to decreasing the ride height.

**Measuring ride height**
Measure the car's ride height when the car is mounted on a HUDY Set-Up System, or when the car is sitting on a flat reference surface (such as a HUDY setup board) using a set of 70mm front / 76mm rear tires. Measure the ride height using a HUDY ride height gauge or calipers from the very end points at the front and rear of the car.

*Note:* If you removed the shocks to measure downstops, reconnect the shocks; do NOT reconect he anti-roll bars.

**5.1 Front ride height - Setting**
Set the front ride height to 7mm.

Increase the front ride height by increasing the shock preload on the front shocks. Decrease the front ride height by decreasing the shock preload on the front shocks. Make sure you change the shock preload on both front shocks equally.

**5.2 Rear ride height - Setting**
Set the rear ride height to 7mm.

Increase the rear ride height by increasing the shock preload on the rear shocks. Decrease the rear ride height by decreasing the shock preload on the rear shocks. Make sure you change the shock preload on both rear shocks equally.

**6.0 Camber**
Camber is the angle of a wheel to the surface on which the car is resting (with wheels and shock absorbers mounted). Zero degrees (0°) of camber means that the wheel is perpendicular to the reference surface. Negative camber means that the top of the wheel is leaning inwards towards the centerline of the car. Positive camber means that the top of the wheel is leaning outwards from the centerline of the car.

Camber affects the car's traction. In general, more negative camber means increased grip. Adjust camber so that the front tires wear flat, and the rear tires wear slightly conical to the inside.

**Measuring camber**
Before measuring camber, lift and drop the end of the car (front or rear) a few cm's to let the suspension settle. Measure the camber using the HUDY Set-Up System.

*Note:* If you measure camber using a camber gauge with the car sitting on its wheels (on a flat reference surface), you may get noticeably different camber readings than those from a HUDY Set-Up System. The reason is that tires (especially the rear tires) have a tendency to lay flat on the surface. If this happens (that is, if the tires are not pre-coned), the camber readings may differ as much as 1° from the reading you would get with the HUDY Set-Up System.

**6.1 Front camber - Setting**
Set the front camber to -1.5° (tops of front wheels leaning inwards).

Adjust front camber by turning the front pivotballs in or out. To get more negative camber, turn the upper pivotball IN and turn the lower pivotball OUT equally. To get less negative camber, turn the upper pivotball OUT and the lower pivotball IN equally. Make sure you adjust the pivotballs equally (in opposite directions) or you will change front track-width.

**6.2 Rear camber - Setting**
Set the rear camber to -3.0° (tops of rear wheels leaning inwards).

Adjust rear camber by turning the lower pivotballs in or out. To get more negative camber, turn both pivotballs OUT equally. To get less negative camber, turn both pivotballs IN equally. Make sure you adjust the pivotballs equally, or you will change rear toe-in.

**7 Toe-in**
Toe-in is the angle of the wheels when looked at from above the car. When the wheels are parallel with the centerline of the car, toe-in is 0°. 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), setting more front toe-out will remedy this.

**Measuring toe-in**
Measure front and rear toe-in using the HUDY Set-Up System

**7.1 Front Toe-in - Setting**
Set the front toe-in to -0.5° (fronts of front wheels pointing slightly outwards).

Adjust front toe-in using the track-rods that connect the servo-saver to the steering blocks. Make the track-rods LONGER to give more front toe-in. Make the track-rods SHORTER to give less toe-in (more toe-out).

**7.2 Rear Toe-in - Setting**
Set the rear toe-in to +2.0° (fronts of rear wheels pointing inwards).

Adjust rear toe-in using the rear lower pivotballs. To get more rear toe-in, turn IN the front pivotball and turn OUT the rear pivotball equally. To get less rear toe-in, turn OUT the front pivotball and turn IN the rear pivotball equally. Make sure you adjust the pivotballs equally (in opposite directions) or you will change the wheel's camber.

**8 Wheelbase**
The Serpent 950R has an adjustable wheelbase so that you can change the distance between the front and rear wheel axles. This allows you to fine-tune your chassis depending on track conditions. Longer wheelbases are typically used in

lower traction conditions, while short wheelbases are typically used in higher traction conditions to get more initial steering going into the corner.

**Measuring wheelbase**
Wheelbase is measured from its longest position (=0) to its shortest position (=-4mm). The wheelbase can be changed in 1mm increments.

Adjust the wheelbase by moving spacers from the rear of the upper and lower wishbones to the front, giving a maximum wheelbase variation of 4mm. The default position is with all 4mm of spacers at the rear of the front upper and lower wishbones, which gives the longest wheelbase. The clip-on spacers used for this adjustment are the same spacers as used for adjusting the caster. Note that for the front upper wishbones both caster spacers and wheelbase spacers are used.
When making wheelbase adjustments, make sure you always use the same amount of wheelbase spacers behind the wishbones.

**8.1 Wheelbase - Setting**
The default wheelbase (=0) occurs when all wheelbase spacers (totalling 4mm) are located behind the front upper and lower wishbones.

To shorten the wheelbase setting, move spacers as appropriate behind the front upper and lower wishbones to in front of upper and lower wishbones. When moving the spacers to the front of the lower wishbones, only place the spacers between the front lower wishbone and the downstop lever. Never place any spacers in front of the downstop lever.

For example, to shorten the wheelbase by 1mm, do the following:
- Remove 1mm spacer from behind the front upper wishbone, and install it in front of the front upper wishbone.
- Remove 1mm spacer from behind the front lower wishbone, and install it between the lower wishbone and the downstop lever and add a further 1mm spacer between the outer downstop mounting point.

Follow the example above to set appropriate wheelbase settings. Note that the total number of spacers in front of and behind the front upper wishbones is always the total sum of the wheelbase spacers and the caster spacers.

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

In general, increasing caster gives more on-power steering exiting a corner, while decreasing caster gives more off-power steering entering a corner.

**9.1 Caster - Setting**
Set the front caster gap to 2mm (2mm spacer in front of the upper wishbone, 1+4mm spacers behind). Note that the 950R uses wheelbase spacers in front of and behind the upper wishbones in addition to the caster spacers.

Adjust the caster angle by moving caster spacers in front of or behind the front upper wishbone. More spacers in front of the upper wishbone increases the caster angle. Fewer spacers in front of the upper wishbone decreases the caster angle.

**10 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.
**C** Put a set of good tires on the car, and ensure that each set of tires is the same size left and right.

**10.1** Check 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.

**10.2** 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.

**10.3** 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.

**10.4** Check 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.

**10.5** 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.

**10.6** 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.

**11 Anti-roll bars**
Anti-roll bars are used to adjust the car’s side traction. In general, increasing the stiffness 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 stiffer, 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).

**11.1 Front anti-roll bar - Setting**
Set the front anti-roll bar to the (softest) horizontal position.

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

**11.2 Rear anti-roll bar - Setting**
The rear anti-roll bar is non-adjustable unless you obtain the optional adjustable anti-roll bar (#909335). This can be adjusted the same as the front.
You can adjust the rear anti-roll bar setting by changing to which anti-roll bar mounting hole on the lower wishbone you use. The inner hole gives a softer setting while the outer holes give a harder setting (default).

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

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