SERPENT ninesixty 960

1/8TH SCALE 4WD COMPETITION CAR

INSTRUCTION MANUAL

SERPENT 960

INTRODUCTION

The Serpent 960 is the next evolution of Serpent's hugely-successful 950 lineage, combining ultimate performance into a single package. The Serpent 960 was designed to be a world champion, while still being easy to use, assemble, and set up. You are now part of the worldwide network of Serpent drivers, which gives you superior technical support and access to many benefits that only Serpent drivers can enjoy.

The Serpent 960 offers many of the same specifications and features that made the Serpent 950/950R into top-competition racecars. Continuously pushing the performance envelope, Serpent's engineers have added many new and innovative features that can help take your Serpent 960 into the winner's circle: stronger reinforced components, easier roll-centre adjustment, redesigned braking system, improved rear suspension design, adjustable rear anti-roll bar, optional throttle servo positioning (laydown or upright), new improved shock absorbers, and new receiver pack configuration.

INSTRUCTIONS
Serpent's long tradition of excellence extends to their instruction manuals, and this instruction manual is no exception. The easy-to-follow layout is richly illustrated with 3D-rendered full-color images to make your building experience quick and easy. 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.

This instruction manual has been divided into sections that will logically lead you through the assembly process of your Serpent 960. 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 identify the kit bag(s) that contains the appropriate parts.

SETUP
In certain assembly steps you need to make basic adjustments, which will give you a good initial setup for your Serpent 960. Fine-tuning the initial setup is an essential part of building a high-performance racecar like your Serpent 960. The separate Serpent 960 Setup Book is an excellent resource for making adjustments on your Serpent 960 and understanding the concepts behind those adjustments.

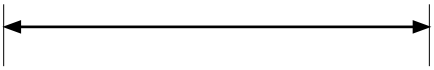
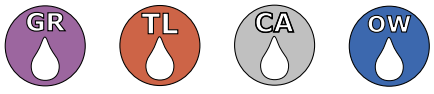
EXPLODED VIEWS AND PARTS LIST
The exploded views and parts lists for the Serpent 960 are contained in a separate Serpent 960 Reference Guide. The exploded views show all the parts of a particular assembly step along with the Serpent part number. The parts lists indicate the part number and name of each part for easy reference when ordering.

SAFETY
Included with your Serpent 960 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

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
	Step number; the order in which you should assemble the indicated parts
	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
	Refer to Serpent 960 Setup Book - Section A: Basic Setup
	Refer to Serpent 960 Setup Book - Section B: Advanced Setup
	Apply graphite grease (GR), threadlock (TL), CA glue (CA) or Serpent's One-way Lube (OW). (Items not included.)

SERPENT.COM

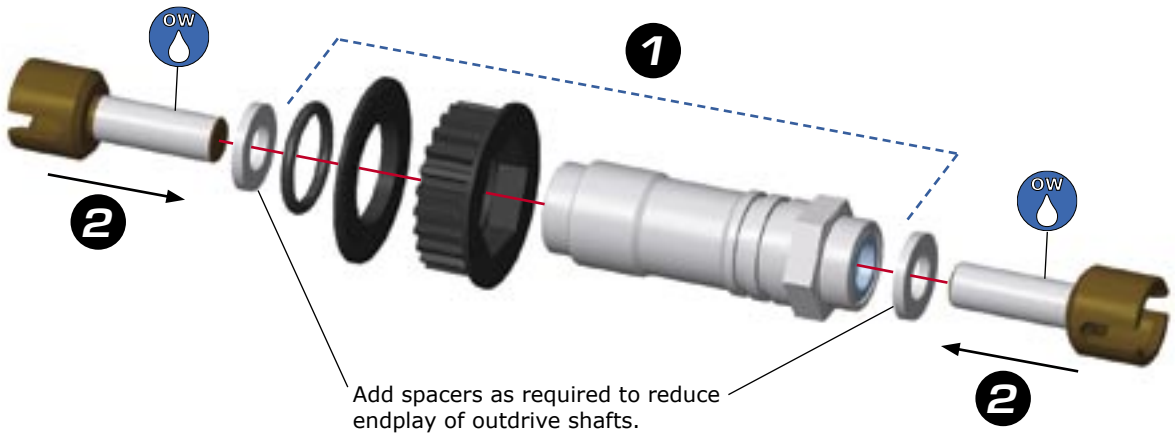
The printed instruction manual included with your Serpent 960 kit is very complete, though due to continuous product development, more up-to-date information is provided at our Serpent.com web portal. This state-of-the-art R/C technology portal is where Serpent racers from all over the world meet and exchange their ideas, and share useful information and experiences about their Serpent cars.

All information about the Serpent 960 is accessible from the Serpent 960 product page on Serpent.com. You can access this page by going to the Products section, and then search for the 'Serpent 960' product name. From the Serpent 960 product page you will find the very latest information about your Serpent 960: reports by team drivers and other experts, tips and tricks, FAQ, forums, setups, image gallery, downloadable files, and even streaming video of the Serpent 960 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.'

1.0 FRONT ASSEMBLY

STEP 1.1

BAG 1

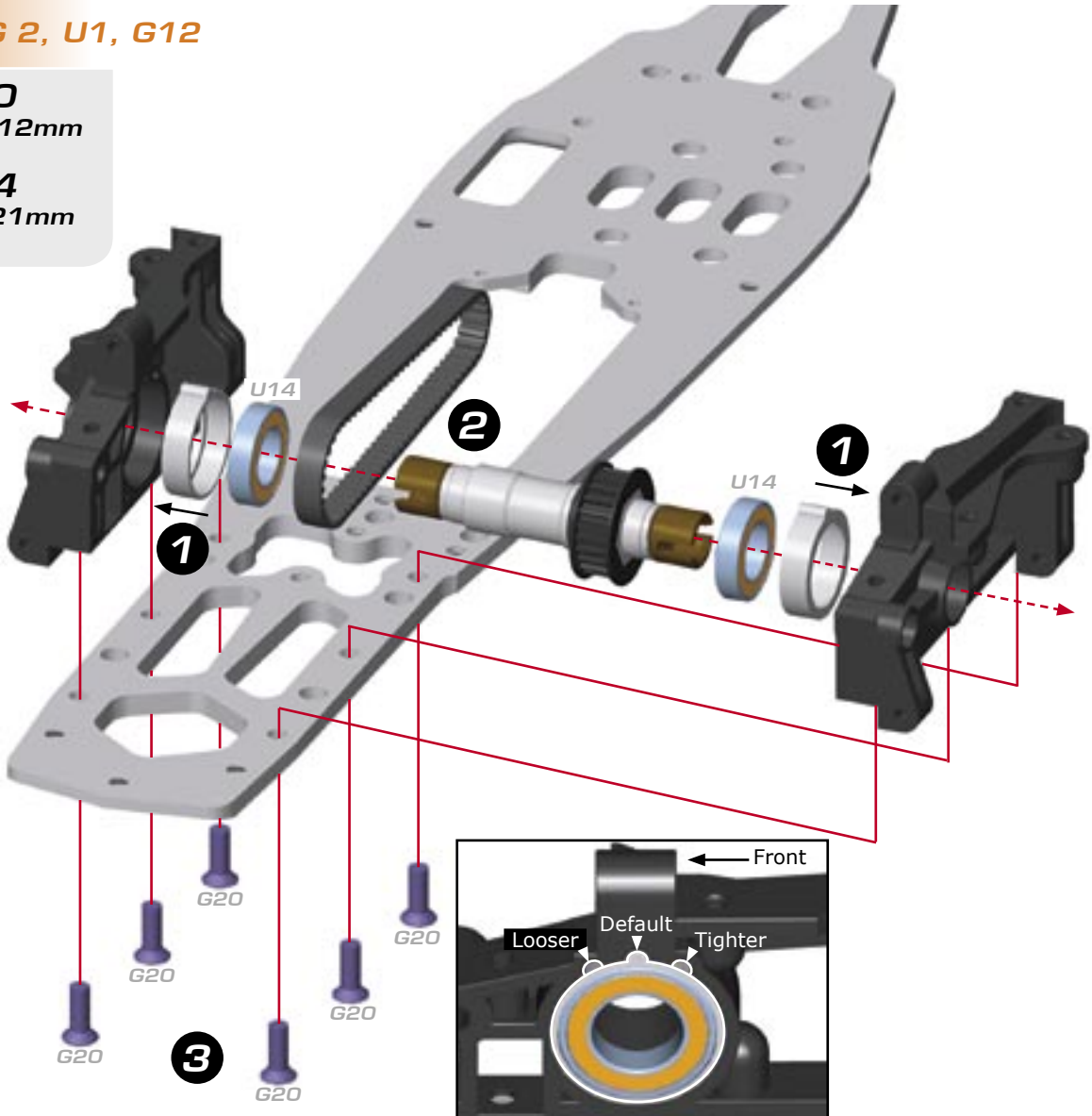


STEP 1.2

BAG 2, U1, G12

G20
M4x12mm

U14
12x21mm

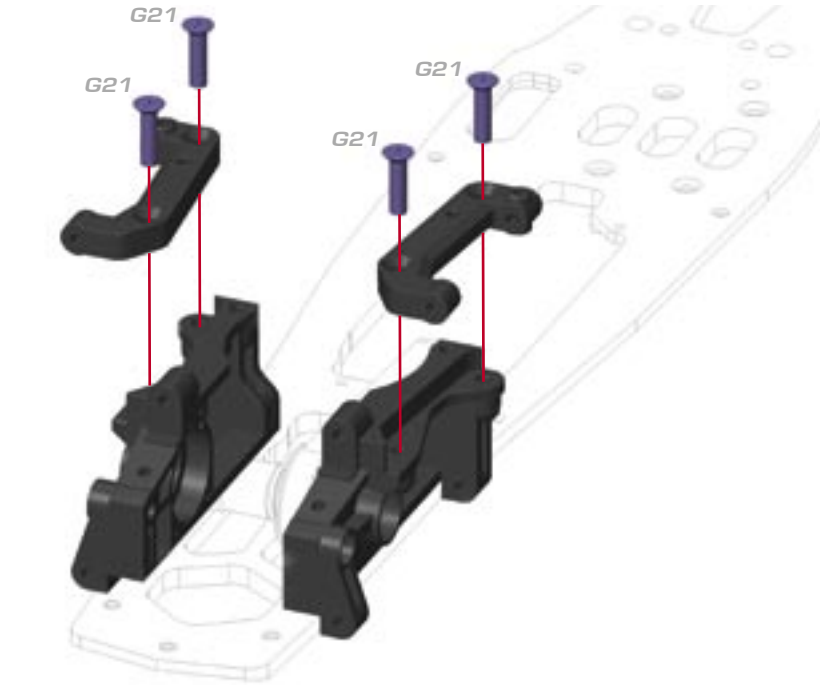


Change the position of **BOTH** eccentric hubs to adjust front belt tension. Both hubs should have the same position.

STEP 1.3

G21
M4x16mm

Learn about front roll center adjustment

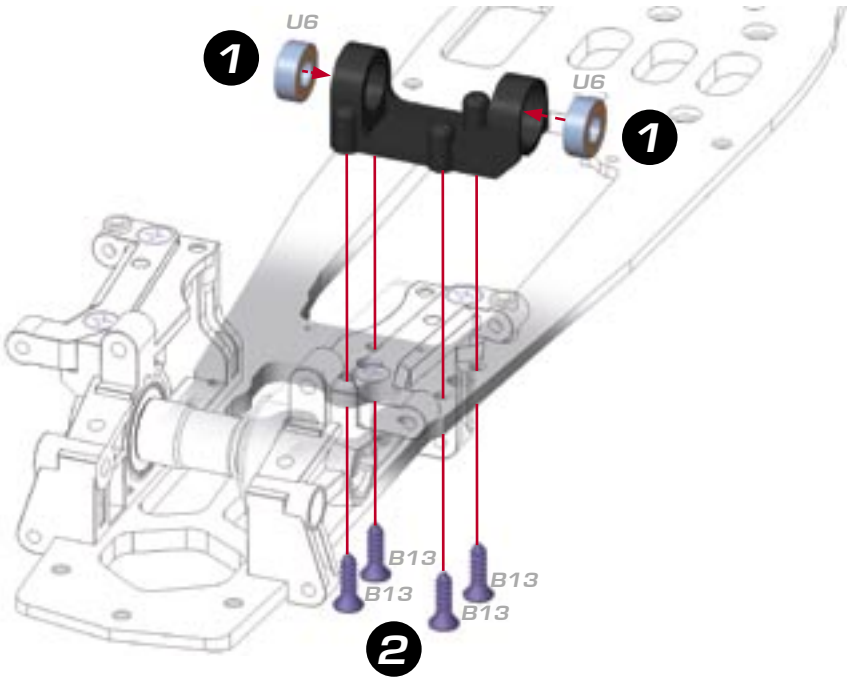


STEP 1.4

BAG U1

B13
3.5x13mm

U6
6x13mm



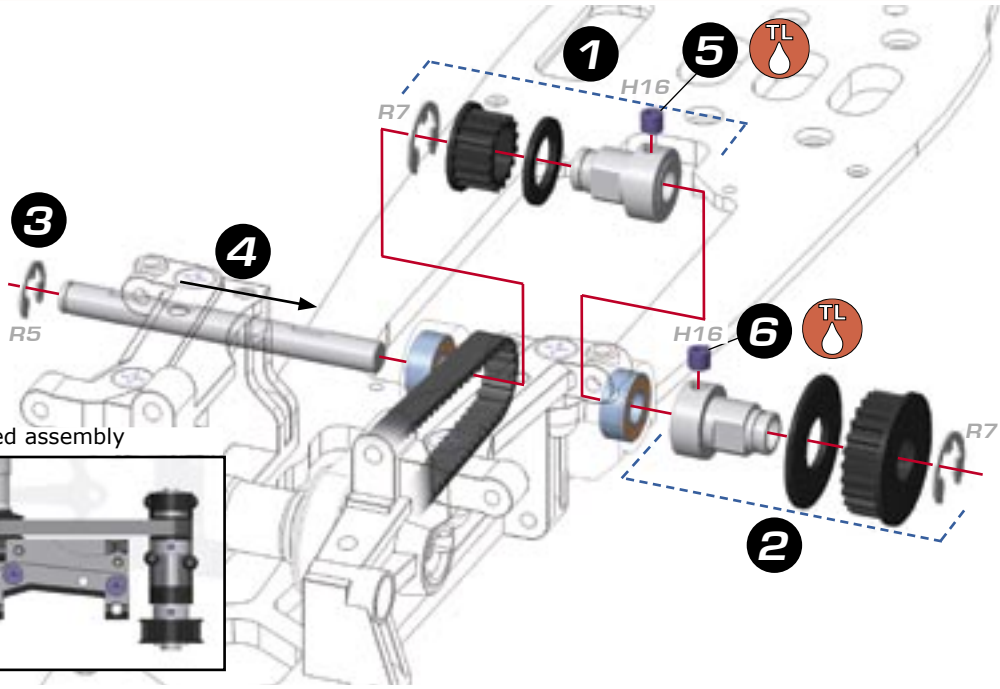
STEP 1.5

BAG 3

H16
M4x4mm

R5
5mm

R7
7mm



Completed assembly

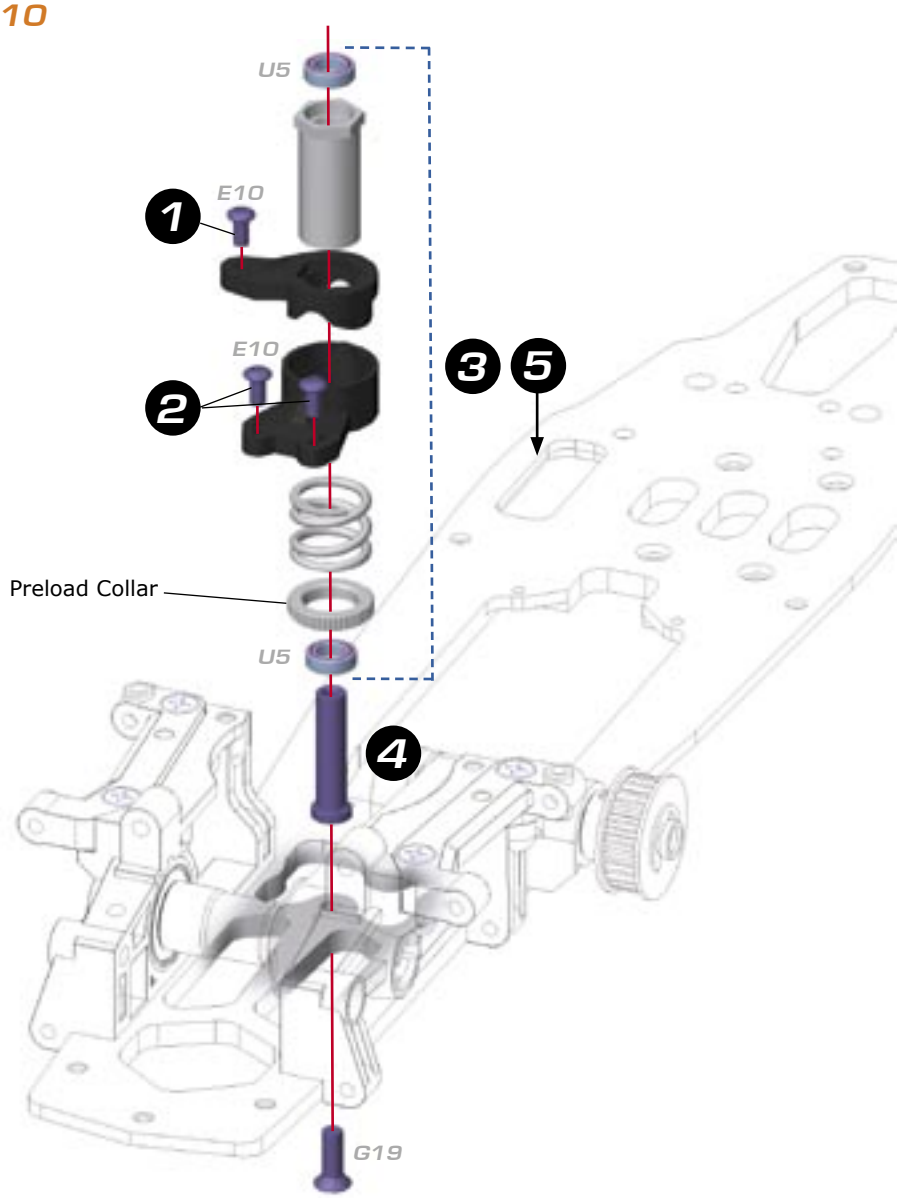
STEP 1.6

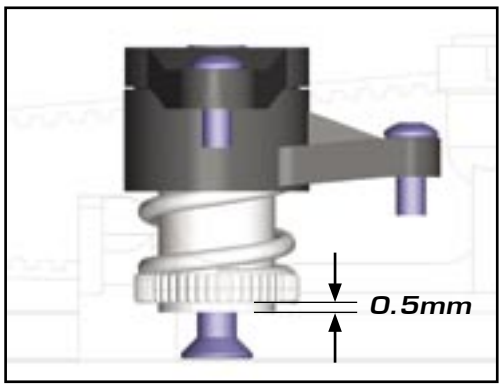
BAG 4, U1, G20, E10

E10
M3x6mm

G19
M4x10mm

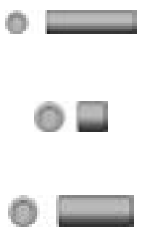
U5
6x10mm





STEP 1.7

BAG 5, 6

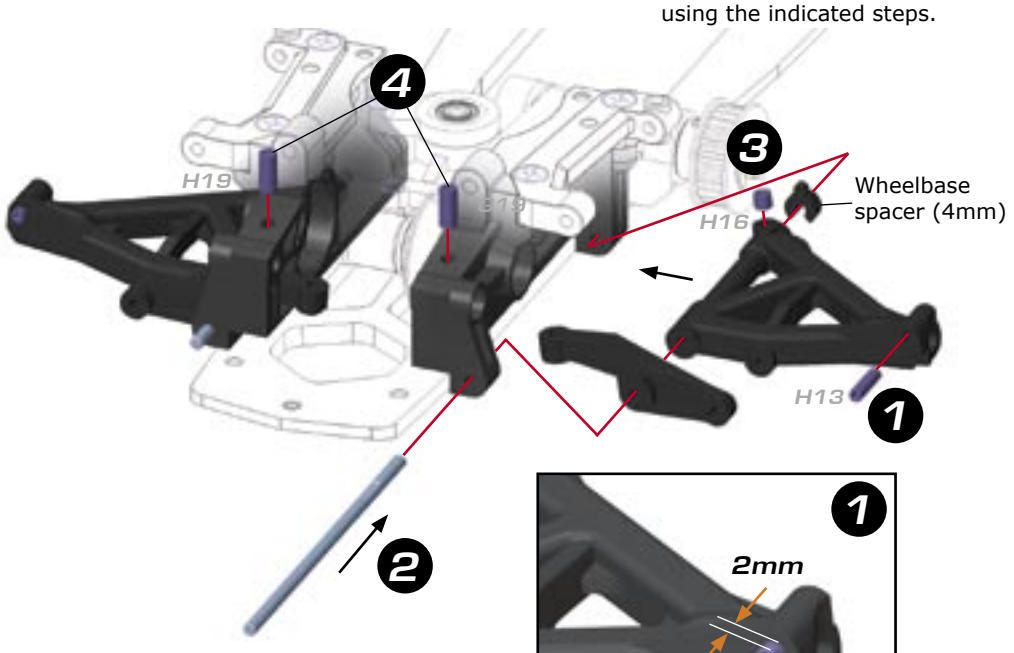


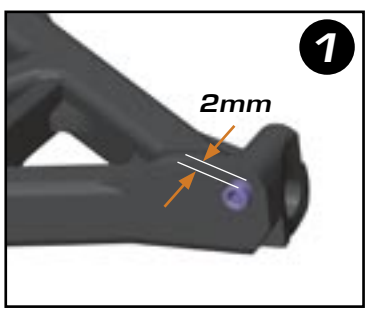
H13
M3x12mm

H16
M4x4mm

H19
M4x10mm

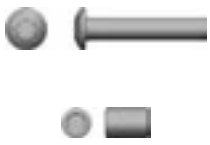
Assemble both front lower arms using the indicated steps.





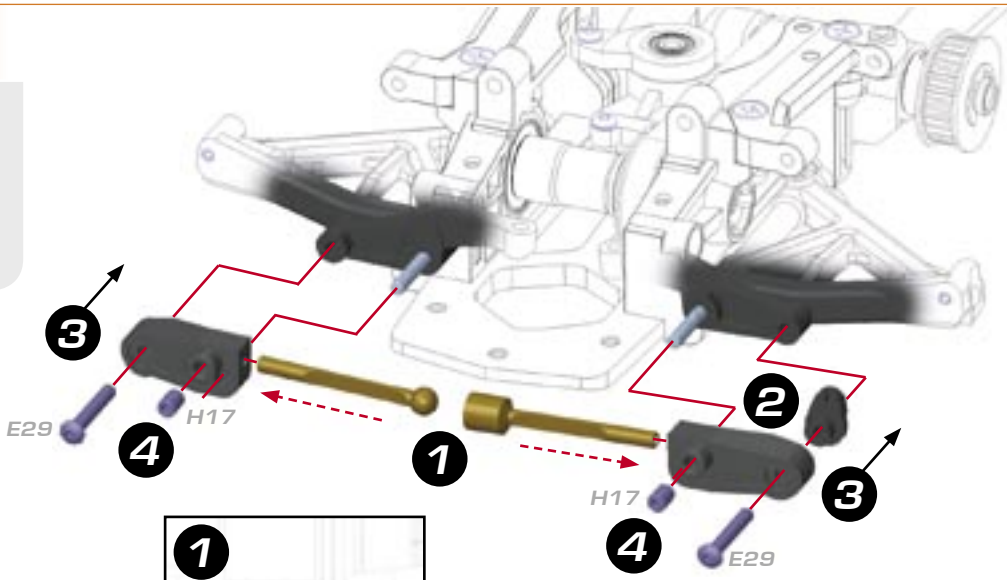
A Set front downstops and wheelbase

STEP 1.8

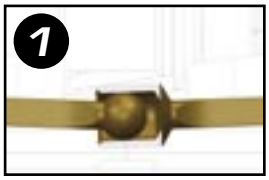


E29
M3x18mm

H17
M4x6mm



A Set front anti-roll bar

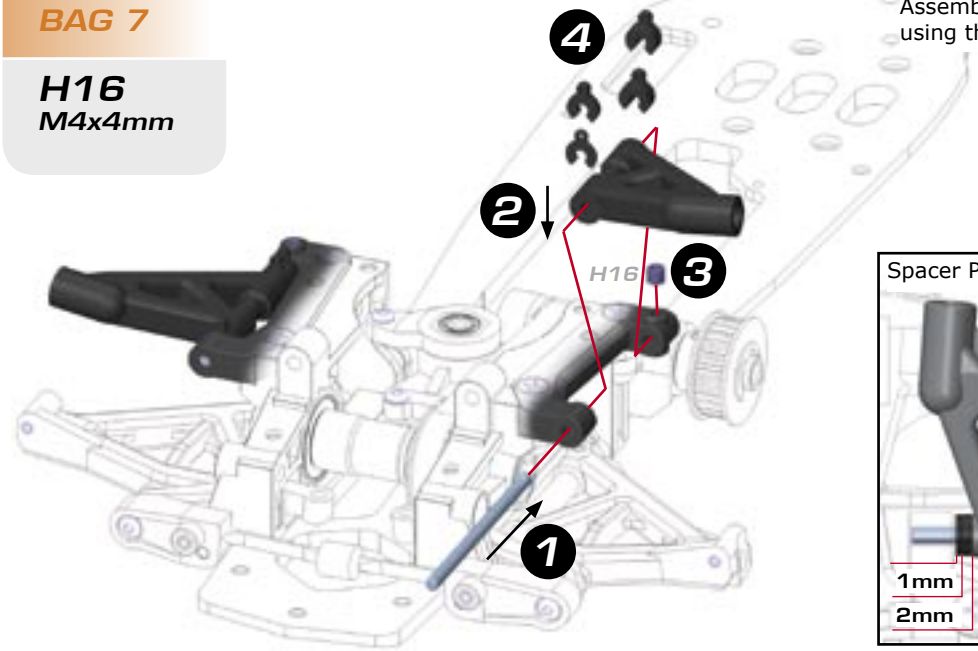


Press anti-roll bars into mounts far enough so the bars do not bind when the suspension is compressed.

STEP 1.9

BAG 7

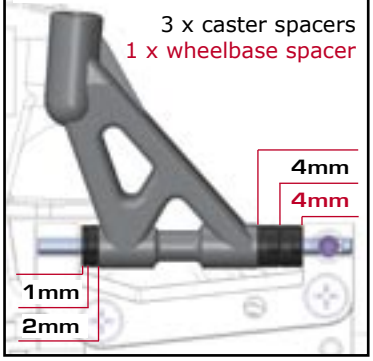
H16
M4x4mm



Assemble both front upper arms using the indicated steps.

Spacer Placement

3 x caster spacers
1 x wheelbase spacer



A Set caster and wheelbase

STEP 1.10

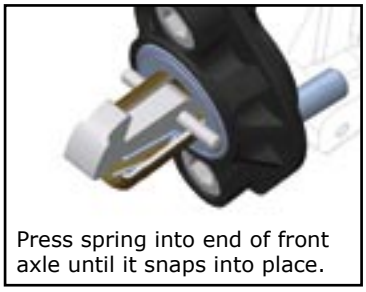
BAG 8, U10, E10

E10
M3x6mm

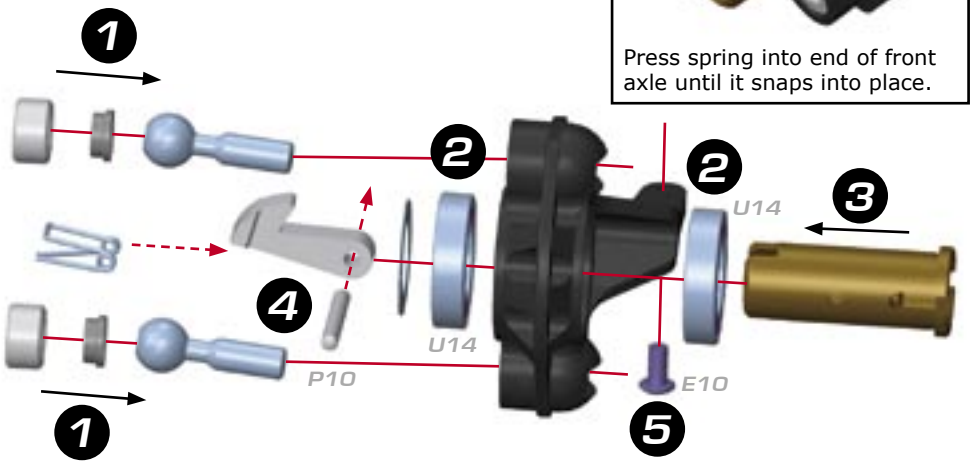
P10
2.5x22mm

U14
12x21mm

Assemble both steering blocks using the indicated steps.

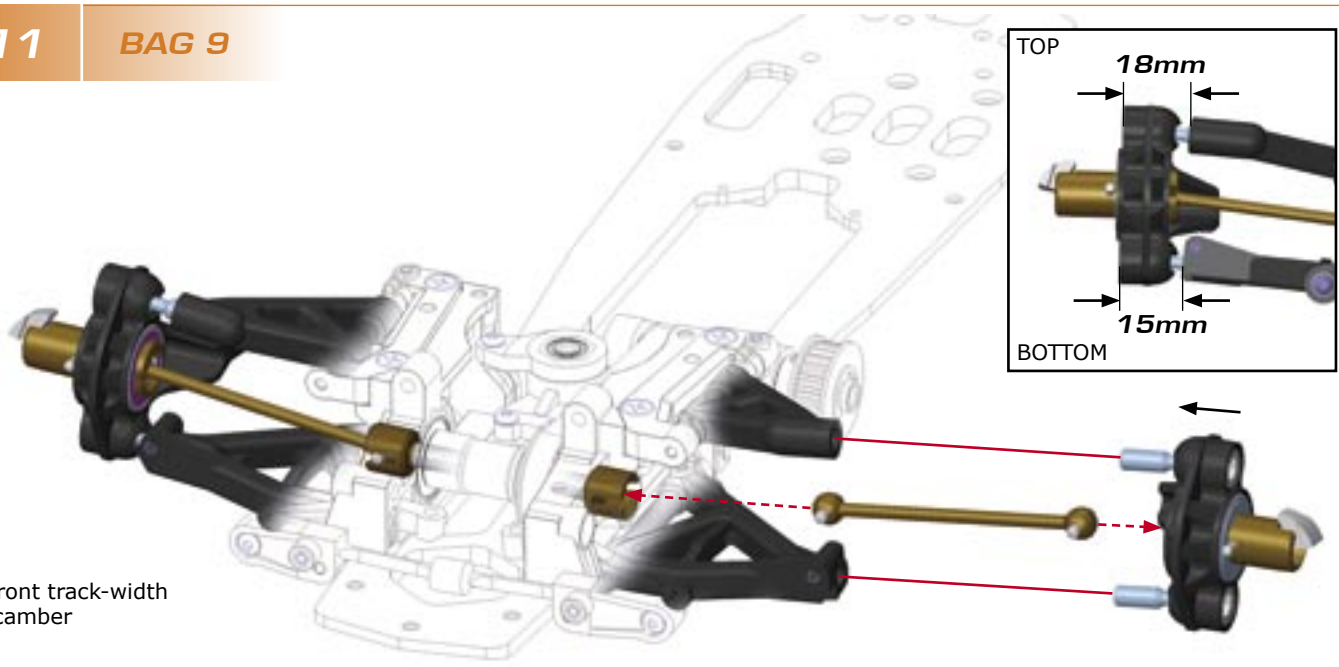


Press spring into end of front axle until it snaps into place.



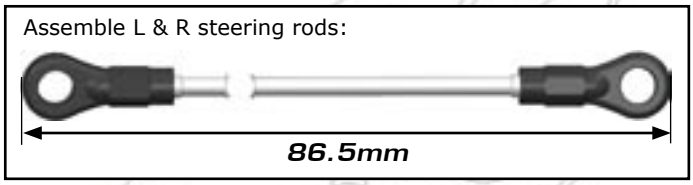
STEP 1.11

BAG 9

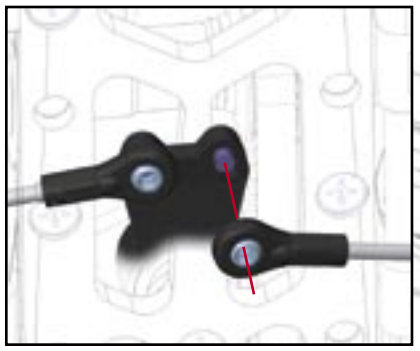


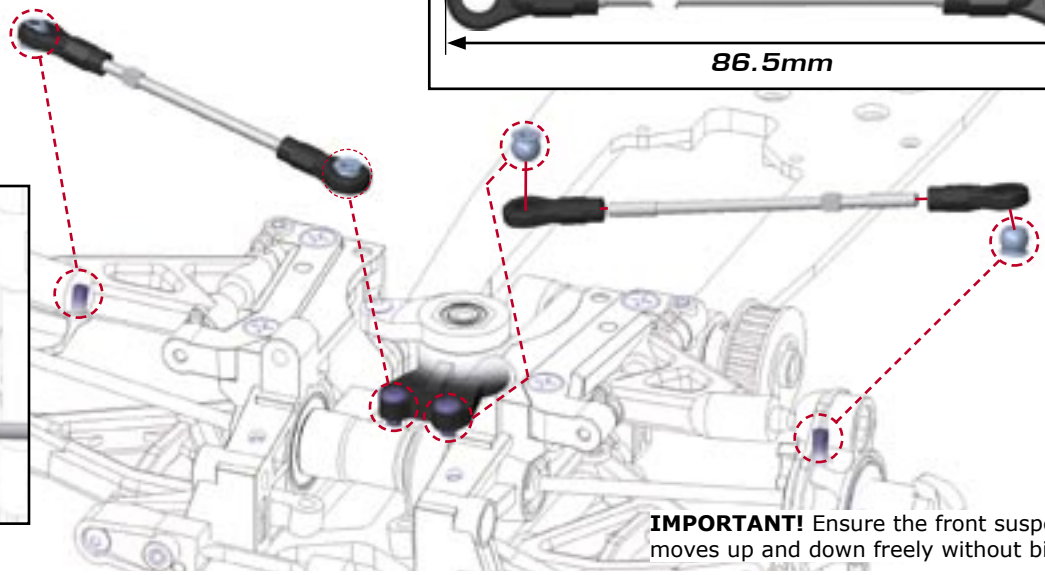
A Set front track-width and camber

STEP 1.12



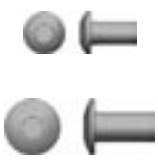
A Set front toe





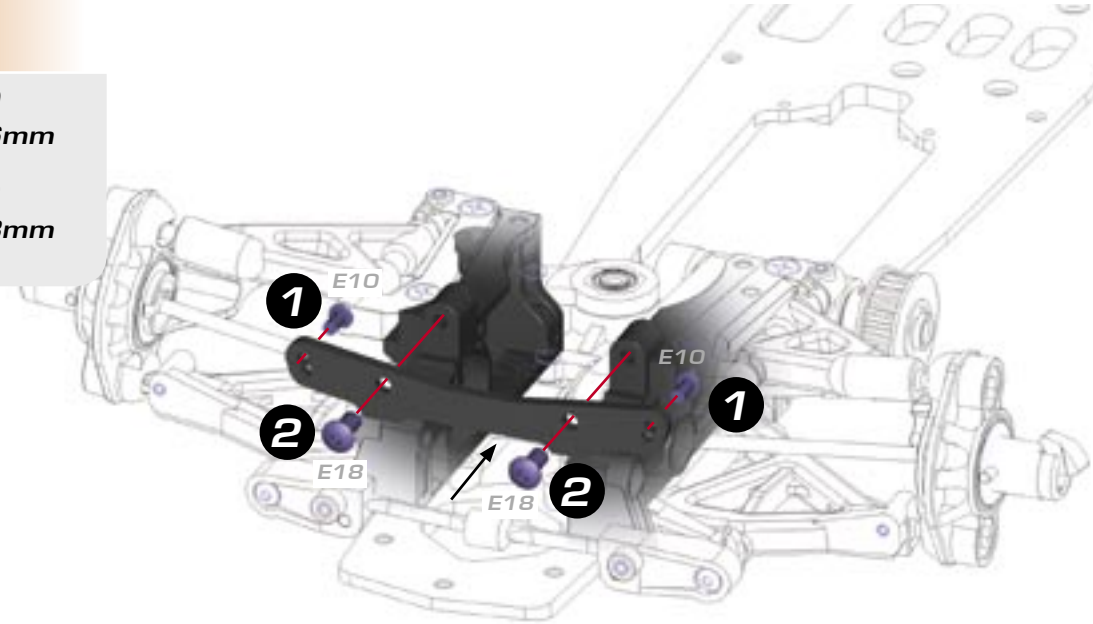
IMPORTANT! Ensure the front suspension moves up and down freely without binding.

STEP 1.13



E10
M3x6mm

E18
M4x8mm



2.0 REAR ASSEMBLY

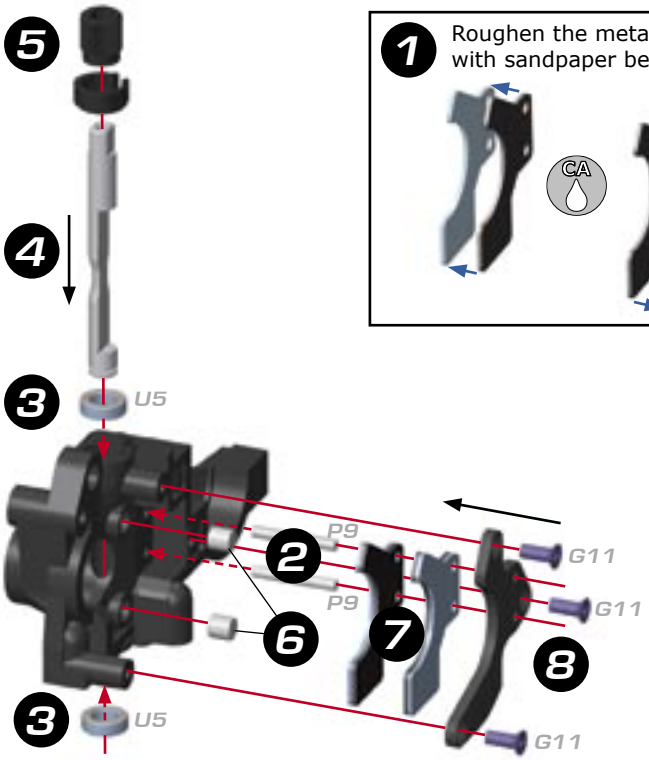
STEP 2.1

BAG 10,11

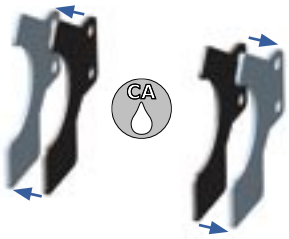
G11
M3x8mm

P9
2.5x20mm

U5
6x10mm

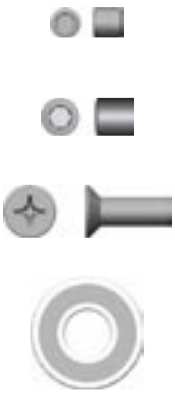


1 Roughen the metal plates with sandpaper before gluing



STEP 2.2

BAG 12, U1, G20



H16
M4x4mm

H22
M5x4mm

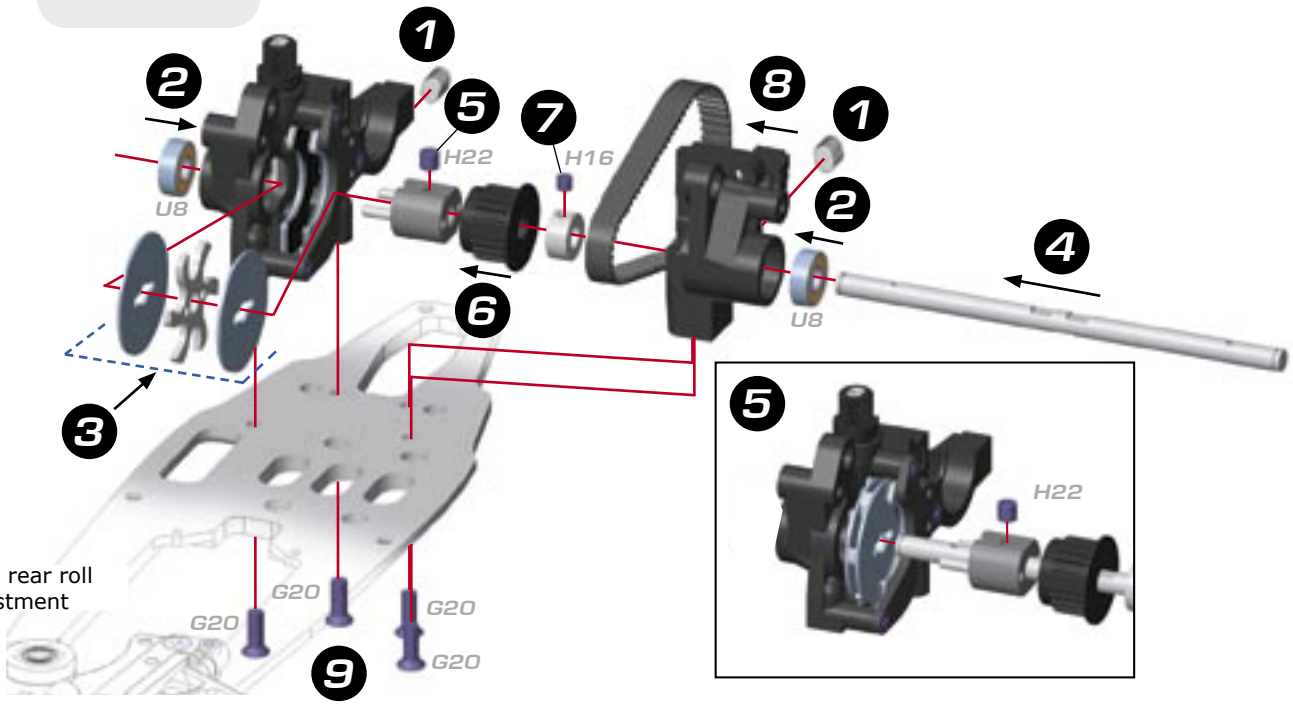
G20
M4x12mm

U8
6x15mm

1 Note orientation of front inserts. Ensure **BOTH** inserts have the same position.

Left Block

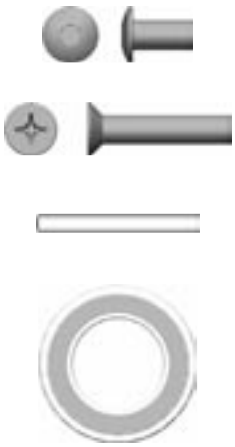
Right Block



Learn about rear roll center adjustment

STEP 2.3

BAG 13, U1, G20

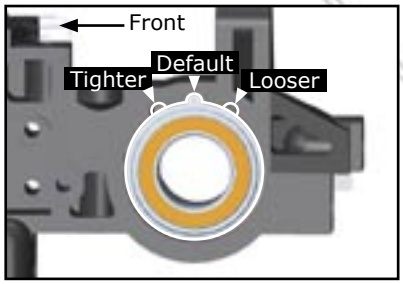


E18
M4x8mm

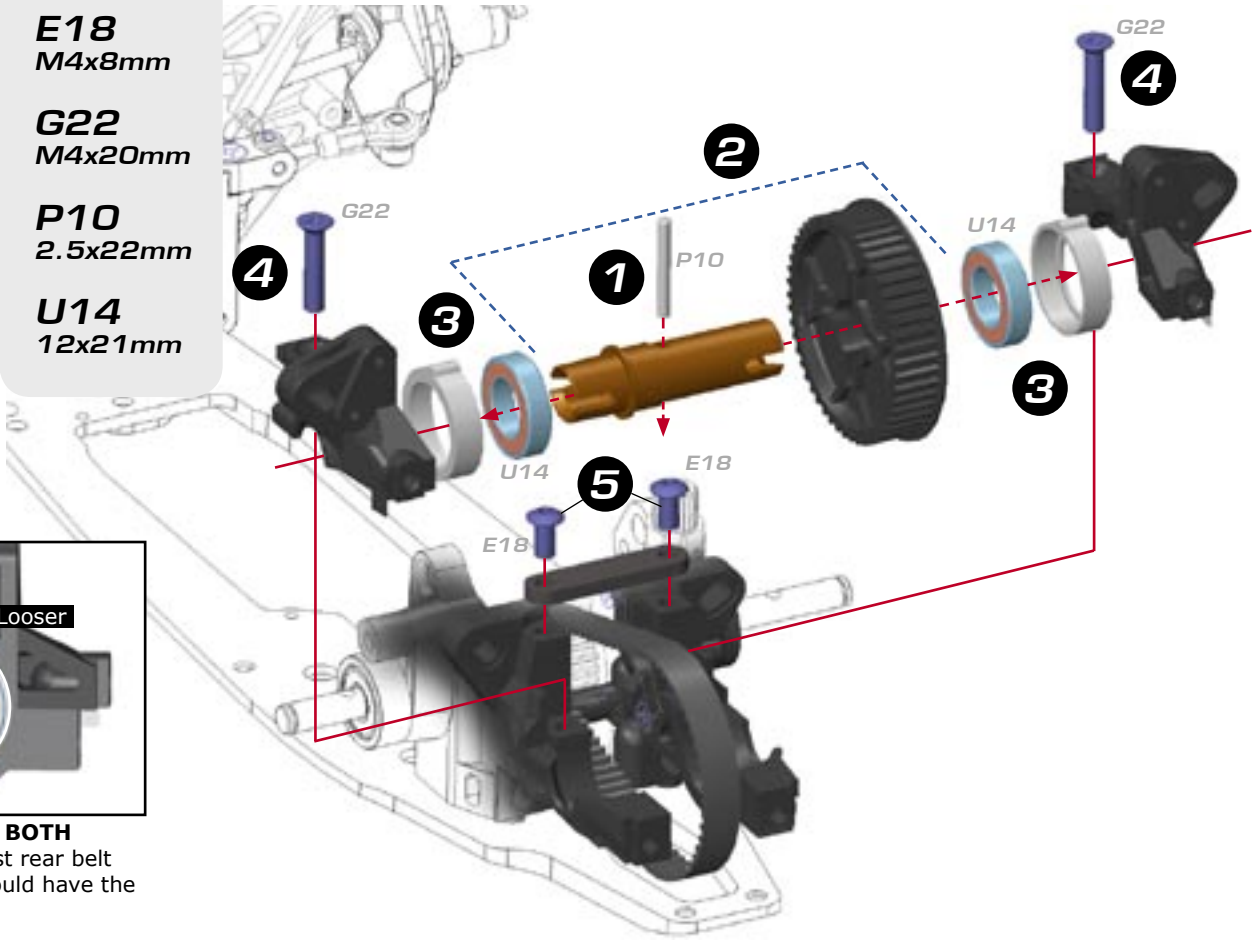
G22
M4x20mm

P10
2.5x22mm

U14
12x21mm



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



STEP 2.4

BAG 14, E10

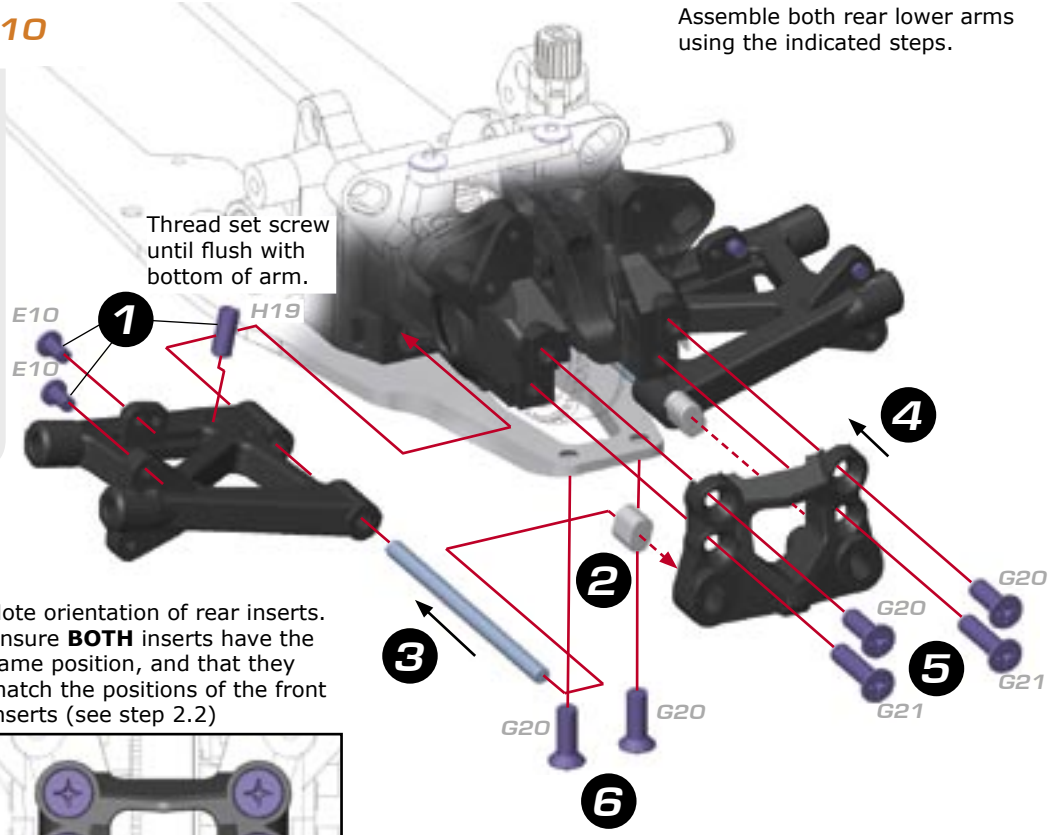
E10
M3x6mm

G20
M4x12mm

G21
M4x16mm

H19
M4x10mm

Assemble both rear lower arms using the indicated steps.



Note orientation of rear inserts. Ensure **BOTH** inserts have the same position, and that they match the positions of the front inserts (see step 2.2)

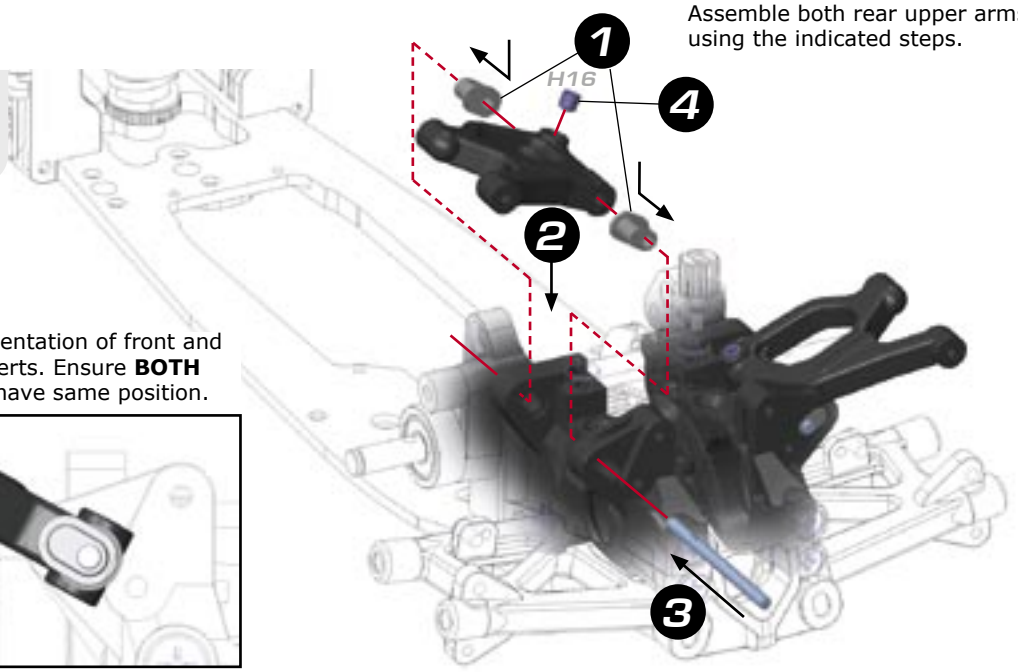
A Set rear downstops

B Learn about rear roll center adjustment

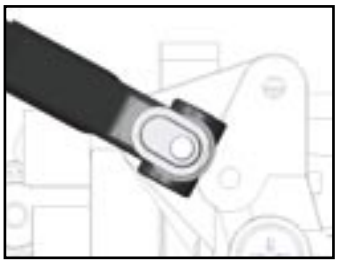
STEP 2.5

H16
M4x4mm

Assemble both rear upper arms using the indicated steps.



Note orientation of front and rear inserts. Ensure **BOTH** inserts have same position.



Learn about rear camber rise adjustment

STEP 2.6

BAG 15, 16, U1

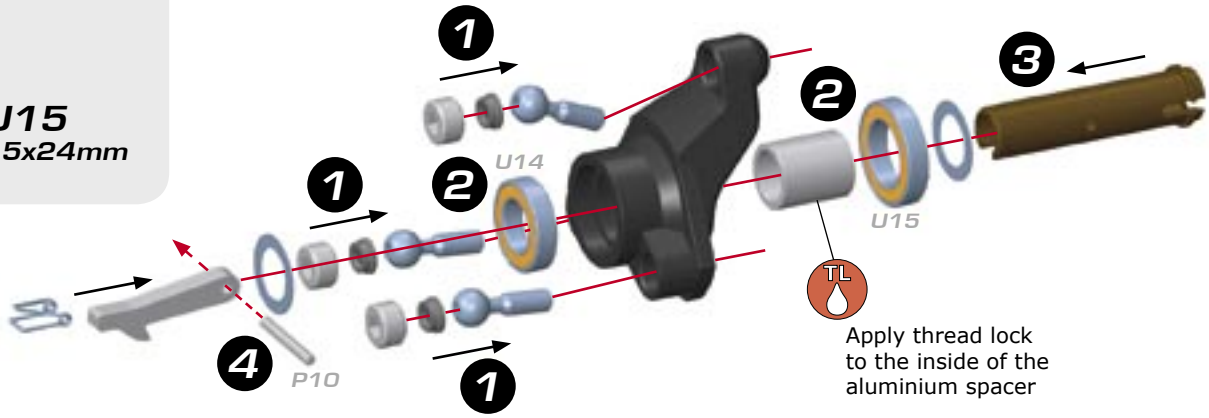
P10
2.5x22mm

U14
12x21mm

U15
15x24mm

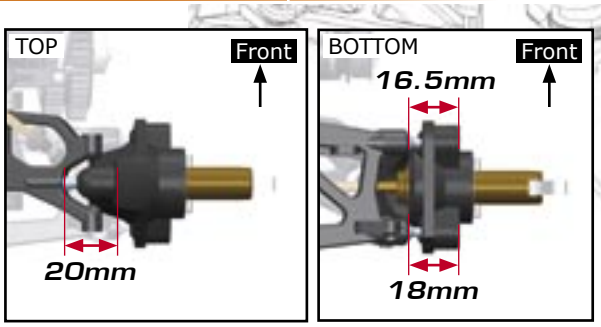
Assemble both rear hubs using the indicated steps.

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

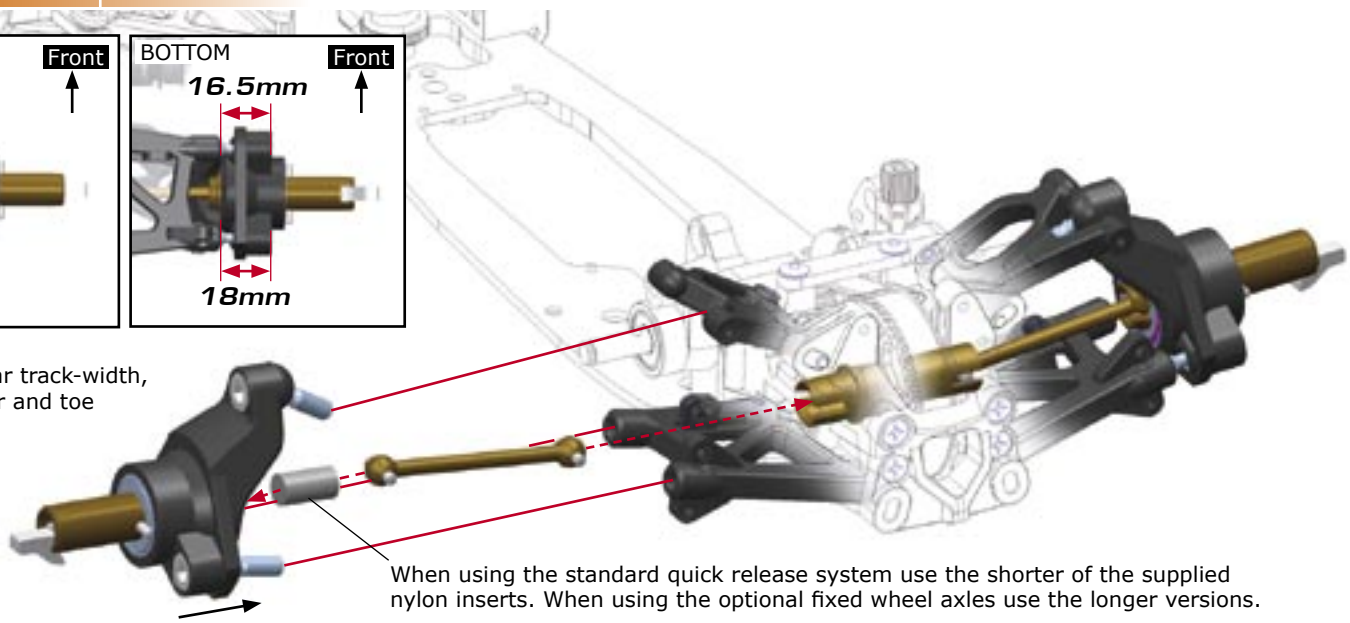


Apply thread lock to the inside of the aluminium spacer

STEP 2.7



Set rear track-width, camber and toe



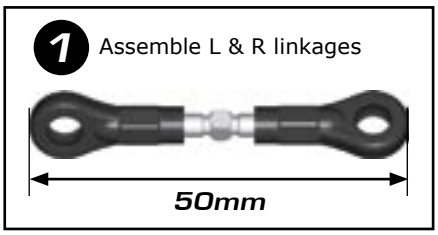
When using the standard quick release system use the shorter of the supplied nylon inserts. When using the optional fixed wheel axles use the longer versions.

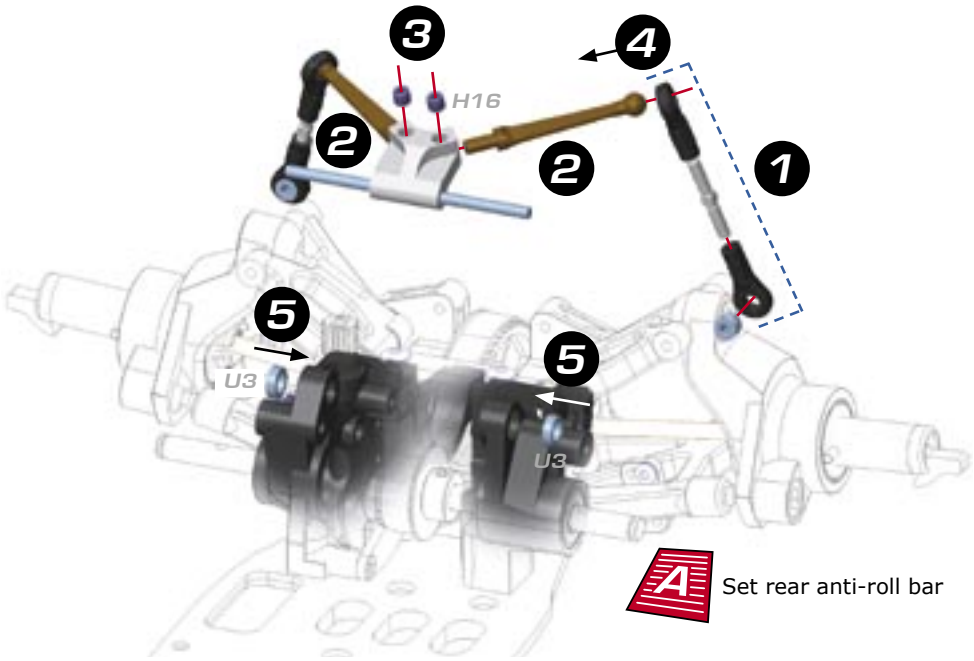
STEP 2.8

BAG 17

H16
M4x4mm

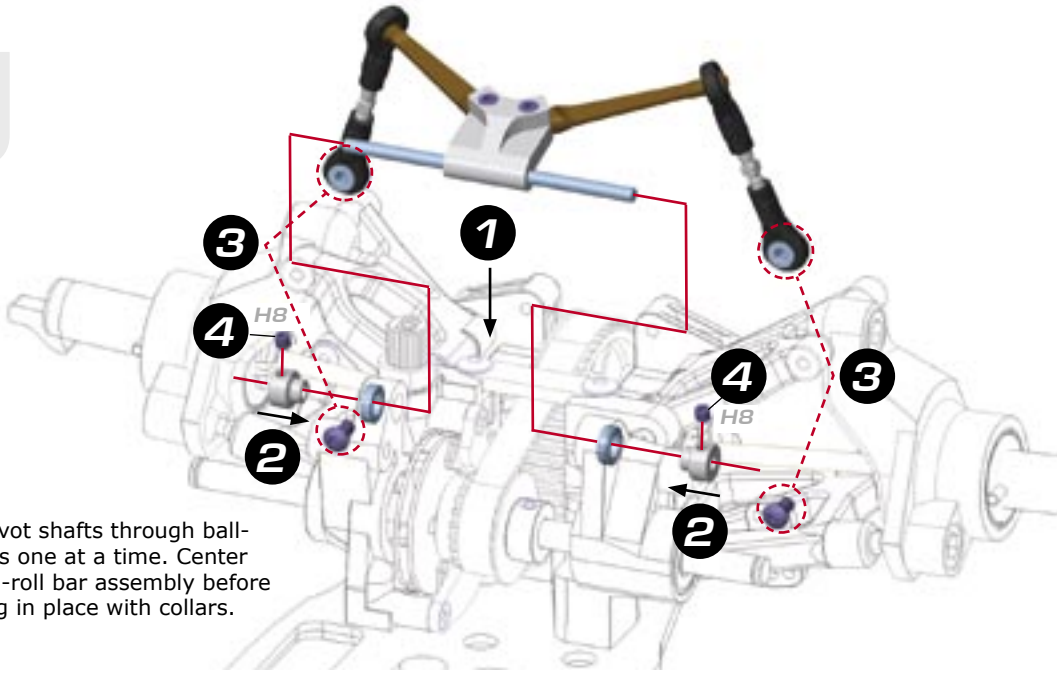
U3
5x8mm





STEP 2.9

H8
M3x3mm

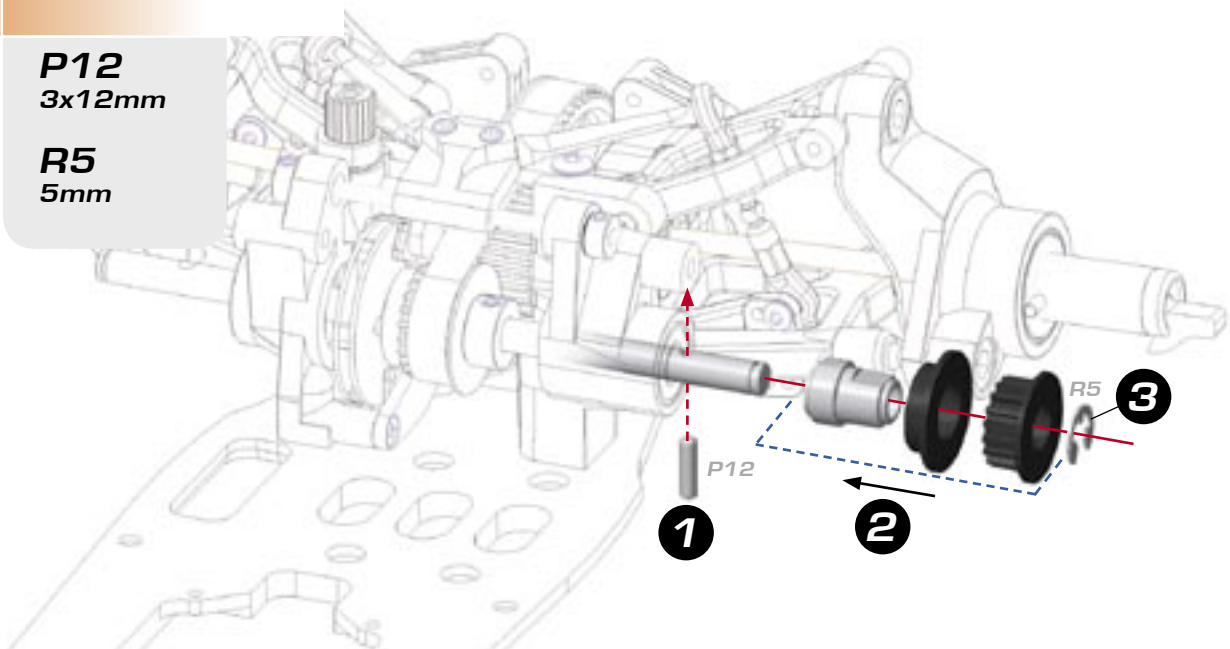


1 Slide pivot shafts through ball-bearings one at a time. Center the anti-roll bar assembly before securing in place with collars.

STEP 2.10

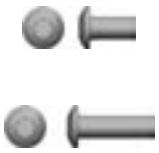
P12
3x12mm

R5
5mm



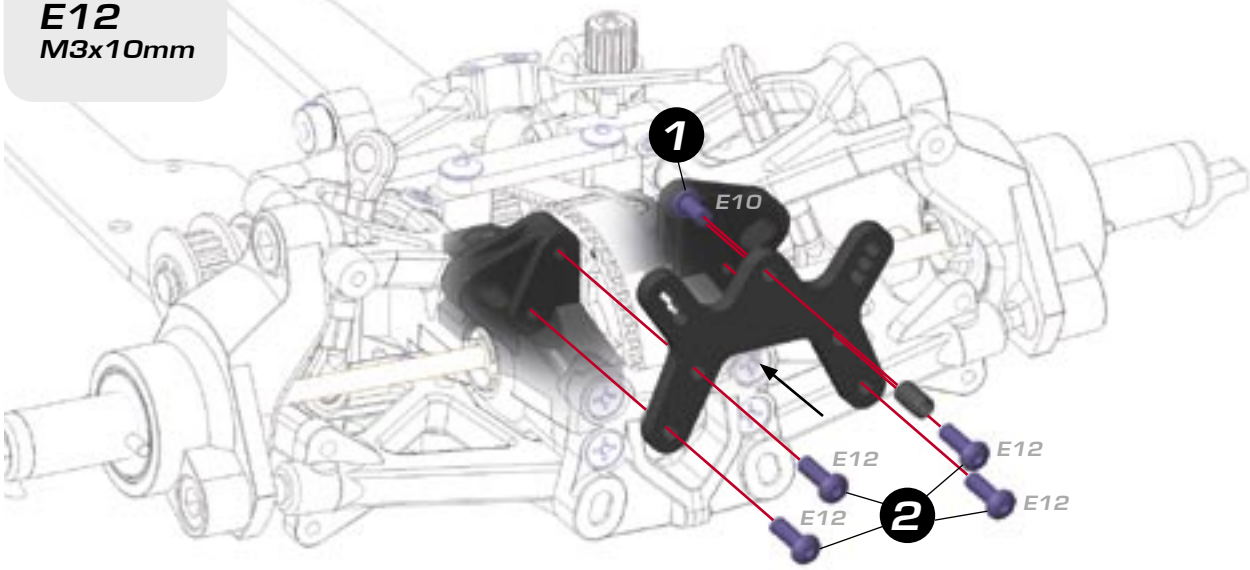
STEP 2.11

BAG 18, E10



E10
M3x6mm

E12
M3x10mm



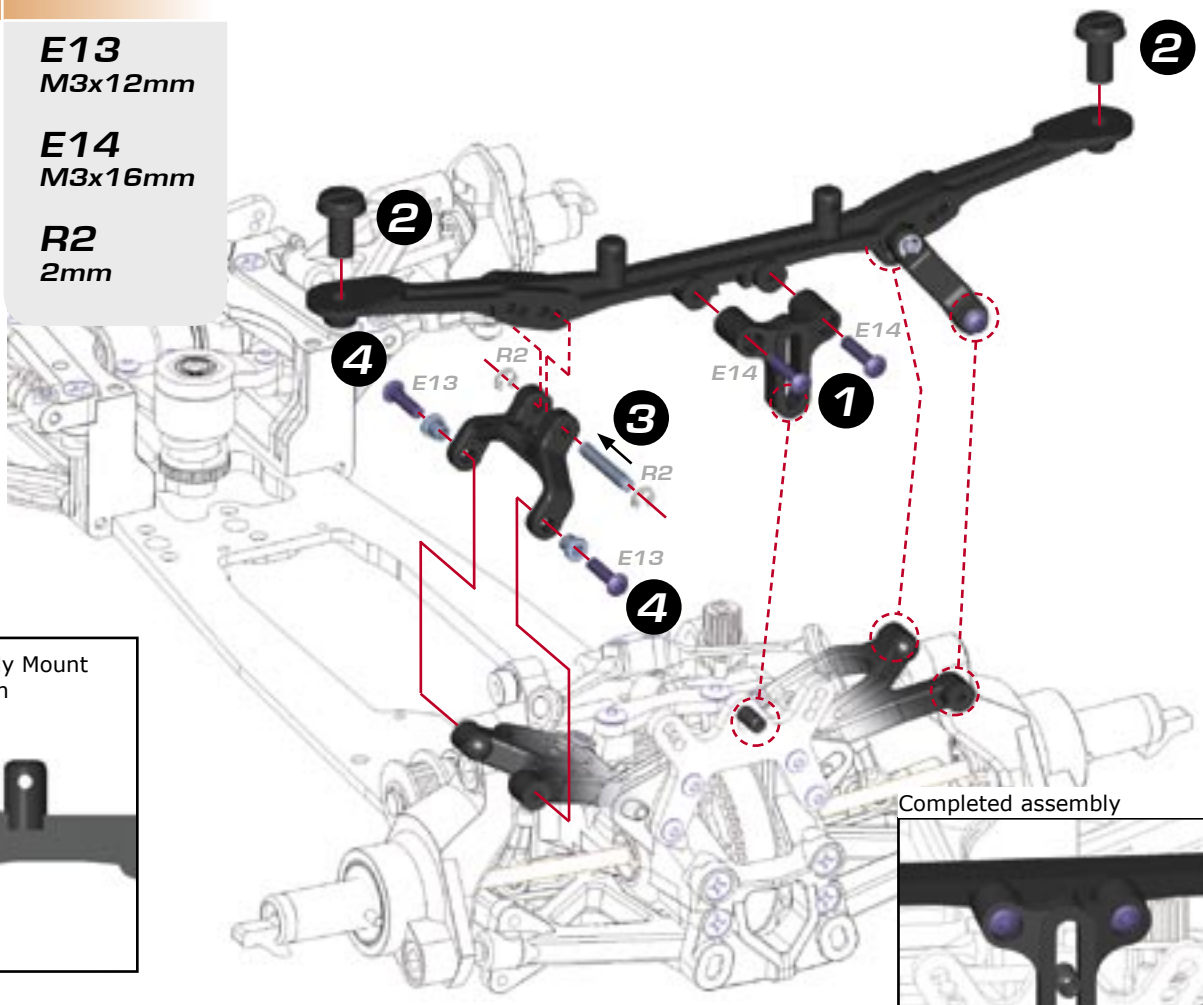
STEP 2.12

BAG 19

E13
M3x12mm

E14
M3x16mm

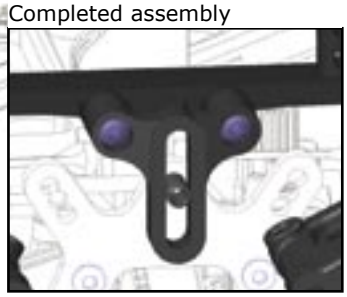
R2
2mm



3 Default Rear Body Mount Mounting Position

Learn about rear bodymount adjustment

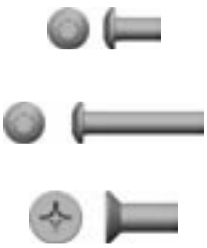
Completed assembly



3.0 RADIO PLATE ASSEMBLY

STEP 3.1

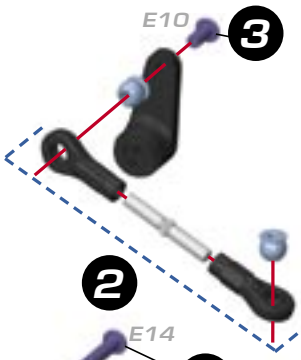
BAG 20, G19



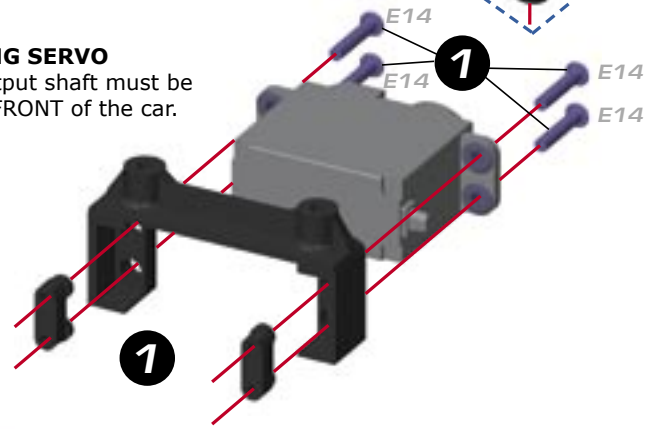
E10
M3x6mm

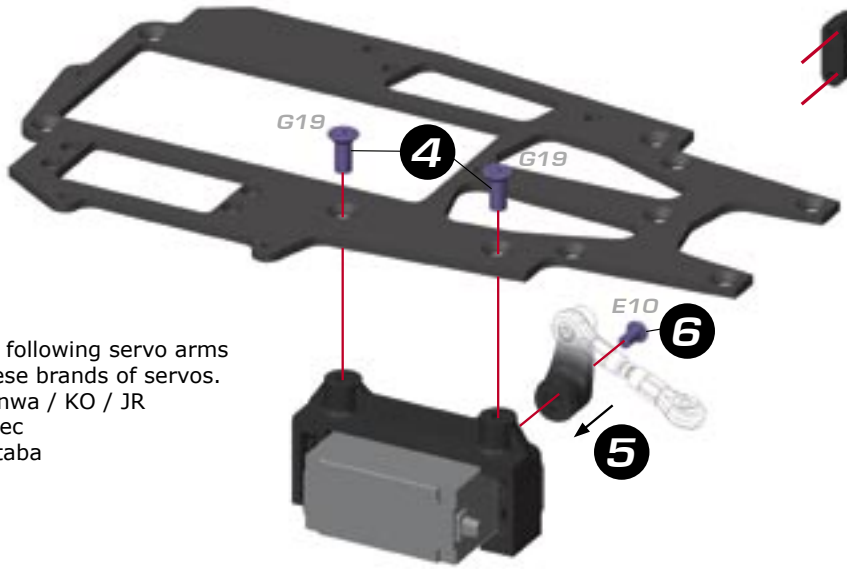
E14
M3x16mm

G19
M4x10mm



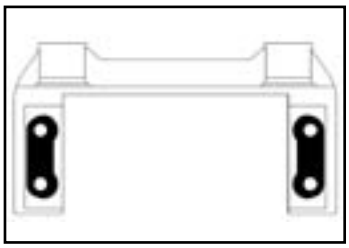
STEERING SERVO
Servo output shaft must be towards FRONT of the car.





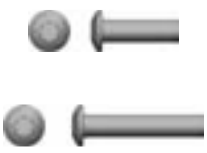
Use the following servo arms with these brands of servos.
23 - Sanwa / KO / JR
24 - Hitec
25 - Futaba

Note the orientation of the servo mounting screw blocks. Reverse the default orientation to mount a smaller servo.



STEP 3.2

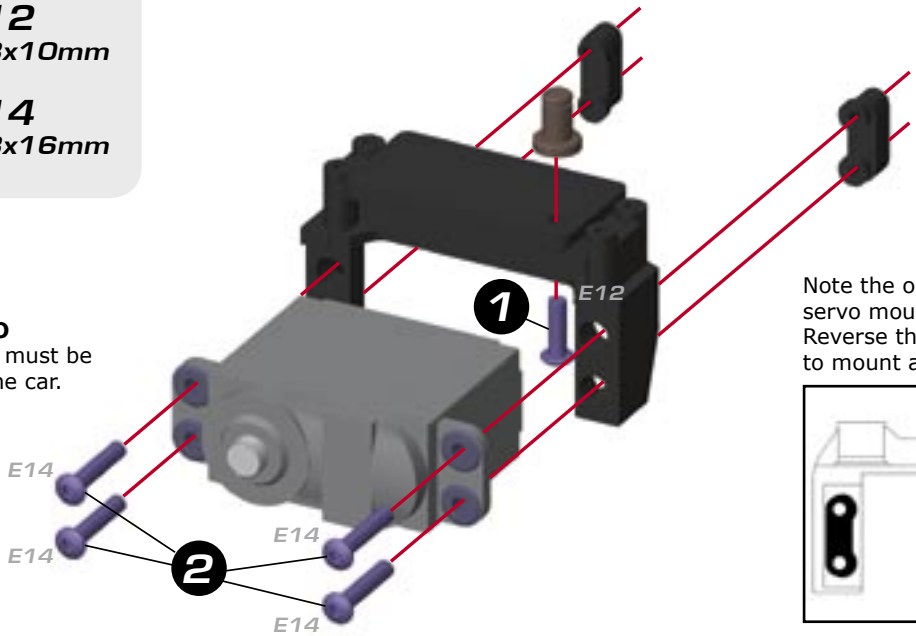
BAG 21



E12
M3x10mm

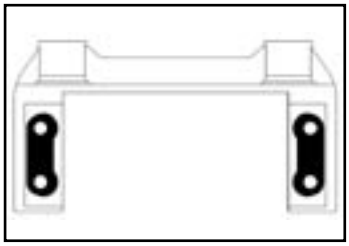
E14
M3x16mm

OPTION 1: Laydown Throttle Servo



THROTTLE SERVO
Servo output shaft must be towards REAR of the car.

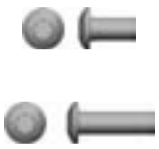
Note the orientation of the servo mounting screw blocks. Reverse the default orientation to mount a smaller servo.



STEP 3.3

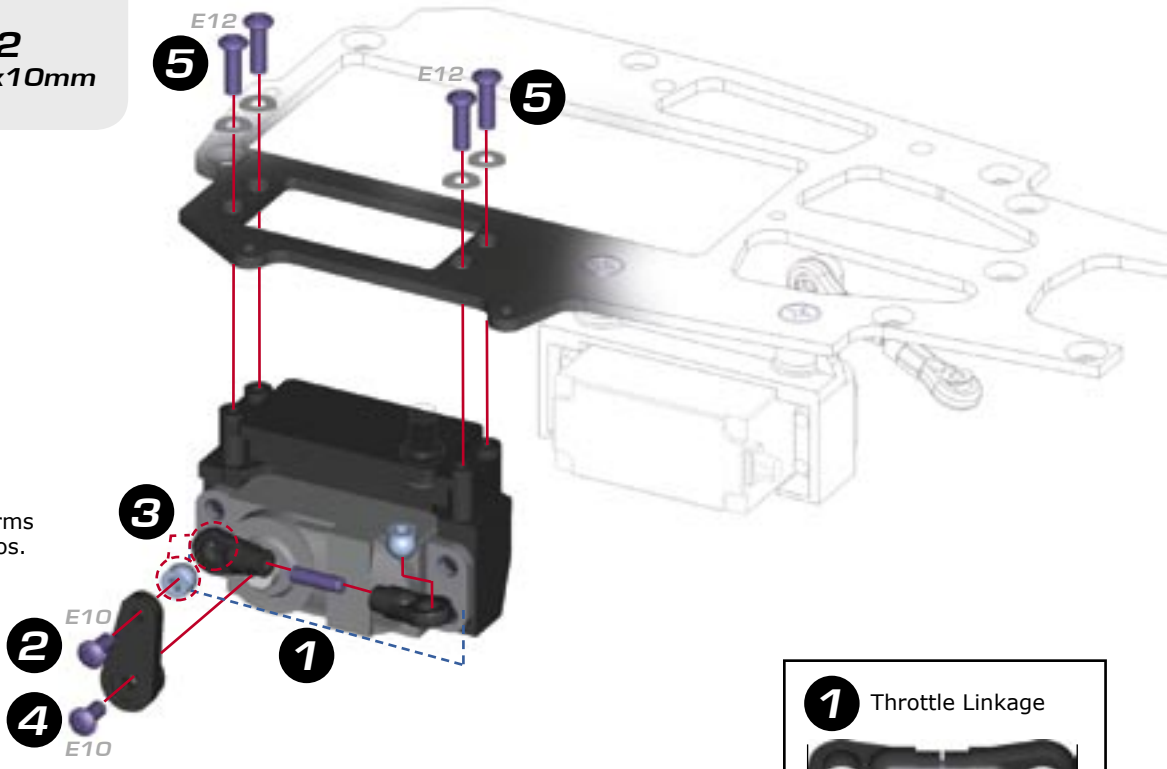
OPTION 1: Laydown Throttle Servo

BAG 22



E10
M3x6mm

E12
M3x10mm

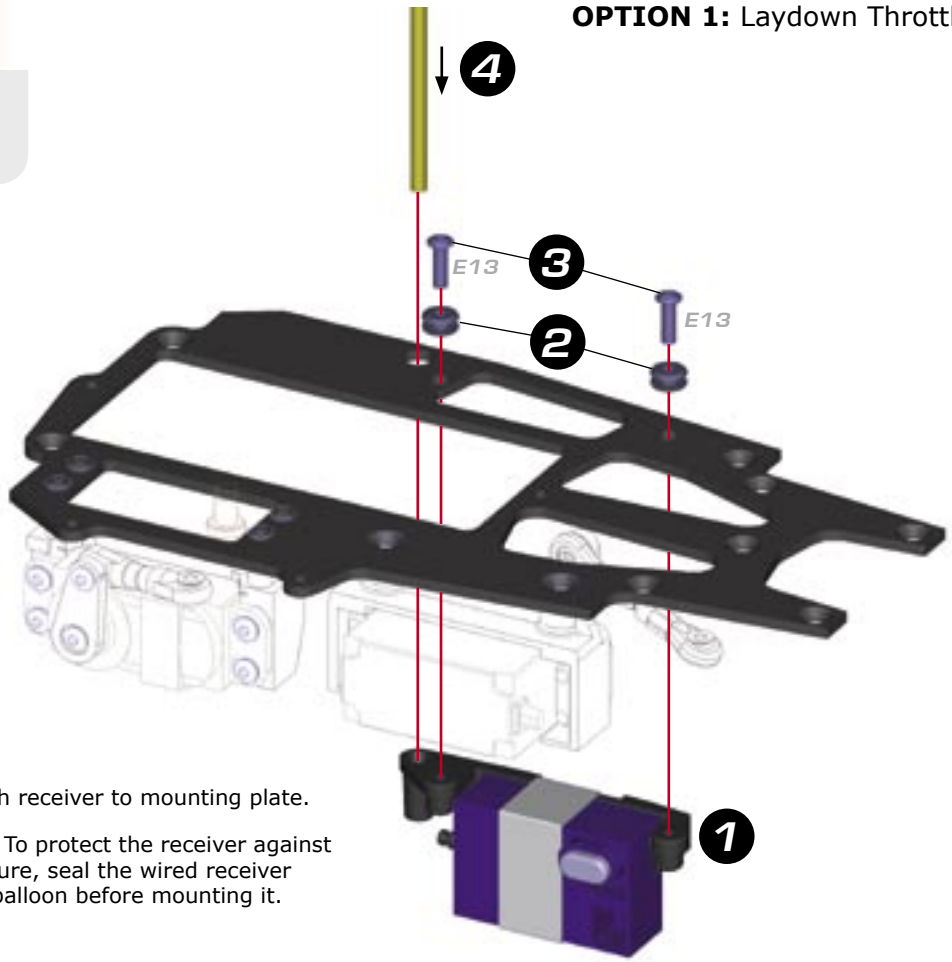


Use the following servo arms with these brands of servos.
23 - Sanwa / KO / JR
24 - Hitec
25 - Futaba

STEP 3.4

OPTION 1: Laydown Throttle Servo

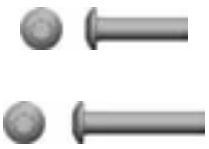
E13
M3x12mm



Securely attach receiver to mounting plate.

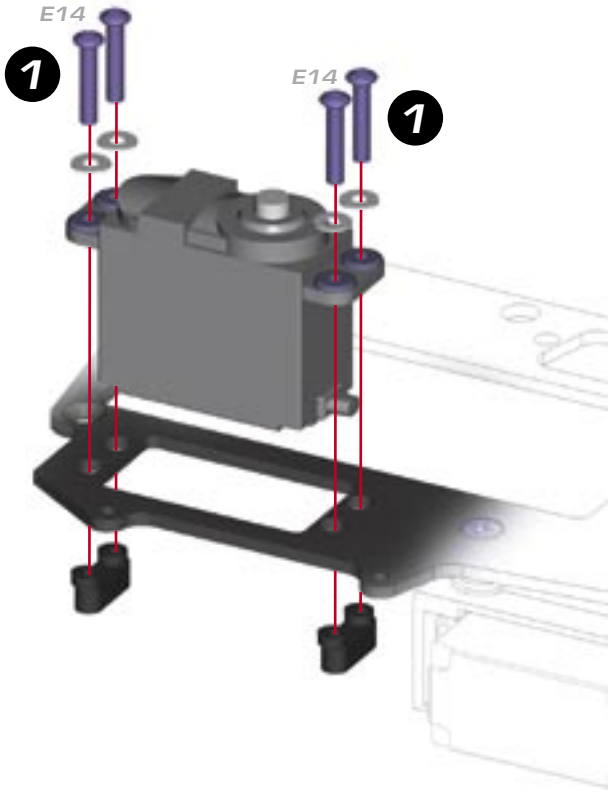
RACING TIP: To protect the receiver against fuel and moisture, seal the wired receiver into a rubber balloon before mounting it.

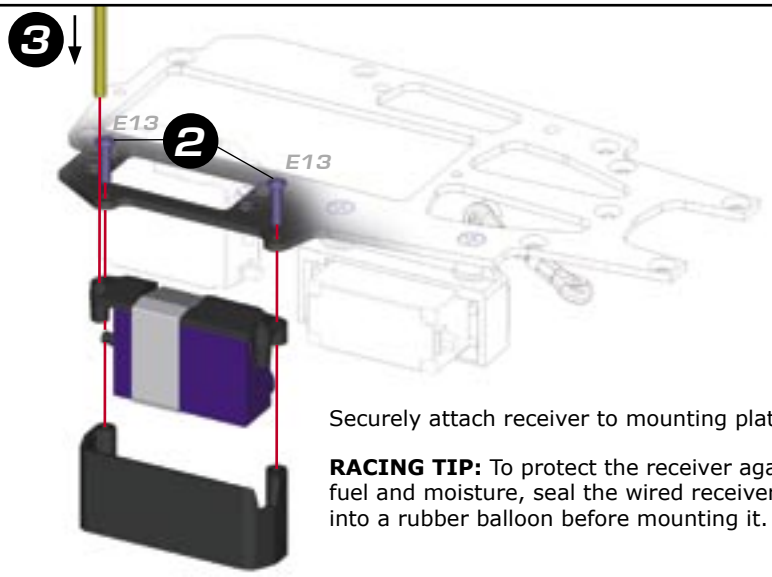
STEP 3.5



E13
M3x12mm

E14
M3x16mm



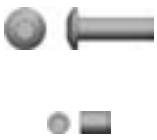


Securely attach receiver to mounting plate.

RACING TIP: To protect the receiver against fuel and moisture, seal the wired receiver into a rubber balloon before mounting it.

STEP 3.6

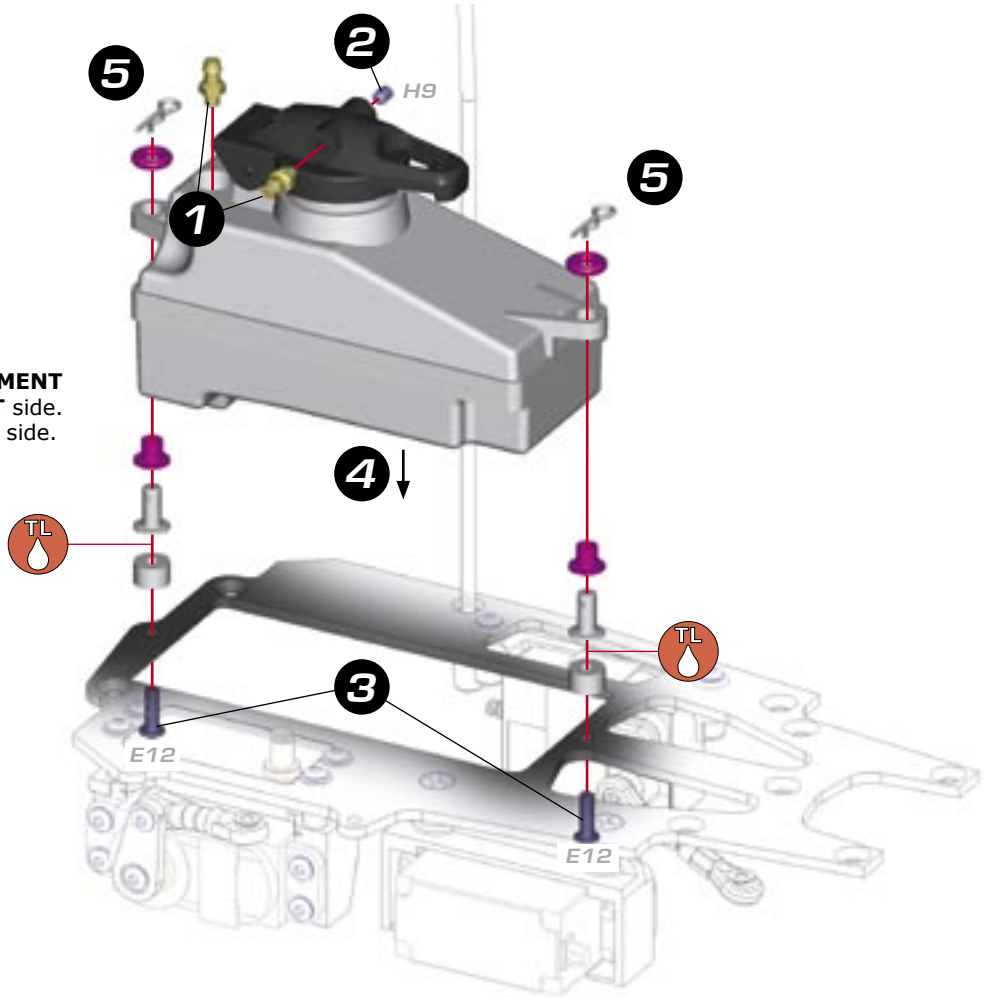
BAG 23



E12
M3x10mm

H9
3x4mm

FUEL CAP FITTING PLACEMENT
CW tracks: Fitting on **RIGHT** side.
CCW tracks: Fitting on **LEFT** side.



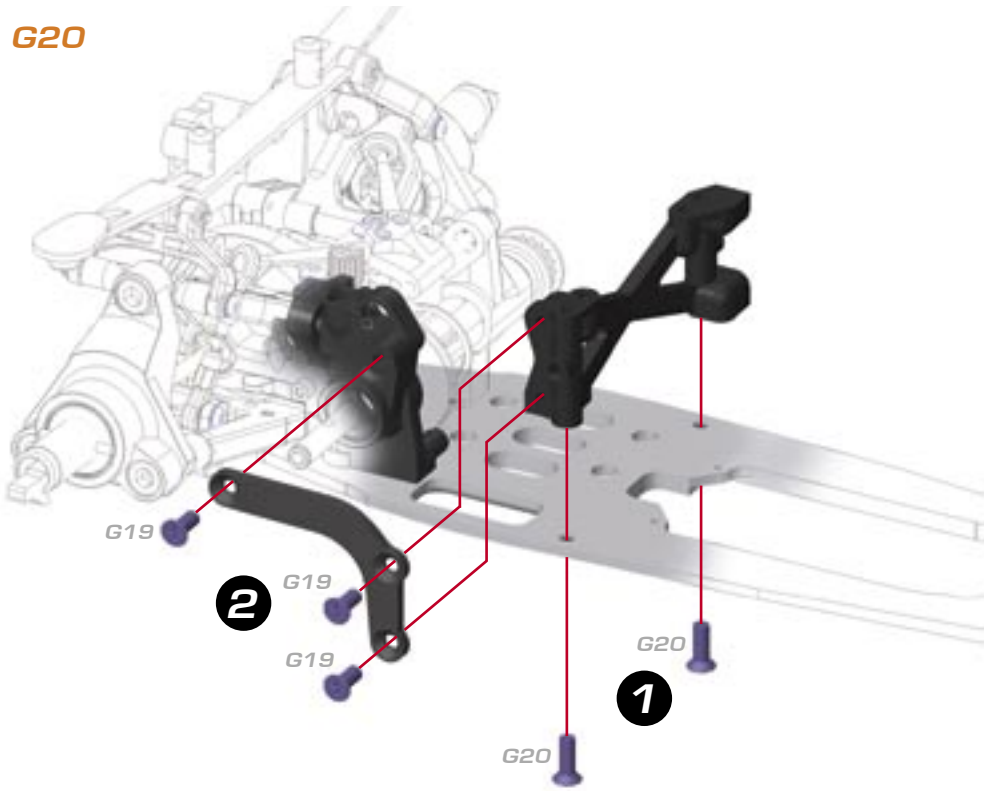
4.0 RADIO PLATE MOUNTING

STEP 4.1

BAG 24, G19, G20

G19
M4x10mm

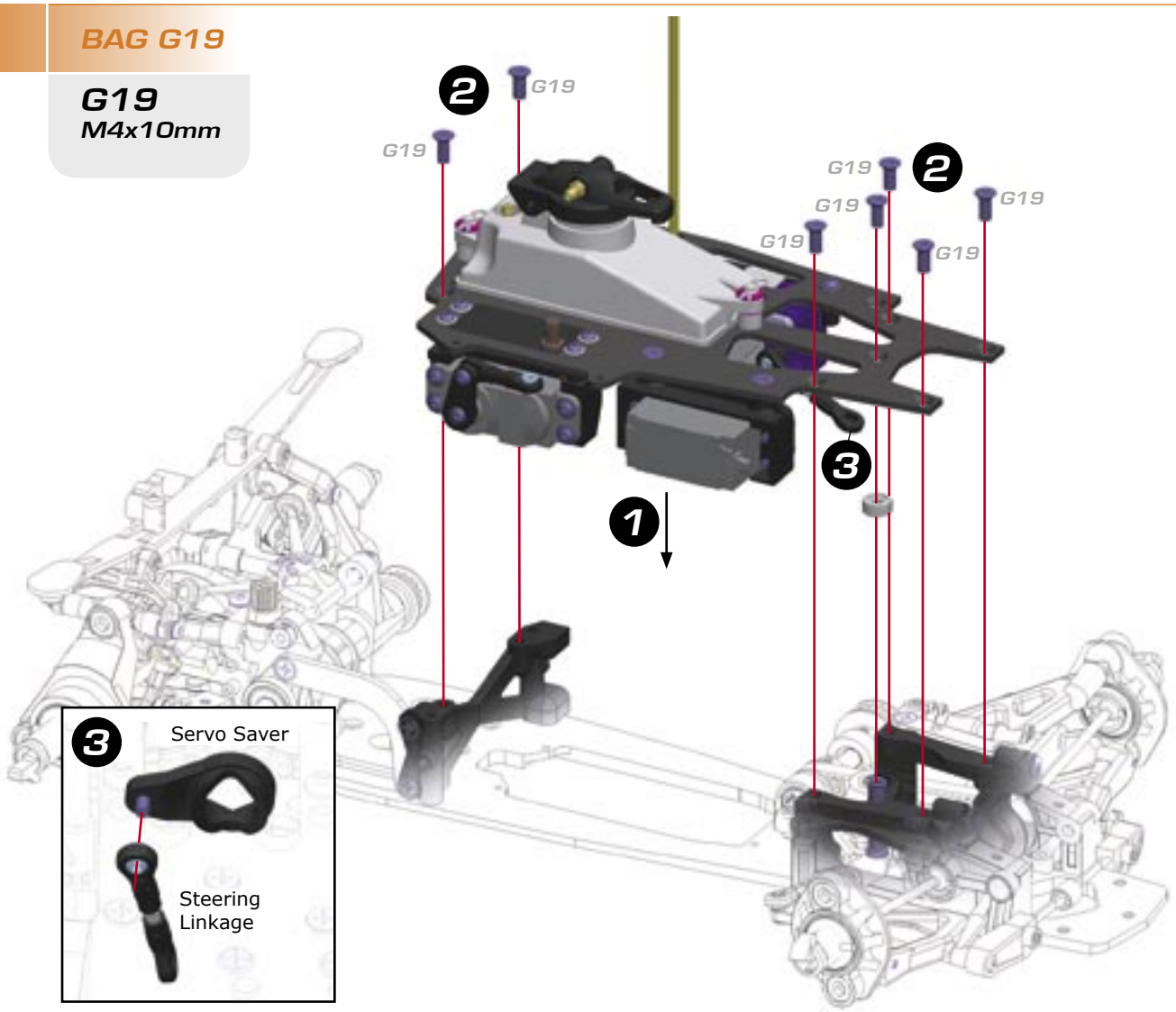
G20
M4x12mm



STEP 4.2

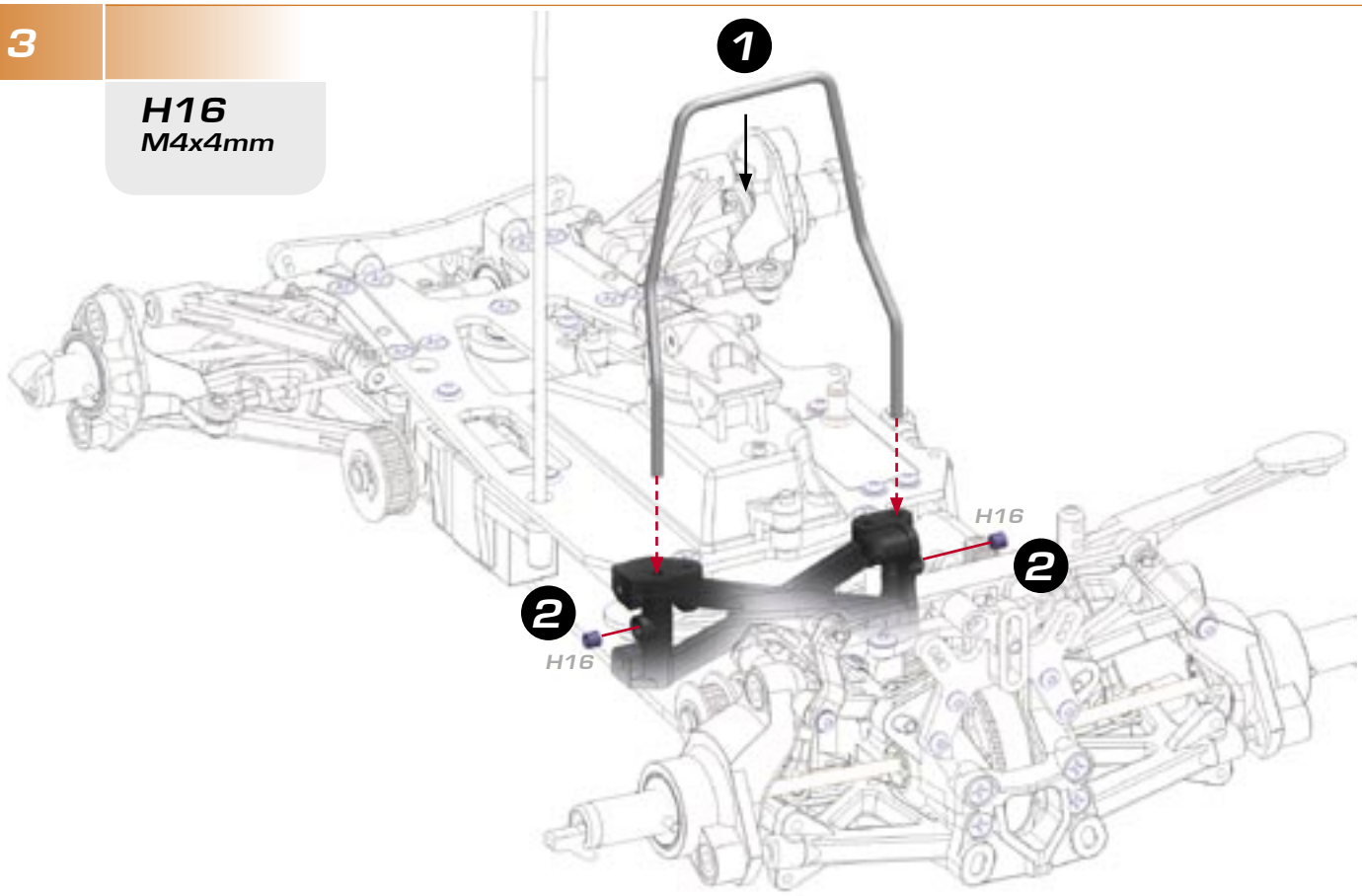
BAG G19

G19
M4x10mm



STEP 4.3

H16
M4x4mm



STEP 4.4

BAG D

1

Unscrew the bottom half of the pre-assembled shock absorbers.

2

FILLING
Fill the shock body with the supplied shock absorber oil.

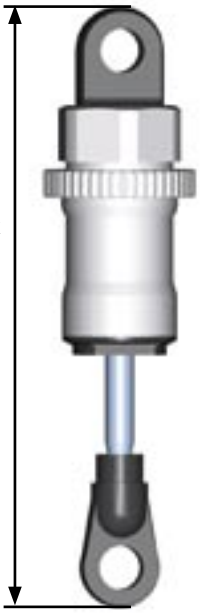
BLEEDING
Let the oil settle and allow the air to escape. Slowly move the piston up and down to release any trapped air bubbles. Repeat as necessary until no bubbles appear.

STEP 4.5

With the shock body filled with oil, slowly screw the bottom half of the pre-assembled shock back onto the shock body.

IMPORTANT! Do not cross thread!

Oil will overflow through the built-in bleed channel in the threads.



Front shock
68mm

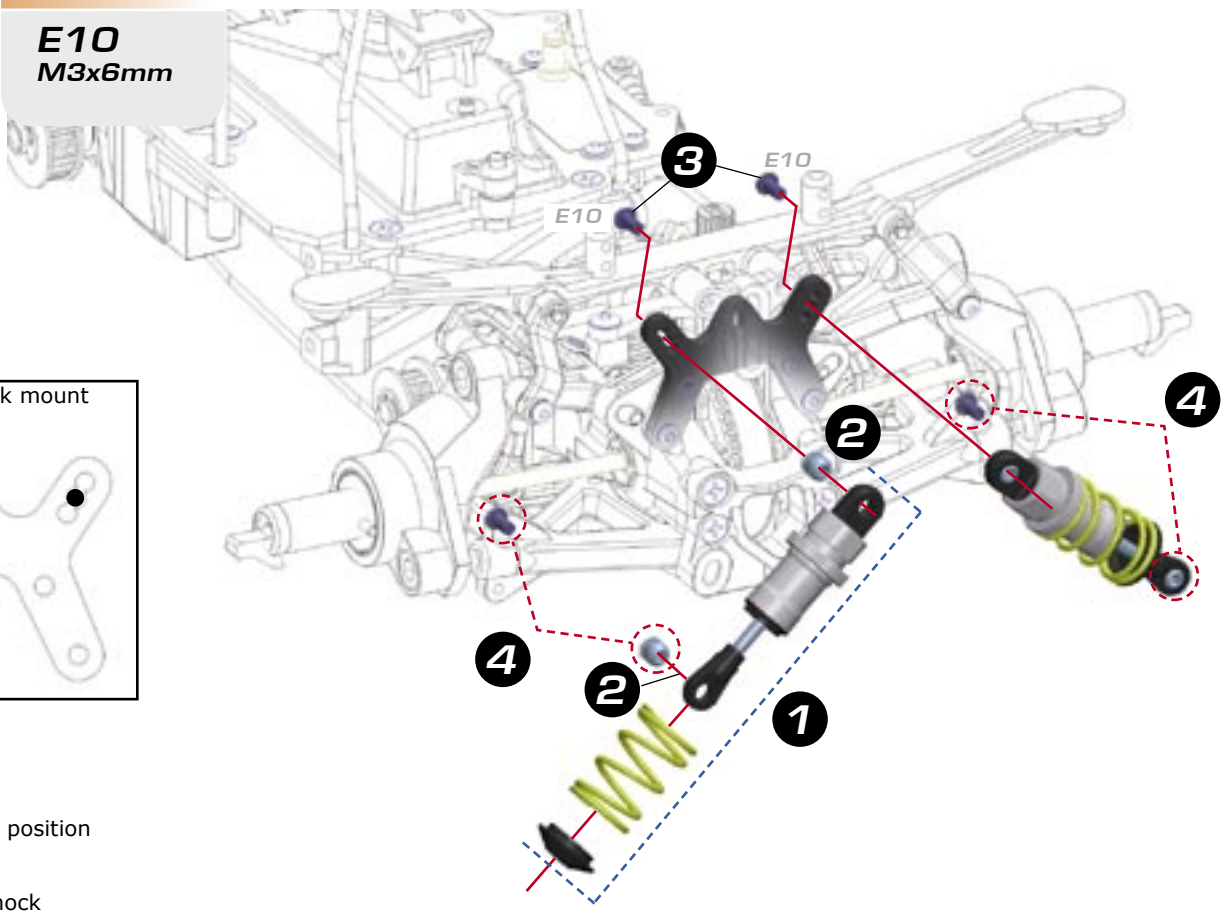
Rear shock
73mm

Learn about shock damping

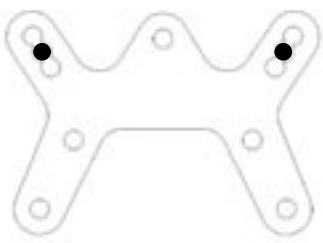
STEP 4.6

BAG 25, E10

E10
M3x6mm



Note the upper shock mount holes used.

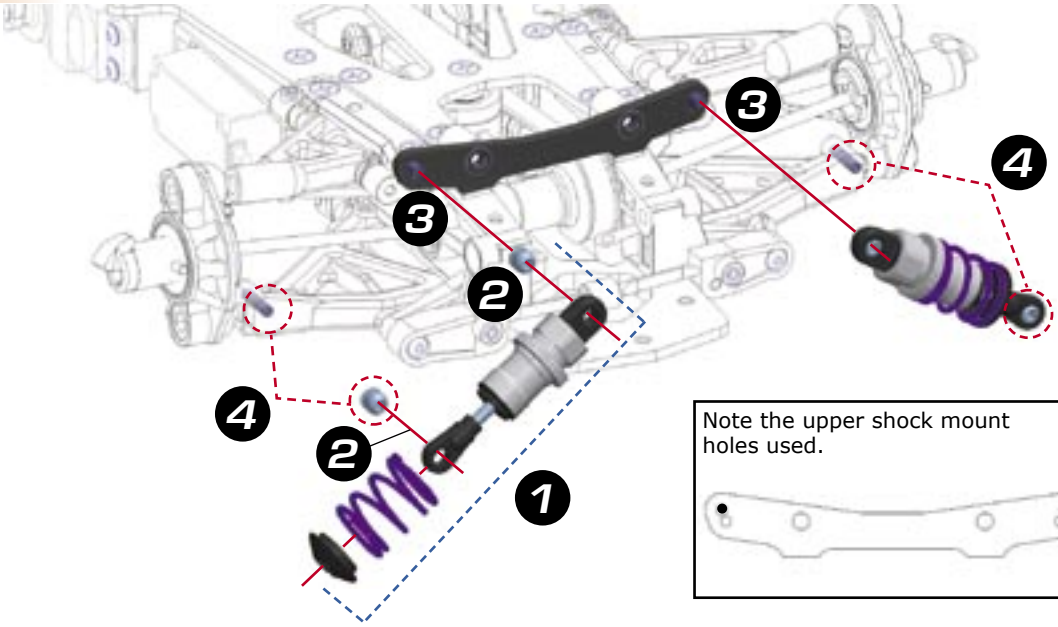


Set rear shock position

Learn about shock adjustment (damping, springs, preload)

STEP 4.7

BAG E10



A Set front shock position

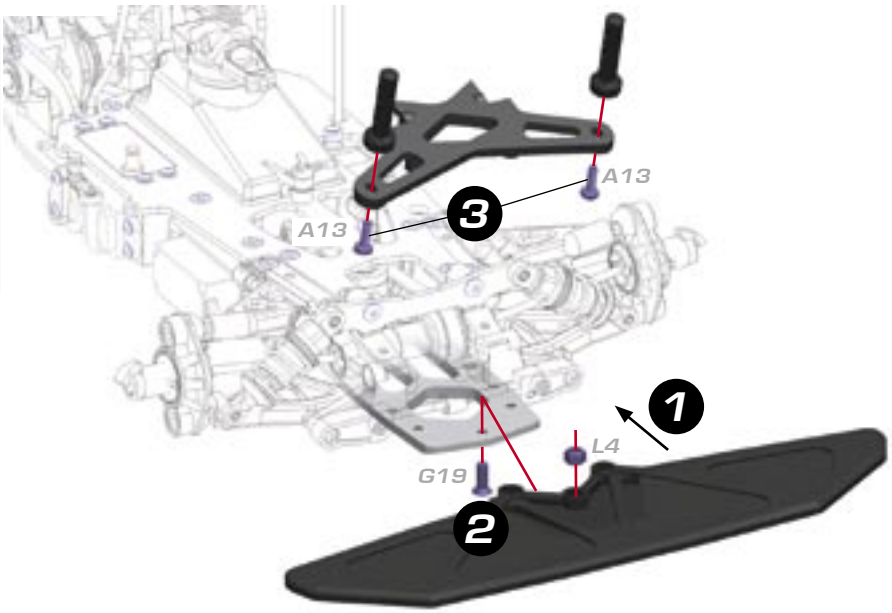
B Learn about shock adjustment (damping, springs, preload)

Note the upper shock mount holes used.

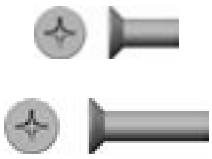
A13
M3x13mm

G19
M4x10mm

L4
M4

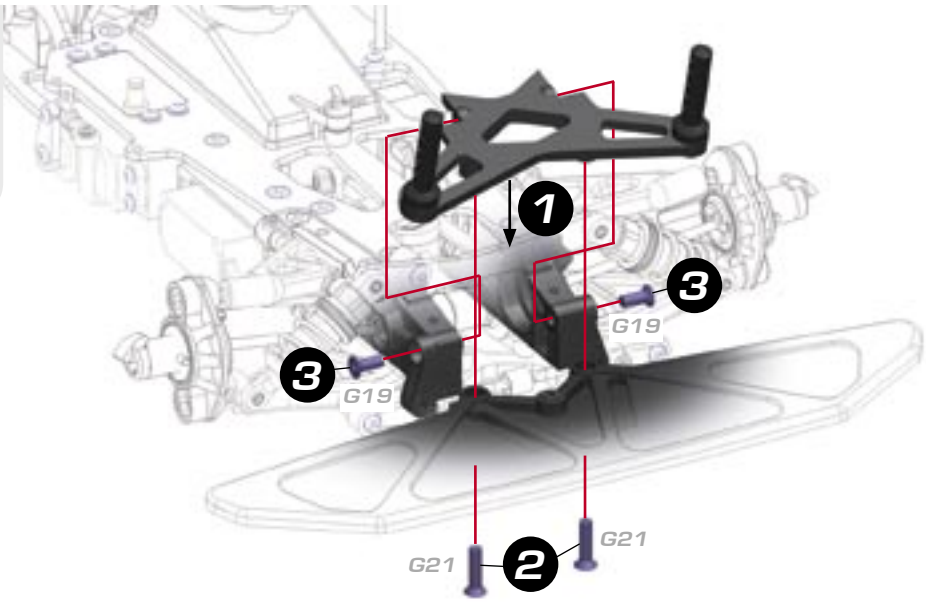


STEP 4.9



G19
M4x10mm

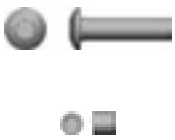
G21
M4x16mm



5.0 GEARBOX ASSEMBLY

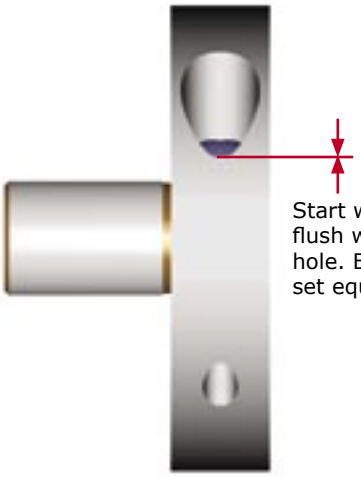
STEP 5.1

BAG 26



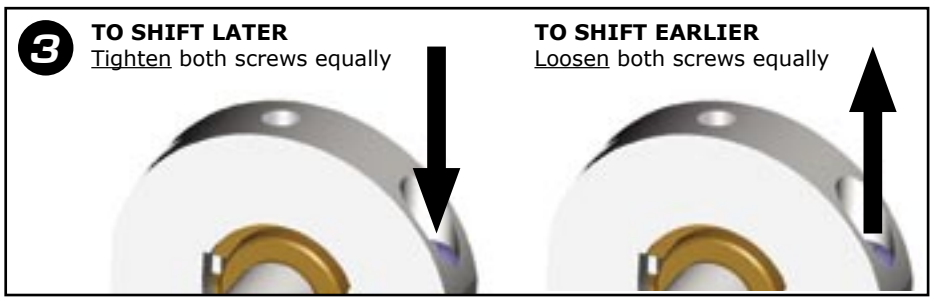
E13
M3x12mm

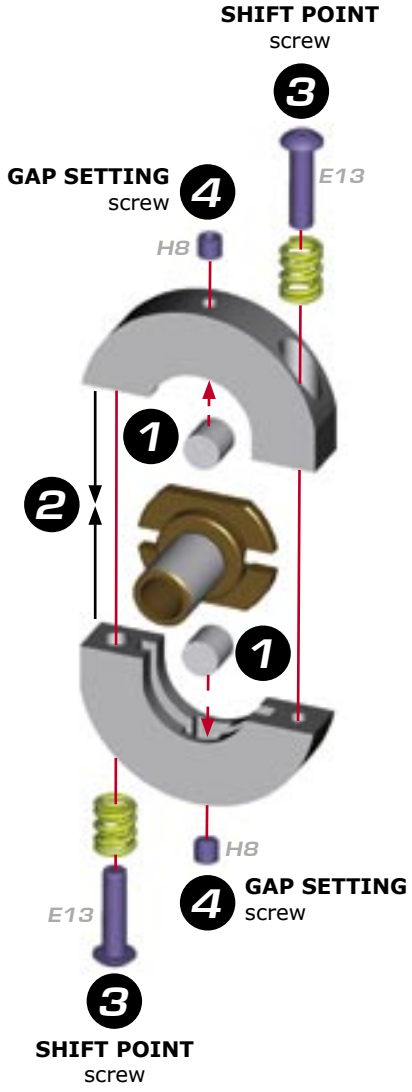
H8
M3x3mm



Start with screw head flush with bottom edge of hole. Both screws must be set equally.

Learn about shift point and shoe gap

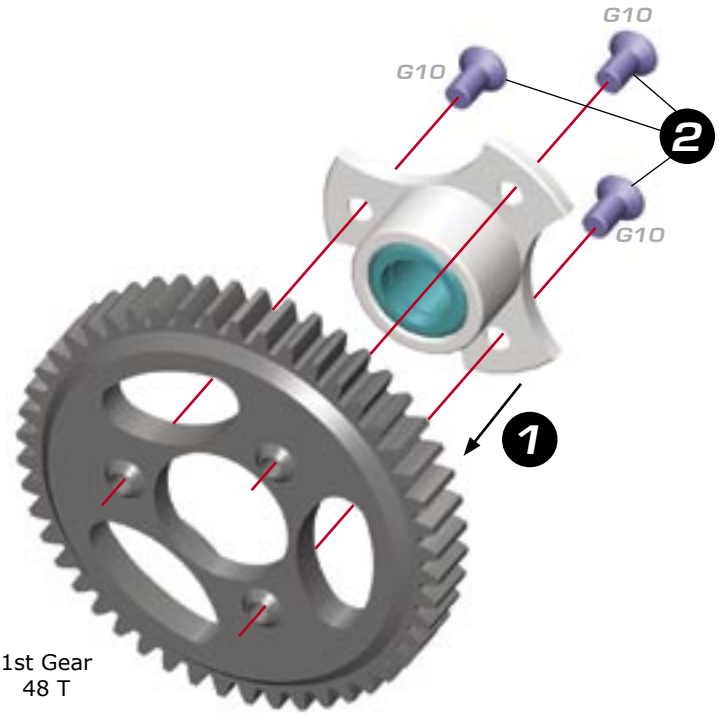




STEP 5.2

BAG 27

G10
M3x6mm



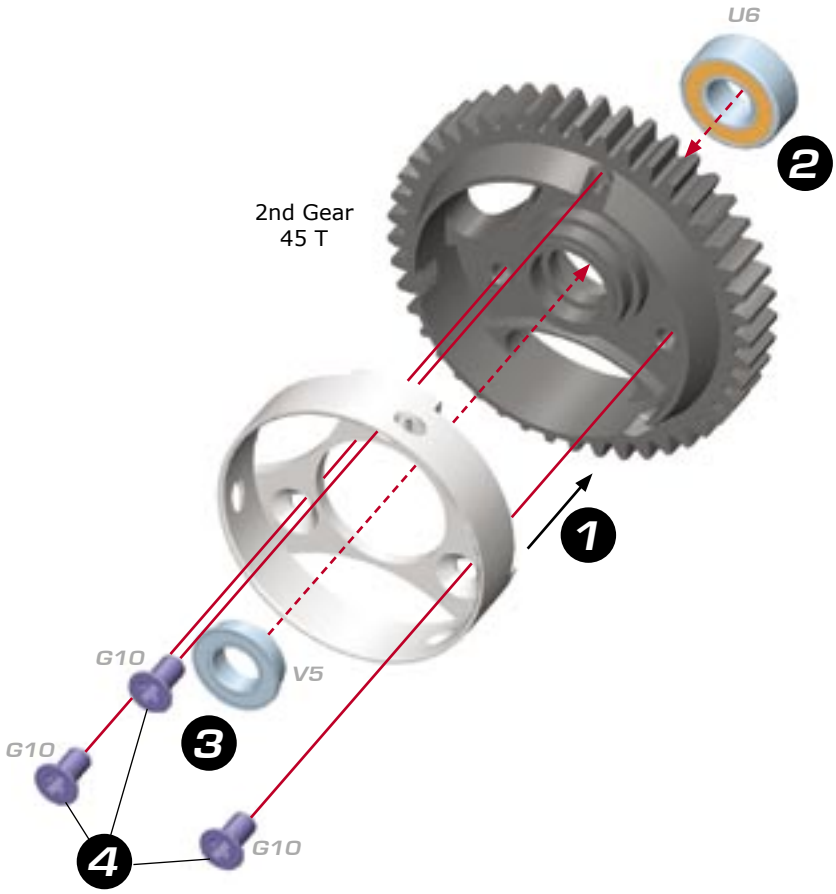
1st Gear
48 T

STEP 5.3

G10
M3x6mm

U6
6x13mm

V5
6x10mm

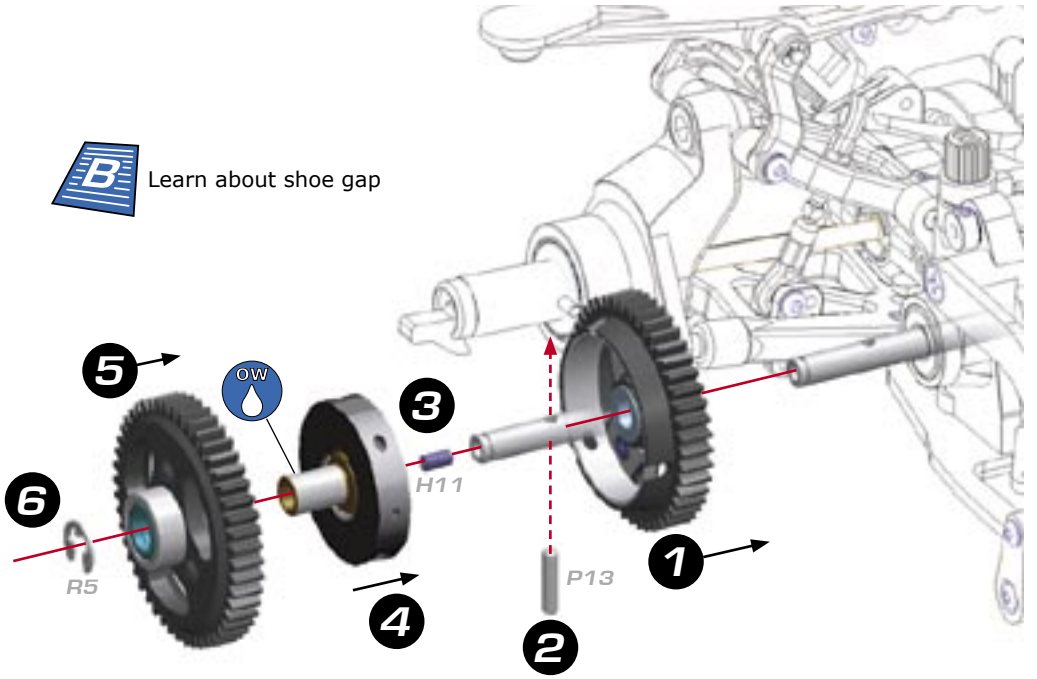


STEP 5.4

H11
M3x8mm

P13
3x14mm

R5
5mm



ADJUSTING THE 2-SPEED SHOE GAP
Loosed the two gap-setting set screws to allow the shoes to rest on the drive adaptor.

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

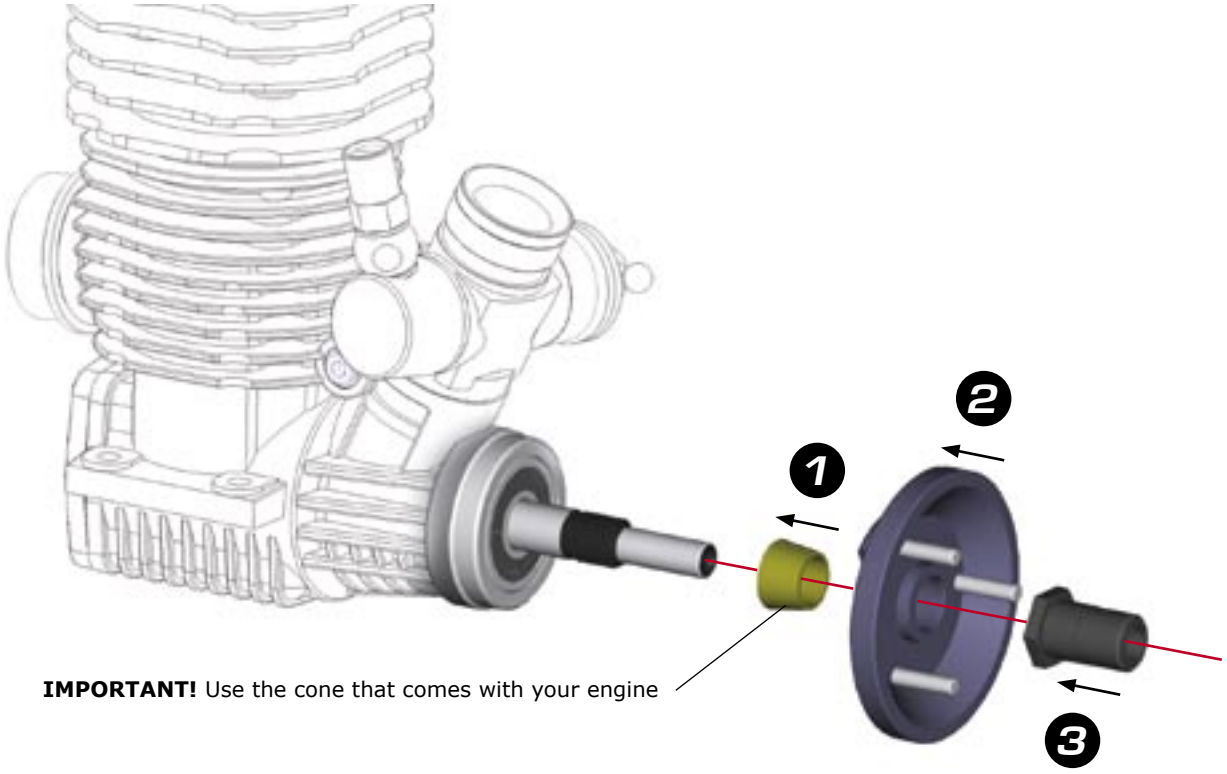
There should be equal but minimal spacing between the 2-speed shoes and the 2nd gear drum. Tighten BOTH gap setting set screws until the shoes touch the inside surface of the aluminum 2nd gear drum, then loosen BOTH set screws by 1/2 turn each. The 2nd gear should spin freely.

Install the first gear.

6.0 CENTAX ASSEMBLY

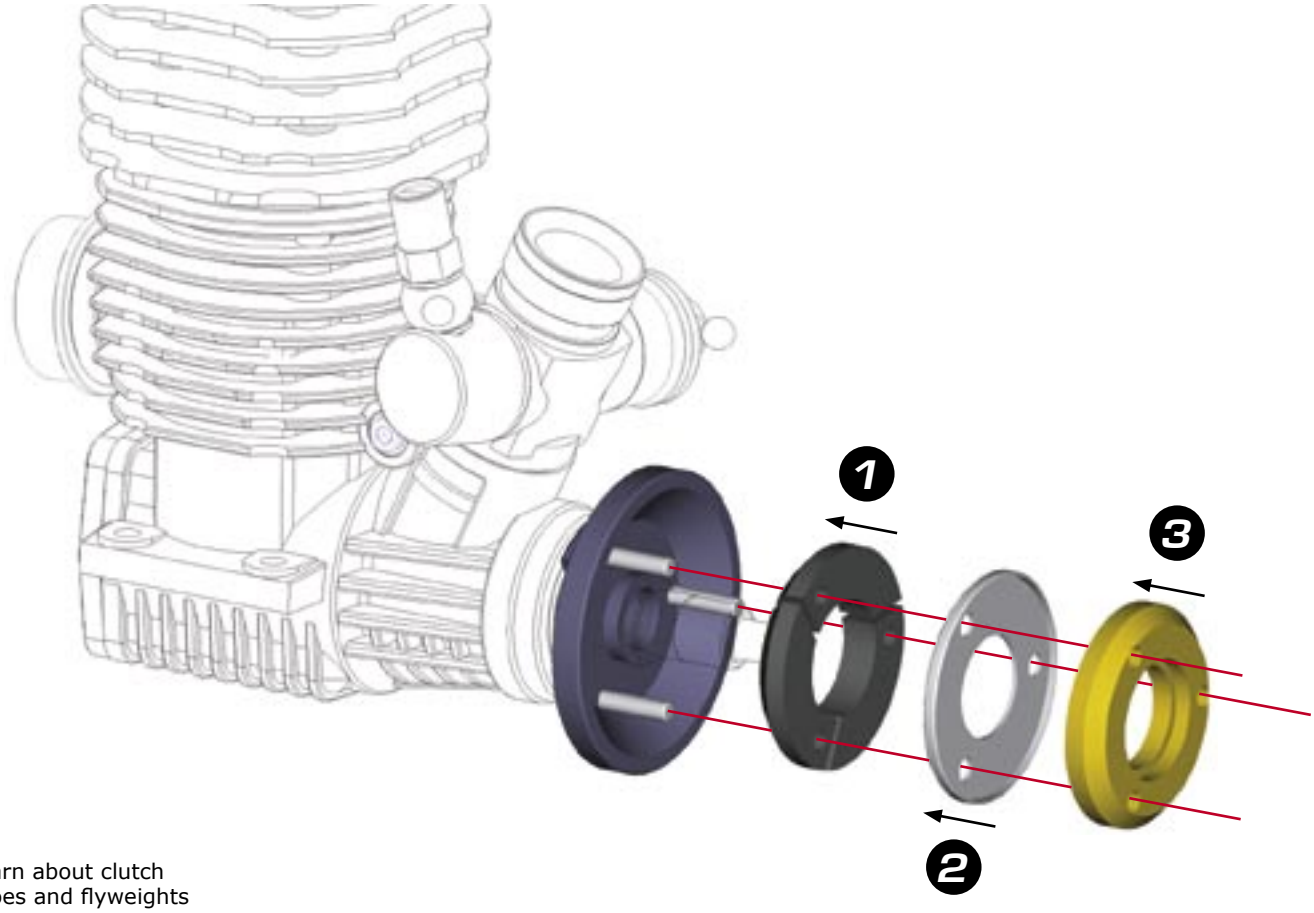
STEP 6.1

BAG 28



IMPORTANT! Use the cone that comes with your engine

STEP 6.2

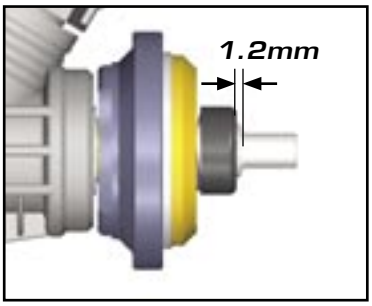


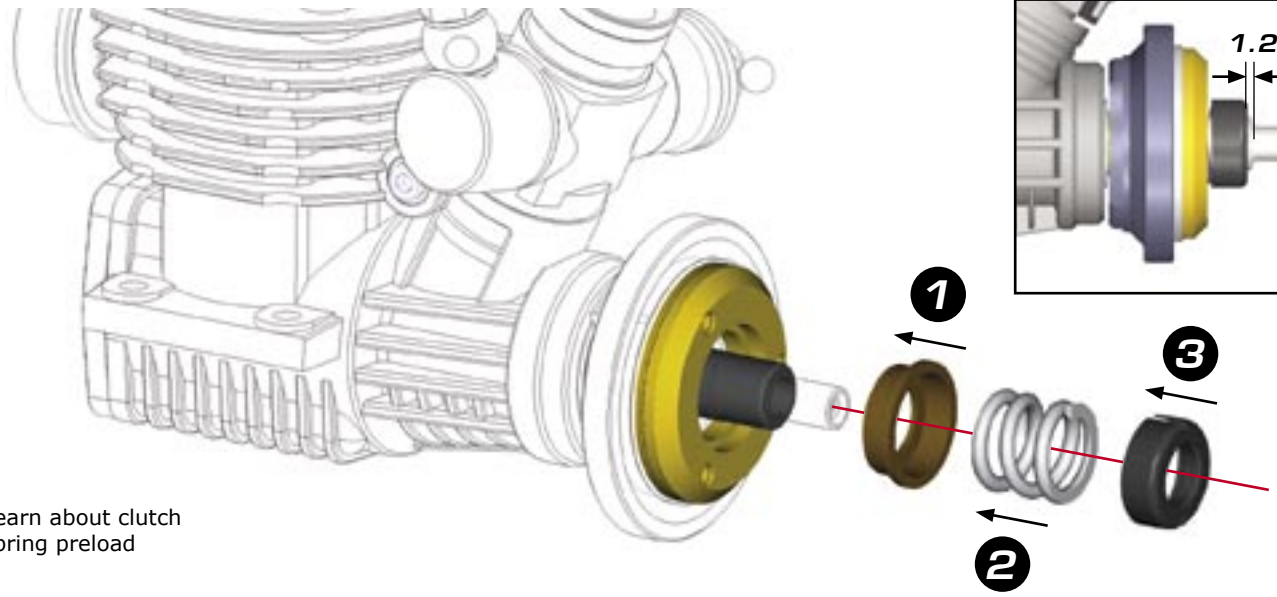
Learn about clutch shoes and flyweights

STEP 6.3

BAG 29

Initial clutch spring tension

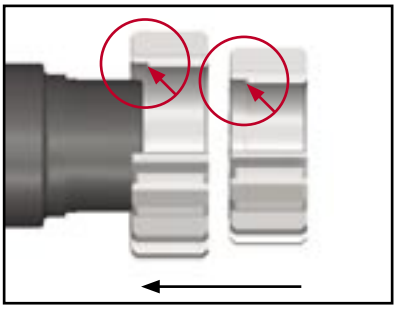


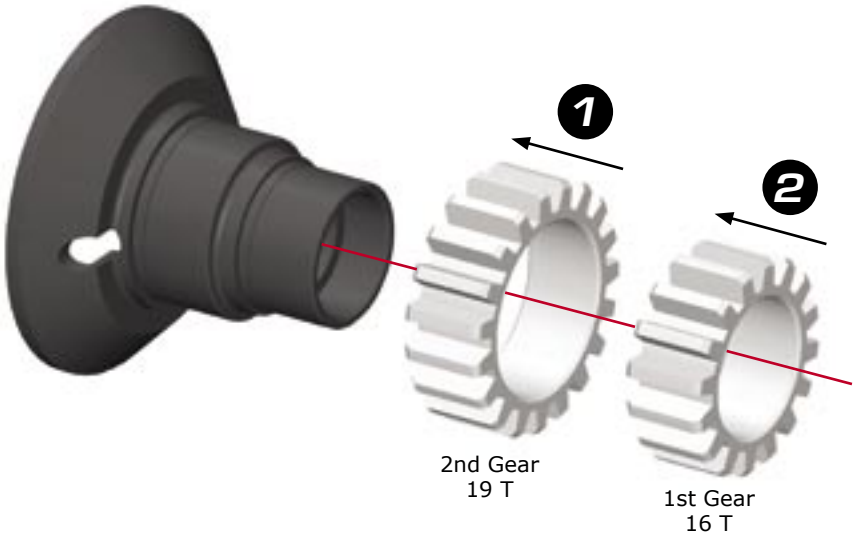


Learn about clutch spring preload

STEP 6.4

Note inside shoulders



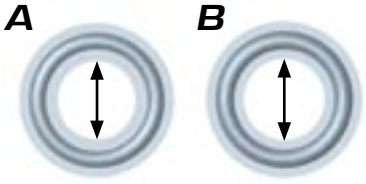


2nd Gear
19 T

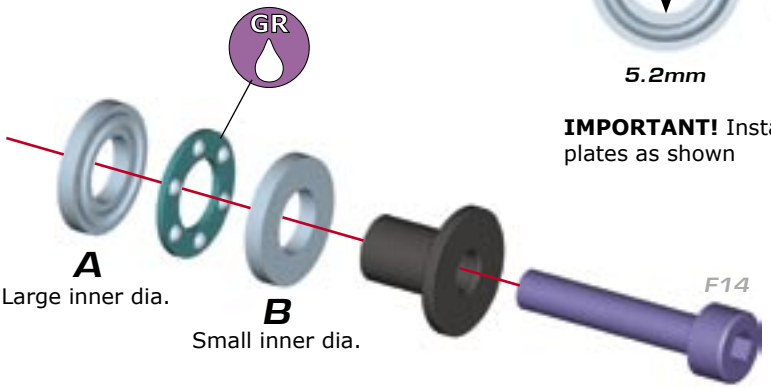
1st Gear
16 T

STEP 6.5

F14
M3x16mm

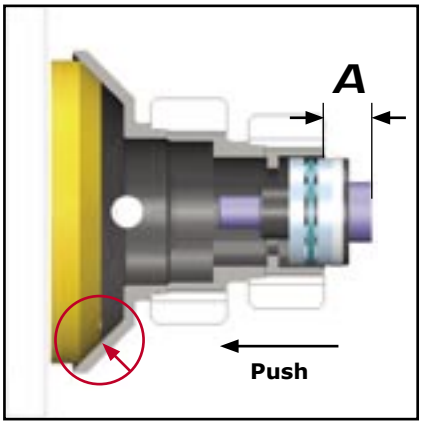


IMPORTANT! Install thrust bearing plates as shown

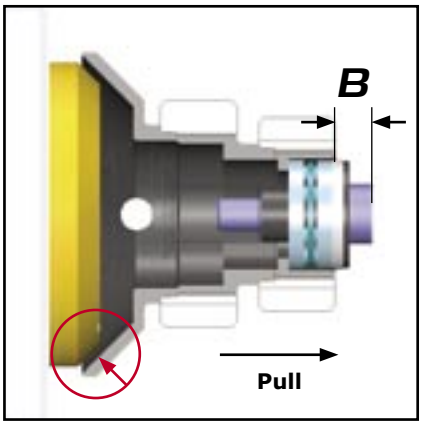


A
Large inner dia.

B
Small inner dia.



1 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.

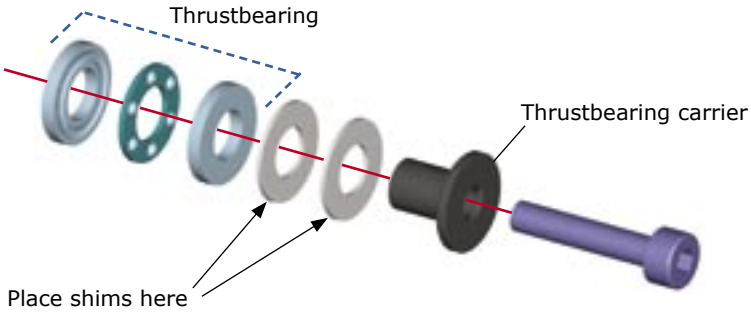


2 Pull the clutchbell away from the clutch shoe, and then measure the distance B as indicated.

3 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

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

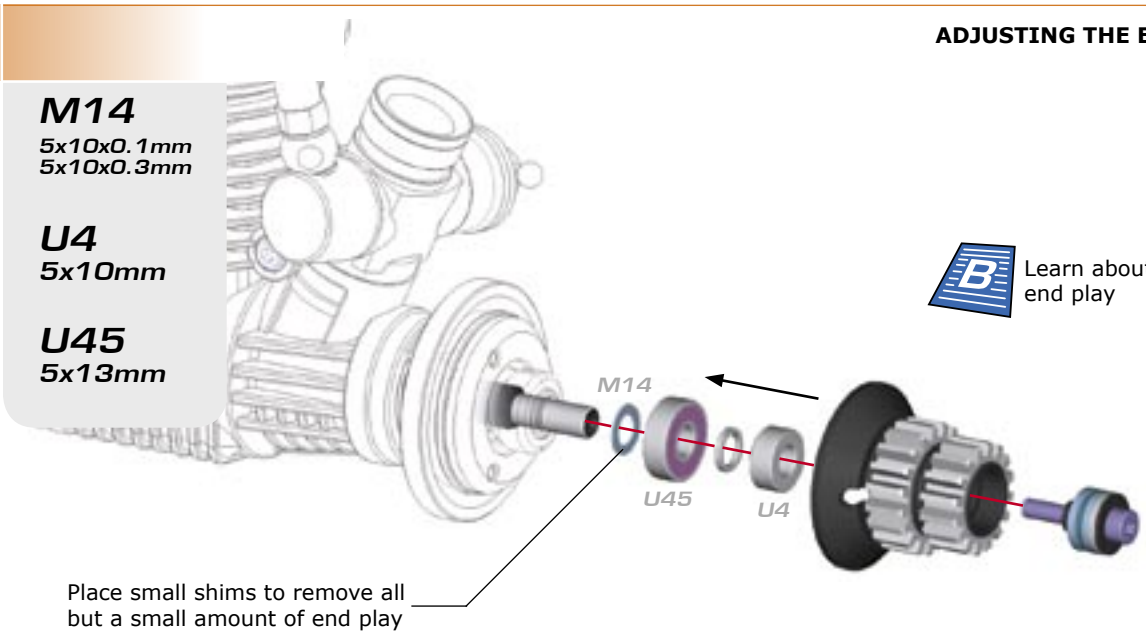


Learn about clutch shoe gap

M14
5x10x0.1mm
5x10x0.3mm

U4
5x10mm

U45
5x13mm

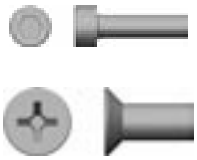


Learn about clutch end play

7.0 FINAL ASSEMBLY

STEP 7.1

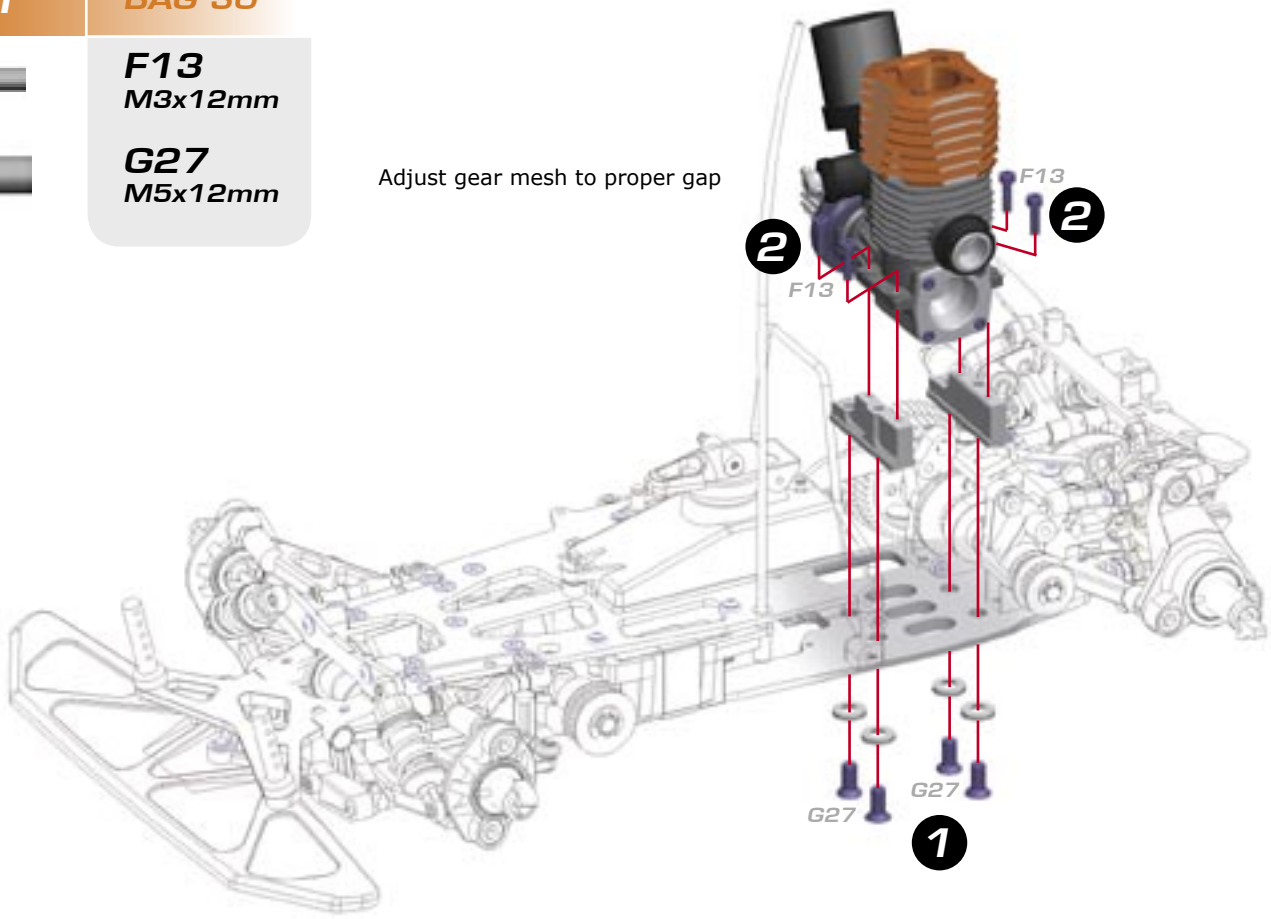
BAG 30



F13
M3x12mm

G27
M5x12mm

Adjust gear mesh to proper gap

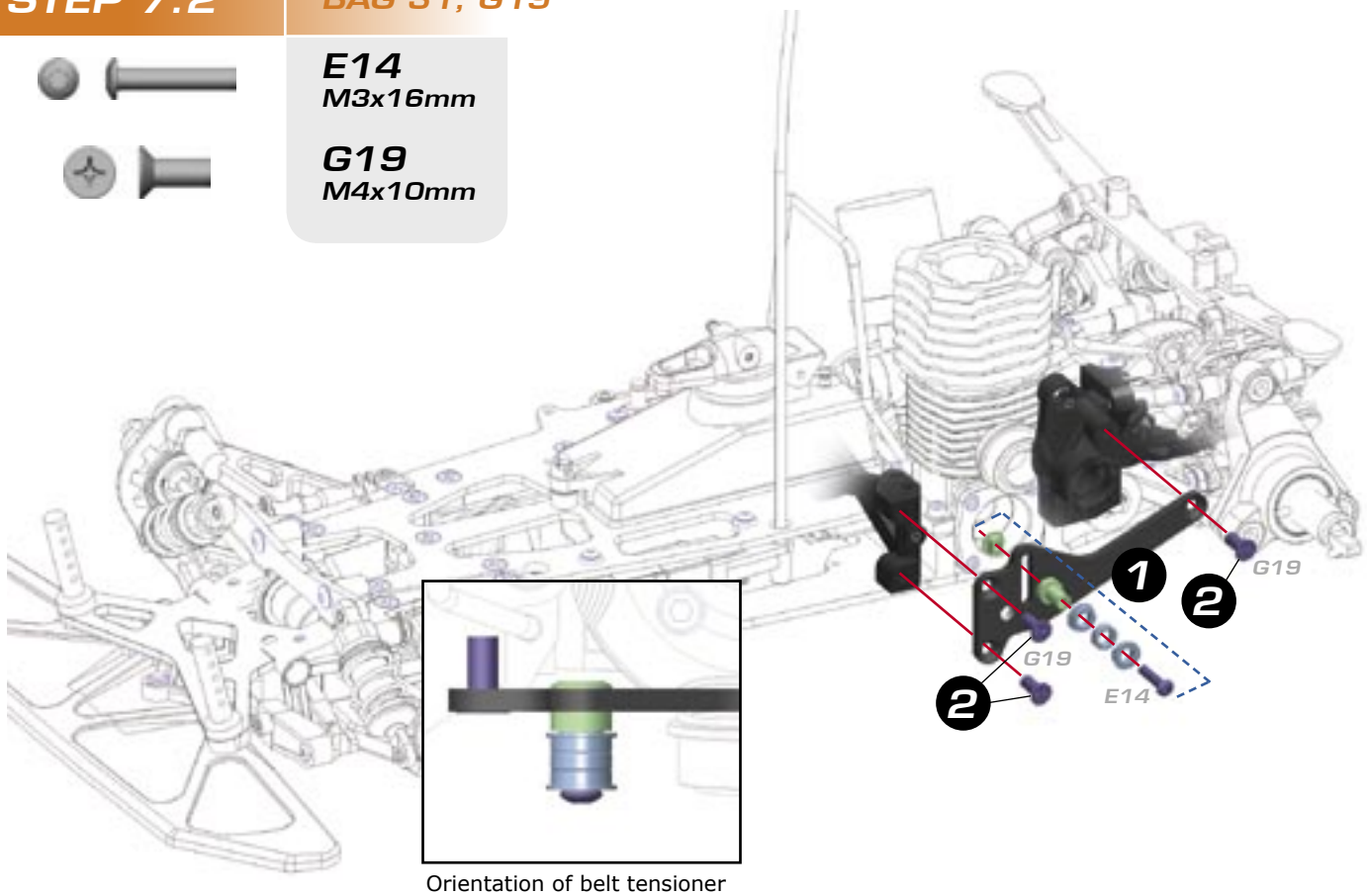


STEP 7.2

BAG 31, G19

E14
M3x16mm

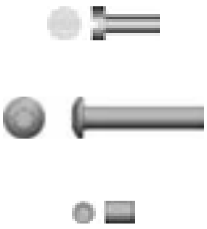
G19
M4x10mm



Orientation of belt tensioner bearings

STEP 7.3

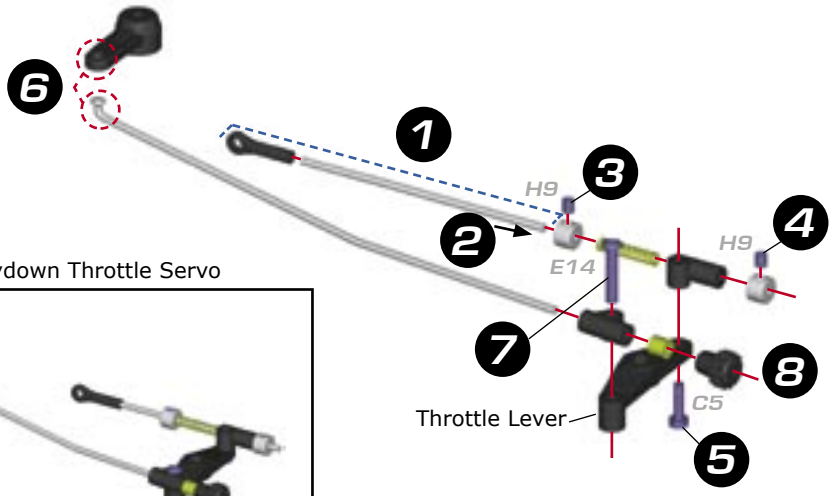
BAG 32, 33



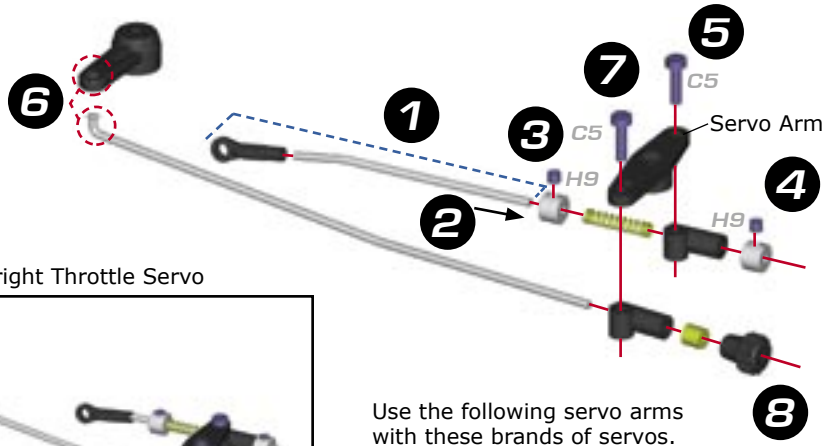
C5
2.5x8mm

E14
M3x16mm

H9
M3x4mm



OPTION 1: Laydown Throttle Servo



OPTION 2: Upright Throttle Servo

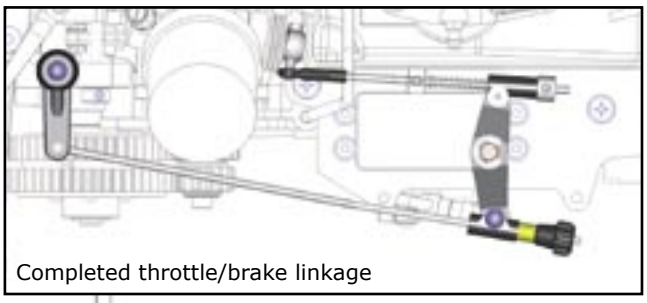
Use the following servo arms with these brands of servos.
23 - Sanwa / KO / JR
24 - Hitec
25 - Futaba

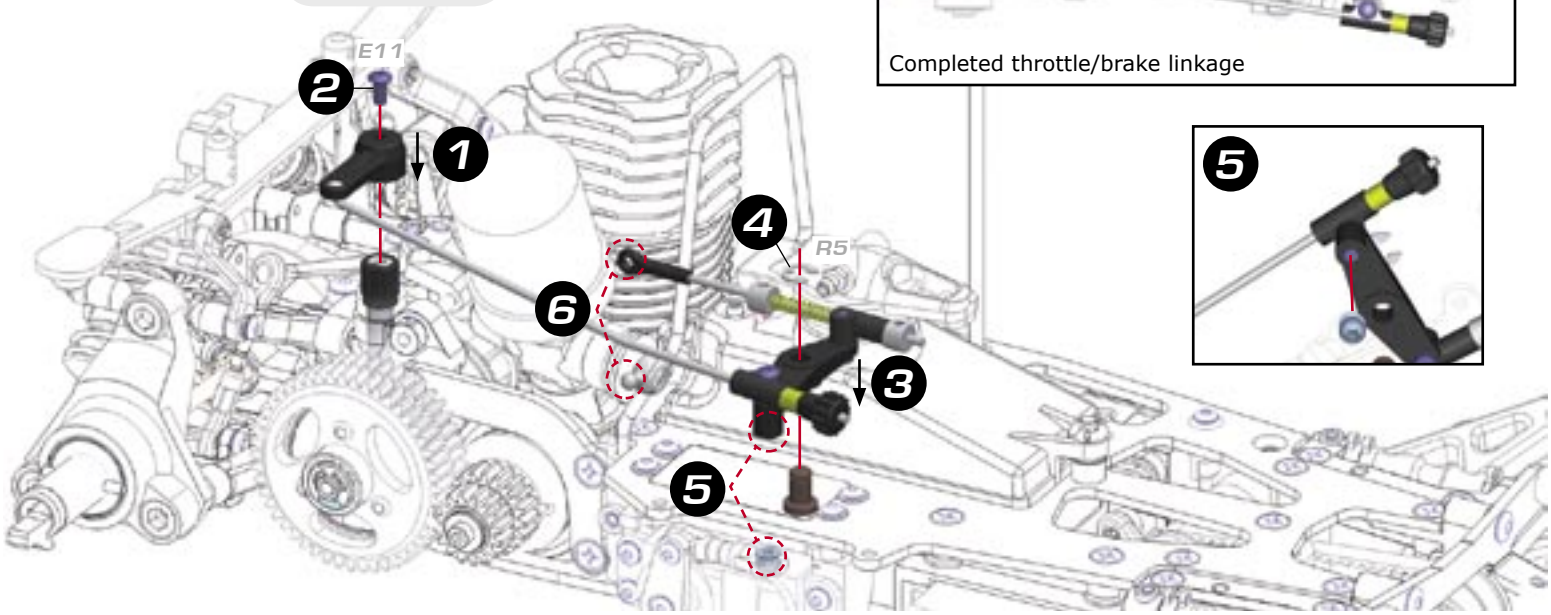
STEP 7.4

OPTION 1: Laydown Throttle Servo

E11
M3x8mm

R5
5mm


Completed throttle/brake linkage



STEP 7.5

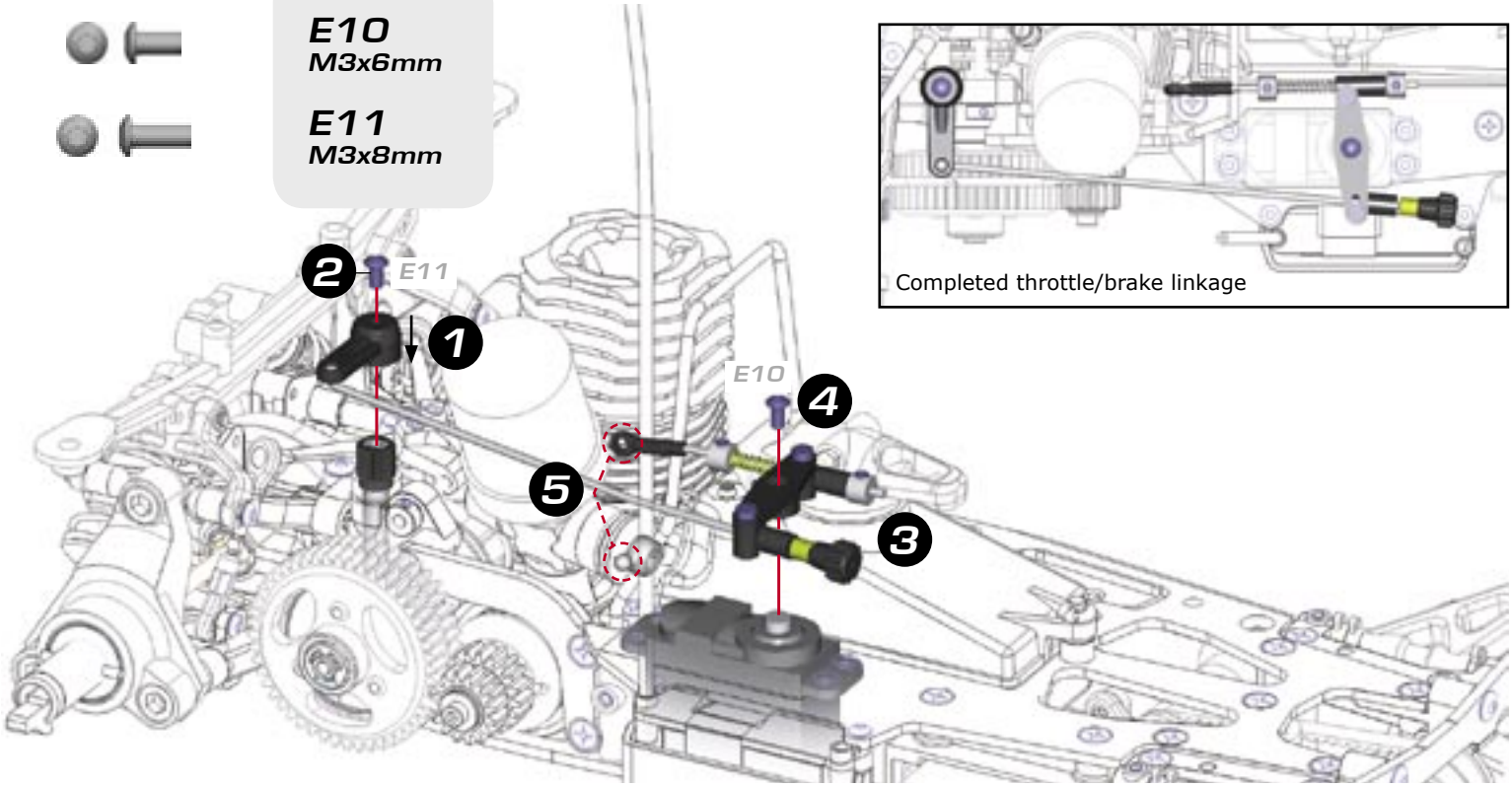
BAG 34, G19

OPTION 2: Upright Throttle Servo

E10
M3x6mm

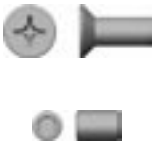
E11
M3x8mm

Completed throttle/brake linkage



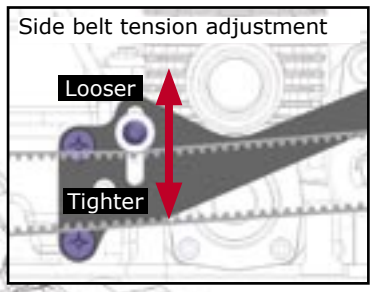
STEP 7.6

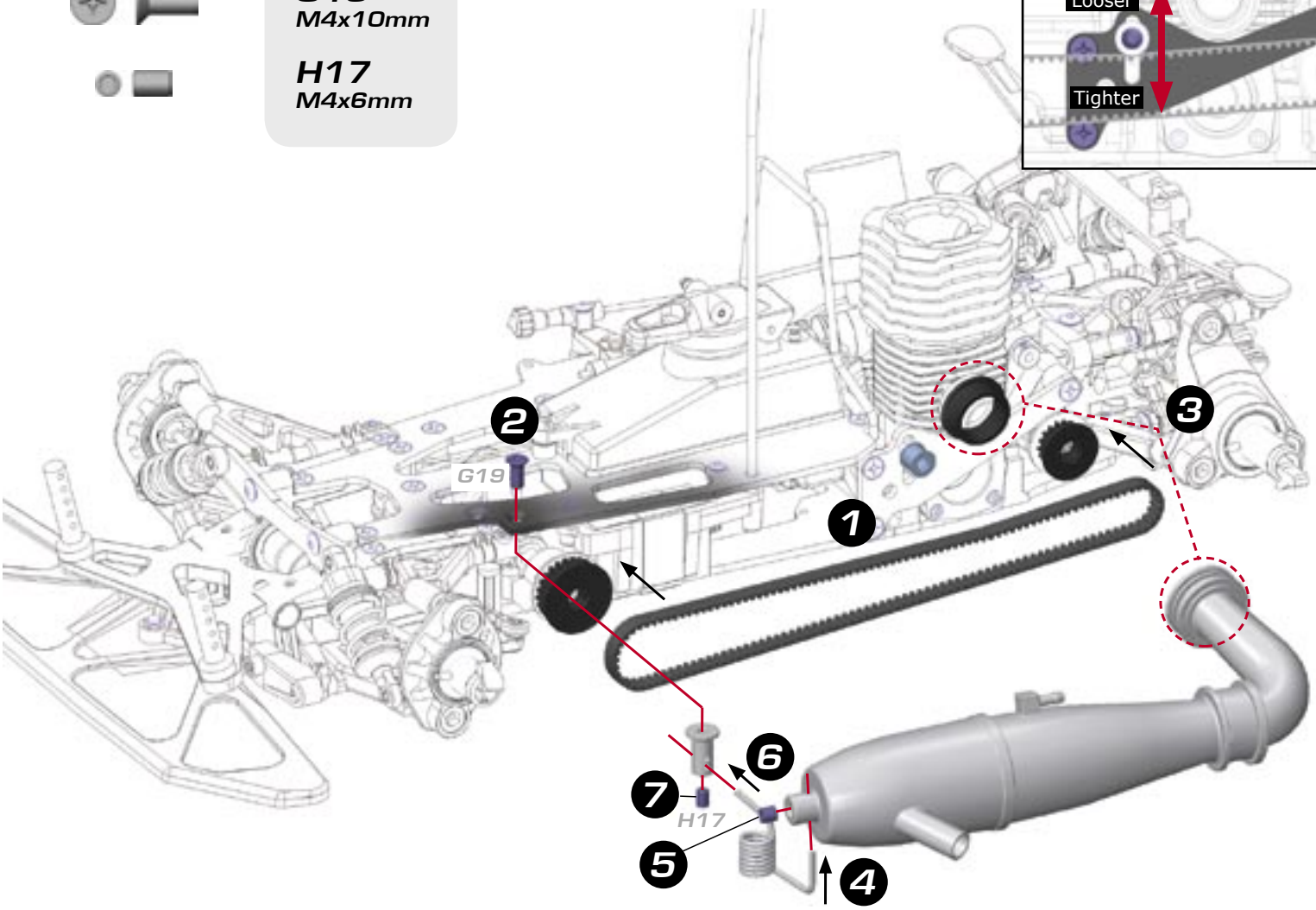
BAG 34, G19



G19
M4x10mm

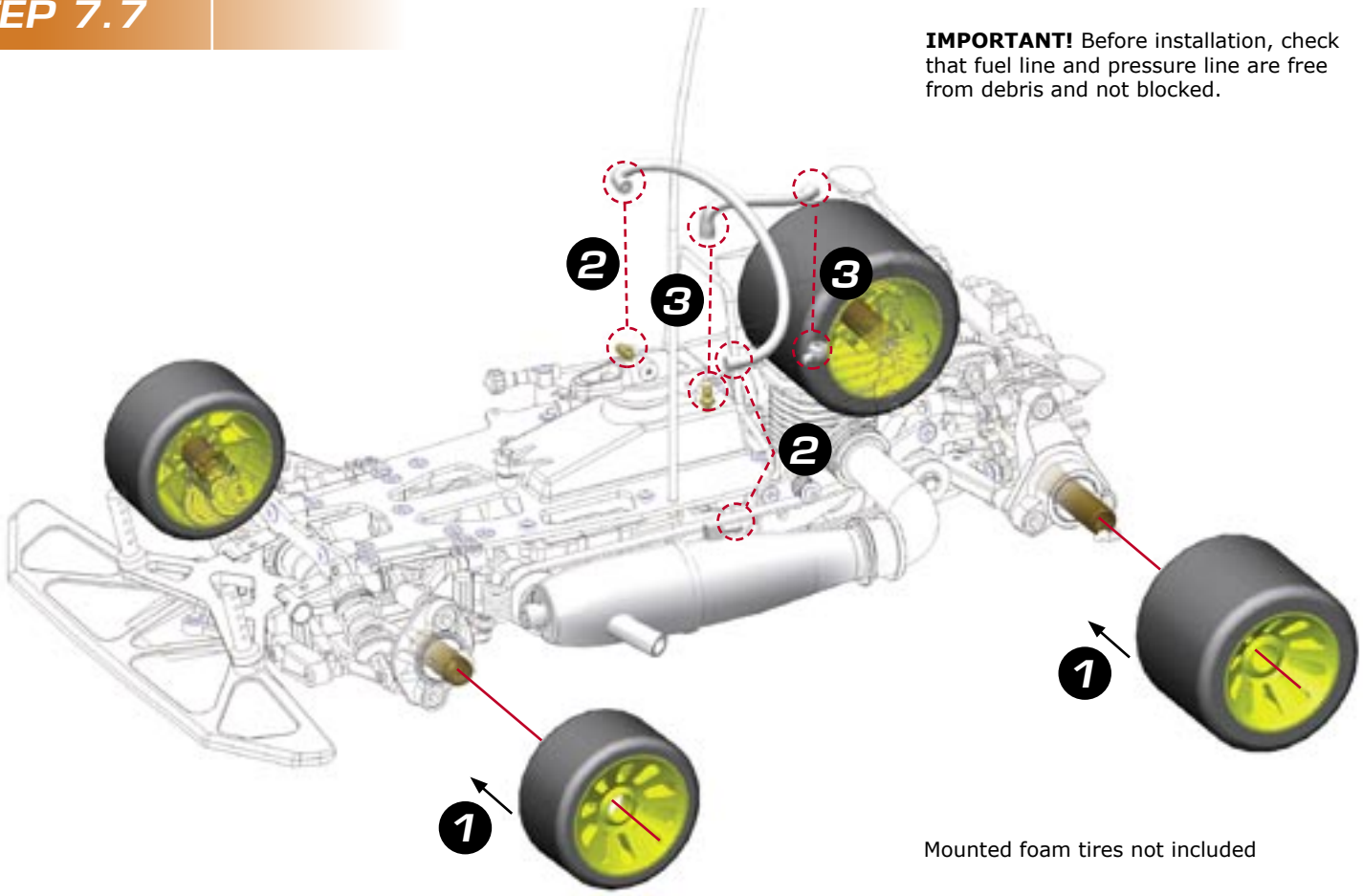
H17
M4x6mm





STEP 7.7

IMPORTANT! Before installation, check that fuel line and pressure line are free from debris and not blocked.

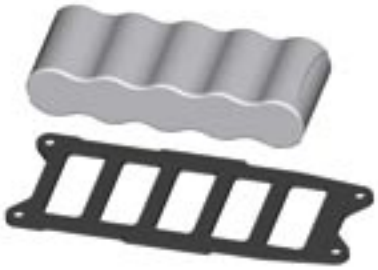


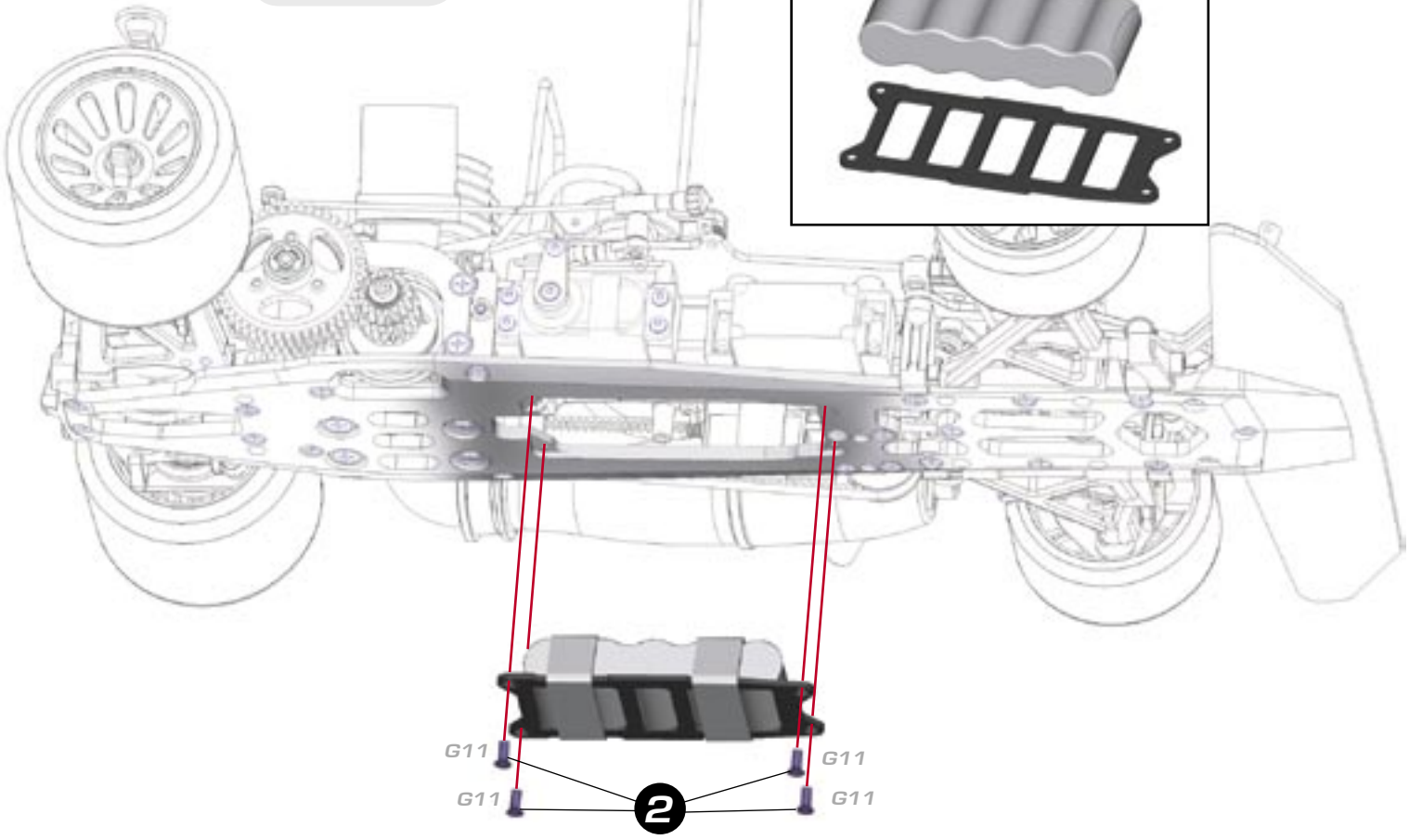
Mounted foam tires not included

STEP 7.8

G11
M3x8mm

1 Securely attach battery pack to mounting plate.

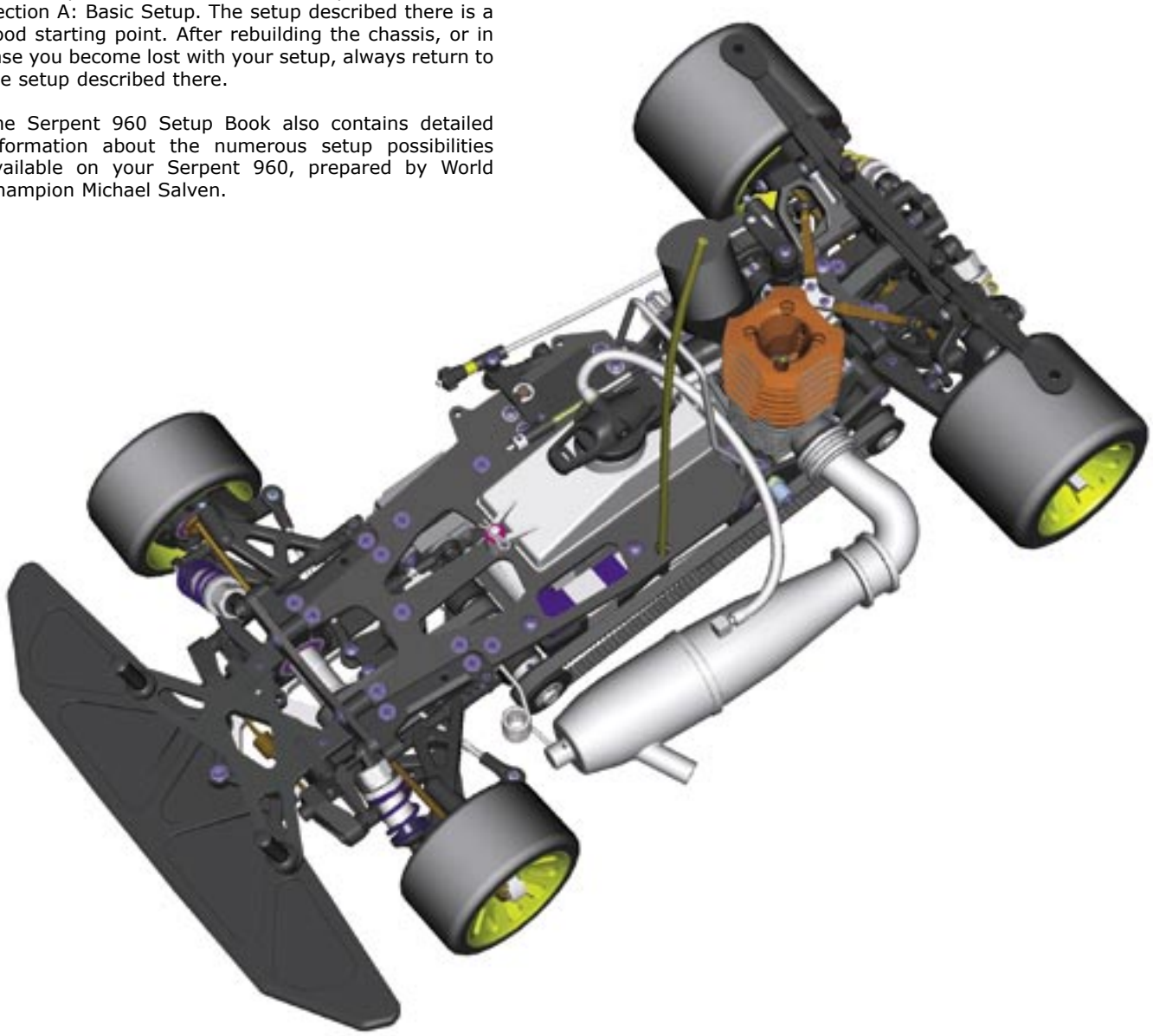




Congratulations, you have completed the building of your new Serpent 960 !

To prepare your car for its first run, go to the *Serpent 960 Setup Book* and follow the setup instructions in Section A: Basic Setup. The setup described there is a good starting point. After rebuilding the chassis, or in case you become lost with your setup, always return to the setup described there.

The Serpent 960 Setup Book also contains detailed information about the numerous setup possibilities available on your Serpent 960, prepared by World Champion Michael Salven.



SERPENT 960

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MOTORSPORT

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#903147 - Version 1