Assembly Guide

Table of Contents

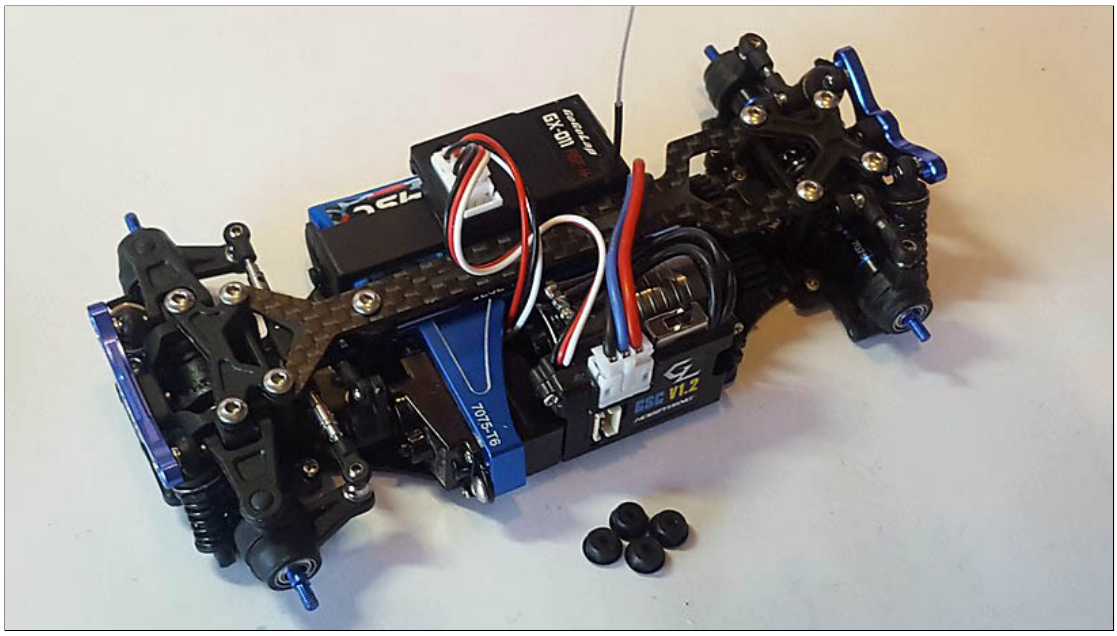
Reference Materials

1. Gear Ratios Chart
2. Setup Sheets

Introduction

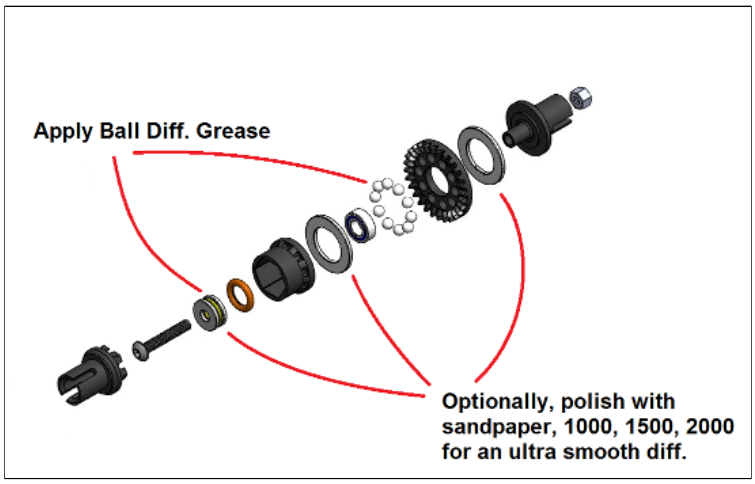
In this assembly guide, we will show you step by step how to assemble the GLA, we will also provide any tips along the way.

Enjoy building and racing with GLA!



Tools required:

Ball Diffs



TIP: GL racing diff plates come highly polished and are ready for use. However, when you rebuild ball diff after prolonged use or for an ultra smooth ball diff, use sandpaper to polish the surfaces of the diff pressure plates, and the thrust ball bearing plates. Start with ~1000, followed by 1500, 2000. You can stop there or another quick polish with 3000 and 5000 just to be sure!

Which grease?

Any RC ball diff grease should be fine, we have tested Kyozho and Taimiya ones below:

How tight?

- Tighten the ball diff screw to tighten the diff, DO NOT over tighten, which will damage the plates and balls.
- If you hold one side of the diff and the gear, then try use your hand to twist the other side, if you can easily twist it, the diff is too loose, tighten until you find it difficult to twist the other side with fingers, then the diff is tight enough.
- An ideal ball diff build should be smooth, low friction but does NOT slip during operation.

Run it in!!!

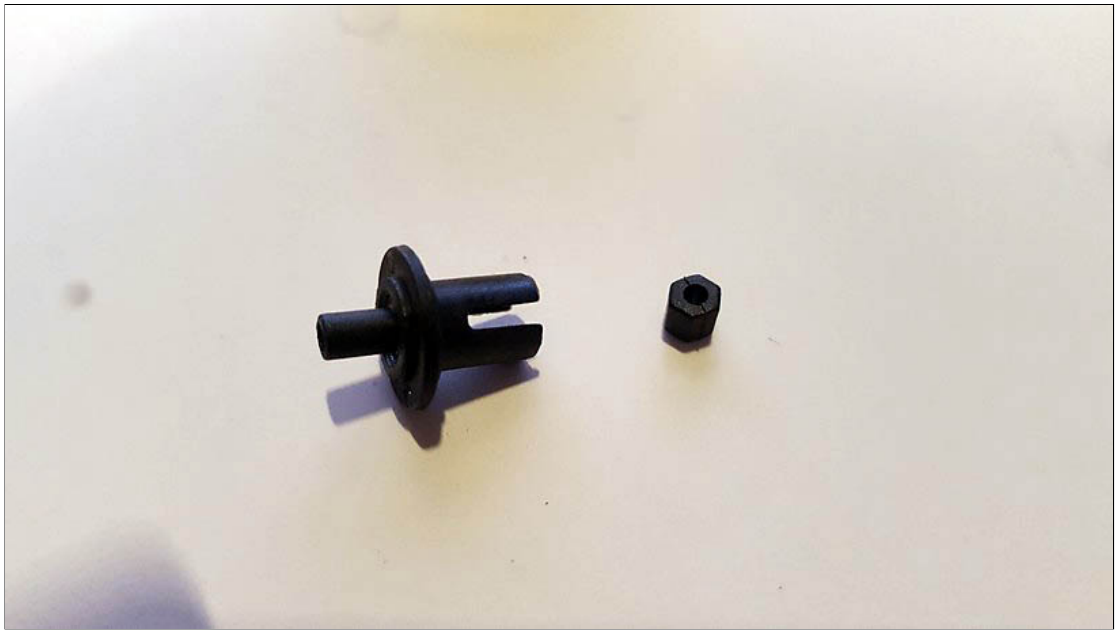
Before using a newly built ball diff, you need to run it in without loading and at relatively low speed. You can do this when the diffs are in the car, and you can hold the left or right wheels of the car, and then apply 20% throttle for 1 minute or so, then check ball diff tightness again. Alternatively, use a dremel tool, connect an universal shaft to the Dremel, and run in the ball diff at the LOWEST speed setting of the dremel.

How to maintain and rebuild?

- Keep applying ball diff grease to thrust ball bearing and pressure plates, the balls and plates will wear much quicker without grease
- If you keep the plates and thrust bearings greased and if your ball diff do not slip during operation in the car, a ball diff will stay smooth for a long time
- But eventually if your diff is either slipping when loose or high friction when tight, then polishing the 4 pressured surfaces will help. May also need some new 2mm balls. GL-Racing will consider making Ball Diff maintenance packs in future so that you can replace the plates and balls without doing all the polishing yourself.

Assembly Step-by-Step walk through

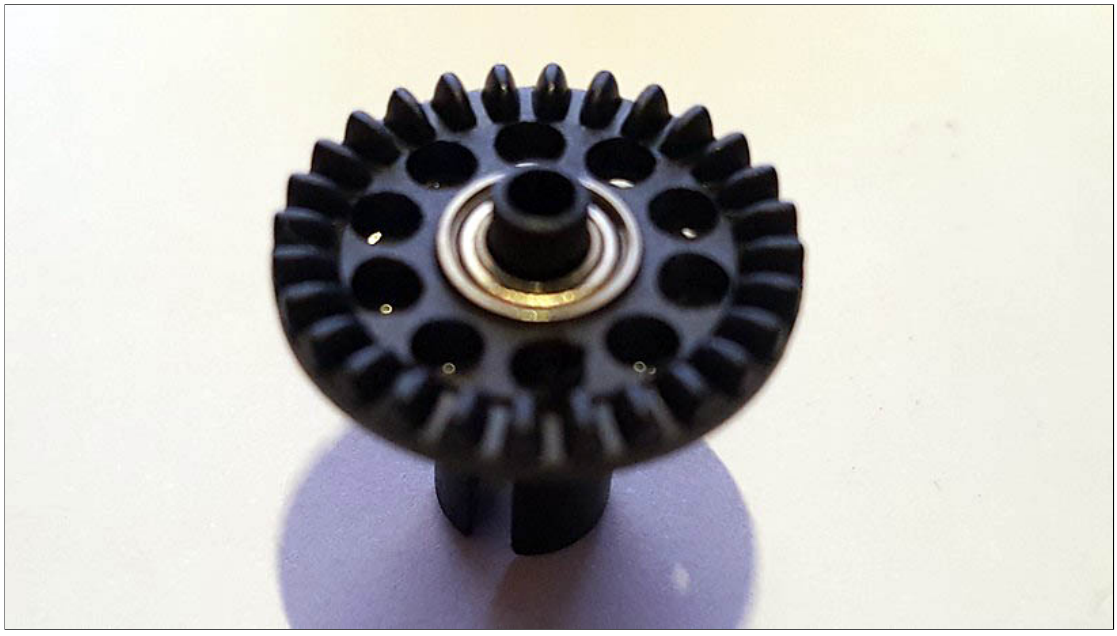
Step 1: Insert HEX nut into diff cup in this photo:



The fitting is quite tight, use a flat head screw driver to push the Hex Nut into the cup as below:

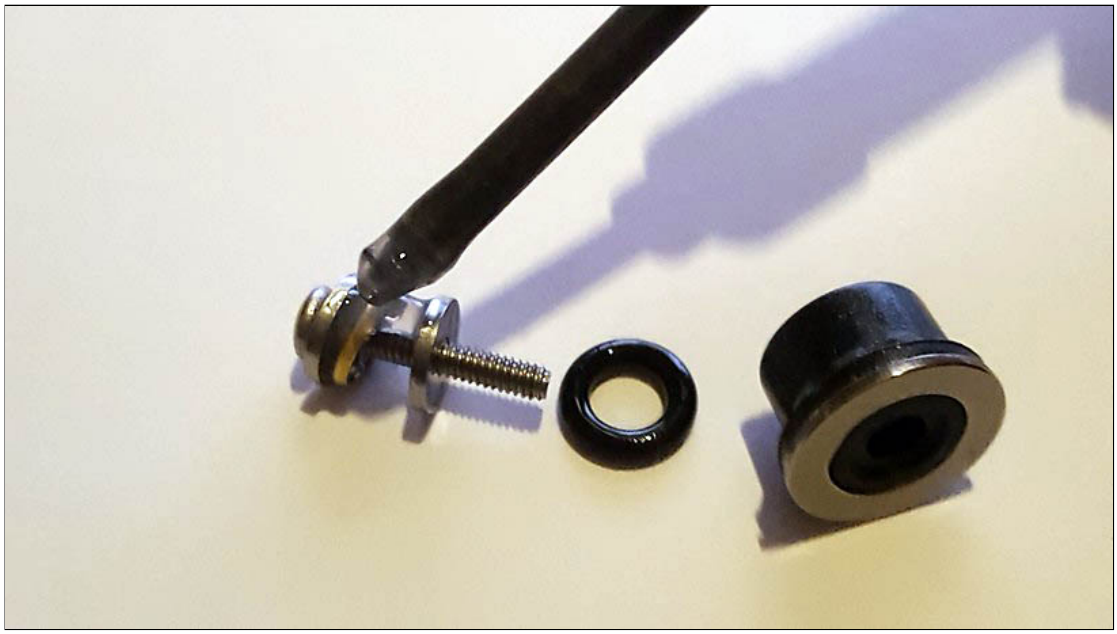
Step 2: Place a pressure plate onto the cup and apply Ball Diff Grease

Step 3: Place a 3x6x2mm ball bearing into diff gear and place onto above cup assembly:



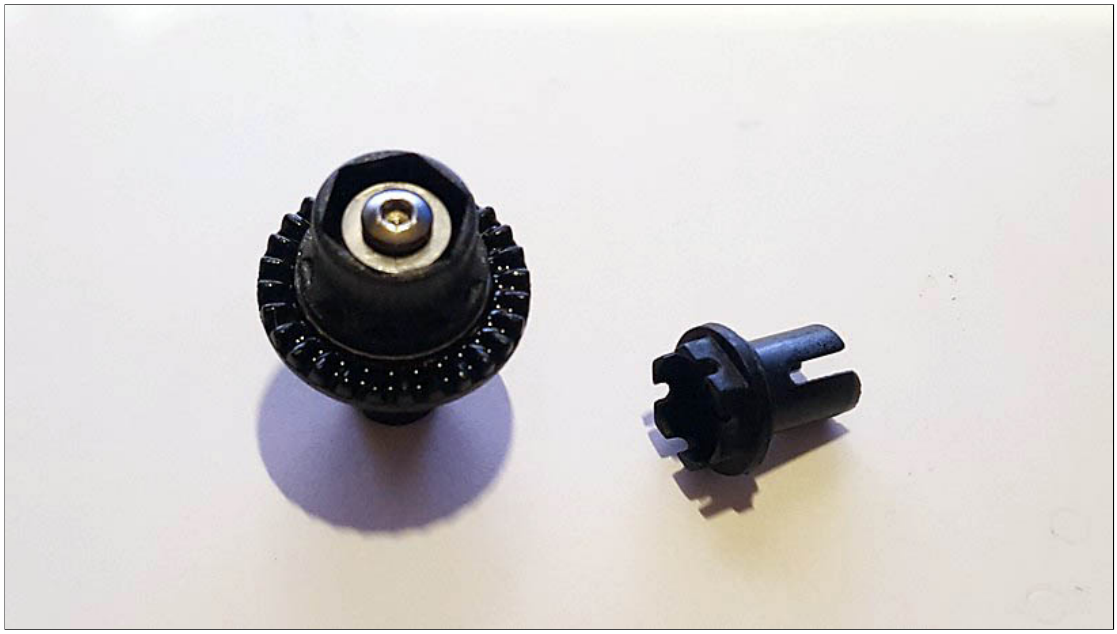
Step 4: Apply Ball diff grease and place 10x 2mm steel balls into the gear, don't drop them!

Step 5: Put the thrust ball bearing onto a 2x12mm machine thread screw, apply ball diff grease, prepare o-ring, ball diff body with a pressure plate attached as below photo:



Step 6: Put O-ring onto the screw between the thrust ball bearing and the Ball diff body:

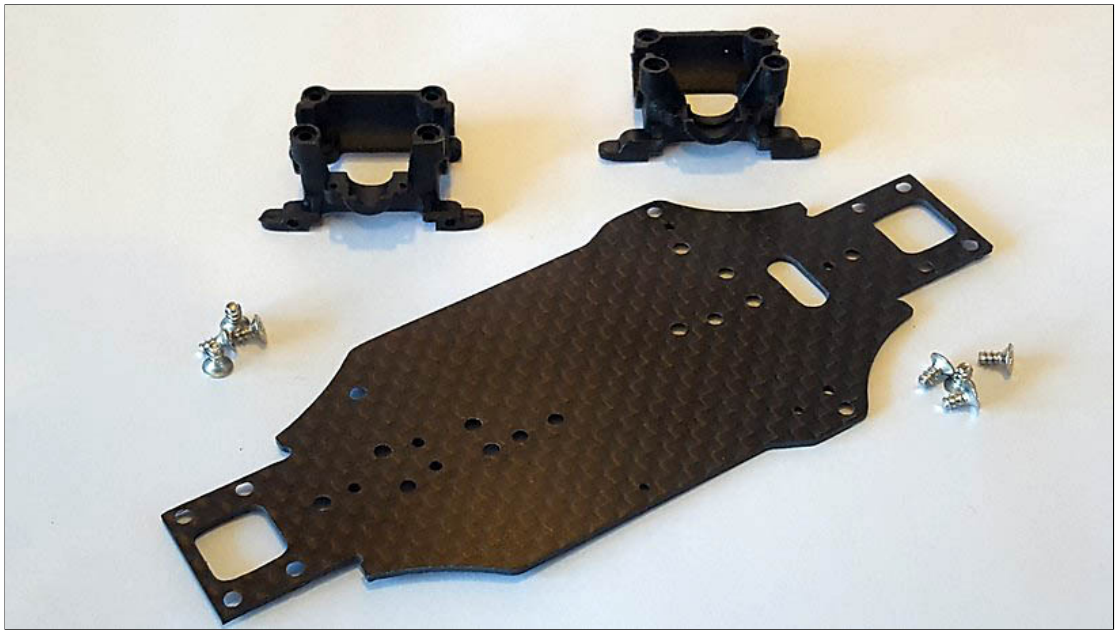
Step 7: Place this Ball diff body assembly onto the previous gear+cup assembly, and prepare the other diff cup:



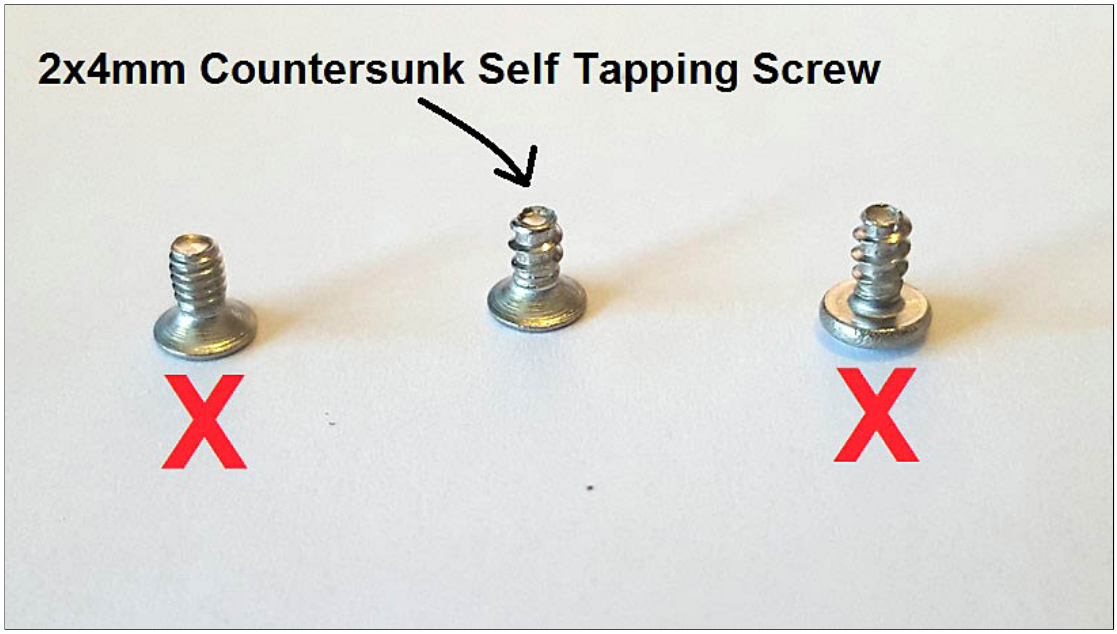
Step 8: Put diff cup onto diff body, tighten screw as per above instructions on "How tight?"

Step 9: Run-in / Break-in the diff as per above instructions on "Run it in!!!" section, using the car or a dremel tool:

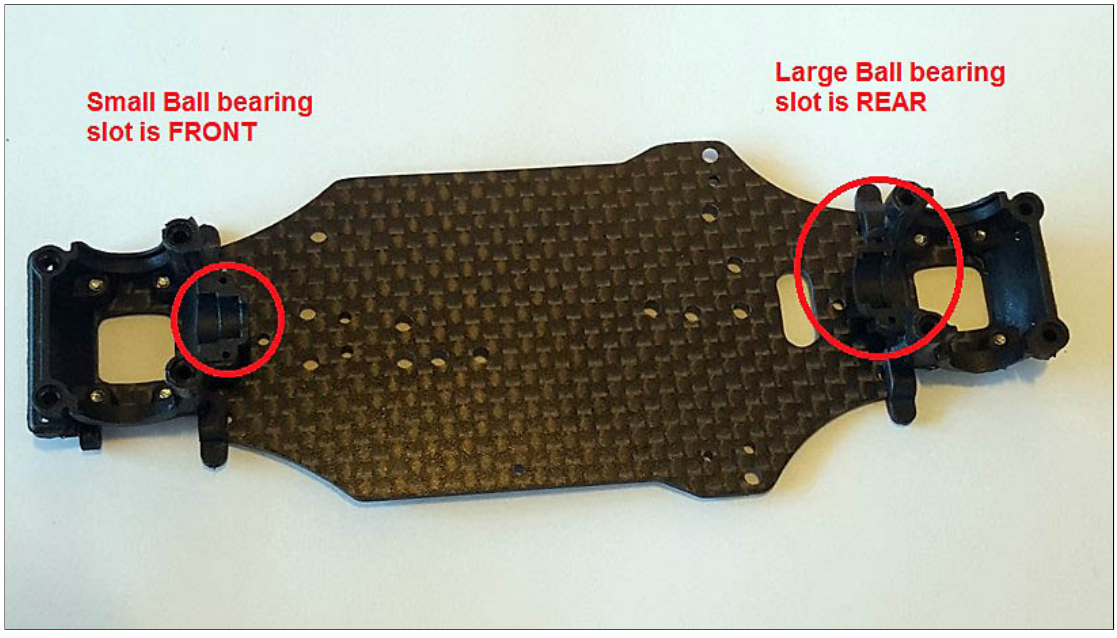
Diff Mounts



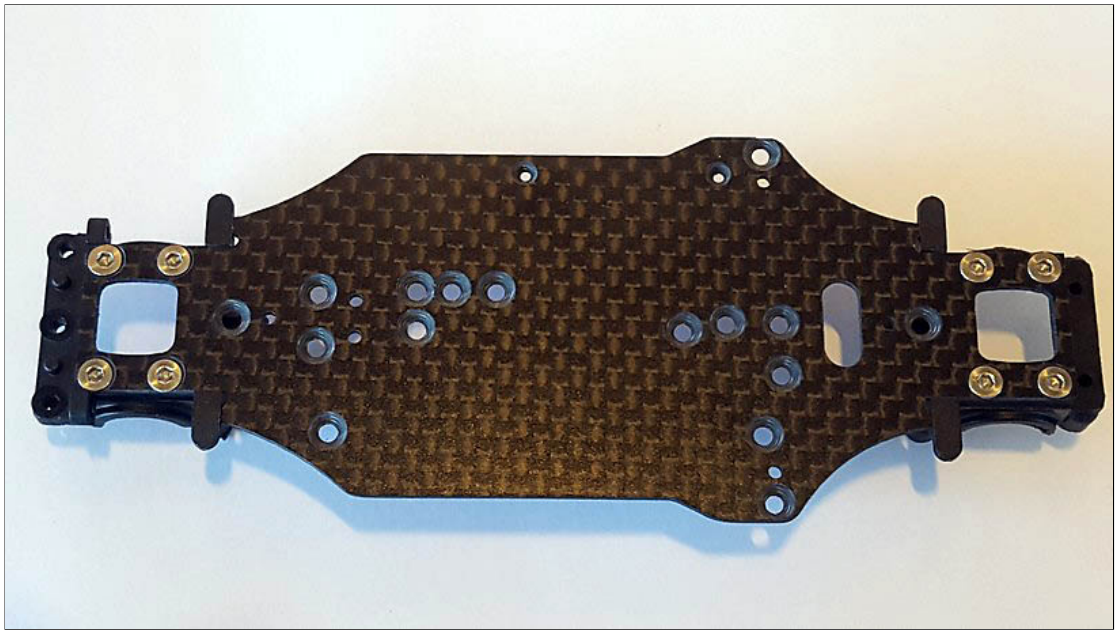
Use eight 2x4 Countersunk Self Tapping screws to mount the front and rear Lower Diff mounts.



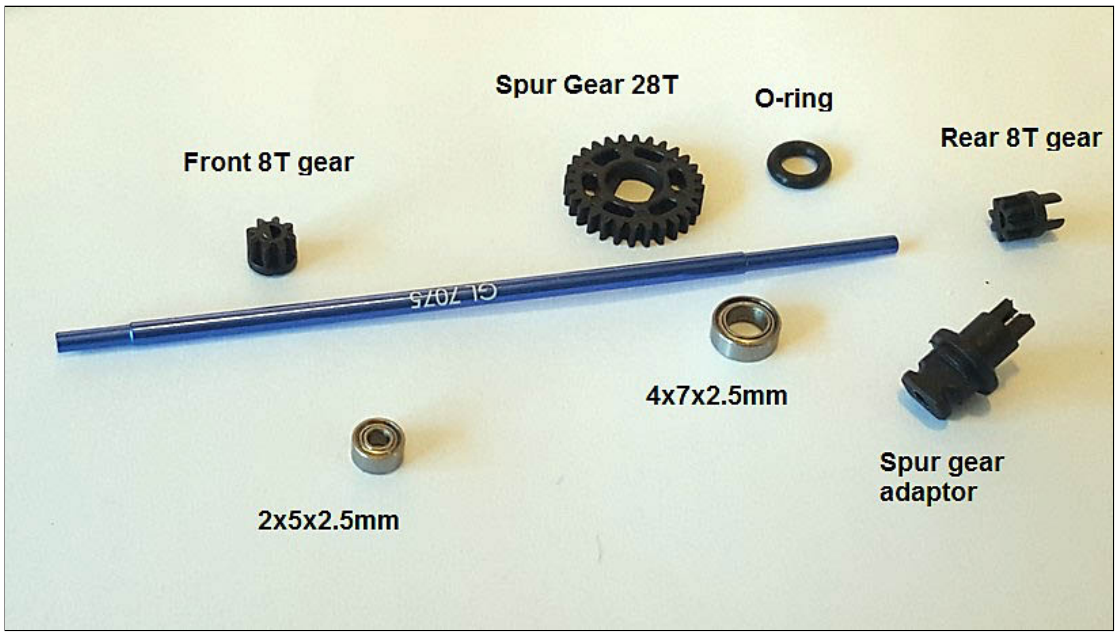
Please note FRONT and REAR are different, completed top view:



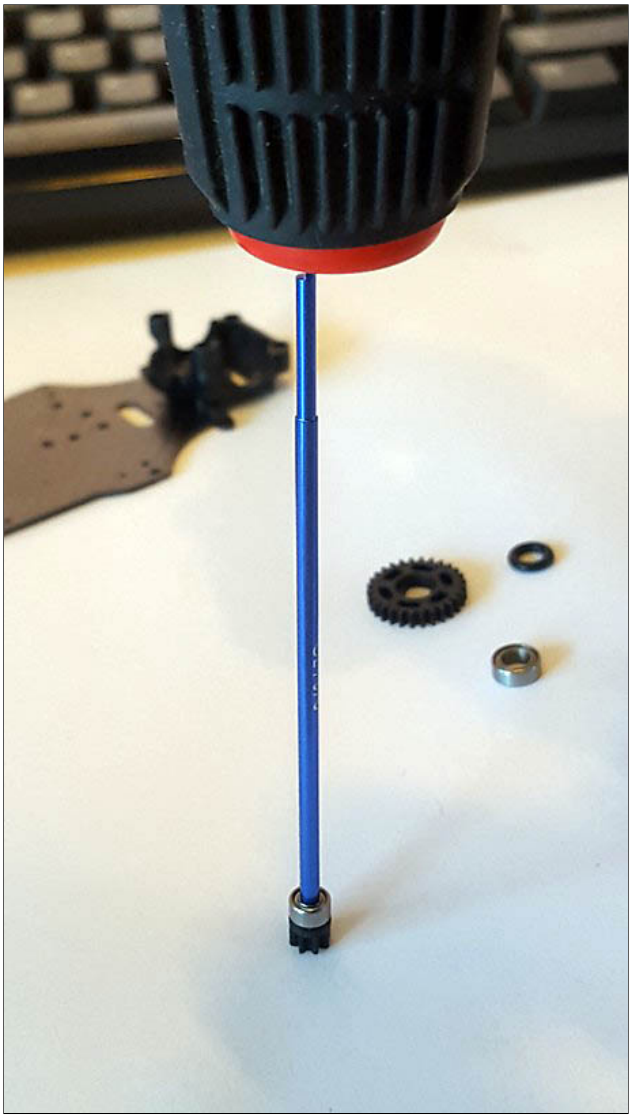
Completed bottom view



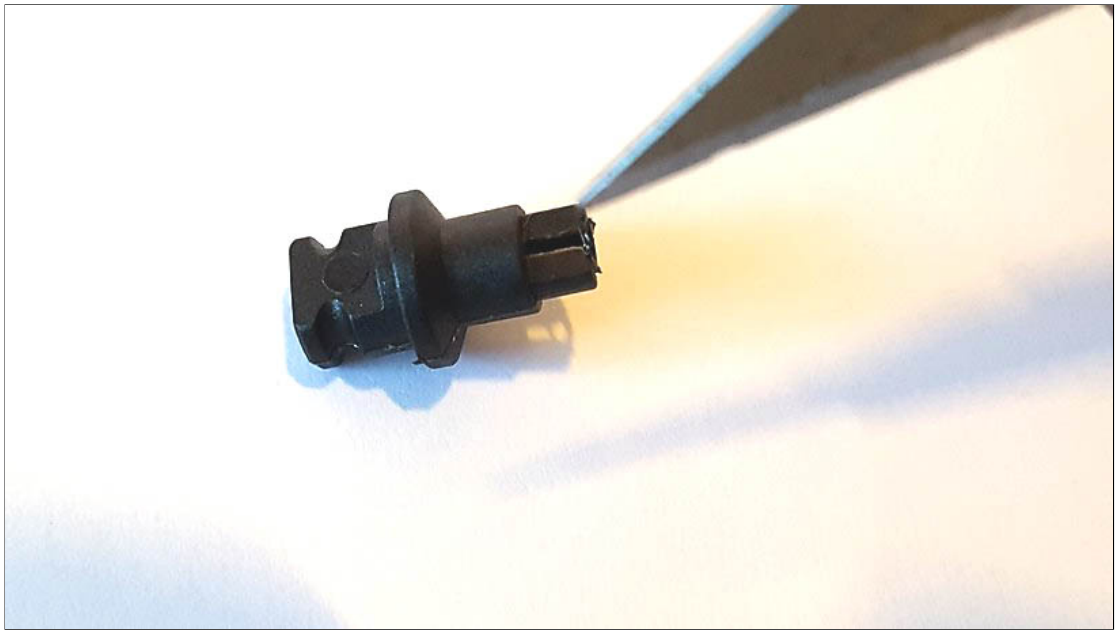
Central Shaft



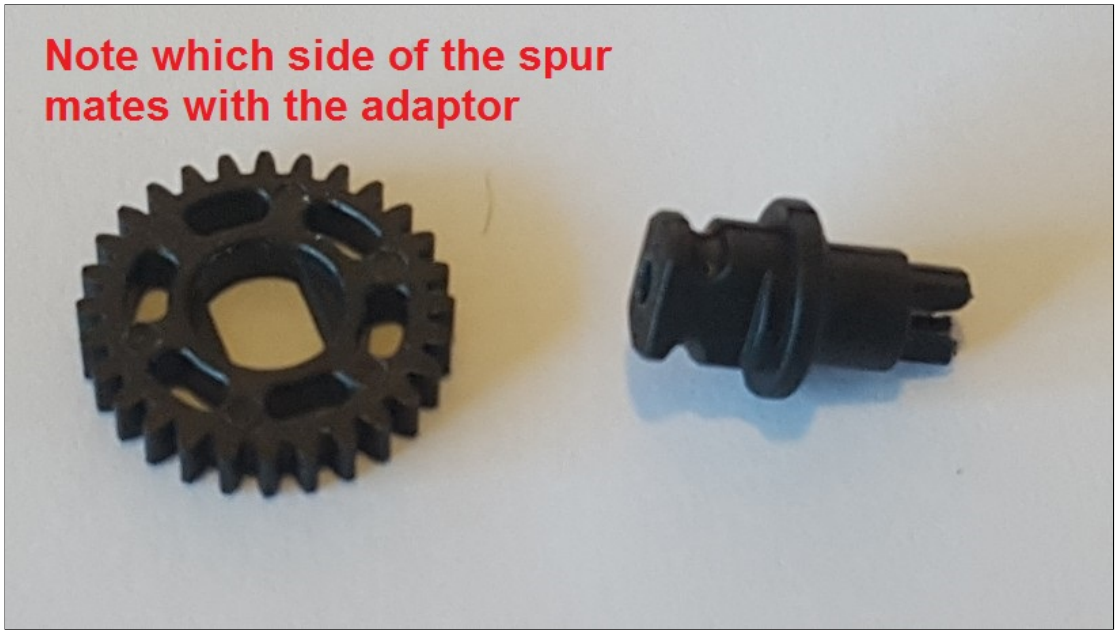
Insert 2x5x2.5mm Ball bearing to the left side of the shaft, then insert Front 8T gear, LINE up the fitting slot of the 8T gear, then hammer down using a plastic hammer or a screwdriver handle carefully.



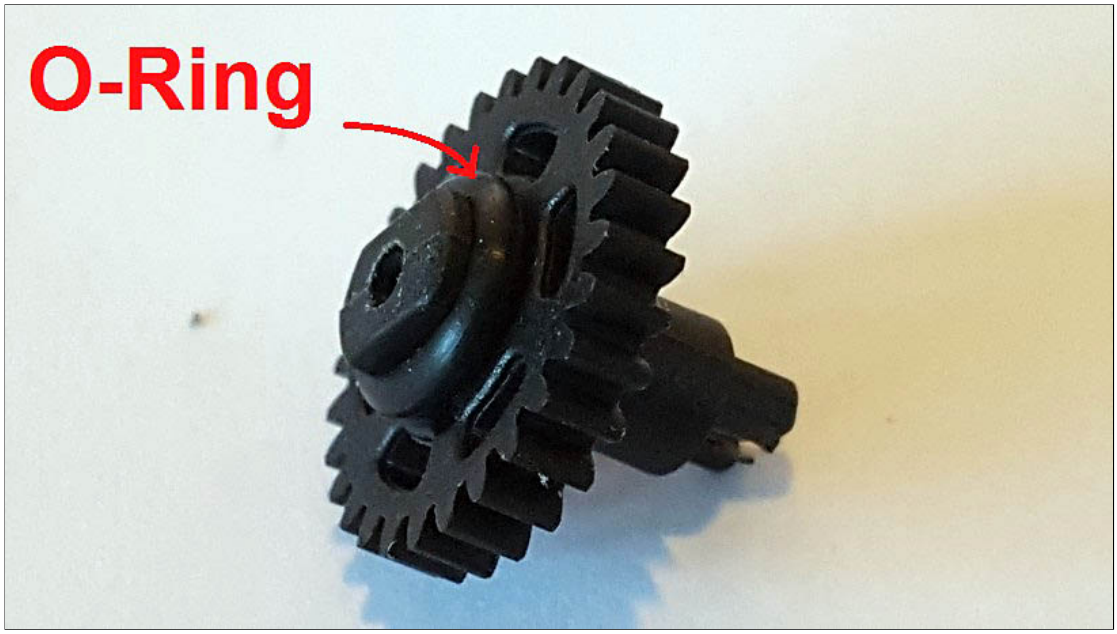
If there is excess plastic on your Spur gear adaptor, please remove with knife, apologies, will improve molding in future



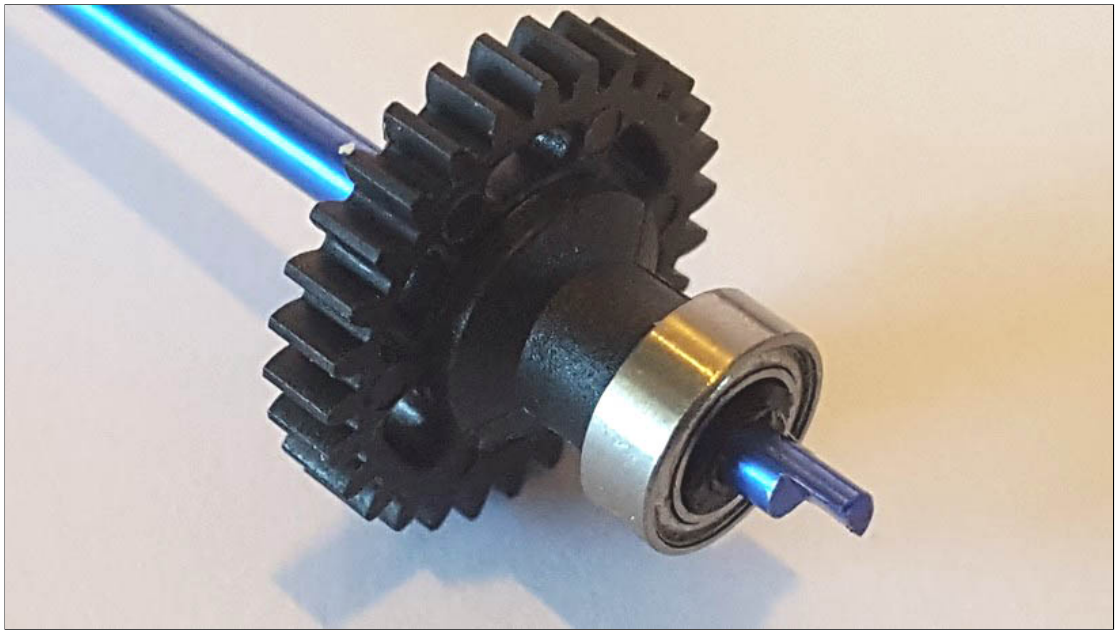
Assembly of Rear side of the shaft



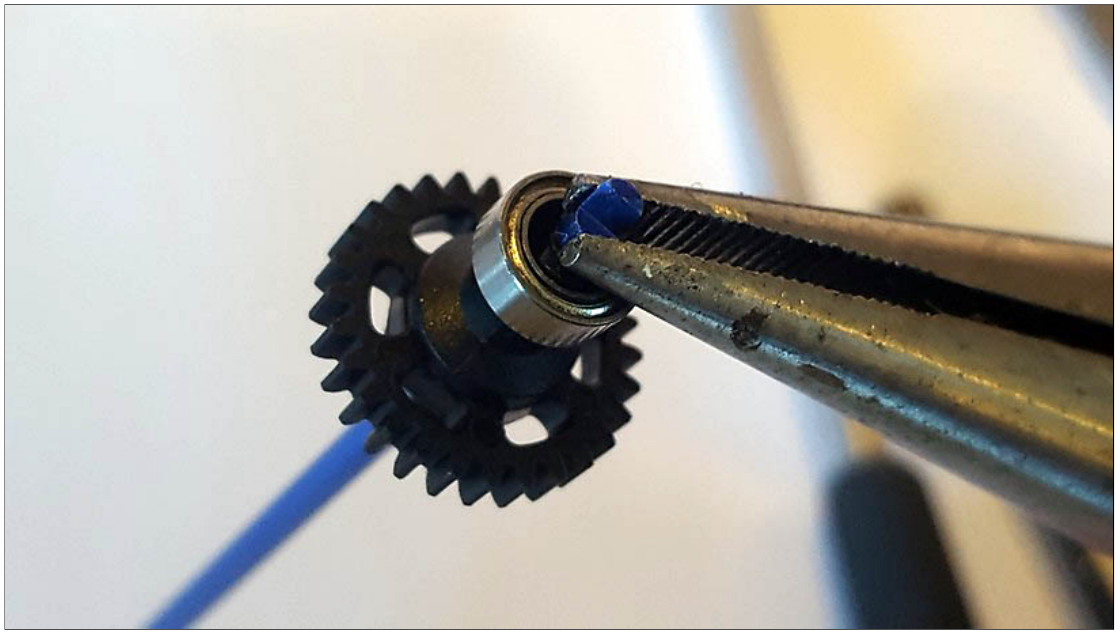
Insert spur into adaptor, and put O-Ring onto adaptor to secure Spur gear



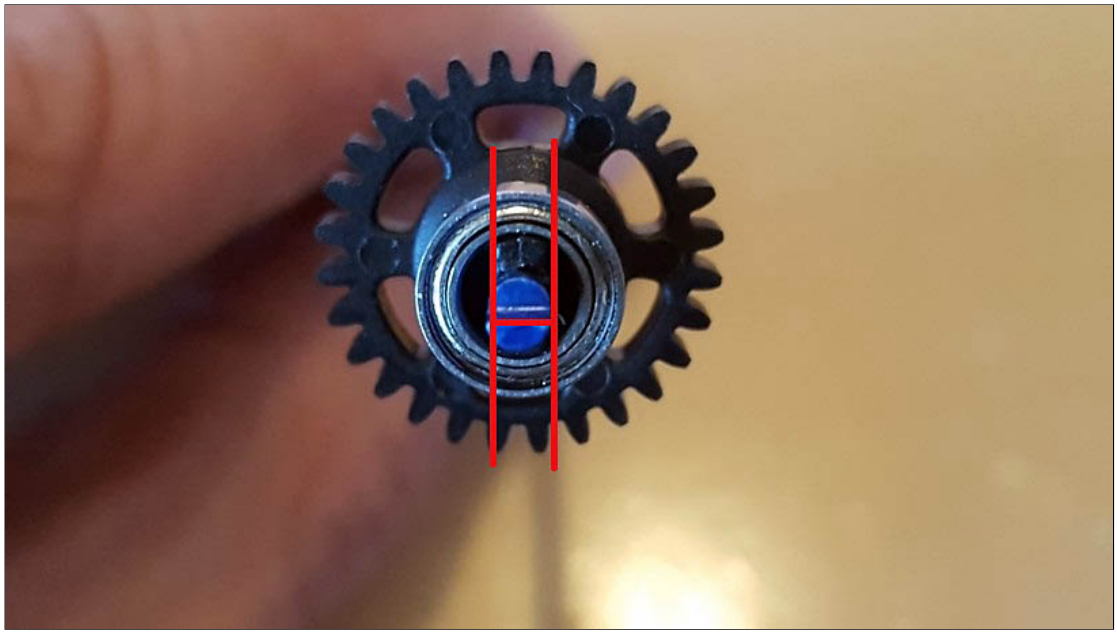
Carefully push the above assembly to the central shaft and then insert 4x7x2.5mm Ball bearing onto Adaptor



Use Long nose pliers to twist shaft against Spur to line up the fitting elements for the Rear 8T gear:



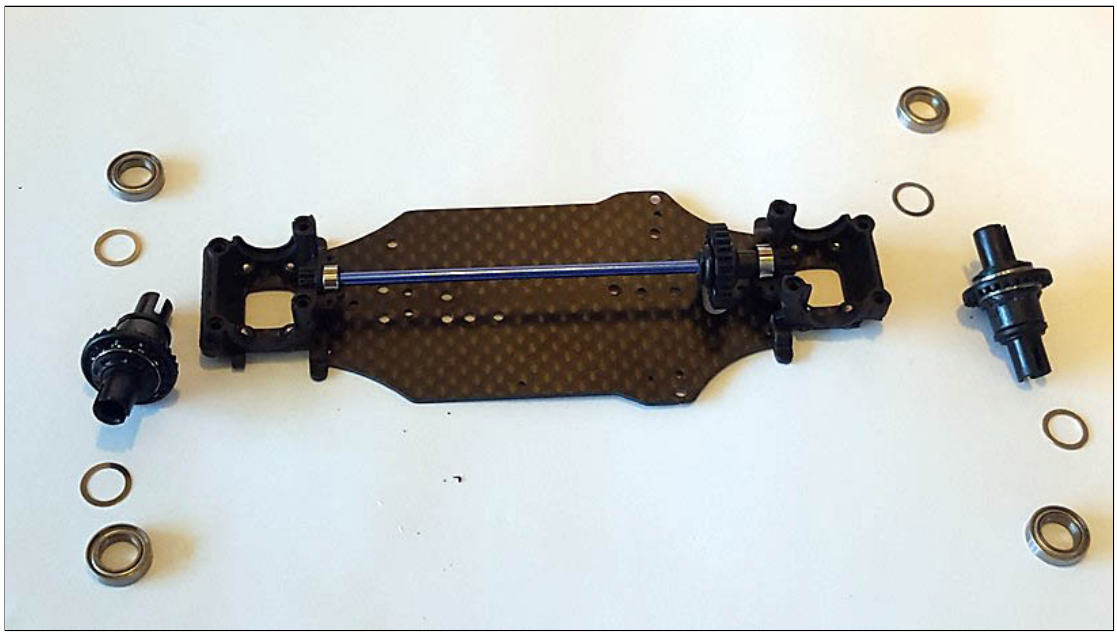
They should line up like this for the rear 8T gear to fit:



Plastic hammer the rear 8T onto the central shaft carefully:

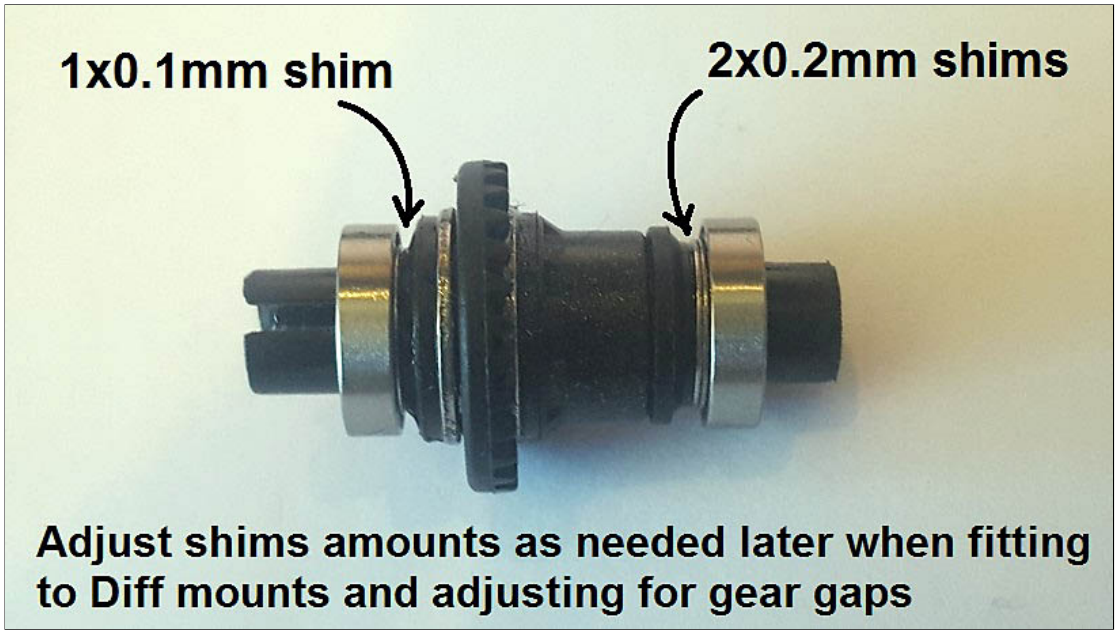
Completed Central Shaft:

Fitting the drive train onto chassis:



Step-by-Step guide:

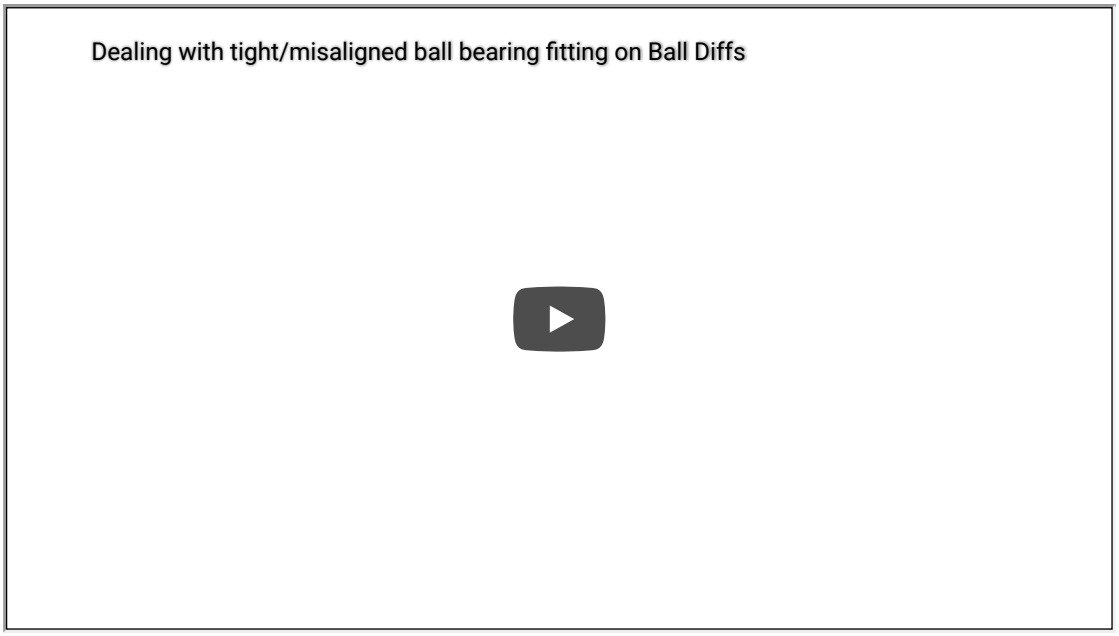
Start with putting 6x8mm shims onto Ball Diffs, Try 2x 0.2mm = 0.4mm on the long side, 1x 0.1mm on the short side, and then the 6x10x2.5mm Ball bearings, adjust shims amounts as needed when fitting to Diff mounts and adjusting for gear gaps:



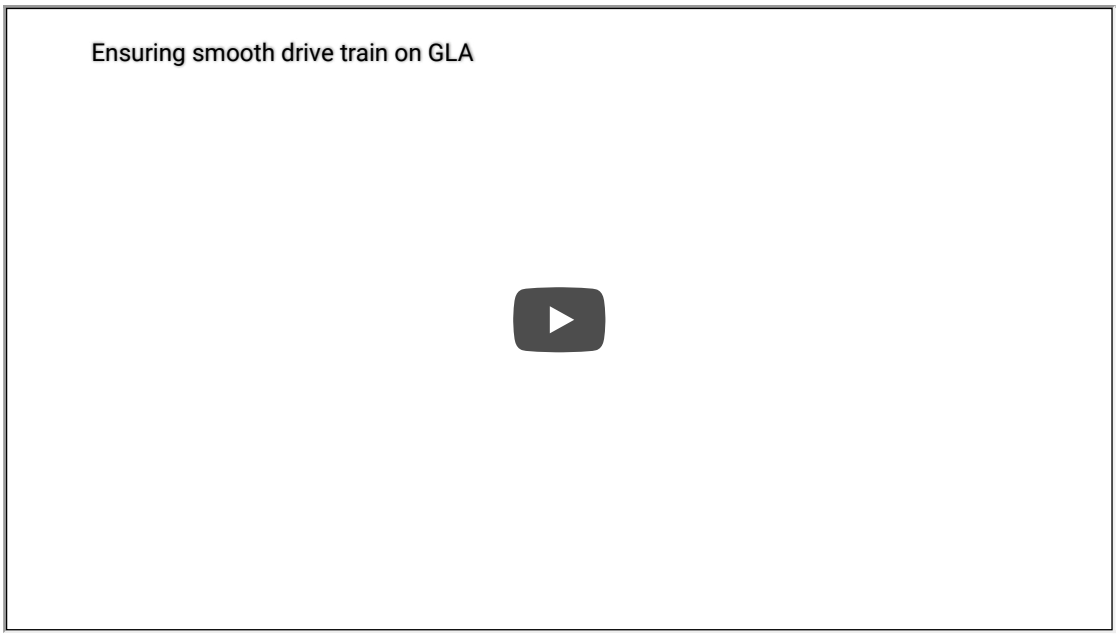
The short side is really tight fitting for the shim and ball bearing, apologies, we'll improve the molding, in the mean time, make sure the bearing is hammered down completely to avoid bearing wobble:

Optional: apply some bearing oil to the 6x10x2.5mm ball bearings, it will be easier to test if the fitting is smooth if the ball bearings are freed up with oil instead of the grease that shipped with the bearings:

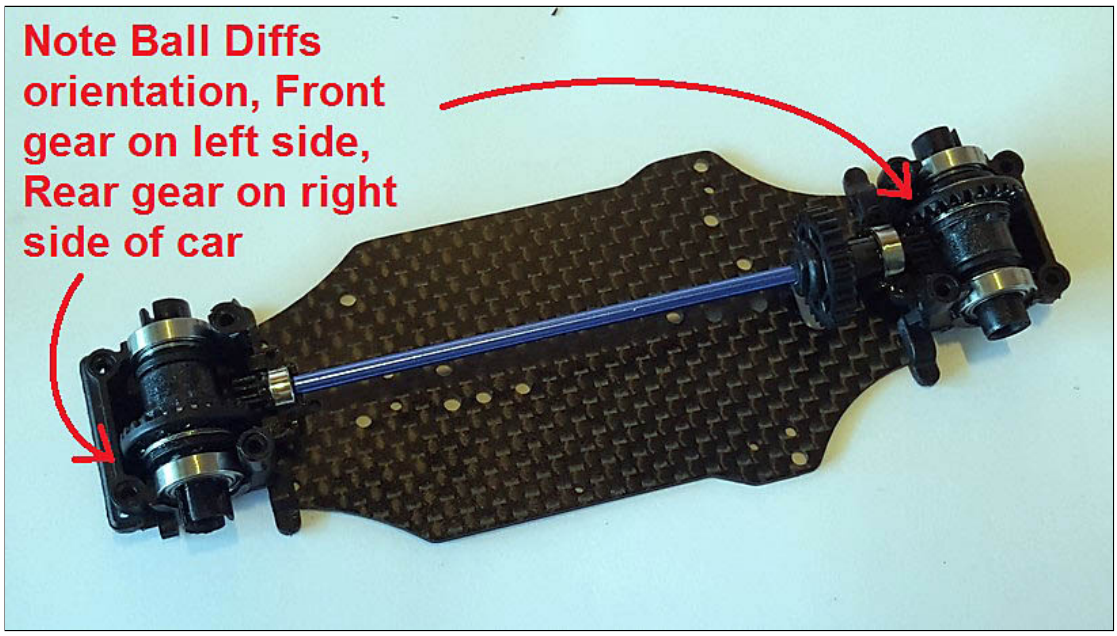
It is by no means easy, here's a video showing you the bearing wobble and how we fixed it with a long nose pliers and a plastic hammer:



Adjust shims amount as necessary so that Ball diffs can rotate freely, check central shaft can rotate freely, and check gear gaps to ensure a small suitable gap:



Please note Front and Rear Ball diff orientation, otherwise, your GLA might have wheels turning the wrong way round!!

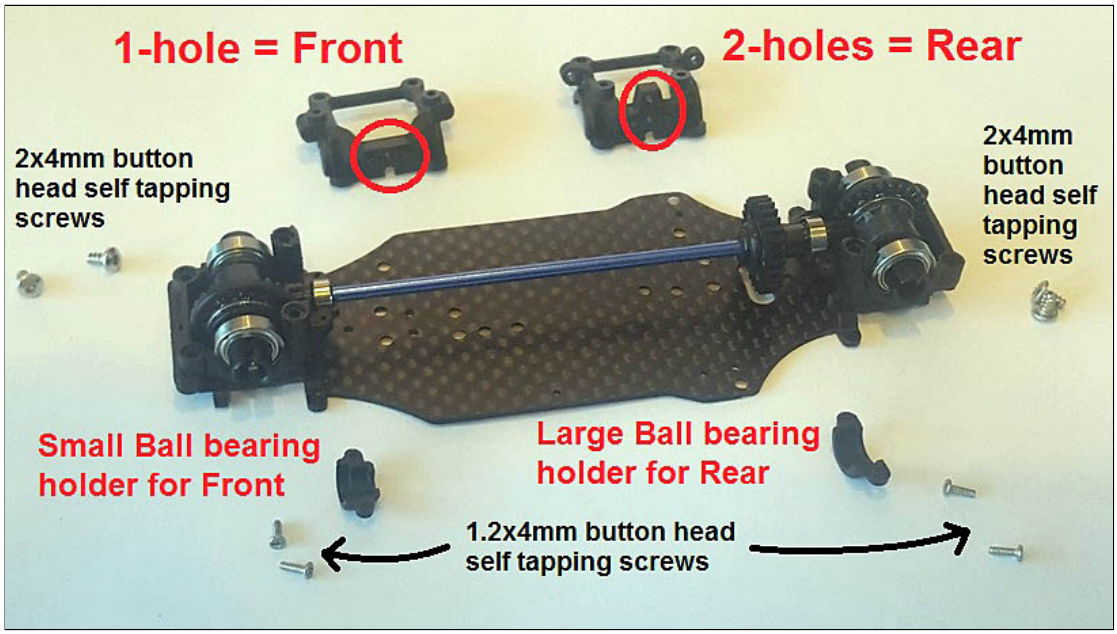


How small should the gear gaps be?

A rule of thumb with 0.5mod gear pitch is that you should be able to just feel the gap by holding a gear, and moving the other, so if we hold the central shaft stationary, and then rotate the diff gear, the diff should be able to move a tiny bit.

> **TIP:** The rear gap has to be very well adjusted, because it will be under more load than the front, make sure the rear diff is well shimmed, and the gear gap is held constant by the shims.

Fastening/Securing the drive train:



Step-by-Step guide:

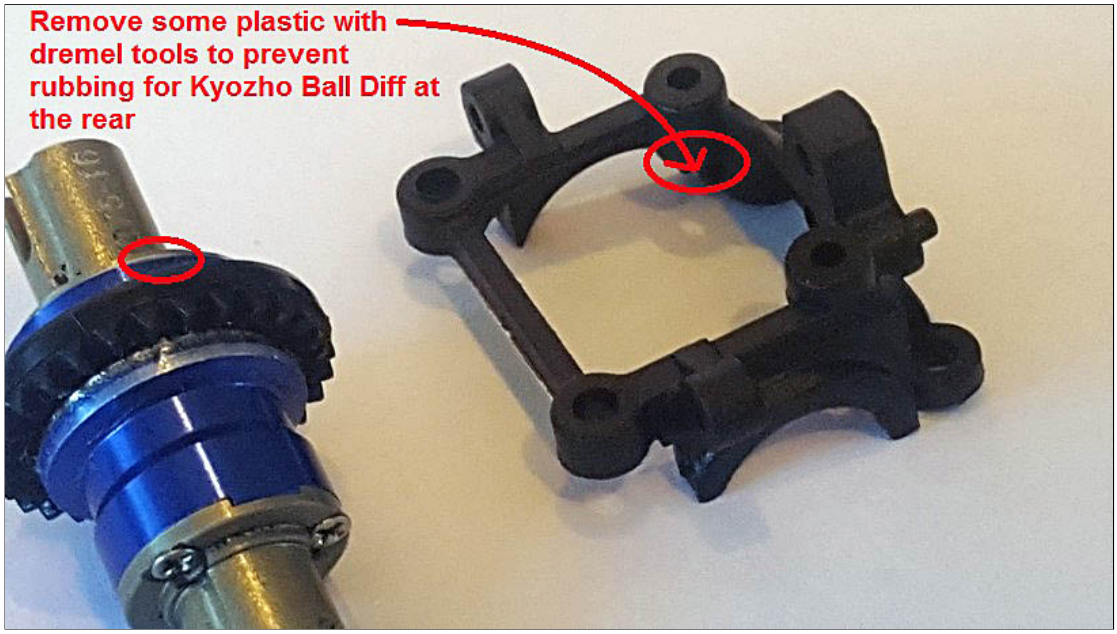
Use the tiny screws, 1.2x4mm, to fasten the Front and Rear Central shaft holders:

Use 2x4mm button head self-tapping screws to secure the top half of Ball Diff holders:

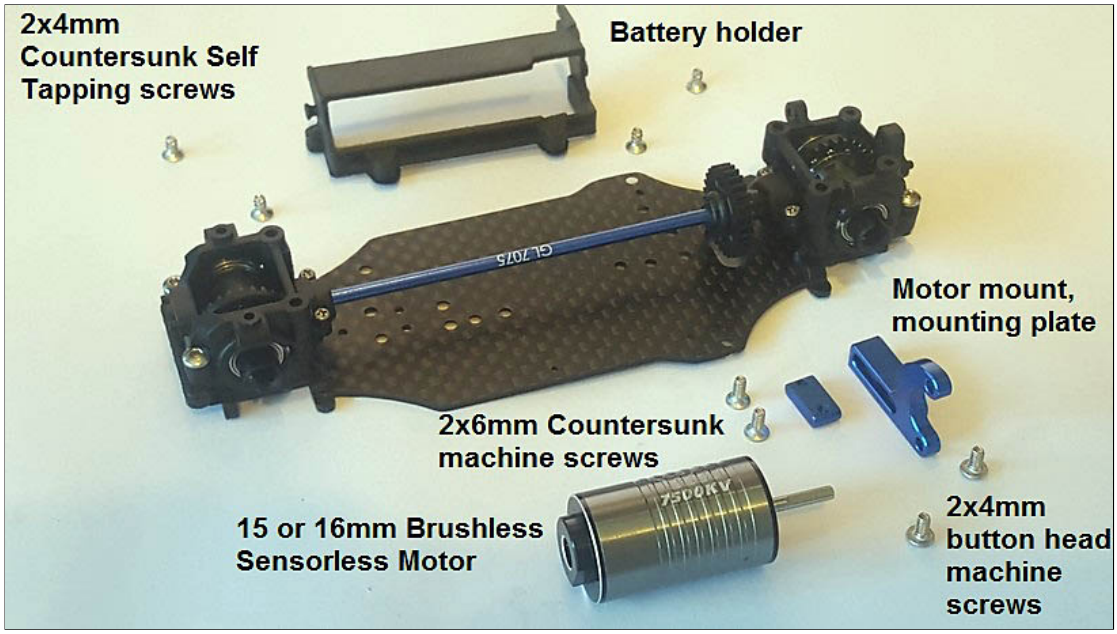
Completed below:

Special Note for Kyozho Ball Diff:

If you try to use Kyozho Ball diff at the rear, it will rub against the marked area of the top rear diff holder, use a dremel tool to remove just enough plastic for clearance.

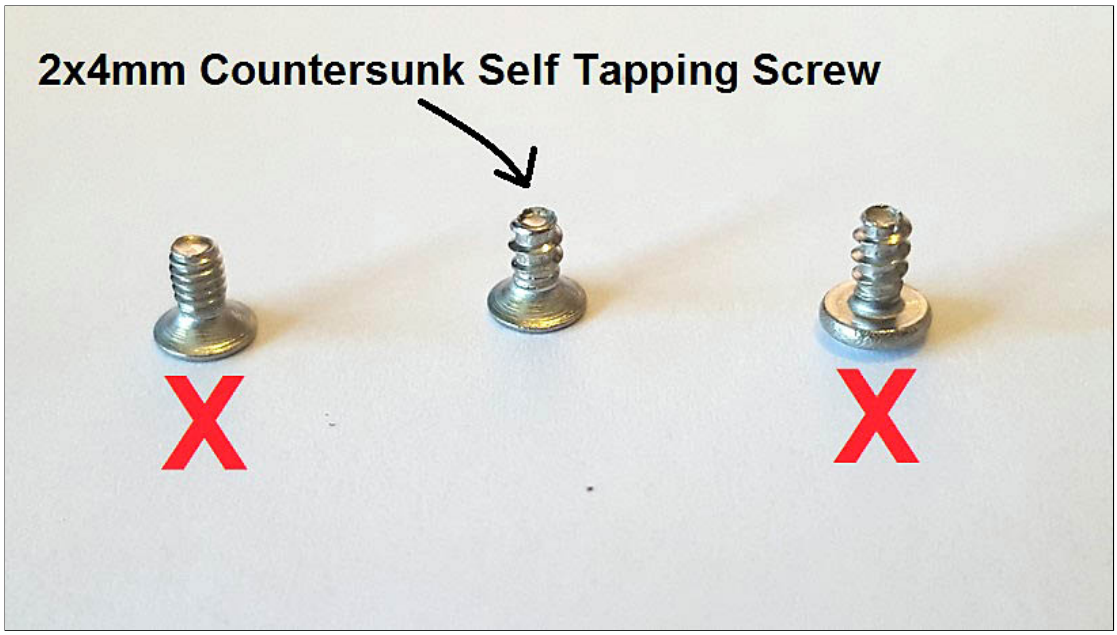


Battery holder and Motor mount:

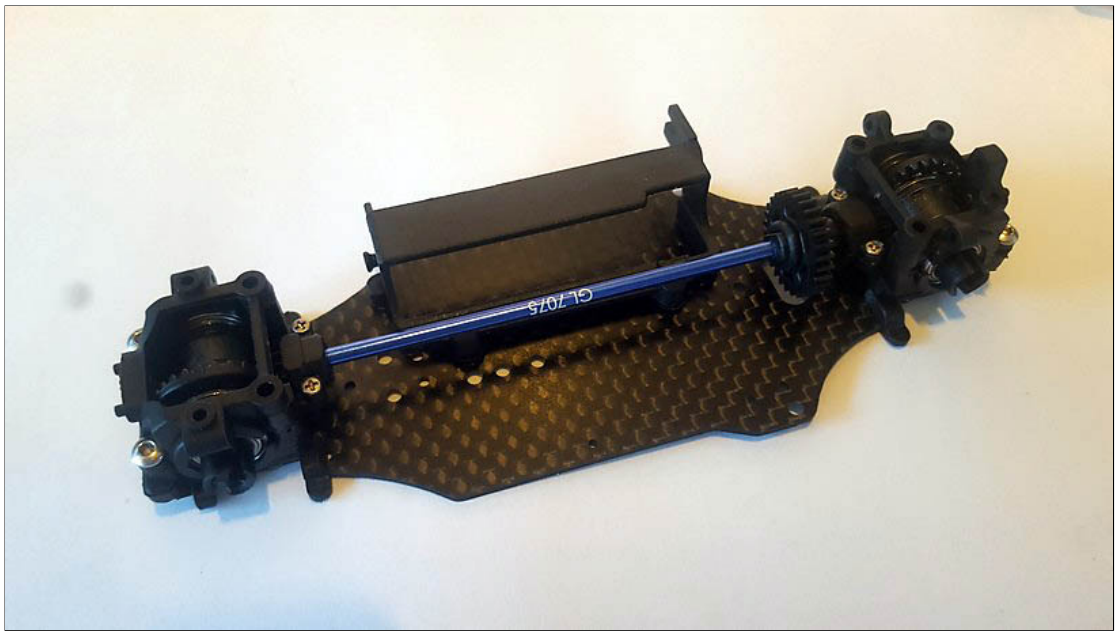


Battery Holder:

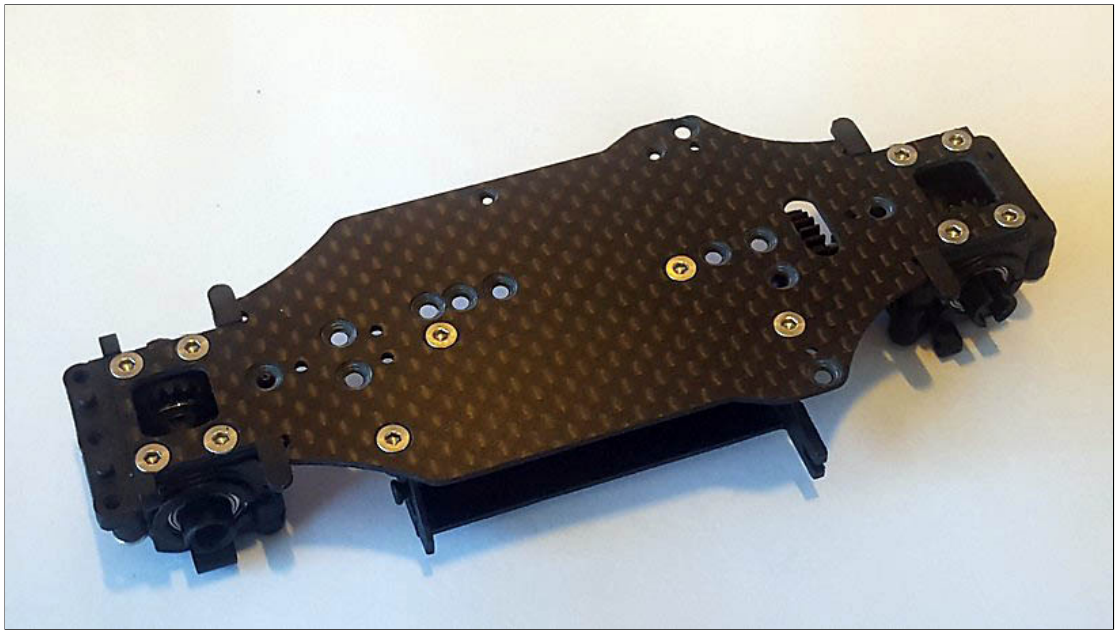
Use 2x4mm Countersunk Self Tapping Screws to secure Battery holder:



Top view:

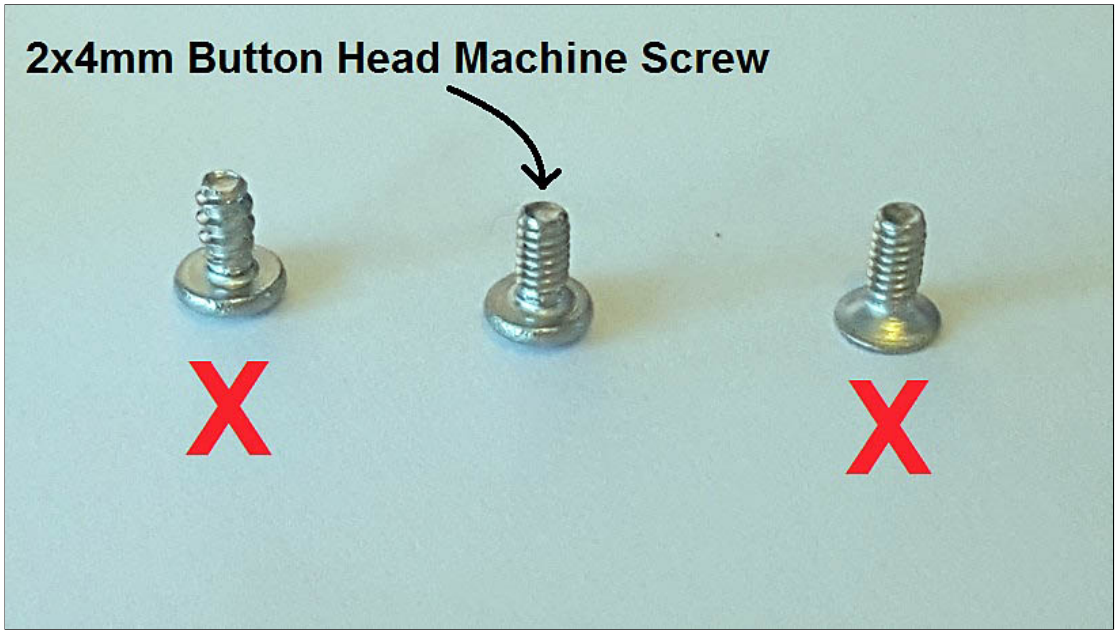


Bottom view:

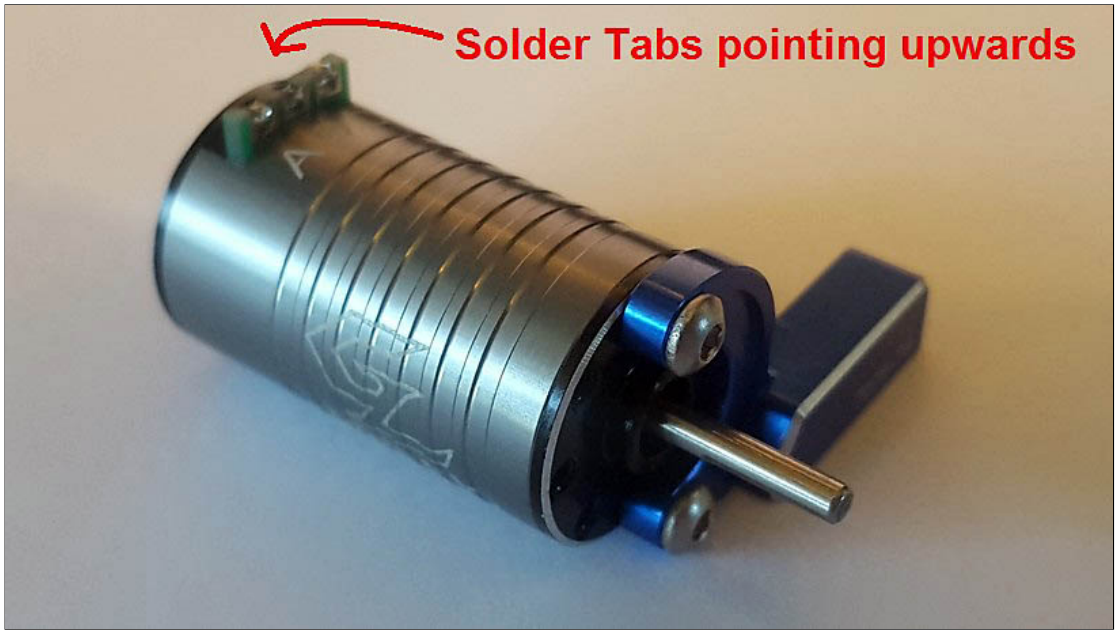


Motor Mount:

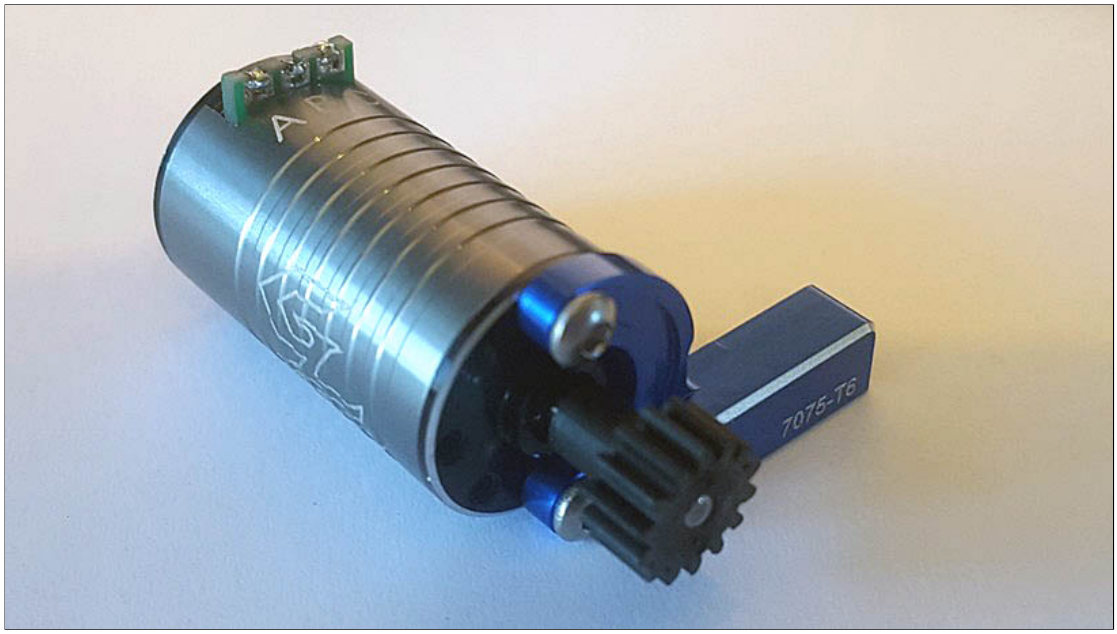
Use 2x4 Button head machine screws to fasten Motor to Motor mount:



Mount motor so that the solder tabs are pointing upwards for soldering to Electronic Speed Controller (Esc) later:



Push Pinion gear onto Motor Shaft, see Gear Ratio Chart for details, but for the bundled 28T spur, use 15T for ~5500KV, 13T for ~7500KV, 12T for ~9500KV:

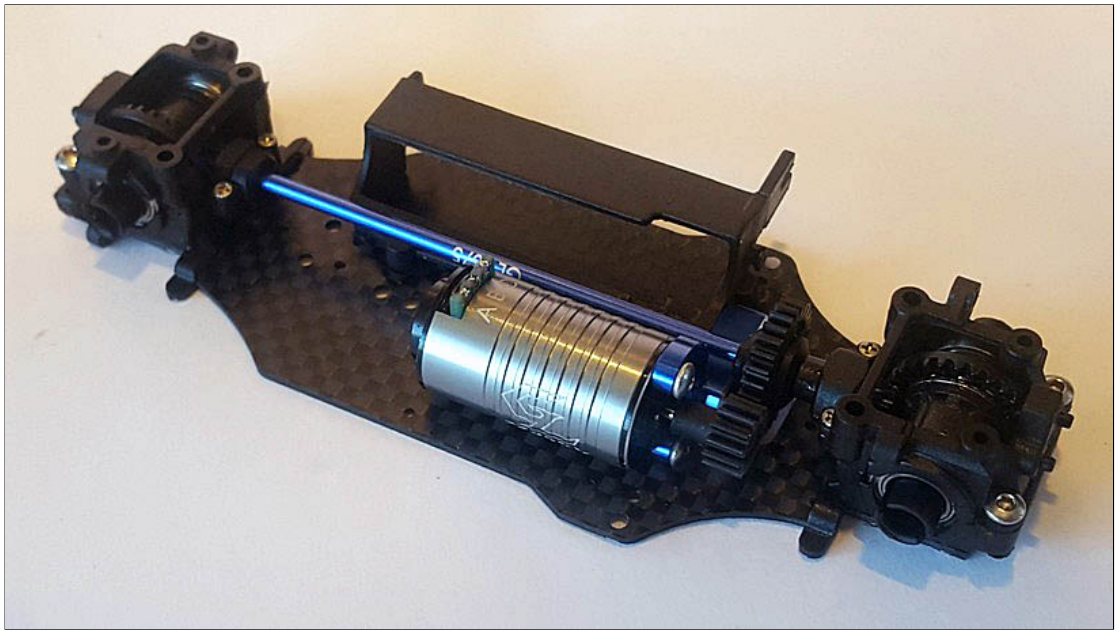


Insert mounting plate into Motor mount (it might be in Motor mount already):

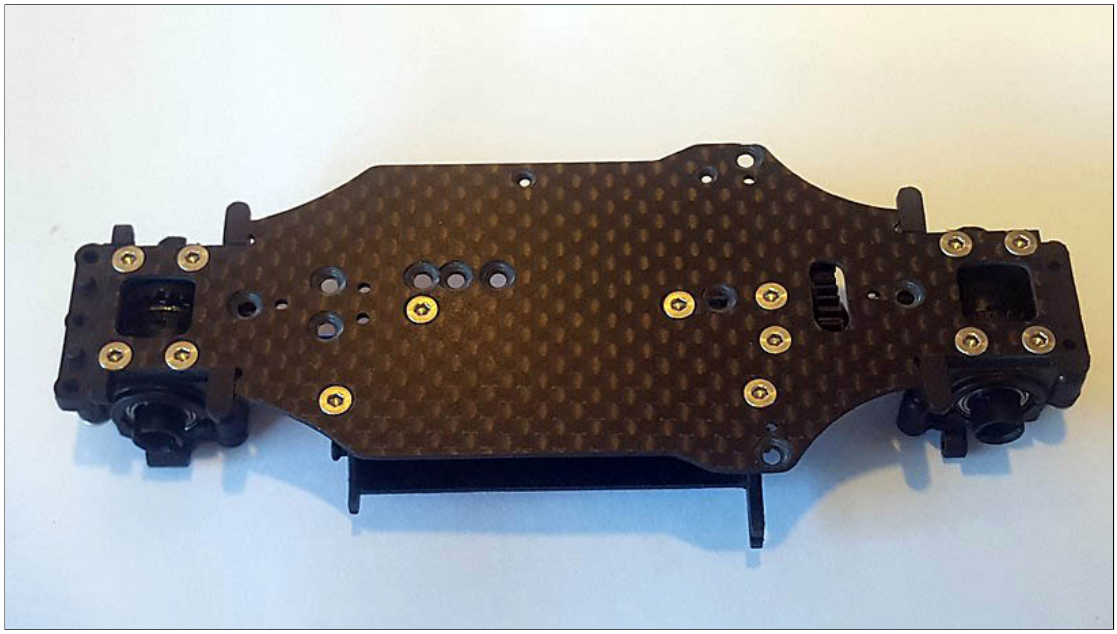
After mounting plate is in place:

Use 2x5mm Countersunk Machine Screws to secure the motor mount, MAKE SURE TO use the longer 2x5mm and NOT 2x4mm:

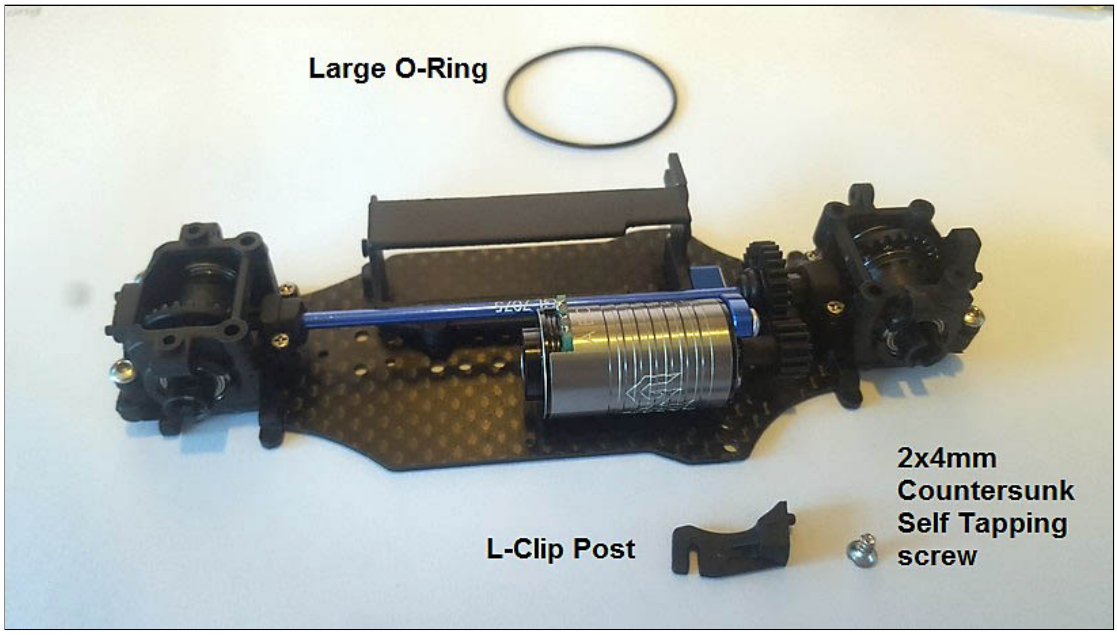
Top view of Motor mount, you can loosen the screws to adjust the gear mesh of the pinion and spur:



Bottom view:

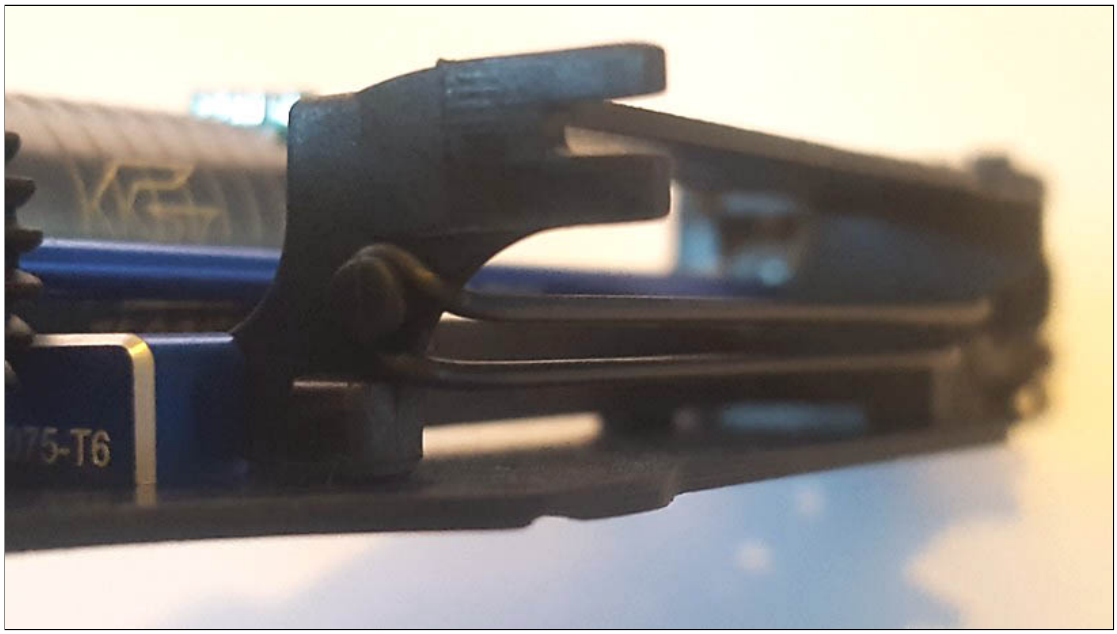


Battery O-ring and L-Clip post:



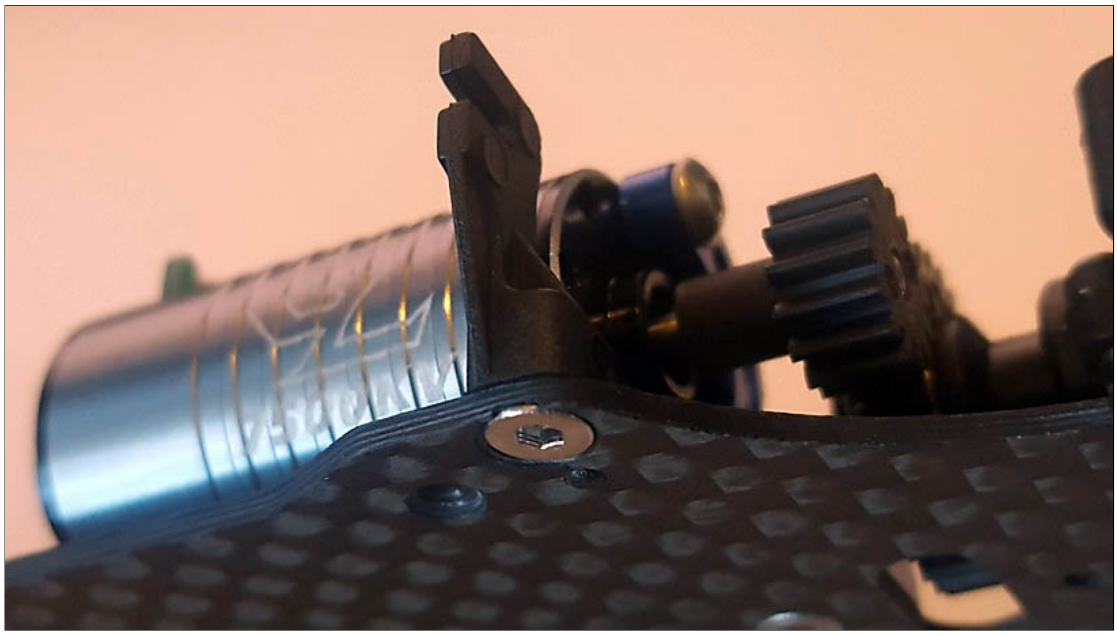
Battery Holder O-Ring:

Simply hook the o-ring onto the Battery holder as follows:

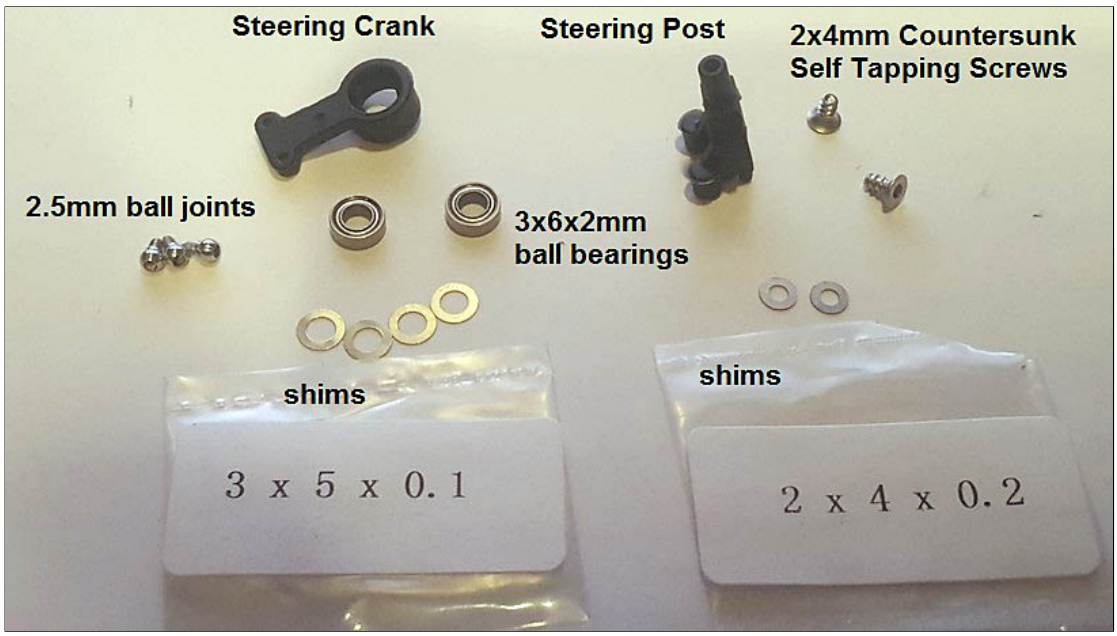


L-Clip Post:

Use a 2x4mm Countersunk Self tapping screw to attach it to chassis:

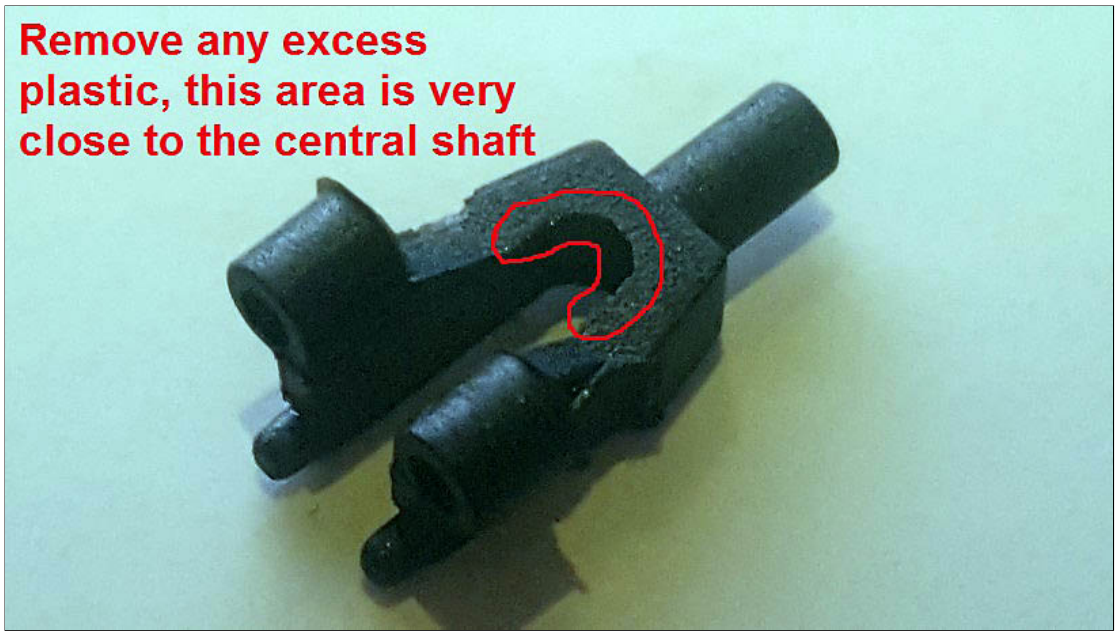


Steering Crank Assembly:

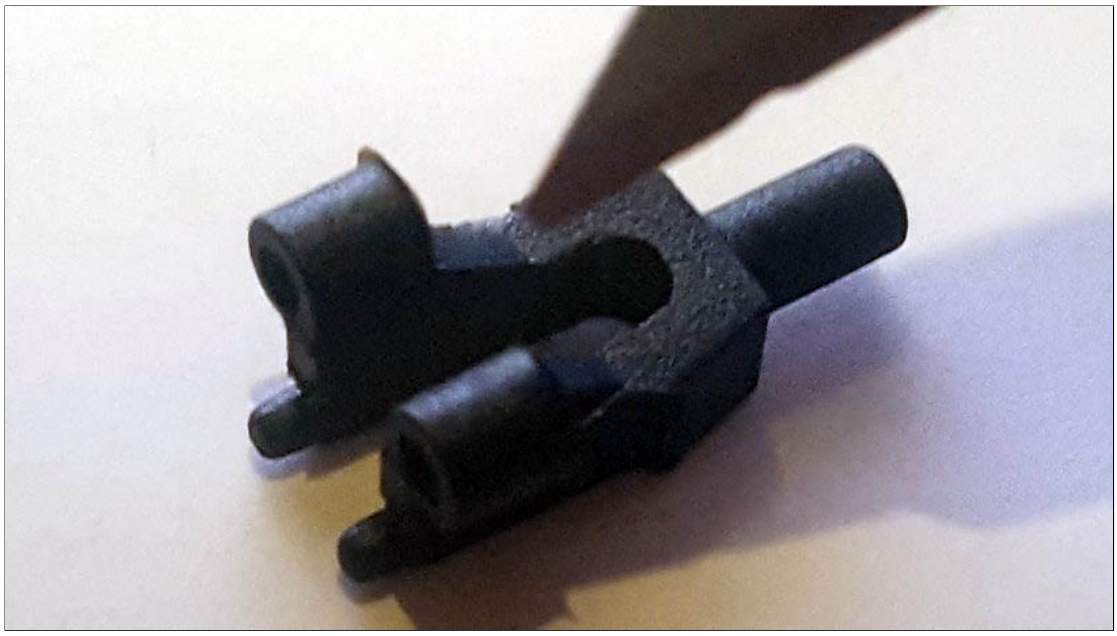


Steering Post:

The marked area below is very close to the central shaft, use knife to remove any excess plastic from the molding process:



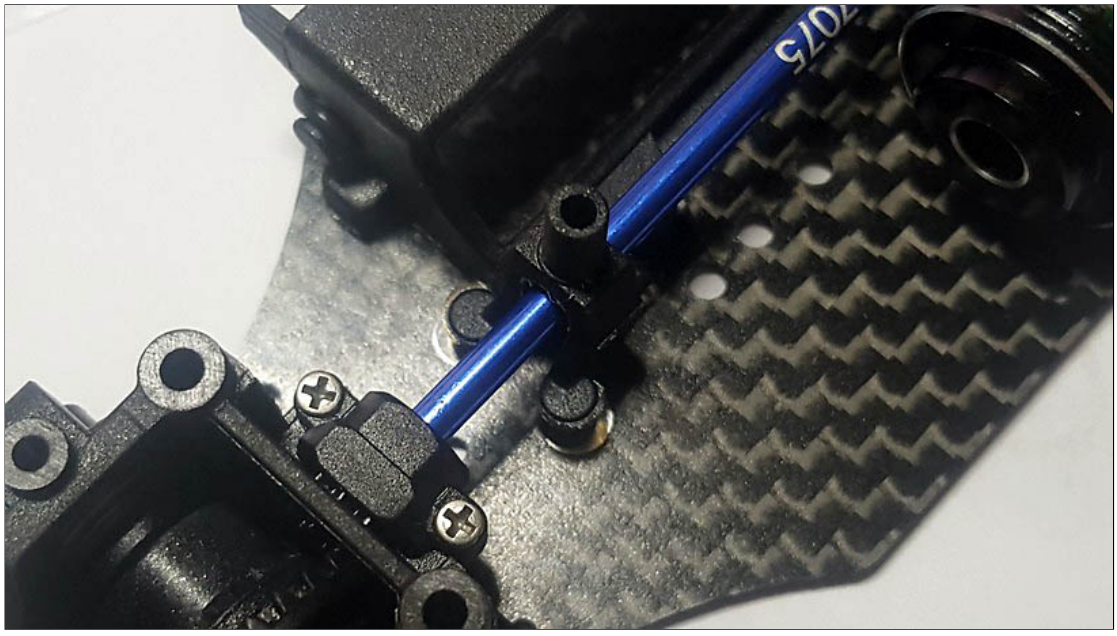
Use knife, sand paper or metal file:



Excess plastics cleared:

Place a 2mm x 0.2mm shim under the steering post, one on each side:

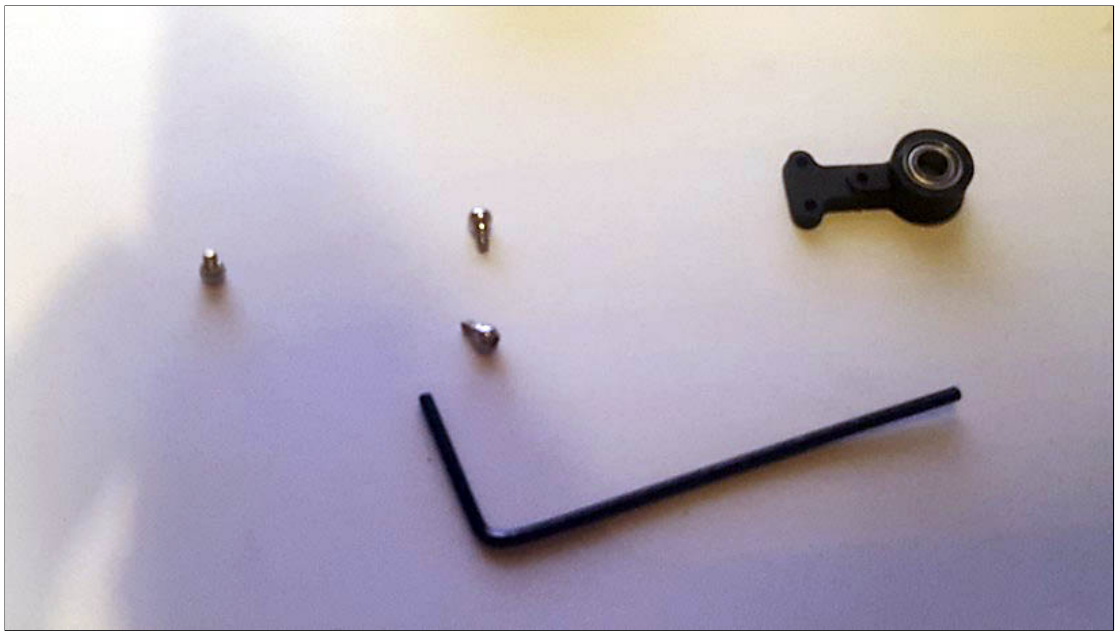
Use 2x4mm Countersunk Self Tapping screws to fix the steering post onto chassis:



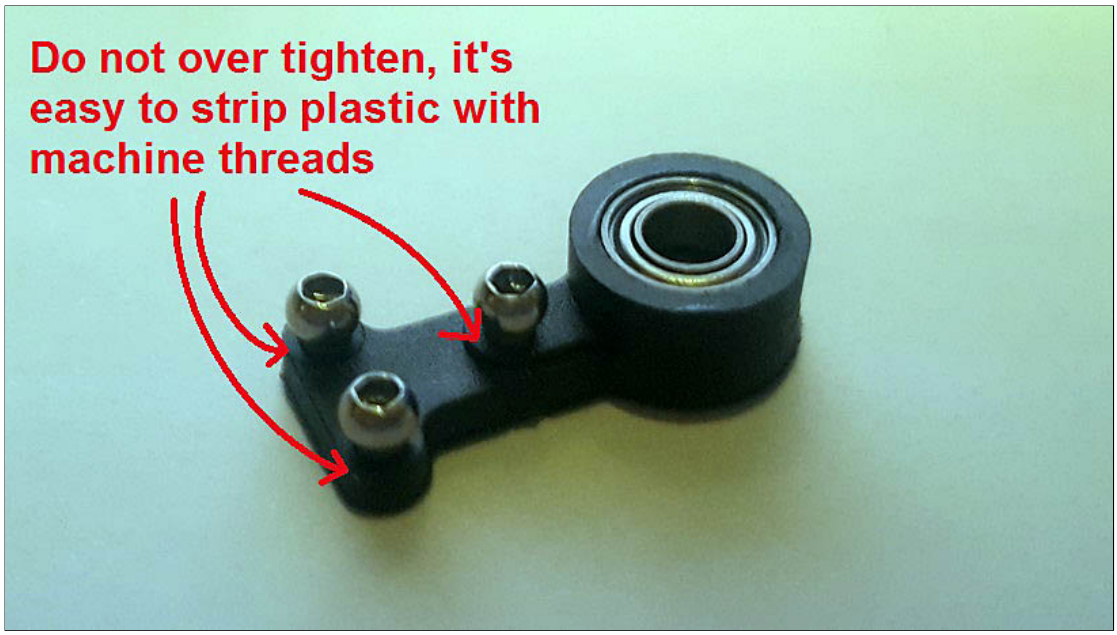
Bottom view:

Steering Crank:

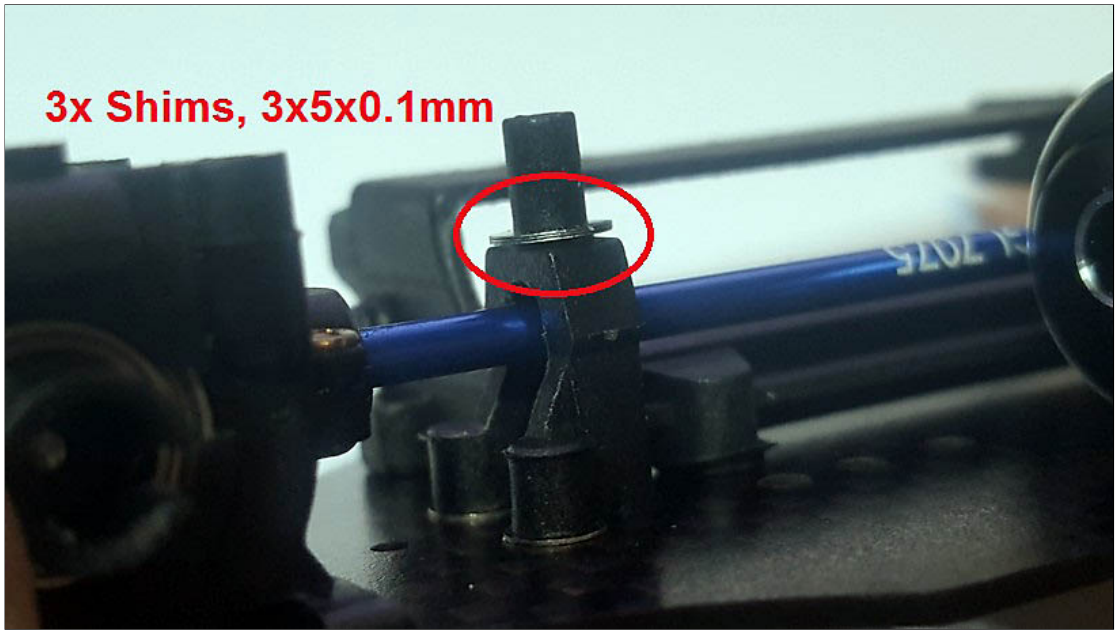
Press the 3x6x2mm ball bearings into the top and bottom slot of the steering crank:



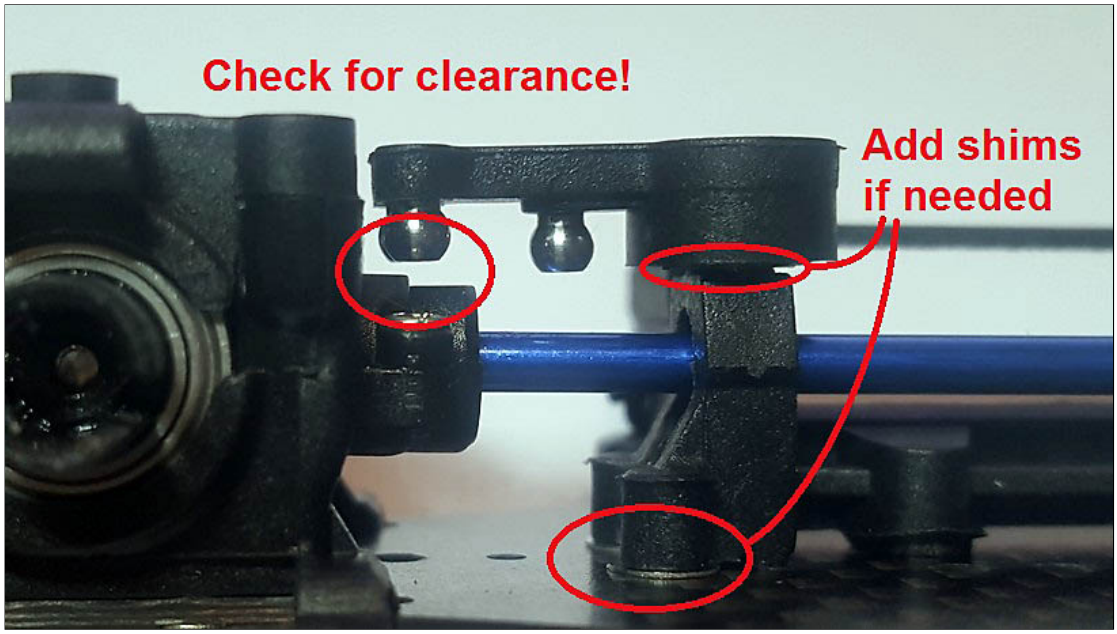
Use the provided Allen key to screw the three 2.5mm ball heads into the crank:



Place 3x Shims, 3x5x0.1mm onto the steering post:

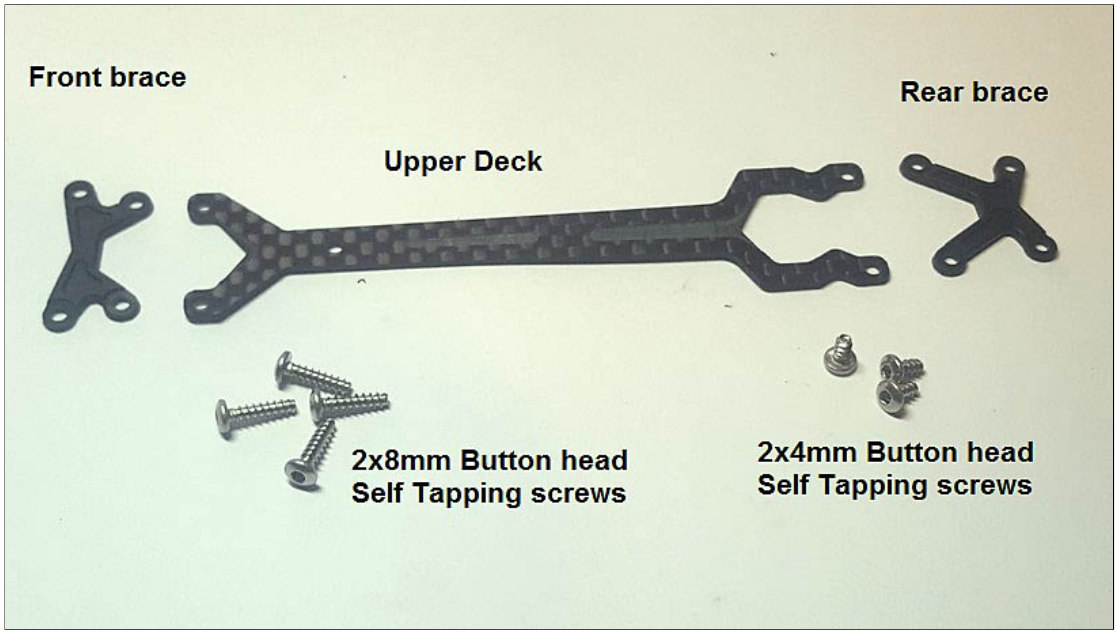


Insert the steering crank onto the steering post, check for ball heads clearance against Front central shaft holder, adjust shims as necessary:

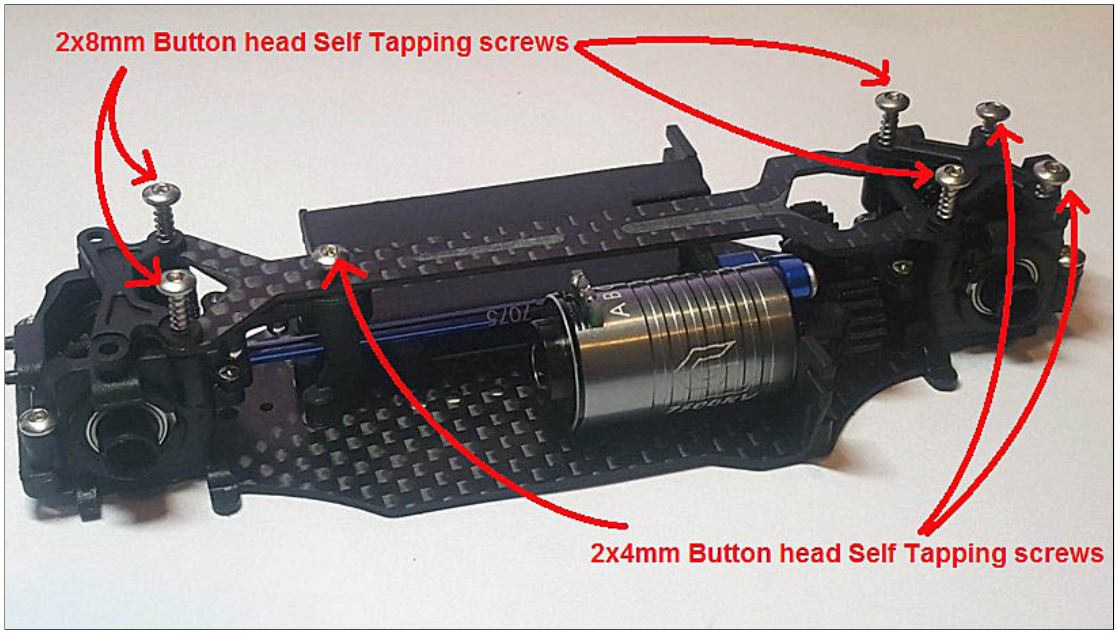


Place 1 Shim, 3x5x0.1mm on top of steering crank:

Upper Deck:



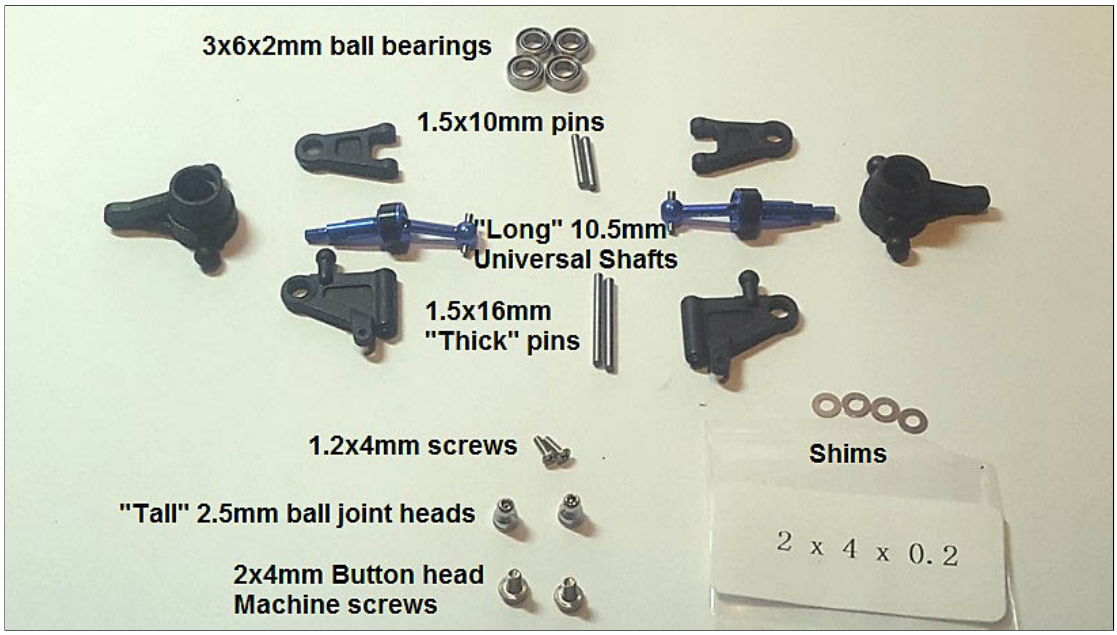
Use the 2x8mm and 2x4mm Button Head Self Tapping screws as below:



For the five upper deck screws, after fully tightened, leave the 2 holes at the front brace blank without screw for now:

> **TIP:** Optionally undo half a turn so that upper deck is free to twist for more chassis flex

Front arms:

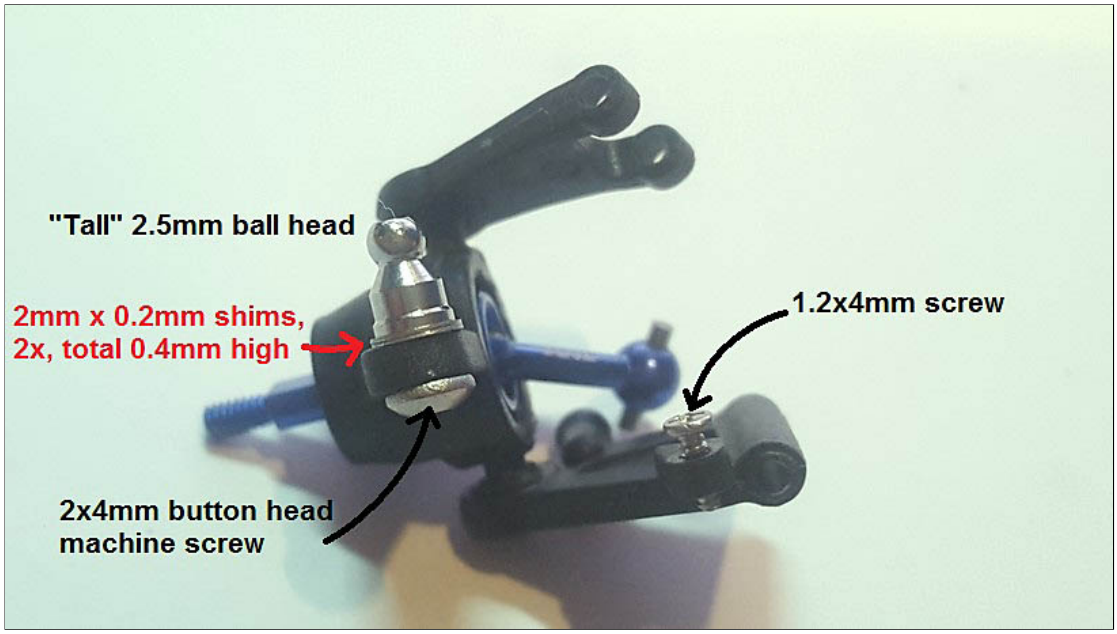


Step-by-Step guide:

Insert 3x6x2mm Ball bearings into both inside and outside of Front Cups:

Left arm below:

1. use 1.2 x 4mm tiny screw as downstop screw
2. screw 2x4mm button head machine screw into steering arm from bottom to top
3. add 2 shims sized 2mm x 0.2mm, total 0.4mm thickness
4. screw on top the "Tall" 2.5mm ball head
5. insert "Long" 10.5mm Universal shaft into Cup



The Front Cup plastic ball heads have some excess plastic and are a little too big for a friction free joint, use sand paper to remove excess plastic and reduce ball size a little as shown in this video:

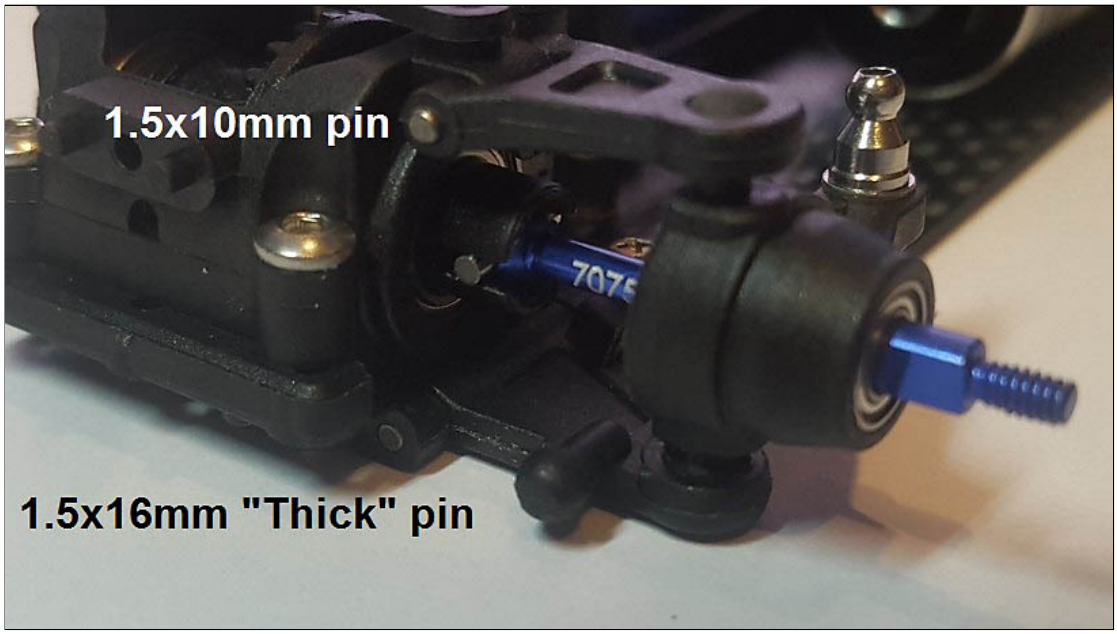
There are some excess plastic on the lower arm in the marked areas, use sandpaper and/or a knife to remove.

TIP: Use a knife to clean up the edges of the 1mm hole, so that plastics don't go into the 1mm hole, potentially jamming the pin

See video:

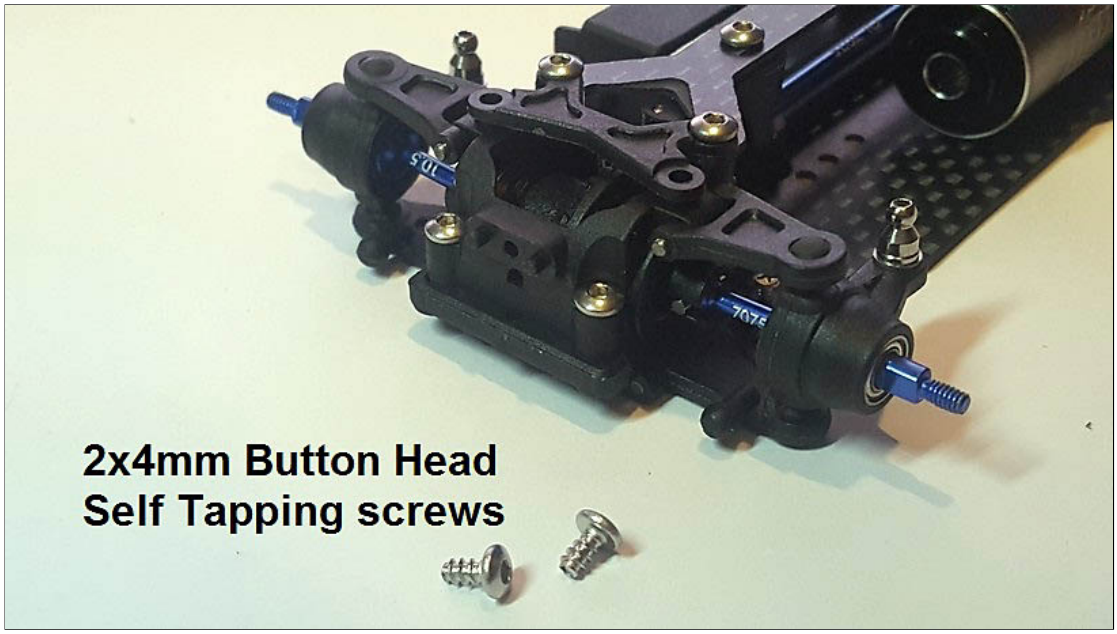
For ultimate grip, it is important that the arms are free to go up and down as much as possible but without too much free play making car unstable, ideally, suspension joints should be free to move, but with as little free play as possible, if the arms can drop by gravity without springs, that's usually good enough, see video:

AFTER checking for smoothness of the joints, insert the 1.5x10mm pin fully through the top arm, and the 1.5x16mm pin to the lower arm.

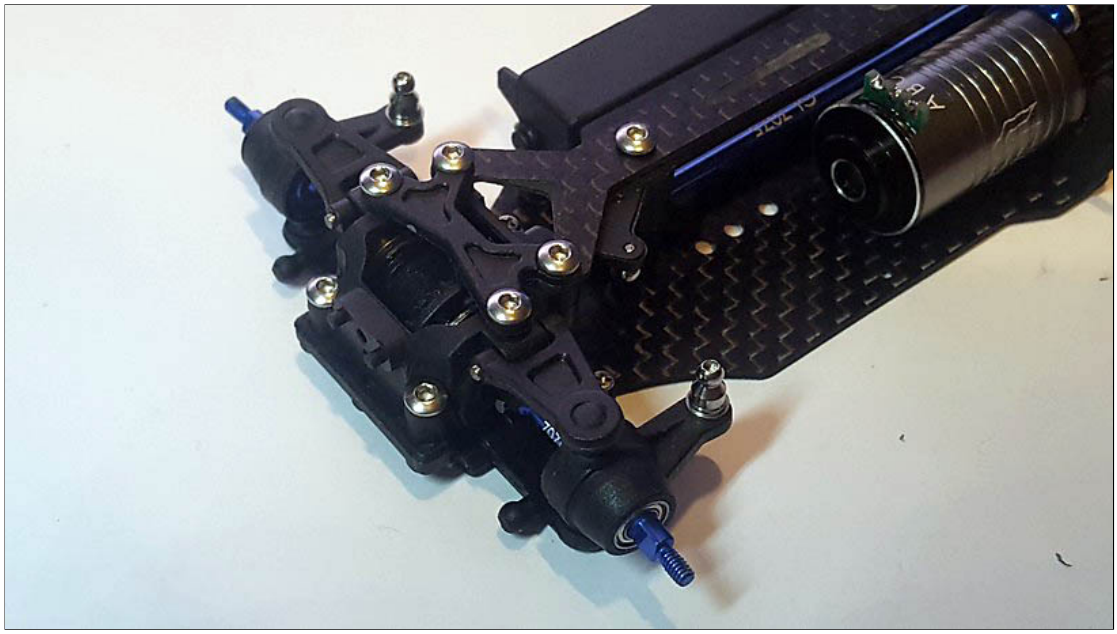


Repeat/Mirror above steps for front right arm.

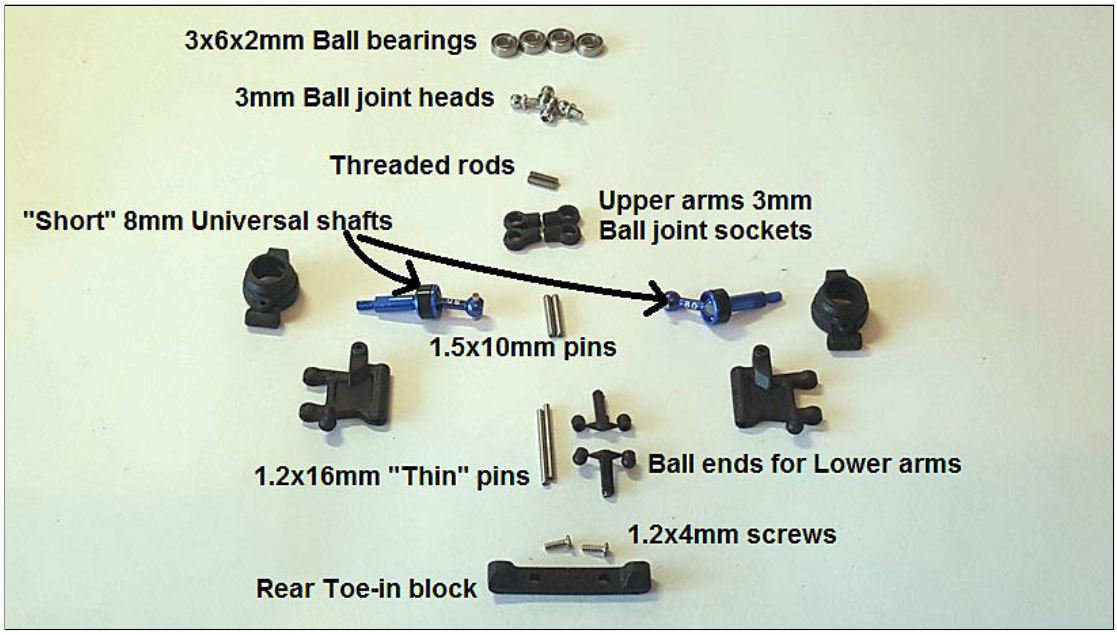
Use 2x4mm Button head Self tapping screws to secure the Front brace as well as Front arm pins:



Front arms done!



Rear arms:

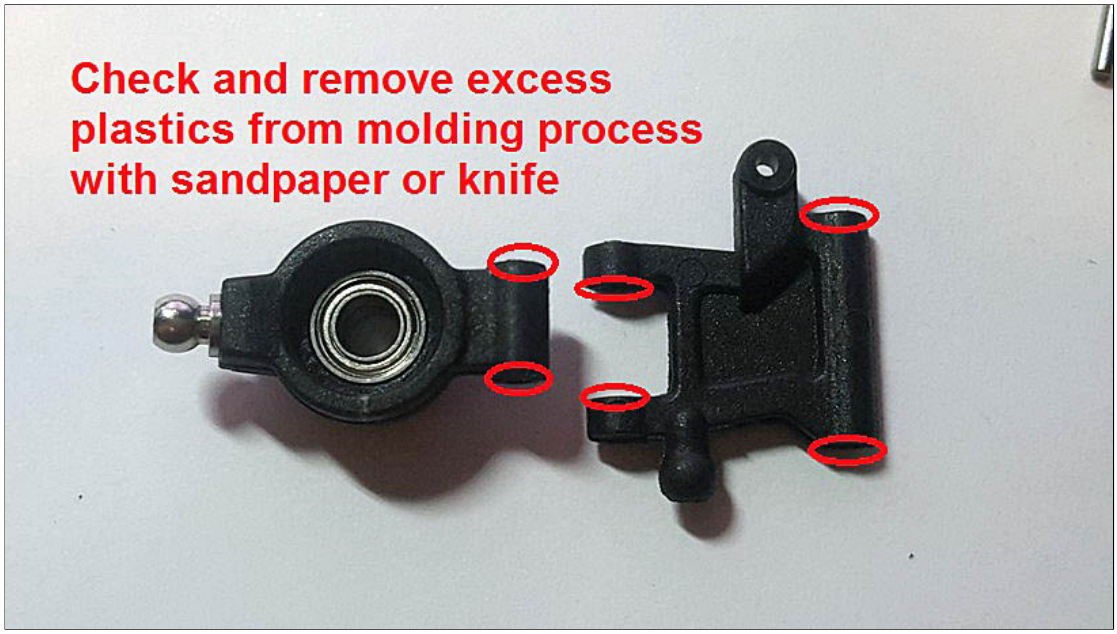


Step-by-Step guide:

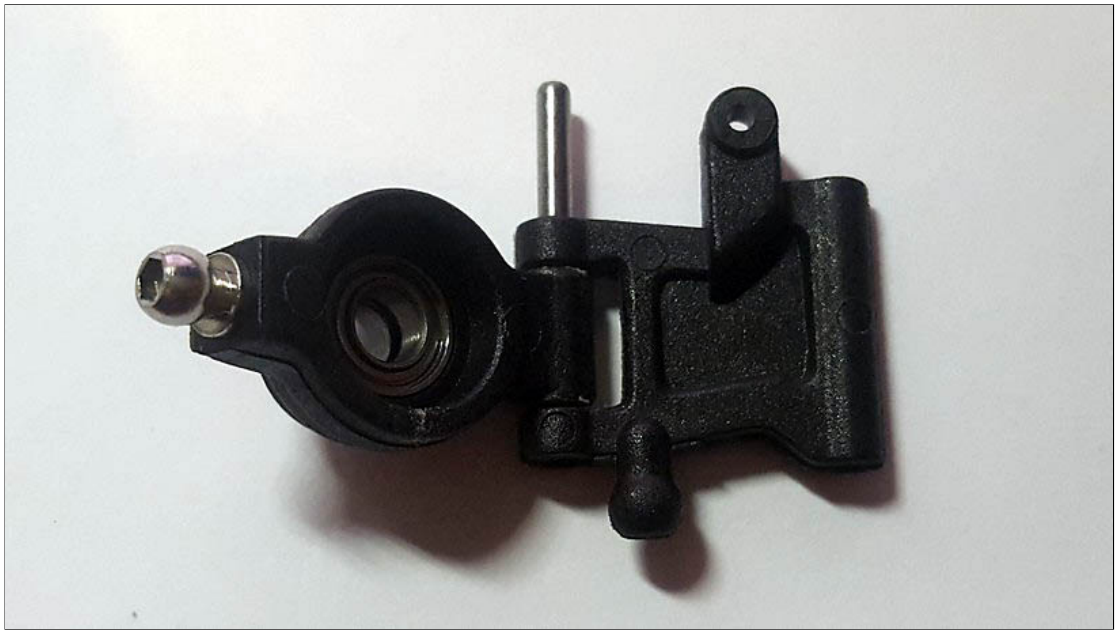
Insert 3x6x2mm Ball bearings into both inside and outside of Rear Cups

Screw 3mm Ball joint heads into Rear Uprights

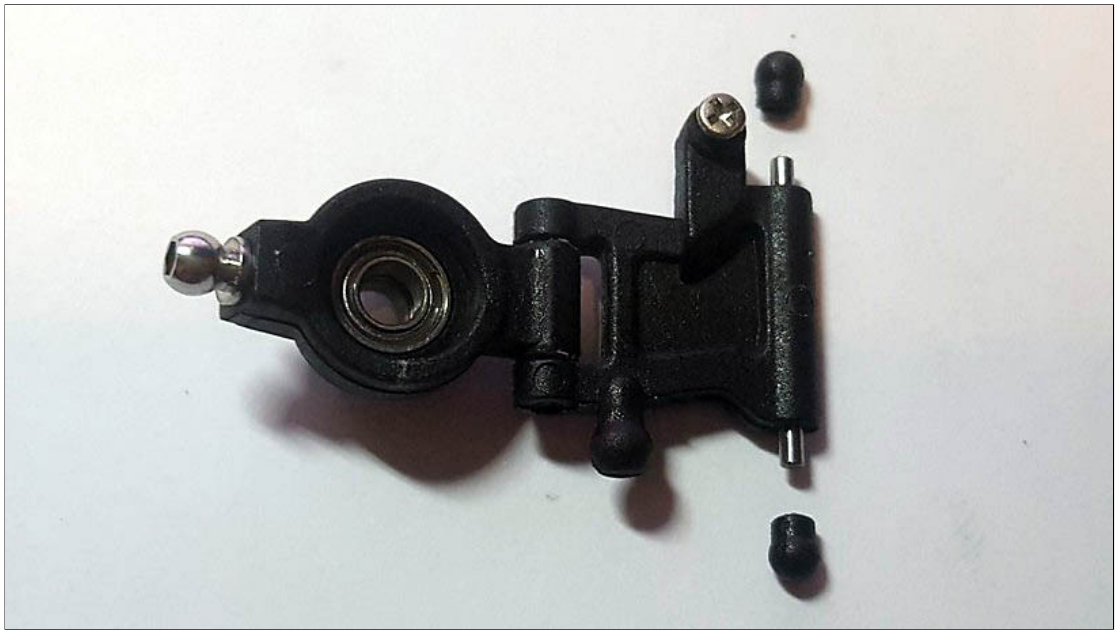
Check and remove excess plastics in the marked areas, this ensures the arms can move freely with minimal friction:



Insert 1.5x10mm pin in place:

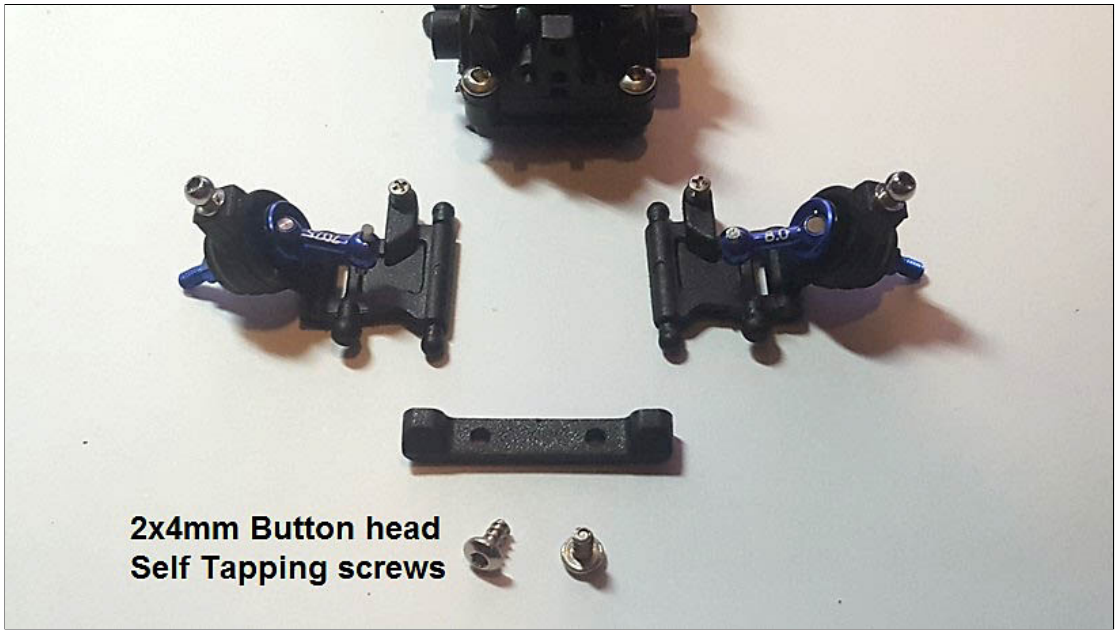


1.2x4mm screw into downstop hole, insert 1.2x16mm "Thin" pin lower arm

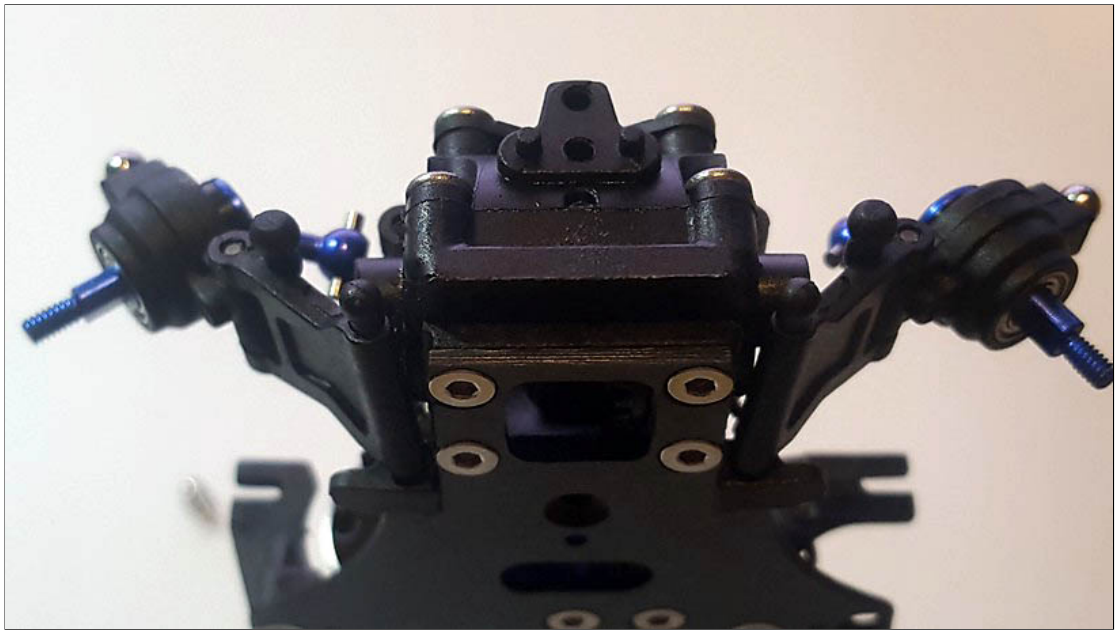


- Attach ball ends to lower pin
- Insert "Short" 8mm Universal shaft into Rear Upright
- Repeat/Mirror for right hand side

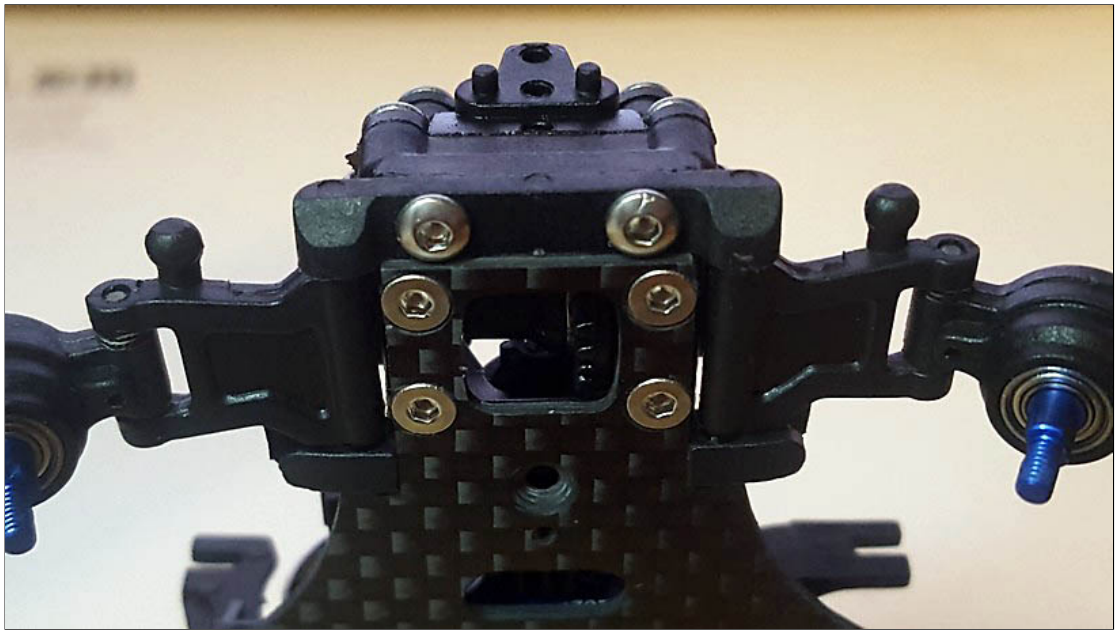
Prepare to mount the Rear Lower arms:



Place both left and right arms into chassis like below (Reminder, make sure down-stops are above chassis) :

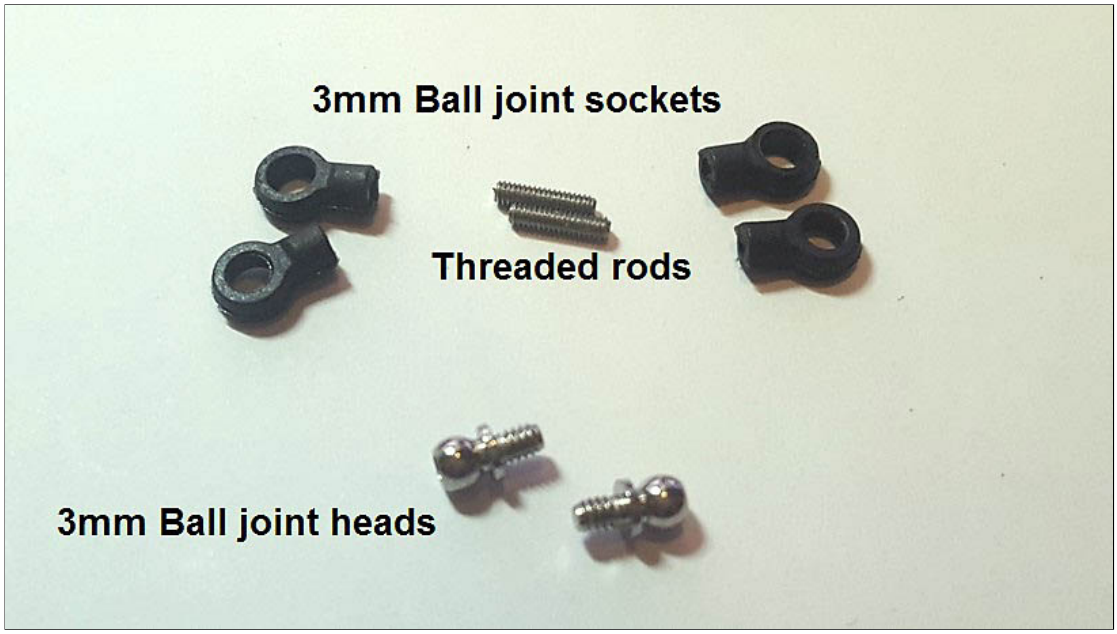


Use 2x4mm Button Head Self Tapping screws to fasten Rear Toe-in block:

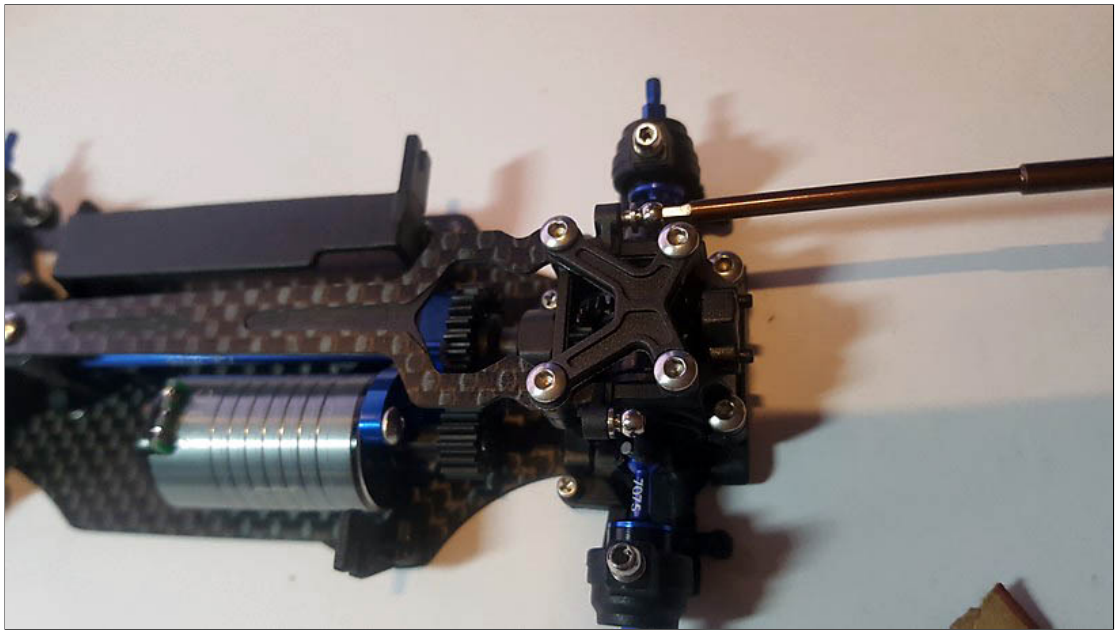


Check that lower rear arms can move freely:

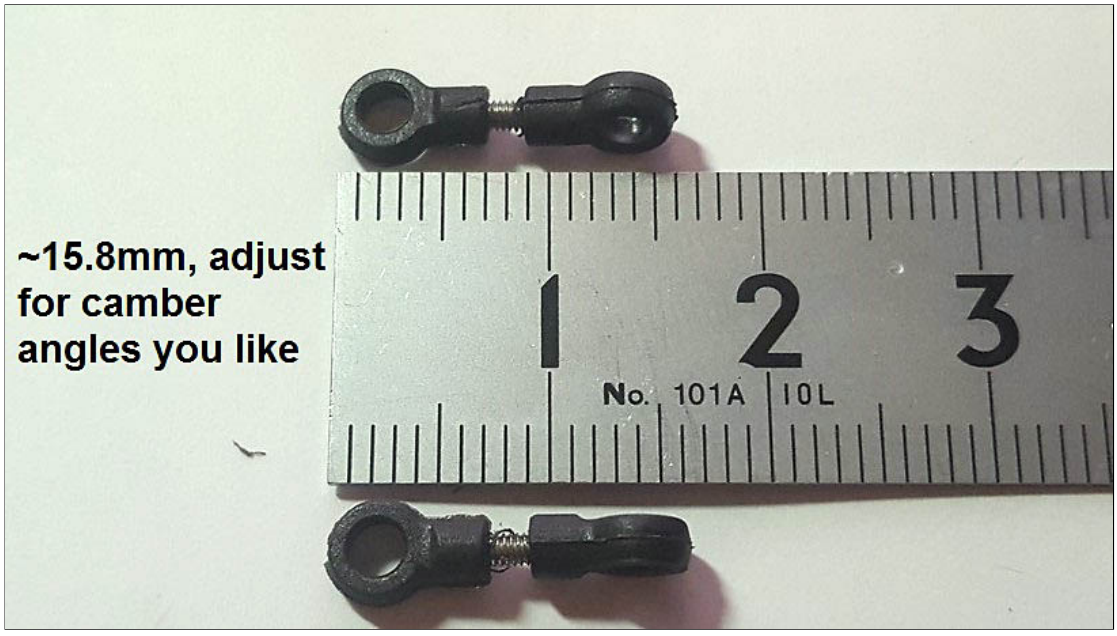
Upper arms/links:



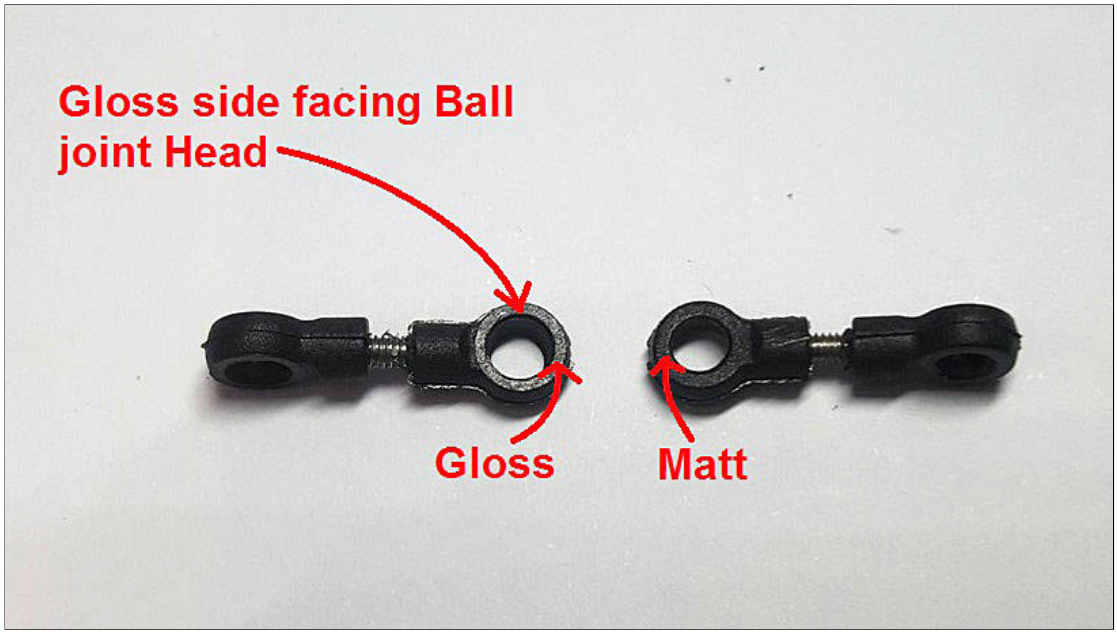
Screw 3mm Ball joint Heads to left and right side of Rear Diff holder:



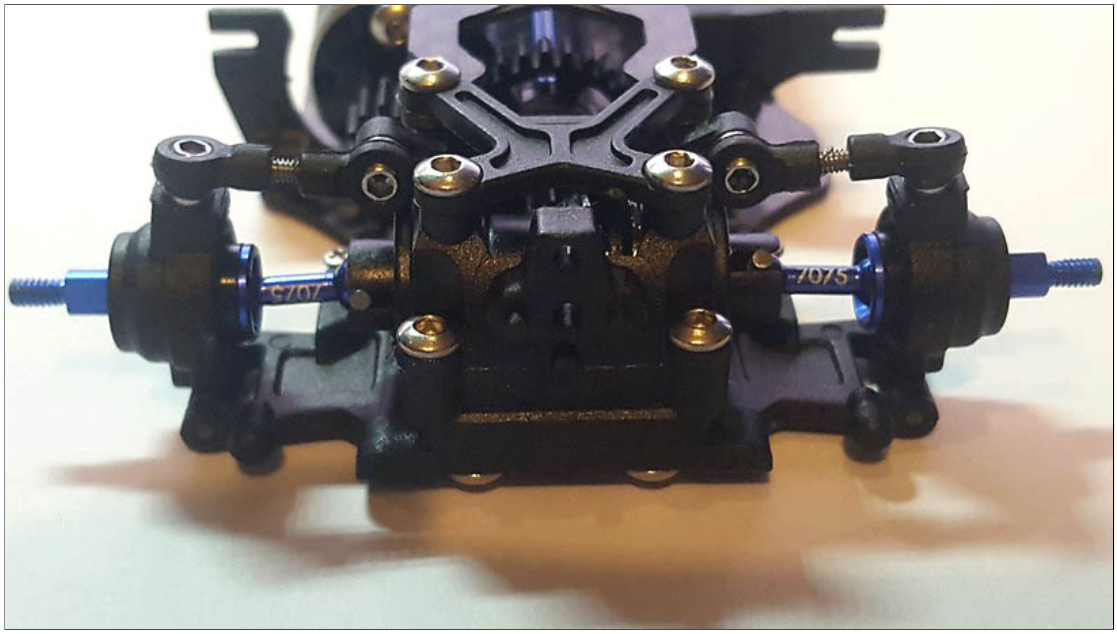
Assemble Rear Upper links to be ~15.8mm in length:



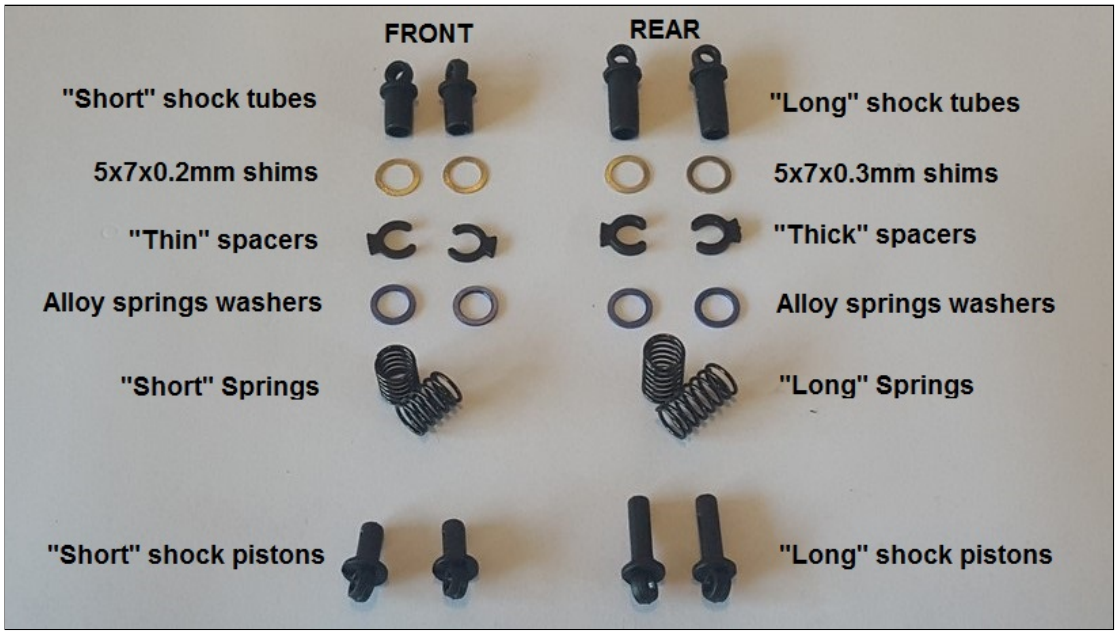
When attaching Ball joints, check that Gloss side faces the Ball joint heads:



Attach Rear Upper arms as below, Rear Arms complete!

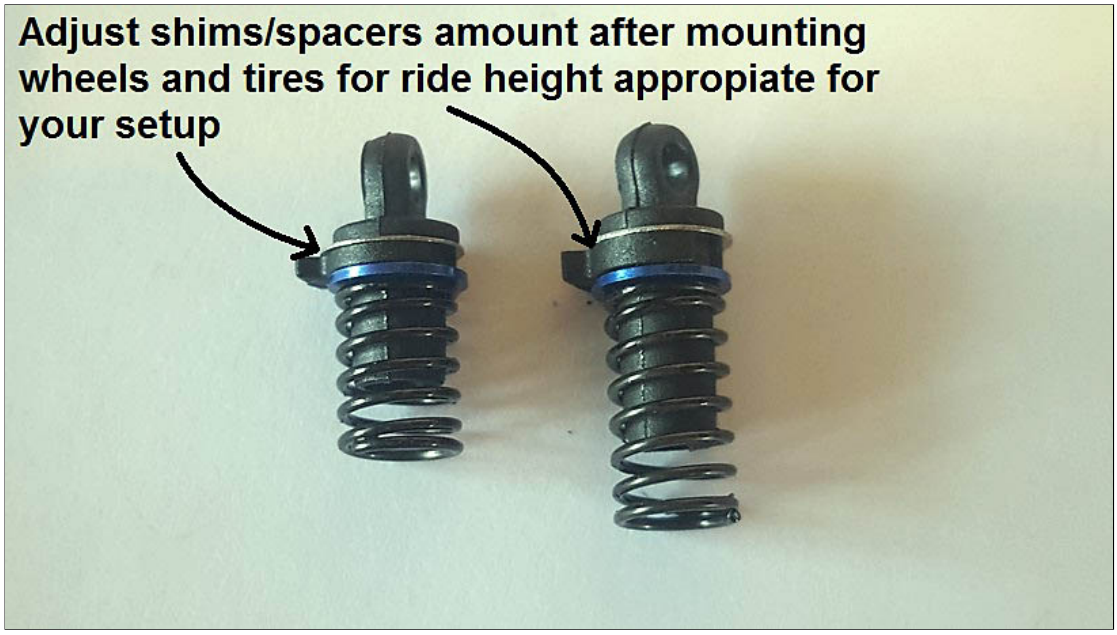


Shock Absorbers:



Step-by-Step guide:

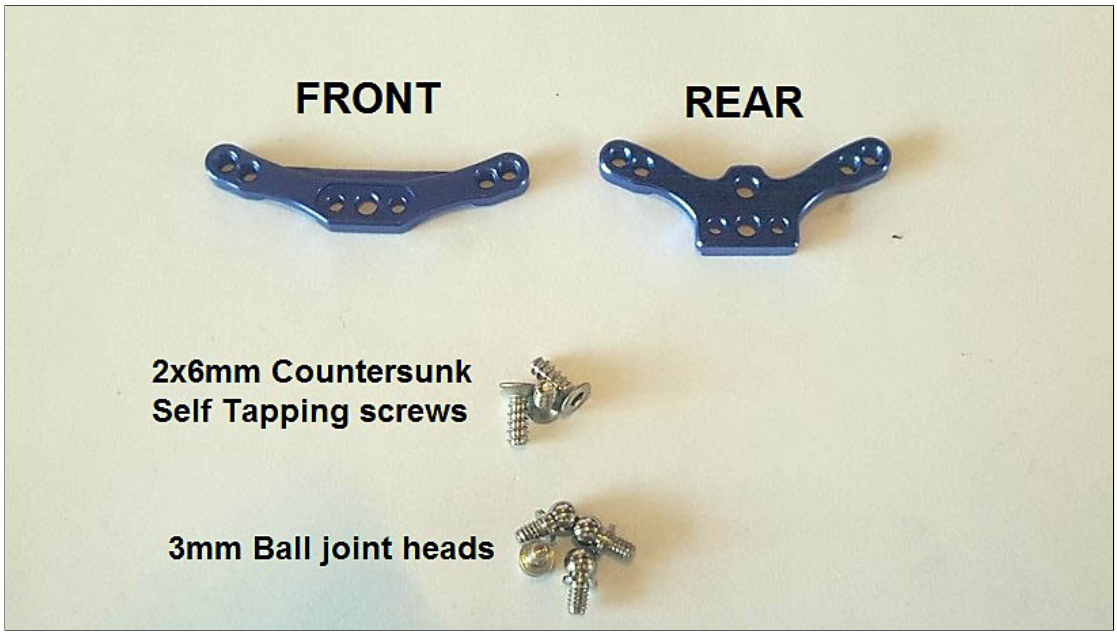
Assemble the top half of the shock absorbers as below:



Apply Friction grease to shock piston as below, we recommend Kyozho 30000 Diff Gear Grease:

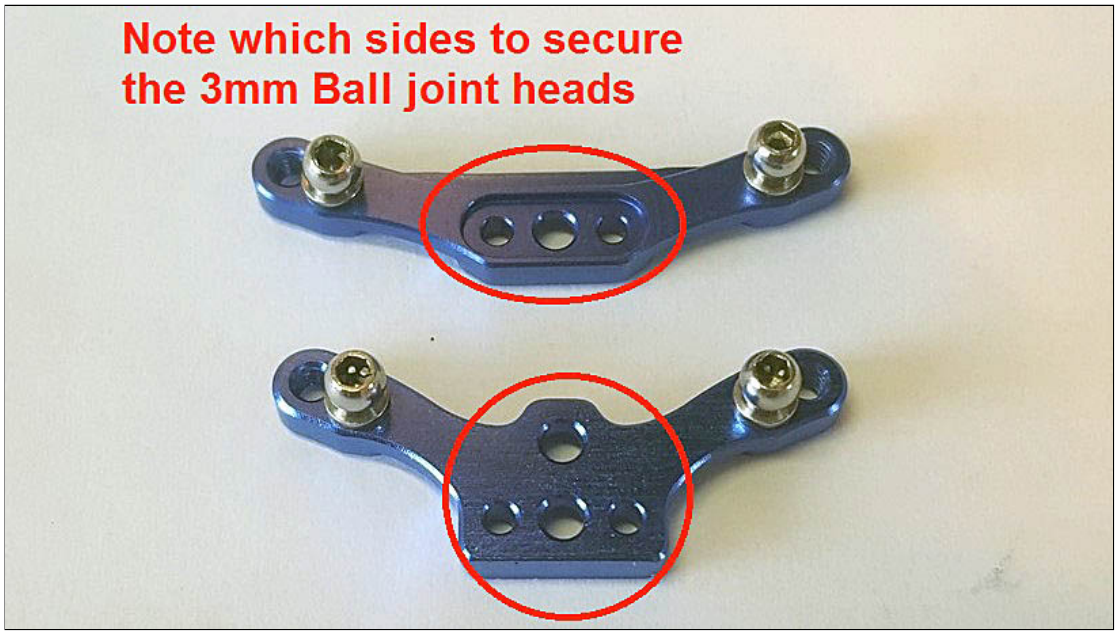
Place piston into top half of shock absorber. Repeat process for a 2nd set:

Shock Towers:

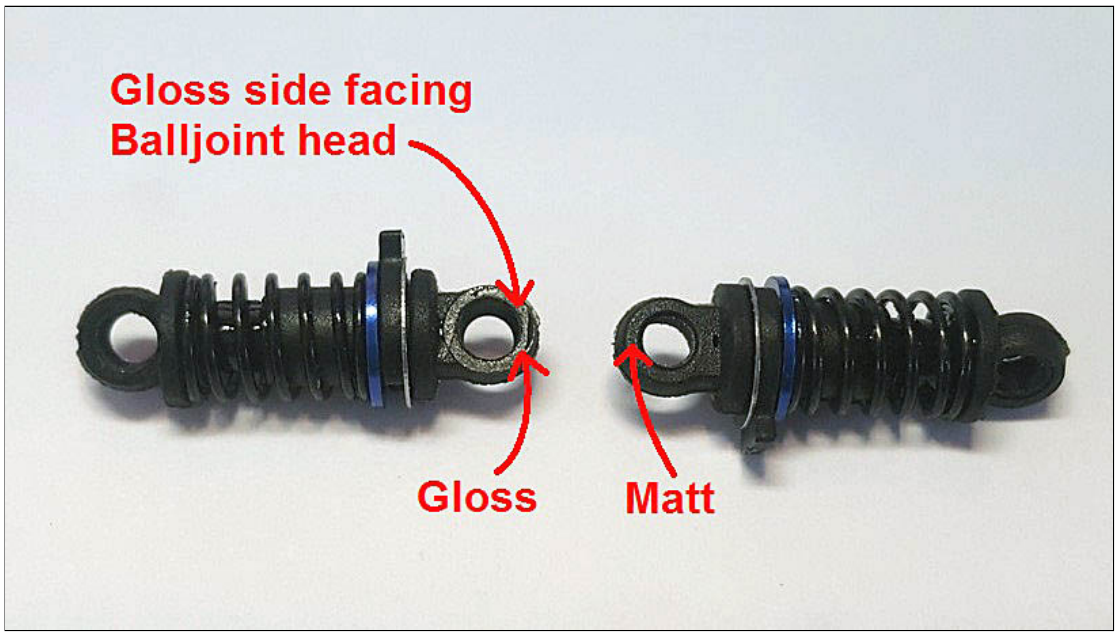


Step-by-Step guide:

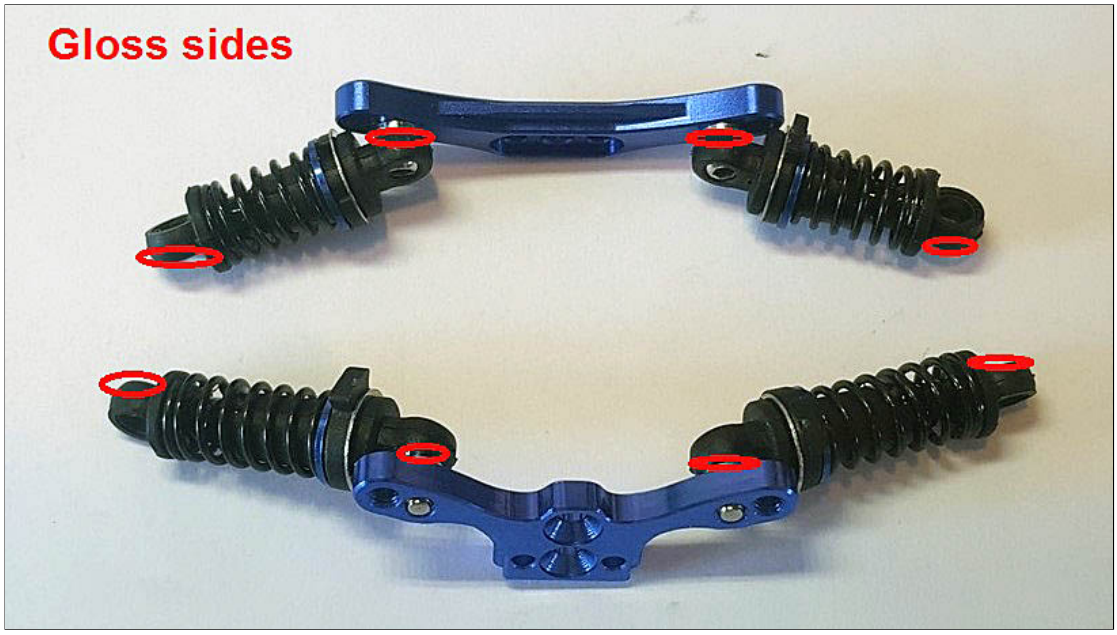
Screw the 3mm Ball joint heads into the "inner" holes of the Shock Towers as below:



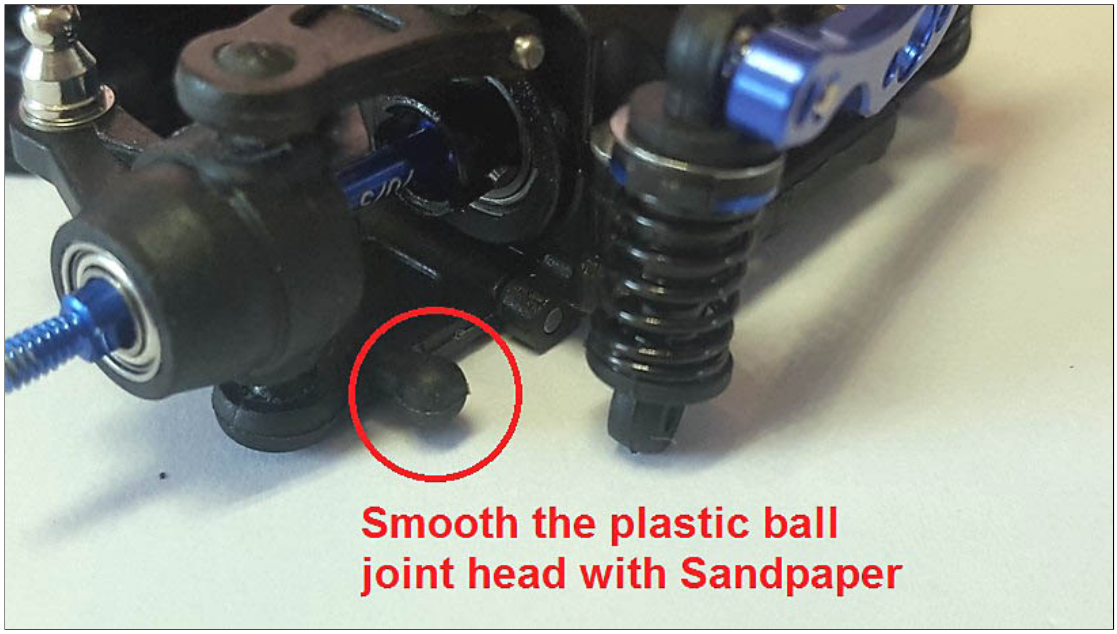
Note that the "Gloss" side faces the Ball joint head:



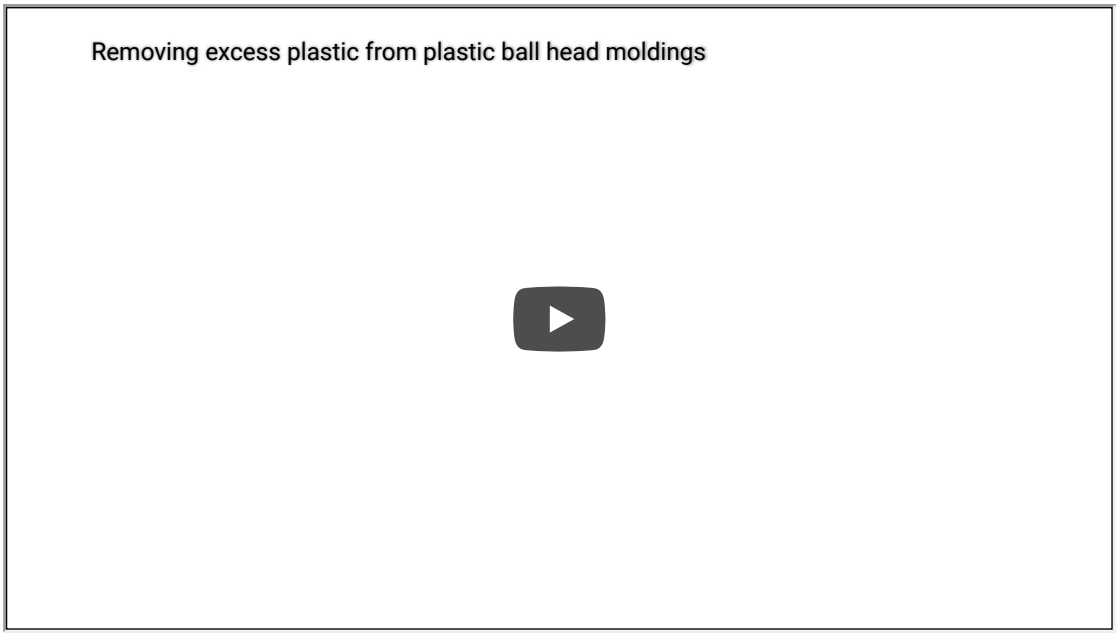
Attach the shock absorbers as below:



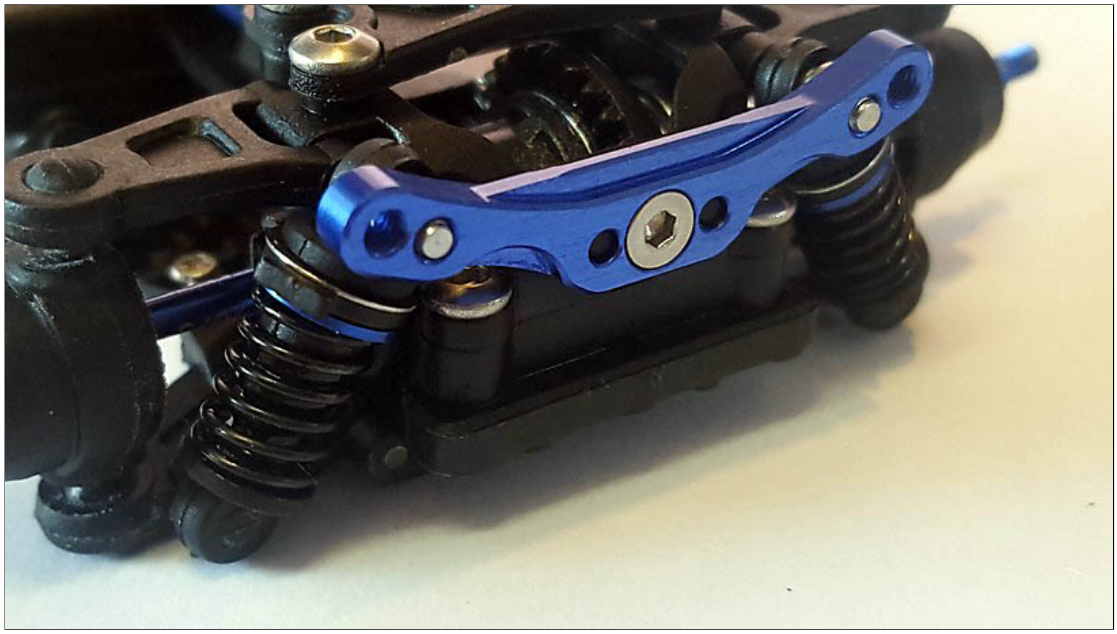
Smooth the plastic ball joint head with Sandpaper:



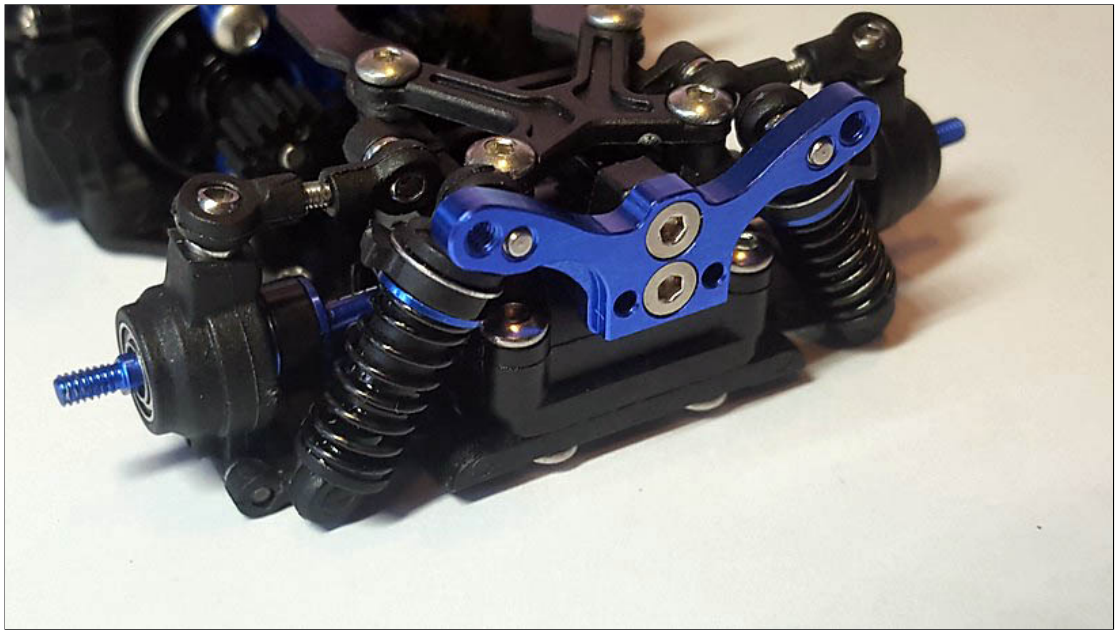
See video also:



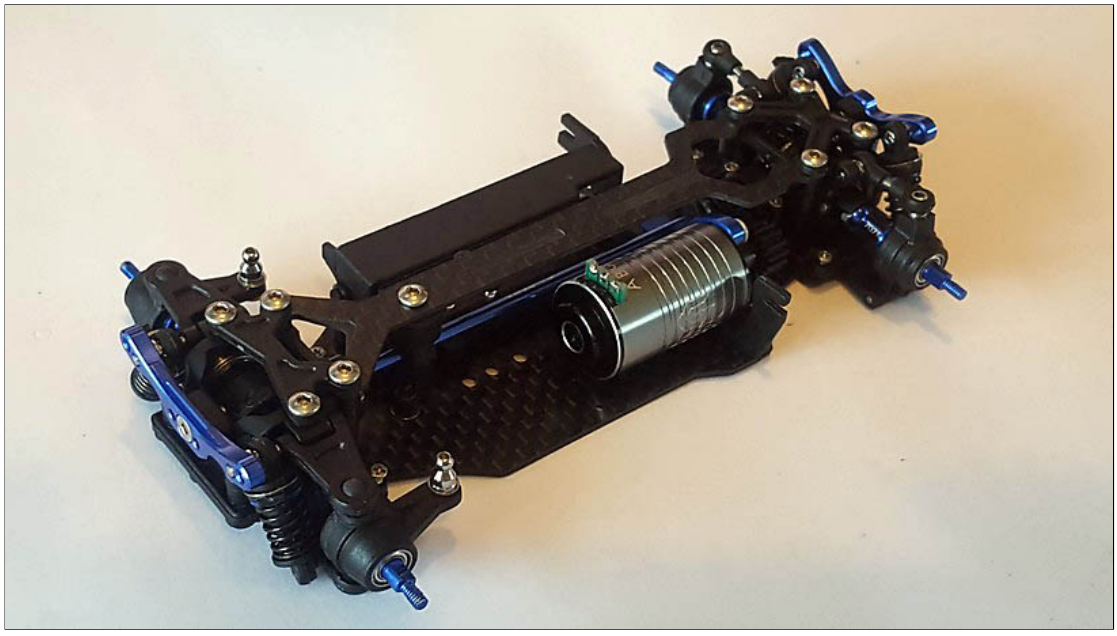
Use 2x6mm Countersunk Self Tapping screw to secure the Front Shock Tower:



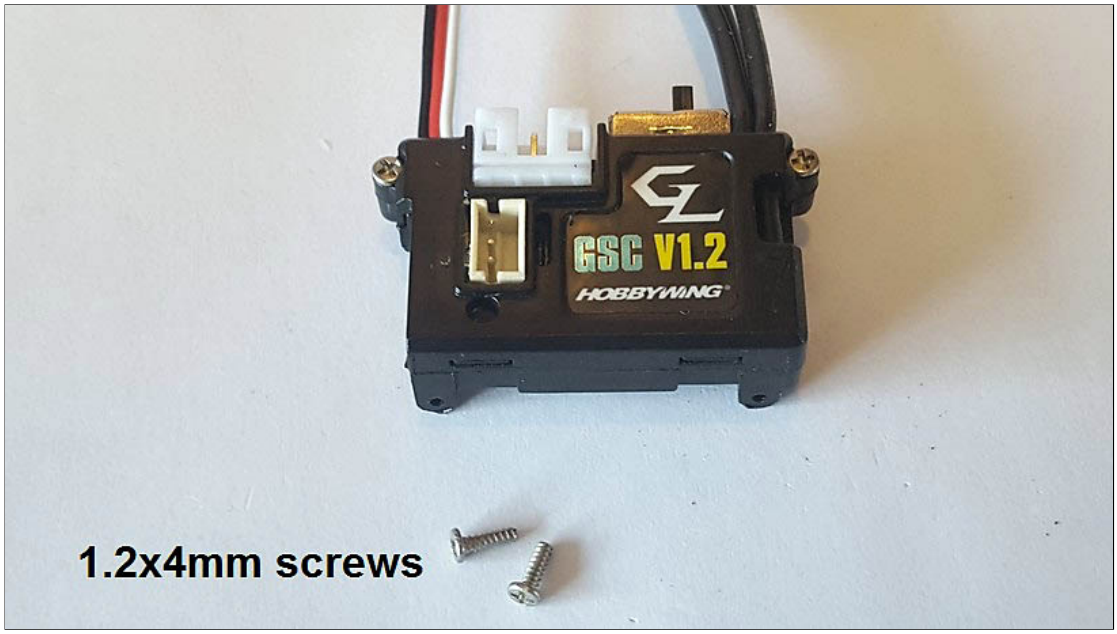
Repeat at the Rear and then use TWO 2x6mm Countersunk Self Tapping screws to secure Rear Shock Tower:



Shock Towers, done!

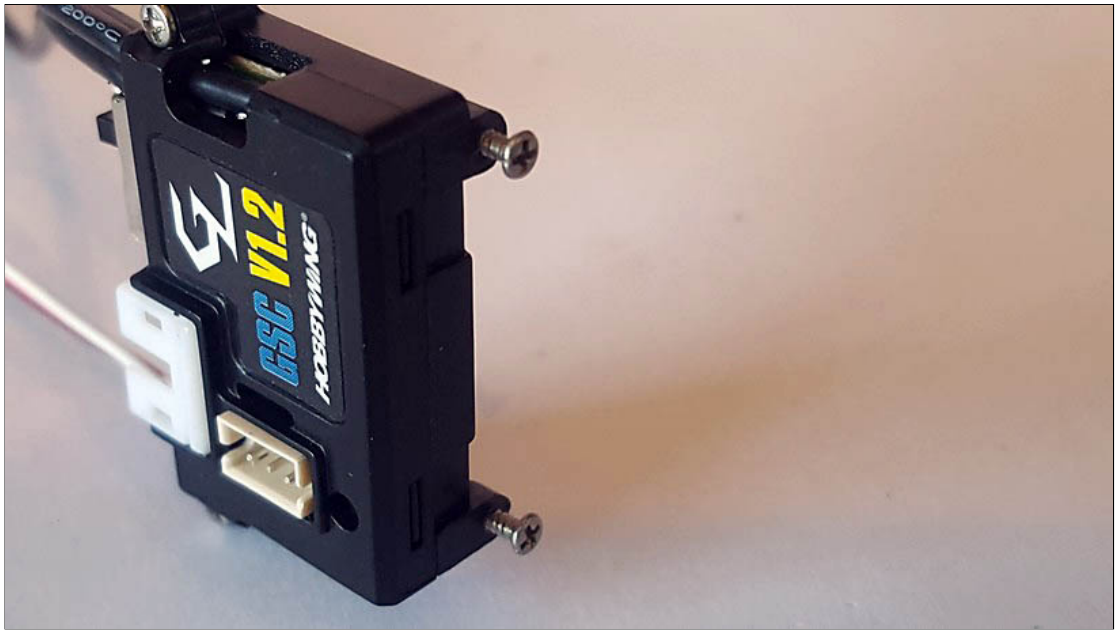


Esc Mounting:

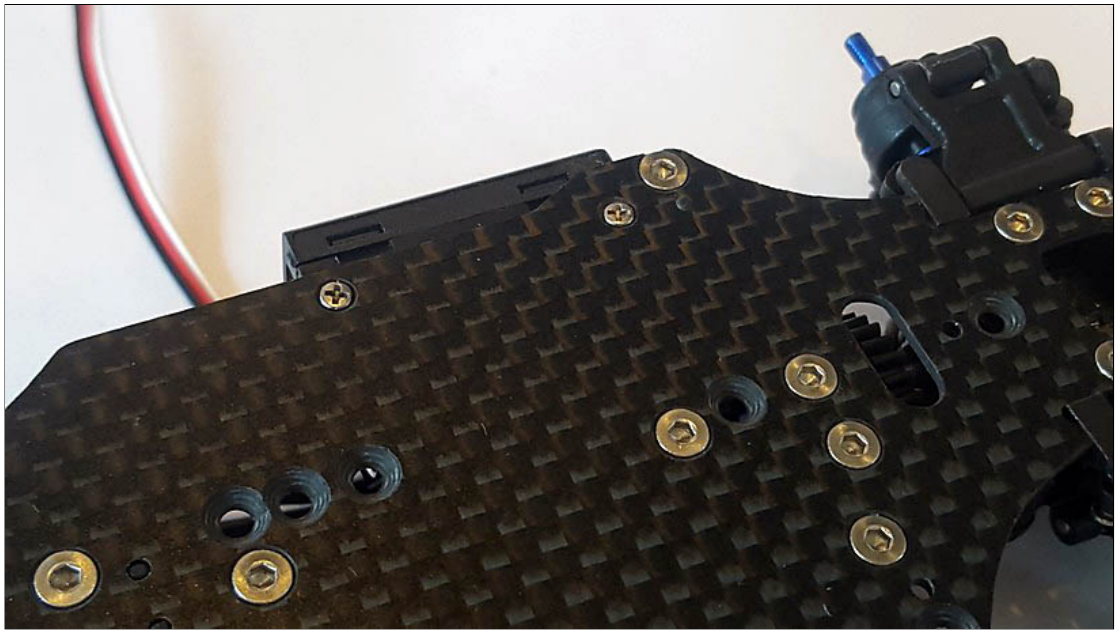


Step-by-Step guide:

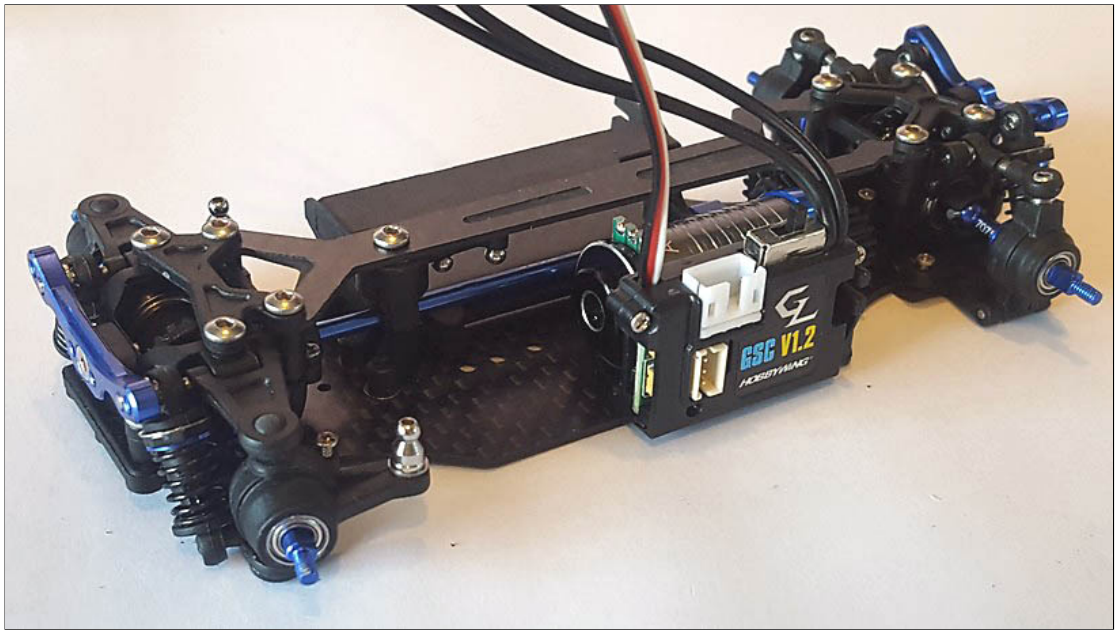
> **TIP:** before mounting on chassis, start tapping the holes on the Esc casing, it will make it easier to mount on chassis later



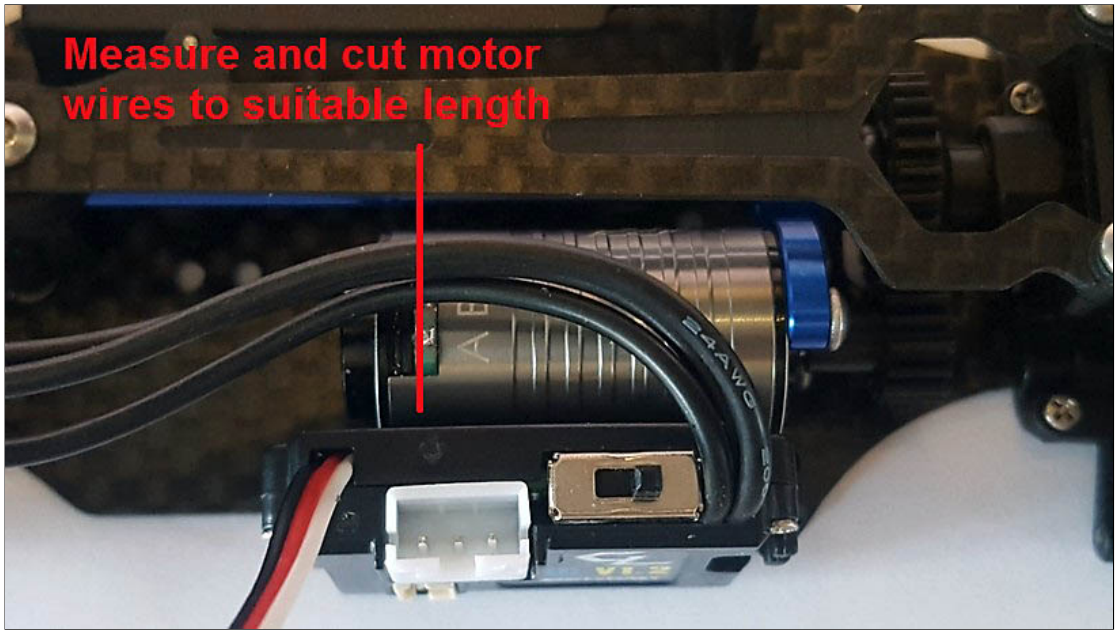
Mount Esc onto Chassis:



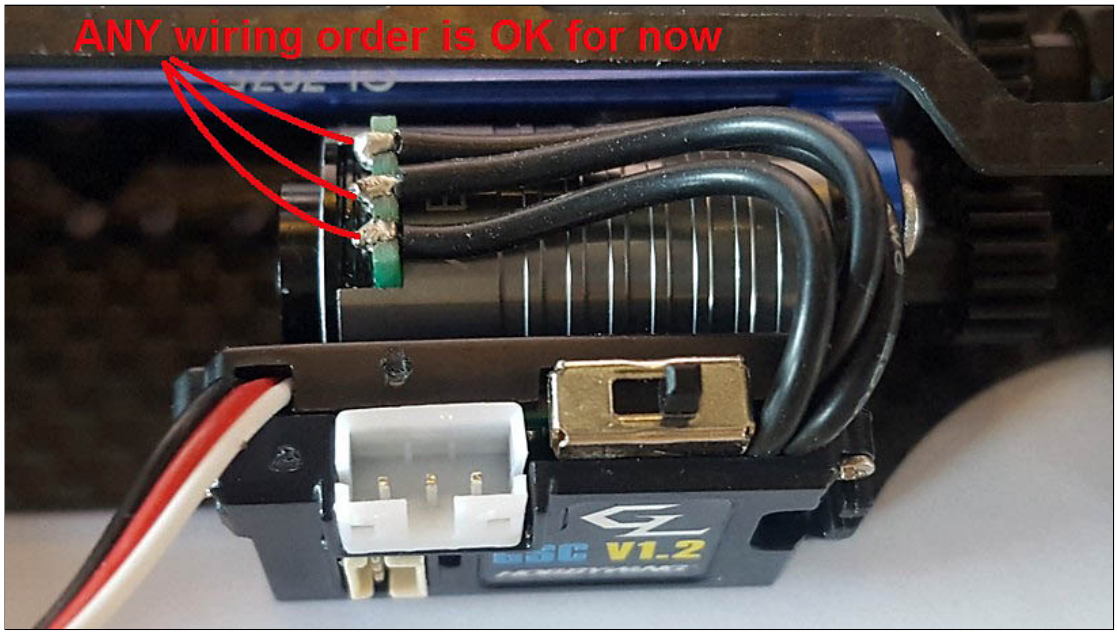
View from above:



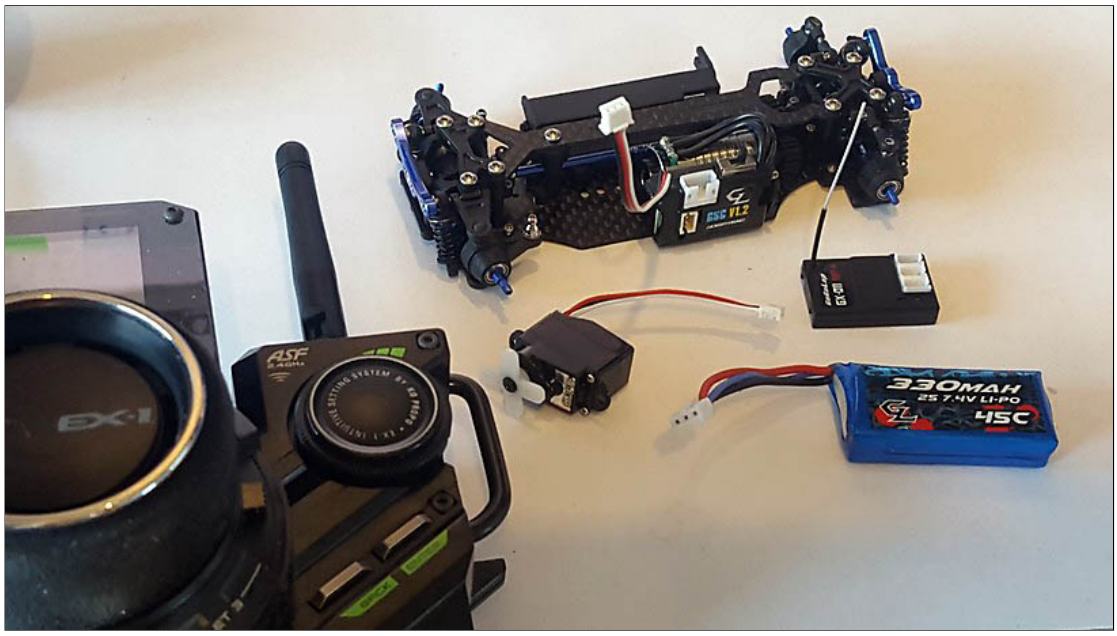
Measure and cut motor wires to suitable lengths:



Solder motor wires to motor, for now, just solder ANY order, for a sensorless motor, you will NOT damage motor with any wiring order, but the motor might run backwards, we shall deal with that later in the next chapter, "Setting up Electronics":



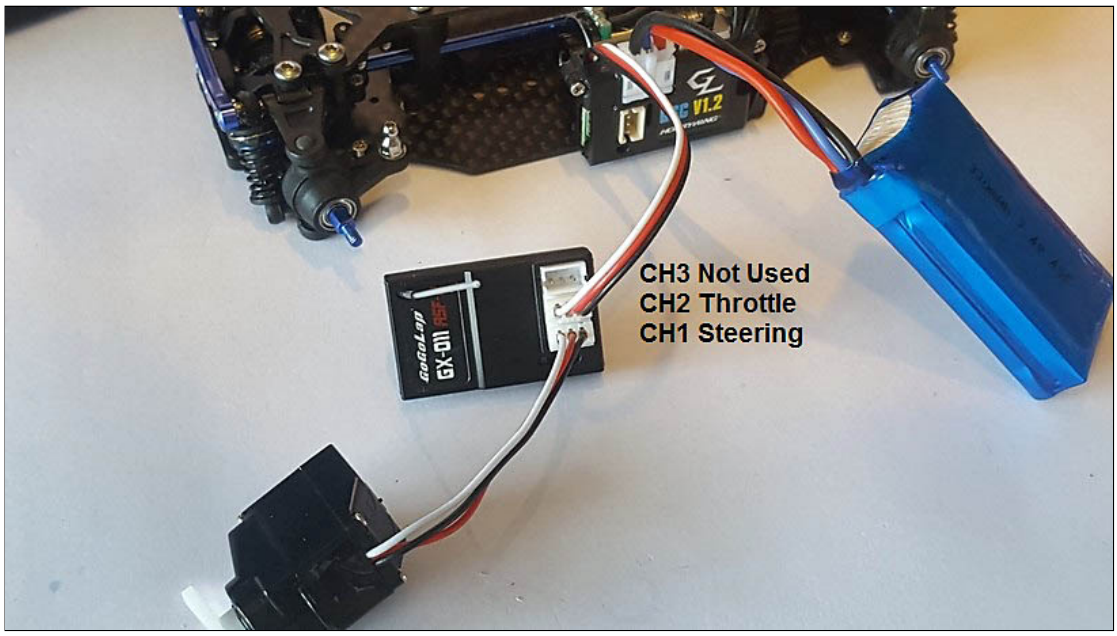
Setting up Electronics:



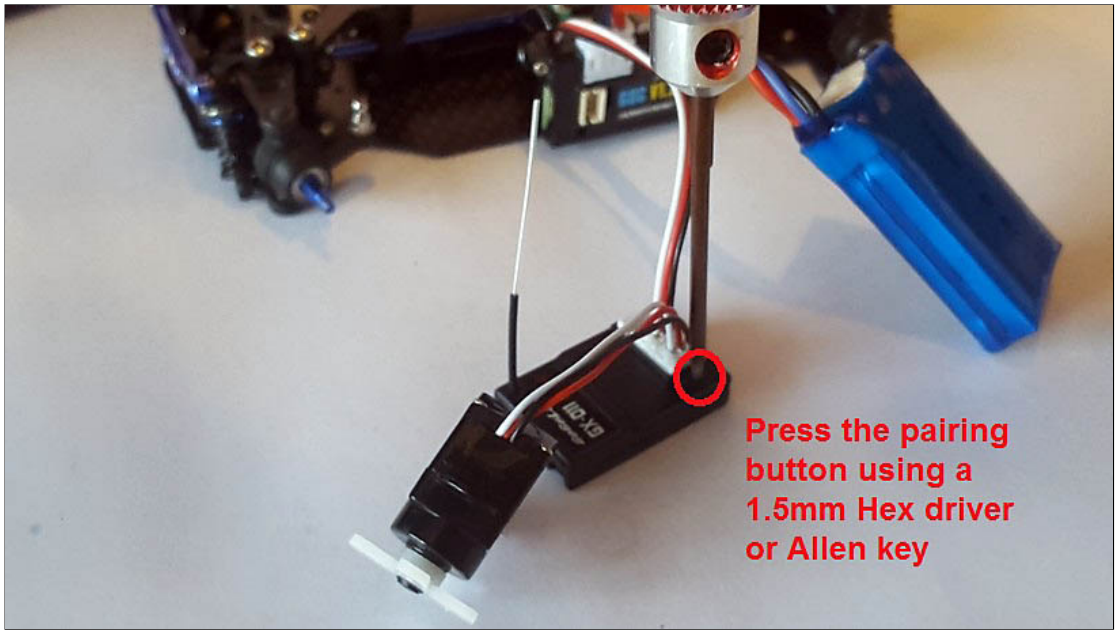
We shall be using KoProp EX1 KIY ASF and GoGoLap ASF-H Receiver in this guide, procedure is similar for other Transmitters and receivers.

Step-by-Step guide:

Connect the Battery, Esc, Receiver, Servo as below:

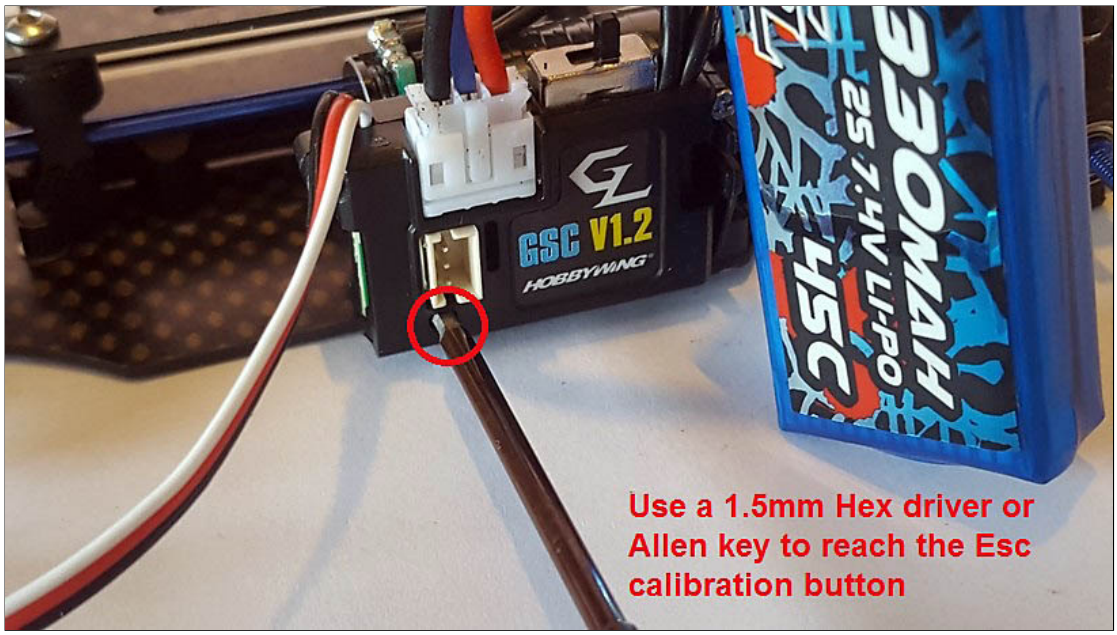


Enter Pairing mode on the Transmitter, hold down the pairing button while turning on the Esc switch, then release pairing button to enter Pairing mode, when light on Receiver stops flashing, pairing is complete. Restart transmitter and car to check Transmitter and Receiver are successfully paired.



Before using the Esc, it is best to calibrate the neutral point, throttle range and brake range with the Transmitter:

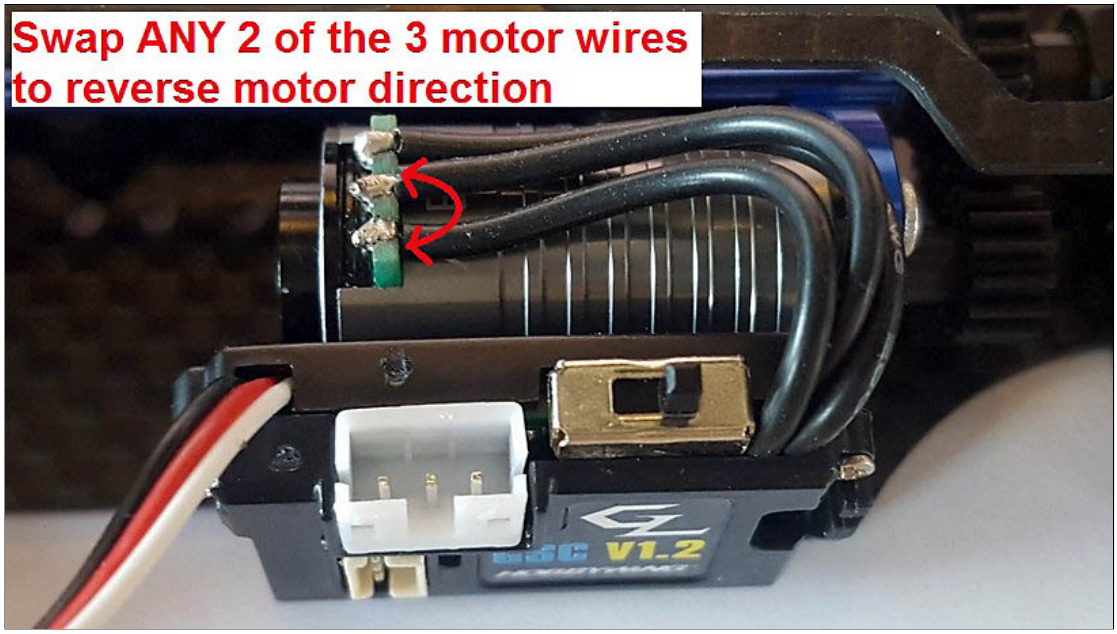
1. Turn On Transmitter
2. Set Transmitter Throttle Trim and Subtrim to 0
3. Set Throttle Hi-Point to 100
4. Set Brake Hi-Point to 100
5. Hold Esc Calibration button with Hex driver or Allen key while turning on Esc
6. The Motor will be beeping indicating that Esc is in calibration mode, release calibration button
7. While Transmitter throttle is at neutral, press Calibration button once, the motor will beep once
8. Hold Transmitter throttle at full throttle, press Calibration button once, the motor will beep twice
9. Hold Transmitter throttle at full brake, press Calibration button once, the motor will beep three times
10. Return Transmitter throttle to neutral, the motor will beep twice, calibration is done



See Video on Esc calibration:

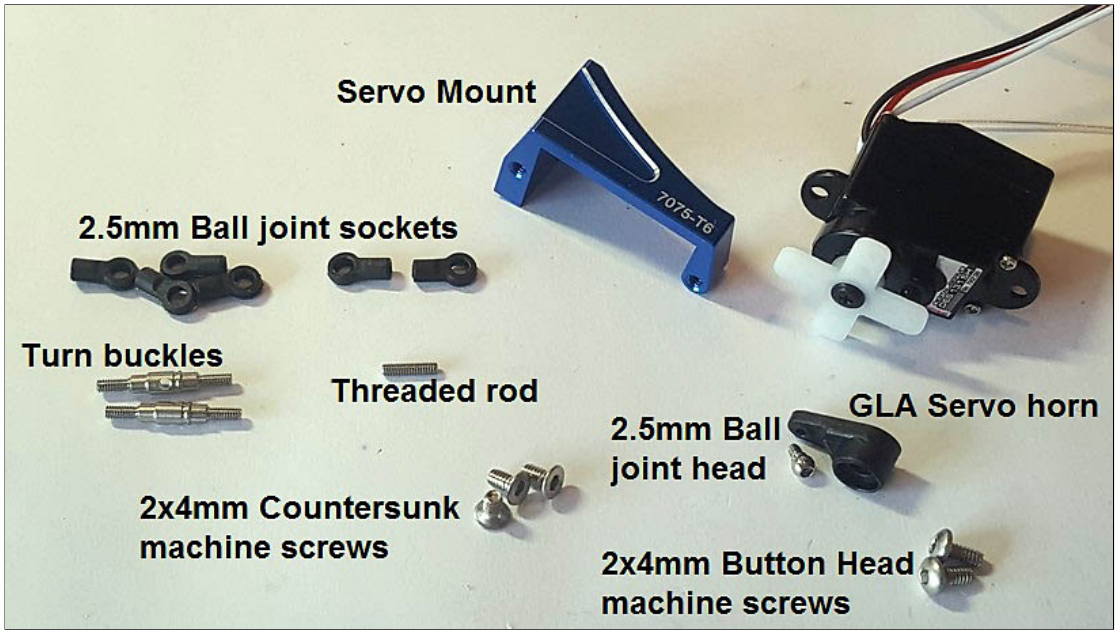
IMPORTANT Check Motor direction:

Apply throttle, check if car running forwards or backwards, if running backwards, swap ANY 2 of 3 motor wires:



Electronics are setup, also, servo now at neutral position

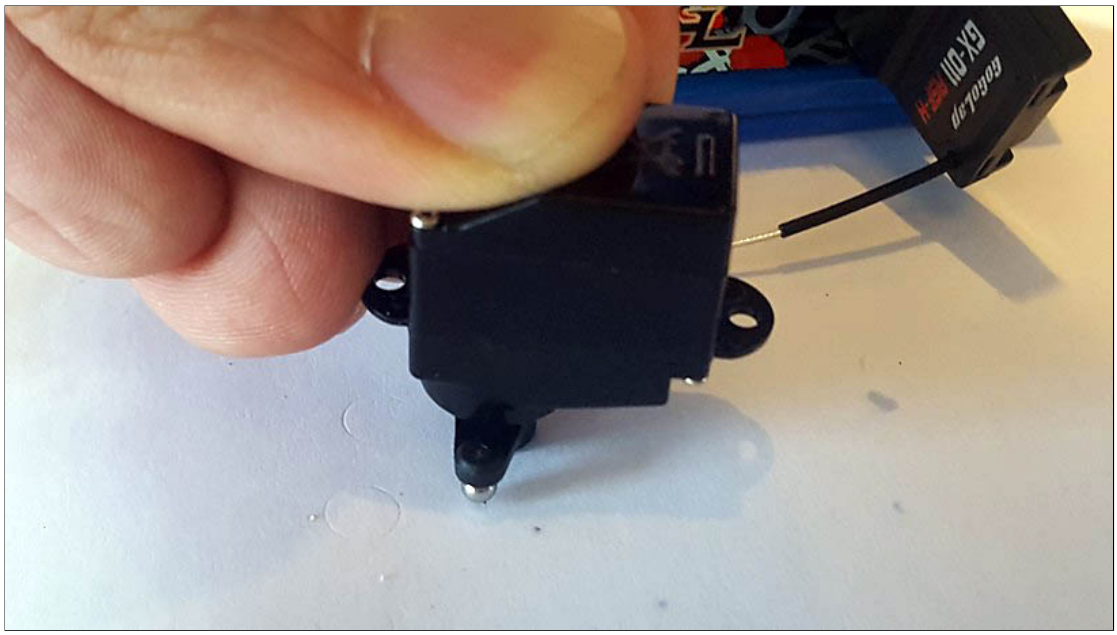
Servo and Steering links:



Servo to Servo Mount:

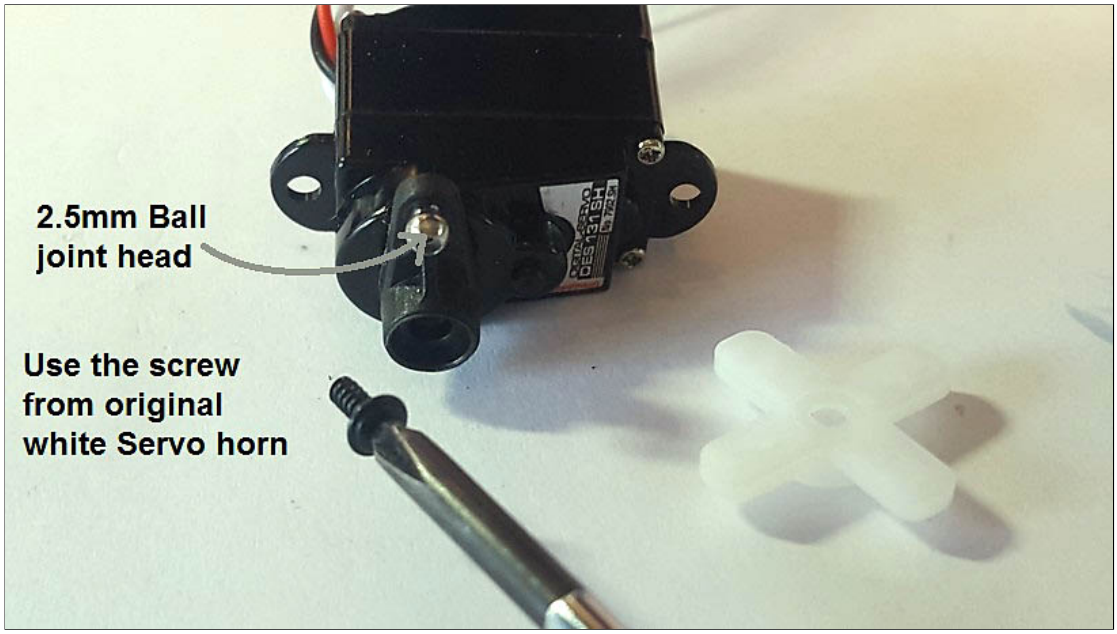
Screw in the 2.5mm ball joint head, check for correct side of Servo horn

Make sure Servo is centered, replace original white Servo horn with GLA Servo horn, the fitting is tight, so push the Servo into GLA horn as below:



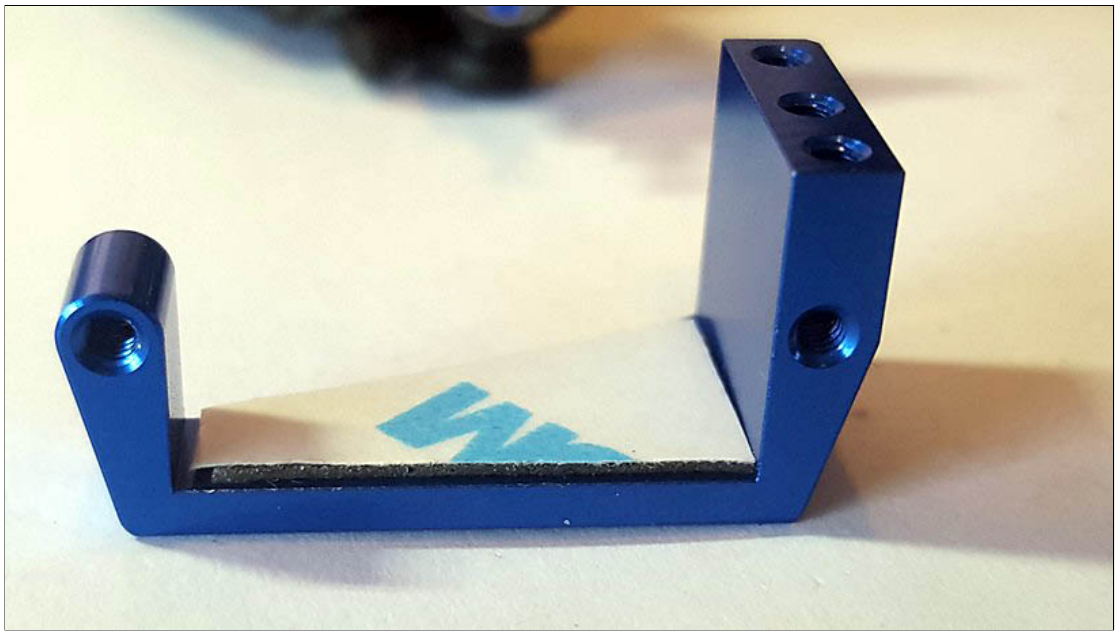
Use the screw from the original white servo horn to secure the GLA Servo horn:

> **TIP:** Hold Servo horn while turning the screw, Do NOT over tighten Servo horn screw, Stop turning when you feel resistance.



Prepare to attach Servo to Servo mount:

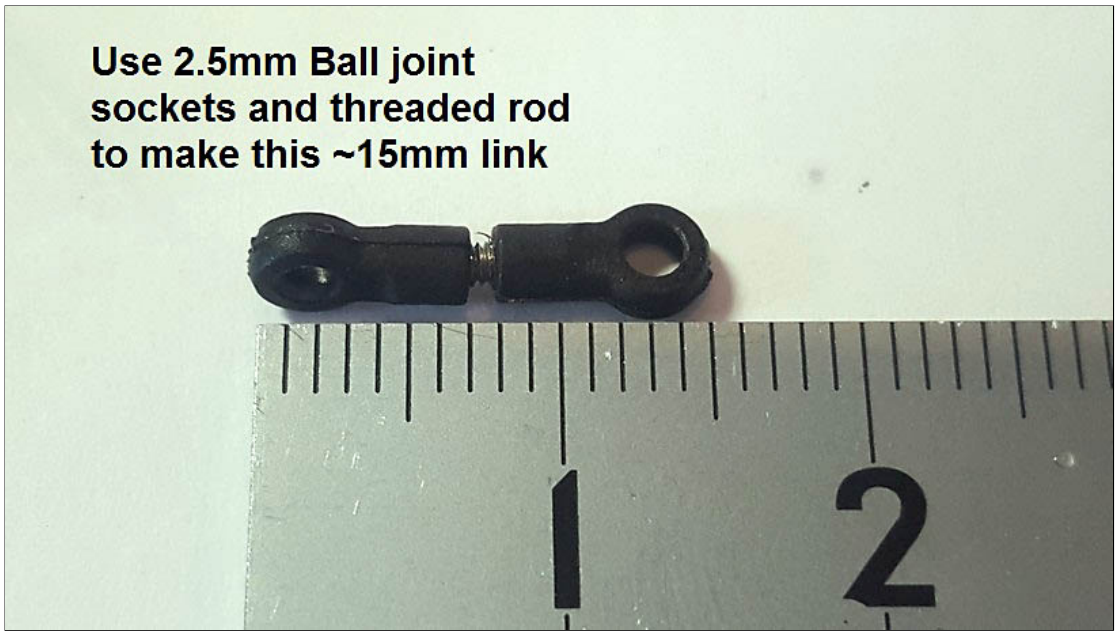
OPTIONAL, use thin ~0.6mm material to buffer between mount and servo, during testing, we found that after heavy crashes, Servo can move a little against mount, this causes centering problems with steering, double sided tape is ideal since it helps secure the Servo to the mount as well as providing some cushioning during crashes, can use other materials like card board also:



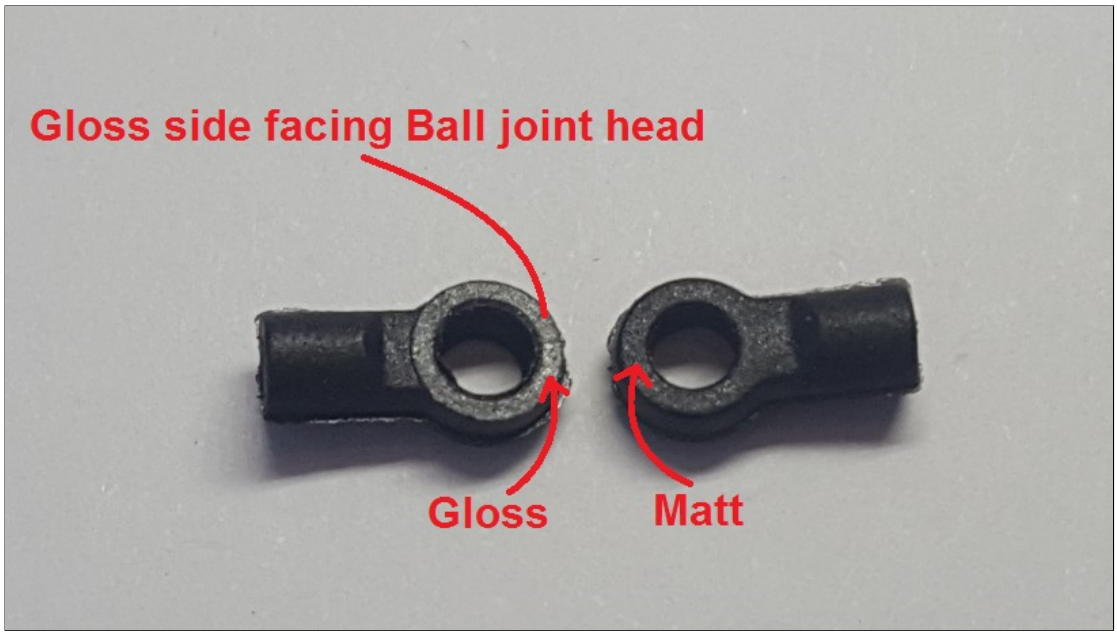
Use 2x4mm Button head machine screws to secure Servo onto Servo Mount:

Steering Links:

Use 2.5mm Ball joint sockets and threaded rod to make a ~15mm link:



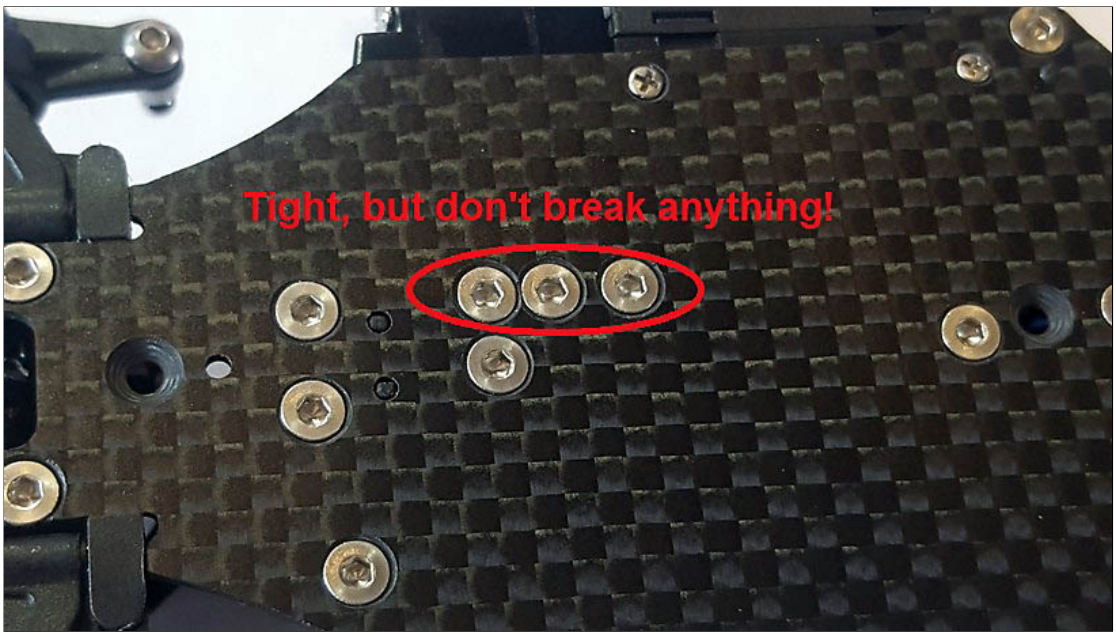
Again, note which side faces the Ball joint heads:



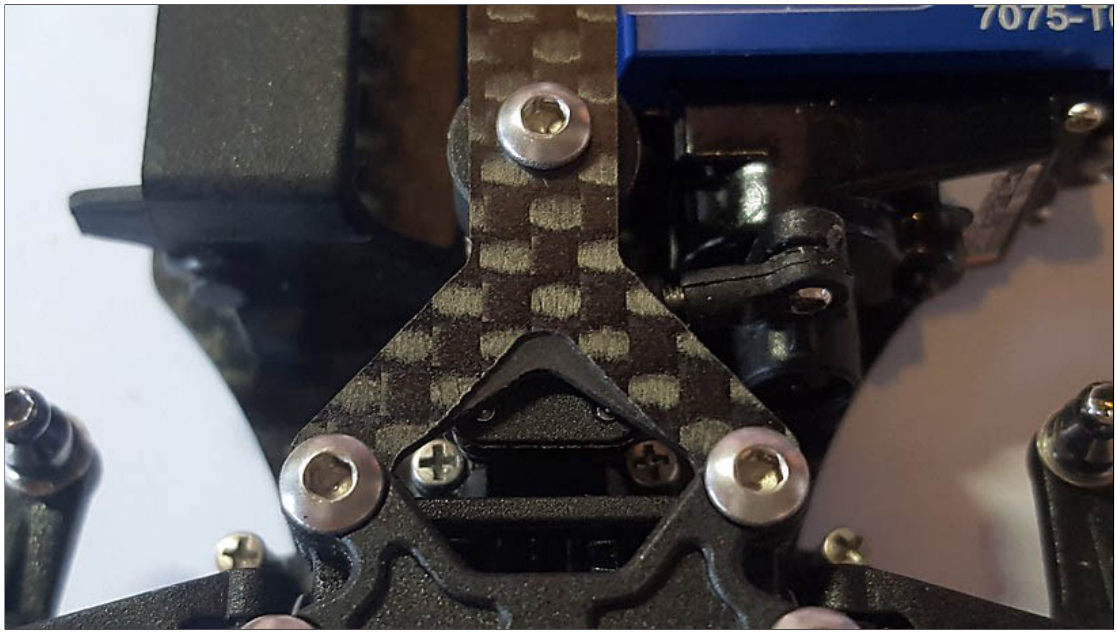
Attach Steering link to Steering crank:

Attach Servo Mount to Chassis using 2x4mm Countersunk Machine screws:

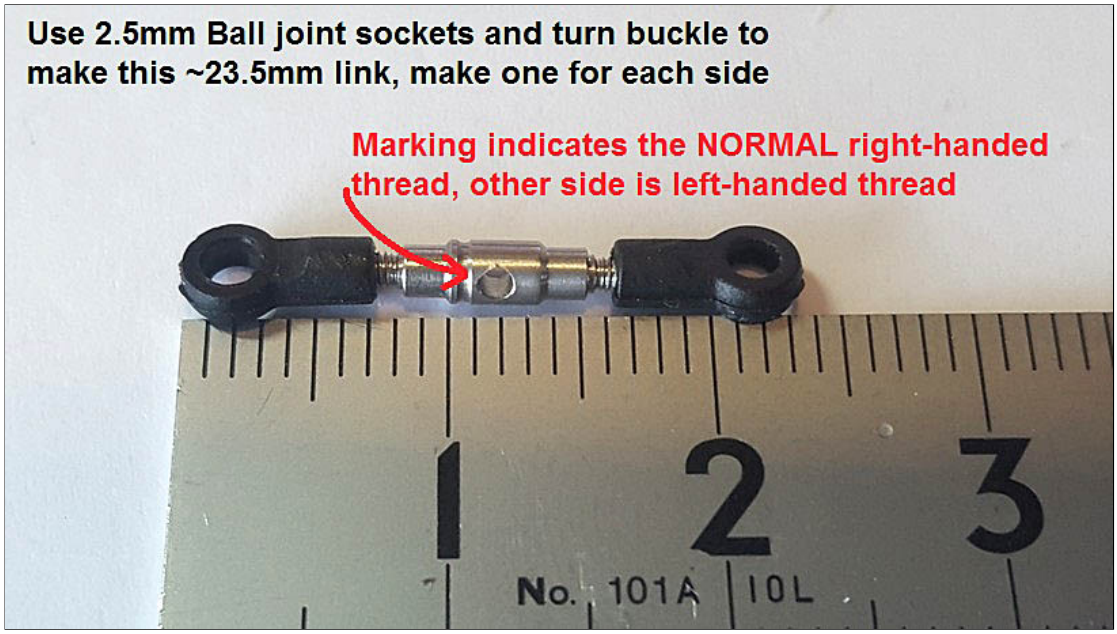
TIP: these 3 screws have to be very tight to prevent Servo from moving during crashes, but don't overdo it and strip the mount holes or break the screws!!



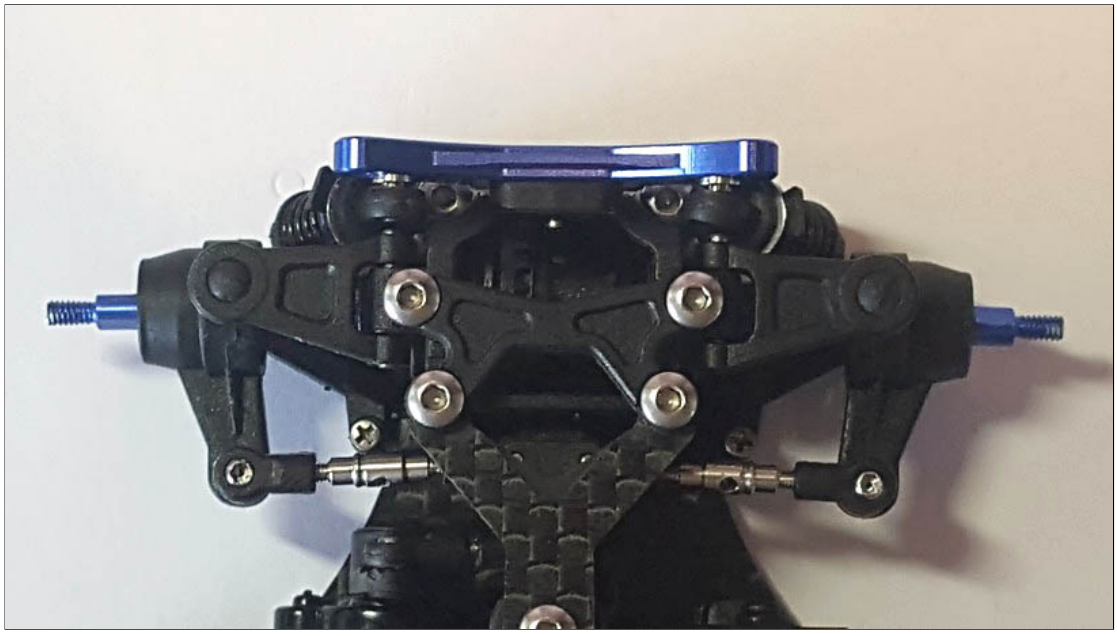
Adjust link length and/or Subtrim on Transmitter to center the Steering Crank as below:



Make TWO Steering track rods as below:

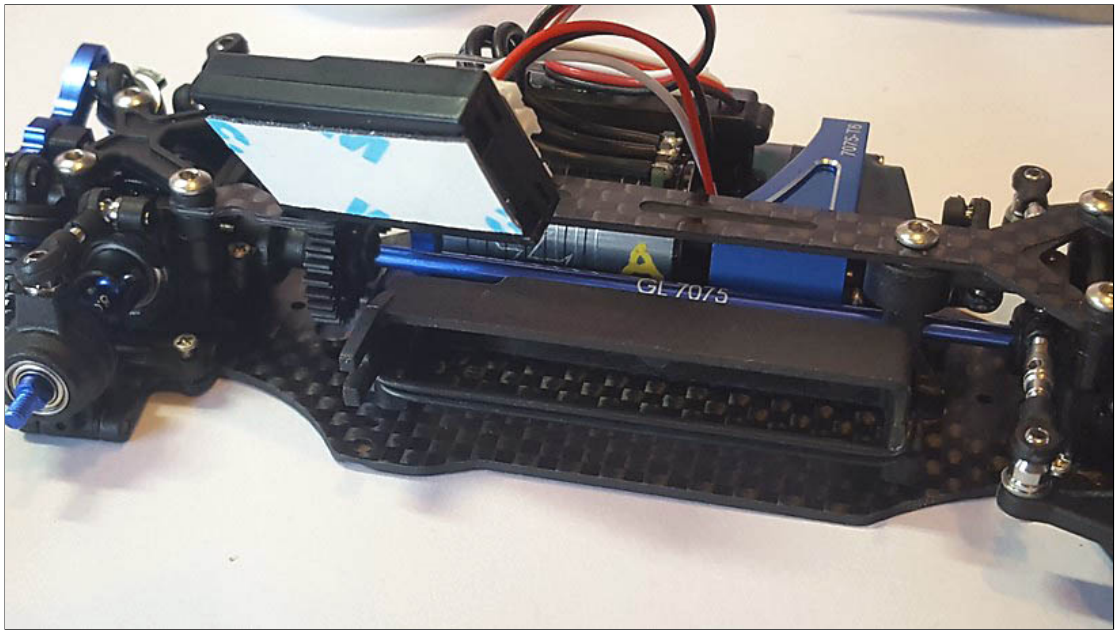


Snap the two Steering rods in place, adjust length for "a little toe out" by default, Servo and Steering links complete.

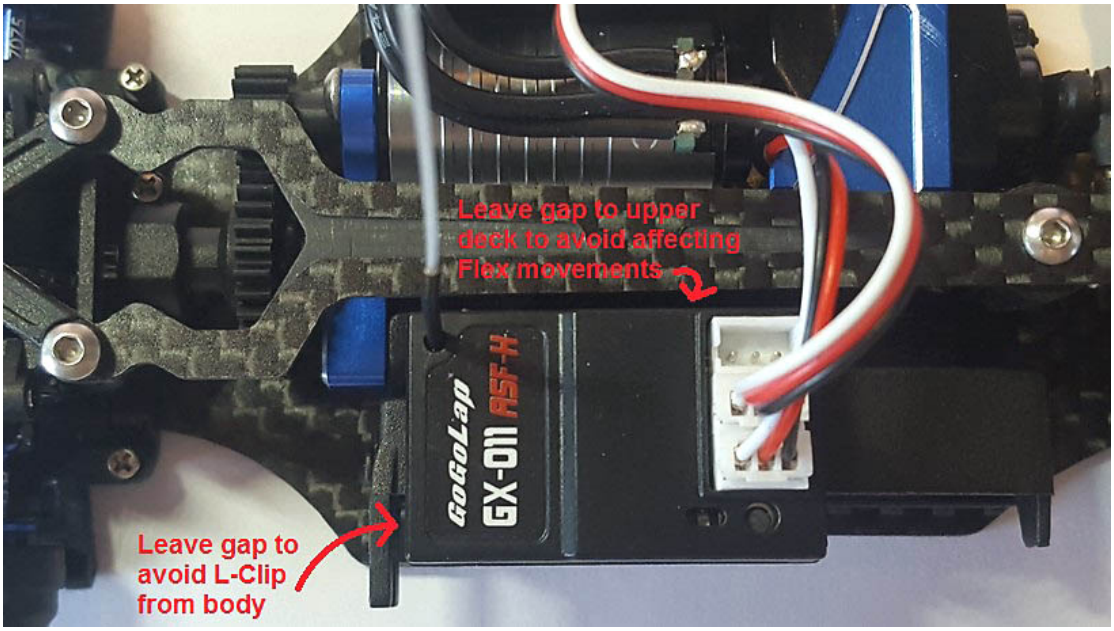


Receiver Mounting:

Cut some double sided tape and attach to Receiver:



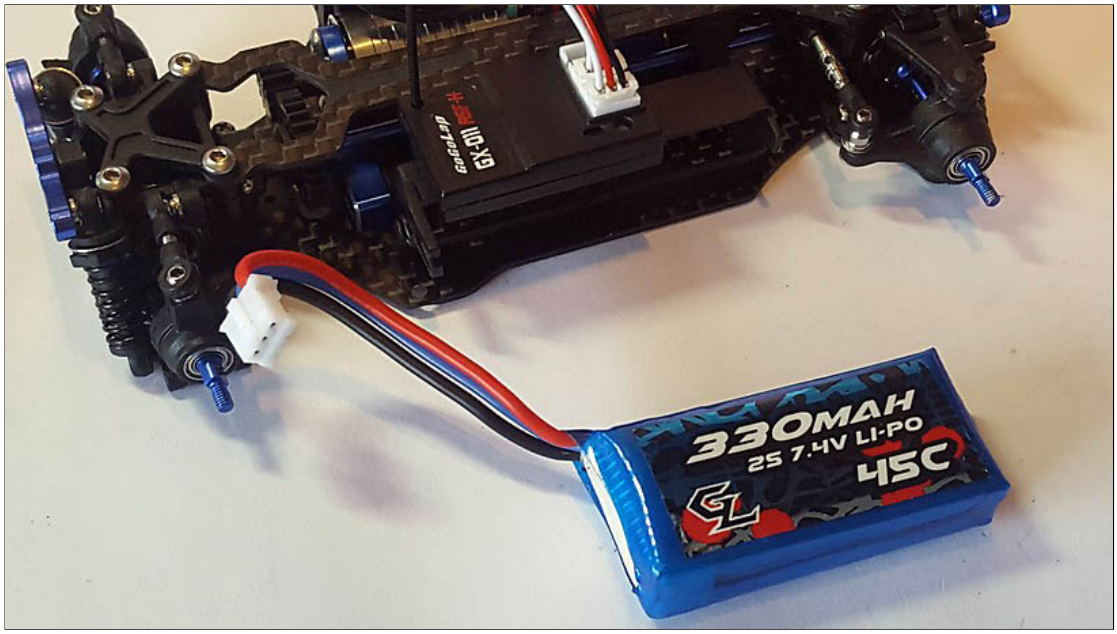
Suggested Receiver position, avoid touching the upper deck, a little forward to avoid the L-Clip from ASC bodies:



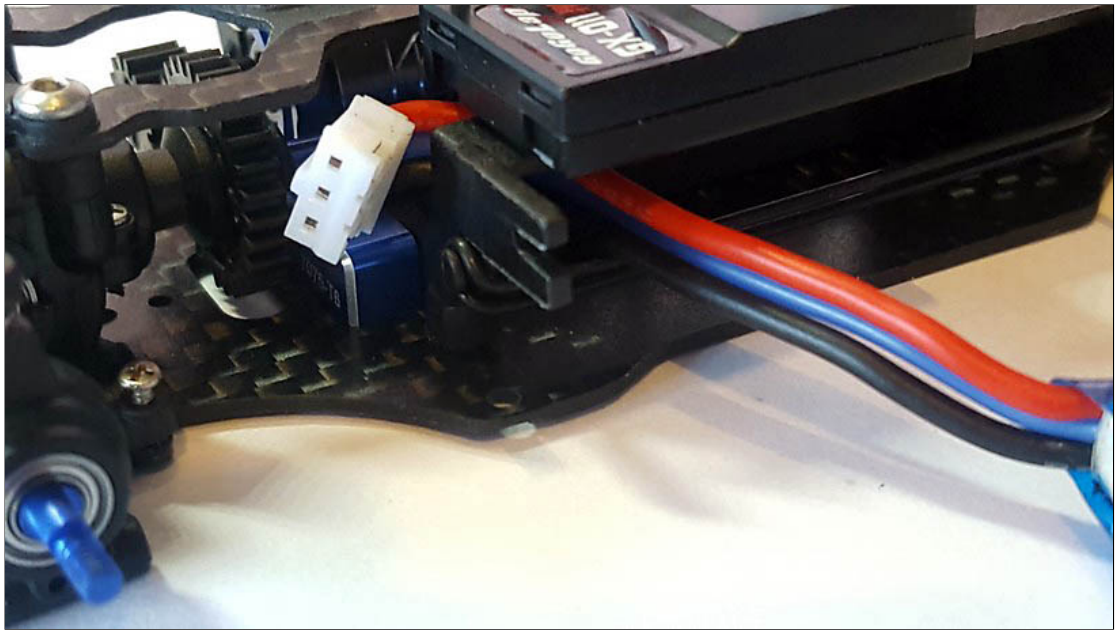
Battery Insertion:

Really? Instructions for this?? Well, it is more like a TIP :)

Bend the battery wires to a hook first:



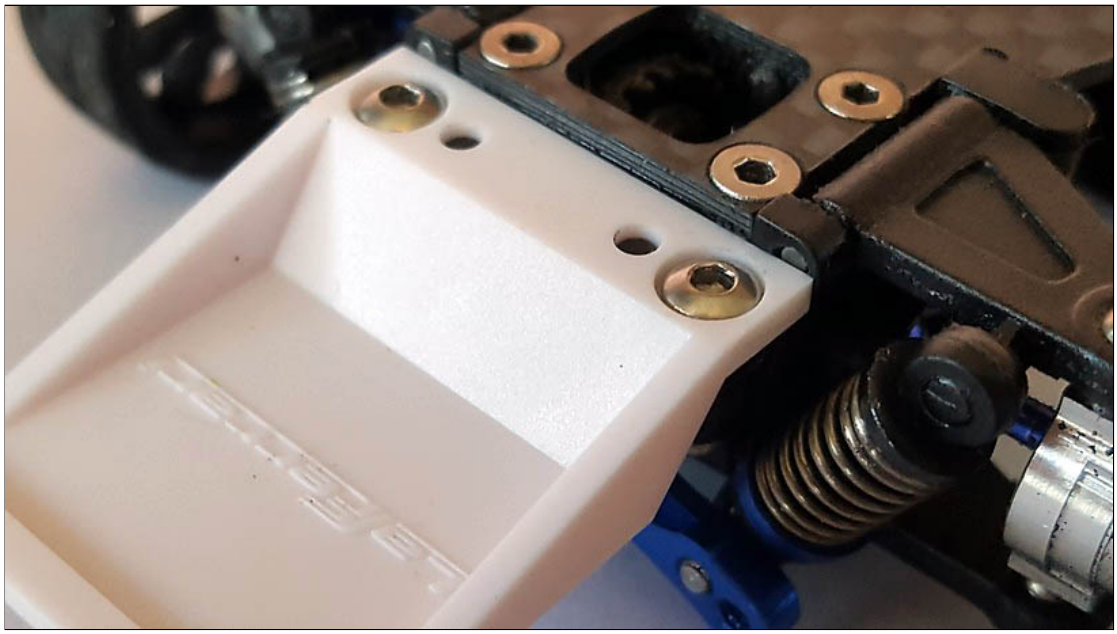
Hook battery plug into the top rear corner of the battery holder:



Adjust O-Ring to below position to secure battery:

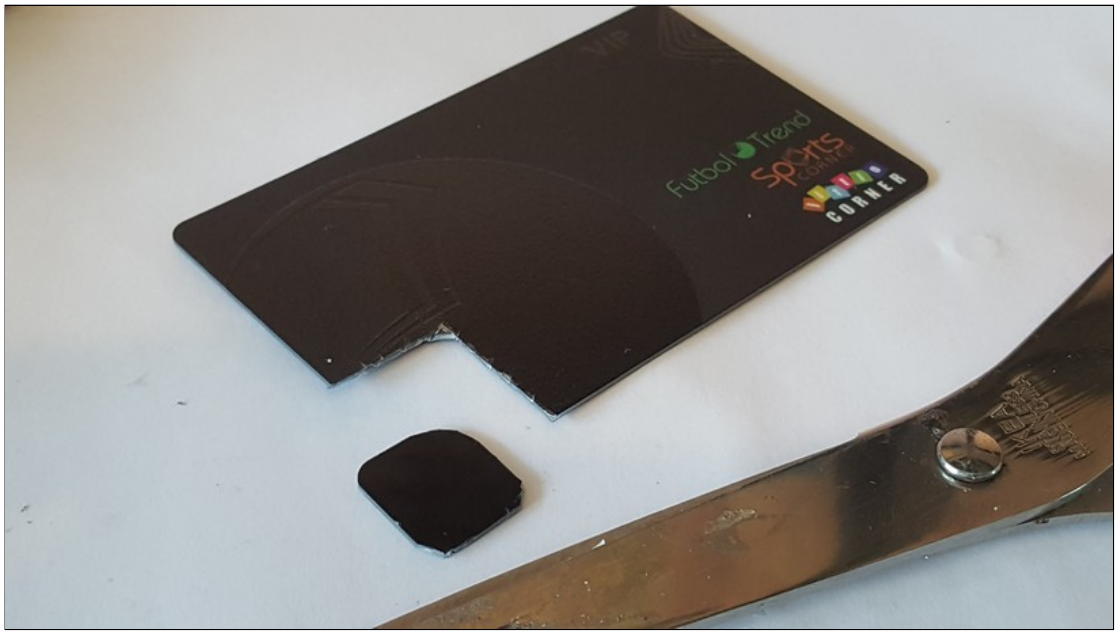
Front Body Mount

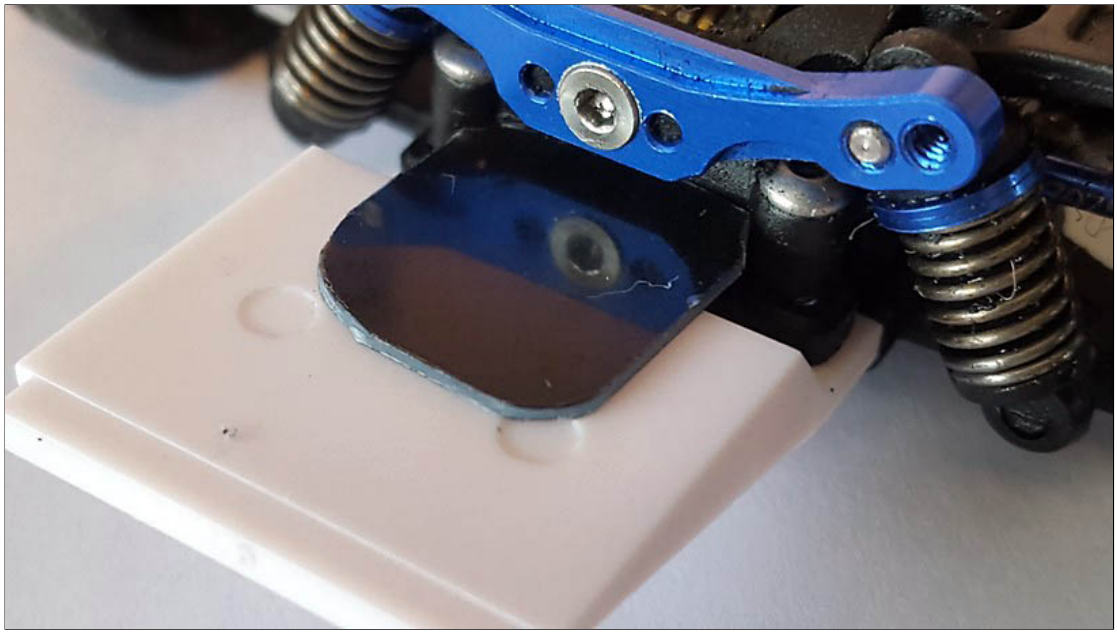
Use 2x4mm Button Head screws to secure the Front body mount of your ASC body:



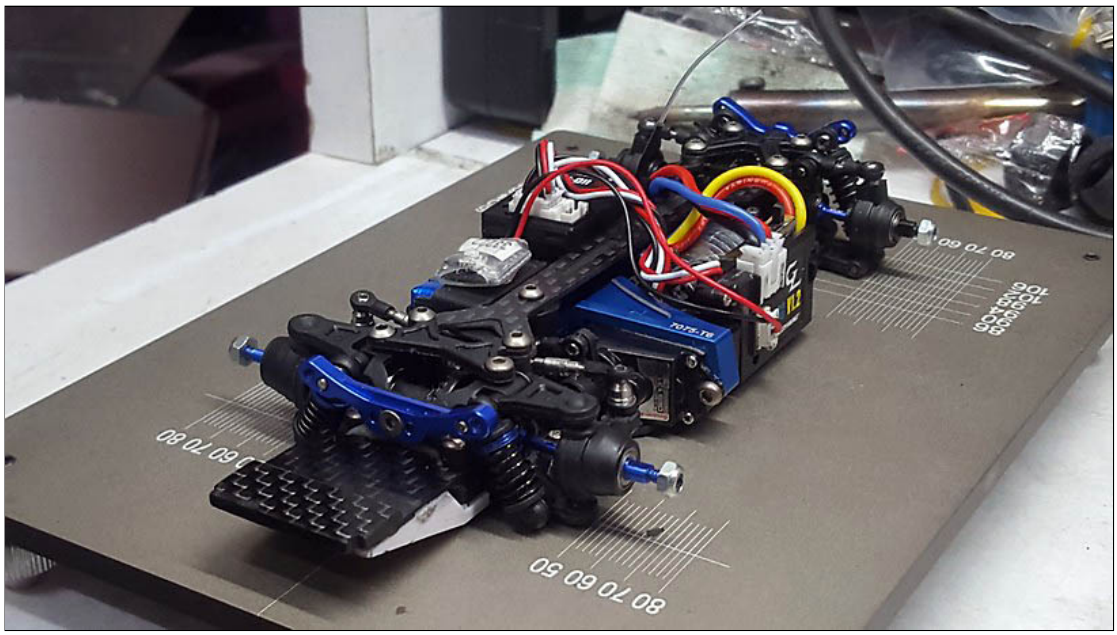
Protect/Support Front Body Mount against bending/snapping:

> **TIP:** Use an old plastic card, or ~0.5mm carbon fiber for a Pro finish, cut a small piece out and Superglue it onto the top of the Front Body mount to hold it against the front bulk head (Diff mount).





Initial Quick Setup



Do the following steps for initial setup:

Note: Below is simply to get your car going asap, if you know about car setup, you can try starting with below suggestions or do your things your own way.

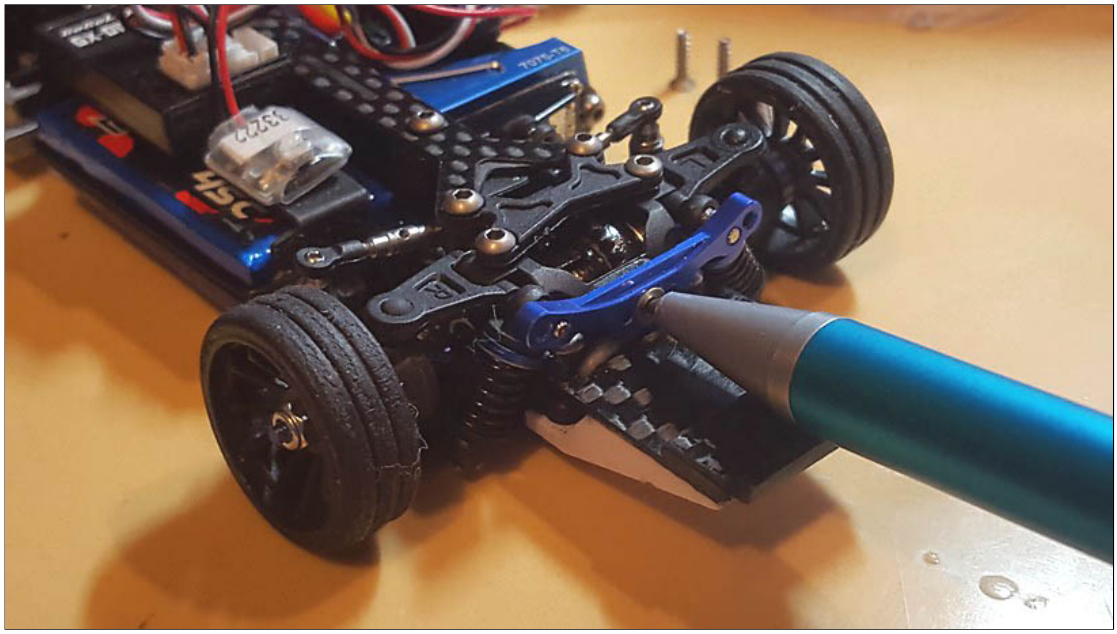
This simple setup process does not require any special tools or guages.

1. Mount a set of wheels with tire diameters that you will most likely use.

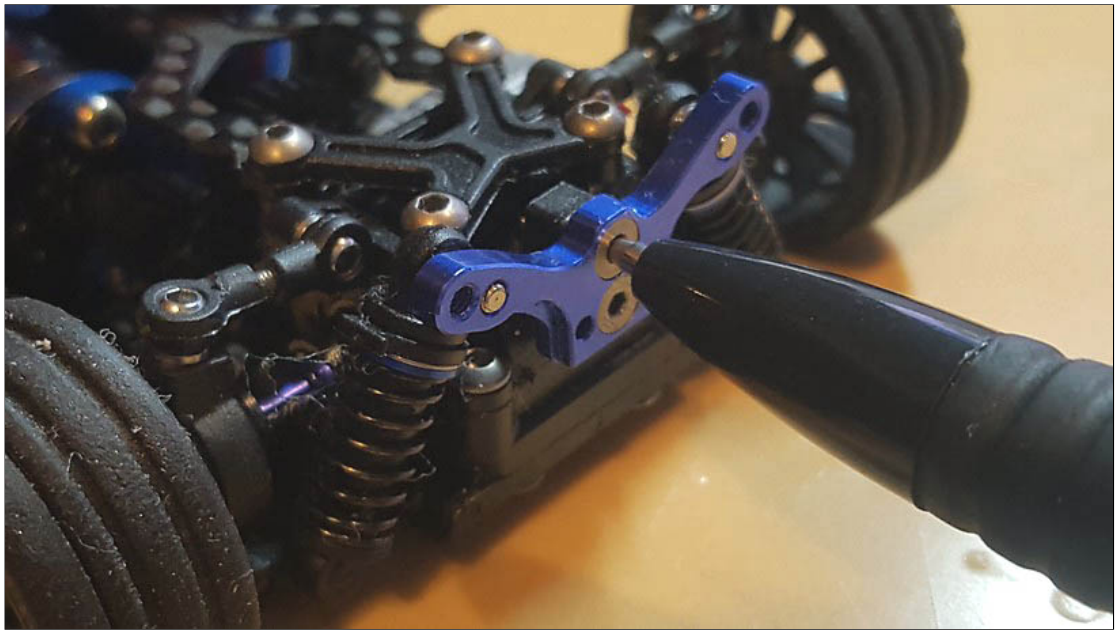
2. Balancing the car

- Balance the car's left and right side using weights, lifting the car using 2 pens like below can check the car's left/right balance

Front - Pen goes to the screw of the shock tower

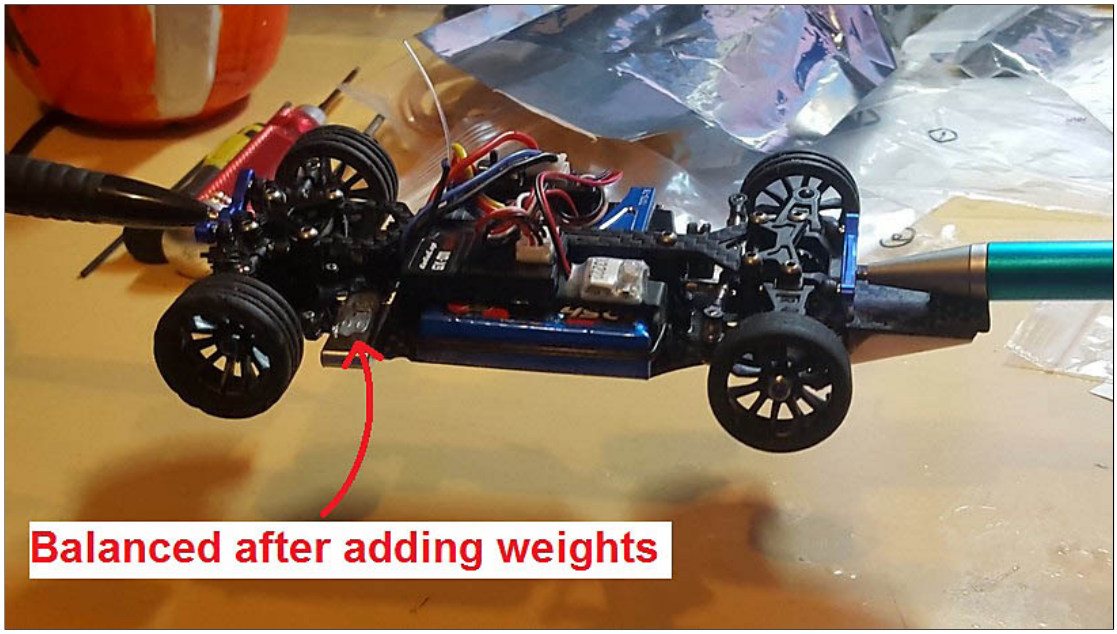


Rear - Pen goes to the screw of the shock tower



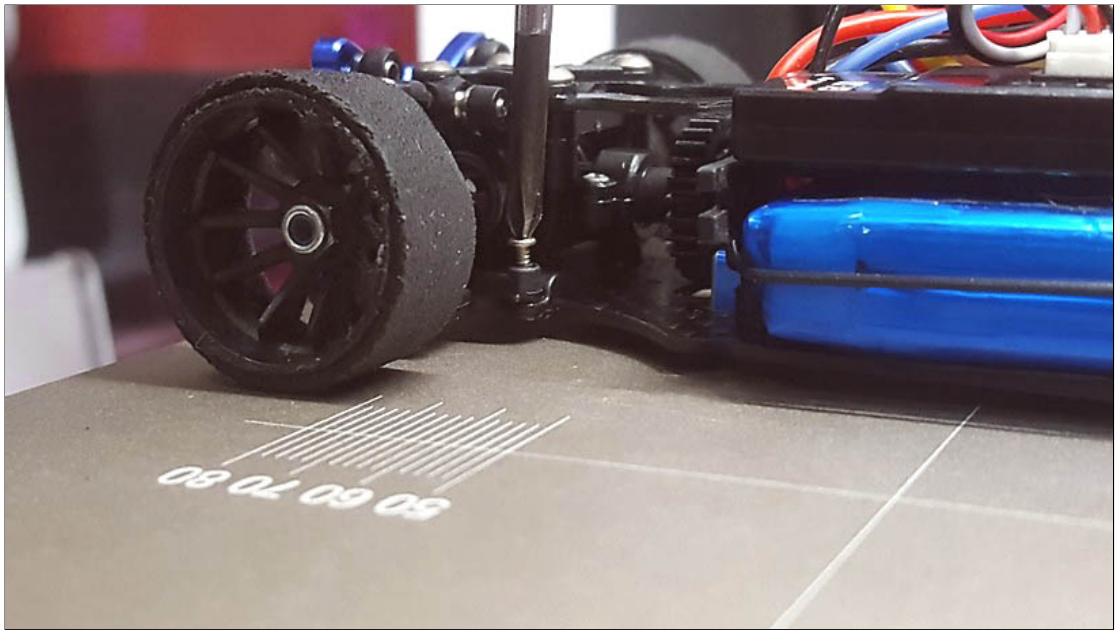
Lift the car with the 2 pens and discover left side too heavy:

Car balanced after adding weights



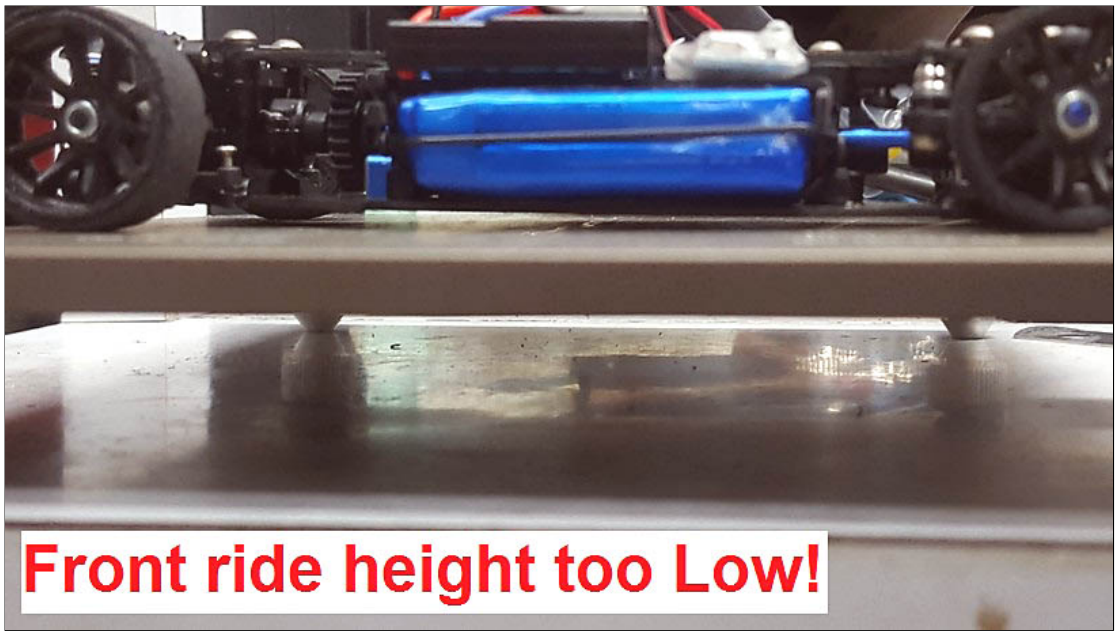
3. Setting ride height and zero preload on the springs

- Unscrew all four down stop screws so that they are not pushing against chassis, and so they will not affect ride height

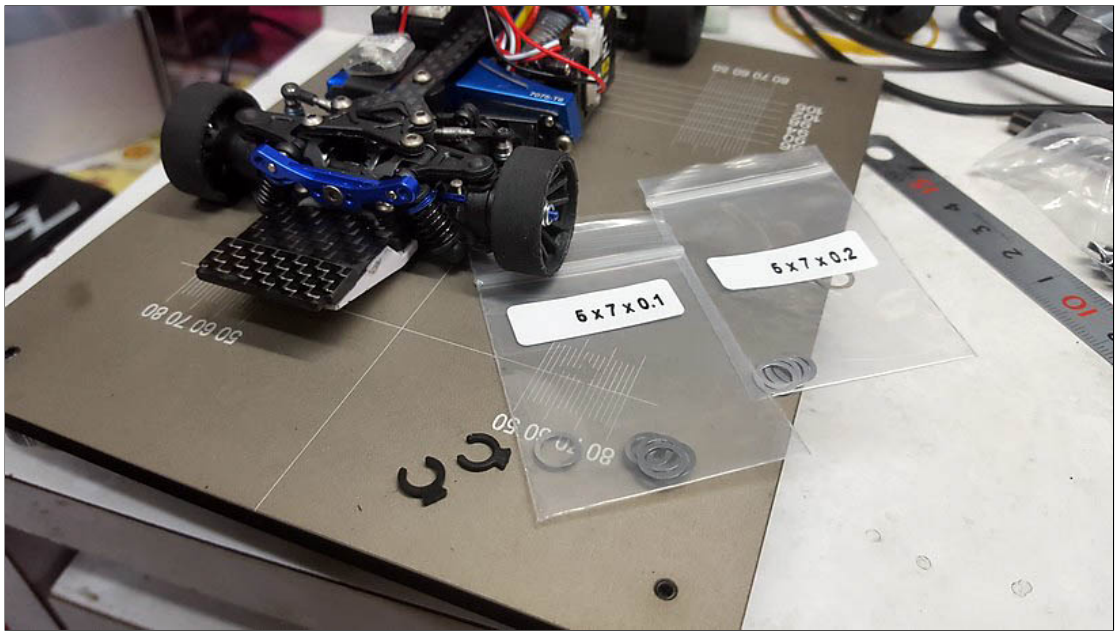


- Set the ride heights, for RCP, around 1.5mm all round, for carpets, ask your local expert, usually 2~2.5mm depending on the thickness of the carpet

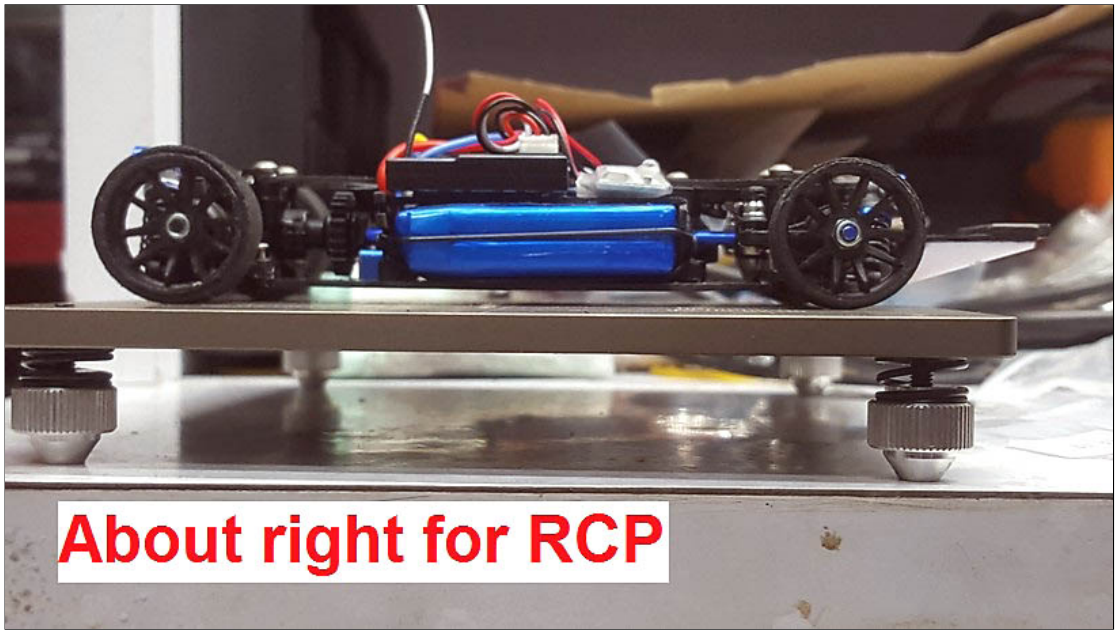
Check ride height, Front a bit too low!



Adjust Shock absorber shims/spacers as needed:



Now about right for RCP:

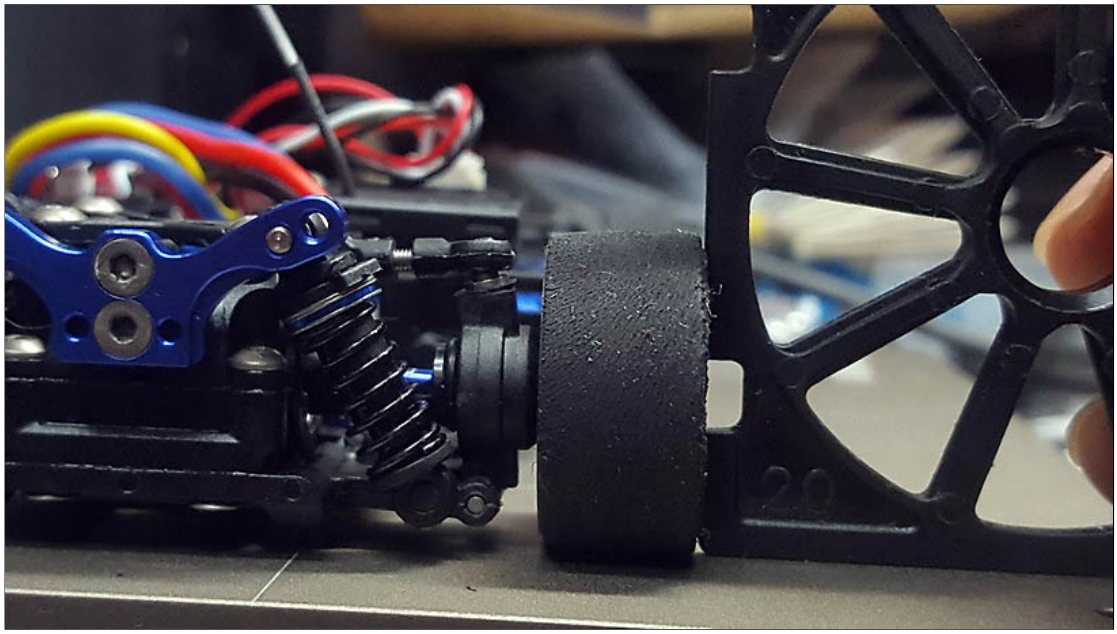


- Setting the downstops so that the springs are at Zero-Preload, i.e. screw clockwise the downstop screws until the length of the shocks = the length of the springs. Or in other words, the springs do not have any compression when the car is in the air, but spring just touches the shock on both spring ends:

4. Final checks:

- Front Toe-out amount and adjust turnbuckles as needed

- Rear camber angles, adjust upper link rods as needed, can try 1.5~2.0 degrees to start off with



5. Proper Set-up

For a more detailed explanation of car setup, below is a very good guide from XRAY, alternatively, there are many 1/10 touring car setup tutorials on youtube, the same theories apply

Set-up Books

Source: