

Formula World GT 200

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Congratulations on your purchase of a Speed Merchant Formula World GT 200 competition chassis.

This instruction manual will detail the specific steps involved to build your new chassis. Make sure to take your time when building, since even though there are very few parts involved in building a Formula World GT 200, it is very important to make sure that all parts operate smooth and free. Some parts included have a protective coating that should be removed and polished (sliding and pivoting parts). Attention to small details like this will make the difference between a chassis that wins national championships, and one that doesn't handle at all.

Required tools and supplies:

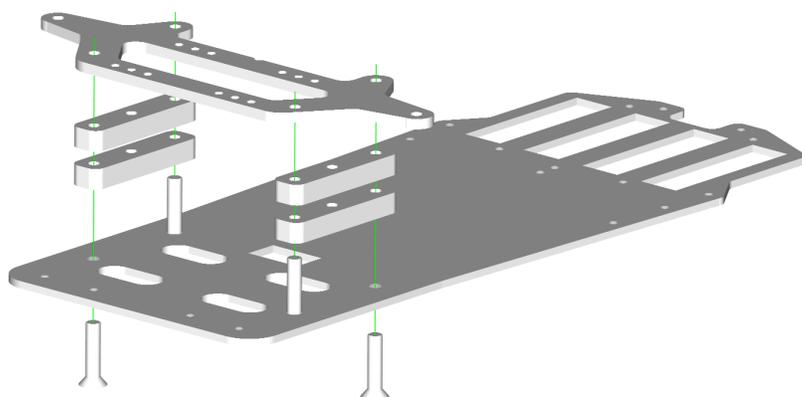
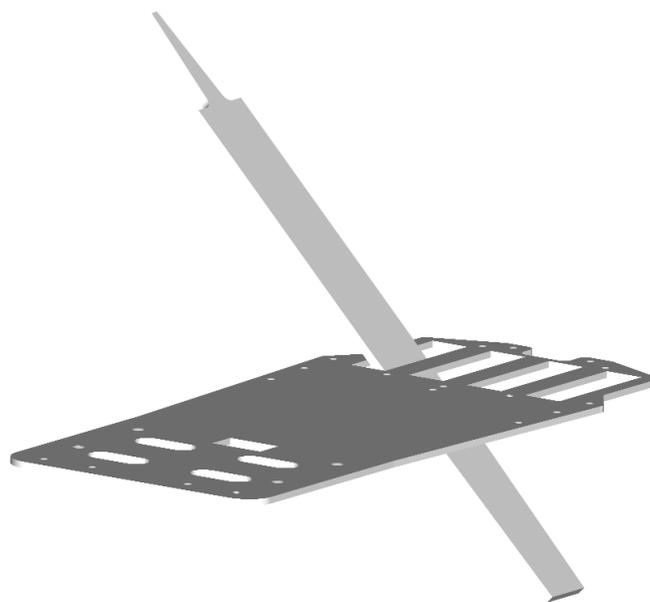
- .050" Hex driver
- 1/16" Hex driver
- 3/32" Hex driver
- 5/64" Hex driver
- 3/16" Nut driver
- 1/4" Nut driver
- 3/32" Nut driver
- File (wide, fine toothed)
- Super Glue a.k.a. CA
- 35 wt. Shock Oil
- Tube Spooage (damper tube fluid)
- 1/8" and 3/32" Drill bits
- 82° countersink
- Fine grit sandpapers
- Metal polish
- Double sided tape (servo tape)
- Ruler
- Pen or pencil

Additional parts required to finish this chassis:

- 540 sized electric motor
- Electronic Speed Controller
- Radio Transmitter
- Radio Receiver
- Servo (mini sized)
- Servo saver
 - (small sized, and to match servo brand)
- 4 Cell Sub-C size NiMh Nickel Metal Hydride Battery
- Tires and Wheels
- Body shell
- Paint to finish body shell

Warning: The carbon fiber plates that make up the components of this chassis do conduct electricity, and care must be taken to ensure that the batteries do not short on the chassis. Carefully, using a fine toothed file, just break over the edge of the battery slots at a 45° angle. The goal is to keep the chassis from cutting the labels on the batteries during regular use. The battery slots have been optimized for newer cells and do not need to have a large amount of material removed. It is best to have a freshly assembled battery pack nearby to check the slots for proper depth. Only remove enough material so that the battery pack will sit flush with the bottom of the chassis, no lower.

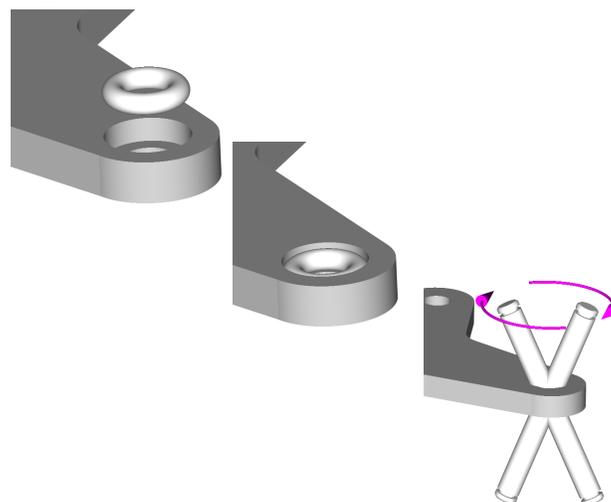
Tip: If you filed the slots too low, they can be carefully built back up to proper height by coating the edges with super glue.



Using the provided stainless steel 8-32 x 3/4" cross point (phillips) screws (x4), attach the lower front suspension arm (be sure the pockets for the pivots are facing down). The screws will thread into the holes shown. Be sure to keep the plate as even as possible, tightening opposite screws a little at a time equally. This will ensure that attaching these two plates together will not introduce any tweak into the chassis. Do not over tighten. Note: to adjust ride height, use the included aluminum washers, equally, between plastic spacers and chassis plate.

Next, install the Teflon bushings (x2) into the pockets in the bottom of the front suspension arm as shown. This will be a tight fit and may require significant pressure from the back end of a smooth screw driver to press them in. Be sure to support the top of the arm plate while installing.

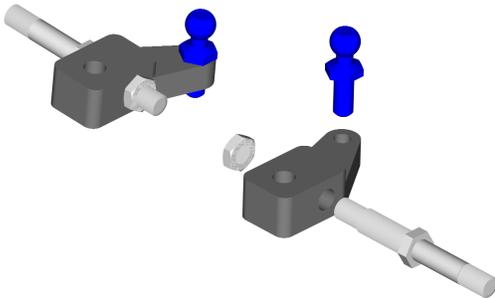
After installation, seat the bushing by sliding in a kingpin and rotate it around in circle as shown.



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Front Suspension Components Assembly

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Install the axles by threading them into the knuckles as shown. The thread that is on the axles is a left-hand thread. After the hex on the axle bottoms on the plastic knuckle, then install 4-40 nut as shown.

Install the blue aluminum ball studs as shown. Do not over tighten.

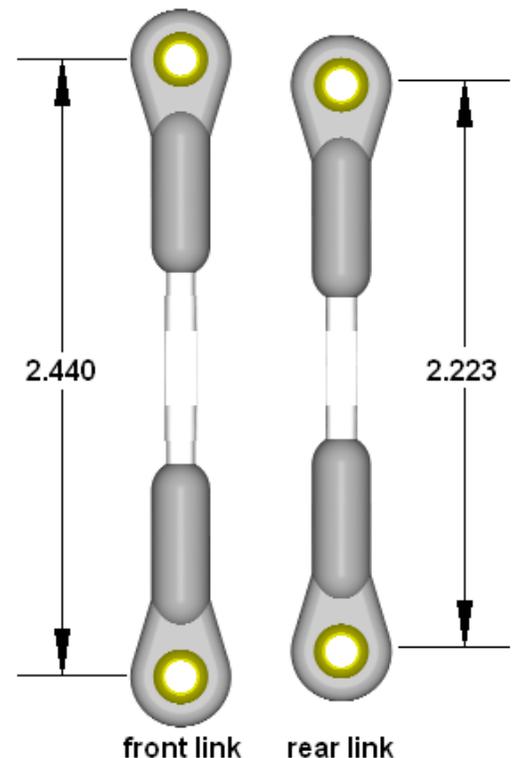
There are 8 captured ball links with brass balls. 4 of the balls in the links have been bored out to slide over the kingpins. Locate a king pin and separate out the 4 bored captured ball links.

Now locate the 4-40 x 1 3/8" turnbuckles (x4). Assemble a captured ball link onto each end of the turnbuckle, being sure that there is one bored out captured ball link and one non-bored out captured ball link on each turnbuckle.

Starting point on this chassis will be 4° caster and -2° camber. To make the settings easier to obtain, using calipers, set the front links at 2.455" [62.36 mm] center of the ball to center of the other ball, and the rear links at 2.244" [56.99 mm] from center to center.

Tip: install the ball links onto the turnbuckles so that the adjustment directions are in the same direction for each link. I.E., two of the bored out captured ball links should be on a left-hand thread, and two should be on a right-hand thread. When installing these on the front of the car, be sure that the left-threaded, bored captured ball links are on the same sides of the chassis. This way, the same direction the wrench is turned on all links causes the turnbuckles to screw in or out is the same for all the links.

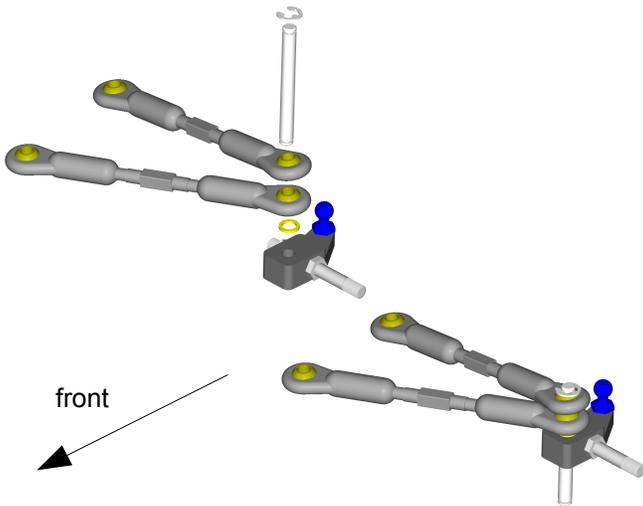
Tip: carefully remove the balls from the plastic end and polish the ball with some polishing compound for smooth operation.



Front Suspension Components Assembly

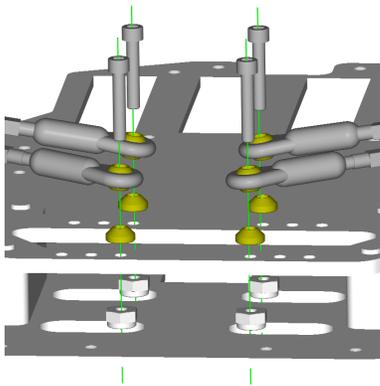
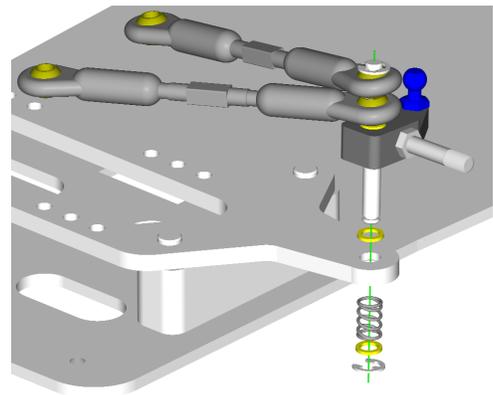
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Locating the kingpins (x2), and the previously assembled front links and steering blocks, along with 1/8" E-clips, assemble as follows; Install the kingpin into the steering block to about the middle of the kingpin. Next, install one .022" brass shim, then slide on the longer link (front) first followed by the shorter link (rear). Install the E-clip onto the top of the the king pin. Now slide the links and steering block to the top of the kingpin, taking up the slack at the top of the kingpin.

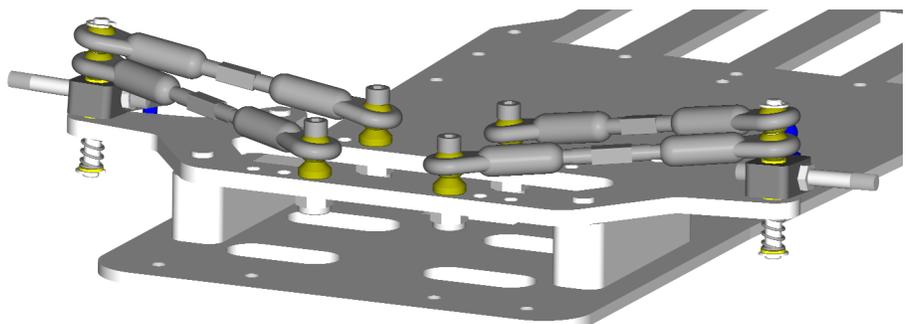
To install the strut assembly into the chassis, start by locating the .022" brass shims (x2), .020" springs (x2) and another E-clip. Slide a shim onto the bottom of the kingpin, then slide the kingpin through the lower arm and through the previously installed teflon bushings. Next follow this by installing another .022" shim, the spring, another shim followed by an E-clip.



Using the 4-40 x 5/8" socket head cap screws (x4), brass cone washers (x4) and large 4-40 lock-nuts (x4), attach the links to the lower arm. Slide the screws through the captured ball ends, through the cone washers, then thread them into the holes closest to the center of the chassis. Keeping a hex driver in the screw, use a nut driver to install the 4-40 nuts from below the chassis. The screws should be held snug to the carbon lower arm when tightening the nuts.

Tip: do not clearance drill the carbon plate. These screws are meant to be threaded into the carbon. This will keep the suspension accurate.

Completed assembly:



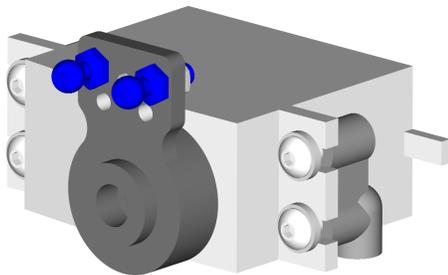
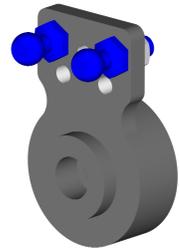
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Steering Servo Installation

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You will need a medium sized servo saver to match the servo you chose for your car. We recommend standard size servos designed for 10th scale chassis. Low profile servos aren't required for your Formula World GT 200.

Locate the aluminum ball studs (x2) (blue anodized) and the mini (flat) 4-40 hex nuts (x2). Install the ball studs in the locations indicated.

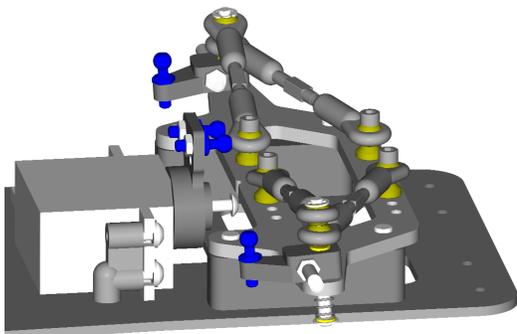
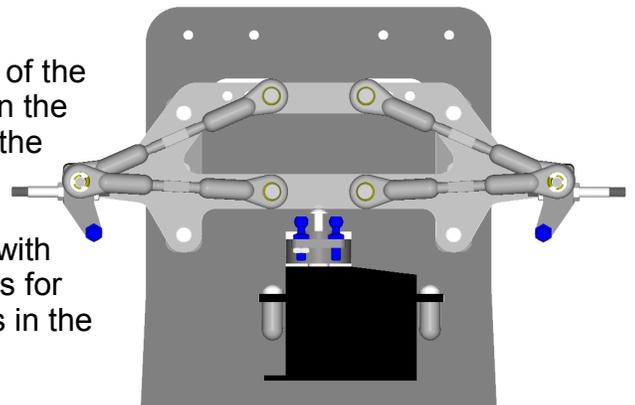


Using the kit supplied servo mounts, attach them to the servo using the provided 4-40 x .375 button head screws (x4). This illustration shows the use of washers under the screws to help distribute the stresses of racing.

To center the servo saver within the travel of the servo, first, turn on your transmitter and center the trims and sub-trims according to your transmitter's instructions. Next, attach the servo to your receiver and power it up either with a receiver pack, or using the battery and electronic speed controller that you will be using in this car. When the servo responds and centers up, attach the servo saver as straight as possible. Don't worry about it being slightly off center, this can be trimmed in on track.

Installing a long button head screw into the mounting hole of the servo saver will allow alignment with the alignment notch in the lower arm. Once the servo is squared onto the arm, mark the hole locations for the servo mounts from side to side.

Pull the button head screw out, and align the servo saver with the slot in the chassis and mark the position on the chassis for the front to rear placement of the servo for mounting holes in the chassis.



After carefully marking the center of the servo mounting holes, place the assembled servo back on the chassis to make sure the marked holes appear where they should be.

Tip: A mis-aligned servo from side to side will make the car behave permanently 'tweaked', and the car will never corner the same to the left as it does to the right. Taking your time and getting this part correct will lead to a pleasant racing experience, and a correctly handling Formula World GT 200.

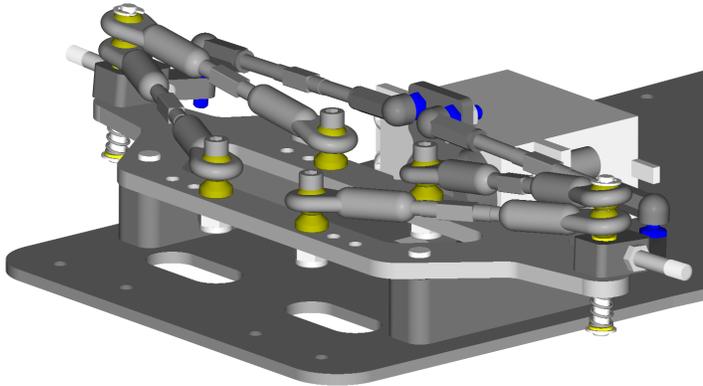
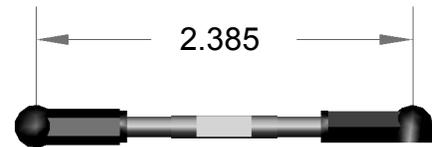
Next, remove the servo and drill the holes and countersink (82°) them from the bottom so that the screw heads are flush.

Steering Assembly – Rear Suspension Assembly

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Locate the ballcups and 4-40 x 1 3/8" turnbuckles (x2). Assemble one as shown and the other opposite hand, to the length shown (2.385"), measuring with a caliper from center to center. This number should get the links close, and can be fine-tuned later for proper toe-in / out.



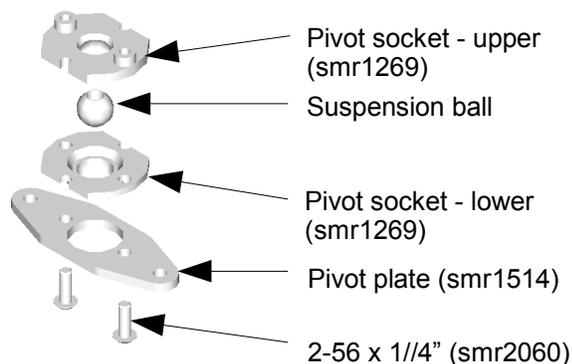
This completes the Speed Merchant World GT Formula front suspension assembly.

Tip: adjusting the camber and caster can also be adjusted with the aid of a spare roll-over antenna inserted in place of the kingpins, using a camber gage. Always adjust for camber first then the caster angle.

To raise or lower the front ride height to run smaller or larger diameter tires, spacers can be added or removed equally between the plastic spacers and the chassis. Included in the kit are aluminum spacer washers that are meant specifically for that purpose. These spacers are available in both .030" and .060". Note, to run really low profile tires, you may need to remove a plastic spacer from each side.

Rear Suspension

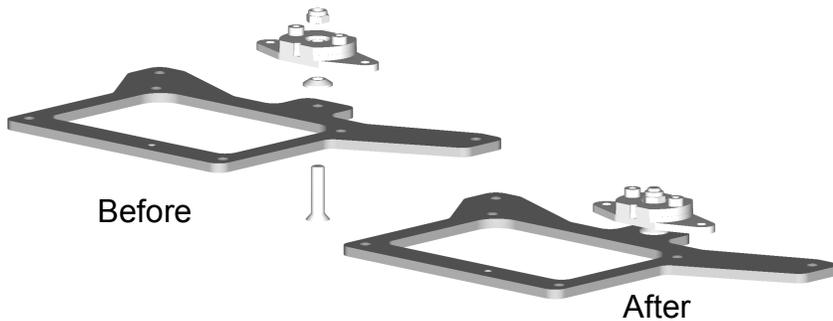
Assemble the center pivot plate with the pivot socket set (smr1268), in the configuration shown, fastening with 2-56 x 1/4" button head screws (x2).



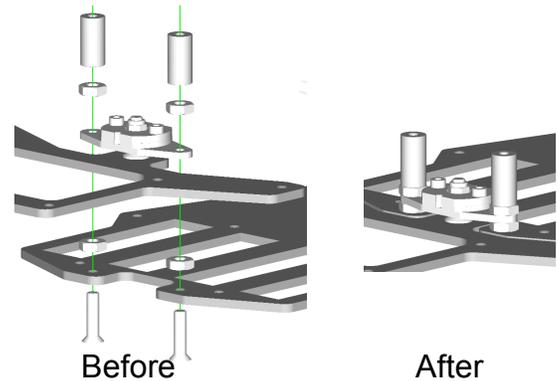
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Rear Suspension Assembly

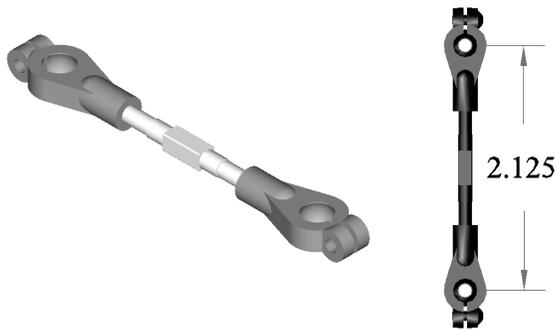
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Attach rear pod plate to the center pivot using a 4-40 x 1/2" flat head screw (smr2014). Use a low roll center cone (SMR5008) on top of the lower pod plate, screwing through the 1/4" x 4-40 threaded suspension ball in the center pivot. Secure using a 4-40 mini-locknut (SMR2080) as a jam nut.

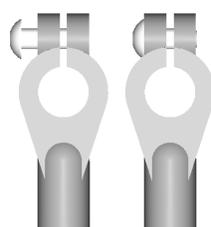
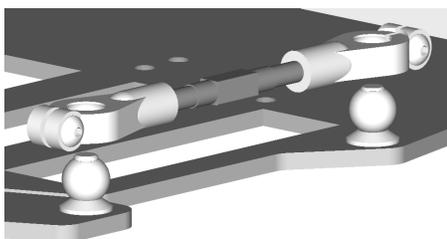
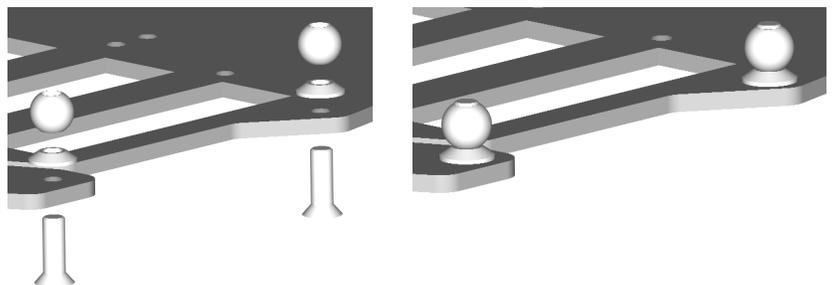


Attach the lower pod plate/pivot assembly to the main chassis using 4-40 x 1/2" flat head screws (x2) (smr2014) with 4-40 hex nuts (x2) (smr2078). Slide center pivot assembly onto the 4-40 screws and secure with 4-40 hex nuts (x2) (smr2078) followed by the tweak plate stand-offs (x2)(smrxxxx).



Assemble the side links from the Link Set (smr1264), screw onto each end of the turnbuckles one of the captured link ends (smr1265-s). Space the plastic captured link ends equally 2-1/8" apart from center to center. This will get the link close, and will be fine-tuned later.

Next, place two 4-40 x 3/8" flat head screws (smr2012) through the chassis and lower pod plate. From the top of the chassis, place one low roll center cone (smr5008) on each of the screws, followed finally by a 1/4" x 4-40 suspension ball screwed down tightly using a small amount of blue thread lock.



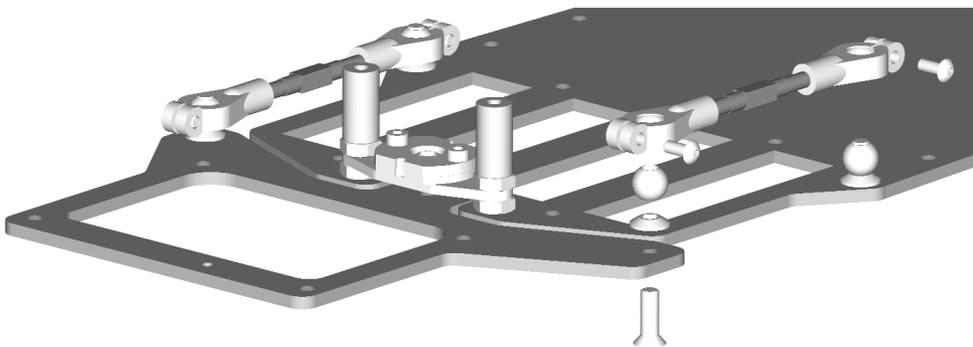
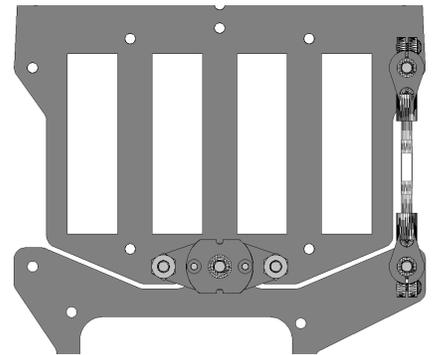
Next, attach only one of the link assemblies to the suspension balls on the chassis. Insert the 2-56 x 1/4" button head screw (smr2060) into the clearance (larger) hole, and screw in until it just bottoms on the captured link ends. It is extremely important that the captured link ends do not bind on the 1/4" x 4-40 suspension balls.

Rear Suspension Assembly

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Holding the chassis and lower pod plate level, examine the gap between the main chassis and the lower pod plate from the bottom. The gap should be even all the way across. Make adjustments to the single attached link until the gap is even.



Next, place two 4-40 x 3/8" flat head screws through the chassis and lower pod plate on the opposite side. From the top of the chassis, place one low roll center cone on each of the screws, followed finally by a 4-40 threaded ball screwed down tight. Next attach the second link to the opposite side using the same method as before.

Articulate the rear pod plate, twisting it left and right, noting the feeling of the motion. The method for fine adjustment for the different actions are as follows:

- If the motion on one side feels 'clicky', then the link on that side of the pod is too long.
- If the motion on one side of the pod feels 'tight', then that side link is too short.

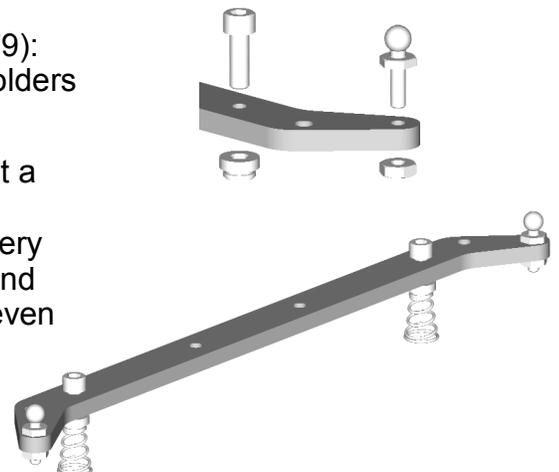
The twisting motion from side to side of the rear pod is really important to get correct. If not adjusted correctly, it will lead to an ill-handling car. If the plate gap was adjusted properly in the previous step, the last link attached *should* be the only link in need of adjustment.

Locate the following items:

2-56 ball stud (x2) and 2-56 nut, tweak spring carriers (smr1279):
4-40 x 3/8" socket head cap screws (x2), and Tweak Spring Holders (x2) and the Tweak Plate.

Install the 2-56 ball stud into the end of the tweak plate and put a 2-56 nut on the end (x2). Skipping a set of holes in, Install the socket head cap screws in the holes indicated. Next, apply a very small amount of CA glue to just the end thread of the screws and install the Tweak Spring Holders until the end of the holder is even with the end of the screw and allow the glue to cure.

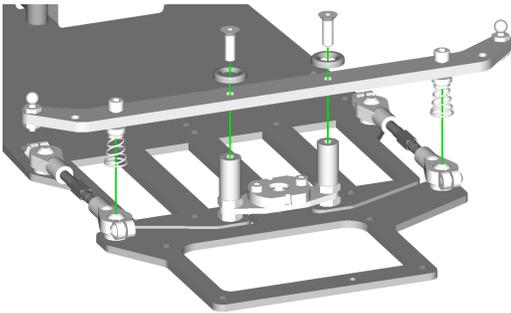
Install the tweak springs, only after the CA glue has fully cured, by pushing and twisting the spring in a clock-wise motion until it 'clicks' into position.



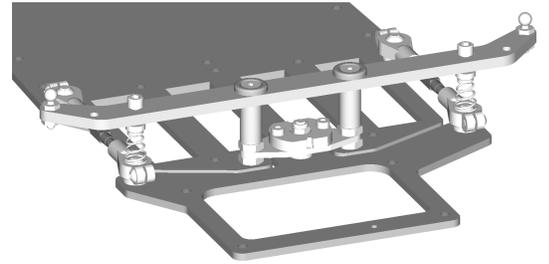
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Rear Suspension Assembly

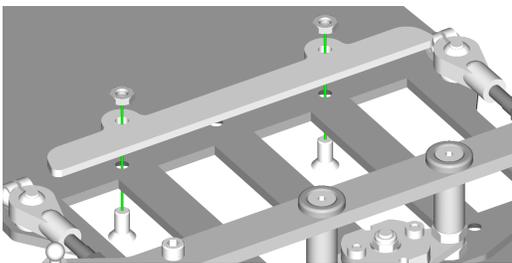
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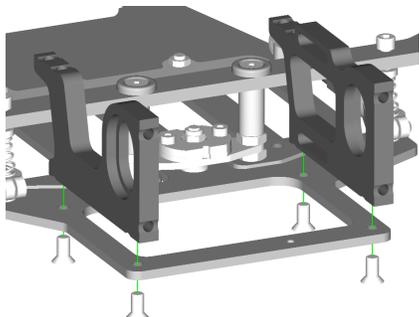
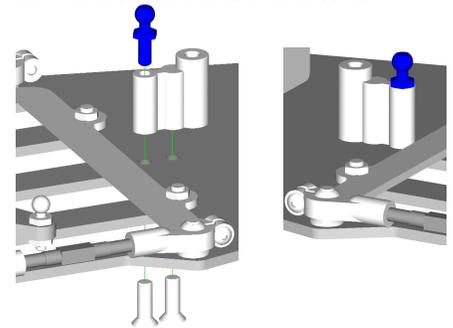
With the tweak spring holders adjusted all the way up, install onto the chassis using 4-40 x 3/8" flat head screws (x2) through the countersunk washers (x2), into the stand-offs.



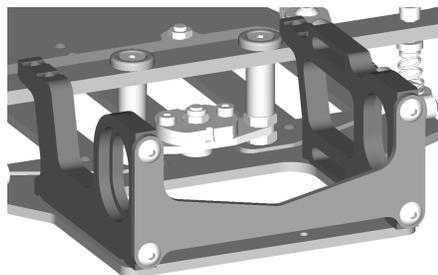
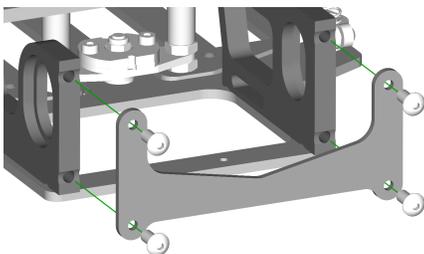
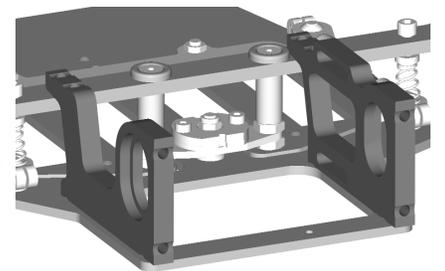
After locating 1 aluminum ball stud, the shock/antenna mount, and 4-40 x 3/8" screws (x2), install the shock mount in the orientation as shown.



Attach the battery positioner as shown on the chassis and attach with 4-40 x 3/8" flat head screws (x2) and 4-40 flat nuts (x2) as shown.

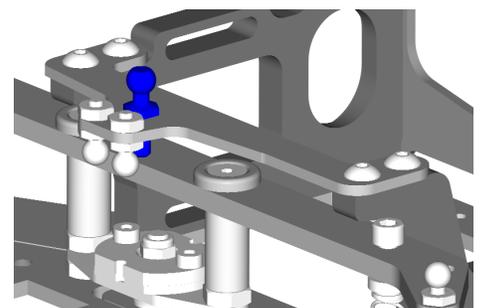
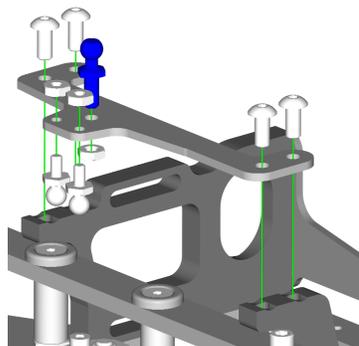


Locate the bulkhead plates for the rear pod and 4-40 x 1/4" flathead screws (x4), and attach to the lower pod plate as shown, being sure not to over-tighten.



Next, attach the rear carbon fiber pod plate using 4-40 x 1/4" button head screws (x4), again being sure not to over-tighten.

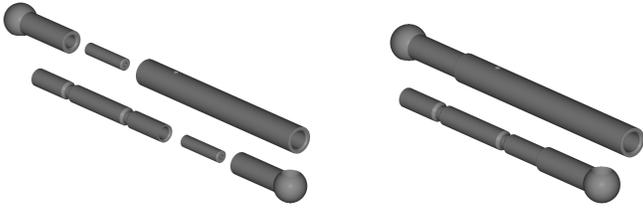
Before attaching the upper pod plate, attach the following ball studs; blue anodized 4-40 ball stud in the center hole, and the shorter 2-56 ball studs from the opposite side of the plate, securing with nuts and thread lock. Attach this assembly, with the 2-56 ball studs (x2) on the bottom side to the rear pod with 4-40 x 1/4" button head screws (x4).



Rear Suspension Assembly

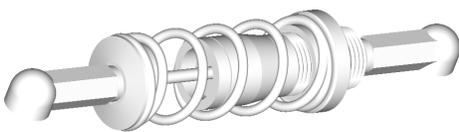
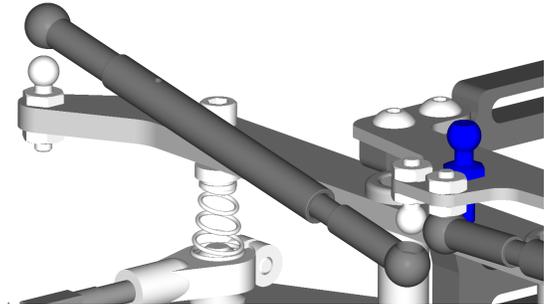
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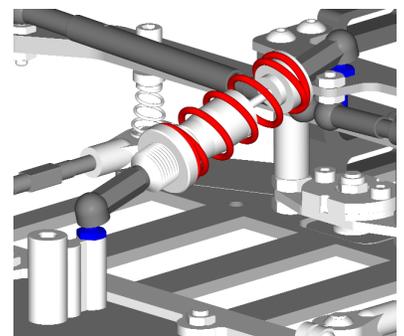
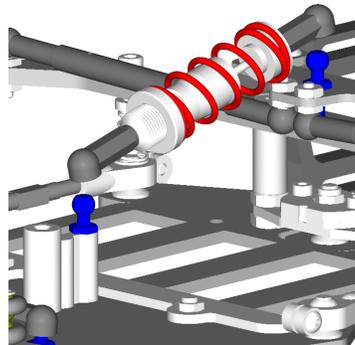
Locate the parts to assemble the side damper tubes, including damping fluid (not included, we recommend Tube Spooge) of your choice. Install the 2-56 grub screws into the ball cup, and screw the damper shafts and tubes as shown. Next, fill the tube with Medium Tube Spooge until it bleeds out the breather hole. Having a rag ready, insert the damper shaft into the tube slowly working the shaft back and forth to fully coat with the Tube Spooge. Wipe off excess Tube Spooge, and repeat with other damper.

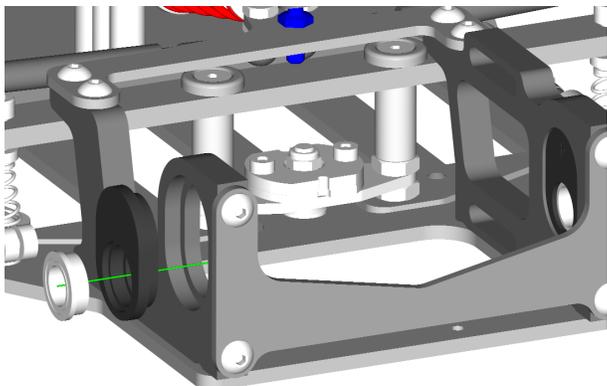
Install the damper tubes in the orientation shown. Periodically, remove the damper tubes, clean and refill with Tube Spooge. When constructed, the tubes should have equal damping. If not, clean out and re-fill both tubes.



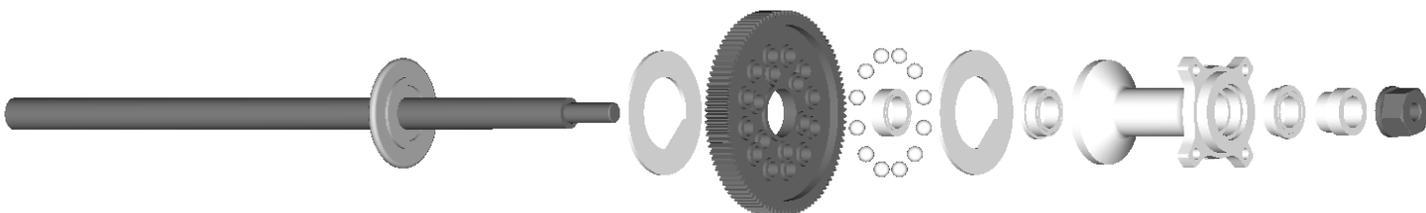
Assemble the shock using the included instructions that came with the shock. We suggest using 35 weight oil inside the shock to start with. Different temperatures and track conditions will dictate what set-up suits your situation best. Install ball cups on each end of the shock.

Tip: Install the shock in the direction shown, this will help keep track debris off the piston shaft. To remove the shock for battery installation, use a pair of needle nose pliers to grab the ball cup attached to the shock body, as close to the shock body and rotate on the axis of the shock. It should pop right off the ball stud on the shock/antenna mount.





Locate the rear axle ride height adjusters (No. 4) (x2) and the 3/8" x 1/4" flanged axle bearings (x2). Install the ride height adjusters into the bulkhead plates. Install the bearings into the ride height adjusters. Tip: we suggest to leave the flashing on these parts, only trimming the gate material. Keeping the flashing on these parts will insure a nice tight fit. If the compression caused by the press fit is causing the bearings to not operate properly, reaming out the bearing holes with a stepped prop reamer will usually alleviate that compression on the bearing.



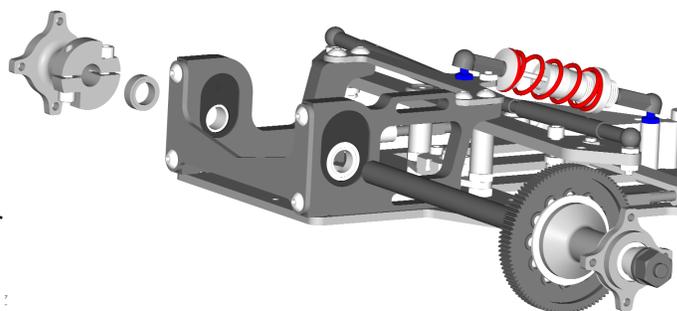
From left to right shown above is; the rear axle, diff ring, 100 tooth spur gear, 3/8" x 1/4" un-flanged bearing, 1/8" diff balls (x12), diff ring, 3/8" x 1/4" flanged bearing, right hub, 3/8" x 1/4" flanged bearing, thrust cone, nylon diff nut.

These components will be installed in that order. Silicone diff grease should be used on the balls after installation into the spur gear (both sides).

Tip: to aid in the assembly, put 3 to 4 dots of grease on the axle flange, and on the right hub before mounting the diff rings. This will hold the rings in place until the assembly is completed.

When tightening the diff nut, tighten it down slowly until it just starts to tighten the diff. From this point on, only tighten 1/4 turn increments, spinning the axle while holding the spur from turning. This will allow the diff to break in slowly. Keep tightening the diff nut until it's difficult to spin the spur while holding the axle and right hub firmly.

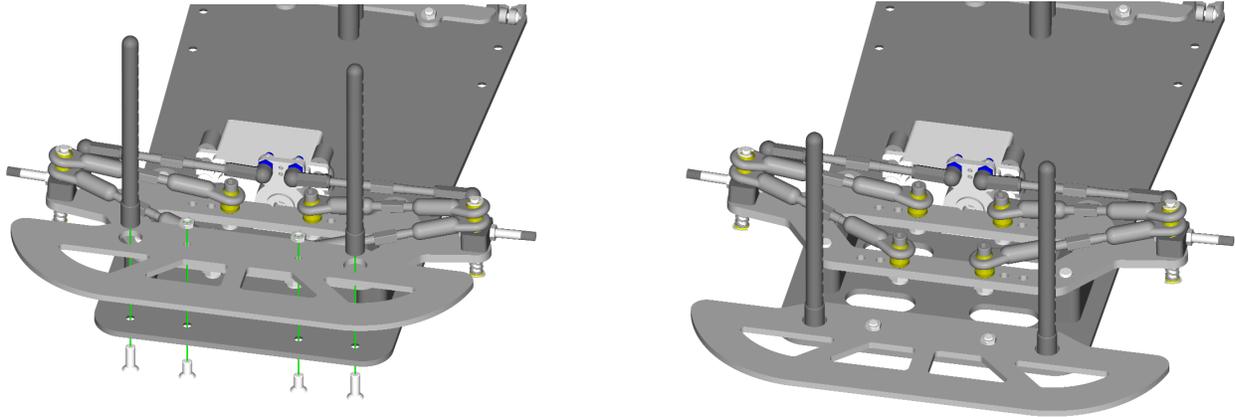
Install axle into rear pod. Slide on left hub and tighten the screws to secure the left hub, and axle assembly. Note: 1/4" axle shims will be needed to bring the rear track width to the desired width. The design of the Formula World GT 200 includes balance holes. Using the balance hole in the rear pod as a centerline reference for the car, install your desired brand of rear wheels and measure from the center of the balance hole to the outside of the rear rims to determine how many shims are required for your desired rear track width.



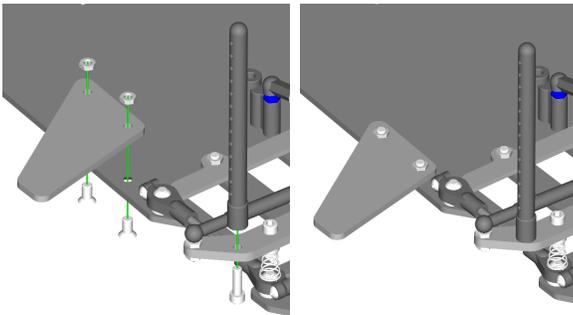
Bumper, Body Post Attachment

Formula World GT 200

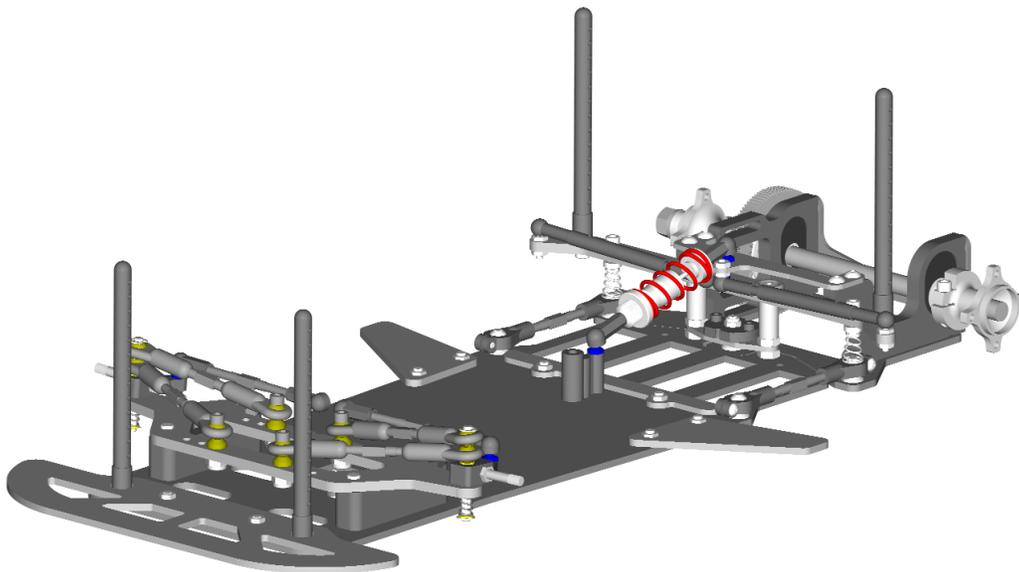
13



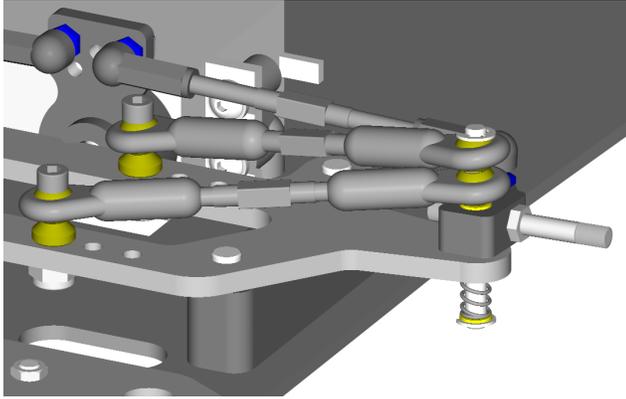
Attach the front bumper with 4-40 x 1/4 flat head screws (x2) and 4-40 flat nuts, leaving loose until the body posts are attached use blue thread lock on the screws. Next attach the body posts and attach with 4-40 x 3/8" long flat head socket head cap screws (x2). Now finish tightening the screws to the bumper.



Attach the remaining two body posts to the tweak plate with 4-40 x 3/8" socket head cap screws (x2). Attach the nerf plates to the main chassis just ahead of the side links using 4-40 x 1/4" socket head cap screws (x2) and 4-40 flat nuts (x2). Use blue thread lock on the screws for the nerf plates.

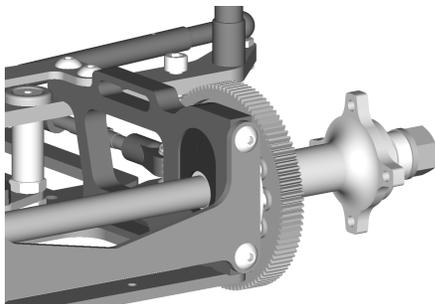
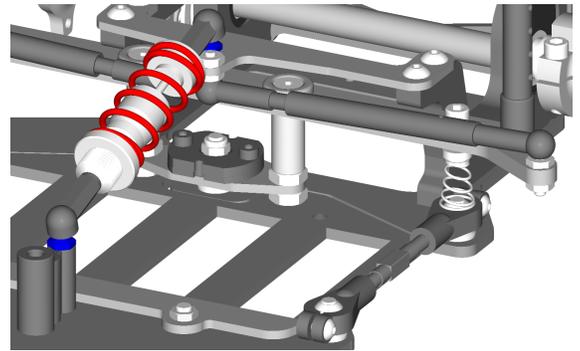


Completed chassis assembly.



Front suspension springs:
Camber angle:
Camber link position:
Camber link cone:
Camber link shims:
Steering ball stud shims:
Caster angle:
Caster link position:
Caster link cone:
Caster link shims:
Ride height blocks (qty):
Ride height shims:
Front ride height (measured):
Front axle shim(s):
Front axle shim(s) position:
Tire compound / brand / rim:
Tire diameter:
Traction additive:
Quantity of tire treated:
Additional tire preparation:

Center shock:
Shock oil (brand, weight):
Shock spring:
Shock shim height:
Damper tube fluid:
Side springs:
Ride height:
Droop height:
Battery position:
Roll cone height:



Axle ride height adjuster:
Track width:
Rear ride height (measured):
Tire compound \ brand \ rim:
Tire diameter:
Traction additive:
Quantity of tire treated:
Additional tire preparation:

Track:
Surface:
Surface conditions:
Surface treatment:
Grip Level:
Temperature:
Weather conditions:

Event:
Driver:
Qualified:
Finished:
Transmitter:
Speed Controller:
Motor / winds / roll-out: