BEAST

INSTRUCTIONS

#0650 Beast Midget Racing Kit

Manufactured by:

Custom Works RC Products
760-B Crosspoint Drive
Denver, NC 28037
www.customworksrc.com

Thank you for purchasing the Beast Midget! The Beast midget platform has been developed for loose dirt buggy tire racing.

This kit includes most of the parts required for the build. The following additional equipment must be added to complete the car. (Be sure to check if the track you plan on racing at has any motor, battery or speed control restrictions.)

- Surface transmitter and receiver (minimum 2 channel.)
- 1/10th scale electronic speed control
- 540 size brushless motor
- Pinion gear (48 pitch, appropriate size for motor)
- 2S hard case "shorty" LiPo battery
- Steering servo (low profile)
- Front and rear wheels and tires (2.2" diameter AE style hex wheels)
- Silicone shock oil (30 weight recommended)
- Lexan paint and/or vinyl wrap for body

Tools
The following tools are provided in the kit and will get you started. We suggest that you purchase higher quality tools for future maintenance.

•.050 Allen key •1.5mm Allen key •1/16 Allen key •2mm Allen key •Turnbuckle wrench •3/16" Hex driver
•1/4" Hex driver •7mm hex driver •Turnbuckle wrench

Additional tools
These tools are recommended for the build and may be required to complete.

•Curved scissors •Needle nose pliers •Hobby knife •Blue thread-lock •Assorted sandpaper •1.9mm piston drill bit

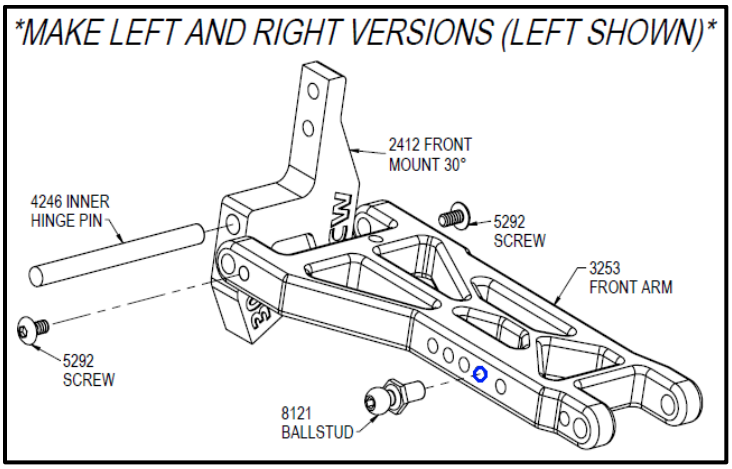
Building tips
Parts are made with tight tolerance and held to the side of a "snug" fit as wear is expected over time. Try as we may, occasionally a burr may remain in a part and fit more tightly than desired. It is ok to use 400 Grit Sandpaper or a .125" drill bit to SLOWLY relieve a part from time to time. Suspension components should always pivot and swivel freely but without too much slop.

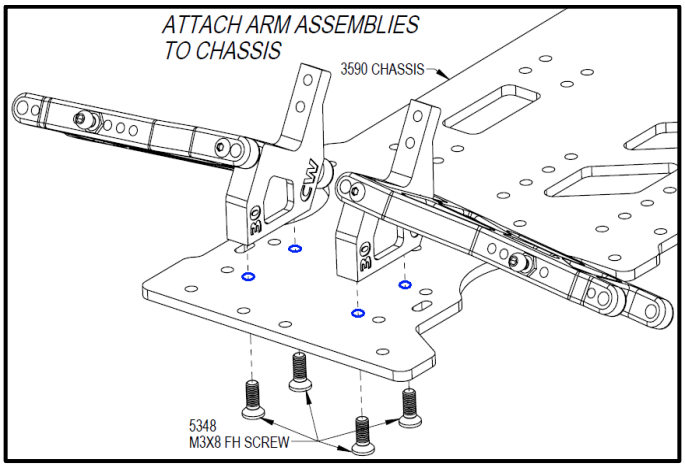
A lite to medium strength (usually the blue variety) thread locking fluid is suggested for all parts where metal screws thread into other metal parts. This will keep the screws from vibrating loose during operation and still allow the screw to be removed if needed. Remember it only takes a very small amount of thread-lock to secure the screw.

Do NOT use power screwdrivers to drive screws into parts. The fast rotation speed can melt and strip plastic parts or cross-thread into the aluminum parts.

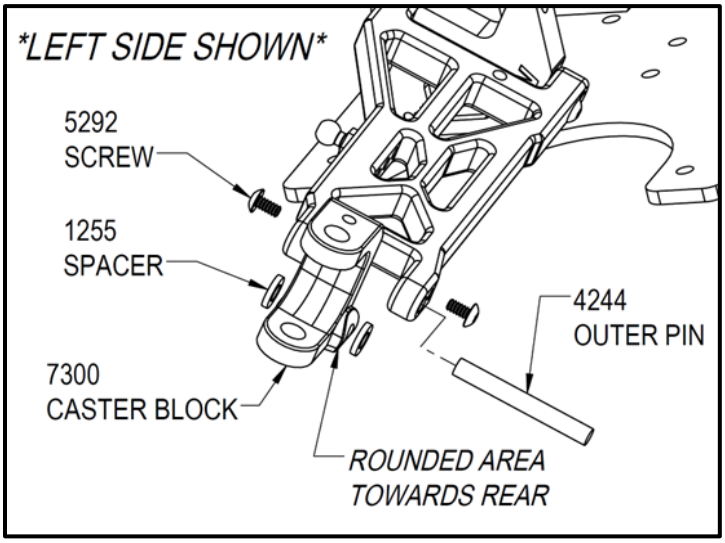
Lightly sand the edges of the carbon fiber pieces using a medium grade sandpaper to avoid splinters. A thin bead of Super Glue can be used to seal the edges of the carbon fiber for more protection against chips and splinters.

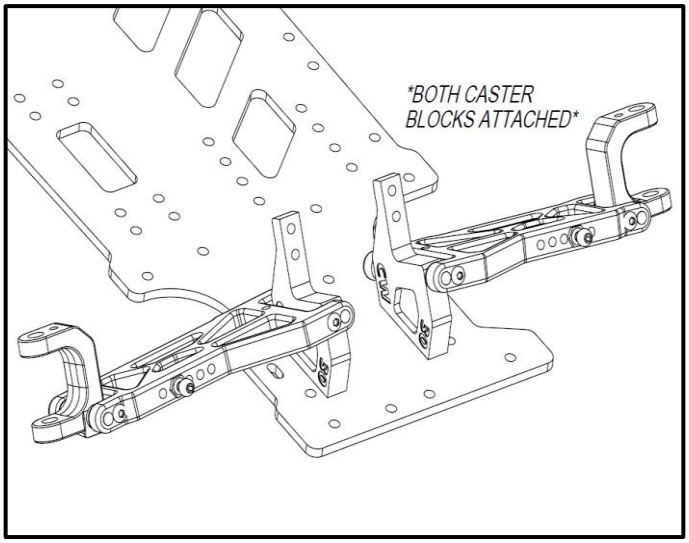
Front Kick-Up Assembly



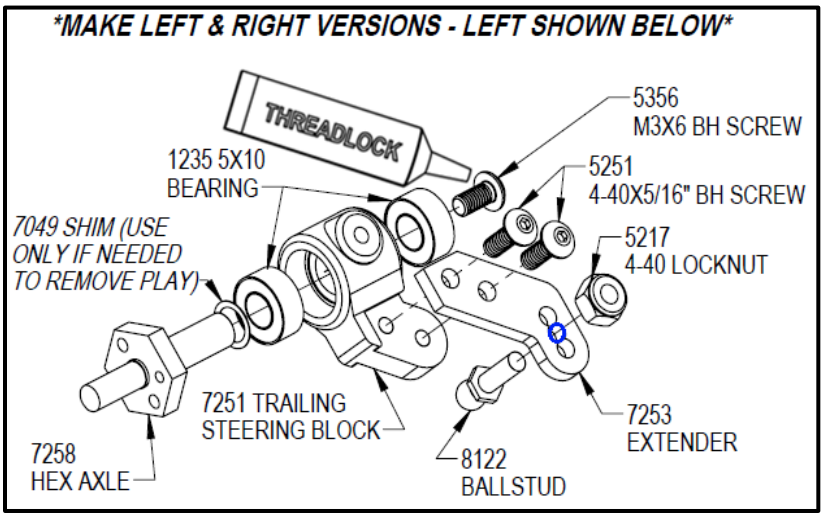


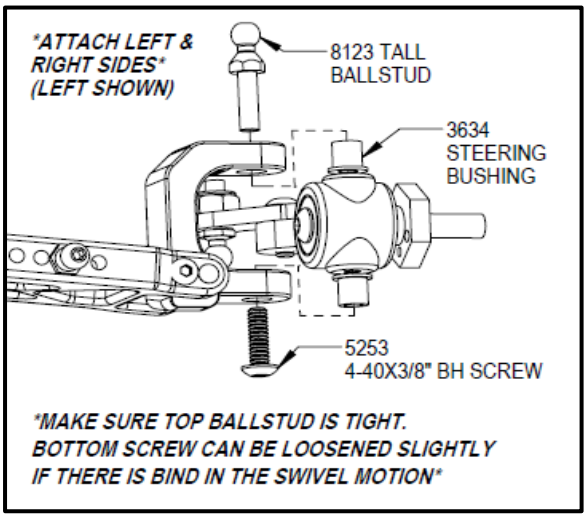
Caster Block Assembly



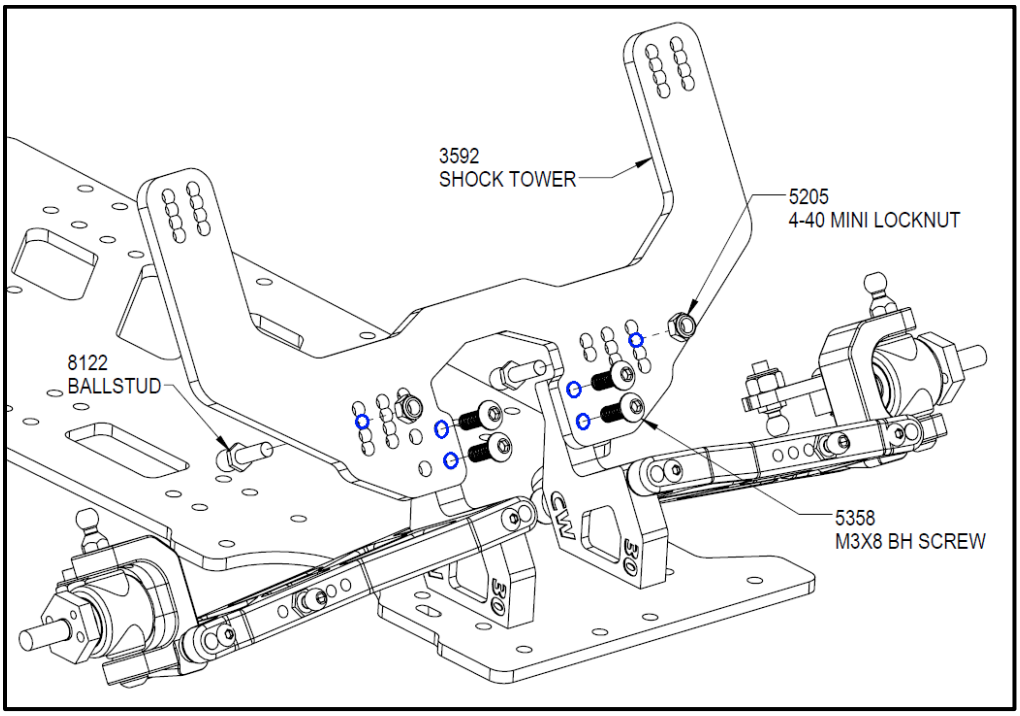


Steering Block Assembly

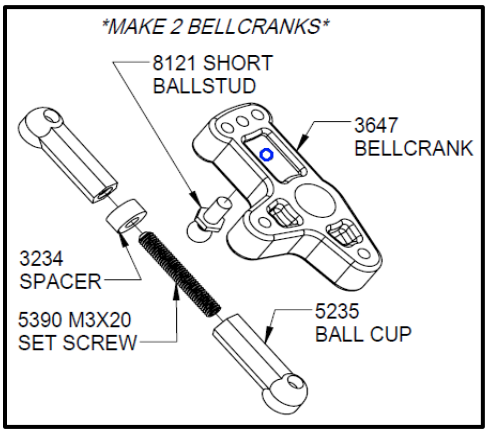


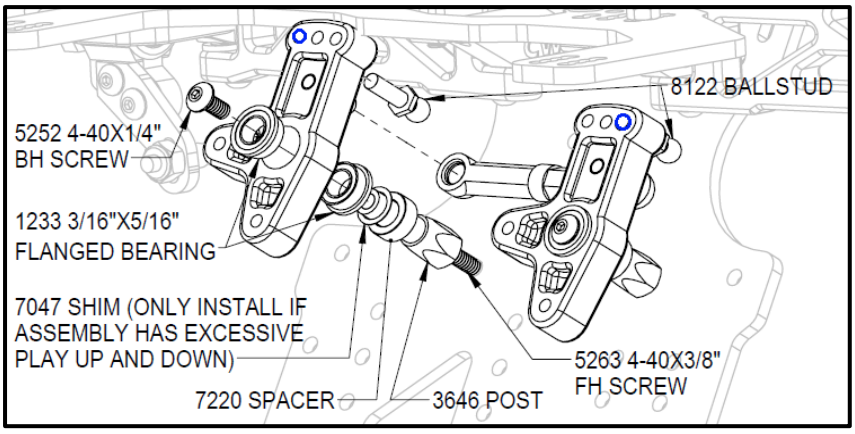


Front Shock Tower Assembly

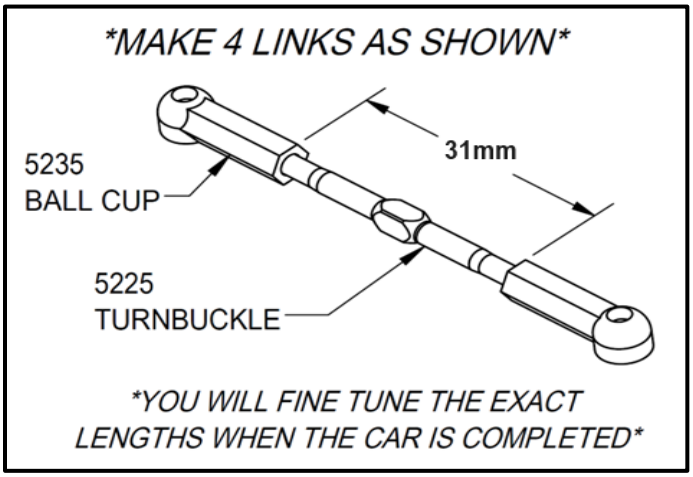


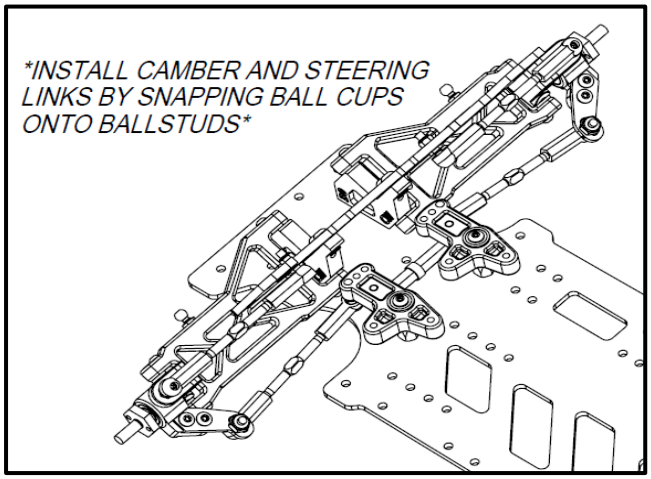
Bellcranks



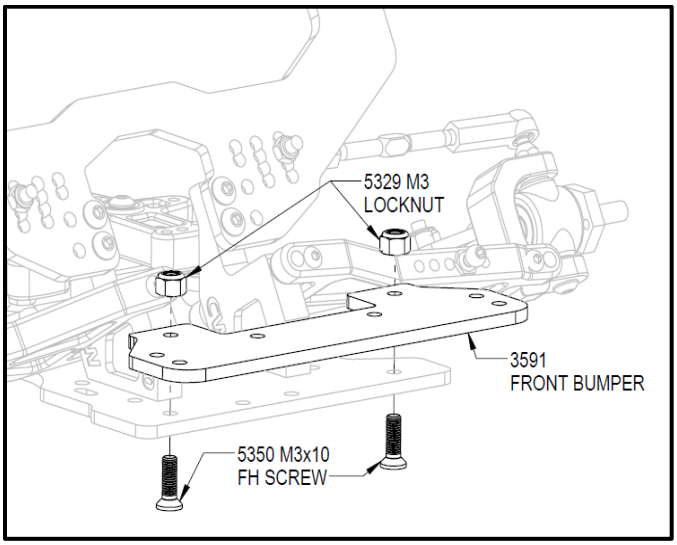


Steering/Front Camber Links

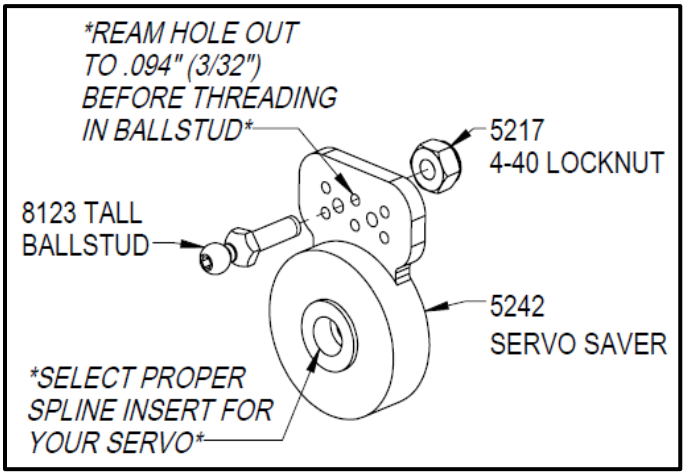


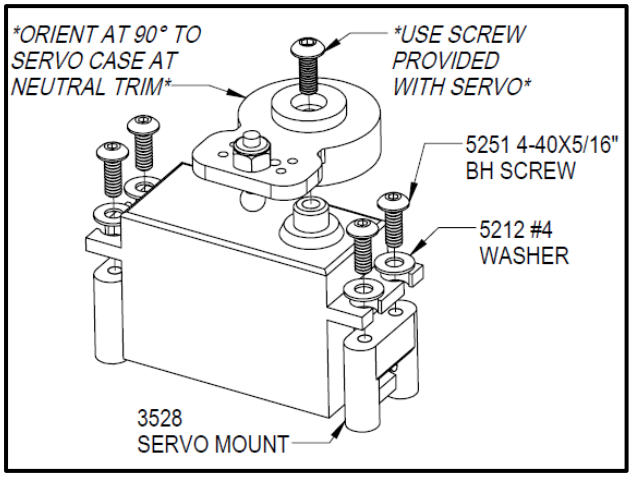


Front Bumper Assembly

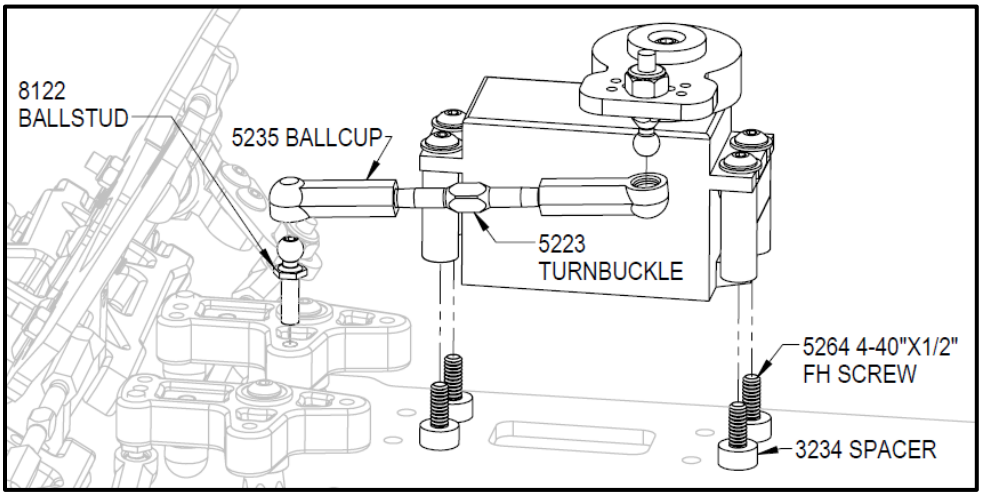


Servo Assembly

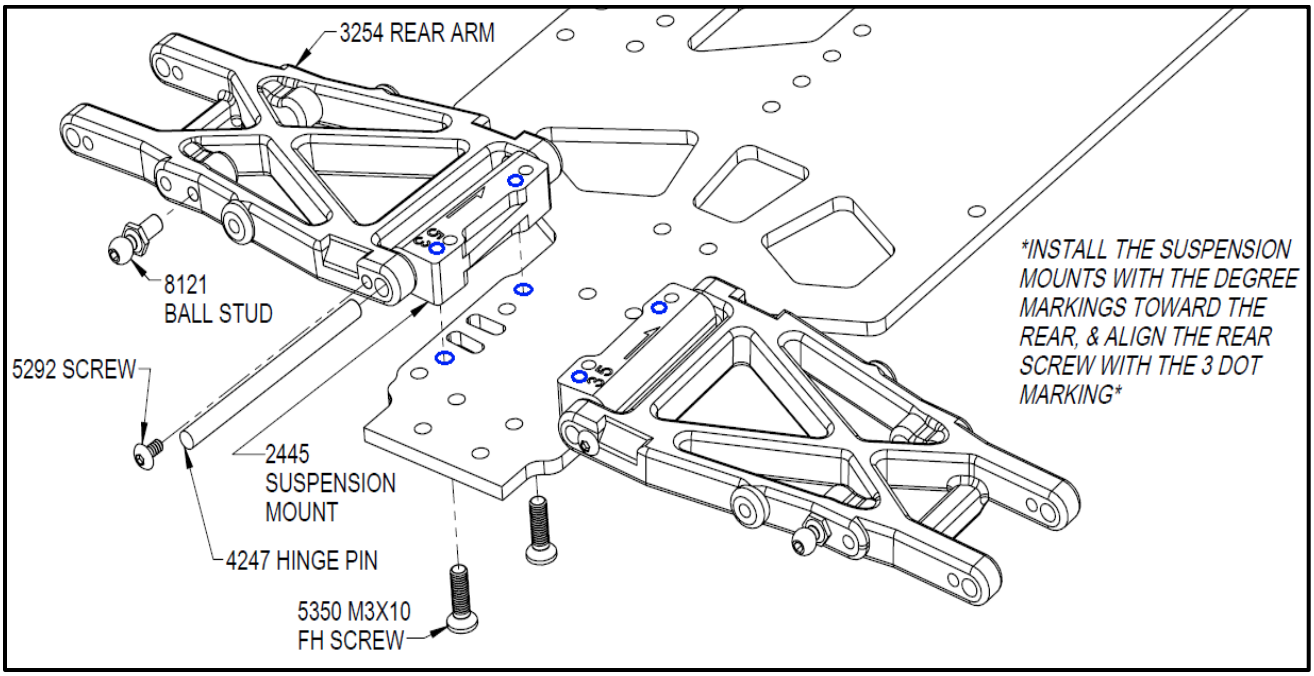




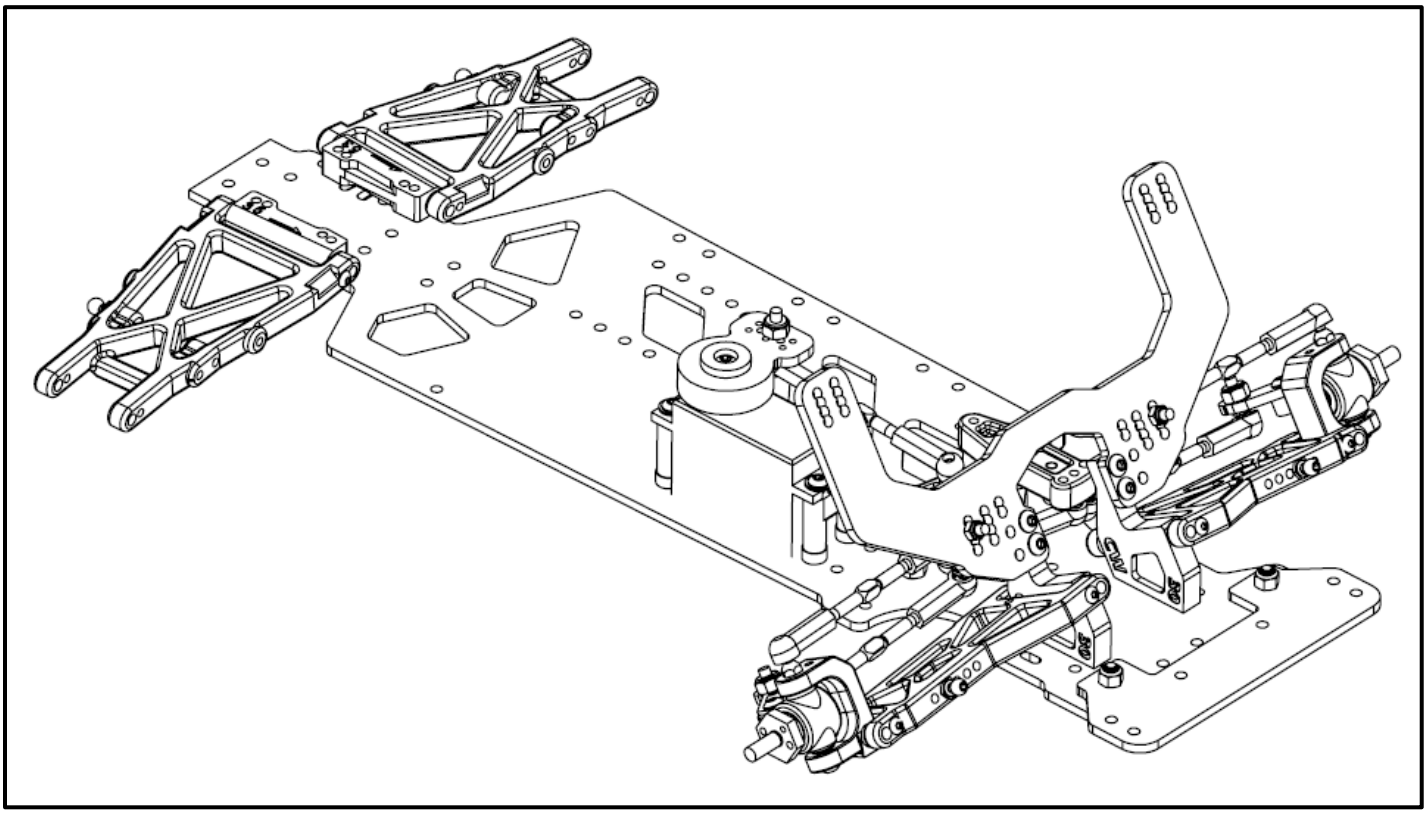
Servo Mounting



Rear Suspension Mount Assembly

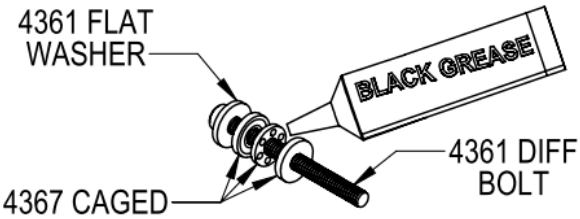


Progress Pic!



Differential Assembly

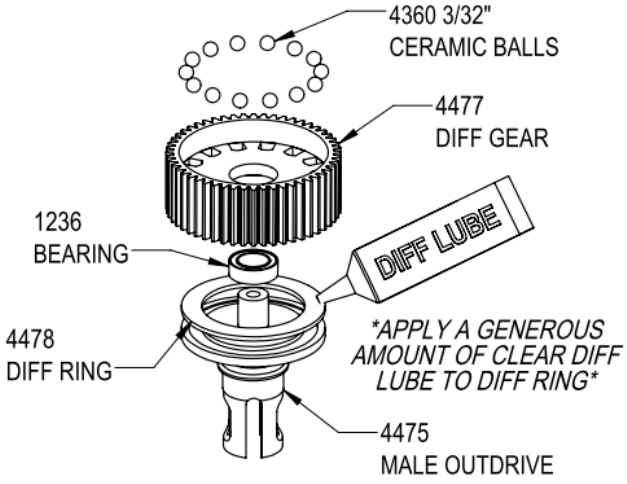
STEP 1 - PREP THE THRUST ASSEMBLY



GROOVES IN THRUST WASHERS FACE THE THRUST BALLS

(SET ASIDE UNTIL STEP 3)

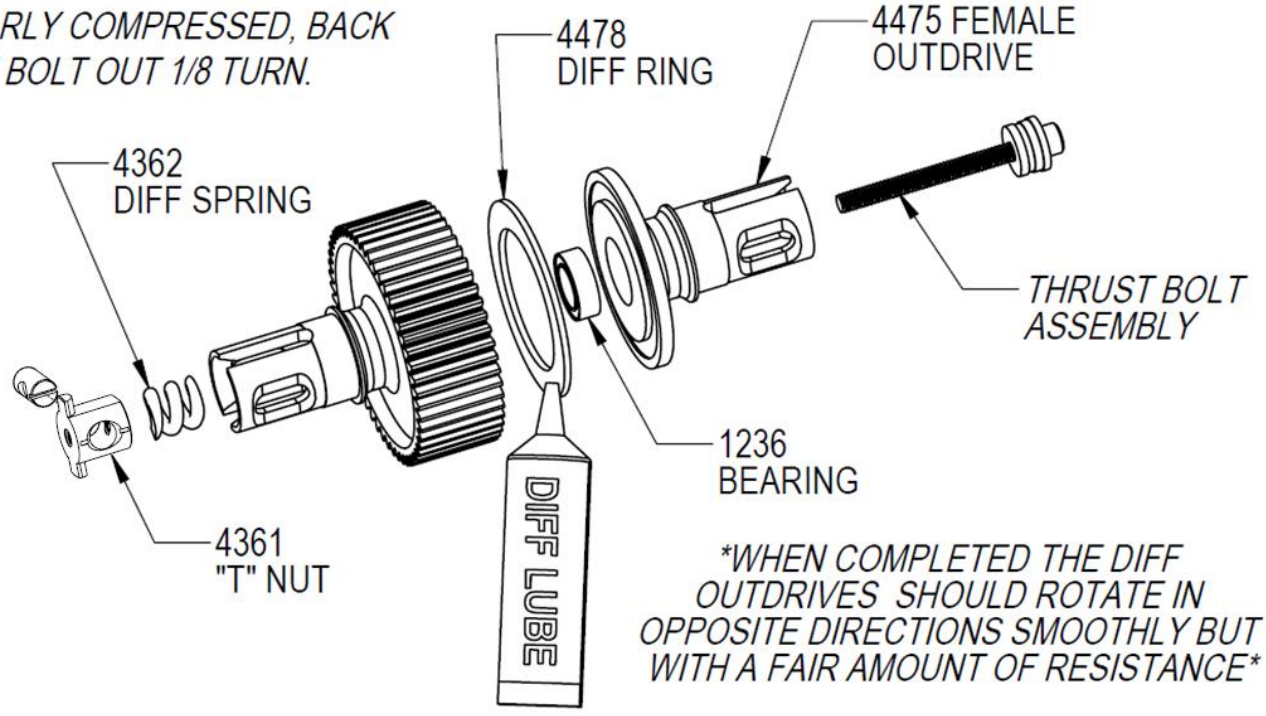
STEP 2 - ASSEMBLE THE MALE DIFF HALF



APPLY A GENEROUS AMOUNT OF CLEAR DIFF LUBE TO DIFF RING

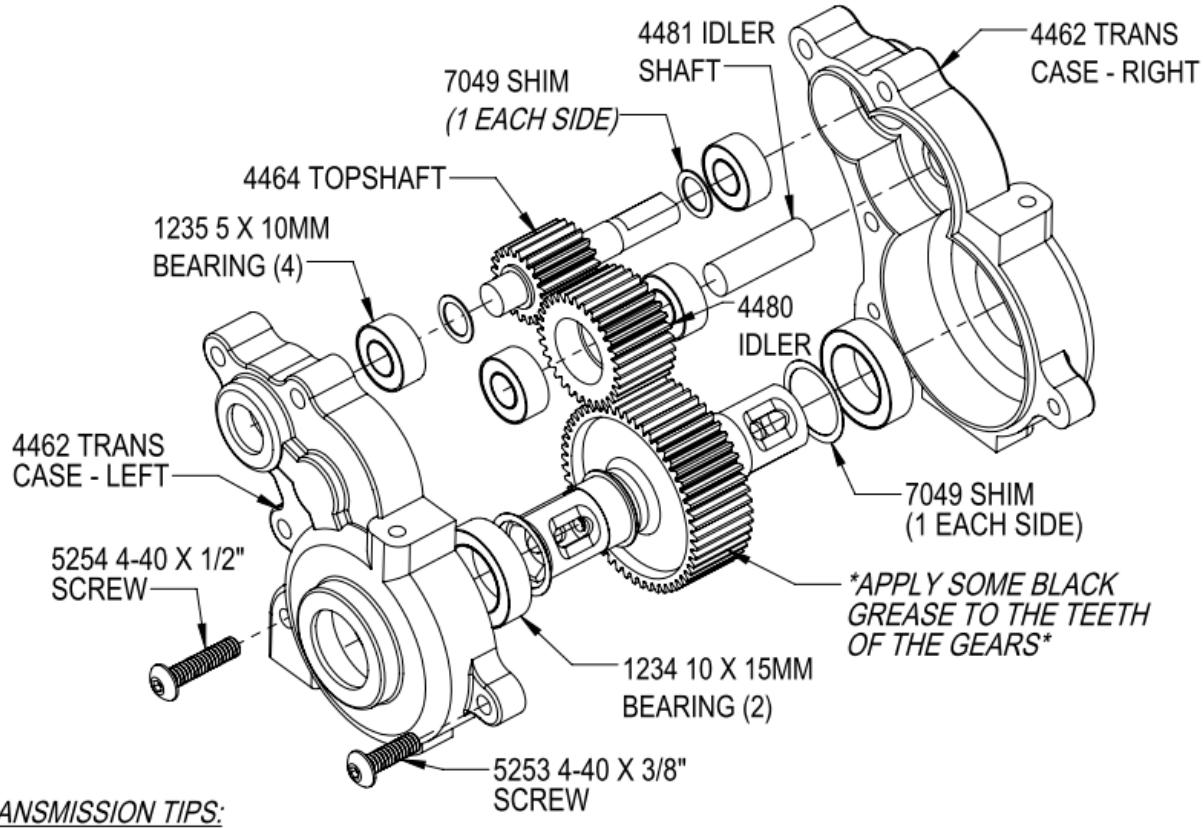
STEP 3 - FINAL DIFF ASSEMBLY

TIGHTEN THE DIFF BOLT INTO THE "T" NUT TO COMPRESS THE SPRING AND SET THE DIFF ACTION. DO NOT OVERTIGHTEN! WHEN THE SPRING FEELS NEARLY COMPRESSED, BACK THE BOLT OUT 1/8 TURN.



WHEN COMPLETED THE DIFF OUTDRIVES SHOULD ROTATE IN OPPOSITE DIRECTIONS SMOOTHLY BUT WITH A FAIR AMOUNT OF RESISTANCE

Transmission Assembly

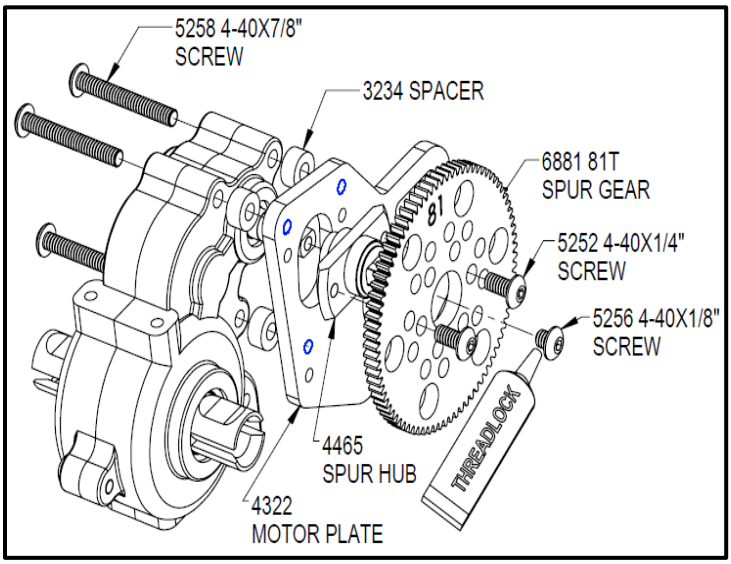


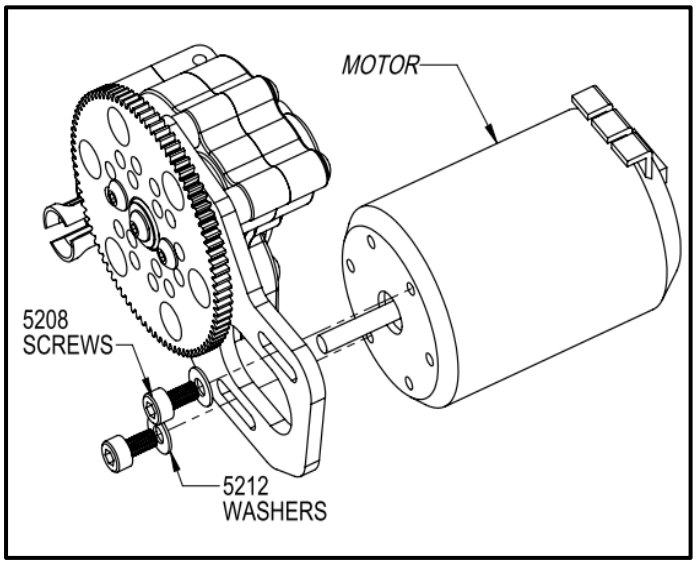
TRANSMISSION TIPS:

1. *BEARINGS CAN BE SPRAYED OUT WITH MOTOR SPRAY AND THEN OILED WITH A LITE OIL FOR BETTER FREE-SPIN. (WE RECOMMEND LEAVING THE GREASE IN THE WHEEL AND HUB BEARINGS FOR ADDED PROTECTION FROM DIRT.)*
2. *ORIENT THE DIFF SCREW TOWARD THE RIGHT SIDE.*
3. *TRANSMISSION IS 2.6 RATIO REDUCTION.*

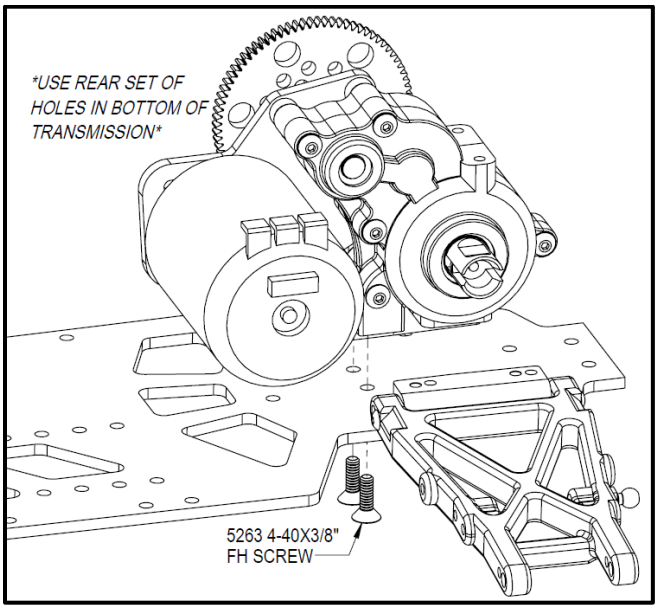
TROUBLESHOOTING:

1. *IF THE OUTDRIVES ARE HOT TO THE TOUCH AFTER A RUN, THE DIFF IS SLIPPING AND NEEDS TIGHTENED.*
2. *A MELTED IDLER OR DIFF GEAR IS USUALLY CAUSED BY A BAD BEARING.*
3. *REGULARLY CHECK TRANSMISSION PARTS FOR WEAR AND REPLACE AS NEEDED.*

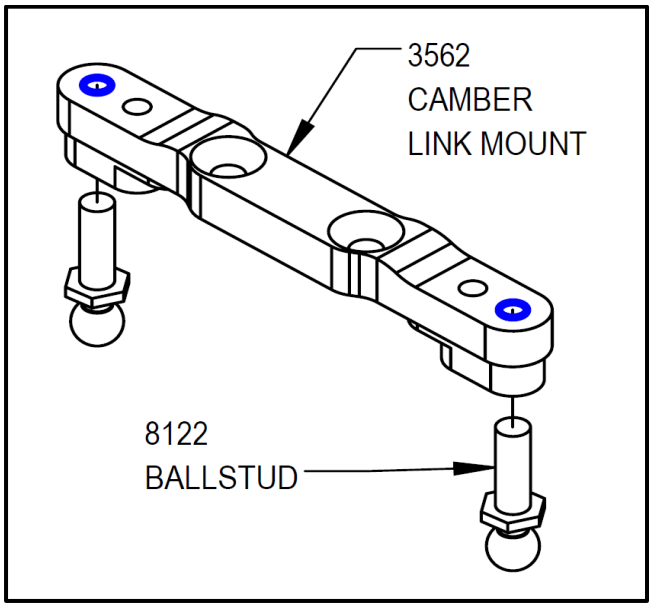




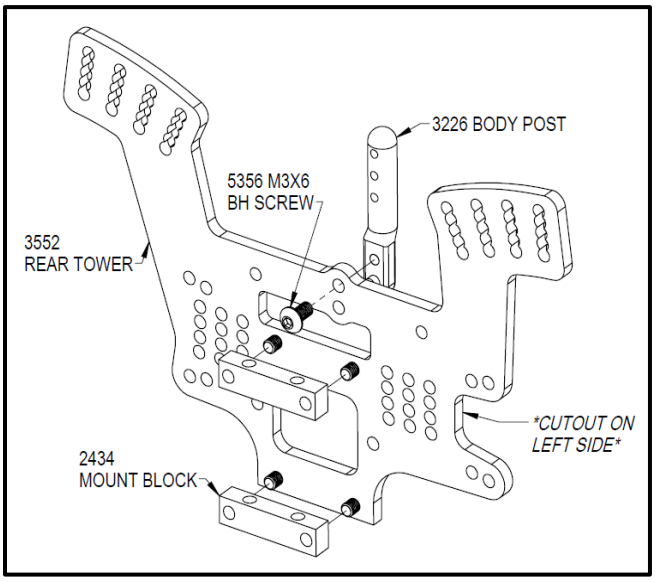
Transmission cont.

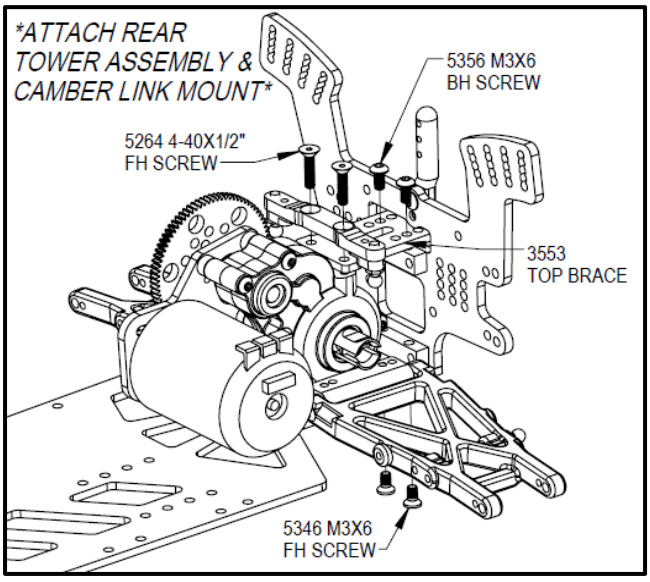


Camber Link Mount Assem.

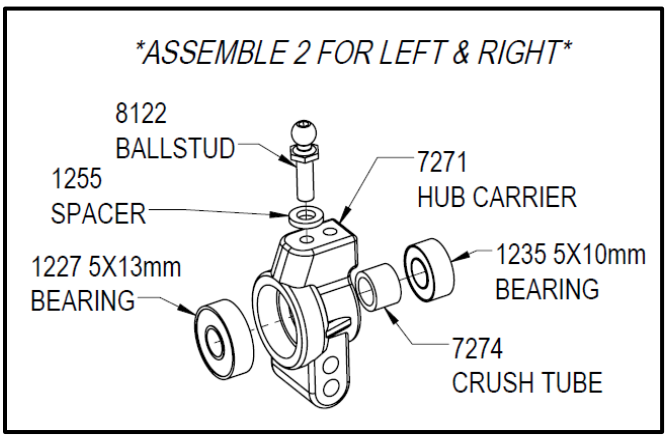


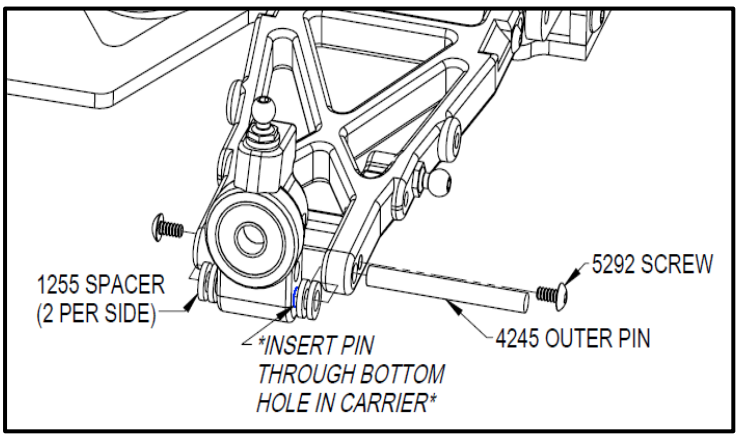
Rear Shock Tower Assembly



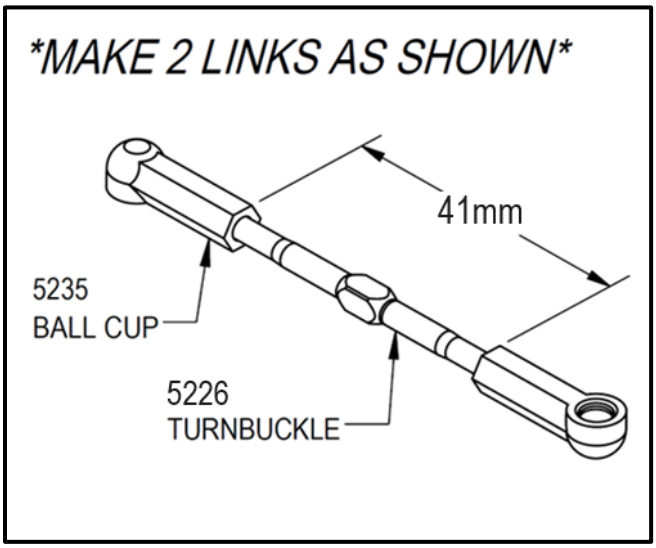


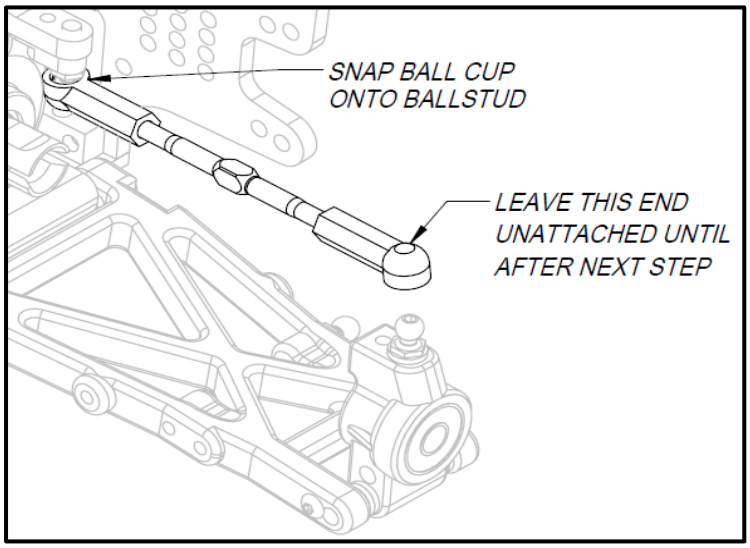
Rear Hub Carrier Assembly



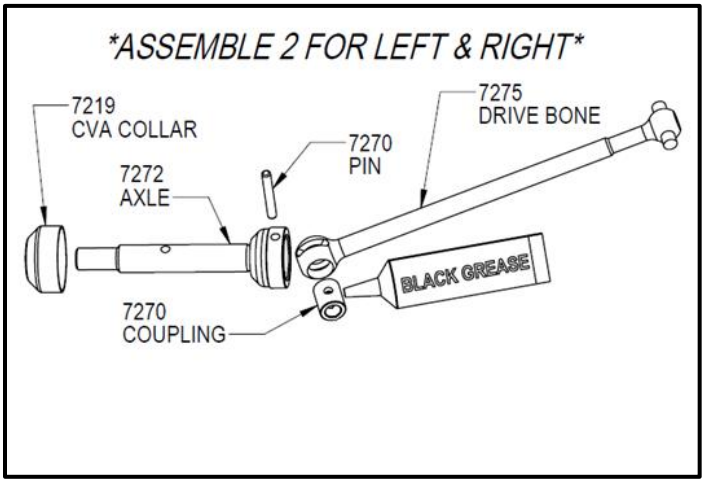


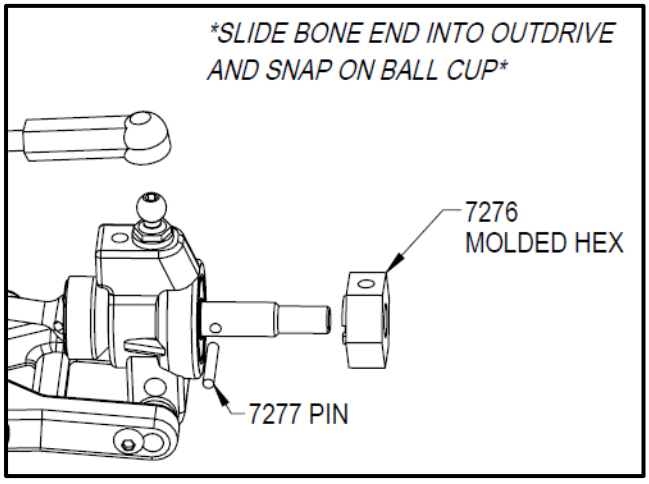
Rear Camber Link Assembly



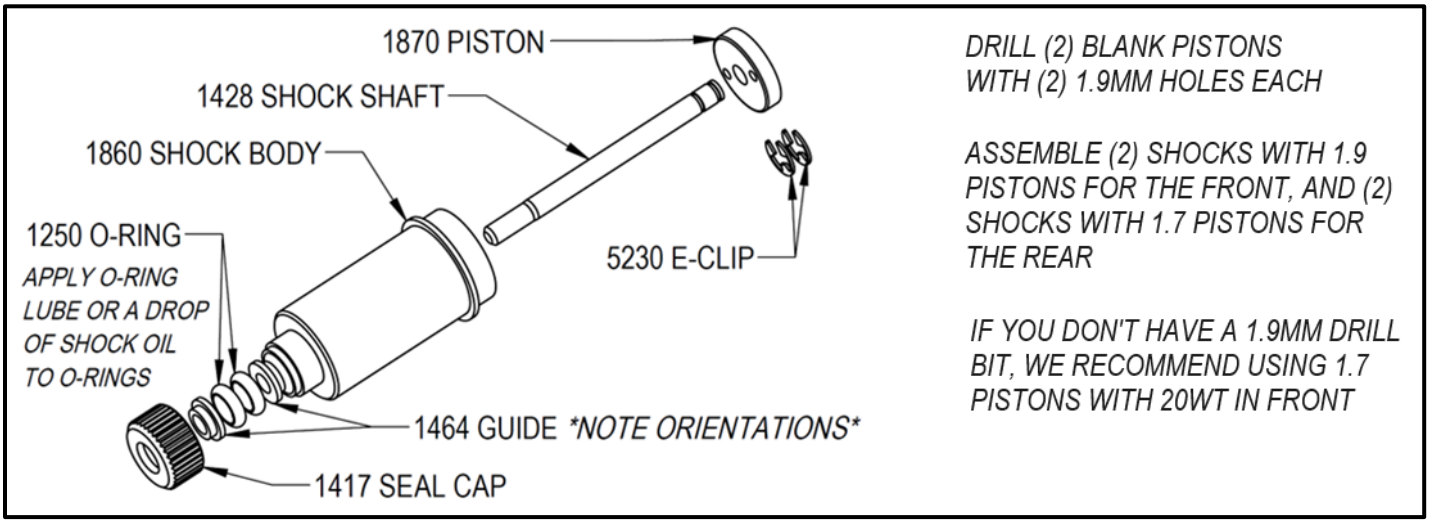


Drivetrain (CVA) Assembly

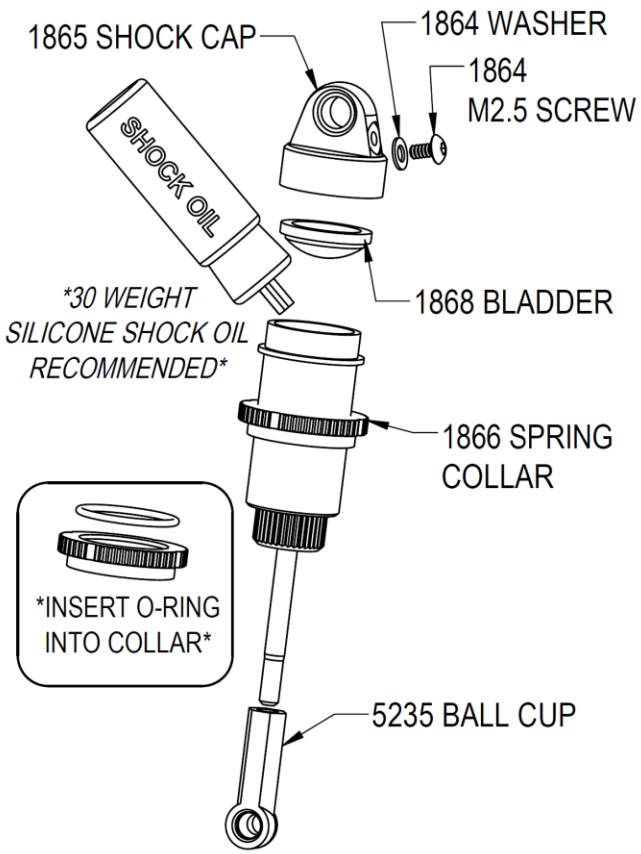




Shock Assembly

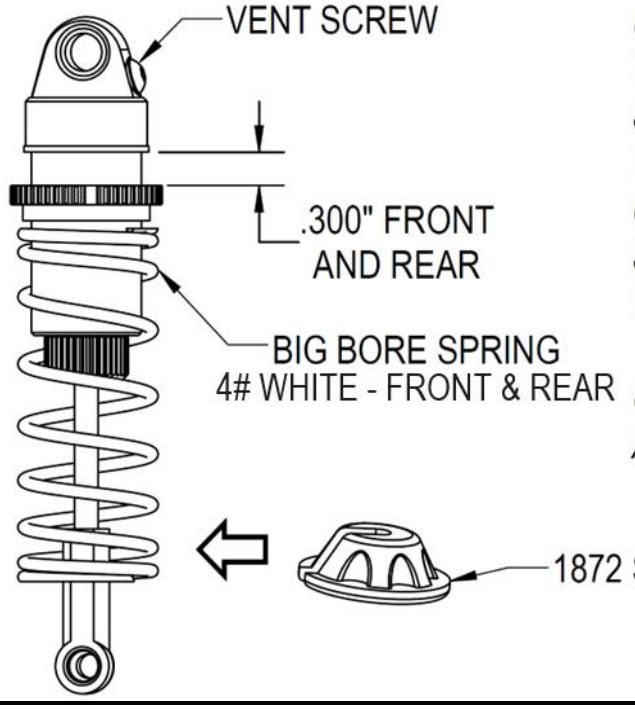


Shock Assembly continued



SHOCK FILLING INSTRUCTIONS

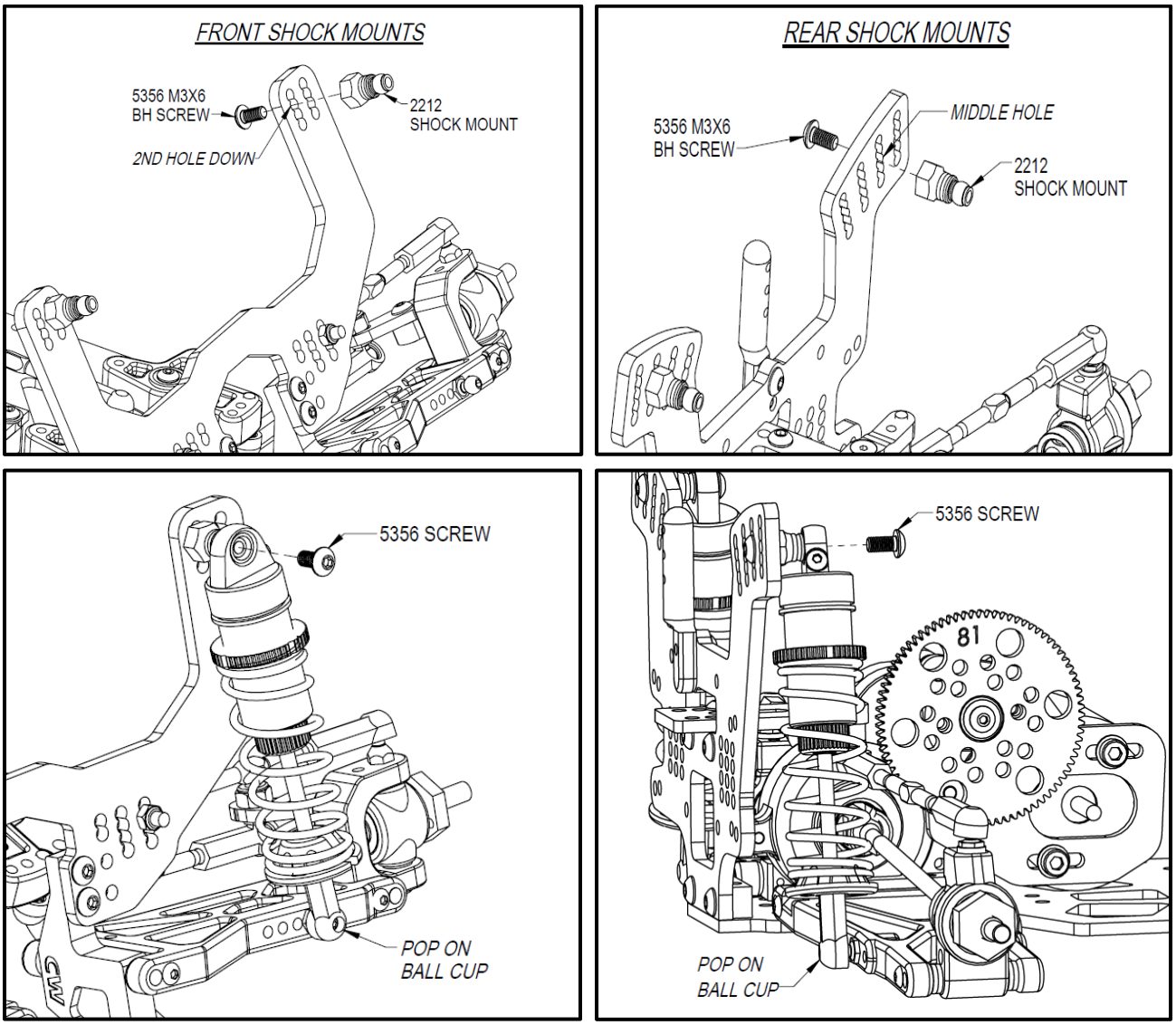
1. *INSTALL SCREW & WASHER INTO SHOCK CAP.*
2. *EXTEND THE SHOCK AND FILL WITH SHOCK OIL. LEAVE SPACE AT THE TOP FOR THE BLADDER.*
3. *MOVE THE SHOCK SHAFT UP AND DOWN SLOWLY TO REMOVE ANY AIR BUBBLES.*
4. *BEGIN TO SCREW ON THE SHOCK CAP AND BLADDER (1 TO 2 TURNS).*
5. *SLOWLY PUSH THE SHAFT ALL THE WAY INTO THE SHOCK. ANY EXCESS OIL WILL SEEP OUT OF THE BLEED HOLE IN THE BOTTOM OF THE SHOCK CAP.*
6. *FINISH SCREWING ON THE SHOCK CAP ALL THE WAY UNTIL HAND TIGHT.*
7. *THE SHOCK SHAFT SHOULD MOVE SMOOTHLY UP AND DOWN. IF IT GETS TIGHT NEAR THE TOP - THERE IS TOO MUCH OIL IN THE SHOCK. RE-BLEED USING LESS OIL.*



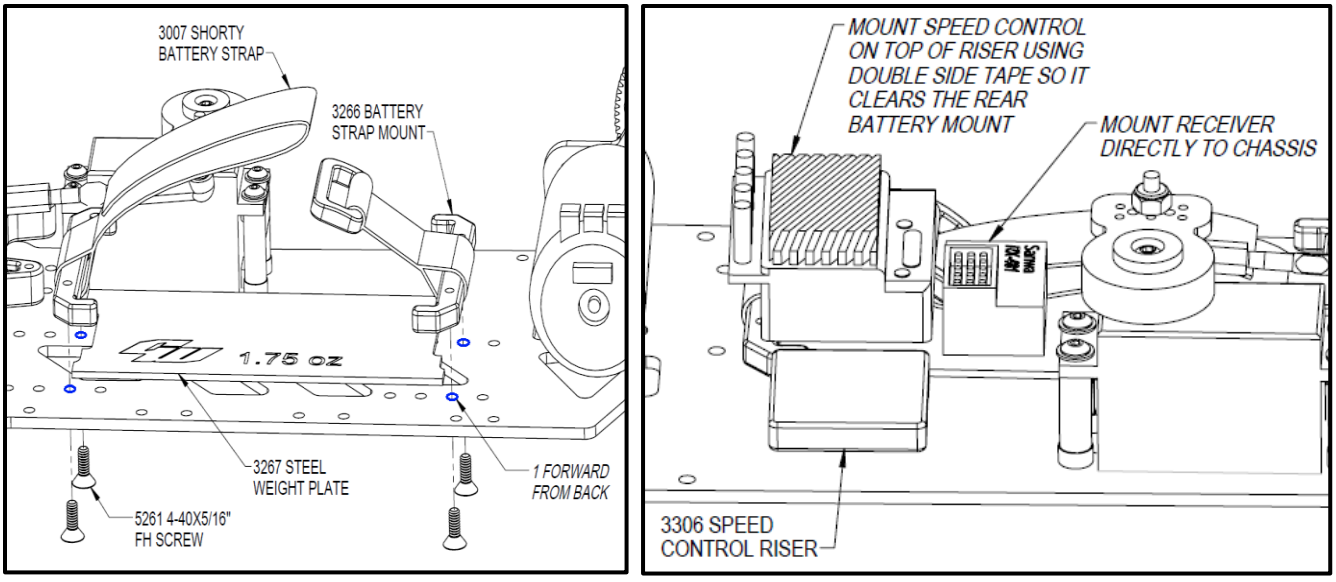
USE THE VENT SCREW TO ADJUST THE AMOUNT OF REBOUND THE SHOCK HAS. TO REMOVE REBOUND TAKE THE SCREW OUT AND COMPRESS THE SHAFT. WITH THE SHAFT COMPRESSED, REINSTALL THE SCREW.

OR REMOVE THE SCREW TO REMOVE ALL PRESSURE FROM THE SHOCK.

Shock Mounting



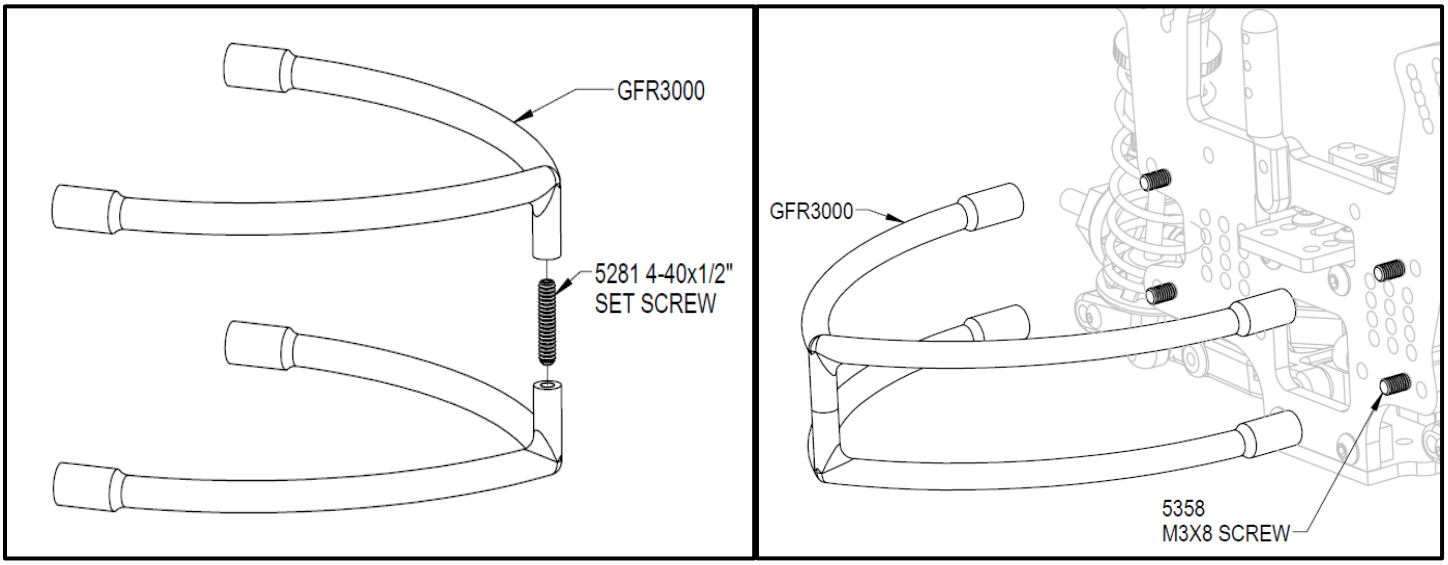
Electronics Mounting



Cage and Body Assembly & Attachment

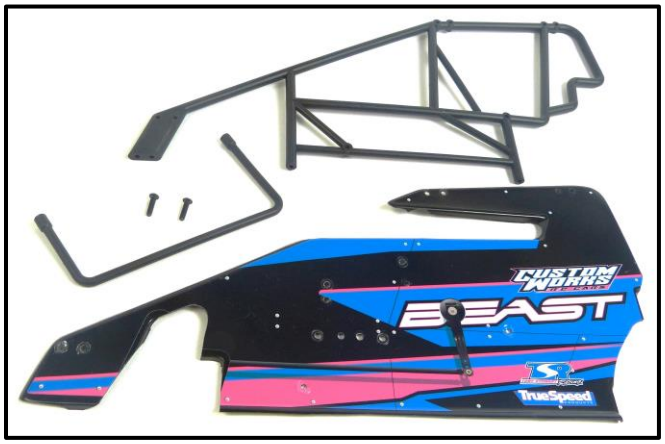
The body pieces in the below images are shown painted & decaled for ease of viewing. Clean the inside of the body pieces with soap & water and allow them to dry completely before painting. There is a protective film on the outside of the body pieces that needs to be removed after painting, before installing on the vehicle or applying a wrap or decals.

It is highly recommended to cut the body pieces out as necessary and drill all holes before cleaning and painting. This ensures that all scratches will be painted over, allowing for a much better-looking completed vehicle. Additional trimming is necessary beyond the molded cut lines in the body panels to clear the front and rear suspension.



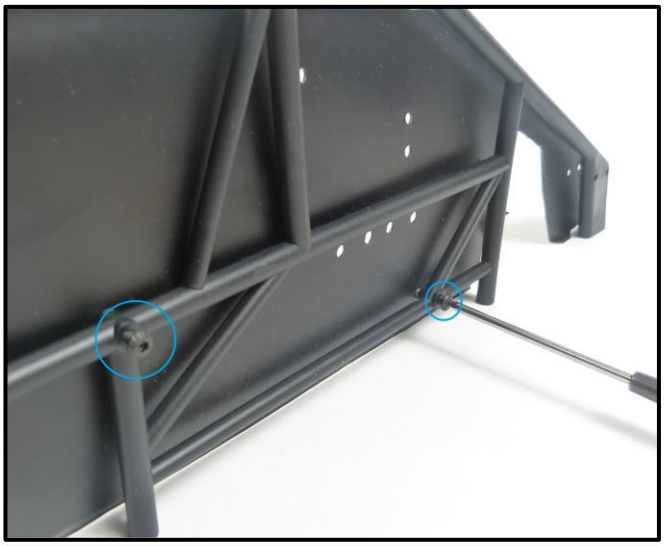
1. Prepare the GFR3010 body side panels, GFR3000 cage sides & nerf bars, and 4pcs of 5362 M3x12 Button Head screws.

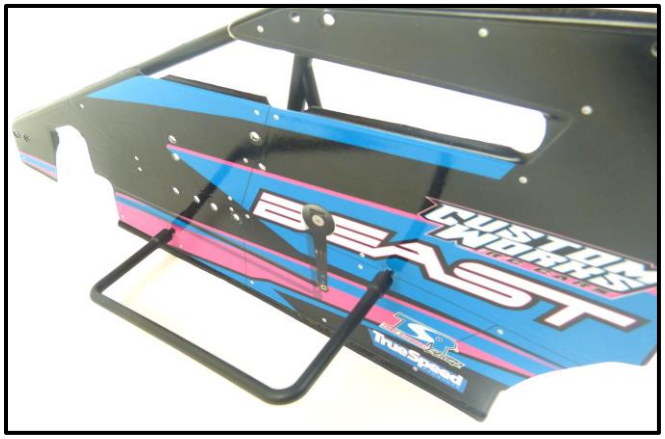
   ****Left side pieces shown****



2. Place the body side panel on the cage side and use the two screws in the positions shown to mount the nerf bar.

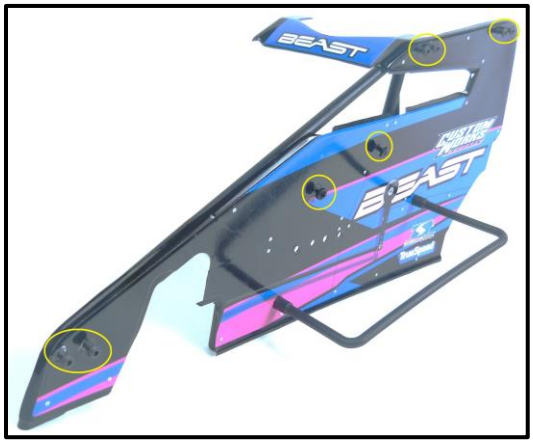
Assemble both left and right sides





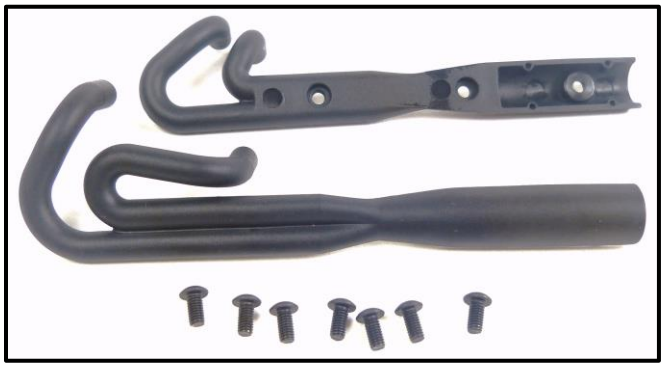
3. Prepare the GFR3010 visor & hood, GFR3000 halo bars & front bumper, 6pcs of 5362 M3x12 Button Head screws, 2pcs of 9900 nylon screws & nuts, and the left cage assembly.

4. First, place the visor where it should be on the top of the cage side, between the cage and the body panel. Now, push all screws through the holes shown. The nylon screws are in the center of the side panel, while the steel screws are around the outer edge.



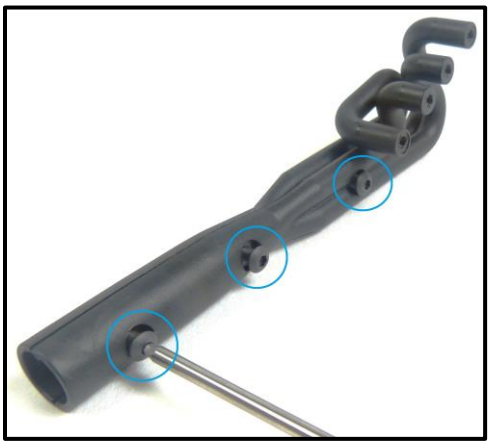
5. Install the halo bars and front bumper with the steel screws. Mount the left side of the hood using the nylon screws & nuts.

Note each part's direction during installation



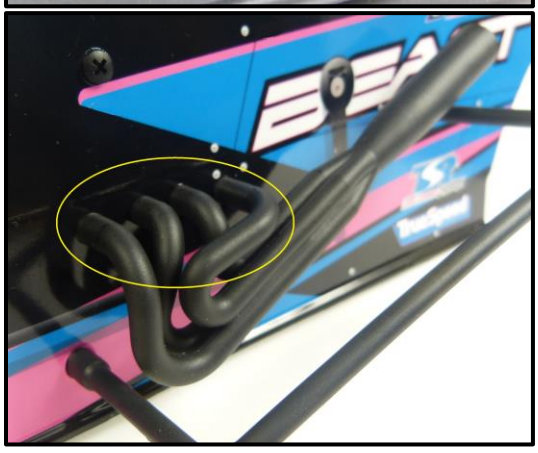
6. Prepare the GFR3011 two header pieces along with 7pcs of 5356 M3x6 screws.

7. Assemble the header pieces together as shown using three of the screws.



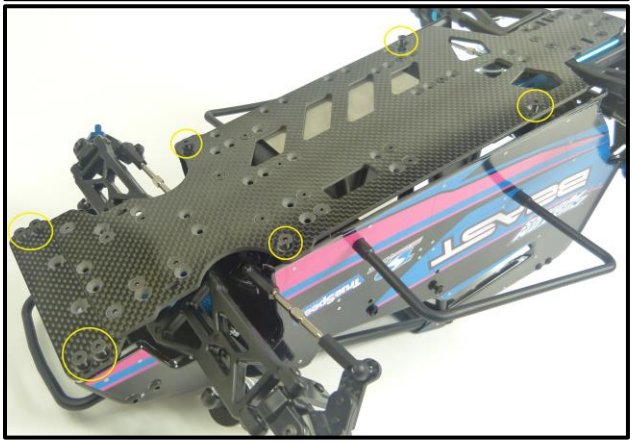
8. Mount the assembled headers to the left side panel using the remaining four screws.

It is up to you where you drill the four screw holes for the header. Just make sure the headers avoid contacting the nerf bar wherever you decide to position them



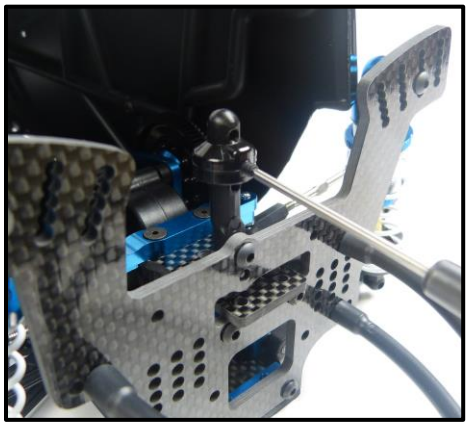
9. Using the remaining 6pcs of 5362 M3x12 screws and 2pcs of 9900 nylon screws & nuts (like used in step 4), fasten the right side of the cage to the rest of the assembly from the previous steps.

10. Locate the 8pcs of 5348 M3x8 Flat Head screws and use them to fasten the cage assembly to the chassis as shown.



11. Gather the GFR3000 tail tank, body post collar, 5209 4-40x1/8” set screw, and body clip.

12. Install the set screw into the body post collar and snug the set screw into place on the body post in the position shown. Be careful not to overtighten the set screw.



13. Position the tail tank on the body post and install the body clip.

Congratulations! The assembly process is nearly complete. Install wheels and tires of your choice using the included wheel nuts. ***Do not over-tighten the wheel nuts!***

Basic set-up – use the included turnbuckle wrench to fine tune the steering and camber links. Begin with a slight amount of toe-out on the front wheels. Make sure the servo saver is centered when the wheels are centered. Adjust the camber links so that the top of all 4 tires lean to the left slightly (1 degree.)

Setup and Tuning

The standard build settings for the kit will provide a good starting point for an average "loose dirt" track. We've done our best to provide the racer with the best possible car, however it is the tuning of the car to the individual driver and track conditions that will make it a consistent winner. The following tuning tips can be used to dial the car into a specific track and situation. Each section is listed by order of importance.

1. Tires

Handling is the most important factor in dirt oval racing when it comes to lower lap times and winning races and at least 50% of handling is in the tires. Some racing tracks and organizations require a spec tire. Other tracks may allow any type of tire to be run. Regardless of the rules, it is important to choose the best option allowable for the track and conditions. Clean your tires with a mixture of Simple Green and water after running. For some tracks, breaking in the tires and/or adding a chemical prep can improve bite – the best advice is to ask another racer(s) who is fast at a track what works best. If tires are wearing out quickly, consider using a harder compound tire.

2. Shocks

If tires are 50% of handling, shocks are probably the next 30%. Now that you've done all the work to make a great set of tires, it's the shock's job to keep them on the track as much as possible. We've found the 6lb rear and 5lb front springs to be the best combination for this car and honestly we don't change them too often. Stiffer or softer springs can be used to achieve different results. Too stiff or too soft can quickly move the car's set up out of the ballpark, so test accordingly and go back to the stock springs if you are struggling. Another important adjustment in the shocks is the dampening which is controlled by the pistons and shock oil. The smaller the piston holes and the heavier the oil, the greater the dampening. Dampening requirements will vary from track to track depending on how bumpy the track is and the size and spacing of the bumps. If your car appears to be skidding as it enters a turn, you likely have too much dampening and should change to a lighter oil or larger hole piston. If the tires appear to be oscillating and bouncing, the problem is likely not enough dampening. Fix by using a smaller hole piston or heavier shock oil. Getting the dampening right for a given track will require some trial and error but is critical in keeping the tires on the ground allowing the car to accelerate and turn effectively. Try to use shock tuning to get the car through the bumps smoothly before attempting to use it to tighten or loosen the car.

3. Wing adjustment

The stock wing placement should be used as the starting point for most tracks. The wing can be moved into the farthest forward position on extremely high-bite tracks where rear bite is plentiful. When looking for more rear bite on a slick track, the wing should be moved toward the rear of the car. The wing angle can also be increased and will give the car a more "planted" feel but at the expense of aerodynamic drag.

4. Camber Links and Roll Centers

The hinge pin and camber link positions described in the kit instructions provide the standard roll center locations for this car. Both front and rear camber links can be shortened by using optional holes included. Shortening the camber links will cause the car to react quicker at the expense of stability. Front and rear can be adjusted independently to achieve the proper chassis balance for a given track condition.

Lowering the inner camber link location will raise the roll center and cause the chassis to roll less in corners. Less roll is generally better for conditions where traction is very high. Also be aware that lowering and/or shortening the camber links will increase camber gain as the suspension compresses.

5. Ride Height and Car Weight

The ride height is the distance between the track and the bottom of the chassis. For most loose dirt tracks the normal ride height should be 18mm in the rear and 17mm in the front. A little more ride height in the rear is usually good

because the rear of the car will squat under acceleration. Ride height is adjusted with the various shock mounting holes provided on the car and fine-tuned using the threaded collars on the springs. Ride height can be lowered for extremely smooth high bite tracks and can be raised if the chassis is bottoming out.

Weight in the form of brass or lead can be added to the car to make the car easier to drive on low bite or bumpy tracks. The added weight helps keep the tires pushed into the track. However adding weight will directly affect ride height by lowering the chassis, which is NOT what you want in this situation. So when adding weight, make sure you re-adjust the ride height.

6. Cross-weight

Cross-weight which is sometimes referred to as "wedge" can help tighten or loosen the car. Since oval racing consists only of left turns, there is less need to keep the weight of the car equally balanced between the left and right side tires. Increasing the spring tension on the left rear and right front shocks will add weight to those corners and make the car tighter. Doing the opposite will make it looser. Be careful not to go too far, excessive cross-weight can upset the ride height and not allow the suspension to work properly. A set of scales is required to measure cross-weight and should be measured on a level surface with the car as "ready to race" as possible.

7. Rear steer

Rear steer is created with the use of the adjustable rear arms. Because the car spends a great amount of time turning left, it is more efficient to have the rear tires help with the steering. The amount of rear steer needed largely depends on the track. Tighter turns require more rear steer. The most common setting is 5 degrees in on the left rear and 2 degrees in on the right rear. To help the car turn more, try 6 degrees in on the left and 1 degree out on the right. To make the car drive straighter try 3 degrees in on the left rear and 2 degrees in on the right rear. This is also a very easy adjustment to make before a race to quickly adapt to a changing track surface.

8. Droop

Droop is the distance the tires can drop before they lose contact with the track when the chassis is lifted. Droop can be limited by the use the different shock mounting holes or with spacers inside the shocks. Limiting the droop in the front suspension will give the car more steering and limiting rear droop can provide more rear side bite. However a car with little or no droop will not handle the bumps in the track as well and can cause a car to be erratic. More droop works better on a low grip track and less droop works better on a high grip track.

9. Other adjustments

The adjustments above account for most of the changes needed to dial the car into a given track. Other adjustments are included in the car such as camber, Ackermann, wheelbase, front track, shock angle, etc. Even more option parts are available such as sway bars, optional caster blocks and front suspension mounts.
Please visit the Tech Center page at www.customworksrc.com for the full setup glossary and explanation of these options. Also you will find a PDF copy of this manual as well as blank set-up sheets and proven racer's set-ups.

Preventive Maintenance

RC cars have many moving parts which will wear over time. The normal wear of these parts as well as dirt from the track and occasional crashes require you to keep your car well maintained for optimal performance. Weekly maintenance should include:

- Remove and clean wheels and tires. Check wear and glue joints.
- Check for "gritty" ball bearings. Clean and re-lube or replace as needed.
- Remove shocks from the car, remove springs from the shocks and check for normal movement.
- With the tires and shocks removed, check suspension movement and make sure it moves freely but without too much slop. Even a small amount of binding caused by a bent pin, dirt, etc can cause erratic handling.
- Remove CVAs and check for excess slop or wear. Clean and re-lube.
- If differential is not smooth, sand or replace rings and rebuild. Make sure differential is not slipping on the track.
- Check for loose screws.
- Check for any bent or broken parts.

Driver:_____ Class:_____ ❑Flat ❑Banked Run Line:_____

Track:_____ Driving Style: Smooth ❑ Surface: Smooth ❑❑❑❑❑ Bumpy

Event:_____ Aggressive ❑ Traction: High ❑❑❑❑❑❑❑ Low

Tires

	Brand/Name	Compound	Insert
RF			
LF			
RR			
LR			

Cleaned With: _____

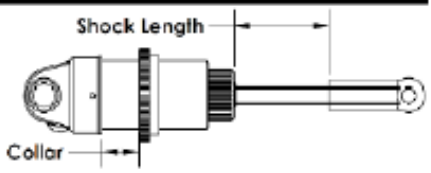
Traction Additive: _____

Notes: _____

Shocks - ❑Small Bore ❑12mm Big Bore ❑Bladder ❑Emulsion

	Body Length	Shaft Length	Spring	Oil	Piston	Shock Length	Collar	Spring Cup
RF	S M L	S M L			S M L			Std. Ext.
LF	S M L	S M L			S M L			Std. Ext.
RR	S M L	S M L			S M L			Std. Ext.
LR	S M L	S M L			S M L			Std. Ext.

Measure the length of the exposed shaft with the shock fully extended.
Go to lighter oil or larger piston if tires are skidding over bumps in track.
Go to heavier oil or smaller piston if tires or car is bouncing.



Ride Height

LF		RF	
LR		RR	

Max Chassis Height

LF		RF	
LR		RR	

Corner Weights

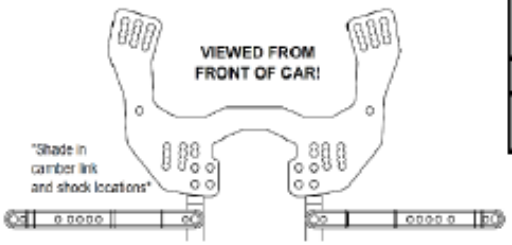
LF		RF	
LR		RR	

Rear %	
Left %	
Wedge %	

Measured From: ❑Bottom of Chassis ❑Top of Chassis

Total Weight: _____

Front Suspension



	Right	Left
Camber	❑0 ❑-5 ❑+5 ❑-10 ❑+10	❑0 ❑-5 ❑+5 ❑-10 ❑+10
Caster	❑ Inner ❑ Outer	❑ Inner ❑ Outer
Kick-Up Location	❑ Inner ❑ Kingpin	❑ Inner ❑ Kingpin
Outer Link Location	❑ Forward ❑ Middle ❑ Back	❑ Forward ❑ Middle ❑ Back
Spindle Ball Stud		

	Right	Left
Hex Offset	❑ Inner ❑ Middle ❑ Outer	❑ Inner ❑ Middle ❑ Outer
Ackermann	❑ Standard ❑ Trailing	❑ Standard ❑ Trailing
Spindle	❑ None ❑ ___mm	❑ None ❑ ___mm
Outer Ball Stud Shims	❑ None ❑ ___mm	❑ None ❑ ___mm
Roll Center Shims		

Kick-Up	❑25° ❑30° ❑35°
Toe	___°
Sway Bar	❑ None ❑ _____

Rear Suspension

	Left	Right
Camber	❑0 ❑1 ❑2 ❑3 ❑4	❑0 ❑1 ❑2 ❑3 ❑4
Spacers Behind Hub	❑ None ❑ .060 ❑ .125	❑ None ❑ .060 ❑ .125
Suspension Mount Shims	❑ 3° ❑ 5° ❑ __°	❑ 3° ❑ 5° ❑ __°
Suspension Mount		
Hub Pin Height		

Gear Diff Oil- _____

	Left	Right
Outdrives / Diff.	❑ Steel ❑ Alum ❑ Gear	
Slipper	❑ Yes ❑ No	
Camber Link Shims	Inner ___ Outer ___	Inner ___ Outer ___
Outer Link Location	❑ Inner ❑ Outer	❑ Inner ❑ Outer
Anti-Squat	❑ None ❑ 1.5° ❑ 3°	❑ None ❑ 1.5° ❑ 3°
Bottom Shock Hole	❑ Inner ❑ Outer	❑ Inner ❑ Outer
Hex Offset	_____	_____

Electronics/Gearing

Servo:_____ Drag Brake:_____

Pinion:_____ Battery:_____

Spur:_____ Battery Position: F❑❑❑❑R

Notes: