Made in the USA
by

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REQUIRED READING

Thank You and Congratulations on purchasing this **ENFORCER GBX**! Within this kit you will find a race winning car with over 17 years worth of **CUSTOM WORKS** design and quality. In order for you to realize this race car's winning potential it is important to follow the written text along with the pictures included. The steps required to build this car are very easy, as long as you read before you build.

The instructional format for building this car is to open each bag in alphabetical order. Each bag of parts will be broken down into "Steps" in the manual. All parts and hardware needed to complete all steps for each separate bag, will be found in each individual bag. There is no need to steal screws from other bags. In the rare event you need to look in a different bag for a certain part, it will be noted clearly.

This car has the capability of being built so that the motor is located in either a REAR or MID-MOTOR configuration. You do not need to decide which version youi would like to build yet as the car can be converted very simply and easily from one to another. The instructions will build the car in the "REAR Motor" format to completion of the build. **At the end of assembly we will instruct how to convert to the MID-MOTOR set-up if that is what you prefer.** Generaly the rear motor configuration will provide the most traction on surfaces that are low bite or bumpy. When racing on a high bite smooth surface the mid motor configuration will usually be faster as it will give the car a more balanced weight bias from front to rear.

All hardware (screws, washers, nuts, etc…) are referred to by size and type in the instructions. To help clarify which screw or nut the instruction is calling for refer to the HARDWARE REFERENCE supplement. The size of the screw or nut should match the "shadow" of the same piece very closely.

Screw ID's are: **FH**=Flat Head **BH**=Button Head **SH**=Socket Head **SS**=Set Screw

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

The supplied white nylon cage can be dyed in a variety of colors using basic fabric dye purchased at any fabric or craft store. Place parts in boiling water with dye stirred within until parts are desired color.

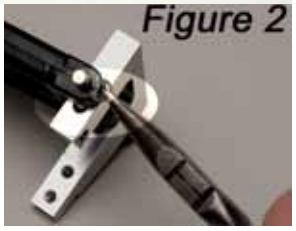
Lightly sand the edges of the graphite pieces using a medium grade sandpaper to avoid splinters. Run a thin bead of Super Glue around the edges to give pieces greater durability.

SUGGESTED TOOLS

Medium Sandpaper
Hobby Scissors
Small Needle Nose Pliers
3/16" Wrench
.110" Drill Bit
X-Acto Knife
Phillips Head Screw Driver
Blue Loctite
Blue Loctite
3/16" Drill Bit

Bag A

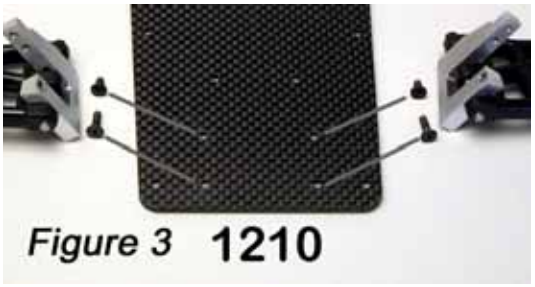
Step #1: Begin by checking the fit of the Suspension Pin in the Suspension Mounts. The Suspension Mounts are machined to a VERY close tolerance and may be tight on the pin at first. If it is tight, slide the pin in and out to clear any burrs that may remain. After checking that the Suspension Pin spins freely in all four holes, slide (1) #4233 Suspension Pin thru the front of the #3250 Suspension Arm and thru the lower hole on the #2204 Suspension Mount as shown in **Figure #1**.



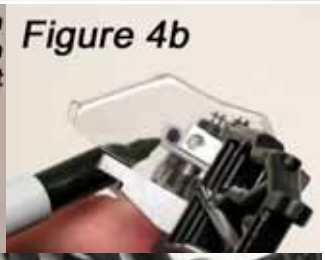
Step #2: Repeat Step #1 with #3250 Suspension Arm facing opposite direction from Suspension Mount. This will make a Left and Right side front suspension for the car.

NOTE: Stepped side of Suspension Arm faces the front of the car.

Step #3: Add one #5203 E-clip to each end of the Suspension Pins as shown in **Figure #2**.



Step #4: Attach Suspension Mounts to the #1210 Enforcer GBX Chassis with (2) 3/8" FH Screws in the forward holes of the chassis and (2) 1/4" FH Screws in the rear holes of the mount. Refer to **Figure #3** for visual.



Step #5: Locate the Hood Mount from the Lexan Body Bag and trim the Hood Mount on the molded line. Position the Hood Mount even with the front of the chassis as shown in **Figure #4a**. With a Sharpie Marker, place a dot where the hole from the Suspension Mount is located on the Hood Mount. As shown in **Figure #4b**, do this to both sides of the Hood Mount. This is to mark the spot where the #2210 Front Mount Brace will go thru the Hood Mount.

Step #6: With a 3/16" Drill Bit make a hole through both marks you made on the Hood Mount in Step #5. Slide the #2210 Suspension Mount Brace thru the drilled holes in the Hood Mount. Attach the Suspension Mount Brace with (2) 1/2" BH screws to the Suspension Mount as shown in **Figure #5**.

Step #7: Attach the #1217 Front Shock Tower to the Suspension Mount with (4) 1/4" BH Screws. Note countersunk holes on tower are to face to the front of the car as shown in **Figure #6.**

Bag B

Castor Blocks / Suspension Tie-Rods

Figure 7

For the next 7 steps you will be building Right and Left steering assemblies.

Step #1: Press the #7201 Front Axle into the #3202 Steering Block. Align holes in both parts as shown in **Figure #7** so that they will allow #7202 King Pin to slide thru in the next step.

Figure 8

Step #2: Place the Steering Block with Front Axle into #3203 Castor Block as shown in **Figure #8**. Slide the King Pin thru the #3203 Castor Block and Steering Block. Attach an e-clip to each end of the King Pin.


Figure 9

Step #3: Thread one 6/32 x 1/8" set screw into the back of the #7201 Front Axle as shown in **Figure #9**.
You should now have a Right and Left Steering Assembly as shown in **Figure #10**.

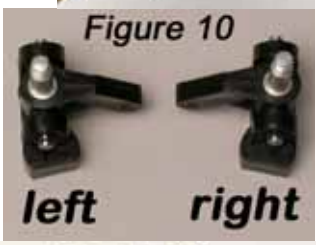


Figure 10

Step #4: Press the Pivot Ball into the #5228 Ball End, then thread the Ball Ends onto each end of the #5221 Turnbuckle. When completed it should look like the Camber Links in **Figure #11**.

Figure 11

NOTE: The Turnbuckles have *normal* threads on one side of the turnbuckle, and *reverse* threads on the other. Mark the Ball End with the NORMAL threads so you remember which way to turn the Turnbuckle for adjusting the Camber Link with supplied tie-rod wrench.

Step #5: Attach the Camber Link by sliding a 1/2" BH Screw thru the Ball End, followed by (3) #5212 Washers, then screw into the top of the Castor Block as shown in **Figure #12**.

Figure 12

Step #6: Mount the steering assembly to the #3250 Suspension Arm by sliding #4237 Outer Suspension Pin thru the Suspension Arm and Castor Block. Add one e-clip to each end of the pin as shown in **Figure #13**.

Figure 13

Step #7: Pass one 4-40 X 1/2" FH Screw thru the front of the Shock Tower in the upper camber link hole. On the backside of the Shock Tower, slide (1) #5212 Washer and then the Ball End from the Camber Link onto the 3/8" FH screw. Fasten to car by threading on (1) #5205 4-40 Locknut. The finished assembly should look like that in **Figure #14**. Repeat for other side of car.

Bag C

Steering Assembly

Step #1: Press the Pivot Balls into the #5214 Ball End, then thread the Ball Ends onto each end of the #5221 Turnbuckles. When completed it should look like the Steering Links in **Figure #15**. Make 2 of these.

Step #2: Assemble the Steering Links on each end of the #3207 Steering Rack Slide using (1) 3/8" 2-56 SH Screw with (1) #2 Washer between the screw head and Ball End. Insert (1) 2-56 Locknut into the hexagon hole on the backside of the Steering Rack Slide and tighten the 3/8" 2-56 SH Screw to it. Refer to **Figure #15** for example.

Step #3: On the remaining turnbuckle thread one #5228 ball end and one #5229 ball end, these are the two shortest ends in the bag. Now install the Servo Linkage to the raised hole on the #3207 Steering Rack Slide using (1) 1/2" 2-56 SH Screw with (1) #2 Washer on <u>each side</u> of the Ball End. IInsert (1) 2-56 Locknut into the hexagon hole on the backside of the #3207 Steering Rack Slide and tighten the 1/2" 2-56 SH Screw to it. Refer to **Figure #15** for example.

Step #4: Install the Steering Rack Slide into the Steering Rack with the raised hole on the Steering Rack Slide to the LEFT. The Steering Rack Slide should move FREELY in the Rack. If it does not, check for flashing on the Slide OR pry open the Rack with your fingers. You should now have the Steering Assembly built as seen in **Figure #16**.

NOTE: You will need to adjust the length of all of these rods after the car is completely assembled and your radio is installed.

Step #5: Mount the now completed Steering Assembly to the chassis using (2) 3/8" FH Screws.

Step #6: Mount the Steering Links to each Steering Block using (1) 1/2" 2-56 SH Screw with (1) #2 Washer on <u>each side</u> of the Ball End. On the other side of the Steering Block Arm add (1) 2-56 Locknut. Your car should now look like the picture in **Figure #17**.

Bag D

Rear Bulkhead

Figure 18

Step #1: Attach the #2224 Top Plate Block to the #1240 Shock Tower using (2) 1/4" BH Screws as shown in **Figure #18**.

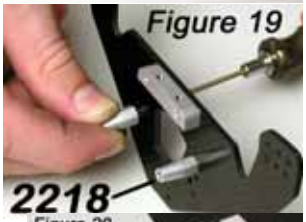


Figure 19

Step #2: Attach #2218 Camber Link Stand-Off to the same side of the #1240 Shock Tower as the #2224 Top Plate Block using (2) 3/8" BH Screws. Mount the Camber Link Stand-Offs in the upper most holes as shown in **Figure #19**.

Figure 20

Step #3: Slide (2) 1/2" BH Screws thru the bottom holes on the #1240 Shock Tower in the same direction as the screws from Steps #1 & #2. Slide the #1211 Graphite Shock Tower Spacer over the screws. Thread screws into the #2220 Transmission Spacer Mount as shown in **Figure #20.**

Bag E

Rear Suspension Arms and Mounts

Figure 21

Step #1: Remove flashing and burrs from the #3250 Suspension Arms than attach to the #2222 Toe-Block with a #4234 1/8" X 7/8" Suspension Pin as shown in **Figure #21**. Add one #5230 1/8" E-Clip to each end of the Suspension Pin. This clip is slightly LARGER than the clips used so far in the kit.

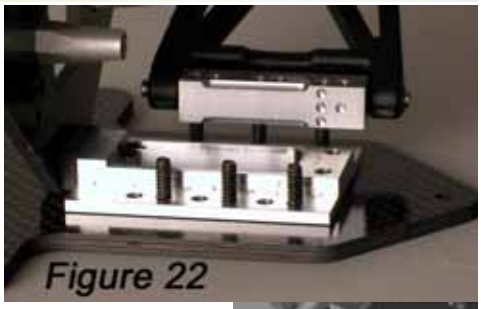


Figure 22

Step #2: Mount the “Rear Bulkhead” from Bag “D” to the rear of the chassis using (6) 1/2" FH Screws passing thru the bottom of the chassis. The Rear Bulkhead should be mounted with the Shock Tower facing toward the FRONT of the car. The (2) rear screws passing thru the chassis, should pass thru the rear most holes on the #2220 Transmission Spacer Mount as shown in **Figure #22**. If all is done correctly, (2) holes from the Transmission Spacer will be visible in the REAR oval slot in the chassis as shown in **Figure #23.**

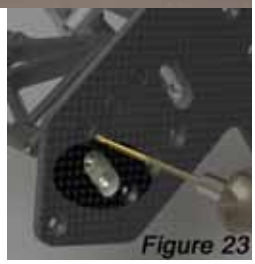


Figure 23

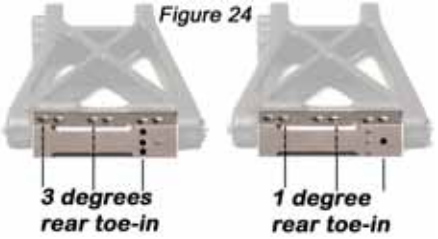


Figure 24

Step #3: Mount the #2222 Toe Blocks to the chassis by aligning the rear screw passing thru the chassis and #2220 Transmission Spacer Mount with the threaded hole closest to the (3) Dimples on the Toe Block. By mounting the screw in the hole with the (3) Dimples next to it, you are mounting the Toe Block on the car so that the rear wheel will have 3^{O} of Toe-IN. If the screw were to thread into the hole with (1) Dimple next to it, the rear wheel would have 1^{O} Toe-IN. Refer to **Figure #24** for example of mounting options. Continue to fasten the other screws.

NOTE: More Toe-IN increases rear traction while hurting straight line speed. Less Toe-IN decreases rear traction while improving straight line speed.

Bag F

Bearing Carriers/Camber Links/Drive Train

Step #1: Open the bag containing the #7210 CVD's and build them according to the instructions.

NOTE: Save the extra axle shims included in the bag, they will be used in Step #2

Figure 25

Step #2: Press (2) #1226 3/16"X 3/8" Unflanged Bearing into each side of the #3241 Bearing Carrier. Following the sequence of part in **Figure #25**, first slide (2) of the THIN axle shims that were packaged in the #7210 "CVD Bag". Now slide the CVD Axle thru the bearings in the carrier. Finish this step by sliding (1) THICK Shim and (1) THIN Shim from the "CVD Bag" onto the axle. Make (2) of these.

Step #3: To secure the axle, press the #7204 Roll Pin into the hole in the axle that is close to the outer bearing in the #3241 Bearing Carrier. Although it can be difficult at times, the best way we have found to do this is to get the Roll Pin into position directly over the hole by holding in the entire piece as shown in **Figure #26**. With the piece on its side and the roll pin in position, use the pliers to squeeze the Roll Pin into the axle. When complete, equal parts of the Roll Pin should be on both sides of the axle. Make (2) of these.

Figure 26

Step #4: Partially slide (1) #4235 Suspension Pin thru the remaining holes in the end of the Suspension Arm. Add (2) #4236 Rear Carrier Shims to the Suspension Pin then slide the Suspension Pin thru the BOTTOM holes on the Bearing Carrier. After the pin is thru the Bearing Carrier place (2) more Rear Carrier Shims between the Bearing Carrier and the Suspension Arm. To finish assembly add (1) #5230 E-Clip to each end of the Suspension Pin. There should now be 2 Shims on each side of the Bearing Carrier as shown in **Figure #27**. Do this step to both sides of the car.

Figure 27

NOTE: There are extra .010" thick Shims enclosed, these are to be used if the Rear Carrier Shim does not take out all of the play. You want the Bearing Carrier to be free as it pivots on the pin, but not slide forward/backward on it excessively. Also the Bearing Carriers can fit on either side of the car; this is no RIGHT or LEFT side to this part.

Step #5: Press the Pivot Ball into the Ball End, then thread the #5213 Ball Ends onto each end of the #5222 Turnbuckles. When completed it should look like the Camber Links in **Figure #28**. Make 2 of these.

Figure 28

Step #6: Attach one end of the Camber Link to the Aluminum Stand-Off already assembled on the Shock Tower with (1) 3/8" BH Screw. Attach the other end of the Camber Link with (1) 1/2" BH Screw to the FRONT of the Bearing Carrier and thru the OUTER-MOST hole. Tighten (1) 4-40 Locknut to the Screw on the back side of the Bearing Carrier as shown in **Figure #29**.


Figure 29


Figure 30

You have now completed building this kit thru Bag “F”. The Rear of your car should look like the one shown in **Figure #30**.
Take a break, have a Coke!

Bag G

Differential Assembly

Step #1: Apply a generous amount of #4391 Diff Lube into the diff ball holes on the #4356 Diff Gear. With Diff Lube in holes, press the (12) #4357 Diff Balls into the holes on the Diff Gear. Be sure to spread out the grease that was pushed out when installing the Diff Balls. Finally press (1) #1229, 5/32" X 5/16" Bearing into the center of the Diff Gear as shown in **Figure #31**.

Step #2: Using the #4364 Left Diff Outdrive Hub, press the #4362 Diff Spring into the slotted end of the Diff Hub followed by the #4361 T-Nut as shown in **Figure #32**.

Step #3: Following along with **Figure #33**, slide (1) #4360 Diff Thrust Washer onto the #4361 2-56 Diff Bolt. Apply a good amount of #4388 Black Grease to the Thrust Washer on the side facing away from the bolt head. Now stick (6) #4359 Diff Thrust Balls into the Black Grease on the Thrust Washer. Slide the remaining Thrust Washer onto the Diff Bolt. There should be enough Black Grease to hold the Thrust Balls in place during assembly. Now carefully slide the entire Bolt into the outdrive end of the #4365 Right Diff Outdrive Hub without losing any Thrust Balls. Finally insert the Bolt Cover.

Step #4: Insert (1) #1229, 5/32" X 5/16" Bearing into the Right Outdrive Hub. Apply a very thin coat of Diff Grease to the flat area on BOTH the Right AND Left Outdrive Hubs as shown in **Figure #34**. Now place (1) #4358 Diff Drive Ring on both areas with the thin coat of Diff Lube. Slide the Diff Gear onto the Right Outdrive Hub. Finally slide Left Outdrive Hub over the Diff Bolt and onto the Diff Gear. Tighten the Diff Bolt to the T-Nut but not all the way. Check to make sure the Diff Plates are still in their seat on the Outdrive Hubs and rotate the Diff Hub several times as you tighten the bolt. Follow Step #5 for instruction on how to finish tightening the Diff Bolt.

Step #5: As shown in **Figure 34a**, place the 1/16” wrench used earlier throgh the slot in the opposite Diff Outdrive. As you tighten the Diff Bolt, you should notice the T-Nut stubs moving closer to the end of the Diff Hub slot. While the T-Nut is moving closer to the end of the slot, the spring behind the T-Nut is being compressed. When the T-Nut reaches the bottom of the slot, the spring should be fully compressed. Pay attention to feeling when the spring is fully compressed, you DO NOT WANT TO OVERTIGHTEN THE BOLT. When the spring is fully compressed, loosen the Diff Bolt 1/8 of a turn, No more or less. Your Diff should spin smoothly with the hubs turning in opposite directions.

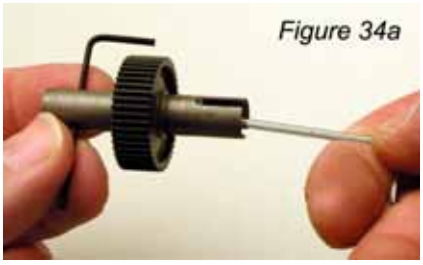


Figure 34a

NOTE: After running the car once or twice, check the adjustment of the Diff.

Bag H

Transmission Casing

Figure 35

Step #1: Separate the #4352 Transmission Halves from the each other, and insert (1) #1226, 3/16" X 3/8" Bearing to the top of each case and (1) #1230, 3/8" X 5/8" Bearing to the bottom of each case as shown in **Figure #35**.

Step #2: Following **Figure #36**, place (1) THIN Washer over the long shaft on the #4368 Top Drive Shaft and slide it thru the TOP of the Right Side Transmission Half. Install the #4355 Idler Gear Shaft into the recessed hole between the two bearings on the Right Side Transmission Half. Press (2) #1226, 3/16" X 3/8" Bearings into each side of the #4354 Idler Gear and slide that onto the Idler Gear Shaft. Now install the Right Side Diff Hub (Hub with Diff Bolt) into Right Transmission Half. Finally place (1) THICK and (1) THIN Washer on the short shaft on the Top Drive Shaft and align the entire Left Side Transmission Half over all 3 gears.

Step #3: Install (1) 3/8" FH Screw into the very bottom of the Left Side Transmission Half as shown in **Figure #37** and thread it in until it is tight. Press the #4369 Roll Pin into the hole in the Top Gear Shaft so that equal parts of the Roll Pin stick out of the axle, just as when installing the Roll Pins on the CVD axles.

Step #4: First slide (3) 1" SH Screws thru the Left Transmission Half, then on the Right Transmission Half, slide (3) #4352 Motor Plate Spacers on the screws sticking thru with “stepped-down” end toward the transmission as shown in **Figure #38**.

Step #5: As shown in **Figure #39**, position the #2225 Motor Plate on the Transmission and tighten to it with the (3) 1" SH Screws from Step #4. The Motor Plate Spacers will be BETWEEN the Transmission and Motor Plate

Figure 39

Bag I

Slipper-Clutch Assembly

Figure 40

Follow the parts as they are laid out in sequence in **Figure #40** for Steps #1 thru #5.

Step #1: Slide the #4371 Inner Clutch Hub onto the Top Drive Shaft and align the slot over the Roll Pin.

Step #2: Place the #4373 Clutch Disc onto the Inner Clutch Hub with the #4372 Outer Clutch Hub on top.

Step #3: Install (1) #4376, 3/16" X 3/8" Bushing on the shaft followed by (1) Silver Washer, (1) Thick Gold Washer, and (1) Silver Washer (#4375).

Step #4: Slide on #4374 Torque Control Spring and secure all of the above with (1) #5245 5-40 Lock-nut until the top of the nut is flush with the end of the Top Drive Shaft.

Step #5: Attach the #4881 Spur Gear with (2) #5250 3/16" BH Screws.


Figure 41

Bag J

Mounting Transmission

Step #1: Using the Black Grease used to build the Diff, place a small amount on both Dog-Bone Pins as shown in **Figure #41**.


Figure 42

Step #2: Bringing the Transmission in from the BACK of the car, place each Dog-Bone into the Outdrive Hub and set the Transmission onto the Gearbox Spacer Plate as shown in **Figure #42** with the Motor Plate to the RIGHT side of the car.

Step #3: Fasten the Transmission to the car with (2) 1/2" SH Screws from underneath the Chassis and thru the Gearbox Spacer Plate as shown in **Figure #43**.


Figure 43

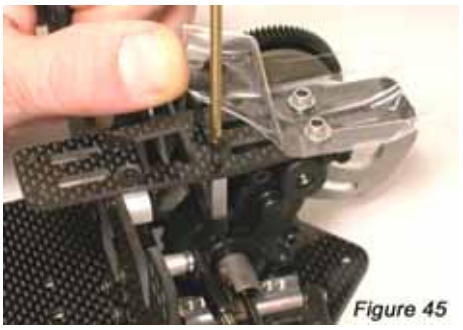
Step #4: Locate the Tail Tank Mount in the Lexan Body Bag and ream (2) .110" holes in the mount on the Black Dots provided.

Step #5: Hold the #1238 Transmission Brace as shown in **Figure #44** by taking note of the position of the entire part by looking at “square” in the center of the piece and which side the countersunk holes are positioned. Holding the part as shown in **Figure #44**, Install (2) 1" SH Screws into the middle set of holes on the Transmission Brace. Slide the #2227 Transmission Brace Spacer over the 1" Screws.

Step #6: Still holding the Brace as in **Figure #44**, slide (2) 1/4" FH Screws from the underside of the part in the “Countersink Facing Down” holes. Align the Tail Tank Mount holes you reamed over the 1/4" FH Screws and secure the Tail Tank Mount with (1) #5212 Washer and (1) #5205 4-40 Locknut on EACH screw.

Step #7: Place (2) 3/8" FH Screws in the “Countersink Facing Up” holes and thread them tight onto the Top Plate Block mounted to the Shock Tower.

Step #8: As shown in **Figure #45**, gently pull the Tail Tank Mount to one side and use a 3/32" Hex Wrench to tighten the 1" SH Screw to the Transmission Casing.



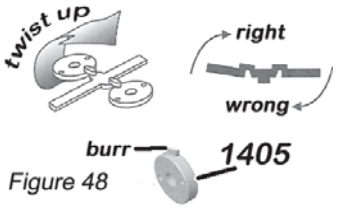
Bag K

Mounting and Building Shocks

For the following 5 Steps, you will complete each Step (4) Times.

Step #1: Mount (1) #1403 Black O-ring into the groove on the #1402 Threaded Shock Collar as shown in **Figure #46**. Add a drop of Shock Oil to the O-ring and thread it onto the #1401 Threaded Shock Body with the “shoulder” facing down.

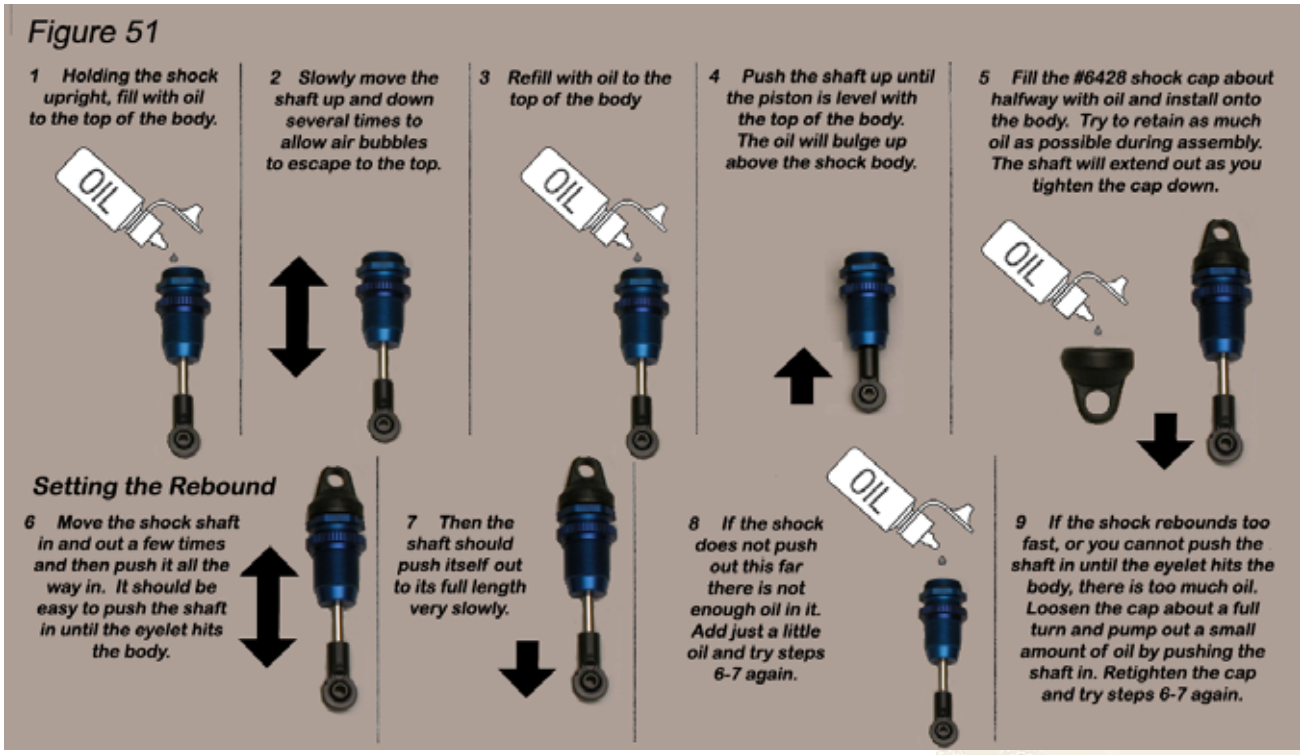
Step #2: Soak the #1411 VC Foam with the Shock Oil and install it onto the VC Bobbin as shown in **Figure #47**.



Step #3: Remove the #1405 Shock Pistons with the “2” on them from the parts tree as shown in **Figure #48**. Be SURE to REMOVE ANY BURRS on the Shock Piston, or your shock will NOT work correctly. Add a #5230 E-Clip to each side of the #2 Shock Piston on the #1413 Shock Shaft. Install (1) #1406 O-ring over the threads on the TOP of the Shock Body. Both of these are shown in **Figure #49**.

Step #4: Following the sequence of parts in **Figure #50**, slide the VC Bobbin from Step #2 on the Shock Shaft and then (2) #1250 O-Rings. Add a couple drops of oil to the O-Rings and insert the entire Shock Assembly into the Shock Body and FIRMLY pull the Shock Shaft through in order to "seat" the VC Bobbin. Finally press the #1409 Pivot Ball into the Eyelet and thread it onto the Shock Shaft. Be sure when holding the Shock Shaft with pliers to use a rag to cover the shaft so the pliers don't scar it.

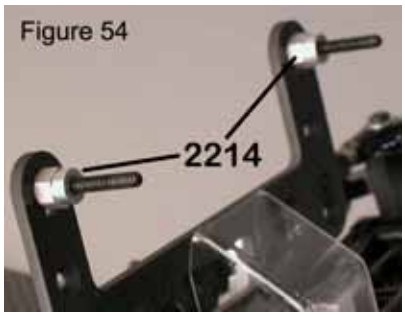
Step #5: To fill the Shocks with oil and complete their assembly follow the picures and text provided in **Figure 51**.



Step #6: Using Silver Springs on Rear and Gold Springs on Front, slide the spring over the shock shaft and on to the shock body. Compress the spring and than add the #1407 Spring cup by sliding it on the shaft through the notch in the spring cup. The cup should than slide down over the shock eyelet until it bottoms out. Release the spring and your shock should now look like the one at the top of **Figure 52**.

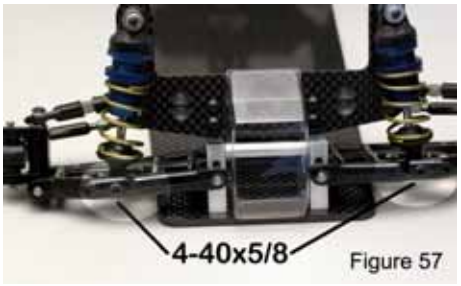
Step #7: On the Rear Shock Tower, Insert (1) 4-40x7/8" SH Screw thru the lower/middle hole on each side of the Shock Tower as shown in **Figure #53**. Thread on (1) #2214 Shock Stand-Off onto each screw with the shoulder on the spacer facing AWAY from the Shock Tower.

Step #8: On the Front Shock Tower, Insert (1) 4-40x7/8" SH Screw thru the upper hole on each side of the Shock Tower as shown in **Figure #54**. Thread on (1) #2214 Shock Stand-Off onto each screw with the shoulder on the spacer facing AWAY from the Shock Tower.



Step #9: Mount the Rear Shocks by placing the Shock Cap End of the shock onto the mount on the Shock Tower. Insert (1) #1408 Shock Bushing on the mount and into the Shock Cap and fasten with (1) 4-40 Lock-nut as shown in **Figure #55**. Following **Figure #56** mount the Eyelet end of the Shock with (1) 1/2" SH Screw and (1) #5212 Washer to the INNER most hole on the Suspension Arm.

Step #10: Mount the Front Shocks by placing the Shock Cap End of the shock onto the mount on the Shock Tower. Insert (1) #1408 Shock Bushing on the mount and into the Shock Cap and fasten with (1) 4-40 Lock-nut as shown in **Figure #57**. Mount the Eyelet end of the Shock in between the supports in the Suspension Arm with (1) 5/8" SH Screw.

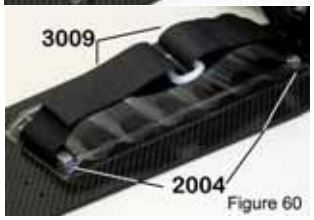


Bag L

Battery Cradle

Step #1: On the #3224 Battery Cradle trim the excess lexan off at the trim lines, leaving the sides even with the bottom of the battery cradles. Trim the ends along the top of the corner, leaving the flat base with the hole dimples for mounting. Drill an1/8" hole on all (4) dimple marks as shown in **Figure #58**.

Step #2: Insert (4) 3/8" FH Screws thru the bottom of the chassis. There are multiple locations to mount the Battery Cradle in the car, we want to mount the Cradle with it CENTERED in the chassis and all the way BACK as shown in **Figure #59**.



Step #3: Slide the #3009 Velcro Strap over the #2004 Battery Strap Mount and thread the (4) screws from Step#2 to the Strap Mount as shown in **Figure #60**.

Note: If you allready have your radio and electronic equipment you may proceed to the next page. If you wish to install it at a later point than proceed to page XX. In our experience, radio installation is much easier without the cage and body attached.

Bag M

Radio and Motor Installation

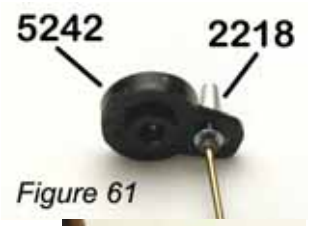


Figure 61

The following steps will guide you through the process of installing your radio equipment. While the installation we show will provide the most versatile use of your new GBX ENFORCER it is important to understand that radio equipment comes in a variety of shapes and sizes. Always follow the recomendations of your radio or electronic equipments manufacturer regarding their use and operation. For alternate installations consult your hobby dealer or you can find more information on our website.

Figure 62


Figure 63

STEP #1: Remove the Servo Saver Spline adapters from Bag M along with the #5242 Servo Saver. Determine which of the 3 Spline Adapters fits your particular brand of servo by sliding it over the spline on top of the servo**.**

STEP #2: Slide the #5212 Washer over one of the 4-40 X 3/8" Button Head screws and insert the screw down through the top of the servo saver using the middle and innermost hole. Now attach the #2218 Stand-off to the servo saver being sure to align one of the flat spots of the hex up against the body of the servo saver as shown in **Figure 61**.


Figure 64

STEP #3: Using the 4-40 X 3/8" screws and 4 washers, mount the servo to the #5240 Servo Mounts as shown in **Figure 62** being sure to place the open slots of the mounts toward the bottom of the servo. Now set the servo on the chassis in the approximate position shown in **Figure 63.**

STEP #4: Now attach the Steering linkage from the steering rack to the Stand-off using a 3/8" button head screw as shown in **Figure 64.** Now you will place the servo saver over the servo spline and position the servo based on the following considerations. mount the servo as close to the Steering Rack as possible so that the servo linkage is as parrallel as possible to the steering slider when looking down from top. The servo must be as far right as possible in the car but not so far that it will intrude with the mounting of the cage and body in the upcoming steps. Refer to **Figure 63** for approximate position.

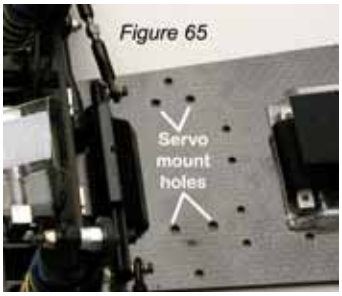


Figure 65

STEP #5: You will now need to measure the hole spacing on the bottom of the servo mounts so that you can mark their positions on the graphite chassis. Once you have marked those positions drill 4 holes with a .110" drill bit through the chassis as shown in **Figure 65.** If you have a countersink bit it is recomended to countersink the holes from the bottom of the chassis. You can now mount the servo using either the 3/8" Flat head screws provided or if you did not countersink the holes you can use the 4 3/8" Button head screws instead.

STEP #6: Now you can attach the servo saver to the servo using the screw that came with the servo to hold the saver on. Your steering servo and linkage should now look like that shown in **Figure 66.**

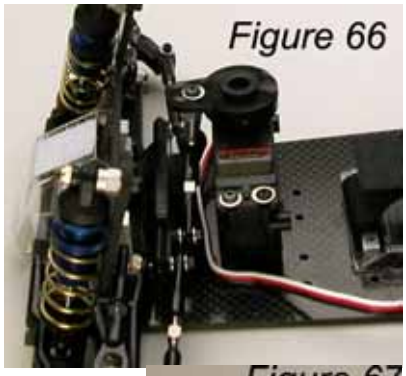


Figure 66

STEP #7: Attach a piece of your favorite brand of servo tape to the back of your Electronic Speed Control and mount it to the front of the top plate as shown in **FIGURE 67.**

STEP #8: Now thread your antenna wire through the base of the antenna mount and than through the antennae tube as shown in **Figure 68.** Secure the antennae mount to the chassis with a 4-40 X 1/4" Flat head screw through the hole at the right rear side of the battery cradle.


Figure 67

NOTE: Your choice of motor and the size of track you are racing on will determine the size of the pinion gear you will require for this car. Consult your favorite hobby dealer or another racer for the best pinion and motor combination for your track and applicatioin or you can find additional information on our website at www.CustomWorksRC.com.

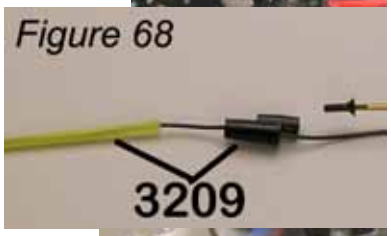


Figure 68

STEP #9: Mount your motor to the motor plate using the provided #5208 3MM Screws and 2.5MM Hex Wrench. Now install your pinion gear so that the teeth line up evenly with the spur gear. As shown in **Figure 69** move the motor forward sliding the pinion into the spur gear and secure the screws being sure to leave just enough play in the gears to allow them to rock slightly.


Figure 69

STEP #10: Assemble your battery pack as per the manufacturers instructions, place it in the battery cradle and secure it with the strap as shown in **Figure 70**.

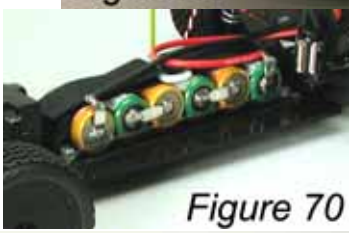


Figure 70

NOTE: You will need to follow the manufacturers instructions regarding hooking up your receiver and electronic speed control connetions. After soldering your motor and battery pack in the car it should look like **Figure 71.**

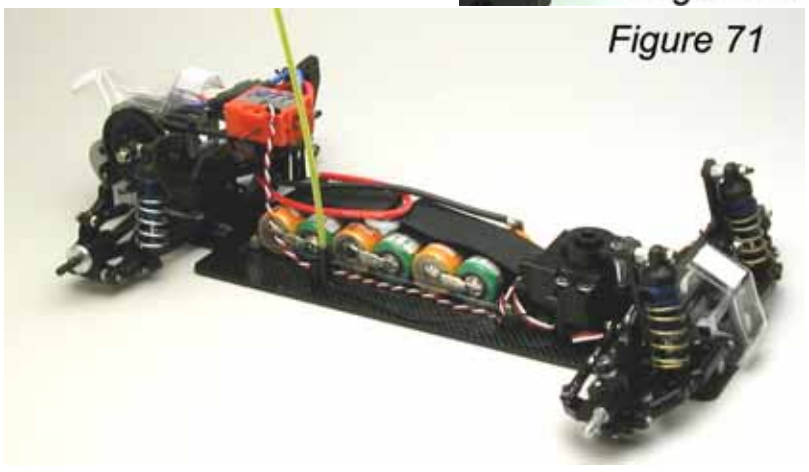


Figure 71

Bag N

Tire and Wheel Installation


Figure 72

NOTE: In this step you will be using a fast drying super glue type adhesive to secure the tires and wheels to each other. Be very careful with this process as the glue can tend to run very easilly through the tire and may glue your finger to the tire or wheel before you know it. You must follow the directions and precautions provided by the glue manufacturer to insure a secure bond.


Figure 73

STEP #1: Using a reamer or the previously used .110" drill bit. Drill a hole in the center of each of the 4 wheels as shown in **Figure 72.**

STEP #2: If using foam inserts place them inside the tire before mounting on wheels. Now place the wheels inside each of the tires and work both beads of the tire into the channels on the outside edge of the rim. After all 4 tires are completed peel back a portion of the tire from the wheel and apply an even bead of tire glue between the wheel and the tire as shown in **Figure 73.** Repeat this step several times working your way around the tire until it is secure. Now set the wheel and tire down **BUT be sure to PLACE THE FRESHLY GLUED SIDE UP** until it has dried completely. You may repeat this process now for the remaining 3 tires. Once dry it is a good idea to go back and re-seal the edges by applying another small bead of glue and letting it run around the edge of the tire at the gap between tire and wheel.

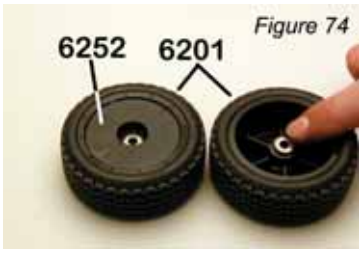


Figure 74

STEP #4: Once the tires have completely dried you may now mount them to the car. Place one #1226 Bearing into each side of the front wheels as shown in **Figure 74.**

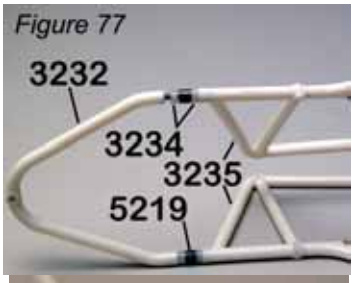
STEP #5: Refer to **Figure 75** and place one 3/16" shim over the front axle followed bye the front wheel and than another 3/16" shim. Now secure with one 8-32 Locknut, be very careful to not overtighten the nut. you want to tighten it just enough to eliminate any slop from side to side but no more. Repeat for other side of car.


Figure 75

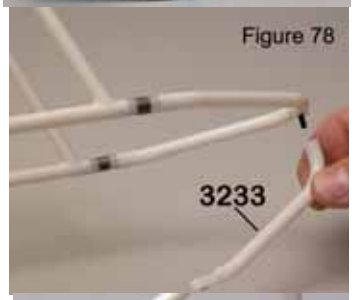
STEP #6: Now slide one of the rear wheels onto the rear axle as shown in
Figure 76. Be sure to index the roll pin in the axle so that it slides into the drive slot molded in the back of the wheel. Now secure with a #5207 locknut. Be sure not to over tighten as you can bend the roll pin.


Figure 76

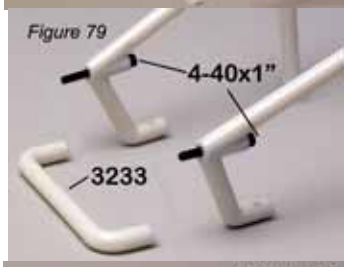
Cage and Body Mounting



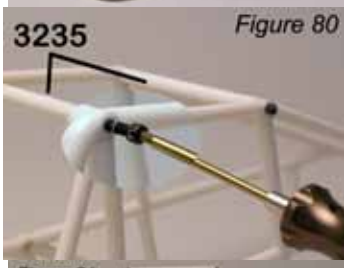
Step #1: Using the #5219 Cage Turnbuckle, place (1) #3234 Cage Spacer onto the longer thread and screw it all the way into one of the #3235 Main Cage Halfs. Now add (1) Cage Spacer to the other end of the Cage Turnbuckle and thread it all the way into the #3233 Rear Bumper by turning the entire Main Cage Half COUNTER-CLOCKWISE to thread the Rear Bumper onto the Cage Turnbuckle. The idea is to get both Rear Bumper and Cage Half to tighten against the turnbuckle at the same time regardless of alignment at this point. Place (1) Cage Spacer on the short end of another Cage Turnbuckle and thread that into the other side of the Cage Loop. Finally add (1) Cage Spacer to the remaining longer end of the Cage Turnbuckle and thread on the other Main Cage Half. Refer to **Figure #77** for visual.



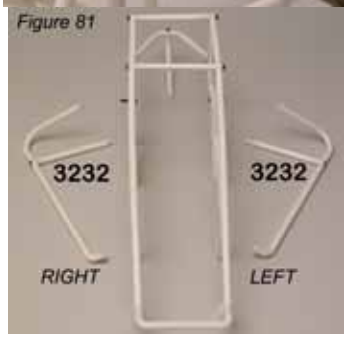
Step #2: Mount the #3233 Real Tail Brace to the Rear Bumper with (1) 5/8" BH Screw as shown in **Figure # 78**.



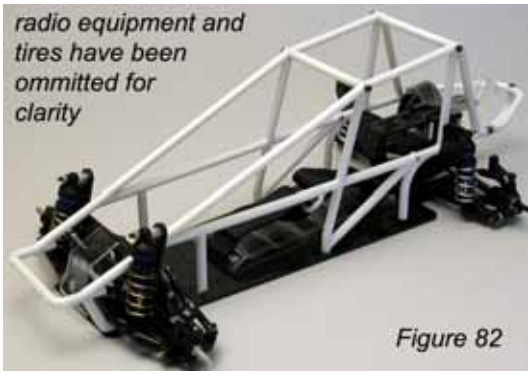
Step #3: Align both Cage Halves so they are parallel to one another and tighten the Cage Turnbuckle if needed. Mount the #3233 Front Bumper by placing (2) 1" SH Screws thru the front of the Main Cage Halves as shown in **Figure #79**.



Step #4: Using the (4) Special #XXXX 3/4" SH Screws with a clip hole drilled in the head, mount the #3235 Upper Cage Brace onto the top of the Cage as shown in **Figure #80**.



Step #5: Sub-assemble the remaining parts which are the #3232 Nerf-Bars using (1) 1/2" BH Screw to mount the Nerf Bar Support to the Nerf Bar. Look carefully at **Figure #81** at the Nerf Bar Support and Nerf Bar and you will figure out which one is RIGHT and LEFT from the picture. Before mounting the Nerf Bars you must mount the Body Panels first. We will do this at a later time.



Step #6: Mount the Cage to the Chassis by sliding the “hooks” on the front of the cage under the Front Suspension Arms first, then bring the rest of the cage down onto the chassis. Mount those two front hooks with (2) 3/8" FH Screws and the Rear Bumper Brace with (1) 3/8" FH Screw and (1) 4-40 Lock-nut. **Figure #82** shows the Cage mounted to the Chassis.

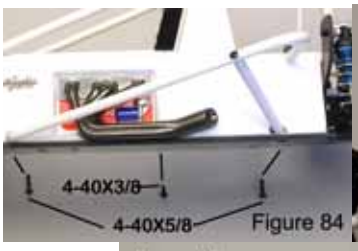
Step #7: Using **Figure 83** as a guide trim, and paint the #9024 Body Panels, #9029 Eagle Hood, #9027 Tail Tank on the molded body lines for either REAR or MID-MOTOR set-up as directed…

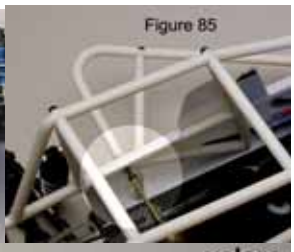
REAR MOTOR: Trim the Tail Tank following the round-arc on the left side of the tank. Cut the rear of the Body Panels approximately 5/16" shorter than the molded line toward the back of the car. On left side Body Panel, do NOT cut out the semi-circle that is molded in the panel.

MID-MOTOR: Do NOT cut out the round arc on the left side of the Tail Tank. On the left side Body Panel, trim along the round arc provided. You can leave the entire Body Panel the original length however instead of removing the rear portion of the right side panel you will need to cut access holes in order to access your motor mounting screws and pinion gear.

Following **Figure #83**, drill the (3) 1/8" holes on the bottom of both Body Panels as directed by the dimple marks in the lexan.

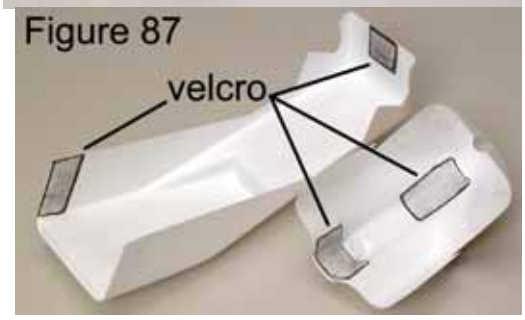
Step #8: Install the LEFT side Body Panel first by threading (1) 3/8" FH Screw to the Cage thru the chassis into the middle hole you drilled in the Body Panel. Secure the front end of the Nerf Bar to the chassis with (1) 5/8" FH Screw and mount the Nerf Bar Support to the chassis with (1) 5/8" FH Screw as well. **Figure #84** shows the mounting of these three screws. Now mount the Left Side Nerf Bar to the Body Panel with (1) 5/8" BH Screw thru the Cage and into the Nerf Bar as in **Figure #85**. Finally mount the RIGHT side Body Panel as you did the left side.





Step #9: Following **Figure #86**, mount one side of the Velcro to the places shown. We suggest to mount the “hook” side of the Velcro to the body mounts on the car.

Step #10: Mount the “loop” side of the Velcro to the Hood and Tail Tank in the areas shown in **Figure #87.** Now attach the Hood and the Tail Tank to the car using the velcro.



Step #11: Assemble the #9021 Wing kit using the instructions provided in the wing bag. Mount the wing to the car and it should now look just like the car shown below.

Congratulations!!

You have now completed the assembly process of your new Custom Works Enforcer GBX kit. In the next section of this manual you will find instructions for converting this car to a Mid-Motor Configuration as well as some basic setup hints and advice. It is important to remember that all tracks and racing surfaces are different. Therefore the suggestions we give you are general in nature and should by no means be treated as the only options.

Rear Motor TO Mid-Motor Conversion

Step #1: Remove the (2) 1/4" FH Screws and (2) 1" SH Screw from the top of the Transmission Mount Brace. From underneath the chassis, remove the (2) 1/2" SH Screws from the Transmission Spacer Plate that are threaded into the Transmission.

Figure 90

Step #2: Disassemble the Slipper Clutch, remove the (3) 1" SH Screws and (1) 3/8" FH Screw that hold the Transmission Halves together. Flip the Top Drive Shaft so the shaft sticks out of the LEFT transmission half. Remember to leave the shims on the Top Drive Shaft, NOT in the Transmission Halves so that you maintain the same spacing. Finally flip around the Diff Gear assembly so that the Diff Bolt end also sticks out the LEFT transmission half. Now thread the (1) 3/8" FH Screw back into the transmission and slide the (3) 1" SH Screws in from the RIGHT side so that the Motor Plate mounts on the LEFT side. Remount the Motor Plate with spacers and Re-assemble the Slipper Clutch. In **Figure #90** you will see complete versions of the transmission set up for Rear or Mid-Motor.


Figure 91

Step #3: Remove the (6) 1/2" FH Screws that are holding on the Transmission Spacer Plate and Rear Toe Blocks. Turn around the Rear Bulkhead assembly so that the Shock Tower is facing toward the REAR of the car. Flip the Rear Toe Blocks so that the dimples on the Rear Toe Blocks once again are toward the REAR of the car. The (2) rear screws passing thru the chassis, should pass thru the rear most holes on the Transmission Spacer Mount as shown in **Figure #91**.

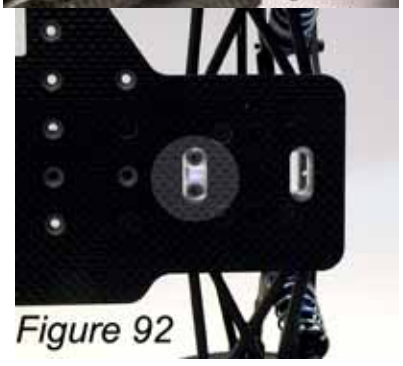


Figure 92

Step #4: If all is done correctly, (2) holes from the Transmission Spacer will be visible in the FRONT oval slot in the chassis as shown in **Figure #92**. Re-attach the Rear Toe Blocks with the (6) 1/2" FH Screws.

Step #5: Bringing the Transmission in from the FRONT of the car, place each Dog-Bone into the Outdrive Hub and set the Transmission onto the Gearbox Spacer Plate as shown in **Figure #93** with the Motor Plate to the RIGHT side of the car.

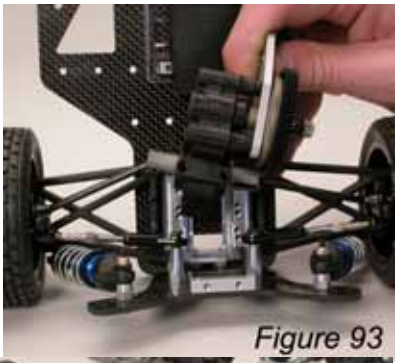


Figure 93

Step #6: Fasten the Transmission back to the car with the 2 4-40X1/2" SH Screws from underneath the Chassis and thru the Gearbox Spacer Plate as you did in Step #2. Re-attach the Transmission Brace with the “square” facing toward the back. The lexan Tail Tank Mount will now be attached where the holes line up over the Top Plate Block on the Shock Tower. Use (2) 3/8" BH Screws with Washers to tighten the Tail Tank Mount to the Top Plate Block. Your car should now look like the car shown in **Figure 94.**


Figure 94

TUNING TIPS: These are some general guidelines for optimizing handling performance. None of these “tips” are EVER set in stone. On any given day this manual or any chassis engineering book or guru can be proved wrong by the almighty stop watch. A good way to approach chassis set-up is to try one change, practice it, think how the car felt different from before, and compare lap times from the stop watch…..this will never fail.

Car Is Loose (oversteers):	**Car Pushes (understeers):**
Increase Wing Angle	Decrease Wing Angle
Add Spoiler to Wing	Decrease Spoiler on Wing
Softer Rear Spring	Heavier Rear Spring
Heavier Front Spring	Softer Front Spring
Use Front Sway Bar	Use Rear Sway Bar
Try Harder Front Compound Tire	Try Softer Front Compound Tire
Try Softer Rear Compound Tire	Try Harder Rear CompoundTire
Move Battery to Center of Car	Move Battery to Left of Center
Raise Front Ride Height	Lower Front Ride Height
Lower Rear Ride Height	Raise Rear Ride Height
Thread Shock Collar DOWN on Right Front	Thread Shock Collar UP on Right Front
Thread Shock Collar UP on Right Rear	Thread Shock Collar DOWN on Right Rear
Increase Rear Toe	Decrease Rear Toe
Increase Castor	Decrease Castor

Car Is Erratic:

Bent Suspension Pins: Remove shocks to check free movement
Bound Ball Joint: Should spin free on balls while mounted to the car.
Bent or Loose Camber Links
Wore out Bearings or Completely Seized Bearings
Chunked Tire: Check to see if Foam or Rubber Tire is still glued to wheel.
Loose Screws: Especially Chassis Screws, add Blue Loctite to prevent.
Shocks: Either Bound-up or Out of Oil. Must swivel freely on mounts.
Foreign Objects: Unlucky Dirt/Stones preventing Suspension or Steering Movement.
Blown Differential
Radio Problem: Bad Servo, Weak Servo Saver Spring, Transmitter Pot blown.

Caster: Angle of the kingpin in relation to a vertical plane as viewed from the side of the car. Increasing the angle will make the car more stable out of the turn and down the straights and increase steering entering a turn. Decreasing the angle will make the car feel more “touchy” at high speeds and help steering while exiting the turn.

Front Toe IN: Front edge of car tires point *toward* the chassis as viewed from above the car. Settles and makes steering reaction less aggressive especially on acceleration. Easier set-up to drive and works well for bumpy tracks.**Front Toe OUT:** Front edge of car tires point *away* from the chassis as viewed from above the car. Increases aggressiveness of car especially on entry to the turn. Works well on smooth, high bite tracks where rear traction is not a problem.

Camber (Front or Rear): Angle by which the tire and wheel contacts the racing surface when viewed from the Front or Rear of the car. Oval cars generally always have the Right Side tires leaning TOWARD the chassis and the Left Side tires leaning AWAY from the chassis. In oval racing jargon, more camber means more angle TOWARD the chassis on the Right Side and more angle AWAY from the chassis on the Left Side. Starting from 0 Degrees (tire standing straight up) ADDING camber in the oval fashion will increase traction when cornering however remember too much of anything is generally a bad thing. Camber is usually adjusted (especially Foam tires) when one edge of the tire is wearing more than the other.

Camber Gain: Angle of the Camber Link relative to the Suspension Arm. Lowering the camber link on the shock tower OR raising the camber link on the castor block will INCREASE the camber angle of the tire when the suspension is compressed. Raising the camber link on the shock tower OR lowering the camber link on the castor block will DECREASE the camber angle of the tire when the suspension is compressed. There is not a “correct” set-up and once again too much of anything is generally bad. This will help change the “feel” of the car thru the turns.

Camber Link Length: Comparing this to the length of the Suspension Arm from each pivot point and keeping the Camber the same, making the link *shorter* will decrease traction for that corner of the car while making it *longer* will increase traction for that corner of the car. Once the camber link is equal to or greater than the Suspension Arm pivots, the gain of traction ends. Also a shorter camber link will increase camber gain and a longer decrease camber gain.

Shock Angle: Leaning the shock toward the car is effectively like changing to a *softer* spring. Standing the shock closer to vertical is effectively like changing to a *stiffer* spring. Try when the car is working well and when one spring change is TOO much for your set-up.

Ride Height: Check by pushing the chassis down once or twice to simulate bumps on the track. Having the front end *higher* than the rear will make the car increase rear traction especially out of the turn. Having the front end *lower* than the front will make the car increase front traction especially entering the turn. Generally its safe to start the car with the ride heights even.

Rear Toe-In: Front edge of car tires point *toward* the chassis as viewed from above the car. Increasing the angle toward the car will increase rear traction while decreasing front traction. Decreasing the angle will do the opposite.

Wheelbase (Front End): Wheelbase is the distance between the front and rear axles. Running the entire front end assembly in the forward position makes the wheelbase longer and therefore more stable on long/fast tracks with flowing turns. Running the entire front end assembly in the rear position make the wheelbase shorter and therefore more suitable for short-tracks where you are constantly turning.

Wheelbase (Rear End): This adjustment uses the plastic spacers on the kingpin the rear bearing carrier rides on. With the spacers in front of the carrier it will lengthen the wheelbase but will increase steering. If the spacers are behind the carrier it will shorten the wheelbase but increase rear traction. This is completely backwards from how it works for the Front End only because in the rear of the car you have the weight of the motor and the torque it creates. Shortening the wheelbase here makes more of the car hang over the rear tires and promotes more weight transfer.

48 Pitch	Spur Gear							
Pinion	66	68	70	72	75	78	81	84
12	13.20	13.60	14.00	14.40	15.00	15.60	16.20	16.80
13	12.18	12.55	12.92	13.29	13.85	14.40	14.95	15.51
14	11.31	11.66	12.00	12.34	12.86	13.37	13.89	14.40
15	10.56	10.88	11.20	11.52	12.00	12.48	12.96	13.44
16	9.90	10.20	10.50	10.80	11.25	11.70	12.15	12.60
17	9.32	9.60	9.88	10.16	10.59	11.01	11.44	11.86
18	8.80	9.07	9.33	9.60	10.00	10.40	10.80	11.20
19	8.34	8.59	8.84	9.09	9.47	9.85	10.23	10.61
20	7.92	8.16	8.40	8.64	9.00	9.36	9.72	10.08
21	7.54	7.77	8.00	8.23	8.57	8.91	9.26	9.60
22	7.20	7.42	7.64	7.85	8.18	8.51	8.84	9.16
23	6.89	7.10	7.30	7.51	7.83	8.14	8.45	8.77
24	6.60	6.80	7.00	7.20	7.50	7.80	8.10	8.40
25	6.34	6.53	6.72	6.91	7.20	7.49	7.78	8.06
26	6.09	6.28	6.46	6.65	6.92	7.20	7.48	7.75
27	5.87	6.04	6.22	6.40	6.67	6.93	7.20	7.47
28	5.66	5.83	6.00	6.17	6.43	6.69	6.94	7.20
29	5.46	5.63	5.79	5.96	6.21	6.46	6.70	6.95
30	5.28	5.44	5.60	5.76	6.00	6.24	6.48	6.72
31	5.11	5.26	5.42	5.57	5.81	6.04	6.27	6.50
32	4.95	5.10	5.25	5.40	5.63	5.85	6.08	6.30
33	4.80	4.95	5.09	5.24	5.45	5.67	5.89	6.11
34	4.66	4.80	4.94	5.08	5.29	5.51	5.72	5.93
35	4.53	4.66	4.80	4.94	5.14	5.35	5.55	5.76

64 Pitch	Spur Gear							
Pinion	78	81	85	88	93	96	100	104
16	11.70	12.15	12.75	13.20	13.95	14.40	15.00	15.60
17	11.01	11.44	12.00	12.42	13.13	13.55	14.12	14.68
18	10.40	10.80	11.33	11.73	12.40	12.80	13.33	13.87
19	9.85	10.23	10.74	11.12	11.75	12.13	12.63	13.14
20	9.36	9.72	10.20	10.56	11.16	11.52	12.00	12.48
21	8.91	9.26	9.71	10.06	10.63	10.97	11.43	11.89
22	8.51	8.84	9.27	9.60	10.15	10.47	10.91	11.35
23	8.14	8.45	8.87	9.18	9.70	10.02	10.43	10.85
24	7.80	8.10	8.50	8.80	9.30	9.60	10.00	10.40
25	7.49	7.78	8.16	8.45	8.93	9.22	9.60	9.98
26	7.20	7.48	7.85	8.12	8.58	8.86	9.23	9.60
27	6.93	7.20	7.56	7.82	8.27	8.53	8.89	9.24
28	6.69	6.94	7.29	7.54	7.97	8.23	8.57	8.91
29	6.46	6.70	7.03	7.28	7.70	7.94	8.28	8.61
30	6.24	6.48	6.80	7.04	7.44	7.68	8.00	8.32
31	6.04	6.27	6.58	6.81	7.20	7.43	7.74	8.05
32	5.85	6.08	6.38	6.60	6.98	7.20	7.50	7.80
33	5.67	5.89	6.18	6.40	6.76	6.98	7.27	7.56
34	5.51	5.72	6.00	6.21	6.56	6.78	7.06	7.34
35	5.35	5.55	5.83	6.03	6.38	6.58	6.86	7.13
36	5.20	5.40	5.67	5.87	6.20	6.40	6.67	6.93
37	5.06	5.25	5.51	5.71	6.03	6.23	6.49	6.75
38	4.93	5.12	5.37	5.56	5.87	6.06	6.32	6.57
39	4.80	4.98	5.23	5.42	5.72	5.91	6.15	6.40
40	4.68	4.86	5.10	5.28	5.58	5.76	6.00	6.24
41	4.57	4.74	4.98	5.15	5.44	5.62	5.85	6.09
42	4.46	4.63	4.86	5.03	5.31	5.49	5.71	5.94
43	4.35	4.52	4.74	4.91	5.19	5.36	5.58	5.80
44	4.25	4.42	4.64	4.80	5.07	5.24	5.45	5.67
45	4.16	4.32	4.53	4.69	4.96	5.12	5.33	5.55
46	4.07	4.23	4.43	4.59	4.85	5.01	5.22	5.43
47	3.98	4.14	4.34	4.49	4.75	4.90	5.11	5.31

GEAR RATIO CHARTS:

The Charts to the right give you final drive gear ratios for your car. The Transmission gear reduction is 2.40 to 1 with this car. To calculate the Drive Ratio you divide your spur gear by your pinion gear and than multiply by 2.40.

Your ideal gear ratio will vary greatly depending on the track size, surface type, amount of traction available, and your choice of motor. For best results consult your local hobby dealer or a fellow racer at your local track for the ideal choice of gear ratio for your application.

Good Luck!