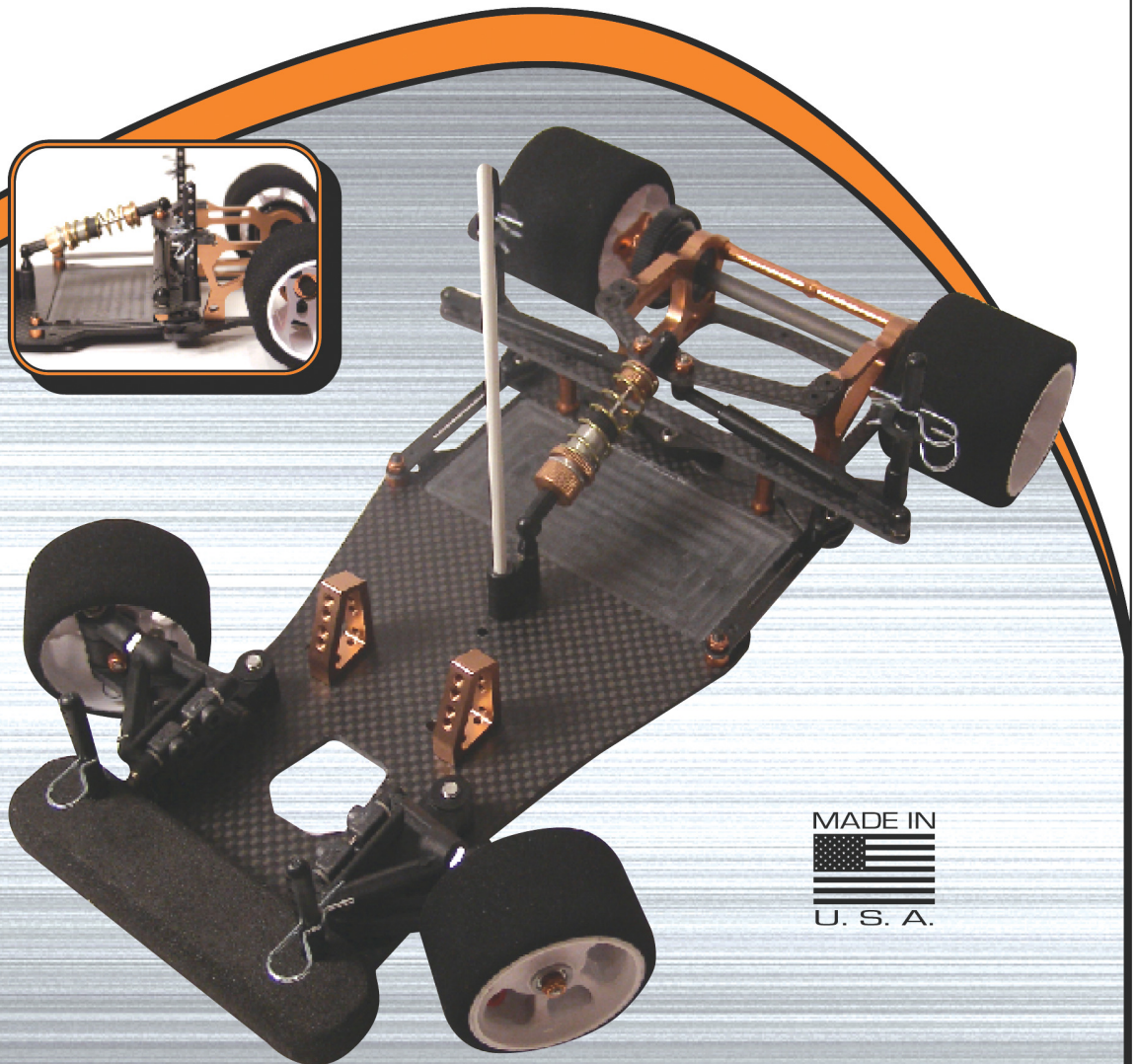
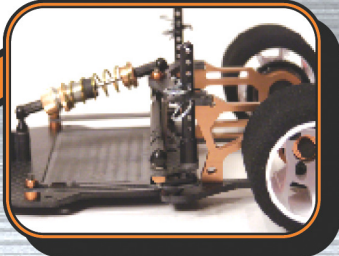
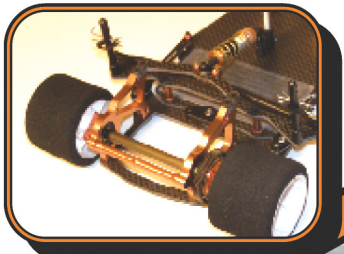


COPPERHEAD 12

BTM
RACING.com

Instruction Manual



MADE IN

U. S. A.

BTM
RACING.com

352-544-0463 / 15373 Flightpath Dr. / Brooksville, FL 34604 / www.bmiracing.com

Message from BMI Racing

The Copperhead 12 is a revolutionary step forward in 1/12th scale car design. We spent the last year refining the proven DB12RR LiPo edition racing machine. The goal of the Copperhead 12 project was to take the best features of the DB12RR and make a new type of rear suspension that will set new standards for speed, versatility and ease of use. The Copperhead 12 was designed to be race tuned for any traction level. It has been proven on lower traction asphalt tracks all the way to the highest traction carpet tracks.

Here at BMI Racing, we put quality before quantity. Unlike a lot of cars available, we make all of our parts in house. From pivot balls to carbon fiber components, every part is guaranteed to be the highest quality. We do not sacrifice anywhere on our products. Every part is inspected for quality.

Please read through the instruction manual carefully. Even if you are an experienced R/C racer, there are some details about the Copperhead 12 that are different than other cars. To get the most out of your kit you must have it assembled correctly. Have fun building and racing your new race car. As always, we here at BMI Racing appreciate your support

With Regards,
Jason Breiner
BMI Racing

Items needed to assemble your Copperhead 12

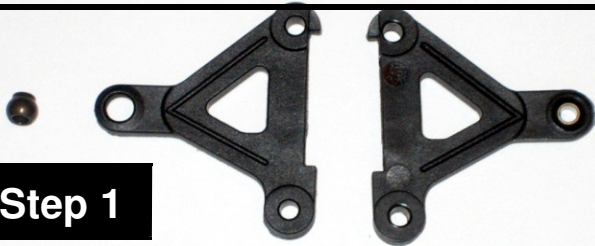
1. .050", 1/16" and 3/32" Allen wrenches
2. A #2 Phillips Screwdriver
3. 3/16" and 11/32" nut drivers
4. A pair of needle nose pliers
5. A pair of slip joint pliers
6. A hobby knife
7. A ruler or calipers
8. A file
9. A soldering iron
10. Diff Grease
11. Electric Motor Cleaner Spray
12. 50wt silicon shock oil (for center shock)
13. 10,000wt silicon diff oil (for damper tubes)

Items needed to operate your Copperhead 12

1. Two channel surface Radio system
2. A mini servo*
3. 3.7 volt LiPo battery packs
4. A battery charger
5. A Brushless electronic speed control
6. Brushless electric motor
7. A 64 pitch pinion gear
8. A small servo saver.
9. 1/12th scale body
10. 1/12th scale tires

Front suspension assembly

Step 1



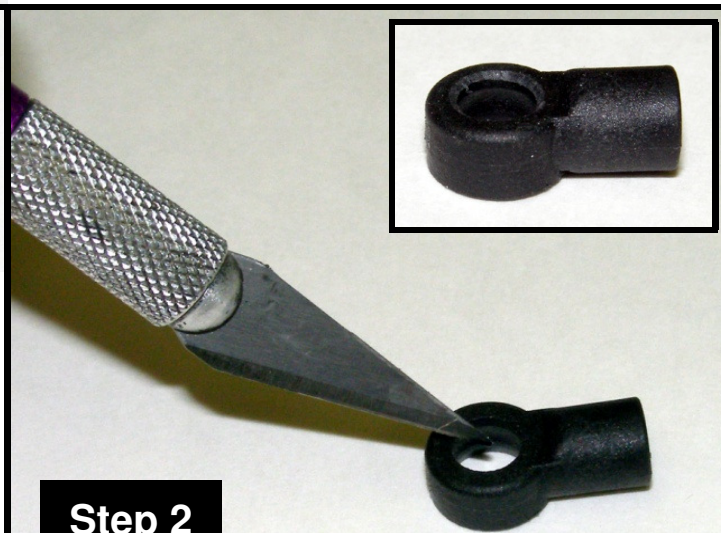
Locate your lower front suspension arms and the hard anodized alloy pivot balls. Note that the arms are symmetrical. At this time you must pick which one will become the left and right arms as this will determine how you pop the pivot ball into the arms.

Pop the pivot balls into the arms with the shoulder on the ball facing up. Do this by placing the ball on a hard flat surface and placing the arm over the ball. Carefully push the arm down over the pivot ball. Be careful. It will take a lot of force.

Special Note:

The Copperhead 12 uses IRS hard anodized alloy pivot balls and the new IRS lower suspension arms. If the balls are tight in the lower arms carefully squeeze them with pliers until the ball just begins to move freely

Step 2



Locate your upper suspension arm rod ends. Note that the top side of the rod end opening is smaller than the bottom

With a hobby knife, carefully chamfer the top of the rod ends opening. This creates clearance for the king pin shims that will go here later. This will ensure there is no binding in the suspension.

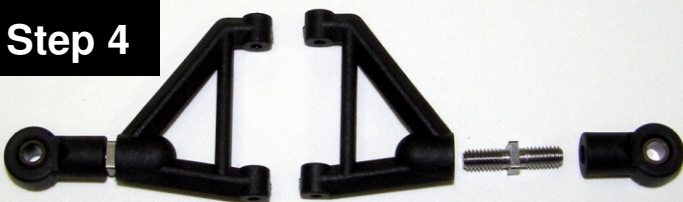
The inset picture shows a finished rod end.

Step 3



Locate the two remaining hard anodized alloy pivot balls and snap them into the upper arm rod ends with the shoulder on the ball facing down. As with the lower arms, squeeze the rod ends if the balls do not move freely.

Step 4



Locate the upper suspension arms, the upper arm turnbuckles and assemble as shown above.

We prefer to thread the right hand thread portions of the turnbuckles into the rod ends and the left hand thread into the upper arms.

Note:

The arms have a bottom and a top. They have small circular impressions on the bottoms.

Step 5



Locate the 5 degree reactive caster upper suspension mounts, upper suspension hinge pin, e-clip and nylon caster spacers.

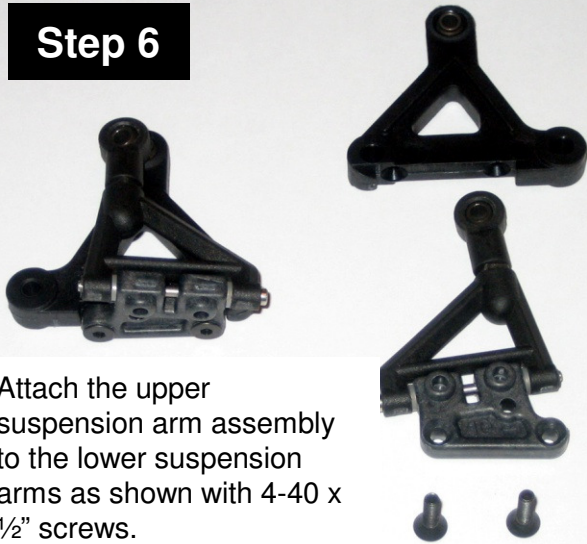
Assemble as shown.

Make sure the upper suspension arms pivots freely. If there is any binding at all, the car may handle poorly. If the upper arms are tight, use the back of a hobby knife to scrape the front and back of the reactive caster blocks and the inside of the upper suspension arms to make more clearance for the caster spacers. Take your time here and get it right!

Special Note:

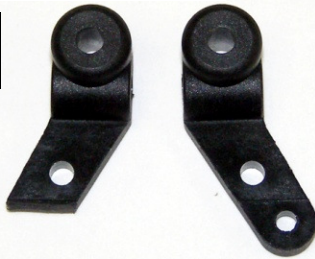
The Copperhead 12 uses IRS upper hinge pins and does not require setscrews in the upper suspension arm mounts.

Step 6



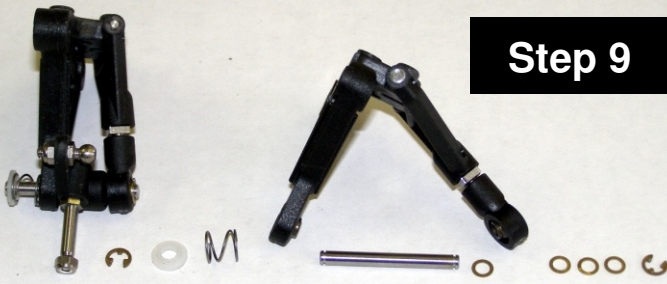
Attach the upper suspension arm assembly to the lower suspension arms as shown with 4-40 x 1/2" screws.

Step 7



Locate the left and right steering spindles. Trim the steering arms length to the line molded on the part as shown.

Step 9



Locate 2 steel 1/8" king pins, 10 1/8" shims, 4 e-clips and 2 .020" springs.

1. Snap an e-clip on to one end of the king pin.
2. Slide 3 shims onto the king pins against the e-clip.
3. Pass this through the pivot ball in the upper suspension arms rod end.
4. Place one more shim on the king pin.
5. Slide the steering spindle onto the king pin.
6. Slide the king pin through the pivot ball in the lower suspension arm.

Step 8



Locate the titanium front axles, four 4-40 alloy lock nuts, and two alloy pivot balls.

Thread the titanium axles into the steering spindles. Note that the threads on the axles that go into the spindles are left hand. After the axles are fully seated tighten an alloy 4-40 lock nut onto the threaded stub coming out the back of the spindle.

Thread the alloy pivot balls into the holes on the steering arms and secure them with alloy 4-40 lock nuts. Remember these are alloy pivot balls so make the nuts snug. They are strong enough to last a few racing seasons; but if you crank them down, you can snap them.

1. Slide the .020" spring and nylon retainer onto the king pin and snap an e-clip on the bottom of the king pin.
2. Repeat for the other side of the front suspension.

Special notes:

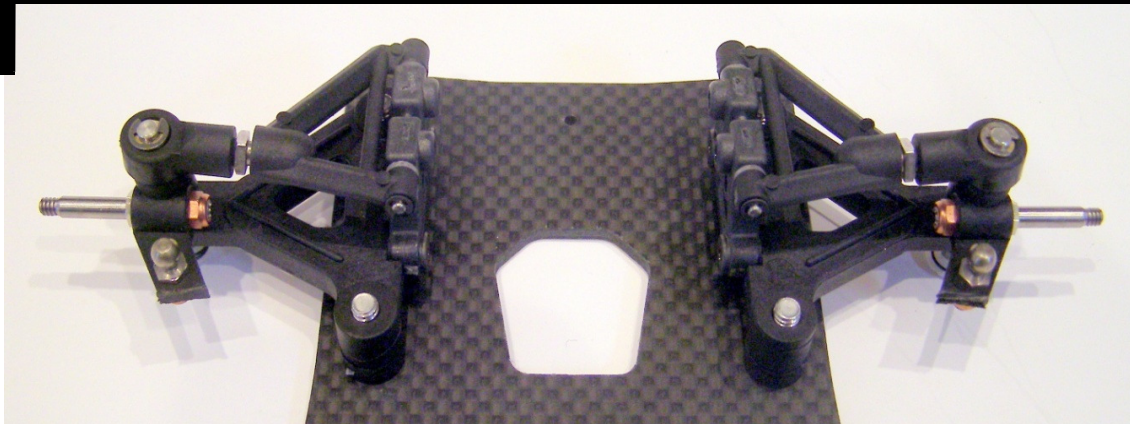
Make sure the steering arms on the spindle are pointing towards the rear of the car as shown in the picture.

The axle is offset in the spindle. Make sure the axle is closest to the lower suspension arm. As shown in the picture to the left

It is important that the king pin slide freely in all of the parts including the steering spindle. When you thread the axle into the spindle, it may swell the king pin bore and make it tight on the spindle. You can try to use a 1/8" drill to open it up but the best solution is to use a 1/8" reamer.

You can order the reamer from:
www.mcmaster.com. The part number is 2995A61

Step 10



Locate four 8-32 x 5/8" screws and 4 nylon lower suspension arm spacer. Use 1 thin and 1 thick nylon spacer under each pad on the arms.

Pass a screw through the chassis and slide a nylon riser over the screw. Start threading the screw into the lower suspension arm but do not tighten it. Pass another screw through the chassis and slide a nylon riser over that screw. Start threading the screw into the other hole on the lower suspension arm. Tighten both screws. Repeat on the other side.

Special Note:

In testing, we found we preferred to not use any suspension brace, strap or tube to connect the left and right suspension assemblies. This was true on high traction carpet tracks to low bite asphalt tracks. You can add or remove lower arm spacers to adjust ride height and to compensate for tire wear.

Rear suspension assembly



Locate two flex plates*, 2 flex plate pivot ball housings w/ the pivot balls installed, and 4 2-56 button head screws.

1. Slide pivot ball housing through the flex plate so the flex plate encloses the boss on the lower side of the housing.

2. Pass the 2-56 screws through the pivot ball housing from the top so they thread into the flex plate.

Step 11

Step 12

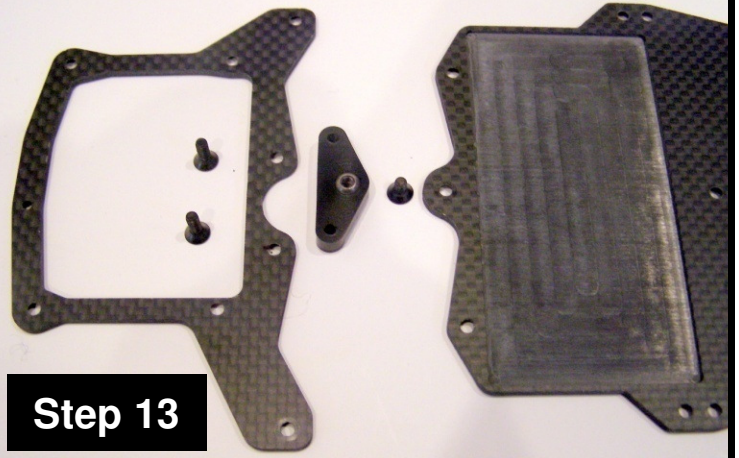


Take a minute to prepare all your carbon components for assembly. With a file or sand paper knock off any sharp edges along the perimeter or the carbon parts.

Special note:

Carbon fiber dust is really bad for you. Always wear a mask and eye protection when sanding or filing carbon fiber.

Step 13

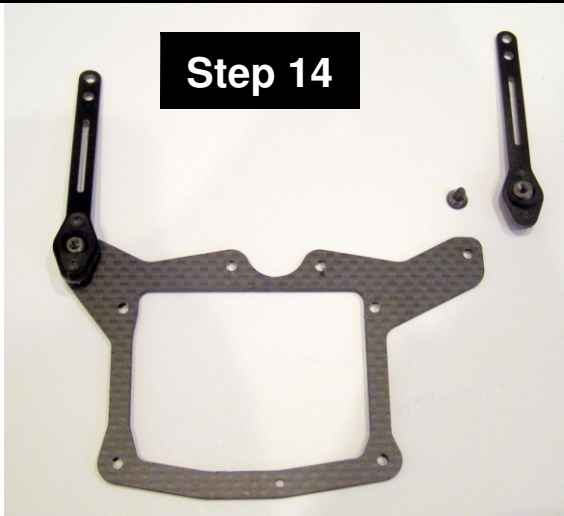


Locate the delrin center pivot assembly, one 4-40 x 1/4", and two 4-40 x 3/8" flat head screws.

Attach the center pivot assembly to the rear most hole in the center of the lower chassis plate with the 1/4" screw. The shoulder on the pivot ball and the two bosses on the center pivot assembly should face down towards the chassis. The pivot ball has a 3/32" hex in the top so you can use a wrench to tighten it firmly.

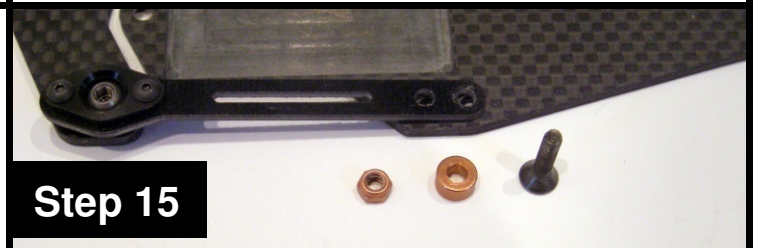
Attach the rear lower pod plate to the center pivot assembly with two 4-40 x 3/8" flat head screws.

Step 14



Attach the two flex plate assemblies to the lower pod plate with 4-40 x 1/4" flat head screws. Access the 3/32" hex in the top of the pivot ball so you can tighten it down firmly.

Step 15



Locate 2 copper anodized non-threaded spacers, 2 copper anodized aluminum lock nuts and 2 4-40 x 1/2" flat head screws.

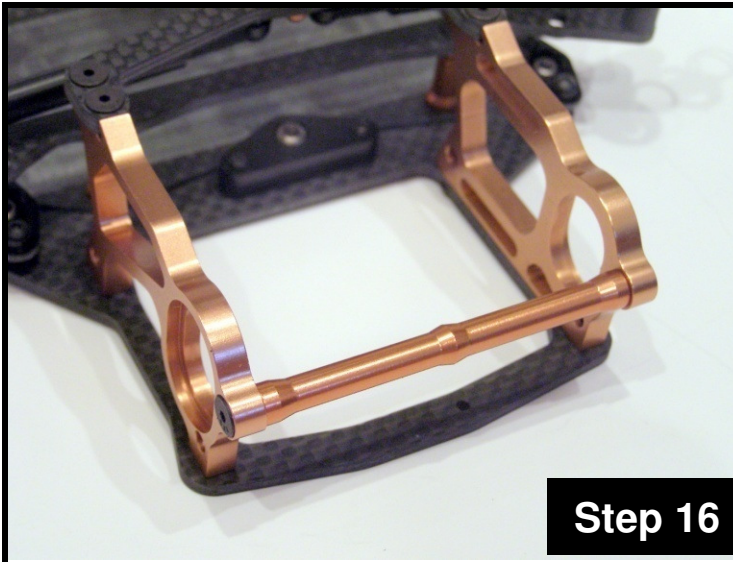
1. Pass a 4-40 x 1/2" flat head screw through the hole in the chassis corresponding to the front hole on the flex plate.

2. Pass a copper non-threaded spacer over the screw.

3. Slide the forward hole on the flex plate over the screw and the spacer.

4. Thread the aluminum locknut onto the screw and hold it with a 3/16 nut driver as you tighten the screw. You want these nuts to be tight but do not overdo it. You do not want to strip the nuts.

5. Repeat to assemble the other side



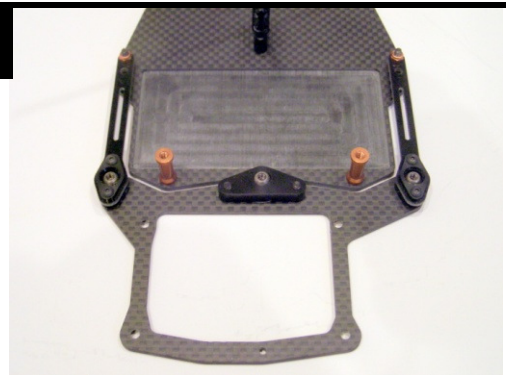
Step 16

Locate the two alloy rear pod plates, the alloy rear pod plate spacer tube 2 4-40 x 3/8" flat head screws and 4 4-40 x 1/4" flat head screws.

Attach the alloy pod plates to the lower carbon pod plate with the 4 4-40 x 1/4" screws.

Attach the alloy rear pod plate spacer tube to the alloy rear pods with the 2 4-40 x 3/8" screws.

Step 18

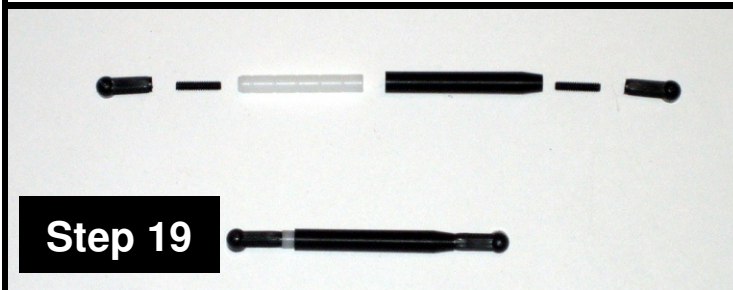


Locate and install the two long copper anodized threaded spacers as shown with 4-40 x 1/4" flat head screws.

Step 18



Locate and install the carbon damper tube/body mount /brace as shown with 4-40 x 1/4" flat head screws.



Step 19



Locate the damper tube parts bag, the rear pod top plate and 4 4-40 x 1/4" flat head screws..

1.Thread a 4-40 x 3/8" set screw into each of the 4 ball cups from the damper parts bag.

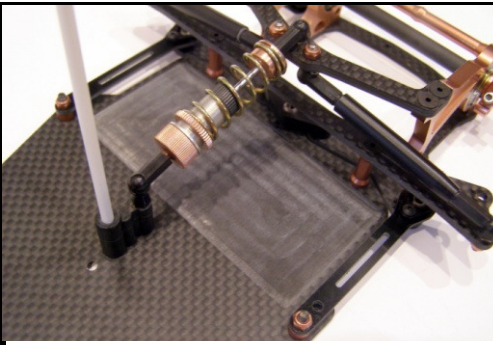
2.Thread a ball cup/set screw assembly into the ends of each of the damper tube pistons and damper tubes.

1. Apply 10,000wt silicon diff oil to the pistons and insert them into the damper tubes.
2. Attach the alloy ball studs to the bottom of the pod top plate and the tops of the side wings as shown in step 19. Secure them with alloy lock nuts
3. Attach the carbon pod top plate to the alloy rear pod plates
4. Snap the ball cups of the assembled damper tubes onto the pivot balls on the pod top plate and cross brace.

Note:

If you feel play between your ball cups and ball studs, you can place a single layer of plastic bag material between your ball cup and ball stud then snap them together. This will cut and insert a disc of plastic into your ball cup reducing or eliminating the play. If you still feel play, repeat the process. We find you usually need one to two layers to get the proper feel, no play but totally free movement.

Step 20



1. Install the molded shock mount-antenna mount with 2 4-40 x 1/4" flat head screws using the 2 rear mounting holes.
2. Assemble the Silva bladder shock as per the included instructions with 50wt silicon shock oil.
3. Place the one medium black alloy ball stud in the antenna mount and a standard ball stud in the rear pod top plate as shown. Secure the top pod plate ball stud with an alloy lock nut.
4. Install the included gold shock spring onto the shock and snap the shock in place.

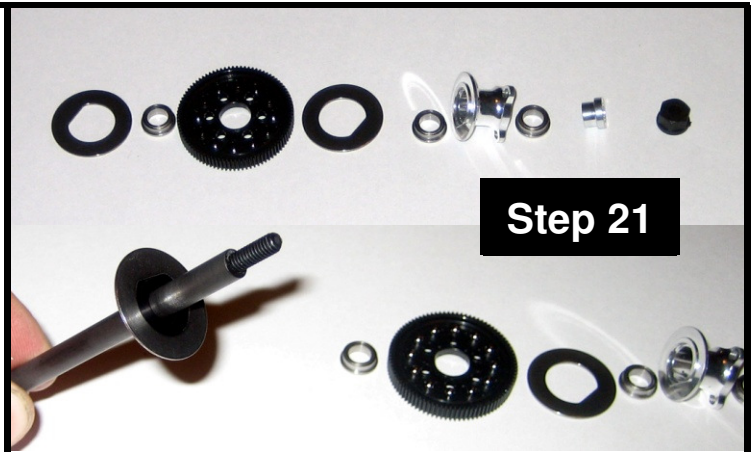
Trim the ball cup so the over all shock length is 2.710" . This length will give you the standard setting of 1.5mm of rear pod droop. If you thread on the ball cup until it stops, you will have zero pod droop.

Diff Assembly:

Step 21 Continued

1. Put a small dab of diff grease on the axle flange so the diff will stick to it. Place a diff ring on the flange so its flat keys onto the flat on the diff flange.
2. Place a flanged 3/8 x 1/4" bearing in the center of the spur gear. Slide the spur gear and bearing unit on to the axle until it stops against the diff ring.
3. With a small flat screw driver remove the diff balls from the diff grease and snap them into the outer row of holes in the spur gear.
4. Place a flanged 3/8 x 1/4" bearing into the inside face of the right side diff hub. Put a small dab of diff grease on the hub flange so the diff will stick to it. Place a diff ring on the flange so its flat keys onto the flat on the hub flange. Slide this unit on to axle.
5. Slide a flanged 3/8 x 1/4" bearing over the axle into the outside face of the right side diff hub. Slide the stepped thrust cone onto the axles so the smaller diameter part is against the right hub bearing.

Step 21



Locate the rear axle parts bag. There are a couple of steps that can make your diff last longer that should be done at this time.

Use the right alloy diff hub as a holder and sand both sides of each diff ring on 600 grit sand paper using electric motor cleaner spray as a lubricant. Sand until you see an even scoring pattern across the face of each diff ring. Clean them with motor spray and set them aside.

The diff balls may have a protective oil coating on them. Place them on a clean paper towel and carefully clean them with motor spray. When dry drop them into your cup of diff grease and stir them to coat them with diff grease.

1. Thread the black nylon lock nut onto the threaded stud on the axles until it makes contact with the thrust cone.
2. Tighten the black lock nut gradually with an 11/32" nut driver until you notice you cannot slip the spur gear when holding the axle and right hub in a fixed position.

Six 4-40 x 1/4" cap head screws are supplied to mount your rear wheels.

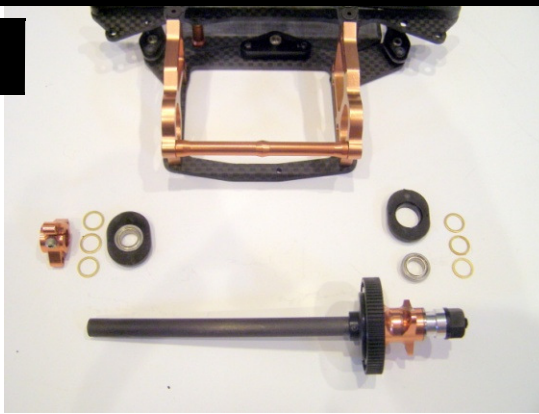
Notes:

Keep you fingers clean with motor spray. Diff assembly is like surgery. You do not want dirt or oil where it does not belong.

The grease on the diff balls when you pluck them out of the cup of diff grease is all you need. Smearing diff grease on the rings will make your diff get dirty faster and make a mess.

The ultimate goal in building a diff is one which is extremely free and glass smooth but requires a lot of force to slip the spur gear.

Step 22



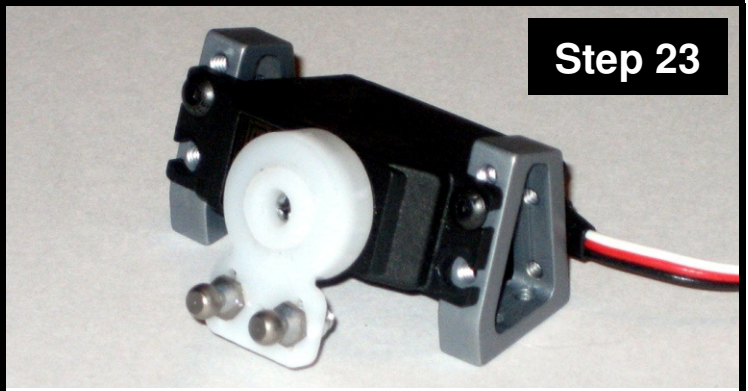
Insert the IRS precision ride height adjuster cams into the rear alloy pod plates. Insert a 3/8" x 1/4" flanged bearing into each ride height adjuster and insert the axle as shown. Note that the left clamping hub has the shallow center boss out towards the wheel. This is necessary to have symmetrical wheel spacing.

Install your favorite wheels and measure the width of the car. Shim as necessary to obtain a centered axle and a 172mm rear track width.

Special Note:

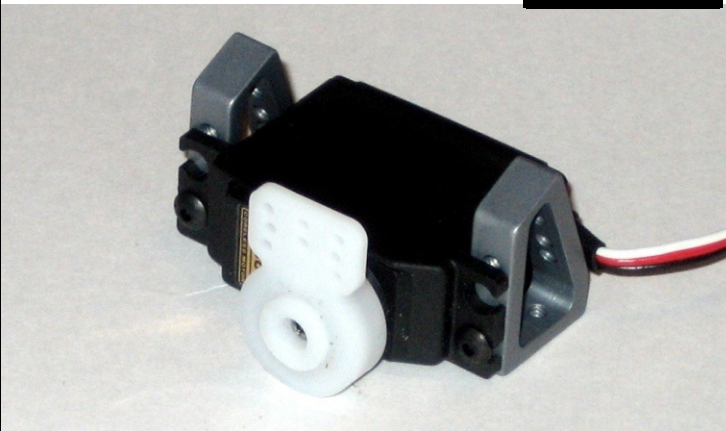
The Copperhead 12 is designed to work with IRS precision ride height adjuster cams. We find too much size variation in other cams and cannot guarantee they will fit properly.

Step 23



For most conditions we run the servo on the angled mounts.

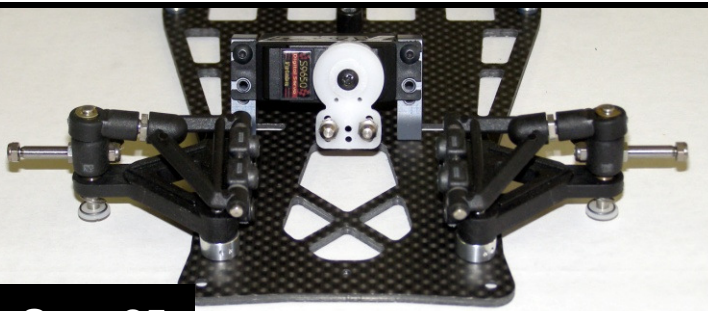
Step 24



If you are looking to run the servo flat, you will need to use black medium ball studs on the steering spindles to remove bump steer. This form of servo mounting will give the effect of being more smooth and easier to drive.

You have two servo mounting options with the Copperhead 12, Angled or Flat. The BMI Servo Mounts have holes to allow either mounting option.

The servo is mounted to the servo mounts with two 4-40 x 1/4" button head screws.

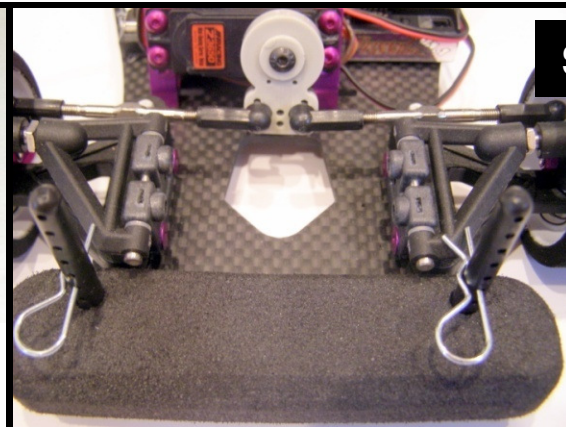


Step 25

The Servo mounts are attached to the lower chassis with two 4-40 x 1/4" flat head screws.

At this time drill out the center holes on your servo saver (not supplied) for two Nickel Teflon ball studs. Secure them with two 3/16 alloy lock nuts.

You have two slotted holes for servo mounting in the chassis and 2 in each servo mount. They let you achieve proper linkage geometry whether you run your ball studs in front of the servo saver as shown or behind them. The slots in the chassis allow you to center your servo. The chassis is not limited to fitting specific servos. Any mini servo will fit. This is a valuable tuning option as the servo's weight has a big effect on chassis weight distribution.



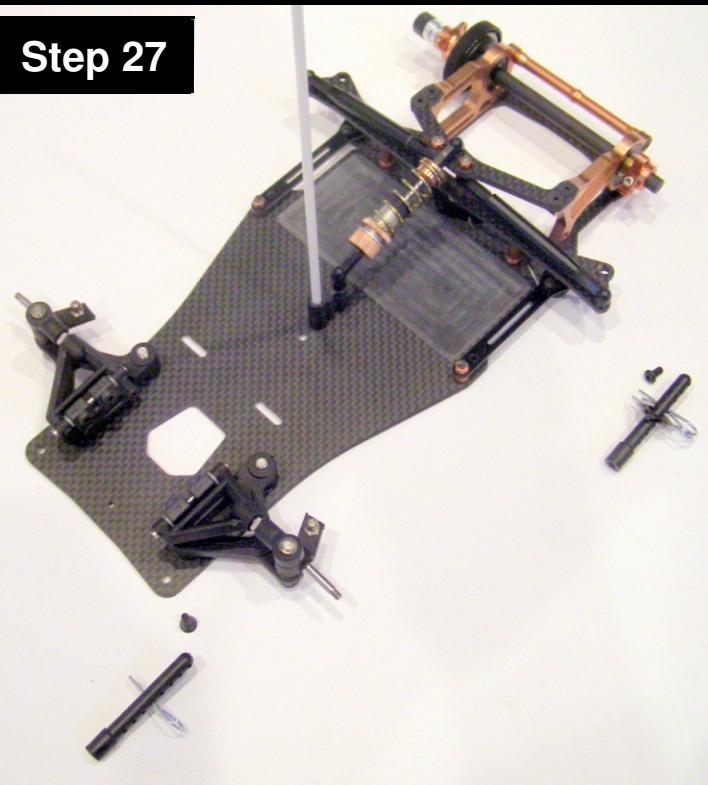
Step 26

Locate two titanium turnbuckles and four black ball cups. Assemble them as shown and adjust them to an over all length of 2.375" (60.5mm). This is a starting point. You will need to reset their length after setting your camber in order to achieve the desired amount of front toe.

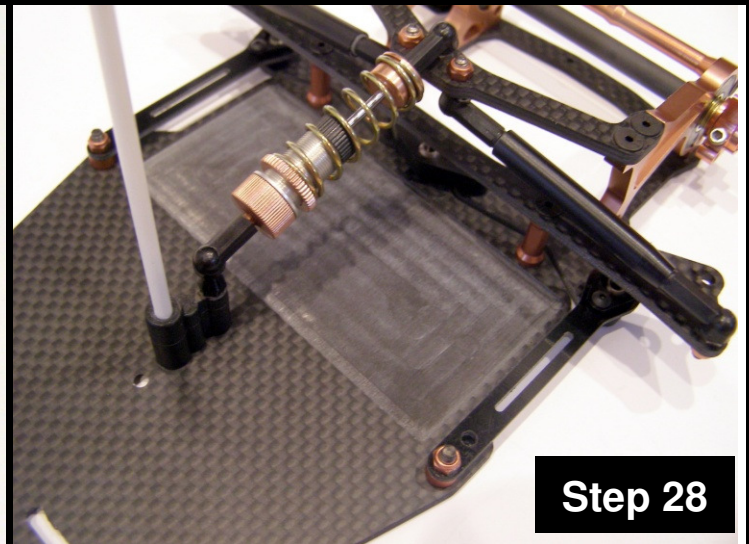
Note:

You can use the same plastic bag trick mentioned in Step 19 to remove play in your steering linkage. Remember you want to remove play but still have totally free movement in the links. Any friction at all is unacceptable and will make you car not center properly after steering inputs

Step 27



Install your body posts with two 4-40 x 3/8" flat head screws in the front and two 4-40 x 1/4" button head screws in the rear..



Step 28

You will need to secure battery with strapping tape.

Congratulations, your done!

Go to the starting setup sheet, adjust your car to the base setup and hit the track!

Copperhead 12 1/12 Pro (LiPo) Racing Chassis Kit

Includes:

- (1) #DBB1011R LiPo CHASSIS PLATE or (1) DBB1010R CHASSIS PLATE
- (1) #DBB1020R LOWER POD CF
- (1) #DBB1030R TOP REAR POD PLATE
- (1) #DBB1141 CROSS BRACE
- (1) STICKER SHEET
- (1) #DBB7010 BOCA 1/4 X 3/8 FLANGED BEARING PAIR (5)
- (1) #DBB7020 BOCA 1/8 X 5/16 FLANGED BEARING PAIR (4)
- (1) #DBB1110 FIBERGLASS ROLL OVER ANTENNA
- (1) #DBB6105 10-32 X 1/8 SET SCREWS PAIR (2)
- (1) #DBB6215 2-56 X 3/16 BUTTON HEAD SCREWS (4)
- (1) #DBB6225 2/56 X 3/16 FLAT HEADS PAIR (2)
- (1) #DBB6411 4-40 X 1/4 FLAT HEAD SCREWS (17)
- (1) #DBB6412 4-40 X 3/8 FLAT HEAD SCREWS (8)
- (1) #DBB6413 4-40 X 1/2 FLAT HEAD SCREWS (6)
- (1) #DBB6435 4-40 X 1/2 SET SCREWS PAIR (2)
- (1) #DBB6445 4-40 X 1/4 CAP HEAD SCREWS (6)
- (1) #DBB6465 4-40 X 1/4 BUTTON HEAD SCREWS (8)
- (1) #DBB6485 ALLOY LOCK NUT (14)
- (1) #DBB6495 NICKLE/TEFLON BALL STUD SET (8)
- (1) #DBB6496 MEDIUM BALL STUD (1)
- (1) #DB6510 King Pin E-Clips (4)
- (1) #DBB4010R REAR AXLE KIT
- (1) #DBB4030 IRS RIDE HEIGHT ADJUSTER SET
- (1) #DBB4040 REAR AXLE SHIMS (6)
- (1) #DBB5088 88T/64P DIFF. GEAR
- (1) #DBB3010R FLEX PLATES G10 PAIR (2)
- (1) #DBB3020 CENTER PIVOT BALL HOUSING & BALL
- (1) #DBB3025 REAR SUSPENSION PIVOT BALLS PAIR (2)
- (1) #DBB3029 FLEX PLATE PIVOT BALL HOUSING PAIR (2)
- (1) #DBB3040 DAMPER TUBE ASSY. PAIR
- (1) #DBB3056 MICRO SPRING GOLD 12#
- (1) #DBB3060 SILVA BLADDER SHOCK

- (1) #DBB2010 IRS LOWER SUSPENSION ARMS, SPACERS & SCREWS
- (1) #DBB2020 FRONT UPPER SUSPENSION ARM MOUNT SET
- (1) #DBB2025 UPPER SUSPENSION ARMS PAIR (2)
- (1) #DBB2030 FRONT UPPER SUSPENSION ARM ROD END PAIR (2)
- (1) #DBB2035 FRONT UPPER SUSPENSION ARM TURNBUCKLE PAIR (2)
- (1) #DBB2040 IRS UPPER HINGE PIN SET (2)
- (1) #DBB2050 FRONT SUSPENSION PIVOT BALLS (4)
- (1) #DBB2060 STEERING SPINDLE PAIR (2)
- (1) #DBB2065 TITANIUM FRONT AXLE SET W/NUTS (2)
- (1) #DBB2070 KING PIN PAIR (2)
- (1) #DBB2075 KING PIN SHIMS (10)
- (1) #DBB2080 TITANIUM TURNBUCKLES PAIR (2)
- (1) #DBB2100 LINEAR FRONT SPRINGS W/CUP .020 PAIR (2)
- (1) #DBB1053R REAR POD BRACE
- (1) #DBB1054R LOWERED RIGHT POD PLATE
- (1) #DBB1055 LOWERED LEFT POD PLATE
- (2) #DBB1060 SERVO MOUNTS PAIR (2)
- (1) #DBB1070 STAND OFF SET
- (2) #DBB1080 BODY MOUNTS PAIR (2)
- (1) #DBB1081 BODY MOUNT PIVOT (4)
- (1) #DBB1082 BODY PINS (8)
- (1) #DBB1091 BATTERY RETENTION BELT
- (1) #DBB1092 ANTENNA/SHOCK MOUNT
- (1) #DBB1093 BALL CUP (12)
- (1) #DBB1094 FIBERGLASS BATTERY LOCATOR PLATE (ONLY IN LiPo KIT)