



Nitro
Vehicles
INSTRUCTION MANUAL

www.redcatracing.com

WARNING!

READ ALL INSTRUCTIONS INCLUDED WITH VEHICLE BEFORE OPERATING



Age warning: This radio controlled vehicle is not a toy! You must be 14yrs of age or older to operate this vehicle. Adult supervision is required.



RISK OF FIRE!

RISK OF EXPLOSION!

There is a risk of fire and explosion when dealing with Fuel and Batteries.

Nitro fuel contains Nitromethane and Methyl alcohol. These chemicals are highly flammable and explosive. Only use in well ventilated areas. Keep away from fire, spark, and heat. Store in a cool place away from heat. **NEVER SMOKE AROUND FUEL OF ANY KIND!**



Only use in a well ventilated area. Never run your engine indoors.

Rechargeable batteries may become hot and catch fire if left unattended or charged too quickly. Use extra caution when charging LiPO batteries. Use only LiPO specific chargers. Charge away from flammable materials. Never charge at a rate higher than 1S. (2000Mah pack = 2amps charge rate). Overcharging can lead to fire and explosion. Always store battery packs in a cool place.



POISONOUS!

Fuels contain Nitromethane and Methyl alcohol and are toxic. Injury or death can occur if swallowed. May irritate skin and cause injury if absorbed into the skin. Injury or death can occur from breathing the toxic fumes. **KEEP AWAY FROM CHILDREN AND PETS!** Always follow manufacturer's recommendations on fuel container.



RISK OF BURNS!

The engine, exhaust pipe, batteries, electronic speed controller, electric motor, and other areas of the vehicle get hot. Burns can occur if touched after vehicle operation. Allow adequate time to cool before handling.



RISK OF ELECTRICAL SHOCK!

Use caution when charging batteries. Do not touch positive and negative leads together. Do not lay battery on metal. Use only chargers specified for the battery type being charged. Keep batteries and chargers away from water.



RISK OF INJURY!

Hobby grade RC vehicles can cause serious injury or death if not operated correctly. Never use vehicle in crowds. Never chase people or animals. Drive in safe open areas only. Keep body parts away from moving parts.



RISK OF DAMAGE!

Never operate RC vehicles on public roads. Damage of vehicle and property can occur. Only operate on open private property.

Welcome to the world of hobby grade RC

Recommended for ages 14+ (with adult supervision)

Congratulations on your new hobby grade radio control vehicle. Hobby grade RCs offer many advantages over radio controlled vehicles sold in the toy department. One of the greatest advantages to hobby grade RC vehicles is the ability to set up the vehicle the way YOU want it. This includes tuning the motor for top performance, changing gear ratios to better suit your terrain, tuning the many adjustable suspension components like changing ride height and geometry, as well as customizing the overall appearance of your vehicle. Redcat Racing hobby grade RC vehicles were designed with all these characteristics in mind to provide you with much fun and adjustability.

Redcat Racing hobby grade RC vehicles are incredibly fast with some reaching speeds of 40 mph. While this is fun and exciting, it also comes with a great deal of responsibility. A 10-20 pound RC vehicle traveling at 30 mph carries much momentum. Getting hit in the leg at that speed is like being hit with a sledge hammer and serious injury may occur. Property damage as well as damage to your RC vehicle are also possible. Great care must be used while operating these vehicles.

This is not a toy and should not be treated as one. Nitro engines are highly tuned pieces of equipment and need to be used only as directed. Follow the included instructions closely and be sure to keep hands away from the hot surfaces of the engine and exhaust pipe. Make sure you read all included manuals completely before attempting to start your nitro vehicle.

The engine in this RC vehicle runs on a mixture of Nitro methane, Methanol, and special oil blends. This is referred to as hobby grade "Nitro fuel." Only nitro fuel designed for RC cars and trucks should be used. Do not use gasoline in nitro powered engines as this will cause damage and potential injury to the operator. Nitro fuel is dangerous for many reasons. An invisible flame, explosive fumes, and poisonous chemicals are a few reasons nitro fuel should be handled with care. Nitro fuel should be used by an adult and only as intended by the manufacturer.

Redcat Racing radio controlled vehicles are engineered for performance as well as durability. This means shedding weight where ever possible and using complex suspension components that offer many tuning options. This allows the operator to make adjustments that will effect the way the vehicle responds to all aspects of the terrain. As you may know, any RC vehicle, whether it be hobby or toy grade, can break. How and when it breaks depends solely on your driving style. Unlike toy grade RCs, hobby grade RCs are designed with parts replacement in mind. Spare parts are readily available from Redcat Racing and more durable aluminum parts are available as well. It is recommended to keep spare parts on hand so if you run into that oak tree at full speed, you will have the necessary replacement parts to get you up and running again quickly.

Appearance is just as important as speed and handling. Who wants to go fast and look good doing it? You do! That is why Redcat Racing has also designed their vehicles to look as good as they perform. Accessories may also be added to your vehicle to customize its looks. As mentioned earlier, Redcat Racing hobby grade RC vehicles are completely customizable and that is where all the fun is at.

Imagine yourself being on the pit crew of a full scale monster truck. Making suspension adjustments for smoother landings or changing the gearing to get that hole-shot from the start. That is the feeling you will get when adjusting the suspension on your new Redcat Racing vehicle. Increase ride height so you can clear the driveway with a single jump or thicken the oil inside the oil filled shocks to make high speed laps around your front yard. The possibilities are endless with Redcat Racing, so put on you favorite pit crew cap, grab your Redcat Racing vehicle and have the time of your life!

Unpacking and setting up your new vehicle

The moment you've been waiting for is finally here. Your new Redcat Racing package has arrived. Before you go crazy from excitement, let's go over a few simple steps.

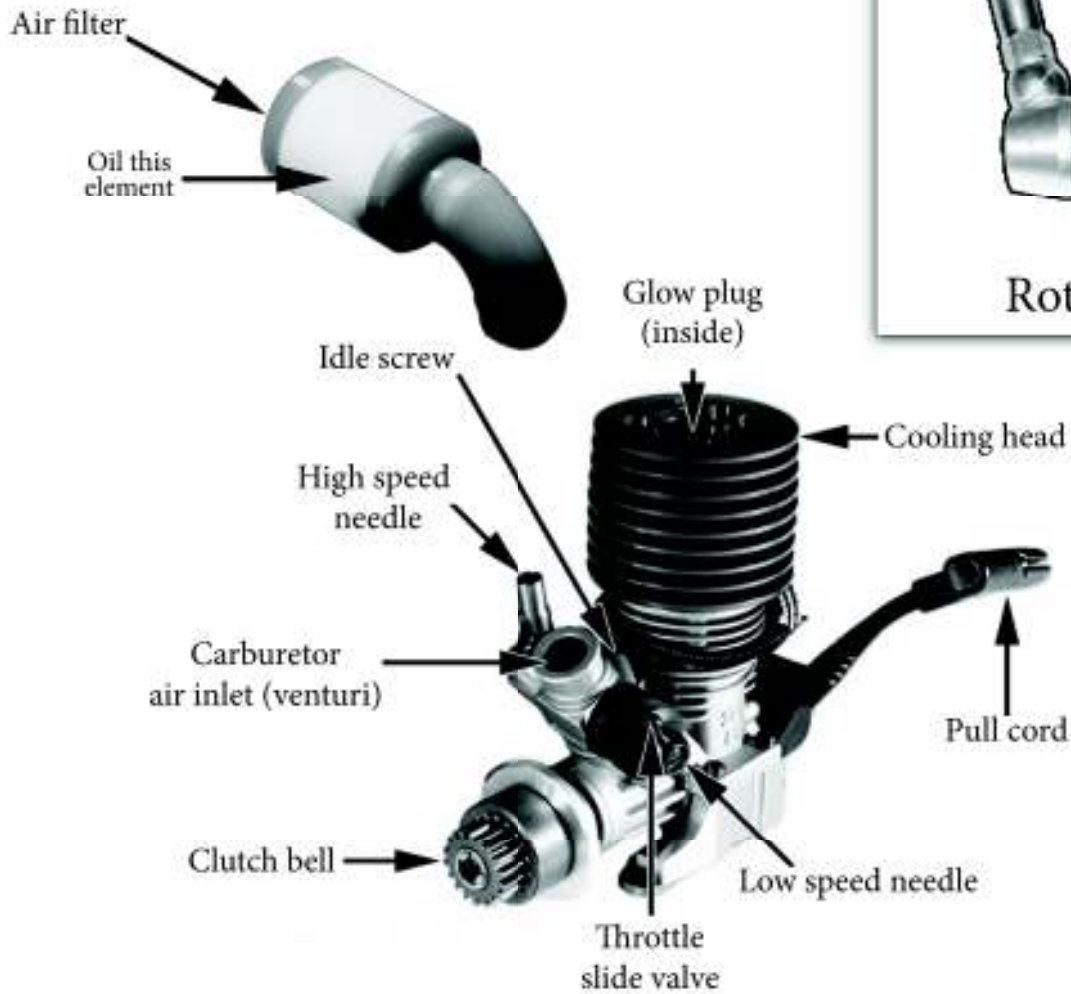
Unboxing your Redcat Racing RC vehicle

- Be sure you've removed all parts, equipment, tools, and documentation from the box. It's easy for small parts to get hidden in the packing materials and overlooked.
- Completely read all documents and instructions included with your vehicle.
- Acquire any necessary items such as transmitter batteries, receiver batteries, fuel, glow starter, and any additional tools and supplies needed.

Looking over your Redcat Racing vehicle

1. Be sure to look over your new Redcat Racing RC. This may save you some hassle in the future.
2. Check all screws to make sure they are tight. Do not over tighten screws nested into plastic as this may damage the plastic threads. Avoid using power tools for this step.
3. Check all nuts, bolts, and clips to ensure they are tight and secure.
4. Lube and Install the air filter onto the engine's carburetor if it is not already done. The air filter used on RC vehicles uses a sticky oil treatment to aid in filtration and keep damaging dust out of the combustion chamber. Failure to soak the filter in this oil will void the engine's warranty and possibly damage the motor. You can find air filter pre-treatment oil at a local hobby shop.
 - To apply the filter pretreatment oil, place the filter element in a sandwich bag.
 - Add about a teaspoon of air filter oil into the bag.
 - Using your fingers, work the oil into the filter. The plastic bag keeps your hands clean and allows you to see your progress.
 - Add more oil if needed. If too much oil has been used, wrap the filter element in a paper towel and squeeze out the excess oil. Too much oil can restrict air flow and cause the engine to run rich. The filter should be saturated, but not completely soaked.
 - Install the appropriate batteries into the transmitter and receiver.
5. Perform a radio range check. DO NOT START YOUR ENGINE TO DO THIS!
 - Thread the vehicle's antenna through the plastic antenna tube and turn on the transmitter.
 - Turn on the receiver switch found in the vehicle.
 - Check that the controls are working properly. The steering wheel should operate the steering and the trigger should operate the servo linked to the engine. Pulling the trigger should open the carburetor, neutral trigger position should allow about a 1/16-1/8 inch gap in the carburetor, and pushing forward should leave the same gap but actuate the brake mechanism.
 - Leave a buddy with the vehicle and walk 50 yards away. You and your buddy decide on a routine since it will be difficult to communicate with each other while testing. An example would be....turn wheel left and count to ten, turn wheel right and count to ten, Pull trigger and count to ten, and push brakes and count to ten. You will want to repeat these steps moving further out as you progress until you are beyond the maximum distance you plan to run the vehicle.
 - If the radio performed without any glitches or twitching, you are ready to break in your motor.

Nitro engines



Knowing your engine

Knowing and understanding the different parts of your engine is important. Study the images on this page and familiarize yourself with the different engine parts. Knowing what each part is called and where it is located will help you while breaking-in and tuning the engine.



Binding a 2.4GHz Transmitter and Receiver

The radio and transmitter will arrive in your ready to run vehicle pre-bound.

It will be necessary to bind your radio and transmitter if you replace the receiver. Each brand, or technology, of receiver may only be bound with the corresponding brand transmitter. This is true for all brands, or technologies, of 2.4GHz radios.

Transmitters and receivers may have unique ways of binding.

Transmitters include a button that is pressed for binding. This button may or may not be labelled "Bind."

Below are a few examples of transmitter bind button locations. Although some are labelled differently, they are still used in the binding process.

"Bind" button



"Bind" button



"SEL" button



Receivers use two methods of entering into their bind mode.

1. By holding down a bind button before powering up.
2. By inserting a bind plug before powering up.

Below is an example of a receiver that uses a bind button and one that uses a bind plug.

Bind Button



Bind Plug



Bind Plug



Before continuing to the bind process, determine whether the receiver uses a bind button or bind plug. Be sure to locate the button that will be used for binding the radio as well. Refer to the previous page as a reference.

Binding Process

1. Hold down the bind button on the receiver while turning on the power, by either plugging in a receiver battery or turning on the ESC. The LED light on the receiver should blink quickly, notifying you it is in bind mode.
 - *note. If your receiver doesn't include a bind button, plug the included bind plug into the third receiver port and turn on power. The LED should blink quickly.
2. Hold the bind button on the transmitter while turning on power. Some transmitters offer a slowly blinking LED, signifying it is in bind mode. Hold down the button until the receiver light stops blinking.
3. At this point the radio is bound to the receiver.
4. Turn off the power to both the transmitter and receiver.
5. Unplug the bind plug, if one was used.
6. Turn on the transmitter then receiver. Check corresponding controls with the transmitter and receiver.
 - a. If all checks out, you have successfully bound your radio.
 - b. If the receiver is not receiving a signal from the transmitter
 - I. repeat the process.
 - c. If the radio still won't bind
 - I. Check for radio and transmitter compatibility
 - II. Check Batteries in both the transmitter as well as the battery being used for the receiver.
 - III. Be sure the bind plug (if applicable) is inserted into the correct slot, usually labelled "bind."
 - IV. Be sure you are pressing the correct button on the transmitter and receiver.
 - V. Be sure to press and hold the receiver's bind button as you power up the receiver.
 - VI. Be sure to hold the bind button on the transmitter until the receiver LED stops blinking. This usually takes 5 - 10 seconds.

Swapping radios between vehicles can be tricky, some radios don't work with some receivers. Use the appropriate receiver for the appropriate radio.

Breaking In and tuning your engine

Breaking in your nitro engine properly is very important to its long life. When an engine is new, part's tolerances are tight and there isn't proper seating of the piston against the cylinder wall. Without proper break in, the engine will be difficult to keep tuned, if you can tune it at all, and the life of the engine will be shortened.

Breaking in your new engine:

1. Find a safe and secure place outside to set the vehicle so the wheels are off the ground. Sometimes a box works well for this.
2. Be sure the radio range check has been performed and both transmitter and receiver are on.
3. Fill the fuel tank with nitro fuel designed for RC cars and trucks.
4. Prime the engine. Cover the exhaust outlet and pull the starter cord a few times until you see fuel enter the carburetor through the fuel lines.
5. Place a glow igniter, with new batteries installed, onto the glow plug.
6. Start the engine with the throttle in neutral position by pulling the pull chord. Short quick pulls are the best way to start the engine. Pulling the starter cord more than 10" may result in damage to the starting mechanism.
7. If the engine does not start after ten pulls, remove the glow igniter and prime the engine again. Do not over do this step as it will result in a flooded engine.
8. Place the glow igniter on the glow plug. Make sure it is well seated.
9. Pull the pull chord with short quick pulls to start the engine. Once the engine starts, remove the glow igniter.
10. Let the engine idle through one full tank of fuel. Two tanks is even better. Keep a close eye on the vehicle during this process as erratic performance may occur during these break-in stages. There should be moisture (unburned fuel and oil) coming out of the exhaust. This ensures there's enough lubricant flowing through the engine. The engine's factory needle settings should be fine for this. If there isn't any moisture and smoke coming out of the exhaust, you will need to richen the fuel mixture with the high speed needle. See tuning your engine for instruction. You may need to restart the engine periodically. You should not have to re-prime in between starts as the engine stalls are most likely caused by flooding.
11. After all the fuel has idled out of the tank, let the vehicle cool for 15 minutes. You may then run the vehicle around the yard. It is important not to go beyond 1/2 throttle during this stage. The goal here is to allow the parts to wear without overheating or stress. Go through two full tanks while staying under 1/2 throttle. Let the engine cool for 15 minutes inbetween tanks.
12. You may now run up to 3/4 throttle. The engine should still be running rich at this point, which means plenty of fuel. More fuel means more lubrication and cooler engine temperatures. You should see plenty of smoke coming out of the exhaust during running.
13. After this stage is completed, let cool 15 minutes, and you may begin tuning the engine for performance.

Tuning your engine

How an engine works:

Inside the combustion chamber, where the piston is found, three things are needed for a properly working engine. Fuel, Air, and Compression are all needed. Fuel is needed to burn, air is needed to make the fuel burn hotter, and compression is needed to make it burn even hotter resulting in an explosion.

Fuel is mixed with air in the carburetor and the mixture is sent into the combustion chamber. This is where the piston pushes up on the fuel mixture compressing it tight. The fuel is then ignited by the red hot glow plug which causes an explosion forcing the piston down to have it happen all over.

When mixing fuel we refer to a rich mixture and a lean mixture. A rich mixture has more fuel than a lean mixture. To richen the mixture, you add more fuel and to lean out the mixture, you use less fuel. Oil is mixed into the fuel, so a rich mixture has more oil than a lean mixture. **Running your engine too lean will cause damage from friction and overheating!**

To control the amount fuel in our fuel and air mixture, we use adjustment needles. There is a high speed needle and a low speed needle. We always start adjusting the high speed needle first.

Adjusting the High speed needle:

After break-in has been completed, you may tune your engine for optimal performance. The engine should always be at running temperature before making any adjustments. Never tune a cold engine!

Bring the engine up to running temperature by running the vehicle around for about four minutes.

Always start tuning with the high speed needle first. The high speed needle controls the over all amount of fuel allowed into the engine so changing the settings on the high speed needle will also effect the low speed needle settings.

Run the vehicle at full throttle. There should be a healthy amount of smoke exiting the exhaust pipe.

Making adjustments in 1/8 inch intervals, turn the high speed needle (refer to engine diagram) clockwise until optimal speed is obtained.

Once maximum speed and a smooth high pitch wine are obtained, turn the high speed needle counterclockwise 1/8 turn. This is the optimal running zone.

Double check for smoke coming out of the exhaust. If a healthy amount of smoke is not coming out of the exhaust, richen up the fuel mixture by turning the high speed needle counter-clockwise another 1/8 turn until proper smoke is visible. Remember, if smoke is not visible, you are not lubricating your engine.

Adjusting the low speed needle:

Now that the high speed needle is properly set, you may adjust the low speed needle. To do this follow these steps. Remember! Never tune a cold engine!

1. Start by pinching the fuel line that goes into the carburetor while the engine is idling. The engine's Rpm should rise for 4-5 seconds and then the engine should stall. This gives you an idea of what low speed fuel mixture you are currently running. When you pinch the needle, you cut off the fuel supply while allowing the air to still enter the engine. This leans out the mixture until the engine stalls. A leaner mixture will burn hotter, to a point, causing the engine to speed up until it starves for fuel.
2. While pinching the fuel line, if the engine ran less than 4-5 seconds, it is too lean. Turn the low speed needle counterclockwise 1/8 turn. If it ran much longer than 4-5 seconds before stalling, it is too rich and you need to turn the low speed needle clockwise 1/8 turn. Once you've got that right, move on to step 3.
3. From a stopped position, quickly pull the trigger to full throttle. The engine should get to top speed smoothly and with minimal hesitation. If it does not, you may fine tune the low speed needle to ensure it does. Start by turning the low speed needle clockwise 1/16 turn. Notice the change and repeat this step as needed. Once optimal acceleration is reached, back the low speed needle out 1/16 turn.
4. If the engines performance decreases, sputters, gurgles, and stalls with little to no smoke, it may be too lean. Turn the needle counter clockwise 1/16 turn until smoke is visible at 1/4 throttle.

Setting the idle:

Idle is set from the factory and should only be changed if the engine is tuned properly and still has difficulty idling.

Open the carburetor by pulling the throttle and tighten the idle screw 1/16 turn. Test the engine and repeat if necessary. The idle speed should remain as low as possible without stalling. Higher idle speeds cause erratic performance and excessive wear on the clutch.

Maintaining your Redcat Racing vehicle

There is much fun to be had running RC vehicles. To ensure that fun continues throughout the years, here are some maintenance tips to follow.

Chassis maintenance:

Many substances such as dirt, grass, grime, and unburned nitro oil can find its way onto your RC chassis. It's a good idea to clean this off after each days use. There are many ways to clean an RC vehicle. Here are a few examples.

1. One of the most effective ways to clean the chassis is with a used tooth brush, old paint brush, and rag. These three tools work well for removing dirt and debris.
2. Pay close attention to areas with moving parts such as suspension components, steering components, and drive train. It is important to get these areas clean to help prevent wear.
3. Unburned nitro oil can easily be removed with nitro car cleaner, sold at hobby stores. Read the instructions on the can carefully before using.
4. Though running your vehicle through water is never recommended, the moisture found on grass and other outside elements may still make its way into the vehicles bearings. Here are some tips on drying, cleaning, and oiling the bearings.
5. Your Redcat Racing vehicle may have bearings in various locations like wheel hubs, steering linkages, gear supports, and drive shaft supports. First you must have access to all the bearings. Remove all four wheels and any other parts blocking bearing access.
 - Spray the bearings with a water displacer such as WD40 or Wire Dryer. This will flush out moisture, dirt, and grime.
 - After a good spraying with a water displacer, the bearing will be left dry and in need of oil. Use a light bearing oil found at the hobby shop or auto parts store. *This step is important* Failing to re-oil the bearing will cause them to wear prematurely and replacements will be necessary. A few drops of oil per bearing should be fine. Spin the bearing to work the oil into the inner race.
6. Check all screws and moving parts
 - It's a good idea to quickly go over the entire vehicle after each run to ensure all screws remain tight and there isn't any excess slop in the moving parts.
 - Thread lock should be used on any screws that fasten into metal parts, especially on the motor.
7. Checking for cracks and excess wear is also a good way to save yourself from headaches down the road.

Engine Maintenance:

After a day of running your nitro vehicle, be sure the fuel tank is empty and all nitro fuel has been burned out of the engine. The methanol found in Nitro fuel absorbs moisture which causes rust.

1. After emptying the fuel tank, restart the engine so any remaining fuel will be used up.
2. Clean off the engine with an old paint brush and/or some compressed air to remove any excess dirt and debris.
3. Remove the air filter being careful not to let anything fall into the carburetor.
4. Open the carburetor's venturi all the way by pulling the throttle trigger or moving the linkage by hand and add 3-4 drops of after run oil into the opening of the carburetor. Turn the engine over by hand a few times to disperse the oil. After run oil helps protect the inner components of the engine, like bearings from rust and can be found at your local hobby shop.
5. Install the air filter back onto the carburetor to keep debris from entering.
6. Clean the air filter with soap and water if needed. A dirty air filter will cause the engine to starve for air resulting in a rich fuel mixture. Remember to let the air filter dry completely before re-oiling. Oil the air filter with "air filter pretreatment oil" after each cleaning. You can buy air filter oil at your local hobby shop.
7. It's a good idea to check the glow plug after every five tanks of fuel. After thoroughly cleaning the inside of the head (top of engine with cooling fins) with a cotton swab, remove the glow plug by unscrewing it. ****CAUTION*** keep fingers away from the coiled glow element for this next step* Holding the glow plug with pliers, connect it to the glow igniter. The coiled element should glow bright orange. It is a good idea to compare it to a new glow plug until you become familiar with how it should look. Glow plugs will need replacing from time to time. If the engine won't start or runs erratic, this is the first thing to check. Reinstall or replace if needed.

Electronics:

Be sure to check your electronics after each use. The electronics are the life line of the vehicle and if they aren't working properly, a crash is almost certain.

- Periodically range check your radio system to ensure proper operation.
- Check batteries regularly. It is important to have fresh batteries in the transmitter and receiver. The receiver batteries will most likely need replacing first. Not only do they power the receiver, but they also power both the throttle and steering servos.
- Check the antenna on both the receiver and the transmitter. Make sure there are no cuts or breaks in the receiver antenna. This will cause glitches and possible signal loss.
- Using the transmitter, check both servos by turning the wheel and pulling the trigger. Check that both servos are operating smoothly and no clicking noises can be heard.
- Make sure all electronics stay dry. Water can short out the circuit boards inside the electronics causing failure.

Driving Tips

Once engine break-in has been completed, you will be ready to have some real fun. Here are some tips to help improve your driving skills.

Perspective:

The single most difficult aspect of driving RC vehicles is perspective. Perspective involves your relation to the vehicle. Are you behind the vehicle, in front of the vehicle, or beside it?

Driving an RC vehicle while standing behind it is like driving a full size car or go-cart. When you turn left, it goes to the left and when you turn right, it goes to the right. Simple.

What if the vehicle is coming toward you? When to turn the wheel to the left, will it go toward your left? No! Because the vehicle is coming toward you, the controls seem reversed. The controller doesn't actually change, it just seems like it does because of perspective.

Always imagine yourself sitting inside the vehicle, not standing outside with a remote. Imagine you are driving and the wheel on the remote is the actual steering wheel inside the car. Keeping this mind set will help you make the correct steering decisions no matter which direction the RC vehicle is pointed.

Controlling Steering and throttle input

The steering and throttle inputs are both proportional. This means slightly pulling the trigger will make the RC vehicle move slowly. Pulling the trigger all the way back will cause the RC vehicle to go fast. The same applies to the steering.

The most common mistake with new RC enthusiasts is over correction. Over correction is when a slight amount of steering or throttle is needed and full throttle or steering is applied causing "crazy driving".

It's a good time to learn how to control your movements. This may sound silly, but nerves and adrenaline have a lot to do with over correction. It is sometimes difficult to control our movements when we are excessively excited and I promise you, when you first hear the scream of the nitro engine and the grass starts flying, you will get excited.

As you become more familiar with your RC vehicle, you will tend to relax a little more making it easier to concentrate on small control inputs instead of great big ones.

Look where your going

While controlling a vehicle going 30 mph it's important to look where it's going instead of where it's been. Looking a good five-to-fifteen feet in front of the vehicle will give you time to react to uncertain obstacles. It also prevents trees from jumping out in front of you.

Advanced driving tips

As you become comfortable driving your Redcat Racing RC vehicle, you may want to drive smoother and with more precision so you can go faster. Here are a few driving tips that are sure to add some excitement.

Drifting:

Driving on loose surfaces like dirt or gravel can be fun, but how do you keep from spinning out?

Counter steering is the answer to that question. Here is a rule of thumb to go by. Always keep the front tires pointed in the direction you want the car to go. This is true regardless which direction the vehicle itself is pointed.

Here is an example:

Let's say you are driving in loose dirt. You are traveling at full speed and you want to make a left hand turn while maintaining most of your speed. You turn the wheel left spinning the vehicle 360 degrees resulting in a complete loss of speed.

Try this! Get the RC up to full speed again, only this time, turn left and when the vehicle starts to spin, turn right keeping the front tires pointed where you want the car to go. When done correctly, the vehicle will enter into a slide or "drift" allowing you to turn while maintaining most of your speed. Practice this many times in both directions and you'll be drifting like a pro.

Jumping:

When done correctly, jumping is by far the most impressive maneuver done with RC vehicles. All RC's can go up, but how they land determines whether it was a success or a mess. Anyone can hit a jump at full throttle, I'm going to teach you how to land on all four tires.

The wheels on an RC vehicle act as gyroscopes. All this really means is, you can drive the vehicle while it's in the air. The amount of throttle or brake applied while in mid flight will control whether the nose is up or down. Applying throttle will raise the nose and applying brake will lower the nose.

This is good to know if you hit a jump and your vehicle's nose is pointed at the ground. Hit the gas! Hitting the gas will raise the nose to help level out the landing. The amount of throttle used is in direct relation to the amount of correction needed.

This is where it gets complicated. Adding steering input in conjunction with throttle inputs will cause a whole new outcome.

Let's say you are in mid flight, your left front tire is closest to the ground, and you want to level the vehicle out. In this case you would steer left and apply throttle. This will raise the left front tire. Applying too much throttle will raise the left front tire too high.

Here is a good rule of thumb. Steer into the front corner of the vehicle you want to correct and apply the appropriate trigger response. Remember, applying throttle raises the nose and applying the brake lowers it.

This will take much practice so be sure to have some spare parts on hand. Bad landings can do lots of damage.

Driving with minimal braking:

Let me clarify what I am talking about. Do not disable the brakes at any time on your Redcat Racing RC vehicle. I am talking about planning ahead and looking where you are going.

Find a large field or empty lot you have permission to be on. Set out some small cones or plastic cups to mark the corners of an oval. Drive around your newly created test track and see how it goes.

Now drive around the same track but this time, look at the corner before you get there. Let off the throttle before you get to the corner and plan how you will get around it. Using this technique, try to make it around the whole track without using the brakes. Let the vehicle coast around each corner and apply throttle as you exit. Continue this over and over, increasing speed with each lap. If it gets too exciting in the corner, let off the throttle sooner. This will teach you to look ahead eliminating surprises. Use caution! If you think you might hit something, hit the brakes instead.

SETUP TIPS

Redcat Racing cars, trucks, and buggies offer many tuning options to help you achieve the exact feel you like in a vehicle. These tuning options include shock position, ride height, camber, toe in or out, shock stiffness, and over all suspension geometry.

SHOCK POSITION:

Shock position plays a big role in how your vehicle handles bumps as well as turning stability. The effects of shock position effect the area of the vehicle you change. For instance, if you change the front shock positions, it will effect the traction and stiffness of the front tires.

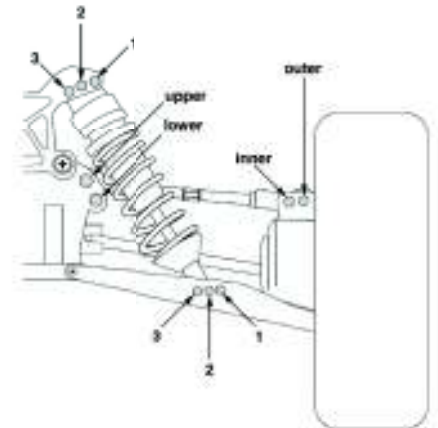
FRONT SHOCK POSITION:

POSITION: top=1 & bottom=3

The straighter up and down the shock is, the stiffer it will feel. This may also decrease bump handling stability as well as decrease traction. The benefit of this position in increased steering response.

POSITION: top=3 & bottom=1

Shocks in a more leaned position will give a softer feel. This increases bump stability and front traction however, it decreases steering response.



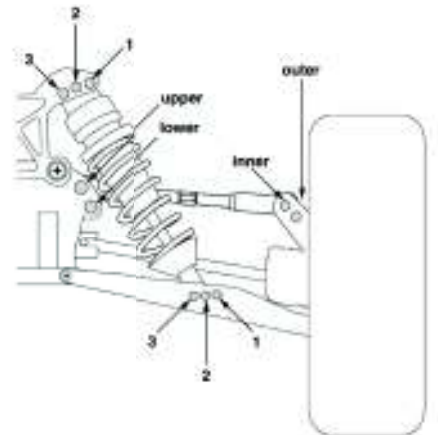
REAR SHOCK POSITION:

POSITION: top=1 & bottom=3

The straighter up and down the rear shocks are, the stiffer the feel. This decreases rear traction which increases steering, but gives less stability over bumps.

POSITION: top=3 & bottom=1

Leaning the rear shocks in decreases steering by providing more rear traction and increases bump stability.



RIDE HEIGHT:

Adjust ride height by moving the top spring collar up or down on the shock body.

Increasing ride height allows you to drive over larger obstacles but also raises the vehicle's center of gravity (C. O. G.). A higher C. O. G. means less stability.

Decreasing ride height increases stability but decreases the size of the obstacles you can maneuver over.

SHOCK OIL:

Heavier weight shock oil (bigger number) will provide more dampening and slow down the speed at which the shock travels. This will reduce chassis roll for more stability.

Lighter weight shock oil (smaller number) will offer less dampening allowing the shock to recover quicker. This is better for rough terrain but offers less high speed stability from increased chassis roll.

UPPER LINK ADJUSTMENTS:

Adjusting the upper link effects the vehicle's "roll center". Adjusting "roll center" will effect the way the chassis rolls at its center of gravity.

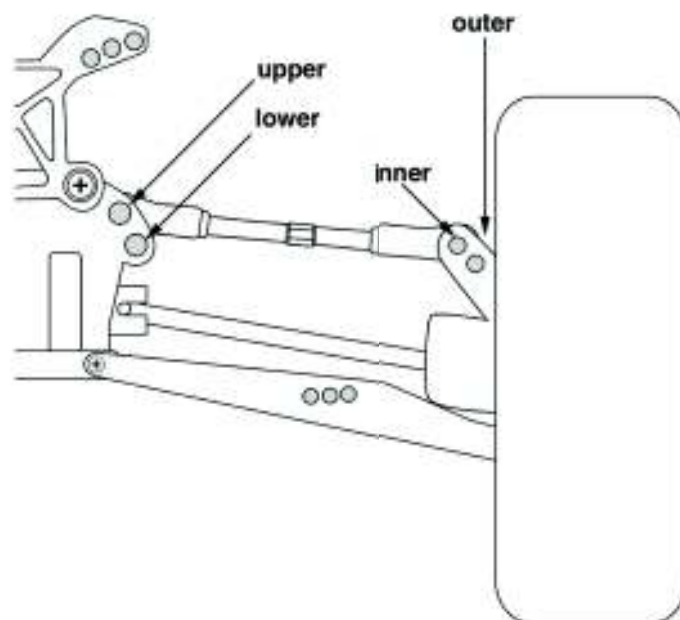
There are two mounting positions to chose from on the chassis side and hub carrier side of the upper link.

Two things to watch for are upper link length and upper link angle.

UPPER LINK LENGTH:

The longer the upper link, the more the chassis wants to roll in turns. While chassis roll may not seem good, it adds traction in the turns. This is good for a loose track where much traction is needed.

The shorter the upper link, the less the chassis will roll. This is good for a high bite track where stability is needed.



UPPER LINK ANGLE:

The angle of the upper links also effect chassis roll.

Parallel upper link:

When the upper link is parallel (level) to the lower arm, the chassis has a tendency to roll more giving more cornering traction on low grip tracks.

Angled upper link:

You must first understand, when I refer to an angled upper link, I'm referring to the inside of the link angling downward. This will give the vehicle a more stable feel with less overall traction. This is good for high bite tracks where stability is needed.

FRONT or REAR:

Keep in mind, changes made to the rear effect the rear and changes made to the front effect the front. Both front and rear traction effect the vehicles turn-ability. Less traction in the front will make the vehicle more difficult to steer, but less traction in the rear will make the vehicle steer more easily.

TOE IN & OUT:

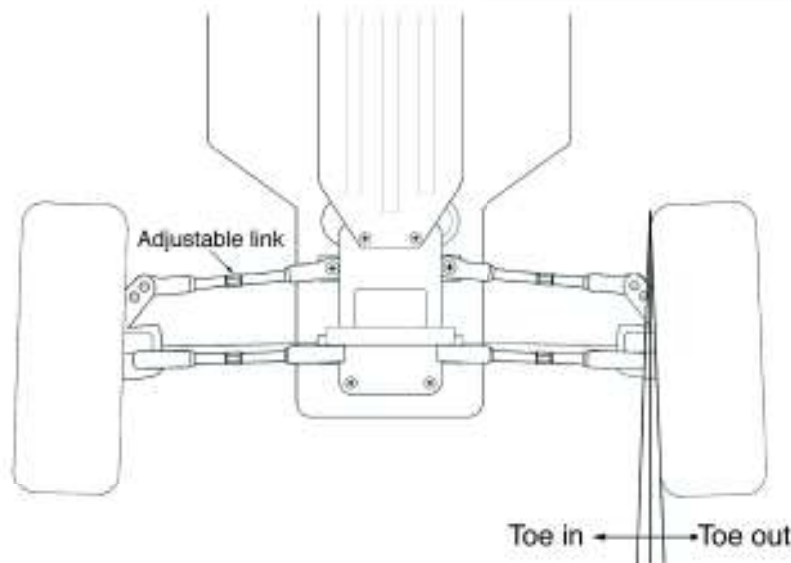
Toe in and out refers to whether the front of the tires are angled in or out.

Toe out:

Toe out gives less straight line tracking (darty feel) but more steering. 2 degrees of toe out is usually good for the front.

Toe in:

Toe in gives less steering and more straight line tracking. 0-2 degrees of toe in are usually good for the rear.



CAMBER:

Camber is the vertical angle at which the tires sit in relation to the ground.

NEGATIVE CAMBER:

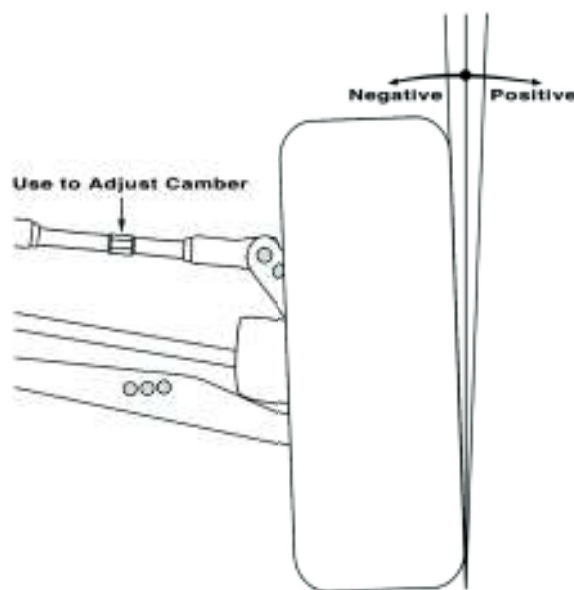
Adding little negative camber (1-2 deg.) will lean the tops of the tires inward providing more traction while cornering.

POSITIVE CAMBER:

Adding little positive camber will lean the tops of the tires outward providing much less traction while cornering. Positive camber is usually not used.

NEUTRAL CAMBER:

No camber added will set the tires straight up and down offering the most straight line traction but slightly decreased traction while cornering.



SLIPPER CLUTCH ADJUSTMENTS:

INCREASING SLIP:

The small nut on the end of the slipper clutch (large spur gear next to motor) allows you to tune the vehicles traction to your driving style. Loosening the nut provides more clutch slip which reduces the amount of wheel spin. Be careful not to loosen the nut too much. Over loosening the slipper clutch will cause excess slip to the spur gear resulting in high levels of heat from friction. This can quickly ruin a gear.

DECREASING SLIP:

Tightening the small slipper nut will reduce gear slippage sending the power to the ground resulting in more wheel spin. The slipper clutch also acts to protect the inner gears from shock failure. This occurs when landing while on full throttle or hitting something while on throttle. Over tightening the slipper clutch will result in less protection for all gears.

SETTING THE SLIPPER:

The slipper should slip slightly (not easily) when rolling the vehicle while holding the spur gear. If it slips easily, it is too loose. If it will not slip at all, it is too tight.

GEARING:

Gearing the vehicle down will provide more initial power and less top speed. Gearing the vehicle up will provide more top speed and less initial power.

GEARING UP:

There are two ways you can gear up for more speed. Increase the size (more teeth) of the clutch bell or Decrease the size (less teeth) of the spur gear (large gear on the slipper clutch)

GEARING DOWN:

There are two ways to gear the vehicle down for more power. Decrease the size (less teeth) of the clutch bell or increase the size (more teeth) of the spur gear (large gear on slipper clutch)

Altering Gear Ratios:

Altering the speed and performance of Redcat Racing RC vehicles with different gearing ratios is easy. Two options are available for tuning gear ratios. Replacing the spur gear and/or the clutch bell.

Which do I change?

Which gear to change depends on availability and the amount of change desired.

Changing the tooth count on the spur gear will offer smaller changes than changing the tooth count on the clutch bell. If a large change is desired, start with the clutch bell and then fine tune with the spur gear.

Changing the clutch bell:

The clutch bell is found at the end of the engines crank shaft. The clutch bell houses the spring loaded centrifugal clutch shoes. You may change the tooth count on the clutch bell to tune the vehicle's speed and acceleration.



Go Faster

To make the vehicle go faster, replace the clutch bell with one that has more teeth. The bigger the tooth count difference, the bigger the speed difference.

NOTE: The faster you gear your vehicle, the less low end torque it will have. Gearing too high may over stress the engine causing it to overheat.

More Power

If more pulling power is needed, replace the clutch bell with one that has less teeth. This will increase power, but decrease top speed.

Changing the Spur Gear:

The spur gear is the large gear meshed with the clutch bell. The spur gear is usually mounted to a slipper clutch assembly.

Go Faster

To add top speed, replace the spur gear with one that has less teeth. This will increase speed, but decrease bottom end torque.

More Power

For more power, install a spur gear with more teeth. This will increase power, but decrease top speed.



Gear Mesh:

Replacing the clutch bell or spur gear will require resetting the gear mesh. Gear mesh refers to how the gears fit, or mesh, with each other.

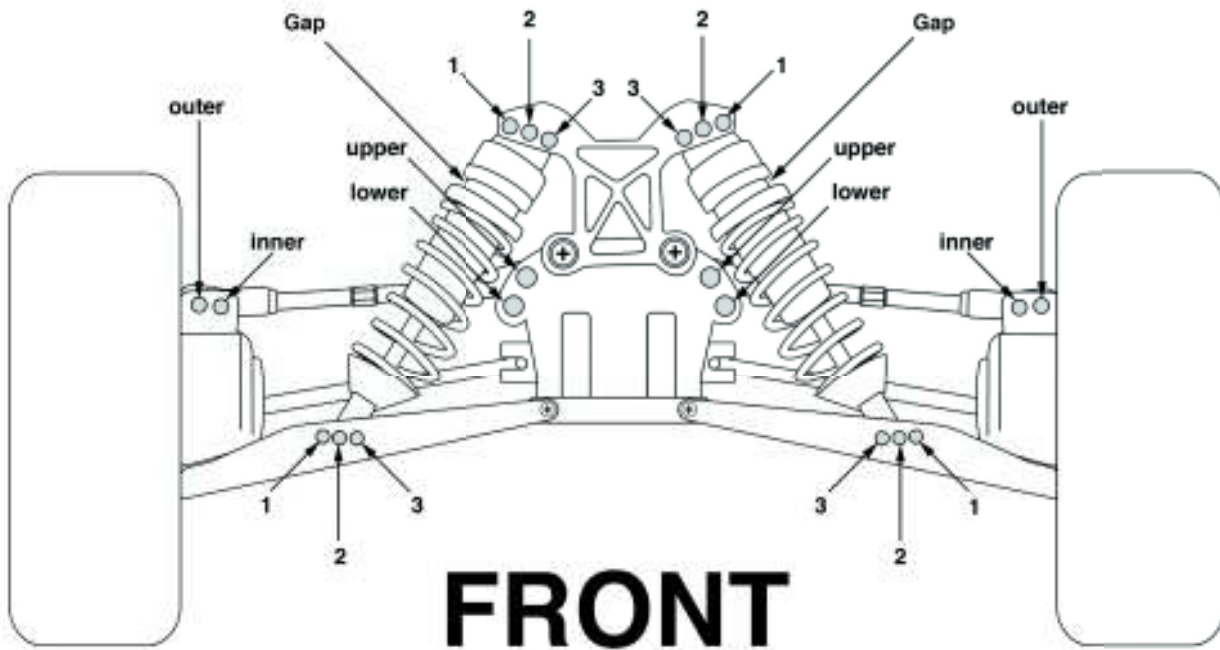
Using a regular piece of white printer paper can help achieve the perfect mesh.

After loosening the four motor mount screws on the bottom of the chassis, push the motor's clutch bell gear against the spur gear, sandwiching the piece of paper between them.

Tighten the motor mount screws adding a drop of blue loctite to each screw. Remove the paper. There should be a small amount of play between the gears.



Set-up Sheet



Shock Position:

Top: 1 2 3
 Bottom: 1 2 3

Upper Link Position:

Inside: Upper Lower
 Outside: Inner Outer

Shock oil: _____ wt.

Camber Deg:

Negative: _____ degrees
 Positive: _____ degrees

Spring pre-load "Gap": _____

Toe:

In: _____ degrees
 Out: _____ degrees

Piston inserts: _____ (1, 2, or 3 holes)

Additional notes: _____

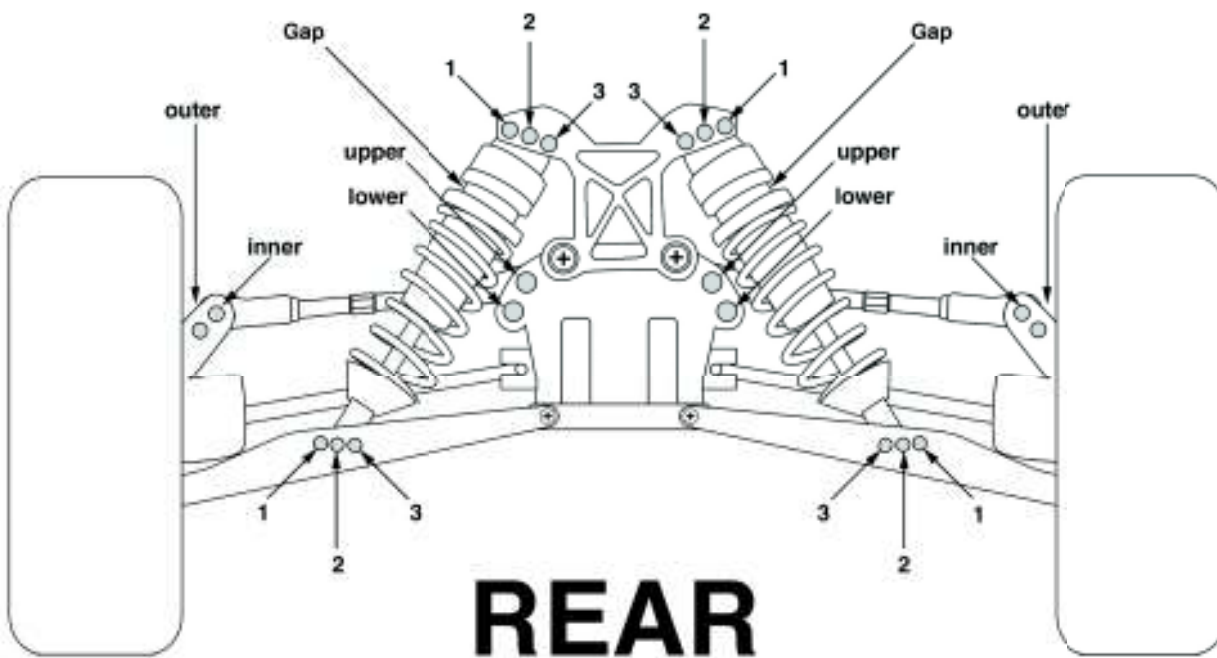
Fuel:

Brand: _____
 Nitro content: _____ %
 Oil content: _____ %

Glow Plug: _____



Set-up Sheet



Shock Position:

Top: 1 2 3
 Bottom: 1 2 3

Upper Link Position:

Inside: Upper Lower
 Outside: Inner Outer

Shock oil: _____ wt.

Camber Deg:

Negative: _____ degrees
 Positive: _____ degrees

Spring pre-load "Gap":

Piston inserts: _____ (1, 2, or 3 holes)

Additional notes: _____

Pinion Gear: _____ teeth

Spur Gear: _____ teeth

Spur Gear: metal plastic

Tires: _____

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Trouble shooting Symptoms	Possible causes	Possible Fixes
Engine won't start	No fuel Glow igniter batteries are dead Bad glow plug Engine is cold and needs to be primed	Add fuel Replace batteries Replace glow plug Plug exhaust and pull cord a few times
Engine runs erratic	Bad or old fuel Air leak in fuel system Bad glow plug	Use fresh fuel Check tank lid, fuel lines for cracks, & carburetor for proper seating Check glow plug and replace if bad
High pitch engine and stalls (little or no smoke)	Engine too lean Air leak in fuel system	Turn mixture needle counter-clockwise Check entire fuel system for leaks
Sluggish engine and stalls (lots of smoke)	Engine too rich Dirty air filter Broken or melted clutch	Turn mixture needle clockwise Clean and re-oil filter Replace clutch
Engine won't hold tune	Changed fuels (different nitro or oil content) Bad glow plug Different temperature glow plug recently installed Air leak in fuel system Dirt in carburetor or motor	Go back to old fuel Replace glow plug Use same brand and temp glow plug as before Check entire fuel system for leaks Clean carburetor and motor
Engine runs great but won't idle	Idle screw not set	Turn off engine, open throttle, & turn idle screw clockwise 1/4 turn
Sluggish steering	Low receiver battery Servo saver has loosened up.	Use new batteries Tighten servo saver screw/nut
Brakes won't work	Loose brake linkage Oil on brake discs Center of disc is rounded out	Adjust collar and tighten set screw Clean with degreaser Replace brake discs
Loss of control	Bad transmitter or receiver batteries. Electronics may have gotten wet	Change batteries immediately Unplug battery, dry electronics, replace if needed

WARNING!

READ ALL INSTRUCTIONS INCLUDED WITH VEHICLE BEFORE OPERATING



Age warning: This radio controlled vehicle is not a toy! You must be 14yrs of age or older to operate this vehicle. Adult supervision is required.



RISK OF FIRE!

RISK OF EXPLOSION!

There is a risk of fire and explosion when dealing with Fuel and Batteries.

Nitro fuel contains Nitromethane and Methyl alcohol. These chemicals are highly flammable and explosive. Only use in well ventilated areas. Keep away from fire, spark, and heat. Store in a cool place away from heat. **NEVER SMOKE AROUND FUEL OF ANY KIND!**



Only use in a well ventilated area. Never run your engine indoors.

Rechargeable batteries may become hot and catch fire if left unattended or charged too quickly. Use extra caution when charging LiPO batteries. Use only LiPO specific chargers. Charge away from flammable materials. Never charge at a rate higher than 1S. (2000Mah pack = 2amps charge rate). Overcharging can lead to fire and explosion. Always store battery packs in a cool place.



POISONOUS!

Fuels contain Nitromethane and Methyl alcohol and are toxic. Injury or death can occur if swallowed. May irritate skin and cause injury if absorbed into the skin. Injury or death can occur from breathing the toxic fumes. **KEEP AWAY FROM CHILDREN AND PETS!** Always follow manufacturer's recommendations on fuel container.



RISK OF BURNS!

The engine, exhaust pipe, batteries, electronic speed controller, electric motor, and other areas of the vehicle get hot. Burns can occur if touched after vehicle operation. Allow adequate time to cool before handling.



RISK OF ELECTRICAL SHOCK!

Use caution when charging batteries. Do not touch positive and negative leads together. Do not lay battery on metal. Use only chargers specified for the battery type being charged. Keep batteries and chargers away from water.



RISK OF INJURY!

Hobby grade RC vehicles can cause serious injury or death if not operated correctly. Never use vehicle in crowds. Never chase people or animals. Drive in safe open areas only. Keep body parts away from moving parts.



RISK OF DAMAGE!

Never operate RC vehicles on public roads. Damage of vehicle and property can occur. Only operate on open private property.